

MITSUBISHI SIGMA WORKSHOP MANUAL

FILING INSTRUCTION

Please keep these manual pages in the binder which is keeping the manual [PWGE9004].

File these pages according to the signs "ADDED", "REVISED" and "DELETED" on the "list of effective pages" which are interpreted below.

ADDED: File the pages with this sign additionally in your manual.

REVISED, DELETED: Replace the existing pages with the corresponding pages with this sign.

Missing sheets will be supplied upon request.

Pub. No. PWGE9004-G



Group/ Page	Revision code	Date	Remarks	Group/ Page	Revision code	Date	Remarks
Foreword	D	Dec. 1992		24 thru 28	D	Dec. 1992	
Supplemental Restraint System (SRS)	G	May 1994	REVISED	29 thru 30		Nov. 1990	
Master Table of Contents	F	Oct. 1993		31	D	Dec. 1992	
00 – General				32		Nov. 1990	
1	B	Dec. 1991		33	D	Dec. 1992	
2 thru 6		Nov. 1990		34 thru 38		Nov. 1990	
7 thru 8	G	May 1994	REVISED	39	D	Dec. 1992	
8-1	F	Oct. 1993		40		Nov. 1990	
8-2	D	Dec. 1992		41	D	Dec. 1992	
9	D	Dec. 1992		42		Nov. 1990	
10	F	Oct. 1993		43	D	Dec. 1992	
10-1 thru 10-2	F	Oct. 1993		44 thru 45		Nov. 1990	
11		Nov. 1990		46	D	Dec. 1992	
11-1	F	Oct. 1993		47		Nov. 1990	
11-2 thru 11-5	D	Dec. 1992		12–Lubrication			
12 thru 16		Nov. 1990		1	A	Apr. 1991	
17	E	Jun. 1993		2 thru 3		Nov. 1990	
18		Nov. 1990		4	F	Oct. 1993	
11 – Engine				4-1	A	Apr. 1991	
1	E	Jun. 1993		5		Nov. 1990	
2	D	Dec. 1992		13–Fuel			
3	E	Jun. 1993		1	G	May 1994	REVISED
4	D	Dec. 1992		1-1	F	Oct. 1993	
5 thru 8		Nov. 1990		2 thru 4	D	Dec. 1992	
8-1 thru 8-2	E	Jun. 1993		4-1	D	Dec. 1992	
9		Nov. 1990		4-2 thru 4-4	D	Dec. 1992	
10 thru 11	A	Apr. 1991		5	D	Dec. 1992	
11-1 thru 11-2	A	Apr. 1991		6		Nov. 1990	
12 thru 13	D	Dec. 1992		7 thru 8	G	May 1994	REVISED
14		Nov. 1990		9	A	Apr. 1991	
14-1 thru 14-2	D	Dec. 1992		10 thru 11		Nov. 1990	
15	E	Jun. 1993		12	E	Jun. 1993	
16		Nov. 1990		13 thru 14		Nov. 1990	
17	A	Apr. 1991		15	B	Dec. 1991	
17-1 thru 17-2	A	Apr. 1991		16	A	Apr. 1991	
18	F	Oct. 1993		17	D	Dec. 1992	
19	E	Jun. 1993		18		Nov. 1990	
19-1	E	Jun. 1993		18-1 thru 18-6	D	Dec. 1992	
19-2	D	Dec. 1992		18-7	G	May 1994	REVISED
19-3	E	Jun. 1993		18-8 thru 18-26	D	Dec. 1992	
19-4	D	Dec. 1992		18-27	G	May 1994	REVISED
20 thru 23		Nov. 1990		18-28 thru 18-31	D	Dec. 1992	
				18-32	G	May 1994	REVISED
				18-33 thru 18-45	D	Dec. 1992	
				18-46 thru 18-47	G	May 1994	REVISED

LIST OF EFFECTIVE PAGES

2

Group/ Page	Revision code	Date	Remarks	Group/ Page	Revision code	Date	Remarks
18-48 thru 18-50	D	Dec. 1992		90-1 thru 90-2	A	Apr. 1991	
19 thru 24		Nov. 1990		91		Nov. 1990	
25 thru 27	F	Oct. 1993		92	D	Dec. 1992	
28		Nov. 1990		93	A	Apr. 1991	
29	F	Oct. 1993		94		Nov. 1990	
30	A	Apr. 1991		94-1 thru 94-5	D	Dec. 1992	
31 thru 32		Nov. 1990		95		Nov. 1990	
33	D	Dec. 1992		96	D	Dec. 1992	
34	B	Dec. 1991		97		Nov. 1990	
35 thru 37		Nov. 1990		98	D	Dec. 1992	
38 thru 39	G	May 1994	REVISED	98-1 thru 98-2	D	Dec. 1992	
40		Nov. 1990		99 thru 107		Nov. 1990	
41 thru 42	B	Dec. 1991		108	D	Dec. 1992	
43		Nov. 1990		108-1 thru 108-2	D	Dec. 1992	
44 thru 46	B	Dec. 1991		109 thru 112		Nov. 1990	
47 thru 48		Nov. 1990		113	A	Apr. 1991	
49	A	Apr. 1991		114		Nov. 1990	
50 thru 51		Nov. 1990		114-1 thru 114-2	A	Apr. 1991	
51-1 thru 51-2	D	Dec. 1992		115 thru 117		Nov. 1990	
51-3 thru 51-6	G	May 1994	REVISED	118	A	Apr. 1991	
52 thru 53	G	May 1994	REVISED	119		Nov. 1990	
53-1 thru 53-2	G	May 1994	REVISED	119-1 thru 119-2	A	Apr. 1991	
54	B	Dec. 1991		120 thru 121		Nov. 1990	
55	A	Apr. 1991		122	A	Apr. 1991	
55-1	A	Apr. 1991		122-1 thru 122-2	A	Apr. 1991	
56	D	Dec. 1992		123		Nov. 1990	
57 thru 58		Nov. 1990		124 thru 125	A	Apr. 1991	
59 thru 60	D	Dec. 1992		125-1 thru 125-2	A	Apr. 1991	
61 thru 62		Nov. 1990		126 thru 128		Nov. 1990	
63	D	Dec. 1992		128-1 thru 128-2	D	Dec. 1992	
63-1	D	Dec. 1992		129 thru 132		Nov. 1990	
64	D	Dec. 1992		133	B	Dec. 1991	
65 thru 66		Nov. 1990		133-1	B	Dec. 1991	
66-1 thru 66-3	D	Dec. 1992		134	B	Dec. 1991	
67		Nov. 1990		135 thru 137		Nov. 1990	
68	D	Dec. 1992		137-1 thru 137-2	B	Dec. 1991	
69 thru 70		Nov. 1990		138		Nov. 1990	
70-1 thru 70-3	D	Dec. 1992		139	A	Apr. 1991	
71	A	Apr. 1991		140 thru 143		Nov. 1990	
72		Nov. 1990		144	B	Dec. 1991	
72-1 thru 72-2	A	Apr. 1991		145 thru 146		Nov. 1990	
73 thru 78		Nov. 1990		147 thru 148	F	Oct. 1993	
79	D	Dec. 1992		148-1 thru 148-2	D	Dec. 1992	
80 thru 89		Nov. 1990		149	B	Dec. 1991	
90	D	Dec. 1992		150		Nov. 1990	

Group/ Page	Revision code	Date	Remarks	Group/ Page	Revision code	Date	Remarks
151 thru 152	G	May 1994	REVISED	13		Nov. 1990	
153		Nov. 1990		14	A	Apr. 1991	
154	A	Apr. 1991		15	B	Dec. 1991	
154-1	A	Apr. 1991		15-1	B	Dec. 1991	
155	D	Dec. 1992		16	A	Apr. 1991	
156		Nov. 1990		17	D	Dec. 1992	
157	G	May 1994	REVISED	18 thru 20	D	Dec. 1992	
158 thru 160	G	May 1994	ADDED	21-Clutch			
14-Cooling				1 thru 4		Nov. 1990	
1 thru 2		Nov. 1990		5 thru 8	B	Dec. 1991	
3 thru 4	C	Jun. 1992		9 thru 10		Nov. 1990	
5 thru 7		Nov. 1990		22-Manual Transmission			
8 thru 10	D	Dec. 1992		1	G	May 1994	REVISED
15-Intake and Exhaust				2 thru 3	D	Dec. 1992	
1	D	Dec. 1992		4		Nov. 1990	
2 thru 3	B	Dec. 1991		5	B	Dec. 1991	
3-1	B	Dec. 1991		6 thru 7		Nov. 1990	
3-2 thru 3-4	F	Oct. 1993		8 thru 9	D	Dec. 1992	
3-5	G	May 1994	REVISED	10 thru 12		Nov. 1990	
3-6	F	Oct. 1993		23-Automatic Transmission			
4 thru 5	D	Dec. 1992		1	G	May 1994	REVISED
5-1 thru 5-2	D	Dec. 1992		1-1	F	Oct. 1993	
6	D	Dec. 1992		2 thru 11		Nov. 1990	
16-Engine Electrical				12	D	Dec. 1992	
1	D	Dec. 1992		13	B	Dec. 1991	
1-1 thru 1-2	D	Dec. 1992		14 thru 16		Nov. 1990	
2		Nov. 1990		17	D	Dec. 1992	
3 thru 5	E	Jun. 1993		17-1	D	Dec. 1992	
5-1 thru 5-2	E	Jun. 1993		18		Nov. 1990	
6	E	Jun. 1993		19	A	Apr. 1991	
6-1 thru 6-2	A	Apr. 1991		20		Nov. 1990	
7 thru 8		Nov. 1990		21 thru 22	D	Dec. 1992	
9	C	Jun. 1992		22-1	D	Dec. 1992	
9-1 thru 9-2	C	Jun. 1992		23	D	Dec. 1992	
10 thru 11	D	Dec. 1992		24	B	Dec. 1991	
12		Nov. 1990		25 thru 26	D	Dec. 1992	
12-1 thru 12-8	A	Apr. 1991		27		Nov. 1990	
13 thru 15		Nov. 1990		28	B	Dec. 1991	
16 thru 20	A	Apr. 1991		29	D	Dec. 1992	
21	D	Dec. 1992		30		Nov. 1990	
17-Emission Control				31	B	Dec. 1991	
1 thru 10	D	Dec. 1992		31-1	B	Dec. 1991	
10-1 thru 10-4	D	Dec. 1992		32	D	Dec. 1992	
11 thru 12	D	Dec. 1992		33	E	Jun. 1993	
12-1 thru 12-2	D	Dec. 1992		34		Nov. 1990	

Group/ Page	Revision code	Date	Remarks	Group/ Page	Revision code	Date	Remarks
35 thru 37	D	Dec. 1992		6 thru 7	E	Jun. 1993	
37-1 thru 37-4	D	Dec. 1992		8	G	May 1994	REVISED
38 thru 42		Nov. 1990		9 thru 11		Nov. 1990	
43 thru 45	A	Apr. 1991		33B-ACTIVE-Electronic Control Suspension			
46	D	Dec. 1992		1	G	May 1994	REVISED
46-1	D	Dec. 1992		1-1	F	Oct. 1993	
47	B	Dec. 1991		1-2	G	May 1994	ADDED
48	E	Jun. 1993		2 thru 5	G	May 1994	REVISED
49		Nov. 1990		6		Nov. 1990	
50	B	Dec. 1991		7	G	May 1994	REVISED
51 thru 56		Nov. 1990		7-1 thru 7-2	G	May 1994	ADDED
57	D	Dec. 1992		8	G	May 1994	REVISED
58 thru 59		Nov. 1990		9 thru 10		Nov. 1990	
26-Front Axle				11	B	Dec. 1991	
1 thru 3		Nov. 1990		12		Nov. 1990	
4	A	Apr. 1991		13	E	Jun. 1993	
5		Nov. 1990		14 thru 22		Nov. 1990	
6		Nov. 1990		23	B	Dec. 1991	
7	A	Apr. 1991		24 thru 37		Nov. 1990	
8 thru 12		Nov. 1990		38	A	Apr. 1991	
13	A	Apr. 1991		39 thru 41		Nov. 1990	
14		Nov. 1990		42	F	Oct. 1993	
15	B	Dec. 1991		43 thru 47		Nov. 1990	
15-1	C	Jun. 1992		48	C	Jun. 1992	
15-2	B	Dec. 1991		49 thru 53		Nov. 1990	
16 thru 18	B	Dec. 1991		54	B	Dec. 1991	
19 thru 20		Nov. 1990		55		Nov. 1990	
27-Rear Axle				55-1 thru 55-2	B	Dec. 1991	
1 thru 4		Nov. 1990		56 thru 57	D	Dec. 1992	
31-Wheel and Tyre				57-1 thru 57-2	D	Dec. 1992	
1		Nov. 1990		58 thru 86		Nov. 1990	
2	B	Dec. 1991		87	G	May 1994	REVISED
3		Nov. 1990		88	B	Dec. 1991	
4	B	Dec. 1991		89	G	May 1994	REVISED
32-Power Plant Motor				90		Nov. 1990	
1	G	May 1994	REVISED	91	G	May 1994	REVISED
2 thru 6		Nov. 1990		91-1 thru 91-2	G	May 1994	ADDED
7	G	May 1994	REVISED	92 thru 93	G	May 1994	REVISED
8		Nov. 1990		94 thru 96		Nov. 1990	
33A-Front Suspension				97 thru 98	E	Jun. 1993	
1		Nov. 1990		99	G	May 1994	REVISED
2	E	Jun. 1993		100 thru 102		Nov. 1990	
3		Nov. 1990		103 thru 104	E	Jun. 1993	
4	E	Jun. 1993		105 thru 120		Nov. 1990	
5		Nov. 1990		121	A	Apr. 1991	

Group/ Page	Revision code	Date	Remarks	Group/ Page	Revision code	Date	Remarks
122 thru 124		Nov. 1990		96	A	Apr. 1991	
34—Rear Suspension				97		Nov. 1990	
1		Nov. 1990		98	A	Apr. 1991	
2	E	Jun. 1993		99		Nov. 1990	
3		Nov. 1990		100 thru 105	D	Dec. 1992	
4	E	Jun. 1993		106	B	Dec. 1991	
5	G	May 1994	REVISED	107		Nov. 1990	
6		Nov. 1990		108	B	Dec. 1991	
7	G	May 1994	REVISED	109 thru 117		Nov. 1990	
8 thru 9		Nov. 1990		118	B	Dec. 1991	
10	G	May 1994	REVISED	118-1	B	Dec. 1991	
11 thru 12		Nov. 1990		119 thru 128		Nov. 1990	
13 thru 14	E	Jun. 1993		129	D	Dec. 1992	
15		Nov. 1990		129-1 thru 129-2	D	Dec. 1992	
35—Service Brakes				130		Nov. 1990	
1	D	Dec. 1992		131	B	Dec. 1991	
2		Nov. 1990		132 thru 133		Nov. 1990	
3	E	Jun. 1993		134	D	Dec. 1992	
4	G	May 1994	REVISED	36—Parking Brakes			
5 thru 9		Nov. 1990		1	G	May 1994	REVISED
10 thru 11	G	May 1994	REVISED	2 thru 3		Nov. 1990	
12	G	May 1994	REVISED	3-1 thru 3-2	D	Dec. 1992	
13 thru 14	G	May 1994	REVISED	4	B	Dec. 1991	
15 thru 19		Nov. 1990		5 thru 6		Nov. 1990	
20	B	Dec. 1991		7	F	Oct. 1993	
21		Nov. 1990		8 thru 9		Nov. 1990	
22	B	Dec. 1991		37A—Steering			
23 thru 29		Nov. 1990		1	G	May 1994	REVISED
30	D	Dec. 1992		1-1	F	Oct. 1993	
31 thru 33		Nov. 1990		1-2	D	Dec. 1992	
34	E	Jun. 1993		2	D	Dec. 1992	
35	D	Dec. 1992		2-1 thru 2-2	D	Dec. 1992	
36	B	Dec. 1991		3	D	Dec. 1992	
37	D	Dec. 1992		3-1	G	May 1994	ADDED
38 thru 41		Nov. 1990		4	G	May 1994	REVISED
42	D	Dec. 1992		4-1	G	May 1994	ADDED
43		Nov. 1990		5		Nov. 1990	
44 thru 84	D	Dec. 1992		6	B	Dec. 1991	
85 thru 87		Nov. 1990		7	D	Dec. 1992	
88 thru 90	B	Dec. 1991		8		Nov. 1990	
90-1 thru 90-2	B	Dec. 1991		9	D	Dec. 1992	
91 thru 92	B	Dec. 1991		10		Nov. 1990	
93		Nov. 1990		10-1 thru 10-10	D	Dec. 1992	
94	E	Jun. 1993		11 thru 12		Nov. 1990	
95		Nov. 1990		13	D	Dec. 1992	

Group/ Page	Revision code	Date	Remarks	Group/ Page	Revision code	Date	Remarks
14	G	May 1994	REVISED	23	D	Dec. 1992	
14-1 thru 14-2	G	May 1994	REVISED	24 thru 26		Nov. 1990	
15	G	May 1994	REVISED	26-1 thru 26-4	D	Dec. 1992	
16	G	May 1994	REVISED	27		Nov. 1990	
16-1 thru 16-2	G	May 1994	REVISED	28	D	Dec. 1992	
17	D	Dec. 1992		29		Nov. 1990	
17-1	B	Dec. 1991		29-1 thru 29-4	D	Dec. 1992	
18 thru 20		Nov. 1990		30 thru 36		Nov. 1990	
21	A	Apr. 1991		36-1 thru 36-2	G	May 1994	ADDED
22		Nov. 1990		37 thru 38	G	May 1994	REVISED
22-1	G	May 1994	REVISED	39	C	Jun. 1992	
22-2	A	Apr. 1991		40		Nov. 1990	
23 thru 24		Nov. 1990		41 thru 44	C	Jun. 1992	
25	A	Apr. 1991		44-1 thru 44-2	C	Jun. 1992	
26 thru 35		Nov. 1990		45	C	Jun. 1992	
36	B	Dec. 1991		45-1 thru 45-2	C	Jun. 1992	
37 thru 38		Nov. 1990		46		Nov. 1990	
39	E	Jun. 1993		47	D	Dec. 1992	
40	B	Dec. 1991		48 thru 54		Nov. 1990	
41 thru 46		Nov. 1990		51-Exterior			
47	A	Apr. 1991		1 thru 2		Nov. 1990	
37B-4-Wheel Steering System (4WS)				3	G	May 1994	REVISED
1		Nov. 1990		4	D	Dec. 1992	
2	C	Jun. 1992		4-1 thru 4-2	D	Dec. 1992	
3 thru 4		Nov. 1990		5 thru 7		Nov. 1990	
5 thru 6	B	Dec. 1991		8	G	May 1994	REVISED
7		Nov. 1990		8-1	G	May 1994	REVISED
8	C	Jun. 1992		8-2	D	Dec. 1992	
9 thru 12		Nov. 1990		9	B	Dec. 1991	
42-Body				10	A	Apr. 1991	
1	G	May 1994	REVISED	11	B	Dec. 1991	
1-1	F	Oct. 1993		12	A	Apr. 1991	
2		Nov. 1990		13	D	Dec. 1992	
3	A	Apr. 1991		13-1 thru 13-2	D	Dec. 1992	
4	G	May 1994	REVISED	14	D	Dec. 1992	
5 thru 13		Nov. 1990		15	G	May 1994	REVISED
14	C	Jun. 1992		16 thru 17		Nov. 1990	
14-1 thru 14-2	C	Jun. 1992		18	D	Dec. 1992	
15	C	Jun. 1992		19 thru 27	C	Jun. 1992	
16		Nov. 1990		28 thru 37		Nov. 1990	
17	C	Jun. 1992		52-Interior			
18		Nov. 1990		1	G	May 1994	REVISED
19	A	Apr. 1991		2 thru 3		Nov. 1990	
19-1	A	Apr. 1991		4	F	Oct. 1993	
20 thru 22		Nov. 1990		4-1 thru 4-2	F	Oct. 1993	

Group/ Page	Revision code	Date	Remarks	Group/ Page	Revision code	Date	Remarks
5	F	Oct. 1993		10	B	Dec. 1991	
5-1 thru 5-2	F	Oct. 1993		11		Nov. 1990	
6	B	Dec. 1991		11-1	G	May 1994	REVISED
7 thru 9		Nov. 1990		11-2	A	Apr. 1991	
10	G	May 1994	REVISED	12 thru 18		Nov. 1990	
11 thru 21		Nov. 1990		19	A	Apr. 1991	
22	B	Dec. 1991		20 thru 21	G	May 1994	REVISED
23 thru 24		Nov. 1990		22		Nov. 1990	
52B-Supplemental Restraint System (SRS)				23 thru 24	C	Jun. 1992	
1 thru 22	F	Oct. 1993		25 thru 26	D	Dec. 1992	
23 thru 25	G	May 1994	REVISED	27	C	Jun. 1992	
25-1	G	May 1994	ADDED	28 thru 29	G	May 1994	REVISED
26 thru 28	G	May 1994	REVISED	30		Nov. 1990	
28-1	G	May 1994	REVISED	31	D	Dec. 1992	
29 thru 32	F	Oct. 1993		31-1 thru 31-2	D	Dec. 1992	
33 thru 34	G	May 1994	REVISED	32	D	Dec. 1992	
34-1 thru 34-2	G	May 1994	ADDED	33	G	May 1994	REVISED
35 thru 60	F	Oct. 1993		33-1 thru 33-2	G	May 1994	ADDED
61 thru 62	G	May 1994	REVISED	34	D	Dec. 1992	
63 thru 68	F	Oct. 1993		34-1 thru 34-2	D	Dec. 1992	
69 thru 70	G	May 1994	REVISED	35		Nov. 1990	
71	F	Oct. 1993		35-1	B	Dec. 1991	
72	G	May 1994	REVISED	36 thru 39		Nov. 1990	
73 thru 78	F	Oct. 1993		39-1	B	Dec. 1991	
79 thru 80	G	May 1994	REVISED	40 thru 41	A	Apr. 1991	
81 thru 88	F	Oct. 1993		41-1	G	May 1994	REVISED
89	G	May 1994	REVISED	41-2	B	Dec. 1991	
90 thru 91	F	Oct. 1993		41-3	G	May 1994	REVISED
92	G	May 1994	REVISED	41-4	C	Jun. 1992	
93 thru 94	F	Oct. 1993		42 thru 63		Nov. 1990	
95 thru 96	G	May 1994	REVISED	64	B	Dec. 1991	
96-1 thru 96-2	G	May 1994	ADDED	65 thru 67		Nov. 1990	
97 thru 98	G	May 1994	REVISED	68	G	May 1994	REVISED
99 thru 100	F	Oct. 1993		68-1 thru 68-2	G	May 1994	ADDED
101	G	May 1994	REVISED	69		Nov. 1990	
102 thru 108	F	Oct. 1993		70	D	Dec. 1992	
109	G	May 1994	REVISED	71	C	Jun. 1992	
54-Chassis Electrical				72	D	Dec. 1992	
1	G	May 1994	REVISED	73 thru 74		Nov. 1990	
1-1	G	May 1994	REVISED	75	G	May 1994	REVISED
2 thru 3		Nov. 1990		75-1 thru 75-2	G	May 1994	ADDED
4 thru 5	G	May 1994	REVISED	76		Nov. 1990	
5-1 thru 5-2	G	May 1994	ADDED	77	C	Jun. 1992	
6 thru 8	C	Jun. 1992		78 thru 79		Nov. 1990	
9	D	Dec. 1992		80	G	May 1994	REVISED

LIST OF EFFECTIVE PAGES

8

Group/ Page	Revision code	Date	Remarks	Group/ Page	Revision code	Date	Remarks
80-1 thru 80-2	G	May 1994	ADDED	53		Nov. 1990	
(82	C	Jun. 1992		54 thru 55	F	Oct. 1993	
/ 83 thru 89	D	Dec. 1992		55-1	G	May 1994	REVISED
90 thru 91	D	Dec. 1992		55-2	F	Oct. 1993	
55-Heater, Air Conditioner and Ventilation				56 thru 58	G	May 1994	REVISED
1	G	May 1994	REVISED	59 thru 62	F	Oct. 1993	
1-1 thru 1-2	F	Oct. 1993		62-1	F	Oct. 1993	
2	F	Oct. 1993		62-2	E	Jun. 1993	
3 thru 4	G	May 1994	REVISED	63	F	Oct. 1993	
5	D	Dec. 1992		63-1 thru 63-2	F	Oct. 1993	
6 thru 8	A	Apr. 1991		64		Nov. 1990	
9	D	Dec. 1992					
10		Nov. 1990					
11 thru 13	D	Dec. 1992					
14 thru 16	D	Dec. 1992					
16-1 thru 16-2	D	Dec. 1992					
17	D	Dec. 1992					
18	G	May 1994	REVISED				
19 thru 21	D	Dec. 1992					
22		Nov. 1990					
23	F	Oct. 1993					
23-1 thru 23-2	F	Oct. 1993					
24	A	Apr. 1991					
24-1	A	Apr. 1991					
25 thru 26	F	Oct. 1993					
27		Nov. 1990					
28	F	Oct. 1993					
29 thru 31		Nov. 1990					
31-1 thru 31-5	F	Oct. 1993					
32	F	Oct. 1993					
32-1	F	Oct. 1993					
33 thru 34	F	Oct. 1993					
35 thru 37		Nov. 1990					
38	D	Dec. 1992					
39		Nov. 1990					
39-1 thru 39-2	D	Dec. 1992					
40 thru 42	B	Dec. 1991					
43 thru 44		Nov. 1990					
45 thru 46	D	Dec. 1992					
46-1 thru 46-2	D	Dec. 1992					
47		Nov. 1990					
48	F	Oct. 1993					
49	G	May 1994	REVISED				
50		Nov. 1990					
51 thru 52	F	Oct. 1993					

RJST405005-222
 RJST310007-230
 RJST306007-108
 RJST301007-506
 RJST207007-146
 RJST011005-1016
 RJST104006-328
 RJST011005-1016

MITSUBISHI SIGMA WORKSHOP MANUAL

FOREWORD

This Workshop Manual contains procedures for removal, disassembly, inspection, adjustment, reassembly and installation, etc. for service mechanics.

Use the following manuals in combination with this manual as required.

TECHNICAL INFORMATION MANUAL

PYGE 9008
PYGE 9101

WORKSHOP MANUAL ENGINE GROUP

PWEE □□□□
(Looseleaf edition)

ELECTRICAL WIRING

PHSE 9036
PHGE 9229
(Looseleaf edition)

PARTS CATALOGUE

B608A10□A□

All information, illustrations and product descriptions contained in this manual are current as at the time of publication. We, however, reserve the right to make changes at any time without prior notice or obligation.



General	00
Engine	11
Lubrication	12
Fuel	13
Cooling	14
Intake and Exhaust	15
Engine Electrical	16
Emission control	17
Clutch	21
Manual Transmission	22
Automatic Transmission	23
Front Axle	26
Rear Axle	27
Wheel and Tyre	31
Power Plant Mount	32
Front Suspension	33A
ACTIVE-Electronic Control Suspension	33B
Rear Suspension	34
Service Brakes	35
Parking Brakes	36
Steering	37A
4-Wheel Steering System (4WS)	37B
Body	42
Exterior	51
Interior	52
Supplemental Restraint System (SRS)	52B
Chassis Electrical	54
Heater, Air Conditioner and Ventilation	55

WARNINGS REGARDING SERVICING OF SUPPLEMENTAL RESTRAINT SYSTEM (SRS) EQUIPPED VEHICLES

WARNING!

- (1) Improper service or maintenance of any component of the SRS, or any SRS-related component, can lead to personal injury or death to service personnel (from inadvertent firing of the air bag) or to the driver and passenger (from rendering the SRS inoperative.)**
- (2) If it is possible that the SRS components are subjected to heat over 93°C (200°F) in baking or in drying after painting, remove the SRS components (air bag module, SRS diagnosis unit, front impact sensors) beforehand.**
- (3) Service or maintenance of any SRS component or SRS-related component must be performed only at an authorized MITSUBISHI dealer.**
- (4) MITSUBISHI dealer personnel must thoroughly review this manual, and especially its GROUP 52B – Supplemental Restraint System (SRS), before beginning any service or maintenance of any component of the SRS or any SRS-related component.**

NOTE

Section titles with the asterisks (*) in the table of contents in each group indicate operations requiring warnings.

GENERAL

CONTENTS

E01CA--

HOW TO USE THIS MANUAL	3	MAJOR SPECIFICATIONS	9
Scope of Maintenance, Repair and Servicing		PRECAUTIONS BEFORE SERVICE	10
Explanations	3	SUPPLEMENTAL RESTRAINT SYSTEM	
Definition of Terms	3	(SRS)-AIR BAG.....	11-1
Model Indications	3	SUPPORT LOCATIONS FOR LIFTING AND	
Explanation of Manual Contents	4	JACKING	12
Explanation of Circuit Diagrams	6	STANDARD PARTS-TIGHTENING-TORQUE	
VEHICLE IDENTIFICATION	7	TABLE	16
Vehicle Information Code Plate	7	MAIN SEALANT AND ADHESIVE TABLE	17
Models	7		
Model Code	8		
Chassis Number	8		

NOTE

HOW TO USE THIS MANUAL

E018AAV

SCOPE OF MAINTENANCE, REPAIR AND SERVICING EXPLANATIONS

This manual provides explanations, etc. concerning procedures for the inspection, maintenance, repair and servicing of the subject model. Note, however, that for engine and transmission-related component parts, this manual covers only on-vehicle inspections, adjustments, and the removal and installation procedures for major components. For detailed information concerning the inspection, checking, adjustment, disassembly and reassembly of the engine, transmission and major components after they have been removed from the vehicle, please refer to the separate manuals covering the engine and the transmission.

SERVICE ADJUSTMENT PROCEDURES

"Service adjustment procedures" are procedures for performing inspections and adjustments of particularly important locations with regard to the construction and for maintenance and servicing, but other inspections (for looseness, play, cracking, damage, etc.) must also be performed.

INSPECTION

Under this title are presented inspection and checking procedures to be performed by using special tools and measuring instruments and by feeling, but, for actual maintenance and servicing procedures, visual inspections should always be performed as well.

DEFINITION OF TERMS

STANDARD VALUE

Indicates the value used as the standard for judging the quality of a part or assembly on inspection or the value to which the part or assembly is corrected and adjusted. It is given by tolerance.

LIMIT

Shows the standard for judging the quality of a part or assembly on inspection and means the maximum or minimum value within which the part or assembly must be kept functionally or in strength. It is a value established outside the range of standard value.

REFERENCE VALUE

Indicates the adjustment value prior to starting the work (presented in order to facilitate assembly and adjustment procedures, and so they can be completed in a shorter time).

CAUTION

Indicates the presentation of information particularly vital to the worker during the performance of maintenance and servicing procedures in order to avoid the possibility of injury to the worker, or damage to component parts, or a reduction of component or vehicle function or performance, etc.

MODEL INDICATIONS

The following abbreviations are used in this manual for classification of model types.

3000: Indicates models equipped with the 3000 cc (6G72) petrol engine.

M/T: Indicates the manual transmission, or models equipped with the manual transmission.

A/T: Indicates the automatic transmission, or models equipped with the automatic transmission.

MPI: Indicates the multi-point injection, or engines equipped with the multi-point injection.

SOHC: Indicates an engine with the single overhead camshaft, or a model equipped with such an engine.

DOHC: Indicates an engine with the double overhead camshaft, or a model equipped with such an engine.

EXPLANATION OF MANUAL CONTENTS

Indicates procedures to be performed before the work in that section is started, and procedures to be performed after the work in that section is finished.

Maintenance and Servicing Procedures

- (1) A diagram of the component parts is provided near the front of each section in order to give the reader a better understanding of the installed condition of component parts.
- (2) The numbers provided within the diagram indicate the sequence for maintenance and servicing procedures; the symbol  indicates a nonreusable part; the tightening torque is provided where applicable.

- Removal steps:
The part designation number corresponds to the number in the illustration to indicate removal steps.
- Disassembly steps:
The part designation number corresponds to the number in the illustration to indicate disassembly steps.
- Installation steps:
Specified in case installation is impossible in reverse order of removal steps. Omitted if installation is possible in reverse order of removal steps.
- Reassembly steps:
Specified in case reassembly is impossible in reverse order of disassembly steps. Omitted if reassembly is possible in reverse order of disassembly steps.

Classifications of Major Maintenance/Service Points

When there are major points relative to maintenance and servicing procedures (such as essential maintenance and service points, maintenance and service standard values, information regarding the use of special tools, etc.), these are arranged together as major maintenance and service points and explained in detail.

- ◆◆: Indicates that there are essential points for removal or disassembly.
- ◆◆: Indicates that there are essential points for installation or reassembly.

Indicates (by symbols) where lubrication is necessary. In this example, multipurpose grease is to be applied (where indicated) to the steering gear box.

Symbols for Lubrication, Sealants and Adhesives

Information concerning the locations for lubrication and for application of sealants and adhesives is provided, by using symbols, in the diagram of component parts or on the page following the component parts page, and explained.

- : Grease
(multipurpose grease unless there is a brand or type specified)
- : Sealant or adhesive
- : Brake fluid or automatic transmission fluid
- : Engine oil, gear oil or air conditioner compressor oil
- : Adhesive tape or butyl rubber tape

Indicates
the group
number.

Indicates
the page
number.

Indicates
the group
title.

Indicates
the section
title

This information is applicable for vehicles destined for Europe. This information is also applicable to vehicles (with specifications for Europe) that are shipped to General Export destinations.

37-24 STEERING – Power Steering Gear Box

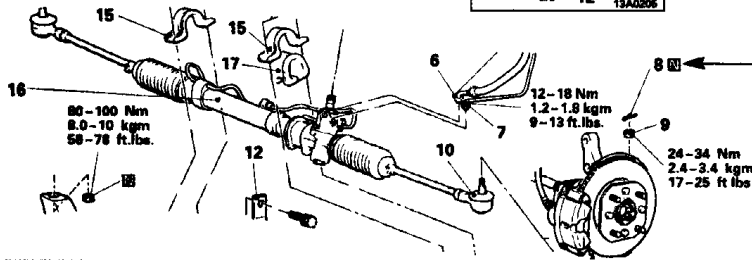
POWER STEERING GEAR BOX <VEHICLES FOR EUROPE>

REMOVAL AND INSTALLATION

Pre-removal Operation

- Draining of the Power Steering Fluid
- Removal of the Air Cleaner <Vehicles with a Carburettor>

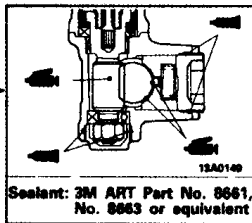
<2WD>



Repair kit or set parts are shown. (Only very frequently used parts are shown.)

Denotes non-reusable part.

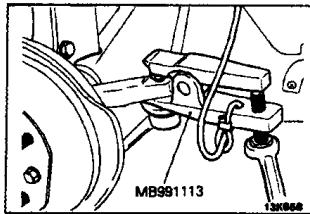
Denotes tightening torque.



Removal steps

- 1 Dust cover mounting bolts
- 5 Connection for joint assembly and gear box
- 6 Flare nut of return hose
- 7 Flare nut of pressure hose assembly
- 8 Split pins
- 9 Tie-rod end and knuckle connecting nuts
- 10 Tie-rod end ball joints
- 11 Crossmember support bracket

Operating procedures, cautions, etc. on removal, installation, disassembly and reassembly are described.



SERVICE POINTS OF REMOVAL

5. DISCONNECTION OF JOINT ASSEMBLY AND GEAR BOX

Before disconnecting the joint assembly from the gear box, loosen the steering column assembly mounting bolts

10. REMOVAL OF TIE-ROD END BALL JOINTS

Caution

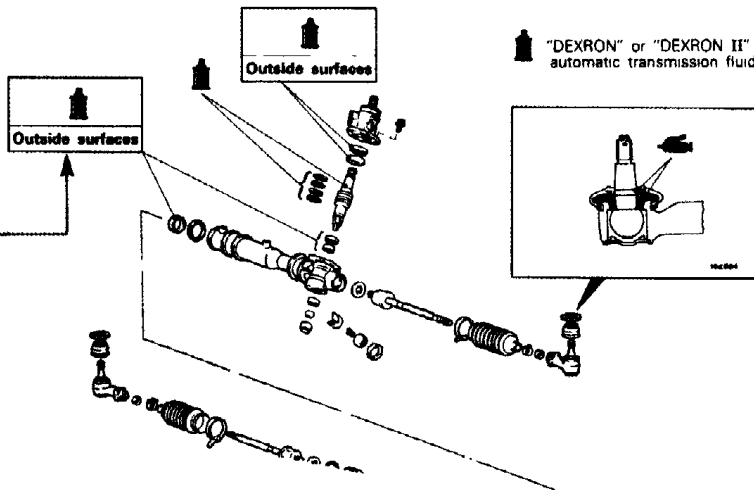
To prevent the special tool from jumping out, secure it by cord to a nearby part.

This number corresponds to the number appearing in "Removal steps", "Disassembly steps", "Installation steps" or "Reassembly steps".

37-28

STEERING – Power Steering Gear Box

LUBRICATION AND SEALING POINTS



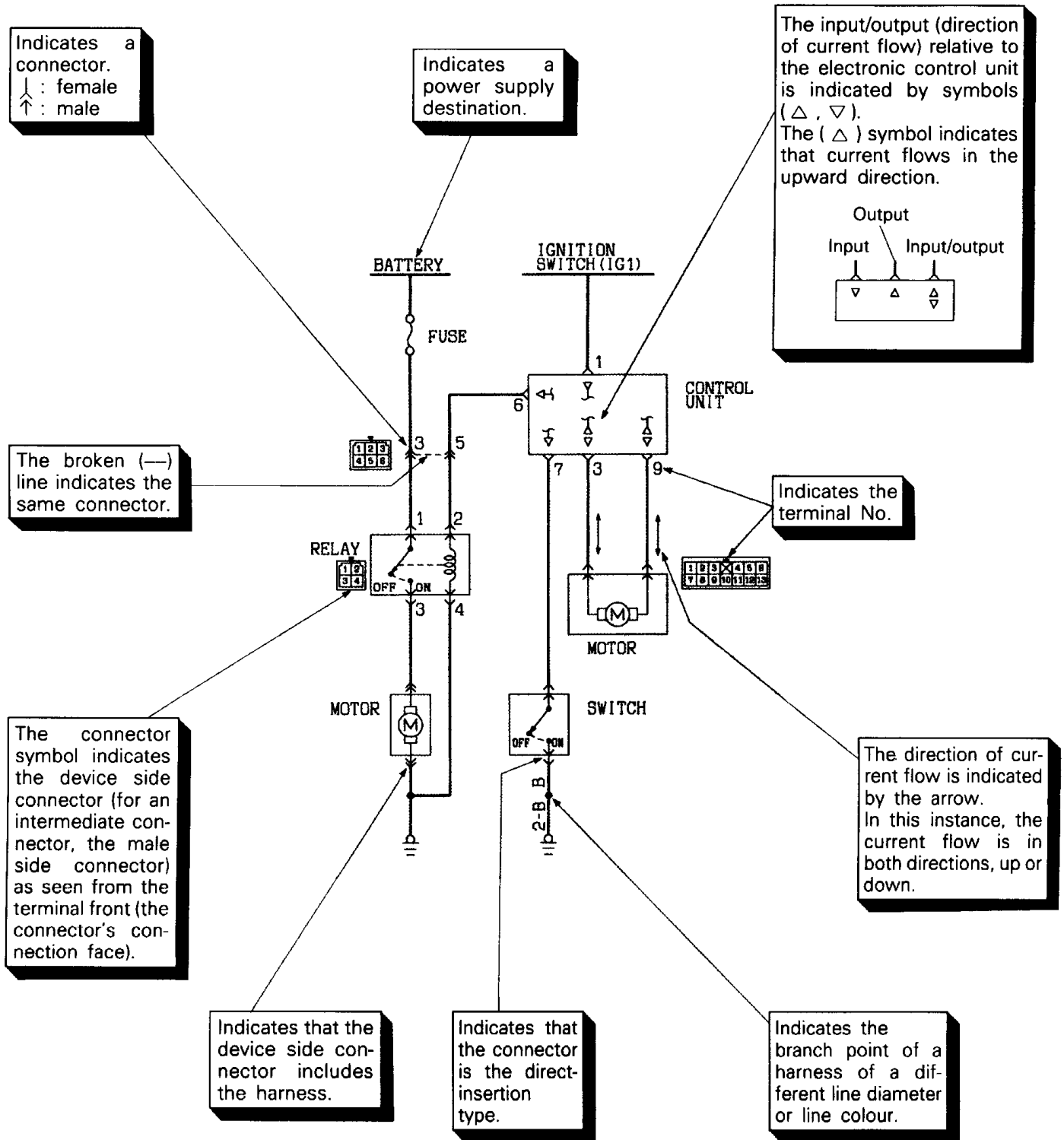
The title of the page (following the page on which the diagram of component parts is presented) indicating the locations of lubrication and sealing procedures.

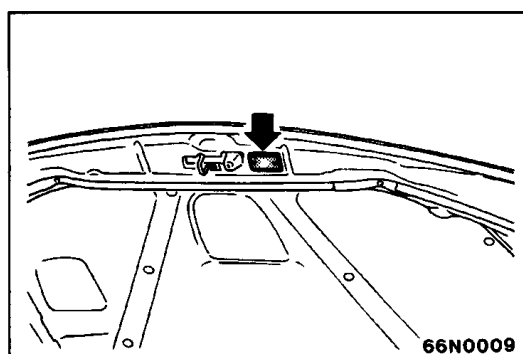
EXPLANATION OF CIRCUIT DIAGRAMS

The symbols used in circuit diagrams are used as described below.

NOTE

For detailed information concerning the reading of circuit diagrams, refer to the separate manual of "ELECTRICAL WIRING".





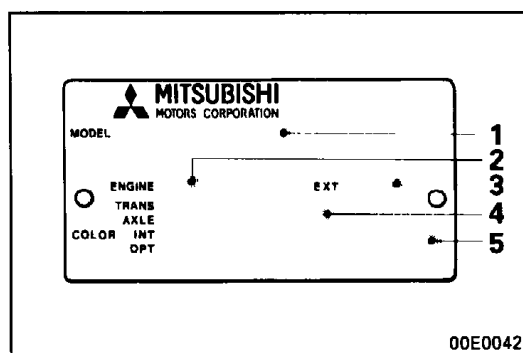
VEHICLE IDENTIFICATION

VEHICLE INFORMATION CODE PLATE

LOCATION

E01DD--

Vehicle information code plate is riveted on the hood inner panel.



CODE PLATE DESCRIPTION

The plate shows model code, engine model, transmission model, and body colour code.

- | | | |
|----------------------|--------------------|---|
| 1. MODEL | F16AS XML6 | Model series
Vehicle model |
| 2. ENGINE | 6G72 | Engine model |
| 3. EXT | CA6A | Exterior code |
| 4. TRANS
AXLE | F5M33 | Transmission model |
| 5. COLOR, INT
OPT | R25 87V 03V | Equipment code
Interior code
Exterior colour code |

MODELS

Model code	Engine model	Transmission model
F16ASNHEL6	6G72-SOHC	F5M33-5 M/T
F16ASNHER6*3	6G72-SOHC	F5M33-5 M/T
F16ASRHEL6	6G72-SOHC	F4A33-ELC 4 A/T
F16ASRHER6*3	6G72-SOHC	F4A33-ELC 4 A/T
F16ASNXML6	6G72-DOHC	F5M33-5 M/T
F16ASNXMLR6*3	6G72-DOHC	F5M33-5 M/T
F16ASNUML6*1	6G72-DOHC	F5M33-5 M/T
F16ASNUMR6*2	6G72-SOHC	F5M33-5 M/T
F16ASRXML6	6G72-DOHC	F4A33-ELC 4 A/T
F16ASRXMR6	6G72-DOHC	F4A33-ELC 4 A/T
F16ASRPML6	6G72-DOHC	F4A33-ELC 4 A/T
F16ASRPMR6	6G72-DOHC	F4A33-ELC 4 A/T

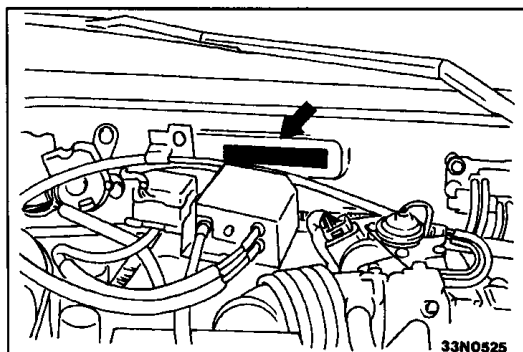
NOTE

- *1: Vehicles built from June, 1992
 *2: Vehicles built from June, 1992 up to April, 1994
 *3: Vehicles built up to April, 1994

MODEL CODE

F	16	A	S	N	X	M	L	6
1	2	3	4	5	6	7	8	

- | | |
|--|---|
| <ol style="list-style-type: none"> 1. Development order
F16 – 2,972 cc (181.3 cu.in.) 2. Sort
A – Passenger car 3. Body style
S – 4-door sedan 4. Transmission type
N – 5-speed manual transmission
R – 4-speed automatic transmission 5. Trim level
H – High line
X, U – Extra line
P – Premium line | <ol style="list-style-type: none"> 6. Specified engine feature
E – Electronic injection
M – Double overhead camshaft 7. Steering wheel location
L – Left hand
R – Right hand 8. Destination
6 – For Europe |
|--|---|

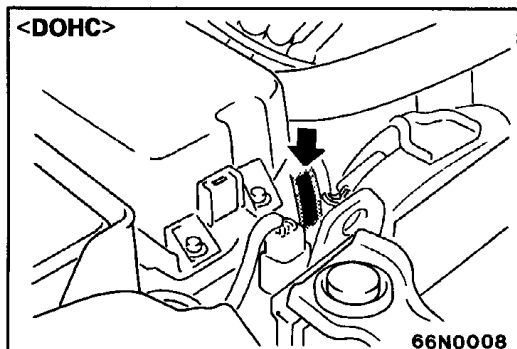
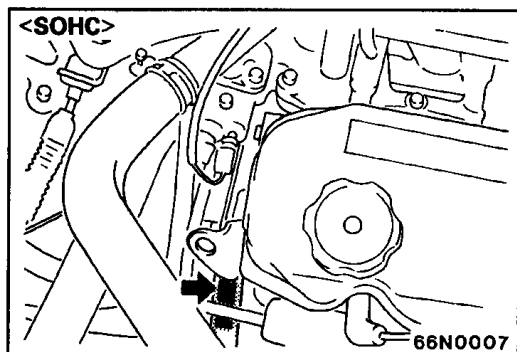


CHASSIS NUMBER

The chassis number is stamped on the toeboard inside the engine compartment.

▲	J	M	B	S	N	F16A	M	Y	000001	▲
	1	2	3	4	5	6	7 8	9	10	11

- | | |
|--|---|
| <ol style="list-style-type: none"> 1. Asia 2. Japan 3. MITSUBISHI
A – For Europe, right hand drive
B – For Europe, left hand drive 4. Body style
S – 4-door sedan 5. Transmission type
N – 5-speed manual transmission
R – 4-speed automatic transmission 6. Development order
F16 – 2,972 cc (181.3 cu.in.) | <ol style="list-style-type: none"> 7. Sort
A – Passenger car 8. Vehicle type
F16 – SIGMA 9. Model year
M – 1991
N – 1992
P – 1993
S – 1995 10. Plant
Y – Ohe Motor Vehicle Works 11. Serial number |
|--|---|

**ENGINE MODEL NUMBER**

1. The engine number is stamped on the engine cylinder block as shown in the illustration.

Engine model	Engine displacement cc (cu.in.)
6G72	2,972 (181.3)

2. The engine serial number is stamped near the engine model number, and the serial number cycles, as shown belows.

<Vehicles built up to May. 1993>

Engine serial number cycling		
AA0201-----▶AA9999	-----▶AB0001	
▶AY9999	-----▶BA0001	-----▶YY9999

<Vehicles built from June. 1993>

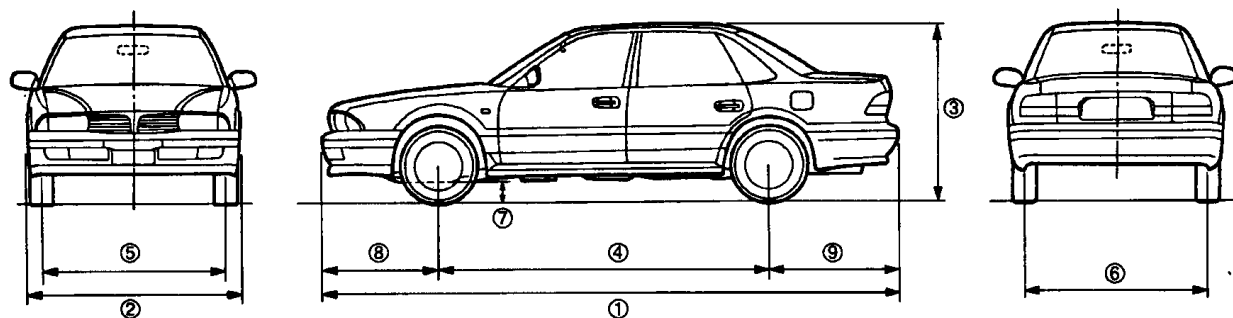
Engine serial number cycling		
A09990-----▶A99999	-----▶B00001	
▶Y99999		

00-8-2

NOTES

MAJOR SPECIFICATIONS

E9ADHAB



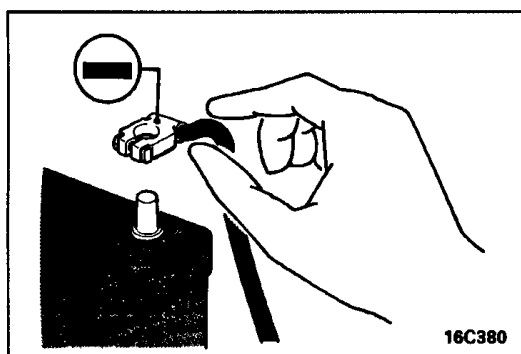
66N0010

Items	F16ASNHEL6 F16ASNHER6	F16ASRHEL6 F16ASRHER6	F16ASNXML6 F16ASNXMLR6 F16ASNUML6 F16ASNUMR6	F16ASRXML6 F16ASRXMR6	F16ASRPML6 F16ASRPMLR6
Dimensions mm (in.)					
Overall length ①	4,750 (187.0)				
Overall width ②	1,775 (69.9)				
Overall height (unladen) ③	1,435 (56.5)				
Wheelbase ④	2,720 (107.0)				
Track – front ⑤	1,535 (60.4)				
Track – rear ⑥	1,530 (60.2)				
Ground clearance (unladen) ⑦	155 (6.1)				
Overhang – front ⑧	970 (38.2)				
Overhang – rear ⑨	1,060 (41.7)				
Weight kg (lbs.)					
Kerb weight	1,420–1,500 (3,130–3,307)	1,460–1,540 (3,219–3,395)	1,475–1,590 (3,252–3,505)	1,520–1,635 (3,351–3,605)	1,560–1,645 (3,439–3,627)
Gross vehicle weight	2,070 (4,564)	2,070 (4,564)	2,070 (4,564)	2,070 (4,564)	2,070 (4,564)
Max. axle weight					
front	1,170 (2,579)	1,170 (2,579)	1,170 (2,579)	1,170 (2,579)	1,170 (2,579)
rear	1,010 (2,227)	1,010 (2,227)	1,010 (2,227)	1,010 (2,227)	1,010 (2,227)
Seating capacity	5				
Engine					
Model	6G72				
Total displacement cc (cu. in.)	2,972 (181.3)				
Transmission					
Model	F5M33	F4A33	F5M33	F4A33	F4A33
Type	5-speed manual	4-speed automatic	5-speed manual	4-speed automatic	4-speed automatic

PRECAUTIONS BEFORE SERVICE

SUPPLEMENTAL RESTRAINT SYSTEM (SRS)

1. Items to follow when servicing SRS
 - (1) Be sure to read GROUP 52B – Supplemental Restraint System (SRS)
For safe operations, please follow the directions and heed all warnings.
 - (2) Always use the designated special tools and test equipment.
 - (3) The SRS system is designed to retain enough voltage to deploy the air bag even after the battery has been disconnected. Serious injury may result from unintended air bag deployment if work is done on the SRS system immediately after the battery cable is disconnected.
 - (4) Never attempt to disassemble or repair the SRS components (front impact sensors, SRS diagnosis unit, air bag module and clock spring). If faulty, replace it.
 - (5) Warning labels must be heeded when servicing or handling SRS components. Warning labels are located in the following locations.
 - Hood
 - Sun visor
 - Glove box
 - SRS diagnosis unit
 - Steering wheel
 - Air bag module
 - Clock spring
 - Steering gear and linkage clamp
 - (6) Store components removed from the SRS in a clean and dry place.
The air bag module should be stored on a flat surface and placed so that the pad surface facing upward.
Do not place anything on top of it.
 - (7) Be sure to deploy the air bag before disposing of the air bag module or disposing of a vehicle equipped with an air bag. (Refer to GROUP 52B – Air Bag Modules Disposal Procedures.)
 - (8) Whenever you finish servicing the SRS, check the SRS warning lamp operation to make sure that the system functions properly.
2. Observe the following when carrying out operations on places where SRS components are installed, including operations not directly related to the SRS air bag.
 - (1) When removing or installing parts do not allow any impact or shock to the SRS components.
 - (2) SRS components should not be subjected to heat over 93°C (200°F), so remove the SRS components before drying or baking the vehicle after painting.
After re-installing them check the SRS warning lamp operation to make sure that the system functions properly.



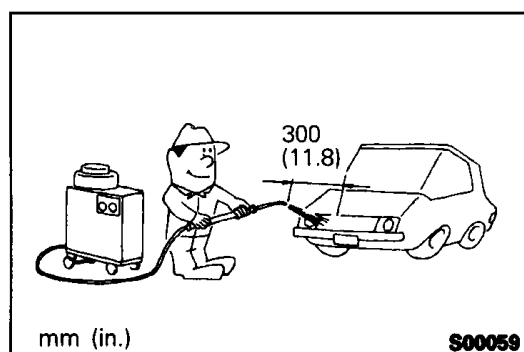
SERVICING THE ELECTRICAL SYSTEM

Before replacing a component related to the electrical system and before undertaking any repair procedures involving the electrical system, be sure to first disconnect the negative (–) cable from the battery in order to avoid damage caused by short-circuiting.

Caution

Before connecting or disconnecting the negative (–) cable, be sure to turn off the ignition switch and the lighting switch.

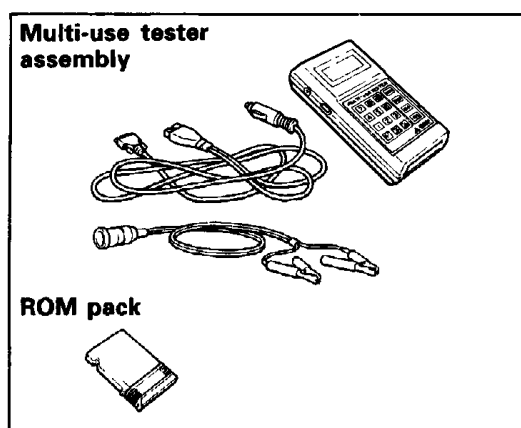
(If this is not done, there is the possibility of semiconductor parts being damaged.)



VEHICLE WASHING

If high-pressure car-washing equipment or steam car-washing equipment is used to wash the vehicle, be sure to note the following information in order to avoid damage to plastic components, etc.

- Spray nozzle distance: 300 mm (11.8 in.) or more
- Spray pressure: 4 Mpa (40 kg/cm², 569 psi) or less
- Spray temperature: 82°C (180°F) or less
- Time of concentrated spray to one point: within 30 sec.



MULTI-USE TESTER

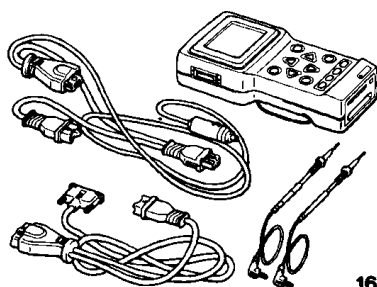
1. Refer to the MULTI-USE TESTER INSTRUCTION MANUAL for instructions on handling the multi-use tester.

Caution

Connection and disconnection of the multi-use tester should always be made with the ignition switch in the OFF position.

2. Always use a ROM pack that is appropriate for the vehicle.

ROM pack No.	Applicable vehicles
MB991419	Vehicles built up to May, 1992
MB991481	Vehicles built from June, 1992

MUT-II sub-assembly

16X0606

ROM pack

16X0607

MUT-II

To operate the MUT-II, refer to the "MUT-II OPERATING INSTRUCTION".

Caution

Connection and disconnection of the MUT-II should always be made with the ignition switch in the OFF position.

IN ORDER TO PREVENT VEHICLES FROM FIRE

"Improper installation of electrical or fuel related parts could cause a fire. In order to retain the high quality and safety of the vehicle, it is important that any accessories that may be fitted or modifications/repairs that may be carried out which involve the electrical or fuel systems, **MUST** be carried out in accordance with MMC's Information/Instructions".

ENGINE OILS**Health Warning**

Prolonged and repeated contact with mineral oil will result in the removal of natural fats from the skin, leading to dryness, irritation and dermatitis. In addition, used engine oil contains potentially harmful contaminants which may cause skin cancer. Adequate means of skin protection and washing facilities must be provided.

Recommended Precautions

The most effective precaution is to adapt working practices which prevent, as far as practicable, the risk of skin contact with mineral oils, for example by using enclosed systems for handling used engine oil and by degreasing components, where practicable, before handling them.

Other precautions:

- Avoid prolonged and repeated contact with oils, particularly used engine oils.
- Wear protective clothing, including impervious gloves where practicable.
- Avoid contaminating clothes, particularly underpants, with oil.
- Do not put oily rags in pockets, the use of overalls without pockets will avoid this.
- Do not wear heavily soiled clothing and oil-impregnated foot-wear. Overalls must be cleaned regularly and kept separate from personal clothing.
- Where there is a risk of eye contact, eye protection should be worn, for example, chemical goggles or face shields; in addition an eye wash facility should be provided.
- Obtain First Aid treatment immediately for open cuts and wounds.
- Wash regularly with soap and water to ensure all oil is removed, especially before meals (skin cleansers and nail brushes will help). After cleaning, the application of preparations containing lanolin to replace the natural skin oils is advised.
- Do not use petrol, kerosine, diesel fuel, gas oil, thinners or solvents for cleaning skin.
- Use barrier creams, applying them before each work period, to help the removal of oil from the skin after work.
- If skin disorders develop, obtain medical advice without delay.

SUPPLEMENTAL RESTRAINT SYSTEM (SRS)-AIR BAG

E01GA-A

The explanation below is for the vehicles without air bag in the passenger's side. As for the vehicles with air bag in the passenger's side, refer to the GROUP52B – General Information, SRS Service Precautions.

GENERAL INFORMATION

The Supplemental Restraint System (SRS) is designed to supplement the driver's seat belt to help reduce the risk or severity of injury to the driver by activating and deploying an air bag in certain frontal collisions.

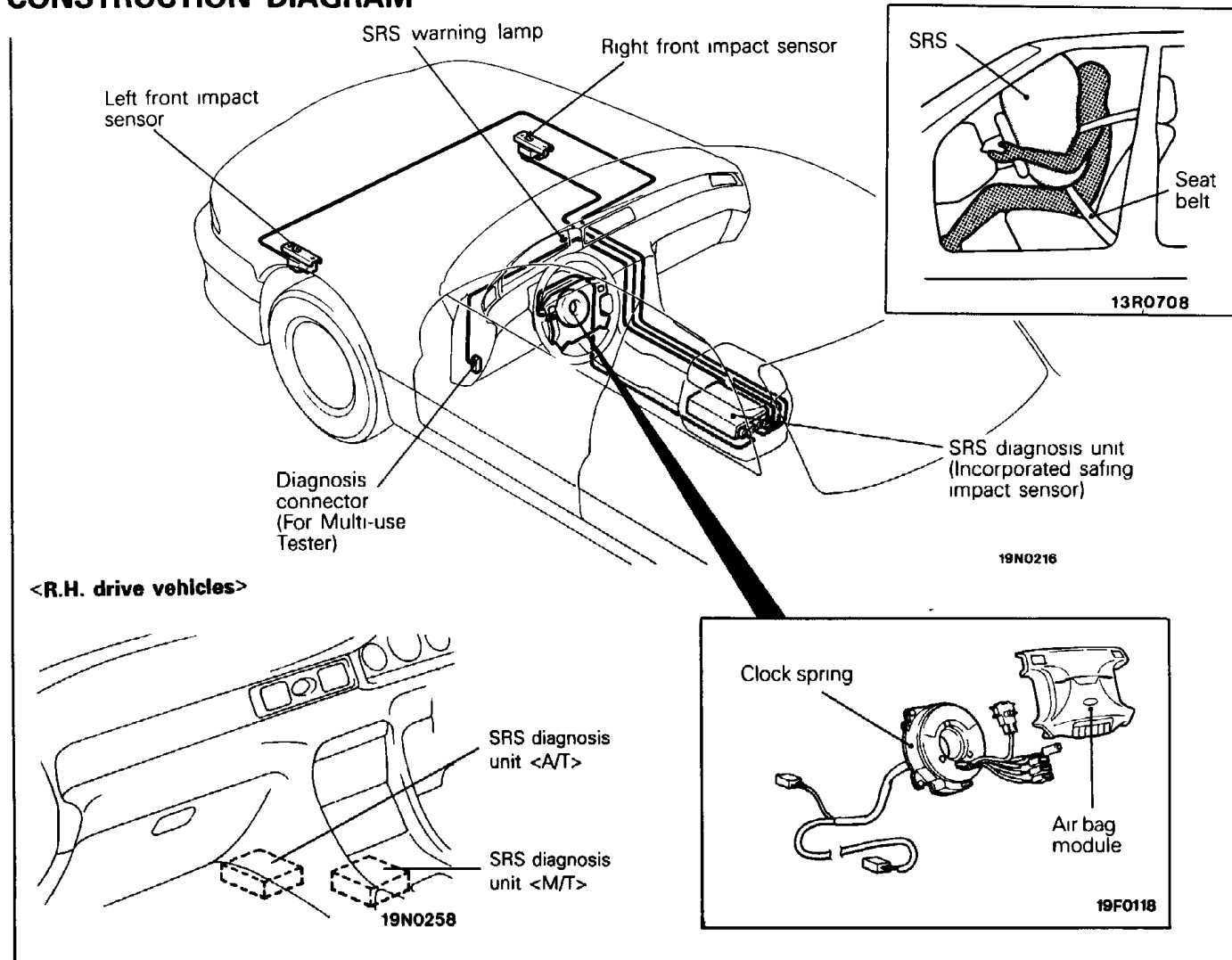
The SRS consists of: left front and right front impact sensors, one each located on the right and left side lower members; an air bag module which contains the folded air bag and an inflator unit located in the centre of the steering wheel; the SRS diagnosis unit located under the floor console assembly (underneath the centre of the instrument panel for R.H. drive vehicles), which monitors the system, and which contains a safing impact sensor; and SRS warning lamp located on the instrument panel, which indicates the

operational status of the SRS; a clock spring interconnection located within the steering column; wiring.

The SRS is designed so that the air bag will deploy when the safing sensor, plus either or both of the left front and right front impact sensors simultaneously activate while the ignition switch is "ON". That is designed to occur in frontal or near-frontal impacts of moderate to severe force.

Only authorized service personnel should do work on or around the SRS components. Those service personnel should read this manual carefully before starting any such work. Extreme care must be used when servicing the SRS, to avoid injury to the service personnel (by inadvertent deployment of the air bag) or the driver (by rendering the SRS inoperative).

CONSTRUCTION DIAGRAM



SRS SERVICE PRECAUTIONS

1. In order to avoid injury to yourself or others from accidental deployment of the air bag during servicing, read and carefully follow all the precautions and procedures described in this manual.
2. Do not use any electrical test equipment on or near SRS components, except those specified on GROUP 52B – Special Tools and Test Equipment.
Never use an analogue ohmmeter.
3. **Never Attempt to Repair the Following Components:**
 - Front Impact Sensors
 - SRS Diagnosis Unit (SDU)
 - Clock Spring
 - Air Bag Module

If any of these components are diagnosed as faulty, they should only be replaced, in accordance with the INDIVIDUAL COMPONENT SERVICE procedures in this manual.
4. Do not attempt to repair the wiring harness connectors of the SRS. If any of the connectors are diagnosed as faulty, replace the wiring harness. If the wires are diagnosed as faulty, replace or repair the wiring harness according to the following table.

<L.H. drive vehicles>

SDU Terminal No	Harness Connector (No. of Terminals, Color)	Destination of Harness	Corrective Action
1	2 pins, red	Clock spring	Replace clock spring
2			
3	2 pins, yellow	Front wiring harness → Front impact sensor (LH)	Replace with sensor cable *
4			
5	2 pins, blue	Front wiring harness → Front impact sensor (RH)	
6			
7 and 8	14 pins, red	—	—
9		Body wiring harness → Diagnosis check pin	Correct or replace each wiring harness
10		Body wiring harness → Front wiring harness → Control wiring harness → Front wiring harness → Body wiring harness → Ignition switch (ST)	
11		Body wiring harness → Junction block (fuse No. 18)	
12		Body wiring harness → Instrument panel wiring harness → Junction block (fuse No. 12)	
13		Body wiring harness → Instrument panel wiring harness → SRS warning lamp	
14			
15 to 18		—	—
19		Body wiring harness → Earth	Correct or replace body wiring harness.
20			

NOTE

- (1) The sensor cable marked with * is available as service part
 (2) The sensor cable used as a replacement part is routed along the front wiring harness.

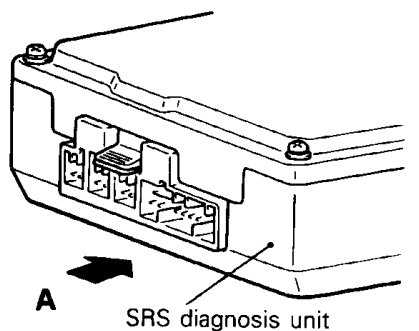
<R.H. drive vehicles>

SDU Terminal No.	Harness Connector (No. of Terminals, Color)	Destination of Harness	Corrective Action
1	2 pins, red	Body wiring harness → Clock spring	Correct or replace body wiring harness or replace clock spring.
2			
3	2 pins, yellow	Body wiring harness → Front wiring harness → Front impact (LH) sensor	Replace with sensor cable.*
4			
5	2 pins, blue	Body wiring harness → Front wiring harness → Front impact (RH) sensor	
6			
7 and 8	14 pins, red	—	—
9		Body wiring harness → Diagnosis check pin	Correct or replace each wiring harness
10		Body wiring harness → Front wiring harness → Control wiring harness → Front wiring harness → Body wiring harness → Ignition switch (ST)	
11		Body wiring harness → Junction block (fuse No. 18)	
12		Body wiring harness → Instrument panel wiring harness → Junction block (fuse No. 12)	
13		Body wiring harness → Instrument panel wiring harness → SRS wiring lamp	
14			
15 to 18		—	—
19	Body wiring harness → Earth	Correct or replace body wiring harness	
20			

NOTE

(1) The sensor cable marked with * is available as service part.

(2) The sensor cable used as a replacement part is routed along the body wiring harness and the front wiring harness.

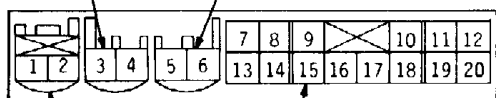


View A

13R0704

To front impact sensor (L.H.)

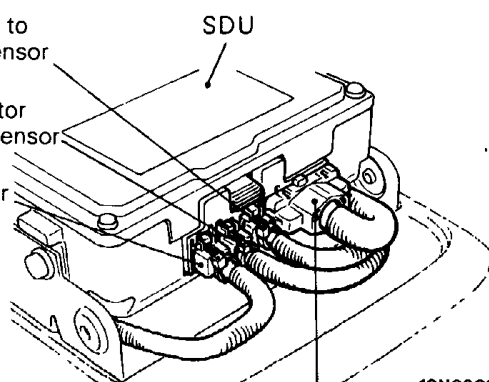
To front impact sensor (R.H.)



To body wiring harness (14-pin)

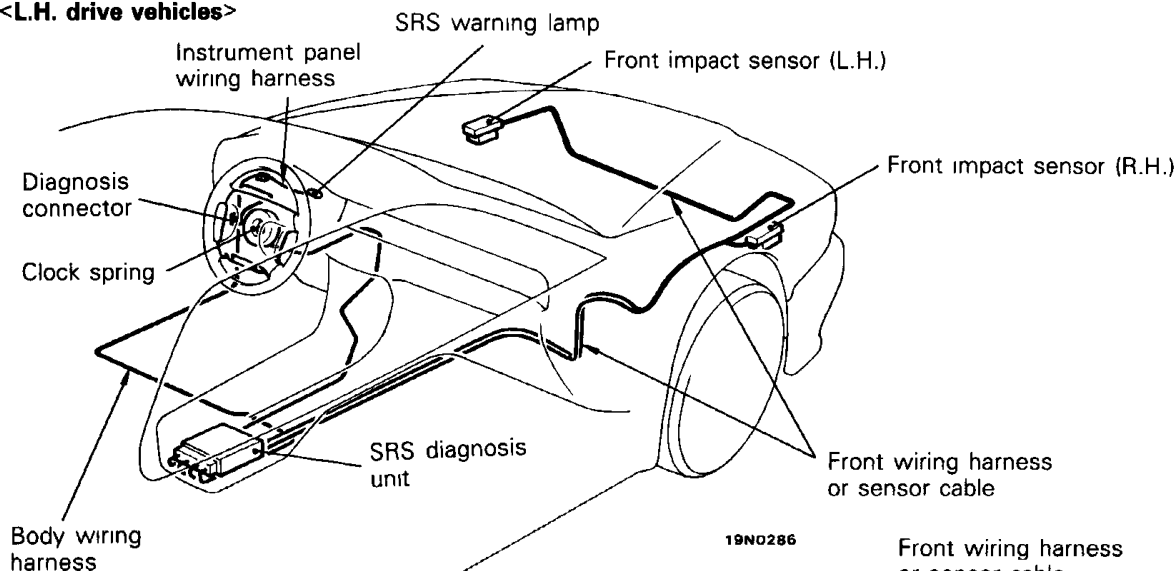
To clock spring

19N0200

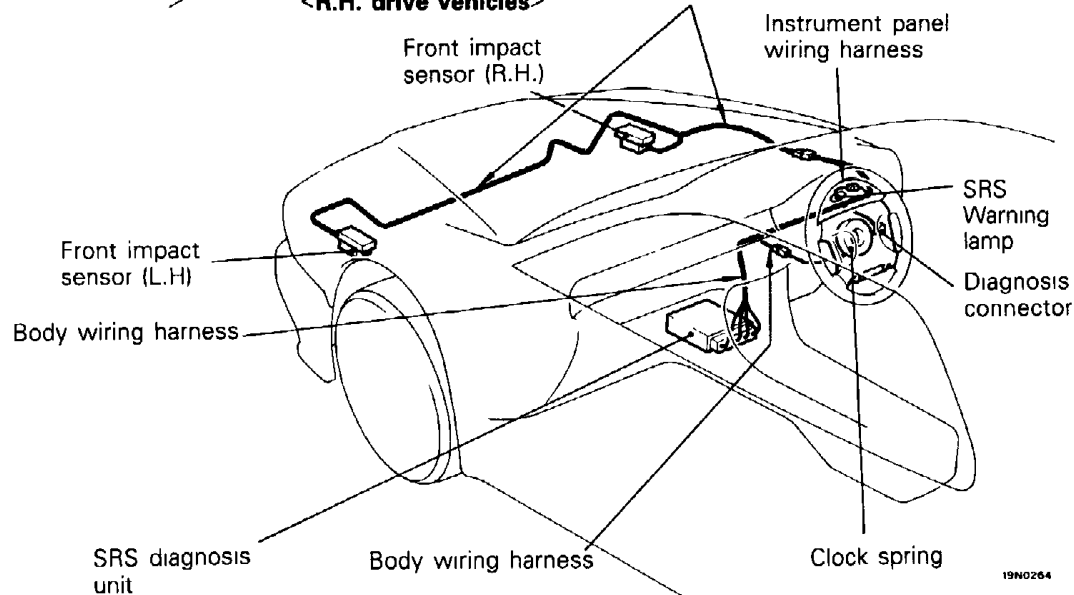
2-pin blue connector to
right front impact sensor2-pin yellow connector
to left front impact sensor2-pin red connector
to clock spring

14-pin red connector to body wiring harness

<L.H. drive vehicles>



<R.H. drive vehicles>



5. **After disconnecting the battery cable, wait 60 seconds or more before proceeding with the following work. The SRS system is designed to retain enough voltage to deploy the air bag for a short time even after the battery has been disconnected, so serious injury may result from unintended air bag deployment if work is done on the SRS system immediately after the battery cables are disconnectd.**
6. SRS components should not be subjected to heat over 93°C (200°F), so remove the front impact sensors, SRS diagnosis unit, air bag module and clock spring before drying or baking the vehicle after painting.
Recheck SRS system operability after re-installing the components.
7. Whenever you finish servicing the SRS, check the SRS warning lamp operation to make sure that the system functions properly. (Refer to GROUP 52B – Troubleshooting.)
8. Make certain that the ignition switch is OFF when the Multi-use Tester is connected or disconnected.
9. If you have any questions about the SRS, please contact your local distributor.

NOTE

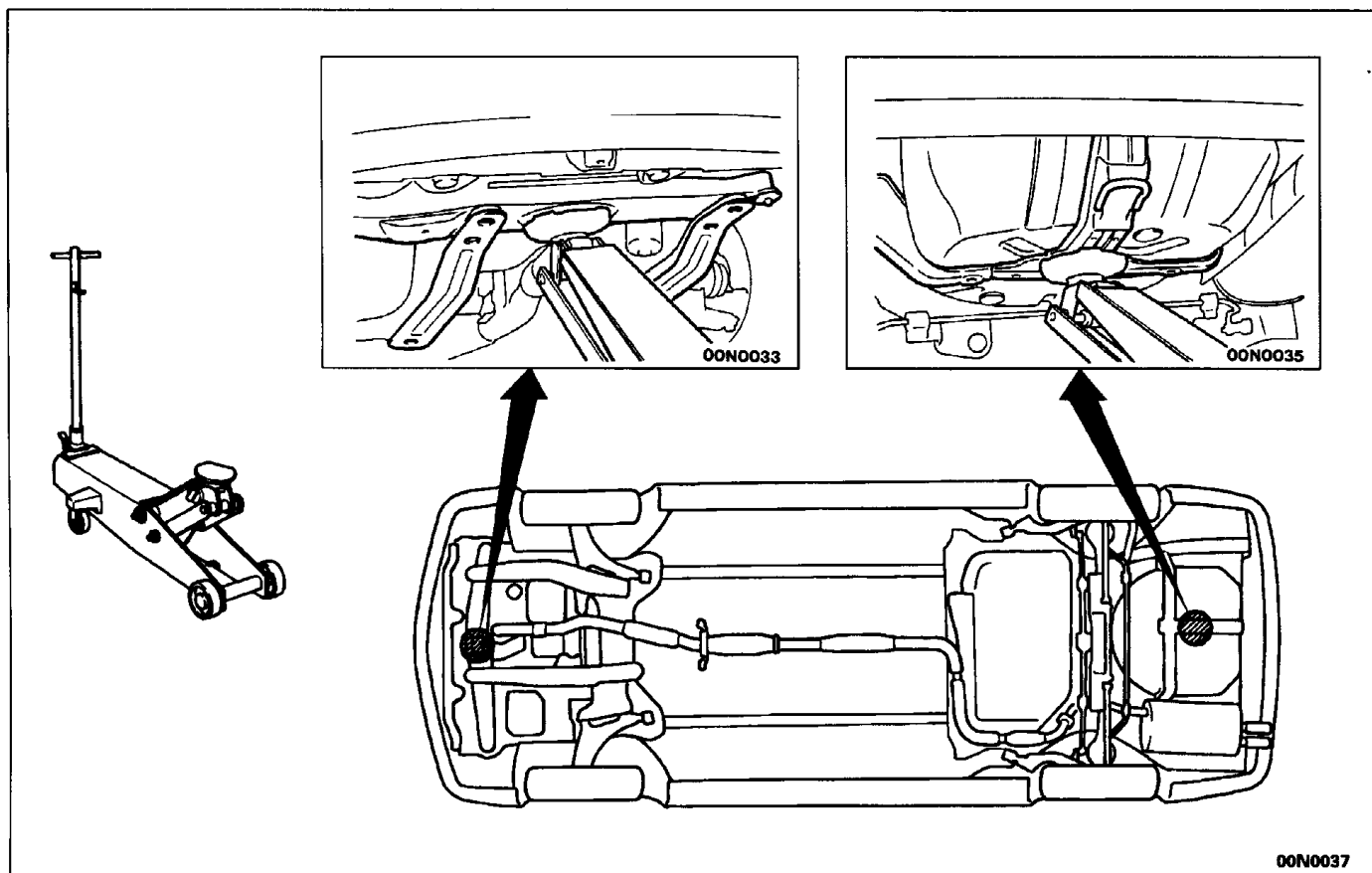
SERIOUS INJURY CAN RESULT FROM UNINTENDED AIR BAG DEPLOYMENT. SO USE ONLY THE PROCEDURES AND EQUIPMENT SPECIFIED IN THIS MANUAL.

SUPPORT LOCATIONS FOR LIFTING AND JACKING

E01LB--

Caution

Do not support the vehicle at locations other than specified supporting points. If do so, this will cause damage etc.

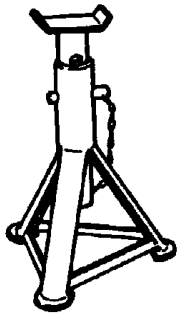
SUPPORT POSITIONS FOR A GARAGE JACK

SUPPORT POSITIONS FOR AXLE STANDS, A SINGLE-POST LIFT OR DOUBLE-POST LIFT

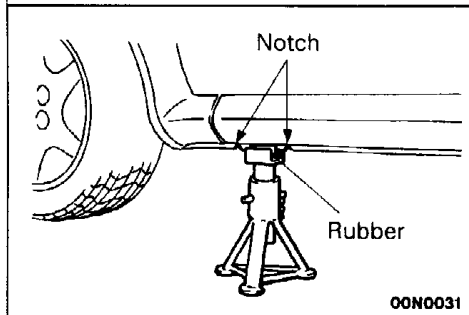
Caution

When service procedures require removing rear suspension, fuel tank, spare tyre and rear bumper, place additional weight on rear end of vehicle or anchor vehicle to hoist to prevent tipping of centre of gravity changes.

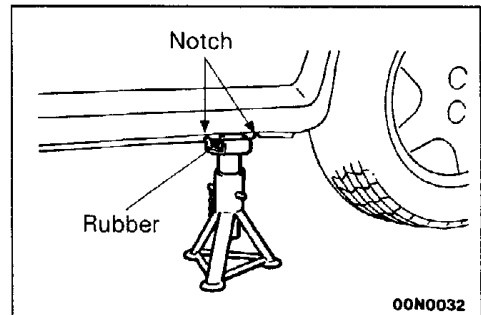
AXLE STANDS



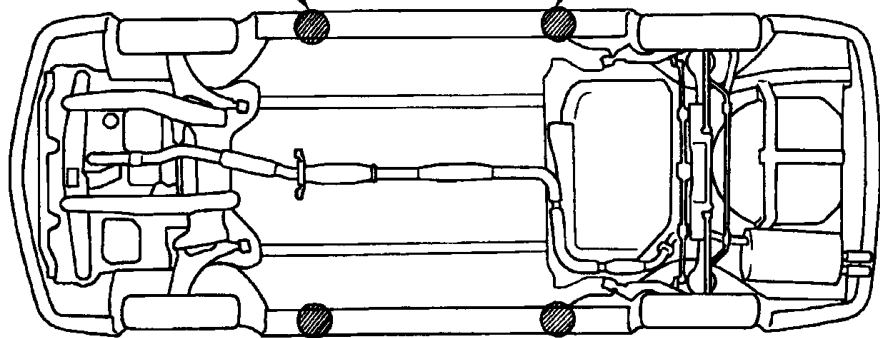
00E608



00N0031

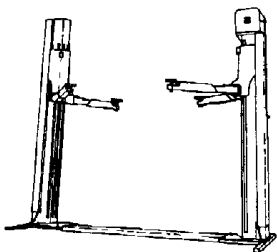


00N0032

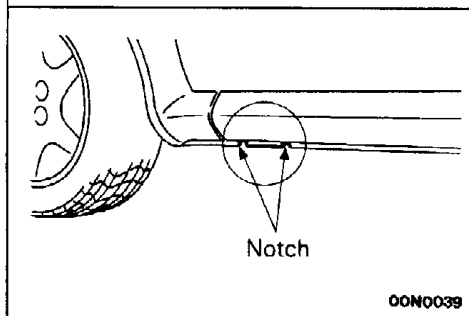


00N0038

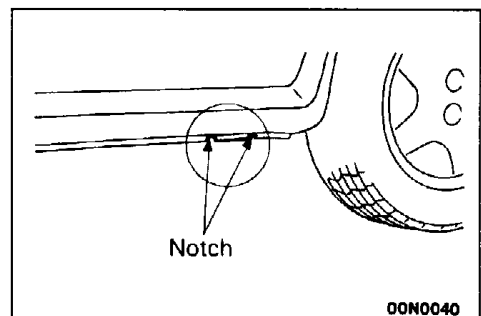
DOUBLE-POST LIFT



00E610

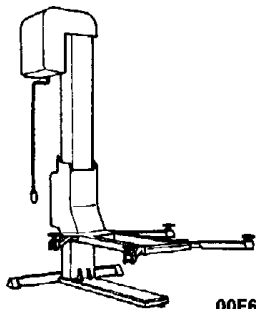


00N0039

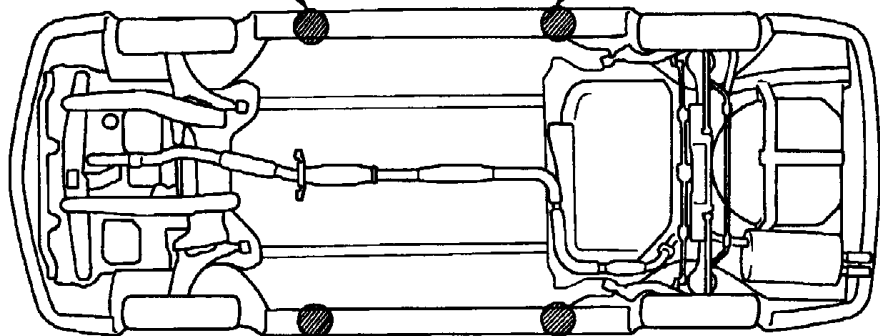


00N0040

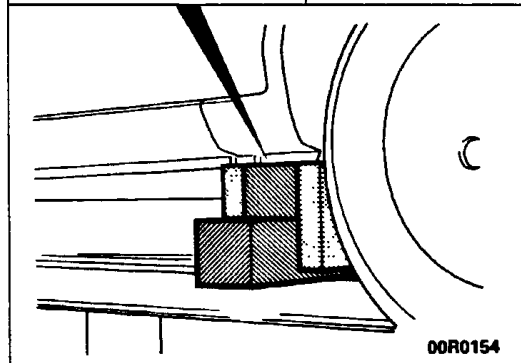
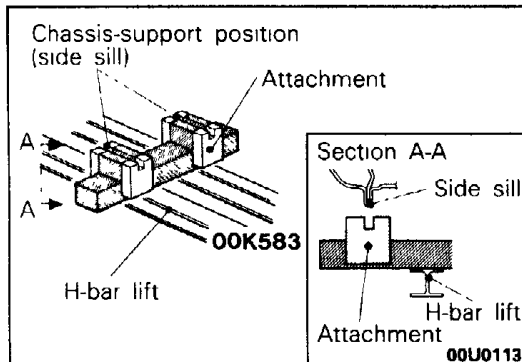
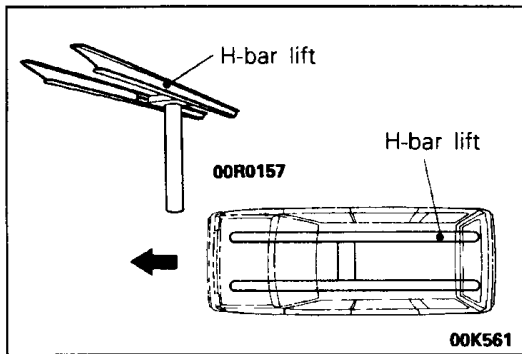
SINGLE-POST LIFT



00E609



00N0038



SUPPORT POSITIONS AND SUPPORT METHOD FOR AN H-BAR LIFT

Caution

When service procedures require removing rear suspension, fuel tank, spare tyre and rear bumper, place additional weight on rear end of vehicle or anchor vehicle to hoist to prevent tipping of centre of gravity changes.

When H-bar lift is used to lift up vehicles, use of metallic attachment attached to the H-bar lift may cause damage to the suspension arm etc. Therefore, lift up the vehicle by the following procedure.

- (1) Place the vehicle on the H-bar lift (same direction).
- (2) Place attachments on the H-bar lift at the designated chassis-support positions. When making the attachments, refer to the section concerning making them.

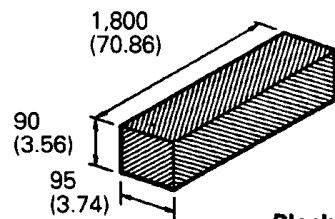
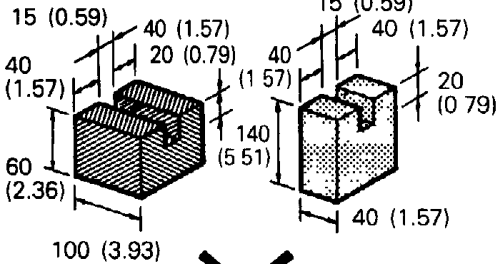
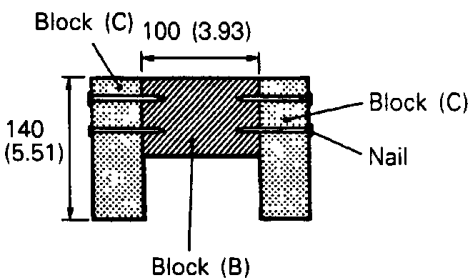
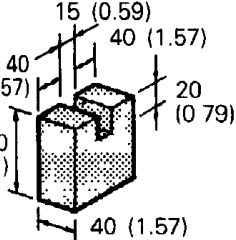
Caution

If support is at any location other than the designated positions, the body or suspension might be deformed or otherwise damaged, so care should be taken to support only at the correct (designated) positions.

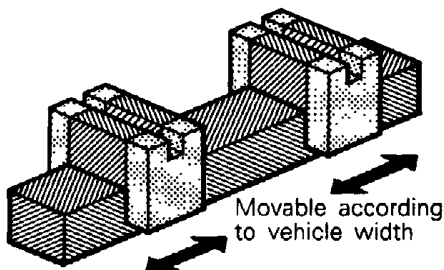
- (3) Raise the H-bar lift to the height at which the vehicle is slightly raised and check to be sure that the vehicle is correctly and sufficiently secured; then raise the vehicle.

Block (A)

mm (in.)

**Block (B)****Block (C)**

00U0111

Finished attachment

00U0112

PREPARATION OF "ATTACHMENTS"

- (1) Prepare the blocks (wooden) and nails as shown in the figure.

Item	Dimensions mm (in.)	Q'ty
Block (A)	90 × 95 × 1,800 (3.54 × 3.74 × 70.86)	2
Block (B)	60 × 100 × 95 (2.36 × 3.93 × 3.74)	4
Block (C)	140 × 40 × 95 (5.51 × 1.57 × 3.74)	8
Nail	70 (2.76) or more	32

Caution

The wood selected for the blocks must be hard.

- (2) For the (B) blocks and (C) blocks, use a saw and chisel or similar tool to make grooves of the dimensions shown in the figure.
- (3) Make four "ATTACHMENTS" such as shown in the figure, nailing (B) and (C) blocks so that each (B) block is sandwiched between (C) blocks.

STANDARD PARTS-TIGHTENING-TORQUE TABLE

E01MA-

Each torque value in the table is a standard value for tightening under the following conditions.

- (1) Bolts, nuts and washers are all made of steel and plated with zinc.
- (2) The threads and bearing surface of bolts and nuts are all in dry condition.

The values in the table are not applicable:

- (1) If toothed washers are inserted.
- (2) If plastic parts are fastened.
- (3) If bolts are tightened to plastic or die-cast inserted nuts.
- (4) If self-tapping screws or self-locking nuts are used.

Standard bolt and nut tightening torque

Bolt nominal diameter (mm)	Pitch (mm)	Torque Nm (kgm, ft.lbs.)		
		Head mark ④	Head mark ⑦	Head mark ⑧
M5	0.8	2.5 (0.25, 1.8)	5 (0.5, 3.6)	6 (0.6, 4.3)
M6	1.0	5 (0.5, 3.6)	9 (0.9, 6.5)	10 (1.0, 7.2)
M8	1.25	12 (1.2, 8.7)	22 (2.2, 16)	25 (2.5, 18)
M10	1.25	24 (2.4, 17)	45 (4.5, 33)	53 (5.3, 38)
M12	1.25	42 (4.2, 30)	83 (8.3, 60)	98 (9.8, 71)
M14	1.5	73 (7.3, 53)	140 (14.0, 101)	160 (16.0, 116)
M16	1.5	113 (11.3, 82)	210 (21.0, 152)	240 (24.0, 174)
M18	1.5	170 (17.0, 123)	310 (31.0, 224)	350 (35.0, 253)
M20	1.5	230 (23.0, 166)	420 (42.0, 304)	490 (49.0, 354)
M22	1.5	310 (31.0, 224)	570 (57.0, 412)	660 (66.0, 477)
M24	1.5	400 (40.0, 289)	750 (75.0, 542)	870 (87.0, 629)

Flange bolt and nut tightening torque

Bolt nominal diameter (mm)	Pitch (mm)	Torque Nm (kgm, ft.lbs.)		
		Head mark ④	Head mark ⑦	Head mark ⑧
M6	1.0	5 (0.5, 3.6)	10 (1.0, 7.2)	12 (1.2, 8.7)
M8	1.25	13 (1.3, 9.4)	24 (2.4, 17)	28 (2.8, 20)
M10	1.25	26 (2.6, 19)	50 (5.0, 36)	58 (5.8, 42)
M10	1.5	24 (2.4, 17)	45 (4.5, 33)	55 (5.5, 40)
M12	1.25	47 (4.7, 34)	95 (9.5, 69)	105 (10.5, 76)
M12	1.75	43 (4.3, 31)	83 (8.3, 60)	98 (9.8, 71)

Taper thread tightening torque

Thread size	Torque Nm (kgm, ft.lbs.)	
	Female thread material: Light alloy	Female thread material: Steel
NPTF 1/6	7 (0.7, 5.0)	10 (1.0, 7.2)
PT 1/8	10 (1.0, 7.2)	18 (1.8, 13)
PT 1/4, NPTF 1/4	25 (2.5, 18)	40 (4.0, 29)
PT 3/8	48 (4.8, 35)	68 (6.8, 49)

NOTE: NPTF is dry seat pipe thread, while PT is pipe thread.

MAIN SEALANT AND ADHESIVE TABLE

E002A-

Application	Recommended brand
1. Sealants for engine accessories	
(1) Sealing between rocker cover and camshaft bearing cap (4G6 DOHC and 6G7 engines only)	3M ATD Part No. 8660 or equivalent
(2) ● Sealing between semi-circular packing and rocker cover and between semi-circular packing and cylinder head ● Oil pressure switch (except 4G1 and 6G7 engines)	3M ATD Part No. 8660 or equivalent
(3) Engine coolant temperature switch, Engine coolant temperature sensor, Thermo valve, Thermo switch, Joints, Engine coolant temperature gauge unit (large size)	3M Nut Locking Part No. 4171 or equivalent
(4) Engine coolant temperature gauge unit (small size, MD091056 only)	3M ATD Part No. 8660 or equivalent
(5) Oil pan (except 4G5 engine)	MITSUBISHI GENUINE Part No. MD970389 or equivalent
2. Sealing between glass and weatherstrip	
(1) ● Sealing between tempered glass and weatherstrip	3M ATD Part No. 8513 or equivalent
● Sealing between body flange and weatherstrip	3M ATD Part No. 8509 or equivalent
(2) Sealing between laminated glass and weatherstrip	3M ATD Part No. 8509 or equivalent

Application	Recommended brand
3. Adhesion with ribbon sealer ● Waterproof film for door ● Fender panel ● Splash shield ● Mud guard ● Rear combination lamp	3M ATD Part No. 8625 or equivalent
4. Adhesives for interior trim	
(1) Adhesion of polyvinyl-chloride sheet	3M Part No. EC-1368 or equivalent
(2) Adhesion of door weatherstrip to body	3M ATD Part No. 8001 or 3M ATD Part No. 8011 or equivalent
(3) Sealing between grommet or packing and metal seal	3M ATD Part No. 8513 or equivalent
(4) ● Adhesion of headlining and other interior trim materials ● Adhesion of fuel tank to pad	3M Part No. EC-1368 or 3M ATD Part No. 8080 or equivalent
5. Body sealant ● Sealing of sheet metal, drip rail, floor, body side panel, trunk, front panel and the like joints ● Sealing of tailgate hinges	3M ATD Part No. 8531 or 3M ATD Part No. 8646 or equivalent

Application	Recommended brand
6. Chassis sealant	
(1) ● Sealing of flange surfaces and threaded portions ● Fuel gauge unit packing	3M ATD Part No. 8659 or equivalent
(2) Sealing of flange surfaces, threaded portions, packing and dust cover ● Differential carrier packing ● Dust covers for ball joint and linkage ● Steering gear box packing and shims ● Steering gear housing rack support cover and top cover ● Mating surface of knuckle arm flange	3M ATD Part No. 8663 or equivalent
(3) Sealing between accelerator arm bracket and toeboard	Drying sealant
(4) Sealant for drum brake shoe hold-down pin and wheel cylinder	3M ATD Part No. 8513 or equivalent
7. Fast bonding adhesive Adhesion of all materials except polyethylene, polypropylene, fluorocarbon resin or other materials with highly absorbent surface	3M ATD Part No. 8155 or equivalent
8. Anaerobic fast bonding adhesives	
(1) Fixing of bolts and screws ● Tightening of drive gear to differential case ● Bolts for coupling tilt steering upper column with lower column	3M Stud locking Part No. 4170 or equivalent
(2) Fixing of bearing, fan, pulley and gear connections	
(3) Sealing of small recess or flange surface	
9. Undercoat	3M ATD Part No. 8864 or equivalent

ENGINE

CONTENTS

E11AA--

SPECIFICATIONS	2	OIL PAN	18
General Specifications	2	TIMING BELT <SOHC>	20
Service Specifications	2	TIMING BELT <DOHC>	24
Sealants	3	CAMSHAFT OIL SEALS <SOHC>	30
SPECIAL TOOLS	4	CAMSHAFT OIL SEALS <DOHC>	31
SERVICE ADJUSTMENT PROCEDURES		CRANKSHAFT FRONT OIL SEAL	33
<SOHC>	6	CRANKSHAFT REAR OIL SEAL	34
Drive Belt Tension Inspection and	6	CYLINDER HEAD GASKET <SOHC>	36
Adjustment		CYLINDER HEAD GASKET <DOHC>	39
Ignition Timing Inspection and	7	ENGINE ASSEMBLY <SOHC>	42
Adjustment		ENGINE ASSEMBLY <DOHC>	45
Idle Speed Inspection	8		
Idle Mixture Inspection	8-1		
Compression Pressure Inspection	9		
Manifold Vacuum Inspection	10		
Timing Belt Tension Adjustment	11		
Lash Adjuster Inspection	11		
SERVICE ADJUSTMENT PROCEDURES			
<DOHC>	12		
Drive Belt Tension Inspection and	12		
Adjustment			
Ignition Timing Inspection and Adjustment	13		
<Vehicles built up to November, 1992>			
Ignition Timing Inspection	14-1		
<Vehicles built from December, 1992>			
Idle Speed Inspection	15		
Idle Mixture Inspection	15		
Compression Pressure Inspection	16		
Manifold Vacuum Inspection	17		

SPECIFICATIONS

GENERAL SPECIFICATIONS

E11CA--

Items	6G72-SOHC	6G72-DOHC
Number of cylinder and arrangement	6, V-type	6, V-type
Total displacement cc (cu.in.)	2,972 (181.4)	2,972 (181.4)
Bore×Stroke mm (in.)	91.1×76	91.1×76
Compression ratio	10.0	10.0
Firing order	1-2-3-4-5-6	1-2-3-4-5-6
Combustion chamber	Compact type	Pentroof type
Lash adjuster	Equipped	Equipped

SERVICE SPECIFICATIONS

E11CB--

Items	6G72-SOHC	6G72-DOHC
Standard value		
Drive belt deflection mm (in.)		
Alternator and power steering oil pump		
When checked	6.0–9.0 (0.24–0.35)	–
When a new belt is installed	4.0–5.0 (0.16–0.20)	–
When used belt is installed	6.0–8.0 (0.24–0.31)	–
Air conditioner compressor		
When checked	7.5–9.5 (0.30–0.37)	–
When a new belt is installed	6.5–7.0 (0.26–0.28)	–
When used belt is installed	7.5–8.5 (0.30–0.34)	–
Alternator* ¹ or alternator and air conditioner compressor* ²		
When checked	–	4.0–5.5 (0.16–0.22)
When a new belt is installed	–	3.5–4.0 (0.14–0.16)
When used belt is installed	–	4.0–5.0 (0.16–0.20)
Power steering oil pump		
When checked	–	9.0–11.0 (0.35–0.43)* ³ or 9.5–13.5 (0.37–0.53)* ⁴
When a new belt is installed	–	7.0–8.5 (0.28–0.33)* ³ or 7.5–9.0 (0.30–0.35)* ⁴
When used belt is installed	–	9.0–11.0 (0.35–0.43)* ³ or 10.5–12.5 (0.41–0.49)* ⁴

NOTE

- (1) The *¹ symbol is applicable to models without air conditioner
 (2) The *² symbol is applicable to models with air conditioner
 (3) The *³ symbol is applicable to vehicles built up to October, 1991
 (4) The *⁴ symbol is applicable to vehicles built from November, 1991

Items	6G72 – SOHC	6G72 – DOHC
Timing belt tension torque Nm (kgm, ft.lbs.)	—	10 (1.0, 7.2)
Auto tensioner rod protrusion mm (in.)	—	3.8–4.5 (0.15–0.18)
Ignition timing	5° BTDC ± 2°	5° BTDC ± 2°*5 or 5° BTDC ± 3°*6
Engine Idle speed r/min.	700 ± 100	700 ± 100
CO concentration and HC concentration at idle		
CO concentration %	0.5 or less	0.5 or less
HC concentration ppm	100 or less	100 or less
Intake manifold vacuum mmHg (in.Hg)	Approx. 515 (20)	Approx. 520 (20)
Limit		
Engine compression pressure kPa (kg/cm ² , psi)	min. 1050 (10.5, 149)	min. 980 (9.8, 139)
Engine compression pressure difference between each cylinder kPa (kg/cm ² , psi)	max. 100 (1.0, 14)	max. 100 (1.0, 14)

NOTE

(1) The *5 symbol is applicable to vehicles built up to November, 1992

(2) The *6 symbol is applicable to vehicles built from December, 1992

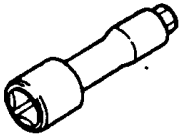
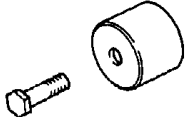
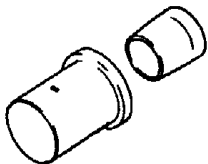
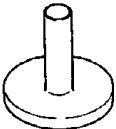
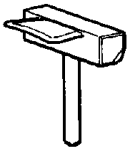
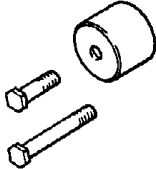
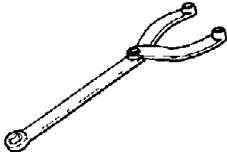
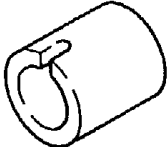
SEALANTS

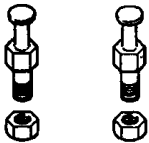
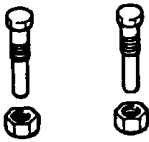
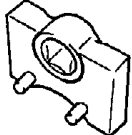
E11CE--

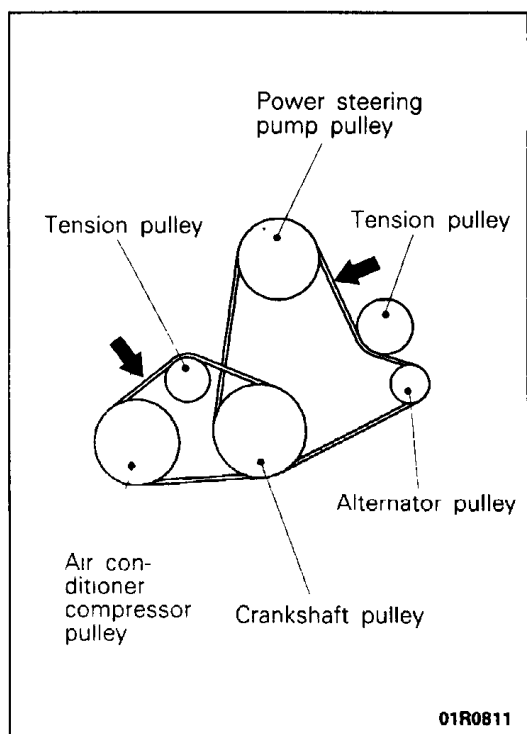
Items	Specified sealants	Characteristics
Rocker cover and camshaft bearing cap seal	3M ATD Part No. 8660 or equivalent	Semi-drying sealant
Oil pan	MITSUBISHI GENUINE Part No. MD970389 or equivalent	

SPECIAL TOOLS

E11DA--

Tool	Number	Name	Use
	MD998051	Cylinder head bolt wrench	Loosening and tightening of cylinder head bolt
	MD998713	Camshaft oil seal installer	Installation of camshaft oil seal <SOHC>
	MD998717	Crankshaft front oil seal installer	Installation of crankshaft front oil seal
	MD998718	Crankshaft rear oil seal installer	Installation of crankshaft rear oil seal
	MD998727	Oil pan remover	Removal of oil pan <SOHC, DOHC built up to October, 1992>
	MD998761	Camshaft oil seal installer	Installation of camshaft oil seal <DOHC>
	MB990767	End yoke holder	Supporting the sprocket and shaft pulley when attaching or detaching them
	MD998716	Crankshaft wrench	Used if the crankshaft needs to be rotated to attach the timing belt, etc. when the piston and connecting rod assembly is assembled. <SOHC>

Tool	Number	Name	Use
	MD998719	Crankshaft pulley holder	Supporting the crankshaft pulley when crankshaft bolt and pulley are removed or reinstalled. Use together with MB990767 <SOHC>
	MD998754	Crankshaft pulley holder	Supporting the crankshaft pulley when crankshaft bolt and pulley are removed or reinstalled. Use together with MB990767 <DOHC>
	MD998767	Socket wrench	Adjustment of timing belt <DOHC>
	MB990968	Torque wrench	Adjustment of timing belt <DOHC>
	MD998769	Crankshaft pulley spacer	Used if the crankshaft needs to be rotated to attach the timing belt etc. <DOHC>



SERVICE ADJUSTMENT PROCEDURES <SOHC>

DRIVE BELT TENSION INSPECTION AND ADJUSTMENT

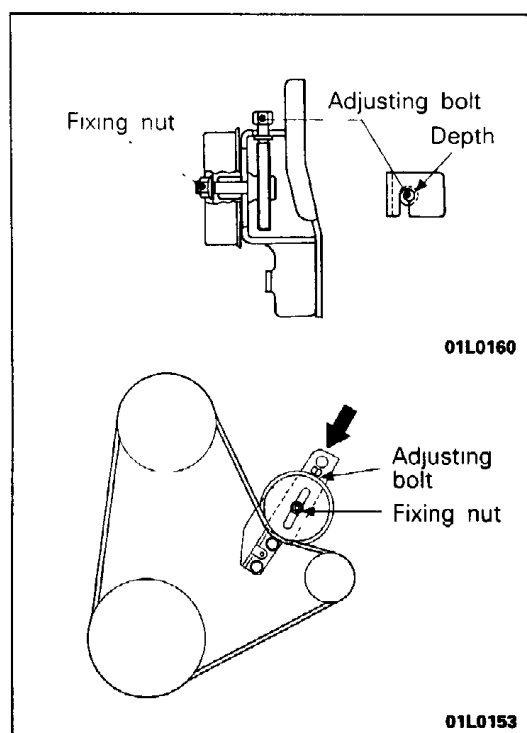
E11FQBA

Check the tension by pulling or pushing at the centre of the belt between pulleys with a force of 100N (10 kg, 22 lbs.) as indicated in the figure. Measure drive belt tension.

Standard value:

mm (in.)

Items	Check value	Adjustment value	
		New belt	Used belt
For alternator and P/S pump	6.0–9.0 (0.24–0.35)	4.0–5.0 (0.16–0.20)	6.0–8.0 (0.24–0.31)
For A/C compressor	7.5–9.5 (0.30–0.37)	6.5–7.0 (0.26–0.28)	7.5–8.5 (0.30–0.34)



ALTERNATOR AND POWER STEERING PUMP DRIVE BELT TENSION ADJUSTMENT

- (1) Loosen tension pulley fixing bolt.
- (2) Adjust belt deflection with adjusting bolt.

Caution

Put the adjusting bolt into the recess at the far depth of the elongated hole on the tension bracket.

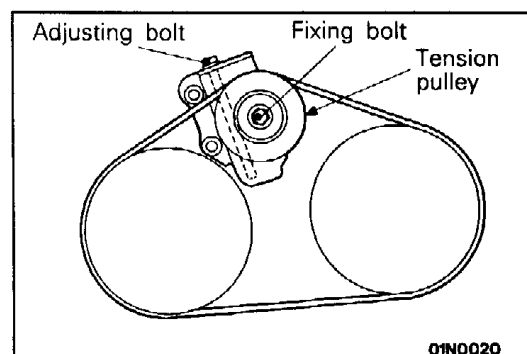
- (3) Tighten the fixing nut.

Tightening torque: 50 Nm (5 kgm, 36 ft.lbs.)

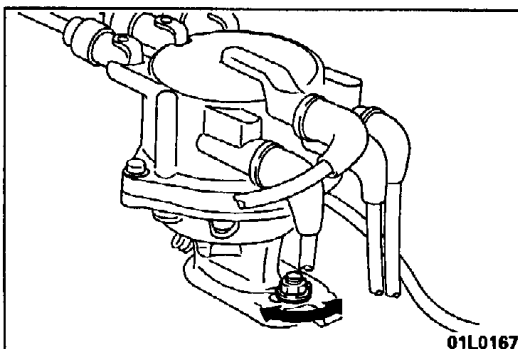
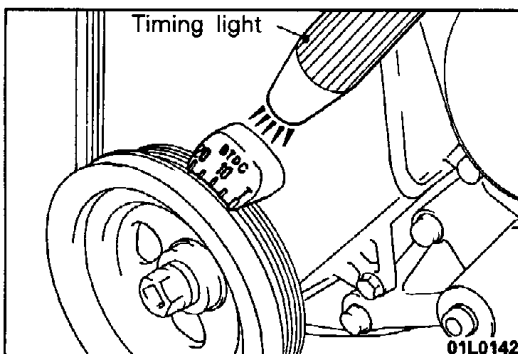
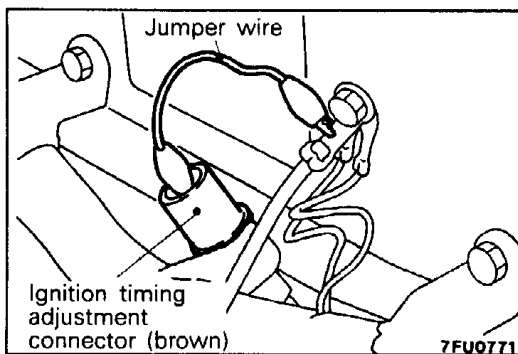
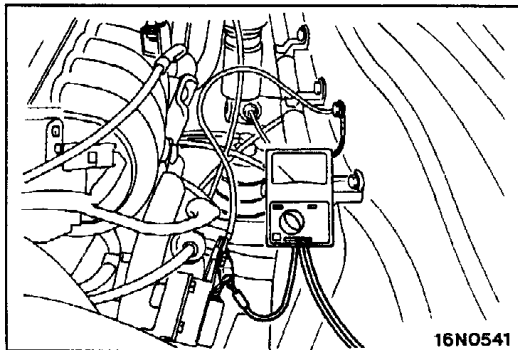
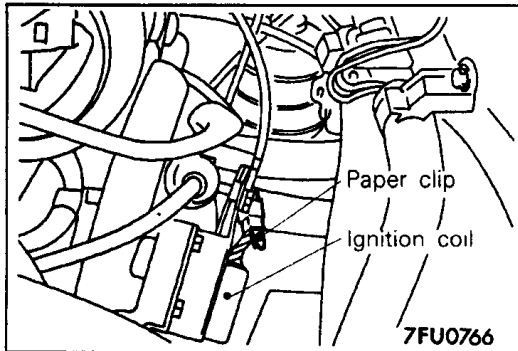
- (4) Run the engine one time or more.
- (5) Check the deflection or belt tension. Readjust, if necessary.

Caution

Before checking, turn the engine one time or more.



AIR CONDITIONER COMPRESSOR DRIVE BELT TENSION ADJUSTMENT



IGNITION TIMING INSPECTION AND ADJUSTMENT

E11FU8A

- (1) Before inspection and adjustment set vehicle in the following condition.
 - Engine coolant temperature: 80–95°C (176–205°F)
 - Lamps, electric cooling fan and all accessories: OFF
 - Transmission: Neutral (P range on vehicles with A/T)
 - Steering wheel: Straight forward position.
- (2) Insert a paper clip from harness side into the 3-pin connector between the primary side of the ignition coil and the tachometer.
- (3) Connect a primary-voltage-detection type of tachometer to the paper clip.

NOTE

Do not use the Multi-use tester.

If tested with the Multi-use tester connected to the diagnosis connector, the ignition timing will not be the basic timing but be ordinary timing.

- (4) Set up a timing light.
- (5) Start the engine and run at idle.
- (6) Check that engine idle speed is within the standard value.

Standard value: 700±100 r/min.

- (7) Turn the ignition switch to OFF.
- (8) Remove the waterproof connector from the ignition timing adjustment connector (brown).
- (9) Connect the jumper wire with the clip to the ignition timing adjustment terminal, and earth this to the body as illustrated.

NOTE

Grounding this terminal sets the engine to the basic ignition timing.

- (10) Start the engine and run it at idle.
- (11) Check that basic ignition timing is within the standard value.

Standard value: 5° BTDC±2°

- (12) If not within the standard value, loosen distributor fixing nut and adjust by rotating distributor body.

NOTE

The ignition timing will be advanced if the distributor is turned in a clockwise direction, and retarded if it is turned in a anticlockwise direction.

- (13) Tighten mounting nut after adjusting.

- (14) Stop the engine, remove the jumper wire from the ignition timing adjustment connector (brown), and return the connector to its original condition.
- (15) Start the engine and check that ignition timing is at the standard value.

Standard value: approx. 15° BTDC

NOTE

1. Ignition timing is variable within about $\pm 7^\circ$, even under normal operating.
 2. And it is automatically further advanced by about 5° from 15° BTDC at higher altitudes.
- (16) Sealing tape is to be attached to the fitting nut only for vehicles for Switzerland.

NOTE

Sealing tape is attached to all vehicles when new.

IDLE SPEED INSPECTION

E11FXCR

- (1) Before inspection and adjustment set vehicles in the following condition.
 - Engine coolant temperature: 80–95°C (176–205°F)
 - Lamps, electric cooling fan and all accessories: OFF
 - Transmission: Neutral (P range on vehicles with A/T)
 - Steering wheel: Straight forward position

- (2) Check the ignition timing. Adjust if necessary.

Standard value: 5° BTDC $\pm 2^\circ$

- (3) After turning the ignition switch to OFF, connect the multi-use tester to the diagnosis connector (white).
- (4) Start the engine and run it at idle.
- (5) Run the engine at idle for 2 minutes.
- (6) Check the idle speed. Select item No. 38 and take a reading of the idle speed.

Curb idle speed: 700 $\pm$ 100 r/min.

NOTE

The idle speed is adjusted automatically by the idle speed control (ISC) system.

- (7) If there is a deviation from the standard value, refer to GROUP 13 – Check Chart Classified by Problem Symptoms, and check the MPI components.

IDLE MIXTURE INSPECTION

1. Before inspection, set vehicles in the following condition:
 - Engine coolant temperature: 80–95°C (176–203°F)
 - Lamps, electric cooling fan and all accessories: OFF
 - Transmission: Neutral (P range on vehicles with A/T)
2. Check that the basic ignition timing is within the standard value.

Standard value: 5° BTDC ± 2°

3. After turning the ignition switch to OFF, connect the multi-use tester (MUT) to the diagnosis connector (white).
4. Start the engine and run it at 2,500 rpm for 2 minutes.
5. Set the CO, HC tester.
6. Check the CO concentration and the HC concentration at idle.

Standard value

CO concentration: 0.5% or less

HC concentration: 100 ppm or less

7. If there is a deviation from the standard value, check the following items:
 - Diagnosis output
 - Closed-loop control (When the closed-loop control is carried out normally, the output signal of the oxygen sensor changes between 0–400mV and 600–1,000mV at idle.)
 - Combustion pressure
 - Injector
 - Ignition coil, spark plug cable, spark plug
 - Leak in the EGR system and in the EGR valve
 - Evaporative emission control system
 - Compression pressure

NOTE

Replace the three way catalyst when the CO and HC concentrations do not remain inside the standard value, even though the result of the inspection is normal on all items.

NOTES

COMPRESSION PRESSURE INSPECTION

E11FGBM

- (1) Before inspection, check that the engine oil, starter and battery are normal. Also, set the vehicle to the following condition:

- Engine coolant temperature: 80–95°C (176–205°F)
- Lamps, electric cooling fan and all accessories: OFF
- Transmission: Neutral (P range on vehicle with A/T)
- Steering wheel: Straight forward position

- (2) Disconnect the spark plug cables.
 (3) Remove all of the spark plugs.
 (4) Disconnect the distributor connector.

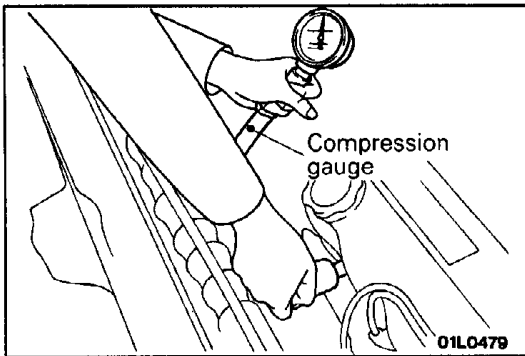
NOTE

Doing this will prevent the engine control unit from carrying out ignition and fuel injection.

- (5) Cover the spark plug hole with a rag etc., and after the engine has been cranked, check that no foreign material is adhering to the rag.

Caution

1. **Keep away from the spark plug hole when cranking.**
2. **If compression is measured with water, oil, fuel, etc., that has come from cracks inside the cylinder, these materials will become heated and will gush out from the spark plug hole, which is dangerous.**



- (6) Set compression gauge to one of the spark plug holes.
 (7) Crank the engine with the throttle valve fully open and measure the compression pressure.

Limit: min. 1,050 kPa (10.5kg/cm², 149 psi.)

- (8) Measure the compression pressure for all the cylinders, and check that the pressure differences of the cylinders are below the limit.

Limit: max. 100 kPa (1.0 kg/cm², 14 psi)

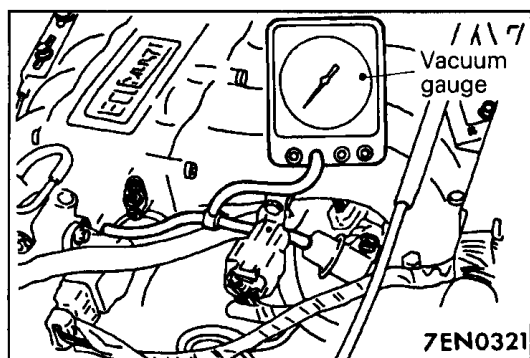
- (9) If there is a cylinder with compression or a compression difference that is outside the limit, pour a small amount of engine oil through the spark plug hole, and repeat the operations in steps (7) and (8).

- ① If the compression increases after oil is added, the cause of the malfunction is a worn or damaged piston ring and/or cylinder inner surface.
- ② If the compression does not rise after oil is added, the cause is a burnt or defective valve seat, or pressure is leaking from the gasket.

- (10) Connect the distributor connector.
 (11) Install the spark plugs and spark plug cables.
 (12) Use the multi-use tester to erase the self-diagnosis codes.

NOTE

This will erase the problem code resulting from the distributor connector being disconnected.

**MANIFOLD VACUUM INSPECTION**

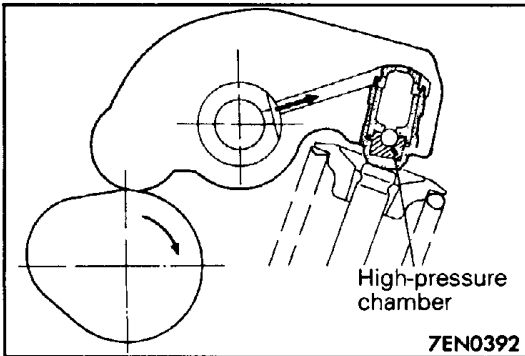
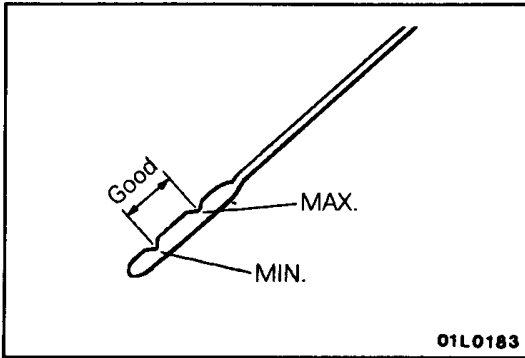
E11FWAS

- (1) Start the engine and allow it to warm up until the temperature of the coolant reaches 80 to 95°C (176 to 205°F).
- (2) Connect a tachometer.
- (3) Attach a three-way union to the vacuum hose between the fuel pressure regulator and the air intake plenum, and connect a vacuum gauge.
- (4) Start the engine and check that idle speed is within specification. The read off the vacuum gauge.

Standard value: Approx. 515 mmHg (20 in.Hg)

- (5) If not within specification, refer to following chart for cause and repair.

Symptom	Probable cause	Remedy
Vacuum gauge reads under standard value but pointer is stable.	• Delayed ignition timing.	• Adjust ignition timing.
Vacuum gauge pointer fluctuates slowly.	• Idle mixture concentration too rich.	• Check MPI system.
Vacuum gauge reading decreases irregularly.	• Idle mixture concentration too lean.	• Check MPI system.
Vacuum gauge pointer decreases about 30–160 mmHg (1.18–6.30 in.Hg) intermittently.	• Burned, warped or pitted valves.	• Install new valves.
Vacuum gauge pointer suddenly decreases about 250 mmHg (9.84 in.Hg) from standard value and then returns.	• Blown cylinder head gasket.	• Install new cylinder head gasket.



LASH ADJUSTERS CHECK

E11FBAF1

NOTE

Soon after the engine is started or while it is running, abnormal noise (clattering) which may be attributed to the adjuster sounds but does not stop. In this case, check the following.

- (1) Check the engine oil, and refill or replace oil if necessary.

NOTE

1. If the oil amount is small, air will be sucked from the oil strainer and mixed in the oil passage.
2. If the oil amount is excessive, the oil will be stirred by the crank and mixed with a large amount of air.
3. Air and oil can not be separated easily in the deteriorated oil, and the amount of air mixed in the oil increases.

If such mixed-in air enters the high pressure chamber in the lash adjuster, the air in the high-pressure chamber will be compressed while the valve is opened, the lash adjuster will be excessively compressed and abnormal noise will be produced when the valve is closed.

This is the same phenomenon which occurs when the valve clearance is improperly adjusted to the excessively large.

However, it will return to the normal if the air entrapped in the adjuster is released in this case.

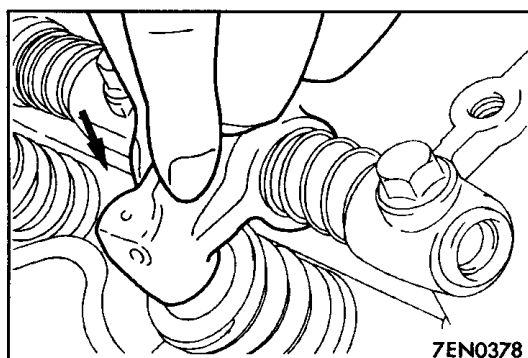
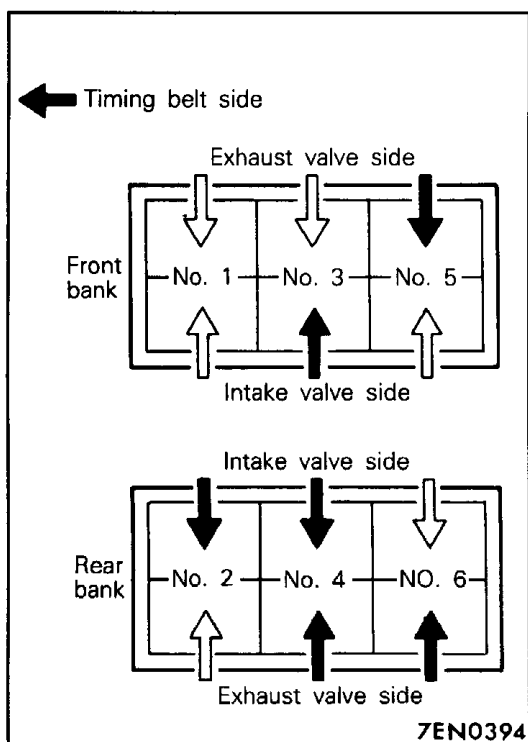
- (2) Start the engine, and slowly race* it several times (10 times or less).

If the abnormal noise is eliminated by racing the engine, it means that the air is released from the high-pressure chamber of the lash adjuster and the function of the lash adjuster is returned to normal.

* Gradually increase the engine speed from the idle speed to 3,000 r/min. (for 30 seconds), and then gradually slow down the engine to the idling speed (for 30 seconds).

NOTE

1. If the vehicle is parked on a slope for a long time, the oil will be sometimes reduced in the lash adjuster, and air will enter the high-pressure chamber when the engine is started.
2. After the vehicle is parked for a long time, the oil will go out of the oil passage. Since it takes a little time to supply oil to the lash adjuster, air sometimes enters the high-pressure chamber.



(3) If any abnormal noise is not eliminated by racing, check the lash adjuster.

- ① Stop the engine.
- ② Set the engine so that cylinder No. 1 is positioned at the top dead centre of the compression.
- ③ Press the rocker arm at the area indicated by the ← arrow mark to check whether the rocker arm is lowered or not.
- ④ Slowly turn the crankshaft 360 degrees clockwise.
- ⑤ In the same procedure as Step③, check the rocker arm at the area indicated by the ← arrow mark.

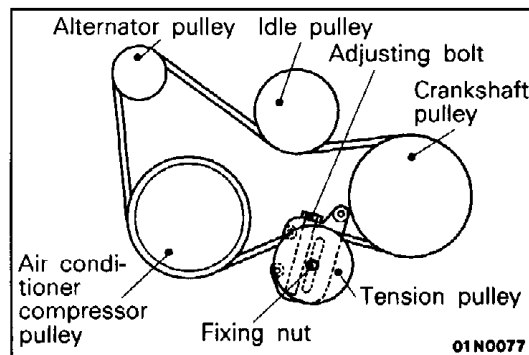
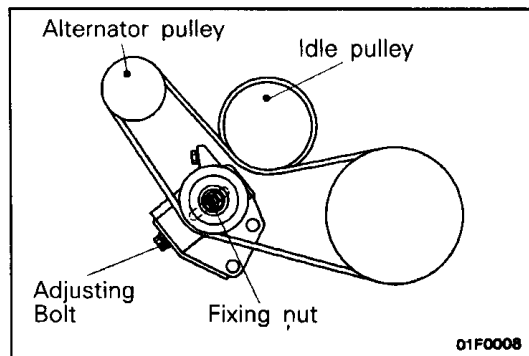
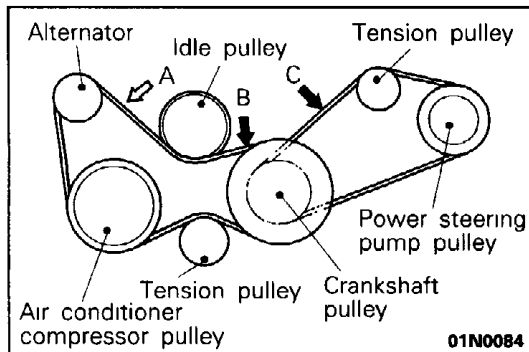
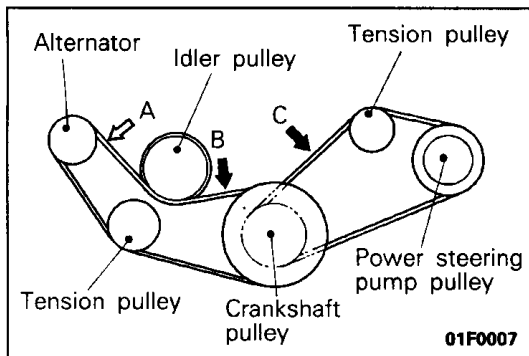
⑥ If the rocker arm is lowered when it is pressed, replace the lash adjuster.

When the lash adjuster is replaced, bleed air from all adjusters and assemble them. Recheck them following Steps ① to ⑤.

Moreover, if it is felt to be so hard that the rocker arm is not lowered when it is pressed, the lash adjuster is normal. Check for other causes of the abnormality.

NOTE

For the air bleeding procedure of the lash adjuster, refer to the engine workshop manual.



SERVICE ADJUSTMENT PROCEDURES <DOHC>

DRIVE BELT TENSION INSPECTION AND ADJUSTMENT

Check the tension by pulling or pushing at the centre of the belt between pulleys with a force of 100N (10 kg, 22 lbs.) as indicated in the figure. Measure drive belt tension.

Standard value:

mm (in.)

Items		Check value	Adjustment value	
			New belt	Used belt
For alternator or alternator and A/C compressor	A or B	4.0–5.5 (0.16–0.22)	3.5–4.0 (0.14–0.16)	4.0–5.0 (0.16–0.20)
P/S pump	C	9.0–11.0* ¹ (0.35–0.43) or 9.5–13.5* ² (0.37–0.53)	7–8.5* ¹ (0.28–0.33) or 7.5–9.0* ² (0.30–0.35)	9.0–11.0* ¹ (0.35–0.43) or 10.5–12.5* ² (0.41–0.49)

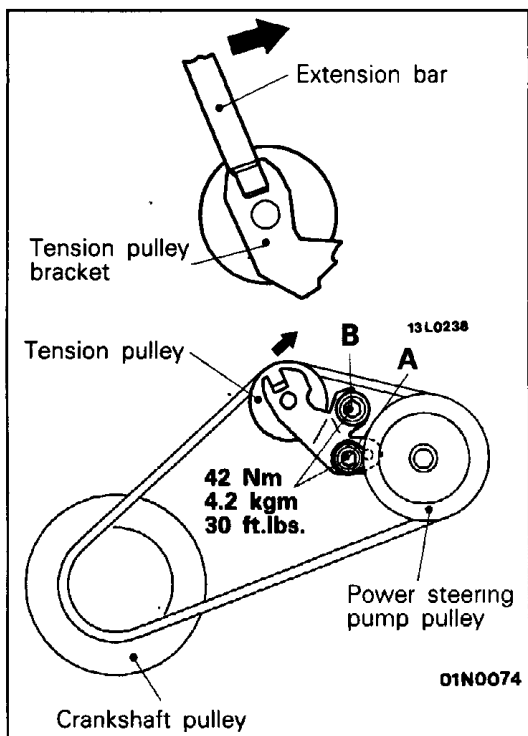
NOTE

*¹: Vehicles built up to October, 1991

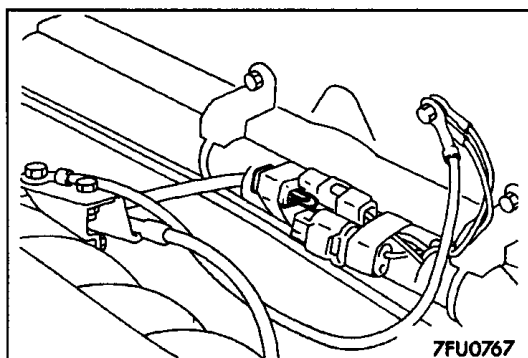
*²: Vehicles built from November, 1991

ALTERNATOR DRIVE BELT TENSION ADJUSTMENT <DOHC> <Vehicle without air conditioner>

ALTERNATOR AND AIR CONDITIONER COMPRESSOR DRIVE BELT TENSION ADJUSTMENT <DOHC> <Vehicle with air conditioner>

**POWER STEERING PUMP DRIVE BELT TENSION ADJUSTMENT**

- (1) Insert an extension bar [insertion depth 12.7 mm (0.5 in.)], etc. into the opening at the end of the tension pulley bracket.
- (2) Use straight handle box wrench to loosen the tension pulley fixing bolts in the order of A and B.
- (3) Move the extension bar installed to the tension pulley in the direction of arrow to adjust the belt tension.
- (4) Use straight handle box wrench to tighten the tension pulley fixing bolts in the order of A and B.
- (5) Give the crankshaft one turn or more in normal direction (clockwise) to run in the belt.
- (6) Check the belt deflection. Readjust, if necessary.

**IGNITION TIMING INSPECTION AND ADJUSTMENT <Vehicles built up to November, 1992>**

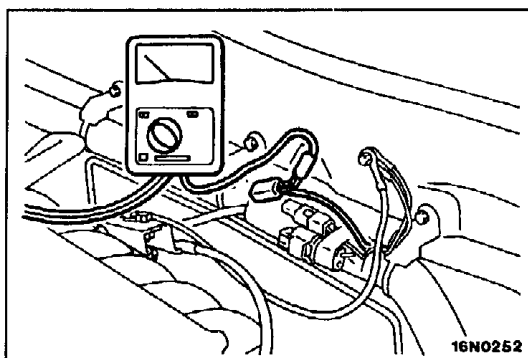
E11FUBB

- (1) Before inspection and adjustment set vehicle in the following condition.
 - Engine coolant temperature: 80–95°C (176–205°F)
 - Lamps, electric cooling fan and all accessories: OFF
 - Transmission: Neutral (P range on vehicles with A/T)
 - Steering wheel: Straight forward position
- (2) Insert a paper clip into the 1-pin connector (blue) as shown in the illustration.
- (3) Connect a primary-voltage-detection type of tachometer to the paper clip.

NOTE

Do not use the Multi-use tester.

If tested with the Multi-use tester connected to the diagnosis connector, the ignition timing will not be the basic timing but be ordinary timing.



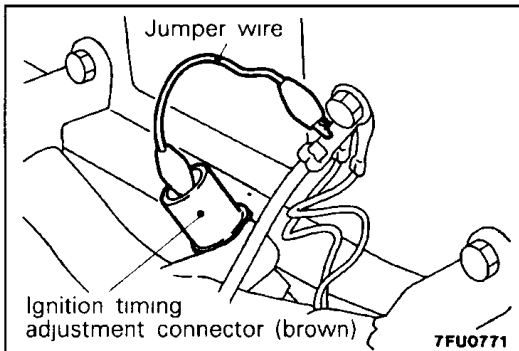
- (4) Set the timing light.
- (5) Start the engine and run at idle.
- (6) Check that engine idle speed is within the standard value.

Standard value: 700±100 r/min.

NOTE

The engine speed indicated is a third of actual speed. In other words, the reading of the tachometer times 3 is actual speed.

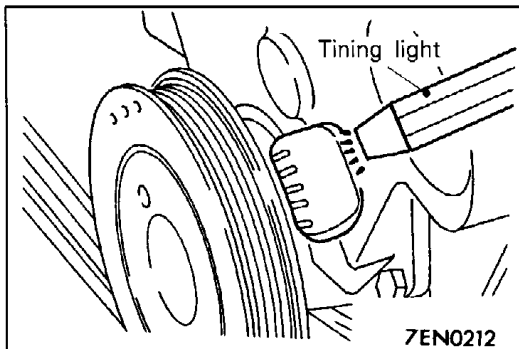
- (7) Turn the ignition switch to OFF.



- (8) Remove the waterproof connector from the ignition timing adjustment connector (brown).
- (9) Connect the jumper wire with the clip to the ignition timing adjustment terminal, and earth this to the body as illustrated.

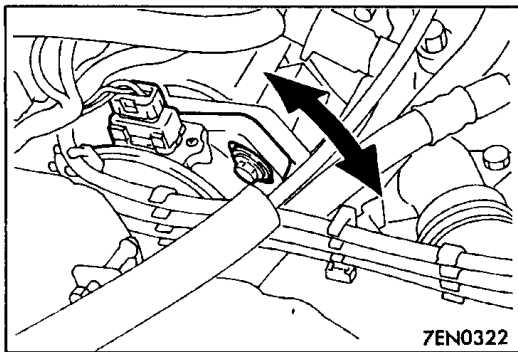
NOTE

Grounding this terminal sets the engine to the basic ignition timing.



- (10) Start the engine and run at idle.
- (11) Check that basic ignition timing is within the standard value.

Standard value: 5° BTDC ± 2°



- (12) If there is a deviation from the standard value, loosen holding nut of the crankshaft angle sensor, and then rotate the crankshaft angle sensor to adjust.

NOTE

The ignition timing is advanced when the crankshaft angle sensor itself is turned clockwise direction, and is retarded when turned anticlockwise direction.

- (13) After adjustment, tighten the nut.

Caution

Be careful; when tightening the nut, that the crankshaft-angle sensor does not move.

- (14) Stop the engine, remove the jumper wire from the ignition timing adjustment connector (brown), and return the connector to its original condition.
- (15) Start the engine and check that ignition timing is at the standard value.

Standard value: approx. 15° BTDC

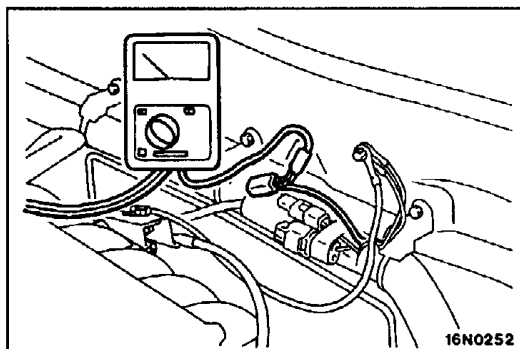
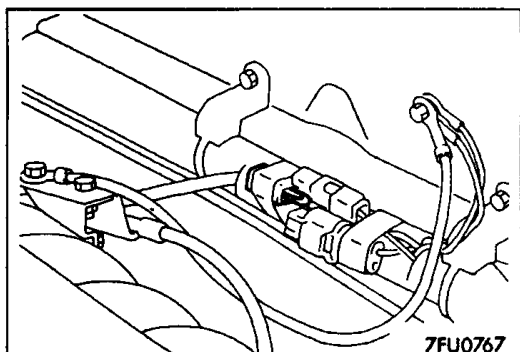
NOTE

1. Ignition timing is variable within about ± 7°, even under normal operating.
2. And it is automatically further advanced by about 5° from 15° BTDC at higher altitudes.

- (16) Sealing tape is to be attached to the fitting nut only for vehicles for Switzerland.

NOTE

Sealing tape is attached to all vehicles when new.



IGNITION TIMING INSPECTION <Vehicles built from December, 1992>

E11FUBB

- (1) Before inspection and adjustment set vehicle in the following condition.
 - Engine coolant temperature: 80–95°C (176–205°F)
 - Lamps, electric cooling fan and all accessories: OFF
 - Transmission: Neutral (P range on vehicles with A/T)
 - Steering wheel: Straight forward position
- (2) Insert a paper clip into the 1-pin connector (blue) as shown in the illustration.

- (3) Connect a primary-voltage-detection type of tachometer to the paper clip.

NOTE

Do not use the Multi-use tester.

If tested with the Multi-use tester connected to the diagnosis connector, the ignition timing will not be the basic timing but be ordinary timing.

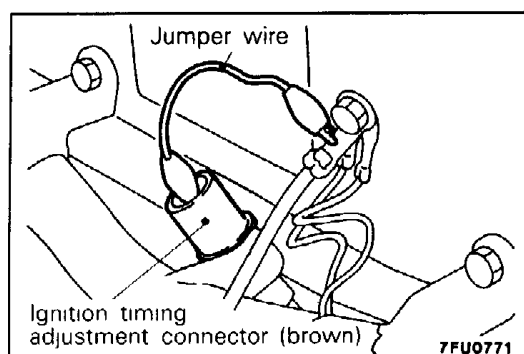
- (4) Set the timing light.
- (5) Start the engine and run at idle.
- (6) Check that engine idle speed is within the standard value.

Standard value: 700±100 r/min.

NOTE

The engine speed indicated is a third of actual speed. In other words, the reading of the tachometer times 3 is actual speed.

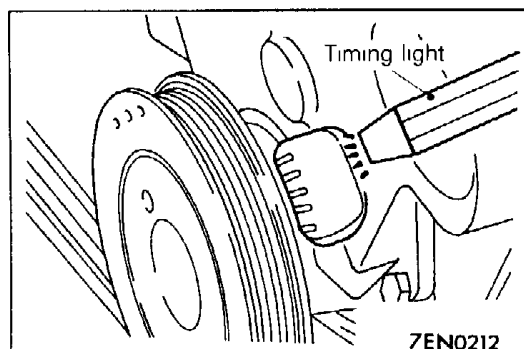
- (7) Turn the ignition switch to OFF.



- (8) Remove the waterproof connector from the ignition timing adjustment connector (brown).
- (9) Connect the jumper wire with the clip to the ignition timing adjustment terminal, and earth this to the body as illustrated.

NOTE

Grounding this terminal sets the engine to the basic ignition timing.



- (10) Start the engine and run at idle.
- (11) Check that basic ignition timing is within the standard value.

Standard value: 5° BTDC ± 3°

- (12) If there is a deviation from the standard value, refer to GROUP 13 – On Vehicle Inspection of MPI Components and check the crank angle sensor.

- (13) Stop the engine, remove the jumper wire from the ignition timing adjustment connector (brown), and return the connector to its original condition.
- (14) Start the engine and check that ignition timing is at the standard value.

Standard value: approx. 15° BTDC

NOTE

- 1. Ignition timing is variable within about $\pm 7^\circ$, even under normal operating.
- 2. And it is automatically further advanced by about 5° from 15° BTDC at higher altitudes.

IDLE SPEED INSPECTION

E11FXCS

- (1) Before inspection and adjustment set vehicles in the following condition.
- Engine coolant temperature: 80–95°C (176–205°F)
 - Lamps, electric cooling fan and all accessories: OFF
 - Transmission: Neutral (P range on vehicles with A/T)
- (2) Check the ignition timing. (Refer to P.11-13.)

Standard value:**Vehicles built up to November, 1992 5° BTDC ± 2°****Vehicles built from December, 1992 5° BTDC ± 3°**

- (3) After turning the ignition switch to OFF, connect the multi-use tester to the diagnosis connector (white).
- (4) Start the engine and run it at idle.
- (5) Run the engine at idle for 2 minutes.
- (6) Check the idle speed. Select item no.38 and take a reading of the idle speed.

Curb idle speed: 700±100 r/min.**NOTE**

1. The idle speed is adjusted automatically by the idle speed control (ISC) system.
 2. The engine speed indicated is a third of actual speed. In other words, the reading of the tachometer times 3 is actual speed.
- (7) If there is a deviation from the standard value refer to GROUP 13 – Check Chart Classified by Problem Symptoms, and check the MPI components.

IDLE MIXTURE INSPECTION

Refer to P.11-8-1, for information concerning inspection procedures.

Basic ignition timing:**Vehicles built up to November, 1992 5° BTDC ± 2°****Vehicles built from December, 1992 5° BTDC ± 3°**

COMPRESSION PRESSURE INSPECTION

E11FGBN

- (1) Before inspection, check that the engine oil, starter and battery are normal. Also, set the vehicle to the following condition:
 - Engine coolant temperature: 80–95°C (176–205°F)
 - Lamps, electric cooling fan and all accessories: OFF
 - Transmission: Neutral (P range on vehicle with A/T)
- (2) Disconnect the spark plug cables.
- (3) Remove all of the spark plugs.
- (4) Disconnect the crank angle sensor connector.

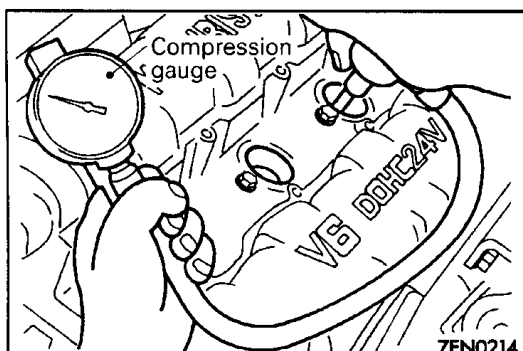
NOTE

Doing this will prevent the engine control unit from carrying out ignition and fuel injection.

- (5) Cover the spark plug hole with a rag etc., and after the engine has been cranked, check that no foreign material is adhering to the rag.

Caution

1. **Keep away from the spark plug hole when cranking.**
2. **If compression is measured with water, oil, fuel, etc., that has come from cracks inside the cylinder, these materials will become heated and will gush out from the spark plug hole, which is dangerous.**



- (6) Set compression gauge to one of the spark plug holes.
- (7) Crank the engine with the throttle valve fully open and measure the compression pressure.

Limit: min. 980 kPa (9.8 kg/cm², 139 psi.)

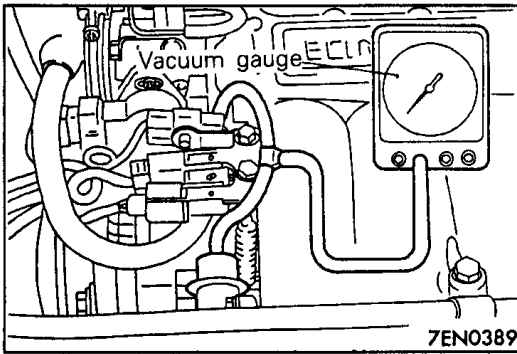
- (8) Measure the compression pressure for all the cylinders, and check that the pressure differences of the cylinders are below the limit.

Limit: max. 100 kPa (1.0 kg/cm², 14 psi.)

- (9) If there is a cylinder with compression or a compression difference that is outside the limit, pour a small amount of engine oil through the spark plug hole, and repeat the operations in steps (7) and (8).
 - ① If the compression increases after oil is added, the cause of the malfunction is a worn or damaged piston ring and/or cylinder inner surface.
 - ② If the compression does not rise after oil is added, the cause is a burnt or defective valve seat, or pressure is leaking from the gasket.
- (10) Connect the crank angle sensor connector.
- (11) Install the spark plugs and spark plug cables.
- (12) Use the multi-use tester to erase the self-diagnosis codes.

NOTE

This will erase the problem code resulting from the crank angle sensor connector being disconnected.

**MANIFOLD VACUUM INSPECTION**

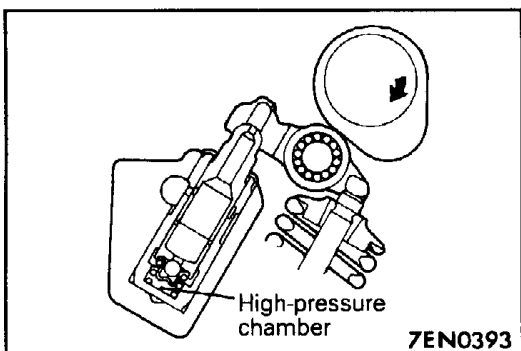
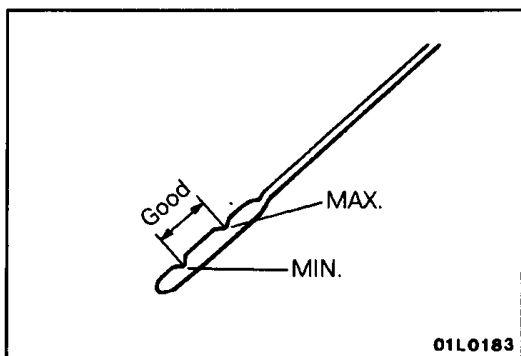
E11FWAT

- (1) Start the engine and allow it to warm up until the temperature of the coolant reaches 80 to 95°C (176 to 205°F).
- (2) Connect a tachometer.
- (3) Attach a three-way union to the vacuum hose between the fuel pressure regulator and the air intake plenum, and connect a vacuum gauge.
- (4) Start the engine and check that idle speed is within specification. Then read off the vacuum gauge.

Standard value: Approx. 520 mmHg (20 in.Hg)

- (5) If not within specification, refer to following chart for cause and repair.

Symptom	Probable cause	Remedy
Vacuum gauge reads under standard value but pointer is stable.	• Delayed ignition timing.	• Adjust ignition timing.
Vacuum gauge pointer fluctuates slowly.	• Idle mixture concentration too rich.	• Check MPI system.
Vacuum gauge reading decreases irregularly.	• Idle mixture concentration too lean.	• Check MPI system.
Vacuum gauge pointer decreases about 30–160 mmHg (1.18–6.30 in.Hg) intermittently.	• Burned, warped or pitted valves.	• Install new valves.
Vacuum gauge pointer suddenly decreases about 250 mmHg (9.84 in.Hg) from standard value and then returns.	• Blown cylinder head gasket.	• Install new cylinder head gasket.

**LASH ADJUSTERS CHECK**

E11F8AF2

NOTE

Soon after the engine is started or while it is running, abnormal noise (clattering) which may be attributed to the adjuster sounds but does not stop. In this case, check the following.

- (1) Check the engine oil, and refill or replace oil if necessary.

NOTE

1. If the oil amount is small, air will be sucked from the oil strainer and mixed in the oil passage.
2. If the oil amount is excessive, the oil will be stirred by the crank and mixed with a large amount of air.
3. Air and oil can not be separated easily in the deteriorated oil, and the amount of air mixed in the oil increases.

If such mixed-in air enters the high pressure chamber in the lash adjuster, the air in the high-pressure chamber will be compressed while the valve is opened, the lash adjuster will be excessively compressed and abnormal noise will be produced when the valve is closed.

This is the same phenomenon which occurs when the valve clearance is improperly adjusted to be excessively large.

However, it will return to be normal if the air entrapped in the adjuster is released in this case.

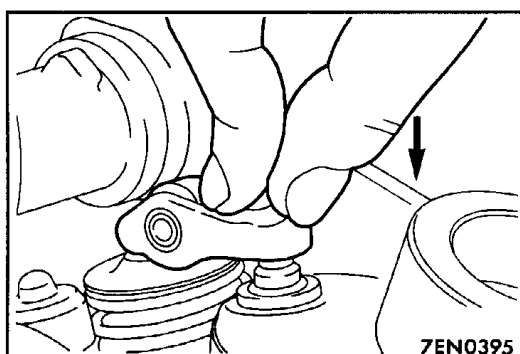
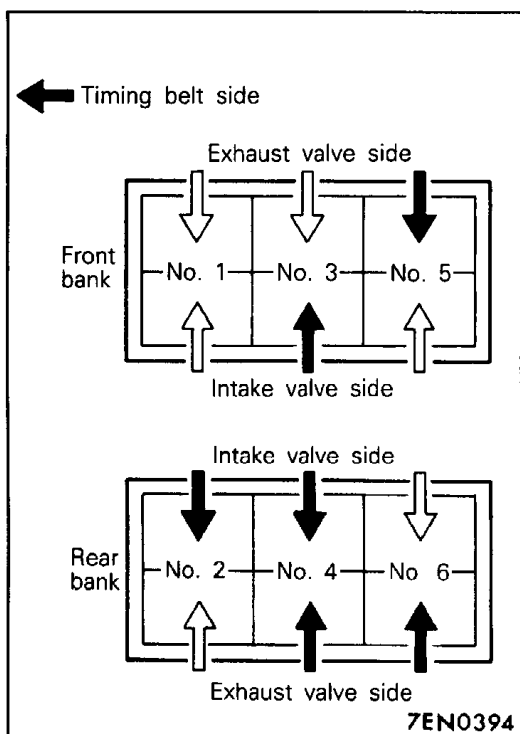
- (2) Start the engine, and slowly race* it several times (10 times or less).

If the abnormal noise is eliminated by racing the engine, it means that the air is released from the high-pressure chamber of the lash adjuster and the function of the lash adjuster is returned to normal.

- * Gradually increase the engine speed from the idle speed to 3,000 r/min. (for 30 seconds), and then gradually slow down the engine to the idling speed (for 30 seconds).

NOTE

1. If the vehicle is parked on a slope for a long time, the oil will be sometimes reduced in the lash adjuster, and air will enter the high-pressure chamber when the engine is started.
2. After the vehicle is parked for a long time, the oil will go out of the oil passage. Since it takes a little time to supply oil to the lash adjuster, air sometimes enters the high-pressure chamber.



(3) If any abnormal noise is not eliminated by racing, check the lash adjuster.

- ① Stop the engine.
- ② Set the engine so that cylinder No. 1 is positioned at the top dead centre of the compression.
- ③ Press the rocker arm at the area indicated by the ⇐ arrow mark to check whether the rocker arm is lowered or not.
- ④ Slowly turn the crankshaft 360 degrees clockwise.
- ⑤ In the same procedure as Step ③, check the rocker arm at the area indicated by the ⇐ arrow mark.

⑥ If the rocker arm is lowered when it is pressed, replace the lash adjuster.

When the lash adjuster is replaced, bleed air from all adjusters and assemble them. Recheck them following Steps ① to ⑤.

Moreover, if it is felt to be so hard that the rocker arm is not lowered when it is pressed, the lash adjuster is normal. Check for other causes of the abnormality.

NOTE

For the air bleeding procedure of the lash adjuster, refer to the engine workshop manual.

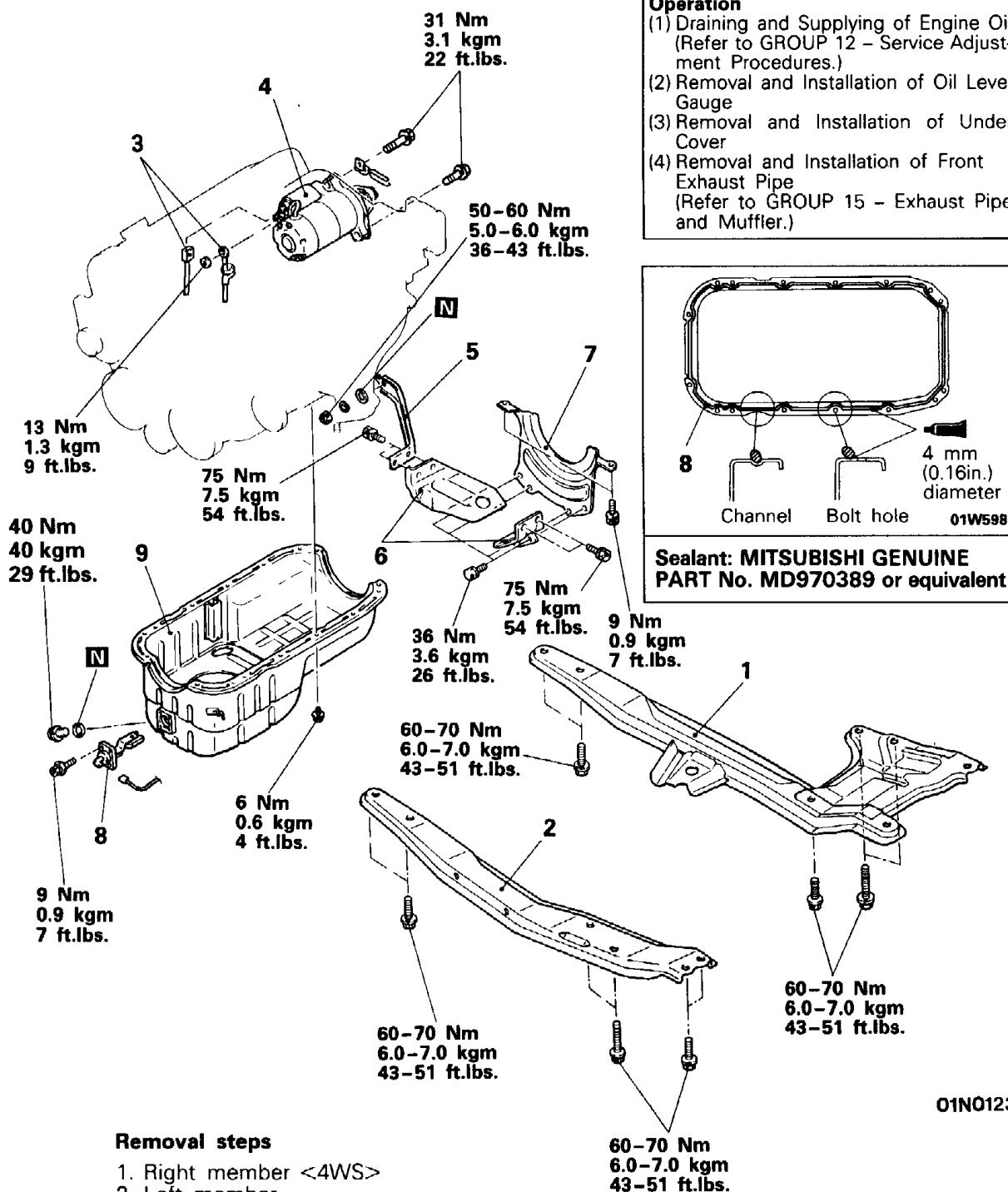
OIL PAN

REMOVAL AND INSTALLATION

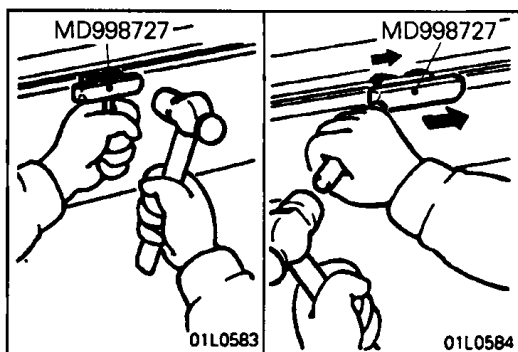
<DOHC built up to October, 1992 and SOHC>

Pre-removal and Post-installation Operation

- (1) Draining and Supplying of Engine Oil
(Refer to GROUP 12 – Service Adjustment Procedures.)
- (2) Removal and Installation of Oil Level Gauge
- (3) Removal and Installation of Under Cover
- (4) Removal and Installation of Front Exhaust Pipe
(Refer to GROUP 15 – Exhaust Pipe and Muffler.)

**Removal steps**

1. Right member <4WS>
2. Left member
3. Harness connector
4. Starter
5. Roll stopper stay
6. Transmission stay
7. Bell housing cover
8. Engine oil level sensor
9. Oil pan

**SERVICE POINTS OF REMOVAL**

E11KBBi

9. REMOVAL OF OIL PAN

- (1) Remove oil pan bolts.
- (2) Tap the special tool in between the oil pan and cylinder block.
- (3) Slide the special tool by tapping it at an angle to remove the oil pan.

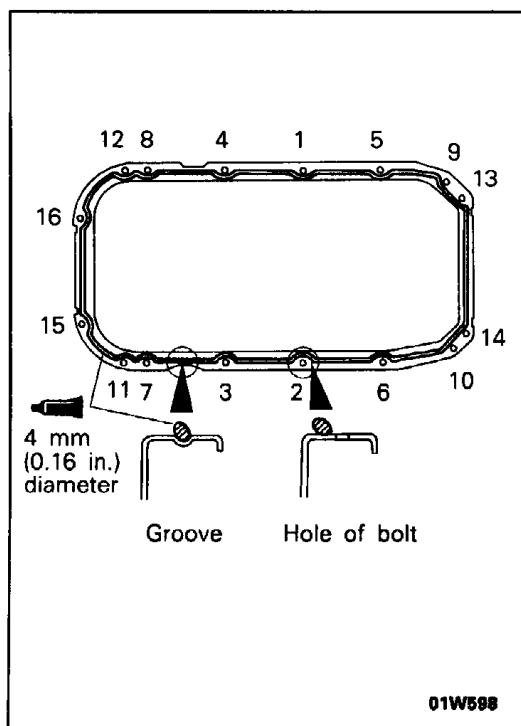
Caution

The use of a screwdriver or chisel in place of the special tool can damage the gasket seat surface and cause oil leakage.

INSPECTION

E11KEAA

- Check oil pan for cracks.
- Check oil pan sealant-coated surface for damage and deformation.

**SERVICE POINTS OF INSTALLATION**

E11KDBi

9. INSTALLATION OF OIL PAN

- (1) Remove sealant from oil pan and cylinder block mating surfaces.
- (2) Degrease the sealant-coated surface and the engine mating surface.
- (3) Apply the specified sealant around the gasket surface of oil pan as specified in illustration.

**Specified sealant: MITSUBISHI GENUINE PART
No. MD970389 or equivalent**

NOTE

The sealant should be applied in a continuous bead approximately 4 mm (0.16 in.) in diameter.

- (4) Assemble oil pan to cylinder block within 15 minutes after applying the sealant.

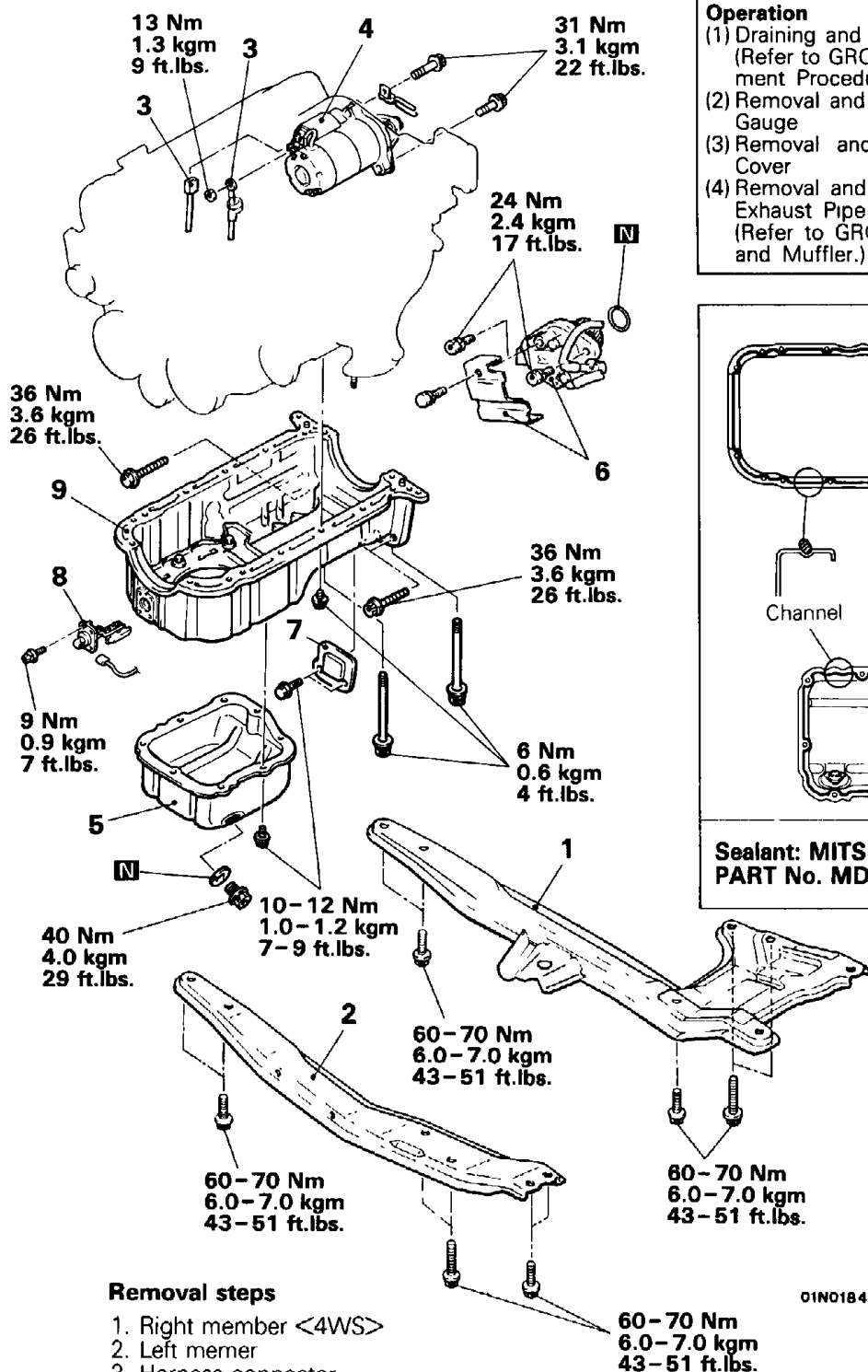
Caution

1. Tighten the oil pan mounting bolt in the order illustrated (left).
2. After installing the oil pan, wait at least 30 minutes before starting the engine.

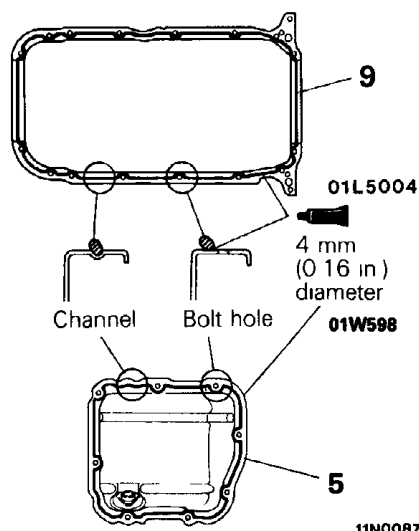
REMOVAL AND INSTALLATION

<DOHC built from November, 1992>

E11KA-A

**Pre-removal and Post-installation Operation**

- (1) Draining and Supplying of Engine Oil (Refer to GROUP 12 – Service Adjustment Procedures.)
- (2) Removal and Installation of Oil Level Gauge
- (3) Removal and Installation of Under Cover
- (4) Removal and Installation of Front Exhaust Pipe (Refer to GROUP 15 – Exhaust Pipe and Muffler.)



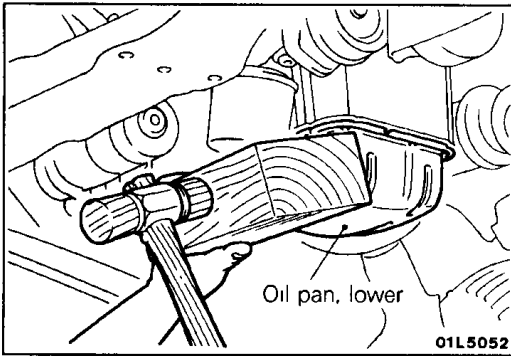
Sealant: MITSUBISHI GENUINE
PART No. MD970389 or equivalent

Removal steps

1. Right member <4WS>
2. Left member
3. Harness connector
4. Starter
5. Oil pan, lower
6. Rear oil pump <4WS>
7. Cover
8. Engine oil level sensor
9. Oil pan, upper



01N0184



SERVICE POINTS OF REMOVAL

5. REMOVAL OF OIL PAN, LOWER

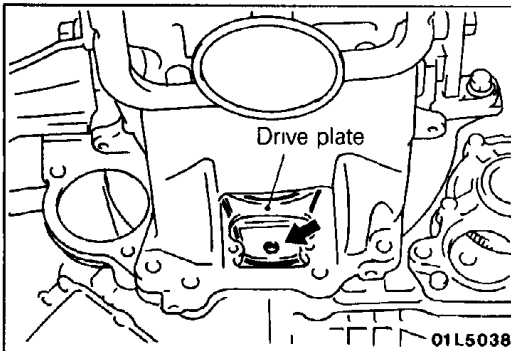
- (1) Remove the oil pan, lower installation bolt.
- (2) Place a wooden block to the oil pan, lower as shown in the figure and remove by tapping with a hammer

Caution

The use of an oil pan remover (MD998723) can damage the oil pan, upper (aluminum made).

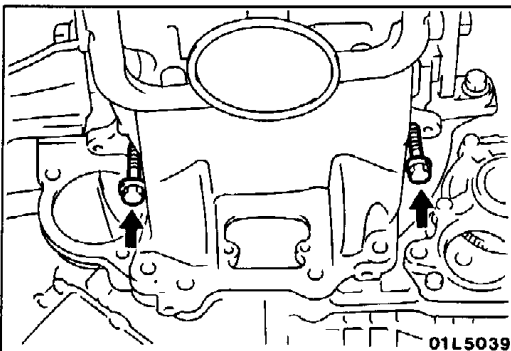
6. REMOVAL OF REAR OIL PUMP <4WS>

- (1) Remove the oil pump with hose attached from the transmission.
- (2) Place the oil pump somewhere so it will not be in the way while working.



9. REMOVAL OF OIL PAN, UPPER

- (1) For vehicles with A/T, rotate the drive plate to the position shown in the figure to prevent the oil pan from interfering with the drive plate when removing the oil pan, upper, and remove the drive plate attaching bolt
- (2) Remove the oil pan, upper installation bolt.

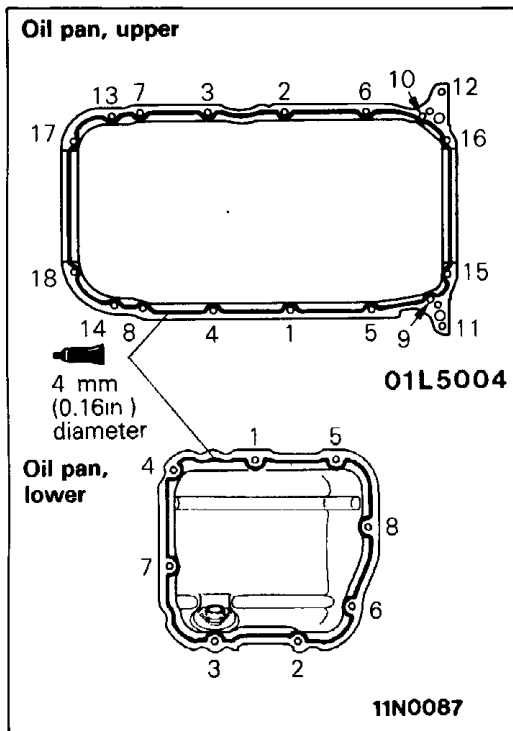


- (3) Install the bolt [bolt diameter x length: 10 x 38 mm (0.39 x 1.50 in.)] that links the oil pan, upper with the transmission in the hole of the oil pan, upper as shown in the figure and tighten the bolt to remove the oil pan, upper.

INSPECTION

E11KEAA1

- Check oil pan for cracks.
- Check oil pan sealant-coated surface for damage and deformation.

**SERVICE POINTS OF INSTALLATION**

E11KDB11

9. INSTALLATION OF OIL PAN, UPPER/5. OIL PAN, LOWER

- (1) Remove sealant from oil pan and cylinder block mating surfaces.
- (2) Degrease the sealant-coated surface and the engine mating surface.
- (3) Apply the specified sealant around the gasket surface of oil pan as specified in illustration.

**Specified sealant: MITSUBISHI GENUINE PART
No. MD970389 or equivalent**

NOTE

The sealant should be applied in a continuous bead approximately 4 mm (0.16 in.) in diameter.

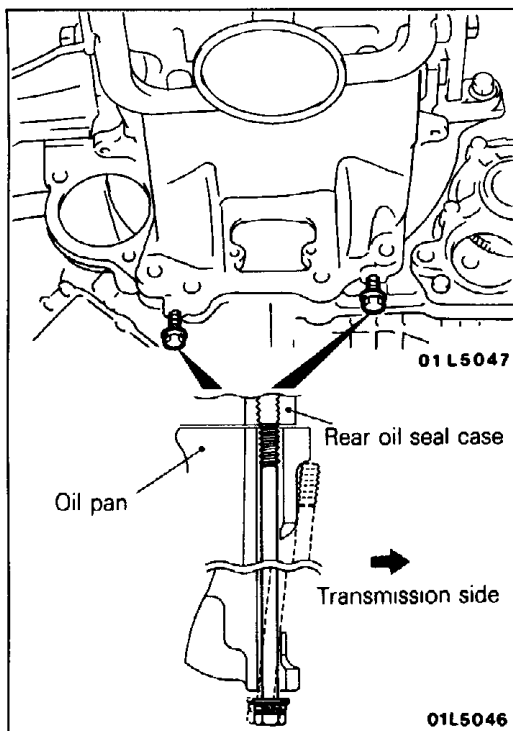
- (4) Assemble oil pan to cylinder block within 15 minutes after applying the sealant.
- (5) Tighten the oil pan mounting bolt in the order illustrated (left).

Caution

1. Put the bolt in the oil pan, upper installation hole as shown in the figure not to be slanted and tighten it fully in the rear oil seal case.
 2. After installing the oil pan, wait at least 30 minutes before starting the engine.
- (6) For vehicles with A/T, tighten the attaching bolt of the removed drive plate.

Tightening torque:

46 – 53 Nm (4.6 – 5.3 kgm, 33 – 38 ft.lbs.)



NOTES

TIMING BELT <SOHC>

REMOVAL AND INSTALLATION

Pre-removal Operation

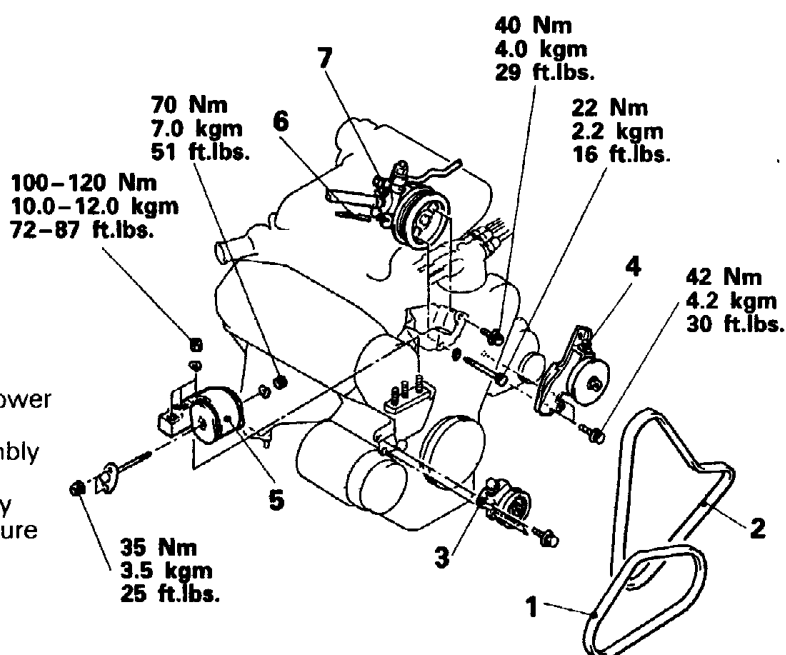
- (1) Removal of Under Cover (LH)
- (2) Jack up the engine transmission assembly until there is no weight on the engine mount insulator.
- (3) Removal of Headlamp Washer Tank

Post-installation Operation

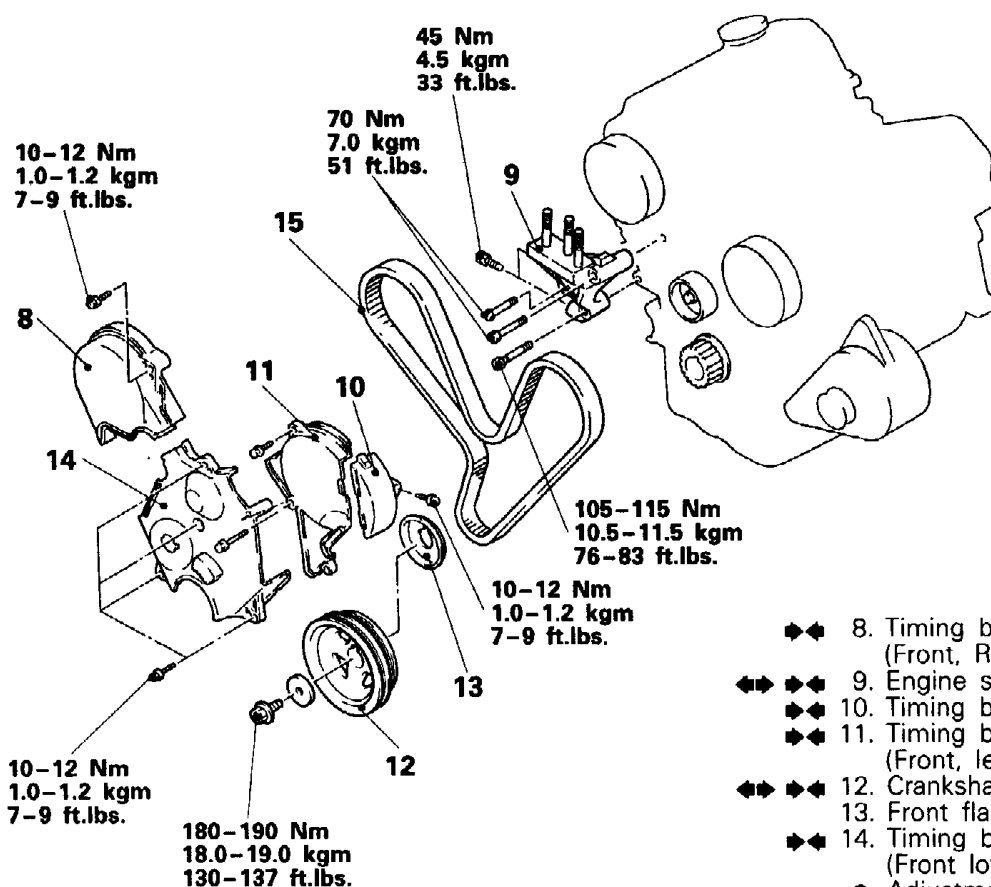
- (1) Installation of Headlamp Washer Tank
- (2) Installation of Under Cover (LH)

Removal steps

- V-belt tension adjustment
(Refer to P.11-6.)
1. V-ribbed belt (Air conditioner)
 2. V-ribbed belt (Alternator and power steering pump)
 3. Tensioner pulley bracket assembly
 4. Tensioner pulley assembly
 5. Engine mount bracket assembly
 6. Power steering oil pump pressure switch connector
 7. Power steering oil pump



01N0008



01N0005

- ◆◆ 8. Timing belt cover (Front, Right)
- ◆◆◆◆ 9. Engine support bracket
- ◆◆◆◆ 10. Timing belt cover cap
- ◆◆◆◆ 11. Timing belt cover (Front, left)
- ◆◆◆◆ 12. Crankshaft pulley
- ◆◆◆◆ 13. Front flange
- ◆◆◆◆ 14. Timing belt cover (Front, lower)
- Adjustment of timing belt tension
- ◆◆◆◆ 15. Timing belt

SERVICE POINTS OF REMOVAL

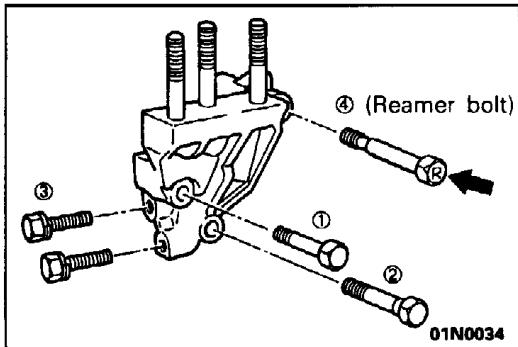
E11GBFC

7. DISCONNECTION OF POWER STEERING OIL PUMP

Disconnect the oil pump (with the hose attached).

NOTE

Suspend the removed oil pump (by using wire or similar material) at a place where no damage will be caused during removal/installation of the engine assembly.

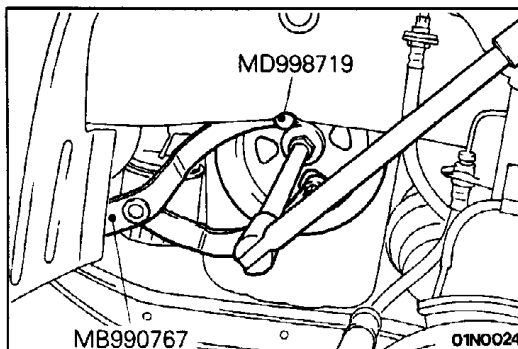
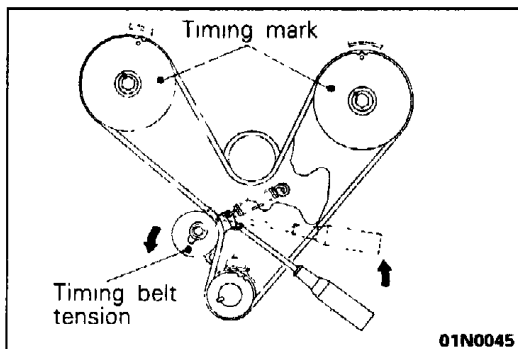
**9. REMOVAL OF ENGINE SUPPORT BRACKET**

Remove the engine support bracket in the numbered sequence shown in the illustration.

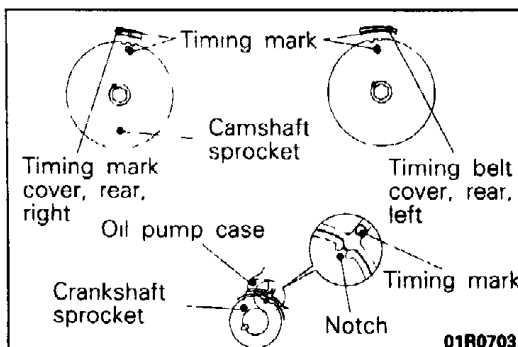
Spraying lubricant, slowly remove the bolt (reamer bolt) indicated by the arrow.

Caution

Keep in mind that the reamer bolt is sometimes heat seized on the engine support bracket.

**12. REMOVAL OF CRANKSHAFT PULLEY****15. REMOVAL OF TIMING BELT**

- (1) Align the timing marks.
- (2) Loosen the timing belt tensioner bolt. Use a screwdriver to fully turn the timing belt tensioner anticlockwise along the oblong hole, and then tighten the tensioner bolt.
- (3) If the timing belt is to be re-used, use chalk to mark the flat side of the belt with an arrow indicating the direction of rotation (right turn).
- (4) Remove the timing belt.

**SERVICE POINTS OF INSTALLATION**

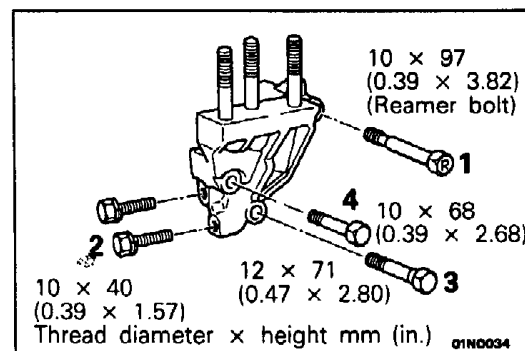
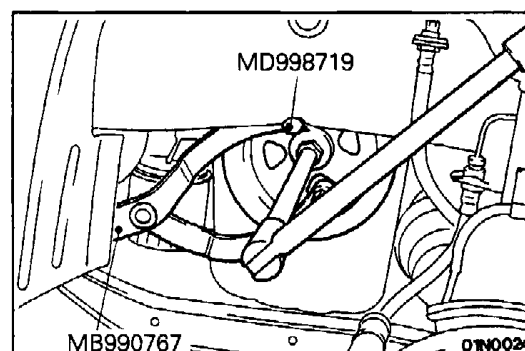
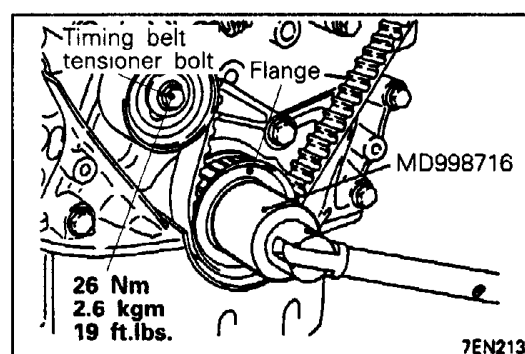
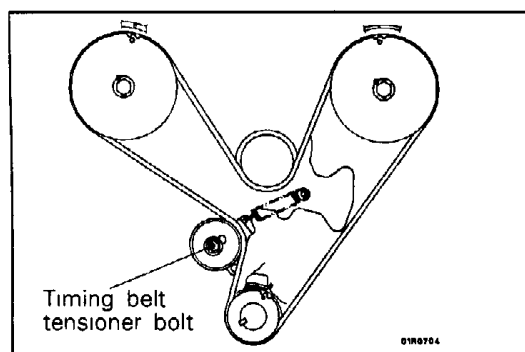
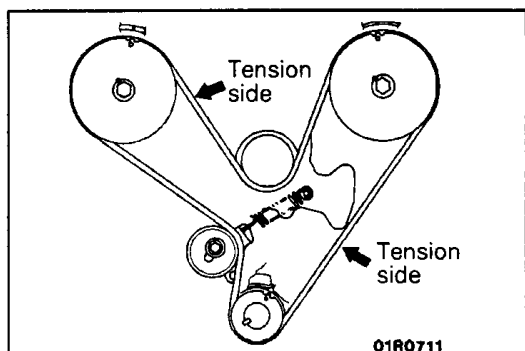
E11GDFC

15. INSTALLATION OF TIMING BELT

- (1) Check that the timing marks of the camshaft sprocket and the crankshaft sprocket are all aligned.

NOTE

In this condition, the No. 1 piston is at top dead centre of the compression.



- (2) Install the timing belt, while making sure that the tension side of the belt is not slackened.

NOTE

If the timing belt is re-used, install so that the arrow marked on it at the time of removal is pointing in the direction of rotation (right turn).

● ADJUSTMENT OF TIMING BELT TENSION

- (1) Loosen the timing belt tensioner bolt 1-2 turns to apply tension to the timing belt by the force of the tensioner spring.

Caution

As the purpose of this procedure is to apply the proper amount of tension to the timing belt, be sure not to rotate the crankshaft in the opposite direction (left turn), or place pressure on the belt to check the amount of tension.

- (2) Install the flange and the special tool, and turn the crankshaft in the correct direction (clockwise direction) two turns.
- (3) Realign the timing marks of each sprocket.
- (4) Tighten the timing belt tensioner bolt to the specified torque.

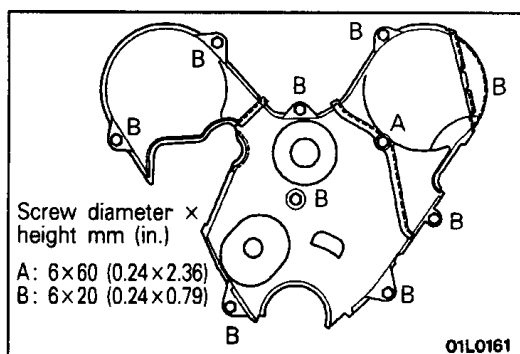
12. INSTALLATION OF CRANKSHAFT PULLEY

9. INSTALLATION OF ENGINE SUPPORT BRACKET

Since the mounting bolts of engine support bracket are different in size depending on location, insert them in numbered sequence.

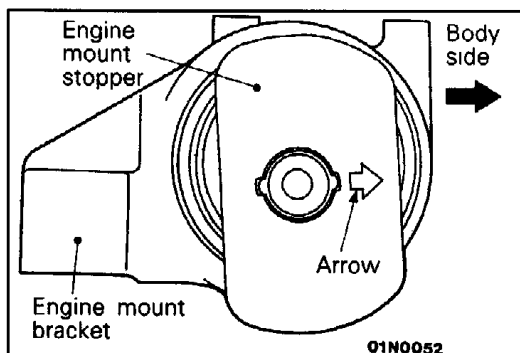
Caution

When installing the reamer bolt, tighten it, slowly spraying lubricant on the reamer area.



14. INSTALLATION OF TIMING BELT COVER (FRONT LOWER)/11. TIMING BELT COVER (FRONT LEFT)/10. TIMING BELT COVER CAP/8. TIMING BELT COVER (FRONT RIGHT)

The dimensions of the installation bolts for the timing covers differ according to the installation location, so be sure not to install the bolts in the incorrect locations.



5. INSTALLATION OF ENGINE MOUNT BRACKET ASSEMBLY

Attach the engine mount bracket stopper so that the arrow faces in the direction as shown in the illustration

TIMING BELT <DOHC>

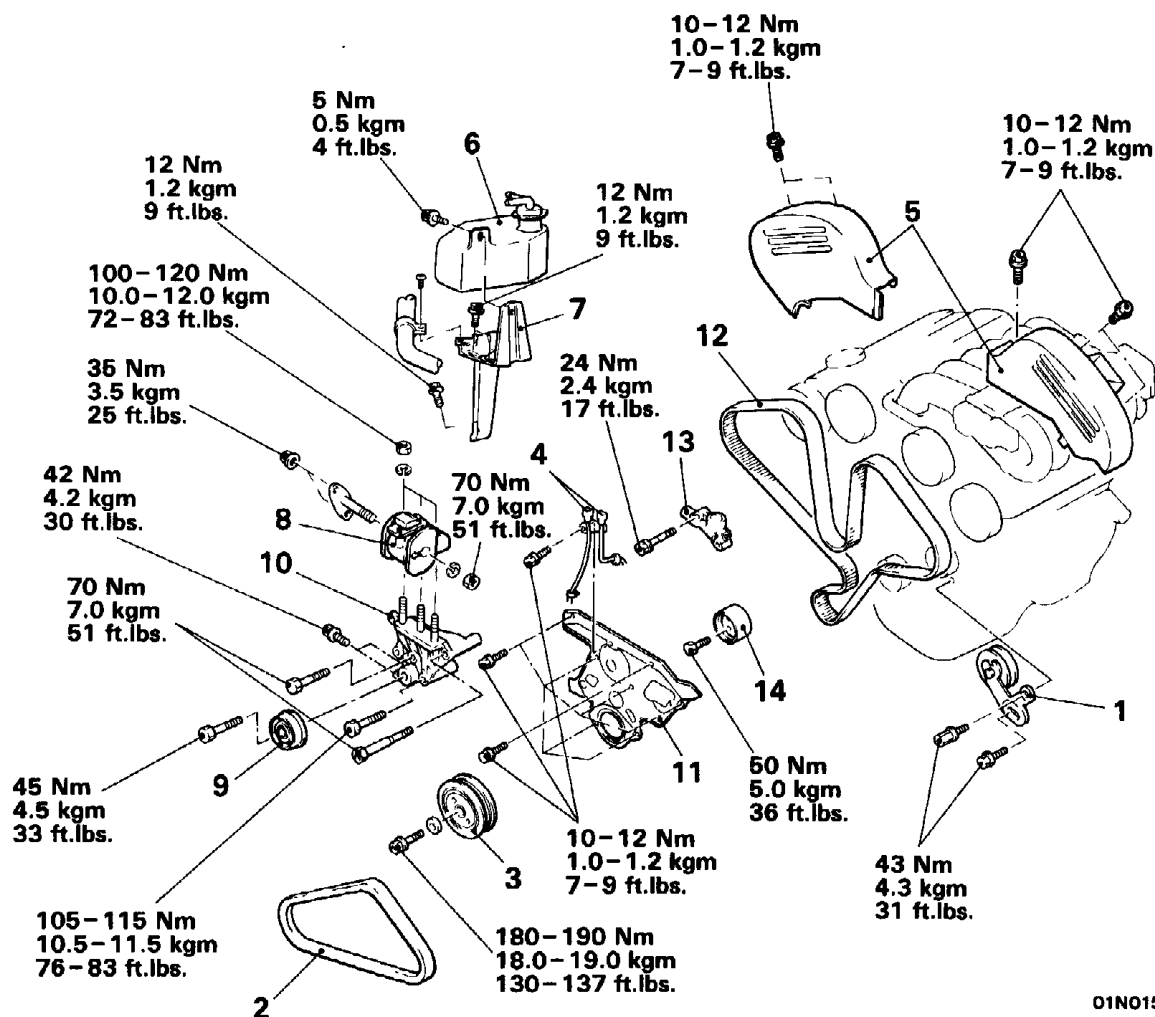
REMOVAL AND INSTALLATION

Pre-removal Operation

- (1) Jack up the engine transmission assembly until there is no weight on the engine mount insulator.
- (2) Removal of Under Cover (LH)
- (3) Removal of Headlamp Washer Tank
- (4) Removal of Alternator
(Refer to GROUP 16 - Alternator.)

Post-installation Operation

- (1) Installation of Alternator
(Refer to GROUP 16 - Alternator)
- (2) Installation of Headlamp Washer Tank
- (3) Installation of Under Cover (LH)
- (4) Adjustment of Drive Belt Tension
(Refer to P 11-12)

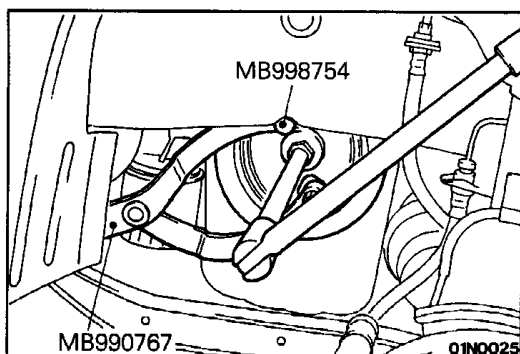


01N0159

Removal steps

1. Tensioner pulley
2. Drive belt (Power steering)
3. Crankshaft pulley
4. Camshaft position sensor connector and crank angle sensor connector
<Vehicles built from November, 1992>
5. Timing belt upper cover
6. Condense tank
<Vehicle with ABS or headlamp washer>
7. Condense tank bracket
<Vehicle with ABS or headlamp washer>

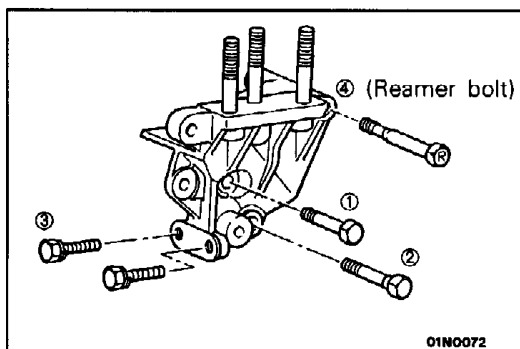
8. Engine mount bracket assembly
9. Idler pulley
10. Engine support bracket
11. Timing belt lower cover
● Adjustment of timing belt tension
12. Timing belt
13. Auto tensioner
14. Tension pulley

**SERVICE POINTS OF REMOVAL****3. REMOVAL OF CRANKSHAFT PULLEY**

Using special tools, remove the crankshaft pulley from the crankshaft.

Caution

Use only the specified special tools, or a damaged pulley damper could result.

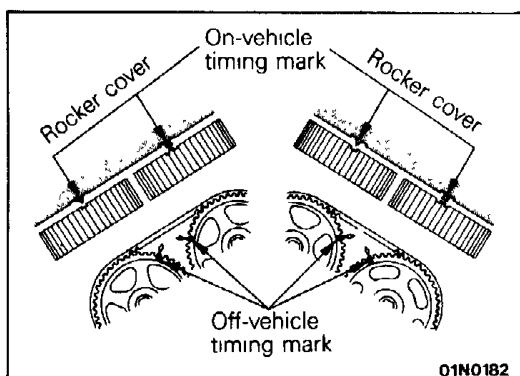
**10. REMOVAL OF ENGINE SUPPORT BRACKET**

Remove the engine support bracket in the numbered sequence shown in the illustration.

Spraying lubricant, slowly remove the bolt (reamer bolt) indicated by the arrow.

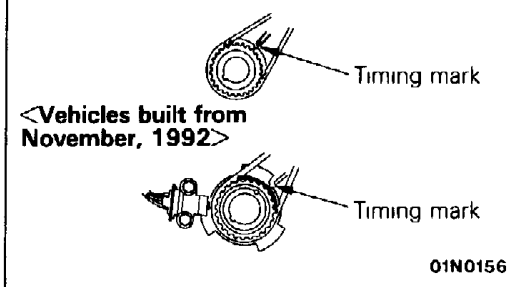
Caution

Keep in mind that the reamer bolt is sometimes heat seized on the engine support bracket.



<Vehicles built up to October, 1992>

<Vehicles built from November, 1992>

**12. REMOVAL OF TIMING BELT**

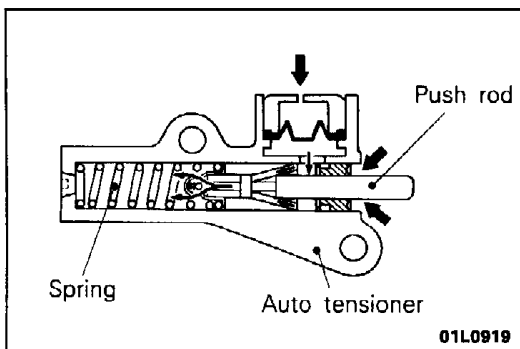
- (1) Align the timing marks.
- (2) Loosen the center bolt on the tensioner pulley to remove the timing belt

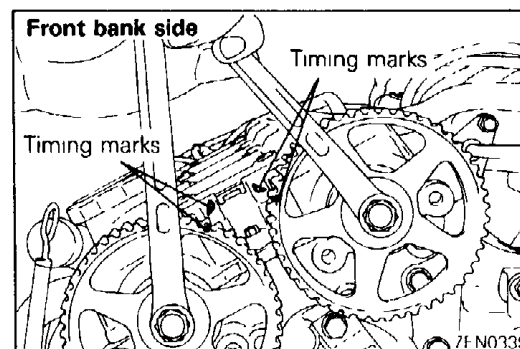
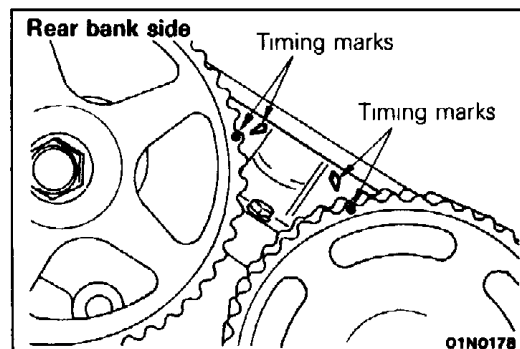
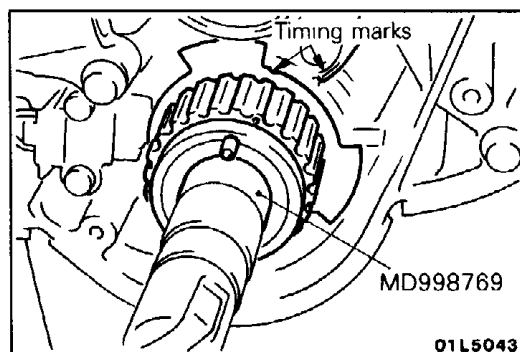
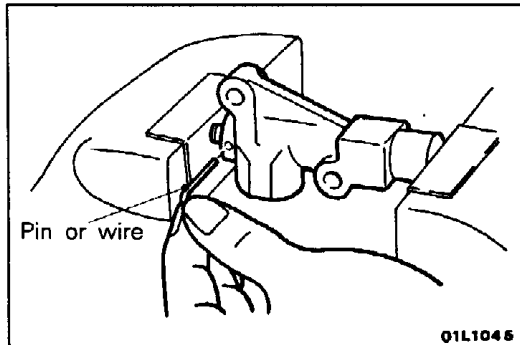
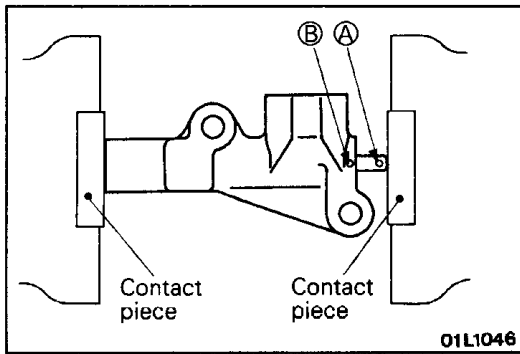
Caution

1. Make a mark on the back of the timing belt indicating the direction of rotation so it may be reassembled in the same direction if it is to be reused.
2. The cam of the front bank camshaft lifts the valve by means of the rocker arm, the spring force of the valve will easily turn the sprocket, so be careful not to insert your fingers, etc.

INSPECTION**AUTO TENSIONER**

- Check the auto tensioner for possible leaks.
- Check the push rod for cracks.





SERVICE POINTS OF INSTALLATION

E11GD8Ca

13. INSTALLATION OF AUTO TENSIONER

- (1) Using a press or vise, compress the push rod of the auto tensioner as slowly as possible and align pin hole A of the push rod and pin hole B of the tensioner cylinder.

Caution

1. The auto tensioner must be placed at a right angle to the pressing surface of the press or vise.
2. Push in the rod slowly to prevent the push rod from being damaged.

- (2) Insert a wire with a diameter of 1.4 mm (0.05 in.) into the aligned pin holes.

NOTE

The wire should be as stiff as possible (such as piano wire, etc.), and should be bent into the shape of an "L".

- (3) Install the tensioner to engine.

12. INSTALLATION OF TIMING BELT

- (1) Install the crankshaft pulley and turn the crankshaft sprocket timing mark forward 3 teeth to move the piston slightly past No.1 cylinder top dead centre.

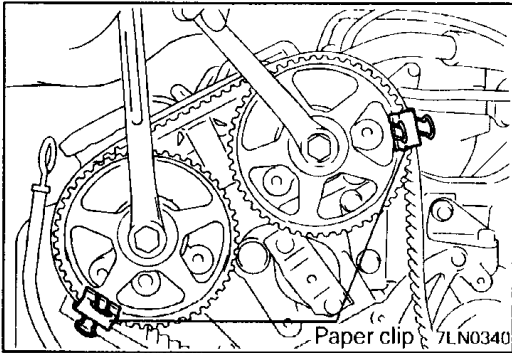
Caution

When the camshaft sprocket is turned with No.1 cylinder top dead centre, there is a danger that the valve and piston will interfere.

- (2) Align the timing mark of the rear bank side camshaft sprocket.
- (3) Align the timing mark of the front bank side camshaft sprocket and support it not to rotate with a closed wrench.

Caution

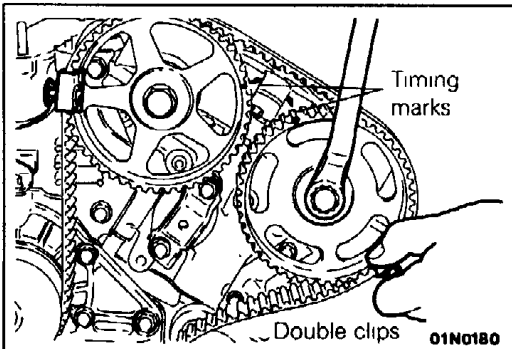
1. The camshaft sprocket will easily turn because of the valve spring force, so be careful not to insert your fingers, etc.
2. If the sprocket on one side of the front bank is turned one full revolution while the sprocket timing marks on the opposite side of the front bank are aligned, the intake and exhaust valves may cause interference.



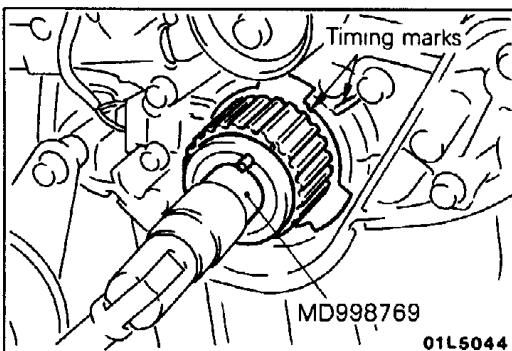
- (4) Check that the camshaft sprocket timing mark of the front bank side is aligned and clamp timing belt with double clips.

Caution

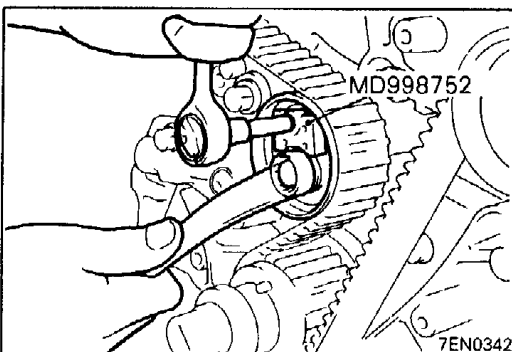
If the timing belt is reused, install so that the arrow marked on it at the time of removal is pointing in the clockwise direction.



- (5) Set the timing belt onto the water pump pulley
 (6) Check that the camshaft sprocket timing mark of the rear bank side is aligned and clamp the timing belt with double clips.
 (7) Set the timing belt onto the idler pulley.



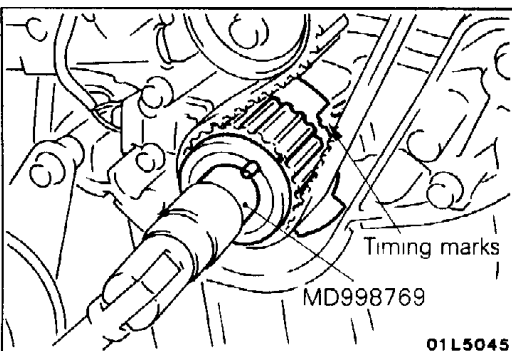
- (8) After aligning the crankshaft sprocket timing marks, turn the crankshaft one touch anticlockwise.
 (9) Set the timing belt onto the crankshaft sprocket.
 (10) Set the timing belt onto the tensioner pulley.

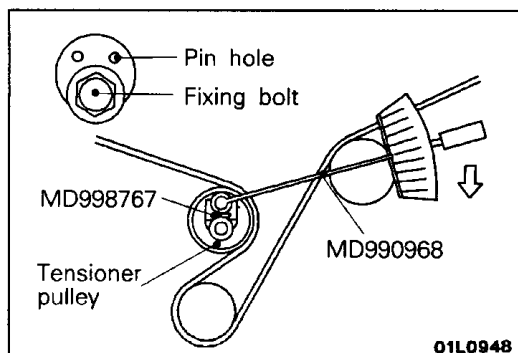


- (11) Place the tensioner pulley pin hole so that it is towards the top. Press the tensioner pulley onto the timing belt, and provisionally tighten the fixing bolt.
 (12) Align the crankshaft sprocket timing marks.
 (13) Check that each of the sprocket timing mark is aligned.
 (14) Remove the 4 double clips.

● **ADJUSTMENT OF TIMING BELT TENSION**

- (1) After turning the crankshaft a 1/4 turn anticlockwise, turn it clockwise to the position where the timing marks are aligned.



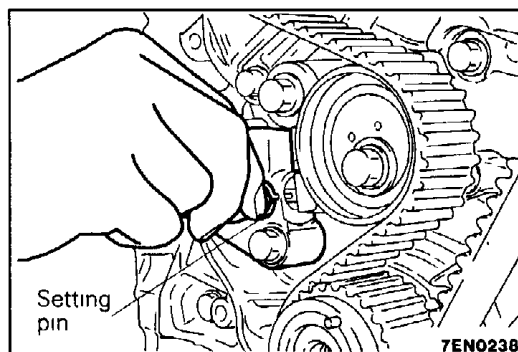


- (2) Next, loosen the center bolt of the tensioner pulley and using the special tool and a torque wrench, apply tension to the timing belt as shown in the illustration; then tighten the center bolt at the specified torque.

Caution

When tightening the bolt, ensure that the tensioner pulley shaft doesn't rotate with the bolt.

Specified torque: 10 Nm (1.0 kgm, 7.2 ft.lbs.) [tensional torque]



- (3) Pull out the auto tensioner setting pin. At this time, check that the setting pin can be pulled out easily. Turn the crankshaft clockwise 2 turns, and after leaving it in this position for 5 minutes or more, check again that the auto tensioner setting pin can be pulled or inserted easily.

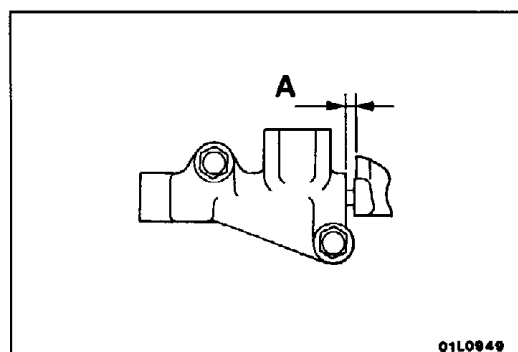
NOTE

If the setting pin cannot be easily inserted, then it is satisfactory if the auto tensioner rod projection amount is within the standard value.

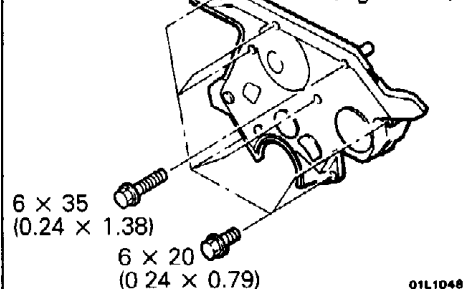
Standard value (A): 3.8–4.5 mm (0.15–0.18 in.)

If it is outside the standard value, repeat the operations in steps 1. to 3.

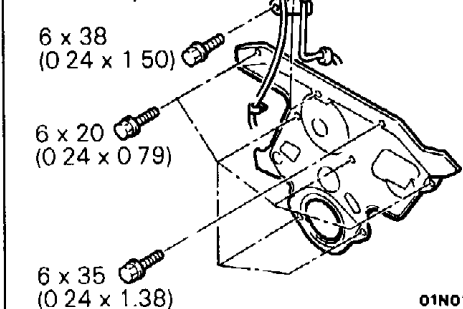
- (4) Check again that each of the sprocket timing marks is aligned.



<Vehicles built up to October, 1992> Bolt diameter × length mm (in.)

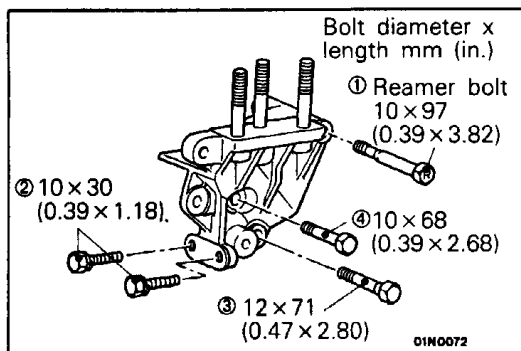


<Vehicles built from November, 1992>



11. INSTALLATION OF TIMING BELT LOWER COVER

The dimensions of the mounting bolts are different, so do be sure to install them correctly.

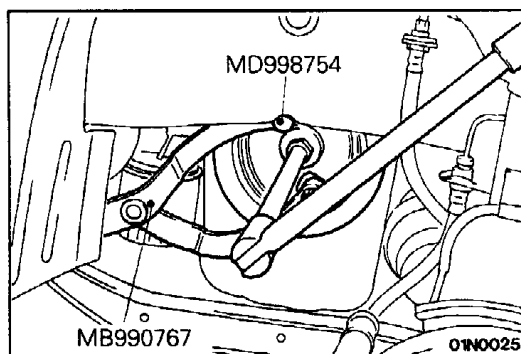


9. INSTALLATION OF ENGINE SUPPORT BRACKET

Since the engine support bracket mounting bolts differ in size depending on their locations, install them in the numbered sequence shown in the figure.

Caution

When installing the reamer bolt, tighten it slowly while spraying lubricant on the reamer area.



4. INSTALLATION OF CRANKSHAFT PULLEY

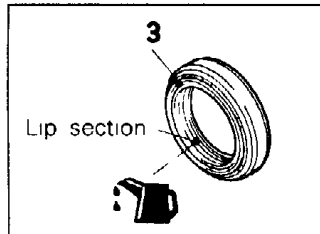
Caution

Use only the specified special tools, otherwise the pulley damper could be damaged.

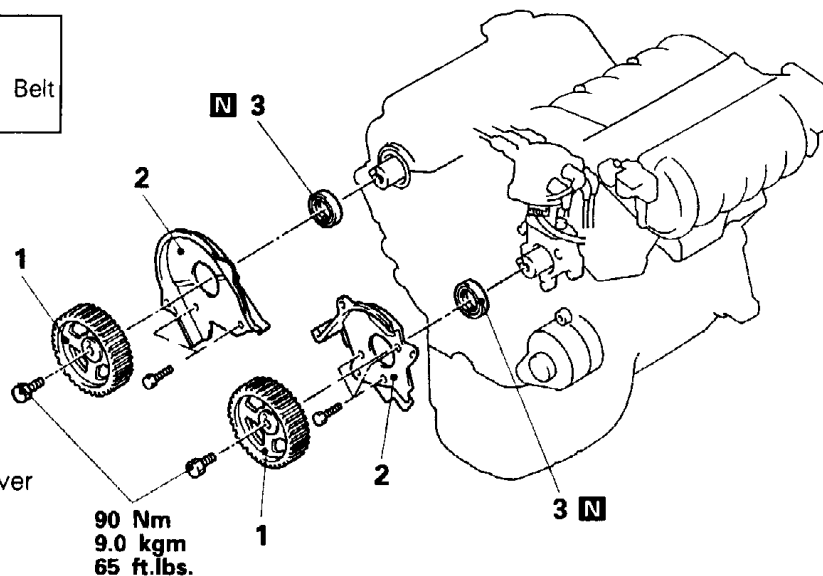
CAMSHAFT OIL SEALS <SOHC>

E11VA-

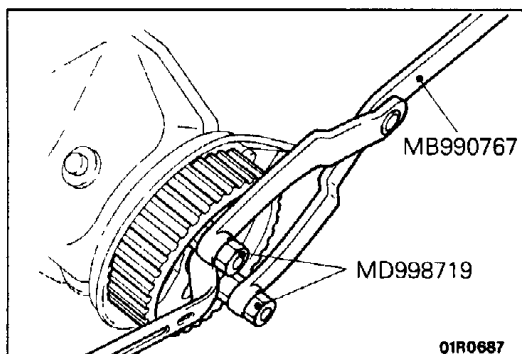
REMOVAL AND INSTALLATION

Pre-removal and Post-installation OperationRemoval and Installation of Timing Belt
(Refer to P.11-20:)**Removal steps**

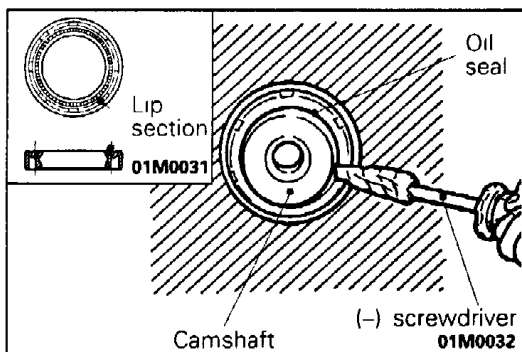
- 1 Camshaft sprocket
- 2 Timing belt rear cover
- 3 Camshaft oil seal



01N0047

**SERVICE POINTS OF REMOVAL**

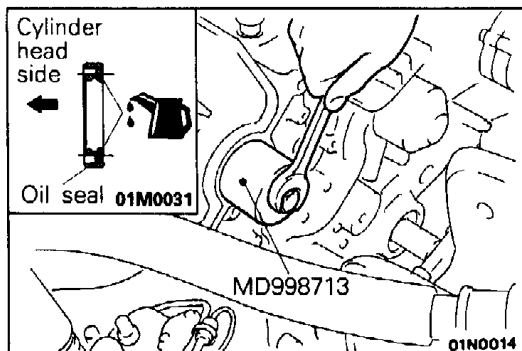
E11VBAA

1. REMOVAL OF CAMSHAFT SPROCKET**3. REMOVAL OF CAMSHAFT OIL SEAL**

- (1) Make a notch in the oil seal lip section with a knife, etc.
- (2) Cover the end of a (-) screwdriver with a rag and insert into the notched section of the oil seal, and lever out the oil seal to remove it.

Caution

Be careful not to damage the camshaft and the cylinder head.

**SERVICE POINTS OF INSTALLATION**

E11VCAA

3. INSTALLATION OF CAMSHAFT OIL SEAL

- (1) Apply a small amount of engine oil to the oil seal lip and then insert.
- (2) Press fitting the oil seal into the cylinder head.

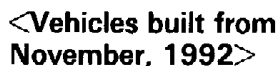
E11VA--

Pre-removal Operation

- (1) Removal of Air Intake Plenum
- (2) Removal of Timing Belt
(Refer to P.11-24.)

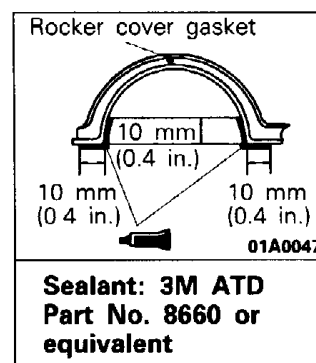
Post-installation Operation

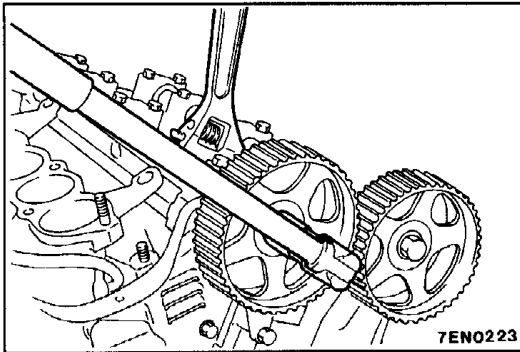
- (1) Installation of Timing Belt (Refer to P.11-24.)
- (2) Installation of Air Intake Plenum
- (3) Accelerator Cable Adjustment (Refer to GROUP 13 - Service Adjustment Procedures.)



Removal steps

1. Centre cover
2. Spark plug cable
3. PCV hose
4. Blow-by hose
5. Rocker cover
- 5-1. Camshaft position sensor
6. Camshaft sprocket
7. Camshaft oil seal





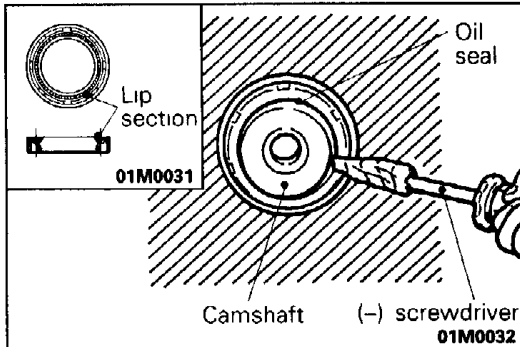
SERVICE POINTS OF REMOVAL

6. REMOVAL OF CAMSHAFT SPROCKET

- (1) Hold the hexagonal section of the camshaft with a wrench, etc., and loosen the camshaft sprocket bolt.

Caution

As the sprocket could become damaged, do not apply the wrench to the camshaft sprocket.

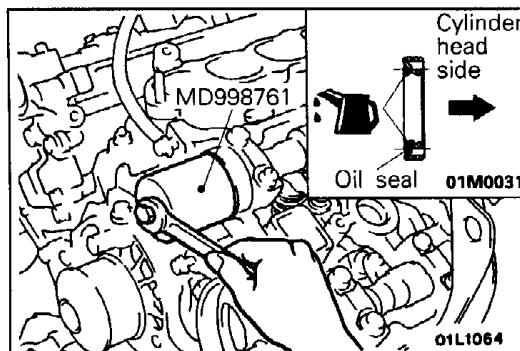


7. REMOVAL OF CAMSHAFT OIL SEAL

- (1) Make a notch in the oil seal lip section with a knife, etc.
- (2) Cover the end of a (-) screwdriver with a rag and insert into the notched section of the oil seal, and lever out the oil seal to remove it.

Caution

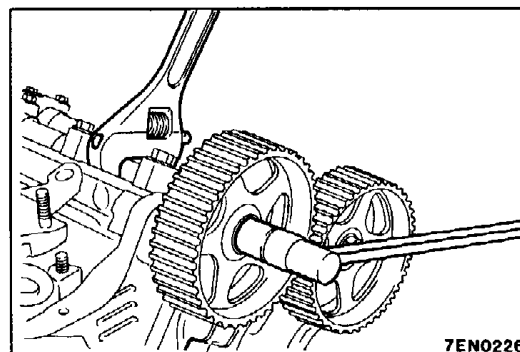
Be careful not to damage the camshaft and the cylinder head.



SERVICE POINTS OF INSTALLATION

7. INSTALLATION OF CAMSHAFT OIL SEAL

- (1) Apply a small amount of engine oil to the oil seal lip and then insert.
- (2) Press fitting the oil seal into the cylinder head.



6. INSTALLATION OF CAMSHAFT SPROCKET

Hold the hexagonal section of the camshaft with a wrench, etc., and tighten the camshaft sprocket bolt.

Caution

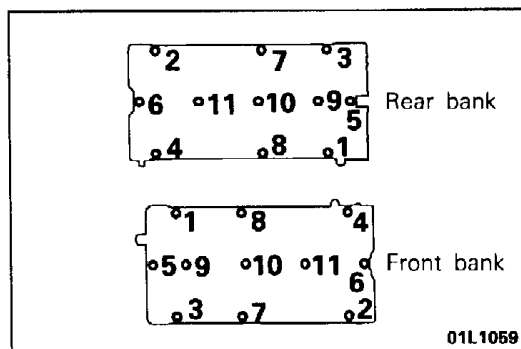
Do not apply the wrench to the camshaft sprocket, as the sprocket could become damaged.

5. INSTALLATION OF ROCKER COVER

Tighten the rocker cover bolts in the order shown in the illustration.

NOTE

- (1) Only No. 5 bolt in the rear bank differs from other bolts in length:
Rear Bank No. 5 Bolt 20 mm (0.79 in.)
All other Bolts 10 mm (0.39 in.)
- (2) Bolts are colour coded for the front and rear banks as follows:
Front bank Black
Rear bank Green
- (3) When the rocker cover gasket has been replaced, tighten bolts in this order and then, retighten bolts 1 to 6 to 4 Nm (0.4 kgm, 2.9 ft.lbs.)

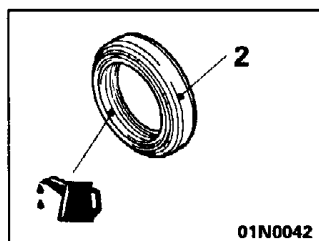


CRANKSHAFT FRONT OIL SEAL

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation

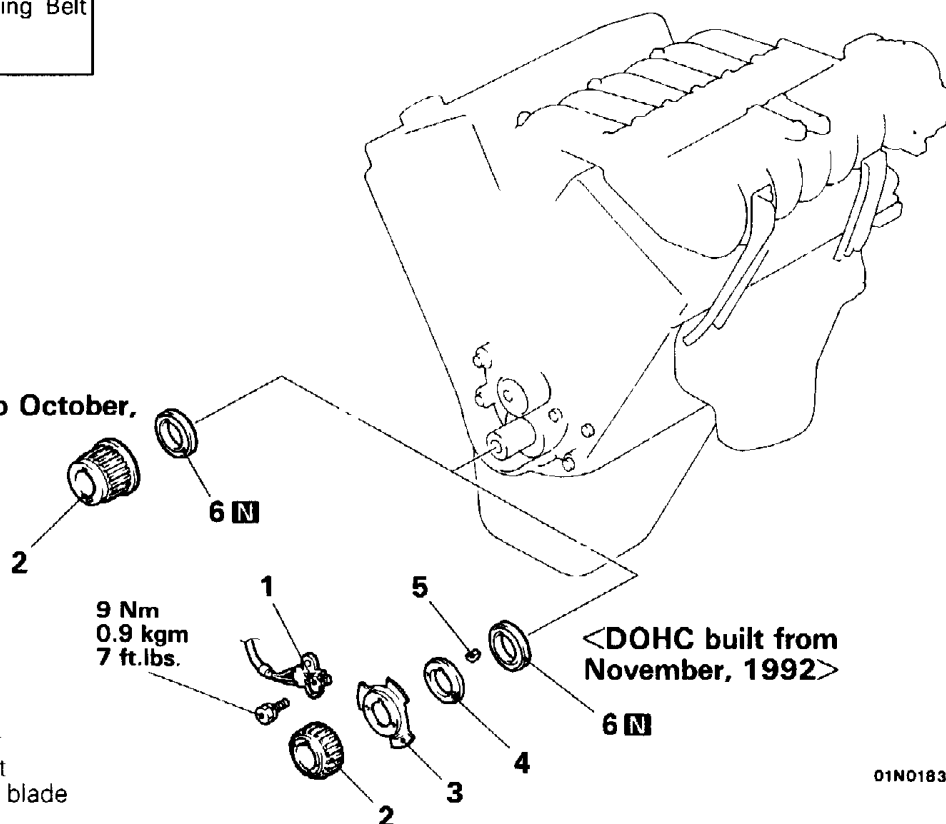
Removal and Installation of Timing Belt
SOHC: Refer to P.11-20.
DOHC: Refer to P.11-24.



<DOHC built up to October, 1992 and SOHC>

Removal steps

- 1 Crank angle sensor
- 2 Crankshaft sprocket
- 3 Crankshaft sensing blade
- 4 Crankshaft spacer
- 5 Key
- 6 Crankshaft front oil seal



<DOHC built from November, 1992>

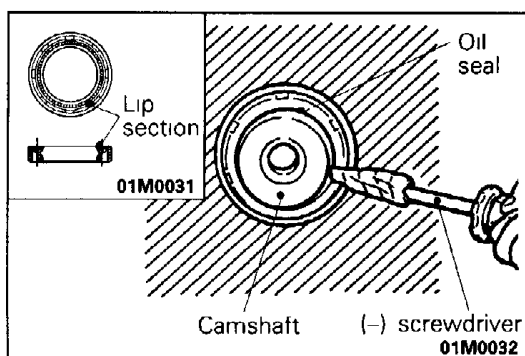
SERVICE POINTS OF REMOVAL

6. REMOVAL OF CRANKSHAFT FRONT OIL SEAL

- (1) Make a notch in the oil seal lip section with a knife, etc.
- (2) Cover the end of a (-) screwdriver with a rag and insert into the notched section of the oil seal, and lever out the oil seal to remove it.

Caution

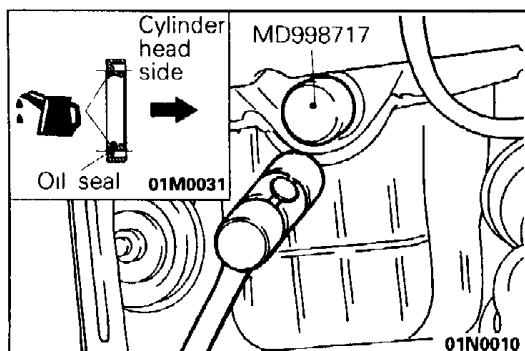
Be careful not to damage the crankshaft and the oil pump case.



SERVICE POINTS OF INSTALLATION

6. INSTALLATION OF CRANKSHAFT FRONT OIL SEAL

- (1) Apply a small amount of engine oil to the oil seal lip and then insert.
- (2) Tap the oil seal into the cylinder block.



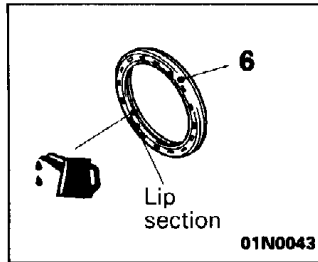
CRANKSHAFT REAR OIL SEAL

REMOVAL AND INSTALLATION

E11VA--

Pre-removal and Post-installation Operation

- (1) Removal and Installation of Transmission Assembly
Refer to GROUP 22 – Transmission assembly <M/T>
Refer to GROUP 23 – Transmission assembly <A/T>
- (2) Removal and Installation of Clutch Cover and Clutch Disc <M/T>

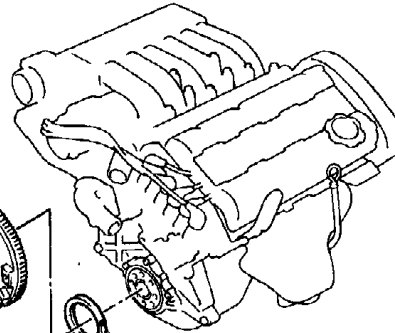


<M/T>

73–77 Nm
7.3–7.7 kgm
53–56 ft.lbs.

<A/T>

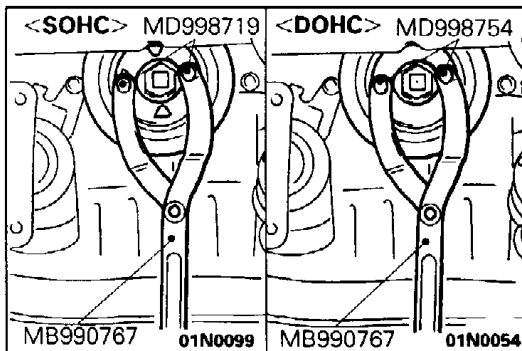
73–77 Nm
7.3–7.7 kgm
53–56 ft.lbs.



01N0115

Removal steps

1. Flywheel <M/T>
2. Adaptor plate <A/T>
3. Drive plate <A/T>
4. Crankshaft rear oil seal



SERVICE POINTS OF REMOVAL

E11VBAB

1. REMOVAL OF FLYWHEEL <M/T>/2. ADAPTOR PLATE <A/T>/3. DRIVE PLATE

Stop the crankshaft pulley from turning, and remove the flywheel or the adaptor plate and the drive plate.

Caution

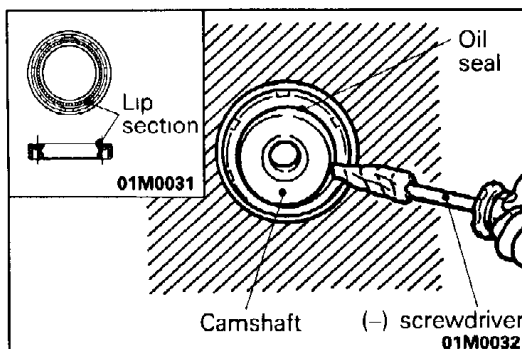
Use only the specified special tools, otherwise the crankshaft pulley damper could be damaged.

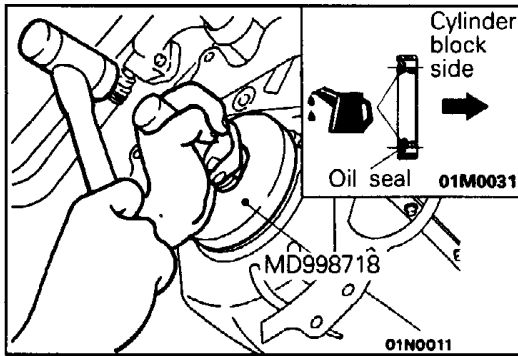
4. REMOVAL OF CRANKSHAFT REAR OIL SEAL

- (1) Make a notch in the lip section of the oil seal with a knife, etc.
- (2) Cover the end of (–) screwdriver with a rag, and insert into the notched section of the oil seal, and lever out the oil seal to remove it.

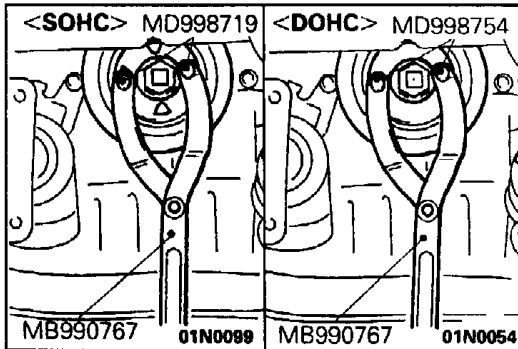
Caution

Be careful not to damage the crankshaft and the oil seal case.



**SERVICE POINTS OF INSTALLATION****4. INSTALLATION OF CRANKSHAFT REAR OIL SEAL**

- (1) Apply a small amount of engine oil to the oil seal lip and then insert.
- (2) Tap the oil seal into the cylinder block.

**3. INSTALLATION OF DRIVE PLATE/2. ADAPTOR PLATE
<A/T>/1. FLY-WHEEL <M/T>**

Stop the crankshaft pulley from turning, and install the flywheel or the drive plate and the adaptor plate.

Caution

Use only the specified special tools, because the crankshaft pulley damper can be damaged.

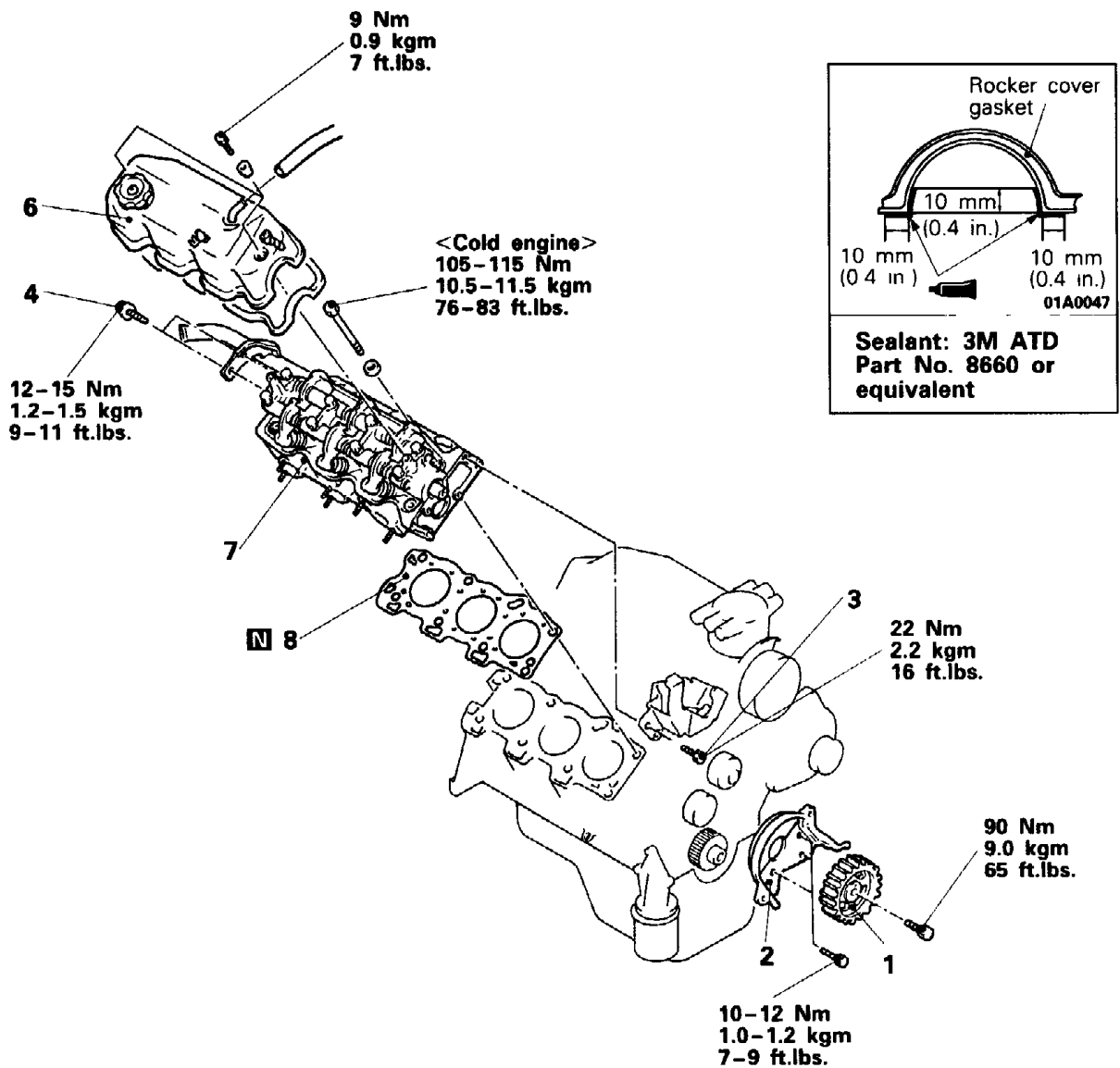
CYLINDER HEAD GASKET <SOHC>

REMOVAL AND INSTALLATION

Pre-removal Operation

- (1) Removal of Exhaust Manifold
(Refer to GROUP 15 – Exhaust Manifold.)
- (2) Draining of Engine Coolant
(Refer to GROUP 14 – Service Adjustment Procedures)
- (3) Removal of Air Intake Plenum
- (4) Removal of Intake Manifold
- (5) Removal of Timing Belt
(Refer to P.11-20.)

<Front Bank>

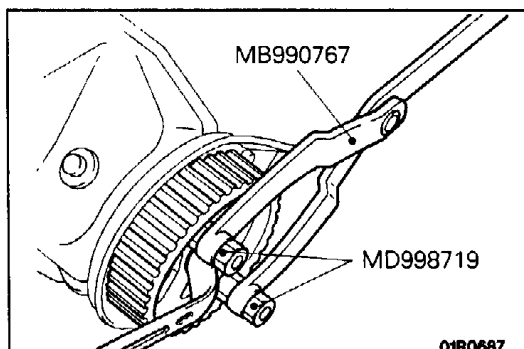
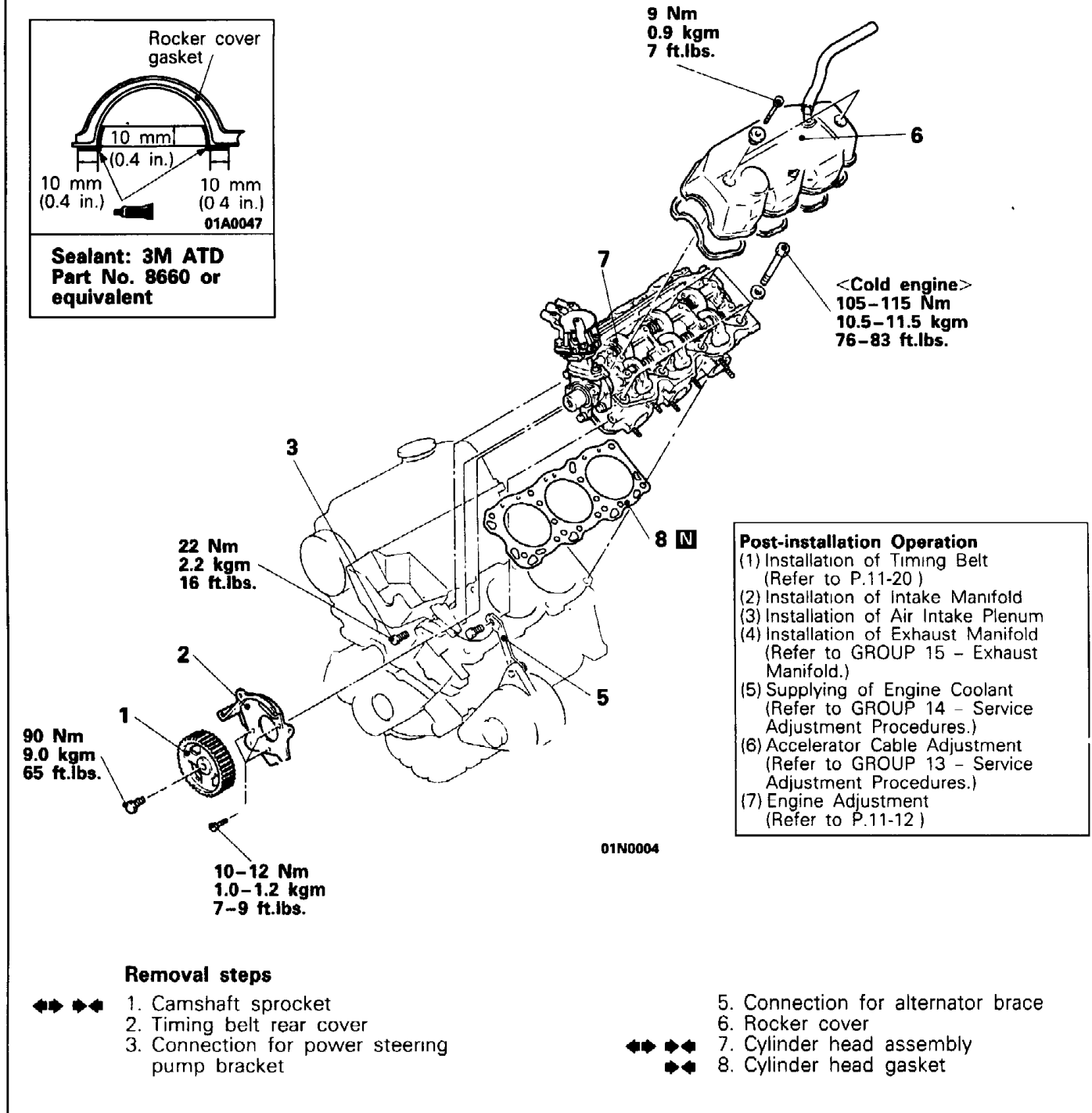
**Removal steps**

1. Camshaft sprocket
2. Timing belt rear cover
3. Power steering oil pump bracket mounting bolt

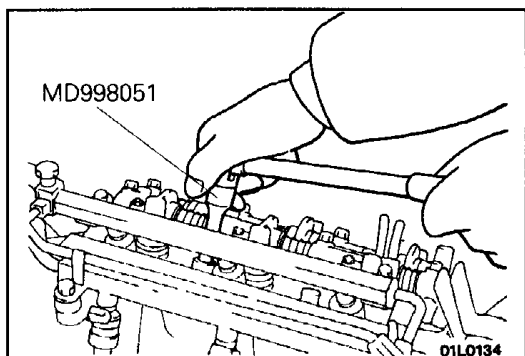


4. Water inlet pipe mounting bolt
6. Rocker cover
7. Cylinder head assembly
8. Cylinder head gasket

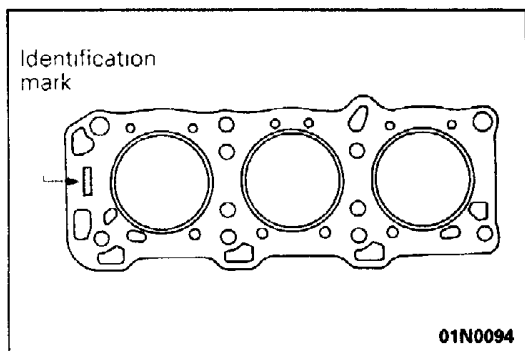
<Rear Bank>

**SERVICE POINTS OF REMOVAL****1. REMOVAL OF CAMSHAFT SPROCKET**

E11JBCE



7. REMOVAL OF CYLINDER HEAD ASSEMBLY



SERVICE POINTS OF INSTALLATION

E11JDCQ

8. INSTALLATION OF CYLINDER HEAD GASKET

- (1) Decrease the cylinder head and cylinder block gasket mounting surfaces.
- (2) Make sure that the gasket has the proper identification mark for the engine.
- (3) Lay the cylinder head gasket on the cylinder block with the identification mark at the front top.

7. INSTALLATION OF CYLINDER HEAD ASSEMBLY

- (1) Use a scraper to clean the gasket surface of the cylinder head assembly.

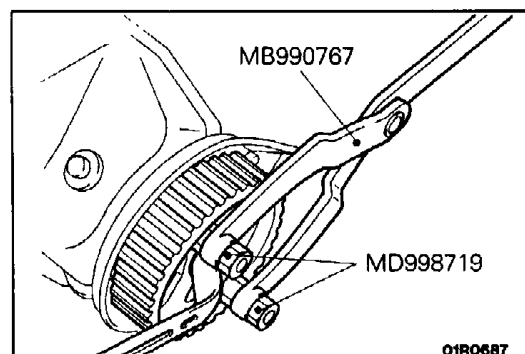
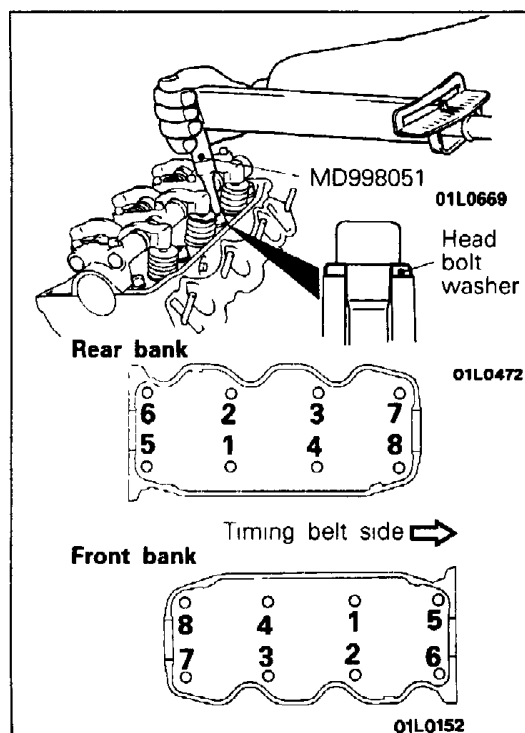
Caution

Take care that no foreign material gets into the coolant passages or oil passages.

- (2) Using the special tool and a torque wrench, tighten the bolts to the specified torque in the order shown in the illustration. (in two or three cycles)

Caution

Install the head bolt washers with shear droop upward as shown in the illustration.



1. INSTALLATION OF CAMSHAFT SPROCKET

CYLINDER HEAD GASKET <DOHC>

E11JA--

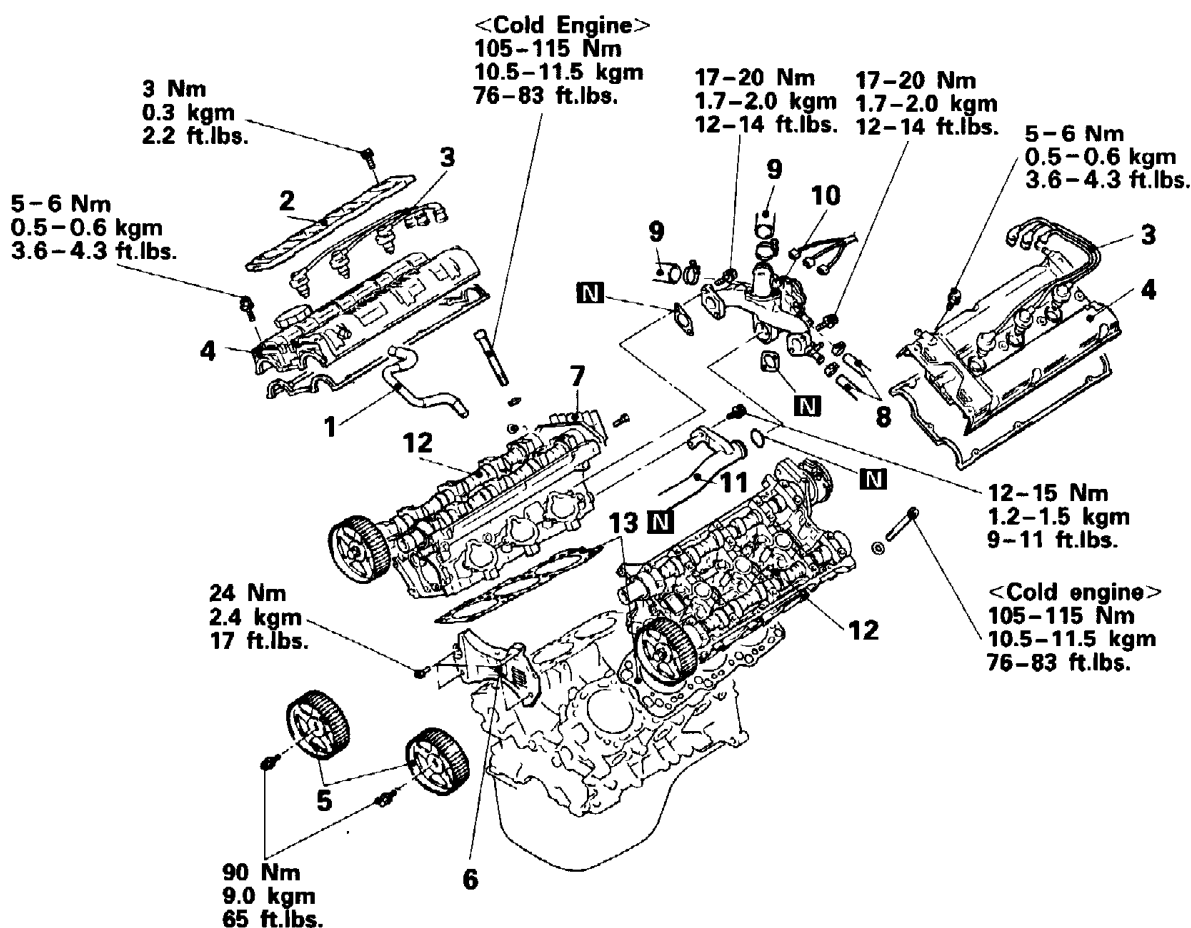
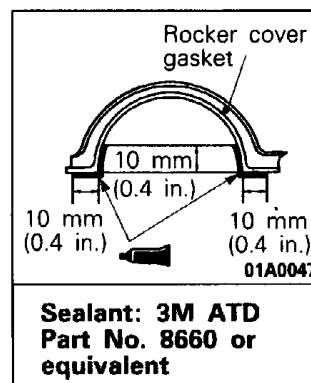
REMOVAL AND INSTALLATION

Pre-removal Operation

- (1) Removal of Exhaust Manifold (Refer to GROUP 15 – Exhaust Manifold.)
- (2) Draining of Engine Coolant (Refer to GROUP 14 – Service Adjustment Procedures.)
- (3) Removal of Air Intake Plenum (Refer to GROUP 15 – Intake Manifold)
- (4) Removal of Intake Manifold (Refer to GROUP 15 – Intake Manifold)
- (5) Removal of Timing Belt (Refer to P 11-24)

Post-installation Operation

- (1) Installation of Timing Belt (Refer to P 11-24)
- (2) Installation of Intake Manifold (Refer to GROUP 15 – Intake Manifold)
- (3) Installation of Air Intake Plenum (Refer to GROUP 15 – Exhaust Manifold)
- (4) Installation of Exhaust Manifold (Refer to GROUP 15 – Exhaust Manifold)
- (5) Supplying of Engine Coolant (Refer to GROUP 14 – Service Adjustment Procedures.)
- (6) Accelerator Cable Adjustment (Refer to GROUP 13 – Service Adjustment Procedures)
- (7) Engine Adjustment (Refer to P 11-12)

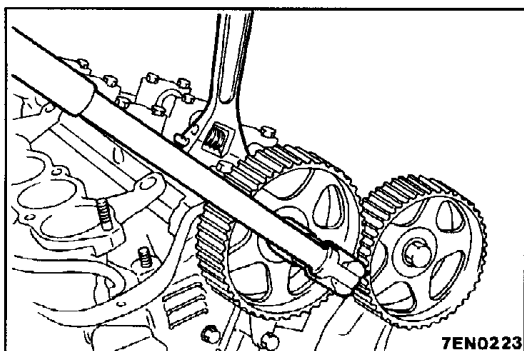


01N0071

Removal steps

1. Blow-by hose
2. Center cover
3. Spark plug cable
4. Rocker cover
5. Intake camshaft sprocket
6. Timing belt rear cover (centre)
7. Ignition coil assembly

8. Heater hose connection
9. Radiator hose connection
10. Thermostat housing
11. Water inlet pipe connection
12. Cylinder head assembly
13. Cylinder head gasket

**SERVICE POINTS OF REMOVAL**

E11JBCE

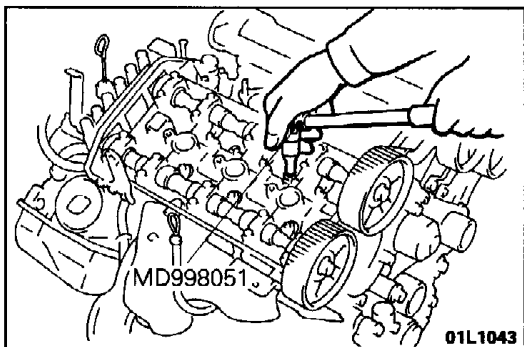
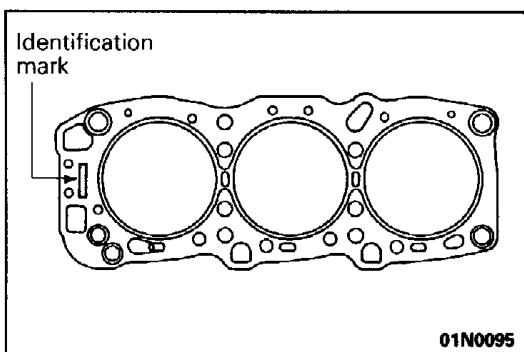
5. REMOVAL OF INTAKE CAMSHAFT SPROCKET

- (1) Using a wrench, hold the camshaft at its hexagon and remove the camshaft sprocket bolt.

Caution

Locking the camshaft sprocket with a tool damages the sprocket.

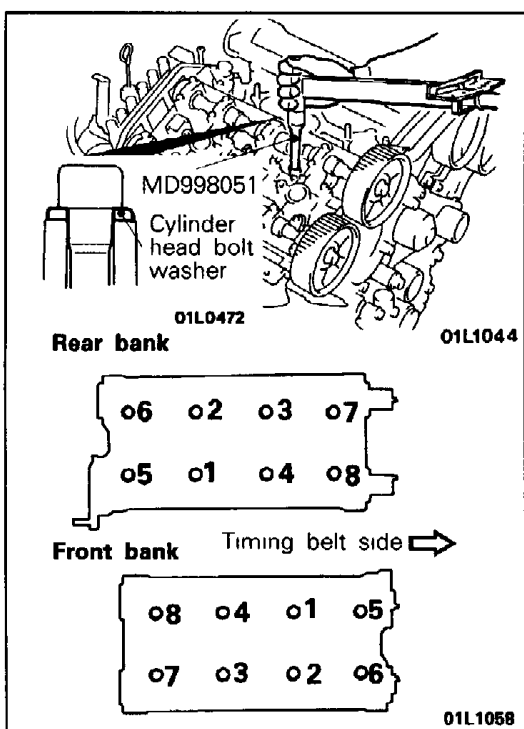
- (2) Remove the camshaft sprockets.

**12. REMOVAL CYLINDER HEAD ASSEMBLY****SERVICE POINTS OF INSTALLATION**

E11JDCQ

13. INSTALLATION OF CYLINDER HEAD GASKET

- (1) Decrease the cylinder head and cylinder block gasket mounting surfaces.
- (2) Make sure that the gasket has the proper identification mark for the engine.
- (3) Lay the cylinder head gasket on the cylinder block with the identification mark at the front top.

**12. INSTALLATION OF CYLINDER HEAD ASSEMBLY**

- (1) Use a scraper to clean the gasket surface of the cylinder head assembly.

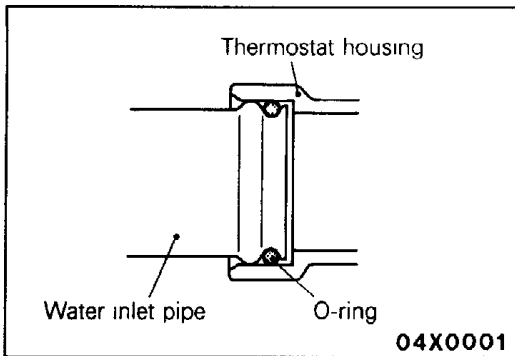
Caution

Take care that no foreign material gets into the cylinder, coolant passages or oil passages.

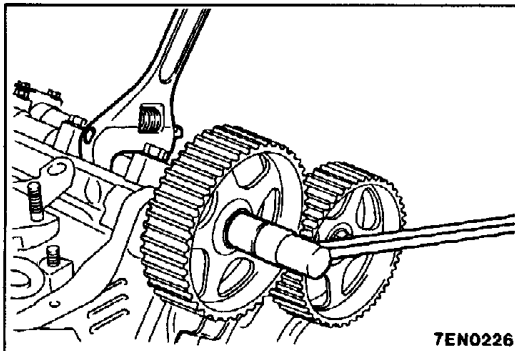
- (2) Using the special tool and a torque wrench, tighten the bolts to the specified torque in the order shown in the illustration. (in two or three cycles)

Caution

Install the head bolt washers with shear droop upward as shown in the illustration.

**10. INSTALLATION OF THERMOSTAT HOUSING**

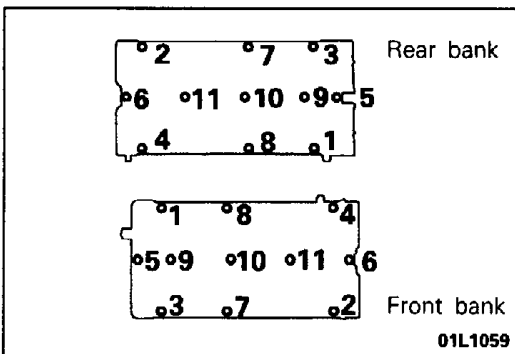
Wet the O-ring outer circumference of the water inlet pipe or the inner surface of the thermostat housing with water and install the thermostat housing.

**5. INSTALLATION OF INTAKE CAMSHAFT SPROCKET**

Using a wrench, hold the camshaft at its hexagon and tighten the bolt to specification.

Caution

Locking the camshaft sprocket with a tool damages the sprocket.

**4. INSTALLATION OF ROCKER COVER**

Tighten the rocker cover bolts in the order shown in the illustration.

NOTE

- (1) Only No. 5 bolt in the rear bank differs from other bolts in length.
Rear Bank No. 5 Bolt 20 mm (0.79 in.)
All other Bolts 10 mm (0.39 in.)
- (2) Bolts are colour-coded for the front and rear banks as follows:
Front bank Black
Rear bank Green
- (3) When the rocker cover gasket has been replaced, tighten bolts in this order, and then retighten bolts 1 to 6 to 4 Nm (0.4 kgm, 2.9 ft.lbs.).

ENGINE ASSEMBLY <SOHC>

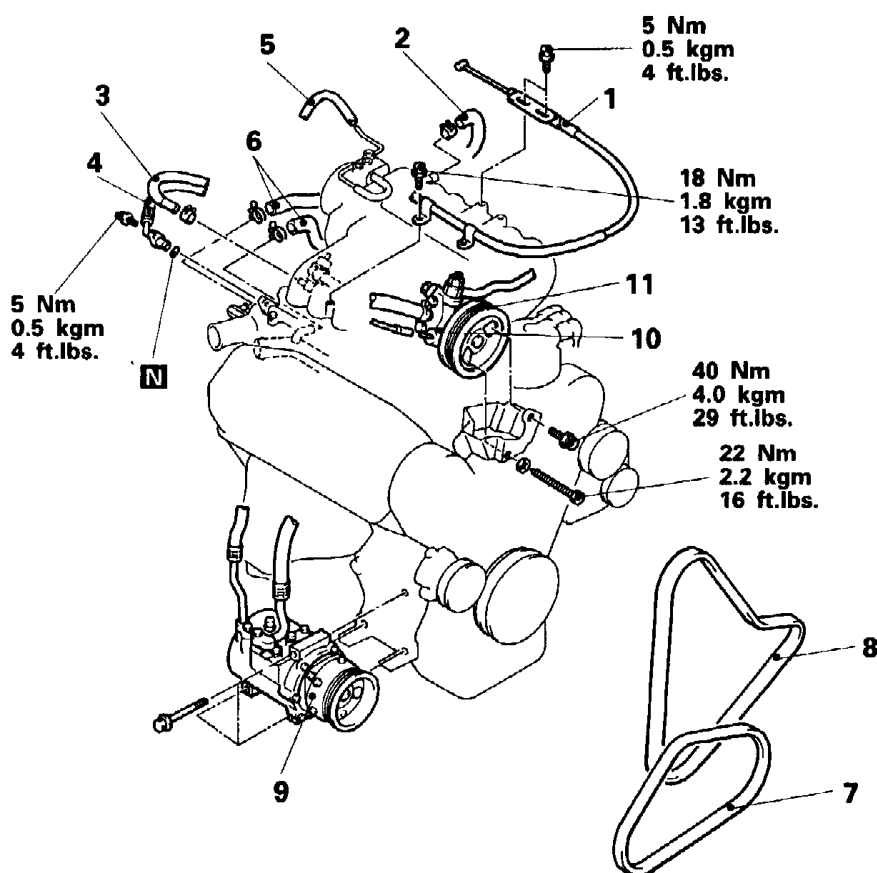
REMOVAL AND INSTALLATION

Pre-removal Operation

- (1) Removal of Hood
(Refer to GROUP 42 – Front Hood.)
- (2) Removal of Headlamp Washer Tank
- (3) Removal of Radiator Assembly
(Refer to GROUP 14 – Radiator.)
- (4) Removal of Front Exhaust Pipe
(Refer to GROUP 15 – Exhaust Pipe and Muffler.)
- (5) Removal of Transmission Assembly
(Refer to GROUP 22, 23 – Transmission Assembly.)

Post-installation Operation

- (1) Installation of Transmission Assembly
(Refer to GROUP 22, 23 – Transmission Assembly.)
- (2) Installation of Front Exhaust Pipe
(Refer to GROUP 15 – Exhaust Pipe and Muffler.)
- (3) Installation of Radiator Assembly
(Refer to GROUP 14 – Radiator.)
- (4) Installation of Headlamp Washer Tank
- (5) Accelerator Cable Adjustment
(Refer to GROUP 13 – Service Adjustment Procedures.)
- (6) Installation of Hood
(Refer to GROUP 42 – Front Hood.)



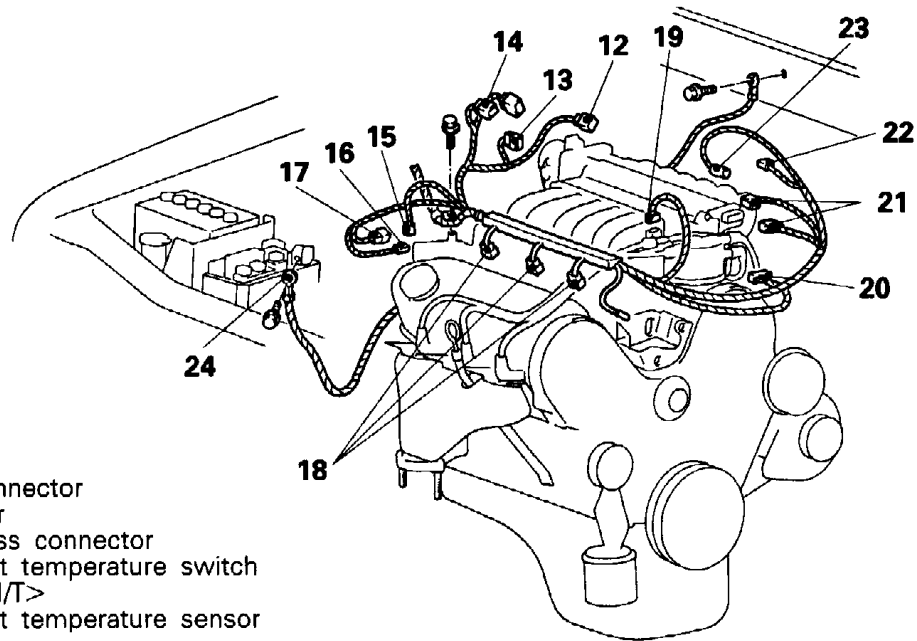
01N0019

Removal steps

1. Accelerator cable connection
2. Brake booster vacuum hose connection
3. Fuel return hose connection
4. Fuel high-pressure hose connection
5. Purge hose connection
6. Heater hose connection

- V-belt tension adjustment
(Refer to P.11-20.)
- 7. V-ribbed belt (Air conditioner compressor)
- 8. V-ribbed belt (Alternator and power steering pump)
- 9. Air conditioner compressor
- 10. Power steering switch connector
- 11. Power steering pump

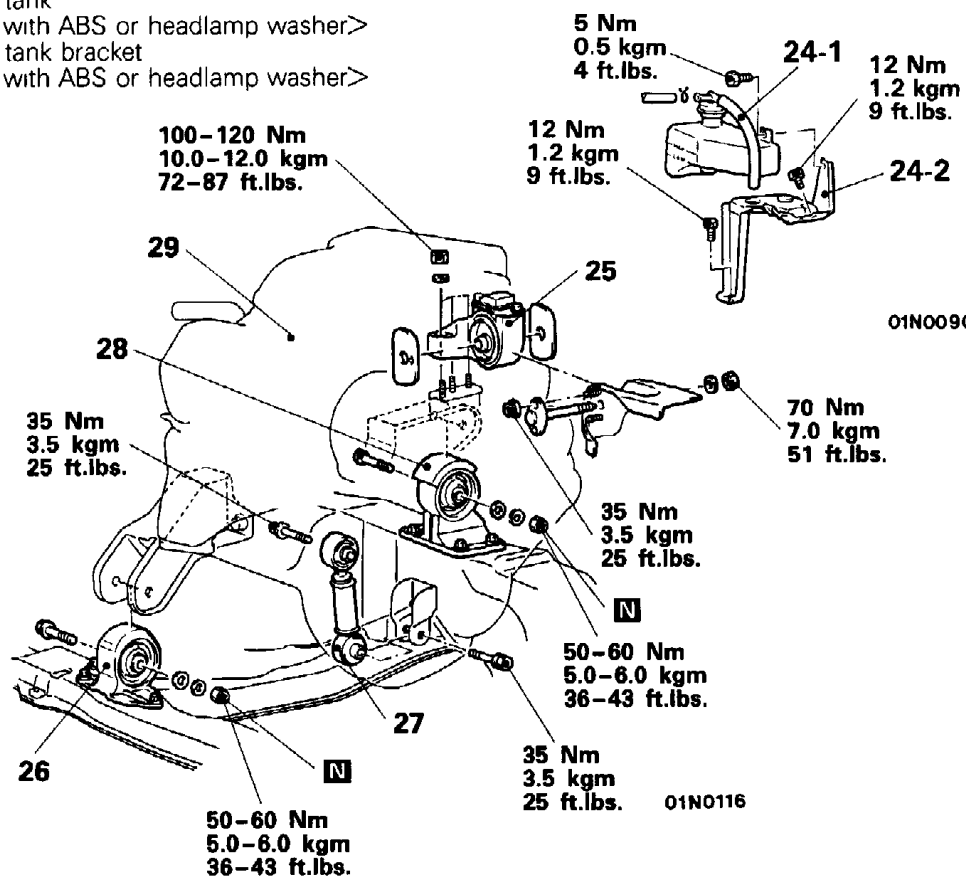




01N0126

- 12. ISC motor connector
- 13. TPS connector
- 14. Injector harness connector
- 15. Engine coolant temperature switch connector <M/T>
- 16. Engine coolant temperature sensor connector
- 17. Engine coolant temperature gauge unit connector
- 18. Injector connector
- 19. Power transistor connector
- 20. Distributor connector
- 21. Variable induction motor connector
- 22. Condenser connector
- 23. Ignition coil connector
- 24. Alternator harness connection
- 24-1. Condense tank
<Vehicles with ABS or headlamp washer>
- 24-2. Condense tank bracket
<Vehicles with ABS or headlamp washer>

- 25. Engine mount bracket assembly
- 26. Front roll stopper and engine assembly
- 27. Engine damper
- 28. Rear roll stopper and engine assembly
- 29. Engine assembly



SERVICE POINTS OF REMOVAL

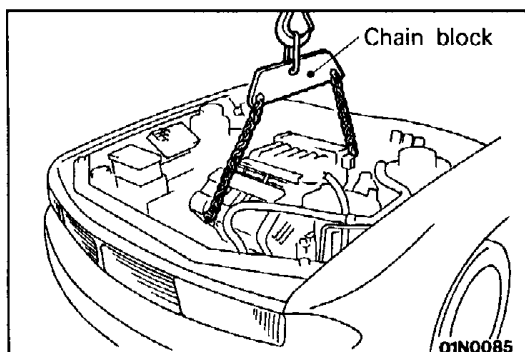
E11TBAH

9. REMOVAL OF AIR CONDITIONER COMPRESSOR

- (1) Remove the compressor from the compressor bracket with hose attached.
- (2) Secure the compressor using wire so that it will not be in the way while working.

11. REMOVAL OF POWER STEERING PUMP

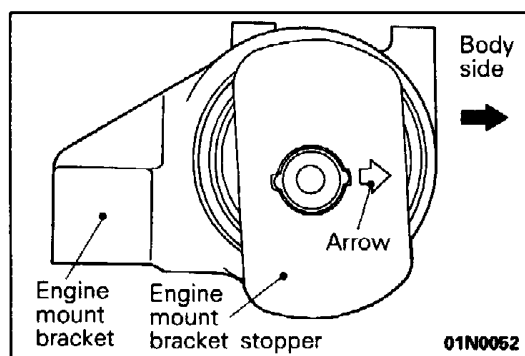
- (1) Remove the pump with hose attached from the bracket.
- (2) Secure the pump using wire so that it will not be in the way while working.

**25. REMOVAL OF ENGINE MOUNT BRACKET ASSEMBLY**

- (1) When lifting up the engine, remove the distributor cap to prevent the wires from contacting and causing damage.
- (2) Attach wire or similar material to the engine hook, and then suspend to the extent that there is no slackness in the wire.
- (3) Remove the mounting bolt and nut of the engine mount bracket assembly.

29. REMOVAL OF ENGINE ASSEMBLY

- (1) Check that all cables, hoses and harness connectors, etc., are disconnected from the engine.
- (2) Lift the chain block slowly to remove the engine assembly upward from the engine compartment.

**SERVICE POINTS OF REMOVAL**

E11TDAI

29. INSTALLATION OF ENGINE ASSEMBLY

Install the engine assembly, and check that the harnesses, pipes and hoses are not caught.

25. INSTALLATION OF ENGINE MOUNT BRACKET ASSEMBLY

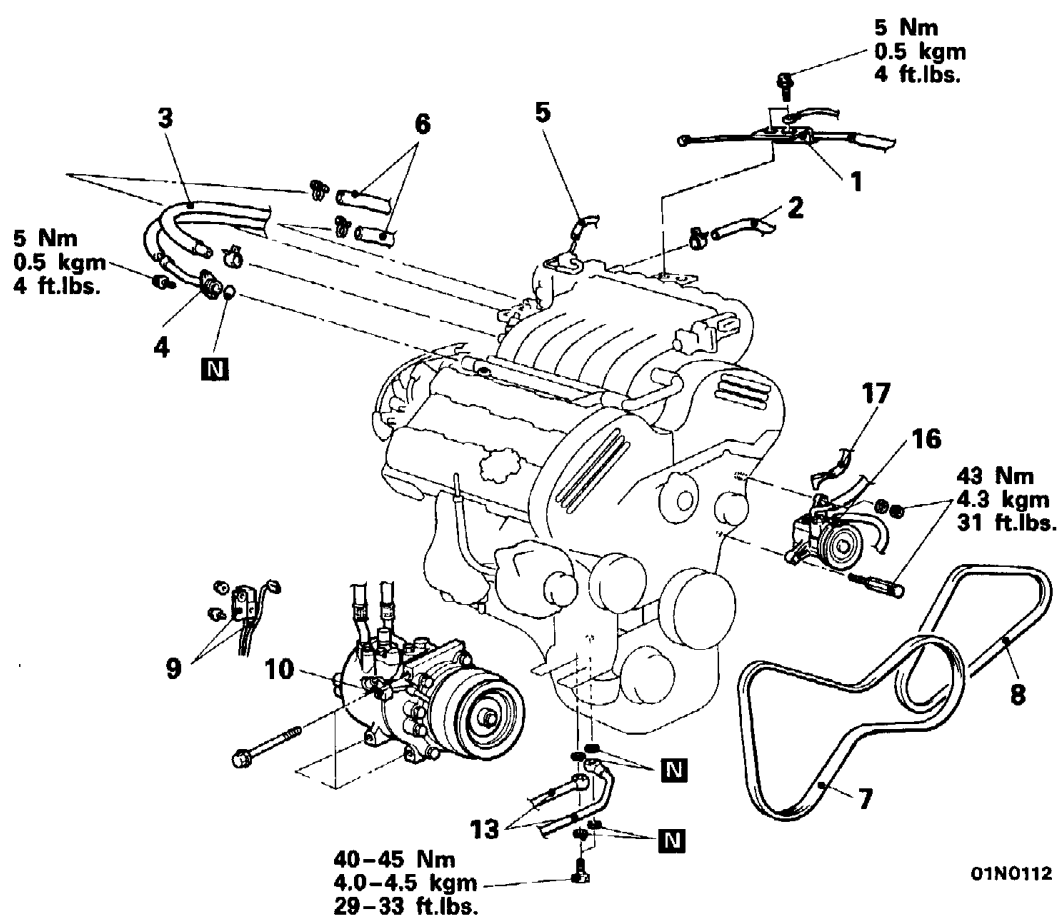
Install so that the arrow of the engine mount bracket stopper is facing the direction shown in the figure.

ENGINE ASSEMBLY <DOHC>**REMOVAL AND INSTALLATION****Pre-removal Operation**

- (1) Removal of Hood
(Refer to GROUP 42 – Front Hood.)
- (2) Removal of Headlamp Washer Tank
(Refer to GROUP 14 – Radiator.)
- (3) Removal of Radiator Assembly
(Refer to GROUP 14 – Radiator.)
- (4) Removal of Front Exhaust Pipe
(Refer to GROUP 15 – Exhaust Pipe and Muffler.)
- (5) Removal of Transmission Assembly
(Refer to GROUP 22, 23 – Transmission Assembly.)

Post-installation Operation

- (1) Installation of Transmission Assembly
(Refer to GROUP 22, 23 – Transmission Assembly)
- (2) Installation of Front Exhaust Pipe
(Refer to GROUP 15 – Exhaust Pipe and Muffler.)
- (3) Installation of Radiator Assembly
(Refer to GROUP 14 – Radiator.)
- (4) Installation of Headlamp Washer Tank
(Refer to GROUP 14 – Radiator.)
- (5) Accelerator Cable Adjustment
(Refer to GROUP 13 – Service Adjustment Procedures)
- (6) Installation of Hood
(Refer to GROUP 42 – Front Hood.)



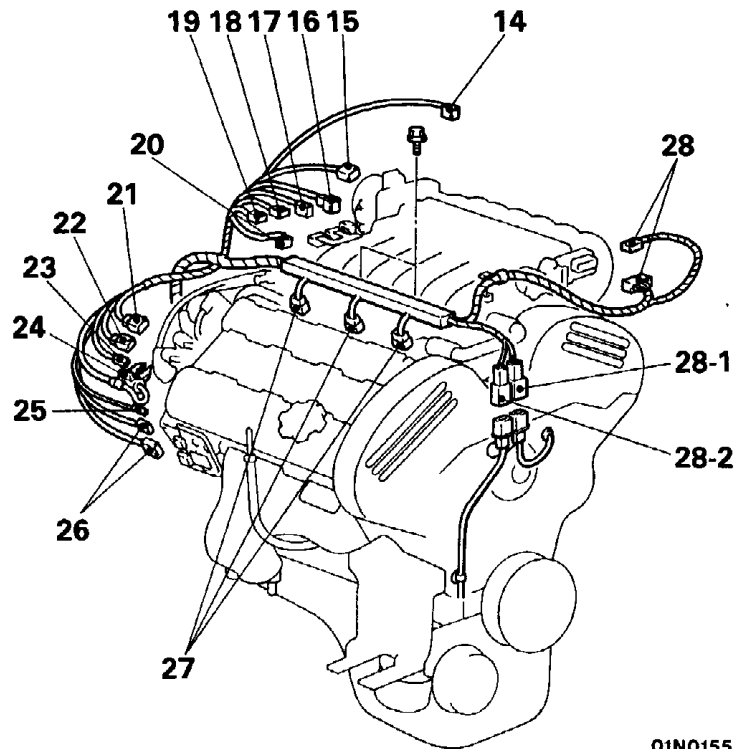
01N0112

Removal steps

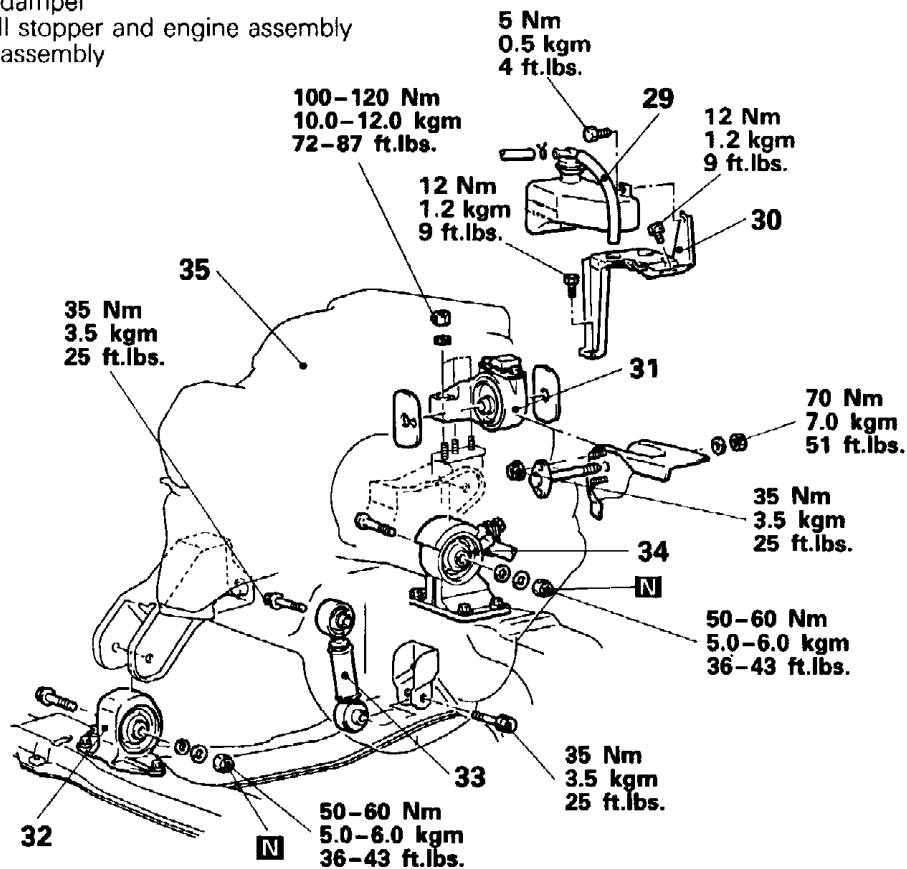
1. Accelerator cable connection
2. Brake booster vacuum hose connection
3. Fuel return hose connection
4. Fuel high-pressure hose connection
5. Purge hose connection
6. Heater hose connection
- V-belt tension adjustment
(Refer to P.11-24.)
7. V-ribbed belt (Alternator and air conditioner compressor)

8. V belt (Power steering pump)
9. Alternator harness connector
10. Air conditioner compressor
11. Power steering pump
12. Power steering oil pressure switch connector
13. Engine oil cooler hose connection

- 14. APS connector
<Vehicles with traction control system>
- 15. ISC motor connector
- 16. TPS connector
- 17. Power steering switch and oil pressure switch connector
- 18. Injector harness connector
- 19. Knock sensor connector
- 20. Crank angle sensor connector
<Vehicles built up to October, 1992>
- 21. Engine coolant temperature switch connector
- 22. Engine coolant temperature gauge unit connector
- 23. Engine coolant temperature sensor connector
- 24. Condenser
- 25. Ignition coil connector
- 26. Power transistor connector
- 27. Injector connector
- 28. Variable induction motor connector
- 28-1. Camshaft position sensor connector
<Vehicles built from November, 1992>
- 28-2. Crank angle sensor connector
<Vehicles built from November, 1992>
- 29. Condense tank <Vehicles with ABS or headlamp washer>
- 30. Condense tank bracket <Vehicles with ABS or headlamp washer>
- ◆◆◆◆ 31. Engine mount bracket assembly
- 32. Front roll stopper and engine assembly
- 33. Engine damper
- ◆◆◆◆ 34. Rear roll stopper and engine assembly
- ◆◆◆◆ 35. Engine assembly



01N0155



01N0090

SERVICE POINTS OF REMOVAL

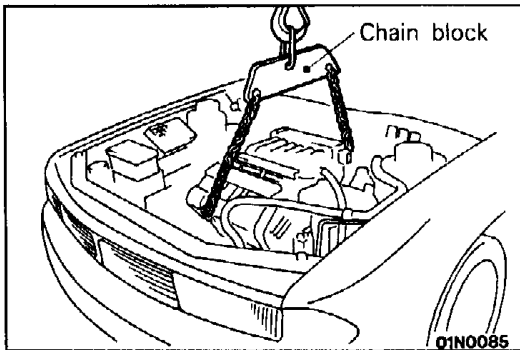
E11TBAI

10. REMOVAL OF AIR CONDITIONER COMPRESSOR

- (1) Remove the compressor with hose attached from the compressor bracket.
- (2) Secure the compressor with wire so that it will not be in the way while working.

11. REMOVAL OF POWER STEERING PUMP

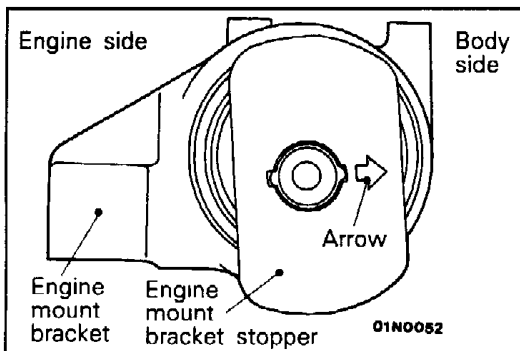
- (1) Remove the oil pump with hose attached from the bracket.
- (2) Place the oil pump somewhere so it will not be in the way while working.

**31. REMOVAL OF ENGINE MOUNT BRACKET ASSEMBLY**

- (1) Attach wire or similar material to the engine hook, and then suspend by using a chain block or similar so that there is no slacking in the wire.
- (2) Remove the mounting nut and bolt of the engine mount bracket assembly.

35. REMOVAL OF ENGINE ASSEMBLY

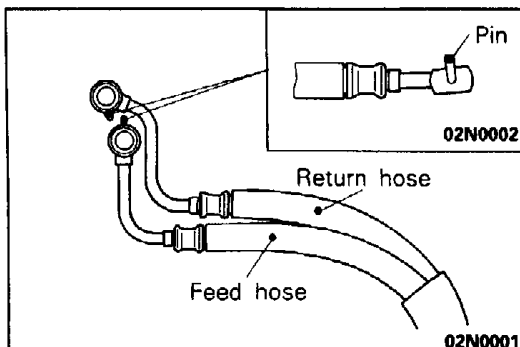
- (1) Check that all cables, hoses and harness connectors, etc., are disconnected from the engine.
- (2) Lift the chain block slowly to remove the engine assembly upward from the engine compartment.

**SERVICE POINTS OF INSTALLATION****35. INSTALLATION OF ENGINE ASSEMBLY**

Install the engine assembly, and check that the harnesses, pipes and hoses are not caught.

31. INSTALLATION OF ENGINE MOUNT BRACKET ASSEMBLY

Install so that the arrow of the engine mount bracket stopper is facing the direction shown in the figure.

**13. INSTALLATION OF ENGINE OIL COOLER HOSE**

Install by inserting the eye joint pin into the hole in the oil filter bracket as shown in the figure.

LUBRICATION

CONTENTS

E12AA--

GENERAL INFORMATION	2	ENGINE OIL COOLER <DOHC>	5
SPECIFICATIONS	3		
General Specifications	3		
Lubricants	3		
SERVICE ADJUSTMENT PROCEDURES	3		
Engine Oil Inspection	3		
Engine Oil Replacement	4		
Oil Filter Replacement	4		
Oil level sensor inspection	4-1		

GENERAL INFORMATION

ENGINE OILS

Health Warning

Prolonged and repeated contact with mineral oil will result in the removal of natural fats from the skin, leading to dryness, irritation and dermatitis. In addition, used engine oil contains potentially harmful contaminants which may cause skin cancer. Adequate means of skin protection and washing facilities must be provided.

Recommended Precautions

The most effective precaution is to adapt working practices which prevent, as far as practicable, the risk of skin contact with mineral oils, for example by using enclosed systems for handling used engine oil and by degreasing components, where practicable, before handling them.

Other precautions:

- Avoid prolonged and repeated contact with oils, particularly used engine oils.
- Wear protective clothing, including impervious gloves where practicable.
- Avoid contaminating clothes, particularly underpants, with oil.
- Do not put oily rags in pockets, the use of overalls without pockets will avoid this.
- Do not wear heavily soiled clothing and oil-impregnated foot-wear. Overalls must be cleaned regularly and kept separate from personal clothing.
- Where there is a risk of eye contact, eye protection should be worn, for example, chemical goggles or face shields; in addition an eye wash facility should be provided.
- Obtain First Aid treatment immediately for open cuts and wounds.
- Wash regularly with soap and water to ensure all oil is removed, especially before meals (skin cleansers and nail brushes will help). After cleaning, the application of preparations containing lanolin to replace the natural skin oils is advised.
- Do not use petrol, kerosine, diesel fuel, gas oil, thinners or solvents for cleaning skin.
- Use barrier creams, applying them before each work period, to help the removal of oil from the skin after work.
- If skin disorders develop, obtain medical advice without delay.

SPECIFICATIONS

GENERAL SPECIFICATIONS

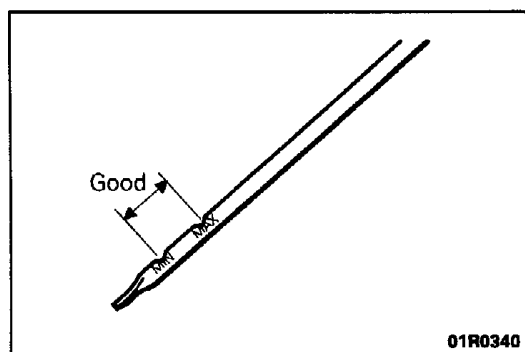
E12CA–

Items	DOHC
Engine oil cooler Performance	J/h (kcal/h, BTU/h) 20,930 × 10 ³ (5,000, 19,841)

LUBRICANTS

E12CD–

Items	SOHC	DOHC
Engine oil		
Quantity	lit (U.S.qts, Imp.qts.)	
Oil pan	4.0 (4.2, 3.5)	4.0 (4.2, 3.5)
Oil filter	0.3 (0.32, 0.26)	0.3 (0.32, 0.26)
Oil cooler	0.1 (0.11, 0.09)	0.3 (0.32, 0.26)
Brand (API classification)	SG or higher	SG or higher



SERVICE ADJUSTMENT PROCEDURES

ENGINE OIL INSPECTION

E12FCAA

1. Pull out the oil level gauge and remove oil adhered to the level gauge, wiping with clean cloth.
2. Insert the level gauge into the oil level gauge guide.
3. Pull out the level gauge slowly and check that the oil level is in the illustrated range.

NOTE

1. For this inspection, place the vehicle on a level surface.
2. Check while the engine is stationary. If the engine has been started, stop it and allow for some time before inspection.
4. If below the minimum level, supply with specified oil.

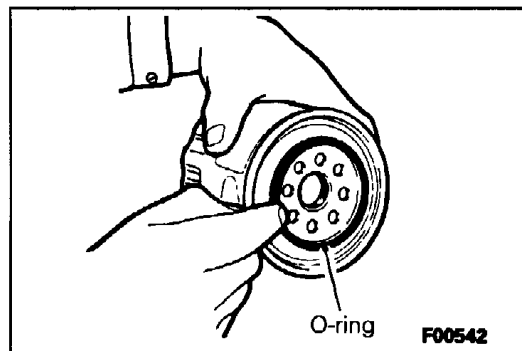
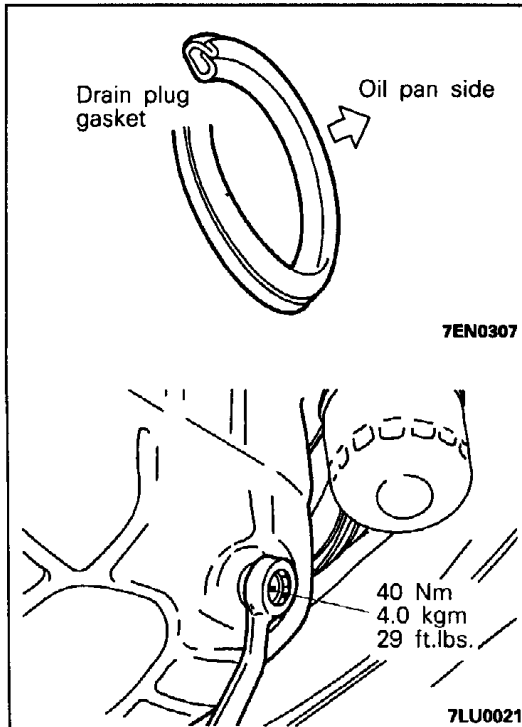
Specified oil: (API classification)

SG or higher

Caution

Refilling beyond the maximum level has adverse effect on engine performance.

5. Run the engine at idle and stop. Then allow some time and check oil level again to make sure it is within the specified range.
6. Check to ensure that the oil is not noticeably dirty or mixed with coolant or gasoline, and that it has the proper viscosity.



ENGINE OIL REPLACEMENT

E12FAAB

1. Warm up the engine and then remove the filler cap.
2. Drain the engine oil by removing the drain plug.
3. Replace the gasket with a new part, install it in the direction shown in the illustration, and tighten the drain plug to the specified torque.
4. Fill with new engine oil through the oil filler.

Specified oil (API classification): SG or higher

Oil quantity: 4.0 lit. (4.2 U.S.qts., 3.5 Imp.qts.)
(excluding residual oil in the oil filter and oil cooler)

Caution

Cover the alternator with a rag so that if the oil is spilt it will not get on the alternator (DOHC engine).

5. Start the engine and let it idle for a few minutes.
6. Stop the engine and check the oil level with the level gauge.

OIL FILTER REPLACEMENT

E12FBAC

1. Remove the filler cap.
2. Drain the engine oil by removing the oil drain plug.
3. Use an oil filter wrench to remove the engine oil filter.
4. Clean the surface of the filter bracket attachment.
5. Lubricate the O-ring of the new oil filter with a small amount of engine oil.
6. Screw in the oil filter by hand, and after the O-ring contacts the flange surface, tighten it another 3/4 turns with a filter wrench. etc. [approx. 14 Nm (1.4 kgm, 10 ft.lbs.)]
7. Refill the engine oil.
8. Race the engine two or three times to make sure that no engine oil leaks from the oil filter seal.

ENGINE OIL COOLER <DOHC> REMOVAL AND INSTALLATION

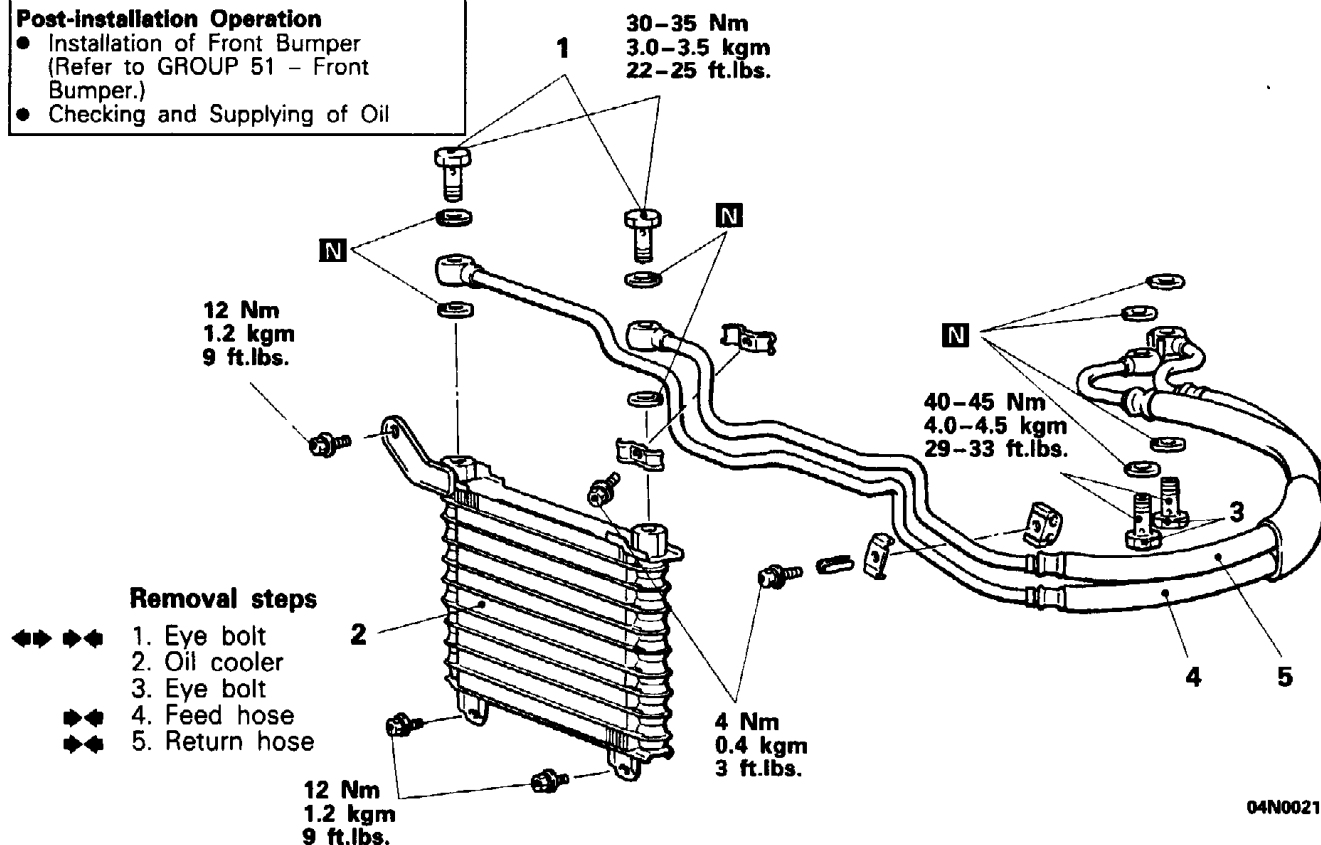
E12JA-

Pre-removal Operation

- Removal of Front Bumper
(Refer to GROUP 51 – Front Bumper.)

Post-installation Operation

- Installation of Front Bumper
(Refer to GROUP 51 – Front Bumper.)
- Checking and Supplying of Oil



04N0021

SERVICE POINT OF REMOVAL

E12JBAG

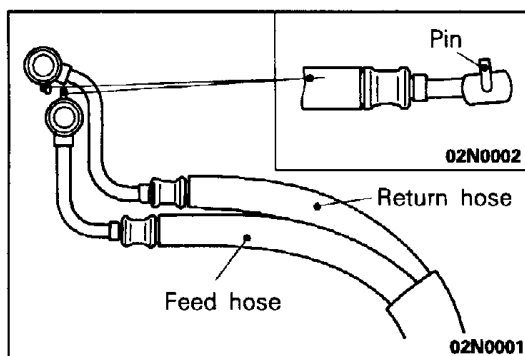
1. REMOVAL OF EYE BOLT**Caution**

Be sure to hold the weld nut of the oil cooler while loosening the eye bolt.

INSPECTION

E12JCAE

- Check for foreign material between oil cooler fins.
- Check the oil cooler fins for bend or damage.
- Check the oil cooler and cooler hoses for cracks, damage, clogging or deterioration.
- Check the eye bolts for clogging.

**SERVICE POINTS OF INSTALLATION**

E12JDAQ

5. INSTALLATION OF RETURN HOSE/4. FEED HOSE (ENGINE SIDE)

Insert the eye joint pin into the oil filter bracket hole and install as shown in the diagram.

1. INSTALLATION OF EYE BOLT**Caution**

Be sure to hold the weld nut of the oil cooler while tightening the eye bolt.

FUEL

CONTENTS

E13AA--

GENERAL INFORMATION	2	SERVICE ADJUSTMENT PROCEDURES	43
Multi Point Injection System Diagram	2	Throttle Body (Throttle Valve Area) Cleaning	43
SPECIFICATIONS	5	Idle Position Switch and Throttle Position Sensor Adjustment <Except for Vehicles with TCL>	43
General Specifications	5	Throttle Position Sensor Adjustment <Vehicles with TCL>	45
Service Specifications	6	Idle Switch and Accelerator Position Sensor Adjustment <Vehicles with TCL>	45
Sealants	7	Fixed SAS Adjustment	47
SPECIAL TOOLS	7	Basic Idle Speed Adjustment	47
TROUBLESHOOTING	9	Accelerator Cable Inspection and Adjustment	49
Explanation of Troubleshooting Procedures	9	Fuel Filter Replacement	50
Explanation and Precaution Related to Harness Checking	10	Fuel Gauge Unit Replacement	50
Engine Warning Lamp (Check Engine Lamp)	12	Two-way Valve Replacement	51
Items Indicated by the Engine Warning Lamp	12	Fuel Pump Operation Check	51
Engine Warning Lamp Inspection	13	Fuel Pump Connector Disconnection	51
Self-diagnosis	13	Inspecting Operation of The TCL (Traction Control) System	51-1
Read Out of Malfunction Code	16		
Traction Control (TCL) System	18-1		
Auto-cruise Control System	19		

CONTINUED ON NEXT PAGE

WARNINGS REGARDING SERVICING OF SUPPLEMENTAL RESTRAINT SYSTEM (SRS) EQUIPPED VEHICLES

WARNING!

- (1) Improper service or maintenance of any component of the SRS, or any SRS-related component, can lead to personal injury or death to service personnel (from inadvertent firing of the air bag) or to the driver and passenger (from rendering the SRS inoperative).
- (2) Service or maintenance of any SRS component or SRS-related component must be performed only at an authorized MITSUBISHI dealer.
- (3) MITSUBISHI dealer personnel must thoroughly review this manual, and especially its GROUP 52B – Supplemental Restraint System (SRS) before beginning any service or maintenance of any component of the SRS or any SRS-related component.

NOTE

The SRS includes the following components: impact sensors, SRS diagnosis unit, SRS warning lamp, air bag module, clock spring and interconnecting wiring. Other SRS-related components (that may have to be removed/installed in connection with SRS service or maintenance) are indicated in the table of contents by an asterisk (*).

Auto-cruise Control Cable Inspection and Adjustment	52	Vehicle Speed Sensor	98-2
Accelerator Pedal Switch Inspection and Adjustment	54	Power Steering Fluid Pressure Switch	100
Auto-cruise Control Main Switch Check	54	Air Conditioner Switch and Power Relay ...	102
Auto-cruise Control Setting Check	54	Detonation Sensor	104
Speed-increase Setting Check	55	Electric Load Switch	106
Speed Reduction Setting Check	55	Fan Motor Relay (Radiator Fan, Condensor Fan)	108
Check of Return to the Set Speed before Cancellation and Auto-cruise Control Cancellation	55	Induction Control Valve Position Sensor ..	108-2
ON-VEHICLE INSPECTION OF MPI COMPONENTS	56	Oxygen Sensor	110
Component Location	56	Injectors	113
Power Supply and Ignition Switch-IG <Vehicles built up to November, 1992>	64	Idle Speed Control Servo (Stepper motor)	118
Power Supply and Ignition Switch-IG <Vehicles built from December, 1992> ...	66-1	Ignition Coil and Power Transistor	122
Engine Control Unit Power Earth	67	Purge Control Solenoid Valve	127
Fuel Pump <Vehicles built up to November, 1992>	68	EGR Control Solenoid Valve <Vehicles built from December, 1992> ..	128-1
Fuel Pump <Vehicles built from December, 1992>	70-1	Vacuum Solenoid Valve <Vehicles with TCL>	129
Air Flow Sensor	71	Ventilation Solenoid Valve <Vehicles wit TCL>	132
Intake Air Temperature Sensor	74	Variable Induction Control Servo	134
Barometric Pressure Sensor	77	Engine/Transmission Overall Control Signal <DOHC-A/T>	136
Engine Coolant Temperature Sensor	79	Engine/Transmission Overall Control Signal <SOHC-A/T-Vehicles built from December 1991>	137-1
Throttle Position Sensor	82	Traction Control Signal <Vehicles with TCL>	138
Idle Position Switch	85	Fuel Pressure Test	140
Accelerator Position Sensor <Vehicles with TCL>	88	DETONATION SENSOR	143
Top Dead Centre Sensor <SOHC, DOHC-Vehicles built up to November, 1992>	90	FUEL TANK	144
Crank Angle Sensor <SOHC, DOHC-Vehicles built up to November, 1992>	92	FUEL LINE AND VAPOR LINE	147
Camshaft Position Sensor <DOHC-Vehicles built from December, 1992>	94-1	TCL CONTROL UNIT	148-1
Crank Angle Sensor <DOHC-Vehicles built from December, 1992>	94-4	TCL SWITCH	148-2
Ignition Switch-ST <M/T>	95	HYDRAULIC UNIT <VEHICLES WITH TCL>	148-2
Ignition Switch-ST and Inhibitor Switch <A/T> <Vehicles built up to November, 1992>	96	ACCELERATOR CABLE AND PEDAL	149
Ignition Switch-ST and Inhibitor Switch <A/T> <Vehicles built from December, 1992>	98	AUTO-CRUISE CONTROL*	151

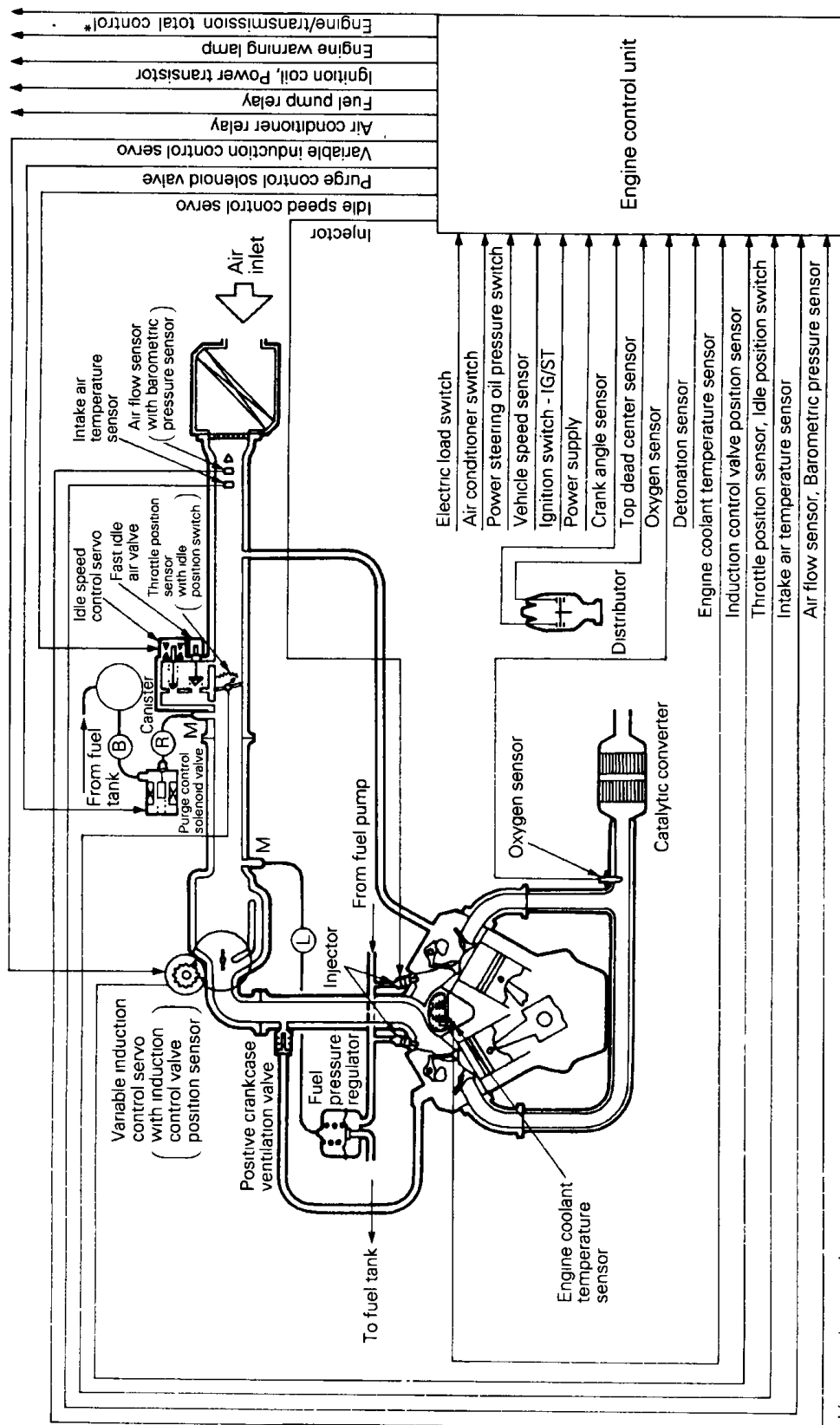
NOTE

GENERAL INFORMATION

MULTI POINT INJECTION SYSTEM DIAGRAM

<SOHC-Vehicles built up to November, 1992>

E13BBAE



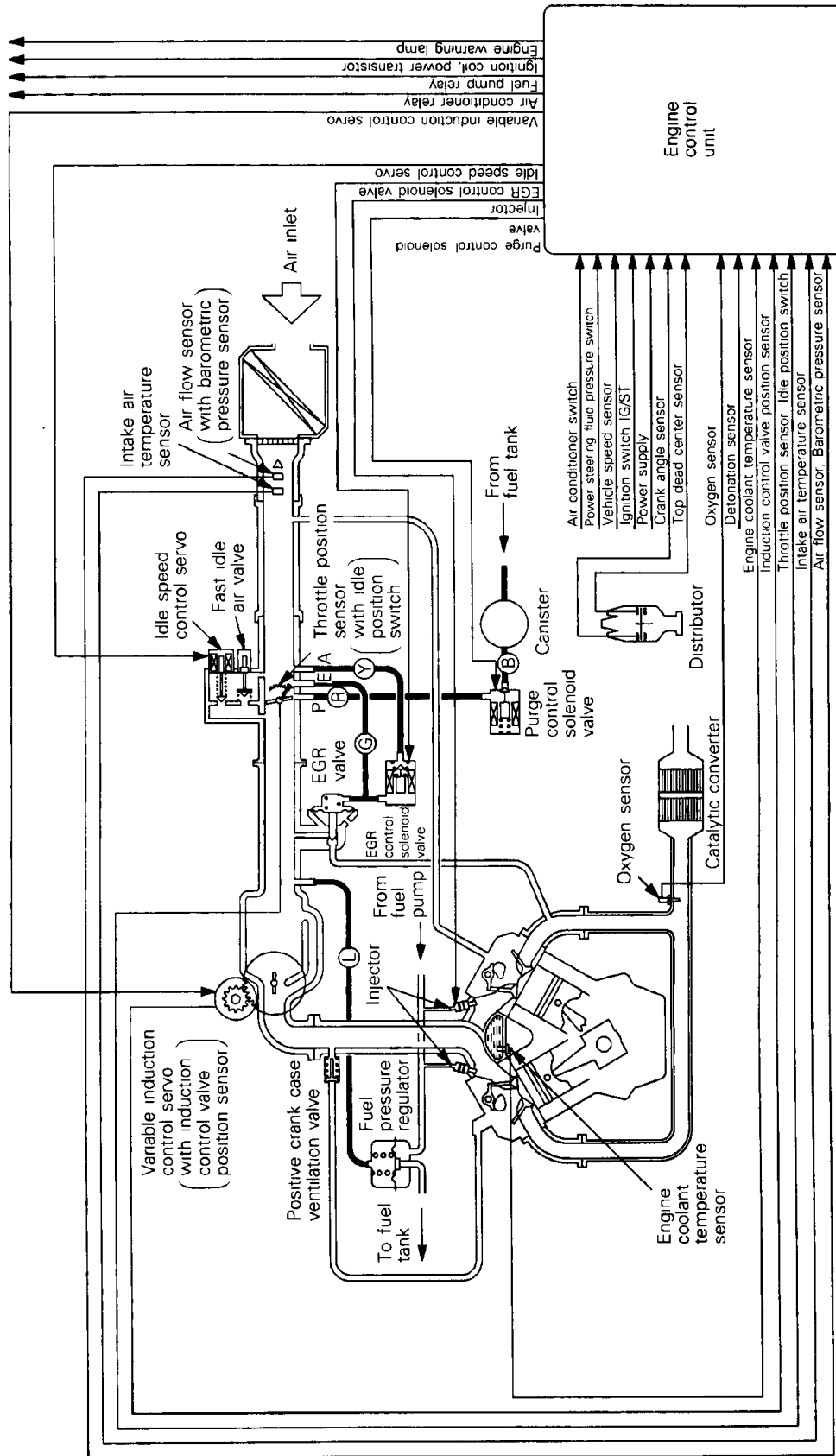
7FU1300

Vacuum hose colour
 B: Black
 L: Light blue
 R: Red

NOTE

*: Vehicles built from December 1991

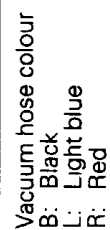
<SOHC-Vehicles built from December, 1992>



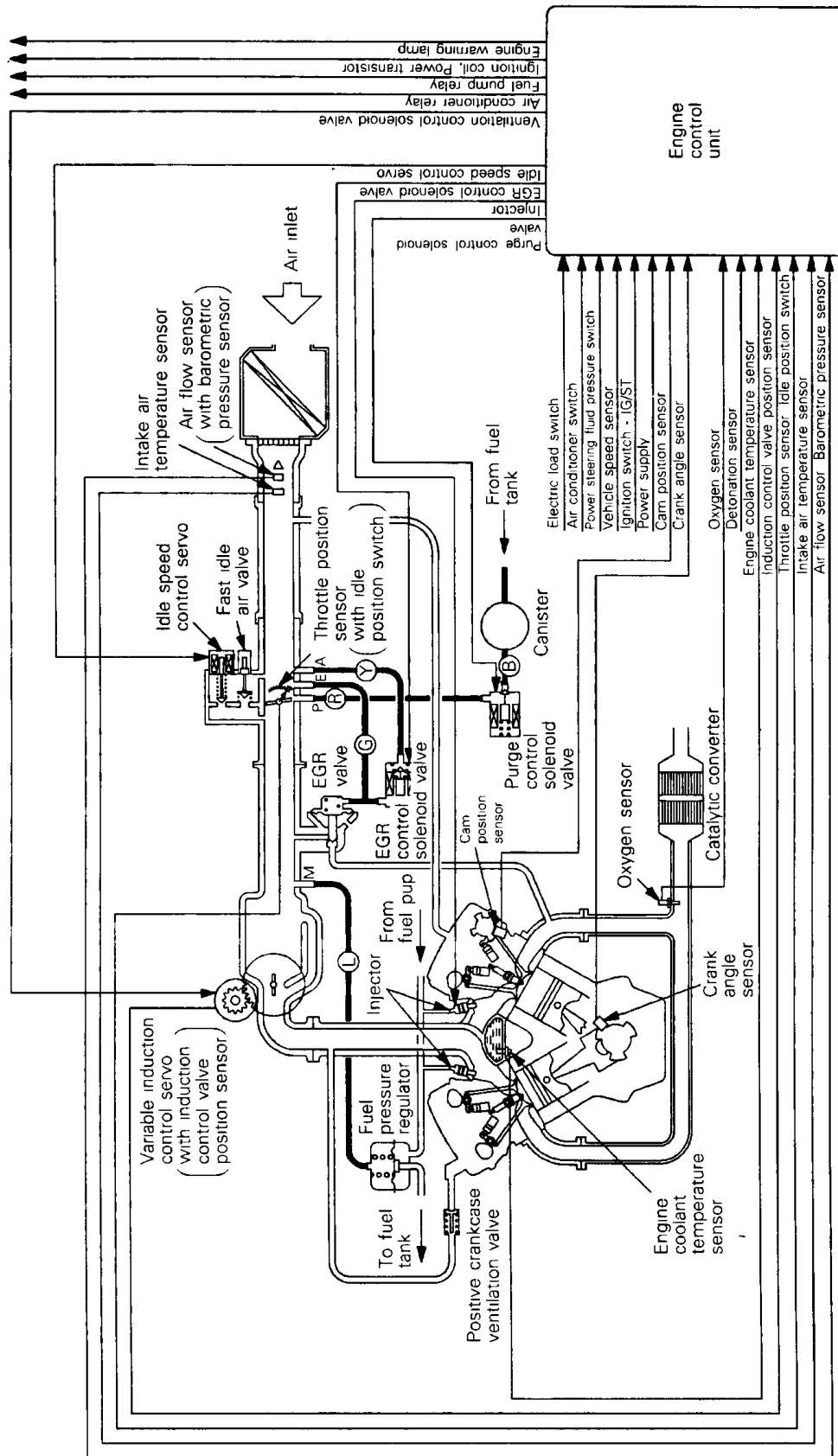
7EM0277

Vacuum hose colour
 B: Black
 G: Green
 L: Light Blue
 R: Red
 Y: Yellow

7FU1152

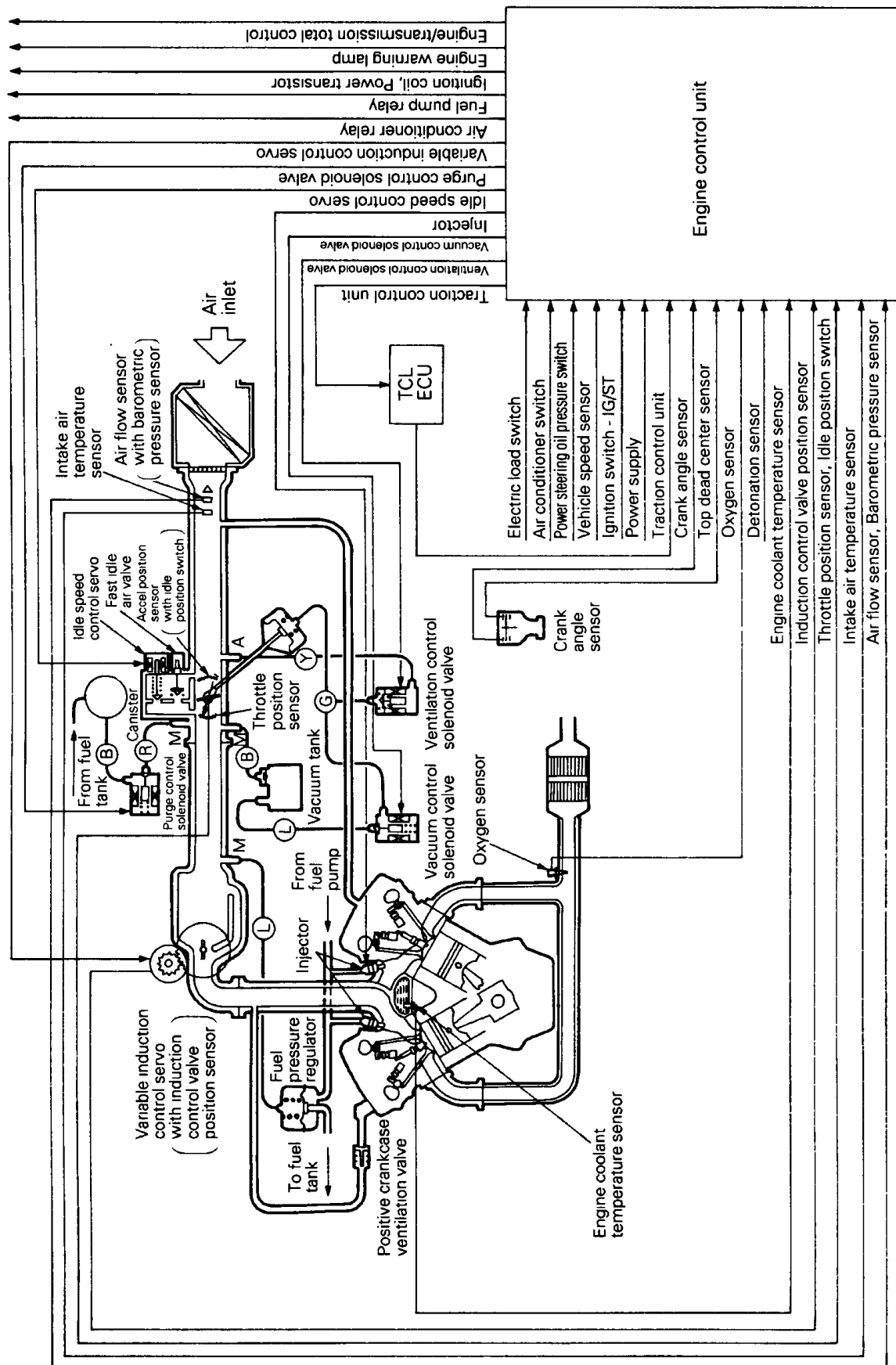


<DOHC-Except for Vehicles with TCL-Vehicles built from December, 1992>



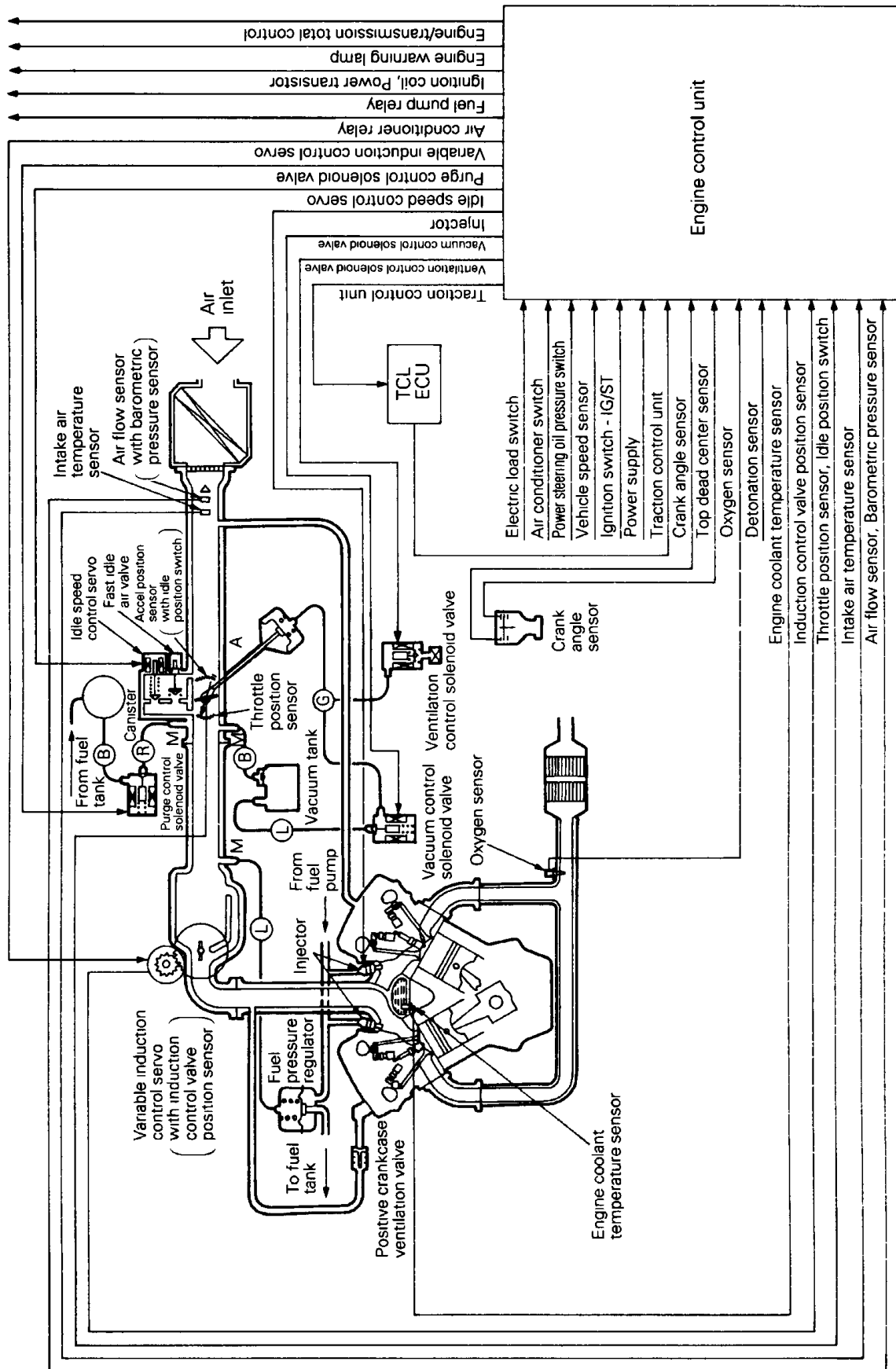
7EM0278

<Vehicles with TCL-Vehicles built up to November, 1991>



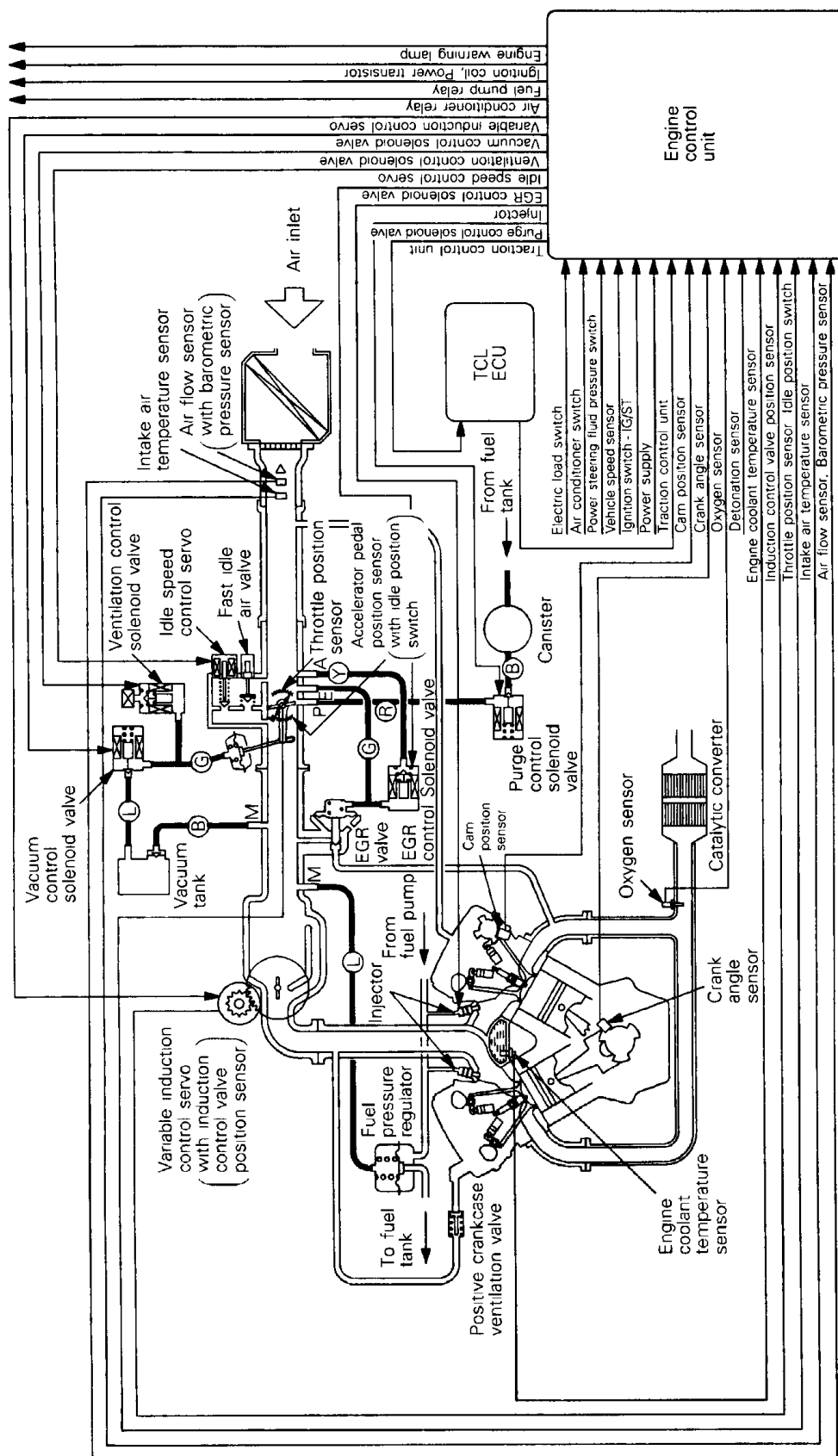
7FU1153

<Vehicles with TCL-Vehicles built from December, 1991 up to November, 1992>



7FU1301

<Vehicles with TCL-Vehicles built from December, 1992>



7EM0279

Vacuum hose colour
 B: Black
 G: Green
 L: Light blue
 R: Red
 Y: Yellow

SPECIFICATIONS

GENERAL SPECIFICATIONS

E13CA--

Items	Specifications
Fuel Tank capacity lit. (U.S.gal., Imp.gal.)	72 (19.0, 15.8)
Fuel pump Type	Electrical, in-tank type
Throttle body Throttle bore mm (in.) Throttle position sensor Accele position sensor <Vehicles with TCL> Idle speed control servo Idle position switch <Except for Vehicles with TCL> Idle position switch <Vehicles with TCL>	60 (2.36) Variable resistor type Variable resistor type Stepper motor type [Stepper motor type bypass air control method with fast idle air valve (FI AV) attached] Contact type (with throttle position sensor) Contact type (with accele position sensor)
Engine control unit Identification model No. <SOHC> <DOHC-Except for Vehicles with TCL> <Vehicles with TCL>	E2T35777* ¹ , E2T60778* ² E2T35780* ¹ , E2T60776* ² E2T35784* ¹ , E2T60777* ²
Sensor Air flow sensor (AFS) Barometric pressure sensor Intake air temperature sensor Engine coolant temperature sensor Oxygen sensor Vehicle speed sensor Inhibitor switch Top dead centre sensor Camshaft position sensor (Top dead centre sensor) Crank angle sensor	Karman vortex type Semiconductor diffusion-type Thermistor type Thermistor type Zirconia type Reed switch type Contact switch type Photointerrupter-type* ¹ Hall element type* ² Photointerrupter-type* ¹ Hall element type* ²
Actuators Control relay type Injector type and number Purge control solenoid valve EGR control solenoid valve Vacuum control solenoid valve Ventilation control solenoid valve	Contact switch type Electromagnetic 6 ON/OFF type solenoid valve Duty cycle type solenoid valve Duty cycle type solenoid valve Duty cycle type solenoid valve

NOTE

(1) The*¹ symbol is applicable to vehicles built up to November, 1992

(2) The*² symbol is applicable to vehicles built from December, 1992

Items	Specifications
Auto-cruise control switch	
Resistance Ω	
SET	2700 $\pm$ 135
RESUME	820 $\pm$ 41
Auto-cruise control unit	
Set error km/h (mph)	0 $\pm$ 10 (0 $\pm$ 6)
Range of speed control km/h (mph)	40–200 (25–125)
Actuator	
Drive system	Vacuum type
Stroke mm (in.)	38–42 (1.5–1.7)
Auto-cruise control vacuum pump	
Rated load A	0.4 or less

SERVICE SPECIFICATIONS

E13CB--

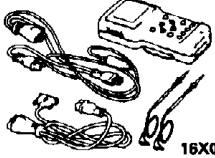
Items	Specifications
Standard value	
Accelerator cable play mm (in.)	
<M/T>	1–2 (0.04–0.08)
<A/T>	3–5 (0.12–0.20)
Accelerator switch switching point mm (in.)	2–6 (0.08–0.24)
Fuel pressure regulator pressure kPa (kg/cm ² , psi)	
Vacuum hose disconnection	330–350 (3.3–3.5, 47–50)
Vacuum hose connection	Approx. 270 (2.7, 38)
Idling speed control (ISC) adjustment r/min	
	700 $\pm$ 50
Throttle-position sensor (TPS) adjustment voltage (at curb idle) mV	400–1000 <Except for Vehicles with TCL> 580–690 <Vehicles with TCL>
Accelerator position sensor adjustment voltage (at curb idle) <Vehicles with TCL> mV	400–1000
Throttle body	
Throttle position sensor (TPS) resistance k Ω	3.5–6.5
Accelerator position sensor resistance <Vehicles with TCL> k Ω	3.5–6.5
ISC servo motor coil resistance Ω [at 20°C (68°F)]	28–33
Input sensor	
Intake air temperature sensor resistance k Ω [at 20°C (68°F)]	2.7
Engine coolant temperature sensor resistance k Ω	
20°C (68°F)	2.4
80°C (176°F)	0.3
Oxygen sensor output voltage V	0.6–1.0

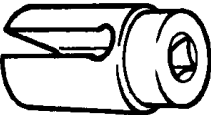
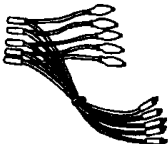
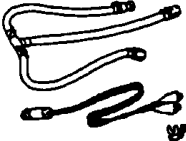
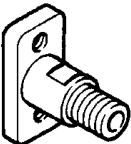
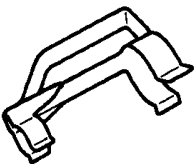
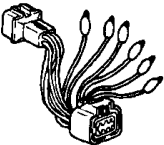
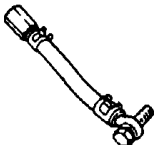
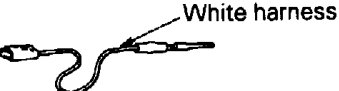
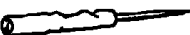
Items	Specifications
Output actuator	
Injector coil resistance Ω [at 20°C (68°F)]	13–16
Purge control solenoid valve resistance Ω [at 20°C (68°F)]	36–44
Vacuum control solenoid valve resistance Ω [at 20°C (68°F)]	36–44
Ventilation control solenoid valve resistance Ω [at 20°C (68°F)]	36–44
Auto-cruise control system	
Accelerator cable play mm (in.)	
<M/T>	0–1 (0–0.04)
<A/T>	2–3 (0.08–0.12)
Throttle cable play mm (in.)	1–2 (0.04–0.08)
Auto-cruise cable play mm (in.)	1–2 (0.04–0.08)
Control Valve, Release Valve resistance Ω	50–60

SEALANTS
E13CE--

Item	Specified sealant	Quantity
Engine coolant temperature sensor threaded part	3M Nut Locking Part No. 4171 or equivalent	As required

SPECIAL TOOLS
E13DA--

Tool	Number	Name	Use
	MB991341	Multi-use tester sub assembly	Up to 1993 models • Reading diagnosis code • MPI system inspection • Auto-cruise control system inspection
	 (For the number, refer to GROUP 00 – Precautions Before Service.)	ROM pack (for multi-use tester)	
 16X0606	MB991502	MUT-II	All models • Reading diagnosis code • MPI system inspection • Auto-cruise control system inspection
	 16X0607	ROM pack	

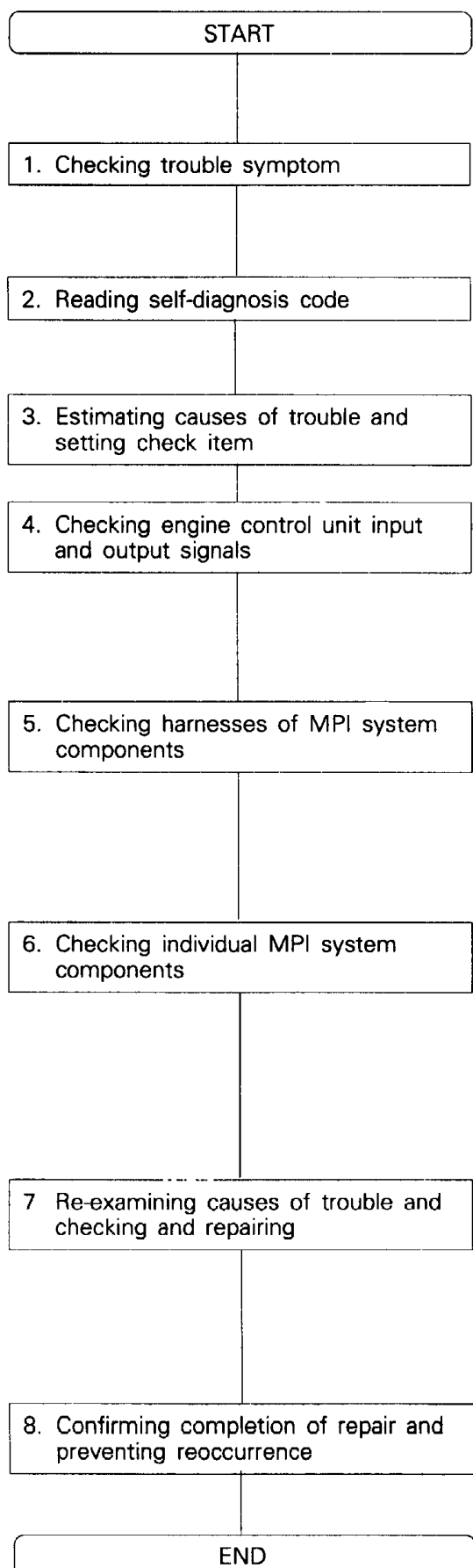
Tool	Number	Name	Use
	MD998773	Detonation sensor wrench	Removal/installation of detonation sensor
	MB991348	Test harness set	• Idle switch and throttle position sensor adjustment • Inspection with analyzer
	MD998706	Injector test set	Inspection of injector
	MD998741	Injector test adaptor	
	MD998746	Clip	
	MD998463	Test harness (6 pin, square)	• Inspection of ISC servo • Inspection with analyzer
	MD998709	Adaptor hose	Fuel pressure measurement
 Red harness  White harness 	MB991223	Test harness set for inspection • Pin contact pressure inspection harness • Probe for ordinary tester connection (for general connector)	• Inspection of oxygen sensor • Measurement of terminal voltage

TROUBLESHOOTING

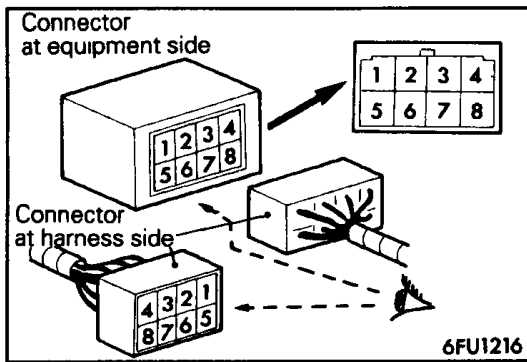
E13EFAHs

EXPLANATION OF TROUBLESHOOTING PROCEDURES

The effective troubleshooting procedures for troubles of the MPI system are explained in the following.

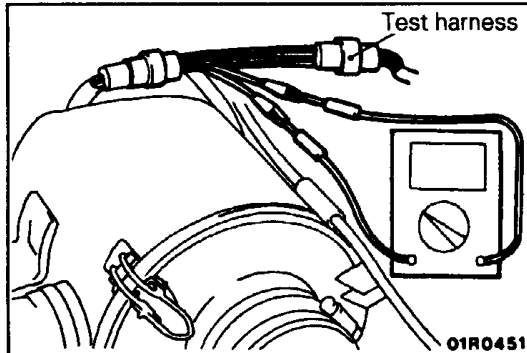


1. Checking trouble symptom
 - Reproduce the problem symptom and check the contents of the trouble and the conditions under which the symptom occurs (engine condition, operating state, etc.).
2. Reading self-diagnosis code
 - Read the self-diagnosis code and when a fault code is output, correct the fault referring to the diagnostic chart.
3. Estimating causes of trouble and setting check item
 - Referring to CHECK CHART CLASSIFIED BY PROBLEM SYMPTOMS, determine the check items and procedures to be followed.
4. Checking engine control unit input and output signals
 - Using a multi-use tester or analyzer, check the input and output signals of the engine control unit.
 - If the input and output signals are normal, the sensor input/actuator control is judged as normal. Then, check the input and output signals of the next check item.
5. Checking harnesses of MPI system components
 - If the input and output signals of the engine control unit are not normal, check the body harnesses of the MPI system components and repair as necessary.
 - After repair, check the input and output signals of the engine control unit again. If they are normal this time, check the input and output signals of the next check item.
6. Checking individual MPI system components
 - If the body harnesses are normal but the input and output signals of the engine control unit are abnormal, check the MPI system components individually and repair or replace as necessary.
 - After repair or replacement, check the input and output signals of the engine control unit again. If they are normal this time, check the input and output signals of the next check item.
7. Re-examining causes of trouble and checking and repairing
 - If the harness check and individual component check have resulted normal but the input and output signals of the engine control unit are abnormal, re-examine the causes of trouble referring to the troubleshooting hints.
Then, check and repair including other groups.
8. Confirming completion of repair and preventing reoccurrence
 - Try to reproduce the problem symptom to make sure that the symptom will not occur again.
 - Remove the true cause of the trouble to prevent its reoccurrence.

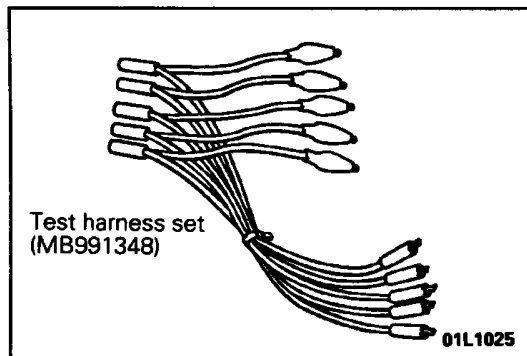


EXPLANATION AND PRECAUTION RELATED TO HARNESS CHECKING

- Connector symbols are described as seen from the terminal end for the connector.

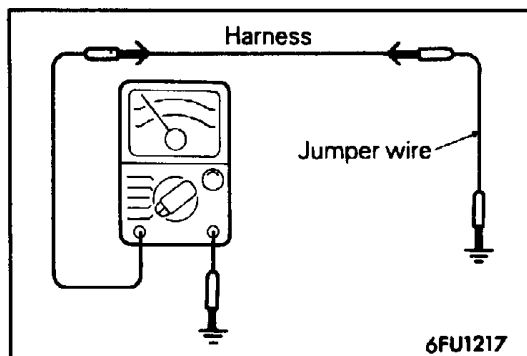


- Be sure to use the special tool (test harness) when, for a waterproof connector, checking while the circuit is conductive.
If a probe is inserted from the harness side, the waterproof capability will be lowered, thereby causing corrosion, so never do so.
- When a connector is disconnected in order to check terminal voltage, etc., never insert a probe if the terminal to be checked is a female pin, because the forceful insertion of a probe will cause improper or incomplete contact.

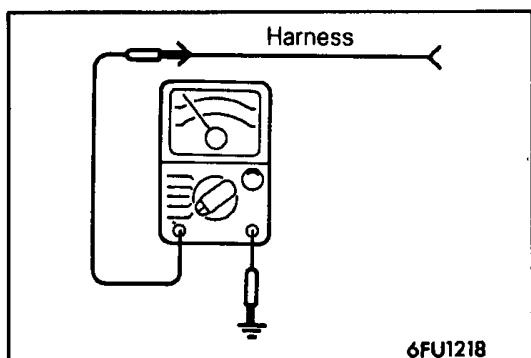


Also, if there is no test harness that is compatible with the connector, the test harness set (MB991348) that can be directly connected between the terminals may be used.

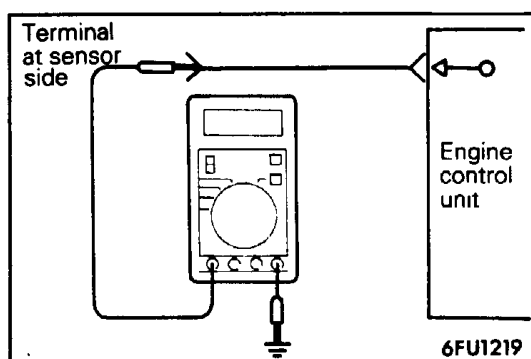
When a connector is disconnected to check the terminal voltages, etc., never insert a probe if the terminal to be checked is a female pin. Use the special tool (Test harness set: MB991223) instead. By forcibly inserting a probe, the contact can be damaged.



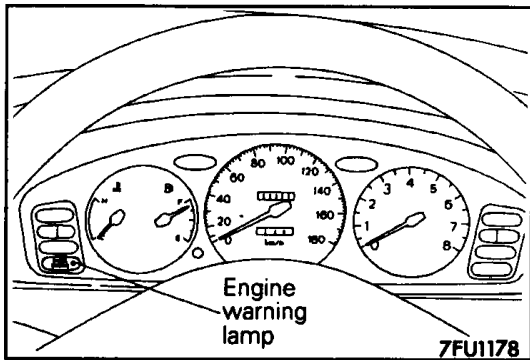
- When checking for damaged or disconnected wiring of a harness (open circuit) and if both ends of the harness are unconnected, use a jumper wire to earth one end of the harness, and then check for continuity between the other end and earth. By doing this, you can check for damaged or disconnected wiring, and, if there is no continuity, the harness should be repaired.



- When checking for a harness short-circuit (short-circuit to earth), open one end of the harness and then check for continuity between the other end and earth. If there is continuity, the harness is short-circuited to earth and should be repaired.



- If the voltage (power-supply voltage) supplied to a sensor is not normal, repair the harness. If the voltage to the sensor is still not normal after the harness has been repaired, replace the engine control unit and check again.



ENGINE WARNING LAMP (CHECK ENGINE LAMP)

Among the self-diagnosis items, an engine warning lamp comes on to notify the driver of the emission control items when an irregularity is detected.

However, when an irregular signal returns to normal and the engine control unit judges that it has returned to normal, the engine warning lamp goes out.

Moreover, when the ignition switch is turned off, the lamp goes out. Even if the ignition switch is turned on again, the lamp does not come on until the irregularity is detected.

Here, immediately after the ignition switch is turned on, the engine warning lamp is lit for 5 seconds to indicate that the engine warning lamp operates normally.

ITEMS INDICATED BY THE ENGINE WARNING LAMP

Engine control unit
Oxygen sensor
Air flow sensor
Intake air temperature sensor
Throttle position sensor
Engine coolant temperature sensor
Crank angle sensor
Camshaft position sensor (Top dead centre sensor)
Barometric pressure sensor
Detonation sensor
Ignition timing adjustment signal
Injector
Ignition coil, Power transistor unit <DOHC>
Vacuum solenoid valve <Vehicles with TCL>
Ventilation solenoid valve <Vehicles with TCL>

Caution

Malfunction indicator lamp will come on even when terminal for ignition timing adjustment is short-circuited.

Therefore, it is not abnormal that the lamp comes on even when terminal for ignition timing adjustment is short-circuited at the time of ignition timing adjustment.

ENGINE WARNING LAMP INSPECTION

- (1) Check that when the ignition switch is turned ON, the lamp illuminates for about 5 seconds and then goes out.
- (2) If the lamp does not illuminate, check for open circuit in harness, blown fuse and blown bulb.

SELF-DIAGNOSIS

The engine control unit monitors the input/output signals (some signals at all times and the others under specified conditions) of the engine control unit.

When it is noticed that an irregularity has continued for a specified time or longer from when the irregular signal is initially monitored, passing a certain number, the engine control unit judges that an irregularity has occurred, memorizes the malfunction code, and outputs the signal to the self-diagnosis output terminal.

There are 21 diagnosis items, including the normal state, and the diagnosis results can be read out with a multi-use tester. (MUT)

Moreover, since memorization of the malfunction codes is backed up directly by the battery, the diagnosis results are memorized even if the ignition key is turned off. The malfunction codes will, however, be erased when the battery terminal or the engine control unit connector is disconnected.

Furthermore, the malfunction code can also be erased by sending the malfunction code erase signal from the multi-use tester to the engine control unit with turning the ignition switch to ON.

Caution

If the sensor connector is disconnected with the ignition switch turned on, the malfunction code is memorized. In this case, send the malfunction code erase signal from the multi-use tester to the engine control unit, and the diagnosis memory will be erased.

The 21 diagnosis items are provided as follows, and if plural items are activated, they are all indicated sequentially from the smallest code number.

Caution

The malfunction code for the ignition timing adjustment signal is output when the circuit for the ignition timing adjustment terminal is short circuited. Consequently when adjusting the ignition timing and the ignition timing adjustment terminal is earthed, the engine warning lamp will also illuminate, thus does not indicate an abnormality exists.

DIAGNOSIS CHART

Output preference order	Diagnosis item	Malfunction code		Check item (Remedy)
		No.	Memory	
1	Engine control unit	–	–	(Replace engine control unit)
2	Oxygen sensor	11	Retained	• Harness and connector • Fuel pressure • Injectors (Replace it defective.) • Intake air leaks • Oxygen sensor
3	Air flow sensor	12	Retained	• Harness and connector (If harness and connector are normal, replace air flow sensor assembly.)
4	Intake air temperature sensor	13	Retained	• Harness and connector • Intake air temperature sensor
5	Throttle position sensor	14	Retained	• Harness and connector • Throttle position sensor • Idle position switch
6	Engine coolant temperature sensor	21	Retained	• Harness and connector • Engine coolant temperature sensor
7	Crank angle sensor	22	Retained	• Harness and connector (If harness and connector are normal, replace crank angle sensor assembly.)
8	Top dead centre sensor	23	Retained	• Harness and connector (If harness and connector are normal, replace crank angle sensor assembly.)
9	Vehicle speed sensor (reed switch)	24	Retained	• Harness and connector • Vehicle speed sensor (reed switch)
10	Barometric pressure sensor	25	Retained	• Harness and connector (If harness and connector are normal, replace barometric pressure sensor assembly.)
11	Detonation sensor	31	Retained	• Harness and connector (If harness and connector are normal, replace detonation sensor)

Output preference order	Diagnosis item	Malfunction code		Check item (Remedy)
		No.	Memory	
12	Ignition timing adjustment signal	36	—	• Harness and connector
13	Injector	41	Retained	• Harness and connector • Injector coil resistance
14	Ignition coil, Power transistor unit (For No. 1–4 cylinders) <DOHC>	44	Retained	• Harness and connector • Ignition coil • Power transistor unit
15	Ignition coil, Power transistor unit (For No. 2–5 cylinders) <DOHC>	52	Retained	• Harness and connector • Ignition coil • Power transistor unit
16	Ignition coil, Power transistor unit (For No. 3–6 cylinders)	53	Retained	• Harness and connector • Ignition coil • Power transistor unit
17	A cable from transmission control unit for transmission of torque reduction signal	61	Retained	• Harness and connector (If the harness and connector are normal, replace the transmission control unit.)
18	Induction control valve position sensor	62	Retained	• Harness and connector (If harness, connector and induction control valve are normal, replace air intake plenum assembly.)
19	Vacuum solenoid valve <Vehicles with TCL>	71	Retained	• Harness and connector • Vacuum solenoid valve
20	Ventilation solenoid valve <Vehicles with TCL>	72	Retained	• Harness and connector • Ventilation solenoid valve
21	Normal state	—	—	—

NOTE

1. Replace the engine control unit if a malfunction code is output although the inspection reveals that there is no problem with the check items.
2. Codes are displayed according to numerical order.

READ OUT OF MALFUNCTION CODE**PRECAUTIONS FOR OPERATION**

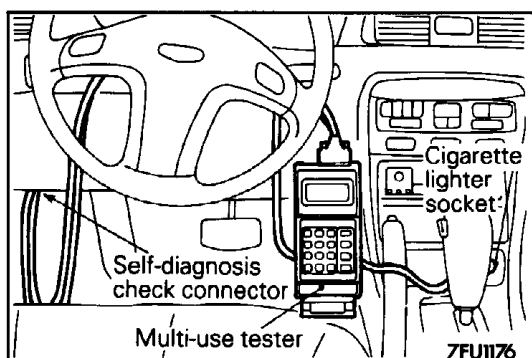
- (1) When battery voltage is low, no detection of failure is possible. Be sure to check the battery for voltage and other conditions before starting the test.
- (2) Diagnosis item is erased if the battery or the engine control unit connector is disconnected. Do not disconnect the battery before the diagnosis result is completely read.
- (3) The ignition switch should always be turned OFF when connecting and disconnecting the multi-use tester.

READ OUT PROCEDURE—USING MULTI-USE TESTER (MUT)

- (1) Read and record the self diagnosis output.
- (2) Refer to the diagnosis chart and repair the trouble.
- (3) Turn the ignition switch OFF, and then turn it ON again.
- (4) Erase the malfunction code.
- (5) Recheck that the function is normal.

NOTE

Connect the multi-use tester to the white diagnosis connector.

**DIAGNOSIS ACCORDING TO DIAGNOSIS 2 MODE**

- (1) Using the multi-use tester (MUT), switch the engine control unit to DIAGNOSIS 2 MODE.
- (2) Test drive.
- (3) As previously mentioned in "READ OUT OF MALFUNCTION CODE", read the diagnosis code and repair the trouble.
- (4) Turn the ignition switch to OFF

NOTE

- By turning the ignition switch to OFF, the diagnosis mode is switched from DIAGNOSIS 2 MODE to DIAGNOSIS 1 MODE.
<Vehicles built up to November, 1991>
- By turning the ignition switch to OFF, all self-diagnosis malfunction codes are erased.
<Vehicles built from December, 1991>

- (5) Erase the malfunction code.

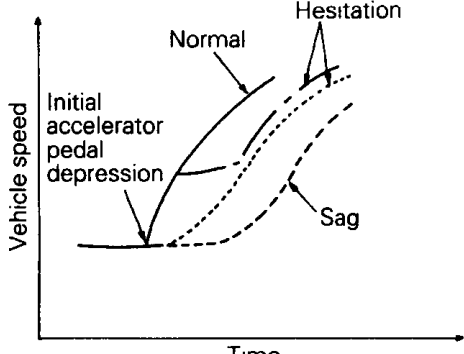
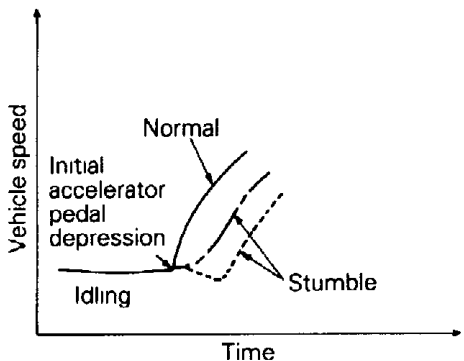
MALFUNCTION CHART

Malfunction Inspection item	Starting		Idling stability				Driveability						Stopping	Reference page
	No starting (no initial combustion)	Poor starting (Long time to start) (Initial combustion and then engine stalls)	Unstable idling (Rough idling)	Improper idling speed	Poor sustained idling	Engine speed does not rises	Hesitation, sag	Poor acceleration	Stumble	Shock	Surge	Knocking	Dieseling	
Power supply and ignition switch IG	① ①													P.13-64
Engine control unit earth	② ②													P.13-67
Fuel pump	③ ③	① ①			① ①		① ①	① ①						P.13-68
Air flow sensor (AFS)					① ①		① ①		⑥ ⑤	⑥ ⑤		④ ④		P.13-71
Air intake temperature sensor			⑤				⑦ ⑦	⑥ ⑥				② ②		P.13-74
Barometric pressure sensor			⑦				⑩ ⑩	⑧ ⑧				③ ③		P.13-77
Engine coolant temperature sensor		③	⑥ ⑤	① ①	⑤ ⑤		⑨ ⑨	⑦ ⑦	④ ④		③ ③			P.13-79
Throttle position sensor (TPS)							⑥ ⑥		③ ③	④ ④				P.13-82
Idle position switch			③ ③	② ②	④ ④									P.13-85
Camshaft position sensor (Top dead centre sensor)	⑤ ⑤	⑥ ⑦			⑧ ⑦					② ②				P.13-90 P.13-94-1
Crank angle sensor	⑥ ⑥	⑦ ⑧			⑨ ⑧					③ ③				P.13-92 P.13-94-4
Ignition switch ST (M/T)	④ ④	③ ④												P.13-95
Ignition switch ST and inhibitor switch (A/T)	④ ④	③ ④		⑥										P.13-96
Vehicle speed sensor					⑥					⑥				P.13-98-2
Power steering fluid pressure switch				③										P.13-100
Air conditioner switch and air conditioner relay				④										P.13-102
Detonation sensor												① ①		P.13-104
Electric load switch				⑤										P.13-106
Fan motor relay (radiator fan, condenser fan)				⑦	⑩ ⑩									P.13-108
Induction control valve position sensor							④ ④	④ ④						P.13-108-2
Oxygen sensor			⑨											P.13-110
Injector	⑧ ⑧	② ②	② ②		③ ③		② ②	② ②	① ①		① ①		①	P.13-113
Idle speed control (ISC) servo		④ ⑤	① ①	⑤ ③	② ②					⑥ ⑦				P.13-113
Ignition coil and power transistor	⑦ ⑦				⑩ ⑨			⑨ ⑨		① ①		⑤ ⑤		P.13-122
Purge control solenoid valve			⑧											P.13-127
EGR control solenoid valve							⑥ ⑥		⑥ ⑥		④ ④			P.13-128-1
Vacuum solenoid valve <DOHC-Vehicles with TCL>							⑫ ⑫	⑩ ⑩	⑦ ⑦					P.13-129
Ventilation solenoid valve <DOHC Vehicles with TCL>						① ①	⑬ ⑬	⑪ ⑪	⑧ ⑧					P.13-132
Variable induction control servo (DC motor)							⑤ ⑤	⑤ ⑤						P.13-134
Engine transmission overall control signal <DOHC A/T>										⑦ ⑥	⑤ ⑤			P.13-136
Engine transmission overall control signal <SOHC A/T>										⑦ ⑥	⑤ ⑤			P.13-137-1
Traction control signal <Vehicles with TCL>			⑩ ⑥	⑨ ④			⑬ ⑬	⑫ ⑫	⑨ ⑨		⑥ ⑥			P.13-138
Fuel pressure		⑤ ⑥	④ ④		⑦ ⑥		③ ③	③ ③	② ②		② ②			P.13-140

○ Hot engine (Encircled numbers indicate inspection order.)

□ Cold engine (Numbers inside a square indicate inspection order.)

PROBLEM SYMPTOMS TABLE (FOR YOUR INFORMATION)

Items		Symptom
Starting	Won't start (no initial combustion)	The starter is used to crank the engine, but there is no combustion within the cylinders, and the engine won't start.
	Starting problem (initial combustion, then stall)	There is combustion within the cylinders, but then the engine soon stalls.
	(Starting takes a long time.)	Engine won't start quickly.
Idling stability	Idling instability (Rough idling)	Engine speed doesn't remain constant; changes during idling. Usually, a judgement can be based upon the movement of the tachometer pointer, and the vibration transmitted to the steering wheel, shift lever, body, etc. This is called rough idling.
	Incorrect idling speed	The engine doesn't idle at the usual correct speed.
	Improper idling continuity Die out Pass out	This non-continuity of idling includes the following elements. (1) Die out The engine stalls when the foot is taken from the accelerator pedal, regardless of whether the vehicles is moving or not. (2) Pass out .. The engine stalls when the accelerator pedal is depressed or while it is being used.
Driving	Engine r.p.m. does not rise.	Engine r.p.m. does not increase even when the accelerator pedal is depressed.
	Hesitation Sag	"Hesitation," is the delay in response of the vehicle speed (engine rpm) that occurs when the accelerator is depressed in order to accelerate from the speed at which the vehicle is now traveling, or a temporary drop in vehicle speed (engine rpm) during such acceleration. Serious hesitation is called "sag".  1FU0223
	Poor acceleration	Poor acceleration is inability to obtain an acceleration corresponding to the degree of throttle opening, even though acceleration is smooth, or the inability to reach maximum speed.
	Stumble	Engine rpm response is delayed when the accelerator pedal is initially depressed for acceleration from the stopped condition.  1FU0224
	Shock	The feeling of a comparatively large impact or vibration when the engine is accelerated or decelerated.
	Surge	This is repeated surging ahead during constant speed travel or during variable speed travel.
Stopping	Knocking	A sharp sound like a hammer striking the cylinder walls during driving and which adversely affects driving.
	Dieseling	The engine continues to run even after the switch is turned OFF. This is called dieseling.

TROUBLESHOOTING

TRACTION CONTROL (TCL) SYSTEM

E13E1AAa

1. PARTICULAR PHENOMENA OF THE TCL SYSTEM

- (1) On slippery road surfaces, such as those covered by snow, sometimes a vibration is felt in the vehicle when traction control is operating normally. This is due to the braking action of the slip control, and is not unusual.
- (2) When the engine is started, a rattling sound can sometimes be heard inside the engine compartment and inside the vehicle. This is the sound of the ABS and TCL operation being checked, and is not unusual.
- (3) When climbing very steep slopes, or if the vehicle is stuck and there is continuous pressure on the accelerator pedal for 20 seconds or more, the TCL will continue to operate, and then the TCL OFF indicator will flash and the TCL system function will stop. In this case, momentarily stop the engine, and then after approximately 7 seconds (until the engine control relay switches OFF) restart the engine. After this, when the vehicle speed has reached 20 km/h (12 mph) or more, if the TCL OFF indicator switches off, then the TCL system will operate normally from then on.
- (4) If the vehicle is driven with extremely low tyre pressure, or with tyres that differ widely in diameter, the TCL system will operate even when the vehicle is moving straight, and the engine will give poor acceleration. This is because the wheel speed signal will be different from that of standard tyres. If standard tyres are fitted and the signal becomes normal, then there is no problem.

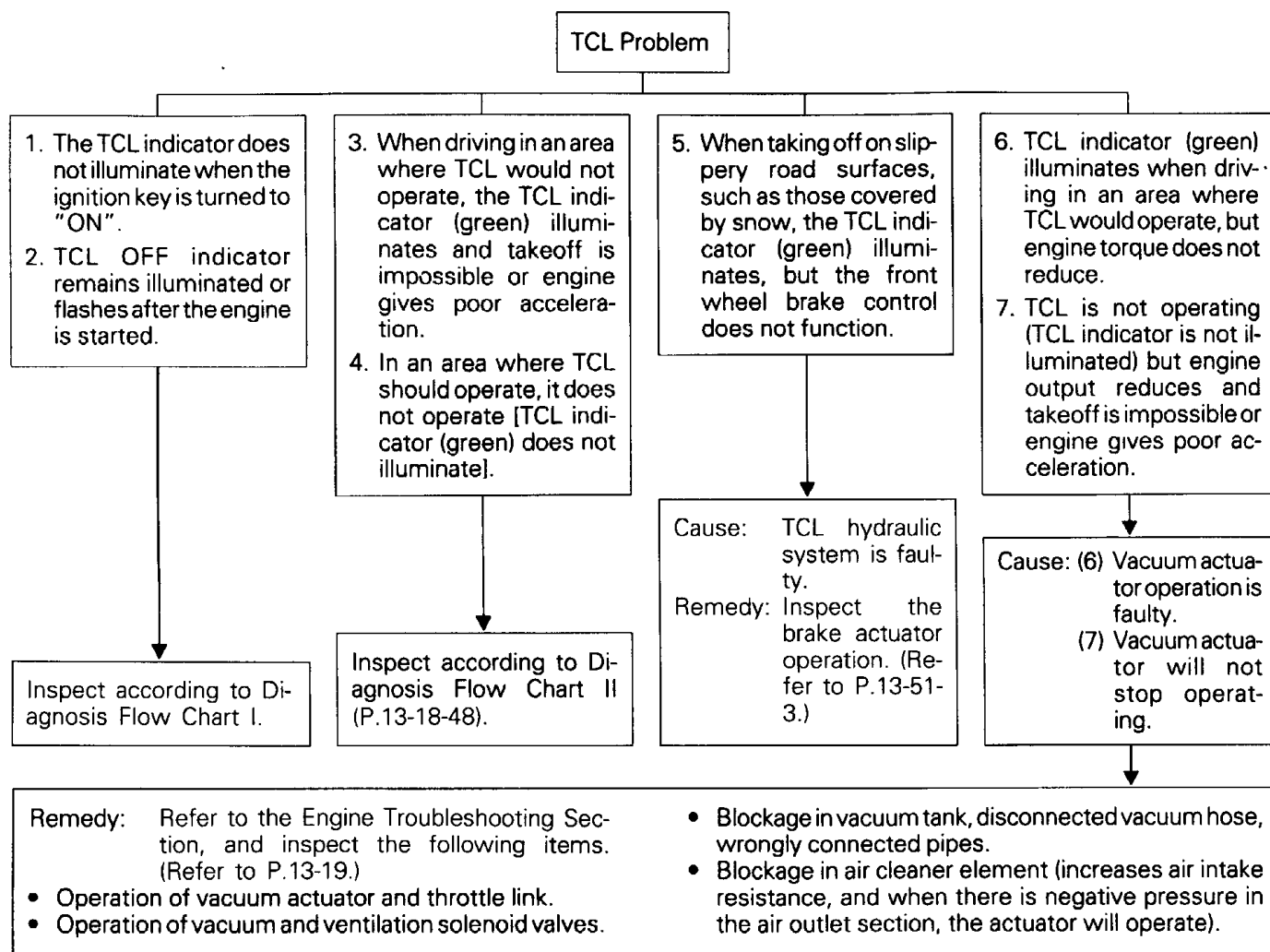
NOTE

When engine gives poor acceleration, it can be determined whether the cause is because of a problem connected to the TCL control or engine trouble by observing whether the TCL indicator (green) is illuminated or not.

2. DIAGNOSTIC PROCEDURES

Traction control system (TCL) problems have been divided into seven major sections as described below.

Each problem can be diagnosed according to the diagnosis flow chart or from the inspection summary.



3. DIAGNOSIS FLOW CHART I

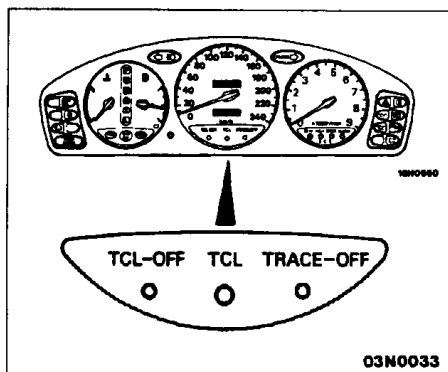
- 1. When the ignition key is turned to "ON", the TCL indicator does not illuminate.**
- 2. The TCL OFF indicator remains illuminated or flashes after the engine is started or while driving.**

Comment: 1. is mainly caused by a broken wire in the indicator circuit, such as an indicator lamp blowout.
2. When lamp remains illuminated, a problem is detected by the self diagnosis function and a problem code is output, or it is probably a short in the indicator

circuit. If the lamp is flashing, a problem code is output, so this should be checked. When not actually driving the problem may not be detected, so it is necessary to retest to get an accurate perception of the problem.

Use the following procedures to recheck the problem.

When the ignition key has been turned to the "ON" position, do all of the TCL indicators illuminate?



TCL indicator
lamps

Illuminated

Not illuminated

Ignition key

ON

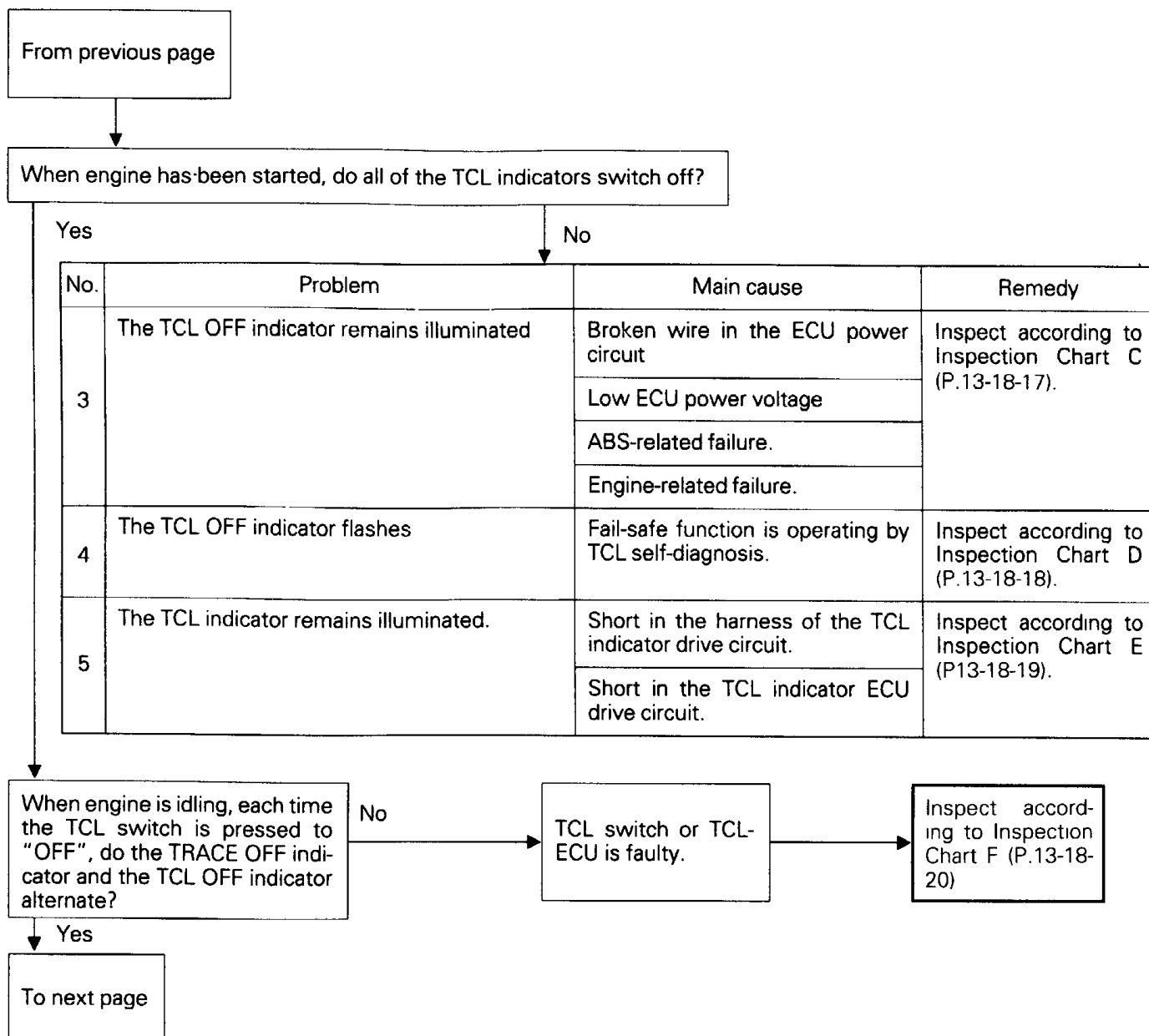
ACC. LOCK

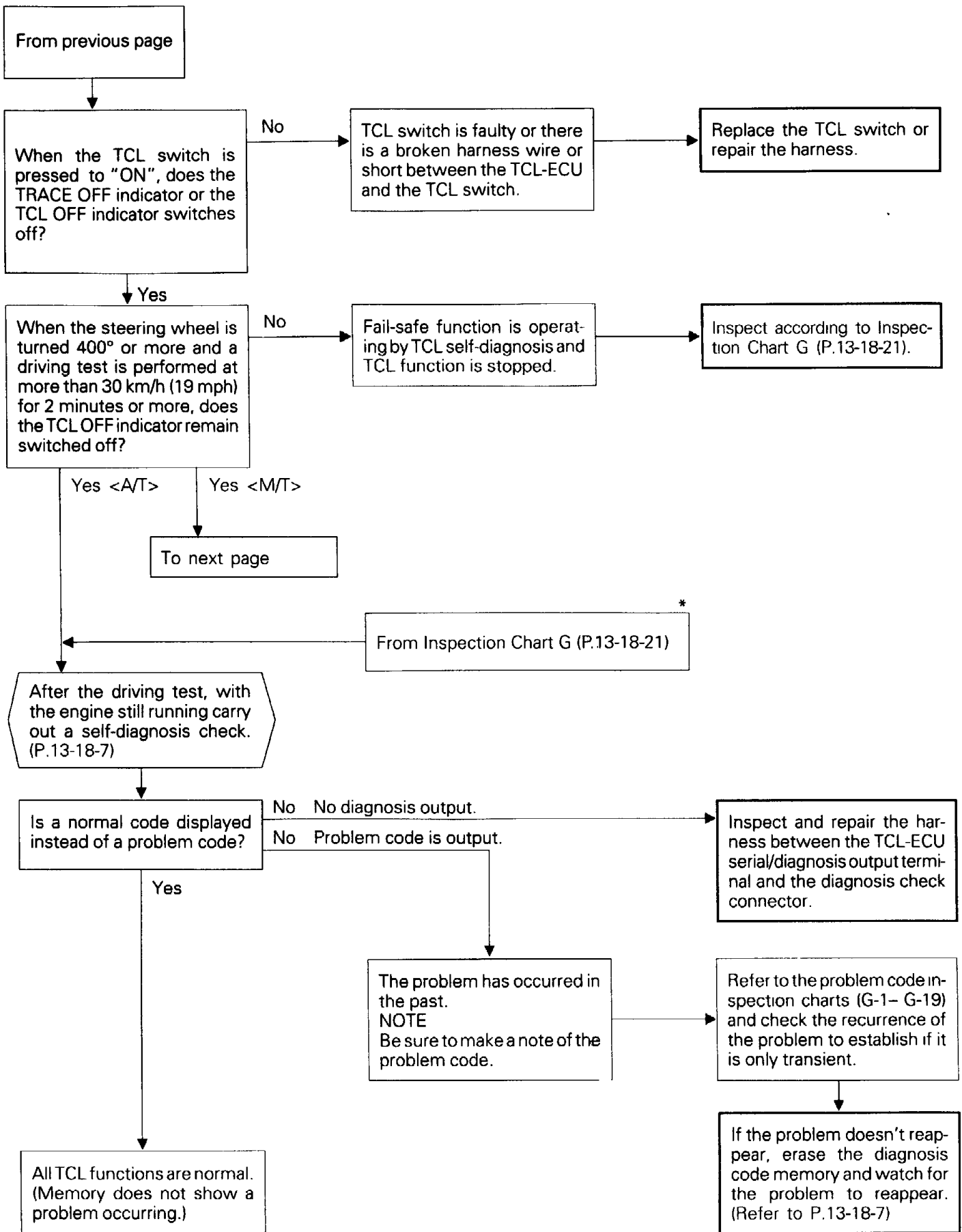
Yes

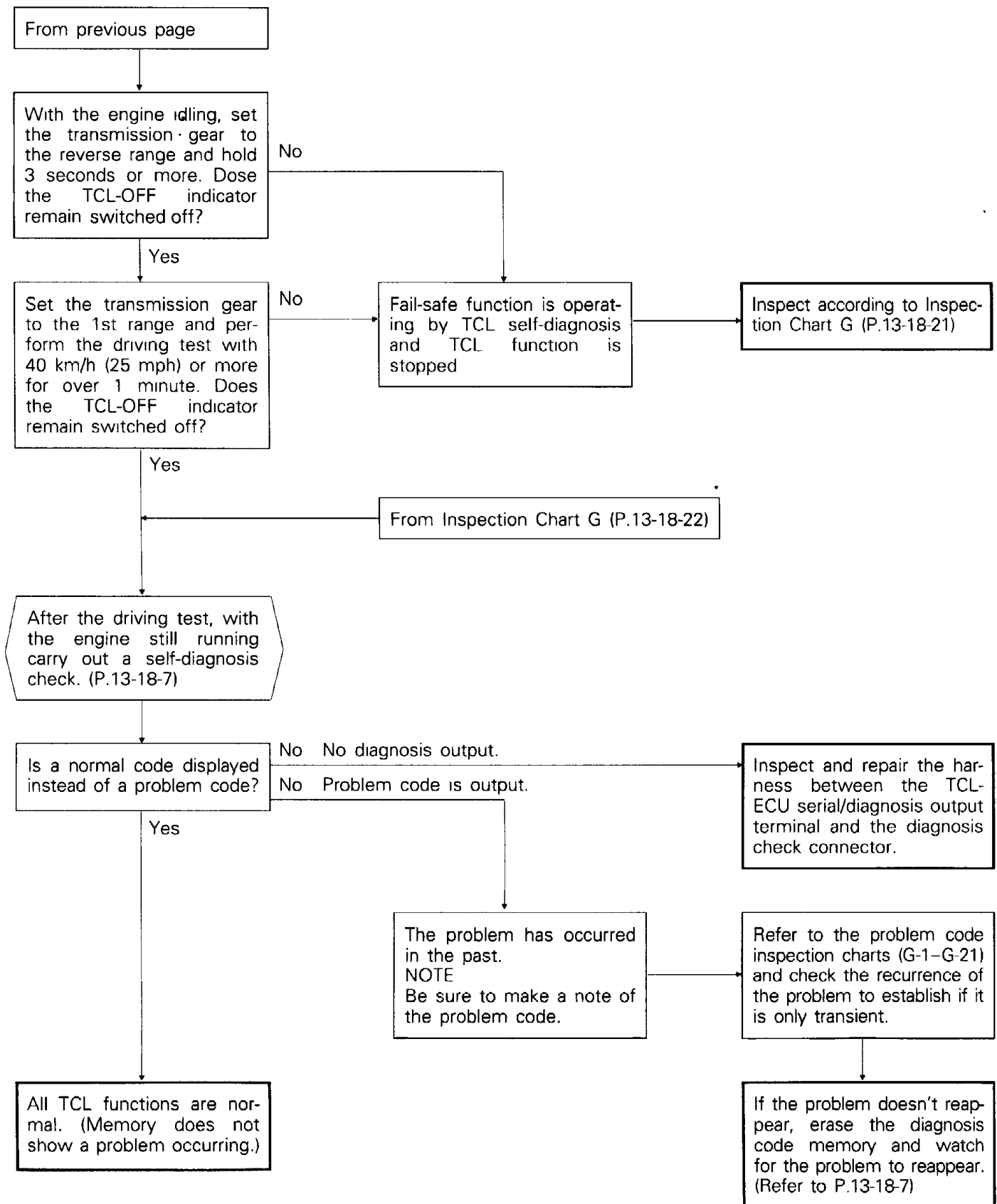
No

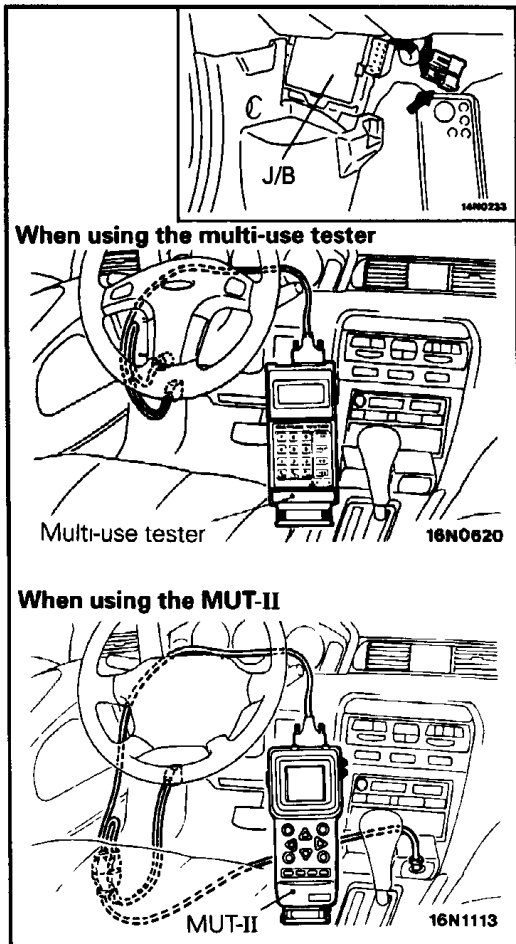
No.	Problem	Main cause	Remedy
1	All TCL indicators are not illuminated.	Broken wire in indicator lamp power circuit (including blown fuse).	Inspect according to Inspection Chart A (P.13-18-14).
		Control unit connector is disconnected.	
2	Either the TCL OFF, TCL or the TRACE OFF indicator is not illuminated. (At least one is illuminated.)	Blown lamp in the indicator that is not illuminated.	Inspect according to Inspection Chart B (P.13-18-15).
		Broken harness wire in the indicator drive circuit of the indicator that is not illuminated.	
		Broken wire in the ECU drive circuit of the indicator that is not illuminated.	

To next page









3-1. Inspection by self-diagnosis

Caution

Connection and disconnection of the multi-use tester <Up to 1993 models> or MUT-II <All models> should always be made with the ignition switch in the OFF position.

- (1) Take a reading of the diagnosis output code and make a note of it.
If the multi-use tester or MUT-II will not activate, inspect the TCL-ECU power circuit or the harness between the TCL-ECU and the diagnosis check connector.
- (2) Momentarily erase the diagnosis code memory with the multi-use tester or MUT-II. Even when the memory is erased, and a problem signal is output, the problem signal currently being displayed will also cause the function to stop. If no signal is output, the problem was only transient, or it is a problem that is only detected while driving.
- (3) When a problem code is output again, or another code is output during a repeated driving test, inspect by following the diagnosis code table on the following page.

NOTE

The codes in the table below will be output as diagnosis codes for the vehicle's condition, even when the TCL system is normal.

These codes are output only when there is some problem, and when the vehicle condition returns to normal, the code will be normal.

<A/T>

Code No.	Vehicle condition
16	Battery is dead
62	ABS warning lamp is illuminated
63	ABS warning lamp is illuminated

<M/T>

Code No.	Vehicle condition
27	Battery is dead
67	ABS warning lamp is illuminated
76	ABS warning lamp is illuminated

3-2. Diagnosis code table

<A/T>

Diagnosis code No.	Probable cause	Inspection chart name or remedy	Reference page
11 ^{*1}	Abnormal APS output	G-1	P.13-18-22
12 ^{*1}	Broken signal wire in the shift control solenoid valve A	G-2	P.13-18-25
13 ^{*1}	Broken signal wire in the shift control solenoid valve B		
14 ^{*1}	Malfunction of the APS or TPS	G-3	P.13-18-27
15 ^{*1}	Malfunction of the TCL switch	G-4	P.13-18-27
16 ^{*2}	Drop in ECU power voltage	G-5	P.13-18-28
17 ^{*2}	Broken signal wire in IG2	G-6	P.13-18-30
21 ^{*1}	Broken wire in the front left wheel speed sensor	G-7	P.13-18-31
22 ^{*1}	Broken wire in the front right wheel speed sensor		
23 ^{*1}	Broken wire in the rear left wheel speed sensor		
24 ^{*1}	Broken wire in the rear right wheel speed sensor		
25 ^{*4}	Temporary simultaneous malfunction of the rear left and right wheel speed sensors	G-8	P.13-18-33
26 ^{*1}	Simultaneous malfunction in the rear left and right wheel speed sensors	G-9	P.13-18-33
33 ^{*1}	Broken wire in the steering wheel sensor	G-10	P.13-18-34
34 ^{*1}	Malfunction of the steering wheel sensor ST-1 or ST-2	G-11	P.13-18-36
35 ^{*1}	Malfunction of the steering wheel sensor ST-N	G-12	P.13-18-37
41 ^{*1}	Abnormal signal flow to the engine-ECU	G-13	P.13-18-39

Diagnosis code No.	Probable cause	Inspection chart name or remedy	Reference page
42* ³	Malfunction of the engine-ECU throttle system	Inspect according to Engine Troubleshooting	—
43* ³	CHECK ENGINE warning lamp is illuminated		
51* ¹	No drive signal response from the front right brake solenoid valve IN side	G-14	P.13-18-40
52* ¹	No drive signal response from the front right brake solenoid valve EX side		
53* ¹	No drive signal response from the front left brake solenoid valve IN side		
54* ¹	No drive signal response from the front left brake solenoid valve EX side		
55* ¹	Malfunction of the brake solenoid valve relay	G-15	P.13-18-42
56* ³	Malfunction of the brake solenoid valve IN side	G-16	P.13-18-44
61* ¹	Broken wire in the ABS 0 (ABS operating) signal	G-17	P.13-18-44
62* ²	Broken wire in the ABS 1 (ABS fail) signal, or malfunction of the ABS	G-18	P.13-18-45
63* ²	Broken wire in the ABS 0 and the ABS 1 simultaneously, or malfunction in the ABS-ECU	G-19	P.13-18-45
—	Normal	—	—

NOTE

(1) When the above problem codes are output, the TCL OFF indicator gives the following displays from the TCL-ECU.

*¹: Causes the indicator to flash.

*²: Causes the indicator to illuminate. However, if the system becomes normal, this problem code is automatically erased, and the TCL OFF indicator switches off.

*³: Causes the indicator to illuminate.

*⁴: This signal is judged to be only temporary, and the TCL OFF indicator is not illuminated or made to flash. (If the system becomes normal, the problem code is automatically erased.)

(2) When several problems are detected, they are all displayed, starting from the lowest code number.

<M/T>

Diagnosis code No.	Probable cause	Inspection chart name or remedy	Reference page
11 ^{*1}	Abnormal APS output	G-1	P.13-18-22
14 ^{*1}	Malfunction of the APS or TPS	G-3	P.13-18-27
24 ^{*1}	Malfunction of the TCL switch	G-4	P.13-18-27
26 ^{*2}	Broken signal wire in IG2	G-6	P.13-18-30
27 ^{*2}	Drop in ECU power voltage	G-5	P.13-18-28
31 ^{*1}	Broken wire in the front right wheel speed sensor	G-7	P.13-18-31
32 ^{*1}	Broken wire in the front left wheel speed sensor		
33 ^{*1}	Broken wire in the rear right wheel speed sensor		
34 ^{*1}	Broken wire in the rear left wheel speed sensor		
35 ^{*4}	Temporary simultaneous malfunction of the rear left and right wheel speed sensors	G-8	P.13-18-33
36 ^{*1}	Simultaneous malfunction in the rear left and right wheel speed sensors	G-9	P.13-18-33
44 ^{*1}	Malfunction of the steering wheel sensor ST-1 or ST-2	G-11	P.13-18-36
45 ^{*1}	Malfunction of the steering wheel sensor ST-N	G-12	P.13-18-37
47 ^{*1}	Broken wire in the steering wheel sensor	G-10	P.13-18-34
54 ^{*1}	Malfunction of the first detection switch	G-20	P.13-18-46
55 ^{*1}	Malfunction of the first detection switch or back-up lamp switch	G-21	P.13-18-47

Diagnosis code No.	Probable cause	Inspection chart name or remedy	Reference page
61 ^{*1}	No drive signal response from the front right brake solenoid valve IN side	G-14	P.13-18-40
62 ^{*1}	No drive signal response from the front right brake solenoid valve EX side		
63 ^{*1}	No drive signal response from the front left brake solenoid valve IN side		
64 ^{*1}	No drive signal response from the front left brake solenoid valve EX side		
65 ^{*1}	Malfunction of the brake solenoid valve relay	G-15	P.13-18-42
66 ^{*3}	Malfunction of the brake solenoid valve IN side	G-16	P.13-18-44
67 ^{*2}	Broken wire in the ABS 0 (ABS operating) signal and the ABS 1 (ABS fail) signal simultaneously, or malfunction in the ABS-ECU	G-19	P.13-18-45
71 ^{*1}	Abnormal signal flow to the engine-ECU	G-13	P.13-18-39
72 ^{*3}	CHECK ENGINE warning lamp is illuminated	Inspect according to Engine Troubleshooting	—
73 ^{*3}	Malfunction of the engine-ECU throttle system		
76 ^{*2}	Broken wire in the ABS 1 (ABS fail) signal, or malfunction of the ABS	G-18	P.13-18-45
77 ^{*1}	Broken wire in the ABS 0 (ABS operating) signal	G-17	P.13-18-44
—	Normal	—	—

NOTE

(1) When the above problem codes are output, the TCL OFF indicator gives the following displays from the TCL-ECU.

^{*1}: Causes the indicator to flash.

^{*2}: Causes the indicator to illuminate. However, if the system becomes normal, this problem code is automatically erased, and the TCL OFF indicator switches off.

^{*3}: Causes the indicator to illuminate.

^{*4}: This signal is judged to be only temporary, and the TCL OFF indicator is not illuminated or made to flash. (If the system becomes normal, the problem code is automatically erased.)

(2) When several problems are detected, they are all displayed, starting from the lowest code number.

3-3. Table of service data inspection items

The following items from the ECU input data can be read using the multi-use tester.

<A/T>

Service data items		Display units	Service data items		Display units
No.	Item		No.	Item	
11	APS opening	mV	24	Wheel speed of rear right wheel	km/H
12	SCSV A drive	ON/OFF	27	Engine displacement	2.5L/3.0L
13	SCSV B drive	ON/OFF	28	Inhibitor switch input	2, L, D, R/N, P
14	TPS opening	mV			
15	Inhibitor switch R position input	ON/OFF	29	Slip control	ON/OFF
16	ECU power voltage	V	30	Trace control	ON/OFF
17	TCL OFF switch input	ON/OFF	31	Steering angle	deg
18	TCL ON switch input	ON/OFF	32	Steering neutral point	ON/OFF
19	Idle switch input	ON/OFF	33	Steering neutral point memory	ON/OFF
20	Ignition switch input	ON/OFF	34	Solenoid RH drive (Intake)	ON/OFF
21	Wheel speed of front left wheel	km/H	35	Solenoid RH drive (Exhaust)	ON/OFF
22	Wheel speed of front right wheel	km/H	36	Solenoid LH drive (Intake)	ON/OFF
23	Wheel speed of rear left wheel	km/H	37	Solenoid LH drive (Exhaust)	ON/OFF

NOTE

- For the steering angle (Item No. 31) 0° will be displayed for neutral position (before memory setting of the neutral position, the ignition key is turned to "ON"), L for left-hand side and R for right-hand side.
- For steering neutral point memory (Item No. 33), when the memory setting of the steering neutral position is completed, "ON" will be displayed.

<M/T>

Service data items		Display units	Service data items		Display units
No.	Item		No.	Item	
11	APS opening	mV	34	Wheel speed of rear left wheel	km/H
13	TPS opening	mV	43	Steering neutral point	ON/OFF
16	Back-up lamp switch input	ON/OFF	44	Steering angle	deg
21	Idle switch input	ON/OFF	45	Steering neutral point memory	ON/OFF
22	Ignition switch input	ON/OFF	51	Slip control	ON/OFF
24	TCL ON switch input	ON/OFF	52	Trace control	ON/OFF
25	TCL OFF switch input	ON/OFF	54	First detection switch input	ON/OFF
27	ECU power voltage	V	56	Distinction between TCL-ECU for 2WS and that for 4WS	2WS/4WS
29	Engine displacement	2.5L/3.0L	61	Solenoid RH drive (Intake)	ON/OFF
31	Wheel speed of front right wheel	km/H	62	Solenoid RH drive (Exhaust)	ON/OFF
32	Wheel speed of front left wheel	km/H	63	Solenoid LH drive (Intake)	ON/OFF
33	Wheel speed of rear right wheel	km/H	64	Solenoid LH drive (Exhaust)	ON/OFF

NOTE

1. For the steering angle (Item No. 44) 0° will be displayed for neutral position (before memory setting of the neutral position, the ignition key is turned to "ON"), L for left-hand side and R for right-hand side.
2. For steering neutral point memory (Item No. 45), when the memory setting of the steering neutral position is completed, "ON" will be displayed.

3-4. Inspection chart for each problem

A	After the ignition key has been turned to the "ON" position, all of the TCL indicators do not illuminate.
---	---

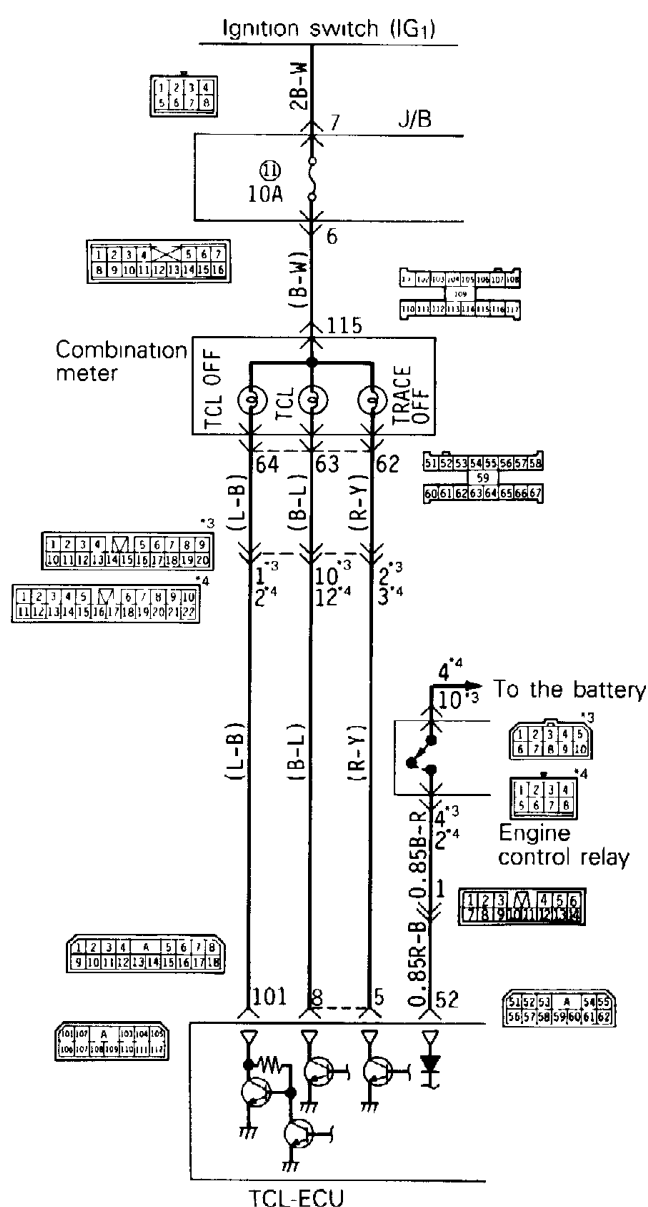
Comment: When the power has been connected, the TCL-ECU will make the TCL OFF, TCL and TRACE OFF indicators all illuminate until engine revolutions reach 450 rpm or higher, in order to check the indicator bulbs. However, the TCL OFF indicator will illuminate even when not started by

the ECU. Thus, when all the indicators do not illuminate, the cause could be either a broken wire in the indicator lamp power circuit or a loose ECU connector.

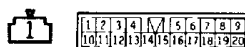
Hint:

If other warning lamps also do not illuminate, the problem is likely to be a blown fuse.

LH drive vehicles



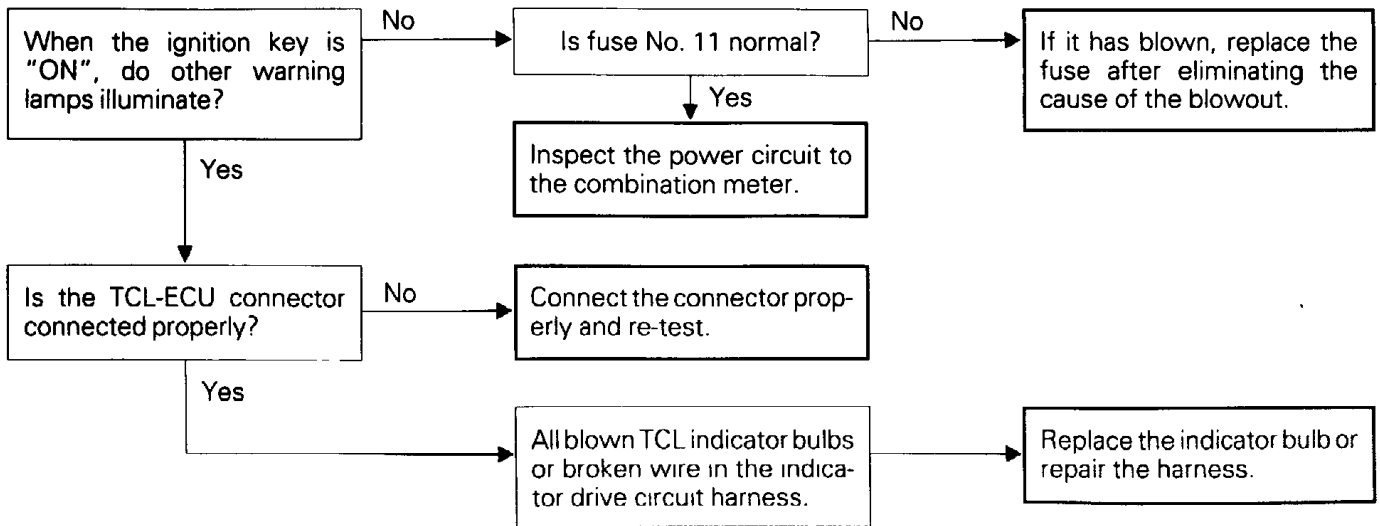
14N0315



14N0314

NOTE

- *1: Vehicles built up to October, 1991
- *2: Vehicles built from November, 1991
- *3: Vehicles built up to October, 1992
- *4: Vehicles built from November, 1992



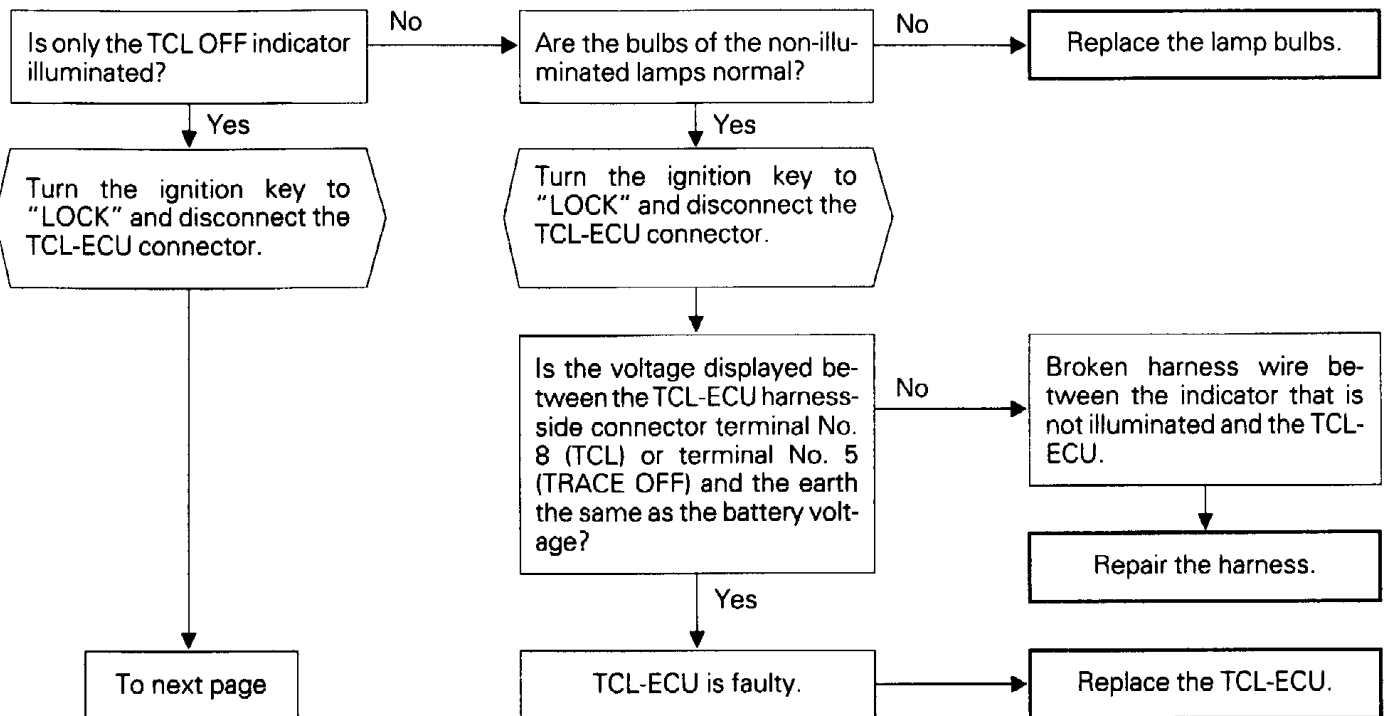
B

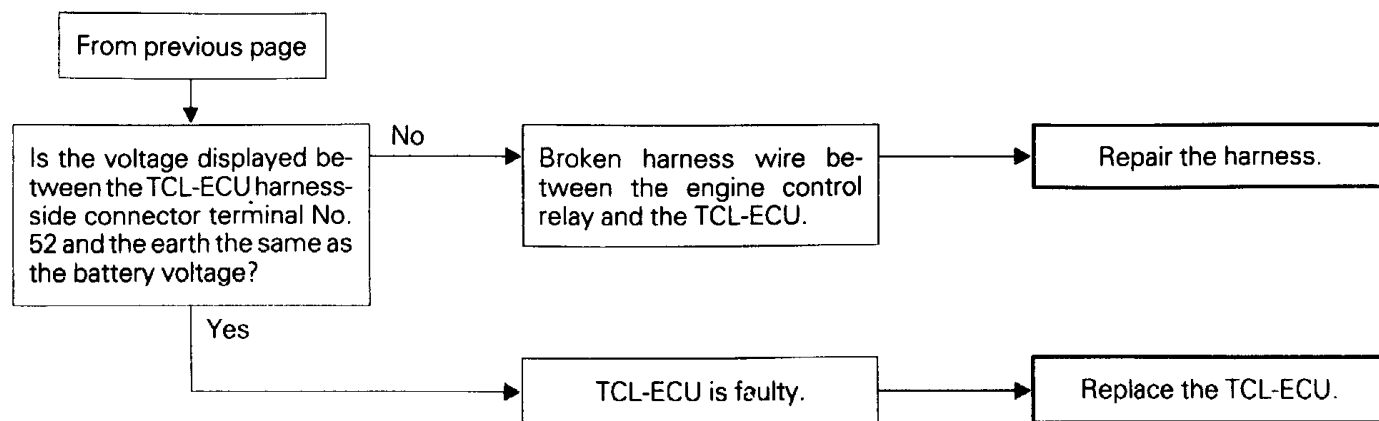
When the ignition key is "ON", either the TCL OFF, TCL or TRACE OFF indicator does not illuminate. (At least one of the indicators does illuminate.)

Comment: The TCL indicators share a common power circuit, so when one or more of the indicators illuminates, the power circuit can be diagnosed as normal. Therefore, there is a strong possibility that the problem is a bulb failure or a broken harness wire.

Hint:

The TCL OFF indicator can illuminate even when its circuit is not driven by the TCL-ECU. Therefore if the TCL OFF indicator is illuminated but other indicators are not illuminated, the reason is probably a faulty TCL-ECU (broken wire in the TCL-ECU power circuit).



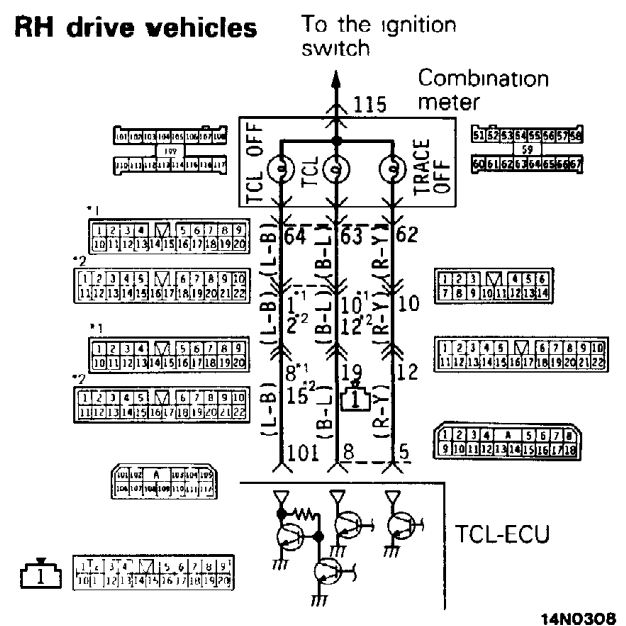
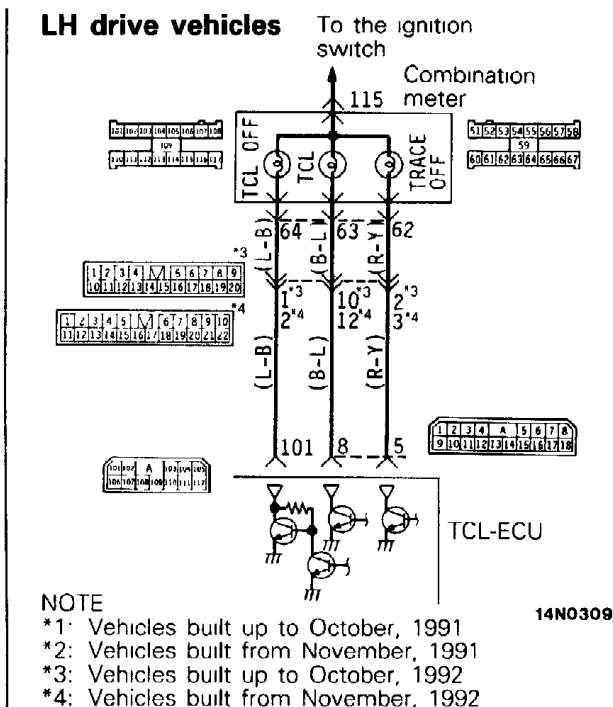
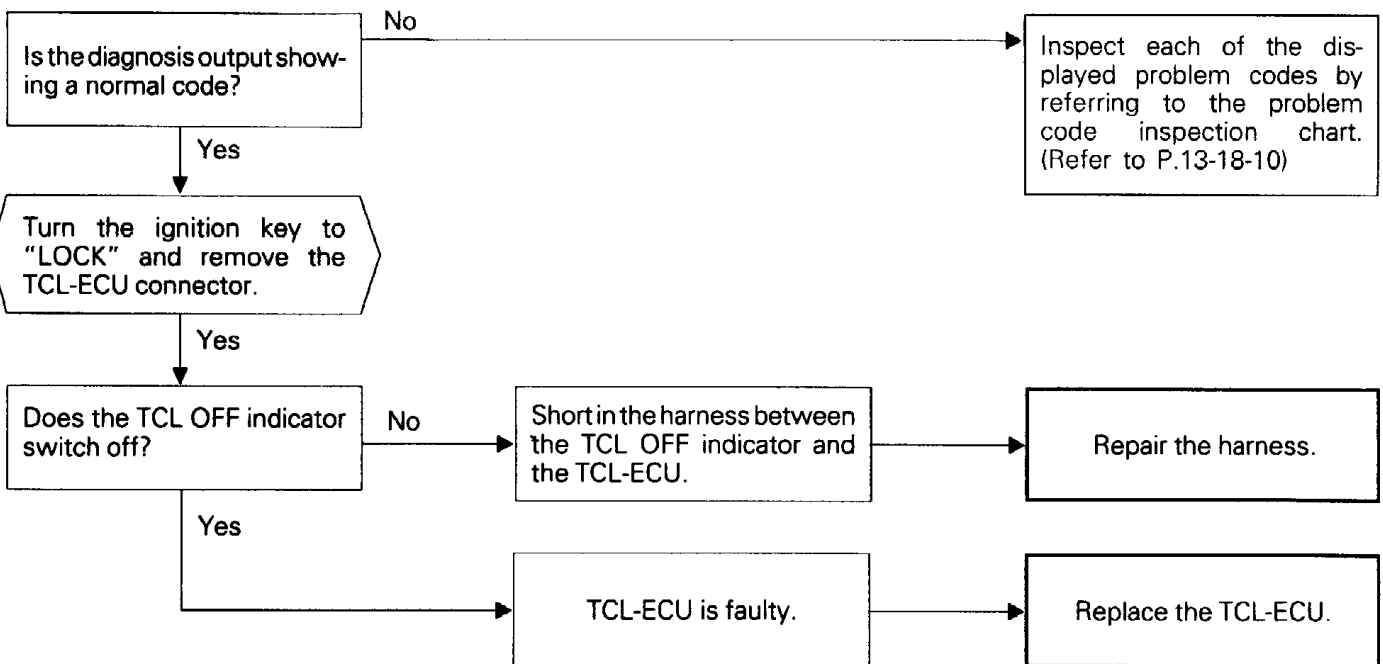


C	After the engine is started, the TCL OFF indicator only remains illuminated. (Other indicators switch off.)
----------	--

Comment: The TCL OFF indicator serves as a system warning indicator, and if the self-checking function detects a malfunction in the system immediately after starting the engine, this indicator will illuminate or flash.
When the indicator illuminates, the cause is a problem in some other system connected with the TCL, or a drop in power voltage.

Hint: When the ABS warning lamp is illuminated, it is likely that there is a problem with the ABS, and when the CHECK ENGINE lamp is illuminated, there is a problem with the engine control system.

NOTE
If there is no diagnosis output (communication cannot be made with the multi-use tester), inspect and repair the harness between the ECU serial/diagnosis output terminal and the diagnosis connector.



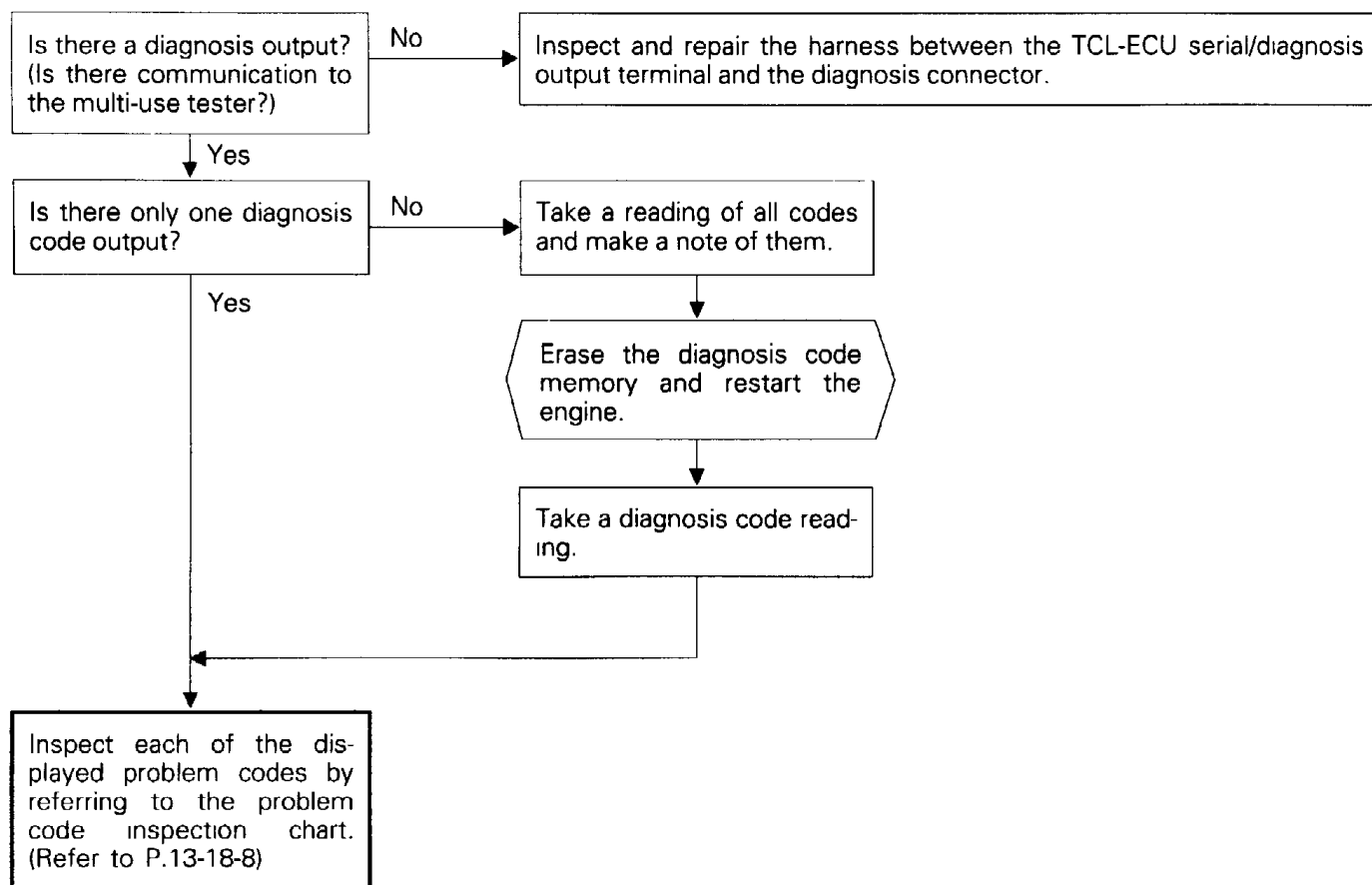
D After the engine is started, the TCL OFF indicator flashes.

Comment: The TCL OFF indicator serves as a system warning indicator, and if the self-checking function detects a malfunction in the system immediately after starting the engine, this indicator will illuminate or flash.

When the indicator flashes, it shows that a problem in the TCL-ECU has been detected, and the system functions have been stopped.

NOTE

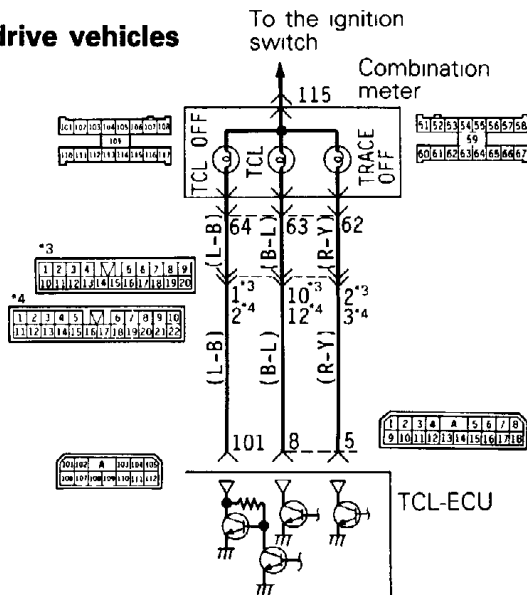
1. When several problem codes are displayed, it is impossible to tell which code is causing the indicator to flash immediately after the engine has been turned on. When there are problems, if the diagnosis code memory is momentarily erased and the engine is restarted, those problem codes will again be displayed.
2. Furthermore, there are some problems that cannot be detected immediately after starting the engine or during idling, but only when the vehicle is actually moving. Therefore, for non-recorded codes, the problems should be checked again during driving and if they recur, the problem code inspection chart should be referred to for inspection.



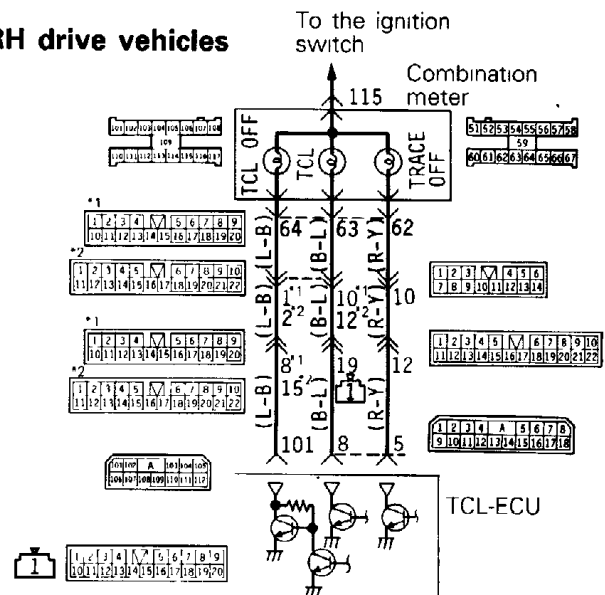
E After the engine is started, the TCL indicator stays on.

Comment: The TCL indicator illuminates when the engine is running only when the traction control is operating. If the light stays on

after the engine is started, the cause is a short in the TCL indicator drive circuit or a faulty TCL-ECU.

LH drive vehicles

14N0309

RH drive vehicles

14N0308

NOTE

- *1: Vehicles built up to October, 1991
- *2: Vehicles built from November, 1991
- *3: Vehicles built up to October, 1992
- *4: Vehicles built from November, 1992

Turn the ignition key to "LOCK" and disconnect the TCL-ECU connector.

Does the TCL indicator remain illuminated when the ignition key is turned to "ON"?

No

TCL-ECU is faulty.

Replace the TCL-ECU.

Yes

Short in the harness between the TCL indicator and the TCL-ECU.

Repair the harness.

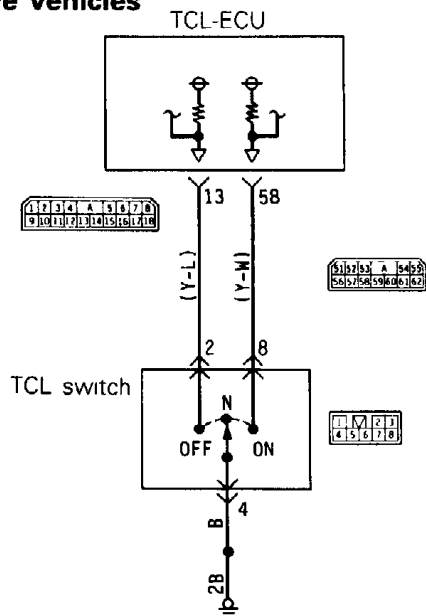
F

When the engine is idling, no matter how often the TCL switch is turned to the "OFF" position, the TRACE OFF indicator and the TCL OFF indicator do not alternate.

Comment: The TRACE OFF indicator and the TCL OFF indicator illuminate alternately each time the TCL switch is turned to OFF. When the indicators do not alternate

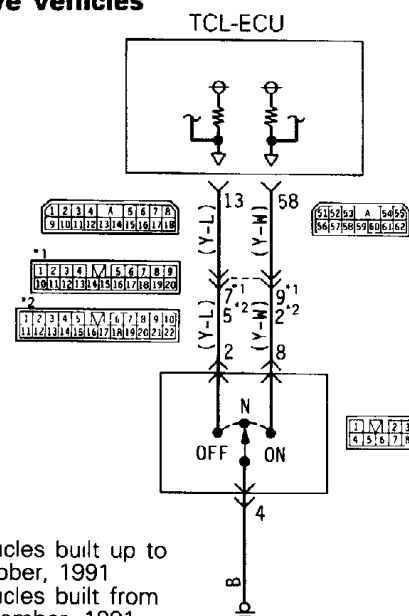
when the switch is operated, there is a problem with the switch or with the TCL-ECU.

LH drive vehicles



14N0239

RH drive vehicles

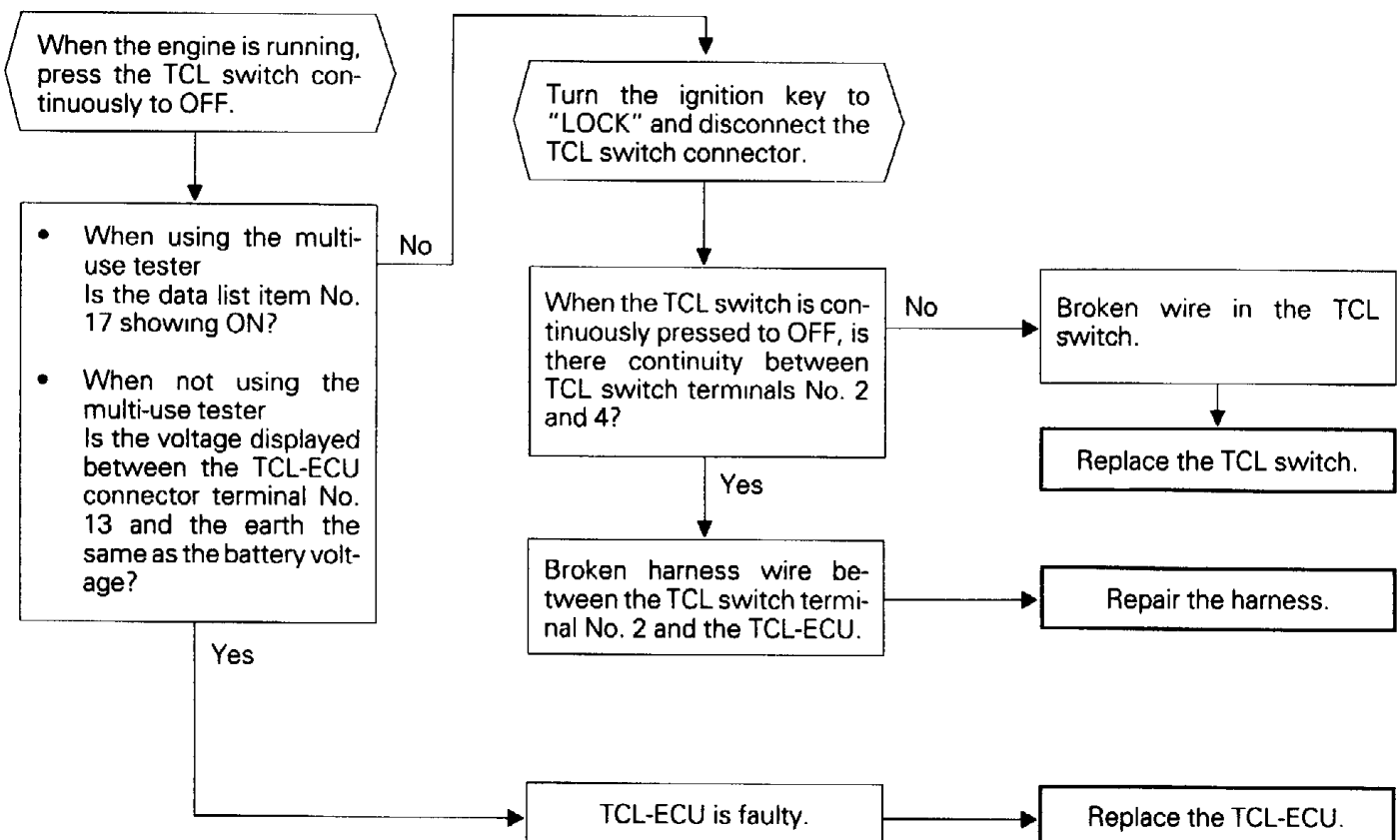


14N0306

NOTE

*1: Vehicles built up to October, 1991

*2: Vehicles built from November, 1991



G

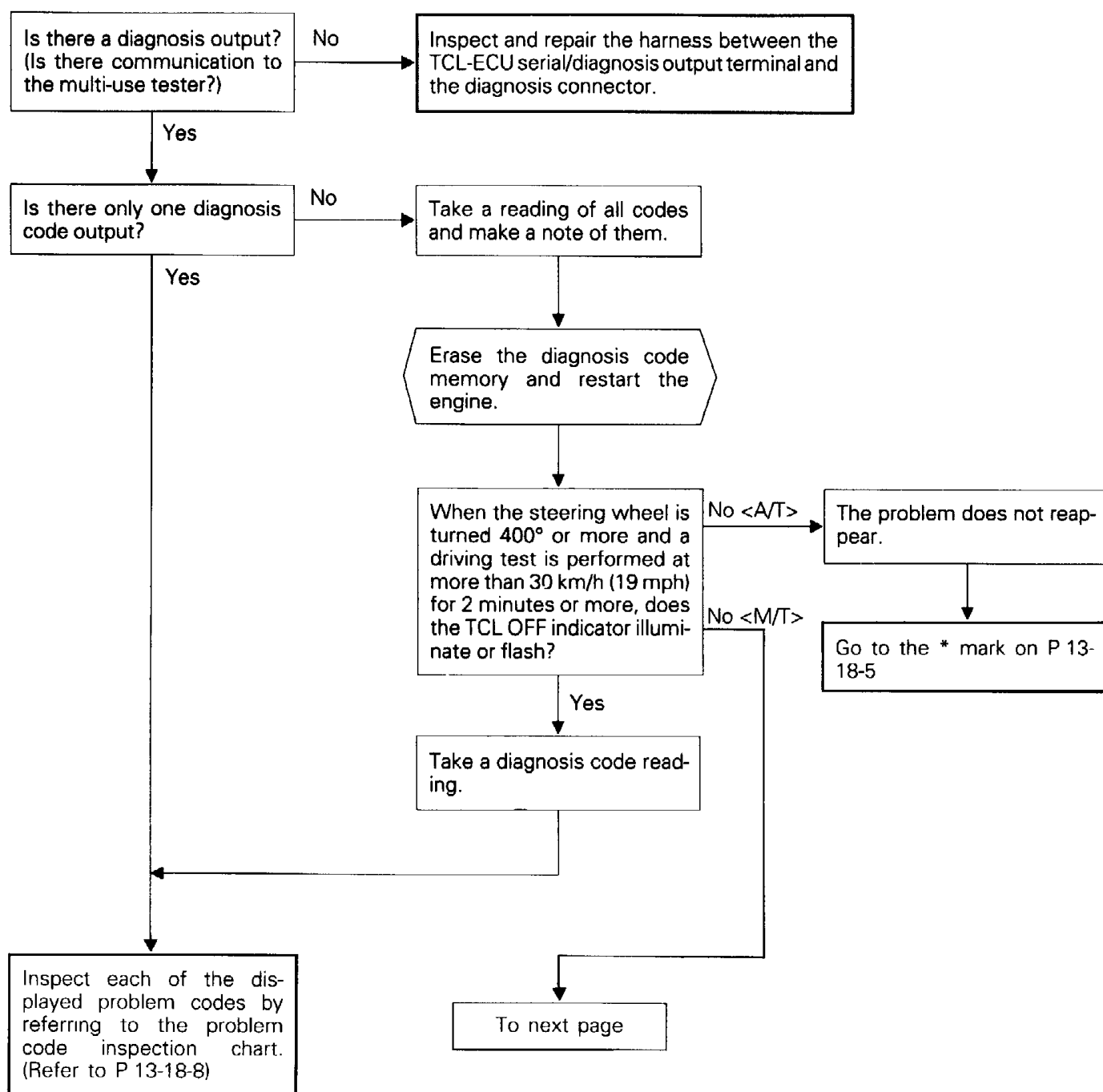
The TCL OFF indicator is normal when the engine is idling, but illuminates or flashes when the vehicle is moving.

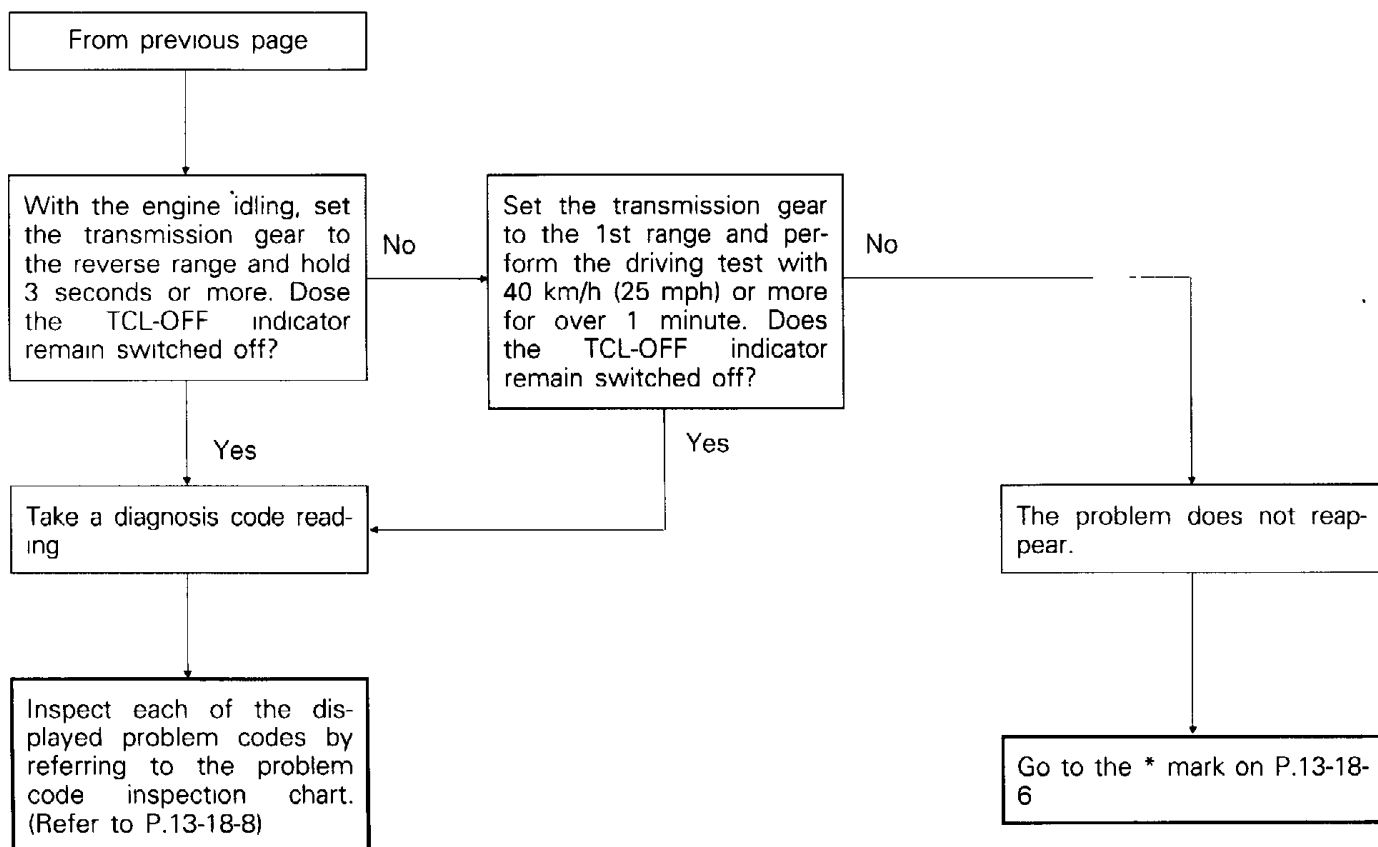
Comment: The TCL OFF indicator serves as a system warning indicator. Even if the self-checking function shows the system to be normal immediately after starting the engine, problems that can be detected only while the vehicle is actually moving can only be checked by a driving test.

NOTE

When several problem codes are displayed, it is impossible to tell which code is causing the indicator to flash when driving. When there are problems, if the diagnosis code memory is momentarily erased and the engine is restarted, those problem codes will again be displayed.

Furthermore, for non-recorded codes, the problems should be checked again and if they recur, the problem code inspection chart should be referred to for inspection.



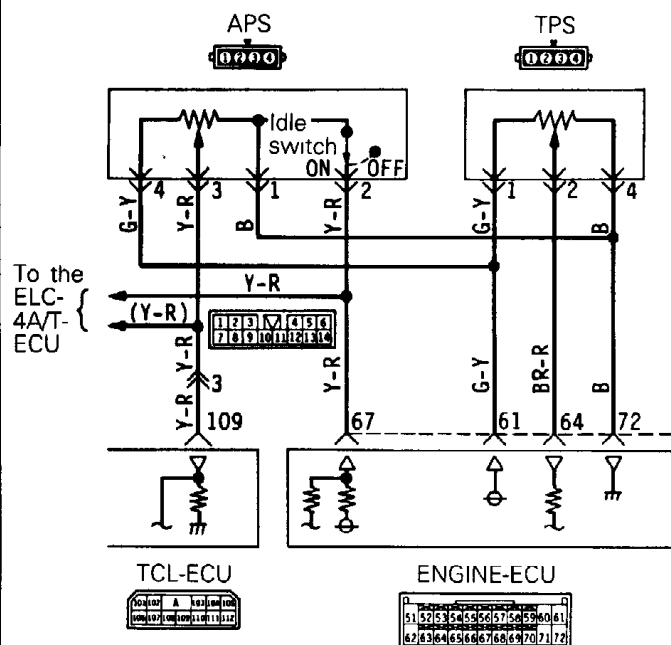

G-1 When diagnosis code No. 11 is displayed

Comment: This problem code is displayed when the APS output voltage becomes less than 0.2V due to a blown or shorted APS circuit.

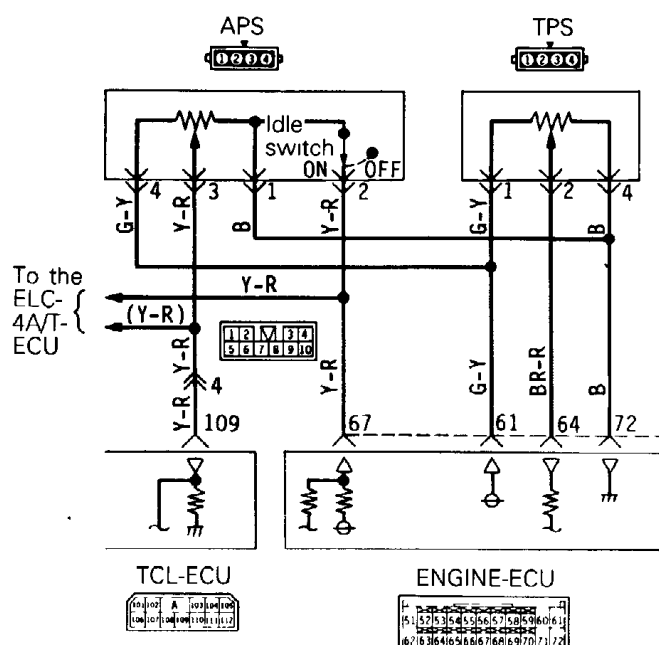
Hint: APS power is supplied from the engine-ECU, and the output signal is shared by the ELC-4A/T and the ECS

(electronic controlled suspension) as well as the TCL. Therefore, for vehicles with A/T, if the ELC-4A/T diagnosis (APS diagnosis time is 4 seconds) is normal, then there is a broken harness wire between the APS and the TCL-ECU, or the TCL-ECU is faulty.

LH drive vehicles

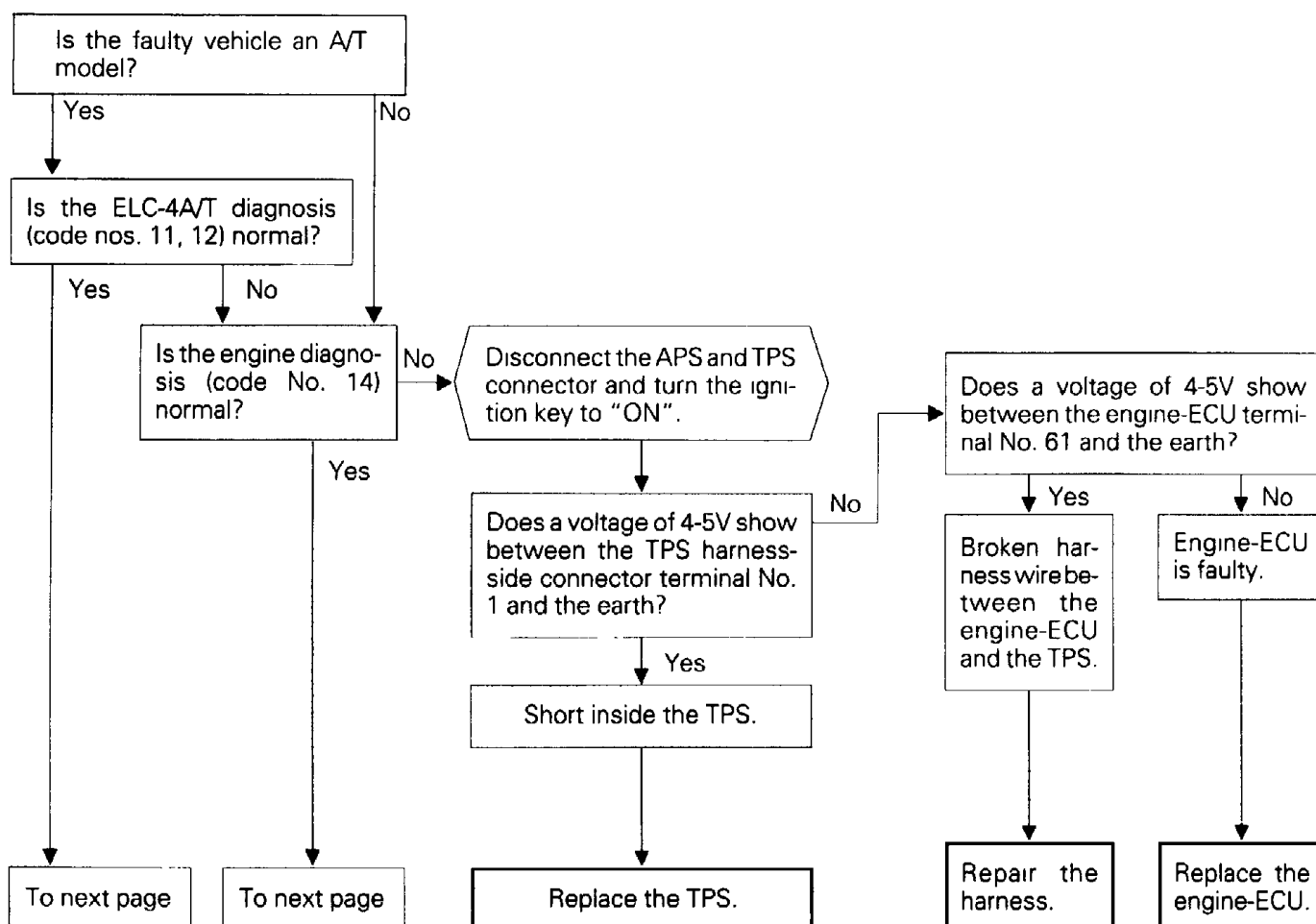


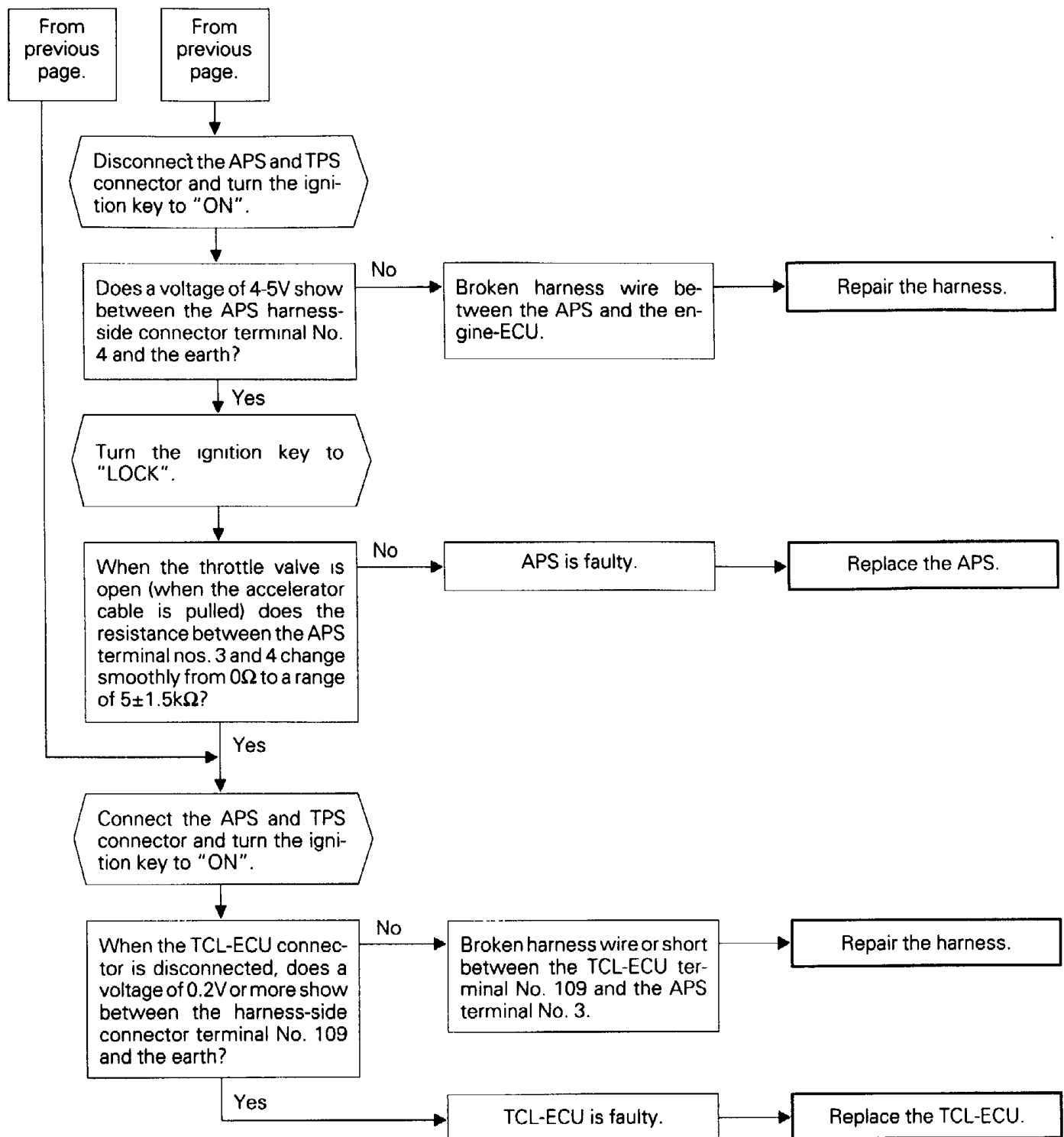
RH drive vehicles



14N0253

14N0252





G-2 When diagnosis code No. 12 or No. 13 is displayed <A/T>

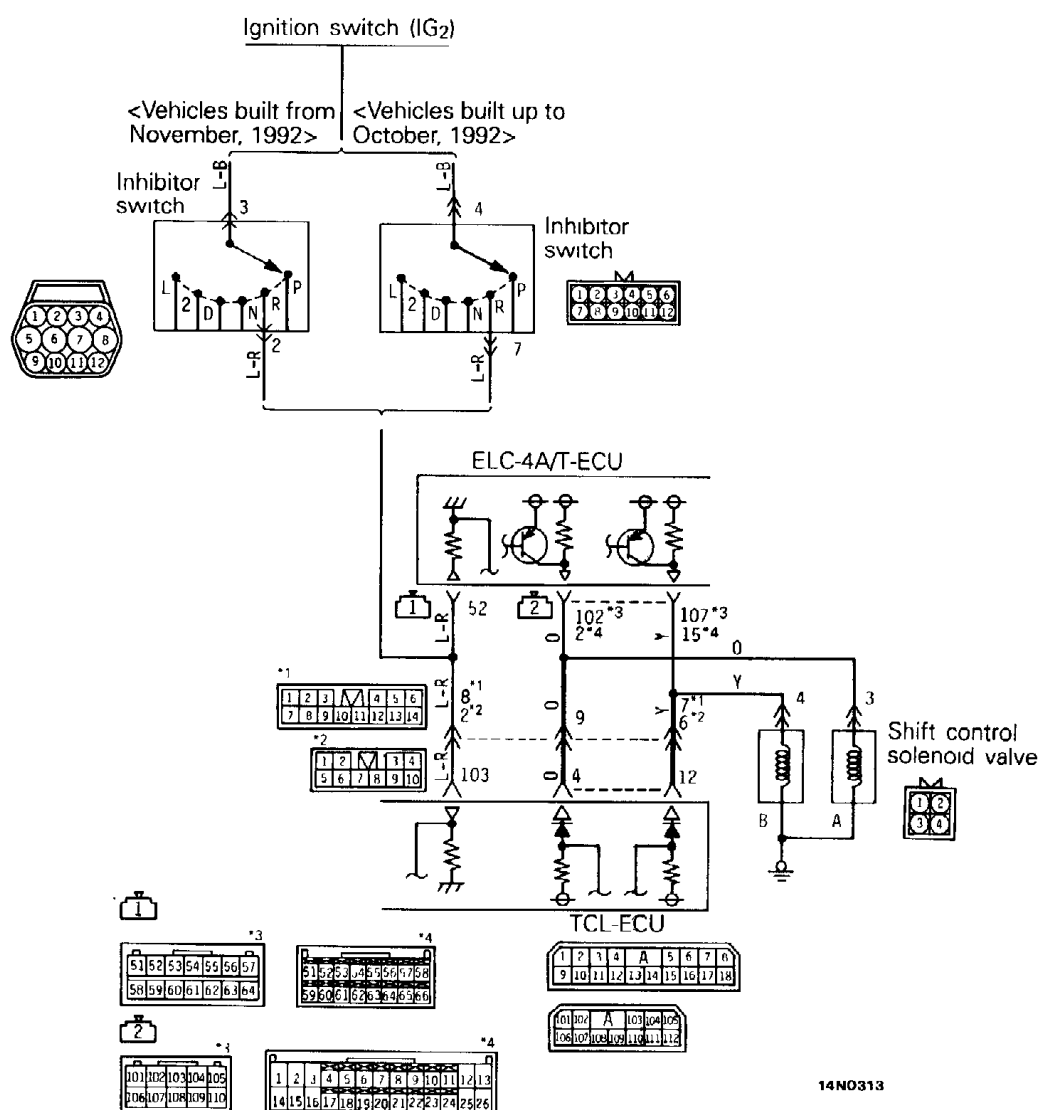
Comment: These problem codes are displayed when a broken wire is detected between the TCL-ECU and the SCSV (Shift Control Solenoid Valve) A or B. The TCL-ECU circuit will turn ON when there is a broken wire in the SCSV A or B, so when the inhibitor switch is at R and the SCSV A is ON, or when the vehicle speed is 100 km/h (62 mph) or more and the SCSV B is ON, the diagnosis will be a broken wire.

Hint:

A broken wire between the ELC-4A/T-ECU and the SCSV A or B is detected from the ELC-ECU side. Therefore, if there is no problem with the ELC-4A/T side, then there is a high possibility that the thick wire shown in the diagram below is broken.

NOTE

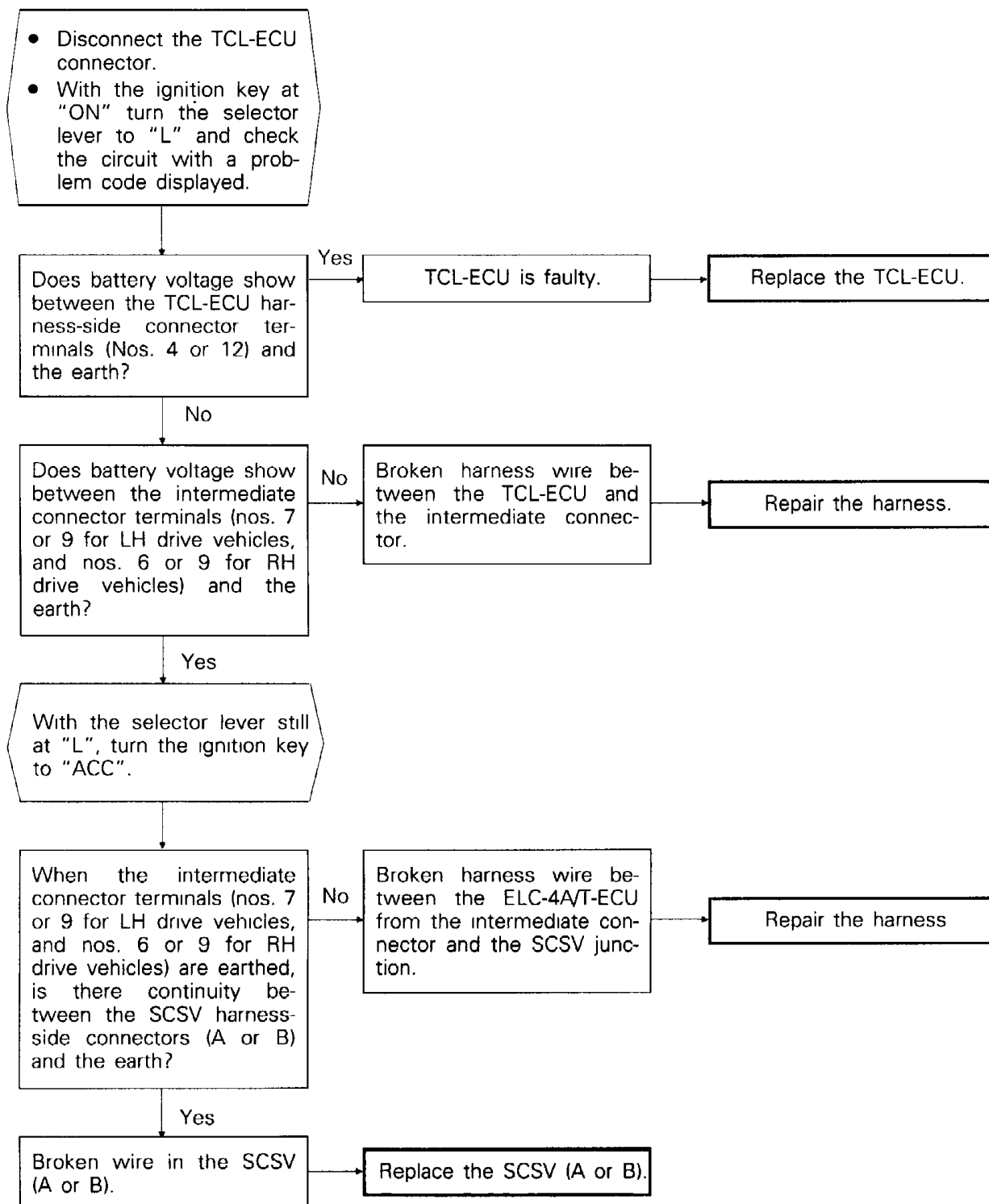
Sometimes these codes will be output due to a short in the inhibitor switch "R" circuit, even when the SCSV A and B are normal.



14N0313

NOTE

- *1: L.H. drive vehicles
- *2: R.H. drive vehicles
- *3: Vehicles built up to October, 1991
- *4: Vehicles built from November, 1991



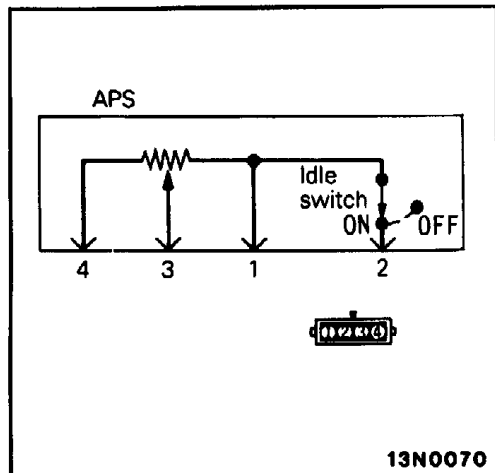
G-3 When diagnosis code No. 14 is displayed.

Comment: This problem code is displayed when the opening difference between the APS and TPS is 20° or greater due to a broken wire in the APS or TPS opening sensor circuit. If the APS has a broken wire, diagnosis code No. 11 is first displayed. Accordingly, when code No. 11 is not displayed,

Hint:

the APS power circuit is diagnosed to be normal.

As the opening of both the APS and the TPS can be read using the multi-use tester, it is better to take a reading of the data for each one to check for an abnormality.



Disconnect the APS connector

When the APS throttle lever is turned, does the resistance between the APS terminal nos. 3 and 4 change smoothly from 0Ω to a range of $5 \pm 1.5k\Omega$?

No

APS is faulty.

Replace the APS.

Yes

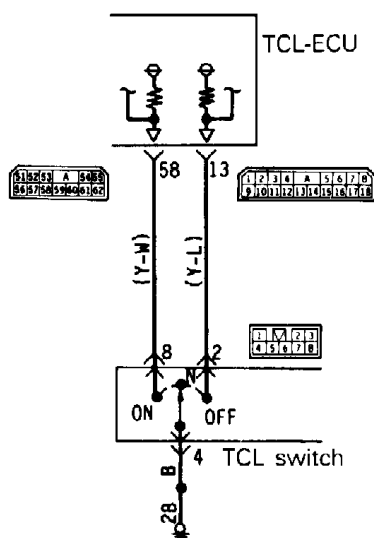
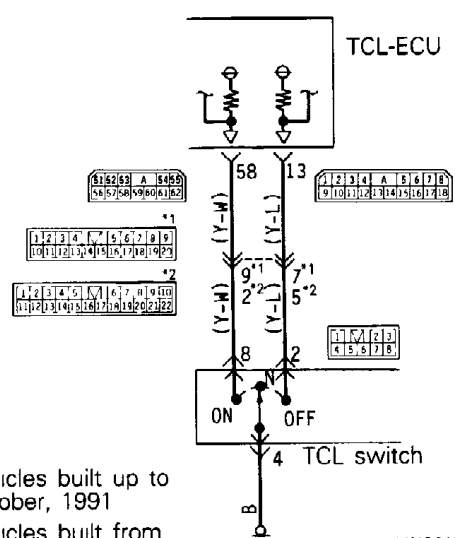
TPS is faulty.

Refer to Engine Troubleshooting.

G-4 When diagnosis code No. 15 <A/T> or No. 24 <M/T> is displayed.

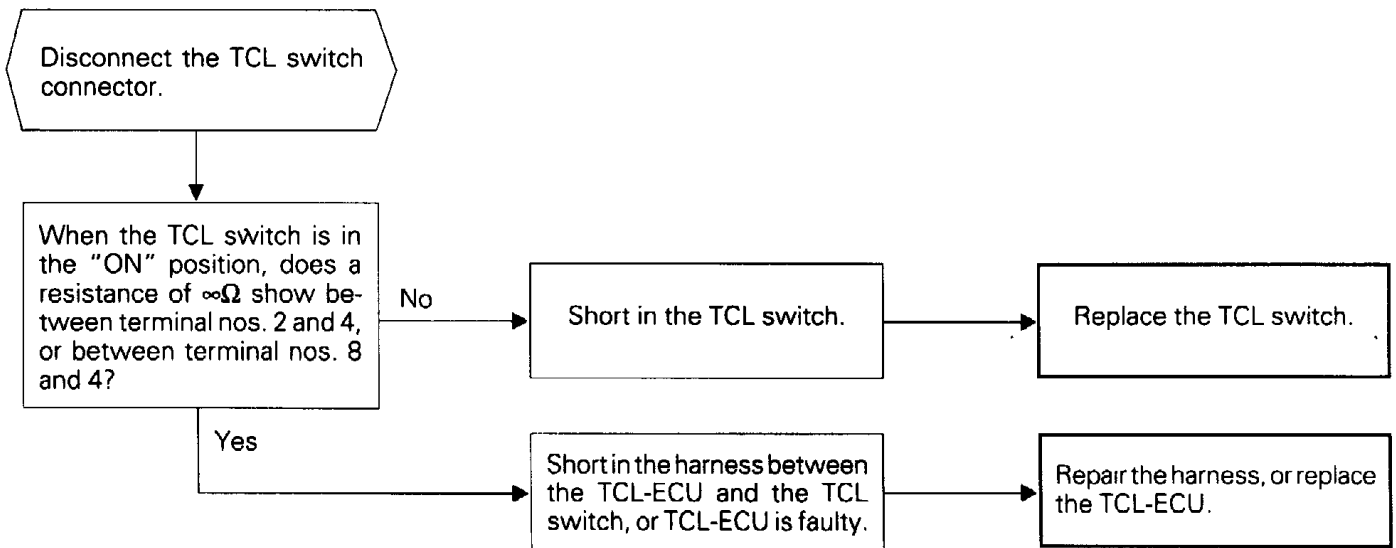
Comment: This problem code is displayed when an ON signal is input at the same time from both the TCL OFF and TRACE OFF posi-

tions because of a short, etc. in the TCL switch circuit.

LH drive vehicles**RH drive vehicles****NOTE**

*1: Vehicles built up to October, 1991

*2: Vehicles built from November, 1991



G-5 When diagnosis code No. 16 <A/T> or No. 27 <M/T> is displayed.

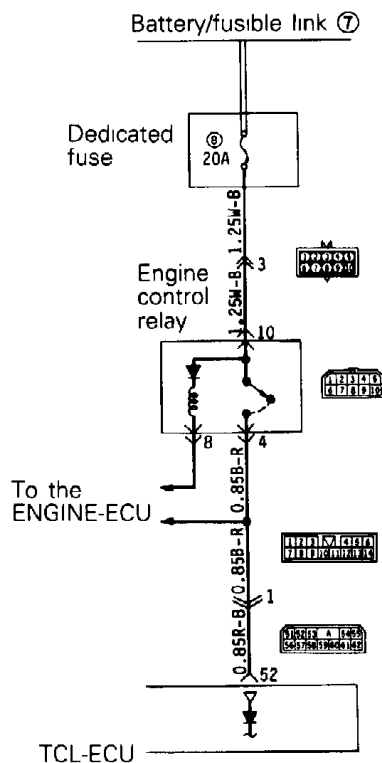
Comment: This problem code is displayed when the TCL-ECU power voltage is lower than the standard value. If the voltage returns to standard voltage or higher, this code will no longer be output.

Caution

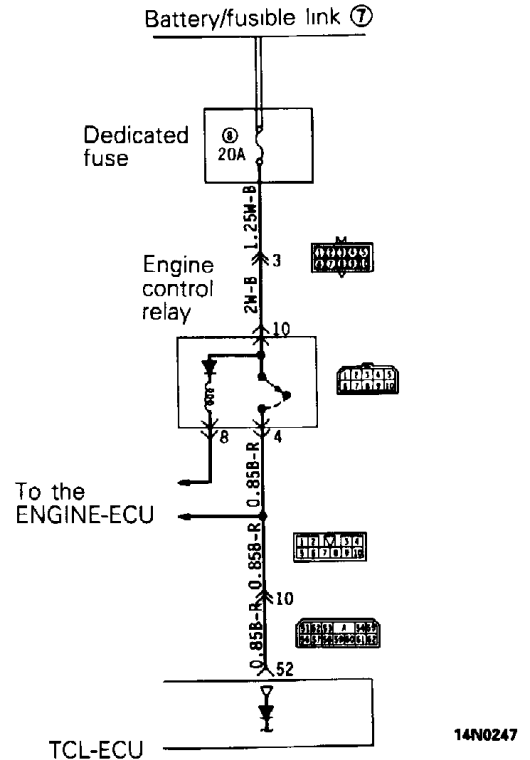
If the battery voltage drops during inspection, this code will be output as a current problem, and correct problem diagnosis cannot be made. Before following the inspection below, check the battery condition, and recharge the battery if necessary.

<Vehicles built up to October, 1992>

LH drive vehicles

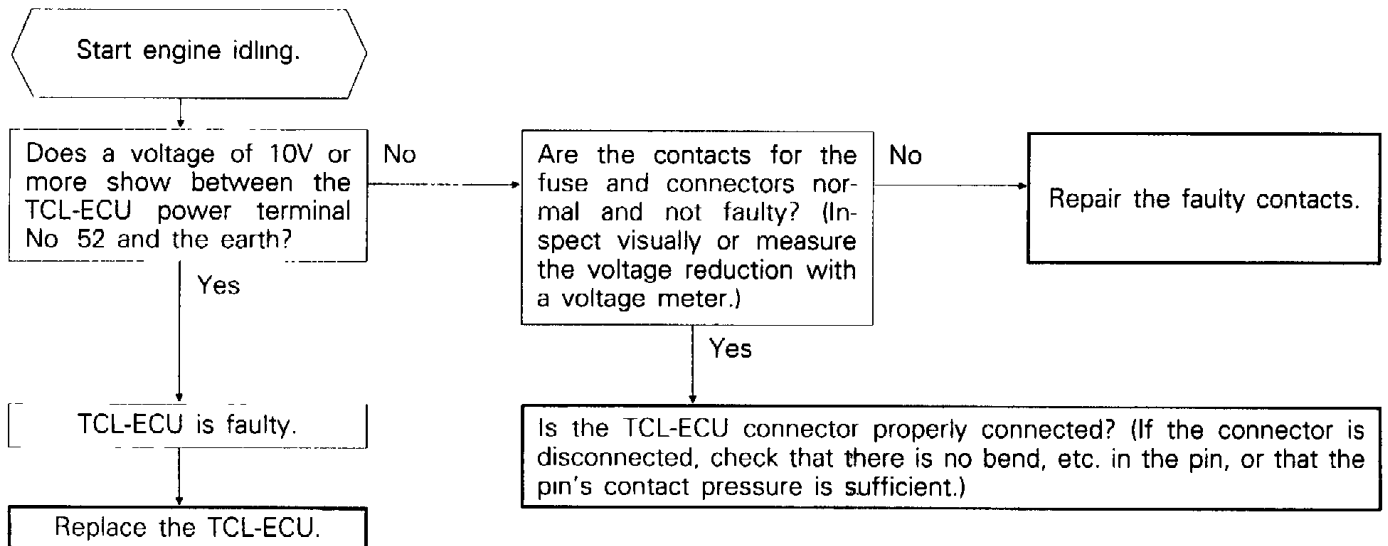
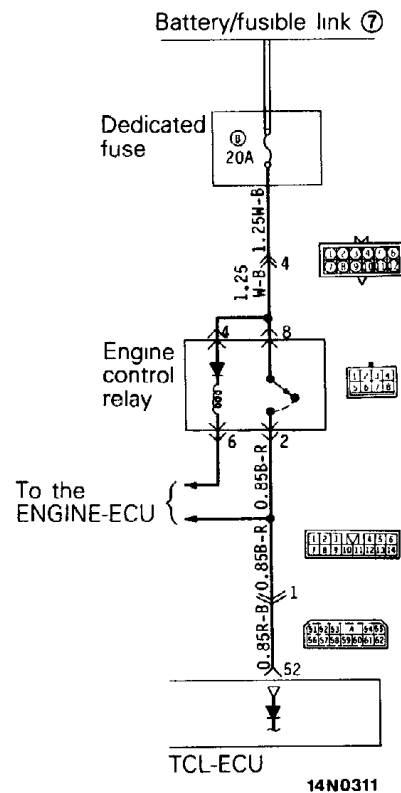
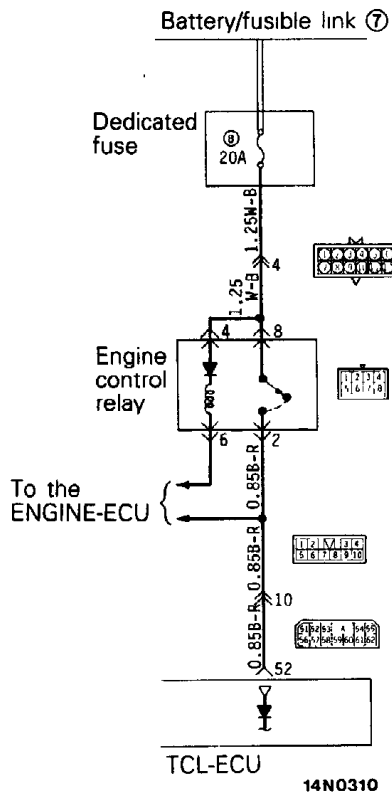


RH drive vehicles



<Vehicles built from November, 1992>
L.H. drive vehicles

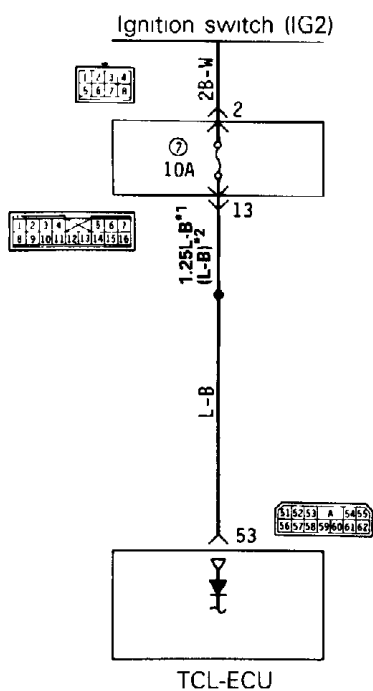
R.H. drive vehicles



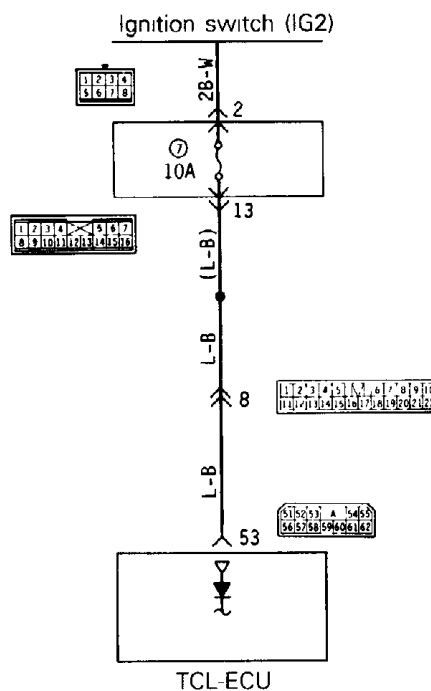
G-6 When diagnosis code No. 17 <A/T> or No. 26 <M/T> is displayed.

Comment: This problem code is displayed when engine revolutions is 450 rpm or higher and IG2 power is not supplied to the TCL-

ECU because of a broken wire or short in the IG2 power circuit.

LH drive vehicles


14N0265

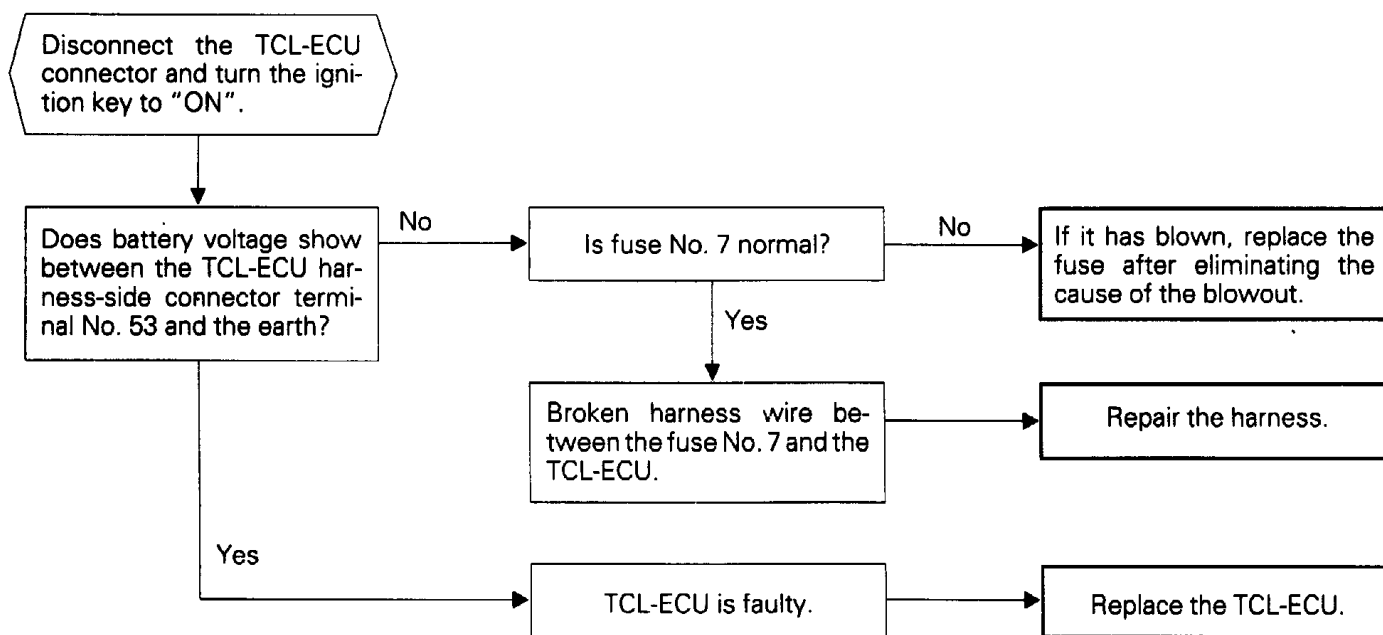
RH drive vehicles


14N0264

NOTE

*1: Vehicles built up to October, 1992

*2: Vehicles built from November, 1992

**G-7**

<A/T> When diagnosis code No. 21, No. 22, No. 23 or No. 24 is displayed.
<M/T> When diagnosis code No. 31, No. 32, No. 33 or No. 34 is displayed.

Comment: When diagnosis code No. 21 or 22 (No. 31 or 32 for M/T) is displayed.

These problem codes are displayed when a pulse is input by the sensor circuit due to a broken wire or short, or a faulty sensor, showing a wheel speed difference of 8 km/h (5 mph) or more in the front left and right wheels compared to the rear wheels.

When diagnosis code No. 23 or 24 (No. 33 or 34 for M/T) is displayed.

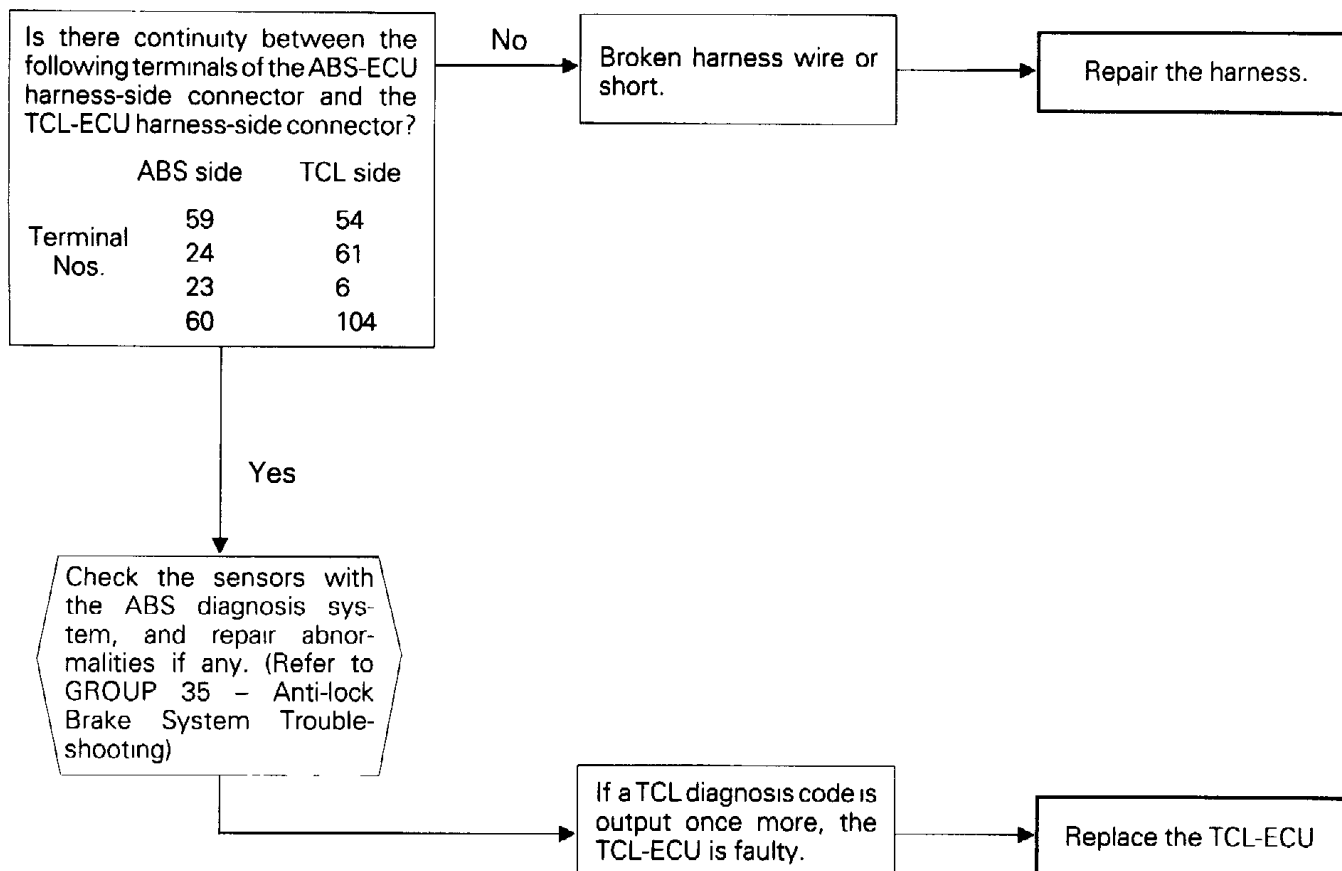
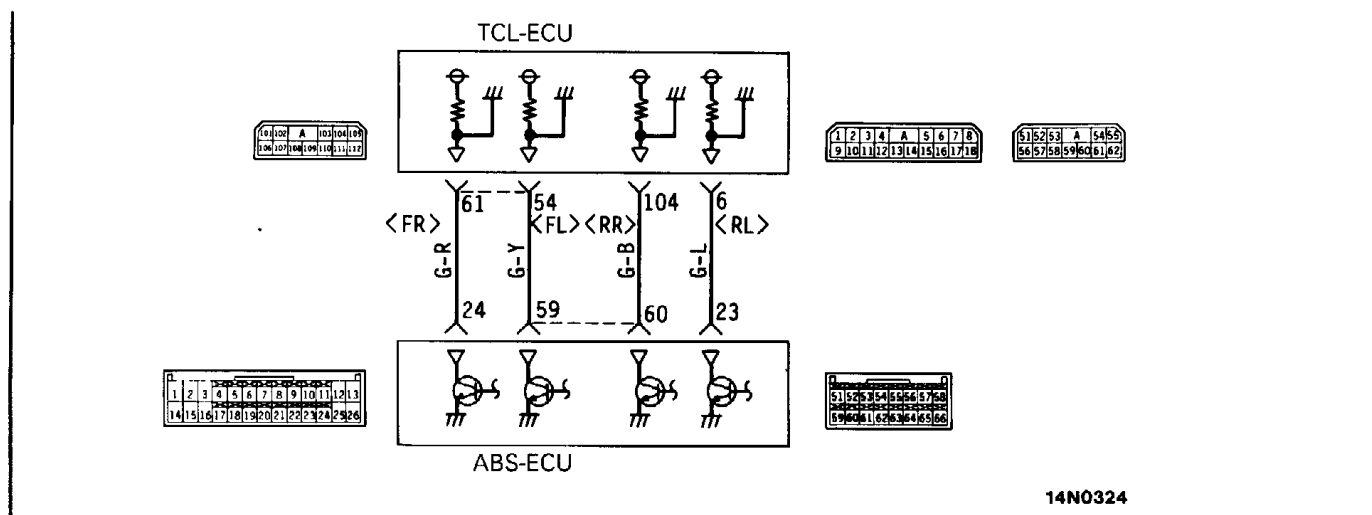
These problem codes are displayed when a pulse is input by the sensor circuit due to a broken wire or short, or a faulty sensor, showing a wheel speed difference of 8 km/h (5 mph) or more in the wheels on one side compared to the opposite side.

Hint:

Problems between the ABS-ECU and the sensor are detected by the ABS-ECU. Therefore, if there is no problem with the ABS side, it is most likely due to a broken harness wire or a short between the ABS-ECU and the TCL-ECU.

NOTE

When these problem codes are output, erase the problem code memory after fixing the cause of the problem, and carry out a driving test at a speed of 20 km/h (12 mph) or higher to check that the codes are not output again.



G-8	When diagnosis code No. 25 <A/T> or No. 35 <M/T> is displayed
------------	--

Comment: While driving at a speed of 20 km/h (12 mph) or over, this problem code is displayed when the pulse signal is stopped for an instant (0.015 sec.), due to a temporary disconnection in the sensor of both rear wheels. However, even when this code is displayed, the TCL OFF indicator will not illuminate or flash. Furthermore, the ABS warning lamp illuminates due to a broken sensor wire in the ABS hardware circuit, and TCL diagnosis code No. 62 (No. 76 for M/T) will be displayed.

Hint: When diagnosis code No. 25 (No. 35 for M/T) is displayed at the same time as code nos. 23 or 24 (nos. 33 or 34 for M/T), inspect according to the troubleshooting for code nos. 23 or 24 (nos. 33 or 34 for M/T).
When code No. 25 (No. 35 for M/T) is displayed by itself, the problem is likely to be a faulty contact in the rear wheel sensor circuit.

Remedy: Inspect according to the same procedure for the ABS wheel speed sensor (rear) inspection. (Refer to GROUP 35 – Serive Adjustment Procedures)

G-9	When diagnosis code No. 26 <A/T> or No. 36 <M/T> is displayed
------------	--

Comment: This problem code is displayed when an abnormality is diagnosed in the rear wheel sensor when the speed of both rear wheels is zero for 20 seconds while traction control is operating.

Hint: This problem occurs when there is a broken harness wire or short between the TCL-ECU and the ABS-ECU that leads to both rear wheels, or if the sensor harnesses for both rear wheel short at the same time.

NOTE

1. When the vehicle is stuck and only the front wheels are moving, or when the front wheels are jacked up and only the front wheels are moving, after 20 seconds the TCL indicator will begin to flash and the system will be isolated.
2. When this problem code is output, erase the problem code memory after fixing the cause of the problem, and carry out a driving test at a speed of 20 km/h (12 mph) or higher to check that the code is not output again.

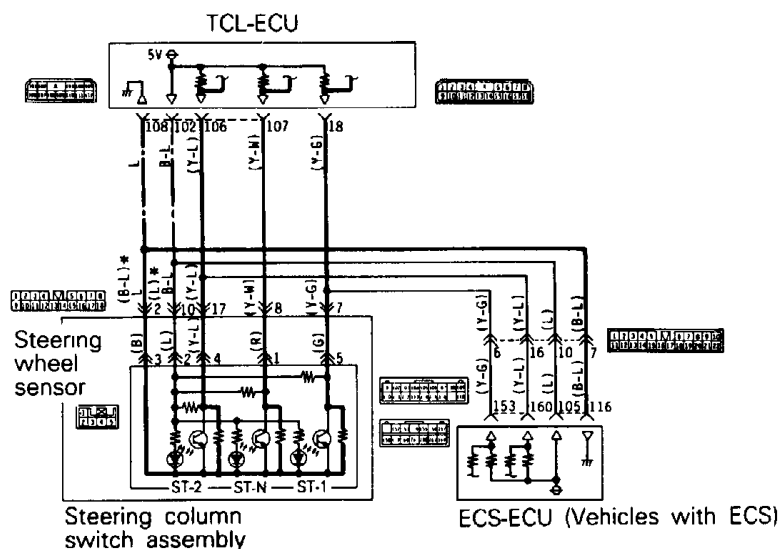
Remedy: Inspect according to the inspection flowchart in Troubleshooting Chart G-7 for diagnosis code nos. 21, 22, 23 and 24 (nos. 31, 32, 33 and 34 for M/T).

When diagnosis code No. 33 <A/T> or No. 47 <M/T> is displayed

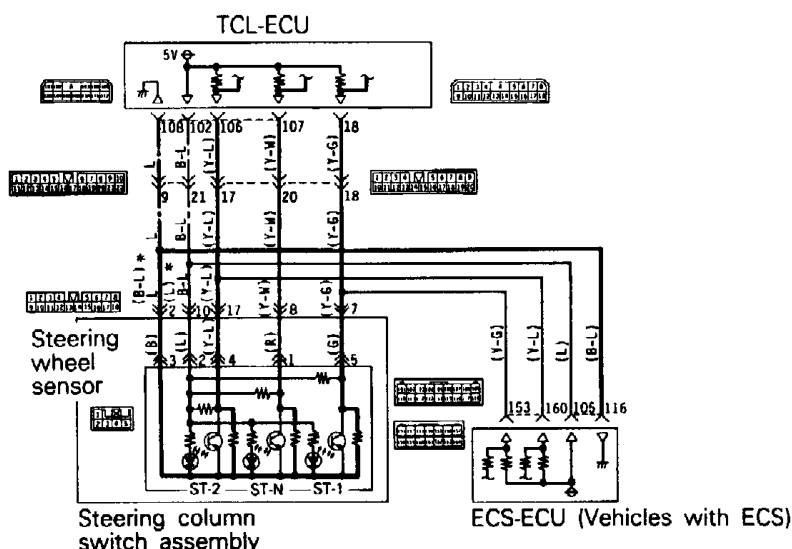
Hint:

played, there is probably a broken wire in a circuit between the sensor and the harness junction of the ECS-ECU and the TCL-ECU.
If the ECS code is normal, then there is probably a broken wire in a circuit between the TCL-ECU and the harness junction of the ECS-ECU and the TCL-ECU.

RH drive vehicles



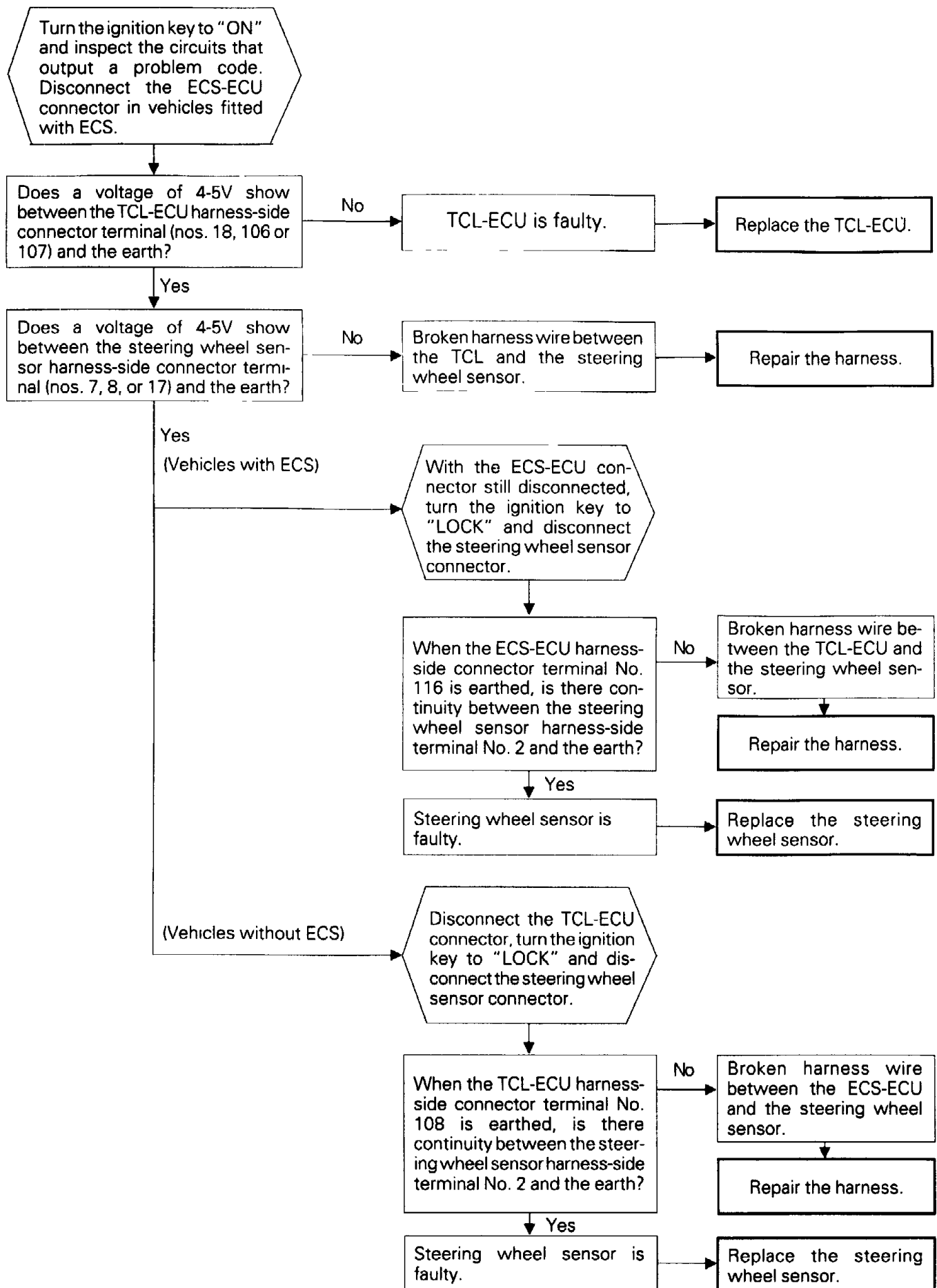
14N0262



NOTE

1. The diameter and color of wires marked with * indicate vehicles with ECS.
2. The dotted lines indicate vehicles without ECS.

14N0263



Comment: This problem code is displayed when an abnormality is diagnosed in the steering wheel sensor power circuit (thick wire section) when the steering angle is less than 10° (no steering signal is input at all) and conditions are as follows:

- Rear wheel speed sensor: When difference between left and right exceeds 1.5 km/h (1 mph) (diagnosed while cornering)

It should be noted that if the vehicle is fitted with left and right tyres of different diameters, this code will sometimes be output while driving, even when the steering wheel sensor is normal.

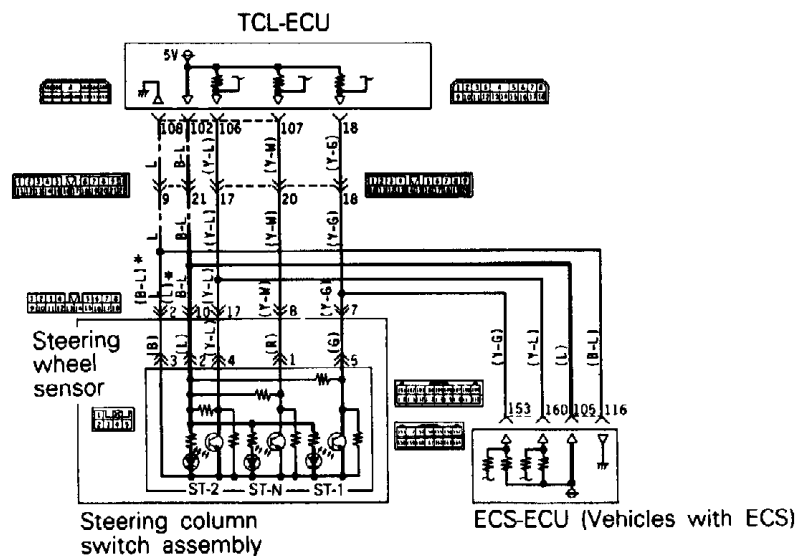
The diagram illustrates the electrical connections for the steering wheel sensor and steering column switch assembly. It shows the following components and their interconnections:

- Steering wheel sensor:** A component with pins 1 through 11. It is connected to the steering column switch assembly and the ECS-ECU.
- Steering column switch assembly:** A component with pins 1 through 11. It is connected to the steering wheel sensor and the ECS-ECU.
- TCL-ECU:** A component with pins 1 through 11. It is connected to the steering wheel sensor and the steering column switch assembly.
- ECS-ECU (Vehicles with ECS):** A component with pins 1 through 11. It is connected to the steering wheel sensor and the steering column switch assembly.

The diagram shows the following connections:

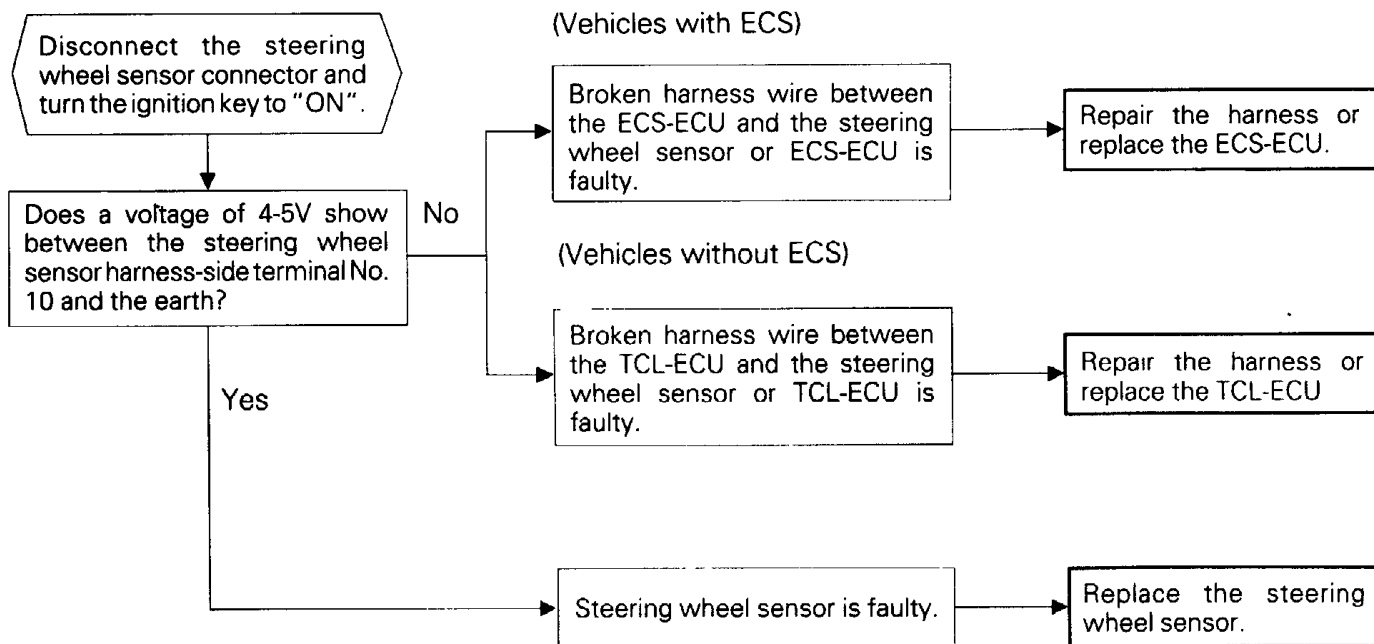
- Steering wheel sensor:**
 - Pin 1: Connected to pin 1 of the steering column switch assembly.
 - Pin 2: Connected to pin 2 of the steering column switch assembly.
 - Pin 3: Connected to pin 3 of the steering column switch assembly.
 - Pin 4: Connected to pin 4 of the steering column switch assembly.
 - Pin 5: Connected to pin 5 of the steering column switch assembly.
 - Pin 6: Connected to pin 6 of the steering column switch assembly.
 - Pin 7: Connected to pin 7 of the steering column switch assembly.
 - Pin 8: Connected to pin 8 of the steering column switch assembly.
 - Pin 9: Connected to pin 9 of the steering column switch assembly.
 - Pin 10: Connected to pin 10 of the steering column switch assembly.
 - Pin 11: Connected to pin 11 of the steering column switch assembly.
- Steering column switch assembly:**
 - Pin 1: Connected to pin 1 of the steering wheel sensor.
 - Pin 2: Connected to pin 2 of the steering wheel sensor.
 - Pin 3: Connected to pin 3 of the steering wheel sensor.
 - Pin 4: Connected to pin 4 of the steering wheel sensor.
 - Pin 5: Connected to pin 5 of the steering wheel sensor.
 - Pin 6: Connected to pin 6 of the steering wheel sensor.
 - Pin 7: Connected to pin 7 of the steering wheel sensor.
 - Pin 8: Connected to pin 8 of the steering wheel sensor.
 - Pin 9: Connected to pin 9 of the steering wheel sensor.
 - Pin 10: Connected to pin 10 of the steering wheel sensor.
 - Pin 11: Connected to pin 11 of the steering wheel sensor.
- TCL-ECU:**
 - Pin 1: Connected to pin 1 of the steering wheel sensor.
 - Pin 2: Connected to pin 2 of the steering wheel sensor.
 - Pin 3: Connected to pin 3 of the steering wheel sensor.
 - Pin 4: Connected to pin 4 of the steering wheel sensor.
 - Pin 5: Connected to pin 5 of the steering wheel sensor.
 - Pin 6: Connected to pin 6 of the steering wheel sensor.
 - Pin 7: Connected to pin 7 of the steering wheel sensor.
 - Pin 8: Connected to pin 8 of the steering wheel sensor.
 - Pin 9: Connected to pin 9 of the steering wheel sensor.
 - Pin 10: Connected to pin 10 of the steering wheel sensor.
 - Pin 11: Connected to pin 11 of the steering wheel sensor.
- ECS-ECU (Vehicles with ECS):**
 - Pin 1: Connected to pin 1 of the steering wheel sensor.
 - Pin 2: Connected to pin 2 of the steering wheel sensor.
 - Pin 3: Connected to pin 3 of the steering wheel sensor.
 - Pin 4: Connected to pin 4 of the steering wheel sensor.
 - Pin 5: Connected to pin 5 of the steering wheel sensor.
 - Pin 6: Connected to pin 6 of the steering wheel sensor.
 - Pin 7: Connected to pin 7 of the steering wheel sensor.
 - Pin 8: Connected to pin 8 of the steering wheel sensor.
 - Pin 9: Connected to pin 9 of the steering wheel sensor.
 - Pin 10: Connected to pin 10 of the steering wheel sensor.
 - Pin 11: Connected to pin 11 of the steering wheel sensor.

RH drive vehicles



NOTES

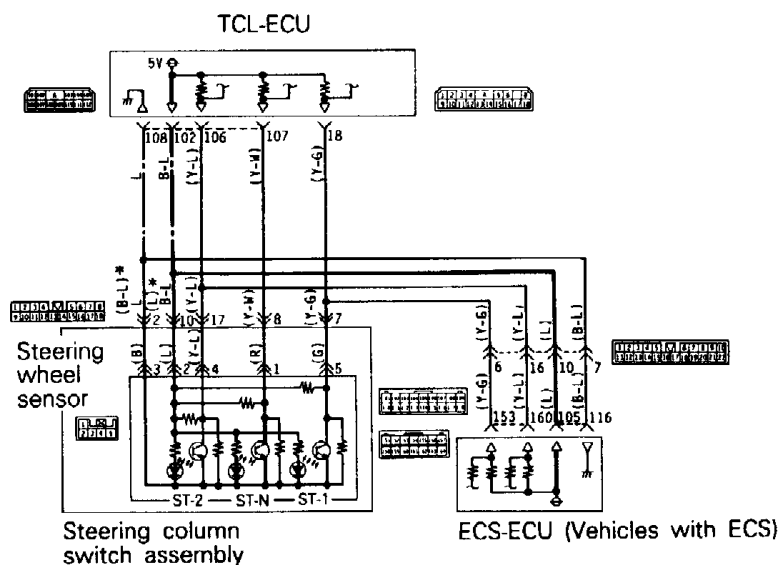
- NOTES
1. The diameter and color of wires marked with * indicate vehicles with ECS.
 2. The dotted lines indicate vehicles without ECS.


G-12 When diagnosis code No. 35 <A/T> or No. 45 <M/T> is displayed

Comment: This problem code is displayed when the steering wheel sensor ST-N circuit (thick wire section) is diagnosed as faulty, when the steering wheel is turned 400° or more, but "ST-N" position is not registered.

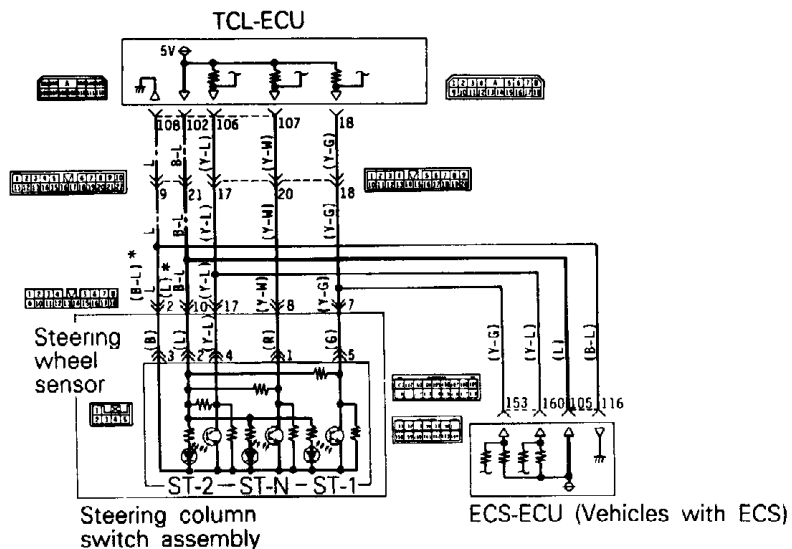
NOTE

Even if there is a problem, this code will not be displayed (detected) if the steering wheel is not turned.

LH drive vehicles


14N0260

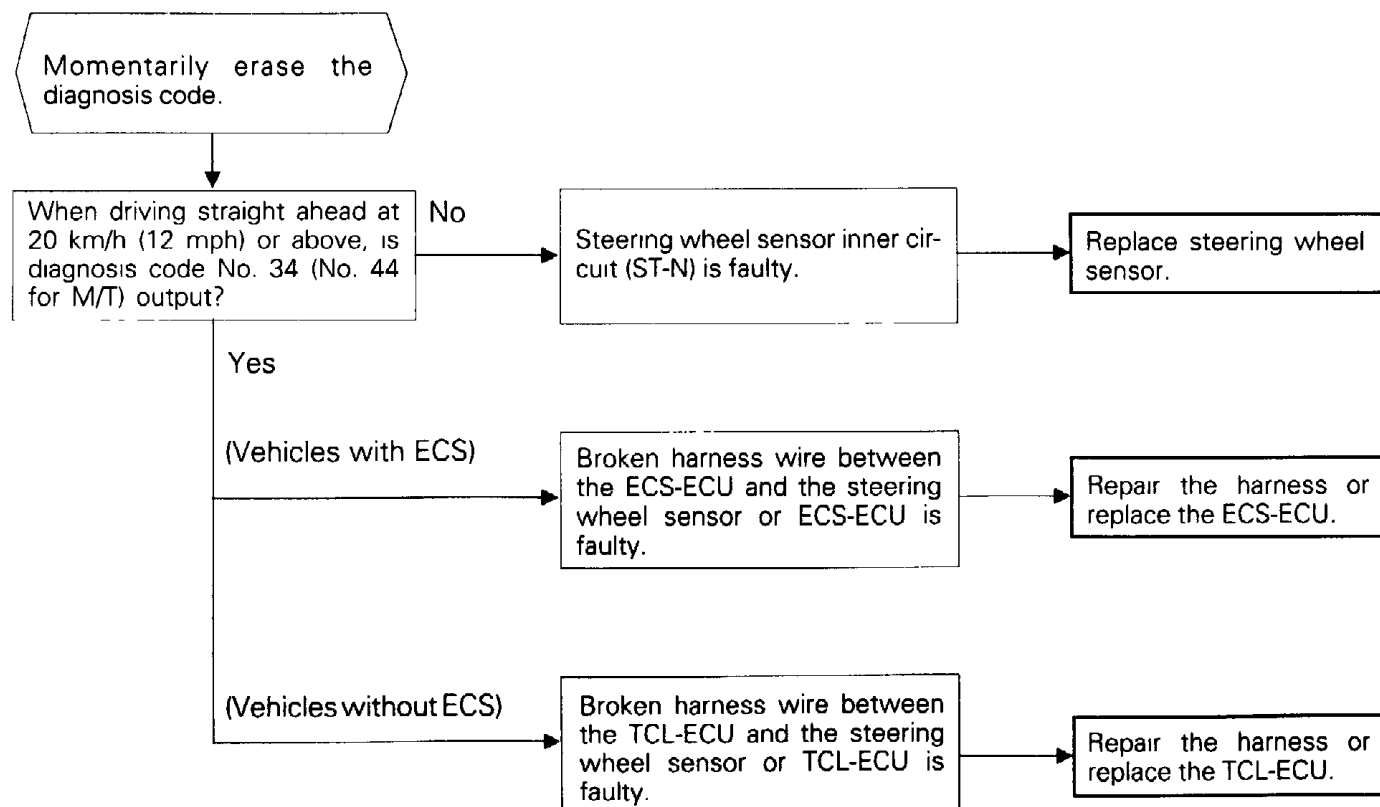
RH drive vehicles



NOTES

1. The diameter and color of wires marked with * indicate vehicles with ECS:
2. The dotted lines indicate vehicles without ECS.

14N0261



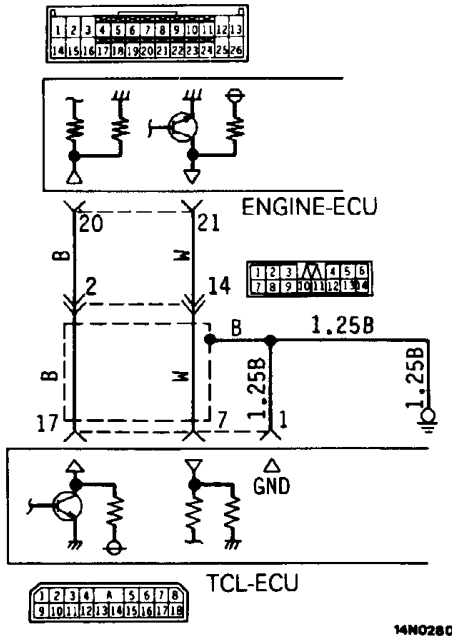
G-13

When diagnosis code No. 41 <A/T> or No. 71 <M/T> is displayed

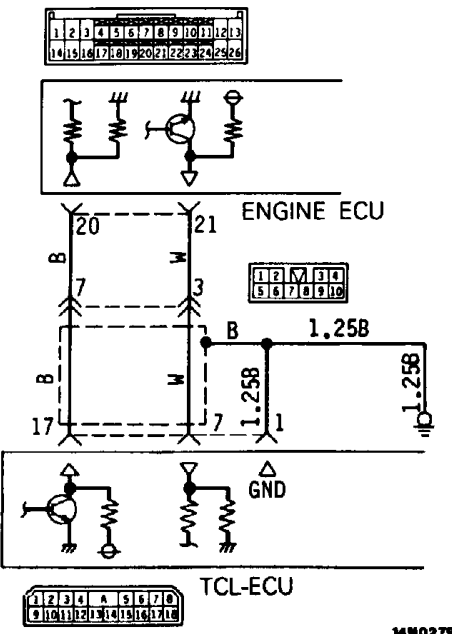
Comment: This code is displayed when there is a problem in the serial communication circuit between the TCL-ECU and the engine-ECU caused by a broken wire or

short, or if an error is detected in the communication due to a faulty ECU or shield wire.

LH drive vehicles



RH drive vehicles



Disconnect the TCL-ECU and engine-ECU connector.

When the TCL-ECU harness-side connector terminal nos. 7 or 2 and 17 are earthed respectively, is there continuity between the following terminals and the earth?

- between intermediate connector terminal No. 3, No. 14 and No. 7 and earth.
- between engine-ECU connector terminal nos. 20 and 21 and earth.

No

Broken wire in the harness with no continuity.

Repair the harness.

Yes

Is there continuity between the TCL-ECU harness side connector terminals (No. 7 or 17) and the earth?

Yes

No

In there continuity between the terminal No. 7 and No. 17 of the TCL-ECU harness side connector?

Yes

Short in the harness between the TCL-ECU and the engine-ECU.

Repair the harness.

No

Replace the engine-ECU with the ECU normally functioned temporarily.

Is a diagnosis code output by the TCL-ECU?

No

Engine-ECU is faulty.

Yes

Replace the engine-ECU.

TCL-ECU is faulty.

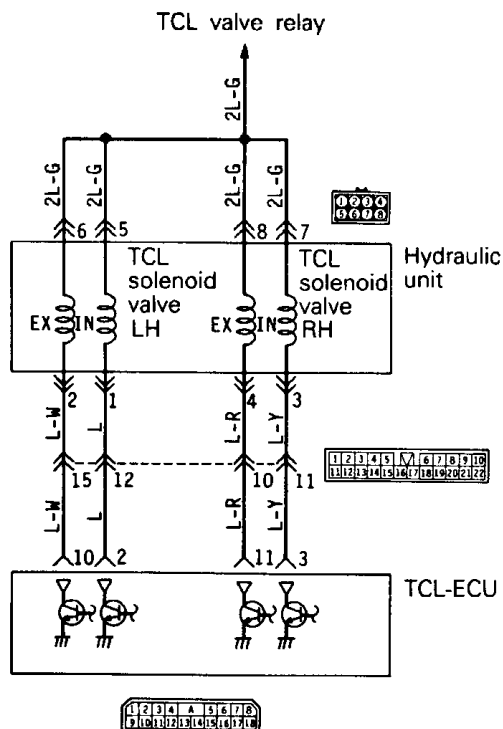
Replace the TCL-ECU.

G-14

<A/T> When diagnosis code No. 51, No. 52, No. 53, or No. 54, is displayed
 <M/T> When diagnosis code No. 61, No. 62, No. 63 or No. 64 is displayed

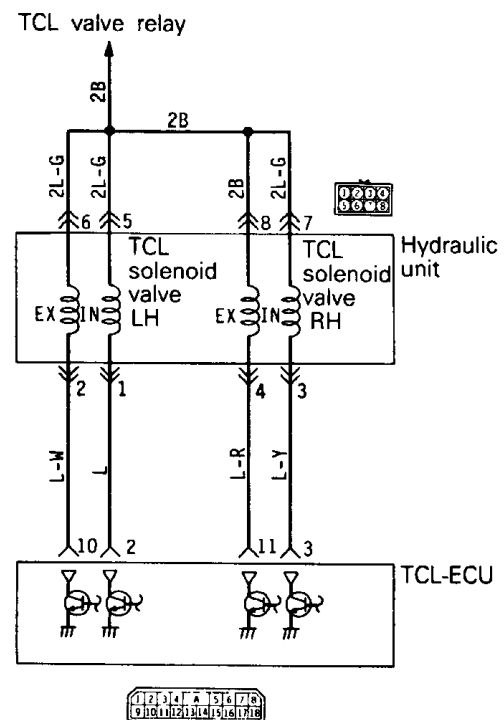
Comment: These codes are displayed when a broken coil wire or short is diagnosed in the solenoid valve or the in the harness when the ignition key is "ON" and the TCL-ECU initial check shows that the solenoid valve is ON but no current is flowing, or the solenoid valve is OFF but current is flowing.

LH drive vehicles



14N0243

RH drive vehicles



14N0244

Disconnect the hydraulic unit connector and turn the ignition key to "ON".

Does battery voltage show between the hydraulic unit harness-side connector terminal No. 5, No. 6, No. 7 or No. 8 and the earth?

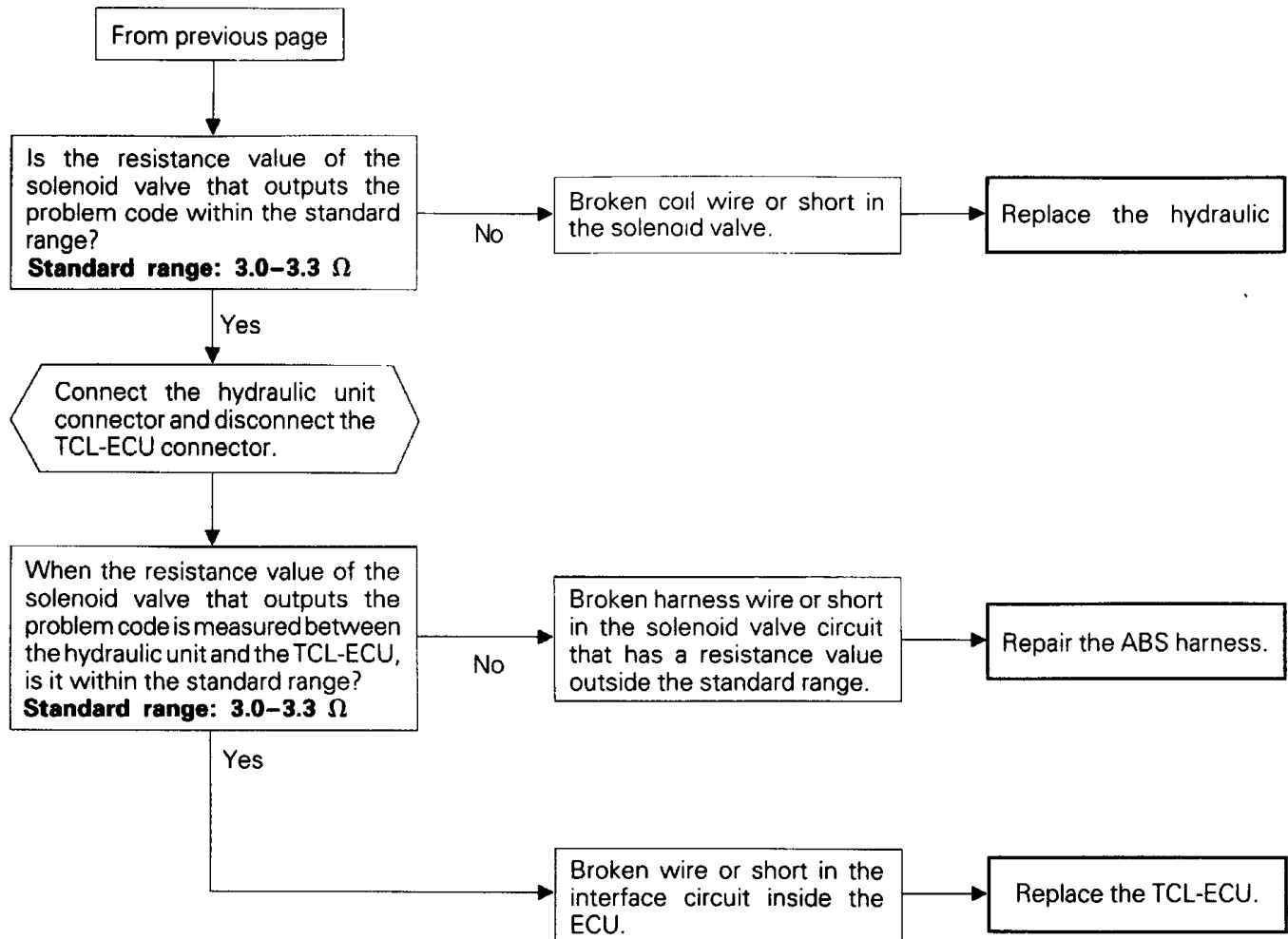
No

Broken harness wire between the TCL valve relay and the hydraulic unit.

Repair the harness.

Yes

To next page



G-15

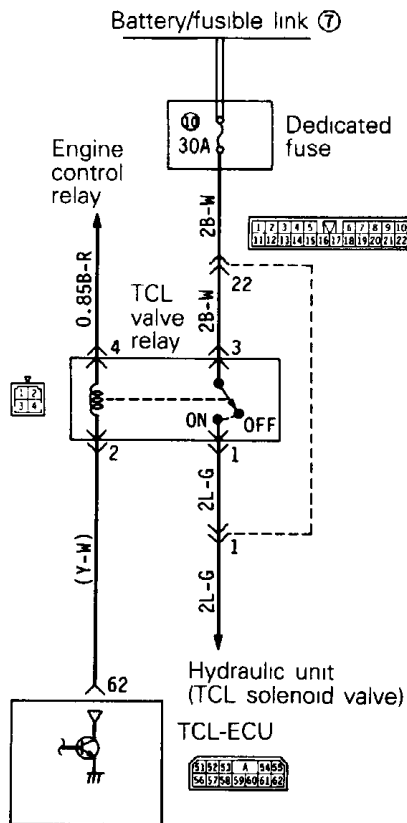
When diagnosis code No. 55 <A/T> or No. 65 <M/T> is displayed

Comment: This problem code is displayed when the ignition key is "ON" and the TCL-ECU initial check shows that the TCL valve relay is ON but no power is supplied to the solenoid valve, or power is being supplied but none of the solenoid valves are operating.

Hint:

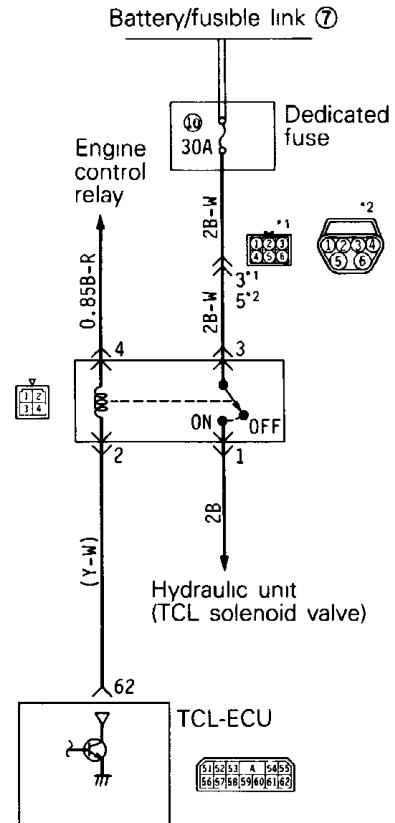
When diagnosis code No. 51, No. 52, No. 53 or No. 54 (No. 61, No. 62, No. 63 or No. 64 for M/T) are displayed, inspect according to the troubleshooting for code No. 51, No. 52, No. 53 and No. 54 (No. 61, No. 62, No. 63 and No. 64 for M/T).

LH drive vehicles



14N0240

RH drive vehicles



NOTE

*1: Vehicles built up to October, 1992

*2: Vehicles built from November, 1992

14N0307

Disconnect the TCL valve relay connector and turn the ignition key to "ON".

Does battery voltage show between the TCL valve relay harness-side connector terminal No. 3 and No. 4 and the earth?

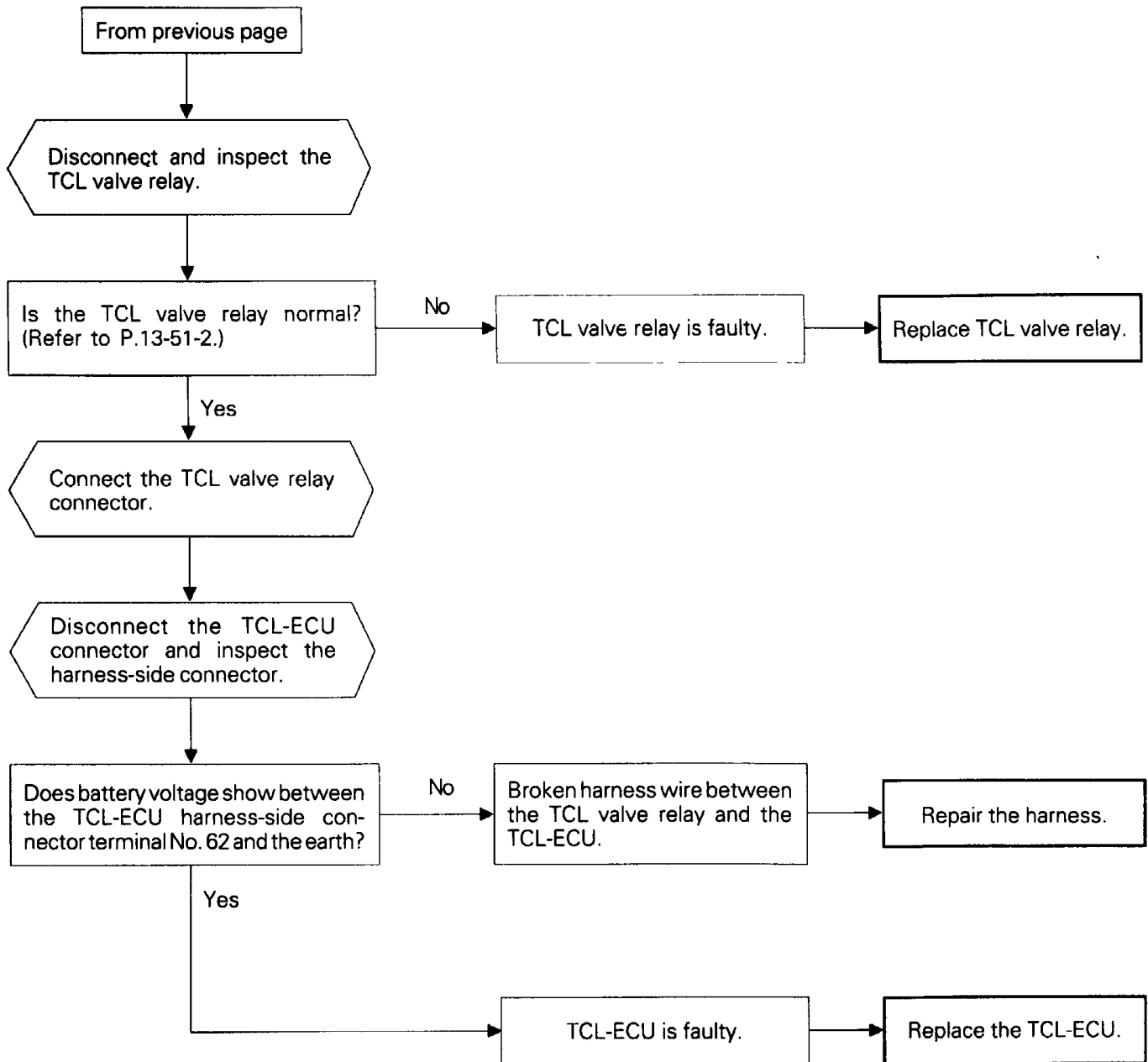
No

Broken harness wire between the engine control relay or fuse No. 10 and the TCL valve relay.

Repair the harness.

Yes

To next page



G-16**When diagnosis code No. 56 <A/T> or 66 <M/T> is displayed**

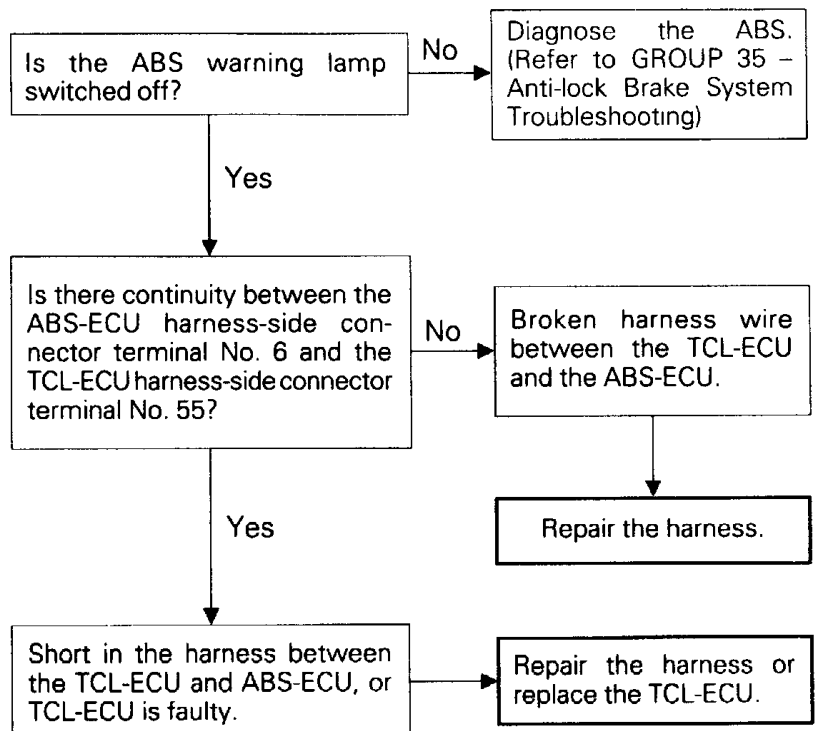
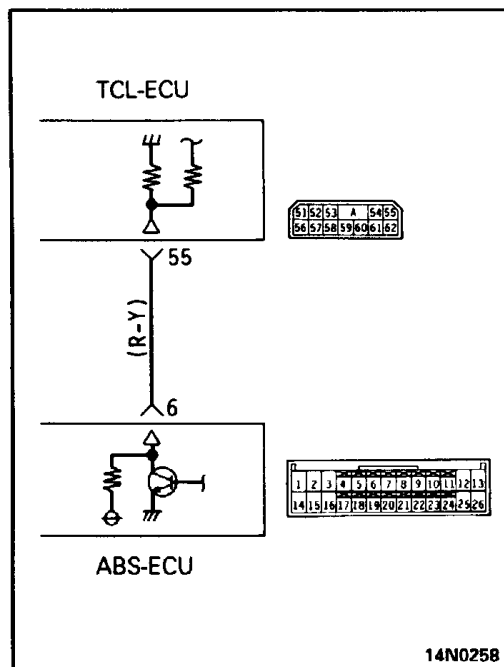
Comment: This problem code is displayed when the solenoid valve is ON (increase in pressure) for a longer than normal time when taking off on a slippery road surface, due to a faulty TCL-ECU interface circuit, etc.

Remedy: Inspect according to the troubleshooting for diagnosis code No. 51, No. 52, No. 53, No. 54 and No. 55 (No. 61, No. 62, No. 63 and No. 64 for M/T), and if the TCL valve relay and solenoid valve are normal, the TCL-ECU is faulty and should be replaced.

G-17**When diagnosis code No. 61 <A/T> or No. 77 <M/T> is displayed**

Comment: This problem code is displayed when the ABS signal during operation stays off for a long period of time (90 seconds or more), due to a broken harness wire or short between the TCL-ECU and the ABS-ECU, or if the ABS-ECU and TCL-ECU interface circuit is faulty.

Hint: If the ABS warning lamp remains off after the engine is started, it is probably caused by a broken harness wire or short between the ABS-ECU and the TCL-ECU.

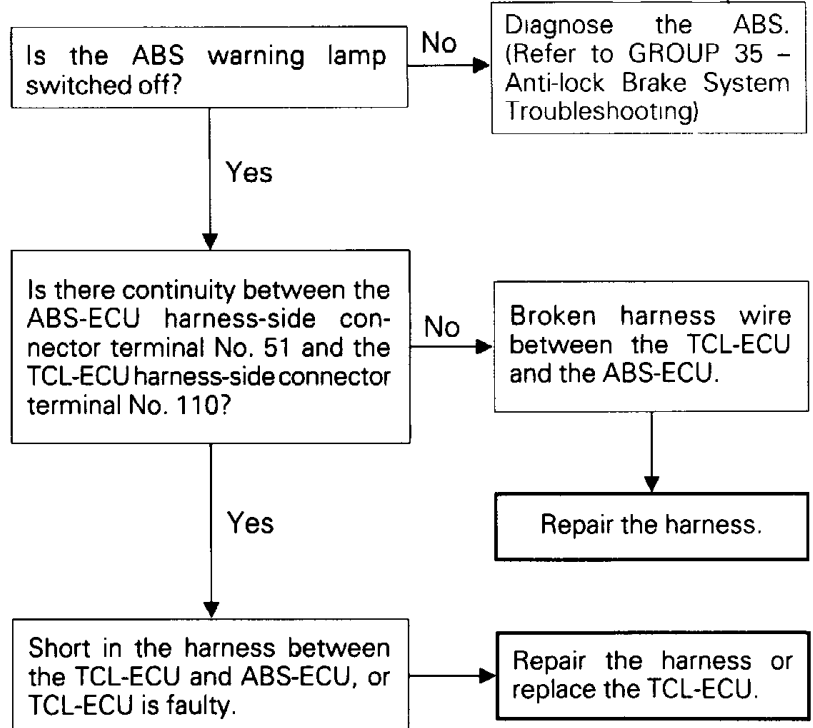
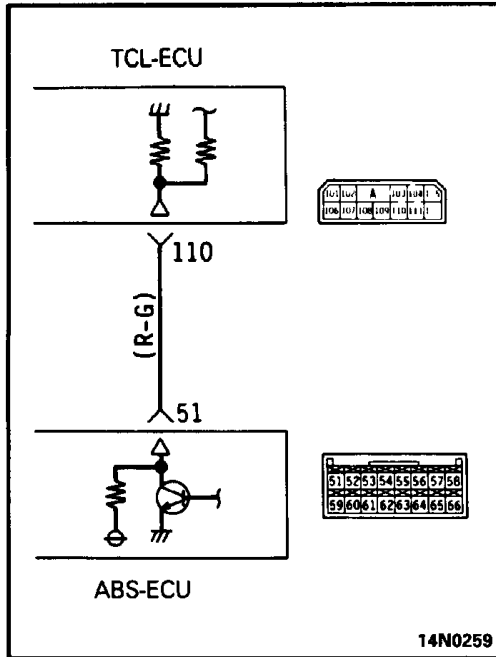


G-18 When diagnosis code No. 62 <A/T> or No. 76 <A/T> is displayed

Comment: This diagnosis code is displayed when the ignition key is "ON" and the TCL OFF indicator illuminates while the ABS-ECU is operating and the ABS warning lamp is illuminated.
If the condition returns to normal, this problem code will not be output.

Hint:

If the ABS warning lamp remains off after the engine is started, there is probably a broken harness wire or short between the ABS-ECU and the TCL-ECU.

**G-19 When diagnosis code No. 63 <A/T> or No. 67 <A/T> is displayed**

Comment: This problem code is displayed when the input signal for when ABS is operating (ABS 0 is the L signal), and the input signal for when ABS fails (ABS 1 is the L signal) are input by the TCL-ECU at the same time.
If the condition returns to normal, this problem code will not be output.

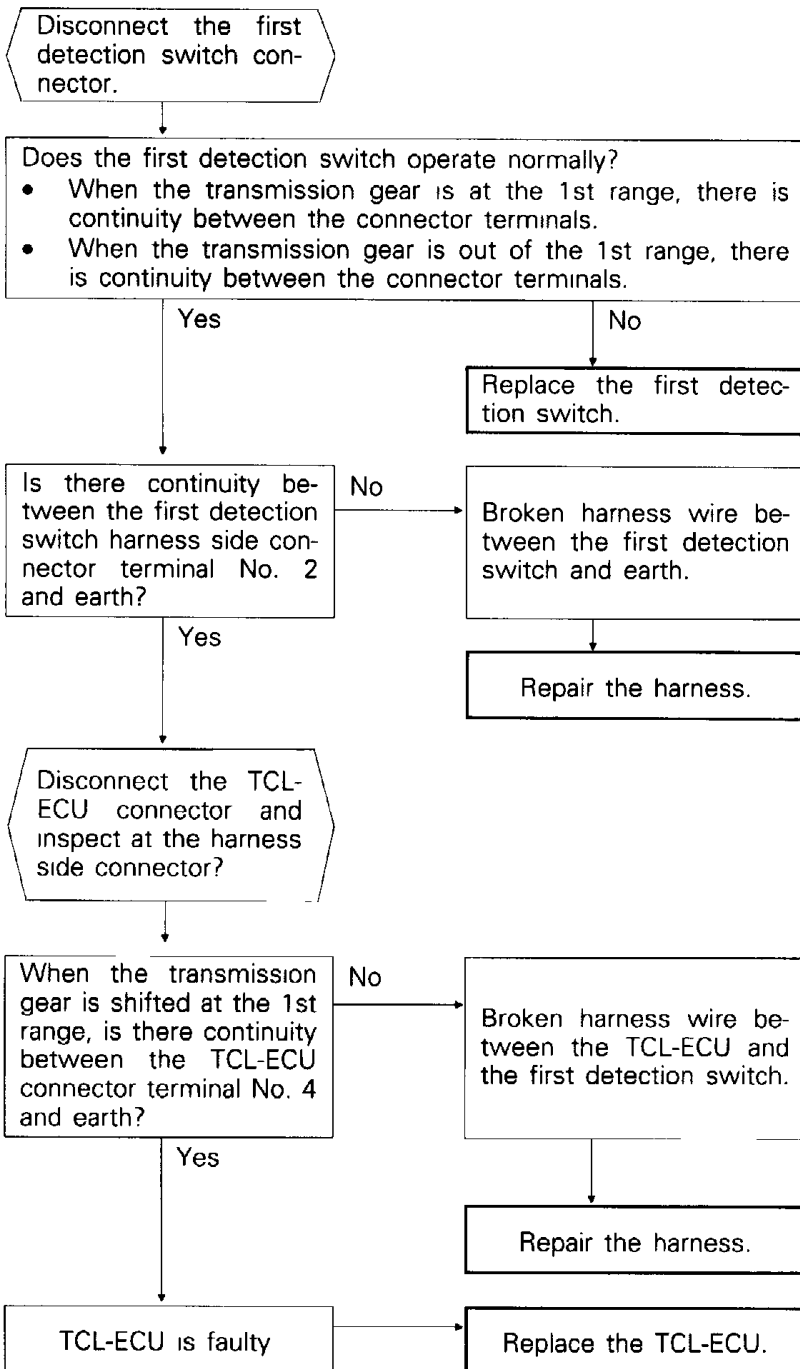
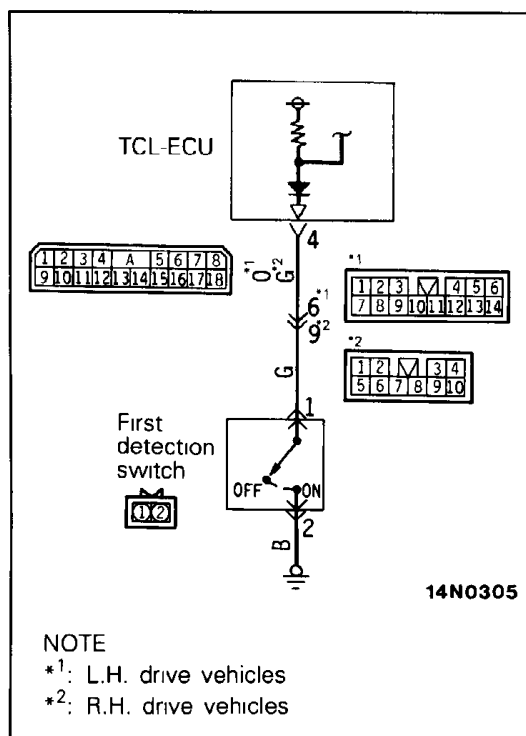
Remedy: Inspect according to troubleshooting for diagnosis code nos. 61 and 62 (nos. 76 and 77 for M/T).

G-20 When diagnosis code No. 54 is displayed <M/T>

Comment: The TCL-ECU detects the transmission gear positions from calculations based on the engine speed and front wheel speed.

Separately from this, when the gear position is 1st gear, an ON signal from the first detection switch is input to the TCL-ECU.

This malfunction code is output if a condition where the first detection switch is OFF for a continuous period of 60 seconds or more even though the calculation value displayed is that for 1st gear, the TCL-ECU judges that there is an open circuit in the first detection switch circuit.

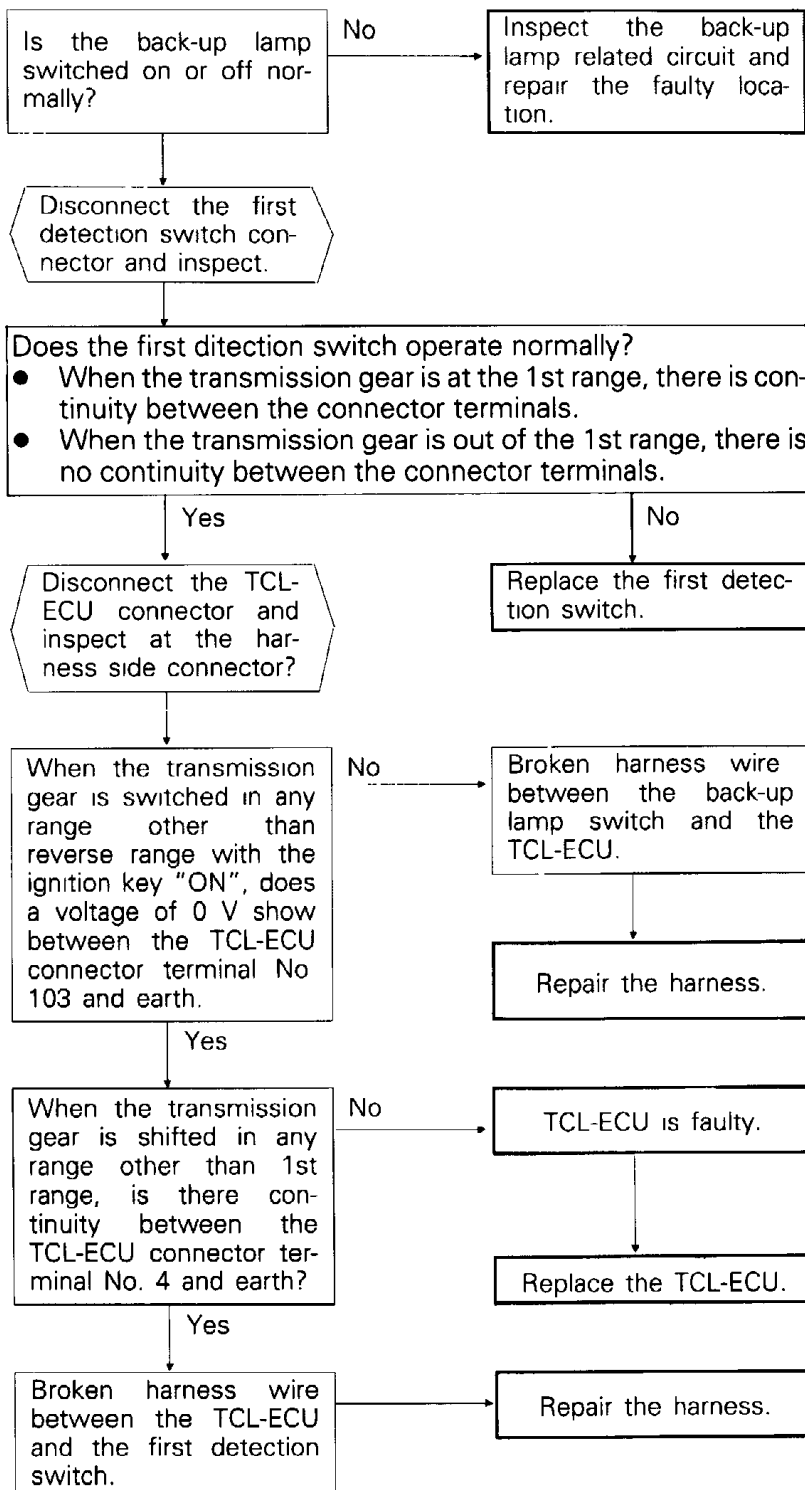
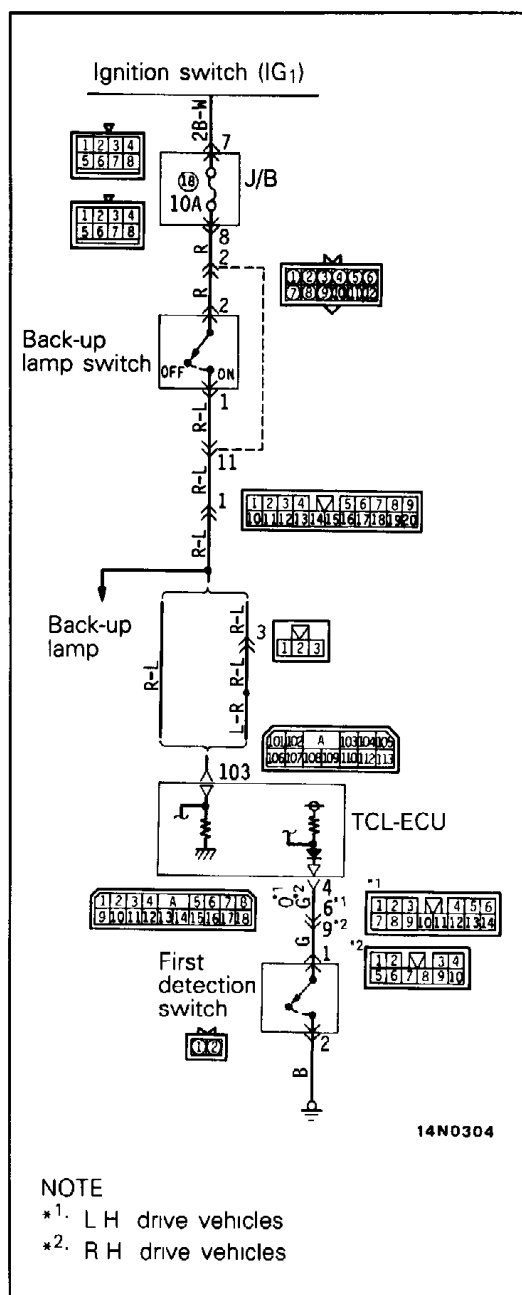


G-21 When diagnosis code No. 55 is displayed <M/T>

Comment: This malfunction code is output if the first detection switch which turns ON when the transmission gear is in 1st position and the back-up lamp switch which turns ON when the transmission gear is in the reverse position are

ON simultaneously.

If this malfunction code is output, the cause is probably an ON malfunction of the first detection switch or back-up lamp switch.



4. DIAGNOSIS FLOW CHART II

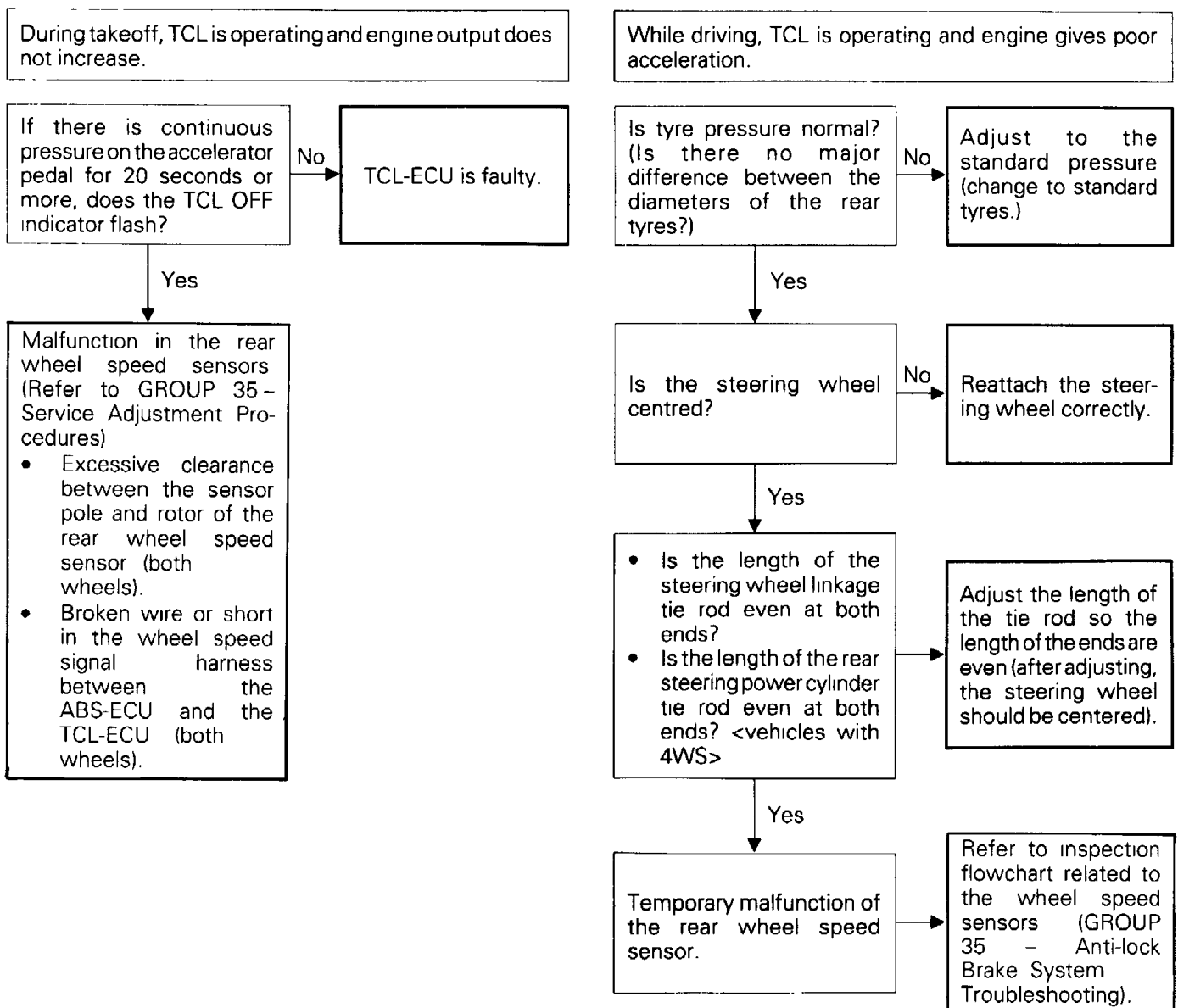
- 3. When driving in an area where TCL would not operate, the TCL indicator (green) illuminates and takeoff is impossible or engine gives poor acceleration.**
- 4. In an area where TCL should operate, it does not operate [TCL indicator (green) does not illuminate].**

Comment: The TCL control unit only detects the causes of nearly all of the above problems for a short time by its self diagnosis function, but the detection time for the following problems is long, so until the TCL OFF indicator starts flashing and a problem code is output, sometimes one

of the above problems can develop. Also, if there is a disagreement between the input value from the steering wheel sensor and the actual steering angle, the trace control will operate, even in areas where the TCL would not normally operate.

After checking if the problem reoccurs, inspect according to the following procedure.

- 3. When driving in an area where TCL would not operate, the TCL indicator (green) illuminates and takeoff is impossible or engine gives poor acceleration.**

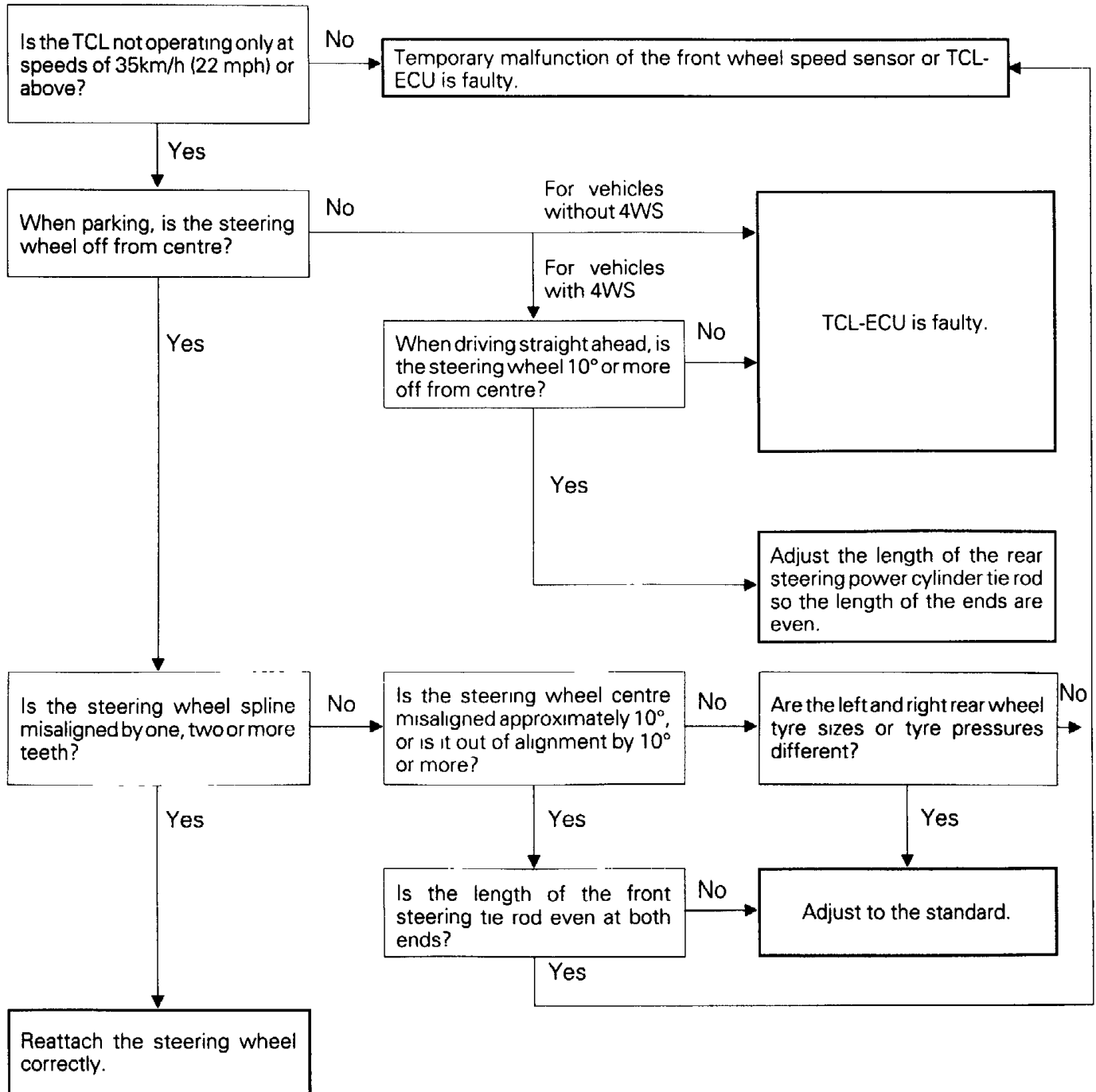


4. In an area where TCL should operate, it does not operate [TCL indicator (green) does not illuminate].

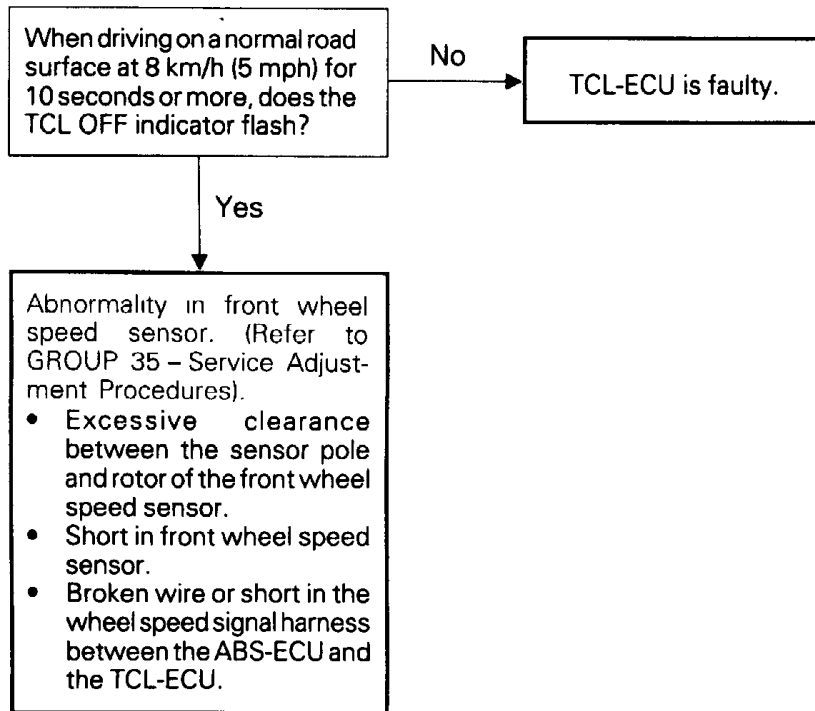
NOTE

This inspection flowchart is suitable for use if the ignition key is "ON" and the TCL OFF indicator illuminates, and then switches off after the engine is started.

When accelerating during turning on normal road surfaces and the TCL does not operate.



When taking off on a slippery road surface and TCL does not operate.



TROUBLESHOOTING

AUTO-CRUISE CONTROL SYSTEM

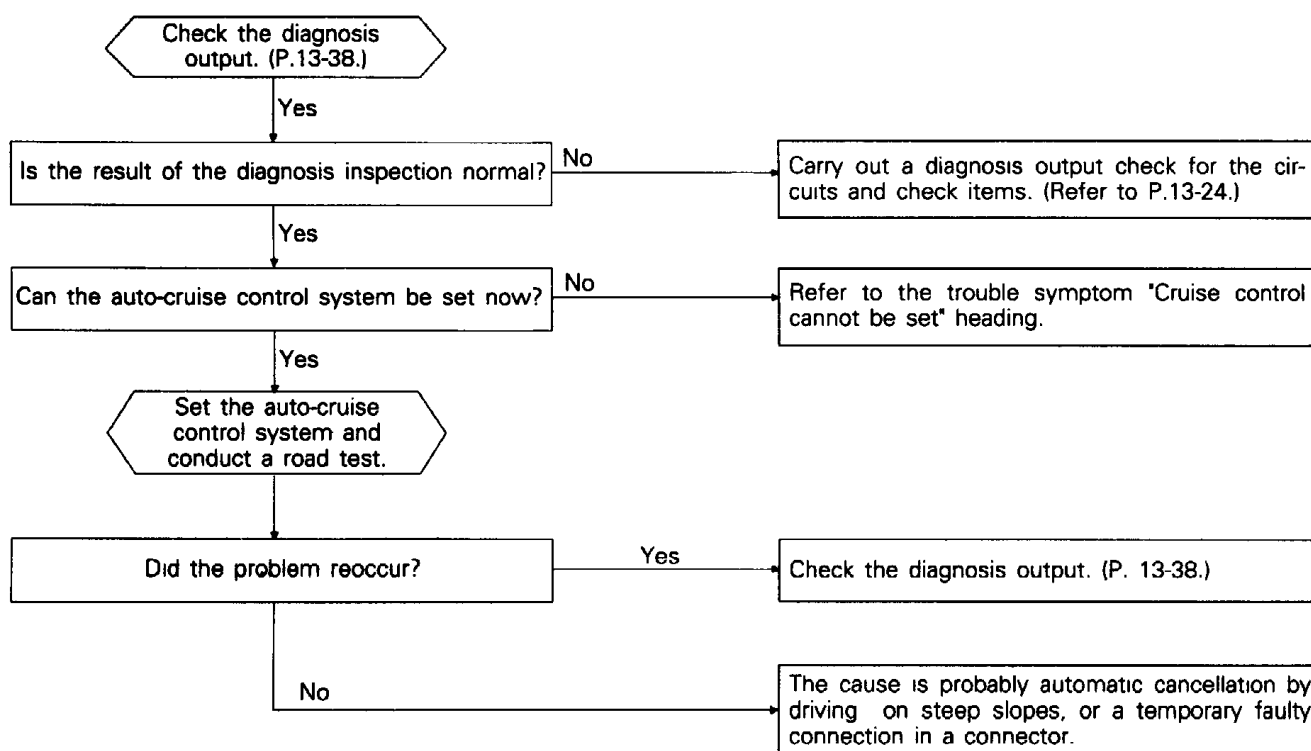
Before commencing troubleshooting, inspect each of the following sections, and if there is an abnormality, carry out a repair.

- (1) Check if the installation and connection routes of the cables and vacuum hoses of the auto-cruise vacuum pump assembly, actuator and link assembly are all normal.
- (2) Check if the link assembly and the movement of all cables are all working smoothly.
- (3) Check if there is no excessive play or tension in each cable.

TROUBLESHOOTING QUICK-REFERENCE CHART

Auto-cruise control system is canceled when cancellation not wanted.
Or, the auto-cruise control system cannot be set after an automatic cancellation.

ECU: Electronic control unit
(Auto-cruise control unit)



Auto-cruise control system cannot be set.

NOTE

This chart is to be used, then, for troubleshooting if it is not possible to use the self-diagnosis for checking.

Prepare to conduct input checking. (Refer to P.13-39.)

Are the results of all input checks normal?

Yes

No

Check results	Probable cause	Remedy	Reference page
Code 21 remains even though SET switch is set to OFF.	SET switch ON malfunction	Replace the control switch.	13-154
	SET switch input line short-circuit	Repair the harness.	13-25
Code 22 remains even though RESUME switch is set to OFF.	RESUME switch ON malfunction	Replace the control switch.	13-154
	RESUME switch input line short-circuit	Repair the harness.	13-26
Code 23 is not canceled even if the stop lamp switch is turned OFF by releasing the brake pedal.	Malfunction of stop lamp switch circuit.	Replace stop lamp switch or repair harness.	13-13 13-154
Code 25 does not disappear, and code 24 does not appear, even though vehicle speed reaches approximately 40 km/h (25 mph) or higher.	Malfunction of the vehicle speed sensor circuit (damaged or disconnected wiring, or short-circuit)	Check or repair the vehicle speed sensor circuit.	13-28
Code 26 is not canceled even if the clutch switch is turned OFF by releasing the clutch pedal. <M/T>	Malfunction of clutch switch circuit.	Replace clutch switch or repair harness.	13-32 13-154
Code 26 is not canceled even if the selector lever is moved to anything but N, P <A/T>	Malfunction of inhibitor switch circuit.	Replace inhibitor switch or repair harness.	13-33 13-155
Code 27 remains even when the CANCEL switch is set to OFF.	Malfunction of CANCEL switch circuit	Replace the control switch or repair the harness.	13-27 13-154
Code 28 remains even when the accelerator pedal is released.	Malfunction of throttle position sensor circuit or accelerator position sensor circuit.	Replace the sensor or repair the harness.	13-36 13-37
Code 29 remains even when idle switch is set to ON.	Malfunction of idle switch circuit.	Replace the switch or repair the harness.	13-36 13-37

Check the auto-cruise vacuum pump circuit. (Refer to P.13-29.)

NOTE

If the results of the check of the auto-cruise vacuum pump circuit (Refer to P.13-29.) and of the auto-cruise vacuum pump and/or actuator themselves (Refer to P.13-155) reveal no abnormal condition, replace the electronic control unit (ECU).

Trouble symptom	Probable cause	Check chart No.	Remedy
- The set vehicle speed varies greatly upward or downward. "Hunching" (repeated alternating acceleration and deceleration) occurs after setting is made.	Malfunction of the vehicle speed sensor circuit	No. 5	Repair the vehicle speed sensor system, or replace the part.
	Malfunction of the speedometer cable or speedometer drive gear		
	Auto-cruise vacuum pump circuit poor contact	No. 6	Repair auto-cruise vacuum pump assembly or replace the part.
	Malfunction of the ECU	—	Replace the ECU.
The auto-cruise control system is not canceled when the brake pedal is depressed.	Damaged or disconnected wiring of the stop lamp switch input circuit: brake switch (for auto-cruise control) malfunction (short-circuit)	No. 7-1	Repair the harness or replace the stop lamp switch.
	Auto-cruise vacuum pump drive circuit short-circuit	No. 6	Repair the harness or replace the auto-cruise vacuum pump.
	Malfunction of the ECU	—	Replace the ECU.
The auto-cruise control system is not canceled when the clutch pedal is depressed. <M/T> (vehicles with a manual transmission) (It is canceled, however, when the brake pedal is depressed.)	Damaged or disconnected wiring of clutch switch input circuit	No. 7-2	Repair the harness, or repair or replace the clutch switch.
	Clutch switch improper installation (won't switch ON)		
	Malfunction of the ECU	—	Replace the ECU.

NOTE

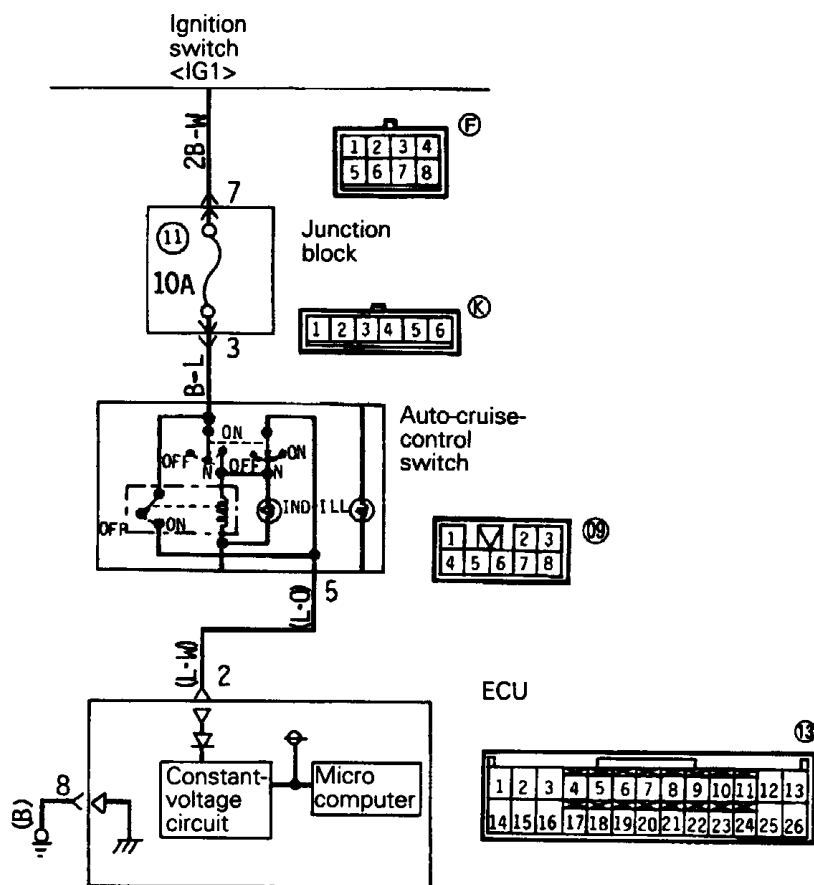
ECU: Electronic control unit

Trouble symptom	Probable cause	Check chart No.	Remedy
The auto-cruise control system is not canceled when the selector lever is moved to the "N" position. <AT> (Vehicles with an automatic transmission) (It is canceled, however, when the brake pedal is depressed.)	Damaged or disconnected wiring of inhibitor switch input circuit	No. 7-3	Repair the harness, or repair or replace the clutch switch.
	Improper adjustment of inhibitor switch		
	Malfunction of the ECU	—	Replace the ECU.
Cannot decelerate by using the SET switch	Temporary damaged or disconnected wiring of SET switch input circuit	No. 2	Repair the harness or replace the auto-cruise control switch.
	Auto-cruise vacuum pump circuit poor contact	No. 6	Repair the harness or replace the auto-cruise vacuum pump.
	Malfunction of the vacuum pump assembly (including air leaks from negative pressure passage)		
	Malfunction of the ECU	—	Replace the ECU.
Cannot accelerate or resume speed by using the RESUME switch.	Damaged or disconnected wiring, or short-circuit, of RESUME switch input circuit	No. 3	Repair the harness or replace the auto-cruise control switch.
	Auto-cruise vacuum pump circuit poor contact	No. 6	Repair the harness or replace the auto-cruise vacuum pump.
	Malfunction of the vacuum pump assembly (including air leaks from negative pressure passage)		
	Malfunction of the ECU	—	Replace the ECU.
Cruise control does not cancel even when the CANCEL switch is set to ON. (However, it is cancelled when the brake pedal is depressed.)	Broken wire in the CANCEL switch circuit inside the control switch	No. 4	Repair the harness or replace the auto-cruise control switch.
	Malfunction of the ECU	—	Replace the ECU.

Trouble symptom	Probable cause	Check chart No.	Remedy
Auto-cruise control system can be set while traveling at a vehicle speed of less than 40 km/h (25 mph), or there is no automatic cancellation at that speed.	Malfunction of the vehicle-speed sensor circuit	No. 5	Repair the vehicle-speed sensor system, or replace the part.
	Malfunction of the speedometer cable or the speedometer drive gear		
	Malfunction of the ECU	—	Replace the ECU.
The indicator lamp of the main switch does not illuminate. (But auto-cruise control system is normal.)	Damaged or disconnected bulb of indicator lamp Malfunction of the main switch	—	Repair the harness or replace the main switch.
	Harness damaged or disconnected		
Malfunction of control function by ON/OFF switching of ELC 4 A/T accelerator switch (Vehicles with A/T) (Non-operation of damper clutch, 2nd gear hold, etc.)	Malfunction of circuit related to accelerator switch OFF function	No. 8	Repair the harness or replace the part.
	Malfunction of the ECU		Replace the ECU.
Overdrive is not canceled during fixed speed driving. (Vehicles with A/T)	Malfunction of circuit related to overdrive cancelation, or malfunction of ECU	No. 9	Repair the harness or replace the part.
No shift to overdrive during manual driving. (Vehicles with A/T)			

CHECK CHART

1. CHECKING THE CONTROL UNIT POWER SUPPLY CIRCUIT



NOTE

- (1) The alphanumeric characters on the side of the connector correspond to those on P.13-41.
 (2) ECU: Electronic control unit (Auto-cruise control unit)

03N0094

Description of operation

When the auto-cruise-control main switch is switched ON while the ignition switch is ON, current flows to the ignition switch (IG1), to fuse No. 11 of the junction block, and to the auto-

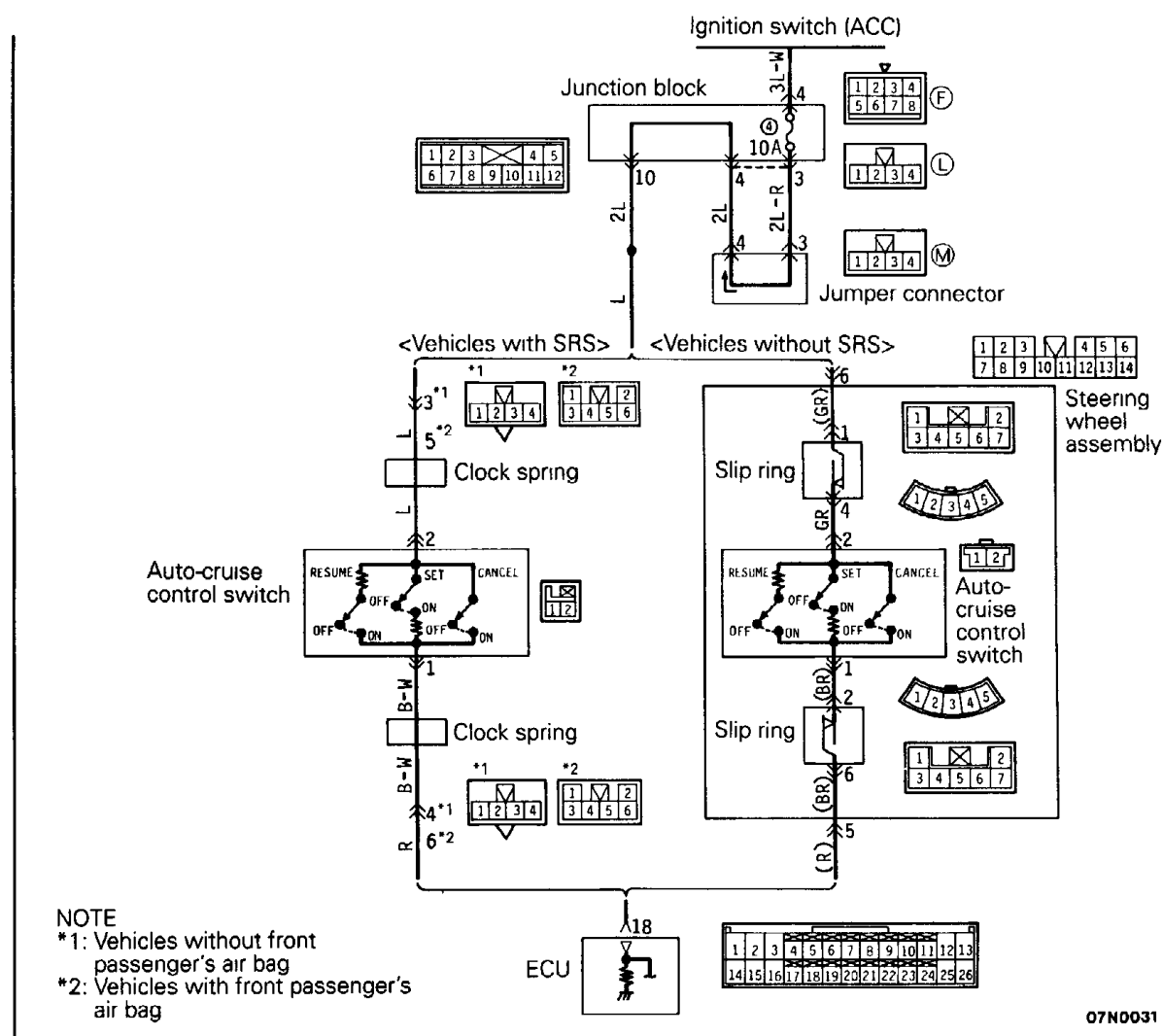
cruise-control main switch, the control unit, and to earth. When the ignition switch is turned off, the cruise control switch is also turned off.

Troubleshooting hint

ECU terminal voltage

Terminal No.	Signal	Conditions	Terminal voltage
2	Control unit power supply	When the auto-cruise-control switch ("MAIN") is switched ON	System voltage
8	Control unit earth	At all times	0V

2. CHECKING THE SET SWITCH CIRCUIT



Description of operation

When the SET switch is switched ON (at the vehicle speed desired to be maintained, and with the main switch of the cruise-control switches ON) that vehicle speed is maintained as a constant speed.

Furthermore, the constant speed is gradually reduced (the "coasting" feature) when the SET switch is switched ON and held while the vehicle is traveling at the previously set constant speed,

and, when the SET switch is switched OFF, the vehicle then maintains that newly set constant speed (the speed at which the SET switch was switched OFF).

Current flows to the junction block fuse No. (4) and to the engine compartment jumper connector. It then returns to the junction block and flows to the auto-cruise control switch (SET switch) and to the auto-cruise control unit.

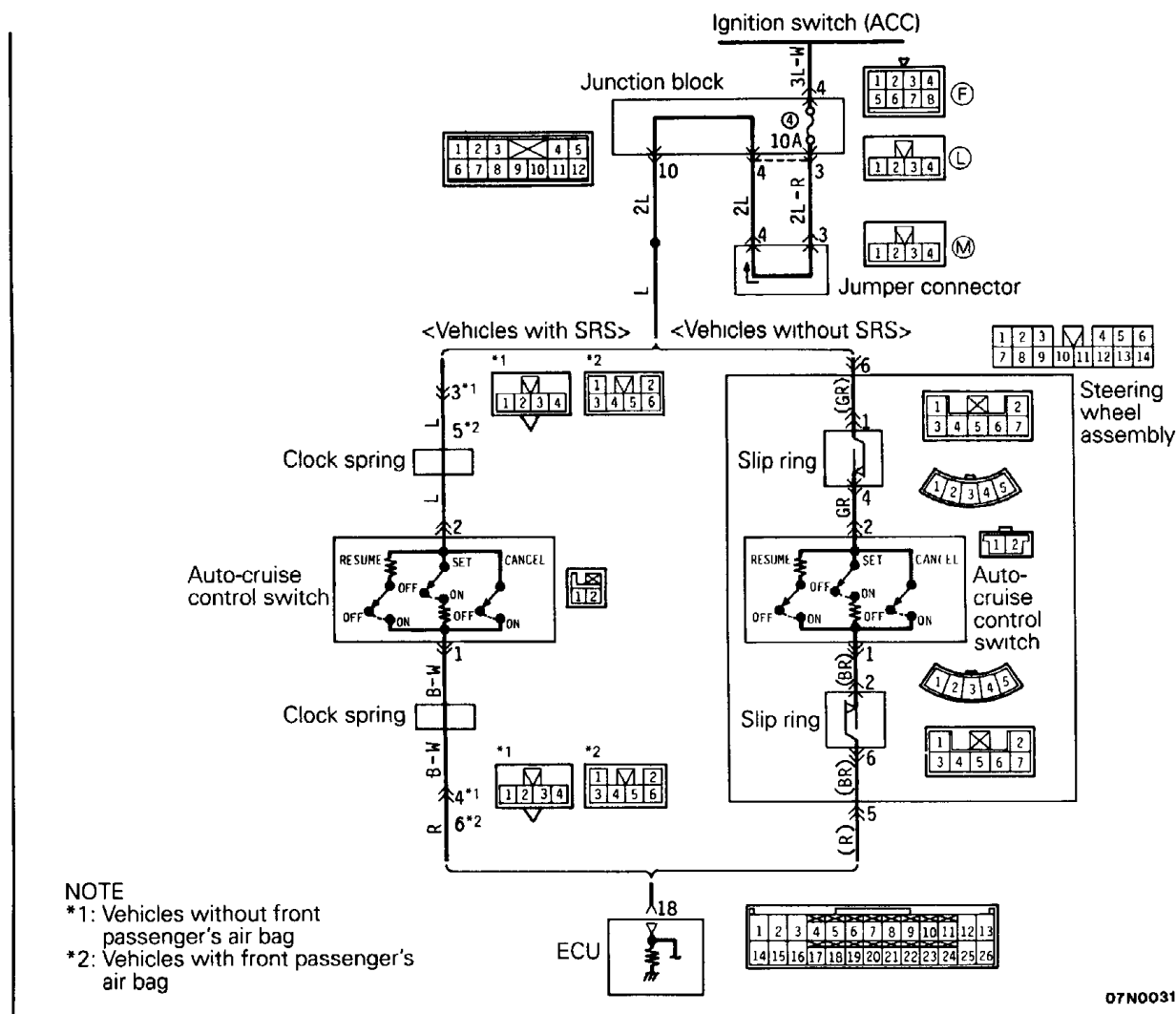
Troubleshooting hint

Diagnosis – No. 15 (automatically cancelled)

ECU terminal voltage

Terminal No.	Signal	Conditions	Terminal voltage
18	SET switch	When the SET switch is switched ON	3V
		When the SET switch is switched OFF	0V

3. CHECKING THE RESUME SWITCH CIRCUIT

**Description of operation**

The set speed (before cancellation) resumes when the RESUME switch is switched ON, even if the constant-speed control has been cancelled. That speed will not resume, however, even if the "RESUME" switch is switched ON, if the auto-cruise main switch is switched OFF and if the vehicle speed decreases to 40 km/h (25 mph) or lower.

In addition when the RESUME is switched ON and held while the vehicle is traveling at a con-

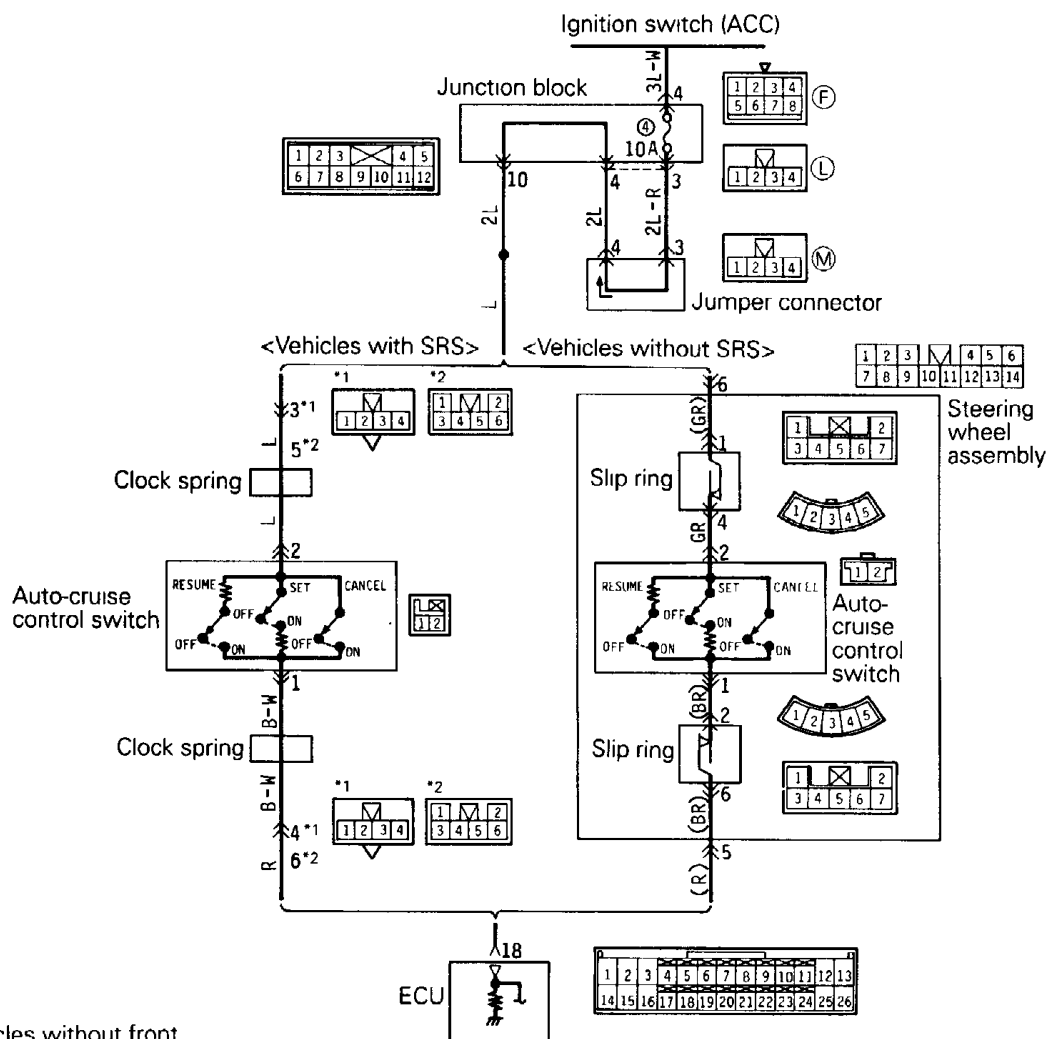
stant speed the vehicle speed will increase the speed at which the switch is subsequently switched OFF will become the newly set constant speed.

Current flows to the junction block fuse no. (4) and to the engine compartment jumper connector. It then returns to the junction block and flows to the auto-cruise control switch (RESUME switch) and to the auto-cruise control unit.

Troubleshooting hint**Diagnosis – No. 5 (automatically cancelled)****ECU terminal voltage**

Terminal No.	Signal	Conditions	Terminal voltage
18	RESUME switch	When the RESUME switch is switched ON	6V
		When the RESUME switch is switched OFF	0V

4. CHECKING THE CANCEL SWITCH CIRCUIT



Description of operation

By turning the CANCEL switch to ON during cruise control, the cancel signal is sent to the auto-cruise control unit. Power to the auto-cruise vacuum pump assembly inside the control unit is stopped, and cruise control is cancelled. Current

flows to the junction block fuse No. (4) and to the engine compartment jumper connector. It then returns to the junction block and flows to the auto-cruise control switch (CANCEL switch) and to the auto-cruise control unit.

Troubleshooting hint

Diagnosis – No. 15 (automatically cancelled)

ECU terminal voltage

Terminal No.	Signal	Conditions	Terminal voltage
18	CANCEL switch	When the CANCEL switch is switched ON	System voltage
		When the CANCEL switch is switched OFF	0V

Vehicle-speed detection circuit

ECU

5V

19 (Y-W)

9 (Y-W)

Reed switch

Combination meter

13 B

16

Junction block

4

2B

13

08

D

H

03N0096

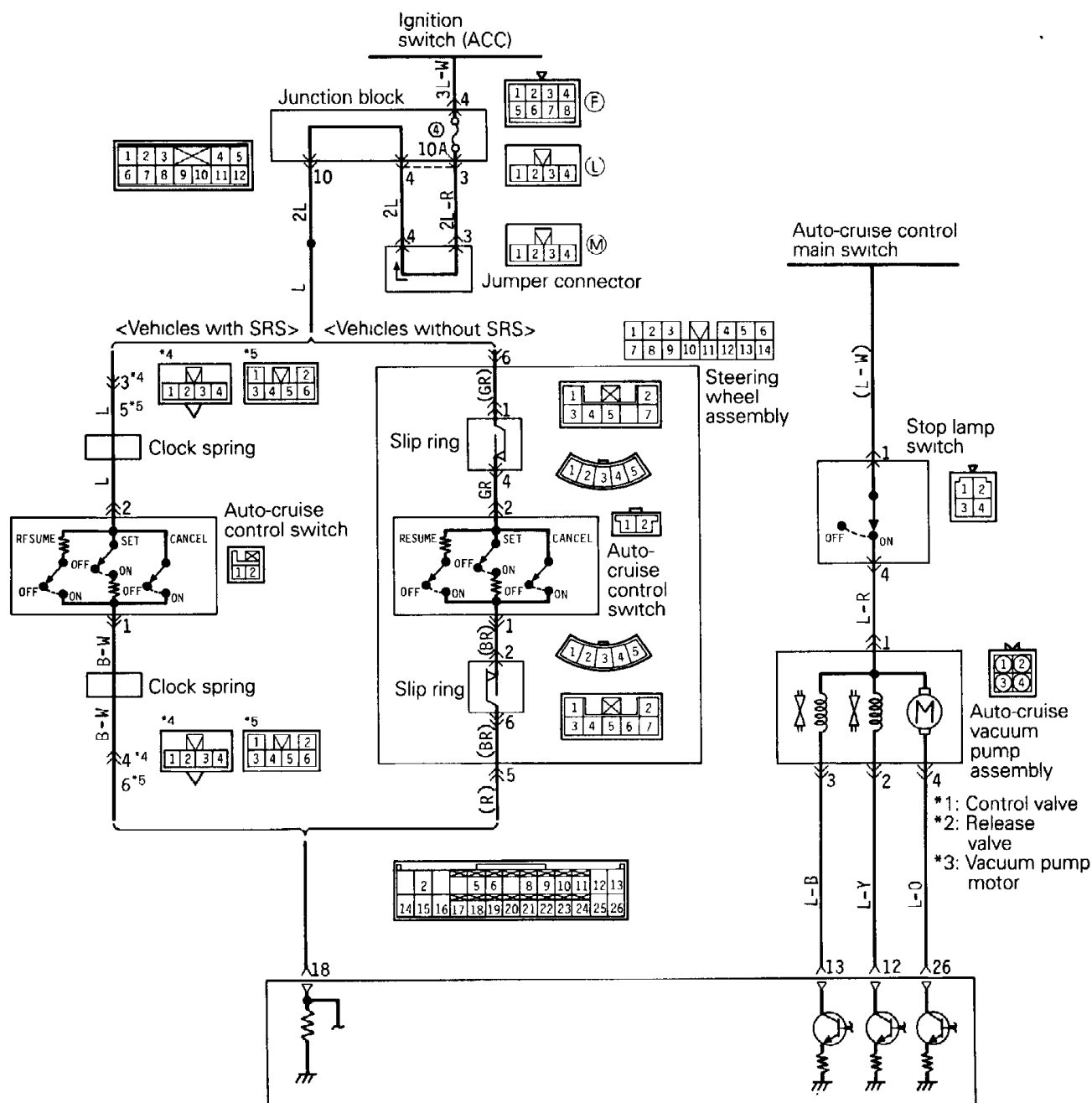
The vehicle-speed sensor is installed within the speedometer; it sends to the control unit pulse signals that are proportional to the rotation speed (i.e., the vehicle speed) of the transmission's out-

This vehicle-speed sensor is the reed switch type of sensor; it generates four pulse signals for each rotation of the speedometer's driven gear.

ECU terminal voltage

Terminal No.	Signal	Conditions	Terminal voltage
19	Vehicle-speed sensor	Move the select lever to the range "D" or "1" and slowly start driving.	0V-0.6V ← Flashing → 2V or higher

6. CHECKING THE AUTO-CRUISE VACUUM PUMP CIRCUIT



07N0032

Description of operation**Hold Mode**

If the SET switch is turned ON when the main switch is turned to ON and the vehicle speed is 40 km/h (25 mph) or higher, the control unit receives a set signal, and current to the electric vacuum pump is stopped, and current flows to the control and release valve solenoid coils, closing both valves together. After the constant speed is reached, the motor and control valve and release valve are repeatedly turned ON and OFF according to driving conditions.

Acceleration Mode

When the RESUME switch is switched ON, the control unit receives a RESUME signal and it not only turns the auto-cruise vacuum pump motor

ON but also turns the control valve and release valve ON (valve is closed).

Deceleration Mode

When the SET switch is switched ON, the control unit receives a set signal and it not only turns the auto-cruise vacuum pump motor control valve OFF (valve is opened) but also turns the release valve ON (valve is closed).

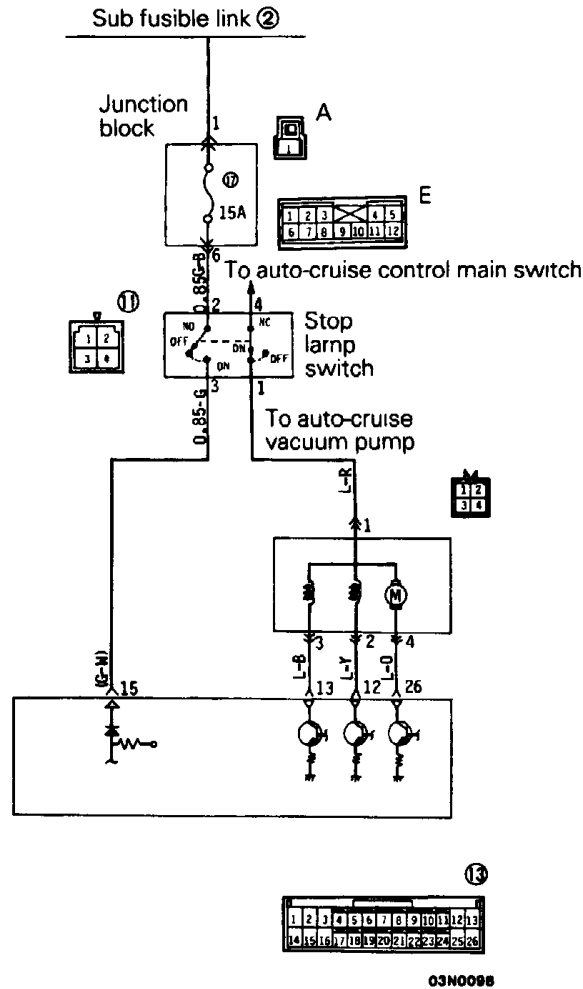
Release Mode

When the CANCEL switch is switched ON, the control unit receives a cancel signal and it not only turns the auto-cruise vacuum pump motor OFF but also turns the control valve and release valve OFF (valve is opened).

Troubleshooting hint**Diagnosis – No. 11 (automatically cancelled)****ECU terminal voltage**

Terminal No.	Signal	Mode/Terminal voltage (V)			
		Hold	Acceleration	Deceleration	Release
26	Auto-cruise vacuum pump drive	System voltage	0	System voltage	System voltage
13	Control valve open/close	0	0	System voltage	System voltage
12	Release valve open/close	0	0	0	System voltage

7-1. CHECKING THE STOP LAMP SWITCH CIRCUIT



Description of operation

When the brake pedal is depressed during constant-speed travel, the stop lamp switch's (NC) contacts for the cruise-control system open, with the result that the current to the auto-cruise vacuum pump is interrupted, thus cancelling the constant-speed travel.

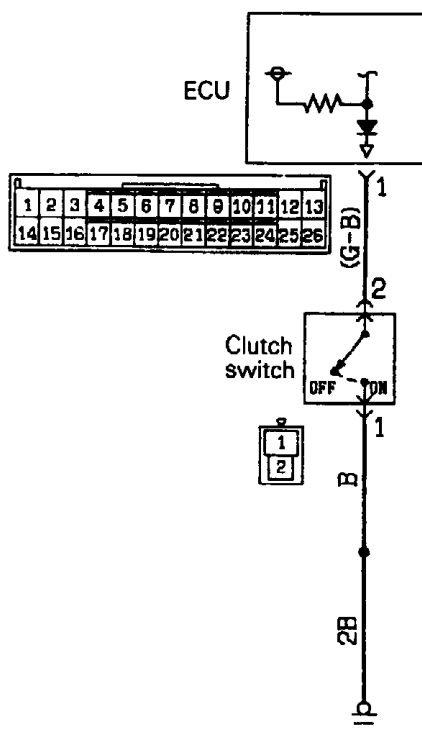
At the same time, moreover, the closing of the (NO) contacts for the stop lamp results in the sending of the cancel signal to the control unit, so that the auto-cruise vacuum pump current is discontinued within the control unit, thereby canceling the constant-speed travel.

Troubleshooting hint

ECU terminal voltage

Terminal No.	Signal	Conditions	Terminal voltage
15	Stop lamp switch	When the brake pedal is depressed	System voltage
		When the brake pedal is not depressed	0V

7-2. CHECKING THE CLUTCH SWITCH CIRCUIT <M/T models>



KX33-AK-R1307A

Description of operation

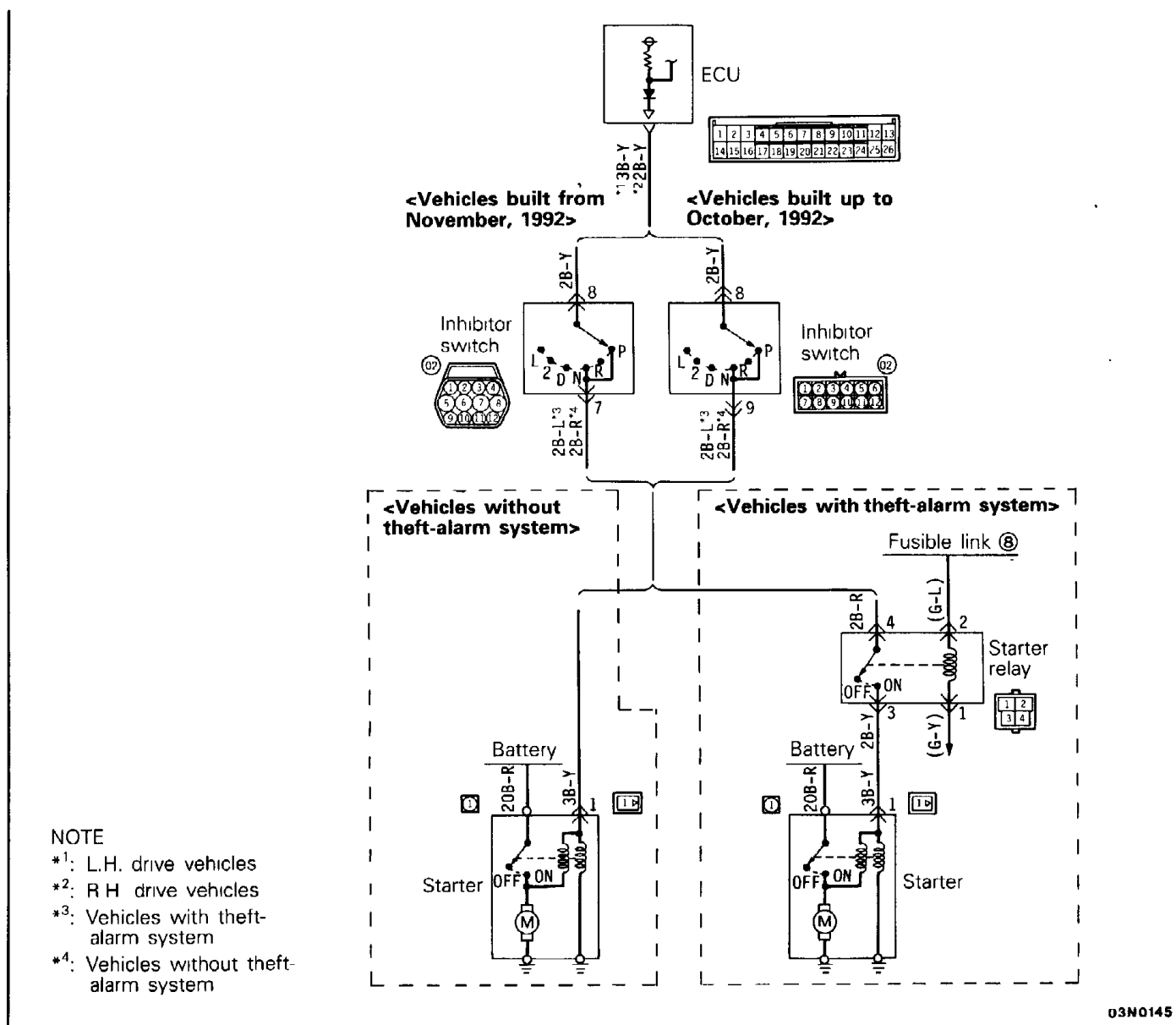
If the clutch pedal is pressed when driving at a constant speed, the clutch switch is turned ON and a cancel signal is input to the control unit.

This causes the vacuum pump assembly drive circuit inside the control unit to be isolated, and cruise control is cancelled.

Troubleshooting hint**ECU terminal voltage**

Terminal No.	Signal	Conditions	Terminal voltage
1	Clutch switch	When the clutch pedal is depressed	0V
		When the clutch pedal is not depressed	5V

7-3. CHECKING THE INHIBITOR SWITCH CIRCUIT <A/T models>

**Description of operation**

The inhibitor switch also functions as the switch for the starter.

If the selector lever is moved to the "N" position during constant-speed travel, current flows to the

control unit, inhibitor switch, starter motor, and to earth; the cancel signal is therefore input to the control unit, thus canceling the constant-speed travel.

Troubleshooting hint**ECU terminal voltage**

Terminal No.	Signal	Conditions	Terminal voltage
1	Inhibitor switch	Neutral	0V

<A/T models built up to October, 1991> Ignition

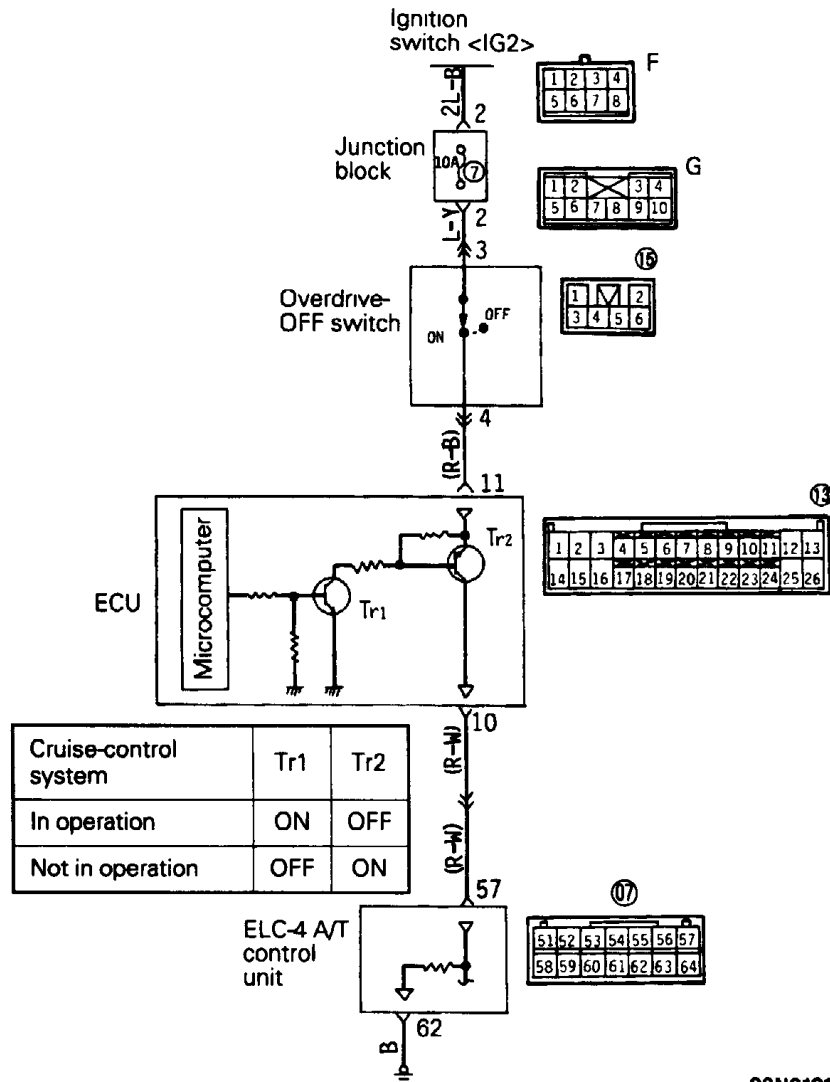


Because the status of the accelerator pedal during constant-speed driving is non-operational, the earth circuit (transistor Tr2) of the accelerator switch is switched OFF only during constant-speed driving.

ECU terminal voltage

REVISÉ

9. CHECKING THE CIRCUIT RELATED TO THE OVERDRIVE-CANCELLATION FUNCTION <A/T models>



03N0101

Description of operation

This is a function that cancels the overdrive function for a certain fixed period of time, if during constant-speed travel in overdrive, the actual vehicle speed decreases to less than the vehicle speed retained in the memory, and then after a short time causes the vehicle speed to return to the vehicle speed retained in the memory. The overdrive function is cancelled in the following cases.

- (1) When resume switch is ON.
- (2) When actual vehicle speed drops 7 km/h

(4mph) or more below the set vehicle speed during cruise control.

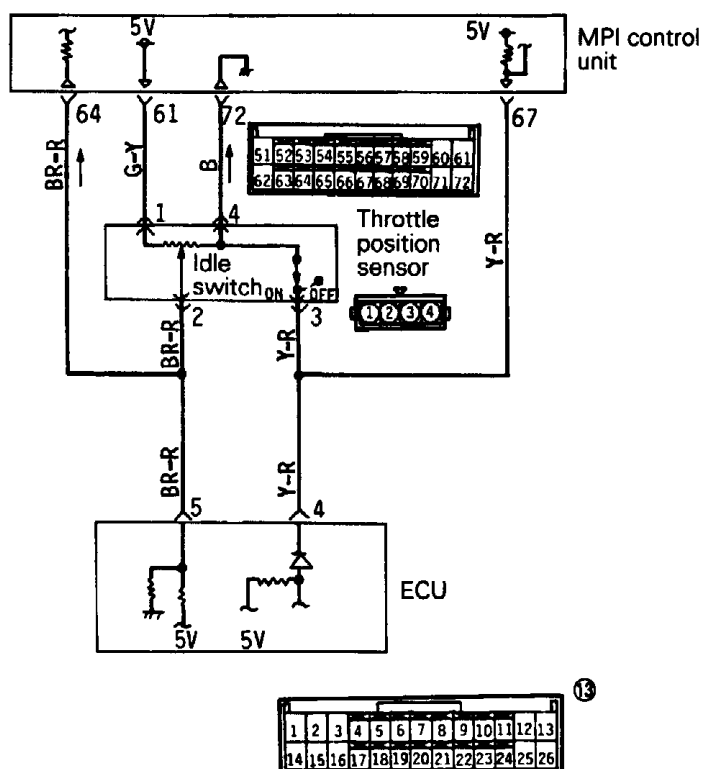
Under the conditions described above, the overdrive ON signals output from the microcomputer (within the cruise control unit) are no longer output, and transistor Tr1 is switched OFF. As a result, transistor Tr2 is also switched OFF, causing the current passing through the overdrive-OFF switch of the selector lever to be interrupted at transistor Tr2, with the result that the drive is controlled at 3rd gear.

Troubleshooting hint

ECU terminal voltage

Terminal No.	Signal	Conditions	Terminal voltage
10	ELC-4 A/T control unit	When the overdrive-OFF Switch is switched ON	System voltage
11	Overdrive-OFF switch	When the overdrive-OFF switch is switched ON	System voltage

10. CHECKING THE THROTTLE POSITION SENSOR AND IDLE SWITCH CIRCUIT <VEHICLES WITHOUT TCL>



03N0102

Description of operation

The throttle position sensor (TPS) converts the opening degree of the throttle valve to a voltage value, and inputs this to the control unit. The control unit compares this signal to the vehicle speed signal, and changes the amount of the ac-

tuator operation. The idle switch standardizes the TPS voltage value when the switch turns from ON to OFF and corrects the movement and distribution of the TPS voltage.

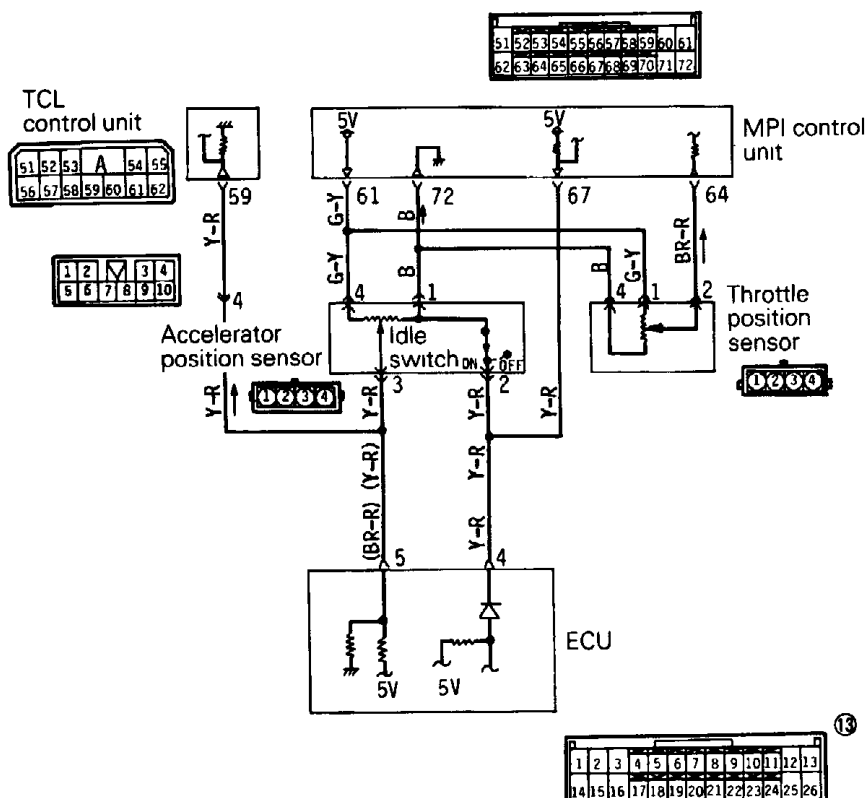
Troubleshooting hint

Diagnosis – No. 17 (automatically cancelled)

ECU terminal voltage

Terminal No.	Signal	Conditions	Terminal voltage
4	Idle switch	When accelerator pedal is pressed	4.5V–5.5V
		When accelerator pedal is released	0V
5	Throttle position sensor	When accelerator pedal is pressed all the way down	4.0V–5.5V
		When accelerator pedal is released	0.5V–0.7V

11. CHECKING THE ACCELERATOR POSITION SENSOR AND IDLE SWITCH CIRCUIT <VEHICLES WITH TCL>



03N0103

Description of operation

The accelerator position sensor converts the opening degree of the throttle valve (equivalent to the amount of the accelerator pedal depression), to a voltage value and inputs this to the control unit. The control unit compares this signal to the vehicle speed signal, and changes the

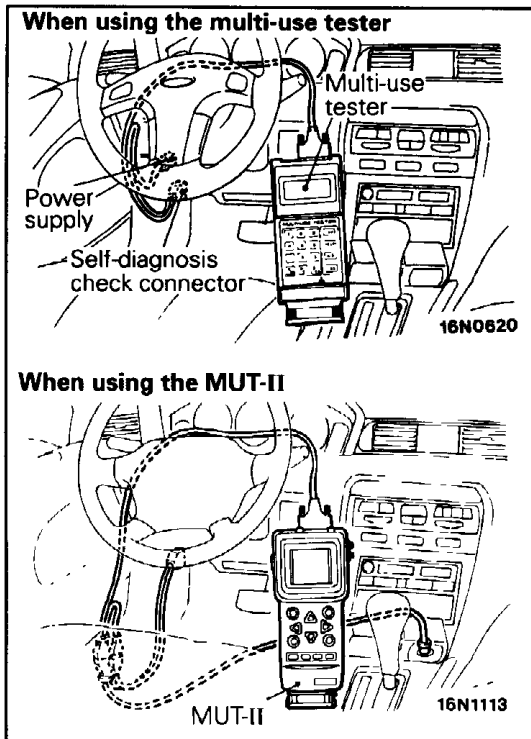
amount of the actuator operation. (Furthermore, the traction control unit performs traction control based on this signal.) The idle switch standardizes the TPS voltage value when the switch turns from ON to OFF and corrects the movement and distribution of the TPS voltage.

Troubleshooting hint

Diagnosis – No. 17 (automatically cancelled)

ECU terminal voltage

Terminal No.	Signal	Conditions	Terminal voltage
4	Idle switch	When accelerator pedal is pressed	4.5V–5.5V
		When accelerator pedal is released	0V
5	Accelerator position sensor	When accelerator pedal is pressed all the way down	4.0V–5.5V
		When accelerator pedal is released	0.5V–0.7V



SELF-DIAGNOSIS CHECKING

Self-diagnosis checking is performed when there has been an automatic cancellation, without cancel switch operation.

- (1) Connect the diagnosis check connector from the junction box to a multi-use tester <Up to 1993 models> or MUT-II <All models>.

Caution

The ignition switch should always be turned OFF when connecting and disconnecting the multi-use tester or MUT-II.

- (2) The cause of the cancellation can be determined in each system by comparing the output code read with those in the following table.
- (3) When a diagnosis code no. is displayed, inspect by referring to the relevant inspection chart no. for each respective code.

NOTE

All diagnosis codes are stored so that it is possible to check if a problem occurred in the past or not until disconnecting the battery terminals, even when the ignition key is turned to OFF.

Also, the diagnosis codes can be erased by the following procedure.

- (1) Turn on ignition switch.
- (2) Turn on main switch with SET switch "ON" and then turn on RESUME switch within one second.
- (3) Turn on SET switch and stop lamp switch simultaneously and keep this condition for more than 5 seconds.
- (4) Turn the main switch OFF and then turn the switch ON, and inspect the self-diagnosis code to check if a normal code is output or not.

DIAGNOSIS DISPLAY PATTERNS AND CODES

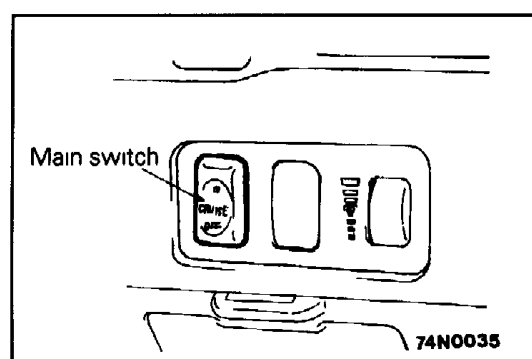
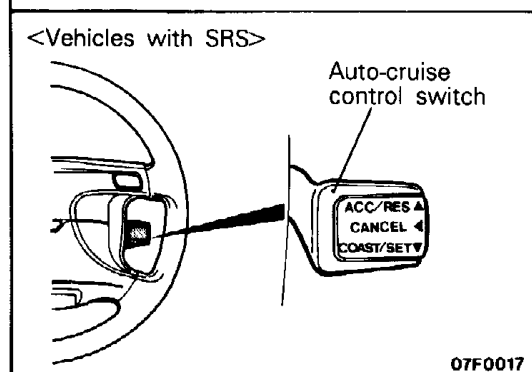
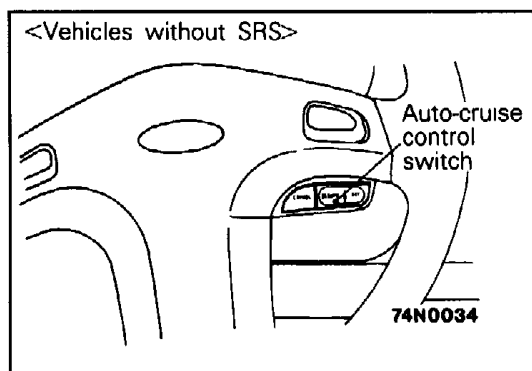
Code No.	Probable cause	Check chart No.
11	Abnormal condition of auto-cruise vacuum pump drive system	No. 6
12	Abnormal condition of vehicle-speed signal system	No. 5
15	Control switch malfunction (when SET and RESUME switches switched ON simultaneously for 60 seconds or more)	No. 2, 3
16	Abnormal condition of ECU	—
17	Abnormal condition of throttle position sensor or accelerator position sensor Abnormal condition of idle switch	No. 10, 11

NOTE

- (1) These codes are displayed when the main switch is ON and the vehicle is not moving at constant speed.

- (2) Diagnosis codes are displayed when, after cancellation of the auto-cruise control system, the vehicle speed decreases to less than approximately 20 km/h (12 mph), and erased by battery "OFF" or erasure of diagnosis codes. (Refer to P.13-38.)

After the diagnosis codes in the memory are erased, if (when the power supply of the electronic control unit is switched ON once again) the power supply of the electronic control unit is normal, the diagnosis output code will be displayed, regardless of whether the system condition is normal or not.



INPUT CHECKING

Input checks should be made when the auto-cruise control system cannot be set and when it is necessary to check (when a malfunction related to the auto-cruise control system occurs) whether or not the input signals are normal.

NOTE

- (1) Input checking can be done during regular operation, and the terminal is the self-diagnosis terminal.
- (2) Display codes are displayed only if the circuit is normal according to the conditions shown in the table on the next page.

Check according to the following procedure.

- (1) Connect the diagnosis check connector from the junction box to a multi-use tester <Up to 1993 models> or MUT-II <All models>.

- (2) Generating the codes

- ① Turn the ignition switch to ON.
- ② With the SET switch ON, switch ON the main switch, and then, within one second, switch ON the RESUME switch.

- (3) Reading the codes

- ① Carry out each input operation as shown in the input check table (refer to P.13-40), and read the codes.

NOTE

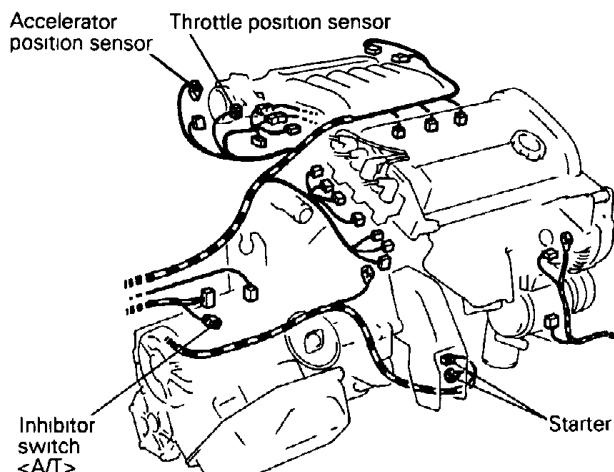
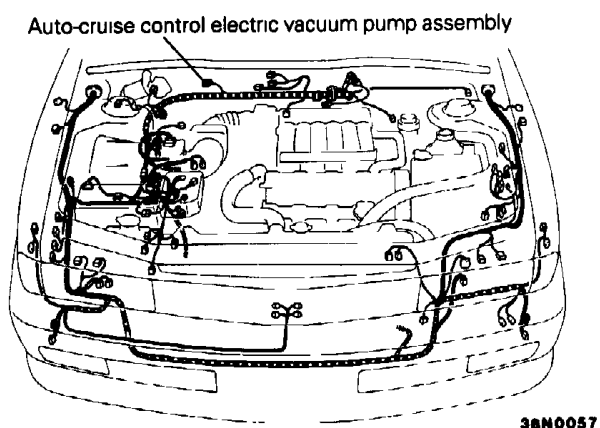
- (1) When two or more input operations are conducted at the same time, each code will be output in order, starting from the smallest code number.
- (2) Each code is displayed in order priority from code 21. If nothing is displayed, the control unit power circuit or the SET or RESUME switches are probably faulty, so check inspection charts 1, 2 and 3.

INPUT CHECK TABLE

Code No.	Input operation	Check results
21	SET switch ON	SET switch circuit normal
22	RESUME switch ON	RESUME switch circuit normal
23	Stop lamp switch (brake pedal depressed)	Stop lamp switch circuit normal
24	Driving at approximately to 40 km/h (25 mph) or higher	When both No. 24 and No. 25 can be confirmed, vehicle-speed sensor circuit normal.
25	Driving at less than approximately 40 km/h (25 mph) or stopped	
26	1. Clutch switch ON (clutch pedal depressed) <M/T> 2. Inhibitor switch ON (selector lever to "N" or "P" range) <A/T>	Inhibitor switch or clutch switch circuit normal
27	CANCEL switch ON	CANCEL switch circuit normal
28	Throttle position sensor (when the accelerator pedal is pressed more than half way)	Throttle position sensor circuit normal
29	Idle switch OFF (accelerator pedal depressed)	Idle switch circuit normal

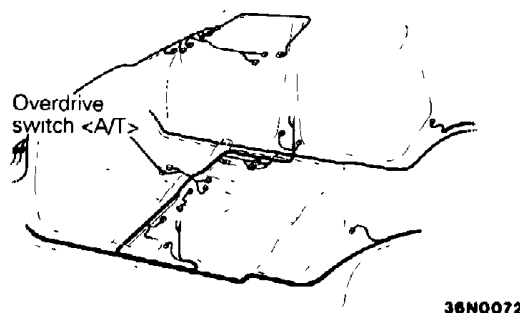
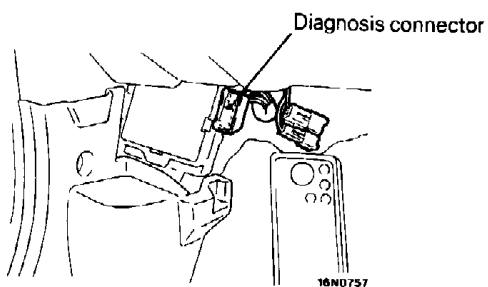
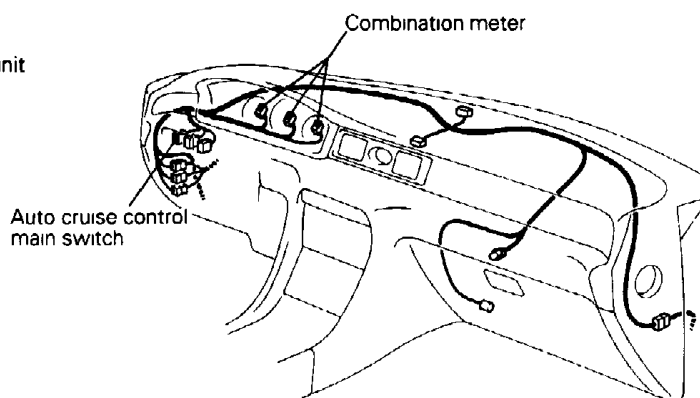
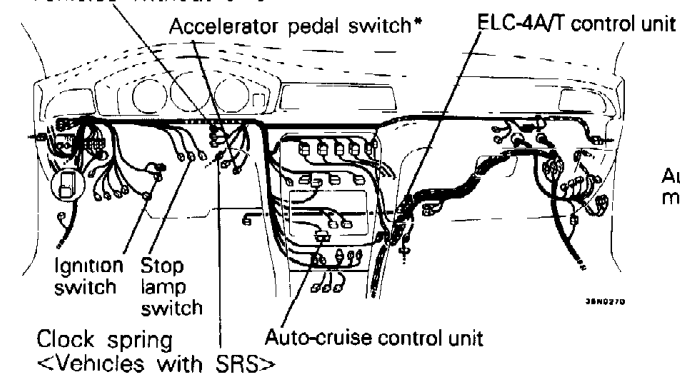
Harness and component placement diagram

<Engine room>



<Inside passenger compartment>

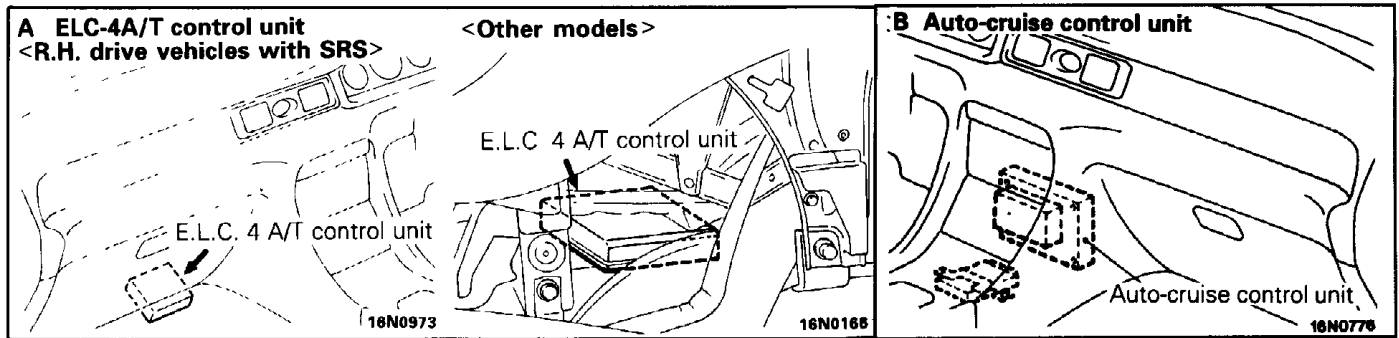
Steering wheel assembly
(column switch)
<Vehicles without SRS>



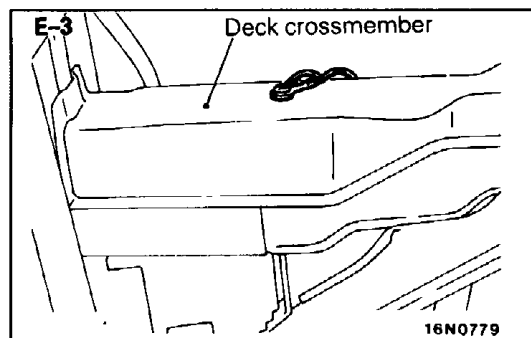
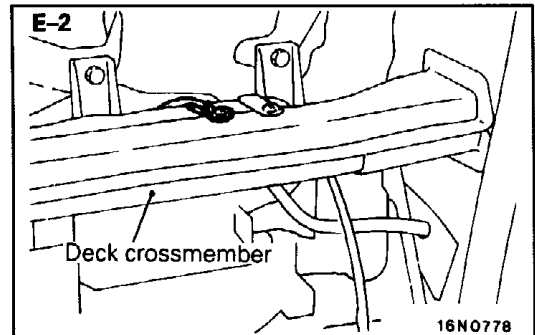
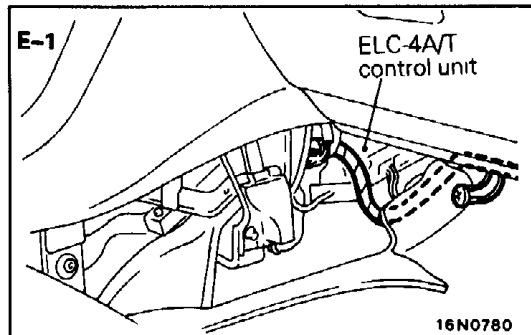
NOTE

*: <A/T models built up to October, 1991>

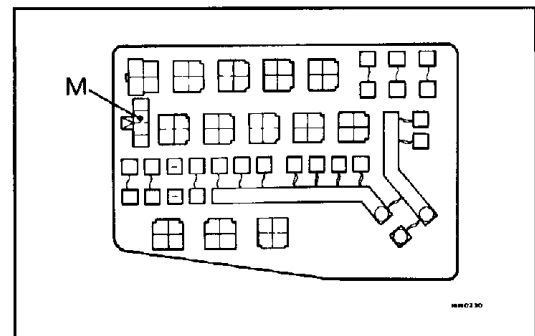
Control unit placement diagram



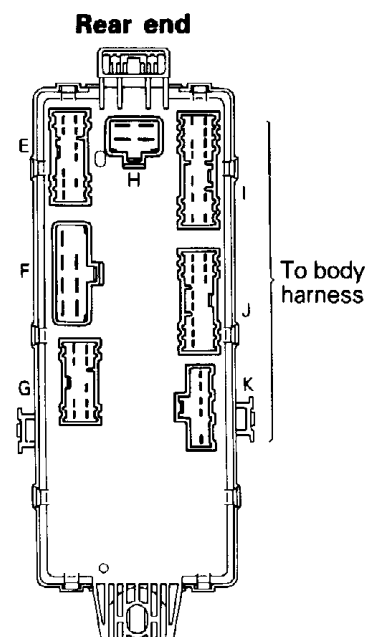
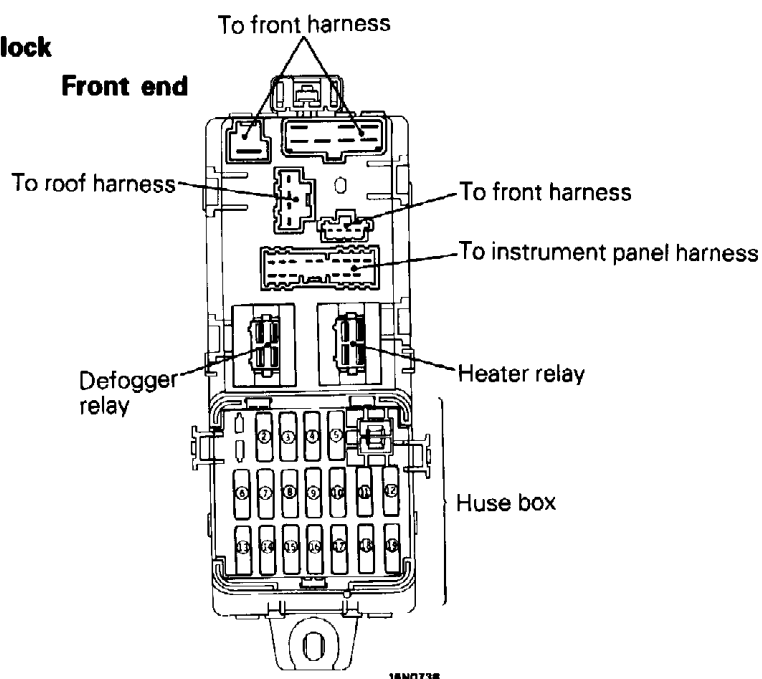
Earth point

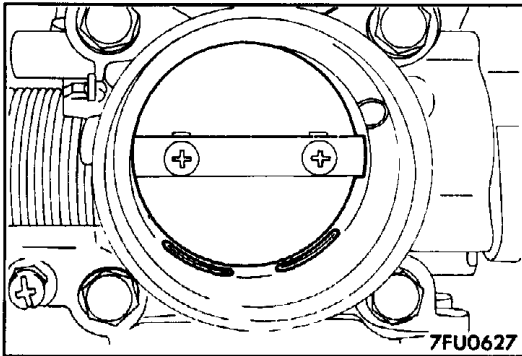


Relay box in engine room



Junction Block





SERVICE ADJUSTMENT PROCEDURES <ENGINE>

THROTTLE BODY (THROTTLE VALVE AREA) CLEANING

E13HAJA

- (1) Start the engine and warm it up until the temperature of the engine coolant reaches 80°C (176°F) or higher; then stop the engine.
- (2) Remove the air intake hose from the throttle body.
- (3) Plug the bypass passage inlet of the throttle body.

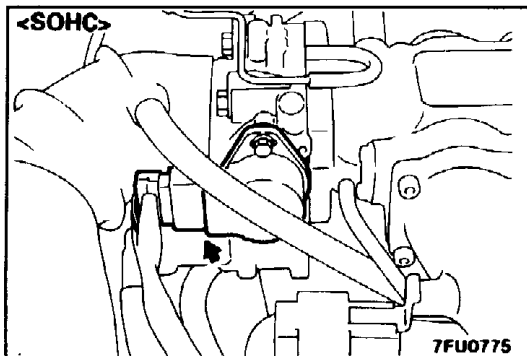
Caution

Do not allow cleaning solvent to enter the bypass passage.

- (4) Spray cleaning solvent into the valve through the throttle body intake port and leave it for about 5 minutes.
- (5) Start the engine, race it several times and idle it for about 1 minute. If the idling speed becomes unstable (or if the engine stalls), slightly open the throttle valve to keep the engine running.
- (6) If the throttle valve deposits are not removed, repeat steps (4) and (5).
- (7) Unplug the bypass passage inlet.
- (8) Attach the air intake hose.
- (9) Use the multi-use tester to erase the self-diagnosis code.
- (10) Adjust the basic idle speed. (Refer to P.13-47.)

NOTE

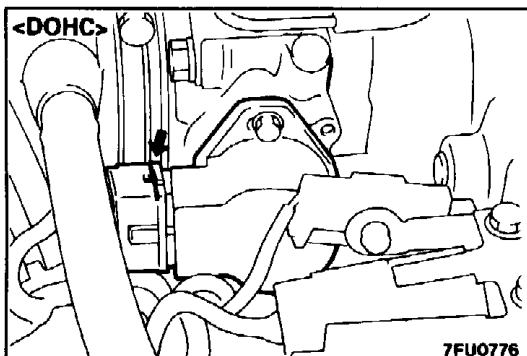
In the case of hunting of the idling engine after adjusting the basic idle speed, remove the battery $\ominus$ cable from the battery terminal for more than 10 seconds, and then idle the engine again.

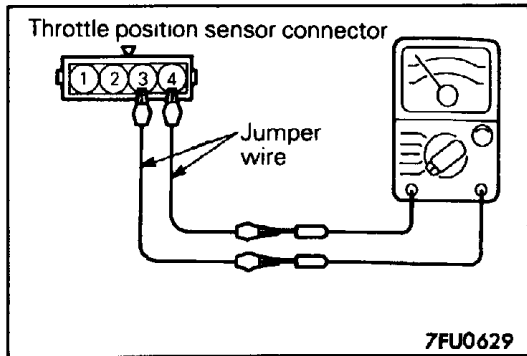


IDLE POSITION SWITCH AND THROTTLE POSITION SENSOR ADJUSTMENT <Except for Vehicles with TCL>

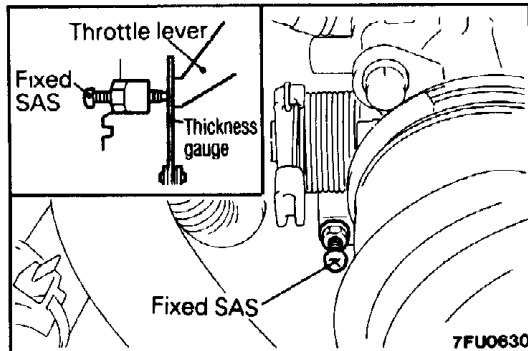
E13HAKB

- (1) Disconnect the connector of the throttle-position sensor.

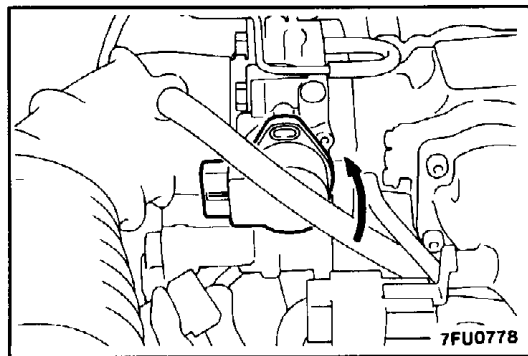




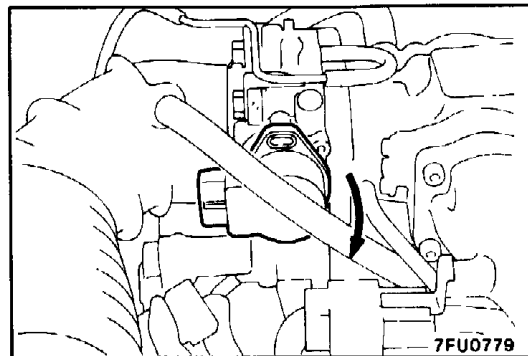
- (2) Connect an ohmmeter between terminal ③ (Idle position switch) and ④ (sensor earth) by using jumper wires.



- (3) Insert a feeler gauge with a thickness of 0.65 mm (0.0256 in.) between the fixed SAS and the throttle lever.



- (4) Loosen the throttle-position sensor installation bolt; then turn fully counterclockwise
- (5) In this condition, check for continuity between terminals ③ and ④.

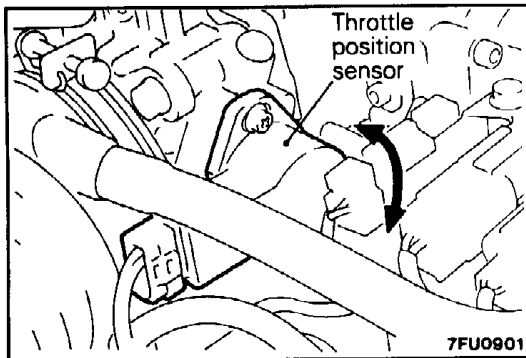
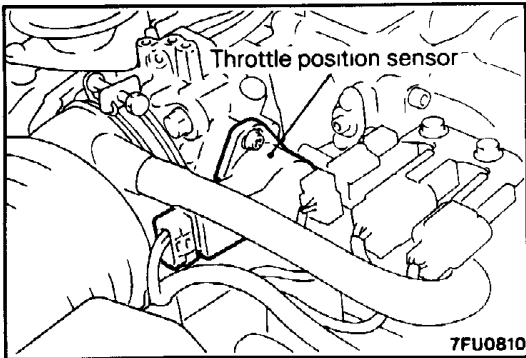


- (6) Slowly turn the throttle-position sensor in the clockwise direction until the point at which the continuity between terminals ③ and ④ changes to non-continuity is found. Tighten the throttle-position sensor installation bolt at that position.
- (7) Connect the connector of the throttle-position sensor.

- (8) Connect the multi-use tester (MUT) to the diagnosis connector.
- (9) Turn the ignition switch ON (but do not start the engine).
- (10) Using the multi-use tester, select item No. 14 and read the throttle position sensor output voltage.

Standard value: 400–1000 mV

- (11) If there is a deviation from the standard value, check the throttle-position sensor and the related harness.
- (12) Remove the feeler gauge.
- (13) Switch OFF the ignition switch.



THROTTLE POSITION SENSOR ADJUSTMENT <Vehicles with TCL>

E13HALA

- (1) Connect the multi-use tester (MUT) to the diagnosis connector.
- (2) Turn the ignition switch ON (but do not start the engine).
- (3) Using the multi-use tester, select item No. 14 and read the throttle position sensor output voltage.

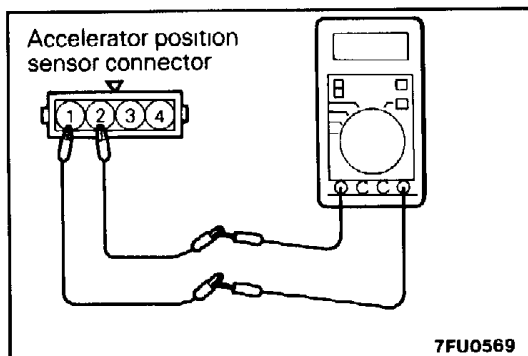
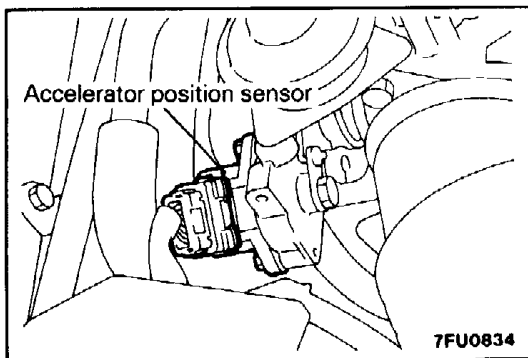
Standard value: 580–690 mV

- (4) If there is any deviation from the standard value, first remove the throttle body, then loosen the throttle position sensor mounting bolt and turn the throttle position sensor to adjust it. After adjusting, tighten the bolts firmly.

NOTE

Output voltage rises when the throttle position sensor is turned clockwise.

- (5) Turn the ignition switch to OFF.
- (6) In the case that self diagnosis malfunction codes are output when adjusting the throttle position sensor, use the multi-use tester to erase the self diagnosis codes (thereby erasing the memory for the malfunction codes due to adjustment of the throttle position sensor).

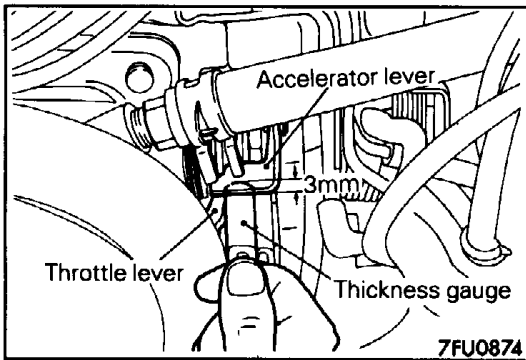


IDLE POSITION SWITCH AND ACCELERATOR POSITION SENSOR (APS) ADJUSTMENT <VEHICLES WITH TCL>

E13HAKC

- (1) Disconnect the accelerator position sensor connector.

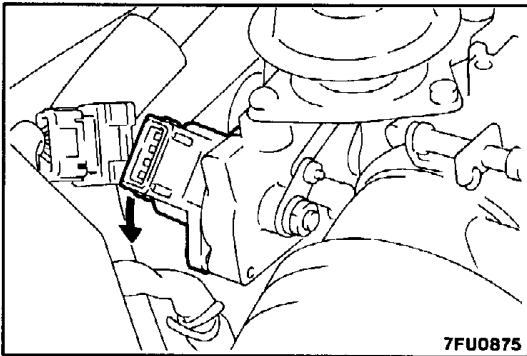
- (2) Use jumper wire between terminal ② (idle position switch) on the accelerator position sensor and terminal ① (sensor earth) to connect a resistance tester.



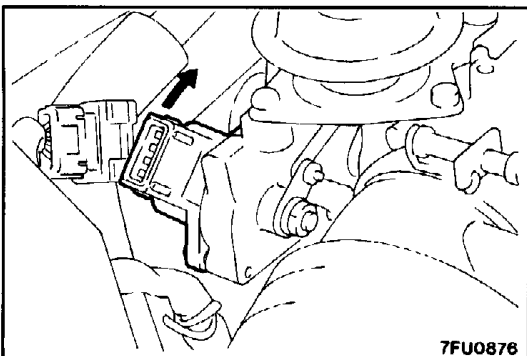
- (3) Insert a 0.5 mm (0.02 in.) thickness gauge for about 3 mm (0.12 in.) between the accelerator lever and the throttle lever.

NOTE

If the thickness gauge is inserted deeper than 3 mm (0.12 in.), the accelerator lever opening degree will be made larger than the set opening.



- (4) Loosen the accelerator position sensor mounting bolt and turn the accelerator position sensor anticlockwise as far as it will go.
 (5) At this time, make sure that there is continuity between the terminals ① and ②.

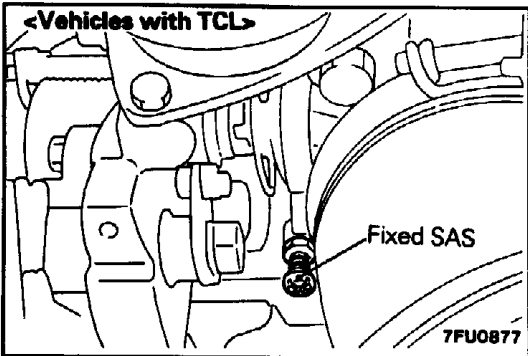
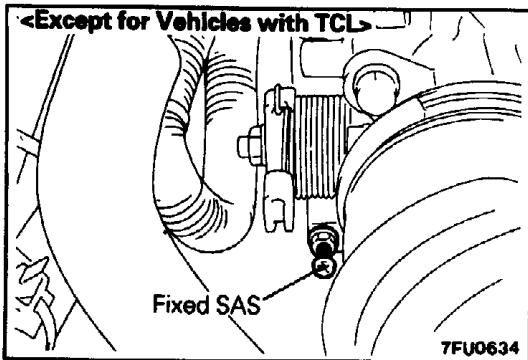


- (6) Slowly turn the accelerator position sensor clockwise to find the point where there is no continuity between the terminals ① and ②. Firmly tighten the accelerator position sensor mounting bolt at this point.
 (7) Connect the accelerator position sensor connector.

- (8) Connect the multi-use tester (MUT) to the diagnosis connector.
 (9) Turn the ignition switch ON. (Do not start the engine.)
 (10) After selecting "TRACTION CONTROL" with the multi-use tester, select item No. 11 and read the accelerator position sensor output voltage.

Standard value: 400–1000 mV

- (11) If the voltage is out of specification, check the accelerator position sensor and associated harnesses.
 (12) Remove the thickness gauge.
 (13) Turn the ignition switch OFF.



FIXED SAS ADJUSTMENT

E13HAMA

NOTE

1. The fixed SAS should not be moved unnecessarily; it has been precisely adjusted by the manufacturer.
2. If the adjustment for any reason is disturbed, readjust as follows.
 - (1) Loosen the tension of the accelerator cable sufficiently.
 - (2) Back out the fixed SAS lock nut.
 - (3) Turn the fixed SAS anticlockwise until it is sufficiently backed out, and securely close the throttle valve fully.
 - (4) Tighten the fixed SAS until the point where the throttle lever is touched (i.e., the point at which the throttle valve begins to open) is found.
From that point, tighten the fixed SAS 1-1/4 turn.
 - (5) While holding the fixed SAS so that it doesn't move, tighten the lock nut securely.
 - (6) Adjust the tension of the accelerator cable.
 - (7) Adjust the basic idling speed (speed adjusting screw).
 - (8) Adjust the idle position switch and throttle position sensor. (Refer to P. 13-43.)
 - (9) Adjust the throttle position sensor, idle position switch and accelerator position sensor. <Vehicles with TCL> (Refer to page 13-45.)

BASIC IDLE SPEED ADJUSTMENT

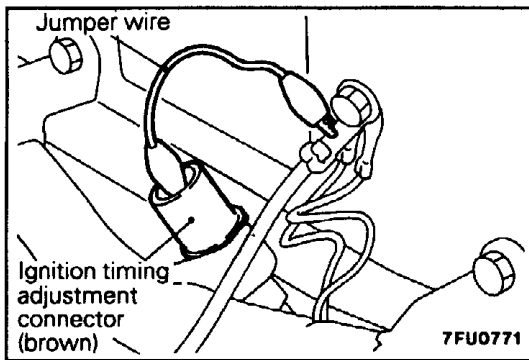
E13HANB

NOTE

1. The standard idling speed has been adjusted, by the speed-adjusting screw (SAS), by the manufacturer, and there should usually be no need for readjustment.
2. The adjustment, if made, should be made after first confirming that the spark plugs, the injectors, the idle-speed control servo, the compression pressure, etc. are all normal.
 - (1) The vehicle should be prepared as follows before the inspection and adjustment.
 - Engine coolant temperature: 80–95°C (176–205°F)
 - Lamps, electric cooling fan and accessories: OFF
 - Transmission: neutral
 - Steering wheel: neutral position
 - (2) Connect the multi-use tester (MUT) to the diagnosis connector.

NOTE

The diagnosis control terminal is earthed when connecting the multi-use tester.



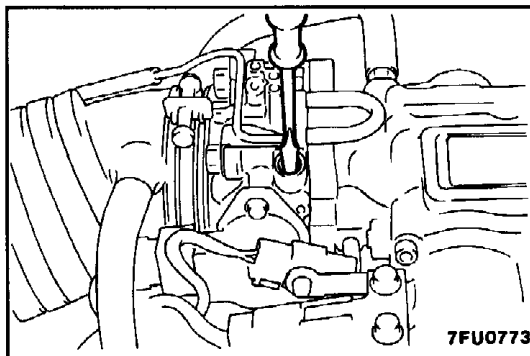
- (3) Remove the waterproof female connector from the ignition timing adjusting connector.
- (4) Use a jumper wire to earth the terminal for adjustment of ignition timing.

- (5) Start the engine and run at idle.
- (6) Using the multi-use tester, select item No. 38 and read the idle speed.

Standard value: 700±50 r/min

NOTE

1. The engine speed may be 20 to 100 r/min. lower than indicated above for a new vehicle (driven approximately 500 km (300 miles) or less), but no adjustment is necessary.
2. If the engine stalls or the rpm is low even though the vehicle has been driven approximately 500 km (300 miles) or more, it is probable that deposits are adhered to the throttle valve, so clean it.
(Refer to P. 13-43.)

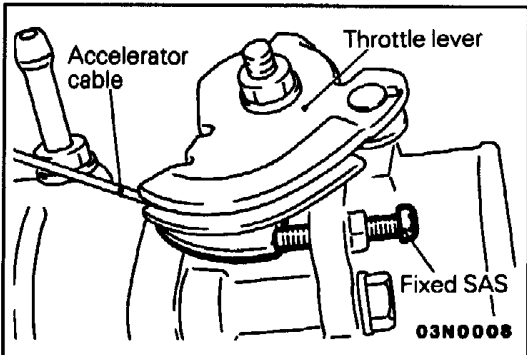
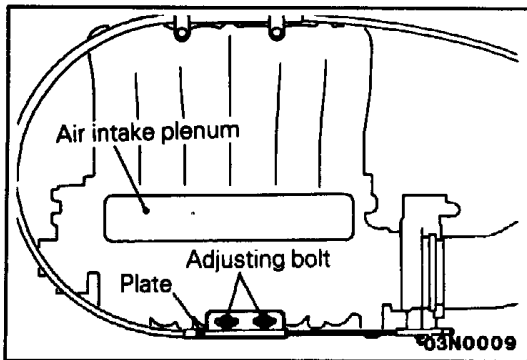


- (7) If not within the standard value range, turn the speed adjusting screw (SAS) to make the necessary adjustment.

NOTE

If the idling speed is higher than the standard value range even when the SAS is fully closed, check whether or not there is any indication that the fixed SAS has been moved. If there is an indication that it has been moved, adjust the fixed SAS. If there are no indications that it has been moved, it is possible that there is leakage as a result of deterioration of the fast idle air valve (FIAPV), and, if so, the throttle body should be replaced.

- (8) Switch OFF the ignition switch.
- (9) Disconnect the jumper wire from the terminal for adjustment of ignition timing, and return the connector to its original condition.
- (10) Start the engine again and let it run at idle speed for about ten minutes; check to be sure that the idling condition is normal.



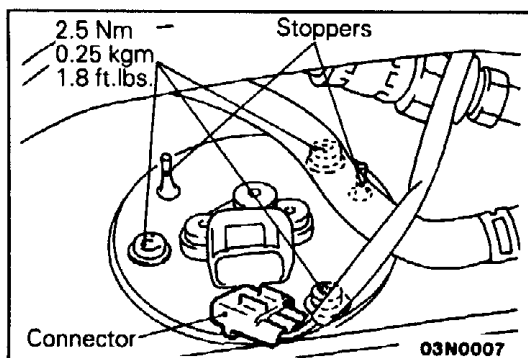
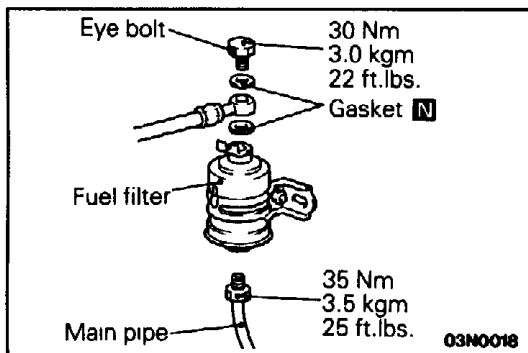
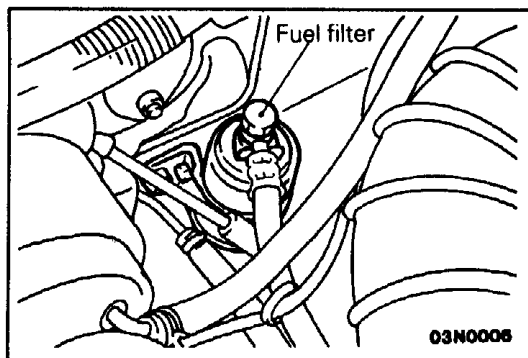
ACCELERATOR CABLE INSPECTION AND ADJUSTMENT

E13FCAY8

<VEHICLES WITHOUT AUTO-CRUISE CONTROL>

- (1) Turn the air conditioner and light switches to OFF so that there is no electrical load when checking.
- (2) Check that the throttle lever is touching the fixed SAS (stopper).
- (3) Make sure that there are no sharp bends in the accelerator cable wiring.
- (4) Check the amount of play in the inner cable.
- (5) If there is a large amount of play in the inner cable, or if there is no play at all, adjust by the following measures.
 - ① Loosen the adjusting bolt.
 - ② Move the plate so the inner cable play is brought to the standard value, and then tighten the adjusting bolt.

Standard value: 1–2 mm (0.04–0.08 in.) <M/T>
3–5 mm (0.12–0.20 in.) <A/T>



FUEL FILTER REPLACEMENT

E13FZAK

- (1) Release the residual pressure inside the fuel line.
- (2) Remove the air intake hose.
- (3) Hold the fuel filter with a spanner, and remove the high pressure fuel hose and the eye bolt.

Caution

The fuel pipe line has some residual pressure, so cover it with a rag, etc.

- (4) Hold the fuel pump with a spanner, and loosen the flare nut to release the connection with the fuel main pipe.
- (5) Remove the fuel filter.
- (6) When installing the fuel filter, use a new gasket, and tighten the high pressure fuel hose and fuel main pipe flare nuts at the specified torque.
- (7) After installation, check that there are no fuel leakages.
 - ① Apply the battery voltage to the fuel pump drive terminal and operate the fuel pump. (Refer to P.13-51.)
 - ② Check for fuel leakages when the fuel is under pressure.

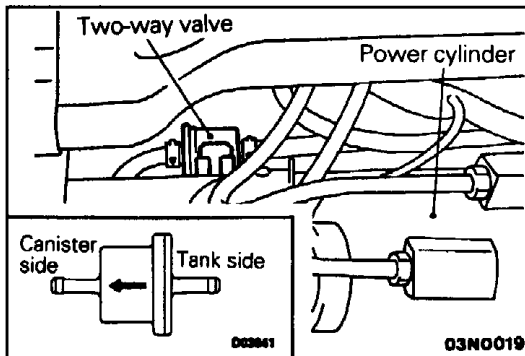
FUEL GAUGE UNIT REPLACEMENT

E13FDAB

- (1) For vehicles with 4WS, remove the rear wheel steering power cylinder attachment bolt, and lower the cylinder.
- (2) Remove the connector from the fuel gauge unit, and remove the unit.
- (3) Align the packing stoppers (2 places) with the holes in the fuel gauge unit.
- (4) When installing the fuel gauge unit, tilt the end of the float to the left before placing it inside the fuel tank.

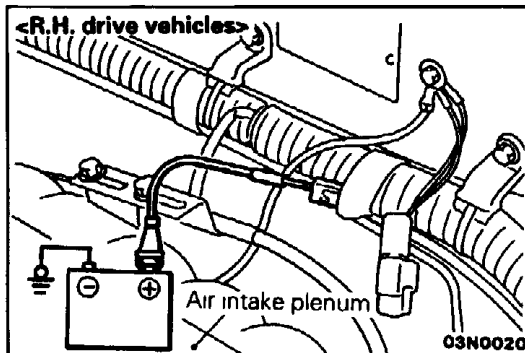
NOTE

There is a reservoir cup inside the fuel tank, so if the fuel gauge unit is tilted to the right when placed in, the fuel gauge unit will hit the reservoir cap.

**TWO-WAY VALVE REPLACEMENT**

E13FFAB

- (1) For vehicles with 4WS, remove the rear wheel steering power cylinder attachment bolt, and lower the cylinder.
- (2) Remove the two-way valve.
- (3) Install so that the installation direction of the two-way valve is correct.

**FUEL PUMP OPERATION CHECK**

E13FGCD

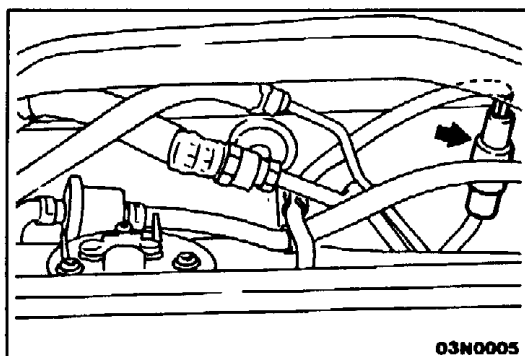
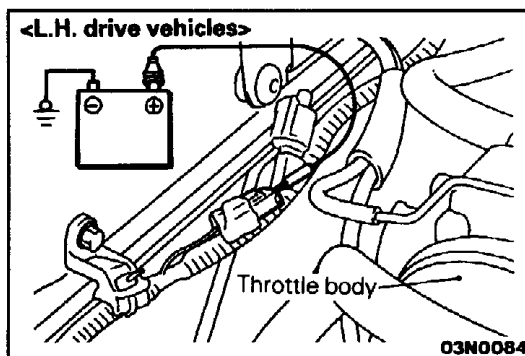
- (1) Check the operation of the fuel pump by using the multi-use tester to force-drive the fuel pump.
- (2) If the fuel pump will not operate, check by using the following procedure, and if it is normal, check the drive circuit.

- ① Turn the ignition switch to OFF.
- ② When the fuel pump drive connector (black) is attached directly to the battery, check if the sound of the fuel pump operation can be heard.

NOTE

As the fuel pump is an in-tank type, the fuel pump sound is hard to hear, so remove the fuel tank cap and check from the tank inlet.

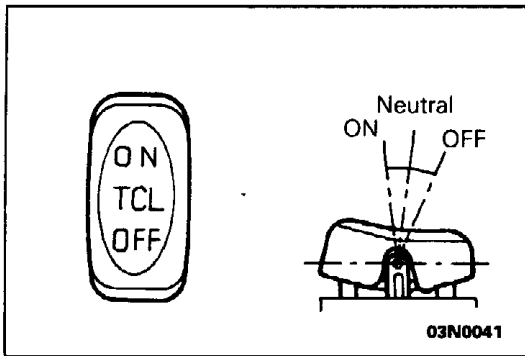
- ③ Check the fuel pressure by pinching the fuel hose with the fingertips.

**FUEL PUMP CONNECTOR DISCONNECTION (HOW TO REDUCE THE FUEL PRESSURE)**

E13HABF

When removing the fuel pipe, hose, etc., since fuel pressure in the fuel pipe line is high, do the following operation so as to release fuel pressure in the line and prevent fuel from running out.

- (1) Lift up the vehicle and remove the fuel pump connector mounted on the rear of the fuel tank.
- (2) After starting the engine and then letting it stop naturally, turn the ignition switch OFF.
- (3) Connect the fuel pump connector.



INSPECTING OPERATION OF THE TCL (TRACTION CONTROL) SYSTEM E13HCAAa

INSPECTING THE ILLUMINATION OF THE TCL SWITCH

When the headlamp is illuminated (tail lamp relay is operating), check if the TCL switch indicator is illuminated.

INSPECTION OF THE TCL INDICATOR LAMPS

1. Check if each indicator lamp is illuminated when the TCL switch is pressed.

TCL switch mode	Inspection conditions	Indicator lamp		
		TCL OFF	TCL	TRACE OFF
Switch does not operate	Turn the ignition key to the ON position.	○	○	○
	Start the engine.	×	×	×
TRACE OFF mode (press once to OFF)	Engine is idling	–	–	○
TCL OFF mode (press once more to OFF)		○	–	–
TCL ON mode	When the engine is idling, turn the steering wheel at least one and a half revolutions.	No illumination	–	–
	Drive the vehicle at 30 km/h (19 mph) for 2 minutes or more.	No illumination	–	–
	With the engine idling, shift the transmission gear to the reverse range and hold 3 seconds or more [M/T].	No illumination	–	–
	Shift the transmission gear to the 1st range and drive the vehicle at over 40 km/h (25 mph) for 1 minute or more [M/T].	No illumination	–	–

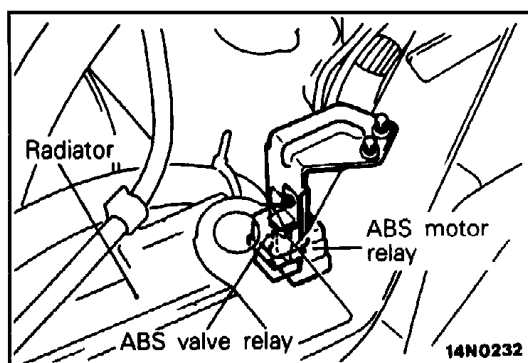
NOTE

○: illuminated, ×: extinguished, –: not relevant

Caution

If a different result is obtained when checking, refer to the "Troubleshooting" section for remedy.

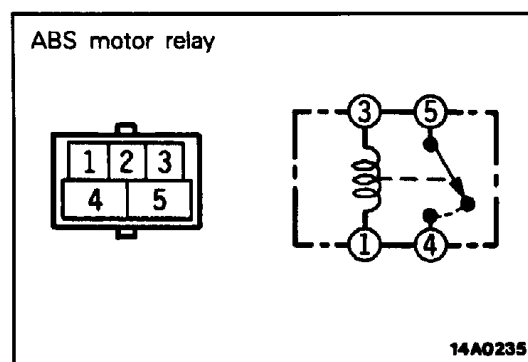
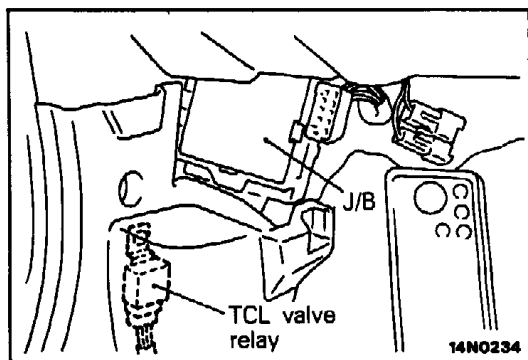
2. When the headlamp is illuminated (tail lamp relay is operating), check if each indicator lamp is dimmed.



INSPECTING THE MOTOR RELAY AND VALVE RELAY

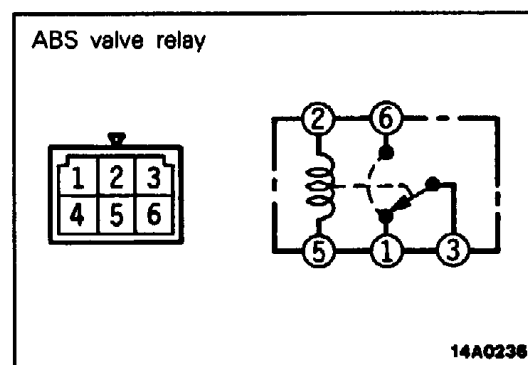
E36FPAP

Check for continuity between the terminals of the relay with and without power as shown in the chart overleaf.



ABS motor relay <when energizing coil is at normal temperature ($20^{\circ} \pm 15^{\circ}\text{C}$ [$68^{\circ} \pm 27^{\circ}\text{F}$)]>

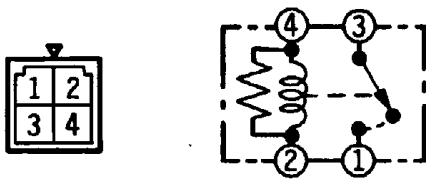
When there is no current	Between terminals ③ and ①	$74 \pm 25\Omega$
	Between terminals ④ and ⑤	No continuity ($\infty \Omega$)
When there is current between terminals ③ and ①	Between terminals ④ and ⑤	Continuity (approx. 0Ω)



ABS valve relay <when energizing coil is at normal temperature ($20^{\circ} \pm 15^{\circ}\text{C}$ [$68^{\circ} \pm 27^{\circ}\text{F}$)]>

When there is no current	Between terminals ② and ⑤	$80 \pm 25\Omega$
	Between terminals ① and ③	Continuity (approx. 0Ω)
	Between terminals ③ and ⑥	No continuity ($\infty \Omega$)
When there is current between terminals ② and ⑤	Between terminals ① and ③	No continuity ($\infty \Omega$)
	Between terminals ③ and ⑥	Continuity (approx. 0Ω)

TCL valve relay



14A0237

TCL valve relay <when energizing coil is at normal temperature ($20^{\circ} \pm 5^{\circ}\text{C}$ [$68^{\circ} \pm 9^{\circ}\text{F}$)]>

When there is no current	Between terminals ④ and ②	$100^{+25}_{-14} \Omega$
	Between terminals ③ and ①	No continuity ($\infty \Omega$)
When there is current between terminals ④ and ②	Between terminals ③ and ①	Continuity (approx. 0Ω)

INSPECTING THE TCL HYDRAULIC SYSTEM INSPECTION USING THE BRAKING FORCE TESTER

NOTE

1. The roller of the braking force tester and the tyre should be dry during testing.
2. The parking brake should be applied to lock the rear wheels.

1. Place the front wheel of the vehicle on the rollers of the braking force tester.
2. Turn the ignition key to the OFF position and set the multi-use tester <Up to 1993 models> or MUT-II <All models> as shown in the diagram.

Caution

Connection and disconnection of the multi-use tester or MUT-II should always be made with the ignition switch in the OFF position.

3. After checking that the selector lever is in neutral, start the engine.

Caution

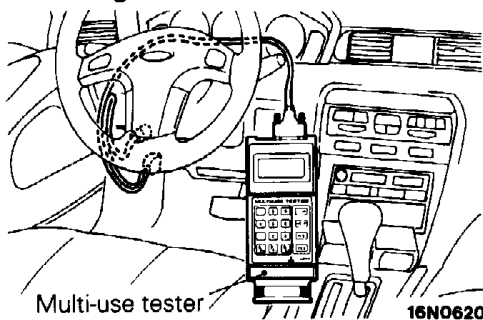
At this time, check that the TCL-related indicator lamps momentarily illuminate before switching off. If they do not switch off, refer to the "Troubleshooting" section (P.13-18-1).

4. Operate the rollers of the braking force tester and keep the steering wheel straight.
5. When the brake pedal is released, perform an actuator test with the multi-use tester or MUT-II (Item Nos. 01, 02) and take a reading of the change in braking force. For diagnosis and remedy, refer to the following "diagnosis table".

NOTE

1. When the multi-use tester or MUT-II is operated and the TCL system is selected, the TCL system will switch to multi-use tester or MUT-II mode and the TCL indicator lamp will illuminate.
2. When the TCL has been interrupted by the fail-safe function, the multi-use tester or MUT-II actuator testing cannot be used.

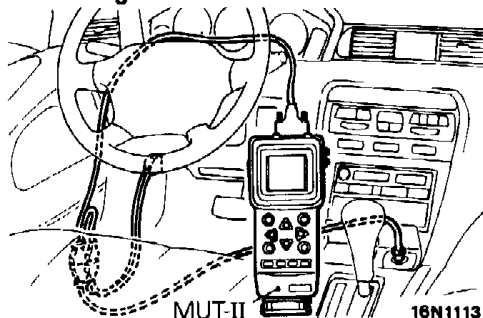
When using the multi-use tester



Multi-use tester

16N0620

When using the MUT-II



MUT-II

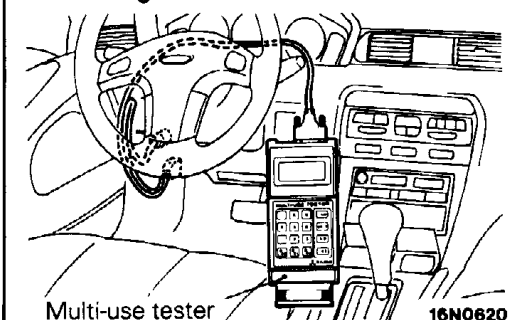
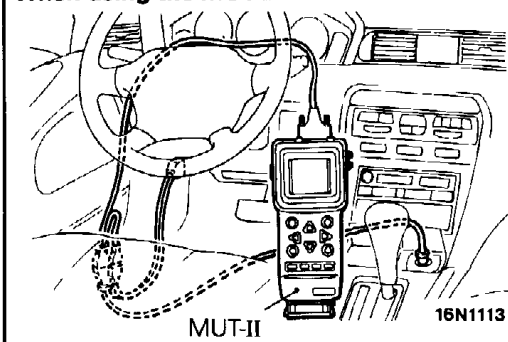
16N1113

Diagnosis Table

No.	Operation	Diagnosis (braking force tester reading)		Cause	Remedy
		Normal	Problem		
01	Operate the multi-use tester or MUT-II to force-drive the actuator, and check the change in braking force.	When the actuator is force-driven by the multi-use tester or MUT-II the brake force will change in the following way. N (kg, lbs.) Approx. 200 (20, 44)	Braking force at step 1 is very slight or hardly increases at all.	Hydraulic unit brake pipes are incorrectly connected.	Connect correctly.
		Step 1 700–900 (70–90, 154–198)		Hydraulic unit is faulty.	Replace the hydraulic unit.
02		Step 2 (After approx. 3 seconds) 350–650 (35–65, 77–143)	Braking force increases at step 1, but the decrease in braking force at step 2 is very slight or almost non-existent.	Hydraulic unit is faulty.	Replace the hydraulic unit.
		Step 3 (After approx. 3 seconds) Approx. 200 (20, 44)			

NOTE

1. For drive conditions, the wheel speed of both front wheels should be 0 km/h (0 mph), and the maximum wheel speed of the wheel to be tested for braking force should be less than 10 km/h (6 mph).
2. The above reasons for problems are given on the assumption that all brake components other than the hydraulic unit are functioning normally.

When using the multi-use tester**When using the MUT-II****SIMPLE INSPECTION**

1. Jack up the front wheels, and support on axle stands.
2. After checking that the selector level is neutral, feel the drag force (drag torque) for each wheel brake.
3. Turn the ignition key to the ACC position and set the multi-use tester or MUT-II as shown in the diagram.

Caution

Connection and disconnection of the multi-use tester or MUT-II should always be made with the ignition switch in the OFF position.

4. Start the engine.

Caution

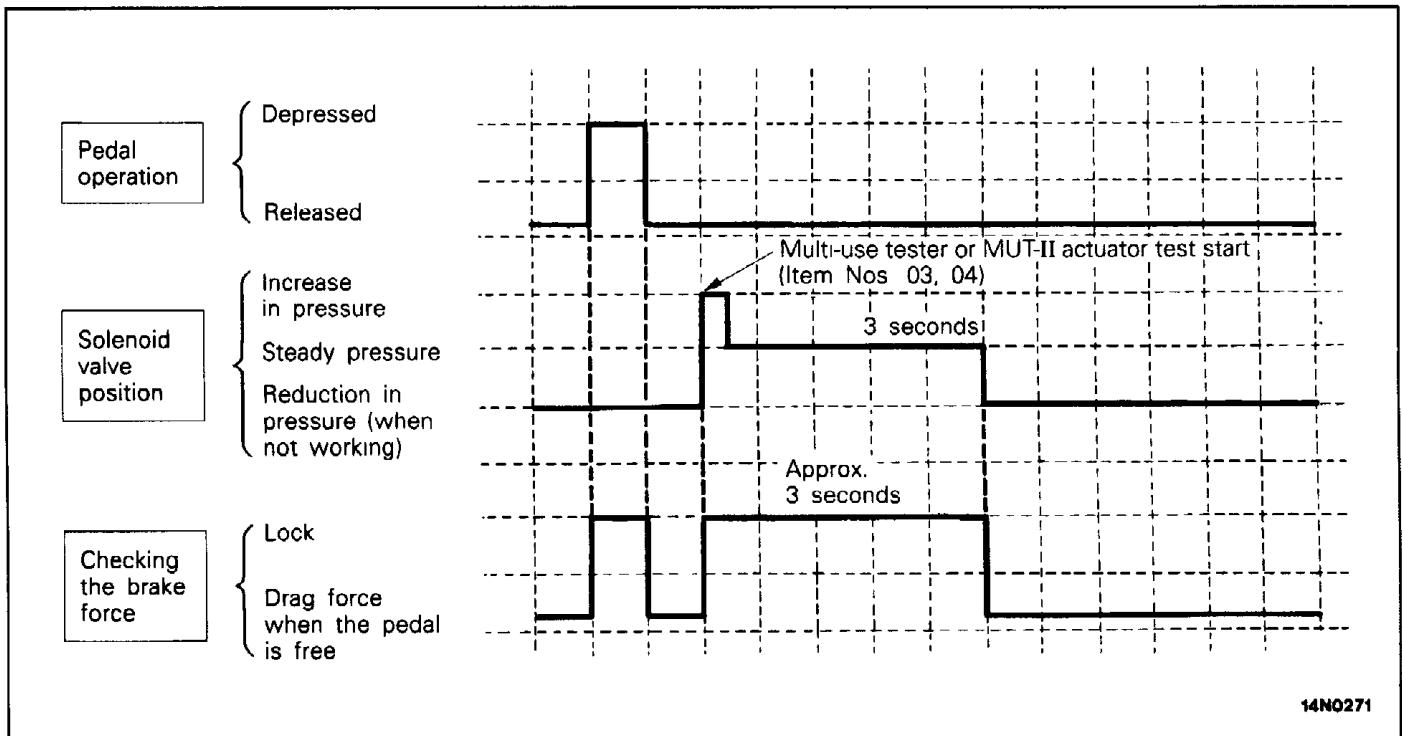
At this time, check that the TCL-related indicator lamps momentarily illuminate before switching off. If they do not switch off, refer to the "Troubleshooting" section (P.13-18-1).

5. Check that the wheels lock when the brake pedal is depressed, and that they become free when the pedal is released.
6. When the brake pedal is released, operate the multi-use tester or MUT-II to force-drive the actuator.
7. Rotate the wheel manually and check the change in braking force.

The result should be as shown in the following diagram.

NOTE

1. When the multi-use tester or MUT-II is operated and the TCL system is selected, the TCL system will switch to multi-use tester or MUT-II mode and the TCL OFF indicator lamp will illuminate.
2. When the TCL-ECU function has been interrupted by the fail-safe function, the multi-use tester or MUT-II actuator testing cannot be performed.



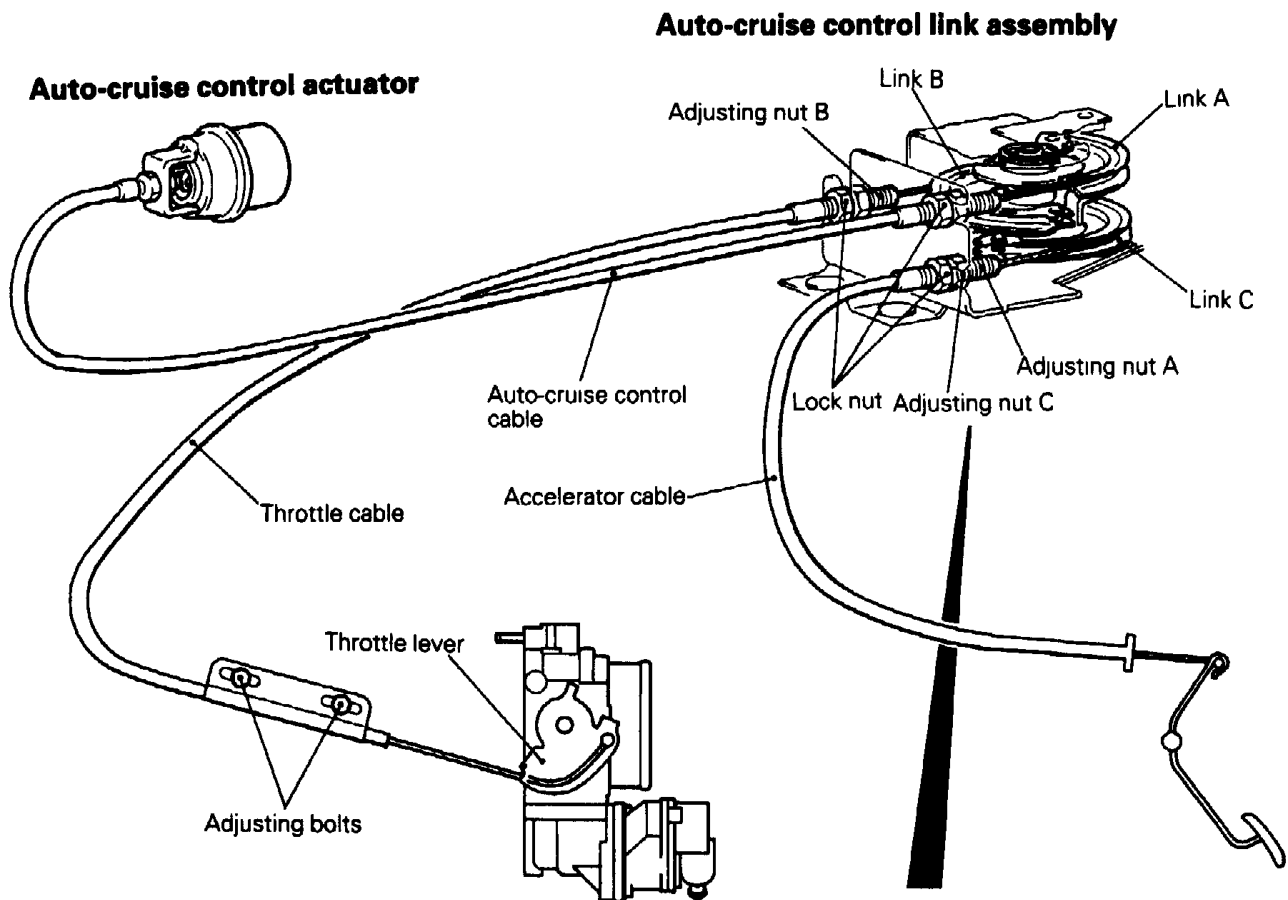
8. If a different result is obtained when checking, correct it by following the procedure in the "diagnosis table".

Diagnosis Table

No.	Operation	Diagnosis (braking force tester reading)		Cause	Remedy
		Normal	Problem		
03	1. Rotate the wheel when the brake pedal is released. 2. Choose the wheel to be checked with the multi-use tester or MUT-II, and force-drive the actuator.	After continuous locking for a 3 second period, the braking force will decrease.	The wheel will not lock.	Hydraulic unit brake pipes are incorrectly connected.	Connect correctly.
04	3. Rotate the selected wheel manually to check the change in braking force.			Hydraulic unit is faulty.	Replace the hydraulic unit.

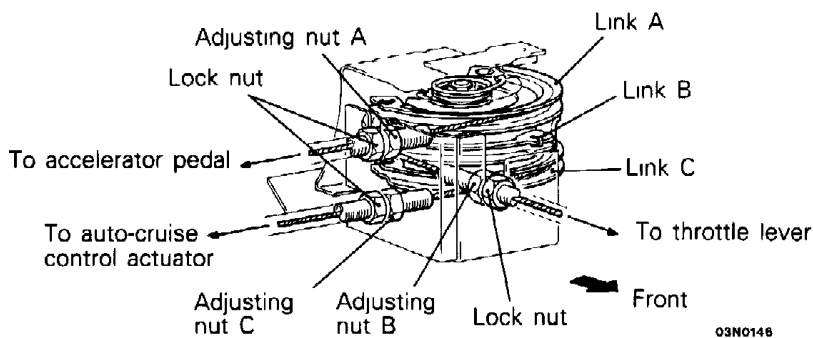
AUTO-CRUISE CONTROL CABLES INSPECTION AND ADJUSTMENT

E13FYAI



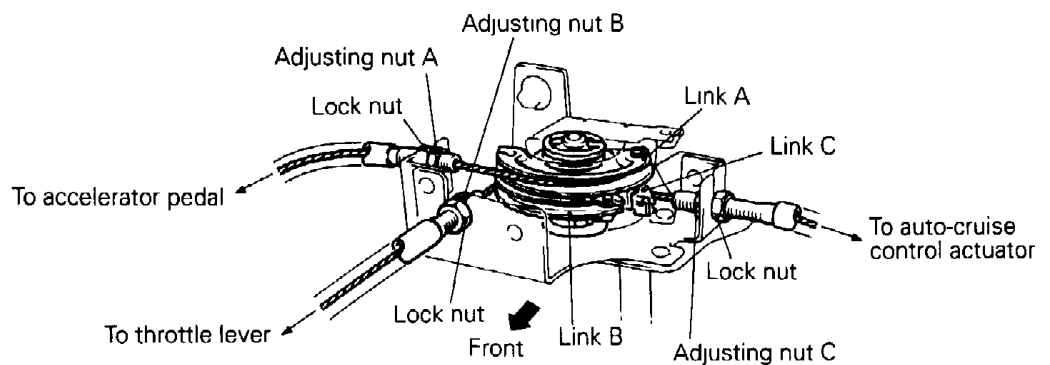
07N0004

<R.H. drive vehicles built from November, 1992>

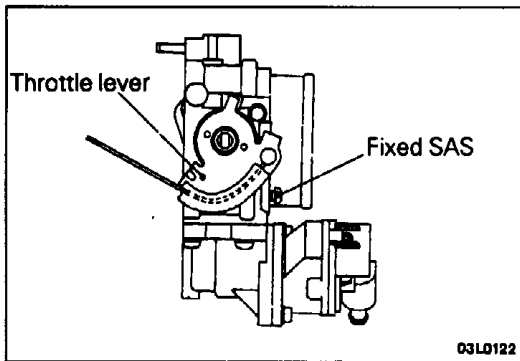


03N0146

<L.H. drive vehicles built from May, 1994>



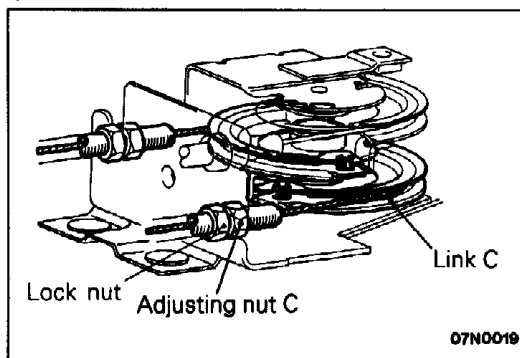
07N0046



- (1) Turn air conditioner and lamps OFF. Inspect and adjust at no load.
- (2) Check if the end of the fixed SAS is touching the throttle lever stopper.

- (3) Confirm there are no sharp bends in cables.
- (4) Depress the accelerator pedal and check if the throttle lever moves smoothly from fully closed to fully open.
- (5) Check inner cables for correct slack.
- (6) If there is too much slack or no slack, adjust play by the following procedures.

**<L.H. drive vehicles built up to April, 1994,
R.H. drive vehicles built up to October, 1992>**



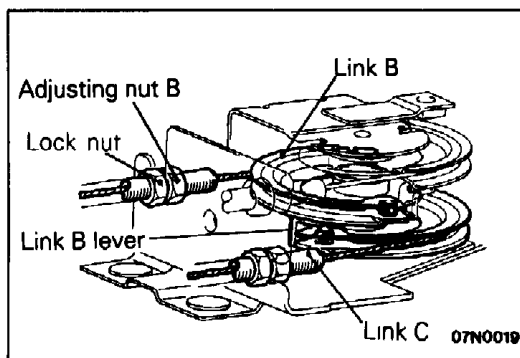
- ① Remove the actuator's cover.
- ② Loosen the adjusting nuts and lock nuts of the throttle lever and intermediate links A, B and C, so that the intermediate links A, B and C and the throttle lever can move freely.
- ③ Rotate the intermediate link C in the direction shown in the diagram, and while keeping it touching the stopper, tighten the adjusting nut C in the direction to lessen the inner cable play of the accelerator cable. Then unscrew the adjusting nut C the specified number of turns just before the intermediate link C begins to move.

Amount to unscrew the adjusting nut C:

<M/T> Approx. half a turn [inner cable play 0–1 mm (0–0.04 in.)]

<A/T> Approx. 2 turns [inner cable play 2–3 mm (0.08–0.12 in.)]

- ④ Fix the accelerator cable with the lock nut.

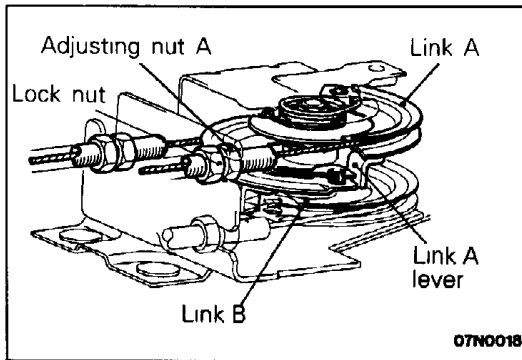


- ⑤ Tighten the adjusting nut B in the direction to lessen the inner cable play of the throttle cable. At the position where the intermediate link B lever touches the intermediate link C, unscrew the adjusting nut B the specified number of turns.

Amount to unscrew the adjusting nut B:

Approx. 1 turn [inner cable play 1–2 mm (0.04–0.08 in.)]

- ⑥ Fix the throttle cable with the lock nut.
- ⑦ Tighten the air intake plenum adjusting bolt.



- ⑧ Tighten the adjusting nut A in the direction to lessen the inner cable play of the cruise control cable. At the position where the intermediate link A lever touches the intermediate link B, unscrew the adjusting nut A the specified number of turns.

Amount to unscrew the adjusting nut A:

Approx. 1 turn [inner cable play 1–2 mm (0.04–0.08 in.)]

- ⑨ Fix the auto-cruise cable with the lock nut.

<R.H. drive vehicles built from November, 1992>

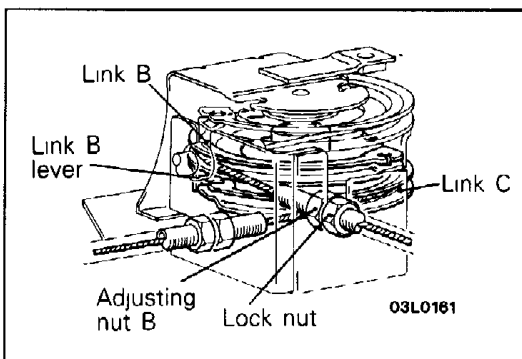
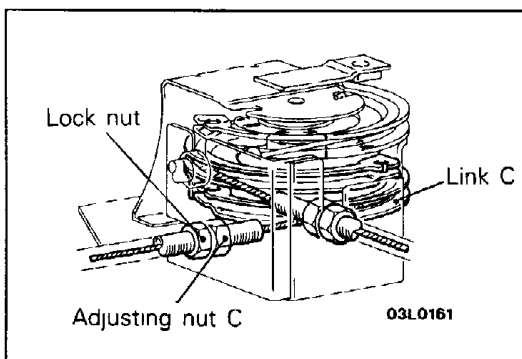
- ① Remove the actuator's cover.
- ② Loosen the adjusting nuts and lock nuts of the throttle lever and intermediate links A, B and C, so that the intermediate links A, B and C and the throttle lever can move freely.
- ③ Rotate the intermediate link C in the direction shown in the diagram, and while keeping it touching the stopper, tighten the adjusting nut C in the direction to lessen the inner cable play of the accelerator cable. Then unscrew the adjusting nut C the specified number of turns just before the intermediate link C begins to move.

Amount to unscrew the adjusting nut C:

<M/T> Approx. half a turn [inner cable play 0–1 mm (0–0.04 in.)]

<A/T> Approx. 2 turns [inner cable play 2–3 mm (0.08–0.12 in.)]

- ④ Fix the accelerator cable with the lock nut.

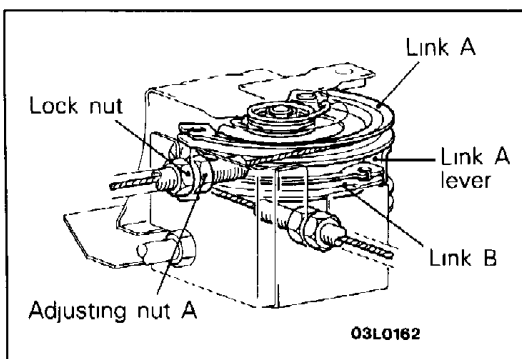


- ⑤ Tighten the adjusting nut B in the direction to lessen the inner cable play of the throttle cable. At the position where the intermediate link B lever touches the intermediate link C, unscrew the adjusting nut B the specified number of turns.

Amount to unscrew the adjusting nut B:

Approx. 1 turn [inner cable play 1–2 mm (0.04–0.08 in.)]

- ⑥ Fix the throttle cable with the lock nut.
- ⑦ Tighten the air intake plenum adjusting bolt.



- ⑧ Tighten the adjusting nut A in the direction to lessen the inner cable play of the cruise control cable. At the position where the intermediate link A lever touches the intermediate link B, unscrew the adjusting nut A the specified number of turns.

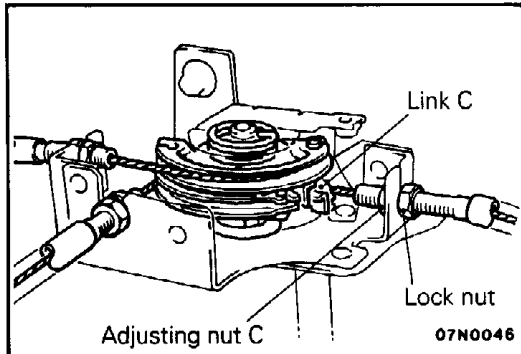
Amount to unscrew the adjusting nut A:

Approx. 1 turn [inner cable play 1–2 mm (0.04–0.08 in.)]

- ⑨ Fix the auto-cruise cable with the lock nut.

<L.H. drive vehicles built from May, 1994>

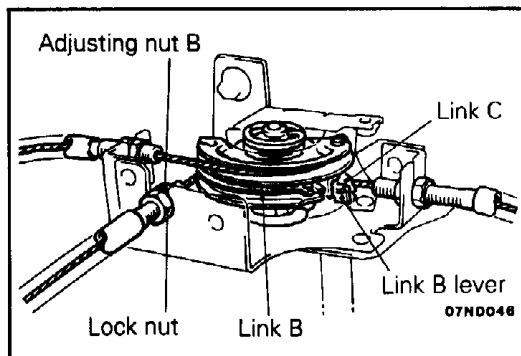
- ① Remove the actuator's cover.
- ② Loosen the adjusting nuts and lock nuts of the throttle lever and intermediate links A, B and C, so that the intermediate links A, B and C and the throttle lever can move freely.
- ③ Rotate the intermediate link C in the direction shown in the diagram, and while keeping it touching the stopper, tighten the adjusting nut C in the direction to lessen the inner cable play of the accelerator cable. Then unscrew the adjusting nut C the specified number of turns just before the intermediate link C begins to move.

**Amount to unscrew the adjusting nut C:**

<M/T> **Approx. half a turn [inner cable play 0–1 mm (0–0.04 in.)]**

<A/T> **Approx. 2 turns [inner cable play 2–3 mm (0.08–0.12 in.)]**

- ④ Fix the accelerator cable with the lock nut.

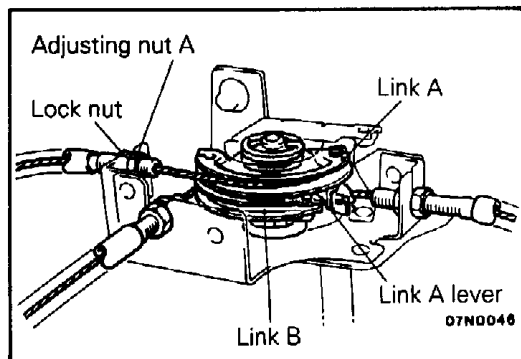


- ⑤ Tighten the adjusting nut B in the direction to lessen the inner cable play of the throttle cable. At the position where the intermediate link B lever touches the intermediate link C, unscrew the adjusting nut B the specified number of turns.

Amount to unscrew the adjusting nut B:

Approx. 1 turn [inner cable play 1–2 mm (0.04–0.08 in.)]

- ⑥ Fix the throttle cable with the lock nut.
- ⑦ Tighten the air intake plenum adjusting bolt.

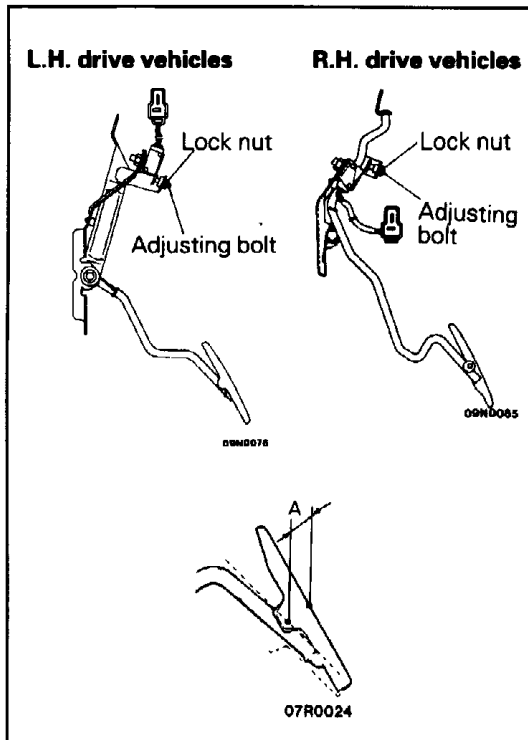


- ⑧ Tighten the adjusting nut A in the direction to lessen the inner cable play of the cruise control cable. At the position where the intermediate link A lever touches the intermediate link B, unscrew the adjusting nut A the specified number of turns.

Amount to unscrew the adjusting nut A:

Approx. 1 turn [inner cable play 1–2 mm (0.04–0.08 in.)]

- ⑨ Fix the auto-cruise cable with the lock nut.



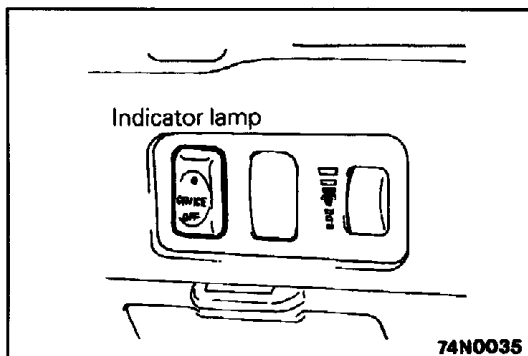
ACCELERATOR PEDAL SWITCH INSPECTION AND ADJUSTMENT

<A/T models built up to October, 1991>

- (1) Warm the engine until the engine coolant temperature reaches normal temperature [80–90°C (176–194°F)], and then stop the engine.
- (2) Check if there is continuity between the accelerator pedal switch terminals when the accelerator pedal is free.
- (3) Check if there is no continuity between the accelerator pedal switch terminals when the accelerator pedal switch is depressed, and the stroke A in the diagram is at the standard value.

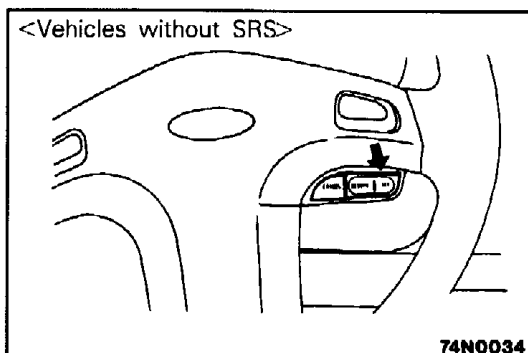
Standard value (A): 2–6 mm (0.08–0.24 in.)

- (4) If the stroke departs from the standard value, adjust with the adjusting bolt.



AUTO-CRUISE CONTROL MAIN SWITCH CHECK

- (1) Turn the ignition key to ON.
- (2) Check to be sure that the indicator lamp within the switch illuminates when the main switch is switched ON.

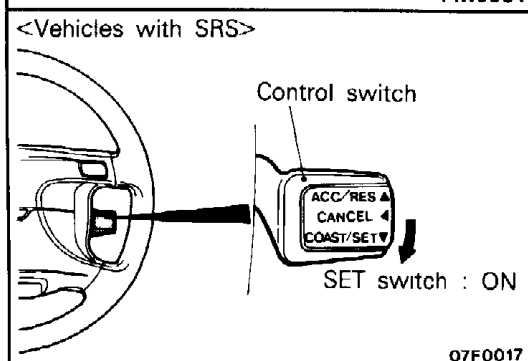


AUTO-CRUISE CONTROL SETTING CHECK

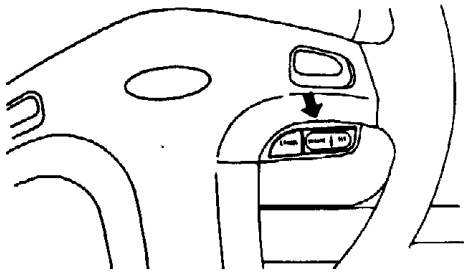
- (1) Switch ON the main switch.
- (2) Drive at the desired speed within the range of approximately 40–200 km/h (25–125 mph).
- (3) Switch ON the SET switch.
- (4) Check to be sure that when the switch is released the speed is the desired constant speed.

NOTE

If the vehicle's speed decreases to approximately 15 km/h (9 mph) below the set speed because of climbing a hill for example, the automatic speed control will be cancelled.

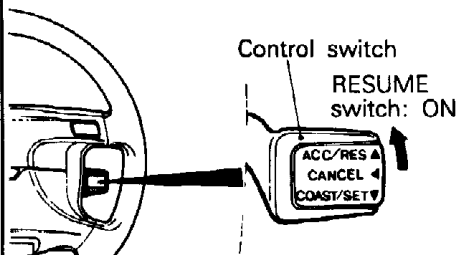


<Vehicles without SRS>



74N0034

<Vehicles with SRS>

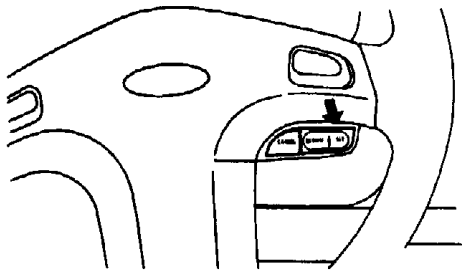


07F0017

SPEED-INCREASE SETTING CHECK

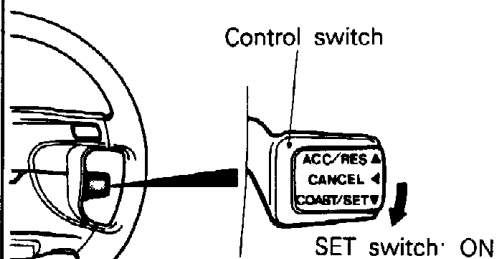
- (1) Set to the desired speed.
- (2) Switch ON the RESUME switch.
- (3) Check to be sure that acceleration continues while the switch is hold, and that when it is released the constant speed at the time when it was released becomes the driving speed.

<Vehicles without SRS>



74N0034

<Vehicles with SRS>



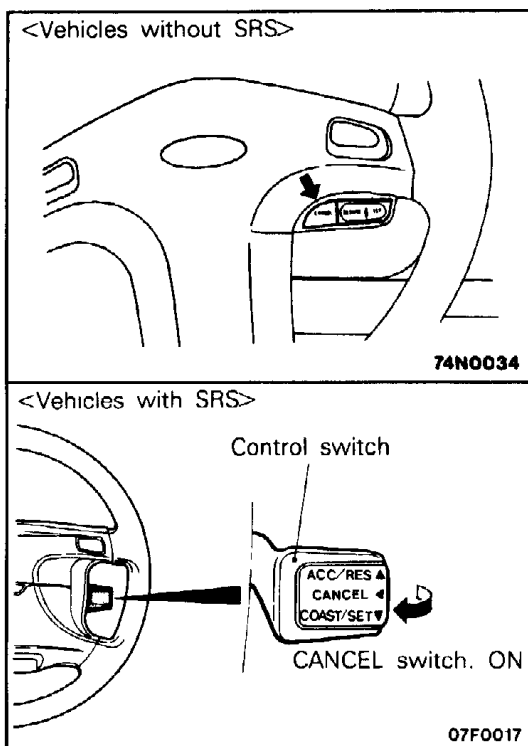
07F0017

SPEED REDUCTION SETTING CHECK

- (1) Set to the desired speed.
- (2) Switch ON the SET switch.
- (3) Check to be sure that deceleration continues while the switch is pressed, and that when it is released the constant speed at the time when it was released becomes the driving speed.

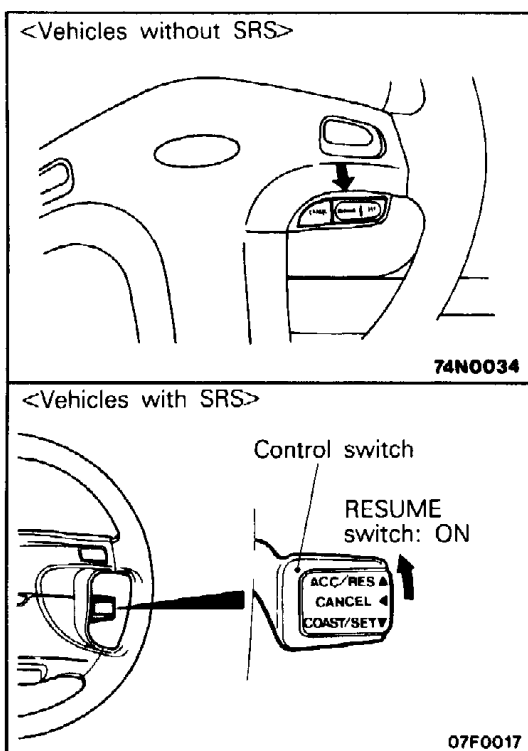
NOTE

When the vehicle speed reaches the low limit [approximately 40 km/h (25 mph)] during deceleration, the automatic speed control will be cancelled.



CHECK OF RETURN TO THE SET SPEED BEFORE CANCELLATION AND AUTO-CRUISE CONTROL CANCELLATION

- (1) Set the auto-cruise speed control.
- (2) When any of the following operations are performed while at constant speed during cruise control, check if normal driving is resumed and deceleration occurs.
 - ① Switch ON the CANCEL switch.
 - ② The brake pedal is depressed.
 - ③ The clutch pedal is depressed. (Vehicles with a manual transmission)
 - ④ The selector lever is moved to the "N" range. (Vehicles with an automatic transmission)



- (3) At a vehicle speed of 40 km/h (25 mph) or higher, check if when the RESUME switch is switched ON, vehicle speed returns to the speed before cruise control driving was cancelled, and constant speed driving occurs.
- (4) When the main switch is turned to OFF while driving at constant speed, check if normal driving is resumed and deceleration occurs.

NOTES

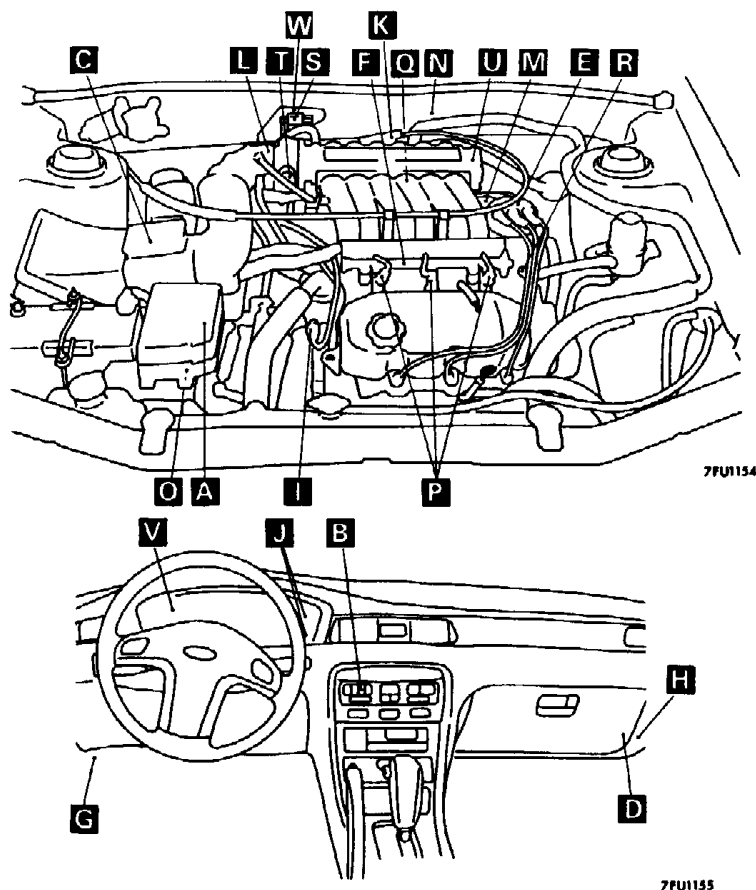
ON VEHICLE INSPECTION OF MPI COMPONENTS

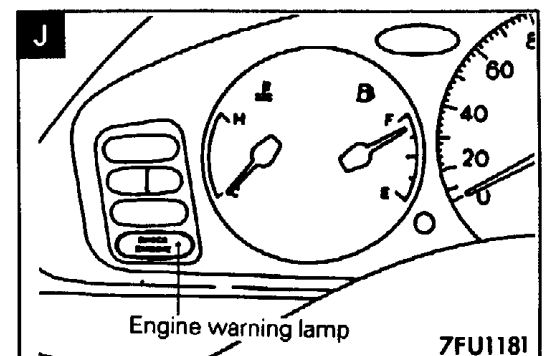
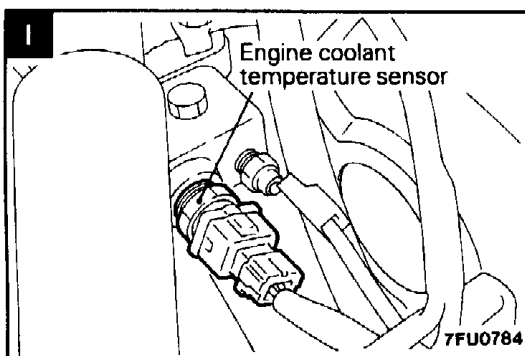
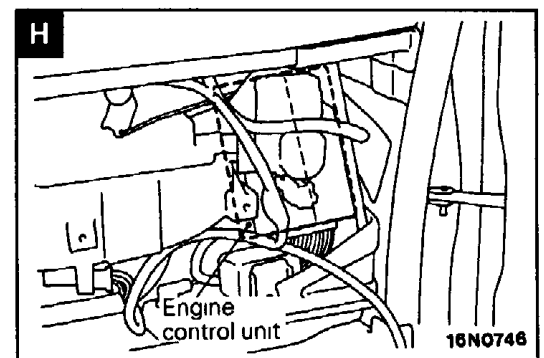
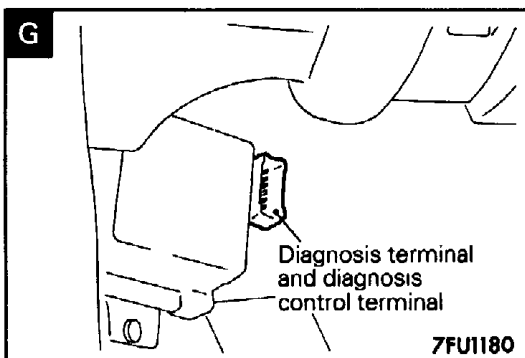
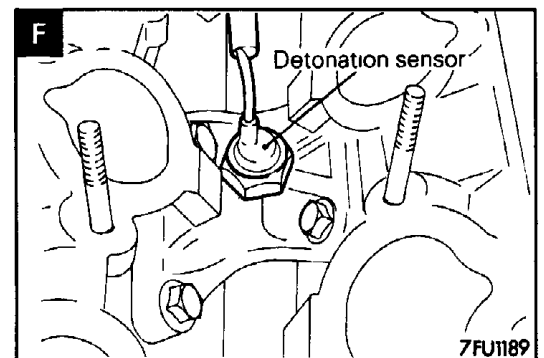
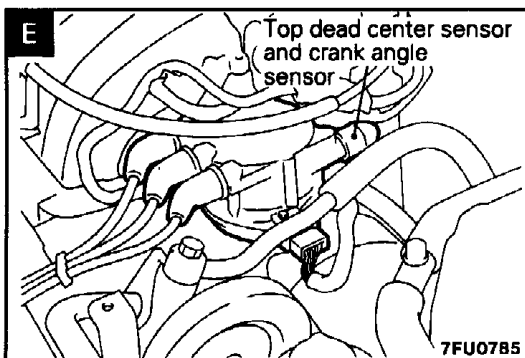
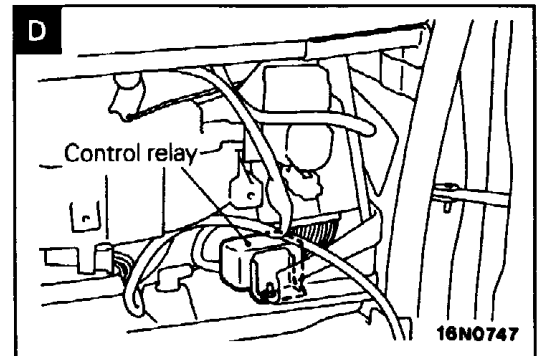
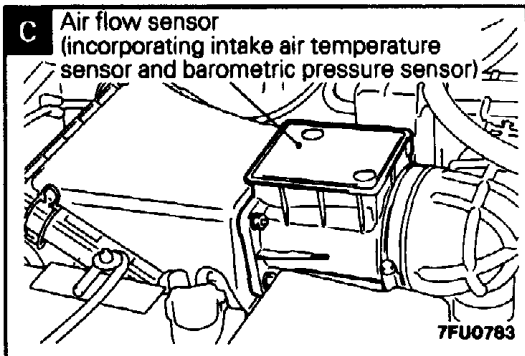
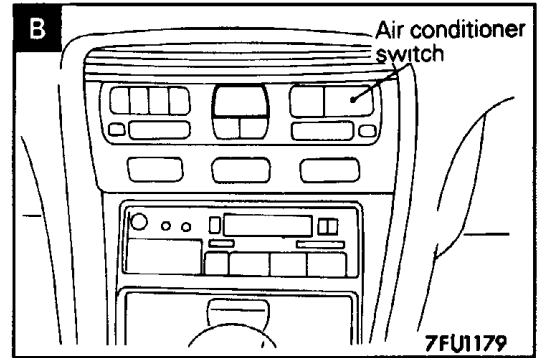
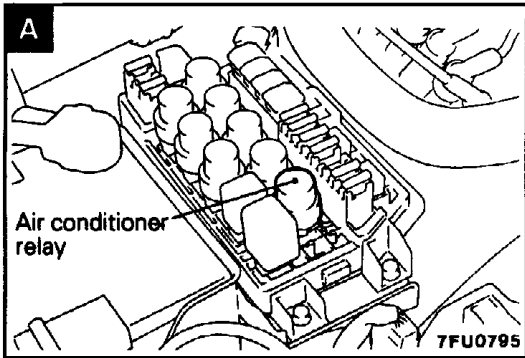
COMPONENTS LOCATION

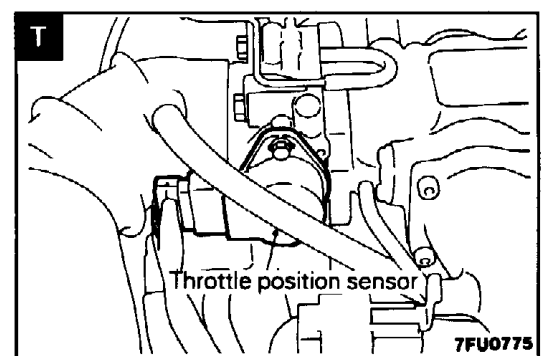
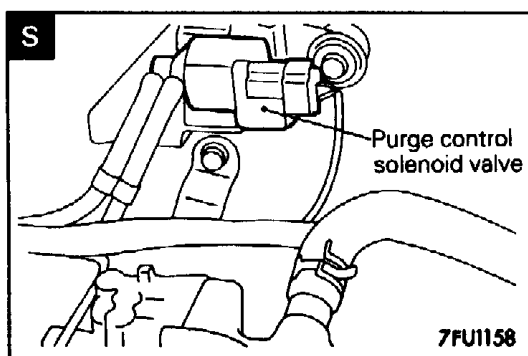
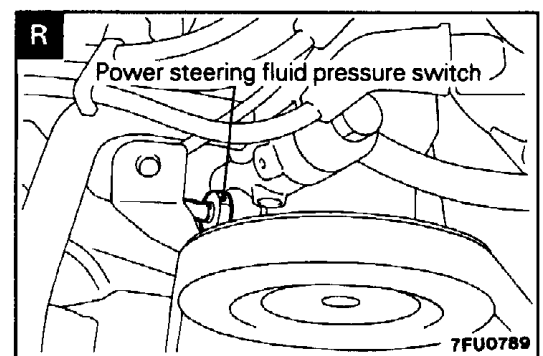
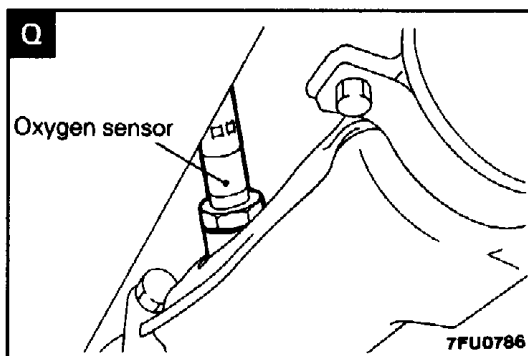
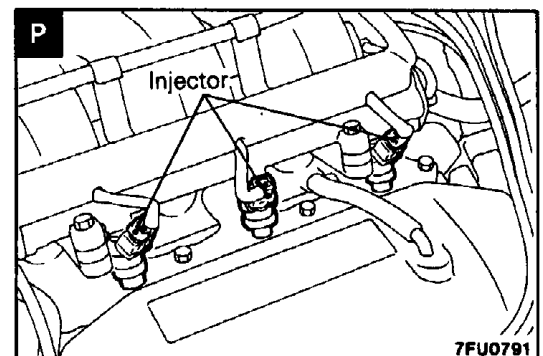
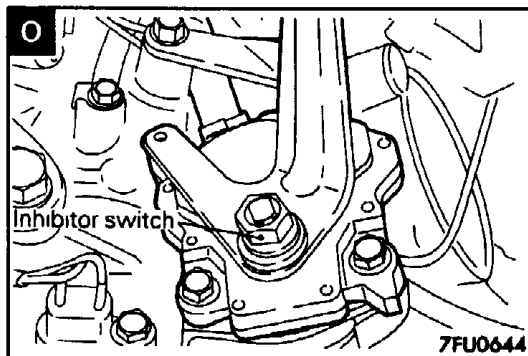
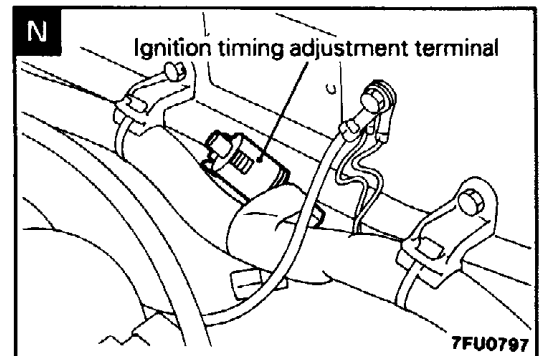
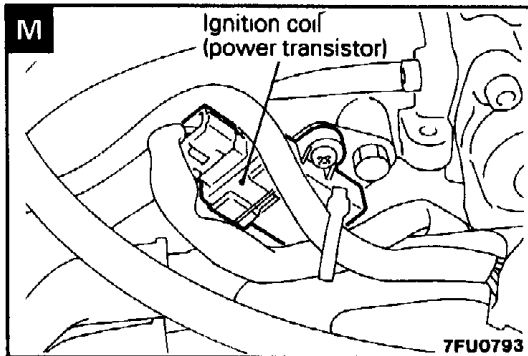
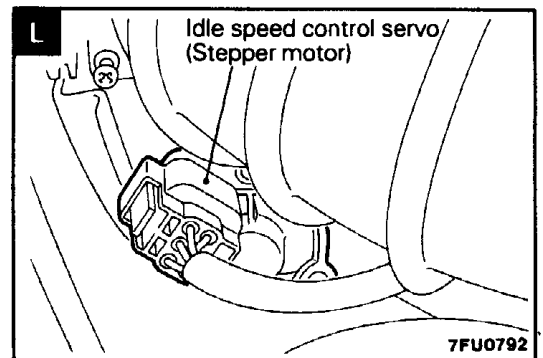
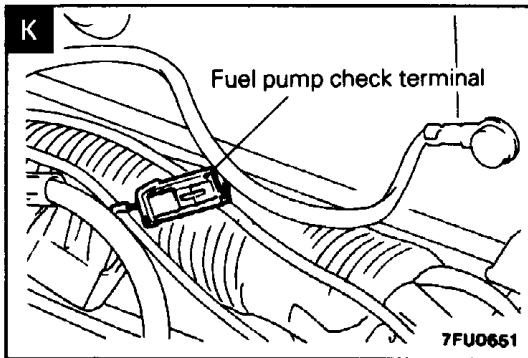
E130AAA

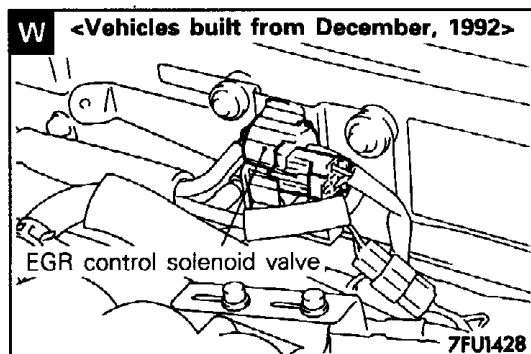
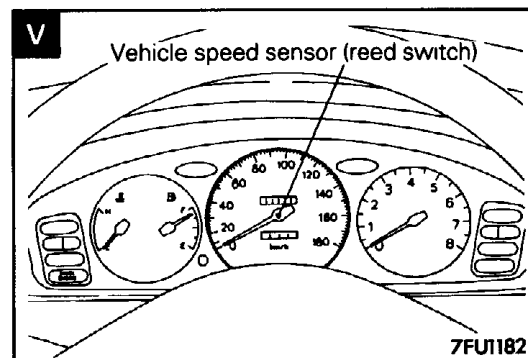
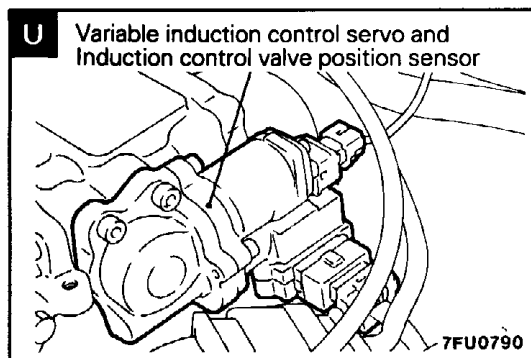
<SOHC>

Name	Symbol	Name	Symbol
Air conditioner relay	A	Idle speed control servo	L
Air conditioner switch	B	Ignition coil (power transistor)	M
Air flow sensor (incorporating intake air temperature sensor and barometric pressure sensor)	C	Ignition timing adjustment terminal	N
		Inhibitor switch	O
		Injector	P
Control relay	D	Oxygen sensor	Q
Crank angle sensor	E	Power steering fluid pressure switch	R
Detonation sensor	F	Purge control solenoid valve	S
Diagnosis connector	G	Throttle position sensor (with idle position switch)	T
EGR control solenoid valve <Vehicles built from December, 1992>	W		
Engine control unit	H		
Engine coolant temperature sensor	I	Variable induction control servo and Induction control valve position sensor	U
Engine warning lamp (check engine lamp)	J		
Fuel pump check terminal	K	Vehicle speed sensor (reed switch)	V



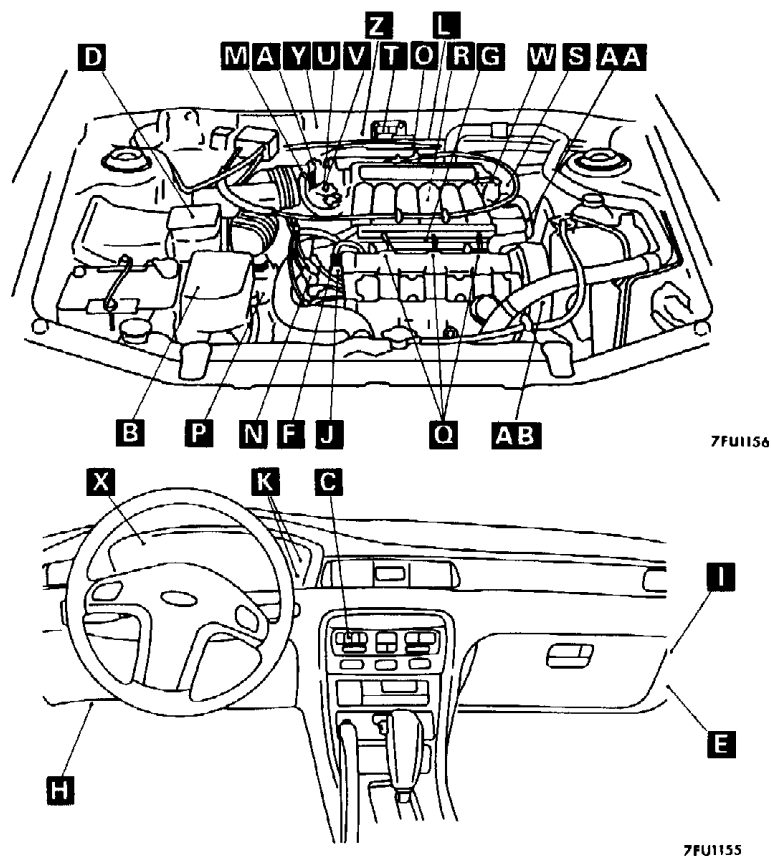


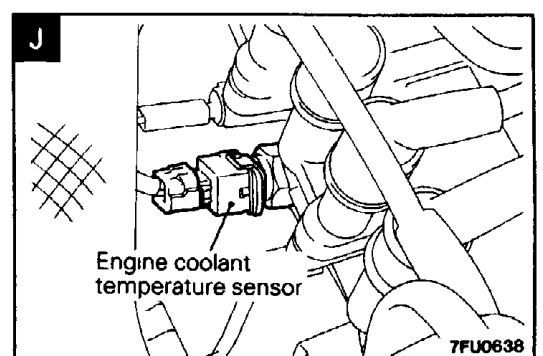
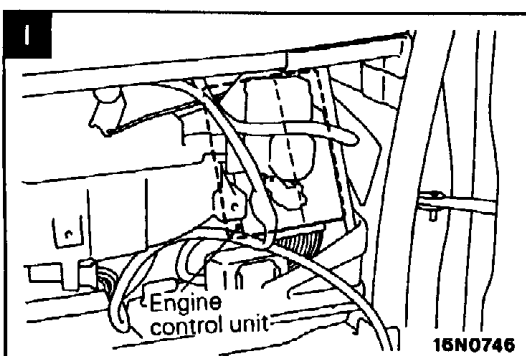
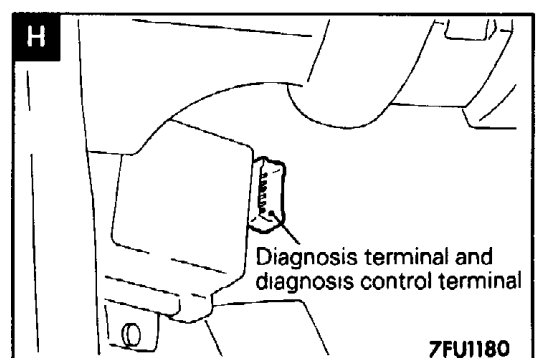
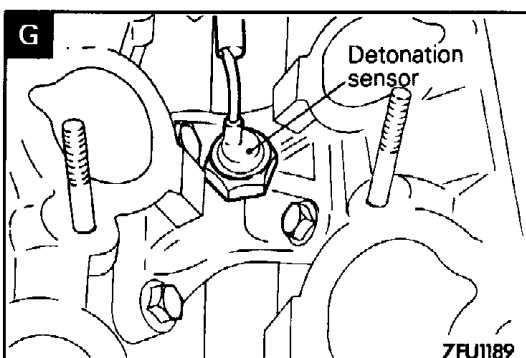
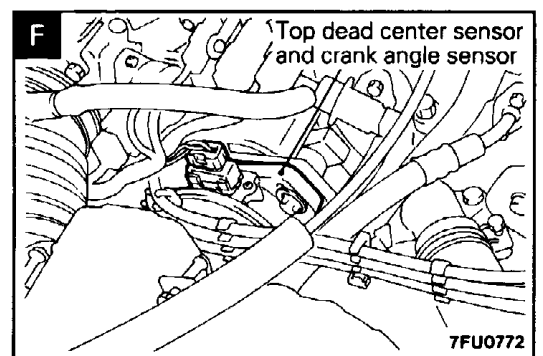
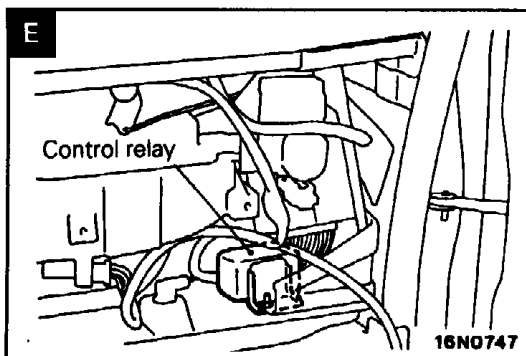
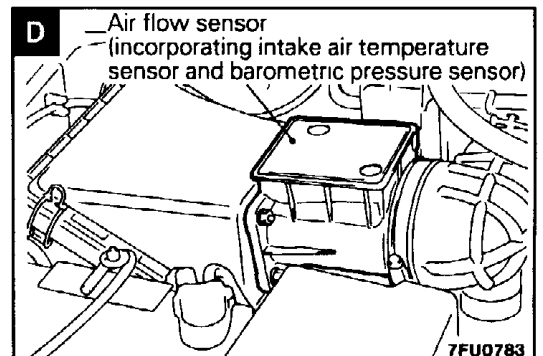
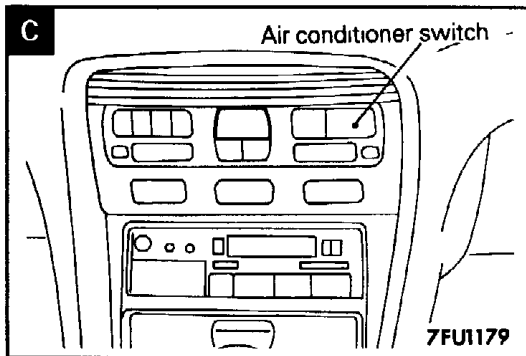
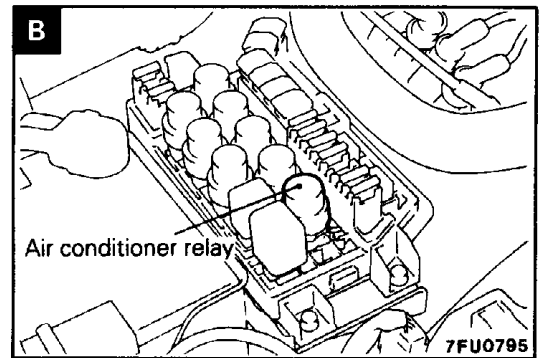
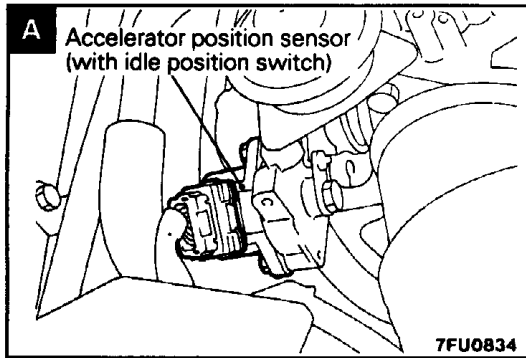


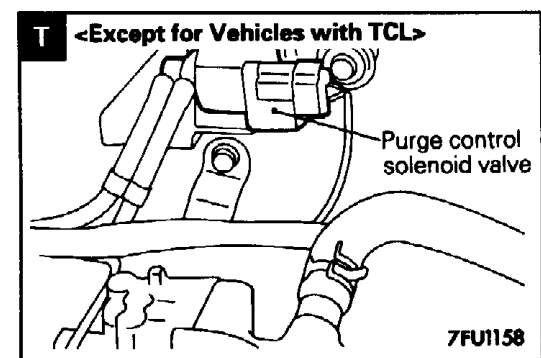
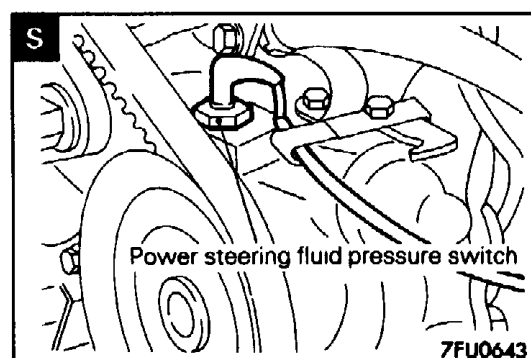
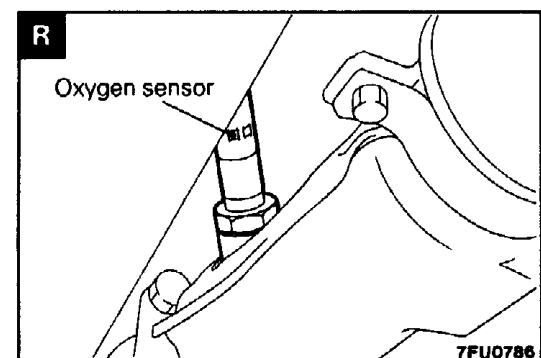
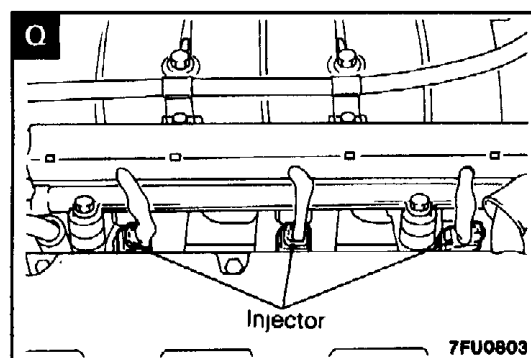
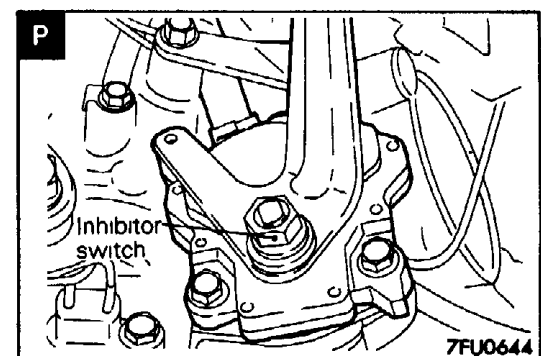
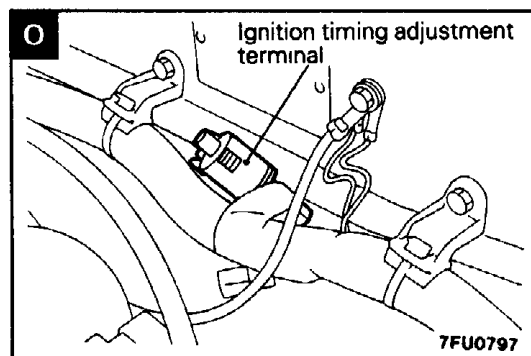
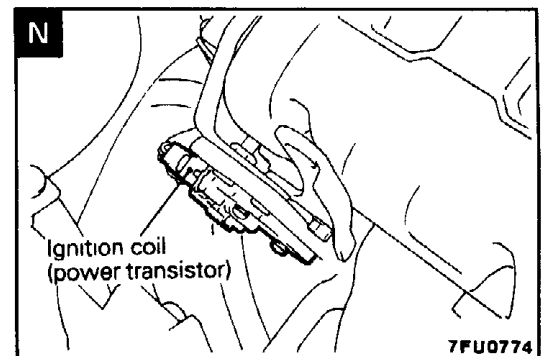
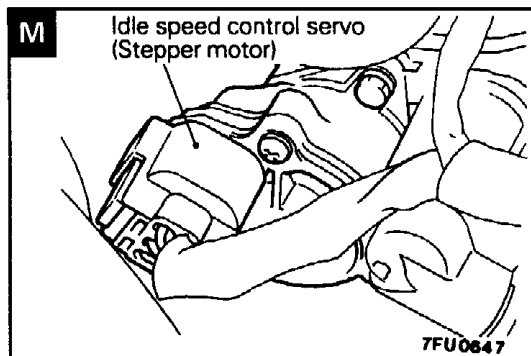
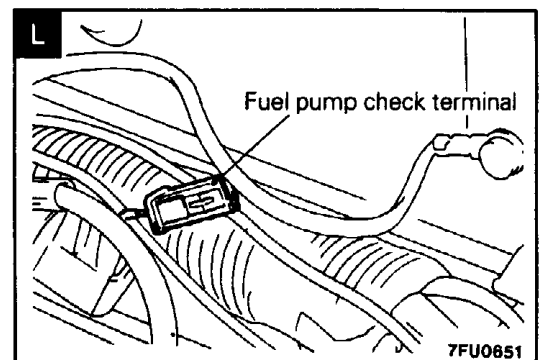
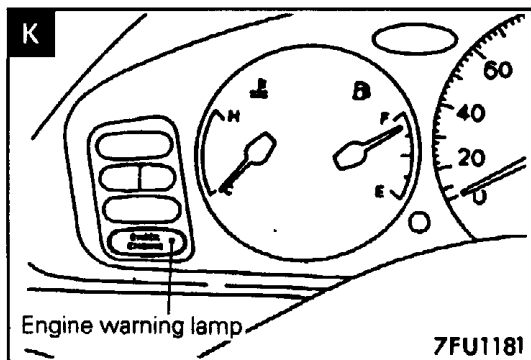


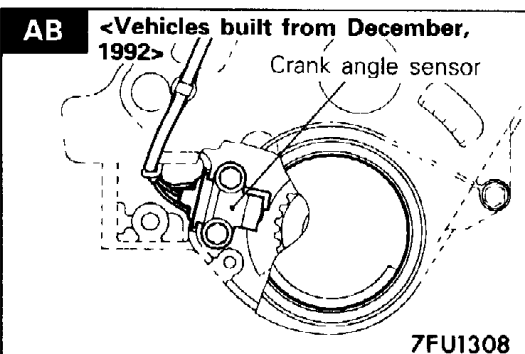
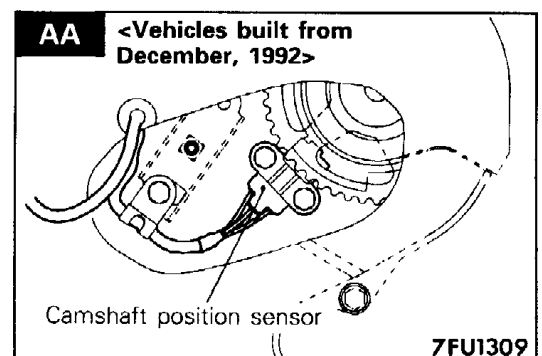
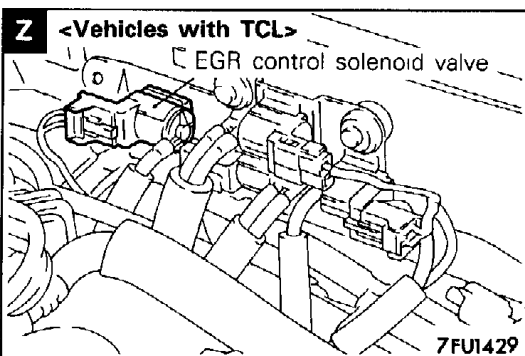
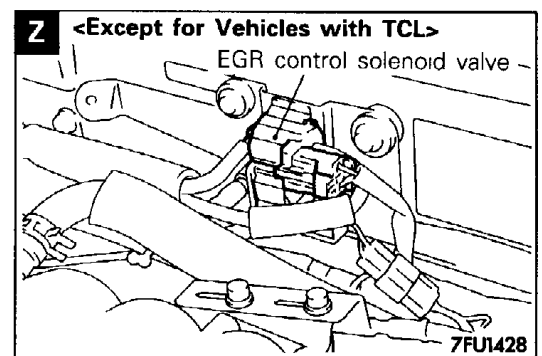
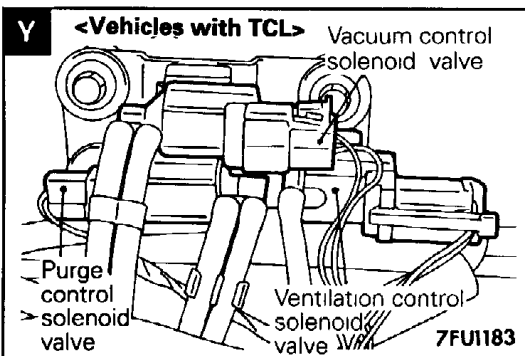
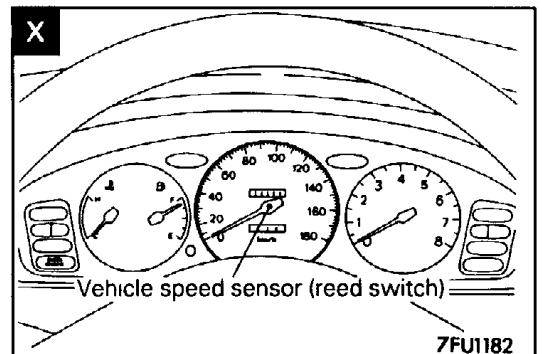
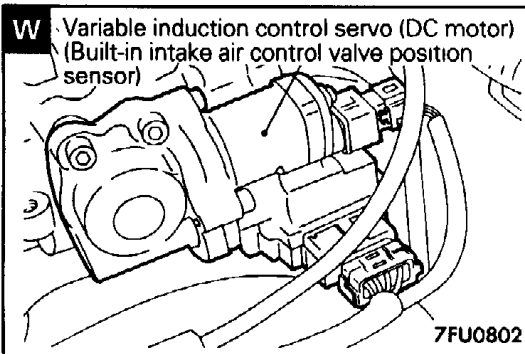
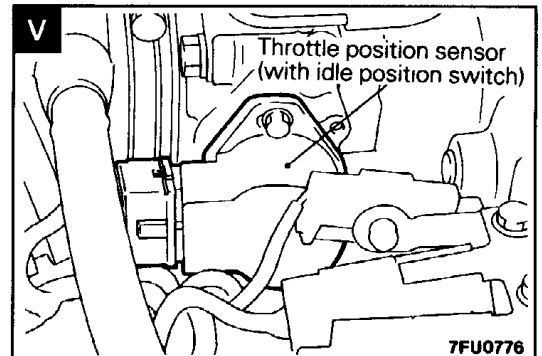
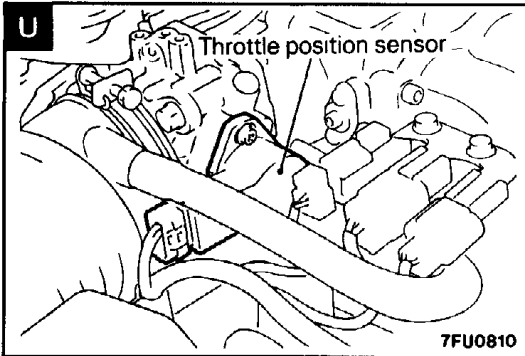
<DOHC>

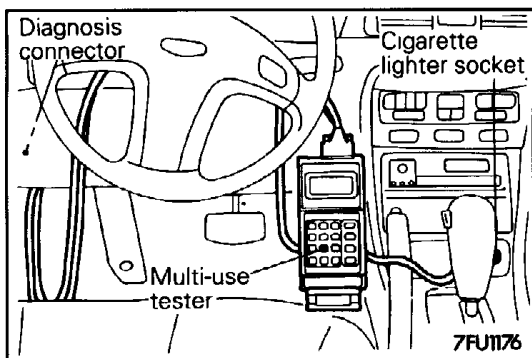
Name	Symbol	Name	Symbol
Accelerator position sensor (with idle position switch) <Vehicles with TCL>	A	Idle speed control servo	M
Air conditioner relay	B	Ignition coil (power transistor)	N
Air conditioner switch	C	Ignition timing adjustment terminal	O
Air flow sensor (incorporating intake air temperature sensor and barometric pressure sensor)	D	Inhibitor switch	P
Camshaft position sensor <Vehicles built from December, 1992>	AA	Injector	Q
Control relay	E	Oxygen sensor	R
Crank angle sensor <Vehicles built up to November, 1992>	F	Power steering fluid pressure switch	S
Crank angle sensor <Vehicles built from December, 1992>	AB	Purge control solenoid valve	T
Detonation sensor	G	Throttle position sensor <Vehicles with TCL>	U
Diagnosis connector	H	Throttle position sensor (with idle position switch) <Except for Vehicles with TCL>	V
EGR control solenoid valve <Vehicles built from December, 1992>	Z	Variable induction control servo and Induction control valve position sensor	W
Engine control unit	I	Vehicle speed sensor (reed switch)	X
Engine coolant temperature sensor	J	Vacuum control solenoid valve, Purge control solenoid valve and Ventilation control solenoid valve <Vehicles with TCL>	Y
Engine warning lamp (check engine lamp)	K		
Fuel pump check terminal	L		











COMPONENT INSPECTION PROCEDURE USING MULTI-USE TESTER

- (1) Inspect according to the service data and actuator test function. If there is any abnormality, inspect the body harness and components, etc. and repair.
- (2) After repairing, recheck using the multi-use tester to confirm that any I/O abnormalities have been correctly fixed.
- (3) Erase the self diagnosis malfunction codes from memory.
- (4) Remove the multi-use tester.
- (5) Restart the engine, test-drive, etc. to confirm that the trouble has been corrected.

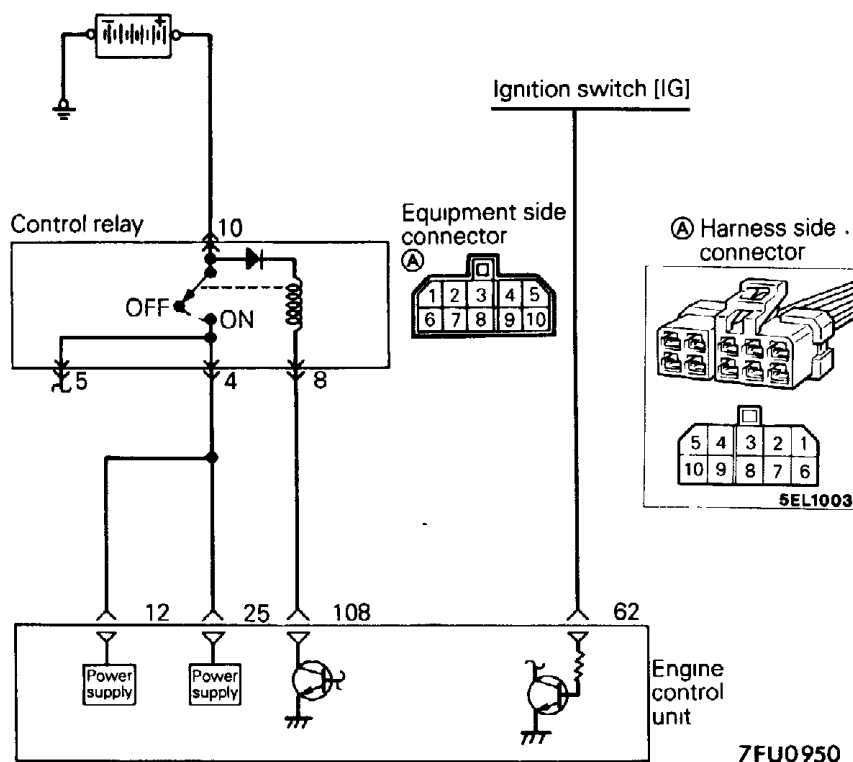
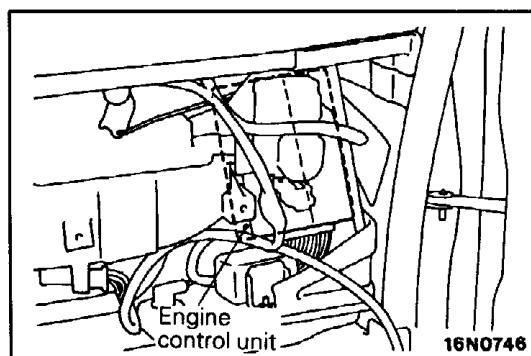
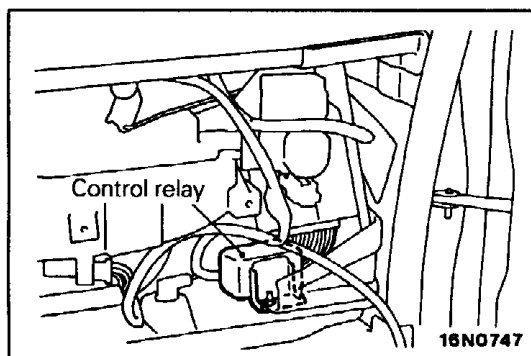
NOTE

Connect the multi-use tester to the white diagnosis connector.

NOTES

POWER SUPPLY AND IGNITION SWITCH-IG

<Vehicles built up to November, 1992>



Engine control unit connector

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544	545	546	547	548	549	550	551	552	553	554	555	556	557	558	559	560	561	562	563	564	565	566	567	568	569	570	571	572	573	574	575	576	577	578	579	580	581	582	583	584	585	586	587	588	589	590	591	592	593	594	595	596	597	598	599	600	601	602	603	604	605	606	607	608	609	610	611	612	613	614	615	616	617	618	619	620	621	622	623	624	625	626	627	628	629	630	631	632	633	634	635	636	637	638	639	640	641	642	643	644	645	646	647	648	649	650	651	652	653	654	655	656	657	658	659	660	661	662	663	664	665	666	667	668	669	670	671	672	673	674	675	676	677	678	679	680	681	682	683	684	685	686	687	688	689	690	691	692	693	694	695	696	697	698	699	700	701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719	720	721	722	723	724	725	726	727	728	729	730	731	732	733	734	735	736	737	738	739	740	741	742	743	744	745	746	747	748	749	750	751	752	753	754	755	756	757	758	759	760	761	762	763	764	765	766	767	768	769	770	771	772	773	774	775	776	777	778	779	780	781	782	783	784	785	786	787	788	789	790	791	792	793	794	795	796	797	798	799	800	801	802	803	804	805	806	807	808	809	810	811	812	813	814	815	816	817	818	819	820	821	822	823	824	825	826	827	828	829	830	831	832	833	834	835	836	837	838	839	840	841	842	843	844	845	846	847	848	849	850	851	852	853	854	855	856	857	858	859	860	861	862	863	864	865	866	867	868	869	870	871	872	873	874	875	876	877	878	879	880	881	882	883	884	885	886	887	888	889	890	891	892	893	894	895	896	897	898	899	900	901	902	903	904	905	906	907	908	909	910	911	912	913	914	915	916	917	918	919	920	921	922	923	924	925	926	927	928	929	930	931	932	933	934	935	936	937	938	939	940	941	942	943	944	945	946	947	948	949	950	951	952	953	954	955	956	957	958	959	960	961	962	963	964	965	966	967	968	969	970	971	972	973	974	975	976	977	978	979	980	981	982	983	984	985	986	987	988	989	990	991	992	993	994	995	996	997	998	999	1000
---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	------

7FU0653

OPERATION

- While the ignition switch is on, battery power is supplied to the engine control unit, the injector, the air flow sensor, etc.
- When the ignition switch is turned on, the battery voltage is applied from the ignition switch to the engine control unit, which then

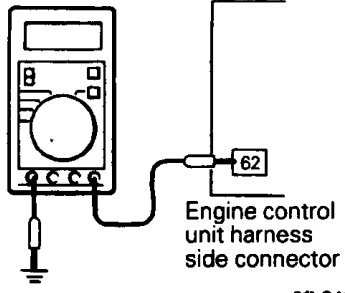
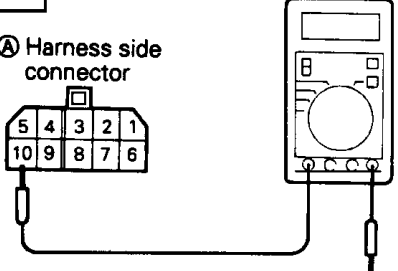
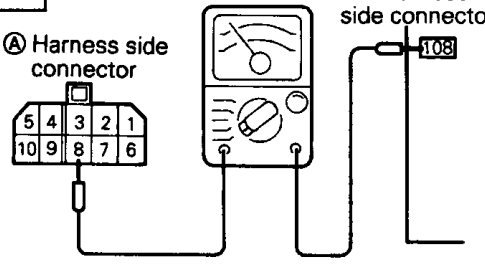
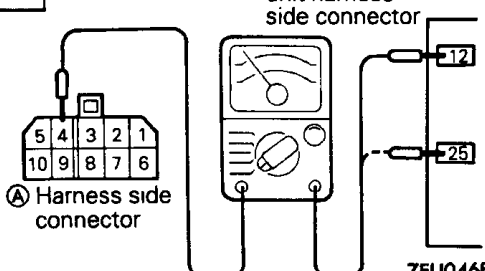
turns ON the power transistor to energize the control relay coil. This turns ON the control relay switch and the power is supplied from the battery to the engine control unit through the control relay switch.

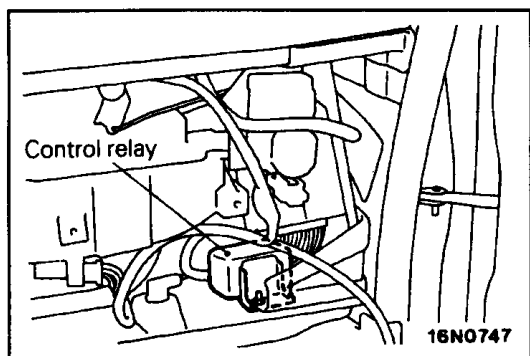
INSPECTION

Using Multi-use Tester (MUT)

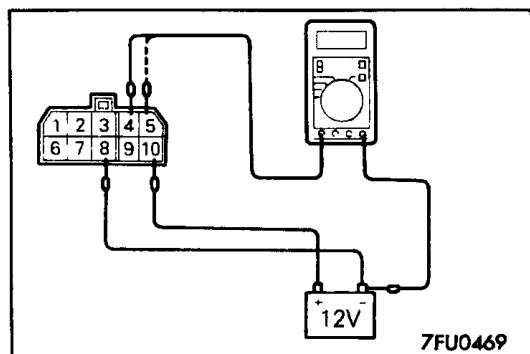
Function	Item No.	Data display	Check condition	Standard value
Data reading	16	Engine control unit power voltage	Ignition switch: ON	SV

HARNESS INSPECTION

1  Engine control unit harness side connector 01L0427	Measure the ignition switch terminal input voltage. - Engine control unit connector: Disconnected - Ignition switch: ON <table border="1"> <tr> <td>Voltage (V)</td> </tr> <tr> <td>SV</td> </tr> </table>	Voltage (V)	SV	OK → 2 ✗ → Repair the harness. (Ignition switch-62)
Voltage (V)				
SV				
2 Ⓐ Harness side connector  7FU0537	Measure the power supply voltage of the control relay. Connector: Disconnected <table border="1"> <tr> <td>Voltage (V)</td> </tr> <tr> <td>SV</td> </tr> </table>	Voltage (V)	SV	OK → 3 ✗ → Repair the harness. (Battery-Ⓐ10)
Voltage (V)				
SV				
3 Ⓐ Harness side connector  Engine control unit harness side connector 7FU0951	Check for an open-circuit, or a short-circuit to earth, between the engine control unit and the control relay. - Engine control unit connector: Disconnected - Control relay connector: Disconnected	OK → 4 ✗ → Repair the harness. (Ⓐ108-108)		
4 Ⓐ Harness side connector  Engine control unit harness side connector 7FU0468	Check for an open-circuit, or a short-circuit to earth between the engine control unit and the control relay. - Control relay connector: Disconnected - Engine control unit connector: Disconnected	OK → STOP ✗ → Repair the harness. (Ⓐ12-25)		

**CONTROL RELAY INSPECTION**

- (1) Remove the control relay.

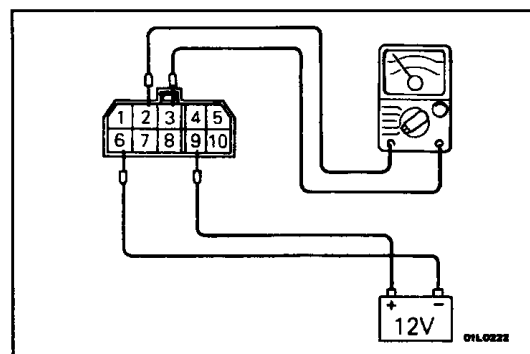


- (2) Use jumper wires and connect control relay terminal ⑩ to the battery ⊕ terminal and terminal ⑧ to the battery ⊖ terminal.

Caution

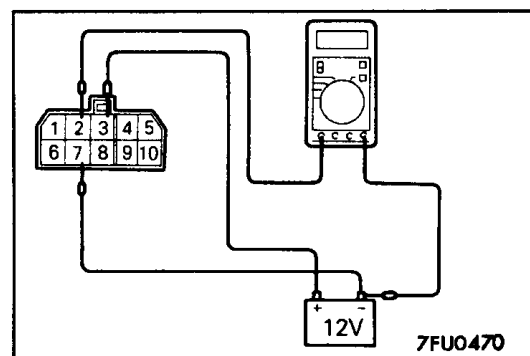
Be very careful when connecting the jumper wires because the relay will be damaged if a mistake is made with the contact terminals.

- (3) With battery ⊖ terminal jumper wire connected and disconnected, measure the voltage at control relay terminals ④ and ⑤.



Jumper wire	Terminal voltage 4	Terminal voltage 5
Connection	System voltage	System voltage
Not connected	0V	0V

- (4) Use jumper wires to connect control relay terminal ⑨ to the battery ⊕ terminal and terminal ⑥ to the battery ⊖ terminal.
- (5) With the battery ⊖ terminal jumper wire connected and disconnected, check the continuity between the terminals ② and ③.

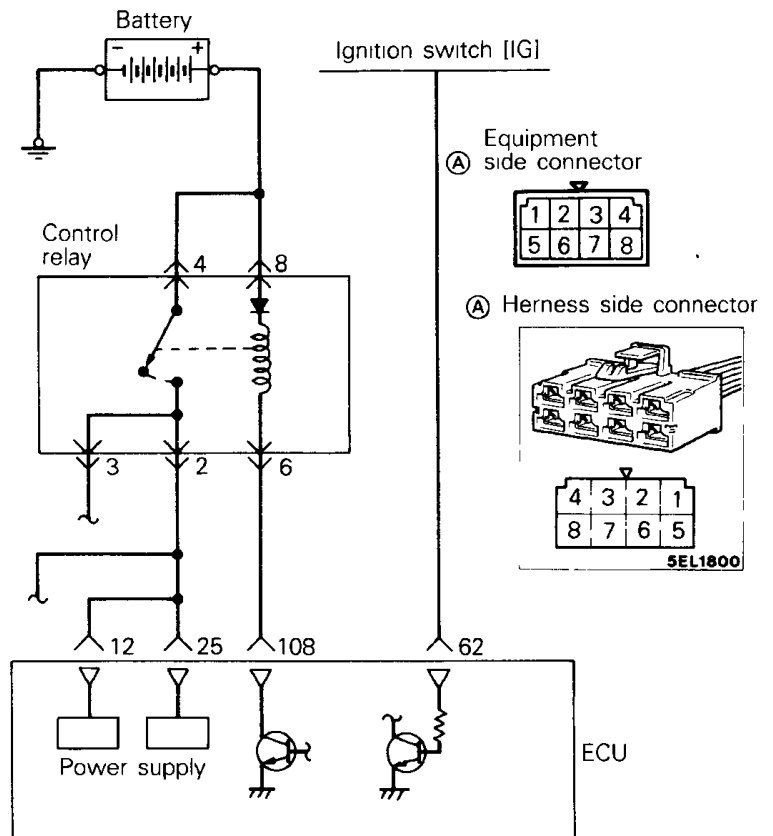
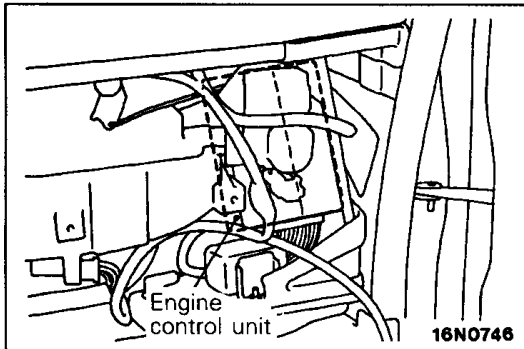
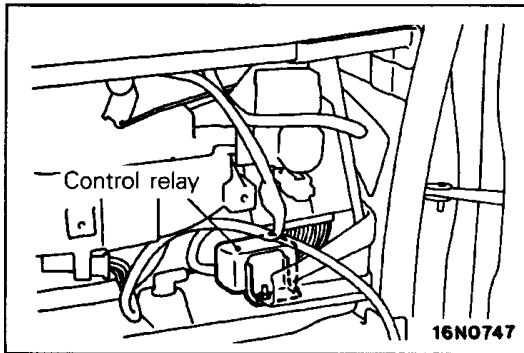


Jumper wire	Continuity between terminals 2-3
Connection	Yes
Not connected	No

- (6) Use jumper wires and connect control relay terminal ③ to the battery ⊕ terminal and terminal ⑦ to the battery ⊖ terminal.
- (7) With the battery ⊖ terminal jumper wire connected and disconnected, measure the voltage at control relay terminal ②.

Jumper wire	Terminal Voltage 2
Connection	System voltage
Not connected	0V

- (8) Replace the control relay if faulty.

POWER SUPPLY AND IGNITION SWITCH-IG <Vehicles built from December, 1992>

ECU connector

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180
---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

7FU0653

OPERATION

Refer to P.13-64

INSPECTION

Using Multi-use Tester (MUT)

Refer to P.13-64

HARNESS INSPECTION

1

Engine control unit harness side connector

01L0427

Measure the ignition switch terminal input voltage.

- Engine control unit connector. Disconnected

Ignition switch	Voltage (V)
OFF	0-1
ON	Battery voltage

OK → **2**

✗ → Repair the harness (Ignition switch - 62) or check the ignition switch

2

① Harness side connector

1FU0808

Measure the power supply voltage of the control relay.

- Ignition switch: OFF
- Control relay connector: Disconnected

Voltage (V)
Battery voltage

OK → **3**

✗ → Repair the harness.
(Battery – (A)4)
(Battery – (A)8)

3

① Harness side connector

Engine control unit harness side connector

1FU0809

Check for open-circuit, or short-circuit to earth, between the engine control unit and the control relay.

- Engine control unit connector: Disconnected
- Control relay connector: Disconnected

OK → **4**

✗ → Repair the harness.
(A)6 – (108)

4

① Harness side connector

Engine control unit harness side connector

6AF0050

Check for open-circuit, or short-circuit to earth, between the engine control unit and the control relay.

- Engine control unit connector: Disconnected
- Control relay connector: Disconnected

OK → **STOP**

✗ → Repair the harness.
(A)2 – (12/25)

5

① Harness side connector

6AF0051

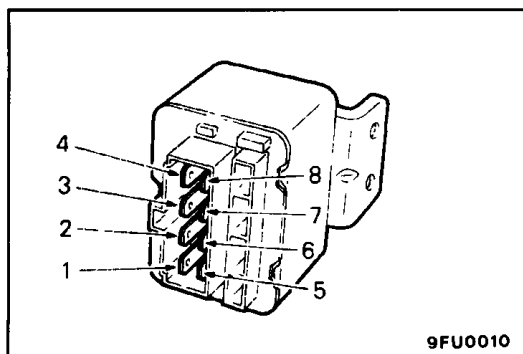
Measure the power voltage to the actuator.

- Control relay connector: Connected
- Engine control relay connector: Connected

Engine	Voltage (V)
Cranking	8V or more
Racing	Battery voltage

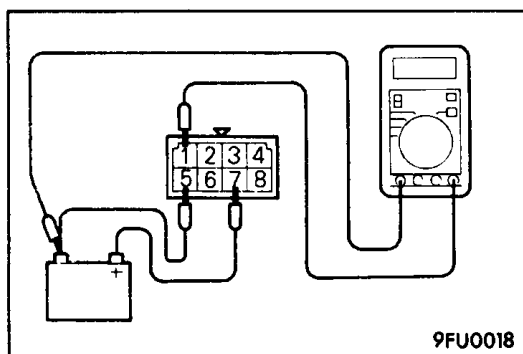
OK → **STOP**

✗ → Replace the control relay or engine control unit is defective

**CONTROL RELAY INSPECTION**

- (1) Remove the control relay.
- (2) Check the continuity between the control relay terminals.

Inspection terminals	Continuity
5-7	Continuity
6-8	Continuity in one direction



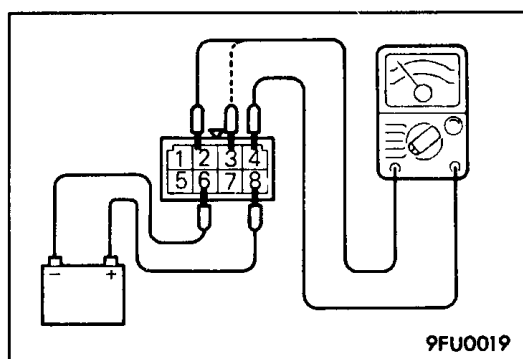
- (3) Use jumper leads to connect control relay terminal ⑦ to the battery (+) terminal and terminal ⑤ to the battery (-) terminal.

Caution

When connecting the jumper leads, be careful not to mistake the connection terminals, as damage to the relay will result.

- (4) Check the voltage at control relay terminal ① while connecting and disconnecting the jumper lead at the battery (-) terminal.

Jumper lead	Voltage at terminal 1
Connected	SV
Disconnected	0V



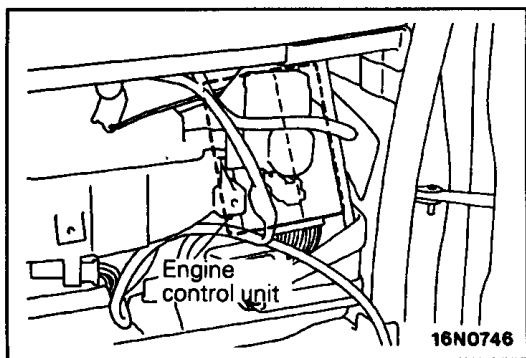
- (5) Use the jumper leads to connect control relay terminal ⑧ to the battery (+) terminal and terminal ⑥ to the battery (-) terminal.
- (6) Check the continuity between control relay terminals ② - ④ and terminals ③ - ④ while connecting and disconnecting the jumper lead at the battery (-) terminal.

Jumper lead	Continuity between terminals 2 - 4	Continuity between terminals 3 - 4
Connected	Continuity (0Ω)	Continuity (0Ω)
Disconnected	No continuity (∞Ω)	No continuity (∞Ω)

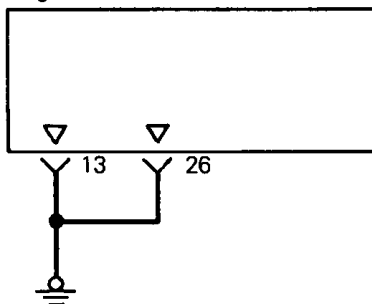
- (7) If there is a defect, replace the control relay.

NOTES

ENGINE CONTROL UNIT POWER EARTH



Engine control unit



01A0191

Engine control unit connector

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	-----

7FU0653

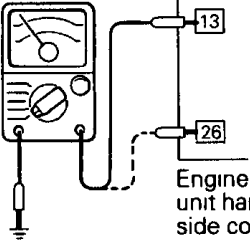
OPERATION

Earth the engine control unit

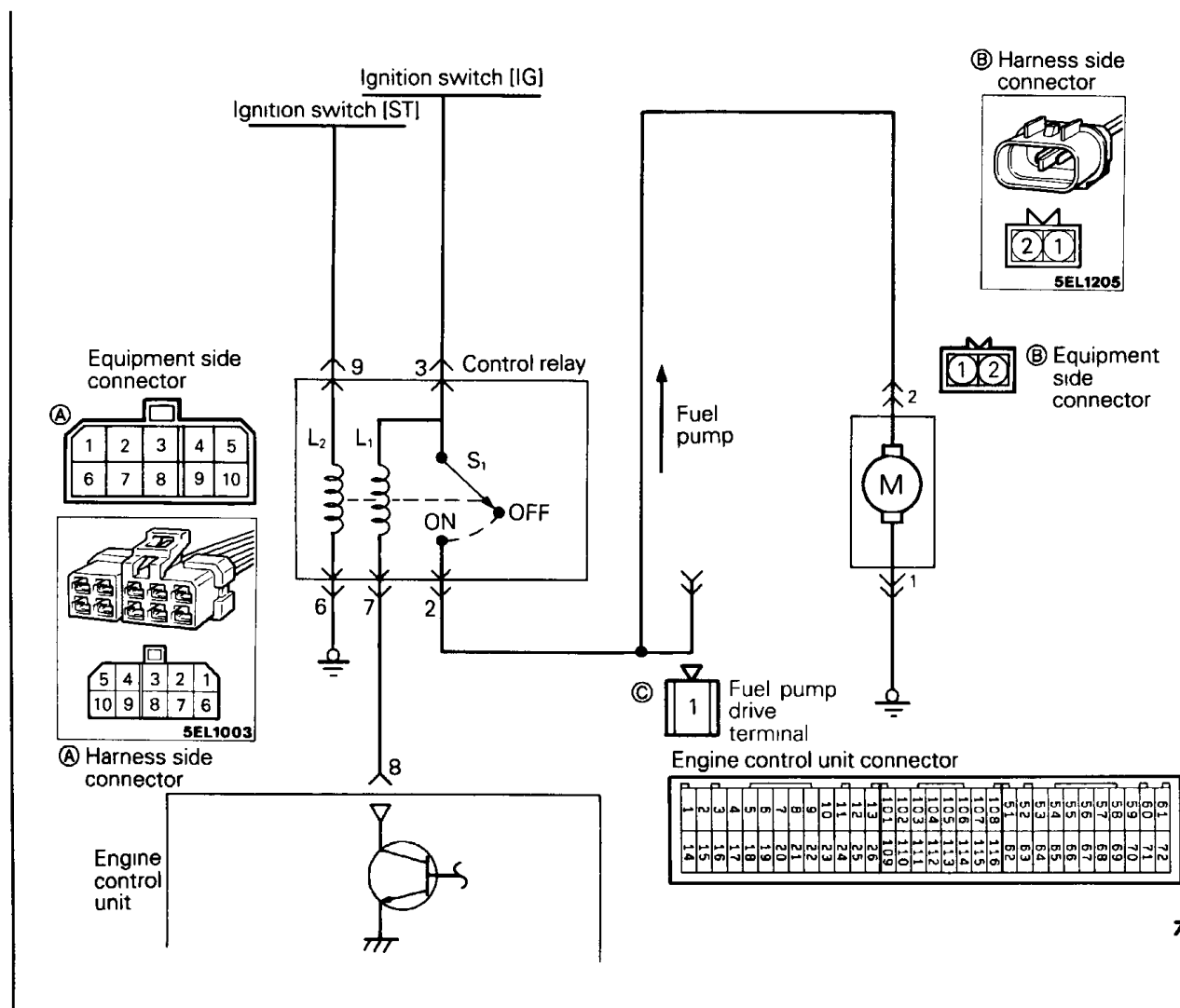
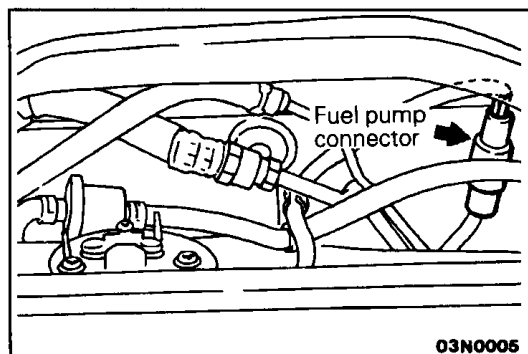
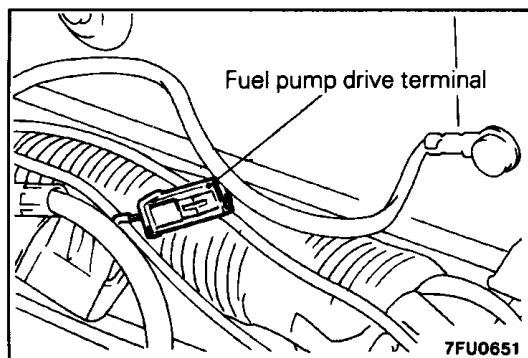
TROUBLESHOOTING HINTS

If the earth wire of the engine control unit is not connected securely to earth, the unit will not operate correctly.

HARNESS INSPECTION

1  Engine control unit harness side connector 01P0180	Check for continuity of the earth circuit. Engine control unit connector: Disconnected OK ✗ STOP Repair the harness. (13, 26 - Earth)
--	--

FUEL PUMP <Vehicles built up to November, 1992>



OPERATION

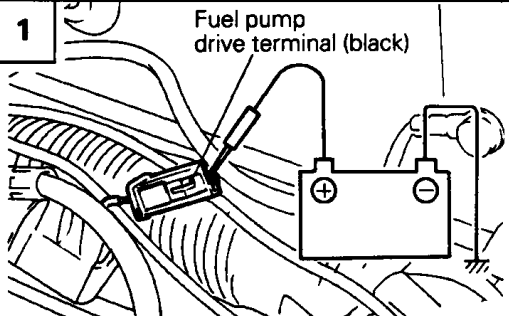
- Drives the fuel pump during cranking and engine operation.
- When the ignition switch is set to START, current flows from the ignition switch through the control relay coil to earth. This turns on the control relay switch and drive power is supplied from the battery through the control relay switch to the fuel pump.
- While the engine is running, the engine control unit keeps the power transistor on and energizes the control relay coil so that drive power is supplied to the fuel pump.
- When the control relay switch is turned on, battery voltage is also applied to the engine control unit so that the control unit detects supply of drive power to the fuel pump.

INSPECTION**Using Multi-use Tester (MUT)**

Function	Item No.	Drive	Check condition	Check content	Normal state
Actuator test	07	Fuel pump is driven to circulate fuel	• Engine cranking • Forced drive of fuel pump Check is made for above two conditions	Hold return hose with fingers to feel pulsation indicating fuel flow	Pulsation is felt
				Listen to pump operating sound near fuel tank	Operating sound is heard

HARNESS INSPECTION

1



Fuel pump drive terminal (black)

7FU0641

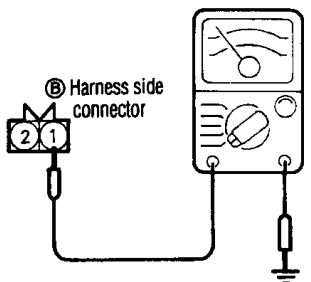
Check the fuel pump.

- Apply battery voltage to the check terminal and operate the pump.

OK → **4**

✗ → **2**

2



Ⓑ Harness side connector

1FU0521

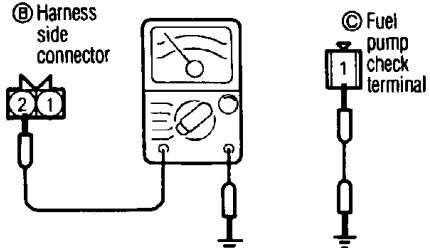
Check the earth circuit of the fuel pump.

- Connector: Disconnected

OK → **3**

✗ → Repair the harness. (Ⓑ1–Earth)

3



Ⓑ Harness side connector

Ⓒ Fuel pump check terminal

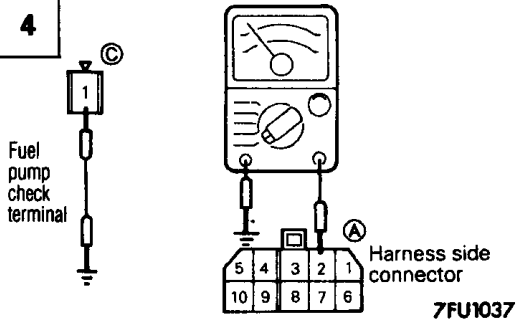
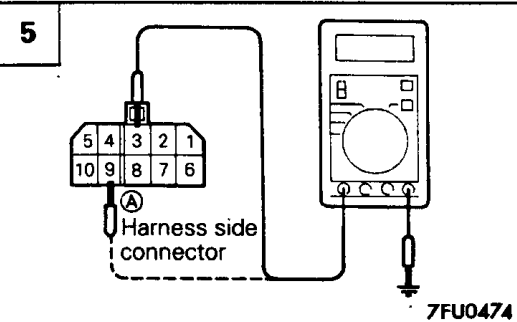
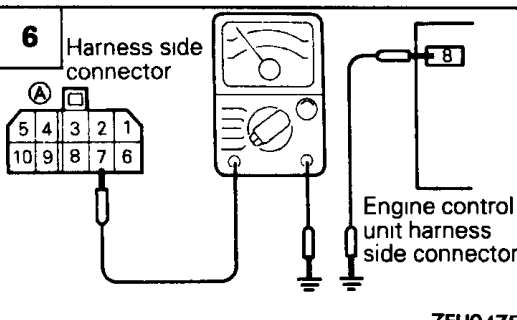
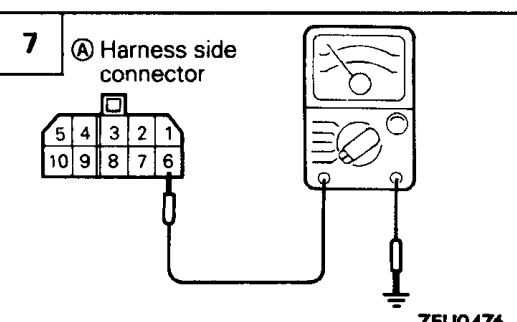
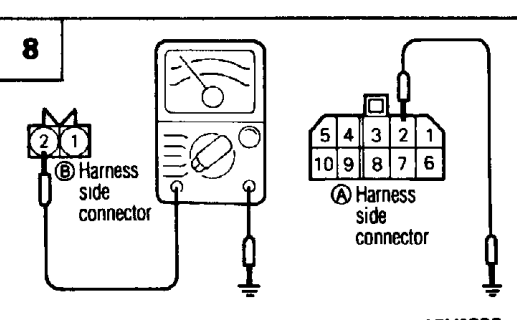
1FU0522

Check for continuity between the fuel pump and the check terminal.

- Connector: Disconnected

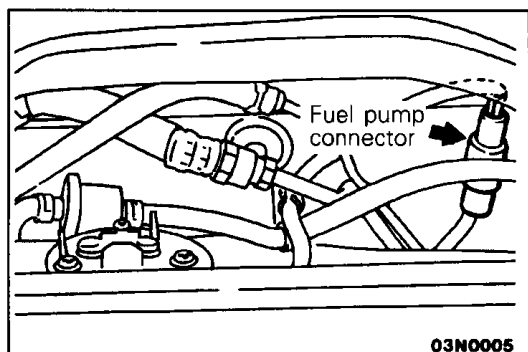
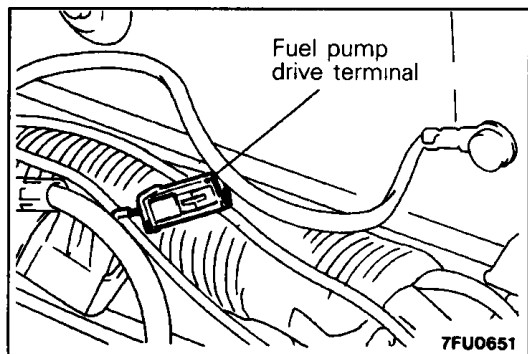
OK → **4**

✗ → Repair the harness. (Ⓑ2–Ⓒ1.)

4  Fuel pump check terminal Harness side connector 7FU1037	Check for continuity between the check terminal and the control relay terminals. - Control relay connector: Disconnected - Fuel pump connector: Disconnected	OK → 5 ✗ → Repair the harness. (A2–C1)		
5  Harness side connector 7FU0474	Measure the power supply voltage of the control relay. - Connector: Disconnected - Ignition switch: START (when A9 checked) - Ignition switch: ON (when A3 checked) <table border="1"><thead><tr><th>Voltage (V)</th></tr></thead><tbody><tr><td>8 or more</td></tr></tbody></table>	Voltage (V)	8 or more	OK → 6 ✗ → Repair the harness. (Ignition switch-IG–A3) (Ignition switch-ST–A9)
Voltage (V)				
8 or more				
6  Harness side connector Engine control unit harness side connector 7FU0475	Check for an open-circuit, or a short-circuit to earth between the control relay and the engine control unit. - Control relay connector: Disconnected - Engine control unit connector: Disconnected	OK → 7 ✗ → Repair the harness. (A7–8)		
7  A Harness side connector 7FU0476	Check for continuity of the earth circuit. Control relay connector: Disconnected	OK → 8 ✗ → Repair the harness. (A6–Earth)		
8  Harness side connector Harness side connector 6FU1333	Check for an open-circuit, or a short-circuit to earth between the control relay and the fuel pump. - Control relay connector: Disconnected - Fuel pump connector: Disconnected	OK → STOP ✗ → Repair the harness. (A2–B2.)		

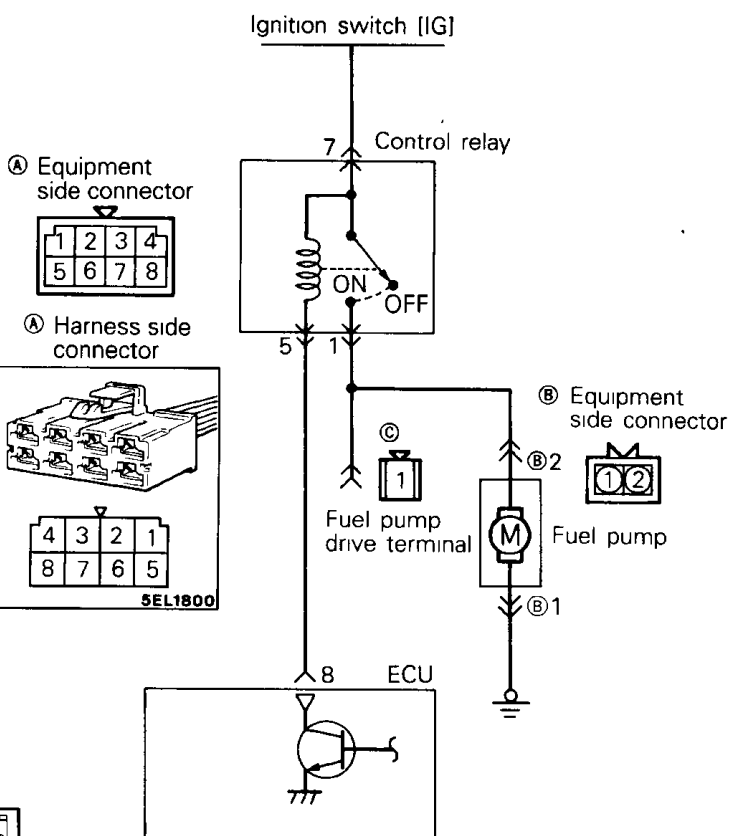
CONTROL RELAY INSPECTION

Refer to P.13-66.

FUEL PUMP <Vehicles built from December, 1992>

ECU connector

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	-----



7FU0653

6AF0159

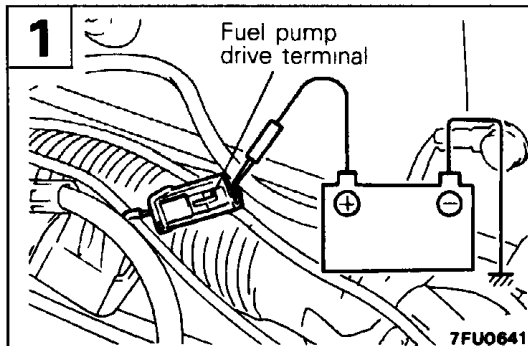
OPERATION

- The fuel pump is driven when the engine is cranking and while the engine is running.
- When the engine is cranking and while the engine is running, the engine control unit turns the power transistor ON to supply

power to the control relay coil. This causes the control relay switch to turn ON, and current is supplied from the ignition switch via the control relay switch to drive the fuel pump.

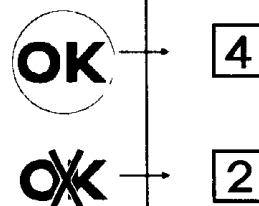
INSPECTION**Using Multi-use Tester (MUT)**

Refer to P. 13-69

HARNESS INSPECTION

Check the fuel pump.

- Apply battery voltage to the fuel pump drive terminal and operate the pump.



2

Ⓑ Harness side connector

1FU0521

Check for continuity of the fuel pump earthing line.

- Fuel pump intermediate connector: Disconnected

OK → **3**

✗ → Repair the harness. (Ⓑ1 – Earth)

3

Ⓑ Harness side connector

1FU0522

Check for open-circuit or short-circuit between the fuel pump and the fuel pump drive terminal.

- Fuel pump intermediate connector: Disconnected
- Control relay connector: Disconnected

OK → **4**

✗ → Repair the harness. (Ⓑ2 – Ⓒ1)

4

Ⓐ Harness side connector

9FU0023

Measure the power supply voltage of the control relay.

- Control relay connector: Disconnected

Ignition switch	Voltage (V)
OFF	0-1
START	Battery voltage

OK → **5**

✗ → Repair the harness. (Ignition switch – Ⓐ7) or check for ignition switch

5

Ⓐ Harness side connector

Engine control unit harness side connector

01A0354

Check for an open-circuit, or a short-circuit to earth between the control relay and the engine control unit.

- Control relay connector: Disconnected
- Engine control unit connector: Disconnected

OK → **6**

✗ → Repair the harness (Ⓐ5 – 8)

6

Ⓐ Harness side connector

9FU0024

Check for continuity between the fuel pump drive terminal and the control relay.

- Control relay connector: Disconnected
- Fuel pump connector: Disconnected

OK → **7**

✗ → Repair the harness. (Ⓐ1 – Ⓒ1)

7

6AF0162

Check for an open-circuit, or a short-circuit to earth between the control relay and the fuel pump.

- Control relay connector: Disconnected
- Fuel pump intermediate connector: Disconnected

OK → **8**

OK → Repair the harness.
(A1) – (B2)

8

6FU1753

Measure the power supply voltage of the fuel pump.

- Control relay connector: Connected
- Engine control unit connector: Connected

Engine	Voltage (V)
Cranking	8V or more
Racing	Battery voltage

OK → **STOP**

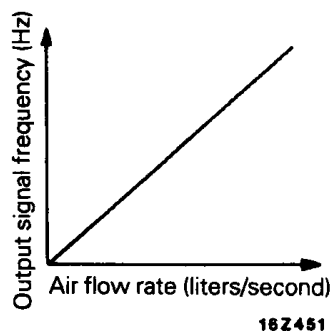
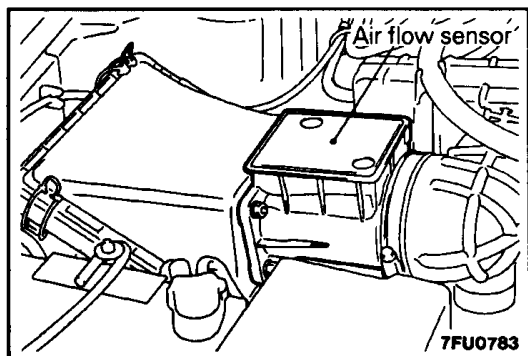
OK → Control relay or engine control unit is defective.

CONTROL RELAY INSPECTION

Refer to P. 13-66-3

NOTE

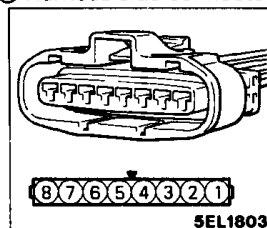
AIR FLOW SENSOR



Ⓐ Equipment side connector



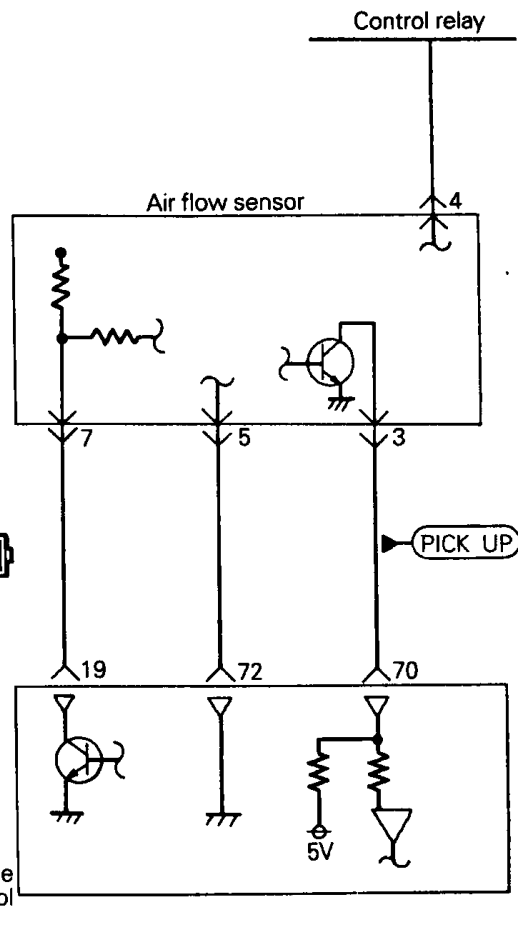
Ⓐ Harness side connector



Engine control unit connector

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72
---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

7FU0653



7FU0654

OPERATION

- The air flow sensor located in the air cleaner converts the engine intake air volume into a pulse signal of frequency proportional to the air volume and inputs it to the engine control unit, which then computes the fuel injection rate, etc. based on the input signal.
- The air flow sensor power is supplied from the control relay to the air flow sensor and is earthed in the engine control unit. The air flow sensor generates a pulse signal as it repeatedly opens and closes between the 5 V voltage supplied from the engine control unit and earth.

TROUBLESHOOTING HINTS

Hint 1: If the engine stalls occasionally, crank the engine and shake the air flow sensor harness. If the engine stalls, poor contact of the air flow sensor connector is suspected.

Hint 2: If the air flow sensor output frequency is other than 0 when the ignition switch is

turned on (but not starting the engine), faulty air flow sensor or engine control unit is suspected.

Hint 3: If the engine can be run idle even though the air flow sensor output frequency is out of specification, troubles are often found in other than the air flow sensor itself.

[Examples]

- Disturbed air flow in the air flow sensor
(Disconnected air duct, clogged air cleaner element)
- Poor combustion in the cylinder
(Faulty ignition plug, ignition coil, injector, incorrect compression pressure, etc.)
- Air leaking into the intake manifold through gap of gasket, etc.

INSPECTION WITH MULTI-USE TESTER (MUT)

Air Flow Sensor

Function	Item No.	Data display	Check condition	Engine condition	Standard value
Data list	12	Sensor air flow (frequency)	• Engine coolant temperature: 80–95°C (176–205°F) • Operation of lamps, electric cooling fan, accessories: OFF • Transmission: neutral (For A/T vehicles: P range) • Steering wheel: center position	700 r/min (Idling)	25–50Hz
				2000 r/min	65–105Hz
				Racing	Frequency increases according to engine speed.

NOTE

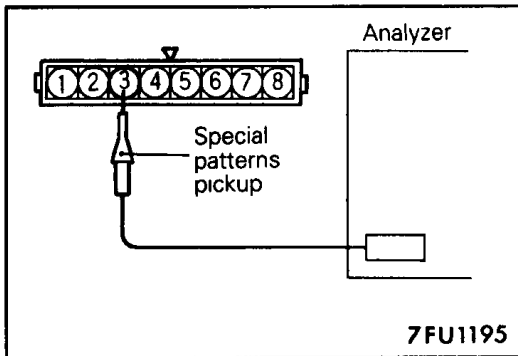
A new vehicle [driven approximately 500 km (300 miles) or less], may show the air flow sensor output frequency to be approximately 10% higher than usual.)

AIR FLOW SENSOR RESET SIGNAL

Function	Item No.	Data display	Check condition	Engine condition	Normal display
Data list	34	Reset signal condition	• Engine warm up	700 r/min (Idling)	ON
				200 r/min	OFF

VOLUMETRIC EFFICIENCY

Function	Item No.	Data display	Check condition	Engine condition	Standard value
Data list	37	Volumetric efficiency	• Engine coolant temperature: 80–95°C (176–205°F) • Operation of lamps, electric cooling fan, accessories: OFF • Transmission: neutral (For A/T vehicles: P range) • Steering wheel: center position	700 r/min (Idling)	15–35%
				2000 r/min	15–30%
				Racing	Volumetric efficiency increases according to engine speed



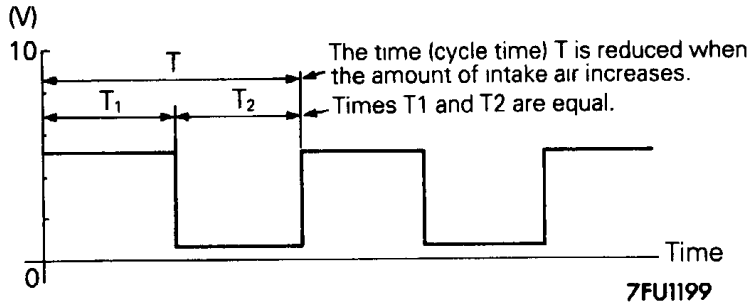
Wave Pattern Inspection Using an Analyzer

Measurement method

- (1) Disconnect the air flow sensor connector, and connect the special tool (test harness: MB991348) in between. (All terminals should be connected.)
- (2) Connect the analyzer special patterns pickup to terminal ③ of the air flow sensor connector.

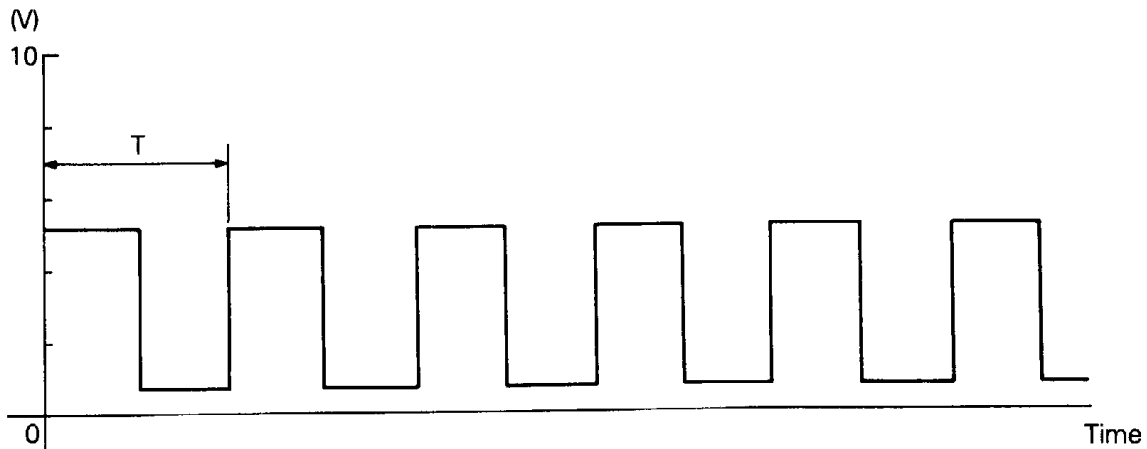
Standard wave pattern

Observation conditions



Function	Special patterns
Pattern height	Low
Pattern selector	Display
Engine r/min.	Idle r/min. (700 r/min.)

Observation conditions (from conditions on above engine speed is increased by racing.)



Wave pattern observation points

Check that cycle time T becomes shorter and the frequency increases when the engine speed is increased.

Examples of abnormal wave patterns

- Example 1

Cause of problem

Sensor interface malfunction

Wave pattern characteristics

Rectangular wave pattern is output even when the engine is not started.

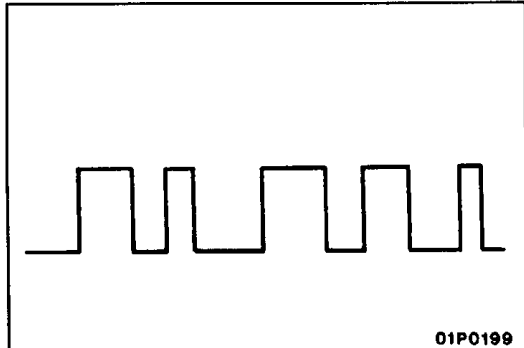
- Example 2

Cause of problem

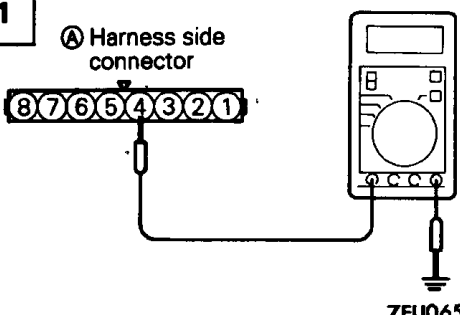
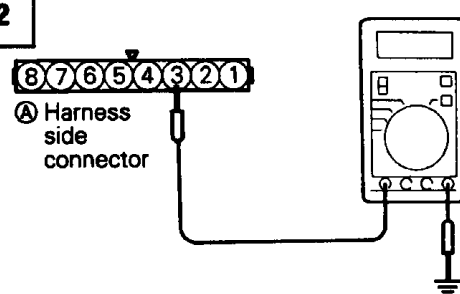
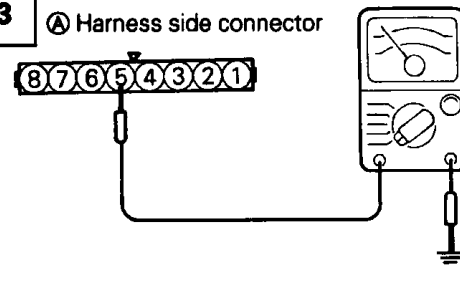
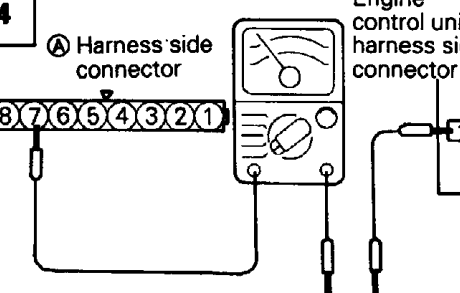
Damaged rectifier or vortex generation column

Wave pattern characteristics

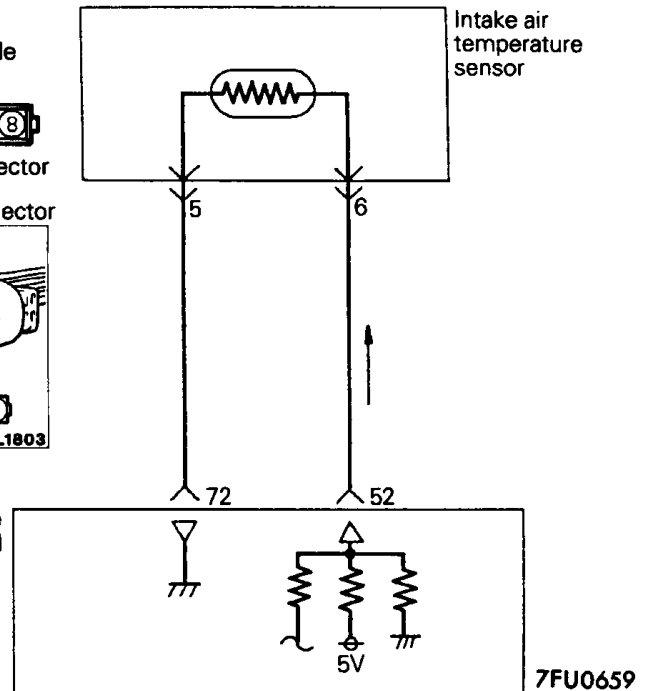
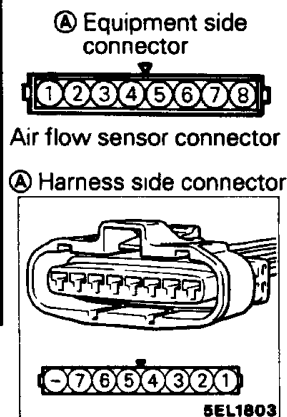
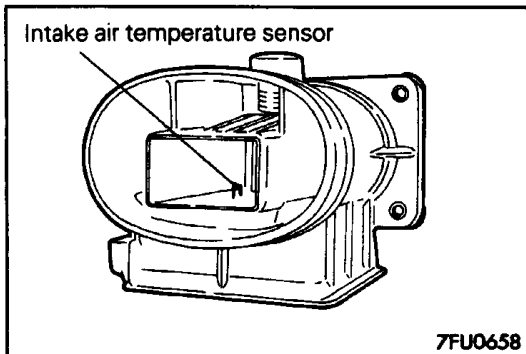
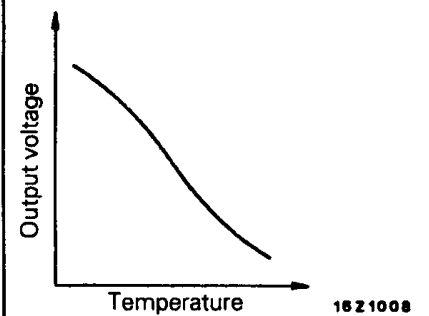
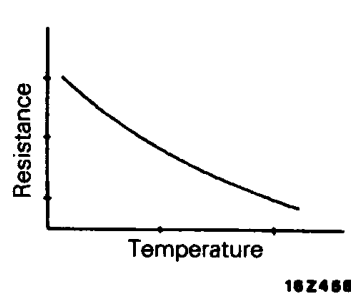
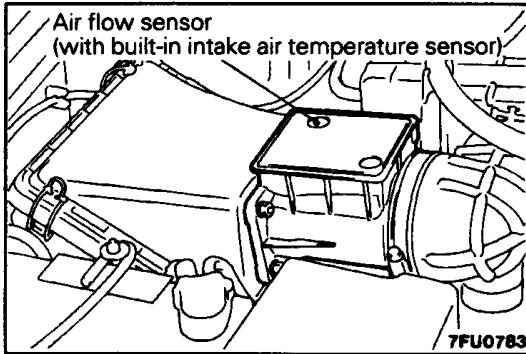
Unstable wave pattern with non-uniform frequency. However, when an ignition leak occurs during acceleration, the wave pattern will be distorted temporarily, even if the air flow sensor is normal.



HARNESS INSPECTION

1 Ⓐ Harness side connector  7FU0655	Measure the power supply voltage. - Connector: Disconnected - Ignition switch: ON <table><tr><td>Voltage (V)</td></tr><tr><td>SV</td></tr></table> OK ✖ 2 Repair the harness. (A4–Control relay) or check the control relay	Voltage (V)	SV
Voltage (V)			
SV			
2 Ⓐ Harness side connector  7FU0656	Measure the terminal voltage. - Connector: Disconnected - Ignition switch: ON <table><tr><td>Voltage (V)</td></tr><tr><td>4.8–5.2</td></tr></table> OK ✖ 3 Repair the harness. (A3–70)	Voltage (V)	4.8–5.2
Voltage (V)			
4.8–5.2			
3 Ⓐ Harness side connector  7FU0657	Check for continuity of the earth circuit. Connector: Disconnected OK ✖ 4 Repair the harness. (A5–72)		
4 Ⓐ Harness side connector Engine control unit harness side connector  7FU0745	Check for continuity between the air flow sensor and the engine control unit. - Air flow sensor connector: Disconnected - Engine control unit connector: Disconnected OK ✖ STOP Repair the harness. (A7–19)		

INTAKE AIR TEMPERATURE SENSOR



OPERATION

- The intake air temperature sensor converts the engine intake air temperature into a voltage and inputs it to the engine control unit, which then corrects the fuel injection rate, etc. based on the input signal.
- The 5 V power in the engine control unit is supplied via a resistor in the unit to the intake air temperature sensor. Via the sensor which is a kind of resistor, it is earthed in the engine control unit. The intake air temperature sensor resistor has such characteristic that its resistance decreases as the intake air temperature rises.
- The intake air temperature sensor terminal voltage increases or decreases as the sensor resistance increases or decreases. Therefore, the intake air temperature sensor terminal voltage changes with the intake air temperature, decreasing as the temperature rises.

TROUBLESHOOTING HINTS

The intake air temperature sensor senses the intake air temperature in the air cleaner so that it may indicate a temperature different from outside temperature depending on engine operating state.

INSPECTION

Using Multi-use Tester (MUT)

Function	Item No.	Data display	Check condition	Intake air temperature	Standard value
Data reading	13	Sensor temperature	Ignition switch: ON or engine running	-20°C (-4°F)	-20°C
				0°C (32°F)	0°C
				20°C (68°F)	20°C
				40°C (104°F)	40°C
				80°C (176°F)	80°C

HARNESS INSPECTION

1 ① Harness side connector

7FU0657

Check for continuity of the earth circuit.

- Connector: Disconnected

OK

→

2

✗

→ Repair the harness. (A5-72)

2 Air flow sensor connector

7FU0660

Measure the power supply voltage.

- Connector: Disconnected
- Ignition switch: ON

Voltage (V)
4.5-4.9

OK

→

STOP

✗

→ Repair the harness. (A6-52)

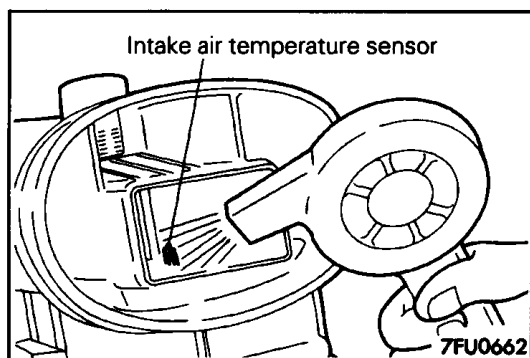
① Harness side connector

7FU0661

SENSOR INSPECTION

- (1) Disconnect the air flow sensor connectors.
- (2) Measure resistance between terminals ⑤ and ⑥.

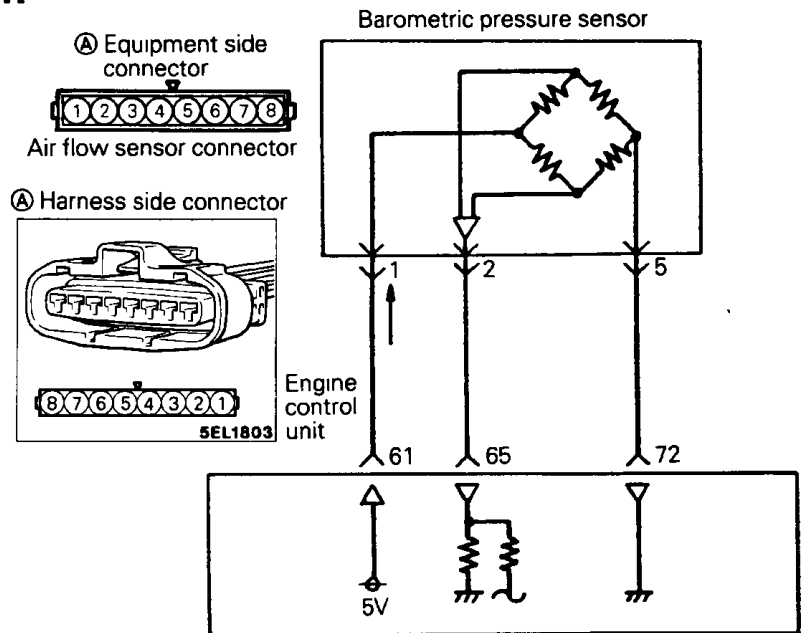
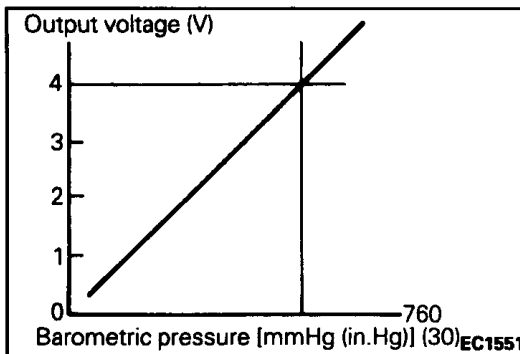
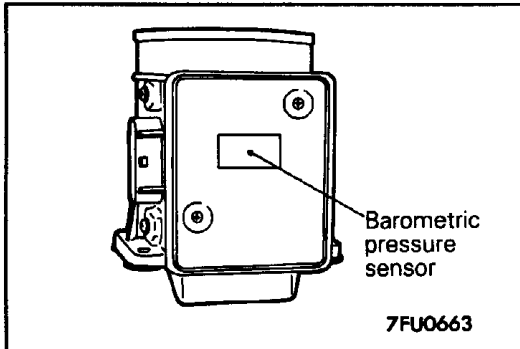
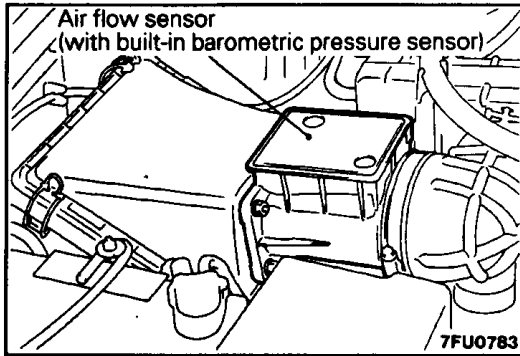
Temperature [°C (°F)]	Resistance (kΩ)
0 (32)	6.0
20 (68)	2.7
80 (176)	0.4



- (3) Measure resistance while heating the sensor using a hair drier.

Temperature [°C (°F)]	Resistance (k Ω)
Higher	Smaller

- (4) If the value deviates from the standard value or the resistance remains unchanged, replace the air flow sensor assembly.

BAROMETRIC PRESSURE SENSOR

7FU0664

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	-----

7FU0653

OPERATION

- The barometric pressure sensor converts the barometric pressure into a voltage and inputs it to the engine control unit, which then corrects the fuel injection rate, etc. based on the input signal.
- The 5 V power in the engine control unit is supplied to the barometric pressure sensor. Through the circuit in the sensor, it is earthed in the engine control unit.
- The barometric pressure sensor output voltage which is proportional to the barometric pressure (absolute pressure) is supplied to the engine control unit.

TROUBLESHOOTING HINTS

Hint 1: If the barometric pressure sensor is faulty, poor driveability is caused at high altitude, in particular.

Hint 2: If the pressure indication of the barometric pressure sensor drops significantly during high speed driving, check the air cleaner for clogging.

INSPECTION

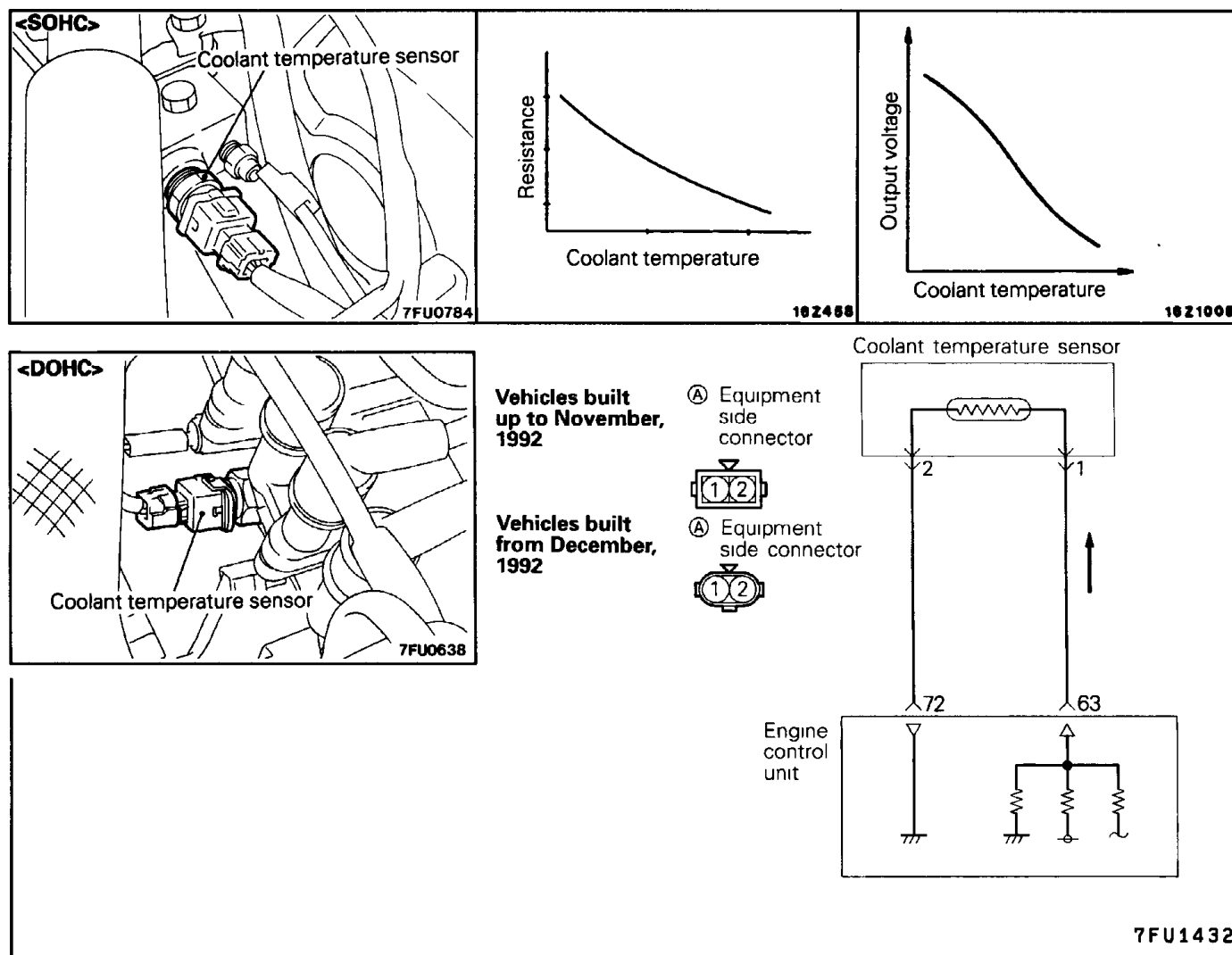
Using Multi-use Tester (MUT)

Function	Item No.	Data display	Check condition	Altitude	Standard value
Data reading	25	Sensor pressure	Ignition switch: ON	0 m (0 ft.)	760 mmHg
				600 m (1,969 ft.)	710 mmHg
				1,200 m (3,937 ft.)	660 mmHg
				1,800 m (5,906 ft.)	610 mmHg

HARNESS INSPECTION

1 (A) Harness side connector 7FU0657	Check for continuity of the earth circuit. Connector: Disconnected	OK → 2 ✗ → Repair the harness. (A5-72)		
2 (A) Harness side connector 7FU0665	Measure the power supply voltage of the barometric pressure sensor. - Connector: Disconnected - Ignition switch: ON <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>Voltage (V)</td> </tr> <tr> <td>4.8-5.2</td> </tr> </table>	Voltage (V)	4.8-5.2	OK → 3 ✗ → Repair the harness. (A1-61)
Voltage (V)				
4.8-5.2				
3 (A) Harness side connector 7FU0666	Check for an open-circuit, or a short-circuit to earth between the engine control unit and the barometric pressure sensor. - Air flow sensor connector: Disconnected - Engine control unit connector: Disconnected	OK → STOP ✗ → Repair the harness. (A2-65)		

ENGINE COOLANT TEMPERATURE SENSOR



OPERATIONS

- The coolant temperature sensor converts the engine coolant temperature into a voltage and inputs it to the engine control unit, which then controls the fuel injection rate and fast idle speed when the engine is cold based on the input signal.
- The 5 V power in the engine control unit is supplied via a resistor in the unit to the coolant temperature sensor. Through the sensor which is a kind of resistor, it is earthed in the engine control unit. The coolant temperature sensor resistor has such characteristic that its resistance decreases as the coolant temperature rises.
- The coolant temperature sensor terminal voltage increases or decreases as the sensor resistance increases or decreases. Therefore, the coolant temperature sensor terminal voltage changes with the coolant temperature, decreasing as the temperature rises.

TROUBLESHOOTING HINTS

If the fast idle speed is inadequate or the engine emits dark smoke during engine warm up operation, the coolant temperature sensor is often faulty.

INSPECTION

Using Multi-use Tester (MUT)

Function	Item No.	Data display	Check condition	Coolant temperature	Standard value
Data reading	21	Sensor temperature	Ignition switch: ON or engine operating	-20°C (-4°F)	-20°C
				0°C (32°F)	0°C
				20°C (68°F)	20°C
				40°C (104°F)	40°C
				80°C (176°F)	80°C

HARNESS INSPECTION

1

Ⓐ Harness side connector

7FU0668

Check for continuity of the earth circuit.

- Connector: Disconnected

2

Repair the harness.
(A2-72)

2

Ⓐ Harness side connector

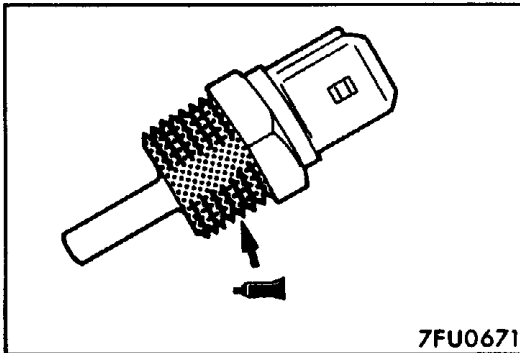
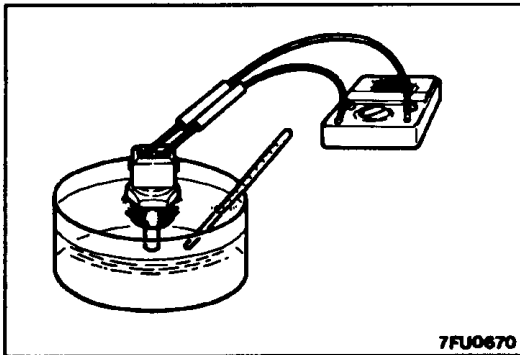
7FU0669

Measure the power supply voltage.

- Connector: Disconnected
- Ignition switch: ON

Voltage (V)
4.5-4.9

Repair the harness.
(A1-63)

**SENSOR INSPECTION**

- (1) Remove the engine coolant temperature sensor.
- (2) Measure the resistance value of the engine coolant temperature sensor while immersing the sensor section into warm water.

Standard value

Temperature (°C)	Resistance value (k Ω)
0	5.8
20	2.4
40	1.1
80	0.3

- (3) If outside the standard value, replace the engine coolant temperature sensor.

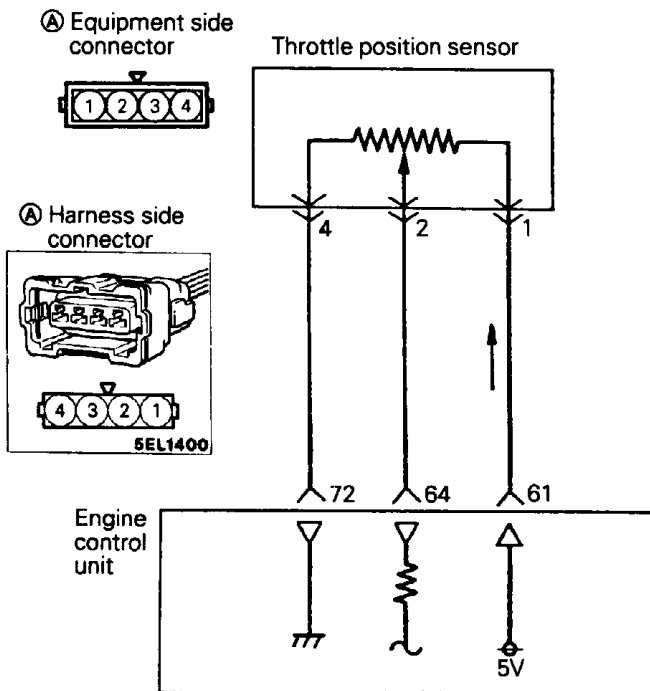
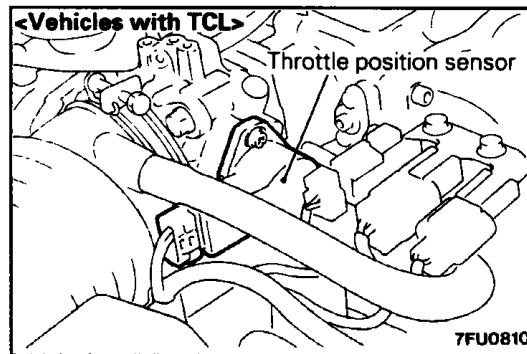
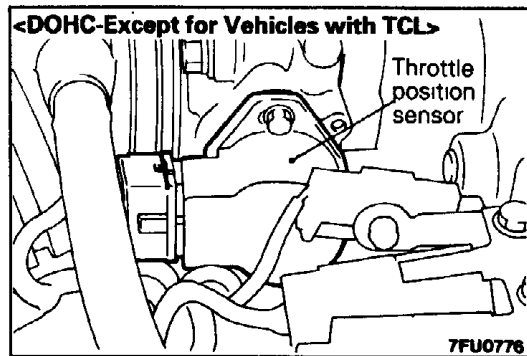
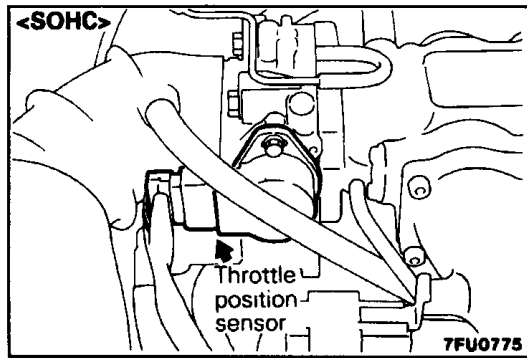
NOTE

Apply sealant to the thread section and tighten to the specified torque.

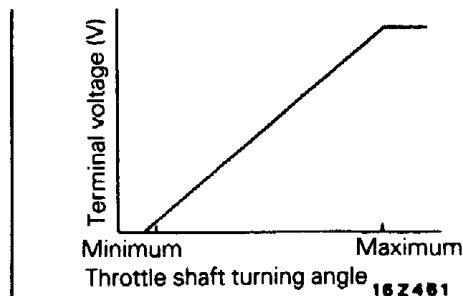
Sealant: 3M Nut Locking Part No. 4171 or equivalent to threaded portion

Tightening torque: 30 Nm (3 kgm, 22 ft.lbs.)

THROTTLE POSITION SENSOR



7FU0672



Engine control unit connector

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	-----

7FU0653

OPERATION

- The throttle position sensor converts the throttle position opening into a voltage and inputs it to the engine control unit, which then controls the fuel injection based on the input signal.
- The 5 V power in the engine control unit is supplied to the throttle position sensor. Through the resistor in the sensor, it is earthed in the engine control unit.
- As the throttle valve shaft rotates from the idle position to wide open position, the resistance between the variable resistor terminal of the throttle position sensor and the earth terminal increases. As a result, the voltage at the throttle position sensor variable resistance terminal also increases.

TROUBLESHOOTING HINTS

Hint 1: The throttle position sensor signal is more important in the control of automatic transmission than in the engine control. Shifting shock and other troubles will be caused if this sensor is faulty.

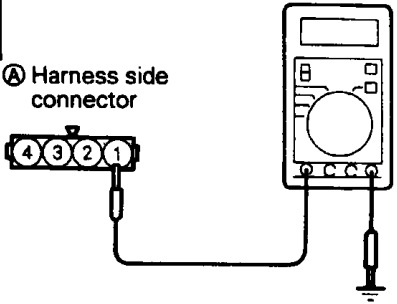
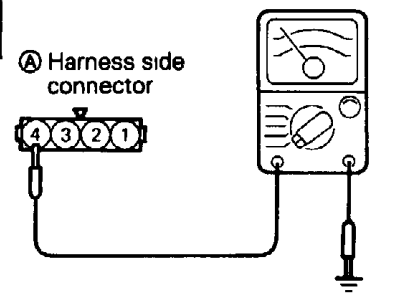
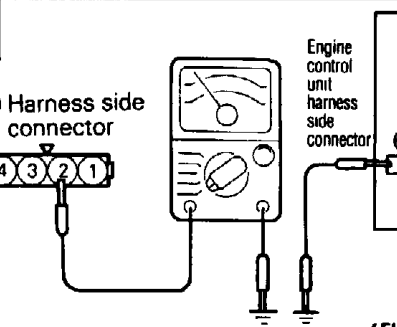
Hint 2: If the output voltage of the throttle position sensor is out of specification, adjust the sensor and check the voltage again. If there is an evidence of disturbed fixed SAS setting adjust the fixed SAS.

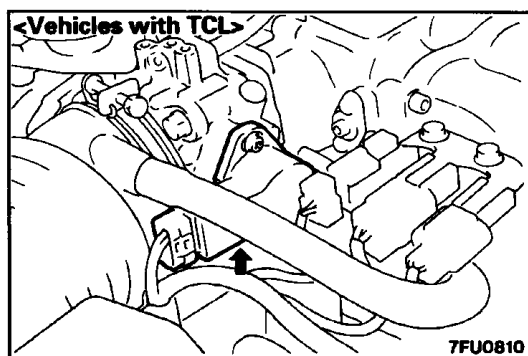
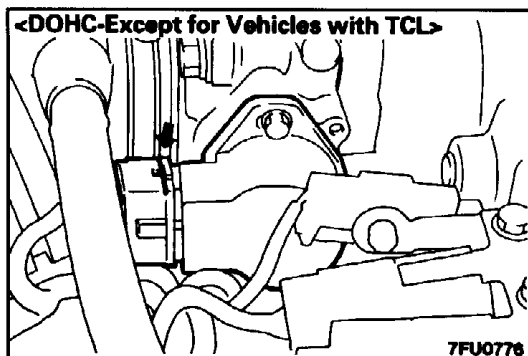
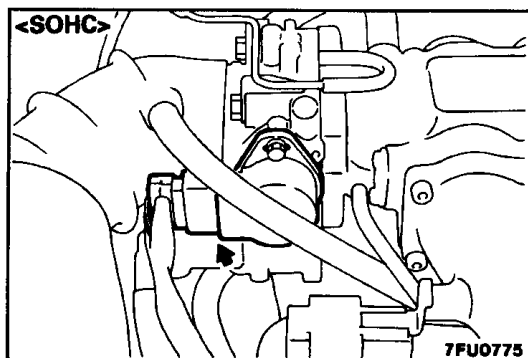
INSPECTION

Using Multi-use Tester (MUT)

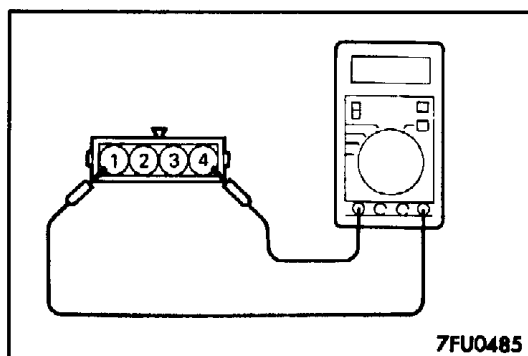
Function	Item No.	Data display	Check condition	Throttle valve	Standard value
Data reading	14	Sensor voltage	Ignition switch: ON	At idle position	300–1000 mV
				Open slowly	Increases with valve opening
				Open widely	4,500–5,500 mV

HARNESS INSPECTION

1  ① Harness side connector 6FU1241	Measure the power supply voltage of the throttle position sensor. - Connector: Disconnected - Ignition switch: ON <table border="1"> <tr> <td>Voltage (V)</td> </tr> <tr> <td>4.8–5.2</td> </tr> </table>	Voltage (V)	4.8–5.2	OK → 2 ✗ → Repair the harness. (A1–61)
Voltage (V)				
4.8–5.2				
2  ① Harness side connector 6FU1242	Check for continuity of the earth circuit. Connector: Disconnected	OK → 3 ✗ → Repair the harness. (A4–72)		
3  ① Harness side connector Engine control unit harness side connector 64 6FU1243	Check for an open-circuit, or a short-circuit to earth between the engine control unit and the throttle position sensor. - Throttle position sensor connector: Disconnected - Engine control unit connector: Disconnected	OK → STOP ✗ → Repair the harness. (A2–64)		

**SENSOR INSPECTION**

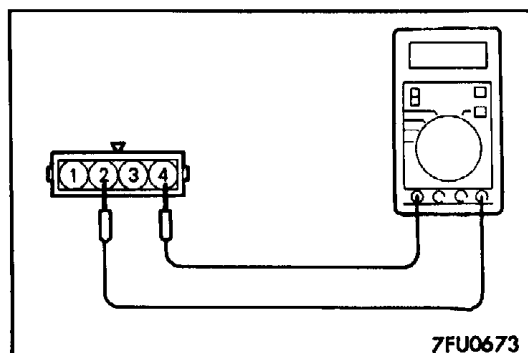
- (1) Disconnect the throttle position sensor connector.



- (2) Measure the resistance between the terminal ① and the terminal ④ on the side of the throttle position sensor connector.

Standard value: 3.5–6.5 kΩ

- (3) Measure the resistance between the terminal ② and the terminal ④ on the side of the throttle position sensor connector.



Slowly open the throttle valve from the idle position to full open.

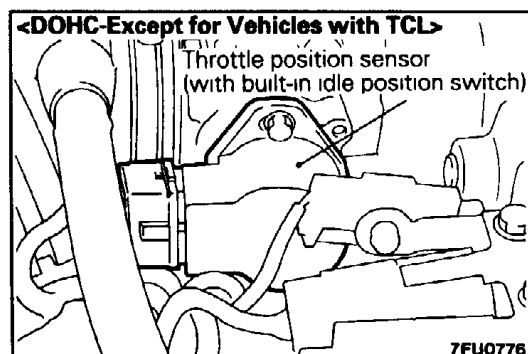
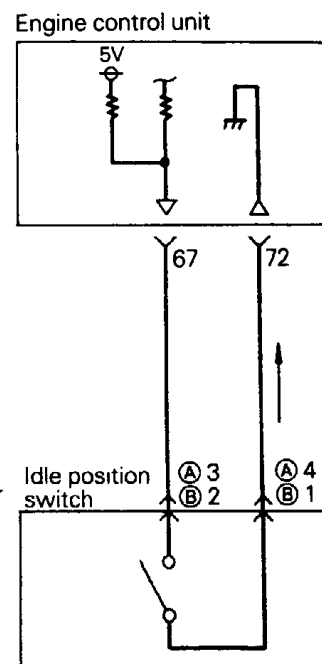
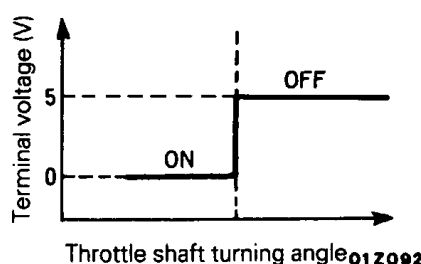
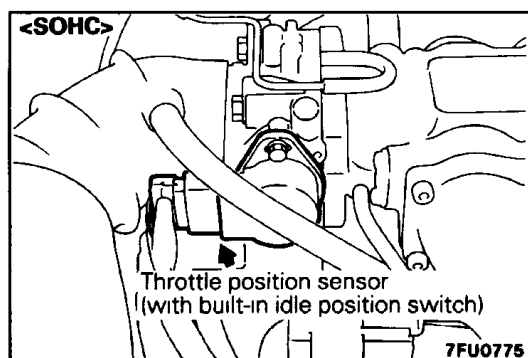
It varies smoothly in proportion to the opening of throttle valve.

- (4) If there is any deviation from the standard value, or if it does not vary smoothly, replace throttle position sensor.

NOTE

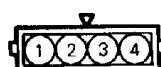
Refer to page 13-43 for an explanation for adjusting the throttle position sensor.

IDLE POSITION SWITCH

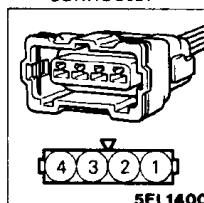


<SOHC, DOHC-Except for Vehicles with TCL>

Ⓐ Component side connector

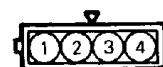


Ⓐ Harness side connector

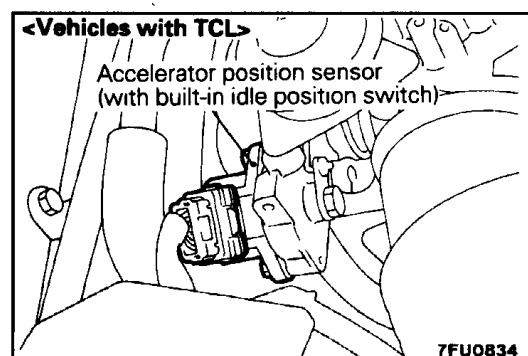
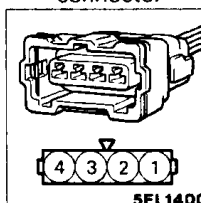


<Vehicles with TCL>

Ⓑ Component side connector



Ⓑ Harness side connector



Engine control unit connector

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72
---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

7FU0674

7FU0653

OPERATION

- The idle position switch senses whether the accelerator pedal is depressed or not, converts it into high/low voltage and inputs the voltage to the engine control unit, which then controls the idle speed control servo based on the input signal.
- The battery voltage in the engine control unit is applied to the idle position switch through a resistor. When the accelerator pedal is released, the idle position switch is turned on

to conduct the voltage to earth. This causes the idle position switch terminal voltage to go low from high.

TROUBLESHOOTING HINTS

If the idle position switch harness and individual part check results are normal but the idle position switch output is abnormal, the following troubles are suspected.

- Improper adjusted accelerator cable
- Improper adjustment of the fixed SAS

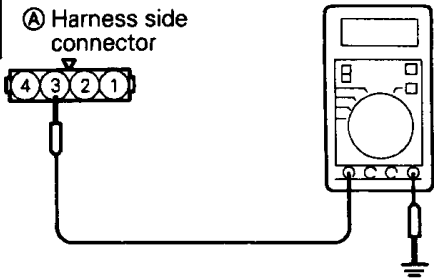
INSPECTION

Using Multi-use Tester (MUT)

Function	Item No.	Data display	Check condition	Throttle valve	Normal indication
Data reading	26	Switch state	Ignition switch: ON (check by operating accelerator pedal repeatedly)	At idle position	ON
				Open a little	OFF

HARNESS INSPECTION

1 (A) Harness side connector



7FU0675

Measure the power supply voltage of the idle position switch.

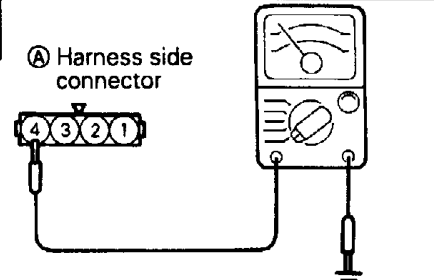
- Connector: Disconnected
- Ignition switch: ON

Voltage (V)
4 or more

OK → **2**

✗ → Repair the harness. (A3-67)

2 (A) Harness side connector



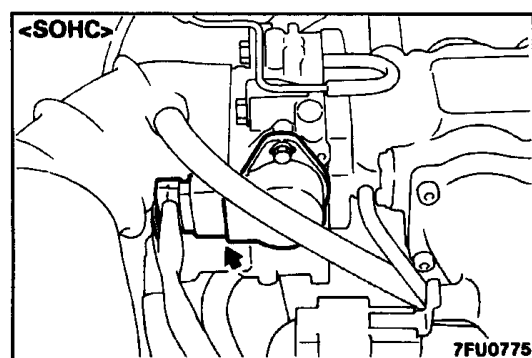
6FU1242

Check continuity of the earth circuit.

- Connector: Disconnect

OK → STOP

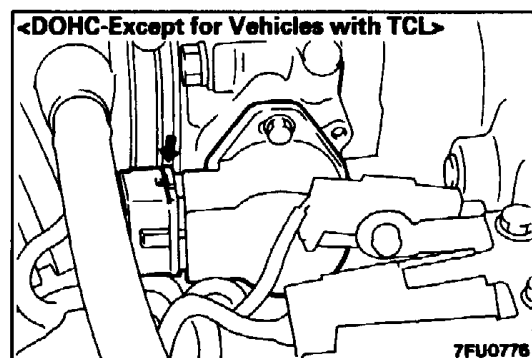
✗ → Repair the harness. (A4-72)



SENSOR INSPECTION

<SOHC, DOHC-Except for Vehicles with TCL>

(1) Disconnect the throttle position sensor connector.



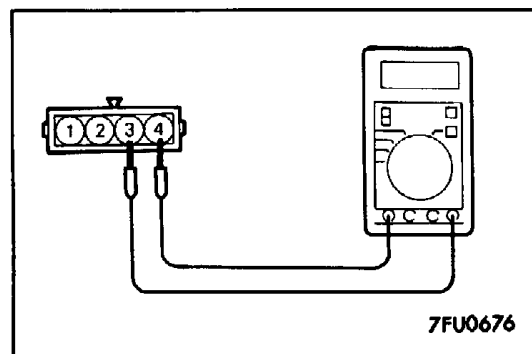
(2) Check the continuity between terminal ③ and ④.

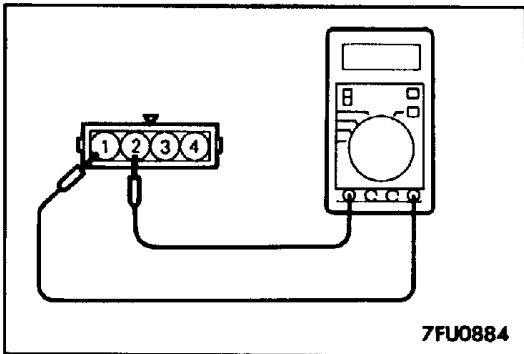
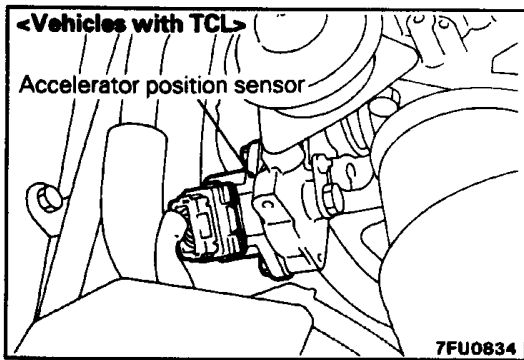
Accelerator pedal	Continuity
Depressed	Non-conductive ($\infty\Omega$)
Released	Conductive (0Ω)

(3) If out of specification, replace the throttle position sensor assembly.

NOTE

Adjust the idle position switch and throttle position sensor after replacement. (Refer to page 13-43.)

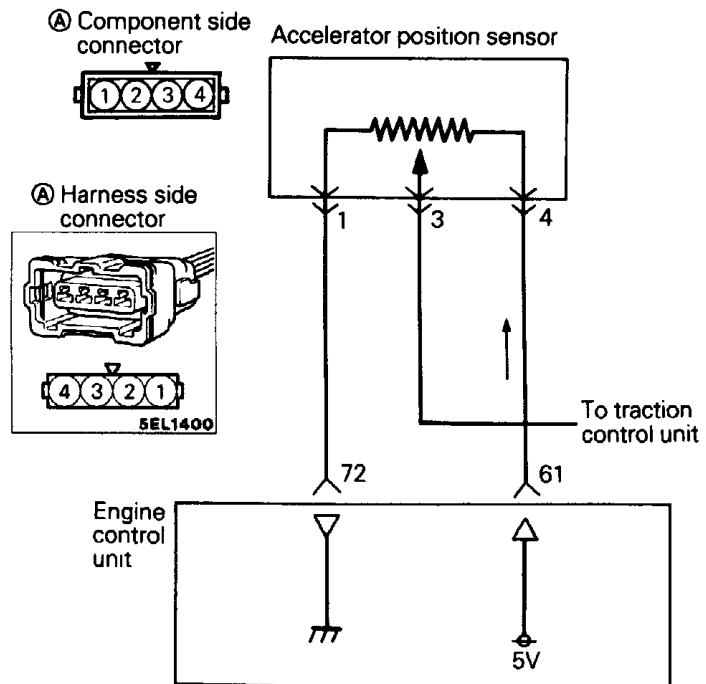
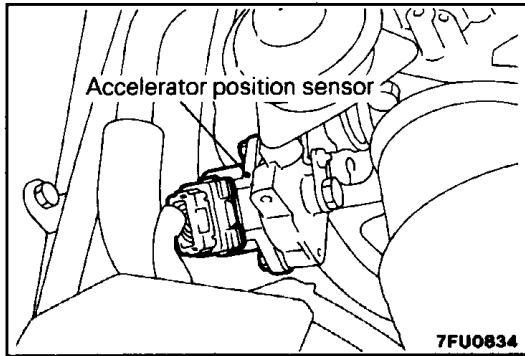


**SENSOR INSPECTION <Vehicles with TCL>**

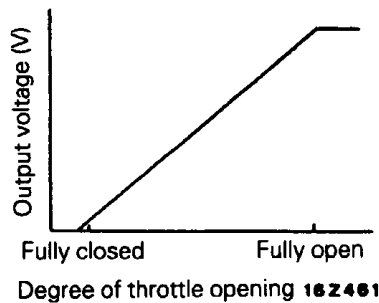
- (1) Disconnect the accelerator position sensor connector
- (2) Check continuity between the terminal ① and the terminal ② on the side of the accelerator position sensor connector.
- | | |
|-------------------|----------------|
| Accelerator pedal | Continuity |
| Depressed | Non-continuity |
| Released | Continuity |
- (3) Replace the throttle position sensor, if it is defective.

NOTE

Adjust the idle position switch and accelerator position sensor after replacement. (Refer to page 13-45.)

ACCELERATOR POSITION SENSOR (APS) <Vehicles with TCL>

7FU0885



Engine control unit connector

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	-----

7FU0653

OPERATION

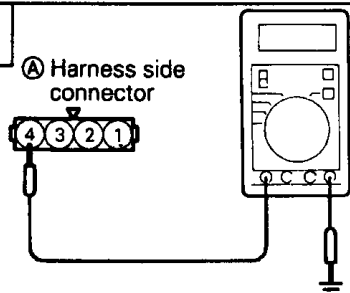
- The accelerator position sensor converts the amount the accelerator pedal is depressed into a voltage and inputs this to the traction control unit. The traction control unit uses this signal for traction control.
- 5 volts from the engine control unit is supplied to one end of the resistor in the accelerator position sensor, and the other end (earth terminal) is earthed at the engine control unit.
- When the accelerator pedal is depressed, resistance between the accelerator position sensor output terminal (variable resistance terminal) and the earth terminal increases according to the amount the pedal is depressed. As a result, the accelerator position sensor output voltage also increases as to the accelerator pedal being pressed.

TROUBLESHOOTING HINT

If accelerator position sensor output voltage deviates from the standard value, adjust the accelerator position sensor first, and then recheck.

HARNESS INSPECTION

1



7FU0482

Measure supplied voltage.

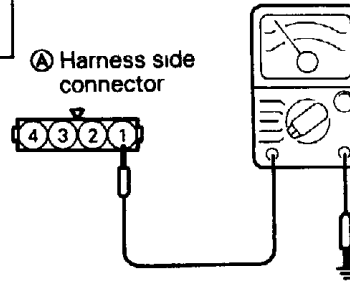
- Connector: Disconnected
- Ignition switch: ON

Voltage (V)
4.8–5.2

OK → **2**

✗ → Repair the harness (A4–61)

2



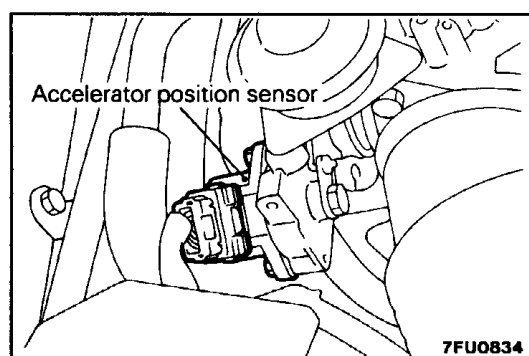
7FU0483

Check continuity of the earth circuit.

- Connector: Disconnect

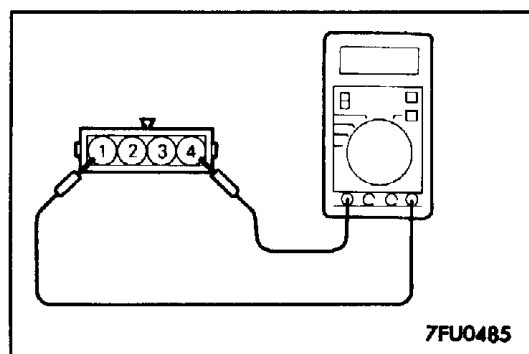
OK → **3**

✗ → Repair the harness (A1–72)

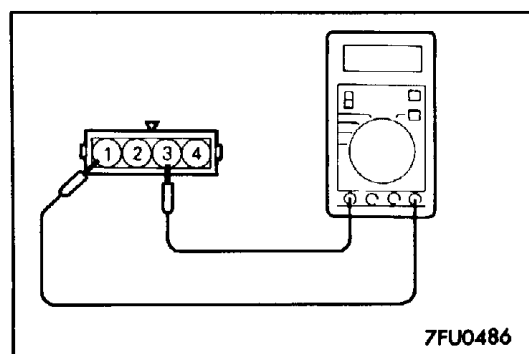


SENSOR INSPECTION

(1) Disconnect the accelerator position sensor connector.



(2) Measure the resistance of the connector terminal ① and the terminal ④ on the accelerator position sensor side.
Standard value: 3.5–6.5 kΩ



(3) Measure the resistance between the connector terminal ① and terminal ③ on the accelerator position sensor side.

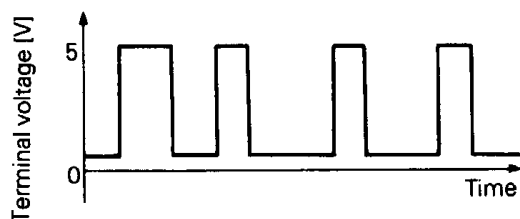
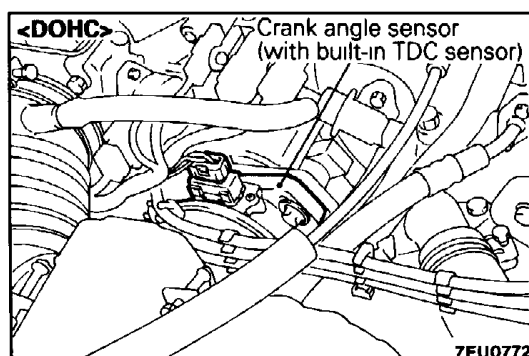
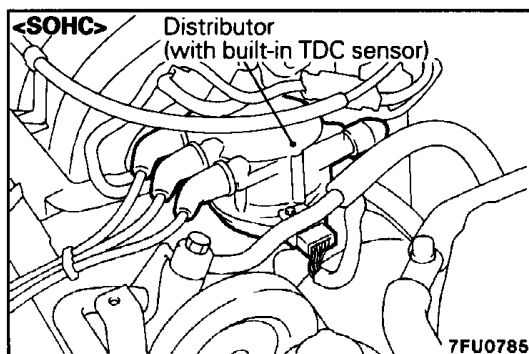
Slowly open the throttle valve from the idle position to full open.

It varies smoothly in proportion to throttle valve opening.

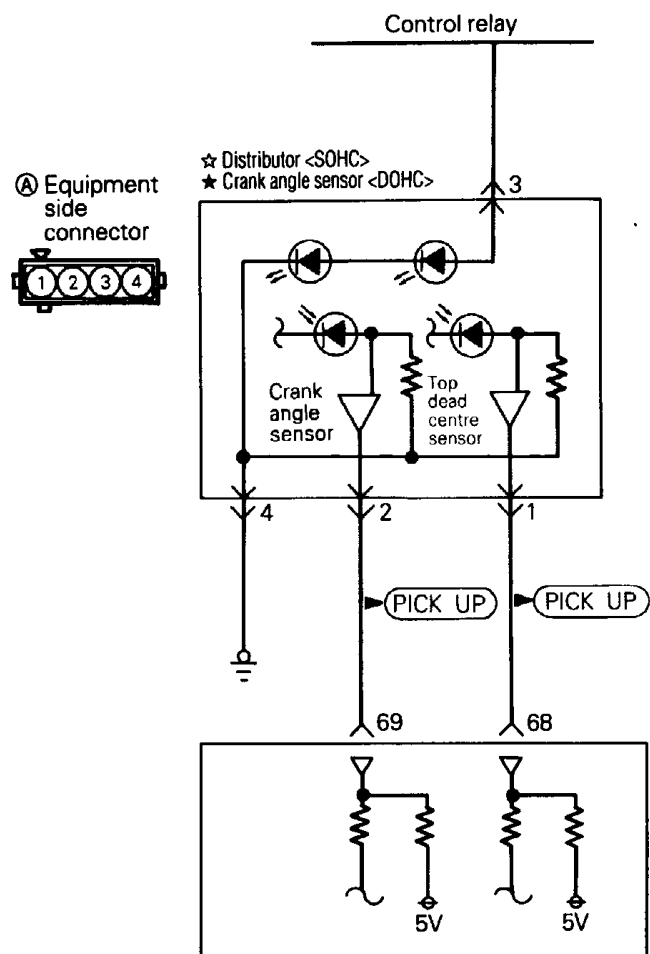
(4) If it deviates from the standard value, or if it does not vary smoothly, replace the accelerator position sensor.

NOTE

Refer to page 13-45 for an explanation for adjusting the throttle positions sensor.

TOP DEAD CENTRE SENSOR**<SOHC, DOHC-Vehicles built up to November, 1992>**

7FU0677



7FU0873

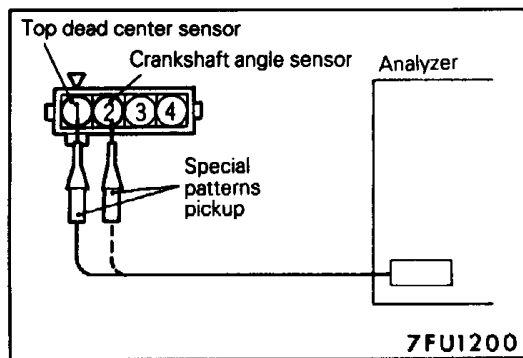
OPERATION

- The top dead centre sensor detects the top dead center of pistons No. 1, No. 3 and No. 5, converts this into a pulse signal which is input to the engine control unit. Based on this signal, the engine control unit calculates the fuel injection order, etc.
- The top dead centre sensor is supplied with power from the control relay and is earthed to the vehicle body. 5 volts is supplied to the top dead centre sensor output terminal from the engine control unit, and a pulse signal is generated by opening and closing the line between the top dead centre sensor output terminal and earth.

TROUBLESHOOTING HINT

- Hint 1: A defective top dead centre sensor would result in inappropriate sequential ignition, which causes engine stalls, unstable idling, and poor acceleration.
- Hint 2: with the ignition switch ON (engine not started), the top dead centre sensor or engine control unit can be assumed to be malfunctioning if the top dead centre sensor signal is output.

Wave Pattern Inspection Using an Analyzer



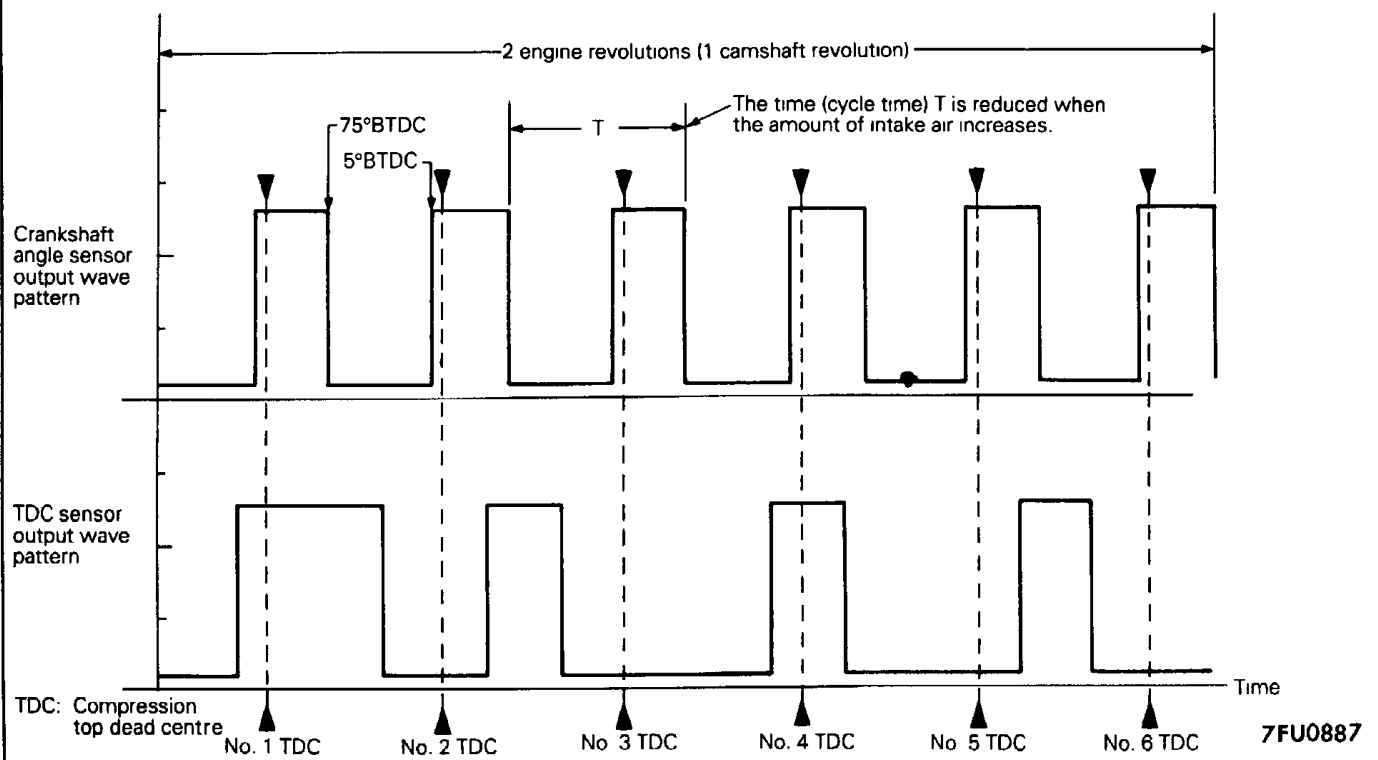
Measurement method

- (1) Disconnect the crankshaft angle sensor connector and connect the special tool (test harness: MB991348) in between. (All terminals should be connected.)
- (2) Connect the analyzer special patterns pickup to terminal ① of the crankshaft angle sensor connector. (When inspecting the top dead centre sensor signal wave pattern.)
- (3) Connect the analyzer special patterns pickup to terminal ② of the crankshaft angle sensor connector. (When inspecting the crankshaft angle sensor signal wave pattern.)

Standard wave pattern

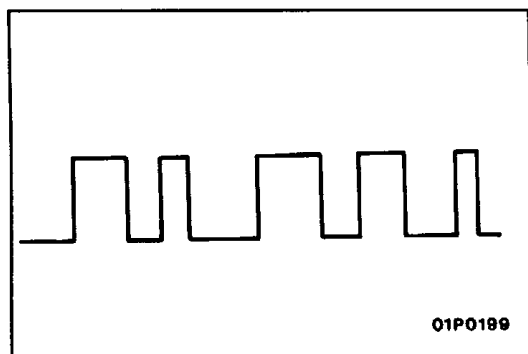
Observation conditions

Function	Special patterns
Pattern height	Low
Pattern selector	Display
Engine r/min.	Idle r/min. (700 r/min.)



Wave pattern observation points

Check that cycle time T becomes shorter and the frequency increases when the engine speed is increased.

**Examples of abnormal wave patterns**

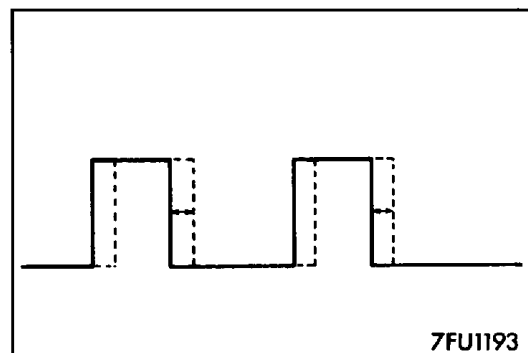
- Example 1

Cause of problem

Sensor interface malfunction

Wave pattern characteristics

Short wave pattern is output even when the engine is not started.



- Example 2

Cause of problem

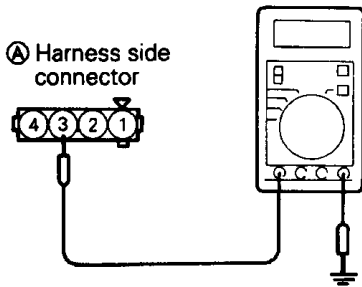
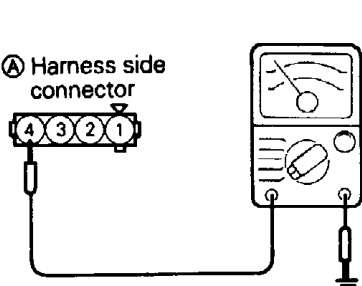
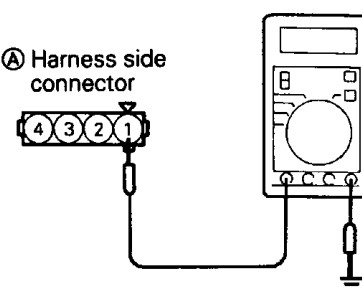
Loose timing belt

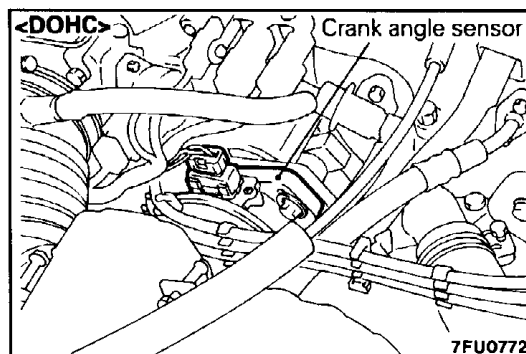
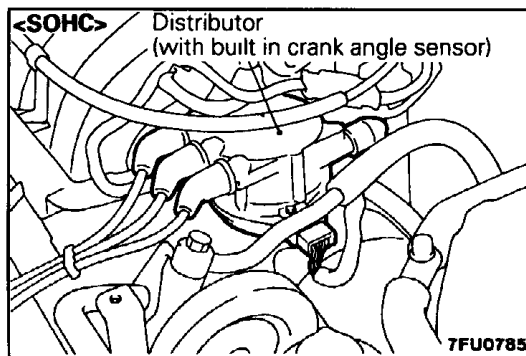
Abnormality in sensor disk

Wave pattern characteristics

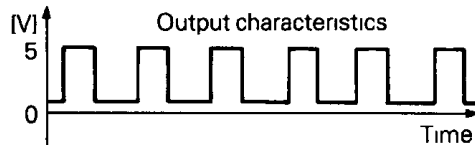
Wave pattern is displaced to the left or right.

HARNES INSPECTION

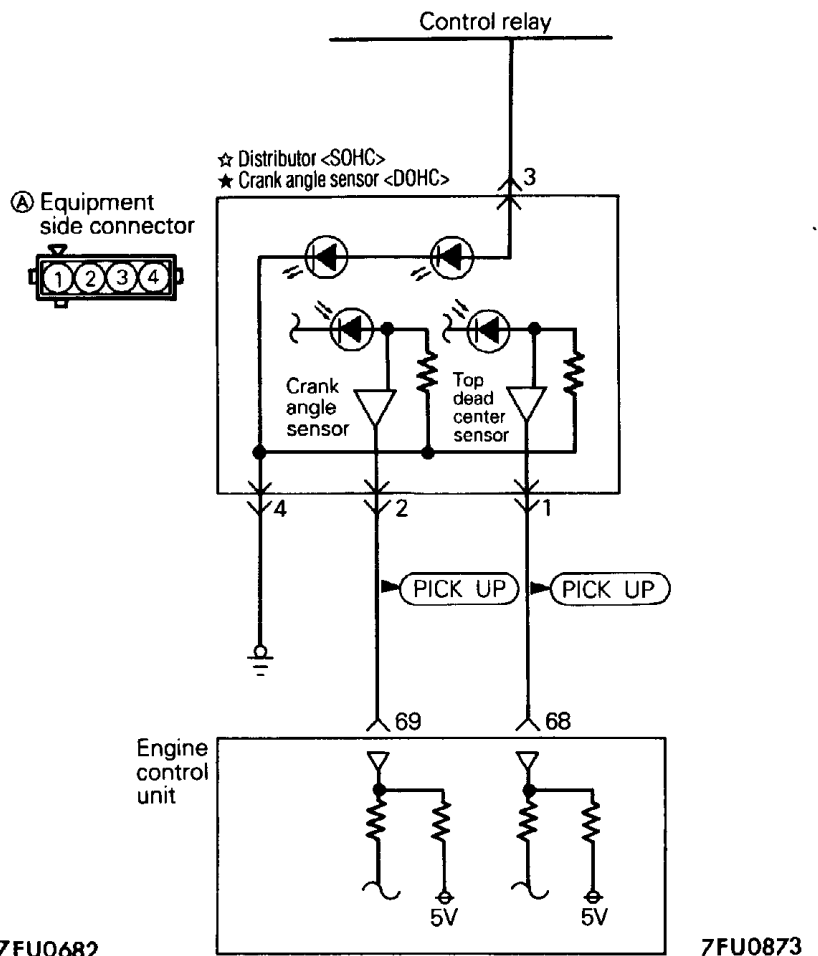
1 ① Harness side connector  7FU0496 <td> Measure the power supply voltage. • Sensor connector: Disconnected • Ignition switch: ON <table><tr><td>Voltage (V)</td></tr><tr><td>SV</td></tr></table> </td> <td> OK → 2 ✖ → Repair the harness. (A3)–Engine control relay) </td>	Measure the power supply voltage. • Sensor connector: Disconnected • Ignition switch: ON <table><tr><td>Voltage (V)</td></tr><tr><td>SV</td></tr></table>	Voltage (V)	SV	OK → 2 ✖ → Repair the harness. (A3)–Engine control relay)
Voltage (V)				
SV				
2 ① Harness side connector  7FU0497 <td> Check for continuity of the earth circuit. • Connector: Disconnected </td> <td> OK → 3 ✖ → Repair the harness. (A4)–Earth) </td>	Check for continuity of the earth circuit. • Connector: Disconnected	OK → 3 ✖ → Repair the harness. (A4)–Earth)		
3 ① Harness side connector  7FU0498 <td> Check the output circuit voltage. • Connector: Disconnected • Ignition switch: ON <table><tr><td>Voltage (V)</td></tr><tr><td>4.8–5.2</td></tr></table> </td> <td> OK →  ✖ → Repair the harness. (A1)–(A6) </td>	Check the output circuit voltage. • Connector: Disconnected • Ignition switch: ON <table><tr><td>Voltage (V)</td></tr><tr><td>4.8–5.2</td></tr></table>	Voltage (V)	4.8–5.2	OK →  ✖ → Repair the harness. (A1)–(A6)
Voltage (V)				
4.8–5.2				

CRANK ANGLE SENSOR**<SOHC, DOHC-Vehicles built up to November, 1992>**

NOTE
Arrow $\blacktriangle$ indicates oscilloscope measurement point.



7FU0682

**OPERATION**

- The crank angle sensor detects the crank angle (position), converts this to a pulse signal and inputs it to the engine control unit.
- The engine control unit not only calculates the engine speed based on this signal but also controls fuel injection timing and ignition timing.
- The crank angle sensor is supplied with power from the control relay and is earthed to the vehicle body. 5 volts is supplied to the crank angle sensor output terminal from the engine control unit, and the pulse signal is generated by opening and closing the line between the output terminal of the crank angle sensor and earth.

TROUBLESHOOTING HINTS

Hint 1: If sudden shocks are felt during driving or if the engine stalls unexpectedly when it is idling, try shaking the crank angle sensor harness while the engine is idling. If the engine stalls, it can be assumed that the connection of the crank angle sensor connector is defective.

Hint 2: When the crank angle sensor outputs a pulse signal with the ignition switch ON (engine not started), it can be assumed that the crank angle sensor or engine control unit is defective.

Hint 3: When the engine does not start, and if the crank angle sensor output speed is 0 r/min. when cranking, it can be assumed that the crank angle sensor is defective or the timing belt is broken.

Hint 4: When the engine does not start, if the tachometer pointer indicates 0 r/min. when cranking, the ignition coil primary current is not interrupted so it can be assumed that the ignition system circuit and ignition coil, and power transistor are defective.

Hint 5: If idling is possible even if the r/min. displayed by the crank angle sensor deviates from the standard value, usually the cause of the defect is something other than the crank angle sensor.

Example of defect

- (1) Defective engine coolant temperature sensor
- (2) Defective idle speed control servo
- (3) Poor adjustment of standard idling speed.

INSPECTION**Using Multi-use Tester (MUT)**

Function	Item No.	Data display	Check condition	Check content	Normal state
Data reading	22	Cranking speed	•Engine cranking •Tachometer connected (check on and off of primary current of ignition coil by tachometer)	Compare cranking speed and multi-use tester reading	Indicated speed to agree

NOTE (DOHC engine only)

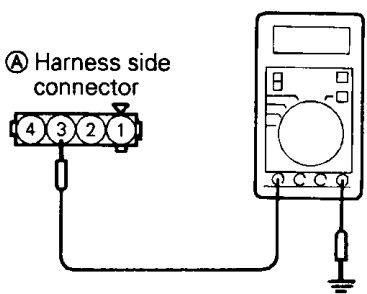
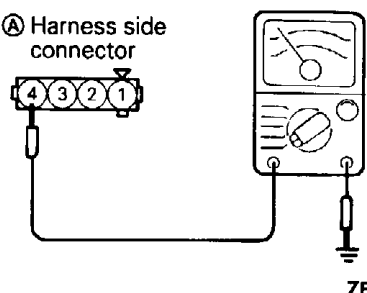
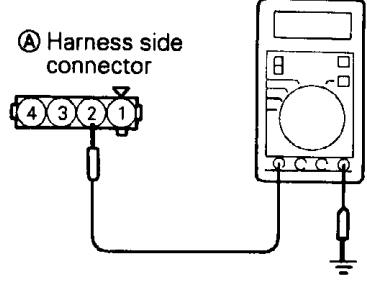
The tachometer indicates 1/3 of actual engine speed. Consequently, three times the indication on the tachometer is the actual engine speed. If inspected when a tachometer is set in the range of two cylinders, the tachometer shows the actual engine speed.

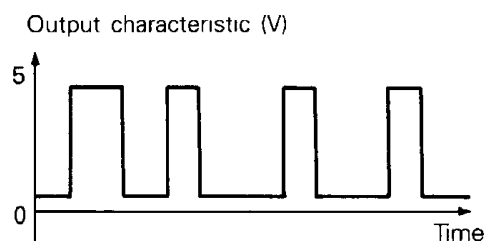
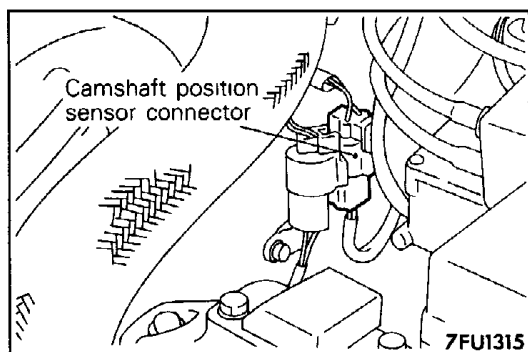
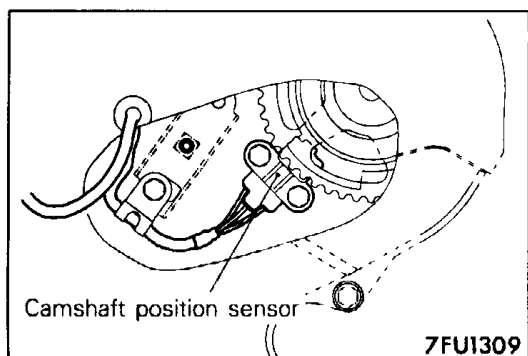
Function	Item No.	Data display	Check condition	Coolant temperature	Standard value
Data reading	22	Idle speed	•Engine: Running at idle •Idle position switch: ON	-20°C (-4°F)	1500-1700 <SOHC> 1300-1500 <DOHC>
				0°C (32°F)	1250-1450
				20°C (68°F)	1050-1250 <SOHC> 1100-1300 <DOHC>
				40°C (104°F)	850-1050 <SOHC> 950-1150 <DOHC>
				80°C (176°F)	600-800

Wave Pattern Inspection Using an Analyzer

Refer to the top dead centre sensor section (P.13-90-1)

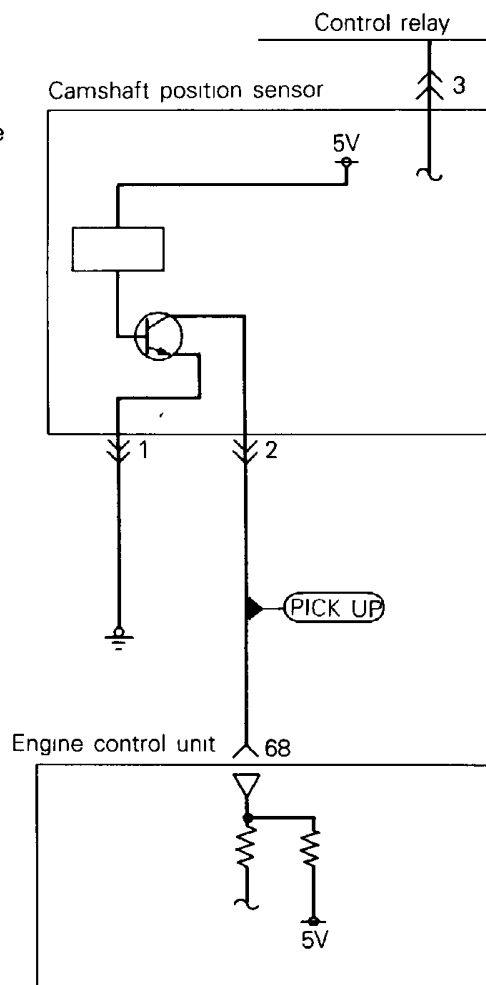
HARNESS INSPECTION

1 ① Harness side connector  7FU0496	Measure the power supply voltage. - Connector: Disconnected - Ignition switch: ON <table><tr><td>Voltage (V)</td></tr><tr><td>SV</td></tr></table>	Voltage (V)	SV	OK 2 ✗ Repair the harness. (A3–Control relay)
Voltage (V)				
SV				
2 ① Harness side connector  7FU0497	Check for continuity of the earth circuit. Connector: Disconnected	OK 3 ✗ Repair the harness. (A4–Earth)		
3 ① Harness side connector  7FU0489	Check the voltage of the output circuit. - Connector: Disconnected - Ignition switch: ON <table><tr><td>Voltage (V)</td></tr><tr><td>4.8–5.2</td></tr></table>	Voltage (V)	4.8–5.2	OK  ✗ Repair the harness. (A2–69)
Voltage (V)				
4.8–5.2				

CAMSHAFT POSITION SENSOR <DOHC-Vehicles built from December, 1992>

7FU0677

Ⓐ Equipment side connector



6AF0054

Engine control unit connector

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	-----

7FU0653

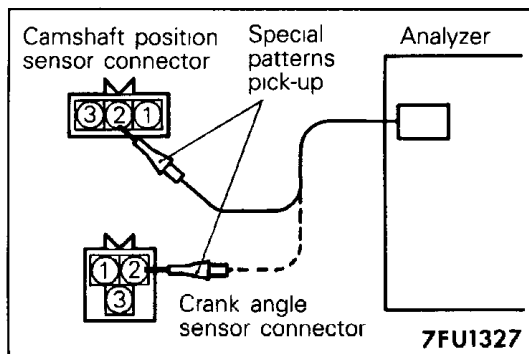
OPERATION

- The camshaft position sensor detects the top dead centre on the compression stroke, converts it into a pulse signal and inputs it to the engine control unit. The engine control unit determines the fuel injection sequence based on this signal.
- Power to the camshaft position sensor is supplied from the control relay, and the earth is located in the body. A 5V voltage is applied from the engine control unit to the camshaft position sensor output terminal, and the camshaft position sensor generates a pulse signal as it switches from OPEN to SHORT (power transistor inside the sensor switches ON/OFF) between the output terminal and the earth.

TROUBLESHOOTING HINTS

- Hint 1: If the camshaft position sensor is defective, proper sequential injection will not occur, so the engine will stall, or unstable idling and poor acceleration will occur.
- Hint 2: When the camshaft position sensor outputs a pulse signal when the ignition switch is turned to ON (without starting the engine), the camshaft position sensor or engine control unit is probably defective.

Wave Pattern Inspection Using an Analyzer



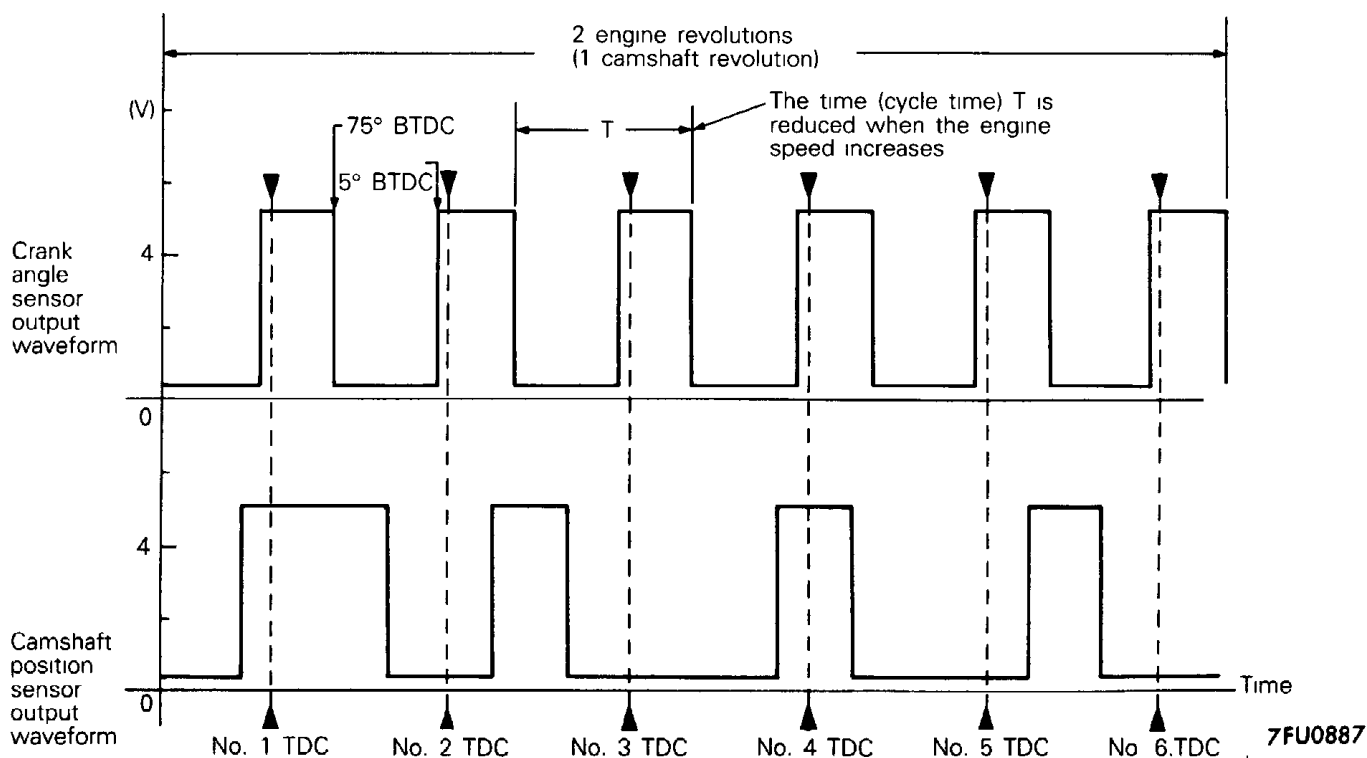
Measurement method

- (1) Disconnect the camshaft position sensor connector and connect the special tool (test harness: MB991223) and jumper wire in between. (All terminals should be connected.)
- (2) Connect the analyzer special patterns pickup to camshaft position sensor terminal ②.
- (3) Disconnect the crank angle sensor connector and connect the special tool (test harness: MD998478) in between.
- (4) Connect the analyzer special patterns pickup to crank angle sensor terminal ②.

Standard wave

Observation conditions

Function	Special patterns
Pattern height	Low
Patterns selector	Display
Engine speed	Idle speed



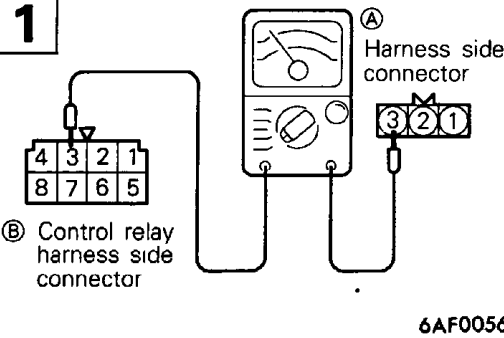
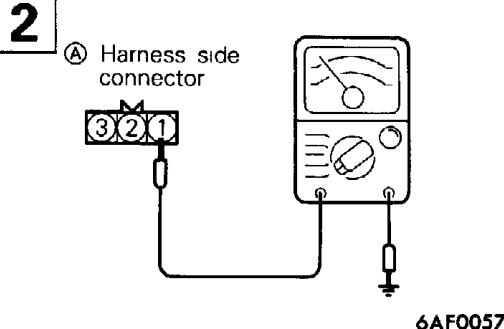
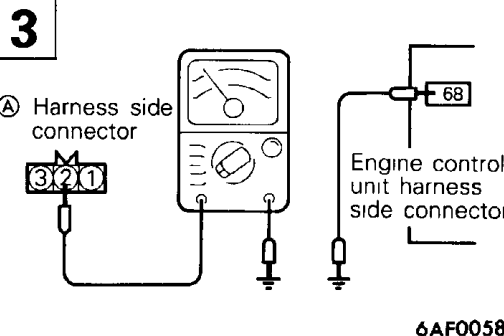
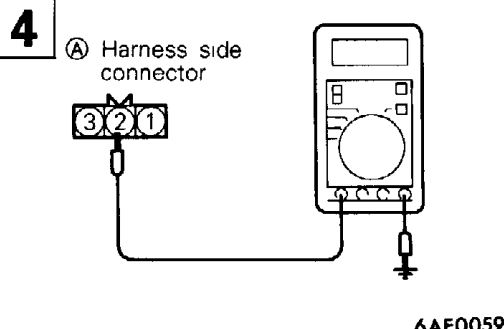
TDC: Top dead centre

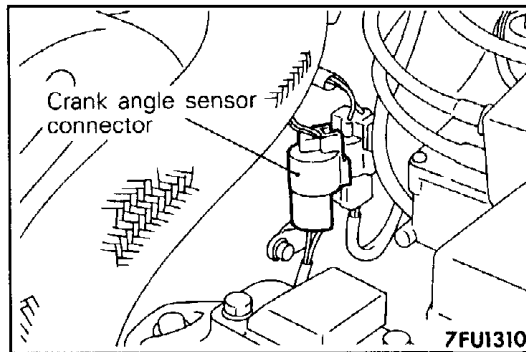
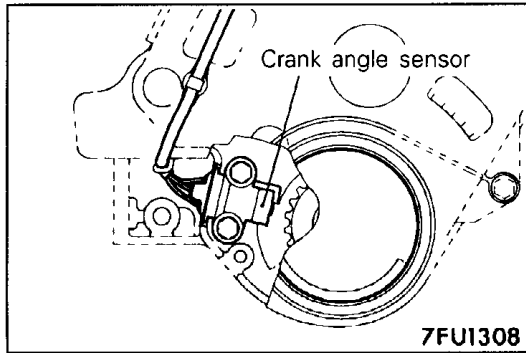
Wave pattern observation points

Examples of abnormal wave patterns

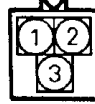
Refer to P.13-90-2

HARNESS INSPECTION

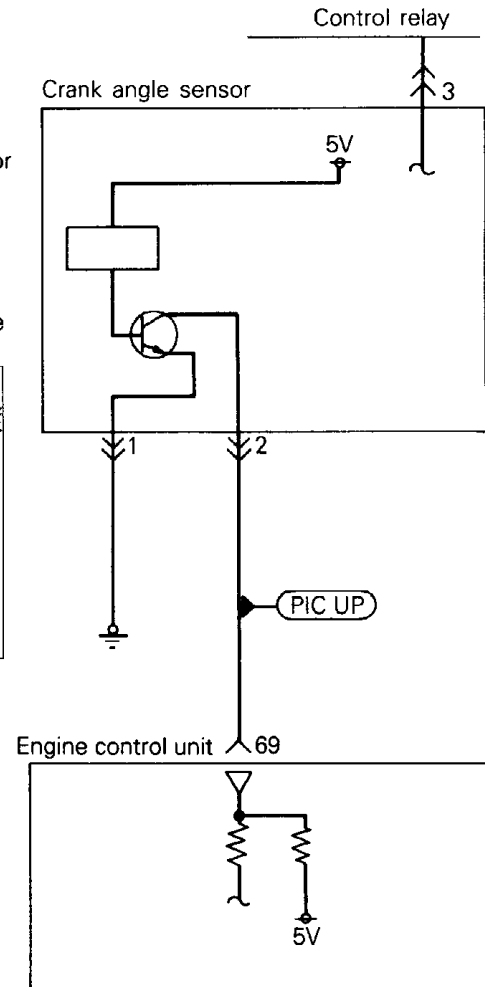
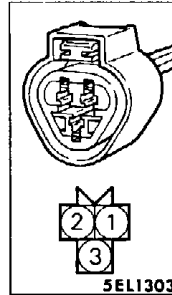
1  ① Harness side connector ② Control relay harness side connector 6AF0056	Check for continuity between camshaft position sensor and control relay. - Camshaft position sensor connector: Disconnected - Control relay connector: Disconnected NOTE Touch the circuit tester probes to both ends of the harness.	OK → 2 ✗ → Repair the harness. (A3 - B3)
2  ① Harness side connector 6AF0057	Check for continuity of the earth circuit Camshaft position sensor connector: Disconnected	OK → 3 ✗ → Repair the harness. (A1 - Earth)
3  ① Harness side connector ② Engine control unit harness side connector 6AF0058	Check for open-circuit or short-circuit to earth, between camshaft position sensor and engine control unit. - Engine control unit connector: Disconnected - Camshaft position sensor connector: Disconnected	OK → 4 ✗ → Repair the harness. (A2 - B6)
4  ① Harness side connector 6AF0059	Measure the impressed voltage. - Camshaft position sensor connector: Disconnected - Engine control unit connector: Connected - Ignition switch: ON Voltage (V) 4.8-5.2	OK →  ✗ → Replace the engine control unit.

CRANK ANGLE SENSOR <DOHC – Vehicles built from December, 1992>

Ⓐ Equipment side connector

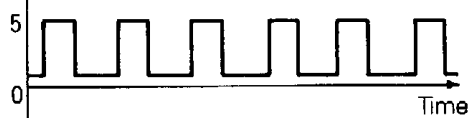


Ⓐ Harness side connector



6AF0060

Output characteristic (V)



7FU0682

Engine control unit connector

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72
---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

7FU0653

OPERATION

Refer to P.13-92

TROUBLESHOOTING HINTS

Refer to P.13-93

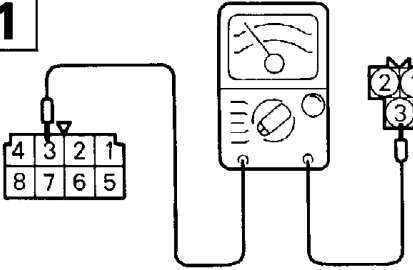
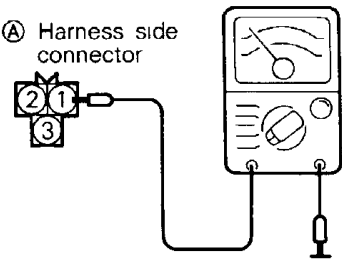
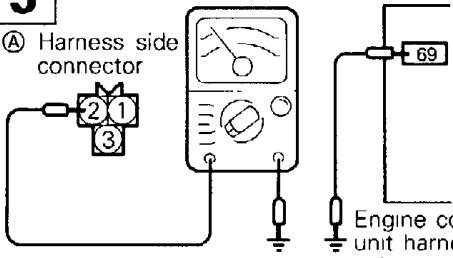
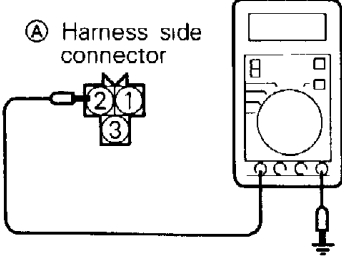
INSPECTION**Using Multi-use Tester (MUT)**

Refer to the crank angle sensor section (P.13-93)

Wave Pattern Inspection Using an Analyzer

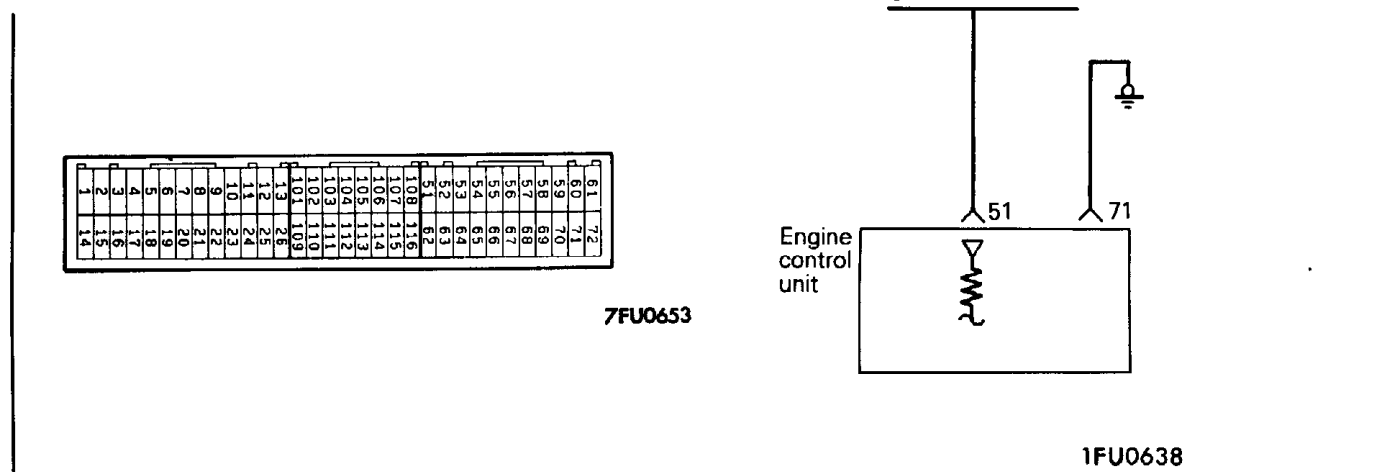
Refer to the top dead centre sensor section (P.13-90-1)

HARNESS INSPECTION

1  6AF0061	Check for continuity between crank angle sensor and control relay. - Crank angle sensor connector: Disconnected - Control relay connector: Disconnected NOTE Touch the circuit tester probes to both ends of the harness.	OK → 2 ✗ → Repair the harness (A3 – B3)
2 Ⓐ Harness side connector  6AF0062	Check for continuity of the earth circuit Crank angle sensor connector: Disconnected	OK → 3 ✗ → Repair the harness. (A1 – Earth)
3 Ⓐ Harness side connector  Engine control unit harness side connector 6AF0063	Check for open-circuit or short-circuit to earth, between top dead centre sensor and engine control unit - Engine control unit connector: Disconnected - Crank angle sensor connector: Disconnected	OK → 4 ✗ → Repair the harness. (A2 – 69)
4 Ⓐ Harness side connector  6AF0064	Measure the impressed voltage - Crank angle sensor connector: Disconnected - Engine control unit connector: Connected - Ignition switch: ON Voltage (V) 4.8–5.2	OK → STOP ✗ → Replace the engine control unit

NOTES

IGNITION SWITCH-ST <M/T>



OPERATION

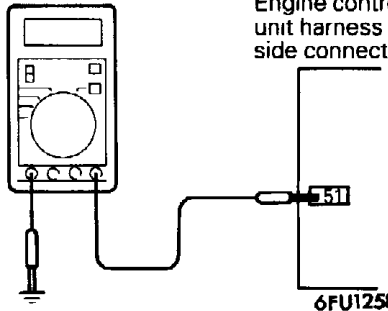
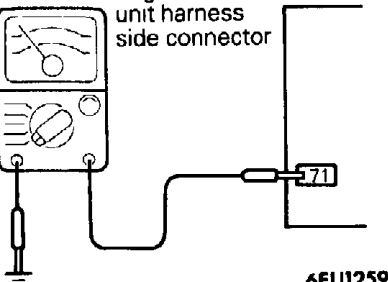
- The ignition switch-ST inputs a high signal to the engine control unit while the engine is cranking. The engine control unit provides fuel injection control, etc., at engine startup based on this signal.
- When the ignition switch is set to START, the battery voltage at cranking is applied through the ignition switch to the engine control unit, which detects that the engine is cranking.

INSPECTION

Using Multi-use Tester (MUT)

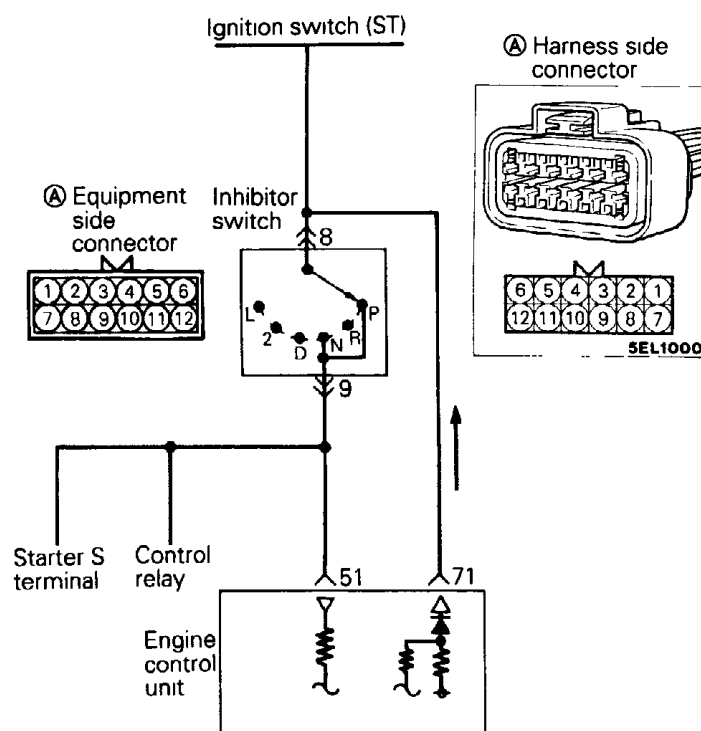
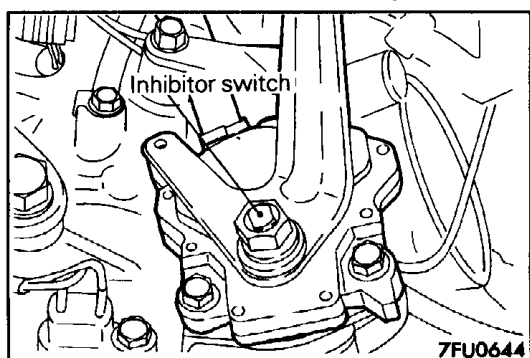
Function	Item No.	Data display	Check condition	Engine	Normal indication
Data reading	18	Switch state	Ignition switch: ON	Stop	OFF
				Cranking	ON

HARNESS INSPECTION

1	 Engine control unit harness side connector 6FU1258	Measure the input voltage to the engine control unit. - Engine control unit connector: Disconnected - Ignition switch: START <table border="1"><tr><td>Voltage (V)</td></tr><tr><td>8 or more</td></tr></table>	Voltage (V)	8 or more	OK → 2 ✗ → Repair the harness. (51)–Ignition switch)
Voltage (V)					
8 or more					
2	 Engine control unit harness side connector 6FU1259	Check for continuity of the earth circuit. Engine control unit connector: Disconnected	OK → STOP ✗ → Repair the harness. (71)–Earth)		

IGNITION SWITCH-ST AND INHIBITOR SWITCH

<A/T> <Vehicles built up to November, 1992>



Engine control unit connector

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	-----

7FU0653

OPERATION

- The ignition switch-ST inputs a high signal to the engine control unit while the engine is cranking. The engine control unit provides fuel injection control, etc., at engine startup based on this signal.
- When the ignition switch is set to START, the battery voltage at cranking is applied through the ignition switch and inhibitor switch to the engine control unit, which detects that the engine is cranking. In case the selector lever is in a position other than the P/N range, the battery voltage is not applied to the engine control unit.
- The inhibitor switch converts the selector lever position (whether it is at the P/N range or at others) into high/low voltage and inputs it to the engine control unit, which then controls the idle speed control servo based on this signal.

- The battery voltage in the engine control unit is applied through a resistor to the inhibitor switch. When the selector lever is set to the P/N range, continuity is produced between the inhibitor switch terminal of the engine control unit and earth through the starter motor, thereby making the terminal voltage go low.

TROUBLESHOOTING HINTS

If the inhibitor switch harness and individual part check have resulted normal but the inhibitor switch output is abnormal, poorly adjusted control cable is suspected.

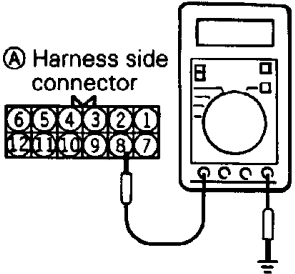
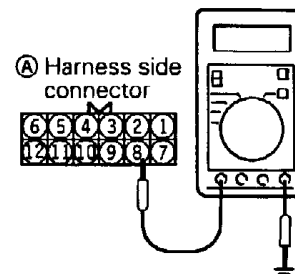
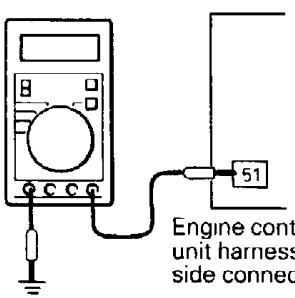
INSPECTION**Using Multi-use Tester (MUT)****IGNITION SWITCH-ST**

Function	Item No.	Data display	Check condition	Engine	Normal indication
Data reading	18	Switch state	Ignition switch: ON	Stop	OFF
				Cranking	ON

INHIBITOR SWITCH

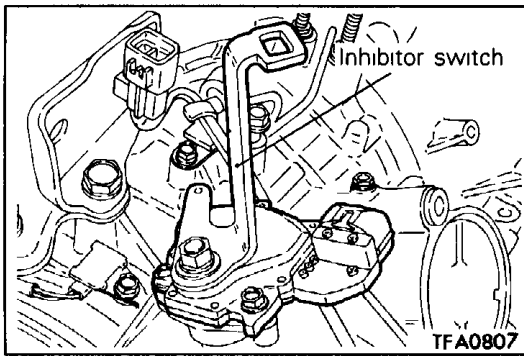
Function	Item No.	Data display	Check condition	Select lever position	Normal indication
Data reading	29	Shift position	Ignition switch: ON	P or N	P or N
				D,2,L or R	D,2,L or R

HARNESS INSPECTION

1  01A0206	Measure the power supply voltage of the inhibitor switch. - Engine control unit connector: Disconnected - Inhibitor switch connector: Disconnected - Ignition switch: START <table border="1" style="width: 100%;"> <tr><td style="text-align: center;">Voltage (V)</td></tr> <tr><td style="text-align: center;">SV</td></tr> </table>	Voltage (V)	SV	OK NG 2 Check the power supply circuit.
Voltage (V)				
SV				
2  01A0208	Measure the inhibitor switch terminal input voltage. - Engine control unit connector: Connected - Inhibitor switch connector: Disconnected - Ignition switch: ON <table border="1" style="width: 100%;"> <tr><td style="text-align: center;">Voltage (V)</td></tr> <tr><td style="text-align: center;">SV</td></tr> </table>	Voltage (V)	SV	OK NG 3 Repair the harness. (A)(8)-(11)
Voltage (V)				
SV				
3  01L0427	Measure the input voltage of engine control unit. - Engine control unit connector: Disconnected - Inhibitor switch connector: Connected - Selector lever: P range - Ignition switch: START <table border="1" style="width: 100%;"> <tr><td style="text-align: center;">Voltage (V)</td></tr> <tr><td style="text-align: center;">8 or more</td></tr> </table>	Voltage (V)	8 or more	OK NG STOP Repair the harness. (A)(9)-(11)
Voltage (V)				
8 or more				

Inhibitor switch inspection

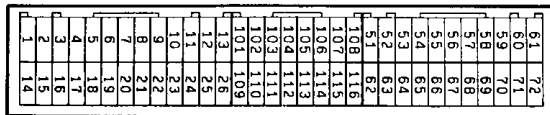
Refer to GROUP 23–Service Adjustment Procedures.

IGNITION SWITCH-ST AND INHIBITOR SWITCH**<A/T> <Vehicles built from December, 1992>**

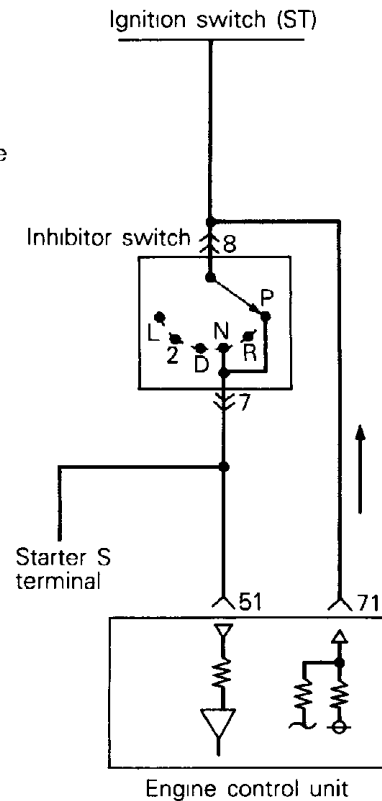
Ⓐ Equipment side connector



Engine control unit connector



7FU0653



9FU0265

OPERATION

Refer to P. 13-96

TROUBLESHOOTING HINTS

Refer to P. 13-96

INSPECTION

Refer to P. 13-97

HARNESS INSPECTION

1 Ⓐ Harness side connector 9FU0268	Measure the power supply voltage of the inhibitor switch. - Engine control unit connector. Disconnected - Inhibitor switch connector: Disconnected - Ignition switch: START <table border="1" style="width: 100%;"> <tr> <th style="text-align: center;">Voltage (V)</th> </tr> <tr> <td style="text-align: center;">SV</td> </tr> </table>	Voltage (V)	SV	OK → ✗ → 2 Check the power supply circuit
Voltage (V)				
SV				

2

Ⓐ Harness side connector

Engine control unit harness side connector

71
51

9FU0269

Check for continuity between inhibitor switch and engine control unit.

- Engine control unit connector: Disconnected
- Inhibitor switch connector: Disconnected

NOTE
Touch the circuit tester probes to both ends of the harness.

OK → **3**

✗ → Repair the harness.
(A 8 - 71)
(A 7 - 51)

3

Ⓐ Harness side connector

9FU0268

Measure the impressed voltage to inhibitor switch terminal

- Engine control unit connector: Connected
- Inhibitor switch connector: Disconnected
- Ignition switch: ON

Voltage (V)
— SV

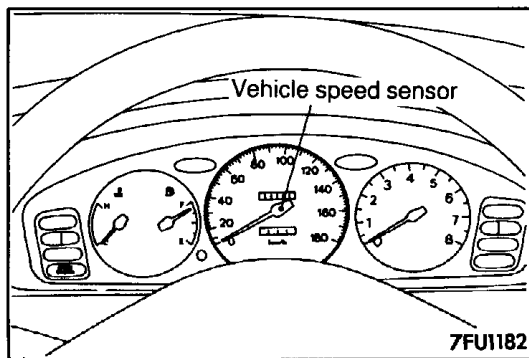
OK →

✗ → Replace the engine control unit

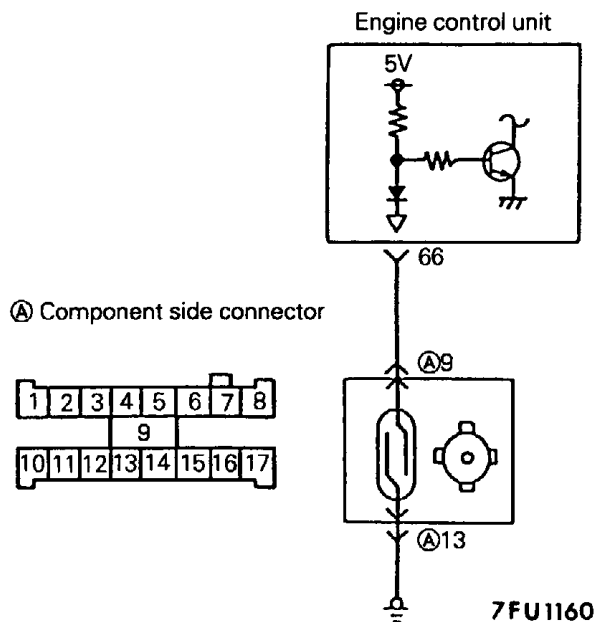
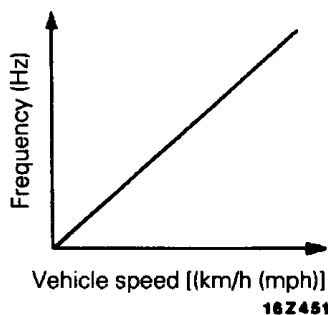
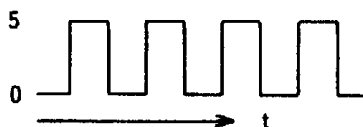
Inhibitor switch inspection

Refer to GROUP 23 – Service Adjustment Procedures.

VEHICLE SPEED SENSOR



Terminal voltage (V)



Engine control unit connector

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34

7FU0653

OPERATION

- The vehicle speed sensor which is located in the speedometer converts the vehicle speed into a pulse signal and inputs it to the engine control unit, which then provides the idle speed control, etc. based on this signal.
- The vehicle speed sensor generates the vehicle speed signal by repeatedly opening and closing between the voltage of about 5 V applied from the engine control unit and earth using a reed switch.

HARNESS INSPECTION

1

Check the vehicle speed sensor output circuit for continuity.

- Engine control unit connector: Disconnected
- Move the vehicle.

Continuity

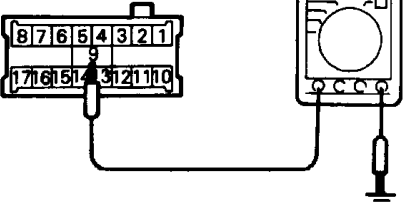
Continuity:

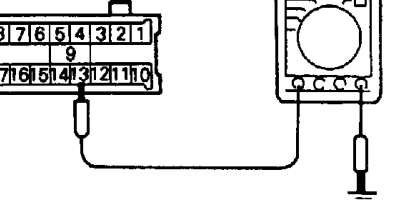
Non-continuity:

One rotation

OK →

✗ → **2**

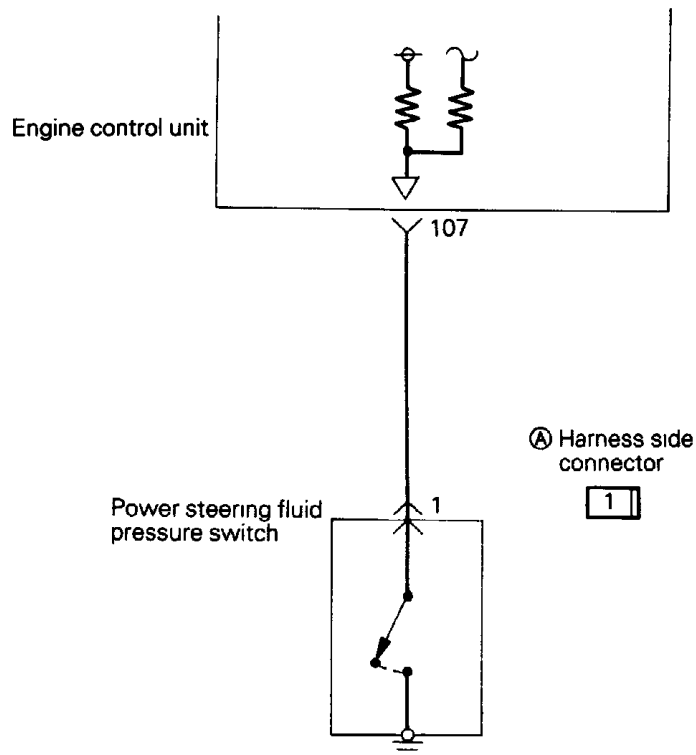
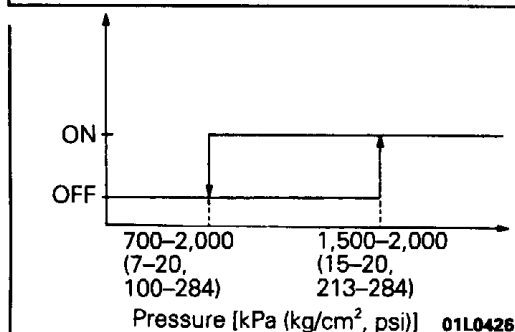
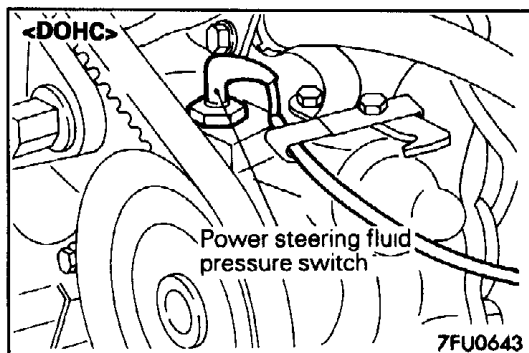
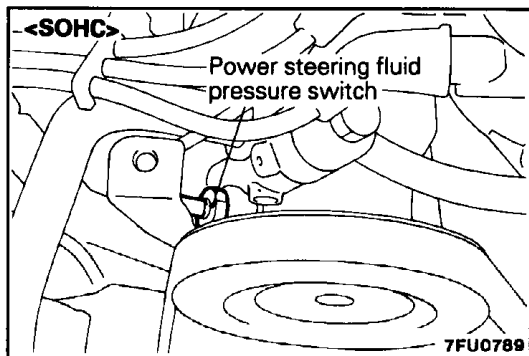
2  6FU1265	Measure the power supply voltage of the vehicle speed sensor. • Connector: Disconnected • Ignition switch: ON <table border="1"><thead><tr><th>Voltage (V)</th></tr></thead><tbody><tr><td>4.5–4.9</td></tr></tbody></table>	Voltage (V)	4.5–4.9	OK 3 OK Repair the harness. (A9–66)
Voltage (V)				
4.5–4.9				

3  7FU1161	Check for continuity of the earth circuit. • Connector: Disconnected	OK STOP OK Repair the harness (A13–Earth)
---	---	---

SENSOR INSPECTION

Refer to GROUP 54 – Meters and Gauges.

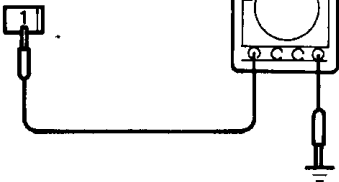
POWER STEERING FLUID PRESSURE SWITCH



Engine control unit connector

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544	545	546	547	548	549	550	551	552	553	554	555	556	557	558	559	560	561	562	563	564	565	566	567	568	569	570	571	572	573	574	575	576	577	578	579	580	581	582	583	584	585	586	587	588	589	590	591	592	593	594	595	596	597	598	599	600	601	602	603	604	605	606	607	608	609	610	611	612	613	614	615	616	617	618	619	620	621	622	623	624	625	626	627	628	629	630	631	632	633	634	635	636	637	638	639	640	641	642	643	644	645	646	647	648	649	650	651	652	653	654	655	656	657	658	659	660	661	662	663	664	665	666	667	668	669	670	671	672	673	674	675	676	677	678	679	680	681	682	683	684	685	686	687	688	689	690	691	692	693	694	695	696	697	698	699	700	701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719	720	721	722	723	724	725	726	727	728	729	730	731	732	733	734	735	736	737	738	739	740	741	742	743	744	745	746	747	748	749	750	751	752	753	754	755	756	757	758	759	760	761	762	763	764	765	766	767	768	769	770	771	772	773	774	775	776	777	778	779	780	781	782	783	784	785	786	787	788	789	790	791	792	793	794	795	796	797	798	799	800	801	802	803	804	805	806	807	808	809	810	811	812	813	814	815	816	817	818	819	820	821	822	823	824	825	826	827	828	829	830	831	832	833	834	835	836	837	838	839	840	841	842	843	844	845	846	847	848	849	850	851	852	853	854	855	856	857	858	859	860	861	862	863	864	865	866	867	868	869	870	871	872	873	874	875	876	877	878	879	880	881	882	883	884	885	886	887	888	889	890	891	892	893	894	895	896	897	898	899	900	901	902	903	904	905	906	907	908	909	910	911	912	913	914	915	916	917	918	919	920	921	922	923	924	925	926	927	928	929	930	931	932	933	934	935	936	937	938	939	940	941	942	943	944	945	946	947	948	949	950	951	952	953	954	955	956	957	958	959	960	961	962	963	964	965	966	967	968	969	970	971	972	973	974	975	976	977	978	979	980	981	982	983	984	985	986	987	988	989	990	991	992	993	994	995	996	997	998	999	1000	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020	1021	1022	1023	1024	1025	1026	1027	1028	1029	1030	1031	1032	1033	1034	1035	1036	1037	1038	1039	1040	1041	1042	1043	1044	1045	1046	1047	1048	1049	1050	1051	1052	1053	1054	1055	1056	1057	1058	1059	1060	1061	1062	1063	1064	1065	1066	1067	1068	1069	1070	1071	1072	1073	1074	1075	1076	1077	1078	1079	1080	1081	1082	1083	1084	1085	1086	1087	1088	1089	1090	1091	1092	1093	1094	1095	1096	1097	1098	1099	1100	1101	1102	1103	1104	1105	1106	1107	1108	1109	1110	1111	1112	1113	1114	1115	1116	1117	1118	1119	1120	1121	1122	1123	1124	1125	1126	1127	1128	1129	1130	1131	1132	1133	1134	1135	1136	1137	1138	1139	1140	1141	1142	1143	1144	1145	1146	1147	1148	1149	1150	1151	1152	1153	1154	1155	1156	1157	1158	1159	1160	1161	1162	1163	1164	1165	1166	1167	1168	1169	1170	1171	1172	1173	1174	1175	1176	1177	1178	1179	1180	1181	1182	1183	1184	1185	1186	1187	1188	1189	1190	1191	1192	1193	1194	1195	1196	1197	1198	1199	1200	1201	1202	1203	1204	1205	1206	1207	1208	1209	1210	1211	1212	1213	1214	1215	1216	1217	1218	1219	1220	1221	1222	1223	1224	1225	1226	1227	1228	1229	1230	1231	1232	1233	1234	1235	1236	1237	1238	1239	1240	1241	1242	1243	1244	1245	1246	1247	1248	1249	1250	1251	1252	1253	1254	1255	1256	1257	1258	1259	1260	1261	1262	1263	1264	1265	1266	1267	1268	1269	1270	1271	1272	1273	1274	1275	1276	1277	1278	1279	1280	1281	1282	1283	1284	1285	1286	1287	1288	1289	1290	1291	1292	1293	1294	1295	1296	1297	1298	1299	1300	1301	1302	1303	1304	1305	1306	1307	1308	1309	1310	1311	1312	1313	1314	1315	1316	1317	1318	1319	1320	1321	1322	1323	1324	1325	1326	1327	1328	1329	1330	1331	1332	1333	1334	1335	1336	1337	1338	1339	1340	1341	1342	1343	1344	1345	1346	1347	1348	1349	1350	1351	1352	1353	1354	1355	1356	1357	1358	1359	1360	1361	1362	1363	1364	1365	1366	1367	1368	1369	1370	1371	1372	1373	1374	1375	1376	1377	1378	1379	1380	1381	1382	1383	1384	1385	1386	1387	1388	1389	1390	1391	1392	1393	1394	1395	1396	1397	1398	1399	1400	1401	1402	1403	1404	1405	1406	1407	1408	1409	1410	1411	1412	1413	1414	1415	1416	1417	1418	1419	1420	1421	1422	1423	1424	1425	1426	1427	1428	1429
---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------

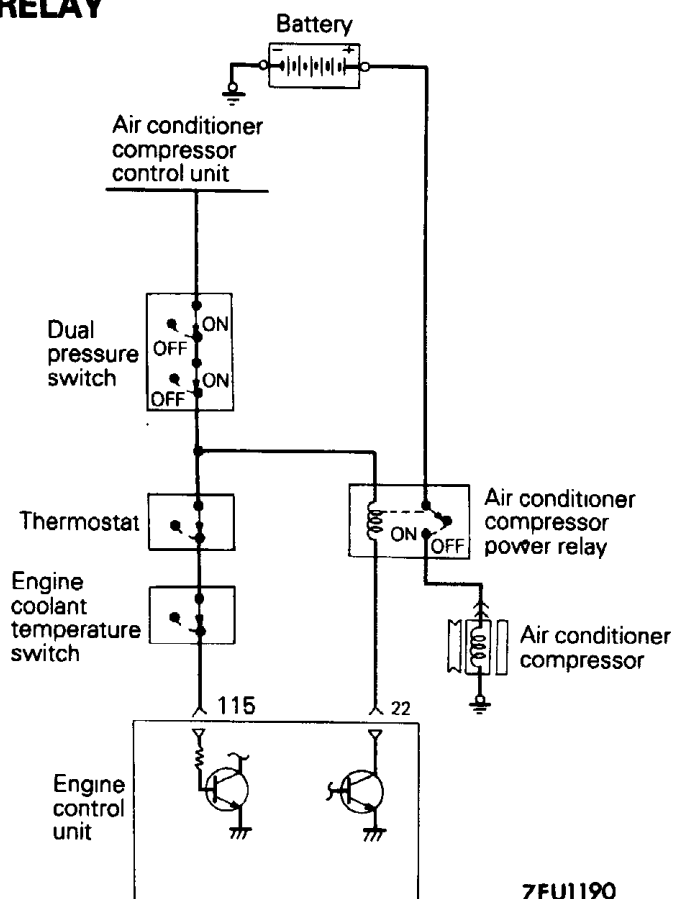
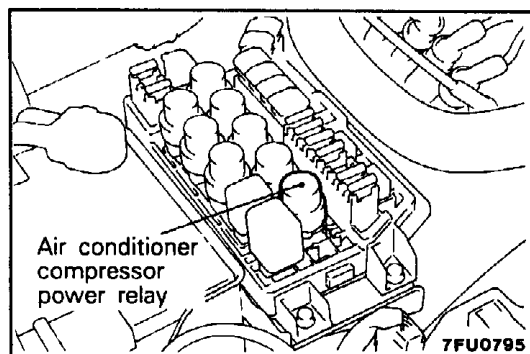
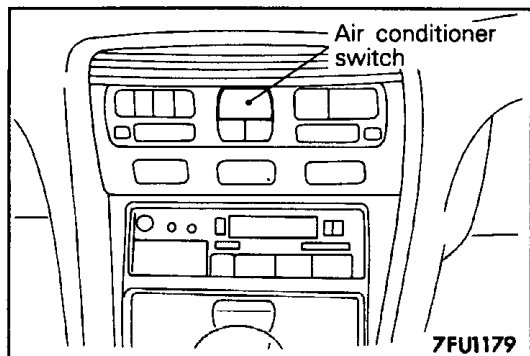
HARNESS INSPECTION

1 Ⓐ Harness side connector  7FU0505	Measure the power supply voltage. • Connector: Disconnected • Ignition switch: ON <table border="1"><tr><td>Voltage (V)</td></tr><tr><td>System voltage</td></tr></table>	Voltage (V)	System voltage	   Repair the harness. (107) – (A1)
Voltage (V)				
System voltage				

SENSOR INSPECTION

Refer to GROUP 37A – Service Adjustment Procedures.

AIR CONDITIONER SWITCH AND POWER RELAY



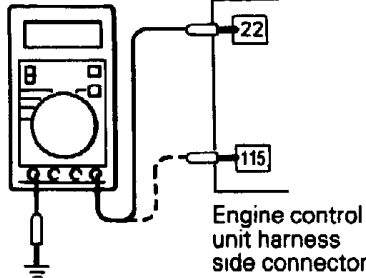
Engine control unit connector

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544	545	546	547	548	549	550	551	552	553	554	555	556	557	558	559	560	561	562	563	564	565	566	567	568	569	570	571	572	573	574	575	576	577	578	579	580	581	582	583	584	585	586	587	588	589	590	591	592	593	594	595	596	597	598	599	600	601	602	603	604	605	606	607	608	609	610	611	612	613	614	615	616	617	618	619	620	621	622	623	624	625	626	627	628	629	630	631	632	633	634	635	636	637	638	639	640	641	642	643	644	645	646	647	648	649	650	651	652	653	654	655	656	657	658	659	660	661	662	663	664	665	666	667	668	669	670	671	672	673	674	675	676	677	678	679	680	681	682	683	684	685	686	687	688	689	690	691	692	693	694	695	696	697	698	699	700	701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719	720	721	722	723	724	725	726	727	728	729	730	731	732	733	734	735	736	737	738	739	740	741	742	743	744	745	746	747	748	749	750	751	752	753	754	755	756	757	758	759	760	761	762	763	764	765	766	767	768	769	770	771	772	773	774	775	776	777	778	779	780	781	782	783	784	785	786	787	788	789	790	791	792	793	794	795	796	797	798	799	800	801	802	803	804	805	806	807	808	809	810	811	812	813	814	815	816	817	818	819	820	821	822	823	824	825	826	827	828	829	830	831	832	833	834	835	836	837	838	839	840	841	842	843	844	845	846	847	848	849	850	851	852	853	854	855	856	857	858	859	860	861	862	863	864	865	866	867	868	869	870	871	872	873	874	875	876	877	878	879	880	881	882	883	884	885	886	887	888	889	890	891	892	893	894	895	896	897	898	899	900	901	902	903	904	905	906	907	908	909	910	911	912	913	914	915	916	917	918	919	920	921	922	923	924	925	926	927	928	929	930	931	932	933	934	935	936	937	938	939	940	941	942	943	944	945	946	947	948	949	950	951	952	953	954	955	956	957	958	959	960	961	962	963	964	965	966	967	968	969	970	971	972	973	974	975	976	977	978	979	980	981	982	983	984	985	986	987	988	989	990	991	992	993	994	995	996	997	998	999	1000	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020	1021	1022	1023	1024	1025	1026	1027	1028	1029	1030	1031	1032	1033	1034	1035	1036	1037	1038	1039	1040	1041	1042	1043	1044	1045	1046	1047	1048	1049	1050	1051	1052	1053	1054	1055	1056	1057	1058	1059	1060	1061	1062	1063	1064	1065	1066	1067	1068	1069	1070	1071	1072	1073	1074	1075	1076	1077	1078	1079	1080	1081	1082	1083	1084	1085	1086	1087	1088	1089	1090	1091	1092	1093	1094	1095	1096	1097	1098	1099	1100	1101	1102	1103	1104	1105	1106	1107	1108	1109	1110	1111	1112	1113	1114	1115	1116	1117	1118	1119	1120	1121	1122	1123	1124	1125	1126	1127	1128	1129	1130	1131	1132	1133	1134	1135	1136	1137	1138	1139	1140	1141	1142	1143	1144	1145	1146	1147	1148	1149	1150	1151	1152	1153	1154	1155	1156	1157	1158	1159	1160	1161	1162	1163	1164	1165	1166	1167	1168	1169	1170	1171	1172	1173	1174	1175	1176	1177	1178	1179	1180	1181	1182	1183	1184	1185	1186	1187	1188	1189	1190	1191	1192	1193	1194	1195	1196	1197	1198	1199	1200	1201	1202	1203	1204	1205	1206	1207	1208	1209	1210	1211	1212	1213	1214	1215	1216	1217	1218	1219	1220	1221	1222	1223	1224	1225	1226	1227	1228	1229	1230	1231	1232	1233	1234	1235	1236	1237	1238	1239	1240	1241	1242	1243	1244	1245	1246	1247	1248	1249	1250	1251	1252	1253	1254	1255	1256	1257	1258	1259	1260	1261	1262	1263	1264	1265	1266	1267	1268	1269	1270	1271	1272	1273	1274	1275	1276	1277	1278	1279	1280	1281	1282	1283	1284	1285	1286	1287	1288	1289	1290	1291	1292	1293	1294	1295	1296	1297	1298	1299	1300	1301	1302	1303	1304	1305	1306	1307	1308	1309	1310	1311	1312	1313	1314	1315	1316	1317	1318	1319	1320	1321	1322	1323	1324	1325	1326	1327	1328	1329	1330	1331	1332	1333	1334	1335	1336	1337	1338	1339	1340	1341	1342	1343	1344	1345	1346	1347	1348	1349	1350	1351	1352	1353	1354	1355	1356	1357	1358	1359	1360	1361	1362	1363	1364	1365	1366	1367	1368	1369	1370	1371	1372	1373	1374	1375	1376	1377	1378	1379	1380	1381	1382	1383	1384	1385	1386	1387	1388	1389	1390	1391	1392	1393	1394	1395	1396	1397	1398	1399	1400	1401	1402	1403	1404	1405	1406	1407	1408	1409	1410	1411	1412	1413	1414	1415	1416	1417	1418	1419	1420	1421	1422	1423	1424	1425	1426	1427	1428	1429	1430	1431	1432	1433	1434	1435	1436	1437	1438	1439	1440	1441	1442	1443	1444	1445	1446	1447	1448	1449	1450	1451	1452	1453	1454	1455	1456	1457	1458	1459	1460	1461	1462	1463	1464	1465	1466	1467	1468	1469	1470	1471	1472	1473	1474	1475	1476	1477	1478	1479	1480	1481	1482	1483	1484	1485	1486	1487	1488	1489	1490	1491	1492	1493	1494	1495	1496	1497	1498	149
---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	-----

AIR CONDITIONER COMPRESSOR POWER RELAY

Function	Item No.	Data display	Check condition	Air conditioner switch	Normal indication
Data reading	49	Air conditioner compressor power relay state	Engine: Idling after warm-up	OFF	OFF (compressor clutch non-activation)
				ON	ON (compressor clutch activation)

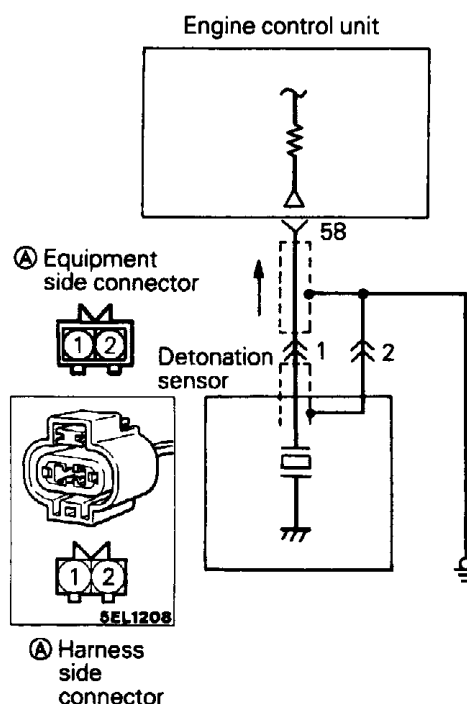
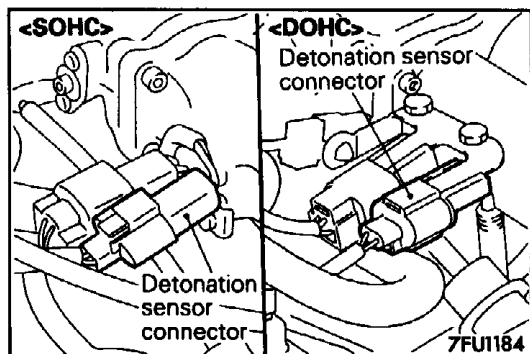
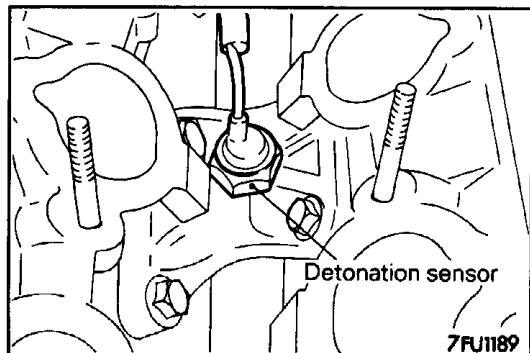
HARNESS INSPECTION

1  Engine control unit harness side connector 01R0863	Measure the power supply voltage of the air conditioner circuit. • Air conditioner switch: ON • Engine control unit connector: Disconnected • Ignition switch: ON <table border="1" style="width: 100%;"> <tr> <td style="text-align: center;">Voltage (V)</td> </tr> <tr> <td style="text-align: center;">System voltage</td> </tr> </table>	Voltage (V)	System voltage	OK STOP OK Check the air conditioner circuit.
Voltage (V)				
System voltage				

AIR CONDITIONER INSPECTION

Refer to GROUP 55 – Service Adjustment Procedures.

DETONATION SENSOR



Engine control unit connector

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72
---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

7FU0653

OPERATION

The detonation sensor converts cylinder block vibrations due to knocking into voltage signals according to the strength of the vibration and inputs them to the engine control unit.

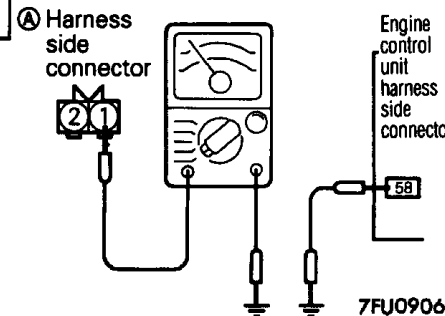
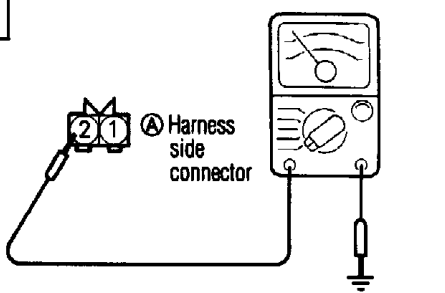
The engine control unit controls the delay in ignition timing based on this signal.

TROUBLESHOOTING HINT

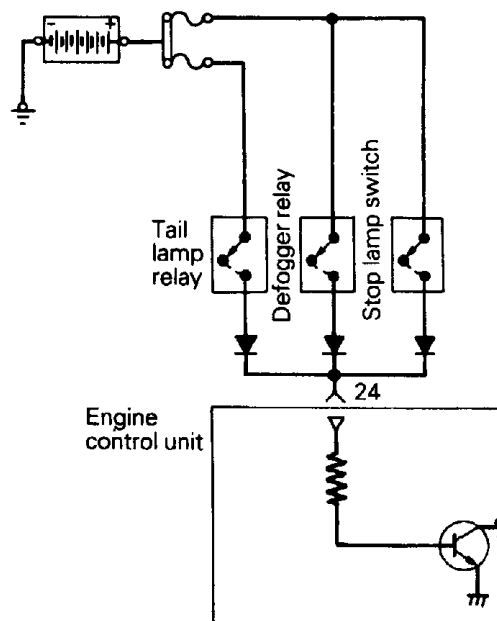
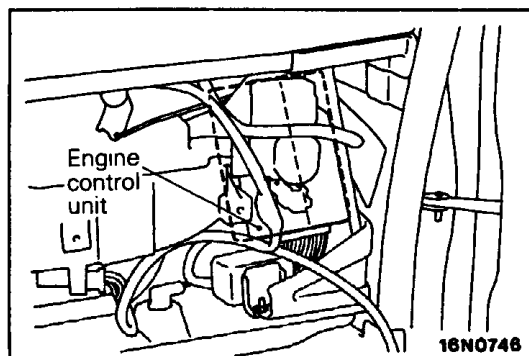
If there is knocking during high load driving, the following malfunctions, in addition to the detonation sensor, can be assumed.

- (1) Improper spark plug heating value
- (2) Improper gasoline
- (3) Incorrect adjustment of standard ignition timing

HARNESS INSPECTION

1  Ⓐ Harness side connector Engine control unit harness side connector 7FUJ0906	Check for an open-circuit or a short-circuit to ground, between the engine control unit and detonation sensor. • Detonation sensor connector: Disconnect • Engine control unit connector: Disconnect	OK → 2 ✗ → Repair the harness (Ⓐ1-58)
2  Ⓐ Harness side connector 6FU1302	Check for continuity of the earth circuit. • Connector: Disconnect	OK → STOP ✗ → Repair the harness (Ⓐ2-earth)

ELECTRIC LOAD SWITCH <DOHC>



7FU0688

Engine control unit connector

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544	545	546	547	548	549	550	551	552	553	554	555	556	557	558	559	560	561	562	563	564	565	566	567	568	569	570	571	572	573	574	575	576	577	578	579	580	581	582	583	584	585	586	587	588	589	590	591	592	593	594	595	596	597	598	599	600	601	602	603	604	605	606	607	608	609	610	611	612	613	614	615	616	617	618	619	620	621	622	623	624	625	626	627	628	629	630	631	632	633	634	635	636	637	638	639	640	641	642	643	644	645	646	647	648	649	650	651	652	653	654	655	656	657	658	659	660	661	662	663	664	665	666	667	668	669	670	671	672	673	674	675	676	677	678	679	680	681	682	683	684	685	686	687	688	689	690	691	692	693	694	695	696	697	698	699	700	701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719	720	721	722	723	724	725	726	727	728	729	730	731	732	733	734	735	736	737	738	739	740	741	742	743	744	745	746	747	748	749	750	751	752	753	754	755	756	757	758	759	760	761	762	763	764	765	766	767	768	769	770	771	772	773	774	775	776	777	778	779	780	781	782	783	784	785	786	787	788	789	790	791	792	793	794	795	796	797	798	799	800	801	802	803	804	805	806	807	808	809	810	811	812	813	814	815	816	817	818	819	820	821	822	823	824	825	826	827	828	829	830	831	832	833	834	835	836	837	838	839	840	841	842	843	844	845	846	847	848	849	850	851	852	853	854	855	856	857	858	859	860	861	862	863	864	865	866	867	868	869	870	871	872	873	874	875	876	877	878	879	880	881	882	883	884	885	886	887	888	889	890	891	892	893	894	895	896	897	898	899	900	901	902	903	904	905	906	907	908	909	910	911	912	913	914	915	916	917	918	919	920	921	922	923	924	925	926	927	928	929	930	931	932	933	934	935	936	937	938	939	940	941	942	943	944	945	946	947	948	949	950	951	952	953	954	955	956	957	958	959	960	961	962	963	964	965	966	967	968	969	970	971	972	973	974	975	976	977	978	979	980	981	982	983	984	985	986	987	988	989	990	991	992	993	994	995	996	997	998	999	1000
---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	------

7FU0653

OPERATION

- When there is a device switch which consumes large electricity or has large electrical load during idling, the electrical load switch inputs the ON/OFF signal of the device switch to the control unit. The engine control unit controls the idle speed control servo with this signal.
- When device with large electric load is turned ON, battery voltage is supplied to the engine control unit. As a result, the engine control unit detects that a device switch is ON.

INSPECTION

Using multi-use tester (MUT)

Function	Item No.	Data display	Check condition	Accessory condition	Standard value
Data reading	33	Switch condition	- Accessory operation: OFF - Engine Idling	Lighting switch only: OFF → ON	OFF → ON
				Rear defogger switch only: OFF → ON	OFF → ON
				Brake pedal only: from "depressed" to "release"	ON → OFF

HARNESS INSPECTION

1

Engine control unit harness side connector

7FU0689

Measure input voltage to engine control unit.

- Engine control unit connector: Disconnect
- Lightning switch: ON (Tail lamp relay goes ON.)

Voltage (V)

System voltage

2

Tail lamp relay related circuit inspection

2

Engine control unit harness side connector

7FU0689

Measure input voltage to engine control unit.

- Engine control unit connector: Disconnect
- Rear defogger switch: ON (Defogger relay goes ON.)

Voltage (V)

System voltage

3

Defogger relay related circuit inspection

3

Engine control unit harness side connector

7FU0689

Measure input voltage to engine control unit.

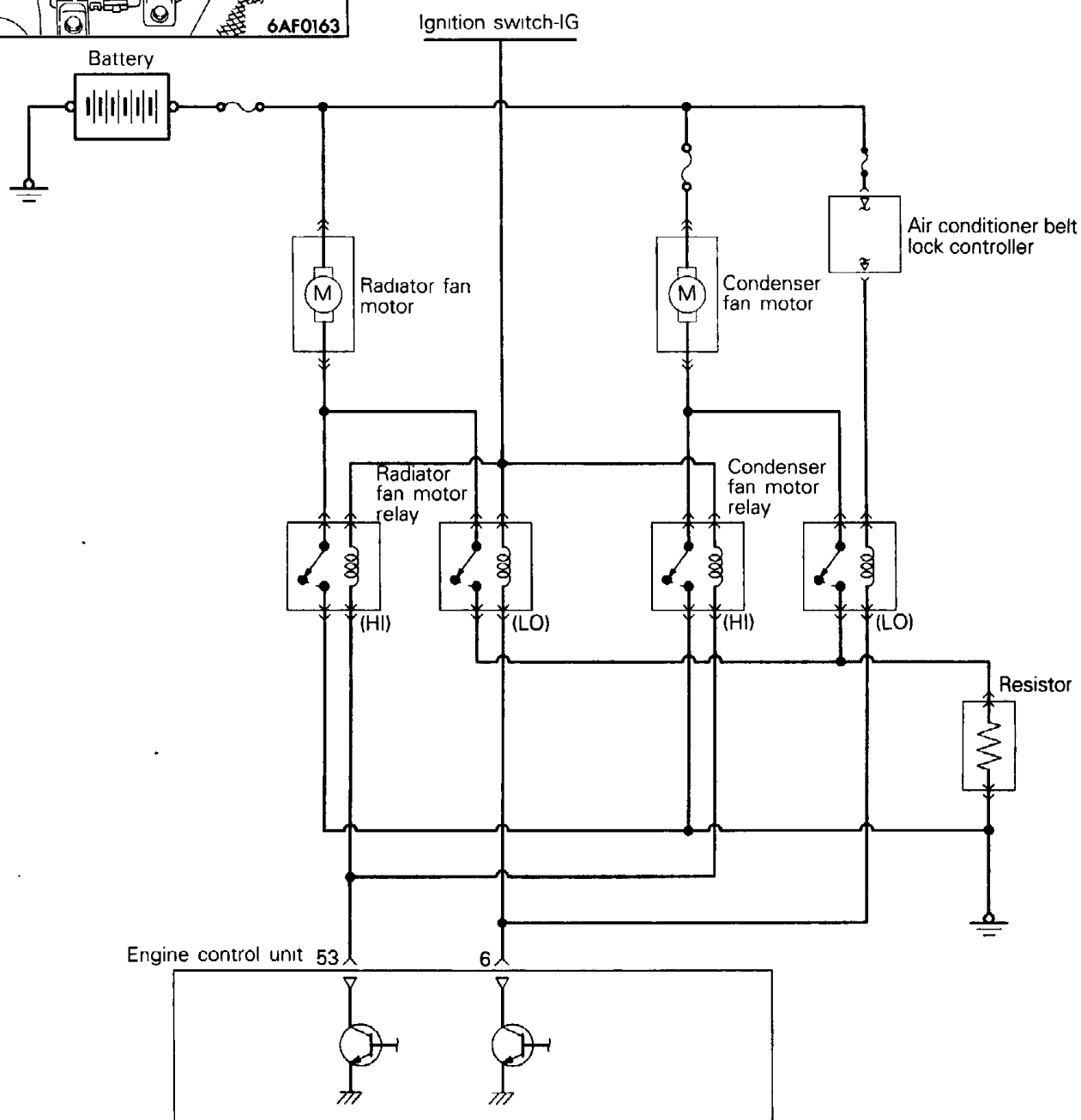
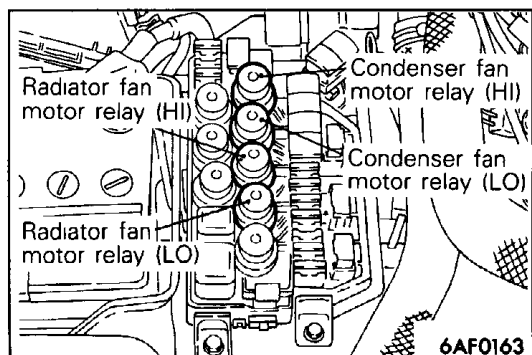
- Engine control unit connector: Disconnect
- Brake pedal: Depressed (Stop lamp relay goes ON.)

Voltage (V)

System voltage

Stop lamp relay and related circuit inspection

FAN MOTOR RELAY (RADIATOR FAN, CONDENSER FAN)



Engine control unit connector

PL	41	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544	545	546	547	548	549	550	551	552	553	554	555	556	557	558	559	560	561	562	563	564	565	566	567	568	569	570	571	572	573	574	575	576	577	578	579	580	581	582	583	584	585	586	587	588	589	590	591	592	593	594	595	596	597	598	599	600	601	602	603	604	605	606	607	608	609	610	611	612	613	614	615	616	617	618	619	620	621	622	623	624	625	626	627	628	629	630	631	632	633	634	635	636	637	638	639	640	641	642	643	644	645	646	647	648	649	650	651	652	653	654	655	656	657	658	659	660	661	662	663	664	665	666	667	668	669	670	671	672	673	674	675	676	677	678	679	680	681	682	683	684	685	686	687	688	689	690	691	692	693	694	695	696	697	698	699	700	701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719	720	721	722	723	724	725	726	727	728	729	730	731	732	733	734	735	736	737	738	739	740	741	742	743	744	745	746	747	748	749	750	751	752	753	754	755	756	757	758	759	760	761	762	763	764	765	766	767	768	769	770	771	772	773	774	775	776	777	778	779	780	781	782	783	784	785	786	787	788	789	790	791	792	793	794	795	796	797	798	799	800	801	802	803	804	805	806	807	808	809	810	811	812	813	814	815	816	817	818	819	820	821	822	823	824	825	826	827	828	829	830	831	832	833	834	835	836	837	838	839	840	841	842	843	844	845	846	847	848	849	850	851	852	853	854	855	856	857	858	859	860	861	862	863	864	865	866	867	868	869	870	871	872	873	874	875	876	877	878	879	880	881	882	883	884	885	886	887	888	889	890	891	892	893	894	895	896	897	898	899	900	901	902	903	904	905	906	907	908	909	910	911	912	913	914	915	916	917	918	919	920	921	922	923	924	925	926	927	928	929	930	931	932	933	934	935	936	937	938	939	940	941	942	943	944	945	946	947	948	949	950	951	952	953	954	955	956	957	958	959	960	961	962	963	964	965	966	967	968	969	970	971	972	973	974	975	976	977	978	979	980	981	982	983	984	985	986	987	988	989	990	991	992	993	994	995	996	997	998	999	1000
----	----	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	------

7FU0653

7FU1414

OPERATION

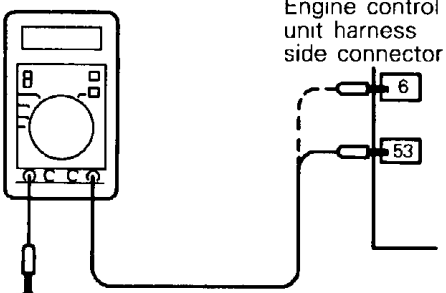
- The engine control unit controls the operation speed of the radiator fan motor and condenser fan motor in accordance with the engine coolant temperature and vehicle speed by controlling the power transistors (low-speed side and high-speed side) inside the engine control unit.
- When the engine control unit turns the low-speed side power transistor inside the engine control unit ON, the radiator fan motor relay (LO) operates and current for driving the radiator fan motor (low-speed operation) is supplied from the battery to the radiator fan motor.
In addition, when the A/C compressor lock controller outputs current for driving the A/C compressor, the compressor fan motor relay (LO) operates and current for driving the condenser fan motor (low-speed operation) is supplied from the battery to the condenser fan motor.
- When the engine control unit turns the high-speed side power transistor inside the engine control unit ON, the radiator fan motor relay (HI) and condenser fan motor relay (HI) operate and current for driving the radiator fan motor and condenser fan motor (high-speed operation) is supplied from the battery to the radiator fan motor and condenser fan motor.

INSPECTION BY USING MUT

Function	Item No.	Check content	Check condition	Normal state
Actuator test	20	Drive the radiator fan motor and the condenser fan motor at high speed	Ignition switch: ON	The radiator fan motor and the condenser fan motor turn at high speed
	21	Drive the radiator fan motor and the condenser fan motor at low speed	Ignition switch: ON	The radiator fan motor and the condenser fan motor turn at low speed

HERNESS INSPECTION

1



Engine control unit harness side connector

6FU2008

Measure the input voltage to the engine control unit

- Engine control unit connector: Disconnected
- Ignition switch: ON

Voltage (V)
Battery voltage

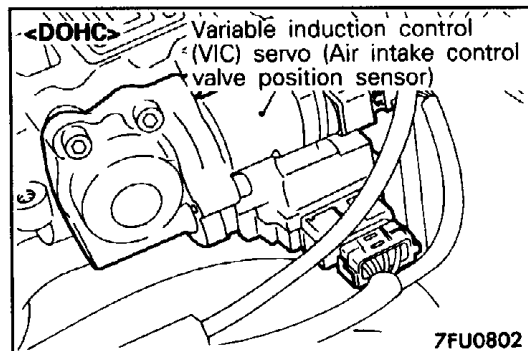
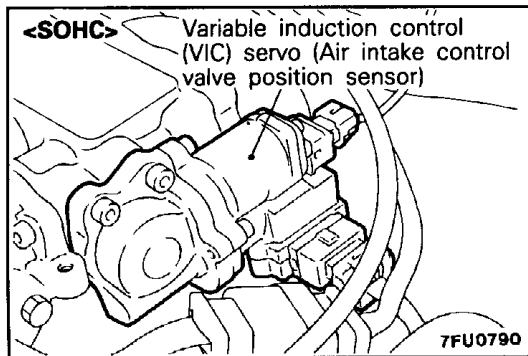
OK → 

OK → Check the fan motor relay circuit

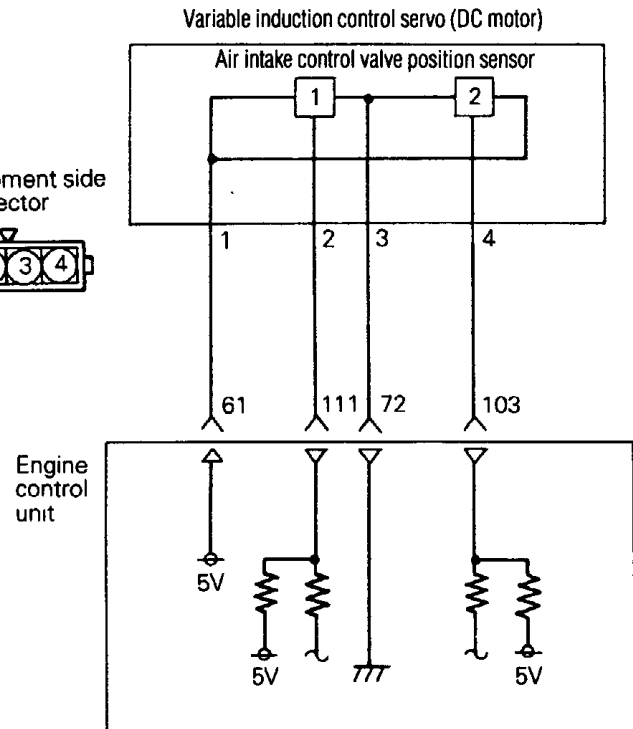
FAN MOTOR RELAY INSPECTION

Refer to GROUP 14 – Radiator and GROUP 55 – Service Adjustment Procedures.

INDUCTION CONTROL VALVE POSITION SENSOR



Ⓐ Equipment side connector

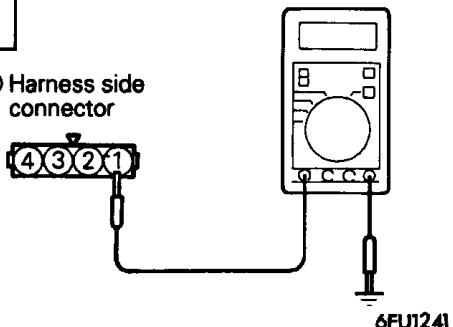
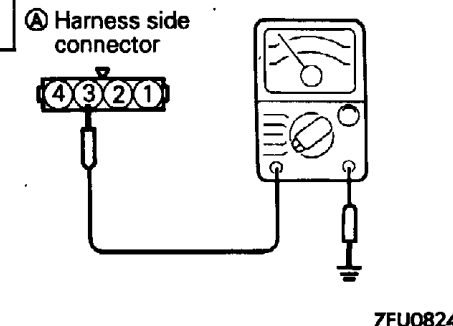
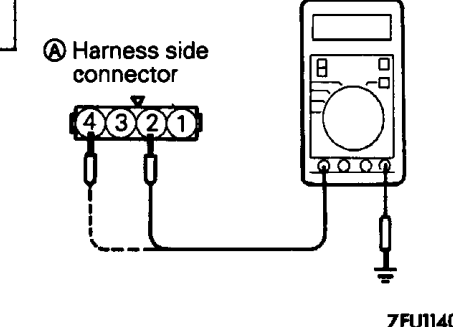


7FU0968

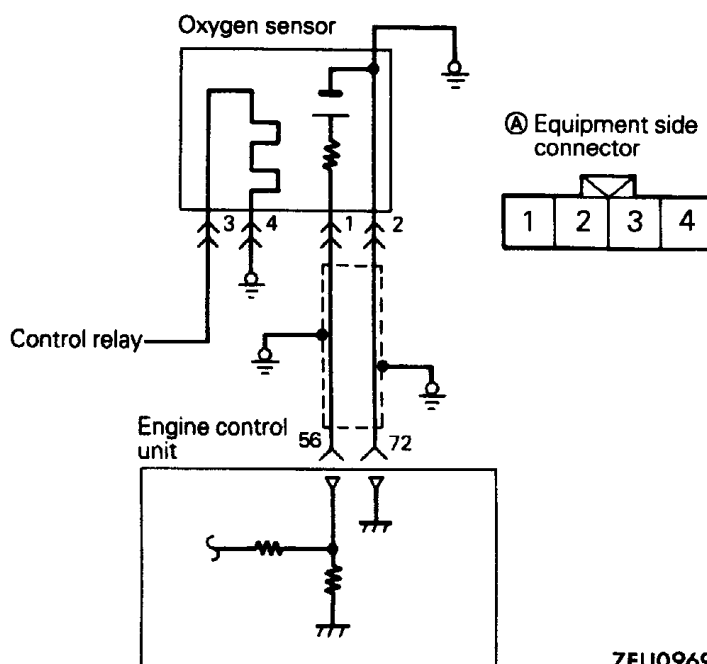
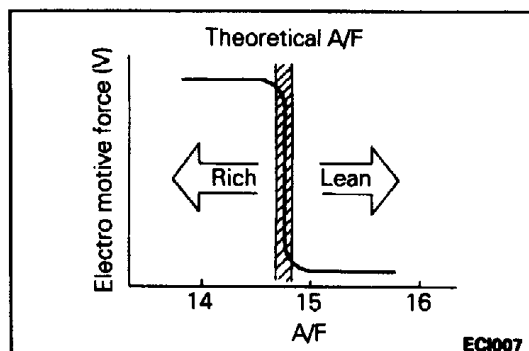
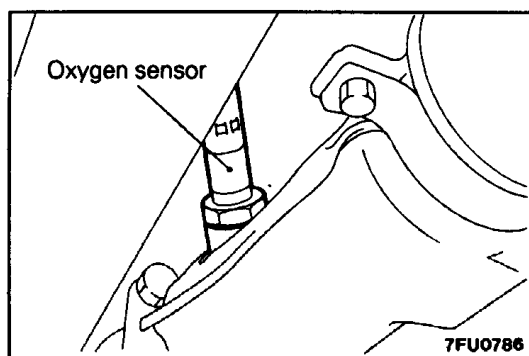
OPERATION

- The air intake control valve position sensor detects the opening of the air intake control valve, converts it to a pulse signal which is input to the engine control unit. The engine control unit controls the opening of the valve with this signal (Variable induction control).
- The air intake control valve position sensor is supplied from the engine control unit with 5 volts of power and earthed to the engine control unit. 5 volts is supplied to the air intake control valve position sensor output terminal (2 terminals) from the engine control unit, and the air intake control valve position sensor generates a pulse signal depending on the opening and closing of the line between the output terminal and earth.

HARNESS INSPECTION

1 Ⓐ Harness side connector  6FU1241	Measure the power supply voltage of the induction valve position sensor. - Connector: Disconnected - Ignition switch: ON <table border="1" style="width: 100%;"> <thead> <tr> <th style="text-align: center;">Voltage (V)</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">4.8–5.2</td> </tr> </tbody> </table>	Voltage (V)	4.8–5.2	OK → 2 ✗ → Repair the harness (A1–B1)
Voltage (V)				
4.8–5.2				
2 Ⓐ Harness side connector  7FU0824	Check continuity of the earth circuit. Connector: Disconnect	OK → 3 ✗ → Repair the harness (A3–I2)		
3 Ⓐ Harness side connector  7FU1140	Measure the terminal voltage. - Connector: Disconnected - Ignition switch: ON <table border="1" style="width: 100%;"> <thead> <tr> <th style="text-align: center;">Voltage (V)</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">4.8–5.2</td> </tr> </tbody> </table>	Voltage (V)	4.8–5.2	OK → STOP ✗ → Repair the harness (A2–I11, A4–I03)
Voltage (V)				
4.8–5.2				

OXYGEN SENSOR



Engine control unit connector

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72
---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

7FU0653

OPERATION

- The oxygen sensor functions to detect the concentration of oxygen in the exhaust gas; it converts those data to voltage, and inputs the resulting signals to the engine control unit.
- If the air/fuel mixture ratio is richer than the theoretical air/fuel mixture ratio (i.e., if the concentration of oxygen in the exhaust gas is sparse), a voltage of approximately 1V is output; if the air/fuel mixture ratio is leaner than the theoretical air/fuel mixture ratio (i.e., if the concentration is dense), a voltage of approximately 0V is output.
- The engine control unit, based upon those signals, regulates the amount of fuel injection so that the air/fuel mixture ratio becomes the theoretical air/fuel mixture ratio.
- Battery power supply is applied, by way of the control relay, to the oxygen sensor heater. As a result, the sensor element is heated by the heater, so that the oxygen sensor shows excellent response even if the temperature of the exhaust gas is low.

TROUBLESHOOTING HINTS**Hint 1:**

The exhaust gas purification performance will worsen if there is a malfunction of the oxygen sensor.

Hint 2:

If the oxygen sensor output voltage deviates from the standard value even though the results of the checking of the oxygen sensor are normal, the cause is probably a malfunction of a component related to air/fuel mixture ratio control.

Examples:

- (1) Malfunction of an injector.
- (2) Air leakage into the intake manifold from a leaking gasket.
- (3) Malfunction of the air-flow sensor, the intake air temperature sensor, the barometric-pressure sensor, or the coolant temperature sensor.

INSPECTION**Using Multi-use tester (MUT)**

Function	Item No.	Data display	Check condition	Engine condition	Standard value
Data reading	11	Sensor detection voltage	Engine: Warm-up (Make the mixture lean by engine speed reduction, and rich by racing.)	When sudden deceleration from 4000 r/min.	200 mV or lower
				When engine is suddenly raced	600–1,000 mV
			Engine: warm up (using the oxygen sensor signal, check the air/fuel mixture ratio, and also check the condition of control by the engine control unit.)	700 r/min (idling)	400 mV or lower
				2,000 r/min	$\updownarrow$ (changes) $\updownarrow$ 600–1,000 mV

HARNESS INSPECTION

1

① Harness side connector

7FU0827

Measure the power supply voltage of the oxygen sensor.

- Connector: Disconnected
- Ignition switch: ON

Voltage (V)

System voltage

2

Repair the harness.
(B3—Control relay)

2

① Harness side connector

Engine control unit harness side connector

56

7FU0828

Check for an open-circuit, or a short circuit to earth between the engine control unit and the oxygen sensor.

- Oxygen sensor connector: Disconnected
- Engine control unit connector: Disconnected

3

Repair the harness.
(A1—56)

3

Ⓐ Harness side connector

7FU0829

Check for continuity of the earth circuit.

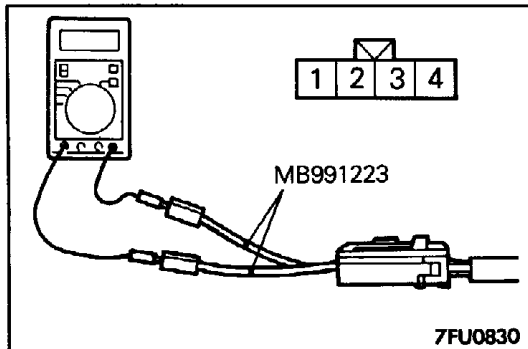
- Connector: Disconnected

OK →

✗ →

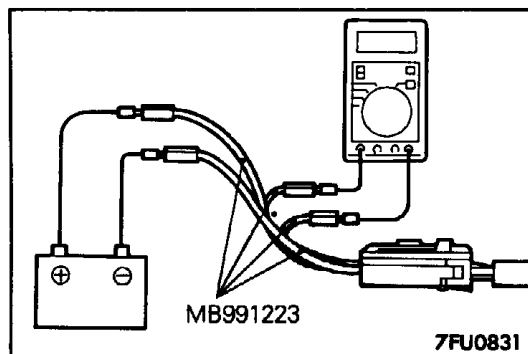
STOP

Repair the harness.
(Ⓐ2-7)
(Ⓐ4-earth)



SENSOR INSPECTION

- (1) Disconnect the oxygen sensor connector and connect the special tool (test harness set) to the connector on the oxygen sensor side.
- (2) Make sure that there is continuity (approx. 20 Ω at 20°C (68°F) between terminal 3 and terminal 4 on the oxygen sensor connector.
- (3) If there is no continuity, replace the oxygen sensor.



- (4) Warm up the engine until engine coolant is 80°C (176°F) or higher.
- (5) Use jumper wires to connect oxygen sensor terminal 3 (connect to (+) terminal) and terminal 4 (connect to (-) terminal) with the battery (+) terminal and (-) terminal.

Caution

Be very careful when connecting the jumper wires; incorrect connection can damage the oxygen sensor.

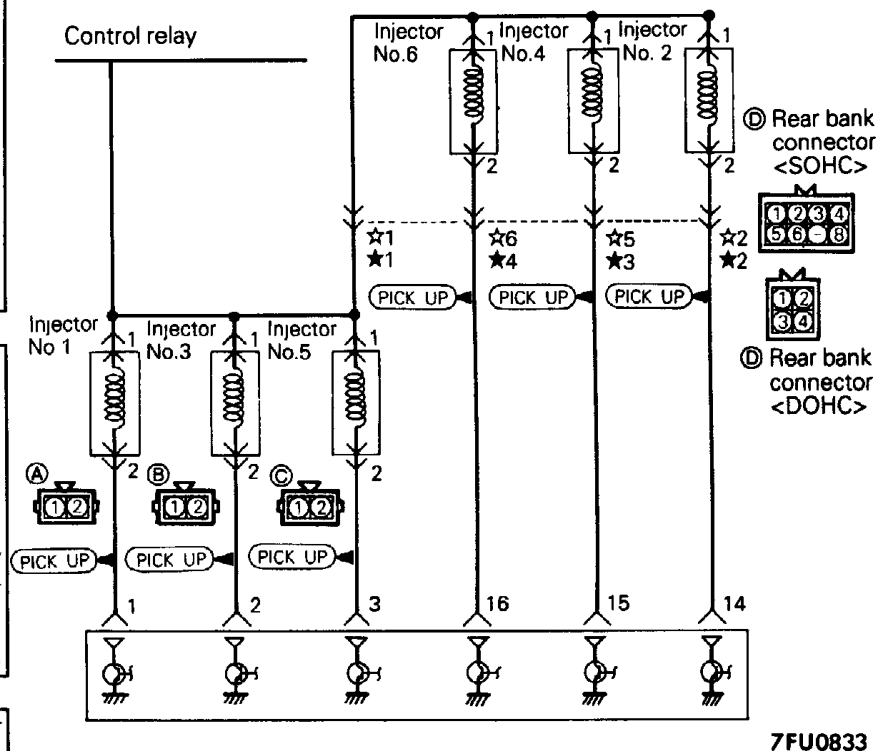
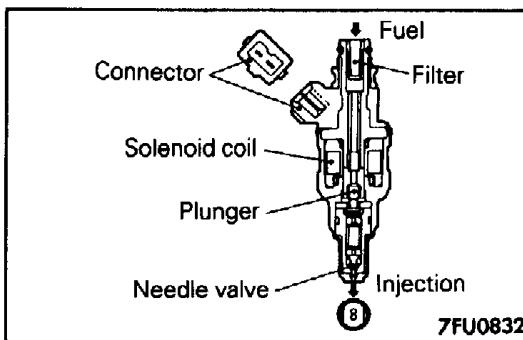
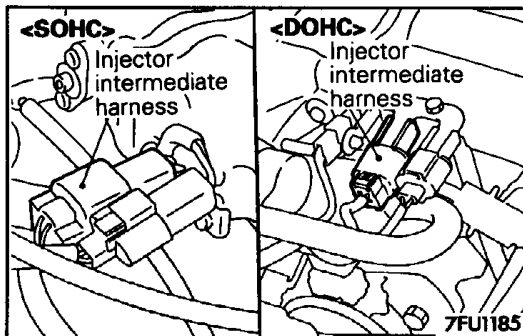
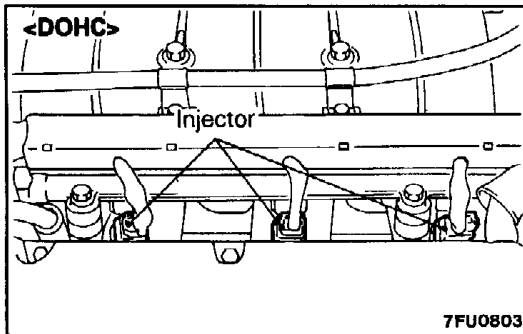
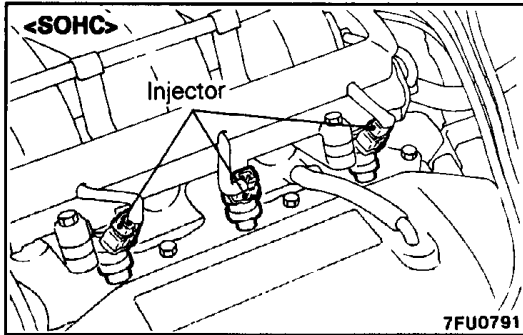
- (6) Connect a digital voltage meter between terminal 1 and terminal 2.
- (7) While repeatedly racing the engine, measure the oxygen sensor output voltage.

Engine	Oxygen sensor output voltage	Remarks
When racing engine	0.6–1.0V	If you make the air/fuel ratio rich by racing the engine repeatedly, a normal oxygen sensor will output a voltage of 0.6–1.0V.

NOTE

- Refer to GROUP 15–Exhaust Manifold for the removal and installation of the oxygen sensor.

INJECTORS



Engine control unit connector

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72
---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

7FU0653

NOTE

- ☆: Indicates SOHC engine.
- ★: Indicates DOHC engine.

OPERATION

- The injector is an injection nozzle with a solenoid valve which injects fuel according to the injection signal coming from the engine control unit.
- The injector has a fixed nozzle opening area and the fuel pressure against manifold inside pressure is regulated to a fixed level. Therefore, the volume of fuel injected by the injector is determined by the time during which the needle valve is open, namely, by the time during which the solenoid coil is energized.
- The battery voltage is applied through the control relay to this injector. When the engine control unit turns ON the power transistor in the unit, the solenoid coil is energized to open the injector valve, which then injects fuel.

TROUBLESHOOTING HINTS

Hint 1: If the engine is hard to start when hot, check fuel pressure and check the injector for leaks.

Hint 2: If the injector does not when the engine that is hard to start is cranked, the following as well as the injector itself may be responsible.

- (1) Faulty power supply circuit to the engine control unit, faulty earth circuit
- (2) Faulty control relay
- (3) Faulty crank angle sensor, top dead centre sensor

Hint 3: If there is any cylinder whose idle state remains unchanged when the fuel injection of injectors is cut one after another during idling make following checks

about such cylinder.

- (1) Injector and harness check
- (2) Ignition plug and high tension cable check

- (3) Compression pressure check

Hint 4: If the injector harness and individual part checks have resulted normal but the injector drive time is out of specification, the following troubles are suspected.

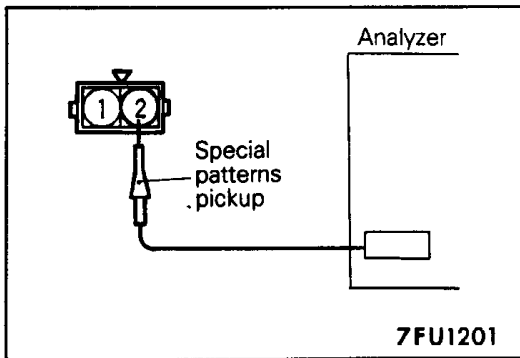
- (1) Poor combustion in the cylinder (faulty ignition plug, ignition coil, compression pressure, etc.)
- (2) High engine resistance

INSPECTION**Using Multi-use Tester (MUT)**

Function	Item No.	Data display	Check condition	Coolant temperature	Standard value
Data reading	41	Drive time	Engine: Cranking	0°C (32°F)	Approx. 14 ms <SOHC> Approx. 17 ms <DOHC>
				20°C (68°F)	Approx. 40 ms <SOHC> Approx. 46 ms <DOHC>
				80°C (176°F)	Approx. 9 ms <SOHC> Approx. 11 ms <DOHC>

Function	Item No.	Data display	Check condition	Engine state	Standard value
Data reading	41	Drive time	• Engine coolant temperature: 80 to 95°C (176 to 205°F) • Lamps, electric cooling fan, accessory units: All OFF • Transmission: Neutral • Steering wheel: Neutral	700r/min (Idle)	2.3–3.5 ms <SOHC> 2.1–3.3 ms <DOHC>
				2,000 r/min	2.1–3.3 ms <SOHC> 1.7–2.9 ms <DOHC>
				When sharp racing is made	To increase

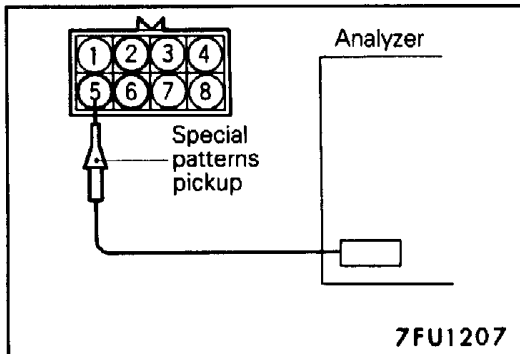
Function	Item No.	Drive content	Check condition	Normal state
Actuator test	01	No. 1 injector shut off	Engine: Idling after warm-up (Shut off the injectors in sequence during after engine warm-up, check the idling condition)	Idle state to change further (becoming less stable or stalling)
	02	No. 2 injector shut off		
	03	No. 3 injector shut off		
	04	No. 4 injector shut off		
	05	No. 5 injector shut off		
	06	No. 6 injector shut off		



Wave Pattern Inspection Using an Analyzer Measurement method

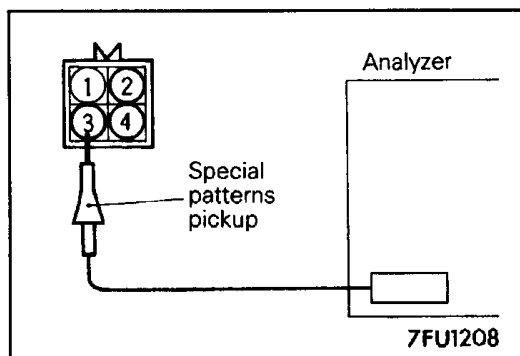
FOR FRONT BANK CYLINDERS (No.1, No.3, No.5)

- (1) Disconnect the injector connector, and connect the special tool (test harness: MB991348) in between. (The power side and the ECU side terminals should both be connected.)
- (2) Connect the analyzer special patterns pickup to the ECU test harness clip.



FOR REAR BANK CYLINDERS (No.2, No.4, No.6) SOHC

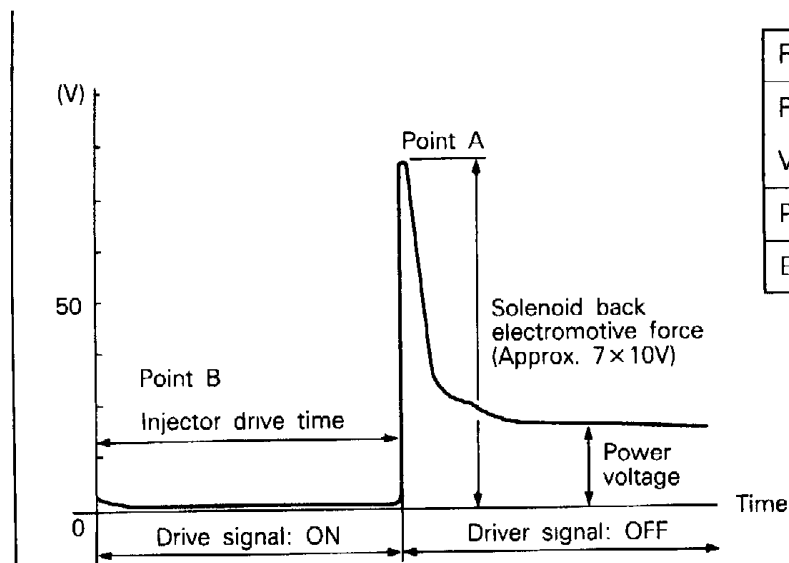
- (1) Disconnect the injector connector for the rear bank and connect the special tool (test harness MD998474).
- (2) Connect the analyzer special patterns pickup to the male side connector terminal (2) [yellow clip on the special tool (yellow lead wire)] to analyze the No.2 cylinder, terminal (5) [yellow clip (red and yellow lead wire)] for the No.4 cylinder, and terminal (6) [green clip (green and black lead wire)] respectively.



DOHC

- (1) Disconnect the injector connector for the rear bank and connect the special tool (test harness MD998464).
- (2) Connect the analyzer special patterns pickup to the male side connector terminal (2) (black clip on the special tool) to analyze the No.2 cylinder, connection terminal (3) (blue clip) for No. 4 cylinder, and connection terminal (4) (white clip) for No. 6 cylinder respectively.

Standard wave pattern



Observation conditions

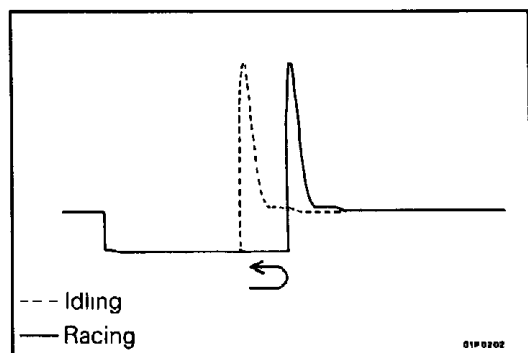
Function	Special patterns
Pattern height	Variable
Variable knob	Adjust by monitoring wave
Pattern selector	Display
Engine r/min.	Idle r/min. (700 r/min.)

7FU1202

Wave pattern observation points

(Point A): Height of back electromotive force in the solenoid coil

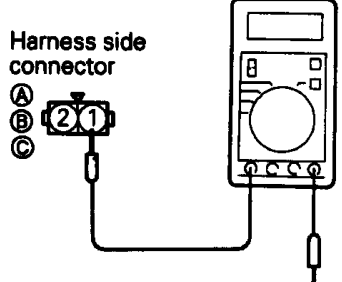
Contrast with standard wave pattern	Probable cause
Solenoid coil back electromotive force is low or doesn't appear at all.	Short in the injector solenoid

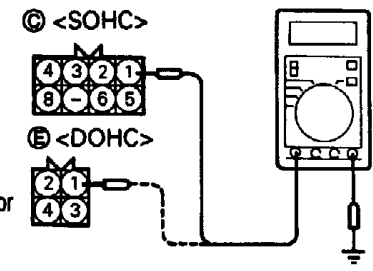


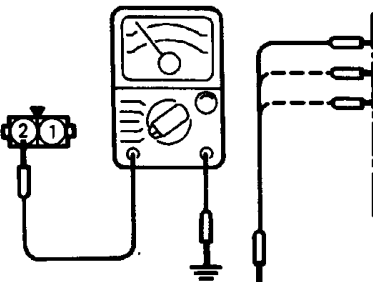
(Point B): Injector drive time

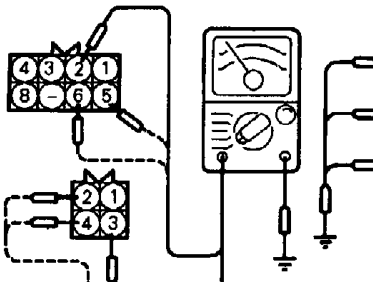
- The injector drive timing will be synchronized with the multi-use tester display.
- When the engine is suddenly raced, the drive time will be greatly extended at first, but the drive time will soon match the engine speed.

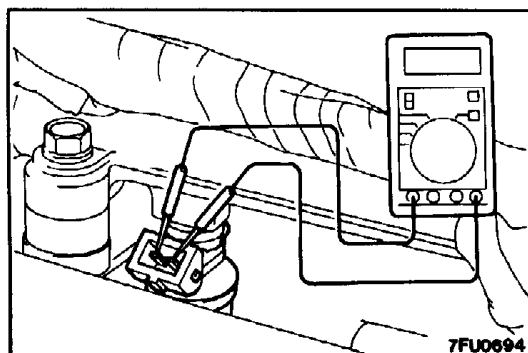
HARNESS INSPECTION

1 Harness side connector  7FU0669	Measure the front bank injector power supply voltage. - Connector: Disconnected - Ignition switch: ON <table border="1"> <tr> <td>Voltage (V)</td> </tr> <tr> <td>System voltage</td> </tr> </table>	Voltage (V)	System voltage	OK → 2 ✗ → Repair the harness (A, B, C) control relay) Check the power supply circuit
Voltage (V)				
System voltage				

2 © <SOHC>  7FU0804	Measure the rear bank injector power source voltage. - Connector: Disconnected - Ignition switch: ON <table border="1"> <tr> <td>Voltage (V)</td> </tr> <tr> <td>System voltage</td> </tr> </table>	Voltage (V)	System voltage	OK → 3 ✗ → Repair the harness (D, E) control relay) (F) control relay)
Voltage (V)				
System voltage				

3  7FU0805	Check for an open-circuit or short circuit between the front bank injector and the engine control unit. - Injector connector: Disconnected - Engine control unit Connector: Disconnected	OK → 4 ✗ → Repair the harness (A, B, C) 2-112 (D, E) 2-112 (F) 2-112
---	--	---

4  7FU0807	Check for an open-circuit or short circuit between the rear bank injector and the engine control unit. - Connector: Disconnected - Engine control unit connector: Disconnected	OK → STOP ✗ → Repair the harness (D, E) 2-112 (F) 2-112
--	--	--



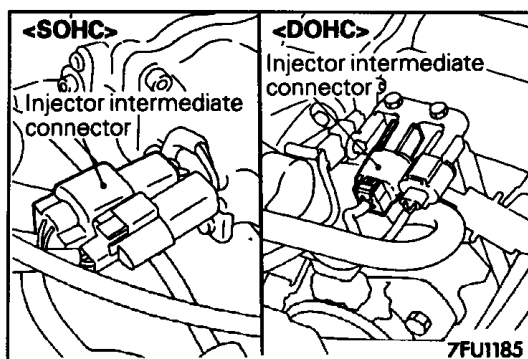
ACTUATOR INSPECTION

Measurement of resistance between front bank terminals

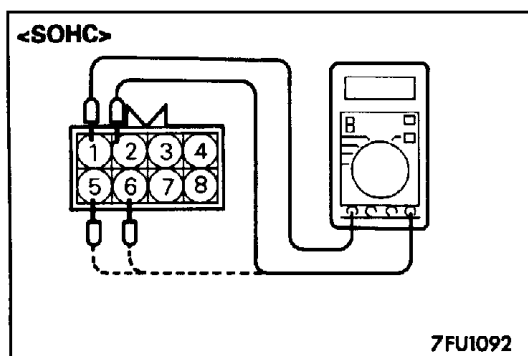
- (1) Disconnect the injector connector
- (2) Measure the resistance between the terminals.

Standard value: 13–16 Ω [At 20°C (68°F)]

- (3) Connect the injector connector.

**Measurement of resistance between rear bank terminals**

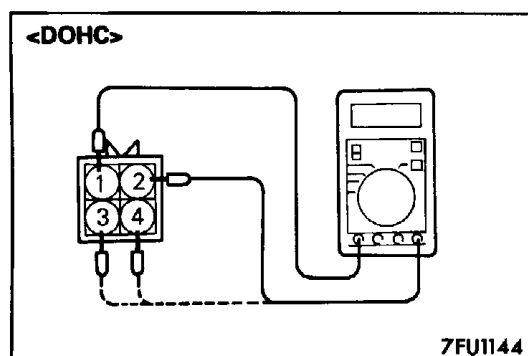
(1) Disconnect the injector intermediate connector.



(2) Measure resistance between terminals.

<SOHC>

Injector No.	Measurement terminal	Resistance
No. 2	①-②	13-16 Ω [At 20°C (68°F)]
No. 4	①-⑤	
No. 6	①-⑥	

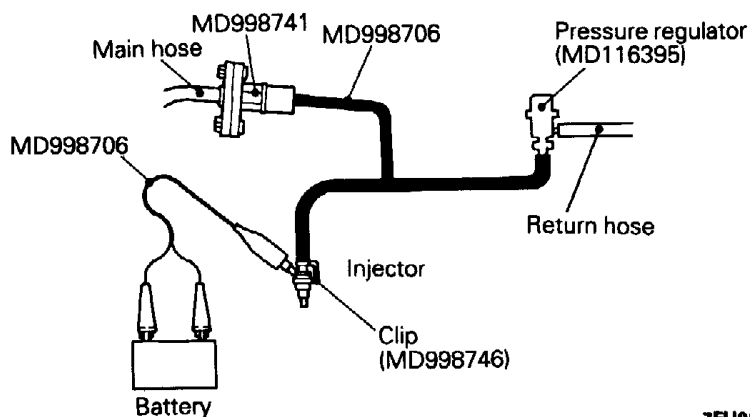
**<DOHC>**

Injector No.	Measurement terminal	Resistance
No. 2	①-②	13-16 Ω [At 20°C (68°F)]
No. 4	①-③	
No. 6	①-④	

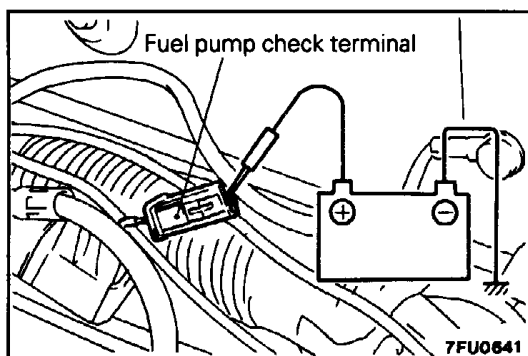
(3) Connect the injector connector.

Checking the Injection Condition

- (1) Following the steps below, bleed out the residual pressure within the fuel pipe line to prevent flow of the fuel. (Refer to P.13-51)
- (2) Remove the injector.
- (3) Arrange the special tool (injector test set), adaptor, fuel pressure regulator and clip as shown in the illustration below.

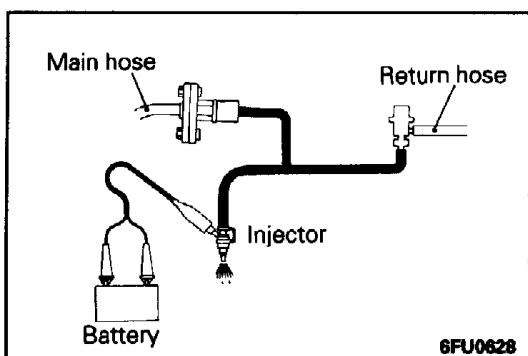


7FU0145



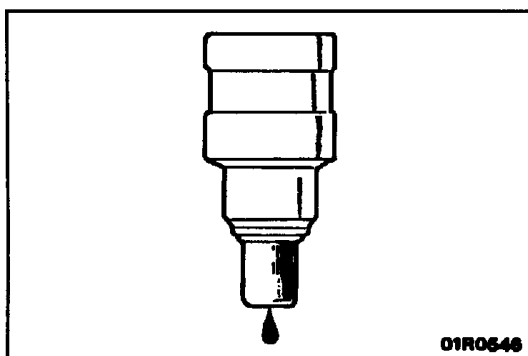
7FU0641

- (4) Connect the battery's negative (–) terminal.
- (5) Apply battery voltage to the fuel pump check terminal (black) and activate the fuel pump.



6FU0628

- (6) Activate the injector and check the atomized spray condition of the fuel. The condition can be considered satisfactory unless it is extremely poor.

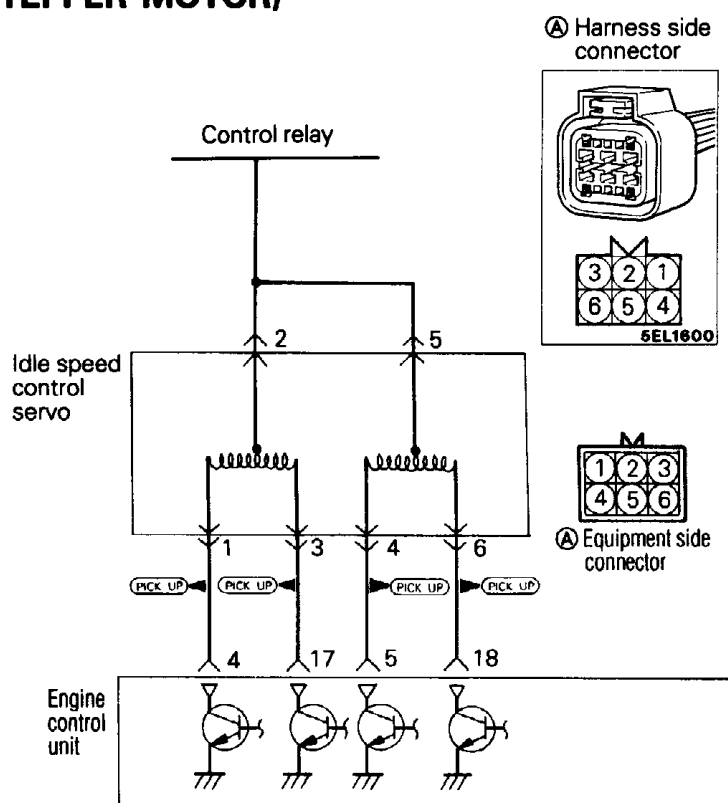
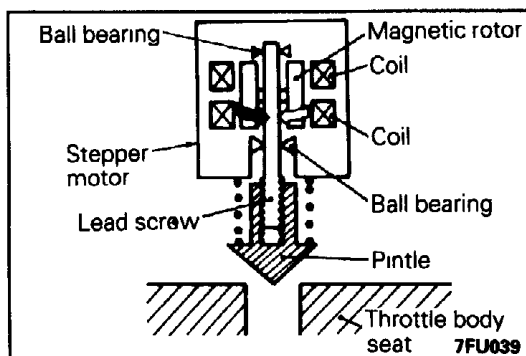
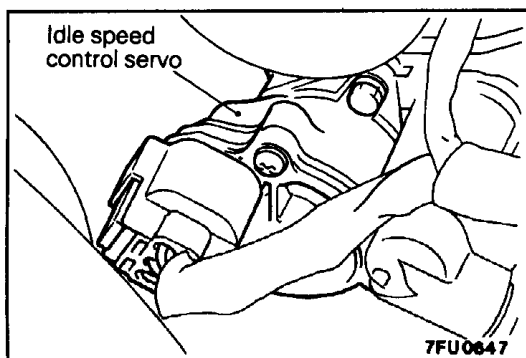


- (7) Stop the actuation of the injector, and check for leakage from the injector's nozzle.

Standard value: 1 drop or less per minute

- (8) Activate the injector without activating the fuel pump; then, when the spray emission of fuel from the injector stops, disconnect the special tool and restore it to its original condition.

IDLE SPEED CONTROL SERVO (STEPPER MOTOR)



7FU0518

Engine control unit connector

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544	545	546	547	548	549	550	551	552	553	554	555	556	557	558	559	560	561	562	563	564	565	566	567	568	569	570	571	572	573	574	575	576	577	578	579	580	581	582	583	584	585	586	587	588	589	590	591	592	593	594	595	596	597	598	599	600	601	602	603	604	605	606	607	608	609	610	611	612	613	614	615	616	617	618	619	620	621	622	623	624	625	626	627	628	629	630	631	632	633	634	635	636	637	638	639	640	641	642	643	644	645	646	647	648	649	650	651	652	653	654	655	656	657	658	659	660	661	662	663	664	665	666	667	668	669	670	671	672	673	674	675	676	677	678	679	680	681	682	683	684	685	686	687	688	689	690	691	692	693	694	695	696	697	698	699	700	701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719	720	721	722	723	724	725	726	727	728	729	730	731	732	733	734	735	736	737	738	739	740	741	742	743	744	745	746	747	748	749	750	751	752	753	754	755	756	757	758	759	760	761	762	763	764	765	766	767	768	769	770	771	772	773	774	775	776	777	778	779	780	781	782	783	784	785	786	787	788	789	790	791	792	793	794	795	796	797	798	799	800	801	802	803	804	805	806	807	808	809	810	811	812	813	814	815	816	817	818	819	820	821	822	823	824	825	826	827	828	829	830	831	832	833	834	835	836	837	838	839	840	841	842	843	844	845	846	847	848	849	850	851	852	853	854	855	856	857	858	859	860	861	862	863	864	865	866	867	868	869	870	871	872	873	874	875	876	877	878	879	880	881	882	883	884	885	886	887	888	889	890	891	892	893	894	895	896	897	898	899	900	901	902	903	904	905	906	907	908	909	910	911	912	913	914	915	916	917	918	919	920	921	922	923	924	925	926	927	928	929	930	931	932	933	934	935	936	937	938	939	940	941	942	943	944	945	946	947	948	949	950	951	952	953	954	955	956	957	958	959	960	961	962	963	964	965	966	967	968	969	970	971	972	973	974	975	976	977	978	979	980	981	982	983	984	985	986	987	988	989	990	991	992	993	994	995	996	997	998	999	1000	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020	1021	1022	1023	1024	1025	1026	1027	1028	1029	1030	1031	1032	1033	1034	1035	1036	1037	1038	1039	1040	1041	1042	1043	1044	1045	1046	1047	1048	1049	1050	1051	1052	1053	1054	1055	1056	1057	1058	1059	1060	1061	1062	1063	1064	1065	1066	1067	1068	1069	1070	1071	1072	1073	1074	1075	1076	1077	1078	1079	1080	1081	1082	1083	1084	1085	1086	1087	1088	1089	1090	1091	1092	1093	1094	1095	1096	1097	1098	1099	1100	1101	1102	1103	1104	1105	1106	1107	1108	1109	1110	1111	1112	1113	1114	1115	1116	1117	1118	1119	1120	1121	1122	1123	1124	1125	1126	1127	1128	1129	1130	1131	1132	1133	1134	1135	1136	1137	1138	1139	1140	1141	1142	1143	1144	1145	1146	1147	1148	1149	1150	1151	1152	1153	1154	1155	1156	1157	1158	1159	1160	1161	1162	1163	1164	1165	1166	1167	1168	1169	1170	1171	1172	1173	1174	1175	1176	1177	1178	1179	1180	1181	1182	1183	1184	1185	1186	1187	1188	1189	1190	1191	1192	1193	1194	1195	1196	1197	1198	1199	1200	1201	1202	1203	1204	1205	1206	1207	1208	1209	1210	1211	1212	1213	1214	1215	1216	1217	1218	1219	1220	1221	1222	1223	1224	1225	1226	1227	1228	1229	1230	1231	1232	1233	1234	1235	1236	1237	1238	1239	1240	1241	1242	1243	1244	1245	1246	1247	1248	1249	1250	1251	1252	1253	1254	1255	1256	1257	1258	1259	1260	1261	1262	1263	1264	1265	1266	1267	1268	1269	1270	1271	1272	1273	1274	1275	1276	1277	1278	1279	1280	1281	1282	1283	1284	1285	1286	1287	1288	1289	1290	1291	1292	1293	1294	1295	1296	1297	1298	1299	1300	1301	1302	1303	1304	1305	1306	1307	1308	1309	1310	1311	1312	1313	1314	1315	1316	1317	1318	1319	1320	1321	1322	1323	1324	1325	1326	1327	1328	1329	1330	1331	1332	1333	1334	1335	1336	1337	1338	1339	1340	1341	1342	1343	1344	1345	1346	1347	1348	1349	1350	1351	1352	1353	1354	1355	1356	1357	1358	1359	1360	1361	1362	1363	1364	1365	1366	1367	1368	1369	1370	1371	1372	1373	1374	1375	1376	1377	1378	1379	1380	1381	1382	1383	1384	1385	1386	1387	1388	1389	1390	1391	1392	1393	1394	1395	1396	1397	1398	1399	1400	1401	1402	1403	1404	1405	1406	1407	1408	1409	1410	1411	1412	1413	1414	1415	1416	1417	1418	1419	1420	1421	1422	1423	1424	1425	1426	1427	1428	1429	1430	1431	1432	1433	1434	1435	1436	1437	1438	1439	1440	1441	1442	1443	1444	1445	1446	1447	1448	1449	1450	1451	1452	1453	1454	1455	1456	1457	1458	1459	1460	1461	1462	1463	1464	1465	1466	1467	1468	1469	1470	1471	1472	1473	1474	1475	1476	1477	1478	1479	1480	1481	1482	1483	1484	1485	1486	1487	1488	1489	1490	1491	1492	1493	1494	1495	1496	1497	1498	149
---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	-----

INSPECTION**Using Multi-use Tester (MUT)**

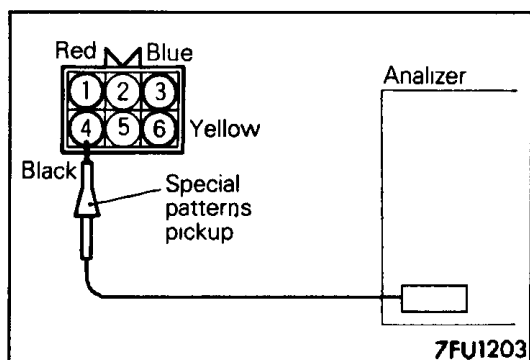
Function	Item No.	Data display	Check condition	Load state	Standard value
Data reading	45	Stepper motor steps	•Engine coolant temperature: 80 to 95°C (176 to 205°F) •Lamps, electric cooling fan, accessory units: All OFF •Transmission: Neutral (For A/T vehicles: P range) •Steering wheel: Neutral •Idle position switch: ON (compressor clutch to be ON if air conditioner switch is ON) •Engine: Idling	Air conditioner switch: OFF	2–25 stp
				Air conditioner switch: OFF → ON	Increase by 10–70 stp
				Air conditioner switch: OFF Selector lever: N to "D" range.	Increase by 5–50 stp

NOTE

(1) When the vehicle is new [within initial operation of about 500 km (300 miles)], the stepper motor steps may be about 30 steps more than standard.

Caution

Apply the brake so the vehicle does not move foreword when shifting the shift lever to the D range.



Wave Pattern Inspection Using an Analyzer

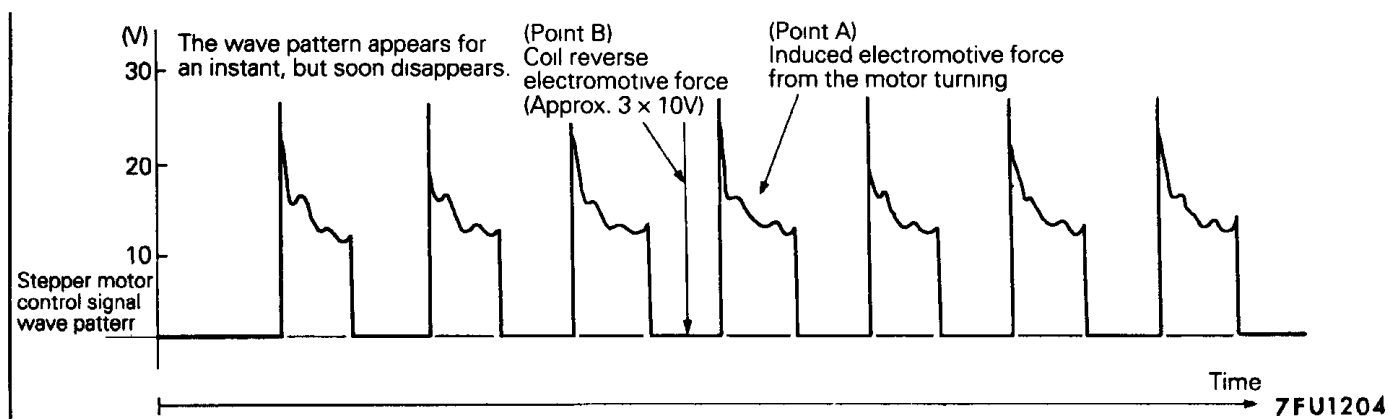
Measurement method

- (1) Disconnect the stepper motor connector, and connect the special tool (test harness: MB998463) in between .
- (2) Connect the analyzer special patterns pickup to the stepper motor-side connector terminal ① (red clip on the special tool), terminal ③ (blue clip), terminal ④ (black clip) and terminal ⑥ (yellow clip) respectively.

Standard wave pattern

Observation conditions

Function	Special patterns
Pattern height	High
Pattern selector	Display
Engine condition	Turn the ignition switch from OFF to ON (without starting the engine).
	While the engine is idling, turn the air conditioner switch to ON.
	Immediately after starting the warm engine (approx. 1 minute).



Wave pattern observation points

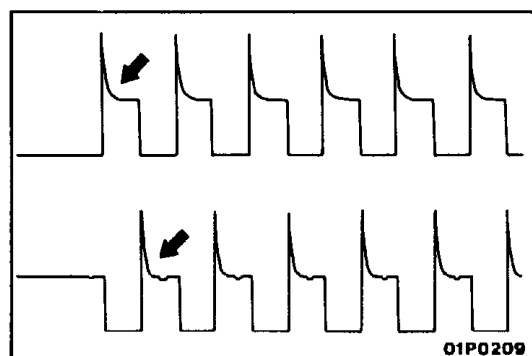
Check that the standard wave pattern appears when the stepper motor is operating.

(Point A): Presence or absence of induced electromotive force from the motor turning. (Refer to the abnormal wave pattern.)

Contrast with standard wave pattern	Probable cause
Induced electromotive force does not appear or is extremely small.	Motor is malfunctioning

(Point B): Height of coil reverse electromotive force

Contrast with standard wave pattern	Probable cause
Coil reverse electromotive force does not appear or is extremely small.	Short in the coil



Abnormal wave pattern

Cause of problem

Motor is malfunctioning. (Motor is not operating.)

Wave pattern characteristics

Induced electromotive force from the motor turning does not appear.

HARNESS INSPECTION

1 ① Harness side connector 01L0395	Measure the power supply voltage of idle speed control servo. - Idle speed control servo connector: Disconnected - Ignition switch: ON <table border="1"> <tr> <td>Voltage (V)</td> </tr> <tr> <td>System voltage</td> </tr> </table>	Voltage (V)	System voltage	OK → 2 ✗ → Repair the harness. (Control relay – ②) (Control relay – ⑤)
Voltage (V)				
System voltage				
2 ① Harness side connector Engine control unit harness side connector 01L0397	Check for an open-circuit, or a short-circuit to earth between the engine control unit and the idle speed control servo. - Engine control unit connector: Disconnected - Idle speed control servo connector: Disconnected	OK → STOP ✗ → Repair the harness. (①–④) (③–⑫) (④–⑤) (⑥–⑮)		

ACTUATOR INSPECTION

Checking the Operation Sound

- (1) Check that the operation sound of the stepper motor can be heard after the ignition is switched ON (but without starting the motor).
- (2) If the operation sound cannot be heard, check the stepper motor's activation circuit.
If the circuit is normal, it is probable that there is a malfunction of the stepper motor or of the engine control unit.

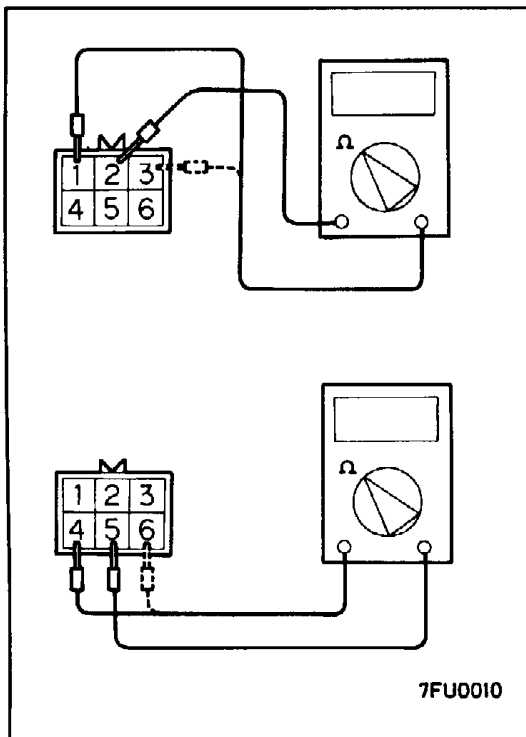
Checking the Coil Resistance

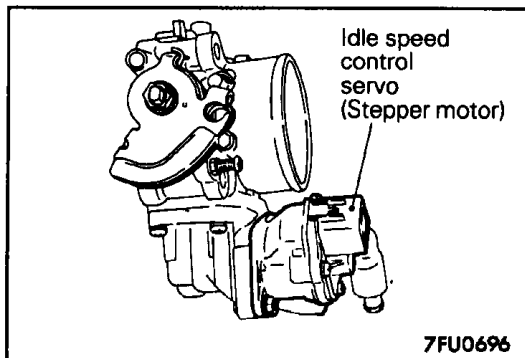
- (1) Disconnect the idle speed control servo connector and connect the special tool (test harness).
- (2) Measure the resistance between terminal ② (white clip of the special tool) and either terminal ① (red clip) or terminal ③ (blue clip) of the connector at the idle speed control servo side.

Standard value: 28–33 Ω at 20°C (68°F)

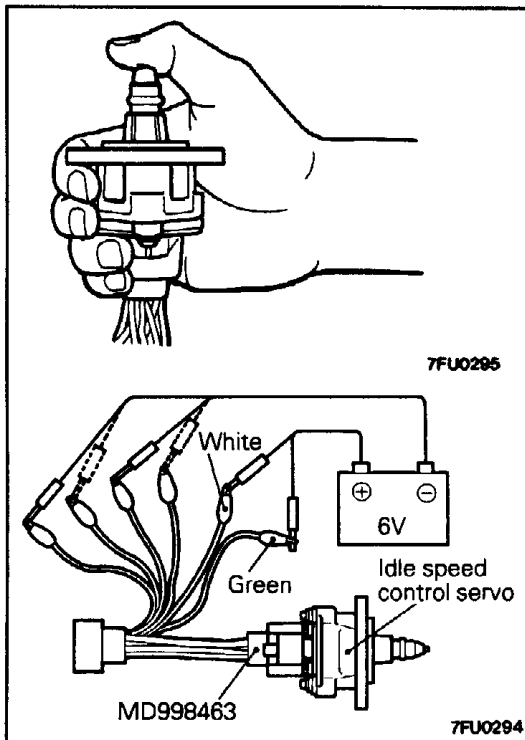
- (3) Measure the resistance between terminal ⑤ (green clip of the special tool) and either terminal ⑥ (yellow clip) or terminal ④ (black clip) of the connector at the idle speed control servo side.

Standard value: 28–33 Ω at 20°C (68°F)



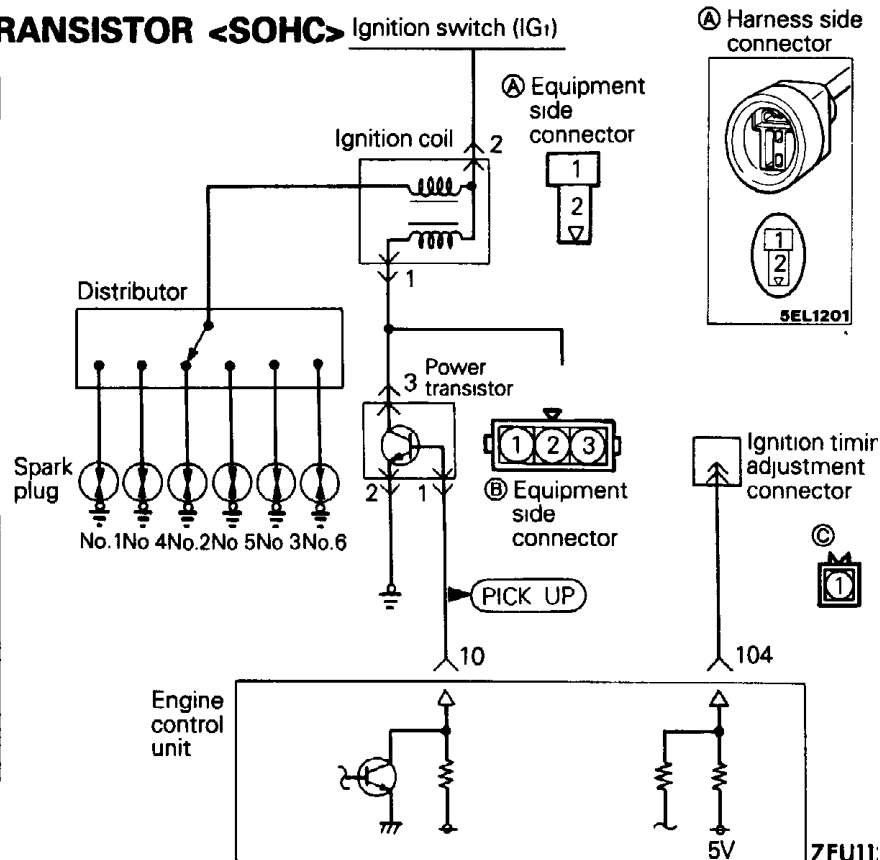
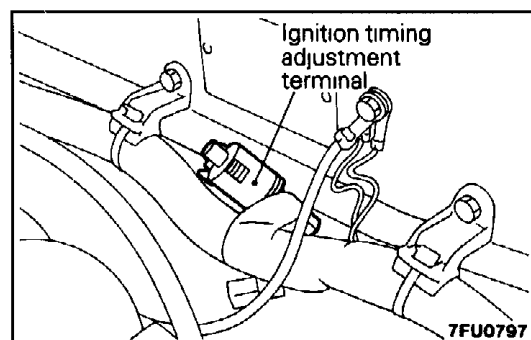
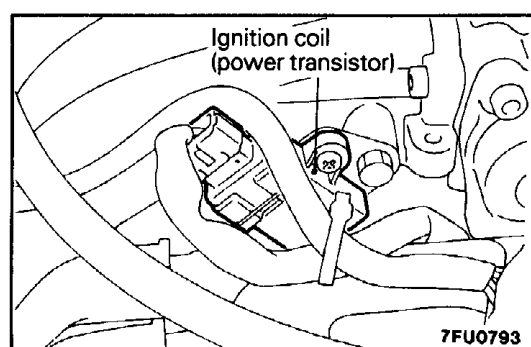
**Operational Check**

- (1) Remove the throttle body.
- (2) Remove the stepper motor.



- (3) Connect the special tool (test harness) to the idle speed control servo connector.
- (4) Connect the positive (+) terminal of a power supply (approx. 6 V) to the white clip and the green clip.
- (5) With the idle speed control servo as shown in the illustration, connect the negative (–) terminal of the power supply to each clip as described in the following steps, and check whether or not a vibrating feeling (a feeling of very slight vibration of the stepper motor) is generated as a result of the activation of the stepper motor.
 - ① Connect the negative (–) terminal of the power supply to the red and black clip.
 - ② Connect the negative (–) terminal of the power supply to the blue and black clip.
 - ③ Connect the negative (–) terminal of the power supply to the blue and yellow clip.
 - ④ Connect the negative (–) terminal of the power supply to the red and yellow clip.
 - ⑤ Connect the negative (–) terminal of the power supply to the red and black clip.
 - ⑥ Repeat the tests in sequence from (5) to (1).
- (6) If, as a result of these tests, vibration is detected, the stepper motor can be considered to be normal.

IGNITION COIL AND POWER TRANSISTOR <SOHC>



OPERATION

- When the power transistor is turned ON by the signal from the engine control unit, primary current flows to the ignition coil. When the power transistor is turned OFF, primary current is shut off and a high voltage is induced in the secondary coil.
- When the engine control unit turns OFF the transistor in the unit, the battery voltage in the unit is applied to the power transistor unit to turn it ON. When the engine control unit turns ON the transistor in the unit, the power transistor unit is turned OFF.

INSPECTION

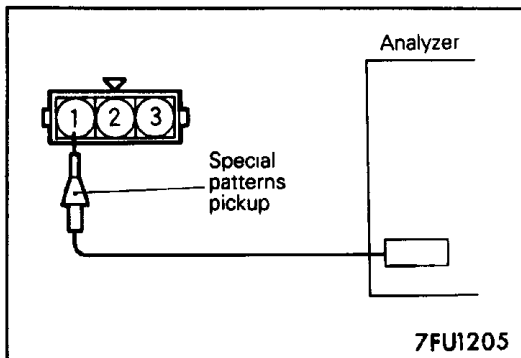
Using Multi-use Tester (MUT)

Ignition advance

Function	Item No.	Data display	Check condition	Engine state	Standard value
Data reading	44	Ignition advance	- Engine: Warming up - Timing lamp: Set (set timing lamp to check actual ignition timing)	700 r/min. (Idle)	7-23° BTDC
				2,000 r/min.	20-40° BTDC

Ignition timing adjustment mode

Function	Item No.	Data display	Check condition	Engine state	Normal display
Data reading	36	Existence of continuity to earth of ignition timing adjustment terminal	Engine: Idling	Earth ignition timing adjustment terminal.	ON
				Remove earth from ignition timing adjustment terminal.	OFF



Wave Pattern Inspection Using an Analyzer

- Ignition coil primary signal
Refer to GROUP 16 – Ignition System.
- Power transistor control signal

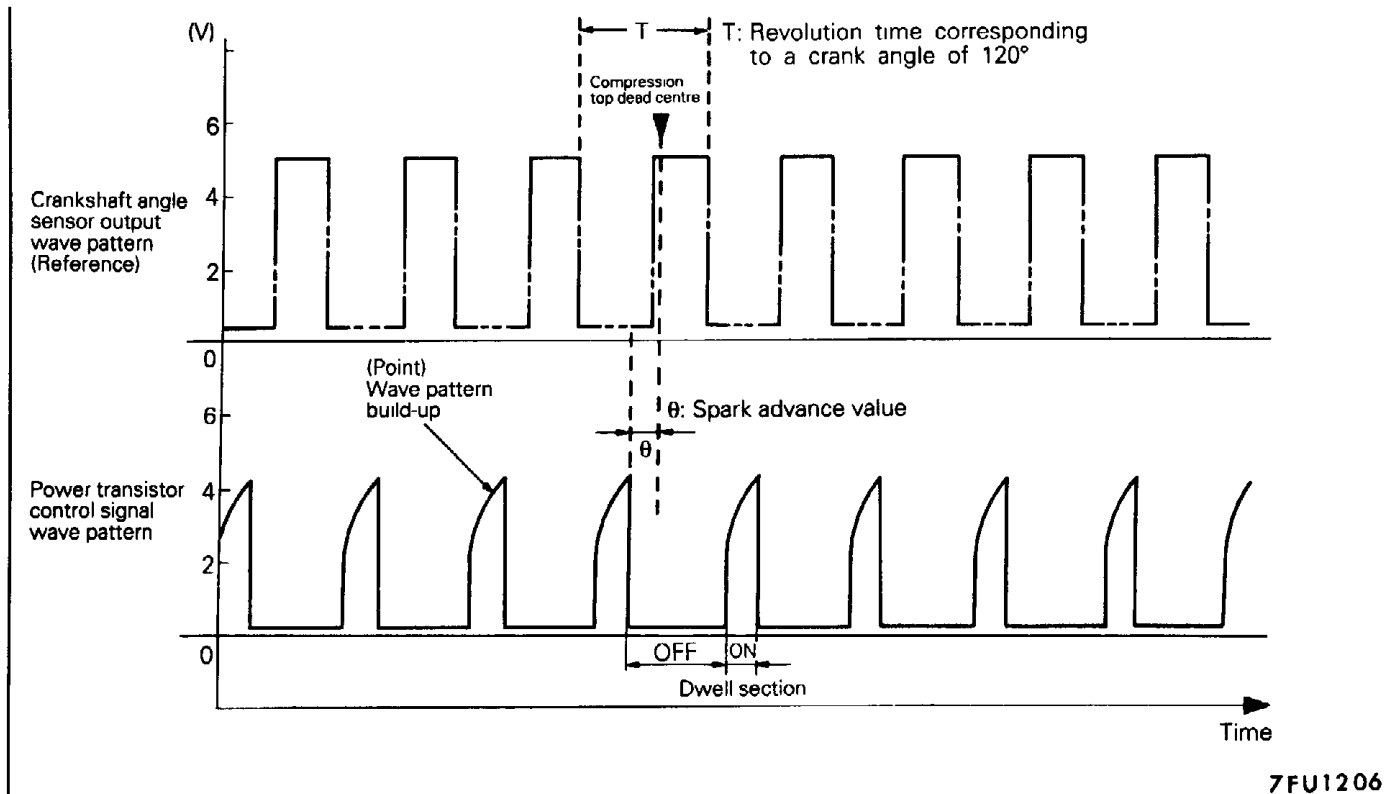
<Measurement method>

- (1) Disconnect the power transistor connector, and connect the special tool (test harness: MB991348) in between. (All terminals should be connected.)
- (2) Connect the analyzer special patterns pickup to the power transistor connector terminal ③.

Standard wave pattern

Observation conditions

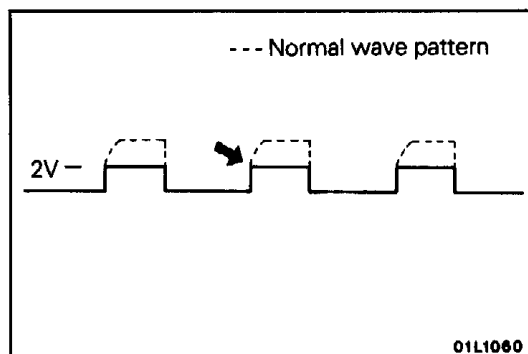
Function	Special patterns
Pattern height	Low
Pattern selector	Display
Engine revolutions	Approx. 1200 r/min.



Wave pattern observation points

(Point): Condition of wave pattern build-up and maximum voltage (Tefer to abnormal wave pattern examples 1 and 2.)

Condition of wave pattern build-up and maximum voltage	Probable cause
Rise to the right to approximately 4.5V from around 2V.	Normal
Becomes a rectangular wave at approx. 2V	Broken wire in ignition primary circuit
Becomes a rectangular wave at power voltage	Malfunction of the power transistor

**Examples of abnormal wave patterns**

● Example 1

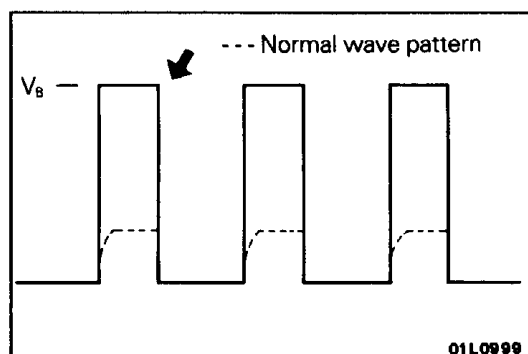
Wave pattern during engine cranking

Cause of problem

Broken wire in ignition primary circuit

Wave pattern characteristics

Top-right part of the build-up section cannot be seen, and voltage value is approximately 2V too low.



● Example 2

Wave pattern during engine cranking

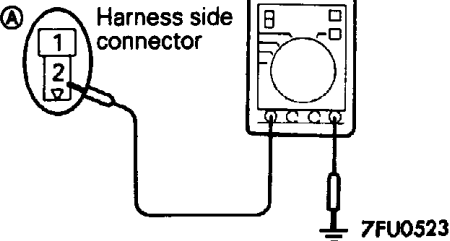
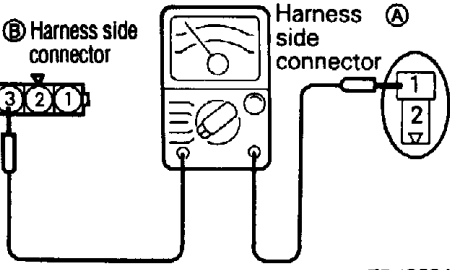
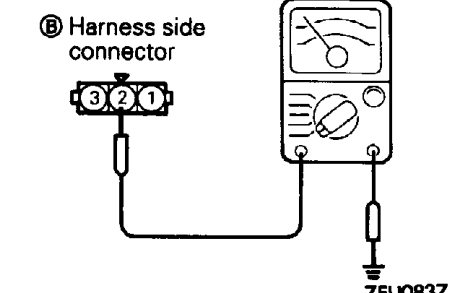
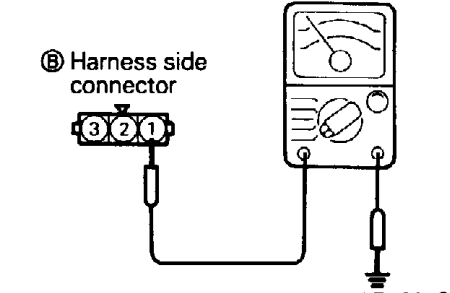
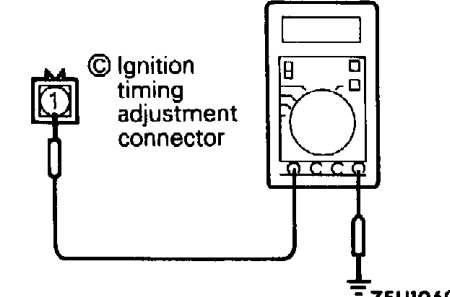
Cause of problem

Malfunction in power transistor

Wave pattern characteristics

Power voltage results when the power transistor is ON.

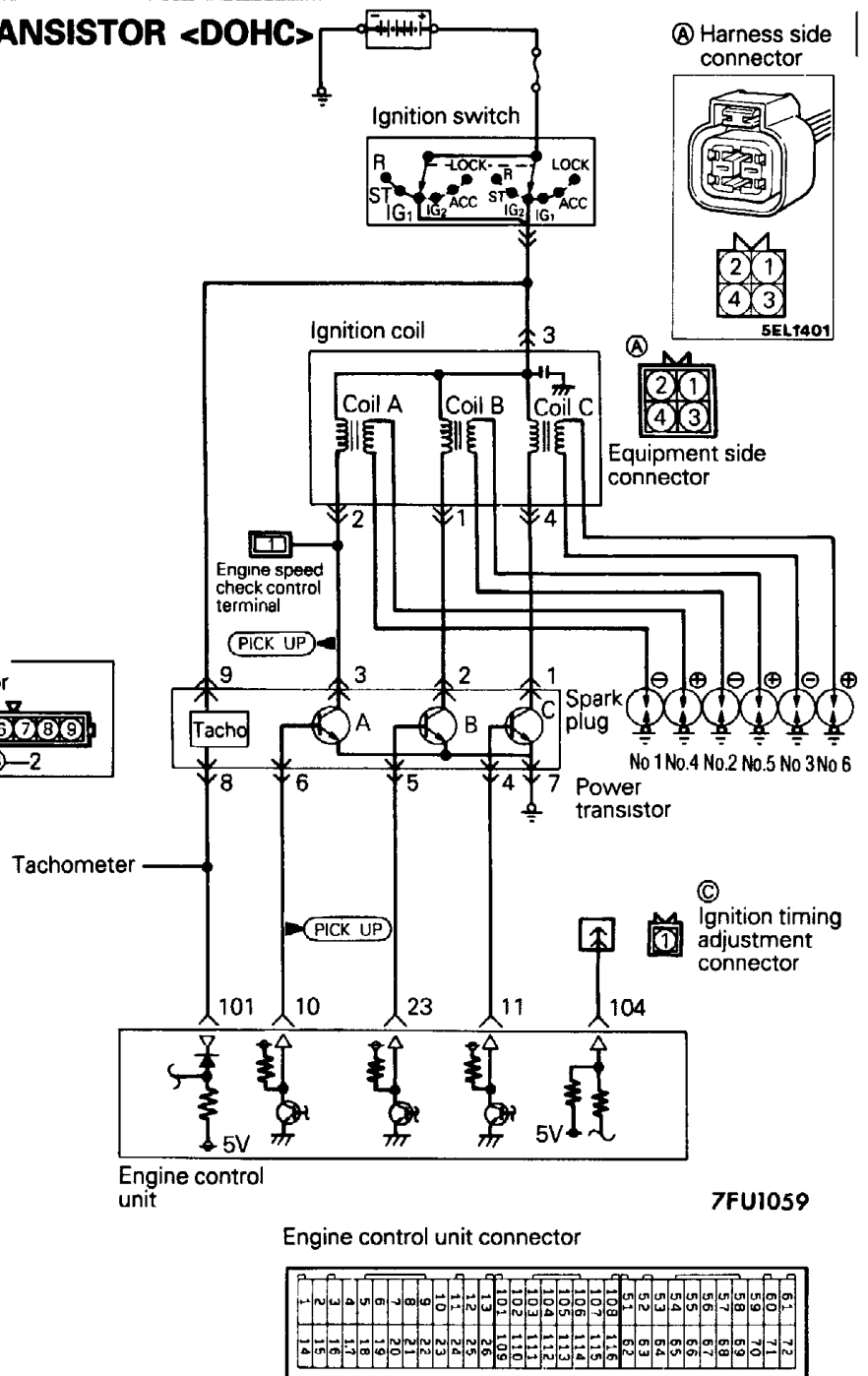
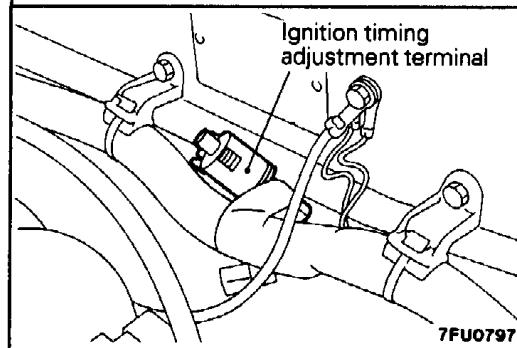
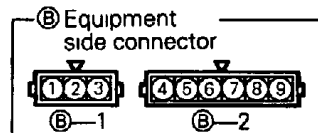
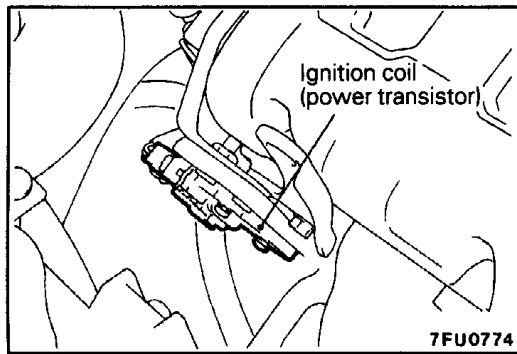
HARNESS INSPECTION

1  ① Harness side connector 7FU0523	Measure the power supply voltage of the ignition coil. - Connector: Disconnected - Ignition Switch: ON <table border="1"> <tr> <td>Voltage (V)</td> </tr> <tr> <td>System voltage</td> </tr> </table>	Voltage (V)	System voltage	OK → 2 ✗ → Repair the harness (A2–Ignition switch)
Voltage (V)				
System voltage				
2  ② Harness side connector 7FU0836	Check for an open-circuit, or a short-circuit to earth between the power transistor and the ignition coil. - Ignition coil connector: Disconnected - Power transistor connector: Disconnected	OK → 3 ✗ → Repair the harness. (A1–B3)		
3  ③ Harness side connector 7FU0837	Check for continuity of the earth circuit. Connector: Disconnected	OK → 4 ✗ → Repair the harness. (B2–Earth)		
4  ④ Harness side connector 7FU0838	Measure the voltage of the control signal circuit of the power transistor. - Connector: Disconnected - Ignition switch: START <table border="1"> <tr> <td>Voltage (V)</td> </tr> <tr> <td>2–6</td> </tr> </table>	Voltage (V)	2–6	OK → 5 ✗ → Repair the harness. (B1–10)
Voltage (V)				
2–6				
5  ⑤ Ignition timing adjustment connector 7FU1060	Measure the voltage of the ignition timing adjustment terminal. Ignition switch: ON <table border="1"> <tr> <td>Voltage (V)</td> </tr> <tr> <td>4.0–5.2</td> </tr> </table>	Voltage (V)	4.0–5.2	OK → STOP ✗ → Repair the harness. (C1–104)
Voltage (V)				
4.0–5.2				

ACTUATOR INSPECTION

Refer to GROUP 16 – Ignition System.

IGNITION COIL AND POWER TRANSISTOR <DOHC>



OPERATION

- When power transistor unit A is switched ON due to a signal from the engine control unit, primary current flows in ignition coil A. When power transistor unit A is switched OFF, primary current is cut off, and high voltage is generated in secondary coil A, thereby generating a spark at No. 1 and No. 4 cylinder spark plugs. On the other hand, when power transistor unit B is switched from ON to OFF, a spark is generated at the No. 2 and No. 5 cylinder spark plugs. Furthermore, when power transistor unit C

switched from ON to OFF, a spark is generated at the No. 3 and No. 6 cylinder spark plugs.

- When the engine control unit turns the power transistor inside the unit OFF, battery voltage inside the unit is supplied to the power transistor unit and the power transistor unit is switched ON. Furthermore, when the engine control unit turns the power transistor inside the unit ON, the power transistor unit is switched OFF.

INSPECTION**Using Multi-use Tester (MUT)****Ignition advance**

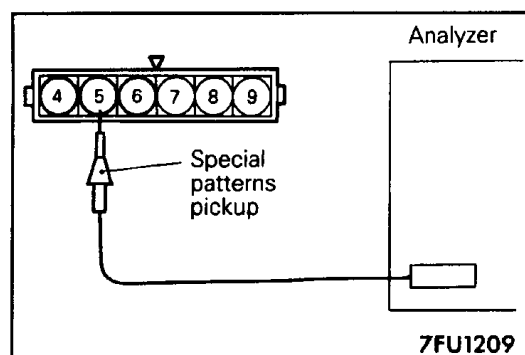
Function	Item No.	Data display	Check condition	Engine state	Standard value
Data reading	44	Ignition advance	• Engine: Warming up • Timing lamp: Set (set timing lamp to check actual ignition timing)	700 r/min. (Idle)	7–23° BTDC
				2,000 r/min.	24–45° BTDC

Ignition timing adjustment mode

Function	Item No.	Data display	Check condition	Engine state	Normal indication
Data reading	36	Existence of continuity to earth of ignition timing adjustment terminal	• Engine: Idling	Earth ignition timing adjustment terminal.	ON
				Remove earth from ignition timing adjustment terminal.	OFF

Standard ignition timing

Function	Item No.	Drive contents	Check condition	Normal condition
Actuator test	17	Set in ignition timing adjustment mode	• Engine: Idling • Timing light: set	Actual ignition timing: 5° BTDC ± 2°



Wave Pattern Inspection Using an Analyzer

- Ignition coil primary signal
Refer to GROUP 16 – Ignition System.
- Power transistor control signal.

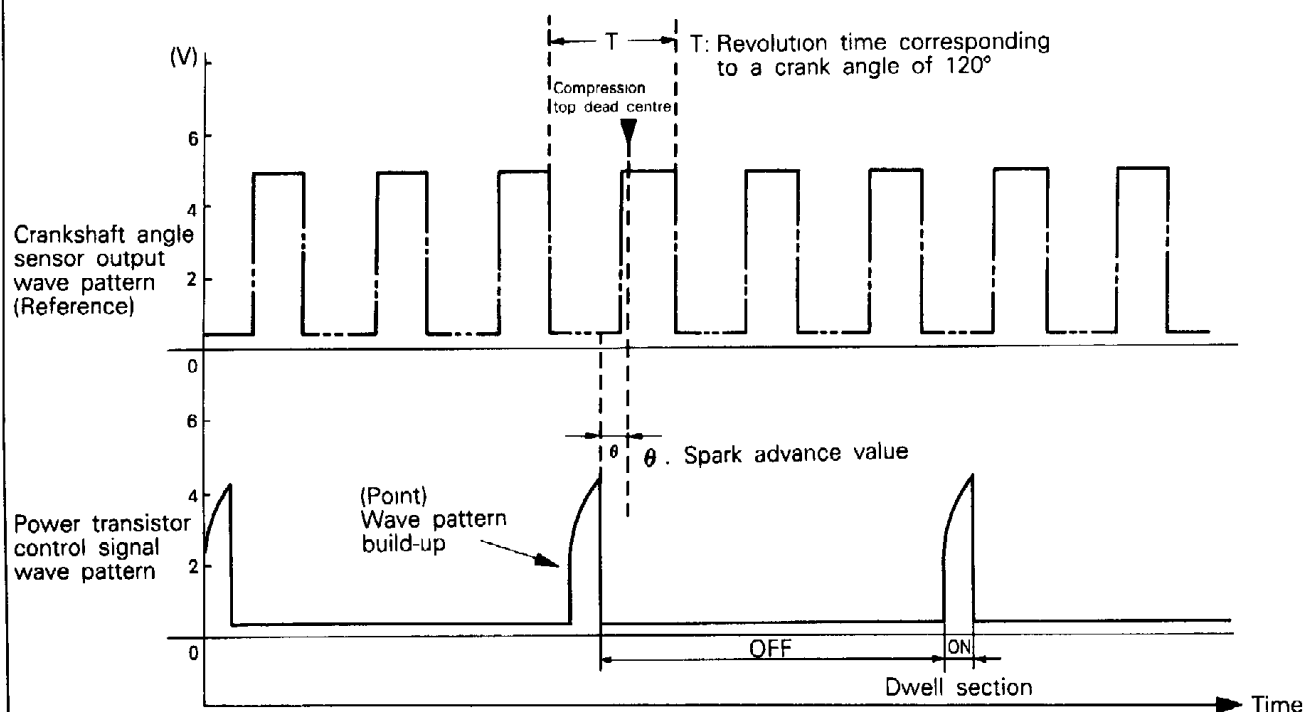
<Measurement method>

- (1) Disconnect the power transistor connector, and connect the special tool (test harness: MB991348) in between. (All terminals should be connected.)
- (2) Connect the analyzer special patterns pickup to the connector terminals (4) (No.3 - No.6), (5) (No.2 - No.5) and (6) (No.1 - No.4) in that order.

Standard wave pattern

Observation conditions

Function	Special patterns
Pattern height	Low
Pattern selector	Display
Engine revolutions	Approx. 1200 r/min.

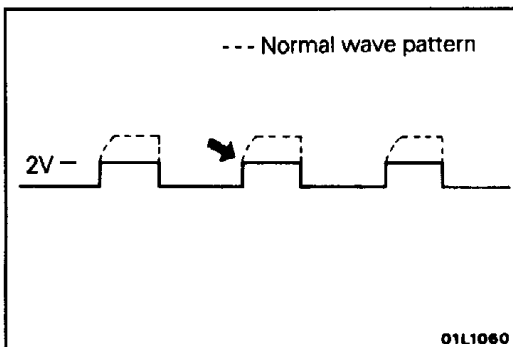


7FU1210

Wave pattern observation points

(Point): Condition of wave pattern build-up and maximum voltage (Refer to abnormal wave pattern examples 1 and 2.)

Condition of wave pattern build-up and maximum voltage	Probable cause
Rise to the right to approximately 4.5V from around 2V.	Normal
Becomes a rectangular wave at approx. 2V	Broken wire in ignition primary circuit
Becomes a rectangular wave at power voltage	Malfunction of the power transistor

**Examples of abnormal wave patterns**

● Example 1

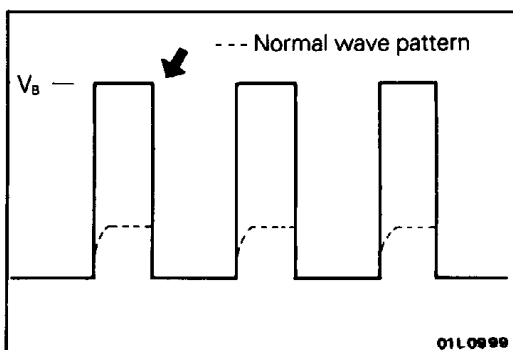
Wave pattern during engine cranking

Cause of problem

Broken wire in ignition primary circuit

Wave pattern characteristics

Top-right part of the build-up section cannot be seen, and voltage value is approximately 2V too low.



● Example 2

Wave pattern during engine cranking

Cause of problem

Malfunction in power transistor

Wave pattern characteristics

Power voltage results when the power transistor is ON.

HARNESS INSPECTION

1

Ⓐ Harness side connector

01L0411

Measure the ignition coil power supply voltage.

- Connector: Disconnected
- Ignition switch: ON

Voltage (V)
System voltage

OK → **2**

✗ → Repair the harness. (Ⓐ) Ignition switch)

2

Ⓑ—2 Harness side connector

7FU0698

Measure the power transistor unit power supply voltage.

- Connector: Disconnected
- Ignition switch: ON

Voltage (V)
System voltage

OK → **3**

✗ → Repair the harness. (Ⓑ) Ignition switch)

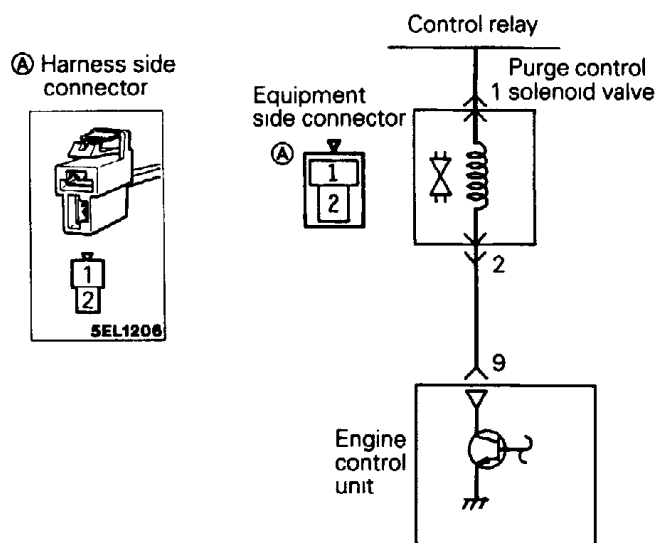
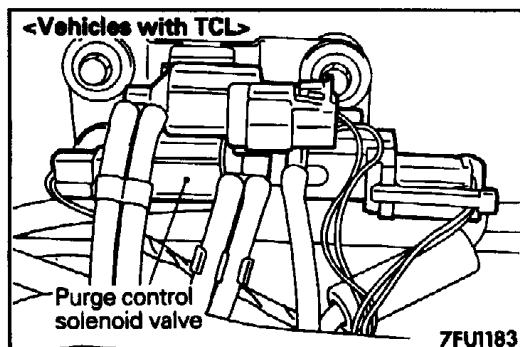
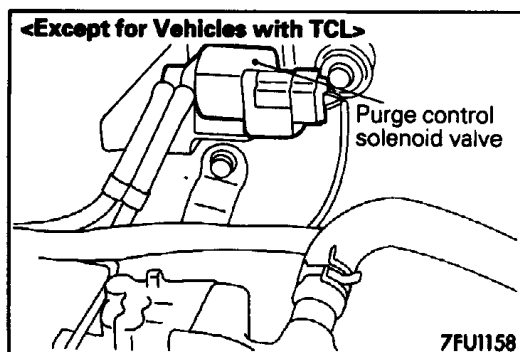
3 ⑧—2 Harness side connector Engine control unit harness side connector 6FU1251	Check for an open circuit, or a short-circuit to earth between the power transistor and engine control unit. - Power transistor connector: Disconnected - Engine control unit connector: Disconnected	OK → 4 ✗ → Repair the harness. (⑧②—101)		
4 ⑧—1 Harness side connector ⑨ Harness side connector 7FU0699	Check for an open circuit, or a short-circuit to earth between the power transistor and the ignition coil. - Power transistor connector: Disconnected - Ignition coil connector: Disconnected	OK → 5 ✗ → Repair the harness. (A1—B2) (A2—B3) (A4—B1)		
5 ⑧—2 Harness side connector 7FU0700	Check for continuity of the earth circuit of the power transistor. Connector: Disconnected	OK → 6 ✗ → Repair the harness. (B7—Earth)		
6 ⑧—2 Harness side connector 7FU0701	Measure the power transistor control signal voltage. - Connector: Disconnected - Ignition switch: START <table border="1"> <thead> <tr> <th>Voltage (V)</th> </tr> </thead> <tbody> <tr> <td>0.5–4.0</td> </tr> </tbody> </table>	Voltage (V)	0.5–4.0	OK → 7 ✗ → Repair the harness (B6—10) (B5—2) (B4—11)
Voltage (V)				
0.5–4.0				
7 © Ignition timing adjustment terminal 7FU1060	Measure the terminal voltage of the ignition timing adjustment terminal. Ignition switch: ON <table border="1"> <thead> <tr> <th>Voltage (V)</th> </tr> </thead> <tbody> <tr> <td>4.0–5.2</td> </tr> </tbody> </table>	Voltage (V)	4.0–5.2	OK → STOP ✗ → Repair the harness. (C1—104)
Voltage (V)				
4.0–5.2				

ACTUATOR INSPECTION

Refer to GROUP 16 – Ignition System.

PURGE CONTROL SOLENOID VALVE

M13RCQA

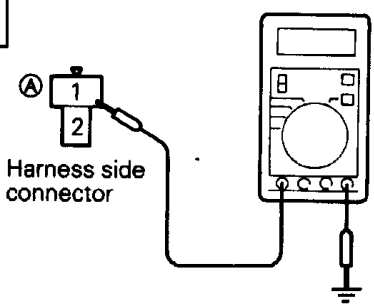


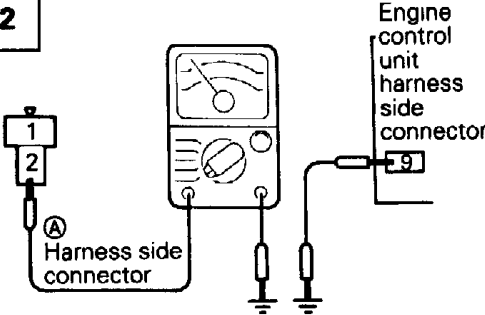
01A0324

Engine control unit connector

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544	545	546	547	548	549	550	551	552	553	554	555	556	557	558	559	560	561	562	563	564	565	566	567	568	569	570	571	572	573	574	575	576	577	578	579	580	581	582	583	584	585	586	587	588	589	590	591	592	593	594	595	596	597	598	599	600	601	602	603	604	605	606	607	608	609	610	611	612	613	614	615	616	617	618	619	620	621	622	623	624	625	626	627	628	629	630	631	632	633	634	635	636	637	638	639	640	641	642	643	644	645	646	647	648	649	650	651	652	653	654	655	656	657	658	659	660	661	662	663	664	665	666	667	668	669	670	671	672	673	674	675	676	677	678	679	680	681	682	683	684	685	686	687	688	689	690	691	692	693	694	695	696	697	698	699	700	701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719	720	721	722	723	724	725	726	727	728	729	730	731	732	733	734	735	736	737	738	739	740	741	742	743	744	745	746	747	748	749	750	751	752	753	754	755	756	757	758	759	760	761	762	763	764	765	766	767	768	769	770	771	772	773	774	775	776	777	778	779	780	781	782	783	784	785	786	787	788	789	790	791	792	793	794	795	796	797	798	799	800	801	802	803	804	805	806	807	808	809	810	811	812	813	814	815	816	817	818	819	820	821	822	823	824	825	826	827	828	829	830	831	832	833	834	835	836	837	838	839	840	841	842	843	844	845	846	847	848	849	850	851	852	853	854	855	856	857	858	859	860	861	862	863	864	865	866	867	868	869	870	871	872	873	874	875	876	877	878	879	880	881	882	883	884	885	886	887	888	889	890	891	892	893	894	895	896	897	898	899	900	901	902	903	904	905	906	907	908	909	910	911	912	913	914	915	916	917	918	919	920	921	922	923	924	925	926	927	928	929	930	931	932	933	934	935	936	937	938	939	940	941	942	943	944	945	946	947	948	949	950	951	952	953	954	955	956	957	958	959	960	961	962	963	964	965	966	967	968	969	970	971	972	973	974	975	976	977	978	979	980	981	982	983	984	985	986	987	988	989	990	991	992	993	994	995	996	997	998	999	1000	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020	1021	1022	1023	1024	1025	1026	1027	1028	1029	1030	1031	1032	1033	1034	1035	1036	1037	1038	1039	1040	1041	1042	1043	1044	1045	1046	1047	1048	1049	1050	1051	1052	1053	1054	1055	1056	1057	1058	1059	1060	1061	1062	1063	1064	1065	1066	1067	1068	1069	1070	1071	1072	1073	1074	1075	1076	1077	1078	1079	1080	1081	1082	1083	1084	1085	1086	1087	1088	1089	1090	1091	1092	1093	1094	1095	1096	1097	1098	1099	1100	1101	1102	1103	1104	1105	1106	1107	1108	1109	1110	1111	1112	1113	1114	1115	1116	1117	1118	1119	1120	1121	1122	1123	1124	1125	1126	1127	1128	1129	1130	1131	1132	1133	1134	1135	1136	1137	1138	1139	1140	1141	1142	1143	1144	1145	1146	1147	1148	1149	1150	1151	1152	1153	1154	1155	1156	1157	1158	1159	1160	1161	1162	1163	1164	1165	1166	1167	1168	1169	1170	1171	1172	1173	1174	1175	1176	1177	1178	1179	1180	1181	1182	1183	1184	1185	1186	1187	1188	1189	1190	1191	1192	1193	1194	1195	1196	1197	1198	1199	1200	1201	1202	1203	1204	1205	1206	1207	1208	1209	1210	1211	1212	1213	1214	1215	1216	1217	1218	1219	1220	1221	1222	1223	1224	1225	1226	1227	1228	1229	1230	1231	1232	1233	1234	1235	1236	1237	1238	1239	1240	1241	1242	1243	1244	1245	1246	1247	1248	1249	1250	1251	1252	1253	1254	1255	1256	1257	1258	1259	1260	1261	1262	1263	1264	1265	1266	1267	1268	1269	1270	1271	1272	1273	1274	1275	1276	1277	1278	1279	1280	1281	1282	1283	1284	1285	1286	1287	1288	1289	1290	1291	1292	1293	1294	1295	1296	1297	1298	1299	1300	1301	1302	1303	1304	1305	1306	1307	1308	1309	1310	1311	1312	1313	1314	1315	1316	1317	1318	1319	1320	1321	1322	1323	1324	1325	1326	1327	1328	1329	1330	1331	1332	1333	1334	1335	1336	1337	1338	1339	1340	1341	1342	1343	1344	1345	1346	1347	1348	1349	1350	1351	1352	1353	1354	1355	1356	1357	1358	1359	1360	1361	1362	1363	1364	1365	1366	1367	1368	1369	1370	1371	1372	1373	1374	1375	1376	1377	1378	1379	1380	1381	1382	1383	1384	1385	1386	1387	1388	1389	1390	1391	1392	1393	1394	1395	1396	1397	1398	1399	1400	1401	1402	1403	1404	1405	1406	1407	1408	1409	1410	1411	1412	1413	1414	1415	1416	1417	14
---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	----

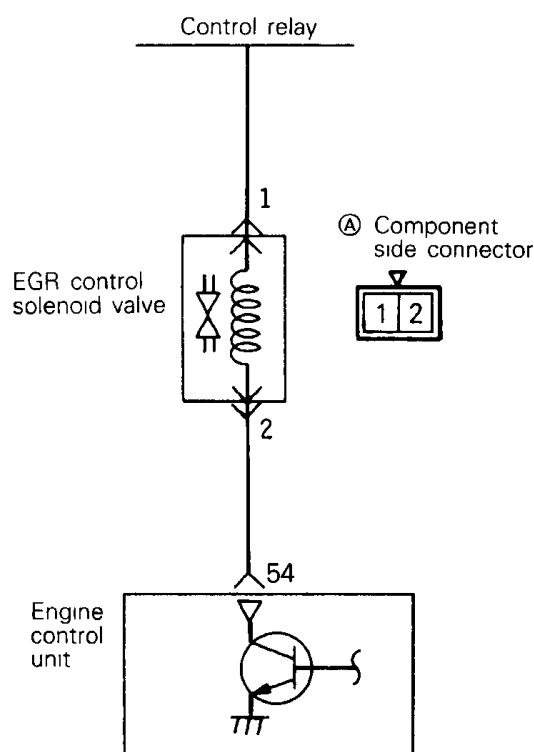
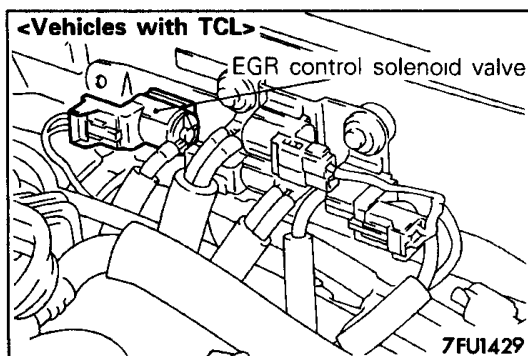
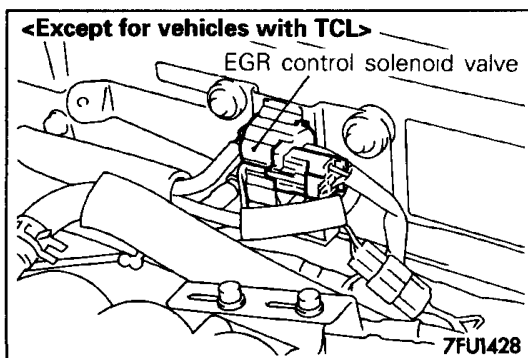
HARNESS INSPECTION

1  Harness side connector 7FU0525	Measure the power supply voltage. • Connector: Disconnected • Ignition switch: ON <table border="1" style="width: 100%;"> <tr> <td style="text-align: center;">Voltage (V)</td> </tr> <tr> <td style="text-align: center;">System voltage</td> </tr> </table>	Voltage (V)	System voltage	OK → 2 OK → Repair the harness. (Control relay-(A1))
Voltage (V)				
System voltage				

2  Harness side connector Engine control unit harness side connector 7FU0526	Check for an open-circuit, or a short-circuit to ground, between the purge control solenoid valve and the engine control unit. • Purge control solenoid valve connector: Disconnected • Engine control unit connector: Disconnected	OK → STOP OK → Repair the harness. (A2-9)
---	---	--

ACTUATOR INSPECTION

Refer to GROUP 17 – Evaporative Emission Control System.

EGR CONTROL SOLENOID VALVE <Vehicles built from December, 1992>

Engine control unit connector

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72
---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

7FU0653

OPERATION

- The EGR control solenoid valve is a duty-control type of solenoid valve; it performs its control function by leaking the EGR valve-activation vacuum to the throttle body A port.
- Battery power supply is supplied, by way of

the control relay, to the EGR control solenoid valve. When the engine control unit switches OFF the power transistor within the unit, current stops flowing to the coil, and the EGR valve-activation negative pressure leaks.

TROUBLESHOOTING HINTS

If the self-diagnosis code for EGR system malfunction is output even though the results of checking the EGR control solenoid valve harness

and the component itself are normal, check the EGR valve, the vacuum hose piping, and the EGR passage for clogging.

13-128-2 FUEL – On Vehicle Inspection of MPI Components

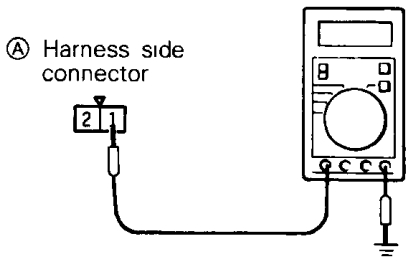
INSPECTION

Using Multi-use tester (MUT)

Function	Item No.	Activation	Check conditions	Normal condition
Actuator test	10	Solenoid valve is switched from OFF to ON.	Ignition switch: ON	Operating sound is heard when driven.

HARNESS INSPECTION

1



① Harness side connector

Measure the power supply voltage.

- Connector: Disconnected
- Ignition switch: ON

Voltage (V)
System voltage

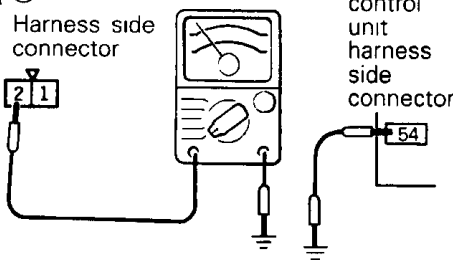
OK

OK

2

Repair the harness.
(① – Control relay)

2



① Harness side connector

Engine control unit harness side connector

Check for an open-circuit, or a short-circuit to ground, between the EGR control solenoid valve and the engine control unit.

- EGR control solenoid valve connector: Disconnected
- Engine control unit connector: Disconnected

OK

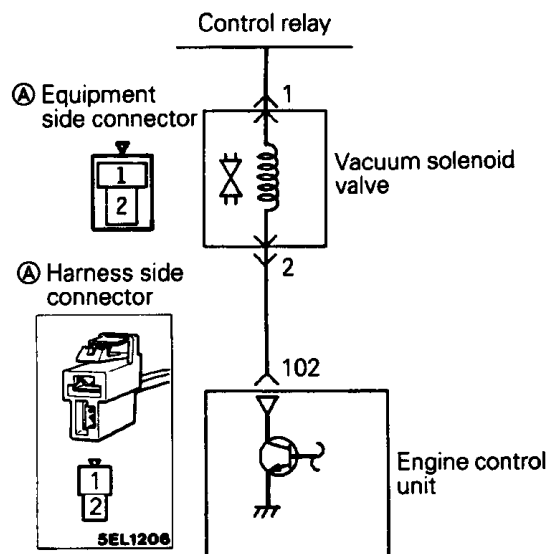
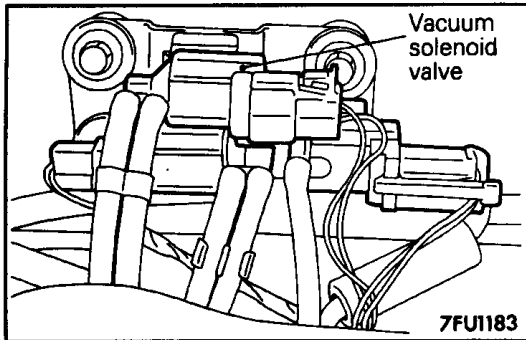
OK

STOP

Repair the harness.
(② – 54)

ACTUATOR INSPECTION

Refer to GROUP 17 – Evaporative Emission Control System.

VACUUM SOLENOID VALVE <Vehicles with TCL>

01A0324

Engine control unit connector

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72
---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

7FU0653

OPERATION

- The vacuum solenoid valve is a duty control type of solenoid valve and controls the vacuum actuator operating vacuum.
- Battery voltage is supplied to the vacuum solenoid valve via the control relay. When the engine control unit turns on the power transistor inside the unit, current flows in the coil and vacuum from the vacuum tank is supplied to on the vacuum actuator.

TROUBLESHOOTING HINTS

Hint 1: When there is a short circuit in the vacuum solenoid valve circuit while the engine is running, intake manifold vacuum acts always on the vacuum actuator. As a result, the throttle valve does not function depending on the de-

gree of accelerator opening but becomes fully closed and the engine speed does not increase from the idling speed.

Hint 2: If the engine speed does not increase above idling speed even if the accelerator pedal is depressed, remove the vacuum hose from the vacuum actuator. Then, if the engine speed rises in proportion to the pedal opening, it indicates the vacuum solenoid valve circuit is short circuited.

Hint 3: The engine control unit drives the vacuum solenoid valve once immediately after the ignition switch is turned ON. Consequently, the noise of the solenoid valve can be heard immediately after turning the ignition switch ON.

INSPECTION**Using Multi-use Tester (MUT)**

Function	Item No.	Drive contents	Check condition	Normal condition
Actuator test	15	Solenoid valve is switched from OFF to ON.	• Ignition switch: ON	Operating noise is heard when driven

HARNESS INSPECTION

1

① Harness side connector

7FU0525

Measure the power supply voltage.

- Connector: Disconnected
- Ignition switch: ON

Voltage (V)
System voltage

OK → **2**

✗ → Repair the harness (A1)–Control relay)

2

① Harness side connector

Engine control unit harness side connector

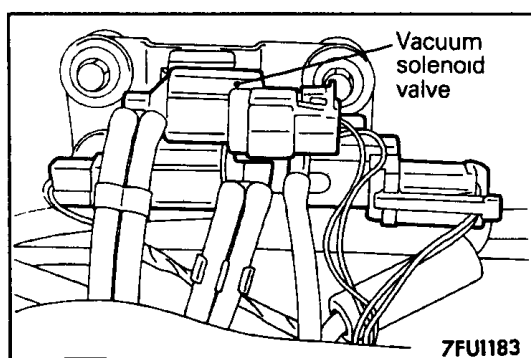
7FU0526

Check for an open-circuit, or a short circuit to earth between vacuum solenoid valve and the engine control unit.

- Vacuum solenoid valve connector: Disconnect
- Engine control unit connector: Disconnect

OK → **STOP**

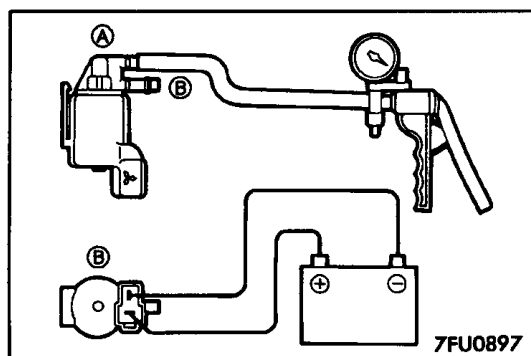
✗ → Repair the harness (A2)–102)



ACTUATOR INSPECTION

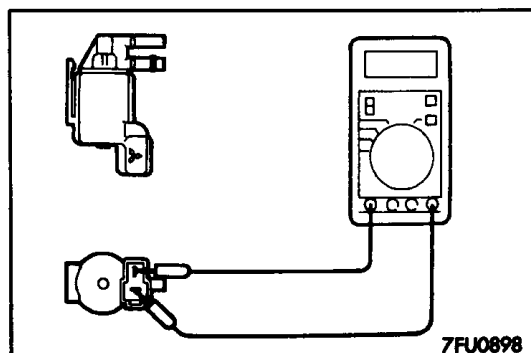
Inspection of operation of vacuum solenoid valve

- (1) Remove the vacuum hose (blue stripe, green stripe) from the solenoid valve.
- (2) Disconnect the harness connector.



- (3) Connect a hand vacuum pump to solenoid valve ① nipple.
- (4) Use jumper wires to connect the valve terminals and battery terminals.
- (5) Connect intermittently the jumper wire to the battery (–) terminal, apply vacuum and inspect air-tightness.

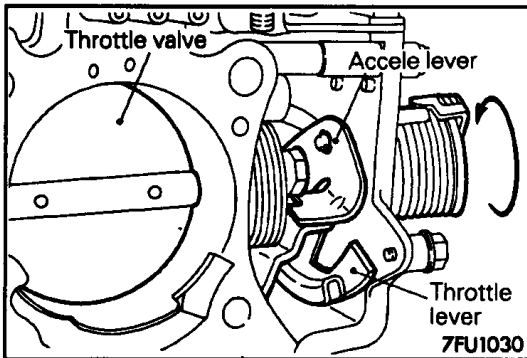
Jumper wire	② nipple condition	Normal condition
Connect	Open	Vacuum is not held.
	Closed	Vacuum is held.
Disconnect	Open	Vacuum is held.



Inspection of coil resistance of vacuum solenoid valve

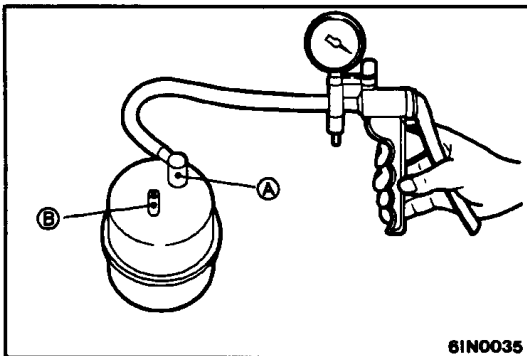
- (1) Measure the resistance between the vacuum solenoid valve terminals.

Standard value: 36–44 Ω [at 20° (68°F)]



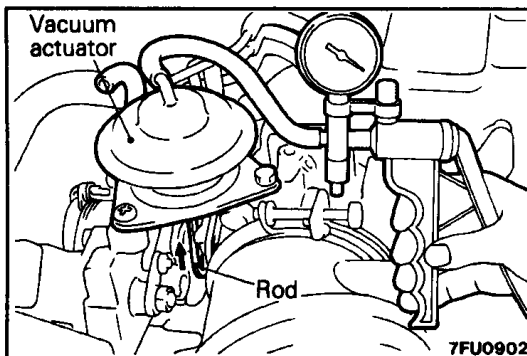
Inspection of throttle valve operation

- (1) Check that the throttle valve opens and closes smoothly (throttle lever moves) according to the opening and closing of the accelerator lever.
- (2) If the throttle valve does not open and close smoothly, there might be a deposit on the throttle valve, so clean the throttle body. (Refer to page 13-43.)



Vacuum tank inspection

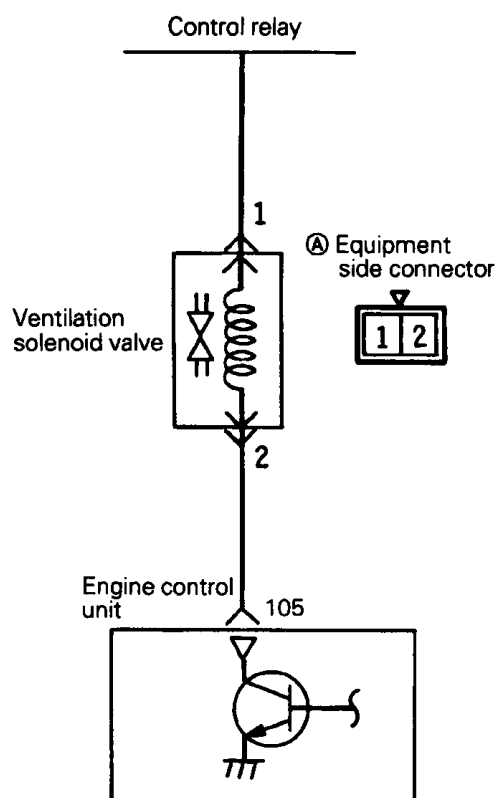
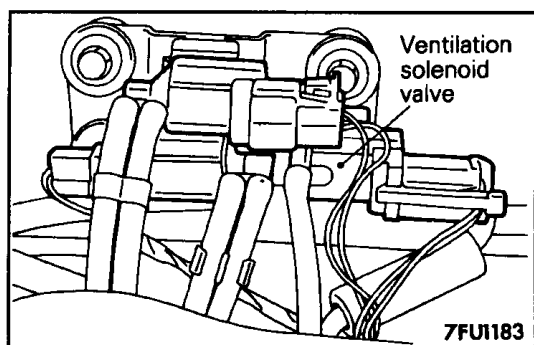
- (1) Connect a hand vacuum pump to vacuum tank (A) nipple, apply 500 mmHg (20 in. Hg) of vacuum and check that the vacuum is held.
- (2) Connect a hand vacuum pump to vacuum tank (B) nipple.
- (3) First, close (A) nipple with your finger and apply 500 mmHg (20 in. Hg) of vacuum. Then, check that the vacuum leaks immediately when you remove the finger blocking the nipple.



Vacuum actuator inspection

- (1) Remove the vacuum hose (green stripe) from the vacuum actuator and connect a hand vacuum pump to the vacuum actuator.
- (2) With the accelerator pedal depressed, check that the rod is pulled up and that vacuum is held when 200 mmHg (8 in. Hg) of vacuum is applied.

VENTILATION SOLENOID VALVE <Vehicles with TCL>



01W657

Engine control unit connector

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72
---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

7FU0653

OPERATION

- The ventilation solenoid valve is a duty control type of solenoid valve and controls the vacuum actuator operating vacuum by equalizing the pressure to the throttle body port A.
- Battery power is supplied to the ventilation solenoid valve via the control relay. When the engine control unit turns the power transistor inside the unit OFF, current stops flowing to the coil and the vacuum actuator operating vacuum is not held.

INSPECTION

Using Multi-use Tester (MUT)

Function	Item No.	Drive contents	Check condition	Normal condition
Actuator test	16	Solenoid valve is switched from OFF to ON.	• Ignition switch: ON	Operating noise is heard when driven

TROUBLESHOOTING HINT

The engine control unit drives the vacuum solenoid valve once the ignition switch is turned ON. Consequently, the operating noise of the ventilation solenoid valve can be heard immediately after the ignition switch is turned ON.

HARNESS INSPECTION

1

01A0824

Measure the power supply voltage.

- Connector: Disconnected
- Ignition switch: ON

Voltage (V)
System voltage

OK → **2**

✗ → Repair the harness (A1-Control relay)

2

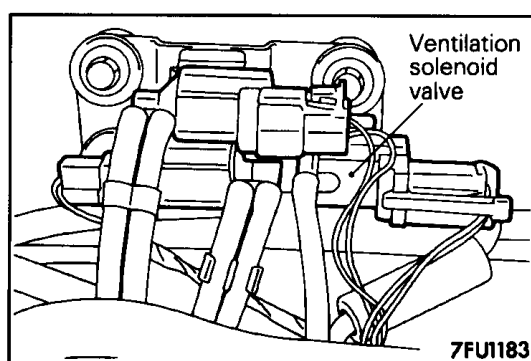
01A0825

Check for an open circuit or a short circuits to earth between the ventilation solenoid valve and the engine control unit

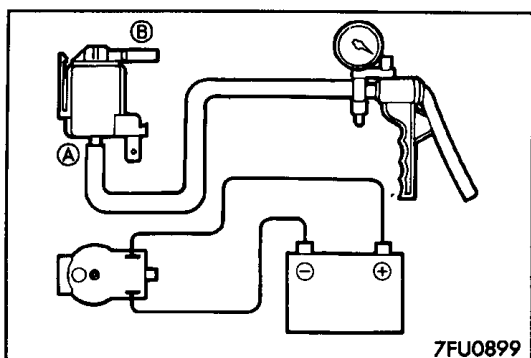
- Ventilation solenoid valve connector: Disconnect
- Engine control unit connector: Disconnect

OK → **STOP**

✗ → Repair the harness (A2-105)

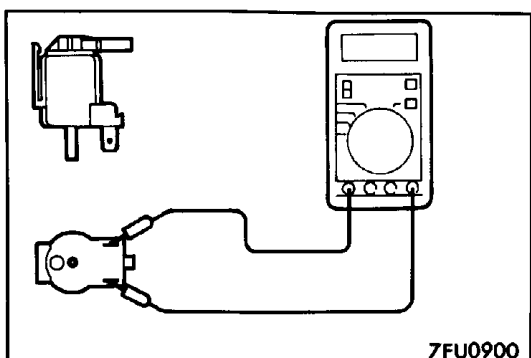
**ACTUATOR INSPECTION <Vehicles built up to November, 1991>****Inspection of ventilation solenoid valve operation**

- (1) Remove the vacuum hose (yellow stripe, green stripe) from the solenoid valve.
- (2) Disconnect the harness connector.



- (3) Connect a hand vacuum pump to the solenoid valve (A) nipple.
- (4) Use jumper wires to connect the solenoid valve terminals and the battery terminals.
- (5) Connect intermittently the jumper wire to the battery (-) terminal, apply vacuum and check for air-tightness.

Jumper wire	Ⓑ Nipple condition	Normal condition
Disconnect	Open	Vacuum is not held.
	Closed	Vacuum is held.
Connect	Open	Vacuum is held.

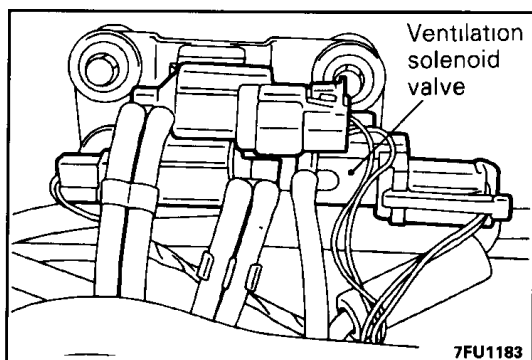
**Inspection of ventilation solenoid valve coil resistance**

- (1) Measure the resistance between the solenoid valve terminals.

Standard value: 36-44 Ω [at 20° (68°F)]

Inspection of vacuum actuator

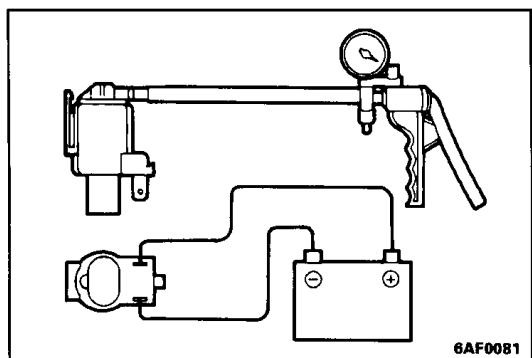
Refer to the vacuum solenoid valve (page 13-129).



ACTUATOR INSPECTION <Vehicles built from December, 1991>

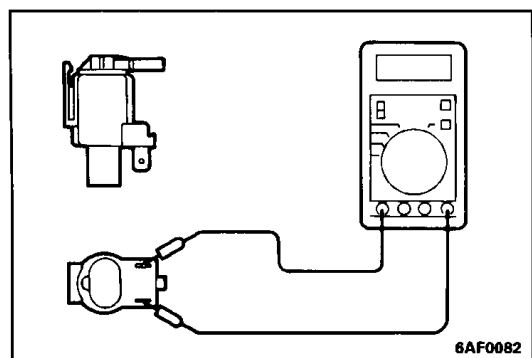
Inspection of ventilation solenoid valve operation

- (1) Remove the vacuum hose (green stripe) from the solenoid valve.
- (2) Disconnect the harness connector.



- (3) Connect a hand vacuum pump to the solenoid valve nipple.
- (4) Use jumper wires to connect the solenoid valve terminals and the battery terminals.
- (5) Connect intermittently the jumper wire to the battery (–) terminal, apply vacuum and check for air-tightness.

Jumper wire	Normal condition
Disconnect	Vacuum is not held.
Connect	Vacuum is held.



Inspection of ventilation solenoid valve coil resistance

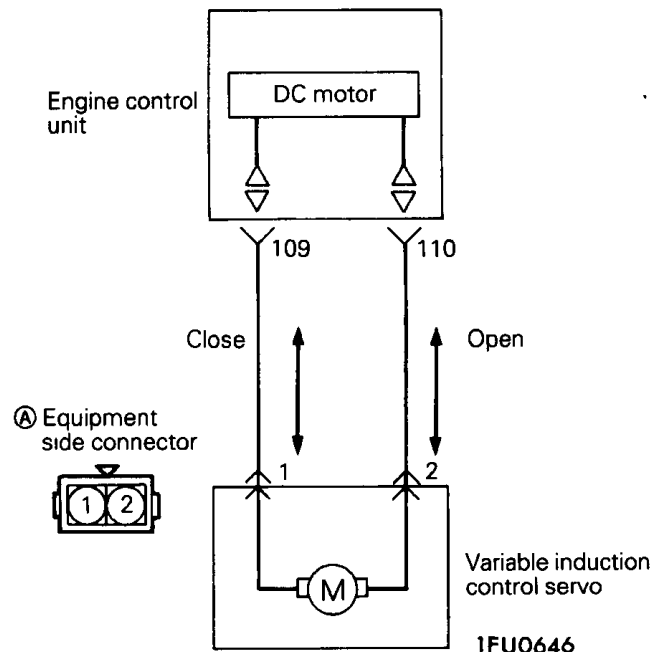
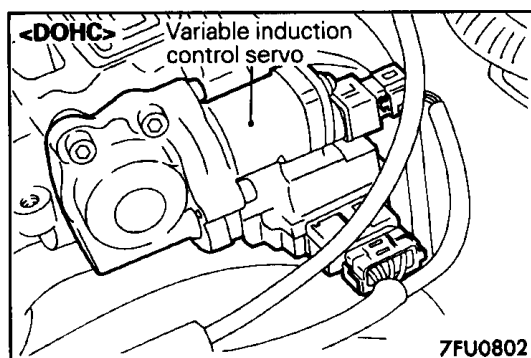
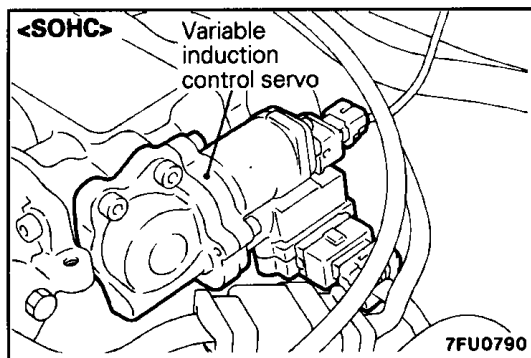
- (1) Measure the resistance between the solenoid valve terminals.

Standard value: 36–44 Ω [at 20° (68°F)]

Inspection of vacuum actuator

Refer to the vacuum solenoid valve (page 13-129).

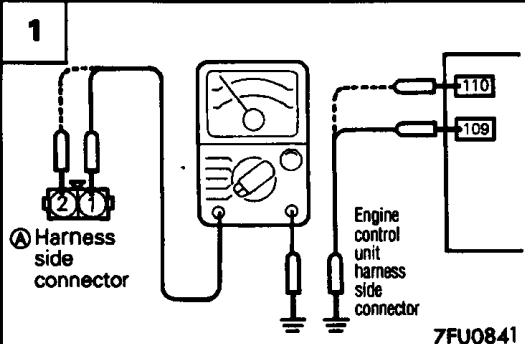
VARIABLE INDUCTION CONTROL SERVO



Engine control unit connector

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544	545	546	547	548	549	550	551	552	553	554	555	556	557	558	559	560	561	562	563	564	565	566	567	568	569	570	571	572	573	574	575	576	577	578	579	580	581	582	583	584	585	586	587	588	589	590	591	592	593	594	595	596	597	598	599	600	601	602	603	604	605	606	607	608	609	610	611	612	613	614	615	616	617	618	619	620	621	622	623	624	625	626	627	628	629	630	631	632	633	634	635	636	637	638	639	640	641	642	643	644	645	646	647	648	649	650	651	652	653	654	655	656	657	658	659	660	661	662	663	664	665	666	667	668	669	670	671	672	673	674	675	676	677	678	679	680	681	682	683	684	685	686	687	688	689	690	691	692	693	694	695	696	697	698	699	700	701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719	720	721	722	723	724	725	726	727	728	729	730	731	732	733	734	735	736	737	738	739	740	741	742	743	744	745	746	747	748	749	750	751	752	753	754	755	756	757	758	759	760	761	762	763	764	765	766	767	768	769	770	771	772	773	774	775	776	777	778	779	780	781	782	783	784	785	786	787	788	789	790	791	792	793	794	795	796	797	798	799	800	801	802	803	804	805	806	807	808	809	810	811	812	813	814	815	816	817	818	819	820	821	822	823	824	825	826	827	828	829	830	831	832	833	834	835	836	837	838	839	840	841	842	843	844	845	846	847	848	849	850	851	852	853	854	855	856	857	858	859	860	861	862	863	864	865	866	867	868	869	870	871	872	873	874	875	876	877	878	879	880	881	882	883	884	885	886	887	888	889	890	891	892	893	894	895	896	897	898	899	900	901	902	903	904	905	906	907	908	909	910	911	912	913	914	915	916	917	918	919	920	921	922	923	924	925	926	927	928	929	930	931	932	933	934	935	936	937	938	939	940	941	942	943	944	945	946	947	948	949	950	951	952	953	954	955	956	957	958	959	960	961	962	963	964	965	966	967	968	969	970	971	972	973	974	975	976	977	978	979	980	981	982	983	984	985	986	987	988	989	990	991	992	993	994	995	996	997	998	999	1000	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020	1021	1022	1023	1024	1025	1026	1027	1028	1029	1030	1031	1032	1033	1034	1035	1036	1037	1038	1039	1040	1041	1042	1043	1044	1045	1046	1047	1048	1049	1050	1051	1052	1053	1054	1055	1056	1057	1058	1059	1060	1061	1062	1063	1064	1065	1066	1067	1068	1069	1070	1071	1072	1073	1074	1075	1076	1077	1078	1079	1080	1081	1082	1083	1084	1085	1086	1087	1088	1089	1090	1091	1092	1093	1094	1095	1096	1097	1098	1099	1100	1101	1102	1103	1104	1105	1106	1107	1108	1109	1110	1111	1112	1113	1114	1115	1116	1117	1118	1119	1120	1121	1122	1123	1124	1125	1126	1127	1128	1129	1130	1131	1132	1133	1134	1135	1136	1137	1138	1139	1140	1141	1142	1143	1144	1145	1146	1147	1148	1149	1150	1151	1152	1153	1154	1155	1156	1157	1158	1159	1160	1161	1162	1163	1164	1165	1166	1167	1168	1169	1170	1171	1172	1173	1174	1175	1176	1177	1178	1179	1180	1181	1182	1183	1184	1185	1186	1187	1188	1189	1190	1191	1192	1193	1194	1195	1196	1197	1198	1199	1200	1201	1202	1203	1204	1205	1206	1207	1208	1209	1210	1211	1212	1213	1214	1215	1216	1217	1218	1219	1220	1221	1222	1223	1224	1225	1226	1227	1228	1229	1230	1231	1232	1233	1234	1235	1236	1237	1238	1239	1240	1241	1242	1243	1244	1245	1246	1247	1248	1249	1250	1251	1252	1253	1254	1255	1256	1257	1258	1259	1260	1261	1262	1263	1264	1265	1266	1267	1268	1269	1270	1271	1272	1273	1274	1275	1276	1277	1278	1279	1280	1281	1282	1283	1284	1285	1286	1287	1288	1289	1290	1291	1292	1293	1294	1295	1296	1297	1298	1299	1300	1301	1302	1303	1304	1305	1306	1307	1308	1309	1310	1311	1312	1313	1314	1315	1316	1317	1318	1319	1320	1321	1322	1323	1324	1325	1326	1327	1328	1329	1330	1331	1332	1333	1334	1335	1336	1337	1338	1339	1340	1341	1342	1343	1344	1345	1346	1347	1348	1349	1350	1351	1352	1353	1354	1355	1356	1357	1358	1359	1360	1361	1362	1363	1364	1365	1366	1367	1368	1369	1370	1371	1372	1373	1374	1375	1376	1377	1378	1379	1380	1381	1382	1383	1384	1385	1386	1387	1388	1389	1390	1391	1392	1393	1394	1395	1396	1397	1398	1399	1400	1401	1402	1403	1404	1405	1406	1407	1408	1409	1410	1411	1412	1413	1414	1415	1416	1417	1418	1419	1420	1421	1422	1423	1424	1425	1426	1427	1428	1429	1430	1431	1432	1433	1434	1435	1436	1437	1438	1439	1440	1441	1442	1443	1444	1445	1446	1447	1448	1449	1450	1451	1452	1453	1454	1455	1456	1457	1458	1459	1460	1461	1462	1463	1464	1465	1466	1467	1468	1469	1470	1471	1472	1473	1474	1475	1476	1477	1478	1479	1480	1481	1482	1483	1484	1485	1486	1487	1488	1489	1490	1491	1492	1493	1494	1495	1496	1497	1498	149
---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	-----

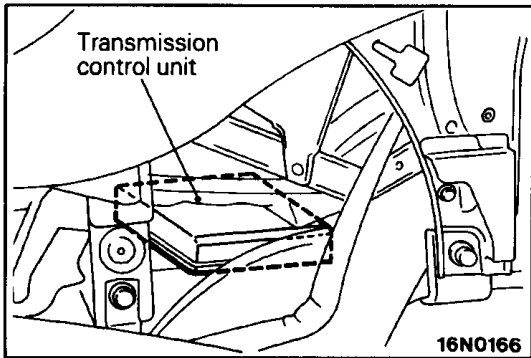
HARNESS INSPECTION

1  7FU0841	Check for an open circuit or a short circuit to earth between the variable induction control (VIC) servo and the engine control unit. • Variable induction control (VIC) servo connector: Disconnect • Engine control unit connector: Disconnect	OK → STOP ✗ → Repair the harness. (A1-109, A2-110)
---	--	--

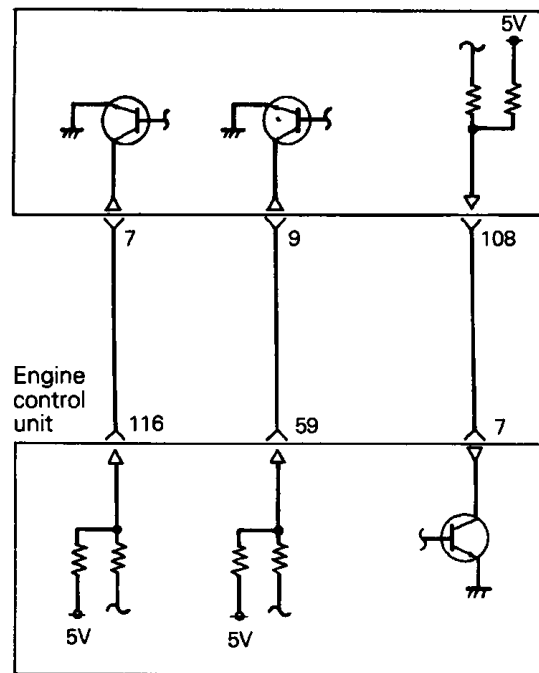
ACTUATOR INSPECTION

Refer to GROUP 15 – Service Adjustment Procedures.

ENGINE/TRANSMISSION OVERALL CONTROL SIGNAL <DOHC-A/T>



Transmission control unit



7FU0843

A Transmission control unit connector

106	101
107	102
108	103
109	104
110	105
10	1
11	2
12	3
13	4
14	5
15	6
16	7
17	8
18	9
58	51
59	52
60	53
61	54
62	55
63	56
64	57

7FU0903

Engine control unit connector

1	61
2	62
3	63
4	64
5	65
6	66
7	67
8	68
9	69
10	70
11	71
12	72
13	73
14	74
15	75
16	76
17	77
18	78
19	79
20	80
21	81
22	82
23	83
24	84
25	85
26	86
27	87
28	88
29	89
30	90
31	91
32	92
33	93
34	94
35	95
36	96
37	97
38	98
39	99
40	100
41	101
42	102
43	103
44	104
45	105
46	106
47	107
48	108
49	109
50	110
51	111
52	112
53	113
54	114
55	115
56	116
57	117
58	118
59	119
60	120
61	121
62	122
63	123
64	124
65	125
66	126
67	127
68	128
69	129
70	130
71	131
72	132
73	133
74	134
75	135
76	136
77	137
78	138
79	139
80	140
81	141
82	142
83	143
84	144
85	145
86	146
87	147
88	148
89	149
90	150
91	151
92	152
93	153
94	154
95	155
96	156
97	157
98	158
99	159
100	160

7FU0653

OPERATION

Information is passed between the engine control unit and the transmission control unit by three communication lines for overall control of the engine and transmission.

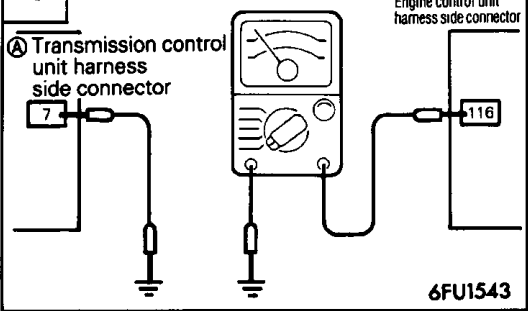
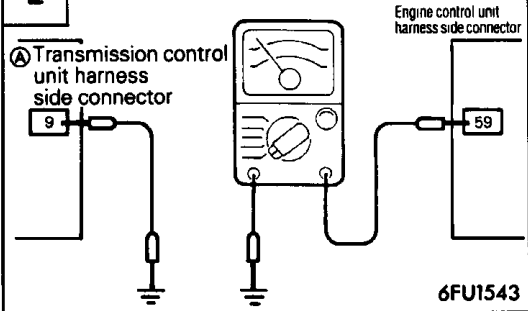
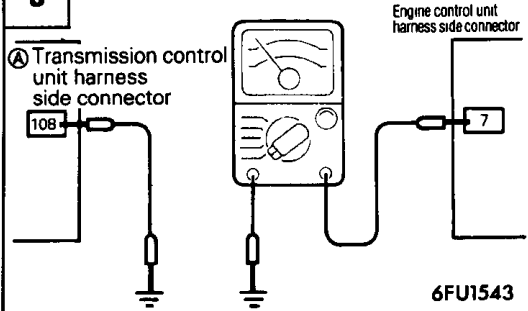
When the transistor inside the engine control unit is switched from OFF to ON by a control signal from the engine control unit, the terminal at which 5V is supplied from the transmission control unit is earthed inside the engine control unit. As a result, voltage on the transmission control unit terminal changes from HIGH to LOW. Furthermore, when the transistor inside the engine control unit is switched from ON to OFF, the terminal with released 5V from the transmission control unit which is earthed inside the engine

control unit is opened and the voltage at the transmission control unit terminal changes from LOW to HIGH.

In this way, voltage at the transmission control unit terminal is controlled according to the ON/OFF state of the transistor inside the engine control unit, and information is transmitted.

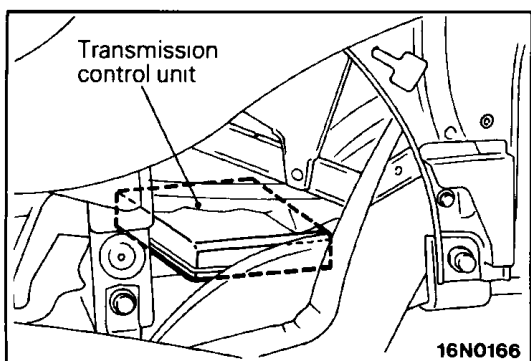
On the other hand, the transmission control unit also controls the voltage at the engine control unit terminal according to the ON/OFF state of the transistor inside the transmission control unit and transmits information. Consequently, the engine and transmission pass control information back and forth.

HARNESS INSPECTION

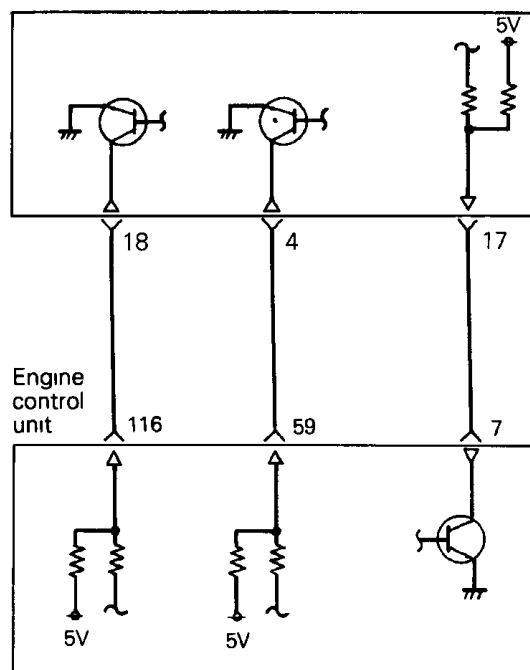
1  Transmission control unit harness side connector Engine control unit harness side connector 6FU1543	Check for an open circuit or a short circuit to earth between the transmission control unit and the engine control unit. • Transmission control unit connector: Disconnect • Engine control unit connector: Disconnect	 → 2  → Repair the harness. (A 7-116)
2  Transmission control unit harness side connector Engine control unit harness side connector 6FU1543	Check for an open circuit or a short circuit to earth between the transmission control unit and the engine control unit. • Transmission control unit connector: Disconnect • Engine control unit connector: Disconnect	 → 3  → Repair the harness. (A 9-59)
3  Transmission control unit harness side connector Engine control unit harness side connector 6FU1543	Check for an open circuit or a short circuit to earth between the transmission control unit and the engine control unit. • Transmission control unit connector: Disconnect • Engine control unit connector: Disconnect	 →   → Repair the harness. (A 108-7)

ENGINE/TRANSMISSION OVERALL CONTROL SIGNAL

<SOHC-A/T-Vehicles built from December, 1991>

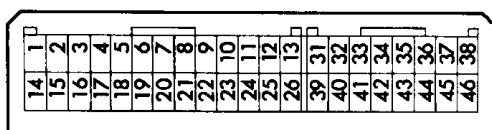


Transmission control unit



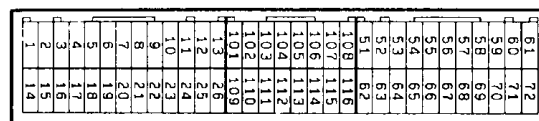
7FU0843

Ⓐ Transmission control unit connector



7FU1302

Engine control unit connector

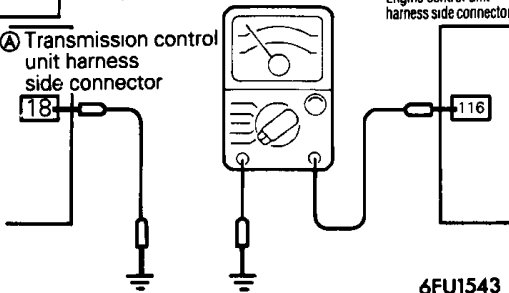
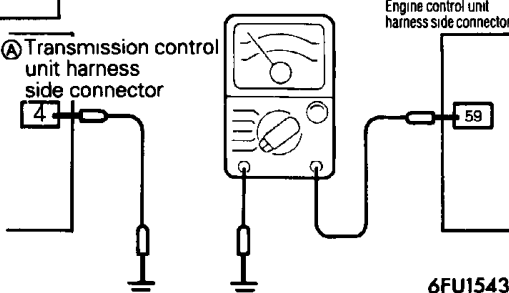
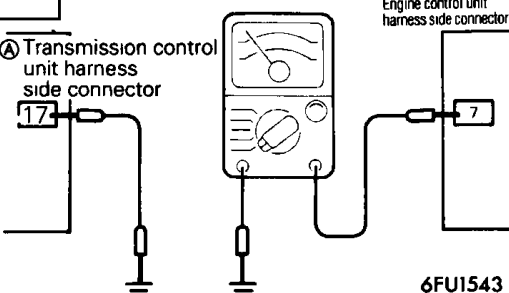


7FU0653

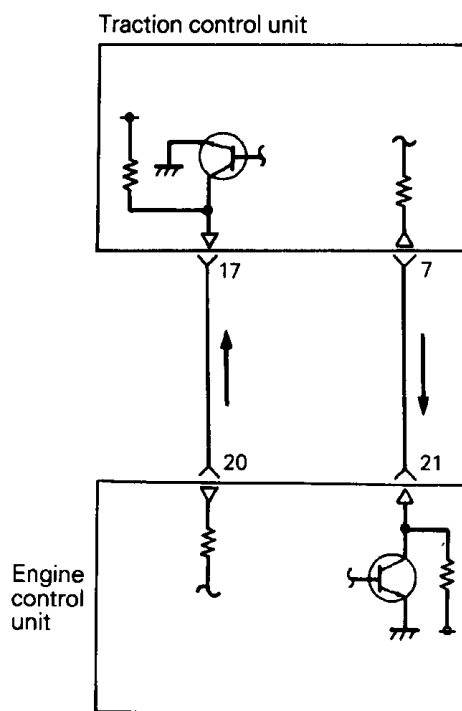
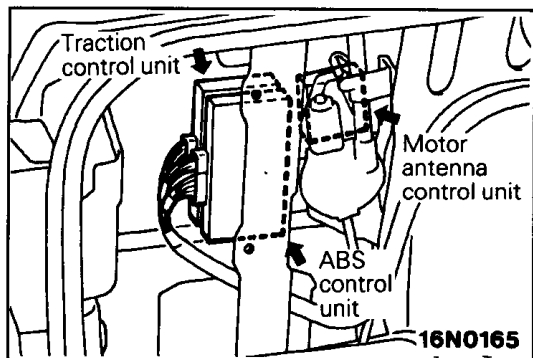
OPERATION

Refer to P.13-136

HARNESS INSPECTION

1  Ⓐ Transmission control unit harness side connector Engine control unit harness side connector 6FU1543	Check for an open circuit or a short circuit to earth between the transmission control unit and the engine control unit. • Transmission control unit connector: Disconnect • Engine control unit connector: Disconnect	OK 2 ✗ Repair the harness. (Ⓐ 18-116)
2  Ⓐ Transmission control unit harness side connector Engine control unit harness side connector 6FU1543	Check for an open circuit or a short circuit to earth between the transmission control unit and the engine control unit. • Transmission control unit connector: Disconnect • Engine control unit connector: Disconnect	OK 3 ✗ Repair the harness. (Ⓐ 4-59)
3  Ⓐ Transmission control unit harness side connector Engine control unit harness side connector 6FU1543	Check for an open circuit or a short circuit to earth between the transmission control unit and the engine control unit. • Transmission control unit connector: Disconnect • Engine control unit connector: Disconnect	OK STOP ✗ Repair the harness. (Ⓐ 17-7)

TRACTION CONTROL SIGNAL <Vehicles with TCL>



A Traction control unit connector

1	2	3	4	5	6	7	8
9	10	11	12	13	14	15	16
17	18						

7FU1191

Engine control unit connector

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	-----

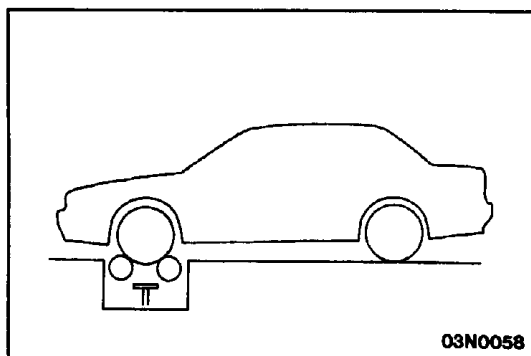
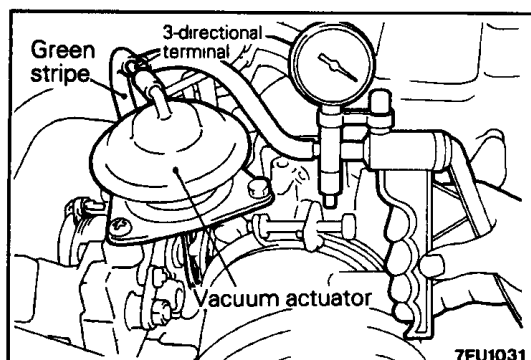
7FU0653

OPERATION

- Control information between the engine control unit and traction control unit is passed by mutual data communication.
- When the engine control unit turns the transistor inside the unit OFF, the voltage supplied to the traction control unit becomes HIGH. And when the engine control unit turns the power transistor inside the unit ON, the voltage supplied to the traction control unit

becomes LOW. As a result, the engine control unit inputs data signals to the traction control unit by turning the transistor inside the unit ON ↔ OFF.

On the other hand, the traction control unit also inputs data signals to the engine control unit by turning the transistor inside the unit ON ↔ OFF.

**Inspection of traction control (TCL) operating vacuum**

- (1) Remove the vacuum hose (green stripe) from the vacuum actuator and connect a hand vacuum pump between the actuator nipple and vacuum hose via the 3-directional terminal.
Set the hand vacuum pump near the driver's seat so the vacuum check can be made from the driver's seat.
- (2) Start the engine.
- (3) Turn the TCL switch to the ON position.
- (4) Set the selector lever in the D range and check the TCL operating vacuum when starting off.

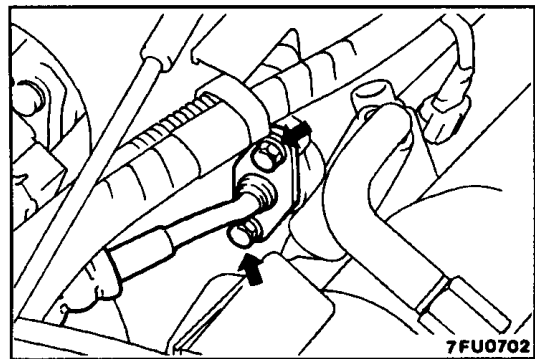
Vehicle condition	Normal vacuum with accelerator pedal depressed
Speedometer tester on front wheel	150 mmHg (6 in. Hg) or more
On a dry paved road	No change

NOTE

1. With the front wheels mounted on a speedometer tester, the function of the TCL system should stop and the vacuum should decrease gradually 20 seconds or more after the accelerator pedal is depressed.
2. If the front wheels slip and there is a difference in the rotation of the front wheels and rear wheels, vacuum controlled by the TCL system is supplied to the vacuum actuator.

HARNESS INSPECTION

1 Ⓐ Traction control unit harness side connector Engine control unit harness side connector 6FU1543	Check for an open circuit or a short circuit to earth between the traction control unit and the engine control unit. • Traction control unit connector: Disconnect • Engine control unit connector: Disconnect	OK → 2 ✗ → Repair the harness. (A17-20)
2 Ⓐ Traction control unit harness side connector Engine control unit harness side connector 6FU1543	Check for an open circuit or a short circuit to earth between the traction control unit and the engine control unit. • Traction control unit connector: Disconnect • Engine control unit connector: Disconnect	OK → STOP ✗ → Repair the harness. (A7-21)

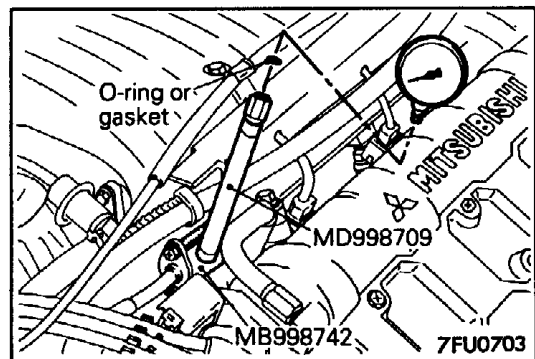


FUEL PRESSURE TEST

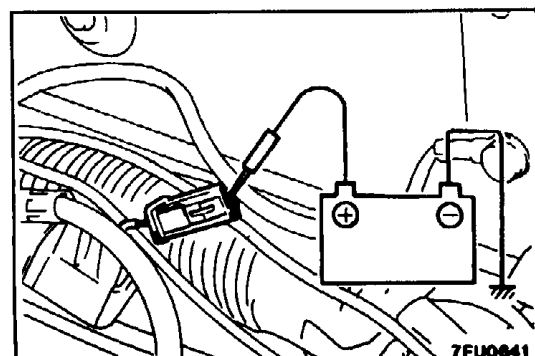
- (1) Reduce the internal pressure of the fuel pipes and hoses. (Refer to P.13-51.)
- (2) Disconnect the fuel high pressure hose at the delivery pipe side.

Caution

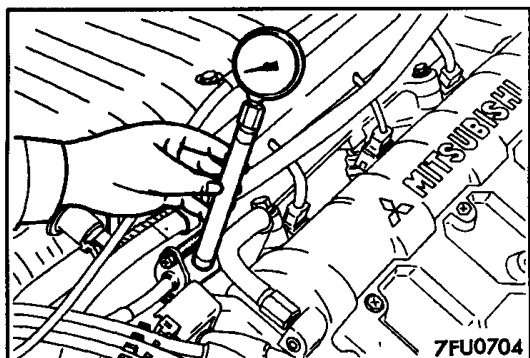
Cover the hose connection with rags to prevent splash of fuel that could be caused by some residual pressure in the fuel pipe line.



- (3) Set a fuel pressure gauge on the special tool, placing adequate O-ring or gasket between the gauge end special tool prevent fuel leaks.
- (4) Attach the special tool set in step (3) to the delivery pipe.
- (5) Connect the (-) battery terminal.

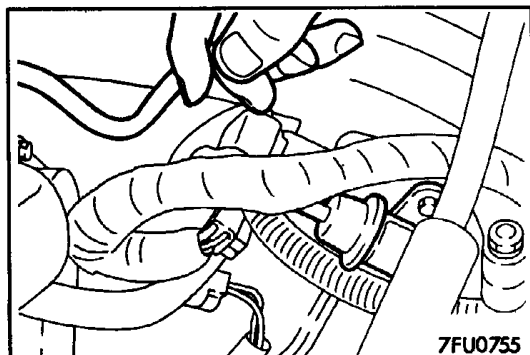


- (6) Connect a jumper wire to the terminal (black) for activation of the fuel pump and to the positive (+) terminal of the battery to activate the fuel pump. With fuel pressure applied, check to be sure that there is no fuel leakage from the fuel pressure gauge and the special tool connection part.
- (7) disconnect the jumper wire (from the terminal for activation of the fuel pump) to stop the fuel pump.
- (8) Start the engine and let it idle.



- (9) Measure the fuel pressure during idling.

Standard value: Approx. 270 kPa (2.7 kg/cm², 38 psi) at curb idle



- (10) Disconnect the vacuum hose from the fuel pressure regulator, and then measure the fuel pressure while using finger to plug the end of the hose.

Standard value: 330–350 kPa (3.3–3.5 kg/cm², 47–50 psi) at curb idle speed

- (11) Check to be sure that the fuel pressure during idling does not decrease even after the engine is raced a few times.
 (12) Use a finger to gently press the fuel return hose while repeatedly racing the engine, and check to be sure that there is fuel pressure in the return hose also.

NOTE

There will be no fuel pressure in the return hose if there is insufficient fuel flow.

- (13) If the fuel pressure measured in steps (9) to (12) deviates from the standard value range, check for the probable cause by referring to the table below, and then make the appropriate repair.

Condition	Probable cause	Remedy
- Fuel pressure is too low. - Fuel pressure drops during racing. - No fuel pressure in fuel return hose.	Fuel filter is clogged.	Replace the fuel filter.
	Malfunction of the valve seat within the fuel pressure regulator, or fuel leakage to return side caused by spring deterioration.	Replace the fuel pressure regulator.
	Fuel pump low discharge pressure.	Replace the fuel pump.
Fuel pressure is too high.	The valve within the fuel pressure regulator is sticking.	Replace the fuel pressure regulator.
	Clogging of the fuel return hose and/or the pipe.	Clean or replace the hose and/or pipe.
No change of the fuel pressure when vacuum hose is connected and when not connected.	Damaged vacuum hose or nipple clogging.	Replace the vacuum hose, or clean the nipple.

- (14) Stop the engine and check for a change of the value indicated by the fuel pressure gauge. The condition is normal if there is no decrease of the indicated value within two minutes.

If there is a decrease of the indicated value, monitor the speed of the decrease, and, referring to the table below, determine the cause of the problem and make the appropriate repair.

Condition	Probable cause	Remedy
After the engine is stopped, the fuel pressure drops gradually.	Injector leakage	Replace the injector.
	Leakage at the fuel pressure regulator valve seat	Replace the fuel pressure regulator.
There is a sudden sharp drop of the fuel pressure immediately after the engine is stopped.	The check valve (within the fuel pump) is not closed.	Replace the fuel pump.

- (15) Remove all remaining pressure from inside the fuel pipe. (Refer to P.13-51.)

- (16) Disconnect the fuel pressure gauge and the special tool from the delivery pipe.

Caution

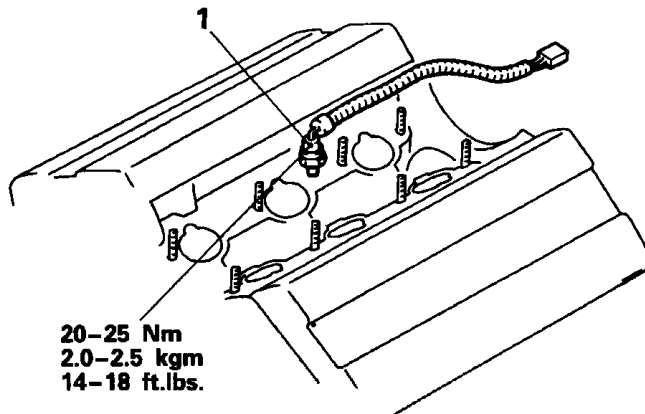
Because there will be a slight amount of remaining pressure in the fuel pipe line, use rags to cover so that fuel doesn't splatter.

- (17) Replace the O-ring at the end of the fuel high-pressure hose with a new one.
- (18) After connecting the fuel high-pressure hose to the delivery pipe, tighten the installation bolt.
- (19) Check to be sure that there is no fuel leakage.
- ① Apply battery voltage to the terminal for activation of the fuel pump so as to activate the fuel pump.
 - ② With fuel pressure applied, check for leakage of the fuel line.

DETONATION SENSOR

REMOVAL AND INSTALLATION

E13YAAA

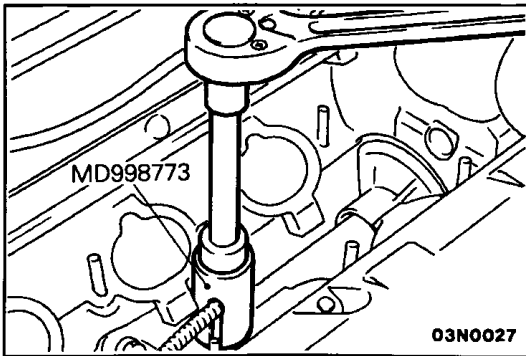


03F0021

↔ ↔ 1. Detonation sensor

Pre-removal and Post-installation Operation

- Removal and installation of air intake plenum.
- Removal and installation of intake manifold.



03N0027

SERVICE POINTS OF REMOVAL

E13YBAA

1. REMOVAL OF DETONATION SENSOR

SERVICE POINTS OF INSTALLATION

E13YDAA

1. INSTALLATION OF DETONATION SENSOR

It should be tightened firmly to the specified torque, as there will be an effect on engine control.

FUEL TANK

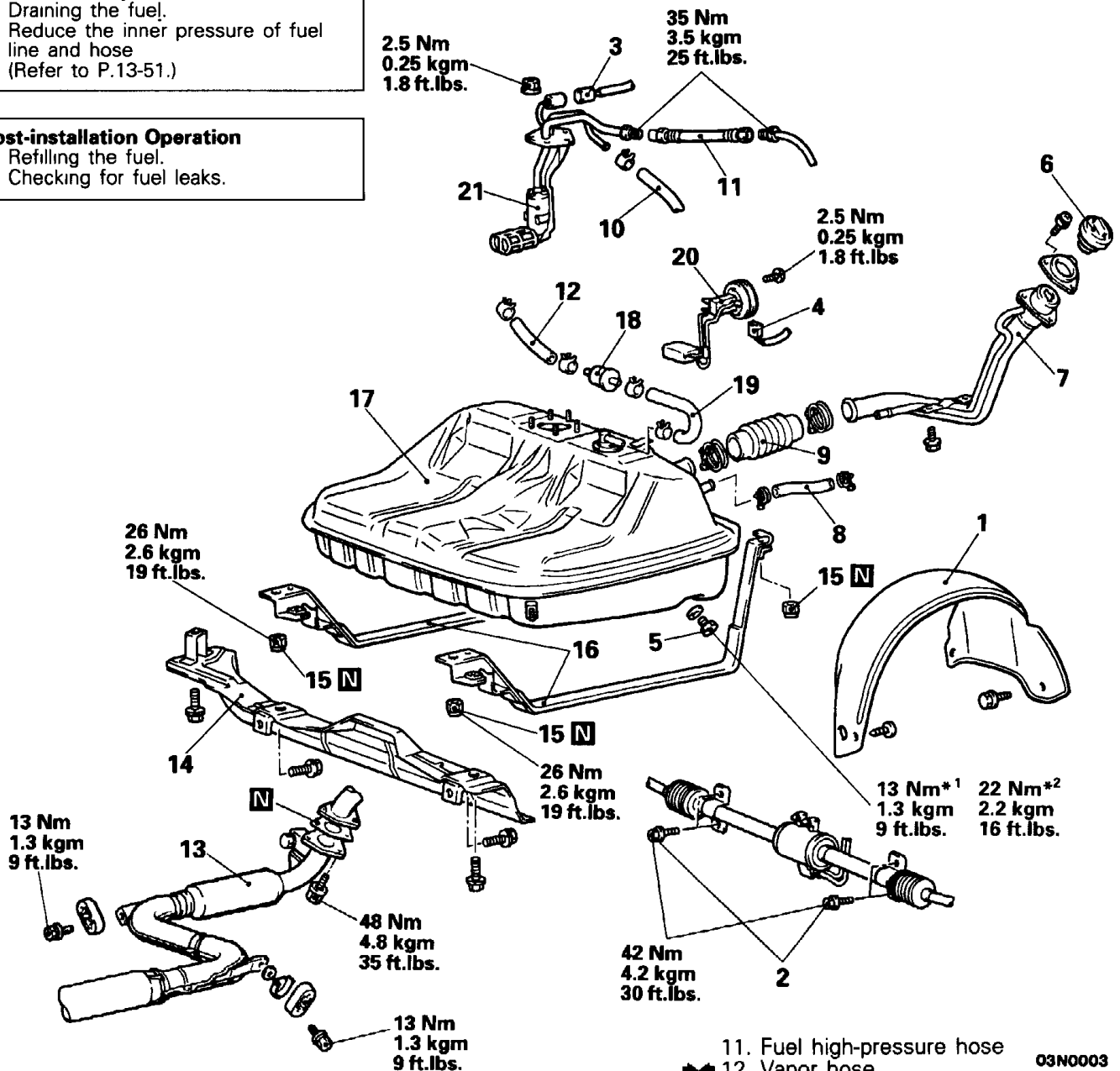
REMOVAL AND INSTALLATION

Pre-removal Operation

- Draining the fuel.
- Reduce the inner pressure of fuel line and hose (Refer to P.13-51.)

Post-installation Operation

- Refilling the fuel.
- Checking for fuel leaks.

**Removal steps**

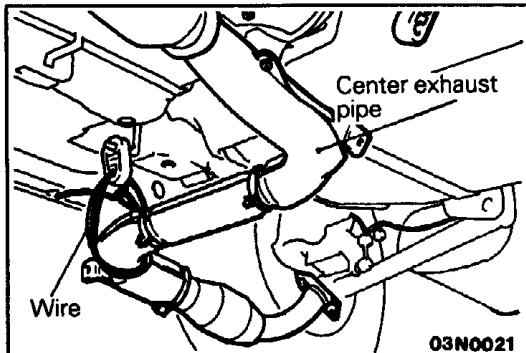
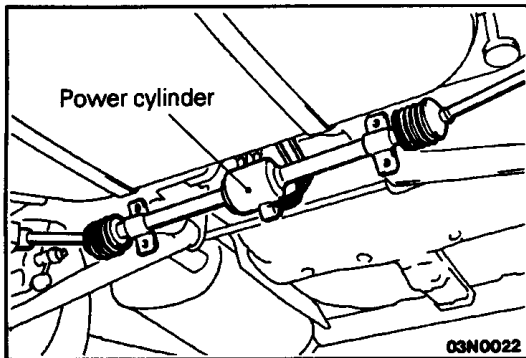
1. Liner <DOHC>
2. Power cylinder attachment bolt <Vehicles with 4WS>
3. Fuel pump connector
4. Fuel gauge unit connector
5. Drain plug
6. Fuel tank cap
7. Filler neck
8. Vapor hose
9. Filler hose
10. Return hose

11. Fuel high-pressure hose
12. Vapor hose
13. Center exhaust pipe
14. Fuel tank protector
15. Self-locking nut
16. Tank band
17. Fuel tank
18. Two-way valve
19. Vapor hose
20. Fuel gauge unit
21. Fuel pump unit

03N0003

NOTE

- *1. Drain plug head mark "4T"
<Vehicles built up to February, 1991>
- *2. Drain plug head mark "7T"
<Vehicles built from March, 1991>

**SERVICE POINTS OF REMOVAL**

E13GBAM

2. REMOVAL OF POWER CYLINDER ATTACHMENT BOLT <VEHICLES WITH 4WS>

Remove the 4WS rear wheel steering power cylinder attachment bolt, and lower the cylinder.

NOTE

Lowering the power cylinder provides working space.

13. REMOVAL OF CENTER EXHAUST PIPE

Remove the rubber hangers (2 places) and the bolt connecting the main muffler, and secure the center exhaust pipe with wire.

INSPECTION

E13GCAL

- Check the hoses and the pipes for crack or damage.
- Check the fuel tank cap for malfunction.
- Check the fuel tank for deformation, corrosion or crack.
- Check the fuel tank for dust or foreign material.

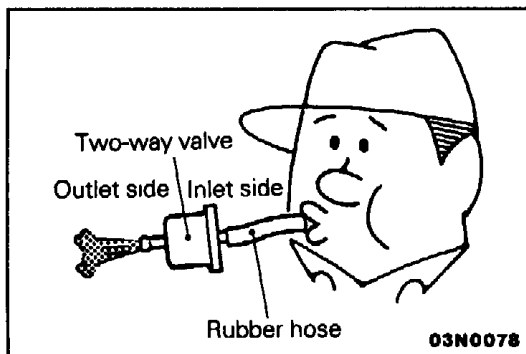
NOTE

If the inside of the fuel tank is to be cleaned, use any one of the following:

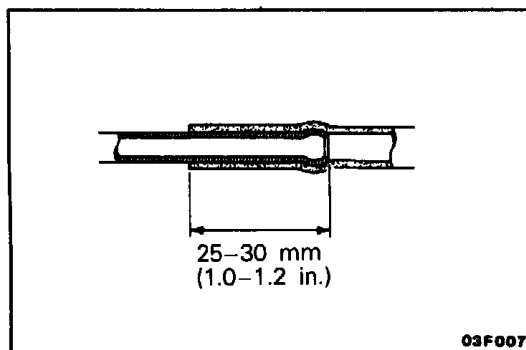
- (1) Kerosene
- (2) Trichloroethylene
- (3) A neutral emulsion type detergent

SIMPLE CHECKING OF THE TWO-WAY VALVE

Attach a clean hose and check the operation of the two-way valve.



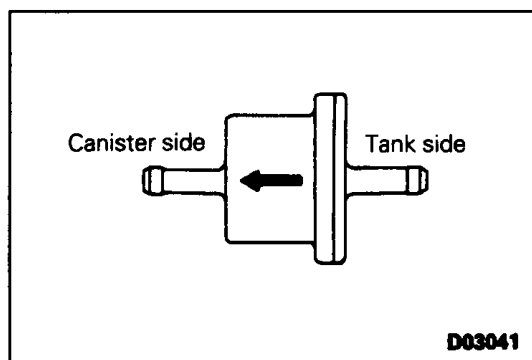
Inspection procedure	Normal condition
Lightly blow from inlet side (fuel tank side).	Air passes through with a slight feeling of resistance.
Lightly blow from outlet side (canister side).	Air passes through.

**SERVICE POINTS OF INSTALLATION**

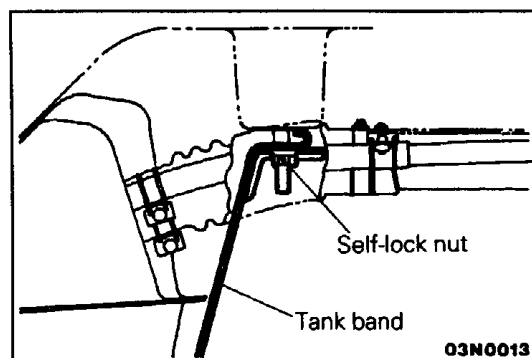
E13GDAY

19./12. INSTALLATION OF VAPOR HOSE/10. RETURN HOSE

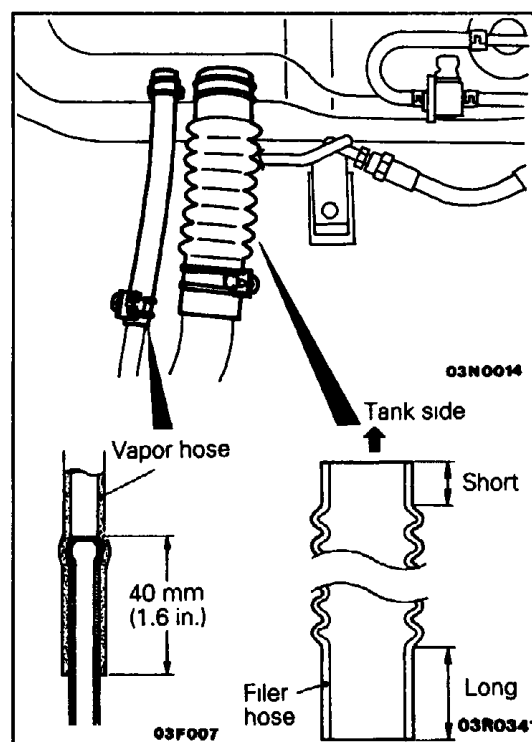
If the pipe has a stepped part, connect securely up to the stepped part. If the pipe has no stepped part, insert so that the inserted portion is 25-30 mm (1.0-1.2 in.) long.

**18. INSTALLATION OF TWO-WAY VALVE**

Install so that the installation direction of the two-way valve is correct.

**15. INSTALLATION OF SELF-LOCKING NUT (REAR)**

Tighten the self-locking nut until the tank band touches the body.

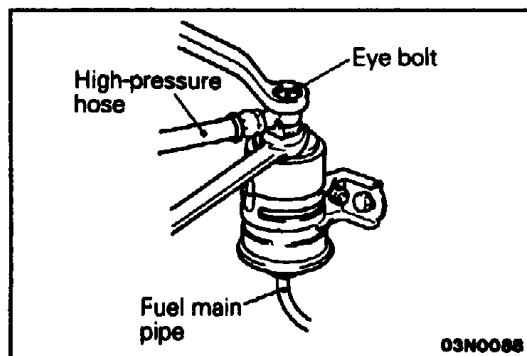
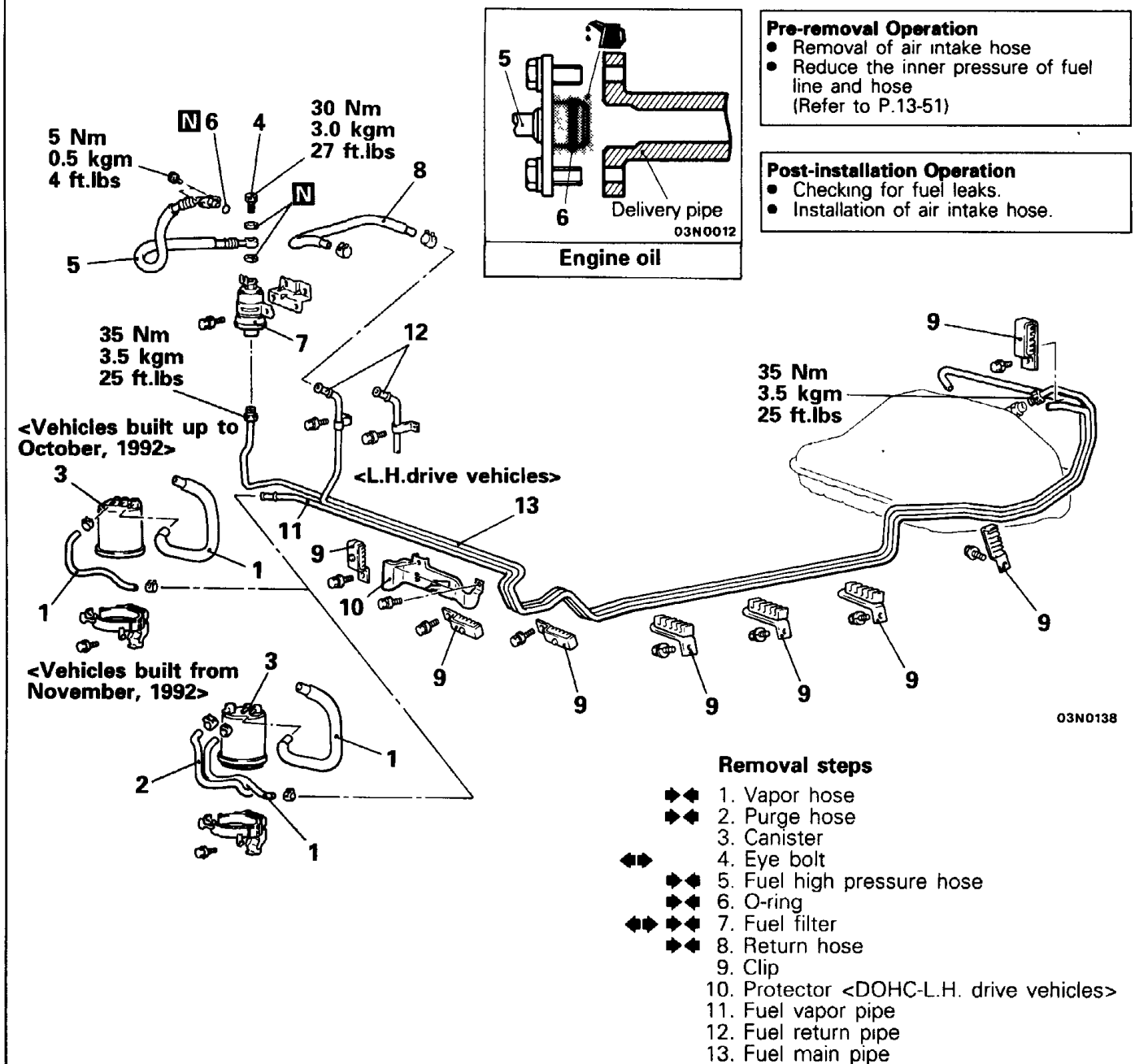
**9. INSTALLATION OF FILLER HOSE/8. VAPOR HOSE**

- (1) Install the filler hose with the short connector piece towards the tank.
- (2) Insert the vapor hose all the way to the tank side, and approx. 40 mm (1.6 in.) to the filler neck side.

FUEL LINE AND VAPOR LINE

E13KA--

REMOVAL AND INSTALLATION



SERVICE POINTS OF REMOVAL

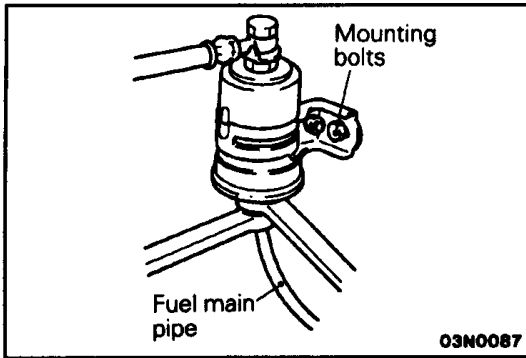
E13KBAM

4. REMOVAL OF EYE BOLT

Remove the eye bolt while holding the fuel filter nut securely.

Caution

Cover the hose connection with rags to prevent splash of fuel that could be caused by some residual pressure in the fuel pipe line.



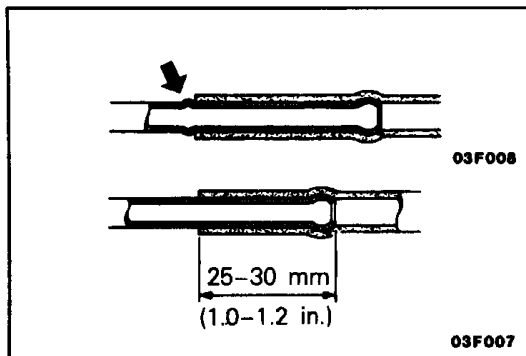
7. REMOVAL OF FUEL FILTER

- (1) Loosen the main pipe flare nut while holding the fuel filter nut securely.
- (2) Remove the fuel filter mounting bolts, and then remove the fuel filter from the bracket.

INSPECTION

E13KCAR

- Check the hose and pipes for cracks, bend, deformation and clogging.
- Check the canister for clogging.
- Check the fuel filter for clogging and damage.



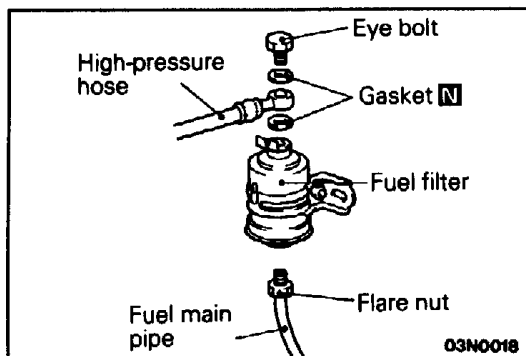
SERVICE POINTS OF INSTALLATION

E13KDAZ

8. INSTALLATION OF FUEL RETURN HOSE / 2. PURGE HOSE / 1. VAPOR HOSE

- (1) If the fuel pipe has a stepped part, connect the fuel hose to the pipe securely, up to the stepped part, as shown in the figure.
- (2) If the fuel pipe does not have a stepped part, connect the fuel hose to the pipe securely, so that it is the standard value.

Standard value: 25-30 mm (1.0-1.2 in.)



7. INSTALLATION OF FUEL FILTER

- (1) When installing the fuel filter, first temporarily install the filter to the filter bracket; then insert the main pipe at the connector part of the filter, and manually screw in the main pipe's flare nut.
- (2) Holding the fuel filter nut, tighten the fuel main pipe's flare nut and eye bolt at the specified torque. Then tighten the filter to the bracket.

6. INSTALLATION OF O-RING/5. HIGH PRESSURE FUEL HOSE

- (1) Apply a little amount of new engine oil to the O-ring.

Caution

Be sure to prevent the engine oil from entering into the delivery pipe.

- (2) Insert the hose, being careful not to damage the O-ring, and tighten securely.

NOTE

Be sure to tighten securely to prevent fuel leaks so that there will be high pressure between the fuel pump and the delivery pipe.

TCL CONTROL UNIT

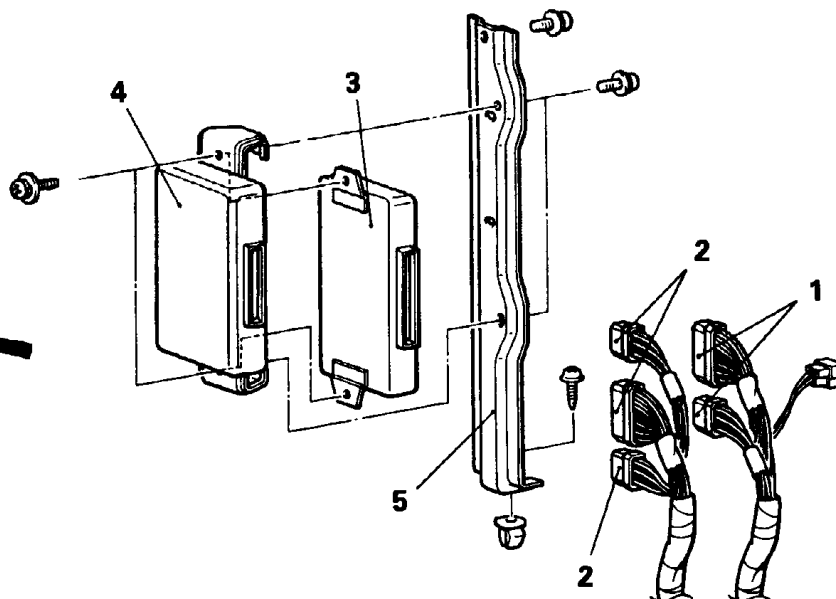
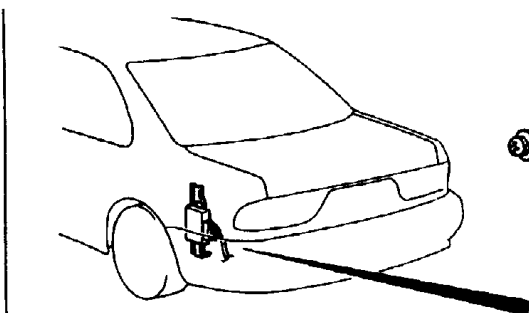
REMOVAL AND INSTALLATION

Pre-removal Operation

- Removal of the Trunk Side Trim (L.H.)(Refer to GROUP 52 – Trim)

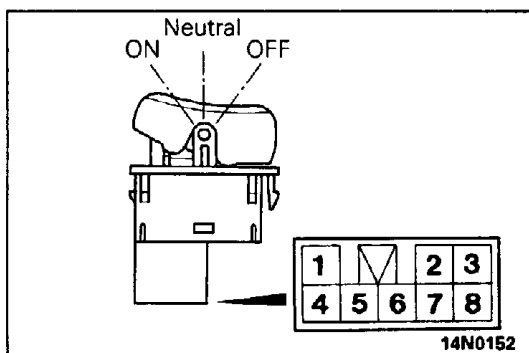
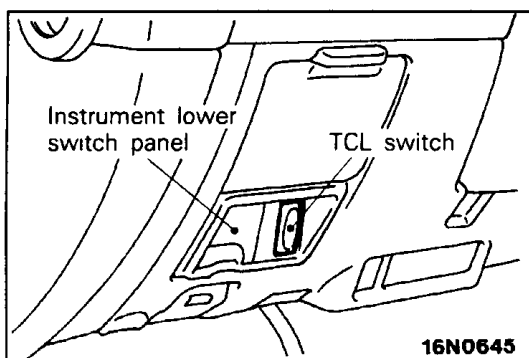
Post-installation Operation

- Checking of the Anti-skid Brake System (Refer to GROUP 35 – Service Adjustment Procedures)
- Checking of the TCL System (Refer to P.13-51-1)
- Installation of the Trunk side Trim (L.H.) (Refer to GROUP 52 – Trim)

**Removal steps**

1. ABS-ECU connector
2. TCL-ECU connector
3. ABS-ECU
4. TCL-ECU
5. Bracket

14N0272



TCL SWITCH

E13REAA

INSPECTION

1. Remove the instrument lower switch panel.
2. Remove the TCL switch.

3. Operate the switch to check continuity between the terminals.

Connector terminal	1	2	3	4	7	8	5		6
Switch position									
ON				○	—	○			
Neutral							○	○	○
OFF		○	—	○					

NOTE

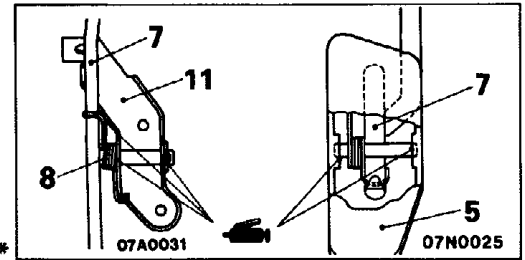
○—○ shows that there is continuity between the terminals.

HYDRAULIC UNIT <VEHICLES WITH TCL>

Refer to GROUP 35 – Hydraulic Unit <Vehicles with ABS>

E13ΦA--

<L.H. drive vehicles>



vehicles>

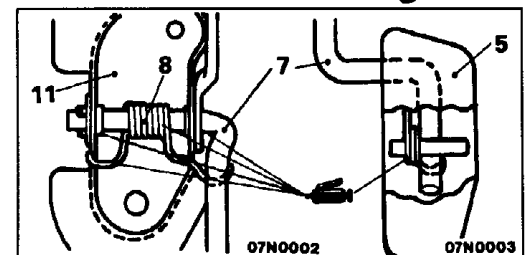
5 Nm
0.5 kgm
4 ft.lbs.

13 Nm
1.3 kgm
9 ft.lbs.

07L0037

07N0001

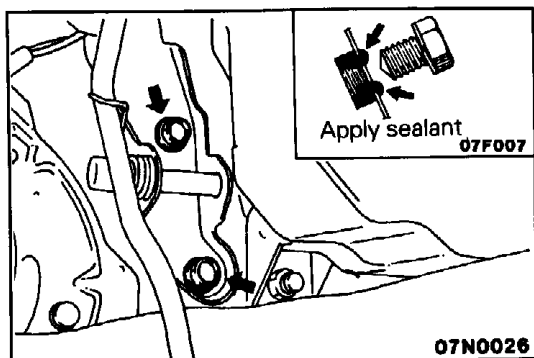
*: Vehicles built up to October, 1991



INSPECTION

E13φCAL

- Check the inner and outer cable for damage.
- Check the cable for smooth movement.
- Check the accelerator arm for bending.
- Check the return spring for deterioration.
- Check the connection of bushing to end metal fitting.
- Check the accelerator switch for ON/OFF switching.
<A/T>

**SERVICE POINTS OF INSTALLATION**

E13φDAφ

11. APPLICATION OF SEALANT TO ACCELERATOR ARM BRACKET <L.H. drive vehicles>

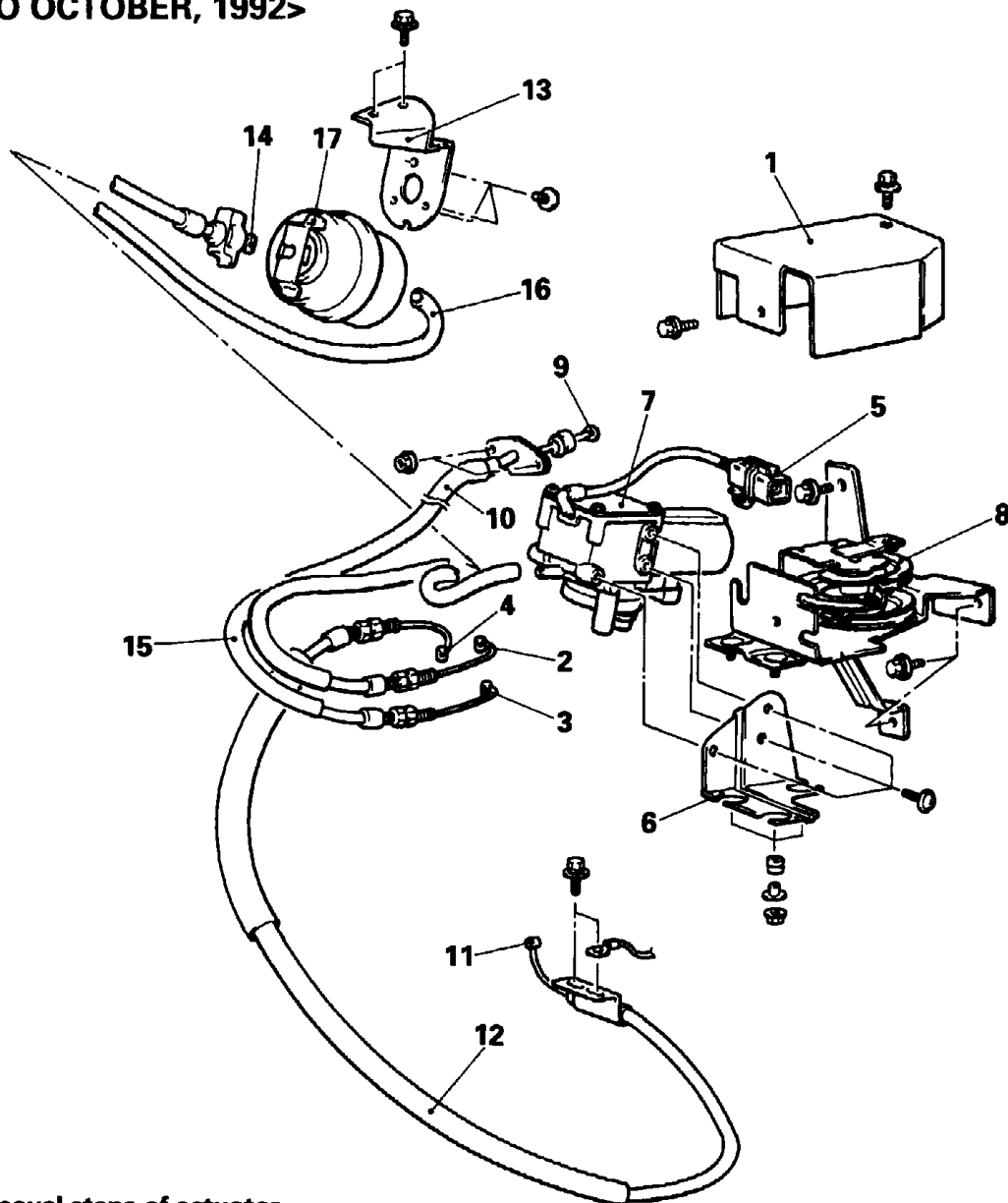
Apply drying sealant to the bolt mounting hole, and then tighten the accelerator arm bracket.

AUTO-CRUISE CONTROL

E13SA-

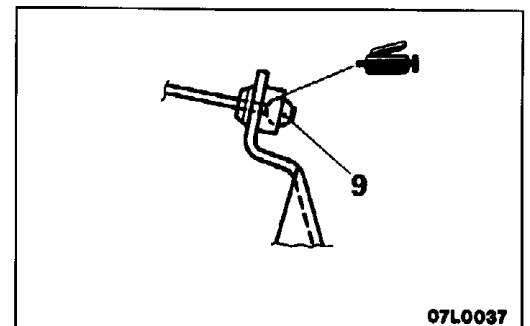
REMOVAL AND INSTALLATION

<L.H. DRIVE VEHICLES BUILT UP TO APRIL, 1994, R.H. DRIVE VEHICLES BUILT UP TO OCTOBER, 1992>

**Removal steps of actuator**

07N0029

1. Link protector
2. Accelerator cable and link assembly connection
3. Auto-cruise control cable and link assembly connection
4. Throttle cable and link assembly connection
5. Auto-cruise vacuum pump connector
6. Pump bracket
7. Auto-cruise vacuum pump assembly
8. Link assembly
9. Accelerator cable and pedal connection
- ◆◆ 10. Accelerator cable
- ◆◆ 11. Throttle cable and throttle body connection
- ◆◆ 12. Throttle cable
13. Actuator bracket
14. Auto-cruise control cable and actuator connection
- ◆◆ 15. Auto-cruise control cable
16. Vacuum hose
17. Actuator



07L0037

Removal steps of main switch

- 18. Instrument panel side switch
- 19. Main switch

Removal steps of control switch**<Vehicles without SRS>**

- 20. Horn pad
- 21. Control switch

Removal steps of control switch**<Vehicles with SRS>****CAUTION: SRS**

Before removal of air bag module, refer to GROUP 52B – SRS Service Precautions and Air Bag Module and Clock Spring.

- 22. Air bag module (Refer to GROUP 52B – Air Bag Module and Clock Spring)
- 23. Air bag module bracket
- 24. Control switch

Pre-removal and post-installation operation (Control unit)

- Removal and installation of the floor console box (Refer to GROUP 52 – Floor Console.)

CAUTION: SRS**<L.H. drive vehicles>**

When removing and installing the floor console in vehicles equipped with SRS, do not let it bump against the SRS diagnostic unit or other components.

- Removal and installation of radio and tape player (Refer to GROUP 54 – Audio System.)

Removal of control unit

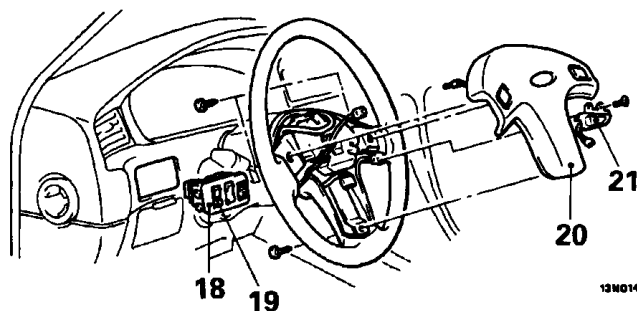
- 25. Control unit

Removal of sensors and switches

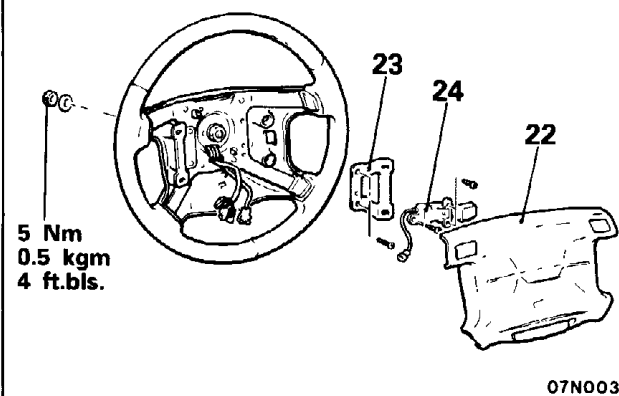
- 26. Throttle position sensor (built-in idle switch)
- 27. Vehicle speed sensor
- 28. Inhibitor switch <A/T>
- 29. Accelerator pedal switch* <A/T>
- 30. Stop lamp switch
- 31. Clutch switch <M/T>

NOTE

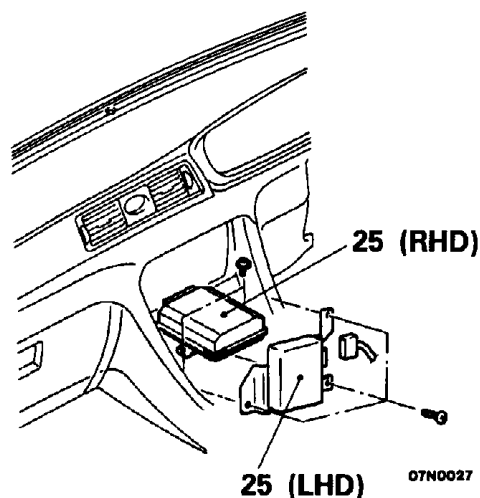
*: Vehicles built up to October, 1991



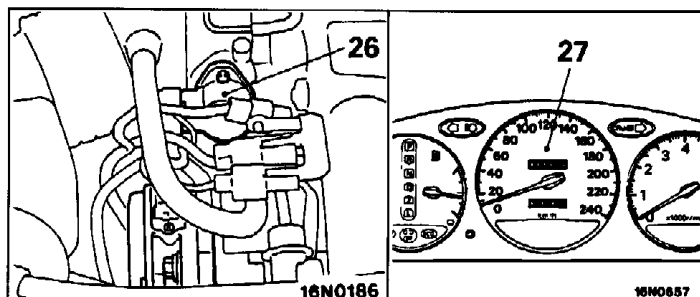
13N0148

<Vehicles with SRS>

07N0033

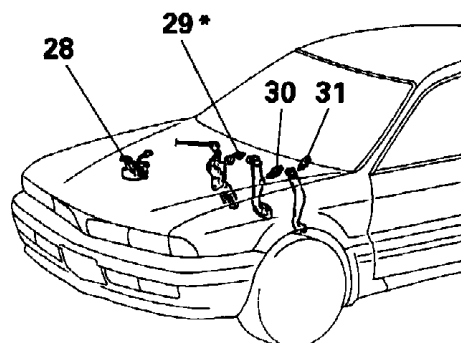


07N0027

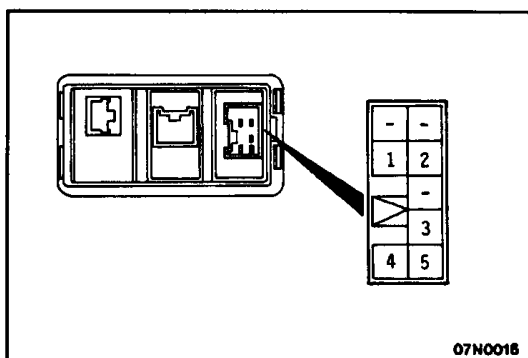


16N0186

16N0657



07N0028



INSPECTION

INDIVIDUAL PARTS INSPECTION

AUTO-CRUISE CONTROL MAIN SWITCH

- (1) Operate the switch and check for continuity between the terminals

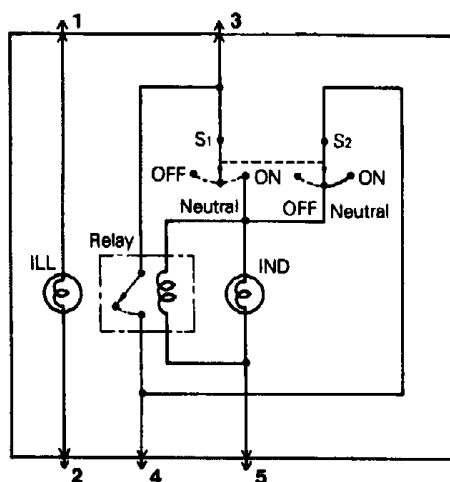
Terminal Switch position	1	ILL	2	3	4	5
OFF	○	○	○			
Neutral	○	○	○		○	○
ON	○	○	○	○	○	○

NOTE

○—○ indicates that there is continuity between the terminals.

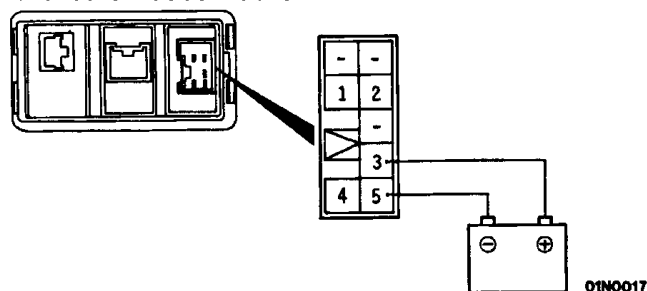
- (2) When the battery ⊕ side is connected to terminal ③ and the ⊖ side is connected to terminal ⑤, and the main switch is turned to ON, check if battery voltage is output between terminal ④ and the earth until the main switch is turned to OFF.

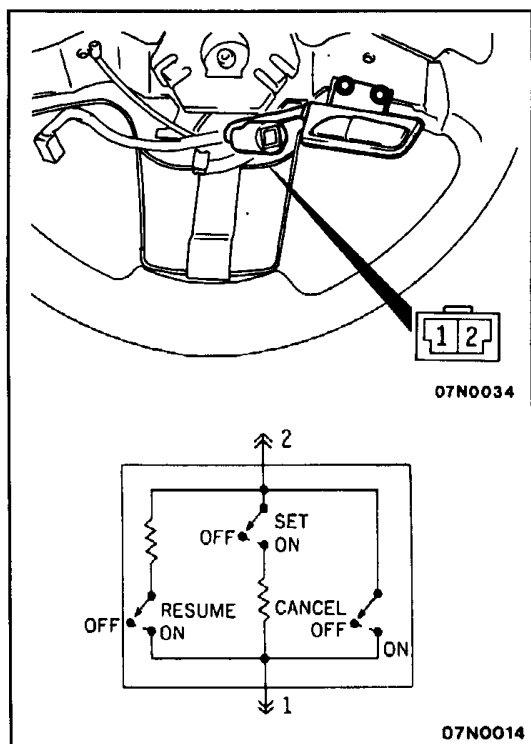
Next, when the main switch is turned to OFF, check if the battery voltage that was output between terminal ④ and the earth becomes 0V.



07N0013

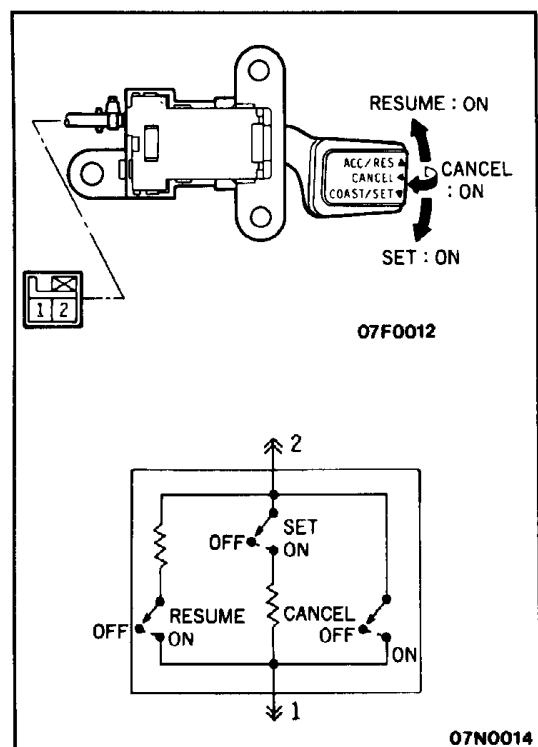
ILL: Illumination lamp
IND: Indicator lamp



**AUTO-CRUISE CONTROL SWITCH****<Vehicles without SRS>**

- (1) Remove the horn pad.
- (2) Measure the resistance between the terminals when each of the SET, RESUME and CANCEL switches is pressed. If the values measured at this time correspond to those in the table below, then there is no problem.

Switch position	Resistance between terminals
Switch OFF	No continuity
CANCEL switch ON	Approx. 0 Ω
RESUME switch ON	Approx. 820 Ω
SET switch ON	Approx. 2700 Ω

**<Vehicle with SRS>**

- (1) Remove the air bag module.

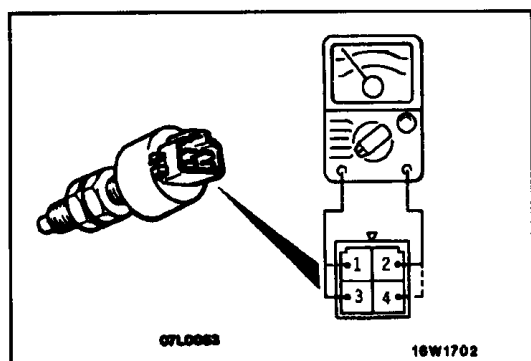
Caution

Before removal of air bag module, refer to GROUP 52B – SRS Service Precautions and Air Bag Module and Clock Spring.

- (2) Measure the resistance between the terminals when each of the SET, RESUME and CANCEL switches is turned to ON.

If the values measured at this time correspond to those in the table below, then there is no problem.

Switch position	Resistance between terminals
When switch is not operated	No continuity
When switch is operated toward (CANCEL switch ON)	Approx. 0 Ω
When switch is operated upward (RESUME switch ON)	Approx. 820 Ω
When switch is operated downward (SET switch ON)	Approx. 2700 Ω

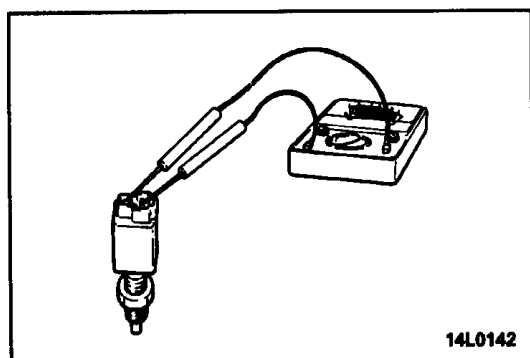
**STOP LAMP SWITCH**

- (1) Disconnect the connector.
- (2) Check for continuity between the terminals of the switch.

Measurement conditions	Switch		For stop lamp circuit		For auto-cruise control circuit	
	Terminal		2	3	1	4
When brake pedal depressed.			○	○		
When brake pedal not depressed.					○	○

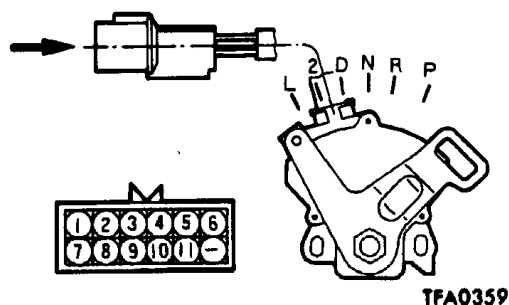
NOTE

○—○ indicates that there is continuity between the terminals.

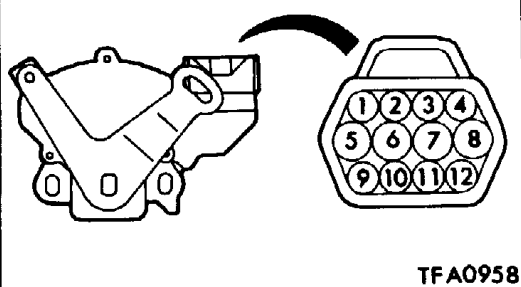
**CLUTCH SWITCH CHECK <M/T>**

- (1) Remove the clutch switch connector.
- (2) Check if there is continuity between the clutch switch terminals while the clutch pedal is depressed, and if there is no continuity when the clutch pedal is released.

<Vehicles built up to October, 1992>



<Vehicles built from November, 1992>

**INHIBITOR SWITCH ("N" POSITION)**

<Vehicles built up to October, 1992>

- (1) Disconnect the connector.
- (2) Check to be sure that there is continuity between connector terminals 8 and 9 when the selector lever is moved to the "N" range.

<Vehicles built from November, 1992>

- (1) Disconnect the connector.
- (2) Check to be sure that there is continuity between connector terminals 7 and 8 when the selector lever is moved to the "N" range.

THROTTLE POSITION SENSOR

Refer to P.13-43, 45.

IDLE SWITCH

Refer to P.13-43, 45.

VEHICLE SPEED SENSOR

- (1) Remove the combination meter.
- (2) When using a (⊖) driver [width 2.9 mm (0.11 in.)] to turn the speed meter shaft, check if there is alternately continuity and then no continuity between terminals ① and ②.

AUTO-CRUISE VACUUM PUMP

INSPECTION OF SOLENOID VALVE (CONTROL VALVE, RELEASE VALVE)

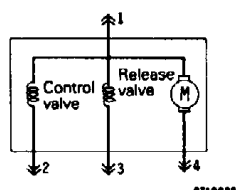
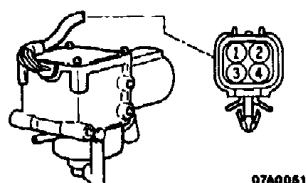
- (1) Remove the auto-cruise vacuum pump connector.
- (2) Measure the resistance value between terminals ① – ② and between ① – ③.

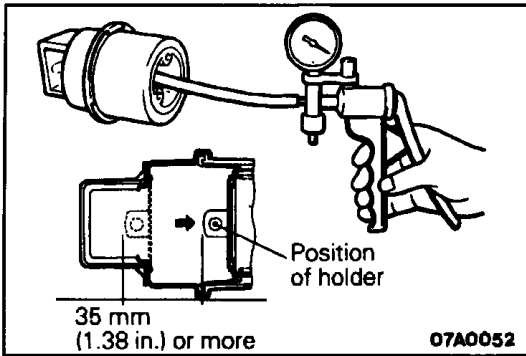
Standard value: 50–60Ω

- (3) Check that the solenoid valve makes an operating noise when battery voltage is impressed between terminals ① – ② and between ① – ③.
- (4) If there is a malfunction of the solenoid valve, replace the auto-cruise vacuum pump assembly.

MOTOR INSPECTION

- (1) Remove the auto-cruise vacuum pump connector.
- (2) Check that the motor revolves when battery voltage is impressed between terminals ① – ④.

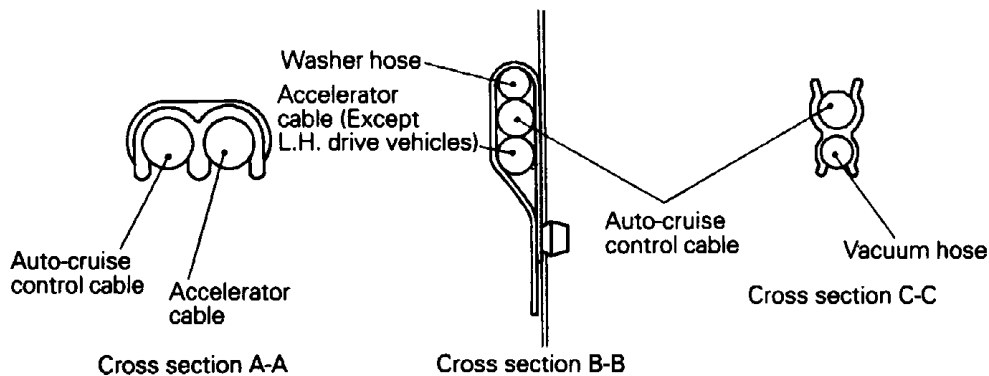


**ACTUATOR INSPECTION**

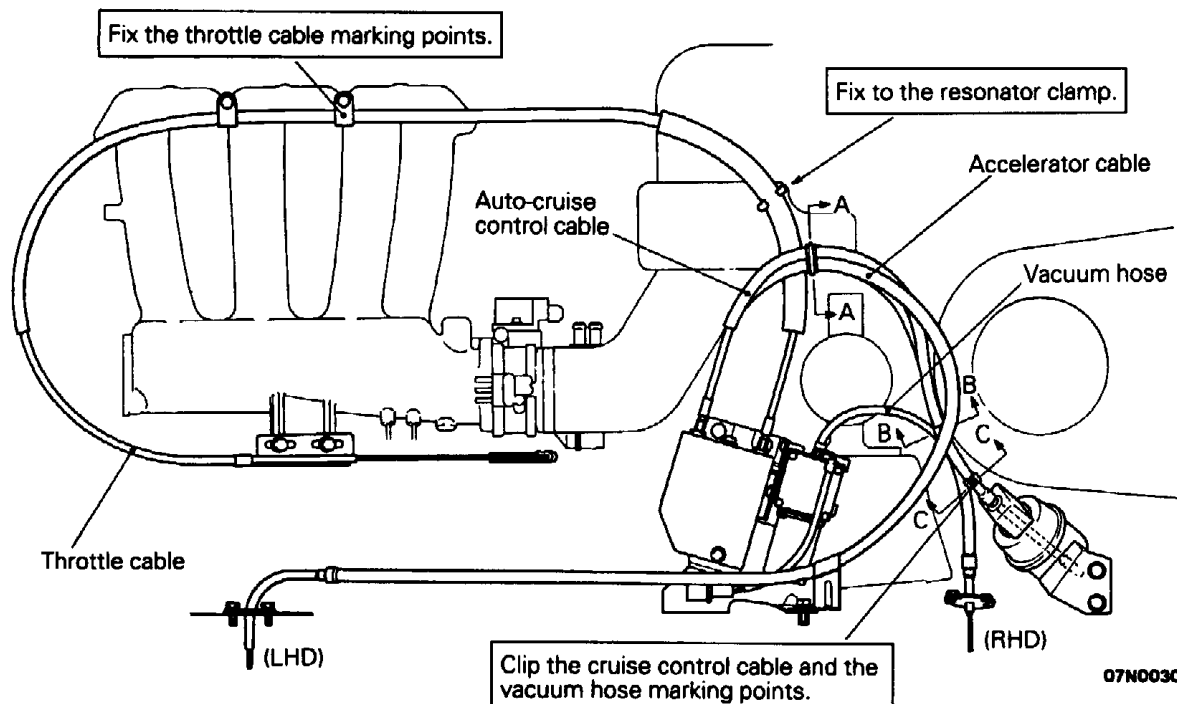
- (1) Remove the actuator.
- (2) Apply negative pressure to the actuator with the vacuum pump and check that the holder moves more than 35 mm (1.38 in.). In addition, check that there is no change in the position of the holder when negative pressure is maintained in that condition.
- (3) First install the actuator and then inspect and adjust the auto-cruise control cable (Refer to P.13-49.)

SERVICE POINTS OF INSTALLATION**15. INSTALLATION OF AUTO-CRUISE CONTROL CABLE/12. THROTTLE CABLE/10. ACCELERATOR CABLE**

Connect each cable as shown in the diagram.



07N0007

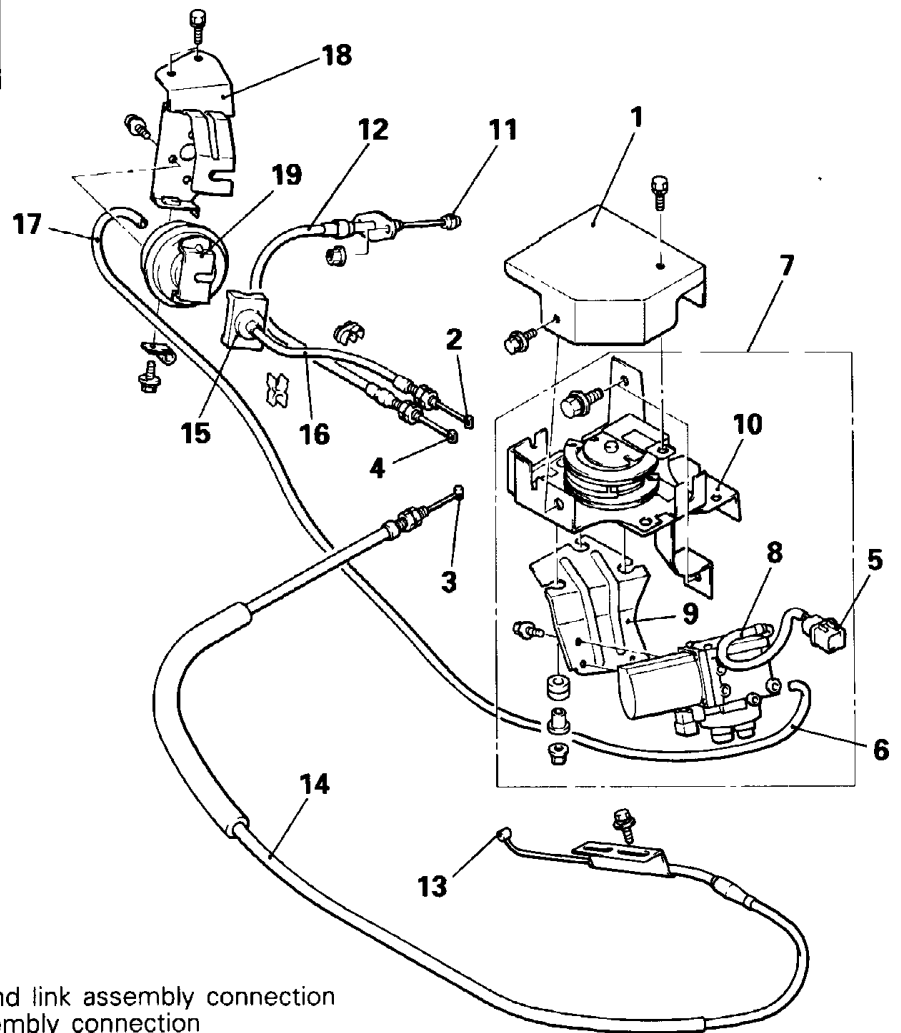
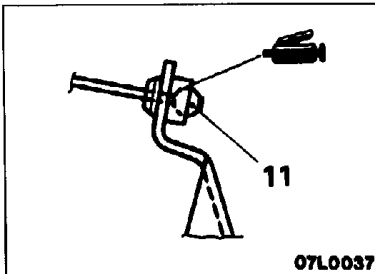


REMOVAL AND INSTALLATION

<R.H. DRIVE VEHICLES BUILT FROM NOVEMBER, 1992>

Pre-removal Operation

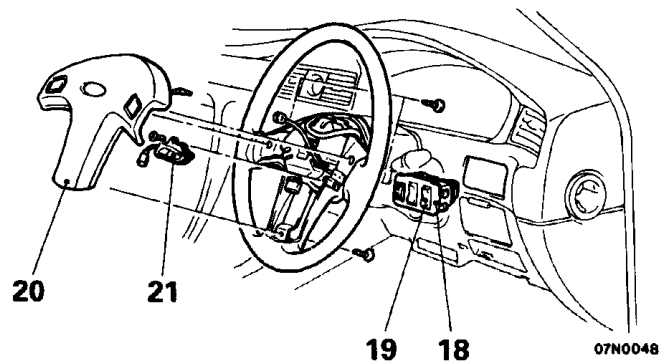
- Adjustment of Auto-cruise Control Cables (Refer to P. 13-52)

**Removal steps of actuator**

1. Link protector
2. Auto-cruise control cable and link assembly connection
3. Throttle cable and link assembly connection
4. Accelerator cable and link assembly connection
5. Auto-cruise vacuum pump connector
6. Vacuum hose and vacuum pump connection
7. Link and vacuum pump assembly
8. Auto-cruise vacuum pump assembly
9. Pump bracket
10. Link assembly
11. Accelerator cable and pedal connection
12. Accelerator cable
13. Throttle cable and throttle body connection
14. Throttle cable
15. Auto-cruise control cable and actuator connection
16. Auto-cruise control cable
17. Vacuum hose
18. Actuator bracket
19. Actuator

03L0173

<Vehicles without SRS>



<Vehicles with SRS built up to April, 1994>

Removal steps of main switch

- 18. Instrument panel side switch
- 19. Main switch

Removal steps of control switch

<Vehicles without SRS>

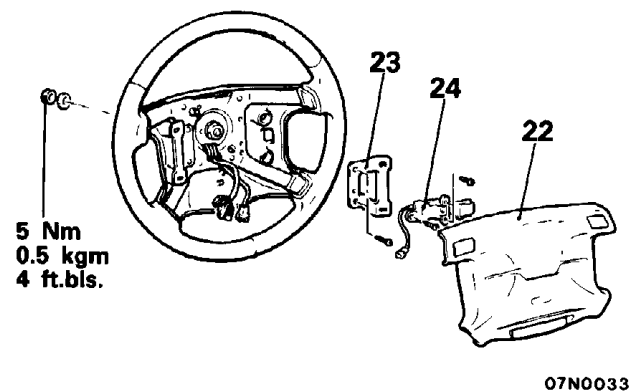
- 20. Horn pad
- 21. Control switch

Removal steps of control switch

<Vehicles with SRS>

CAUTION: SRS

Before removal of air bag module, refer to GROUP 52B – SRS Service Precautions and Air Bag Module and Clock Spring.

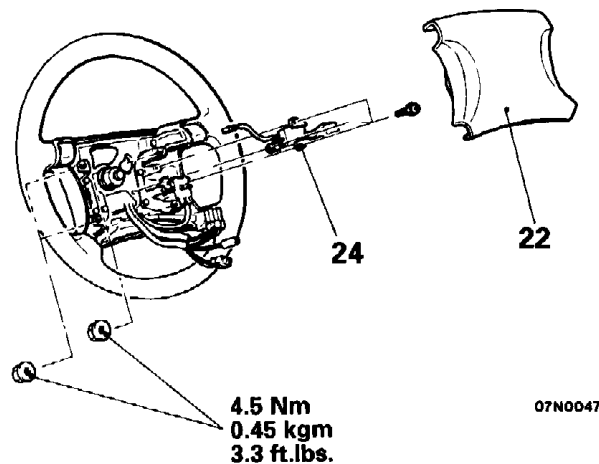


<Vehicles with SRS built from May, 1994>

- 22. Air bag module (Refer to GROUP 52B – Air Bag Module and Clock Spring)
- 23. Air bag module bracket
- 24. Control switch

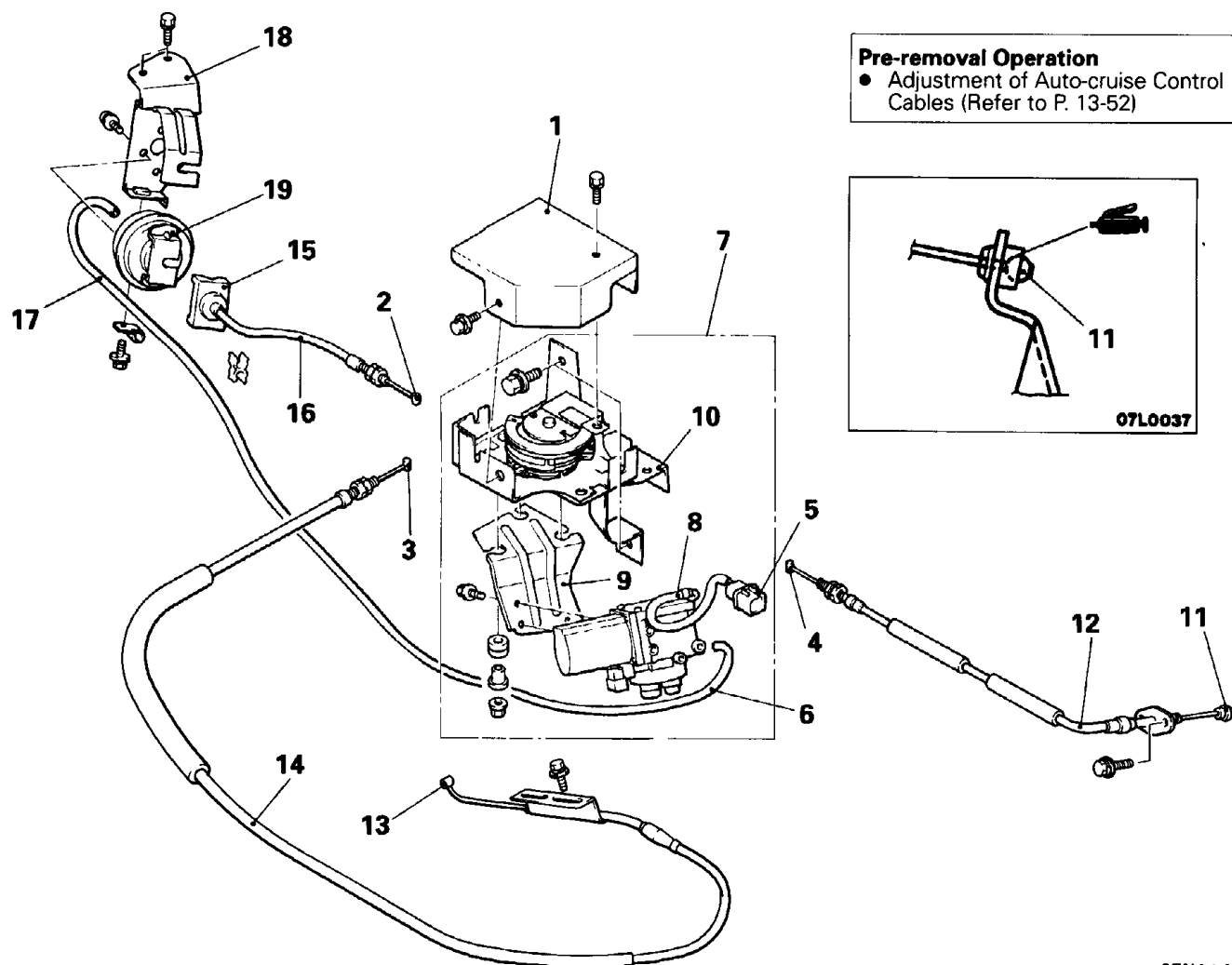
NOTE

For information concerning control unit, sensors and switches, refer to P.13-152.

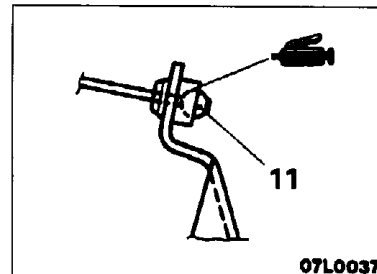
**INSPECTION**

Refer to P.13-153.

REMOVAL AND INSTALLATION <L.H. DRIVE VEHICLES BUILT FROM MAY, 1994>

**Pre-removal Operation**

- Adjustment of Auto-cruise Control Cables (Refer to P. 13-52)

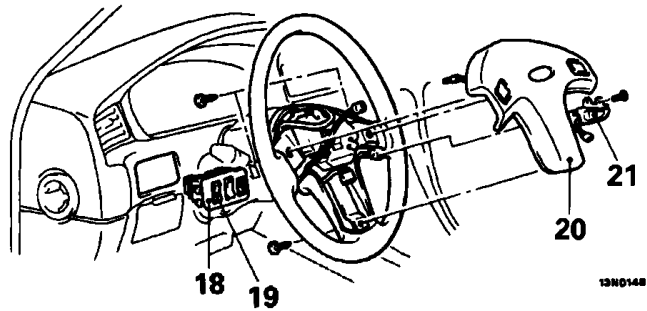


07L0037

07N0042

Removal steps of actuator

1. Link protector
2. Auto-cruise control cable and link assembly connection
3. Throttle cable and link assembly connection
4. Accelerator cable and link assembly connection
5. Auto-cruise vacuum pump connector
6. Vacuum hose and vacuum pump connection
7. Link and vacuum pump assembly
8. Auto-cruise vacuum pump assembly
9. Pump bracket
10. Link assembly
11. Accelerator cable and pedal connection
12. Accelerator cable
13. Throttle cable and throttle body connection
14. Throttle cable
15. Auto-cruise control cable and actuator connection
16. Auto-cruise control cable
17. Vacuum hose
18. Actuator bracket
19. Actuator

**Removal steps of main switch**

- 18. Instrument panel side switch
- 19. Main switch

Removal steps of control switch**<Vehicles without SRS>**

- 20. Horn pad
- 21. Control switch

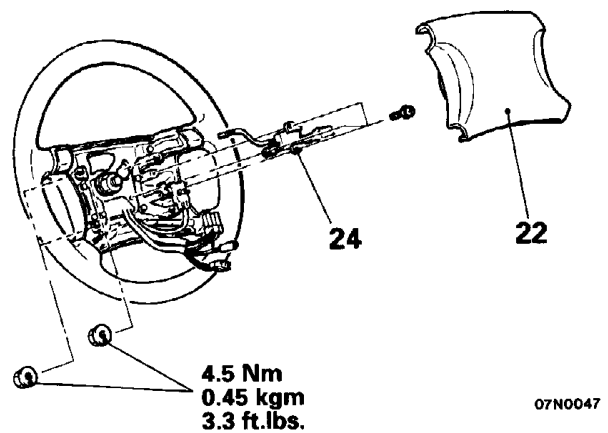
Removal steps of control switch**<Vehicles with SRS>**

CAUTION: SRS
Before removal of air bag module, refer to GROUP 52B – SRS Service Precautions and Air Bag Module and Clock Spring.

- 22. Air bag module (Refer to GROUP 52B – Air Bag Module and Clock Spring)
- 24. Control switch

NOTE

For information concerning control unit, sensors and switches, refer to P.13-152.

<Vehicles with SRS>**INSPECTION**

Refer to P.13-153.

COOLING

CONTENTS

E14AA--

SPECIFICATIONS	2	WATER PUMP	7
General Specifications	2	RADIATOR	8
Service Specifications	2		
Lubricants	3		
Sealant	3		
SERVICE ADJUSTMENT PROCEDURES	3		
Coolant Leak Checking	3		
Radiator Cap Valve Opening Pressure Checking	4		
Coolant Replacement	4		
Concentration Measurement	5		
Coolant Inspection	6		
Thermostat Checking	6		

SPECIFICATIONS

GENERAL SPECIFICATIONS

E14CA-

Items	Specifications
Cooling method	Water-cooled pressurized, forced circulation with electrical fan
Radiator	
Type	Pressurized corrugated fin type
Performance J/h (kcal/h, BTU/h)	$211,814 \times 10^3$ (50,600, 200,793)
Radiator cap	
High pressure valve opening pressure kPa (kg/cm ² , psi)	75–105 (0.75–1.05, 11–15)
Vacuum valve opening pressure kPa (kg/cm ² , psi)	–5 (–0.05, –0.7) or less
Automatic transmission oil cooler <Vehicles with A/T>	
Performance J/h (kcal/h, BTU/h)	$7,116 \times 10^3$ (1,700, 6,746)
Thermostat	
Type	Wax pellet type with jiggle valve
Water pump	
Type	Impeller of centrifugal type

SERVICE SPECIFICATIONS

E14CB-

Items	Specifications
Standard value	
Range of coolant antifreeze concentration %	30–60
Thermostat	
<DOHC>	
Valve opening temperature of thermostat °C (°F)	82 (180)
Full-opening temperature of thermostat °C (°F)	95 (203) or more
<SOHC>	
Valve opening temperature of thermostat °C (°F)	88 (190)
Full-opening temperature of thermostat °C (°F)	100 (212) or more
Engine coolant temperature switch (on radiator)	
<For low temperature>	
Opening temperature OFF→ON °C (°F)	82–88 (180–190)
ON→OFF °C (°F)	78 (172) or less
<For high temperature>	
Opening temperature OFF→ON °C (°F)	96–104 (205–219)
ON→OFF °C (°F)	92 (198) or less
Resistor	
Resistance Ω	0.26–0.32

LUBRICANTS

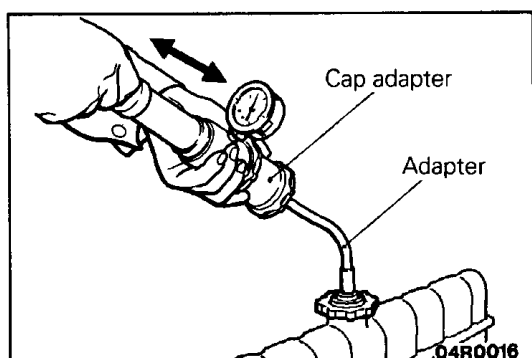
E14CD--

Items	Quantity		
	lit.	U.S.qts.	Imp.qts.
Engine coolant HIGH QUALITY ETHYLENE GLYCOL ANTIFREEZE COOLANT	8.0	8.5	7.0

SEALANT

E14CE--

Items	Specified sealant	Remarks
Cylinder block drain plug	3M Nut Locking Part No. 4171 or equivalent	Drying sealant



SERVICE ADJUSTMENT PROCEDURES

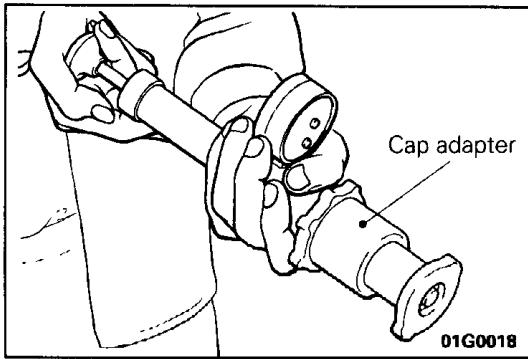
E14FAAAa

COOLANT LEAK CHECKING

1. Confirm that the engine coolant lever is up to the filler neck. Install an adapter and cap adapter to the water outlet fitting and apply 160 kPa (23 psi) pressure. Hold pressure for two minutes, while checking for leakage from the radiator, hose of connections.

Caution

1. **Be sure to completely clean away any moisture from the places checked.**
 2. **When the tester is taken out, be careful not to spill any coolant from it.**
 3. **Be careful, when installing and removing the tester and when testing, not to deform the filler neck of the radiator.**
2. If there is leakage, repair or replace the appropriate part.



RADIATOR CAP VALVE OPENING PRESSURE CHECKING

E14FBADa

1. Use a cap adapter to attach the cap to the tester.
2. Increase the pressure until the indicator of the gauge stops moving.

Limit: 65 kPa (0.65 kg/cm², 9.2 psi)

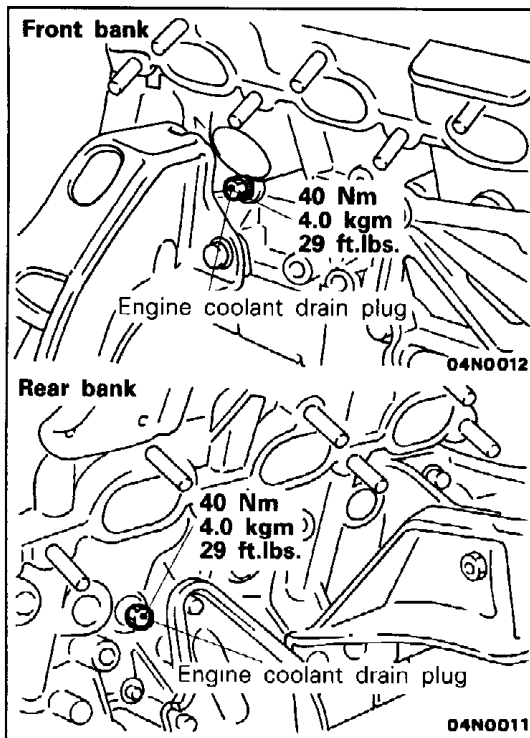
Standard value: 75–105 kPa

(0.75–1.05 kg/cm², 11–15 psi)

3. Replace the radiator cap if the reading does not remain at or above the limit.

NOTE

Be sure that the cap is clean before testing, since rust or other foreign material on the cap seal will cause an improper indication.



COOLANT REPLACEMENT

E14FCAR

1. Drain the engine coolant by removing the drain plug and then the radiator cap.
2. Pull out the exhaust manifold heat protectors from the front bank (DOHC only) and the rear bank.
3. Remove the drain plug from the front and rear bank sides of the cylinder block to drain the engine coolant.
4. Remove the reserve tank to drain the engine coolant.
5. When the engine coolant has drained, pour in water from the radiator cap to clean the engine coolant line.
6. Coat the thread of the cylinder block drain plug with the specified sealant and tighten to the specified torque.

Specified sealant: 3M Nut Locking Part No. 4171 or equivalent

7. Securely tighten the radiator drain plug.
8. Install the reserve tank.

9. Slowly pour the engine coolant into the mouth of the radiator until the radiator is full, and pour also into the reserve tank up to the FULL line.

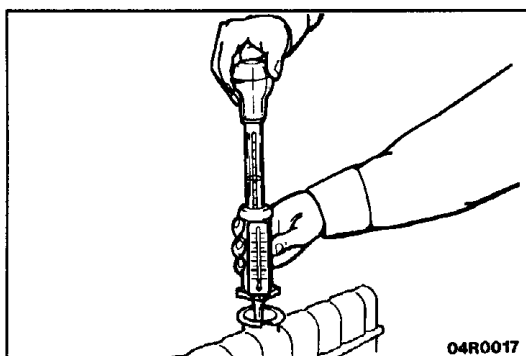
Recommended antifreeze:**HIGH QUALITY ETHYLENE GLYCOL ANTIFREEZE COOLANT**

Quantity	lit. (U.S.qts., Imp.qts.)
	8.0 (8.5, 7.0)

NOTE

For Norway, the non-amine type of antifreeze should be used.

10. Install the radiator cap securely.
11. Start the engine and warm the engine until the thermostat opens.
12. After racing the engine several times up to a limit of 3,000 r/min, stop the engine.
13. When engine is cold, remove the radiator cap and once again add engine coolant until the radiator is full, and also refill the reserve tank up to the FULL line.

**CONCENTRATION MEASUREMENT**

E14FDAB

Measure the temperature and specific gravity of the engine coolant to check the antifreeze concentration.

Standard value: 30–60 % (allowable concentration range)

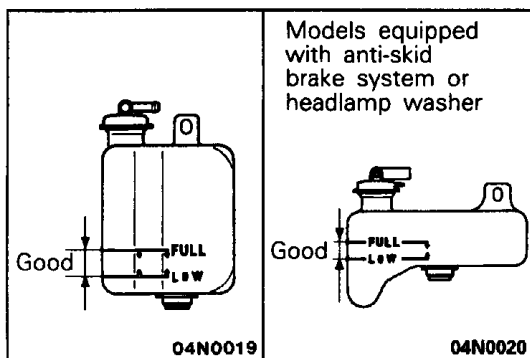
RECOMMENDED ANTIFREEZE

Antifreeze	Allowable concentration
HIGH QUALITY ETHYLENE GLYCOL ANTIFREEZE COOLANT	30–60 %

Caution

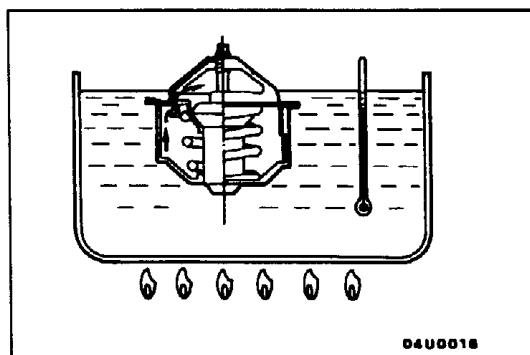
If the concentration of the antifreeze is below 30%, the anti-corrosion property will be adversely affected.

In addition, if the concentration is above 60%, both the anti-freezeing and engine cooling properties will decrease, affecting the engine adversely. For these reasons, be sure to maintain the concentration level within the specified range.

**COOLANT INSPECTION**

E14FHAA

1. Check that the coolant level in the reserve tank is within FULL and LOW limits.
2. Check for presence of oil in the coolant.

**THERMOSTAT CHECKING**

E14FIAB

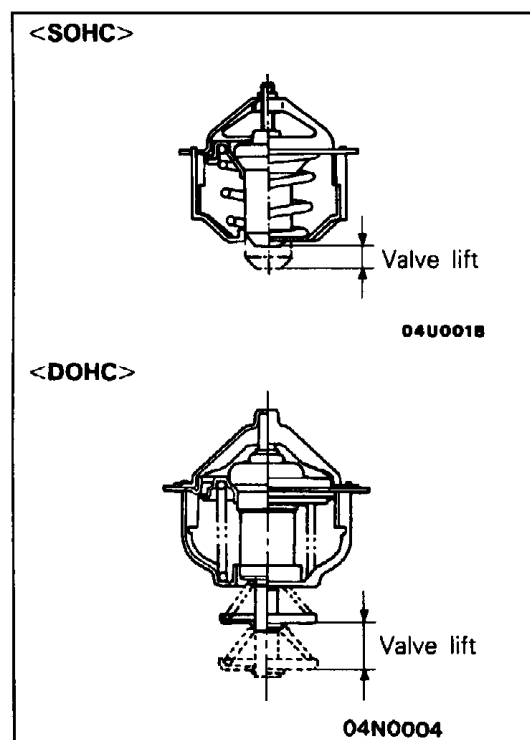
Immerse the thermostat in water, and heat the water while stirring. Check that the thermostat valve opening and fully open temperatures (valve lift when fully open is 8 mm [0.31 in.] or more <SOHC> or 10 mm [0.39 in.] or more <DOHC>) are at standard temperatures.

Standard value

Item	Valve opening temperature °C (°F)	Fully open temperature °C (°F)
<SOHC>	88 (190)	100 (212)
<DOHC>	82 (180)	95 (203)

NOTE

1. Measure valve height when fully closed. Calculate lift by measuring the height when fully open.
2. If valve opens even a little at normal temperature, the thermostat should be replaced.
3. If there is any serious warping, visible damage or breakage, the thermostat should be replaced.
4. Remove any rust or deposits if present.



WATER PUMP

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation

- Draining and Adding of Engine Coolant
- Removal and Installation of Timing Belt (Refer to GROUP 11 – Timing Belt)

24 Nm
2.4 kgm
17 ft.lbs.

N 3

24 Nm
2.4 kgm
17 ft.lbs.

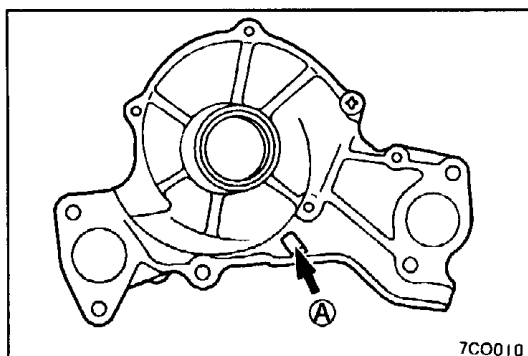
1

N 2

Removal steps

1. Water pump
2. Gasket
3. O-ring

01N0003



7C0010

INSPECTION

E14MCA0

WATER PUMP

If any of the following irregularities are observed, replace the water pump as an assembly.

- (1) Damage or crack on the water pump body.
- (2) Water leakage. With improper sealing, a water leakage mark may be observed around hole (A).

SERVICE POINTS OF INSTALLATION

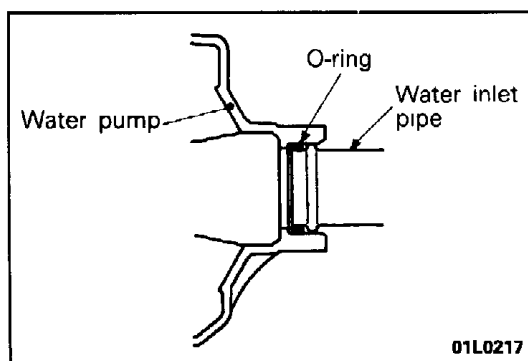
E14MDBB

3. INSTALLATION OF O-RING

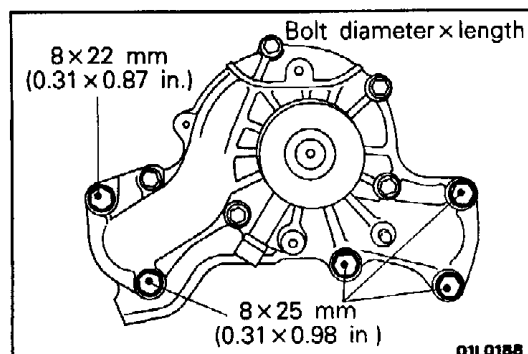
Insert the O-ring to the water inlet pipe, and coat the outer circumference of the O-ring with water.

Caution

Care must be taken not to permit engine oil or other greases to adhere to the O-ring.



01L0217



01L0188

1. INSTALLATION OF WATER PUMP <DOHC>

Water pump installation bolt size are different and caution must be paid to ensure that they are properly installed.

RADIATOR

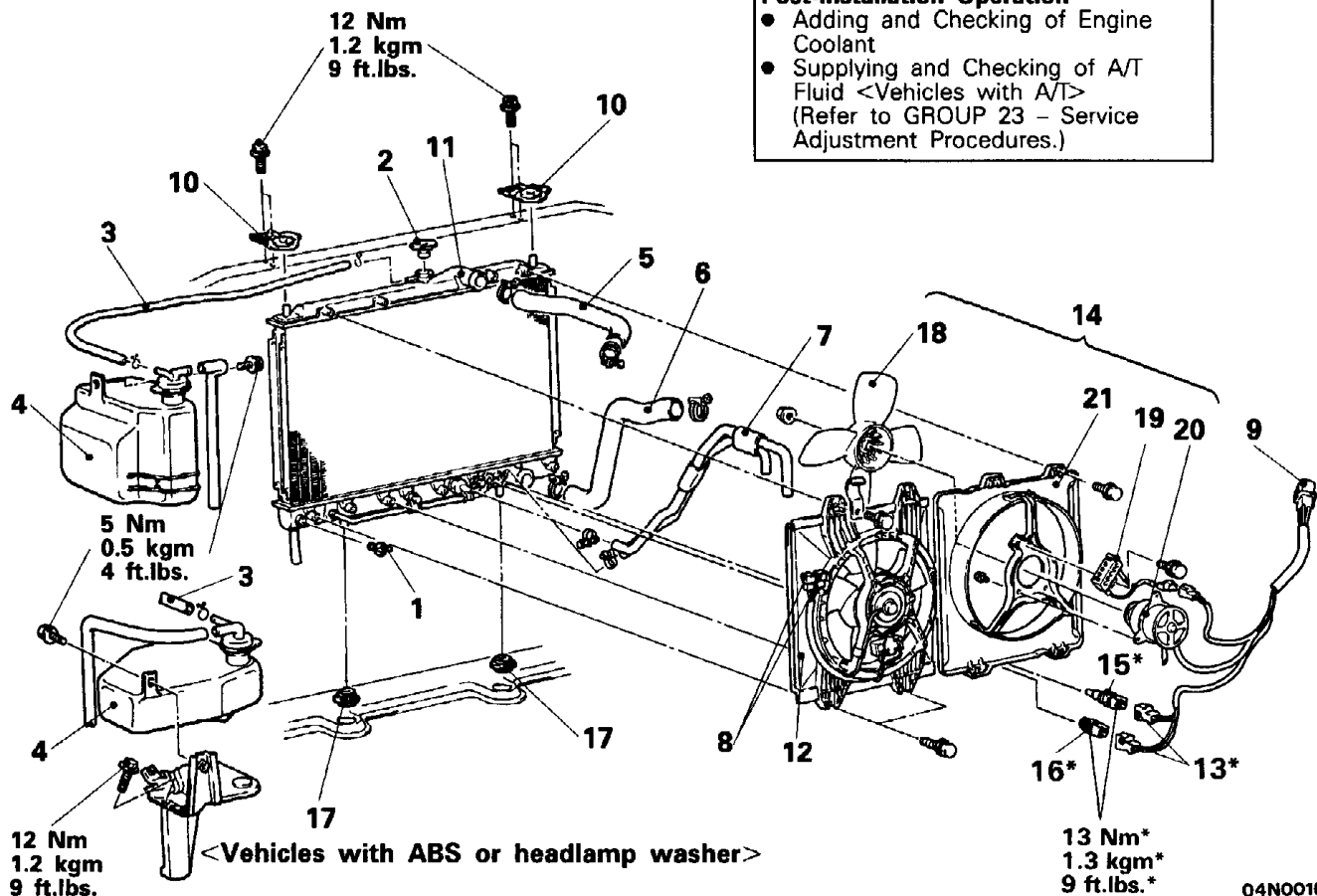
REMOVAL AND INSTALLATION

Pre-removal Operation

- Draining of Engine Coolant

Post-installation Operation

- Adding and Checking of Engine Coolant
- Supplying and Checking of A/T Fluid <Vehicles with A/T> (Refer to GROUP 23 – Service Adjustment Procedures.)

**Radiator removal steps**

1. Drain plug
2. Radiator cap
3. Overflow tube
4. Reserve tank
5. Radiator upper hose
6. Radiator lower hose
7. Transmission fluid cooler hose (radiator side) <Vehicles with A/T>
8. Condenser fan connector <Vehicles with air conditioner>
9. Radiator fan connector
10. Upper insulator
11. Radiator assembly
12. Condenser fan motor assembly <Vehicles with air conditioner>
13. Engine coolant temperature switch connector*
14. Radiator fan motor assembly
15. Engine coolant temperature switch (LO)*
16. Engine coolant temperature switch (HI)*
17. Lower insulator
18. Fan
19. Resistor
20. Radiator fan motor
21. Shroud

Radiator fan motor removal steps

1. Drain plug
2. Radiator cap
5. Radiator upper hose
8. Condenser fan connector <Vehicles with air conditioner>
9. Radiator fan connector
12. Condenser fan motor assembly <Vehicles with air conditioner>
13. Engine coolant temperature switch connector*
14. Radiator fan motor assembly
18. Fan
19. Resistor
20. Radiator fan motor
21. Shroud

NOTE

* Vehicles built up to October, 1992

SERVICE POINTS OF REMOVAL

E14Q8AK

7. DISCONNECTION OF AUTOMATIC TRANSMISSION OIL COOLER HOSES

Use a plug or otherwise cover the hose and nipple part of the radiator so that dust, dirt, foreign materials, etc. do not enter after the hose has been disconnected from the radiator.

INSPECTION

E14QCA6

- Check for foreign material between radiator fins.
- Check the radiator fins for bent, or damage.
- Check the radiator for corrosion, damage, rust or scale.
- Check the radiator hoses for cracks, damage or deterioration.
- Check the reserve tank for damage.
- Check the automatic transmission oil cooler hoses for cracking, damage or deterioration.

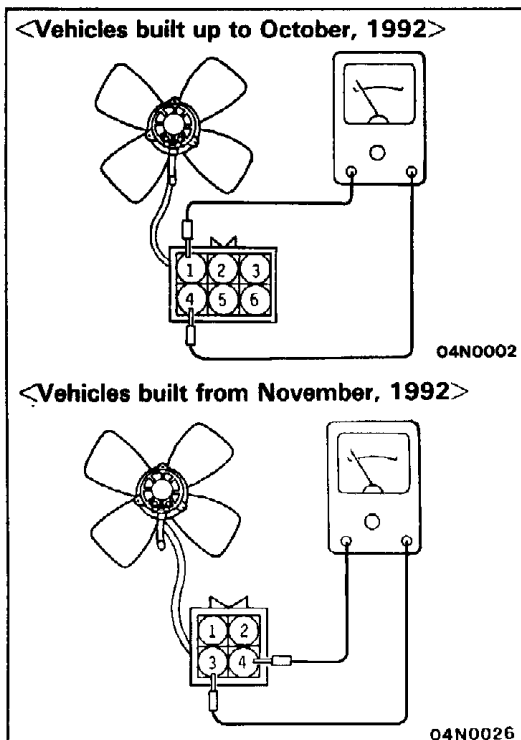
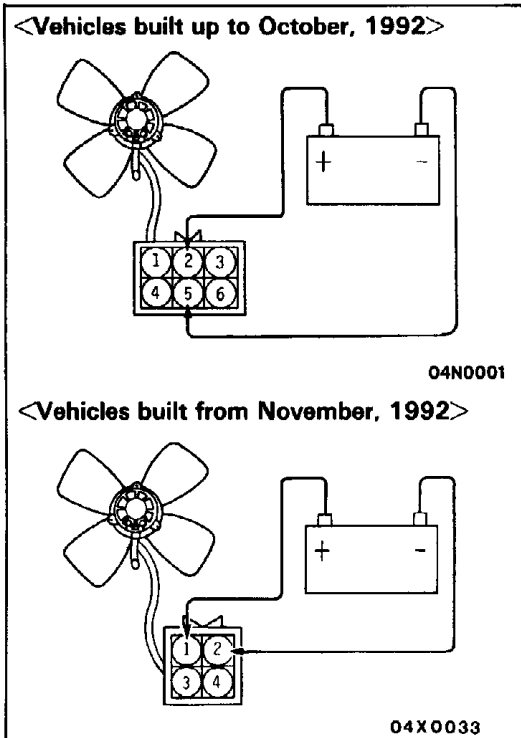
RADIATOR FAN MOTOR INSPECTION

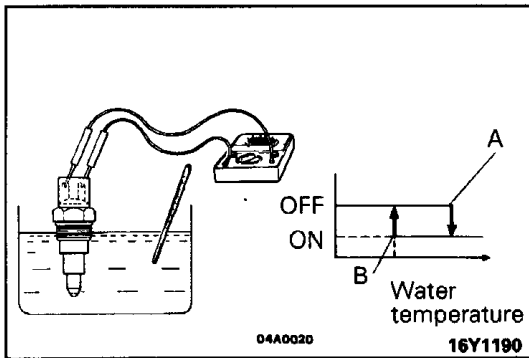
- (1) Check to be sure that the radiator fan rotates when battery voltage is applied between terminals (as shown in the figure).
- (2) Check to see that abnormal noises are not produced, while motor is turning.

RESISTOR INSPECTION

- (1) Remove the radiator fan motor connector.
- (2) Measure the resistance between the terminals (as shown in the figure).
- (3) The condition can be considered to be satisfactory if the measured resistance value is within the following range.

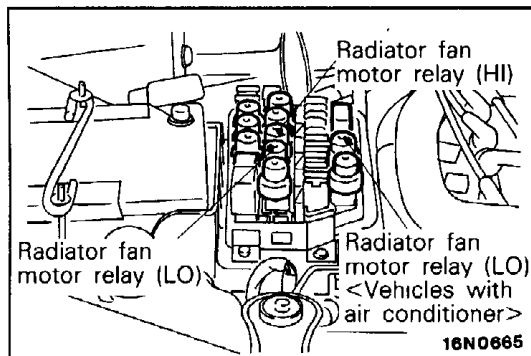
Resistance value: 0.26 – 0.32 Ω



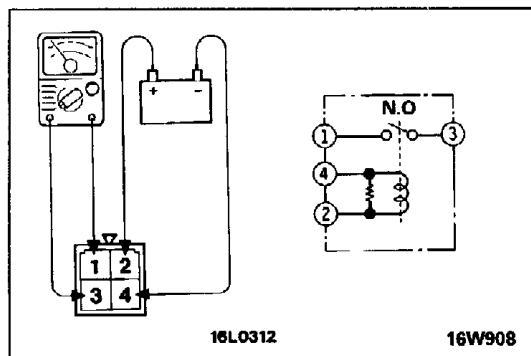
**ENGINE COOLANT TEMPERATURE SWITCH INSPECTION****<Vehicles built up to October, 1992>**

- (1) Dip the engine coolant temperature switch into the warm water or engine oil, as shown in the diagram.
- (2) Check the continuity at the specified temperature using a circuit tester, etc., and if it is within the following ranges, it can be considered satisfactory.

Item	Engine coolant temperature switch (HI)	Engine coolant temperature switch (LO)
Continuity (temperature at point A)	96–104°C or higher (205–219°F or higher)	82–88°C or higher (180–190°F or higher)
No continuity (temperature at point B)	92°C or lower (198°F or lower)	78°C or lower (172°F or lower)

**RADIATOR FAN MOTOR RELAY INSPECTION**

- (1) Remove the radiator fan motor relay HI and LO from the relay box inside the engine compartment.



- (2) Check that there is continuity between terminals when applying battery power to terminal ② and terminal ④ is earthed or when there is no current flowing.

Current	Between terminals 1 and 3	Continuity
No current	Between terminals 1 and 3	No continuity
	Between terminals 2 and 4	Continuity

INTAKE AND EXHAUST

CONTENTS

E15AA-

SPECIFICATIONS	2	INTAKE MANIFOLD	3-2
General Specifications	2	EXHAUST MANIFOLD	4
Service Specifications	2	EXHAUST PIPE AND MAIN MUFFLER	6
SERVICE ADJUSTMENT PROCEDURES	2		
Variable Induction Control System			
Inspection	2		
Intake Manifold Vacuum Inspection	3-1		

15-2 INTAKE AND EXHAUST – Specifications/Service Adjustment Procedures

SPECIFICATIONS

GENERAL SPECIFICATIONS

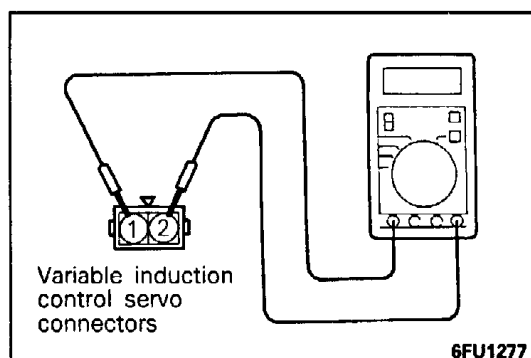
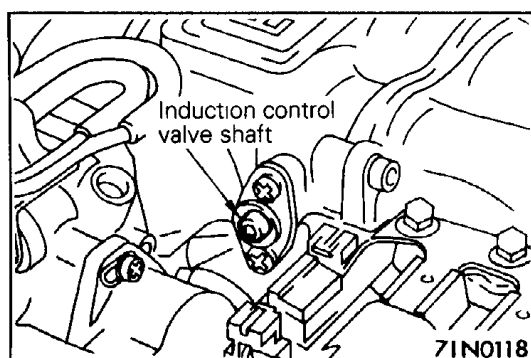
E15CA--

Items	Specifications
Air cleaner Element	Unwoven cloth type
Exhaust system Front exhaust pipe Muffler Coupling Suspension system	Dual type Expansion resonance type Flat coupling Rubber hangers

SERVICE SPECIFICATIONS

E15CB--

Items	Standard value	Limit
Intake manifold and air intake plenum Distortion of the installation surface mm (in.)	0.15 (0.006) or less	0.2 (0.008)



SERVICE ADJUSTMENT PROCEDURES

E15FGAAa

VARIABLE INDUCTION CONTROL SYSTEM INSPECTION <Vehicles built up to November, 1991> SYSTEM INSPECTION

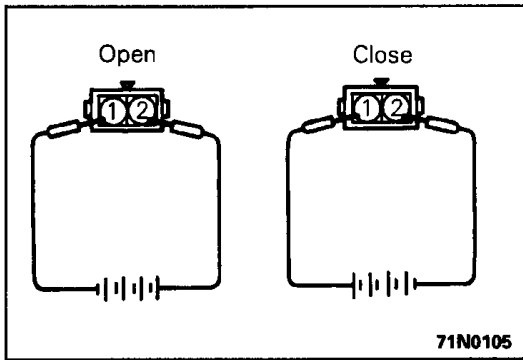
- (1) Warm up the engine.
- (2) Connect the tachometer. (Refer to GROUP 11 - Service Adjustment Procedures.)
- (3) Make sure that when the engine speed is increased from the idle speed to 5,000 r/min., the induction control valve shaft turns.

VARIABLE INDUCTION CONTROL SERVO INSPECTION

- (1) Disconnect the variable induction control servo connectors.
- (2) Check the variable induction control servo coil for continuity.

Standard value

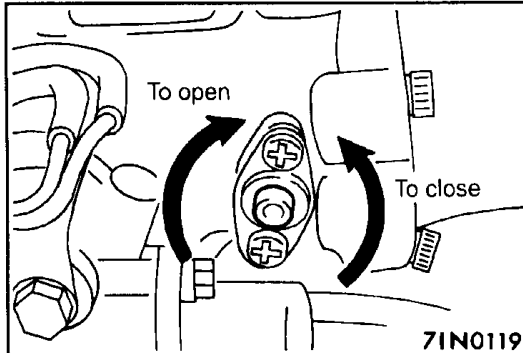
Measured terminal	Continuity
Between terminals ① and ②	Present [5 – 35 Ω: 20°C (68°F)]



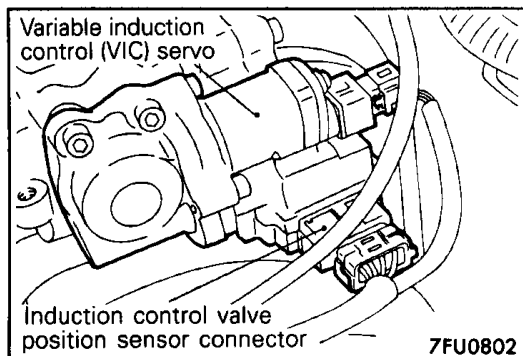
- (3) Make sure that when DC 6V is applied to terminals ① and ② of the variable induction control servo connector, the induction control valve shaft turns smoothly.

Caution

Be sure to apply a voltage of not higher than DC 6V to the variable induction control servo connector terminals since application of high voltage may lock the servo gears.



- (4) If deviation from the standard value occurs or the variable induction control valve shaft does not turn smoothly replace the air intake plenum assembly.

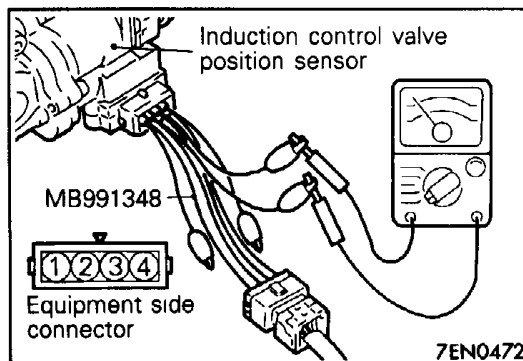


**<Vehicles built from December, 1991>
SYSTEM INSPECTION**

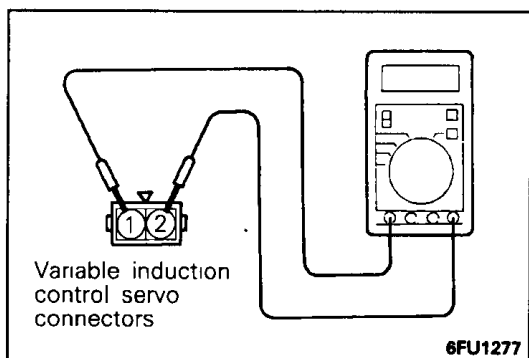
- (1) Disconnect the induction control valve position sensor connector.
- (2) Connect the special tool (test harness set) between the disconnected connectors. (All terminals should be connected.)
- (3) Connect a circuit tester between terminal ② and terminal ③ of the induction control valve position sensor and measure the voltage. In addition, measure the voltage between terminal ③ and terminal ④ in the same way.

Standard value

Engine condition	Voltage [V]
Idle	0-1 or 4.5-5.5
Engine speed gradually increases to 5,000 r/min.,	1.5-4.0 (momentarily)
5,000 r/min.	0-1 or 4.5-5.5



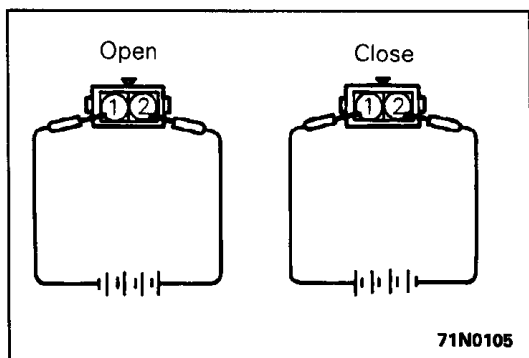
- (4) If the voltages are outside the standard values, inspect the induction control valve position sensor, variable induction control (VIC) servo and the related harnesses.

**VARIABLE INDUCTION CONTROL SERVO INSPECTION**

- (1) Disconnect the variable induction control servo connectors.
- (2) Disconnect the air intake hose from the throttle body.
- (3) Check the variable induction control servo coil for continuity.

Standard value

Measured terminal	Continuity
Between terminals ① and ②	Present [5 – 35 Ω: 20°C (68°F)]

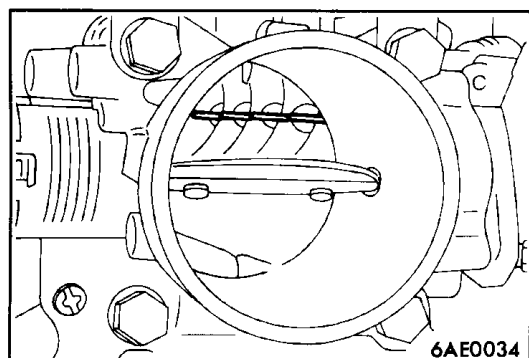


- (4) Make sure that when DC 6V is applied to terminals ① and ② of the variable induction control servo connector, the induction control valve opens and closes smoothly

Caution

Be sure to apply a voltage of not higher than DC 6V to the variable induction control servo connector terminals since application of high voltage may lock the servo gears.

- (5) If outside the standard value, or if the variable induction valve does not open and close smoothly, replace the air intake plenum assembly.

**INTAKE MANIFOLD VACUUM INSPECTION**

E15FBAB

Refer to GROUP 11- Service Adjustment Procedures.

INTAKE MANIFOLD

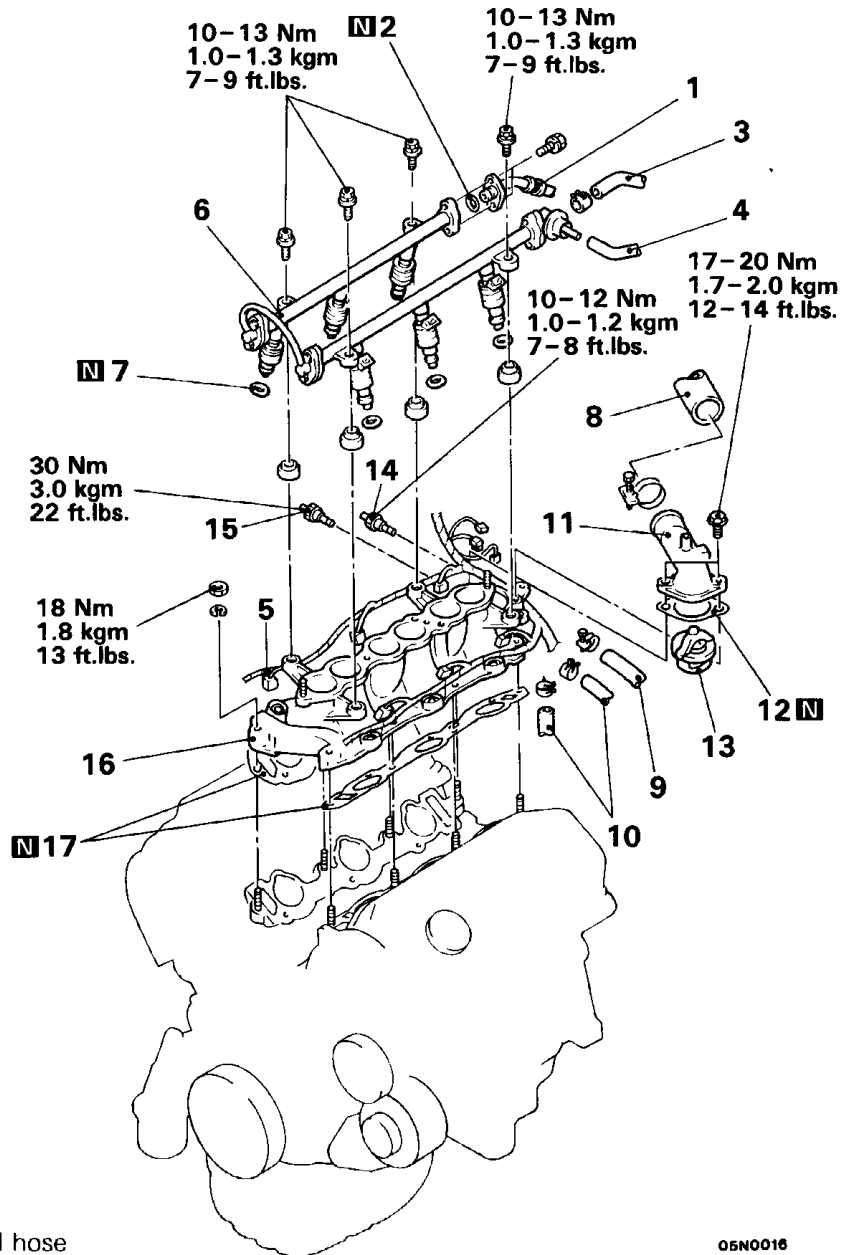
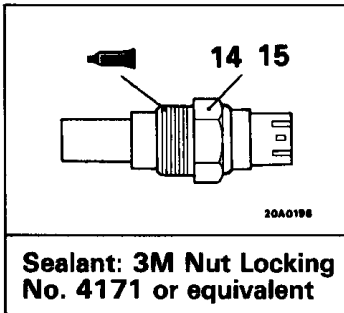
REMOVAL AND INSTALLATION <SOHC>

Pre-removal Operation

- Releasing of Residual Fuel Pressure (Refer to GROUP 13 – Service Adjustment Procedures.)
- Draining of Coolant (Refer to GROUP 14 – Service Adjustment Procedures.)
- Removal of Intake Manifold Plenum

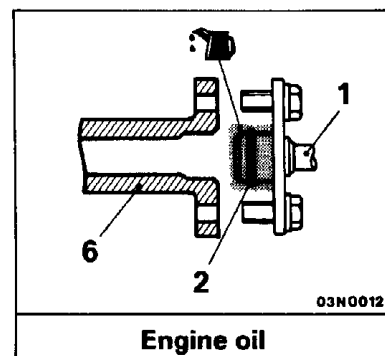
Post-installation Operation

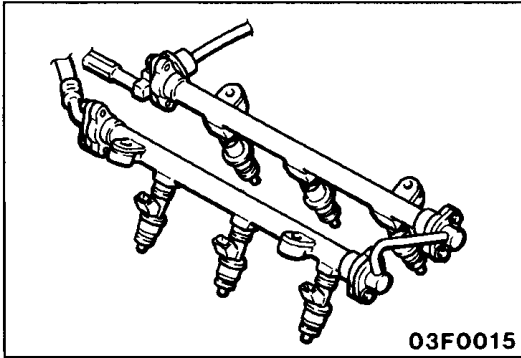
- Installation of Intake Manifold Plenum
- Supplying of Coolant (Refer to GROUP 14 – Service Adjustment Procedures.)
- Adjustment of Accelerator Cable (Refer to GROUP 13 – Service Adjustment Procedures.)



Removal steps

- ◆◆ 1 Connection for high-pressure fuel hose
- ◆◆ 2 O-ring
- ◆◆ 3 Connection for fuel return hose
- ◆◆ 4 Connection for vacuum hoses
- ◆◆ 5 Wiring harness connector
- ◆◆ 6 Delivery pipe, injector and pressure regulator assembly
- ◆◆ 7 Insulators
- ◆◆ 8 Connection for radiator upper hose
- ◆◆ 9 Connection for heater hose
- ◆◆ 10 Connection for water hose
- ◆◆ 11 Water outlet fitting
- ◆◆ 12 Water outlet fitting gasket
- ◆◆ 13 Thermostat
- ◆◆ 14 Engine coolant temperature sensor
- ◆◆ 15 Engine coolant temperature gauge unit
- ◆◆ 16 Intake manifold
- ◆◆ 17 Intake manifold gasket



**SERVICE POINTS OF REMOVAL**

E15MBAS 1

6. REMOVAL OF DELIVERY PIPE, FUEL INJECTOR AND PRESSURE REGULATOR

Remove the delivery pipe with fuel injectors and pressure regulators on.

Caution

Do not drop the injectors when removing the delivery pipe.

SERVICE POINTS OF INSTALLATION**2. INSTALLATION OF O-RING/1. HIGH PRESSURE FUEL HOSE**

- (1) Apply a little amount of new engine oil to the O-ring.

Caution

Be sure to prevent the engine oil from entering into the delivery pipe.

- (2) Insert the hose, being careful not to damage the O-ring, and tighten securely.

NOTE

Be sure to tighten securely to prevent fuel leaks so that there will be high pressure between the fuel pump and the delivery pipe.

REMOVAL AND INSTALLATION <DOHC>

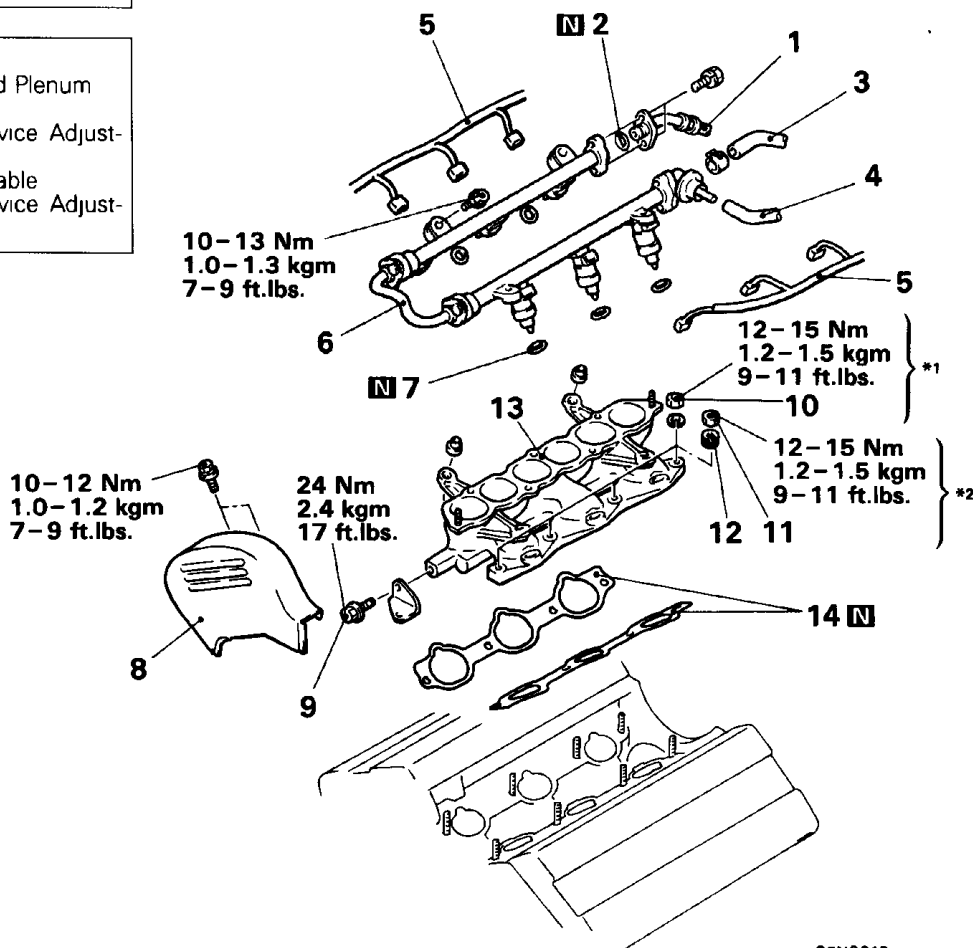
E15MA-B

Pre-removal Operation

- Releasing of Residual Fuel Pressure
(Refer to GROUP 13 – Service Adjustment Procedures.)
- Draining of Coolant
(Refer to GROUP 14 – Service Adjustment Procedures)
- Removal of Intake Manifold Plenum

Post-installation Operation

- Installation of Intake Manifold Plenum
- Supplying of Coolant
(Refer to GROUP 14 – Service Adjustment Procedures)
- Adjustment of Accelerator Cable
(Refer to GROUP 13 – Service Adjustment Procedures)



05N0015

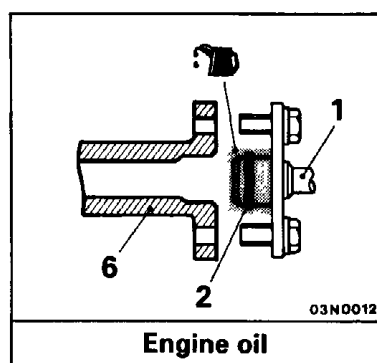
Removal steps

- ◆◆ 1. Connection for high-pressure fuel hose
- ◆◆ 2. O-ring
- 3. Connection for fuel return hose
- 4. Connection for vacuum hoses
- ◆◆ 5. Wiring harness connector
- ◆◆ 6. Delivery pipe, injector and pressure regulator assembly
- 7. Insulators
- 8. Timing belt upper cover
- 9. Water pump stay mounting bolt
- 10. Intake manifold mounting nut^{*1}
- ◆◆ 11. Intake manifold mounting nut^{*2}
- 12. Cone disc spring^{*2}
- 13. Intake manifold
- 14. Intake manifold gasket

NOTE

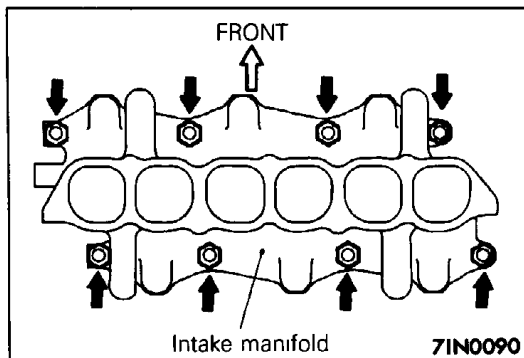
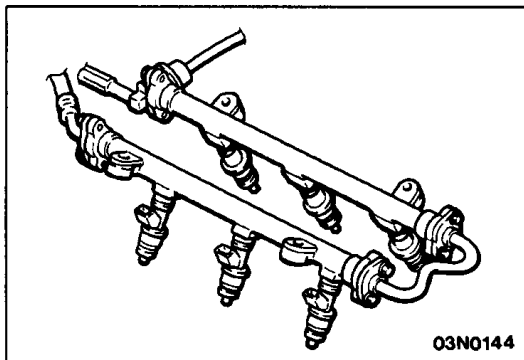
^{*1} <Vehicles built up to October, 1992>

^{*2} <Vehicles built from November, 1992>



03N0012

Engine oil



SERVICE POINTS OF REMOVAL

E16MBA52

6. REMOVAL OF DELIVERY PIPE, FUEL INJECTOR AND PRESSURE REGULATOR

Remove the delivery pipe with fuel injectors and pressure regulators on.

Caution

Do not drop the injectors when removing the delivery pipe.

SERVICE POINTS OF INSTALLATION

11. INSTALLATION OF INTAKE MANIFOLD MOUNTING NUT <Vehicles built from November, 1992>

Tighten the intake manifold mounting nuts one bank after the other by the following procedure.

<Vehicles built from November, 1992 up to November, 1993>

- (1) Tighten the nuts in the front bank to 3–5 Nm (0.3–0.5 kgm, 2.2–3.6 ft.lbs.).
- (2) Tighten the nuts in the rear bank to 12–15 Nm (1.2–1.5 kgm, 9–11 ft.lbs.).
- (3) Tighten the nuts in the front bank to 12–15 Nm (1.2–1.5 kgm, 9–11 ft.lbs.).
- (4) Repeat steps (2) and (3) one more time respectively.

<Vehicles built from December, 1993>

- (1) Tighten the nuts in the front bank to 5–8 Nm (0.5–0.8 kgm, 4–6 ft.lbs.).
- (2) Tighten the nuts in the rear bank to 20–23 Nm (2.0–2.3 kgm, 14–17 ft.lbs.).
- (3) Tighten the nuts in the front bank to 20–23 Nm (2.0–2.3 kgm, 14–17 ft.lbs.).
- (4) Repeat steps (2) and (3) one more time respectively.

2. INSTALLATION OF O-RING/1. HIGH PRESSURE FUEL HOSE

- (1) Apply a little amount of new engine oil to the O-ring.

Caution

Be sure to prevent the engine oil from entering into the delivery pipe.

- (2) Insert the hose, being careful not to damage the O-ring, and tighten securely.

NOTE

Be sure to tighten securely to prevent fuel leaks so that there will be high pressure between the fuel pump and the delivery pipe.

NOTES

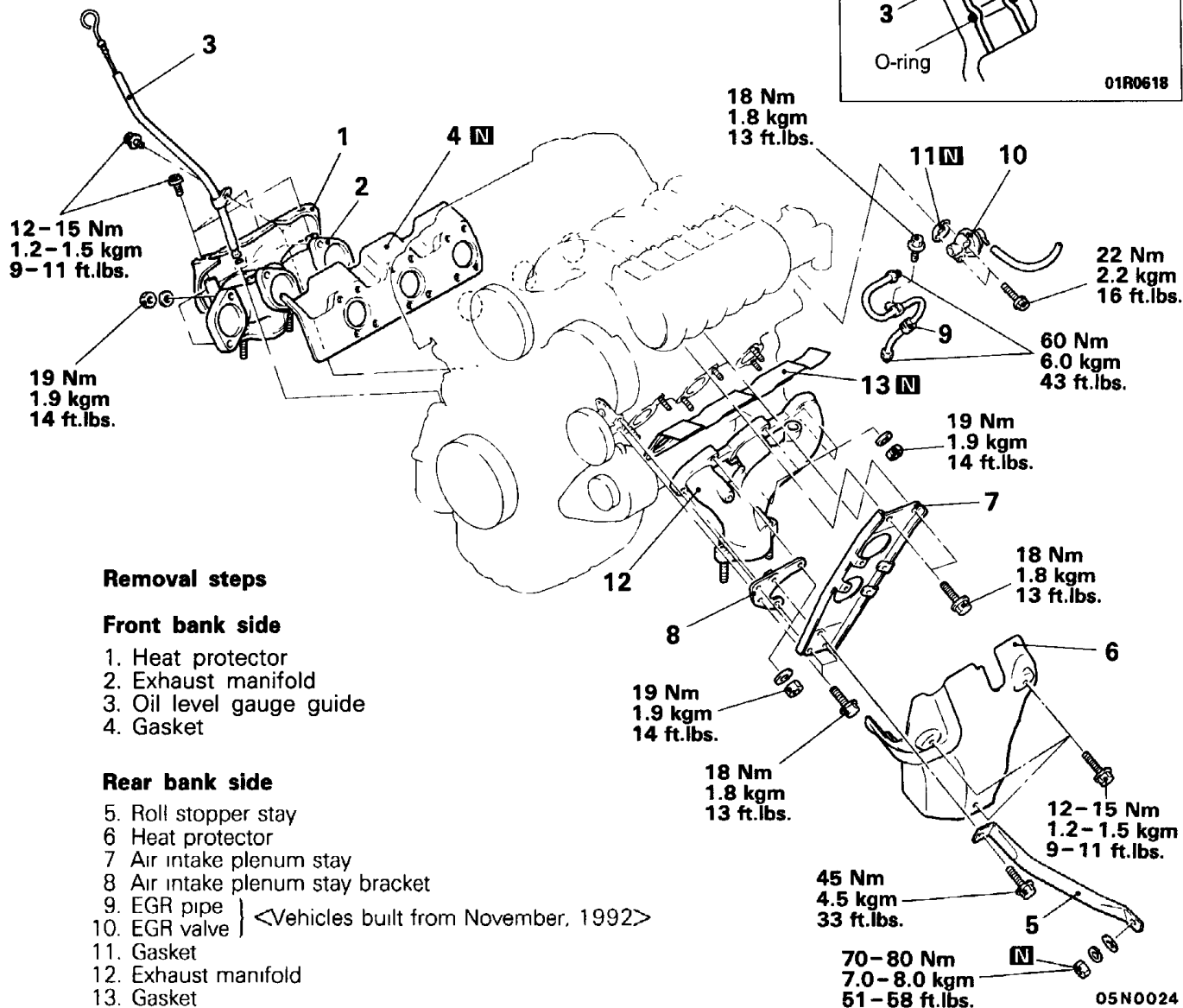
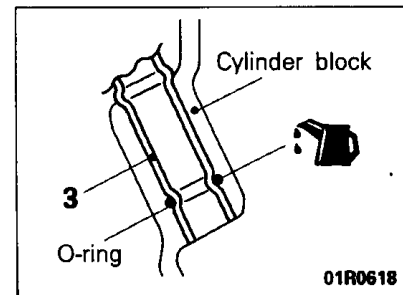
EXHAUST MANIFOLD

REMOVAL AND INSTALLATION <SOHC>

E15NA--

Pre-removal and Post-installation
Operation

- Removal and Installation of Front Exhaust Pipe (Refer to P.15-6.)



INSPECTION

E15NCAD1

EXHAUST MANIFOLD

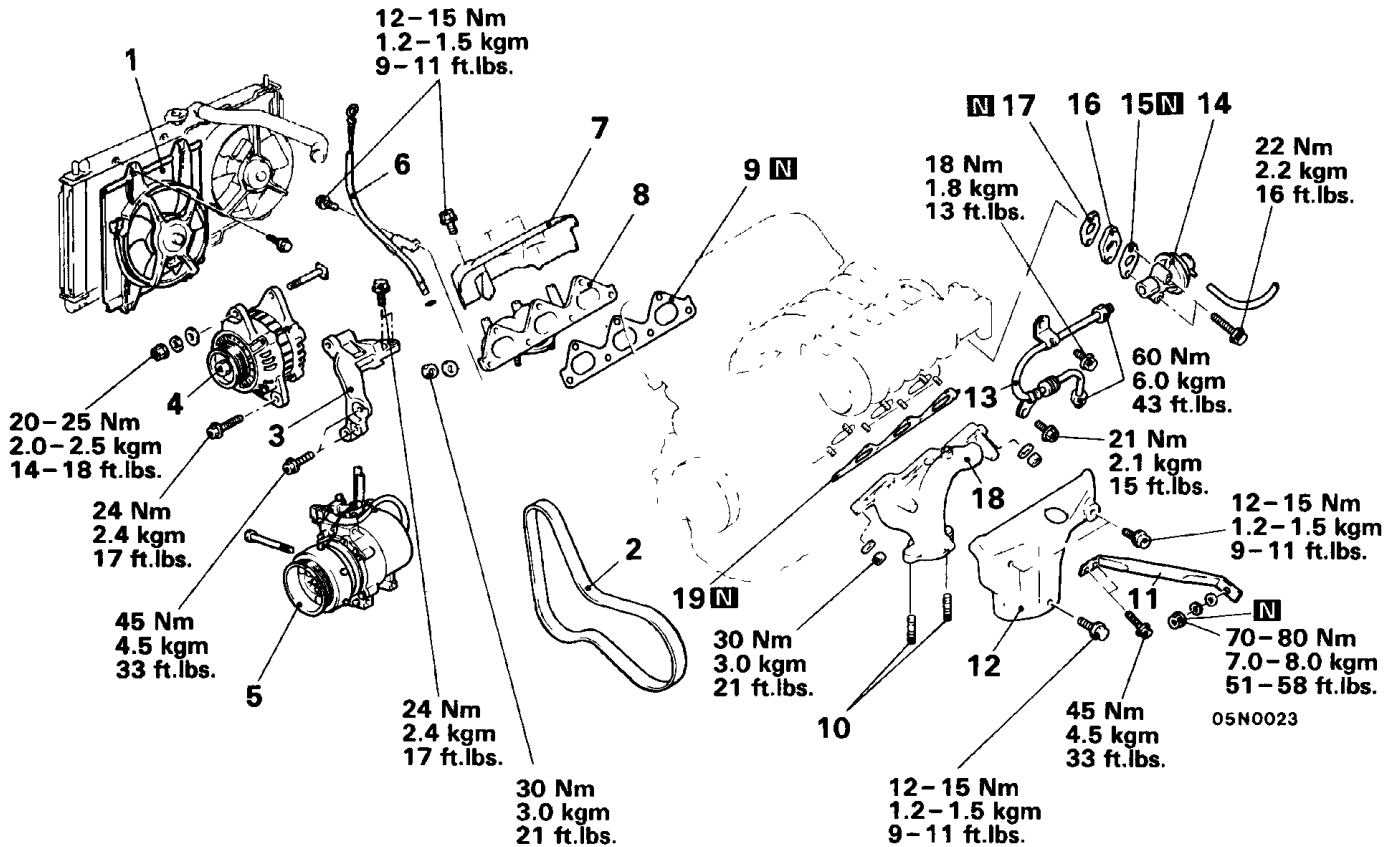
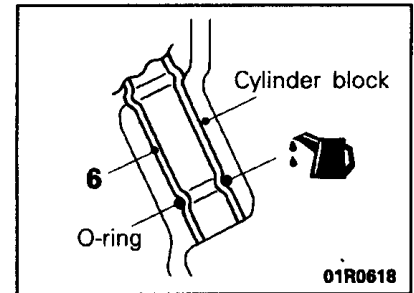
Check for damage or cracking of any part.

REMOVAL AND INSTALLATION <DOHC>

E15NA-A

Pre-removal and Post-installation Operation

- Removal and Installation of Front Exhaust Pipe (Refer to P.15-6.)



Removal steps

Front bank side

1. Condenser fan assembly (Vehicles with air conditioner)
2. Drive belt (Refer to GROUP 11 – Service Adjustment Procedures)
3. Alternator bracket (Refer to GROUP 16 – Engine Electrical)
4. Alternator (Refer to GROUP 16 – Engine Electrical)
5. Compressor (Vehicles with air conditioner)
6. Oil level gauge guide
7. Heat protector
8. Exhaust manifold
9. Gasket

Rear bank side

10. Stud
11. Roll stopper stay
12. Heat protector
13. EGR pipe
14. EGR valve
15. Gasket
16. Spacer <Vehicles with TCL>
17. Gasket <Vehicles with TCL>
18. Exhaust manifold
19. Gasket

<Vehicles built from November, 1992>

SERVICE POINTS OF REMOVAL

E15NBAE

5. REMOVAL OF COMPRESSOR

Remove the air conditioning compressor from the bracket with the hoses still attached.

NOTE

Move the compressor to a place where it will not be an obstruction.

INSPECTION

E15NCAD2

EXHAUST MANIFOLD

Check for damage or cracking of any part.

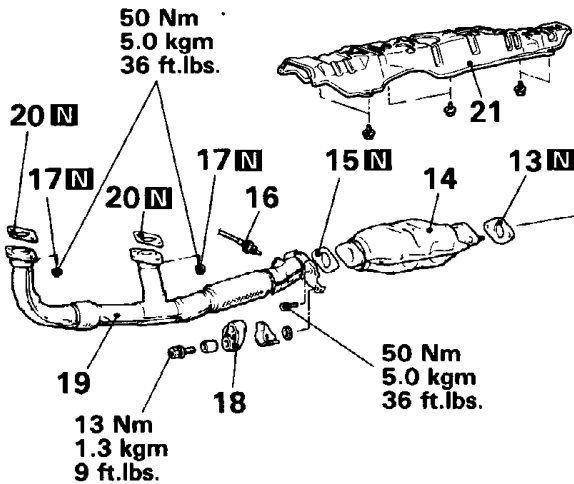
NOTES

EXHAUST PIPE AND MAIN MUFFLER

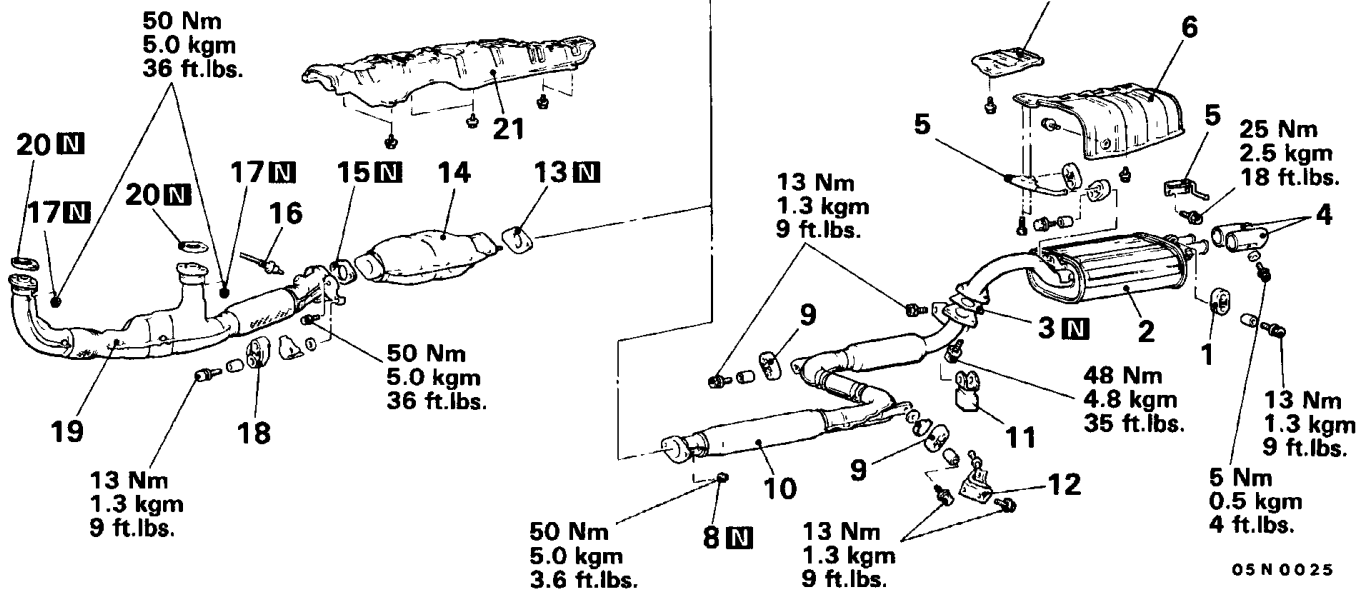
E15RA--

REMOVAL AND INSTALLATION

<Vehicles built up to October, 1992>



<Vehicles built from November, 1992>



05N0025

Removal steps

- | | |
|------------------------------------|--------------------------------|
| 1. Hanger | 12. Hanger bracket |
| 2. Main muffler | 13. Gasket |
| 3. Gasket | 14. Catalytic converter |
| 4. Muffler cutter | 15. Gasket |
| 5. Hanger bracket | 16. Oxygen sensor |
| 6. Rear floor heat protector | 17. Self-locking nut |
| 7. Rear floor heat protector front | 18. Hanger |
| 8. Self-locking nut | 19. Front exhaust pipe |
| 9. Hanger | 20. Gasket |
| 10. Center exhaust pipe | 21. Front floor heat protector |
| 11. Dynamic damper | |

INSPECTION

E15RCAH

- Check the mufflers and pipes for corrosion or damage.
- Check the rubber hangers for deterioration or damage.
- Check for gas leakage from mufflers and pipes.

ENGINE ELECTRICAL

CONTENTS

E16AA--

CHARGING SYSTEM	2	IGNITION SYSTEM	9-2
SPECIFICATIONS	2	SPECIFICATIONS	9-2
General Specifications	2	General Specifications	9-2
Service Specifications	2	Service Specifications	10
SPECIAL TOOLS	2	SPECIAL TOOLS	10
SERVICE ADJUSTMENT PROCEDURES	3	SERVICE ADJUSTMENT PROCEDURES	
Inspection	3	<SOHC>	10
Voltage Drop Test of Alternator Output		Ignition Coil Inspection	10
Line	3	Power Transistor Inspection	11
Output Current Test	4	Resistive Code Inspection	11
Regulated Voltage Test	6	Checking the Detonation Sensor	11
Inspection Using an Analyzer	6-1	Spark Plug Check and Cleaning	12
ALTERNATOR <SOHC>	7	Inspection Using an Analyzer	
ALTERNATOR <DOHC>	8	(Secondary and Primary Ignition Voltage	
STARTING SYSTEM	9	Waveforms)	12-1
SPECIFICATIONS	9	Top Dead Centre Sensor	
General Specifications	9	 Refer to GROUP 13	
SERVICE ADJUSTMENT PROCEDURES	9	(On-vehicle Inspection	
Starter Relay Inspection		of MPI Components)	
<Vehicles with Theft-alarm System>	9	Crank Angle Sensor	
		 Refer to GROUP 13	
		(On-vehicle Inspection	
		of MPI Components)	
		Ignition Timing Adjustment	
		 Refer to GROUP 11	

CONTINUED ON NEXT PAGE

SERVICE ADJUSTMENT PROCEDURES

<DOHC>	13
Ignition Coil Inspection	13
Power Transistor Inspection	13
Resistive Code Inspection	14
Checking the Detonation Sensor	15
Spark Plug Check	15
Inspection Using an Analyzer (Secondary and Primary Ignition Voltage Waveforms)	16
Top Dead Centre Sensor	Refer to GROUP 13 (On-vehicle Inspection of MPI Components)

Camshaft Position Sensor	Refer to GROUP 13 (On-vehicle Inspection of MPI Components)
Crank Angle Sensor	Refer to GROUP 13 (On-vehicle Inspection of MPI Components)
Ignition Timing Adjustment	Refer to GROUP 11

CRANK ANGLE SENSOR AND CAMSHAFT POSITION SENSOR 21

NOTES

CHARGING SYSTEM SPECIFICATIONS

GENERAL SPECIFICATIONS

E16BA--

ALTERNATOR

<SOHC>

Items		Not cold climate zone	Cold climate zone
Type		Battery voltage sensing	Battery voltage sensing
Rated out put	V/A	12/90	12/110
Voltage regulator		Electronic built-in type	Electronic built-in type

<DOHC>

Items		Vehicles without ECS	Vehicles with ECS
Type		Battery voltage sensing	Battery voltage sensing
Rated out put	V/A	12/90	12/110
Voltage regulator		Electronic built-in type	Electronic built-in type

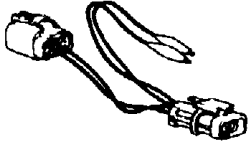
SERVICE SPECIFICATIONS

E16BB--

Items	Specifications
Alternator Standard value Regulated voltage Ambient temp. at voltage regulator V –20°C (–4°F) 20°C (68°F) 60°C (140°F) 80°C (176°F)	 14.2–15.4 13.9–14.9 13.4–14.6 13.1–14.5
Limit Output current	70 % of nominal output current

SPECIAL TOOL

E16BF--

Tool	Number	Name	Use
	MD998467	Alternator harness connector	Checking the alternator (S terminal voltage)

SERVICE ADJUSTMENT PROCEDURES

E16BGAG

VOLTAGE DROP TEST OF ALTERNATOR OUTPUT LINE

This test determines whether the wiring from the alternator "B" terminal to the battery (+) terminal (including the fusible link) is in a good condition or not.

(1) Always be sure to check the following before the test.

- Alternator installation
- Alternator drive belt tension (Refer to GROUP 11 – Service Adjustment Procedures.)
- Fusible link
- Abnormal noise from the alternator while the engine is running

(2) Turn the ignition switch to the OFF position.

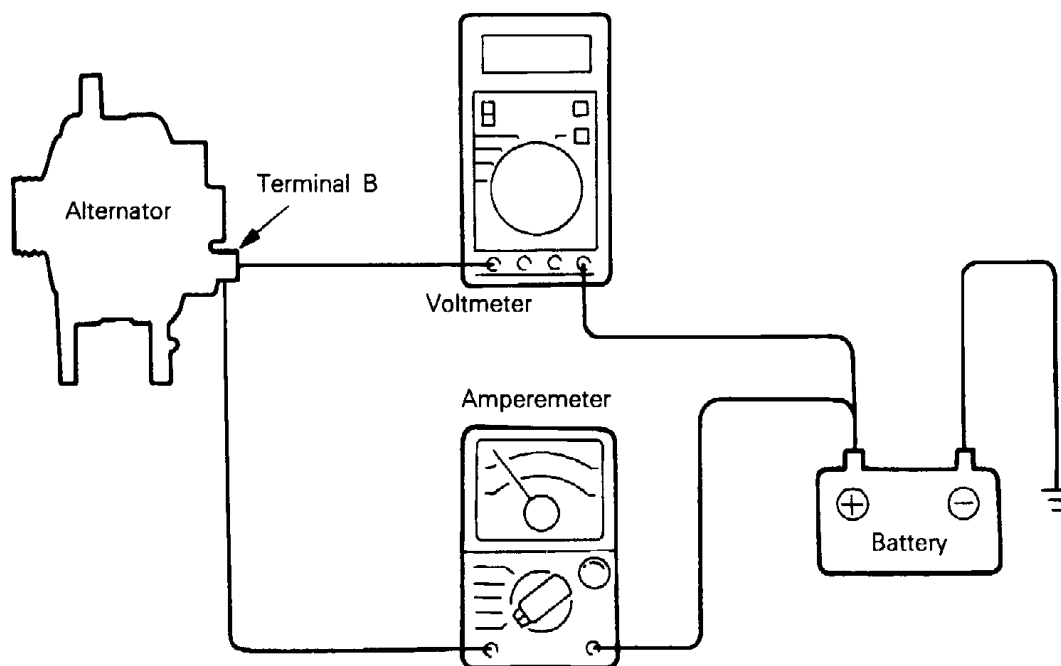
(3) Disconnect the negative battery cable.

(4) Disconnect the alternator output wire from the alternator "B" terminal and connect a DC test ammeter with a range of 0 – 100 A in series between the "B" terminal and the disconnected output wire. (Connect the (+) lead of the ammeter to the "B" terminal, and then connect the (–) lead of the ammeter to the disconnected output wire.)

NOTE

A clamp-type ammeter which enables measurements to be taken without disconnecting the alternator output wire should be recommended. Because, if a vehicle in which the voltage may have dropped due to an imperfect connection at the alternator "B" terminal is being inspected, and so if the alternator "B" terminal is loosened and a test ammeter is connected, the connection will be complete at the time of connection and the possibility of finding problems will be reduced.

(5) Connect a digital-type voltmeter between the alternator "B" terminal and the battery (+) terminal. (Connect the (+) lead of the voltmeter to the "B" terminal, and then connect the (–) lead of the voltmeter to the battery (+) cable.)



5EL0015

- (6) Connect a tachometer. (For the procedure for connecting the tachometer, refer to GROUP 11 – Service Adjustment Procedures.)
- (7) Reconnect the negative battery cable.
- (8) Leave the hood open.
- (9) Start the engine.
- (10) With the engine running at 2500 r/min., turn the headlamps and other lamps on and off to adjust the alternator load so that the value displayed on the ammeter is slightly above 30 A. Adjust the engine speed by gradually decreasing it until the value displayed on the ammeter is 30 A. Take a reading of the value displayed on the voltmeter at this time.

Limit value: Max. 0.3 V

NOTE

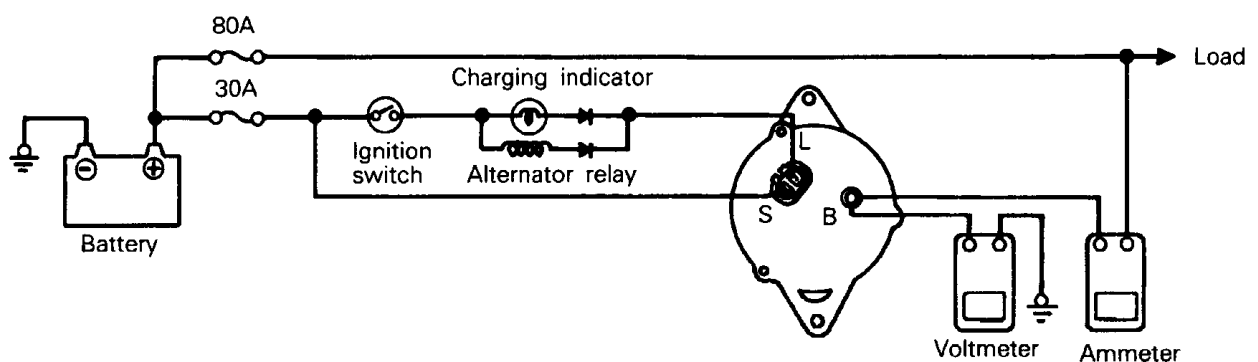
When the alternator output is high and the value displayed on the ammeter does not decrease until 30A, set the value to 40A. Read the value displayed on the voltmeter at this time.

played on the voltmeter at this time.

In this case the limit value becomes max. 0.4V.

- (11) If the value displayed on the voltmeter is above the limit value, there is probably a malfunction in the alternator output wire, so check the wiring between the alternator "B" terminal and the battery (+) terminal (including fusible link). If a terminal is not sufficiently tight or if the harness has become discolored due to overheating, repair and then test again.
- (12) After the test, run the engine at idle.
- (13) Turn off all lamps and turn the ignition switch to the OFF position.
- (14) Disconnect the negative battery cable.
- (15) Disconnect the ammeter, voltmeter and tachometer.
- (16) Connect the alternator output wire to the alternator "B" terminal.
- (17) Connect the negative battery cable.

OUTPUT CURRENT TEST



16P0482

This test determines whether the alternator outputs normal current.

- (1) Before the test, always be sure to check the following.

- Alternator installation
- Battery (Refer to GROUP 54 – Battery.)

NOTE

The battery to be used should be slightly discharged. The load in a fully-charged battery will be insufficient and the test may not be able to be carried out correctly.

- Alternator drive belt tension (Refer to GROUP 11 – Service Adjustment Procedures.)
- Fusible link
- Abnormal noise from the alternator while the engine is running.

- (2) Turn the ignition switch to the OFF position.
 (3) Disconnect the negative battery cable.
 (4) Disconnect the alternator output wire from the alternator "B" terminal and connect a DC test ammeter with a range of 0 – 100 A in series between the "B" terminal and the disconnected output wire. (Connect the (+) lead of the ammeter to the "B" terminal, and then connect the (–) lead of the ammeter to the disconnected output wire.)

Caution

Never use clips but tighten bolts and nuts to connect the line. Otherwise loose connections (e.g. using clips) will lead to a serious accident because of high current.

NOTE

A clamp-type ammeter which enables measurements to be taken without disconnecting the alternator output wire should be recommended.

- (5) Connect a voltmeter with a range of 0–20 V between the alternator "B" terminal and the earth. (Connect the (+) lead of the voltmeter to the "B" terminal, and then connect the (–) lead of the voltmeter to the earth.)
 (6) Connect a tachometer. (For the procedure for connecting the tachometer, refer to GROUP 11 – Service Adjustment Procedures.)
 (7) Connect the negative battery cable.
 (8) Leave the hood open.
 (9) Check to be sure that the reading on the voltmeter is equal to the battery voltage.

NOTE

If the voltage is 0 V, the cause is probably an open

circuit in the wire or fusible link between the alternator "B" terminal and the battery (+) terminal.

- (10) After turning the light switch on and turning on the headlamps, start the engine.

- (11) Immediately after setting the headlamps to high beam and turning the heater blower switch to the high revolution position, increase the engine speed to 2,500 r/min. and read the maximum current output value displayed on the ammeter.

Limit value: 70% of normal current output

NOTE

- For the nominal current output, refer to the Alternator Specifications.
- Because the current from the battery will soon drop after the engine is started, the above step should be carried out as quickly as possible in order to obtain the maximum current output value.
- The current output value will depend on the electrical load and the temperature of the alternator body.
- If the electrical load is small while testing, the specified level of current may not be output even though the alternator is normal. In such cases, increase the electrical load by leaving the headlamps turned on for some time to discharge the battery or by using the lighting system in another vehicle, and then test again.
- The specified level of current also may not be output if the temperature of the alternator body or the ambient temperature is too high. In such cases, cool the alternator and then test again.

- (12) The reading on the ammeter should be above the limit value. If the reading is below the limit value and the alternator output wire is normal, remove the alternator from the engine and check the alternator.

- (13) Run the engine at idle speed after the test.

- (14) Turn the ignition switch to the OFF position.

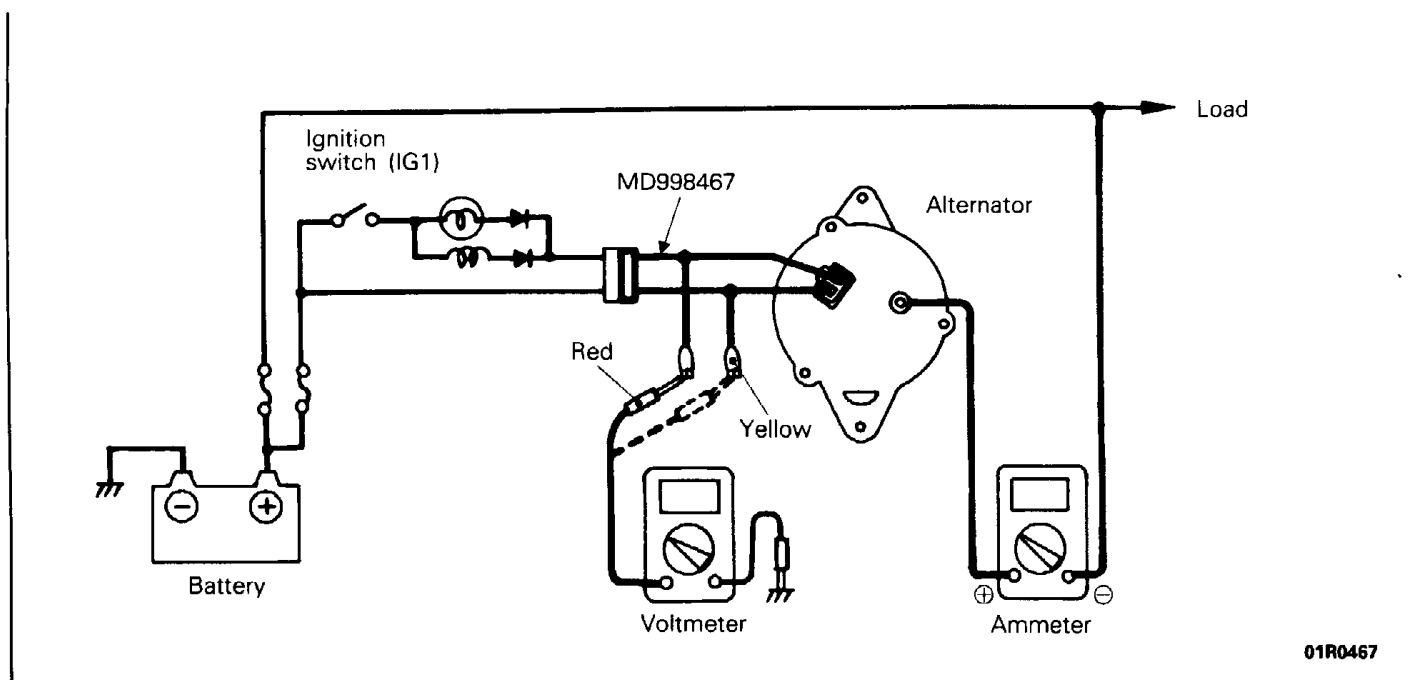
- (15) Disconnect the negative battery cable.

- (16) Disconnect the ammeter, voltmeter and tachometer.

- (17) Connect the alternator output wire to the alternator "B" terminal.

- (18) Connect the negative battery cable.

REGULATED VOLTAGE TEST



01R0467

This test determines whether the voltage regulator is correctly controlling the alternator output voltage.

(1) Always be sure to check the following before the test.

- Alternator installation
- Check to be sure that the battery installed in the vehicle is fully charged. (Refer to GROUP 54 – Battery.)
- Alternator drive belt tension (Refer to GROUP 11 – Service Adjustment Procedures.)
- Fusible link
- Abnormal noise from the alternator while the engine is running

(2) Turn the ignition switch to the OFF position.

(3) Disconnect the negative battery cable.

(4) Connect a digital-type voltmeter between the alternator "S" terminal and the earth. (Connect the (+) lead of the voltmeter to the "S" terminal, and then connect the (–) lead of the voltmeter to a secure earth or to the battery (–) terminal.)

(5) Disconnect the alternator output wire from the alternator "B" terminal.

(6) Connect a DC test ammeter with a range of 0 – 100 A in series between the "B" terminal and the disconnected output wire. (Connect the (+) lead of the ammeter to the "B" terminal, and then connect the (–) lead of the ammeter to the disconnected output wire.)

(7) Connect a tachometer. (Refer to GROUP 11 – Service Adjustment Procedures.)

(8) Reconnect the negative battery cable.

(9) Turn the ignition switch to the ON position and check that the reading on the voltmeter is equal to the battery voltage.

NOTE

If the voltage is 0 V, the cause is probably an open circuit in the wire or fusible link between the alternator "S" terminal and the battery (+) terminal.

(10) Check to be sure that all lamps and accessories are off.

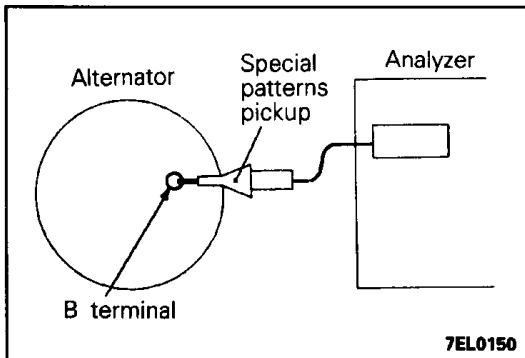
- (11) Start the engine.
- (12) Increase the engine speed to 2,500 r/min.
- (13) Read the value displayed on the voltmeter when the current output by the alternator becomes 10 A or less.
- (14) If the voltage reading conforms to the value in the voltage regulation table, then the voltage regulator is operating normally.
If the voltage is outside the standard value, there is a malfunction of the voltage regulator or of the alternator.

Voltage Regulation Table

Inspection terminal	Voltage regulator ambient temperature °C (°F)	Standard value V
Terminal "S"	-20 (-4)	14.2-15.4
	20 (68)	13.9-14.9
	60 (140)	13.4-14.6
	80 (176)	13.1-14.5

- (15) After the test, lower the engine speed to the idle speed.
- (16) Turn the ignition switch to the OFF position.
- (17) Disconnect the negative battery cable.
- (18) Disconnect the ammeter, voltmeter and tachometer.
- (19) Connect the alternator output wire to the alternator "B" terminal.
- (20) Connect the negative battery cable.

NOTES



INSPECTION USING AN ANALYZER

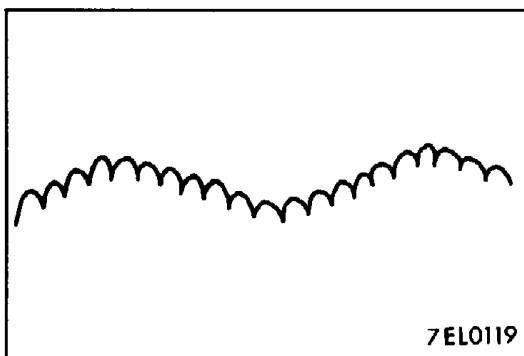
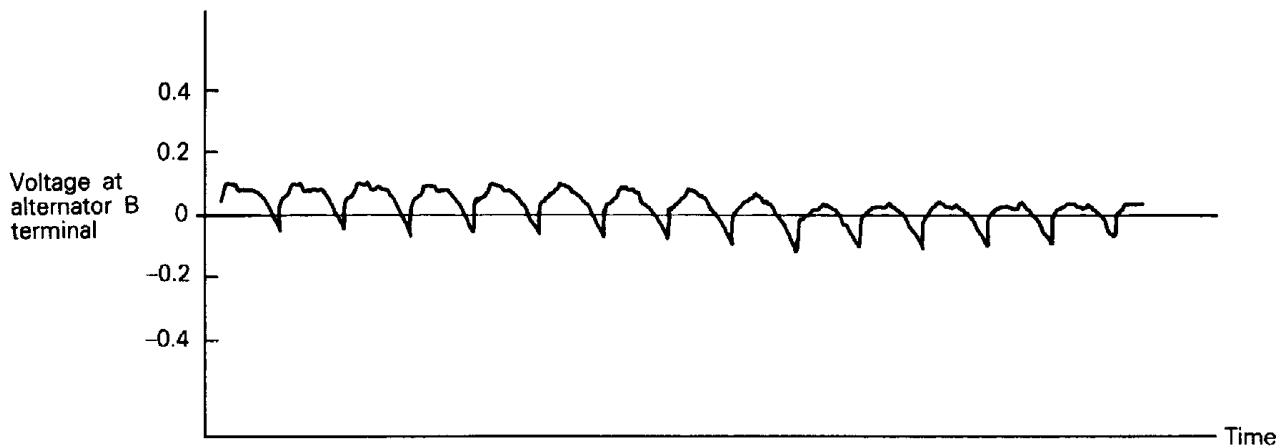
MEASUREMENT METHOD

Connect the analyzer special patterns pick-up to the alternator B terminal.

STANDARD WAVEFORM

Observation Conditions

Function	Special patterns
Pattern height	Variable
Variable knob	Adjust while viewing the wave pattern
Pattern selector	Raster
Engine revolutions	Idle (700r/min.)



NOTE

Furthermore, the voltage waveform of the alternator B terminal can undulate as shown at left. This waveform is produced when the regulator operates according to fluctuations in the alternator load (current), and is normal for the alternator.

EXAMPLES OF ABNORMAL WAVEFORMS

NOTE

1. The size of the waveform patterns differs largely depending on the adjustment of the variable knob on the analyzer.
2. Identification of abnormal waveforms is easier when there is a large output current (regulator is not operating). (Waveforms can be observed when the headlamps are illuminated.)
3. Check the conditions of the charge lamp (illuminated/ not illuminated) also, and carry out a total check.

Abnormal waveforms	Problem cause
Example 1  7EL0120	● Open diode
Example 2  7EL0121	● Short in diode
Example 3  7EL0122	● Broken wire in stator coil
Example 4  7EL0123	● Short in stator coil
Example 5  NOTE: At this time, the charge lamp is illuminated. 7EL0124	● Open supplementary diode

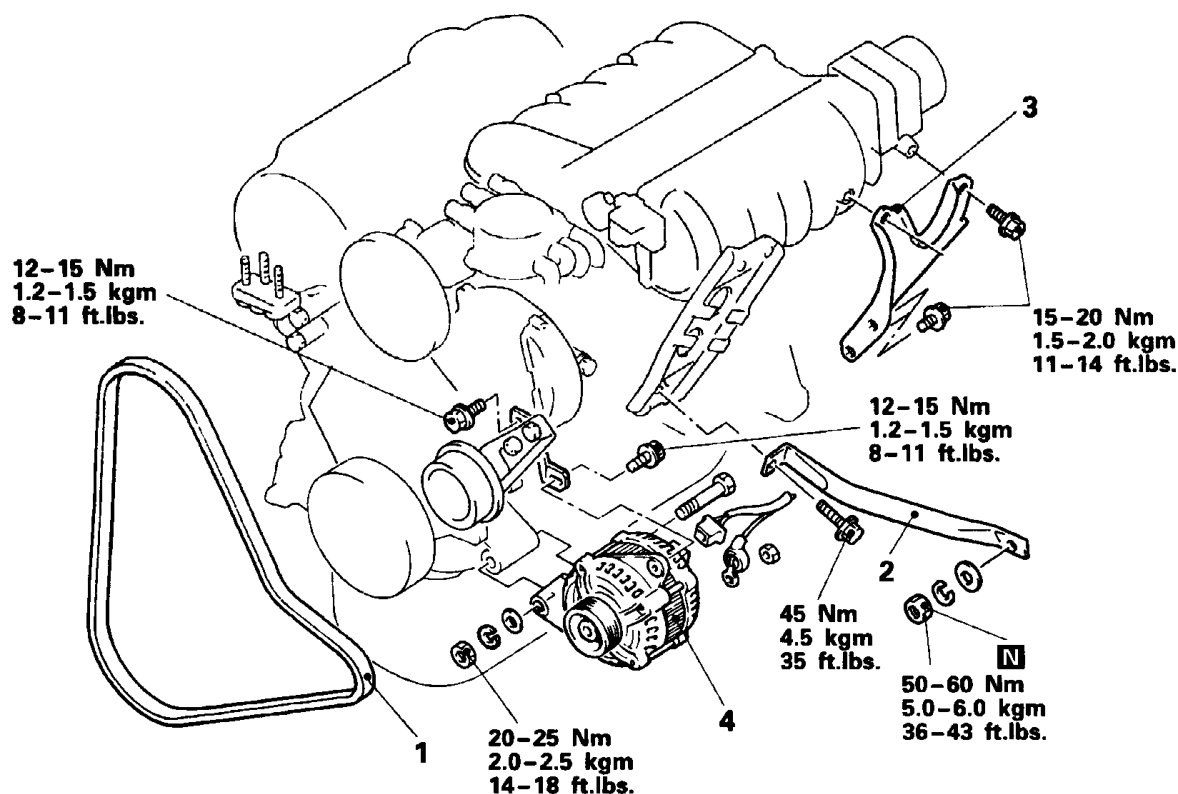
ALTERNATOR <SOHC>

E16BH-1

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation

- Removal and Installation of Air Intake Hose

**Removal steps**

- Adjustment of Drive belt tension (Refer to GROUP 11 – Service Adjustment Procedures)
1. Drive belt
 2. Roll stopper stay
 3. Air intake plenum stay
 4. Alternator

01N0114

SERVICE POINTS OF REMOVAL

E16BHCC

4. REMOVAL OF ALTERNATOR

- (1) Remove the mounting nut and bolt.
- (2) Take out the alternator from the transmission side through the bottom of the air intake plenum.

NOTE

There is only a small room to take out the alternator, so be careful not to damage the nearby components.

ALTERNATOR <DOHC>

E16BH-2

REMOVAL AND INSTALLATION

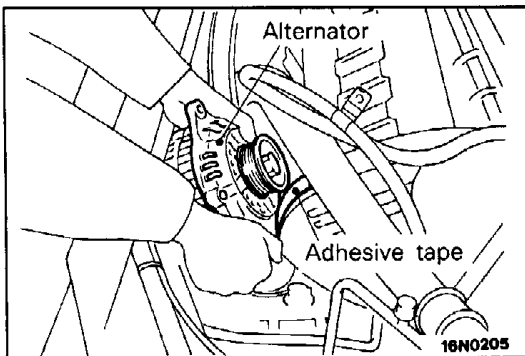
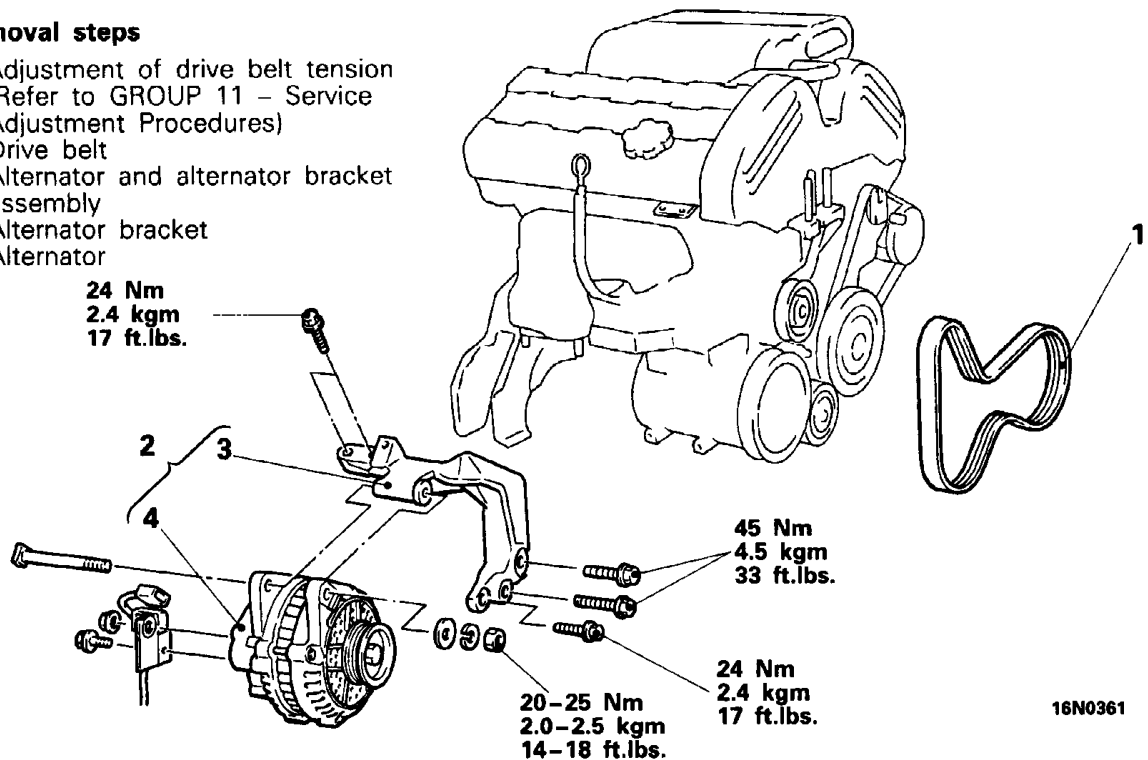
Pre-removal and Post-installation Operation

- Removal and Installation of Head-lamp Washer Tank
- Removal and Installation of Condenser Fan
- Removal and Installation of Upper Radiator Insulator

Removal steps

- Adjustment of drive belt tension (Refer to GROUP 11 – Service Adjustment Procedures)

1. Drive belt
2. Alternator and alternator bracket assembly
3. Alternator bracket
4. Alternator

**SERVICE POINTS OF REMOVAL**

E16BHCD

2. REMOVAL OF ALTERNATOR AND ALTERNATOR BRACKET ASSEMBLY

Before removing the assembly with the engine, loosen the assembly bolt by which the alternator is fixed at the alternator bracket.

4. REMOVAL OF ALTERNATOR**NOTE**

There is only a small room to take out the alternator, so be careful not to damage the nearby components.

SERVICE POINTS OF INSTALLATION

E16BHDD

4. INSTALLATION OF ALTERNATOR/3. ALTERNATOR BRACKET

Before installing the alternator bracket to the engine, install the alternator in the engine compartment.

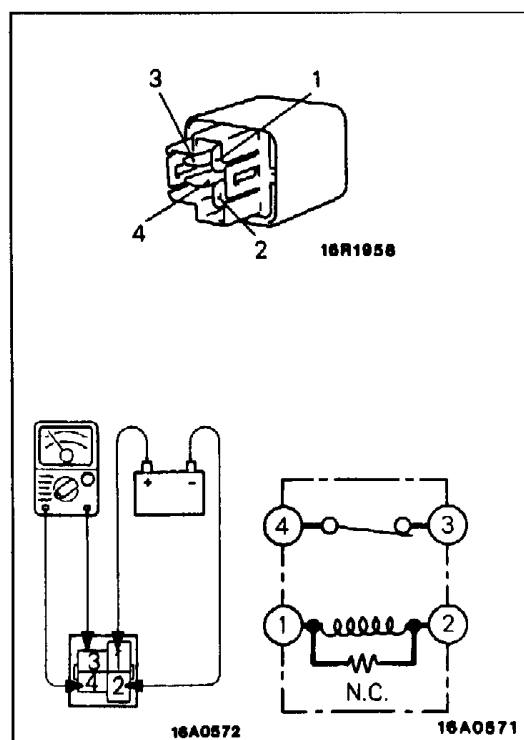
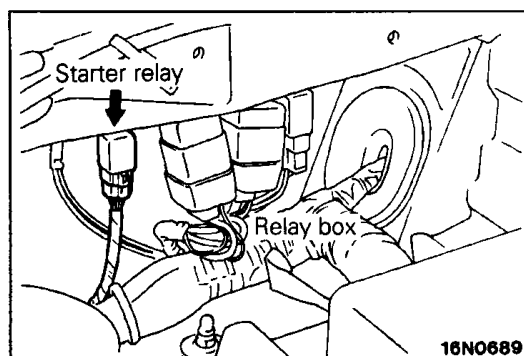
STARTING SYSTEM SPECIFICATIONS

GENERAL SPECIFICATIONS

STARTER MOTOR

E16CA--

Items	M/T	A/T
Type	Reduction drive with planetary gear	Reduction drive with planetary gear
Identification No.	MIT72581	MIT73281
Part No.	MD162842	MD162843
Rated output kW/V	1.2/12	1.2/12
No. of pinion teeth	8	8



SERVICE ADJUSTMENT PROCEDURES

E16CHAA

STARTER RELAY INSPECTION

< VEHICLES WITH THEFT-ALARM SYSTEM >

- (1) Remove the battery and air cleaner assembly.
- (2) Remove the starter relay.
- (3) Apply battery voltage to terminal ① and check the continuity between the terminals when terminal ② is earthed.

Power is supplied between (1)-(2)	3-4 terminals	No continuity
Power is not supplied	1-2 terminals	Continuity
	3-4 terminals	Continuity

16-9-1

NOTES

IGNITION SYSTEM SPECIFICATIONS

GENERAL SPECIFICATIONS

E16DA--

DISTRIBUTOR

Items	SOHC engine
Type	Contact pointless
Advance mechanism	Electronic
Firing order	1-2-3-4-5-6

CRANK ANGLE SENSOR

Items	DOHC engine
Type	Contact pointless
Advance mechanism	Electronic

IGNITION COIL

Items	SOHC	DOHC
Type	Molded single-coil type	Molded 3 coil type
Identification No.	F-504	F-536
Part No.	MD166146	MD152648

SPARK PLUG

Items	SOHC	DOHC
NGK	BPR6ES-11	PFR6J-11
NIPPON DENSO	W20EPR11	PK20PR-P11

SERVICE SPECIFICATIONS

E16DE--

IGNITION COIL

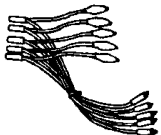
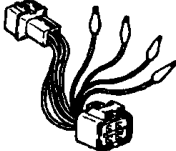
Items		SOHC	DOHC
Primary coil resistance	Ω	0.72–0.88	0.67–0.81
Secondary coil resistance	k Ω	10.3–13.9	11.3–15.3

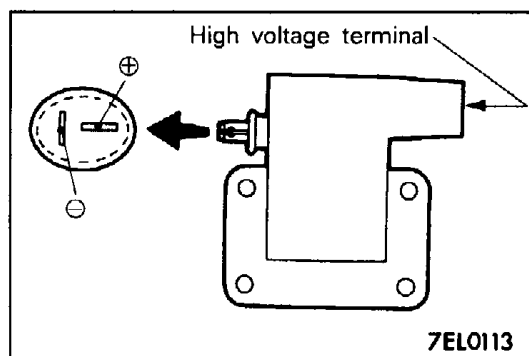
SPARK PLUG

Items		Specifications
Standard value		
Spark plug gap	mm (in.)	1.0–1.1 (0.039–0.043)
Limit		
High tension cable and spark plug cable resistance	k Ω	Max. 22
Spark plug gap (Platinum plug only)	mm (in)	1.3 (0.051)

SPECIAL TOOLS

E16DF--

Tool	Number	Name	Use
	MB991348	Test harness set	Inspection of ignition primary voltage (power transistor connection)
	MD998464	Harness connector (4-pin, square)	Inspection of ignition primary voltage (ignition coil connection)

**SERVICE ADJUSTMENT PROCEDURES <SOHC>**

E16DGAP

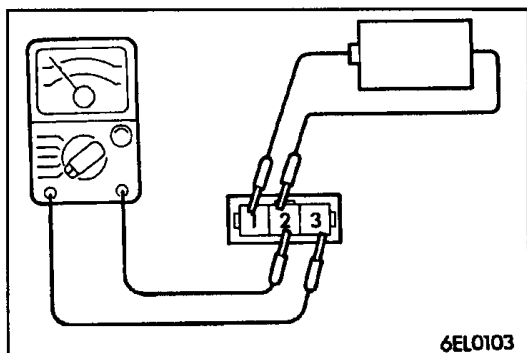
IGNITION COIL INSPECTION

- (1) Measurement of the primary coil resistance
Measure the resistance of the positive (+) terminal and negative (–) terminal of the ignition coil.

Standard value: 0.72–0.88 Ω

- (2) Measurement of the secondary coil resistance
Measure the resistance between the ignition coil's positive (+) terminal and the high tension terminal.

Standard value: 10.3–13.9 k Ω



POWER TRANSISTOR INSPECTION

NOTE

An analog-type circuit tester should be used.

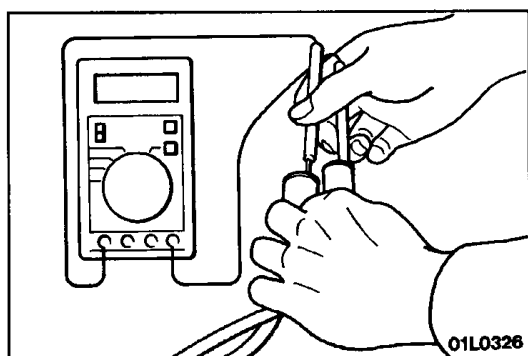
- (1) Connect the negative (–) terminal of the 15V power supply to terminal ② of the power transistor; then check whether there is continuity between terminal ③ and terminal ② when terminal ① and the positive (+) terminal are connected and disconnected.

NOTE

Connect the negative (–) probe of the circuit tester to terminal ③.

Terminal ① and (+) terminal	Terminal ③ and terminal ②
Connected	Continuity
Unconnected	No continuity

- (2) Replace the power transistor if there is a malfunction.



RESISTIVE CODE INSPECTION

Measure the resistance of the high tension cable and all spark plug leads.

- (1) Check cap and coating for cracks.
- (2) Measure resistance.

Limit: Max. 22 kΩ

CHECKING THE DETONATION SENSOR

Check the detonation sensor circuit if self-diagnosis code No. 31 is displayed.

NOTE

For information concerning the self-diagnosis codes, refer to GROUP 13 – Troubleshooting.

SPARK PLUG CHECK AND CLEANING

- (1) Remove the spark plug cables.

Caution

When pulling off the spark plug cable from the plug always hold the cable cap, not the cable.

- (2) Remove the spark plugs.
(3) Check for burned out electrode or damaged insulator. Check for even burning.
(4) Remove carbon deposits with wire brush or plug cleaner. Remove sand from plug screw with compressed air.
(5) Use a plug gap gauge to check that the plug gap is within the standard value range.

Standard value: 1.0–1.1 mm (0.040–0.043 in.)

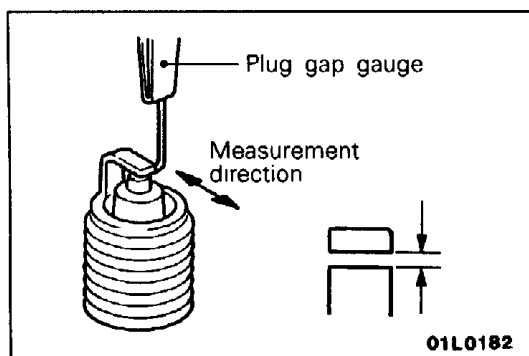
If the plug gap is not within the standard value range adjust by bending the ground electrode.

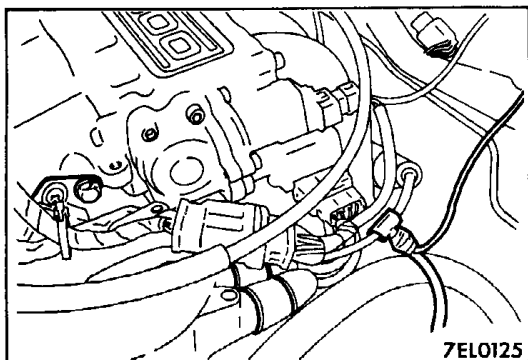
- (6) Clean the engine plug holes.

Caution

Use care not to allow foreign matter in cylinders.

- (7) Install the spark plugs.

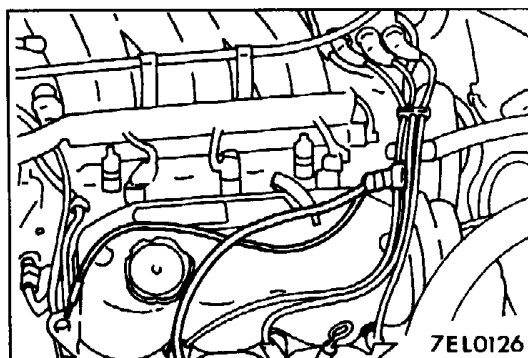




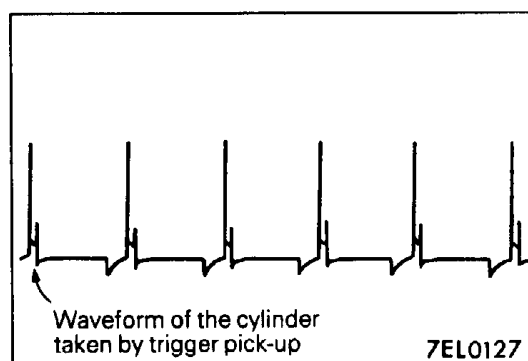
INSPECTION USING AN ANALYZER (SECONDARY AND PRIMARY IGNITION VOLTAGE WAVEFORMS)

INSPECTION OF SECONDARY IGNITION VOLTAGE MEASUREMENT METHOD

(1) Clamp the Secondary pickup around high tension cable.



(2) Clamp the spark plug cable with the Trigger pickup.
(Basically, clamp the No.1 cylinder spark plug cable.)



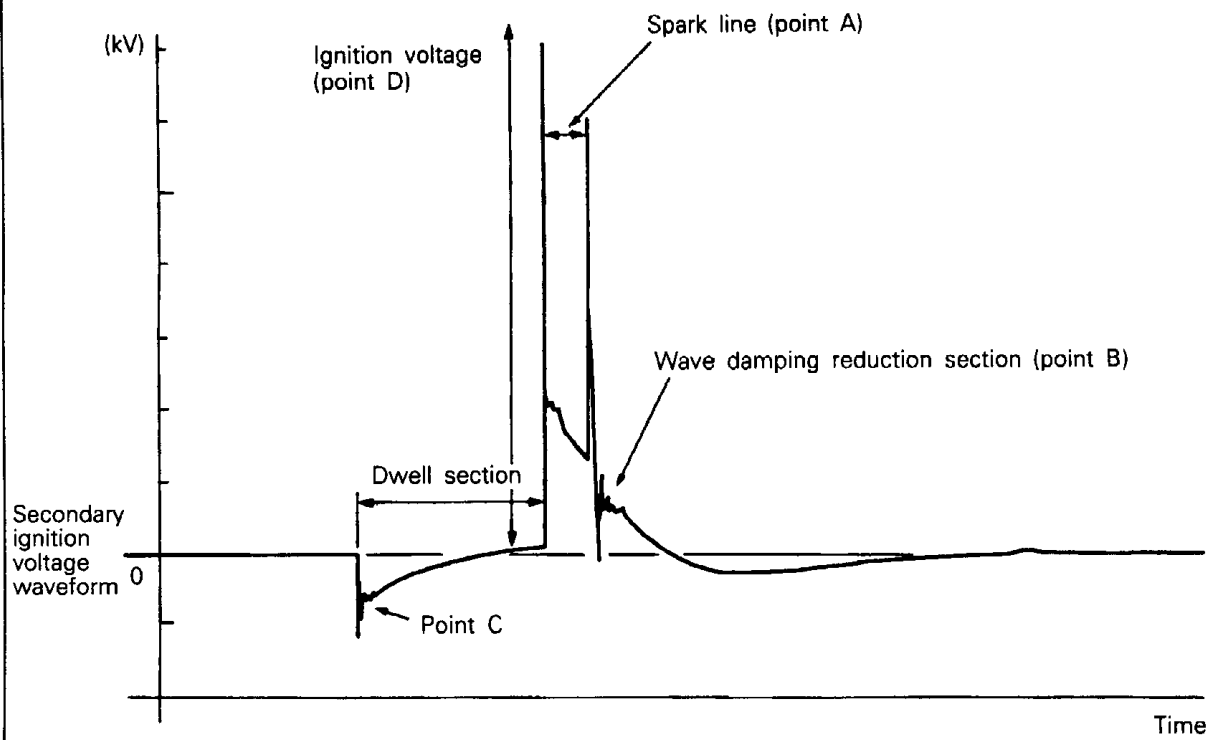
NOTE

The cylinder waveform taken by the trigger pickup appears from the left side of the screen.

STANDARD WAVEFORM

Observation Conditions

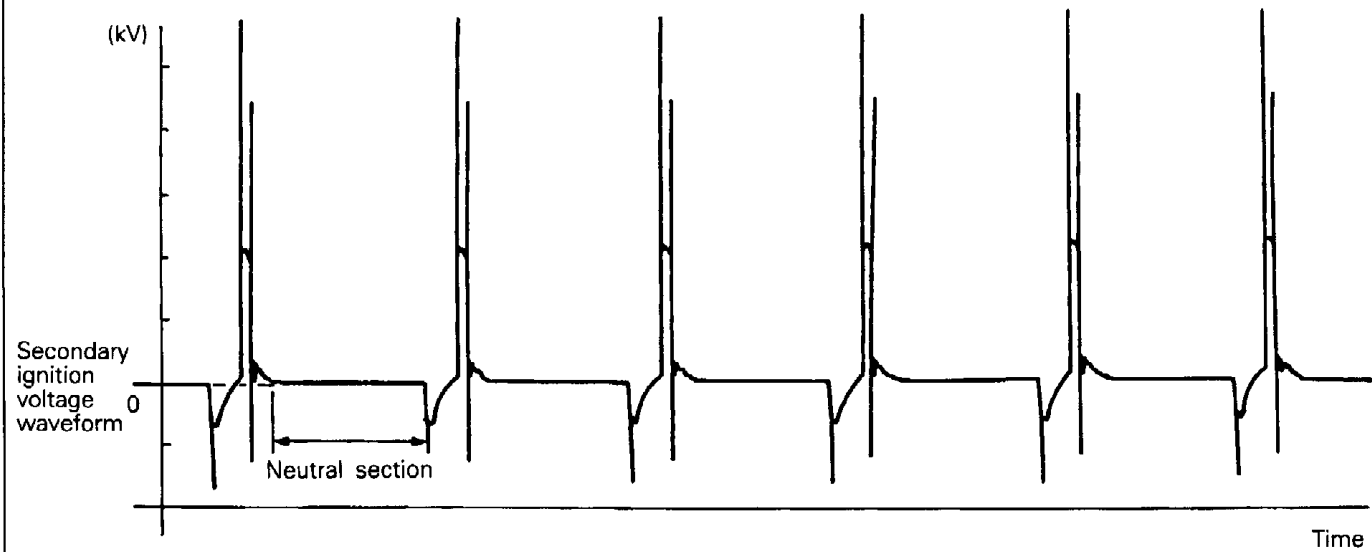
Function	Secondary
Pattern height	High (or Low)
Pattern selector	Raster
Engine revolutions	Idle (700 r/min.)



7EL0128

Observation Condition (Only Pattern selector below changes from the above conditions.)

Pattern selector	Display
------------------	---------



7EL0129

WAVEFORM OBSERVATION POINTS

Point A : The height, length and slope of the spark line (refer to abnormal waveform examples 1, 2, 3 and 4) show the following trends.

Spark line		Plug gap	Condition of electrode	Compression force	Concentration of air mixture	Ignition timing	Spark plug cable
Length	Long	Small	Normal	Low	Rich	Advanced	Leak
	Short	Large	Large wear	High	Lean	Retarded	High resistance
Height	High	Large	Large wear	High	Lean	Retarded	High resistance
	Low	Small	Normal	Low	Rich	Advanced	Leak
Slope		Large	Plug is fouled	–	–	–	–

Point B : Number of vibrations in reduction vibration section
(Refer to abnormal waveform example 5)

Number of vibrations	Coil and condenser
Three or more	Normal
Except above	Abnormal

Point C : Number of vibrations at beginning of dwell section
(Refer to abnormal waveform example 5)

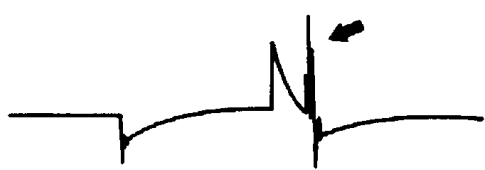
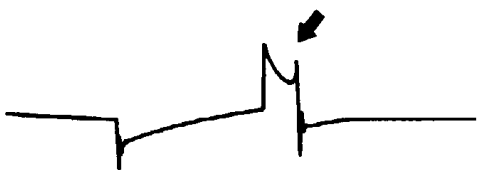
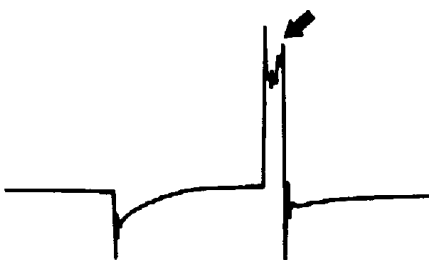
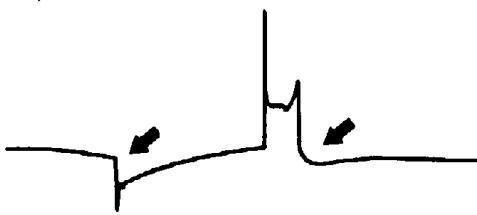
Number of vibrations	Coil
5–6 or higher	Normal
Except above	Abnormal

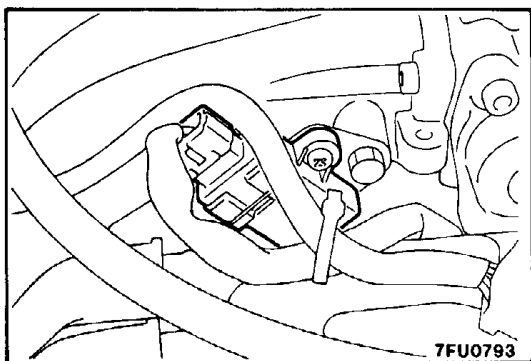
Point D : Ignition voltage height (distribution per each cylinder) shows the following trends.

Ignition voltage	Plug gap	Condition of electrode	Compression force	Concentration of air mixture	Ignition timing	Spark plug cable
High	Large	Large wear	High	Lean	Retarded	High resistance
Low	Small	Normal	Low	Rich	Advanced	Leak

16-12-4 IGNITION SYSTEM – Service Adjustment Procedures <SOHC>

EXAMPLES OF ABNORMAL WAVEFORMS

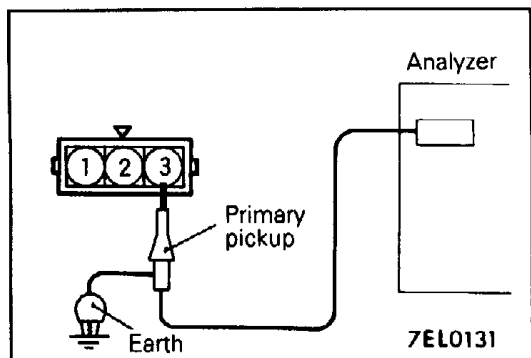
Abnormal waveform	Wave characteristics	Cause of problem
Example 1  01P0215	Spark line is high and short.	Spark plug gap is too large.
Example 2  01P0216	Spark line is low and long, and is sloping. Also, the second half of the spark line is distorted. This could be a result of mis-firing.	Spark plug gap is too small.
Example 3  01P0217	Spark line is low and long, and is sloping. However, there is almost no spark line distortion.	Spark plug gap is fouled.
Example 4  01P0218	Spark line is high and short. Difficult to distinguish between this and abnormal wave pattern example 1.	Spark plug cable is nearly falling off. (Causing a dual ignition)
Example 5  01P0219	No waves in wave damping section.	Rare short in ignition coil.



INSPECTION OF PRIMARY IGNITION VOLTAGE WAVEFORMS

MEASUREMENT METHOD

- (1) Remove the power transistor connector and connect the special tool (Harness connector: MB991348) in between. All terminals should be connected.



- (2) Connect the primary pickup of the adjuster to the power transistor connector terminal (3).
- (3) Earth the primary pickup earth terminal.
- (4) Clamp the spark plug cable with the primary pickup.

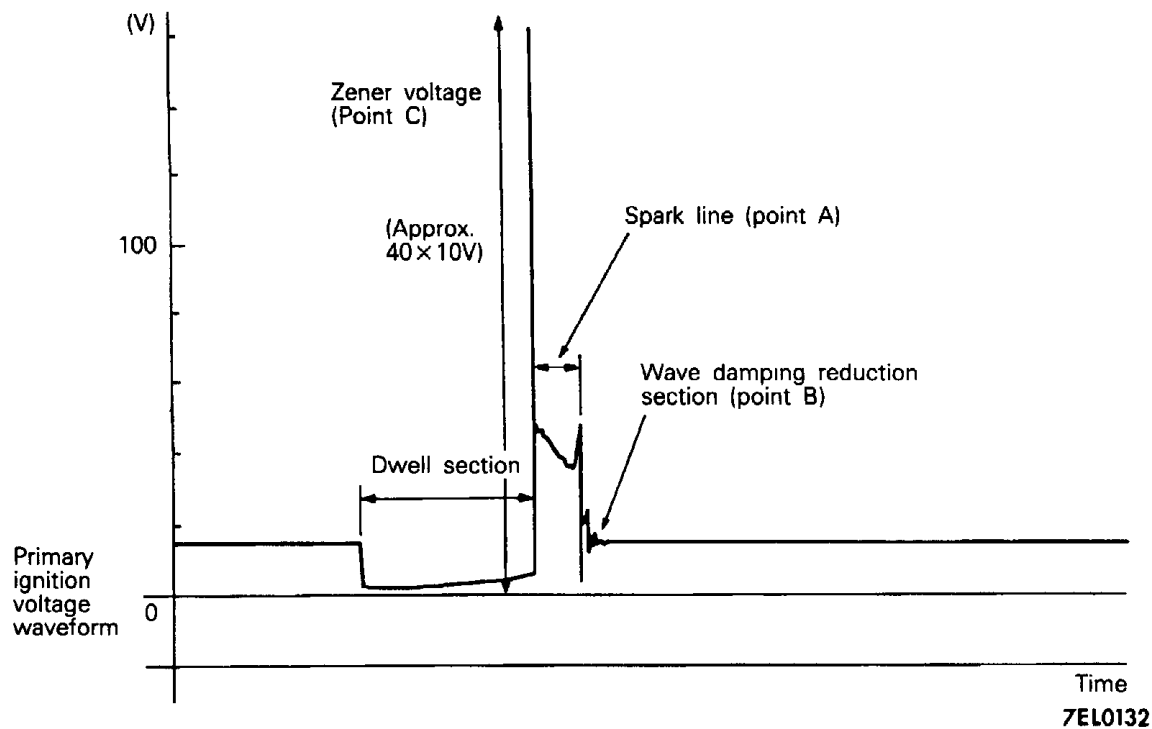
NOTE

The waveform of the cylinder clamped by the trigger pickup appears from the left side of the screen.

STANDARD WAVEFORM

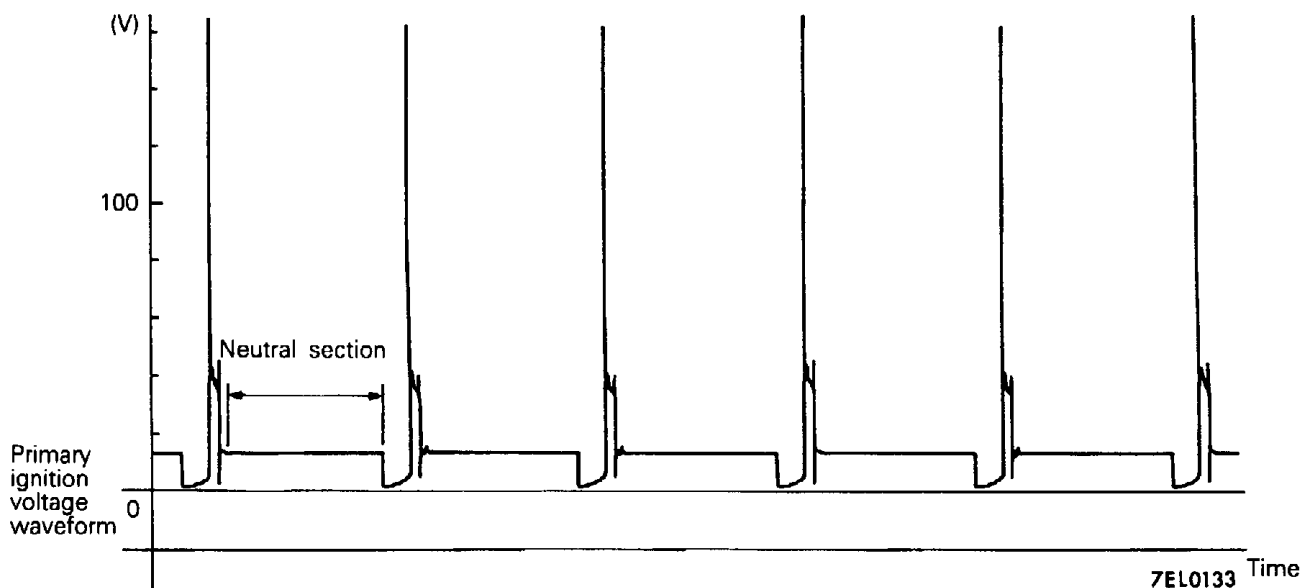
Observation Conditions

Function	Secondary
Pattern height	High (or Low)
Pattern selector	Raster
Engine revolutions	Idle (700 r/min.)



Observation Conditions (Only Pattern selector below changes from the above conditions.)

Pattern selector	Display
------------------	---------



WAVEFORM OBSERVATION POINTS

Point A : The height, length and slope of the spark line (refer to abnormal waveform examples 1, 2, 3 and 4) show the following trends.

Spark line		Plug gap	Condition of electrode	Compression force	Concentration of air mixture	Ignition timing	High tension cable
Length	Long	Small	Normal	Low	Rich	Advanced	Leak
	Short	Large	Large wear	High	Lean	Retarded	High resistance
Height	High	Large	Large wear	High	Lean	Retarded	High resistance
	Low	Small	Normal	Low	Rich	Advanced	Leak
Slope		Large	Plug is fouled	–	–	–	–

Point B : Number of vibrations in reduction vibration section
(Refer to abnormal waveform example 5)

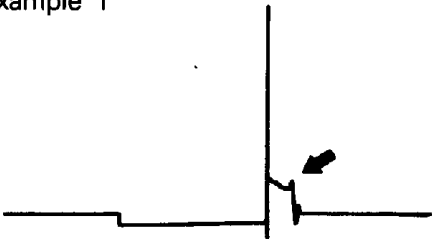
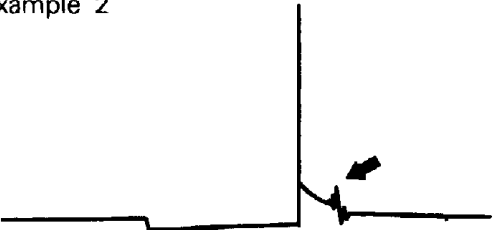
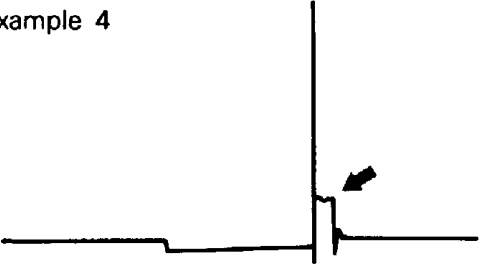
Number of vibrations	Coil, condenser
3 or higher	Normal
Except above	Abnormal

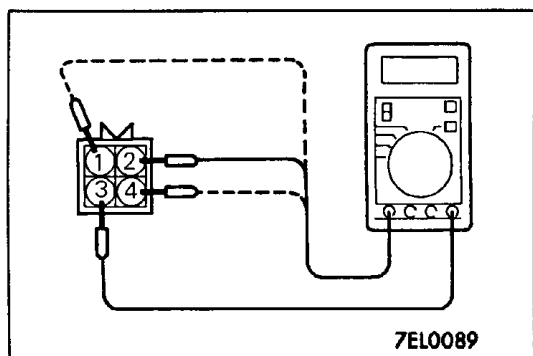
Point C : Height of Zener voltage

Height of Zener voltage	Probable cause
High	Problem in Zener diode
Low	Abnormal resistance in primary coil circuit

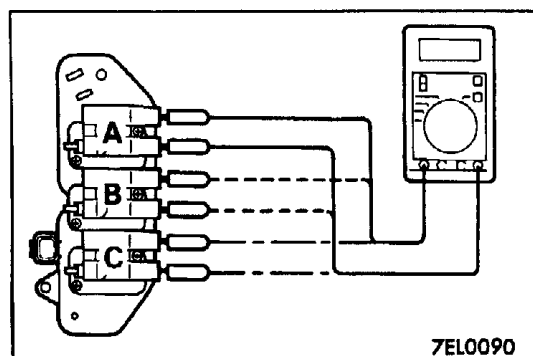
16-12-8 IGNITION SYSTEM – Service Adjustment Procedures <SOHC>

EXAMPLES OF ABNORMAL WAVEFORMS

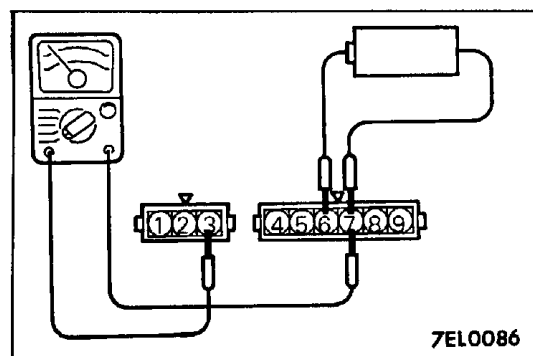
Abnormal waveform	Wave characteristics	Cause of problem
Example 1  01P0210	Spark line is high and short.	Spark plug gap is too large.
Example 2  01P0211	Spark line is low and long, and is sloping. Also, the second half of the spark line is distorted. This could be a result of mis-firing.	Spark plug gap is too small.
Example 3  01P0212	Spark line is low and long, and is sloping. However, there is almost no spark line distortion.	Spark plug gap is fouled.
Example 4  01P0213	Spark line is high and short	Spark plug cable is nearly falling off. (Causing a dual ignition)
Example 5  01P0214	No waves in wave damping section.	Rare short in ignition coil.



7EL0089



7EL0090



7EL0086

SERVICE ADJUSTMENT PROCEDURES <DOHC>

E16DGAQ

IGNITION COIL INSPECTION

Primary Coil Resistance

Measure the resistance between connector terminal ③ (power) and each coil terminal.

Measuring point:

Coil A (No. 1 – No. 4 cylinder side coil) ②–③

Coil B (No. 2 – No. 5 cylinder side coil) ①–③

Coil C (No. 3 – No. 6 cylinder side coil) ④–③

Standard value: 0.67–0.81 Ω

Secondary Coil Resistance

Measure the resistance between each coil high voltage terminals.

Measuring point:

Coil A (No. 1 – No. 4 cylinder side coil)

Coil B (No. 2 – No. 5 cylinder side coil)

Coil C (No. 3 – No. 6 cylinder side coil)

Standard value: 11.3–15.3 k Ω

POWER TRANSISTOR INSPECTION

NOTE

An analog-type circuit tester should be used.

No. 1 – No. 4 coil side

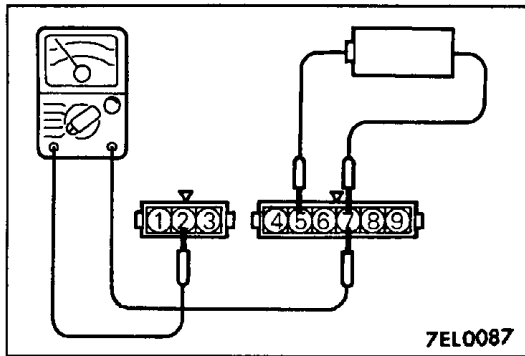
- (1) Connect the negative (–) terminal of the 1.5 V power supply to terminal ⑦ of the power transistor; then check whether there is continuity between terminal ③ and terminal ⑦ when terminal ⑥ and the positive (+) terminal are connected and disconnected.

NOTE

Connect the (–) probe of the circuit tester to terminal ③.

Terminal ⑥ and (+) terminal	Terminal ③ and terminal ⑦
Connected	Continuity
Unconnected	No continuity

- (2) Replace the power transistor if there is a malfunction.

**No. 2 – No. 5 coil side**

- (1) Connect the negative (-) terminal of the 1.5 V power supply to terminal 7 of the power transistor; then check whether there is continuity between terminal 2 and terminal 7 when terminal 5 and the positive (+) terminal are connected and disconnected.

NOTE

Connect the (-) probe of the circuit tester to terminal ②.

Terminal ⑤ and (+) terminal	Terminal ② and terminal ⑦
Connected	Continuity
Unconnected	No continuity

- (2) Replace the power transistor if there is a malfunction.

No. 3 – No. 6 coil side

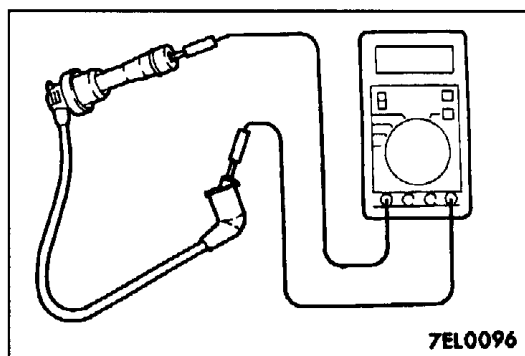
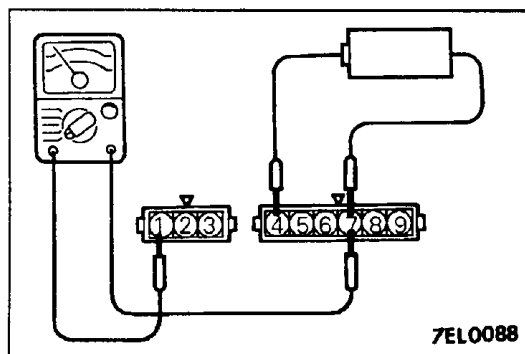
- (1) Connect the negative (-) terminal of the 1.5 V power supply to terminal 7 of the power transistor; then check whether there is continuity between terminal 1 and terminal 7 when terminal 4 and the positive (+) terminal are connected and disconnected.

NOTE

Connect the (-) probe of the circuit tester to terminal ①.

Terminal ④ and (+) terminal	Terminal ① and terminal ⑦
Connected	Continuity
Unconnected	No continuity

- (2) Replace the power transistor if there is a malfunction.

**RESISTIVE CODE INSPECTION**

Measure the resistance of the high tension cable and all spark plug leads.

- (1) Check cap and coating for cracks.
- (2) Measure resistance.

Unit: k Ω

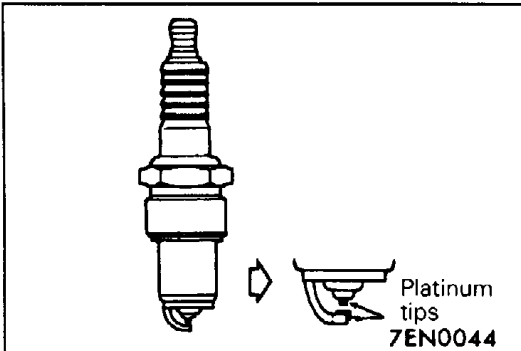
Spark plug cable					
No. 1	No. 2	No. 3	No. 4	No. 5	No. 6
8.6	13.9	6.4	11.5	4.5	11.7

CHECKING THE DETONATION SENSOR

Check the detonation sensor circuit if self-diagnosis code, No. 31 is shown.

NOTE

For information concerning the self-diagnosis codes, refer to GROUP 13 – Troubleshooting.



SPARK PLUG CHECK

- (1) Remove the center cover from the front bank.
- (2) Remove the air intake plenum from the rear bank.
- (3) Remove the spark plug cables.

Caution

When pulling off the spark plug cable from the plug, always hold the cable cap, not the cable.

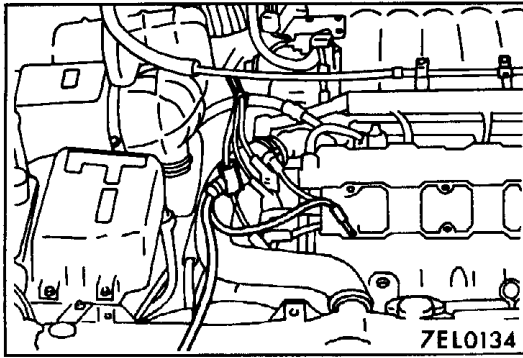
- (4) Remove the spark plugs.
- (5) Check the plug gap and replace if the limit is exceeded.

Standard value: 1.0–1.1 mm (0.039–0.043 in.)

Limit: 1.3 mm (0.051 in.)

Caution

1. Do not attempt to adjust the gap of the platinum plug.
2. Cleaning of the platinum plug may result damage the platinum tip. Therefore, if carbon deposits must be removed, use a plug cleaner and complete cleaning within 20 seconds for protection of the electrode. Do not use wire brushes.



INSPECTION USING AN ANALYZER (SECONDARY AND PRIMARY IGNITION VOLTAGE WAVEFORMS)

INSPECTION OF SECONDARY IGNITION VOLTAGE MEASUREMENT METHOD

- (1) Clamp the SECONDARY PICKUP around spark plug cable.

NOTE

1. The peak of the ignition voltage will be reversed when the spark cables of No.4, No.5, No.6 cylinders are clamped and when the spark plug cables of No.1, No.2, and No.3 cylinders are clamped.
2. Because of the two-cylinder simultaneous ignition system, the waves for two cylinders in each group appear during wave observation (No.1 cylinder - No.4 cylinder, No.2 cylinder - No.5 cylinder, No.3 cylinder - No.6 cylinder). However, wave observation is carried out for the cylinder with the spark plug cable clamped by the secondary pickup.

- (2) Clamp the spark plug cable with the Trigger pickup.

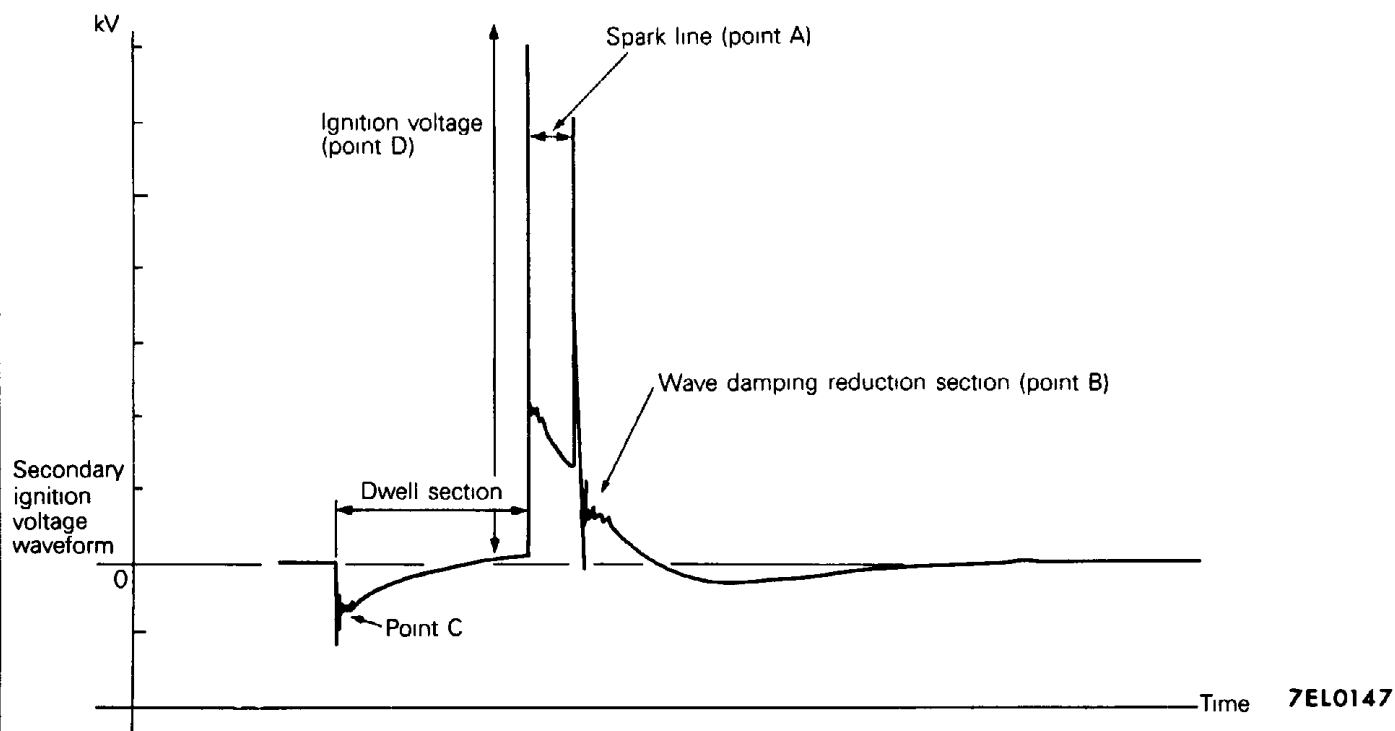
NOTE

1. Clamp the spark plug cable for the No.1, No.2 or No.3 cylinder of the same group with the cylinder that is clamped with the secondary pickup.
2. Identification of which cylinder wave pattern is displayed can be difficult, but the wave pattern of the cylinder which is clamped with the secondary pickup will be stable, so this can be used as a reference for identification.

STANDARD WAVEFORM

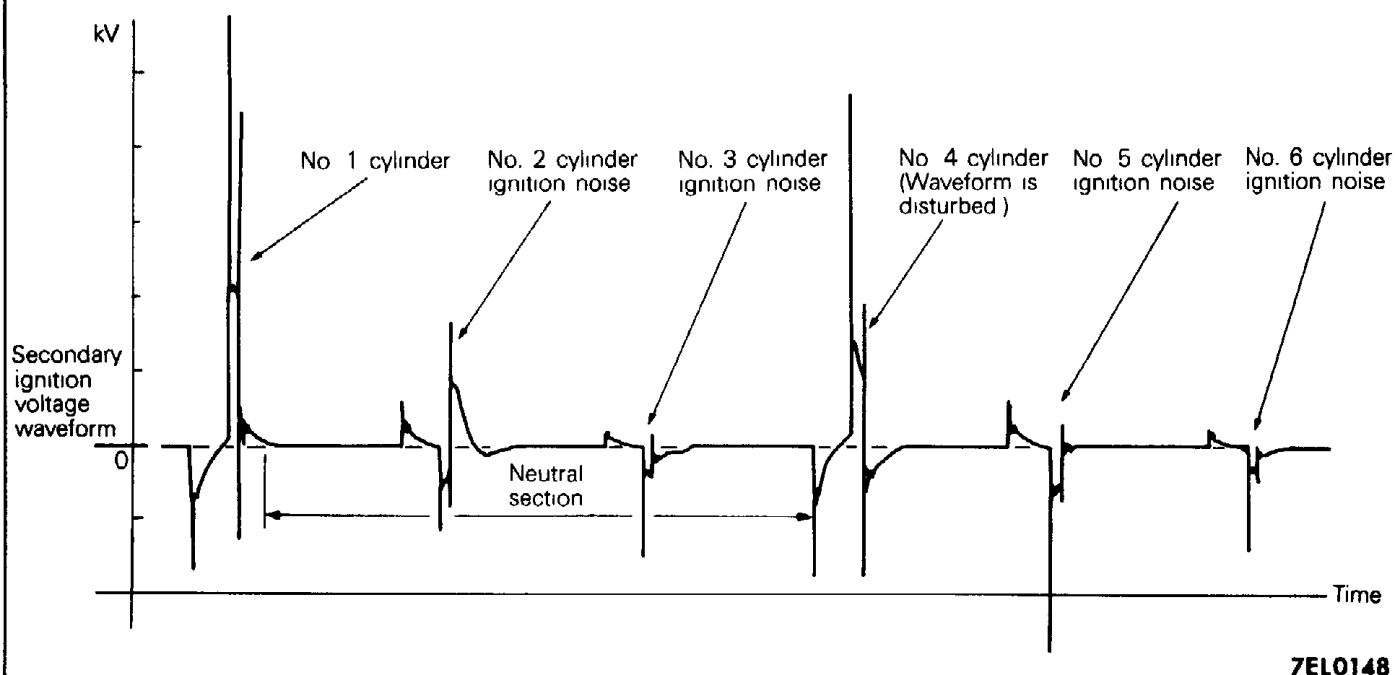
Observation Conditions

Function	Secondary
Pattern height	High (or Low)
Pattern selector	Raster
Engine revolutions	Idle (700 r/min)



Observation Condition (Only pattern selector below changes from the above conditions.)

Pattern selector	Display.
------------------	----------

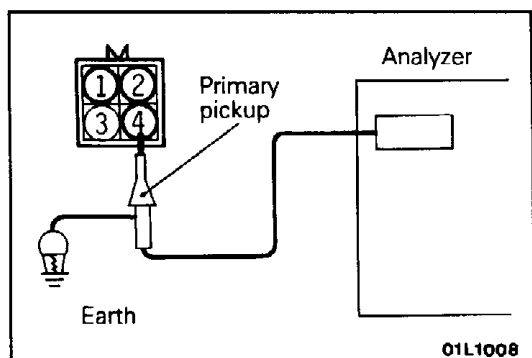


WAVEFORM OBSERVATION POINTS

For waveform observation points, refer to P. 16-12-3

EXAMPLES OF ABNORMAL WAVEFORMS

For examples of abnormal waveforms, refer to P. 16-12-4

**INSPECTION OF PRIMARY IGNITION VOLTAGE****MEASUREMENT METHOD**

- (1) Disconnect the ignition coil connector and connect the special tool (harness connector: MB998464) in between.
- (2) Connect the analyzer primary pickup to the ignition coil connector terminal (2) (black clip on the special tool) when observing the No. 1 - No. 4 cylinder group, terminal (1) (red clip) for the No. 2 - No. 5 cylinder group, and terminal [4] (white clip) for the No. 3 - No. 6 cylinder group.
- (3) Connect the primary pickup earth terminal.
- (4) Clamp the spark plug with the trigger pickup.

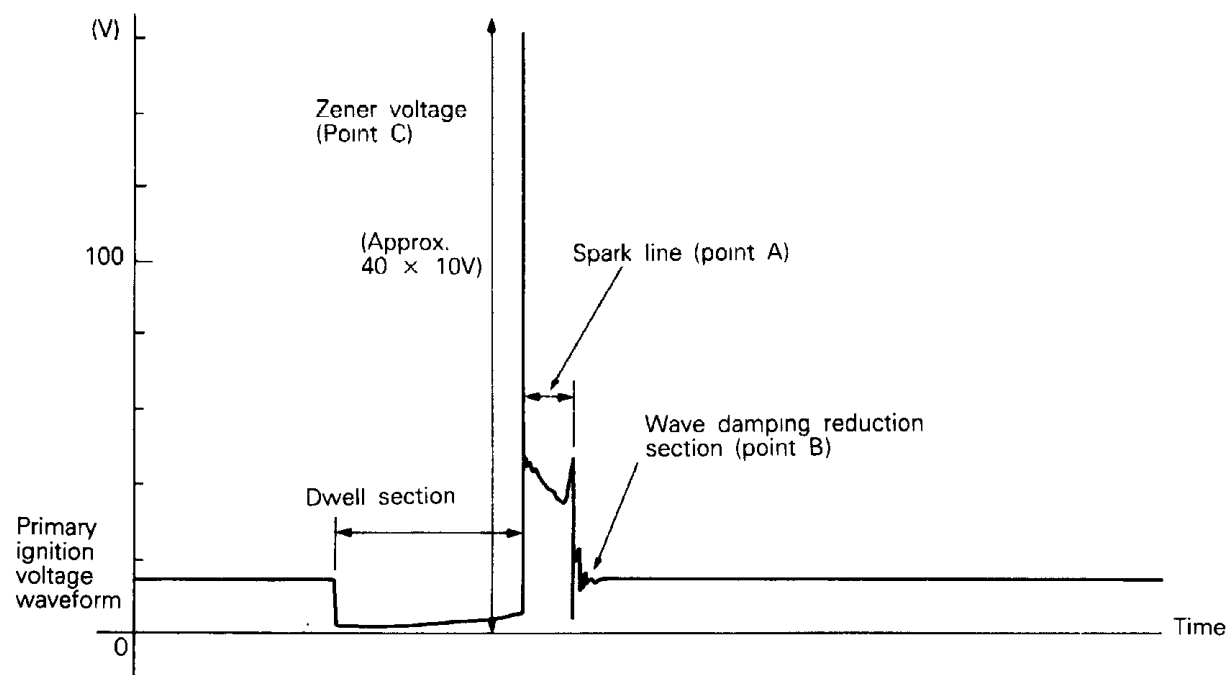
NOTE

1. Clamp the spark plug cable for No.1, No.2 and No.3 cylinders of the same group with the cylinder that is connected to the primary pickup.
2. The wave pattern of either cylinder in the same group will appear at the left edge of the screen.

STANDARD WAVEFORM

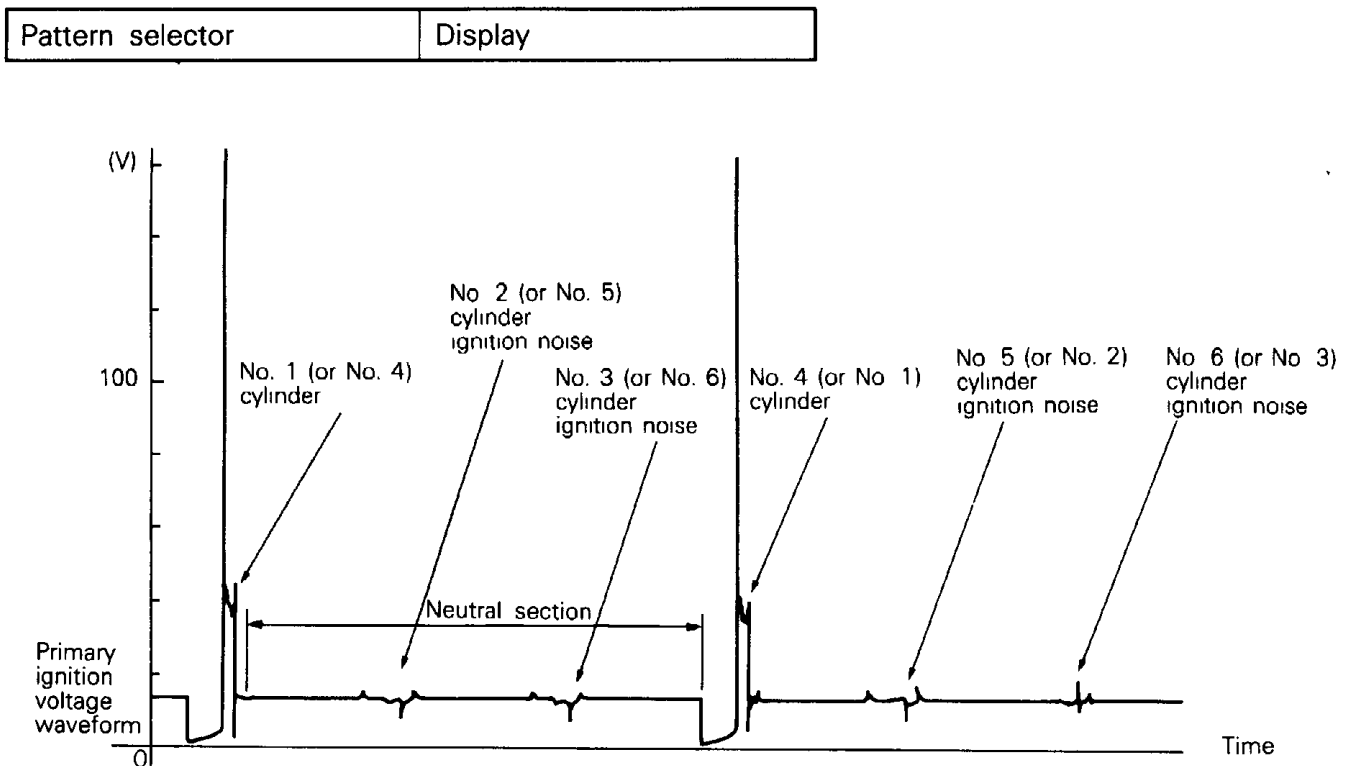
Observation Conditions

Function	Secondary
Pattern height	High (or Low)
Pattern selector	Raster
Engine revolutions	Idle (700 r/min.)



7EL0149

Observation Conditions (Only pattern selector below changes from the above conditions.)



7EL0151

WAVEFORM OBSERVATION POINT

For waveform observation points, refer to P.16-12-7

EXAMPLES OF ABNORMAL WAVEFORMS

For examples of abnormal waveforms, refer to P. 16-12-8

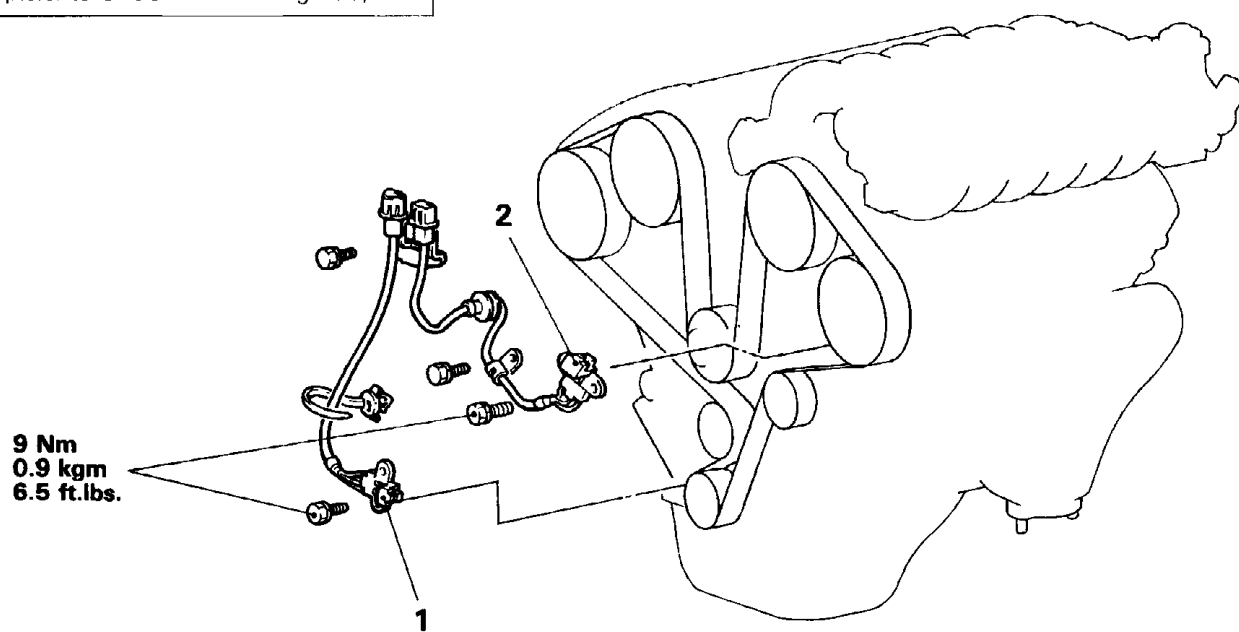
CRANK ANGLE SENSOR AND CAMSHAFT POSITION SENSOR <DOHC BUILT FROM NOVEMBER, 1992>

REMOVAL AND INSTALLATION

Pre-removal and Post-installation

Operation

- Removal and Installation of Timing Belt Cover
(Refer to GROUP 11 – Timing Belt)



16L1099

Removal steps

- 1 Crank angle sensor
- 2 Camshaft position sensor

INSPECTION

For information concerning the inspection of the camshaft position sensor and the crank angle sensor, refer to GROUP 13 – On-Vehicle Inspection of MPI Components.

EMISSION CONTROL

CONTENTS

E17AA--

SPECIFICATIONS	2	Vacuum Hose Piping Diagram	8
General Specifications	2	Vacuum Hose Layout	11
Service Specifications	2	Cautions on Inspection	12-2
Sealants and Adhesive	2	Crankcase Emission Control System	12-2
SERVICE ADJUSTMENT PROCEDURES	3	Evaporative Emission Control System	14
Emission Control Device Reference		Exhaust Emission Control System	
Table	3	<Vehicles built from December, 1992>	17
Component Layout	4	CATALYTIC CONVERTER	20

SPECIFICATIONS

E17CA--

GENERAL SPECIFICATIONS

Items	Name	Specifications
Crankcase emission control system	Positive crankcase ventilation (PCV) valve	Variable flow type (Purpose: HC reduction)
Evaporative emission control system	Canister 2-way valve Purge control solenoid valve	Equipped Equipped ON-OFF solenoid valve (Purpose: HC reduction)
Exhaust emission control system	Air-fuel ratio control device-MPI system	Oxygen sensor feedback type (Purpose: CO, HC, NOx reduction)
	EGR valve EGR control solenoid valve	Vacuum-activated diaphragm type Duty cycle type solenoid valve (Purpose: NOx reduction)
	Catalytic converter	Monolith type (Purpose: CO, HC, NOx reduction)

SERVICE SPECIFICATIONS

E17CB--

Items	Specifications
Purge control solenoid valve coil resistance [at 20°C (68°F)] Ω	36 – 44
EGR control solenoid valve coil resistance [at 20°C (68°F)] Ω	36 – 44

SEALANTS AND ADHESIVE

E17CE--

Items	Specified sealant and adhesive	Remarks
Engine coolant temperature sensor	3M Nut Locking Part No. 4171 or equivalent	Drying sealant

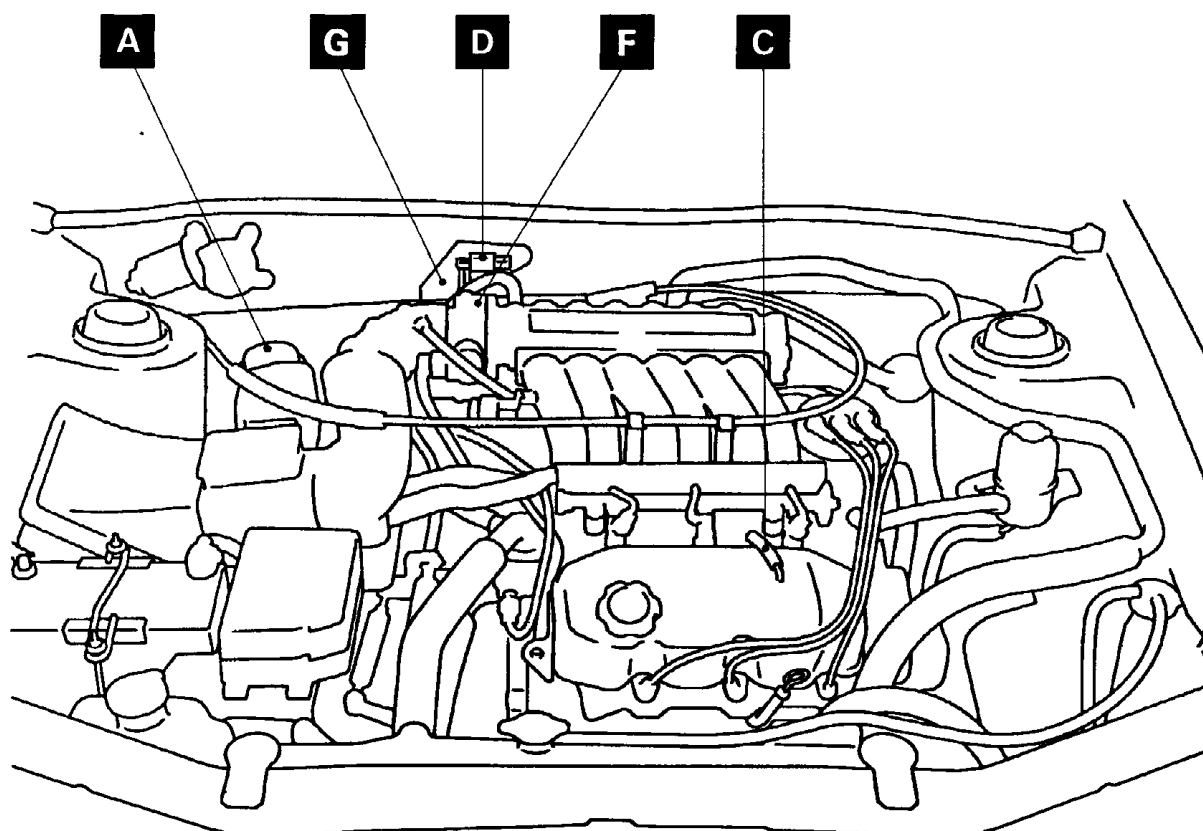
SERVICE ADJUSTMENT PROCEDURES

E17FE--

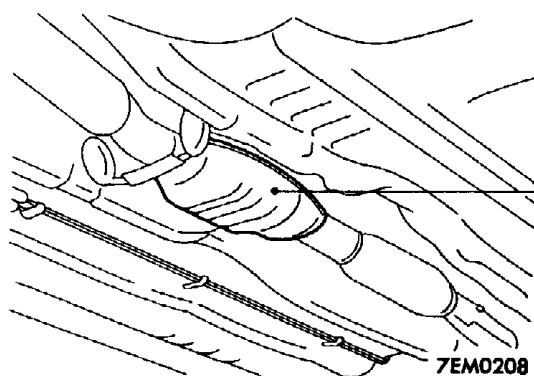
EMISSION CONTROL DEVICE REFERENCE TABLE

Related parts \ Emission control system	Crankcase emission control system	Evaporative emission control system	Air fuel ratio control system	Catalytic converter	Reference page for each part inspection
PCV valve	X				17-12-2
Purge control solenoid valve		X			17-16
2-way valve		X			Fuel (Group 13)
MPI system component		X	X		Fuel (Group 13)
Catalytic converter				X	17-20
EGR valve				X	17-18
EGR control solenoid valve				X	17-19

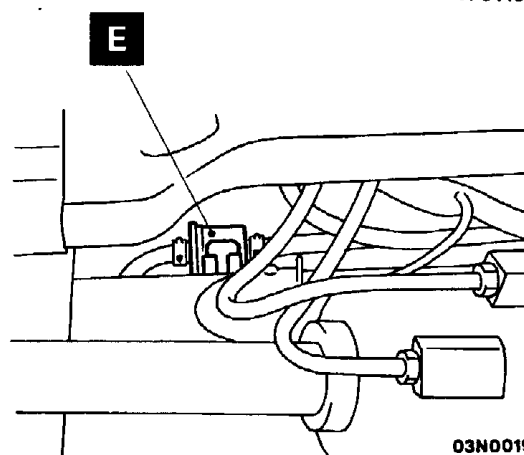
COMPONENT LAYOUT <SOHC>



17FU1154

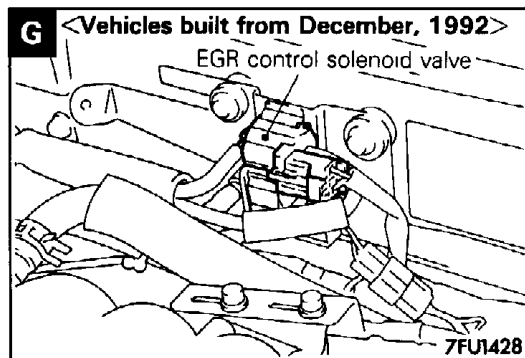
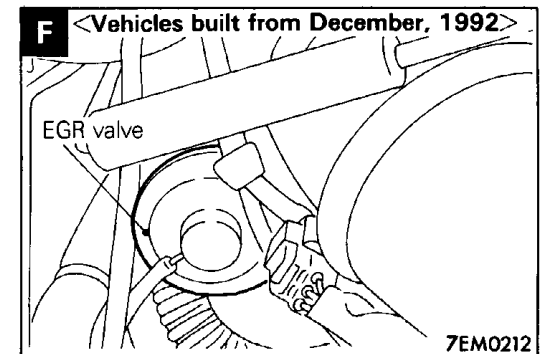
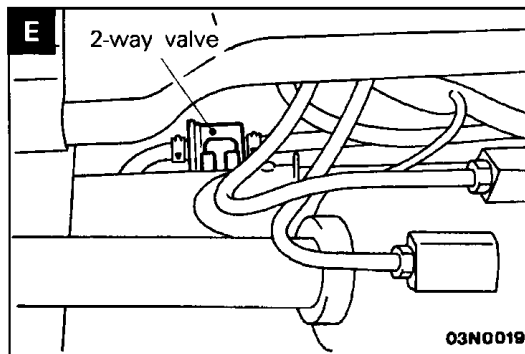
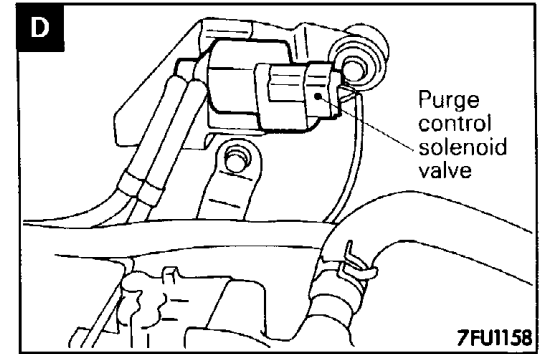
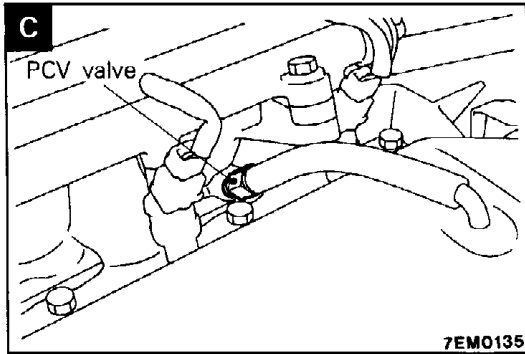
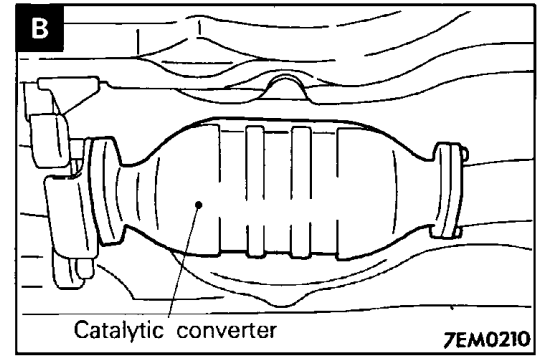
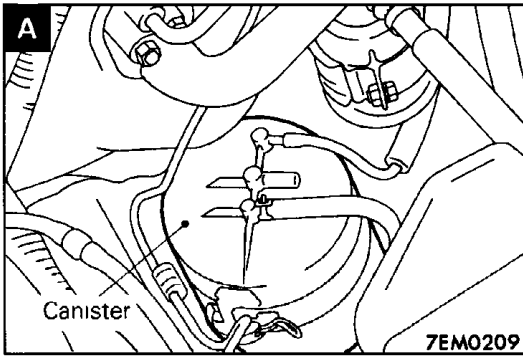


7EM0208

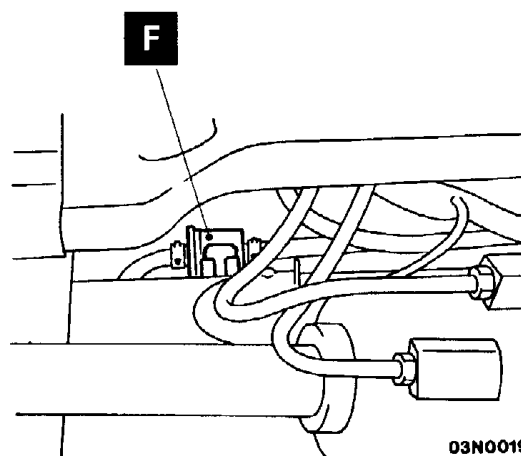
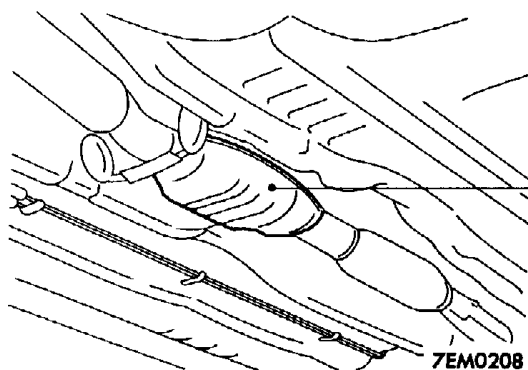
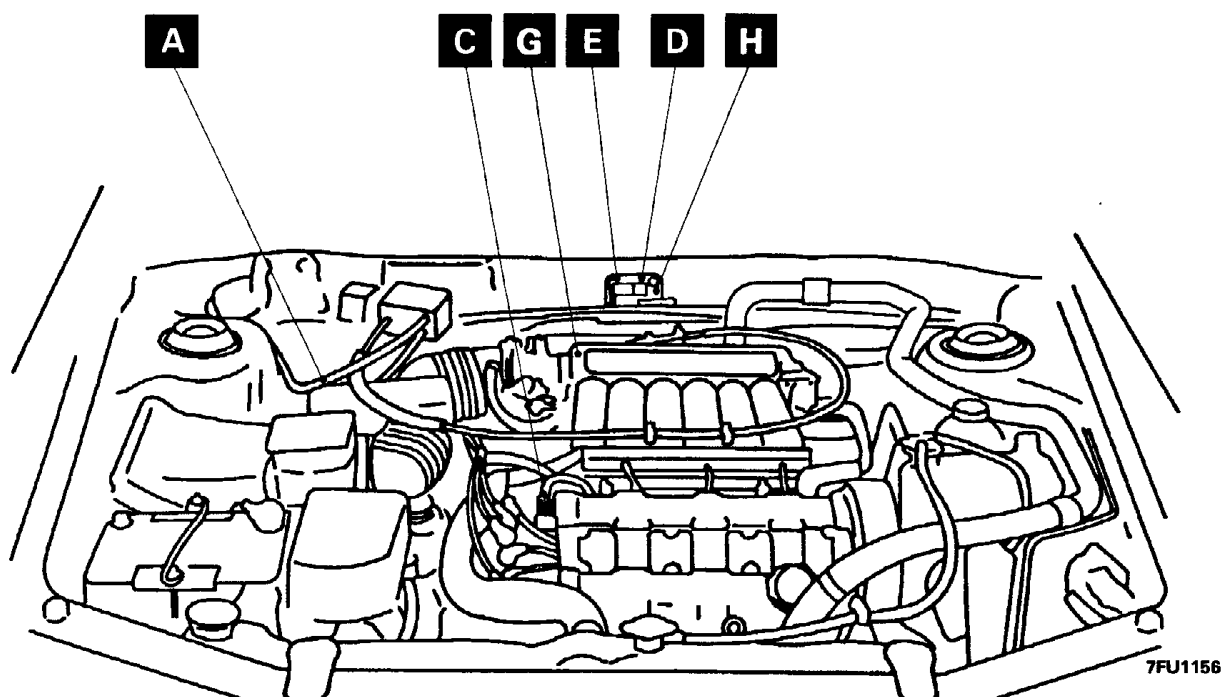


03N0019

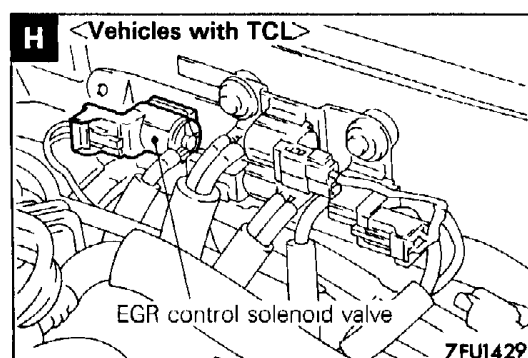
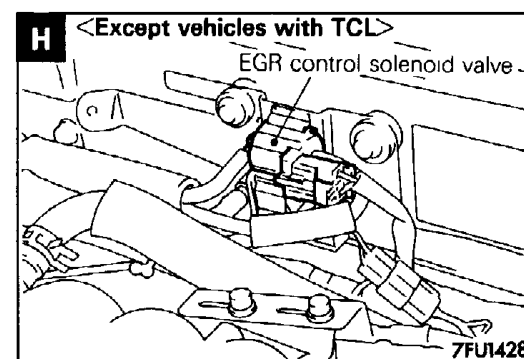
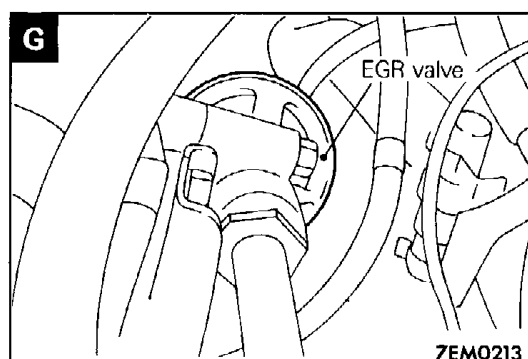
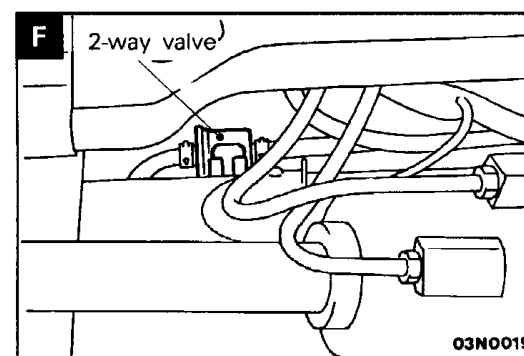
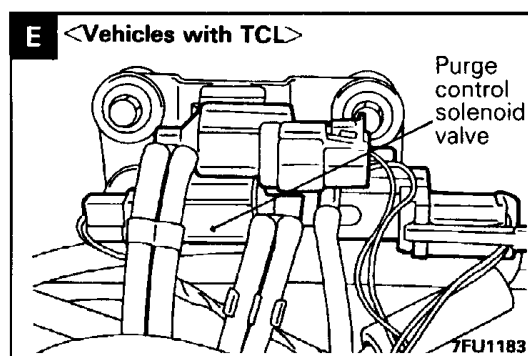
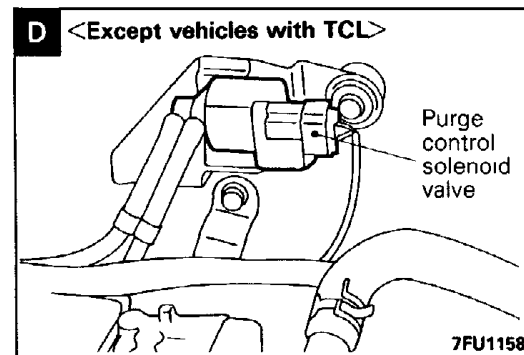
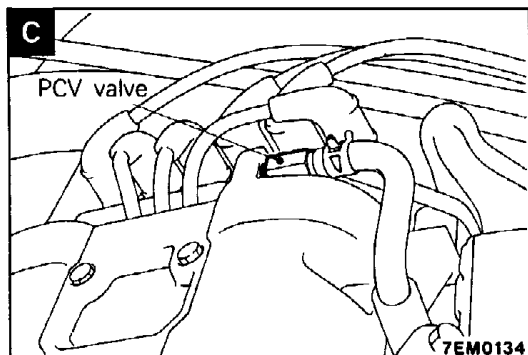
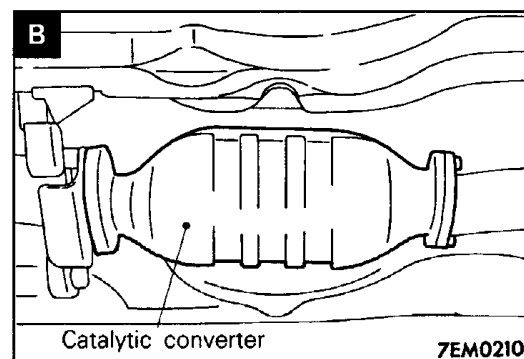
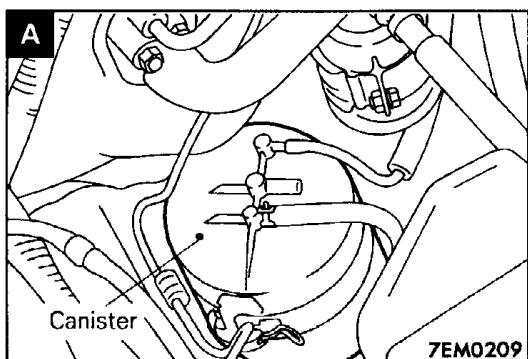
Parts name	Symbol
Canister	A
Catalytic converter	B
PCV valve	C
Purge control solenoid valve	D
2-way valve	E
EGR valve	F
EGR control solenoid valve	G



COMPONENT LAYOUT <DOHC>

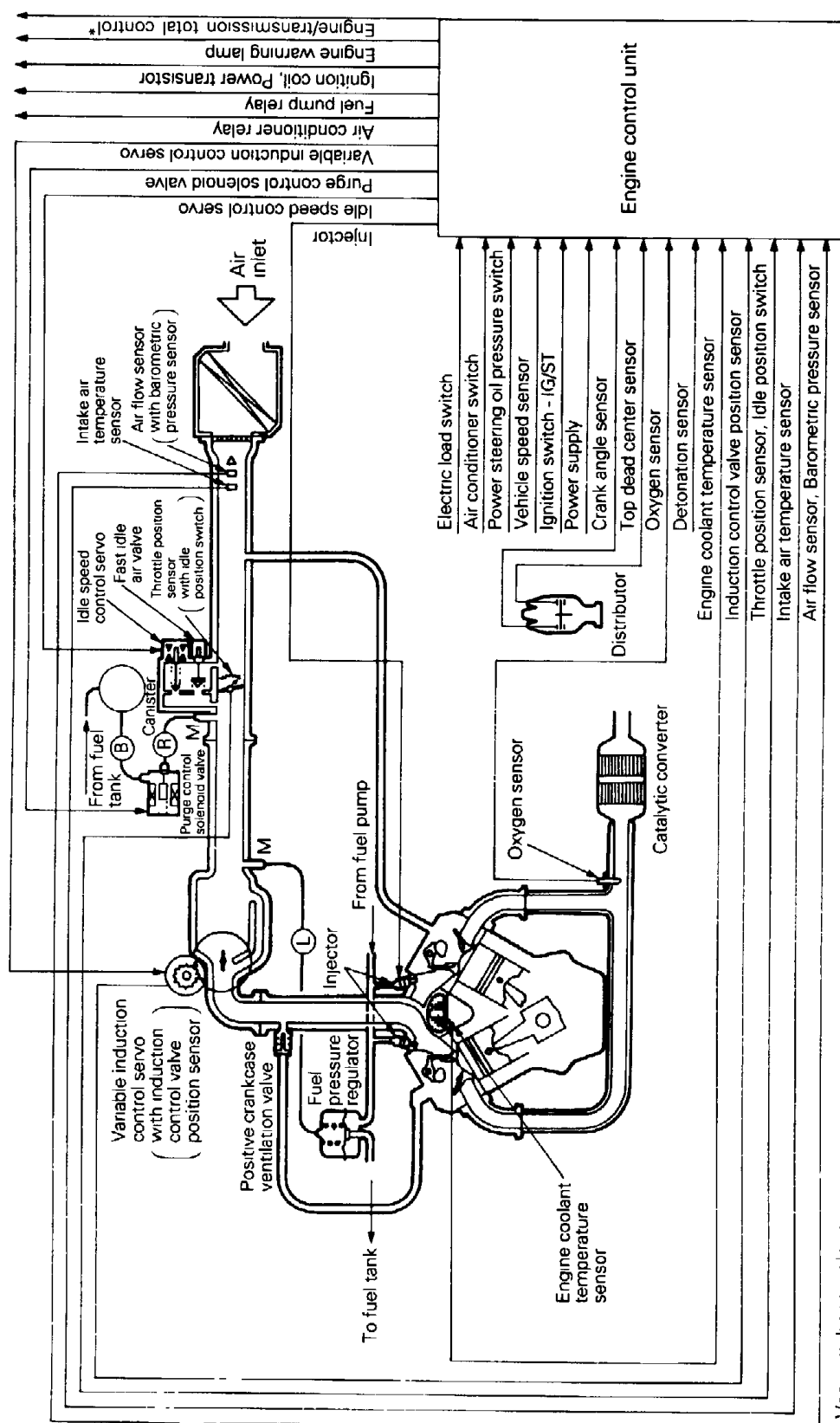


Parts name	Symbol
Canister	A
Catalytic converter	B
PCV valve	C
Purge control solenoid valve	D, E
2-way valve	F
EGR valve	G
EGR control solenoid valve	H



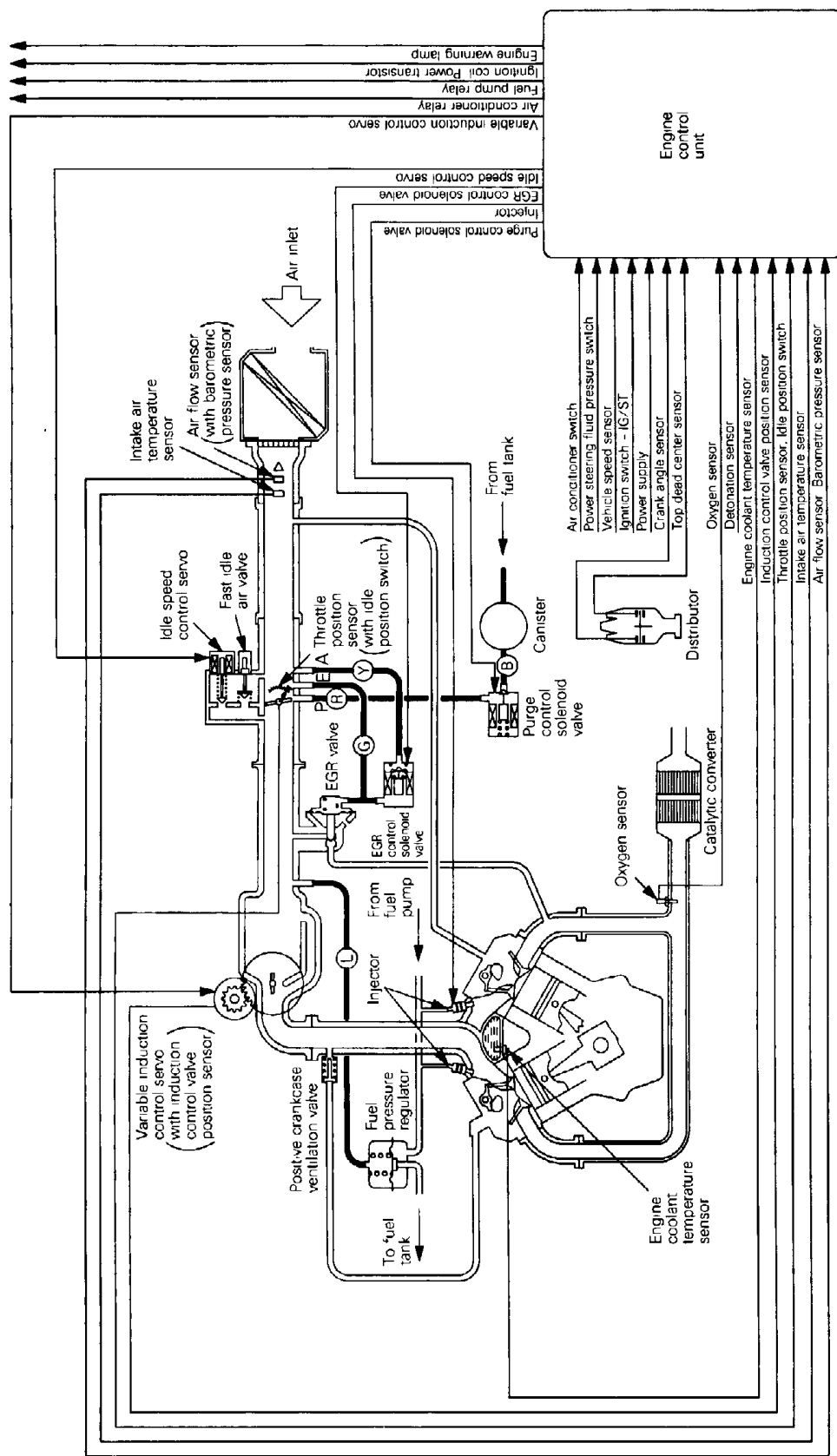
VACUUM HOSE PIPING DIAGRAM

<SOHC - Vehicles built up to November, 1992>



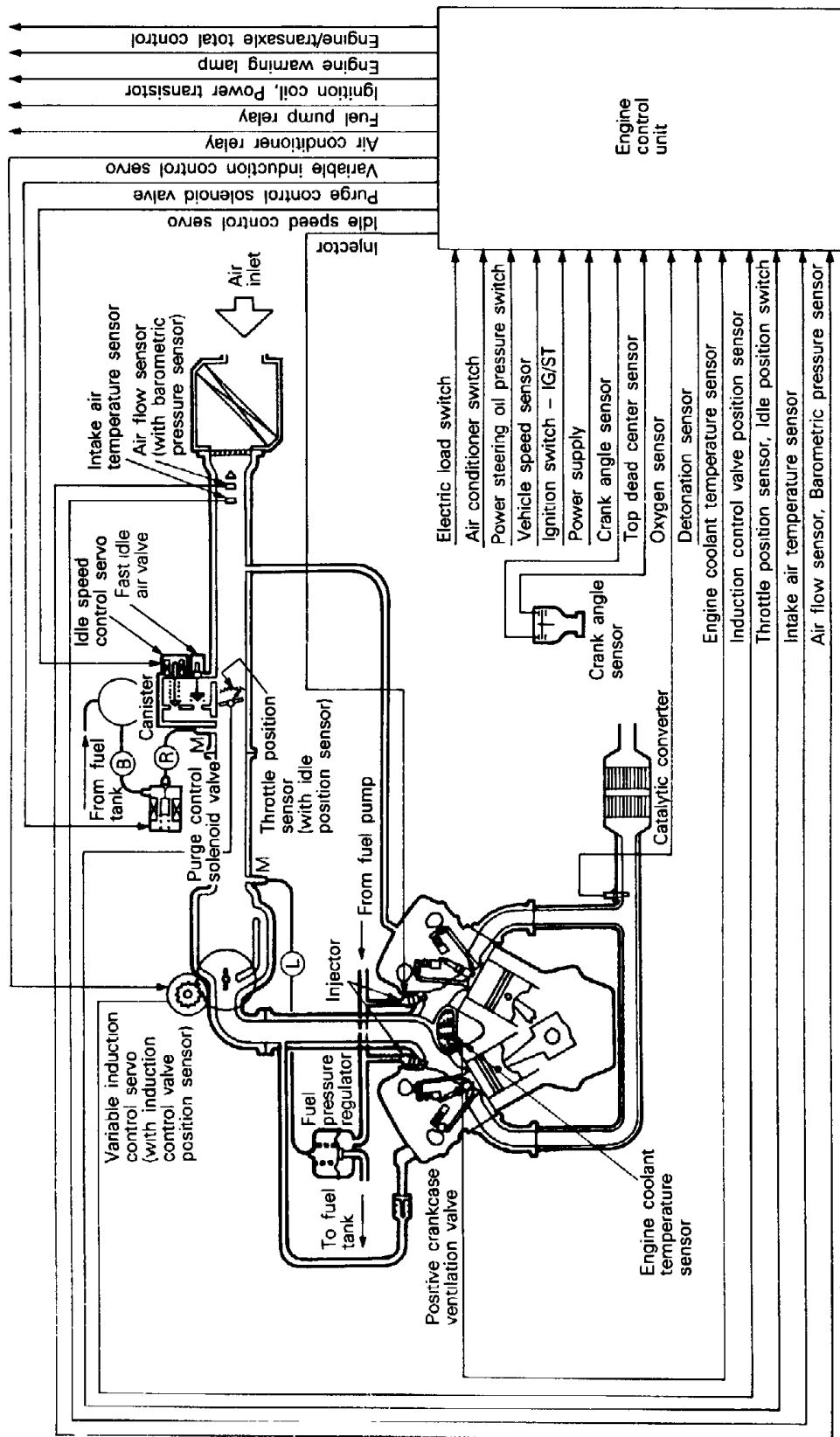
7FU1300

<SOHC – Vehicles built from December, 1992>



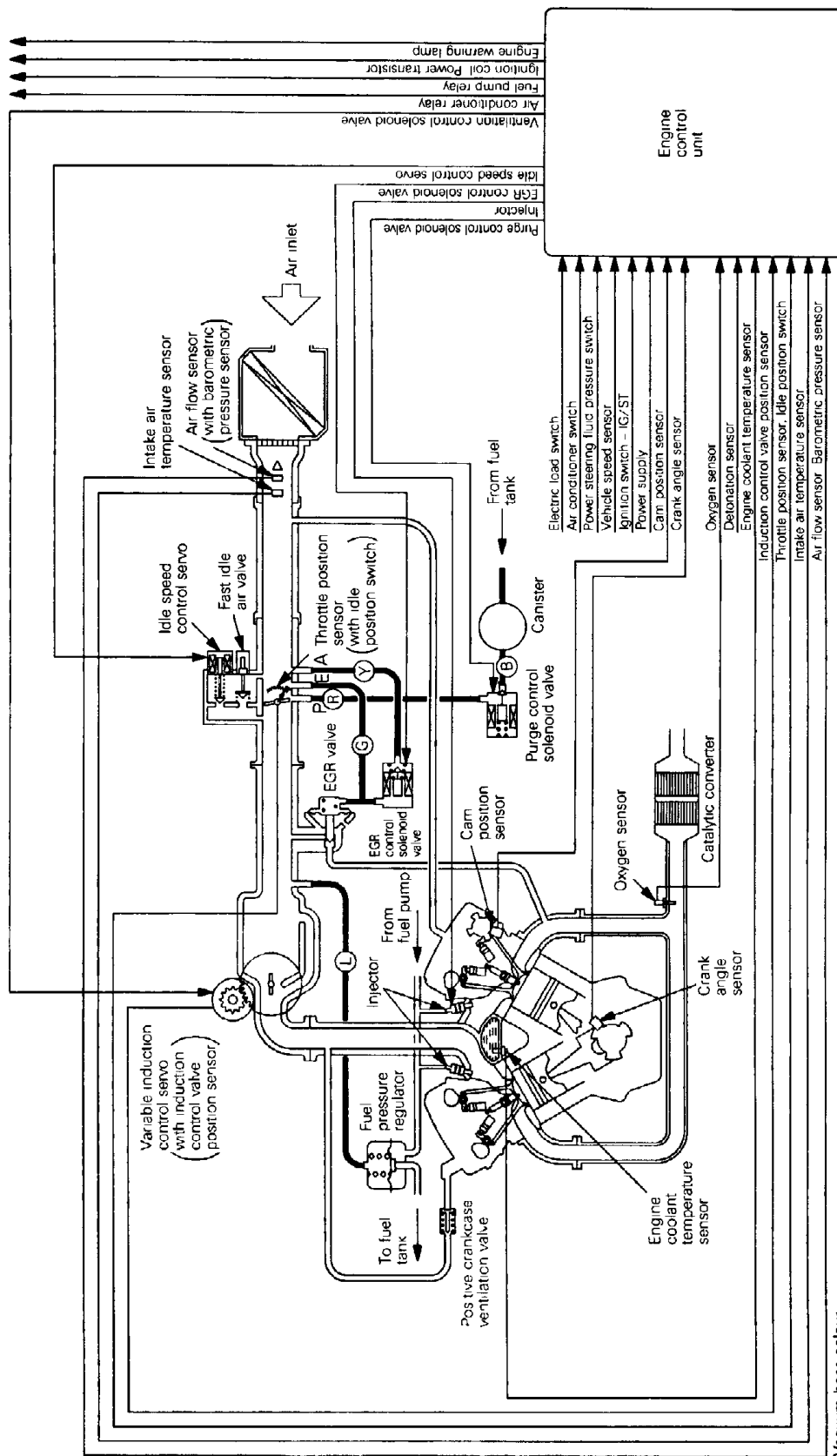
7EM0277

<DOHC – except vehicles with TCL – Vehicles built up to November, 1992>



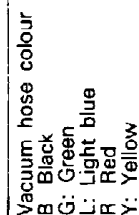
7FU1152

<DOHC – except vehicles with TCL – Vehicles built from December, 1992>

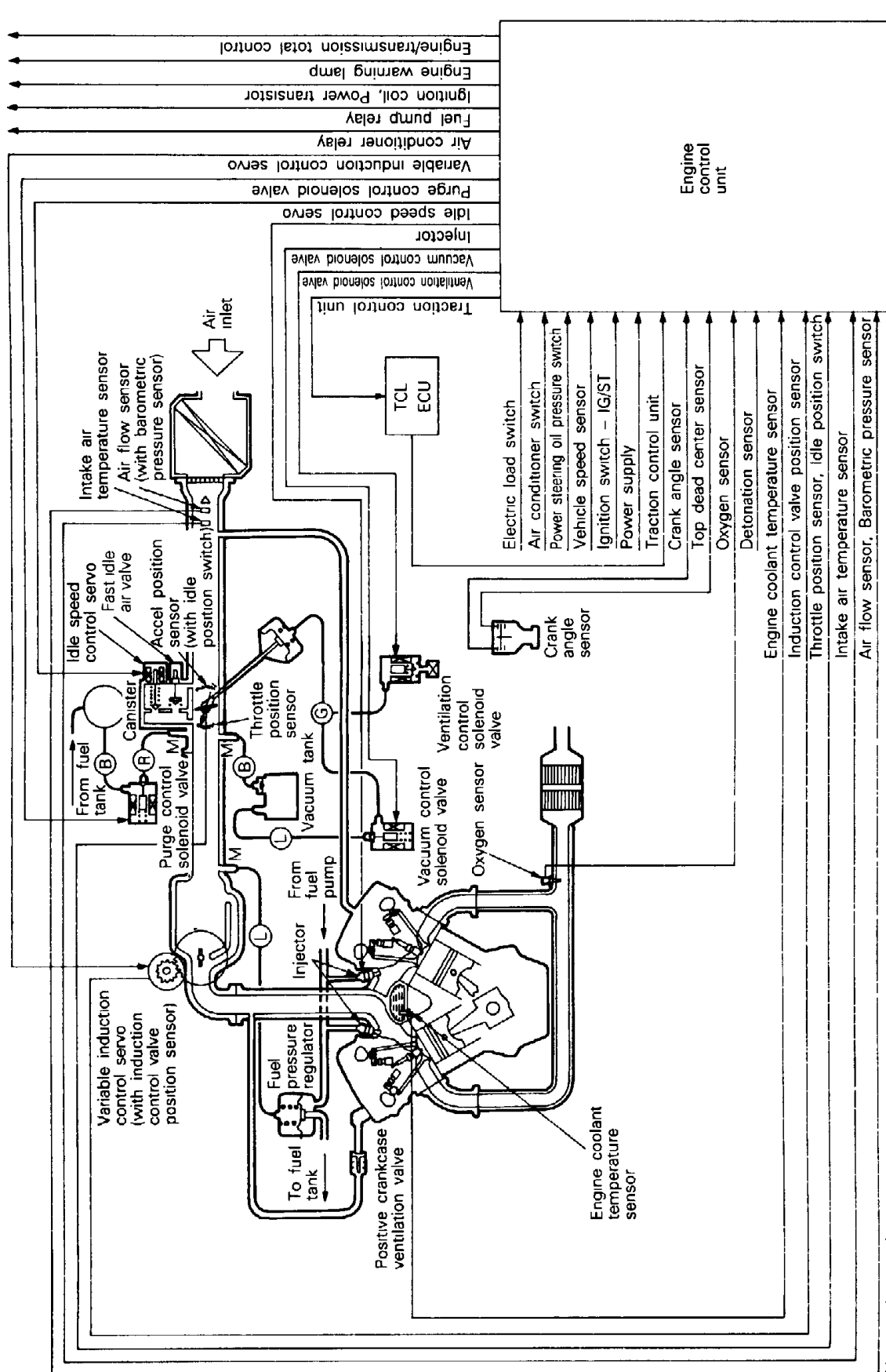


7EM0278

7FU1153

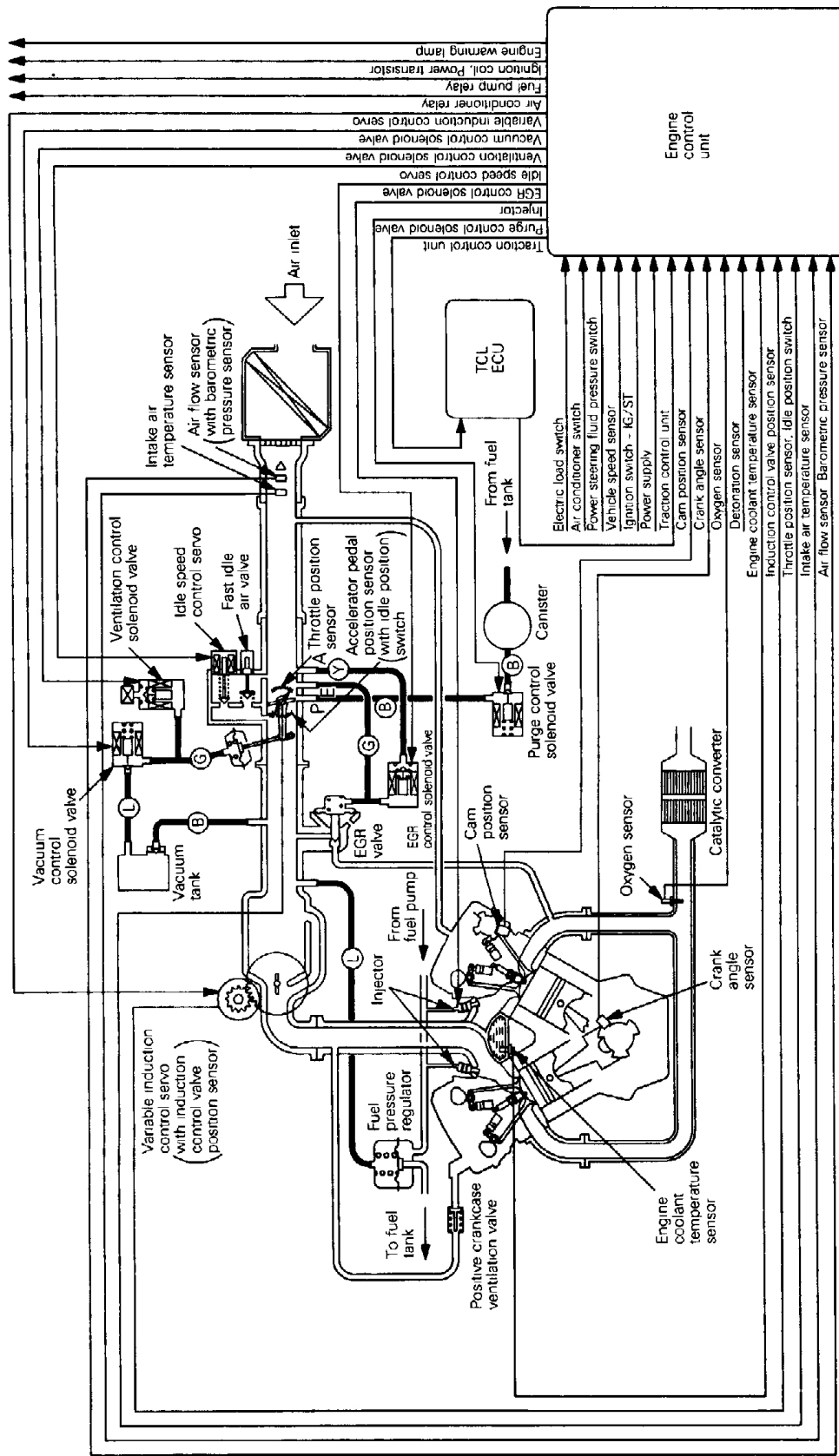


◁ Vehicles with TCL – Vehicles built from December, 1991 up to November, 1992 ▷

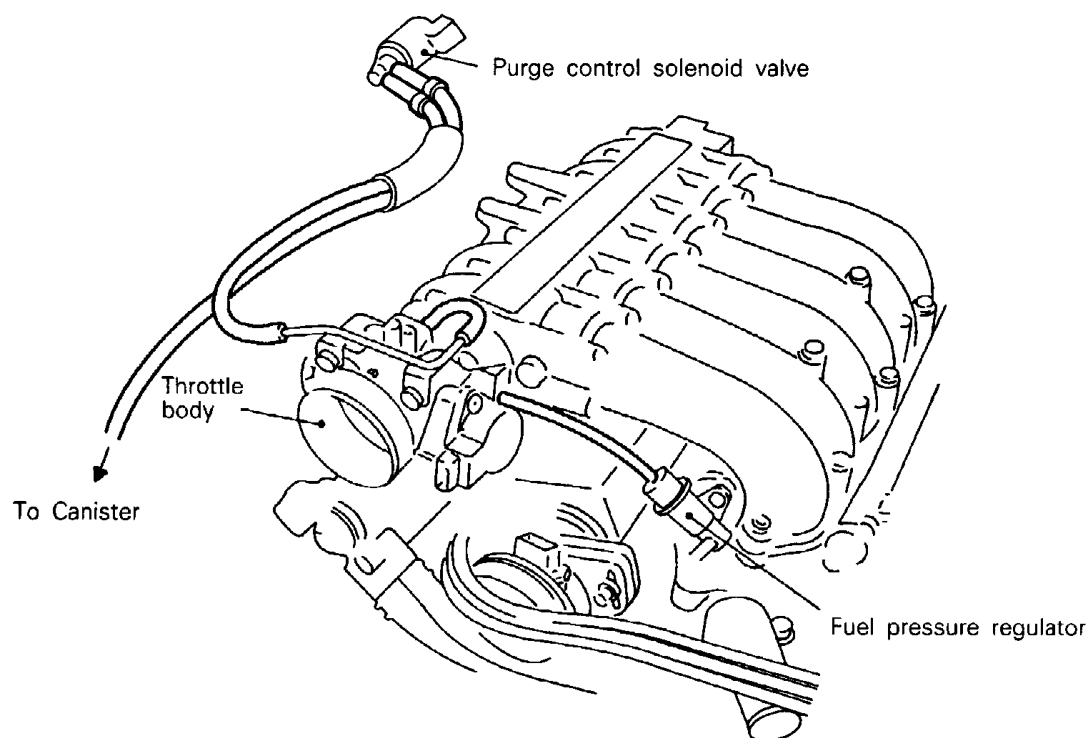


7FU1301

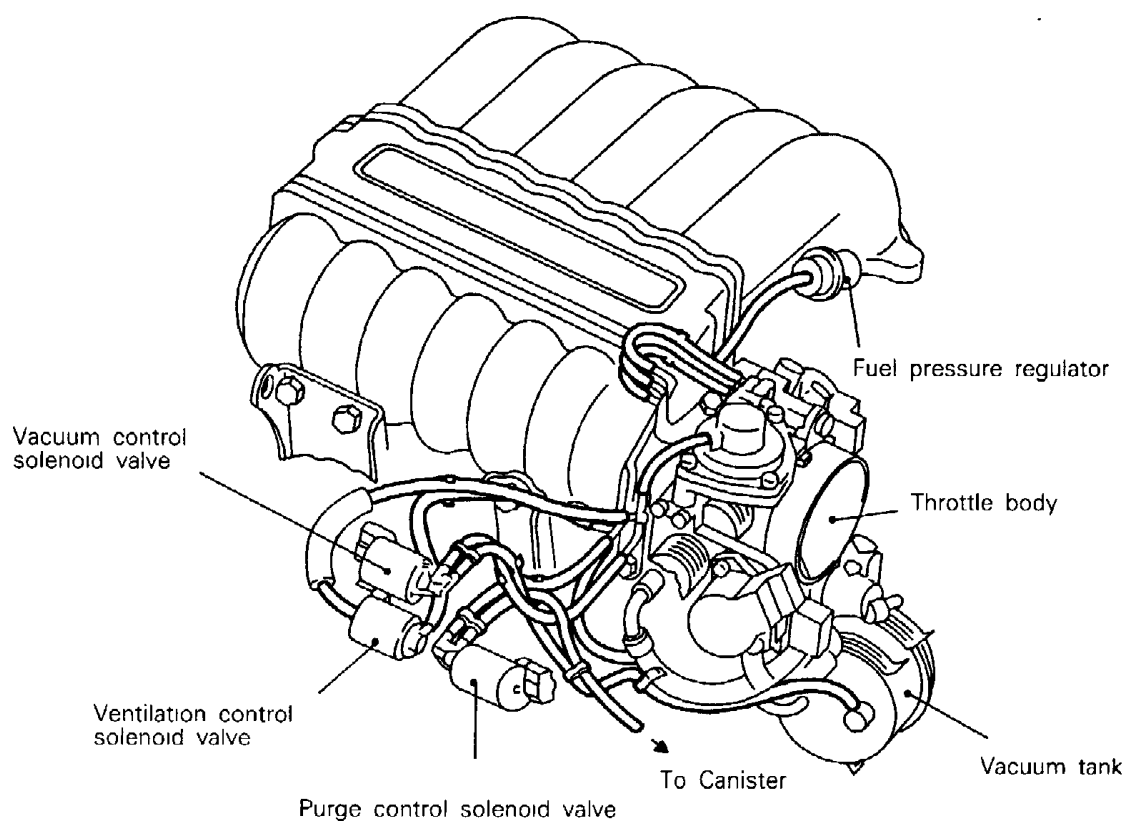
<Vehicles with TCL – Vehicles built from December, 1992>



7EM0279

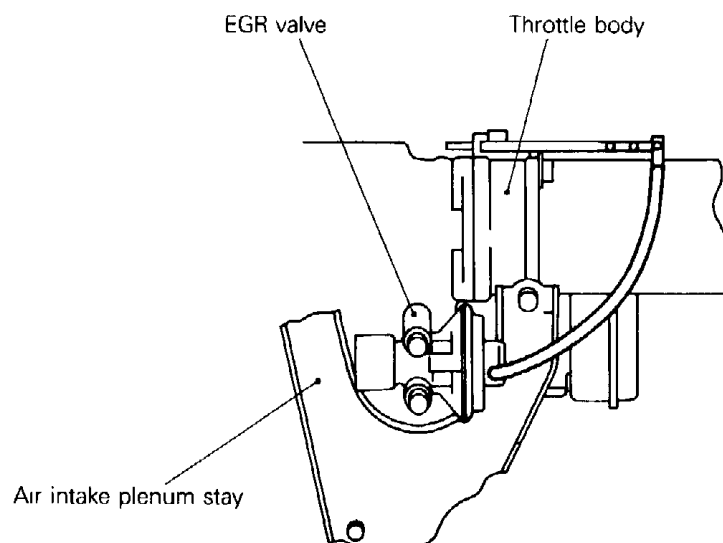
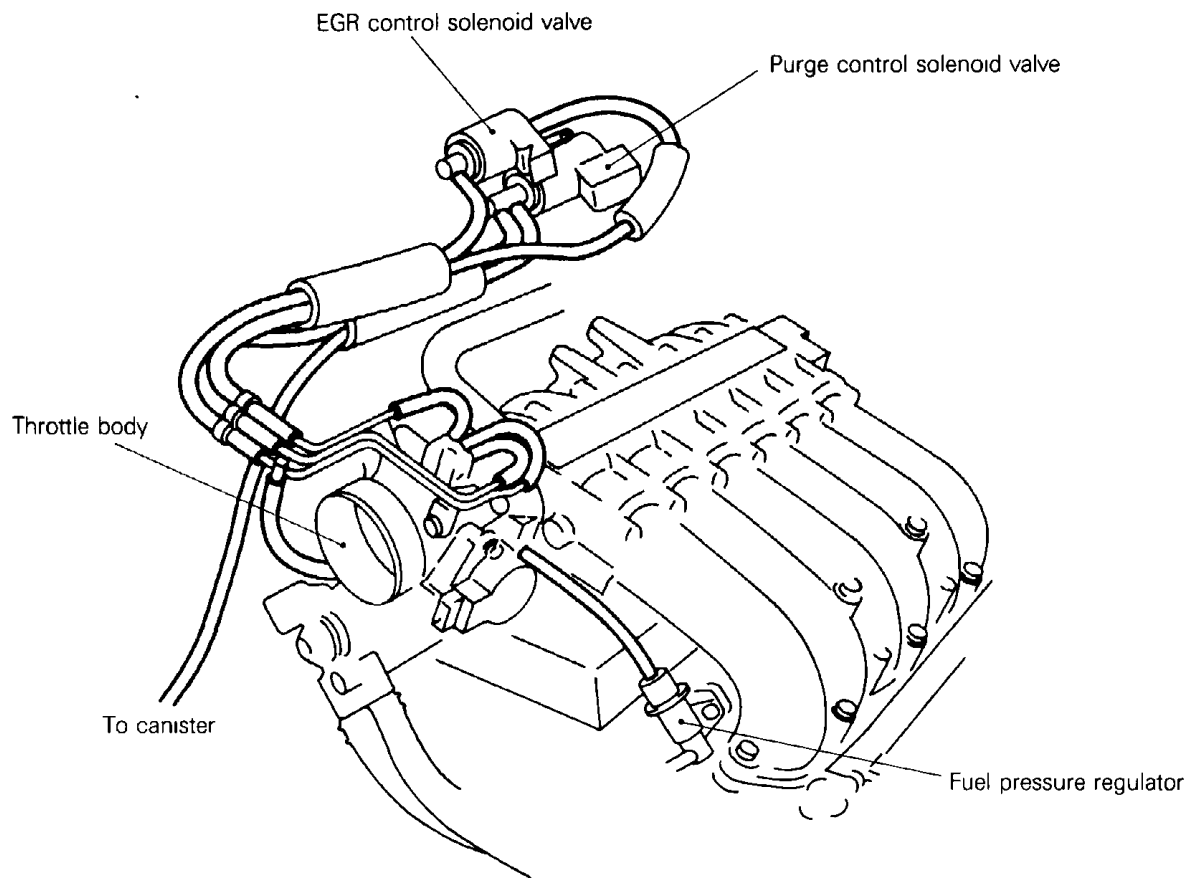
VACUUM HOSE LAYOUT**<SOHC, DOHC – except vehicles with TCL – Vehicles built up to November, 1992>**

7EM0175

<Vehicles with TCL – Vehicles built up to November, 1992>

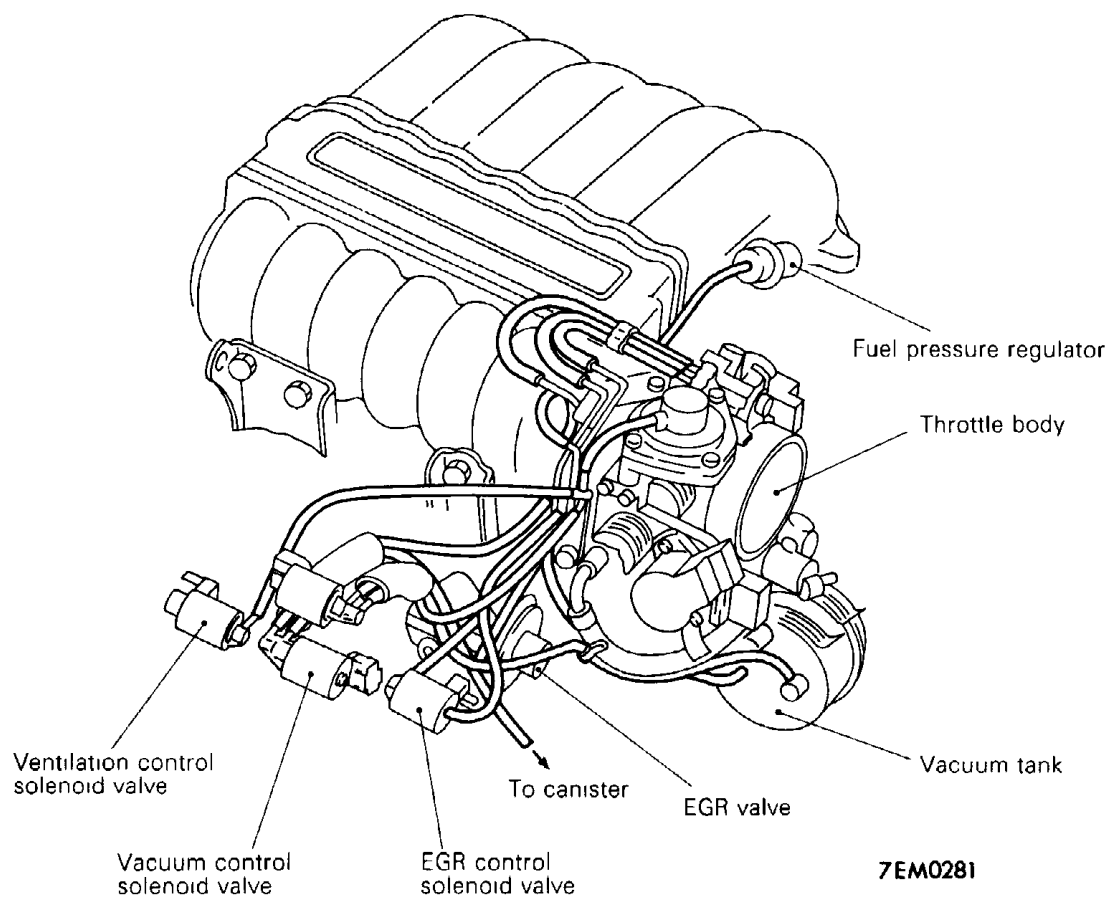
7EM0176

<SOHC, DOHC – except vehicles with TCL – Vehicles built from December, 1992>



7EM0280

<Vehicles with TCL – Vehicles built from December, 1992>



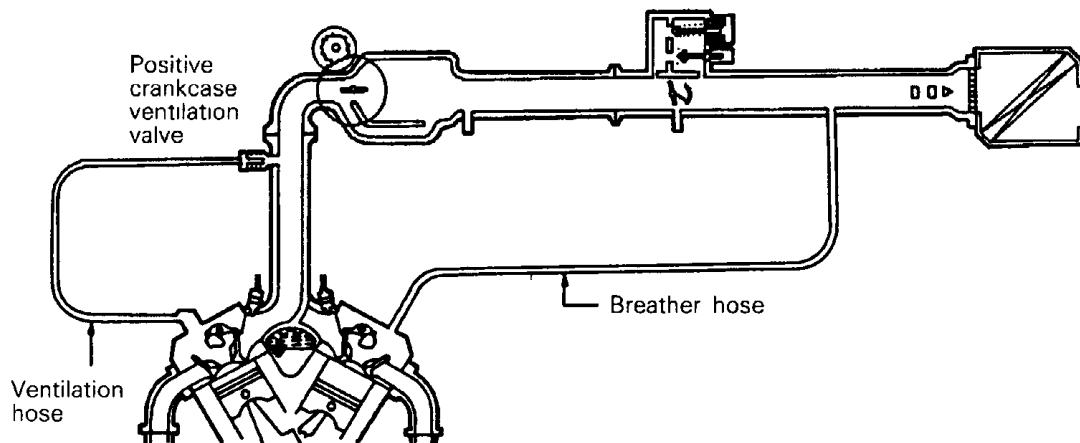
CAUTIONS ON INSPECTION

E17FFAE

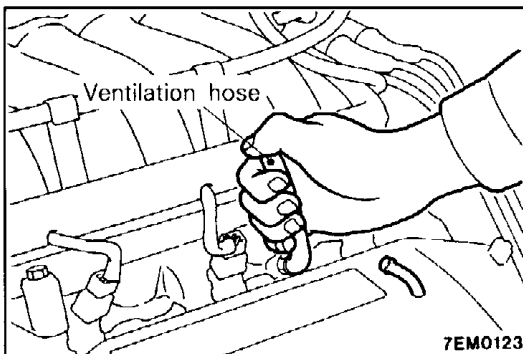
1. Inspect the various devices only after completing engine adjustment.
2. Inspect the hoses to make sure there are no disconnections, connection errors or damage.
3. Make sure there is no hose, pipe or port clogging, or cracks or damage in the hoses and pipes.
4. When replacing device hoses, always mount the replacement hose in the same position (direction) as the original.
5. When finished, check the connections as described in the service manual or service label.

**CRANKCASE EMISSION CONTROL SYSTEM
<SOHC>**

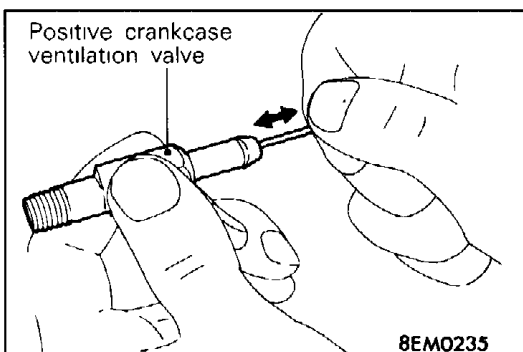
E17FAAL



7EM0177



7EM0123



8EM0235

**POSITIVE CRANKCASE VENTILATION SYSTEM
System Inspection**

- (1) Remove the ventilation hose from the rocker cover.
- (2) Start the engine and run at idle.
- (3) Place a finger on the ventilation hose and confirm that negative pressure of the intake manifold is felt.

NOTE

At this moment, the plunger in the positive crankcase ventilation valve moves forward and backward.

- (4) If negative pressure is not felt, clean the positive crankcase ventilation valve or replace it.
- (5) Tighten the positive crankcase ventilation valve with the specified torque.

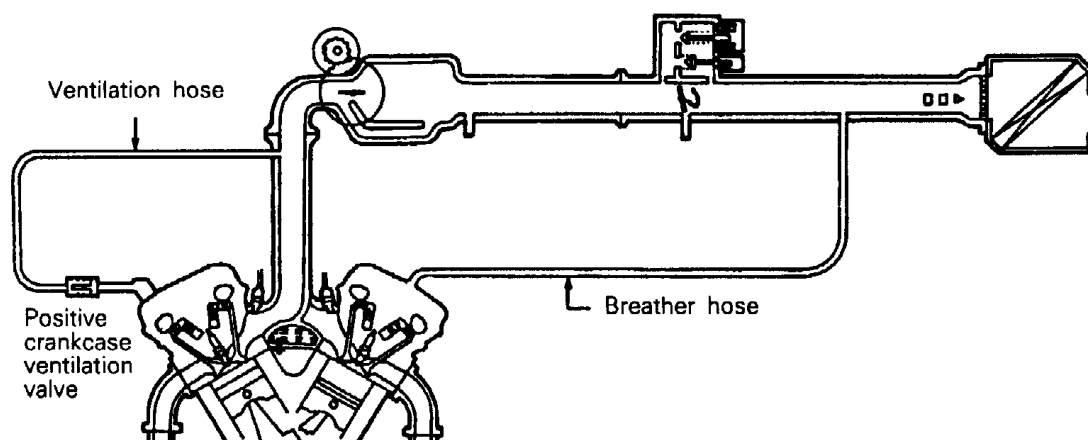
Tightening torque: 10 Nm (1.0 kgm, 7.2 ft.lbs.)

Positive Crankcase Ventilation (PCV) Valve Inspection

- (1) Slide in a narrow stick from the nipple side of the positive crankcase ventilation valve and move it forward and backward to check the plunger movement.
- (2) If the plunger does not move, there is a clogging in the positive crankcase ventilation valve. In this case, clean or replace the valve.

CRANKCASE EMISSION CONTROL SYSTEM <DOHC>

E17FAAM



7EM0178

POSITIVE CRANKCASE VENTILATION SYSTEM System Inspection

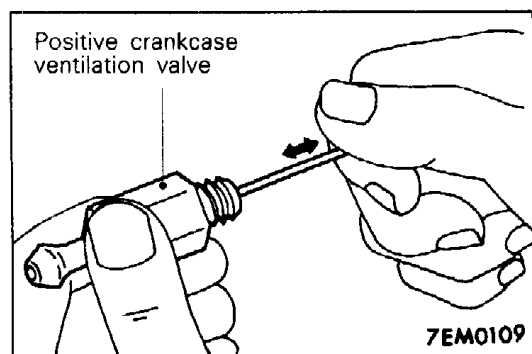
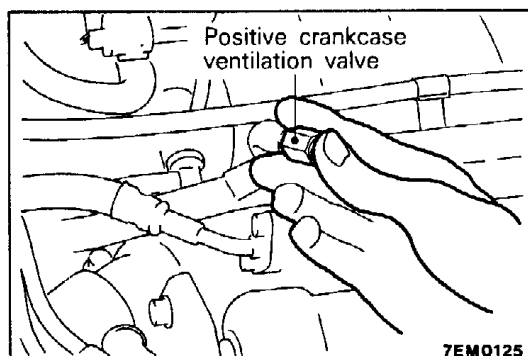
- (1) Remove the ventilation hose from the positive crankcase ventilation valve.
- (2) Remove the positive crankcase ventilation valve from the rocker cover.
- (3) Reinstall the positive crankcase ventilation valve at the ventilation hose.
- (4) Start the engine and run at idle.
- (5) Place a finger at the opening of the positive crankcase ventilation valve and confirm that negative pressure of the intake manifold is felt.

NOTE

At this moment, the plunger in the positive crankcase ventilation valve moves forward and backward.

- (6) If negative pressure is not felt, clean the positive crankcase ventilation valve or replace it.
- (7) Tighten the positive crankcase ventilation valve with the specified torque.

Tightening torque: 10 Nm (1.0 kgm, 7.2 ft.lbs.)



Positive Crankcase Ventilation (PCV) Valve Inspection

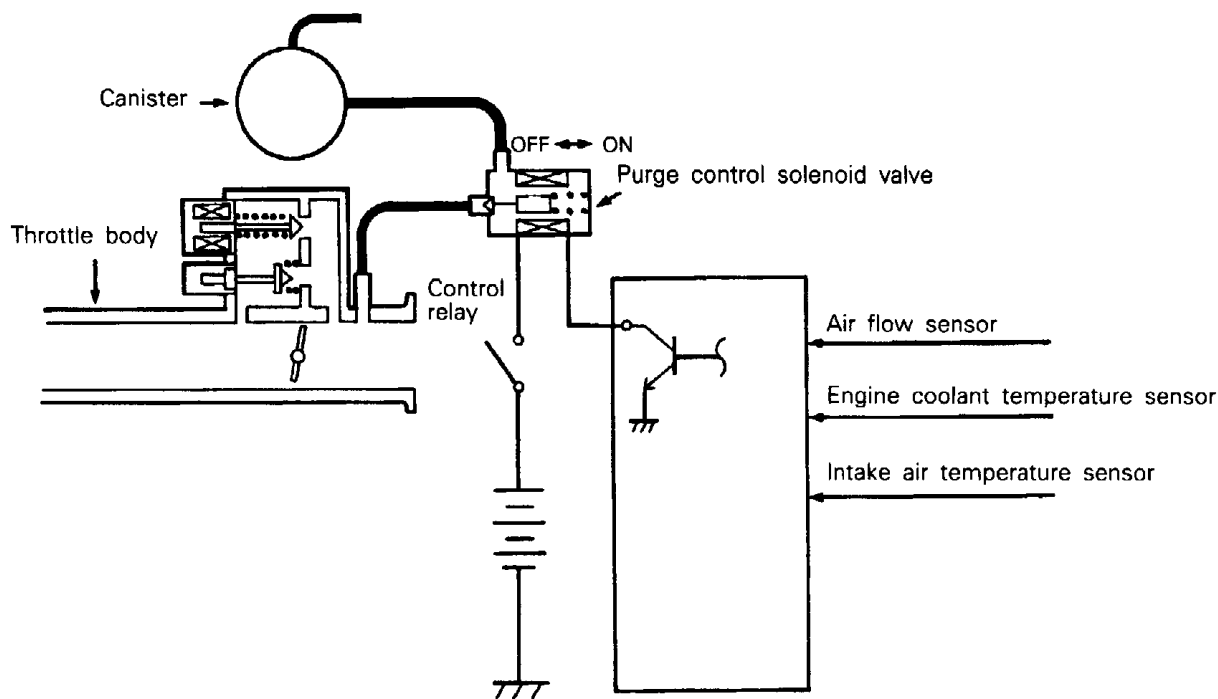
- (1) Slide in a narrow stick at the threaded side of the positive crankcase ventilation valve and make sure that the plunger moves.
- (2) If the plunger does not move, there is a clogging in the positive crankcase ventilation valve. In this case, clean or replace the valve.

EVAPORATIVE EMISSION CONTROL SYSTEM

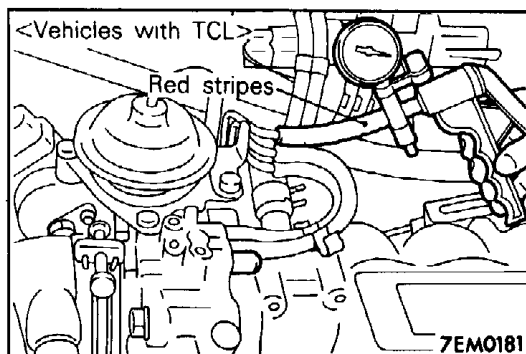
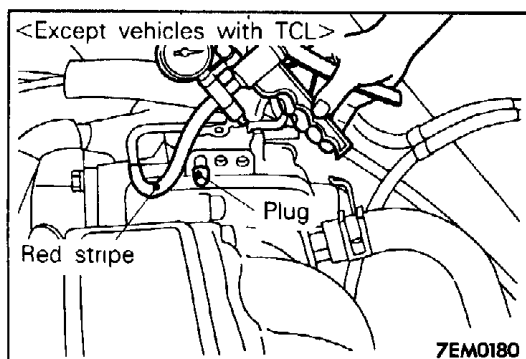
PURGE CONTROL SYSTEM

E17FBAZ

System Inspection



7EM0179



- (1) Disconnect the vacuum hose (red stripes) from the throttle body and connect it to a hand vacuum pump.
- (2) Plug the nipple from which the vacuum hose was removed.
- (3) Inspect the following items with the engine cold [Engine coolant temperature: 40°C (104°F) or less] and hot [Engine coolant temperature: 80°C (176°F) or higher].

When engine is cold

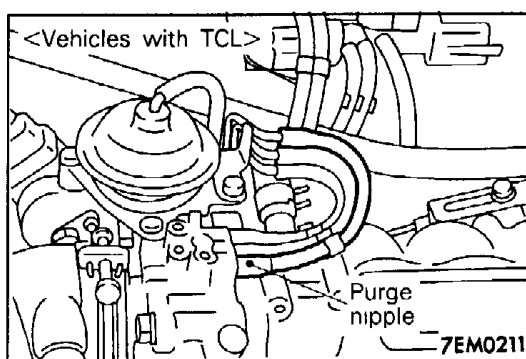
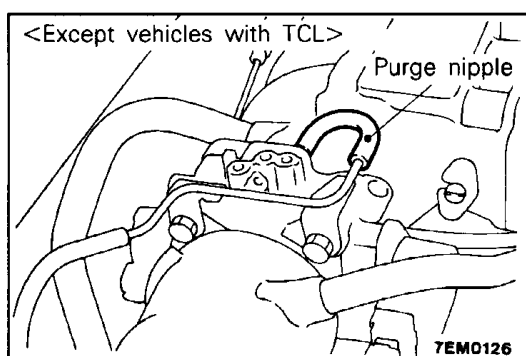
Vacuum	Engine status	Normal condition
400 mm Hg (15.7 in.Hg.)	3,000 r/min.	Vacuum is maintained

When engine is hot

Vacuum	Engine status	Normal condition
400 mm Hg (15.7 in.Hg.)	Idling	Vacuum is maintained
	3,000 r/min.	Vacuum will leak for approximately 3 minutes after the engine is started. After 3 minutes have elapsed, the vacuum will be maintained momentarily, after which it will again leak.*

NOTE

- * The vacuum will leak continuously if the barometric pressure is approximately 580 mmHg (22.8 in.Hg.) or less, or the temperature of the intake air is approximately 50°C (122°F) or higher.

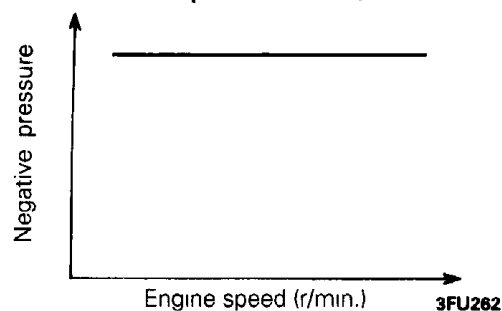
**Purge Port Vacuum Inspection****Check Condition**

Engine coolant temperature: 80–95°C (176–205°F)

- (1) Disconnect the vacuum hose (black) from the throttle body purge hose nipple and connect a hand vacuum pump to the nipple.

17-15-1 EMISSION CONTROL – Service Adjustment Procedures

<Vehicles built up to November, 1991>



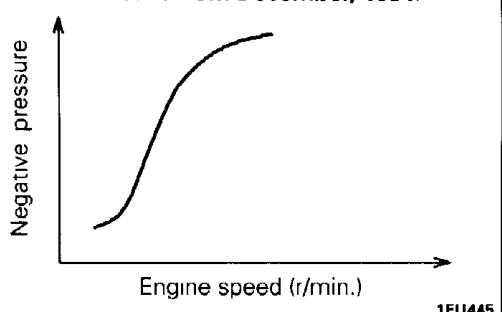
(2) <Vehicles built up to November, 1991>

Start the engine and check to see that, after raising the engine speed by racing the engine, purge vacuum is kept constant regardless of the increased engine speed.

NOTE

If there is no vacuum created, it is possible that the throttle body purge port may be clogged and required cleaning.

<Vehicles built from December, 1991>



<Vehicles built from December, 1991>

Start the engine and check to see that, after raising the engine speed by racing the engine, purge vacuum raises proportionately with the rise in engine speed.

NOTE

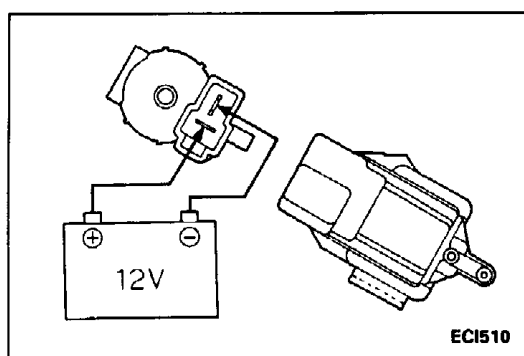
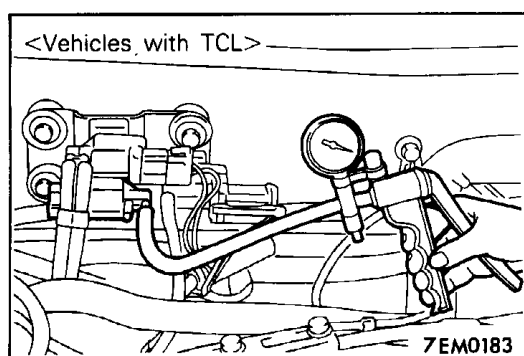
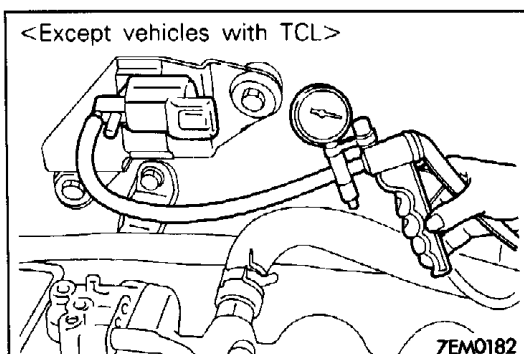
If there is a problem with the change in vacuum, it is possible that the throttle body purge port may be clogged and require cleaning.

Purge Control Solenoid Valve**Inspection****NOTE**

When disconnecting the vacuum hose, always make a mark so that the hose can be reconnected at original position.

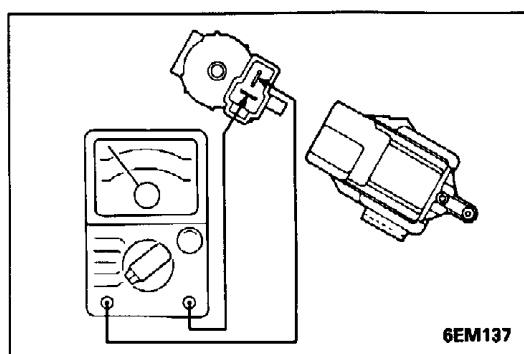
- (1) Disconnect the vacuum hose (black, red stripes) from the solenoid valve.
- (2) Disconnect the harness.

- (3) Connect a hand vacuum pump to the nipple to which the vacuum hose with red stripes was connected.



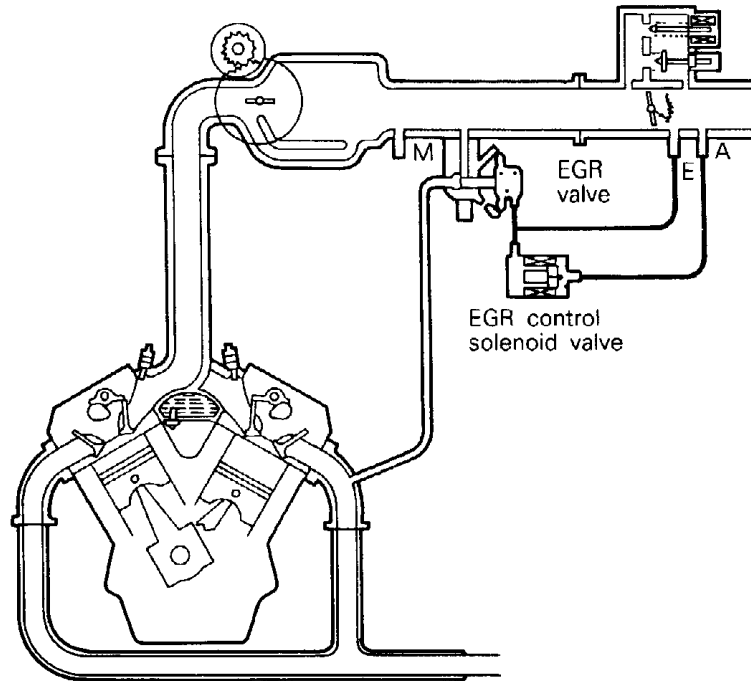
- (4) Check air tightness by applying a vacuum with voltage applied directly from the battery to the purge control solenoid valve and without applying voltage.

Battery voltage	Normal condition
Applied	Vacuum leaks
Not applied	Vacuum maintained

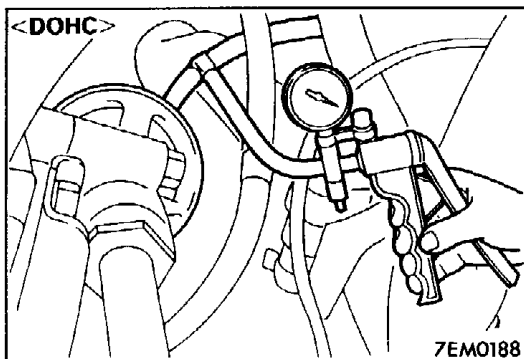
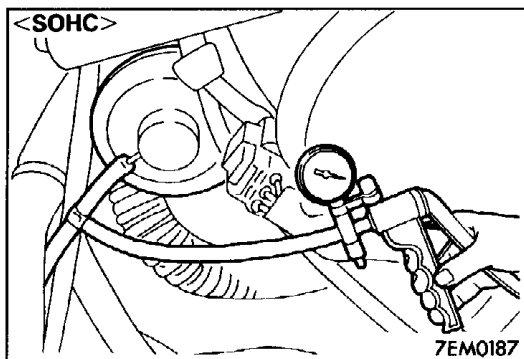


- (5) Measure the resistance between the terminals of the solenoid valve.

Standard value: 36–44 Ω [at 20°C (68°F)]

EXHAUST EMISSION CONTROL SYSTEM <Vehicles built from December, 1992>**EXHAUST GAS RECIRCULATION (EGR) SYSTEM****EGR System Inspection**

7EM0186



- (1) Disconnect the green striped vacuum hose from the EGR valve, and using a three-way terminal, connect a hand vacuum pump as shown.
- (2) Perform checks as follows both for when the engine is not hot [engine coolant temperature 20°C (68°F) or lower] and when the engine is hot [engine coolant temperature 80°C (176°F) or higher].

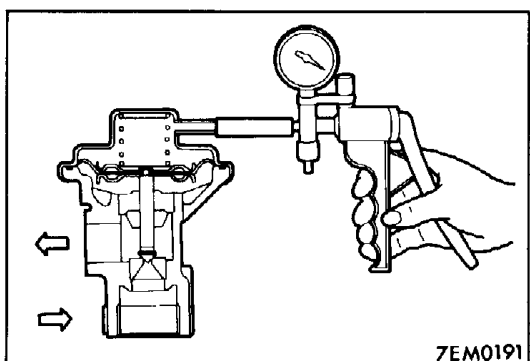
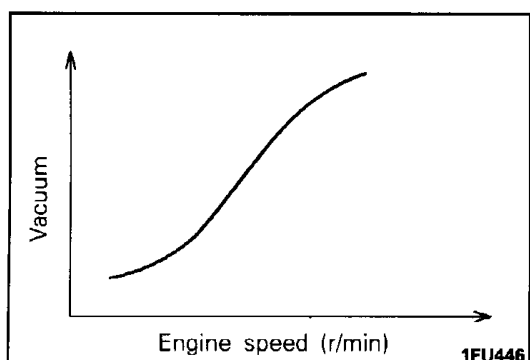
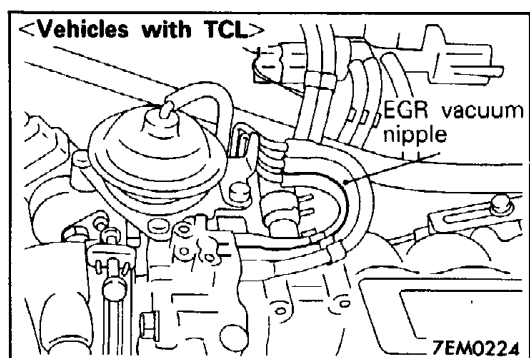
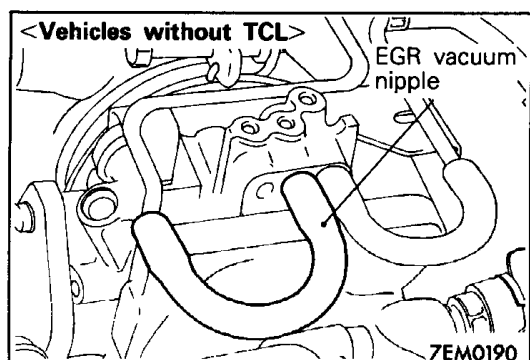
When engine is not hot

Engine operating condition	Normal result
Quickly depress the accelerator pedal to race the engine.	No change in vacuum is detected (atmospheric pressure).

When engine is hot

Engine operating condition	Normal result
Quickly depress the accelerator pedal to race the engine.	Vacuum increases to 98 mmHg (3.9 in.Hg) or higher level.

- (3) Remove the three-way terminal and connect the hand vacuum pump directly to the EGR valve.
- (4) Apply a vacuum of 230 mmHg (9.1 in.Hg) to the EGR valve while running the engine at idle, and make sure that the engine stalls or the idle speed becomes unstable.



EGR Valve Control Vacuum Inspection

Check Condition

Engine coolant temperature: 80–95°C (176–205°C)

- (1) Disconnect the vacuum hose from the throttle body EGR vacuum nipple and connect a hand vacuum pump to the nipple.
- (2) Start the engine and check to see that, after raising the engine speed by racing the engine, the vacuum raises proportionately with the rise in engine speed.

NOTE

If there is a problem with the change in vacuum, it is possible that the throttle body vacuum port may be clogged and require cleaning.

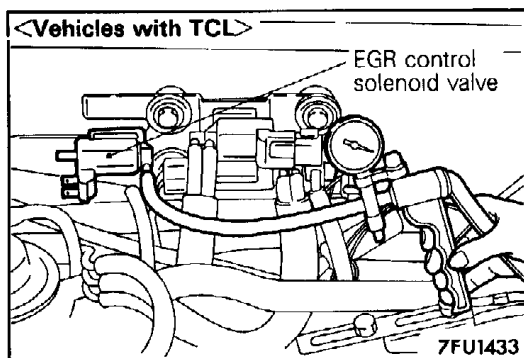
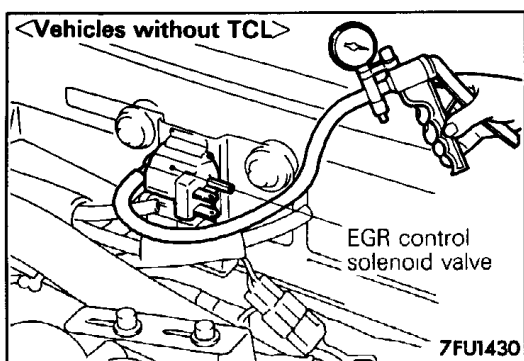
EGR Valve Inspection

- (1) Remove the EGR valve and inspect for sticking, carbon deposits, etc. If found, clean with a suitable solvent so that the valve seats correctly.
- (2) Connect a hand vacuum pump to the EGR valve.
- (3) Apply a vacuum of 300 mmHg (12 in.Hg) and make sure that airtightness is maintained.
- (4) Check whether or not air is blown out of the EGR air passage.

Vacuum	Normal condition
40 mmHg (1.6 in.Hg)	Air is not blown out
240 mmHg (9.4 in.Hg)	Air is blown out.

Caution

When mounting the EGR valve, use a new gasket and tighten to a torque of 18 Nm (1.8 kgm, 13 ft.lbs.).



EGR CONTROL SOLENOID VALVE

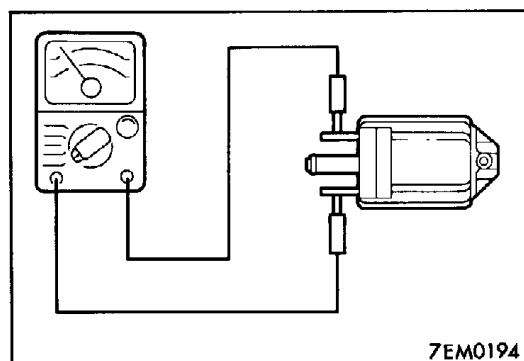
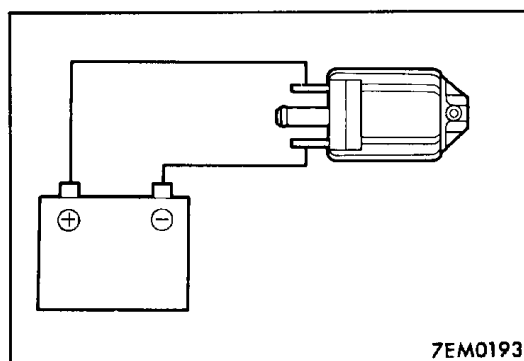
Inspection

NOTE

When disconnecting the vacuum hose, make an identification mark on it so that it can be reconnected to the original position.

- (1) Disconnect the vacuum hose (yellow and green stripe) from the solenoid valve.
- (2) Disconnect the harness connector.
- (3) Connect a hand vacuum pump to the nipple to which the green-striped vacuum hose was connected.
- (4) Apply a vacuum and check for air-tightness when voltage applied directly to the EGR control solenoid valve when the voltage is discontinued.

Battery voltage	Result
When applied	Vacuum is maintained
When discontinued	Vacuum leaks



- (5) Measure the resistance between the terminals of the solenoid valve.

Standard value: 36–44 Ω [at 20°C (68°F)]

CATALYTIC CONVERTER

REMOVAL AND INSTALLATION

E17YA--

For removal and installation procedures, refer to GROUP 15 – Exhaust Pipes and Main Muffler.

INSPECTION

E17YCAAa

Inspect for damage, cracking or deterioration. Replace if faulty.

Caution

1. Operation of any type, including idling, should be avoided if engine misfiring occurs. Under this condition the exhaust system will operate at abnormally high temperature, which may cause damage to the catalyst or underbody parts of the vehicle.
2. Alteration or deterioration of ignition or fuel system, or any type of operating condition which results in engine misfiring must be corrected to avoid overheating the catalytic converters.
3. Proper maintenance and tune up according to manufacturer's specifications should be made to correct the conditions as soon as possible.

CLUTCH

CONTENTS

E21AA-

SPECIFICATIONS	2	CLUTCH PEDAL	5
General Specifications	2	CLUTCH CONTROL	7
Service Specifications	2	CLUTCH MASTER CYLINDER	10
Lubricants	2		
SERVICE ADJUSTMENT PROCEDURES	3		
Clutch Pedal Inspection and Adjustment ..	3		
Bleeding	4		

SPECIFICATIONS

GENERAL SPECIFICATIONS

E21CA--

Items	3000
Clutch operating method	Hydraulic type
Clutch disc Type Facing diameter O.D.×I.D. mm (in.)	Single dry disc type 225×150 (8.9×5.9)
Clutch cover assembly Type Setting load N (kg, lbs)	Diaphragm spring strap drive type 6300 (630, 1386)
Clutch release cylinder I D. mm (in.)	19.05 (3/4)
Clutch master cylinder I D. mm (in.)	15.87 (5/8)

SERVICE SPECIFICATIONS

E21CB--

Items	Specifications
Standard value	
Clutch pedal height mm (in.)	171–181 (6.73–7.13)
Clutch pedal clevis pin play mm (in.)	1–3 (0.04–0.12)
Clutch pedal free play mm (in.)	
L.H. drive vehicles	7–16 (0.28–0.63)
R.H. drive vehicles	6–13 (0.24–0.51)
Distance between the clutch pedal and the toeboard when the clutch is disengaged mm (in.)	55 (2.2) or more

LUBRICANTS

E21CD--

Items	Specified lubricants	Quantity
Clutch fluid	Brake fluid DOT3 or DOT4	As required
Release cylinder push rod end	MITSUBISHI genuine grease Part No. 0101011	As required
Inner surface of clutch master cylinder and outer circumference of piston assembly	Brake fluid DOT3 or DOT4	As required

SERVICE ADJUSTMENT PROCEDURES

CLUTCH PEDAL INSPECTION AND ADJUSTMENT

E21FAAN

1. Measure the clutch pedal height (from the face of the pedal pad to the toeboard) and the clutch pedal clevis pin play (measured at the face of the pedal pad.)

Standard value (A): 171–181 mm (6.73–7.13 in.)

Standard value (B): 1–3 mm (0.04–0.12 in.)

2. If either the clutch pedal height or the clutch pedal clevis pin play are not within standard value range, adjust as follows:

- (1) For vehicles without auto-cruise control system, turn and adjust the bolt so that the pedal height is the standard value, and then secure by tightening the lock nut.

Vehicles with auto-cruise control system, disconnect the clutch switch connector and turn the switch for standard clutch pedal height. Then lock with the lock nut.

- (2) Turn the push rod to adjust the clutch pedal clevis pin play to agree with the standard value and then secure the push rod with the lock nut.

Caution

When adjusting the clutch pedal clevis pin play, be careful not to push the push rod toward the master cylinder.

3. After completing the adjustments, confirm that the clutch pedal free play (measured at the face of the pedal pad) and the distance between the clutch pedal (the face of the pedal pad) and the toeboard when the clutch is disengaged are within the standard value ranges.

Standard value (C):

L.H. drive vehicles

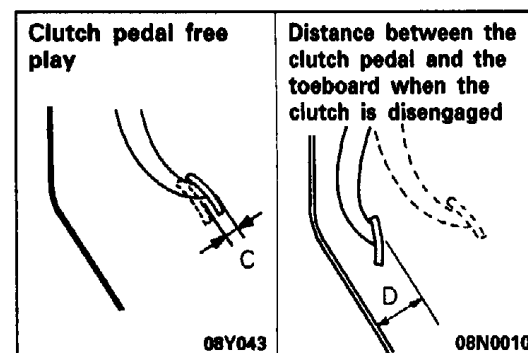
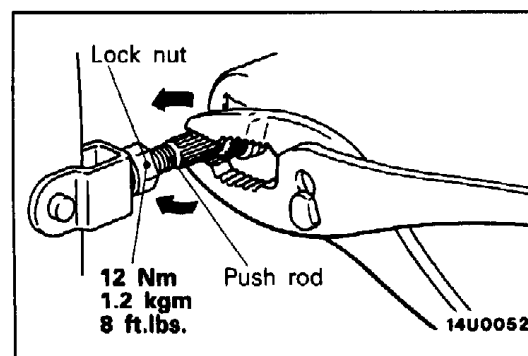
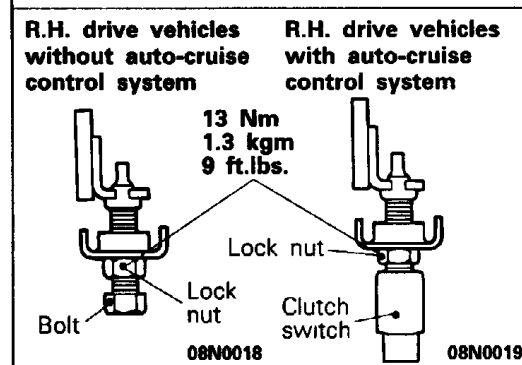
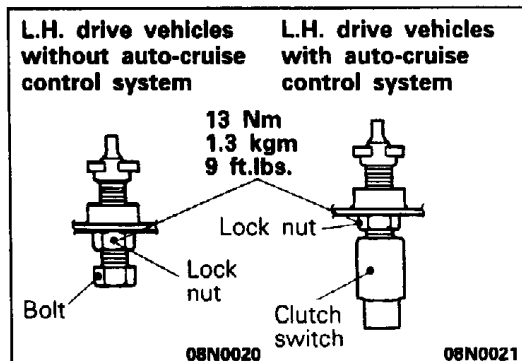
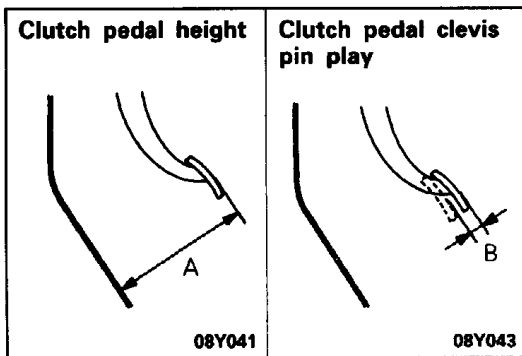
7–16 mm (0.28–0.63 in.)

R.H. drive vehicles

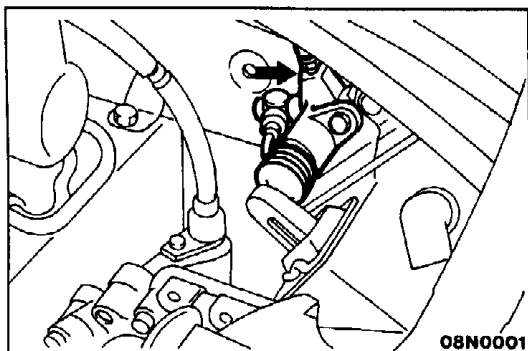
6–13 mm (0.24–0.51 in.)

Standard value (D):

55 mm (2.2 in.) or more



4. If the clutch pedal free play and the distance between the clutch pedal and the toeboard when the clutch is disengaged do not agree with the standard values. It is probably the result of either air in the hydraulic system or a faulty master cylinder or clutch. Bleed the air, or disassemble and inspect the master cylinder or clutch.



BLEEDING

E21FEAB

Whenever the clutch pipe, the clutch hose, and/or the clutch master cylinder have been removed, or if the clutch pedal is spongy, bleed the system.

Specified brake fluid: DOT 3 or DOT 4

Caution

Use the specified brake fluid. Avoid using a mixture of the specified fluid and other fluid.

CLUTCH PEDAL

E21PA-

REMOVAL AND INSTALLATION

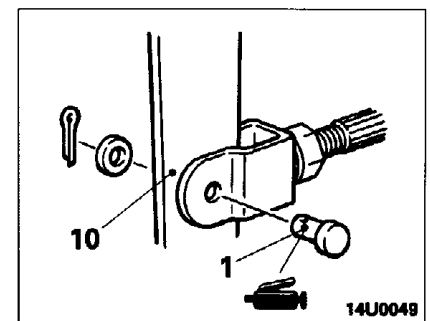
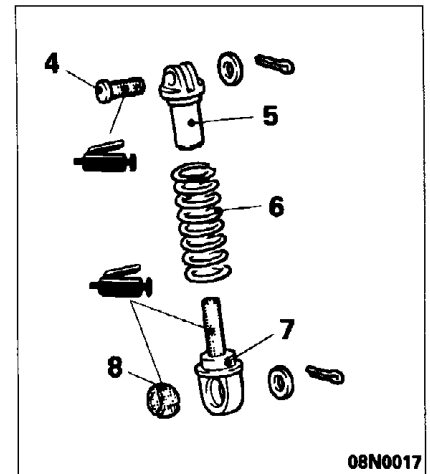
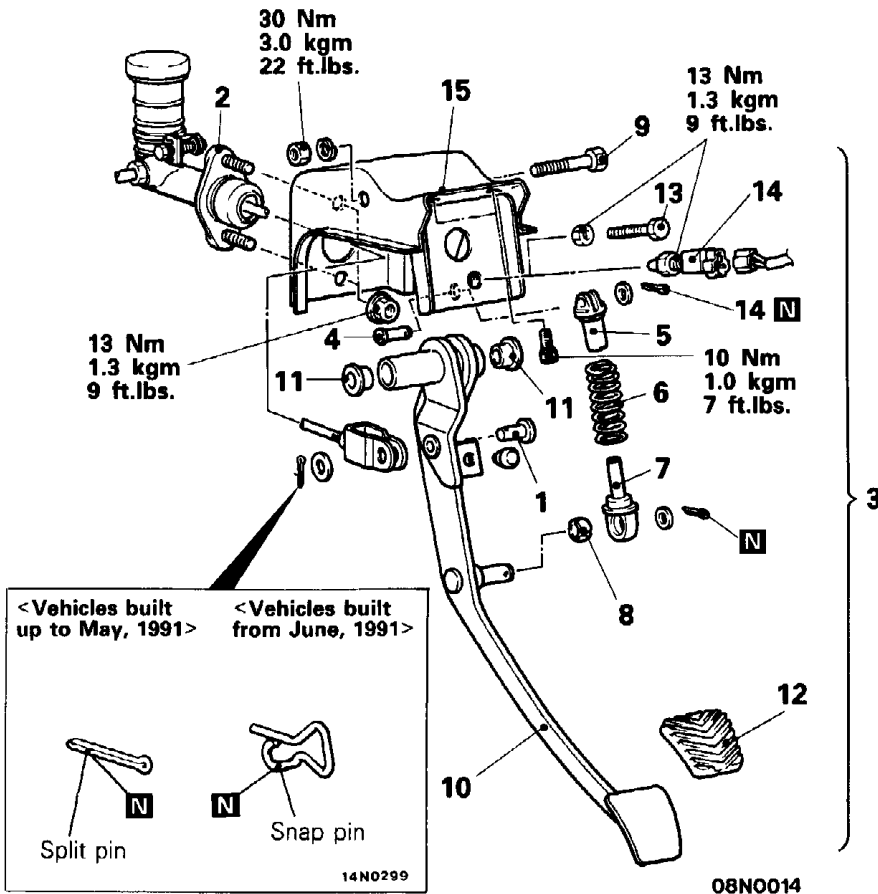
L.H. drive vehicles

Pre-removal Operation

- Removal of the Foot Shower Duct (L.H.) and the Lap Shower Duct (Refer to GROUP 55 – Ducts.)

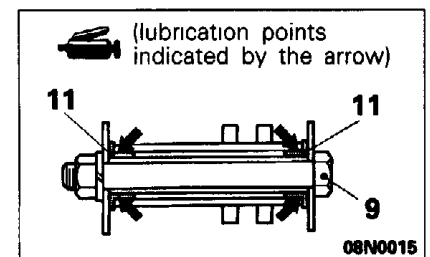
Post-installation Operation

- Installation of the Foot Shower Duct (L.H.) and the Lap Shower Duct (Refer to GROUP 55 – Ducts.)
- Adjustment of the Clutch Pedal (Refer to P.21-3.)



Removal steps

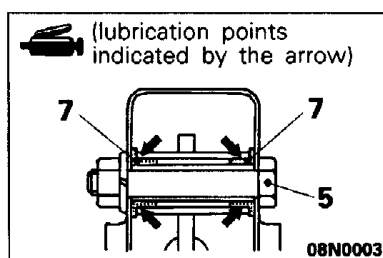
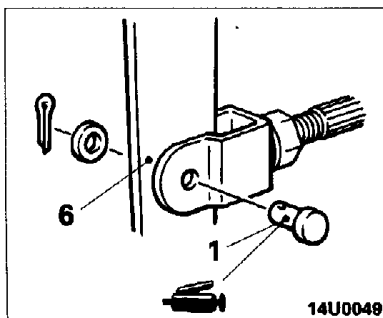
1. Clevis pin
2. Clutch master cylinder connection
3. Clutch pedal assembly
4. Clevis pin
5. Rod A
6. Turnover spring
7. Rod B
8. Bushing
9. Pedal shaft
10. Clutch pedal
11. Bushing
12. Pedal pad
13. Bolt <Vehicles without auto-cruise control system>
14. Clutch switch <Vehicles with auto-cruise control system>
15. Clutch pedal bracket



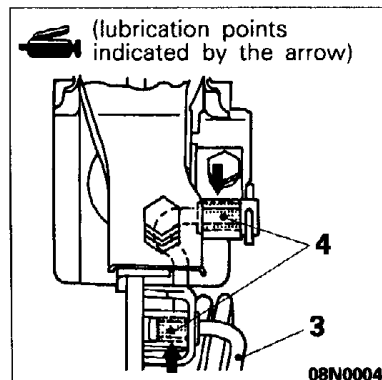
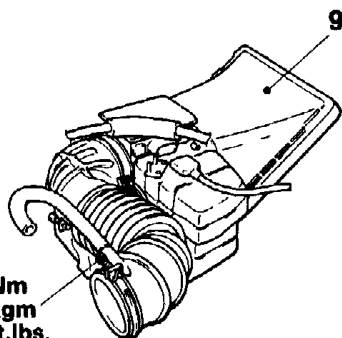
R.H. drive vehicles

Pre-removal Operation

- Removal of the Foot Shower Duct (R.H.) and the Lap Shower Duct (Refer to GROUP 55 – Ducts.)

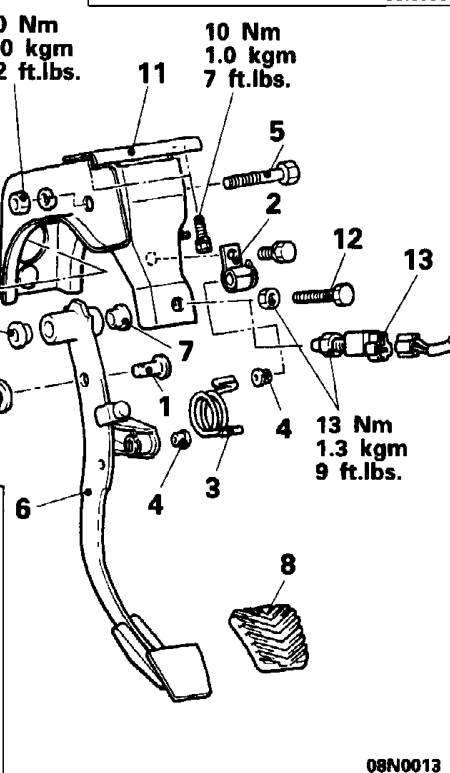
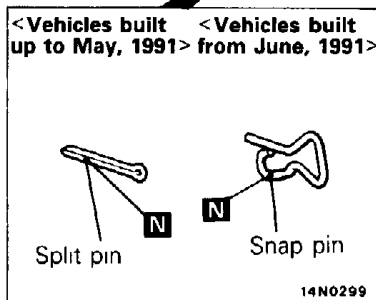


4.0 Nm
0.4 kgm
2.9 ft.lbs.



Removal steps

1. Clevis pin
2. Bracket
3. Turnover spring
4. Bushings
5. Pedal shaft
6. Clutch pedal
7. Bushings
8. Pedal pad
9. Air cleaner cover, air intake hose
10. Clutch master cylinder connection
11. Clutch pedal bracket
12. Bolt <vehicles without auto-cruise control system>
13. Clutch switch <vehicles with auto-cruise control system>



INSPECTION

E21PCAB

- Check the pedal shaft and bushing for wear.
- Check the clutch pedal for bend or torsion.
- Check the turnover spring for damage or deterioration.
- Check the pedal pad for damage or wear.

F21.1A..

- Draining of the Clutch Fluid

- Supplying of Clutch Fluid
- Bleeding of the Clutch Line (Refer to P. 21-4.)



Diagram illustrating the connection of a cable to a terminal block. A screw (1) is used to secure the connection. A separate screw and washer are shown to the left.

Release cylinder
push rod

Release
fork

08W517

Specified grease:
mitsubishi genuine
grease Part No. 0101011

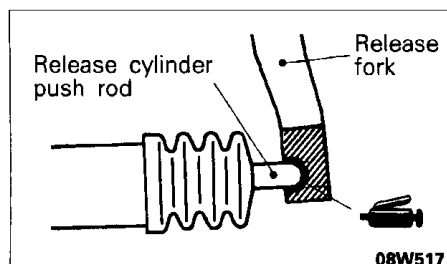
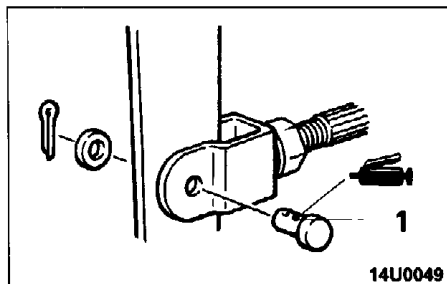
2. Air cleaner cover, air intake hose
8. Clutch pipe A
13. Clutch damper assembly

R.H. drive vehicles**Pre-removal Operation**

- Draining of the Clutch Fluid

Post-installation Operation

- Supplying of Clutch Fluid
- Bleeding of the Clutch Line (Refer to P.21-4.)



Specified grease:
MITSUBISHI genuine grease
 Part No. 0101011

Clutch master cylinder removal steps

- Adjustment of clutch pedal (Refer to P.21-3.)
- 1. Clevis pin
- 2. Air cleaner cover, air intake hose
- 6. Clutch master cylinder
- 7. Sealer

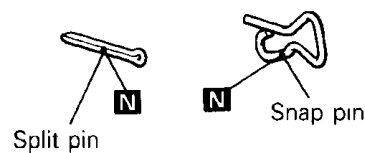
Clutch pipe removal steps

- 2. Air cleaner cover, air intake hose
- 3. Air cleaner element
- 4. Air cleaner body
- 5. Clutch pipe
- 8. Clutch pipe A
- 9. Clutch pipe

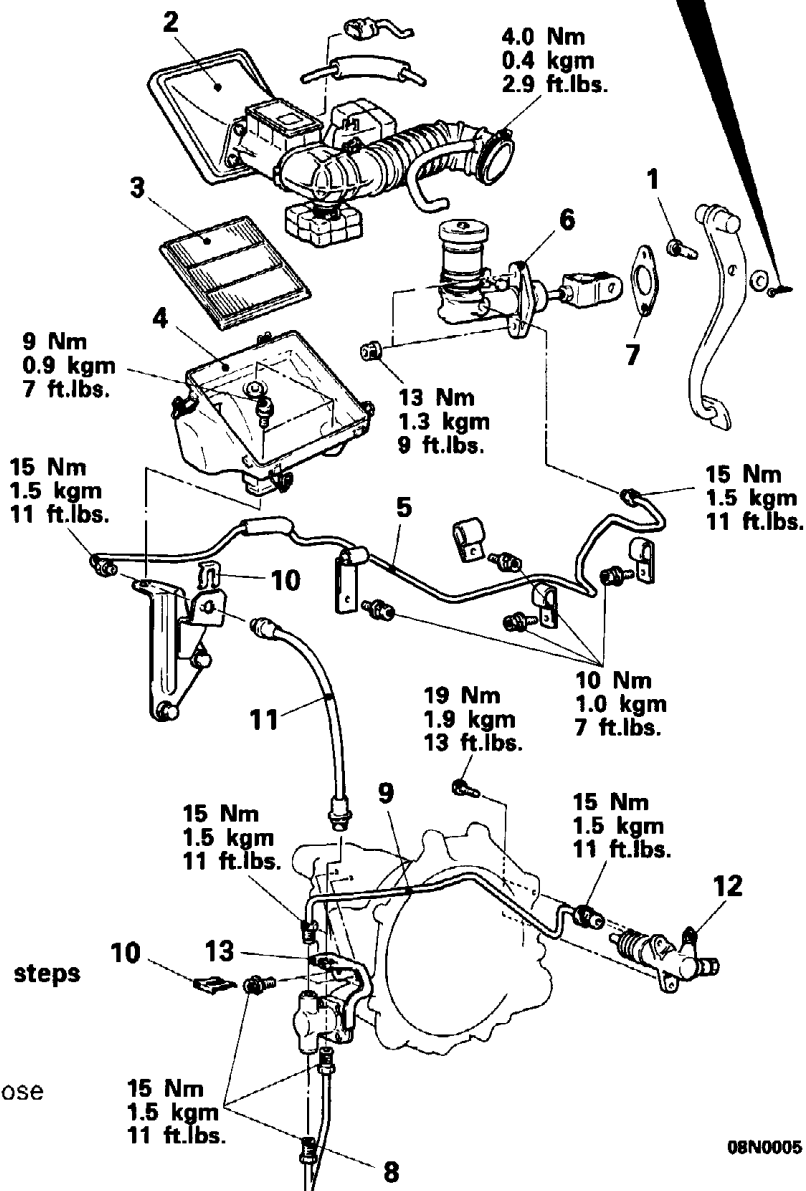
Clutch hose removal steps

- 2. Air cleaner cover, air intake hose
- 3. Air cleaner element
- 4. Air cleaner body
- 10. Hose clip
- 11. Clutch hose

< Vehicles built up to May, 1991 > < Vehicles built from June, 1991 >



14N0299



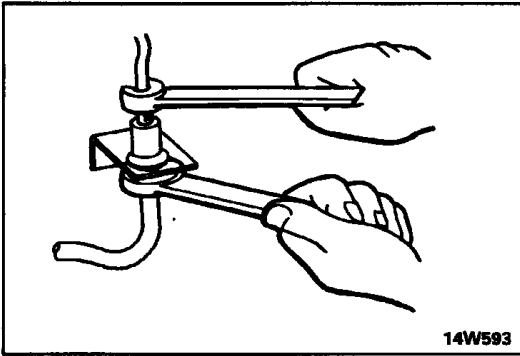
08N0005

Clutch release cylinder removal steps

- 2. Air cleaner cover, air intake hose
- 12. Clutch release cylinder

Clutch damper removal steps

- 2. Air cleaner cover, air intake hose
- 8. Clutch pipe A
- 13. Clutch damper assembly

**SERVICE POINTS OF REMOVAL**

E21JBBD

5. REMOVAL OF CLUTCH PIPE

- (1) For L.H. drive vehicles, remove the brake booster.
(Refer to GROUP 35 – Brake Booster.)
- (2) Holding the nut at the clutch hose side, loosen the flare nut of the clutch pipe.

11. REMOVAL OF CLUTCH HOSE

Holding the nut at the clutch hose side, loosen the flare nut of the clutch pipe.

INSPECTION

E21JCAC

- Check the clutch hose or pipe for cracks or clogging.

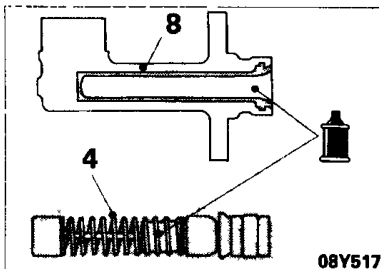
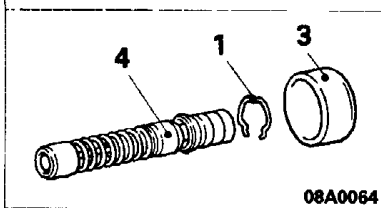
CLUTCH MASTER CYLINDER DISASSEMBLY AND REASSEMBLY

E21SE--

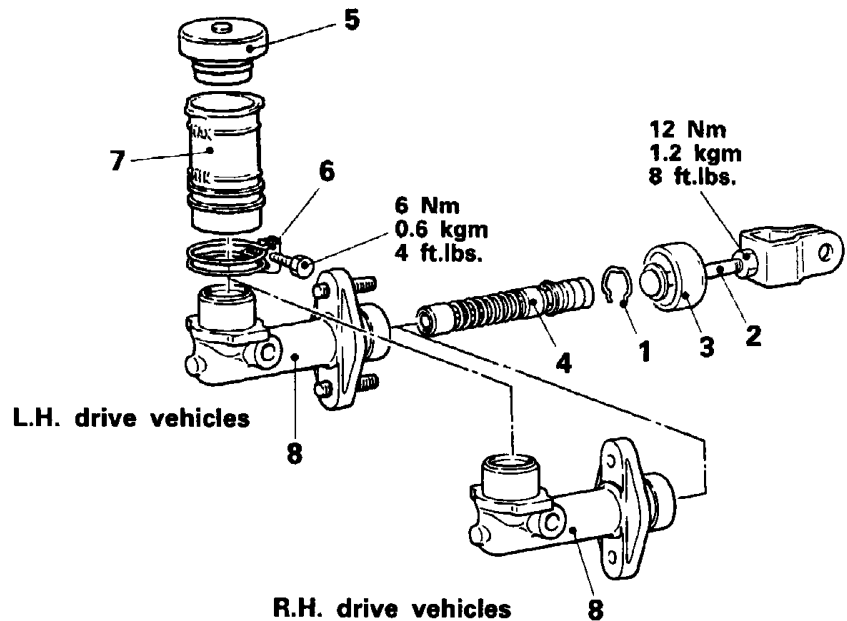
Disassembly steps

1. Piston stopper ring
2. Damper push rod assembly
3. Boot
4. Piston assembly
5. Reservoir cap.
6. Fluid reservoir band
7. Fluid reservoir
8. Clutch master cylinder

Piston repair kit



Clutch fluid
Brake fluid DOT3 or DOT4



08N0016

SERVICE POINTS OF DISASSEMBLY

E21SFAE

4. REMOVAL OF PISTON ASSEMBLY

Caution

1. Do not damage the master cylinder body and piston assembly.
2. Do not disassembly piston assembly.

INSPECTION

E21SGAC

- Check the inside cylinder body for rust or scars.
- Check the piston cup for wear or deformation.
- Check the piston for rust or scars.
- Check the clutch pipe connection part for clogging.

MANUAL TRANSMISSION

CONTENTS

E22AA--

SPECIFICATIONS	2	TRANSMISSION CONTROL*	5
General Specifications	2	SHIFT LEVER ASSEMBLY	7
Service Specifications	2	TRANSMISSION ASSEMBLY	8
Lubricants	2		
SPECIAL TOOL	2		
SERVICE ADJUSTMENT PROCEDURES	3		
Oil Level Check	3		
Changing Oil	3		
Speedometer Cable Replacement	3		

WARNINGS REGARDING SERVICING OF SUPPLEMENTAL RESTRAINT SYSTEM (SRS) EQUIPPED VEHICLES

WARNING!

- (1) Improper service or maintenance of any component of the SRS, or any SRS-related component, can lead to personal injury or death to service personnel (from inadvertent firing of the air bag) or to the driver and passenger (from rendering the SRS inoperative).
- (2) Service or maintenance of any SRS component or SRS-related component must be performed only at an authorized MITSUBISHI dealer.
- (3) MITSUBISHI dealer personnel must thoroughly review this manual, and especially its GROUP 52B – Supplemental Restraint System (SRS) before beginning any service or maintenance of any component of the SRS or any SRS-related component.

NOTE

The SRS includes the following components: impact sensors, SRS diagnosis unit, SRS warning lamp, air bag module, clock spring and interconnecting wiring. Other SRS-related components (that may have to be removed/installed in connection with SRS service or maintenance) are indicated in the table of contents by an asterisk (*).

SPECIFICATIONS

GENERAL SPECIFICATIONS

E22CA--

Items	Specifications
Model	F5M33
Applicable engine	6G72
Type	5-speed floor shift
Gear ratio	
1st	3.090
2nd	1.833
3rd	1.217
4th	0.888
5th	0.741
Reverse	3.166
Final reduction ratio	4.153
Speedometer gear ratio (driven/drive)	28/36

SERVICE SPECIFICATIONS

E22CB--

Items	Specifications
Standard value	
Length of front height sensor rod	mm (in.) 269–270 (10.6–11.0)

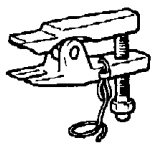
LUBRICANTS

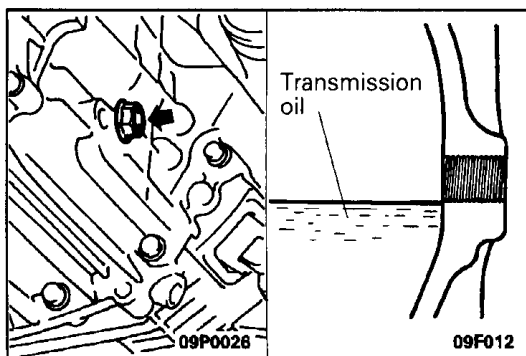
E22CD--

Items	Specified lubricant	Quantity lit. (U.S.qts., Imp.qts.)
Transmission oil	Hypoid gear oil, SAE 75W-90 or 75W-85W conforming to API classification GL-4	2.0 (2.1, 1.8)

SPECIAL TOOL

E22DA--

Tool	Number	Name	Use
	MB991113 or MB990635	Steering linkage puller	● Disconnection of the coupling of the knuckle and lower arm ball joint ● Disconnection of the coupling of the knuckle and tie-rod end ball joint



SERVICE ADJUSTMENT PROCEDURES

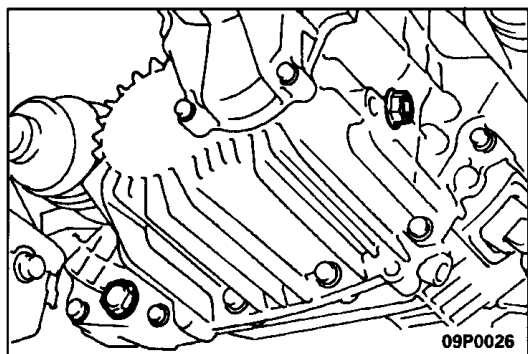
E22FDAO

OIL LEVEL CHECK

Inspect each component for evidence of leakage, and check the oil level by removing the filler plug. If the oil is contaminated, it is necessary to replace it with new oil.

- (1) Oil level should be at the lower portion of the filler plug hole.
- (2) Check that the transmission oil is not noticeably dirty, and that it has a suitable viscosity.
- (3) Tighten filler plug to specified torque.

Specified torque: 30–35 Nm (3.0–3.5 kgm, 22–25 ft.lbs)



CHANGING OIL

1. Remove transmission drain plug.
2. Drain oil.
3. Tighten drain plug to specified torque.

Specified torque: 30–35 Nm (3.0–3.5 kgm, 22–25 ft.lbs)

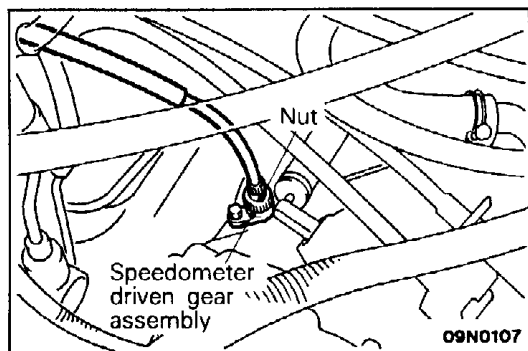
4. Remove filler plug and fill with specified oil till the level comes to the lower portion of filler plug hole.

**Specified oil: Hypoid gear oil SAE 75W-85W
conforming to API GL-4**

Quantity: 2.0 lit. (2.1 U.S.qts., 1.8 Imp.qts.)

5. Tighten filler plug to specified torque.

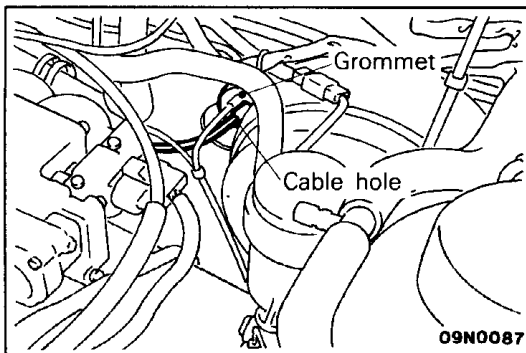
Specified torque: 30–35 Nm (3.0–3.5 kgm, 22–25 ft.lbs)



SPEEDOMETER CABLE REPLACEMENT

E22FCBH

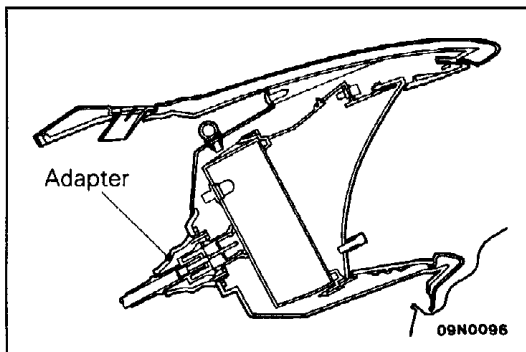
1. Remove the combination meter and the adapter, and then disconnect the speedometer cable.
(Refer to GROUP 54 – Meters and Gauges.)
2. Connect the new speedometer cable to the speedometer driven gear assembly of the transmission, and secure it with the nut.



3. Install the grommet so that the hole through which the cable goes, faces toward the center of the body, as shown in the figure.

Caution

1. The cable arrangement should be made so that the radius of cable bends is 150 mm (5.9 in.) or more.
2. The arrangement of the speedometer cable should be such that it does not interfere with brake tubes, etc.



4. Insert the adapter into the instrument panel, and fasten the new speedometer cable.

Caution

If the speedometer cable is not correctly and securely connected, it may cause incorrect indication by the speedometer, or abnormal noise. Be sure to connect it correctly.

5. After connecting the speedometer, pull the speedometer cable out from the engine compartment until the mark (white) on the cable is fully out from the grommet, to ensure that there are no bends in the cable inside the instrument panel.

TRANSMISSION CONTROL

E22HA--

REMOVAL AND INSTALLATION

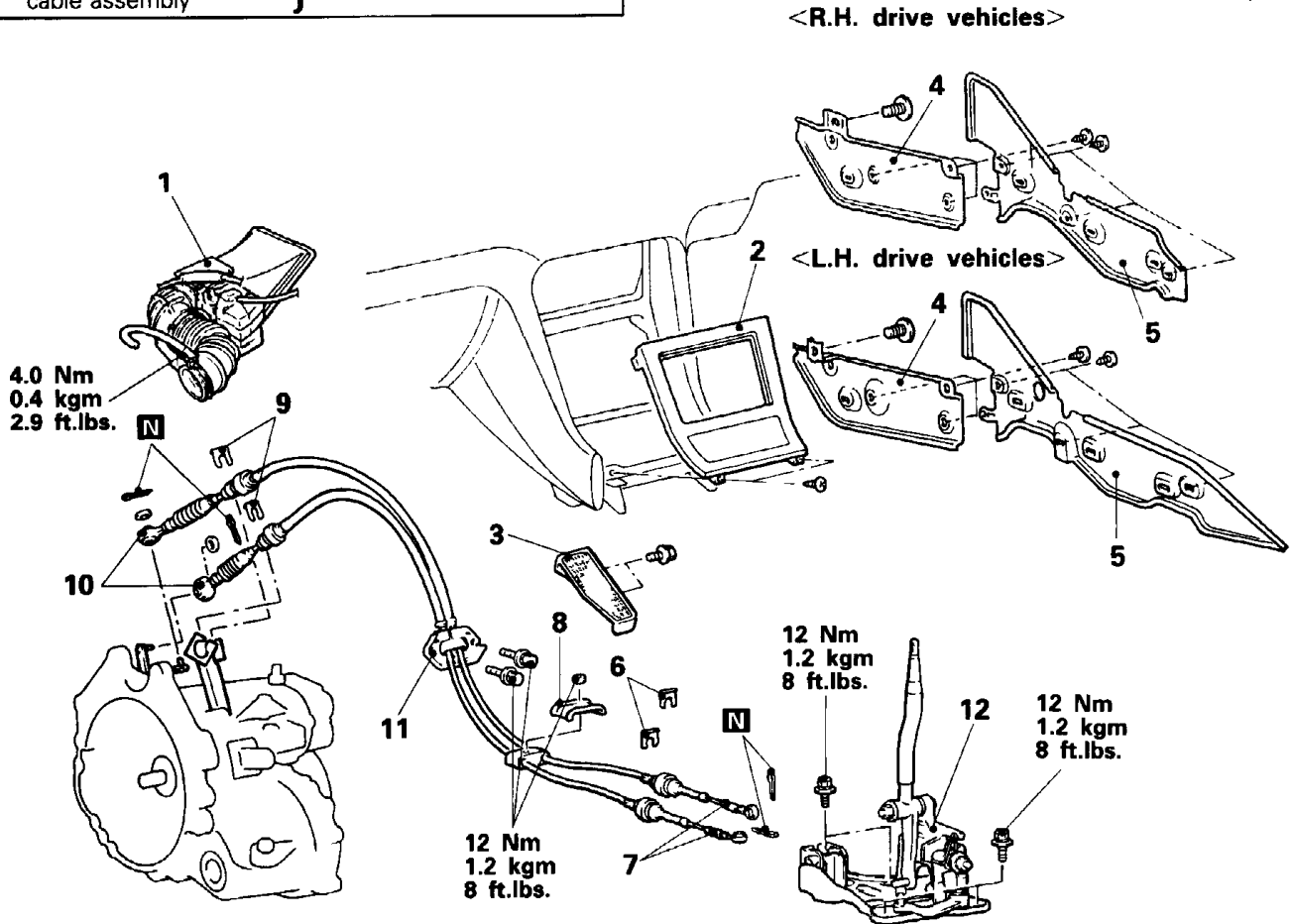
CAUTION: SRS

When removing and installing the following parts from vehicles equipped with SRS, do not let it bump against the SRS diagnostic unit or other components.

- Floor console assembly <L.H. drive vehicles>
- Shift lever assembly
- Transmission control cable assembly } <R.H. drive vehicles>

Pre-removal and Post-installation Operation

- Removal and Installation of Floor Console Assembly (Refer to GROUP 52 – Floor Console.)
- Removal and Installation of Passenger Side Under Cover and Foot Shower Duct <L.H. drive vehicles> (Refer to GROUP 55 – Ventilators.)



09N0093

Removal steps of the transmission control cable assembly

1. Air cleaner cover, air intake hose
2. Audio panel
3. Foot rest <R.H. drive vehicles>
4. Front center reinforcement (right side)
5. Rear center reinforcement (right side)
6. Clip
7. Connection for transmission control cable assembly (shift lever side)
8. Retainer
9. Clip
10. Connection for transmission control cable assembly (transmission side)
11. Transmission control cable assembly

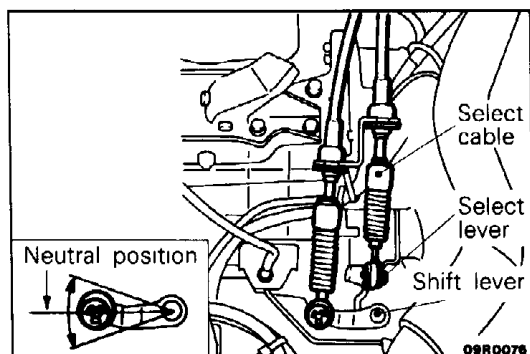
Removal steps of the shift lever assembly

1. Air cleaner cover, air intake hose
2. Audio panel
6. Clip
7. Connection for transmission control cable assembly (shift lever side)
12. Shift lever assembly

INSPECTION

E22HCAJ

- Check the transmission control cable assembly for function and for damage.
- Check the boot for damage.
- Check each bushing for wear or abrasion, sticking, impeded action, and damage.



SERVICE POINTS OF INSTALLATION

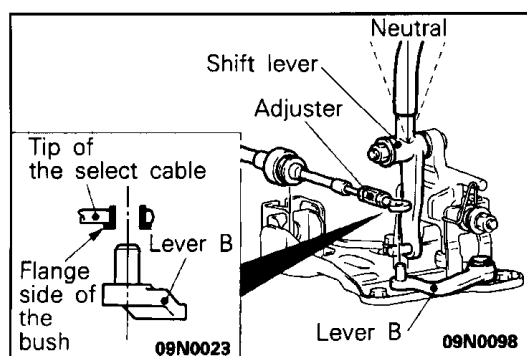
E22HDAM

7. INSTALLATION OF TRANSMISSION CONTROL CABLE ASSEMBLY (SHIFT LEVER SIDE)

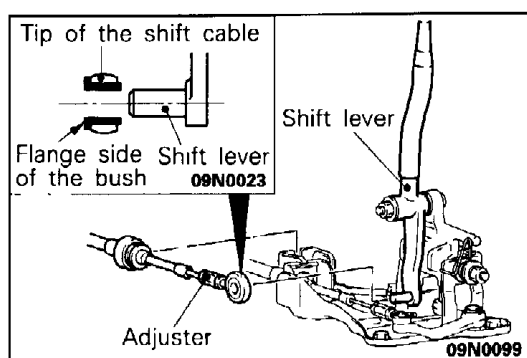
- (1) Set the shift lever of the transmission side at the neutral position.

NOTE

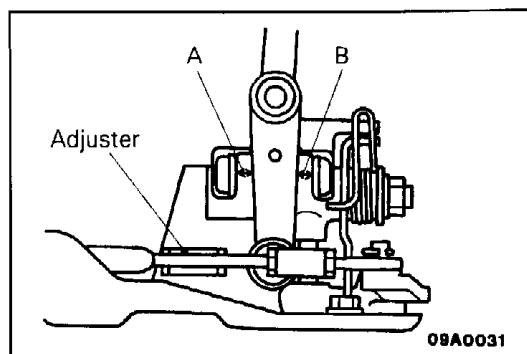
When the shift lever of the transmission side is set at the neutral position, the select lever of the transmission side is also set at the neutral position.



- (2) While leaving the shift lever inside at neutral, place the tip of the select cable in position, in relation to the lever B of the shift lever assembly, as shown in the figure by using the adjuster of the select cable.
- (3) Install the select cable so that the flange side of resin bushing is positioned at the edge of lever B side.



- (4) Adjust the tip of the shift cable to the position shown in the figure, in relation to the inside the shift lever, using the adjuster of the shift cable.
- (5) Install the shift cable so that the flange side of resin bushing at the tip of shift cable is positioned at the split pin side.

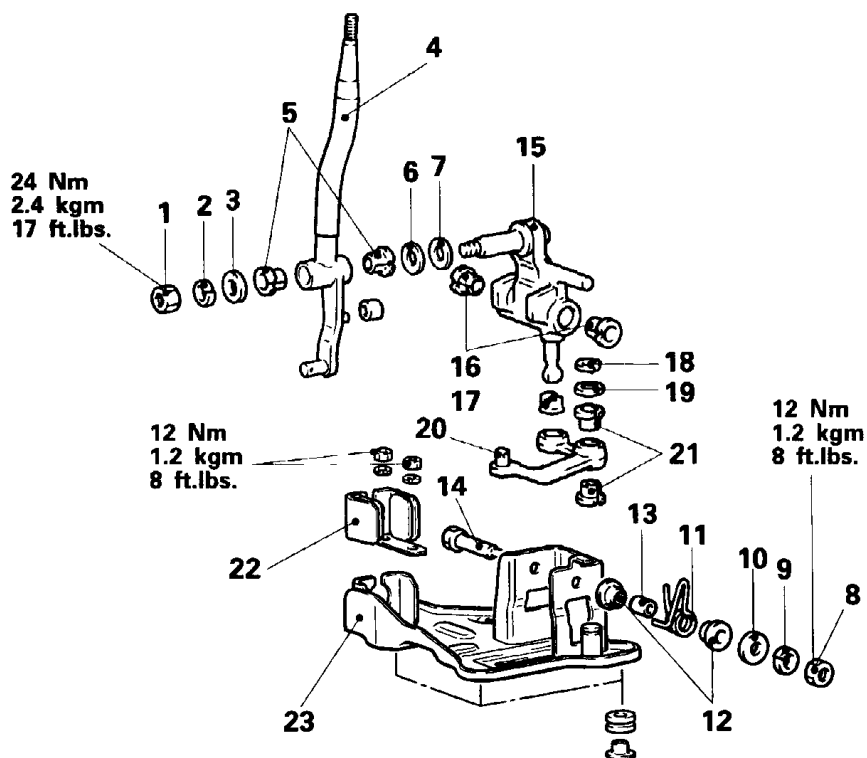


- (6) Adjust the position of the shift cable so that the clearance of A and B in the figure will be equal.
- (7) Put the shift lever to all the positions and make sure that the operation is smooth.

SHIFT LEVER ASSEMBLY

DISASSEMBLY AND REASSEMBLY

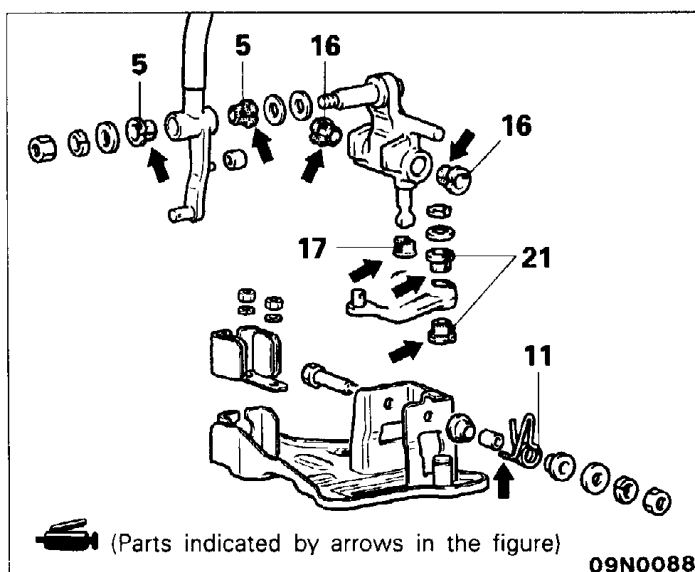
E22HE--



09N0094

Disassembly steps

1. Nut
2. Spring washer
3. Plain washer
4. Shift lever
5. Bushing
6. Plain washer
7. Wave washer
8. Nut
9. Spring washer
10. Plain washer
11. Return spring
12. Bushing
13. Pipe
14. Bolt
15. Lever A
16. Bushing
17. Bushing
18. Snap ring
19. Washer
20. Lever B
21. Bushing
22. Cable bracket
23. Bracket assembly



09N0088

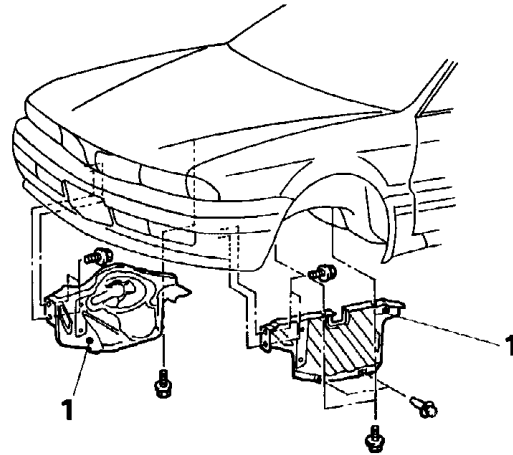
TRANSMISSION ASSEMBLY

REMOVAL AND INSTALLATION

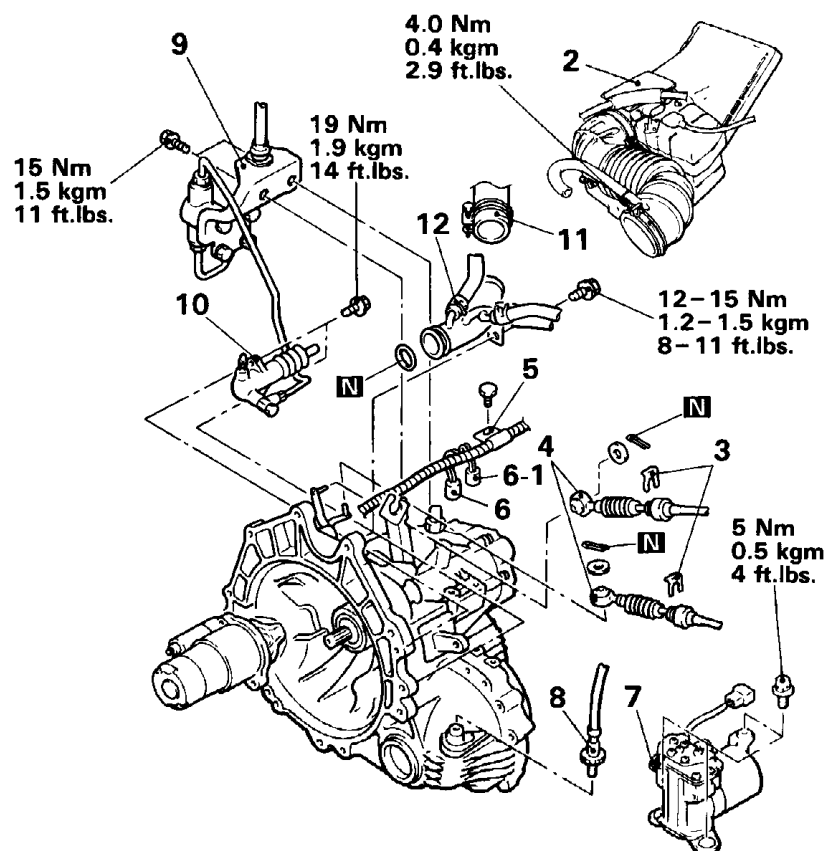
E22JA-

Pre-removal Operation

- (1) Drainage of Engine Coolant <SOHC>
(Refer to GROUP 14 – Service Adjustment Procedures.)
- (2) Drainage of Transmission Oil
(Refer to P.22-3.)
- (3) Removal of Front Under Cover
<Vehicles Equipped with Front Under Cover>



09N0082



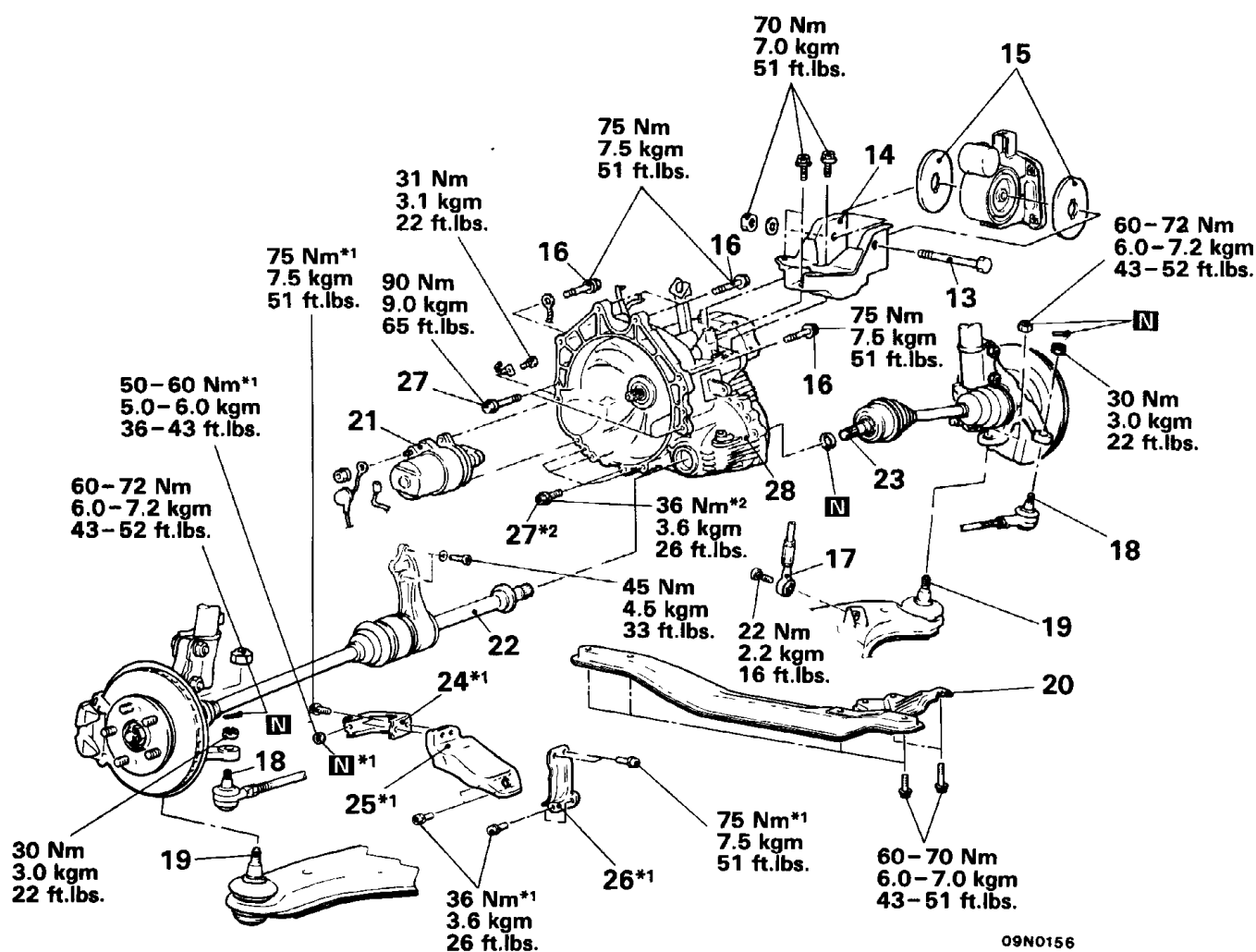
09N0155

Removal steps

1. Side under cover
2. Air cleaner cover, air intake hose
3. Clip
4. Connection for transmission control cable (transmission side)
5. Engine harness connection
6. Backup lamp switch connector
- 6-1 First detection switch connector
<Vehicles equipped with TCL>
7. Compressor assembly
<Vehicles equipped with Active-ECS>
8. Speedometer cable connection
9. Connection for clutch oil line bracket
10. Connection for clutch release cylinder
11. Radiator lower hose connection <SOHC>
12. Connection for water inlet pipe B <SOHC>

Post-installation Operation

- (1) Installation of Front Under Cover
<Vehicles Equipped with Front Under Cover>
- (2) Filling in Transmission Oil
(Refer to P.22-3.)
- (3) Filling in Engine Coolant <SOHC>
(Refer to GROUP 14 – Service Adjustment Procedures)
- (4) Confirmation of Shift Lever Operation and of Its Proper Functioning at Each Shift Position
- (5) Confirmation of Speedometer Function

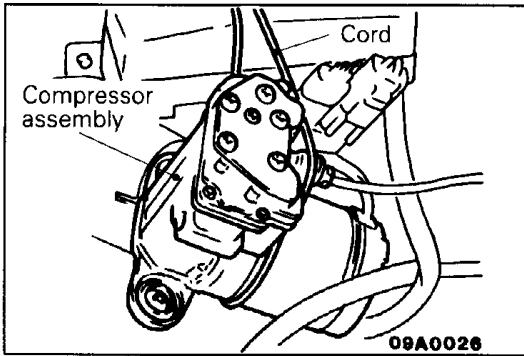


09N0156

- ◆◆ 13. Installation of transmission mount
- ◆◆ 14. Transmission mount bracket
- ◆◆ 15. Transmission mount stoppers
- ◆◆ 16. Transmission assembly upper joint bolt
- ◆◆ 17. Front height sensor rod <Vehicles equipped with Active-ECS>
- ◆◆ 18. Connection between tie rod end and knuckle
- ◆◆ 19. Connection lower arm ball joint and knuckle
- ◆◆ 20. Right member
- ◆◆ 21. Starter
- ◆◆ 22. Drive shaft (left side), inner shaft assembly
- ◆◆ ◆◆ 23. Drive shaft (right side)
- ◆◆ ◆◆ 24. Roll stopper stay A*1
- ◆◆ ◆◆ 25. Transmission stay (front bank)*1
- ◆◆ ◆◆ 26. Transmission stay (rear bank)*1
- ◆◆ ◆◆ 27. Bolts for transmission assembly lower joint
- ◆◆ ◆◆ 28. Transmission assembly

NOTE

- *1 DOHC built up to October, 1992 and SOHC
- *2 DOHC built from November, 1992

**SERVICE POINTS OF REMOVAL**

E22JBCI

**7. REMOVAL OF COMPRESSOR ASSEMBLY
<VEHICLES EQUIPPED WITH ACTIVE-ECS>**

Remove the compressor assembly from the bracket and fix it on the body side without disconnecting the air hose.

10. DISCONNECTION OF CLUTCH RELEASE CYLINDER FROM TRANSMISSION ASSEMBLY

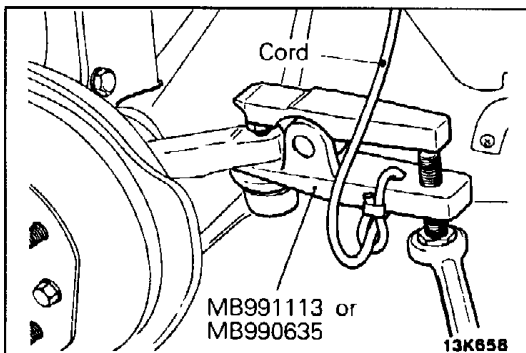
Remove the clutch release cylinder and clutch oil line bracket installation bolt, and then secure at the body side without disconnecting the oil line coupling.

13. REMOVAL OF TRANSMISSION MOUNT

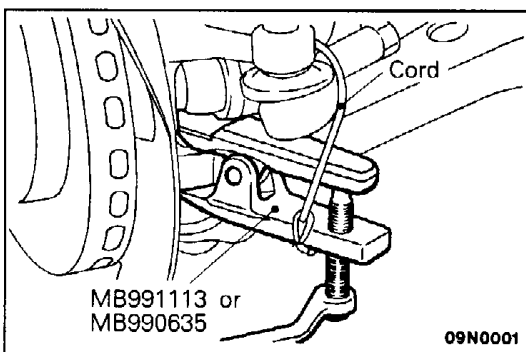
Jack up the transmission assembly to the point that would release a weight on the insulators, and remove the transmission mount insulator bolt.

NOTE

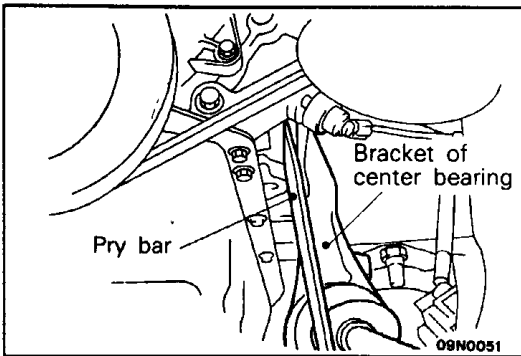
For jacking up, be sure to support a large area of the transmission assembly, the transmission should not be supported at only one point.

**18. REMOVAL OF JOINT OF TIE ROD END FROM THE KNUCKLE****Caution**

1. Loosen the nut only, don't remove it from the tie rod end.
2. Fix the special tool at the strut, etc by a cord in order to avoid dropping it.

**19. REMOVAL OF LOWER ARM BALL JOINT FROM KNUCKLE****Caution**

1. Loosen the nut only, don't remove it from the knuckle.
2. Fix the special tool at the strut, etc by a cord in order to avoid dropping it.



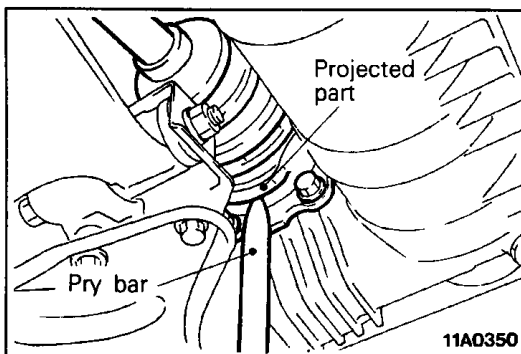
22. REMOVAL OF DRIVE SHAFT (LEFT SIDE) AND INNER SHAFT ASSEMBLY

- (1) Remove the bolts fixing the center bearing bracket, and insert a pry bar between the center bearing bracket of the inner shaft assembly and the cylinder block to remove the center bearing bracket from the cylinder block.
- (2) Pull out the left drive shaft and inner shaft assembly from the transmission assembly.

NOTE

The left drive shaft and inner shaft assembly must be pulled out as a whole, including hub and knuckle, etc.

- (3) Do not sharply bend the left drive shaft and inner shaft assembly which have been pulled out. Fix them with a wire, etc.



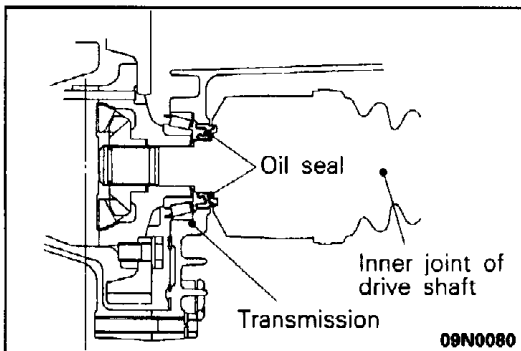
23. REMOVAL OF DRIVE SHAFT (RIGHT SIDE)

- (1) Pull out the right drive shaft from the transmission assembly by inserting a pry bar at the projected part of the right drive shaft.

NOTE

The right drive shaft must be pulled out as a whole assembly, including hub and knuckle, etc.

- (2) Do not sharply bend the joints of the right drive shaft which has been pulled out. Fix it with a wire, etc.



SERVICE POINTS OF INSTALLATION

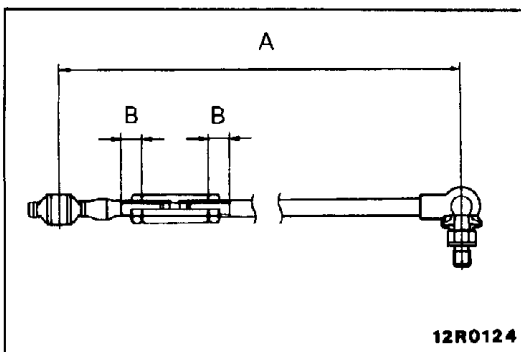
E22JDBG

23. INSTALLATION OF DRIVE SHAFT (RIGHT SIDE)

Insert the right drive shaft straight so that the shaft is not bend toward or against the transmission at the inner joint.

Caution

Do not damage the lip of oil seal of the transmission at the serration part of the right drive shaft.



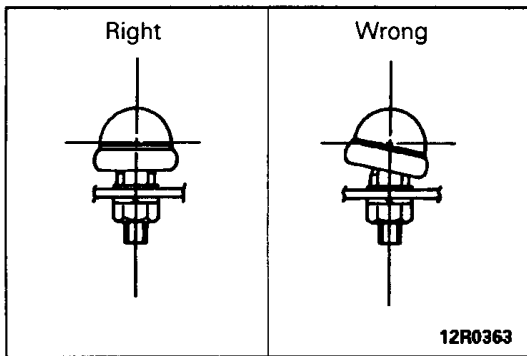
17. INSTALLATION OF FRONT HEIGHT SENSOR ROD <VEHICLES EQUIPPED WITH ACTIVE-ECS>

When install, adjust the length A should be adjusted to the standard value as shown in the figure.

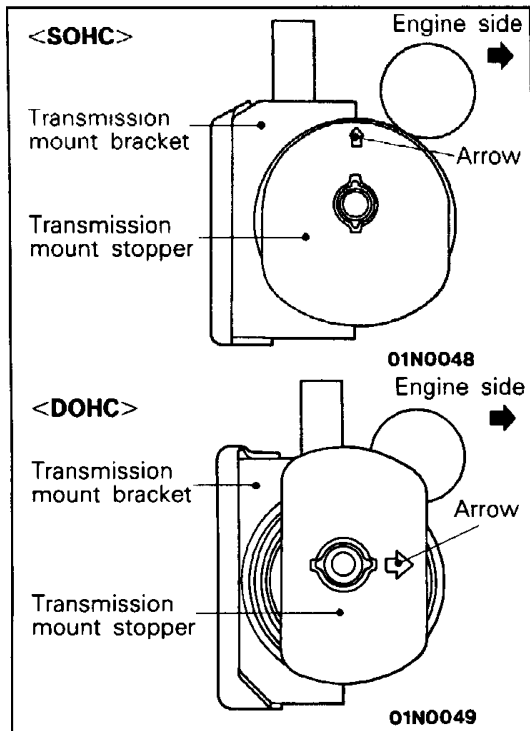
Standard value (A): 269–270 mm (10.6–11.0 in.)

Caution

1. When adjust the length of the front height sensor rod, be sure to keep the length of B (in the figure) equal.

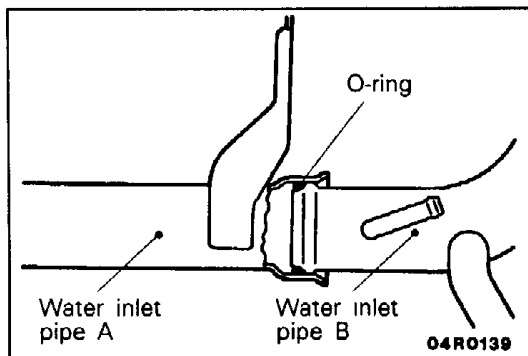


2. The ball joint at the tip of the front height sensor rod should be installed at the center (fulcrum).



15. INSTALLATION OF TRANSMISSION MOUNT STOPPER

The transmission mount stopper should be installed as shown in the figure.



12. INSTALLATION OF WATER INLET PIPE B <SOHC>

Insert water inlet pipe B into the O-ring, and apply water to the outer surface of the O-ring, then connect it with the water inlet pipe A.

Caution

Do not apply any kinds of oil, such as engine oil, on the O-ring.

AUTOMATIC TRANSMISSION

CONTENTS

E23AA--

GENERAL INFORMATION	2	SPECIAL TOOLS	13
SPECIFICATIONS	12	TROUBLESHOOTING	14
General Specifications	12	CONTINUED ON NEXT PAGE	
Service Specifications	12		
Lubricants	12		

WARNINGS REGARDING SERVICING OF SUPPLEMENTAL RESTRAINT SYSTEM (SRS) EQUIPPED VEHICLES

WARNING!

- (1) Improper service or maintenance of any component of the SRS, or any SRS-related component, can lead to personal injury or death to service personnel (from inadvertent firing of the air bag) or to the driver and passenger (from rendering the SRS inoperative).
- (2) Service or maintenance of any SRS component or SRS-related component must be performed only at an authorized MITSUBISHI dealer.
- (3) MITSUBISHI dealer personnel must thoroughly review this manual, and especially its GROUP 52B – Supplemental Restraint System (SRS) before beginning any service or maintenance of any component of the SRS or any SRS-related component.

NOTE

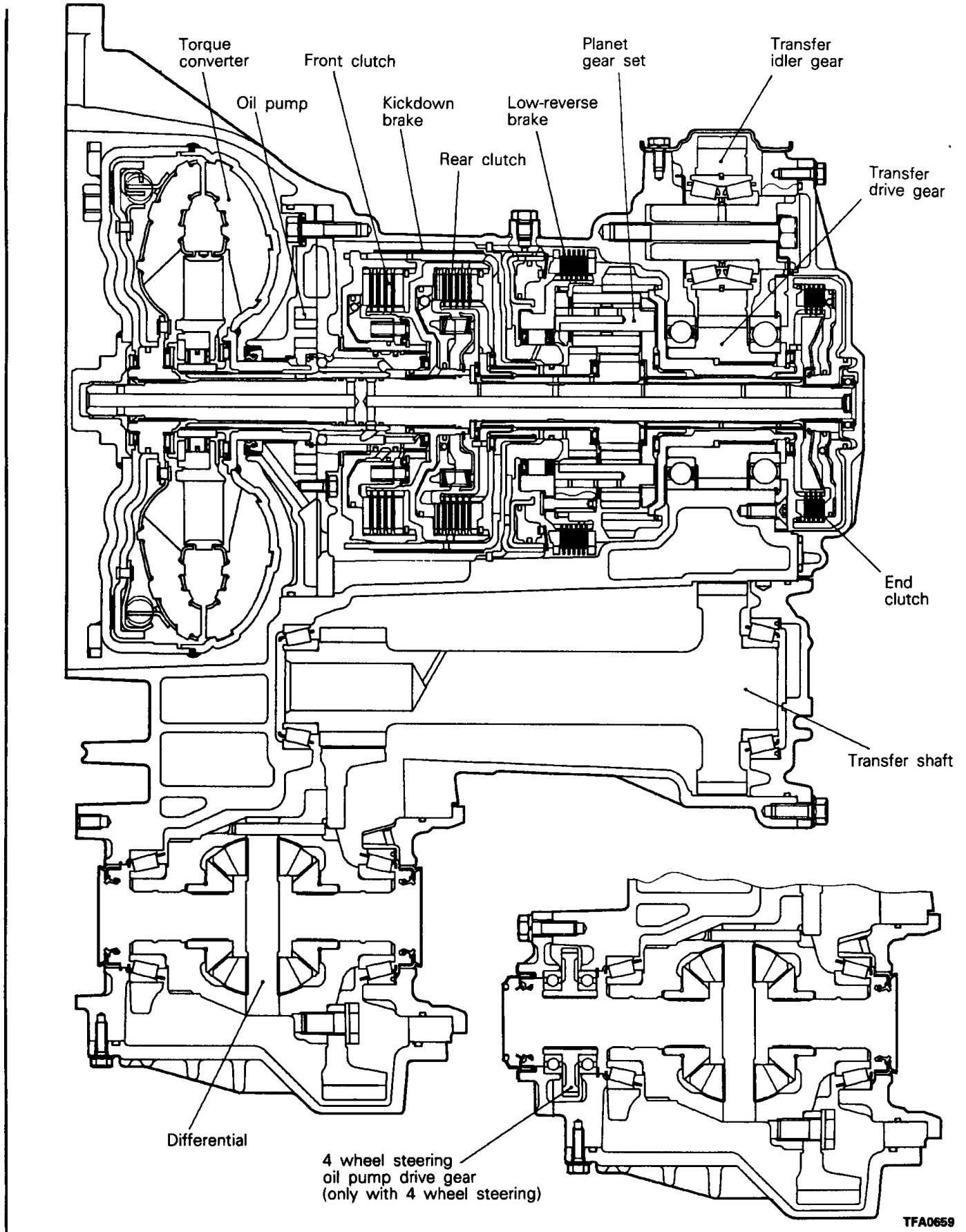
The SRS includes the following components: impact sensors, SRS diagnosis unit, SRS warning lamp, air bag module, clock spring and interconnecting wiring. Other SRS-related components (that may have to be removed/installed in connection with SRS service or maintenance) are indicated in the table of contents by an asterisk (*).

SERVICE ADJUSTMENT PROCEDURES	26	TRANSMISSION CONTROL*	50
Transmission Fluid Level Inspection	26	SELECTOR LEVER ASSEMBLY	52
Transmission Fluid Replacement	27	TRANSMISSION OIL COOLER HOSES	54
Read Out of Malfunction Code	28	TRANSMISSION ASSEMBLY	56
Shift Patterns	36		
Converter Stall Test	38		
Oil Pressure Test	39		
Actuator Test	43		
Kickdown Servo Adjustment	43		
Line Pressure Adjustment	44		
Reducing Pressure Adjustment	46		
Throttle-position Sensor Adjustment	47		
Accelerator Pedal Switch Inspection and Adjustment	47		
Selector Lever Operation Check	47		
Inhibitor Switch and Control Cable Adjustment	48		
Speedometer Cable Replacement	49		

GENERAL INFORMATION

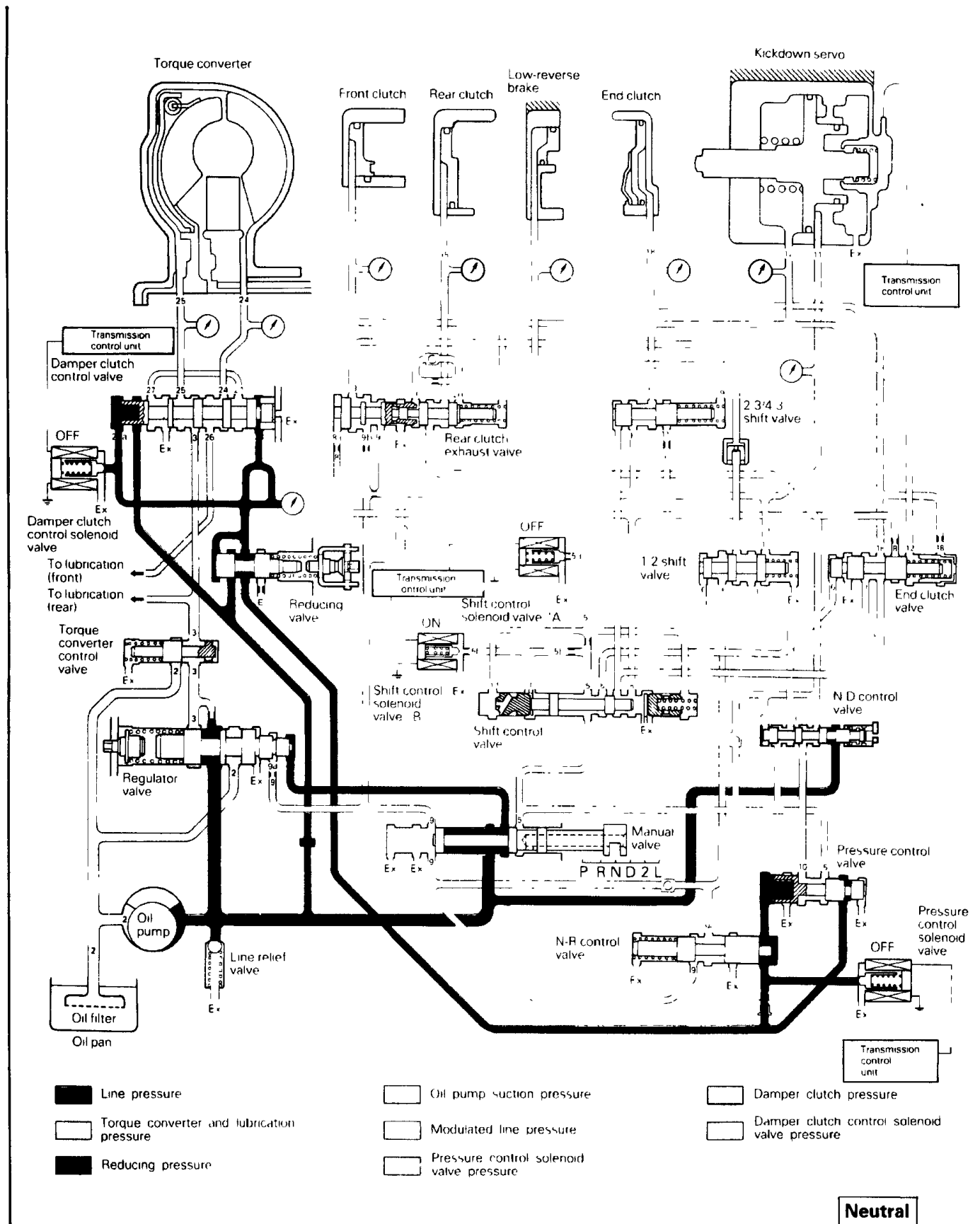
E23BAAK

SECTIONAL VIEW



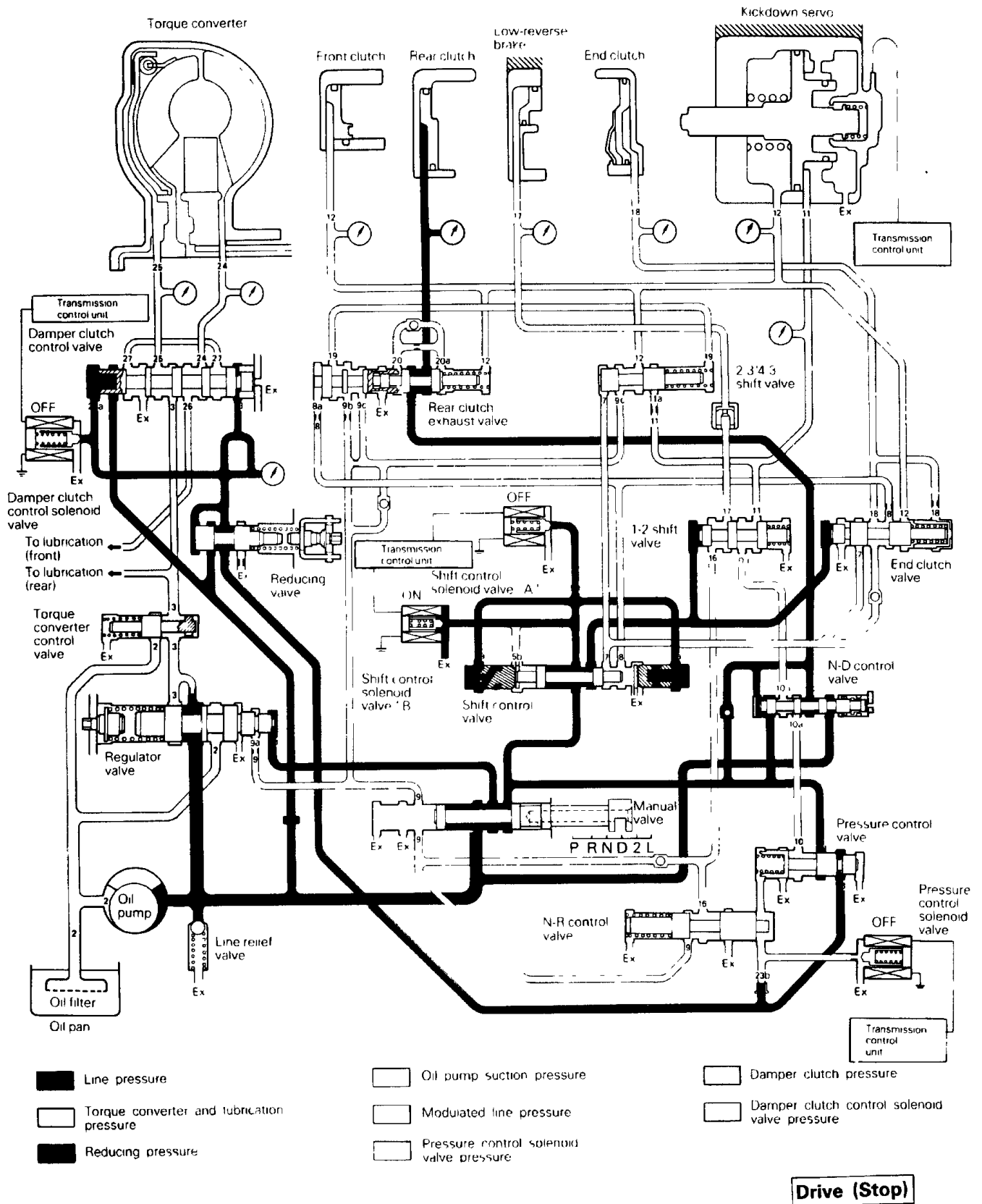
TFA0659

HYDRAULIC CIRCUIT

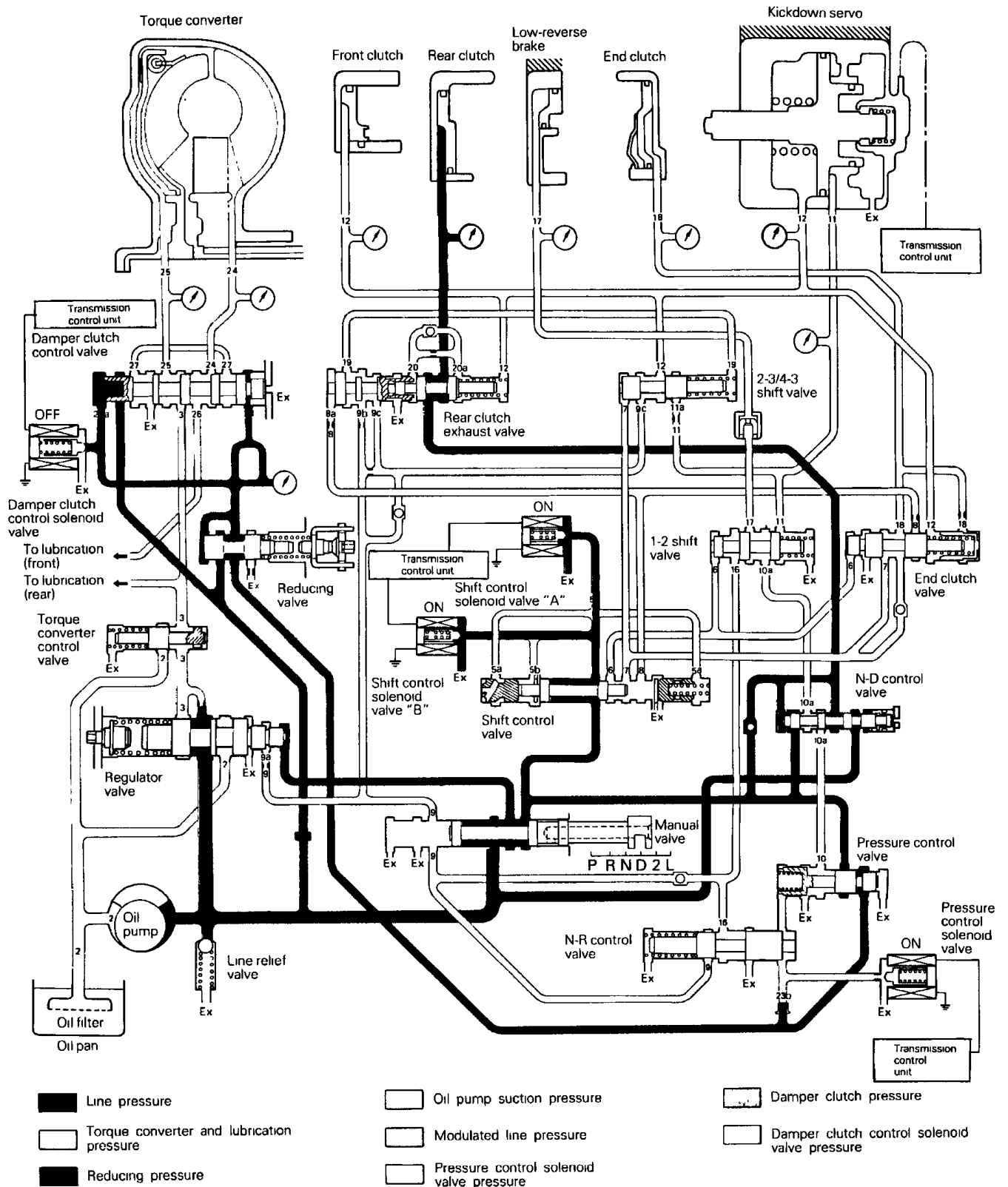


TFA0070

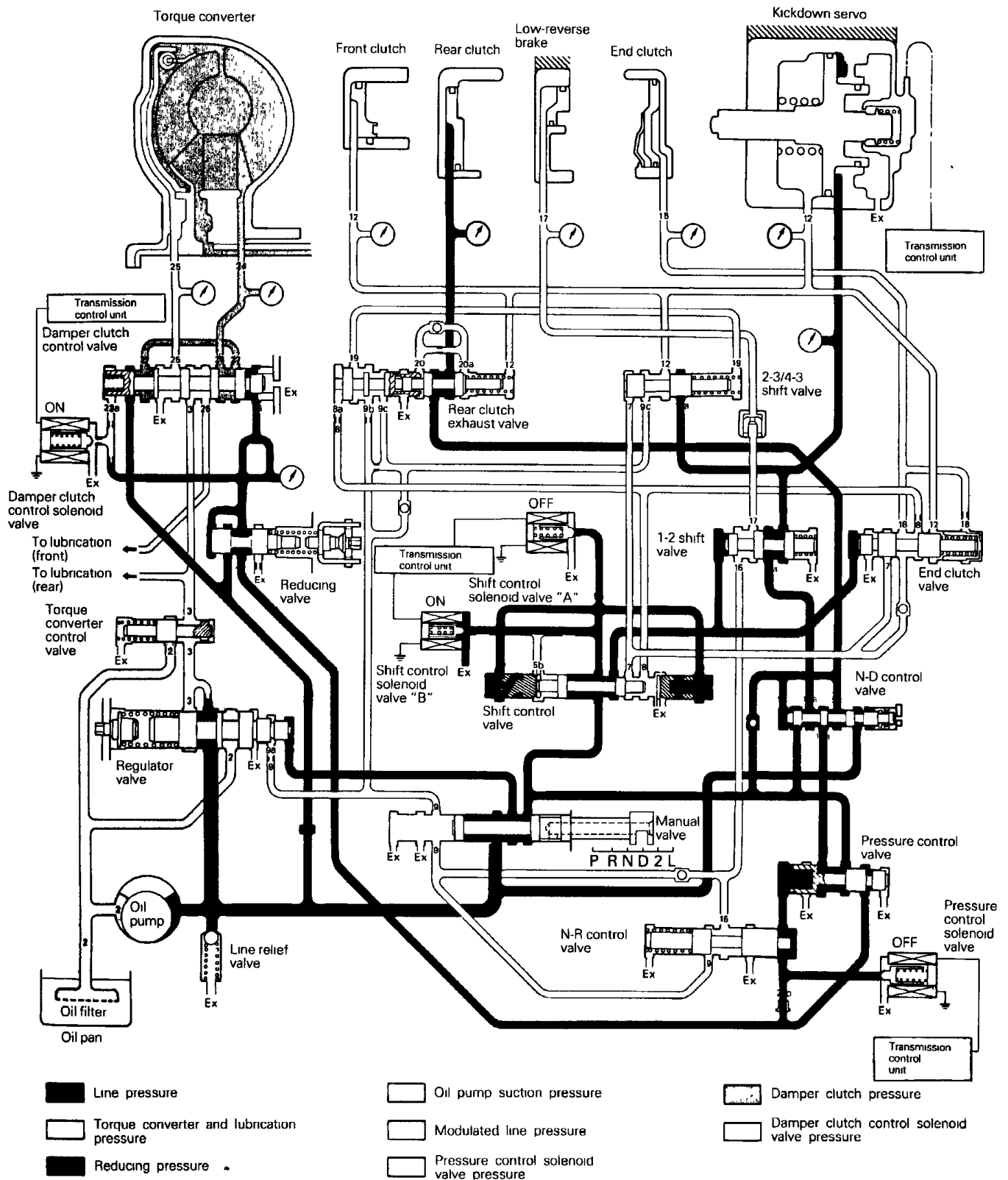




TFA0242

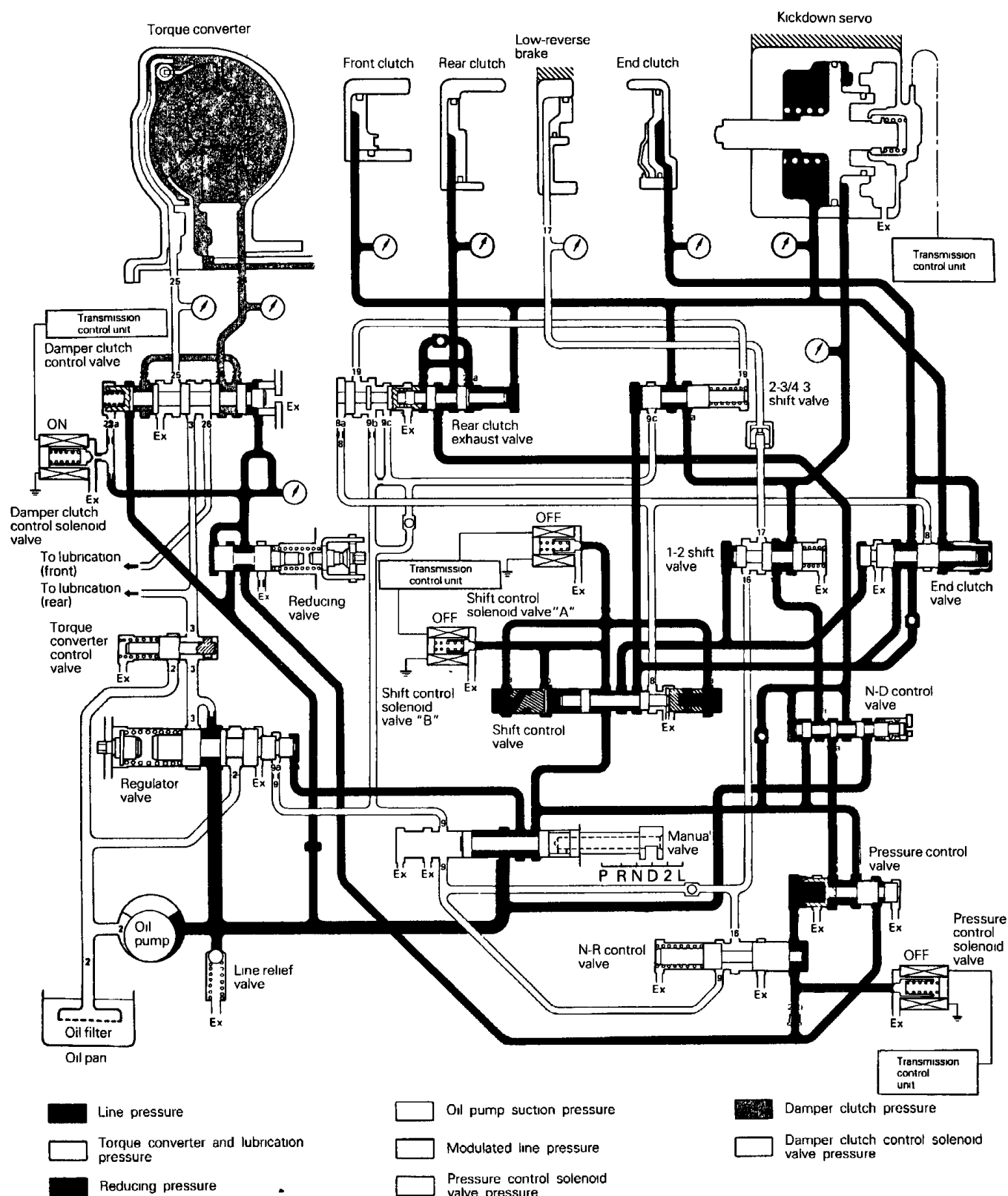
**Drive (First)**

TFA0072



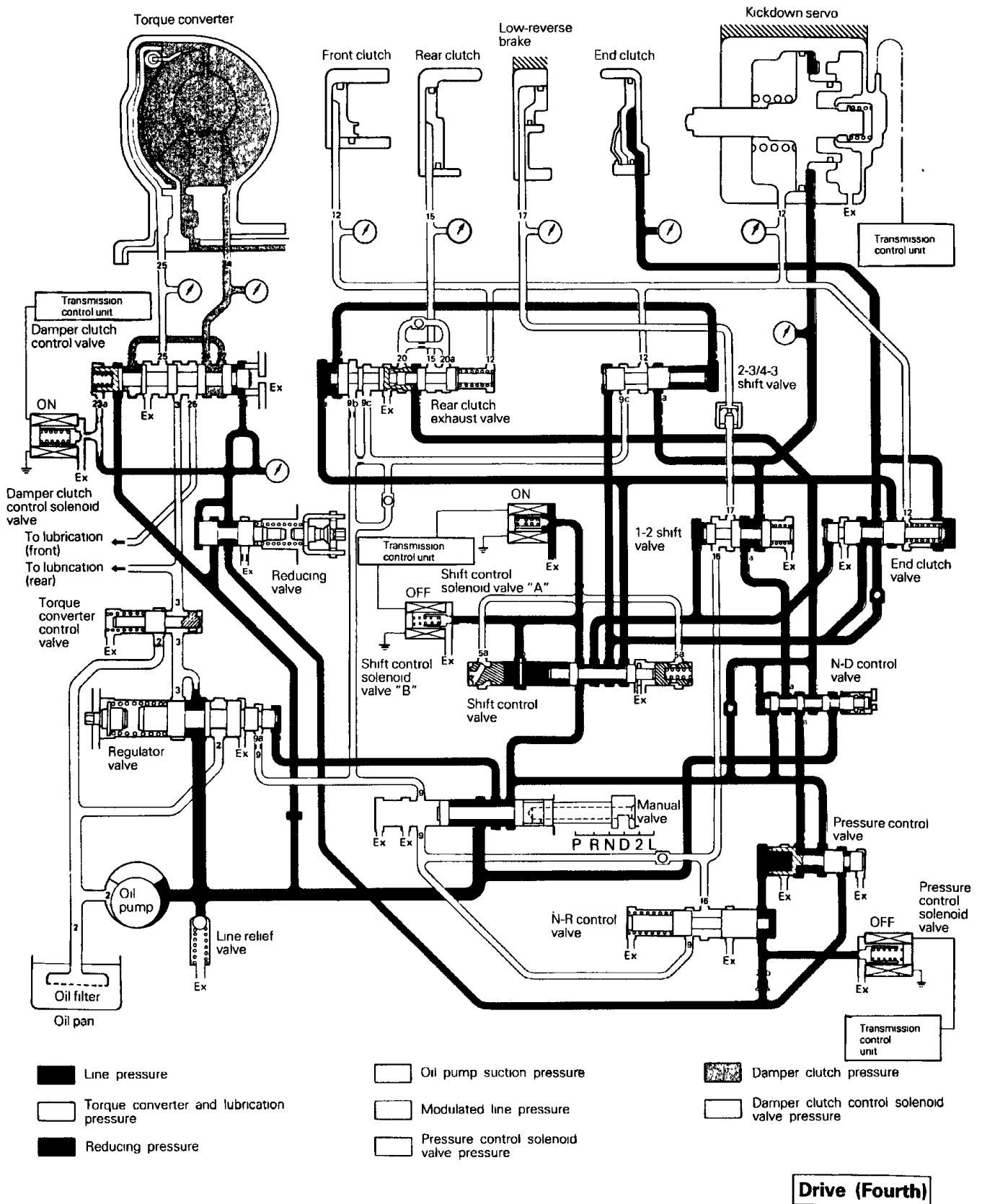
Drive (Second)

TFA0073

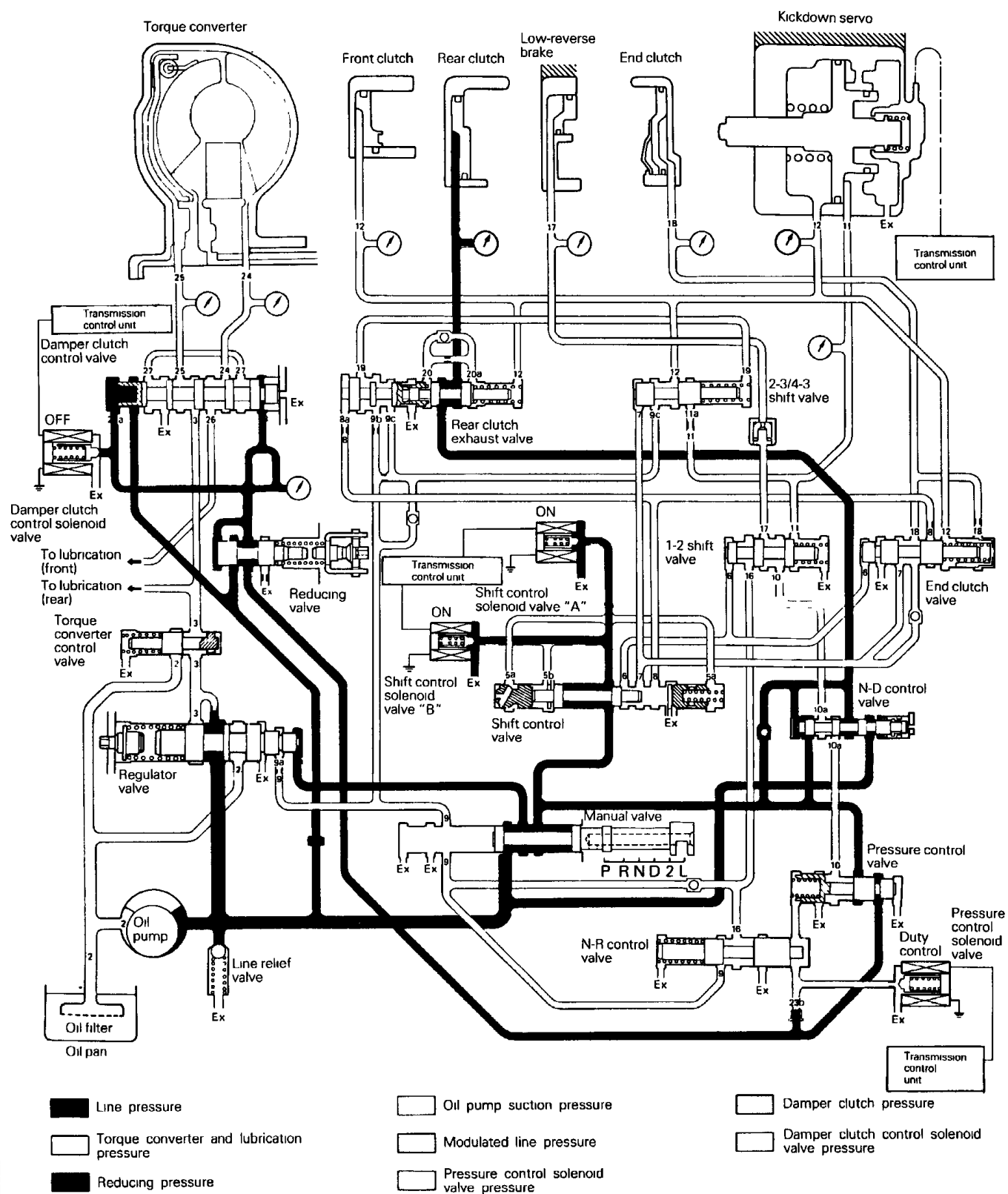


Drive (Third)

TFA0074

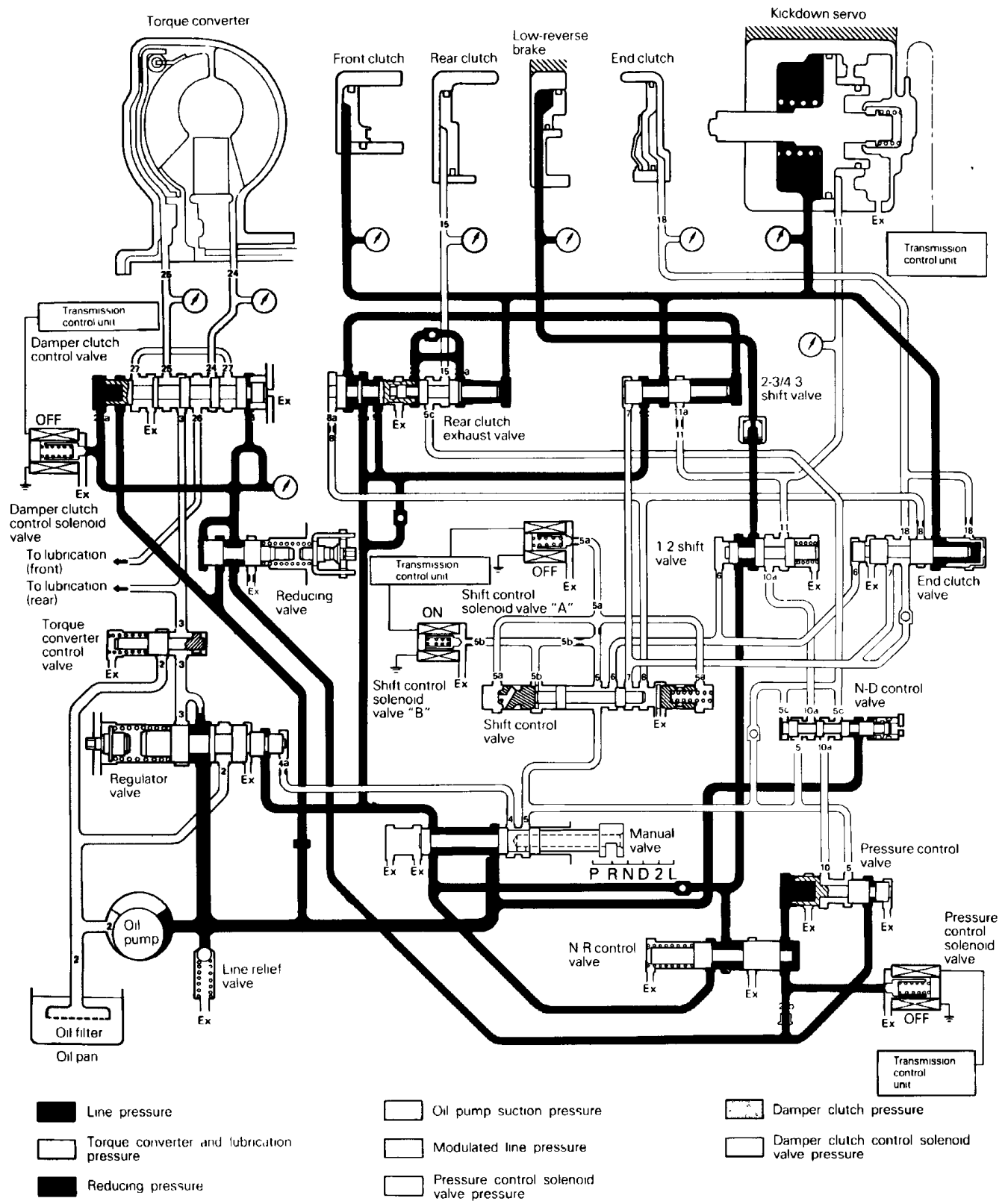


TFA0075



Lock-up (First)

TFA0076



Reverse

TFA0077

SPECIFICATIONS

GENERAL SPECIFICATIONS

E23CA--

Transmission model	F4A33
Torque converter	
Type	3 element with damper clutch
Engine stall speed	1,800–2,800
r/min.	
Transmission	
Type	4-speed full automatic
Front clutch (No. of discs)	4
Rear clutch (No. of discs)	5
End clutch (No. of discs)	4
Low-reverse brake (No. of discs)	6
Kickdown brake	Band type
One-way clutch	Sprag type
Hydraulic control by	Electronic control unit
Oil pump	Gear type
Gear ratio	
1st	2.551
2nd	1.488
3rd	1.000
4th	0.685
Reverse	2.176
Oil cooling method	Water-cooled type oil cooler

SERVICE SPECIFICATIONS

E23CB--

Items	Specifications
Standard value	
Line pressure	kPa (kg/cm ² , psi) 870–890 (8.7–8.9, 124–126)
Oil pressure change for each turn of adjustment screw	38 (0.38, 4.6)
kPa (kg/cm ² , psi)	
Accelerator pedal stroke	mm (in.) 2–6 (0.08–0.24)
(accelerator pedal switch ON to OFF)	
Length of front height sensor rod	mm (in.) 269–270 (10.6–11.0)
Sleeve and selector lever and measurements	mm (in.) 15.2–15.9 (0.598–0.625)

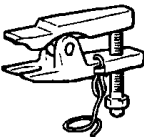
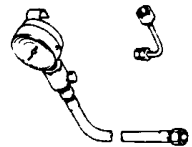
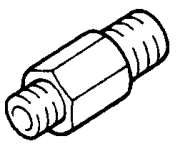
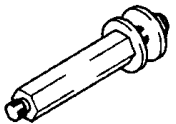
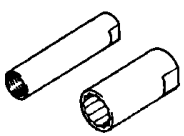
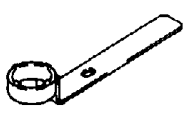
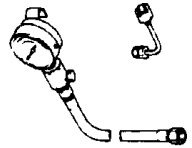
LUBRICANTS

E23CD--

Items	Specified lubricant	Quantity
Transmission fluid	DIA QUEEN ATF-SP or equivalent	7.5 lit. (7.9 U.S. qts., 6.6 Imp. qts.)
Torque converter connection bolt	DIA QUEEN ATF-SP or equivalent	As required

SPECIAL TOOLS

E23DA--

Tool	Number	Name	Use
	MB991113 or MB990635	Steering linkage puller	• Disconnection of the coupling of the knuckle and lower arm ball joint • Disconnection of the coupling of the knuckle and tie-rod end ball joint
	MB991341	Multi-use tester sub assembly	Checking of the diagnosis code, actuator testing, and checking of the service data
	ROM pack (For the number, refer to GROUP 00 – Precautions Before Service.)		
	MB990900 or MB991164	Door hinge adjusting wrench	Removal and installation of oil pump assembly
	MD998330	Oil pressure gauge 3000 kPa (30 kg/cm ² , 400 psi)	Measuring oil pressure
	MD998332	Adapter	Connection of the oil pressure gauge
	MD998915	Kickdown servo wrench adapter	Adjustment of kickdown servo
	MD998916	Kickdown servo adjust wrench set	Adjustment of kickdown servo
	MD998918	Kickdown servo wrench	Adjustment of kickdown servo
	MD999563	Oil pressure gauge 1000 kPa (10 kg/cm ² , 140 psi)	Measuring of pressure

Based upon use of the troubleshooting guide, the probable location of the problem should be estimated.



Checks should be made of fluid levels and the condition of the ATF, as well as the condition of the manual control cables; adjustments should then be made if found to be necessary.



If a presumption has been made that there is an abnormal condition somewhere in the electronic-control system, check the fault code, in order to determine the probable location of the problem, by using a multi-use tester.



When the abnormal system is discovered, check each element (sensors, etc.) one by one, and make repairs as necessary.



When the abnormal condition is presumed to be in the oil-pressure-control system, check by making an oil-pressure test.



When the result of the oil-pressure test does not satisfy the specified pressure, check each system at places related to the valve body, check the oil-pressure passages for leakage, etc.



If the problem is unusually dirty ATF, abnormal noises, oil leakage, or slippage of the clutch or brakes, or an abnormal condition of the transmission itself, disassemble and repair the transmission.

TROUBLESHOOTING

E23EAAJ

Functional malfunctions of the ELC-4A/T can lead to other problems, such as those described below:

- (1) Improper maintenance and/or adjustments
- (2) Malfunctions of the electronic control functions
- (3) Malfunctions of mechanical functions
- (4) Malfunctions of hydraulic control functions
- (5) Malfunctions of engine performance etc.

In order to properly determine ("Troubleshoot") the source of these malfunctions, it is first essential to methodically question the user concerning the details of the problem, such as the condition of the problem, the situation at the time the problem occurred, and any other relevant information, all in as much detail as possible. The user should also be asked whether or not the problem has occurred more than once, and under what conditions. Subsequently, certain tests should be conducted in a certain order, as described at the left.

TROUBLESHOOTING GUIDE

Problem Presumed cause			Driving impossible or abnormal (before start-off)												
			Starter motor won't function	Forward/backward movement impossible	Forward movement impossible	Backward movement impossible	Engine stalls when N → D or R	Clutch slips at D (stall rpm too high)	Clutch slips at R (stall rpm too high)	Stall rpm too low	Vehicle moves at P or N	Engine starts, or vehicle moves, between N-R or N-D	Parking doesn't hold	Abnormal vibration-shock when shift to D-2-R	
Engine	1	Abnormal idling rpm					⊗							×	
	2	Performance malfunction					×			×					
Transmission (power train)	3	Improper adjustment of manual linkage	×	⊗	⊗	⊗		⊗	⊗		⊗	⊗	⊗	⊗	
	4	Malfunction of torque converter		×	×	×				×					
	5	Operation malfunction of oil pump		×	×	×		×	×						
	6	Malfunction of one-way clutch			×			×							
	7	Damaged or worn gear or other rotating part, or improper adjustment of the preload													
	8	Malfunction of parking mechanism								×		×			
	9	Cracked drive plate, or loose bolt		×											
	10	Worn inside diameter of front clutch retainer				×			×						
	Oil-pressure system (including friction elements)	11	Low fluid level		⊗	⊗	⊗		×	×					
		12	Line pressure too low (seal damaged, leakage, looseness, etc.)		⊗	⊗	⊗		⊗	⊗					
13		Malfunction of valve body (sticking valve, working cavity, adjustment, etc.)		⊗	⊗	⊗	×	×	×		×	×		×	
14		Malfunction of front clutch or piston				×			×					×	
15		Malfunction of rear clutch or piston			⊗			×						×	
16		Malfunction of kickdown band or piston													
17		Improper adjustment of kickdown servo													
18		Malfunction of low-reverse brake or piston		×		×			×					×	
19		O-ring of low-reverse brake circuit between valve body and case not installed				×			×						
20		Malfunction of end clutch or piston (check ball hole, other)													
Electronic-control system	21	Malfunction of inhibitors switch, damaged or disconnected wiring, or improper adjustment	×								×	×		×	
	22	Malfunction of TPS, or improper adjustment												×	
	23	Pulse generator (A) damaged or disconnected wiring, or short-circuit													
	24	Pulse generator (B) damaged or disconnected wiring, or short-circuit				×									
	25	Malfunction of kickdown servo switch													
	26	SCSV-A or B damaged or disconnected wiring, or short-circuit or sticking (valve open)													
	27	Malfunction of ignition signal system													
	28	Incorrectly grounded ground strap													
	29	PCSV damaged or disconnected wiring, or short-circuit													
	30	PCSV damaged or disconnected wiring (valve open)		⊗	⊗	⊗		×	×						
	31	DCCSV damaged or disconnecting wiring (valve closed)													
	32	DCCSV short-circuit or sticking (valve open)					⊗								
	33	Malfunction of overdrive control switch													
	34	Malfunction of accelerator switch, or improper adjustment												×	
	35	Malfunction of oil-temperature sensor													
	36	Malfunction of lead switch													
	37	Poor contact of ignition switch													
	38	Malfunction of transmission control unit												×	

NOTE: ⊗ indicates items of high priority during inspection.

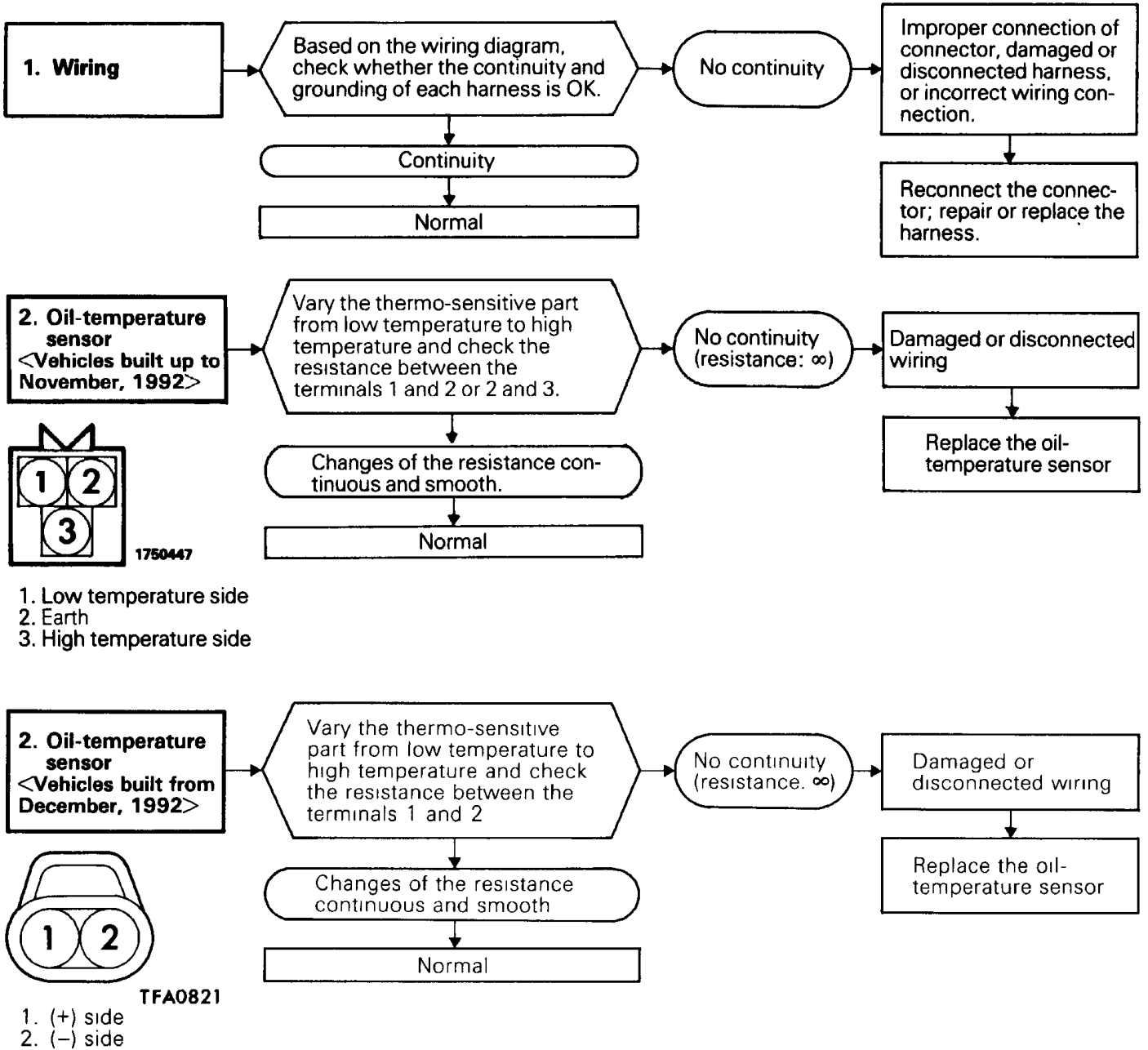
Abbreviations: TPS = Throttle position sensor SCSV = Shift control solenoid valve

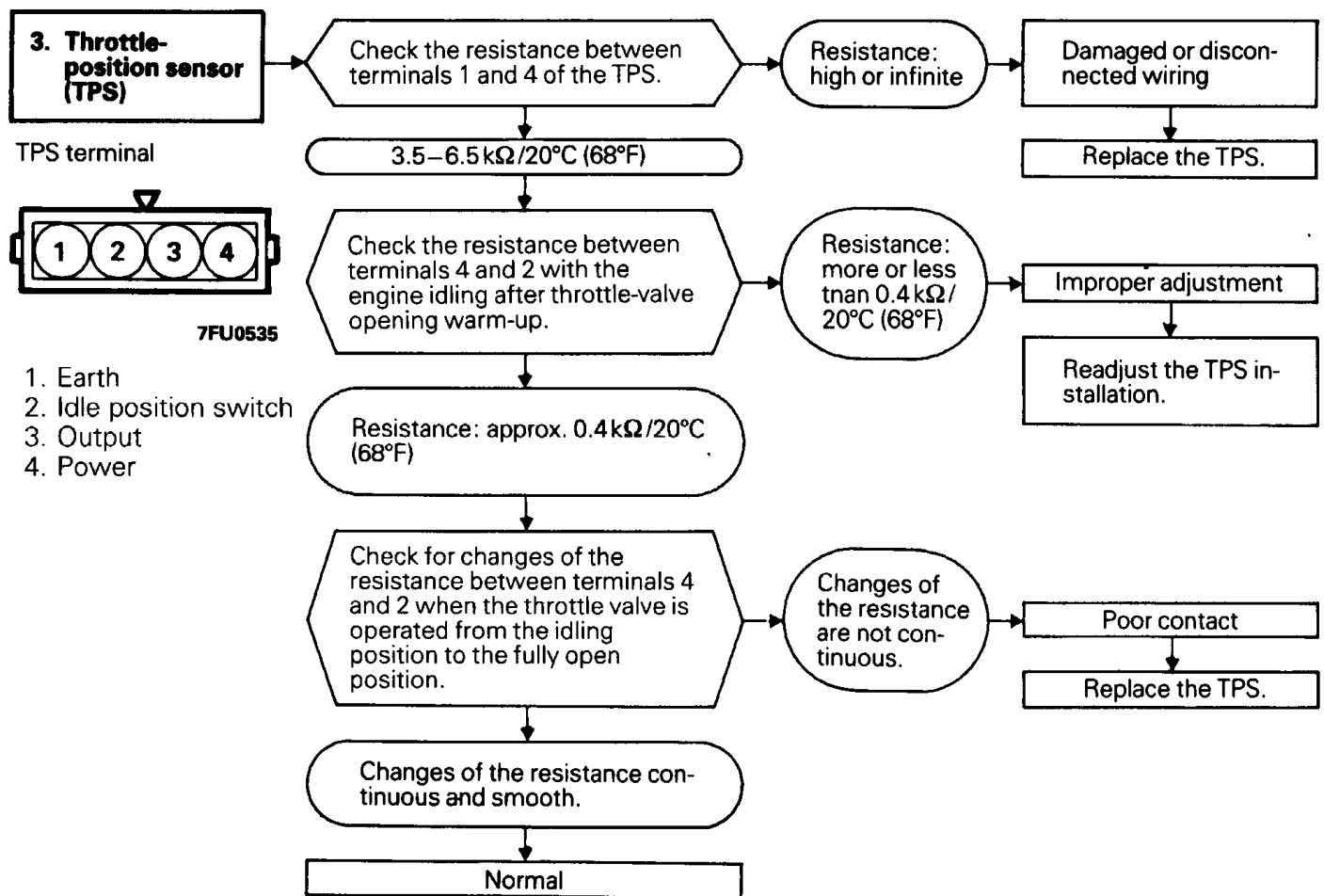
	Transmission malfunction of shift-shock (after start-off)																Abnormal noise, other			
	Won't shift from 2nd to 3rd	Won't shift to 4th	Overdrive control switch doesn't function	Doesn't shift according to shift pattern (shifting is possible)	Improper start-off (starts off from 2nd, etc.)	Excessive creeping or idling vibration	Excessive vibration-shock when shift 1-2 or 3-4	Excessive vibration-shock when shift 2-3 or 4-3	Excessive vibration-shock during upshift	Excessive vibration-shock during D-2 downshift	Sudden engine rpm increase during upshift	Sudden engine rpm increase during 3-2 shift, excessive vibration	Excessive vibration-shock only when cold	Excessive vibration-shock (other than already described)	Damper clutch won't function	Abnormal vibration in high-load region in low gear (approx 1 Hz)	Abnormal noise from converter housing together with engine rpm	Mechanical noise (clatter noise) from converter housing	Abnormal noise inside transmission case	3rd gear is held
1						X														
2					X		X	X	X	X			X	X		X				
3		X			X															X
4					X										X	X				
5												X					X			
6																				
7																		X		
8																				
9																	X			
10	X	X									X	X								X
11												X								X
12										⊗	⊗			X						X
13	X			X	X		X	X	X	X	X	X	X	X	X	X				X
14	X							X	X		X									X
15																				X
16							X				X	X								X
17							X				X	X		X						X
18										X										X
19																				X
20		⊗					X				X									X
21		X			X															X
22				⊗			X	X	⊗	X	⊗	X		X	X	X				
23							X	X	X	X	X	X		X	X	X				X
24				X											X	X				X
25							X					X								X
26																				X
27							X	X	X	X	X	X		X	X					
28																				X
29																				X
30	X	X									X	X								X
31															X					
32																X				X
33		X	X																	
34					X	X									X					
35														X	X	X				
36																				X
37				X																X
38	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X			X

PSCV = Pressure control solenoid valve

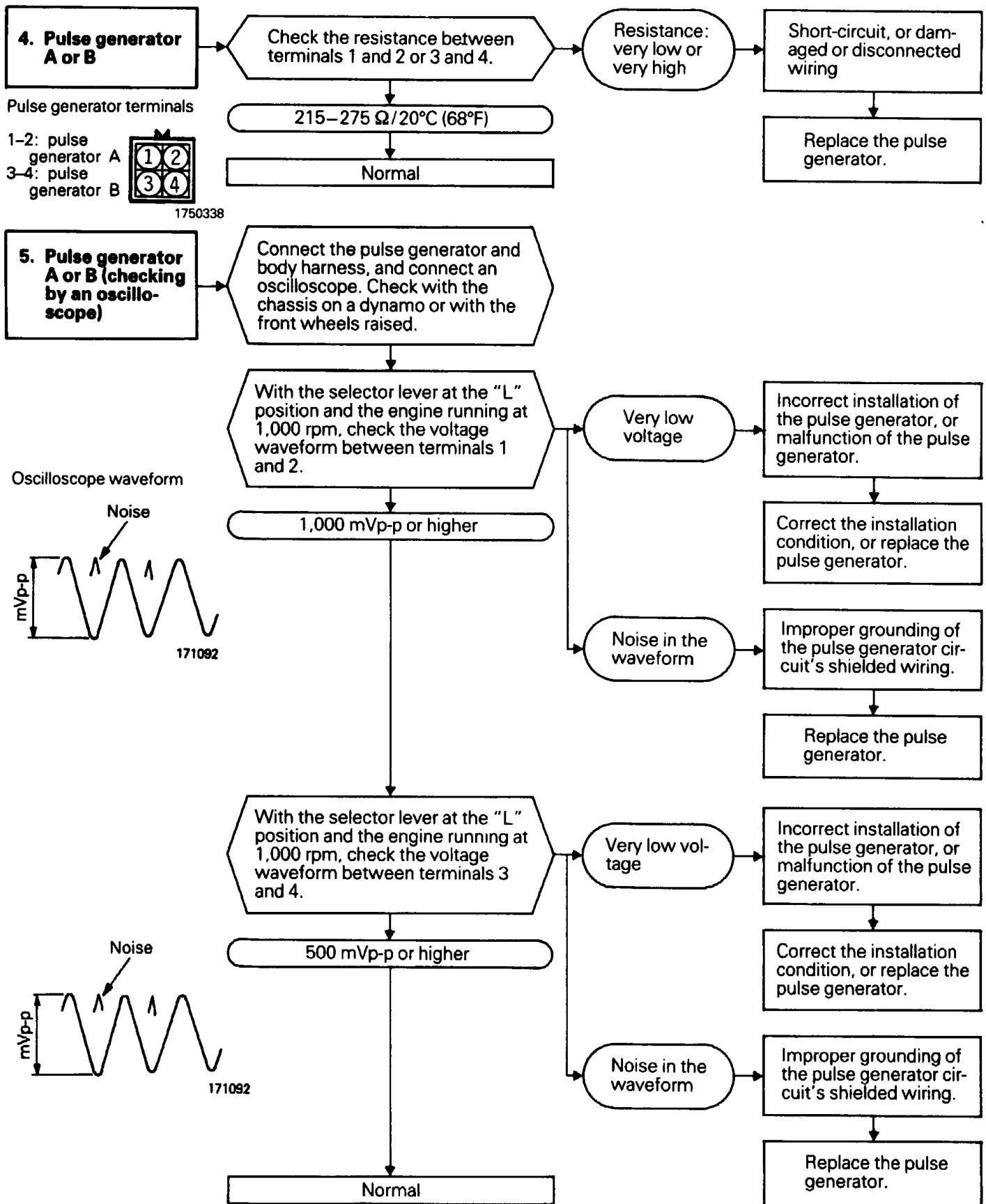
DCCSV = Damper clutch control solenoid valve

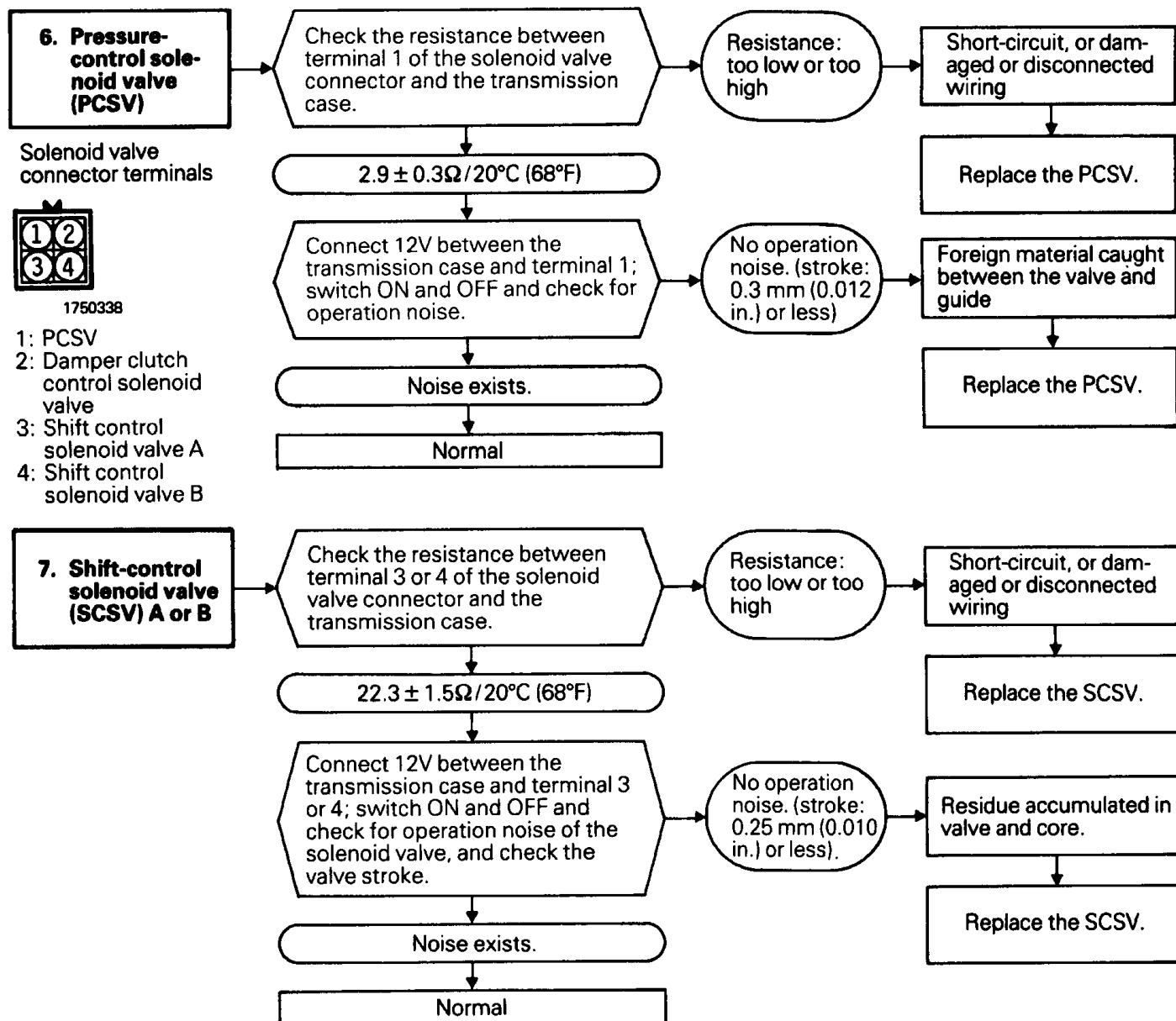
INSPECTION OF ELECTRONIC CONTROL SYSTEM COMPONENTS

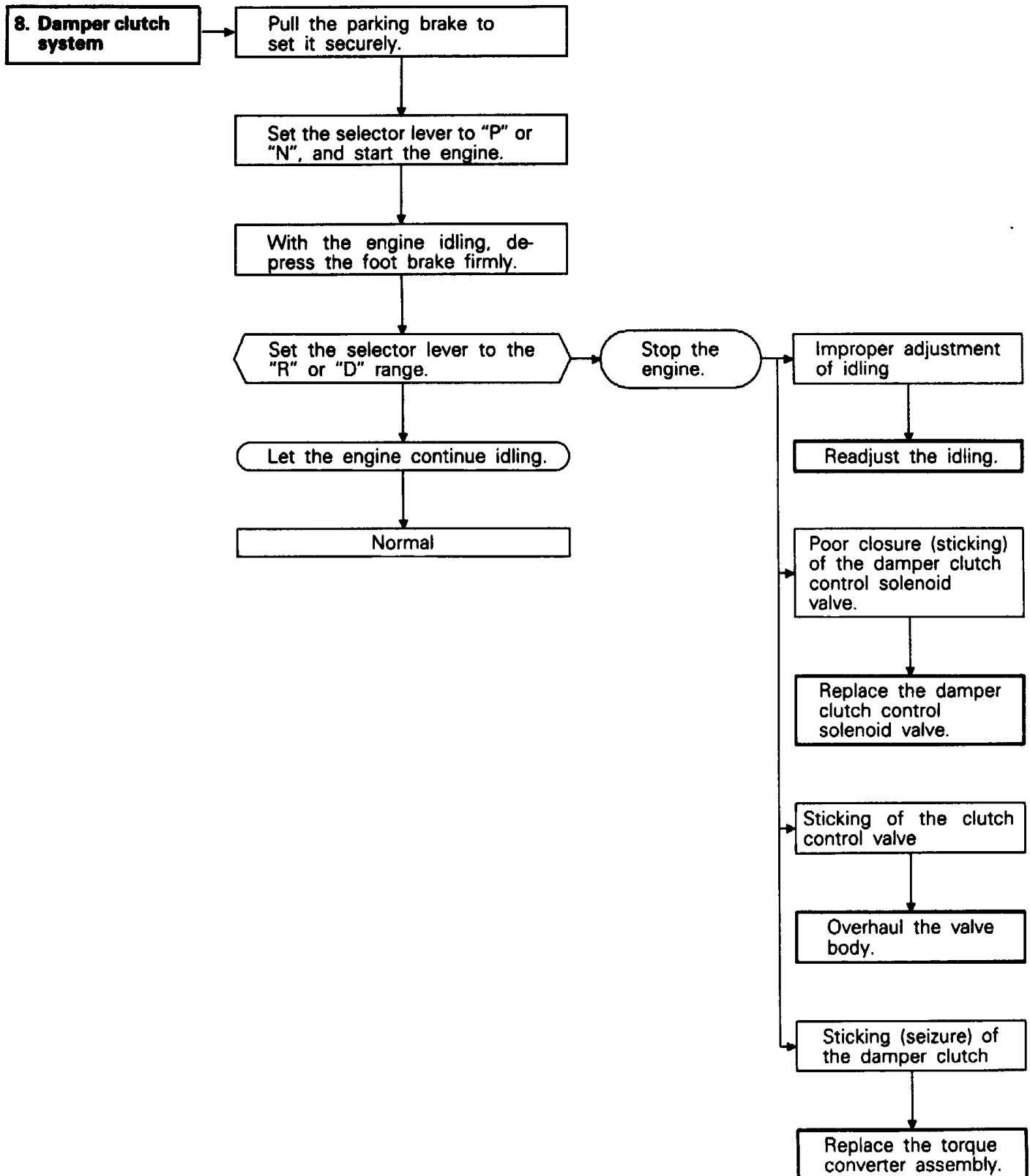




NOTES







9. Damper clutch control solenoid valve (DCCSV)

Solenoid valve connector terminals



1750338

- 1: PCSV
- 2: DCCSV
- 3: Pressure control solenoid valve A
- 4: Pressure control solenoid valve B

Check the resistance between terminal 2 of the solenoid valve connector and the transmission case.

Resistance: too low or too high

Short-circuit, or damaged or disconnected wiring

Replace the DCCSV.

Standard value: 3 Ω/20°C

Connect 12V between the transmission case and terminal 2; switch ON and OFF and check for operation noise.

No operation noise. Check for sticking.* (Valve stroke: 0.3 mm (0.012 in.) or less)

Foreign terminal caught between the valve and guide

Replace the DCCSV.

Noise exists.

*Sticking is usually at the release side.

Normal

10. Accelerator switch
 <Vehicles built up to November, 1992 only>



171096

With the accelerator pedal not depressed, check the resistance between terminals 1 and 2.

No continuity (resistance: ∞)

Check the installation of the accelerator switch; adjust if necessary.

Continuity exists (resistance: 0)

Problem not solved.

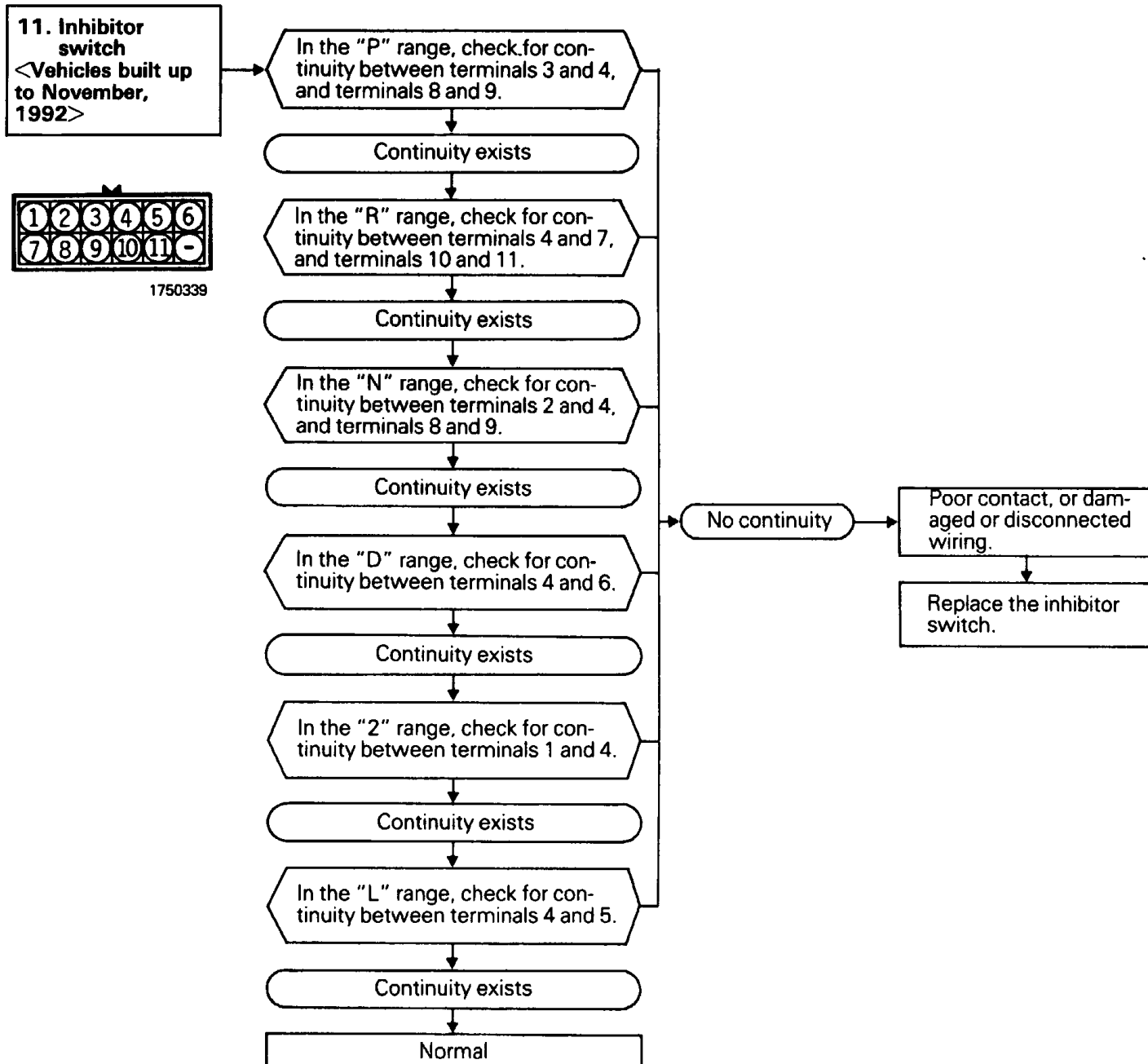
Replace the accelerator switch.

With the accelerator pedal depressed slightly (about 5%), check the resistance between terminals 1 and 2.

Continuity exists (resistance: 0)

No continuity (resistance: ∞)

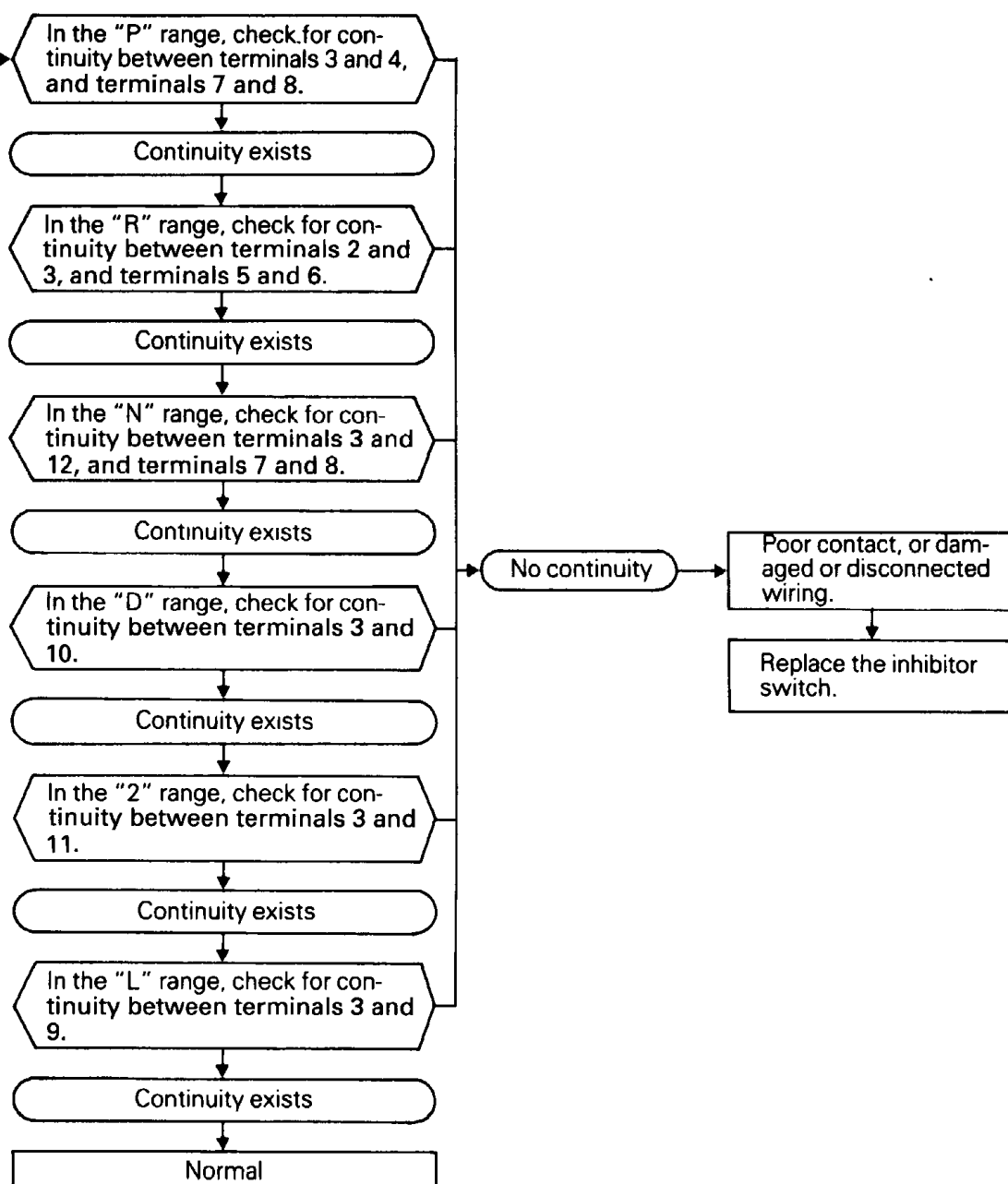
Normal



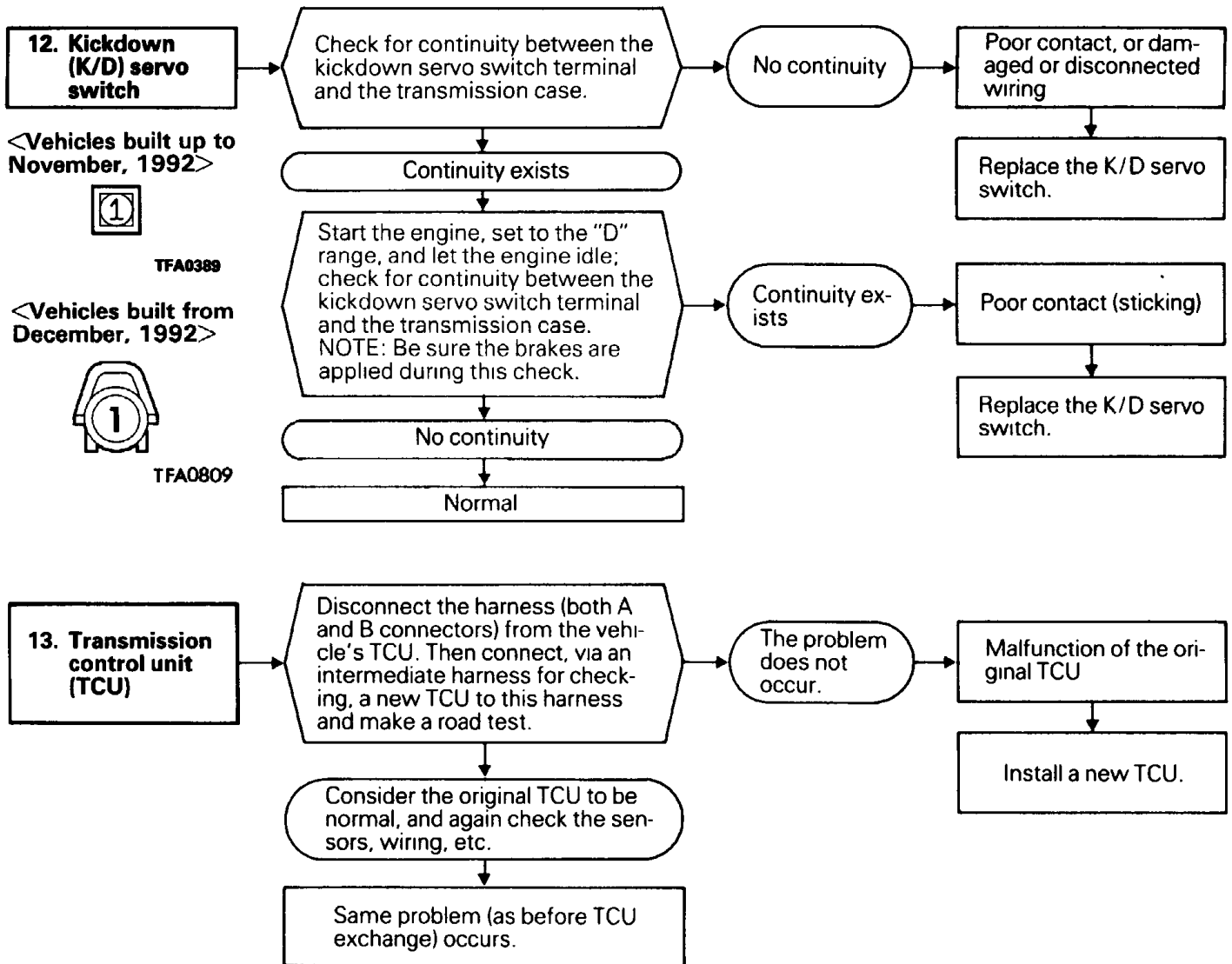
11. Inhibitor switch
<Vehicles built from December, 1992>



TFA0802



NOTES



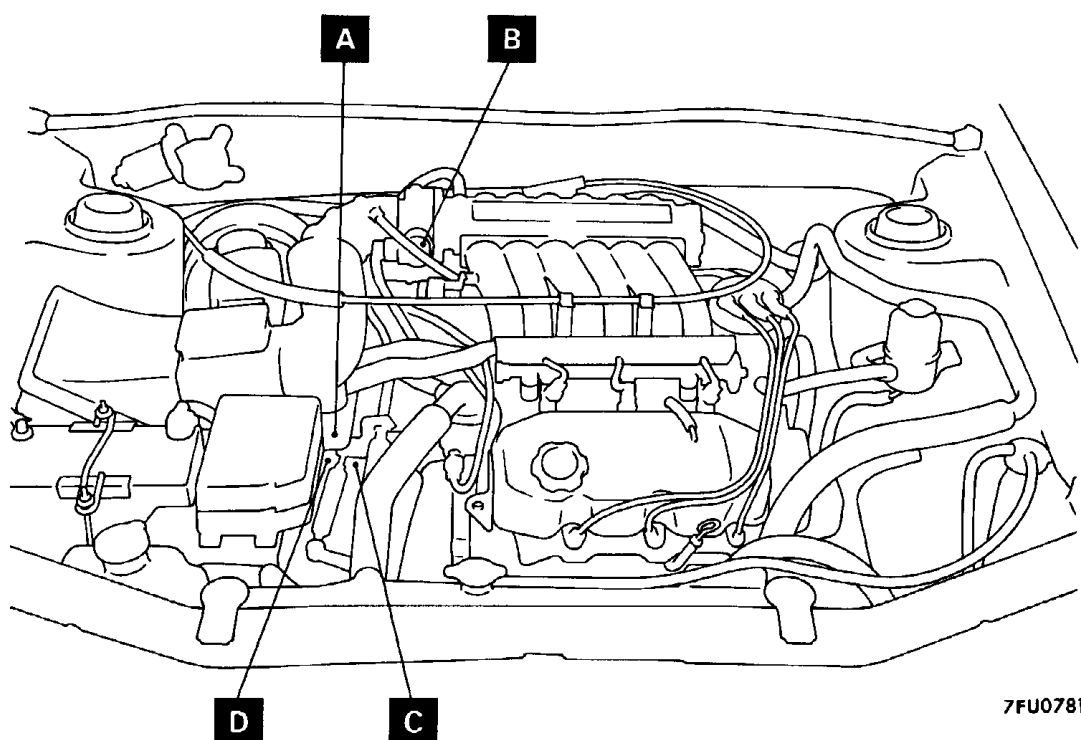
E.L.C. 4-SPEED AUTOMATIC TRANSMISSION CONTROL COMPONENTS LAYOUT

Name	Symbol	Name	Symbol
4 A/T control unit	H	Pulse generator A	A
M.P.I. control unit	I	Pulse generator B	A
M.P.I. throttle position sensor	B	Self-diagnosis check connector	F
Oil temperature sensor	D	Solenoid valve	C
Power (PWR)/Economy (ECO) switch	G	Vehicle-speed sensor	E

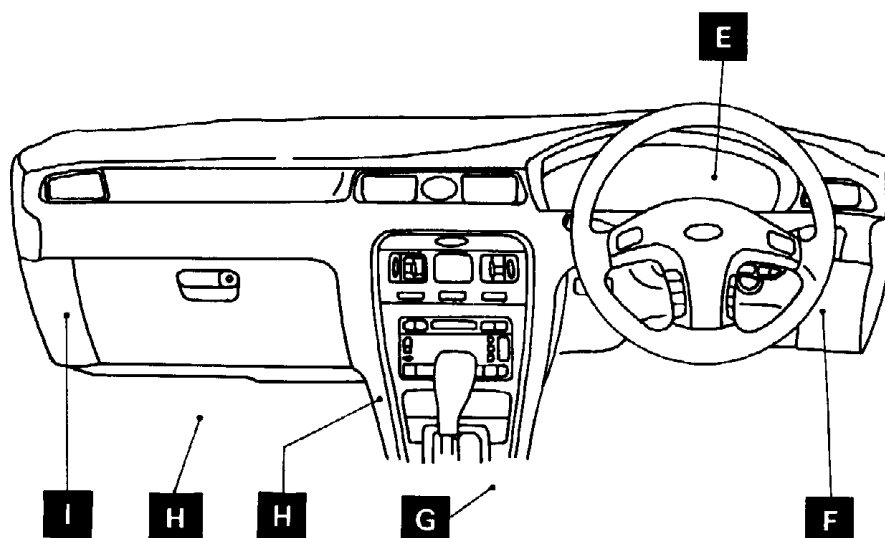
NOTE

C and D are built into the transmission.

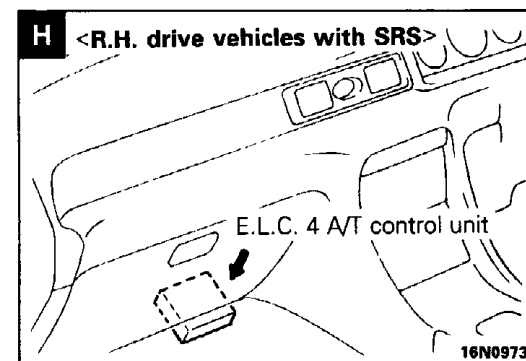
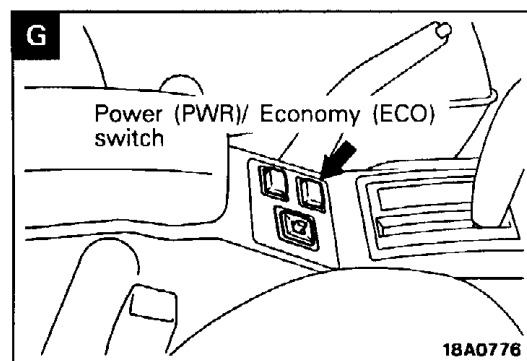
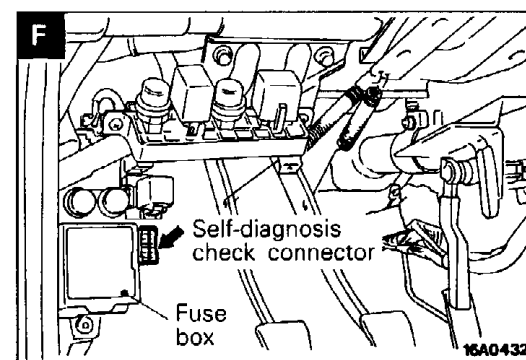
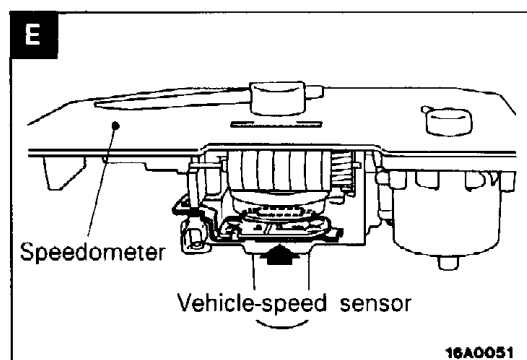
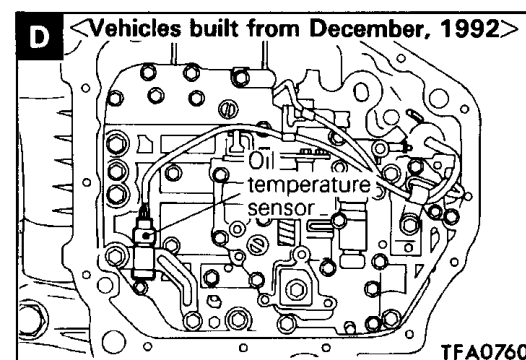
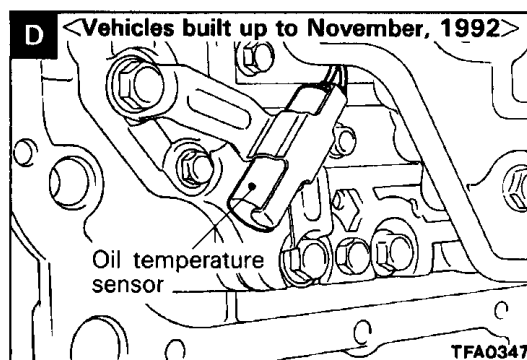
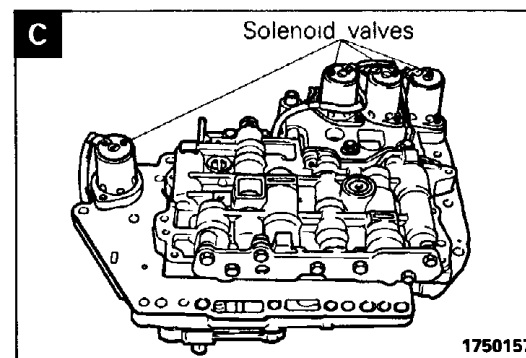
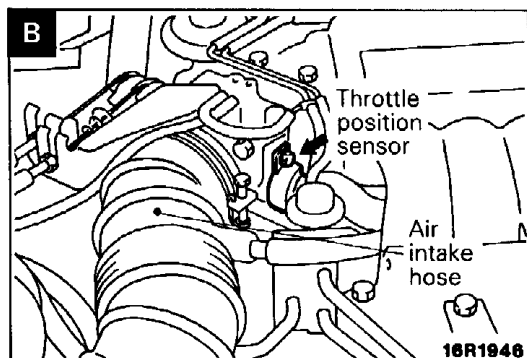
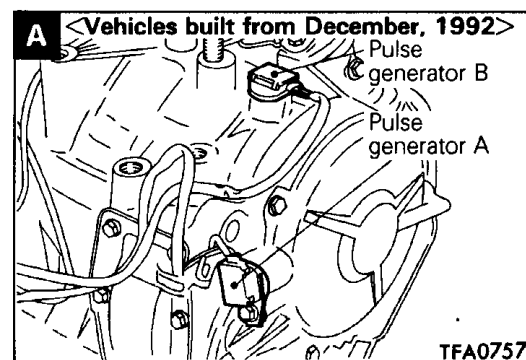
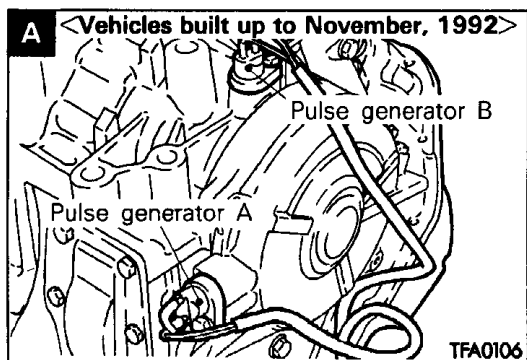
For details of the location of the throttle position sensor, refer to GROUP 13 – On-vehicle Inspection of MPI components.

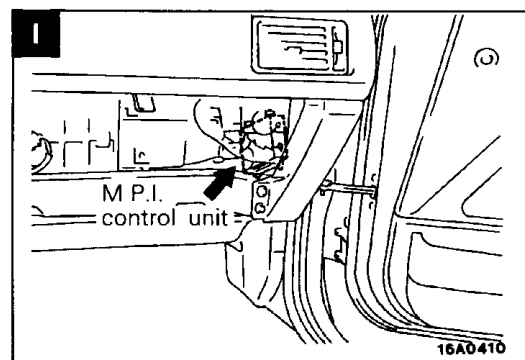
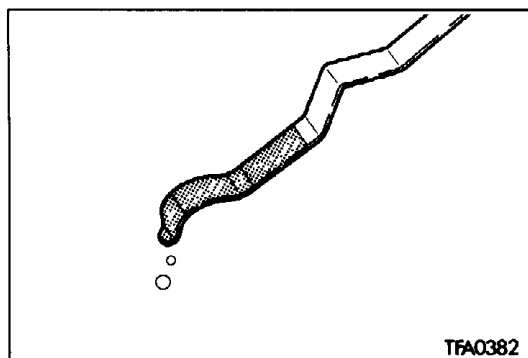
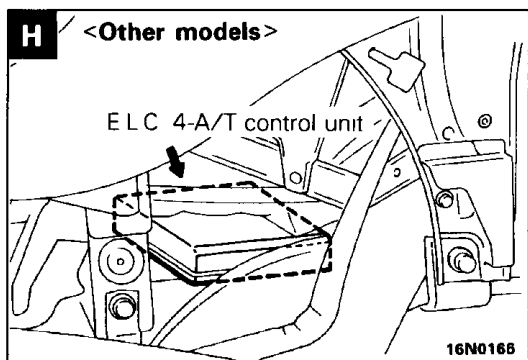


7FU0781



7FU0782





SERVICE ADJUSTMENT PROCEDURES

E23FLAI

TRANSMISSION FLUID LEVEL INSPECTION

1. Drive until the fluid temperature reaches the usual temperature [70–80°C (160–180°F)].
2. Place vehicle on level floor.
3. Move selector lever sequentially to every position to fill torque converter and hydraulic circuit with fluid, then place lever in "N" Neutral position.
4. Before removing dipstick, wipe all dirt from area around dipstick. Then take out the dipstick and check the condition of the fluid.

The transmission should be overhauled under the following conditions.

- If there is a "burning" odor.
 - If the fluid color has become noticeably blacker.
 - If there is a noticeably great amount of metal particles in the fluid.
5. Check to see if fluid level is in "HOT" range on dipstick. If fluid level is low, add automatic transmission fluid until level reaches "HOT" range.

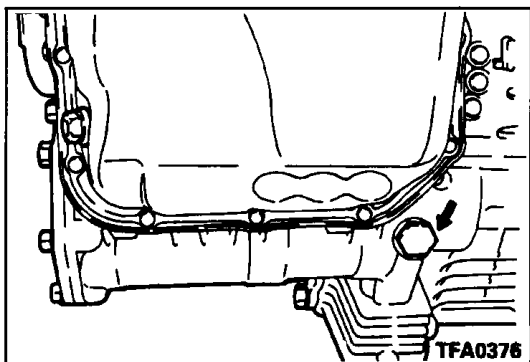
Transmission fluid: DIA QUEEN ATF-SP or equivalent

Low fluid level can cause a variety of conditions because it allows pump to take in air along with fluid. Air trapped in hydraulic circuit forms bubbles which make fluid spongy. Therefore, pressures will be erratic, causing delayed shift, slippy clutch and brakes, etc.

Improper filling can also raise fluid level to high. When transmission has too much fluid, gears churn up foam and cause the same conditions which occur with low fluid level, resulting in accelerated deterioration of automatic transmission fluid.

In either case, air bubbles can cause overheating, fluid oxidation, which can interfere with normal valve, clutch, and servo operation. Foaming can also result in fluid escaping from transmission vent where it may be mistaken for a leak.

6. Be sure to examine fluid on dipstick closely.

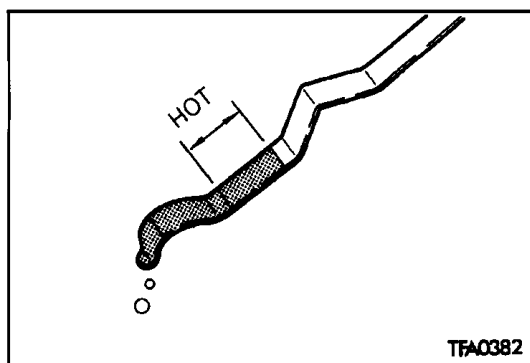
**TRANSMISSION FLUID REPLACEMENT**

E23FX-

Drain the fluid and check whether there is any evidence of contamination.

Replenish with new fluid after the cause of any contamination has been corrected.

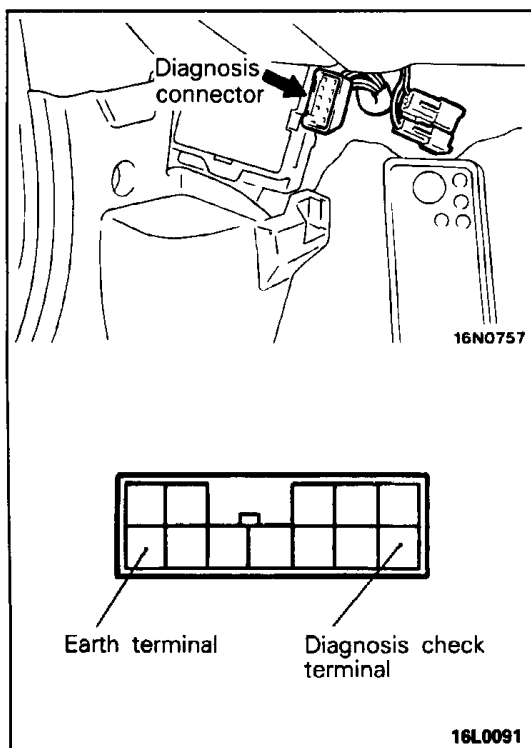
1. Remove drain plug at transmission case bottom to let fluid drain.
2. Place a drain container with large opening under the transmission oil pan.
3. Loosen oil pan bolts and tap pan at one corner to break it loose allowing fluid to drain, then remove oil pan.
4. Check the oil filter for clogging and damage and replace if necessary.
5. Clean drain plug and tighten drain plug with gasket to 30–35 Nm (3.0–3.5 kgm, 22–25 ft.lbs.).
6. Clean both gasket surfaces of transmission case and oil pan.
7. Install oil pan with new gasket and tighten oil pan bolts to 10–12 Nm (1.0–1.2 kgm, 7.5–8.5 ft.lbs.).



8. Pour 4.5 liters (4.8 U.S.qts., 4.0 Imp.qts.) of specified ATF into case through dipstick hole. [Total quantity of ATF required is approx. 7.5 liters (7.9 U.S.qts., 6.6 Imp.qts.). Actually however, approx. 4.5 liters (4.8 U.S.qts., 4.0 Imp.qts.) of fluid can be replaced because rest of fluid remains in torque converter.]

Specified fluid: DIA QUEEN ATF-SP or equivalent

9. Start engine and allow to idle for at least two minutes. Then, with parking brake on, move selector lever momentarily to each position, ending in "N" Neutral position.
10. Add sufficient ATF to bring fluid level to lower mark. Recheck fluid level after transmission is at normal operating temperature. Fluid level should be between upper and lower marks of "HOT" range. Insert dipstick fully to prevent dirt from entering transmission.



READ OUT OF MALFUNCTION CODE

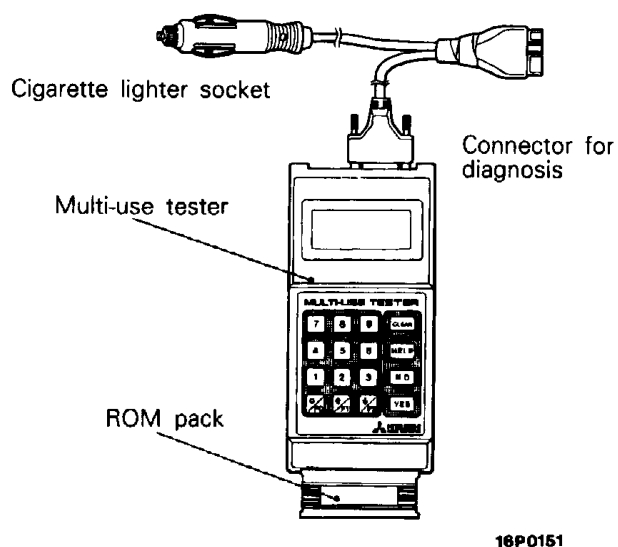
E23FAAHa

Caution

Connection and disconnection of the multi-use tester should always be made with the ignition switch in the OFF position.

- (1) Connect the voltmeter or multi-use tester to the connector for diagnosis.
- (2) Read out malfunction codes.
- (3) Check the cause according to the "DIAGNOSIS CHART" and "FAIL-SAFE CHART" and repair.
- (4) Use the multi-use tester to erase the malfunction code. If you do not have a multi-use tester, remove the (-) terminal of the battery to erase the malfunction code.

Multi-use tester



DIAGNOSIS CHART

Code No.	Description	Remedy
11	Excessively high throttle position sensor output	● Check the throttle position sensor connector. ● Check the throttle position sensor itself. ● Adjust the throttle position sensor. ● Check the accelerator switch (No. 24: output or not) <Vehicles built up to November, 1992 only>
12	Excessively low throttle position sensor output	
13	Throttle position sensor malfunction	
14	Improperly adjusted throttle position sensor system	
15	• Open in the low-temperature side of the oil temperature sensor circuit. <Vehicles built up to November, 1992> • Open the oil temperature sensor circuit. <Vehicles built from December, 1992>	● Oil temperature sensor connector inspection ● Oil temperature sensor inspection
16	Short in the high-temperature side of the oil temperature sensor circuit. <Vehicles built up to November, 1992 only>	
17	Open in the high-temperature side of the oil temperature sensor circuit or short in the low-temperature side circuit. <Vehicles built up to November, 1992 only>	
21	Open kickdown servo switch circuit	
22	Shorted kickdown servo switch circuit	● Check the kickdown servo switch connector. ● Check the kickdown servo switch.
23	Open ignition pulse pickup cable circuit	● Check the ignition pulse signal line.
24	Open-circuited or improperly adjusted accelerator switch <Vehicles built up to November, 1992 only>	● Check the accelerator switch connector. ● Check the accelerator switch itself. ● Adjust the accelerator switch.
31	Open pulse generator A circuit	● Check the pulse generator A and pulse generator B. ● Check the vehicle speed reed switch (for chattering.)
32	Open pulse generator B circuit	

Code No.	Description	Remedy
33	Open-circuit or improperly adjusted wide open throttle switch	● Check the wide open throttle switch connector. ● Check the wide open throttle switch itself. ● Adjust the wide open throttle switch.
34	Short-circuit or improperly adjusted wide open throttle switch	
41	Open shift control solenoid valve A circuit	● Check the solenoid valve connector. ● Check shift control solenoid valve A.
42	Shorted shift control solenoid valve A circuit	
43	Open shift control solenoid valve B circuit	● Check the solenoid valve connector. ● Check shift control solenoid valve B.
44	Shorted shift control solenoid valve B circuit	
45	Open pressure control solenoid valve circuit	● Check the solenoid valve connector. ● Check the pressure control solenoid valve.
46	Shorted pressure control solenoid valve circuit	
47	Broken wire in damper clutch control solenoid valve	● Inspection of solenoid valve connector ● Individual inspection of damper clutch control solenoid valve
48	Short circuit in damper clutch control solenoid valve	
49	Defect in the damper clutch system	● Inspection of damper clutch hydraulic system ● Individual inspection of damper clutch control solenoid valve ● Replacement of control unit

Code No.	Description	Remedy
51	Shifting to 1st gear does not match the engine speed.	• Check the pulse generator A and pulse generator B connector. • Check pulse generator A and pulse generator B. • Rear clutch slippage.
52	Shifting to 2nd gear does not match the engine speed.	• Check the pulse generator A connector. • Check pulse generator A. • Kickdown brake slippage.
53	Shifting to 3rd gear does not match the engine speed.	• Check the pulse generator A and pulse generator B connector. • Check pulse generator A and pulse generator B. • Front clutch slippage. • Rear clutch slippage.
54	Shifting to 4th gear does not match the engine speed.	• Check the pulse generator A connector. • Check pulse generator A. • Kickdown brake slippage.
61	Short-circuited torque reduction request signal line or open-circuited torque reduction execution signal line.	• Check torque reduction request signal line. • Check torque reduction execution signal line.
62	Open-circuited torque reduction request signal line.	• Check torque reduction request signal line.
63	Short-circuited torque reduction execution signal line.	• Check torque reduction execution signal line.
–	Normal	–
–	Defective transmission control unit (TCU)	• TCU power supply inspection • TCU earth inspection • TCU replacement

23-31-1 AUTOMATIC TRANSMISSION – Service Adjustment Procedures

FAIL-SAFE CHART

Output code	Description	Fail-safe countermeasure	Note (relation to self-diagnosis)
Code No.			
81	Open-circuited pulse generator A	Locked in 3rd (D) or 2nd (2,L)	When code No. 31 is generated 4th time
82	Open-circuited pulse generator B	Locked in 3rd (D) or 2nd (2,L)	When code No. 32 is generated 4th time
83	Open-circuited or shorted shift control solenoid valve A	Locked in 3rd	When code No. 41 or 42 is generated 4th time
84	Open-circuited or shorted shift control solenoid valve B	Locked in 3rd	When code No. 43 or 44 is generated 4th time
85	Open-circuited or shorted pressure control solenoid valve	Locked in 3rd (D) or 2nd (2,L)	When code No. 45 or 46 is generated 4th time
86	Gear shifting does not match the engine speed	Locked in 3rd (D) or 2nd (2,L)	When code No. 51, 52, 53 or 54 is generated 4th time
–	Defective transmission control unit (TCU)	Fixed for 3rd speed	–

NOTES

23-32 AUTOMATIC TRANSMISSION – Service Adjustment Procedures

CHECKING THE CONTROL SYSTEM (WHEN A MULTI-USE TESTER IS USED)

Using the multi-use tester, follow the checking procedures as described in the table below.

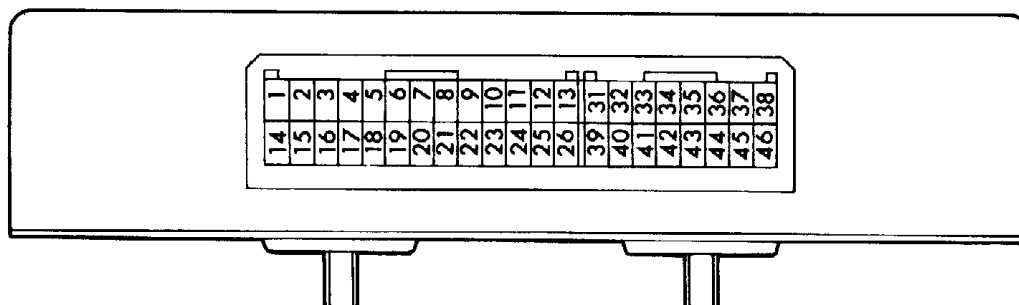
Check items	Check procedures		Probable cause (or remedy) if a malfunction is found
	Check conditions	Normal value	
Throttle position sensor (TPS) ● Data reading ● Item No. 11	Accelerator completely closed	0.3–1.0 V	● TPS is incorrectly adjusted if voltage is high during fully closed or fully open ● TPS or circuit harness malfunction if there is no change ● TPS or accelerator wire malfunction if the change is not smooth
	Accelerator slowly depressed	Changes occur according to degree of opening	
	Accelerator completely open	4.5–5.5 V	
Oil temperature sensor ● Data reading ● Item No. 15	Engine cold (before starting)	Corresponding to outside air temperature	● Oil temperature sensor or circuit harness malfunction
	Engine warming up (during driving)	Gradual increase	
	After engine warmed up	80–110°C	
Kickdown servo switch ● Data reading ● Item No. 21	L range; idling	ON	● Kickdown servo improperly adjusted ● Kickdown servo switch or circuit harness malfunction ● Kickdown servo malfunction
	D range; 1st or 3rd gear	ON	
	D range; 2nd or 4th gear	OFF	
Ignition signal line ● Data reading ● Item No. 23	N range; idling	600–800 r/min.	● Ignition system malfunction ● Ignition signal pick-up circuit harness malfunction
	N range; 2,500 r/min. (tachometer reading)	2,400–2,600 r/min.	
Accelerator switch <Vehicles built up to November, 1992 only> ● Data reading ● Item No. 24	Accelerator fully closed	ON	● Accelerator switch incorrectly adjusted ● Accelerator switch or circuit harness malfunction
	Accelerator slightly depressed	OFF	
Idle position switch ● Data reading ● Item No. 25	Accelerator fully closed	ON	● TPS is incorrectly adjusted ● TPS or circuit harness malfunction
	Accelerator slightly depressed	OFF	
Air conditioner relay signals ● Data reading ● Item No. 26	D range; air conditioner switch ON	ON	● Air conditioner power relay ON signal-detection circuit harness malfunction
	D range; air conditioner switch OFF	OFF	

Check items	Check procedures		Probable cause (or remedy) if a malfunction is found
	Check conditions	Normal value	
Transmission gear position ● Data reading ● Item No. 27	D range; idling	C	● TCU malfunction ● Accelerator switch system malfunction ● Inhibitor switch system malfunction ● TPS system malfunction
	L range; idling	1ST	
	2 range; 2nd gear	2ND	
	D range; overdrive-OFF; 3rd gear	3RD	
	D range; overdrive; 4th gear	4TH	
Pulse generator A ● Data reading ● Item No. 31	D range; stopped	0 r/min.	● Pulse generator A or circuit harness malfunction ● Pulse generator A shielded line malfunction ● Kickdown brake slippage
	D range; driving at 50 km/h in 3rd gear	1,600–2,000 r/min.	
	D range; driving at 50 km/h in 4th gear	1,100–1,400 r/min.	
Pulse generator B ● Data reading ● Item No. 32	D range; stopped	0 r/min.	● Pulse generator B or circuit harness malfunction ● Pulse generator B shielded line malfunction
	D range; driving at 50 km/h in 3rd gear	1,600–2,000 r/min.	
	D range; driving at 50 km/h in 4th gear	1,600–2,000 r/min.	
Over drive switch ● Data reading ● Item No. 35	Overdrive switch ON	OD	● Overdrive switch or circuit harness malfunction
	Overdrive switch OFF	OD-OFF	
Power/Economy select switch ● Data reading ● Item No. 36	Selection of the Power pattern (including during E pattern control when oil temperature is low)	Power	● Power/Economy select switch or circuit harness malfunction
	Selection of the Economy pattern	Economy	
Inhibitor switch ● Data reading ● Item No. 37	Shift to P range	P	● Inhibitor switch improperly adjusted ● Inhibitor switch or circuit harness malfunction ● Manual control cable malfunction
	Shift to R range	R	
	Shift to N range	N	
	Shift to D range	D	
	Shift to 2 range	2	
	Shift to L range	L	
Vehicle speed reed switch ● Data reading ● Item No. 38	Vehicle stopped	0 km/h	● Vehicle speed reed switch malfunction if high-speed signals emitted while vehicle is stopped ● Otherwise, vehicle speed reed switch or circuit harness malfunction
	Driving at 30 km/h	30 km/h	
	Driving at 50 km/h	50 km/h	

23-34 AUTOMATIC TRANSMISSION – Service Adjustment Procedures

Check items	Check procedures		Probable cause (or remedy) if a malfunction is found
	Check conditions	Normal value	
PCSV duty ● Data reading ● Item No. 45	D range; idling	50–70 %	● Duty should become 100 % when, while idling in D range, accelerator is pressed even slightly ● TCU malfunction ● TPS malfunction ● Accelerator switch system malfunction
	D range; 1st gear	100 %	
	D range; during shift	Changes occur according to conditions	
Amount of damper clutch slip ● Data reading ● Item No. 47	D range, 3rd gear 1,500 r/min. (reading on tachometer)	100–300 r/min.	● Damper clutch is defective. ● Ignition signal line or pulse generator system is defective. ● Transmission hydraulic pressure is inadequate. ● Damper clutch control solenoid valve (DCCSV) is defective.
	D range, 3rd gear 3,500 r/min. (reading on tachometer)	0 r/min.	
DCCSV duty ● Data reading ● Item No. 49	D range, 3rd gear 1,500 r/min. (reading on tachometer)	0 %	● Transmission control unit is defective. ● TPS system is defective. ● Pulse generator B system is defective.
	D range, 3rd gear 3,500 r/min. (reading on tachometer)	Change according to negative load	

TRANSMISSION CONTROL UNIT (TCU)



TFA0744

1. Damper clutch control solenoid valve
2. Shift control solenoid valve A
3. –
4. Communication line to engine
5. –
6. –
7. Kickdown servo switch
8. Air conditioner relay signal
9. Diagnosis output terminal
10. Pulse generator B output
11. Diagnosis control terminal
12. Power source
13. Earth
14. Pressure control solenoid valve
15. Shift control solenoid valve B
16. Wide open throttle switch <L H drive vehicles only>
17. Communication line to engine
18. Communication line to engine
19. –
20. Idle position switch
21. Throttle position sensor
22. –
23. Oil temperature sensor
24. Sensor earth
25. Power source
26. Earth
31. Inhibitor switch (P)
32. Inhibitor switch (R)
33. Inhibitor switch (N)
34. Inhibitor switch (D)
35. Inhibitor switch (2)
36. Inhibitor switch (L)
37. Overdrive switch
38. Power mode signal
39. Power source (Backup)
40. Vehicle speed reed switch
41. Pulse generator (B)
42. Pulse generator (B)
43. Pulse generator (A)
44. Pulse generator (A)
45. Earth
46. Ignition pulse

SHIFT PATTERNS

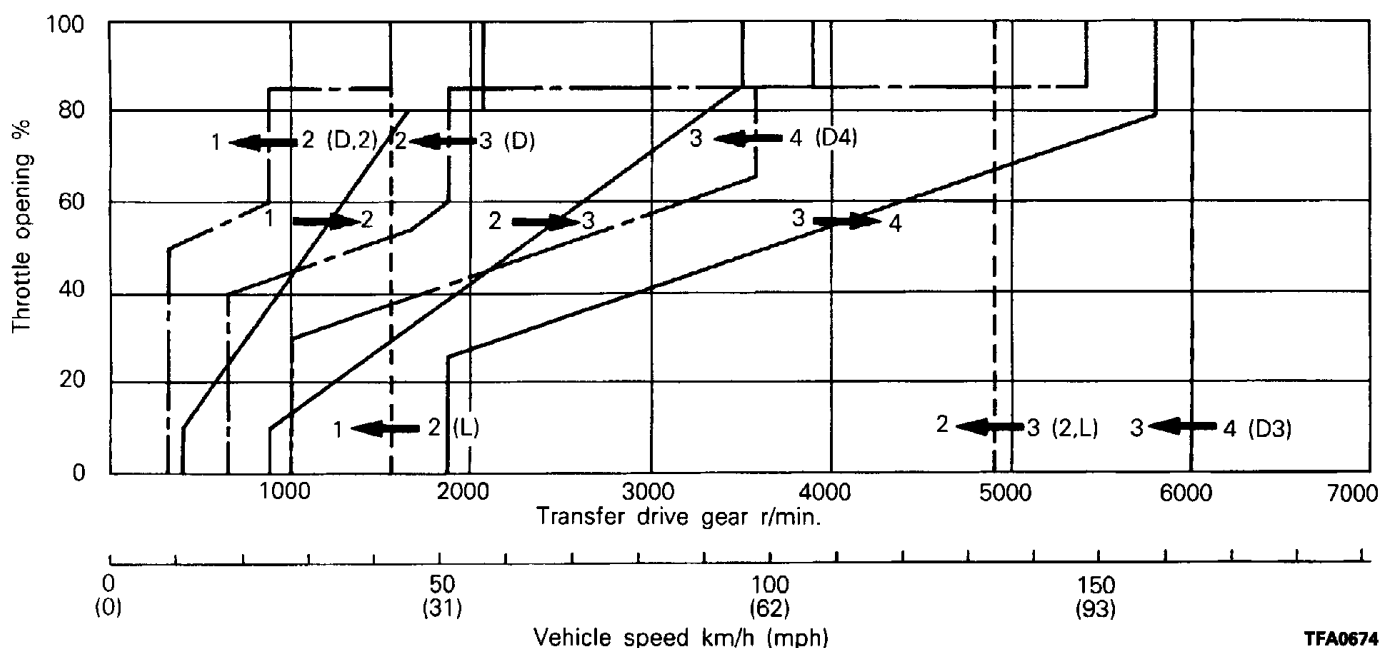
Certain shift patterns have been preset in order to provide the optimum shifting performance in accordance with engine performance.

The solid lines shown in these shift patterns indicate upshifts, and the broken lines indicate downshifts. The reason why there is a difference between the shift points for upshifts and for downshifts is so that upshifts and downshifts will not occur frequently when driving at a speed in the vicinity of the shift point.

When the vehicle is stopped, there is a shift to 2nd gear in order to obtain a suitable "creeping", but when the accelerator pedal is then depressed the vehicle starts off in 1st gear.

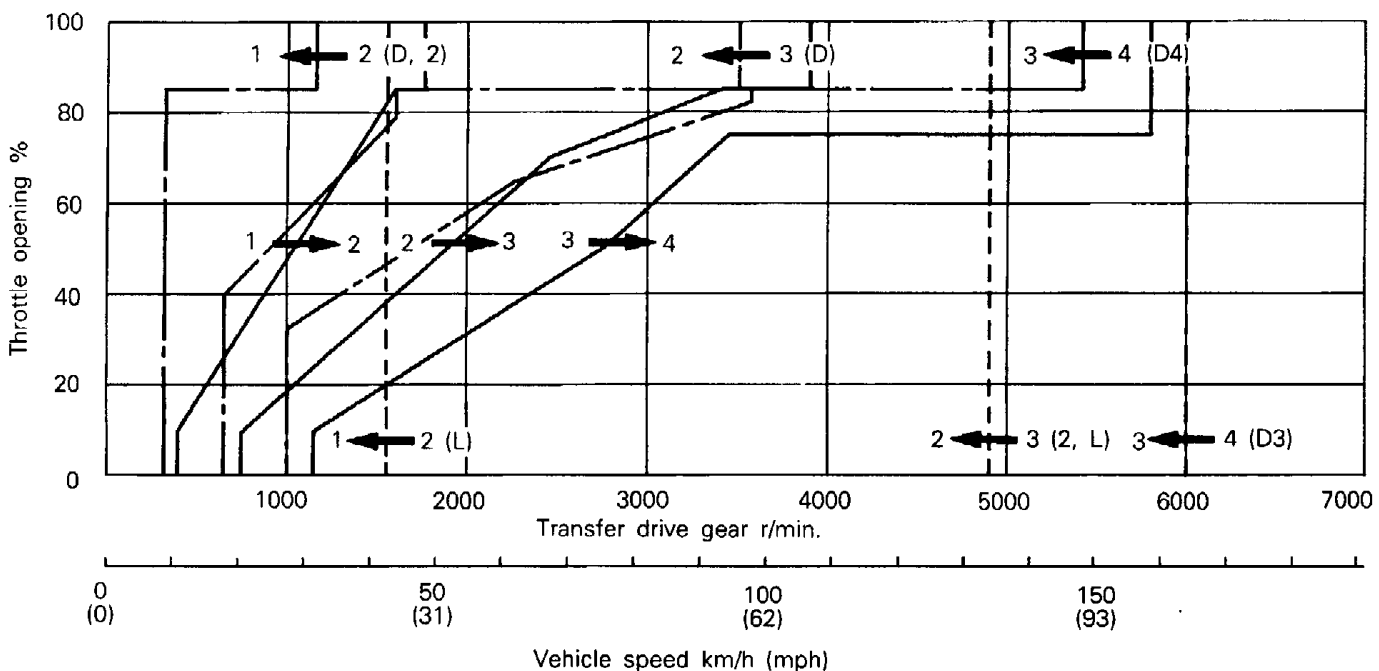
<F4A33-1-UNN3 · F4A33-1-UNP3>

Power (PWR) position



TFA0674

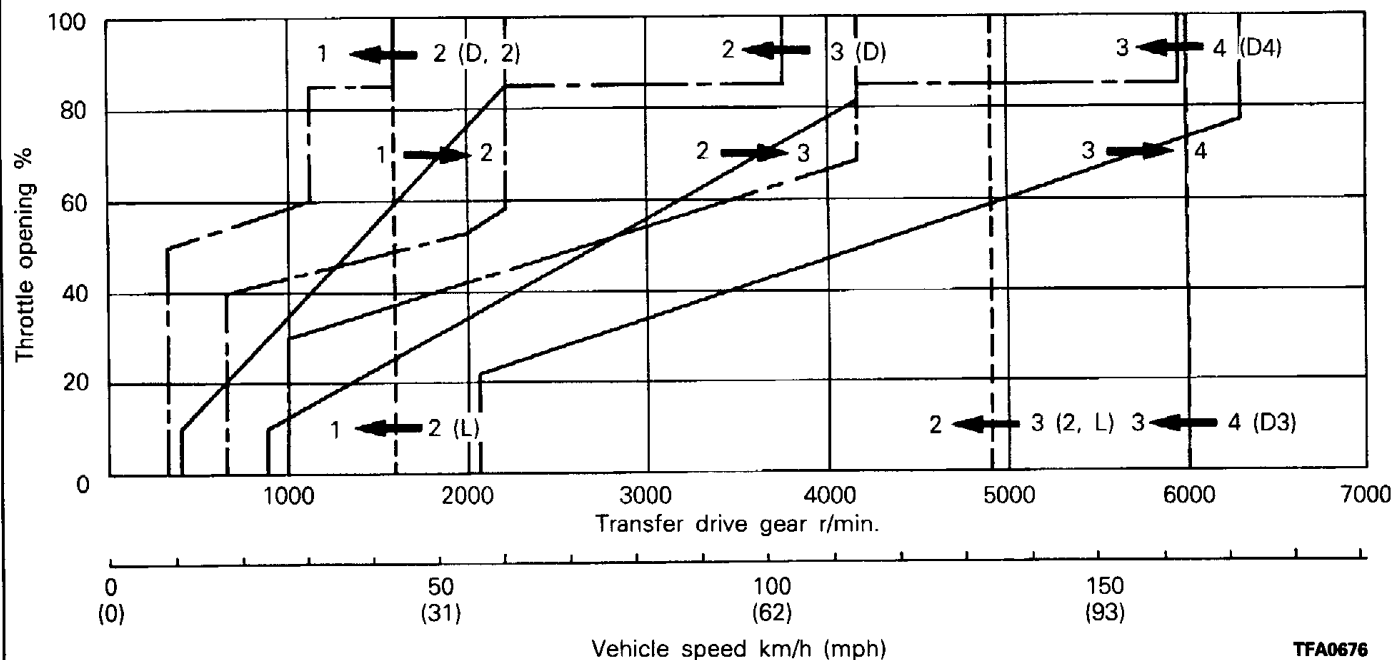
Economy (ECO) position



TFA0675

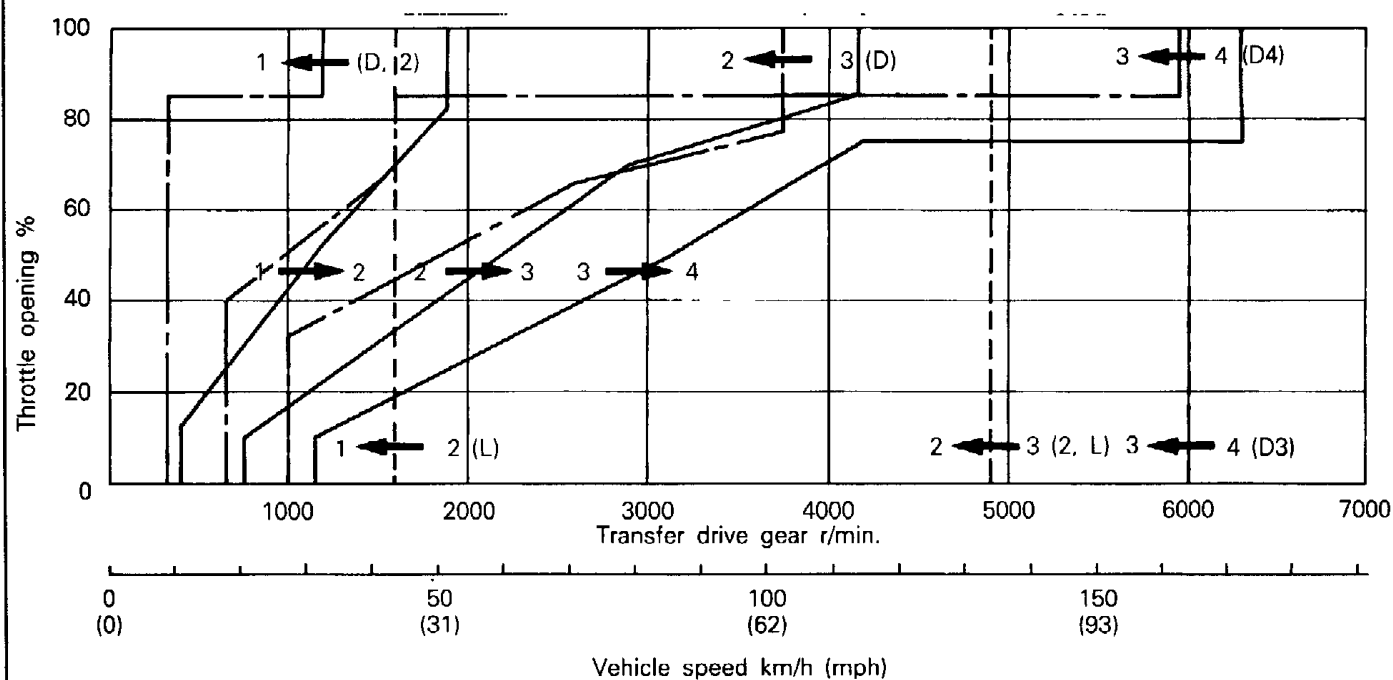
< F4A33-1-UNN4 · F4A33-1-UNP4 >
< F4A33-1-UNN5 · F4A33-1-UNP5 >

Power (PWR) position



TFA0676

Economy (ECO) position

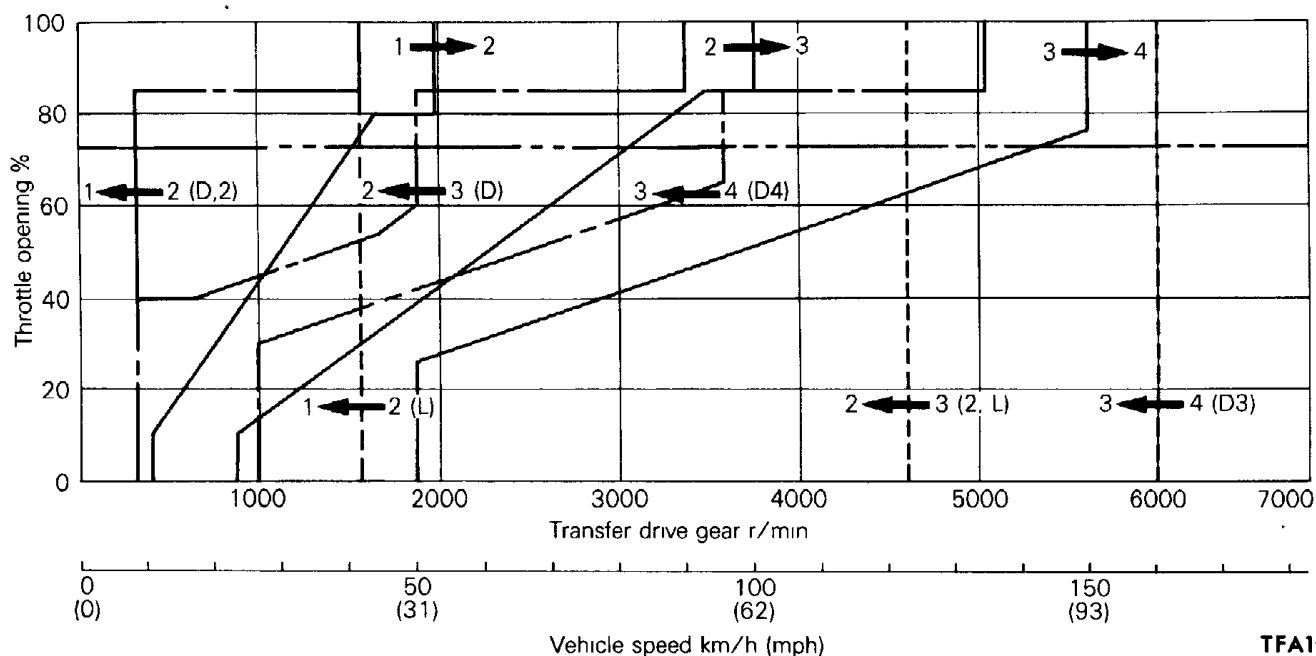


TFA0677

23-37-1 AUTOMATIC TRANSMISSION – Service Adjustment Procedures

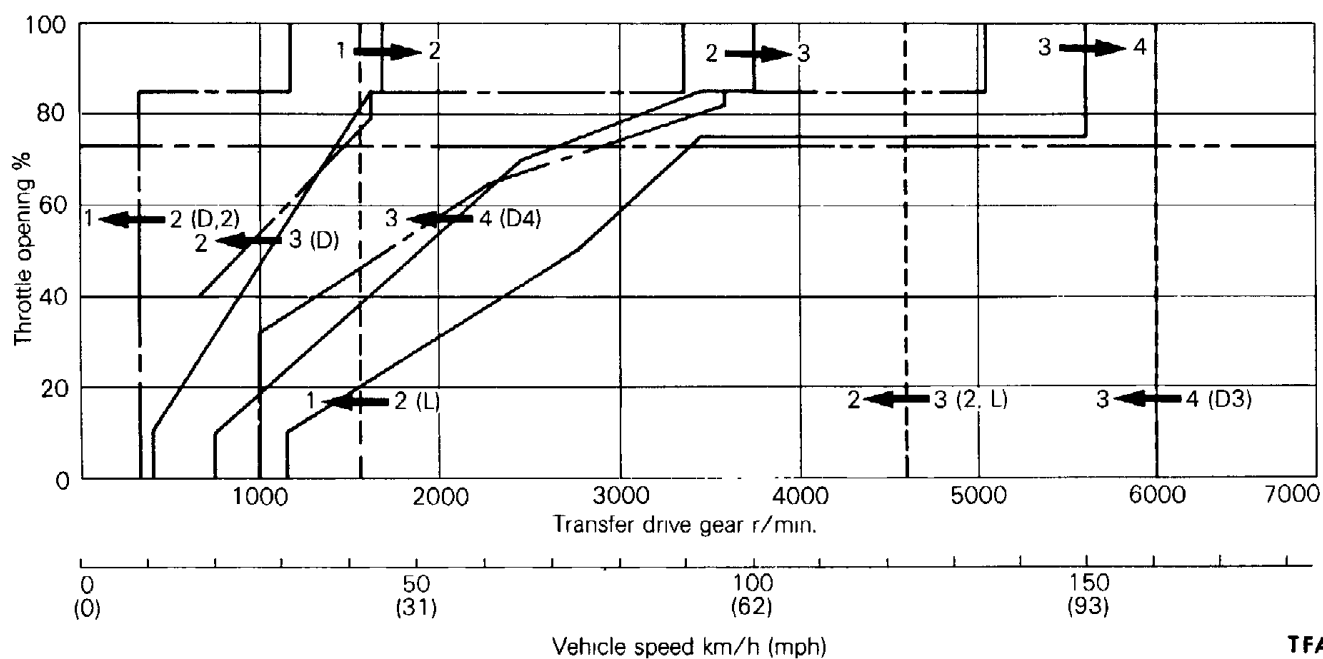
<F4A33-1-UNQ7 (L.H. drive vehicles)>

Power (PWR) position



TFA1045

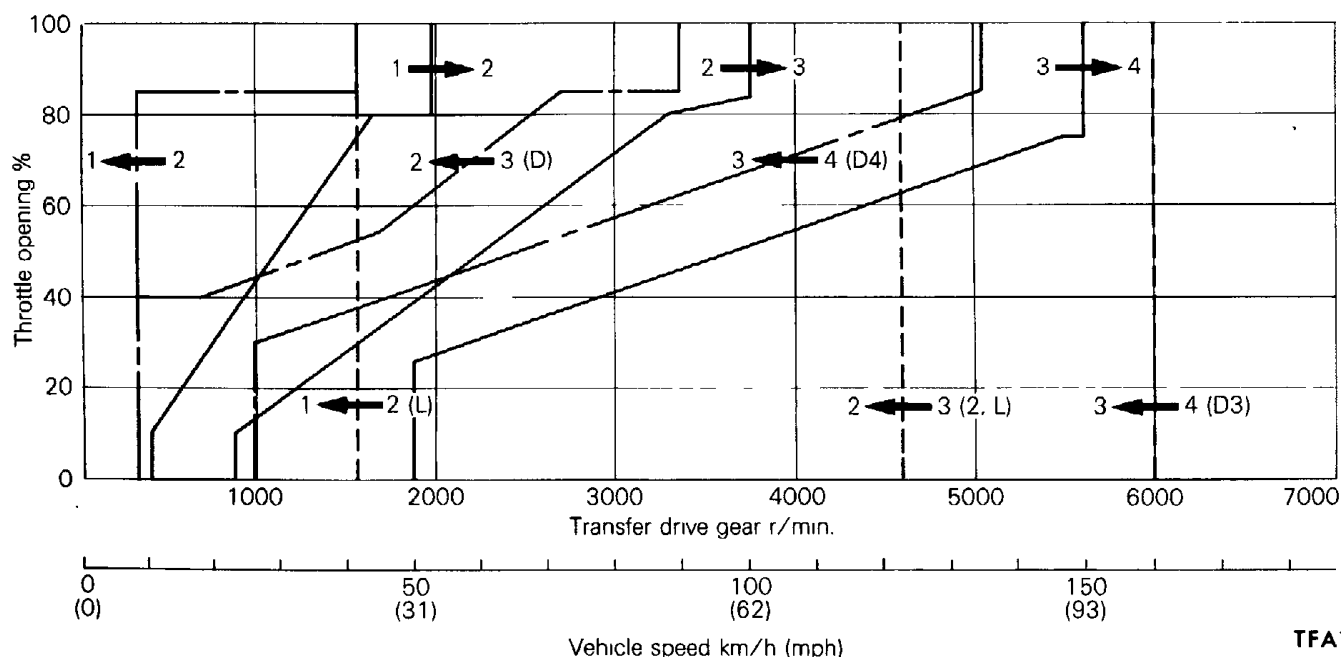
Economy (ECO) position



TFA1046

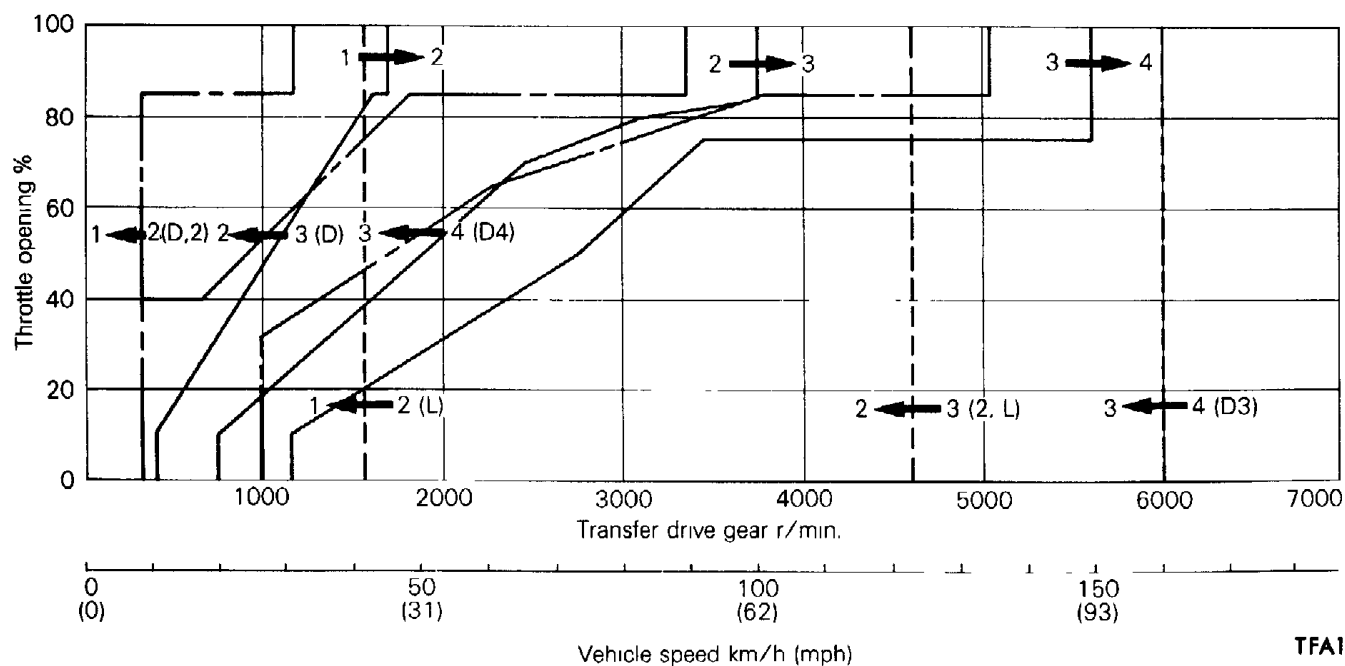
<F4A33-1-UNQ7 (R.H. drive vehicles)>

Power (PWR) position



TFA1051

Economy (ECO) position

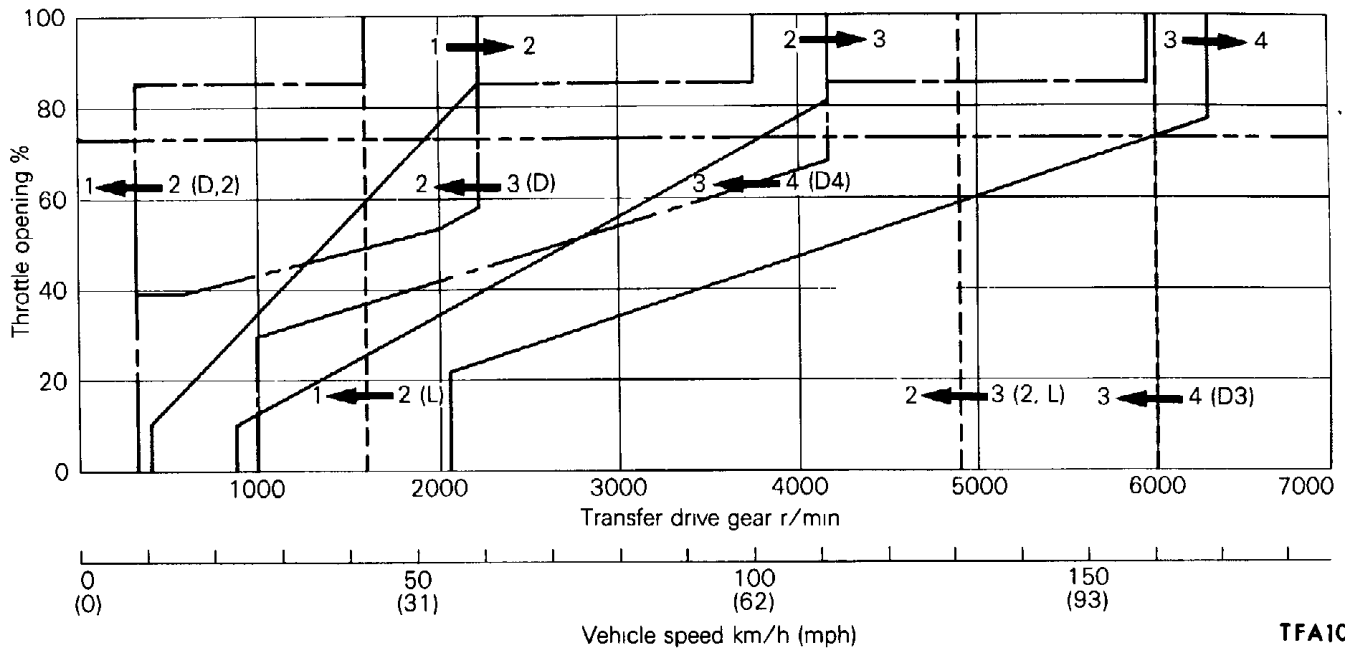


TFA1052

23-37-3 AUTOMATIC TRANSMISSION – Service Adjustment Procedures

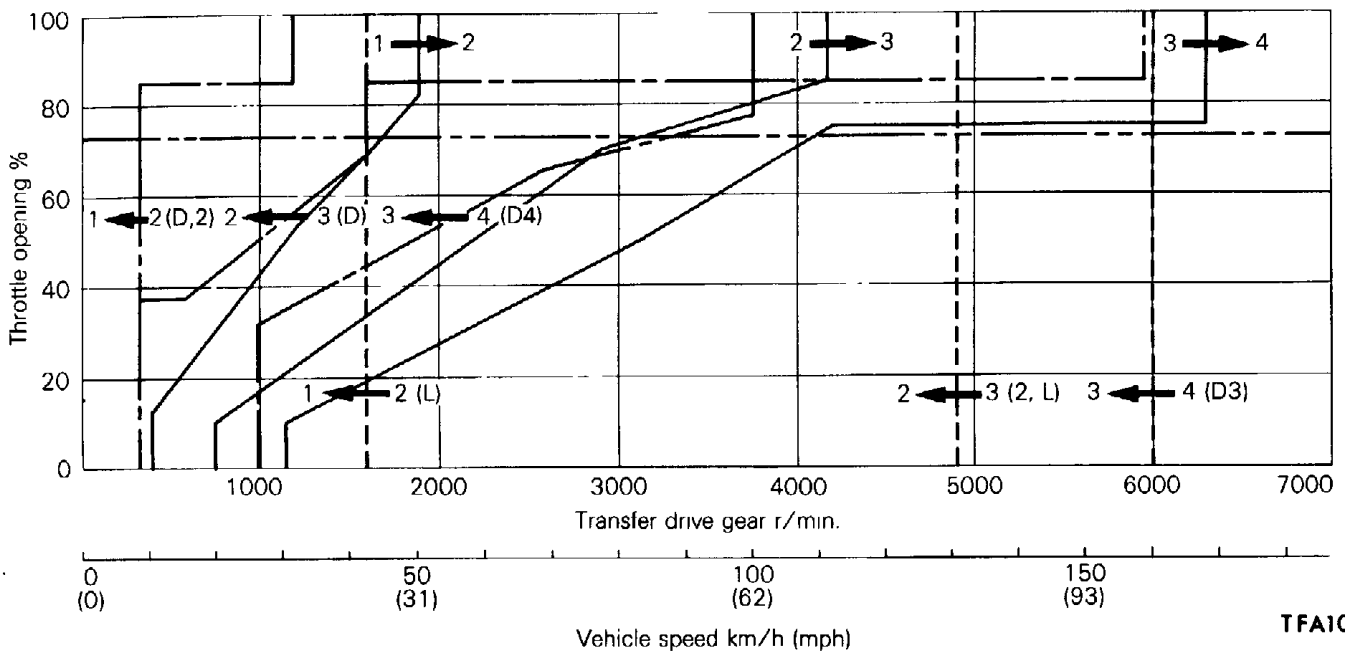
〈 F4A33-1-UNQ5 (L.H. drive vehicles) 〉
〈 F4A33-1-UNQ6 (L.H. drive vehicles) 〉

Power (PWR) position



TFA1047

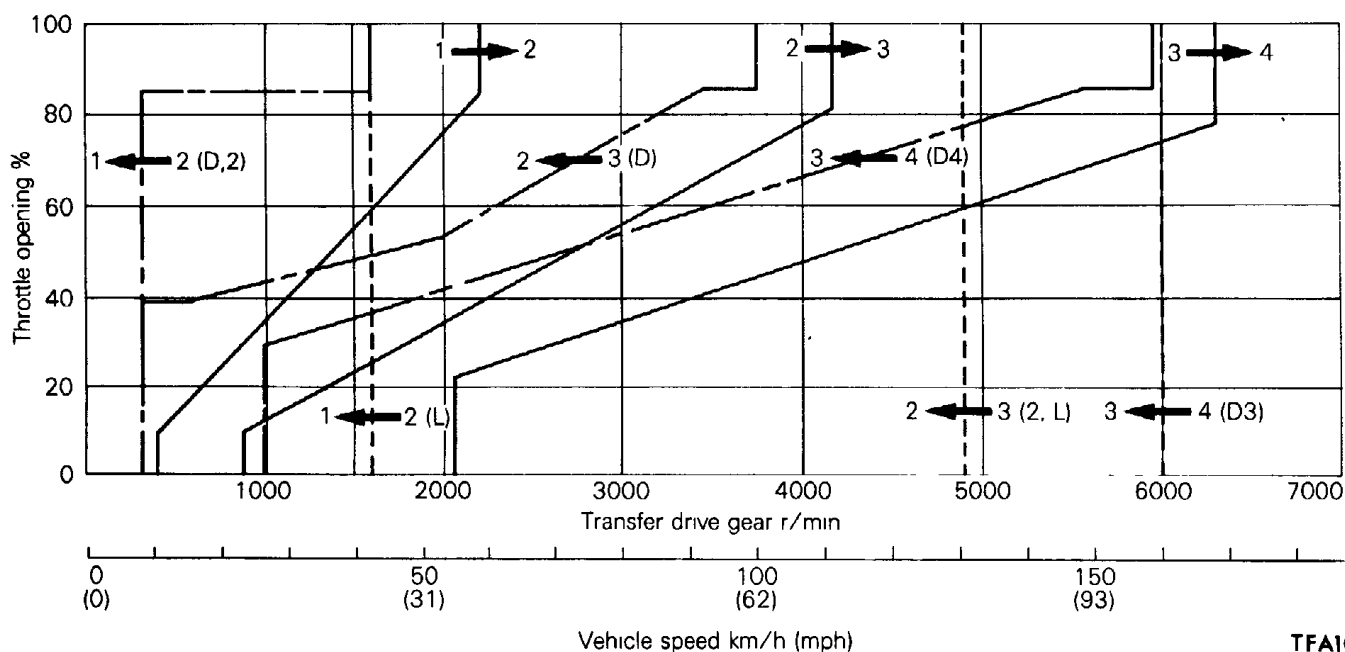
Economy (ECO) position



TFA1048

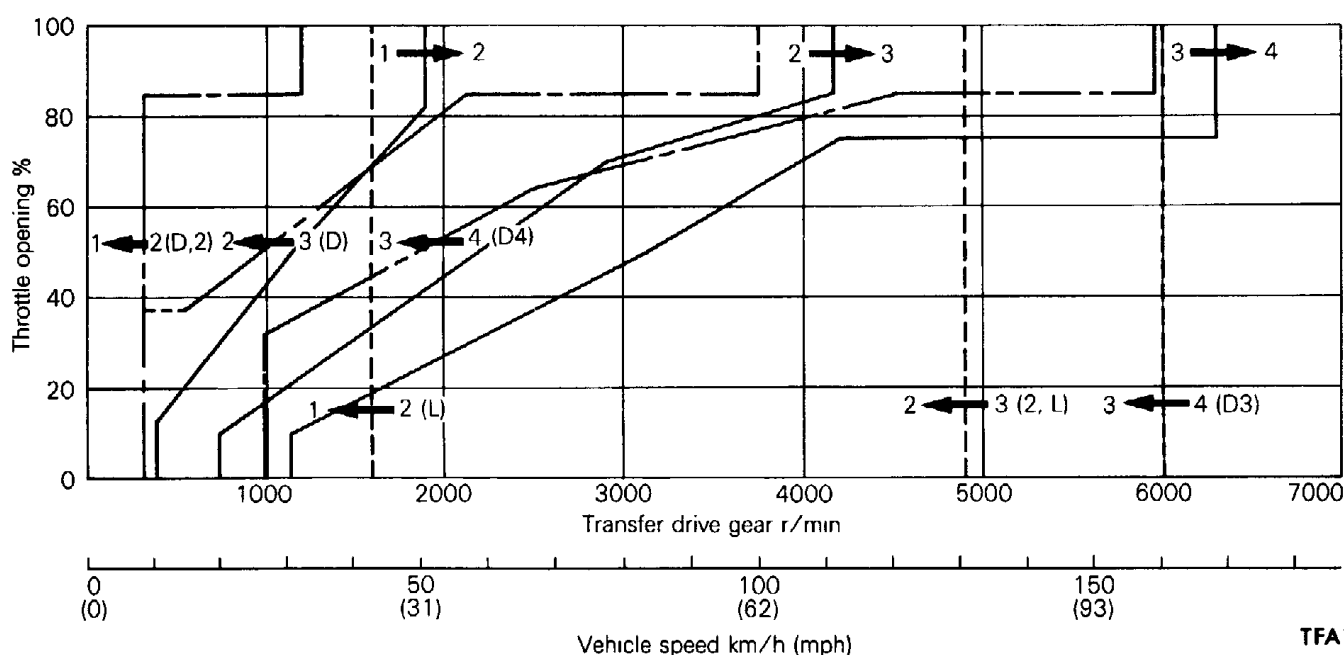
< F4A33-1-UNQ5 (R.H. drive vehicles) >
< F4A33-1-UNQ6 (R.H. drive vehicles) >

Power (PWR) position



TFA1053

Economy (ECO) position



TFA1054

CONVERTER STALL TEST

E23FEAC

Stall test consist of determining maximum engine speed obtained at full throttle in "D" and "R" positions. This test checks torque converter stator overrunning clutch operation, and holding ability of transmission clutches and low-reverse brake.

Caution

During this test, make sure that no one stand in front of or behind vehicle.

1. Check transmission fluid level. Fluid should be at normal operating temperature [70–80°C (160–180°F)]. Engine coolant should also be at normal operating temperature [80–90°C (180–190°F)].
2. Apply chocks to both rear wheels.
3. Attach engine tachometer.
4. Apply parking and service brakes fully.
5. Start engine.
6. With selector lever in "D" position, depress accelerator pedal fully to read engine maximum rpm. Do not hold throttle wide open any longer than is necessary to obtain maximum engine rpm reading, and never longer than 5 seconds at a time. If more than one stall test is required, operate engine at approximately 1,000 r/min in neutral for 2 minutes to cool transmission fluid between tests.

Standard value: 1,800–2,800 r/min

7. Place selector lever to "R" position and perform stall test by the same procedure as in foregoing item.

Stall Speed Above Specification in "D"

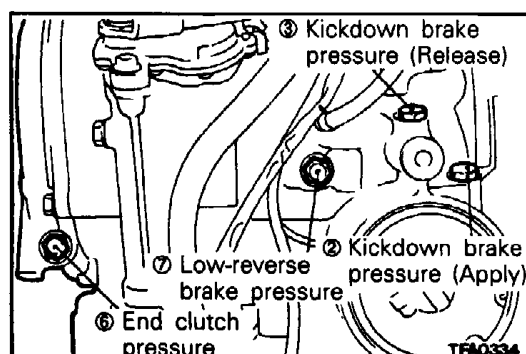
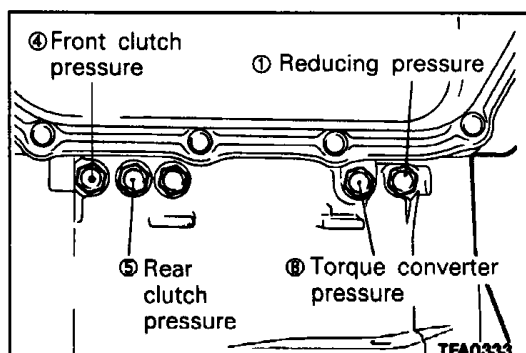
If stall speed is higher than specification, rear clutch or overrunning clutch of transmission is slipping. In this case, perform hydraulic test to locate cause of slippage.

Stall Speed Above Specification in "R"

If stall speed is higher than specification, front clutch of transmission or low-reverse brake is slipping. In this case, perform hydraulic test to locate cause of slippage.

Stall Speed Above Specification in "D" and "R"

If stall speed is lower than specification, insufficient engine output or faulty torque converter is suspected. Check for engine misfiring, ignition timing, valve clearance etc. If these are good, torque converter is faulty.



OIL PRESSURE TEST

E23FBAI

1. Completely warm up the transmission.
2. Raise the vehicle by using a jack so that the drive wheels can be rotated.
3. Connect an engine tachometer and place it in a position where it's easy to see.
4. Attach the special oil-pressure gauge (MD998330, MD999563) and the adaptor (MD998332) to each oil-pressure outlet port.
When the reverse pressure is to be tested, the 3,000 kPa (400 psi) type of gauge should be used.
5. Measure the oil pressure under various conditions, and check to be sure that the measured results are within the standard value range shown in the "Standard oil pressure table" below.
If the oil pressure is not within the specified range, check and repair as described in the section "Remedial steps if oil pressure is not normal".

Standard Oil Pressure Table

No.	Conditions			Standard oil pressure kPa (kg/cm ² , psi)							
	Select lever position	Engine speed rpm	Shift position	① Reducing pressure	② Kickdown brake pressure (Apply)	③ Kickdown brake pressure (Release)	④ Front clutch pressure	⑤ Rear clutch pressure	⑥ End clutch pressure	⑦ Low-reverse brake pressure	⑧ Torque-converter pressure
1	N	Idling	Neutral	360–480 (3.6–4.8, 51–68)	–	–	–	–	–	–	☆
2	D	Idling	2nd gear	360–480 (3.6–4.8, 51–68)	100–210 (1.0–2.1, 14–30)	–	–	730–830 (7.3–8.3, 104–118)	–	–	☆
3	D (SW-ON)	Approx. 2,500	4th gear	360–480 (3.6–4.8, 51–68)	830–900 (8.3–9.0, 118–128)	–	–	–	830–900 (8.3–9.0, 118–128)	–	450–650 (4.5–6.5, 64–92)
4	D (SW-OFF)	Approx. 2,500	3rd gear	360–480 (3.6–4.8, 51–68)	830–900 (8.3–9.0, 118–128)	830–900 (8.3–9.0, 118–128)	830–900 (8.3–9.0, 118–128)	830–900 (8.3–9.0, 118–128)	830–900 (8.3–9.0, 118–128)	–	450–650 (4.5–6.5, 64–92)
5	2	Approx. 2,500	2nd gear	360–480 (3.6–4.8, 51–68)	830–900 (8.3–9.0, 118–128)	–	–	830–900 (8.3–9.0, 118–128)	–	–	450–650 (4.5–6.5, 64–92)
6	L	Approx. 1,000	1st gear	360–480 (3.6–4.8, 51–68)	–	–	–	830–900 (8.3–9.0, 118–128)	–	300–450 (3.0–4.5, 43–64)	☆
7	R	Approx. 2,500	Reverse	360–480 (3.6–4.8, 51–68)	–	1,640–2,240 (16.4–22.4, 233–319)	1,640–2,240 (16.4–22.4, 233–319)	–	–	1,640–2,240 (16.4–22.4, 233–319)	450–650 (4.5–6.5, 64–92)
		Approx. 1,000				1,500 (15, 123) or more	1,500 (15, 123) or more			1,500 (15, 123) or more	

NOTE

– must be 10 kPa (0.1 kg/cm², 1.4 psi) or less.

SW-ON: Switch ON the overdrive control switch

SW-OFF: Switch OFF the overdrive control switch

☆: Hydraulic pressure is generated, but not the standard value.

Remedial Steps If Oil Pressure Is Not Normal

Trouble symptom	Probable cause	Remedy
1. Line pressures are all low (or high). NOTE * "Line pressures" refers to oil pressure ②, ③, ④, ⑤, ⑥ and ⑦, in the "Standard oil pressure table" on the previous page.	a. Clogging of oil filter b. Improper adjustment of oil pressure (line pressure of regulator valve) c. Functional malfunction of valve body assembly d. Looseness of valve body tightening part e. Improper oil pump discharge pressure	a. Visually inspect the oil filter; replace the oil filter if it is clogged. b. Measure line pressure ② (kickdown brake pressure); if the pressure is not the standard value, readjust the line pressure, or, if necessary, replace the valve body assembly. c. Replace the valve body assembly. d. Tighten the valve body tightening bolt and installation bolt. e. Check the side clearance of the oil pump gear; replace the oil pump assembly if necessary.
2 Improper reducing pressure	a. Clogging of the filter (L-shaped type) of the reducing-pressure circuit b. Improper adjustment of oil pressure c. Functional malfunction of valve body assembly	a. Disassemble the valve body assembly and check the filter; replace the filter if it is clogged. b. Measure the ① reducing pressure; if it is not the standard value, readjust, or replace the valve body assembly. c. Replace the valve body assembly.
3. Improper kickdown brake pressure (Apply)	a. Malfunction of the seal ring ①, D-ring ② or seal ring ③ of the sleeve of the kickdown servo piston. b. Functional malfunction of the valve body assembly	a. Disassemble the kickdown servo and check whether the seal ring or D-ring is damaged. If it is cut or has scratches, replace the seal ring or D-ring. b. Replace the valve body assembly.
4. Improper kickdown brake pressure (Release)	a. Malfunction of the seal ring ①, D-ring ② or seal ring ③ of the sleeve of the kickdown servo piston. b. Functional malfunction of the valve body assembly	a. Disassemble the kickdown servo and check whether the seal ring or D-ring is damaged. If it is cut or has scratches, replace the seal ring or D-ring. b. Replace the valve body assembly.
5 Improper front clutch pressure	a. Malfunction of the seal ring ①, D-ring ② or seal ring ③ of the sleeve of the kickdown servo piston. b. Functional malfunction of the valve body assembly c. Wear of the front clutch piston or retainer, or malfunction of the D-ring ④ or seal ring ⑤	a. Disassemble the kickdown servo and check whether the seal ring or D-ring is damaged. If it is cut or has scratches, replace the seal ring or D-ring. b. Replace the valve body assembly. c. Disassemble the transmission itself and check whether or not there is wear of the front clutch piston and retainer inner circumference, or damage of the D-ring and/or seal ring. If there is any wear or damage, replace the piston, retainer, D-ring and/or seal ring.

Trouble symptom	Probable cause	Remedy
6. Improper rear clutch pressure	a. Malfunction of D-ring ⑥ of rear clutch piston, retainer seal ring ⑤ and seal rings ④ and ① of input shaft. b. Functional malfunction of the valve body assembly	a. Disassemble the rear clutch, check input shaft seal ring, retainer seal ring, piston D-ring, etc. and replace broken or damaged parts. b. Replace the valve body assembly.
7. Improper end clutch pressure	a. Malfunction of the seal ring ③ or the D-ring ② and/or oil seal ① of end clutch. b. Functional malfunction of the valve body assembly	a. Disassemble the end clutch and check the oil seal or D-ring of the piston, seal ring of the retainer, etc.; replace if there are cuts, scars, scratches or damage. b. Replace the valve body assembly.
8. Improper low-reverse brake pressure	a. O-ring between valve body and transmission damaged or missing b. Functional malfunction of the valve body assembly c. Malfunction of the D-ring ⑩ of the low-reverse brake piston or the O-ring ⑨ of the retainer	a. Remove the valve body assembly and check to be sure that the O-ring at the upper surface of the upper valve body is not missing or damaged; install or replace the O-ring if necessary. b. Replace the valve body assembly. c. Disassemble the transmission itself and check the D-ring and O-ring for damage; replace if there are cuts, scars, scratches or damage.
9. Improper torque converter pressure	a. Sticking of the damper clutch control solenoid valve (DCCSV) or the damper clutch control valve. b. Clogging or leaking of the oil cooler and or piping. c. Damage to the input shaft ⑦ seal ring. d. Malfunction of the torque converter.	a. Check the operation of the damper clutch system and the DCCSV. b. Repair or replace, as necessary, the cooler and or piping. c. Disassemble the transmission itself and check for damage of the seal ring, replace the seal ring if there is damage. d. Replace the torque converter.



ACTUATOR TEST

E23FVAA

Using the multi-use tester, force the actuator to activate, and then check the kickdown brake pressure of the pressure-control solenoid valve (PCSV) during 50 % duty.

NOTE

Conditions making forced activation possible

- ① Vehicle speed: 0 km/h (0 mph)
- ② Select lever position: D
- ③ Accelerator switch: ON
- ④ Throttle opening: 10 % or less

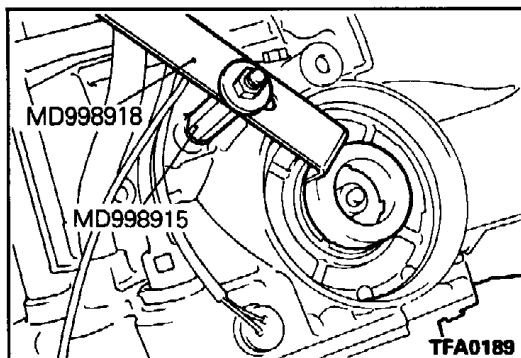
There will be a change to the 50 % duty condition when there is forced activation for five seconds, if all of the above conditions are met.

Standard value: 250–300 kPa (2.5–3.0 kg/cm², 36–43 psi)
<when warm>

KICKDOWN SERVO ADJUSTMENT

E23FH8C

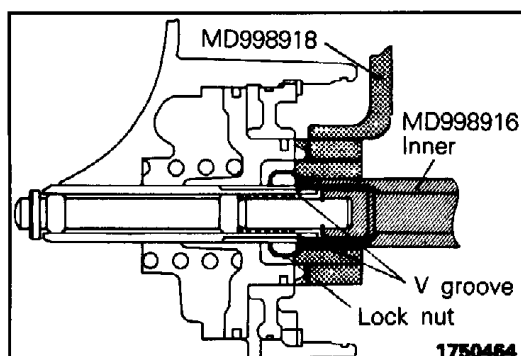
1. Completely remove all dirt and other materials adhered around the kickdown servo switch.
2. Remove the snap ring.
3. Remove the kickdown servo switch.



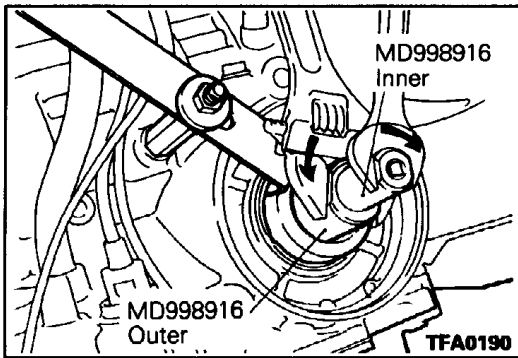
4. To prevent rotation of the piston, engage the pawl of the special tool into the notch of the piston, and using the adapter, fix the piston as shown in the left.

Caution

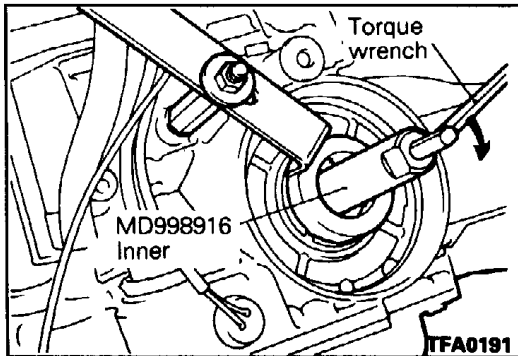
1. Don't press in the piston with the special tool.
2. When mounting the adapter on the transmission case, tighten it by hand. Don't apply much torque.



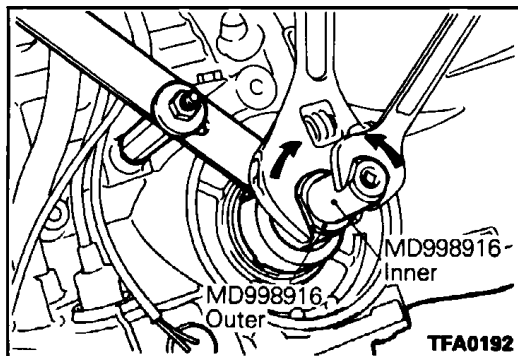
5. Loosen the lock nut to before the V groove of the adjusting rod, and tighten the special tool (inner) until it contacts the lock nut.



6. Engage the special tool (outer) on the lock nut. Rotating the outer cylinder counterclockwise and the inner cylinder clockwise, lock the lock nut and special tool (inner).



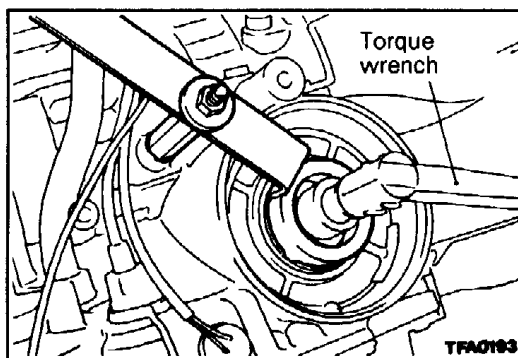
7. Attach a torque wrench to the special tool (inner wrench) and tighten to a torque of 5 Nm (0.5 kgm, 3.6 ft.lbs.) after using 10 Nm (1 kgm, 7.2 ft.lbs.) and repeating "Tighten" and "Loosen" two times. After that, back off the special tool (inner wrench) 2 to 2-1/4 turns.



8. Engage the special tool (outer) on the lock nut. Rotating the outer cylinder clockwise and the inner cylinder counterclockwise, unlock the lock nut and special tool (inner).

Caution

When unlocking the lock, apply equal force to both tools.



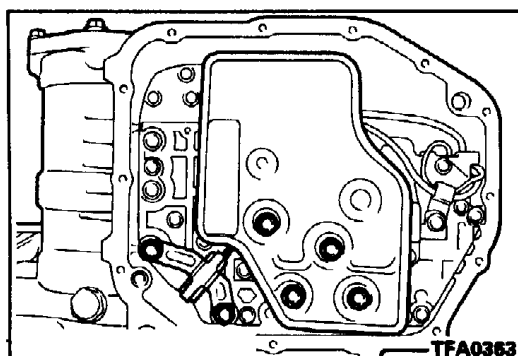
9. Tighten the lock nut by hand until the lock nut contacts the piston. Then, using the torque wrench, tighten to the specified torque.

Lock nut: 25–32 Nm (2.5–3.2 kgm, 18–23 ft.lbs.)

Caution

If it is rapidly tightened with the socket wrench or torque wrench, the lock nut and adjusting rod may rotate together.

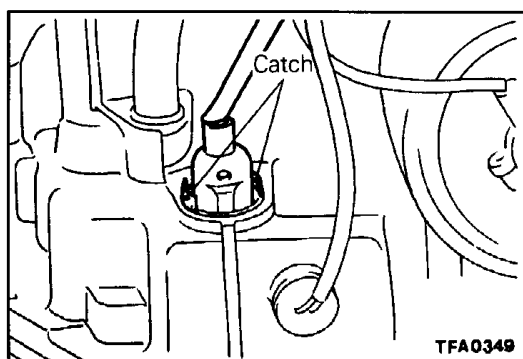
10. Remove the special tool which fastens the piston. Attach the plug to the outlet of the low-reverse pressure.



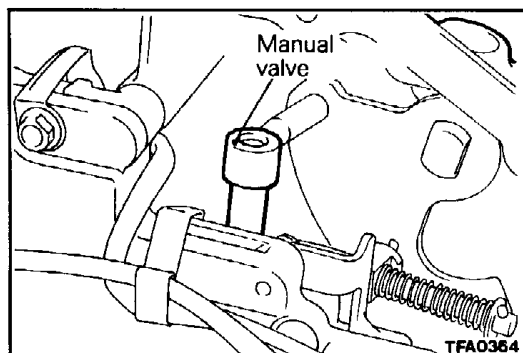
LINE PRESSURE ADJUSTMENT

E23FNAF

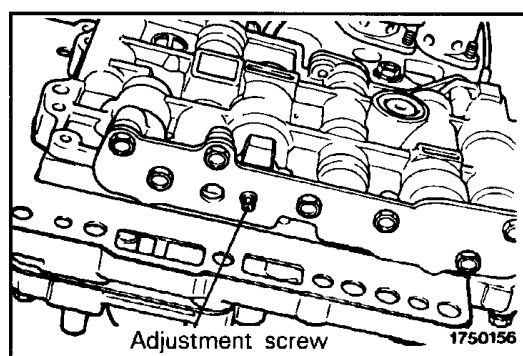
1. Drain out the automatic transmission fluid.
2. Remove the oil pan.
3. Remove the oil filter.
4. Remove the oil-temperature sensor.
5. Press the solenoid valve harness grommet and connector into the transmission case.



6. Press the catches of the solenoid valve harness grommets and pass the connector through the case hole.



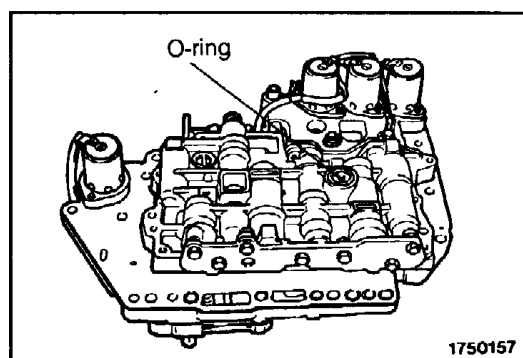
7. Remove the valve body assembly. The manual valve can come out, so be careful not to drop it.



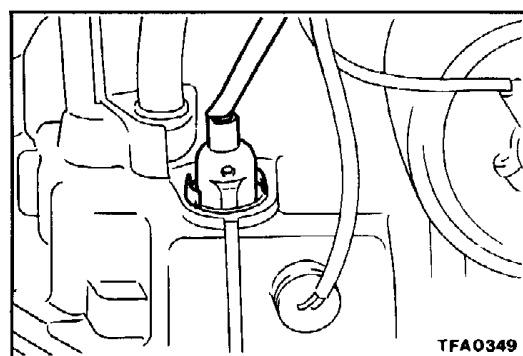
8. Turn the adjustment screw of the regulator valve and adjust so that the line pressure (kickdown brake pressure) becomes the standard value.
When the adjustment screw is turned to the clockwise, the line pressure becomes lower; when it is turned to counter-clockwise, it becomes higher.

Standard value: 870–890 kPa (8.7–8.9 kg/cm², 124–126 psi)

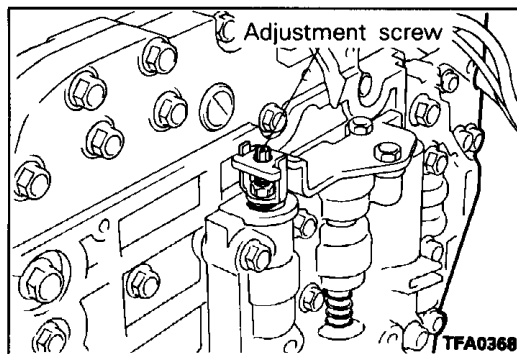
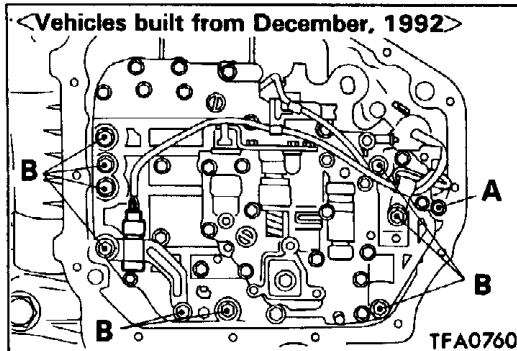
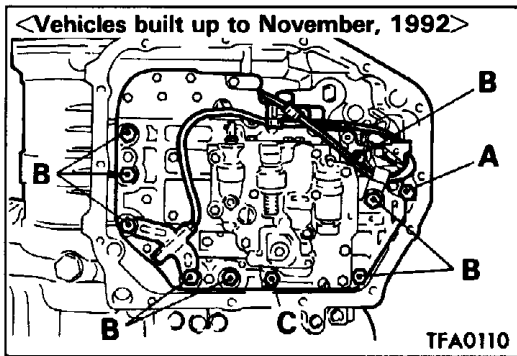
Oil pressure change for each turn of adjustment screw: 38 kPa (0.38 kg/cm², 5.4 psi)



9. Check to be sure that the O-ring is installed on the upper surface of the valve body at the place shown in the figure.
10. Replace the O-ring of the solenoid valve harness grommet with a new one.



11. Pass the solenoid valve connector through the inside of the hole in the case.



12. Install the valve body and oil temperature sensor, and then tighten valve body assembly mounting bolts.

A bolt: 18 mm (0.709 in.) long

B bolt: 25 mm (0.984 in.) long

C bolt: 40 mm (1.575 in.) long

13. Install the oil filter.
14. Install a new oil pan gasket and oil pan.
15. Pour in the specified amount of Automatic transmission fluid.
16. Make the oil pressure test. Readjust if necessary.

REDUCING PRESSURE ADJUSTMENT WHEN A MULTI-USE TESTER IS NOT USED

E23FNBC

1. Remove parts up to the oil filter in the same way as for adjustment of the line pressure. The valve body need not be removed.
2. Turn the adjustment screw of the lower valve body and adjust so that the reducing pressure is the standard value. When the adjustment screw is turned to the right, the reducing pressure becomes lower; when it is turned to the left, it becomes higher.

NOTE

When adjusting the reducing pressure, aim for the center value (425 kPa, 4.25 kg/cm², 60 psi) of the standard value allowance.

Standard value: 425 ± 10 kPa

(4.25 ± 0.1 kg/cm², 60 ± 1 psi)

Oil pressure change for each turn of adjustment screw: 45 kPa (0.45 kg/cm², 6.4 psi)

3. Install the oil filter and oil pan in the same way as for adjustment of the line pressure.
4. Make the oil pressure test. Readjust if necessary.

WHEN A MULTI-USE TESTER IS USED

1. Use the multi-use tester to force-actuate the pressure control solenoid valve to 50% duty, and measure the kickdown brake pressure at that time. If the kickdown pressure is not within the standard value adjust using the reducing pressure adjustment screw.

**Standard value: 275 ± 25 kPa
(2.75 ± 0.25 kg/cm², 39 ± 4 psi)**

Oil pressure change for each turn of adjustment screw: 22 kPa (0.22 kg/cm², 3 psi)

2. Check to be sure, after completing this adjustment, that the reducing pressure is within the range of 360–480 kPa (3.6–4.8 kg/cm², 51–68 psi)

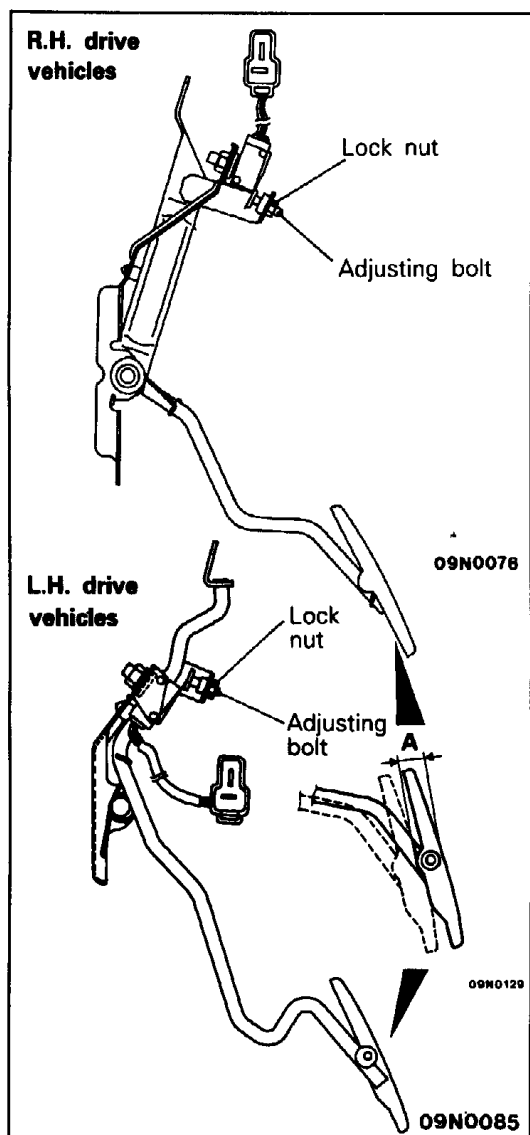
Caution

The adjustment should be made at an oil temperature of 70–80°C (158–176°F).

If the adjustment is made at an oil temperature that is too high, the line pressure will decrease during idling, with the result that a correct adjustment cannot be made.

23-46-2

NOTES

**THROTTLE-POSITION SENSOR ADJUSTMENT**

E23FZ--

Refer to GROUP 13 – Service Adjustment Procedures.

ACCELERATOR PEDAL SWITCH INSPECTION AND ADJUSTMENT

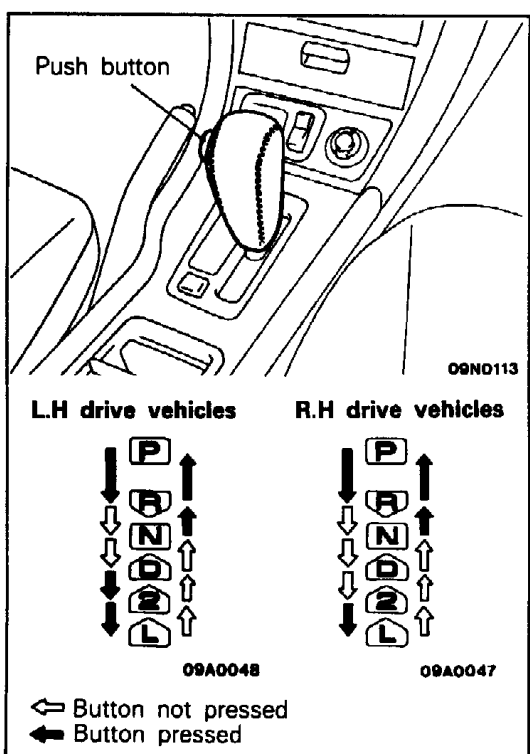
E23FUAB

<Vehicles built up to November, 1991>

When the accelerator pedal is not depressed, there is continuity between the accelerator pedal switch terminals. Check that there is no continuity between the switch terminals when the pedal is depressed and indication stroke A reaches the standard value.

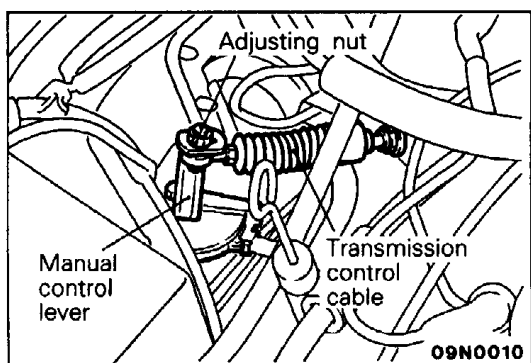
Standard value (A): 2–6 mm (0.08–0.24 in.)

When the stroke shown in the figure deviates from the standard value, adjust with the adjusting bolt.

**SELECTOR LEVER OPERATION CHECK**

E23FOAB

1. Shift selector lever to each range and check that lever moves smoothly and is controlled. Check that position indicator is correct.
2. Check to be sure the selector lever can be shifted to each position (by button operation as shown in the illustration).
3. Start the engine and check if the vehicle moves forward when the selector lever is shifted from N to D, and moves backward when shifted to R.
4. When the shift lever malfunctions, adjust control cable and selector lever sleeve. Check for worn shift lever assembly sliding parts.

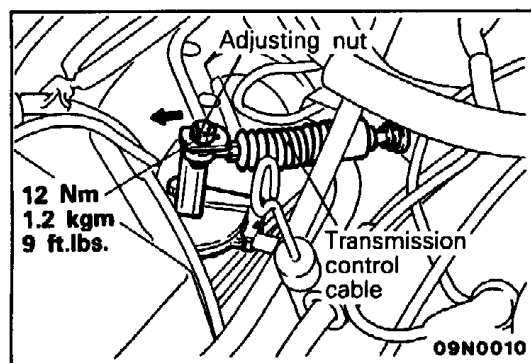
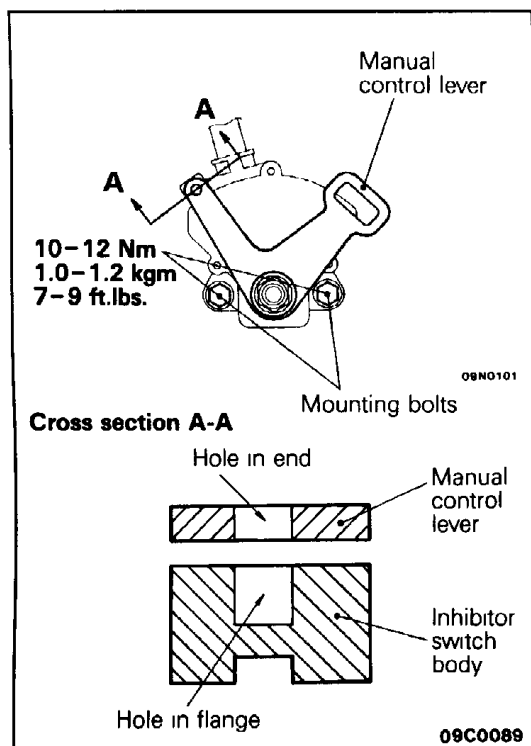


INHIBITOR SWITCH AND CONTROL CABLE ADJUSTMENT

E23FOAG

INHIBITOR SWITCH

1. Place selector lever in "N" (Neutral) position.
2. Loosen transmission control cable to manual control lever coupling adjusting nut to set cable and lever free.
3. Place manual control lever in "N" (neutral) position.
4. Loosen the inhibitor switch body mounting bolts, rotate and adjust the inhibitor switch body so the hole in the end of the manual control lever and the hole (cross section A-A in the figure on the left) in the flange of the inhibitor switch body are aligned.
5. Tighten the mounting bolts of the inhibitor switch body to the specified torque. Be careful at this time that the position of the switch body is not changed
6. Lightly pull the transmission control cable in the arrow's direction, and tighten the adjusting nut to the specified torque.
7. Check that the selector lever is in the "N" position.
8. Check that each range on the transmission side operates and functions correctly for each position of the selector lever.



CONTROL CABLE

Whether control cable is properly adjusted can be confirmed by checking whether inhibitor switch is performing well.

1. Apply parking brakes and service brakes securely.
2. Place selector lever to "R" range.
3. Set ignition key to "ST" position.
4. Slowly move the selector lever upward until it clicks as it fits in notch of "P" range. If starter motor operates when lever makes a click, "P" position is correct.
5. Then slowly move selector lever to "N" range by the same procedure as in foregoing paragraph. If starter motor operates when selector lever fits in "N" , "N" position is correct.
6. Also check to be sure the vehicle doesn't begin to move and the lever doesn't stop between P-R-N-D.
7. The control cable is properly adjusted if, as described above, the starter motor starts at both the "P" range and the "N" range.

SPEEDOMETER CABLE REPLACEMENT**E23FPAE**

Refer to GROUP 22 – Service Adjustment Procedures.

TRANSMISSION CONTROL

REMOVAL AND INSTALLATION

E231A--

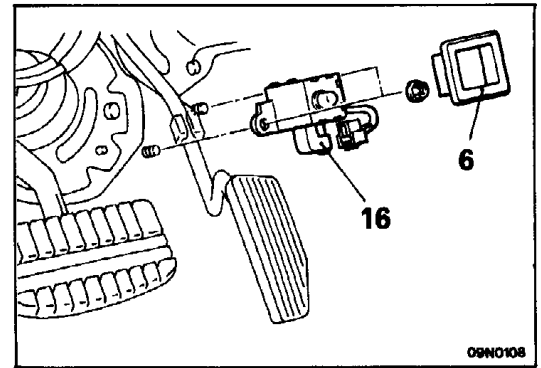
Pre-removal and Post-installation Operation

- Removal and Installation of Floor Console Assembly (Refer to GROUP 52 – Floor Console.)

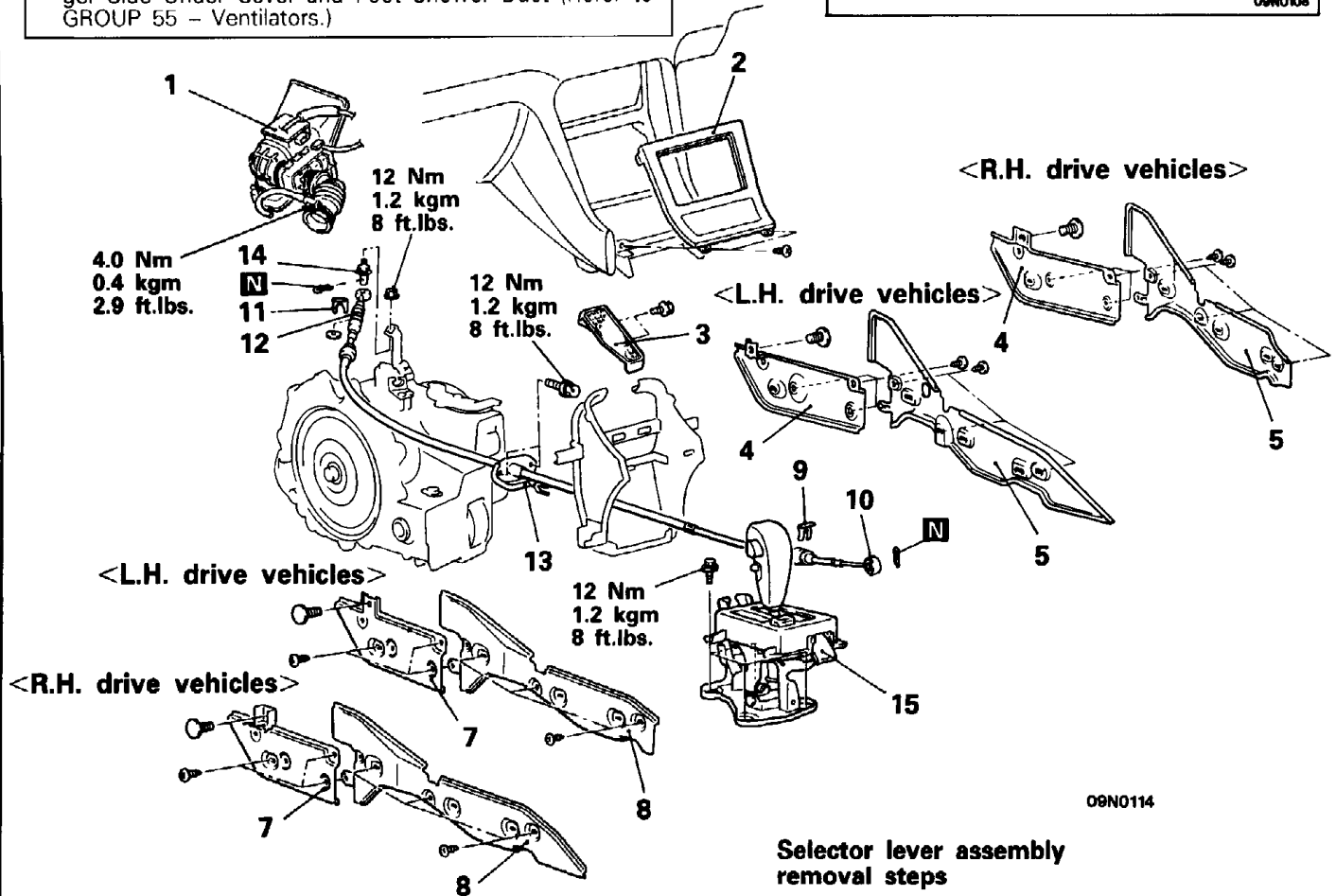
CAUTION: SRS <L.H. drive vehicles>

When removing and installing the floor console assembly from vehicles equipped with SRS, do not let it bump against the SRS diagnostic unit or other components.

- Removal and Installation of Passenger Side Under Cover and Foot Shower Duct (Refer to GROUP 55 – Ventilators.)



09N0108



09N0114

Transmission control cable assembly removal steps

1. Air cleaner cover, air intake hose
2. Audio panel
3. Foot rest <R.H. drive vehicles>
4. Front center reinforcement (R.H. side)
5. Rear center reinforcement (R.H. side)
6. Clip
10. Connection for the transmission control cable assembly (selector lever assembly side)
11. Clip
12. Connection for the transmission control cable assembly (transmission side)
13. Transmission control cable assembly
14. Adjuster

Selector lever assembly removal steps

1. Air cleaner cover, air intake hose
2. Audio panel and ashtray
3. Foot rest <R.H. drive vehicles>
4. Front center reinforcement (R.H. side)
5. Rear center reinforcement (R.H. side)
6. Cover <L.H. drive vehicles>
7. Front center reinforcement (L.H. side)
8. Rear center reinforcement (L.H. side)
9. Clip
10. Connection for the transmission control cable assembly (selector lever assembly side)
15. Selector lever assembly

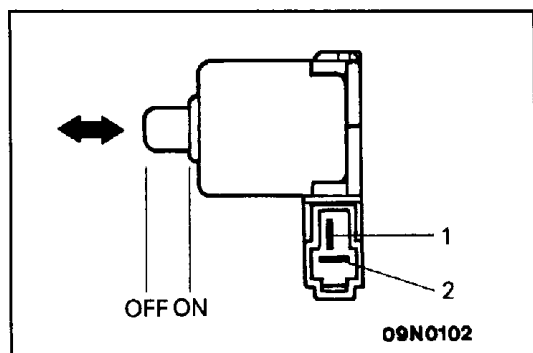
Removal of wide open throttle switch <L.H. drive vehicles>

6. Cover
16. Wide open throttle switch

INSPECTION

E231CAJ

Check the transmission control cable assembly for function and for damage.

**WIDE OPEN THROTTLE SWITCH
<L.H. DRIVE VEHICLES>**

Check for continuity between terminals when the switch is OFF and when ON.

	1	2
ON		
OFF		

NOTE

○—○ indicates that there is continuity between the terminals.

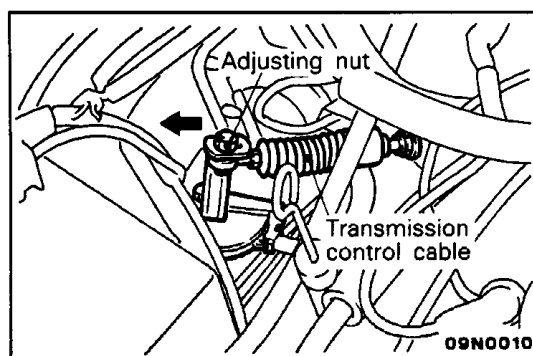
SERVICE POINTS OF INSTALLATION

E231DAJ

10. INSTALLATION OF THE TRANSMISSION CONTROL CABLE ASSEMBLY (SELECTOR LEVER ASSEMBLY SIDE)

After installing the transmission control cable, adjust in the following way.

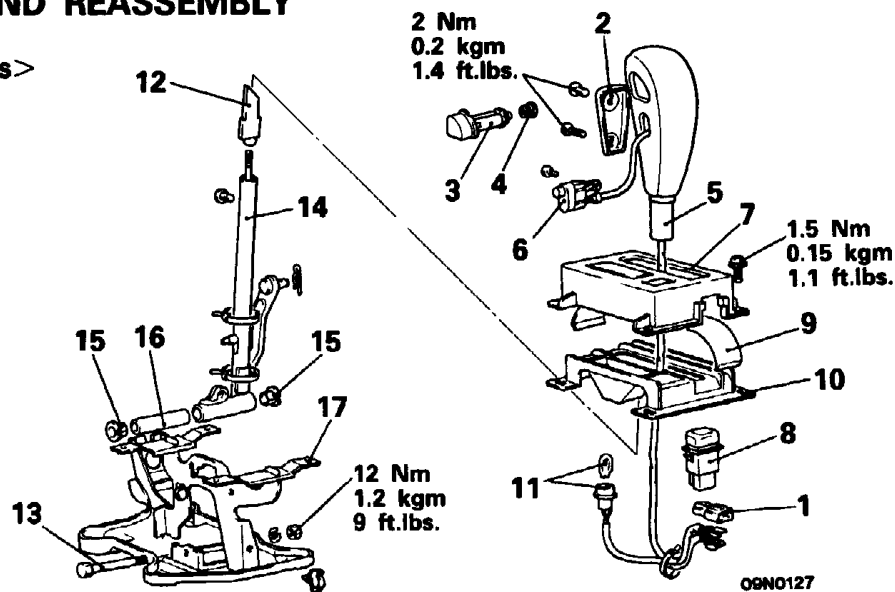
- (1) Put the selector lever in the "N" position.
- (2) Loosen the adjusting nut, gently pull the transmission control cable in the direction of the arrow and tighten the nut.



SELECTOR LEVER ASSEMBLY

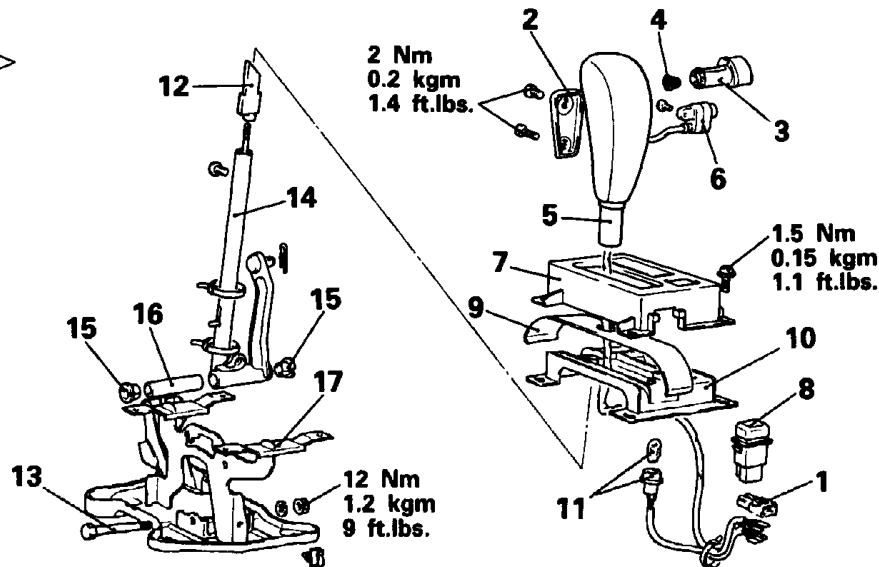
DISASSEMBLY AND REASSEMBLY

<L.H. drive vehicles>



09N0127

<R.H. drive vehicles>

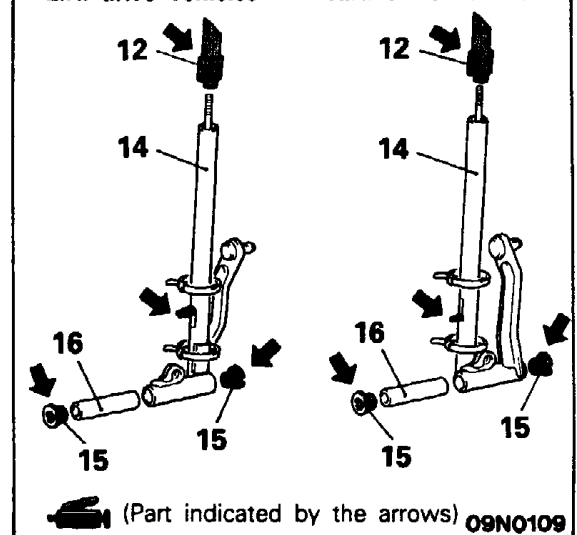


09N0128

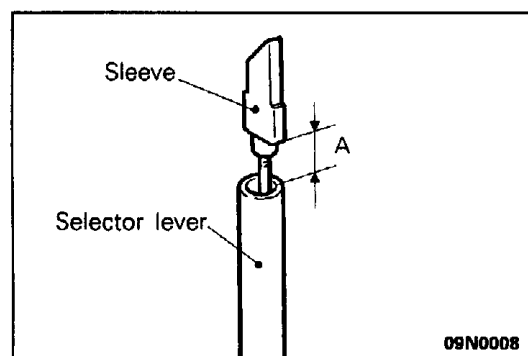
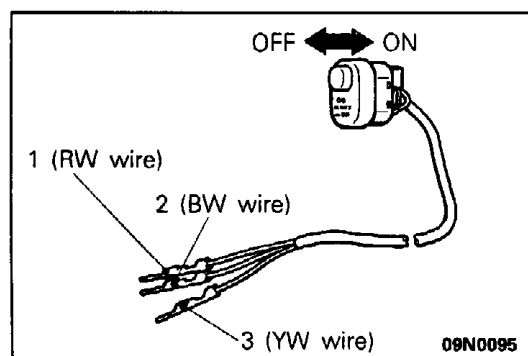
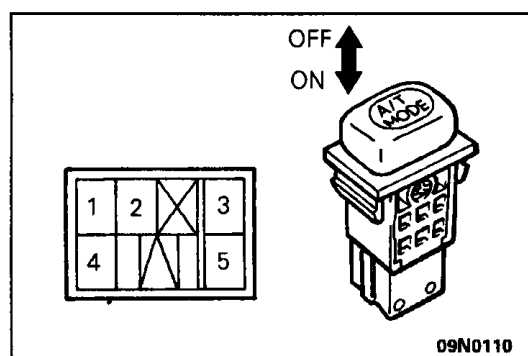
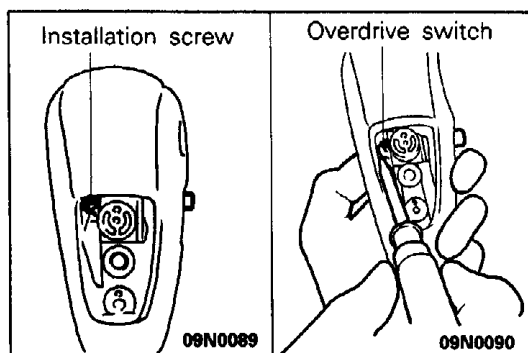
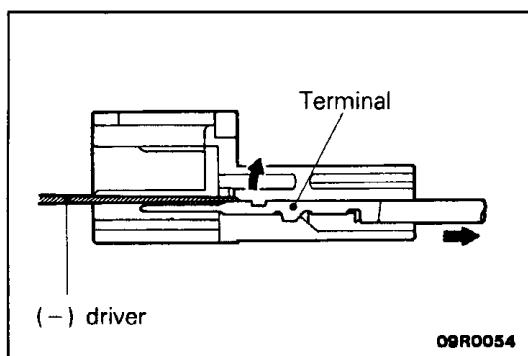
Disassembly steps

- ◆◆ 1. Overdrive switch/position lamp connector case
- 2. Cover
- 3. Push button
- 4. Spring
- 5. Selector knob
- ◆◆ 6. Overdrive switch
- 7. Upper panel
- 8. Power (PWR)/Economy (ECO) changeover switch
- 9. Slider
- 10. Lower panel
- ◆◆ 11. Position indicator lamp assembly
- ◆◆ 12. Sleeve
- 13. Bolt
- 14. Selector lever assembly
- 15. Push
- 16. Pipe
- 17. Bracket assembly

<L.H. drive vehicles> <R.H. drive vehicles>



09N0109



SERVICE POINTS OF DISASSEMBLY

E23NBAA

1. REMOVAL OF THE OVERDRIVE SWITCH/POSITION LAMP CONNECTOR CASE

Use a flat-tip screwdriver or similar tool and pull out the terminal from the overdrive switch/position lamp connector case

6. REMOVAL OF OVERDRIVE SWITCH

Remove the screw attaching the overdrive switch, press the switch and remove the selector knob.

INSPECTION

E23NCAA

- Check the detent plate for wear.
- Check the bushing for wear or damage.
- Check the spring for damage or deterioration.

POWER (PWR)/ECONOMY (ECO) CHANGEOVER SWITCH

Check for continuity between terminals when the switch is OFF and when ON.

Terminal	1	2	3	4	5
Switch position					
ON (PWR)				○—○	
OFF (ECO)			○—○		○—○

NOTE

○—○ indicates that there is continuity between the terminals.

OVERDRIVE SWITCH

Check for continuity between terminals when the switch is OFF and when ON.

Terminal	1	2	3
Switch position			
Overdrive operating (ON)	○—○		
Overdrive not operating (OFF)	○—○		○—○

NOTE

○—○ indicates that there is continuity between the terminals.

SERVICE POINTS OF REASSEMBLY

E23NDAA

12. INSTALLATION OF SLEEVE

Put the selector lever in the "N" position, turn the sleeve and adjust dimension A between the sleeve and the end of the lever so it reaches the standard value.

Standard value A: 15.2–15.9mm (0.598–0.625 in.)

TRANSMISSION OIL COOLER HOSES

E23KA-

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation

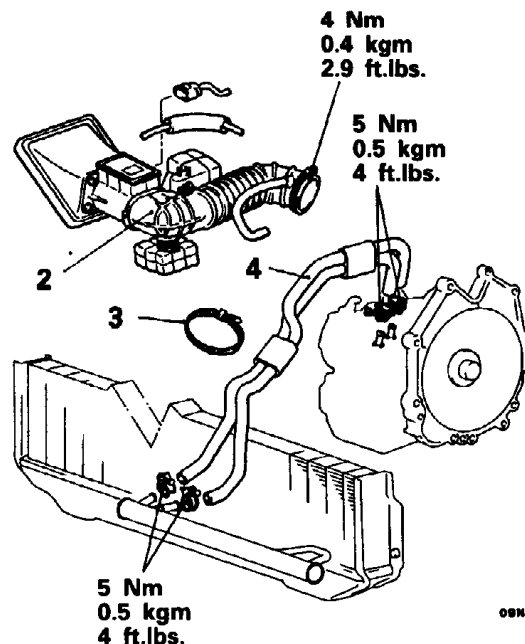
- (1) Draining and Filling with Transmission Fluid (Refer to P.23-27.)
- (2) Removal and Installation of Front Bumper <Vehicles with Oil Cooler> (Refer to GROUP 51 – Front Bumper.)

1. Hose B <Vehicles with oil cooler>

Hose assembly removal steps

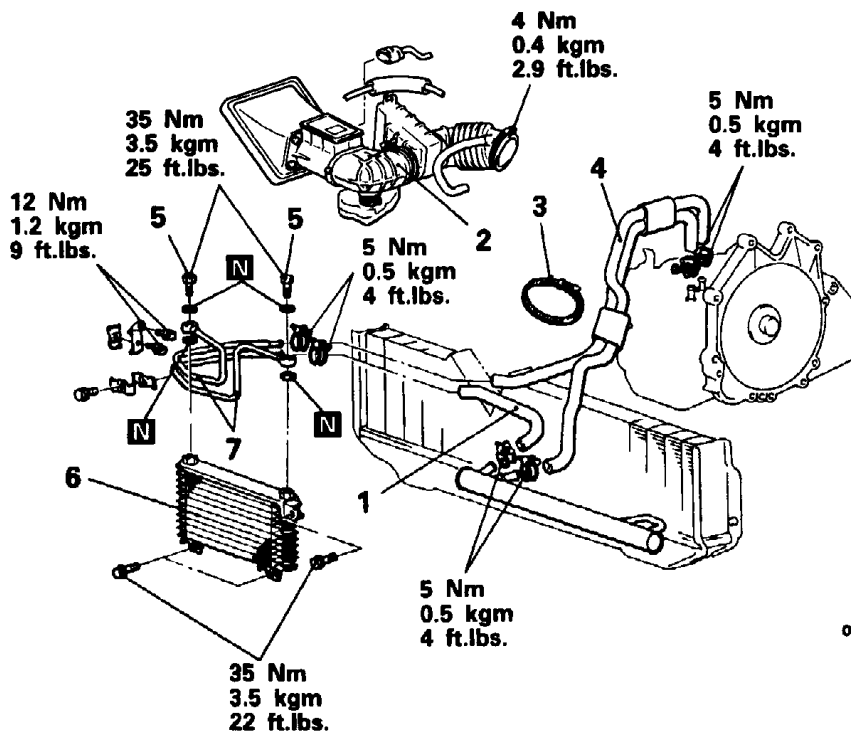
2. Air cleaner cover, air intake hose
3. Hose band
4. Hose assembly
<Vehicles with oil cooler>

<Vehicles without oil cooler>



06N0060

<Vehicles with oil cooler>



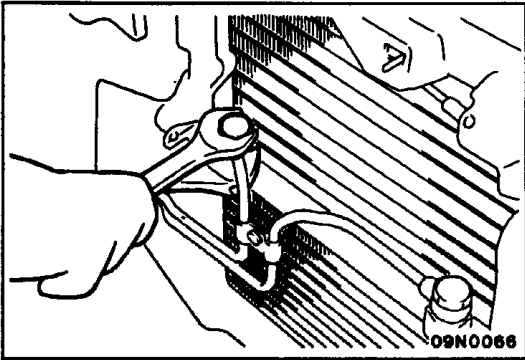
06N0059

Transmission oil cooler removal steps

5. Eye bolt
6. Oil cooler

Transmission oil pipe assembly removal steps

5. Eye bolt
7. Oil pipe assembly



SERVICE POINTS OF REMOVAL

E23KBAD

5. REMOVAL OF EYE BOLT

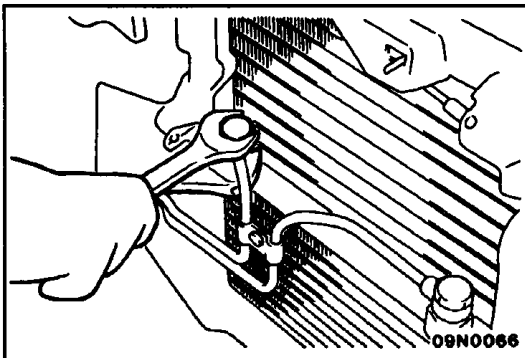
Caution

Secure the connector with a wrench or similar tool and, being careful not to apply unnecessary force to the oil cooler connector, remove the eye bolt.

INSPECTION

E23KCA8

- Check the hose and pipe for crack, damage or clog.
- Check for rusted or clogged radiator oil cooler.
- Check the eye bolt for clogging or deformation.



SERVICE POINTS OF INSTALLATION

E23KDAC

5. INSTALLATION OF EYE BOLT

- (1) Carefully wipe off dirt, etc. from the screw threads and fitting surface.
- (2) Secure the connector with a wrench or similar tool and, being careful not to apply unnecessary force to the oil cooler connector, tighten the eye bolt.

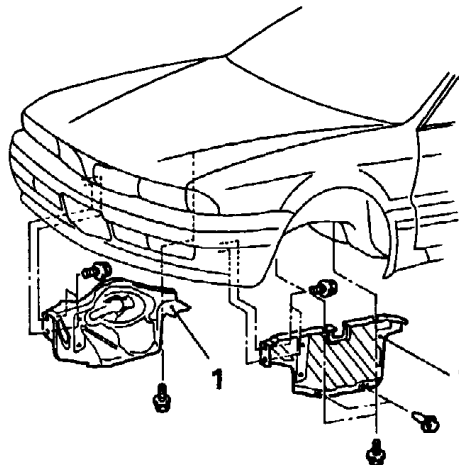
TRANSMISSION ASSEMBLY

E23LA-

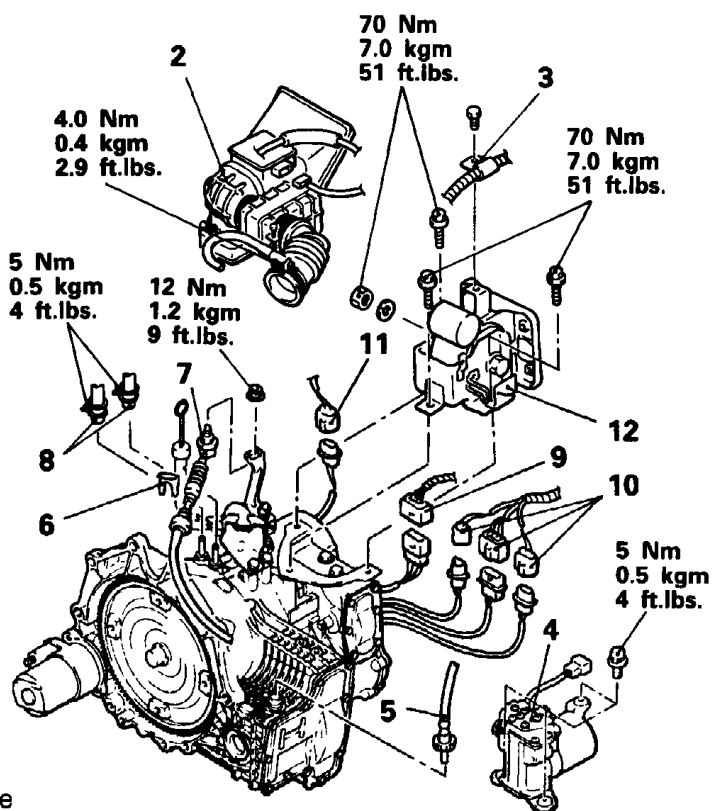
REMOVAL AND INSTALLATION

Pre-removal Operation

- (1) Drainage of Transmission Fluid
(Refer to P.23-27.)
- (2) Removal of Front Under Cover
<Vehicles with Front Under Cover>
- (3) Removal of Drive Shaft (left side),
Inner Shaft Assembly <Vehicles with
4WS> (Refer to GROUP 26 – Drive
Shaft.)



09N0082

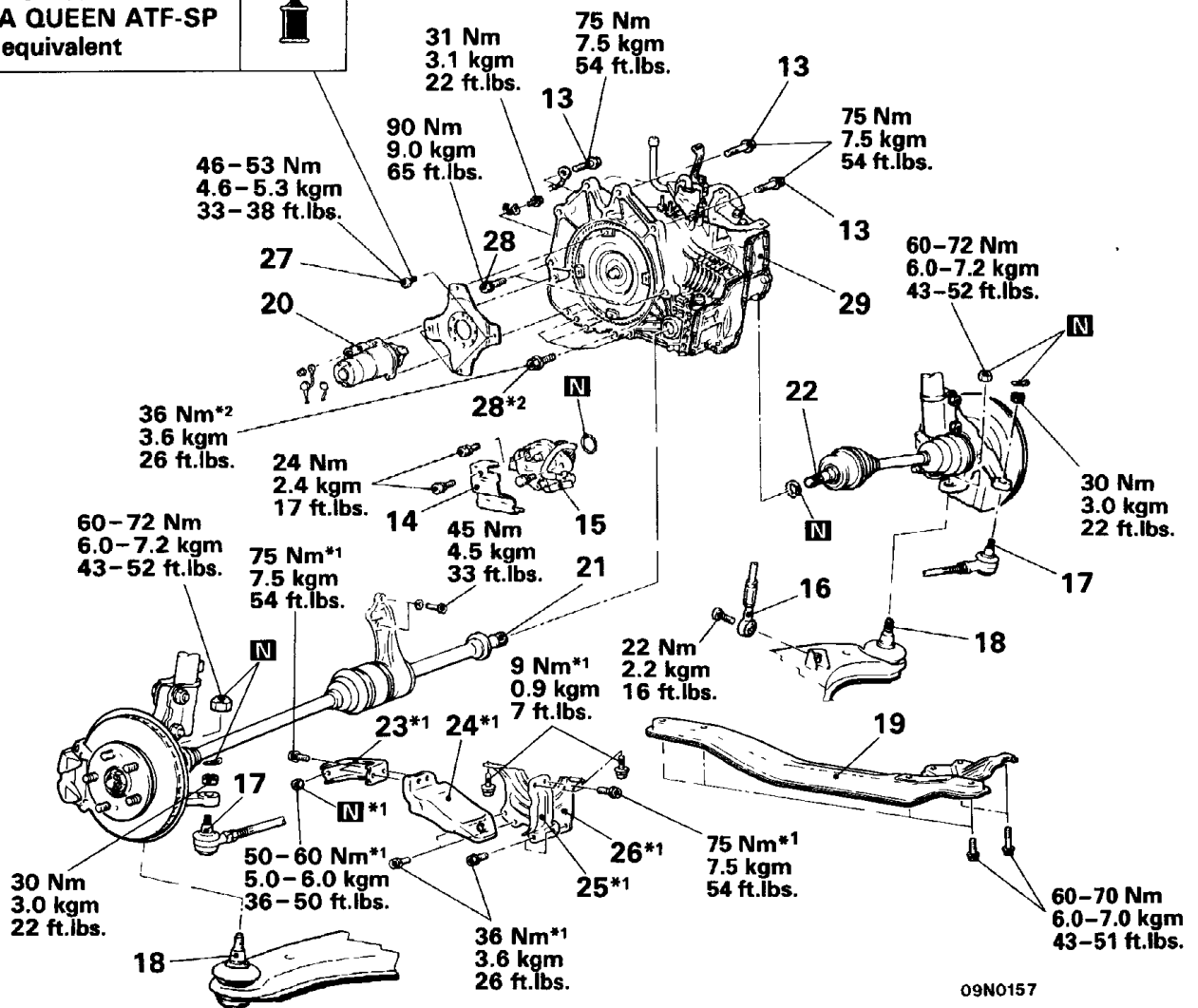


09N0097

Removal steps

1. Side under cover
2. Air cleaner cover, air intake hose
3. Engine harness connection
4. Compressor assembly
<Vehicles with ACTIVE-ECS>
5. Speedometer cable connection
6. Clip
7. Transmission control cable connection
8. Connection for transmission fluid cooler
hose
9. Inhibitor switch connector
10. Kick down servo switch connector,
pulse generator connector, oil tempera-
ture sensor connector
11. Shift control solenoid valve connector
12. Connection for transmission mounting
bracket

Transmission fluid:
DIA QUEEN ATF-SP
or equivalent



09N0157

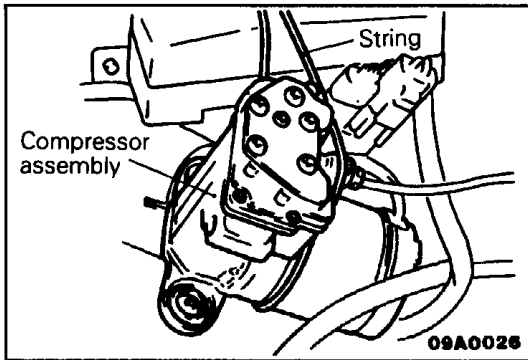
- 13. Transmission assembly upper connection bolt
- 14. Heat protector <Vehicles with 4WS>
- 15. Oil pump assembly <Vehicles with 4WS>
- 16. Front height sensor rod <Vehicles with ACTIVE-ECS>
- 17. Connection for tie rod end and knuckle
- 18. Connection for lower arm ball joint and knuckle
- 19. Right member
- 20. Starter
- 21. Drive shaft (left side), inner shaft assembly
- 22. Drive shaft (right side)
- 23. Roll stopper stay A*1
- 24. Transmission stay (Front bank side)*1
- 25. Transmission stay (Rear bank side)*1
- 26. Bell housing cover*1
- 27. Torque converter connection bolt
- 28. Transmission assembly lower connection bolt
- 29. Transmission assembly

Post-installation Operation

- (1) Installation of Drive Shaft (left side), Inner Shaft Assembly <Vehicles with 4WS> (Refer to GROUP 26 – Drive Shaft.)
- (2) Installation of Front Under Cover <Vehicles with Front Under Cover>
- (3) Filling in Transmission Fluid (Refer to P.23-27.)
- (4) Check operation of the selector lever and operation in each position
- (5) Check operation of meters and gauges.

NOTE

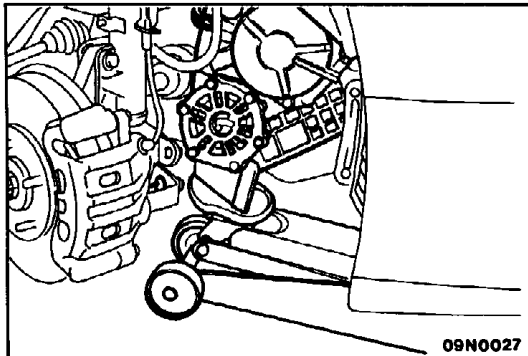
- *1: DOHC built up to October, 1992 and SOHC
- *2: DOHC built from November, 1992



SERVICE POINTS OF REMOVAL

4. REMOVAL OF COMPRESSOR ASSEMBLY <VEHICLES WITH ACTIVE-ECS>

Remove the compressor assembly from the bracket and secure it to the body without removing the air hose connection.

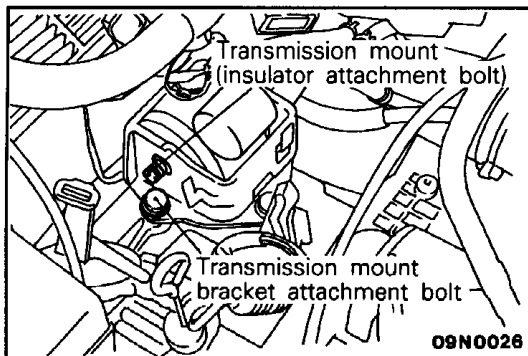


12. REMOVAL OF TRANSMISSION MOUNT BRACKET CONNECTION

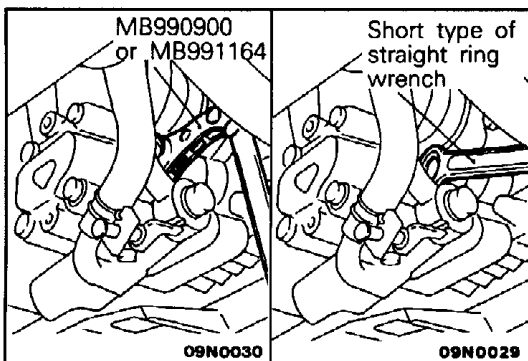
- (1) Use a garage jack to support the transmission assembly, setting it in a position so there is no weight on the insulators.

NOTE

When jacking it up, support the transmission assembly over a wide area so force is not applied to one part of it.



- (2) Remove the nut, move the transmission mount insulator attachment bolt to set a wrench or similar tool on the transmission mount bracket attachment bolt and remove the transmission mount bracket attachment bolt.



15. REMOVAL OF OIL PUMP ASSEMBLY <VEHICLES WITH 4WS>

- (1) Without removing the oil hose connection, loosen the bolt using a short type of straight ring wrench or special tool.

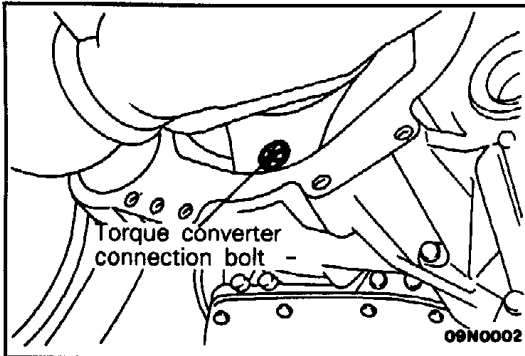
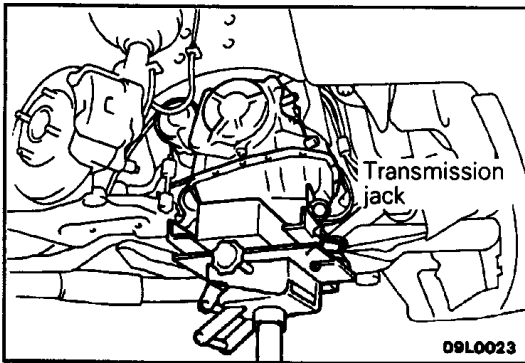
Caution

Do not apply more than 100 Nm (10 kgm, 72 ft.lbs.) of torque to the special tool (MB991164).

- (2) Secure the removed oil pump assembly to the body with a wire or something similar.

17. DISCONNECTION OF TIE ROD END AND KNUCKLE/18. LOWER ARM BALL JOINT AND KNUCKLE/21. DRIVE SHAFT (LEFT SIDE), INNER SHAFT ASSEMBLY/22. DRIVE SHAFT (RIGHT SIDE)

Refer to GROUP 22 – Transmission Assembly.



27. REMOVAL OF TORQUE CONVERTER CONNECTION BOLT/28. TRANSMISSION ASSEMBLY LOWER CONNECTION BOLT/29. TRANSMISSION ASSEMBLY

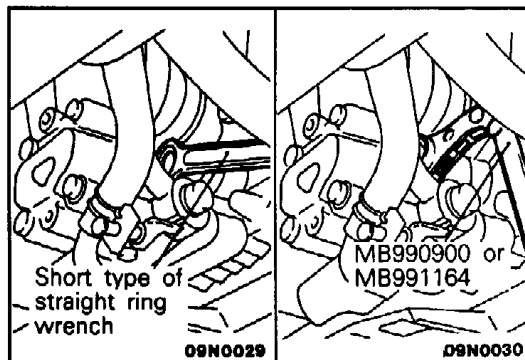
- (1) Support the transmission assembly with a transmission jack.
- (2) Remove the connection bolts (4 locations) while turning the crank shaft.
- (3) Press in the torque converter to the transmission side so the torque converter does not remain on the engine side.
- (4) Remove the transmission assembly lower connection bolt and lower the transmission assembly.

SERVICE POINTS OF INSTALLATION

E23LDAJ

22. INSTALLATION OF DRIVE SHAFT (RIGHT SIDE)/16. FRONT HEIGHT SENSOR ROD <VEHICLES WITH ACTIVE-ECS>

Refer to GROUP 22 – Transmission Assembly.

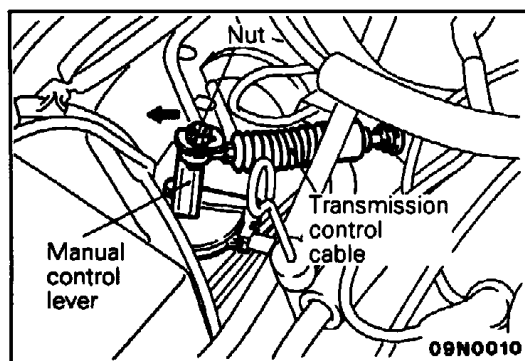


15. INSTALLATION OF OIL PUMP ASSEMBLY <VEHICLES WITH 4WS>

Use a short type of straight ring wrench or the special tool to tighten the bolt.

Caution

Do not apply more than 100 Nm (10 kgm, 72 ft.lbs.) of torque to the special tool (MB991164).



7. INSTALLATION OF TRANSMISSION CONTROL CABLE

After installing the transmission control cable, adjust in the following way.

- (1) Put the selector lever in the "N" position.
- (2) Loosen the adjusting nut, gently pull the transmission control cable in the direction of the arrow and tighten the nut.

FRONT AXLE

CONTENTS

E26AA-

SPECIFICATIONS	2	SERVICE ADJUSTMENT PROCEDURES	5
General Specifications	2	Hub End Play Inspection	5
Service Specifications	2	AXLE HUB	6
Lubricants	2	DRIVE SHAFT	12
SPECIAL TOOLS	3		

SPECIFICATIONS

GENERAL SPECIFICATIONS

E28CA--

Items	M/T	A/T
Wheel bearing		
Type	Double-row angular contact ball bearing	Double-row angular contact ball bearing
O.D. × I.D. mm (in.)	84 × 45 (3.31 × 1.77)	84 × 45 (3.31 × 1.77)
Drive shaft		
Joint type		
Outer	B.J.	B.J.
Inner	T.J.	T.J.
Length mm (in.)		
L.H. shaft	405 (16.1)	405 (16.1)
R.H. shaft	393 (15.5)	381 (15.0)

SERVICE SPECIFICATIONS

E28CB—

Items	Specifications
Standard value	
Setting of T.J. boot length	mm (in.) 75 ± 3 (2.95 ± 0.12)
Limit	
Hub end play	mm (in.) 0.05 (0.0020)
Wheel bearing starting torque	Nm (kgcm, in.lbs.) 1.8 (18, 16) or less

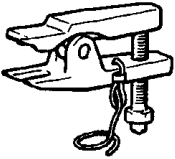
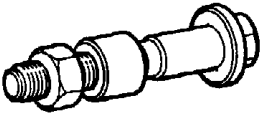
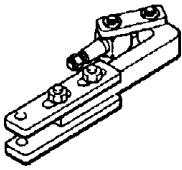
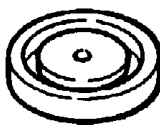
LUBRICANTS

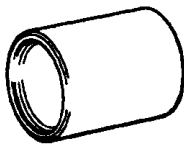
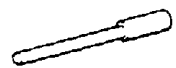
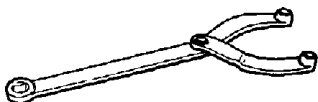
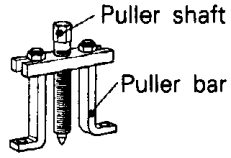
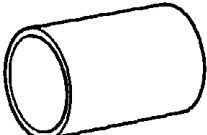
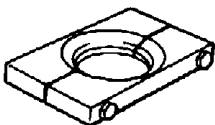
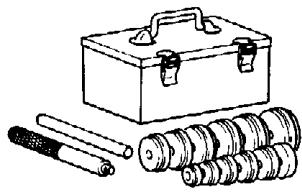
EZBCD—

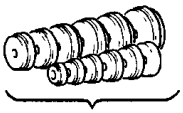
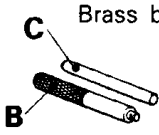
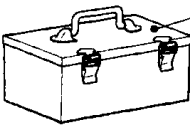
Items	Specifications
B.J. boot grease g (oz.)	145 (5.11)
T.J. boot grease g (oz.)	160 (5.64)
Dust seal inner g (oz.)	14–20 (0.49–0.71)
Dust seal outer g (oz.)	8–12 (0.28–0.42)

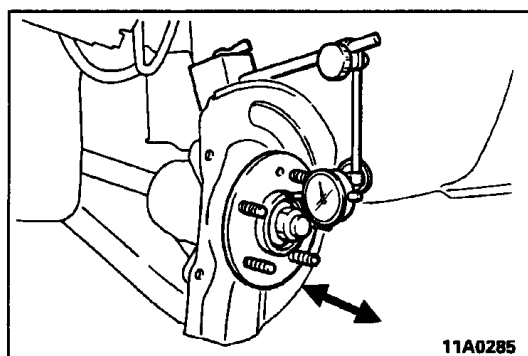
SPECIAL TOOLS

E26DA-

Tool	Number	Name	Use
	MB991113 or MB990635	Steering linkage puller	Removal of the lower arm ball joint and tie rod
	MB990998	Front hub remover and installer	Removal or press-in the hub
	MB991355	Knuckle arm bridge	Removal of the hub
	MB990685	Torque wrench	Measurement of the wheel bearing starting torque
	MB990326	Preload socket	
	MB990810	Side bearing puller	Removal of the wheel bearing inner race
	MB990955	Oil seal installer	Press-fitting of the oil seal
	MB990947	Lower arm bushing arbor	

Tool	Number	Name	Use
	MB990890	Rear suspension bushing base	Press-fitting of the wheel bearing, oil seal and dust seals
	MB990883	Rear suspension arbor	
	MB990767	End yoke holder	Removal of the drive shaft NOTE Three puller bars (MB990244) are used
	MB990241 (MB990244 MB990242)	Axle shaft puller Puller bar Puller shaft	
	MB991354	Puller body	
	MB991172	Adapter	Press-fitting of the inner shaft
	MB991248 or MD998801	Inner shaft remover	Press-out of the inner shaft and press-fitting seal plate.
	MB990925	Bearing and oil seal installer set	Removal of wheel bearing Press-fitting of center bearing MB990932 MB990938 Press-out of center bearing MB990930 MB990938 Press-fitting of dust seal outer MB990934

 A Installer adapter  C Brass bar B Bar (snap-in type)  Tool box					
Type	Tool number	O.D. mm (in.)	Type	Tool number	O.D. mm (in.)
A	MB990926	39 (1.54)	A	MB990933	63.5 (2.50)
	MB990927	45 (1.77)		MB990934	67.5 (2.66)
	MB990928	49.5 (1.95)		MB990935	71.5 (2.81)
	MB990929	51 (2.01)		MB990936	75.5 (2.97)
	MB990930	54 (2.13)		MB990937	79 (3.11)
	MB990931	57 (2.24)	B	MB990938	–
	MB990932	61 (2.40)	C	MB990939	–



SERVICE ADJUSTMENT PROCEDURES

E26FEAD

HUB END PLAY INSPECTION

1. Jack up the vehicle and remove the front wheels.
2. Remove the disc brake caliper and suspend it with a wire. (Refer to GROUP 35 – Service Adjustment Procedures.)
3. Remove the brake disc from the front hub.
4. Attach a dial indicator as shown in the illustration, and then measure the end play while moving the hub back and forth.

Limit: 0.05 mm (0.0020 in.)

NOTE

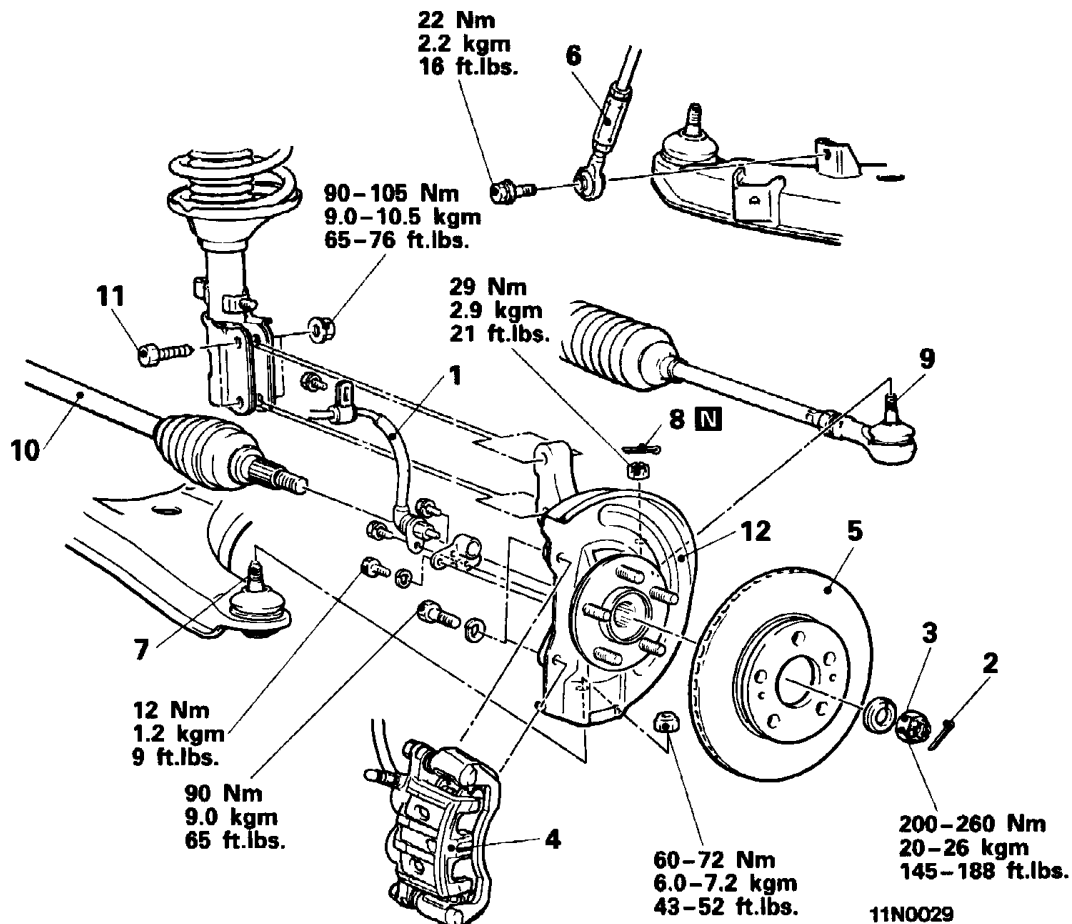
Secure the brake disc and hub by the wheel nut so that the brake disc won't come off the hub.

5. If end play exceeds the limit, disassemble and check parts.

AXLE HUB

REMOVAL AND INSTALLATION

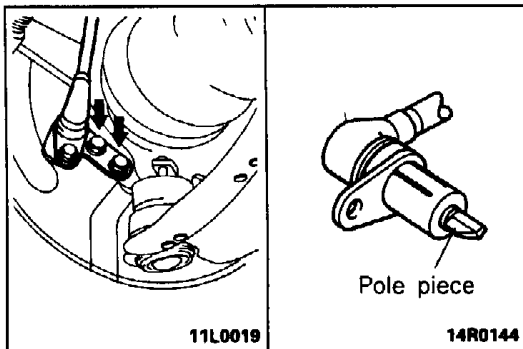
E26HA--



Removal steps

- ◆◆◆◆ 1. Front speed sensor
<Vehicles with ABS>
- ◆◆◆◆ 2. Split pin
- ◆◆◆◆ 3. Drive shaft nut
- ◆◆◆◆ 4. Caliper assembly
- ◆◆◆◆ 5. Brake disc
- ◆◆◆◆ 6. Front height sensor
<Vehicles with ACTIVE-ECS>

- ◆◆◆◆ 7. Connection for lower arm ball joint
- ◆◆◆◆ 8. Split pin
- ◆◆◆◆ 9. Connection for tie rod end
- ◆◆◆◆ 10. Drive shaft
- ◆◆◆◆ 11. Front strut mounting bolt
- ◆◆◆◆ 12. Hub and knuckle



SERVICE POINTS OF REMOVAL

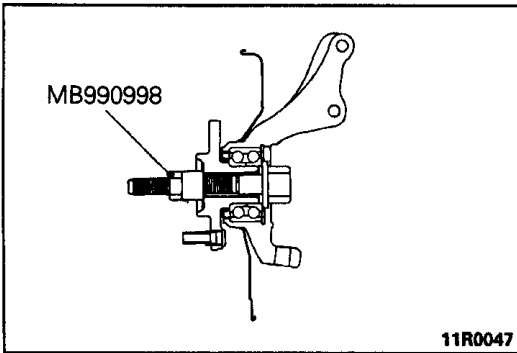
E26HBAH

1. DISCONNECTION OF FRONT SPEED SENSOR
<VEHICLES WITH ABS>

Remove the mounting bolts which hold the speed sensor bracket to the knuckle, and then remove the speed sensor.

Caution

Be careful when handling the pole piece at the tip of the speed sensor and the toothed edge of the rotor so as not to damage them by striking against other parts.



3. REMOVAL OF DRIVE SHAFT NUT

With brake pressure applied, remove the drive shaft nut.

Caution

Do not apply the vehicle weight to the wheel bearing while loosening the drive shaft nut. If, however, the vehicle weight must be applied to the bearing (because of moving the vehicle), temporarily secure the wheel bearing by using the special tool, MB990998, etc.

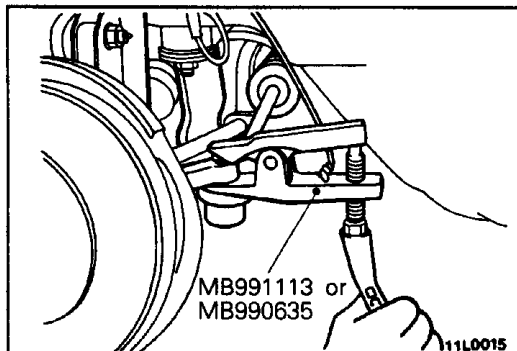
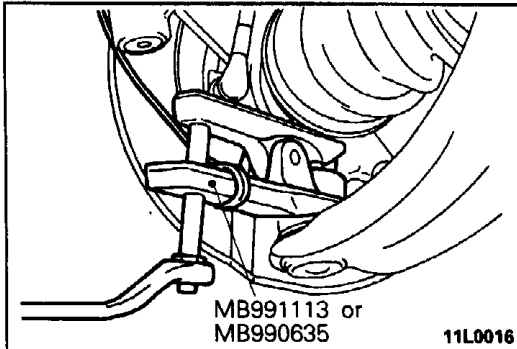
4. REMOVAL OF CALIPER ASSEMBLY

Secure the removed caliper assembly with wire, etc.

7. DISCONNECTION OF LOWER ARM BALL JOINT

Caution

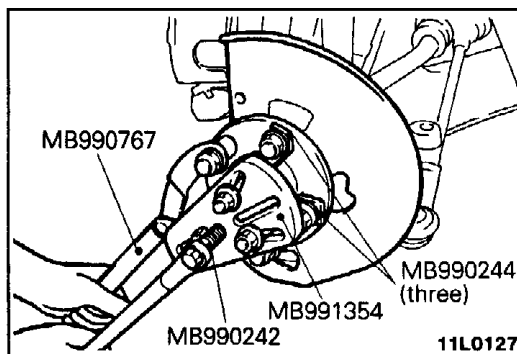
1. Be sure to tie the cord of the special tool to the nearby part.
2. Loosen the nut but do not remove it.



9. DISCONNECTION OF TIE ROD END

Caution

1. Be sure to tie the cord of the special tool to the nearby part.
2. Loosen the nut but do not remove it.



10. REMOVAL OF DRIVE SHAFT

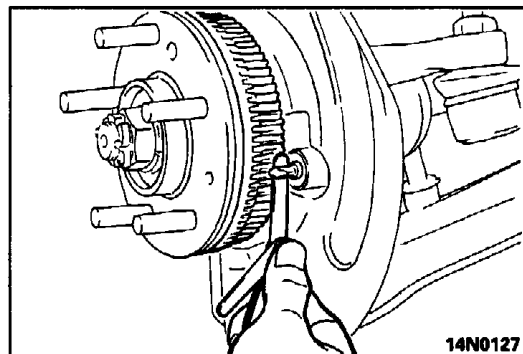
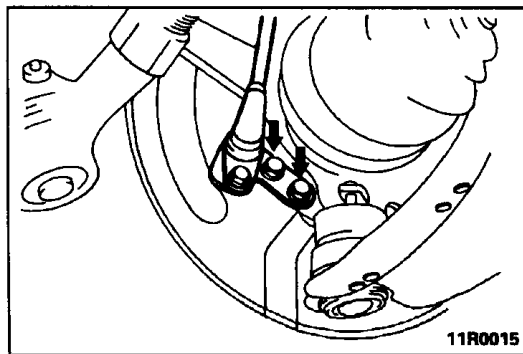
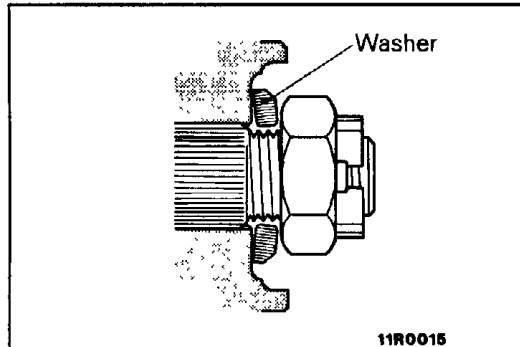
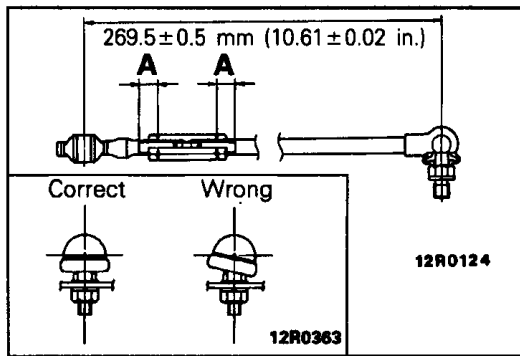
INSPECTION

E26HCAD

- Check the hub for cracks and spline for wear.
- Check the oil seal for damage.
- Check the knuckle for cracks.
- Check for defective bearing.

NOTE

If the meshing of the wheel bearing outer race and the knuckle, or of the wheel bearing inner race and the hub, is loose, replace the bearing or damaged parts.



SERVICE POINTS OF INSTALLATION

E26HDAG

6. INSTALLATION OF FRONT HEIGHT SENSOR <VEHICLES WITH ACTIVE ECS>

Install so that the dimensions of the rod assembly are equal to the reference values in the diagram.

Caution

1. When adjusting the length of the rod, adjust so that dimension A is uniform.
2. Height sensors must be installed so that the ball joint at the rod end is at rocking centre.

3. INSTALLATION OF DRIVE SHAFT NUT

- (1) Be sure to install the washer and drive shaft nut in the specified direction.
- (2) With brake pressure applied, tighten the drive shaft nut.
- (3) If the position of the split pin holes does not match, tighten the nut up to 260 Nm (26 kgm, 188 ft.lbs.) in maximum.
- (4) Install the split pin in the first matching holes and bend it securely.

Caution

Before securely tightening the drive shaft nuts, make sure there is no load on the wheel bearings.

1. INSTALLATION OF FRONT SPEED SENSOR <VEHICLES WITH ABS>

- (1) Temporarily install the speed sensor to the knuckle.

Caution

Be careful when handling the pole piece at the tip of the speed sensor and the toothed edge of the rotor so as not to damage them by striking against other parts.

- (2) Insert a thickness gauge into the space between the speed sensor's pole piece and the rotor's toothed surface, and then tighten the speed sensor at the position where the clearance is the standard value all around.

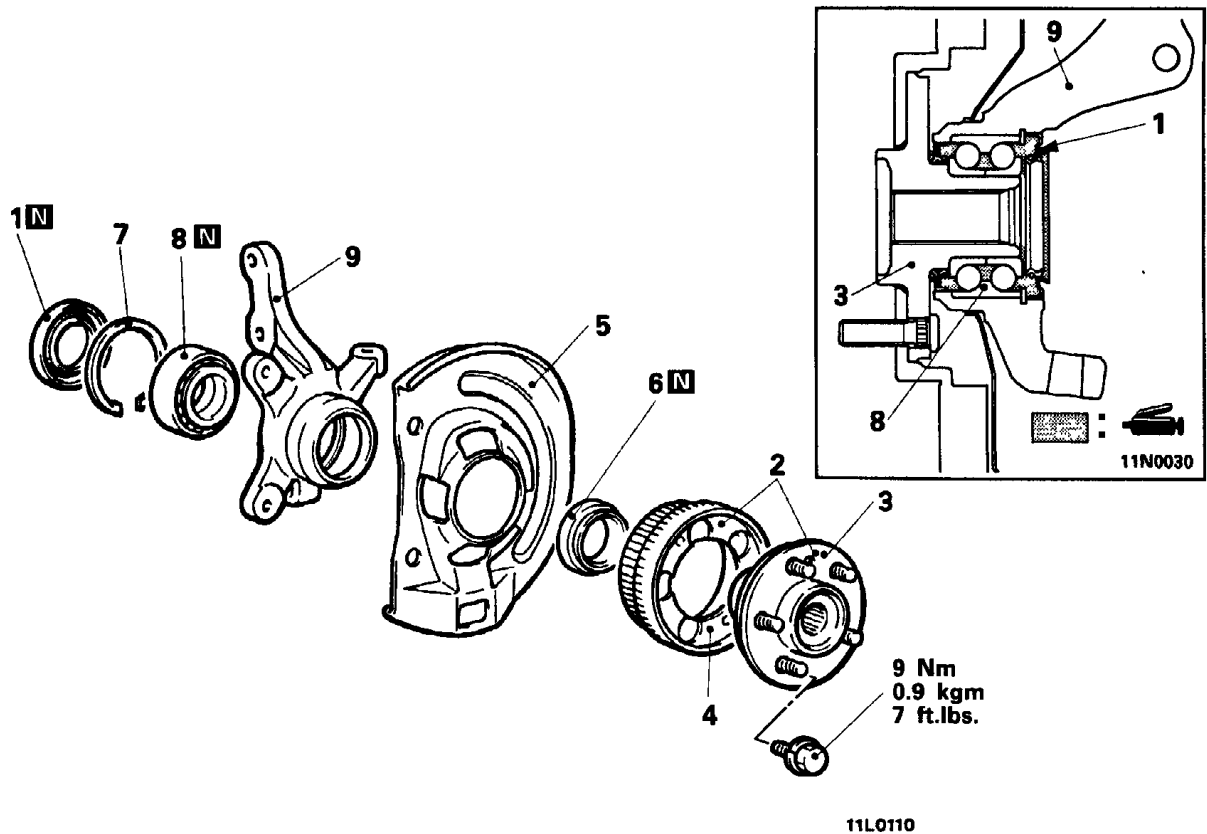
Standard value: 0.3–0.9 mm (0.012–0.035 in.)

NOTE

If the clearance between the speed sensor's pole piece and the rotor's toothed surface is not within the standard value range, it is probable that the rotor is incorrectly installed, recheck installation.

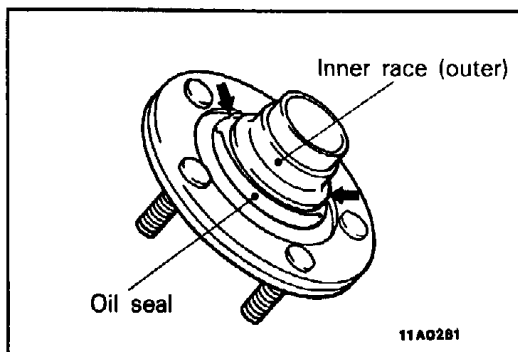
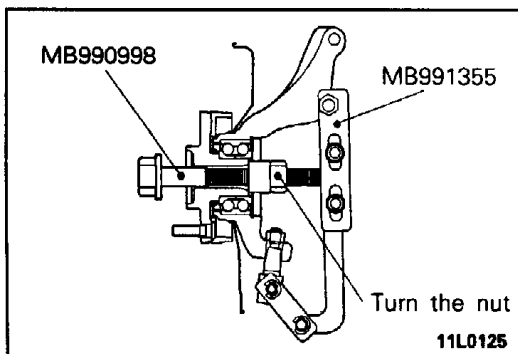
DISASSEMBLY AND REASSEMBLY

E26H-



Disassembly steps

- | | |
|--|--|
| <ul style="list-style-type: none"> ◆◆ 1. Oil seal (drive shaft side) ◆◆ ● Adjustment of wheel bearing starting torque ◆◆ ● Adjustment of hub end play ◆◆◆ 2. Hub and rotor <Vehicles with ABS> ◆◆◆ 3. Hub | <ul style="list-style-type: none"> ◆◆ 4. Rotor <Vehicles with ABS> ◆◆ 5. Dust shield ◆◆ 6. Oil seal (hub side) ◆◆ 7. Snap ring ◆◆◆ 8. Wheel bearing ◆◆◆ 9. Knuckle |
|--|--|



SERVICE POINTS OF DISASSEMBLY

E26HJAG

**2. REMOVAL OF HUB AND ROTOR
<VEHICLES WITH ABS>**

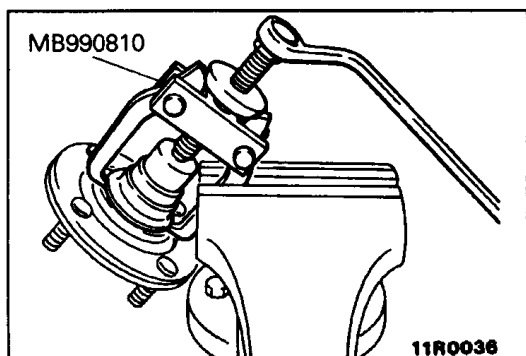
- (1) Attach the special tools to the knuckle and hub.
- (2) Secure the knuckle in a vise.
- (3) Tighten the nut of the special tool and remove the hub from the knuckle.

Caution

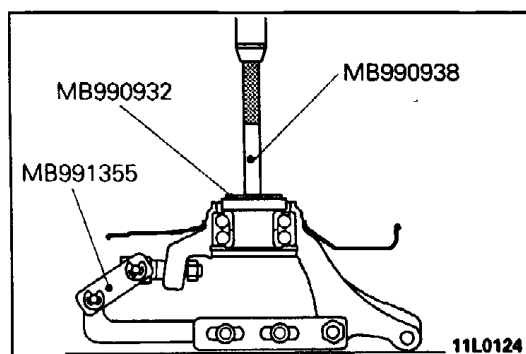
1. Be sure to use the special tools.
2. If the hub and knuckle are disassembled by striking them with a hammer, the bearing will be damaged.

8. REMOVAL OF WHEEL BEARING

- (1) Crush the oil seal in two places so that the tabs of the special tool will be caught on the wheel bearing inner race.



- (2) Remove the wheel bearing inner race from the front hub by using the special tool.

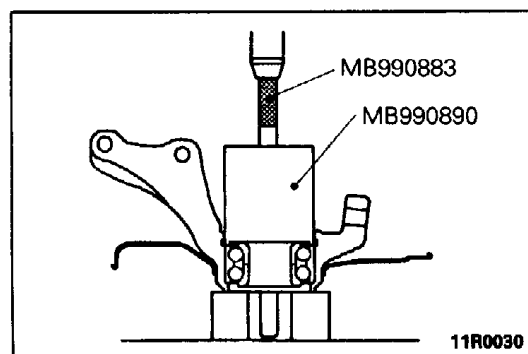


- (3) Drive the wheel bearing out by using the special tools.

INSPECTION

E26HKAAb

- Check the front hub and brake disc mounting surfaces for galling and contamination.
- Check the knuckle inner surface for galling and cracks.
- Check for defective bearing.

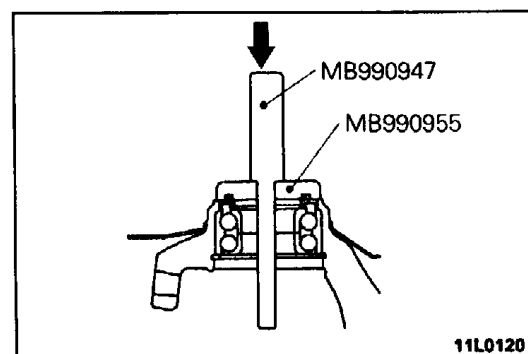


SERVICE POINTS OF REASSEMBLY

E26H0AE

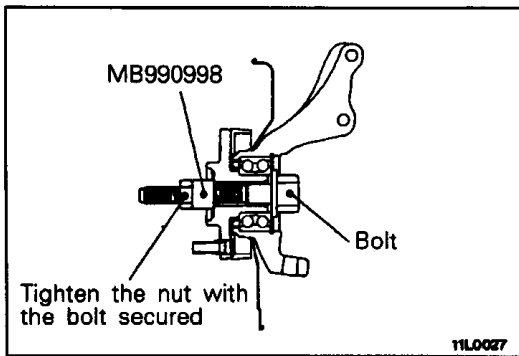
9. INSTALLATION OF KNUCKLE/8. WHEEL BEARING

- (1) Fill the wheel bearing with multipurpose grease.
- (2) Apply a thin coating of multipurpose grease to the knuckle and bearing contact surfaces.
- (3) Press-in the bearing by using the special tools.



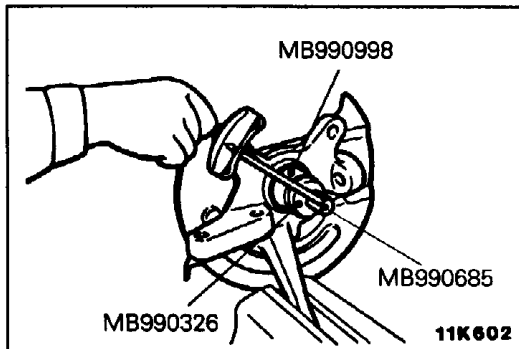
6. INSTALLATION OF OIL SEAL (HUB SIDE)

- (1) Drive the oil seal (hub side) into the knuckle by using the special tools until it is flush with the knuckle end surface.
- (2) Apply multipurpose grease to the lip of the oil seal and to the surfaces of the oil seal which contact the front hub.



2. INSTALLATION OF HUB AND ROTOR <VEHICLES WITH ABS>

- (1) Use the special tool to mount the hub and rotor onto the knuckle.
- (2) Tighten the nut of the special tool to 200–260 Nm (20–26 kgm, 145–188 ft.lbs.).
- (3) Rotate the hub in order to seat the bearing.
- (4) Leave the special tool in place and take the measurements described below.



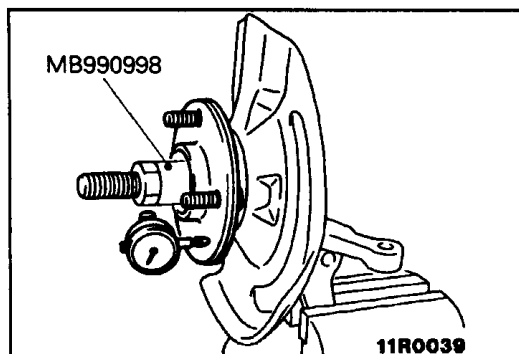
• ADJUSTMENT OF WHEEL BEARING STARTING TORQUE

Measure the wheel bearing starting torque (hub starting torque) by using the special tools.

Limit: 1.8 Nm (18 kgcm, 16 in.lbs.) or less

NOTE

The starting torque must be within the limit and, in addition, the bearing must not feel rough when rotated.

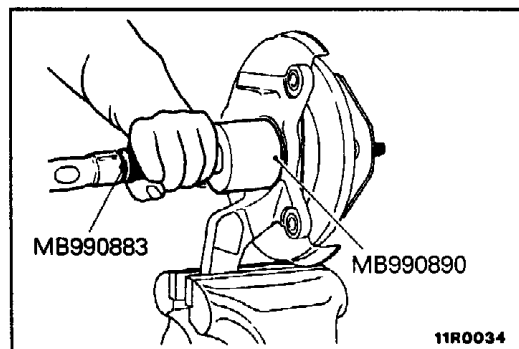


• ADJUSTMENT OF HUB END PLAY

- (1) Measure to determine whether the end play of the hub is within the specified limit or not.

Limit: 0.05 mm (0.0020 in.)

- (2) If the starting torque and hub end play are not within the limit range while the nut is tightened to 200–260 Nm (20–26 kgm, 144–188 ft.lbs.), the bearing, hub and/or knuckle have probably not been installed correctly. Repeat the disassembly and assembly procedure.



1. INSTALLATION OF OIL SEAL (DRIVE SHAFT SIDE)

Drive the oil seal (drive shaft side) into the knuckle until it contacts the snap ring.

Apply multipurpose grease to the lip of the oil seal.

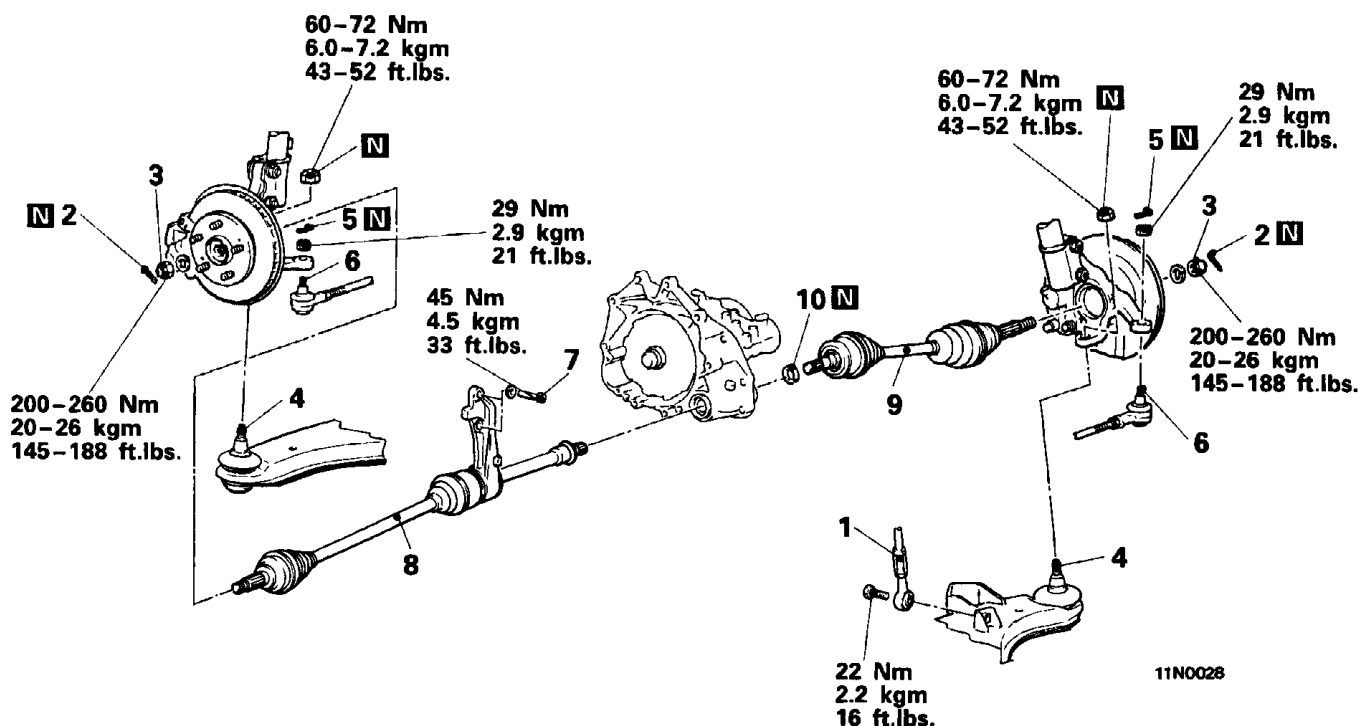
DRIVE SHAFT

REMOVAL AND INSTALLATION

E26QA-

Pre-removal and Post-installation Operation

Removal and Installation of Under Cover

**Removal steps**

- ◆◆ 1. Front height sensor
<Vehicles with ACTIVE-ECS>
- ◆◆◆◆ 2. Split pin
- ◆◆◆◆ 3. Drive shaft nut
- ◆◆◆◆ 4. Connection for lower arm ball joint
- ◆◆◆◆ 5. Split pin
- ◆◆◆◆ 6. Connection for tie rod end
- ◆◆◆◆ 7. Center bearing bracket installation bolt
- ◆◆◆◆ 8. Drive shaft and inner shaft assembly (LH)
- ◆◆◆◆ 9. Drive shaft (RH)
- ◆◆◆◆ 10. Circlip

SERVICE POINTS OF REMOVAL

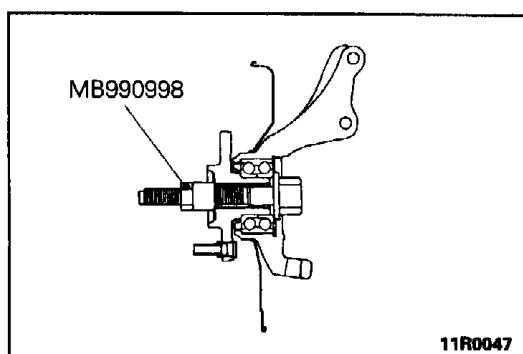
E26QCB

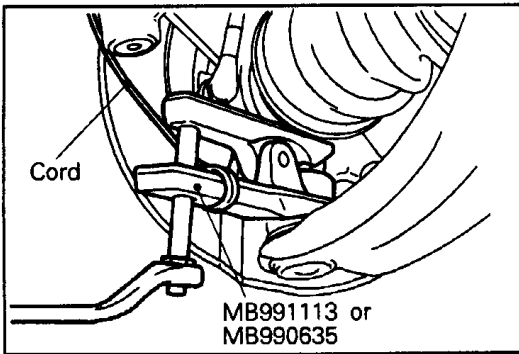
3. REMOVAL OF DRIVE SHAFT NUT

With brake pressure applied, remove the drive shaft nut.

Caution

Do not apply the vehicle weight to the wheel bearing while loosening the drive shaft nut. If, however, the vehicle weight must be applied to the bearing (because of moving the vehicle), temporarily secure the wheel bearing by using the special tool, MB990998, etc.

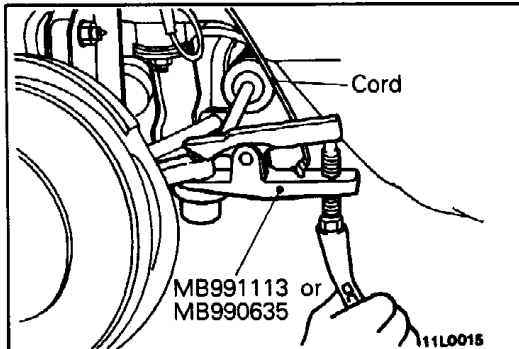




4. DISCONNECTION OF LOWER ARM BALL JOINT

Caution

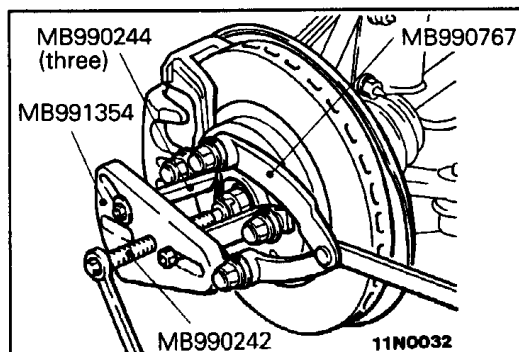
1. Be sure to tie the cord of the special tool to the nearby part.
2. Loosen the nut but do not remove it.



6. DISCONNECTION OF TIE ROD END

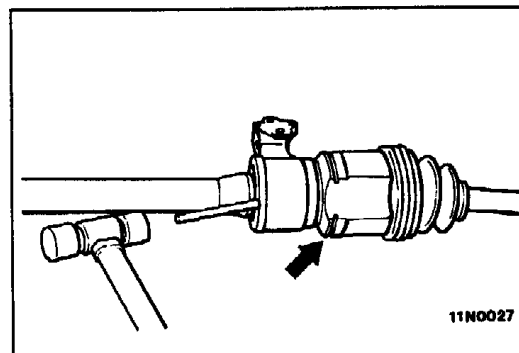
Caution

1. Be sure to tie the cord of the special tool to the nearby part.
2. Loosen the nut but do not remove it.

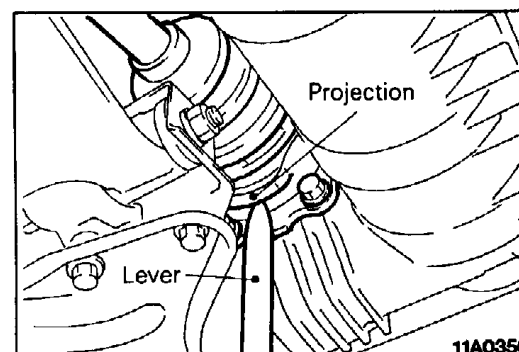


8. REMOVAL OF DRIVE SHAFT AND INNER SHAFT (LH)/9. DRIVE SHAFT (RH)

- (1) Use the special tools to push out the drive shaft from the front hub.



- (2) If the inner shaft and transmission are tightly joined, tap the center bearing bracket lightly with a plastic hammer, etc. to remove the drive shaft and inner shaft (LH) from the transmission.



- (3) Apply a lever to the projecting part of the drive shaft to remove the drive shaft from the transmission.

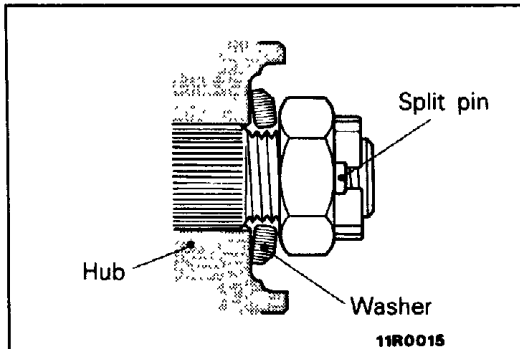
Caution

Do not pull on the drive shaft; doing so will damage the T.J.; be sure to use the pry bar.

INSPECTION

E26QCB0

- Check the drive shaft boot for damage or deterioration.
- Check the ball joints for wear or operating condition.
- Check the spline part for wear or damage.

**SERVICE POINTS OF INSTALLATION**

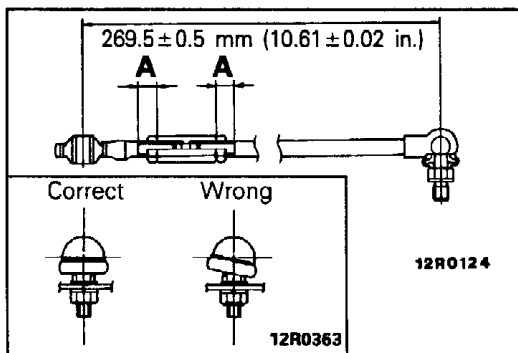
E26QDAH

3. INSTALLATION OF DRIVE SHAFT NUT

- (1) Be sure to install the washer and drive shaft nut in the specified direction.
- (2) With brake pressure applied, tighten the drive shaft nut.
- (3) If the position of the split pin holes does not match, tighten the nut up to 260 Nm (26 kgm, 188 ft.lbs.) in maximum.
- (4) Install the split pin in the first matching holes and bend it securely.

Caution

Before securely tightening the drive shaft nuts, make sure there is no load on the wheel bearings.

**1. INSTALLATION OF FRONT HEIGHT SENSOR
<VEHICLES WITH ACTIVE-ECS>**

Install so that the dimensions of the rod assembly are equal to the reference values in the diagram.

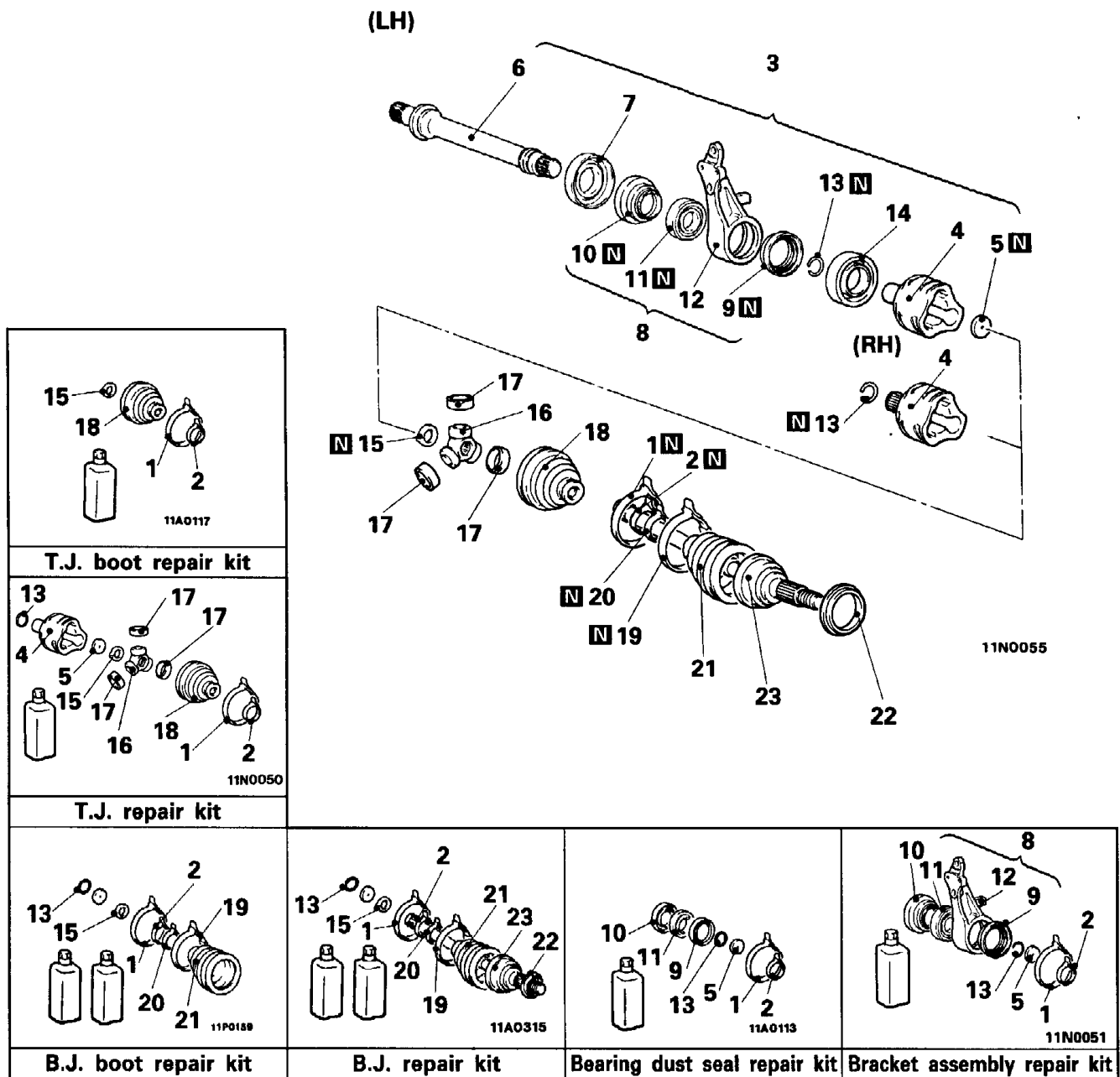
Caution

1. When adjusting the length of the rod, adjust so that dimension A is uniform.
2. Height sensors must be installed so that the ball joint at the rod end is at rocking centre.

DISASSEMBLY AND REASSEMBLY

<Vehicles built up to October, 1991>

E26QE-

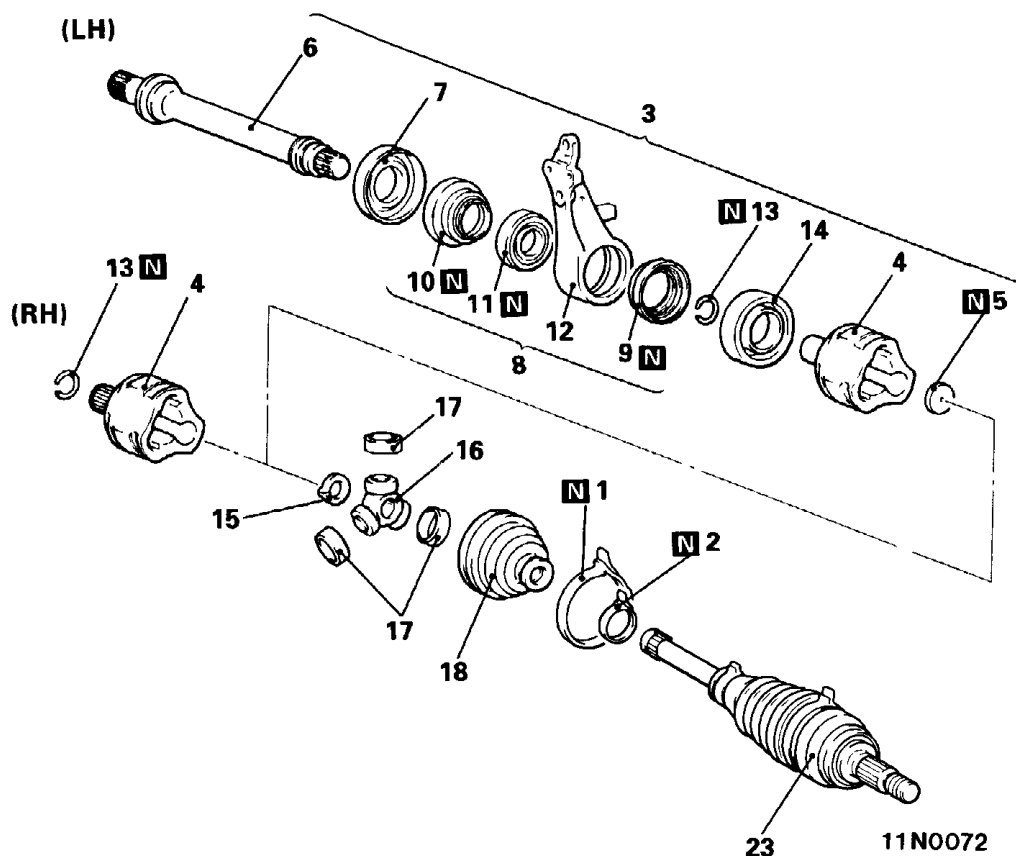


Disassembly steps

- ◆◆ 1. T.J. boot band (large)
- ◆◆ 2. T.J. boot band (small)
- ◆◆ 3. T.J. case and inner shaft assembly
- ◆◆ 4. T.J. case
- ◆◆ 5. Seal plate
- ◆◆ 6. Inner shaft
- ◆◆ 7. Dust cover
- ◆◆ 8. Bracket assembly
- ◆◆ 9. Dust seal outer
- ◆◆ 10. Dust seal inner
- ◆◆ 11. Center bearing
- ◆◆ 12. Center bearing bracket

- 13. Circlip
- 14. Dust cover
- 15. Snap ring
- ◆◆ 16. Spider assembly
- ◆◆ 17. Free ring
- ◆◆ 18. T.J. boot
- ◆◆ 19. B.J. boot band (large)
- ◆◆ 20. B.J. boot band (small)
- ◆◆ 21. B.J. boot
- ◆◆ 22. Dust cover
- ◆◆ 23. B.J.

< Vehicles built from November, 1991 >



11A0117	11N0050	11A0113	11N0051
T.J. boot repair kit	T.J. repair kit	Bearing dust seal repair kit	Bracket assembly repair kit

Disassembly steps

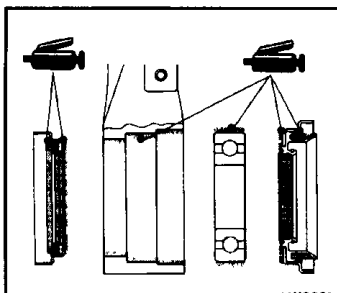
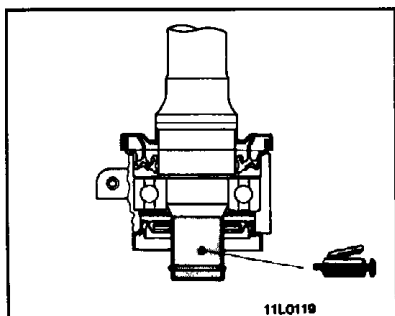
- ◆◆ 1. T.J. boot band (large)
- ◆◆ 2. T.J. boot band (small)
- ◆◆ 3. T.J. case and inner shaft assembly
- ◆◆ 4. T.J. case
- ◆◆ 5. Seal plate
- ◆◆◆◆ 6. Inner shaft
- ◆◆◆◆ 7. Dust cover
- ◆◆◆◆ 8. Bracket assembly
- ◆◆◆◆ 9. Dust seal outer
- ◆◆◆◆ 10. Dust seal inner
- ◆◆◆◆ 11. Center bearing
- ◆◆◆◆ 12. Center bearing bracket

- 13. Circlip
- 14. Dust cover
- 15. Snap ring
- ◆◆ 16. Spider assembly
- ◆◆◆◆ 17. Free ring
- ◆◆◆◆ 18. T.J. boot
- 23. B.J.

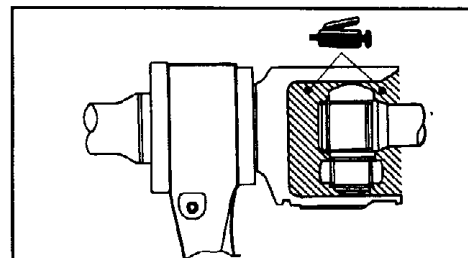
Caution
The B.J. is a type that cannot be disassembled.

LUBRICANT POINTS

<Vehicles built up to October, 1991>

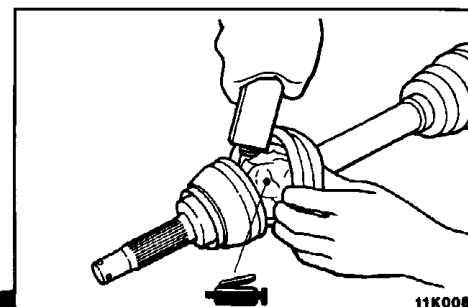
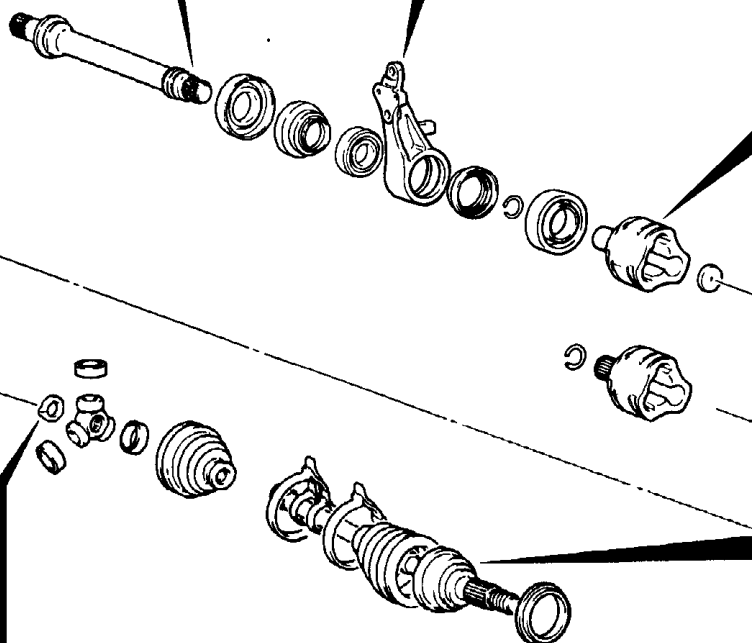


Dust seal inner 14–20 g
(0.49–0.71 oz.)
Dust seal outer 8–12 g
(0.28–0.42 oz.)



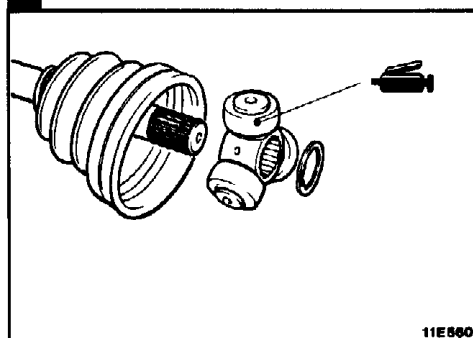
Grease: Repair kit grease
160 g (5.64 oz.)

Caution
The drive shaft joint uses special grease. Do not mix old and new or different types of grease.



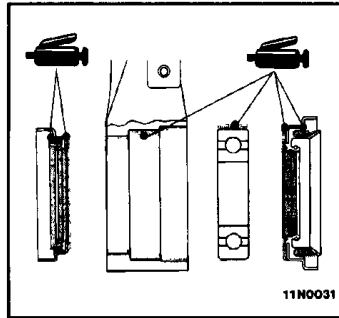
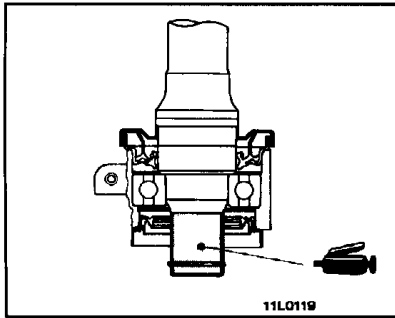
Grease: Repair kit grease
145 g (5.11 oz.)

Caution
The drive shaft joint uses special grease. Do not mix old and new or different types of grease.

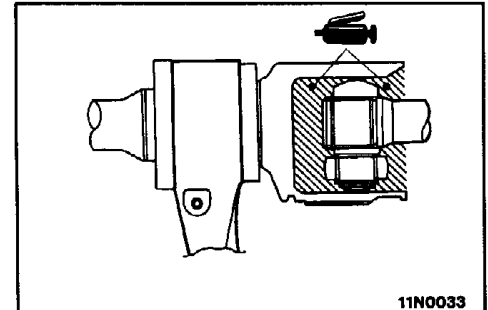


Grease: Repair kit grease

<Vehicles built from November, 1991>

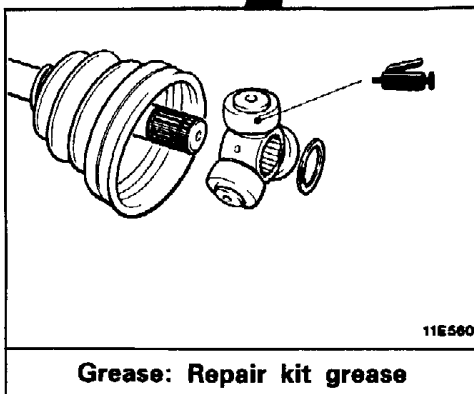
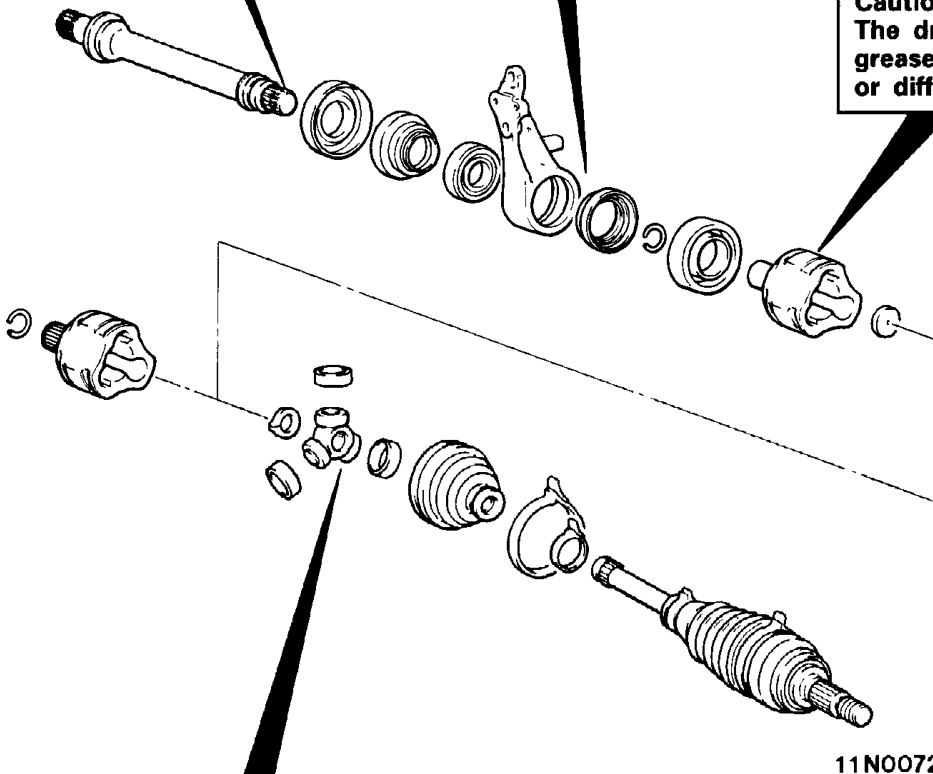


Dust seal inner 14–20 g
(0.49–0.71 oz.)
Dust seal outer 8–12 g
(0.28–0.42 oz.)

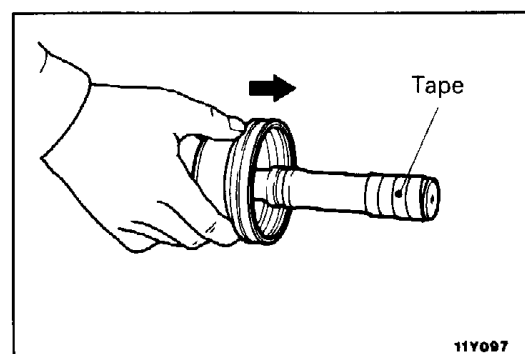
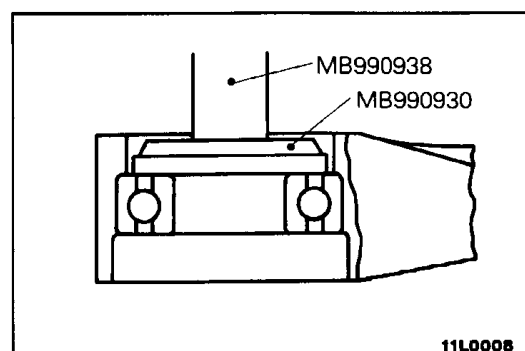
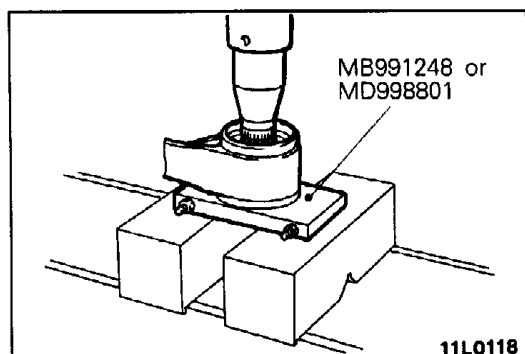
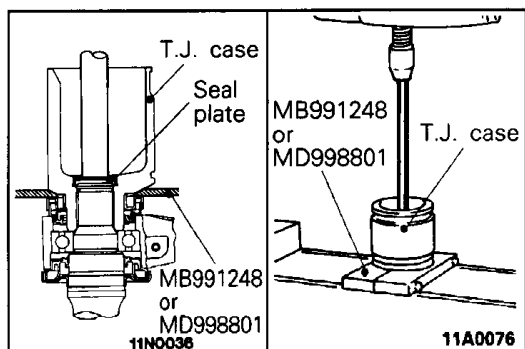


Grease: Repair kit grease
160 g (5.64 oz.)

Caution
The drive shaft joint uses special grease. Do not mix old and new or different types of grease.



Grease: Repair kit grease



SERVICE POINTS OF DISASSEMBLY

E26QFCG

6. REMOVAL OF INNER SHAFT

- (1) Using the special tool, remove the inner shaft assembly, together with the seal plate, from the T.J. case.

NOTE

Press the tool directly against the seal plate. The tool under pressure will puncture and deform the seal plate, and push out the inner shaft underneath.

- (2) Use the special tool to remove the inner shaft from the center bearing bracket.

11. REMOVAL OF CENTER BEARING

18. REMOVAL OF T.J. BOOT / 21. B.J. BOOT

<Vehicles built up to October, 1991>

- (1) Wrap vinyl tape around the spline part on the T.J. side of the drive shaft so that the T.J. and B.J. boots are not damaged when they are removed.
- (2) Withdraw the T.J. and B.J. boots from the drive shaft.

18. REMOVAL OF T.J. BOOT

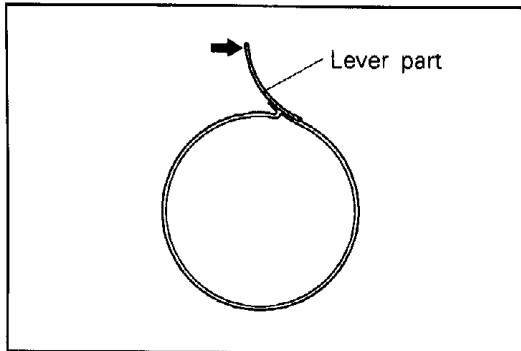
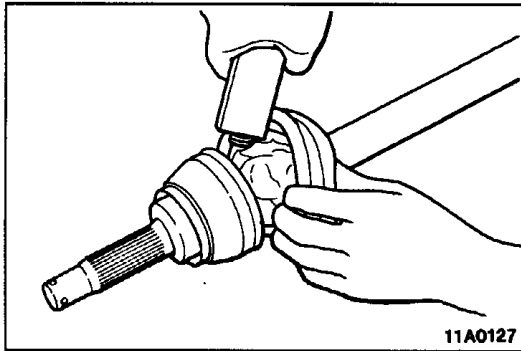
<Vehicles built from November, 1991>

- (1) Wrap vinyl tape around the spline part on the T.J. side of the drive shaft so that the T.J. boot is not damaged when it is removed.
- (2) Withdraw the T.J. boot from the drive shaft.

INSPECTION

E26QGCE

- Check the drive shaft for damage, bending or corrosion.
- Check the inner shaft for damage, bending or corrosion.
- Check the drive shaft splines for wear or damage.
- Check the inner shaft splines for wear or damage.
- Check for entry of water and/or foreign material into B.J..
- Check the spider assembly for roller rotation, wear or corrosion.
- Check the groove inside T.J. case for wear or corrosion.
- Check the boots for deterioration, damage or cracking.
- Check the center bearing for seizure, discoloration or roughness of rolling surface.
- Check the dust cover for damage or deterioration.



SERVICE POINTS OF REASSEMBLY

E26QHCga

21. INSTALLATION OF B.J. BOOT /18. T.J. BOOT

<Vehicles built up to October, 1991>

- (1) Wrap vinyl tape around the spline part on the drive shaft, and then install the B.J. boot and T.J. boot, in that order.
- (2) Fill the inside of the B.J. and B.J. boot with the specified grease.

Specified grease: Repair kit grease 145 g (5.11 oz)

NOTE

The grease in the repair kit should be divided in half for use, respectively, at the joint and inside the boot.

Caution

The drive shaft joint use special grease. Do not mix old and new or different types of grease.

- (3) Secure the boot bands.

Also, to identify the boot bands, a product number is engraved on lever part of each band.

B.J. boot band (large): 20-22#B.J.104

B.J. boot band (small): 20-15#B.J.104

T.J. boot band (large): 20-75#B.J.95

T.J. boot band (small): 20-72#B.J.100

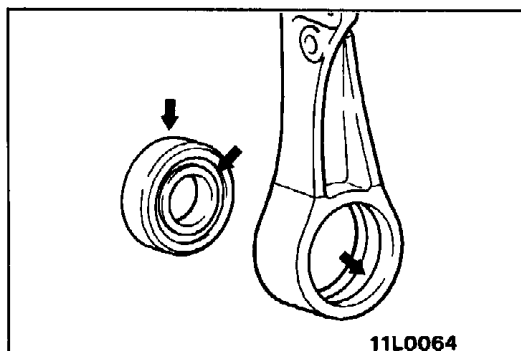
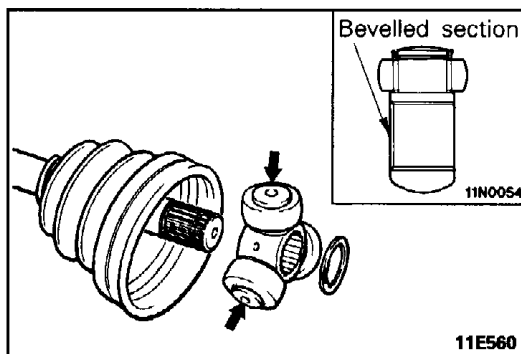
Caution

The boot bands should be tightened with the drive shaft at a 0° break angle.

18. INSTALLATION OF T.J. BOOT

<Vehicles built from November, 1991>

Wrap vinyl tape around the spline part on the drive shaft, and then install T.J. boot.



16. INSTALLATION OF SPIDER ASSEMBLY

- (1) Apply the specified grease furnished in the repair kit to the spider assembly between the spider axle and the roller.

Specified grease: Repair kit grease

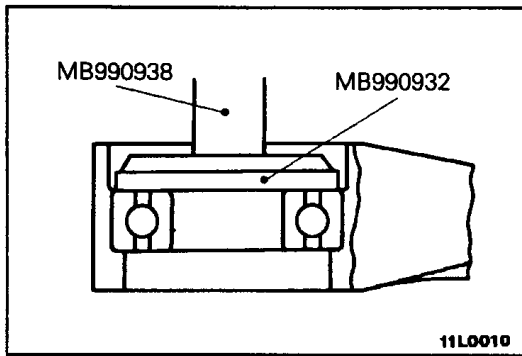
Caution

The drive shaft joint uses special grease. Do not mix old and new or different types of grease.

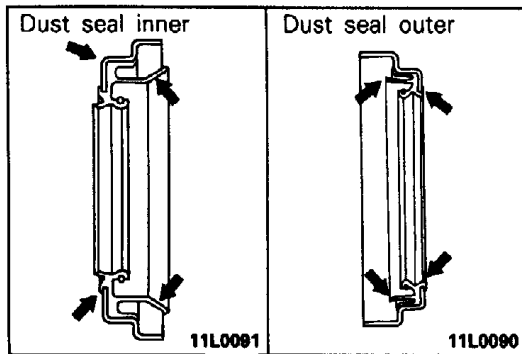
- (2) Install the spider assembly to the shaft from the direction of the spline bevelled section.

11. INSTALLATION OF CENTER BEARING

- (1) Apply multipurpose grease to the center bearing and inside the center bearing bracket.



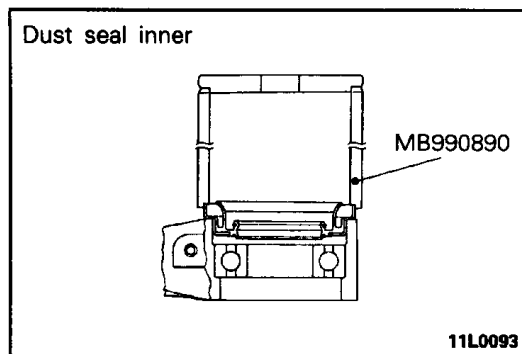
- (2) Use the special tools to press-fit the center bearing into the center bearing bracket.



10/9. INSTALLATION OF DUST SEALS

- (1) Apply multipurpose grease to the rear surfaces of all dust seals.

Dust seal inner	14–20 g (0.49–0.71 oz.)
Dust seal outer	8–12 g (0.28–0.42 oz.)



- (2) Use the special tool to install the dust seal so that its surface runs even with that of the center bearing bracket.

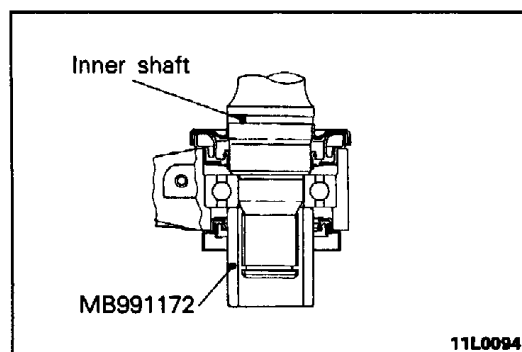
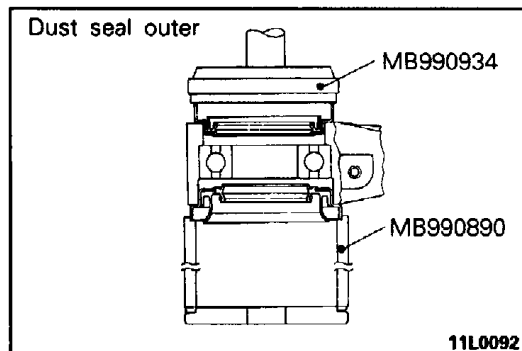
Caution

Do not damage the rubber section on the outside of the dust seal.

- (3) Apply multipurpose grease to the lip of each dust seal.

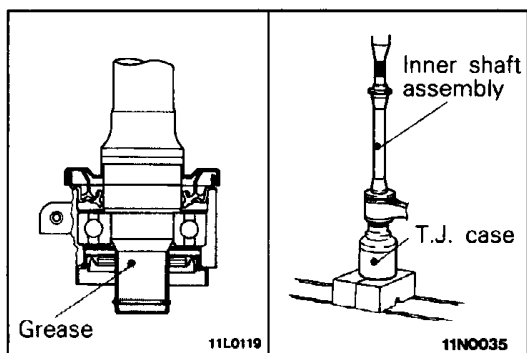
NOTE

When applying grease, make sure that it does not adhere to anything outside the lip.



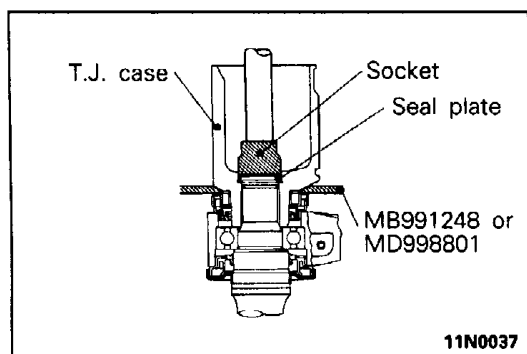
6. INSTALLATION OF INNER SHAFT

- Use the special tool to hold the inner race of the center bearing and force the inner shaft into place.

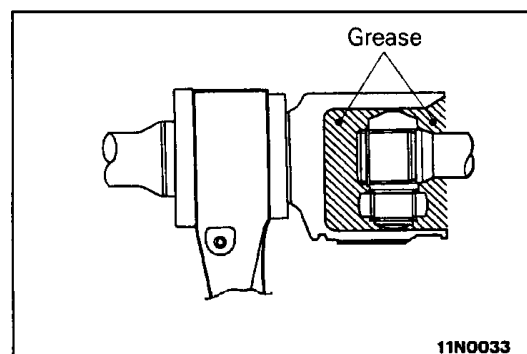


3. INSTALLATION OF T.J. CASE AND INNER SHAFT ASSEMBLY

- (1) Apply multipurpose grease to the inner shaft spline, then press fit it into the T.J. case.



- (2) Using the special tool and socket (width across flats 22 mm [0.87 in.]), press the seal plate into the T.J. case.



- (3) Fill the specified grease furnished in the repair kit to the T.J. case.

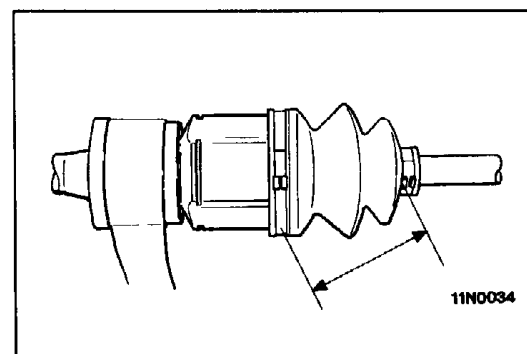
Specified grease: Repair kit grease 160 g (5.64 oz.)

NOTE

The grease in the repair kit should be divided in half for use, respectively, at the joint and inside the boot.

Caution

The drive shaft joint uses special grease. Do not mix old and new or different types of grease.



2. INSTALLATION OF BOOT BAND (SMALL)/1. T.J. BOOT BAND (LARGE)

Set the T.J. boot bands at the specified distance in order to adjust the amount of air inside the T.J. boot, and then tighten the T.J. boot band securely.

Standard value: 75±3 mm (2.95±0.12 in.)

REAR AXLE

CONTENTS

E27AA--

SPECIFICATIONS	2	SERVICE ADJUSTMENT PROCEDURES	2
General Specifications	2	Wheel Bearing End Play Inspection	2
Service Specifications	2	Rear Hub Rotary-Sliding Resistance Inspection	3
		REAR AXLE HUB	3

SPECIFICATIONS

GENERAL SPECIFICATIONS

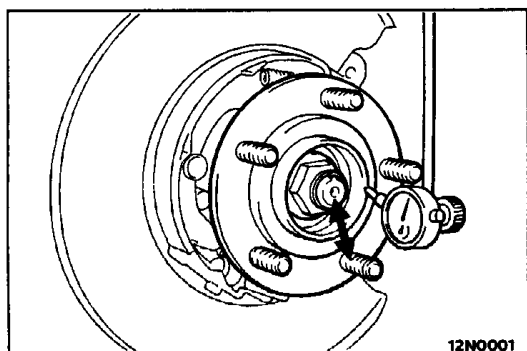
E27CA--

Items	Specifications
Wheel bearing Type	Unit ball bearing

SERVICE SPECIFICATIONS

E27CB--

Items	Specifications
Limit	
Wheel bearing end play	mm (in.) 0.05
Wheel bearing rotary-sliding resistance	N (kg, lbs.) 31 (3.1,7) or less
Wheel bearing rotary-sliding torque	Nm (kgm, ft.lbs.) 1.8 (0.18, 1.30) or less



SERVICE ADJUSTMENT PROCEDURES

WHEEL BEARING END PLAY INSPECTION E27FHAC

1. Inspect the play of the bearings while the vehicles is jacked up and resting on floor jack.
2. Remove the hub cap and then release the parking brake.
3. Remove the caliper assembly and the brake disc.
4. Check the bearing's end play.

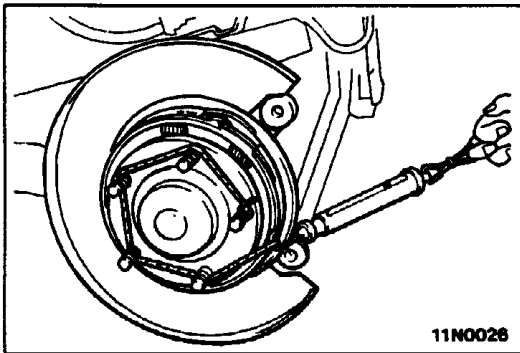
Place a dial gauge against the hub surface; then move the hub in the axial direction and check whether or not there is end play.

Limit: 0.05 mm (0.0020 in.) or less

NOTE

If the limit value is exceeded, the lock nut should be tightened to the specified torque and check the end play again.

5. Replace the rear hub bearing unit if an adjustment cannot be made to within the limit.



REAR HUB ROTARY-SLIDING RESISTANCE (TORQUE) ADJUSTMENT

E27FMA8

1. Inspect the play of the bearings while the vehicles is jacked up and resting on floor jack.
2. Release the parking brake.
3. Remove the caliper assembly and the brake disc.
4. After turning the hub a few times to seat the bearing, attach a spring balance to the hub bolt, and, pulling at a 90° angle from the hub bolt, measure to determine whether or not the rotary-sliding resistance of the rear hub (the rotary-sliding torque of the rear hub) is the standard value.

Limit:

Rear hub rotary-sliding resistance

31 N (3.1 kg, 7 lbs.) or less

Rear hub rotary-sliding torque

1.8 Nm (0.18 kgm, 1.30 ft.lbs.) or less

NOTE

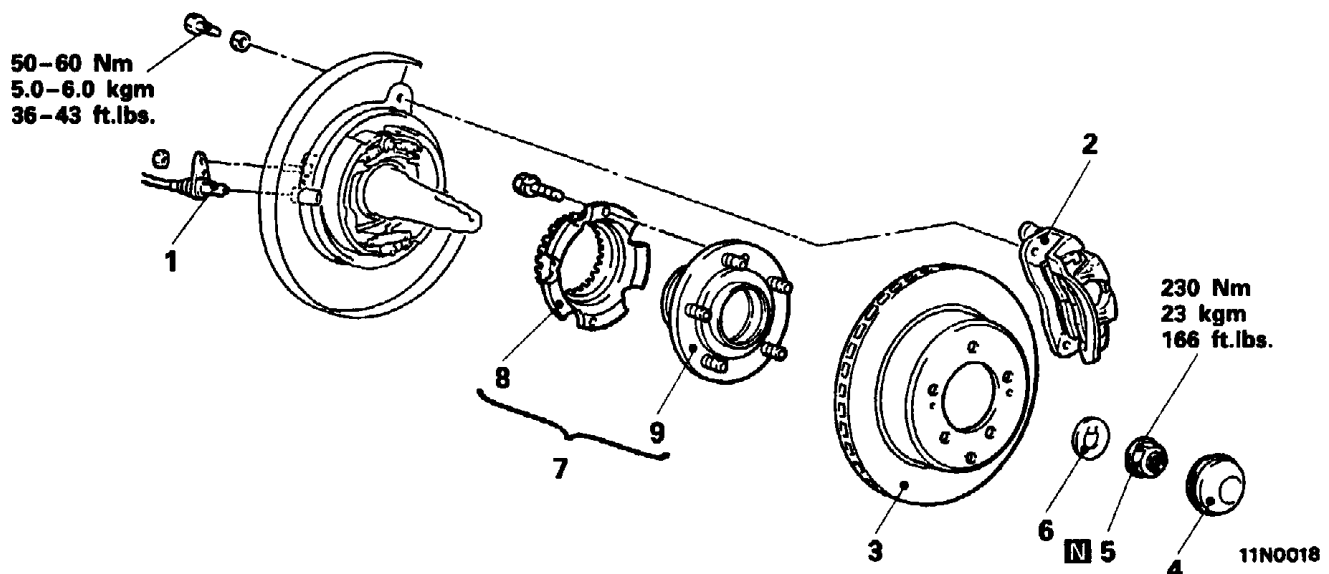
If the limit value is exceed, loosen the nut and then tighten it to the specified torque, and ckeck the rear hub rotary-sliding torque again.

5. Replace the rear hub bearing unit if an adjustment cannot be made to within the limit.

REAR AXLE HUB

REMOVAL AND INSTALLATION

E27GA–

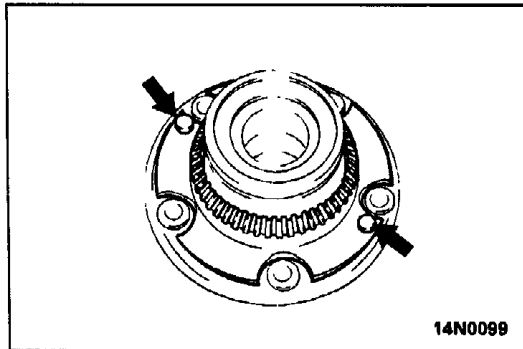
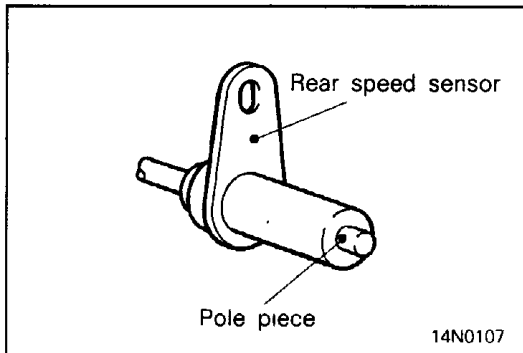


Removal steps

- ◆◆◆ 1. Rear speed sensor <Vehicles with ABS>
- ◆◆ 2. Caliper assembly
- ◆◆ 3. Brake disc
- ◆◆ 4. Hub cap
- ◆◆ 5. Flange nut
- ◆◆ 6. Tongued washer
- ◆◆ 7. Rear hub assembly
- ◆◆ 8. Rear rotor <Vehicles with ABS>
- ◆◆ 9. Rear hub unit bearing

Caution

The rear hub unit bearing should not be dismantled.



SERVICE POINTS OF REMOVAL

E27GBAB

1. REMOVAL OF REAR SPEED SENSOR

Caution

When removing the speed sensor from the adapter, be careful that the end pole piece does not strike the teeth of the rotor or other parts.

2. REMOVAL OF CALIPER ASSEMBLY

Remove the caliper assembly and suspend it.

8. REMOVAL OF REAR ROTOR

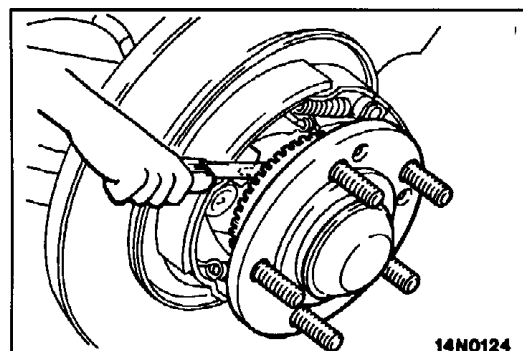
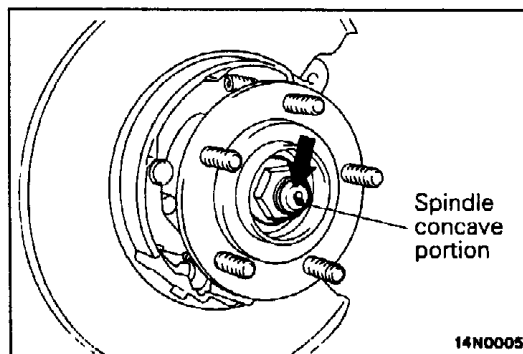
Caution

Care must be taken not to scratch or otherwise damage the teeth of the rotor. The rotor must never be dropped. If the teeth of the rotor are chipped, resulting in a deformation of the rotor, it will not be able to accurately detect the wheel rotation speed, and the system will not function normally.

INSPECTION

E27GCAD

- Check the oil seal for crack or damage.
- Check the rear hub unit bearing for wear or damage.
- Check the rear rotor for chipped teeth.



SERVICE POINTS OF INSTALLATION

E27GDAH

5. INSTALLATION OF FLANGE NUT

After tightening the flange nut, crimp the nut to meet the concave portion of the spindle.

1. INSTALLATION OF REAR SPEED SENSOR <VEHICLES WITH ABS>

Insert a thickness gauge into the space between the speed sensor's pole piece and the rotor's toothed surface, and then tighten the speed sensors at the position where the clearance at all places is within the standard value.

Standard value: 0.2–0.7 mm (0.008–0.028 in.)

WHEEL AND TYRE

CONTENTS

E31AA--

SPECIFICATIONS	2	SERVICE ADJUSTMENT PROCEDURES	4
General Specifications	2	Tyre Inflation Pressure Check	4
Service Specifications	2	Tyre Wear Check	4
TROUBLESHOOTING	3	Wheel Runout Check	4

SPECIFICATIONS

GENERAL SPECIFICATIONS

E31CA--

Items	SOHC	DOHC
Wheel		
Type	Steel type	Steel type or Aluminium type
Size	15×6JJ	15×6JJ
Offset mm (in.)	46 (1.8)	46 (1.8)
P.C.D. mm (in.)	114.3 (4.5)	114.3 (4.5)
Tyre		
Size	205/65R15	205/65R15
Tyre inflation pressure kPa (kg/cm ² , psi)		
Front	220 (2.2, 31)	220 (2.2, 31)
Rear	180 (1.8, 26)	180 (1.8, 26)

NOTE P.C.D. (Pitch Circle diameter) indicates the pitch circle diameter of the wheel installation holes.

SERVICE SPECIFICATIONS

E31CB--

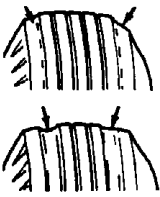
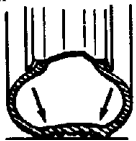
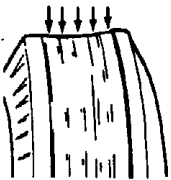
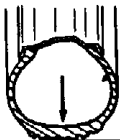
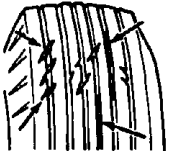
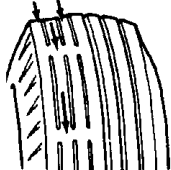
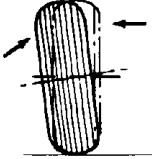
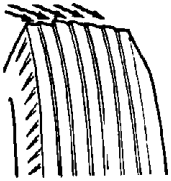
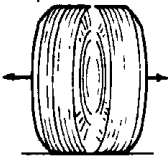
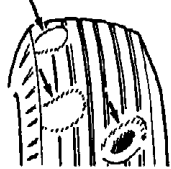
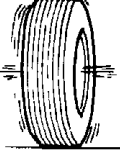
Items	Specifications
Standard value	
Wheel nut tightening torque Nm (kgm ,ft.lbs.)	90 – 110 (9 – 11, 65 – 80)
Limit	
Wheel runout	
<Vehicles built up to October, 1991>	
Radial mm (in.)	2.0 (0.08)
Lateral mm (in.)	2.0 (0.08)
<Vehicles built from November, 1991>	
Radial mm (in.)	1.2 (0.05) [1.0 (0.04)]
Lateral mm (in.)	1.2 (0.05) [1.0 (0.04)]
Tread depth of type	16 (0.06)

NOTE

Values inside [] are for aluminium wheels.

TROUBLESHOOTING

E31EA--

Symptom	Probable cause	Remedy	Reference page
Rapid wear at shoulders 	Under-inflation or lack of rotation 	Adjust the tyre pressure	Refer to P.31-2
Rapid wear at centre 	Over-inflation or lack of rotation 		
Cracked treads 	Under-inflation		
Wear on one side 	Excessive camber 	Inspect the camber	Refer to GROUP 33A, 33B – Service Adjustment procedures
Feathered edge 	Incorrect toe-in 	Adjust the toe-in	
Bald spots 	Unbalanced wheel 	Adjust the imbalanced wheels	—
Scalloped wear 	Lack of rotation of tyres or worn or out-of-alignment suspension 	Rotate the tyres inspect the front suspension alignment	Refer to GROUP 33A, 33B – Service Adjustment procedures

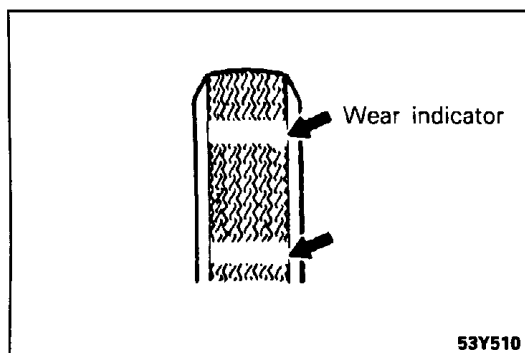
11U0047

SERVICE ADJUSTMENT PROCEDURES

E31FAA

TYRE INFLATION PRESSURE CHECK

Check the inflation pressure of the tyres. If it is not within the standard value, make the necessary adjustment.

**TYRE WEAR CHECK**

E31FBAA

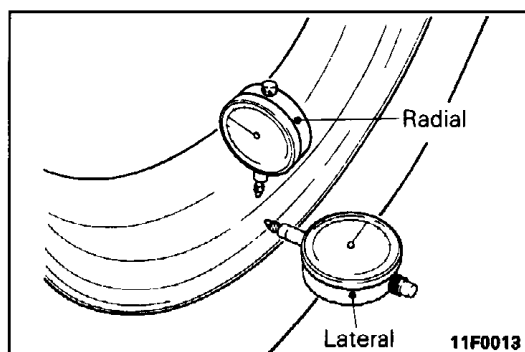
Measure the tread depth of tyres.

Limit: 1.6 mm (0.06 in.)

If the remaining tread depth is less the limit, replace the tyre.

NOTE

When the tread depth of tyres is reduced to 1.6 mm (0.06 in.) or less, wear indicators will appear.

**WHEEL RUNOUT CHECK**

E31FCAA

Jack up the vehicle so that the wheels are clear of the floor. While slowly turning the wheel, measure wheel runout with a dial indicator.

Limit: <Vehicles built up to October, 1991>

Radial 2.0 mm (0.08 in.)

Lateral 2.0 mm (0.08 in.)

<Vehicles built from November, 1991>

Steel wheel

Radial 1.2 mm (0.05 in.)

Lateral 1.2 mm (0.05 in.)

Aluminium wheel

Radial 1.0 mm (0.04 in.)

Lateral 1.0 mm (0.04 in.)

If wheel runout exceeds the limit, replace the wheel.

POWER PLANT MOUNT

CONTENTS

E32AA--

SPECIFICATIONS	2	ENGINE ROLL STOPPER AND ENGINE DAMPER	5
Service Specifications	2		
SPECIAL TOOLS	2	RIGHTMEMBER, LEFTMEMBER AND CROSSMEMBER*	6
ENGINE MOUNTING	3		
TRANSMISSION MOUNTING	4		

WARNINGS REGARDING SERVICING OF SUPPLEMENTAL RESTRAINT SYSTEM (SRS) EQUIPPED VEHICLES

WARNING!

- (1) Improper service or maintenance of any component of the SRS, or any SRS-related component, can lead to personal injury or death to service personnel (from inadvertent firing of the air bag) or to the driver and passenger (from rendering the SRS inoperative).
- (2) Service or maintenance of any SRS component or SRS-related component must be performed only at an authorized MITSUBISHI dealer.
- (3) MITSUBISHI dealer personnel must thoroughly review this manual, and especially its GROUP 52B – Supplemental Restraint System (SRS) before beginning any service or maintenance of any component of the SRS or any SRS-related component.

NOTE

The SRS includes the following components: impact sensors, SRS diagnosis unit, SRS warning lamp, air bag module, clock spring and interconnecting wiring. Other SRS-related components (that may have to be removed/installed in connection with SRS service or maintenance) are indicated in the table of contents by an asterisk (*).

SPECIFICATIONS

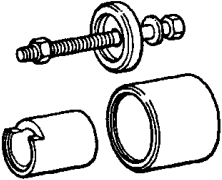
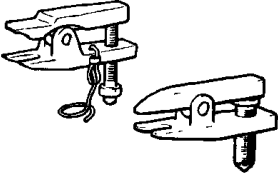
SERVICE SPECIFICATIONS

E32CB--

Items		Specifications
Standard Value		
No.1 crossmember		
Bushing (B) projection	mm (in.)	9.0 ± 1.5 (0.35 ± 0.06)
Crossmember		
Bushing (A) projection	mm (in.)	$9.7^{+0.5}_{-2.5}$ ($0.38^{+0.02}_{-0.1}$)
Bushing (B) projection	mm (in.)	$9.0^{+0.5}_{-2.5}$ ($0.35^{+0.02}_{-0.1}$)

SPECIAL TOOLS

E32DA--

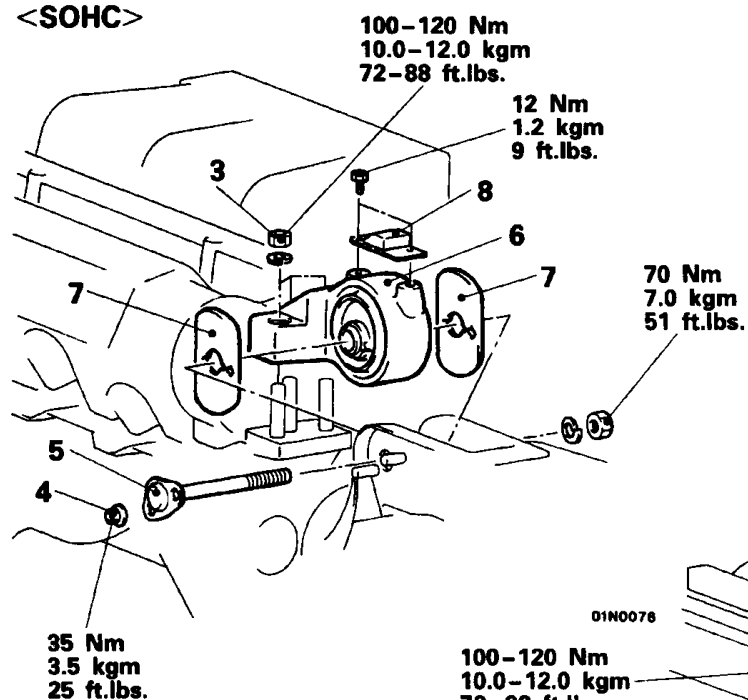
Tool	Number	Name	Use
	MB991045	Bushing remover and installer	Removal and installation of the crossmember bushing
	MB990635 or MB991113	Steering linkage puller	Removal of the ball joint

ENGINE MOUNTING

REMOVAL AND INSTALLATION

E32JA--

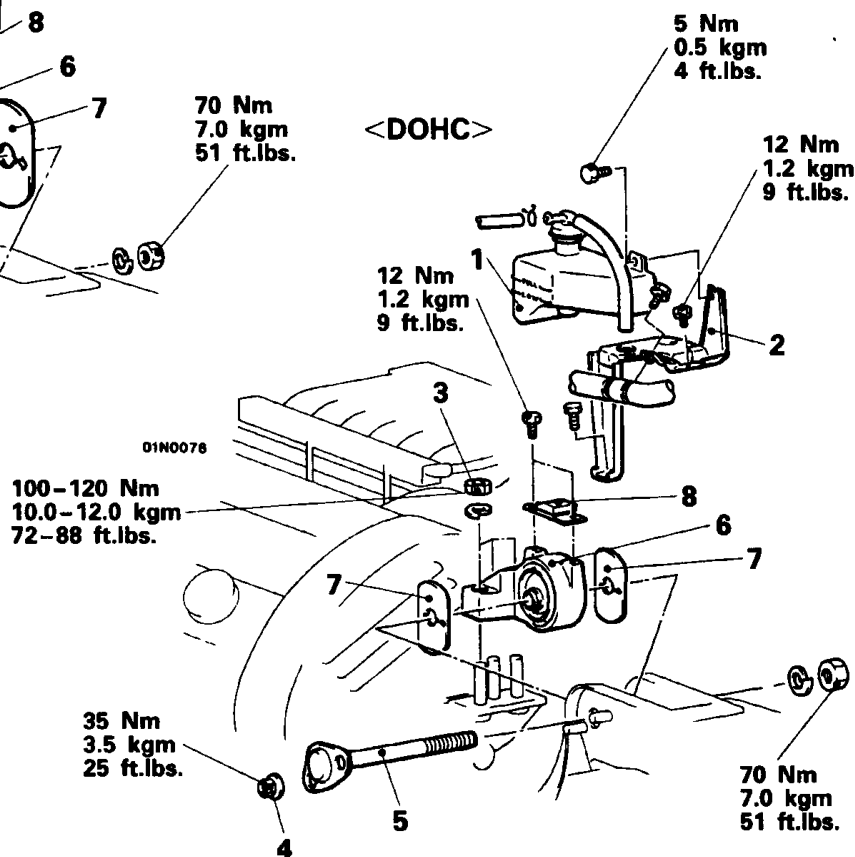
<SOHC>



Pre-removal Operation

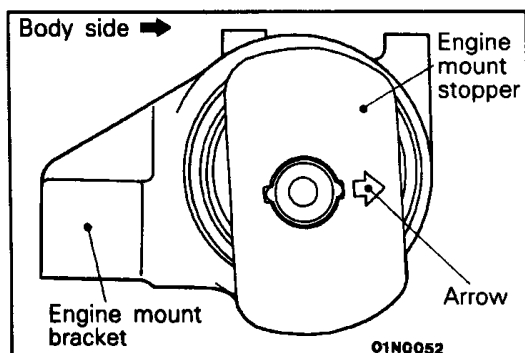
- Jack up the engine transmission assembly so that the weight is taken off the engine mounts.

<DOHC>



Removal steps

1. Reserve tank <Vehicles with ABS or headlamp washer>
2. Reserve tank bracket <Vehicles with ABS or headlamp washer>
3. Engine mount bracket attachment nut
4. Engine mount insulator mounting bolt attachment nut
5. Engine mount insulator mounting bolt
6. Engine mount bracket
7. Engine mount stopper
8. Dynamic damper



INSPECTION

E22JCAB

- Check each insulator for cracks or damage.
- Check each bracket for deformations or damage.

SERVICE POINTS OF INSTALLATION

E32JDCE

7. INSTALLATION OF ENGINE MOUNT STOPPER

Clamp the engine mount stopper so that the arrow points in the direction as shown in the diagram.

TRANSMISSION MOUNTING

REMOVAL AND INSTALLATION

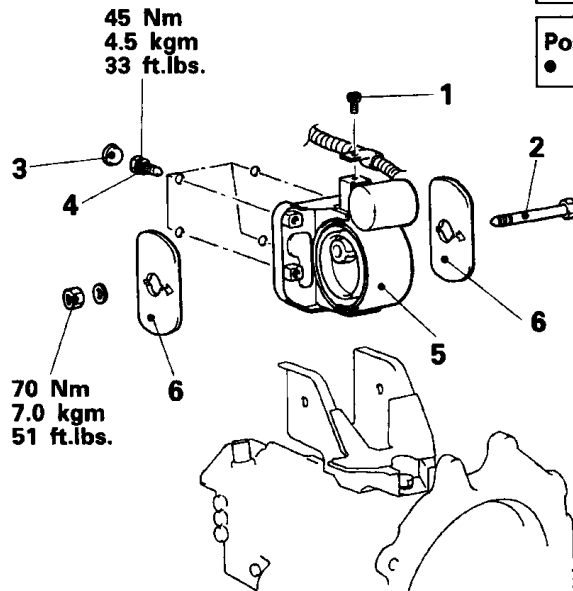
E32KA--

Pre-removal Operation

- Jack up the engine transmission assembly so that the weight is taken off the engine mounts.
- Removal of the Air Cleaner

Post-installation Operation

- Installation of the Air Cleaner



01N0039

Removal steps

1. Engine harness attachment bolt
2. Transmission mount insulator attachment bolt
3. Cap
4. Transmission mount attachment bolt
5. Transmission mount bracket
6. Transmission mount stopper

**SERVICE POINTS OF REMOVAL**

E32KBAC

4. REMOVAL OF TRANSMISSION MOUNT ATTACHMENT BOLT

Remove the transmission mount attachment bolt, making sure that it doesn't fall inside the fender shield.

INSPECTION

E32KCAB

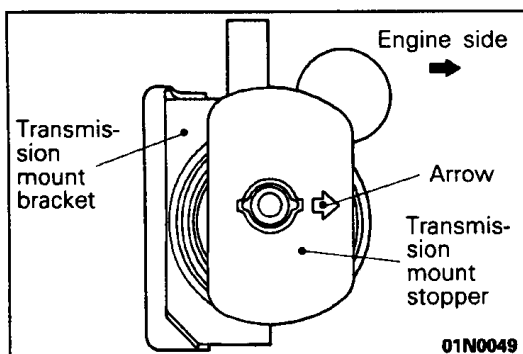
- Check each insulator for cracks or damage.
- Check each bracket for deformation or damage.

SERVICE POINTS OF INSTALLATION

E32KDAC

6. INSTALLATION OF TRANSMISSION MOUNT STOPPER

Clamp the transmission mount stopper so that the arrow points in the direction as shown in the diagram.

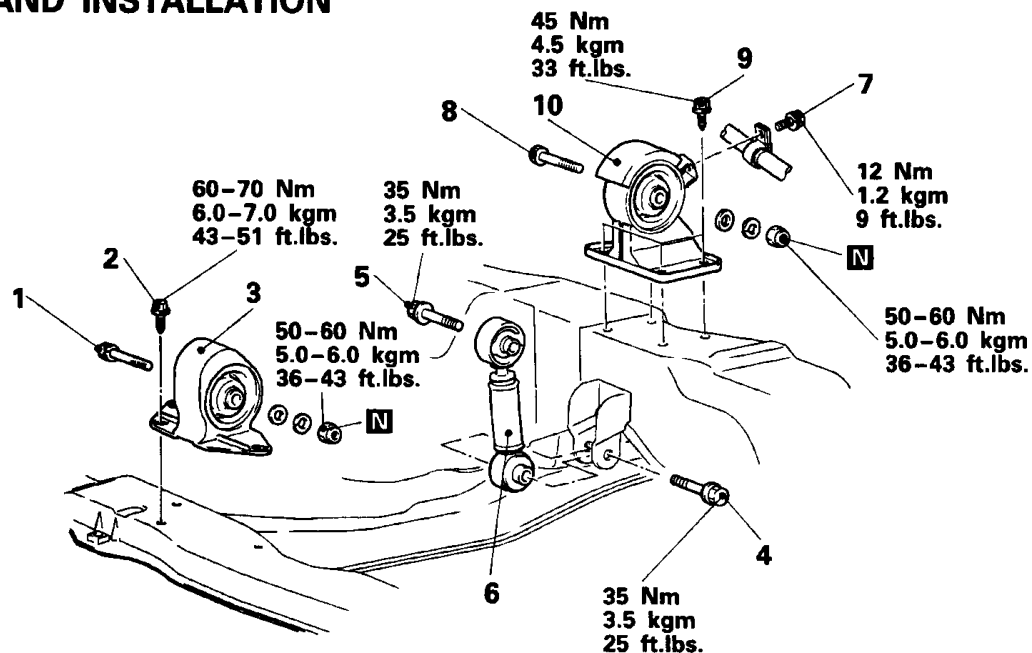


01N0049

ENGINE ROLL STOPPER AND ENGINE DAMPER

REMOVAL AND INSTALLATION

E32SA--



01N0037

Removal steps for front roll stopper

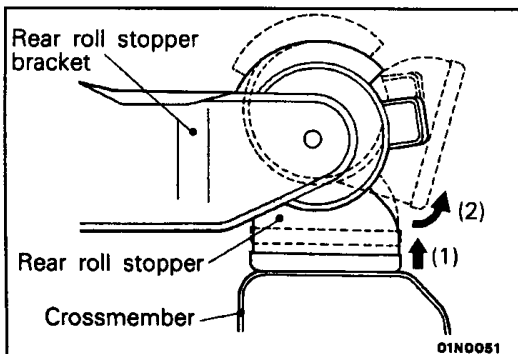
1. Front roll stopper attachment bolt (engine side)
2. Front roll stopper attachment bolt (No.1 crossmember side)
3. Front roll stopper

Removal steps for engine damper

4. Engine damper lower attachment bolt
5. Engine damper upper attachment bolt
6. Engine damper

Removal steps for rear roll stopper

7. Hose installation bolt
<R.H. drive vehicles and L.H. drive vehicles with 4WS>
8. Rear roll stopper attachment bolt (engine side)
9. Rear roll stopper attachment bolt (crossmember side)
10. Rear roll stopper



01N0051

SERVICE POINTS OF REMOVAL

E32SBAA

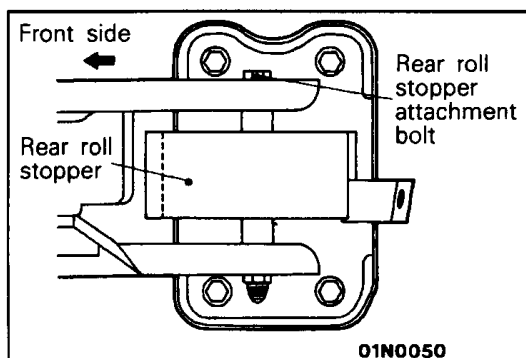
10. REMOVAL OF REAR ROLL STOPPER

- (1) Lift the rear roll stopper slightly upwards.
- (2) Pull out the rear roll stopper by turning in the direction as shown in the diagram.

INSPECTION

E32SCAA

- Check each insulator for cracks or damage.
- Check each bracket for deformation or damage.
- Operation of the engine damper shock absorber.



SERVICE POINTS OF INSTALLATION

E32SDAA

10. INSTALLATION OF REAR ROLL STOPPER/8. REAR ROLL STOPPER ATTACHMENT BOLT (ENGINE SIDE)

- (1) Install the rear roll stopper, facing as shown in the diagram.
- (2) Clamp the rear roll stopper installation bolt (engine side) in the direction as shown in the diagram.

RIGHTMEMBER, LEFTMEMBER AND CROSSMEMBER

REMOVAL AND INSTALLATION

E32TA--

Removal steps for No.1 crossmember, leftmember and rightmember

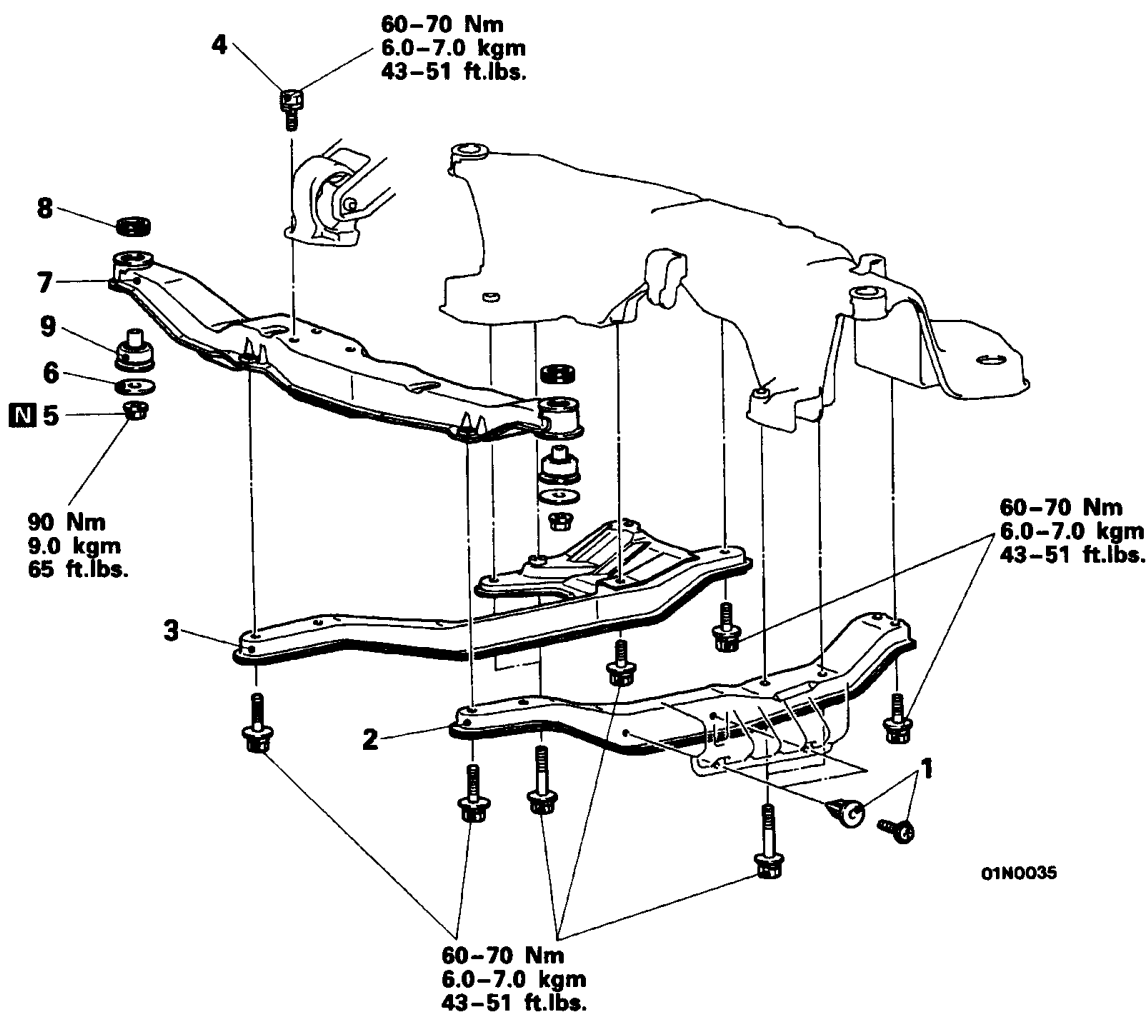
1. Cover attachment clip
2. Leftmember
3. Rightmember
4. Front roll stopper attachment bolt
5. No.1 crossmember attachment nut
6. Lower plate
7. No.1 crossmember
8. Stopper B
9. Bush B

Pre-removal Operation

- Removal of the Under Cover

Post-installation Operation

- Air Bleeding from Power Steering Fluid (Refer to GROUP 37A - Service Adjustment Procedures.)
- Checking of NORMAL Vehicle Height <Vehicles with ECS> (Refer to GROUP 33B - Service Adjustment Procedures.)
- Installation of the Under Cover

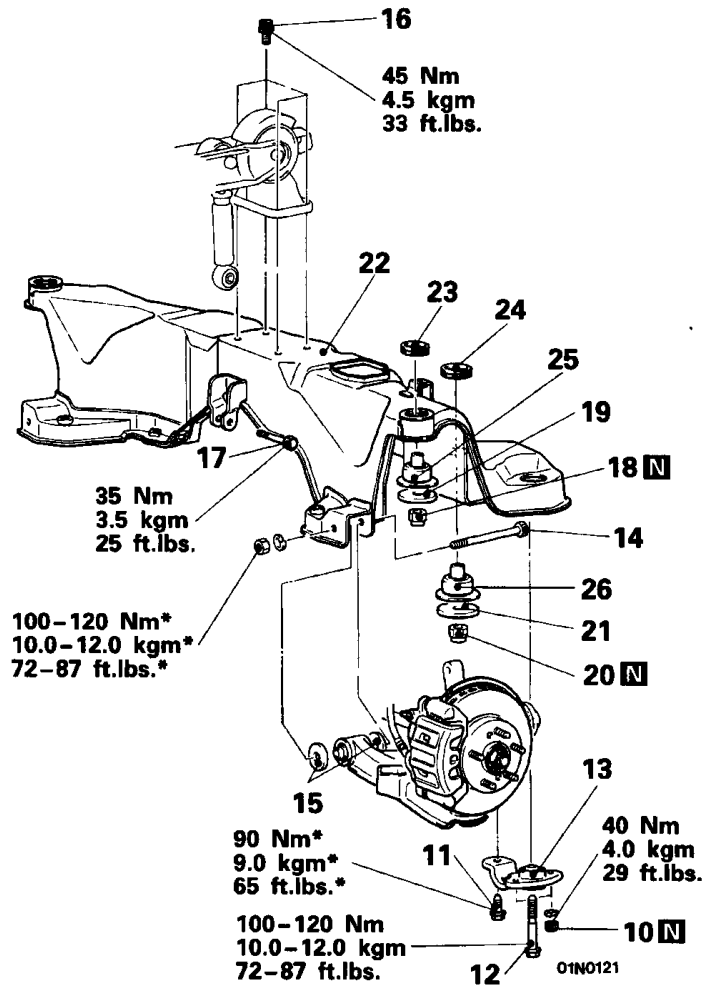


CAUTION: SRS

For vehicles with SRS, before removal of steering gear box, refer to GROUP 52B – SRS, center front wheels and remove ignition key. Failure to do so may damage SRS clock spring and render SRS system inoperative, risking serious driver injury.

Removal steps for crossmember

- Front exhaust pipe
(Refer to GROUP 15 – Exhaust Pipe and Muffler)
- Front height sensor <Vehicles with ECS>
(Refer to GROUP 33B – Front and Rear Height Sensors)
- Stabilizer bar
(Refer to GROUP 33A – Stabilizer Bar)
- Steering gear box
(Refer to GROUP 37A – Power Steering Gear and Linkage)
- 10. Clamp attachment nut
- 11. Clamp attachment bolt (small)
- 12. Clamp attachment bolt (large)
- 13. Clamp
- 14. Lower arm shaft
- 15. Stopper
- 16. Rear roll stopper lower attachment bolt
- 17. Engine damper lower attachment bolt
- 18. Crossmember attachment nut
- 19. Lower plate
- 20. Crossmember attachment nut
- 21. Lower plate
- 22. Crossmember
- 23. Stopper B
- 24. Stopper A
- 25. Bush B
- 26. Bush A



Caution

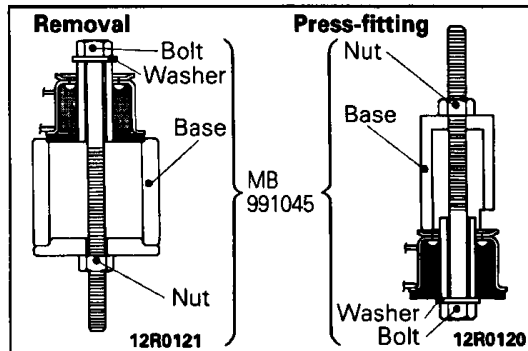
*: Indicates parts which should be temporarily tightened, and then fully tightened with the vehicle on the ground in the unladen condition.

32-8 POWER PLANT MOUNT – Rightmember, Leftmember and Crossmember

INSPECTION

E32TBAA

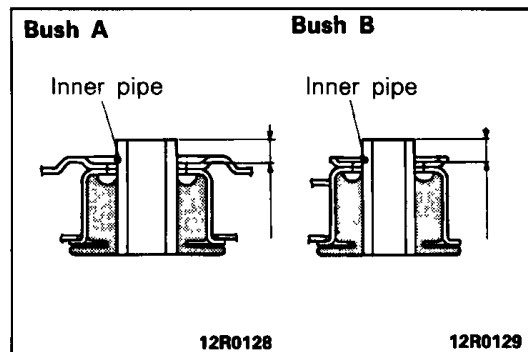
- Check the crossmember for cracks or deformation.
- Check the bushings for cracks or deterioration.
- Check the rightmember for cracks or deformation.
- Check the leftmember for cracks or deformation.



BUSHING REPLACEMENT

E32TCAA

- (1) Apply soapy water to the contact surface of the bush when press-fitting the bush.



- (2) The bush should be press-fitted so that the inner pipe projection is at the standard length.

Standard values

No.1 crossmember

Bush B: 9.0 ± 1.5 mm (0.35 ± 0.06 in.)

Crossmember

Bush A: $9.7^{+0.5}_{-2.5}$ mm ($0.38^{+0.02}_{-0.1}$ in.)

Bush B: $9.0^{+0.5}_{-2.5}$ mm ($0.35^{+0.02}_{-0.1}$ in.)

FRONT SUSPENSION

CONTENTS

33AA--

SPECIFICATIONS	2	STRUT ASSEMBLY	5
General Specifications	2	LOWER ARM	8
Service Specifications	2	STABILIZER BAR	10
SPECIAL TOOLS	3		
SERVICE ADJUSTMENT PROCEDURES	4		
Front Wheel Alignment Inspection and Adjustment	4		

SPECIFICATIONS

GENERAL SPECIFICATIONS

33CA--

Items		SOHC	DOHC
Suspension system		McPherson strut with coil spring and compression rod type	
Coil spring	Wire dia×O.D.×free length mm (in.)	15.0×185.0×399 – MT (0.59×7.28×15.7)	15.2×185.2×403 – MT (0.59×7.29×15.9)
		15.2×185.2×403 – AT (0.59×7.29×15.9)	15.4×185.4×400 – AT (0.61×7.30×15.7)
	Coil spring identification colour	Yellow×2 – MT Light blue×1 – AT	Light blue×1 – MT Light blue×2 – AT
Spring constant	N/mm (kg/mm, lbs./in.)	23 (2.3, 128)	23 (2.3, 128) – MT 25 (2.5, 138) – AT
Shock absorber		Hydraulic, cylindrical double-acting type	
Type			
Max. length mm (in.)		506 (19.92)	
Min. length mm (in.)		352 (13.86)	
Stroke mm (in.)		154 (6.06)	
Damping force			
[at 0.3 m/sec. (0.984 ft./sec)]			
Expansion N (lbs.)		950 (209)	
Contraction N (lbs.)		450 (99)	

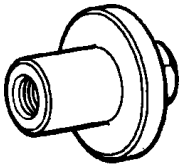
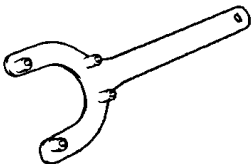
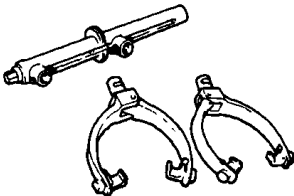
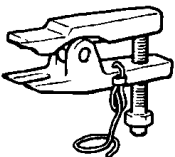
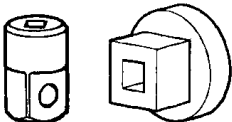
SERVICE SPECIFICATIONS

33CB--

Items	Specification
Standard value	
Toe-in	
At the centre of tyre tread mm (in.)	0±3 (0±0.12)
Toe angle (per wheel)	0±9'
Toe-out angle on turns (inner wheel when outer wheel at 20°)	22°
Camber	0°±30'
Caster	2°45'±30'
Kingpin inclination	13°15'
Side slip mm (in.)	0±3 (0±0.12)
Lower arm ball joint starting torque Nm (kgcm, in.lbs.)	10–22 (100–220, 87–190)
Stabilizer link ball joint starting torque Nm (kgcm, in.lbs.)	1.7–3.2 (17–32, 15–28)

SPECIAL TOOLS

33DA-

Tool	Number	Name	Use
	MB991004	Wheel alignment gauge attachment	Measurement of the wheel alignment
	MB991176	Spring seat holder	Disassembly/assembly of the strut assembly
	MB991237 MB991238	Spring compressor body Arm set	Compression of the front coil spring
	MB991113 (MB990635)	Steering linkage puller	Removal of the lower arm ball joint
	MB990326	Preload socket	Measurement of the lower arm ball joint starting torque Measurement of the stabilizer link rotation-starting torque
	MB990968	Torque wrench	
	MB990799	Ball joint remover and installer	Installation of the dust cover

SERVICE ADJUSTMENT PROCEDURES

FRONT WHEEL ALIGNMENT INSPECTION AND ADJUSTMENT

33FAAU

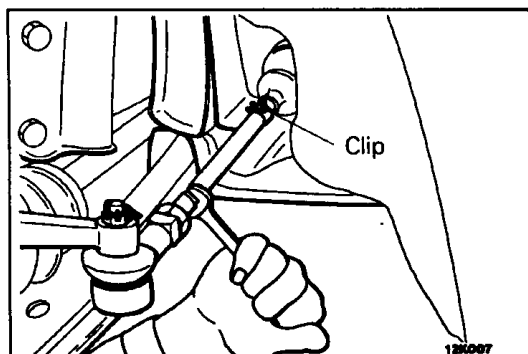
TOE-IN

1. Measure the toe-in.

Standard value:

At the centre of tyre tread 0 ± 3 mm (0 ± 0.12 in.)

Toe angle (per wheel) $0 \pm 9'$



2. If the toe-in is not within the standard value, adjust the toe-in by undoing the clips and turning the left and right tie rod turnbuckles by the same amount (in opposite directions).
3. After making the adjustments, use a turning radius gauge to confirm that the steering wheel turning angle is within the standard value range. (Refer to GROUP 37A).

TOE-OUT ANGLE ON TURNS

To check the steering linkage, especially after the vehicle has been involved in an accident or if an accident is presumed, it is advisable to check the toe-out angle on turns in addition to the wheel alignment.

Conduct this test on the left turn as well as on the right turn.

Standard value:

22° (inner wheel when outer wheel at 20°)

CAMBER, CASTER AND KINGPIN INCLINATION

Measure the camber, caster and kingpin inclination by using the special tool, a camber/caster/kingpin gauge and a turning radius gauge.

Standard value:

Camber $0^\circ \pm 30'$

Caster $2^\circ 45' \pm 30'$

Kingpin inclination $13^\circ 15'$

NOTE

1. Camber and caster are pre-set at the factory and cannot be adjusted.
2. If camber and caster are not within the standard value, replace bent or damaged parts.

SIDE SLIP

Measure the side slip with a side slip tester.

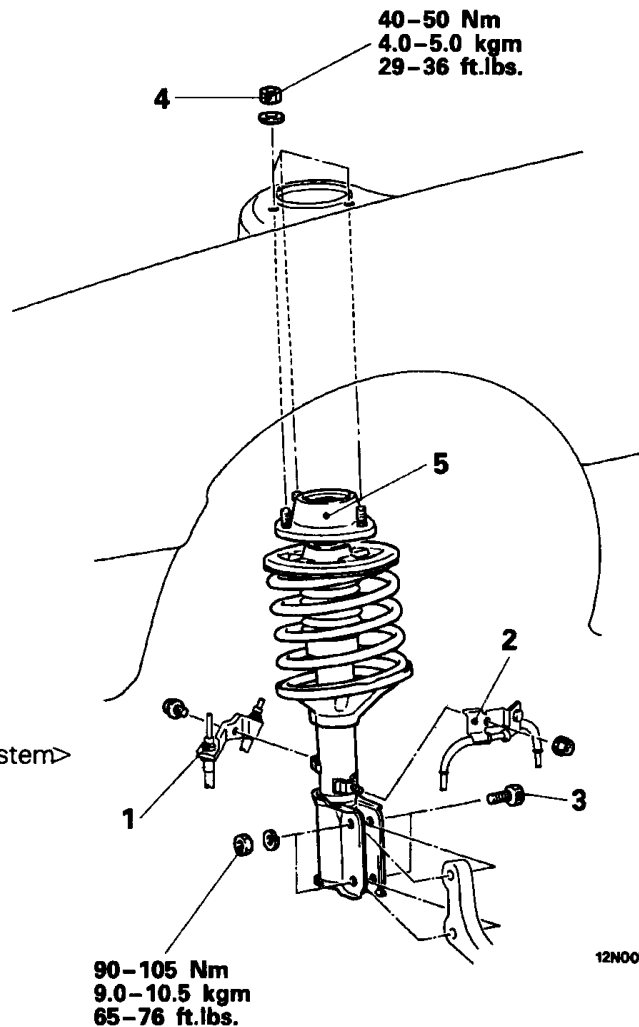
Standard value: 0 ± 3 mm (0 ± 0.12 in.)

STRUT ASSEMBLY

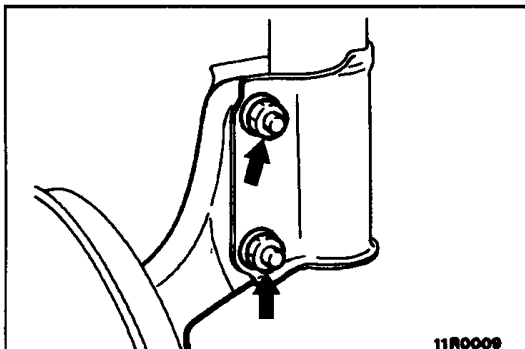
33LA-

REMOVAL AND INSTALLATION**Removal steps**

1. Brake hose and pipe bracket
2. Front speed sensor clamp
<Vehicles with Anti-skid brake system>
3. Strut lower mounting bolts
4. Strut upper mounting nuts
5. Strut assembly

**Post-installation Operation**

- Front Wheel Alignment Adjustment
(Refer to P. 33A-4)

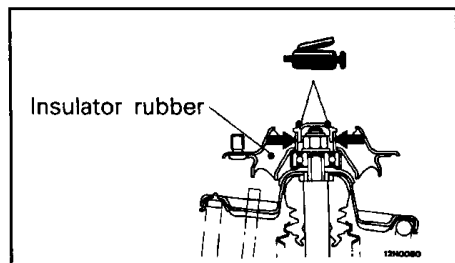
**INSPECTION**

E33LCAC

- Check for oil leaks from the strut assembly.
- Check the strut assembly shock absorber for damage or deformation.

DISASSEMBLY AND REASSEMBLY

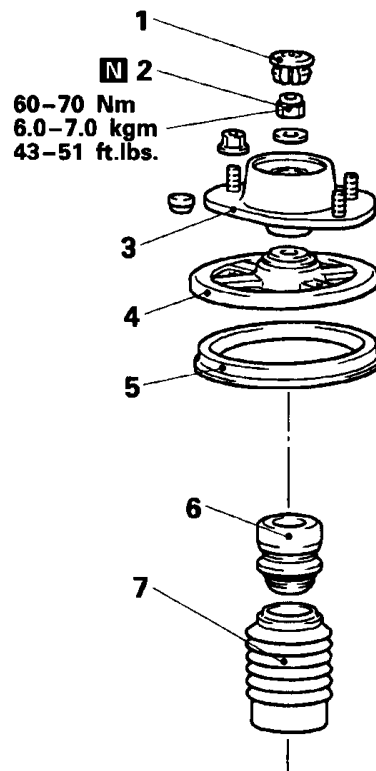
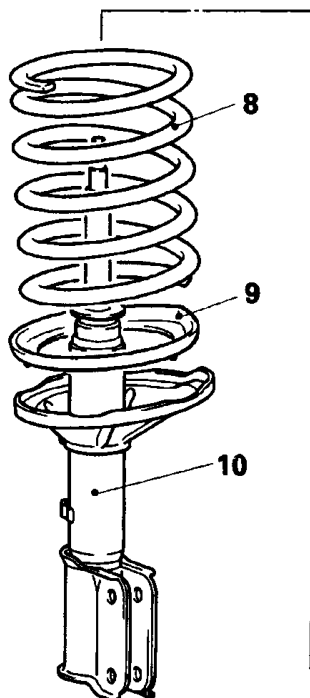
33LE-



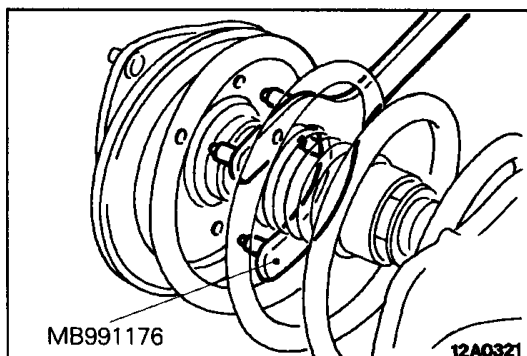
Disassembly steps



1. Dust cover
2. Self-locking nut
3. Strut insulator
4. Spring seat, upper
5. Spring pad, upper
6. Bump rubber
7. Dust cover
8. Coil spring
9. Spring seat, lower
10. Strut assembly



12N0083



SERVICE POINTS OF DISASSEMBLY

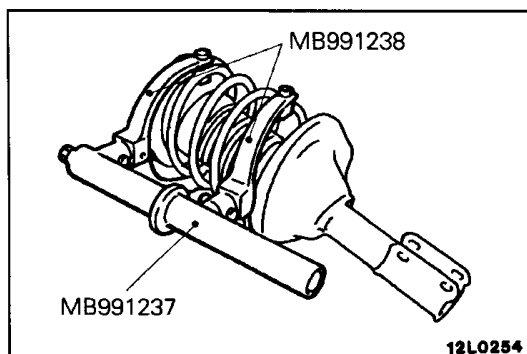
E33LFAI

2. REMOVAL OF SELF-LOCKING NUT

- (1) Holding the spring upper seat with the special tool, loosen the self-locking nut.

Caution

- (1) The self-locking nut should be loosened only, not removed.
- (2) Do not use an air tool.



- (2) Using the special tools, compress the coil spring, and then remove the self-locking nut.

Caution

- (1) Install the special tools evenly, and so that the maximum length will be attained within the installation range.
- (2) Do not use an air tool to tighten the bolt of the special tool and to remove the self-locking nut.

SERVICE POINTS OF REASSEMBLY

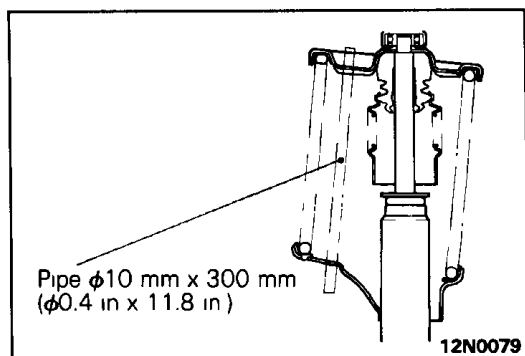
33LHAM

2. INSTALLATION OF SELF-LOCKING NUT

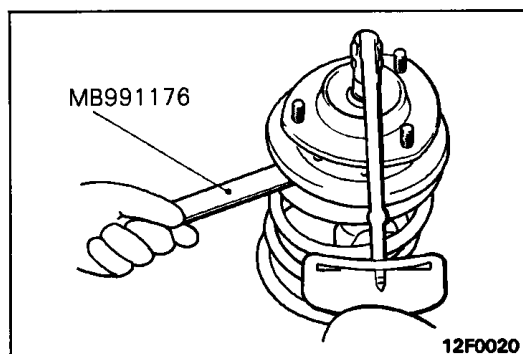
- (1) With the coil spring held compressed by the special tools (MB991237 and MB991238), provisionally tighten the self-locking nut.

Caution

Do not use an air tool to tighten the bolt of the special tool.



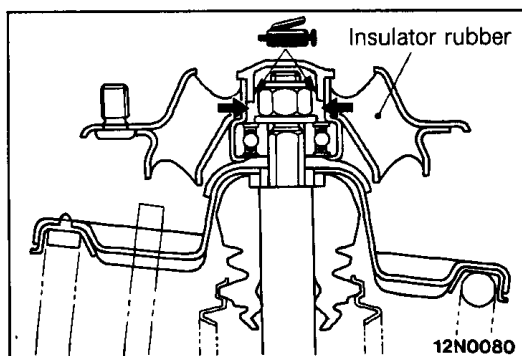
- (2) Using the pipe, line up the holes in the strut assembly spring lower seat with the hole in the spring upper seat.
- (3) Correctly align both ends of the coil spring with the grooves in the spring seat, and then loosen the special tools (MB991237 and MB991238).



- (4) Using the special tool, tighten the strut insulator at the specified torque.

Caution

Do not use an air tool.



- (5) Apply multipurpose grease to the bearing part of the strut insulator, and install the insulator cap.

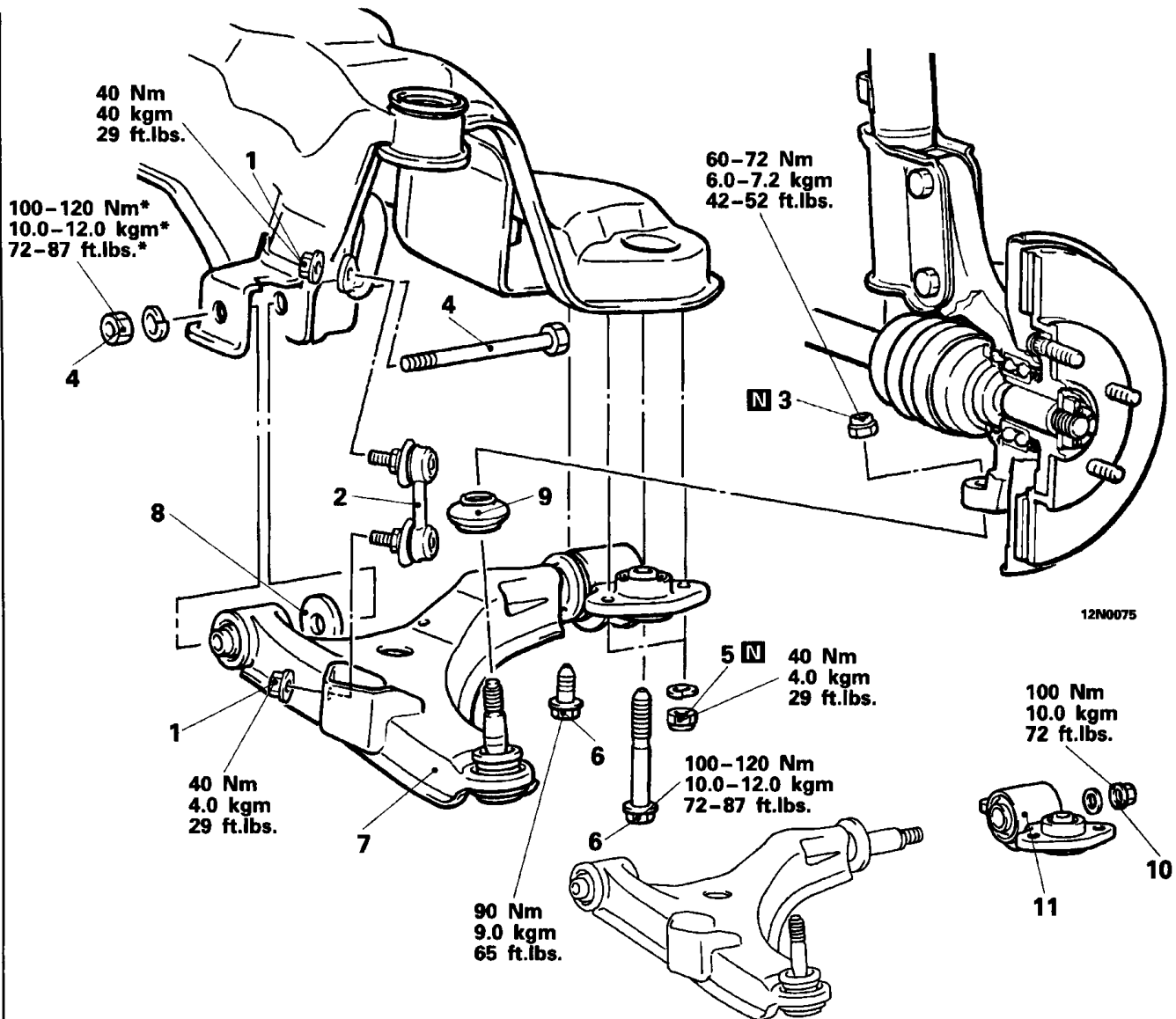
Caution

When applying the grease, take care that grease does not adhere to the insulator's rubber part.

LOWER ARM

REMOVAL AND INSTALLATION

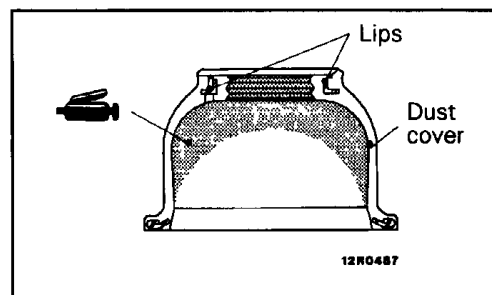
330A--

**Removal steps**

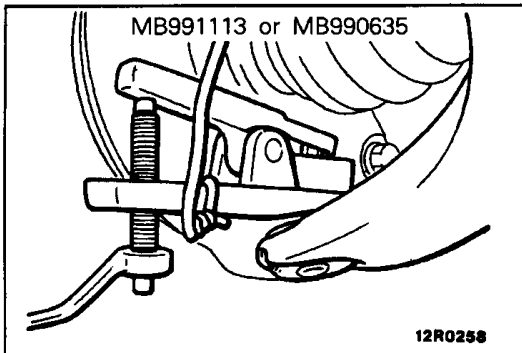
1. Stabilizer link mounting nuts
2. Stabilizer link
3. Self-locking nut
4. Lower arm mounting nut and bolt
5. Self-locking nuts
6. Bolts
7. Lower arm assembly
8. Stopper
9. Ball joint dust cover
10. Self-locking nut
11. Clamp

Caution

*: Indicates parts which should be temporarily tightened, and then fully tightened with the vehicle on the ground in the unladen condition.

**Post-installation Operation**

- Front Wheel Alignment Adjustment (Refer to P. 33A-4.)



SERVICE POINTS OF REMOVAL

330BAK

3. REMOVAL OF SELF-LOCKING NUT

Using the special tool, disconnect the lower arm ball joint from the knuckle.

Caution

1. Be sure to tie the cord of the special tool to the nearby part.
2. Loosen the nut but do not remove it.

INSPECTION

330CAI

- Check the bushing for wear and deterioration.
- Check the lower arm for bend or breakage.
- Check the clamp for deterioration or damage.
- Check the ball joint dust cover for cracks.
- Check all bolts for condition and straightness.

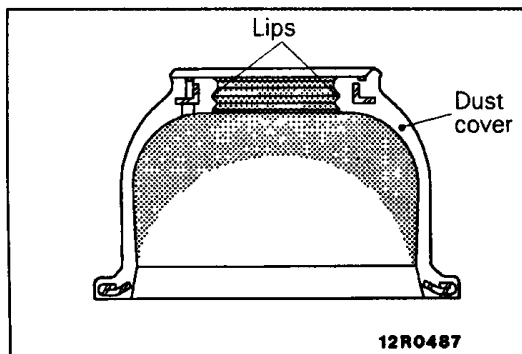
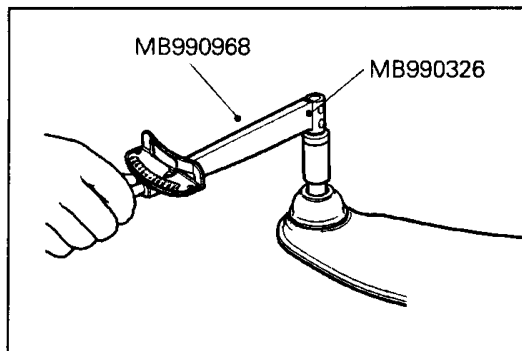
CHECKING OF BALL JOINT FOR STARTING TORQUE

- (1) If a crack is noted in the dust cover, replace it, adding grease.
- (2) Shake the ball joint stud several times.
- (3) Mount two nuts on the ball joint, and then measure the ball joint starting torque.

Standard value: 10–22 Nm

(100–220 kgcm, 87–190 in.lbs.)

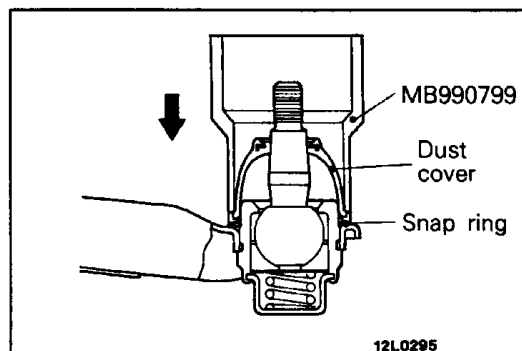
- (4) If the starting torque exceeds the upper limit of standard value, replace the lower arm assembly.
- (5) Even if the starting torque is below the lower limit of the standard value, the ball joint may be reused unless it has drag and excessive play.



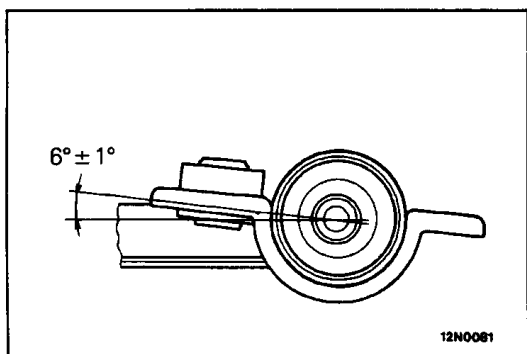
BALL JOINT DUST COVER REPLACEMENT

E330DAD1

- (1) Remove the dust cover.
- (2) Apply multipurpose grease to the lip and inside of the dust cover.



- (3) Drive in the dust cover with special tool until it is fully seated.



SERVICE POINTS OF INSTALLATION

330EAJ

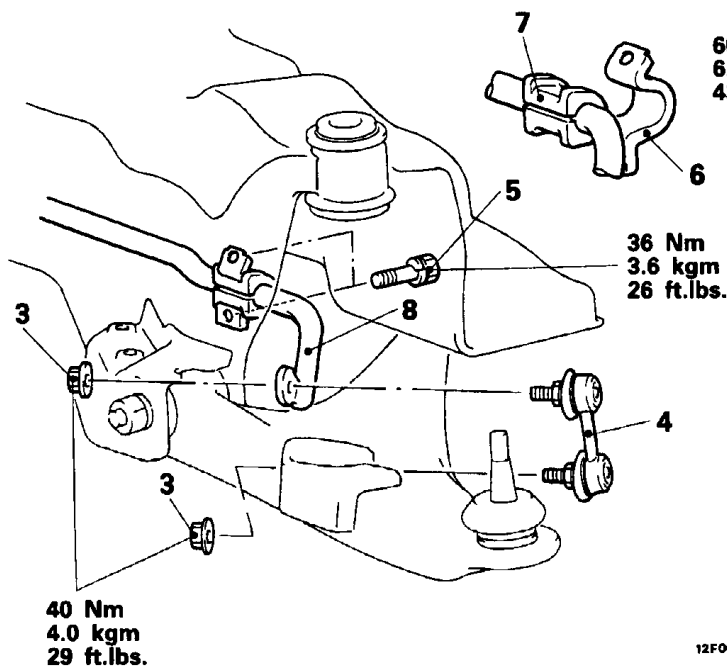
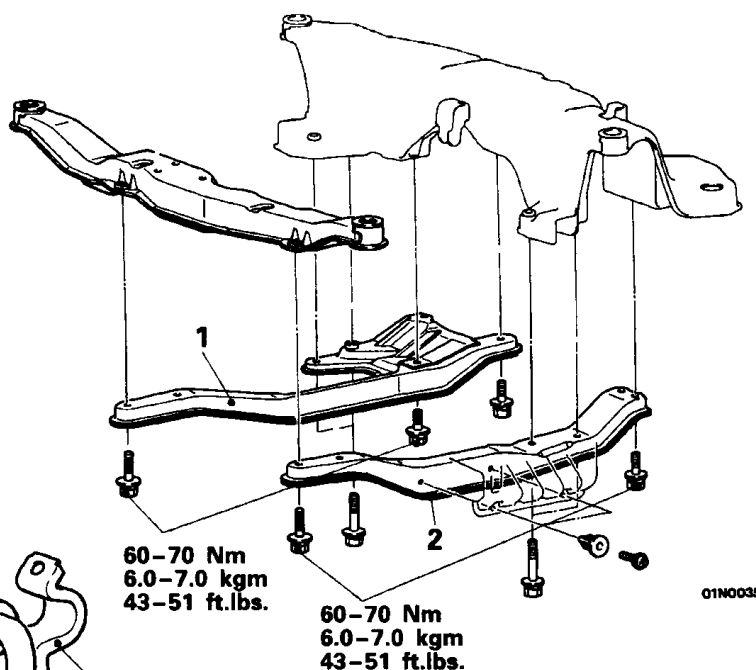
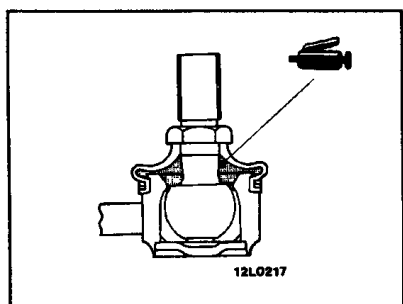
10. INSTALLATION OF SELF LOCKING NUT

After positioning the clamp at the angle indicated in the illustration, install the self-locking nut.

STABILIZER BAR

33RA-

REMOVAL AND INSTALLATION



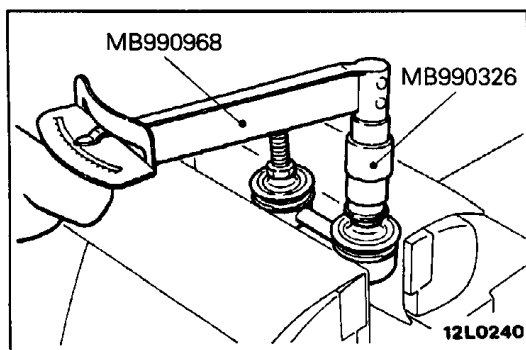
Removal steps

- Removal of front exhaust pipe
(Refer to GROUP 15 – Exhaust Pipe)
- 1. Right member
- 2. Left member
- 3. Stabilizer link installation nuts
- 4. Stabilizer link
- 5. Stabilizer bar bracket installation bolt
- 6. Stabilizer bar bracket
- 7. Bushing
- 8. Stabilizer bar

INSPECTION

E33RCAC

- Check the bushing for wear and deterioration.
- Check the stabilizer bar for deterioration or damage.
- Check the stabilizer link ball joint dust cover for cracks.
- Check all bolts for condition and straightness.

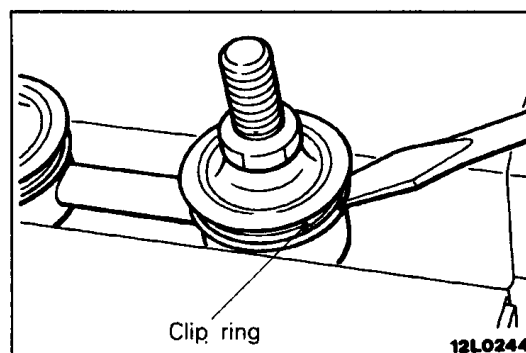


CHECKING OF STABILIZER LINK BALL JOINT FOR STARTING TORQUE

- (1) If a crack is noted in the dust cover, replace it, adding grease.
- (2) Shake the stabilizer link ball joint stud several times.
- (3) Mount two nuts on the ball joint, and then measure the ball joint starting torque.

**Standard value : 1.7–3.2 Nm
(17–32 kgcm, 15–28 in.lbs.)**

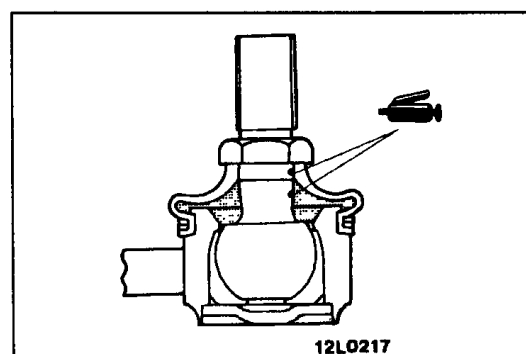
- (4) If the starting torque exceeds the upper limit of standard value, replace the stabilizer link.
- (5) Even if the starting torque is below the lower limit of the standard value, the ball joint may be reused unless it has drag and excessive play.



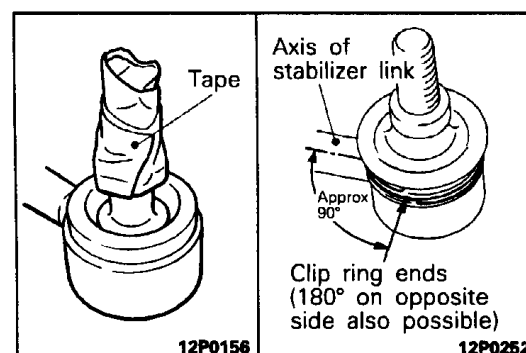
BALL JOINT DUST COVER REPLACEMENT

33REAE

- (1) Remove the clip ring and the dust cover.



- (2) Apply multipurpose grease to the lip and inside of the dust cover.



- (3) Use vinyl tape to tape the stabilizer link where shown in the illustration, and then install the dust cover to the stabilizer link.
- (4) Secure the dust cover by the clip ring.

NOTE

When installing the clip ring, align it so that its ends are located at a 90° angle from the axis of the stabilizer link

ACTIVE-ELECTRONIC CONTROL SUSPENSION

CONTENTS

E33AA--

SPECIFICATIONS	2	SPECIAL TOOLS	4
General specifications	2	TROUBLESHOOTING	6
Service specifications	3		

CONTINUED ON NEXT PAGE

WARNINGS REGARDING SERVICING OF SUPPLEMENTAL RESTRAINT SYSTEM (SRS) EQUIPPED VEHICLES

WARNING!

- (1) Improper service or maintenance of any component of the SRS, or any SRS-related component, can lead to personal injury or death to service personnel (from inadvertent firing of the air bag) or to the driver and passenger (from rendering the SRS inoperative).
- (2) Service or maintenance of any SRS component or SRS-related component must be performed only at an authorized MITSUBISHI dealer.
- (3) MITSUBISHI dealer personnel must thoroughly review this manual, and especially its GROUP 52B – Supplemental Restraint System (SRS) before beginning any service or maintenance of any component of the SRS or any SRS-related component.

NOTE

The SRS includes the following components: impact sensors, SRS diagnosis unit, SRS warning lamp, air bag module, clock spring and interconnecting wiring. Other SRS-related components (that may have to be removed/installed in connection with SRS service or maintenance) are indicated in the table of contents by an asterisk (*).

SERVICE ADJUSTMENT PROCEDURES	87	SHOCK ABSORBER ASSEMBLY	101
Alarm Lamp Check	87	RESERVE TANK ASSEMBLY (Front)	105
Checking by Self-diagnosis	87	RESERVE TANK ASSEMBLY (Rear)	107
System Checking by Using Alarm Lamp ..	87	AIR COMPRESSOR ASSEMBLY	108
Normal Vehicle Height Checking and Adjustment	88	SOLENOID VALVE AND DRYER	110
Rolling Diaphragm Checking	89	AIR TUBE	116
System Operation Check	89	HEIGHT SENSOR	118
Low-pressure Switch (Low-pressure Tank Side) Actuation Pressure Check	91	ACTIVE-ECS SENSOR SWITCH*	121
High-pressure Switch (High-pressure Tank Side) Actuation Pressure Check	92	CONTROL UNIT	122
G sensor Output Voltage Check	93	ACTIVE-ECS RELAY	123
STRUT ASSEMBLY	94		
LOWER ARM	99		

NOTES

SPECIFICATIONS

GENERAL SPECIFICATIONS

Items	Front Suspension		Rear Suspension
	L. H. drive vehicles	R. H. drive vehicles	
Suspension system	McPherson strut with coil spring and compression rod type		Multi link with coil spring type
Wheel alignment			
Camber	0° ± 30'		0° ± 30'
Caster	2°45' ± 30'		
Toe-in mm (in.)	0 ± 3 (0 ± 0.12)		– 2 to 3 (–0.08 to 0.12)
Coil spring			
Wire dia x O.D. x free length mm (in.)	<M/T> L.H.: 14.4 x 194.4 – 184.4 x 428 (0.57 x 7.65 – 7.26 x 16.9) R.H.: 14.4 x 194.4 – 184.4 x 428*1 (0.57 x 7.65 – 7.26 x 16.9), 14.2 x 194.2 – 184.2 x 428*2 (0.56 x 7.65 – 7.25 x 16.9) <A/T> 14.6 x 194.6 – 184.6 x 427 (0.57 x 7.66 – 7.27 x 16.8)		11.0 x 127.0 x 377 (0.43 x 5.0 x 14.8)
Coil spring identification color	<M/T> L.H.: Green x 1 R.H.: Green x 1*1, Pink x 1*2 <A/T> Green x 2		Light blue x 1
Spring constant N/mm (kg/mm, lbs/in.)	<M/T> L.H.: 16.0 (1.60, 90) R.H.: 16.0 (1.60, 90)*1 15.2 (1.52, 85)*2 <A/T> 16.9 (1.69, 95)		18 (1.8, 101)
Shock absorber			
Type	Hydraulic, cylindrical double-acting type		Hydraulic, cylindrical double-acting type
Max. length mm (in.)	485 (19.1)		505.5 (19.9)
Min. length mm (in.)	341 (13.4)		364 (14.3)
Stroke mm (in.)	144 (5.7)		141.5 (5.6)
Damping/force [at 0.3 m/sec. (0.9 ft/sec.)]			
Expansion N (kg, lbs.)			
HARD	1,500 (150, 330)		1,400 (140, 308)
MEDIUM	1,100 (110, 242)		1,000 (100, 220)
SOFT	700 (70, 154)		600 (60, 132)
Contraction N (kg, lbs.)			
HARD	750 (75, 165)		800 (80, 176)
MEDIUM	550 (55, 121)		550 (55, 121)
SOFT	300 (30, 66)		300 (30, 66)

NOTE

*1: Vehicles built up to March, 1992

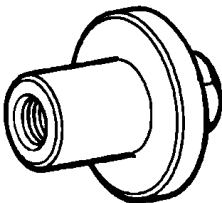
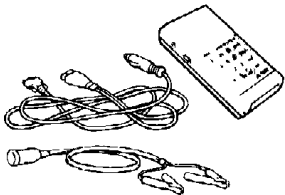
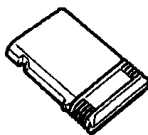
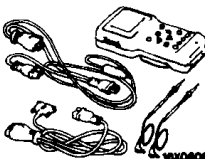
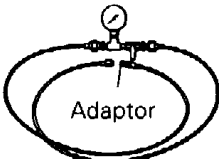
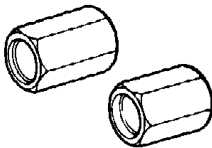
*2: Vehicles built from April, 1992

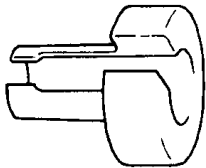
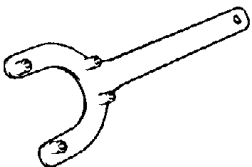
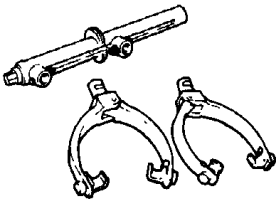
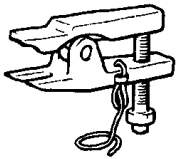
SERVICE SPECIFICATIONS

E33CB--

Items	Specifications
Standard value	
Toe-in	
At the centre of tyre tread	mm (in.)
Toe angle (per wheel)	0 ± 3 (0 ± 0.12)
Toe-out angle on turn (inner wheel when outer wheel at 20°C)	0 ± 9'
Camber	22°
Caster	0° ± 30'
Kingpin inclination	2°45' ± 30'
Side slip	13°15'
Wheel arch height to centre of wheel	mm (in.)
Front	0 ± 3 (0 ± 0.12)
Rear	391–401 (15.4–15.8)
High-pressure switch	362–372 (14.3–14.6)
Pressure switch shut of pressure	kPa (kg/cm ² , psi)
Pressure switch operation pressure	900 (9, 128) or more
Low-pressure switch	kPa (kg/cm ² , psi)
Return pump activation pressure	710–810 (7.1–8.1, 101–115)
Return pump stop pressure	kPa (kg/cm ² , psi)
Lower arm ball joint starting torque	140 ± 30 (1.4 ± 0.3, 20 ± 4)
Air compressor relief pressure	70 ± 30 (0.7 ± 0.3, 10 ± 4)
G sensor output voltage (when vehicle is level)	Nm (kgcm ² , in.lbs.)
	10–22 (100–220, 87–191)
	kPa (kg/cm ² , psi)
	1,000–1,300 (10–13, 142–185)
	V
	2.5 ± 0.6

SPECIAL TOOLS

Tool	Number	Name	Use
	MB991004	Wheel alignment gauge attachment	Measurement of the wheel alignment for the aluminium type wheel
	MB991268 MB991341	Multi-use tester sub-assembly	Up to 1993 models - Checking of self-diagnosis codes - Read-out of service data - Testing of the actuator - ACTIVE-ECS – Service Adjustment Procedures
 (For the number, refer to GROUP 00 – Precautions Before Service.)		ROM pack	
	MB991502	MUT-II	All models - Checking of self-diagnosis codes - Read-out of service data - Testing of the actuator - ACTIVE ECS – Service Adjustment Procedures
 16X0607		ROM pack	
	MB991075 Adaptor	Air pressure gauge	To check air pressure
	MB991226 E (M 12 female) F (M 14 female)	Adaptor set	

Tool	Number	Name	Use
	MB991229	Air tube releaser	Removal/installation of the air tube
	MB991176	Spring seat holder	Disassembly/reassembly of the strut assembly
	MB991237 MB991238, MB991239	Spring compressor body Arm set	- Compression of the front coil spring (MB991237, MB991238) - Compression of the rear coil spring (MB991237, MB991239)
	MB991113 or MB990635	Steering linkage puller	Removal of the lower arm ball joint
	MB990326	Preload socket	Measurement of the lower arm ball joint starting torque
	MB990968	Torque wrench	
	MB990799	Ball joint remover and installer	Installation of the dust cover

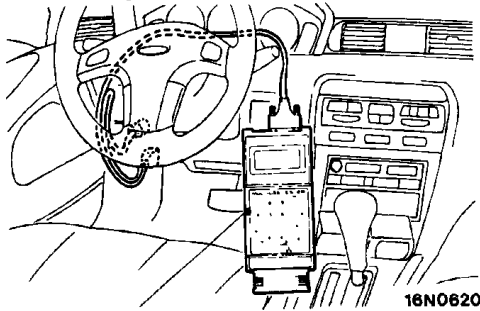
TROUBLESHOOTING**HOW TO USE THE TROUBLESHOOTING**

E33EAA-E

COMPOSITION OF THE TROUBLESHOOTING

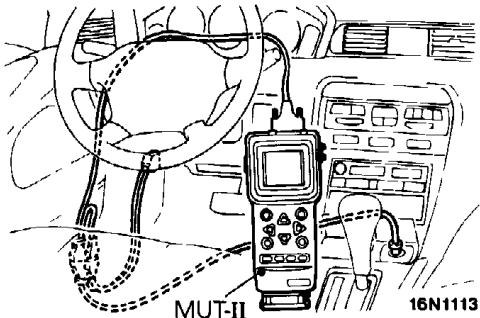
In order to make the troubleshooting procedures for the ACTIVE-ELECTRONIC CONTROL SUSPENSION (ACTIVE-ECS) as accurate and as easy as possible, the troubleshooting is composed mainly of the following information.

No.	Item		Description (purpose)		Page	
1	How to use the troubleshooting		To provide an overall understanding of information provided by the troubleshooting		P.33B-6	
2	Troubleshooting points		To provide an understanding of certain important points and notes helpful for following troubleshooting procedures.		P.33B-7	
3	Selection of the troubleshooting chart		To provide broad general classifications of problems and malfunctions.		P.33B-8	
4	Troubleshooting quick-reference charts	Troubleshooting chart [I]	Diagnosis when the self-diagnosis indication is normal.	Malfunctions related to the ACTIVE-ECS indicator.	P.33B-9	
		Troubleshooting chart [II]		Malfunctions related to a change in the body attitude.	P.33B-10	
		Troubleshooting chart [III]		Other	Malfunctions that do not include the air-pressure system	P.33B-11
					Malfunctions that include the air-pressure system.	P.33B-13
		Troubleshooting chart [IV]	Diagnosis of the self-diagnosis malfunction code output.	P.33B-14		
5	Checking according to charts classified by the malfunction symptom		Steps according to the malfunction symptom are described by flow charts.		P.33B-21	
6	Troubleshooting hints classified according to circuits		Informational hints for troubleshooting and circuit diagrams (for circuits to which the ultimate cause has been narrowed down by using the charts classified by the malfunction symptom) are provided for system circuits. Individual final checks and inspections are conducted by using this information for reference.		P.33B-23	

When using the multi-use tester

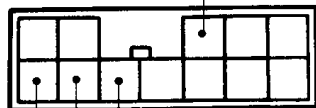
Multi-use tester

16N0620

When using the MUT-II

MUT-II

16N1113

Diagnosis connectorDiagnosis/service
data output

Earth Diagnosis/service data
switching input
Simulated vehicle-speed
input

16L0091

TROUBLESHOOTING POINTS**REGARDING THE DIAGNOSIS FUNCTION**

For the ACTIVE-Electronic Control Suspension (ACTIVE-ECS), the electronic control unit has been provided with the following functions in order to make checking of the electronic-control system easier.

- (1) Output of self-diagnosis codes
- (2) Output of service data
- (3) Testing of the actuator

Note that all of the above can be checked by using the multi-use tester <Up to 1993 models> or MUT-II <All models>.

NOTE

Connect the multi-use tester or MUT-II to diagnosis connector 1 (white).

Caution

Connection and disconnection of the multi-use tester or MUT-II should always be made with the ignition switch in the OFF position.

33B-7-1 ACTIVE-ELECTRONIC CONTROL SUSPENSION – Troubleshooting

Checks to make when the alarm lamp illuminates

(1) The alarm lamp will illuminate under the conditions described below.

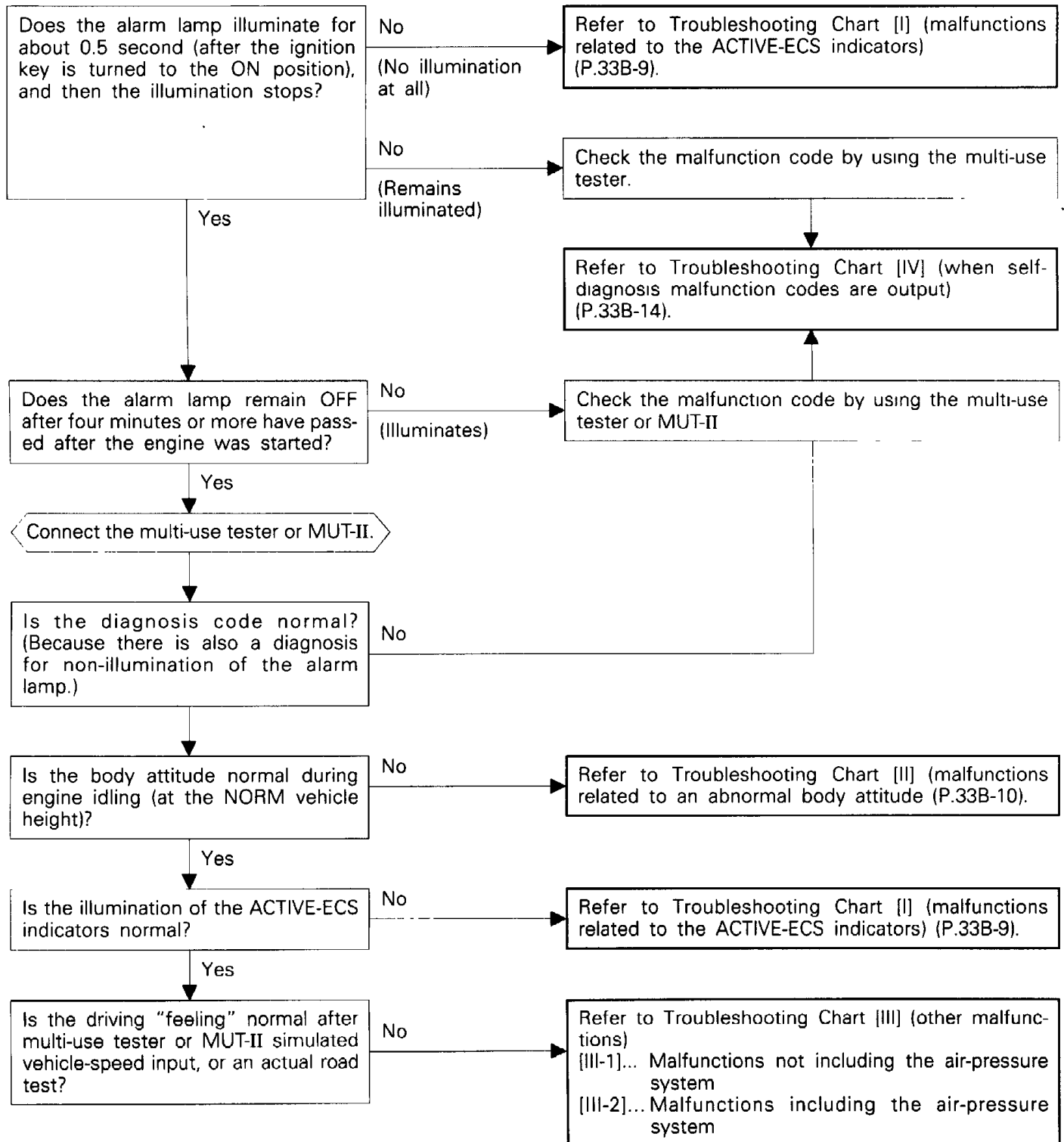
If it no longer illuminates after following the procedures described below, the system is normal.

Item	Procedure	Reasons for alarm lamp illumination
When the vehicle is overloaded	Stop the engine and lighten the load; then start the engine once again.	The vehicle height adjustment is not completed after three minutes or more have passed.
When the vehicle is stopped on a steep hill or slope with the engine running	Move the vehicle to a level surface and stop the engine; then start the engine once again.	The vehicle height adjustment is made due to the load movement on the steep slope, but the adjustment is not completed even though three minutes or more have passed.
When the vehicle-height adjustment is made frequently during hot summer weather, etc.	After stopping the engine, open the bonnet; then start the engine once again after the compressor within the engine compartment has become cool.	Either the compressor has operated continuously for four minutes or longer, or the compressor's thermo switch has been switched OFF, and, because the compressor is not operating, there is insufficient air pressure, with the result that vehicle height adjustment is not completed even though three minutes or more have passed.

(2) If the alarm lamp illuminates occasionally during driving, check for an improper contact within the sensor system (diagnosis No.22-25).(Refer to P.33B-15, 16.)

NOTES

SELECTION OF THE TROUBLESHOOTING CHART



TROUBLESHOOTING QUICK REFERENCE CHART

1. TROUBLESHOOTING CHART [1] (MALFUNCTIONS RELATED TO THE ACTIVE-ECS INDICATORS)

Problem	Check points									Troubleshooting hints classified by circuit
	Fuse	Power relay	Connector	Wiring harness	ACTIVE-ECS			Tail lamp relay	ECU	
					Manual Switches		Indicator lamps			
					SPORT	HIGH				
All indicators don't illuminate.	x	x	x	x						[7] (P. 33B-23)
No control mode switching.				x					x	
No indicator illumination when control mode switch is pressed				x			x		x	
The correct indicator does not illuminate				x	x	x	x		x	
An indicator that should not be illuminated remains illuminated.				x	x	x	x		x	
The indicators do not become dimmer when the headlamps are switched ON.				x				x		

NOTE

1. Malfunctions related to the ACTIVE-ECS indicators should be checked and corrected after first checking whether or not the replacement or repair of the ACTIVE-ECS indicator, wiring harness or ECU components is the cause of the malfunction.
2. x: Indicates the applicable point.

For information concerning the procedures for checking each circuit individually, refer to troubleshooting hint [7] of the troubleshooting guide classified by circuits.

33B-10 ACTIVE-ELECTRONIC CONTROL SUSPENSION – Troubleshooting

2. TROUBLESHOOTING CHART [II] (MALFUNCTIONS RELATED TO CHANGES OF THE BODY ATTITUDE)

No	Check item (function)		Probable cause							Trouble-shooting hints classified by circuit
			The body remains tilted when the vehicle is stopped. (The alarm lamp illuminates about two minutes later.)		The vehicle height changes after the anti-rolling control action		The vehicle height changes when left as is			
			Tilts to the left.	Tilts to the right	The vehicle height increases.	The vehicle height decreases.	The vehicle height at the front or rear increases.	The vehicle height decreases		
							Front or rear only.	One wheel only		
1	G sensor *1 (analogue detection of body lateral Gs)		x (Output Remains 5V)	x (Output Remains 0V)						[1]
2	Exhaust valves for Active (Switching of air spring exhaust to internal circulation or external discharge.)	Front			x (Stuck open)	x (Harness short-circuit, stuck closed)				[22]
		Rear			x (Stuck open)	x (Harness short-circuit, stuck closed)				[22]
3	Air-supply valves (These valves supply air to the air springs when the vehicle height is increased and during attitude control.)	Front				x (Harness short-circuit stuck closed)	x (Leakage at valve seat)	x (Air leakage to outside)		[23]
		Rear				x (Harness short-circuit, stuck closed)	x (Leakage at valve seat)	x (Air leakage to outside)		[24]
4	Control valves	Left front							x (Leakage at valve seat or air leakage to outside)	[25]
		Right front								
		Left rear								
		Right rear								[26]

NOTE

- 1 *1 When there is an abnormal condition of the output signals, including incorrect installation of the G sensor, the anti-rolling action is activated, and because there is no reset, the vehicle body remains tilted. When this condition continues for one minute or more, the alarm lamp illuminates and a self-diagnosis code (No. 11) is output.
- 2 x Indicates the applicable point

3. TROUBLESHOOTING CHART [III] (OTHER MALFUNCTIONS)

(1) [III-1] Malfunctions not including the air-pressure system

No	Check points (functions)	Item No. or diagnosis code	Service data		Malfunction			
			Condition and indicated data	Indication (standard value)	Anti-rolling control action is activated frequently.	System operates with the ignition key ON (with the engine stopped).	No control when stopped	No anti-squat control
1	G sensor (detection of body lateral Gs)	11	Stop the vehicle at a horizontally level place	(2 5)	x (Liquid leakage)			
2	Alternator "L" terminal (detection of engine rotation)	12	Engine rotation Engine stop	HIGH LOW		x (Harness wiring damaged or disconnected)	x (Harness short circuit)	
3	Throttle position sensor (detection of sudden acceleration or deceleration)	14	Throttle fully open	V (0 25)				x (Damaged or disconnected wiring) (Short circuit)
4	High-pressure switch (detection of high-pressure tank pressure)	15	760 kPa (7.6 kg/cm ² , 108 psi) or less 950 kPa (9.5 kg/cm ² , 135 psi) or more	ON OFF				
5	Headlamp switch (detection of headlamp illumination)	18	Headlamp switch ON/OFF	ON OFF				
6	Steering wheel sensor (detection of steering direction and angular velocity)	21	STR. 1 and STR. 2 each ON/OFF	ON OFF				
7	Vehicle speed sensor (detection of vehicle speed)	24	Vehicle speed input to ECU	km/h				x *
8	Stop lamp switch (detection of braking)	26	Stop lamp switch ON/OFF	ON OFF				
9	Accel switch* ¹ or Idle position switch* ²	34	Accel switch* ¹ or idle position switch* ² ON/OFF	ON OFF				
10	A/T inhibitor switch	31	R range ON All other ranges OFF	ON OFF				
11	M/T back up lamp switch	32	Back up lamp switch ON/OFF	ON OFF				
12	Door switch	33	Door switch ON/OFF	ON OFF				
13	Damping force switching actuator	41	-	-				
14	Compressor relay	43	-	-				
15	Compressor	-	-	-				
16	Return pump relay	44	-	-				
17	Return pump	-	-	-				

NOTE

- The * symbol indicates the period of time between the detection of the malfunction of the vehicle-speed sensor and the illumination of the alarm lamp.
- x: Indicates the applicable point.
- *¹ <Vehicles built up to October, 1991>
*² <Vehicles built from November, 1991>

33B-12 ACTIVE-ELECTRONIC CONTROL SUSPENSION – Troubleshooting

Malfunction													Troubleshooting hints classified by circuit
Compressor motor non-activation	Front does not become lower wheel an vehicle light is selected	Front only becomes lower when Low vehicle height is selected at night (with headlamps ON)	No anti-rolling control	No anti-drive control	Vehicle-speed-response function doesn't operate		No A/T shift squat control	Anti-squat control doesn't function during revers	Vehicle-height adjustment starts late when passengers get in or out	Vehicle-height adjustment frequency increase when vehicle is stopped	Damping force switching doesn't function.	Non-operation of return pump	
					Damping force automatic switching	Vehicle-height adjustment							[1]
													[2]
													[3]
x (Damaged or disconnected wiring)													[4]
	x (Harness wiring damaged or disconnected)	x (Harness short-circuit)											[5]
			x (Harness short-circuit)										[9]
			x *	x *	x *	x *							[12]
				x (Damaged or disconnected wiring)									[14]
							x (Damaged or disconnected wiring)						[14]
							x (Damaged or disconnected wiring) (Harness short circuit)	x (Damaged or disconnected wiring)					[15]
								x (Damaged or disconnected wiring)					[15]
									x (Damaged or disconnected wiring circuit)	x (Short circuit)			[16]
											x (Damaged or disconnected wiring)(Short circuit)		[17]
x (Damaged or disconnected wiring)													[18]
x (Damaged or disconnected wiring)													[18]
												x (Damaged or disconnected wiring)	[19]
												x (Damaged or disconnected wiring)	[19]

(2) [III-2] Malfunctions including the air-pressure system

No	Check points (functions)	Problem						Trouble- shooting hints classified by circuit
		Compressor is activated frequently.	Active attitude control doesn't function. (excessive rolling during driving)	Active attitude control effect is not sufficient. (a feeling of incompatibility during driving)	Vehicle height overshoots its target when adjusted.	Abnormal vehicle-height adjustment.		
						Diagnosis No 54	Diagnosis No 55	
1	Low-pressure switch (detection of low-pressure tank pressure)	× (Air leakage)					× (Air leakage)	[3]
2	High-pressure switch (detection of high pressure tank pressure)	× (Air leakage) (Characteristic malfunction)	× (Air leakage)	× (Air leakage)			× (Air leakage) (Contacts fused)	[5]
3	Rear pressure sensor (detection of pressure within rear air springs)	× (Air leakage)		× (Air leakage)			× (Air leakage)	[13]
4	Exhaust valve for vehicle-height adjustment					× (Stuck)		[20]
5	Flow-rate switchover valve (flow-rate switchover during vehicle-height adjustment and attitude-control mode)	× (Air leakage)		× (Stuck closed)	× (Stuck open)		× (Air leakage)	[21]
6	Front or rear exhaust valve (switching of air spring exhaust to internal circulation or external discharge)		× (Stuck open)	× (Stuck open)		× (Stuck closed) (Harness short-circuit)		[23]
7	Front or rear air-supply valve (air supply to air springs during vehicle-height increase and attitude-control mode)	× (Air leakage)		× (Stuck closed) (Harness short-circuit)		× (Stuck closed) (Harness short-circuit)	× (Air leakage)	[23], [24]
8	Front (left and right) and rear (left and right) control valves	× (Air leakage)		× (Stuck closed) (Harness short-circuit)		× (Stuck closed) (Harness short-circuit)	× (Air leakage)	[25], [26]
9	Compressor	× (Air leakage)					× (Air leakage)	[18]
10	Air tube	× (Air leakage)	× (Air leakage) (Clogged)	× (Air leakage) (Clogged)		× (Clogged)	× (Air leakage)	—

NOTE

×. Indicates the applicable point.

33B-14 ACTIVE-ELECTRONIC CONTROL SUSPENSION – Troubleshooting

4. TROUBLESHOOTING CHART [IV] (WHEN SELF-DIAGNOSIS MALFUNCTION CODES ARE OUTPUT)

NOTE

- (1) The alarm lamp does not illuminate for an abnormal condition (code No. 12) of the alternator output voltage ("L" terminal) or abnormal condition of the low pressure switch (code No. 13), abnormal condition of the rear pressure switch (code No. 25) for air leakage (code No. 56) within the front or rear valves.
- (2) For malfunctions represented by a code number with the * symbol, if the malfunction is of a temporary nature (such as improper contact of a connector, etc.), the warning lamp's illumination will stop when the malfunction stops, and the function will return to normal.
- (3) When the alarm lamp is illuminated (i.e., when a malfunction has been detected), the control mode cannot be switched (with the exception of a certain few malfunctions) when the control switch is pressed.
- (4) If two or more malfunctions occur at the same time, the corresponding code numbers will be displayed in order from the lowest one.

Diagnosis code No.	Malfunction	Vehicle condition	Probable cause	Action
0	Normal	—	—	—
*11	Damaged or disconnected wiring or short-circuit of G sensor input circuit, or G sensor malfunction.	Alarm lamp illuminates; among attitude-control modes, only rolling control stops. (Others operate normally.)	● Improper installation of G sensor. ● G sensor internal wiring damaged or disconnected. ● Damaged or disconnected wiring or short-circuit of G sensor circuit. ● Connector of G sensor circuit disconnected. ● Malfunction of ECU.	Troubleshooting hints classified by circuit [1]
*12	With the ignition key at the ON position and the vehicle speed at 40 km/h (25 mph) or higher, the output voltage of the alternator "L" terminal is approximately 5V or lower.	The charging warning lamp illuminates, and, furthermore, the system does not function when the vehicle is stopped (vehicle speed of 3 km/h (2 mph) or lower). NOTE The alarm lamp does not illuminate, and, furthermore, there is no detection of harness damage or disconnection between the alternator "L" terminal and the ECU.	● Insufficient alternator "L" terminal output voltage (malfunction of the charging system). ● Harness short-circuit between the alternator "L" terminal and the ECU. ● ECU malfunction.	Troubleshooting hints classified by circuit [2]
*13	The low-pressure switch is not switched OFF even though the attitude-control function is performed 30 times. The return pump is activated frequently.	The alarm lamp illuminates, and only the attitude-control function stops. (Other functions are normal.)	● Low-pressure switch is fused. ● Damaged or disconnected wiring, or short-circuit, of the low-pressure switch circuit harness. ● The connector of the low-pressure switch circuit is disconnected. ● ECU malfunction.	Troubleshooting hints classified by circuit [3]

ACTIVE-ELECTRONIC CONTROL SUSPENSION – Troubleshooting 33B-15

Diagnosis code No.	Malfunction	Vehicle condition	Probable cause	Action
*21	Damaged or disconnected wiring of the steering wheel sensor input circuit, or a malfunction of the steering wheel sensor.	The alarm lamp illuminates, and the attitude-control function stops. The damping force is held to MEDIUM, and the vehicle height is held to NORMAL.	- Steering wheel sensor malfunction. - Damaged or disconnected wiring of the steering wheel sensor circuit harness. - Disconnection of the connector of the steering wheel sensor circuit. - ECU malfunction.	Troubleshooting hints classified by circuit [9]
*22	An abnormal signal (a signal unlike any normal signal such as an error code, etc.) is input from the front height sensor; or, a malfunction of the vehicle-height discrimination circuit within the ECU.	The alarm lamp illuminates, and the attitude-control function and the vehicle-height control function are stopped. The damping force is held to MEDIUM. NOTE Note that 32 seconds are required to determine that there is a malfunction.	- Front height sensor malfunction. - Damaged or disconnected wiring, or a short-circuit, of the front height sensor circuit. - Disconnection of the connector of the front height sensor circuit. - ECU malfunction.	Troubleshooting hints classified by circuit [10]
*23	An abnormal signal is input from the rear height sensor; or, a malfunction of the vehicle-height discrimination circuit within the ECU.	The alarm lamp illuminates, and the attitude-control function and the vehicle-height control function are stopped. The damping force is held to MEDIUM. NOTE Note that 32 seconds are required to determine that there is a malfunction.	- Rear height sensor malfunction. - Damaged or disconnected wiring, or a short-circuit, of the rear height sensor circuit. - Disconnection of the connector of the rear height sensor circuit. - ECU malfunction.	Troubleshooting hints classified by circuit [11]
*24	There is damaged or disconnected wiring, or a short-circuit, of the vehicle-speed sensor input circuit. (The throttle is open 30% or more, and the output of the alternator "L" terminal is HIGH level, but even so the input of the vehicle-speed pulses is not 30 seconds or longer.)	The alarm lamp illuminates, and the attitude-control function stops. The damping force is held to MEDIUM, and the vehicle height is held to NORMAL.	- Malfunction of the vehicle-speed sensor (damaged or disconnected wiring, or a short-circuit). - Damaged or disconnected wiring, or a short-circuit, of the vehicle-speed sensor circuit. - The connector of the vehicle-speed sensor circuit is disconnected. - ECU malfunction.	Troubleshooting hints classified by circuit [12]

33B-16 ACTIVE-ELECTRONIC CONTROL SUSPENSION – Troubleshooting

Diagnosis code No.	Malfunction	Vehicle condition	Probable cause	Action
*25	There is damaged or disconnected wiring of the rear pressure sensor input circuit. (The rear internal pressure is abnormally high.)	The alarm lamp illuminates, and the attitude-control function and the vehicle-height control function are stopped. The damping force is held to MEDIUM. NOTE This code is also output during driving in an overloaded condition.	● Rear pressure sensor malfunction. ● Damaged or disconnected wiring, or a short-circuit, of the rear pressure sensor circuit. ● Disconnection of the connector of the rear pressure sensor circuit. ● ECU malfunction	Troubleshooting hints classified by circuit [13]
41	Damaged or disconnected wiring of the damping force switching actuator (step motor type) or of the actuator circuit, or a malfunction of an output transistor within the ECU.	The alarm lamp illuminates, and the attitude-control function and the damping-force control function are stopped. The vehicle height is held to NORMAL.	● All connectors of the damping-force switching actuator (step motor type) and the actuator circuit are disconnected. ● Damaged or disconnected wiring, or a short-circuit, of the damping-force switching actuator (step motor type) and the harness of the ECU part of the actuator circuit. ● ECU malfunction.	Troubleshooting hints classified by circuit [17]
42	There is damaged or disconnected wiring, or a short-circuit, of the solenoid valve power source relay circuit.	The alarm lamp illuminates, and the attitude-control function and the vehicle-height control function are stopped. The damping force is held to MEDIUM.	● The solenoid valve power source relay contacts are fused. ● Damaged or disconnected wiring of the solenoid valve power source relay coil. ● Damaged or disconnected wiring, or a short-circuit, of the solenoid valve power source relay circuit. ● Disconnection of the connector of the solenoid valve power source relay circuit. ● ECU malfunction.	Troubleshooting hints classified by circuit [7]

ACTIVE-ELECTRONIC CONTROL SUSPENSION – Troubleshooting 33B-17

Diagnosis code No.	Malfunction	Vehicle condition	Probable cause	Action
43	Damaged or disconnected wiring, or a short-circuit, of the compressor relay circuit, or a malfunction of an output transistor within the ECU.	The alarm lamp illuminates, and the attitude-control function and the vehicle-height control function are stopped. The damping force is held to MEDIUM.	● Damaged or disconnected wiring, or a short-circuit, of the compressor relay coil. ● Damaged or disconnected wiring, or a short-circuit, of the compressor relay circuit harness. ● Disconnection of the compressor relay circuit connector. ● ECU malfunction.	Troubleshooting hints classified by circuit [18]
44	Damaged or disconnected wiring, or a short-circuit, of the return pump relay circuit, or a malfunction of an output transistor within the ECU.	The alarm lamp illuminates, and the attitude-control function and the vehicle-height control function are stopped. The damping force is held to MEDIUM.	● Damaged or disconnected wiring, or a short-circuit, of the return pump relay coil. ● Damaged or disconnected wiring, or a short-circuit, of the return pump relay circuit harness. ● Disconnection of the return pump relay circuit connector. ● ECU malfunction.	Troubleshooting hints classified by circuit [19]
45	Damaged or disconnected wiring, or a short-circuit, of the exhaust valve actuation circuit (for vehicle-height adjustment), or a malfunction of an output transistor within the ECU.	The alarm lamp illuminates, and the attitude-control function and the vehicle-height control function are stopped. The damping force is held to MEDIUM.	● Damaged or disconnected wiring, or a short-circuit, of the exhaust valve coil (for vehicle-height adjustment). ● Damaged or disconnected wiring, or a short-circuit, of the exhaust valve actuation circuit (for vehicle-height adjustment). ● Disconnection of the connector of the exhaust valve actuation circuit (for vehicle-height adjustment). ● ECU malfunction.	Troubleshooting hints classified by circuit [20]

33B-18 ACTIVE-ELECTRONIC CONTROL SUSPENSION – Troubleshooting

Diagnosis code No.	Malfunction	Vehicle condition	Probable cause	Action
46	Damaged or disconnected wiring, or a short-circuit, of the flow-rate switchover valve actuation circuit, or a malfunction of an output transistor within the ECU.	The alarm lamp illuminates, and the attitude-control function and the vehicle-height control function are stopped. The damping force is held to MEDIUM.	• Damaged or disconnected wiring, or a short-circuit, of the flow-rate switchover valve coil. • Damaged or disconnected wiring, or a short-circuit, of the flow-rate switchover valve circuit harness. • Disconnection of the flow-rate switchover valve circuit connector. • ECU malfunction.	Troubleshooting hints classified by circuit [21]
47	Damaged or disconnected wiring of the front or rear exhaust valve actuation circuit (for active control), or a malfunction of an output transistor within the ECU.	The alarm lamp illuminates, and the attitude-control function and the vehicle-height control function are stopped. The damping force is held to MEDIUM.	• Damaged or disconnected wiring of the front or rear exhaust valve coil (for active control). • Damaged or disconnected wiring of the front or rear exhaust valve circuit (for active control). • Disconnection of the connector of the front or rear exhaust valve circuit (for active control). • ECU malfunction.	Troubleshooting hints classified by circuit [22]
51	Damaged or disconnected wiring of the front or rear air-supply valve actuation circuit, or a malfunction of an output transistor within the ECU.	The alarm lamp illuminates, and the attitude-control function and the vehicle-height control function are stopped. The damping force is held to MEDIUM.	• Damaged or disconnected wiring of the front or rear air-supply valve coil. • Damaged or disconnected wiring of the front or rear air-supply valve circuit harness. • Disconnection of the connector of the front or rear air-supply valve circuit. • ECU malfunction.	Troubleshooting hints classified by circuit [23], [24]

ACTIVE-ELECTRONIC CONTROL SUSPENSION – Troubleshooting 33B-19

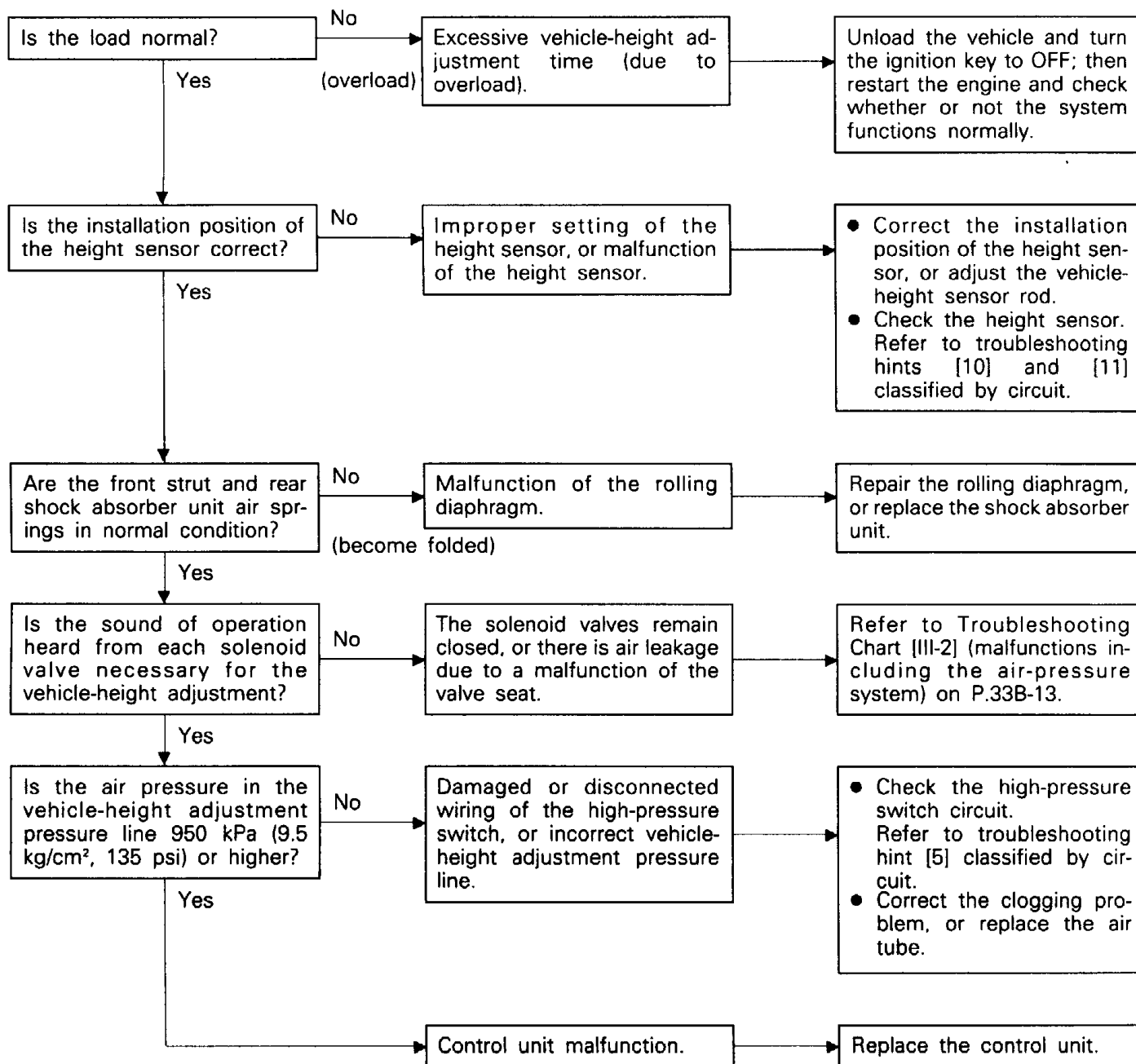
Diagnosis code No.	Malfunction	Vehicle condition	Probable cause	Action
52	Damaged or disconnected wiring of the left front or right front valve actuation circuit, or a malfunction of an output transistor within the ECU.	The alarm lamp illuminates, and the attitude-control function and the vehicle-height control function are stopped. The damping force is held to MEDIUM.	• Damaged or disconnected wiring of the left front or right front valve coil. • Damaged or disconnected wiring of the left front or right front valve circuit harness. • Disconnection of the connector of the left front or right front valve circuit. • ECU malfunction.	Troubleshooting hints classified by circuit [25]
53	Damaged or disconnected wiring of the left rear or right rear valve actuation circuit, or a malfunction of an output transistor within the ECU.	The alarm lamp illuminates, and the attitude-control function and, the vehicle-height control function are stopped. The damping force is held to MEDIUM.	• Damaged or disconnected wiring of the left rear or right rear valve coil. • Damaged or disconnected wiring of the left rear or right rear valve circuit harness. • Disconnection of the connector of the left rear or right rear valve circuit. • ECU malfunction.	Troubleshooting hints classified by circuit [26]
54	Even though three minutes or more have passed for the vehicle-height adjustments of the front and the rear, and the pressure within the high-pressure tank is sufficient (the high-pressure switch is OFF), the vehicle-height adjustments are not completed.	The alarm lamp illuminates, and the attitude-control function and the vehicle-height control function are stopped. The damping force is held to MEDIUM.	• Overloaded condition. • Improper adjustment of the front or rear vehicle-height sensor. • Air-pressure line is clogged. • Malfunction of the front strut unit or the rear shock absorber unit air spring. • ECU malfunction.	Refer to Malfunction Symptoms Chart [A] on P.33B-21

33B-20 ACTIVE-ELECTRONIC CONTROL SUSPENSION – Troubleshooting

Diagnosis code No.	Malfunction	Vehicle condition	Probable cause	Action
55	Even though three minutes or more have passed for the vehicle-height adjustments of the front and the rear, and with insufficient pressure within the high-pressure tank (the high-pressure switch is ON), the vehicle-height adjustments are not completed, or the compressor has operated continuously for four minutes or longer.	The alarm lamp illuminates, and the attitude-control function and the vehicle-height control function are stopped. The damping force is held to MEDIUM.	● Compressor malfunction. Damaged or disconnected wiring of the harness between the compressor relay and the compressor. Malfunction of the air compression of the compressor. ● Air leakage from the high-pressure tank (non-airtight connection with the low-pressure tank). ● High-pressure switch is fused.	Refer to Malfunction Symptoms Chart [B] on P.33B-22.
56	The return pump is continuously activated (repeatedly starts and stops eight times), even though neither the attitude-control function nor the vehicle-height control function has been initiated.	Control functions are not stopped (alarm lamp does not illuminate).	Air leakage within the front (left or right) or rear (left or right) valve.	Replace the front or rear solenoid valve.

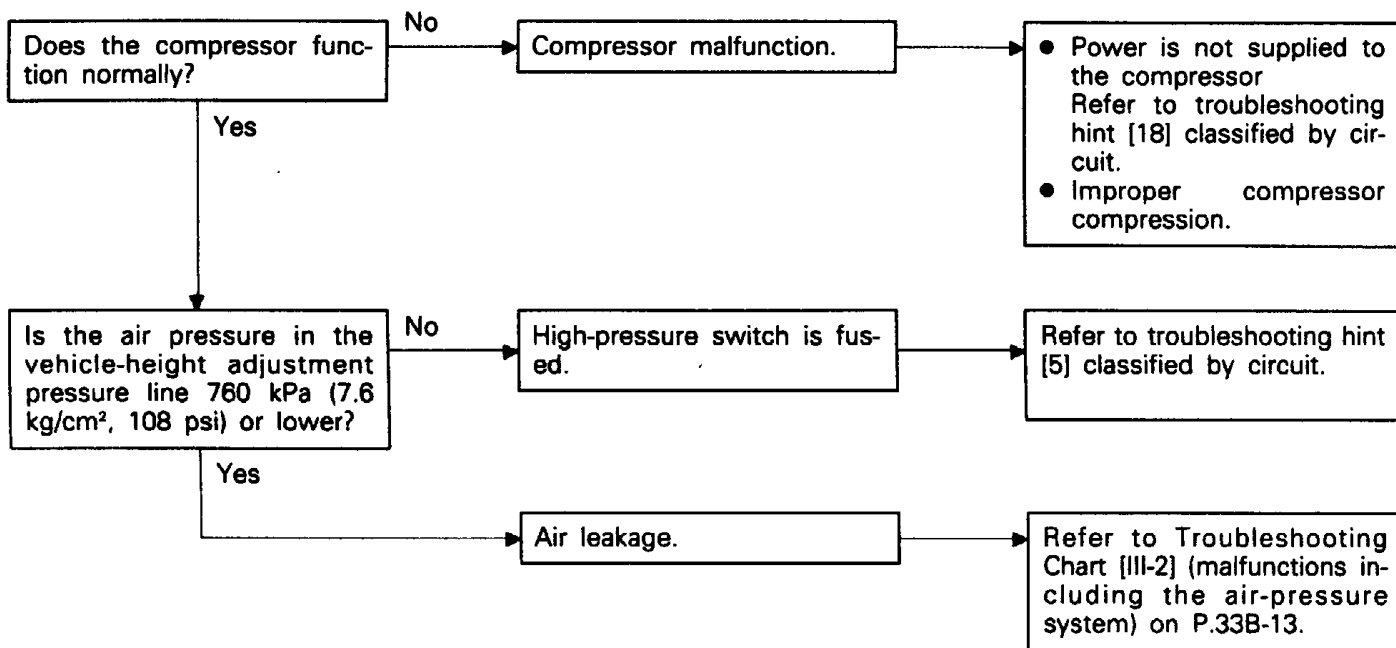
CHECKING ACCORDING TO CHARTS CLASSIFIED BY THE MALFUNCTION SYMPTOM

[A] DIAGNOSIS CODE NO. 54



33B-22 ACTIVE-ELECTRONIC CONTROL SUSPENSION – Troubleshooting

[B] DIAGNOSIS CODE NO. 55



TROUBLESHOOTING HINTS CLASSIFIED ACCORDING TO CIRCUITS**Contents**

No.	Item	Page
[1]	G-sensor circuit	P.33B-24
[2]	Alternator “L” terminal circuit	P.33B-26
[3]	Low-pressure switch circuit	P.33B-28
[4]	Throttle-position sensor circuit (accel-position sensor circuit)	P.33B-30
[5]	High-pressure switch circuit	P.33B-32
[6]	ACTIVE-ECS power-supply circuit	P.33B-34
[7]	ACTIVE-ECS indicators circuit	P.33B-38
[8]	Headlamp switch circuit	P.33B-41
[9]	Steering wheel sensor circuit	P.33B-43
[10]	Front-height sensor circuit	P.33B-45
[11]	Rear-height sensor circuit	P.33B-47
[12]	Vehicle-speed sensor circuit	P.33B-49
[13]	Rear-pressure sensor circuit	P.33B-51
[14]	Stop lamp switch circuit/accel switch circuit*1	P.33B-54
	Stop lamp switch circuit/Idle position switch circuit*2	P.33B-55-1
[15]	Inhibitor switch circuit/Back-up lamp switch circuit	P.33B-56
[16]	Door switch circuit	P.33B-58
[17]	Damping force switching actuator drive circuit	P.33B-60
[18]	Compressor drive circuit	P.33B-62
[19]	Return pump drive circuit	P.33B-64
[20]	Exhaust valve actuation circuit (for vehicle-height adjustment)	P.33B-66
[21]	Flow-rate switchover valve actuation circuit	P.33B-68
[22]	Front/rear exhaust valve activation circuit	P.33B-71
[23]	Front air-supply valve activation circuit	P.33B-74
[24]	Rear air-supply valve activation circuit	P.33B-77
[25]	Left front/right front valve activation circuit	P.33B-80
[26]	Left rear/right rear valve activation circuit	P.33B-83
[27]	ACTIVE-ECS-related diagnosis/service data output circuit	P.33B-86

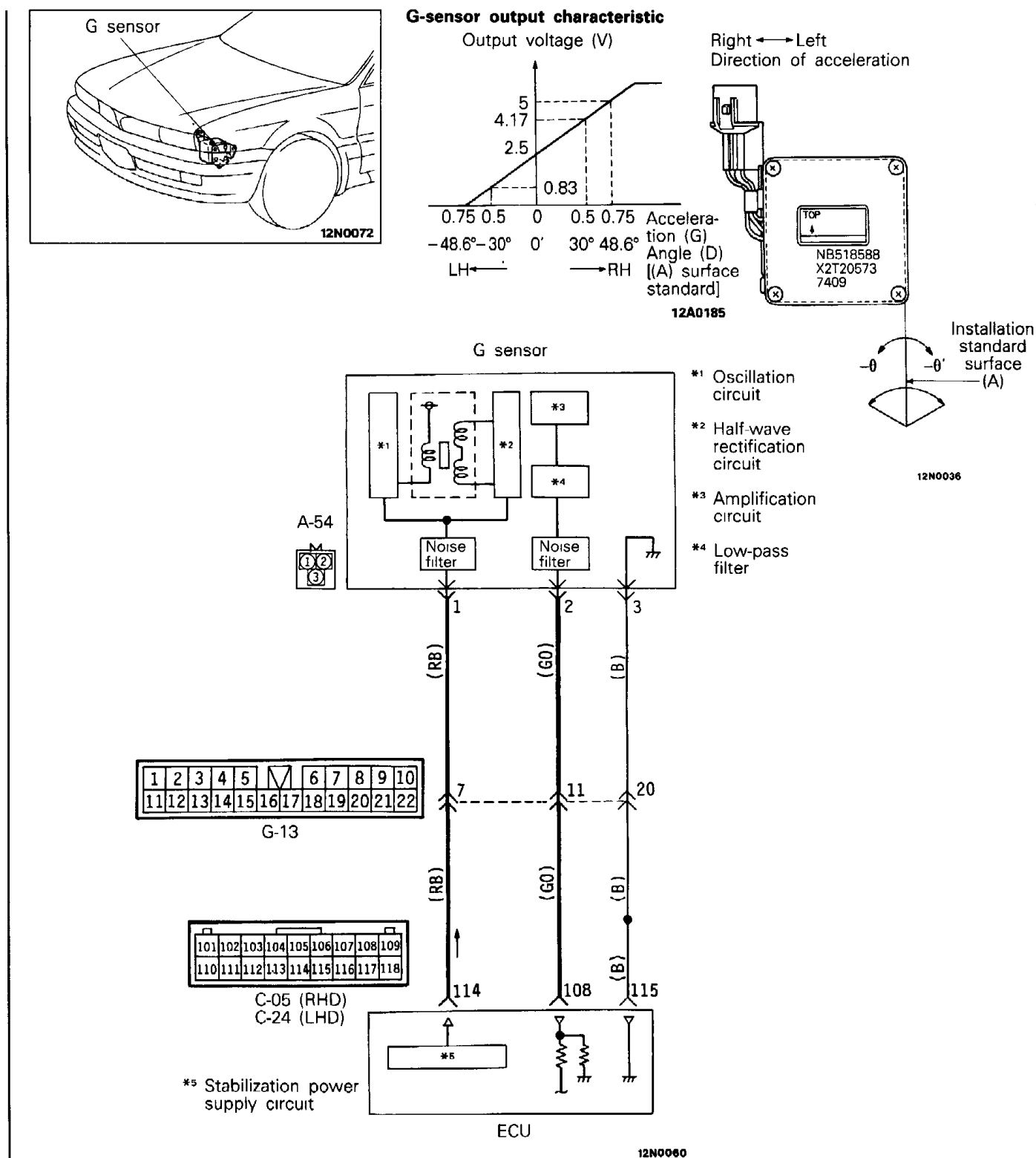
NOTE

*1 : <Vehicles built up to October, 1991>

*2 : <Vehicles built from November, 1991>

33B-24 ACTIVE-ELECTRONIC CONTROL SUSPENSION – Troubleshooting

[1] G-SENSOR CIRCUIT



Operation

The G-sensor detects the amount of acceleration that is generated (to the left or right) when the vehicle body turns. Applying the principle of the differential transformer, the magnetic field changes when the movable iron core within the coil moves in response to acceleration, and these changes

are taken out as changes of voltage. Within the coil, silicon oil is enclosed in order to suppress the vibration of the movable iron core. Note that the G-sensor is a special sensor for control of rolling.

Diagnosis

When signals that are otherwise virtually inconceivable are input due to damaged or disconnected wiring or a short-circuit or similar problem

of a heavy-line circuit, the alarm lamp illuminates and control is as described in the table below.

Diagnosis No.	Attitude control	Damping force control	Vehicle-height control	Switch acceptance.	
				HIGH	AUTO
11	Rolling control only stops.	Normal operation	Normal operation	○	○

Service data indication

Code No.	Indication	Standard value
11	G-sensor output voltage	Approx. 2.5V when vehicle is horizontal

ECU terminal voltages (when connector is connected)

Terminal No.	Signal	Condition	Terminal voltage
114	Power supply for sensor.	When the ECU is activated	7.0–7.6V
108	G-sensor output signal	When stopped	1.9–3.1V
		When wiring damaged or disconnected	Approx. 0V
115	Sensor circuit earth	Constantly	Approx. 0V

Checking the G-sensor circuit (with the connector disconnected)

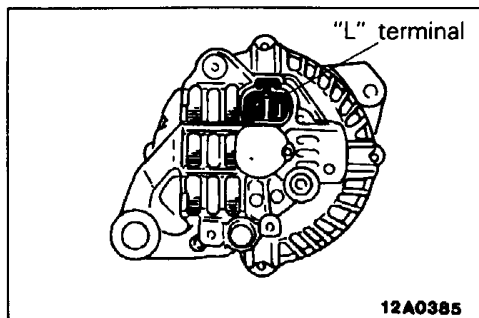
Terminal No.	Connection destination or measured part	Measurement	Tester connection	Check condition	Standard
108	G-sensor output	Resistance	114–2	–	Continuity
114	G-sensor power source	Resistance	114–1	–	Continuity

Troubleshooting hints

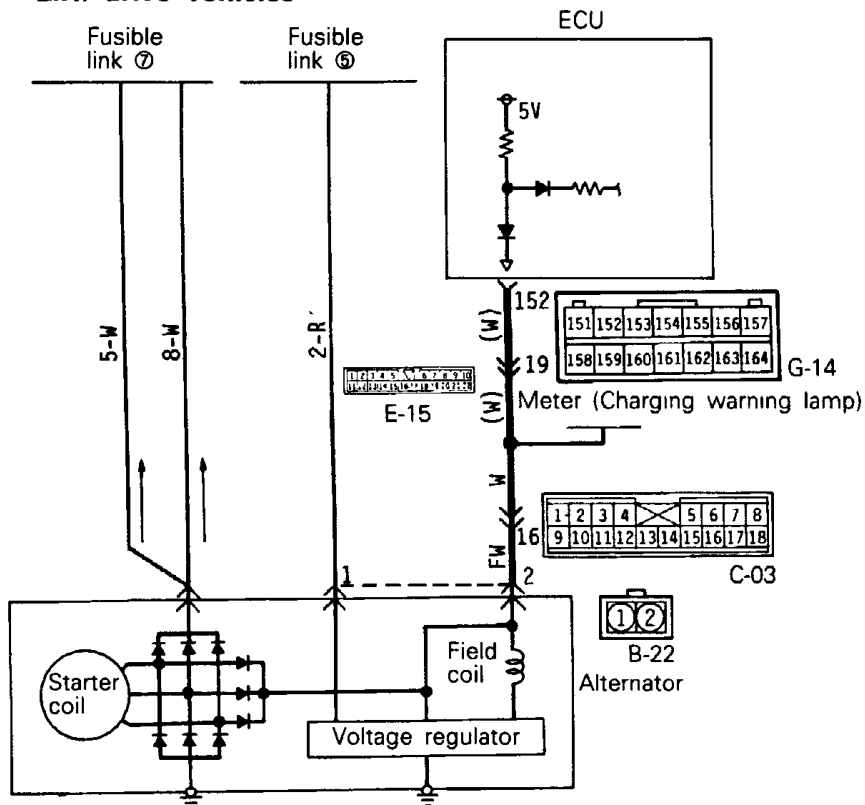
Malfunction mode	Malfunction probable cause	Malfunction	Note
Silicon oil leakage	Because the silicon oil for suppression of vibrations of the G-sensor movable iron core is leaking due to a collision, the sensitivity is oversensitive.	Rolling control occurs frequently.	–
Damaged or disconnected earth line.	The earth line is damaged or disconnected. Malfunction is not detected because the earth line is earthed to the G sensor's body itself, however, noise is easily picked up.	- There are times of a feeling of incompatibility of the rolling control. - Rolling control occurs suddenly; an error occurs.	–

33B-26 ACTIVE-ELECTRONIC CONTROL SUSPENSION – Troubleshooting

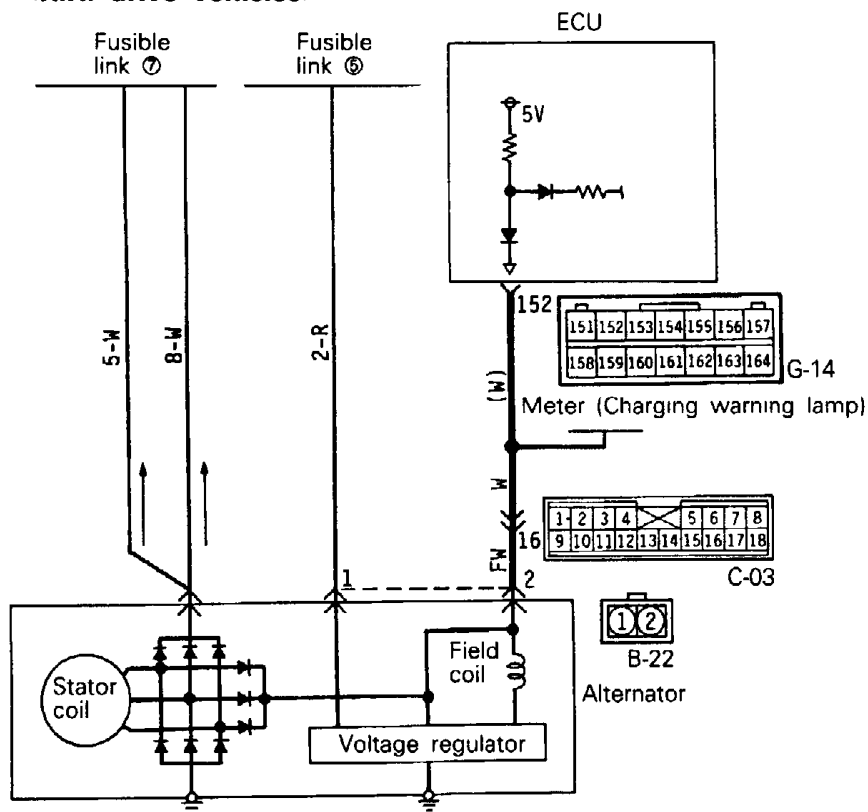
[2] ALTERNATOR "L" TERMINAL CIRCUIT



<L.H. drive vehicles>



<R.H. drive vehicles>



Operation

The alternator "L" terminal signal is used to determine whether or not the engine is operating. This is in order to reduce the frequency of compressor operation, and is because activation of

the system is possible while the engine is operating, or at a vehicle speed of 3 km/h (2 mph) or higher.

Diagnosis

When the alternator "L" terminal is LOW level (as a result of a short-circuit of the heavy-line circuit or due to an abnormal condition of the alternator) even though the vehicle speed is 40 km/h (25

mph), control is as described in the table below. Note, however, that there is no detection if there is damaged or disconnected wiring of the harness, and the alarm lamp does not illuminate.

Diagnosis No.	Attitude control	Damping force control	Vehicle-height control	Switch acceptance	
				HIGH	AUTO
12	*"L" terminal "L" logic				

*"L" terminal "L" logic: As a result of system operation conditions, the system is not activated at a vehicle speed of less than 3 km/h (2 mph). When the vehicle speed becomes 3 km/h (2 mph) or higher all functions are normal. (Refer to the explanation of the operation.)

Service data indication

Code No.	Indication
12	The output voltage level of the alternator "L" terminal is indicated.

ECU terminal voltage (when connector is connected)

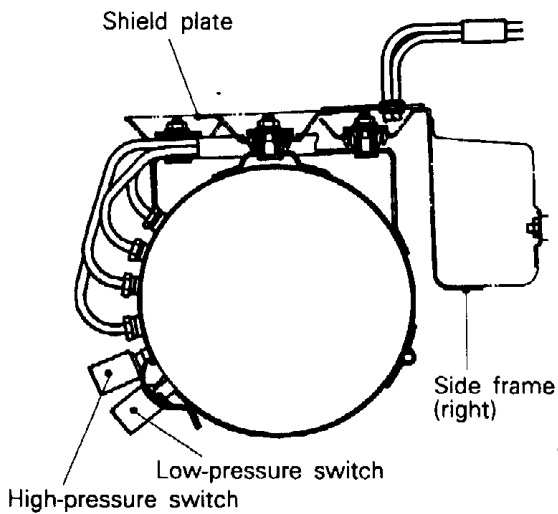
Terminal No.	Signal	Condition*	Terminal voltage
152	Alternator "L" terminal signal	When engine stalls	Approx. 0.5–3V
		When engine is operating	Approx. 13–15V
		When harness wiring is damaged or disconnected	4.5–5.5V

Checking the alternator "L" terminal circuit (with the connector disconnected)

Terminal No.	Connection destination or measured part	Measurement	Tester connection	Check condition	Standard
152	Alternator	Voltage	152-earth	Ignition switch ON	Approx. 2–5V
				While engine is operating	System voltage

33B-28 ACTIVE-ELECTRONIC CONTROL SUSPENSION – Troubleshooting

[3] LOW-PRESSURE SWITCH CIRCUIT



12A0172

Low-pressure switch

ON

OFF

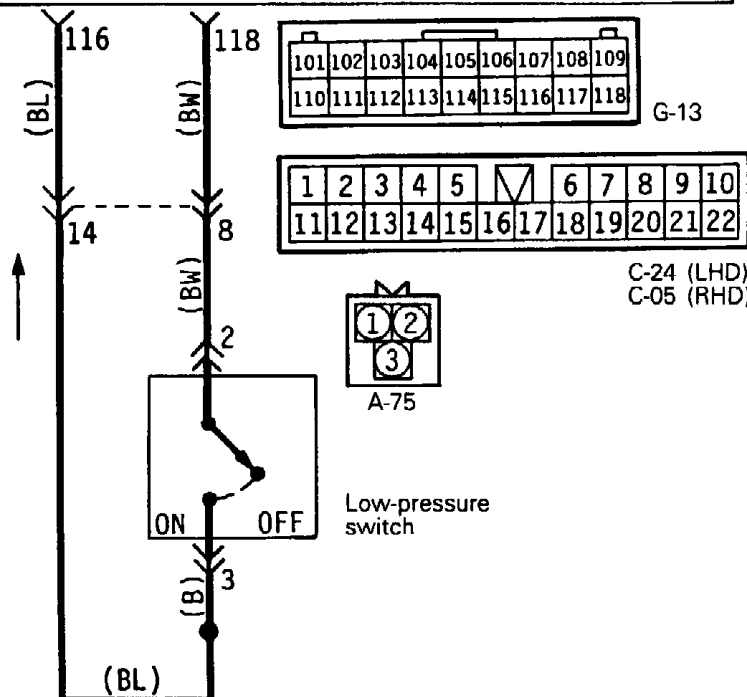
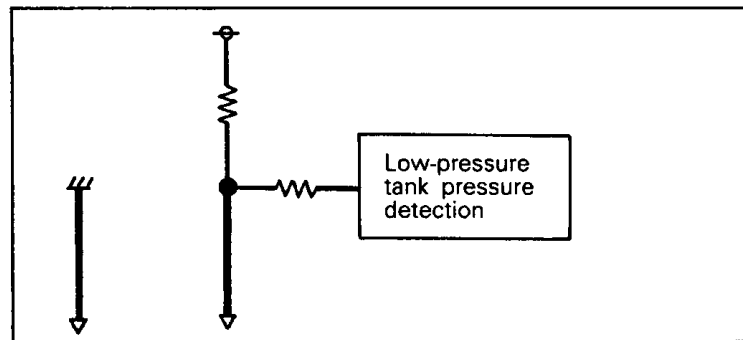
70 (0.7, 10)

140 (1.4, 20)

Pressure kPa (kg/cm², psi)

12A0461

ECU



12N0061

Operation

The low-pressure switch is switched ON and OFF by the pressure in the low-pressure tank, and as a result the ECU functions to control the activation and stop of the return pump.

When the pressure in the low-pressure tank becomes 140 kPa (1.4 kg/cm², 20 psi) or higher,

it is switched OFF, and as a result the ECU sends the drive signal to the return pump. It is switched ON at a pressure of 70 kPa (0.7 kg/cm², 10 psi) or lower and the return pump stops two seconds later.

Diagnosis

When there is a short-circuit, or damaged or disconnected wiring, of the heavy-line circuit, or if the contacts of the low-pressure switch become

fused, the alarm lamp illuminates, and control is as described in the table below.

Diagnosis No.	Attitude control	Damping force control	Vehicle-height control	Switch acceptance	
				HIGH	AUTO
13	Control stop	Normal operation	Normal operation	Accept	

Service data indication

Code No.	Indication
13	Indicates ON or OFF condition of the low-pressure switch.

ECU terminal voltages (when connector is connected)

Terminal No.	Signal	Condition	Terminal voltage
118	Low-pressure tank pressure signal	When the low-pressure switch is ON	Approx. 0V
		When the low-pressure switch is OFF	4–8V

Checking the low-pressure switch circuit (with the connector disconnected).

Terminal No.	Connection destination or measured part	Measurement	Tester connection	Check condition	Standard
118	Low-pressure switch	Resistance	118-earth	Drive the return pump by actuator test item no. 6 to lower the inside pressure of the low pressure tank; Inside pressure of low pressure tank is 70 kPa (0.7 kg/cm ² , 10 psi) or less.	Continuity

Left Diagram: Vehicles without TCL

Engine control unit

5V

5V

61 72 67

GY B YR

1 4 3

Idle switch ON OFF

Throttle-position sensor

B-07

2

BrR

(GW)

13

(GW)

151

*1

C-27

51 52 53 54 55 56 57 58 59 60 61
62 63 64 65 66 67 68 69 70 71 72

1 2 3 4 5 6
7 8 9 10 11 12 13 14

C-31

151 152 153 154 155 156 157
158 159 160 161 162 163 164

G-14

Right Diagram: Vehicles with TCL

Engine control unit

5V

5V

61 72 67

GY B YR

4 1 2

Idle switch ON OFF

Accel-position sensor

B-06

3

YR

(YR)

13

(GW)

151

*1

C-29

51 52 53 54 55 56 57 58 59 60 61
62 63 64 65 66 67 68 69 70 71 72

1 2 3 4 5 6
7 8 9 10 11 12 13 14

C-31

151 152 153 154 155 156 157
158 159 160 161 162 163 164

G-14

To the throttle position sensor

Legend:

*1 Throttle position detection

<Vehicles without TCL>

<Vehicles with TCL>

12N0175

Left Diagram: Vehicles without TCL

Right Diagram: Vehicles with TCL

Legend:

- Engine control unit**: 5V, 61, 72, 67, B, YR, 1, 4, 3, 2, 11, 151
- Throttle-position sensor**: 1, 4, 3, 2, 11, 151
- Accel-position sensor**: 1, 4, 3, 2, 11, 151
- ECS control unit**: 1, 4, 3, 2, 11, 151
- Terminal Blocks**: C-27, B-07, B-06, C-36, G-14
- Wires**: GY, B, YR, GW, BrR
- Switches**: Idle switch (ON/OFF)
- Resistors**: 1, 4, 3, 2, 11, 151
- Diodes**: 1, 4, 3, 2, 11, 151
- Relays**: *1

***1 Throttle position detection**

<Vehicles without TCL>

<Vehicles with TCL>

12N0038

PWGE9004

Operation

For accelerator position detection, the same throttle position sensor as the engine ECU uses is used in vehicles without TCL, and the same

accelerator position sensor as the TCL ECU uses is used in vehicles with TCL.

Service data indication

Code No.	Indication
14	The output voltage of the throttle position sensor is indicated.

ECU terminal voltages (when connector is connected)

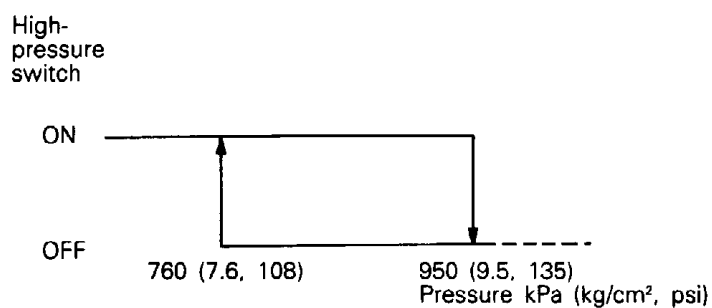
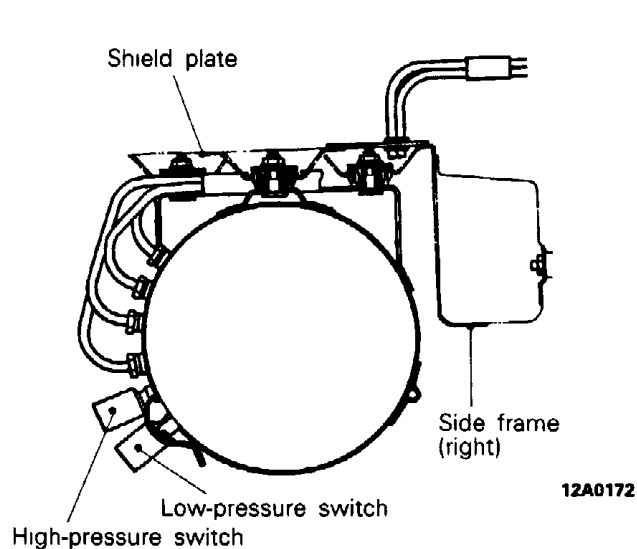
Terminal No.	Signal	Condition	Terminal voltage
151	Throttle-position sensor signal (Accel-position sensor signal)	During idle	Approx. 0–1V
		When fully open	Approx. 4–8V
		When there is damaged or disconnected wiring	Approx. 0V

Checking the throttle-position sensor circuit (with the connector disconnected)

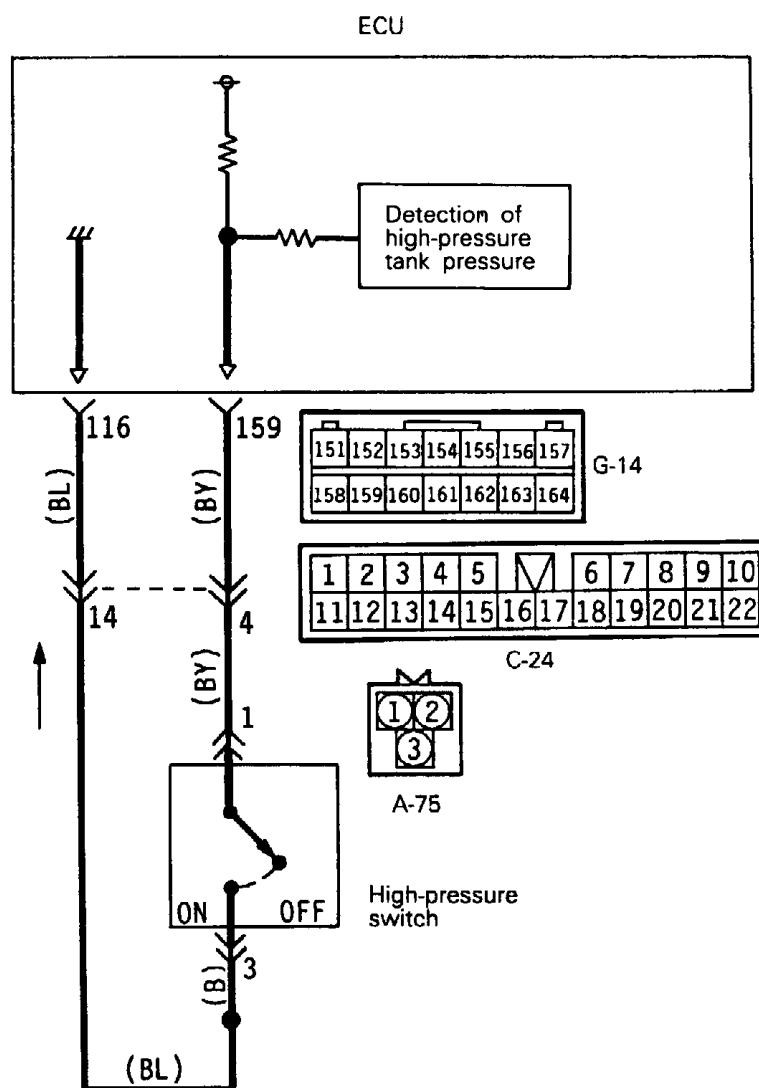
Terminal No.	Connection destination or measured part	Measurement	Tester connection	Standard
1	Throttle-position sensor (Accel-position sensor)	Resistance	1–4	3.5–6.5 k Ω
4				

33B-32 ACTIVE-ELECTRONIC CONTROL SUSPENSION – Troubleshooting

[5] HIGH-PRESSURE SWITCH CIRCUIT



12N0139



12N0062

Operation

The high-pressure switch is switched ON and OFF by the pressure in the high-pressure tank, and as a result the ECU functions to control the activation and stop of the compressor.

When the pressure in the high-pressure tank becomes 760 kPa (7.6 kg/cm², 108 psi) or lower, the high-pressure switch is switched ON, and as a result the ECU sends the drive signal to the compressor.

Conversely, when the pressure of the high-pressure tank becomes 950 kPa (9.5 kg/cm², 135 psi) or higher, the high-pressure switch is switched OFF, and the compressor is stopped two seconds thereafter.

Note, however, that the compressor is not activated, even if the high-pressure switch is switched ON, if the return pump is in operation. Note also that there is no diagnosis function for the high-pressure switch.

Service data indication

Code No.	Indication
15	Indicates the ON/OFF status of the high-pressure switch.

ECU terminal voltages (with connector connected)

Terminal No.	Signal	Condition	Terminal voltage
159	High-pressure tank pressure signal	When high-pressure switch is ON (low pressure)	Approx. 0V
		When high-pressure switch is OFF (high pressure)	4 – 8V

Checking the high-pressure switch circuit (with the connector disconnected)

Terminal No.	Connection destination or measured part	Measurement	Tester connection	Check condition	Standard
159	High-pressure switch	Resistance	159-Earth	Drive the return pump by actuator test item No. 6 to raise the inside pressure of the high pressure tank; Inside pressure of high pressure tank is 950 kPa (9.5 kg/cm ² , 135 psi) or more.	No continuity

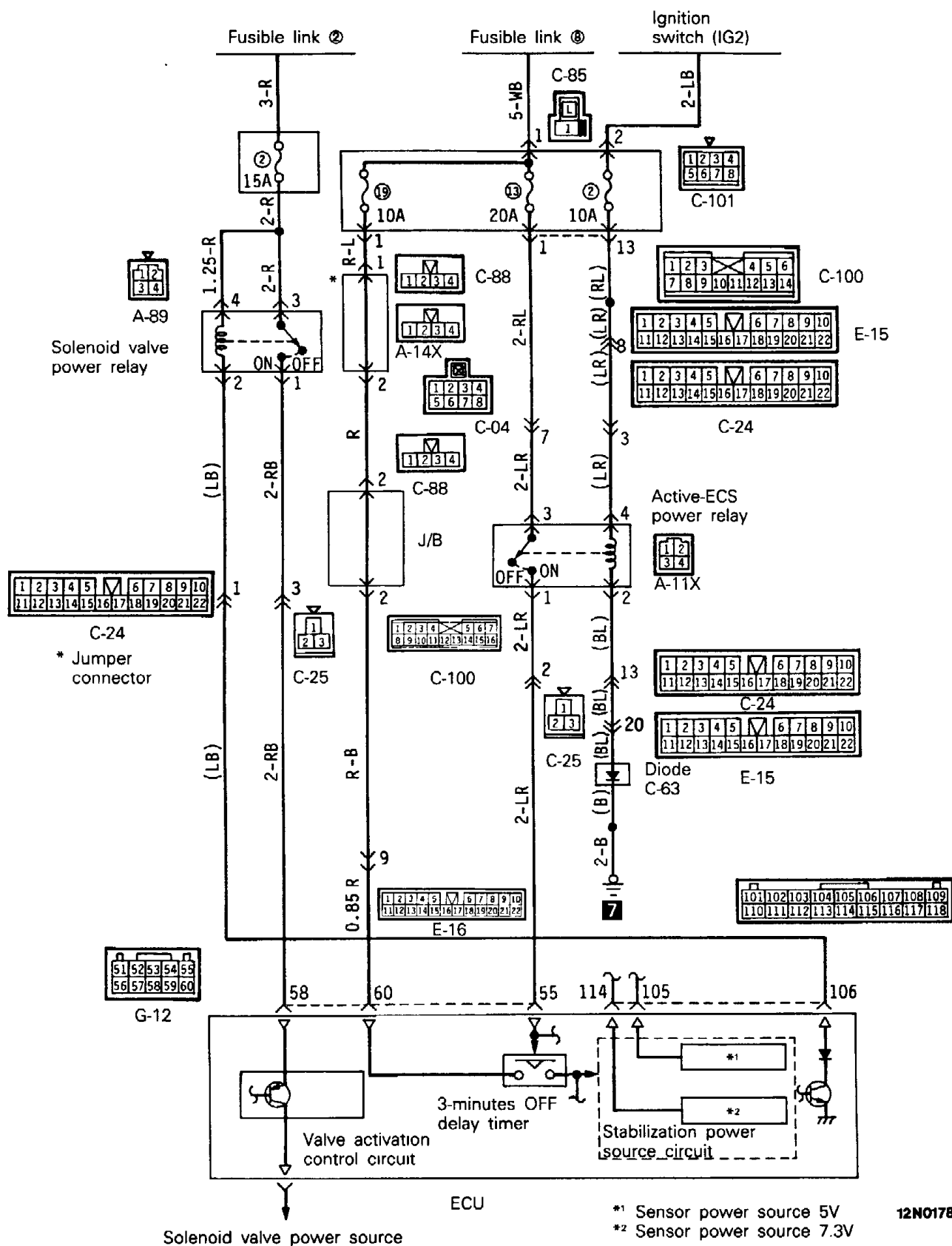
Troubleshooting hints

Malfunction mode	Malfunction probable cause	Malfunction	Note
Harness wiring damage or disconnection.	Harness wiring damage or disconnection, or improper switch contact.	Compressor doesn't operate.	–
Harness short-circuit.	Harness short-circuit, or switch short-circuit.	Compressor operates without stopping.	Diagnosis No. 55 output.
Air leakage.	O-ring worn or damaged.	Rolling control feeling of incompatibility, very frequent operation of compressor.	–

33B-34 ACTIVE-ELECTRONIC CONTROL SUSPENSION – Troubleshooting

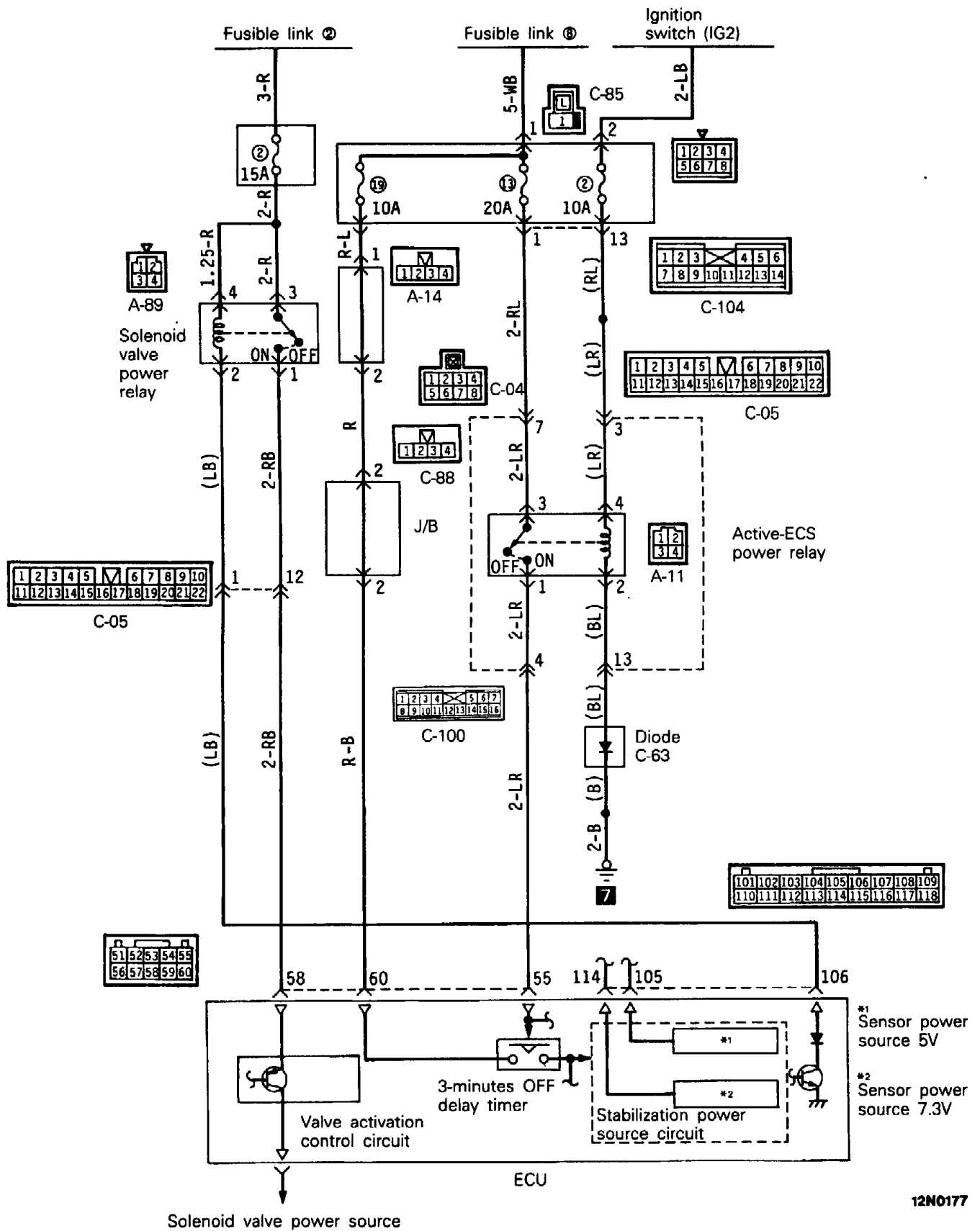
[6] ACTIVE-ECS POWER SOURCE CIRCUIT

<L.H. drive vehicles>



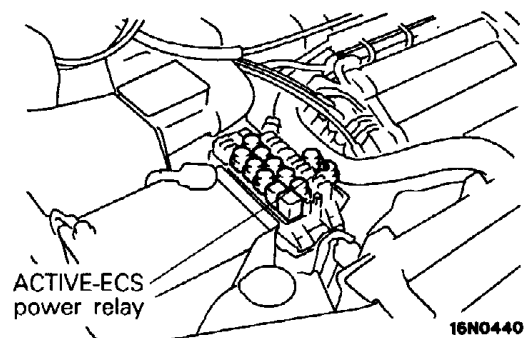
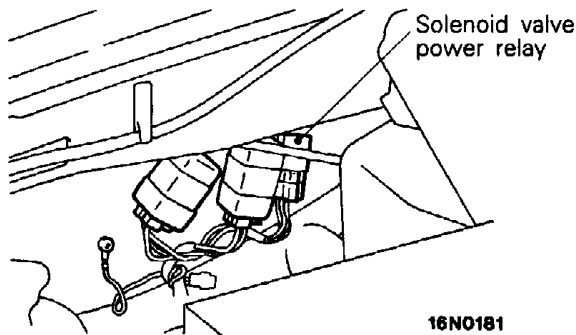
12N0178

<R.H. drive vehicles>



12N0177

33B-36 ACTIVE-ELECTRONIC CONTROL SUSPENSION – Troubleshooting



Operation

When the ignition is switched ON, the ECS power relay is also switched ON, and power is supplied to the system. At the same time, the ECU switches ON the solenoid valve power relay, and power is supplied to the solenoid valve activation circuit. As a result, system operation is possible.

When the ignition switch is switched OFF after driving, the three-minute OFF delay timer makes vehicle-height adjustment (down only) possible for a period of three minutes, thus preventing the vehicle height from increasing while passengers get out of the vehicle, etc.

Diagnosis

When problems such as damage or disconnection of the heavy-line circuit, or fusing of the contacts of the solenoid valve power relay, etc. occur, the

alarm lamp illuminates, and control is as described in the table below.

Diagnosis No.	Attitude control	Damping force control	Vehicle-height control	Switch acceptance	
				HIGH	AUTO
42	Rolling control only stops.	Held at MEDIUM	Rolling control only stops	Not accept	

Service data indication

Code No.	Indication
16	Indicates ON/OFF status of the ignition switch.

ECU terminal voltage (when connector is connected)

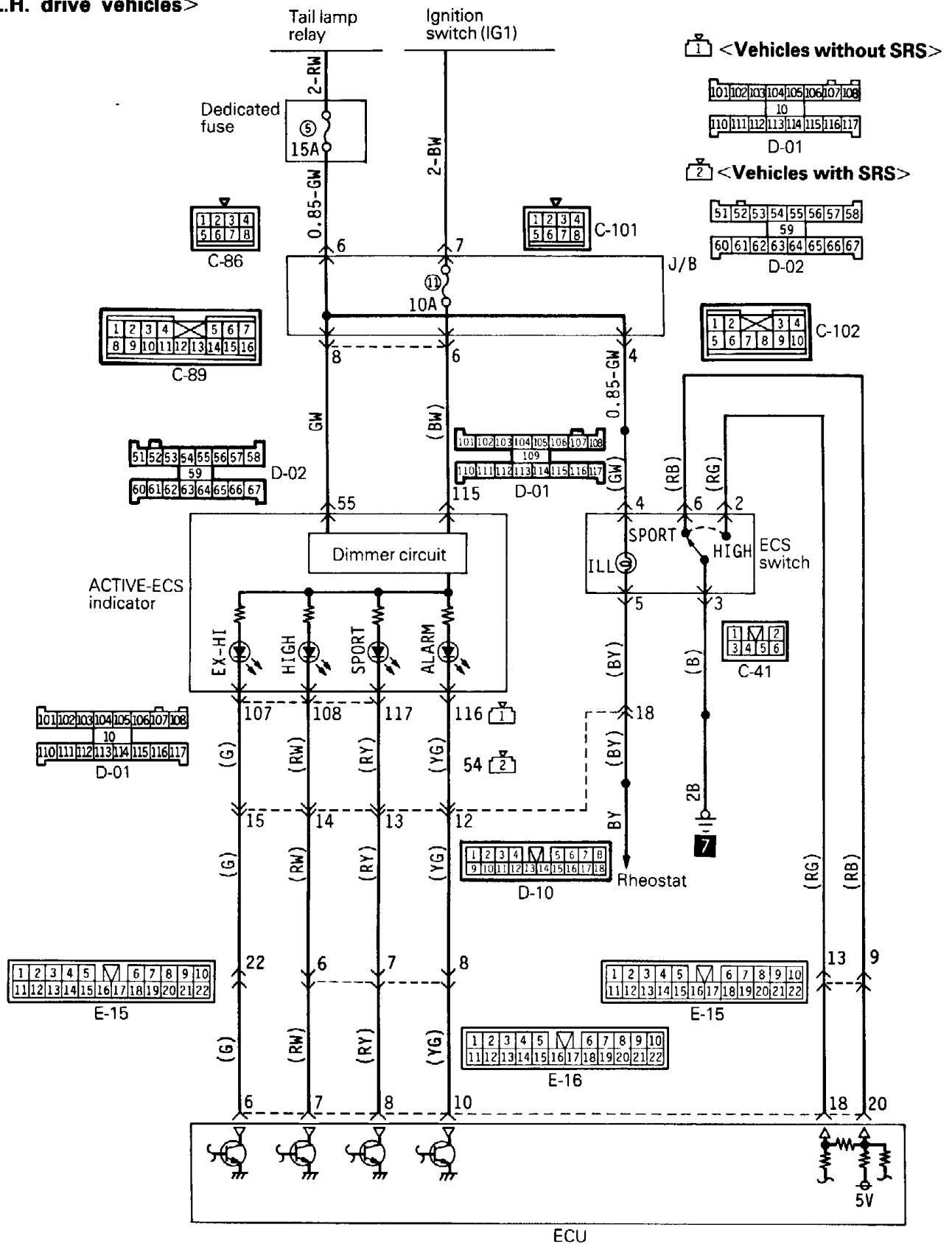
Terminal No.	Signal	Condition	Terminal voltage
55	Ignition (IG2) power source signal	When ignition switch is ON	System voltage
		When ignition switch is OFF	Approx. 0V
58	Solenoid valve power relay output signal	When system is normal	System voltage
		During fail-safe	Approx. 0V
60	Battery (+B) power source	Constantly	System voltage
114	Sensor power source (7.3V)	Constantly	6.3 – 8.3V
105	Sensor power source (5V)	Constantly	4.5 – 5.5V
106	Solenoid valve power relay drive signal	When solenoid valve power relay is ON	0–1.0V
		When solenoid valve power relay is OFF	System voltage

Checking the ACTIVE-ECS power source circuit (with the connector disconnected)

Terminal No.	Connection destination or measured part	Measurement	Tester connection	Check condition	Standard
55	Ignition switch	Voltage	55-earth	Ignition switch OFF	Approx. 0V
				Ignition switch OFF → ON	0V → System voltage
58	Solenoid valve power relay	Voltage	58-earth	Terminal 106 open.	Approx. 0V
				Terminal 106 earthed.	0V → System voltage
60	ECU back-up power source	Voltage	60-earth	—	System voltage

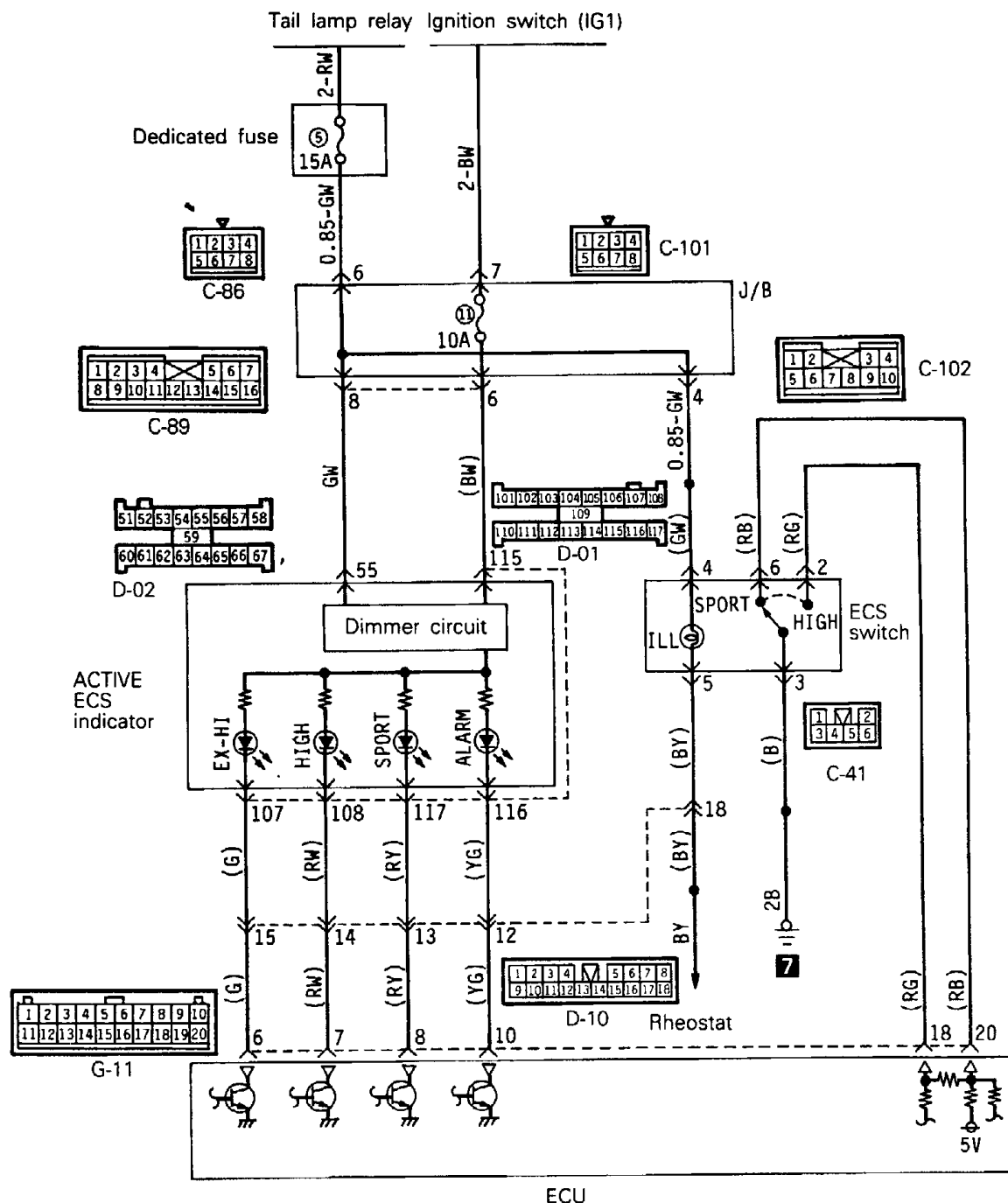
[7] ACTIVE-ECS INDICATORS CIRCUIT

<L.H. drive vehicles>

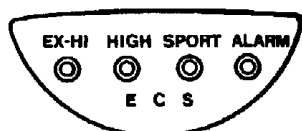


16N0918

<R.H. drive vehicles>



12N0040



74N0011

ACTIVE-ECS INDICATOR INSPECTION CHART

After the ignition key has been turned to ON, check if the indicator lamps illuminate until approximately 0.5 second after the engine is started.

33B-40 ACTIVE-ELECTRONIC CONTROL SUSPENSION – Troubleshooting

Service data indication

Code No.	Indication	Standard value	
17	ECU input voltage indications when SPORT, HIGH switches are pressed.	When switches are open	Approx. 5V
		When SPORT switch is ON	Approx. 0V
		When HIGH switch is ON	Approx. 2.5V

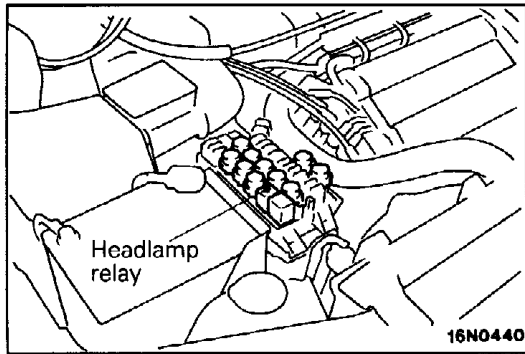
1. Inspection of each ACTIVE-ECS indicator

Disconnect the control unit connector and turn the ignition switch to ON.

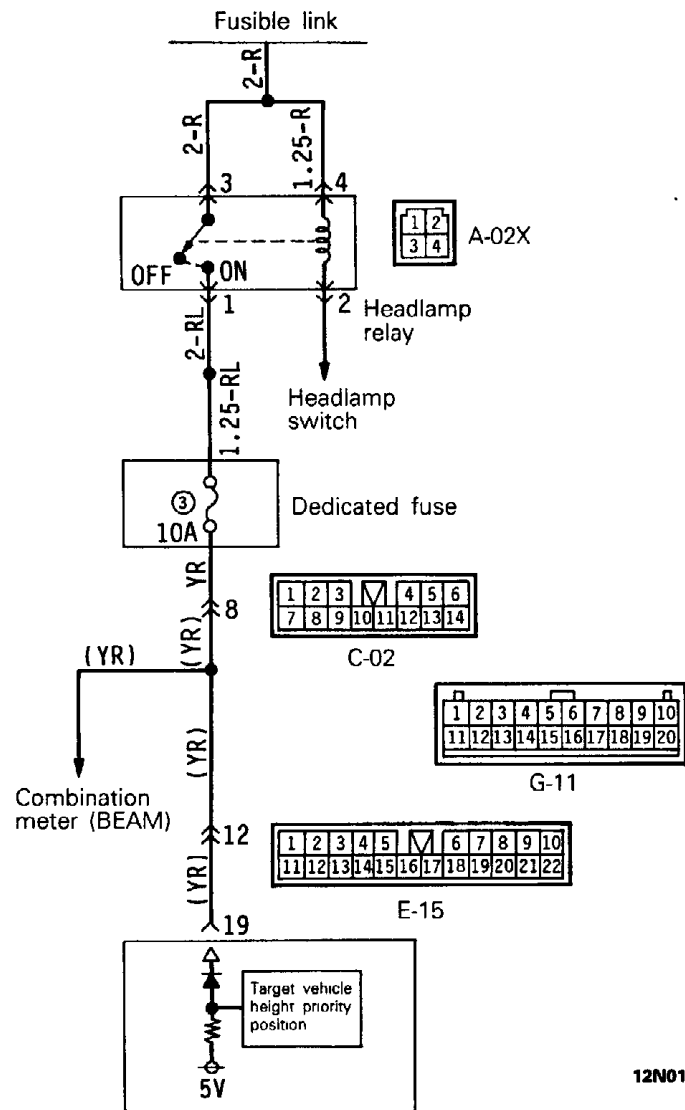
Earth each terminal in the connector that has been disconnected from the control unit.

Connector Side Earth Terminal No.	Normal Condition
10	"ALARM" illuminates
8	"SPORT" illuminates
7	"HIGH" illuminates
6	"EX-HI" illuminates

[8] HEADLAMP SWITCH CIRCUIT

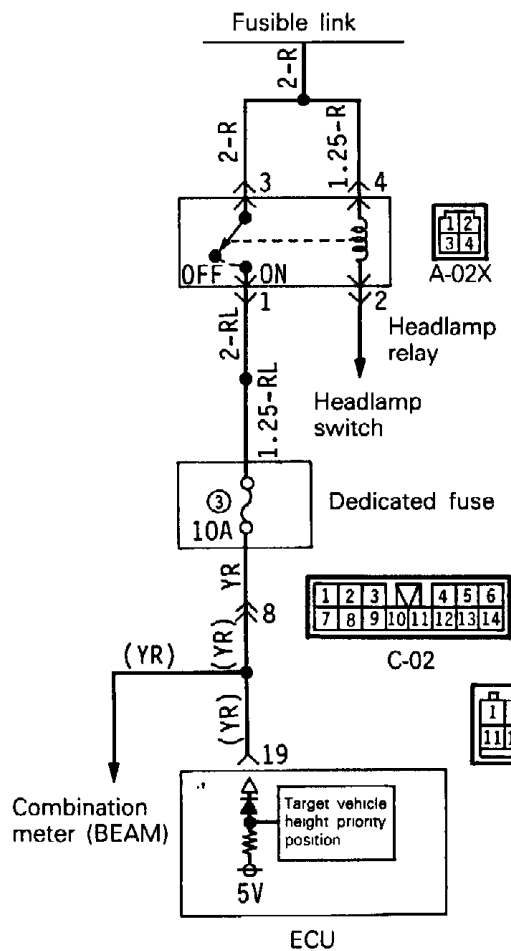


<L.H. drive vehicles>



12N0173

<R.H. drive vehicles>



12N0041

33B-42 ACTIVE-ELECTRONIC CONTROL SUSPENSION – Troubleshooting

Operation

The ACTIVE-ECS system functions, in order to improve the "air drag" characteristic, to adjust the vehicle height to the LOW setting at the front end only during the daytime when the vehicle speed reaches 120 km/h (75 mph) or higher and continues at that speed for a period of ten seconds or longer.

During the nighttime, however, in order to prevent deviation of the headlamp beams from the required directional path, the vehicle height is adjusted to the LOW setting for both the front end and the

rear end when signals from the headlamp relay are input.

Because the headlamps illuminate in the daytime for vehicles equipped with the daytime running lamps and for vehicles equipped with dim-dip lamps, the LOW vehicle height is always selected and maintained for both the front and rear of the vehicle when the vehicle is driven at a vehicle speed of 120 km/h (75 mph) or higher for ten seconds or longer continuously.

Service data indication

Code No.	Indication
18	Indicates the ON or OFF status of the headlamp switch.

ECU terminal voltages (when connector is connected)

Terminal No.	Signal	Condition	Terminal voltage
19	Headlamp switch signal	When headlamp switch is ON	System voltage
		When headlamp switch is OFF	Approx. 0V
		When there is damaged or disconnected wiring	4 – 8V

Headlamp switch circuit (with the connector disconnected)

Terminal No.	Connection destination or measured part	Measurement	Tester connection	Check condition	Standard
19	Headlamp relay	Voltage	19-earth	When the headlamp switch is OFF	Approx. 0V
				When the headlamp switch is ON	System voltage

33B-44 ACTIVE-ELECTRONIC CONTROL SUSPENSION – Troubleshooting

Operation

The slitted disc installed to the steering shaft interrupts, or allows light to pass with the result that electric signals corresponding to the angular-

velocity of the steering wheel movement are detected and passed to the ECU.

Diagnosis

If there is damage or disconnection of the heavy-line circuit, the alarm lamp illuminates and control

is as described in the table below.

Diagnosis No.	Attitude control	Damping force control	Vehicle-height control	Switch acceptance	
				HIGH	AUTO
21	Control stop	Held at MEDIUM	Held at NORM vehicle height.	Not accept	

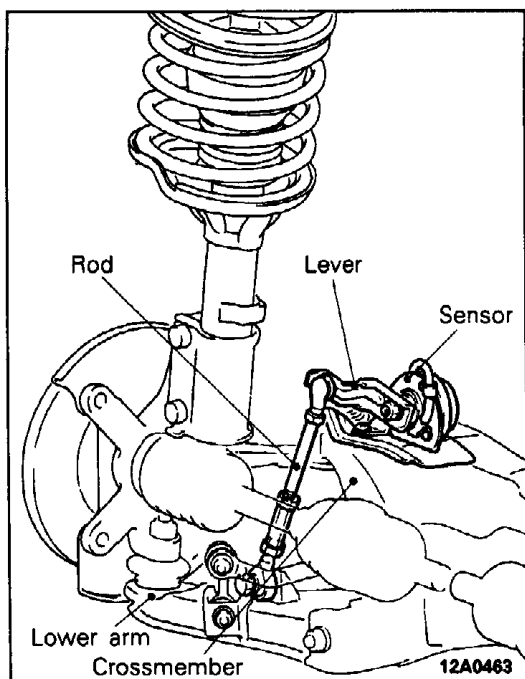
Service data indication

Code No.	Indication
21	Indicates the ON or OFF status individually for STR. 1 and STR. 2.

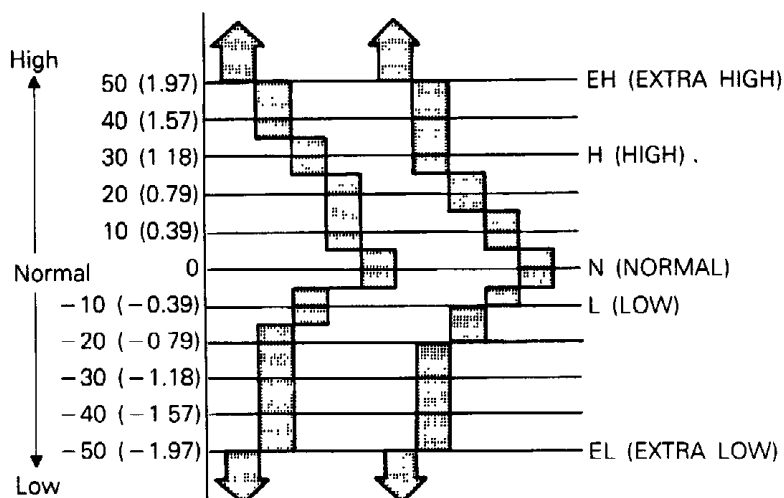
ECU terminal voltages (when connector is connected)

Terminal No.	Signal	Condition	Terminal voltage
105	Power source for sensor	When the ECU is activated	4 – 8V
153	Steering wheel sensor (A)	When the photo-interruptor is ON	Approx. 0V
160	Steering wheel sensor (B)	When the photo-interruptor is OFF	3.0–4.0V
		When there is damage or disconnection of the harness	4 – 8V
116	Sensor circuit earth	Constantly	Approx. 0V

[10] FRONT-HEIGHT SENSOR CIRCUIT



Relationship between N (normal vehicle height) and other vehicle-height levels



[Unit : mm (in)]

12A0560

101	102	103	104	105	106	107	108	109
110	111	112	113	114	115	116	117	118

G-13

151	152	153	154	155	156	157
158	159	160	161	162	163	164

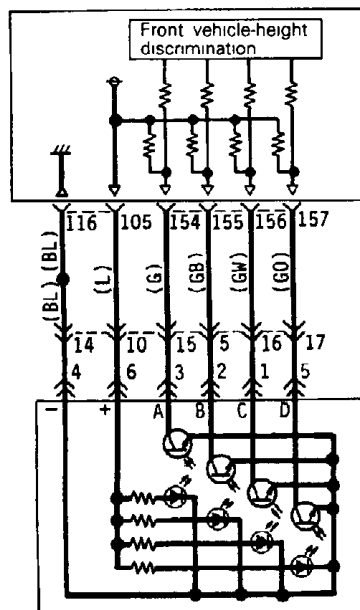
G-14

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22								

C-24 (LHD)
C-05 (RHD)

1	2	3
4	5	6

A-63



Front-height sensor

12N0057

Operation

The front-height sensor detects (by detecting the relative position of the body and the front axle) the action movements (bouncing, nose diving, etc.), and the vehicle height, of the front of the vehicle.

The rotating disc plate rotates in the area between four pairs of light-emitting diodes and photo-

transistors, and the slits in the disc thus interrupt, or let pass, the light beams between the light-emitting diodes and the photo-transistors.

By employing the data gathered in this way, the sensor can detect the vehicle height as any one of the nine level classifications.

33B-46 ACTIVE-ELECTRONIC CONTROL SUSPENSION – Troubleshooting

Diagnosis

When a signal (error code) indicating an abnormal condition (resulting from damage or disconnection of the heavy-line circuit, or a malfunction of a

photo-transistor, etc.) is input, the alarm lamp illuminates and control is as described in the table below.

Diagnosis No.	Attitude control	Damping force control	Vehicle-height control	Switch acceptance	
				HIGH	AUTO
22	Control stop	Held at MEDIUM	Control stop	Not accept	

Service data indication

Code No.	Indication
22	Current vehicle-height level (ERROR when there is a malfunction) Indicates the ON or OFF status of each photo-interruptor.

ECU terminal voltages (when connector is connected)

Terminal No.	Signal	Condition	Terminal voltage
105	Power source for sensor	When the ECU is activated	4 – 8V
154, 155 156, 157	Front vehicle-height signal	When the photo-interruptors are ON	Approx. 0V
		When the photo-interruptors are OFF	4 – 8V
116	Sensor circuit earth	Constantly	Approx. 0V

Troubleshooting hints (mechanical malfunctions)

Malfunction mode	Malfunction probable cause	Malfunction	Note
Improper adjustment of the front-height sensor rod.	Because of the improper adjustment of the front-height sensor rod, a signal not corresponding to the actual vehicle height is being sent to the ECU.	• When the engine is stopped and left as it is, the height of only the front end decreases to lower than the NORMAL vehicle height. • With the engine running, the height of the front end is lower than the NORMAL vehicle height. • With the engine running (AUTO mode and NORMAL vehicle height), the height of the front end becomes higher than the NORMAL height).	—

33B-48 ACTIVE-ELECTRONIC CONTROL SUSPENSION – Troubleshooting

Diagnosis

When a signal (error code) indicating an abnormal condition (resulting from damage or disconnection of the heavy-line circuit, or a malfunction of a

photo-transistor, etc.) is input, the alarm lamp illuminates and control is as described in the table below.

Diagnosis No.	Attitude control	Damping force control	Vehicle-height control	Switch acceptance	
				HIGH	AUTO
23	Control stop	Held at MEDIUM	Control stop	Not accept	

Service data indication

Code No.	Indication
23	Current vehicle-height level (ERROR when there is a malfunction) Indicates the ON or OFF status of each photo-interruptor.

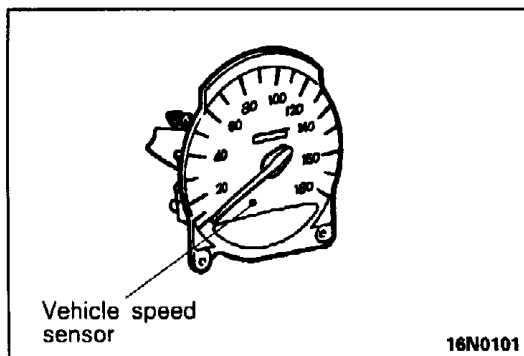
ECU terminal voltages (when connector is connected)

Terminal No.	Signal	Condition	Terminal voltage
105	Power source for sensor	When the ECU is activated	4-8 V
161,162 163	Rear vehicle-height signal	When the photo-interruptors are ON	Approx. 0V
		When the photo-interruptors are OFF	4-8 V
164	Rear vehicle-height signal	Constantly	Approx. 0V
116	Sensor circuit earth	Constantly	Approx. 0V

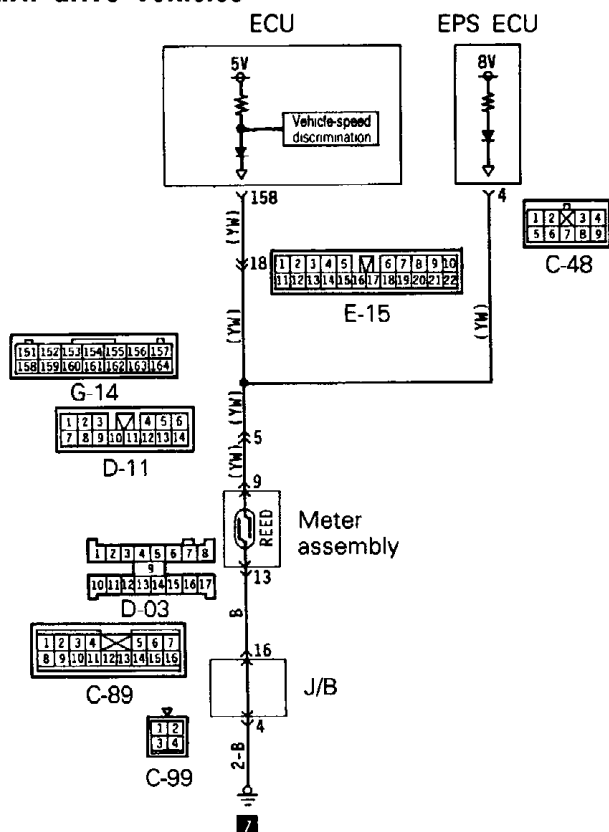
Troubleshooting hints (mechanical malfunctions)

Malfunction mode	Malfunction probable cause	Malfunction	Note
Improper adjustment of the rear-height sensor rod.	Because of the improper adjustment of the rear-height sensor rod, a signal not corresponding to the actual vehicle height is being sent to the ECU.	• When the engine is stopped and left as it is, the height of only the rear end decreases to lower than the NORMAL vehicle height • With the engine running, the height of the rear end is lower than the NORMAL vehicle height. • With the engine running (AUTO mode and NORMAL vehicle height), the height of the rear end becomes higher than the NORMAL height).	—

[12] VEHICLE-SPEED SENSOR CIRCUIT

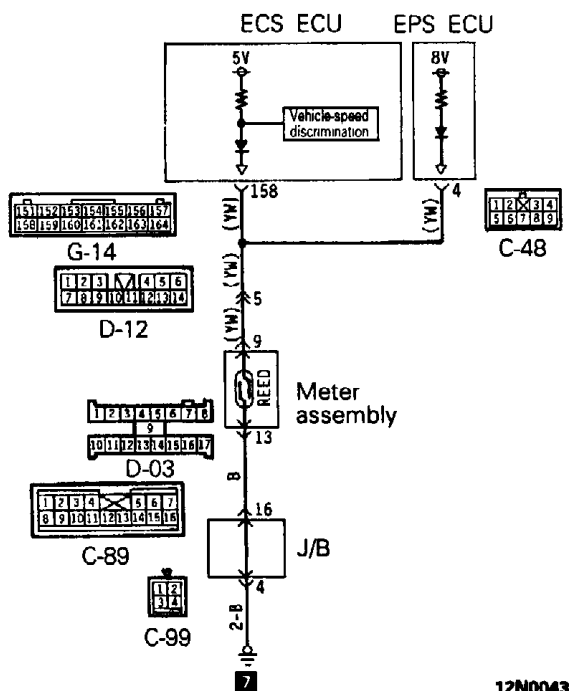


<L.H. drive vehicles>



12N0171

<R.H. drive vehicles>



12N0043

33B-50 ACTIVE-ELECTRONIC CONTROL SUSPENSION – Troubleshooting

Operation

The vehicle-speed sensor is a reed switch type with pulse signals being sent four times for each rotation of the transmission's output gear.

Diagnosis

If there is damage or disconnection of the heavy-line circuit, or a malfunction of the vehicle-speed sensor, the alarm lamp illuminates and control is as described in the table below.

Diagnosis No.	Attitude control	Damping force control	Vehicle-height control	Switch acceptance	
				HIGH	AUTO
24	Control stop	Held at MEDIUM	Held at NORMAL	Not accept	

Service data indication

Code No.	Indication
24	Indicates the vehicle speed input to the ECU (including the simulated vehicle speed).

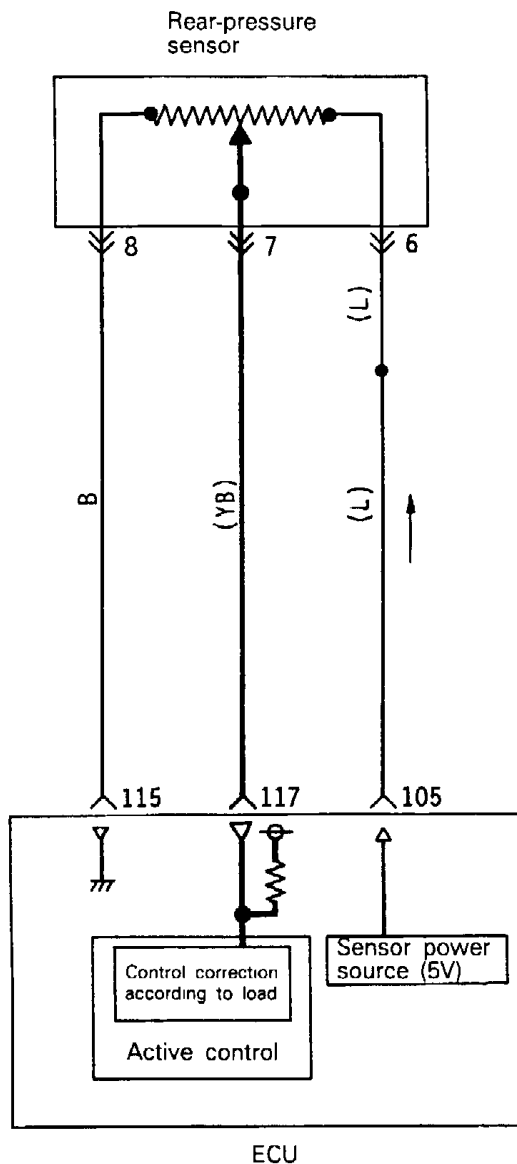
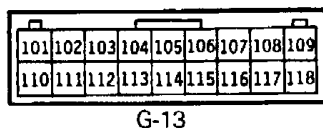
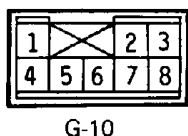
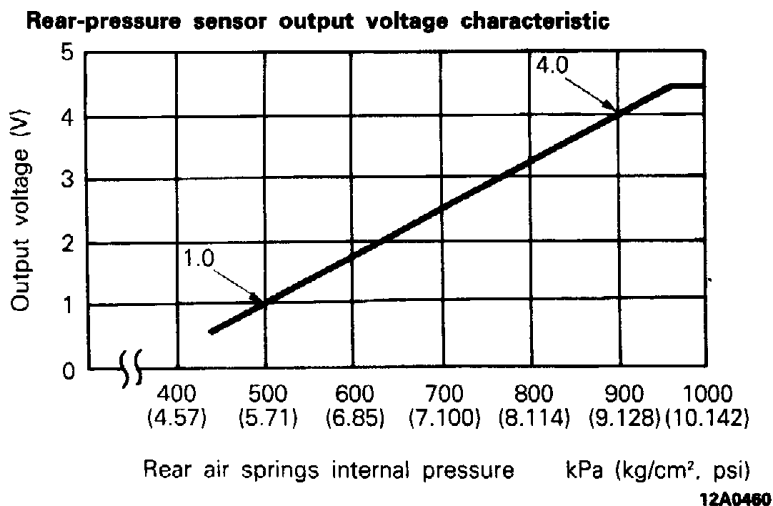
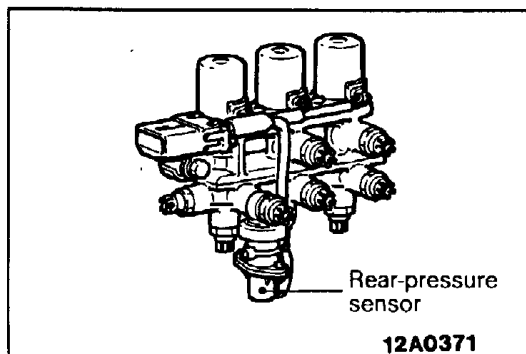
ECU terminal voltages (when connector is connected)

Terminal No.	Signal	Condition	Terminal voltage
158	Vehicle-speed signal	When the vehicle-speed sensor reed switch is ON	Approx. 0V
		When the vehicle-speed sensor reed switch is OFF	7.0 – 9.0V

Checking the vehicle-speed sensor circuit (with the connector disconnected)

Terminal No.	Connection destination or measured part	Measurement	Tester connection	Check condition	Standard
158	Vehicle-speed sensor	Resistance	158-earth	With the battery's (–) terminal disconnected, move the vehicle back and forth.	Continuity I No continuity

[13] REAR-PRESSURE SENSOR CIRCUIT



12N0058

33B-52 ACTIVE-ELECTRONIC CONTROL SUSPENSION – Troubleshooting

Operation

The rear-pressure sensor detects the internal pressure of the rear air springs.

Although the timing of air supply and exhaust for control of the vehicle attitude is basically determined according to a predetermined "map", the

supplying and exhaust times are corrected as necessary, according to data from this sensor, in order to cope with changes of the load carried by the vehicle and other factors.

Diagnosis

If, because of damage or disconnection of the heavy-line circuit, or a malfunction of the rear-pressure sensor, etc., a higher than normal value of the internal pressure of the air springs is in-

dicated continuously, the alarm lamp illuminates, and control is as described in the table below. Note, however, this diagnosis signal is given if there is an overload.

Diagnosis No.	Attitude control	Damping force control	Vehicle-height control	Switch acceptance	
				HIGH	AUTO
25	Control stop	Normal operation	Only the vehicle-height increase control function stops.	Not accept	Accept

Service data indication

Code No.	Indication	Standard value
25	Rear-pressure sensor output voltage	Fluctuates within a range of 0.5V to 4.5V when the body is shaken from side to side.

Condition		Reference value
Front seats: 2 persons	When EXTRA HIGH	Approx. 2.45V
	When HIGH vehicle height	Approx. 1.60V
	When NORMAL vehicle height	Approx. 0.90V
	When LOW vehicle height	Approx. 0.86V

ECU terminal voltages (when connector is connected)

Terminal No.	Signal	Condition	Terminal voltage
105	Power supply for sensor	When the ECU is activated	4 – 8V
117	Rear air spring pressure signal	Low rear air spring pressure High rear air spring pressure	0.5V ↑ 4.5V
		When wiring is damaged or disconnected	4 – 8V
115	Sensor circuit earth	Constantly	0V

Checking the rear-pressure sensor (with the connector disconnected)

Terminal No.	Connection destination or measured part	Measurement	Tester connection	Check condition	Standard
105 115	Rear-pressure sensor All resistances	Resistance	105–115	–	3.5–7.0 kΩ
105 117	Rear-pressure sensor output	Resistance	117–115	Change should be smooth (according to the air pressure applied to the rear-pressure sensor) within the standard value range shown at the right.	0–5 kΩ

Troubleshooting hints (mechanical malfunctions)

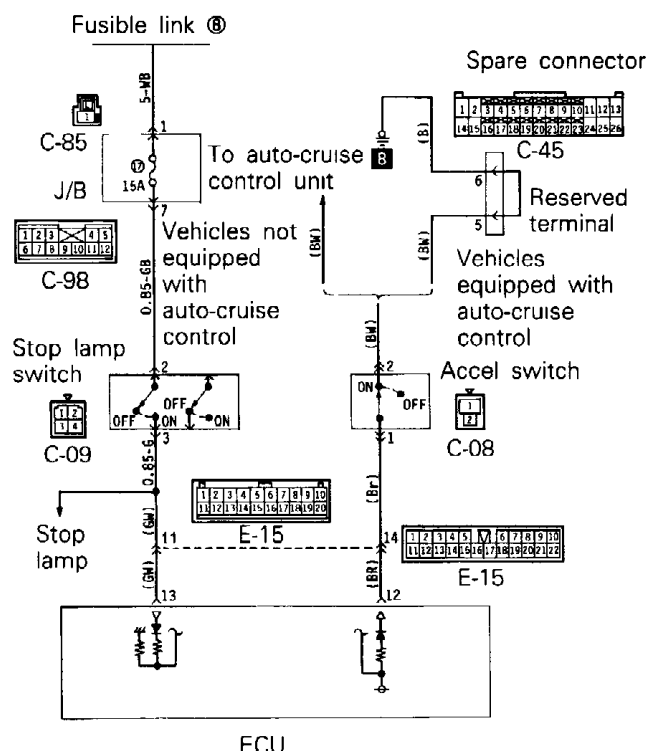
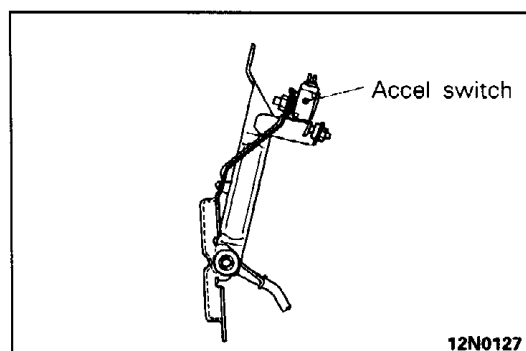
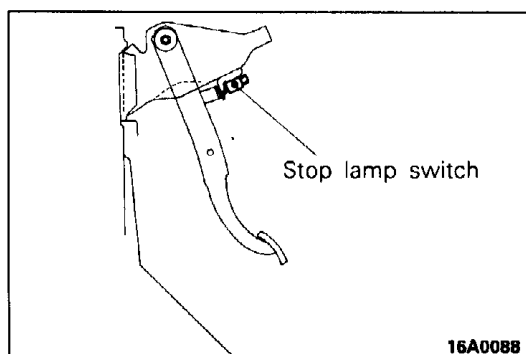
Malfunction mode	Malfunction probable cause	Malfunction	Note
Harness short-circuit	Because of a short-circuit of the harness, etc., no correction of the air-supply and exhaust time can be made to compensate for a loaded condition of the vehicle.	Insufficient control of the attitude, resulting in a feeling of incompatibility.	–
Air leakage	Wear, damage, etc. of the O-ring	Vehicle height decreases if not corrected.	–

33B-54 ACTIVE-ELECTRONIC CONTROL SUSPENSION – Troubleshooting

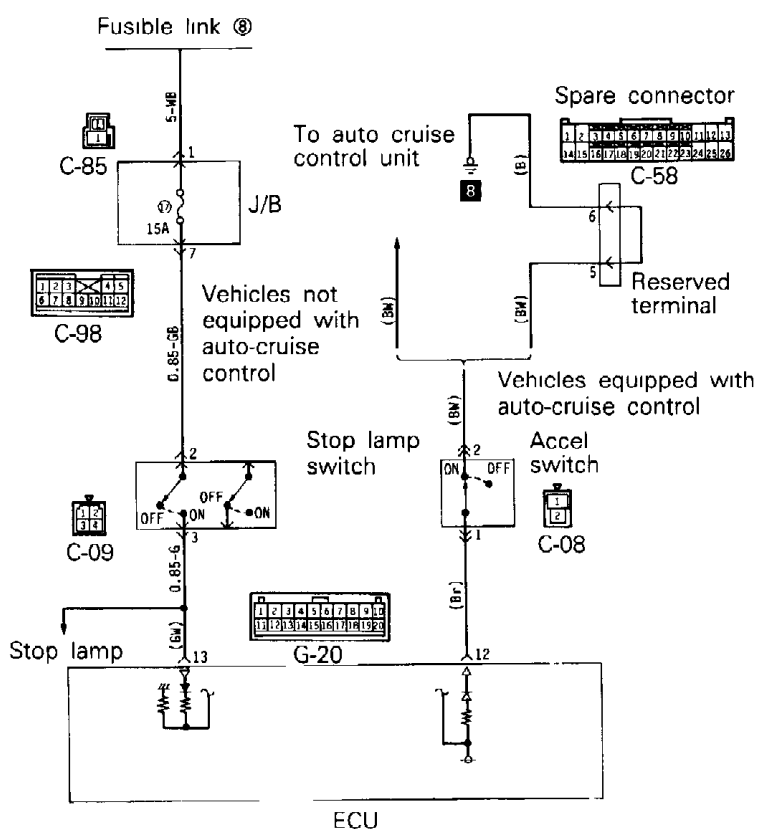
[14] STOP LAMP SWITCH CIRCUIT/ACCEL SWITCH CIRCUIT

<Vehicles built up to October, 1991>

<L.H. drive vehicles>



<R.H. drive vehicles>



Operation

When the brake pedal is depressed, the stop lamp switch is switched ON and 12V is sent to the ECU, thus resulting is the detection that braking is in progress.

When the accel pedal is depressed, the accel switch is switched OFF and ECU power supply 5V is earthed, thus resulting is the detected that accel is in progress.

Service data indication

Code No.	Indication
26	Indicates the ON or OFF status of the stop lamp switch.
34	Indicates the ON or off status of the accel switch.

ECU terminal voltages (when connector is connected)

Terminal No.	Signal	Condition	Terminal voltage
13	Stop lamp switch signal	When the stop lamp switch is ON	0V
		When the stop lamp switch is OFF	System voltage
12	Accel switch signal	When the stop lamp switch is ON	0V
		When the stop lamp switch is OFF	System voltage

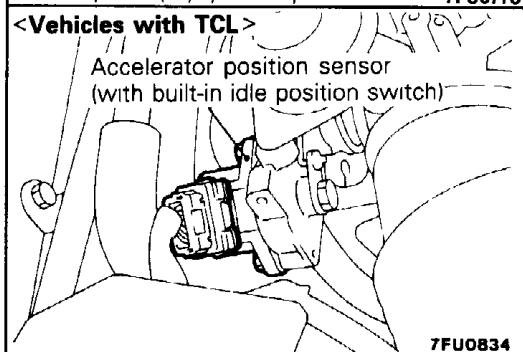
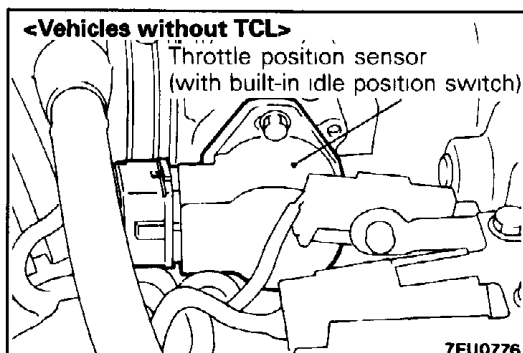
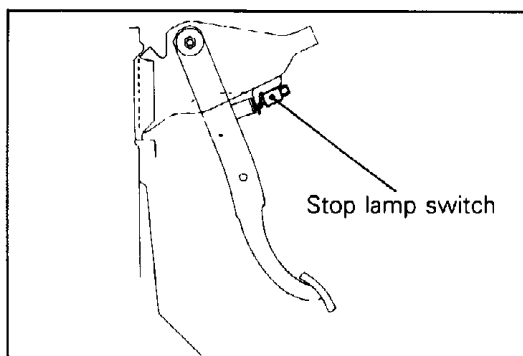
Checking the stop lamp switch circuit (with the connector disconnected)

Terminal No.	Connection destination or measured part	Measurement	Tester connection	Check condition	Standard
13	Stop lamp switch	Voltage	13-earth	Ignition switch ON Depress the brake pedal.	System voltage
				Do not depress the brake pedal.	0V
12	Accel switch	Voltage	12-earth	Ignition switch ON Depress the accel pedal.	System voltage
				Do not depress the accel pedal.	0V

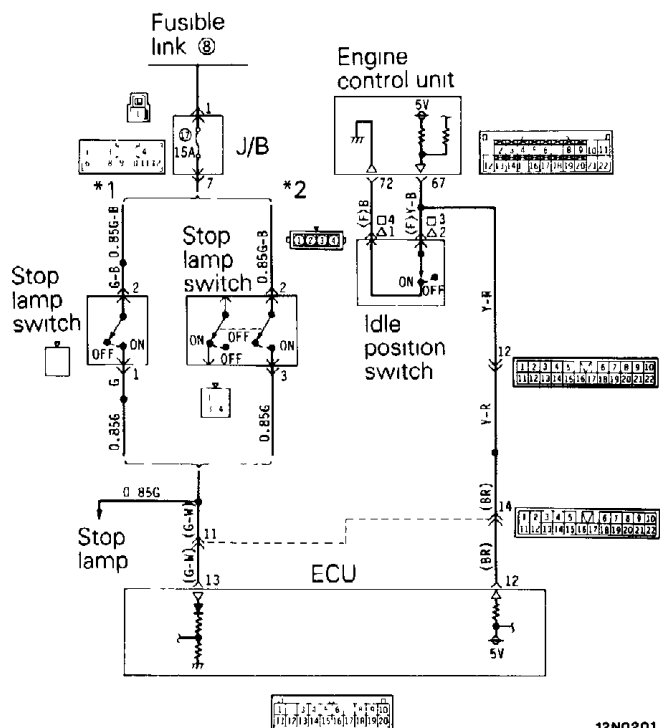
33B-55-1 ACTIVE-ELECTRONIC CONTROL SUSPENSION – Troubleshooting

[14] STOP LAMP SWITCH CIRCUIT/IDLE POSITION SWITCH CIRCUIT

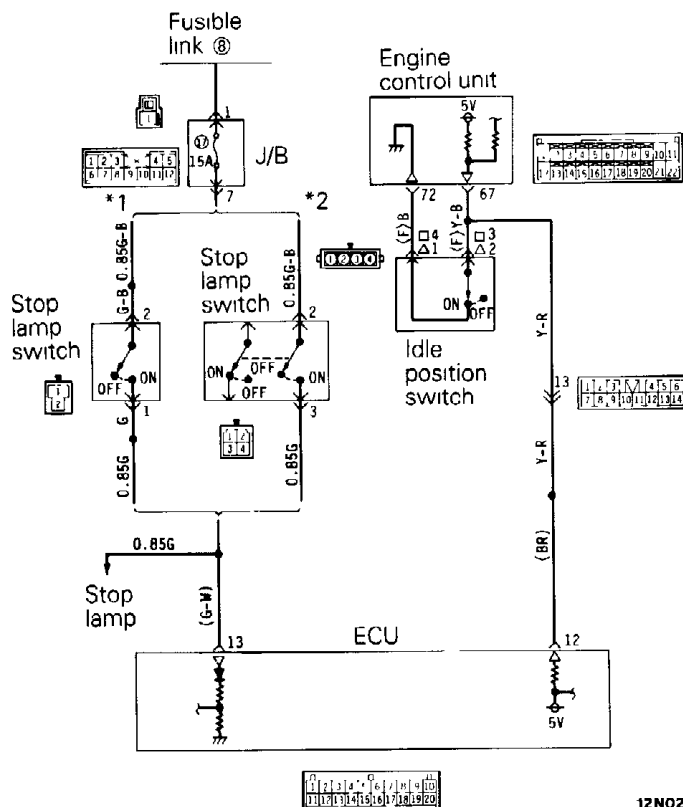
<Vehicles built from November, 1991>



<L.H. drive vehicles>



<R.H. drive vehicles>



NOTE

*1 : Vehicles without auto-cruise control

*2 : Vehicles with auto-cruise control

□ : Vehicles without TCL

△ : Vehicles with TCL

Operation

When the brake pedal is depressed, the stop lamp switch is switched ON and the battery voltage is sent to the ECU, thus resulting is the detection that braking is in progress.

The idle position switch senses whether the accelerator pedal is depressed or not, converts it into high/low voltage and inputs the voltage to the ECU.

Power supply of 5V inside the ECU is applied to the idle position sensor. When the accelerator pedal is released, the idle position switch is turned on to conduct the voltage (5V) to earth. This causes the idle position switch terminal voltage to go low from high.

Service data indication

Code No.	Indication
26	Indicates the ON or OFF status of the stop lamp switch.
34	Indicates the ON or OFF status of the idle position switch.

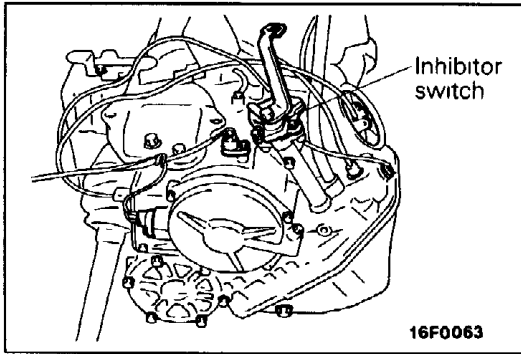
ECU terminal voltages (when connector is connected)

Terminal No.	Signal	Condition	Terminal voltage
13	Stop lamp switch signal	When the stop lamp switch is ON	0V
		When the stop lamp switch is OFF	System voltage
12	Idle position switch signal	When accelerator pedal is depressed	0V
		When accelerator pedal is not depressed	4 – 8 V

Checking the stop lamp switch and idle position switch circuit (with the connector disconnected)

Terminal No.	Connection destination or measured part	Measurement	Tester connection	Check condition		Standard
13	Stop lamp switch	Voltage	13-earth	Ignition switch ON	Depress the brake pedal.	System voltage
					Do not depress the brake pedal.	0V
12	Idle position switch	Voltage	12-earth	Ignition switch ON	Depress the accel pedal.	4 – 8 V
					Do not depress the accel pedal.	0V

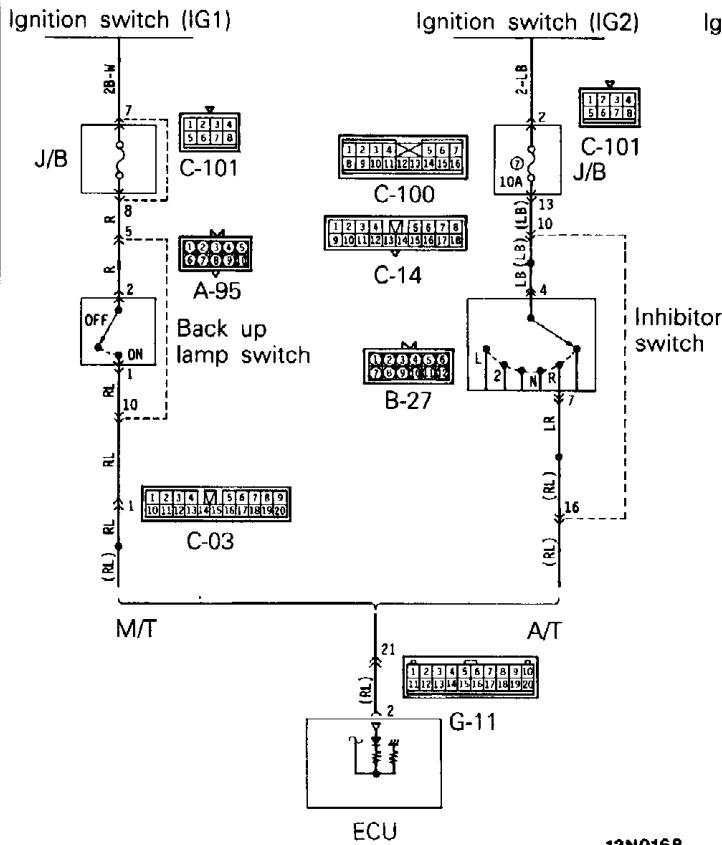
[15] INHIBITOR OR SWITCH CIRCUIT/BACK UP LAMP SWITCH CIRCUIT



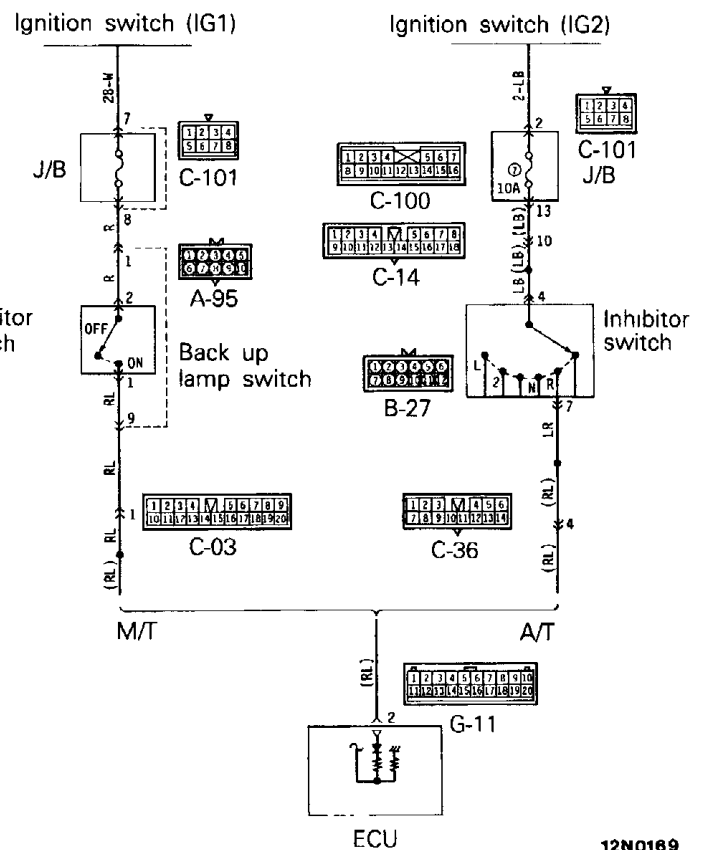
<Vehicles built up to October, 1992>

L.H. drive vehicles

R.H. drive vehicles



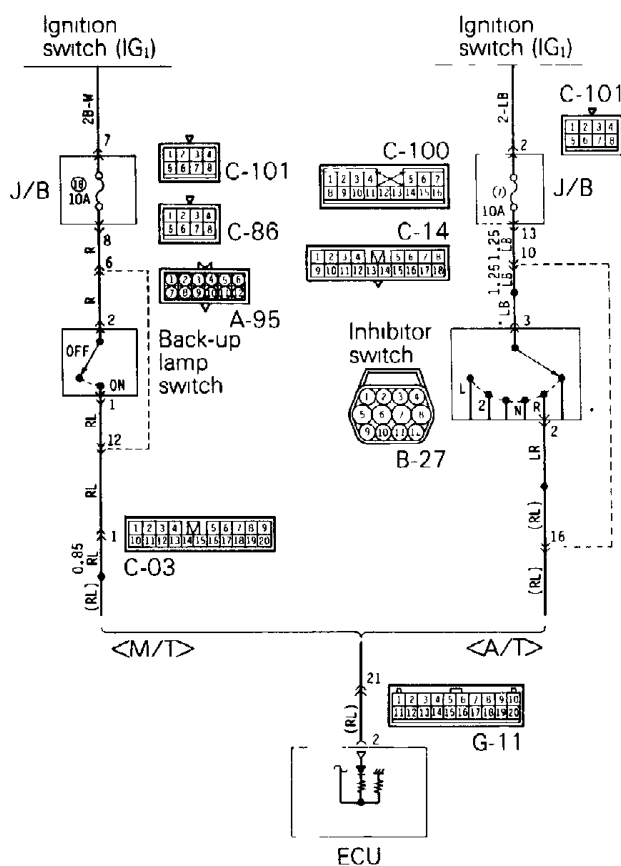
12N0168



12N0169

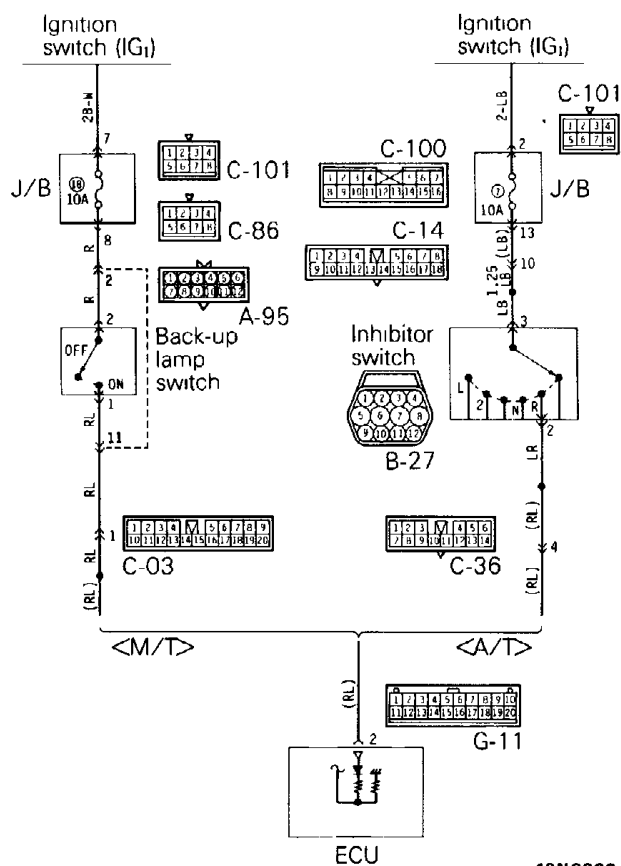
<Vehicles built from November, 1992>

L.H. drive vehicles



12N0208

R.H. drive vehicles



12N0209

Service data indication

Code No.	Indication
31	When the inhibitor switch is in the REVERSE position, ON is displayed, and OFF is displayed in any other position
32	Indicates the ON or OFF status of the back-up lamp switch

ECU terminal voltage (when connector is connected)

Terminal No.	Signal	Condition	Terminal voltage
2	A/T shift signal R	When the inhibitor switch is in the REVERSE position	System voltage
72	Manual transmission back-up signal	When the back-up lamp switch is ON	System voltage

33B-57-1 ACTIVE-ELECTRONIC CONTROL SUSPENSION – Troubleshooting

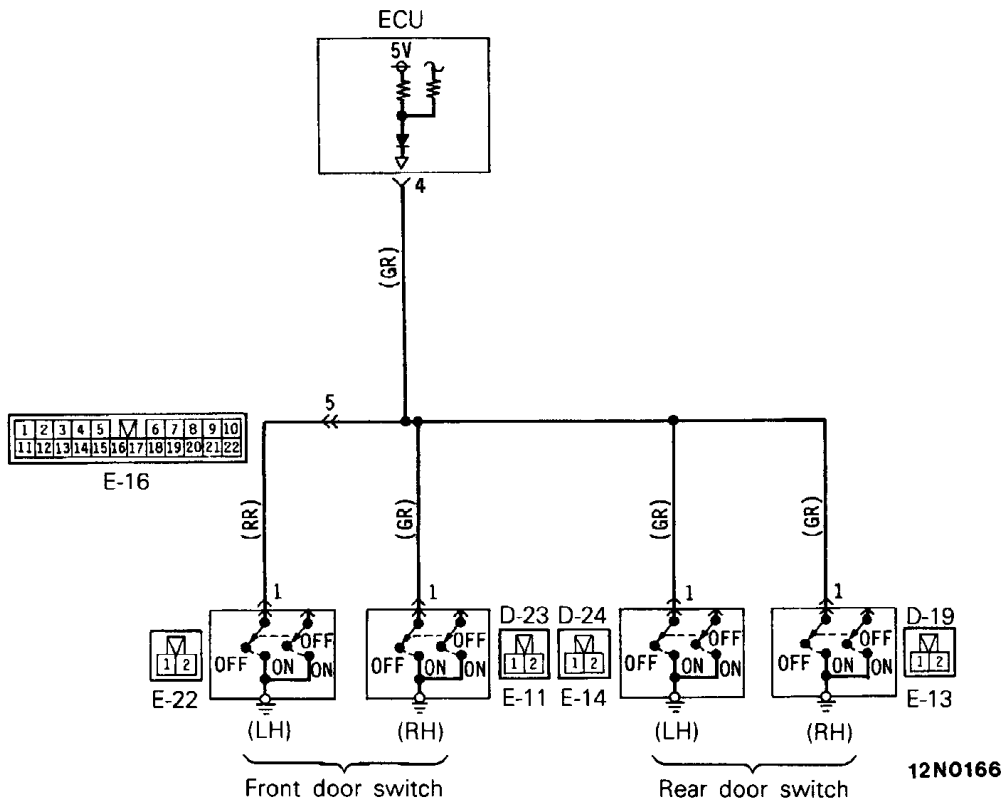
Checking the circuit (with the connector disconnected)

Terminal No.	Connection destination or measured part	Measurement	Tester connection	Check condition		Standard
2	Inhibitor switch "R"	Voltage	2-earth	With the selector lever shifted to the REVERSE position	Ignition switch OFF	0V
					Ignition switch ON	System voltage
72	Back-up lamp	Voltage	72-earth	With the shift lever shifted to the REVERSE position	Ignition switch OFF	Approx. 0V
					Ignition switch ON	System voltage

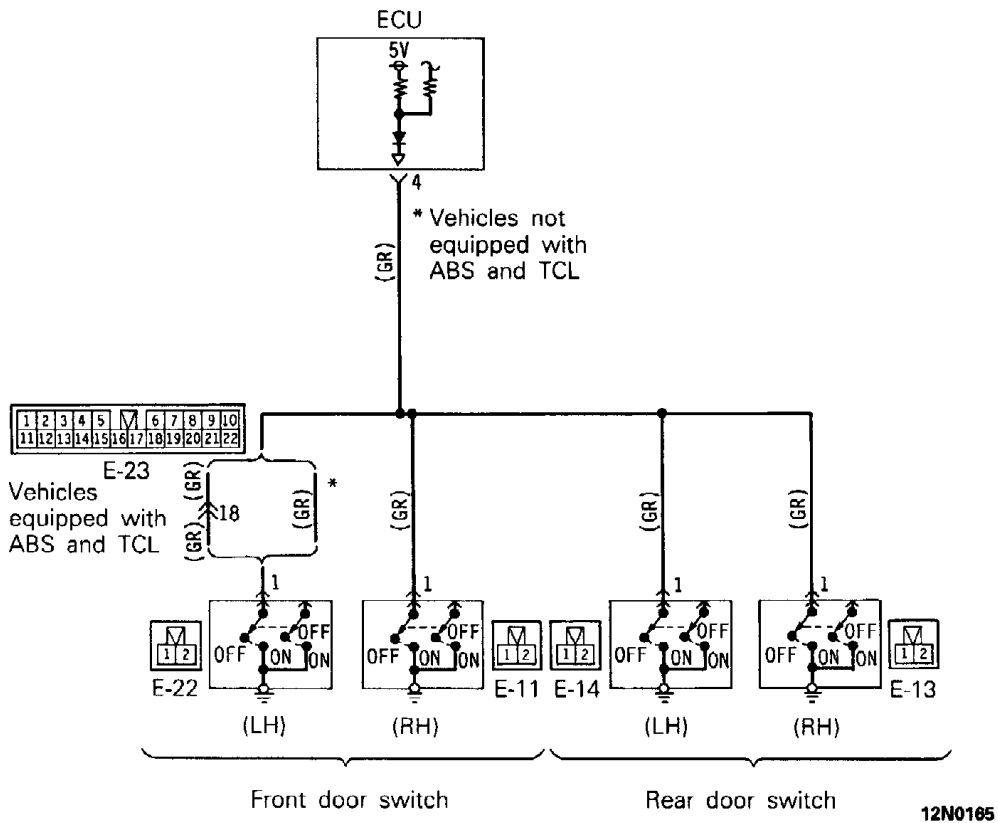
NOTES

[16] DOOR SWITCH CIRCUIT

<L.H. drive vehicles>



<R.H. drive vehicles>



Service data indication

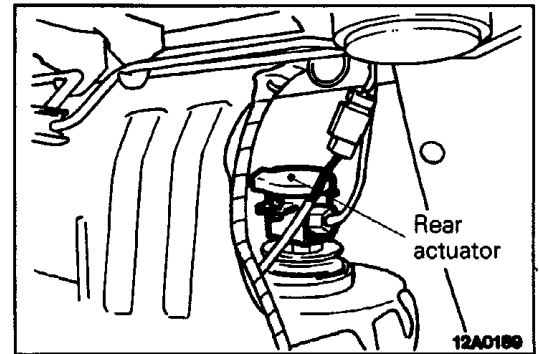
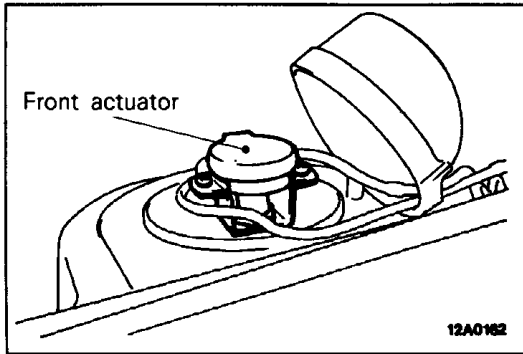
Code No.	Indication
33	Indicates the ON or OFF status of the door switch (indicates ON if at least one door is opened)

ECU terminal voltages (when connector is connected)

Terminal No.	Signal	Condition	Terminal voltage
4	Door switch signal	When a door (at least one) opened	0V
		When the door is closed	System voltage

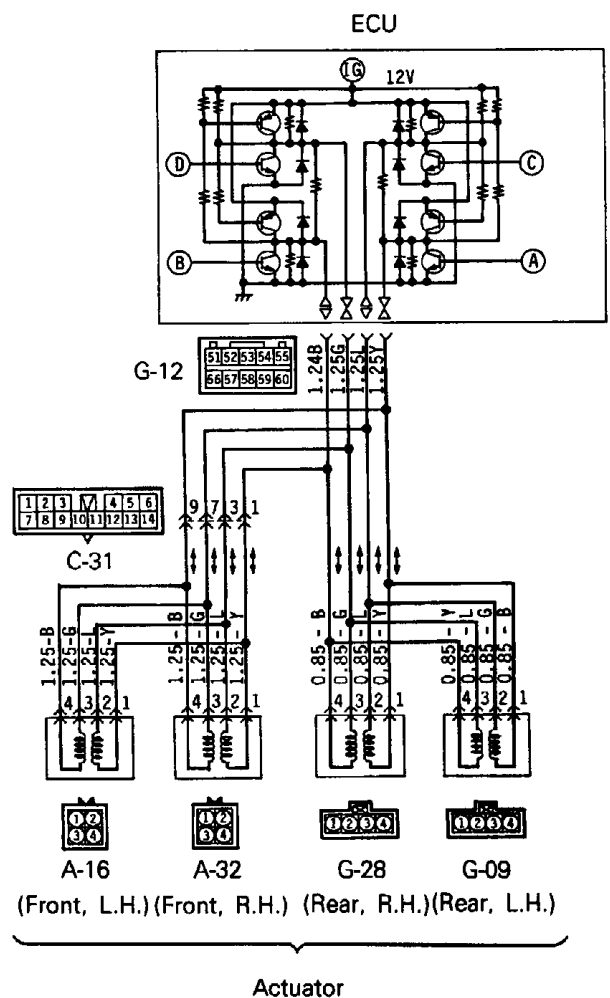
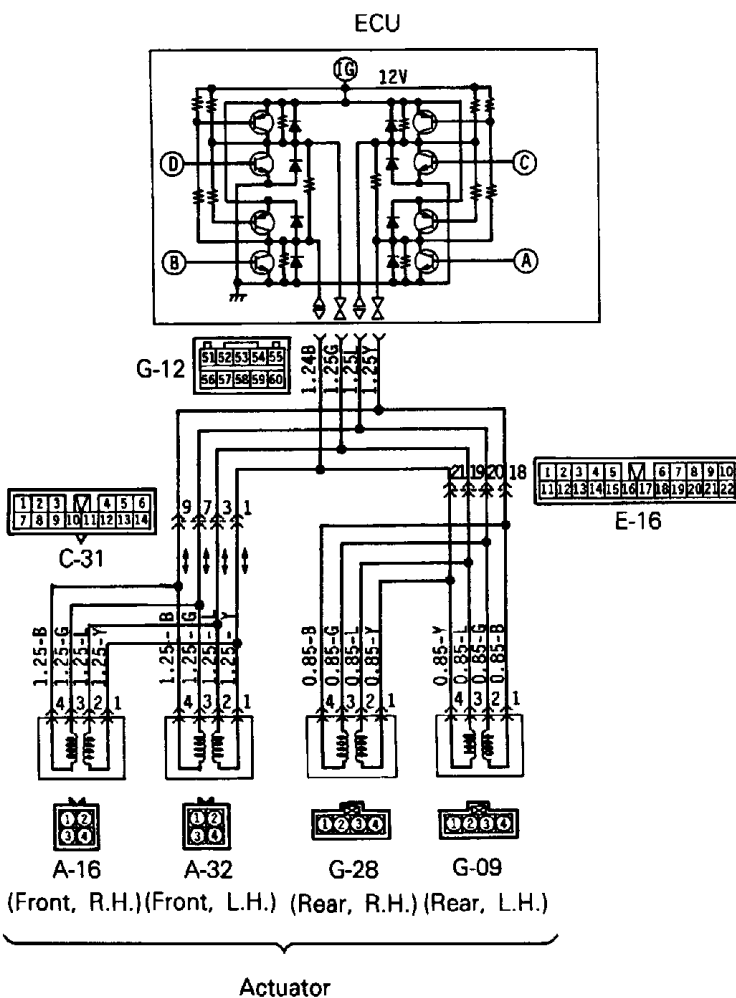
33B-60 ACTIVE-ELECTRONIC CONTROL SUSPENSION – Troubleshooting

[17] DAMPING FORCE SWITCHING ACTUATOR DRIVE CIRCUIT



<L.H. drive vehicles>

<R.H. drive vehicles>



12N0163

12N0164

Operation

The damping force switching actuator is the step motor. The allows the control rod of each shock absorber to rotate, thus selecting the damping

force at one of four levels (HARD, MEDIUM, SOFT' or SOFT).

Diagnosis

If there is damage or disconnection of the heavy-line circuit, the alarm lamp illuminates, and control is as described in the table below. (Because the

actuators are connected in parallel, there can be no detection if wiring damage or disconnection occurs at the final circuit.)

Diagnosis No.	Attitude control	Damping force control	Vehicle-height control	Switch acceptance	
				HIGH	AUTO
41	Control stop	Control stop	Held at NORMAL	Not accept	

Actuator compulsory activation

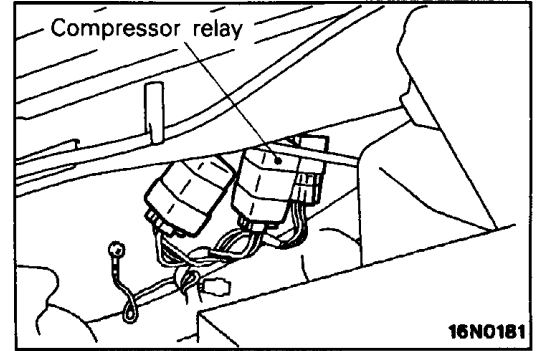
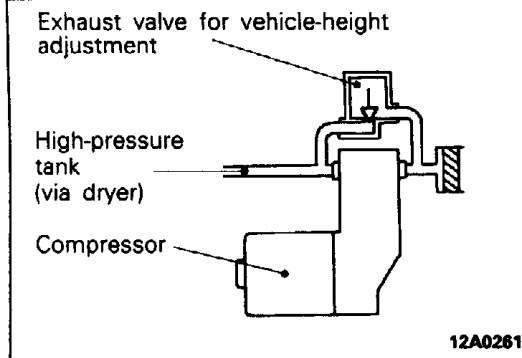
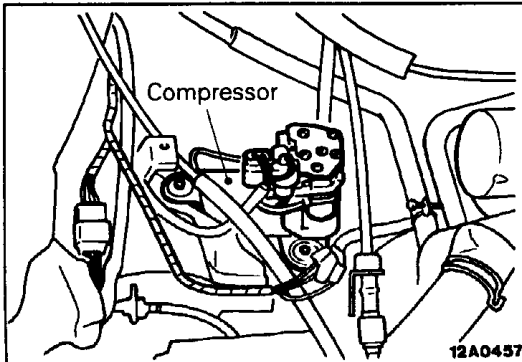
Code No.	Applicable operation	Description of activation
01	SOFT damping force	The damping force is compulsorily switched to SOFT; there is a return to the original damping force three seconds thereafter.
02	SOFT' damping force	The damping force is compulsorily switched to SOFT'; there is a return to the original damping force three seconds thereafter.
03	MEDIUM damping force	The damping force is compulsorily switched to MEDIUM; there is a return to the original damping force three seconds thereafter.
04	HARD damping force	The damping force is compulsorily switched to HARD; there is a return to the original damping force three seconds thereafter.

Checking the damping force switching actuator drive circuit (with the connector disconnected)

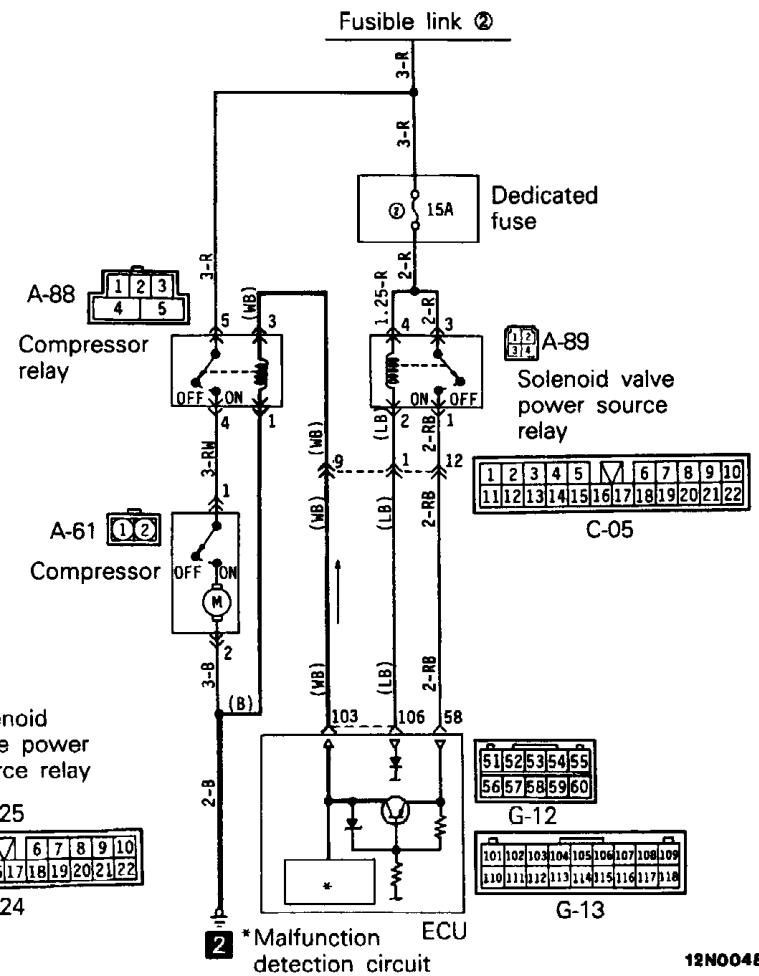
Terminal No.	Connection destination or measured part	Measurement	Tester connection	Check condition	Standard
51 56	Damping force switching actuator (step motor)	Resistance	51-56	Four coils that have a constant resistance of 6.4 ± 0.3 ohms are connected in parallel (front and rear).	Approx. 1.6 Ω
52 57	Damping force switching actuator (step motor)	Resistance	52-57	Four coils that have a constant resistance of 6.4 ± 0.3 ohms are connected in parallel (front and rear).	Approx 1.6 Ω

33B-62 ACTIVE-ELECTRONIC CONTROL SUSPENSION – Troubleshooting

[18] COMPRESSOR DRIVE CIRCUIT



<R.H. drive vehicles>



12N0048

Operation

The compressor is activated when the pressure within the high-pressure tank decreases to 760 kPa (7.6 kg/cm², 108 psi) or lower, and then stops two seconds after the pressure reaches 950 kPa (9.5 kg/cm², 135 psi). Note, however, the compressor is not activated while the return pump is

operating. A thermal switch is provided at the motor circuit. This thermal switch functions to interrupt the power to the motor (in order to protect the compressor) if the temperature within the compressor becomes high.

Diagnosis

If there is damage or disconnection of the heavy-line circuit, or a short-circuit, or a malfunction of the output transistor within the ECU, the alarm lamp illuminates and control is as described in

the table below.

(Note that the diagnosis is only applicable up to the compressor relay.)

Diagnosis No.	Attitude control	Damping force control	Vehicle-height control	Switch acceptance	
				HIGH	AUTO
43	Control stop	Held at MEDIUM	Control stop	Not accept	

Actuator compulsory activation

Code No.	Applicable operation	Description of activation
05	Compressor relay ON	The compressor relay is compulsorily switched ON for a period of three seconds.

ECU terminal voltages (when connector is connected)

Terminal No.	Signal	Condition	Terminal voltage
103	Compressor relay activation signal	When the compressor relay is ON	System voltage
		When the compressor relay is OFF	System voltage
		During fail-safe (solenoid valve power-source relay switch OFF)	0V

Checking the compressor drive circuit (with the connector disconnected)

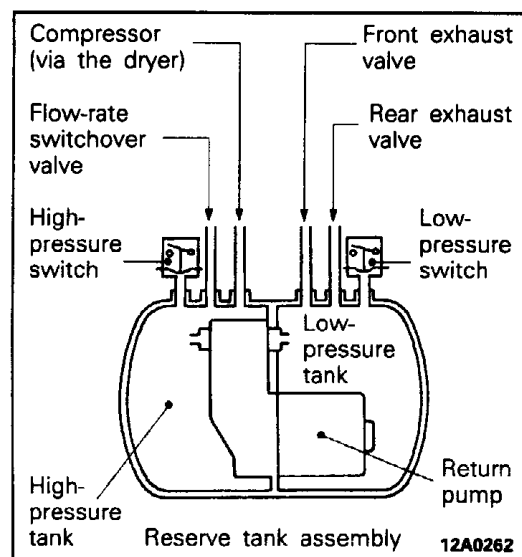
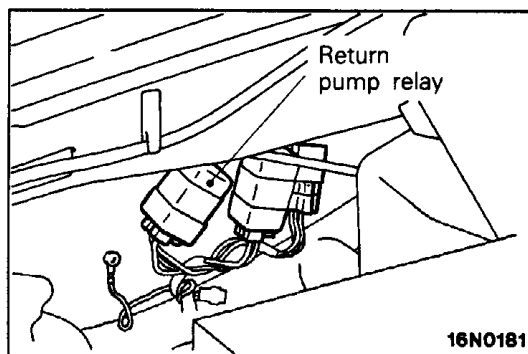
Terminal No.	Connection destination or measured part	Measurement	Tester connection	Check condition	Standard
103	Compressor relay	Resistance	103-earth	–	Approx. 75Ω
				Next apply battery voltage to terminal 103.	Compressor operation

Troubleshooting hints (mechanical malfunctions)

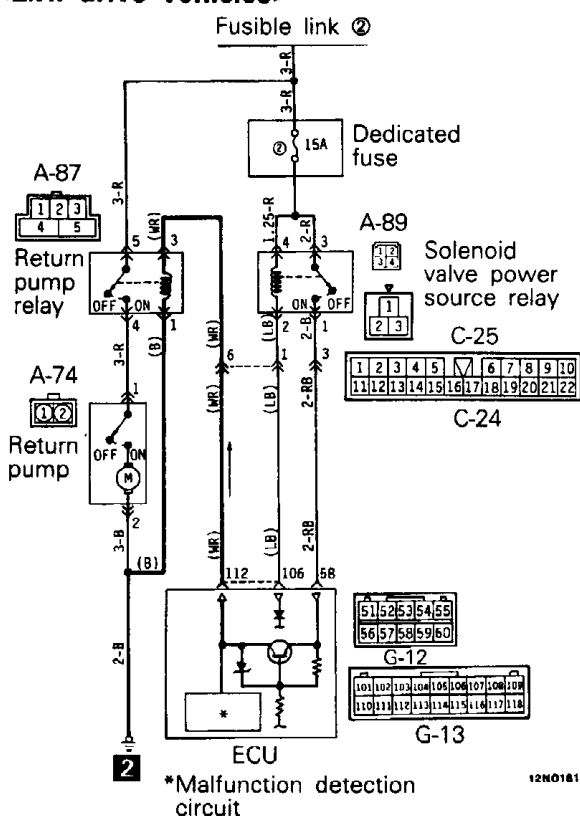
Malfunction mode	Malfunction probable cause	Malfunction	Note
The compressor relay is fused.	The compressor relay contacts are fused.	The compressor won't stop, causing the battery to become flat.	–
The compressor is stuck.	The compressor won't operate due to fusing, etc.	The vehicle height can't be increased.	–

33B-64 ACTIVE-ELECTRONIC CONTROL SUSPENSION – Troubleshooting

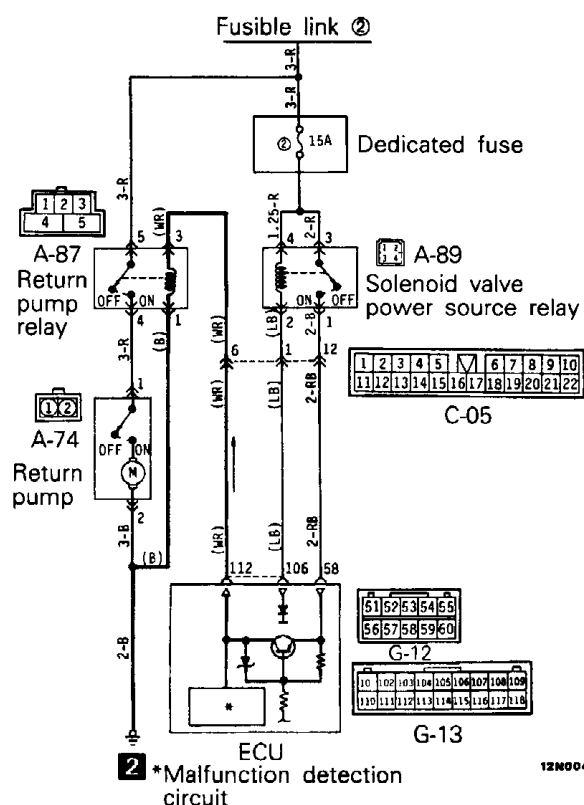
[19] RETURN PUMP DRIVE CIRCUIT



<L.H. drive vehicles>



<R.H. drive vehicles>



Operation

The return pump is activated when the pressure within the low-pressure pressure tank increases to 140 kPa (1.4 kg/cm², 20 psi) or higher, and then stops two seconds after the pressure is reduced to 70 kPa (0.7 kg/cm², 10 psi) or lower.

A thermal switch is provided at the motor circuit. This thermal switch functions to interrupt the power to the motor (in order to protect the return pump) if the temperature within the return pump becomes high.

Diagnosis

If there is damage or disconnection of the heavy-line circuit, or a short-circuit, or a malfunction of the output transistor within the ECU, the alarm

lamp illuminates and control is as described in the table below. (Note that the diagnosis is only applicable up to the return pump relay.)

Diagnosis No.	Attitude control	Damping force control	Vehicle-height control	Switch acceptance	
				HIGH	AUTO
44	Rolling control only stops.	Held at MEDIUM	Rolling control only stops.	Not accept	

Actuator compulsory activation

Code No.	Applicable operation	Description of activation
06	Return pump relay ON	The return pump relay is compulsorily switched ON for a period of three seconds.

ECU terminal voltages (when connector is connected)

Terminal No.	Signal	Condition	Terminal voltage
112	Return pump relay activation signal	When the return pump relay is ON	System voltage
		When the return pump relay is OFF	0V
		During fail-safe (solenoid valve power source relay switch OFF)	0V

Checking the return pump drive circuit (with the connector disconnected)

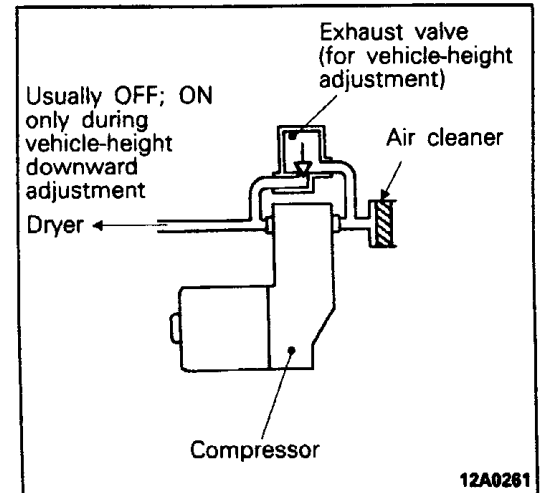
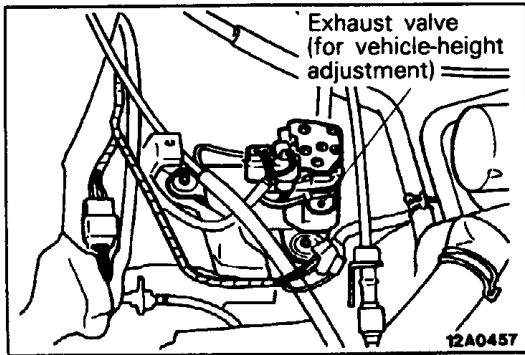
Terminal No.	Connection destination or measured part	Measurement	Tester connection	Check condition	Standard
112	Return pump relay	Resistance	112-earth	–	Approx. 75Ω
				Next apply battery voltage to terminal 112.	Return pump operation

Troubleshooting hints (mechanical malfunctions)

Malfunction mode	Malfunction probable cause	Malfunction	Note
The return pump relay is fused.	The return pump relay contacts are fused.	The return pump won't stop, causing the battery to become flat.	–
The return pump is stuck.	The return pump won't operate due to fusing, etc.	- Insufficient attitude-control effect. - Vehicle height increases after rolling control.	–

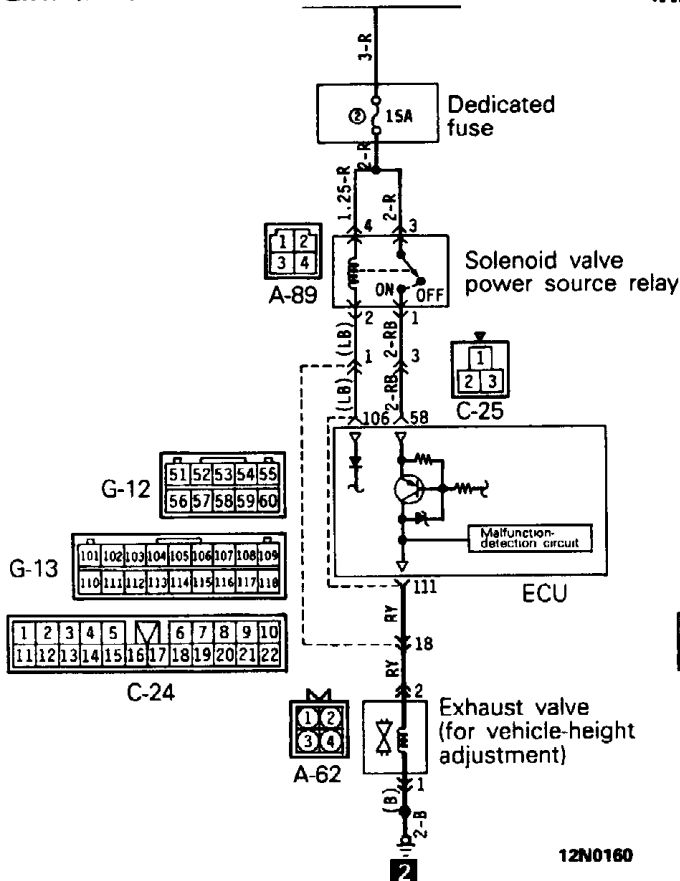
33B-66 ACTIVE-ELECTRONIC CONTROL SUSPENSION – Troubleshooting

[20] EXHAUST VALVE ACTIVATION CIRCUIT (FOR VEHICLE-HEIGHT ADJUSTMENT)



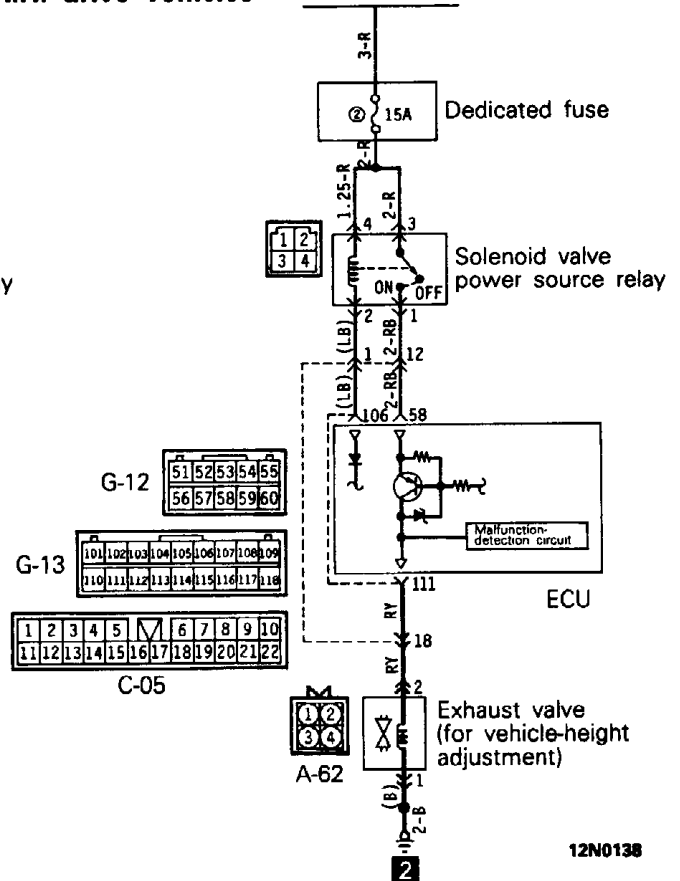
<L.H. drive vehicles>

Fusible link ②



<R.H. drive vehicles>

Fusible link ②



Operation

The exhaust valve for adjustment of the vehicle height is installed at the compressor assembly. This valve is switched ON only when a downward

adjustment of the vehicle height is being made; it functions to discharge air (from the air springs) into the atmosphere.

Diagnosis

If there is damage or disconnection of the heavy-line circuit, or a short-circuit, or a malfunction of the output transistor within the ECU, the alarm

lamp illuminates and control is as described in the table below.

Diagnosis No.	Attitude control	Damping force control	Vehicle-height control	Switch acceptance	
				HIGH	AUTO
45	Rolling control only stops.	Held at MEDIUM	Rolling control only stops.	Not accept	

Actuator compulsory activation

The exhaust valve for vehicle-height adjustment is activated by the following.

Code No.	Applicable operation
07	Vehicle height downward adjustment

ECU terminal voltages (when connector is connected)

Terminal No.	Signal	Condition	Terminal voltage
111	Exhaust valve (for vehicle-height adjustment) activation signal	When the exhaust valve (for vehicle-height adjustment) is ON (open)	System voltage
		When the exhaust valve (for vehicle-height adjustment) is OFF (closed)	0V
		During fail-safe (for solenoid valve power source relay switch OFF)	0V

Checking the exhaust valve (for vehicle-height adjustment) activation circuit (with the connector disconnected)

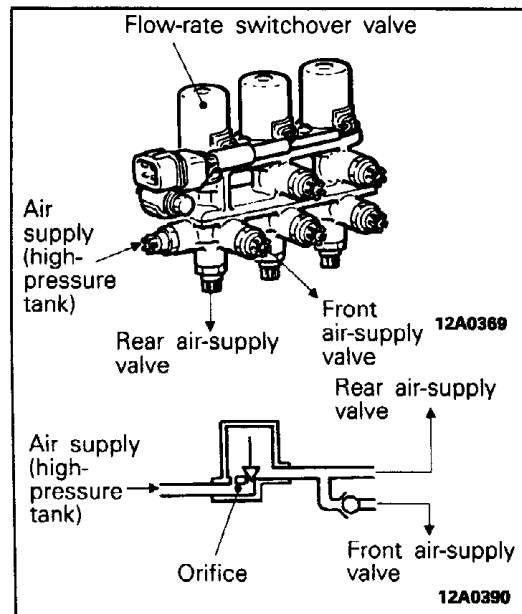
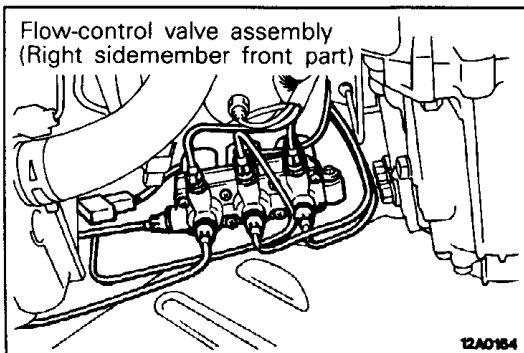
Terminal No.	Connection destination or measured part	Measurement	Tester connection	Check condition	Standard
111	Exhaust valve (for vehicle-height adjustment)	Resistance	111-earth	—	Approx. 15 Ω

Troubleshooting hints (mechanical malfunctions)

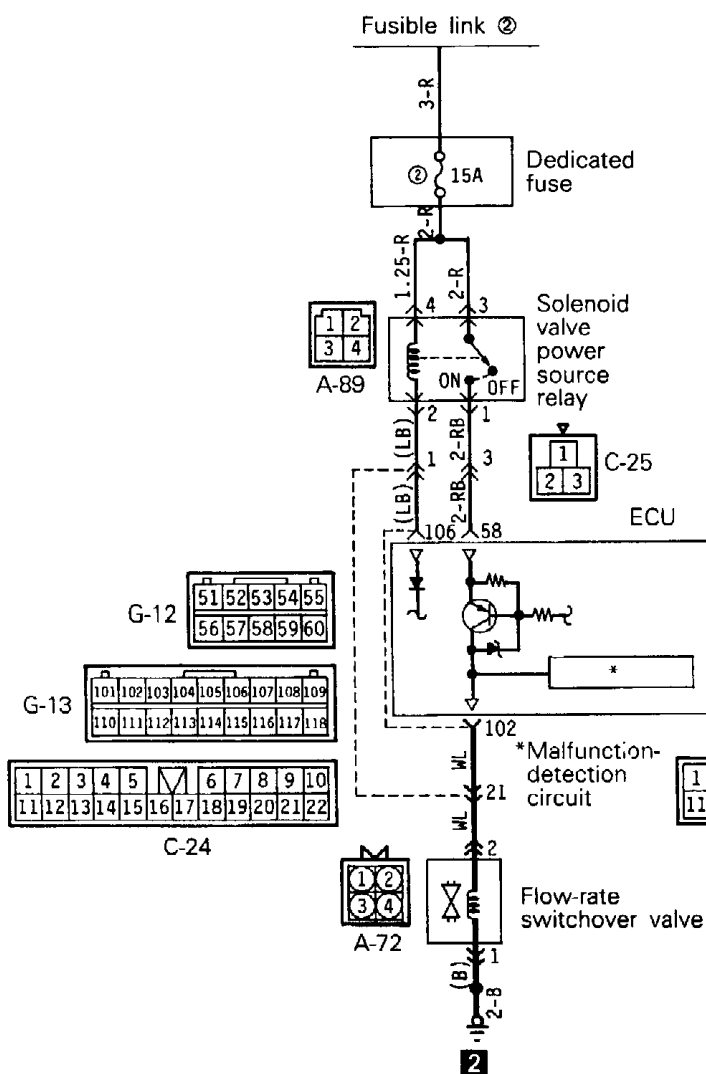
Malfunction mode	Malfunction probable cause	Malfunction	Note
Stuck in the OFF (closed) position	Air cannot be discharged because the valve is stuck in the OFF (closed) due to corrosion, freezing, etc. caused by moisture penetration	Vehicle height doesn't decrease.	Diagnosis code No. 54 is output.
Stuck in the ON (open) position	Air discharge cannot be stopped because the valve is stuck in the ON (open) due to corrosion, freezing, etc. caused by moisture penetration	- Vehicle height doesn't increase. - Compressor doesn't stop.	Diagnosis code No. 55 is output.
Air leakage at valve seat	Valve seat is worn.	- Vehicle height doesn't increase. - Compressor doesn't stop.	Diagnosis code No. 55 is output

33B-68 ACTIVE-ELECTRONIC CONTROL SUSPENSION – Troubleshooting

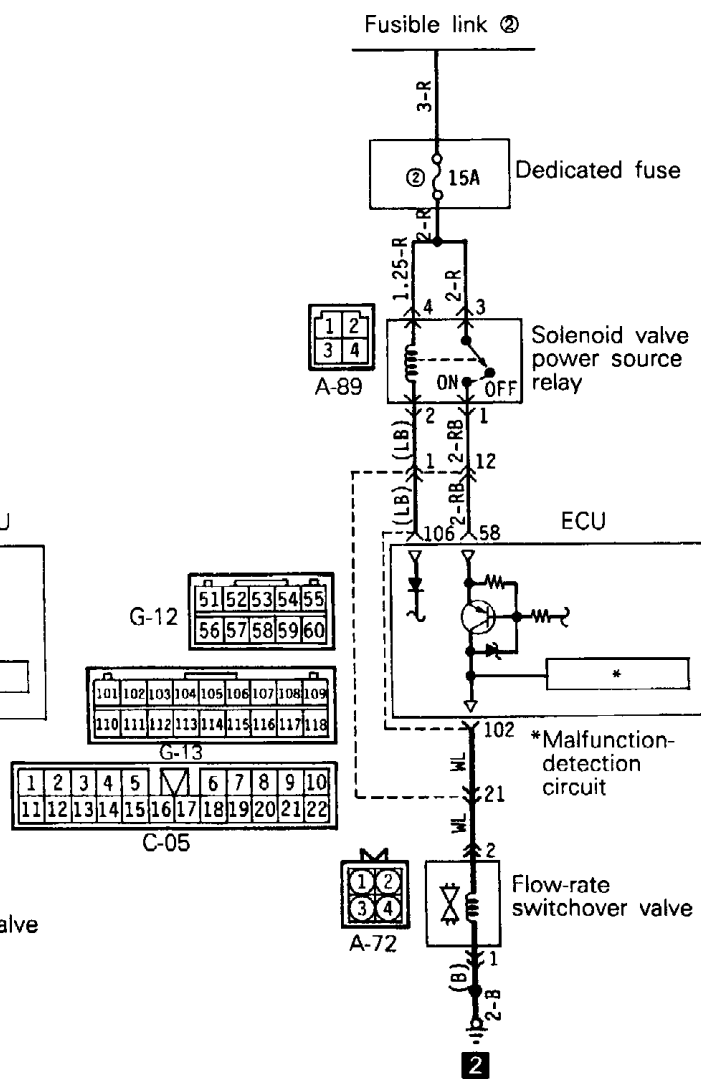
[21] FLOW-RATE SWITCHOVER VALVE ACTIVATION CIRCUIT



<L.H. drive vehicles>



<R.H. drive vehicles>



Operation

The flow-rate switchover valve switches, in two stages, the intake air flow volume supplied to each of the air springs.

Usually, during ordinary adjustments of the vehicle height, the flow-rate switchover valve is OFF (closed) in order to suppress the speed of the change of vehicle height to the appropriate speed, and

the air is supplied to each of the air springs with the flow volume restricted by the orifice.

This valve is switched ON (opened) for rapid adjustment of the vehicle height, or during control of rolling etc., when the vehicle is traveling on a bad road surface, thus permitting a greater amount of air to be supplied to the air springs.

Diagnosis

If there is damage or disconnection of the heavy-line circuit, or a short-circuit, or a malfunction of the output transistor within the ECU, the alarm

lamp illuminates and control is as described in the table below.

Diagnosis No.	Attitude control	Damping force control	Vehicle-height control	Switch acceptance	
				HIGH	AUTO
46	Rolling control only stops.	Held at MEDIUM	Rolling control only stops	Not accept	

Actuator compulsory activation

The flow-rate switchover valve is activated by the following.

Code No.	Applicable operation
09	Rolling control (left turn)
10	Rolling control (right turn)

ECU terminal voltages (when connector is connected)

Terminal No.	Signal	Condition	Terminal voltage
102	Flow-rate switchover valve activation signal	When the flow-rate switchover valve is ON (open)	System voltage
		When the flow-rate switchover valve is OFF (closed)	0V
		During fail-safe (solenoid valve power source relay switch OFF)	0V

Checking the flow-rate switchover valve activation circuit (with the connector disconnected)

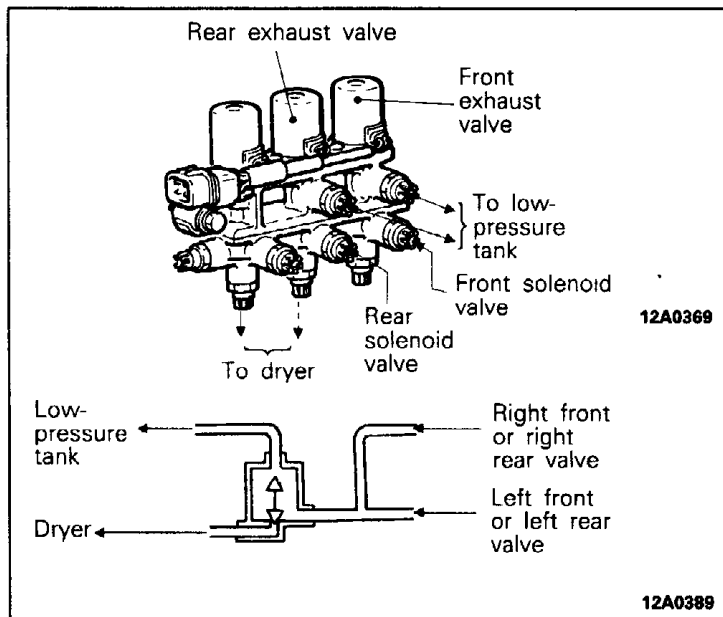
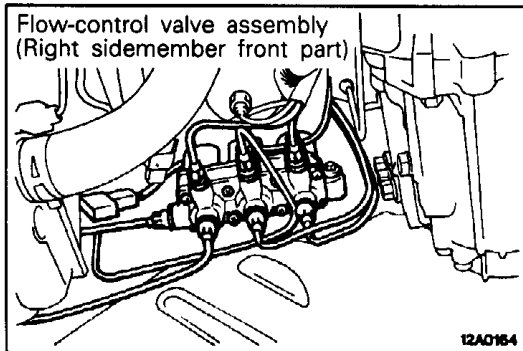
Terminal No.	Connection destination or measured part	Measurement	Tester connection	Check condition	Standard
102	Flow-rate switchover valve activation signal	Resistance	102-earth	—	8.5–13.5 Ω

33B-70 ACTIVE-ELECTRONIC CONTROL SUSPENSION – Troubleshooting

Troubleshooting hints (mechanical malfunctions)

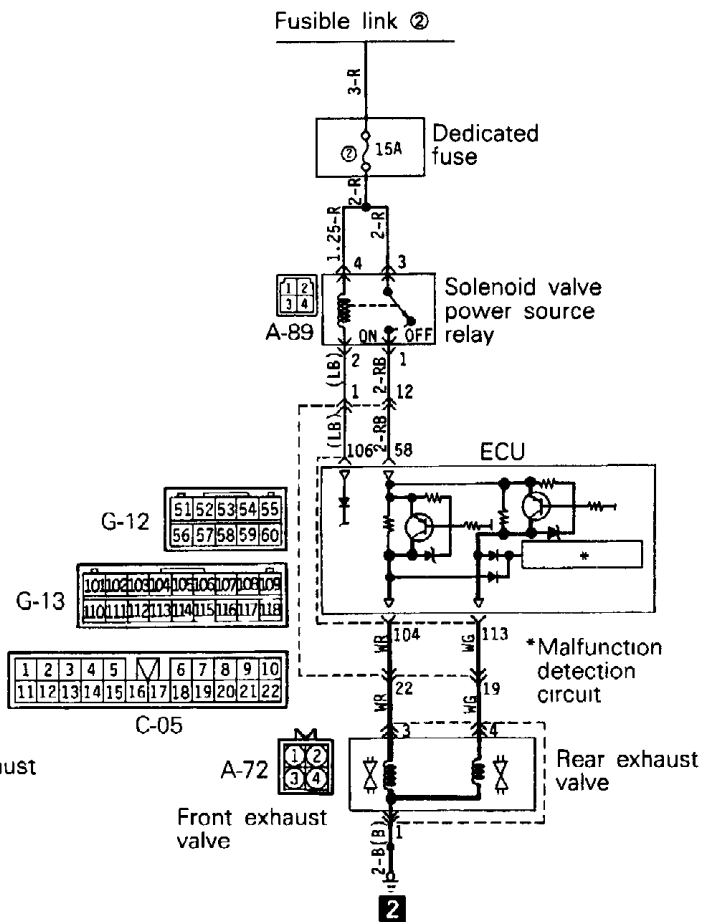
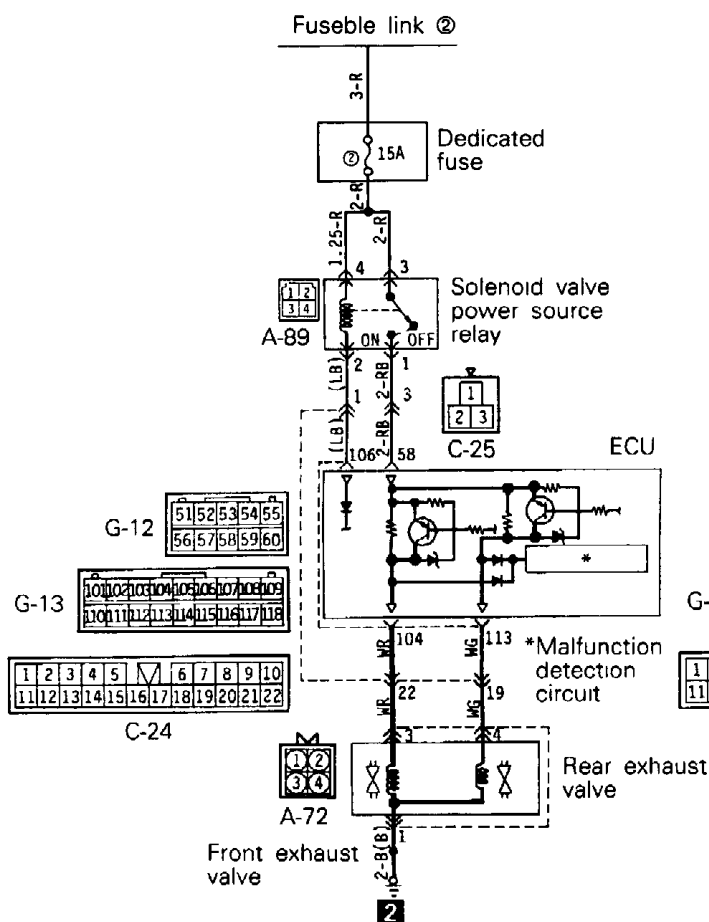
Malfunction mode	Malfunction probable cause	Malfunction	Note
Stuck in the OFF (closed) position	The valve is stuck in the OFF (closed) due to corrosion, freezing, etc. caused by moisture penetration.	● Insufficient rolling control effect. A feeling of incompatibility. ● The vehicle height decreases after rolling control. ● The vehicle height upward adjustment is slow when a poor road surface is detected.	–
Stuck in the ON (open) position	The valve is stuck in the ON (open) due to corrosion, freezing, etc. caused by moisture penetration.	● The upward adjustment of the vehicle height is excessive. ● There is a feeling of incompatibility during rolling control (excessive control).	–
Air leakage to atmosphere	Wear, etc. of the O-ring, etc	● The compressor is activated too frequently. ● There is a feeling of incompatibility during rolling control	Very slight leakages cannot be detected Such leakage is detected a long time afterward by a decrease of the vehicle height.

[22] FRONT/REAR EXHAUST VALVE ACTIVATION CIRCUIT



<L.H. drive vehicles>

<R.H. drive vehicles>



12N0158

12N0051

33B-72 ACTIVE-ELECTRONIC CONTROL SUSPENSION – Troubleshooting

Operation

These valves switch the air exhausted (from the front and rear left and right strut air springs) to either internal recirculation or discharge to the atmosphere. These valves are OFF (closed) during the attitude-control air-exhaust mode, and the exhaust air is led to the low-pressure tank and is once again circulated within the system. The valves are ON (open) during downward adjustment of the vehicle height, and the exhaust air, after

passing through the dryer, is discharged (from the exhaust valves for vehicle-height adjustment) into the atmosphere. These valves are switched ON (opened), in order to maintain the differential pressure of the strut air springs, when the rolling control is being maintained.

(At this time, because the exhaust valves for vehicle-height adjustment are OFF (closed), air is not discharged to the atmosphere.)

Diagnosis

If there is damage or disconnection of the heavy-line circuit, or a malfunction of an output transistor within the ECU, the alarm lamp illuminates, and

control is as described in the table below. Note that the malfunction-detection circuit is the same for the front and the rear exhaust valves.

Diagnosis No.	Attitude control	Damping force control	Vehicle-height control	Switch acceptance	
				HIGH	AUTO
47	Control stop	Held at MEDIUM	Control stop	Not accept	

Actuator compulsory activation

The front or the rear exhaust valves are activated by the following.

Code No.	Applicable operation
07	Vehicle height downward adjustment
09	Rolling control (left turn)
10	Rolling control (right turn)

ECU terminal voltage (when connector is connected)

Terminal No.	Signal	Condition	Terminal voltage
104	Front exhaust valve activation signal	When the front/rear exhaust valves are ON (open)	System voltage
113	Rear exhaust valve activation signal	When the front/rear exhaust valves are OFF (closed)	0V
		During fail-safe (for solenoid valve power source relay switch OFF)	0V

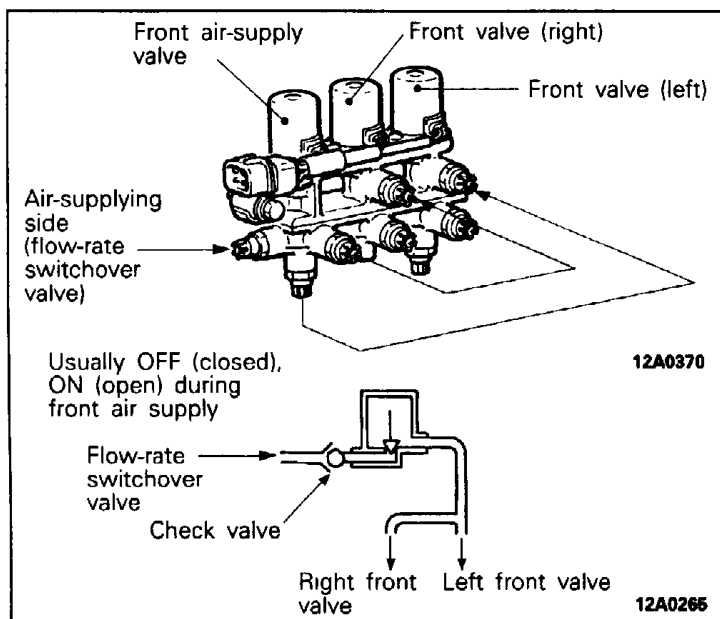
Checking the front/rear exhaust valves activation circuit (with the connector disconnected)

Terminal No.	Connection destination or measured part	Measurement	Tester connection	Check condition	Standard
104	Front exhaust valve	Resistance	104-earth	–	8.5–13.5 Ω
113	Rear exhaust valve	Resistance	113-earth	–	8.5–13.5 Ω

Troubleshooting hints (mechanical malfunctions)

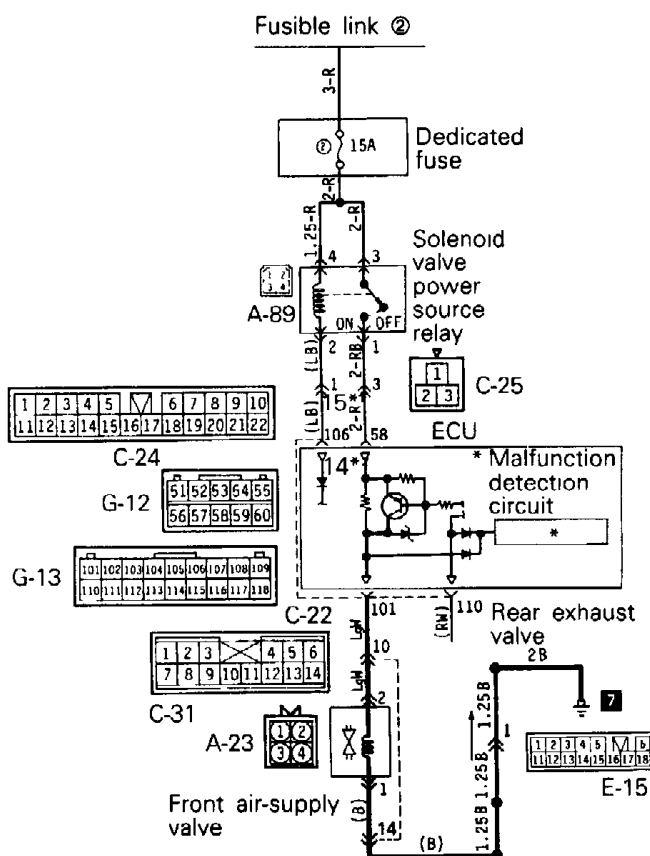
Malfunction mode	Malfunction probable cause	Malfunction	Note
Stuck in the OFF (closed) position	The exhaust air cannot be switched to the outside-discharge mode because the valve is stuck in the OFF (closed) due to corrosion, freezing, etc. caused by moisture penetration.	● The vehicle-height adjustment (downward) cannot be made at the front or rear. ● The vehicle height decreases at the front or rear during rolling control hold. ● The vehicle-height adjustment (downward) is too fast and is excessive. ● The return pump is activated during the vehicle-height adjustment (downward).	–
Stuck in the ON (open) position	The exhaust air cannot be switched to the internal-circulation mode because the valve is stuck in the ON (open) due to corrosion, freezing, etc. caused by moisture penetration.	● Insufficient attitude control effect (air cannot be discharged). ● The front or rear vehicle height increases after the rolling control.	–

[23] FRONT AIR-SUPPLY VALVE ACTIVATION CIRCUIT



<L.H. drive vehicles>

<R.H. drive vehicles>



12N0050

Operation

The front air-supply valves are switched ON (opened) for air supply to the left and right strut air springs during attitude control and during vehicle-height adjustment upward.

Usually, and during air exhaust, these valves are OFF (closed).

Note that a check valve is provided in these valves in order to prevent reverse flow of the air.

Diagnosis

If there is damage or disconnection of the heavy-line circuit, or a malfunction of an output transistor within the ECU, the alarm lamp illuminates, and

control is as described in the table below.

Note that the malfunction-detection circuit is the same for the rear air-supply valves.

Diagnosis No.	Attitude control	Damping force control	Vehicle-height control	Switch acceptance	
				HIGH	AUTO
51	Control stop	Held at MEDIUM	Control stop	Not accept	

Actuator compulsory activation

The front air-supply valves are activated by the following.

Code No.	Applicable operation
08	Vehicle height upward adjustment
09	Rolling control (left turn)
10	Rolling control (right turn)

ECU terminal voltages (when connector is connected)

Terminal No.	Signal	Condition	Terminal voltage
101	Front air-supply valve activation signal	When the front air-supply valves are ON (open)	System voltage
		When the front air-supply valves are OFF (closed)	0V
		During fail-safe (for solenoid valve power source relay switch OFF)	0V

Checking the front air-supply valve activation circuit (with the connector disconnected)

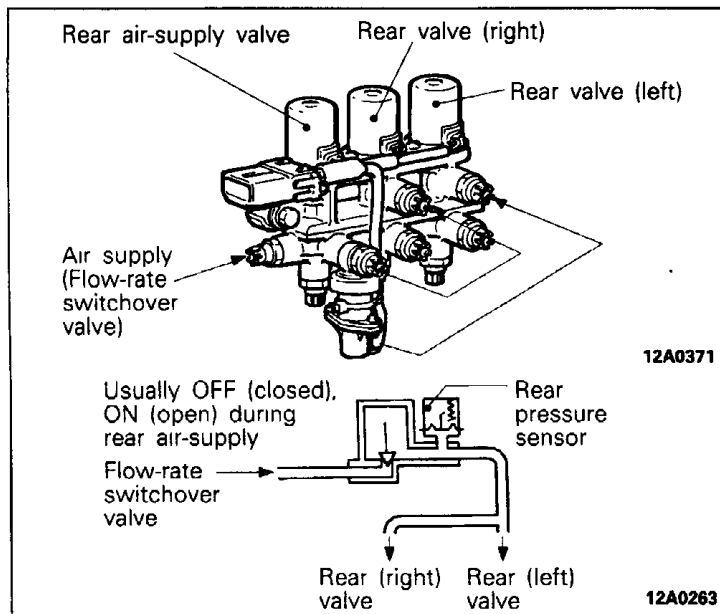
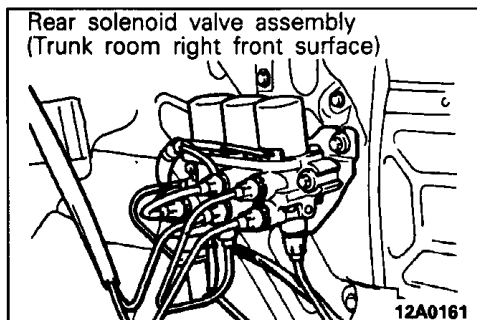
Terminal No.	Connection destination or measured part	Measurement	Tester connection	Check condition	Standard
101	Front air-supply valve	Resistance	101-earth	–	8.5–13.5 Ω

33B-76 ACTIVE-ELECTRONIC CONTROL SUSPENSION – Troubleshooting

Troubleshooting hints (mechanical malfunctions)

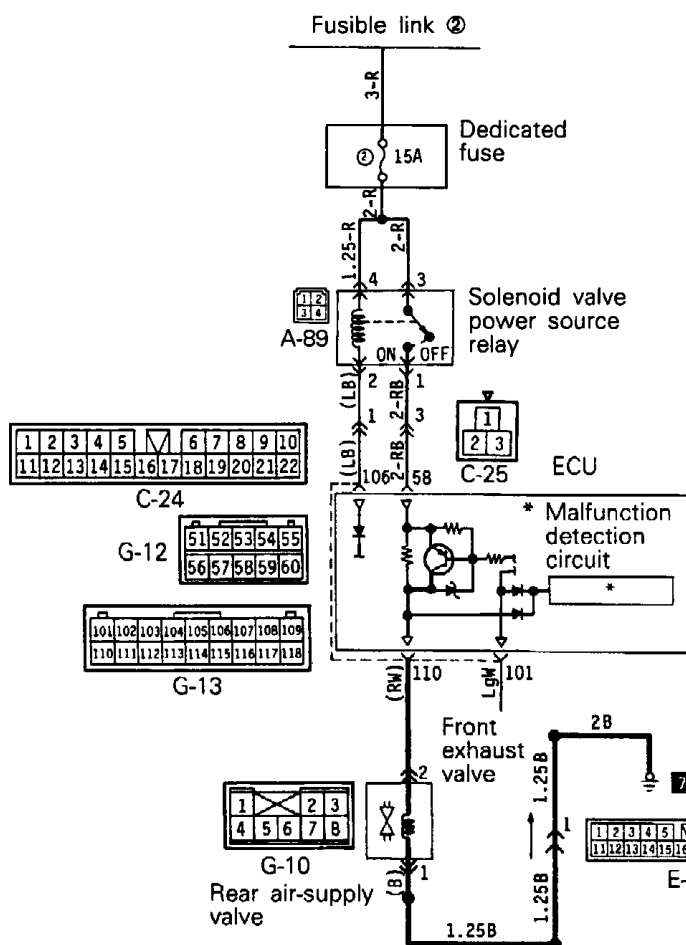
Malfunction mode	Malfunction probable cause	Malfunction	Note
Stuck in the OFF (closed) position	Air cannot be supplied in because the valve is stuck in the OFF (closed) due to corrosion, freezing, etc. caused by moisture penetration.	• The front vehicle-height will not increase. • Insufficient control of rolling and braking dive. • The front vehicle-height decreases after rolling control.	–
Stuck in the ON (open) position	Air supply cannot be stopped because the valve is stuck in the ON (open) due to corrosion, freezing, etc. caused by moisture penetration.	The front vehicle-height increases and the body tilts to one side.	–
Air leakage at the valve seat	Valve seat is worn.	• When left as is, the front vehicle-height increases. • The front vehicle-height downward adjustment frequency increases.	Diagnosis No. 56 output
Air leakage to atmosphere	Wear, etc. of the O-ring etc.	• When left as is, the front vehicle-height decreases. • Air is not accumulated in the high-pressure tank. • The compressor is activated too frequently.	Very slight leakages cannot be detected. Such leakage is detected a long time afterward by a decrease of the vehicle height.

[24] REAR AIR-SUPPLY VALVE ACTIVATION CIRCUIT

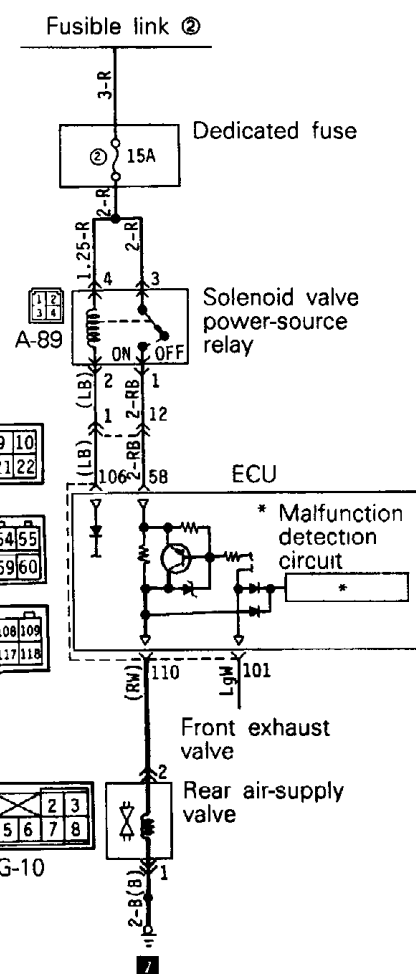


<L.H. drive vehicles>

<R.H. drive vehicles>



12N0157



12N0049

33B-78 ACTIVE-ELECTRONIC CONTROL SUSPENSION – Troubleshooting

Operation

The rear air-supply valves are switched ON (opened) for air supply to the left and right air springs during attitude control and during vehicle-height adjustment upward.

Usually, and during air exhaust, these valves are OFF (closed). Note that the rear-pressure sensors, for detection of the internal pressure of the rear shock absorbers, are installed in these valves.

Diagnosis

If there is damage or disconnection of the heavy-line circuit, or a malfunction of an output transistor within the ECU, the alarm lamp illuminates, and

control is as described in the table below. Note that the malfunction-detection circuit is the same for the front air-supply valves.

Diagnosis No.	Attitude control	Damping force control	Vehicle-height control	Switch acceptance	
				HIGH	AUTO
51	Control stop	Held at MEDIUM	Control stop	Not accept	

Actuator compulsory activation

The rear air-supply valves are activated by the following.

Code No.	Applicable operation
08	Vehicle height downward adjustment
09	Rolling control (left turn)
10	Rolling control (right turn)

ECU terminal voltage (when connector is connected)

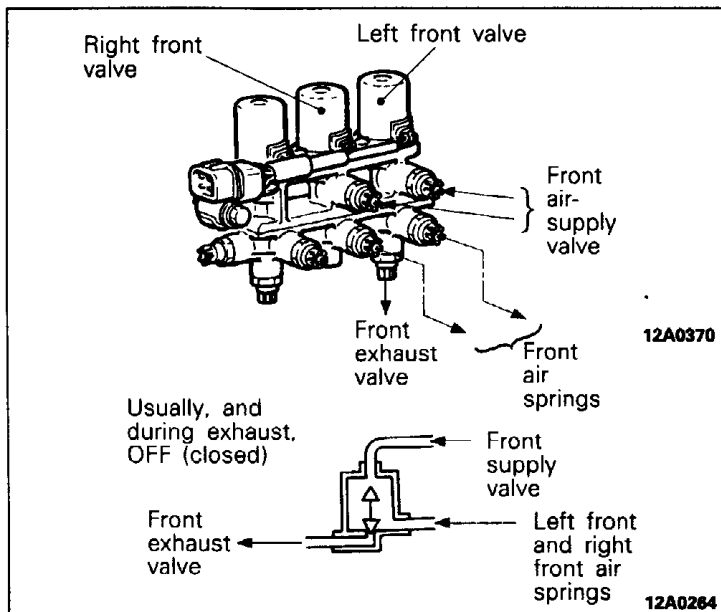
Terminal No.	Signal	Condition	Terminal voltage
110	Rear air-supply valve activation signal	When the rear air-supply valves are ON (open)	System voltage
		When the rear air-supply valves are OFF (closed)	0V
		During fail-safe (for solenoid valve power source relay switch OFF)	0V

Checking the rear air-supply valve activation circuit (with the connector disconnected)

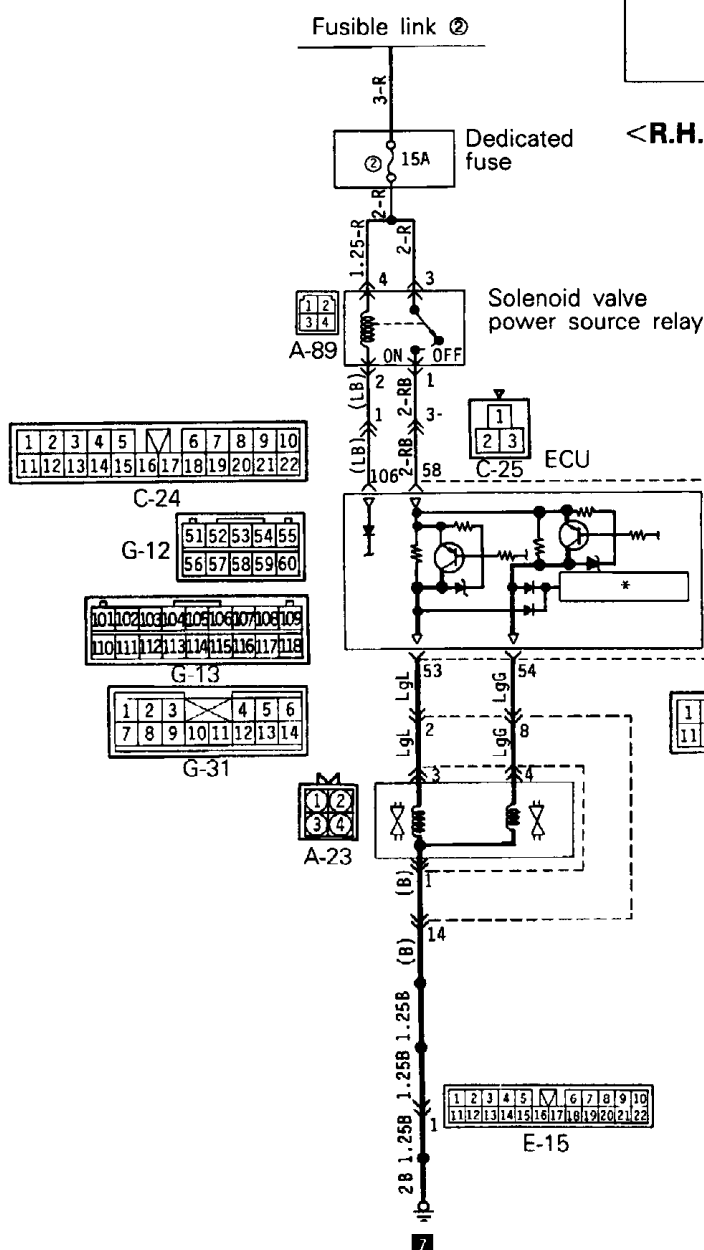
Terminal No.	Connection destination or measured part	Measurement	Tester connection	Check condition	Standard
110	Rear air-supply valve	Resistance	110-earth	–	8.5–13.5 Ω

Troubleshooting hints (mechanical malfunctions)

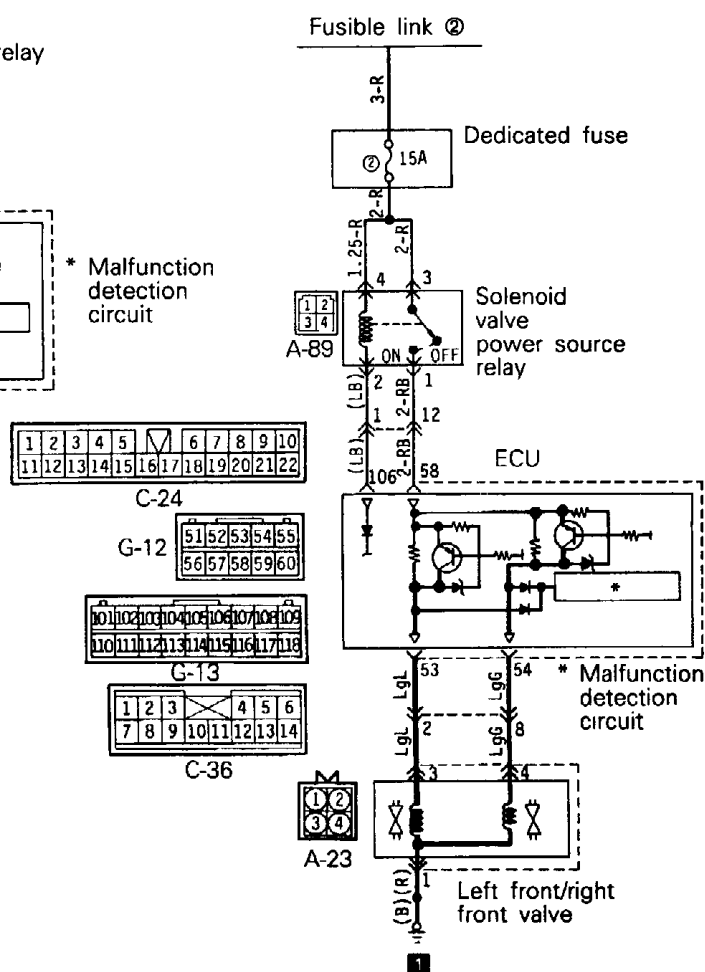
Malfunction mode	Malfunction probable cause	Malfunction	Note
Stuck in the OFF (closed) position	Air cannot be supplied in because the valve is stuck in the OFF (closed) due to corrosion, freezing, etc. caused by moisture penetration.	• The rear vehicle-height will not increase. • Insufficient control of rolling and squat. • The rear vehicle-height decreases after rolling control.	–
Stuck in the ON (open) position	Air supply cannot be stopped because the valve is stuck in the ON (open) due to corrosion, freezing, etc. caused by moisture penetration.	The rear vehicle-height increases and the body tilts to one side.	–
Air leakage at the valve seat	Valve seat is worn.	• When left as is, the rear vehicle-height increases. • The rear vehicle-height downward adjustment frequency increases.	Diagnosis No. 56 output
Air leakage to atmosphere	Wear, etc. of the O-ring, etc.	• When left as is, the rear vehicle-height decreases. • Air is not accumulated in the high-pressure tank. • The compressor is activated too frequently.	Very slight leakages cannot be detected. Such leakage is detected a long time afterward by a decrease of the vehicle height



<L.H. drive vehicles>



<R.H. drive vehicles>



Operation

The left front and right front valves are for switching the air intake and exhaust for the left front and right front strut air springs.

These valves are usually, and during air intake, OFF (closed), and are ON (open) during exhaust.

Diagnosis

If there is damage or disconnection of the heavy-line circuit, or a malfunction of an output transistor within the ECU, the alarm lamp illuminates, and

control is as described in the table below. Note that the malfunction-detection circuit is the same for the left front and right front valves.

Diagnosis No.	Attitude control	Damping force control	Vehicle-height control	Switch acceptance	
				HIGH	AUTO
52	Control stop	Held at MEDIUM	Control stop	Not accept	

Actuator compulsory activation

The left front and right front valves are activated by the following.

Code No.	Applicable operation
07	Vehicle height downward adjustment
09, 10	Rolling control (left turning: left valve)/ rolling control (right turning: right valve)

ECU terminal voltages (when connector is connected)

Terminal No.	Signal	Condition	Terminal voltage
53	Left front valve activation signal	When the left/right front valves are ON	System voltage
		When the left/right front valves are OFF	0V
54	Right front valve activation signal	During fail-safe (for solenoid valve power source relay switch OFF)	0V

Checking the left front/right front valves activation circuit (with the connector disconnected)

Terminal No.	Connection destination or measured part	Measurement	Tester connection	Check condition	Standard
53	Left front valve	Resistance	53-earth	Constanty	8.5–13.5 Ω
54	Right front valve	Resistance	54-earth	Constanty	8.5–13.5 Ω

33B-82 ACTIVE-ELECTRONIC CONTROL SUSPENSION – Troubleshooting

Troubleshooting hints (mechanical malfunctions)

Malfunction mode	Malfunction probable cause	Malfunction	Note
Stuck in the OFF (closed) position	Air cannot be discharged because the valve is stuck in the OFF (closed) due to corrosion, freezing, etc. caused by moisture penetration.	• The left front and right front vehicle-height increases after rolling control. • Insufficient active control effect.	–
Stuck in the ON (open) position	Air cannot be taken in because the valve is stuck in the ON (open) due to corrosion, freezing, etc. caused by moisture penetration.	• The left front and right front vehicle height decreases, and the body tilts to one side. • The return pump is activated too frequently.	Diagnosis code No. 56 is output.
Air leakage at valve seat	Valve seat is worn.	When left as is, the front vehicle-height will decrease.	Diagnosis code No. 56 is output.
Air leakage to atmosphere	Wear, etc. of the O-ring, etc.	When left as is, the front vehicle-height will decrease.	Very slight leakages cannot be detected. Such leakage is detected a long time afterward by a decrease of the vehicle height.

33B-84 ACTIVE-ELECTRONIC CONTROL SUSPENSION – Troubleshooting

Operation

The left rear and right rear valves are for switching the air supply and exhaust for the left rear and right rear shock absorber air springs.

These valves are usually, and during air supply, OFF (closed), and are ON (open) during exhaust.

Diagnosis

If there is damage or disconnection of the heavy-line circuit, or a malfunction of an output transistor within the ECU, the alarm lamp illuminates, and

control is as described in the table below. Note that the malfunction-detection circuit is the same for the left rear and right rear valves.

Diagnosis No.	Attitude control	Damping force control	Vehicle-height control	Switch acceptance	
				HIGH	AUTO
53	Control stop	Held at MEDIUM	Control stop	Not accept	

Actuator compulsory activation

The left rear and right rear valves are activated by the following.

Code No.	Applicable operation
07	Vehicle height downward adjustment
09, 10	Rolling control (left turning: left valve)/ rolling control (right turning: right valve)

ECU terminal voltages (when connector is connected)

Terminal No.	Signal	Condition	Terminal voltage
109	Left rear valve activation signal	When the left/right rear valves are ON	System voltage
		When the left/right rear valves are OFF	0V
107	Right rear valve activation signal	During fail-safe (for solenoid valve power source relay switch OFF)	0V

Checking the left rear/right rear valves activation circuit (with the connector disconnected)

Terminal No.	Connection destination or measured part	Measurement	Tester connection	Check condition	Standard
109	Left rear valve	Resistance	109-earth	–	8.5–13.5 Ω
107	Right rear valve	Resistance	107-earth	–	8.5–13.5 Ω

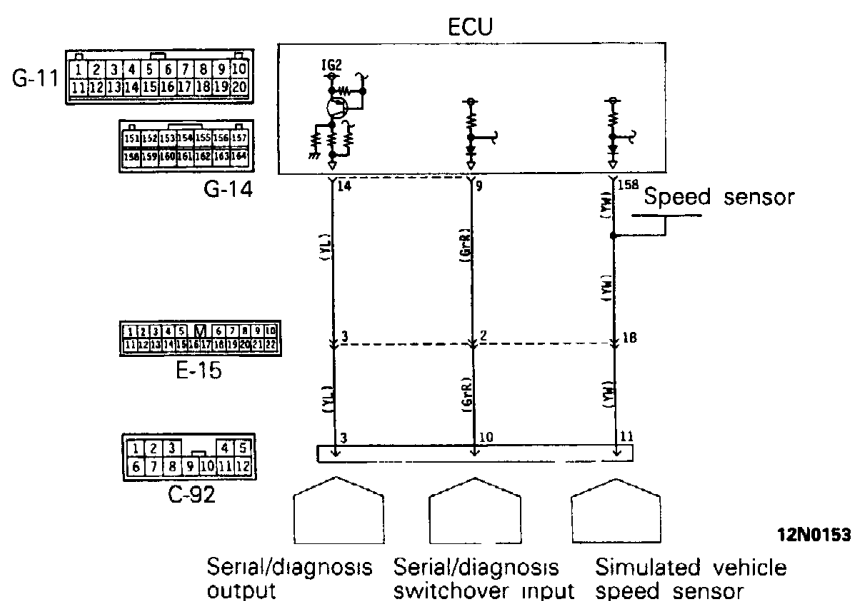
Troubleshooting hints (mechanical malfunctions)

Malfunction mode	Malfunction probable cause	Malfunction	Note
Stuck in the OFF (closed) position	Air cannot be discharged because the valve is stuck in the OFF (closed) due to corrosion, freezing, etc. caused by moisture penetration.	● The left rear and right rear vehicle-height increases after rolling control. ● Insufficient active control effect.	–
Stuck in the ON (open) position	Air cannot be taken in because the valve is stuck in the ON (open) due to corrosion, freezing, etc. caused by moisture penetration.	● The left rear and right rear vehicle height decreases, and the body tilts to one side. ● The return pump is activated too frequently.	Diagnosis code No. 56 is output.
Air leakage at valve seat	Valve seat is worn.	When left as is, the rear vehicle-height will decrease.	Diagnosis code No. 56 is output.
Air leakage to atmosphere	Wear, etc. of the O-ring, etc.	When left as is, the rear vehicle-height will decrease.	Very slight leakages cannot be detected. Such leakage is detected a long time afterward by a decrease of the vehicle height.

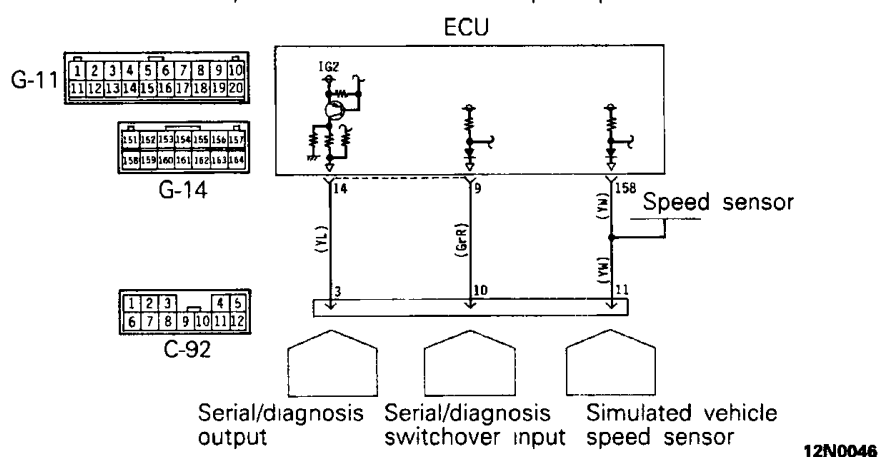
33B-86 ACTIVE-ELECTRONIC CONTROL SUSPENSION – Troubleshooting

[27] ACTIVE-ECS RELATED DIAGNOSIS/SERVICE DATA OUTPUT CIRCUIT

<L.H. drive vehicles>



<R.H. drive vehicles>

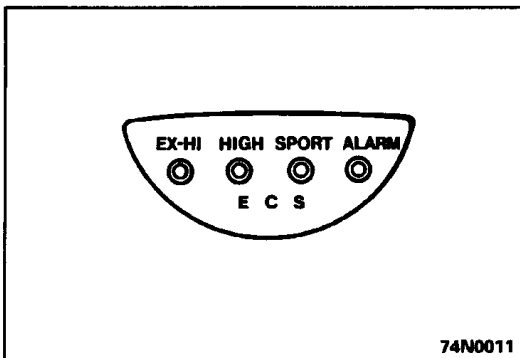


ECU terminal voltages (when connector is connected)

Terminal No.	Signal	Condition	Terminal voltage
9	Diagnosis/service data switching signal	When multi-use tester is connected	0V
		Usual	3.0–5.0V
14	Diagnosis/service data switching signal	Constantly	0V System voltage

ACTIVE-ECS related diagnosis/service data output circuit (with the connector disconnected)

Terminal No.	Connection destination or measured part	Measurement	Tester connection	Check condition	Standard
9	Diagnosis/service data switching signal	Resistance	9 Diagnosis concentrated connector	—	Continuity
14	Harness for diagnosis/service data output	Resistance	14 Diagnosis concentrated connector	—	Continuity

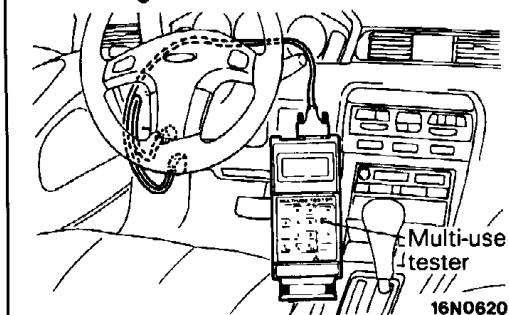


SERVICE ADJUSTMENT PROCEDURES

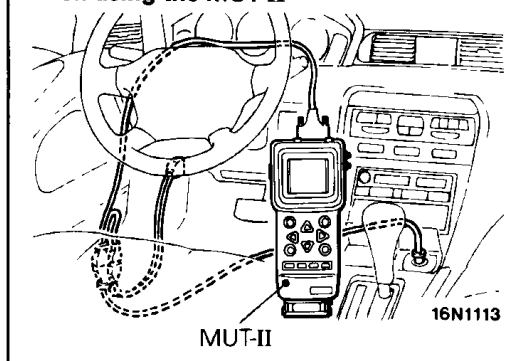
ALARM LAMP CHECK

Check if the alarm lamp illuminates for approximately 0.5 second when the ignition key is turned to ON and the engine has been started.

When using the multi-use tester



When using the MUT-II



SYSTEM CHECKING BY USING ALARM LAMP

1. After checking the alarm lamp bulb to be sure it has not failed, let the engine idle for approximately 4 minutes or more to check to be sure that the alarm lamp does not illuminate.
2. While the alarm lamp is on, connect the multi-use tester <Up to 1993 models> or MUT-II <All models> to the diagnosis check terminal of the wiring harness and check the diagnosis output code.

Caution

Connection and disconnection of the multi-use tester or MUT-II should always be made with the ignition switch in the OFF position.

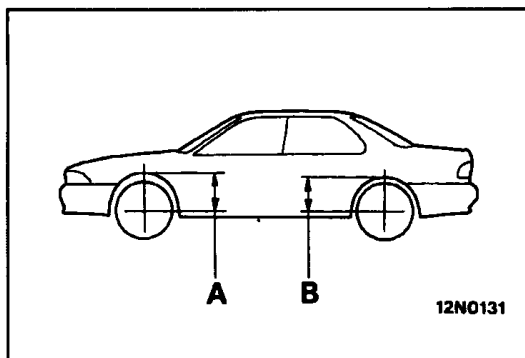
NOTE

Although the alarm lamp illuminates under the following circumstances, there is no actual malfunction if, after the following procedures have been followed and then the alarm lamp does not illuminate after waiting about four minutes or more.

1. When there is an overload
Stop the engine, unload the cargo, and then restart the engine.
2. When the vehicle is stopped (with the engine running) on a steep hill or slope.
Move the vehicle to a horizontal place and stop; then stop the engine and restart it.
3. When vehicle-height adjustments are made frequently.
After stopping the engine, open the hood and allow the compressor to cool; then restart the engine.
4. When the vehicle is driven on winding roads in the mountains continuously for 18 minutes or longer. To protect the return pump from damage, stop the engine and then restart it.

CHECKING BY SELF-DIAGNOSIS

- (1) Inspect the self-diagnosis codes.
- (2) After completion of repairs to the malfunctions erase the self-diagnosis codes.
- (3) Carry out a repeat self-diagnosis output inspection and check if the self-diagnosis codes are normal.

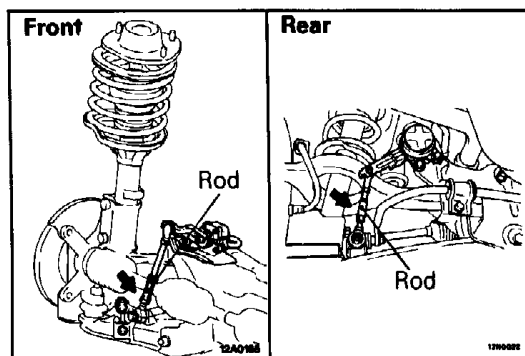


NORMAL VEHICLE HEIGHT CHECK AND ADJUSTMENT

1. Park the vehicle on a flat surface.
2. With the vehicle unladen, start the engine, and after vehicle height adjustment is completed, check if the vehicle height is at NORMAL.
3. Measure the distance between the wheel arch and the center of the axle for both the right front and left rear.

Standard value:

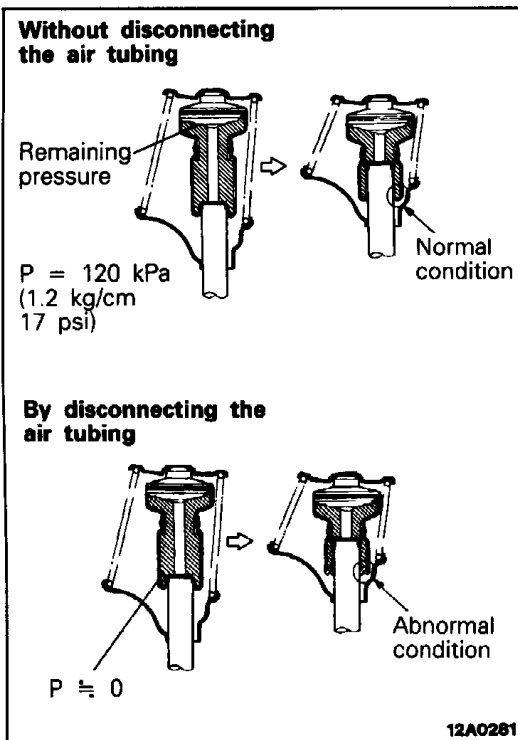
A (Front)	391–401 mm (15.4–15.8 in.)
B (Rear)	362–372 mm (14.3–14.6 in.)



4. If the vehicle height is not within the standard value, loosen the turnbuckles of the front and rear height sensor rods, and then make the adjustment by changing the length of the rods. (One turn of the nut will raise or lower the front vehicle height by approximately 6 mm [0.24 in.], and the rear vehicle height by approximately 3 mm [0.12 in.].) The vehicle height becomes higher when the rods are lengthened.

Caution

1. Both the front and rear heights must be checked, because, even though only the front or the rear is adjusted, the other height (rear or front) is also changed.
2. The adjustments of the vehicle height must be made while the engine is idling (vehicle stopped).



ROLLING DIAPHRAGM CHECKING

Under normal conditions, the rolling diaphragm is as shown in the "normal condition" half of the figure. If, however, the vehicle is jacked up while there is no air in the air springs and then let down suddenly, the diaphragm may become double folded, as shown in the "abnormal condition" half of the illustration.

If the vehicle is driven in abnormal condition, the diaphragm will soon be damaged, so the procedure below should be followed to prevent this.

Checking method

Front: Jack the front end up and check visually or feel the diaphragm.

Rear: Check to be sure that movement is smooth when the rear part of the body is bounced up and down.

Repair method

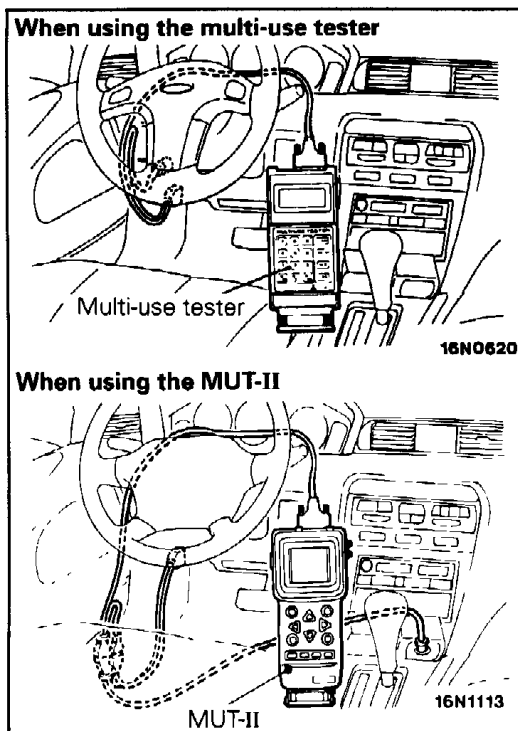
1. Jack up the vehicle and start the engine.
2. Press the HIGH vehicle-height switch for two seconds or longer so as to set to the EXTRA HIGH vehicle-height.
3. Supply air to each air spring so as to return the diaphragm to the normal form.

NOTE

The diaphragm will return easily if a solution of soap and water is applied to the diaphragm.

Caution

In order to prevent double-folding of the diaphragm, be sure, if the air tubing is disconnected in the course of servicing, to follow step 2 above after connecting the tubing in order to introduce air into the air springs.

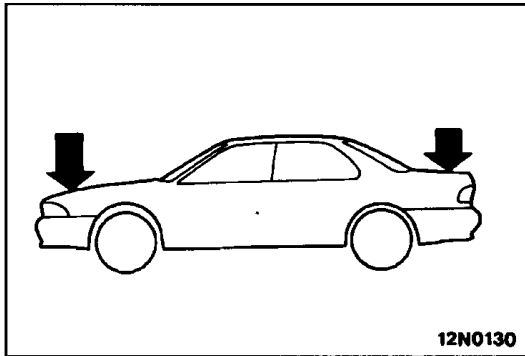


SYSTEM OPERATION CHECK

The checking procedures described below are for the purpose of actually activating the system so as to verify whether or not the system's function is normal.

Caution

1. **For checks conducted by an actual road test, do so in a safe place and observe the speed limit.**
For tests that require high-speed driving, such tests can be conducted while the vehicle is stopped by using the multi-use tester <Up to 1993 models> or MUT-II <All models> to input simulated vehicle-speed signals.
Connection and disconnection of the multi-use tester or MUT-II should always be made with the ignition switch in the OFF position.
2. **Never drive the vehicle while the simulated vehicle-speed signals are still being used.**

**CHECKING THE DAMPING FORCE**

1. Move the wheel to the straight-ahead position.
2. Start the engine.
3. Set to the AUTO mode (normal vehicle height).
4. Press the control mode switch and check to be sure that there is a difference of the damping force for each control mode when the vehicle is moved up and down at a rate of twice per second.

Control mode	Damping force
AUTO	SOFT
SPORT	MEDIUM

CHECKING THE ANTI-ROLLING FUNCTION

1. Move the wheels to the straight-ahead position.
2. Turn the ignition key to ON.
3. When simulated vehicle-speed signals of 35 km/h (22 mph) or higher are input and the steering wheel is turned 45° or more, check that the damping force changes to MEDIUM or HARD, depending on the speed at which the steering wheel is turned.
Check to be sure that this sensitivity increases (for each control mode) as the vehicle speed increases.

CHECKING THE ANTI-DIVE FUNCTION

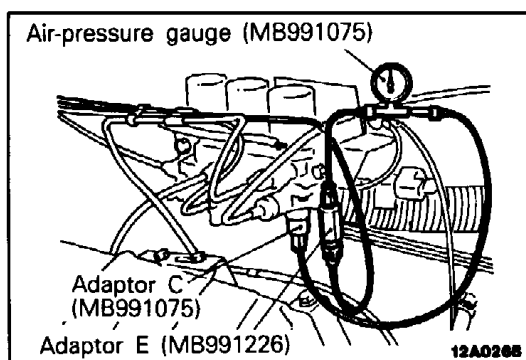
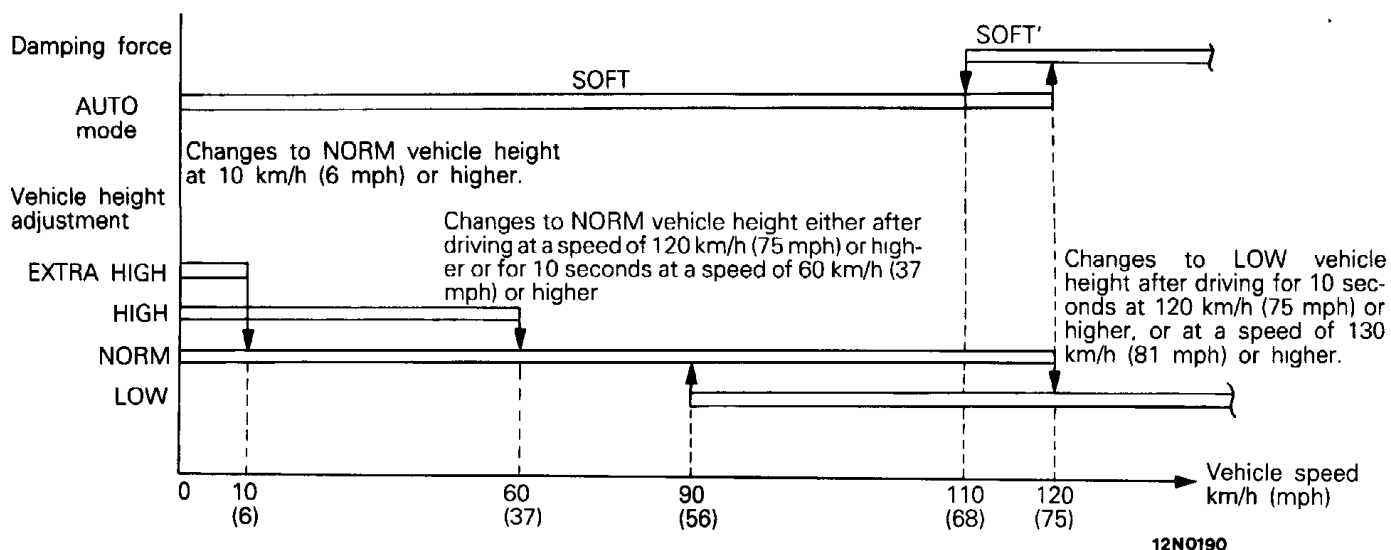
1. Turn the ignition key to ON.
2. Input a simulated vehicle-speed signal of 3 km/h (2 mph) or more.
3. With the brake pedal depressed (the stop lamp is ON), check that the damping force changes to HARD when the simulated vehicle-speed input signal is suddenly decreased from 100 km/h (62 mph) or higher, and that there is air supply at the front and exhaust at the rear.

CHECKING THE ANTI-SQUAT FUNCTION

1. Turn the ignition key to ON.
2. Input a simulated vehicle-speed signal that is 3 km/h (2 mph) or higher and is less than 100 km/h (62 mph).
3. Check if the damping force changes to HARD when the accelerator pedal is suddenly depressed, and that there is air exhaust at the front and supply at the rear.

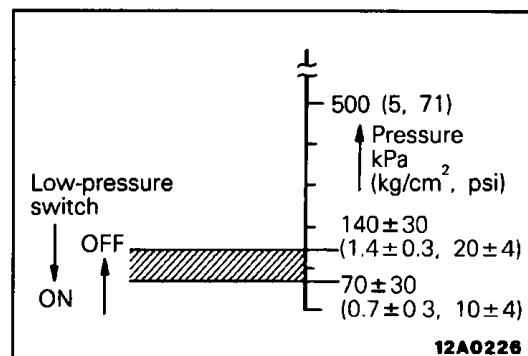
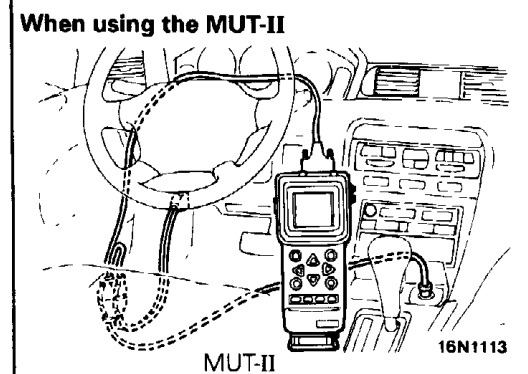
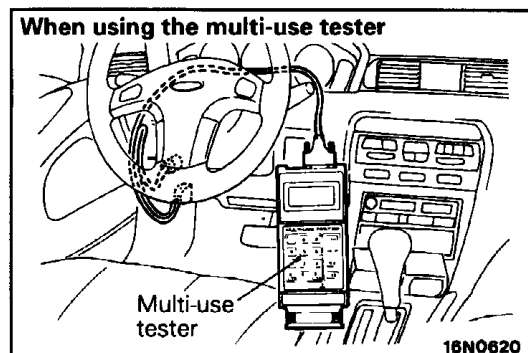
CHECKING THE VEHICLE-SPEED RESPONSE FUNCTION

1. Start the engine.
2. Input simulated vehicle-speed signals and check whether or not there are changes of the damping force and of the vehicle height (as shown in the diagram below) according to changes in the vehicle speed.



LOW-PRESSURE SWITCH (LOW-PRESSURE TANK SIDE) ACTUATION PRESSURE CHECK

1. Remove joint H of the blue-marked air tube (for the left front valve) of the front solenoid valve assembly.
2. Connect the special too (air-pressure gauge) between the disconnected air tube and the front solenoid valve assembly by using the special tools (adaptors E and C).



3. Connect the multi-use tester <Up to 1993 models> or MUT-II <All models>, start the engine, and wait until the compressor stops (the high-pressure switch is OFF).

Caution

Connection and disconnection of the multi-use tester or MUT-II should always be made with the ignition switch in the OFF position.

4. Input simulated vehicle-speed signals [3 km/h (2 mph) or higher].
5. With the simulated vehicle-speed signals still being input, conduct actuator test No. 09 (left turn) or No. 10 (right turn) so as to increase the pressure within the low-pressure tank chamber.

6. During the actuator test, monitor the pressure gauge indication and check whether or not the pressure when the return pump activation starts (i.e., the maximum gauge reading) and the pressure when the return pump stops are both within the standard value.

Standard value:

Return pump actuation pressure

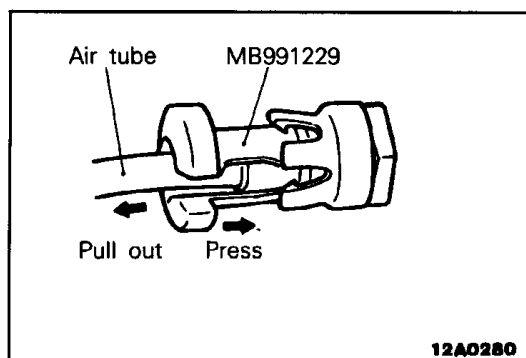
140 ± 30 kPa (1.4 ± 0.3 kg/cm², 20 ± 4 psi)

Return pump stop pressure

70 ± 30 kPa (0.7 ± 0.3 kg/cm², 10 ± 4 psi)

7. If the internal pressure of the low-pressure tank is not within the standard values when the return pump operation is actuated (i.e., the low-pressure switch is OFF) or when the operation of the return pump is stopped (low-pressure switch ON), remove the reserve tank assembly and replace the low-pressure switch.

NOTES

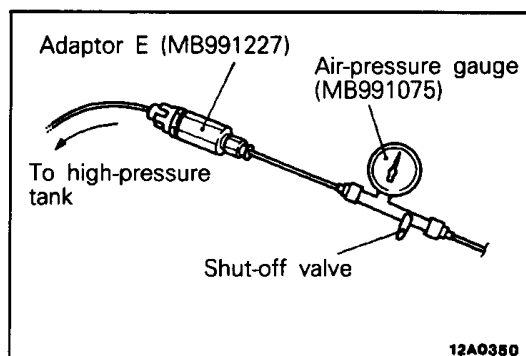
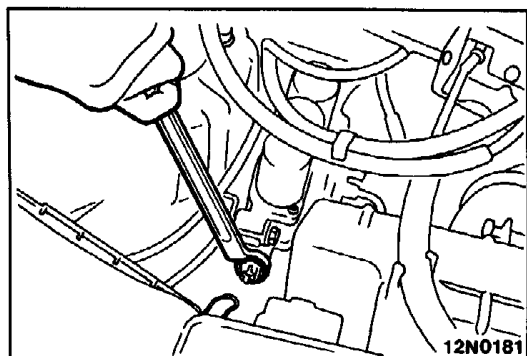


HIGH-PRESSURE SWITCH (HIGH-PRESSURE TANK SIDE) ACTUATION PRESSURE CHECK

1. Remove joint A of the yellow-marked air tube (for the front air-supply valves) of the front solenoid valve assembly.

NOTE

Removal is easier if the special tool is used to pull the air tube out, and then a socked wrench is used for removal.



2. Connect the gauge side air tubes of the special tool (air-pressure gauge) to the disconnected air tube and joint, connecting them via the special tube (adaptor E).

NOTE

The shut-off valve of the air-pressure gauge should be closed.

3. Start the engine and activate the compressor.

NOTE

If the system is in normal condition, the compressor will be activated after the engine is started, because the pressure within the high-pressure tank has decreased.

4. After activation of the compressor, the pressure within the high-pressure tank will increase; check whether or not the pressure is the standard value when the compressor is stopped.

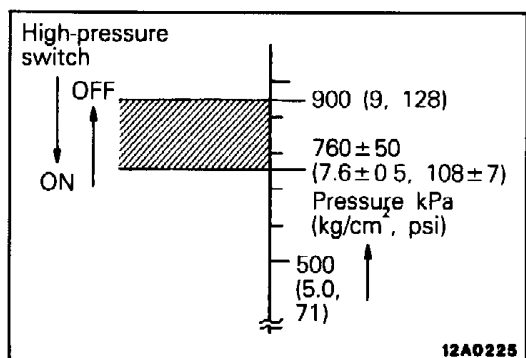
Standard value: 900 kPa (9 kg/cm², 128 psi) or higher

5. Gradually open the shut-off valve of the air-pressure gauge while watching the indicator of the air-pressure gauge; check whether or not the pressure that actuates the compressor's operation (when the pressure within the high-pressure tank has dropped) is within the standard value range.

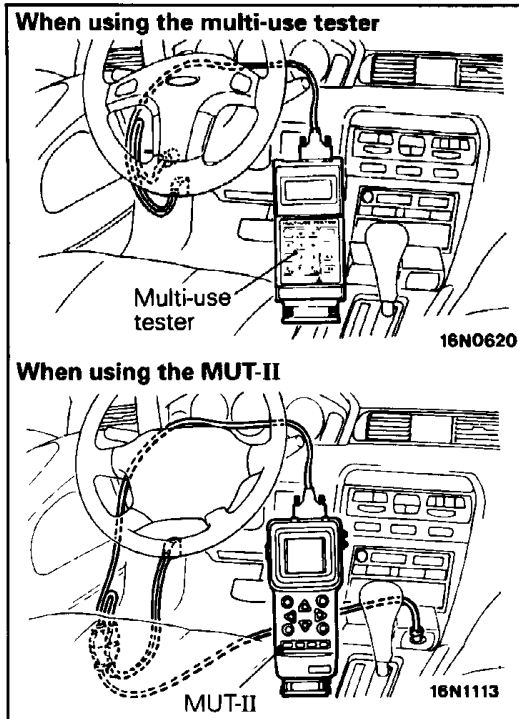
**Standard value: 760±50 kPa
(7.6±0.5 kg/cm², 108±7 psi)**

NOTE

The ON/OFF status of the high-pressure switch at this time can be checked by the multi-use tester <Up to 1993 models> or MUT-II <All models> (Refer to P.33B-4.)



6. If the pressure within the high-pressure tank is not within the standard value range when the compressor is stopped (high-pressure switch OFF) or the compressor is activated (high-pressure switch ON), remove the reserve tank assembly and replace the high-pressure switch.



G-SENSOR OUTPUT VOLTAGE CHECK

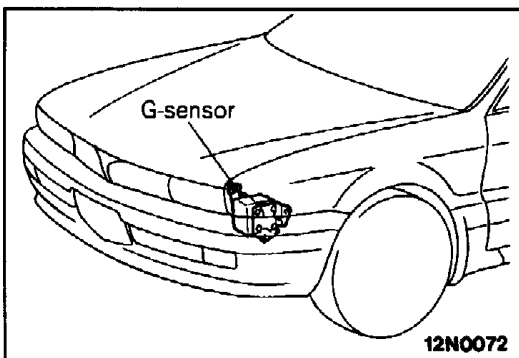
1. Unload the vehicle and move it to a horizontal surface.
2. Connect the multi-use tester <Up to 1993 models> or MUT-II <All models> and start the engine.

Caution

Connection and disconnection of the multi-use tester or MUT-II should always be made with the ignition switch in the OFF position.

3. Check whether the G-sensor output voltage is within the standard value range when the vehicle-height is the NORMAL vehicle-height.

Standard value: $2.5 \pm 0.6V$



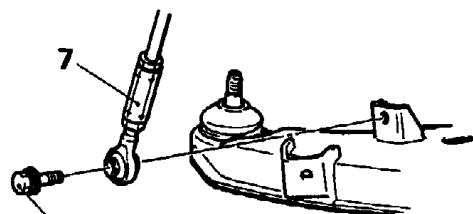
4. If the G-sensor output voltage is not within the standard value range, check the installation condition of the G sensor; if there is bolt loose, deformation of the body, etc., repair it. If the problem is not repairable, replace the G sensor.

NOTE

If the G-sensor installation surface is at an angle (tilted) due to body deformation or some other cause, a washer(s) or shim(s) may be used to make an adjustment so that the output voltage is within the standard value range.

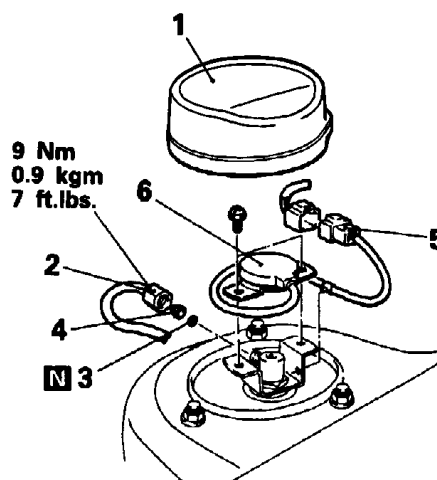
STRUT ASSEMBLY

REMOVAL AND INSTALLATION



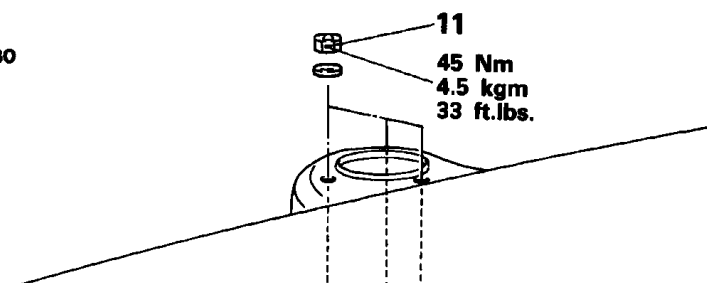
22 Nm
2.2 kgm
16 ft.lbs.

12A0230



9 Nm
0.9 kgm
7 ft.lbs.

12N0032



45 Nm
4.5 kgm
33 ft.lbs.

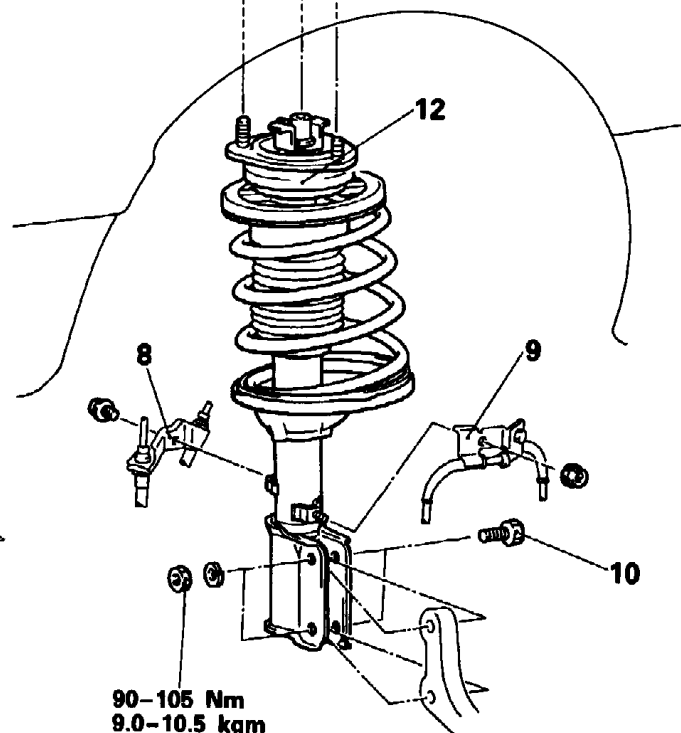
Removal steps



1. Dust cover
2. Air tube
3. O-ring
4. Bush
5. Actuator connector
6. Actuator
7. Front height sensor rod
8. Brake hose and tube clamp
9. Front speed sensor clamp
- <Vehicles with anti-skid brake system>
10. Front strut lower mounting bolts
11. Front strut upper mounting nuts
12. Strut assembly

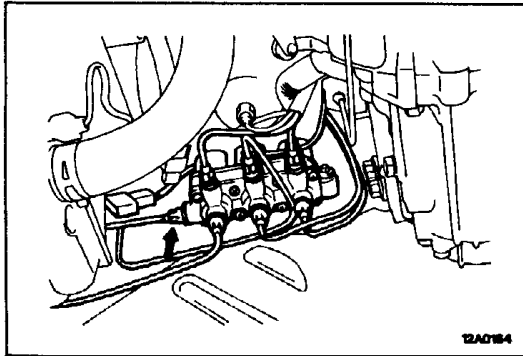
Post-installation Operation

- Operation Check of ECS System (Refer to P.33B-89.)
- Front Wheel Alignment Adjustment



90-105 Nm
9.0-10.5 kgm
16-76 ft.lbs.

12N0033



INSPECTION

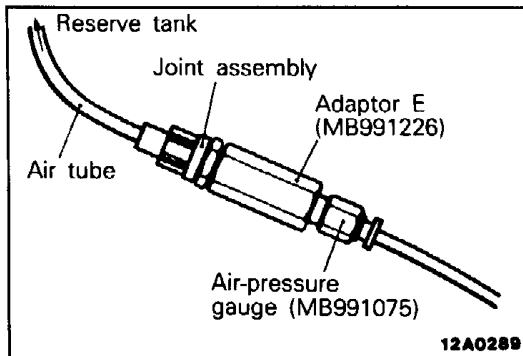
E33LCAE

CHECKING FOR STRUT ASSEMBLY AIR LEAKAGE

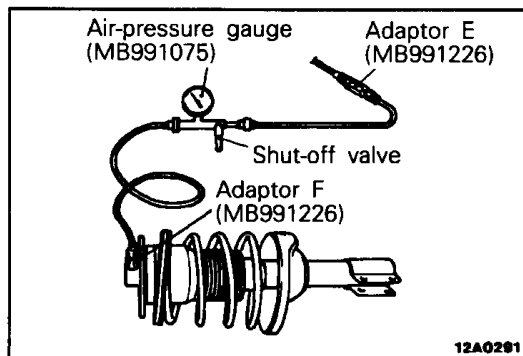
- (1) Disconnect the flow-control solenoid valve's air tube (connected to the high-pressure side of the reservoir tank) shown in the illustration, and then take off the joint assembly.

NOTE

This air tube is connected, via the reservoir tank and the dryer, to the compressor assembly.



- (2) Install the removed joint assembly to the special tool (adaptor set) and then connect to the disconnected air tube.



- (3) Connect the air tube at the shut-off valve side of the special tool (air-pressure gauge) to the air tube side, and the other one to the strut assembly. The installation at the strut side is done by using the special tool (adaptor set).

Caution

To prevent the entry of moisture during the strut assembly air leak check, utilize air from the dryer.

- (4) Remove the compressor connector, then operate it by connecting it directly to the battery.

NOTE

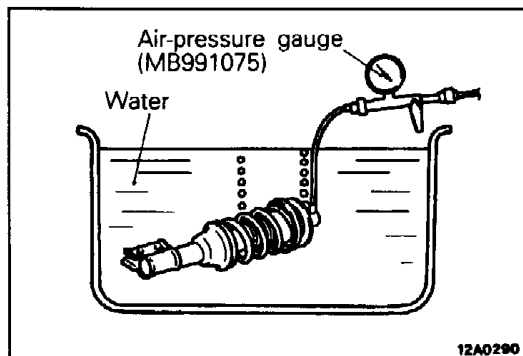
Refer to P.33B-108 for compressor connector array.

- (5) Insert the strut assembly into a water tank and check for air leakage at a pressure of about 500 kPa (5 kg/cm², 71 psi).

Caution

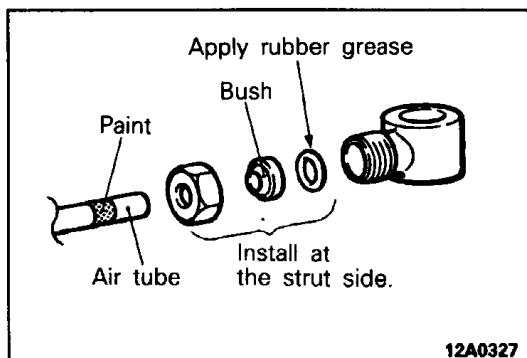
1. Don't mistake the rise of bubbles attached to the outside of the strut for air leakage.
2. Dry the strut with an air blower after the check has been completed.

- (6) When air leakage is found, check the strut assembly and replace it as necessary.



CHECKING THE ACTUATOR

For detailed information concerning the checking of the actuator, refer to the troubleshooting guide and to the service adjustment procedures section.



SERVICE POINTS OF INSTALLATION

E33LDA-J

2. INSTALLATION OF AIR TUBE

- (1) After coating the O-ring with rubber grease, install the O-ring, bush and flare nut to the strut assembly.

Caution

1. The O-ring may be damaged if it is installed at the air tube side when the connection is made.
2. The bush must be installed so that the projection part is facing in the direction indicated in the illustration.

- (2) First insert the air tube until resistance is felt, and then push the tube in until the painted place on the air tube.

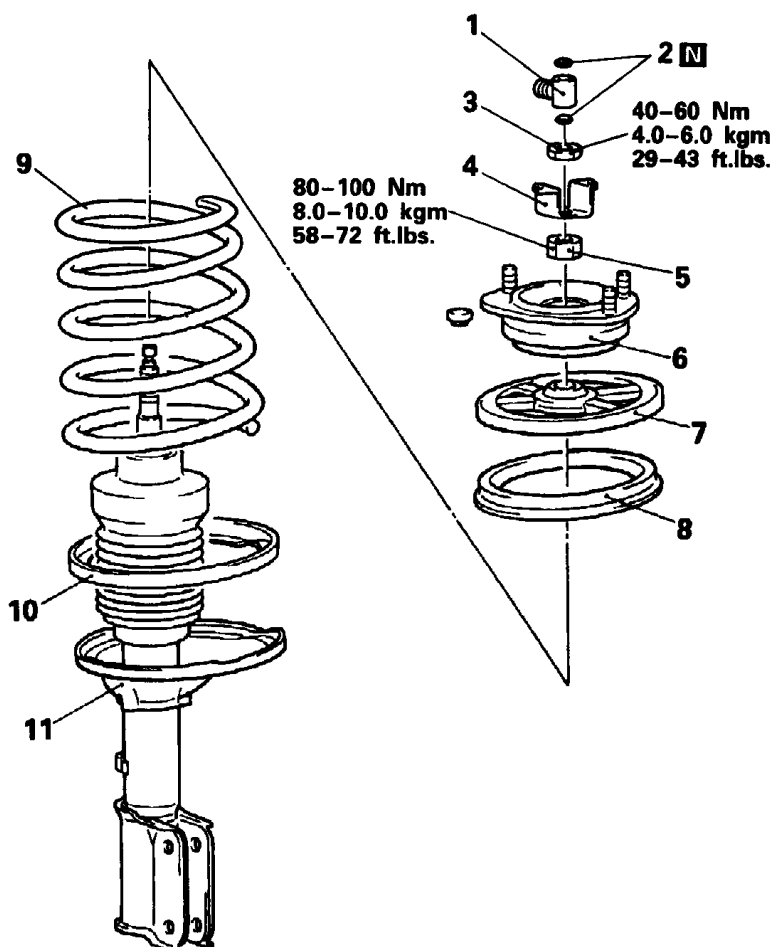
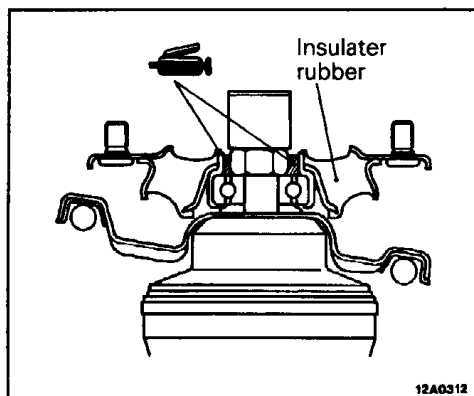
Caution

Air leakage may occur if the air tube connection is not complete and secure.

- (3) After connecting the air tube, in order to prevent double-folding of the diaphragm, while still in the lifted condition, press the vehicle-height switch (HIGH switch) for two seconds or longer to select the EXTRA HIGH mode so that air will be supplied to the air springs.

DISASSEMBLY AND REASSEMBLY

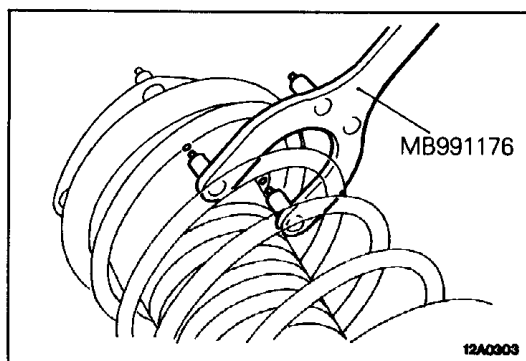
E33LE-



Disassembly steps

1. Joint
2. O-ring
3. Actuator bracket mounting nut
4. Actuator bracket
5. Strut insulator mounting nut
6. Strut insulator
7. Upper spring seat
8. Upper spring pad
9. Coil spring
10. Lower spring pad
11. Strut assembly

12A0304



SERVICE POINTS OF DISASSEMBLY

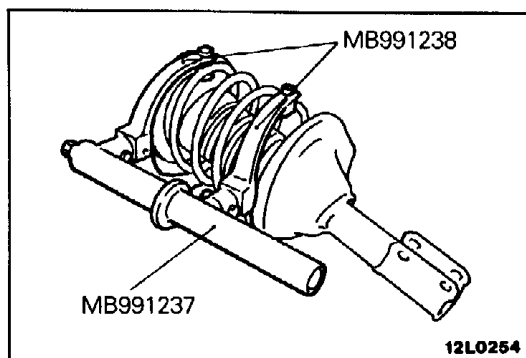
E33LFA-L

5. REMOVAL OF STRUT INSULATOR MOUNTING NUT

- (1) Using the special tool, loosen the strut insulator mounting nut while holding the spring seat (upper).

Caution

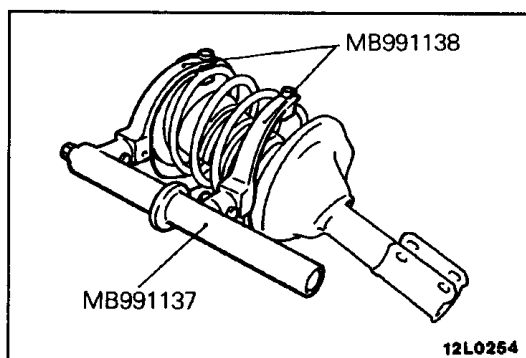
- (1) The strut insulator mounting nut should be loosened only, not removed.
- (2) Do not use an air tool.



- (2) Using the special tools, compress the coil spring and then remove the strut insulator mounting nut.

Caution

- (1) Install the special tools evenly, and so that the maximum length will be attained within the installation range.
- (2) Do not use an air tool to tighten the bolt of the special tool and to remove the strut insulator mounting nut.



SERVICE POINTS OF REASSEMBLY

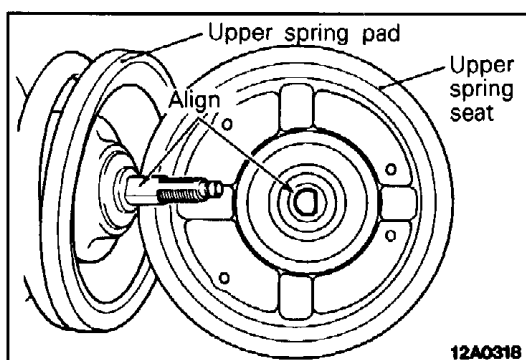
E33UHAL

9. INSTALLATION OF COIL SPRING

Attach the special tools to the coil spring and compress the spring, and then install to the strut.

Caution

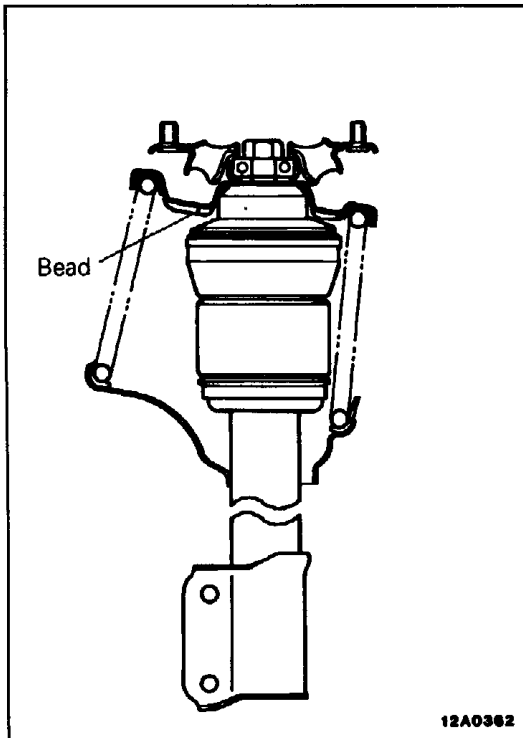
Do not use an air tool to tighten the bolt of the special tool.



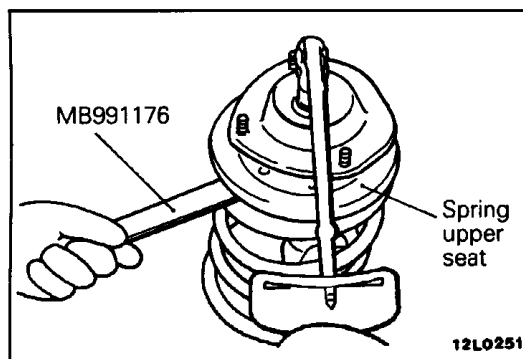
7. INSTALLATION OF UPPER SPRING SEAT

- (1) Install the spring upper seat to the piston rod, and align the notched part of the piston rod and the hole in the spring seat.

33B-98 ACTIVE-ELECTRONIC CONTROL SUSPENSION – Strut Assembly



- (2) Align the bead of the spring upper seat and the facing direction of the knuckle bracket.



5. INSTALLATION OF STRUT INSULATOR MOUNTING NUT

- (1) Loosely attach the strut insulator installation nut to the strut assembly.
- (2) Correctly align both ends of the coil spring with the groove in the spring seat, and then loosen the special tools (MB991237 and MB991238).
- (3) Using the special tool, hold the spring upper seat in place and tighten the strut insulator installation nut.

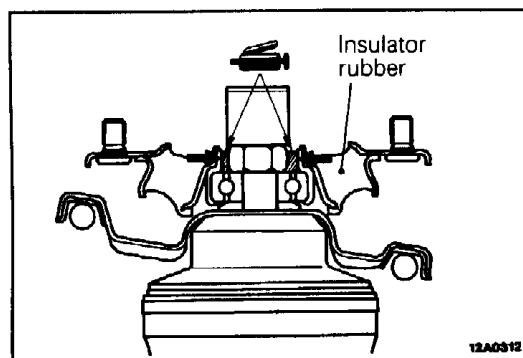
Caution

Do not use an air tool.

- (4) Apply a coating of multipurpose grease to the insulator bearing channel.

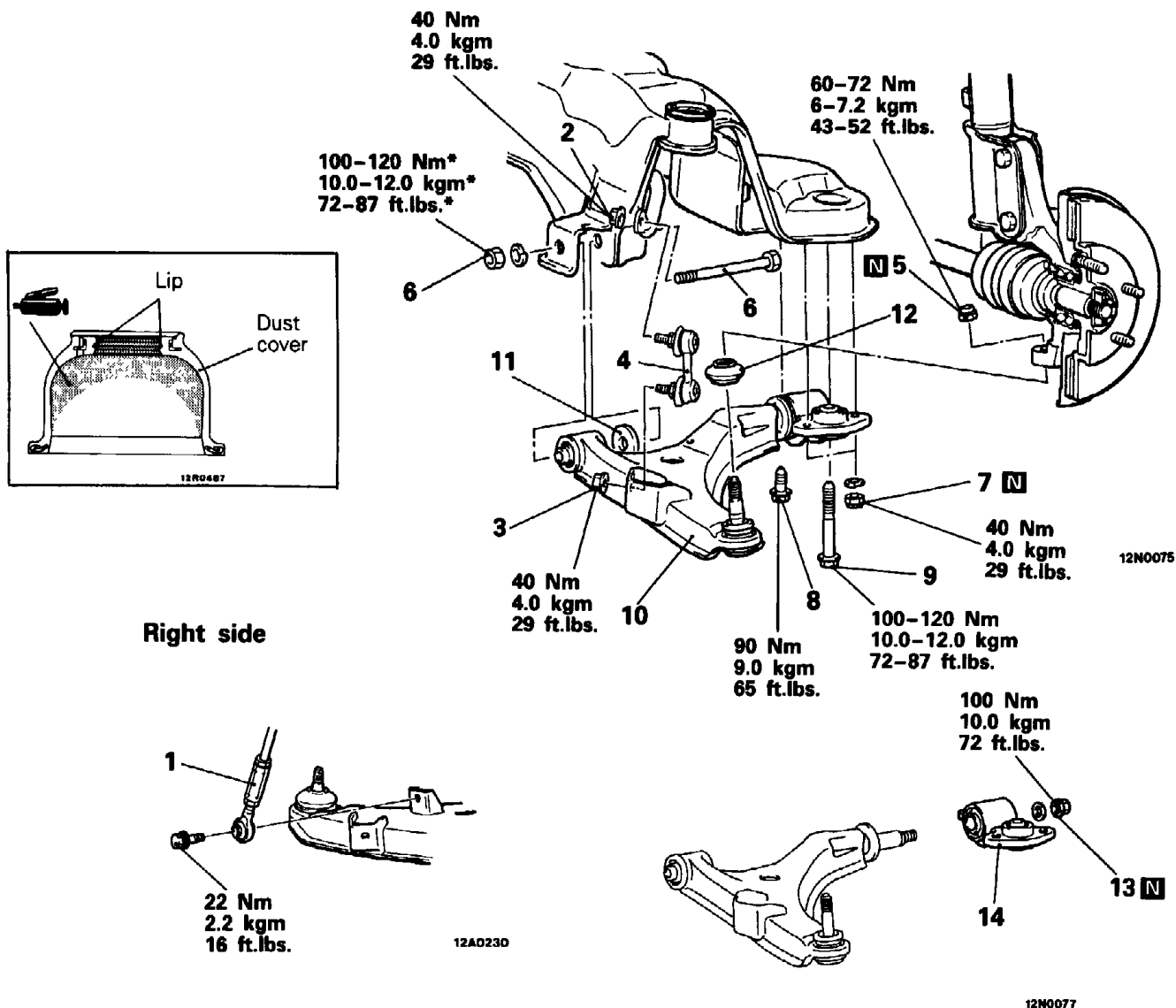
Caution

When coating with grease, take care that the grease does not adhere to the insulator rubber part.



LOWER ARM

REMOVAL AND INSTALLATION



Removal steps

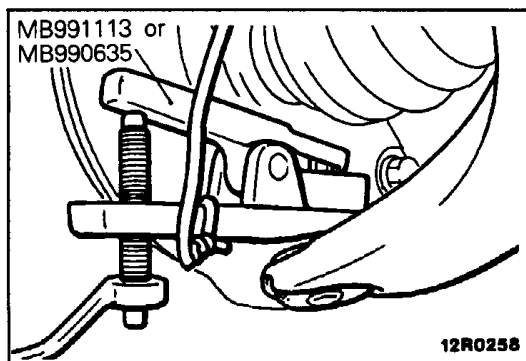
1. Front height sensor rod
2. Stabilizer link mounting nut (Stabilizer bar side)
3. Stabilizer link mounting nut (Lower arm side)
4. Stabilizer link
5. Lower arm ball-joint and knuckle coupling self-locking nut
6. Lower arm mounting bolt and nut
7. Clamp mounting self locking nut
8. Clamp mainting bolt (small)
9. Clamp mounting bolt (large)
10. Lower arm assembly
11. Stopper
12. Dust cover
13. Lower arm clamp mounting self locking nuts
14. Lower arm clamp

Post-installation Operation

- Operation Check of ECS System (Refer to P 33B-89.)
- Front Wheel Alignment Adjustment

Caution

*: Indicates parts which should be temporarily tightened, and then fully tightened with the vehicle on the ground in the unladen condition.



SERVICE POINTS OF REMOVAL

E330BA-L

5. REMOVAL OF LOWER ARM BALL JOINT

Using the special tool, disconnect the lower arm ball joint from the knuckle.

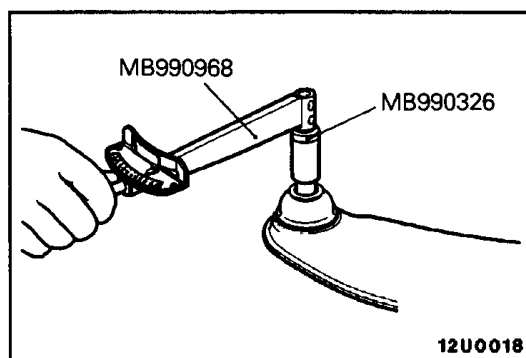
NOTE

- (1) Always tie the cord of the special tool to the nearby part.
- (2) Loosen the nut but do not remove it.

INSPECTION

E330CAE

- Check the lower arm for bend or breakage.
- Check the lower arm shaft for cracks and damage.
- Check the clamp for deterioration or damage.
- Check the bushing for wear and deterioration.
- Check the ball joint dust cover for cracks.



BALL JOINT CHECKING FOR STARTING TORQUE

- (1) If a crack is noted in the dust cover, replace it, adding grease.
- (2) Shake the ball joint stud several times.
- (3) Mount two nuts on the ball joint, and then measure the ball joint starting torque.

Standard value: 10–22 Nm

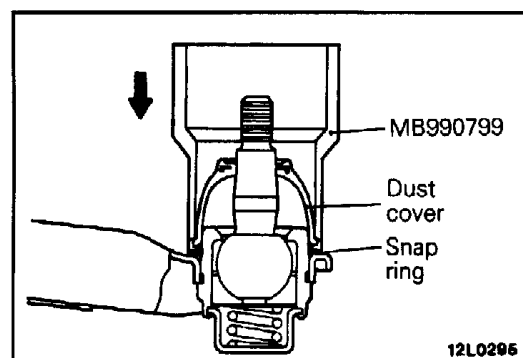
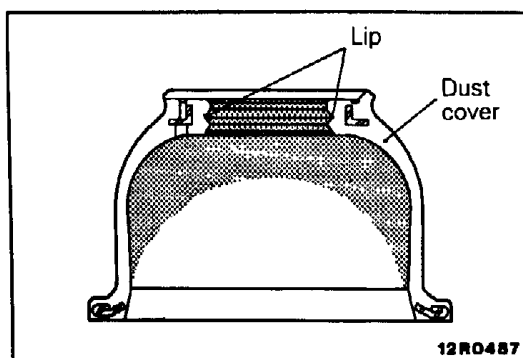
(100–220 kgcm, 87–191 in.lbs.)

- (4) If the starting torque exceeds the upper limit of standard value, replace the lower arm assembly. Even if the starting torque is below the lower limit of the standard value, the ball joint may be reused unless it has drag and excessive play.

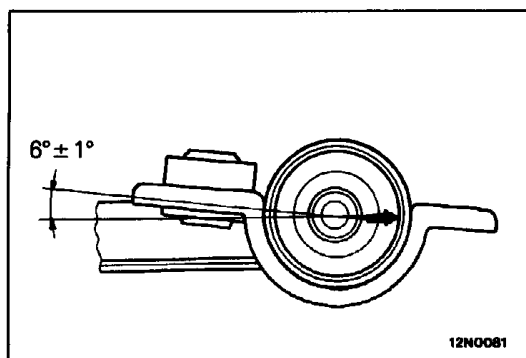
BALL JOINT DUST COVER REPLACEMENT

E330DAD

- (1) Remove the dust cover.
- (2) Apply multipurpose grease to the lip and inside of the dust cover.



- (3) Drive in the dust cover with special tool until it is fully seated.



SERVICE POINTS OF INSTALLATION

13. INSTALLATION OF LOWER ARM CLAMP MOUNTING SELF-LOCKING NUT

Tilt the mounting surface of the lower arm clamp $6^\circ \pm 1^\circ$ to the lower arm lower surface, set the lower arm clamp, and install the self-locking nut.

SHOCK ABSORBER ASSEMBLY

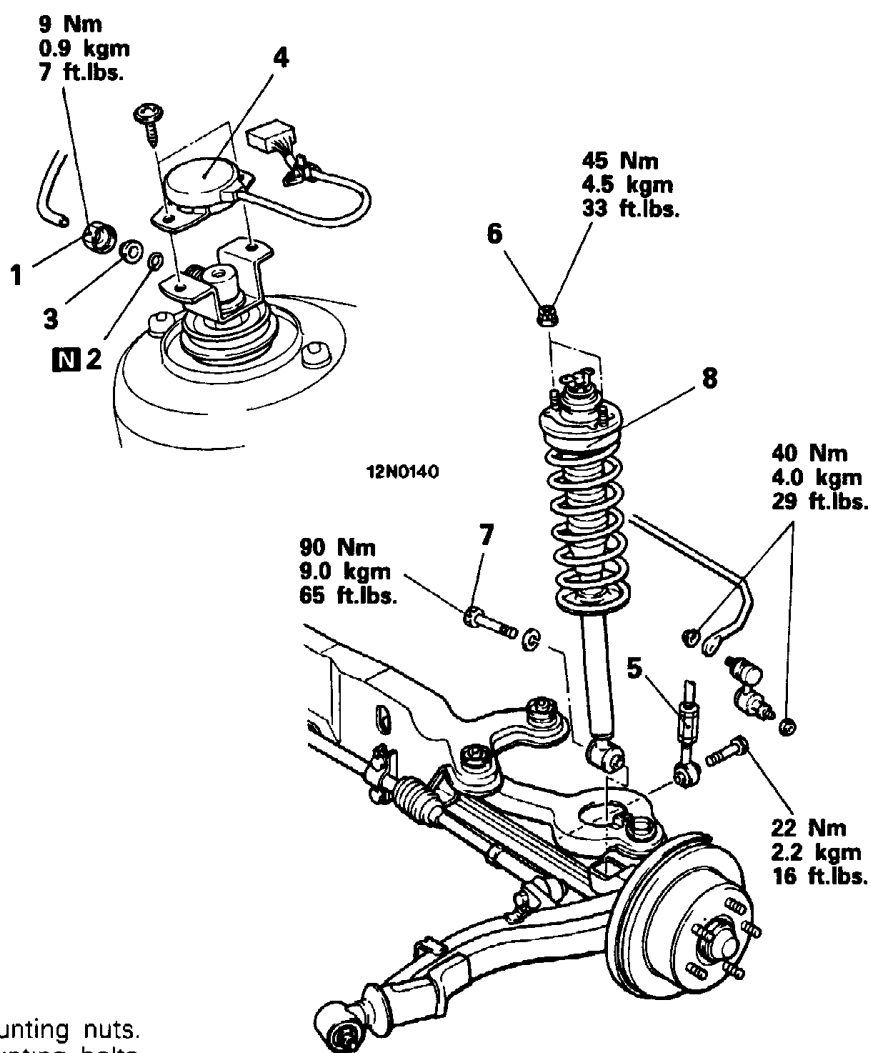
REMOVAL AND INSTALLATION

Pre-removal Operation

- Removal of Trunk Room Side Trim (Refer to GROUP 52 – Trims)

Post-installation Operation

- Installation of Trunk Room Side Trim (Refer to GROUP 52 – Trims)
- Operation Check of ECS System (Refer to P 33B-89)
- Rear Wheel Alignment Adjustment



Removal steps

- ◆◆ 1. Air tube
2. O-ring
3. Bush
4. Actuator
5. Rear height sensor rod
6. Shock absorber upper mounting nuts.
7. Shock absorber lower mounting bolts.
8. Shock absorber

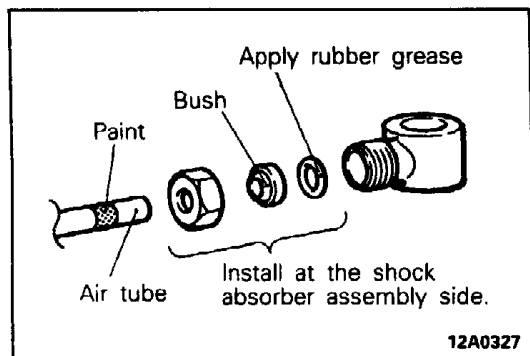
12N0125

INSPECTION

E33YAB-B

CHECKING FOR SHOCK ABSORBER ASSEMBLY AIR LEAKAGE

For information concerning checking for air leakage of the shock absorber assembly, refer to the section concerning the strut assembly (P.33B-99).



SERVICE POINTS OF INSTALLATION

E33YACA

1. CONNECTION OF AIR TUBE

- (1) After applying a coating of rubber grease to the O-ring, install the O-ring, bush and joint at the shock absorber assembly side.

Caution

1. The O-ring might be damaged if it is installed at the air tube side and then the insertion is made.
2. The bush must be installed so that the projection part is facing in the direction indicated in the illustration.

- (2) First insert the air tube until resistance is felt, and then push in the tube until the painted place on the air tube.

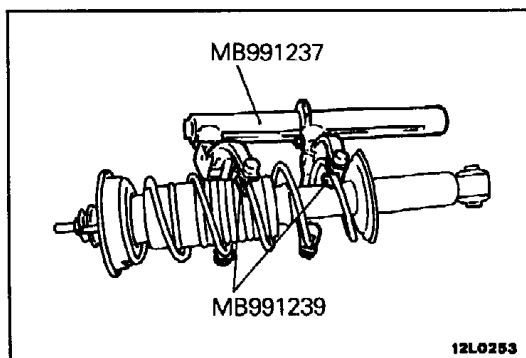
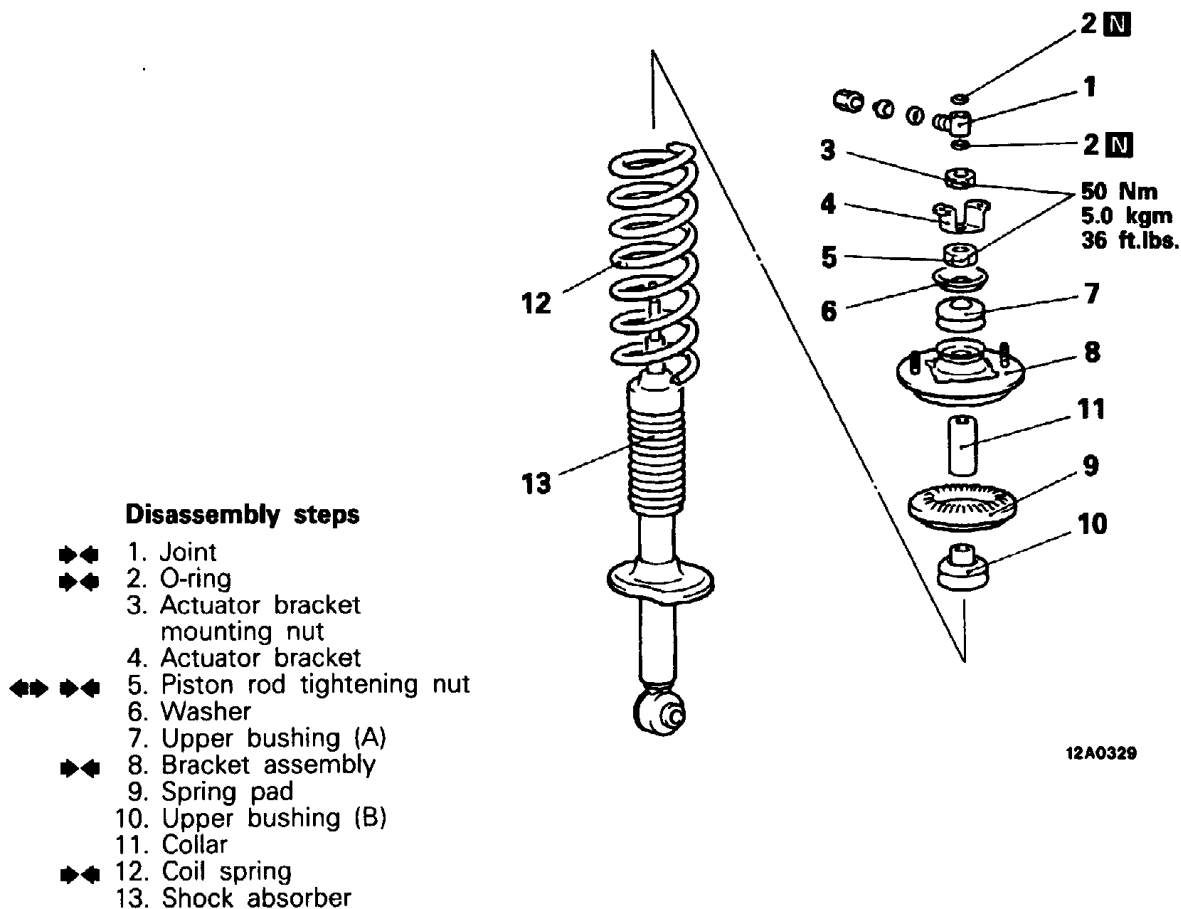
Caution

Air leakage may occur if the air tube connection is not complete and secure.

- (3) After connecting the air tube, in order to prevent double-folding of the diaphragm, while still in the lifted condition, press the vehicle-height switch (HIGH switch) for two seconds or longer to select the EXTRA HIGH mode so that air will be supplied to the air springs.

DISASSEMBLY AND REASSEMBLY

E33YAD-



SERVICE POINTS OF DISASSEMBLY

E33YAEA

5. REMOVAL OF PISTON ROD TIGHTENING NUT

- (1) Compress the coil spring using the special tools.

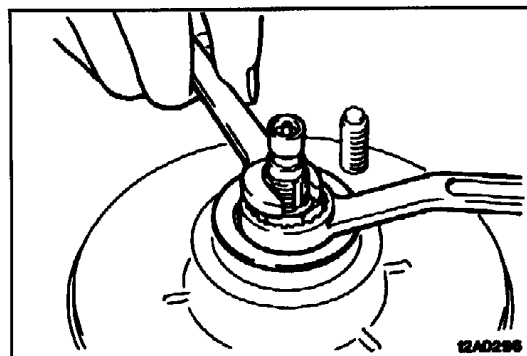
Caution

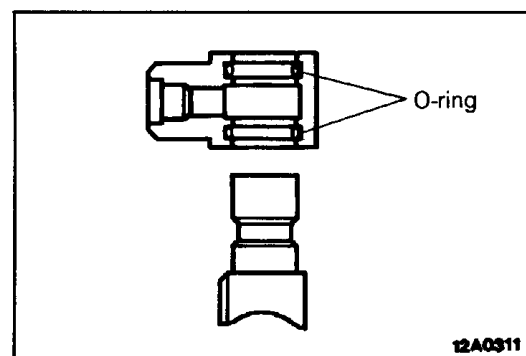
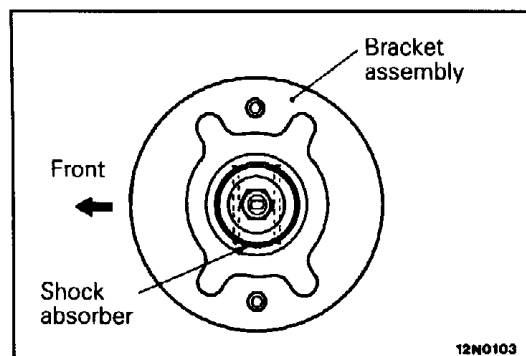
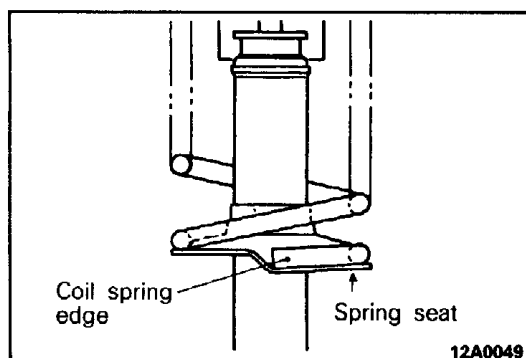
- (1) Install the special tools evenly, and so that the maximum length will be attained within the installation range.
- (2) Do not use an air tool to tighten the bolt of the special tool.

- (2) While holding the piston rod, remove the piston rod tightening nut.

Caution

Do not use an air tool.





SERVICE POINTS OF REASSEMBLY

E33YAGA

12. INSTALLATION OF COIL SPRING

- (1) Use the special tools (MB991237 and MB991239) to compress the coil spring and insert it in the shock absorber.

Caution

Do not use an air tool to tighten the bolt of the special tool.

- (2) Align the edge of the coil spring to the position of the shock absorber spring seat as shown.

8. INSTALLATION OF BRACKET ASSEMBLY/5. PISTON ROD TIGHTENING NUT

- (1) With the position of the bracket assembly as shown in the figure, tighten the tightening nut to the specified torque.

Caution

Do not use an air tool.

- (2) Install the coil spring so that the lower edge fits into the spring seat groove and the upper edge fits into the spring pad groove, then remove the special tools (MB991237 and MB991239).

2. INSTALLATION OF O-RING/1. JOINT

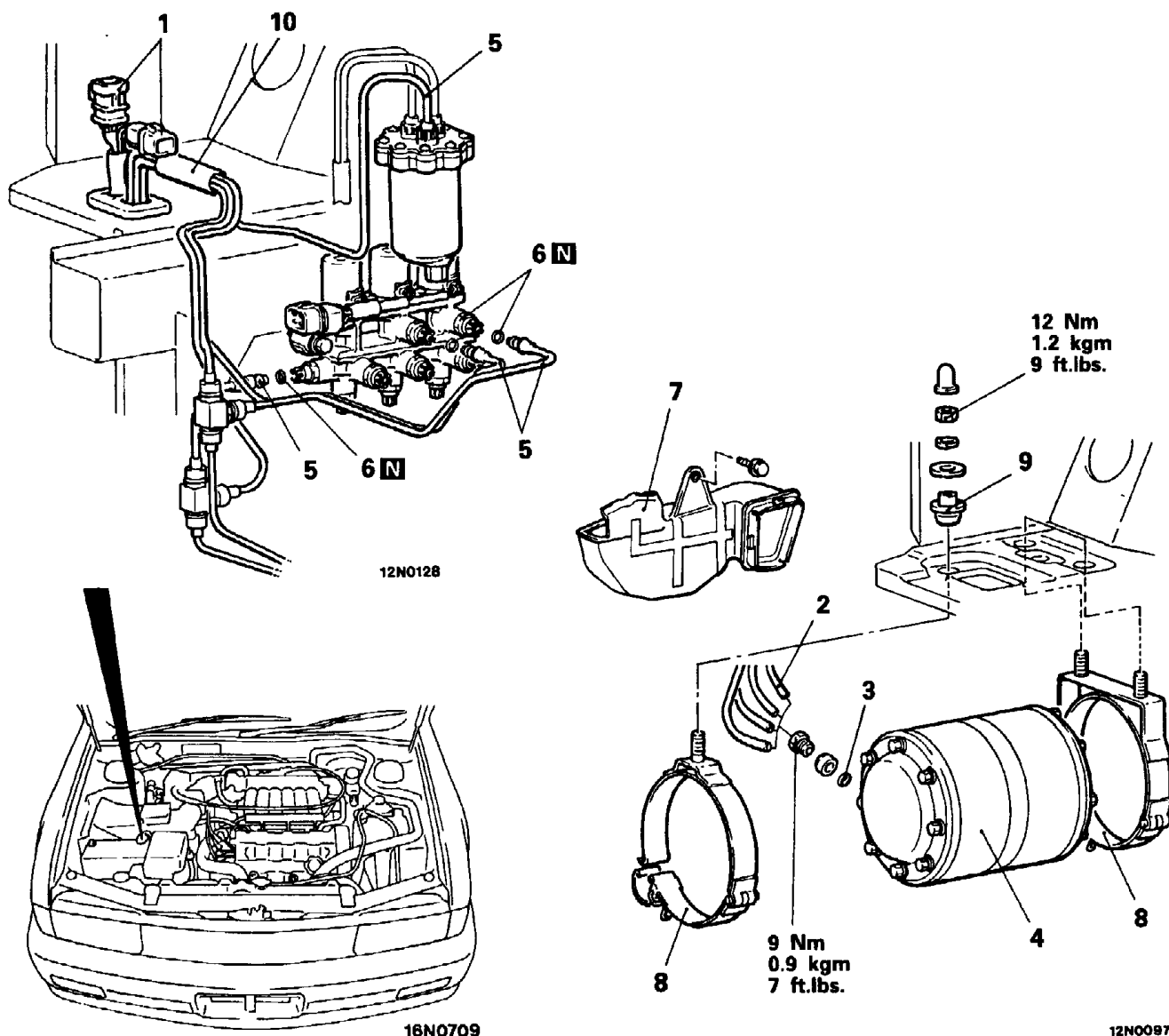
Apply a coating of rubber grease to the O-ring, install it to the joint, and then install to the piston rod.

REAR SUSPENSION ASSEMBLY/UPPER ARM/LOWER ARM/TRAILING ARM

Refer to GROUP 34 – Rear Suspension.

RESERVE TANK ASSEMBLY (FRONT)

REMOVAL AND INSTALLATION



Removal steps

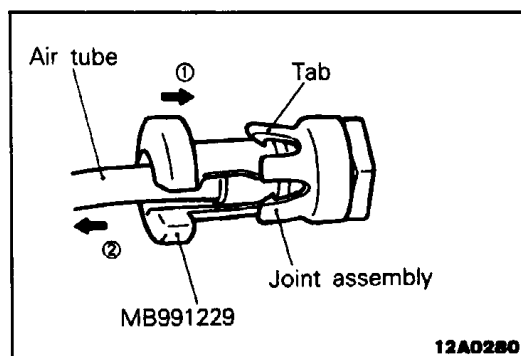
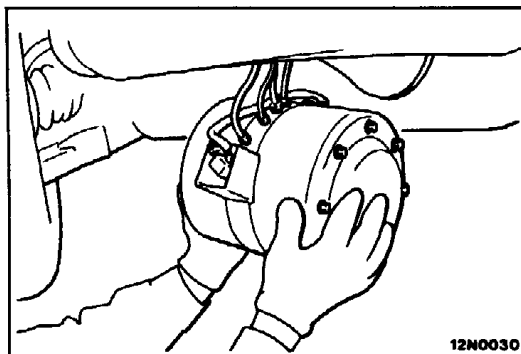
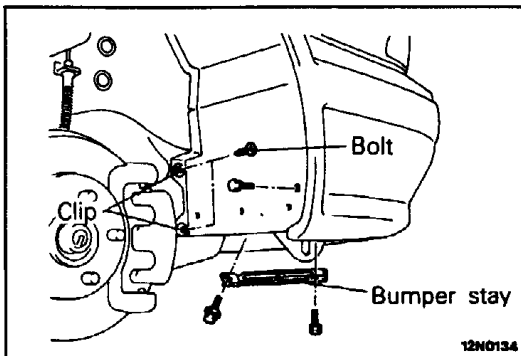
1. Reserve tank connector
2. Air tube
3. O-ring
4. Reserve tank (Front)
5. Air tube
6. O-ring
7. Air intake tube
8. Tank holder
9. Bush
10. Air tube

Pre-removal Operation

- Removal of Battery and Battery Tray
- Removal of Underguard

Post-installation Operation

- Installation of Underguard
- Installation of Battery and Battery Tray
- Operation Check of ECS System (Refer to P 33B-89.)



SERVICE POINTS OF REMOVAL

E33ZDA-0

2. REMOVAL OF AIR TUBE

- (1) Remove the splash shield clip and bolt, as shown in the diagram.
- (2) Remove the bumper stay.

- (3) Remove the reserve tank from the tank holder, and after pulling it downwards, being careful not to damage the air tubes, remove the air tube and reserve tank connections.

10. REMOVAL OF AIR TUBES

- (1) Push the special tool inward, in direction ① shown in the figure, in order to expand the tabs of the joint.
- (2) Pull out the air tube, together with the special tool, in direction ②.

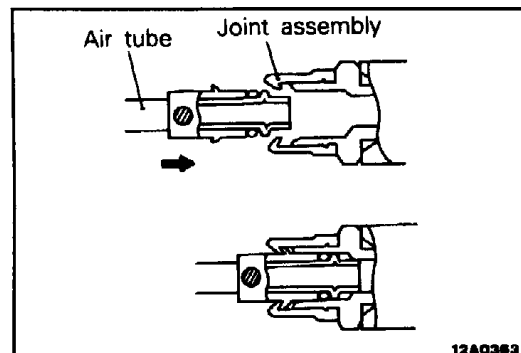
Caution

To prevent dust, dirt and other foreign material from getting into the air tubes, dryer or solenoid valve openings, use vinyl tape or similar material to cover these openings.

INSPECTION

E33ZDBC

For detailed information concerning the checking of the return pump, the high-pressure switch and the low-pressure switch, refer to the troubleshooting guide and service adjustment procedures section.

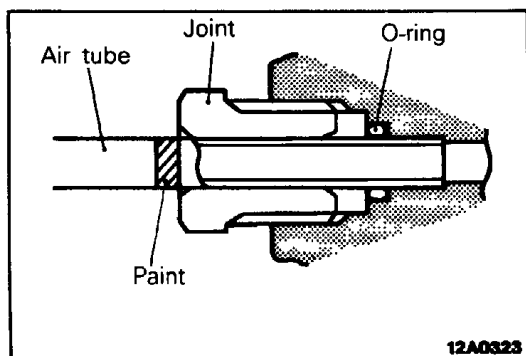


SERVICE POINTS OF INSTALLATION

E33ZDC-0

10. INSTALLATION OF AIR TUBES

Push the air tube inward to the joint assembly at the device side until a "click" is heard, and then check to be sure that the tabs of the joint assembly are securely affixed to the air tube.



2. CONNECTION OF AIR TUBE

Connect the air tube securely, all the way to the painted mark.

Caution

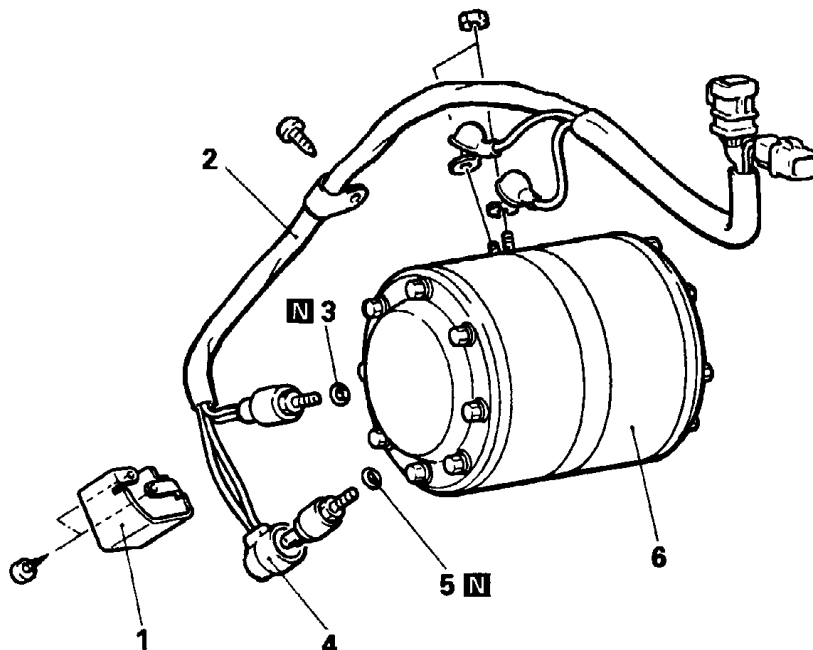
Be sure that the connection is secure; if it is not, an air leak may result.

DISASSEMBLY AND REASSEMBLY

E33ZD-

Disassembly steps

1. Cover
2. Wiring harness (incorporated with high pressure switch)
3. O-ring
4. Low pressure switch
5. O-ring
6. Reserve tank



12N0096

RESERVE TANK ASSEMBLY (REAR)

REMOVAL AND INSTALLATION

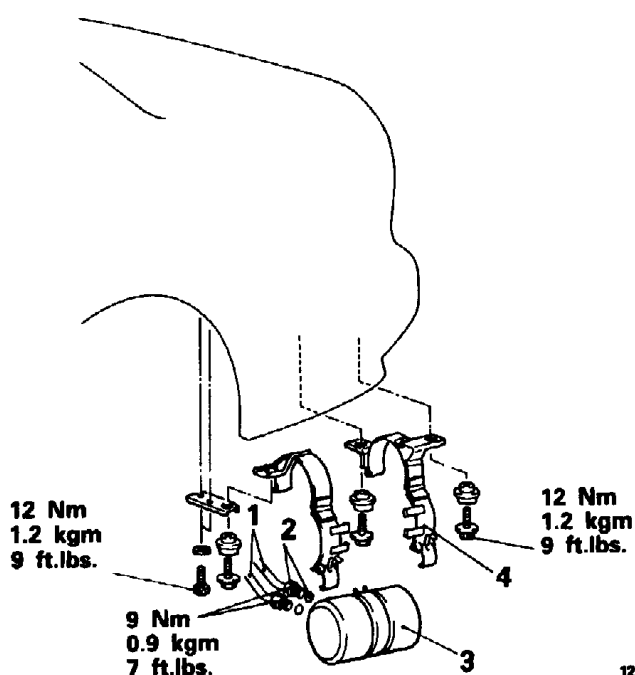
E33ZD-

Removal steps

1. Air tube
2. O-ring
3. Reserve tank (Rear)
4. Tank holder

Post-installation Operation

- Operation Check of ECS System (Refer to P 33B-89)



12N0123

SERVICE POINTS OF REASSEMBLY

E33ZDC-E

1. INSTALLATION OF AIR TUBE

Refer to Reserve tank (Front) (Refer to P.33B-105.)

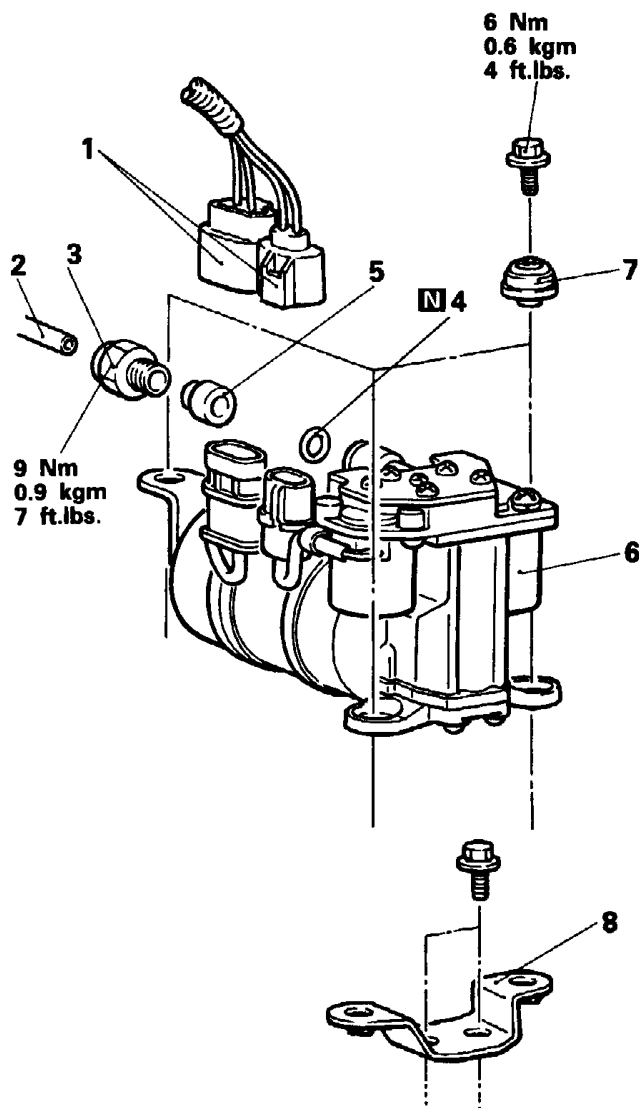
AIR COMPRESSOR ASSEMBLY REMOVAL AND INSTALLATION

Pre-removal Operation

- Removal of Air Cleaner
(Refer to GROUP 15 – Air Cleaner.)

Post-Installation Operation

- Installation of Air Cleaner
(Refer to GROUP 15 – Air Cleaner.)
- Operation Check of ECS System
(Refer to P.33B-89.)



Removal steps



1. Front wiring harness connector
2. Air tube
3. Joint
4. O-ring
5. Connector
6. Air compressor assembly
7. Compressor mounting rubbers
8. Compressor mount bracket

12A0376

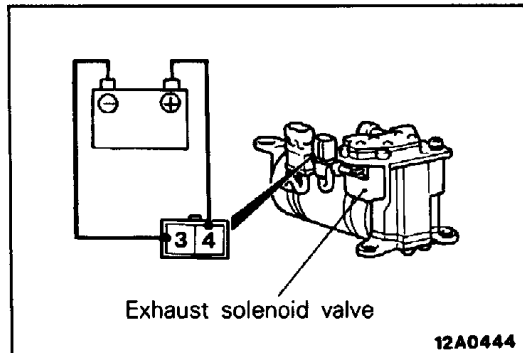
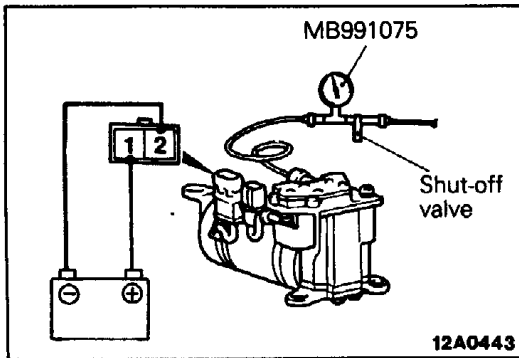
SERVICE POINTS OF REMOVAL

E33ZCAC

2. REMOVAL OF AIR TUBE

Caution

1. In order to prevent dust, dirt and other foreign material from getting into the air tube and air compressor openings, cover these opening with vinyl tape or similar material.
2. Be careful not to bend the air tubes.



INSPECTION

E332C8A

- (1) Using special tool (adaptor C), connect the air tube on the gauge side of the special tool to the air compressor.
- (2) Apply battery voltage (12V) between terminals (1) and (2) compressor.
- (3) Check whether the relief pressure of the air compressor is the standard value.

Standard value: 1,000–1,300 kPa (10–13 kg/cm², 142–185 psi)

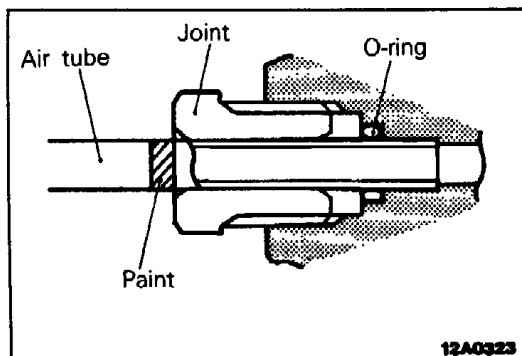
NOTE

Because of pulsation caused by the opening and closing of the exhaust solenoid valve combined with the relief valve, the gauge's indicator will show a reading which fluctuates within a range of 200–300 kPa (2–3 kg/cm², 29–43 psi). Use the mid-point of this fluctuation to make the gauge reading.

- (4) Stop the air compressor and, with the pressure held, apply battery voltage (12V) between air compressor terminals (3) and (4). At this time, check to be sure that the exhaust solenoid valve makes a "click" sound and the pressure is gradually decreasing.
- (5) If air compressor relief pressure is not within the standard value, or if there is a malfunction of the exhaust solenoid valve, replace the air compressor.

Caution

When the air compressor is replaced, first check to be sure that there is no air leakage at air tube joints, no poor contacts of wiring, and that the thermo switch is not in operation.



SERVICE POINTS OF INSTALLATION

E332CCC

2. INSTALLATION OF AIR TUBE

- (1) First insert the air tube at the lower part of the dryer until resistance is felt, and then press the tube further inward to the paint mark on the air tube.

Caution

Air leakage may occur if the air tube connection is not complete and secure.

- (2) Connect air tubes correctly to the air compressor. Apply a soap-and-water solution to the air tube connections to check to be sure that there is no air leakage.

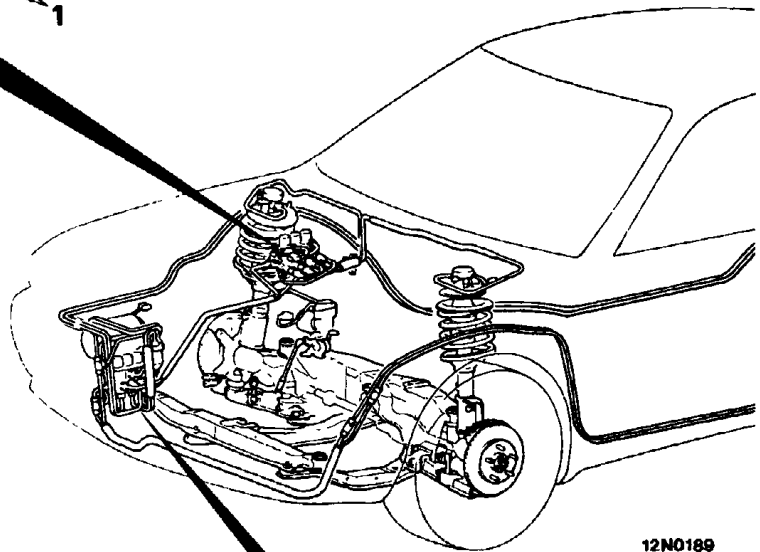
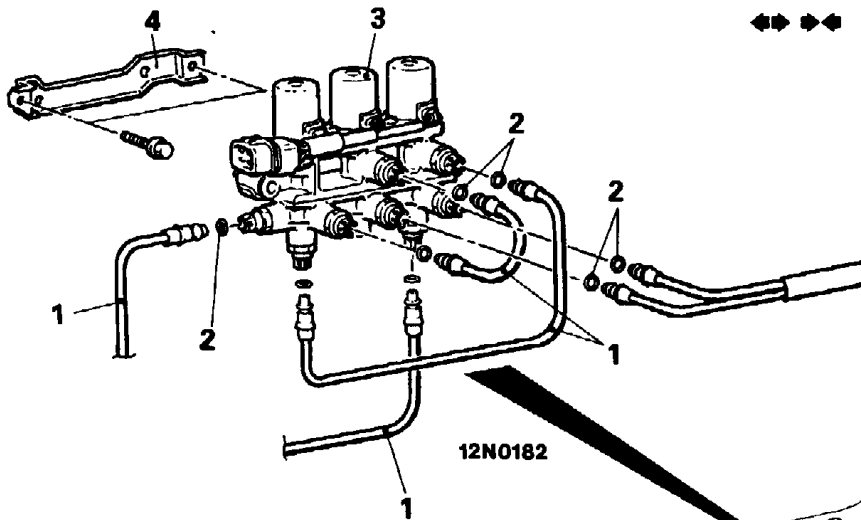
SOLENOID VALVE AND DRYER

E332A

REMOVAL AND INSTALLATION

Front solenoid valve removal steps

- Removal of Air intake hose
- 1. Air tubes
- 2. O-ring
- 3. Front solenoid valve assembly
- 4. Front solenoid valve bracket



Dryer removal steps

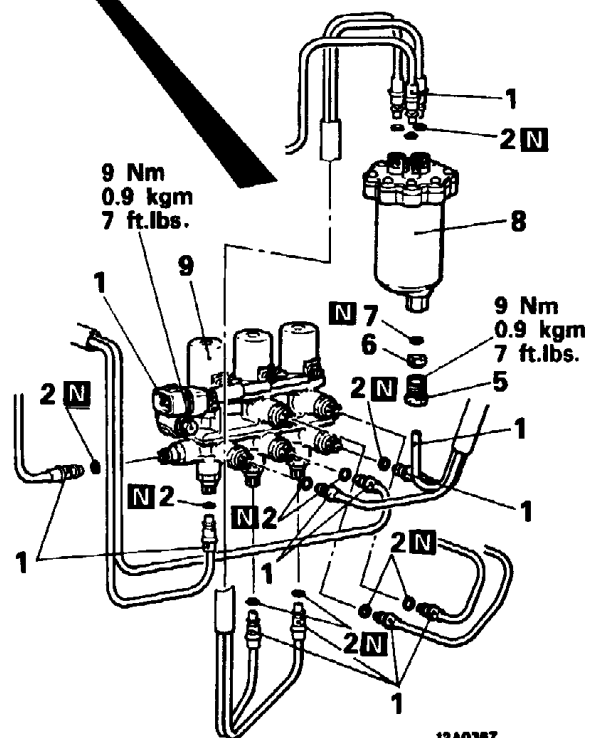
- 1. Air tubes
- 2. O-rings
- 5. Joint assembly
- 6. Bush
- 7. O-ring
- 8. Dryer

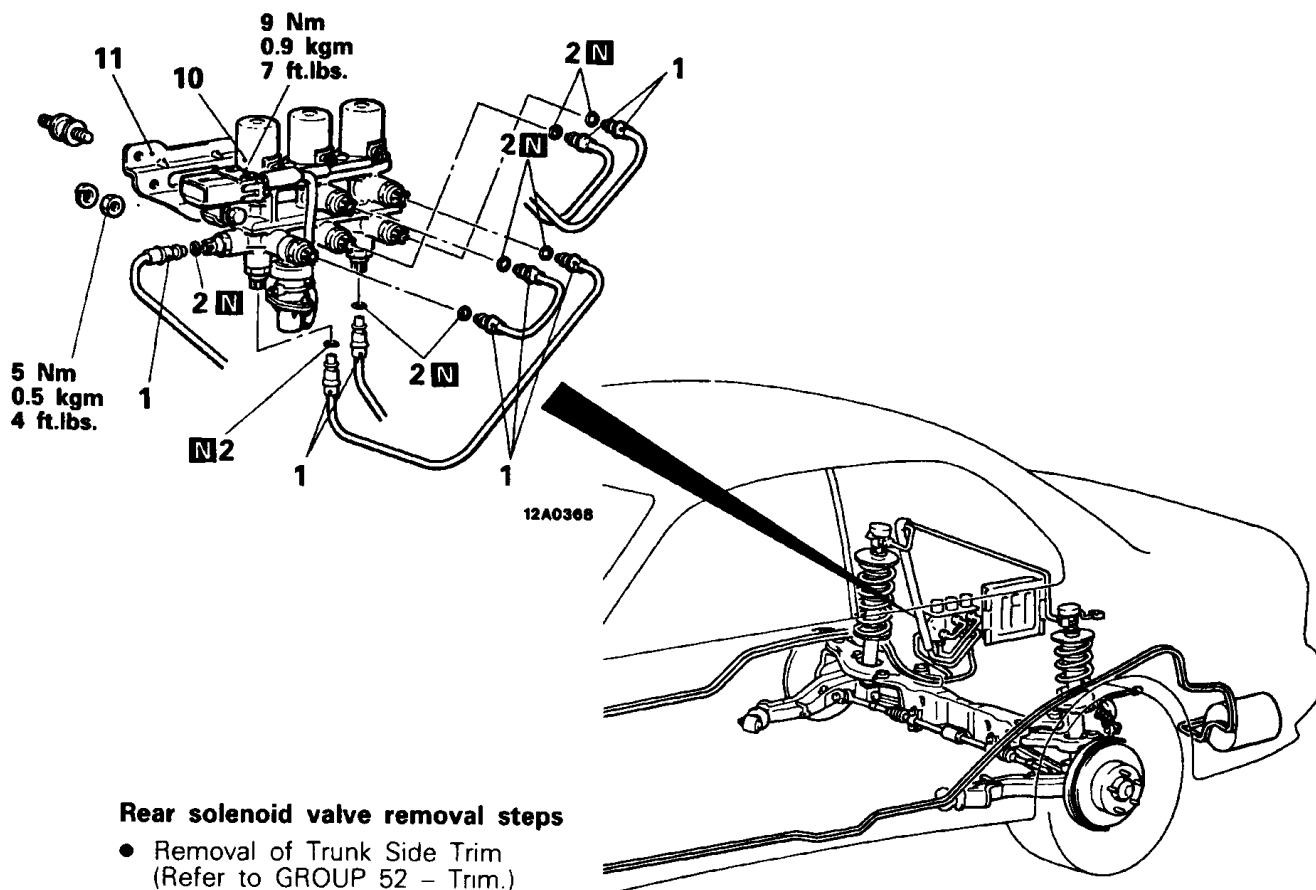
Flow control solenoid valve assembly removal steps

- Battery & Battery tray
- Washer tank assembly
- 1. Air tubes
- 2. O-rings
- 9. Flow control solenoid valve assembly

Post-Installation Operation

- Operation Check of ECS System (Refer to P.33B-89.)





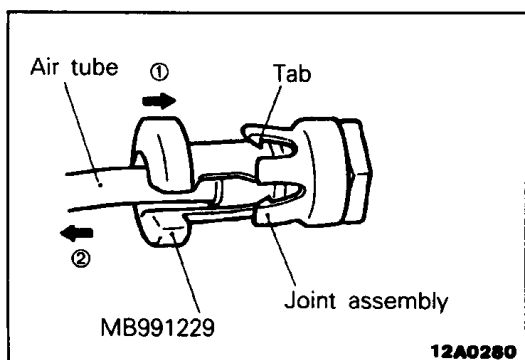
Rear solenoid valve removal steps

- Removal of Trunk Side Trim (Refer to GROUP 52 – Trim.)

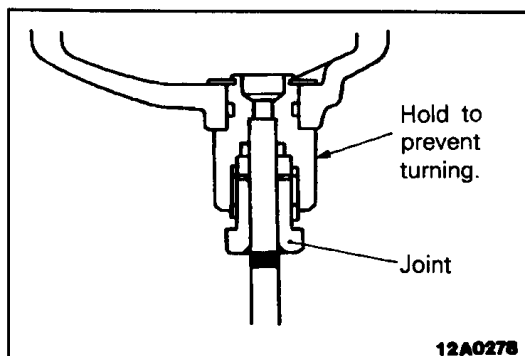


1. Air tubes
2. O-rings
10. Rear solenoid valve assembly
11. Rear solenoid valve bracket

12N0142



12A0280



12A0278

SERVICE POINTS OF REMOVAL

E33ZAAC

1. REMOVAL OF AIR TUBES

- (1) Push the special tool inward, in direction ① shown in the figure, in order to expand the tabs of the joint.
- (2) Pull out the air tube, together with the special tool, in direction ②.

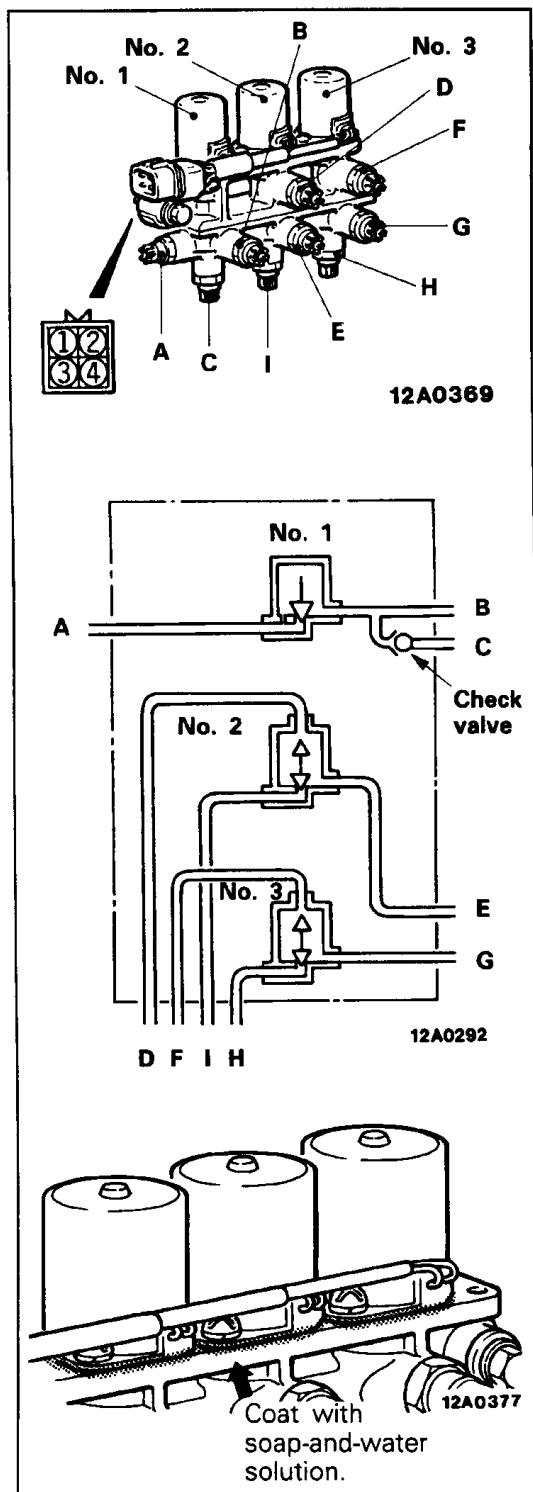
Caution

In order to prevent dust, dirt and other foreign material from getting into the air tube, solenoid valve and dryer openings. Cover these openings with vinyl tape or similar material.

- (3) For the air tube at the lower part of the dryer, loosen the joint, and then pull off.

NOTE

When loosening the joint, use a spanner at the hexagonal part of the joint installation part so as to prevent it from turning.

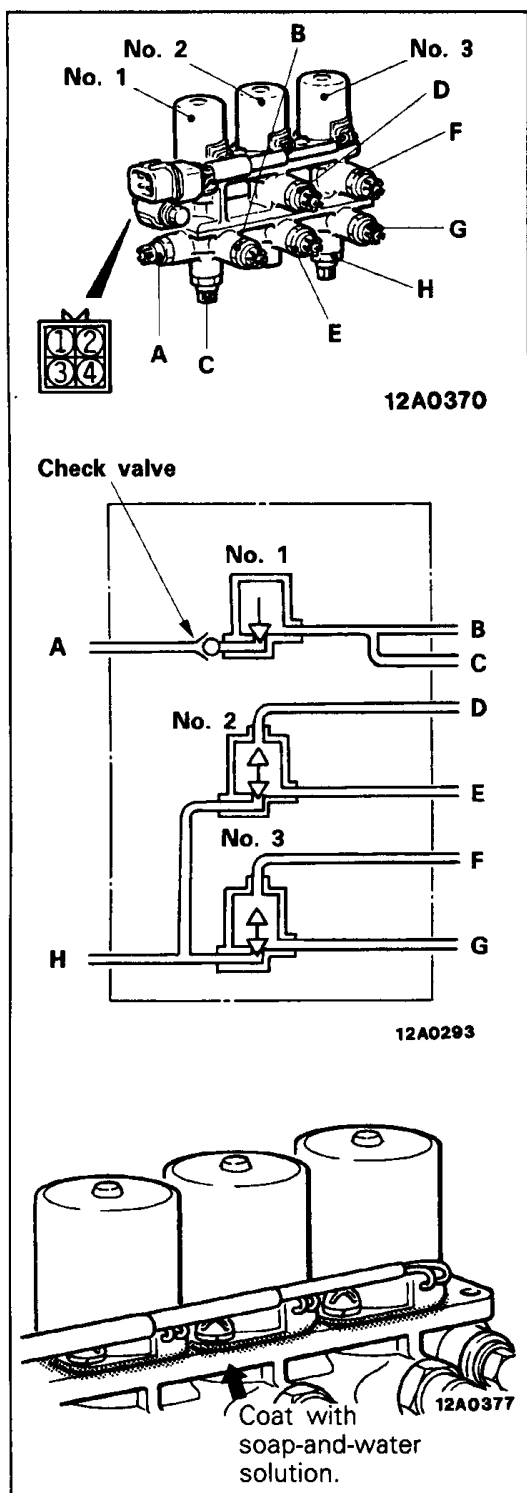


INSPECTION

1. FLOW CONTROL SOLENOID VALVE

Check the No. 1–3 solenoid valves shown in the figure for correct operation and air leakage.

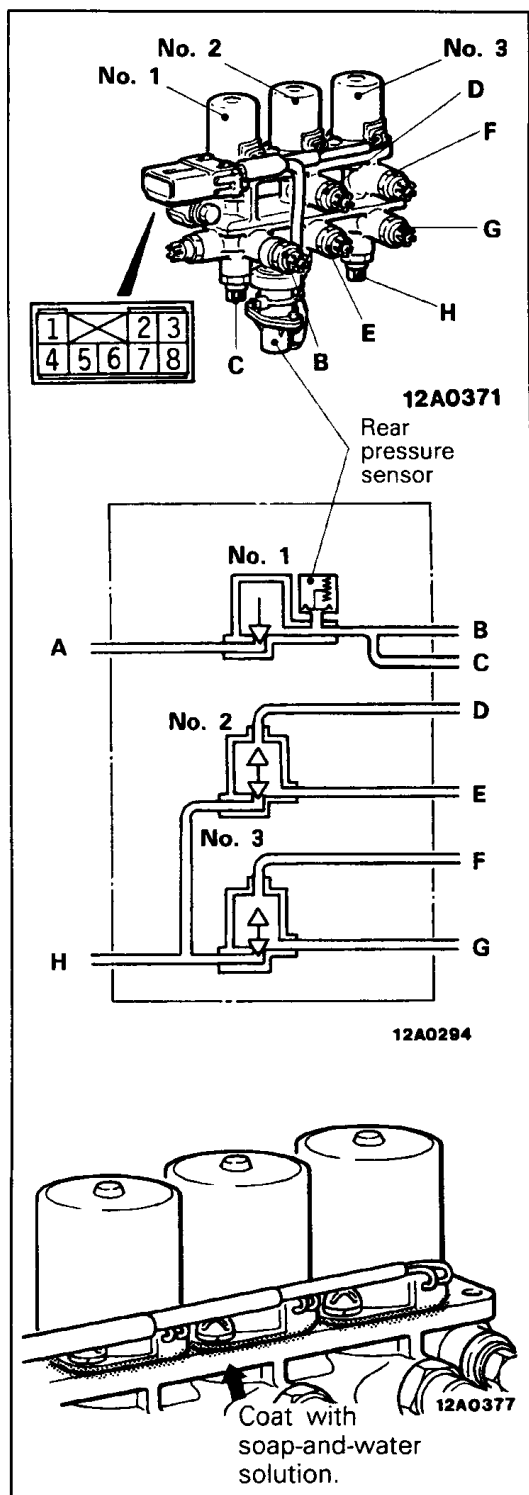
Check item	Condition	Result
Inject air from Part A and apply battery voltage to terminal ② and then earth terminal ①.	A "click" noise will be heard, and the volume of air blown out from joints B and C will become greater.	Good
	Other than as described above.	Malfunction of No. 1 solenoid valve
Blow air in at joint E, apply battery voltage (12V) to terminal ③, and then earth terminal ①.	A "click" noise will be heard, and the air being blown out will change from joint D to joint I.	Good
	Other than as described above	Malfunction of No. 2 solenoid valve
Inject air from part G and apply battery voltage (12V) to terminal ④, and then earth terminal ①.	A "click" noise will be heard, and the air being blown out will change from joint F to joint H.	Good
	Other than as described above.	Malfunction of No. 3 solenoid valve
Inject air from part C.	Air is not blown out.	Good
	Air is blown out from joint B.	Malfunction of check valve
With an air pressure of 1,000 kPa (10 kg/cm ² , 142 psi) from parts B, H and I, apply a soap-and-water solution where shown in the illustration.	No air leakage.	Good
	Air leakage	Malfunction of solenoid valve seal



2. FRONT SOLENOID VALVE

Check the No. 1–3 solenoid valves shown in the figure for correct operation and air leakage.

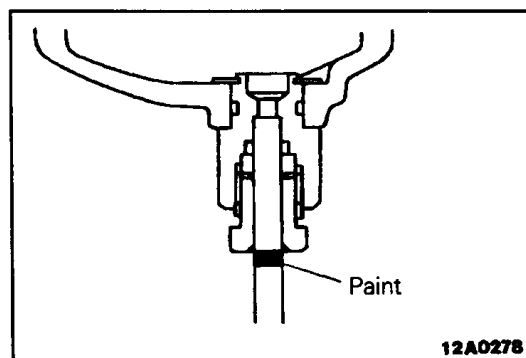
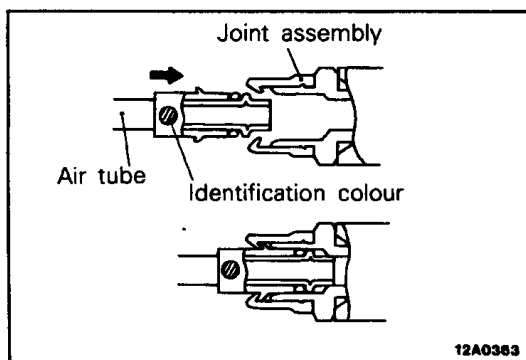
Check item	Condition	Result
Inject air from Part A and apply battery voltage to terminal ② and then earth terminal ①.	A "click" noise will be heard, and the volume of air blown out from joints B and C will become greater.	Good
	Other than as described above.	Malfunction of No. 1 solenoid valve
Blow air in at joint E, apply battery voltage (12V) to terminal ③, and then earth terminal ①.	A "click" noise will be heard, and the air being blown out will change from joint D to joint H.	Good
	Other than as described above	Malfunction of No. 2 solenoid valve
Inject air from part G and apply battery voltage (12V) to terminal ④, and then earth terminal ①.	A "click" noise will be heard, and the air being blown out will change from joint F to joint H.	Good
	Other than as described above.	Malfunction of No. 3 solenoid valve
Apply battery voltage (12V) to terminal ② and, with terminal ① earthed, blow air in at joint B or C.	Air is not blown out from joint A.	Good
	Air is blown out from joint A.	Malfunction of check valve
With an air pressure of 1,000 kPa (10 kg/cm ² , 142 psi) from parts B, H and I, apply a soap-and-water solution where shown in the illustration.	No air leakage.	Good
	Air leakage	Malfunction of solenoid valve seal



3. REAR SOLENOID VALVE

Check the No. 1–3 solenoid valves shown in the figure for correct operation and air leakage.

Check item	Condition	Result
Inject air from Part A and apply battery voltage (12V) to terminal ② and then earth terminal ①.	A "click" noise will be heard, and the air will be blown out from joints B and C.	Good
	Other than as described above.	Malfunction of No. 1 solenoid valve
Blow air in at joint E, apply battery voltage (12V) to terminal ③, and then earth terminal ①.	A "click" noise will be heard, and the air being blown out will change from joint D to joint H.	Good
	Other than as described above	Malfunction of No. 2 solenoid valve
Inject air from part G and apply battery voltage (12V) to terminal ④, and then earth terminal ①.	A "click" noise will be heard, and the air being blown out will change from joint F to joint H.	Good
	Other than as described above.	Malfunction of No. 3 solenoid valve
With an air pressure of 1,000 kPa (10 kg/cm ² , 142 psi) from parts A and H, apply a soap-and-water solution where shown in the illustration.	No air leakage.	Good
	Air leakage	Malfunction of solenoid valve seal



SERVICE POINTS OF INSTALLATION

E33ZACC

1. INSTALLATION OF AIR TUBES

- (1) For the one-touch type of air tube, press in to the joint assembly at the device side until a "click" is heard, and then check that the tabs of the joint assembly are securely affixed to the air tube.

Caution

Before connecting the air tube, check that the identification colour of the tube and the colour at the joint agree.

- (2) First insert the air tube at the lower part of the dryer until resistance is felt, and then press the tube further inward to the paint mark on the air tube.

Caution

Air leakage may occur if the air tube connection is not complete and secure.

- (3) After connection of the air tube, check for double-folding of the rolling diaphragm. (Refer to P.33B-89.)

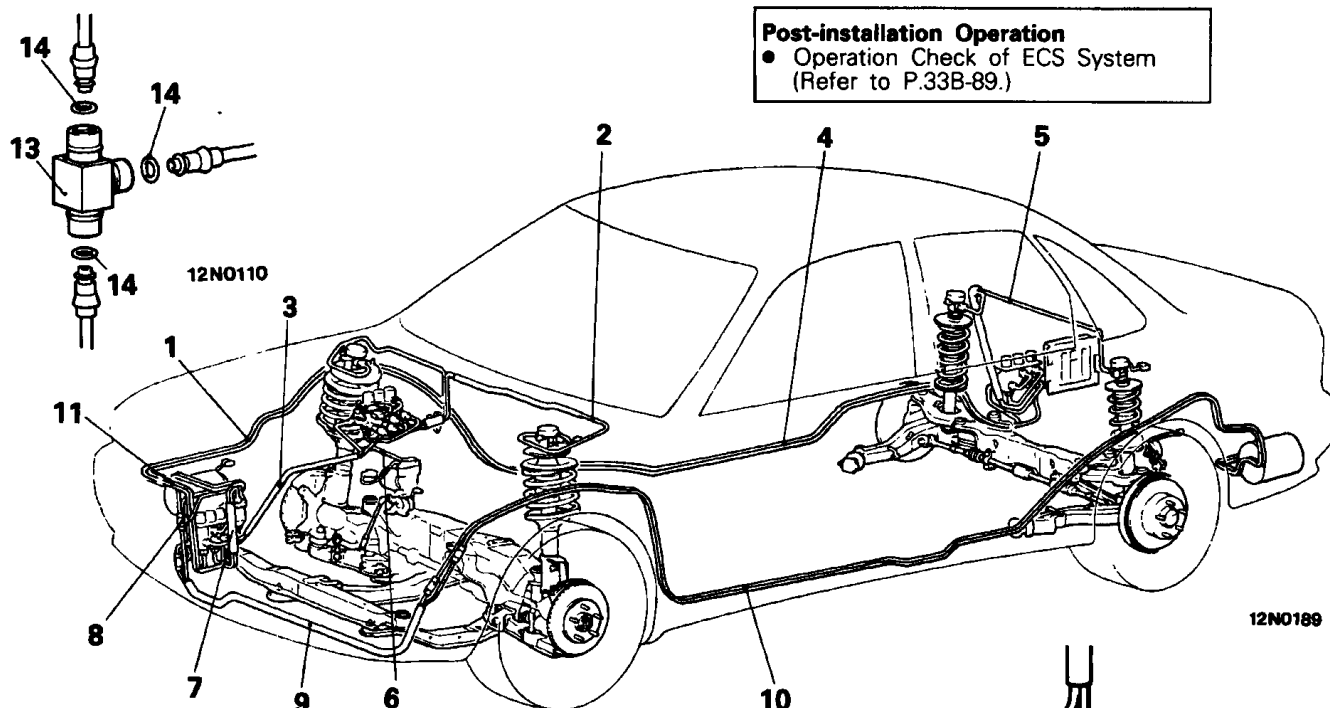
AIR TUBE

REMOVAL AND INSTALLATION

E33ZB—

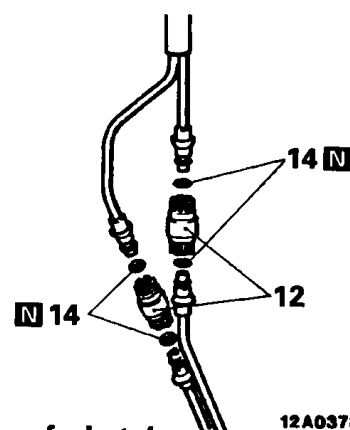
Post-installation Operation

- Operation Check of ECS System
(Refer to P.33B-89.)



12N0189

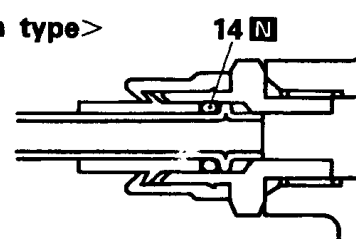
1. *Air tubes
(flow control solenoid valve to joint assembly)
2. Air tubes
(front solenoid valve to actuator)
3. Air tubes
(flow control solenoid valve to front solenoid valve)
4. *Air tubes
(joint assembly to rear solenoid valve)
5. Air tube
(rear solenoid valve to actuator)
6. Air tubes
(flow control solenoid valve to air compressor)
7. Air tubes
(dryer to flow control solenoid valve)
8. Air tube
(flow control solenoid valve to joint assembly B)
9. Air tube
(joint assembly B to joint assembly A)
10. *Air tube
(joint assembly A to reserve tank rear)
11. Air tubes
(to reserve tank)
12. Joint assembly A
13. Joint assembly B
14. O-ring
15. Joint
16. Bush



12A0378

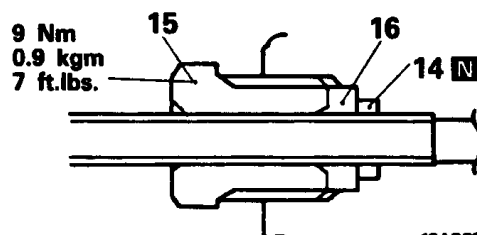
Cross-section of air tube joint

<One-touch type>



12A0173

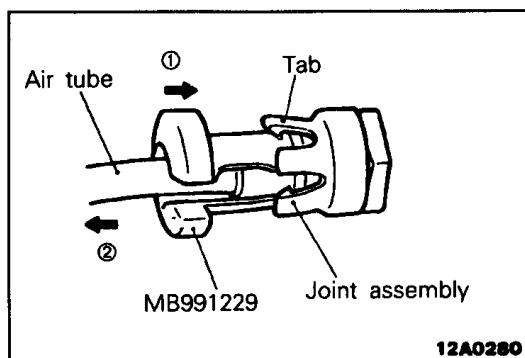
<Flare-nut type>



12A0324

NOTE

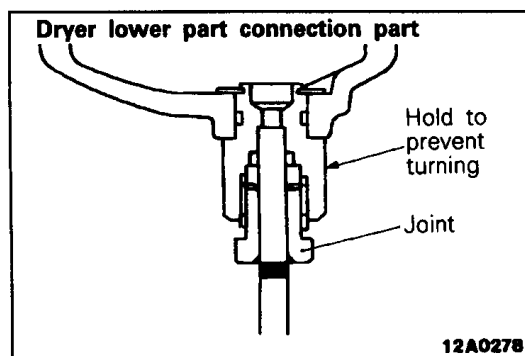
- (1) Connections within () are air tube connections.
- (2) Air tubes indicated by the * symbol are interwound with the harness.

**SERVICE POINTS OF REMOVAL**

E33ZBAA

REMOVAL OF AIR TUBES**One-touch type**

- (1) Push the special tool inward, in direction ① shown in the figure, in order to expand the tabs of the joint.
- (2) Pull out the air tube, together with the special tool, in direction ②.

**Flare-nut type**

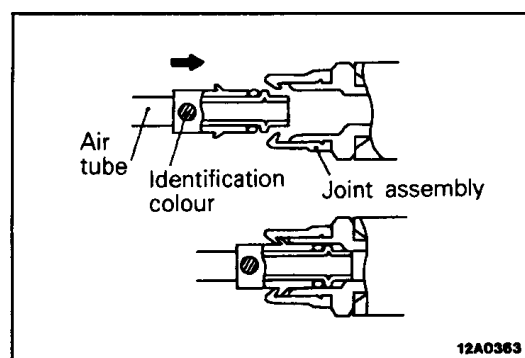
Loosen the joint and pull out the air tube.

NOTE

When loosening the joint at the lower part of the dryer, use a spanner to hold the hexagonal part of the joint installation part to prevent it from turning.

Caution

In order to prevent the entry of dust, foreign material, etc., use vinyl tape or similar material to close the end of the air tube and the opening at the device side.

**SERVICE POINTS OF INSTALLATION**

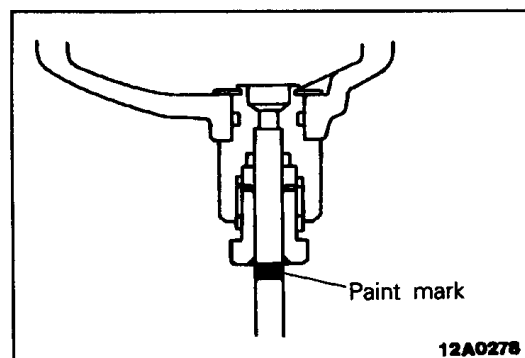
E33ZBCB

INSTALLATION OF AIR TUBES**One-touch type**

Push the air tube in the joint assembly at the device side until a "click" is heard, and then check to be sure that the tabs of the joint assembly are securely affixed to the air tube.

Caution

Before connecting the air tube, check to be sure that the identification colour of the tube and the colour at the joint agree.

**Flare-nut type**

First insert the air tube until resistance is felt, and then press the tube further inward to the paint mark on the air tube.

Caution

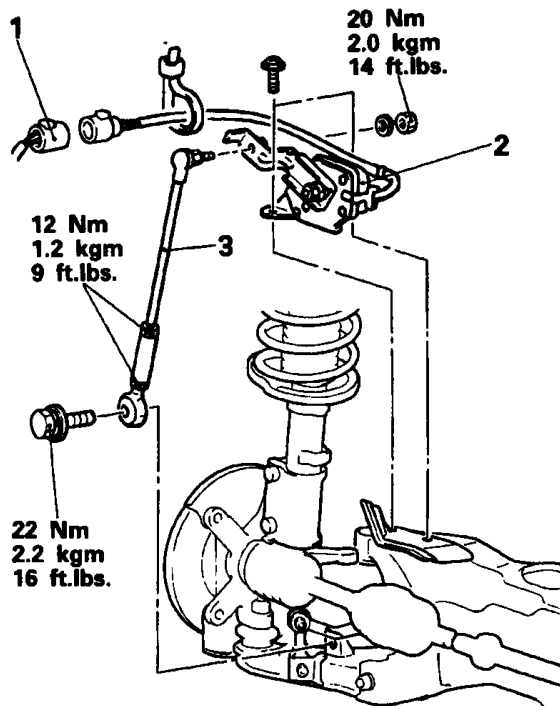
Air leakage may occur if the air tube connection is not complete and secure.

INSPECTION AFTER AIR TUBE INSTALLATION

- (1) Check for double-folding at the rolling diaphragm. (Refer to P.33B-89.)
- (2) Apply a soap-and-water solution to the joint part to check for air leakage; also visually check the air tube for breakage, crushing, pinching, etc.

HEIGHT SENSOR

REMOVAL AND INSTALLATION



12A0357

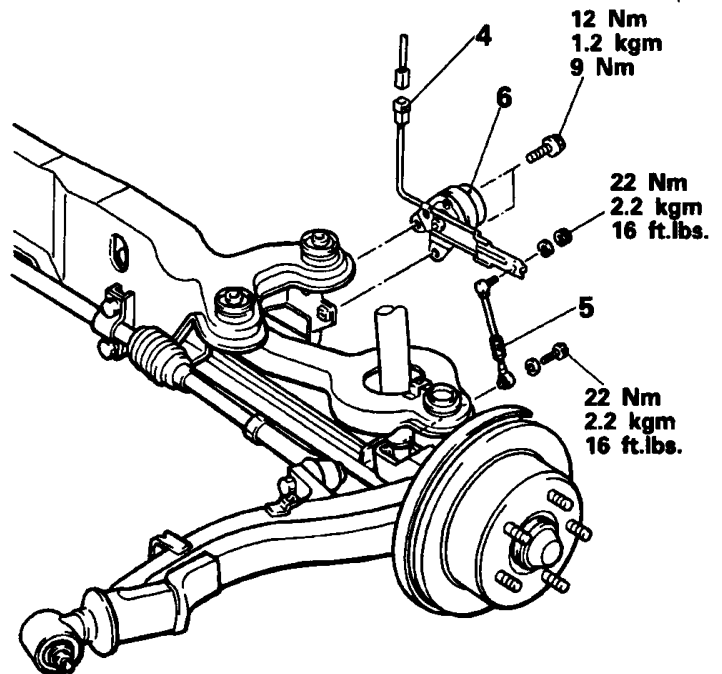
Front height sensor removal steps

- Removal of compressor assembly (Refer to P.33B-108.)

1. Front wiring harness connector
2. Front height sensor
- ◆◆ 3. Front rod assembly

Rear height sensor removal steps

- ◆◆ 4. Body wiring harness connector
5. Rear rod assembly
6. Rear height sensor



12N0124

Post-installation Operation

- Checking and Adjustment of The NORMAL Vehicle-height (Refer to P.33B-88.)
- Operation Check of ECS System (Refer to P.33B-89.)

INSPECTION

- Check the rod and link plate for bending or damage.
- Check the rod adjustment lock nut for looseness.

CHECKING THE SENSOR TERMINAL VOLTAGE

Connect the height sensor to the body harness and then check that each terminal voltage changes as shown in the table below when, with the ignition key at the ON position, the sensor's link plate is turned.

NOTE

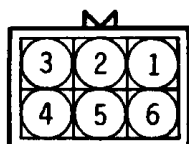
To check the sensor terminal voltage, one method which can be used is to move the rod up and down while the sensor is installed to the chassis.

Front Height Sensor Terminal Voltage

[V]

Vehicle height level	Sensor link position	Terminal No.			
		1	2	3	5
Maximum level	①	0-0.5	4.5-5	0-0.5	4.5-5
Higher than HIGH	②			4.5-5	
HIGH (target height)	③				
Higher than NORMAL	④	0-0.5	4.5-5	0-0.5	4.5-5
NORMAL (target height)	⑤			0-0.5	0-0.5
Lower than NORMAL	⑥				
LOW (target height)	⑦	4.5-5	4.5-5	4.5-5	4.5-5
Lower than LOW	⑧			4.5-5	4.5-5
Minimum level	⑨				

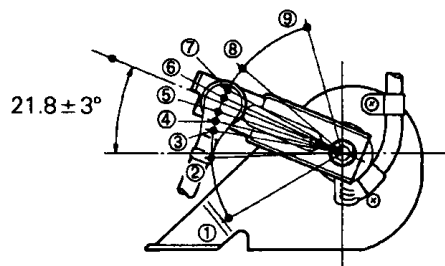
Front height sensor connector terminal array



12N0065

- No. 1 Sensor A No. 4 Earth
 No. 2 Sensor B No. 5 Sensor D
 No. 3 Sensor C No. 6 Sensor power supply (+5V)

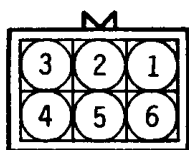
Front height sensor position



12N0035

33B-120 ACTIVE-ELECTRONIC CONTROL SUSPENSION – Height Sensor

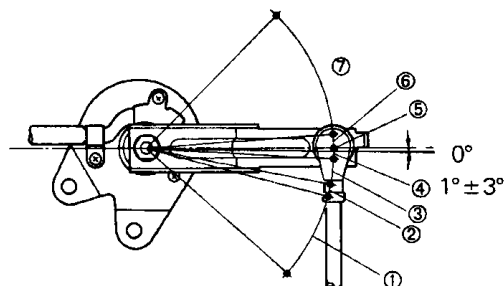
Rear height sensor connector terminal array



12N0065

- | | |
|------------|----------------|
| 1 Sensor A | 4 Earth |
| 2 Sensor B | 5 Power supply |
| 3 Sensor C | 6 — |

Rear height sensor position



12N0034

Rear Height Sensor Terminal Voltages

[V]

Vehicle height level	Sensor link position	Terminal No.		
		1	2	3
Higher than HIGH	①	0-0.5	4.5-5	0-0.5
HIGH (target height)	②			4.5-5
Higher than NORMAL	③		0-0.5	
NORMAL (target height)	④			
Lower than NORMAL	⑤	4.5-5	4.5-5	0-0.5
LOW (target height)	⑥			
Lower than LOW	⑦			4.5-5

SERVICE POINTS OF INSTALLATION

E33ZEC-C

5. INSTALLATION OF REAR ROD ASSEMBLY/3. FRONT ROD ASSEMBLY

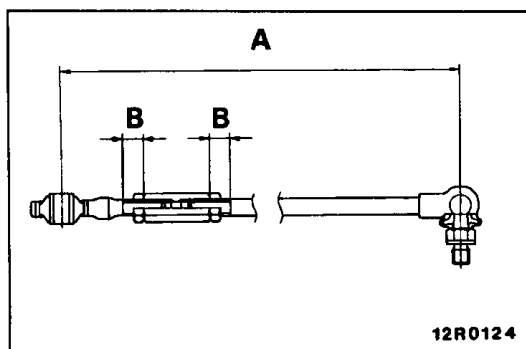
- (1) Adjust the front and rear height sensors so that dimension A of the rod in the illustration is within specification.

Rod assembly length (A)

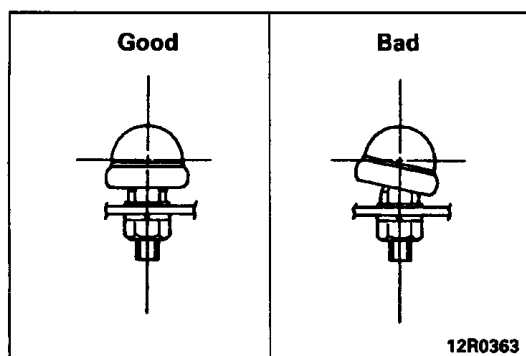
Front	269–270 mm (10.5–10.6 in.)
Rear	135–136 mm (5.3–5.4 in.)

Caution

1. When adjusting the length of the rod, adjust so that dimension B is uniform.
2. Height sensors must be installed so that the ball joint at the rod end is at rocking centre.



12R0124



12R0363

ACTIVE-ECS SENSOR AND SWITCH

E33ZK—

REMOVAL AND INSTALLATION

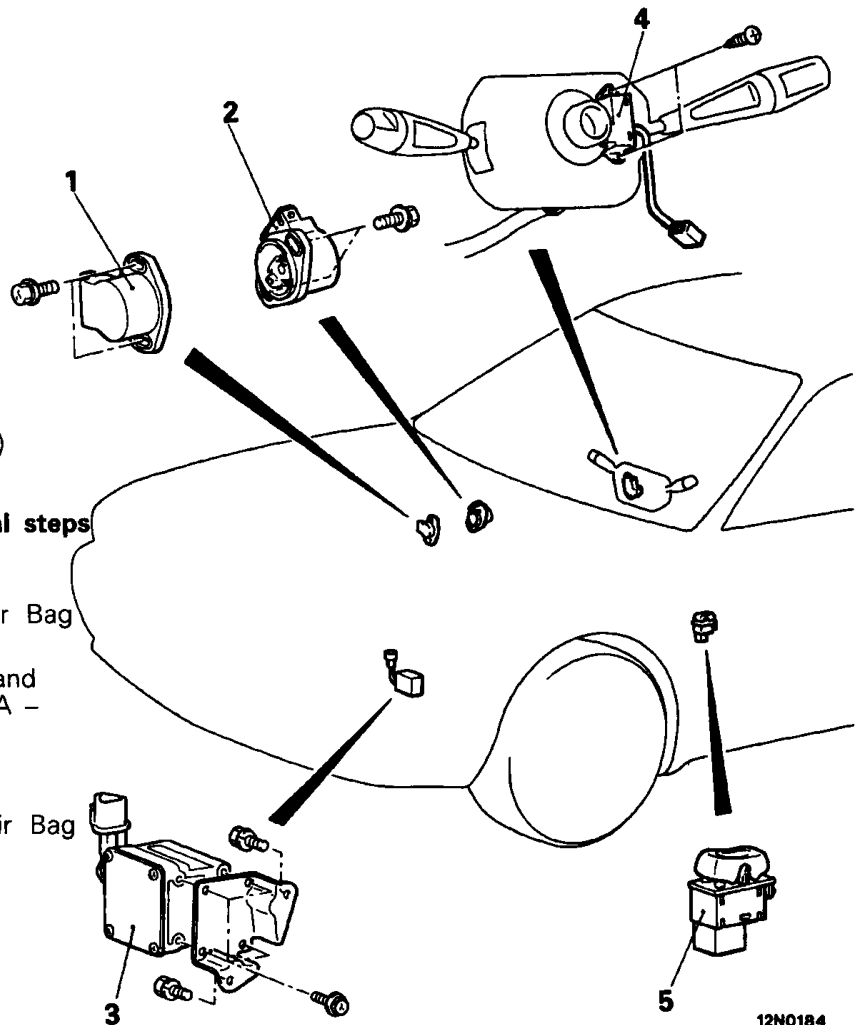
CAUTION: SRS

For vehicles with SRS, before removal of air bag module, refer to GROUP 52B – SRS Service Precautions and Air Bag Module and Clock Spring.

- 1. Throttle position sensor
- 2. Accel position sensor (Vehicles equipped with TCL)
- 3. G sensor

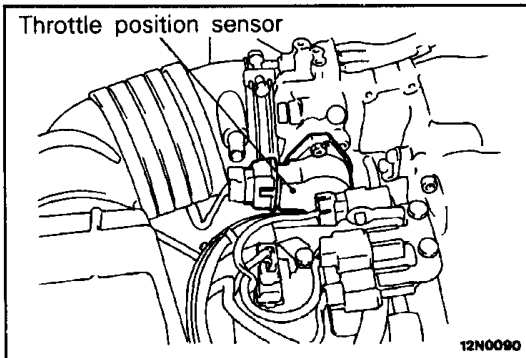
Steering wheel sensor removal steps

- Removal of air bag module.
<Vehicles with SRS>
(Refer to GROUP 52B – Air Bag Module and Clock Spring.)
- Removal of steering wheel and column cover (Refer to G37A – Steering Column Shaft.)
- Removal of clock spring.
<Vehicles with SRS>
(Refer to GROUP 52B – Air Bag Module and Clock Spring)
- Column switch
(Refer to GROUP 54 – Column Switch.)
- 4. Steering wheel sensor
- 5. ACTIVE-ECS switch



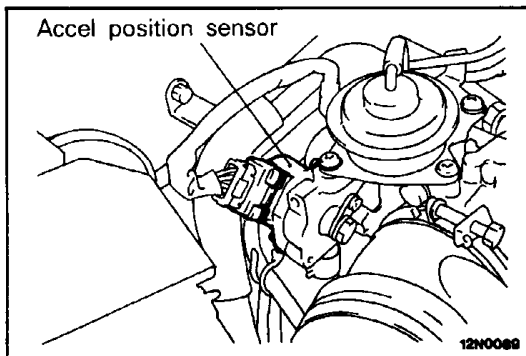
12N0184

Throttle position sensor



12N0090

Accel position sensor



12N0089

SERVICE POINTS OF REMOVAL

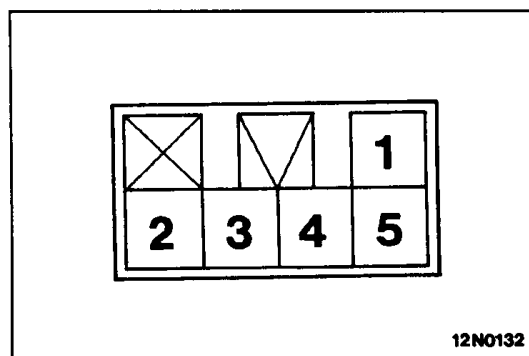
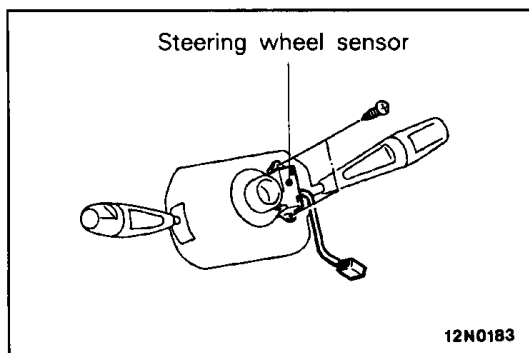
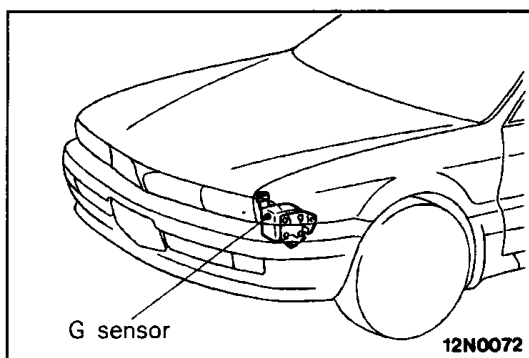
E33ZKA-B

1. REMOVAL OF THROTTLE POSITION SENSOR

Disconnect the harness connector, then remove the throttle position sensor from the throttle body.

2. REMOVAL OF ACCEL POSITION SENSOR

Disconnect the harness connector, then remove the accel position sensor from the throttle body.



3. REMOVAL OF G SENSOR

Disconnect the connection of the harness connector, and then remove the G sensor.

Caution

When removing the G sensor, take care not to drop it or subject it to severe impact.

4. REMOVAL OF STEERING WHEEL SENSOR

Remove the pin terminal from the column switch connector, then remove the steering wheel sensor from the column switch.

Caution

1. The steering wheel sensor utilizes a photo coupler and care should be paid to ensure that no dust or grease are allowed to come into contact with it.
2. Be careful and ensure that the column switch side slit panel is not bent nor oil allowed to come into contact with it.

INSPECTION

E33ZKB-B

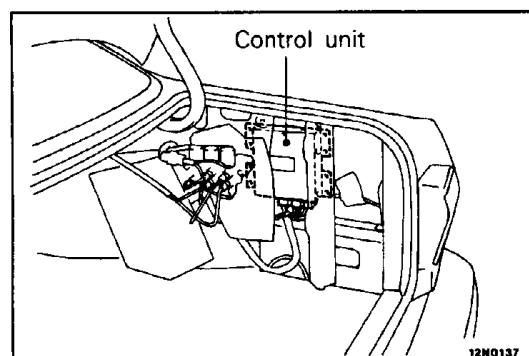
INSPECTION OF ACTIVE-ECS SWITCH

Activate the switch, and check for continuity between the terminals.

Operation Terminal	No operation	Switched to HI	Switched to SP
1		○	
2		○	○
3	○	○	○
4	○	○	○
5			○

NOTE

○—○ indicates that there is continuity between the terminals.
Refer to the Troubleshooting heading for inspection of each sensor



CONTROL UNIT

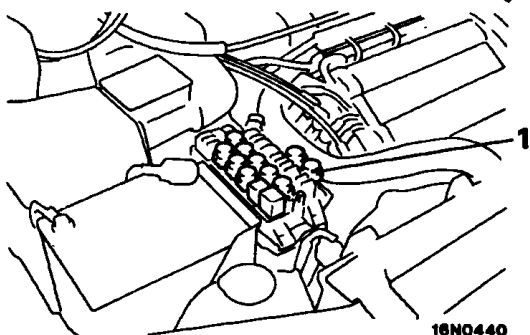
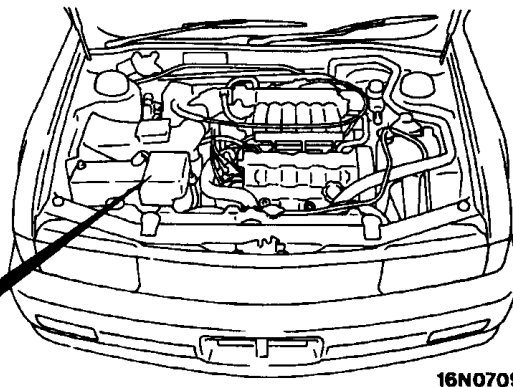
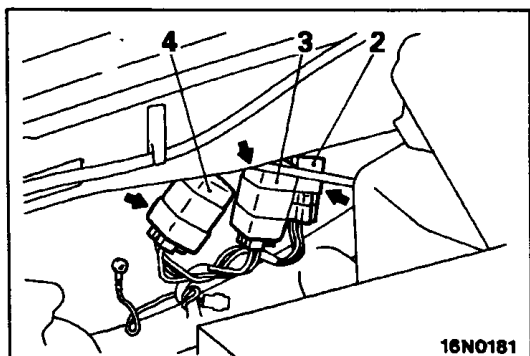
E33ZHAA

SERVICE POINTS OF REMOVAL

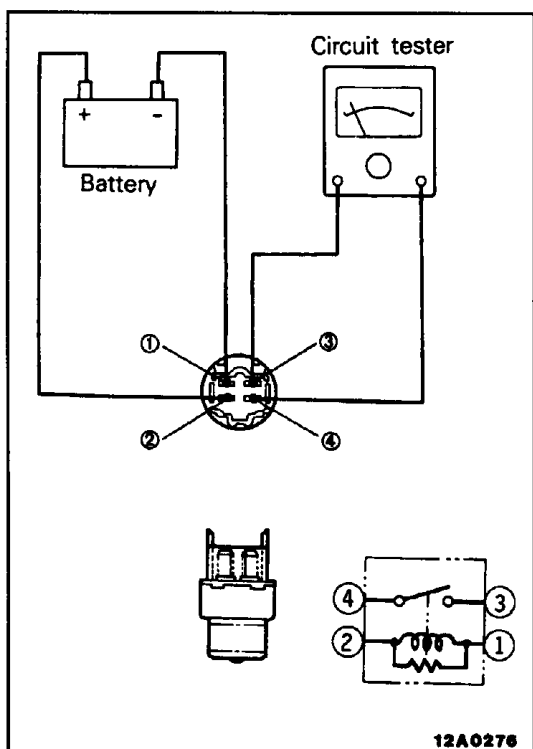
- (1) Remove the trunk side trim.
(Refer to GROUP 52 – "Trims".)
- (2) Remove the installation bolts and connectors, and then remove the control unit.

ACTIVE-ECS RELAY REMOVAL AND INSTALLATION

E33ZL—



1. Power relay
2. Solenoid valve power relay
3. Compressor relay
4. Return pump relay



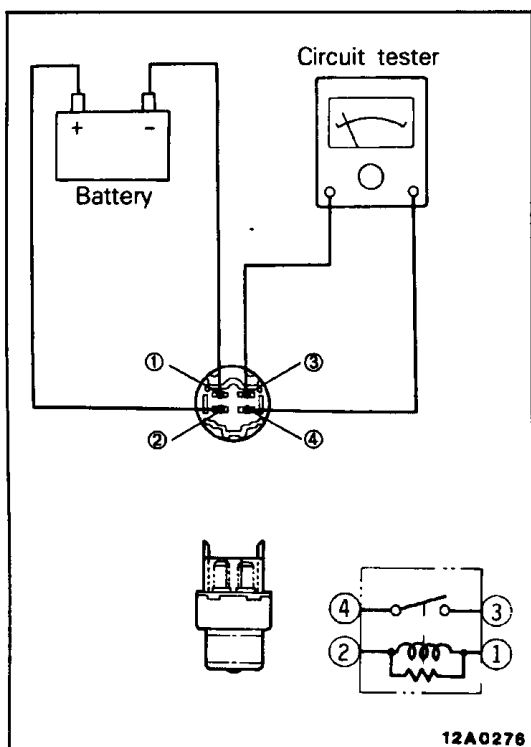
INSPECTION

E33ZLB-B

1. POWER RELAY

Connect battery power source to terminal 1. Check circuit between terminals with terminal 2 earthed.

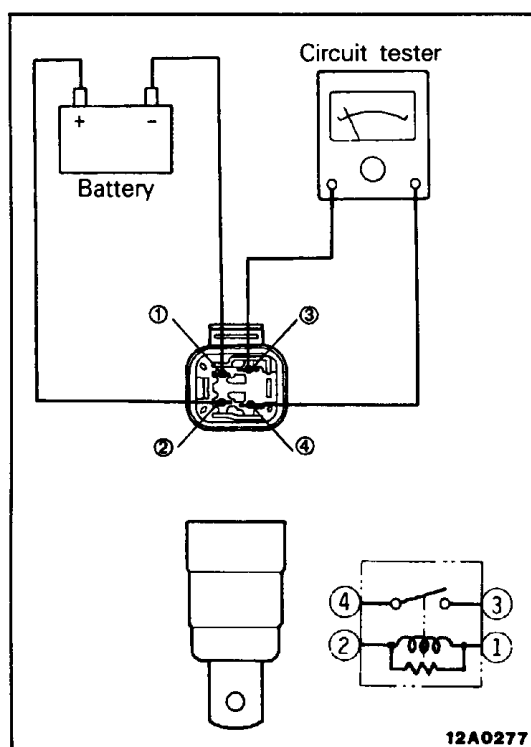
Power is supplied	Between 3-4 terminals	Continuity
Power is not supplied	Between 1-2 terminals	Continuity
	Between 3-4 terminals	No continuity



2. SOLENOID VALVE POWER RELAY

Connect battery power source to terminal 1. Check circuit between terminals with terminal 2 earthed.

Power is supplied	Between 3-4 terminals	Continuity
Power is not supplied	Between 1-2 terminals	Continuity
	Between 3-4 terminals	No continuity



3. COMPRESSOR RELAY/4. RETURN PUMP RELAY

Connect battery power source to terminal 1. Check circuit between terminals with terminal 2 earthed.

Power is supplied	Between 3-4 terminals	Continuity
Power is not supplied	Between 1-2 terminals	Continuity
	Between 3-4 terminals	No continuity

REAR SUSPENSION

CONTENTS

E34AA--

SPECIFICATIONS	2	REAR SUSPENSION ASSEMBLY	
General Specifications	2	<Vehicles equipped with 4WS>	7
Service Specifications	2		
SPECIAL TOOLS	3	UPPER ARM, LOWER ARM AND	
		ASSIST LINK	8
SERVICE ADJUSTMENT PROCEDURES	4	TRAILING ARM	10
Wheel Alignment Inspection		SHOCK ABSORBER ASSEMBLY	12
and Adjustment	4	STABILIZER BAR	14
REAR SUSPENSION ASSEMBLY			
<Vehicles not equipped with 4WS>	5		

SPECIFICATIONS

GENERAL SPECIFICATIONS

E34CB-

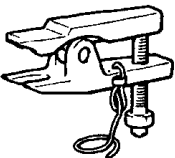
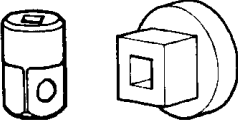
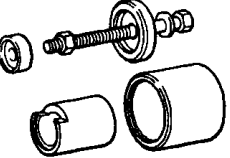
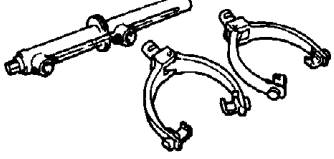
Items	Specifications
Suspension system	Multi-link with coil spring type
Coil spring	
Wire dia.×O.D×free length [Coil spring identification colour]	mm (in.) 11.8×118.6×393.1 (0.46×4.67×15.48) [Orange×1]
Spring constant	N/mm (kg/mm, lbs./in.) 21 (2.1, 117)
Shock absorber	
Type	Hydraulic cylindrical double-acting type
Max. length	mm (in.) 503 (19.8)
Min. length	mm (in.) 341.5 (13.4)
Stroke	mm (in.) 161.5 (6.4)
Damping force [at 0.3 m/sec. (0.9 ft./sec.)]	
Expansion	N (kg, lbs.) 900 (90, 198)
Contraction	N (kg, lbs.) 500 (50, 110)

SERVICE SPECIFICATIONS

Items	Specifications
Standard value	
Toe-in	
at the centre of tyre tread (per wheel)	mm (in.) -2 to 3 (-0.08 to 0.12)
Toe angle (per wheel)	-6' to 9'
Camber	0' ± 30'
Stabilizer bar ball joint starting torque	Nm (kgcm, in.lbs.) 1.7–3.2 (17–32, 15–28)
Upper arm and lower arm ball joint starting torque	Nm (kgcm, in.lbs.) 2.0–9.0 (20–90, 17–78)
Projection of crossmember bush inner pipe	mm (in.) 8.5–9.5 (0.33–0.37)

SPECIAL TOOLS

E34DA--

Tool	Number	Name	Use
	MB991113	Steering linkage puller	Disconnection of ball joint
	MB990326	Preload socket	Mesurement of the ball joint starting torque
	MB990800	Ball joint remover and installer	Installation of the dust cover
	MB991071 MB991072 MB991073	Lower arm bush remover and installer Base Arbor	Driving out and press-fitting of the lower arm bush, upper arm bush and assist link bush
	MB991005 MB991389	Arbor Base	Driving out and press-fitting of the trailing arm bush
	MB991045	Bush remover and installer	Driving out and press-fitting of crossmember bush
	MB991237 MB991239	Spring compressor body Arm set	Removal and installation of the coil spring

SERVICE ADJUSTMENT PROCEDURES

WHEEL ALIGNMENT INSPECTION AND ADJUSTMENT

E34FAA-L

1. CAMBER

Standard value: $0^{\circ} \pm 30'$

Turn the lower arm mounting bolt to adjust.

NOTE

<Vehicles not equipped with 4WS>

The assist link mounting bolt (crossmember side) should be loosened when adjusting.

<Vehicles equipped with 4WS>

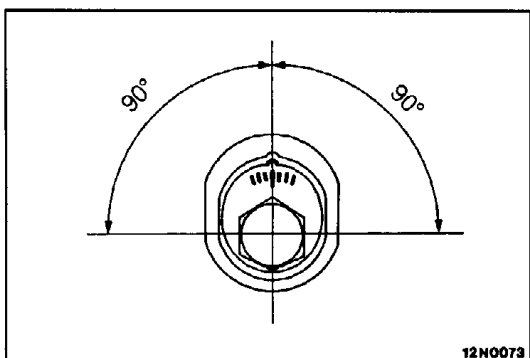
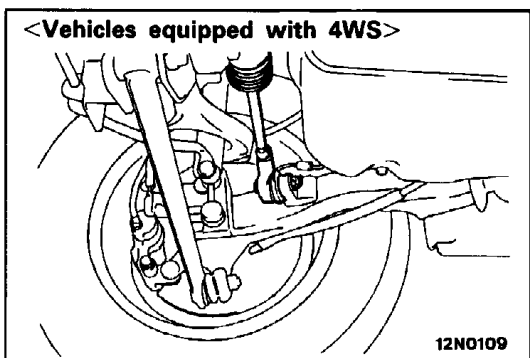
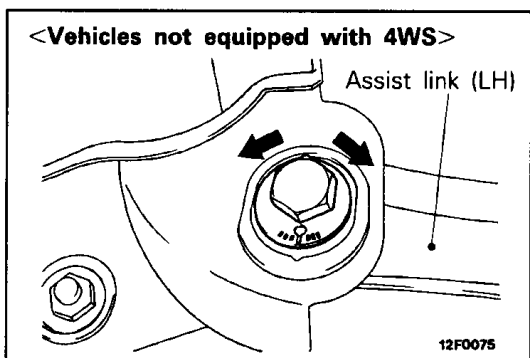
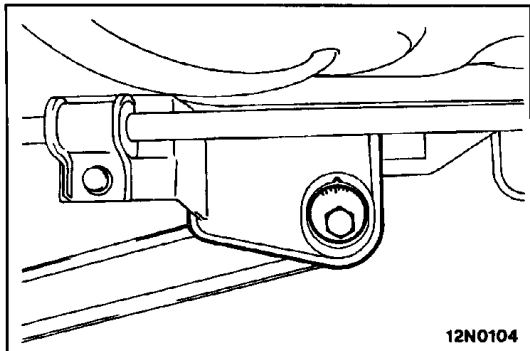
The power cylinder tie rod end should be disconnected from the knuckle when adjusting.

The difference between the left and right wheels should be 30' or less.

Left wheel : clockwise – camber

Right wheel : clockwise + camber

The scale has gradations of approximately 15'.



2. TOE-IN

Standard value:**At the centre of tyre tread:****-2 to 3 mm (-0.08 to 0.12 in.)****Toe angle (per wheel): -6' to 9'**

NOTE

<Vehicles not equipped with 4WS>

The assist link mounting bolt (crossmember side) should be turned an equal amount on both sides when adjusting.

Left wheel: clockwise direction ... toe-in

The scale has gradations of approximately 4.8 mm (0.19 in.) (single side toe angle equivalent to 27')

<Vehicles equipped with 4WS>

The power cylinder tie rod screw section should be turned an equal amount on both sides when adjusting.

Left wheel: Clockwise direction ... toe-out

90° rotation : approximately 1.8 mm (0.07 in.) (single side toe angle equivalent to 16')

The clip should be removed so that the power cylinder boot does not twist.

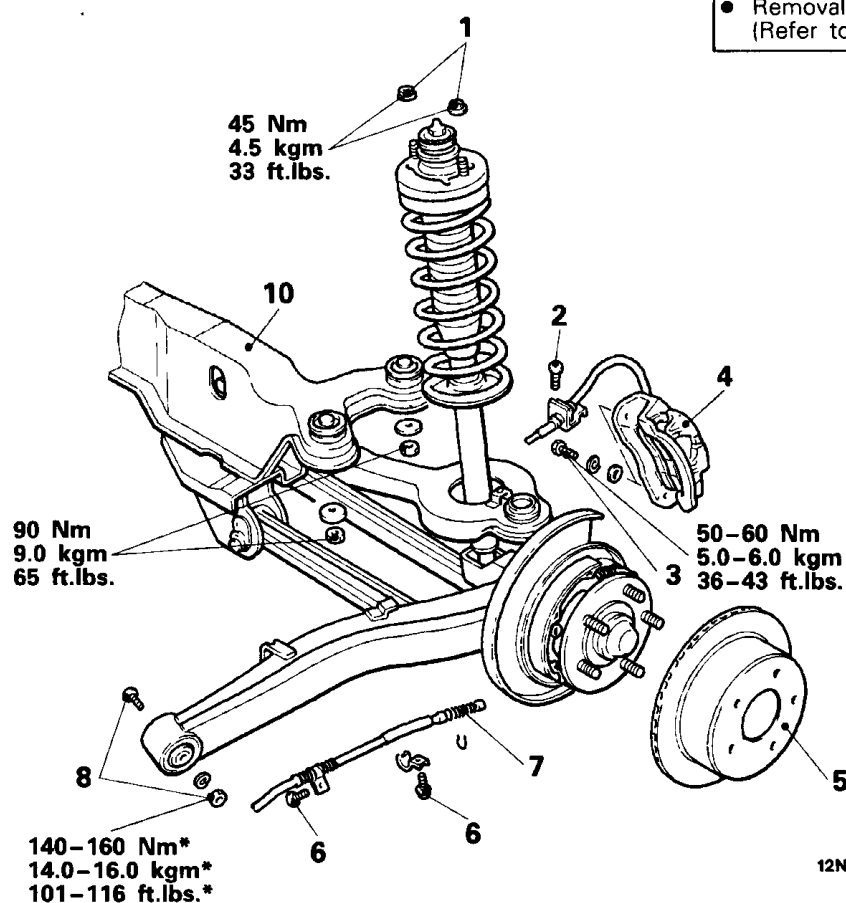
Caution

1. The eccentric bolt should be adjusted within a 90° range left and right from the centre position.
2. Adjust the camber angle first, and then adjust the toe-in. When camber adjustment is made, toe adjustment should always be made also.

REAR SUSPENSION ASSEMBLY <Vehicles not equipped with 4WS>

REMOVAL AND INSTALLATION

E34GA---



12N0116

Removal steps

1. Shock absorber upper mounting nuts
2. Bolt
3. Brake caliper mounting bolts
4. Brake caliper assembly
5. Brake disk
6. Bolt
7. Parking brake cable end
8. Trailing arm mounting bolt and nut
9. Crossmember mounting nuts
10. Rear suspension assembly

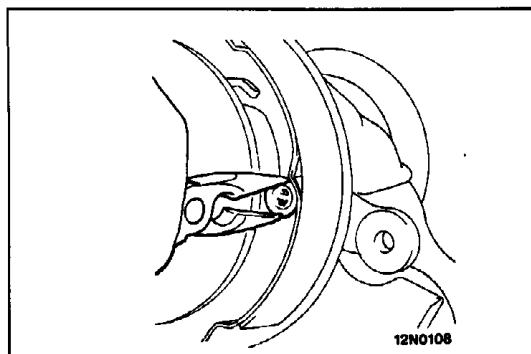


Post-installation Operation

- Installation of Trunk Side Trim (Refer to GROUP 52 – Trim.)
- Parking Brake Lever Stroke Adjustment (Refer to GROUP 36 – Service Adjustment Procedures.)
- Wheel Alignment Inspection and Adjustment (Refer to P.34-4.)

Caution

* Indicates parts which should be temporarily tightened, and then fully tightened with the vehicle on the ground in the unladen condition.



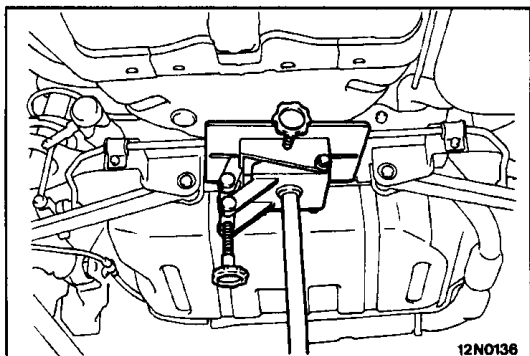
12N0108

SERVICE POINTS OF REMOVAL

E34GBA-P

7. REMOVAL OF PARKING BRAKE CABLE END

After using some small pincers to remove the shoe hold-down cup, retainer spring and shoe-to-shoe spring, remove the parking brake cable end.



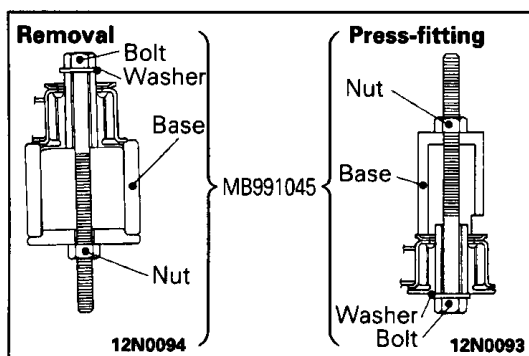
9. REMOVAL OF CROSSMEMBER MOUNTING NUTS

- (1) Before removing the crossmember mounting nuts, support the crossmember with a transmission jack.
- (2) Remove the crossmember mounting nuts.

INSPECTION

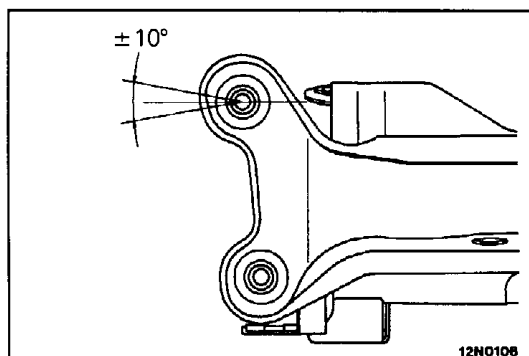
E34GCA-J

- Check crossmember for cracks or other damage.

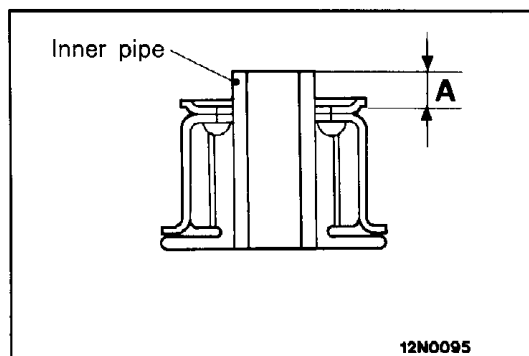


CROSSMEMBER BUSH REPLACEMENT

- (1) Use the special tool to remove and press fit the bushing.



- (2) When press fitting, after applying some soapy water, press in the direction of the arrow into the position as shown in the diagram.



- (3) Press until the inner pipe projection is at the standard value.

Standard value (A): 8.5–9.5 mm (0.33–0.37 in.)

<Vehicles equipped with 4WS>

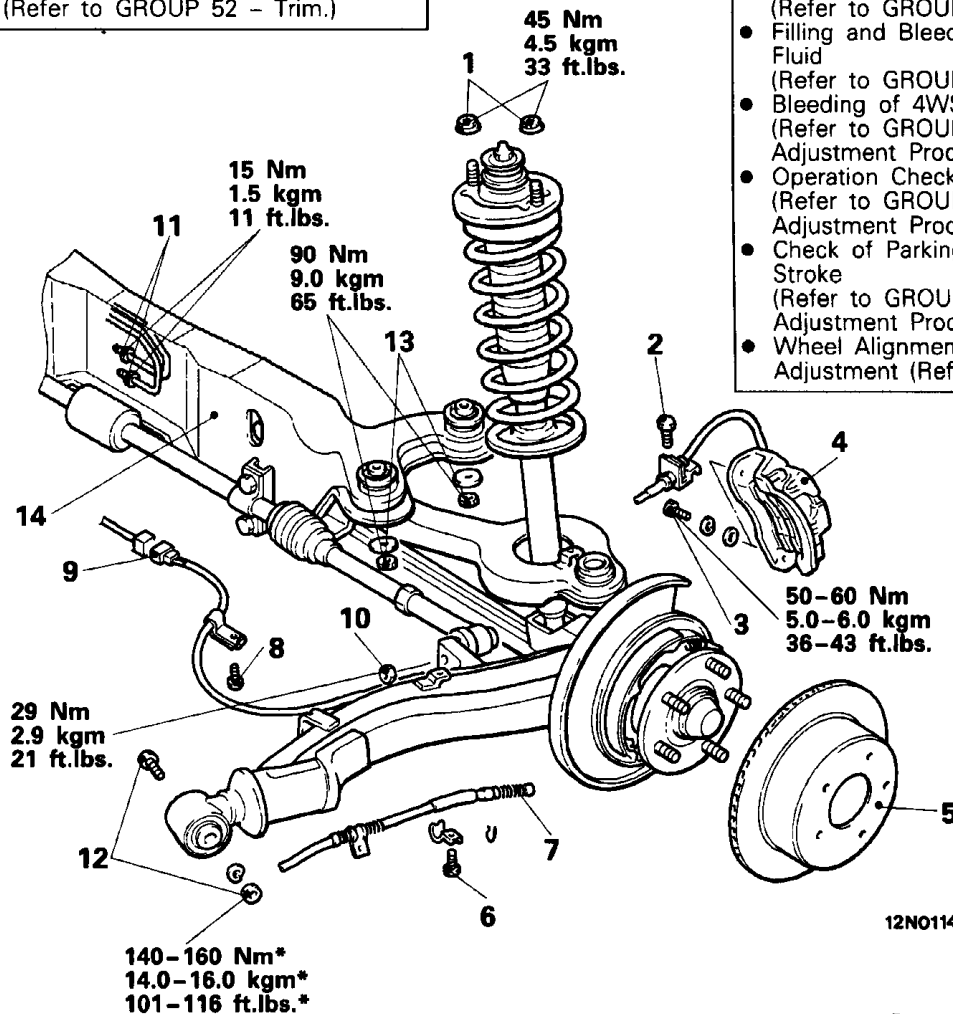
REMOVAL AND INSTALLATION

Pre-removal Operation

- Removal of Trunk Side Trim
(Refer to GROUP 52 – Trim.)

Post-installation Operation

- Installation of Trunk Side Trim
(Refer to GROUP 52 – Trim)
- Filling and Bleeding Power Steering Fluid
(Refer to GROUP 37B – 4WS.)
- Bleeding of 4WS
(Refer to GROUP 37B – Service Adjustment Procedures.)
- Operation Check of 4WS
(Refer to GROUP 37B – Service Adjustment Procedures.)
- Check of Parking Brake Lever Stroke
(Refer to GROUP 36 – Service Adjustment Procedures.)
- Wheel Alignment Inspection and Adjustment (Refer to P.34-4.)



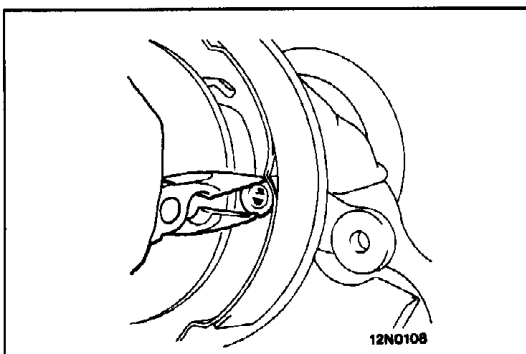
Removal steps

1. Shock absorber upper mounting nuts
2. Bolt
3. Brake caliper mounting bolts
4. Brake caliper assembly
5. Brake disk
6. Bolt
7. Parking brake cable end
8. Bolt (Vehicles equipped with ABS)
9. Connector

10. Power cylinder tie-rod connection nut
11. Power cylinder and pipe connection
12. Trailing arm mounting bolt and nut
13. Crossmember mounting nut
14. Rear suspension assembly

Caution

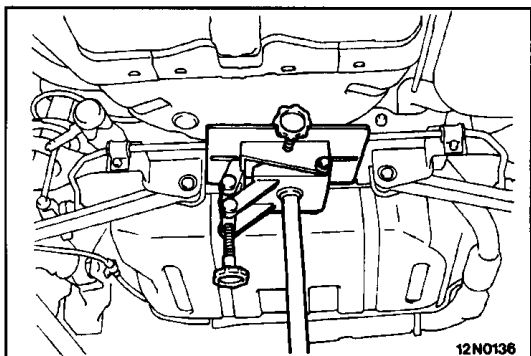
* Indicates parts which should be temporarily tightened, and then fully tightened with the vehicle on the ground in the unladen condition.



SERVICE POINTS OF REMOVAL

7. REMOVAL OF PARKING BRAKE CABLE END

After using some small pincers to remove the shoe hold-down cup, retainer spring and shoe-to-shoe spring, remove the parking brake cable end.



13. REMOVAL OF CROSSMEMBER MOUNTING NUTS

- (1) Before removing the crossmember mounting nuts, support the crossmember with a transmission jack.
- (2) Remove the crossmember mounting nuts.

INSPECTION

- Check crossmember for crack or other damage.

CROSSMEMBER BUSH REPLACEMENT

Refer to P. 34-6.

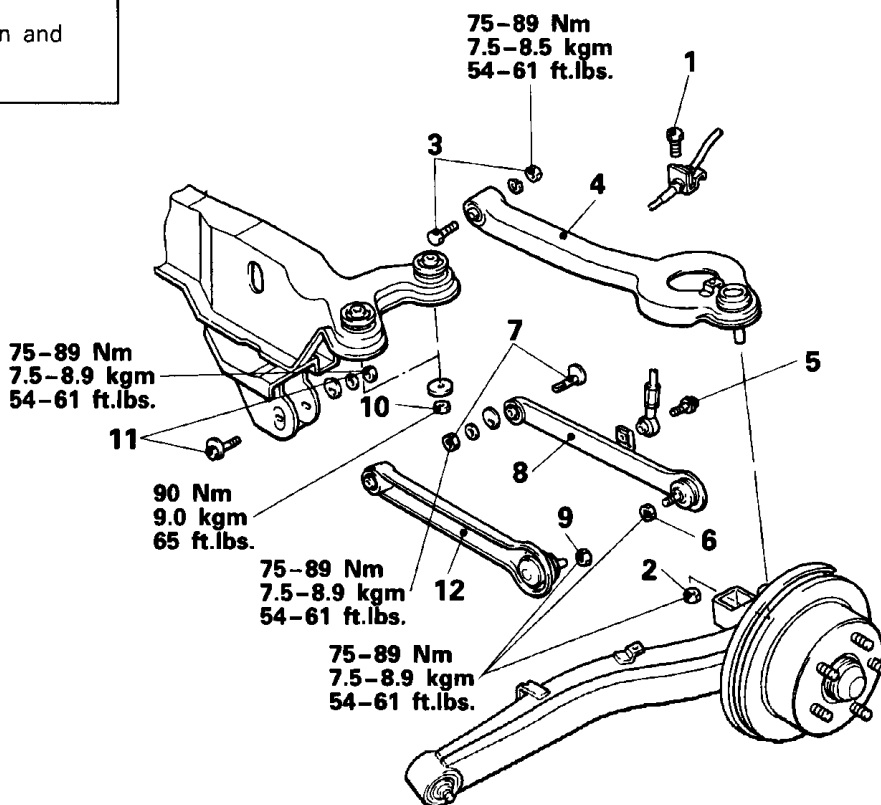
UPPER ARM, LOWER ARM AND ASSIST LINK

E340A---

REMOVAL AND INSTALLATION

Post-installation Operation

- Wheel Alignment Inspection and Adjustment
(Refer to P.34-4.)



12N0118

Upper arm removal steps

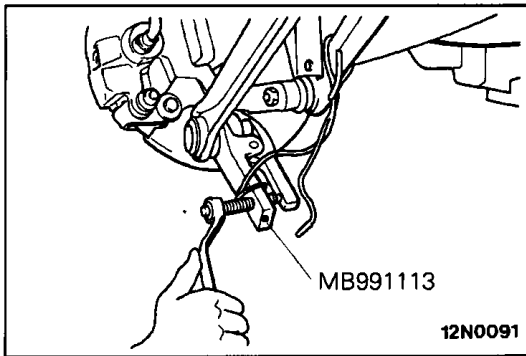
- Removal of shock absorber
(Refer to P.34-12.)
- 1. Brake line clamp bolt
- 2. Self lock nut
- 3. Upper arm mounting bolt and nut
- 4. Upper arm

Lower arm removal steps

- 5. ECS height sensor rod
<Vehicle equipped with ECS>
- 6. Self lock nut
- 7. Lower arm mounting bolt and nut
- 8. Lower arm

Assist link removal steps

- 9. Self lock nut
- 10. Crossmember mounting nuts
- 11. Assist link mounting bolt and nut
- 12. Assist link



SERVICE POINTS OF REMOVAL

E34GAA-A

2./6./9. REMOVAL OF SELF LOCK NUT

With the special tool, disconnect the ball joint and knuckle.

Caution

While the special tool is being used, do not remove the self lock nut; only loosen it.

10. REMOVAL OF CROSSMEMBER MOUNTING NUTS

Loosen the crossmember mounting nuts to lower the crossmember.

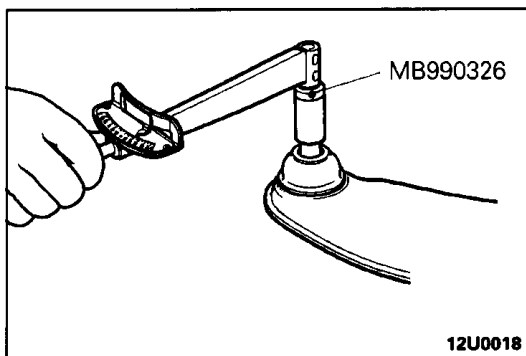
Caution

Don't remove the nuts; only loosen them.

INSPECTION

E34QBA

- Check the bushing for wear and deterioration.
- Check the upper arm or lower arm or assist link for bend or breakage.
- Check the ball joint dust cover for cracks.
- Check all bolts for condition and straightness.

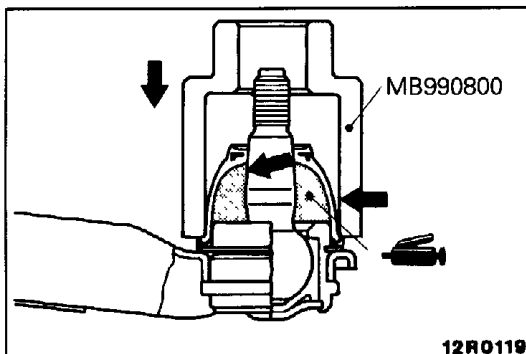


CHECKING OF BALL JOINT FOR STARTING TORQUE

With the special tool, measure the ball joint starting torque.

Standard value: 2–9 Nm

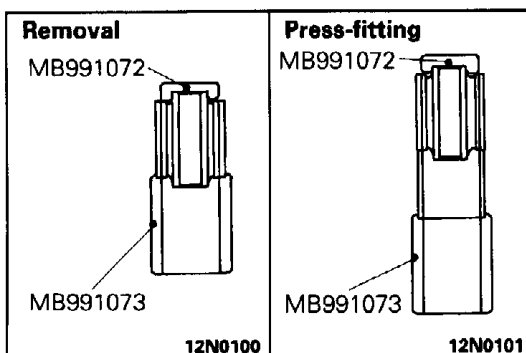
(20–90 kgcm, 17–78 in.lbs.)



BALL JOINT DUST COVER REPLACEMENT

E34QCA

- (1) Remove the dust cover.
- (2) Apply multipurpose grease to the lip and inside of the dust cover.
- (3) Drive in the dust cover with special tool until it is fully seated.



UPPER ARM BUSH, LOWER ARM BUSH, ASSIST-LINK BUSH REPLACEMENT

Use the special tool to remove and press fit the bushing.

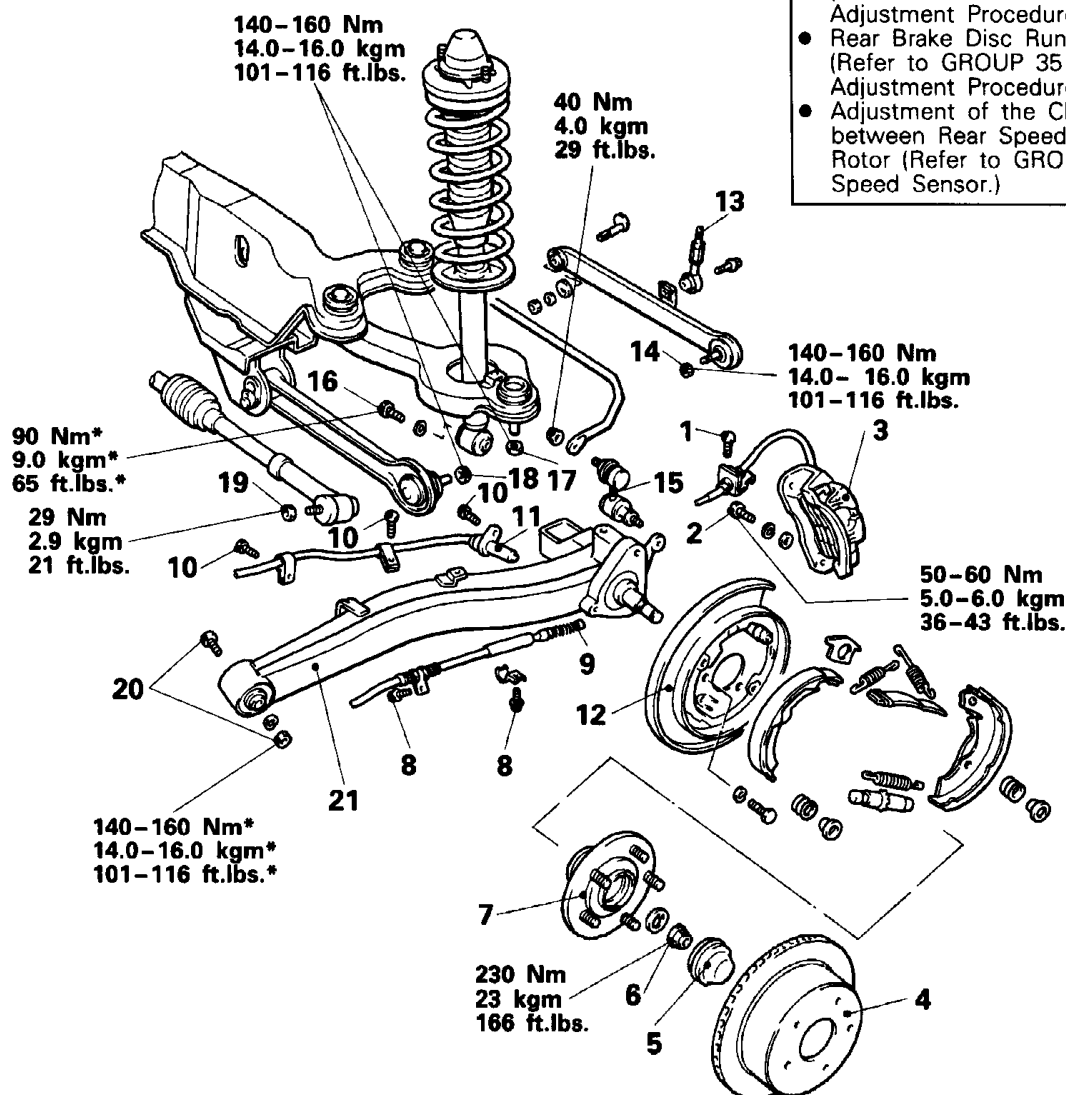
TRAILING ARM

REMOVAL AND INSTALLATION

E340A---

Post-installation Operation

- Wheel Alignment Inspection and Adjustment (Refer to P.34-4.)
- Check of Parking Brake Lever Stroke (Refer to GROUP 36 – Service Adjustment Procedures.)
- Rear Brake Disc Run-out Check (Refer to GROUP 35 – Service Adjustment Procedures.)
- Adjustment of the Clearance between Rear Speed Sensor and Rotor (Refer to GROUP 35 – Wheel Speed Sensor.)

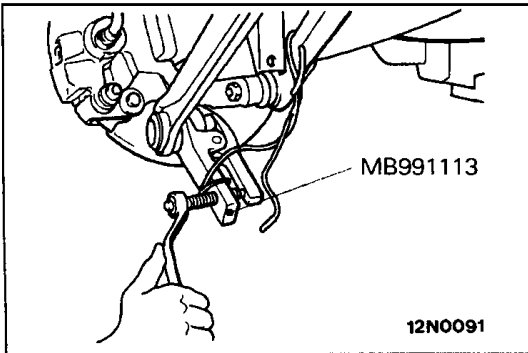
**Removal steps**

1. Brake line clamp bolt
2. Brake caliper mounting bolts
3. Brake caliper
4. Brake disk
5. Hub cap
6. Flange nut
7. Hub assembly
8. Bolt
9. Parking brake cable end
10. ABS speed sensor clamp bolts
<Vehicles equipped with ABS>
11. ABS speed sensor
<Vehicles equipped with ABS>
12. Backing plate
13. ECS height sensor rod
<Vehicles equipped with ABS>

14. Self lock nut
15. Stabilizer link
16. Shock absorber mounting bolt
17. Self lock nut
18. Self lock nut
<Vehicles not equipped with 4WS>
19. Power cylinder tie-rod connection nut
<Vehicles equipped with 4WS>
20. Trailing arm mounting bolt and nut
21. Trailing arm

Caution

* Indicates parts which should be temporarily tightened, and then fully tightened with the vehicle on the ground in the unladen condition.



SERVICE POINTS OF REMOVAL

E340BA-A

9. REMOVAL OF PARKING BRAKE CABLE END

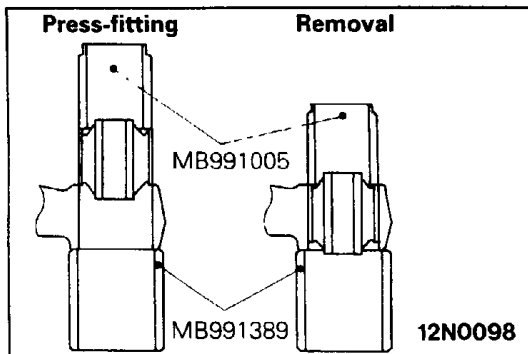
Refer to GROUP 36 – Parking Brake.

14./17./18. REMOVAL OF SELF LOCK NUT

With the special tool, disconnect the ball joint and knuckle.

Caution

While the special tool is being used, do not remove the self lock nut; only loosen it.



INSPECTION

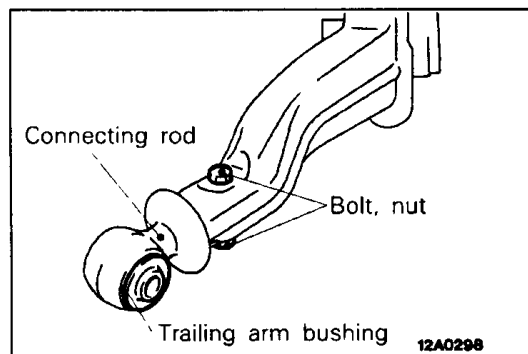
E340CAA

- (1) Check trailing arm for cracks and deformation.
- (2) Check bushing for cracks, deterioration and wear.

TRAILING ARM BUSHING REPLACEMENT

E340EAA

Use the special tool to remove and press fit the bushing.



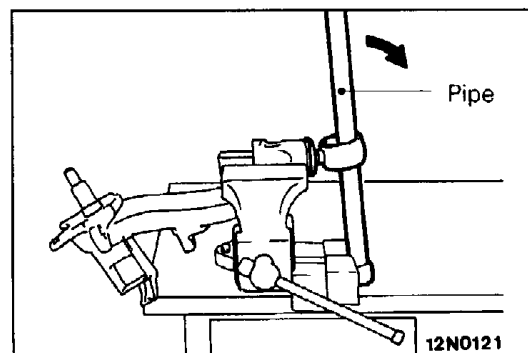
CONNECTING ROD REPLACEMENT

E340FA-B

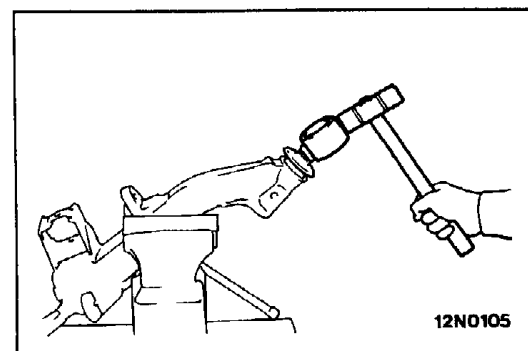
Replace the connecting rod using the following procedure:

<REMOVAL>

- (1) Remove the trailing arm bushing.
- (2) Remove the bolt and nut.

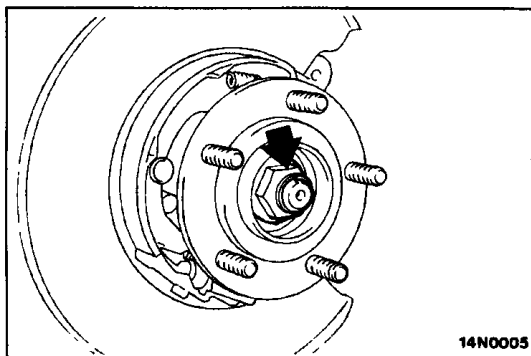


- (3) Clamp the trailing arm with a vice, and use a pipe to pull out the connecting rod.



<INSTALLATION>

- (1) Apply soapy water to the rubber portion of the connecting rod.
- (2) Use a plastic hammer to insert the connecting rod.
- (3) Install the bolt and nut.
- (4) Install the trailing arm bushing.

**SERVICE POINTS OF INSTALLATION**

E340DA-B

9. INSTALLATION OF PARKING BRAKE CABLE END

Refer to GROUP 36 – Parking Brake.

6. INSTALLATION OF FLANGE NUT

After tightening the wheel bearing nut, align with the spindle's indentation and crimp.

SHOCK ABSORBER ASSEMBLY

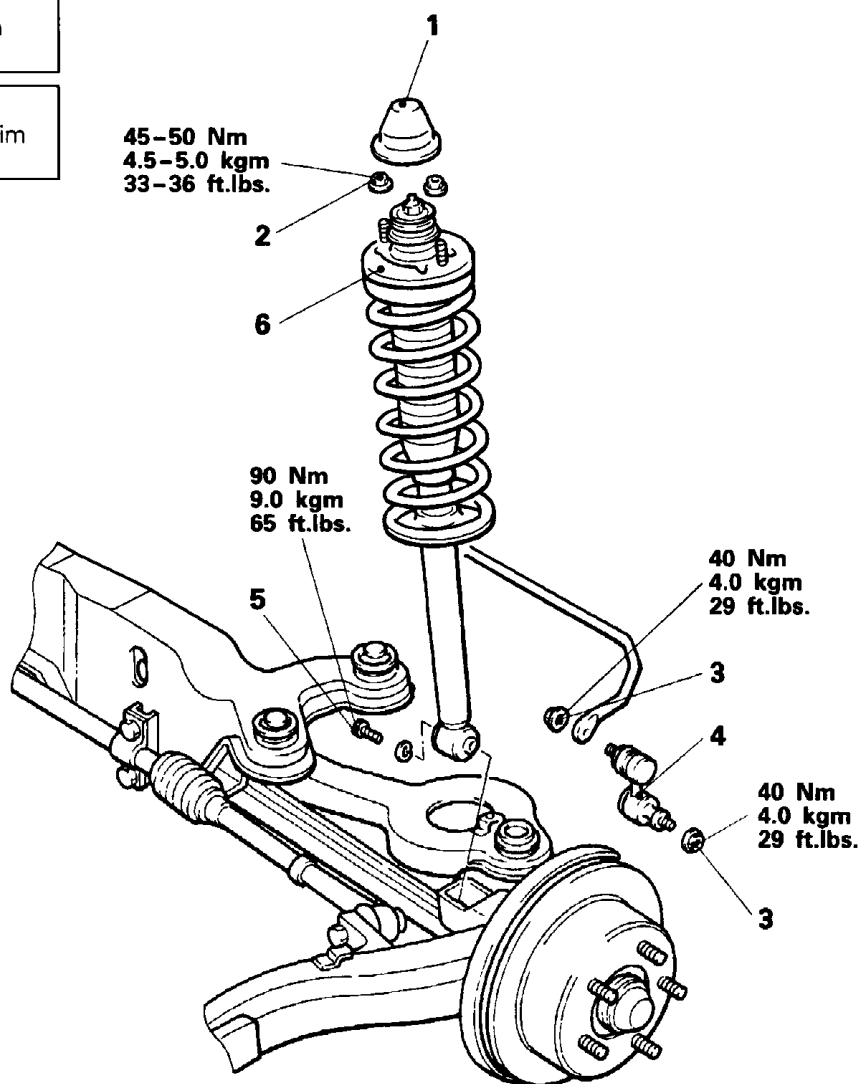
E34MA---

REMOVAL AND INSTALLATION**Pre-removal Operation**

- Removal of the Trunk Side Trim
(Refer to GROUP 52 – Trim.)

Post-installation Operation

- Installation of the Trunk Side Trim
(Refer to GROUP 52 – Trim.)

**Removal steps**

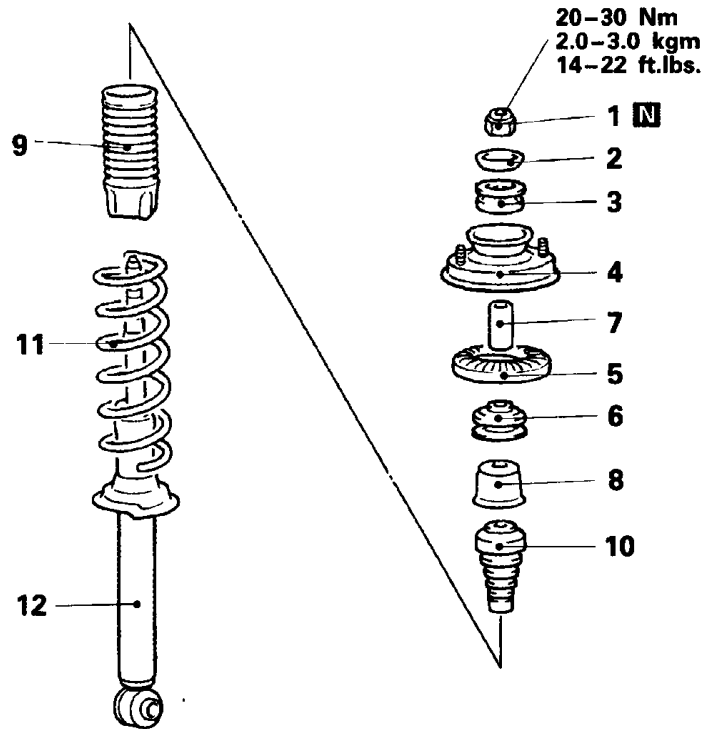
1. Cap
2. Shock absorber upper mounting nuts
3. Stabilizer link mounting nuts
4. Stabilizer link
5. Shock absorber mounting bolt
6. Shock absorber assembly

12N0115

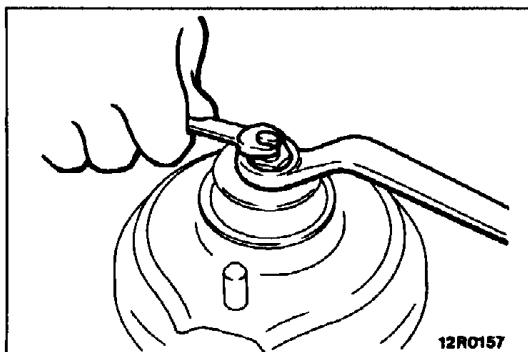
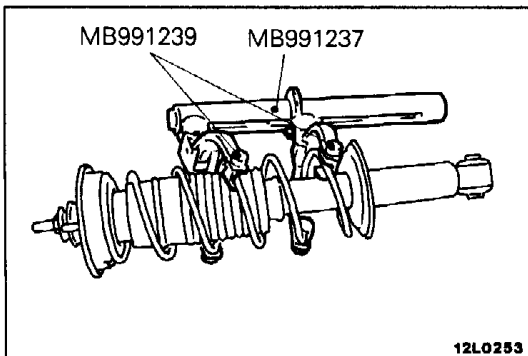
DISASSEMBLY AND REASSEMBLY

Disassembly steps

- ◄◄ ▶▶ 1. Piston rod tightening nut
- ▶▶ 2. Washer
- ▶▶ 3. Upper bushing (A)
- ▶▶ 4. Bracket assembly
- ▶▶ 5. Upper spring pad
- ▶▶ 6. Upper bushing (B)
- ▶▶ 7. Collar
- ▶▶ 8. Cup assembly
- ▶▶ 9. Dust cover
- ▶▶ 10. Bump rubber
- ▶▶ 11. Coil spring
- ▶▶ 12. Shock absorber



12P0183



SERVICE POINTS OF DISASSEMBLY

E34MFAC

1. REMOVAL OF PISTON ROD TIGHTENING NUT

- (1) Before removing the piston rod tightening nut, compress the coil spring using the special tools.

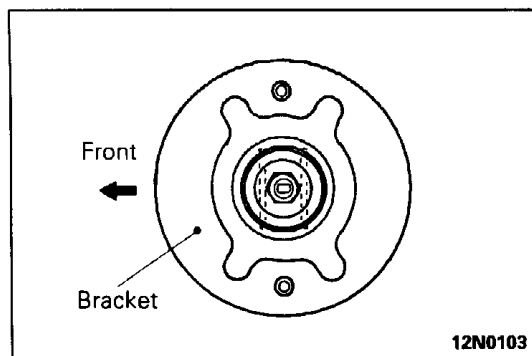
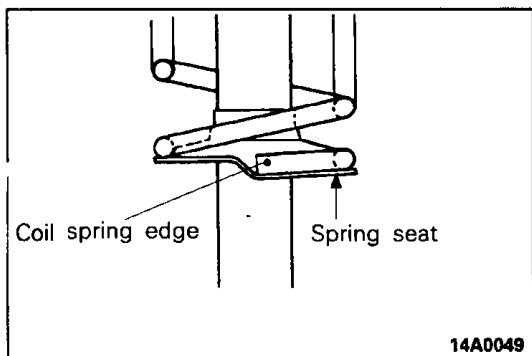
Caution

- (1) Install the special tools evenly, and so that the maximum length will be attained within the installation range.
- (2) Do not use an air tool to tighten the bolt of the special tool.

- (2) While holding the piston rod, remove the piston rod tightening nut.

Caution

Do not use an air tool.



SERVICE POINTS OF REASSEMBLY

E34MHA-H

11. INSTALLATION OF COIL SPRING

- (1) Use the special tools (MB991237 and MB991239) to compress the coil spring and insert it in the shock absorber.

Caution

Do not use an air tool to tighten the bolt of the special tool.

- (2) Align the edge of the coil spring to the position of the shock absorber spring seat as shown.

4. INSTALLATION OF BRACKET ASSEMBLY/1. PISTON-ROD TIGHTENING NUT

- (1) With the position of the bracket assembly as shown in the figure, tighten the tightening nut to the specified torque

Caution

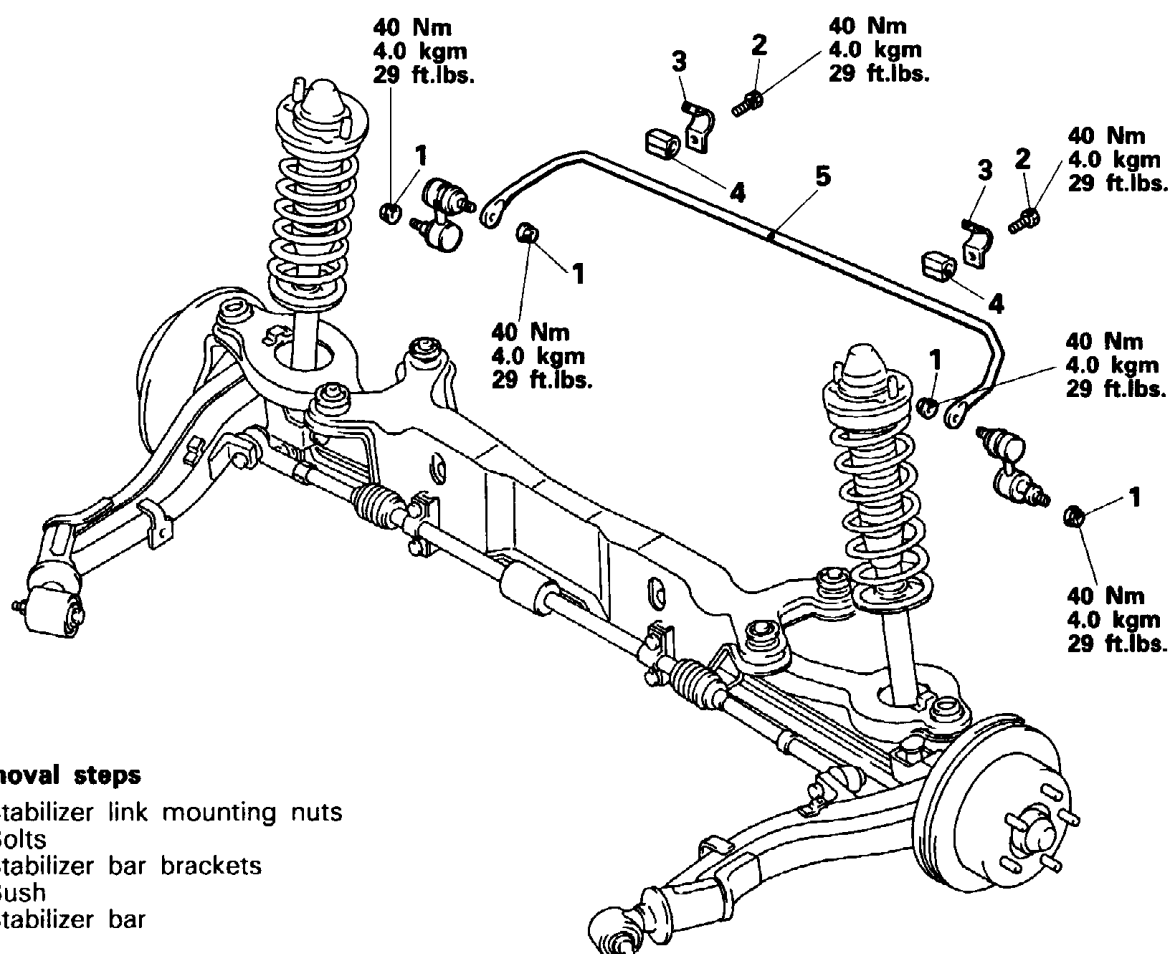
Do not use an air tool.

- (2) Install the coil spring so that the lower edge fits into the spring seat groove and the upper edge fits into the spring pad groove, then remove the special tools (MB991237 and MB991239).

STABILIZER BAR

E34KA--

REMOVAL AND INSTALLATION



Removal steps

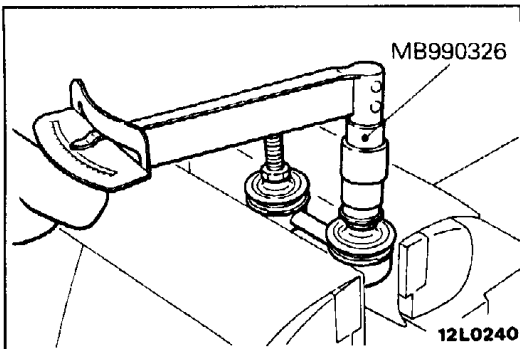
1. Stabilizer link mounting nuts
2. Bolts
3. Stabilizer bar brackets
4. Bush
5. Stabilizer bar

12N0119

INSPECTION

E34KC

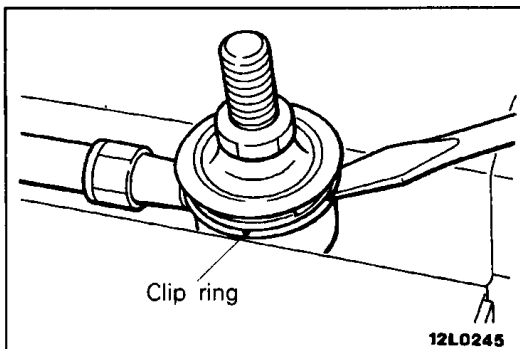
- Check the bushing for wear and deterioration.
- Check the stabilizer bar for deterioration or damage.
- Check the stabilizer link ball joint dust cover for crack.
- Check all bolts for condition and straightness.



CHECKING OF STABILIZER LINK BALL JOINT FOR STARTING TORQUE

With the special tool, measure the ball joint starting torque.

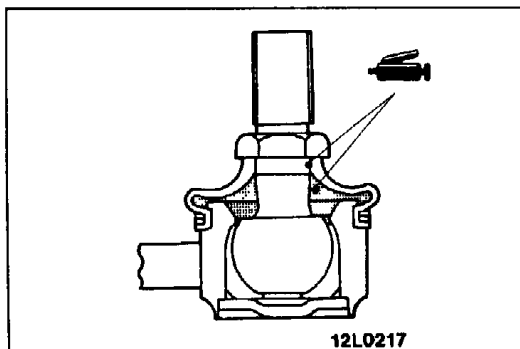
Standard value: 1.7–3.2 Nm
(17–32 kgcm, 15–28 in.lbs.)



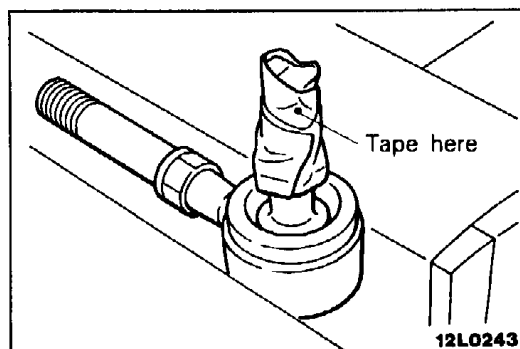
BALL JOINT DUST COVER REPLACEMENT

E34KEA-A

(1) Remove the clip ring and the dust cover.



(2) Apply multipurpose grease to the lip and inside of the dust cover.



(3) Use vinyl tape to tape the stabilizer link where shown in the illustration, and then install the dust cover to the stabilizer link.

(4) Secure the dust cover by the clip ring.

SERVICE BRAKES

CONTENTS

E35AA--

SPECIFICATIONS	2	Rear Brake Disc Run-out Correction	92
General Specifications	2	Brake Lining Thickness Check	93
Service Specifications	3	Brake Drum Inside Diameter Check	93
Lubricants	4	Brake Lining and Brake Drum Connection Check	93
Sealant and Adhesives	4	Checking Operation of The ABS (Anti-lock Brake System)	94
SPECIAL TOOLS	4		
ANTI-LOCK BRAKE SYSTEM TROUBLESHOOTING	5	BRAKE PEDAL	106
SERVICE ADJUSTMENT PROCEDURES	85	MASTER CYLINDER AND BRAKE BOOSTER	108
Brake Pedal Inspection and Adjustment ...	85	BRAKE LINE	111
Brake Booster Operating Test	85	FRONT DISC BRAKE	118
Check Valve Operation Check	86	REAR DISC BRAKE	123
Proportioning Valve Function Test	86	HYDRAULIC UNIT <VEHICLES WITH A.B.S.>	127
Brake Fluid Level Sensor Check	87	WHEEL SPEED SENSOR <VEHICLES WITH A.B.S.>	130
Bleeding	87	ELECTRONIC CONTROL UNIT <VEHICLES WITH A.B.S.>	133
Front Disc Brake Pad Check and Replacement	88		
Front Disc Brake Rotor Inspection	90		
Rear Disc Brake Pad Check and Replacement	90-2		
Rear Brake Disc Thickness Check	92		
Rear Brake Disc Run-out Check	92		

SPECIFICATIONS

GENERAL SPECIFICATIONS

E35CA--

Items	Specifications
Master cylinder Type I.D. mm (in.)	Tandem type (with level sensor) 25.4 (1)
Brake booster Type Effective dia. of power cylinder mm (in.) Boosting ratio [Brake pedal depressing force]	Vacuum type (tandem) 203 + 230 (8.0 + 9.0) 6.0 [302 (30 2, 67)]
Proportioning valve Type Split point MPa (kg/cm ² , psi) Decompression ratio	Dual type 4.0 (40, 569) 0.25
Front brakes Type Disc O.D. mm (in.) Disc thickness mm (in.) Pad thickness mm (in.) Wheel cylinder I.D. mm (in.) Clearance adjustment	Floating caliper, dual-piston, ventilated disc (M-R57W) 276 (10.9) 24 (0.94) 16.0 (0.63) 42.8 (1 11/16) × 2 Automatic
Rear brakes Type Disc O.D. mm (in.) Disc thickness mm (in.) Pad thickness mm (in.) Wheel cylinder I.D. mm (in.) Clearance adjustment	Floating caliper, single piston, ventilated disc (M-R45V) 266 (10.5) 18 (0.71) 15.5 (0.61) 34.9 (1 3/8) Automatic
ABS Rotor teeth Front wheel side Rear wheel side Speed sensor	 98 49 Magnet coil type

SERVICE SPECIFICATIONS

E35CB--

Items		Specifications
Standard value		
Brake pedal height	mm (in.)	176–181 (6.9–7.1)
Brake pedal free play	mm (in.)	3–8 (0.12–0.31)
Brake pedal to floorboard clearance	mm (in.)	85 (3.35) or more
Output pressure of proportioning valve		
Split point	MPa (kg/cm ² , psi)	3.75–4.25 (37.5–42.5, 533–604)
Output fluid pressure		4.75–5.25 (47.5–52.5, 676–747)
[input pressure	MPa (kg/cm ² , psi)]	[8.0 (80, 1 138)]
Pad thickness	mm (in.)	10 (0.39)
Front brake disc thickness	mm (in.)	24 (0.94)
Rear brake disc thickness	mm (in.)	18 (0.71)
Brake lining thickness	mm (in.)	2.8 (0.11)
Brake drum inside diameter	mm (in.)	168 (6.6)
Booster push rod to master cylinder piston clearance	mm (in.)	0.65–0.85 (0.026–0.033)
Disc brake drag force (tangential force of wheel mounting bolts)	N (kg, lbs.)	70 (7.0, 15.4) or less
[Disc brake dragging torque	Nm (kgm, ft.lbs.)]	[4 (0.4, 3)] or less
Speed sensor's internal resistance		k Ω
Front		1.4–2.2
Rear		1.3–2.1
Solenoid valve resistance (in the hydraulic unit)		Ω
Vehicles without TCL		2.8–3.4
Vehicles with TCL		3.0–3.2
Speed sensor insulation resistance	k Ω	100 or more
Clearance between the speed pole piece and the toothed rotor		mm (in.)
Front		0.2–0.7 (0.008–0.028)
Rear		0.3–0.9 (0.012–0.035)
Limit		
Left/right proportioning valve output pressure difference	MPa (kg/cm ² , psi)	0.4 (4, 57)
Front disc runout	mm (in.)	0.08 (0.0031) or less* ¹ , 0.03 (0.0012) or less* ²
Hub end play	mm (in.)	0.05 (0.0020)
Pad thickness	mm (in.)	2.0 (0.08)
Front disc thickness	mm (in.)	22.4 (0.88)
Rear disc thickness	mm (in.)	16.4 (0.65)
Rear disc runout	mm (in.)	0.08 (0.0031) or less
Rear lining thickness	mm (in.)	1.0 (0.04)
Rear drum inside diameter	mm (in.)	169 (6.7)

NOTE

*¹ : <Vehicles built up to July, 1991>*² : <Vehicles built from August, 1991>

LUBRICANTS

E35CD--

Items	Specified lubricant
Brake fluid	DOT3 or DOT4
Brake piston seal Brake piston boot inner surfaces Lock pin boot inner surfaces Guide pin boot inner surfaces Lock pin sleeve	Repair kit grease (orange)
Pad and outer shim contact surface and inner shim and inner shim contact surface and inner shim and pad	Brake grease SAE J310, NLGI No. 1

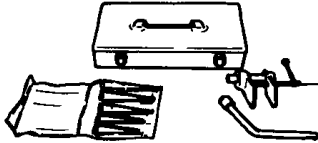
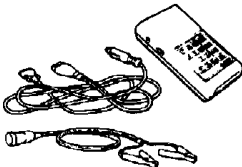
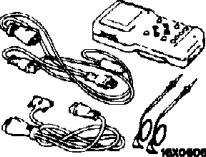
SEALANTS AND ADHESIVES

E35CE--

Item	Specified sealant	Characteristic
Thread part of fitting	3M ATD Part No. 8661, 8663 or equivalent	Semi-drying sealant

SPECIAL TOOLS

E35DA--

Tool	Number	Name	Use
	MB990964	Brake Tool set	Pushing-in of the disc brake piston MB990520
		MB990520	
	MB991341	Multi-use tester assembly	Up to 1993 models For checking of ABS
		ROM pack (For the number, refer to GROUP 00 -) Precautions Before Service.	
	MB991502	MUT-II	
		ROM pack 16X0607	

ANTI-LOCK BRAKE SYSTEM TROUBLESHOOTING

E35EC--

PARTICULAR PHENOMENA OF THE ANTI-LOCK BRAKE SYSTEM

Models equipped with the anti-lock brake system (A.B.S.) may exhibit one or more of the following phenomena from time to time, but none of these are abnormal.

- (1) A pulsing feeling in the brake pedal, or vibration of the body or the steering wheel, when the anti-skid brake system is activated by sudden braking or by braking on a slippery road surface. Actually, this phenomenon is an indication that the A.B.S. is functioning normally.
- (2) When the vehicle speed reaches approximately 6 km/h (4 mph) after the engine is started and the vehicle starts off (for the first time), a whining motor noise may be heard from the engine compartment if the vehicle is traveling in a quiet place, but this noise is simply the result of a self-check being made of the A.B.S. operation.

TROUBLESHOOTING METHODS

Problems related to the A.B.S. can be classified into two general categories: problems in the electrical system and those in the hydraulic system.

For problems in the electrical system the selfdiagnosis function is built into the electronic control unit (E.C.U.) causing the A.B.S. warning lamp to illuminate as a warning to the driver. In this instance, checks can be made by using the multi-use tester and oscilloscope. Problems in the hydraulic system (poor braking, etc.) can be located in the same way as for ordinary brakes. There is, however, the necessity to check to determine whether the problem is related to ordinary brake components or to the components related to the A.B.S. To make this check, use the multi-use tester.

HOW TO USE THE TROUBLESHOOTING FLOW CHART

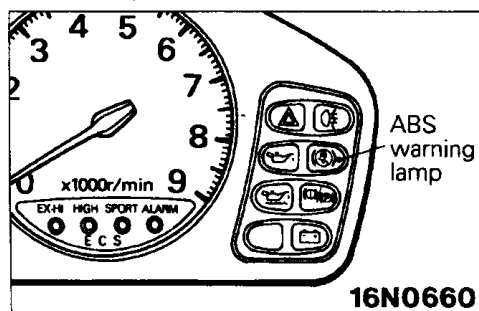
- (1) Following the flow chart, first refer to the illumination pattern of the ABS warning lamp, and next note the diagnosis code and inspect the brake operation.
- (2) Follow the inspection charts listed in the "Remedy" column. In each inspection chart, [Comment] and [Hint] are listed for troubleshooting reference.

NOTE

ECU: Electronic control unit

Check the trouble symptoms by to the following procedure, and inspect according to each instruction.

When the ignition key is turned to "ON", does the ABS warning lamp illuminate?



ABS warning lamp	Illuminated	
	Not illuminated	
Ignition key	ON	
	ACC, LOCK	

14N0166

Yes

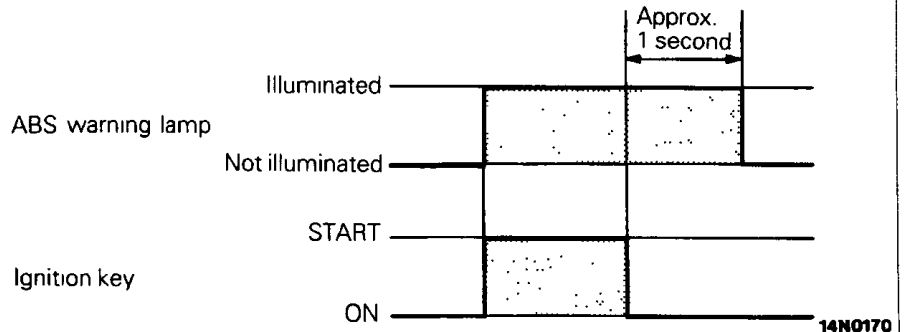
No

No.	Trouble symptom	Main cause	Remedy
1	The ABS warning lamp does not illuminate at all.	Broken wire in the warning lamp power circuit (including blown fuse).	Inspect according to Inspection Chart A (P.35-15).
	ABS warning lamp Illuminated Not illuminated	Warning lamp bulb failure.	
	Ignition key ON ACC, LOCK	Broken wire in two warning lamp drive circuits (both bulb relay and ABS-ECU).	
14N0167			
2	The ABS warning lamp switches off approximately 1 second after the ignition key is turned to "ON".	Broken harness wire between the alternator L terminal and the ABS-ECU.	Inspect according to Inspection Chart B (P.35-19).
	ABS warning lamp Illuminated Not illuminated	Interface inside the ABS-ECU is faulty.	
14N0168			
3	The ABS warning lamp illuminates twice, but after that it remains switched off.	Broken harness wire between the ABS warning lamp and the ABS-ECU.	Inspect according to Inspection Chart C (P.35-20).
	ABS warning lamp Illuminated Not illuminated	Interface inside the ABS-ECU is faulty.	
14N0169			

To next page

From previous page

When the ignition key is turned to "START" to start the engine, does the ABS warning lamp illuminate in the following way, and then switch off?



Yes

No

No.	Trouble symptom	Main cause	Remedy
4	When the ignition key is turned to "START", the ABS warning lamp switches off. (After the engine starts and the lamp remains illuminated, refer to the following item.)	Broken wire in the ABS warning lamp drive circuit when the valve relay is OFF. Broken contact wire when the valve relay is OFF. Broken diode wire.	Inspect according to Inspection Chart D (P.35-21).
5	After the engine starts and the lamp remains illuminated.	Broken wire in the ABS-ECU power circuit. Short in the ABS warning lamp drive circuit. Fail-safe function is operating by the ABS-ECU self-diagnosis. ABS-ECU is faulty.	Inspect according to Inspection Chart E (P.35-23).

When engine is idling, is the ABS warning lamp switched off even after approx. 2 minutes or more?

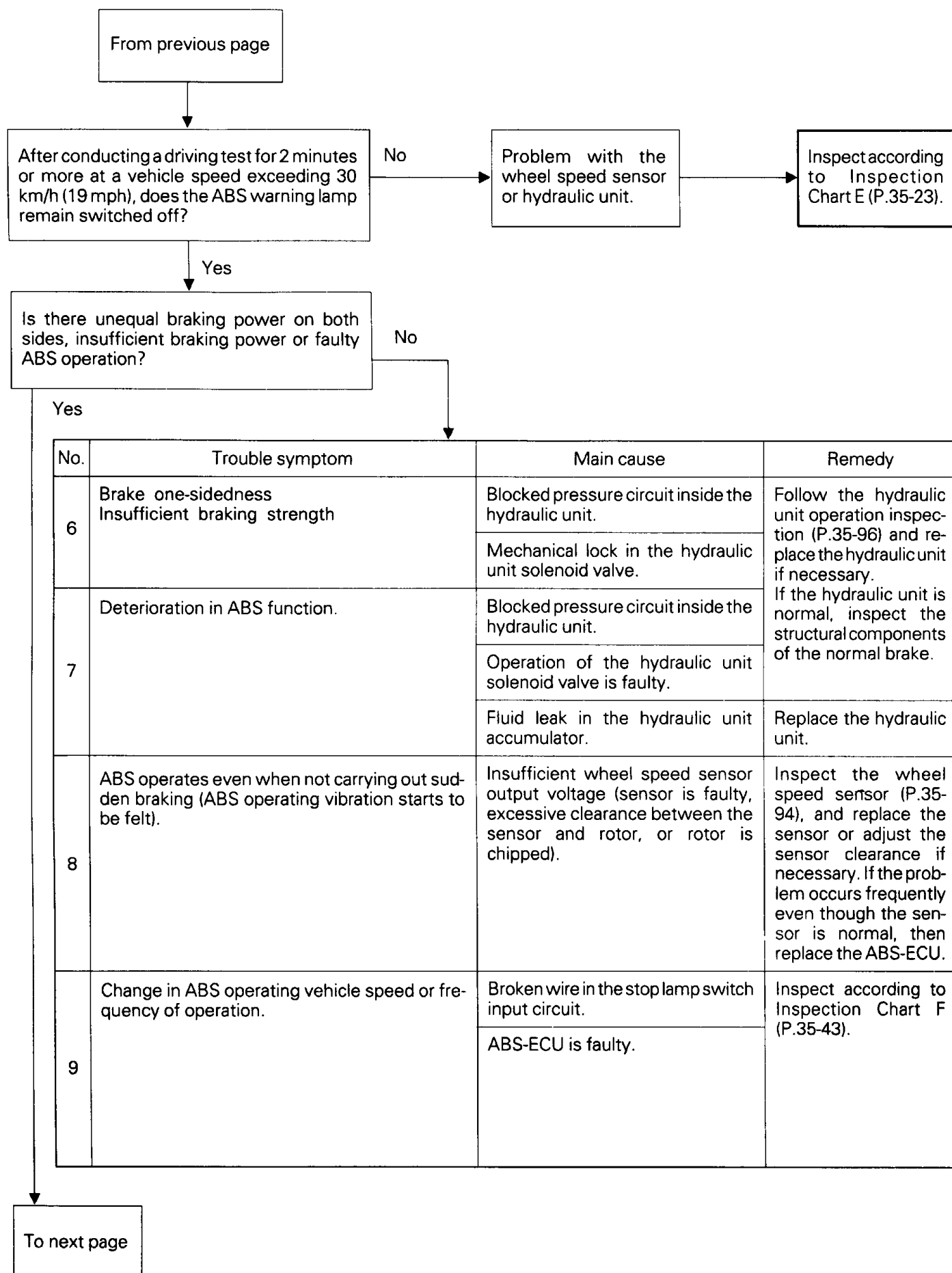
No

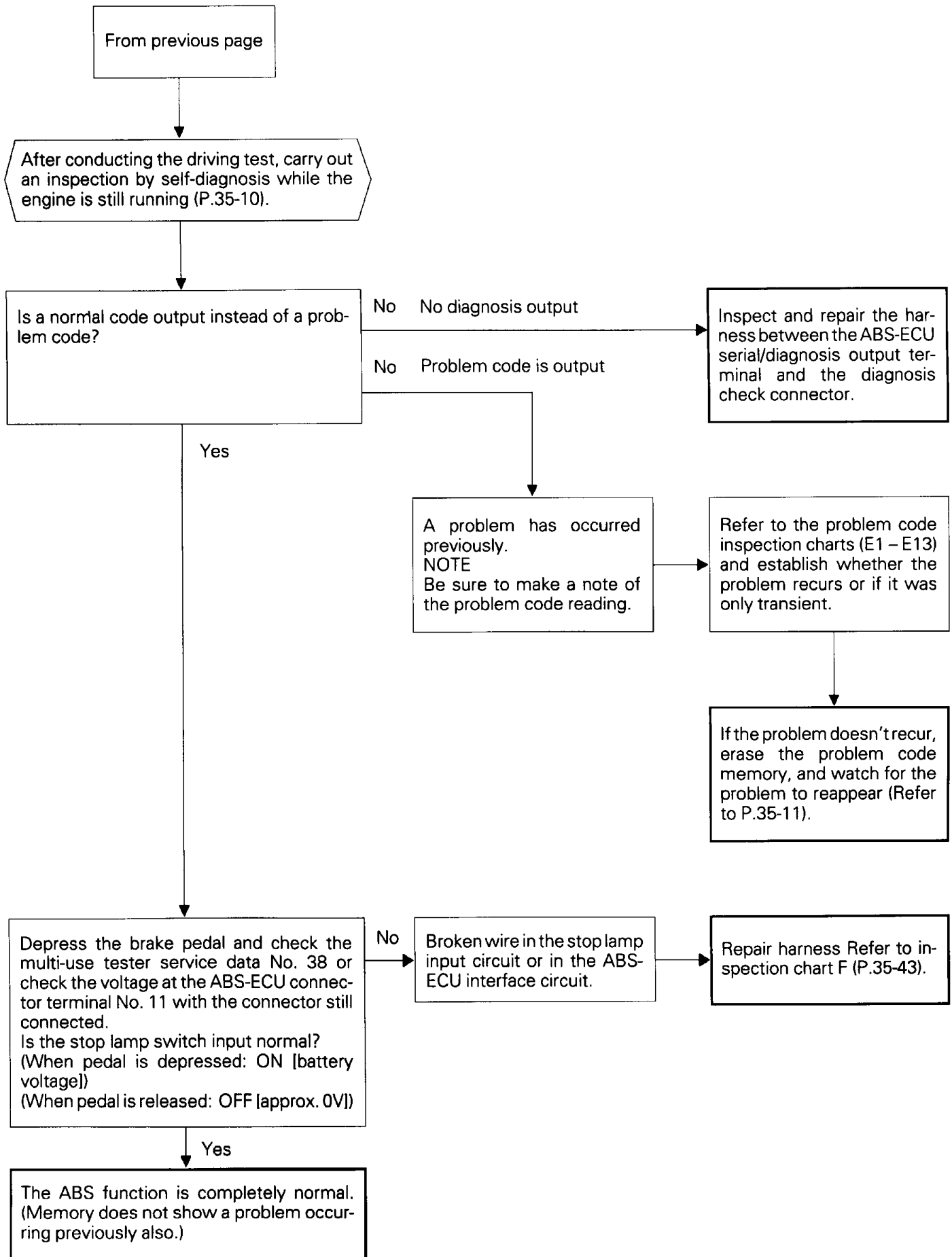
Problem in the hydraulic unit motor or pressure switch.

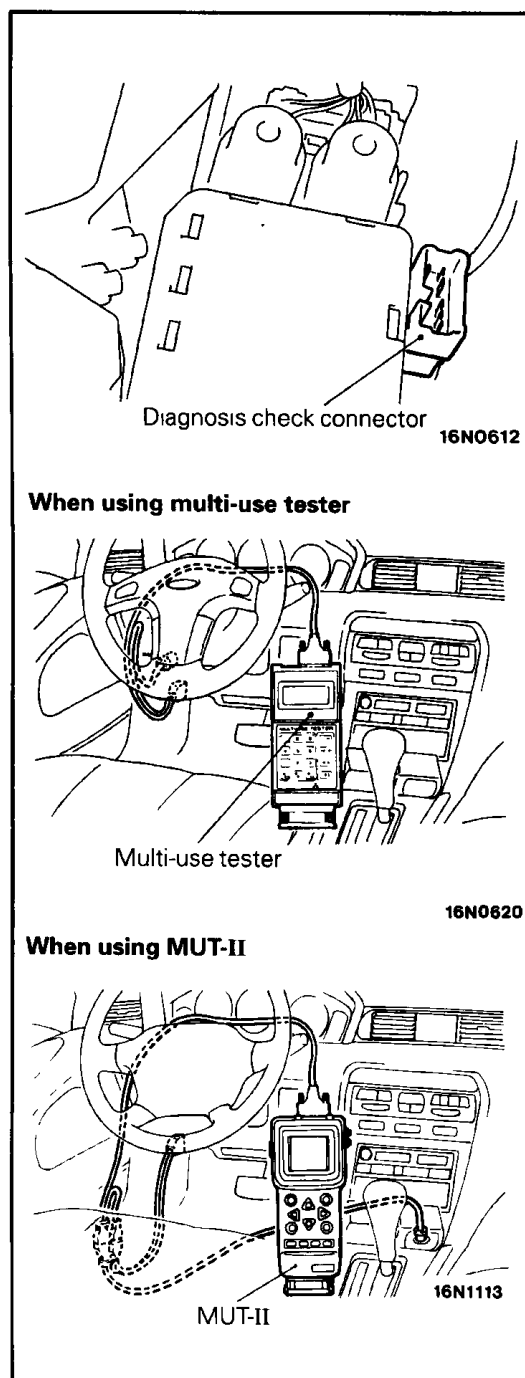
Inspect according to Inspection Chart E (P.35-23).

Yes

To next page







INSPECTION BY SELF-DIAGNOSIS

- (1) Connect the multi-use tester <Up to 1993 models> or MUT-II <All models> to the diagnosis check connector.

Caution

Connection and disconnection of the multi-use tester or MUT-II should always be made with the ignition switch in the OFF position.

- (2) Start the engine, and select the ABS system on the multi-use tester or MUT-II. (ABS warning lamp will illuminate in tester mode.)

If it does not enter tester mode, check the harness between the ABS-ECU power circuit and the ABS-ECU diagnosis check connector.

- (3) Read and make a note of the diagnosis output codes.

NOTE

If the multi-use tester or MUT-II is disconnected after entering tester mode, momentarily stop and restart the engine before activating the multi-use tester or MUT-II.

- (4) Momentarily erase the diagnosis code memory. (Refer to P.35-11.)

If the memory cannot be erased, the function is being stopped by a problem that is currently displaying a problem code. If the memory can be erased, then the problem was only temporary, or it is a problem that can only be detected while driving.

- (5) If the problem code is not erased, or if the ABS function is stopped by a repeated driving test and a problem code is output, inspect according to the problem code inspection charts (E-1 – E-13).

NOTE

The codes below are output as diagnosis codes according to the vehicle's condition, even when the ABS system is normal. These codes are output only for a current problem, and if the vehicle's condition returns to normal, then the codes will become normal.

Code No.	Vehicle Condition
16	Battery is dead
35	Engine is stopped
37	Low accumulator pressure

METHOD OF ERASING THE DIAGNOSIS CODE MEMORY**Caution**

1. When repairs are completed, the diagnosis code memory should be erased.
2. When the ABS-ECU function is stopped, the problem code memory cannot be erased, so the inspection and repair should be continued.

WHEN USING THE MULTI-USE TESTER**<Up to 1993 models> OR MUT-II <All models>**

- (1) Erase the memory with the multi-use tester or MUT-II.

NOTE

1. When using the multi-use tester or MUT-II, 4 codes can be erased, starting from the newest, each time the memory is erased.
2. After erasing the memory, a command cannot be received from the multi-use tester or MUT-II. When checking diagnosis codes, momentarily stop and restart the engine, and then reactivate the multi-use tester or MUT-II.

- (2) Check the diagnosis codes to check that the memory has been erased.

WHEN USING THE CONNECTOR FOR DIAGNOSIS CODE MEMORY ERASURE

- (1) After connecting the two diagnosis code memory erasure connector terminals (left diagram), turn the ignition key to ON.

At this time, the valve relay will turn OFF, and the ABS warning lamp will illuminate.

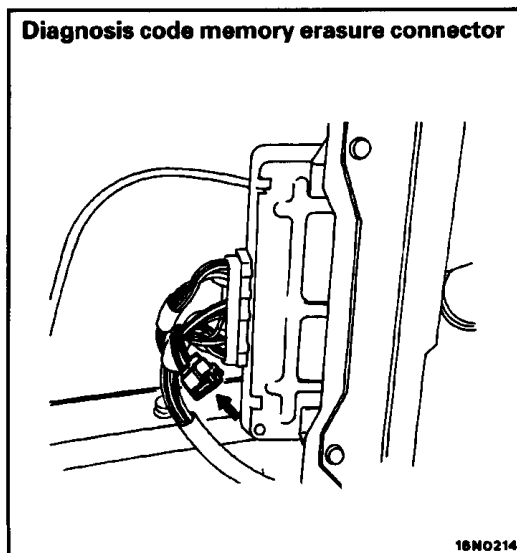
- (2) After approximately one second or more has passed, turn the ignition key to OFF.

- (3) Disconnect the two diagnosis code memory erasure connector terminals and turn the ignition key back to ON.

At this point in time, the erasure of one problem code has been completed.

NOTE

1. When erasing several codes, repeat steps (1) to (3).
2. Even if the ignition switch is continuously turned to ON and OFF with the two diagnosis code memory erasure connector terminals still connected, problem codes cannot be erased.



DIAGNOSIS CODE TABLE

Diagnosis code No.	Name of inspection chart or remedy	Reference page	Diagnosis code No.	Name of inspection chart or remedy	Reference page
11	Inspection chart E-2	P. 35-27	41	Inspection chart E-9	P. 35-34
12			42		
13			43		
14			44		
15	Inspection chart E-1	P. 35-26	45		
16	Inspection chart E-6	P. 35-31	46		
21	Inspection chart E-3	P. 35-28	51	Inspection chart E-10	P. 35-35
22			52	Inspection chart E-11	P. 35-36
23			53		
24			54	Inspection chart E-12	P. 35-39
25	Inspection chart E-4	P. 35-28	61	Inspection chart E-13	P. 35-40
31	Inspection chart E-5	P. 35-28	62	Inspection chart E-14	P. 35-42
32			63	Replace the ABS-ECU	P. 35-133
35	Inspection chart E-7	P. 35-32	–	–	–
37	Inspection chart E-8	P. 35-33	–	–	–

DIAGNOSIS CODE DISPLAY METHOD

The codes are displayed as follows depending on the system problem.

System problem		When using the multi-use tester or MUT-II	When using a voltage meter
No current problem	No previous problem	Normal code	Normal code "continuous 0.5 sec. ON/OFF".
	Previous problem	Four previous codes are displayed, starting from the most recent.	One previous code is displayed, starting from the most recent.
Current problem	No previous problem	One current problem code is displayed.	One current problem code is displayed.
	Previous problem	One current code and three previous codes are displayed, starting from the most recent.	

NOTE

1. If diagnosis code No. 15 appears after a problem is detected in a wheel speed sensor that can specify the wheel position (nos. 11-14 or nos. 21-24), then it cannot be written into memory.
2. Diagnosis codes No. 16 and 35 (low voltage), No. 37 (LPWS ON), and No. 63 (ECU faulty) are only displayed when there is a current problem. (Past occurrences are not recorded in memory.)
3. Even if identical codes are output continuously, the code is only memorized when it is first displayed.

SERVICE DATA INSPECTION TABLE

The following items can be read by the multi-use tester <Up to 1993 models> or MUT-II <All models> from the ABS-ECU input data.

WHEN THE SYSTEM IS NORMAL

Service data item		Display units	Service data item		Display units
No.	Item		No.	Item	
11	Front right wheel speed	km/H	35	Alternator L terminal voltage	HIGH/LOW
12	Front left wheel speed	km/H	36	PCSW terminal voltage	HIGH/LOW
13	Rear right wheel speed	km/H	37	LPWS terminal voltage	HIGH/LOW
14	Rear left wheel speed	km/H	38	ON/OFF condition of stop lamp switch	ON/OFF
16	ECU power voltage	HIGH/LOW			

WHEN SYSTEM IS ISOLATED BY THE ABS-ECU

When the ABS-ECU function is being stopped by the self-diagnosis function, the above code nos. 11-14 for each wheel speed are not displayed.

By using this function, function checking of the hydraulic unit can be done without the need for special devices such as a hydraulic unit checker (MB991131).

ACTUATOR TEST FUNCTION

By using the multi-use tester <Up to 1993 models> or MUT-II <All models>, the following force-activation of the actuator can be performed.

NOTE

When the ABS-ECU function is stopped, actuator testing can not be carried out.

ACTUATOR TEST SPECIFICATIONS

No.	Drive conditions	Drive phenomena	Drive specifications
01	A and B	Solenoid valves of each corresponding hydraulic unit channel.	Voltage increase → Voltage decrease (48 msec) → Constant (3 sec) → Voltage increase (8 msec) → Constant (3 sec) → Carries out voltage increase operation.
02			
03			
04			
05			
06			
07	A	Valve relay and ABS warning lamp	Relay OFF signal is output for 2 seconds. For a six second period including 2 seconds before and after this, the ABS-ECU outputs an ABS warning lamp OFF signal. This checks the operation by illuminating the warning lamp when the relay is OFF.
08	A	Motor relay	Motor ON signal is output for 2 seconds.
Drive conditions: • Condition A: Highest wheel speed is less than 10 km/h (6 mph). • Condition B: Wheel speed of both front wheels or both rear wheels is 0 km/h (0 mph).			

Caution

The No. 08 motor relay drive should be checked only when the inspection is needed for the troubleshooting. There is a danger that the hydraulic

unit actuator pressure could become higher than necessary, which will have an adverse effect on the system.

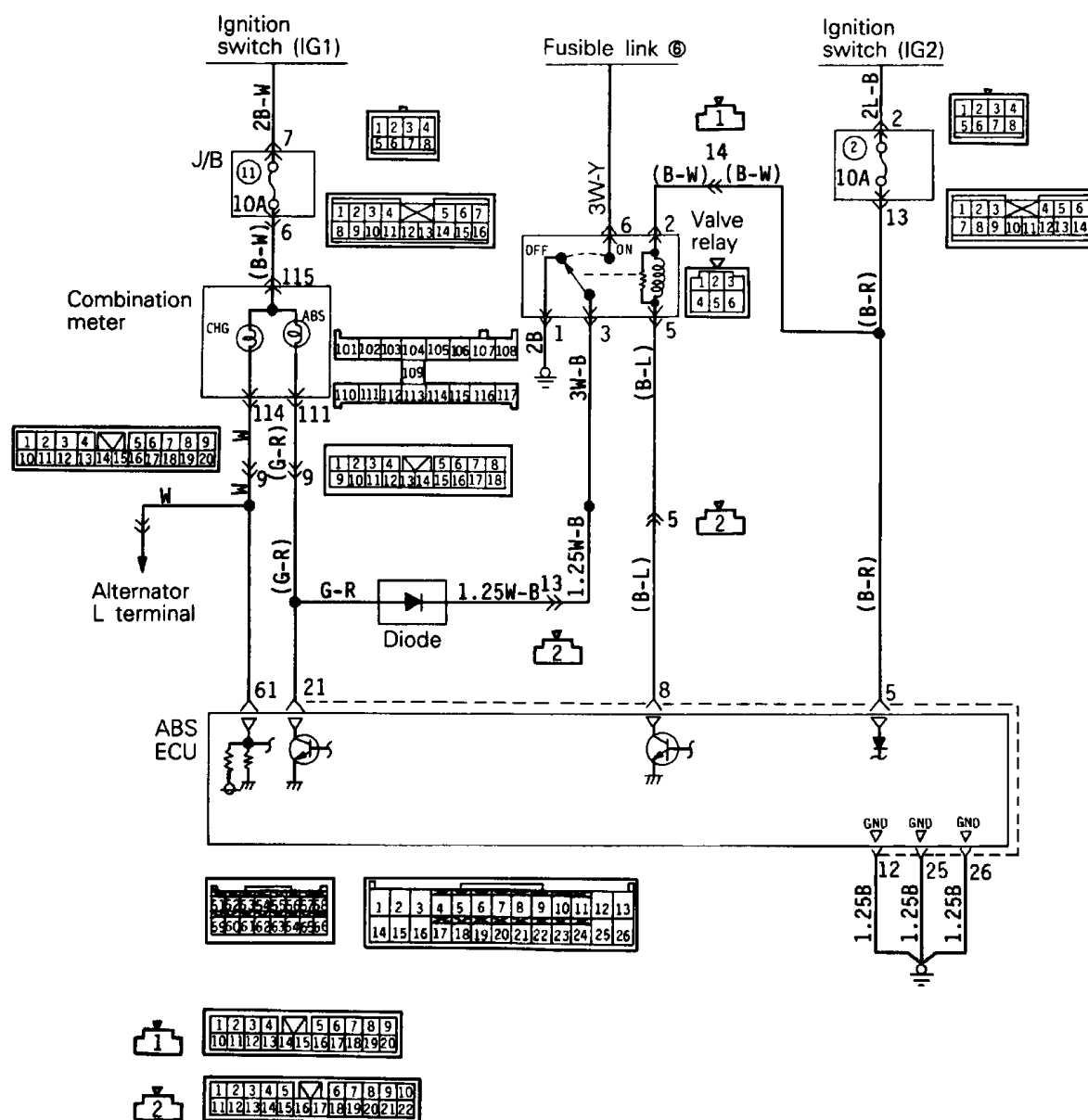
TROUBLE SYMPTOM INSPECTION CHART

A When ignition key is turned to "ON", ABS warning lamp does not illuminate

Comment: When power is supplied to the ABS-ECU, the valve relay changes from OFF to ON/OFF by the initial check, and thus even if there is a problem with the lamp illumination circuit that is driven by the ABS-ECU, the lamp will illuminate twice when the valve relay is OFF. Accordingly, there is a strong possibility that the problem is in the lamp bulb or in the power supply to the lamp.

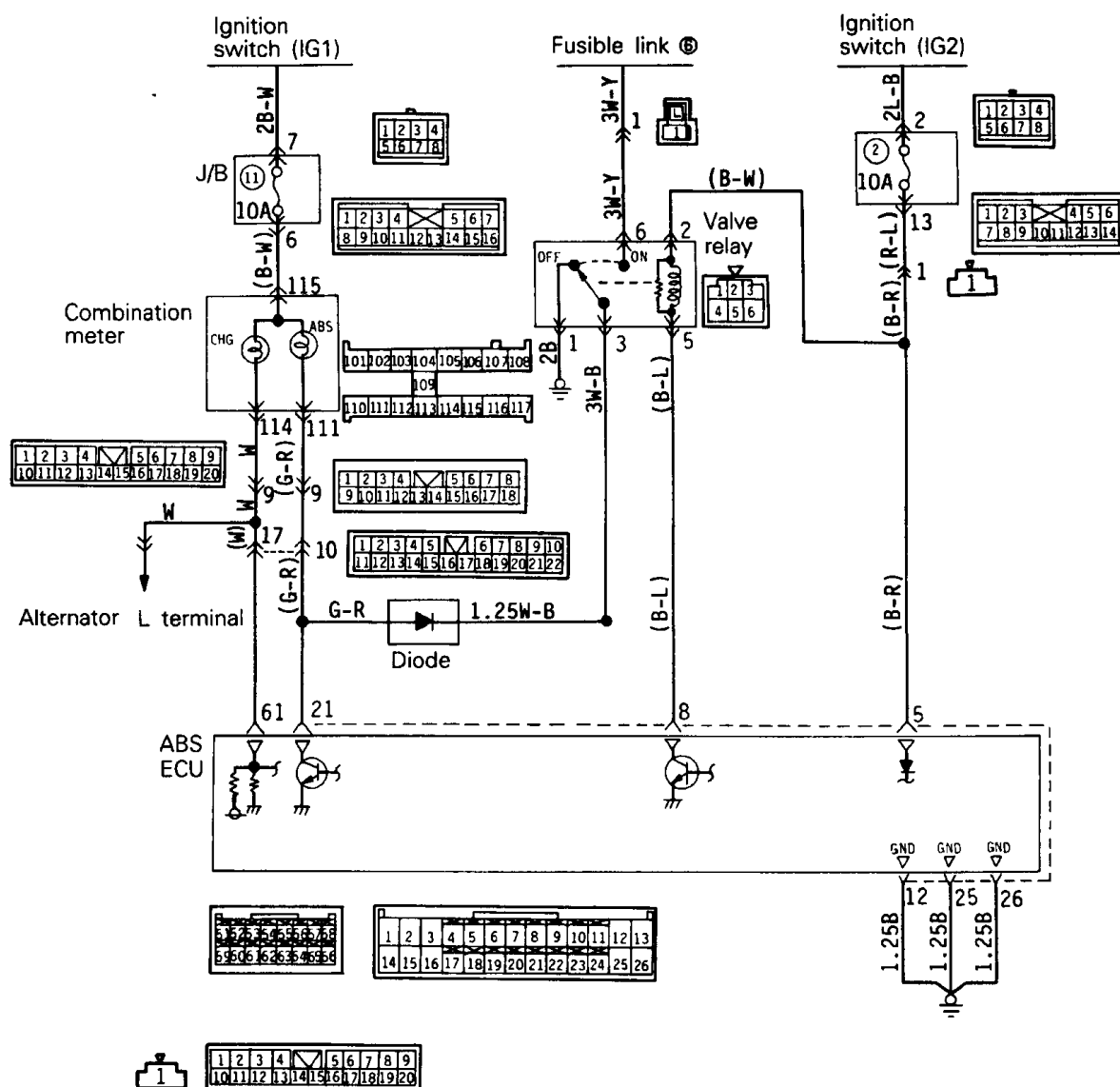
Hint:

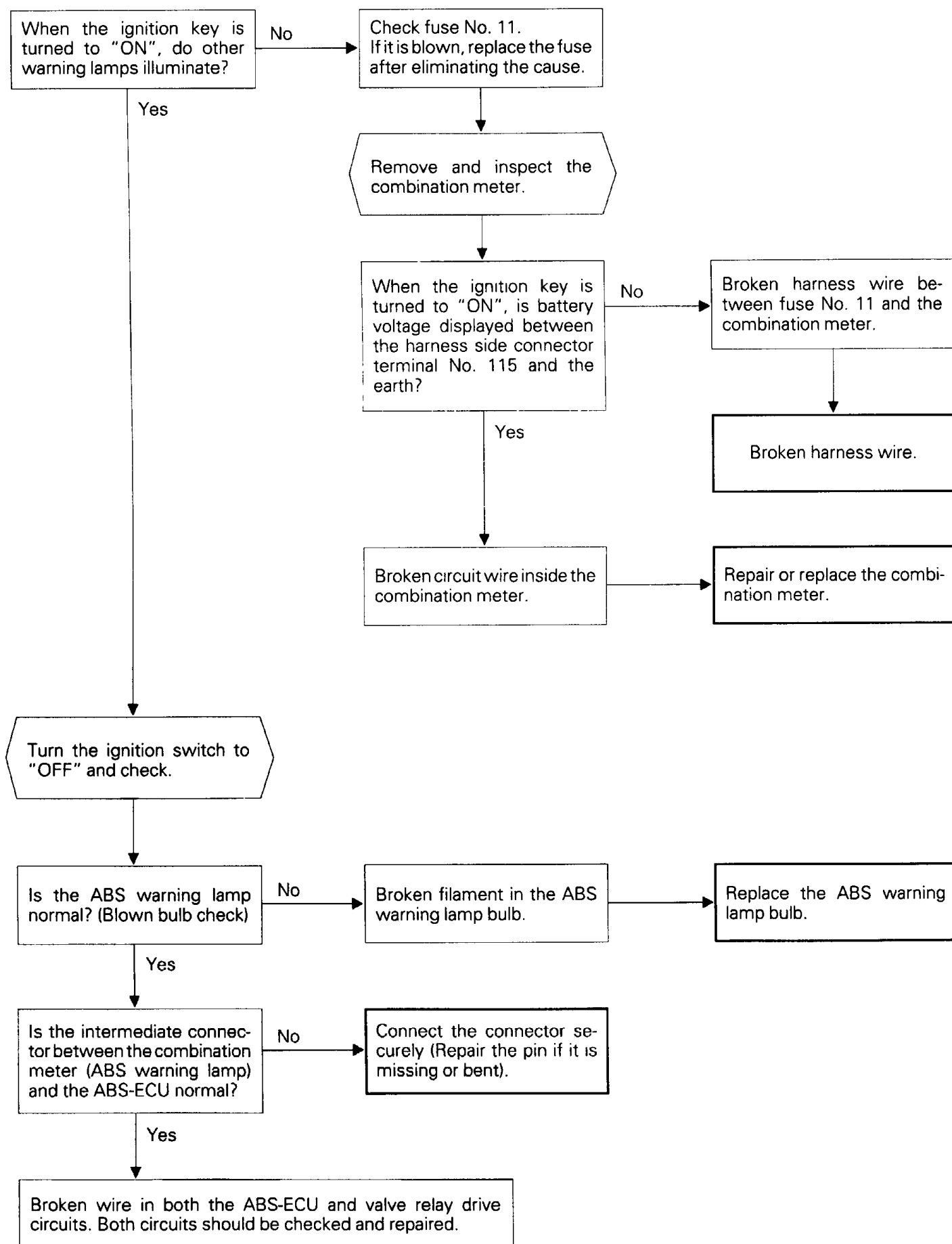
When other warning lamps also do not illuminate, the cause is probably a blown fuse.

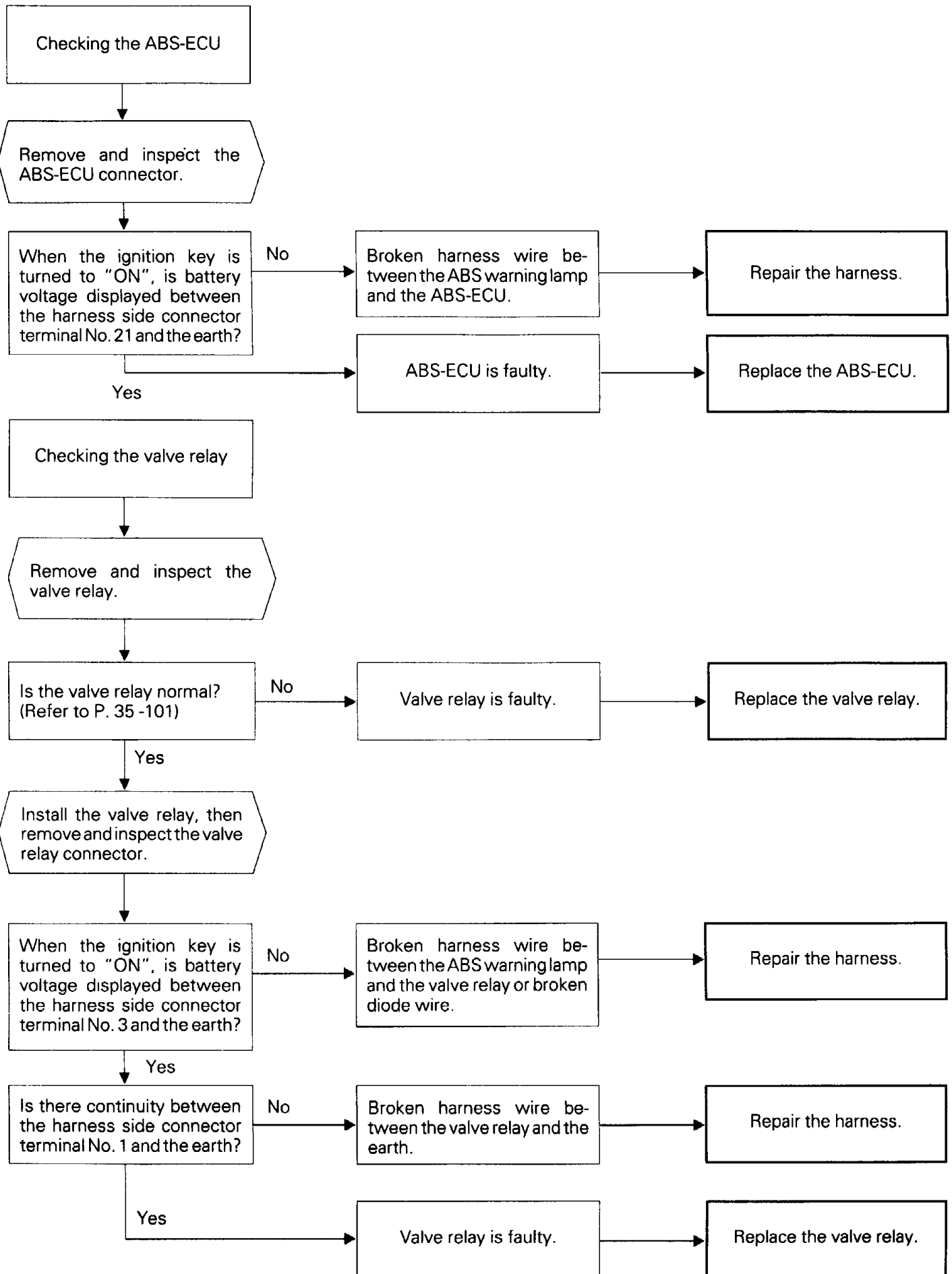
LH drive vehicles

14N0219

RH drive vehicles







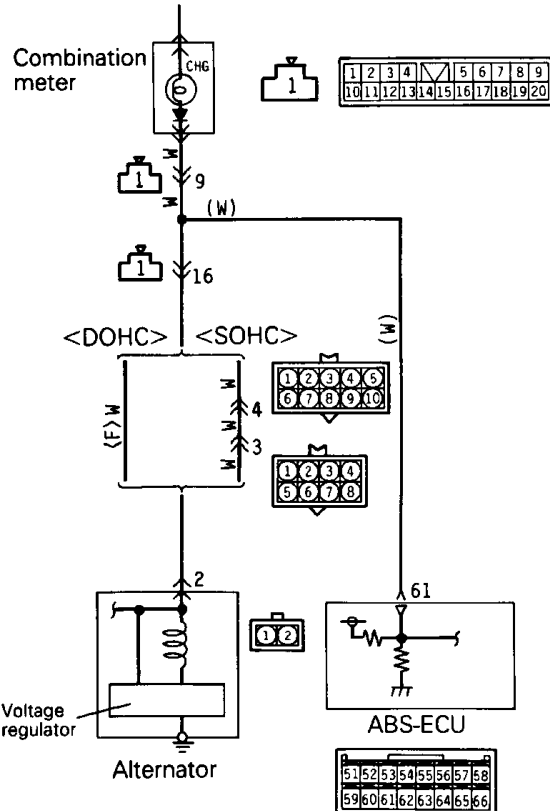
B

The ABS warning lamp switches OFF approximately 1 second after the ignition key is turned to "ON"

Comment: The ABS-ECU monitors the voltage of the alternator L terminal, and when the engine is not running, the voltage of the L terminal is low, and thus the ABS warning lamp illuminates. Accordingly, when the ignition key is

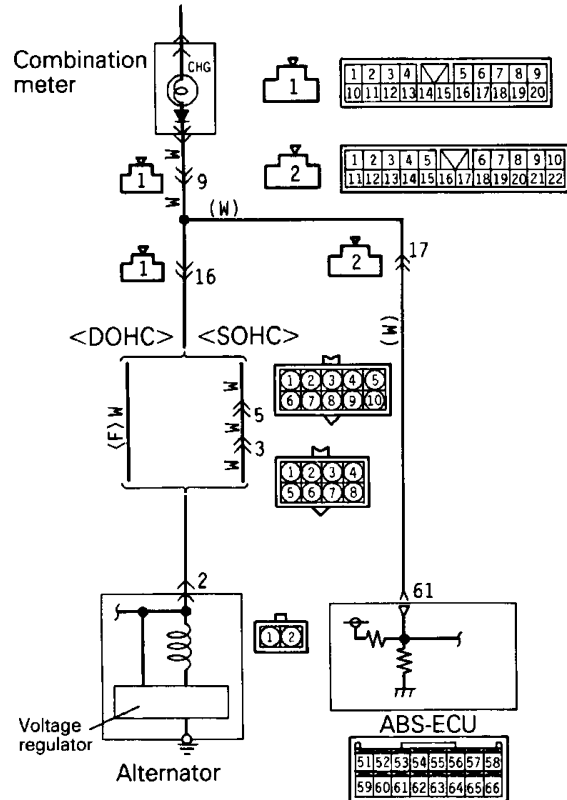
turned to "ON", if the lamp turns off after the initial check (which takes about 1 second), there is a problem in the ABS warning lamp illumination function resulting from the alternator L terminal monitor.

LH drive vehicles



14N0221

RH drive vehicles



14N0267

Remove the ABS-ECU connector, and inspect the harness side connector.

When the ignition key is turned to "ON", does battery voltage show between No. 61 terminal and the earth?

No

Broken harness wire between the alternator L terminal and the ABS-ECU.

Repair the harness.

Yes

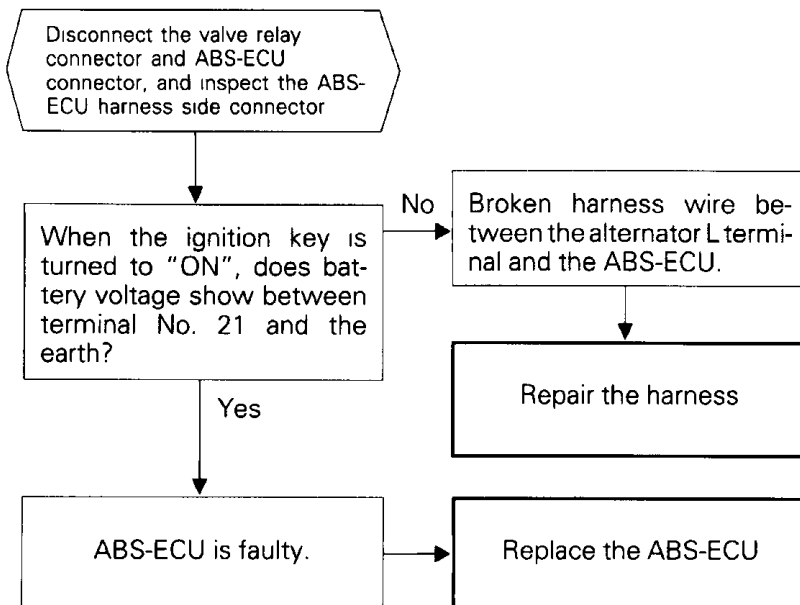
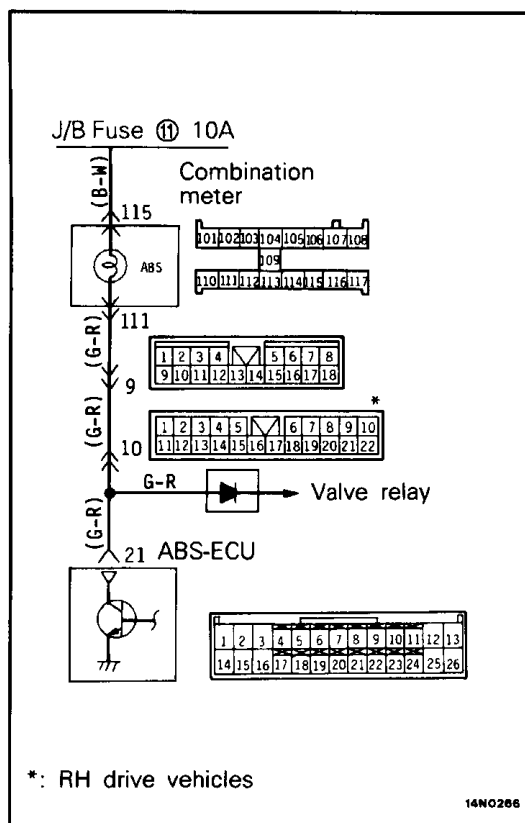
ABS-ECU is faulty.

Replace the ABS-ECU.

C The ABS warning lamp illuminates twice after the ignition key is turned to "ON", but after that it remains switched off

Comment: The ABS-ECU causes the ABS warning lamp to illuminate during the initial check. The valve relay changes from OFF to ON→OFF→ON by the initial check, and if there is a broken wire in the lamp drive circuit from the ABS-ECU, the lamp will

illuminate when the valve relay is OFF. Accordingly, if the ignition key is "ON", and the lamp illuminates twice and then switches off, there is a problem in the ABS-ECU drive circuit.



D When ignition key is turned to "START", ABS warning lamp switches off

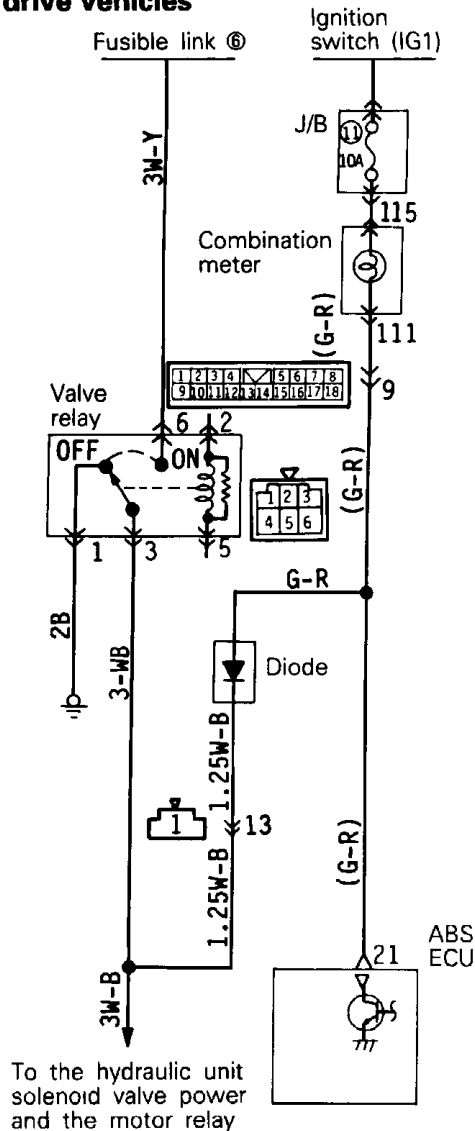
Comment: The ABS-ECU uses the power to the IG2 which is cut when the ignition switch is turned to "START". The ABS warning lamp uses IG1 power which is not cut even when the ignition switch is turned to "START". Accordingly, because the power to the ABS-ECU is stopped in "START" position, if the warning lamp switches off at this time, the cause is a

Hint:

problem in the lamp illumination circuit in the valve relay.

After starting the engine, if the ABS warning lamp remains illuminated, a diagnosis code is detected. If the problem code No. 51 is output, there is a high possibility that there is a melted contact in the valve relay. (Refer to problem code chart E-10.)

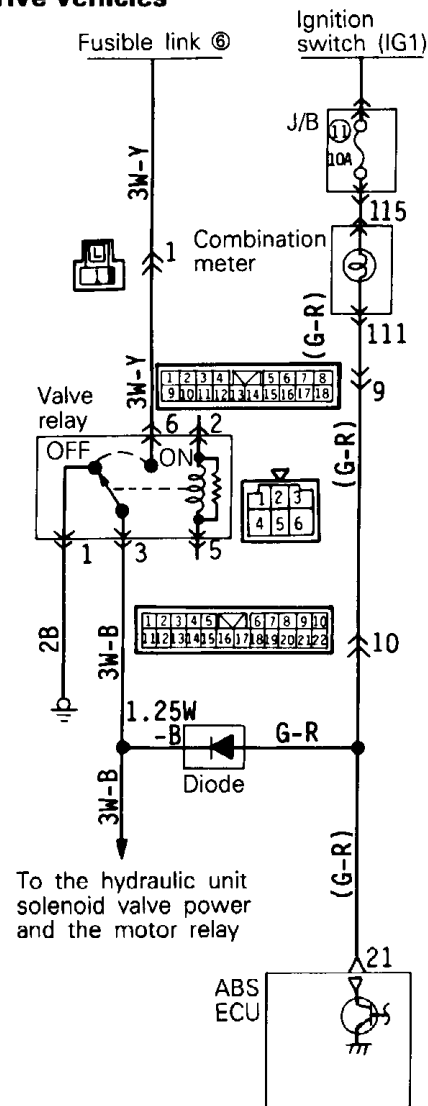
LH drive vehicles



1	2	3	4	5	6	7	8	9	10	11	12	13
14	15	16	17	18	19	20	21	22	23	24	25	26

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20

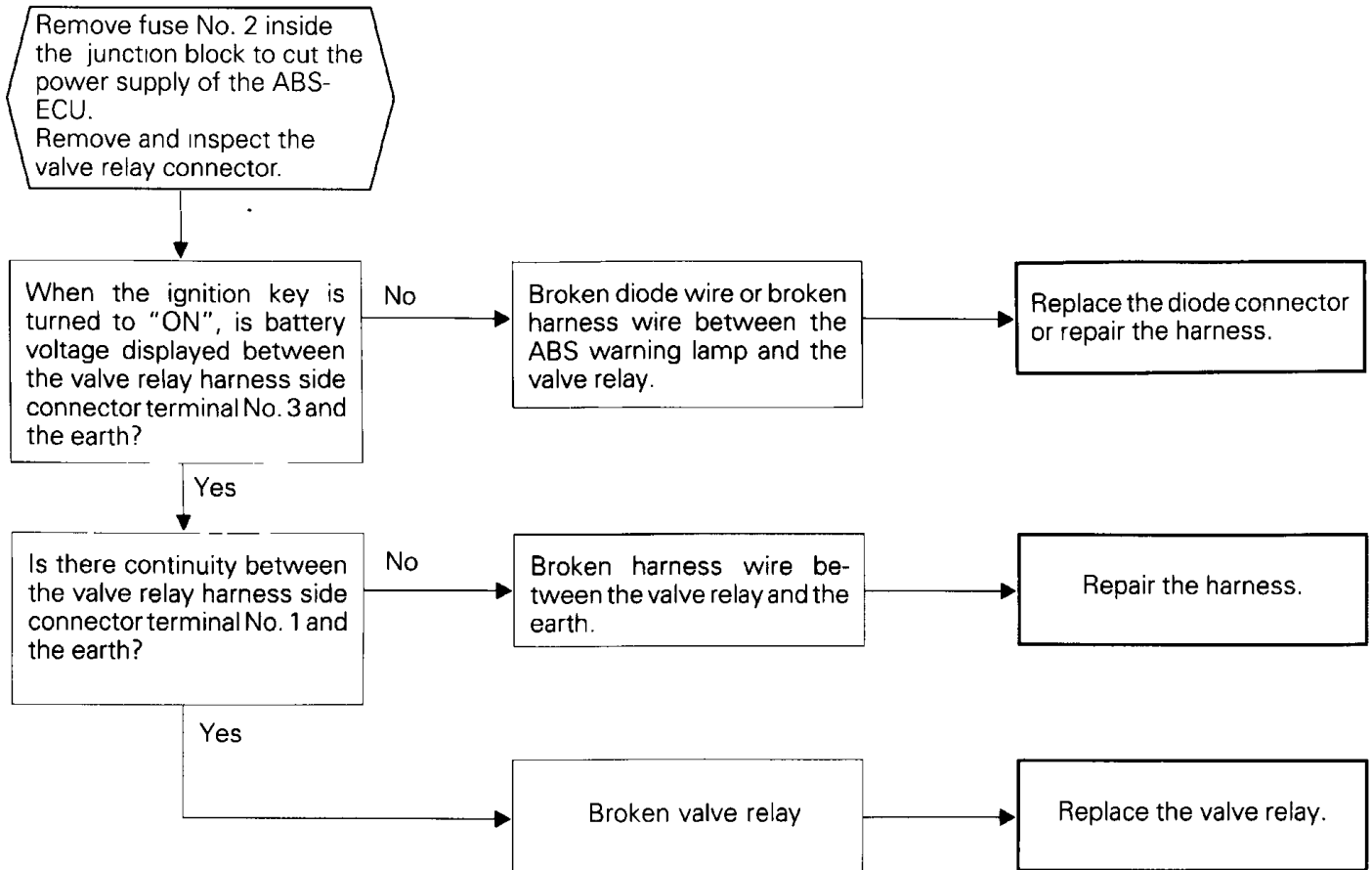
RH drive vehicles

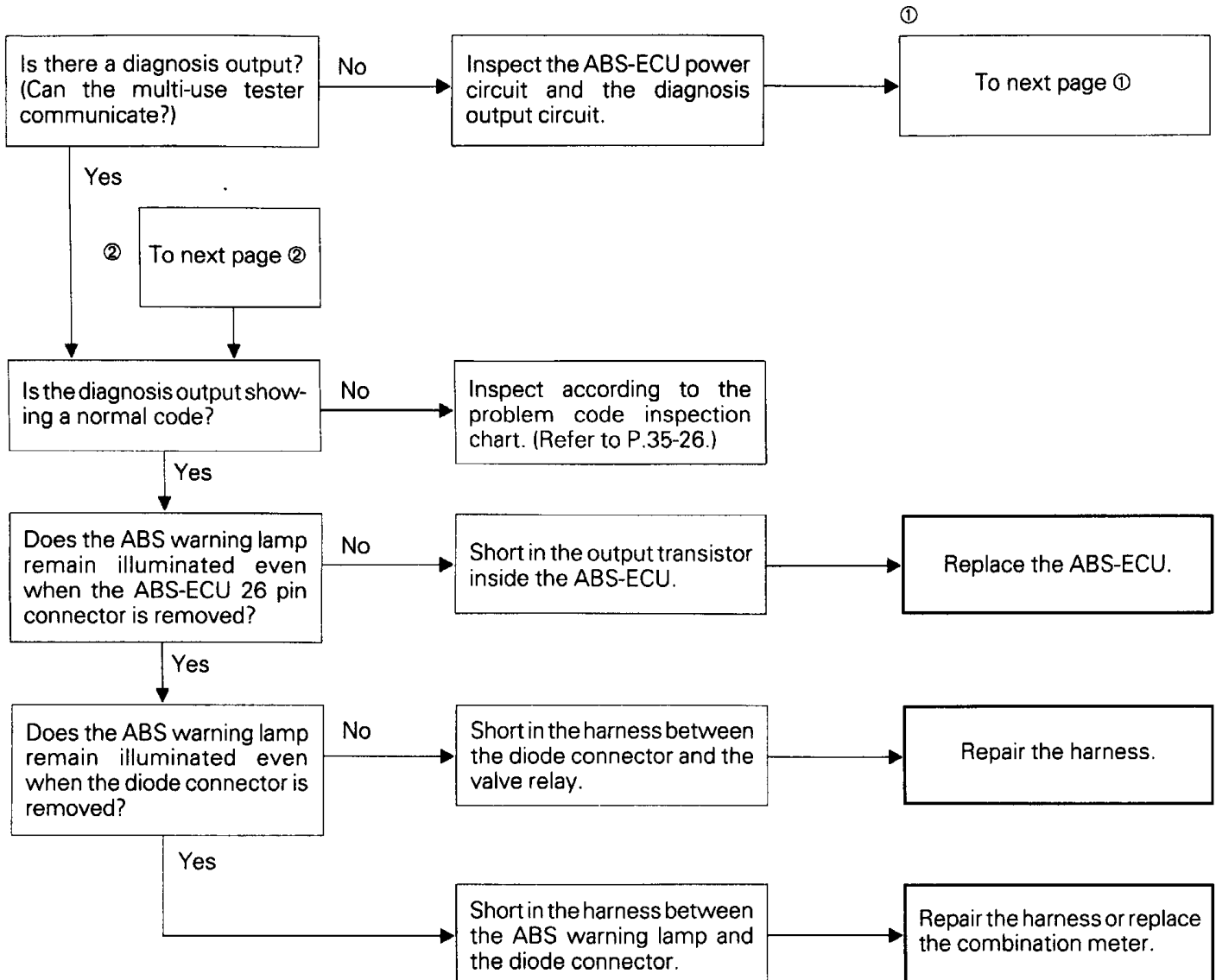


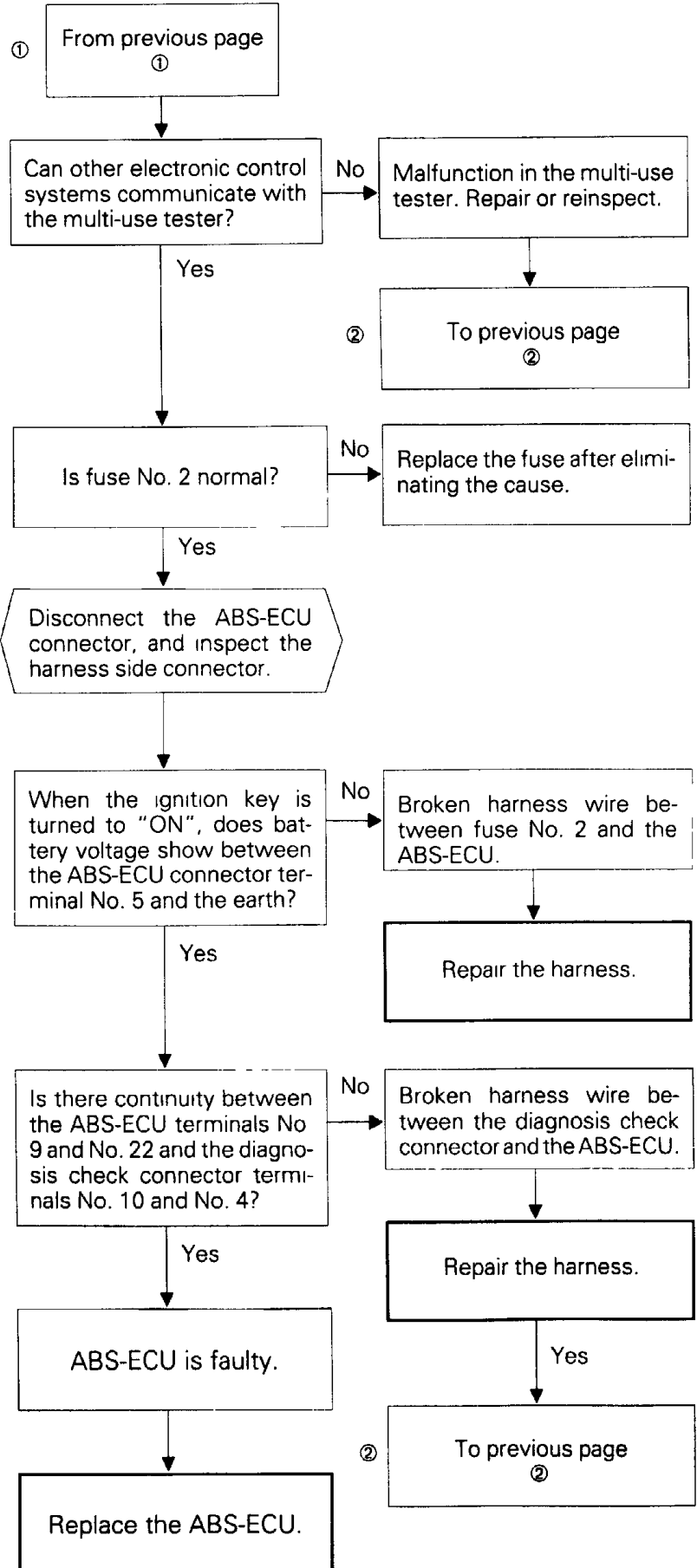
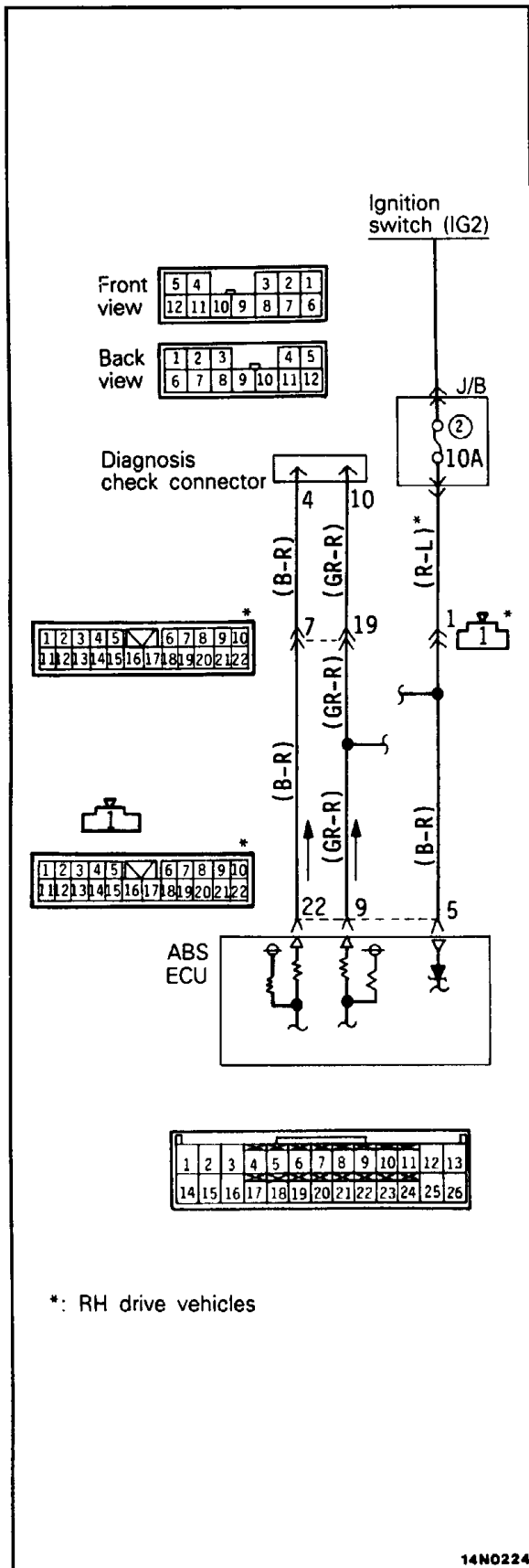
1	2	3	4	5	6	7	8	9	10	11	12	13
14	15	16	17	18	19	20	21	22	23	24	25	26

14N0223

14N0222







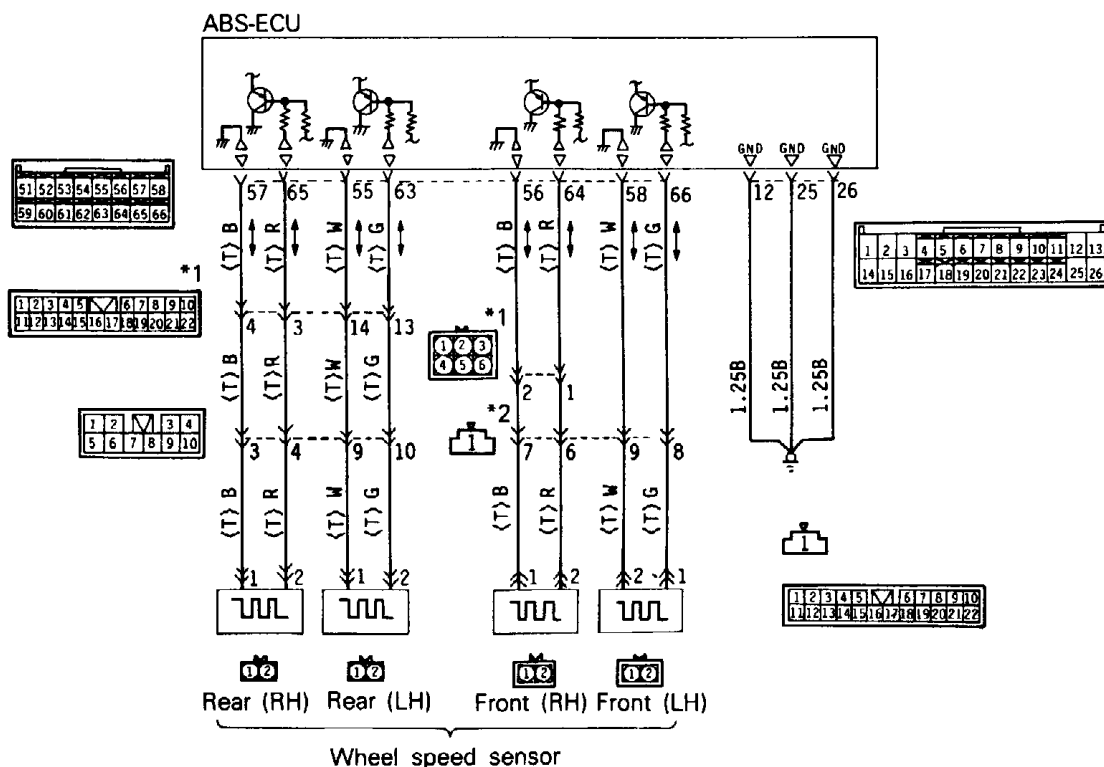
E-1 When diagnosis code No. 15 is displayed

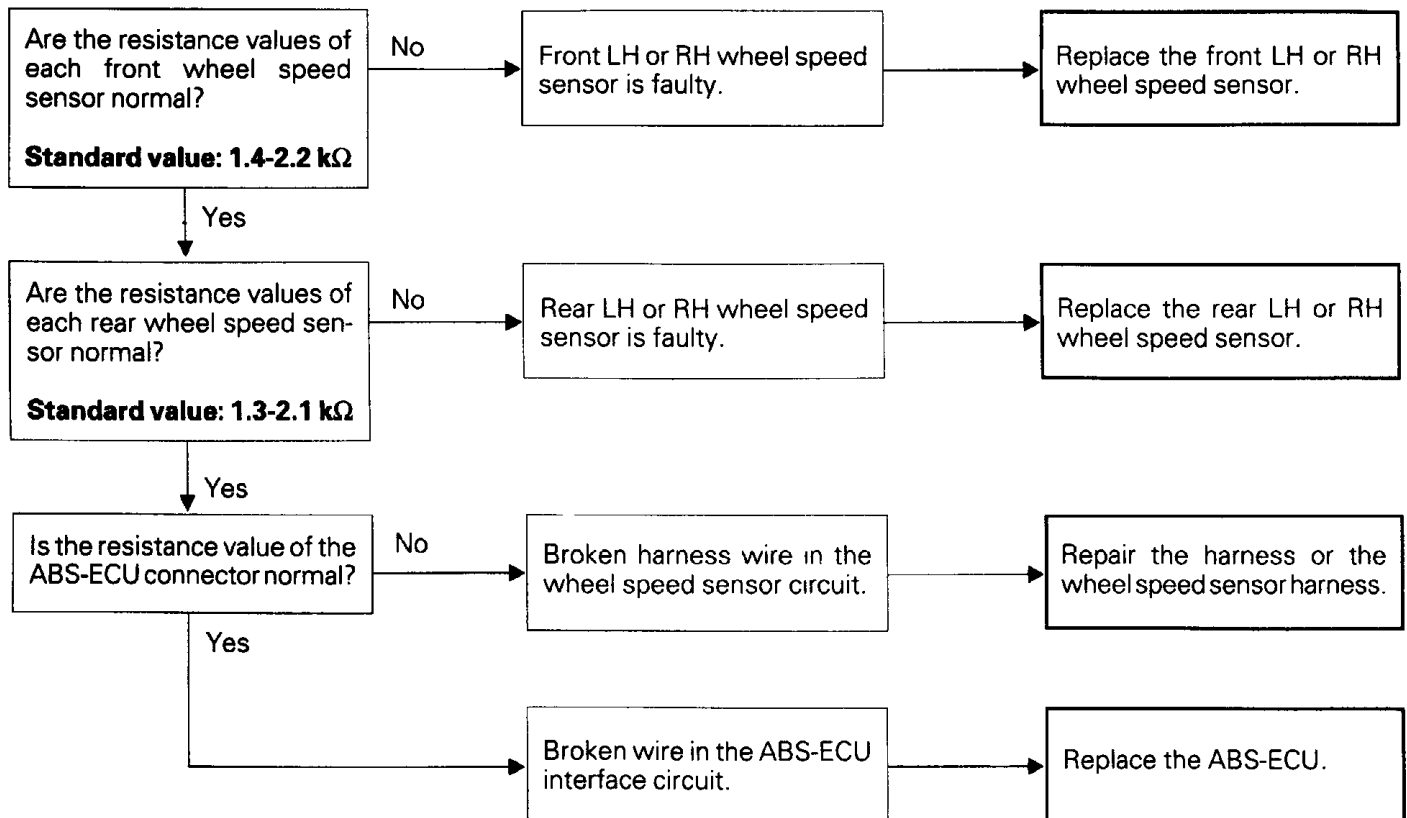
Comment: There is a broken + wire or – wire in one or more of the four wheel speed sensors detected by a broken wire inspection by the ABS-ECU hardware circuit. In this instance, inspect all of the wheel speed sensors, as it cannot be determined which single wheel is abnormal.

Hint: When using the multi-use tester, up to 4 codes are displayed. When this code (No. 15) appears, and a problem code for a specific wheel (nos. 11-14) is also displayed, it is likely that there is a broken wire in the wheel speed sensor indicated by these codes.

NOTE

1. When there is a faulty contact, inspect the sensor cable by lightly flexing and stretching it.
2. If there is no current problem, a normal value will result even if a problem is detected, so when the malfunction in the sensor circuit indicated cannot be discovered, momentarily turn the ignition switch to OFF, and carry out another driving test. At this time, replace the ABS-ECU only if the same problem code is output. After this, if the code does not reappear, there is a problem with the ABS-ECU interface. (For a problem that is difficult to reproduce, there is a possibility that the code will recur even when the ABS-ECU is replaced.)





E-2 When diagnosis code No. 11, No. 12, No. 13 or No. 14 are displayed

Comment: These codes are displayed when the sensor with the broken wire can be distinguished, and sensor output drops due to a faulty sensor or a bent rotor, etc., and anti-lock control is continuously operating.

Hint: If there is currently a broken wire in the sensor circuit, when the engine is restarted, the display switches to diagno-

sis code No. 15. If the same code is displayed even after restarting the engine, the problem is not a broken circuit wire, but something such as an excessive sensor gap.

Remedy: Inspect according to "Wheel Speed Sensor Inspection Flow Chart " (P.35-29), while referring to the above.

E-3 When diagnosis code No. 21, No. 22, No. 23 or No. 24 are displayed

Comment: These problem codes are displayed when a broken wire cannot be verified, but when the vehicle speed reaches 10 km/h (6 mph) or more, no pulses are input.

Hint: The cause is likely to be either a short between the sensor harnesses, a short

in the sensor + wire with the body, or an excessive sensor gap.

Remedy: Inspect according to "Wheel Speed Sensor Inspection Flow Chart " (P.35-29), while referring to the above.

E-4 When diagnosis code No. 25 is displayed

Comment: A problem in both rear wheel sensors is diagnosed when the signal from either of the front wheel speed sensors is diagnosed as normal, and the wheel speed of both rear wheels is 0 km/h (0 mph) for a continuous 20 second period, even if the wheel speed of the front wheels is 11 km/h (7 mph) or more.

Hint: This code is displayed when there is a short in the sensor harnesses of both rear wheels, or if there is low output from both rear wheel sensors.

Remedy: Inspect according to "Wheel Speed Sensor Inspection Flow Chart " (P.35-29), while referring to the above.

NOTE

If the vehicle is raised up, or if the wheels are stuck and only the front wheels are moving, after approximately 20 seconds the ABS warning lamp will illuminate, and the system will be isolated.

Thus, this code can be output even when the system is normal, so it is only output during a current problem, and is not kept in memory from a previous problem. Accordingly, before turning the ignition switch to OFF, the problem code should be read and written down.

E-5 When diagnosis code No. 31 or No. 32 are displayed

Comment: These codes are displayed when a chipped rotor tooth or a jammed rotor (one tooth) is detected.

Also, they show that there is a request of brake fluid pressure control with the stop lamp switch OFF from when the vehicle is stationary until the vehicle speed exceeds approximately 15 km/h (9 mph). If the vehicle repeats start and stop and the condition above is detected five times, the ABS warning lamp will illuminate.

Hint: There is a strong chance that the wheel speed sensor output is low due to a bent rotor tooth or excessive sensor gap. Low sensor output could also be caused by a rare short in the sensor coil.

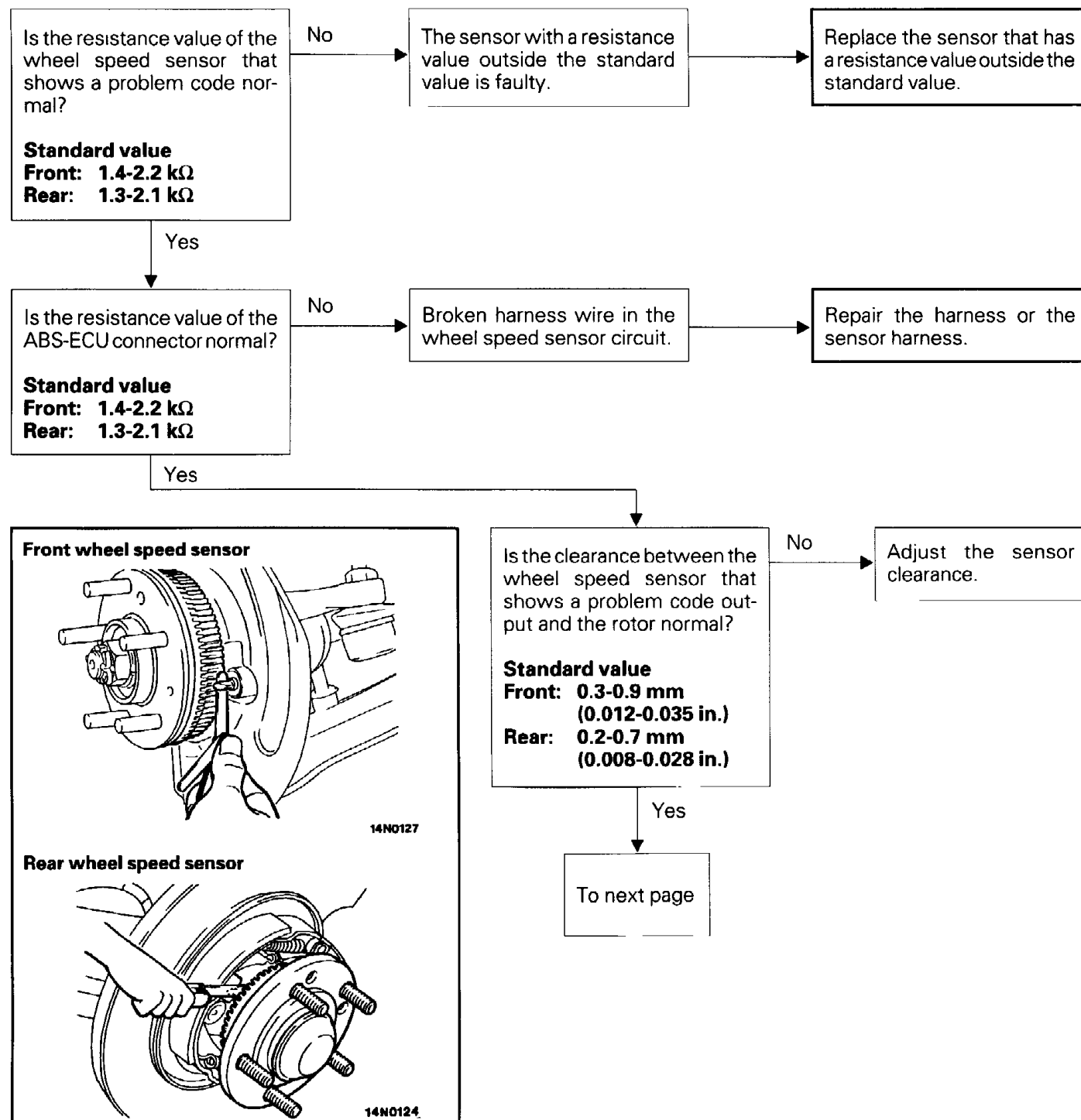
Remedy: Inspect according to "Wheel Speed Sensor Inspection Flow Chart " (P.35-29), while referring to the above.

Wheel Speed Sensor Inspection Flow Chart

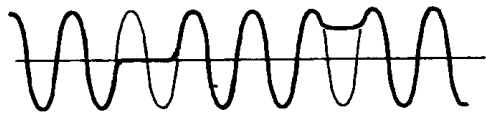
NOTE

1. When there is a faulty contact, inspect the sensor cable by lightly flexing and stretching it.
2. If there is no current problem, a normal value will result even if a problem is detected, so when the malfunction in the sensor circuit indicated cannot be discovered, momentarily turn the ignition switch to OFF, and carry out another driving test.

At this time, replace the ABS-ECU only if the same problem code is output. After this, if the code does not reappear, there is a problem with the ABS-ECU interface. (For a problem that is difficult to reproduce, there is a possibility that the code will recur even when the ABS-ECU is replaced.)



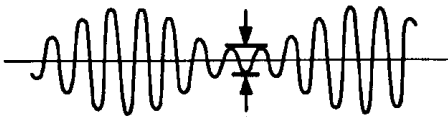
Example of an abnormal oscilloscope wave pattern (chipped tooth)



Shows the abnormal section
1 chipped tooth

14Z022

Rotor eccentricity



Can be used
if 100×2 mV or more

14Z023

From previous page

Yes

Is the rotor of the wheel speed sensor that shows a problem code output normal, with no parts chipped? (Visually inspect or check wave output with an oscilloscope.)

No

Replace the rotor with the chipped teeth.

NOTE

For inspection of wheel speed sensor output using an oscilloscope, refer to P.35-94.

Yes

Inspect the output of each wheel speed sensor, including wave patterns from an oscilloscope.
Is the output voltage from each wheel speed sensor at the standard value or above, and are all wave patterns normal also?

No

If voltage is below the standard value, or if there is an abnormal wave pattern, re-inspect, and replace any sensor or rotor that is faulty.

Standard value: 200 mV_{p-p}

Yes

If all of the above checks are normal and this problem code reappears frequently, then the ABS-ECU is faulty.

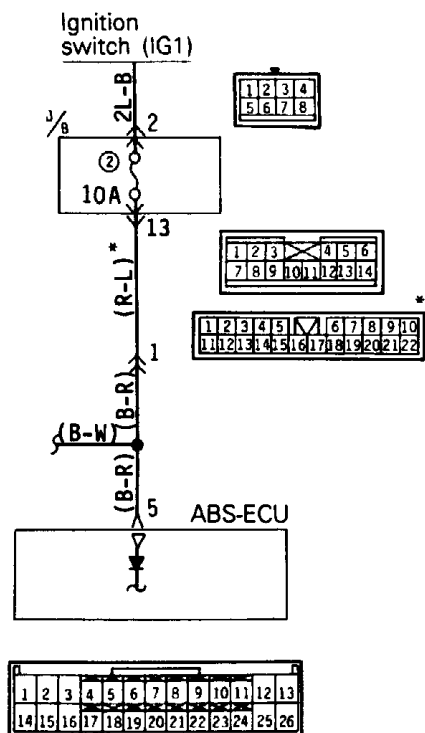
Replace the ABS-ECU and check if the problem doesn't recur.

E-6 When diagnosis code No. 16 is displayed

Comment: This indicates that the ABS-ECU power voltage is lower than the standard value. If the voltage returns to standard voltage or above, this problem code will not be output.

Caution

If the battery voltage drops during inspection, this code will be output as a current problem, and correct diagnosis of the problem cannot be made. Before carrying out the following inspection, check the battery level, and refill it if necessary.



14N0228

*: RH drive vehicles

When the engine is running, does a voltage of 10V or more show between the ABS-ECU power terminal No. 5 and the earth?

No

Yes

Inside of ABS-ECU is faulty.

Replace the ABS-ECU.

Are the fuse contacts normal?
(Inspect visually or by using a voltage meter to measure the drop in voltage.)

No

Repair the faulty contact.

Yes

Is the connection of the ABS-ECU normal? (When the connector is disconnected, check if there are no bends in the pins, or that contact pressure is sufficient.)

E-7 When diagnosis code No. 35 is displayed

Comment: This indicates that the output voltage of the alternator L terminal is low when the ignition key is turned to "ON" and the engine is stopped, or when the engine is running.

If the voltage returns to standard voltage or above, this problem code will not be output.

Hint: When the output voltage of the alternator L terminal is low, the charge warning lamp will illuminate. This code also ap-

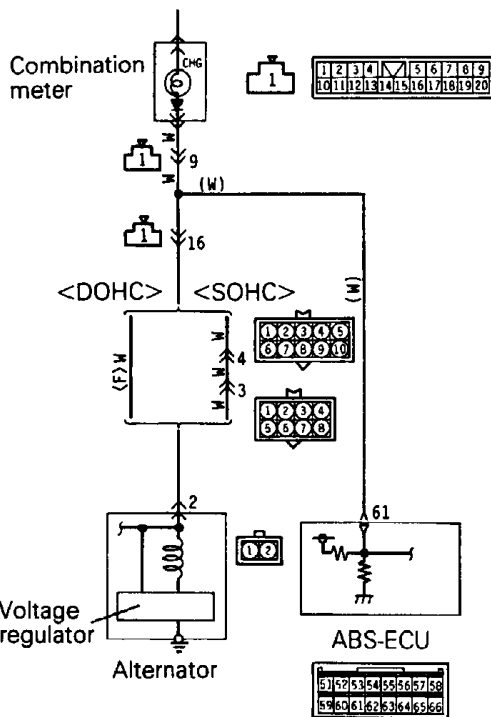
pears when there is a short in the alternator L terminal monitor circuit, but not if there is a broken wire in that circuit.

If the multi-use tester service data displays No. 35, this problem code is output.

NOTE

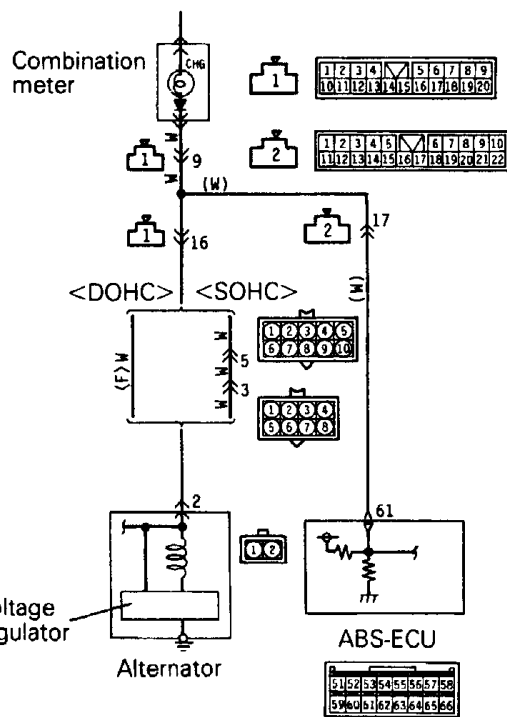
If the engine is stopped, this code will be output, even if the situation is normal, so the following inspection should only be carried out if the code is output while the engine is running.

LH drive vehicles



14M0221

RH drive vehicles



14M0257

Remove the ABS-ECU connector, and inspect the harness side connector.

When the ignition key is in the "ON" position, does a voltage of 7V or more show between terminal No. 61 and the earth?

No

Alternator is faulty, or there is a short in the harness between the ABS-ECU and the alternator.

Repair the harness or replace the alternator.

Yes

Inside of ABS-ECU is faulty.

Replace the ABS-ECU.

E-8 When diagnosis code No. 37 is displayed

Comment: This indicates that the power source pressure for the hydraulic unit is low. If the pressure returns to standard value or above, this problem code will not be output.

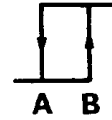
Remedy: While the engine is idling, wait for the pressure to return (motor and pump drive). If the problem continues after approximately 35 seconds or more have passed, the problem code will change over to No. 61. (Inspect according to Inspection chart D-12.)

Hint: This problem code will be output even if there is a broken wire in the LPWS input harness. (ON problem [short] is not detected.)

LPWS: Low pressure warning switch

LPWS ON

LPWS OFF



ABS warning lamp
is not illuminated

ABS warning lamp
is illuminated

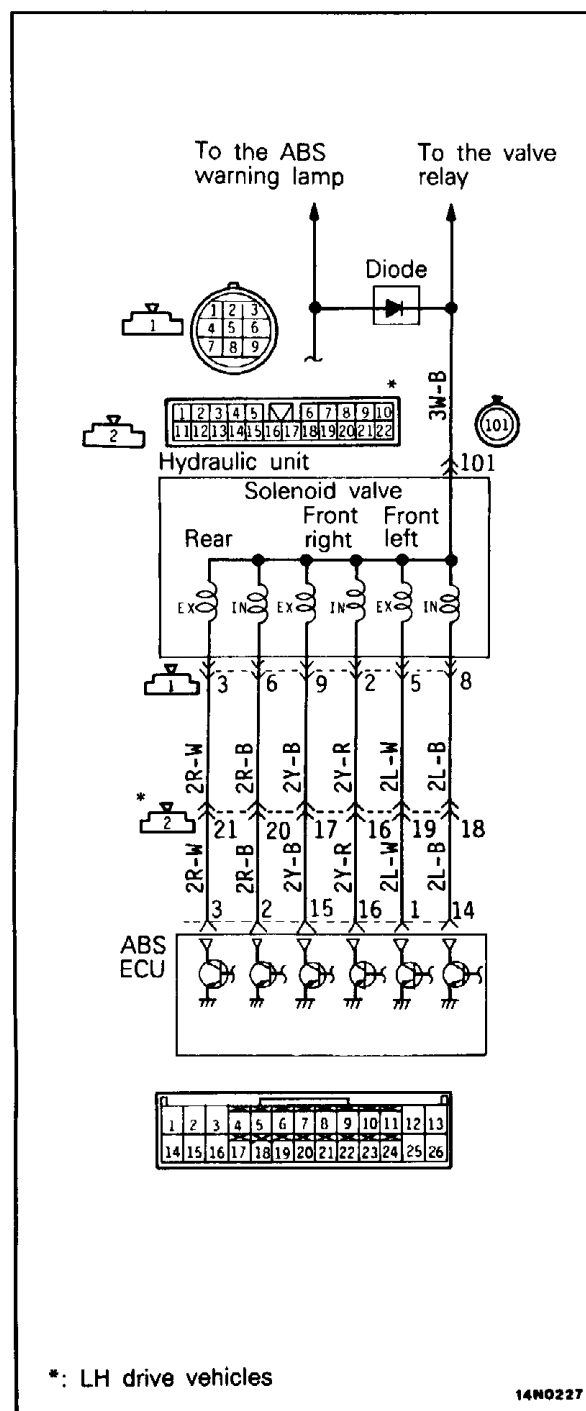
Point A: 12.5 ± 1.0 MPa
(125 ± 10 kg/cm², 1,778 $\pm$ 142 psi.)
Point B: 16.0 MPa
(160 kg/cm², 2,276 psi.) or less

14N0175

E-9 When diagnosis codes No. 41, No. 42, No. 43, No. 44, No. 45 or No. 46 are displayed

Comment: The ABS-ECU normally monitors the solenoid valve drive circuit. If there is no current flowing to the solenoid even when the solenoid is ON, or the current continues to flow to the solenoid even when

the solenoid is OFF, the ABS-ECU diagnoses a broken wire or short in the solenoid coil or a broken wire or short in the harness, and this problem code is output.



Remove the hydraulic unit 9 pin connector and the 1 pin connector, and inspect the hydraulic unit side connector.

Is the resistance value of the solenoid valve that shows a problem code within the standard range?

Standard value:
 2.8–3.4 Ω (vehicles without TCL)
 3.0–3.2 Ω (vehicles with TCL)

Yes

Connect the hydraulic unit 9 pin connector and the 1 pin connector, and remove and inspect the ABS-ECU connector.

If the resistance value of the solenoid valve that shows a problem code is measured between the ABS-ECU connector and the hydraulic unit 1 pin connector (No. 101) terminal, is the value within the standard range?

Standard value:
 2.8–3.4 Ω (vehicles without TCL)
 3.0–3.2 Ω (vehicles with TCL)

Yes

Broken harness wire or short in the ABS-ECU interface.

Replace the ABS-ECU.

Repair the harness.

Broken harness wire or short in the solenoid valve that has a resistance value outside of the standard value range.

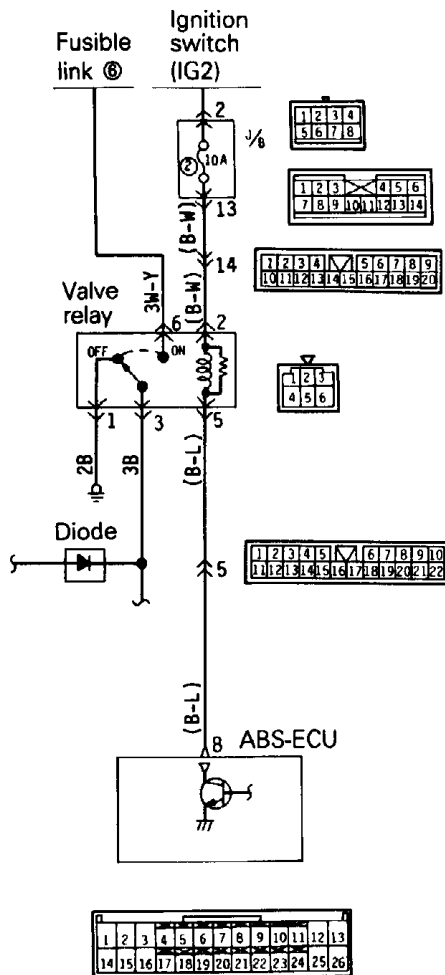
No

Replace the hydraulic unit.

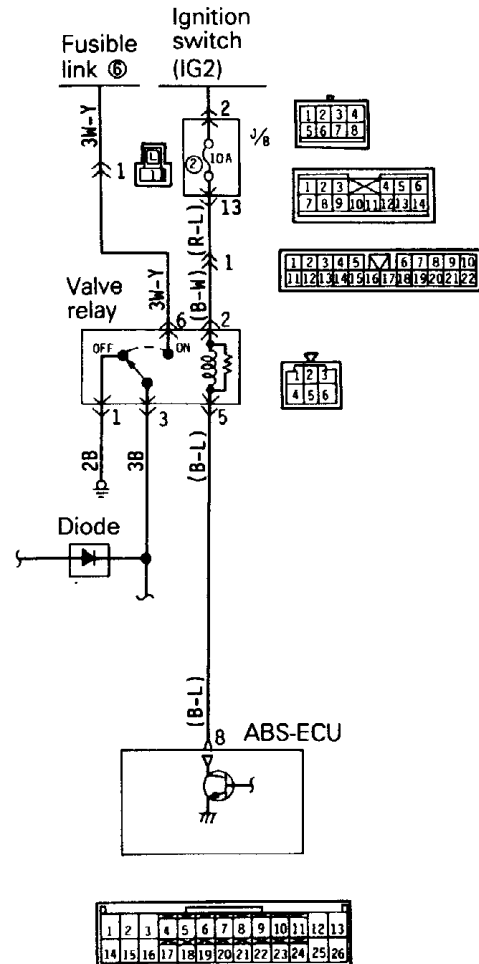
E-10 When diagnosis code No. 51 is displayed

Comment: During the initial check when the ignition switch is turned to "ON", if power is being supplied to the solenoid when the valve relay is OFF, the ABS-ECU diagno-

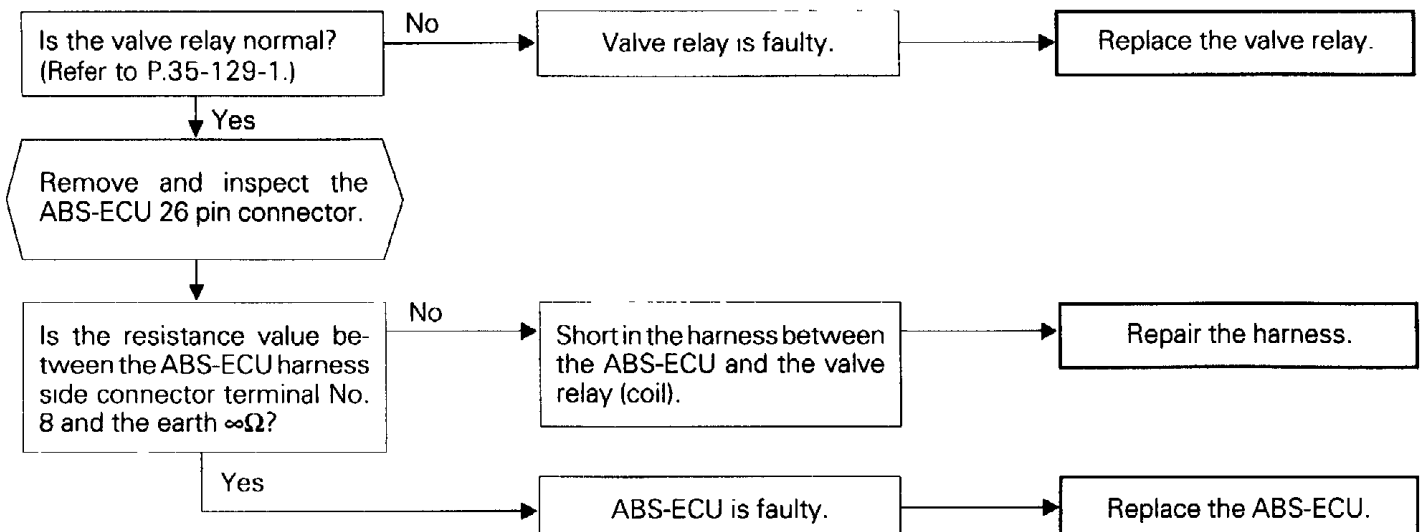
ses a melted relay contact or a short in the valve relay drive circuit, and the problem code No. 51 is output.

LH drive vehicles

14N0229

RH drive vehicles

14N0289



E-11 When diagnosis code No. 52 or No. 53 are displayed

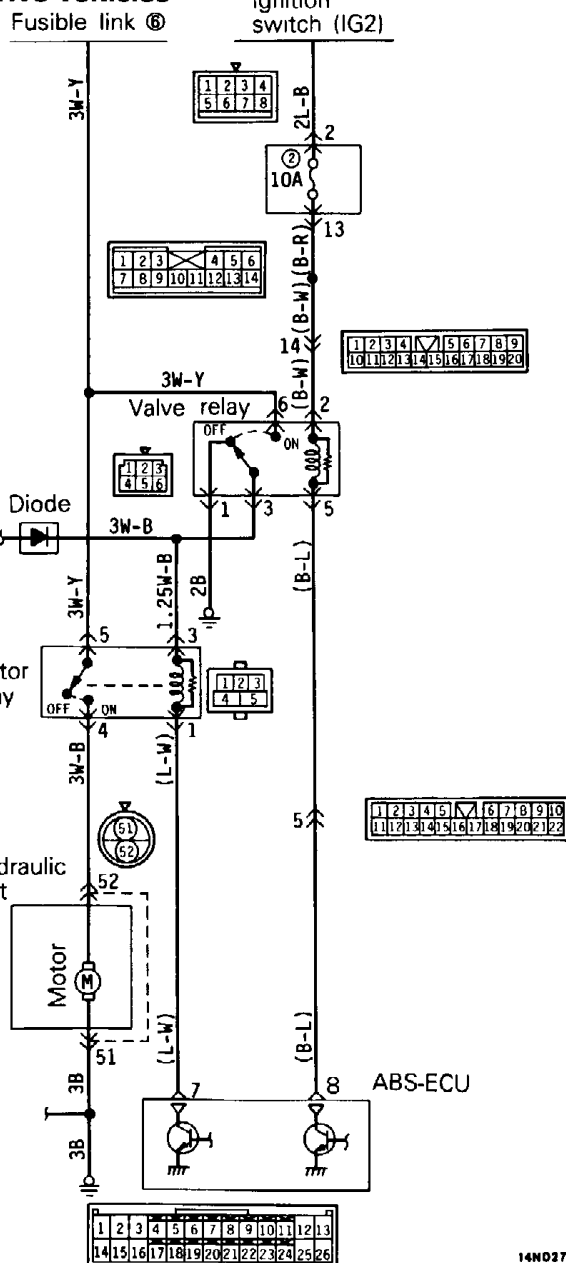
Comment: During the initial check when the ignition switch is turned to "ON", if power is not being supplied to the solenoid when the valve relay is ON, the ABS-ECU diagnoses an OFF problem in the valve relay (not turned ON), and outputs the problem code No. 52. Also, when the motor pump receives a signal to turn ON and voltage at the motor monitor is LOW, the ABS-ECU outputs the problem code No. 53.

Hint: Because the same circuit is used as the power supply circuit for the valve relay and the motor relay, inspection of the circuit between the ABS fusible link (6) and the valve relay is necessary

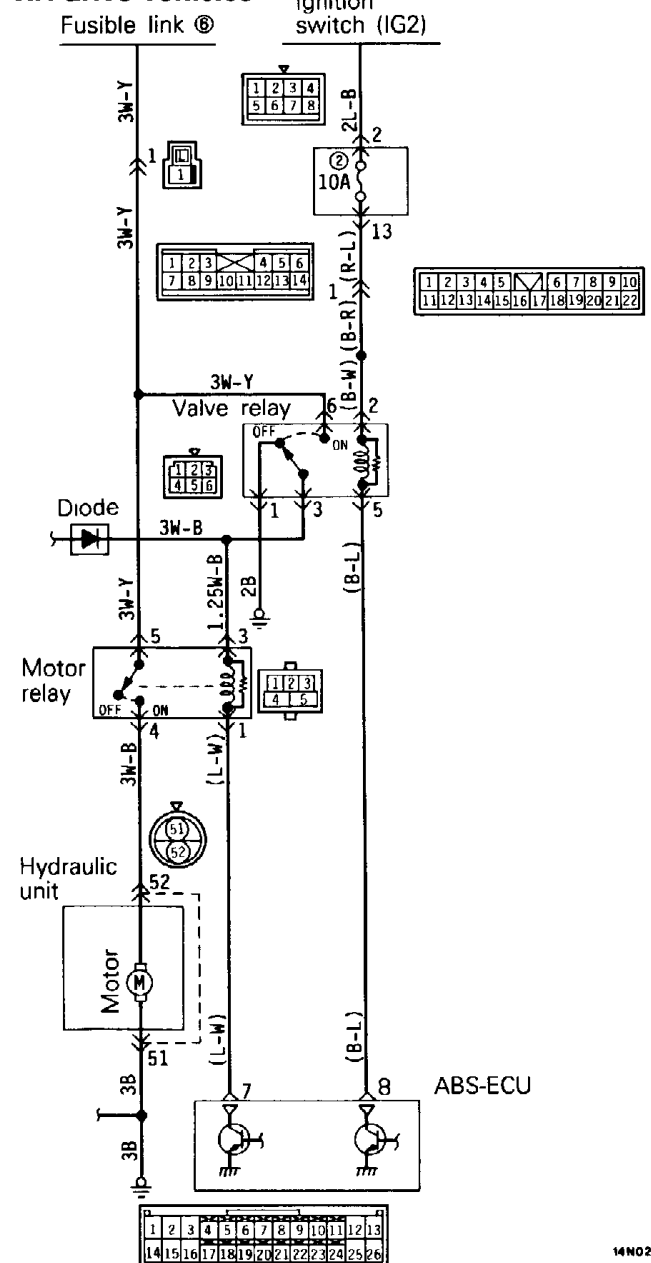
for both code Nos. 52 and 53. However, if the ABS system stops functioning after the sound of the motor is heard, or if it stops functioning when the motor relay is force-driven by the MUT actuator test (No. 08), the power supply and the valve relay system can be considered normal.

Caution

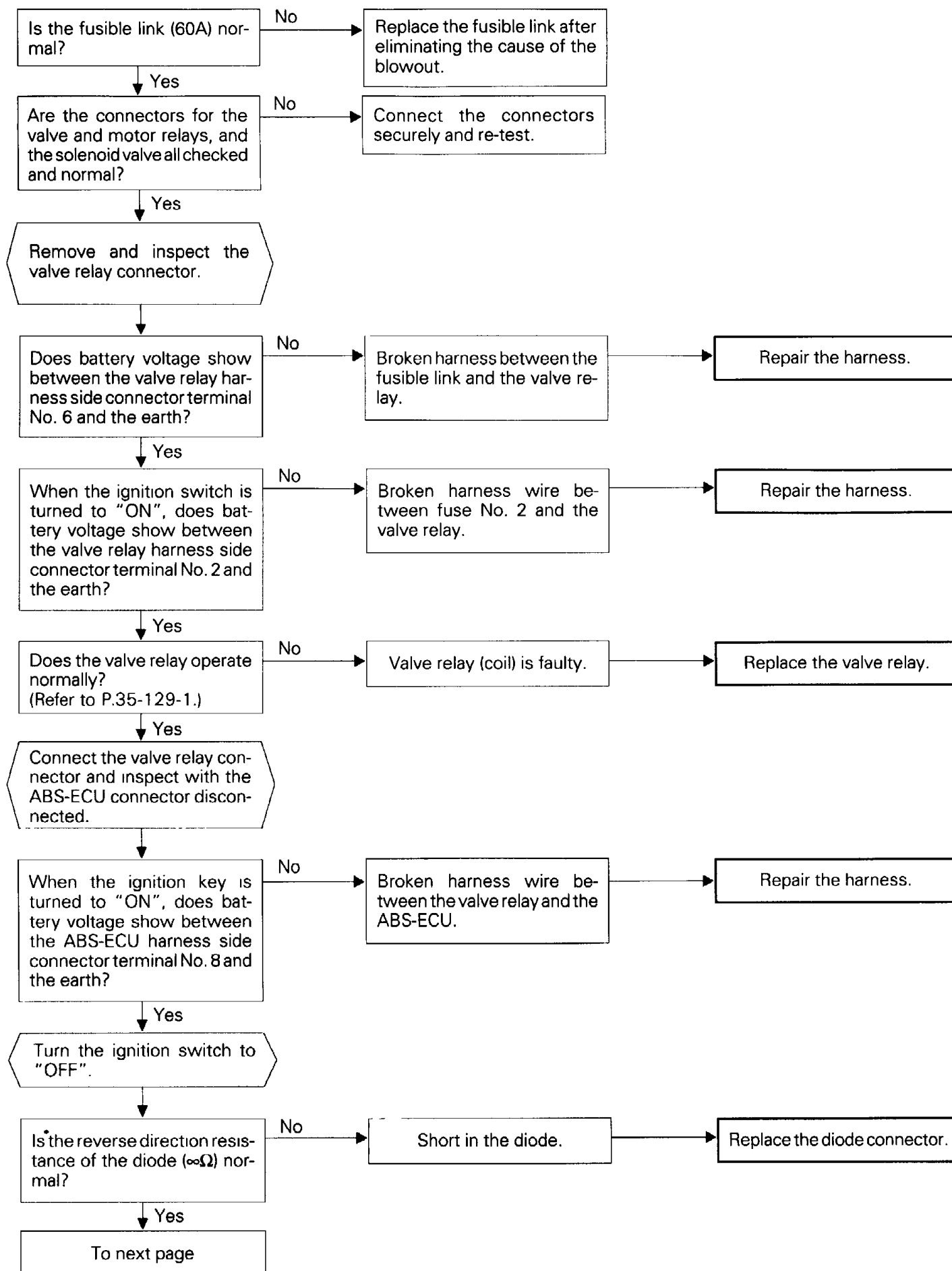
As there is a problem that the accumulator pressure could become higher than necessary, resulting in a bad effect on the system, it is best not to carry out actuator test No. 8 if possible.

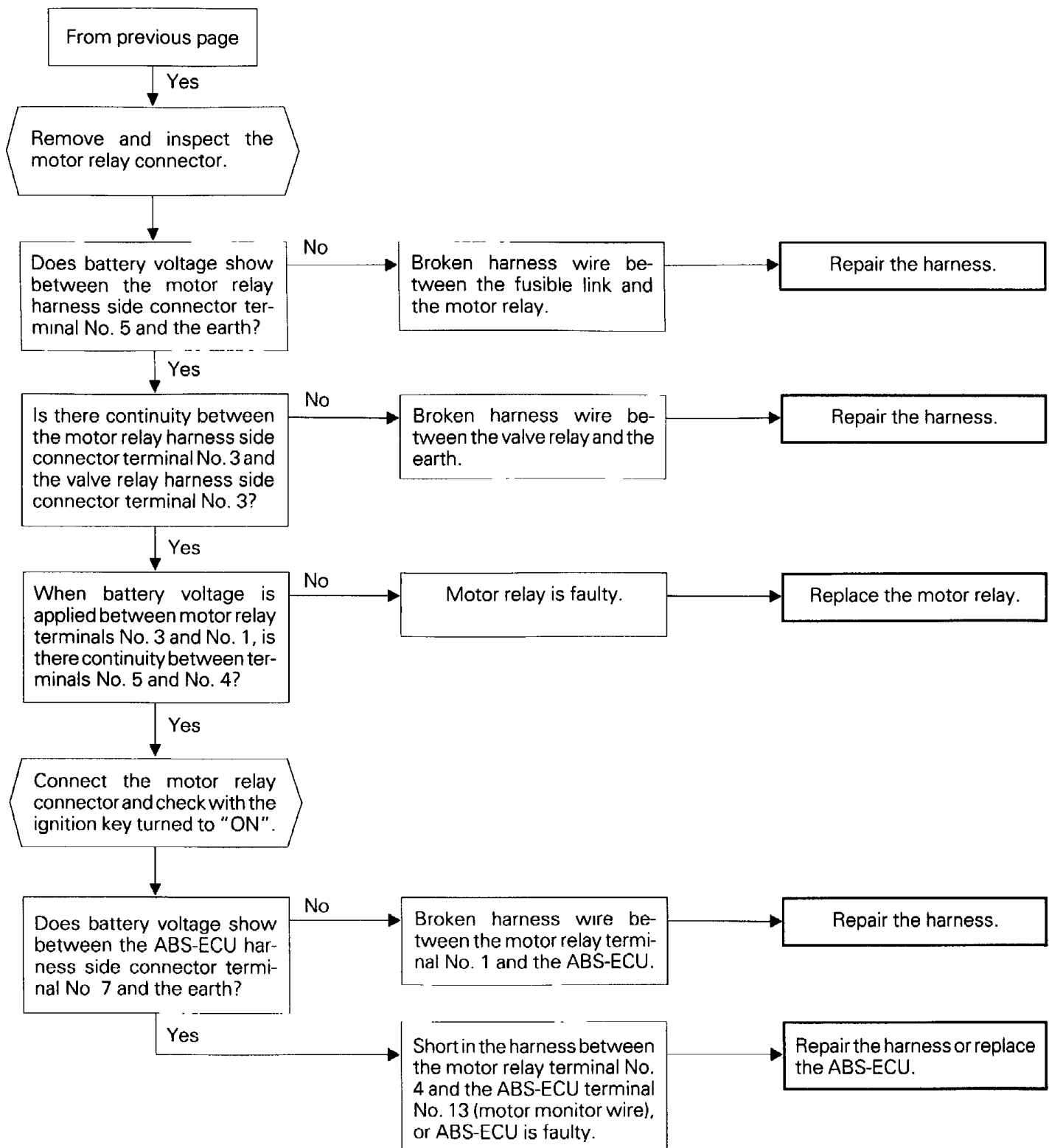
LH drive vehicles

14N0270

RH drive vehicles

14N0220





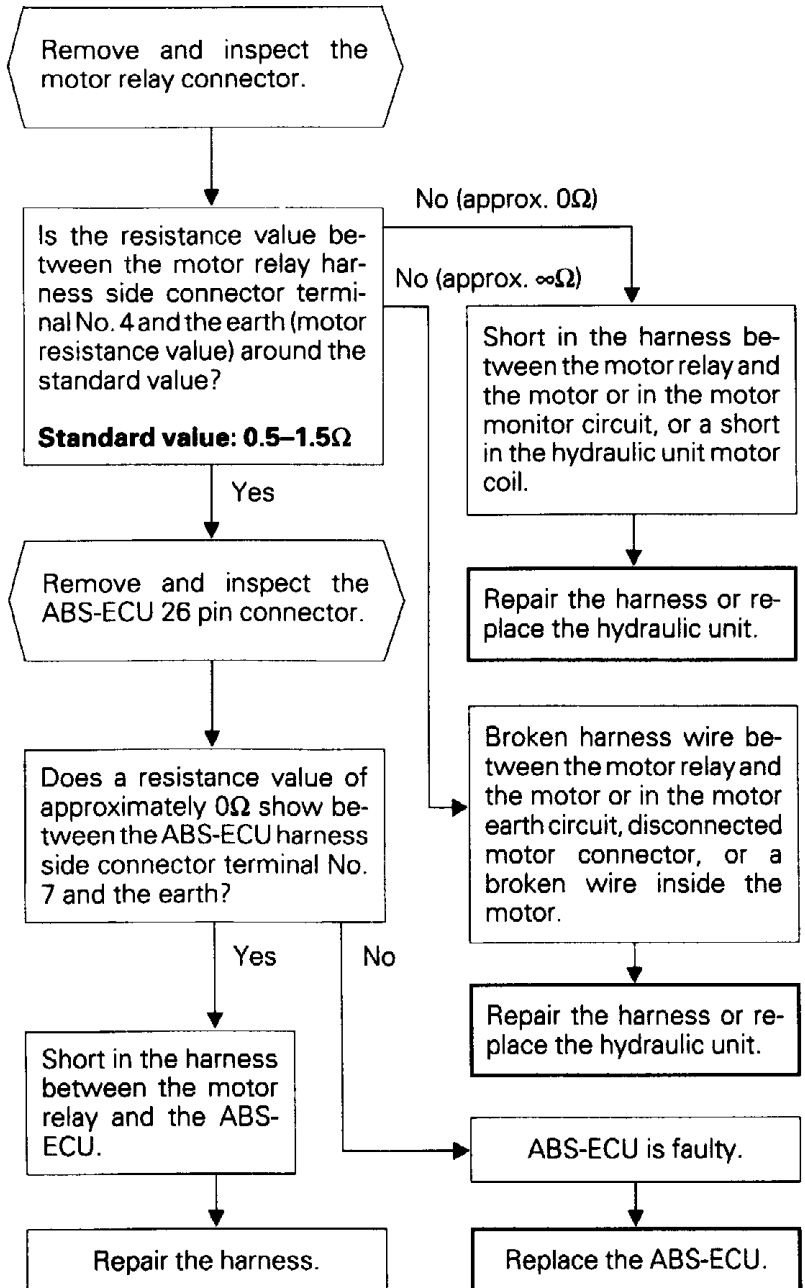
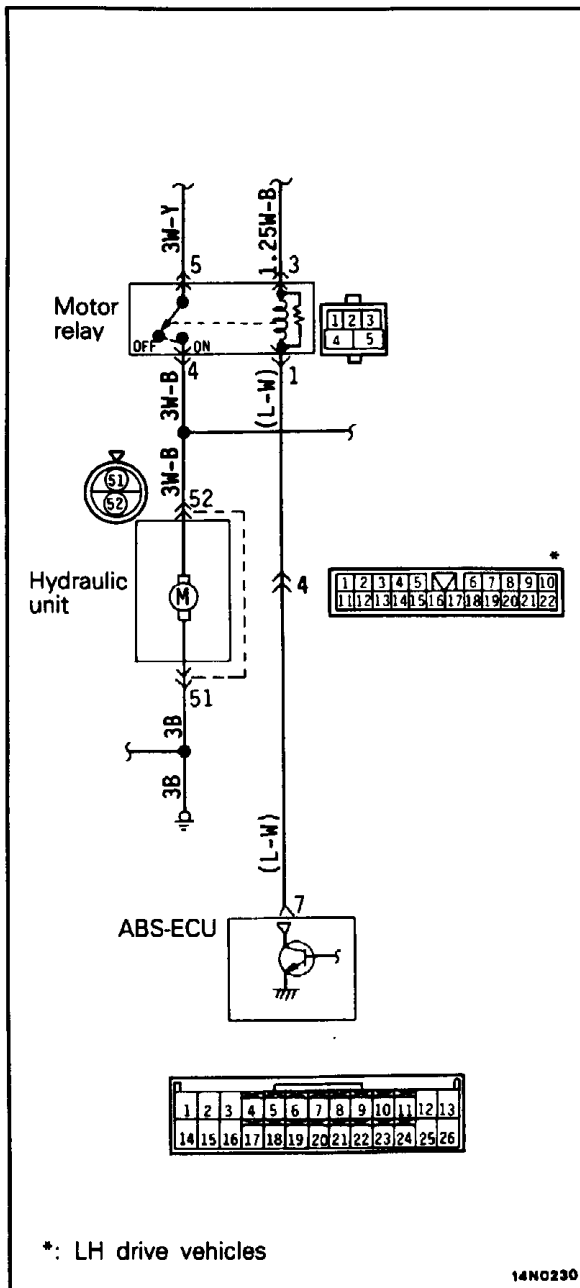
E-12 When diagnosis code No. 54 is displayed

Comment: When the pump motor receives a signal to turn OFF and the motor monitor is ON, if a melted contact, etc. is diagnosed in the motor relay, the ABS-ECU outputs the problem code No. 54.

Hint: Because the motor monitor wire is pulled up into the ABS-ECU by the IG power, this problem code is output if there is a broken wire in the harness, even if the motor relay and the motor are normal.

Caution

If there is a melted contact in the motor relay, the motor will keep turning, even if the ignition switch is turned to OFF. In such a case, immediately remove the fusible link (60A) or disconnect the hydraulic unit 2 pin connector. Excessive running of the motor will cause a reduction in the efficiency of the hydraulic unit solenoid valve.



E-13 When diagnosis code No. 61 is displayed

Comment: The ABS-ECU outputs this problem code No. 61 in the following cases if there is a fault inside the hydraulic unit.

- (1) Even when the pump motor operates for 34 seconds due to demand of the pressure control switch, and then alternately switches OFF for 8.5 seconds and ON for 8.5 seconds, repeating this intermittent operation 4 times (total approx. 1 minute 40 seconds), the accumulator does not recover pressure equal to the pressure control switch standard amount or higher.
- (2) When the low pressure warning switch outputs OFF (low pressure) for approximately 35 seconds after the engine is started.
- (3) When low pressure warning switch ON (high

pressure) is detected after the engine is started, and then the low pressure switch outputs OFF (low pressure) for 10 seconds or longer.

- (4) When the pressure control switch is ON (high pressure side) and the low pressure warning switch is OFF (low pressure side).

Hint: After starting the engine, if the ABS warning lamp illuminates after the motor has been operating intermittently as in (1) above, it is clear that this problem code is output under the conditions in (1) due to faulty pump pressure accumulation.
After starting the engine, if the multi-use tester service data displays No. 37 (ON [high pressure side]), it is clear that this problem code is output under the conditions in (1).

REMEDY FOR FAULTY PUMP PRESSURE ACCUMULATION

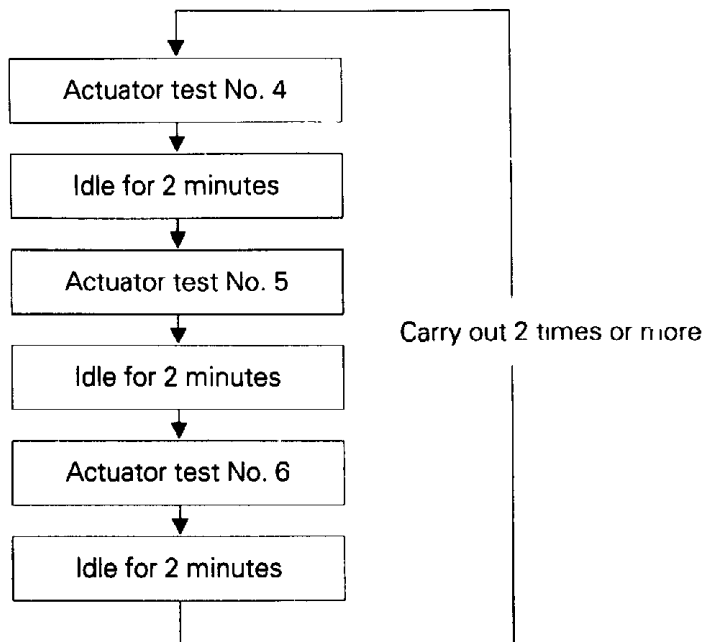
1. Operation to expel N₂ (nitrogen) gas
For a vehicle that hasn't been used for a long period, the high pressure N₂ (nitrogen) gas that is stored inside the hydraulic unit accumulator passes through the rubber diaphragm and collects around the hydraulic unit pump, and this prevents oil pressure from building up even if the hydraulic unit pump is turning, so the following procedure should be carried out to expel the N₂ (nitrogen) that has collected around the pump.

(1) When Using The Multi-use Tester

With the brake pedal depressed, carry out multi-use tester actuator tests No. 04–06 in the following way. (The collected gas is leaked into the reservoir by means of the forced actuation of the solenoid valve.)

NOTE

For points on carrying out actuator tests, refer to P.35-96.



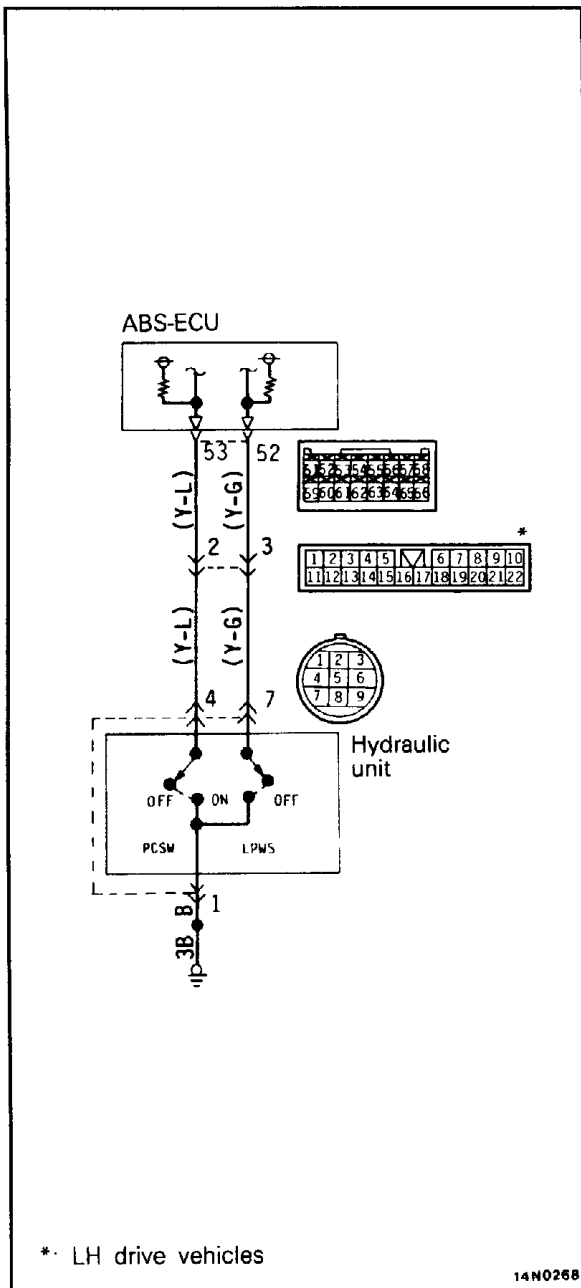
(2) When Not Using The Multi-use Tester

Start the engine, leave it idling for 2 minutes, and then stop the engine.

Repeat this 10 times or more.

(The collected gas is leaked into the reservoir in the same way as when using the multi-use tester, by the repeated short-term operation of the solenoid valve during the initial check.)

2. After carrying out the above, if it is normal [No abnormality is detected in the above cases (1) to (3)], carry out a normal bleeding of the brake lines.
3. After carrying out the above, if the motor operates intermittently and this problem code is output, the motor or pump operation is faulty, so replace the hydraulic unit.

INSPECTION OF PRESSURE SWITCHES (WHEN THE MOTOR DOES NOT OPERATE AFTER THE ENGINE HAS BEEN TURNED ON)


Remove and inspect the hydraulic unit 9 pin connector.

Check the continuity between the hydraulic unit harness side connector terminals No. 4 and No. 1 (PCSW) and between terminals No. 7 and No. 1 (LPWS). Are the operating conditions of both switches one of the following?

	I	II	III
PCSW: ON	ON	OFF	OFF
LPWS: ON	ON	ON	OFF

PCSW: Pressure control switch
LPWS: Low pressure warning switch

Yes

Connect the hydraulic unit connector, and remove and inspect the ABS-ECU connector.

Check for continuity between the ABS-ECU harness side connector terminals No. 53 (PCSW) and No. 52 (LPWS) and the earth. Are the operating conditions of both switches one of the following?

	I	II	III
PCSW: ON	ON	OFF	OFF
LPWS: ON	ON	ON	OFF

PCSW: Pressure control switch
LPWS: Low pressure warning switch

Yes

ABS-ECU is faulty.

No
A pressure switch inside the hydraulic unit is faulty.

Replace the hydraulic unit.

ON: Continuity
OFF: No continuity

No
Broken wire or short in the harness between the hydraulic unit and the ABS-ECU.

ON: Continuity
OFF: No continuity

Replace the ABS-ECU.

E-14 When diagnosis code No. 62 is displayed

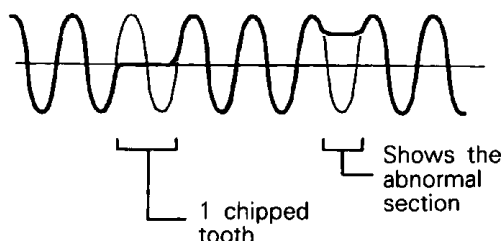
Comment: Diagnosis code No. 62 is a problem code that is output when the ABS is unable to operate for a long period of time. However, it is possible that the problem could be caused not only by a faulty hydraulic unit, but also by a malfunctioning wheel speed sensor.

Caution

The problem code No. 62 is detected in the following cases, even if the ABS system is normal.

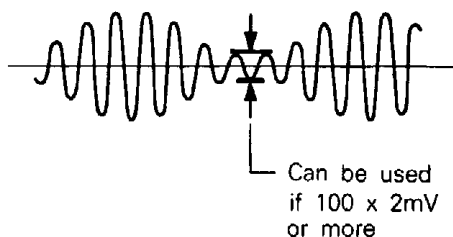
- **If the parking brake is not fully released, or if the brakes are dragging while driving on snow or ice.**
- **When driving with left and right tyres of different sizes (difference in tyre diameter or uneven wear).**
- **When driving for a long period of time on roads with low friction coefficients, such as ice-covered roads.**

Example of an abnormal oscilloscope wave pattern (chipped tooth)



14Z022

Rotor eccentricity



14Z023

Inspect the hydraulic unit operation (P.35-96). Are the results of the hydraulic unit inspection normal?

No

Replace the hydraulic unit.

Yes

Inspect the output of each wheel speed sensor, including wave patterns from an oscilloscope. Are the output voltages of each wheel speed sensor at the standard value or above, and are the wave patterns also normal?

Standard value: 200 mV_{p-p}

No

Inspect the wheel speed sensor that has below-standard voltage output or an abnormal wave pattern.

Inspect according to "Wheel Speed Sensor Inspection Flow Chart" on P.35-26.

Yes

If the above checks are all normal and the problem code is reoccurring frequently, the ABS-ECU is faulty.

No

Replace the ABS-ECU, and check if the problem does not reoccur.

NOTE

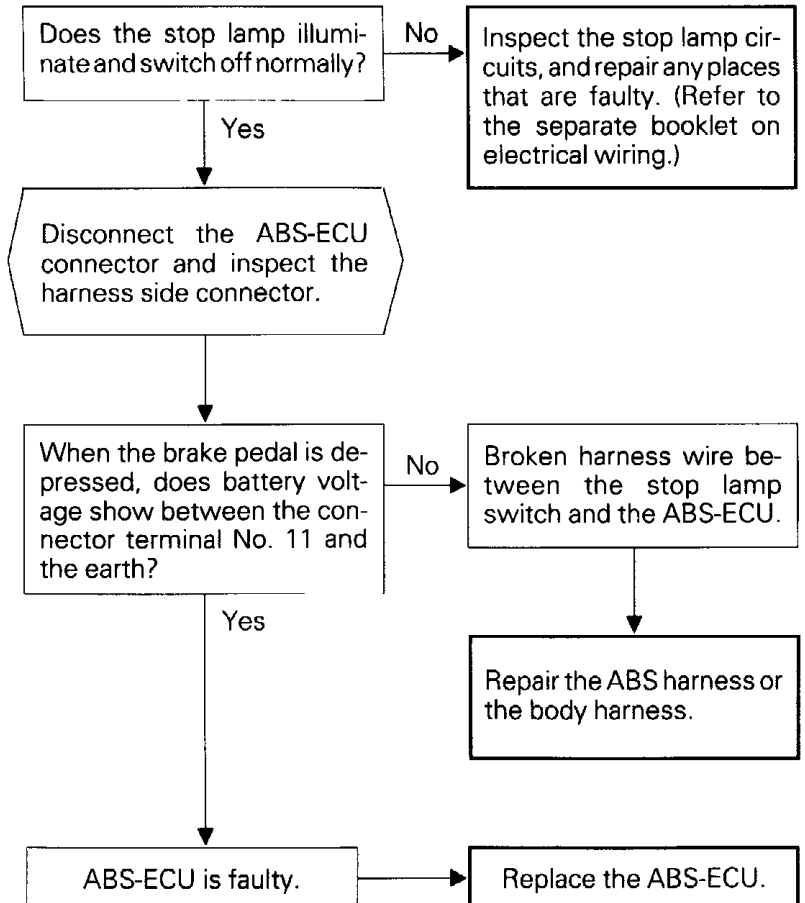
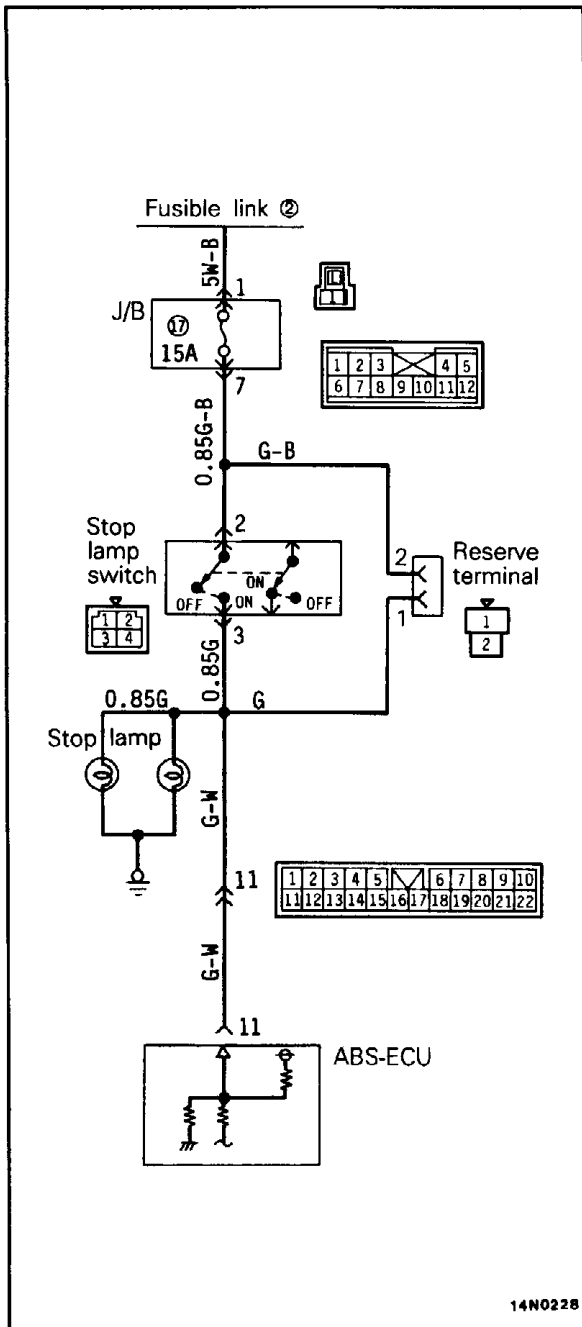
For inspection of wheel speed sensor output using an oscilloscope, refer to P.35-94.

F Change in ABS operating vehicle speed or frequency of operation

Comment: If the stop lamp switch ON signal is not input even once after the engine is started, the ABS control commences when the vehicle speed reaches 15 km/h (9 mph) or above. (Control is possible if the signal is input even once and the vehicle speed is approximately 6 km/h [4 mph] or above.) This symptom indicates a broken wire in the stop lamp switch.

Hint:

When the stop lamp is illuminating normally, if the multi-use tester service data shows No. 38 even if the brake pedal is depressed, then there is a broken harness wire in the stop lamp switch input circuit, or the ABS-ECU interface circuit is faulty.



TRACTION CONTROL (TCL) SYSTEM TROUBLESHOOTING

1. PARTICULAR PHENOMENA OF THE TCL SYSTEM

- (1) On slippery road surfaces, such as those covered by snow, sometimes a vibration is felt in the vehicle when traction control is operating normally. This is due to the braking action of the slip control, and is not unusual.
- (2) When the engine is started, a rattling sound can sometimes be heard inside the engine compartment and inside the vehicle. This is the sound of the ABS and TCL operation being checked, and is not unusual.
- (3) When climbing very steep slopes, or if the vehicle is stuck and there is continuous pressure on the accelerator pedal for 20 seconds or more, the TCL will continue to operate, and then the TCL OFF indicator will flash and the TCL system function will stop. In this case, momentarily stop the engine, and then after approximately 7 seconds (until the engine control relay switches OFF) restart the engine. After this, when the vehicle speed has reached 20 km/h (12 mph) or more, if the TCL OFF indicator switches off, then the TCL system will operate normally from then on.
- (4) If the vehicle is driven with extremely low tyre pressure, or with tyres that differ widely in diameter, the TCL system will operate even when the vehicle is moving straight, and the engine will give poor acceleration. This is because the wheel speed signal will be different from that of standard tyres. If standard tyres are fitted and the signal becomes normal, then there is no problem.

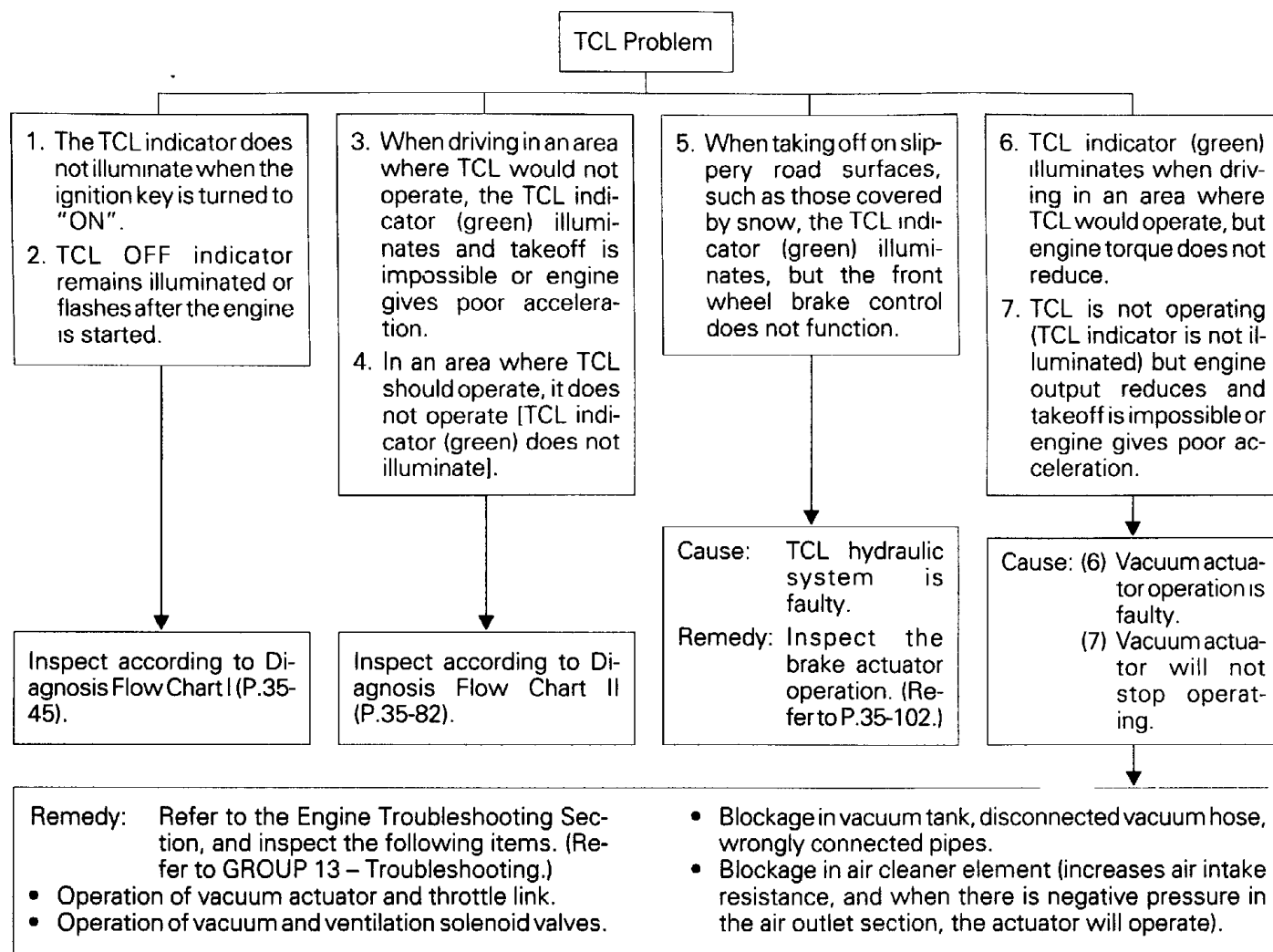
NOTE

When engine gives poor acceleration, it can be determined whether the cause is because of a problem connected to the TCL control or engine trouble by observing whether the TCL indicator (green) is illuminated or not.

2. DIAGNOSTIC PROCEDURES

Traction control system (TCL) problems have been divided into seven major sections as described below.

Each problem can be diagnosed according to the diagnosis flow chart or from the inspection summary.



3. DIAGNOSIS FLOW CHART I

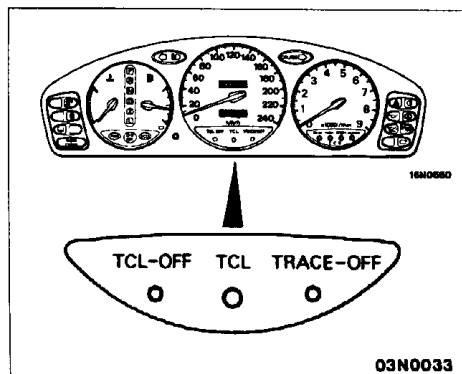
1. When the ignition key is turned to "ON", the TCL indicator does not illuminate.
2. The TCL OFF indicator remains illuminated or flashes after the engine is started or while driving.

Comment: 1. is mainly caused by a broken wire in the indicator circuit, such as an indicator lamp blowout.
2. When lamp remains illuminated, a problem is detected by the self diagnosis function and a problem code is output, or it is probably a short in the indicator

circuit. If the lamp is flashing, a problem code is output, so this should be checked. When not actually driving the problem may not be detected, so it is necessary to retest to get an accurate perception of the problem.

Use the following procedures to recheck the problem.

When the ignition key has been turned to the "ON" position, do all of the TCL indicators illuminate?



TCL indicator
lamps

Illuminated

Not illuminated

Ignition key

ON

ACC, LOCK

Yes

No

No.	Problem	Main cause	Remedy
1	All TCL indicators are not illuminated. TCL indicator lamps Illuminated _____ Not illuminated _____ Ignition key ON _____ ACC, LOCK _____	Broken wire in indicator lamp power circuit (including blown fuse).	Inspect according to Inspection Chart A (P.35-53).
		Control unit connector is disconnected.	
2	Either the TCL OFF, TCL or the TRACE OFF indicator is not illuminated. (At least one is illuminated.)	Blown lamp in the indicator that is not illuminated.	Inspect according to Inspection Chart B (P.35-54).
		Broken harness wire in the indicator drive circuit of the indicator that is not illuminated.	
		Broken wire in the ECU drive circuit of the indicator that is not illuminated.	

To next page

From previous page

When engine has been started, do all of the TCL indicators switch off?

Yes

No

No.	Problem	Main cause	Remedy
3	The TCL OFF indicator remains illuminated	Broken wire in the ECU power circuit	Inspect according to Inspection Chart C (P.35-56).
		Low ECU power voltage	
		ABS-related failure.	
		Engine-related failure.	
4	The TCL OFF indicator flashes	Fail-safe function is operating by TCL self-diagnosis.	Inspect according to Inspection Chart D (P.35-57).
5	The TCL indicator remains illuminated.	Short in the harness of the TCL indicator drive circuit.	Inspect according to Inspection Chart E (P.35-58).
		Short in the TCL indicator ECU drive circuit.	

When engine is idling, each time the TCL switch is pressed to "OFF", do the TRACE OFF indicator and the TCL OFF indicator alternate?

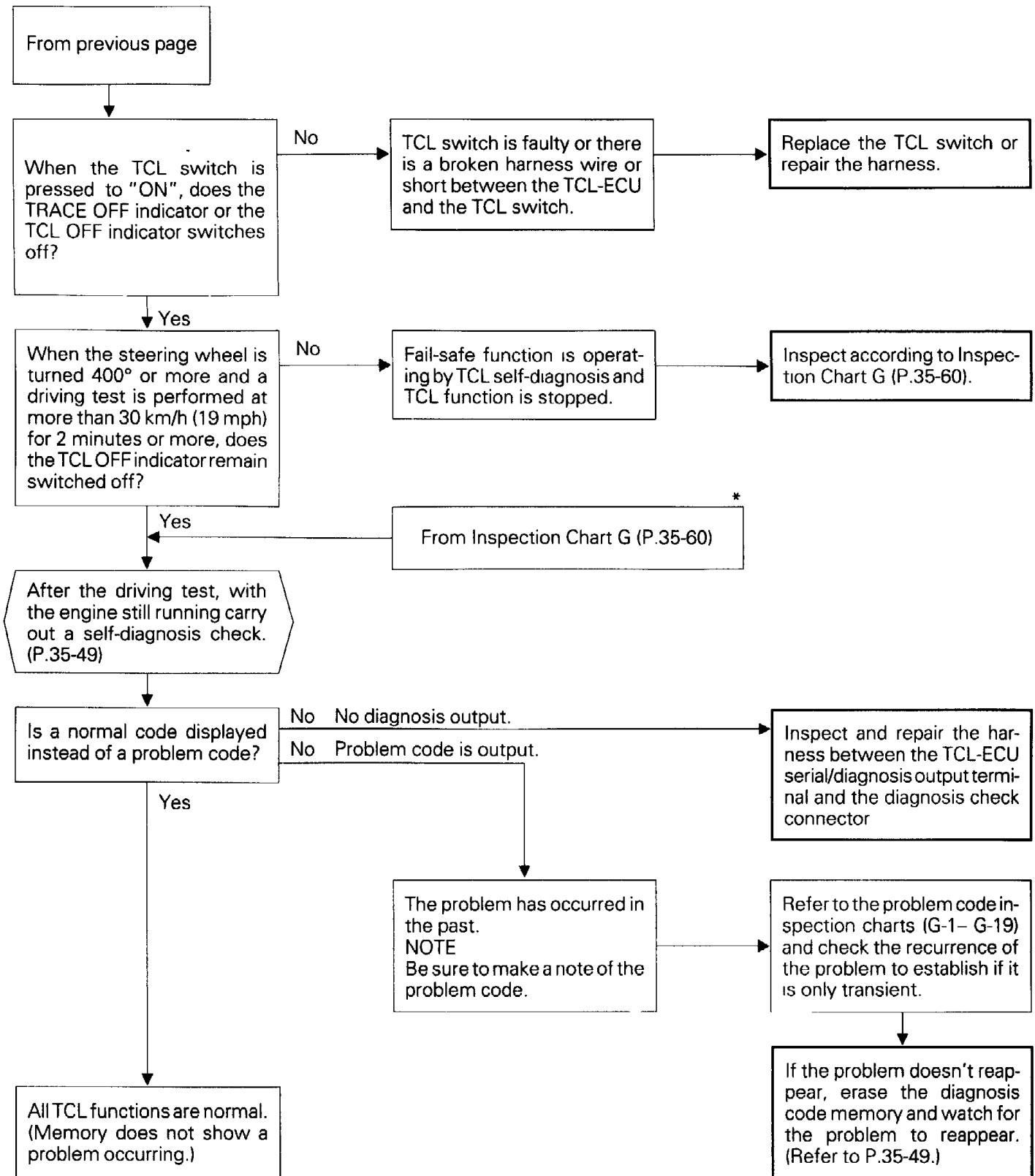
No

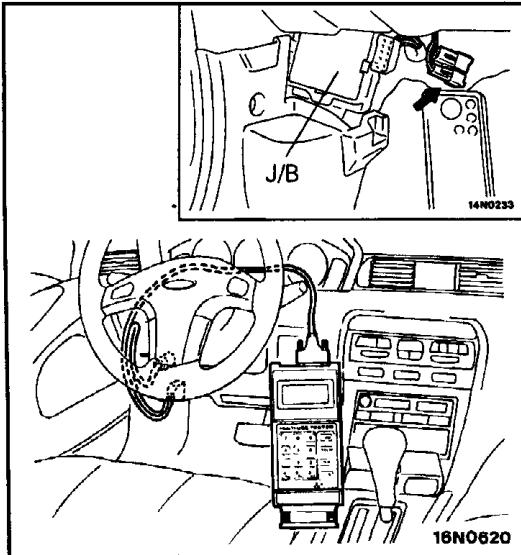
TCL switch or TCL-ECU is faulty.

Inspect according to Inspection Chart F (P.35-59).

Yes

To next page





3-1. Inspection by self-diagnosis

[WHEN USING THE MULTI-USE TESTER]

Caution

Connection and disconnection of the multi-use tester should always be made with the ignition switch in the OFF position.

- (1) Take a reading of the diagnosis output code and make a note of it.
If the multi-use tester will not activate, inspect the TCL-ECU power circuit or the harness between the TCL-ECU and the diagnosis check connector.
- (2) Momentarily erase the diagnosis code memory with the multi-use tester. Even when the memory is erased, and a problem signal is output, the problem signal currently being displayed will also cause the function to stop. If no signal is output, the problem was only transient, or it is a problem that is only detected while driving.
- (3) When a problem code is output again, or another code is output during a repeated driving test, inspect by following the diagnosis code table on the following page.

NOTE

The codes in the table below will be output as diagnosis codes for the vehicle's condition, even when the TCL system is normal.

These codes are output only when there is some problem, and when the vehicle condition returns to normal, the code will be normal.

Code No.	Vehicle condition
16	Battery is dead
62	ABS warning lamp is illuminated
63	ABS warning lamp is illuminated

3-2. Diagnosis code table

Diagnosis code No.	Probable cause	Inspection chart name or remedy	Reference page
11 ^{*1}	Abnormal APS output	G-1	P.35-61
12 ^{*1}	Broken signal wire in the shift control solenoid valve A	G-2	P.35-63
13 ^{*1}	Broken signal wire in the shift control solenoid valve B		
14 ^{*1}	Malfunction of the APS or TPS	G-3	P.35-64
15 ^{*1}	Malfunction of the TCL switch	G-4	P.35-64
16 ^{*2}	Drop in ECU power voltage	G-5	P.35-65
17 ^{*2}	Broken signal wire in IG2	G-6	P.35-66
21 ^{*1}	Broken wire in the front left wheel speed sensor	G-7	P.35-67
22 ^{*1}	Broken wire in the front right wheel speed sensor		
23 ^{*1}	Broken wire in the rear left wheel speed sensor		
24 ^{*1}	Broken wire in the rear right wheel speed sensor		
25 ^{*4}	Temporary simultaneous malfunction of the rear left and right wheel speed sensors	G-8	P.35-69
26 ^{*1}	Simultaneous malfunction in the rear left and right wheel speed sensors	G-9	P.35-69
33 ^{*1}	Broken wire in the steering wheel sensor	G-10	P.35-70
34 ^{*1}	Malfunction of the steering wheel sensor ST-1 or ST-2	G-11	P.35-72
35 ^{*1}	Malfunction of the steering wheel sensor ST-N	G-12	P.35-73
41 ^{*1}	Abnormal signal flow to the engine-ECU	G-13	P.35-75

Diagnosis code No.	Probable cause	Inspection chart name or remedy	Reference page
42* ³	Malfunction of the engine-ECU throttle system	Inspect according to Engine Troubleshooting	—
43* ³	CHECK ENGINE warning lamp is illuminated		
51* ¹	No drive signal response from the front right brake solenoid valve IN side	G-14	P.35-76
52* ¹	No drive signal response from the front right brake solenoid valve EX side		
53* ¹	No drive signal response from the front left brake solenoid valve IN side		
54* ¹	No drive signal response from the front left brake solenoid valve EX side		
55* ¹	Malfunction of the brake solenoid valve relay	G-15	P.35-78
56* ³	Malfunction of the brake solenoid valve IN side	G-16	P.35-80
61* ¹	Broken wire in the ABS 0 (ABS operating) signal	G-17	P.35-80
62* ²	Broken wire in the ABS 1 (ABS fail) signal, or malfunction of the ABS	G-18	P.35-81
63* ²	Broken wire in the ABS 0 and the ABS 1 simultaneously, or malfunction in the ABS-ECU	G-19	P.35-81
—	Normal	—	—

NOTE

(1) When the above problem codes are output, the TCL OFF indicator gives the following displays from the TCL-ECU.

*¹: Causes the indicator to flash.

*²: Causes the indicator to illuminate. However, if the system becomes normal, this problem code is automatically erased, and the TCL OFF indicator switches off.

*³: Causes the indicator to illuminate.

*⁴: This signal is judged to be only temporary, and the TCL OFF indicator is not illuminated or made to flash. (If the system becomes normal, the problem code is automatically erased.)

(2) When several problems are detected, they are all displayed, starting from the lowest code number.

3-3. Table of service data inspection items

The following items from the ECU input data can be read using the multi-use tester.

Service data items		Display units	Service data items		Display units
No.	Item		No.	Item	
11	APS opening	mV	24	Wheel speed of rear right wheel	km/H
12	SCSV A drive	ON/OFF	27	Engine displacement	2.5L/3.0L
13	SCSV B drive	ON/OFF	28	Inhibitor switch input	2, L, D, R/N, P
14	TPS opening	mV			
15	Inhibitor switch R position input	ON/OFF	29	Slip control	ON/OFF
16	ECU power voltage	V	30	Trace control	ON/OFF
17	TCL OFF switch input	ON/OFF	31	Steering angle	deg
18	TCL ON switch input	ON/OFF	32	Steering neutral point	ON/OFF
19	Idle switch input	ON/OFF	33	Steering neutral point memory	ON/OFF
20	Ignition switch input	ON/OFF	34	Solenoid RH drive (Intake)	ON/OFF
21	Wheel speed of front left wheel	km/H	35	Solenoid RH drive (Exhaust)	ON/OFF
22	Wheel speed of front right wheel	km/H	36	Solenoid LH drive (Intake)	ON/OFF
23	Wheel speed of rear left wheel	km/H	37	Solenoid LH drive (Exhaust)	ON/OFF

NOTE

- For the steering angle (Item No. 31) 0° will be displayed for neutral position (before memory setting of the neutral position, the ignition key is turned to "ON"), L for left-hand side and R for right-hand side.
- For steering neutral point memory (Item No. 33), when the memory setting of the steering neutral position is completed, "ON" will be displayed.

3-4. Inspection chart for each problem

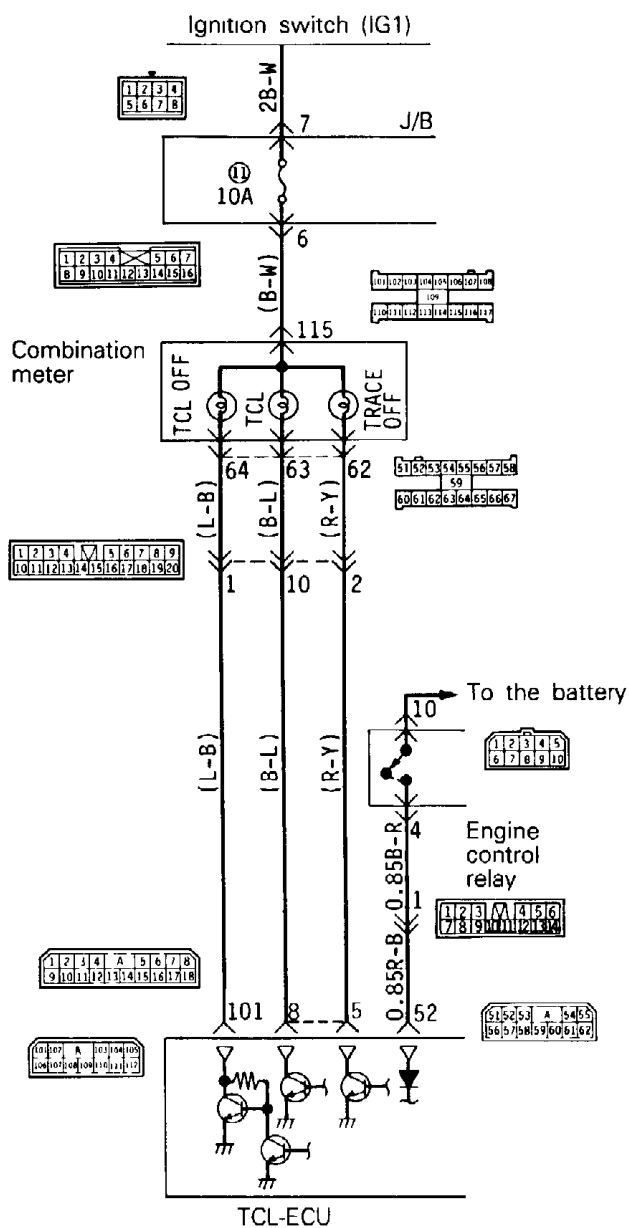
- | | |
|----------|--|
| A | After the ignition key has been turned to the "ON" position, all of the TCL indicators do not illuminate. |
|----------|--|

Comment: When the power has been connected, the TCL-ECU will make the TCL OFF, TCL and TRACE OFF indicators all illuminate until engine revolutions reach 450 rpm or higher, in order to check the indicator bulbs. However, the TCL OFF indicator will illuminate even when not started by

the ECU. Thus, when all the indicators do not illuminate, the cause could be either a broken wire in the indicator lamp power circuit or a loose ECU connector. Hint: If other warning lamps also do not illuminate, the problem is likely to be a blown fuse.

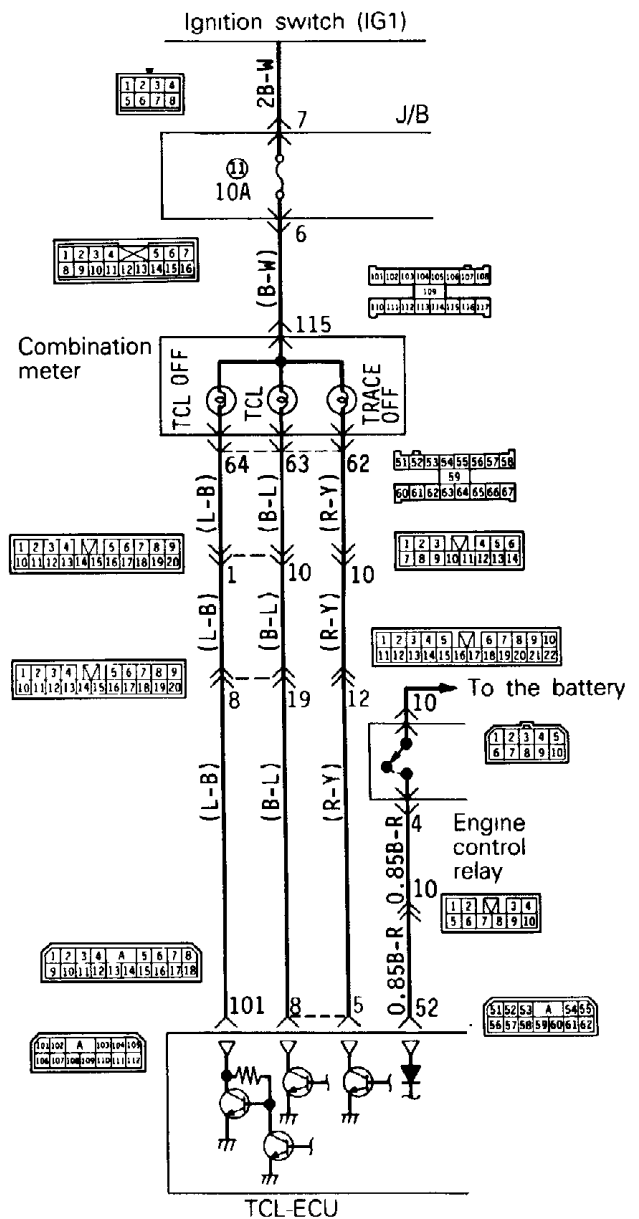
Hint:

LH drive vehicles

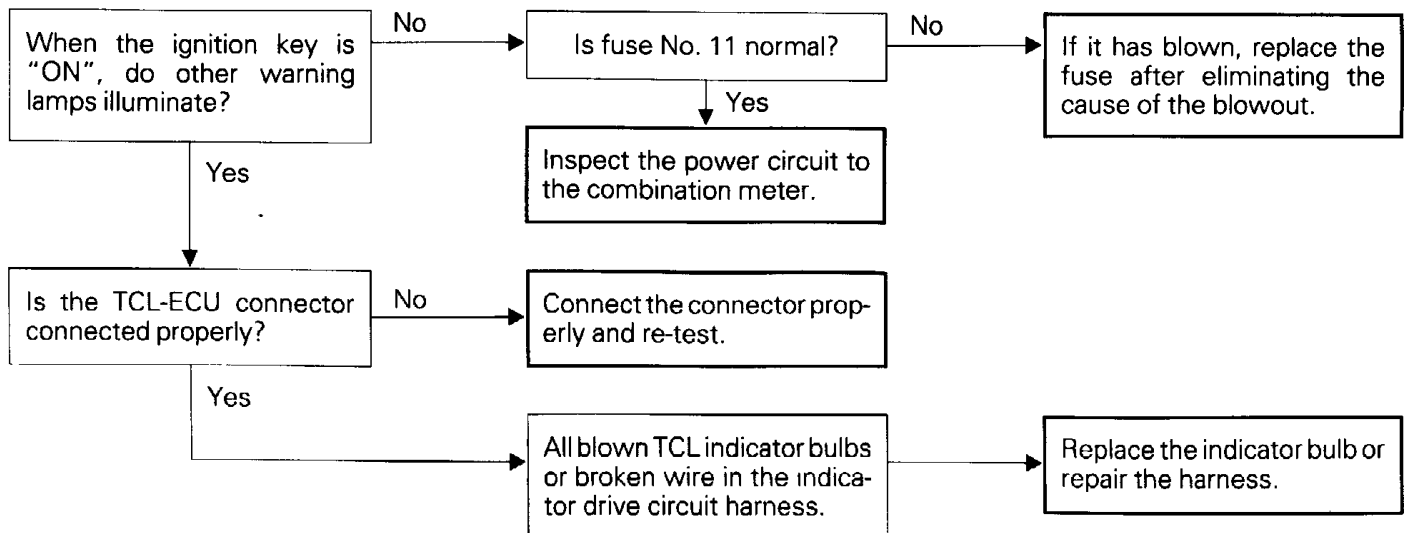


14A0255

RH drive vehicles



14A0254

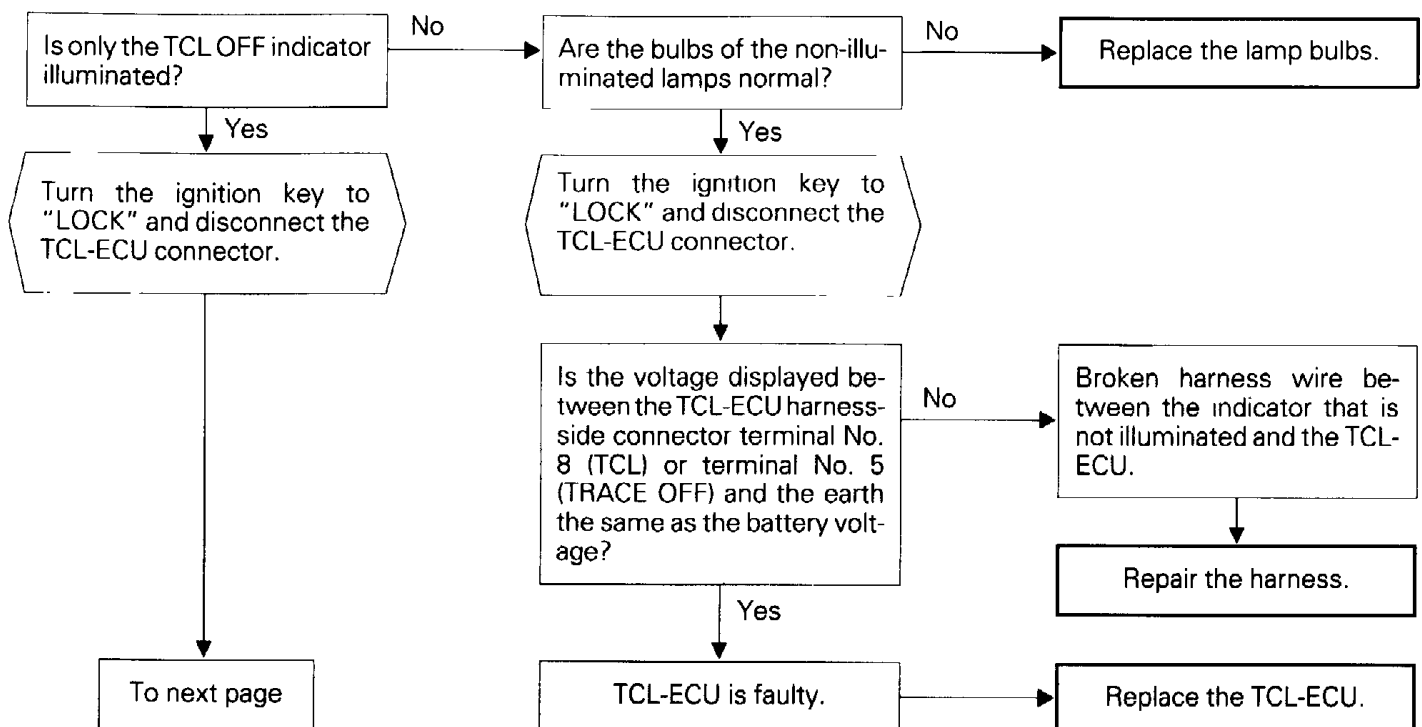


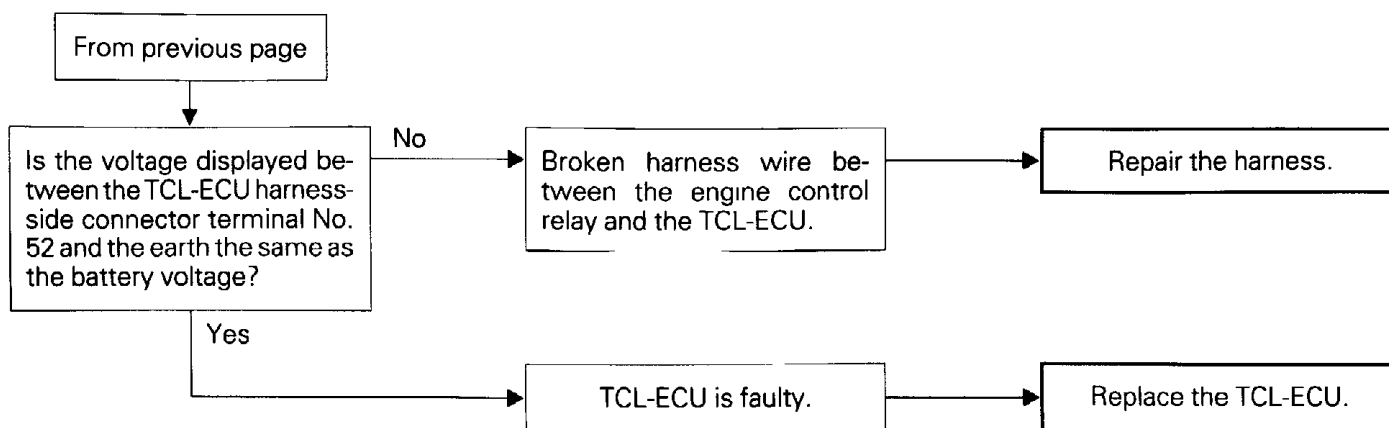
B When the ignition key is "ON", either the TCL OFF, TCL or TRACE OFF indicator does not illuminate. (At least one of the indicators does illuminate.)

Comment: The TCL indicators share a common power circuit, so when one or more of the indicators illuminates, the power circuit can be diagnosed as normal. Therefore, there is a strong possibility that the problem is a bulb failure or a broken harness wire.

Hint:

The TCL OFF indicator can illuminate even when its circuit is not driven by the TCL-ECU. Therefore if the TCL OFF indicator is illuminated but other indicators are not illuminated, the reason is probably a faulty TCL-ECU (broken wire in the TCL-ECU power circuit).





C After the engine is started, the TCL OFF indicator only remains illuminated. (Other indicators switch off.)

Comment: The TCL OFF indicator serves as a system warning indicator, and if the self-checking function detects a malfunction in the system immediately after starting the engine, this indicator will illuminate or flash.

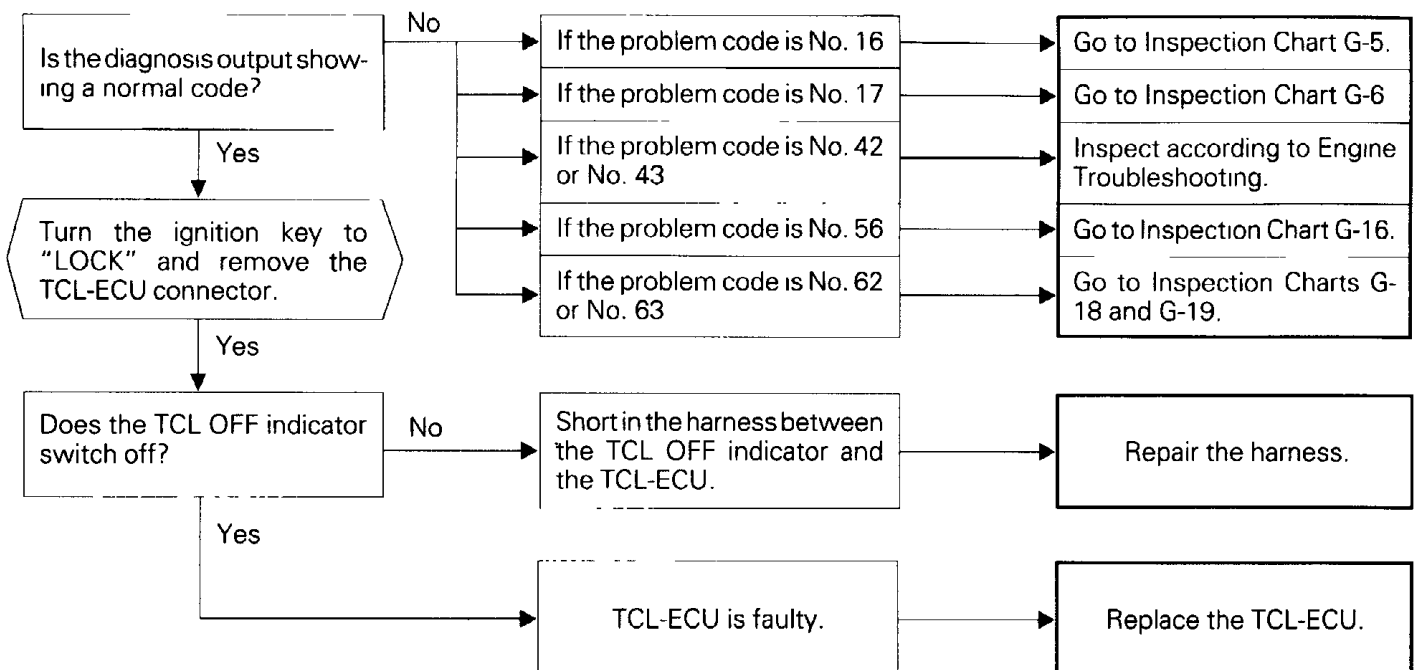
When the indicator illuminates, the cause is a problem in some other system connected with the TCL, or a drop in power voltage.

Hint:

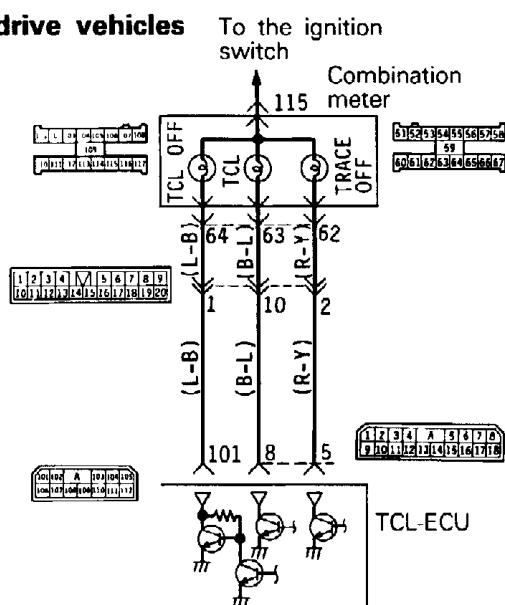
When the ABS warning lamp is illuminated, it is likely that there is a problem with the ABS, and when the CHECK ENGINE lamp is illuminated, there is a problem with the engine control system.

NOTE

If there is no diagnosis output (communication cannot be made with the multi-use tester), inspect and repair the harness between the ECU serial/diagnosis output terminal and the diagnosis connector.

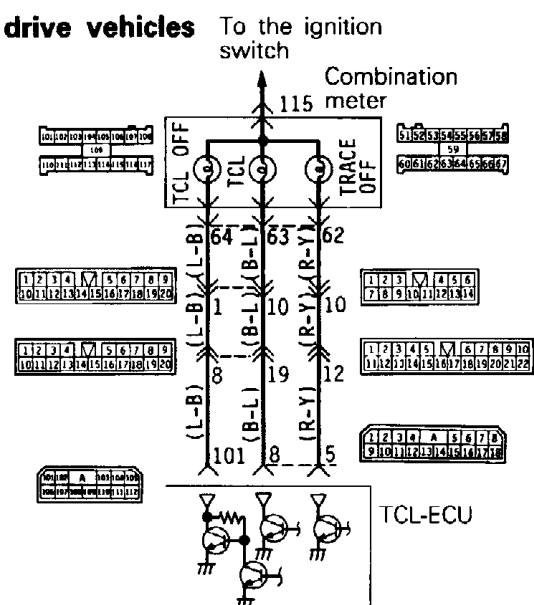


LH drive vehicles



14A0246

RH drive vehicles



14A0245

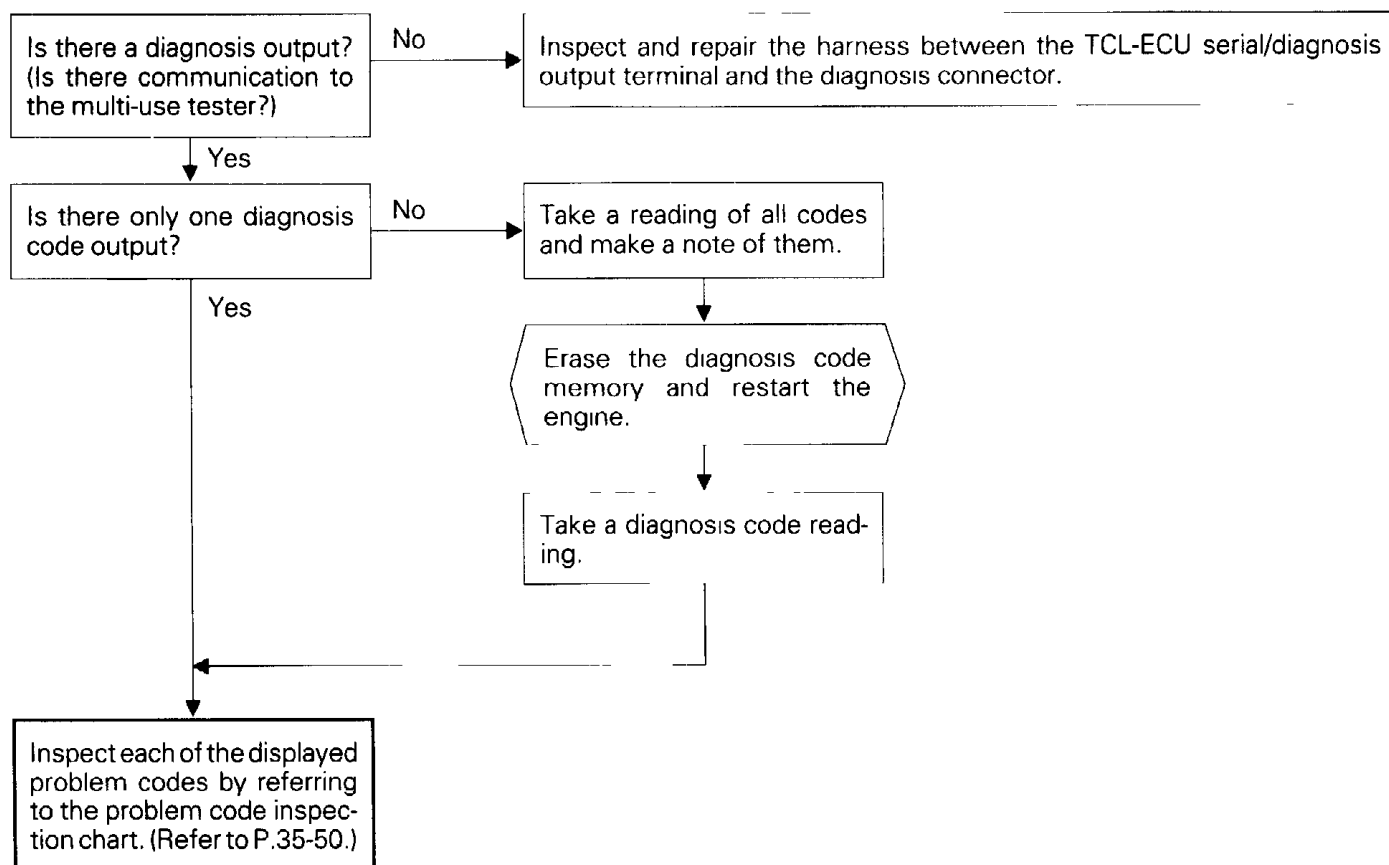
D After the engine is started, the TCL OFF indicator flashes.

Comment: The TCL OFF indicator serves as a system warning indicator, and if the self-checking function detects a malfunction in the system immediately after starting the engine, this indicator will illuminate or flash.

When the indicator flashes, it shows that a problem in the TCL-ECU has been detected, and the system functions have been stopped.

NOTE

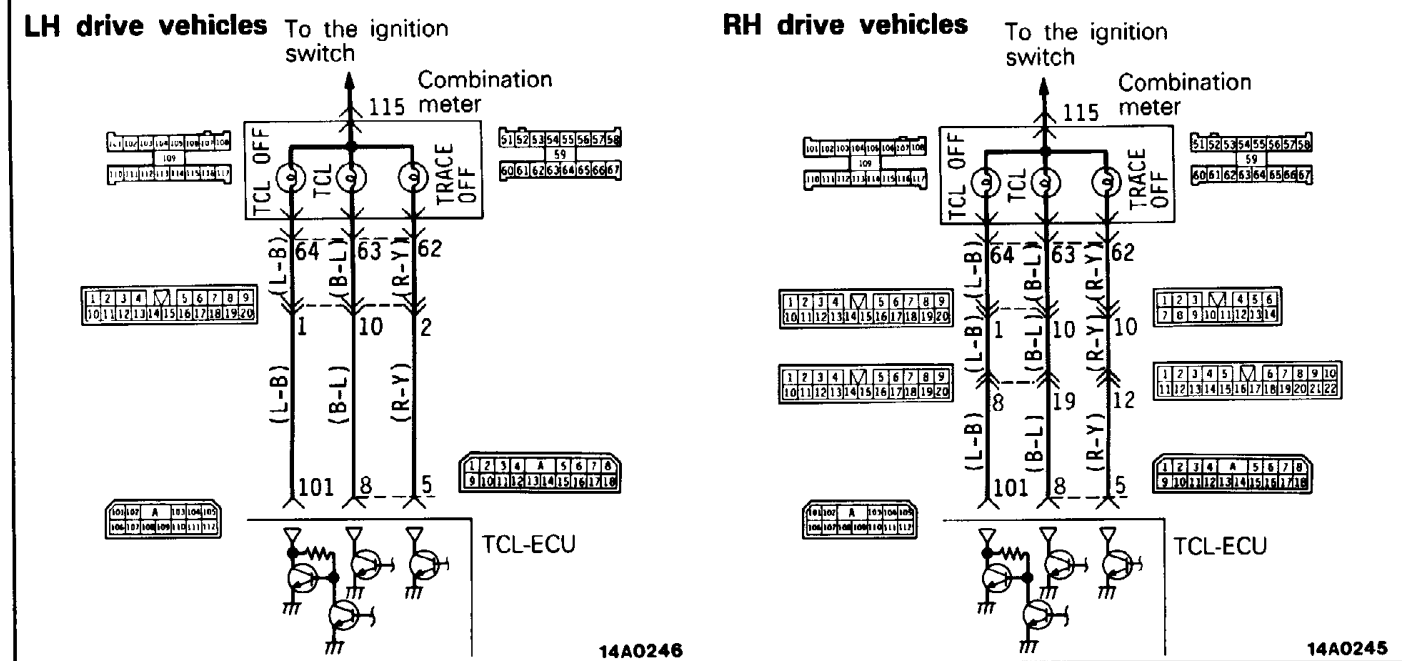
1. When several problem codes are displayed, it is impossible to tell which code is causing the indicator to flash immediately after the engine has been turned on. When there are problems, if the diagnosis code memory is momentarily erased and the engine is restarted, those problem codes will again be displayed.
2. Furthermore, there are some problems that cannot be detected immediately after starting the engine or during idling, but only when the vehicle is actually moving. Therefore, for non-recorded codes, the problems should be checked again during driving and if they recur, the problem code inspection chart should be referred to for inspection.



E After the engine is started, the TCL indicator stays on.

Comment: The TCL indicator illuminates when the engine is running only when the traction control is operating. If the light stays on

after the engine is started, the cause is a short in the TCL indicator drive circuit or a faulty TCL-ECU.



Turn the ignition key to "LOCK" and disconnect the TCL-ECU connector.

Does the TCL indicator remain illuminated when the ignition key is turned to "ON"?

No

TCL-ECU is faulty.

Replace the TCL-ECU.

Yes

Short in the harness between the TCL indicator and the TCL-ECU.

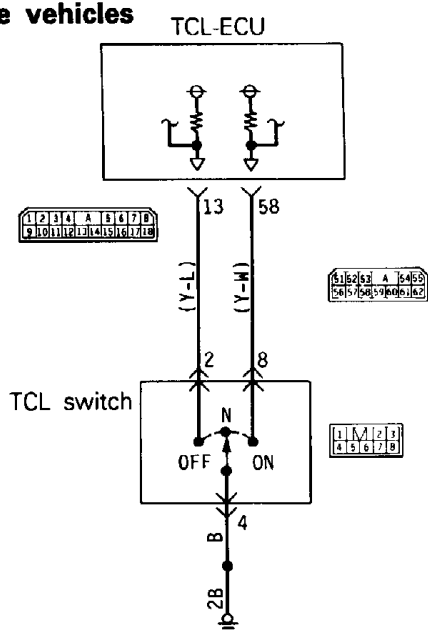
Repair the harness.

- F** When the engine is idling, no matter how often the TCL switch is turned to the "OFF" position, the TRACE OFF indicator and the TCL OFF indicator do not alternate.

Comment: The TRACE OFF indicator and the TCL OFF indicator illuminate alternately each time the TCL switch is turned to OFF. When the indicators do not alternate

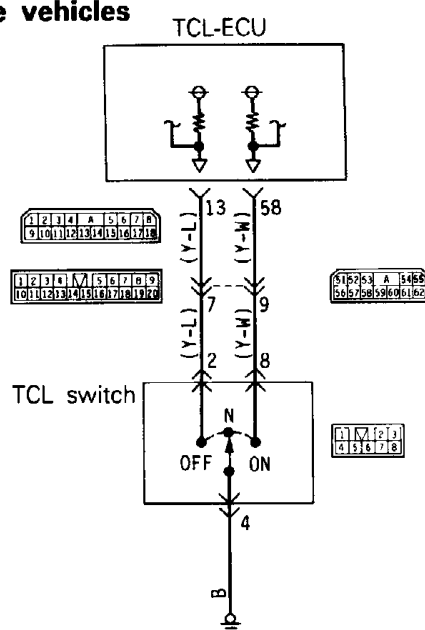
when the switch is operated, there is a problem with the switch or with the TCL-ECU.

LH drive vehicles

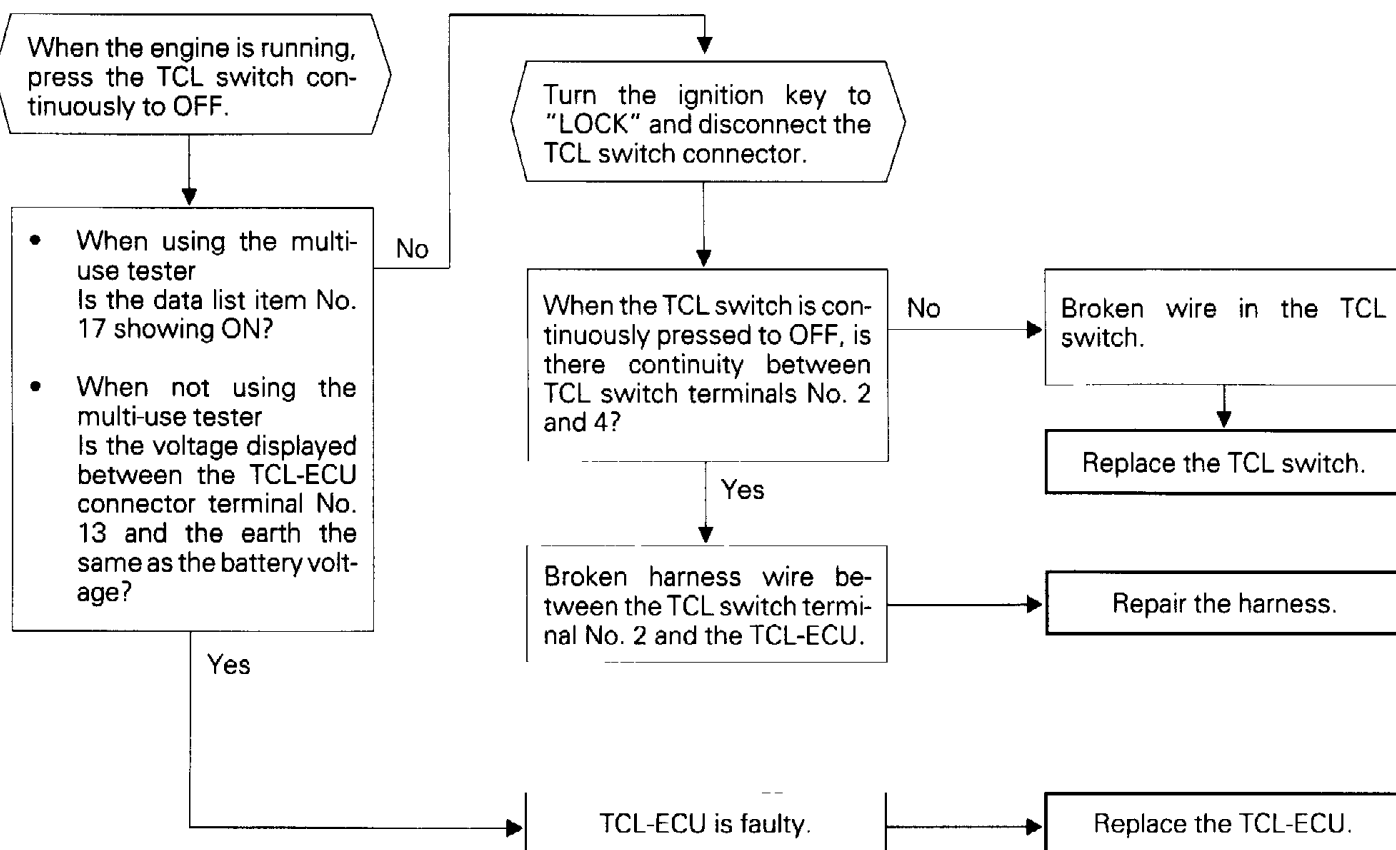


14A0239

RH drive vehicles



14A0238



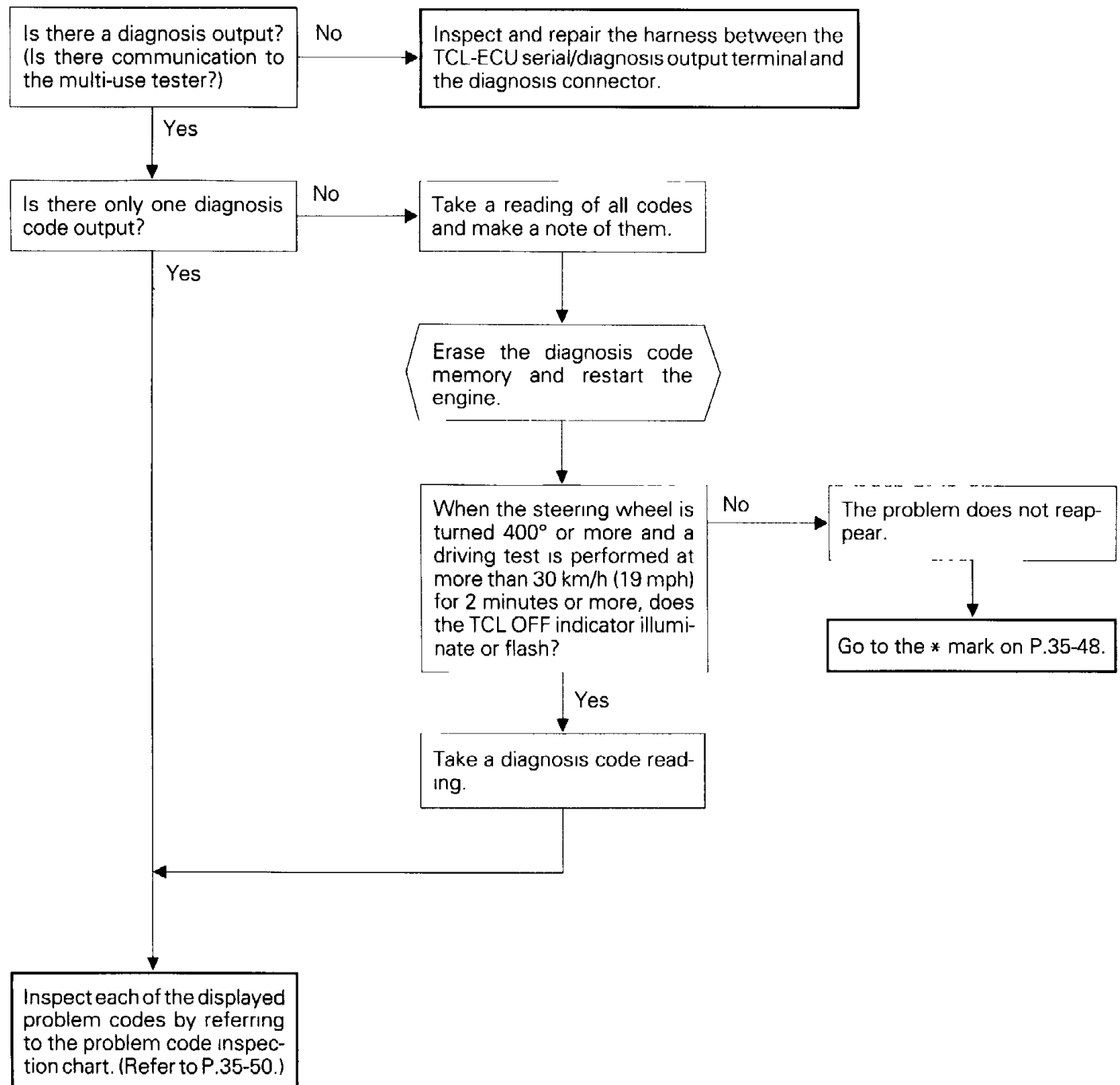
G The TCL OFF indicator is normal when the engine is idling, but illuminates or flashes when the vehicle is moving.

Comment: The TCL OFF indicator serves as a system warning indicator. Even if the self-checking function shows the system to be normal immediately after starting the engine, problems that can be detected only while the vehicle is actually moving can only be checked by a driving test.

NOTE

When several problem codes are displayed, it is impossible to tell which code is causing the indicator to flash when driving. When there are problems, if the diagnosis code memory is momentarily erased and the engine is restarted, those problem codes will again be displayed.

Furthermore, for non-recorded codes, the problems should be checked again and if they recur, the problem code inspection chart should be referred to for inspection.



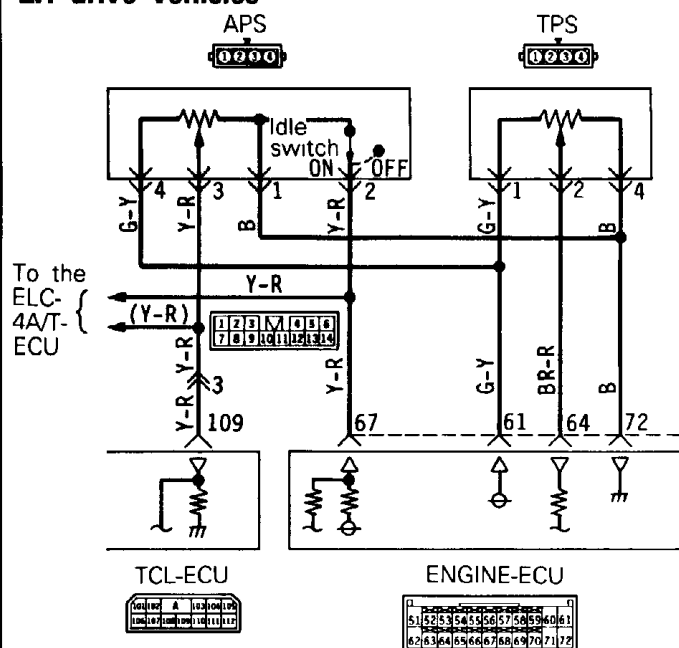
G-1 When diagnosis code No. 11 is displayed

Comment: This problem code is displayed when the APS output voltage becomes less than 0.2V due to a blown or shorted APS circuit.

Hint: APS power is supplied from the engine-ECU, and the output signal is shared by the ELC-4A/T and the ECS (electronic

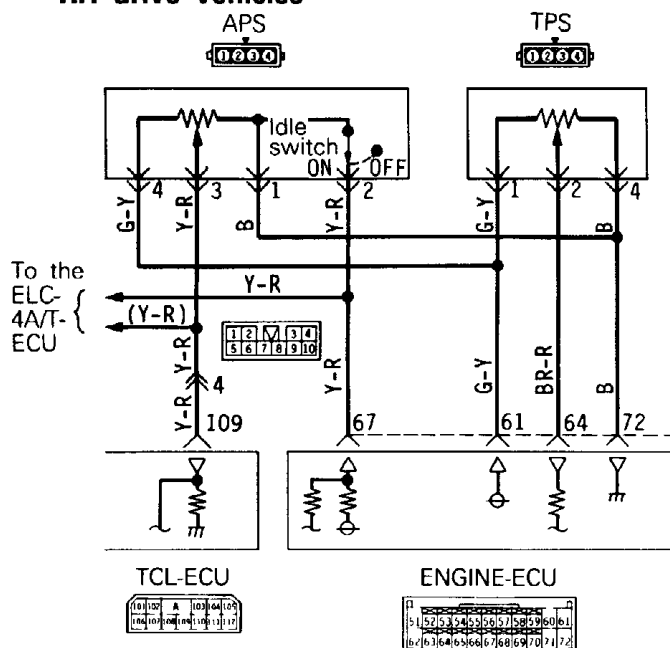
controlled suspension) as well as the TCL. Therefore, if the ELC-4A/T diagnosis (APS diagnosis time is 4 seconds) is normal, then there is a broken harness wire between the APS and the TCL-ECU, or the TCL-ECU is faulty.

LH drive vehicles



14A0253

RH drive vehicles



14A0252

Is the ELC-4A/T diagnosis (code nos. 11, 12) normal?

Yes

No

Is the engine diagnosis (code No. 14) normal?

No

Yes

Disconnect the APS and TPS connector and turn the ignition key to "ON"

Does a voltage of 4-5V show between the TPS harness-side connector terminal No. 1 and the earth?

Yes

Short inside the TPS.

Replace the TPS.

Does a voltage of 4-5V show between the engine-ECU terminal No. 61 and the earth?

Yes

Broken harness wire between the engine-ECU and the TPS.

Repair the harness.

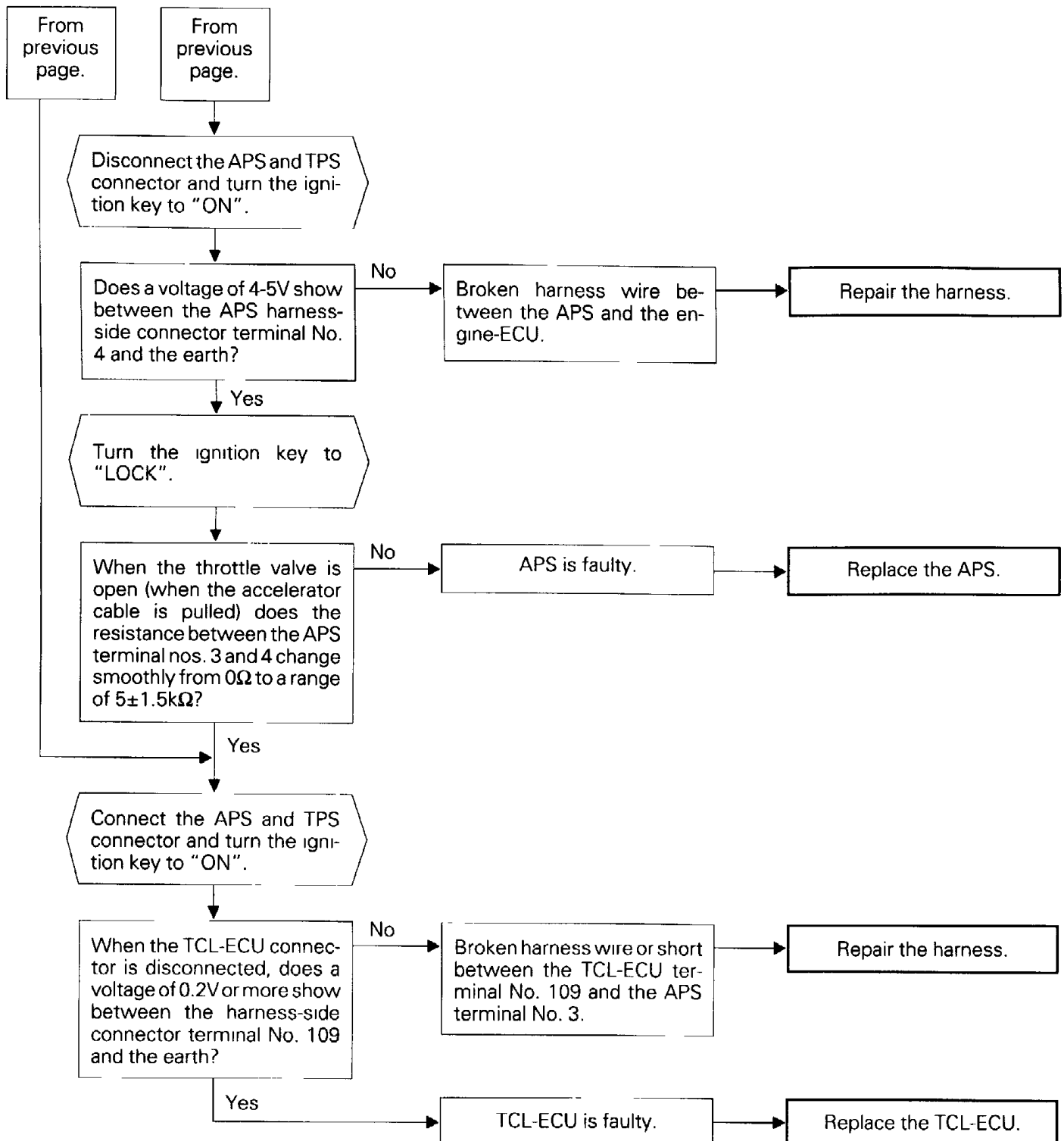
No

Engine-ECU is faulty.

Replace the engine-ECU.

To next page

To next page



G-2 When diagnosis code No. 12 or No. 13 is displayed

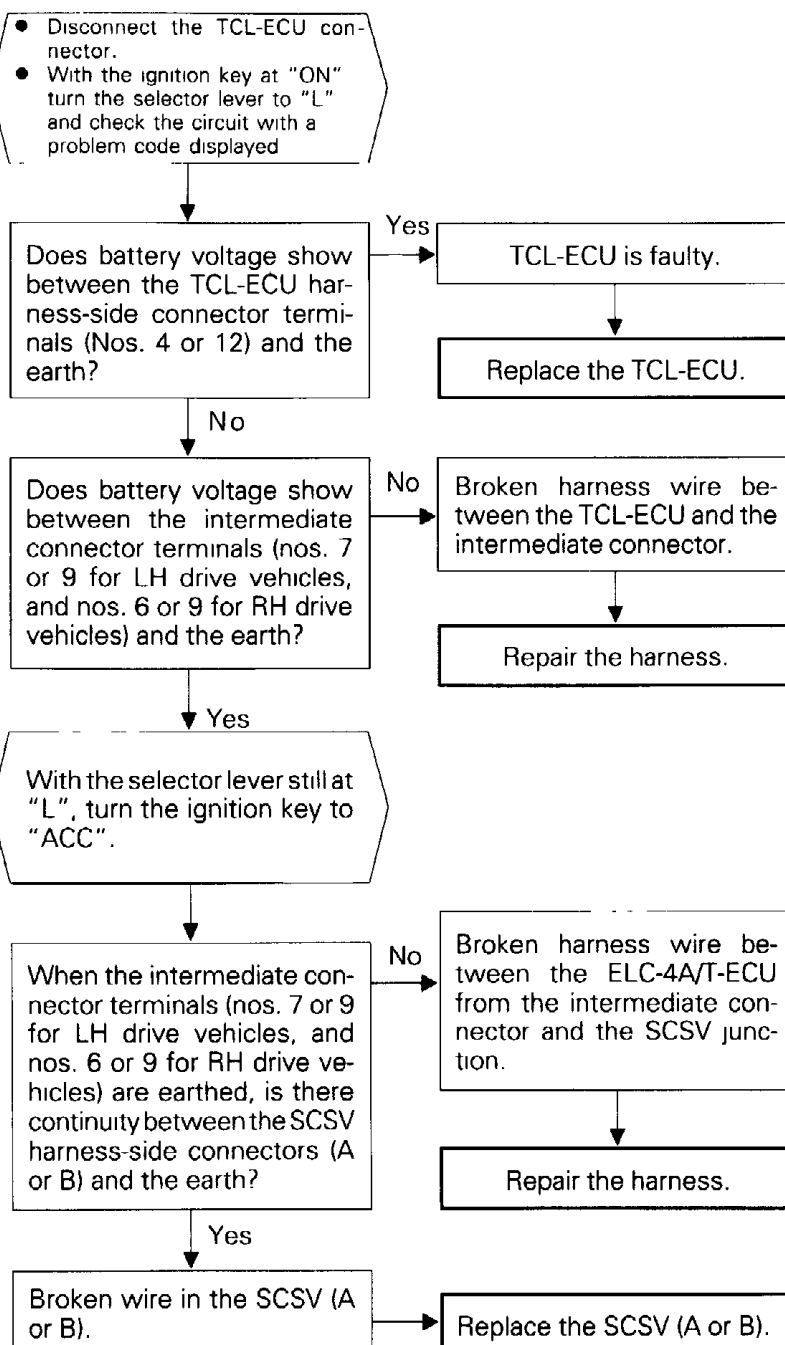
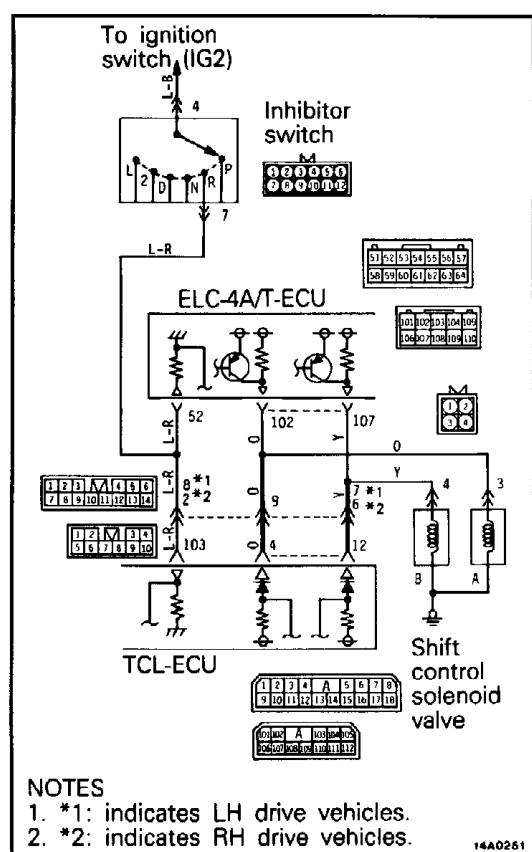
Comment: These problem codes are displayed when a broken wire is detected between the TCL-ECU and the SCSV (Shift Control Solenoid Valve) A or B. The TCL-ECU circuit will turn ON when there is a broken wire in the SCSV A or B, so when the inhibitor switch is at R and the SCSV A is ON, or when the vehicle speed is 100 km/h (62 mph) or more and the SCSV B is ON, the diagnosis will be a broken wire.

Hint:

A broken wire between the ELC-4A/T-ECU and the SCSV A or B is detected from the ELC-ECU side. Therefore, if there is no problem with the ELC-4A/T side, then there is a high possibility that the thick wire shown in the diagram below is broken.

NOTE

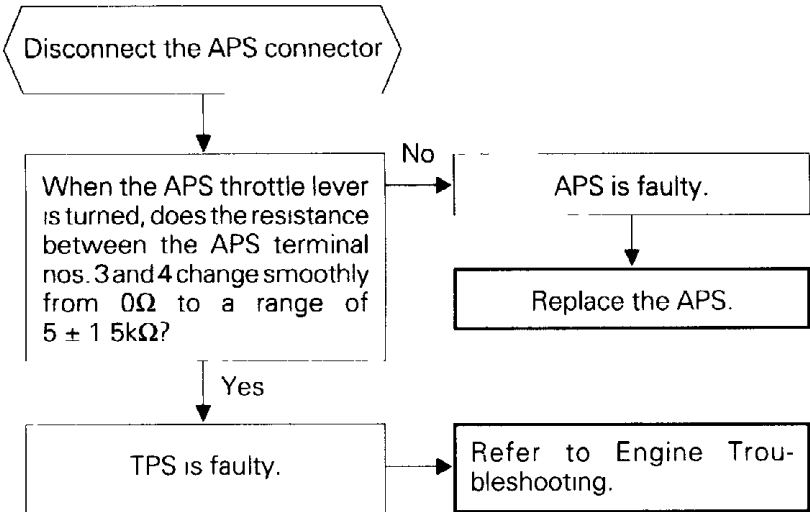
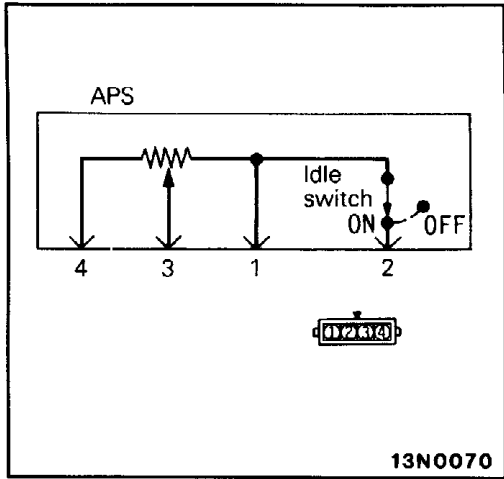
Sometimes these codes will be output due to a short in the inhibitor switch "R" circuit, even when the SCSV A and B are normal.



G-3 When diagnosis code No. 14 is displayed.

Comment: This problem code is displayed when the opening difference between the APS and TPS is 20° or greater due to a broken wire in the APS or TPS opening sensor circuit. If the APS has a broken wire, diagnosis code No. 11 is first displayed. Accordingly, when code No. 11 is not displayed,

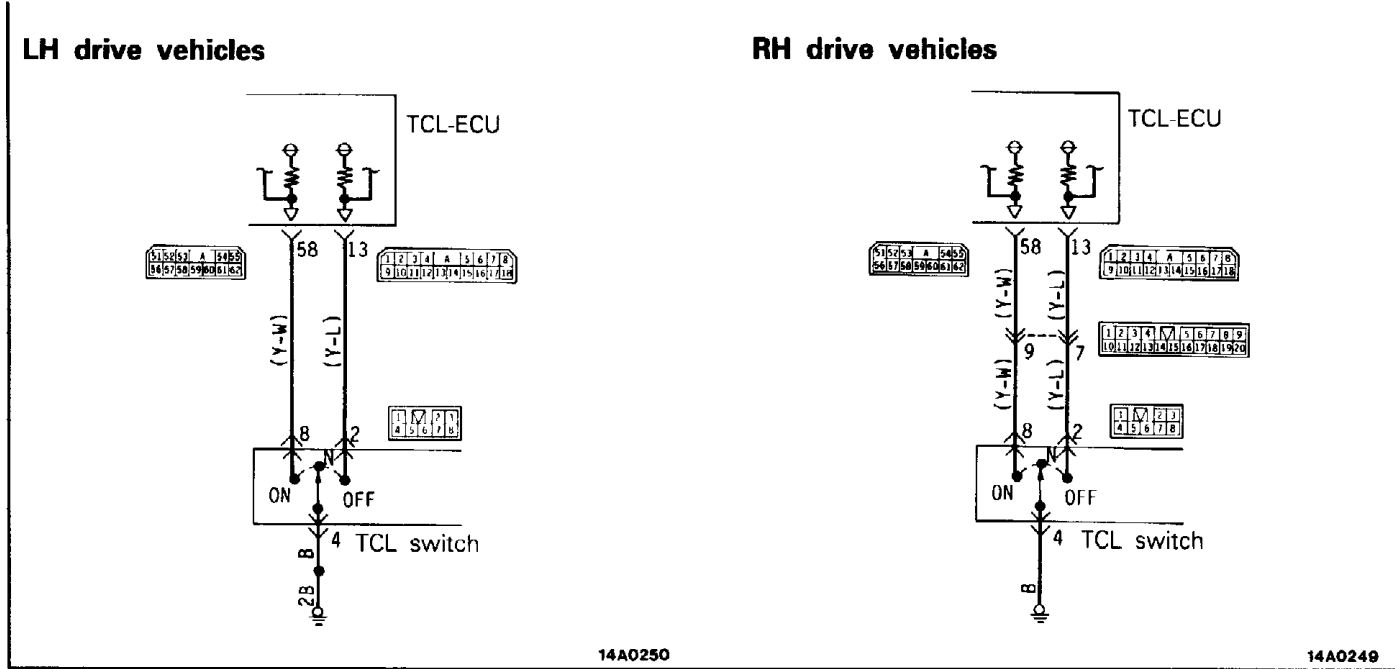
the APS power circuit is diagnosed to be normal.
Hint: As the opening of both the APS and the TPS can be read using the multi-use tester, it is better to take a reading of the data for each one to check for an abnormality.

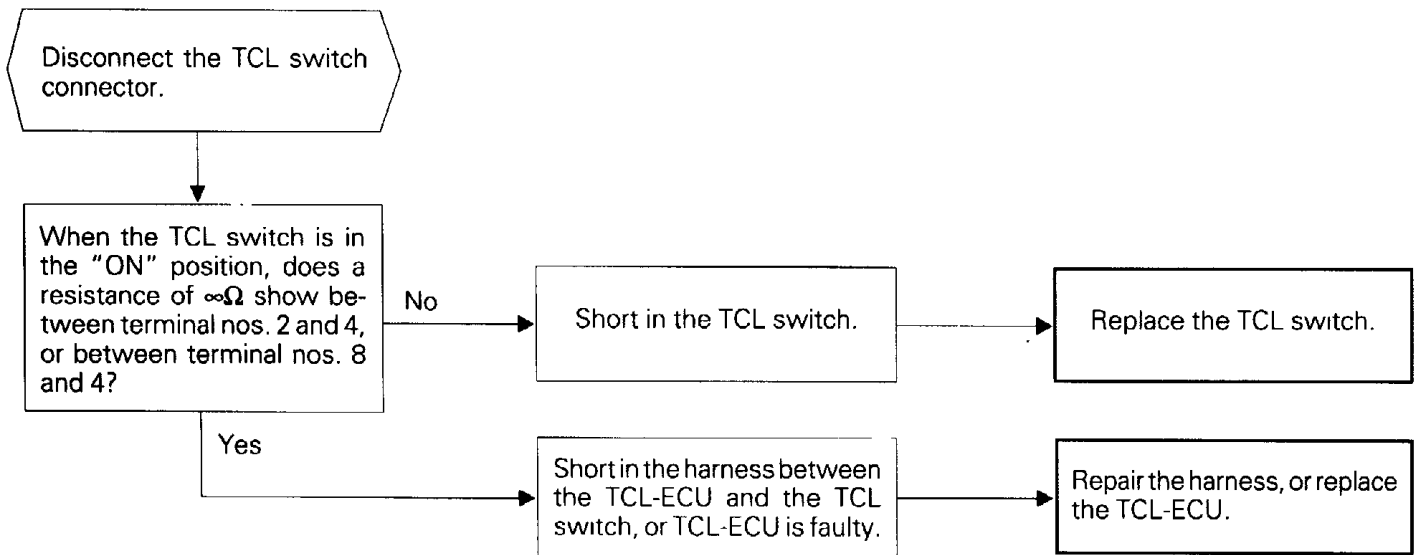


G-4 When diagnosis code No. 15 is displayed.

Comment: This problem code is displayed when an ON signal is input at the same time from both the TCL OFF and TRACE OFF posi-

tions because of a short, etc. in the TCL switch circuit.

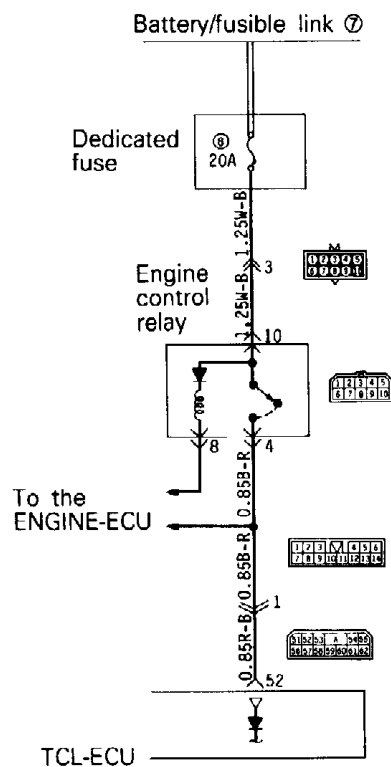
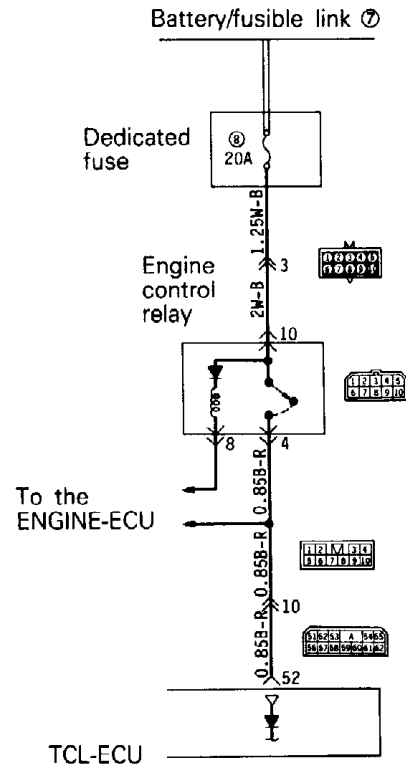


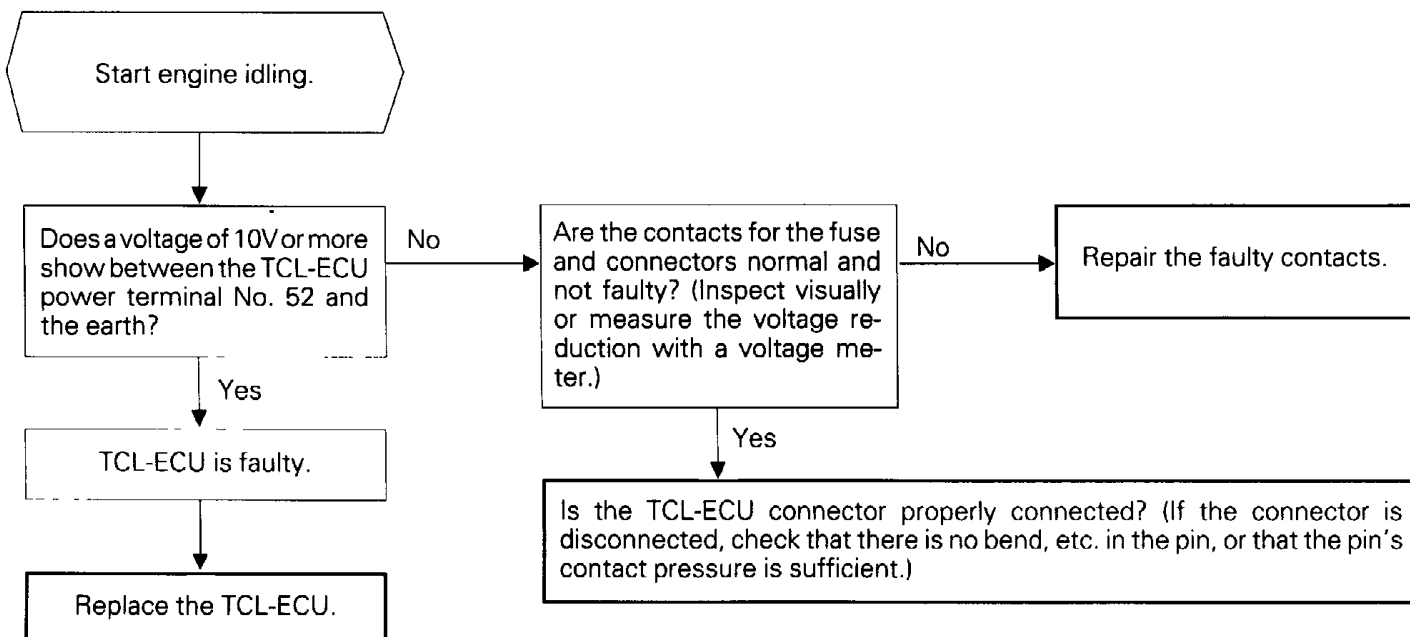
**G-5 When diagnosis code No. 16 is displayed.**

Comment: This problem code is displayed when the TCL-ECU power voltage is lower than the standard value. If the voltage returns to standard voltage or higher, this code will no longer be output.

Caution

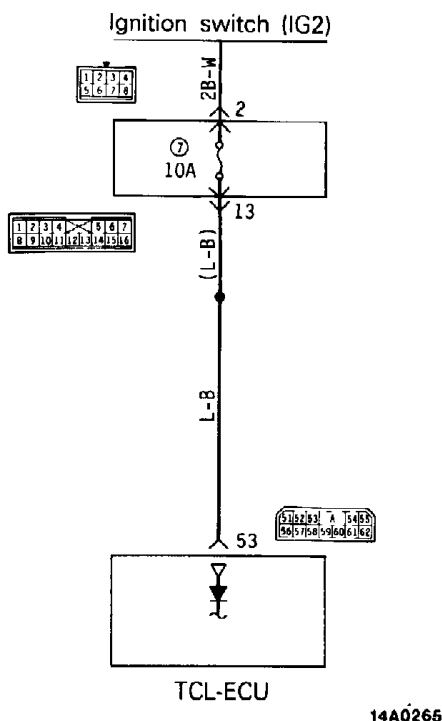
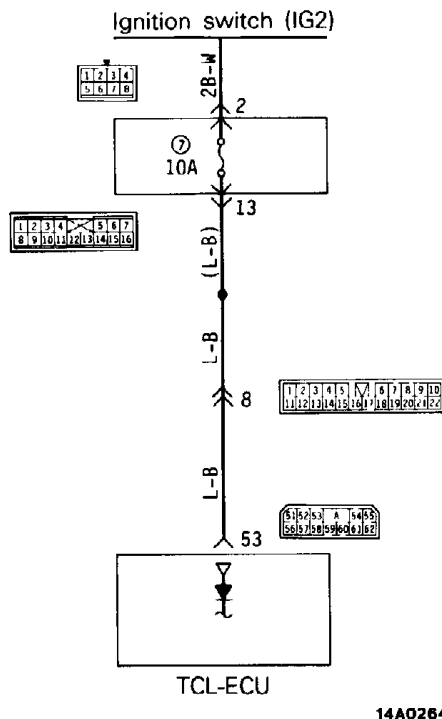
If the battery voltage drops during inspection, this code will be output as a current problem, and correct problem diagnosis cannot be made. Before following the inspection below, check the battery condition, and recharge the battery if necessary.

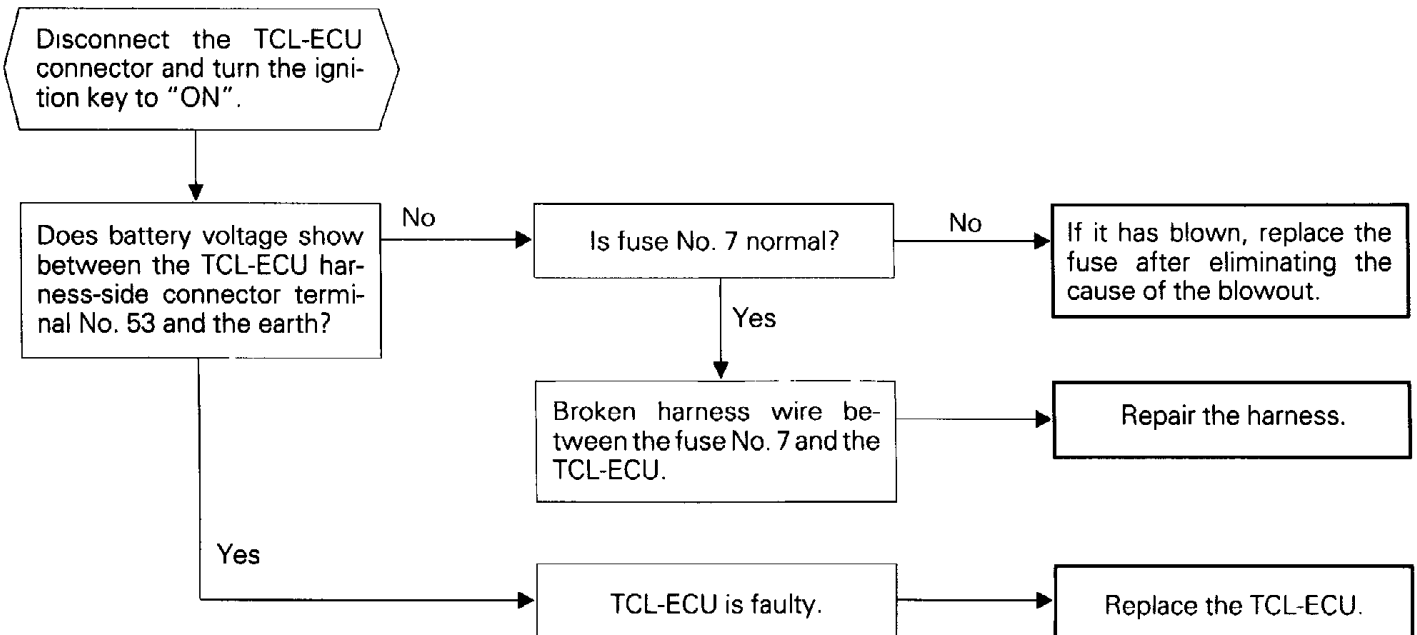
LH drive vehicles**RH drive vehicles**

**G-6 When diagnosis code No. 17 is displayed.**

Comment: This problem code is displayed when engine revolutions is 450 rpm or higher and IG2 power is not supplied to the TCL-

ECU because of a broken wire or short in the IG2 power circuit.

LH drive vehicles**RH drive vehicles**



G-7 When diagnosis code No. 21, No. 22, No. 23 or No. 24 is displayed.

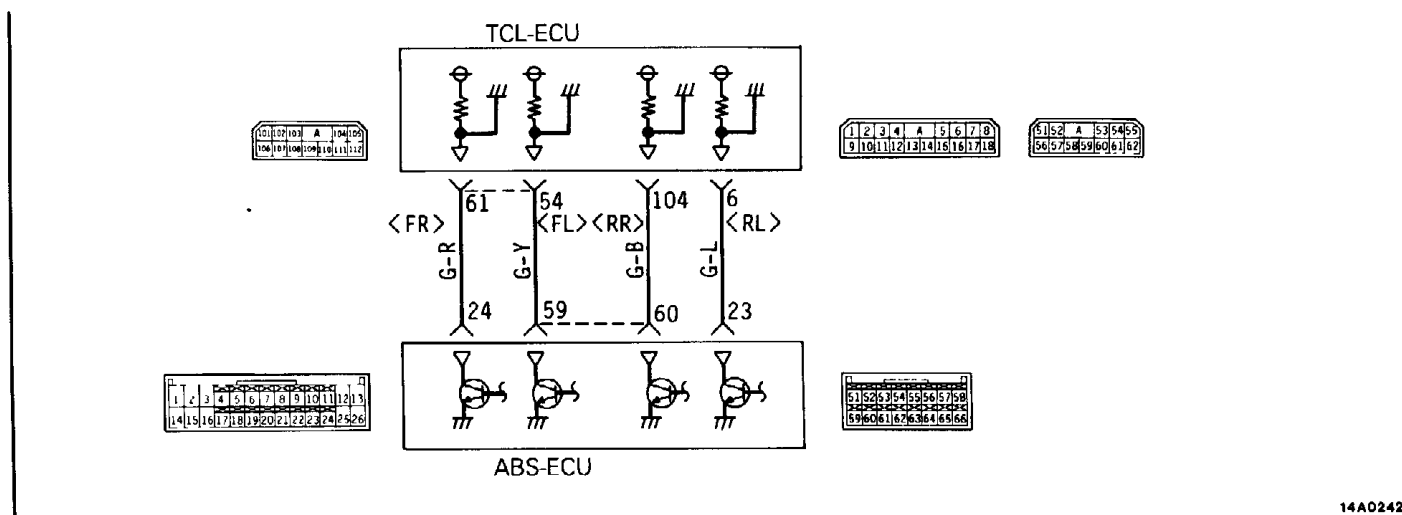
Comment: When diagnosis code No. 21 or 22 is displayed. These problem codes are displayed when a pulse is input by the sensor circuit due to a broken wire or short, or a faulty sensor, showing a wheel speed difference of 8 km/h (5 mph) or more in the front left and right wheels compared to the rear wheels.

When diagnosis code No. 23 or 24 is displayed.

These problem codes are displayed when a pulse is input by the sensor circuit due to a broken wire or short, or a faulty sensor, showing a wheel speed difference of 8 km/h (5 mph) or more in the wheels on one side compared to the opposite side.

Hint: Problems between the ABS-ECU and the sensor are detected by the ABS-ECU. Therefore, if there is no problem with the ABS side, it is most likely due to a broken harness wire or a short between the ABS-ECU and the TCL-ECU.

NOTE
When these problem codes are output, erase the problem code memory after fixing the cause of the problem, and carry out a driving test at a speed of 20 km/h (12 mph) or higher to check that the codes are not output again.



14A0242

Is there continuity between the following terminals of the ABS-ECU harness-side connector and the TCL-ECU harness-side connector?

No

Broken harness wire or short

Repair the harness.

ABS side TCL side

Terminal Nos.	ABS side	TCL side
	59	54
	24	61
	23	6
	60	104

Yes

Check the sensors with the ABS diagnosis system, and repair abnormalities if any. (Refer to P.35-5.)

If a TCL diagnosis code is output once more, the TCL-ECU is faulty.

Replace the TCL-ECU.

G-8 When diagnosis code No. 25 is displayed

Comment: While driving at a speed of 20 km/h (12 mph) or over, this problem code is displayed when the pulse signal is stopped for an instant (0.015 sec.), due to a temporary disconnection in the sensor of both rear wheels. However, even when this code is displayed, the TCL OFF indicator will not illuminate or flash. Furthermore, the ABS warning lamp illuminates due to a broken sensor wire in the ABS hardware circuit, and TCL diagnosis code No. 62 will be displayed.

Hint: When diagnosis code No. 25 is displayed at the same time as code nos. 23 or 24, inspect according to the troubleshooting for code nos. 23 or 24.

When code No. 25 is displayed by itself, the problem is likely to be a faulty contact in the rear wheel sensor circuit.

Remedy: Inspect according to the same procedure for the ABS wheel speed sensor (rear) inspection. (Refer to P.35-94.)

G-9 When diagnosis code No. 26 is displayed

Comment: This problem code is displayed when an abnormality is diagnosed in the rear wheel sensor when the speed of both rear wheels is zero for 20 seconds while traction control is operating.

Hint: This problem occurs when there is a broken harness wire or short between the TCL-ECU and the ABS-ECU that leads to both rear wheels, or if the sensor harnesses for both rear wheel short at the same time.

NOTE

1. When the vehicle is stuck and only the front wheels are moving, or when the front wheels are jacked up and only the front wheels are moving, after 20 seconds the TCL indicator will begin to flash and the system will be isolated.
2. When this problem code is output, erase the problem code memory after fixing the cause of the problem, and carry out a driving test at a speed of 20 km/h (12 mph) or higher to check that the code is not output again.

Remedy: Inspect according to the inspection flowchart in Troubleshooting Chart G-7 for diagnosis code nos. 21, 22, 23 and 24.

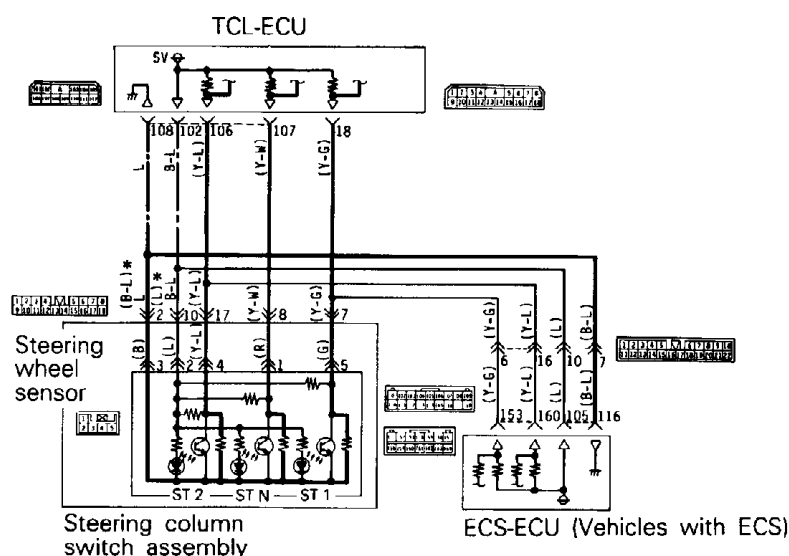
G-10 When diagnosis code No. 33 is displayed

Comment: This problem code is displayed when the steering wheel sensor circuit output wire (thick wire section) is broken.

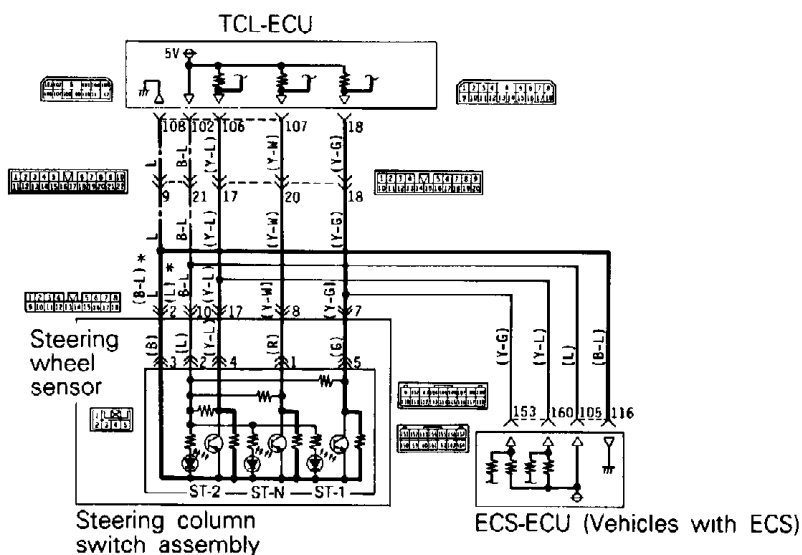
Hint: For vehicles fitted with ECS, the ECS function shares the ST-1 and ST-2 sensor circuit. For this reason, when diagnosis code No. 33 is output, if the ECS warning lamp also illuminates and if the ECS diagnosis code No. 21 is displayed, there

is probably a broken wire in a circuit between the sensor and the harness junction of the ECS-ECU and the TCL-ECU.

If the ECS code is normal, then there is probably a broken wire in a circuit between the TCL-ECU and the harness junction of the ECS-ECU and the TCL-ECU.

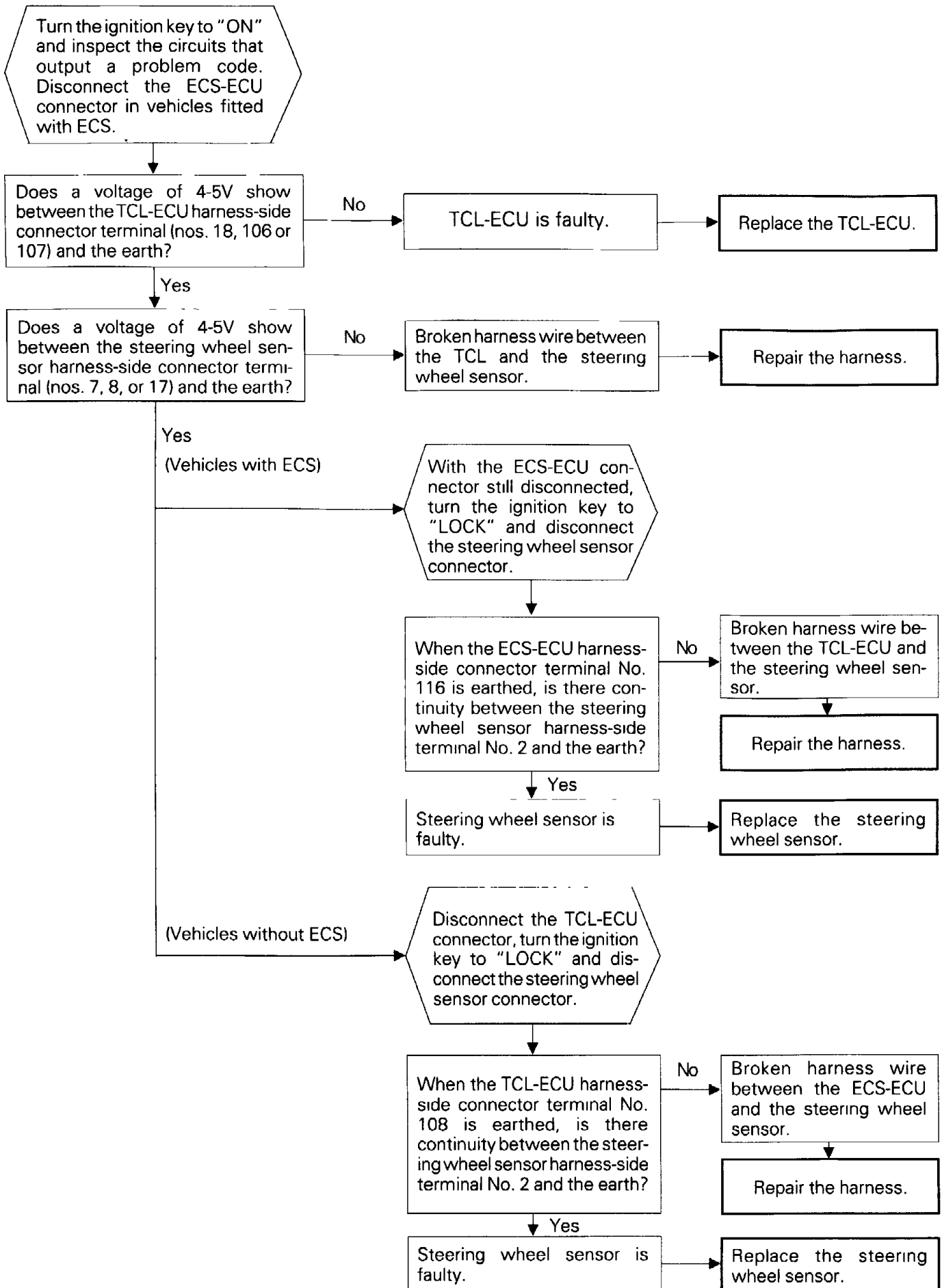
LH drive vehicles

14A0262

RH drive vehicles**NOTE**

1. The diameter and color of wires marked with * indicate vehicles with ECS
2. The dotted lines indicate vehicles without ECS

14A0263



G-11 When diagnosis code No. 34 is displayed

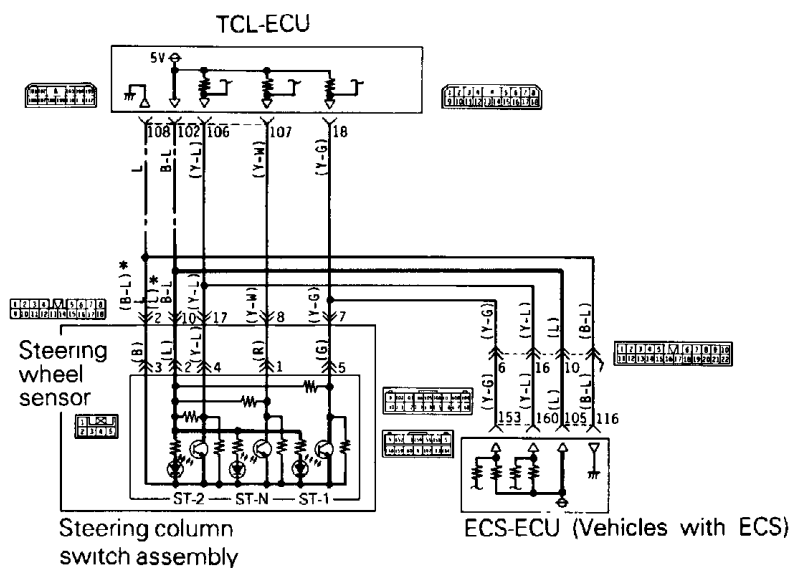
Comment: This problem code is displayed when an abnormality is diagnosed in the steering wheel sensor power circuit (thick wire section) when the steering angle is less than 10° (no steering signal is input at all) and conditions are as follows:

- Vehicle speed: 20 km/h – 60 km/h (12 mph – 37 mph)

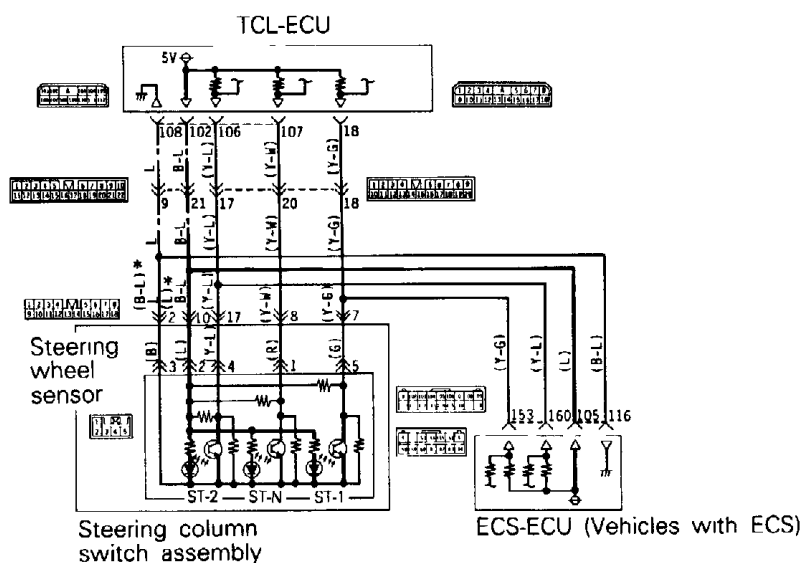
- Rear wheel speed sensor: When difference between left and right exceeds 1.5 km/h (1 mph) (diagnosed while cornering)

NOTE

It should be noted that if the vehicle is fitted with left and right tyres of different diameters, this code will sometimes be output while driving, even when the steering wheel sensor is normal.

LH drive vehicles

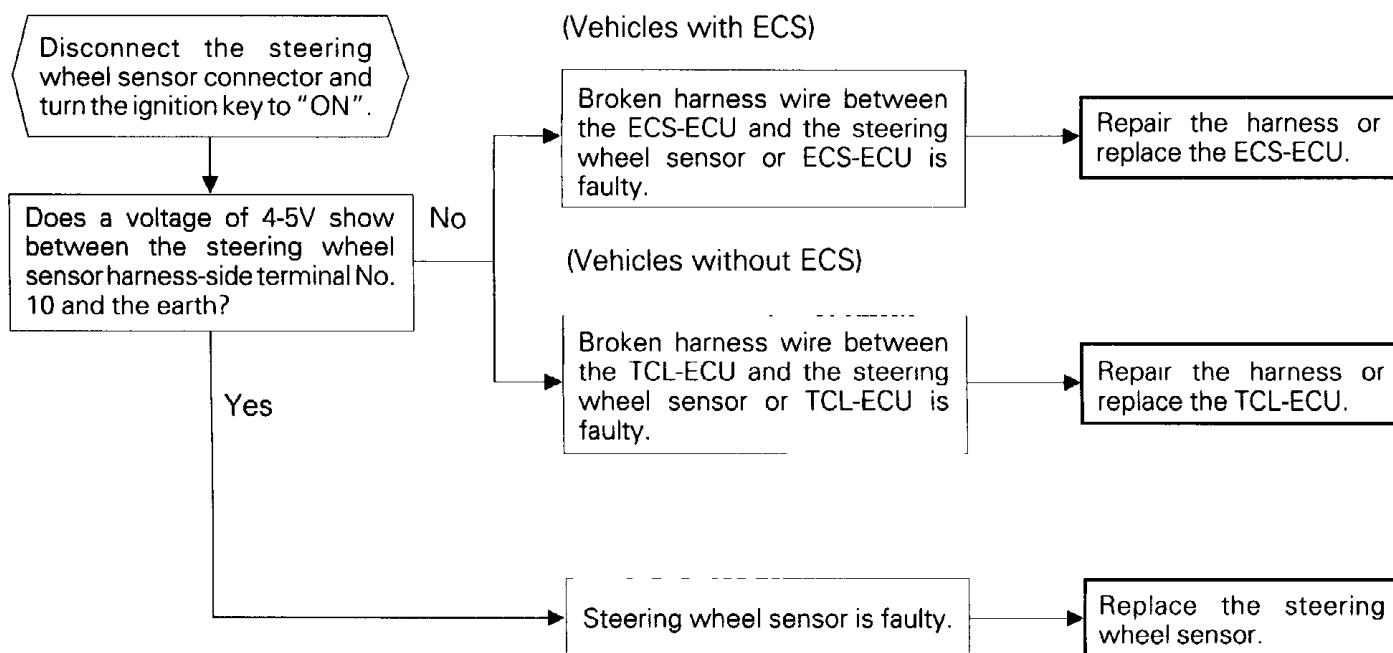
14A0256

RH drive vehicles

14A0257

NOTES

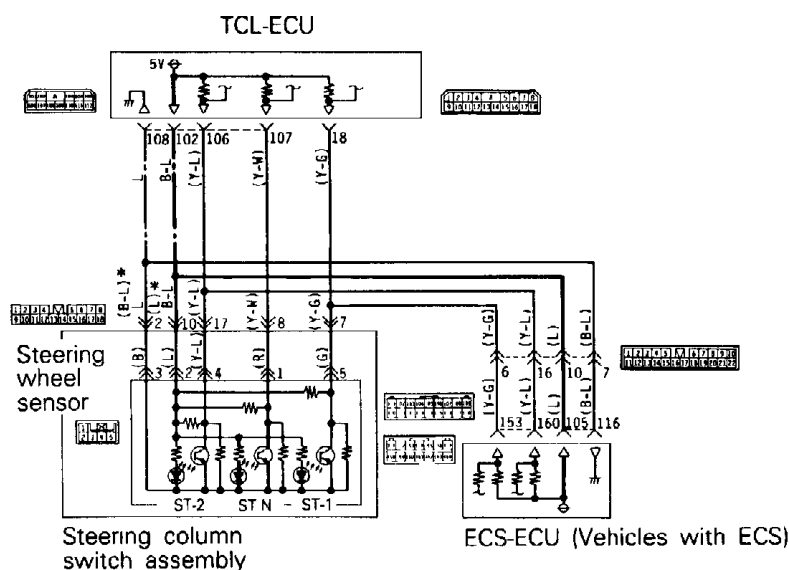
1. The diameter and color of wires marked with * indicate vehicles with ECS.
2. The dotted lines indicate vehicles without ECS.

**G-12 When diagnosis code No. 35 is displayed**

Comment: This problem code is displayed when the steering wheel sensor ST-N circuit (thick wire section) is diagnosed as faulty, when the steering wheel is turned 400° or more, but "ST-N" position is not registered.

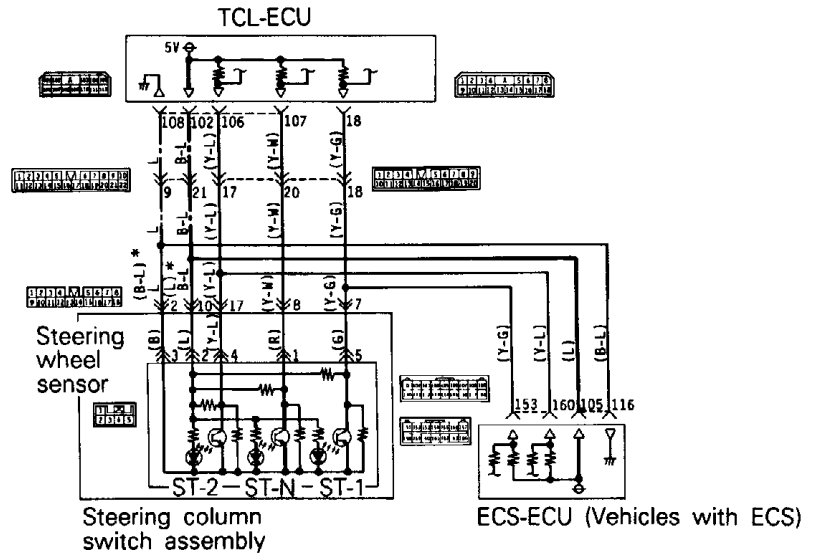
NOTE

Even if there is a problem, this code will not be displayed (detected) if the steering wheel is not turned.

LH drive vehicles

14A0260

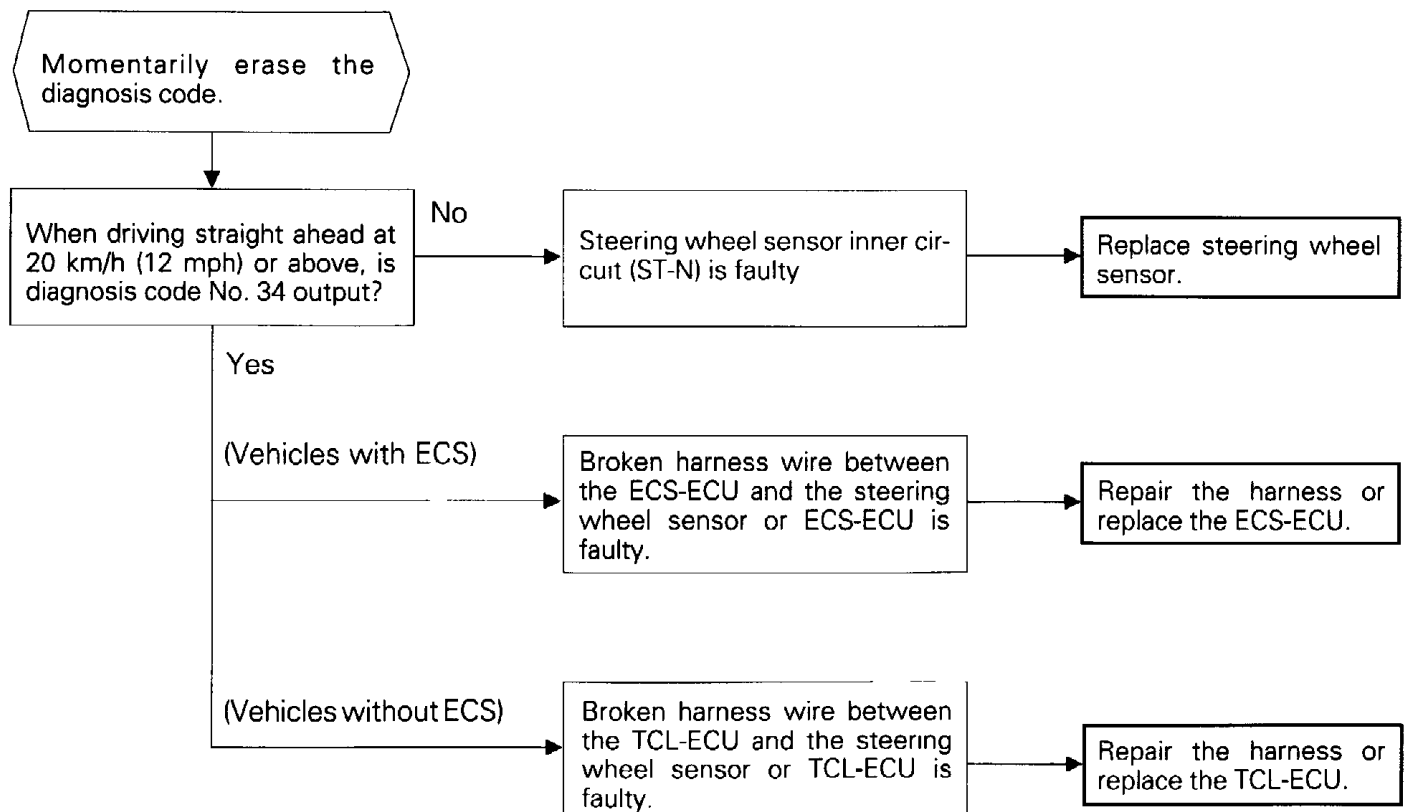
RH drive vehicles



NOTES

1. The diameter and color of wires marked with * indicate vehicles with ECS:
2. The dotted lines indicate vehicles without ECS.

14A02B1

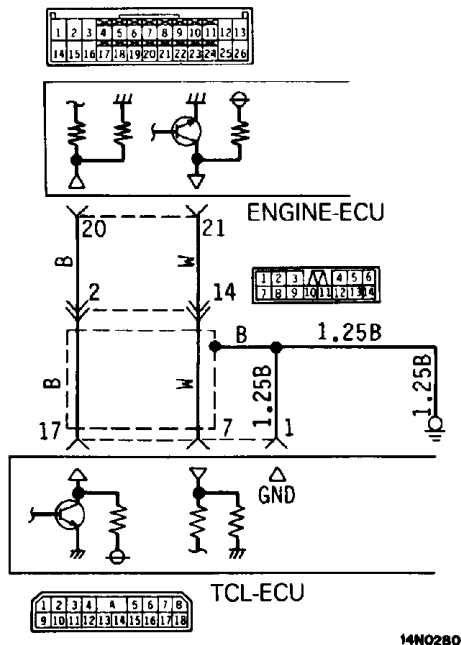


G-13 When diagnosis code No. 41 is displayed

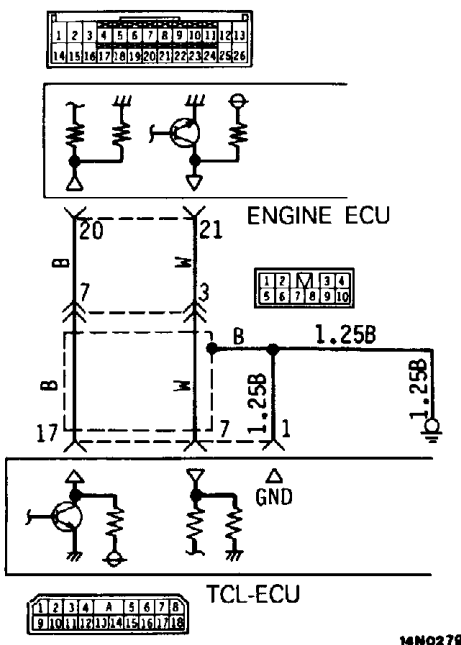
Comment: This code is displayed when there is a problem in the serial communication circuit between the TCL-ECU and the engine-ECU caused by a broken wire or

short, or if an error is detected in the communication due to a faulty ECU or shield wire.

LH drive vehicles



RH drive vehicles



When the TCL-ECU harness-side connector terminal nos. 7 or 2 and 17 are earthed respectively, is there continuity between the following terminals and the earth?

- between intermediate connector terminal No. 3, No. 14 and No. 7 and earth.
- between engine-ECU connector terminal nos. 20 and 21 and earth.

No
Broken wire in the harness with no continuity.
Repair the harness.

Yes

Replace the engine-ECU.

Is a diagnosis code output by the TCL-ECU?

No
Engine-ECU is faulty.
Replace the engine-ECU.

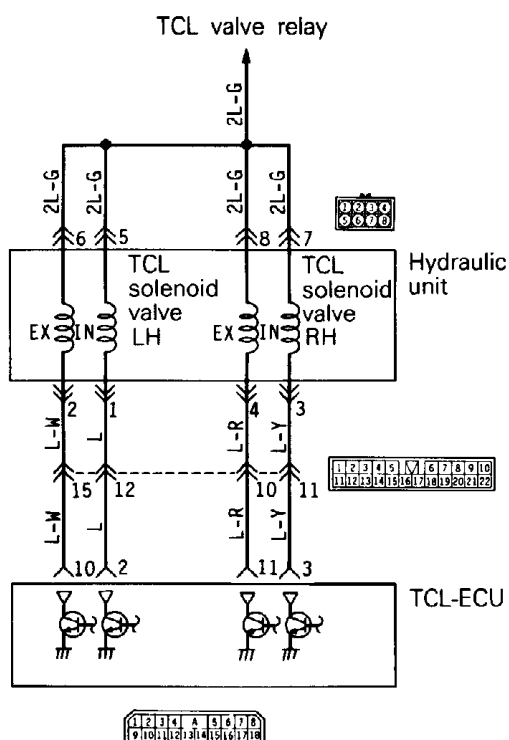
Yes

TCL-ECU is faulty.

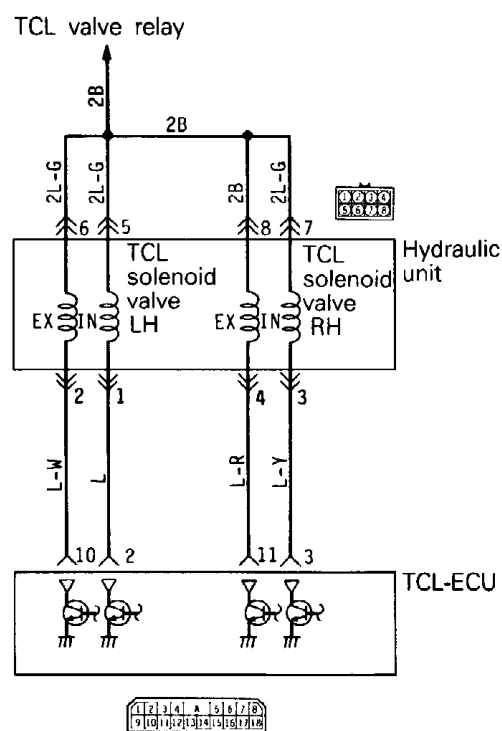
Replace the TCL-ECU.

G-14**When diagnosis code No. 51, no. 52, no. 53, or no. 54, is displayed**

Comment: These codes are displayed when a broken coil wire or short is diagnosed in the solenoid valve or the in the harness when the ignition key is "ON" and the TCL-ECU initial check shows that the solenoid valve is ON but no current is flowing, or the solenoid valve is OFF but current is flowing.

LH drive vehicles

14A0243

RH drive vehicles

14A0244

Disconnect the hydraulic unit connector and turn the ignition key to "ON".

Does battery voltage show between the hydraulic unit harness-side connector terminal No. 5, No. 6, No. 7 or No. 8 and the earth?

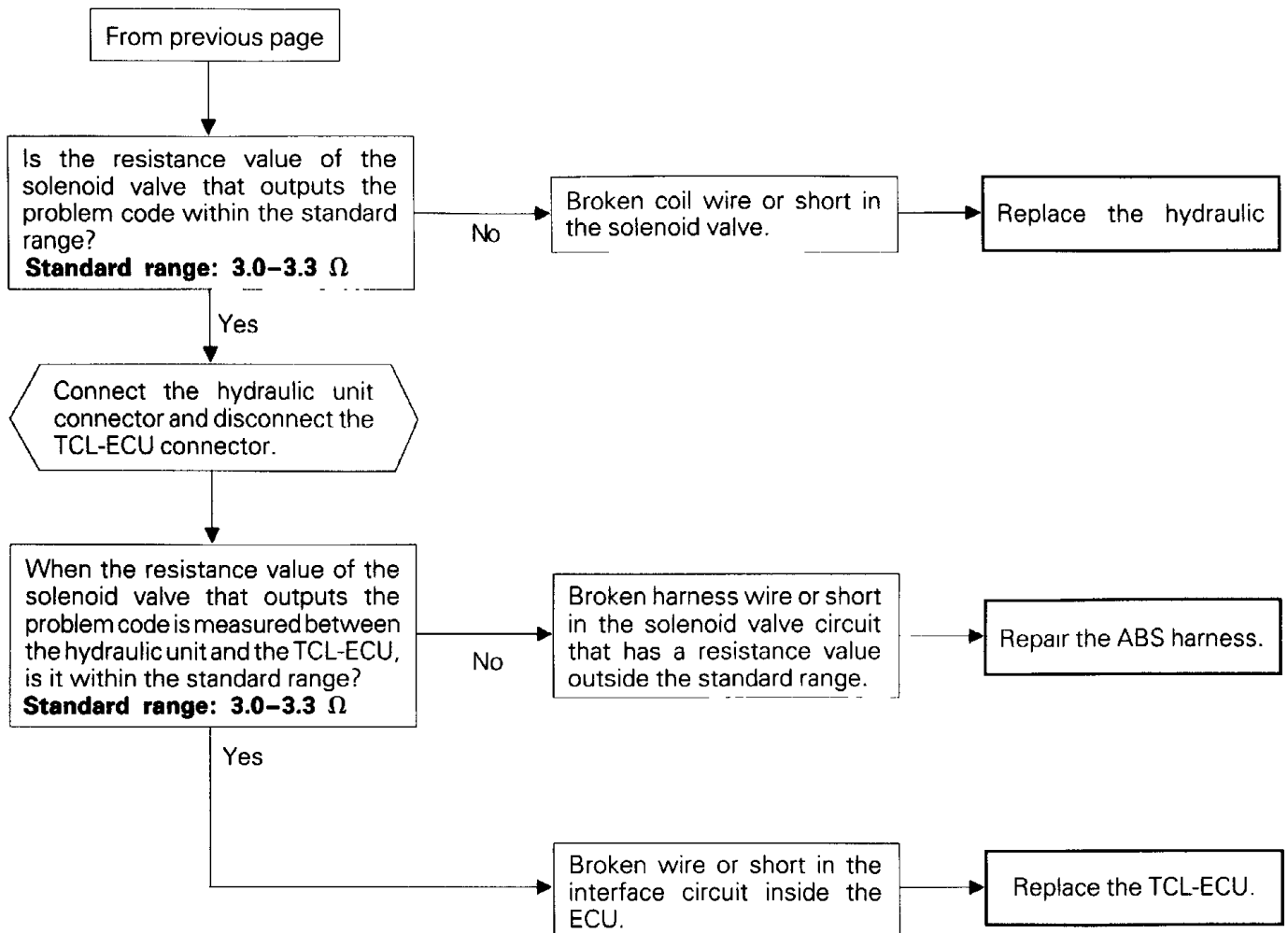
No

Broken harness wire between the TCL valve relay and the hydraulic unit.

Repair the harness.

Yes

To next page

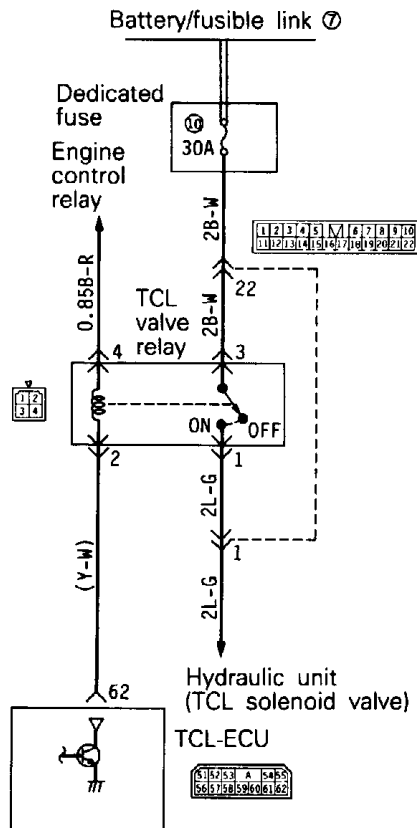


G-15 When diagnosis code No. 55 is displayed

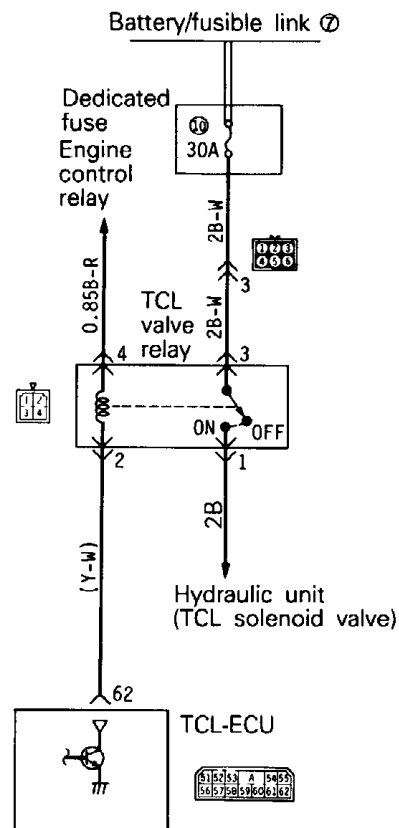
Comment: This problem code is displayed when the ignition key is "ON" and the TCL-ECU initial check shows that the TCL valve relay is ON but no power is supplied to the solenoid valve, or power is being supplied but none of the solenoid valves are operating.

Hint:

When diagnosis code No. 51, No. 52, No. 53 or No. 54 are displayed, inspect according to the troubleshooting for code No. 51, No. 52, No. 53 and No. 54.

LH drive vehicles

14A0240

RH drive vehicles

14A0241

Disconnect the TCL valve relay connector and turn the ignition key to "ON".

Does battery voltage show between the TCL valve relay harness-side connector terminal No. 3 and No. 4 and the earth?

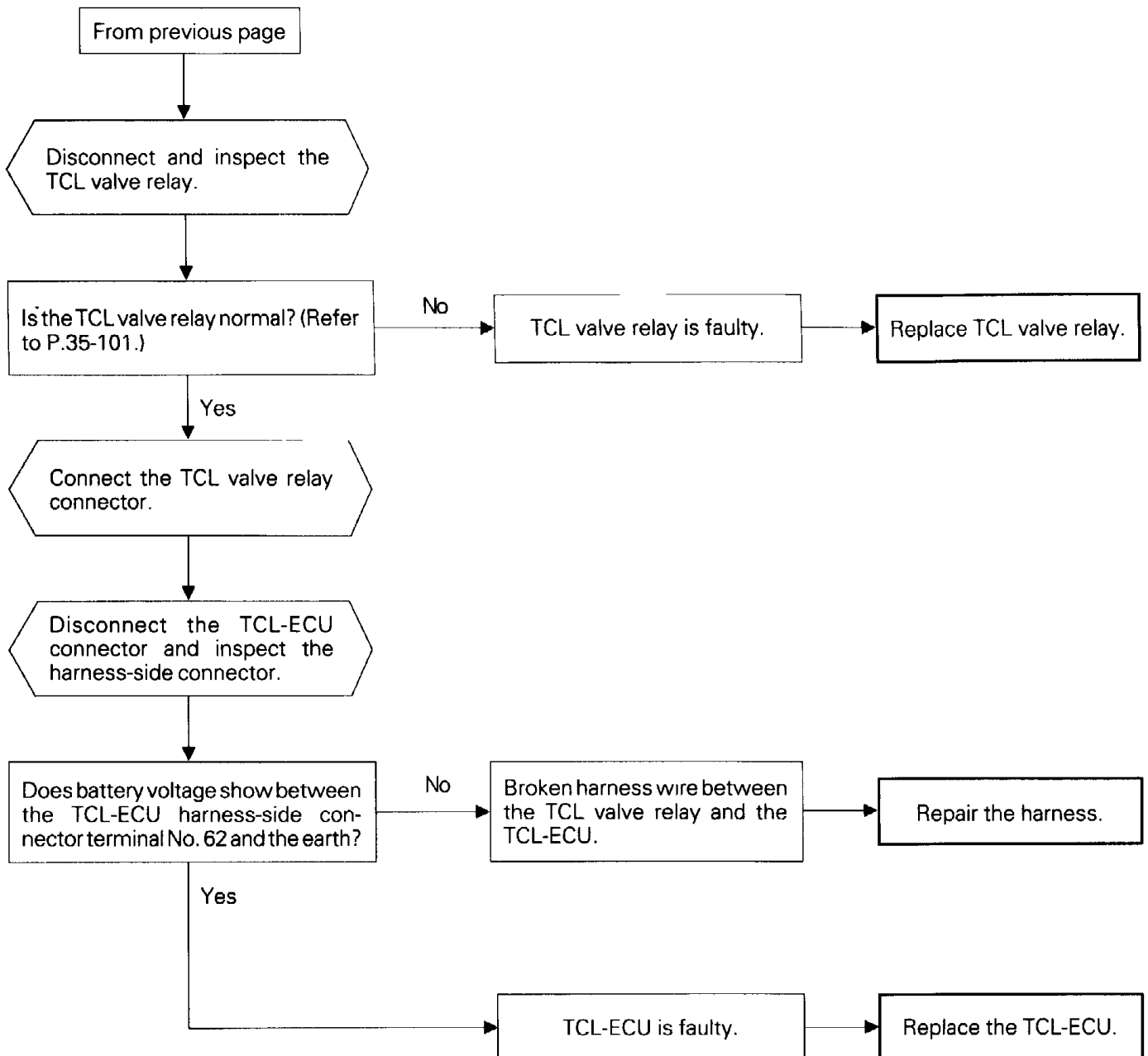
No

Broken harness wire between the engine control relay or fuse No. 10 and the TCL valve relay.

Repair the harness.

Yes

To next page



G-16 When diagnosis code No. 56 is displayed

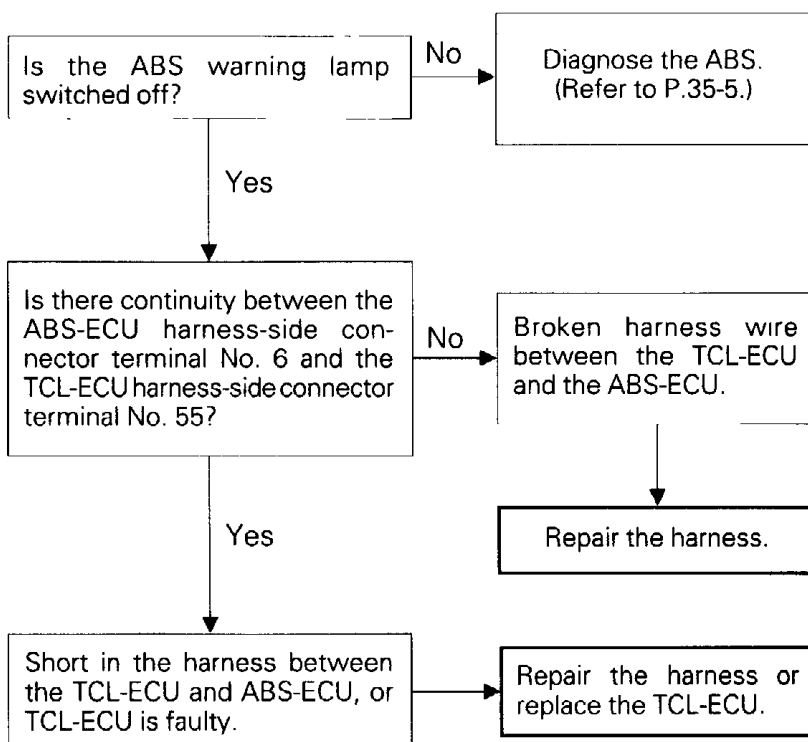
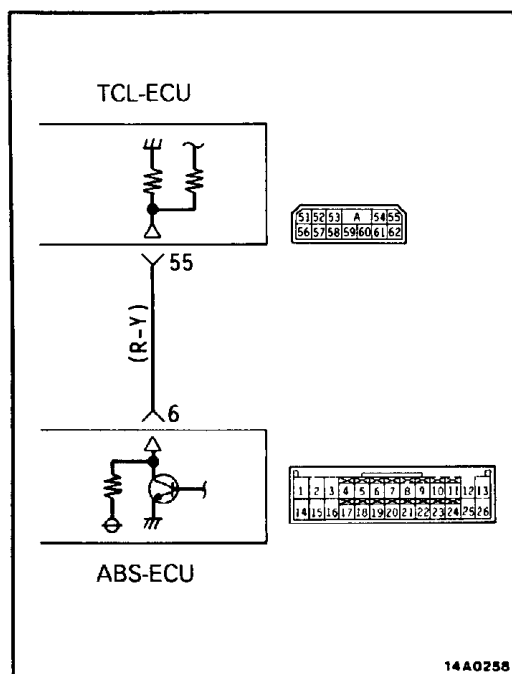
Comment: This problem code is displayed when the solenoid valve is ON (increase in pressure) for a longer than normal time when taking off on a slippery road surface, due to a faulty TCL-ECU interface circuit, etc.

Remedy: Inspect according to the troubleshooting for diagnosis code No. 51, No. 52, No. 53, No. 54 and No. 55, and if the TCL valve relay and solenoid valve are normal, the TCL-ECU is faulty and should be replaced.

G-17 When diagnosis code No. 61 is displayed

Comment: This problem code is displayed when the ABS signal during operation stays off for a long period of time (90 seconds or more), due to a broken harness wire or short between the TCL-ECU and the ABS-ECU, or if the ABS-ECU and TCL-ECU interface circuit is faulty.

Hint: If the ABS warning lamp remains off after the engine is started, it is probably caused by a broken harness wire or short between the ABS-ECU and the TCL-ECU.



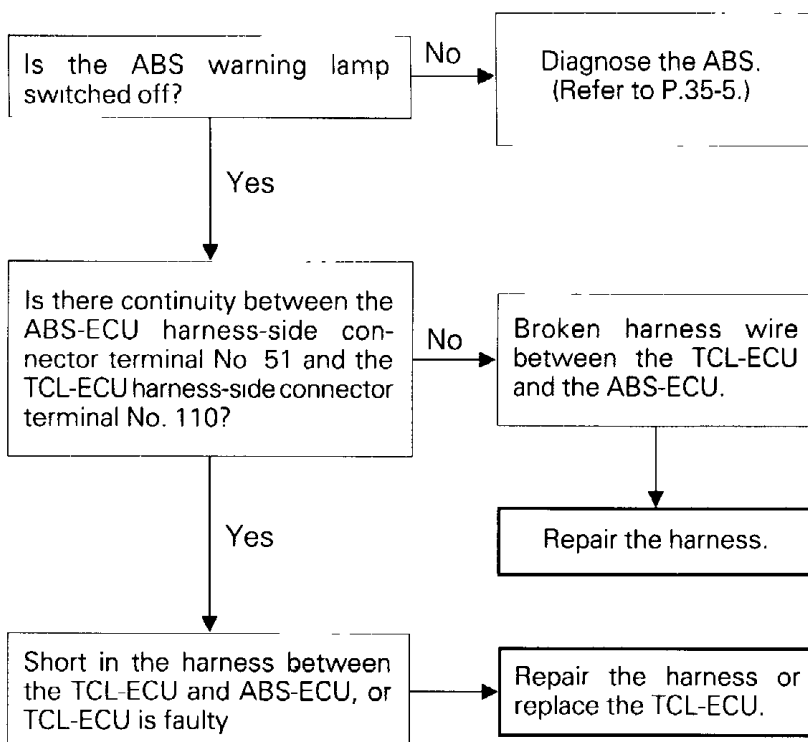
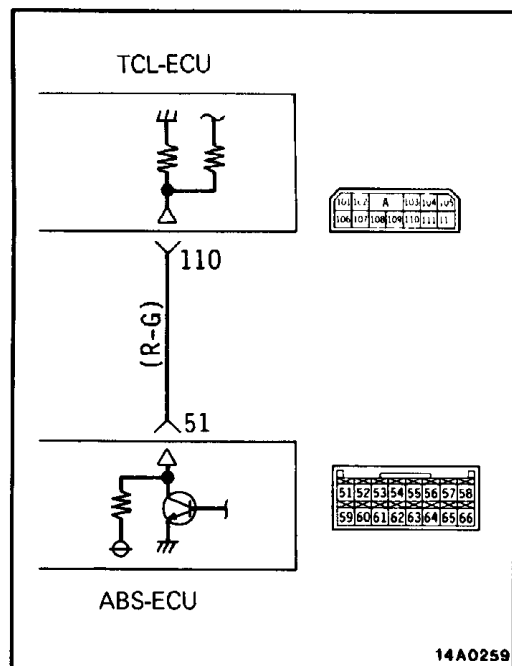
G-18 When diagnosis code No. 62 is displayed

Comment: This diagnosis code is displayed when the ignition key is "ON" and the TCL OFF indicator illuminates while the ABS-ECU is operating and the ABS warning lamp is illuminated.

If the condition returns to normal, this problem code will not be output.

Hint:

If the ABS warning lamp remains off after the engine is started, there is probably a broken harness wire or short between the ABS-ECU and the TCL-ECU.

**G-19 When diagnosis code No. 63 is displayed**

Comment: This problem code is displayed when the input signal for when ABS is operating (ABS 0 is the L signal), and the input signal for when ABS fails (ABS 1 is the L signal) are input by the TCL-ECU at the same time.

If the condition returns to normal, this problem code will not be output.

Remedy: Inspect according to troubleshooting for diagnosis code nos. 61 and 62.

4. DIAGNOSIS FLOW CHART II

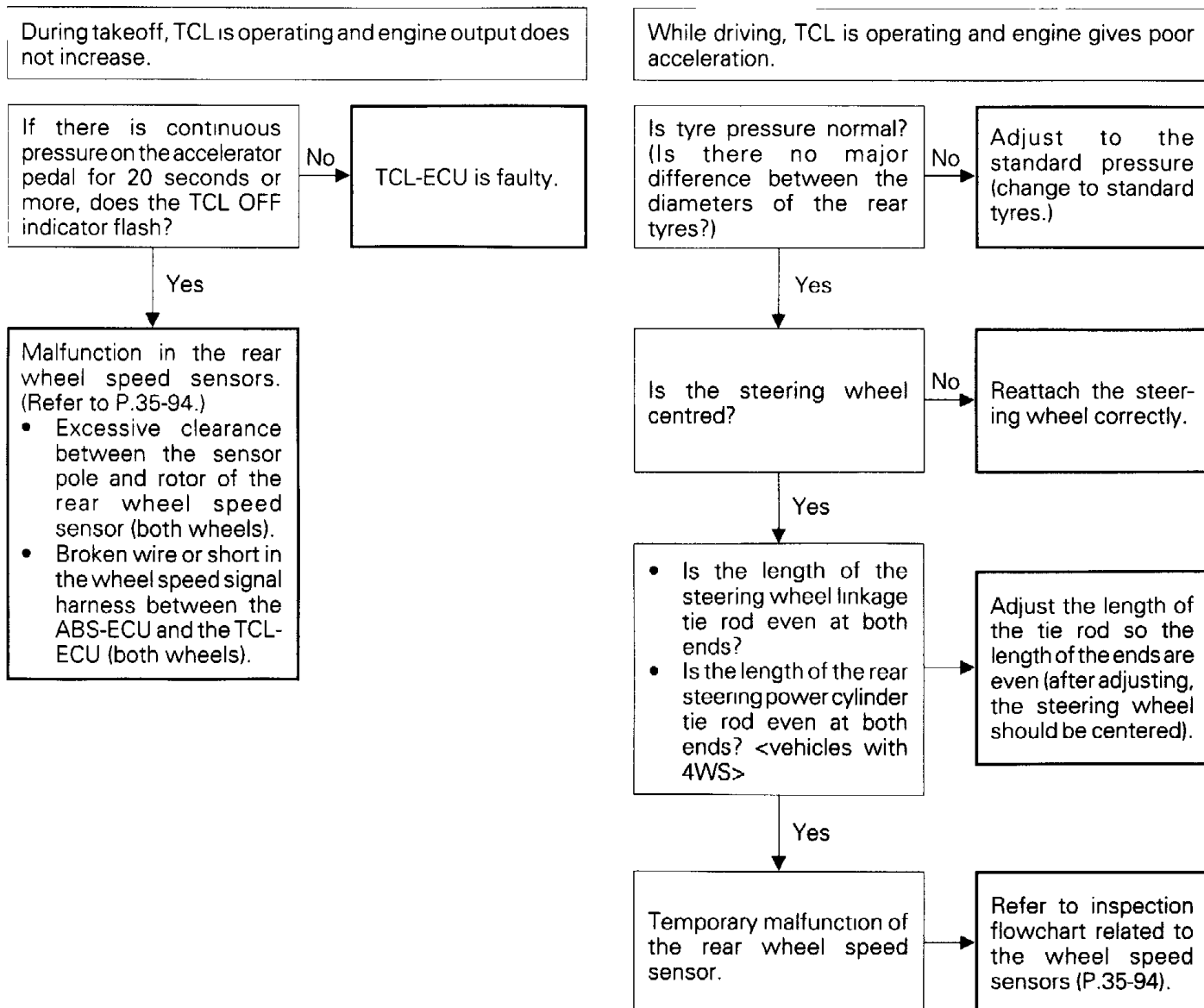
3. When driving in an area where TCL would not operate, the TCL indicator (green) illuminates and takeoff is impossible or engine gives poor acceleration.
4. In an area where TCL should operate, it does not operate [TCL indicator (green) does not illuminate].

Comment: The TCL control unit only detects the causes of nearly all of the above problems for a short time by its self diagnosis function, but the detection time for the following problems is long, so until the TCL OFF indicator starts flashing and a problem code is output, sometimes one

of the above problems can develop. Also, if there is a disagreement between the input value from the steering wheel sensor and the actual steering angle, the trace control will operate, even in areas where the TCL would not normally operate.

After checking if the problem reoccurs, inspect according to the following procedure.

3. When driving in an area where TCL would not operate, the TCL indicator (green) illuminates and takeoff is impossible or engine gives poor acceleration.

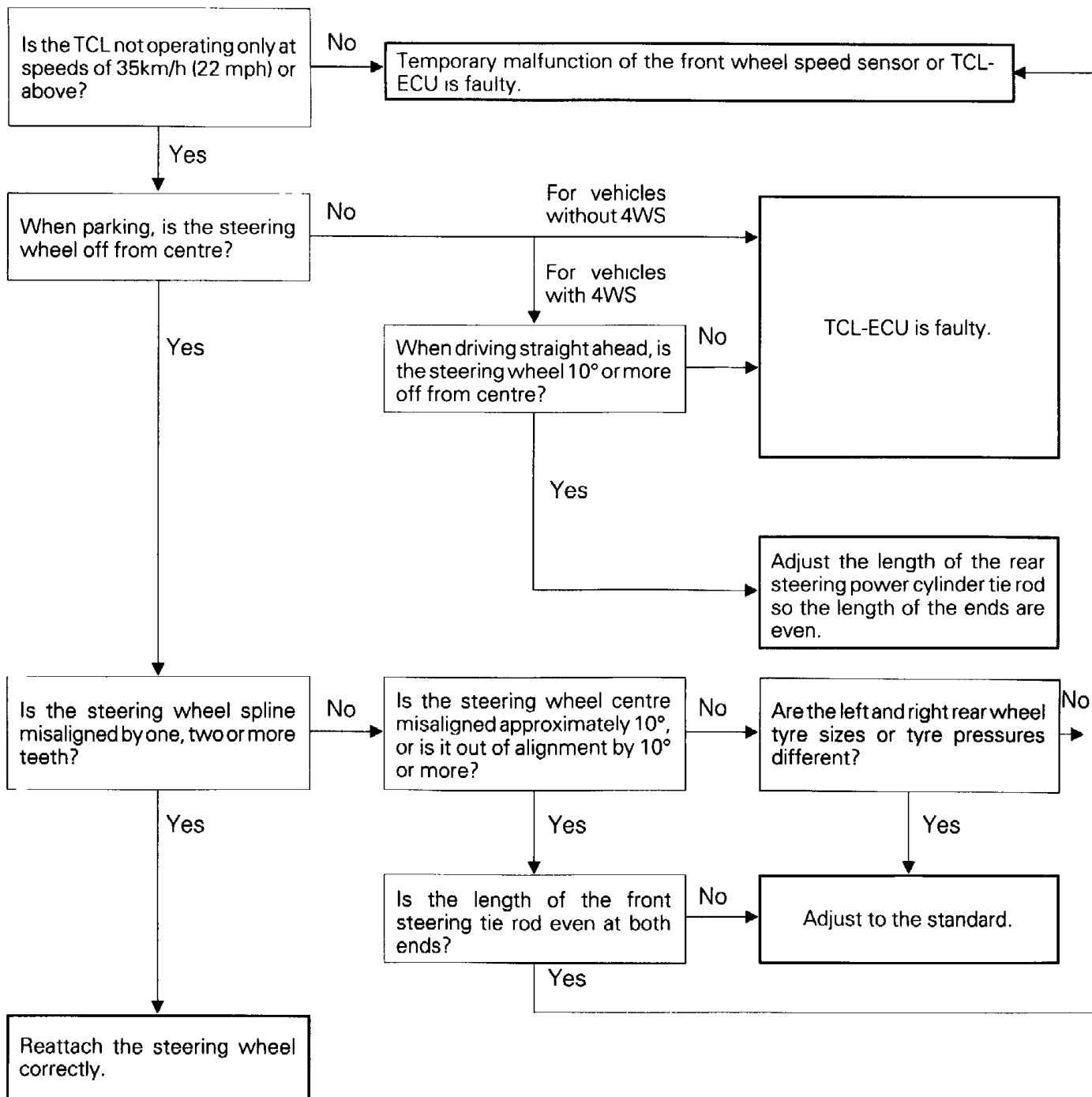


4. In an area where TCL should operate, it does not operate [TCL indicator (green) does not illuminate].

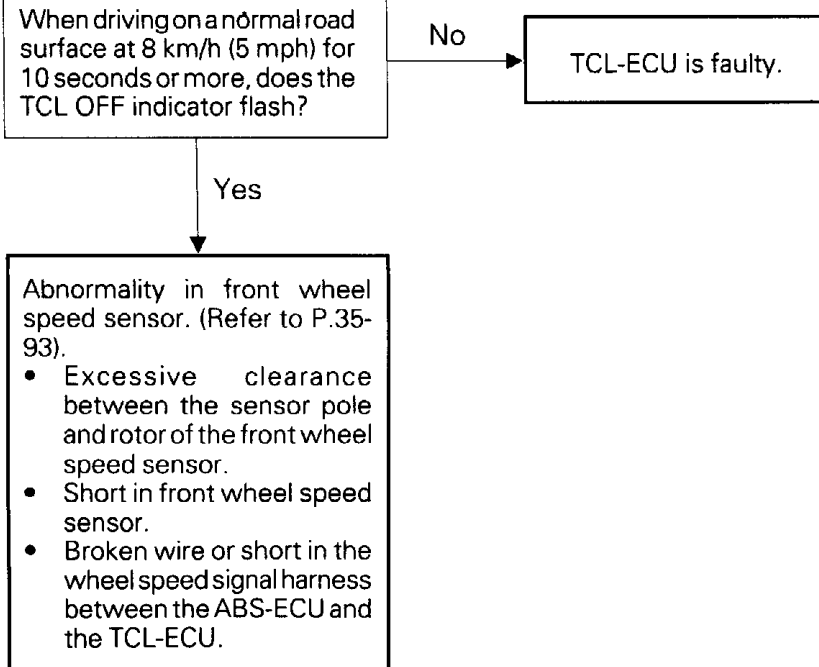
NOTE

This inspection flowchart is suitable for use if the ignition key is "ON" and the TCL OFF indicator illuminates, and then switches off after the engine is started.

When accelerating during turning on normal road surfaces and the TCL does not operate.



When taking off on a slippery road surface and TCL does not operate.

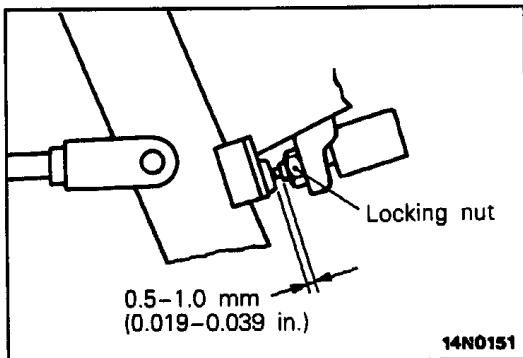
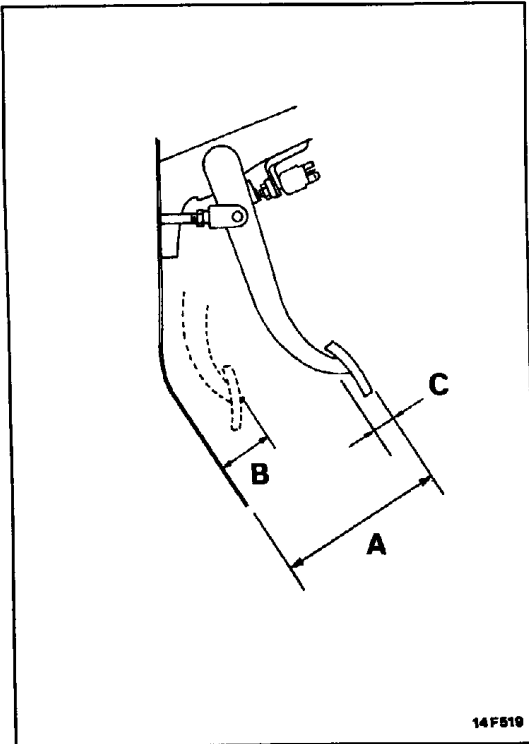


SERVICE ADJUSTMENT PROCEDURES

E35FAAH

BRAKE PEDAL INSPECTION AND ADJUSTMENT

1. Measure the brake pedal height (A) as illustrated.
Standard value (A): 176–181 mm (6.9–7.1 in.)
2. Start the engine, depress the brake pedal with approximately 500 N (50 kg, 110 lbs.) of force, and measure the clearance between the brake pedal and the floorboard.
Standard value (B): 85 mm (3.35 in.) or more
3. While the engine is stopped, depress the brake pedal two or three times. After thus eliminating the vacuum in the brake booster, press the pedal down by hand, and confirm that the free play (C) is within the standard value range.
Standard value (C): 3–8 mm (0.12–0.31 in.)



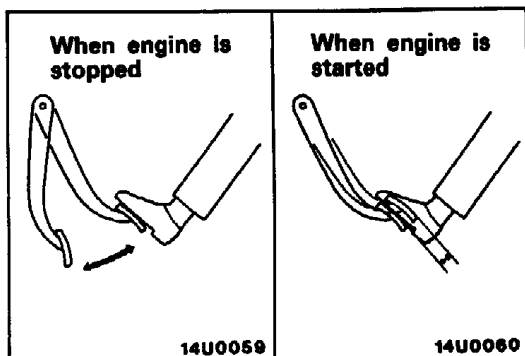
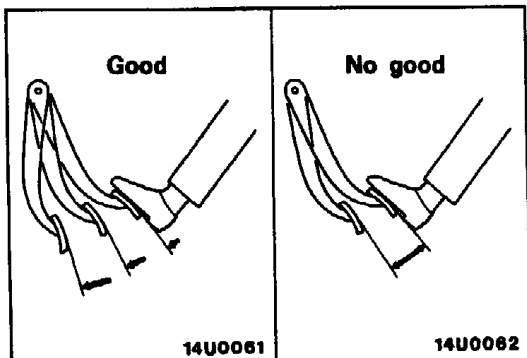
4. Adjust the brake pedal height
 - (1) Sufficiently loosen the stop lamp switch by loosening lock nut.
 - (2) Adjust the brake pedal height by turning the operating rod with pliers (with locking nut loosened).
 - (3) After turning the stop lamp switch until it contacts the pedal stop (until immediately before the brake pedal begins to move), turn the stop lamp switch back 1/2 to 1 revolution and secure with a lock nut.

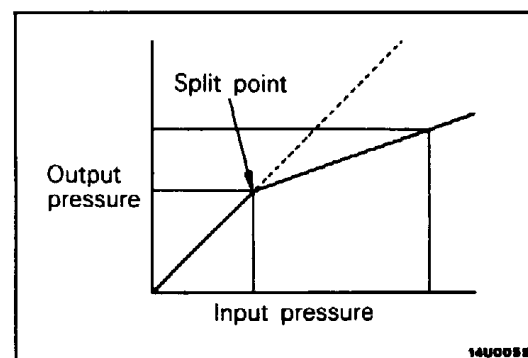
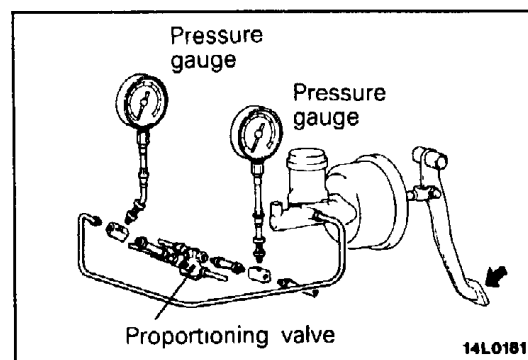
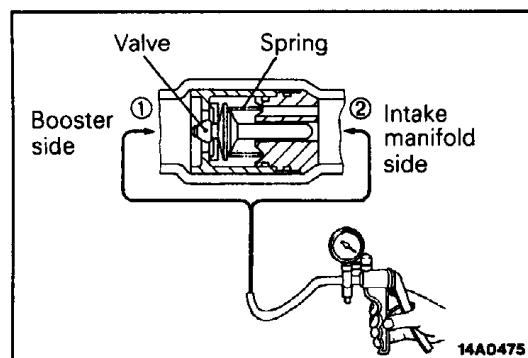
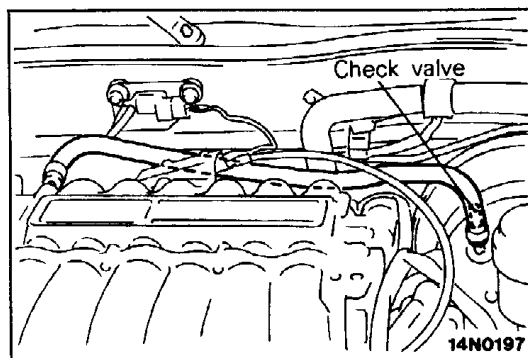
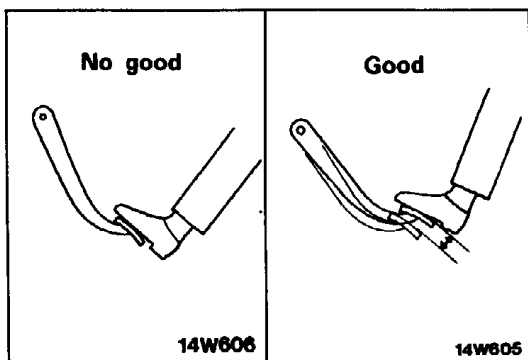
BRAKE BOOSTER OPERATING TEST

E35FCAA

For simple checking of the brake booster operation, carry out the following tests:

1. Run the engine for one or two minutes, and then stop it. If the pedal depresses fully the first time but gradually becomes higher when depressed succeeding times, the booster is operating properly; if the pedal height remains unchanged, the booster is defective.
2. With the engine stopped, step on the brake pedal several times. Then step on the brake pedal and start the engine. If the pedal moves downward slightly, the booster is in good condition. If there is no change, the booster is defective.





- With the engine running, step on the brake pedal and then stop the engine.

Hold the pedal depressed for 30 seconds. If the pedal height does not change, the booster is in good condition, if the pedal rises, the booster is defective.

If the above three tests are okay, the booster performance can be determined as good.

If one of the above three tests is not okay at last, the check valve, vacuum hose, or booster will be defective.

CHECK VALVE OPERATION CHECK

E36FEA1

When checking the check valve, keep the check valve fit in the vacuum hose.

- Remove the vacuum hose.

NOTE

The check valve is press-fit inside the vacuum hose.

- Check the operation of the check valve by using a vacuum pump.

Vacuum pump connection	Accept/reject criteria
Connection at the brake booster side ①	A negative pressure (vacuum) is created and held.
Connection at the intake manifold side ②	A negative pressure (vacuum) is not created.

Caution

If the check valve is defective, replace it as an assembly unit together with the vacuum hose.

PROPORTIONING VALVE FUNCTION TEST

E35FKC1

- Connect two pressure gauges, one each to the input side and output side of the proportioning valve, as shown.
- Air bleed the brake line and the pressure gauge.
- While gradually depressing the brake pedal, make the following measurements and check to be sure that the measured values are within the allowable range.
 - (1) Output pressure begins to drop relative to input pressure (split point).

Standard value: 3.75–4.25 MPa

(37.5–42.5 kg/cm², 533–604 psi)

- (2) Output fluid pressure when input fluid pressure is 8.0 MPa (80 kg/cm², 1,138 psi).

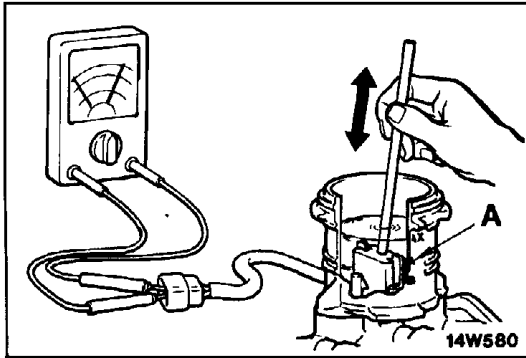
Standard value: 4.75–5.25 MPa

(47.5–52.5 kg/cm², 676–747 psi)

- (3) Output pressure difference between left and right brake lines

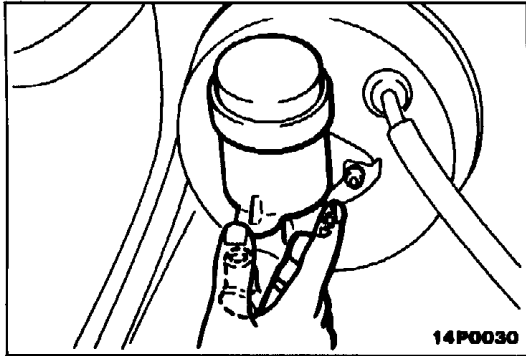
Limit: 0.4 MPa (5 kg/cm², 57 psi)

- If the measured pressures are not within the permissible ranges, replace the proportioning valve.

**BRAKE FLUID LEVEL SENSOR CHECK**

E35FBAG

The brake fluid level sensor is in good condition if there is no continuity when the float surface is above "A", and if there is continuity when the float surface is below "A".

**BLEEDING**

E35FYAJ

Caution

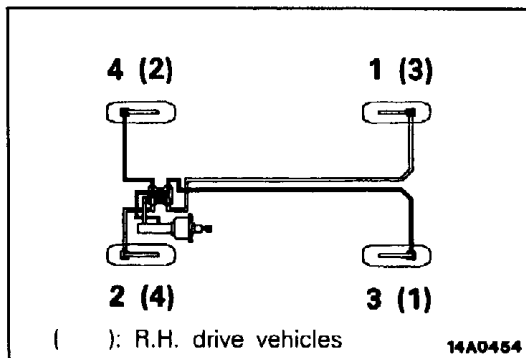
Use the specified brake fluid. Avoid using a mixture of the specified brake fluid and other fluid.

Specified brake fluid: DOT3 or DOT4

BLEEDING OF MASTER CYLINDER

The master cylinder used has no check valve, so if bleeding is carried out by the following procedure, bleeding of air from the brake pipeline will become easier. (When brake fluid is not contained in the master cylinder.)

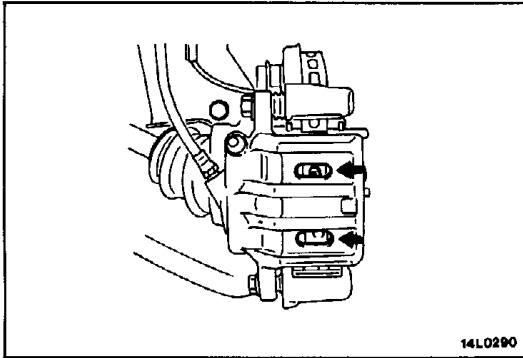
- (1) Fill the reserve tank with brake fluid.
- (2) Keep the brake pedal depressed.
- (3) Have another person cover the master cylinder outlet with a finger.
- (4) With the outlet still closed, release the brake pedal.
- (5) Repeat steps 2. – 4. three or four times to fill the inside of the master cylinder with brake fluid.

**BLEEDING OF BRAKE PIPE LINE**

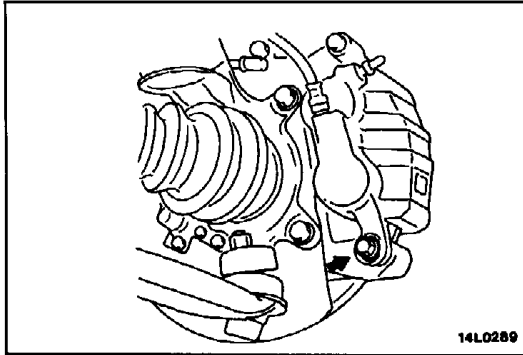
Start the engine and bleed the air in the sequence shown in the figure.

Caution

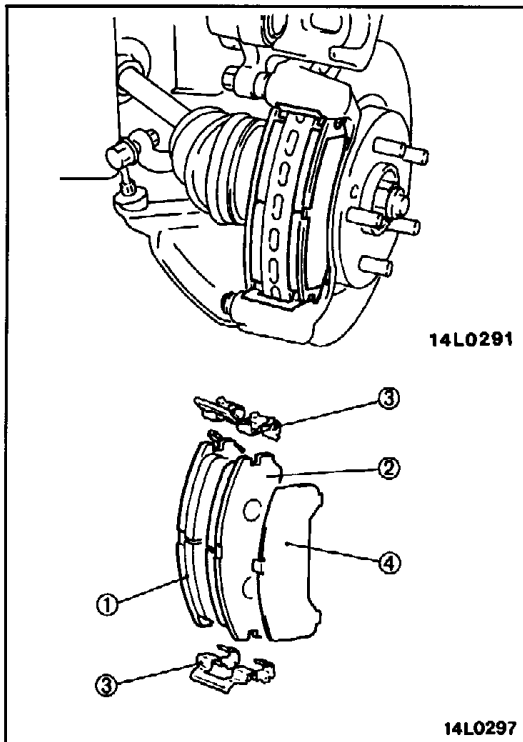
For vehicles with ABS, be sure to install a filter to the master cylinder reservoir tank when supplying brake fluid.



14L0290

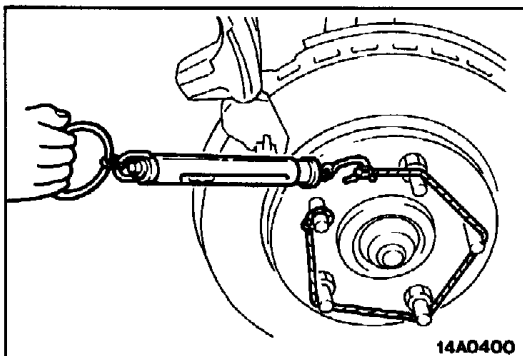


14L0289



14L0291

14L0297



14A0400

FRONT DISC BRAKE PAD CHECK AND REPLACE- MENT

E36FQAJa

1. Check brake pad thickness through caliper body check port.

Standard value: 10.0 mm (0.39 in.)

Limit: 2.0 mm (0.08 in.)

Caution

1. When the limit is exceeded, replace the pads at both sides, and also the brake pads for the wheels on the opposite side at the same time.
2. If there is a significant difference in the thicknesses of the pads on the left and right sides, check the sliding condition of the piston, lock pin and guide pin.
2. Remove guide pin. Lift caliper assembly and retain with wires.

Caution

Do not wipe off the special grease that is on the guide pin or allow it to contaminate the lock pin.

3. Remove the following parts from caliper support.

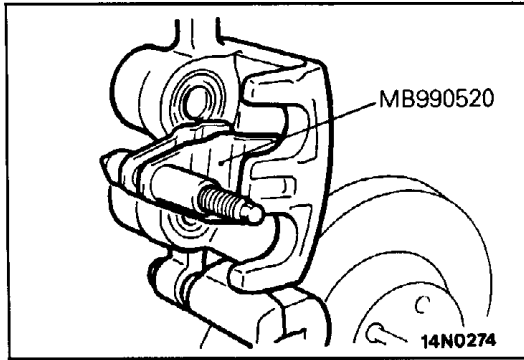
- ① Pad & wear indicator assembly
- ② Pad assembly
- ③ Clip
- ④ Outer shim

4. In order to measure the disc brake drag torque after pad installation, use a spring balance to measure the rotation sliding resistance of the hub in the forward direction with the pads removed.

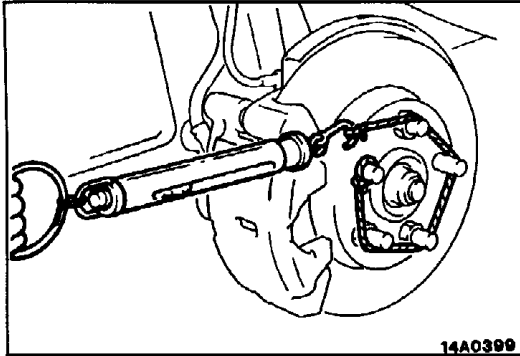
NOTE

Tighten the nuts in order to secure the disc to the hub.

5. Securely attach the pad clip to the caliper support.



6. Clean piston and insert into cylinder with special tool.
7. Be careful that the piston boot does not become caught, when lowering the caliper assembly and install the guide pin.



8. Start the engine, and after depressing the brake pedal hard two or three times, stop the engine.
9. Turn brake disc forward 10 times.
10. Use a spring balance to measure the rotation sliding resistance of the hub in the forward direction.

11. Calculate the drag torque of the disc brake (difference between measured values in 10 and 4).

Standard value: 70 N (7.0 kg, 15.4 lbs.) or less
[4 Nm (0.4 kgm, 3 ft.lbs.)] or less

12. If the disc brake drag force exceeds the standard value, disassemble piston and clean the piston. Check for corrosion or worn piston seal, and check the sliding condition of the lock pin and guide pin.

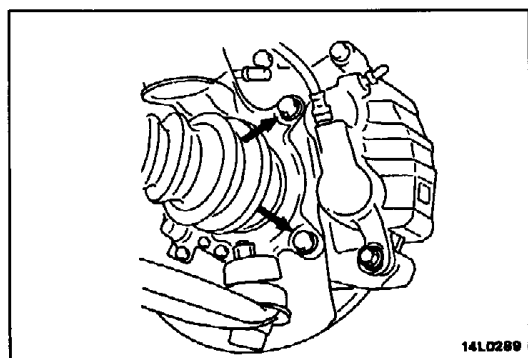
FRONT DISC BRAKE ROTOR INSPECTION

CAUTION

When servicing disc brakes, it is necessary to exercise caution to keep the disc brakes within the allowable service values in order to maintain normal brake operation.

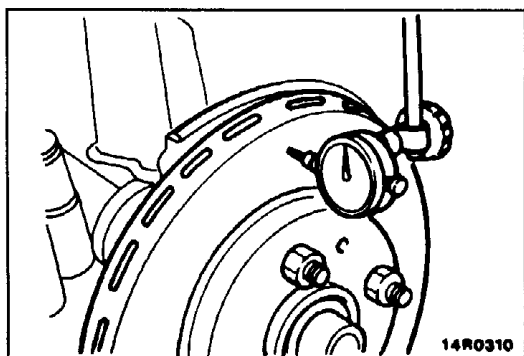
Before re-finishing or re-processing the brake disc surface, the following conditions should be checked.

Inspection items	Remarks
Scratches, rust, saturated lining materials and wear	• If the vehicle is not driven for a certain period, the sections of the discs that are not in contact with lining will become rusty, causing noise and shuddering. • If grooves resulting from excessive disc wear and scratches are not removed prior to installing a new pad assembly, there will momentarily be inappropriate contact between the disc and the lining (pad).
Run-out or drift	Excessive run-out or drift of the discs will increase the pedal depression resistance due to piston knock-back.
Change in thickness (parallelism)	If the thickness of the disc changes, this will cause pedal pulsation, shuddering and surging.
Inset or warping (flatness)	Overheating and improper handling while servicing will cause inset or warping.

**RUN-OUT CHECK**

E35F8AE

1. Remove the caliper support; then raise the caliper assembly upward and secure by using wire.
2. Inspect the disc surface for grooves, cracks, and rust. Clean the disc thoroughly and remove all rust.



3. Place a dial gauge approximately 5 mm (0.2 in.) from the outer circumference of the brake disc, and measure the runout of the disc.

Limit:

<Vehicles built up to July, 1991>

0.08 mm (0.0031 in.) or less

<Vehicles built from August, 1991>

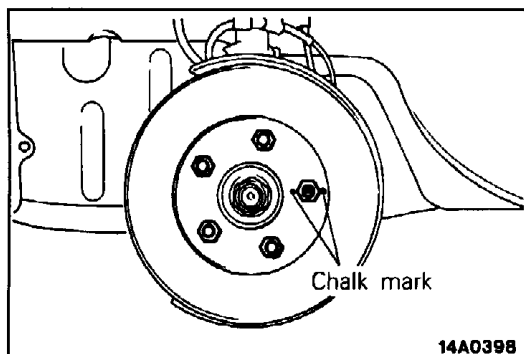
0.03 mm (0.0012 in.) or less

NOTE

Tighten the nuts in order to secure the disc to the hub.

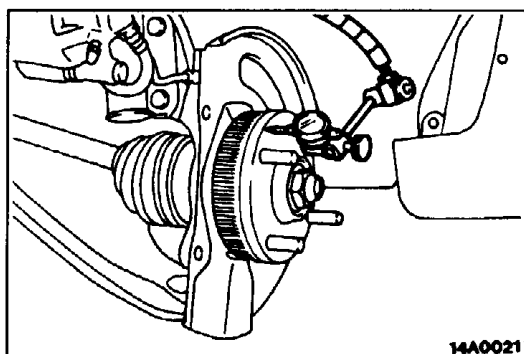
RUN-OUT CORRECTION

E35FTAAb



1. If the run-out the brake disc is equivalent to or exceeds the limit specification, change the phase of the disc and hub, and then measure the run-out again.

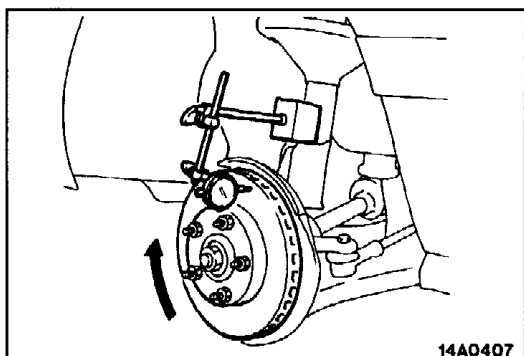
(1) Before removing the brake disc, chalk both sides of the wheel stud on the side at which run-out is greatest.



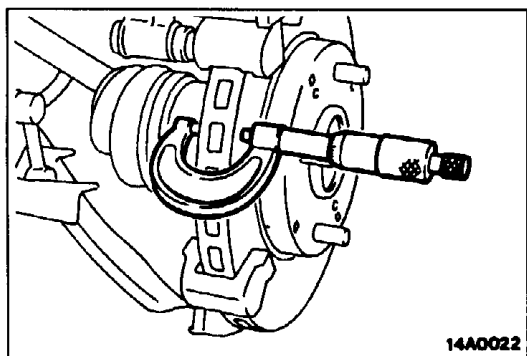
- (2) Remove the brake disc, and then place a dial gauge as shown in the illustration; then move the hub in the axial direction and measure the play.

Limit: 0.05 mm (0.0020 in.)

If the play is equivalent to or exceeds the limit, disassemble the hub knuckle and check each part.



- (3) If the play does not exceed the limit specification, install the brake disc at a position 180° away from the chalk mark, and then check the run-out of the brake disc once again.
2. If the run-out cannot be corrected by changing the phase of the brake disc, replace the brake disc or turn rotor with on the car type brake lathe ("MAD, DL-8700PF" or equivalent).



THICKNESS CHECK

1. Using a micrometer, measure disc thickness at eight positions, approximately 45° apart and 10 mm (0.39 in.) in from the outer edge of the disc.

Brake disc thickness

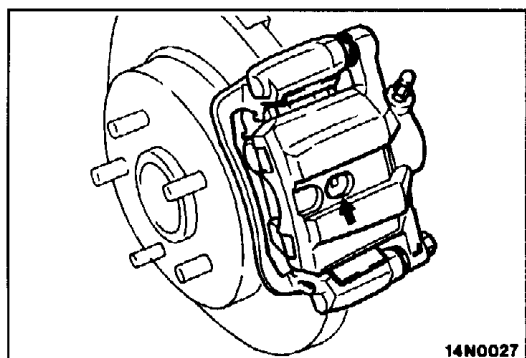
Standard value: 24 mm (0.94 in.)

Limit: 22.4 mm (0.88 in.)

Thickness variation (at least 8 position)

The difference between any thickness measurements should not be more than 0.015 mm (0.0006 in.).

2. If the disc is beyond the limits for thickness, remove it and install a new one. If thickness variation exceeds the specification, replace the brake disc or turn rotor with on the car type brake lathe ("MAD, DL-8700PF" or equivalent).



REAR DISC BRAKE PAD CHECK AND REPLACEMENT

E35FUAE

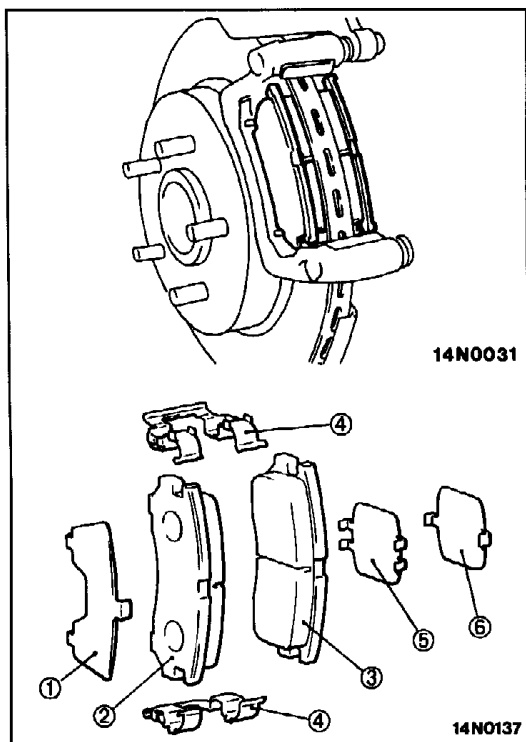
1. Check brake pad thickness through caliper body check port.

Standard value: 10.0 mm (0.39 in.)

Limit: 2.0 mm (0.08 in.)

Caution

1. When the limit is exceeded, replace the pads at both sides, and also the brake pads for the wheels on the opposite side at the same time.
2. If there is a significant difference in the thicknesses of the pads on the left and right sides, check the sliding condition of the piston, lock pin sleeve and guide pin sleeve.



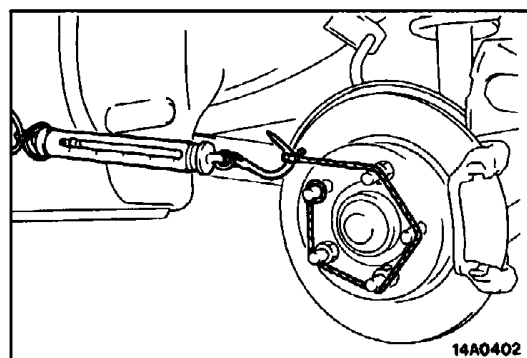
2. Remove guide pin. Lift caliper assembly and retain with wires.

Caution

Do not wipe off the special grease that is on the guide pin or allow it to contaminate the guide pin.

3. Remove the following parts from caliper support.

- ① Outer shim
- ② Pad assembly
- ③ Pad & wear indicator assembly
- ④ Clip
- ⑤ Inner shim A
- ⑥ Inner shim B



4. In order to measure the disc brake drag torque after pad installation, use a spring balance to measure the rotation sliding resistance of the hub in the forward direction with the pads removed.

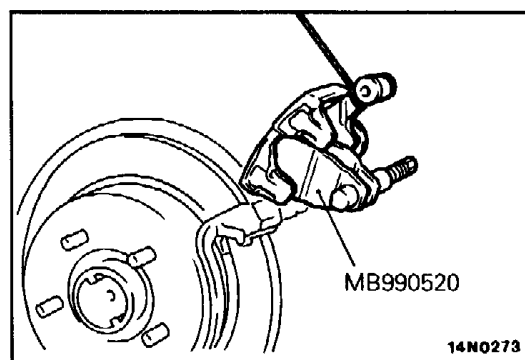
NOTE

To secure the disc to the hub, tighten the nuts.

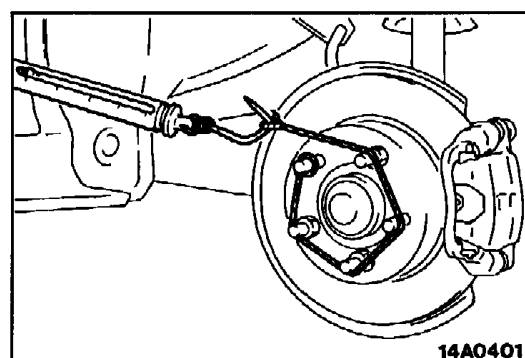
5. Securely attach the pad clip to the caliper support.

Caution

Do not deposit grease or other dirt on pad or brake disc friction surfaces.



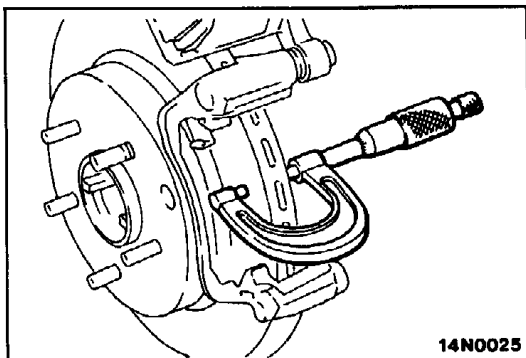
6. Clean the piston; then use the special tool to thread the piston into the cylinder.
7. Be careful that the piston boot does not become caught, when lowering the caliper assembly and install the lock pin.



8. Start the engine, and after depressing the brake pedal hard two or three times, stop the engine.
9. Turn brake disc forward 10 times.
10. Use a spring balance to measure the rotation sliding resistance of the hub in the forward direction.
11. Calculate the drag torque of the disc brake (difference between measured values in 10 and 4).

**Standard value: 70 N (7.0 kg, 15.4 lbs.) or less
[4 Nm (0.4 kgm, 3 ft.lbs.)] or less**

12. If the disc brake drag force exceeds the standard value, disassemble piston and clean piston. Check for corrosion or worn piston seal, and check the sliding condition of the lock pin and guide pin.



REAR BRAKE DISC THICKNESS CHECK

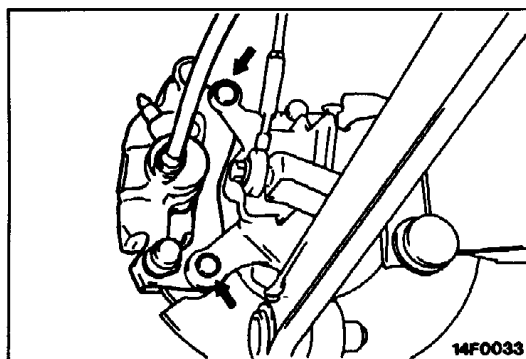
E35FVAB

1. Remove dirt and rust from brake disc surface.
2. Measure disc thickness at 4 locations or more.

Standard value: 18.0 mm (0.71 in.)

Limit: 16.4 mm (0.65 in.)

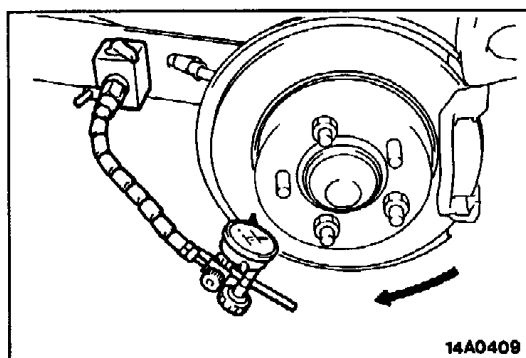
Replace the discs and pad assembly for both sides left and right of the vehicle if they are worn beyond the specified limit.



REAR BRAKE DISC RUN-OUT CHECK

E35FWAB

1. Remove the caliper support, raise the caliper assembly, and secure it by using a wire, etc.



2. Place a dial gauge approximately 5 mm (0.2 in.) from the outer circumference of the brake disc, and measure the run-out of the disc.

Limit: 0.08 mm (0.0031 in.) or less

NOTE

To secure the disc to the hub, tighten the nuts.

REAR BRAKE DISC RUN-OUT CORRECTION

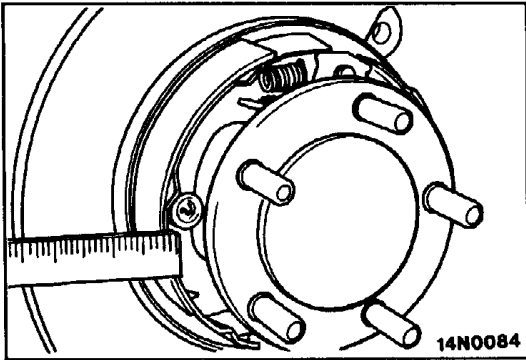
E36FLAA

1. If the run-out of the brake disc is equivalent to or exceeds the limit specification, change the phase of the disc and hub, and then measure the run-out again.

NOTE

The procedures for checking by changing the installation phase of the disc are the same as those for the front brake discs. (Refer to P.35-90.)

2. If the problem cannot be corrected by changing the phase of the brake disc, replace the disc.

**BRAKE LINING THICKNESS CHECK**

E35FFAC

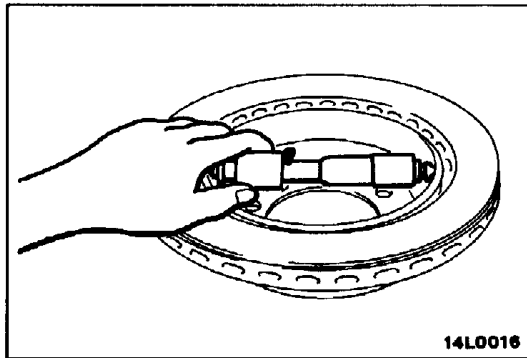
1. Remove the rear brake assembly, raise the rear brake assembly and secure it by using a wire, etc.
2. Remove the brake drum.
3. Measure the wear of the brake lining at the place worn the most.

Standard value: 2.8 mm (0.11 in.)**Limit: 1.0 mm (0.04 in.)**

4. Replace the shoe and lining assembly if brake lining thickness is less than the limit if it is not worn evenly.

Caution

Whenever the shoe and lining assembly is replaced, replace both RH and LH assemblies as a set to prevent car from pulling to one side when braking.

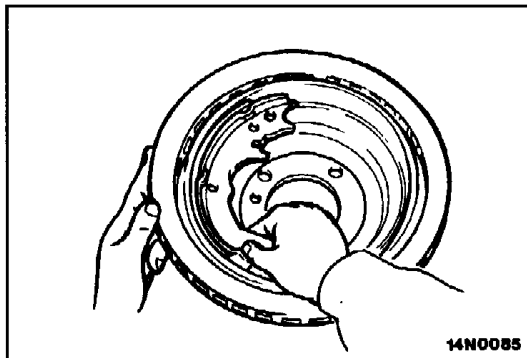
**BRAKE DRUM INSIDE DIAMETER CHECK**

E35FGAC

1. Remove the rear brake assembly, raise the rear brake assembly and secure it by using a wire, etc.
2. Remove the brake drum.
3. Measure the inside diameter of the hub and drum at two or more locations.

Standard value: 168 mm (6.6 in.)**Limit: 169 mm (6.7 in.)**

4. Replace brake drums and shoe and lining assembly when wear exceeds the limit value or is badly imbalanced.

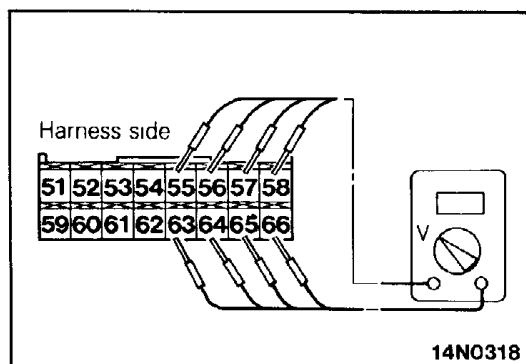
**BRAKE LINING AND BRAKE DRUM CONNECTION CHECK**

E35FLAC

1. Remove the rear brake assembly, raise the rear brake assembly and secure it by using a wire, etc.
2. Remove the brake drum.
3. Remove the shoe and lining assembly.
4. Chalk inner surface of brake drum and rub with shoe and lining assembly.
5. Replace shoe and lining assembly or brake drums if very irregular contact area.

NOTE

Clean of chalk after check.



CHECKING OPERATION OF THE ABS (ANTI-LOCK BRAKING SYSTEM)

WHEEL SPEED SENSOR OUTPUT VOLTAGE CHECK

E35FPAM

1. Check that the clearance between the wheel speed sensor and the rotor are within the standard values.
2. Raise up the wheels and release the parking brake.
3. Remove the control unit harness connector and measure from the harness side connector.

Caution

Be sure to remove the connector double lock and insert the probe into the harness side. Inserting it into the terminal side will result in a bad connection.

4. Rotate the wheel to be measured at approximately 1/2 – 1 rotations per second, and check the output voltage using a circuit tester or an oscilloscope.

Front		Rear	
LH	RH	LH	RH
58	56	55	57
66	64	63	65

Output voltage

When measuring with a circuit tester:

70 mV or more

When measuring with an oscilloscope:

200 mV p-p or more

5. If the output voltage is lower than the above values, the reason could be as follows:
 - Excessive clearance between the wheel speed sensor pole piece and the rotor.
 - Faulty wheel speed sensor.
 so adjust the wheel speed sensor or replace it.

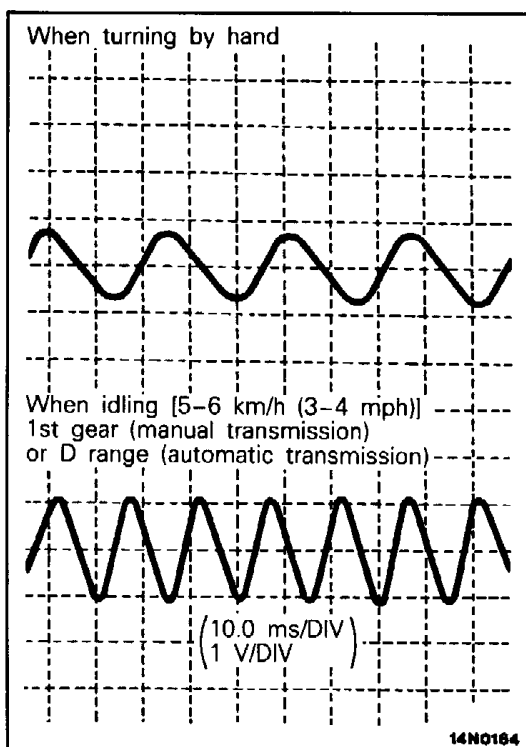
INSPECTING WAVE FORMS WITH AN OSCILLOSCOPE

Use the following method to observe the output voltage wave form from each wheel sensor with an oscilloscope.

Start the engine, and rotate the front wheels by engaging 1st gear (vehicles with manual transmission) or D range (vehicles with automatic transmission). Turn the rear wheels manually so that they rotate at a constant speed.

NOTE

1. Check the connection of the sensor harness and connector before using the oscilloscope.
2. The wave form measurements can also be taken while the vehicle is actually moving.
3. The output voltage will be small when the wheel speed is low, and similarly it will be large when the wheel speed is high.



WAVE OBSERVATION POINTS

Phenomenon	Cause	Suggested remedy
Wave amplitude is too small, or doesn't appear at all.	Wheel speed sensor is faulty.	Replace the sensor.
	Wrong clearance between the pole piece and rotor.	Adjust the clearance.
Excessive variation in the wave amplitude. (However, if the lowest amplitude occurs at 100mV or above, there is no problem.)	Excessive runout or eccentricity in the axle hub.	Replace the hub.
Noise or interference in the wave pattern.	Broken sensor wire.	Replace the sensor.
	Broken harness wire.	Repair the harness.
	Faulty wheel speed sensor attachment.	Repair the sensor attachment.
	Chipped or broken rotor teeth.	Replace the rotor.

NOTE

As the wheel speed sensor cable moves in conjunction with the movement of the front and rear suspension, the wires might break while driving on rough roads, but may have continuity while driving on normal roads. Accordingly, when measuring the wave pattern of the wheel speed sensor voltage, output, take a measurement while shaking the sensor harness to simulate the special conditions of a rough road.

INSPECTION OF THE ABS HYDRAULIC SYSTEM

E35FPAN

INSPECTION USING THE BRAKING FORCE TESTER

NOTE

1. The roller of the braking force tester and the tyre should be dry during testing.
2. When testing the front brakes, apply the parking brake, and when testing the rear brakes, stop the front wheels by chocking them.
1. Place the front wheel or the rear wheel on the rollers of the braking force tester.
2. Turn the ignition key to the OFF position and set the multi-use tester as shown in the diagram.

Caution

Connection and disconnection of the multi-use tester should always be made with the ignition switch in the OFF position.

3. After checking that the selector lever is in neutral, start the engine.

Caution

At this time, check that the ABS warning lamp illuminates for a brief period before turning off. If it doesn't turn off, refer to the "Troubleshooting" section (P.35-5.)

4. Operate the rollers of the braking force tester.
5. Keep depressing the brake pedal until the reading on the braking force tester reaches the value below, and maintain this braking force while testing.

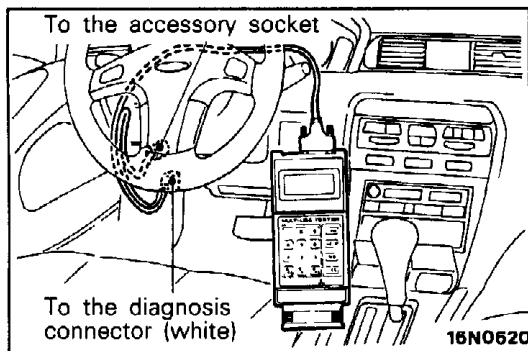
N (kg, lbs.)

Front wheel	1,800 (180, 397)
Rear wheel	650 (65, 143)

6. After the reading on the braking force tester has stabilized, operate the multi-use tester to carry out an actuator test (Item Nos. 01, 02, 03) and take a reading of the change in braking force. For diagnosis and remedy, refer to the following diagnosis table.

NOTE

1. When the multi-use tester is used and the ABS system is selected, the ABS system will switch to the multi-use tester mode and the ABS warning lamp will illuminate.
2. When the ABS has been interrupted by the fail-safe function, the multi-use tester actuator testing cannot be used.

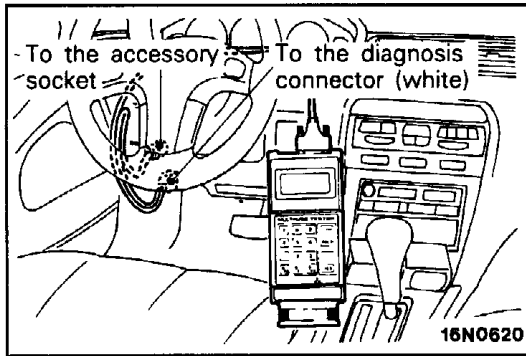


Diagnosis Table

No.	Operation	Diagnosis (braking force tester reading)		Cause	Remedy
		Normal	Problem		
01	After the reading on the braking force tester has stabilized, operate the multi-use tester to force-drive the actuator, and take a reading of the change in braking force.	1. When the actuator is force-driven by the multi-use tester, the brake force will change in the following way Front wheel: N (kg, lbs.) 1,800 (180, 397) Step 1 600 ± 200 (60 ± 20, 132 ± 44) Step 2 (After approx. 6 seconds) 1,000 ± 200 (100 ± 20, 220 ± 44) Rear wheel: 650 (65, 143) Step 1 300 ± 15 (30 ± 15, 66 ± 33) Step 2 (After approx. 6 seconds) 650 ± 150 (65 ± 15, 143 ± 33)	The Braking force at step 1 is very slight or hardly decreases at all.	Hydraulic unit brake pipes are incorrectly connected.	Connect correctly.
				Hydraulic unit is faulty.	Replace the hydraulic unit.
02			The Braking force decreases at step 1, but the increase in braking force at step 2 is very slight or almost non-existent.	Blockage in the brake line outside the hydraulic unit.	Inspect the brake line and unblock.
				Hydraulic unit is faulty.	Replace the hydraulic unit
03		2 Directly after checking the value at step 2 (within approx. 3 seconds), the braking force does not increase even when the brake pedal pressure is increased.	When the brake pedal pressure is increased, braking force increases.	Fluid leaking from the hydraulic unit (faulty seal).	Replace the hydraulic unit.

NOTE

- For drive conditions, the wheel speed of both front wheels or both rear wheels should be 0 km/h (0 mph), and the maximum wheel speed of the wheel to be tested for braking force should be less than 10 km/h (6 mph).
- During testing, if the brake pedal pressure is not continuously maintained, an error could occur, resulting in a faulty diagnosis. When a diagnosis is faulty, the reason could be that pedal pressure was not constant, so the test should be repeated in the same way if necessary.
- The above reasons for problems are given, on the assumption that all brake components other than the hydraulic unit and brake lines are functioning normally.

**SIMPLE INSPECTION**

1. Jack up the vehicle, and support it on axle stands.
2. Release the parking brake, and feel the drag force (drag torque) on each road wheel.
3. Turn the ignition key to the OFF position and set the multi-use tester as shown in the diagram.

Caution

Connection and disconnection of the multi-use tester should always be made with the ignition switch in the OFF position.

4. After checking that the selector lever is in neutral, start the engine.

Caution

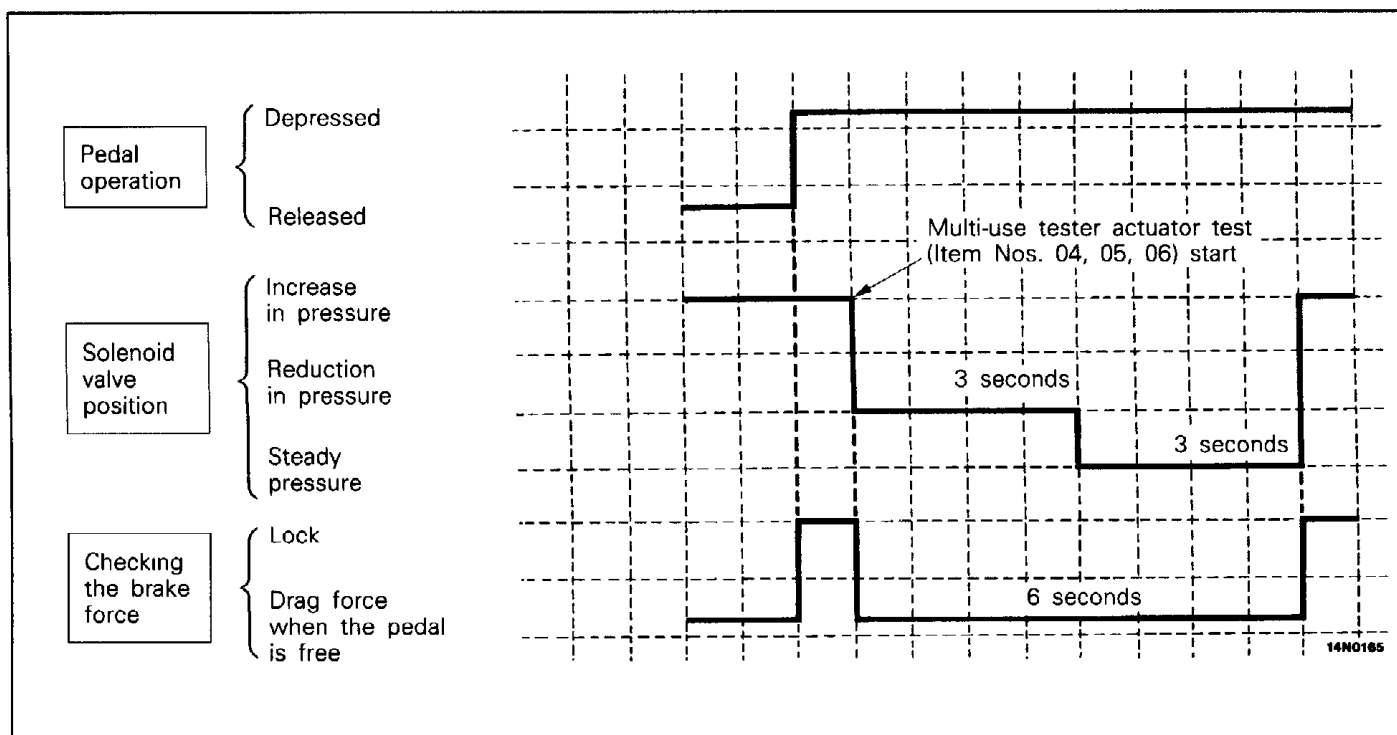
At this time, check that the ABS warning lamp illuminates for a brief period before turning off. If it doesn't turn off, refer to the "Troubleshooting" section (P.35-5).

5. Use the multi-use tester to force-drive the actuator.
6. Turn the wheel by hand and check the change in braking force when the brake pedal is depressed.

The result should be as shown in the following diagram.

NOTE

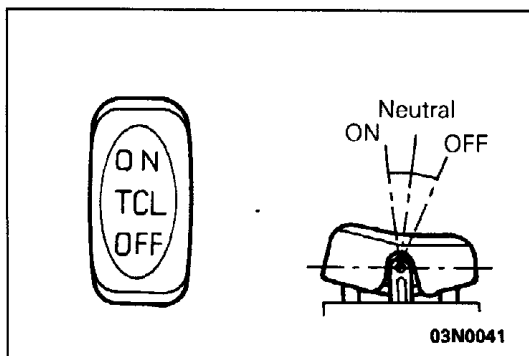
1. When the multi-use tester is used and the ABS system is selected, the ABS system will switch to multi-use tester mode, and the ABS warning lamp will illuminate.
2. When the ABS function has been interrupted by the fail-safe, the multi-use tester actuator testing cannot be used.



7. If a different result is obtained when checking, correct it by following the procedure in the "diagnosis table".

Diagnosis Table

No.	Operation	Diagnosis (braking force tester reading)		Cause	Remedy
		Normal	Problem		
04	(1) Depress the brake pedal to lock the wheels.	After locking for a 6 second period, the braking force will release.	The wheel will not lock even when the brake pedal is depressed.	Blockage in the brake line outside the hydraulic unit.	Inspect the brake line and unblock.
	(2) Choose the wheel to be checked with the multi-use tester, and force-drive the actuator.			Blockage in the oil pressure circuit in the hydraulic unit.	Replace the hydraulic unit.
05	(3) Rotate the selected wheel manually to check the change in braking force.		Braking force does not decrease.	Hydraulic unit brake pipes are incorrectly connected.	Connect correctly.
06				Hydraulic unit solenoid valve is faulty.	Replace the hydraulic unit.



INSPECTING OPERATION OF THE TCL (TRACTION CONTROL) SYSTEM

E35FPA0

INSPECTING THE ILLUMINATION OF THE TCL SWITCH

When the headlamp is illuminated (tail lamp relay is operating), check if the TCL switch indicator is illuminated.

INSPECTION OF THE TCL INDICATOR LAMPS

1. Check if each indicator lamp is illuminated when the TCL switch is pressed.

TCL switch mode	Inspection conditions	Indicator lamp		
		TCL OFF	TCL	TRACE OFF
Switch does not operate.	Turn the ignition key to the ON position.	○	○	○
	Start the engine.	×	×	×
TRACE OFF mode (press once to OFF)	Engine is idling	–	–	○
TCL OFF mode (press once more to OFF)		○	–	–
TCL ON mode	When the engine is idling, turn the steering wheel at least one and a half revolutions.	No illumination	–	–
	Drive the vehicle at 30 km/h (19 mph) for 2 minutes or more.	No illumination	–	–

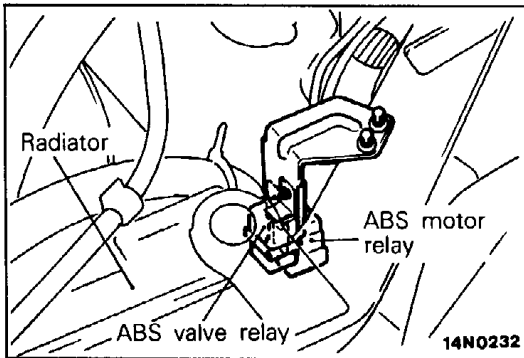
NOTE

○: illuminated, ×: extinguished, –: not relevant

Caution

If a different result is obtained when checking, refer to the "Troubleshooting" section for remedy.

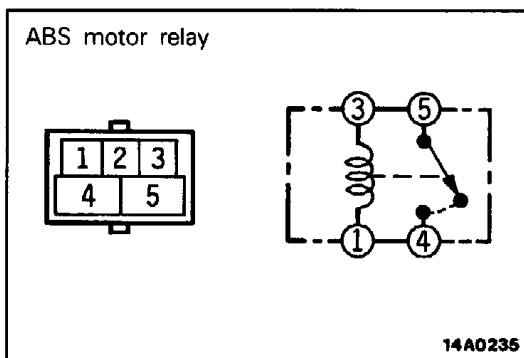
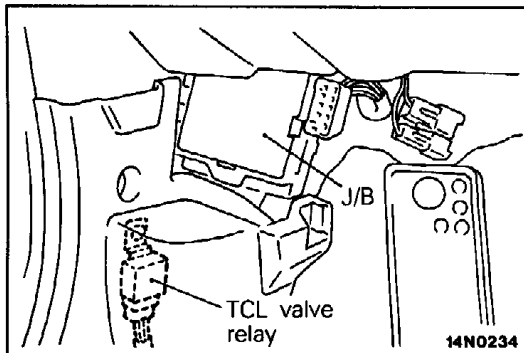
2. When the headlamp is illuminated (tail lamp relay is operating), check if each indicator lamp is dimmed.



INSPECTING THE MOTOR RELAY AND VALVE RELAY

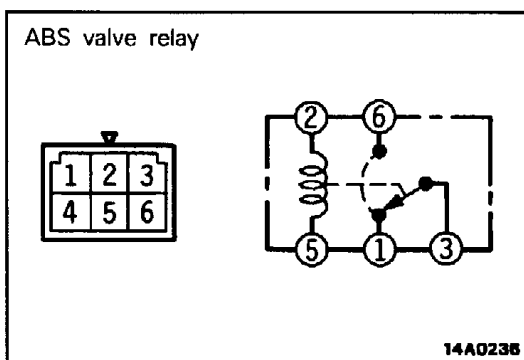
E35FPAP

Check for continuity between the terminals of the relay with and without power as shown in the chart overleaf.



ABS motor relay <when energizing coil is at normal temperature ($20^{\circ} \pm 15^{\circ}\text{C}$ [$68^{\circ} \pm 27^{\circ}\text{F}$)]>

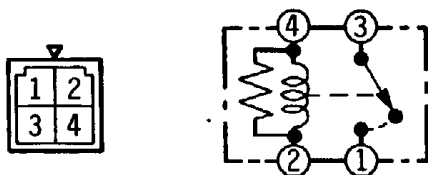
When there is no current	Between terminals ③ and ①	$74 \pm 25\Omega$
	Between terminals ④ and ⑤	No continuity ($\infty \Omega$)
When there is current between terminals ③ and ①	Between terminals ④ and ⑤	Continuity (approx. 0Ω)



ABS valve relay <when energizing coil is at normal temperature ($20^{\circ} \pm 15^{\circ}\text{C}$ [$68^{\circ} \pm 27^{\circ}\text{F}$)]>

When there is no current	Between terminals ② and ⑤	$80 \pm 25\Omega$
	Between terminals ① and ③	Continuity (approx. 0Ω)
	Between terminals ③ and ⑥	No continuity ($\infty \Omega$)
When there is current between terminals ② and ⑤	Between terminals ① and ③	No continuity ($\infty \Omega$)
	Between terminals ③ and ⑥	Continuity (approx. 0Ω)

TCL valve relay



14A0237

TCL valve relay <when energizing coil is at normal temperature ($20^{\circ} \pm 5^{\circ}\text{C}$ [$68^{\circ} \pm 9^{\circ}\text{F}$)]>

When there is no current	Between terminals ④ and ②	$100^{+25}_{-14} \Omega$
	Between terminals ③ and ①	No continuity ($\infty \Omega$)
When there is current between terminals ④ and ②	Between terminals ③ and ①	Continuity (approx. 0Ω)

INSPECTING THE TCL HYDRAULIC SYSTEM

INSPECTION USING THE BRAKING FORCE TESTER

NOTE

1. The roller of the braking force tester and the tyre should be dry during testing.
2. The parking brake should be applied to lock the rear wheels.

1. Place the front wheel of the vehicle on the rollers of the braking force tester.
2. Turn the ignition key to the OFF position and set the multi-use tester as shown in the diagram.

Caution

Connection and disconnection of the multi-use tester should always be made with the ignition switch in the OFF position.

3. After checking that the selector lever is in neutral, start the engine.

Caution

At this time, check that the TCL-related indicator lamps momentarily illuminate before switching off.

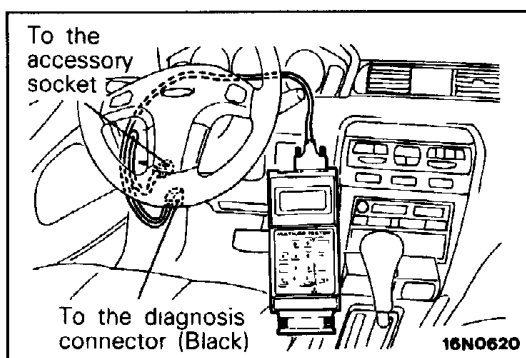
If they do not switch off, refer to the "Troubleshooting" section (P.35-44).

4. Operate the rollers of the braking force tester and keep the steering wheel straight.
5. When the brake pedal is released, perform an actuator test with the multi-use tester (Item Nos. 01, 02) and take a reading of the change in braking force.

For diagnosis and remedy, refer to the following "diagnosis table".

NOTE

1. When the multi-use tester is operated and the TCL system is selected, the TCL system will switch to multi-use tester mode and the TCL indicator lamp will illuminate.
2. When the TCL has been interrupted by the fail-safe function, the multi-use tester actuator testing cannot be used.

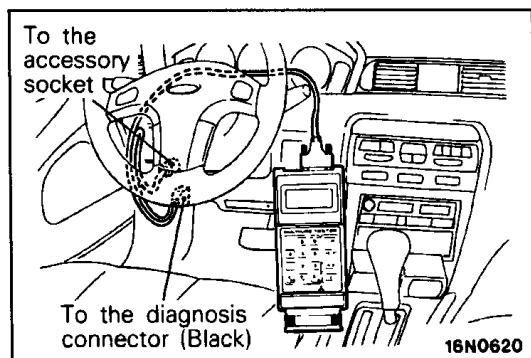


Diagnosis Table

No.	Operation	Diagnosis (braking force tester reading)		Cause	Remedy
		Normal	Problem		
01	Operate the multi-use tester to force-drive the actuator, and check the change in braking force	When the actuator is force-driven by the multi-use tester the brake force will change in the following way. N (kg, lbs.) Approx. 200 (20, 44)	Braking force at step 1 is very slight or hardly increases at all.	Hydraulic unit brake pipes are incorrectly connected.	Connect correctly.
		Step 1 700–900 (70–90, 154–198)		Hydraulic unit is faulty.	Replace the hydraulic unit.
02		Step 2 (After approx. 3 seconds) 350–650 (35–65, 77–143)	Braking force increases at step 1, but the decrease in braking force at step 2 is very slight or almost non-existent.	Hydraulic unit is faulty.	Replace the hydraulic unit.
		Step 3 (After approx. 3 seconds) Approx. 200 (20, 44)			

NOTE

- For drive conditions, the wheel speed of both front wheels should be 0 km/h (0 mph), and the maximum wheel speed of the wheel to be tested for braking force should be less than 10 km/h (6 mph).
- The above reasons for problems are given on the assumption that all brake components other than the hydraulic unit are functioning normally.

**SIMPLE INSPECTION**

1. Jack up the front wheels, and support on axle stands.
2. After checking that the selector level is neutral, feel the drag force (drag torque) for each wheel brake.
3. Turn the ignition key to the ACC position and set the multi-use tester as shown in the diagram.

Caution

Connection and disconnection of the multi-use tester should always be made with the ignition switch in the OFF position.

4. Start the engine.

Caution

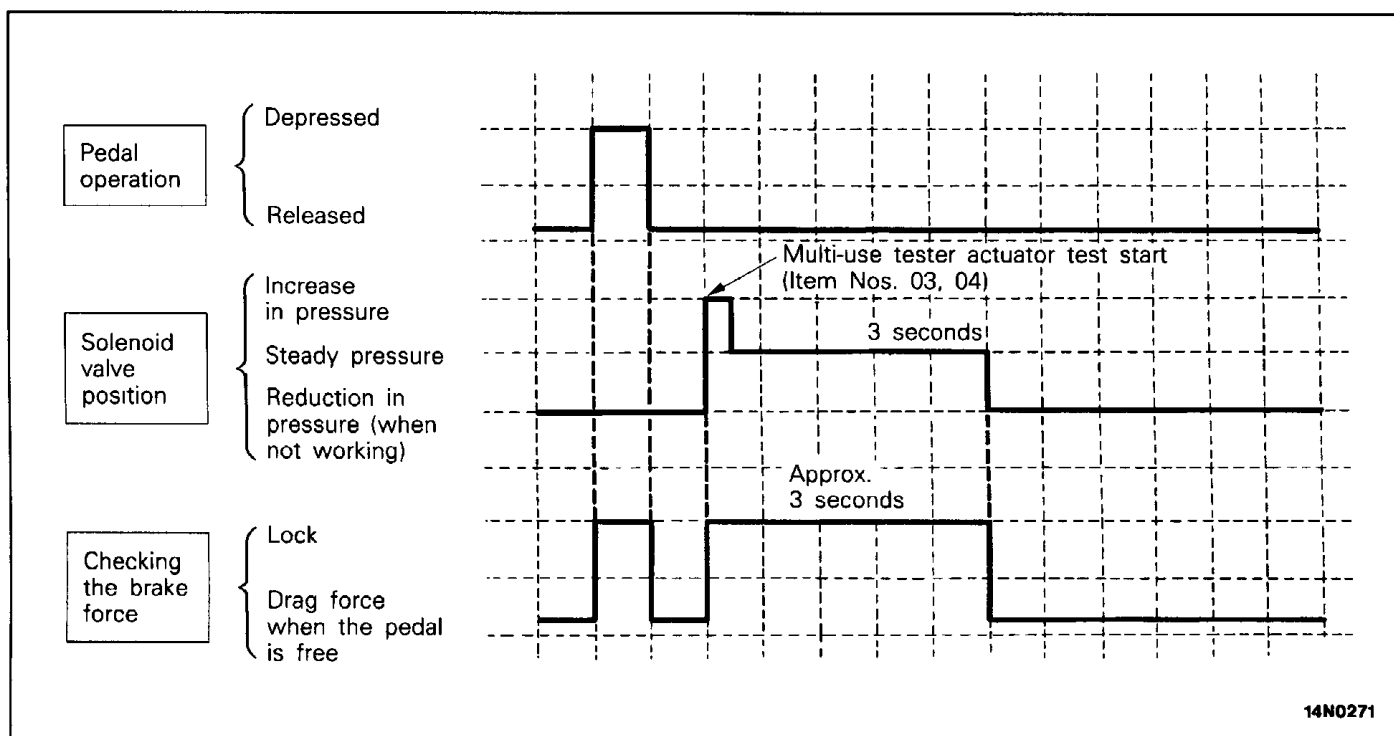
At this time, check that the TCL-related indicator lamps momentarily illuminate before switching off. If they do not switch off, refer to the "Troubleshooting" section (P.35-44).

5. Check that the wheels lock when the brake pedal is depressed, and that they become free when the pedal is released.
6. When the brake pedal is released, operate the multi-use tester to force-drive the actuator.
7. Rotate the wheel manually and check the change in braking force.

The result should be as shown in the following diagram.

NOTE

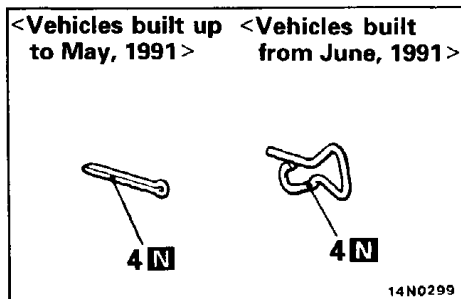
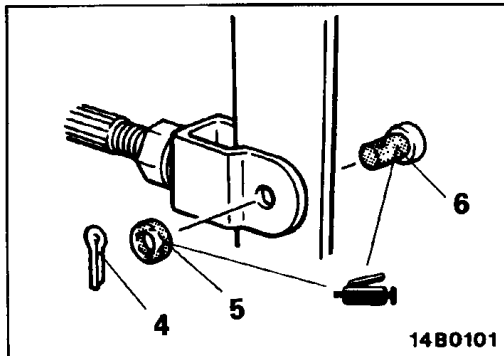
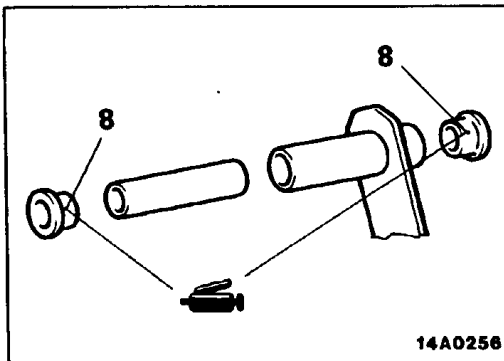
1. When the multi-use tester is operated and the TCL system is selected, the TCL system will switch to multi-use tester mode and the TCL OFF indicator lamp will illuminate.
2. When the TCL-ECU function has been interrupted by the fail-safe function, the multi-use tester actuator testing cannot be performed.



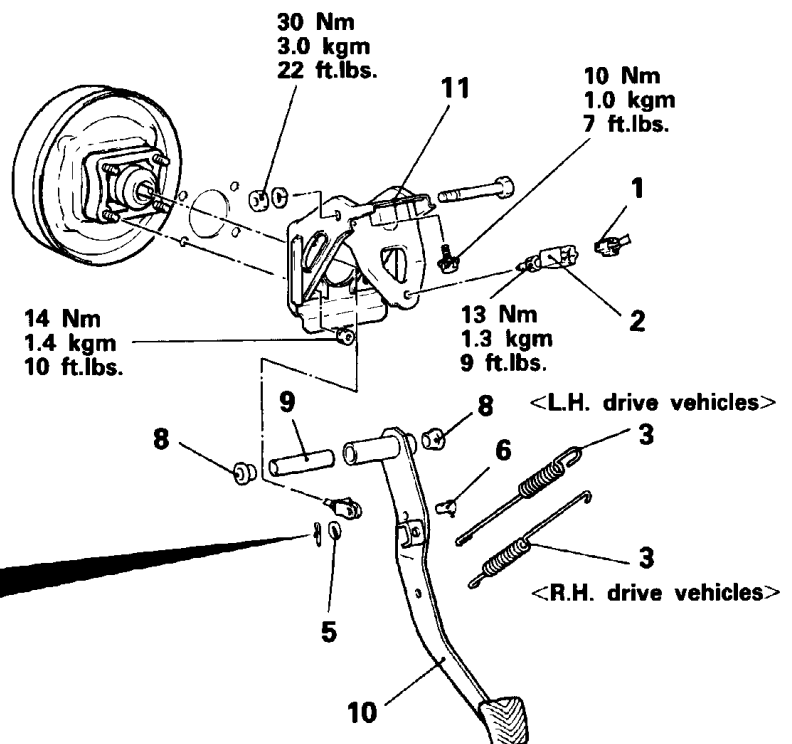
8. If a different result is obtained when checking, correct it by following the procedure in the "diagnosis table".

Diagnosis Table

No.	Operation	Diagnosis (braking force tester reading)		Cause	Remedy
		Normal	Problem		
03	1. Rotate the wheel when the brake pedal is released.	After continuous locking for a 3 second period, the braking force will decrease.	The wheel will not lock.	Hydraulic unit brake pipes are incorrectly connected.	Connect correctly.
	2. Choose the wheel to be checked with the multi-use tester, and force-drive the actuator.				
04	3. Rotate the selected wheel manually to check the change in braking force.			Hydraulic unit is faulty.	Replace the hydraulic unit.

BRAKE PEDAL**REMOVAL AND INSTALLATION****Post-installation Operation**

- Brake Pedal Adjustment
(Refer to P.35-85.)

**Stop lamp switch removal steps**

1. Stop lamp switch connector
2. Stop lamp switch

Brake pedal removal steps

1. Stop lamp switch connector
2. Stop lamp switch
3. Brake pedal return spring
4. Split pin*1 or snap pin*2
5. Washer
6. Clevis pin
7. Brake pedal assembly*
(parts from step 8 to step 11)
8. Bushing
9. Spacer
10. Brake pedal
11. Member assembly

NOTE

- (1)*: M/T (L.H. drive vehicles)
 (2)*1: <Vehicles built up to May, 1991>
 *2: <Vehicles built from June, 1991>

E35GCAH

INSPECTION

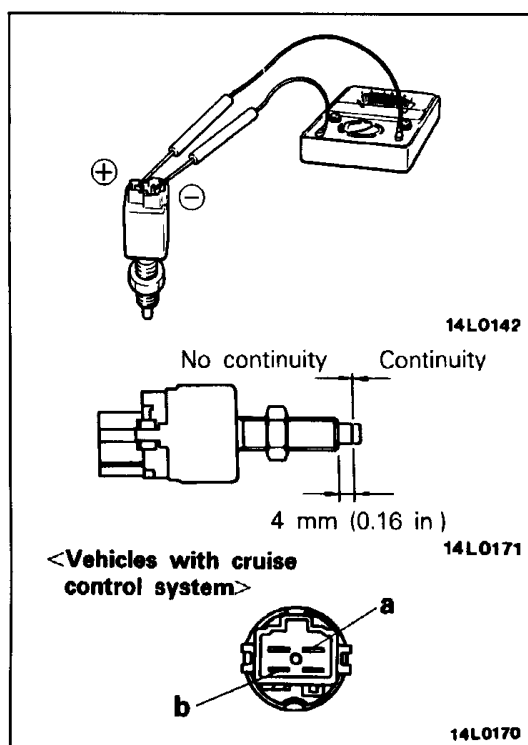
- Check the bushing for wear.
- Check the brake pedal for bend or twisting.
- Check the brake pedal return spring for damage.

Stop lamp switch

Connect a circuit tester to the stop lamp switch, and check whether or not there is continuity when the plunger of the stop lamp switch is pushed in and when it is released.

The stop lamp switch is in good condition if there is no continuity when the plunger is pushed in to a depth of within 4 mm (0.16 in.) from the outer case edge surface, and if there is continuity when it is released.

For vehicles with cruise control system, the check for continuity should be made at connectors "a" and "b" of the stop lamp switch.



MASTER CYLINDER AND BRAKE BOOSTER

E351A--

REMOVAL AND INSTALLATION

Pre-removal Operation

- Draining of Brake Fluid

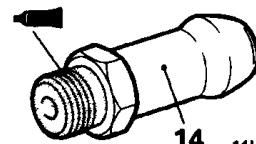
Post-installation Operation

- Supplying Brake Fluid
- Bleeding (Refer to P.35-87.)
- Adjustment of Brake Pedal (Refer to P.35-85.)

Brake tube flare nuts

15 Nm
1.5 kgm
11 ft.lbs.

14F038

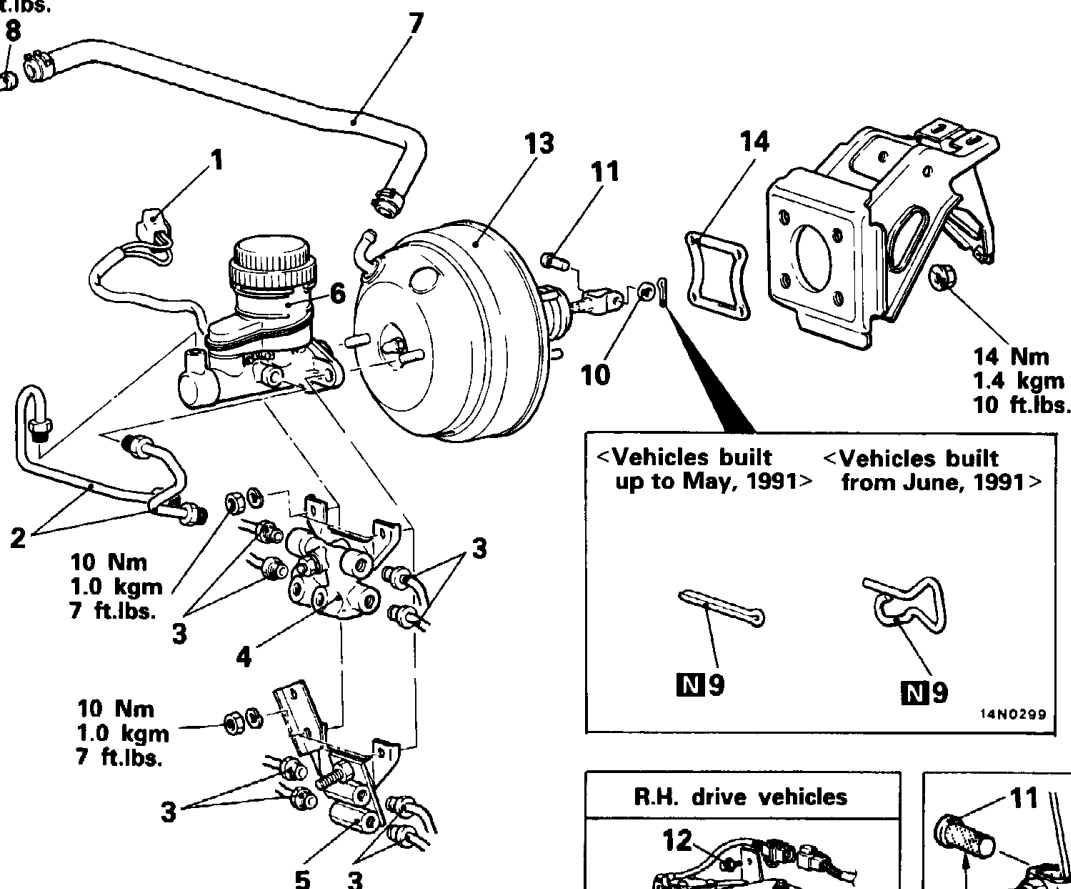


14

14L0218

Sealant: 3M ATD Part
No. 8663, 8661
or equivalent

15-18 Nm
1.5-1.8 kgm
11-13 ft.lbs.



14N0190

<Vehicles built
up to May, 1991>

<Vehicles built
from June, 1991>

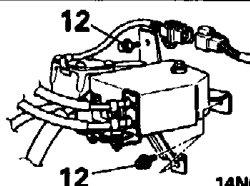


N9

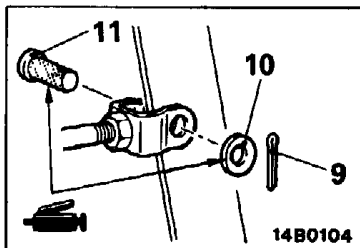


N9

14N0299

R.H. drive vehicles

14N0037



14B0104

Master cylinder removal steps

1. Brake fluid level sensor connector
2. Brake pipe
3. Brake pipe connection
4. Proportioning valve
5. Connector assembly
6. Master cylinder

- ◆◆ • Adjustment of clearance between brake booster push rod and primary piston

Brake booster removal steps

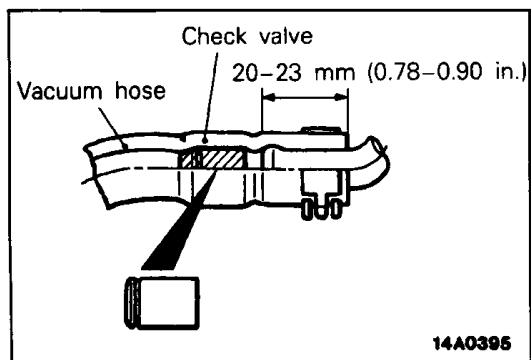
- ◆◆ 6. Master cylinder
- ◆◆ 7. Vacuum hose (with check valve)

8. Fitting
9. Split pin*1 or snap pin *2
- 10 Washer
- 11.Clevis pin
- 12.Actuator installation bolt
- <Vehicles with cruise control>
- 13.Brake booster
- 14.Sealer

NOTE

*1 : <Vehicles built up to May, 1991>

*2 : <Vehicles built from June, 1991>



SERVICE POINTS OF INSTALLATION

E35IDAG

7. CONNECTION OF THE VACUUM HOSE

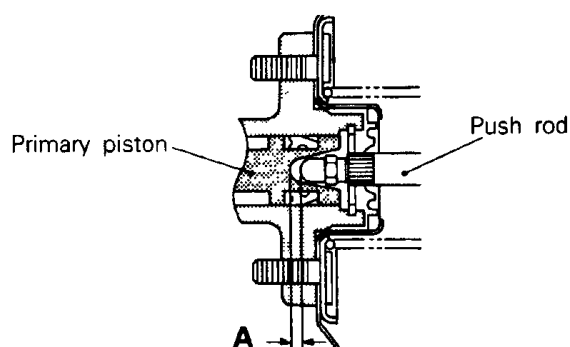
- (1) Install to the pipe part of the brake booster so that the amount of insertion of the vacuum hose is as shown in the figure.

Caution

The check valve and the pipe part of the brake booster must not contact each other.

- (2) Insert securely and completely until the vacuum hose at the engine side contacts the edge of the hexagonal part of the fitting, and then secure by using the hose clip.

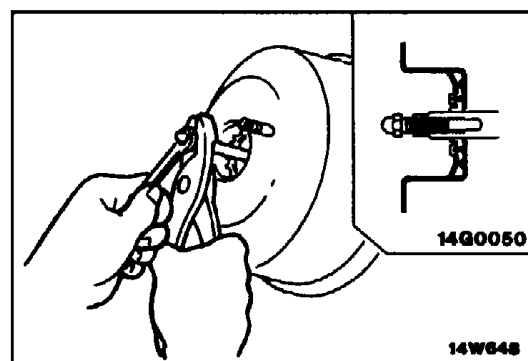
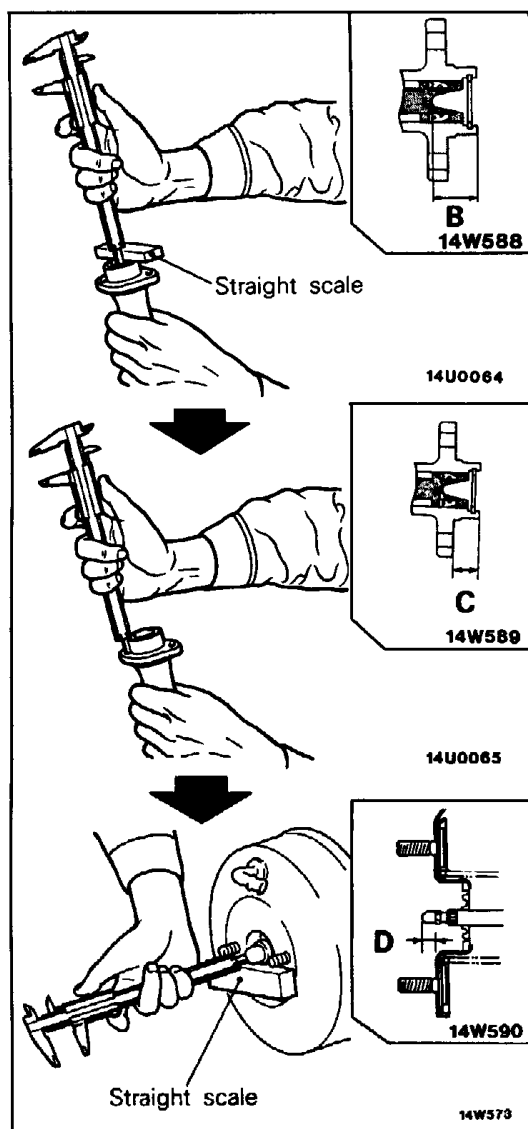
• **ADJUSTMENT OF CLEARANCE BETWEEN BRAKE BOOSTER PUSH ROD AND PRIMARY PISTON**



Calculate clearance A from the B, C and D measurements.

$$A = B - C - D$$

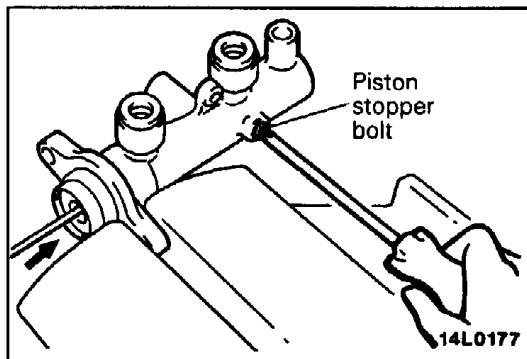
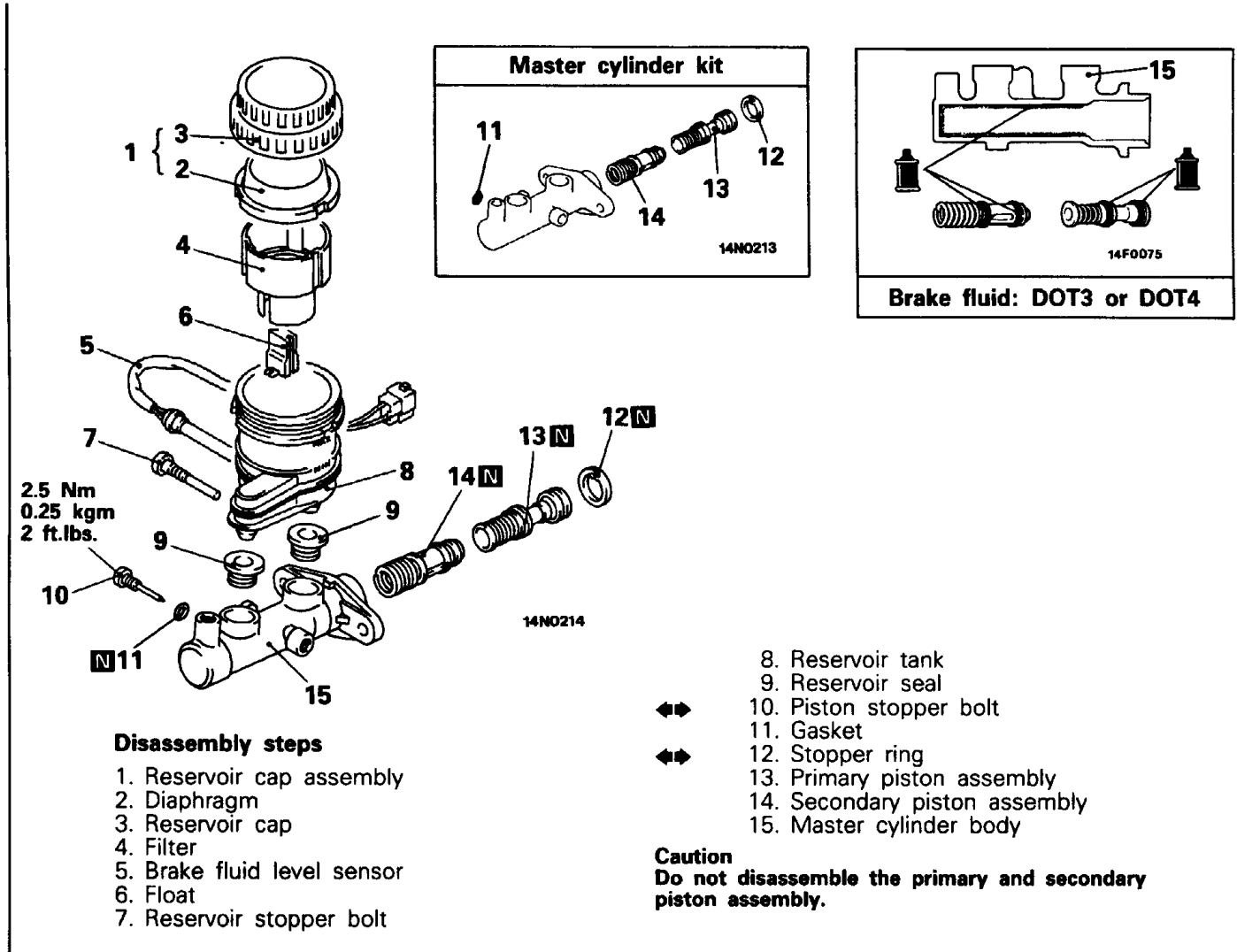
Standard value (A): 0.65-0.85 mm (0.026-0.033 in.)



If the clearance is not within the standard value range, adjust by changing the push rod length by turning the screw of the push rod.

DISASSEMBLY AND REASSEMBLY (MASTER CYLINDER)

E351E-

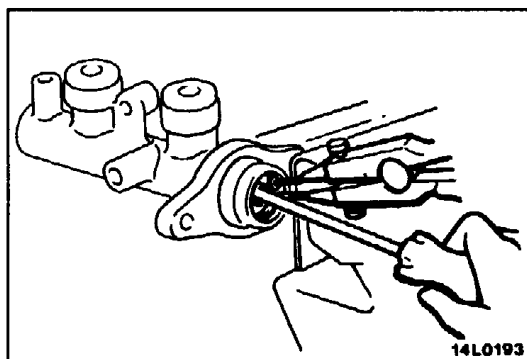


SERVICE POINTS OF DISASSEMBLY

E351FAE

10. DISASSEMBLY OF PISTON STOPPER BOLT

Remove the piston stopper bolt, while depressing the piston.



12. DISASSEMBLY OF PISTON STOPPER RING

Remove the piston stopper ring, while depressing the piston.

INSPECTION

E351GAF

- Check the inner surface of master cylinder body for rust or pitting.
- Check the primary and secondary pistons for rust, scoring, wear, damage or wear.
- Check the diaphragm for cracks and wear.

BRAKE LINE

E35KA-

REMOVAL AND INSTALLATION**Vehicles without ABS****Pre-removal Operation**

- Draining of Brake Fluid

Post-installation Operation

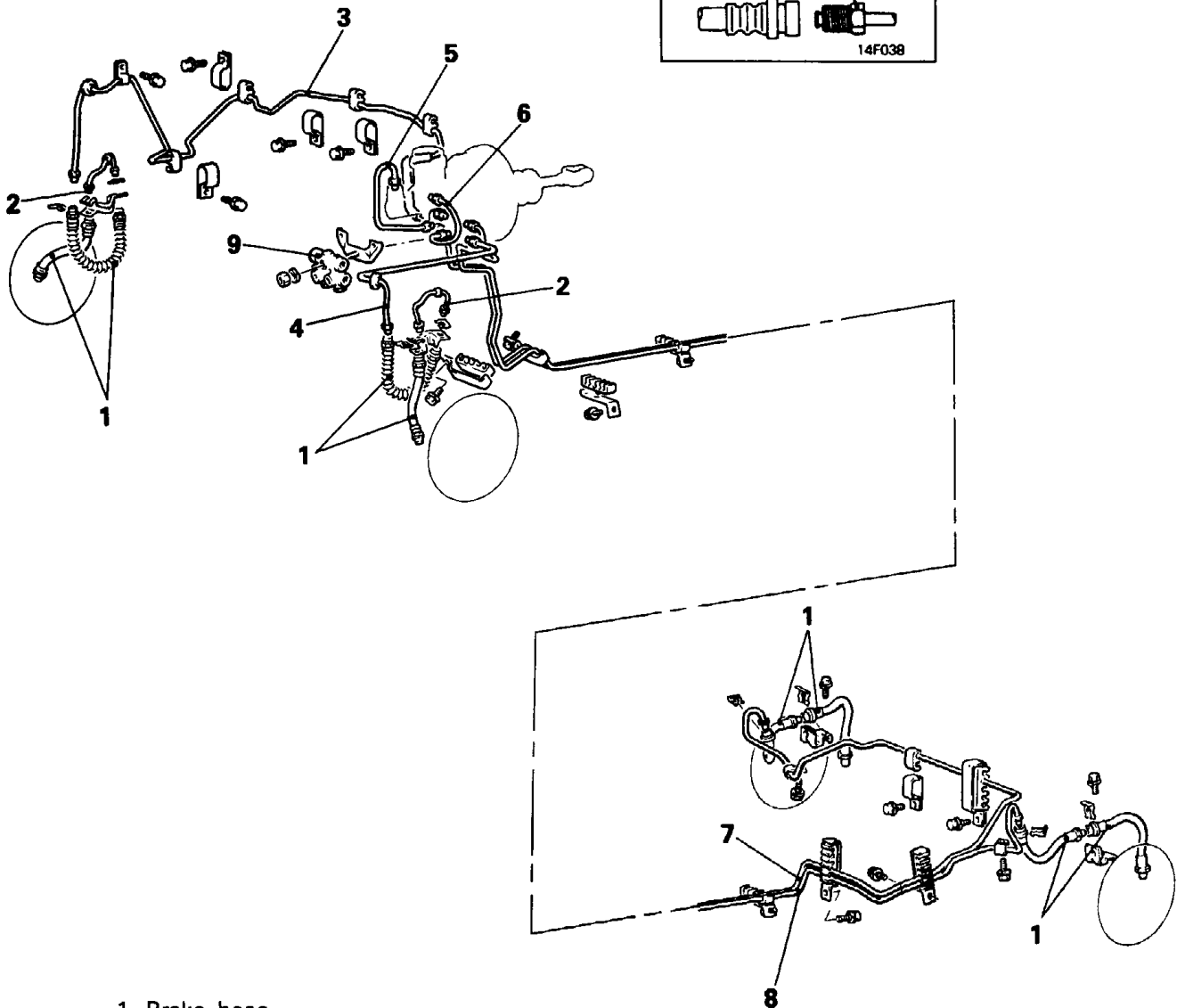
- Supplying Brake Fluid
- Bleeding Brake Lines
(Refer to P.35-87.)

L.H. drive vehicles**Flared brake line nuts**

15 Nm
1.5 kgm
11 ft.lbs.



14F038



1. Brake hose
2. Brake pipe (strut)
3. Brake pipe (front RH)
4. Brake pipe (front LH)
5. Brake pipe (A)
6. Brake pipe (B)
7. Brake pipe (main LH)
8. Brake pipe (main RH)
9. Proportioning valve

14N0192

R.H. drive vehicles

Pre-removal Operation

- Draining of Brake Fluid

Post-installation Operation

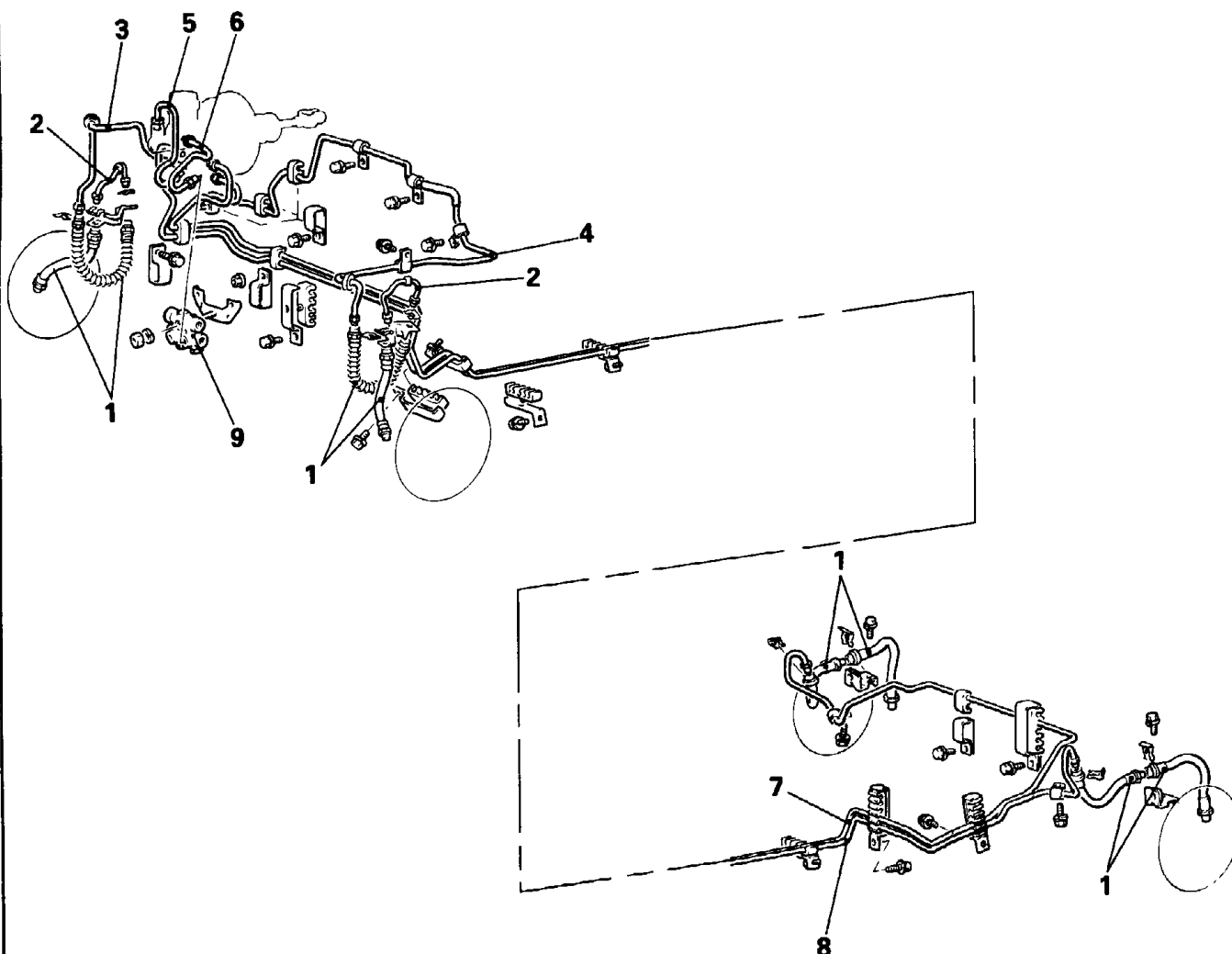
- Supplying Brake Fluid
- Bleeding Brake Lines
(Refer to P 35-87)

Flared brake line nuts

15 Nm
1.5 kgm
11 ft.lbs.



14F038



1. Brake hose
2. Brake pipe (strut)
3. Brake pipe (front RH)
4. Brake pipe (front LH)
5. Brake pipe (A)
6. Brake pipe (B)
7. Brake pipe (main LH)
8. Brake pipe (main RH)
9. Proportioning valve

14N0193

Vehicles with ABS

L.H. drive vehicles

Pre-removal Operation

- Draining of Brake Fluid

Post-installation Operation

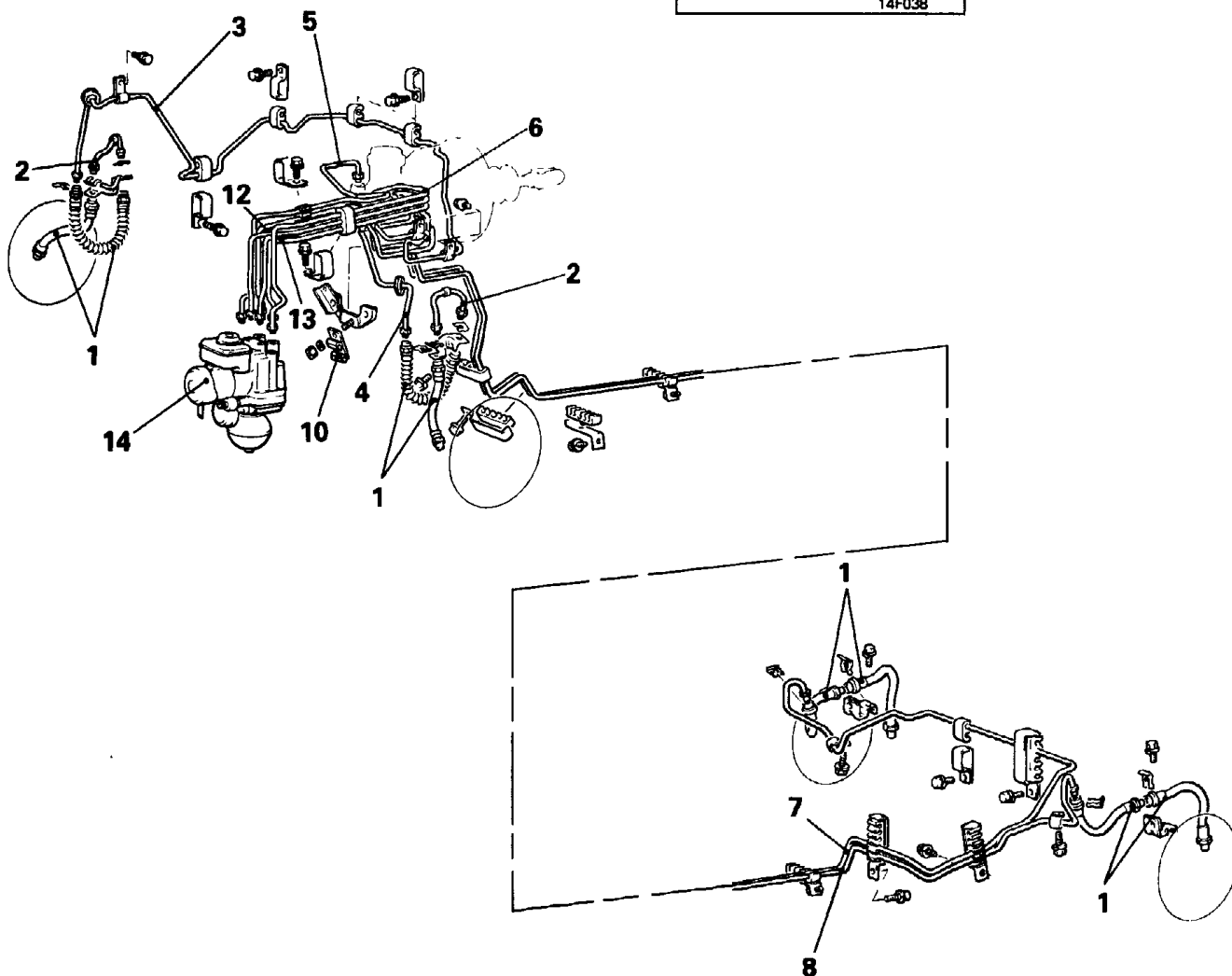
- Supplying Brake Fluid
- Bleeding Brake Lines
(Refer to P.35-87.)

Flared brake line nuts

15 Nm
1.5 kgm
11 ft.lbs.



14F038



14N0195

1. Brake hose
2. Brake pipe (strut)
3. Brake pipe (front RH)
4. Brake pipe (front LH)
5. Brake pipe (A)
6. Brake pipe (B)
7. Brake pipe (main LH)
8. Brake pipe (main RH)
10. Connector assembly
12. Brake pipe (rear RH)
13. Brake pipe (rear LH)
- ◆◆ 14. Hydraulic unit

R.H. drive vehicles

Pre-removal Operation

- Draining of Brake Fluid

Post-installation Operation

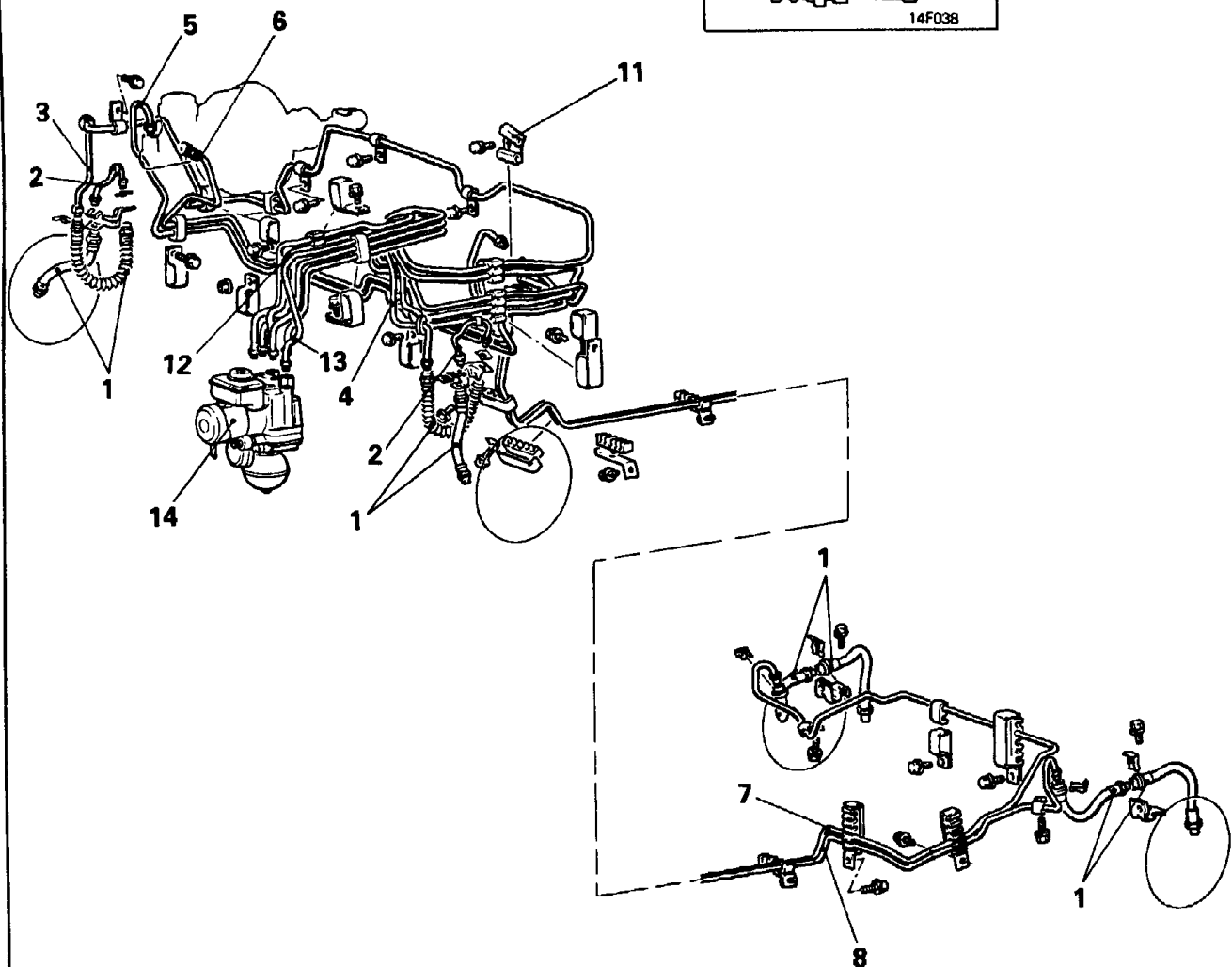
- Supplying Brake Fluid
- Bleeding Brake Lines
(Refer to P.35-87)

Flared brake line nuts

15 Nm
1.5 kgm
11 ft.lbs.



14F038



14N0114

1. Brake hose
2. Brake pipe (strut)
3. Brake pipe (front RH)
4. Brake pipe (front LH)
5. Brake pipe (A)
6. Brake pipe (B)
7. Brake pipe (main LH)
8. Brake pipe (main RH)
11. 2 way connector
12. Brake pipe (rear RH)
13. Brake pipe (rear LH)
- ◆◆ 14. Hydraulic unit

Vehicles with TCL

L.H. drive vehicles

Pre-removal Operation

- Draining of Brake Fluid

Post-installation Operation

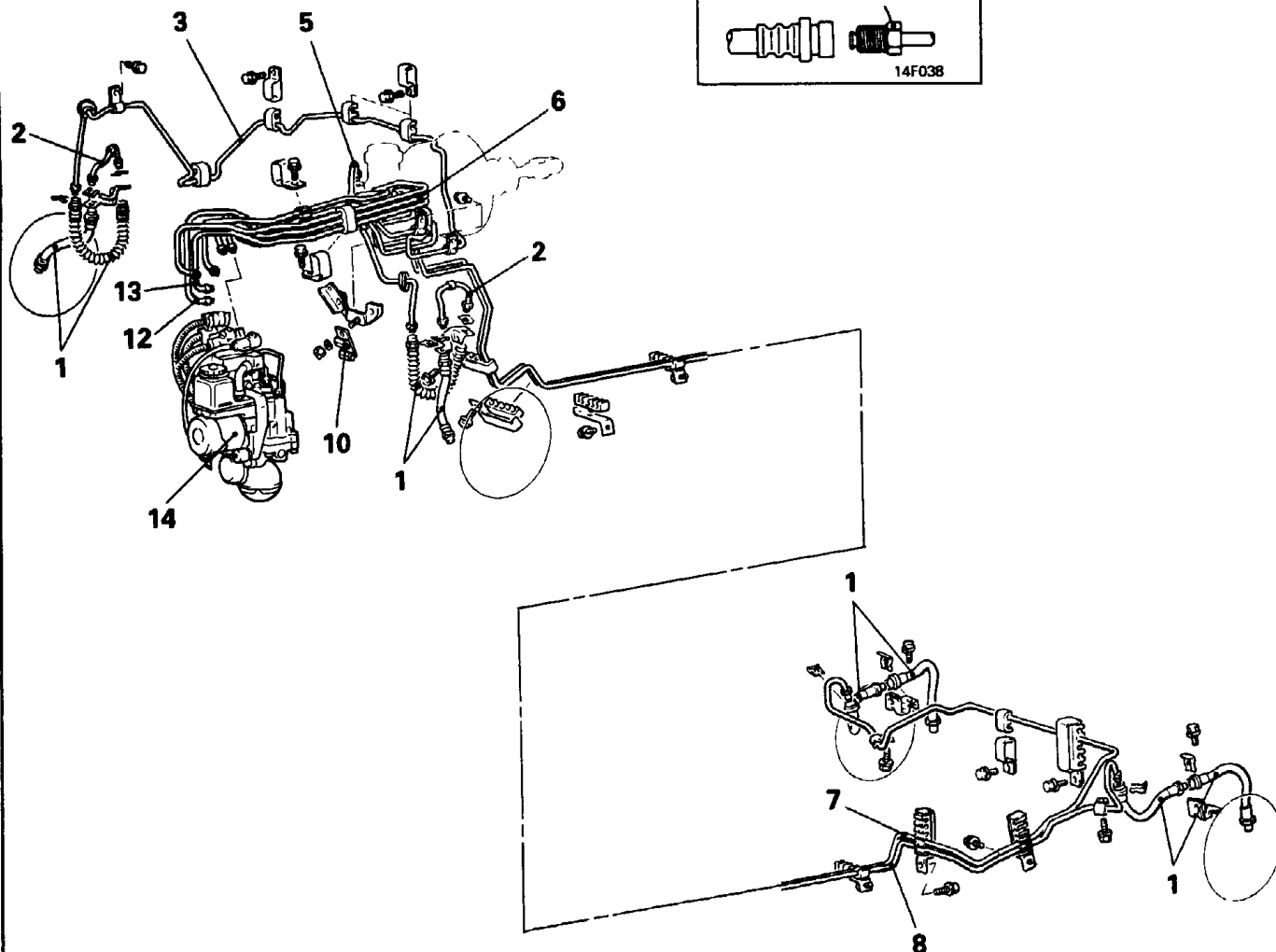
- Supplying Brake Fluid
- Bleeding Brake Lines
(Refer to P.35-87.)

Flared brake line nuts

15 Nm
1.5 kgm
11 ft.lbs.



14F038



14N0196

1. Brake hose
2. Brake pipe (strut)
3. Brake pipe (front RH)
4. Brake pipe (front LH)
5. Brake pipe (A)
6. Brake pipe (B)
7. Brake pipe (main LH)
8. Brake pipe (main RH)
10. Connector assembly
12. Brake pipe (rear RH)
13. Brake pipe (rear LH)
- ◆◆ 14. Hydraulic unit

R.H. drive vehicles

Pre-removal Operation

- Draining of Brake Fluid

Post-installation Operation

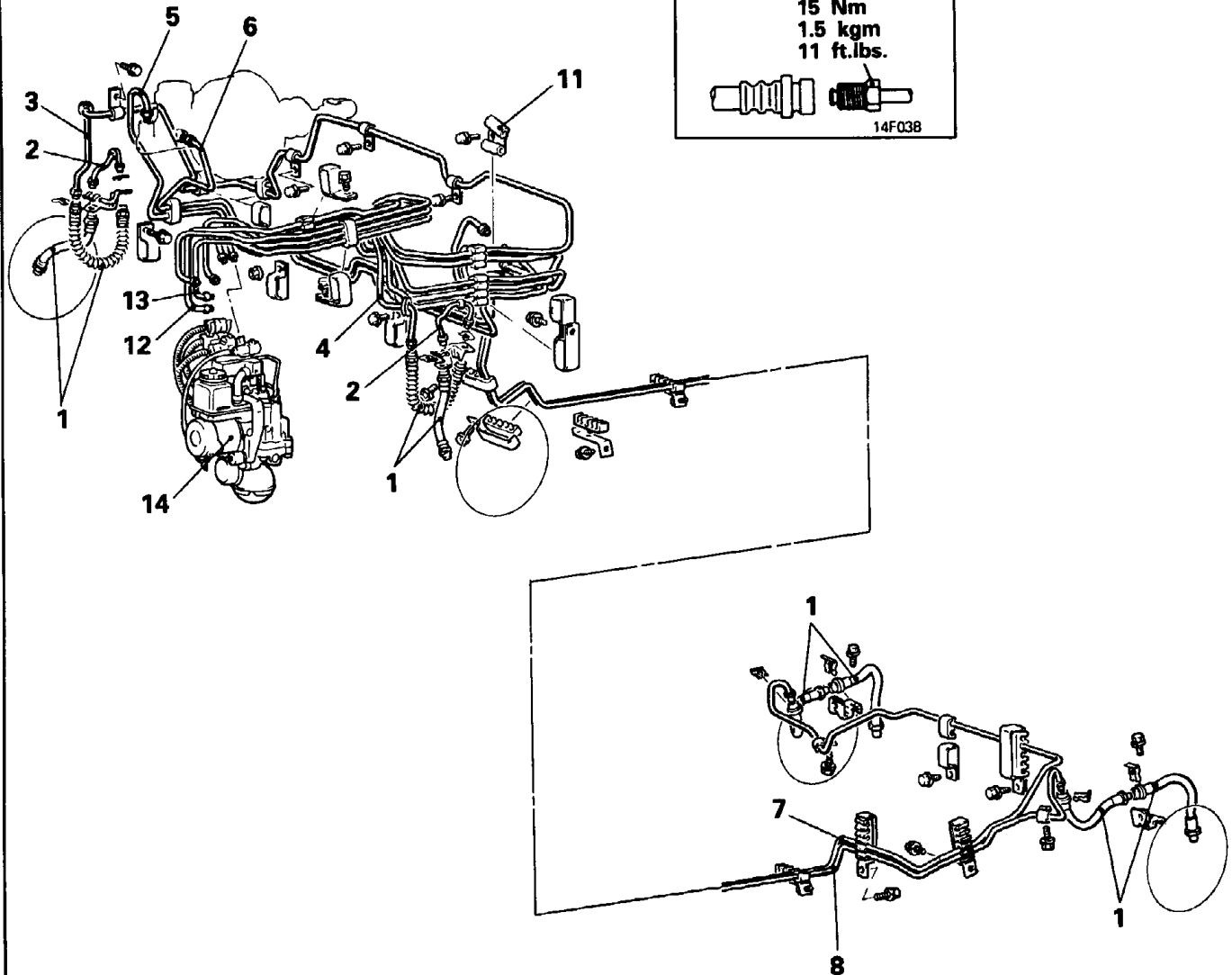
- Supplying Brake Fluid
- Bleeding Brake Lines
(Refer to P.35-87.)

Flared brake line nuts

15 Nm
1.5 kgm
11 ft.lbs.



14F038



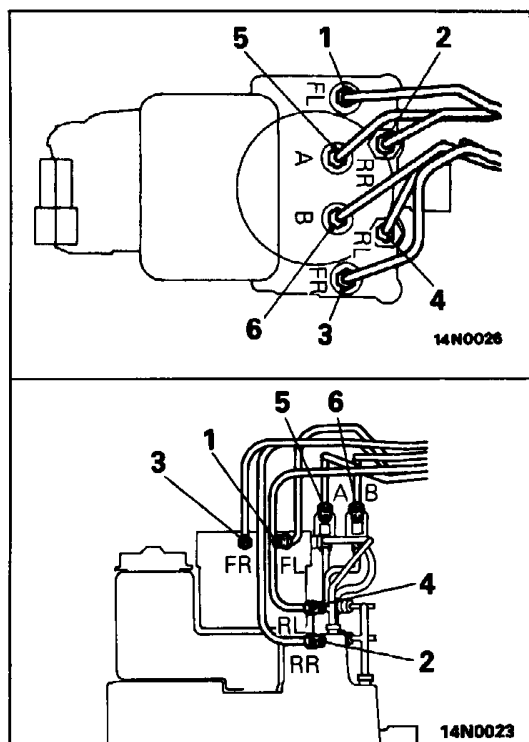
14N0113

1. Brake hose
2. Brake pipe (strut)
3. Brake pipe (front RH)
4. Brake pipe (front LH)
5. Brake pipe (A)
6. Brake pipe (B)
7. Brake pipe (main LH)
8. Brake pipe (main RH)
11. 2 way connector
12. Brake pipe (rear RH)
13. Brake pipe (rear LH)
- ◆◆ 14. Hydraulic unit

INSPECTION

E35KCAA

- Check the brake tubes for cracks, crimps and corrosion.
- Check the brake hoses for cracks, damage and leakage.
- Check the flared brake line nuts for damage and leakage.

**SERVICE POINTS OF INSTALLATION**

E35KDAK

14. CONNECTION OF THE PIPES TO THE HYDRAULIC UNIT

Connect the pipes to the hydraulic unit as shown in the illustration.

1. Hydraulic unit – front brake (L.H.)
2. Hydraulic unit – rear brake (R.H.)
3. Hydraulic unit – front brake (R.H.)
4. Hydraulic unit – rear brake (L.H.)
5. Hydraulic unit – master cylinder
(for left front and right rear)
6. Hydraulic unit – master cylinder
(for right front and left rear)

FRONT DISC BRAKE

REMOVAL AND INSTALLATION

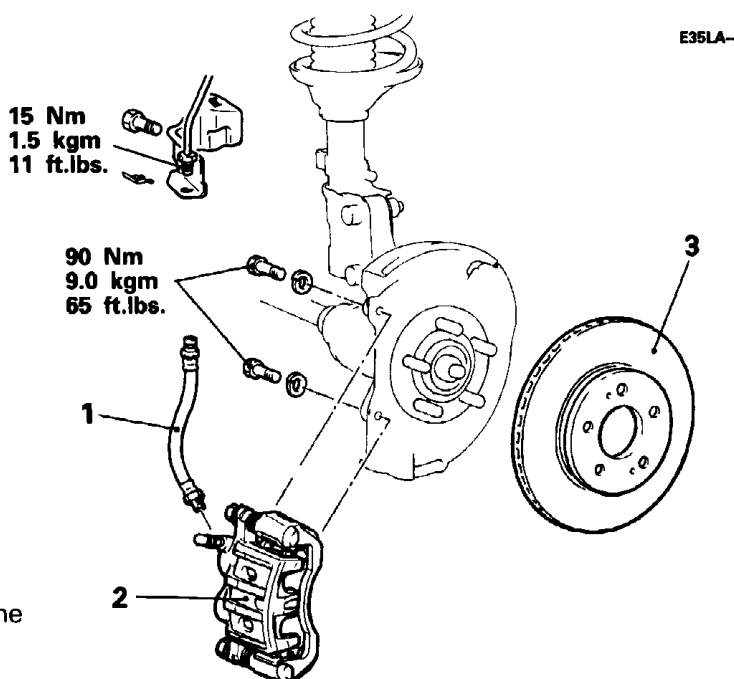
Pre-removal Operation

- Draining of Brake Fluid

Post-installation Operation

- Brake FLuid Filling
- Brake Line Bleeding
(Refer to P.35-87.)

1. Connection for the brake hose and the brake tube
2. Front brake assembly
3. Brake disc



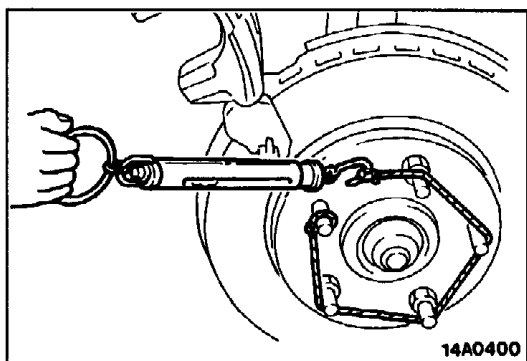
E35LA-

14N0140

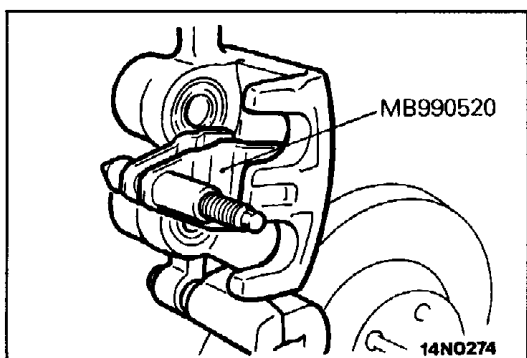
INSPECTION

E35LCAC

- Check the brake disc for damage.



14A0400



14N0274

SERVICE POINTS OF INSTALLATION

E35LDAFa

2. INSTALLATION OF FRONT BRAKE ASSEMBLY

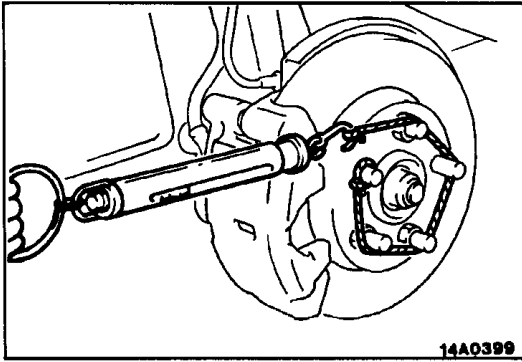
Measure the disc brake drag force after installation of the brake assembly by the following procedure.

- (1) With the brake assembly removed, use a spring balance to measure the rotation sliding resistance of the hub in the forward direction.

NOTE

To secure the disc to the hub, Tighten the nuts.

- (2) After installing the caliper support to the knuckle, use the special tool to expand the piston, and then install the caliper body.
- (3) Start the engine, and after depressing the brake pedal hard two or three times, stop the engine.



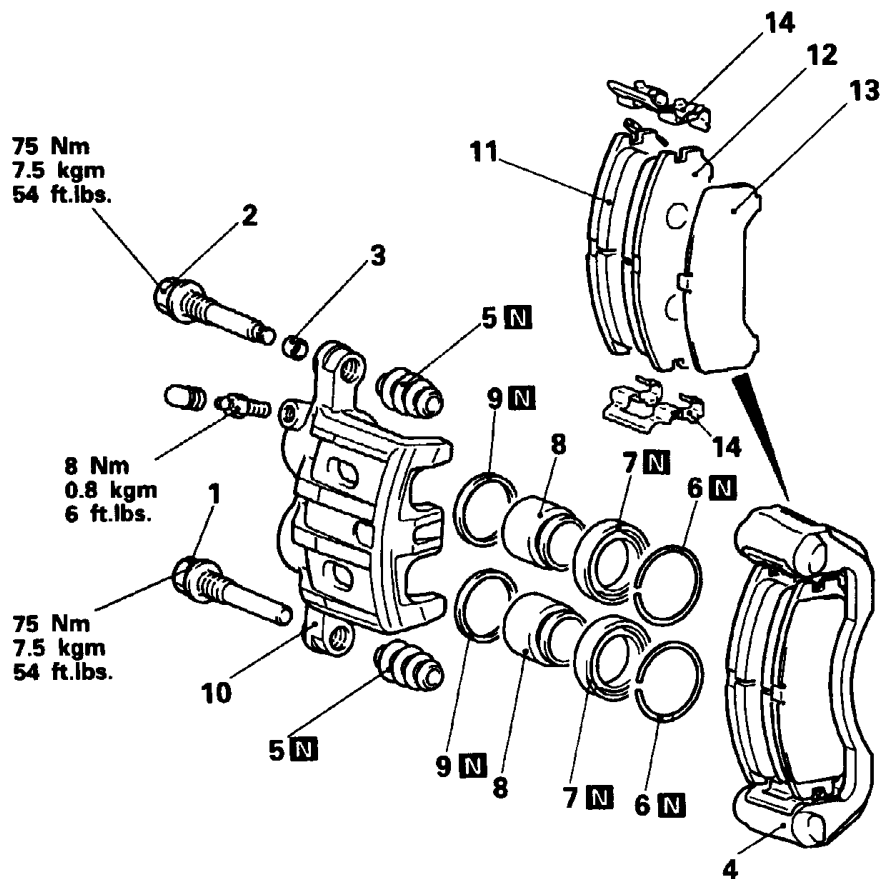
- (4) Turn brake disc forward 10 times.
- (5) Use a spring balance to measure the rotation sliding resistance of the hub in the forward direction.
- (6) Calculate the drag torque of the disc brake (difference between measured values in 5 and 1).

**Standard value: 70 N (7.0 kg, 15.4 lbs.) or less
[4 Nm (0.4 kgm, 3 ft. lbs.)) or less**

- (7) If the disc brake drag force exceeds the standard value, disassemble piston and clean the piston. Check for corrosion or worn piston seal, and check the sliding condition of the lock pin and guide pin.

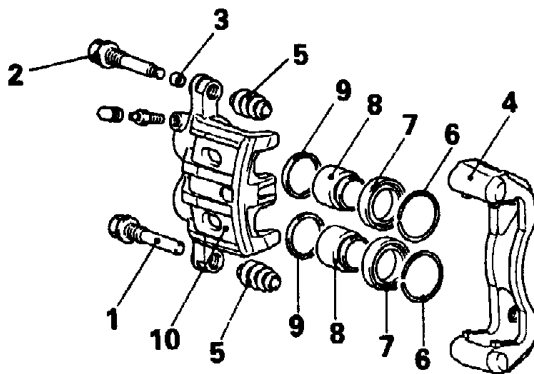
DISASSEMBLY AND REASSEMBLY

E35LF-



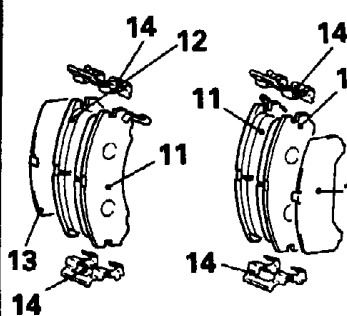
14L0295

Brake caliper kit



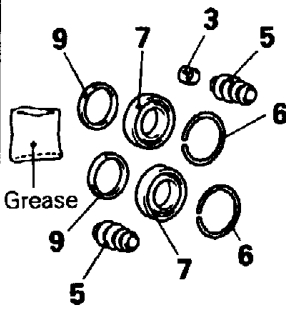
14L0296

Pad repair kit



14L0297

Seal and boots repair kit



14L0298

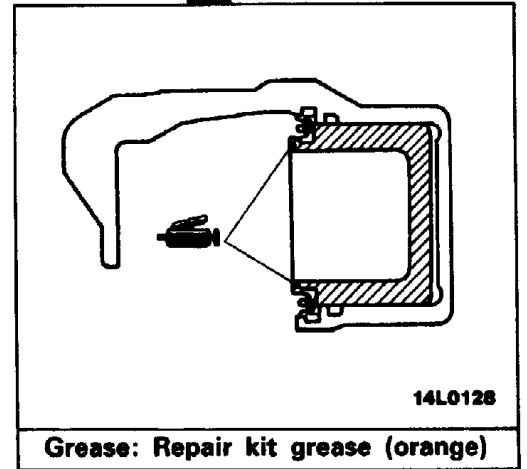
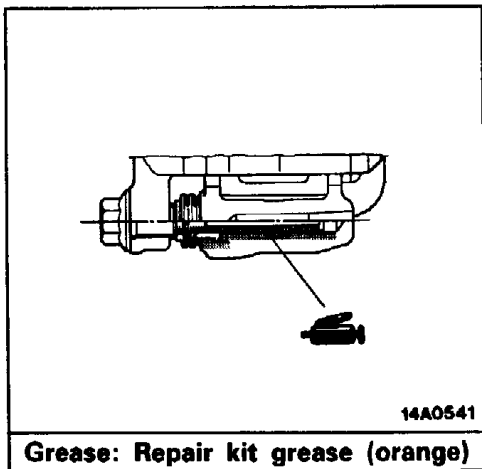
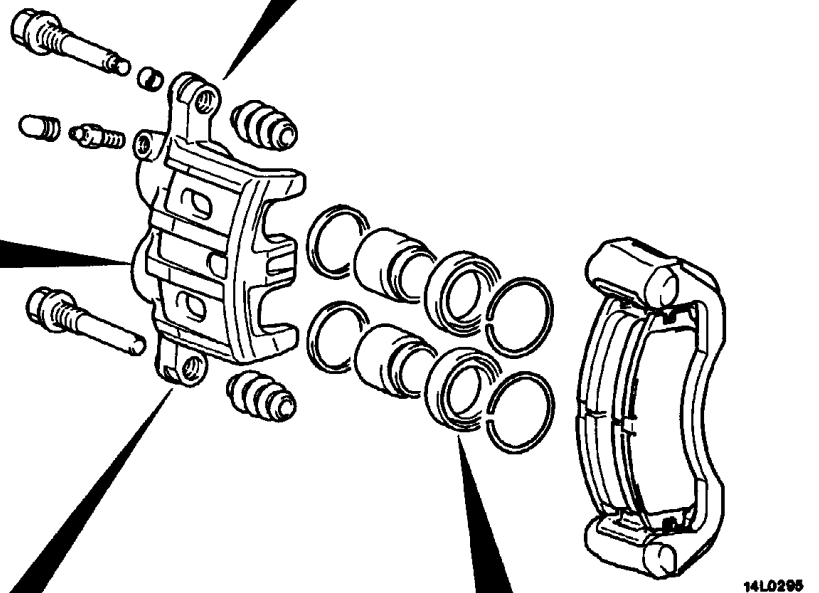
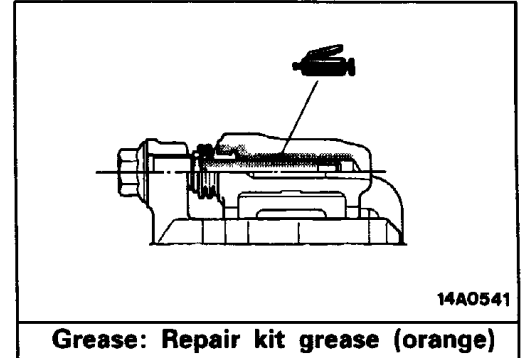
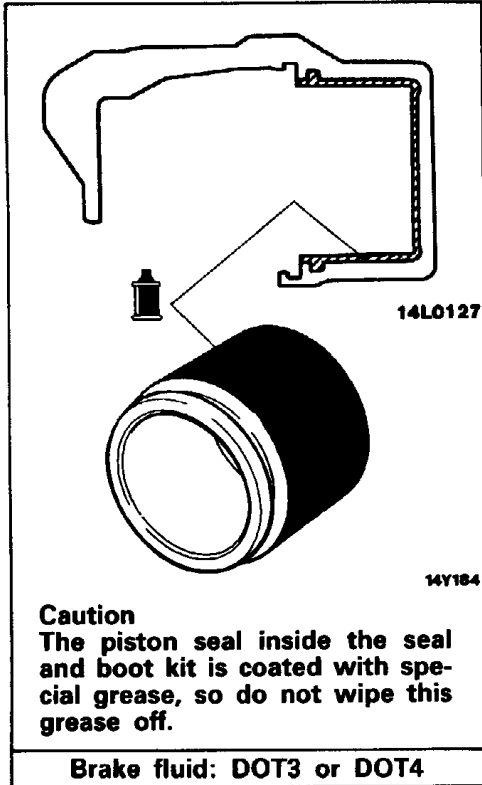
Caliper assembly disassembly steps

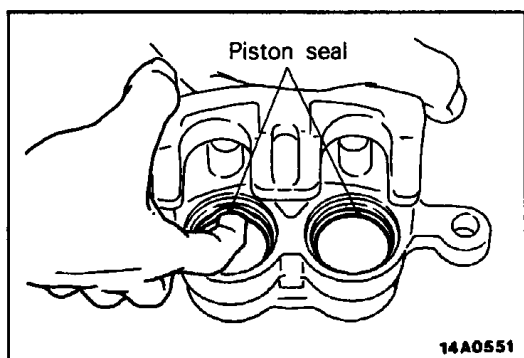
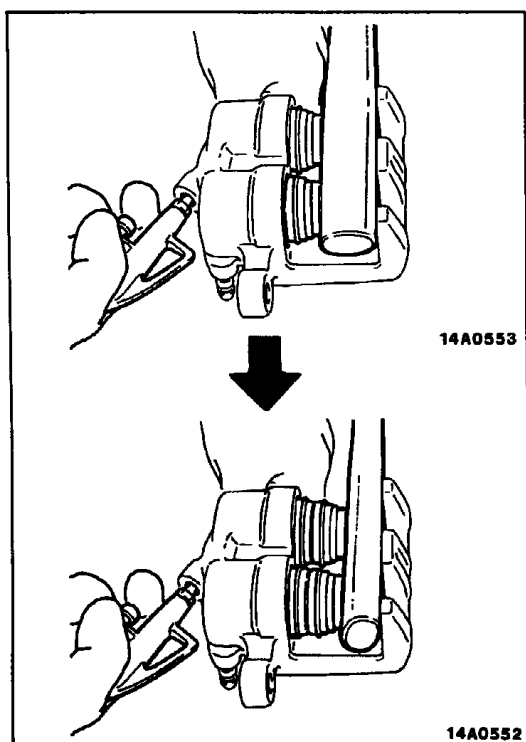
- ◆◆ 1. Guide pin
- ◆◆ 2. Lock pin
- ◆◆ 3. Bushing
- ◆◆ 4. Caliper support (pad, clip, shim)
- ◆◆ 5. Boot
- ◆◆ 6. Boot ring
- ◆◆ 7. Piston boot
- ◆◆ 8. Piston
- ◆◆ 9. Piston seal
- ◆◆ 10. Caliper body

Pad assembly disassembly steps

- ◆◆ 1. Guide pin
- ◆◆ 2. Lock pin
- ◆◆ 3. Bushing
- ◆◆ 4. Caliper support (pad, clip, shim)
- ◆◆ 11. Pad assembly (with wear indicator)
- ◆◆ 12. Pad assembly
- ◆◆ 13. Outer shim
- ◆◆ 14. Clip

LUBRICATION POINTS





SERVICE POINTS OF DISASSEMBLY

E35LGAG

When disassembling the rear disc brakes, disassemble both sides (left and right) as a set.

7. REMOVAL OF PISTON BOOT/8. PISTON

Pump in compressed air through the brake hose installation hole and remove the pistons and piston boot.

Caution

When removing the pistons, be sure to use the handle of a plastic hammer and adjust the height of the two pistons while pumping in air slowly in so that the pistons protrude evenly.

Do not remove one piston completely before trying to remove the other piston because it will become impossible to remove the second piston.

9. REMOVAL OF PISTON SEAL

- (1) Remove piston seal with finger tip.

Caution

Do not use a screwdriver or other tool to prevent damage to inner cylinder.

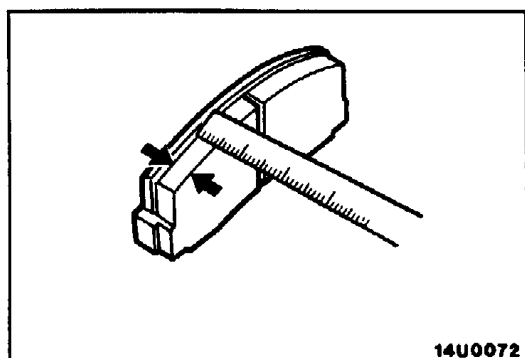
- (2) Clean piston surface and inner cylinder with trichloroethylene, alcohol or specified brake fluid.

Specified brake fluid: DOT3 or DOT4

INSPECTION

E35LHAD

- Check cylinder for wear, damage or rust.
- Check piston surface for wear, damage or rust.
- Check caliper body or sleeve for wear.
- Check pad for damage or adhesion of grease, check backing metal for damage.

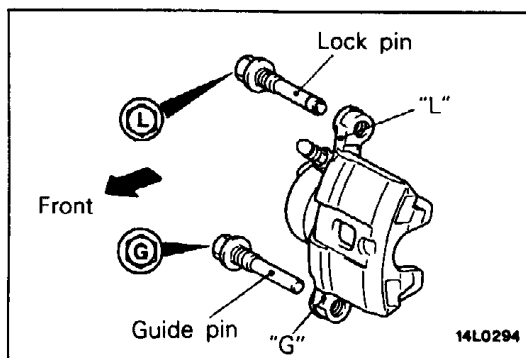
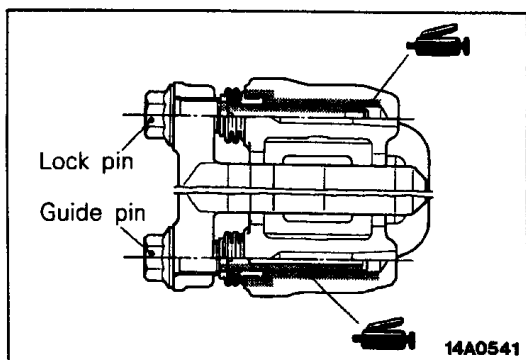


PAD WEAR CHECK

Measure thickness at the thinnest and worn area of the pad. Replace pad assembly when pad thickness is less than the limit value.

Standard value : 10 mm (0.39 in.)

Limit value : 2.0 mm (0.08 in.)



SERVICE PIONTS OF REASSEMBLY

E35LIAH

5. INSTALLATION OF BOOT/3. BUSHING/2. LOCK PIN/1. GUIDE PIN

- (1) Grease parts as illustrated with specified grease.

Specified grease: Repair kit grease (orange)

- (2) Install the guide pin and lock pin as illustrated so that each head mark of the guide pin and the lock pin matches the indication mark ("G" or "L") located on the caliper body.

REAR DISC BRAKE

E35RA--

REMOVAL AND INSTALLATION**Pre-removal Operation**

- Draining of Brake Fluid

Post-installation Operation

- Brake Fluid Filling
- Brake Line Bleeding
(Refer to P.35-87)

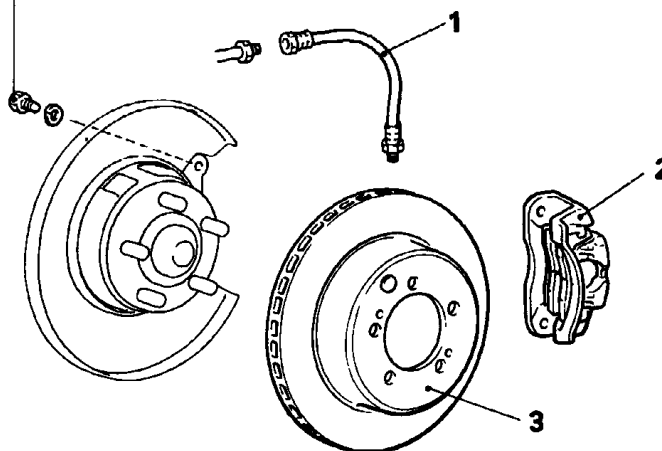
Flared brake line nuts

15 Nm
1.5 kgm
11 ft.lbs.



14F038

50-60 Nm
5.0-6.0 kgm
36-43 ft.lbs.



14N0035

Removal steps

- ◆◆ 1. Connection for the brake hose
- 2. Rear brake assembly
- 3. Brake disc

INSPECTION

E3LCAC

- Check the brake disc for damage.

SERVICE POINTS OF INSTALLATION

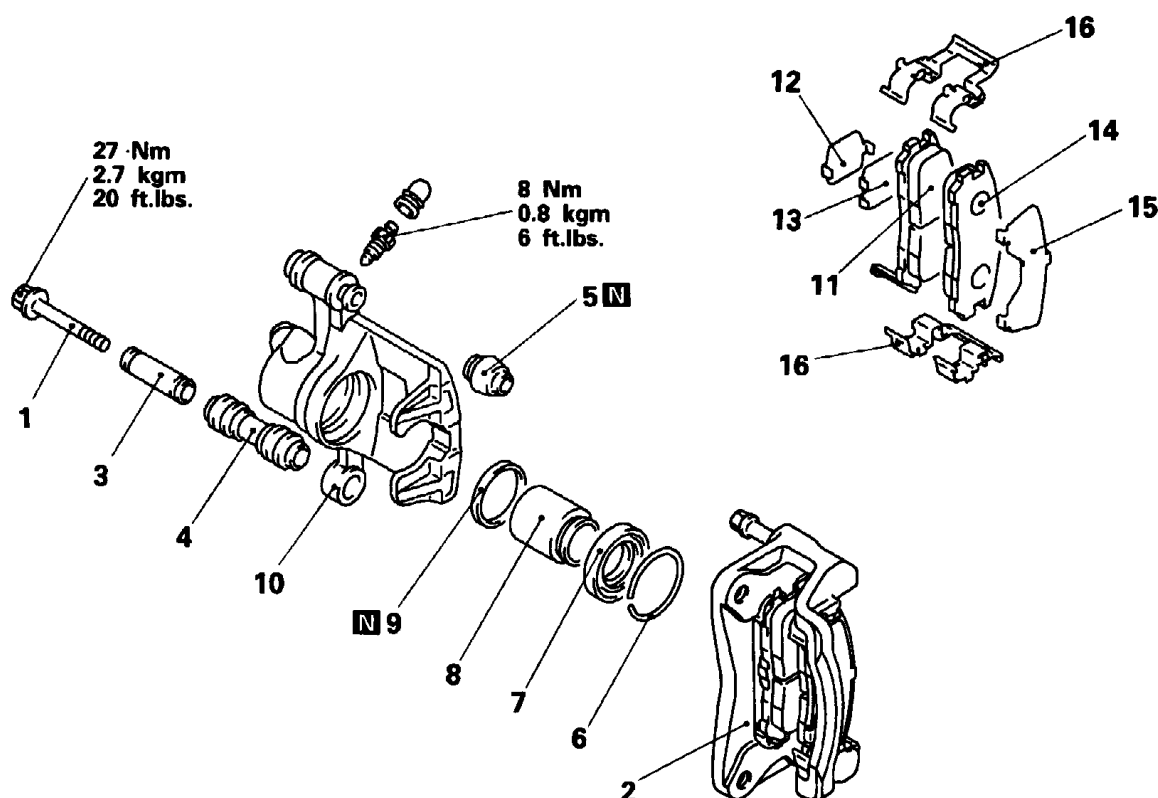
E35RDAG

2. INSTALLATION OF REAR BRAKE ASSEMBLY

Install by the same procedure as for the front brake assembly.
(Refer to P.35-118.)

DISASSEMBLY AND REASSEMBLY

E38RF-



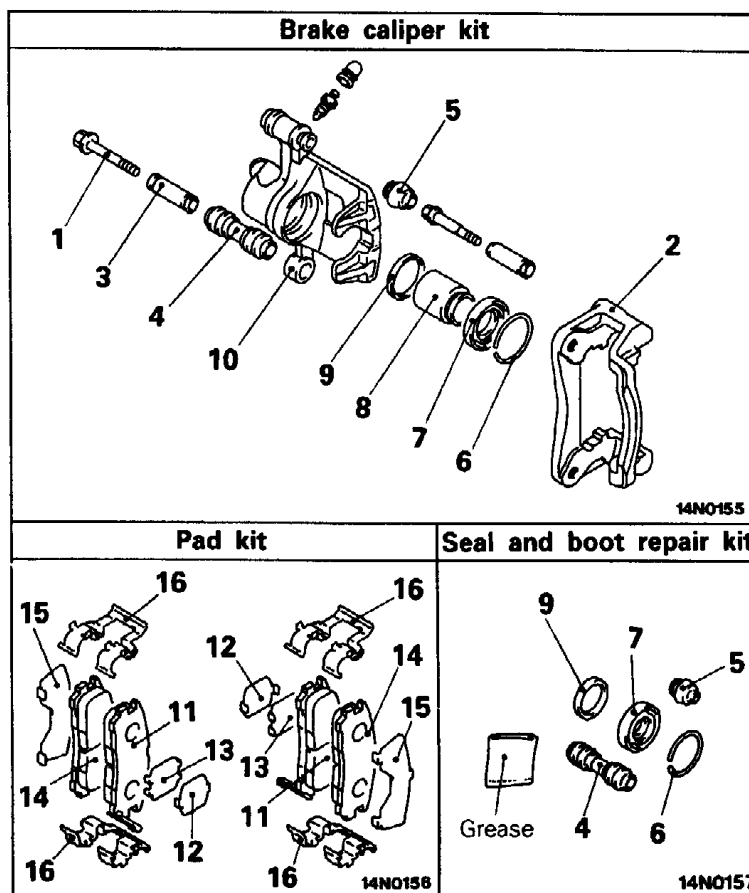
14N0154

Caliper assembly disassembly steps

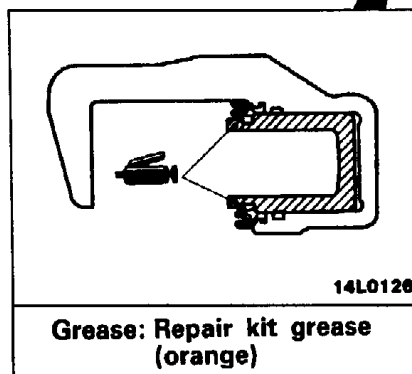
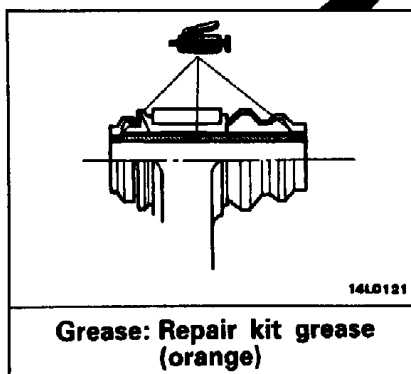
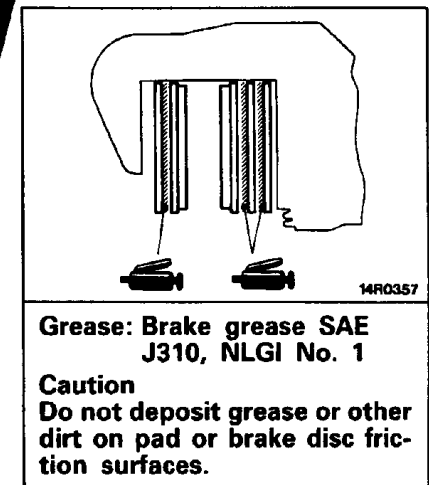
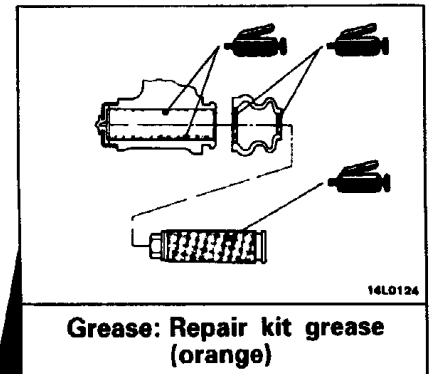
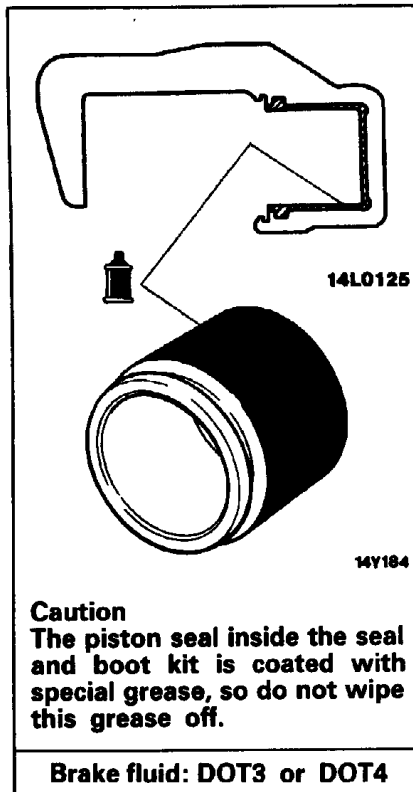
1. Lock pin
2. Caliper support (pad, clip, shim)
3. Sleeve
4. Lock pin boot
5. Guide pin boot
6. Boot ring
7. Piston boot
8. Piston
9. Piston seal
10. Caliper body

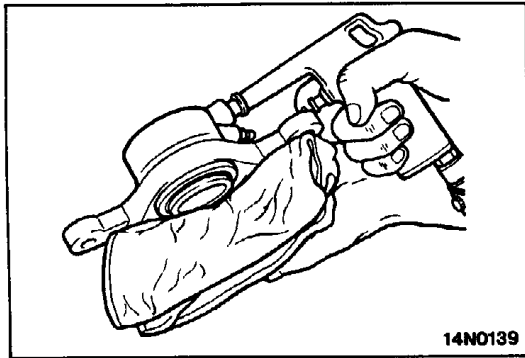
**Pad assembly disassembly steps**

1. Lock pin
2. Caliper support (Pad, clip, shim)
11. Pad and wear indicator assembly
12. Inner shim B
13. Inner shim A
14. Pad assembly
15. Outer shim
16. Clip

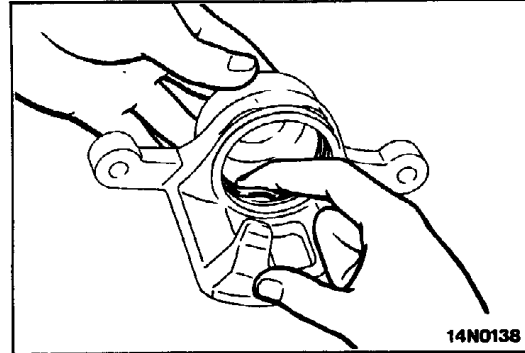


LUBRICANT POINTS





14N0139



14N0138

SERVICE POINTS OF DISASSEMBLY

E35RGAE

When disassembling the rear disc brakes, disassemble both sides (left and right) as a set.

7. REMOVAL OF PISTON BOOT/8. PISTON

Protect caliper body with cloth. Blow compressed air through brake hose to remove piston boot and piston.

Caution

Blow compressed air gently

9. REMOVAL OF PISTON SEAL

- (1) Remove piston seal with finger tip.

Caution

Do not use (-) screwdriver or other tool to prevent damage to inner cylinder.

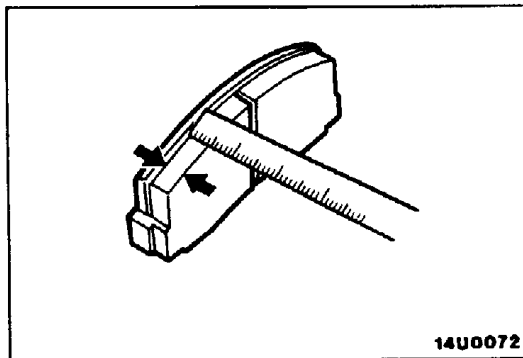
- (2) Clean piston surface and inner cylinder with trichloroethylene, alcohol or specified brake fluid.

Specified brake fluid: DOT3 or DOT4

INSPECTION

E35RHAD

- Check cylinder for wear, damage or rust.
- Check piston surface for wear, damage or rust.
- Check caliper body or sleeve for wear.
- Check pad for damage or adhesion of grease, check backing metal for damage.



14U0072

PAD WEAR CHECK

Measure thickness at the thinnest and worn area of the pad. Replace pad assembly when pad thickness is less than the limit value.

Standard value : 10 mm (0.39 in.)

Limit value : 2.0 mm (0.08 in.)

HYDRAULIC UNIT <VEHICLES WITH A.B.S.>

E35WA-

Caution

1. Do not dismantle the hydraulic unit, as the inside contains high pressure brake fluid. Also, the brake pipes marked with "*" on vehicles fitted with TCL contain high pressure brake fluid, so these pipes should never be disconnected (refer to P.35-129).
2. Do not refill the hydraulic unit reserve tank, even if the fluid level drops. When the fluid level drops below the MIN line, the hydraulic unit should be replaced.
3. The accumulator contains high pressure nitrogen gas, so keep it away from flames.
4. Do not loosen or remove the safety plug in the lower section of the accumulator, except when disposing of the hydraulic unit.
5. Do not throw the accumulator into fire, drill holes, press, or weld without first releasing the gas.
6. When disposing of the hydraulic unit, first release the gas by turning the safety plug two or three times to loosen it, and wait about 3 minutes until the hissing sound can no longer be heard and all the gas has escaped. Remove the plug before disposal.

REMOVAL AND INSTALLATION <VEHICLES WITHOUT TCL>

Flared brake line nuts

15 Nm
1.5 kgm
11 ft.lbs.



14F038

Pre-removal Operation

- Draining of Brake Fluid
- Removal of the Headlamp Washer Tank (Refer to GROUP 51 – Headlamp Washer.)

Post-installation Operation

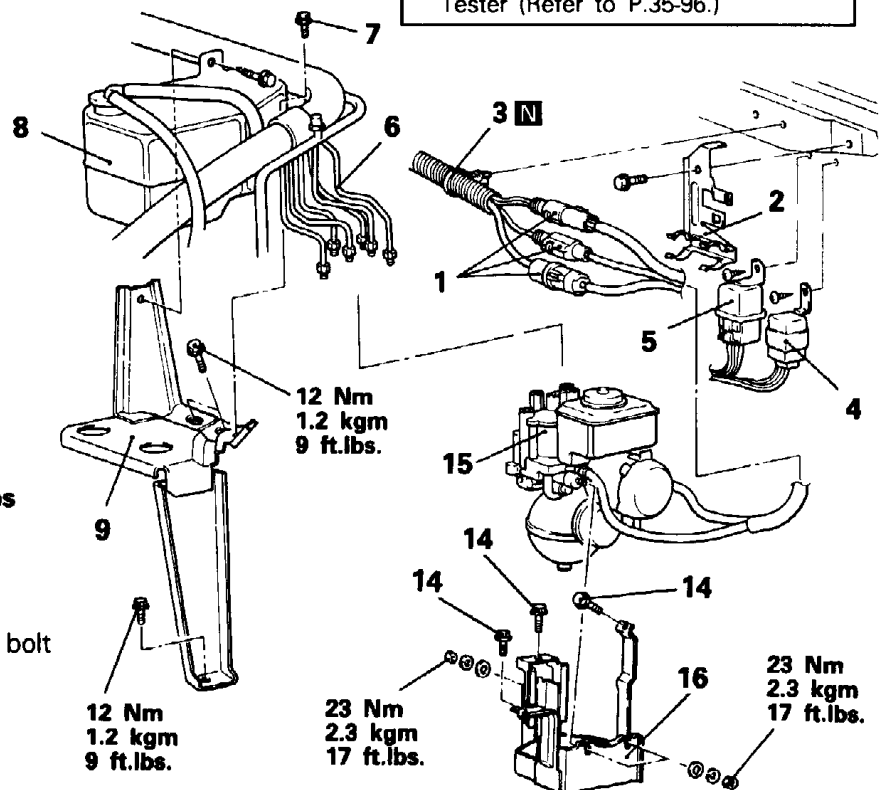
- Attaching the Headlamp Washer Tank (Refer to GROUP 51 – Headlamp Washer.)
- Supplying Brake Fluid
- Bleeding Brake Lines (Refer to P.35-87.)
- Checking by Using the Multi-Use Tester (Refer to P.35-96.)

Relay removal steps

1. Hydraulic unit connector
2. Connector bracket
3. Clip
4. Motor relay
5. Valve relay

Hydraulic unit removal steps

1. Hydraulic unit connector
2. Connector bracket
3. Clip
6. Brake pipe
7. A/C pressure hose clamp bolt
8. Condense tank
9. Condense tank bracket
14. Bolt
15. Hydraulic unit
16. Hydraulic unit bracket



14W0207

REMOVAL AND INSTALLATION <VEHICLES WITH TCL>

Flared brake line nuts

15 Nm
1.5 kgm
11 ft.lbs.



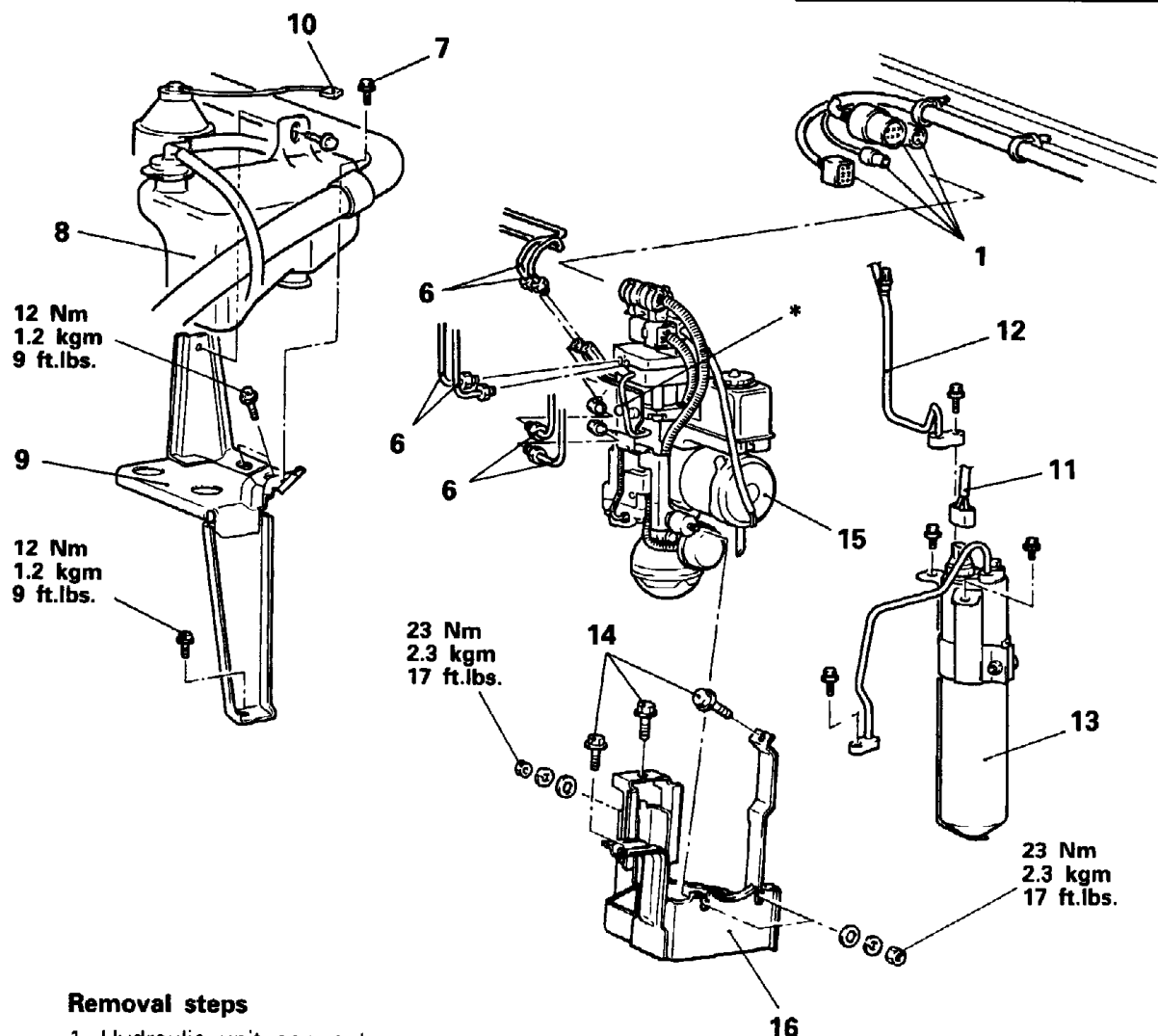
14F038

Pre-removal Operation

- Draining of Brake Fluid
- Removal of Refrigerant (Refer to GROUP 55 – Service Adjustment Procedures.)
- Removal of Headlamp Washer Tank (Refer to GROUP 51 – Headlamp Washer.)
- Removal of Master Cylinder (L H drive vehicles only) (Refer to P.35-108.)

Post-installation Operation

- Installation of Master Cylinder (L.H. drive vehicles only) (Refer to P.35-108.)
- Installation of Headlamp Washer Tank (Refer to GROUP 51 – Headlamp Washer)
- Supply of Refrigerant (Refer to GROUP 55 – Service Adjustment Procedures.)
- Supplying Brake Fluid
- Bleeding Brake Lines (Refer to P.35-87)
- Checking by Using the Multi-use Tester (Refer to P.35-49)

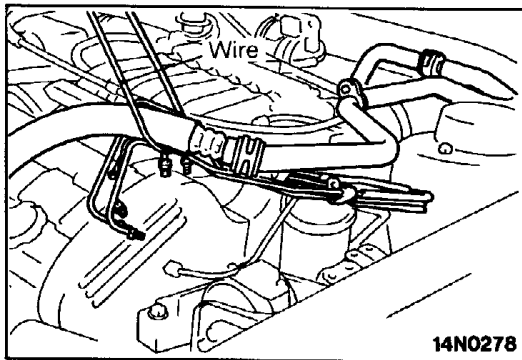


Removal steps



1. Hydraulic unit connectors
6. Brake pipe
7. A/C pressure hose clamp bolts
8. Condense tank
9. Condense tank bracket
10. 4WS oil level connector
11. Dual-pressure switch connector
12. Liquid pipe B
13. High pressure pipe and receiver assembly
14. Bolts
15. Hydraulic unit
16. Hydraulic unit bracket

14N0209



SERVICE POINTS OF REMOVAL

E35WBAD

6. REMOVAL OF BRAKE PIPE/7. A/C PRESSURE HOSE CLAMP BOLT

- (1) After disconnecting the brake pipes from the hydraulic unit, remove the brake pipe mounting clamp bolt.
- (2) Lift up the brake pipes and the A/C pressure hose and secure them to the hood so that they do not interfere with the removal and installation of the hydraulic unit.

Caution

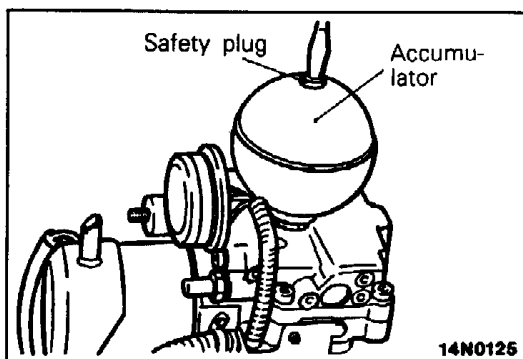
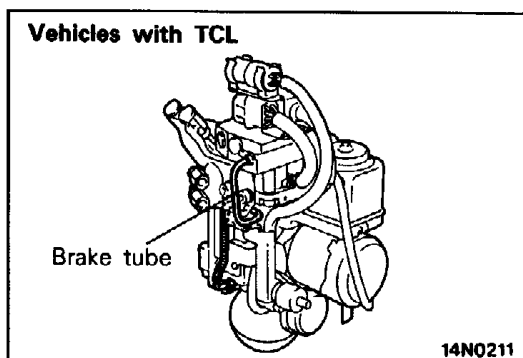
Do not bend the brake pipes or A/C pressure hose by using excessive force.

15. REMOVAL OF HYDRAULIC UNIT

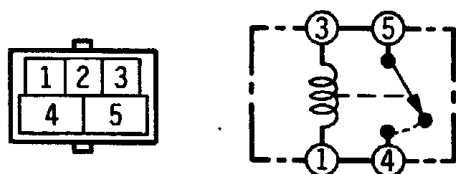
Remove the hydraulic unit by pushing it backwards so that it doesn't touch the piping of the A/C receiver.

Caution

1. Be careful during removal of the hydraulic unit as the unit is heavy.
2. Do not dismantle the hydraulic unit, as the inside contains high pressure brake fluid. Also, the brake pipes shown contain high pressure brake fluid, so this pipe should never be disconnected.
3. Do not drop the hydraulic unit or subject it to shocks.
4. Do not turn the hydraulic unit upside down or put it on its side.
5. Do not refill the hydraulic unit reserve tank, even if the fluid level drops. When the fluid level drops below the MIN line, the hydraulic unit should be replaced.
6. The accumulator contains high pressure nitrogen gas, so keep it away from flames.
7. Do not loosen or remove the safety plug in the lower section of the accumulator, except when disposing of the hydraulic unit.
8. Do not throw the accumulator into fire, drill holes, press, or weld without first releasing the gas.
9. When disposing of the hydraulic unit, first release the gas by turning the safety plug two or three times to loosen it, and wait about 3 minutes until the hissing sound can no longer be heard and all the gas has escaped. Remove the plug before disposal.

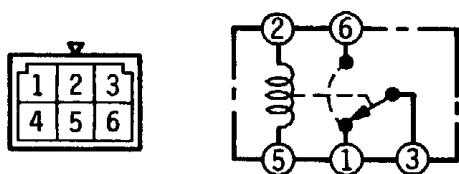


ABS motor relay



14A0235

ABS valve relay



14A0236

INSPECTION

MOTOR RELAY AND VALVE RELAY

Motor relay <when energizing coil is at normal temperature (20° ± 15°C [68° ± 27°F])>

When there is no current	Between terminals ③ and ①	74 ± 25Ω
	Between terminals ④ and ⑤	No continuity (∞ Ω)
When there is current between terminals ③ and ①	Between terminals ④ and ⑤	Continuity (approx. 0Ω)

Valve relay <when energizing coil is at normal temperature (20° ± 15°C [68° ± 27°F])>

When there is no current	Between terminals ② and ⑤	80 ± 25Ω
	Between terminals ① and ③	Continuity (approx. 0Ω)
	Between terminals ③ and ⑥	No continuity (∞ Ω)
When there is current between terminals ② and ⑤	Between terminals ① and ③	No continuity (∞ Ω)
	Between terminals ③ and ⑥	Continuity (approx. 0Ω)

NOTES

WHEEL SPEED SENSOR <VEHICLES WITH A.B.S.>

E15VA--

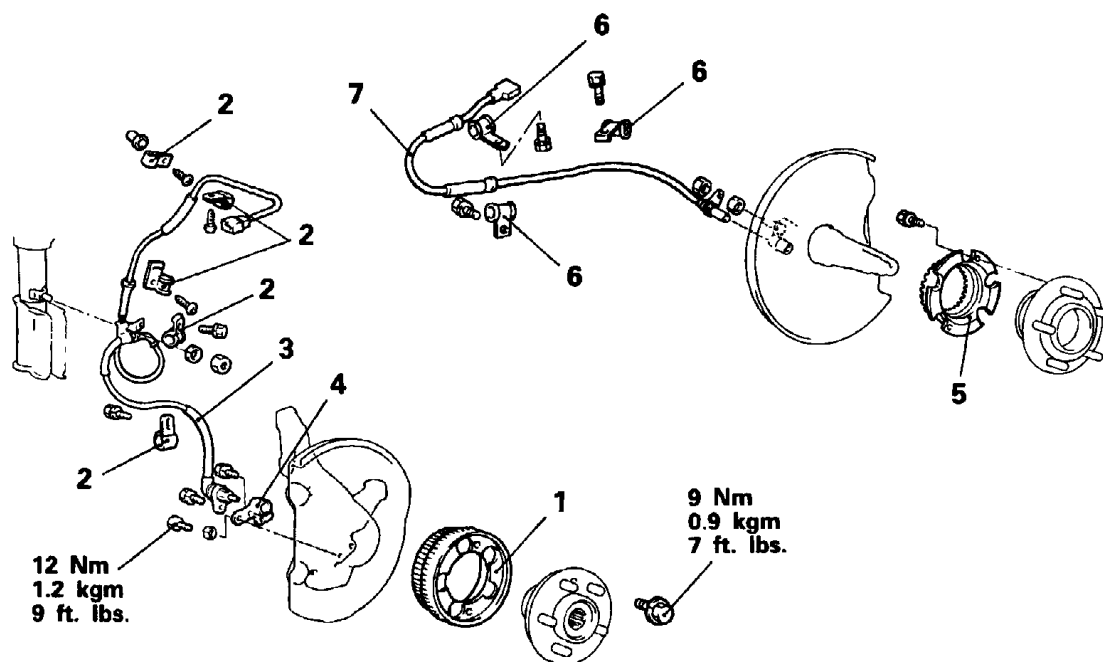
REMOVAL AND INSTALLATION

Pre-removal Operation

- Removal of the Splash Shield
(Refer to GROUP 42 – Fender.)

Post-installation Operation

- Checking of the Anti-skid Brake System
(Refer to P.35-94.)
- Installation of the Splash Shield
(Refer to Group 42 – Fender.)



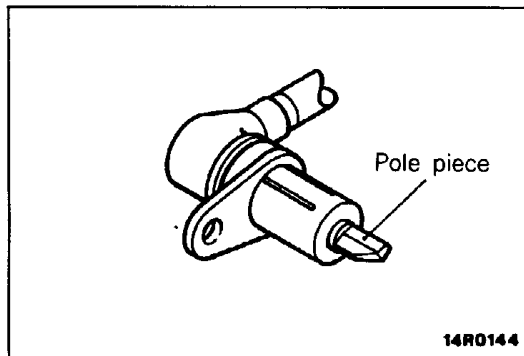
14N0106

Front speed sensor removal steps

- ◄◄ 1. Front toothed rotor
- ◄◄ 2. Clip
- ◄◄ ◄◄ 3. Front speed sensor
- ◄◄ ◄◄ 4. Front speed sensor bracket

Rear speed sensor removal steps

- ◄◄ 5. Rear toothed rotor
- ◄◄ 6. Clip
- ◄◄ ◄◄ 7. Rear speed sensor



SERVICE POINTS OF REMOVAL

E35YBAD

1./5. REMOVAL OF TOOTHED ROTOR 3./7. SPEED SENSOR

Caution

1. Be careful when handling the pole piece at the tip of the speed sensor and the toothed edge of the rotor so as not to damage them, as they are easily chipped if knocked.
2. Care must be taken not to scratch or scar the rotor's toothed surface, and not to drop it.
If the rotor's toothed surface is chipped or the rotor is deformed, it might not be able to accurately sense the wheel rotation speed and as a result the system might not perform normally.

INSPECTION

SPEED SENSOR CHECK

- (1) Check whether any metallic foreign material has adhered to the pole piece of the speed sensor tip, and, if so, it is removed.

Also check whether the pole piece is damaged, and, if so, replace it with a new one.

NOTE

The pole piece is magnetized because of the magnet built into the speed sensor, with the result that metallic foreign material easily adheres to it. Moreover, the pole piece may not be able to function, to correctly sense the wheel rotation speed if it is damaged.

- (2) Measure the resistance between the speed sensor terminals.

Standard value: Front 1.4 – 2.2 kΩ
Rear 1.3 – 2.1 kΩ

If the internal resistance of the speed sensor is not within the standard value, replace it with a new speed sensor.

- (3) Remove all connections from the speed sensor, and then measure the resistance between terminals 1 and 2 and the body of the speed sensor.

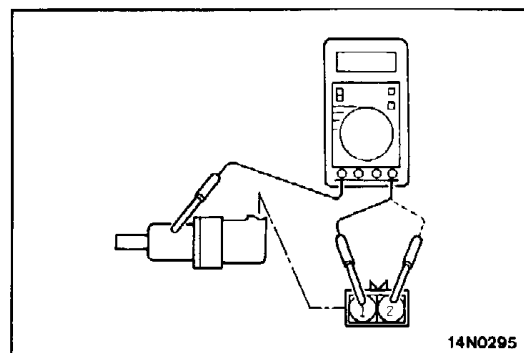
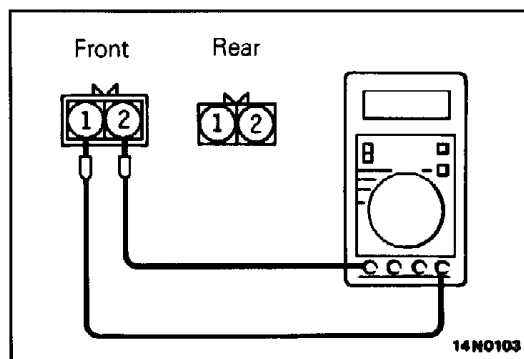
Standard value: 100 kΩ or more

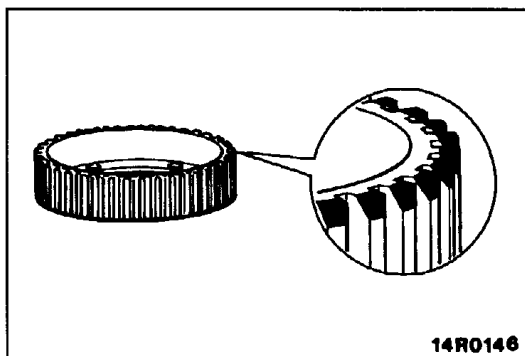
If the speed sensor insulation resistance is outside the standard value range, replace with a new speed sensor.

- (4) Check the speed sensor cable for breakage, damage or disconnection; replace with a new one if a problem is found.

NOTE

When checking for cable damage, remove the cable clamp part from the body and then bend and pull the cable near the clamp to check whether or not temporary disconnection occurs.





14R0146

TOOTHED ROTOR CHECK

Check whether rotor teeth are broken or deformed, and, if so, replace the rotor.

SERVICE POINTS OF INSTALLATION

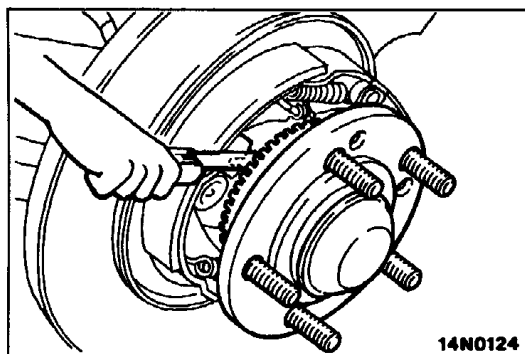
7. INSTALLATION OF REAR SPEED SENSOR

Insert a thickness gauge into the space between the speed sensor's pole piece and the rotor's toothed surface, and then tighten the speed sensors at the position where the clearance is the standard value.

Standard value: 0.2–0.7 mm (0.008–0.028 in.)

NOTE

Check to be sure that there is no contact of the speed sensor's pole piece and the rotor's toothed surface when the rear hub assembly is slowly rotated one full turn. If there is contact, it is probable that the rotor or the rear hub is installed incorrectly, recheck installation.



14N0124

4. INSTALLATION OF FRONT SPEED SENSOR BRACKET

Assemble the speed sensor and the speed sensor bracket.

NOTE

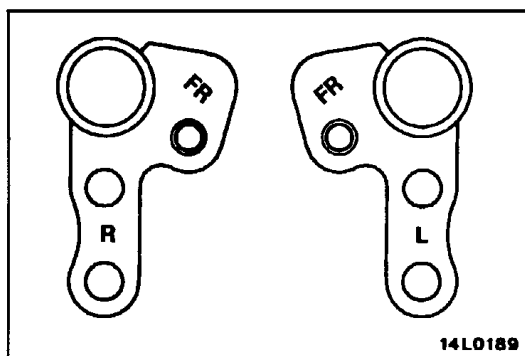
(1) The shapes are different for the left and right speed sensor brackets. Each bracket has an identification symbol, so be sure to note these symbols and install correctly.

FR: Indicates that the bracket is for the front speed sensor.

R: Indicates that the bracket is for the right wheel.

L: Indicates that the bracket is for the left wheel.

(2) Check to be sure, when installing the speed sensor to the bracket, that the letters 'FR' are visible.



14L0189

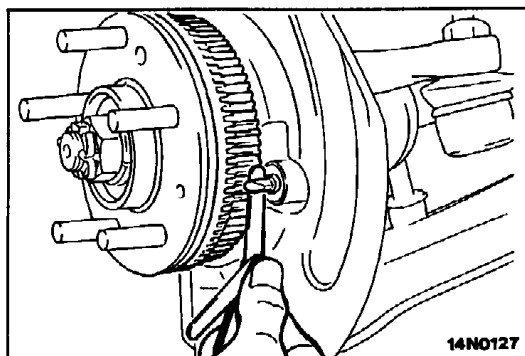
3. INSTALLATION OF FRONT SPEED SENSOR

Insert a thickness gauge into the space between the speed sensor's pole piece and the rotor's toothed surface, and then tighten the speed sensor at the position where the clearance is the standard value all around.

Standard value: 0.3–0.9 mm (0.012–0.035 in.)

NOTE

If the clearance between the speed sensor's pole piece and the rotor's toothed surface is not within the standard value range, it is probable that the rotor is incorrectly installed, recheck installation.



14N0127

ELECTRONIC CONTROL UNIT <VEHICLES WITH A.B.S.>

E35EA--

REMOVAL AND INSTALLATION

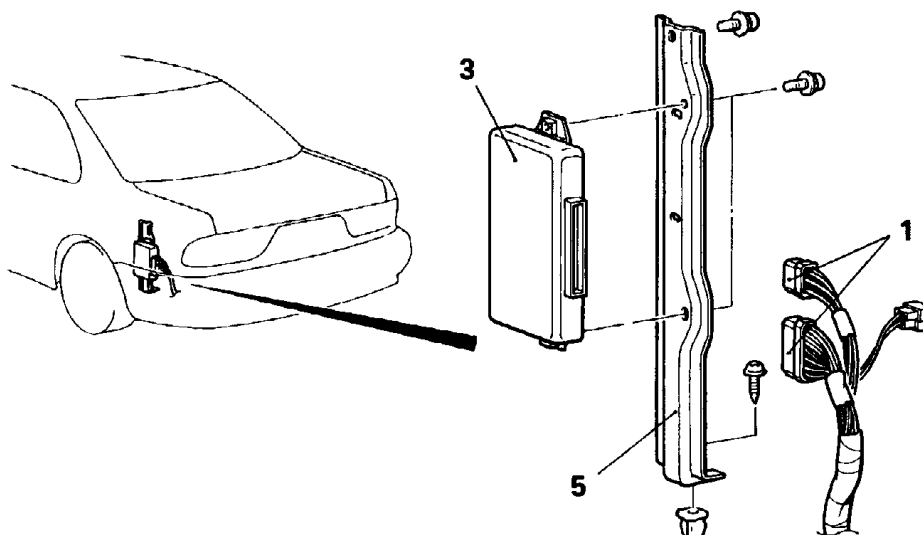
Pre-removal Operation

- Removal of the Trunk Side Trim (L H) (Refer to GROUP 52 – Trim.)

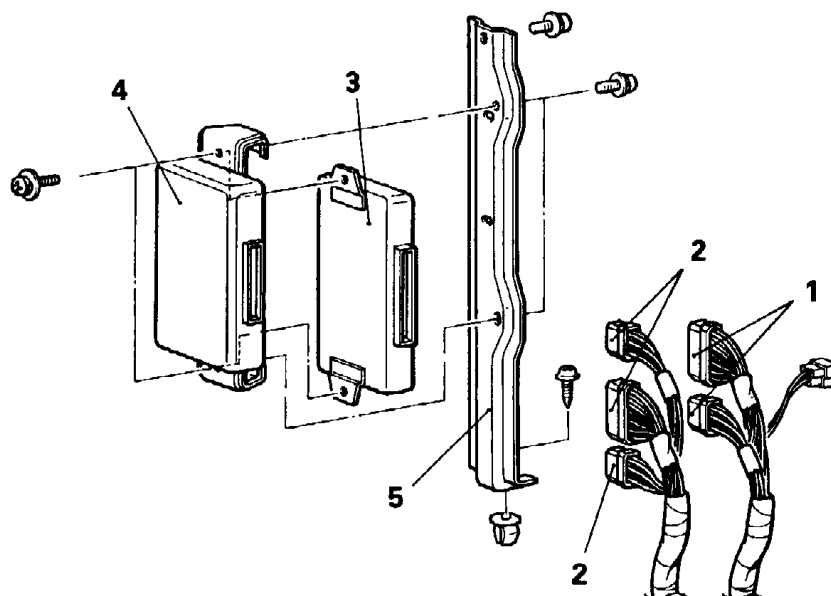
Post-installation Operation

- Checking of the Anti-skid Brake System (Refer to p. 35-5.)
- Installation of the Trunk side Trim (L H) (Refer to GROUP 52 – Trim)

<Vehicles without TCL>



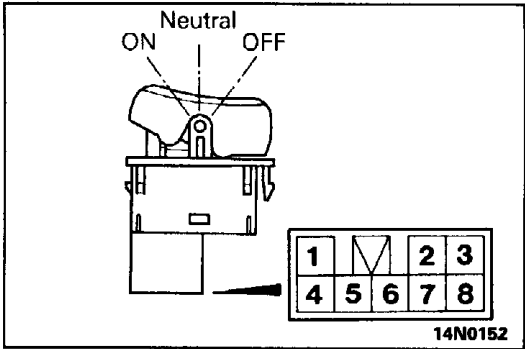
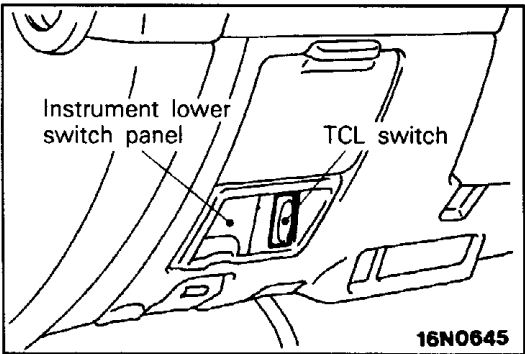
<Vehicles with TCL>



Removal steps

1. ABS-ECU connector
2. TCL-ECU connector
3. ABS-ECU
4. TCL-ECU
5. Bracket

14N0272



TCL SWITCH

E35XEAA

INSPECTION

1. Remove the instrument lower switch panel.
2. Remove the TCL switch.

3. Operate the switch to check continuity between the terminals.

Connector terminal	1	2	3	4	7	8	5	6
Switch position								
ON				○		○		
Neutral							○	○
OFF		○		○				

NOTE

○—○ shows that there is continuity between the terminals.

PARKING BRAKES

CONTENTS

E36AA--

SPECIFICATIONS	2	SERVICE ADJUSTMENT PROCEDURES ...	2
General Specifications	2	Parking Brake Lever Stroke Check	2
Service Specifications	2	Parking Brake Switch Check	3
Lubricants	2	Lining Running-in	3-1
Sealants	2	PARKING BRAKE LEVER AND PARKING BRAKE CABLE*	4
		PARKING BRAKE DRUM	7

WARNINGS REGARDING SERVICING OF SUPPLEMENTAL RESTRAINT SYSTEM (SRS) EQUIPPED VEHICLES

WARNING!

- (1) Improper service or maintenance of any component of the SRS, or any SRS-related component, can lead to personal injury or death to service personnel (from inadvertent firing of the air bag) or to the driver and passenger (from rendering the SRS inoperative).
- (2) Service or maintenance of any SRS component or SRS-related component must be performed only at an authorized MITSUBISHI dealer.
- (3) MITSUBISHI dealer personnel must thoroughly review this manual, and especially its GROUP 52B—Supplemental Restraint System (SRS), before beginning any service or maintenance of any component of the SRS or any SRS-related component.

NOTE

The SRS includes the following components: impact sensors, SRS diagnosis unit, SRS warning lamp, air bag module, clock spring, and interconnecting wiring. Other SRS-related components (that may have to be removed/installed in connection with SRS service or maintenance) are indicated in the table of contents by an asterisk (*).

36-2 PARKING BRAKES – Specifications/Service Adjustment Procedures

SPECIFICATIONS

GENERAL SPECIFICATIONS

E36CA--

Items	Specifications
Type	Mechanical brake acting on rear wheels
Brake lever type	Lever type
Cable arrangement	V-type

SERVICE SPECIFICATIONS

E36CB--

Item	Specifications
Standard value	
Parking brake lever stroke	3–5 notches
Brake lining thickness	mm (in.) 2.8 (0.110)
Brake drum inside diameter	mm (in.) 168 (6.6)
Limit	
Brake lining thickness	mm (in.) 1.0 (0.039)
Brake drum inside diameter	mm (in.) 169 (6.7)

LUBRICANTS

E36CD--

Items	Specified lubricants
Shoe and lining assembly and strut contact surfaces	Brake grease SAE J310, NLGI No.1
Shoe and lining assembly and adjuster contact surfaces	
Adjuster	

SEALANTS

E36CE--

Item	Specified sealants	Remarks
Shoe hold-down pin	3M ATD Part No.8513 or equivalent	Drying sealant

SERVICE ADJUSTMENT PROCEDURES

PARKING BRAKE LEVER STROKE CHECK

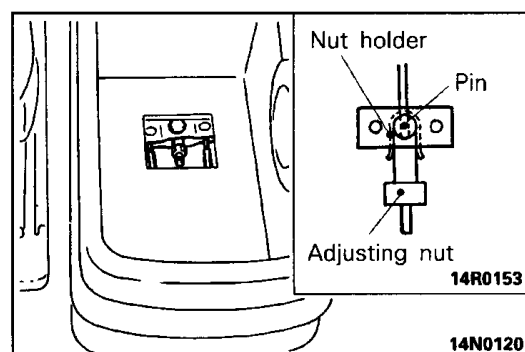
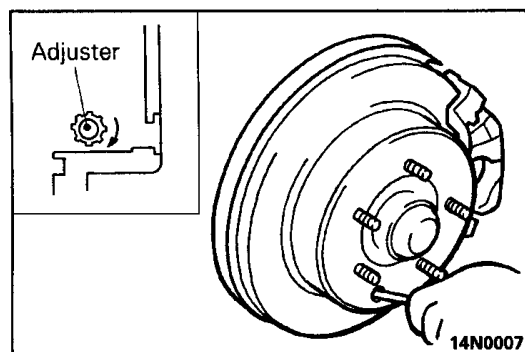
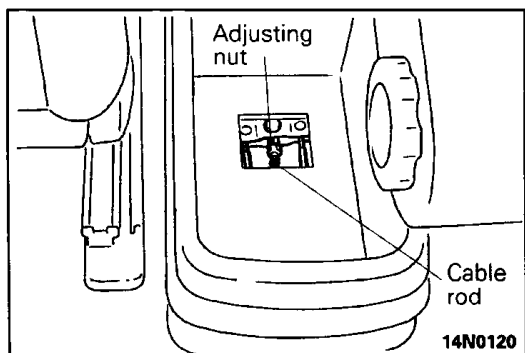
E36FAAT

1. Pull the parking brake lever with a force of approx. 200 N (20 kg, 45 lbs.), and count the number of notches.

Caution

The 200 N (20 kg, 45 lbs.) force of the parking brake lever must be strictly observed.

Standard value: 3–5 notches



2. If the parking brake lever stroke is not the standard value, adjust as described below.

- (1) Remove the inner compartment mat of the floor console.
- (2) Loosen the adjusting nut to the end of the cable rod, thus freeing the parking brake cable.

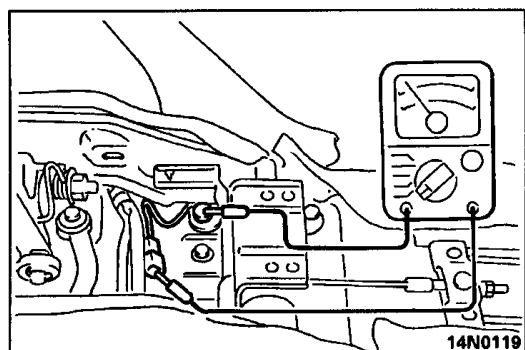
- (3) Remove the adjustment hole plug, and then use a flat-tip (–) screwdriver to turn the adjuster in the direction of the arrow (the direction which expands the shoe) so that the disc will not rotate.
- (4) Return the adjuster five notches in the direction opposite to the direction of the arrow.

- (5) Turn the adjusting nut to adjust the parking brake lever stroke to within the standard value range.

Caution

If the number of brake lever notches engaged is less than the standard value, the cable has been pulled excessively. Be sure to adjust it to within the standard value.

- (6) After making the adjustment, check to be sure that there is no play between the adjusting nut and the pin. Also check that the adjusting nut is securely held at the nut holder.
- (7) After adjusting the lever stroke, jack up the rear of the vehicle.
- (8) With the parking brake lever in the released position, turn the rear wheel to confirm that the rear brakes are not dragging.



PARKING BRAKE SWITCH CHECK

E36FCAD

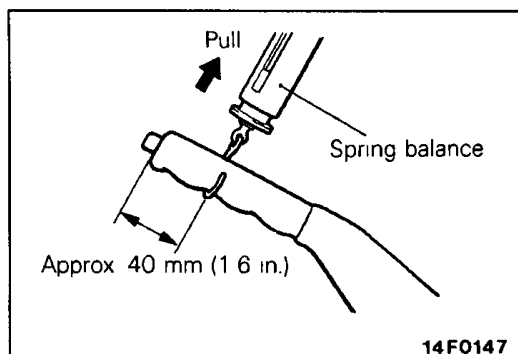
1. Disconnect the connector of the parking brake switch, and connect an ohmmeter to the parking brake switch and the switch installation bolt.
2. The parking brake switch is good if there is continuity when the parking brake lever is pulled and there is no continuity when it is returned.

LINING RUNNING-IN

Carry out running-in by the following procedure when replacing the parking brake linings or the rear brake disc rotors, or when brake performance is insufficient.

Caution

Carry out running-in in a place with good visibility, and pay careful attention to safety.



- (1) Adjust the parking brake stroke to the specified value.

**Standard value: 3–5 notches [operation force:
Approx. 200 N (20 kg, 44 lbs.)]**

- (2) Hook a spring balance onto the centre of the parking brake lever grip and pull it with a force of 100–150 N (10–15 kgf, 22–33 lbs.) in a direction perpendicular to the handle.
- (3) Drive the vehicle at a constant speed of 35–50 km/h (22–31 mph) for 100 metres (328 ft.).
- (4) Release the parking brake and let the brakes cool for 5–10 minutes.
- (5) Repeat the procedure in steps (2) to (4) 4–5 times.

NOTES

PARKING BRAKE LEVER AND PARKING BRAKE CABLE

REMOVAL AND INSTALLATION

E36LA--

CAUTION: SRS <L.H.drive vehicles>

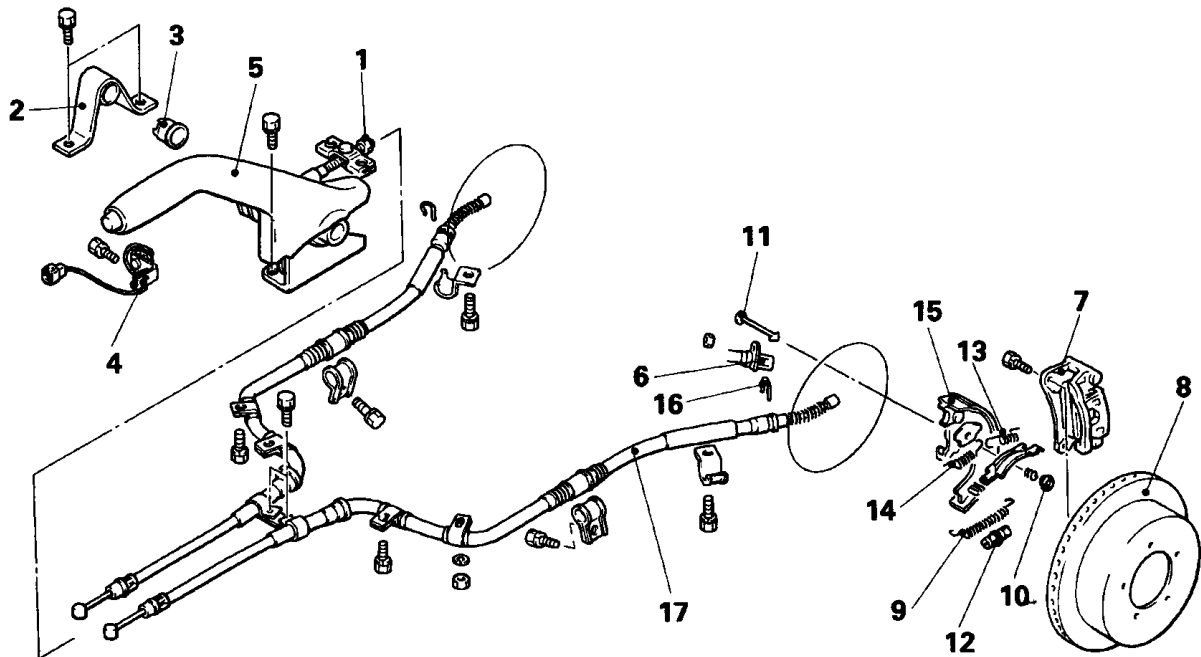
1. When removing and installing the floor console in vehicles equipped with SRS, do not let it bump against the SRS diagnostic unit or other components.
2. Before removal of SRS diagnosis unit, refer to GROUP 52B – SRS Diagnosis Unit.

Pre-removal Operation

- Removal of Floor Console (Refer to GROUP 52 – Console Box.)
- Removal of SRS diagnosis unit <Vehicles with SRS> (Refer to GROUP 52B – SRS Diagnosis Unit)
- Removal of Rear Seat (Refer to GROUP 52 – Seat.)

Post-installation Operation

- Parking Brake Lever Stroke Adjustment (Refer to P.36-2.)
- Installation of Floor Console (Refer to GROUP 52 – Console Box.)
- Installation of SRS diagnosis unit <Vehicles with SRS> (Refer to GROUP 52B – SRS Diagnosis Unit)
- Installation of Rear Seat (Refer to GROUP 52 – Seat.)



14N0198

Parking brake lever removal steps

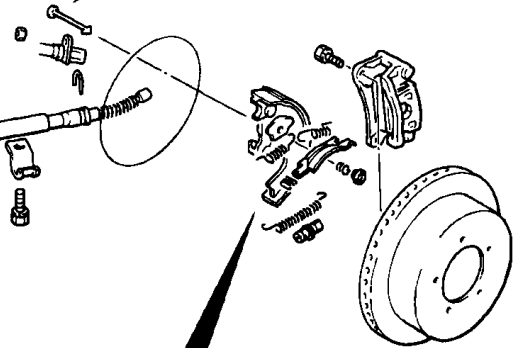
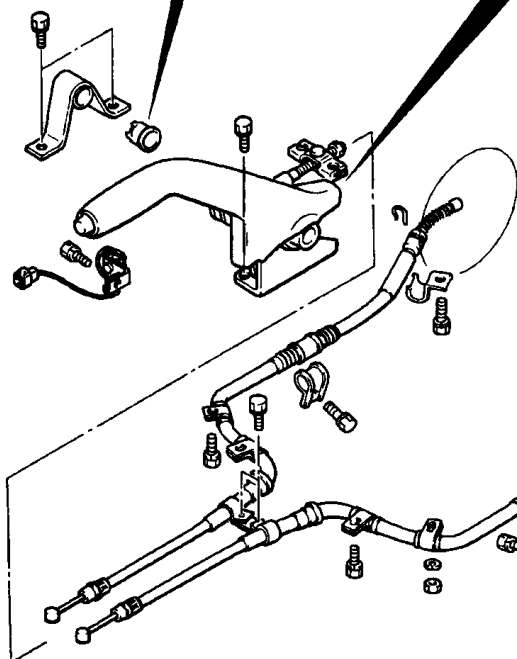
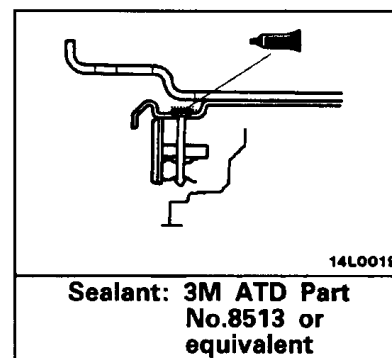
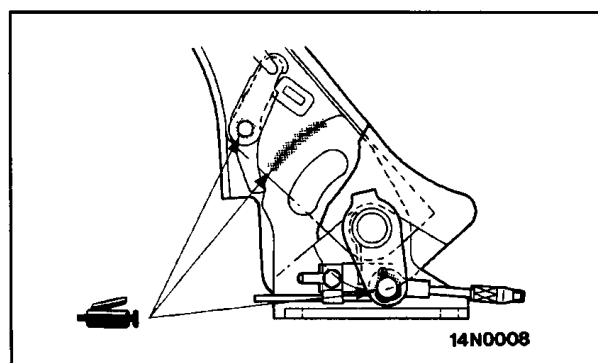
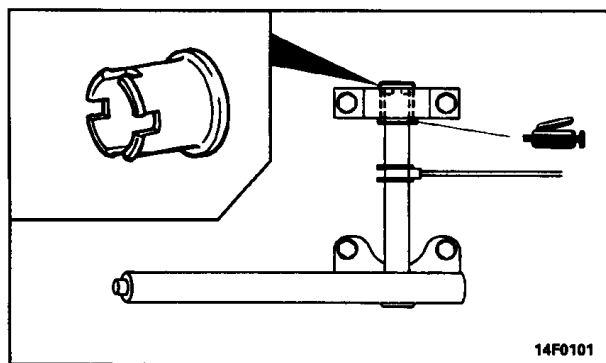
1. Adjusting nut
2. Parking brake stay
3. Bushing
4. Parking brake switch
5. Parking brake lever

Parking brake cable removal steps

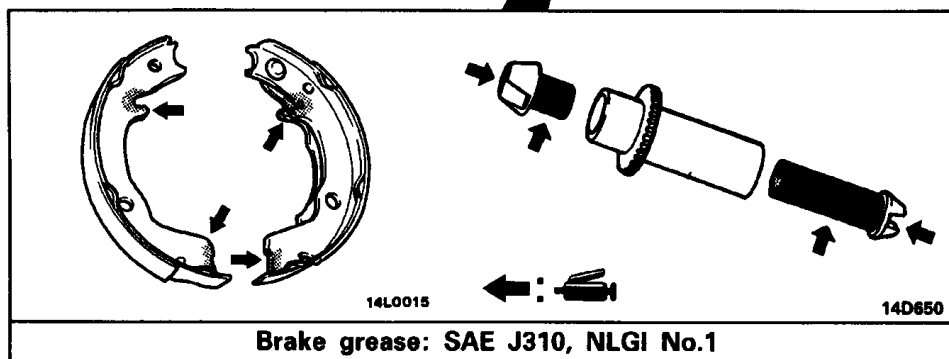
1. Adjusting nut
6. Rear speed sensor <Vehicles with ABS>
7. Rear brake assembly
8. Rear brake disc
9. Adjusting wheel spring

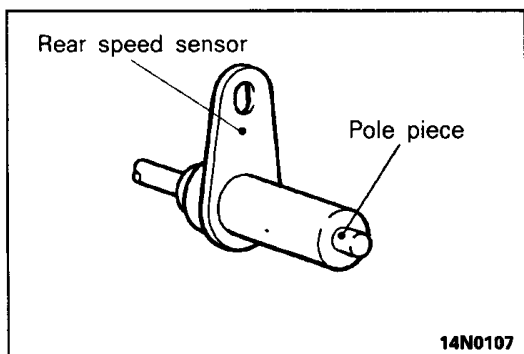
10. Shoe hold-down cup
11. Shoe hold-down pin
12. Adjuster
13. Shoe-to-anchor spring (rear)
14. Shoe-to-anchor spring (front)
15. Shoe and lining assembly
16. Clip
17. Parking brake cable

LUBRICANT AND SEALING POINTS



14N0198





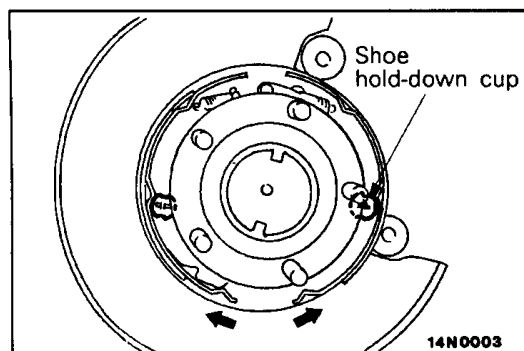
SERVICE POINTS OF REMOVAL

E36LBAF

6. REMOVAL OF REAR SPEED SENSOR <VEHICLES WITH ABS>

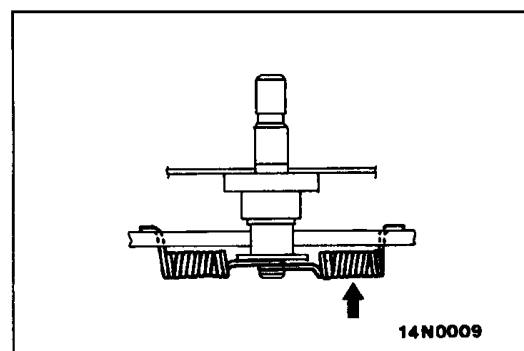
Caution

When removing the speed sensor from the adapter, be careful that the end pole piece does not strike the teeth of the rotor or other parts.



10. REMOVAL OF SHOE HOLD-DOWN CUP

Extend the shoe and lining assembly, and remove the shoe hold-down cup.



SERVICE POINTS OF INSTALLATION

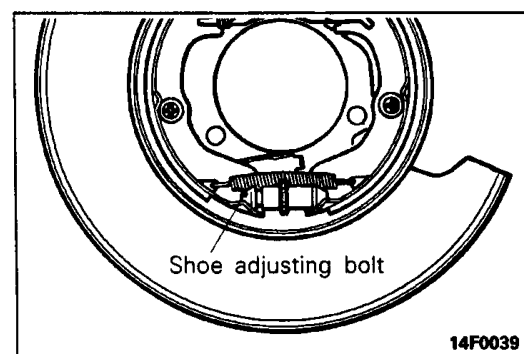
E36LDAF

14./13. SHOE-TO-ANCHOR SPRING

The load on the respective shoe-to-anchor springs is different, so the spring in the figure has been painted.

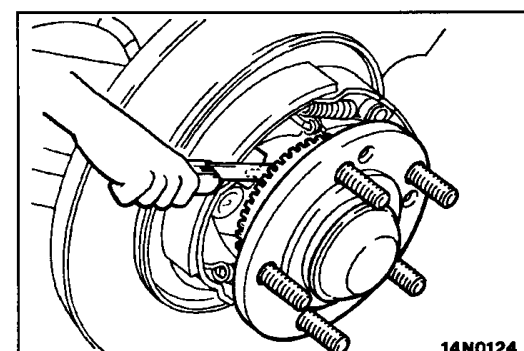
NOTE

The figure shows the left wheel; for the right wheel, the position is symmetrical.



12. INSTALLATION OF ADJUSTER

Install the adjuster so that the shoe adjusting bolt of left hand wheel is attached towards the front of the vehicle, and the shoe adjusting bolt of right hand wheel is towards the rear of the vehicle.



6. INSTALLATION OF REAR SPEED SENSOR <VEHICLES WITH ABS>

Insert a thickness gauge into the space between the speed sensor's pole piece and the rotor's toothed surface and then tighten the speed sensors at the position where the clearance at all places is within the standard value.

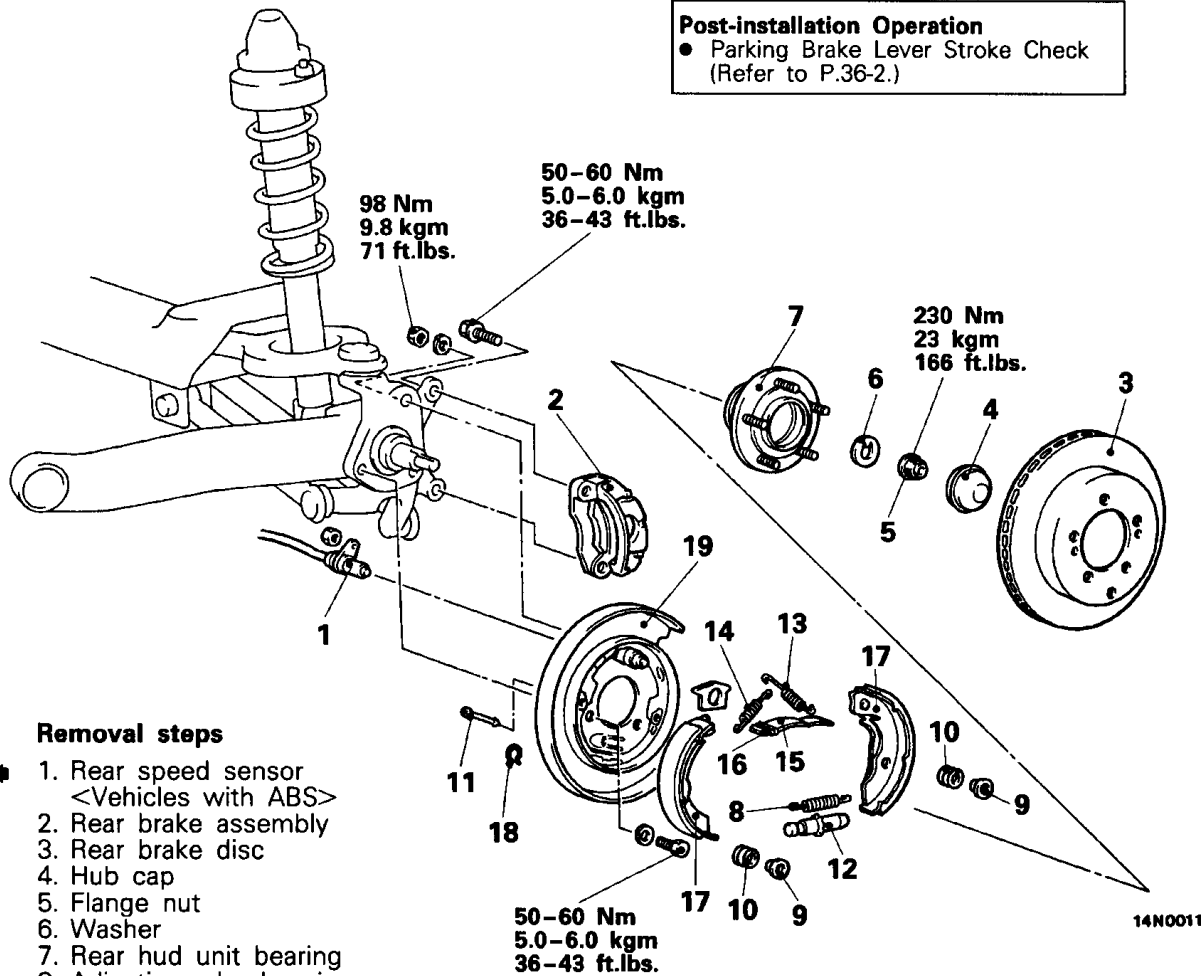
Standard value: 0.2–0.7 mm (0.008–0.028 in.)

PARKING BRAKE DRUM REMOVAL AND INSTALLATION

E36RA-

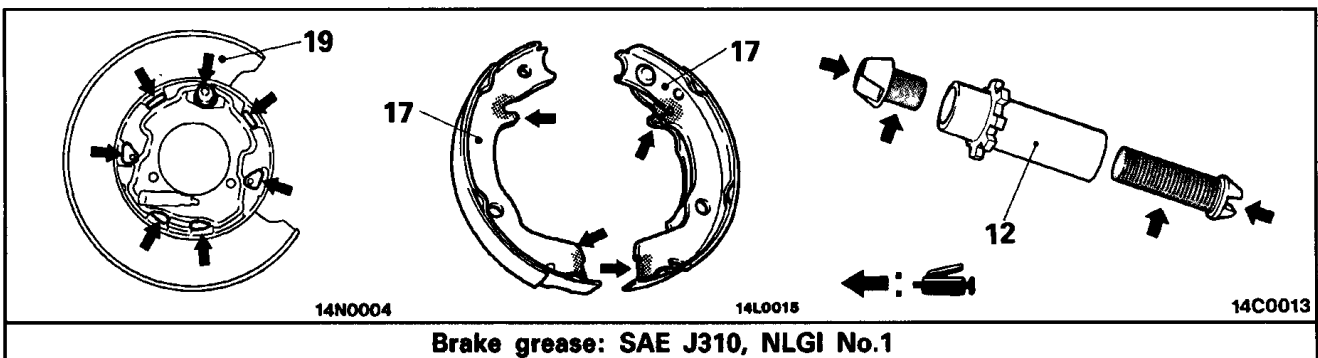
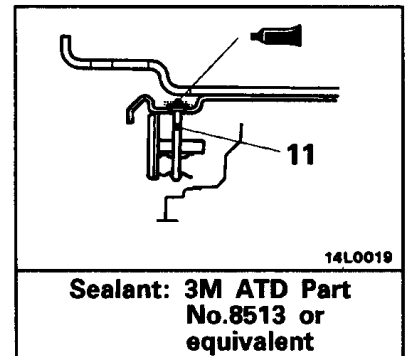
Post-installation Operation

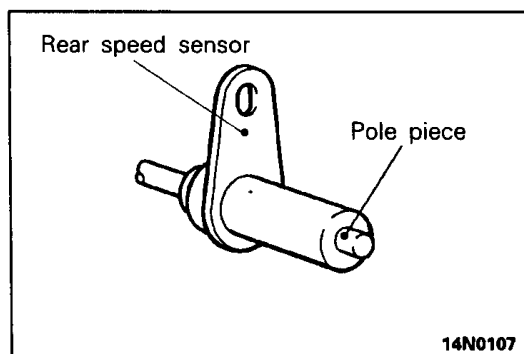
- Parking Brake Lever Stroke Check (Refer to P.36-2.)



Removal steps

- ◀▶▶▶ 1. Rear speed sensor
<Vehicles with ABS>
- ▶▶▶▶ 2. Rear brake assembly
- ▶▶▶▶ 3. Rear brake disc
- ▶▶▶▶ 4. Hub cap
- ▶▶▶▶ 5. Flange nut
- ▶▶▶▶ 6. Washer
- ▶▶▶▶ 7. Rear hub unit bearing
- ▶▶▶▶ 8. Adjusting wheel spring
- ◀▶▶▶ 9. Shoe hold-down cup
- ◀▶▶▶ 10. Shoe hold-down spring
- ◀▶▶▶ 11. Shoe hold-down pin
- ▶▶▶▶ 12. Adjuster
- ▶▶▶▶ 13. Shoe-to-anchor spring (rear)
- ▶▶▶▶ 14. Shoe-to-anchor spring (front)
- ▶▶▶▶ 15. Strut
- ▶▶▶▶ 16. Strut return spring
- ▶▶▶▶ 17. Shoe and lining assembly
- ▶▶▶▶ 18. Clip
- ▶▶▶▶ 19. Backing plate





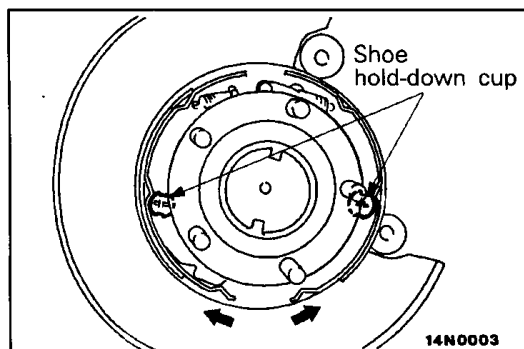
SERVICE POINTS OF REMOVAL

E36RBAC

1. REMOVAL OF REAR SPEED SENSOR

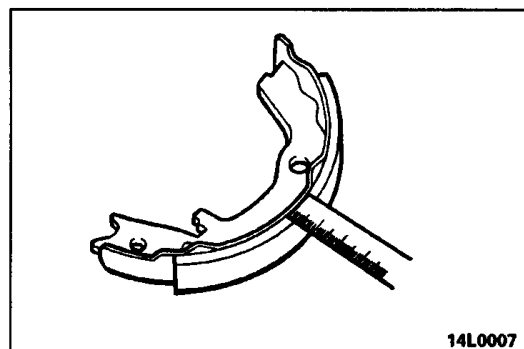
Caution

When removing the speed sensor from the adapter, be careful that the end pole piece does not strike the teeth of the rotor or other parts.



9. REMOVAL OF SHOE HOLD-DOWN CUP

Extend the shoe and lining assembly, and remove the shoe hold-down cup.



INSPECTION

E36RCAA

CHECKING FOR UNUSUAL WEAR OF THE BRAKE LINING AND BRAKE DRUM

- (1) Measure the thickness of the brake lining at several places.

Standard value: 2.8 mm (0.110 in.)

Limit: 1.0 mm (0.039 in.)

Caution

Replace the brake shoes if the thickness of the brake lining is the limit value or less.

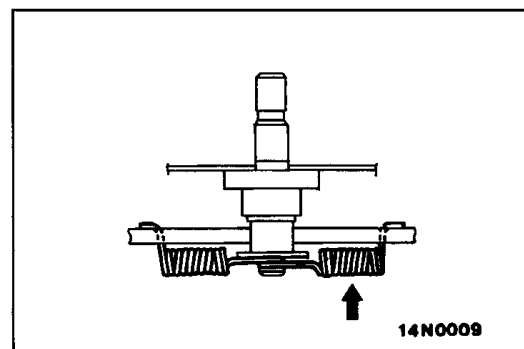
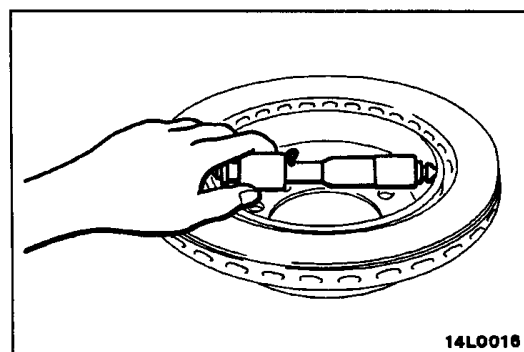
- (2) Using a dial gauge caliper or micrometer (for inner side), measure the brake disc drum inner diameter at two or more places.

Standard value: 168.0 mm (6.6 in.)

Limit: 169.0 mm (6.7 in.)

Caution

Replace if the brake disc drum inner diameter is the limit value or more.



SERVICE POINTS OF INSTALLATION

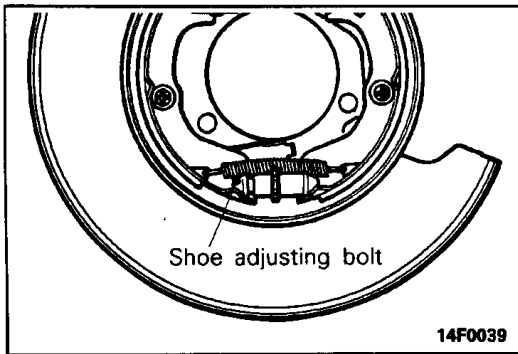
E36RDAD

14./13. SHOE-TO-ANCHOR SPRING

The load on the respective shoe-to-anchor springs is different, so the spring in the figure has been painted.

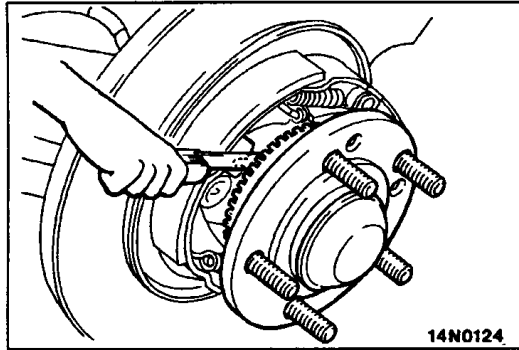
NOTE

The figure shows the left wheel; for the right wheel, the position is symmetrical.



12. INSTALLATION OF ADJUSTER

Install the adjuster so that the shoe adjusting bolt of left hand wheel is attached towards the front of the vehicle, and the shoe adjusting bolt of right hand wheel is towards the rear of the vehicle.



1. INSTALLATION OF REAR SPEED SENSOR <VEHICLES WITH ABS>

Insert a thickness gauge into the space between the speed sensor's pole piece and the rotor's toothed surface, and then tighten the speed sensors at the position where the clearance at all places is within the standard value.

Standard value: 0.2–0.7 mm (0.008–0.028 in.)

STEERING

CONTENTS

E37AA--

SPECIFICATIONS	2	SPECIAL TOOLS	4
General Specifications	2	TROUBLESHOOTING <E.P.S.>	7
Service Specifications	2	CONTINUED ON NEXT PAGE	
Lubricants	3		
Sealant and Adhesives	3		

WARNINGS REGARDING SERVICING OF SUPPLEMENTAL RESTRAINT SYSTEM (SRS) EQUIPPED VEHICLES

WARNING!

- (1) Improper service or maintenance of any component of the SRS, or any SRS-related component, can lead to personal injury or death to service personnel (from inadvertent firing of the air bag) or to the driver and passenger (from rendering the SRS inoperative).
- (2) Service or maintenance of any SRS component or SRS-related component must be performed only at an authorized MITSUBISHI dealer.
- (3) MITSUBISHI dealer personnel must thoroughly review this manual, and especially its GROUP 52B—Supplemental Restraint System (SRS), before beginning any service or maintenance of any component of the SRS or any SRS-related component.

NOTE

The SRS includes the following components: impact sensors, SRS diagnosis unit, SRS warning lamp, air bag module, clock spring, and interconnecting wiring. Other SRS-related components (that may have to be removed/installed in connection with SRS service or maintenance) are indicated in the table of contents by an asterisk (*).

SERVICE ADJUSTMENT PROCEDURES 12

Steering Wheel Free Play Check	12
Steering Angle Check	12
Tie Rod End Ball Joint Variation Check	12
Tie Rod End Ball Joint Starting Torque Check	13
Stationary Steering Effort Check	13
Checking Steering Wheel Return to Centre	15
E.P.S. Solenoid Check	15
V-Belt Tension Check	17
Fluid Level Check	17-1

Fluid Replacement	18
Bleeding	18
Oil Pump Pressure Test	19
Power Steering Oil Pressure Switch Check	20

STEERING WHEEL AND SHAFT* 21**POWER STEERING GEAR BOX* 25****POWER STEERING OIL PUMP 39****POWER STEERING HOSES 44****E.P.S. CONTROL UNIT* 47**

NOTES

SPECIFICATIONS

GENERAL SPECIFICATIONS

E37CA--

Items	Specifications
Gear box	
Steering gear type	Rack and pinion
Oil pump	
Oil pump type	Vane type
Displacement	cm ³ /rev. (cu.in./rev.) 9.6 (0.59)
Relief set pressure	MPa (kg/cm ² , psi.) 8 (80, 1,138)

SERVICE SPECIFICATIONS

E37CB--

Items	Specifications
Standard value	
Steering wheel free play (with engine stopped)	mm (in.) 10 (0.43) or less
Steering angle	
Inner wheel	37°00' ± 2°
Outer wheel	30°30'
Tie rod end ball joint starting torque	Nm (kgcm, in.lbs.) 0.5–2.5 (5–25, 4–22)
Stationary steering effort	N (kg, lbs.)
<Vehicles built up to October, 1992>	
Conventional power steering	31 (3.1, 6.8) or less
E.P.S. (Vehicles without 4WS)	23 (2.3, 5.1) or less
E.P.S. (Vehicles with 4WS)	33 (3.3, 7.2) or less
<Vehicles built from November, 1992>	
Conventional power steering	
L.H. drive vehicles	34 (3.4, 7.5) or less
R.H. drive vehicles	31 (3.1, 6.8) or less
E.P.S.	
L.H. drive vehicles	28 (2.8, 6.2) or less
R.H. drive vehicles	23 (2.3, 5.1) or less
Solenoid current	A 0.9–1.1
V-belt tension	mm (in.)
SOHC Engine	
When belt tension is inspected	6–9 (0.24–0.35)
When belt tension is readjusted	7 (0.28)
When new belt is installed	4–5 (0.16–0.20)
DOHC Engine	
<Vehicles built up to October, 1991>	
When belt tension is inspected or readjusted	9–11 (0.35–0.43)
When new belt is installed	7–8.5 (0.28–0.33)
<Vehicles built from November, 1991>	
When belt tension is inspected	9.5–13.5 (0.37–0.53)
When belt tension is readjusted	10.5–12.5 (0.41–0.49)
When new belt is installed	7.5–9.0 (0.30–0.35)

Items		Specifications
Oil pump pressure	MPa (kg/cm ² , psi)	
Oil pump relief pressure		7.5–8.2 (75–82, 1.067–1.166)
Pressure under no-load conditions		0.8–1.0 (8–10, 114–142)
Steering gear retention hydraulic pressure		7.5–8.2 (75–82, 1.067–1.166)
Oil pressure switch operating pressure	MPa (kg/cm ² , psi)	
OFF → ON		1.5–2.0 (15–20, 213–284)
ON → OFF		0.7–1.2 (7–12, 100–171)
Total pinion preload	Nm (kgcm, in.lbs.)	
Conventional power steering		
0° (Neutral position)–60°		1.3–1.8 (13–18, 11–16)
60°–180°		0.7–1.2 (7–12, 6–10)
E.P.S. (Vehicles without 4WS)		1.3 (13, 11)
E.P.S. (Vehicles with 4WS)		0.7–1.6 (7–16, 6–14)
Tie-rod joint swing resistance	N (kg, lbs)	8–20 (0.8–2.0, 1.9–4.6)
Tie-rod joint swing torque	Nm (kgcm, in.lbs.)	2–5 (20–50, 17–43)
Limit		
Steering wheel free play (when hydraulic operation)	mm (in.)	30 (1.2)
Tie rod end ball joint variation (shaft direction)	mm (in.)	1.5 (0.059)
Space between vane and rotor	mm (in.)	0.06 (0.0024)

NOTES

LUBRICANTS

E37CD--

Items	Specified lubricants	Quantity
Power steering gear box		
Bearing	Automatic transmission fluid DEXRON or DEXRON II	As required
O-ring	Automatic transmission fluid DEXRON or DEXRON II	As required
Oil seal	Automatic transmission fluid DEXRON or DEXRON II	As required
Special tool (MB991213)	Automatic transmission fluid DEXRON or DEXRON II	As required
Pinion and valve assembly seal ring part	Automatic transmission fluid DEXRON or DEXRON II	As required
Bellows	Silicone grease	As required
Oil pump		
Power steering fluid	Automatic transmission fluid DEXRON or DEXRON II	0.9 lit. (0.95 U.S.qt., 0.79 Imp.qt.)
Flow control valve	Automatic transmission fluid DEXRON or DEXRON II	As required
Friction surface of rotor, vane, cam ring and pump cover	Automatic transmission fluid DEXRON or DEXRON II	As required
O-ring	Automatic transmission fluid DEXRON or DEXRON II	As required

SEALANT AND ADHESIVES

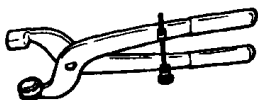
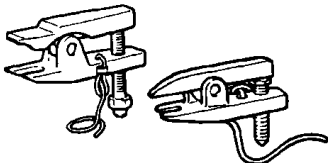
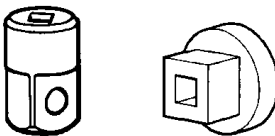
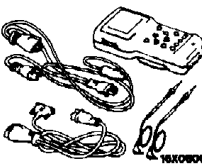
E37CE--

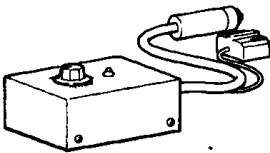
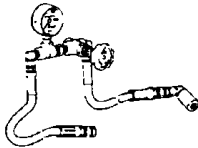
Items	Specified sealant and adhesive	Remarks
Steering column assembly		
Retainer attachment hole	3M ATD Part No. 8661 or equivalent	Semi-drying sealants
Power steering gear box		
End plug screw		
Power steering rack support cover screw		
Dust cover lip for tie rod end ball joint	3M ATD Part No. 8661 or equivalent	Semi-drying sealants

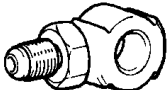
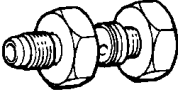
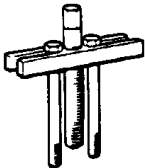
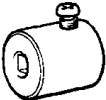
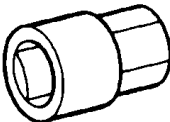
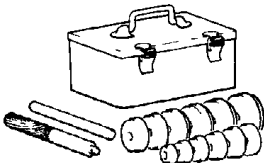
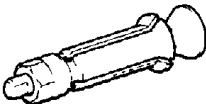
NOTES

SPECIAL TOOLS

E37DA--

Tool	Number	Name	Use
	MB990948	Linkage joint gauge	Ball joint variation check for shaft direction
	MB991113 or MB990635	Steering linkage puller	Disconnection of tie-rod end
	MB990685	Torque wrench	Measurement of the ball joint starting torque Measurement of the pinion shaft preload
	MB990326 or CT-1046	Preload socket	Measurement of the ball joint starting torque
	MB991341	Multi-use tester subassembly	Up to 1993 models Checking the solenoid valve current control function
	ROM pack (For the number, refer to GROUP) (00 – Precautions Before Service.)		
	MB991502	MUT-II	
	ROM pack 16X0607		All models Checking the solenoid valve current control function

Tool	Number	Name	Use
	MB991141	Dummy speed oscillator	Checking the solenoid valve current control function Checking of stationary steering effort during simulated high-speed driving
	MB991167	Harness adapter	
	MB990662	Oil pressure gauge assembly	Measurement of oil pressure

Tool	Number	Name	Use
	MB990993 or MB991217	Power steering oil pressure gauge adapter (pump side)	Measurement of oil pressure
	MB990994	Power steering oil pressure gauge adapter (hose side)	
	MB990803	Steering wheel puller	Disconnection of the steering wheel
	MB990826	Torque wrench	Removal and installation of the tilt bracket or upper bracket
	MB991006	Preload socket	Measurement of the pinion shaft preload
	MB991204	Torque wrench socket	Adjustment of rack support Removal of rack support cover
	MB990925	Bearing and oil seal installer set (Refer to GROUP 26)	Installation of the oil seal and bearing MB990927 MB990938 MB990939
	MB991120	Needle bearing puller	Removal of rack housing needle bearing
	MB991197	Bar (long type)	To press in the oil seal for the rack

Tool	Number	Name	Use
	MB991199	Oil seal installer	To press in the oil seal for the rack
	MB991099	Oil seal installer attachment	Oil seal installer guide
	MB991202	Oil seal & bearing installer	Press fitting of rack housing bearing
	MB991214	Rack installer	Rack installation
	MB991203	Oil seal & bearing installer	To press in the valve housing oil seal and bearing
	MB991317	Seal ring installer	Compression of the seal rings after replacement of the pinion seal rings
	MB991152	Dust cover installer	To press in the column tube lower part bearing
	MB990776	Front axle base	Installation of dust cover for tie rod end ball joint

TROUBLESHOOTING <E.P.S.> <VEHICLES BUILT UP TO OCTOBER, 1992>

E37EAAL

Trouble symptom	Trouble area	Inspection item	Reference page
Steering wheel movement is heavy. (When ignition key is turned to ON, no current flows through the solenoid.)	Steering gear and linkage	Solenoid valve continuity	P.37A-15
		Solenoid or PCV operation is faulty.	P.37A-15, 34
	Harness or fuse	Blown fuse	–
		Remove the control unit connector and check the continuity in the solenoid harness (between terminals No. 2 and No. 3).	P.37A-11
	Control unit	Turn the ignition key momentarily to ACC or LOCK and check if the fail-safe function is operating.	P.37A-9 Refer to the flow-chart type troubleshooting guide "Trouble Symptom 2".
		Check for continuity in each harness and for abnormalities in the control unit power circuit.	
While driving at medium or high speed, steering remains light.	Control unit	Use a tester to check the stationary steering effort.	P.37A-13
		Check the solenoid current in relation to changes in vehicle speed.	P.37A-15
	Steering gear and linkage	Solenoid or PCV operation.	P.37A-15, 34

NOTE

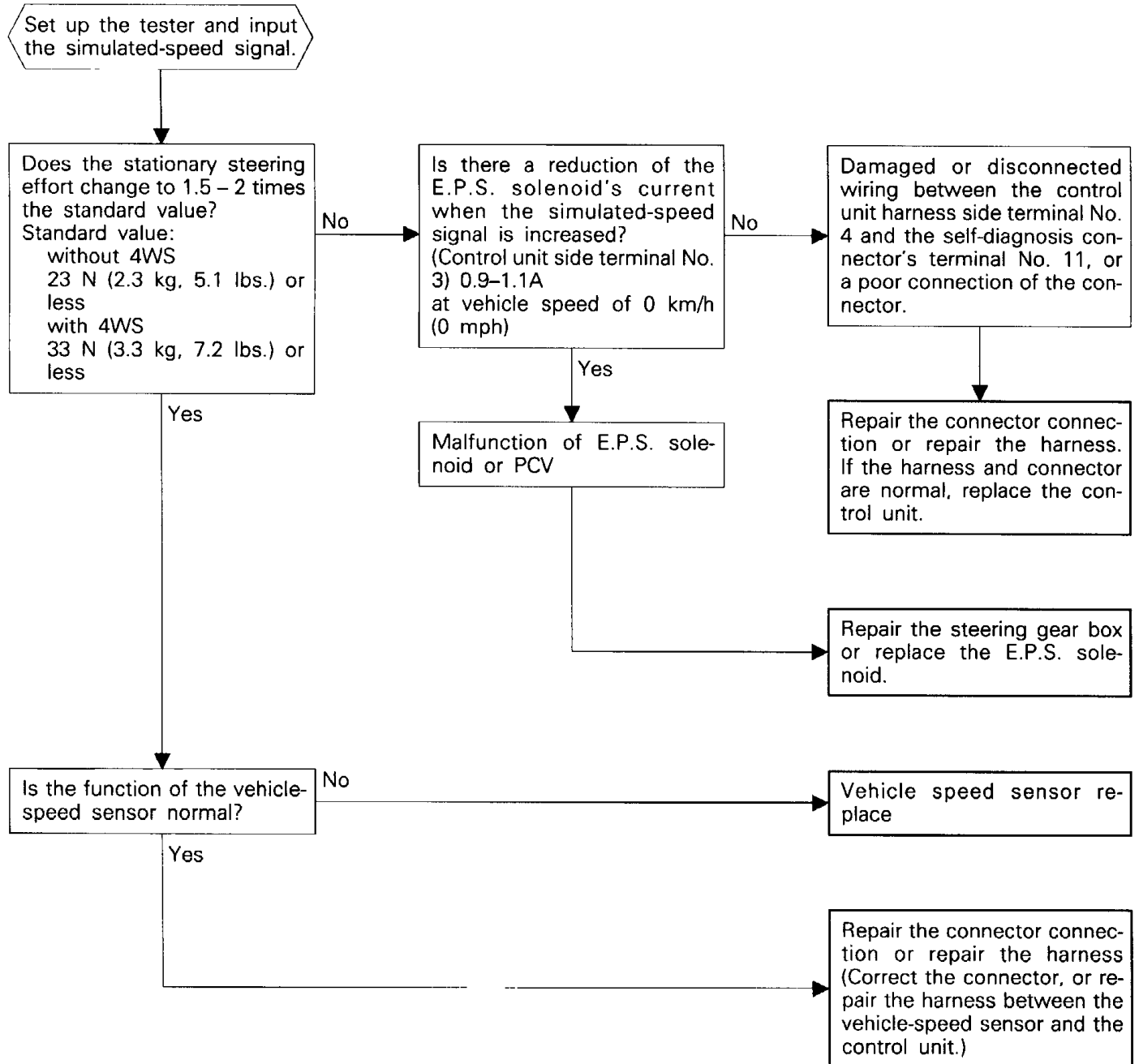
- (1) For checking procedures for each problem, refer to the flow-chart type of troubleshooting guide on the following page.
(2) P.C.V. = Proportioning control valve

Trouble Symptom 1

Steering effort remains light at moderate and high speeds.

NOTE

- (1) Check to be made by using the special tool; dummy speed oscillator or MUT.
- (2) Refer to the circuit diagram for terminal numbers at the harness side of the E.P.S. control unit.

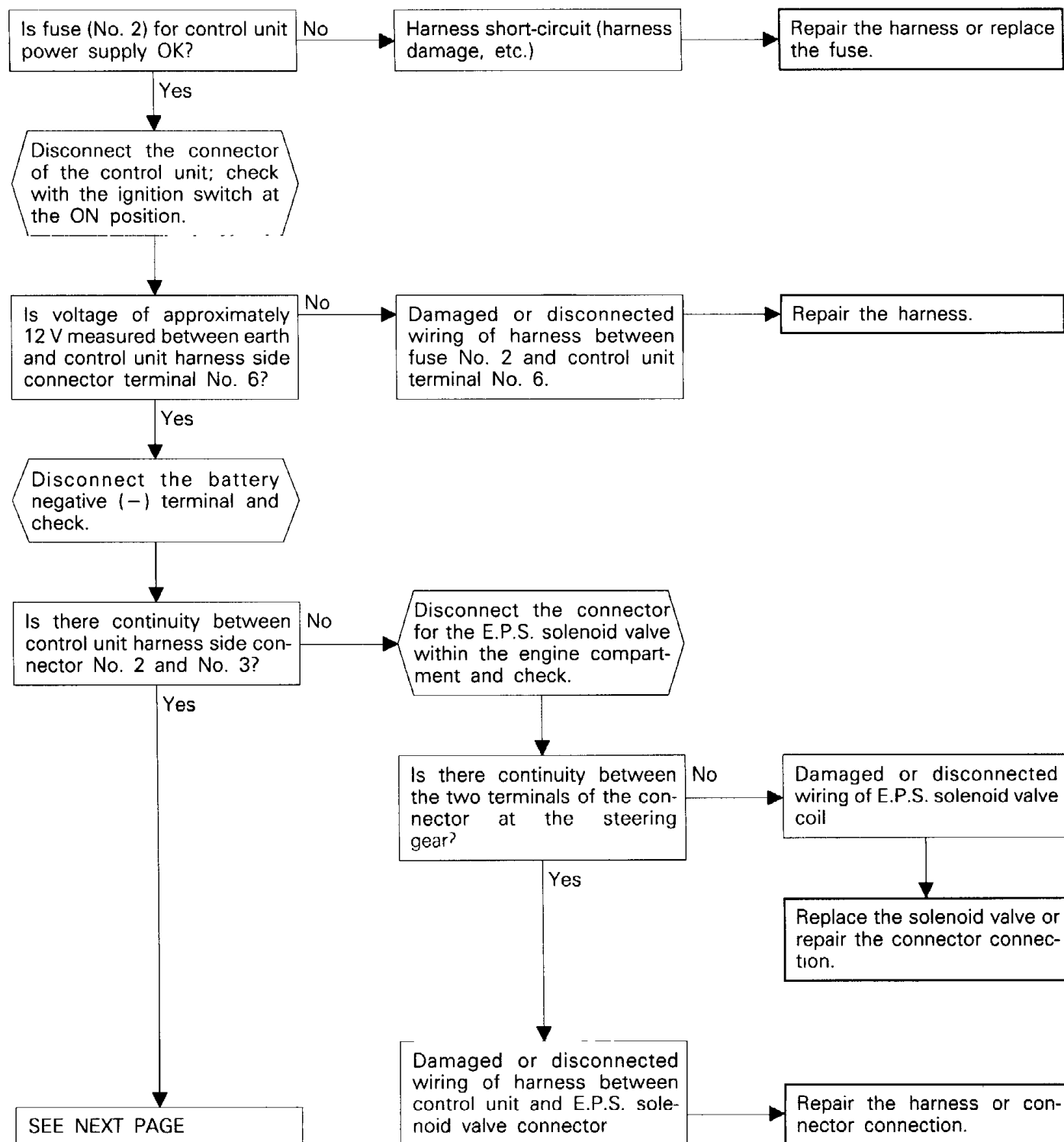


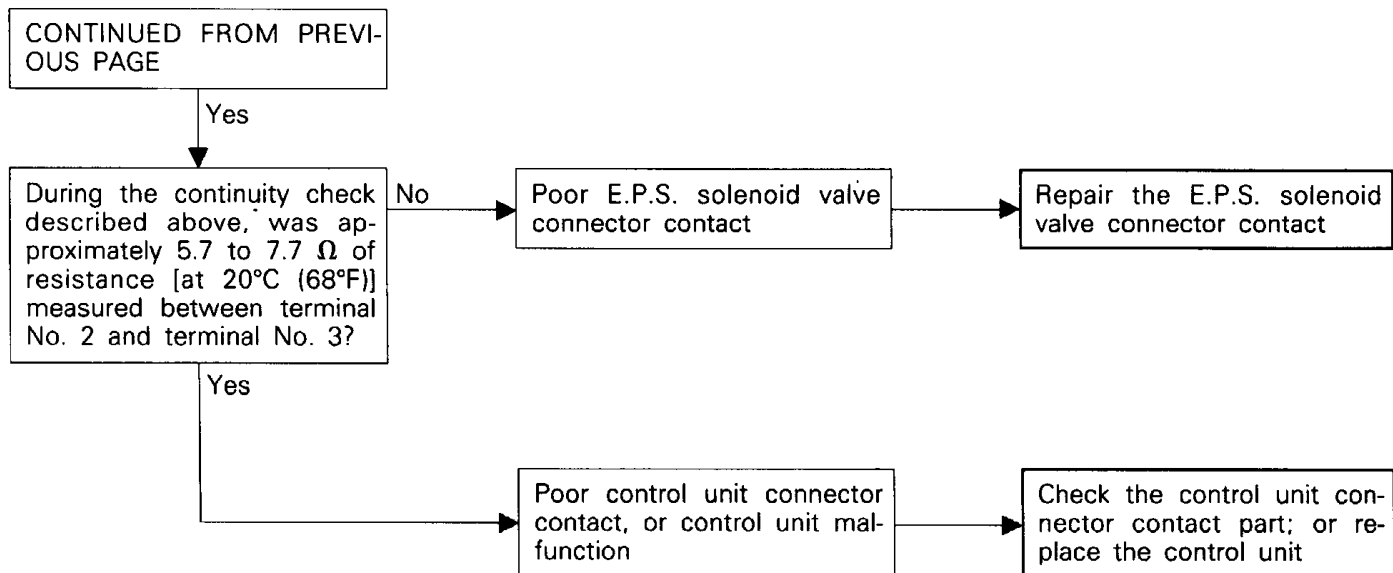
Trouble Symptom 2

No flow of solenoid current (large steering effort required to turn steering wheel fully) when the ignition switch is at the ON position.

NOTE

- (1) Before making the checks described below, check to be sure that the failsafe system has not been activated by racing the engine.
- (2) Refer to the circuit diagram for terminal numbers at the harness side of the E.P.S. control unit.

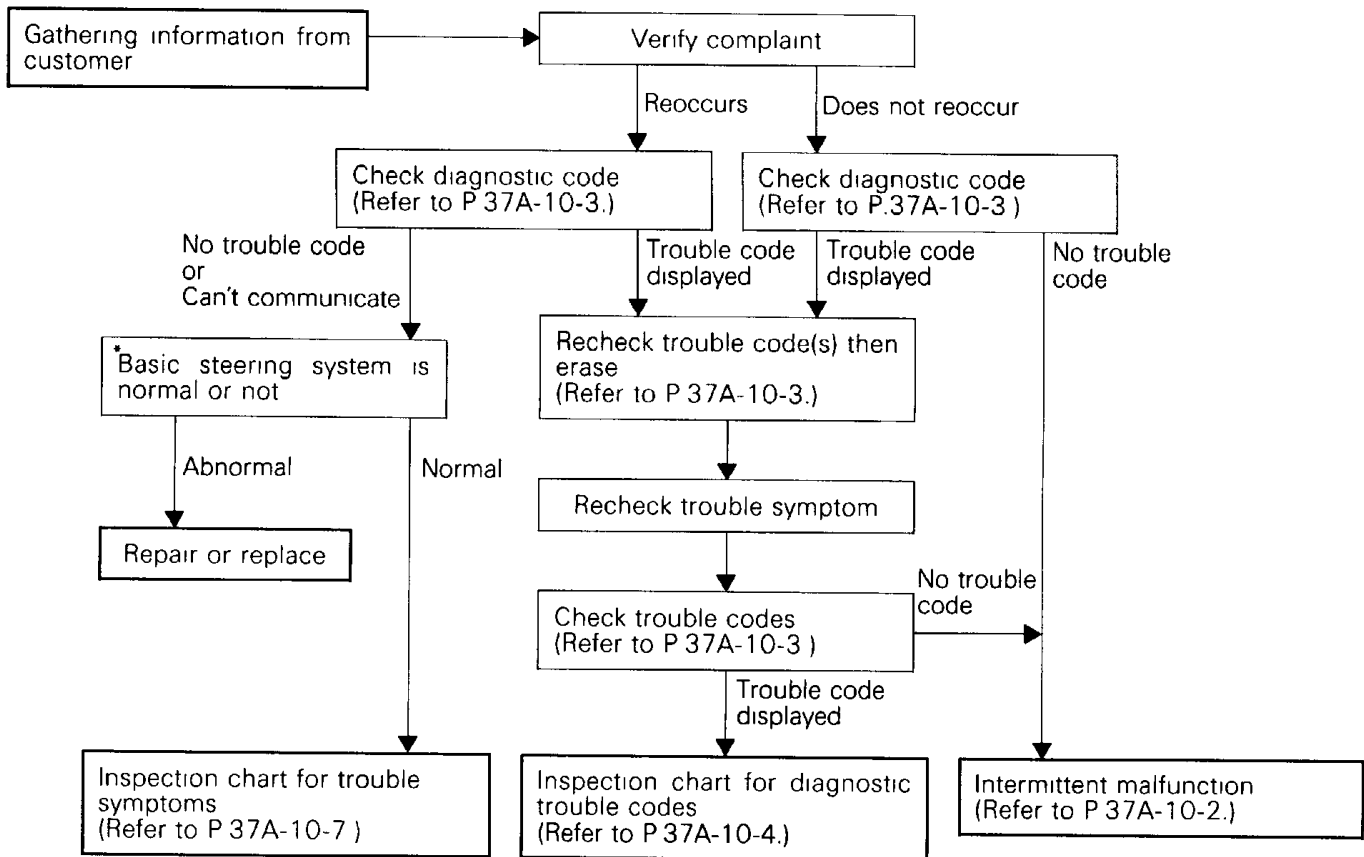




TROUBLESHOOTING <E.P.S.> <VEHICLES BUILT FROM NOVEMBER, 1992>

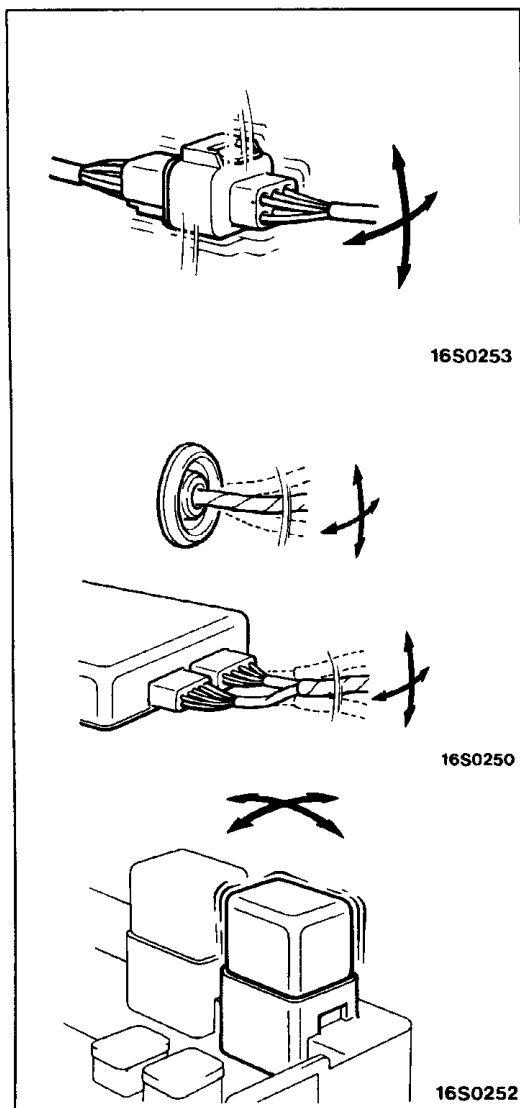
E37EAALa

STANDARD FLOW OF DIAGNOSTIC TROUBLESHOOTING



NOTE

* : Basic steering system refers to steering system other than the E.P.S. system

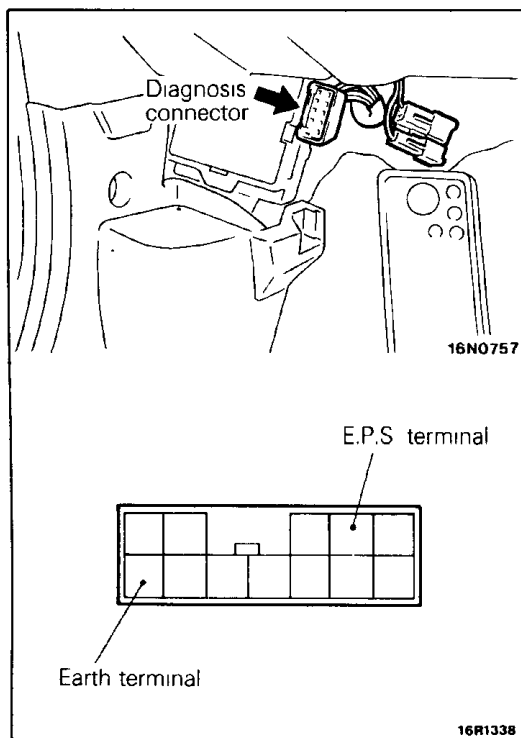


Points to note for intermittent malfunctions

Intermittent malfunctions often occur under certain conditions, and if these conditions can be ascertained, determining the cause becomes simple. In order to ascertain the conditions under which an intermittent malfunction occurs, first ask the customer for details about the driving conditions, weather conditions, frequency of occurrence and trouble symptoms, and then try to recreate the trouble symptoms. Next, ascertain whether the reason why the trouble symptom occurred under these conditions is due to vibration, temperature or some other factor. If vibration is thought to be the cause, carry out the following checks with the connectors and components to confirm whether the trouble symptom occurs.

The objects to be checked are connectors and components which are indicated by inspection procedures or given as probable causes (which generate diagnosis codes or trouble symptoms).

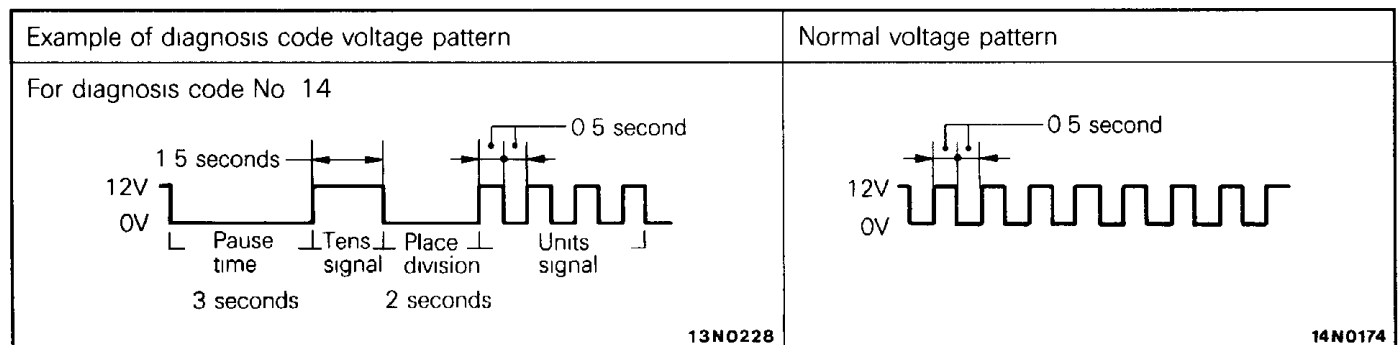
- Gently shake the connector up, down and to the left and right.
- Gently shake the wiring harness up, down and to the left and right.
- Gently rock each sensor and relay, etc. by hand.
- Gently shake the wiring harness at suspensions and other moving parts.



INSPECTION BY SELF-DIAGNOSIS

- (1) With the vehicle stationary and idling, measure the voltage output pattern between the E.P.S. terminal of the diagnosis connector and the earth, as shown at left, and make a note of this pattern.
- (2) Momentarily erase the diagnosis code memory. (If the ignition switch is turned to OFF, the diagnosis codes will be erased.) Even when the memory is erased, and a problem signal is output, the problem signal currently being displayed will also cause the function to stop. If no signal is output, the problem was only transient, or it is a problem that is only detected while driving.
- (3) When a problem code is output again, or another code is output during a repeated driving test, inspect by following the diagnosis code table.

Method of diagnosing display results



NOTE

Other diagnosis codes also are output as voltage patterns corresponding to the code numbers.

DIAGNOSIS CODE TABLE

Diagnosis code No.	Probable cause	Inspection chart name or remedy	Reference page
11*1	Abnormal control unit power supply	E-1	P.37A-10-4
12*1	Faulty vehicle speed sensor	E-2	P.37A-10-5
13	Faulty E.P.S. solenoid valve	E-3	P.37A-10-6
14	Faulty control unit inner circuit	Repair the control unit	P.37A-47

NOTE

Diagnosis code with *1 will be erased if the system returns to normal

INSPECTION CHART FOR DIAGNOSTIC TROUBLE CODES

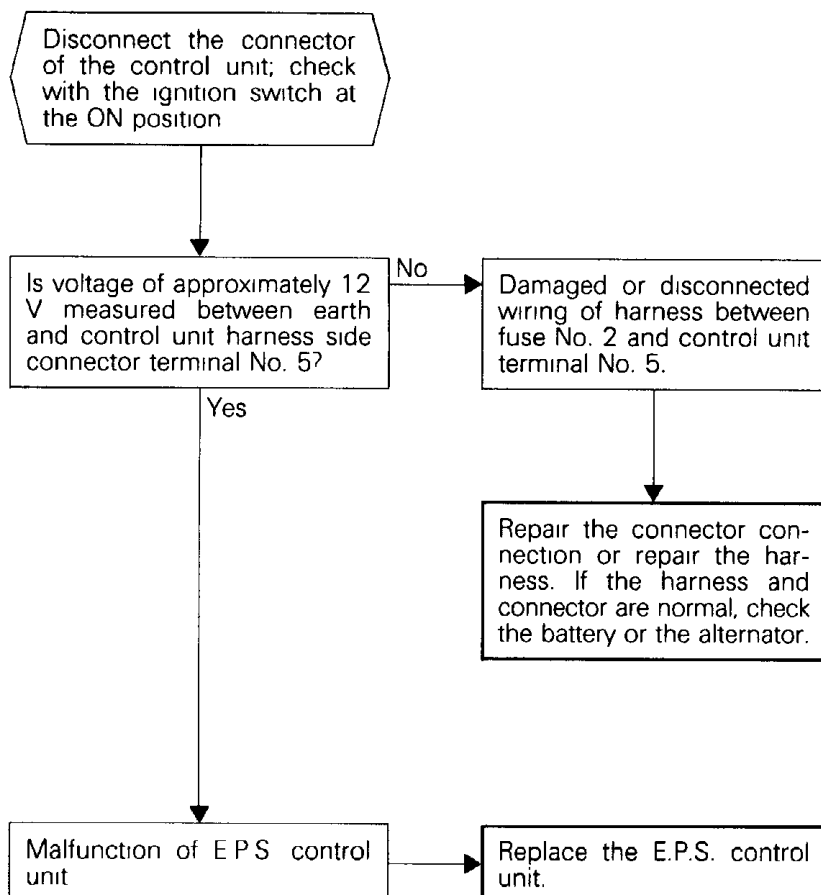
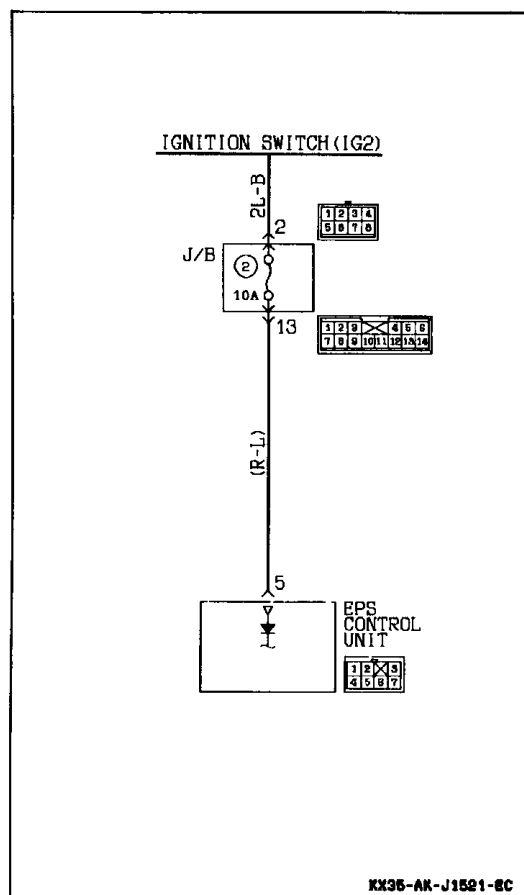
E-1 When diagnosis code No.11 is displayed

Comment: This diagnosis code is output if the EPS-ECU power supply voltage is outside the specified value.

Furthermore, if the voltage returns to the specified value, this diagnosis code is not output.

Caution

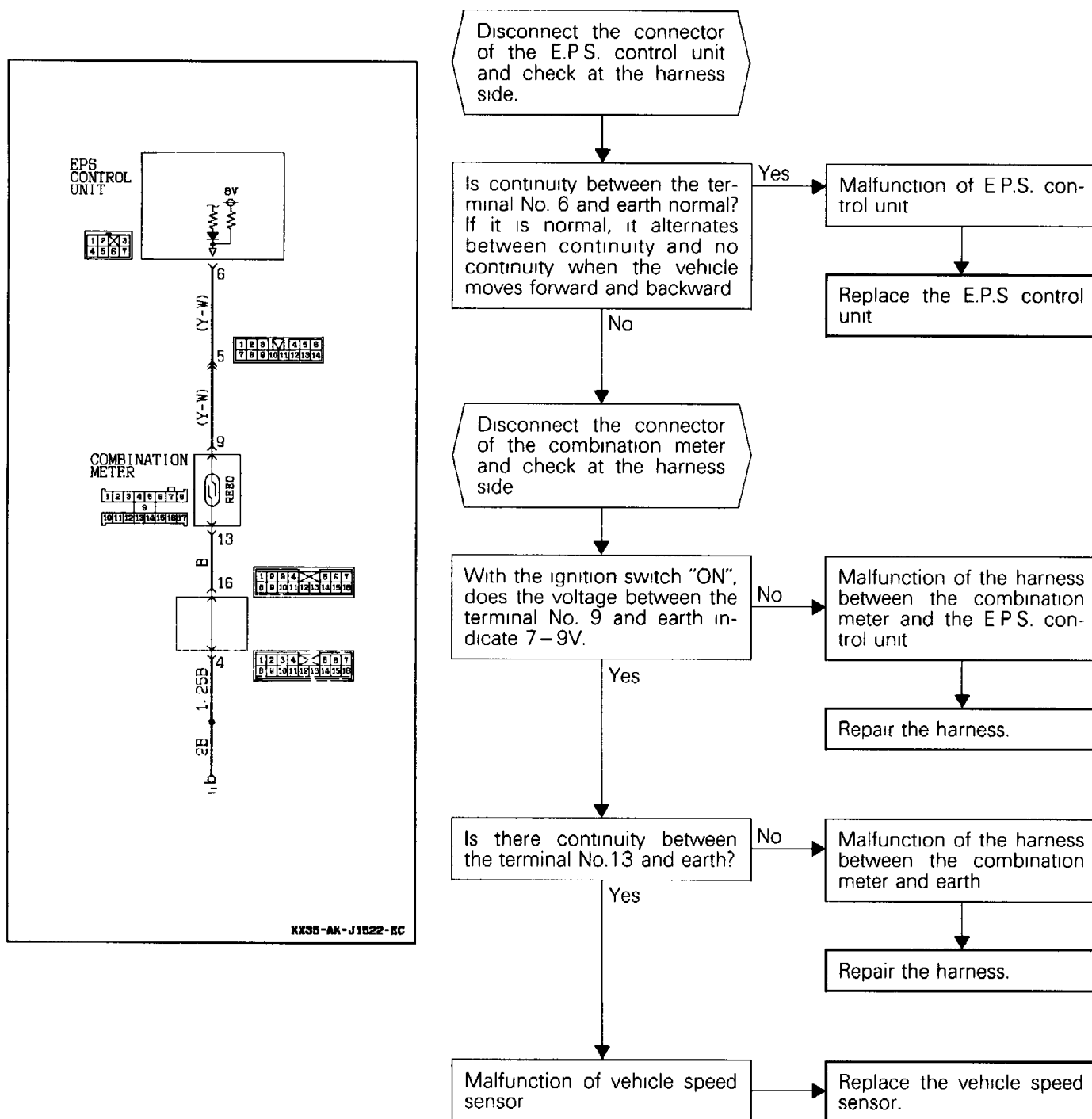
If the battery voltage drops during inspection, this diagnosis code will be output as a current problem, and correct diagnosis of the problem cannot be made. Before carrying out the following inspection, check the battery condition, and refill it if necessary.



E-2 When diagnosis code No.12 is displayed

Comment: This diagnosis code is output if a signal from the vehicle speed sensor is not input for a period of 1 minute or more while the vehicle is driving (throttle valve

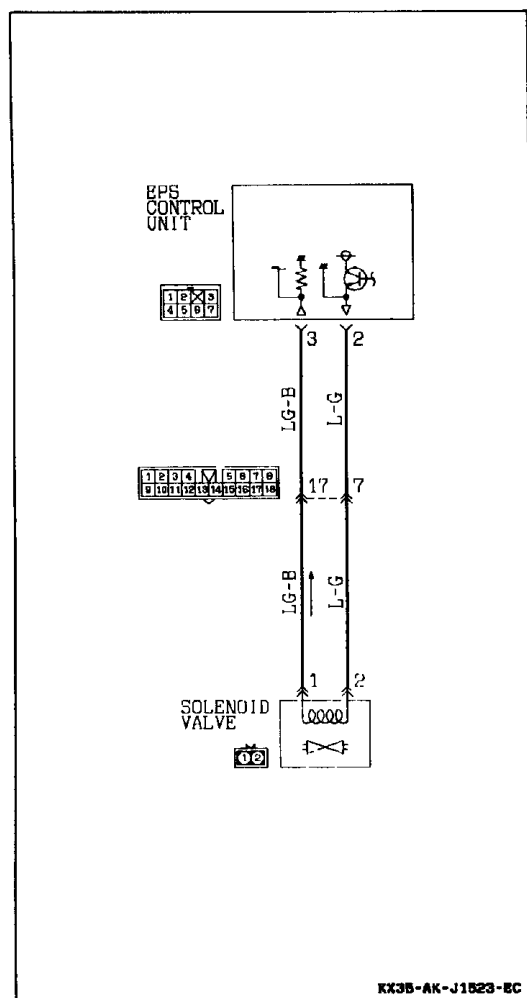
is open). Furthermore, if the vehicle speed signal returns to normal, this diagnosis code is not output.



E-3 When diagnosis code No.13 is displayed

Comment: This diagnosis code is output if current corresponding to the vehicle speed is output from the E.P.S. control unit to

the solenoid valve and the resulting feedback current is outside the standard value.



Disconnect the connector for the E.P.S. solenoid valve within the engine compartment and check

Does the resistor between the connector terminals of the E P S solenoid valve side indicate $5.7 - 7.7\Omega$?

No

Malfunction of E.P.S. solenoid valve

Replace the E.P.S. solenoid valve

Yes

Disconnect the connector of the EPS control unit and check at the harness side

Does the resistance between the terminals No. 2 and No. 3 indicate $5.7 - 7.7\Omega$?

No

Malfunction of the harness between the E.P.S. control unit and the E.P.S. solenoid valve

Repair the harness

Yes

Malfunction of EPS control unit

Replace the E.P.S. control unit

INSPECTION CHART FOR TROUBLE SYMPTOMS

Trouble symptom	Trouble area	Inspection item	Reference page
Steering wheel movement is heavy. (When ignition key is turned to ON, no current flows through the solenoid.)	Steering gear and linkage	Solenoid valve continuity	P.37A-15
		Solenoid or PCV operation is faulty.	P.37A-15, 34
	Harness or fuse	Blown fuse	–
		Remove the control unit connector and check the continuity in the solenoid harness (between terminals No. 2 and No. 3).	P.37A-10-6 Refer to the circuit diagram
	Control unit	Turn the ignition key momentarily to ACC or LOCK and check if the fail-safe function is operating.	P.37A-10-9 Refer to the flow-chart type troubleshooting guide "Trouble Symptom 2".
		Check for continuity in each harness and for abnormalities in the control unit power circuit.	
While driving at medium or high speed, steering remains light.	Control unit	Use a tester to check the stationary steering effort.	P.37A-13
		Check the solenoid current in relation to changes in vehicle speed.	P.37A-15
	Steering gear and linkage	Solenoid or PCV operation.	P.37A-15, 34

NOTE

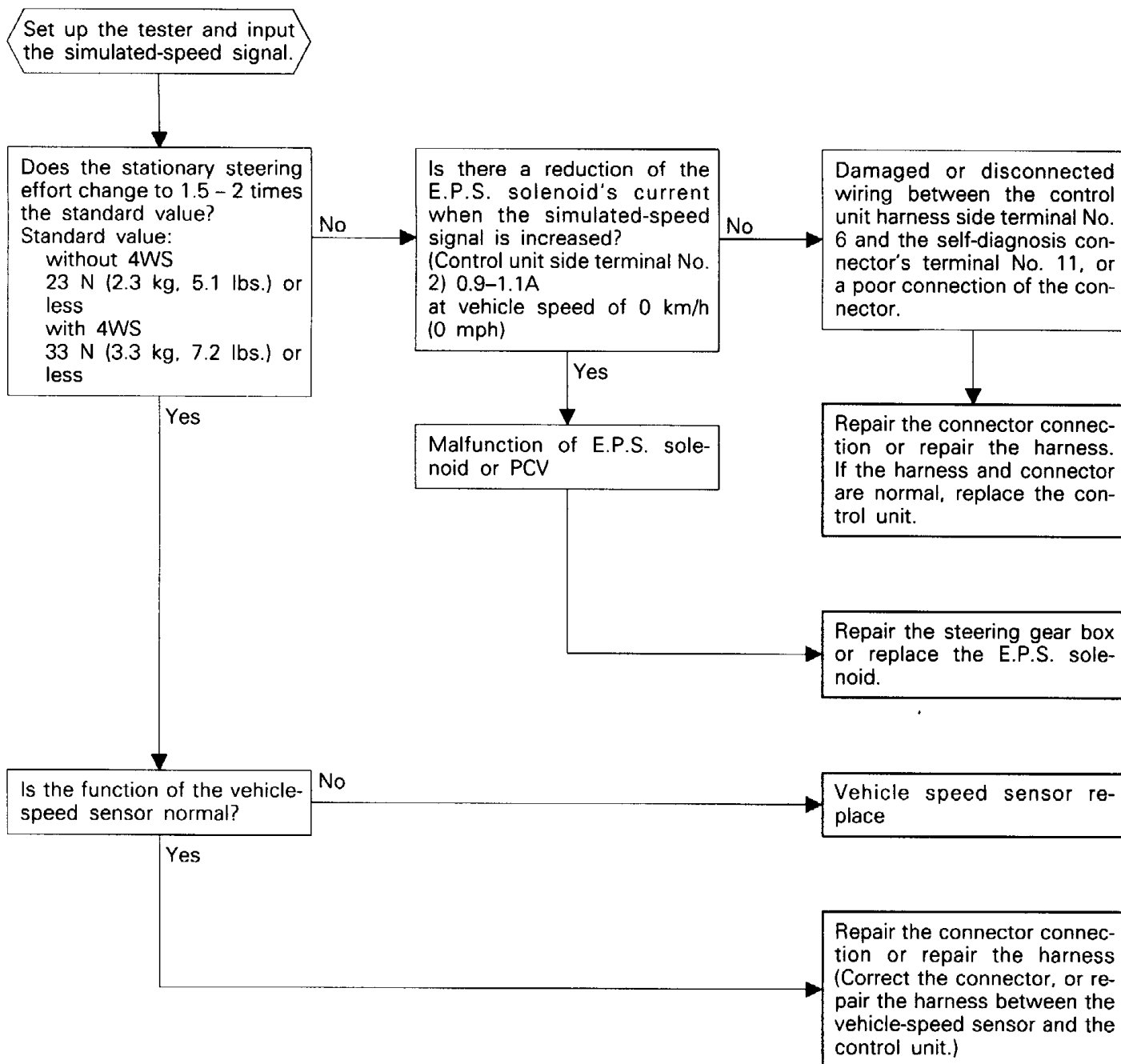
- (1) For checking procedures for each problem, refer to the flow-chart type of troubleshooting guide on the following page.
 (2) P.C.V. = Proportioning control valve

Trouble Symptom 1

While driving at medium or high speed, steering remains light.

NOTE

- (1) Check to be made by using the special tool; dummy speed oscillator or MUT.
- (2) Refer to the circuit diagram (P.37A-10-4, 10-5, 10-6) for terminal numbers at the harness side of the E.P.S. control unit.

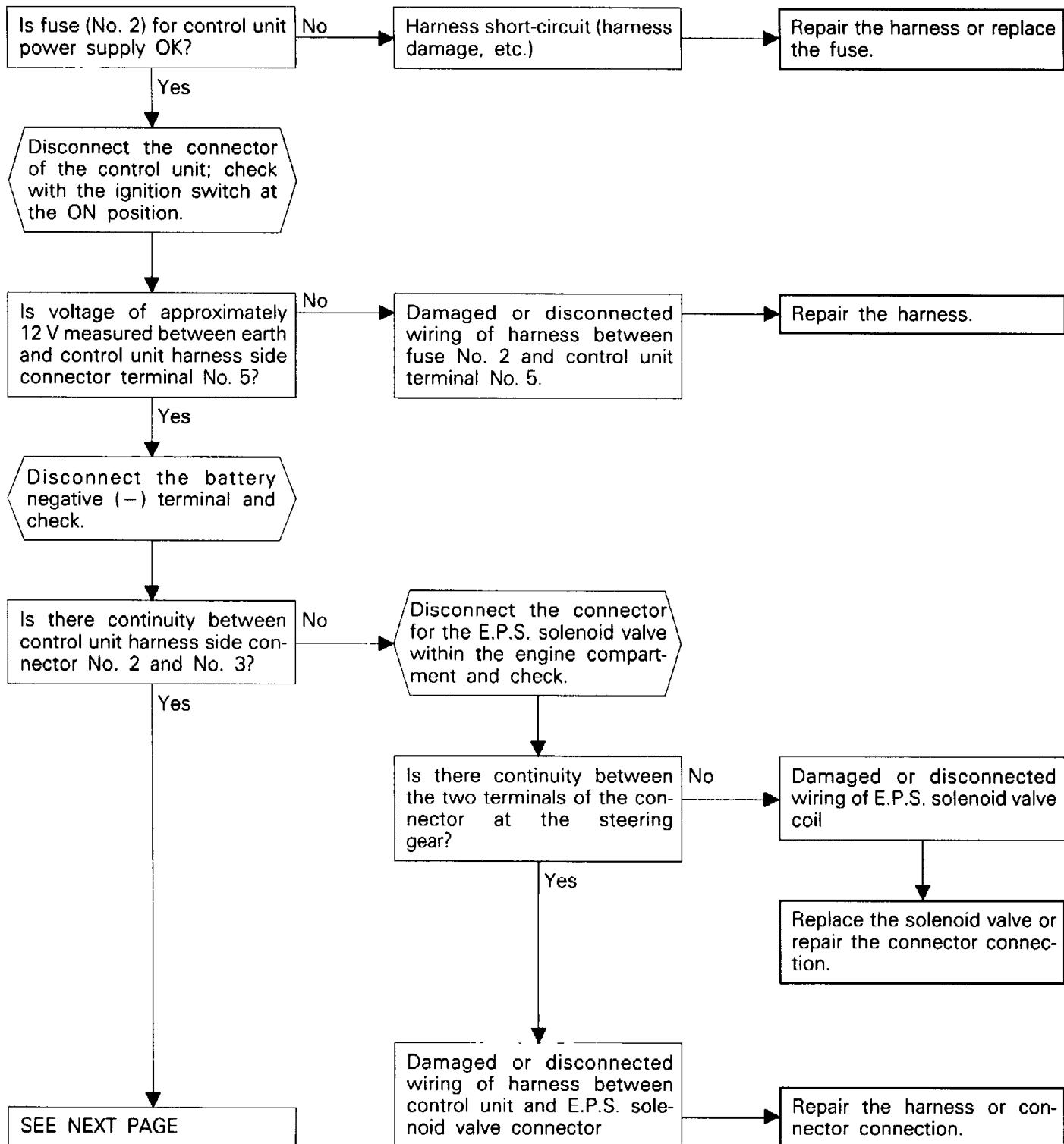


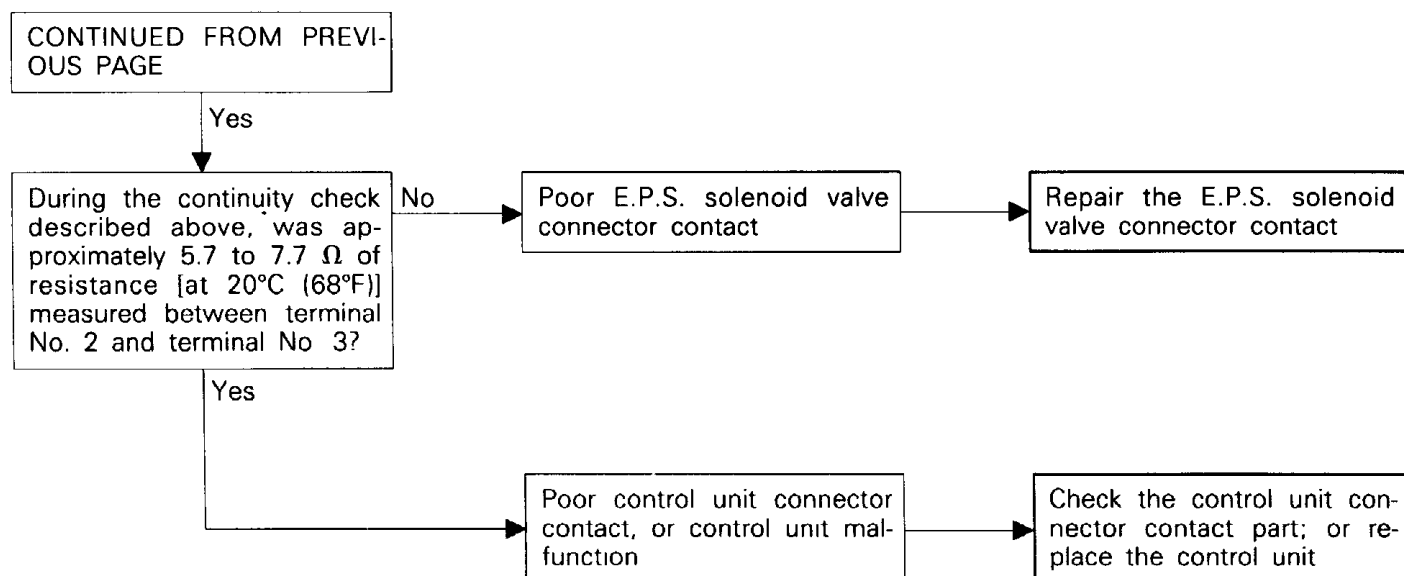
Trouble Symptom 2

Steering wheel movement is heavy. (When ignition key is turned to ON, no current flows through the solenoid.)

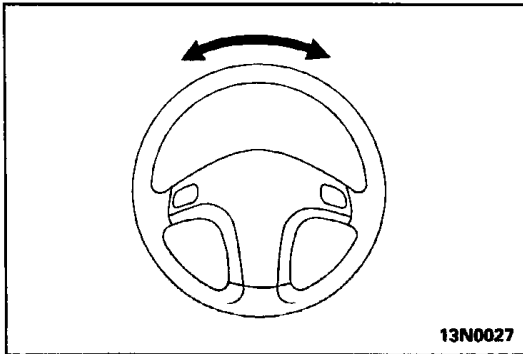
NOTE

- (1) Before making the checks described below, check to be sure that the failsafe system has not been activated by racing the engine.
- (2) Refer to the circuit diagram (P.37A-10-4, 10-5, 10-6) for terminal numbers at the harness side of the E.P.S. control unit.

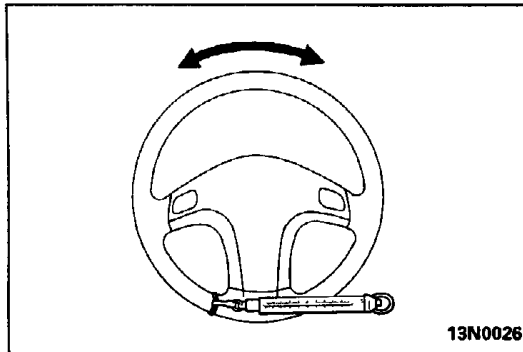




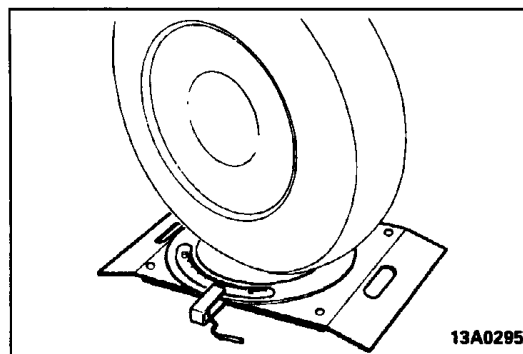
PWGE9004



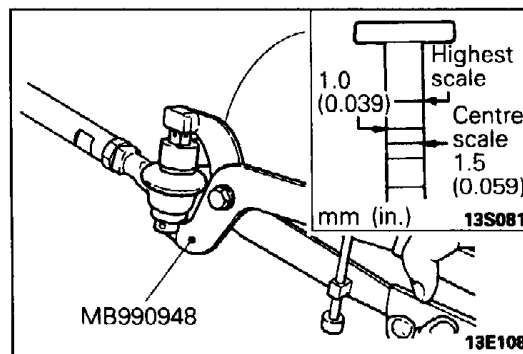
13N0027



13N0026



13A0295



13S081

SERVICE ADJUSTMENT PROCEDURES

E37FABC

STEERING WHEEL FREE PLAY CHECK

1. With engine running (hydraulic operation), set front wheels straight ahead.
2. Measure the play on steering wheel circumference before wheels start to move when slightly moving steering wheel in both directions.

Limit: 30 mm (1.2 in.)

3. When play exceeds the limit, check for play on steering shaft connection and steering linkage. Correct or replace.
4. If the free play still exceeds the limit value, set steering wheel straight ahead with engine stopped. Load 5 N (0.5 kg, 1 lb.) towards steering wheel circumference and check play.

Standard value (steering wheel play with engine stopped): 10 mm (0.43 in.) or less

If the play exceeds the standard value, remove steering gear box and check total pinion torque.

STEERING ANGLE CHECK

E37FDAE

1. Locate front wheels on turning radius gauge and measure steering angle.

Standard value:

Inside wheel	37°00' ± 2°
Outside wheel	30°30'

2. When the angle is not within the standard value, the toe is probably incorrect. Adjust toe (Refer to GROUP 33A – Service Adjustment Procedures) and recheck steering angle.

TIE ROD END BALL JOINT VARIATION CHECK (SHAFT DIRECTION)

E37FVAA

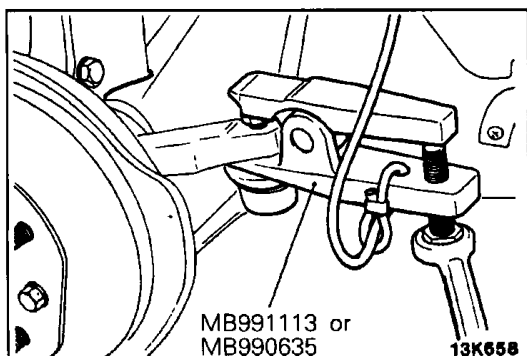
1. Hold ball joint with the special tool.
2. Set special tool scale at its highest and measure variation with ball stud compressed. The variation should locate between the highest and centre scales.

Limit: 1.5 mm (0.059 in.)

3. When the variation exceeds the centre scale, replace the tie-rod end.

Caution

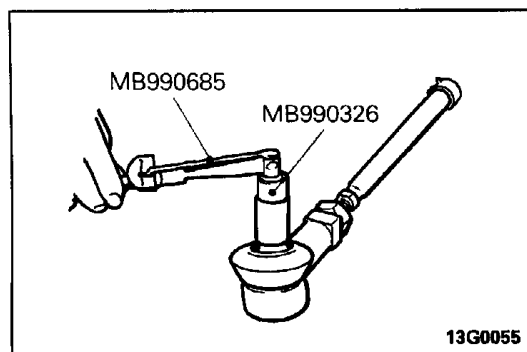
Even if the variation is within the limit, check ball joint starting torque.



TIE ROD END BALL JOINT STARTING TORQUE CHECK

E37FMAA

1. Disconnect tie rod and knuckle with special tool.



2. Move ball joint stud several times and install nut on stud. Measure ball joint starting torque with special tools.

Standard value: 0.5–2.5 Nm (5–25 kgcm, 4–22 in.lbs.)

3. When the starting torque exceeds the standard value, replace tie rod end.
4. When the starting torque is under the standard value, check ball joint for end play or ratcheting. If none of these, the joint is still serviceable.

STATIONARY STEERING EFFORT CHECK <VEHICLES BUILT UP TO OCTOBER, 1992>

E37FFAE

1. With the vehicle stopped on a flat, paved surface, turn the steering wheel to the straight ahead position.
2. Start the engine and set it to $1,000 \pm 100$ r/min.

Caution

After checking the engine r/min., there must be a return to the standard idling r/min.

3. Attach a spring balance to the outer circumference of the steering wheel and measure the steering force required to turn the steering wheel from the straight ahead position to the left and right (within a range of 1.5 turns). Also check to be sure that there is no significant fluctuation of the required steering force.

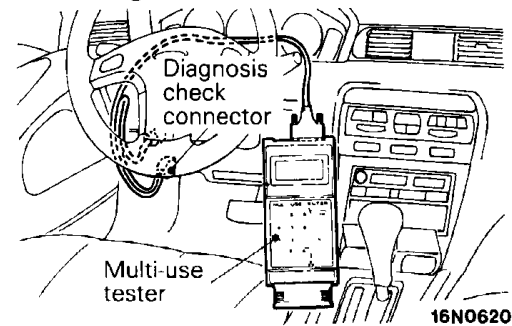
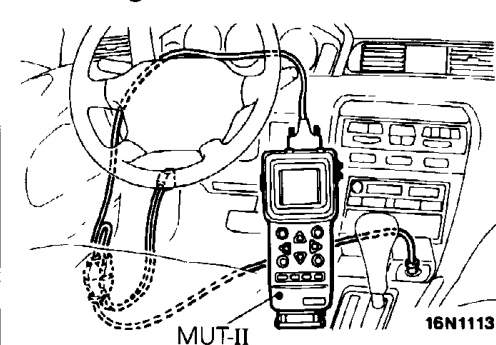
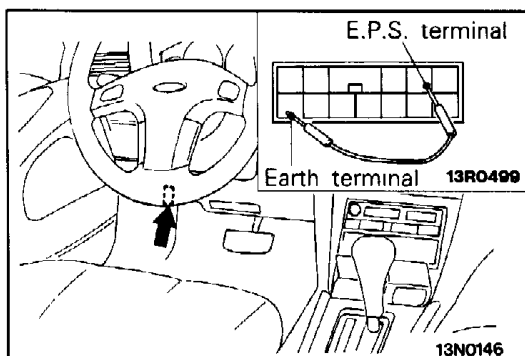
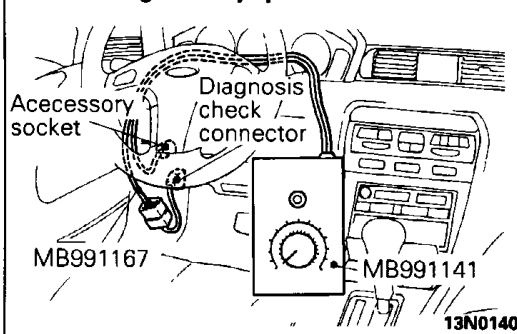
Standard value:

Steering effort

Conventional Power Steering		31 N (3.1 kg, 6.8 lbs.) or less
E.P.S.	Without 4WS	23 N (2.3 kg, 5.1 lbs.) or less
	4WS	33 N (3.3 kg, 7.2 lbs.) or less

Fluctuation allowance 6 N (0.6 kg, 1.3 lbs.) or less

4. If the measured force exceeds the standard value, refer to the troubleshooting and make the checks and adjustments described there.

When using multi-use tester**When using MUT-II****When using dummy speed oscillator**

5. For models equipped with the E.P.S., the vehicle speed is detected by the E.P.S. solenoid, thereby changing the required steering effort, and therefore, after checking the E.P.S. solenoid, a tester should be used to input simulated-speed signals so that the required stationary steering effort during simulated high speed driving can be checked.

For information concerning the checking of the E.P.S. solenoid and the set up of the tester, refer to p.37A-15.

- (1) Check whether or not the required steering effort when the turn is started is 1.5 to two times the standard value shown in item (3) when simulated-speed signals of the values indicated below are input.
- (2) If there is no change of the required steering effort, refer to the troubleshooting guide for the procedures for checking the various components.

NOTE

It is also possible to make the check described in step (5), without using the tester, by short-circuiting the E.P.S. terminal and the earth terminal of the self-diagnosis check connector, as shown in the illustration at the left.

- (3) For A/T models, when making the check in step (5), there will be a 3-speed hold by the fail-safe function. Therefore, be sure to disconnect the negative (–) terminal of the battery for ten seconds or longer in order to cancel the 3-speed hold after completion of checks by using the tester.

Caution

1. **Never drive the vehicle with the tester connected or self-diagnosis check connector short circuit.**
2. **The driving test used for making checks while the vehicle is moving should be done in a safe place.**

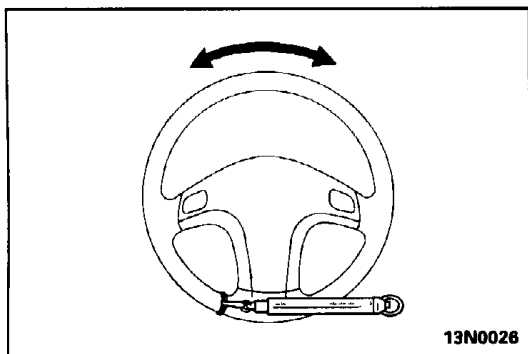
STATIONARY STEERING EFFORT CHECK

<VEHICLES BUILT FROM NOVEMBER, 1992>
E37FFAEa

1. With the vehicle stopped on a flat, paved surface, turn the steering wheel to the straight ahead position.
2. Start the engine and set it to $1,000 \pm 100$ r/min.

Caution

After checking the engine r/min., there must be a return to the standard idling r/min.



3. Attach a spring balance to the outer circumference of the steering wheel and measure the steering force required to turn the steering wheel from the straight ahead position to the left and right (within a range of 1.5 turns). Also check to be sure that there is no significant fluctuation of the required steering force.

Standard value:

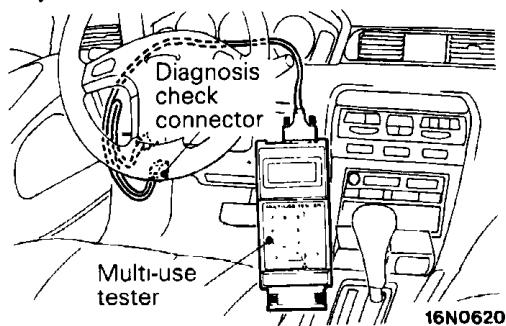
Steering effort

Conventional Power Steering	L.H. drive vehicles	34 N (3.4 kg, 7.5 lbs.) or less
	R.H. drive vehicles	31 N (3.1 kg, 6.8 lbs.) or less
E.P.S	L.H. drive vehicles	28 N (2.8 kg, 6.2 lbs.) or less
	R.H. drive vehicles	23 N (2.3 kg, 5.1 lbs.) or less

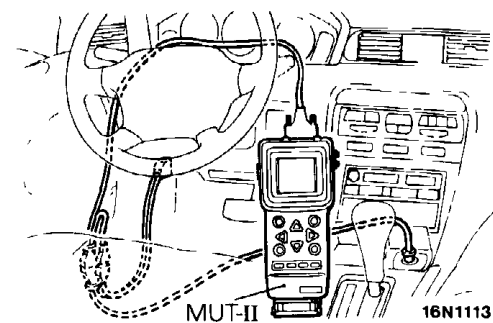
Fluctuation allowance 6 N (0.6 kg, 1.3 lbs.) or less

4. If the measured force exceeds the standard value, refer to the troubleshooting and make the checks and adjustments described there.

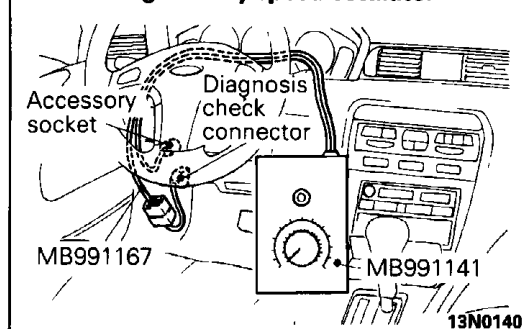
**When using multi-use tester
<Up to 1993 models>**



When using MUT-II <All models>



When using dummy speed oscillator



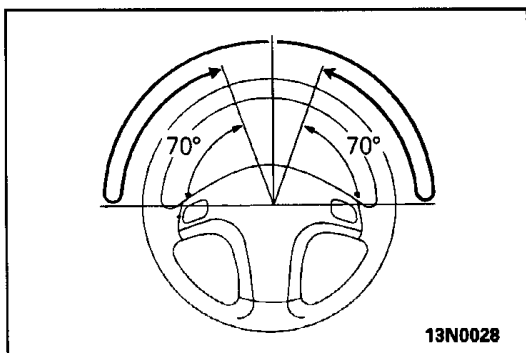
5. For models equipped with the E.P.S., the vehicle speed is detected by the E.P.S. solenoid, thereby changing the required steering effort, and therefore, after checking the E.P.S. solenoid, a tester should be used to input simulated-speed signals so that the required stationary steering effort during simulated high speed driving can be checked.

For information concerning the checking of the E.P.S. solenoid and the set up of the tester, refer to P.37A-16-1.

- (1) Check whether or not the required steering effort when the turn is started is 1.5 to two times the standard value shown in item (3) when simulated-speed signals of the values indicated below are input.
- (2) If there is no change of the required steering effort, refer to the troubleshooting guide for the procedures for checking the various components.
- (3) For A/T models, when making the check in step (5), there will be a 3-speed hold by the fail-safe function. Therefore, be sure to disconnect the negative (-) terminal of the battery for ten seconds or longer in order to cancel the 3-speed hold after completion of checks by using the tester.

Caution

1. **Never drive the vehicle with the tester connected or self-diagnosis check connector short circuit.**
2. **The driving test used for making checks while the vehicle is moving should be done in a safe place.**



CHECKING STEERING WHEEL RETURN TO CENTRE

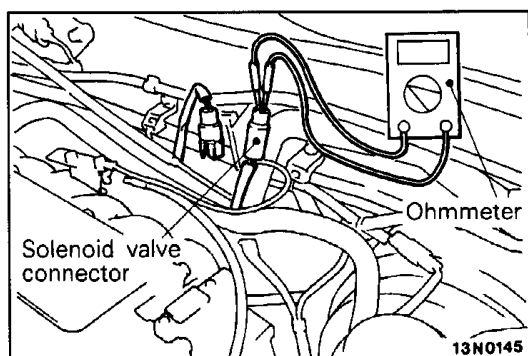
E37FGAA

To make this test, conduct a road test and check as follows.

1. Make both gradual and sudden turns and check the steering "feeling" to be sure that there is no difference in the steering force required and the wheel return between left and right turns.
2. At a speed of 35 km/h (22 mph), turn the steering wheel 90°, and release the steering wheel after 1 or 2 seconds. If the steering wheel then returns 70° or more, the return can be judged to be satisfactory.

NOTE

There will be a momentary feeling or "heaviness" when the wheel is turned quickly, but this is not abnormal. (This is because the oil pump discharge amount is especially apt to be insufficient during idling.)



E.P.S. SOLENOID CHECK

E37FPAC

SOLENOID CONTINUITY CHECK

Check for continuity, by using an ohmmeter, between the solenoid valve terminal and the disconnection of the solenoid valve connector.

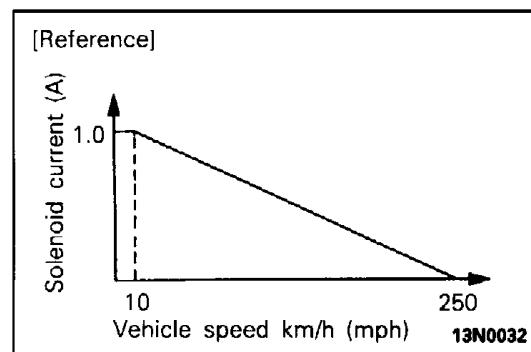
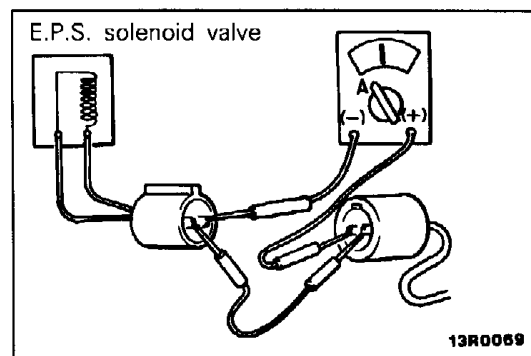
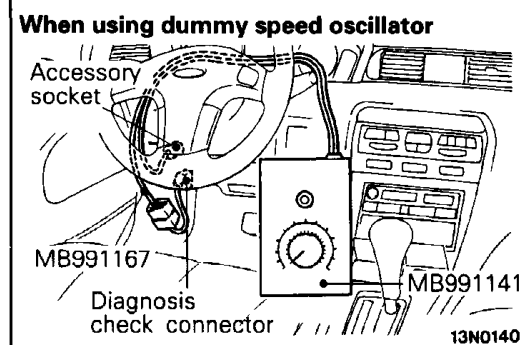
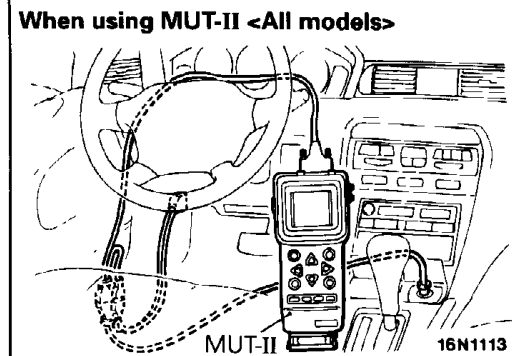
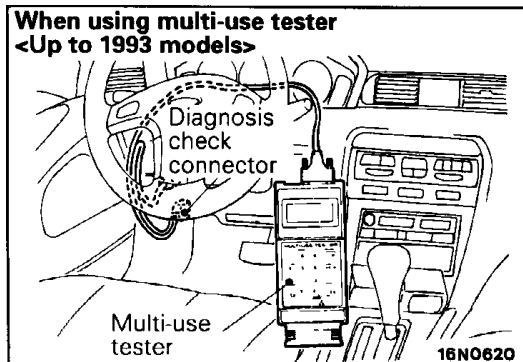
SOLENOID CURRENT CHECK

<VEHICLES BUILT UP TO OCTOBER, 1992>

1. Set up the multi-use tester <Up to 1993 models>, MUT-II <All models> or dummy speed oscillator as follows.
 - (1) Turn the ignition switch to ACC or LOCK, and apply the parking brake.

NOTE

The fail-safe system will be activated when the engine is raced for approximately 50 seconds at an engine speed of 2,300 r/min. or higher, and the solenoid current will be cut, but the fail-safe system can be cancelled by switching OFF the engine and then restarting it.



- (2) For the dummy speed oscillator (MB991141), set the vehicle-speed selection switch to 0 km/h (0 mph).
- (3) Connect the connector of the tester to the diagnosis check connector at the side part of fuse block, and then connect the connector for the power supply to the cigarette lighter socket (chassis side).

For models equipped with the auto-cruise control system, the main switch must be switched OFF.

Caution

The ignition switch should always be turned OFF when connecting and disconnecting the multi-use tester or MUT-II.

- (4) Start the engine and let it idle.
- (5) For the multi-use tester or MUT-II, input the simulated vehicle speed, using the vehicle-speed signal function. If the simulated vehicle speed cannot be input, a message will be displayed on the tester's display; move the vehicle ahead 0.3 to 0.4 m (0.98 to 1.31 ft.) if such a message is displayed.
- (6) For the dummy speed oscillator (MB991141), set the vehicle-speed selection switch to 10–20 km/h (6–12 mph), and check to be sure that the monitor lamp is flashing. If it remains steadily illuminated rather than flashing, move the vehicle forward about 0.3–0.4 m (0.98–1.31 ft.) until it begins flashing.

2. Disconnect the wiring harness connector (the waterproof connector in the engine compartment) of the E.P.S. solenoid valve, and then connect an ammeter between the solenoid valve connector and the harness at the body side.

Caution

Do not earth the solenoid terminal.

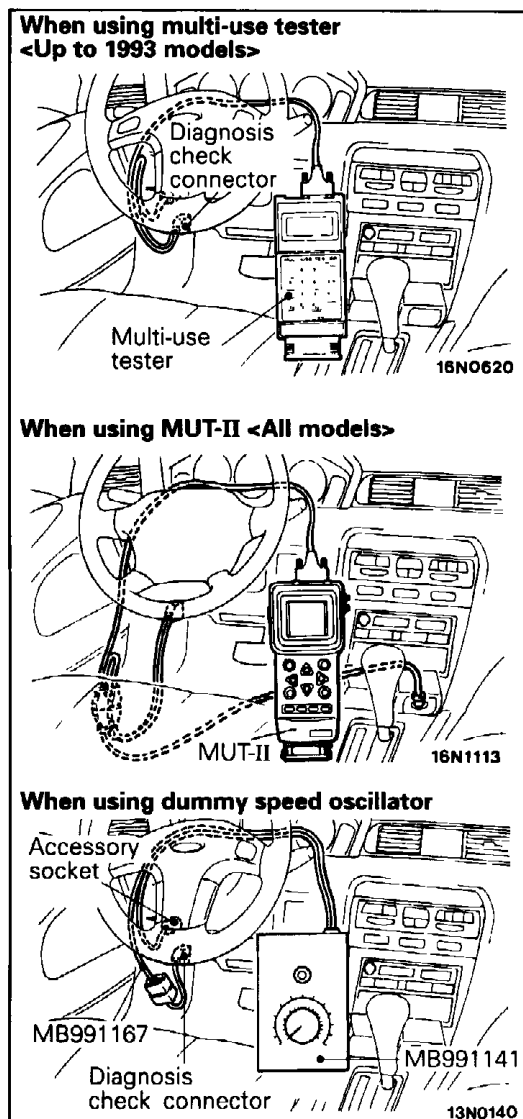
3. Check to be sure that the solenoid current is within the standard value range when the vehicle speed is 0 km/h (0 mph), and that it decreases as the vehicle speed is increased.

Standard value: 0.9–1.1 A at vehicle speed of 0 km/h (0 mph)

4. If the solenoid current does not decrease when simulated-speed signals for an increased speed are input, refer to the troubleshooting guide (P.37A-8).
5. For automatic transmission models, when the tester is used, there will be a 3-speed hold by the fail-safe function. Therefore, be sure to disconnect the negative (-) terminal of the battery for ten seconds or longer in order to cancel the 3-speed hold after completion of checks by using the tester.

Caution

1. **Never drive the vehicle with the tester connected.**
2. **The driving test used for making checks while the vehicle is moving should be done in a safe place.**


SOLENOID CURRENT CHECK
<VEHICLES BUILT FROM NOVEMBER, 1992>

1. Set up the multi-use tester <Up to 1993 models> or MUT-II <All models> or dummy speed oscillator as follows.
 - (1) Turn the ignition switch to ACC or LOCK, and apply the parking brake.

NOTE

The fail-safe system will be activated when the engine is raced for approximately 60 seconds at an engine speed of 2,300 r/min. or higher, but the fail-safe system can be cancelled by switching OFF the engine and then restarting it.

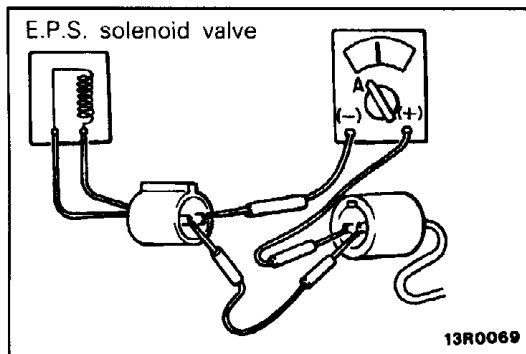
- (2) For the dummy speed oscillator (MB991141), set the vehicle-speed selection switch to 0 km/h (0 mph).
- (3) Connect the connector of the tester to the diagnosis check connector at the side part of fuse block, and then connect the connector for the power supply to the cigarette lighter socket (chassis side).

For models equipped with the auto-cruise control system, the main switch must be switched OFF.

Caution

The ignition switch should always be turned OFF when connecting and disconnecting the multi-use tester or MUT-II.

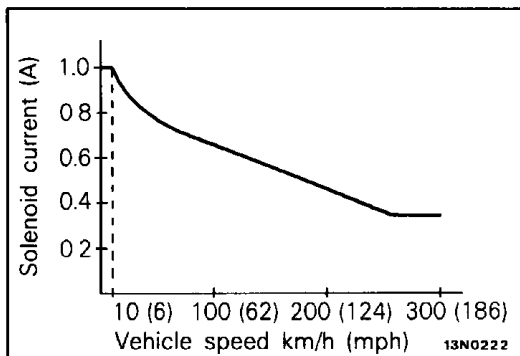
- (4) Start the engine and let it idle.
- (5) For the multi-use tester or MUT-II, input the simulated vehicle speed, using the vehicle-speed signal function. If the simulated vehicle speed cannot be input, a message will be displayed on the tester's display; move the vehicle ahead 0.3 to 0.4 m (0.98 to 1.31 ft.) if such a message is displayed.
- (6) For the dummy speed oscillator (MB991141), set the vehicle-speed selection switch to 10–20 km/h (6–12 mph), and check to be sure that the monitor lamp is flashing. If it remains steadily illuminated rather than flashing, move the vehicle forward about 0.3–0.4 m (0.98–1.31 ft.) until it begins flashing.



2. Disconnect the wiring harness connector (the waterproof connector in the engine compartment) of the E.P.S. solenoid valve, and then connect an ammeter between the solenoid valve connector and the harness at the body side.

Caution

Do not earth the solenoid terminal.



3. Check to be sure that the solenoid current is within the standard value range when the vehicle speed is 0 km/h (0 mph), and that it decreases as the vehicle speed is increased.
Standard value: 0.9–1.1 A at vehicle speed of 0 km/h (0 mph)
4. If the solenoid current does not decrease when simulated-speed signals for an increased speed are input, refer to the troubleshooting guide (P.37A-10-1).

5. For automatic transmission models, when the tester is used, there will be a 3-speed hold by the fail-safe function. Therefore, be sure to disconnect the negative (–) terminal of the battery for ten seconds or longer in order to cancel the 3-speed hold after completion of checks by using the tester.

Caution

1. **Never drive the vehicle with the tester connected.**
2. **The driving test used for making checks while the vehicle is moving should be done in a safe place.**

V-BELT TENSION CHECK

E37FHAH

Check to be sure that the belt is not damaged and that the V-belt is correctly attached to the groove of the pulley.

NOTE

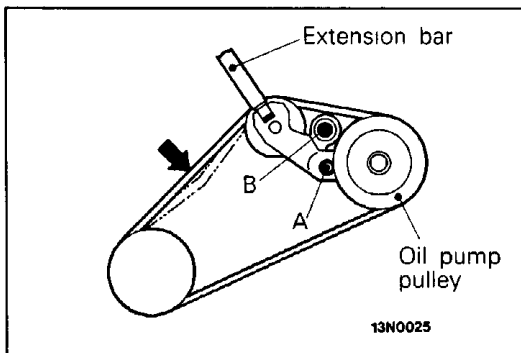
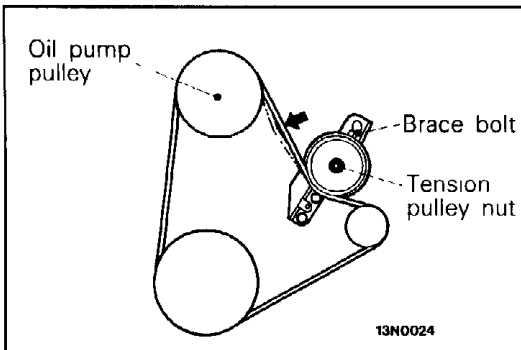
If there is abnormal noise or belt slippage, check the belt tension and check for unusual wear or abrasion, or damage, of the pulley contact surface, and for scars or scratches on the pulley.

<SOHC Engine>

1. Press in V-belt at the illustrated position with about 100 N (22 lbs.) and measure deflection.

Standard value

When belt tension is inspected	6–9 mm (0.24–0.35 in.)
When belt tension is readjusted	7 mm (0.28 in.)
When new belt is installed	4–5 mm (0.16–0.20 in.)



2. If the deflection is out of the standard values, loosen the tension pulley nut and adjust the belt tension with brace bolt.

<DOHC Engine>

1. Press in V-belt at the illustrated position with about 100 N (22 lbs.) and measure deflection.

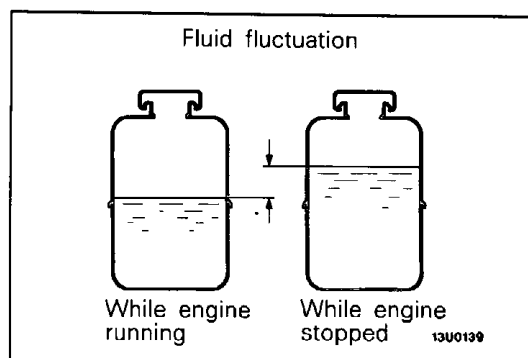
Standard value**<Vehicles built up to October, 1991>**

When belt tension is inspected or readjusted	9–11 mm (0.35–0.43 in.)
When new belt is installed	7–8.5 mm (0.28–0.33 in.)

<Vehicles built from November, 1991>

When belt tension is inspected	9.5–13.5 mm (0.37–0.53 in.)
When belt tension is readjusted	10.5–12.5 mm (0.41–0.49 in.)
When new belt is installed	7.5–9.0 mm (0.30–0.35 in.)

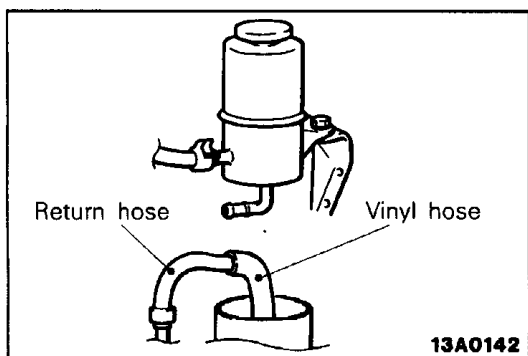
2. If the deflection is out of the standard values adjust the belt tension using the following procedure.
 - (1) Loosen the tension pulley's securing bolts A and B.
 - (2) Mount the extension bar on the tension pulley.
 - (3) While increasing the tension of the V-belt with the extension bar, retighten the tension pulley's securing bolts A and B in the order mentioned.

**FLUID LEVEL CHECK**

E37FIAD

1. Park the vehicle on a flat, level surface, start the engine, and then turn the steering wheel several times to raise the temperature of the fluid to approximately 50–60°C (122–140°F).
2. With the engine running, turn the wheel all the way to the left and right several times.
3. Check the fluid in the oil reservoir for foaming or milkiness.

Check the difference of the fluid level when the engine is stopped, and while it is running. If the fluid level changes considerably, air bleeding should be done.



FLUID REPLACEMENT

E37FJAF

1. Raise the front wheels on a jack, and then support them with rigid racks.
2. Disconnect the return hose connection.
3. Connect a vinyl hose to the return hose, and drain the oil into a container.
4. Disconnect the high-tension cable, and then while operating the starting motor intermittently, turn the steering wheel all the way to the left and right several times to drain all of the fluid.

Caution

Be careful not to position the high-tension cable near the carburettor or the delivery pipe.

5. Connect the return hoses securely, and then secure it with the clip.
6. Fill the oil reservoir with the specified fluid up to the lower position of the filter, and then bleed the air.

**Specified fluid: Automatic transmission fluid
DEXRON or DEXRON II**

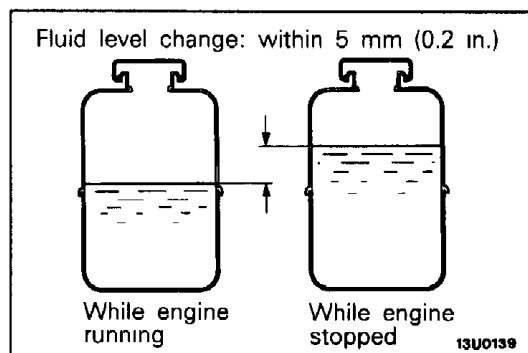
BLEEDING

E37FKAG

1. Jack up the front wheels and support them by using a rigid rack.
2. Manually turn the oil pump pulley a few times.
3. Turn the steering wheel all the way to the left and to the right five or six times.
4. Disconnect the high-tension cable, and then, while operating the starting motor intermittently, turn the steering wheel all the way to the left and right five or six times (for 15 to 20 seconds).

Caution

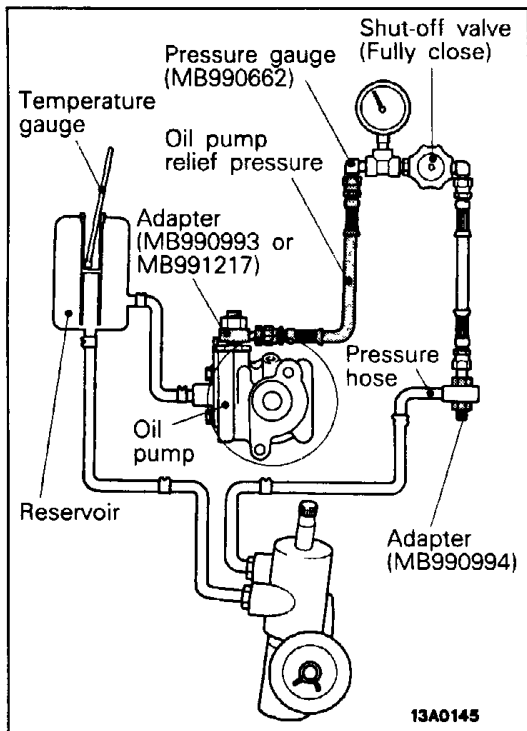
1. **During air bleeding, replenish the fluid supply so that the level never falls below the lower position of the filter.**
2. **If air bleeding is done while engine is running, the air will be broken up and absorbed into the fluid; be sure to do the bleeding only while cranking.**



5. Connect the ignition cable, and then start the engine (idling).
6. Turn the steering wheel to the left and right until there are no air bubbles in the oil reservoir.
7. Confirm that the fluid is not milky, and that the level is up to the specified position on the level gauge.
8. Confirm that there is very little change in the fluid level when the steering wheel is turned left and right.
9. Check whether or not the change in the fluid level is within 5 mm (0.2 in.) when the engine is stopped and when it is running.

Caution

1. If the change of the fluid level is 5 mm (0.2 in.) or more, the air has not been completely bled from the system, and thus must be bled completely.
2. If the fluid level rises suddenly after the engine is stopped, the air has not been completely bled.
3. If air bleeding is not complete, there will be abnormal noises from the pump and the flow-control valve, and this condition could cause a lessening of the life of the pump, etc.

**OIL PUMP PRESSURE TEST**

E37FLAE

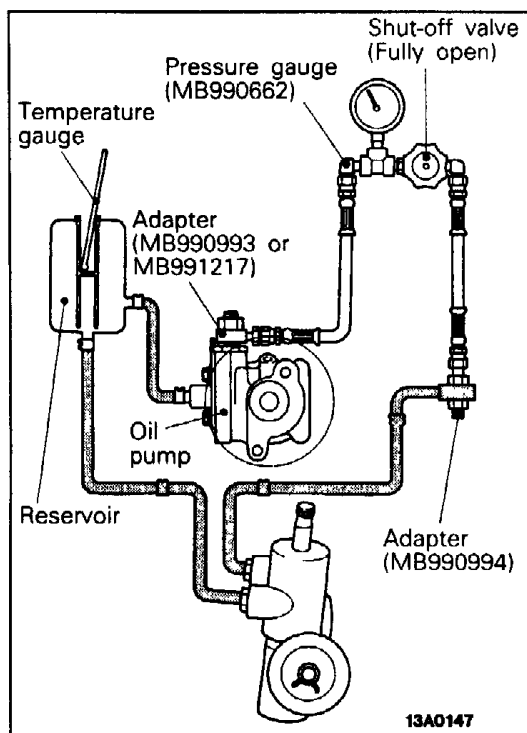
CHECKING THE OIL PUMP RELIEF PRESSURE

1. Disconnect the pressure hose from the oil pump, and then connect the special tools.
2. Bleed the air, and then turn the steering wheel several times while the vehicle is not moving so that the temperature of the fluid rises to approximately 50–60°C (122–140°F).
3. Start the engine and idle it at $1,000 \pm 100$ r/min.
4. Fully close the shut-off valve of the pressure gauge and measure the oil pump relief pressure to confirm that it is within the standard value range.

Standard value: 7.5–8.2 MPa**(75–82 kg/cm², 1,067–1,166 psi.)****Caution**

Pressure gauge shut off valve must not remain closed for more than 10 seconds.

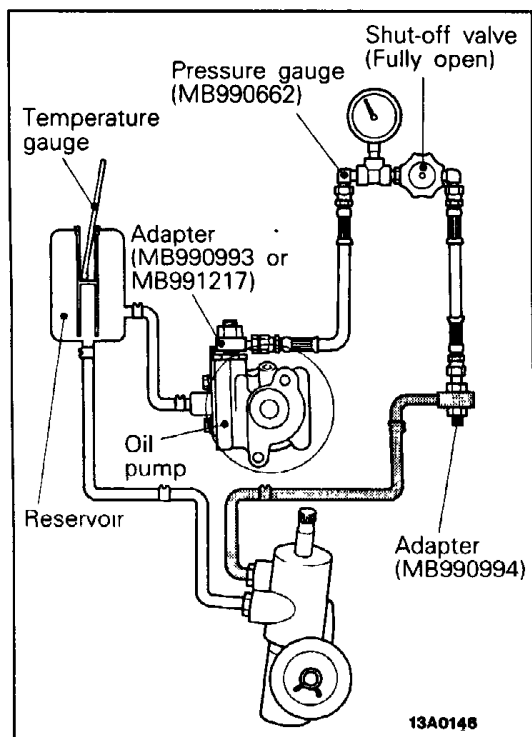
5. If it is not within the standard value, overhaul the oil pump.
6. Remove the special tools, and then tighten the pressure hose to the specified torque.
7. Bleed the system.

**CHECKING THE PRESSURE UNDER NO-LOAD CONDITIONS**

1. Disconnect the pressure hose from the oil pump, and then connect the special tools.
2. Bleed the air, and then turn the steering wheel several times while the vehicle is not moving so that the temperature of the fluid rises to approximately 50–60°C (122–140°F).
3. Start the engine and idle it at $1,000 \pm 100$ r/min.
4. Check whether or not the hydraulic pressure is the standard value when no-load conditions are created by fully opening the shut-off valve of the pressure gauge.

Standard value: 0.8–1.0 MPa**(8–10 kg/cm², 114–142 psi.)**

5. If it is not within the standard value, the probable cause is a malfunction of the oil line or steering gear box, so check these parts and repair as necessary.
6. Remove the special tools, and then tighten the pressure hose to the specified torque.
7. Bleed the system.



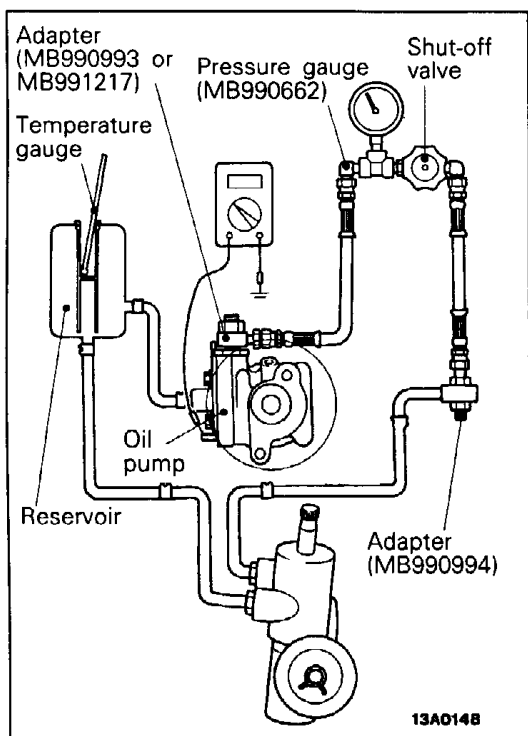
CHECKING THE STEERING GEAR RETENTION HYDRAULIC PRESSURE

1. Disconnect the pressure hose from the oil pump, and then connect the special tools.
2. Bleed the air, and then turn the steering wheel several times while the vehicle is not moving so that the temperature of the fluid rises to approximately 50–60°C (122–140°F).
3. Start the engine and idle it at $1,000 \pm 100$ r/min.
4. Fully close and fully open the shut-off valve of the pressure gauge.
5. Turn the steering wheel all the way to the left or right; then check whether or not the retention hydraulic pressure is the standard value.

Standard value: 7.5–8.2 MPa

(75–82 kg/cm², 1,067–1,166 psi.)

6. When not within the standard value, overhaul the steering gear box.
Remeasure fluid pressure.
7. Remove the special tools, and then tighten the pressure hose to the specified torque.
8. Bleed the system.



POWER STEERING OIL PRESSURE SWITCH CHECK

E37FQAA

1. Disconnect the pressure hose from the oil pump, and then connect the special tools.
2. Bleed the air, and then turn the steering wheel several times while the vehicle is not moving so that the temperature of the fluid rises to approximately 50–60°C (122–140°F).
3. The engine should be idling.
4. Disconnect the connection of the connector for the oil pressure switch, and place an ohmmeter in position.
5. Gradually close the shut-off valve of the pressure gauge and increase the hydraulic pressure then check whether or not the hydraulic pressure that activates the switch is the standard value.

Standard value: 1.5–2.0 MPa

(15–20 kg/cm², 213–284 psi.)

6. Gradually open the shut-off valve and reduce the hydraulic pressure; then check whether or not the hydraulic pressure that deactivates the switch is the standard value.

Standard value: 0.7–1.2 MPa

(7–12 kg/cm², 100–171 psi.)

7. Remove the special tools, and then tighten the pressure hose to the specified torque.
8. Bleed the system.

STEERING WHEEL AND SHAFT

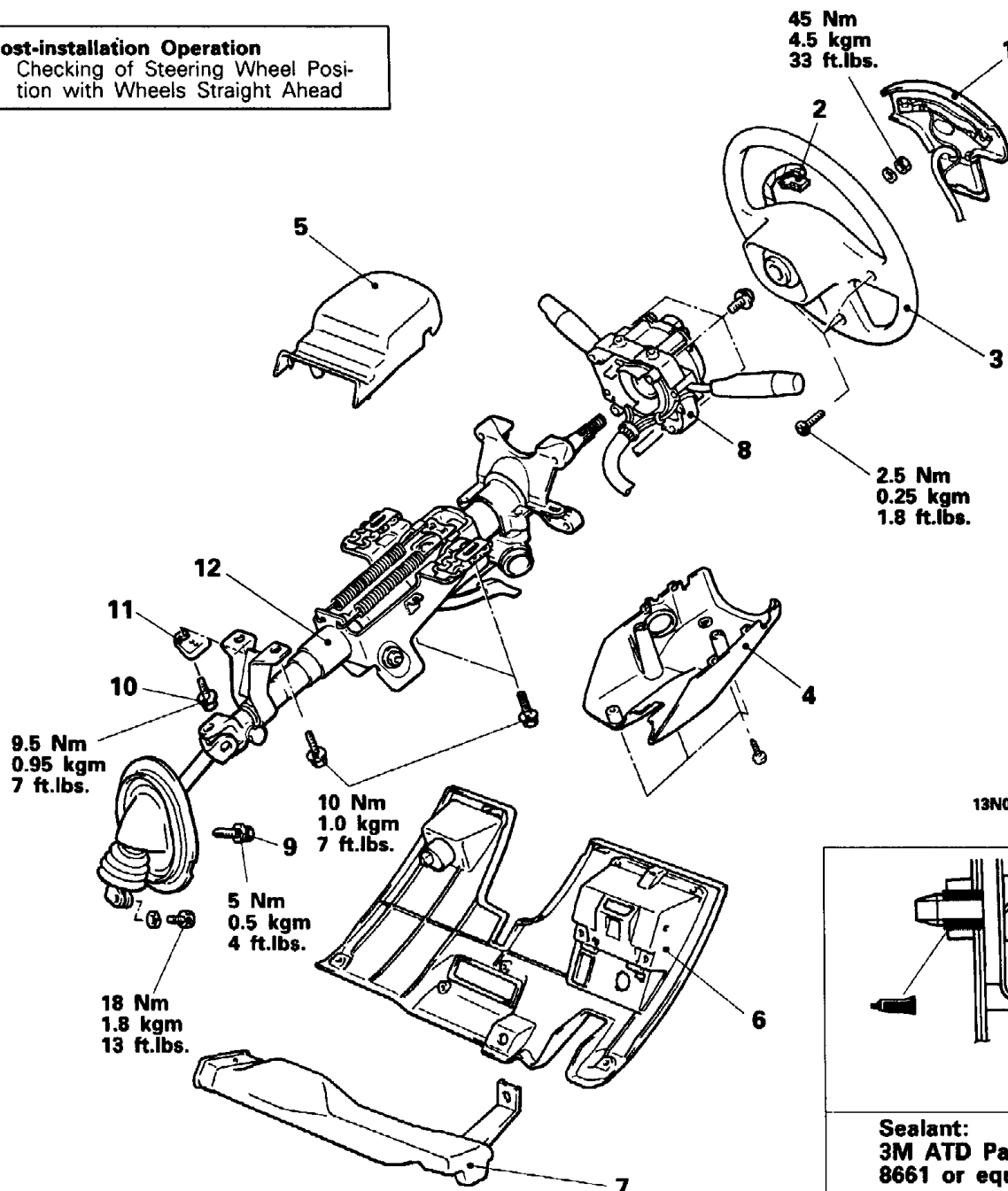
<VEHICLES WITHOUT SRS>

REMOVAL AND INSTALLATION

E37HA--

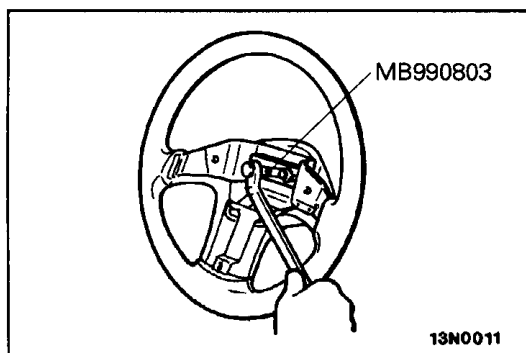
Post-installation Operation

- Checking of Steering Wheel Position with Wheels Straight Ahead

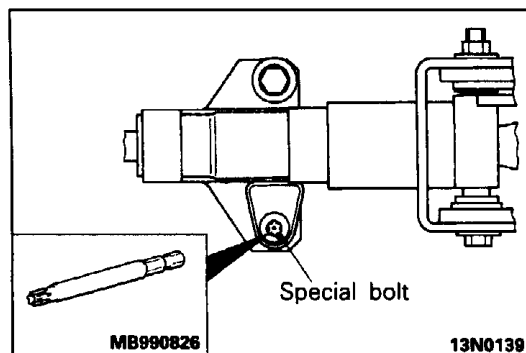
**Removal steps**

1. Horn pad
2. Harness connector (Vehicle with auto-cruise control)
3. Steering wheel
4. Lower column cover
5. Upper column cover
6. Driver side lower panel (Refer to GROUP 52 – Instrument Panel.)

7. Lap cooler duct and foot shower duct
8. Column switch
9. Retainer attachment bolt
10. Special screw
11. Special washer
12. Steering column assembly

**SERVICE POINTS OF REMOVAL**

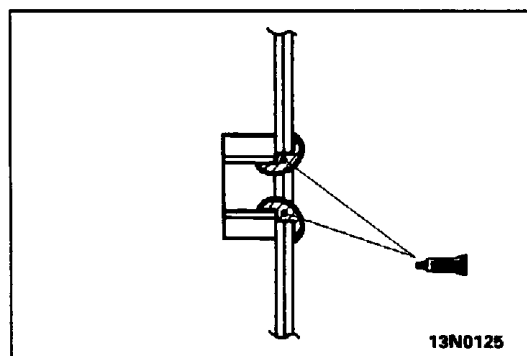
E37HBAS

3. REMOVAL OF STEERING WHEEL**10. REMOVAL OF SPECIAL SCREW****SERVICE POINTS OF INSTALLATION**

E37HDAH

10. INSTALLATION OF SPECIAL SCREW

Tighten the special screw using the special tool.

**9. INSTALLATION OF RETAINER ATTACHMENT BOLT**

Before installing the bolt, apply specified sealant to the retainer attachment hole in the toeboard.

STEERING WHEEL AND SHAFT

<VEHICLES WITH SRS>

REMOVAL AND INSTALLATION

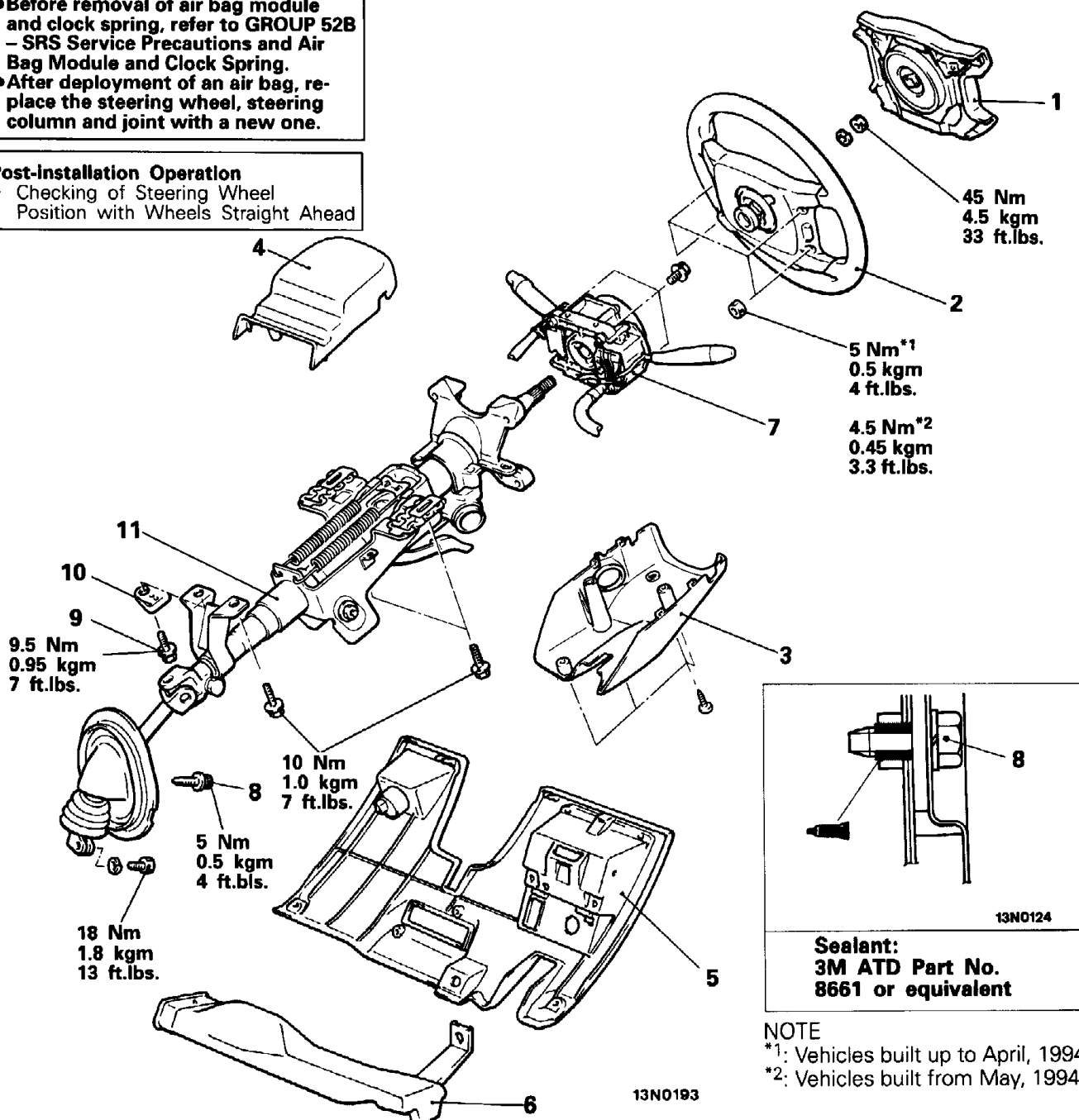
E37HA-A

CAUTION; SRS

- Before removal of air bag module and clock spring, refer to GROUP 52B – SRS Service Precautions and Air Bag Module and Clock Spring.
- After deployment of an air bag, replace the steering wheel, steering column and joint with a new one.

Post-Installation Operation

- Checking of Steering Wheel Position with Wheels Straight Ahead

**Removal steps**

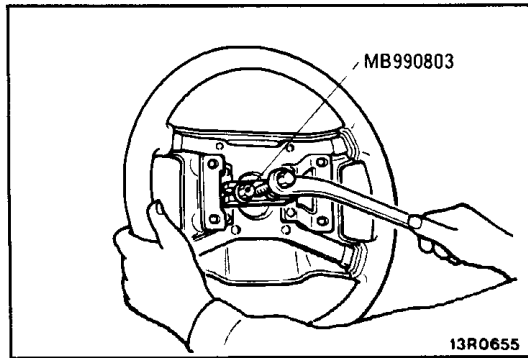
1. Air bag module (Refer to GROUP 52B – Air Bag Module and Clock Spring)
2. Steering wheel
3. Lower column cover
4. Upper column cover
5. Driver side lower panel (Refer to GROUP 52 – Instrument Panel.)

6. Lap cooler duct and foot shower duct
7. Column switch and clock spring (Refer to GROUP 52B – Air Bag Module and Clock Spring)
8. Retainer attachment bolt
9. Special screw
10. Special washer
11. Steering column assembly

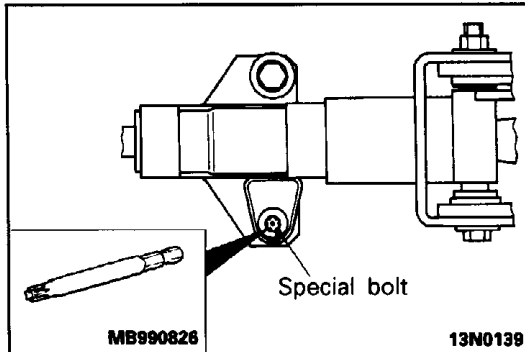
NOTE

*1: Vehicles built up to April, 1994

*2: Vehicles built from May, 1994

**SERVICE POINTS OF REMOVAL**

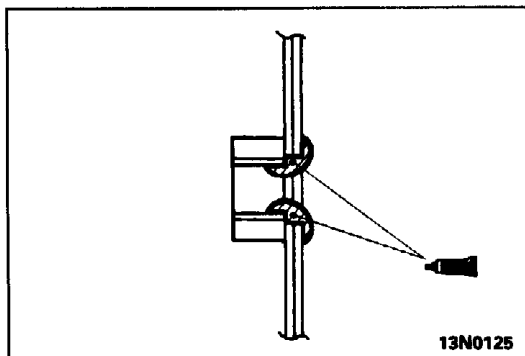
E37HBAS1

2. REMOVAL OF STEERING WHEEL**9. REMOVAL OF SPECIAL SCREW****SERVICE POINTS OF INSTALLATION**

E37HDAH1

9. INSTALLATION OF SPECIAL SCREW

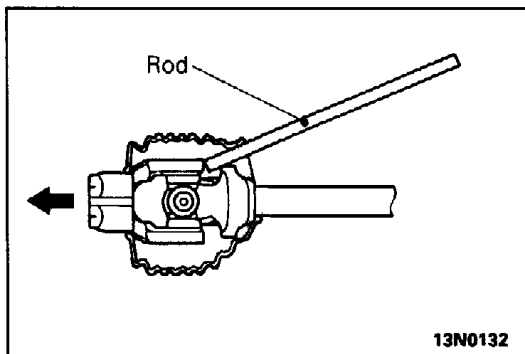
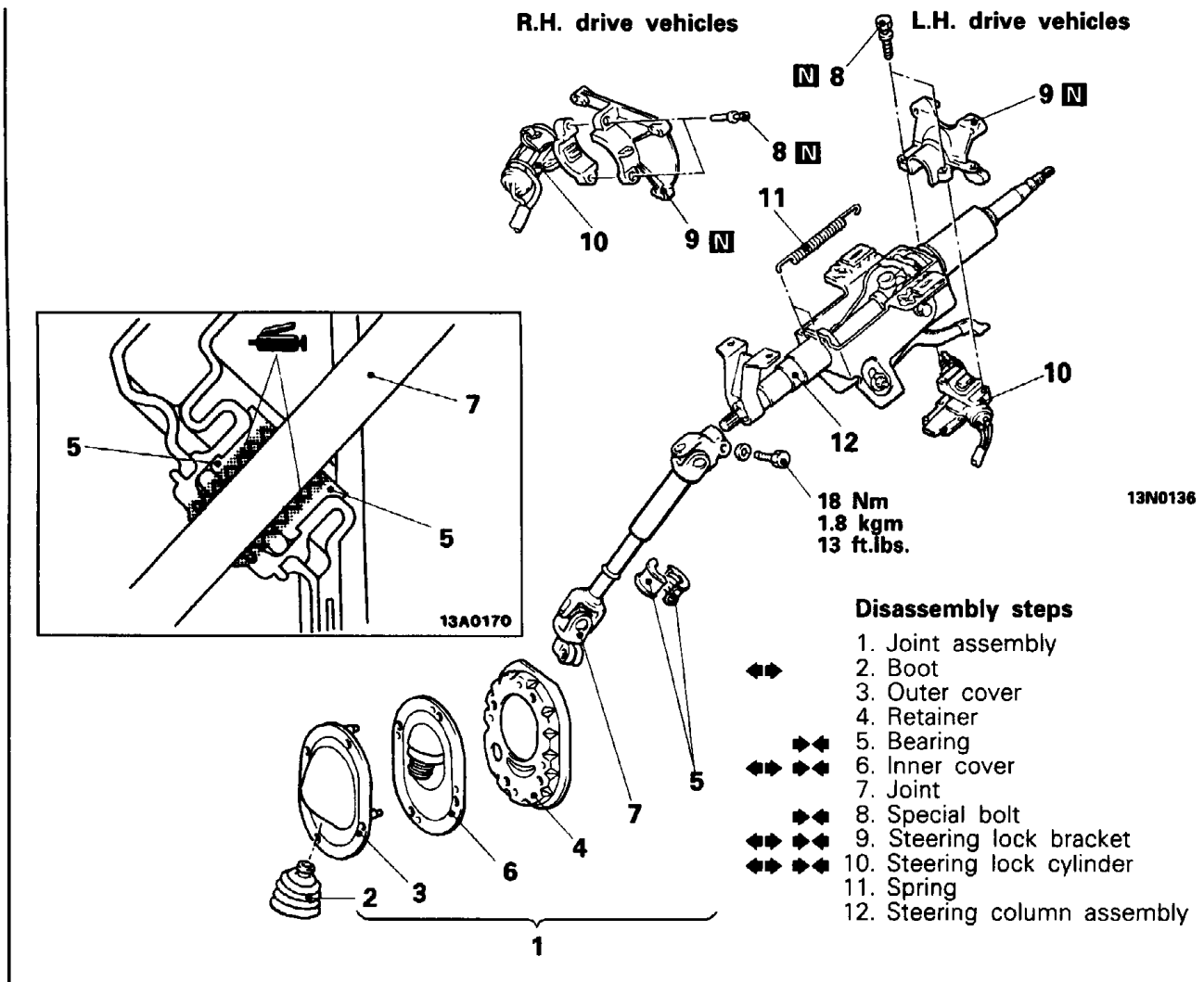
Tighten the special screw using the special tool.

**8. INSTALLATION OF RETAINER ATTACHMENT BOLT**

Before installing the bolt, apply specified sealant to the retainer attachment hole in the toeboard.

DISASSEMBLY AND REASSEMBLY

E37HE-

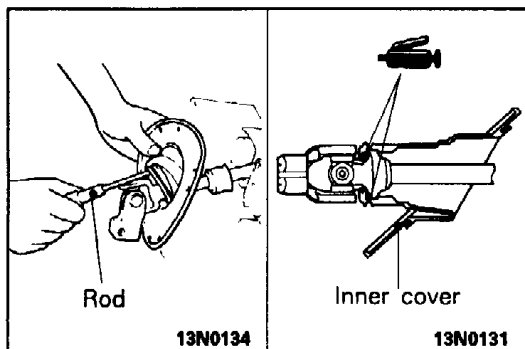


SERVICE POINTS OF DISASSEMBLY

E37HFAQ

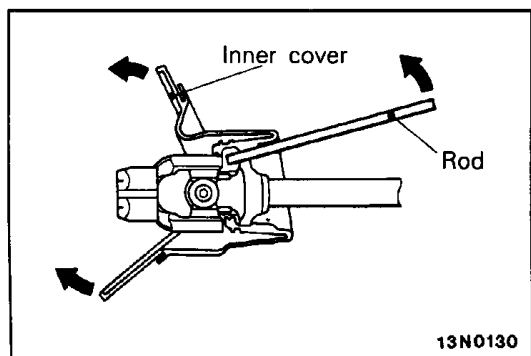
2. REMOVAL OF BOOT

- (1) Apply grease to the inside lip of the boot.
- (2) Remove the boot while using a rod to widen the lip section.



6. REMOVAL OF INNER COVER

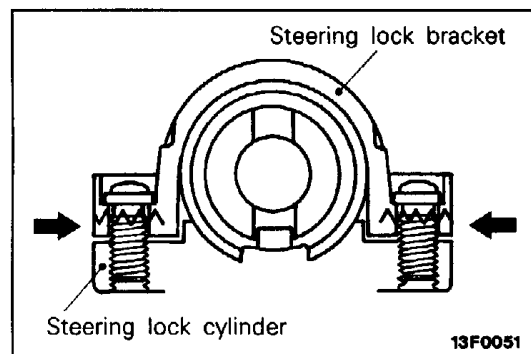
- (1) Apply grease to the inside lip of the inner cover.
- (2) Cover the joint while using a rod to widen the lip section.



- (3) While using the rod to widen the inner cover from behind, pull the cover to remove it from the joint.

9. REMOVAL OF STEERING LOCK BRACKET/10. STEERING LOCK CYLINDER

If it is necessary to remove the steering lock cylinder, use a hacksaw to cut the special bolts at the steering lock bracket side.



SERVICE POINTS OF REASSEMBLY

E37HHAK

10. INSTALLATION OF STEERING LOCK CYLINDER/9. STEERING LOCK BRACKET/ 8. SPECIAL BOLT

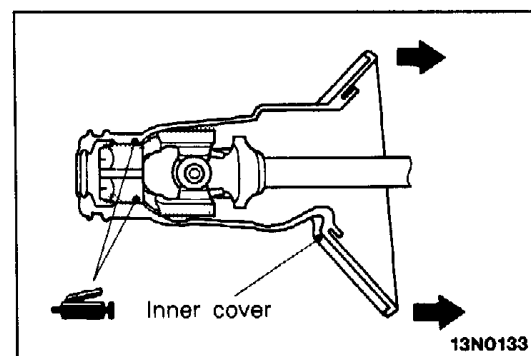
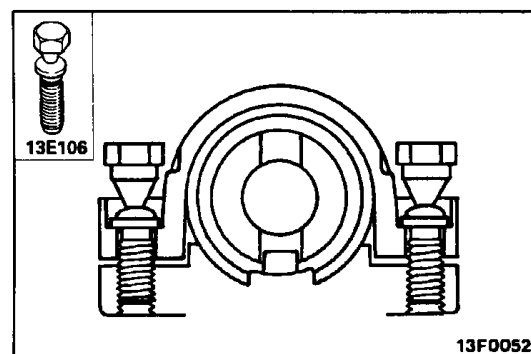
- (1) When installing the steering lock and steering lock bracket to the column tube, temporarily install the steering lock in alignment with the column boss.
- (2) After checking that the lock works properly, tighten the special bolts until the head twists off.

Caution

The steering lock bracket and bolts must be replaced with new ones when the steering lock is installed.

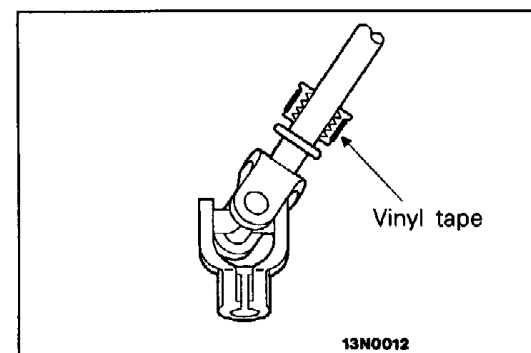
6. INSTALLATION OF INNER COVER

Cover the inside lip of the inner cover with grease and pull the outside of the cover onto the joint.



5. INSTALLATION OF BEARING

- (1) Fill the inside of the bearing with multipurpose grease.
- (2) Install the bearings to the shaft on the joint assembly.
- (3) Wrap vinyl tape approximately one and one-half times around the concave circumferences of the bearings, and then press fit the bearings into the cover assembly.



POWER STEERING GEAR BOX

REMOVAL AND INSTALLATION

CAUTION: SRS

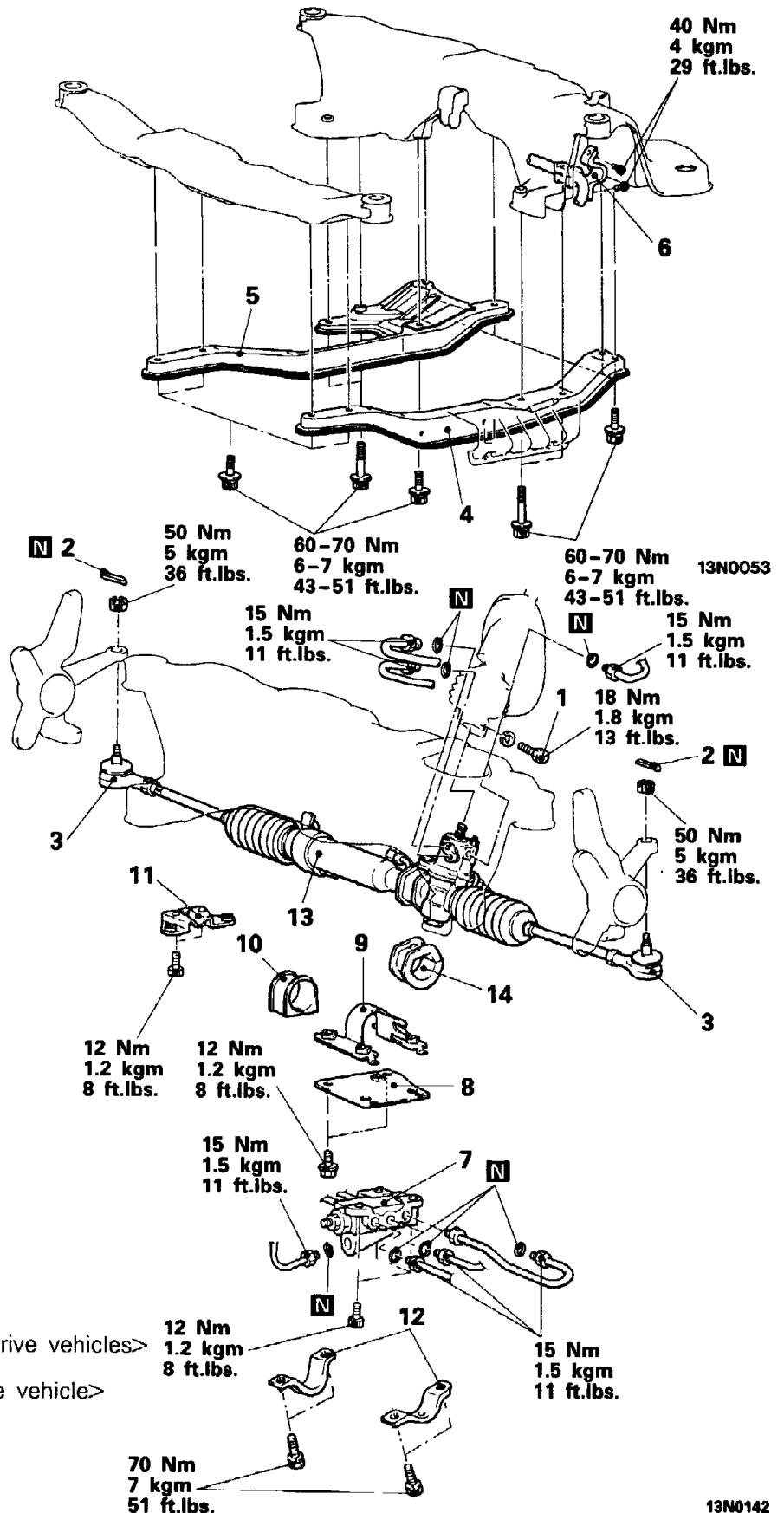
For vehicles with SRS, before removal of steering gear box, refer to GROUP 52B - SRS, center front wheels and remove ignition key. Failure to do so may damage SRS clock spring and render SRS system inoperative, risking serious driver injury.

Pre-removal Operation

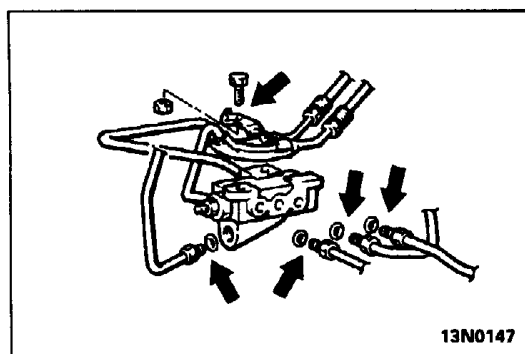
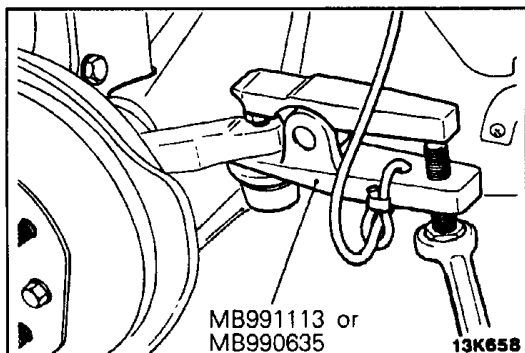
- Draining of the Power Steering Fluid (Refer to P.37A-18)
- Removal of Front Exhaust Pipe (Refer to GROUP 15 - Exhaust Pipe and Main Muffler.)

Post-installation Operation

- Installation of Front Exhaust Pipe (Refer to GROUP 15 - Exhaust Pipe and Main Muffler.)
- Supplying of the Power Steering Fluid (Refer to P.37A-18)
- Bleeding of the Power Steering Fluid Line (Refer to P.37A-18)
- Checking of Steering Wheel Position with Wheels Straight Ahead
- Adjustment of the Front Wheel Alignment (Refer to GROUP 33A - Service Adjustment Procedures.)

**Removal steps**

1. Joint assembly and gear box connecting bolt
2. Split pin
3. Tie-rod end and knuckle connecting nut
4. Left member
5. Right member
6. Stabilizer bar bracket
7. Control valve
8. Plate
9. Valve bracket } <L.H. drive vehicles>
10. Cylinder holder } <L.H. drive vehicles>
11. Valve bracket <R.H. drive vehicle>
12. Clamp
13. Gear box assembly
14. Mounting rubber



SERVICE POINTS OF REMOVAL

E37PBAF

3. DISCONNECTION OF TIE-ROD END

7. REMOVAL OF CONTROL VALVE

Remove the connections shown in the diagram and remove the control valve from the gear housing. Secure the control valve to the crossmember with wire, etc.

13. REMOVAL OF GEAR BOX ASSEMBLY

- (1) Move the rack completely to the right and pull the left-side tie-rod from the crossmember.
- (2) While tilting the left side of the gear box downward, remove it to the left.

NOTE

Remove the gear box to opposite direction for right-hand drive vehicles.

Caution

When removing the gear box, pull it out carefully and slowly to avoid damaging the boots.

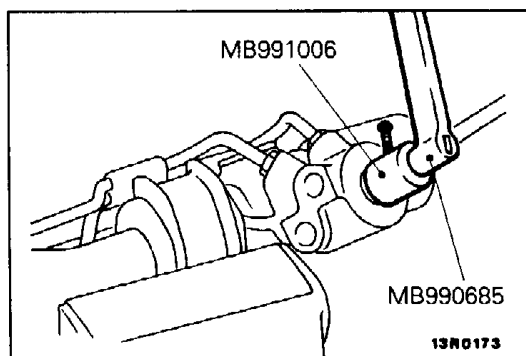
INSPECTION

E37PCAG

GEAR BOX FOR TOTAL PINION PRELOAD

Using the special tools, rotate the pinion gear at the rate of one rotation in approximately 4 to 6 seconds to check the total pinion preload.

Standard value:



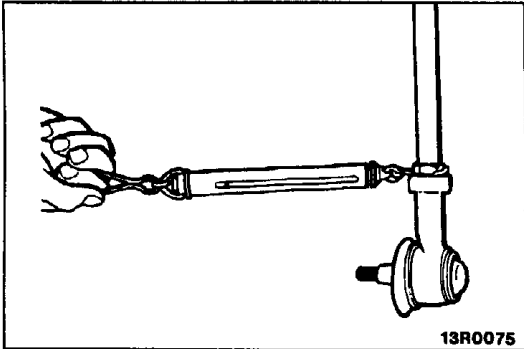
		Total pinion preload	Change in torque
Conventional power steering gear box	0°(Neutral position)–60°	1.3–1.8 Nm (13–18 kgcm, 11 –16 in.lbs.)	0.3 Nm (3 kgcm, 3 in.lbs.)
	60°–180°	0.7–1.2 Nm (7–12 kgcm, 6–10 in.lbs.)	0.3 Nm (3 kgcm, 3 in.lbs.)
E.P.S. gear box	Vehicles without 4WS	1.3 Nm (13 kgcm, 11 in.lbs.)	0.3 Nm (3 kgcm, 3 in.lbs.)
	Vehicles with 4WS	0.7–1.6 Nm (7–16 kgcm, 6–14 in.lbs.)	0.5 Nm (5 kgcm, 4 in.lbs.)

NOTE

Measure the pinion preload through the whole stroke of the rack.

If the measured value is not within the standard range, first adjust the rack support cover, and then check the total pinion starting torque again.

If the total pinion starting torque cannot be adjusted to within the standard range by adjusting the rack support cover, check the rack support cover, rack support spring, rack support and replace any parts necessary.



CHECK THE TIE ROD FOR SWING RESISTANCE

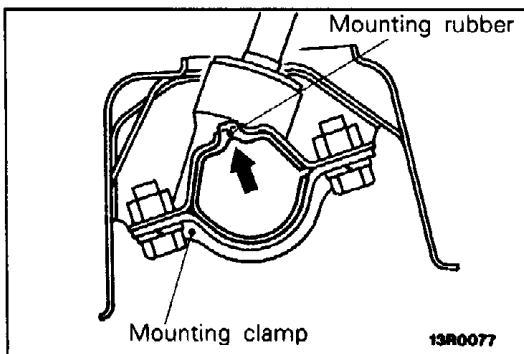
- (1) Give 10 hard swings to the tie rod.
- (2) Measure the tie rod swing resistance with a spring balance.

**Standard value: 8–20 N (0.8–2.0 kg, 1.9–4.6 lbs.)
[2–5 Nm (20–50 kgcm, 17–43 in.lbs.)]**

- (3) If the measured value exceeds the standard value, replace tie rod assembly.

NOTE

Even if the measured value is below the standard value, the tie rod which swings smoothly without excessive play may be used.



SERVICE POINTS OF INSTALLATION

E37PDAB

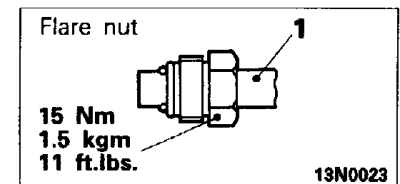
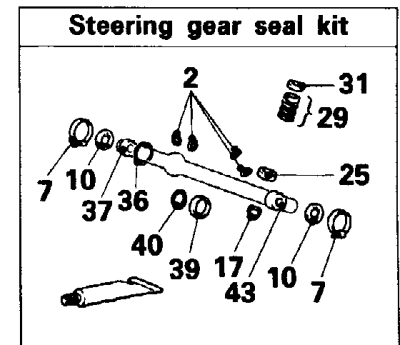
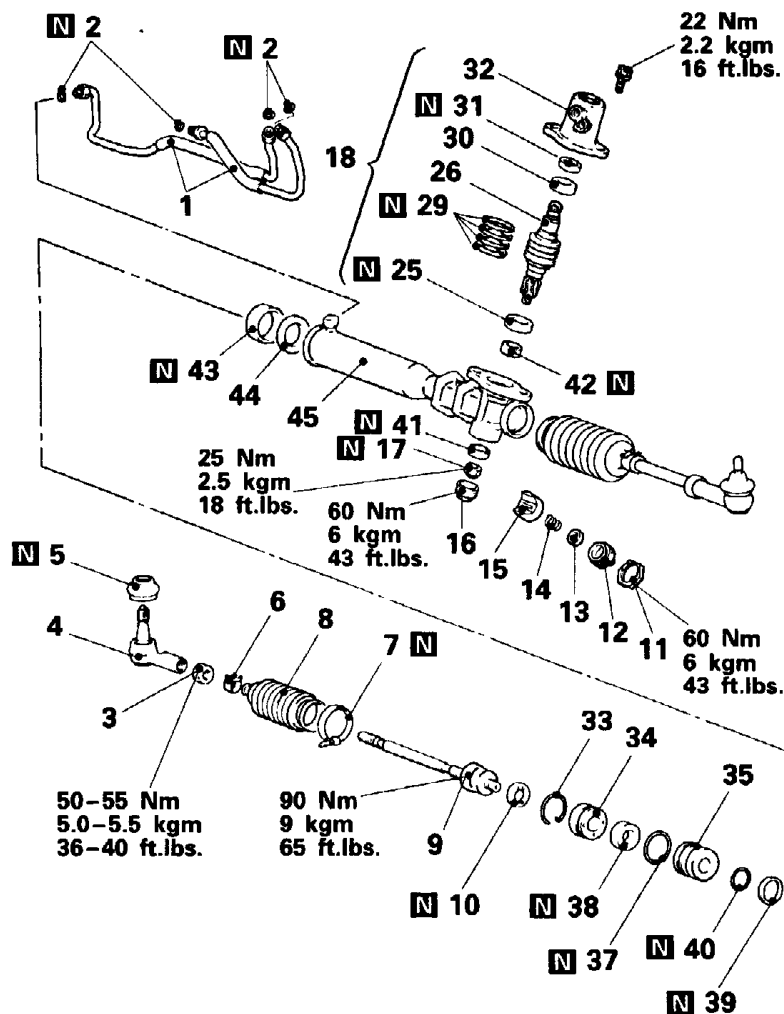
14. INSTALLATION OF MOUNTING RUBBER/13. GEAR BOX ASSEMBLY

When installing the mounting rubber, align the projection of the mounting rubber with the indentation in the crossmember to install the gear box.

DISASSEMBLY AND REASSEMBLY

E37PE-

<Conventional power steering gear box>

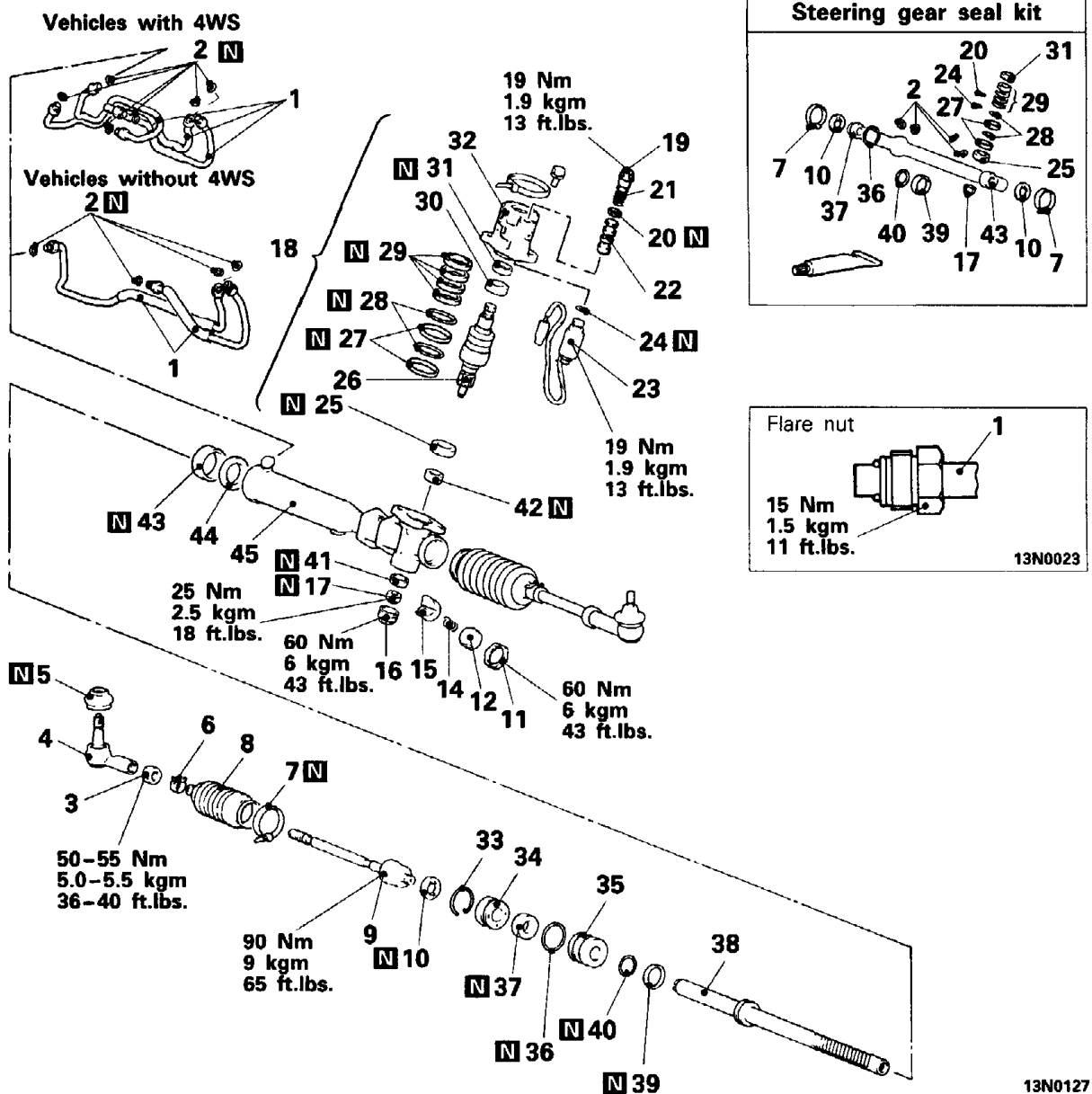


13N0126

Disassembly steps

- | | |
|-----------------------------------|-------------------------------|
| 1. Feed tube | 25. Oil seal |
| 2. O-ring | 26. Pinion and valve assembly |
| 3. Tie rod end locking nut | 29. Seal ring |
| 4. Tie rod end | 30. Ball bearing |
| 5. Dust cover | 31. Oil seal |
| 6. Bellows clip | 32. Valve housing |
| 7. Bellows band | 33. Circlip |
| 8. Bellows | 34. Rack stopper |
| 9. Tie rod | 35. Rack bushing |
| 10. Tab washer | 36. Rack |
| Adjustment of total pinion torque | 37. O-ring |
| 11. Locking nut | 38. Oil seal |
| 12. Rack support cover | 39. Seal ring |
| 13. Cushion rubber | 40. O-ring |
| 14. Rack support spring | 41. Ball bearing |
| 15. Rack support | 42. Needle roller bearing |
| 16. End plug | 43. Oil seal |
| 17. Self-locking nut | 44. Back-up washer |
| 18. Valve housing assembly | 45. Rack housing |

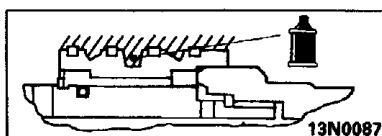
<E.P.S. gear box>

**Disassembly steps**

- | | | |
|-------------------------------------|-------------------------------|---------------------------|
| 1. Feed tube | 15. Rack support | 30. Ball bearing |
| 2. O-ring | 16. End plug | 31. Oil seal |
| 3. Tie rod end locking nut | 17. Self-locking nut | 32. Valve housing |
| 4. Tie rod end | 18. Valve housing assembly | 33. Circlip |
| 5. Dust cover | 19. P.C.V. cap | 34. Rack stopper |
| 6. Bellows clip | 20. O-ring | 35. Rack bushing |
| 7. Bellows band | 21. P.C.V. spring | 36. Rack |
| 8. Bellows | 22. Solenoid valve | 37. O-ring |
| 9. Tie rod | 23. P.C.V. | 38. Oil seal |
| 10. Tab washer | 24. O-ring | 39. Seal ring |
| • Adjustment of total pinion torque | 25. Oil seal | 40. O-ring |
| 11. Locking nut | 26. Pinion and valve assembly | 41. Ball bearing |
| 12. Rack support cover | 27. Seal ring | 42. Needle roller bearing |
| 14. Rack support spring | 28. O-ring | 43. Oil seal |
| | 29. Seal ring | 44. Back-up washer |
| | | 45. Rack housing |

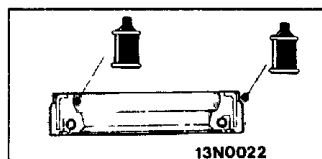
LUBRICATION AND SEALING POINTS

<Conventional power steering gear box>



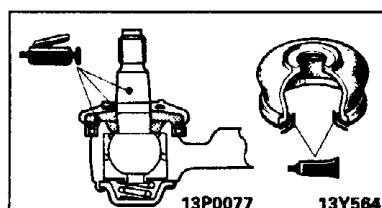
13N0087

Fluid:
Automatic transmission fluid
DEXRON or DEXRON II



13N0022

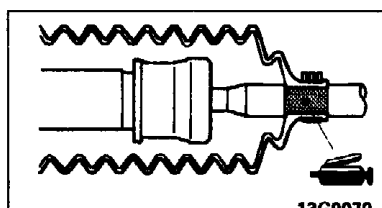
Fluid:
Automatic transmission fluid
DEXRON or
DEXRON II



13P0077

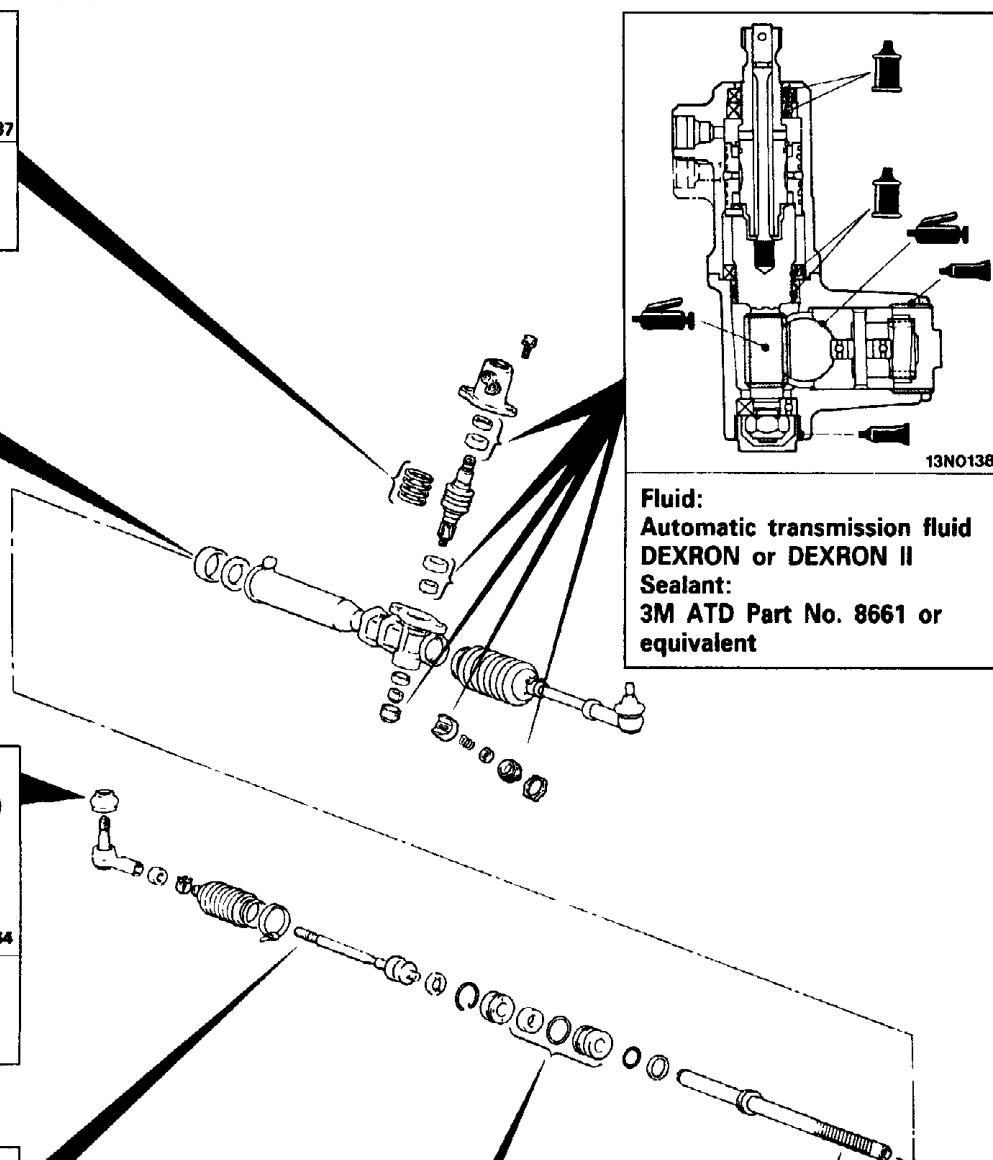
13Y564

Sealant:
3M ATD Part No. 8661 or
equivalent

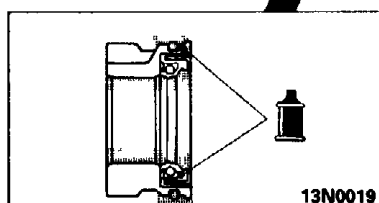


13G0070

Grease: Silicone grease

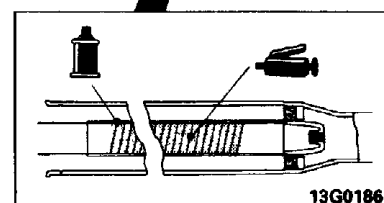


13N0126



13N0019

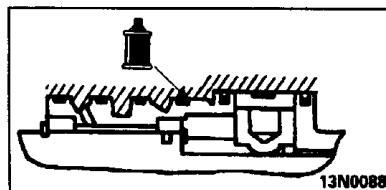
Fluid:
Automatic transmission fluid
DEXRON or DEXRON II



13G0186

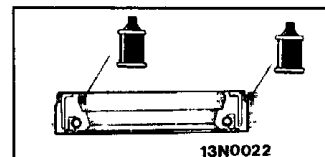
Fluid:
Automatic transmission fluid
DEXRON or DEXRON II

<E.P.S. gear box>



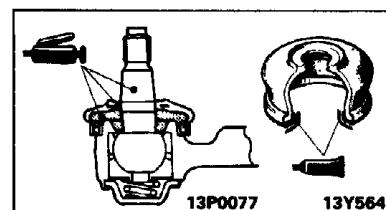
13N0088

Fluid:
Automatic transmission fluid
DEXRON or DEXRON II



13N0022

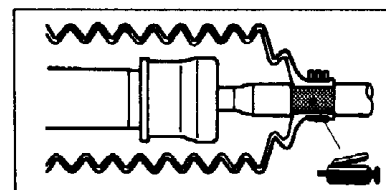
Fluid:
Automatic transmission fluid
DEXRON or
DEXRON II



13P0077

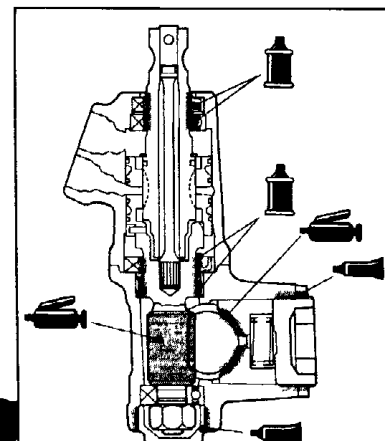
13Y564

Sealant:
3M ATD Part No. 8661 or
equivalent



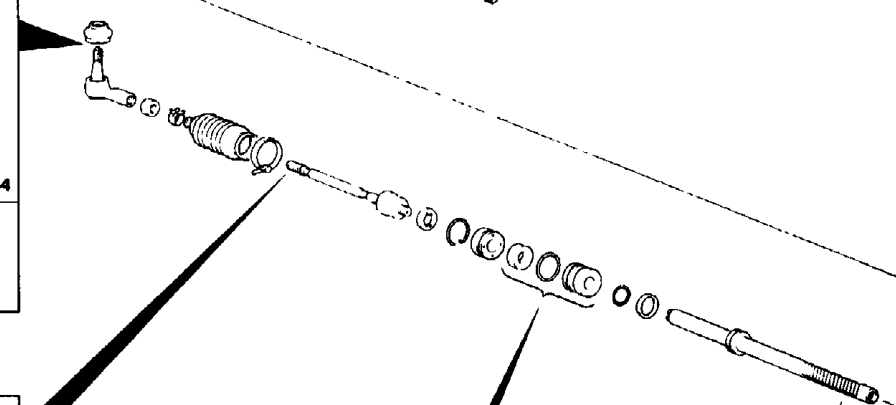
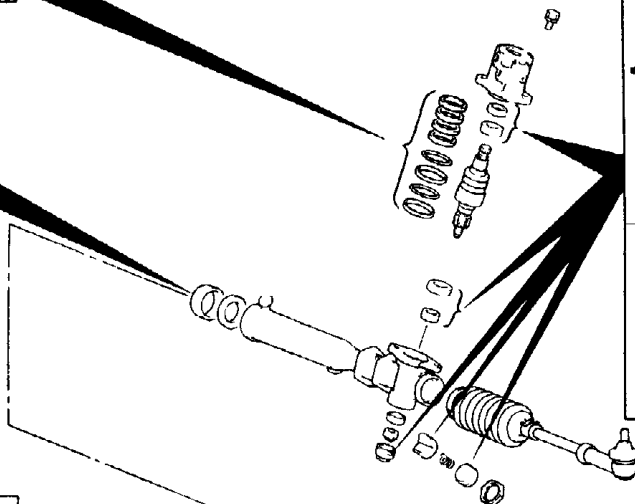
13G0070

Grease: Silicone grease

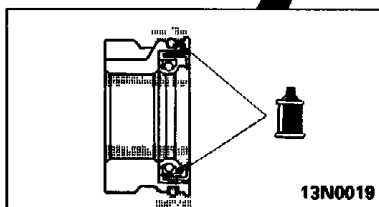


13F0031

Fluid:
Automatic transmission fluid
DEXRON or DEXRON II
Sealant:
3M ATD Part No. 8661 or
equivalent

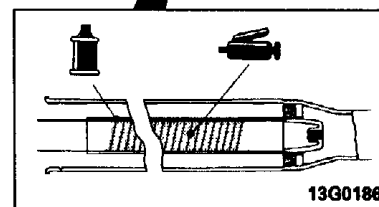


13N0127



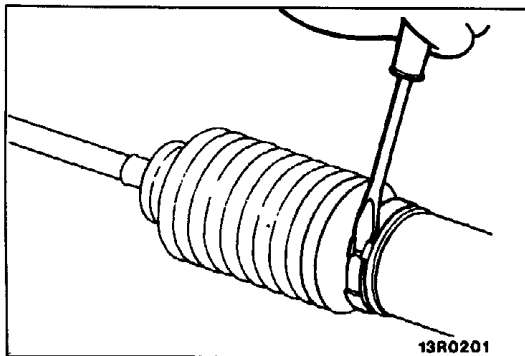
13N0019

Fluid:
Automatic transmission fluid
DEXRON or DEXRON II



13G0186

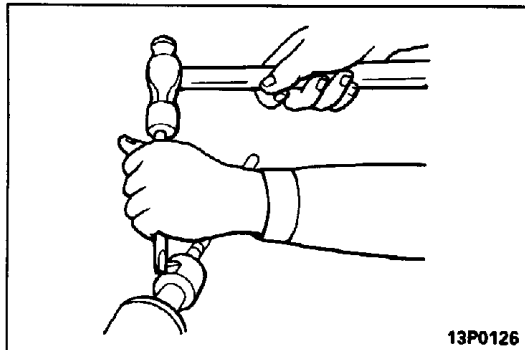
Fluid:
Automatic transmission fluid
DEXRON or DEXRON II

**SERVICE POINTS OF DISASSEMBLY**

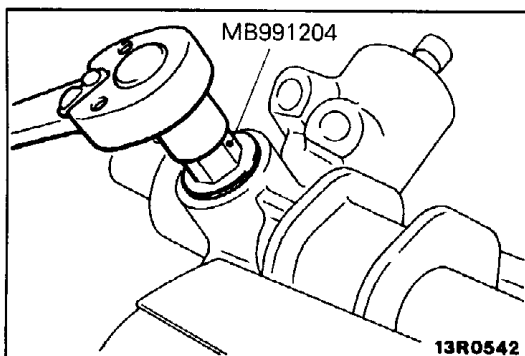
E37PFAK

7. REMOVAL OF BELLOWS BANDS

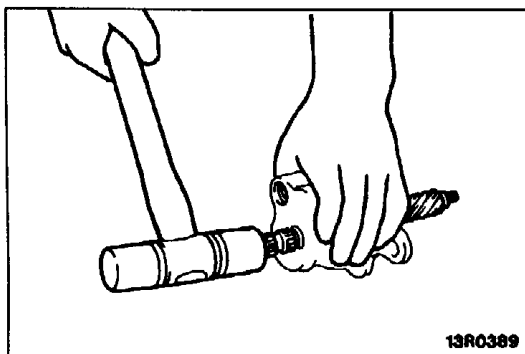
Using a screwdriver or similar tool, loosen and then remove the boot retaining band.

**10. REMOVAL OF TAB WASHER**

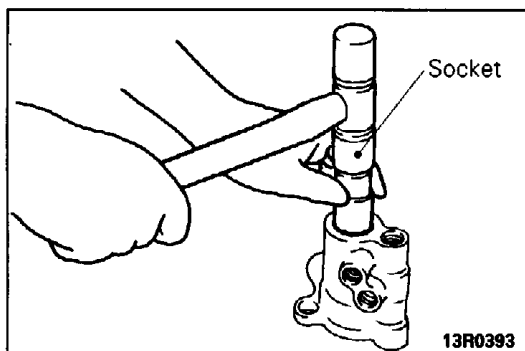
Unstake the tab washer which fixes the tie rod and rack with a chisel.

**12. REMOVAL OF RACK SUPPORT COVER**

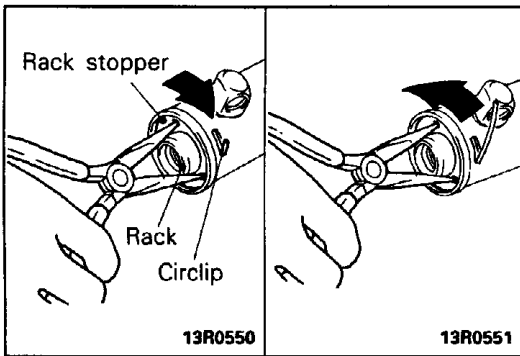
Using the special tool, remove the rack support cover from the gear box.

**25. REMOVAL OF OIL SEAL/26. PINION AND VALVE ASSEMBLY**

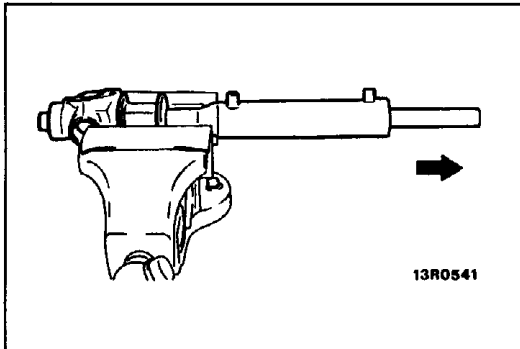
Using a plastic hammer, gently tap the pinion to remove it.

**30. REMOVAL OF BALL BEARING/31. OIL SEAL**

Using a socket, remove the oil seal and the ball bearing from the valve housing simultaneously.

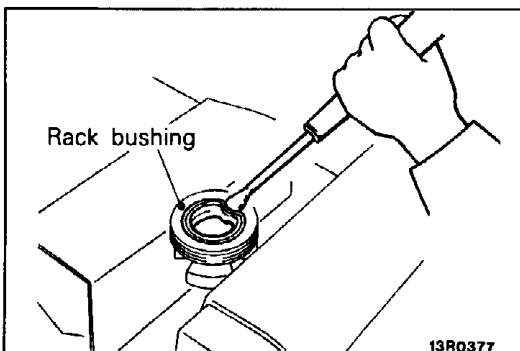
**33. REMOVAL OF CIRCLIP**

- (1) Turn the rack stopper clockwise until the end of the circlip comes out of the slot in the rack housing.
- (2) Turn the rack stopper anticlockwise to remove the circlip.

**36. REMOVAL OF RACK**

Pull out the rack slowly.

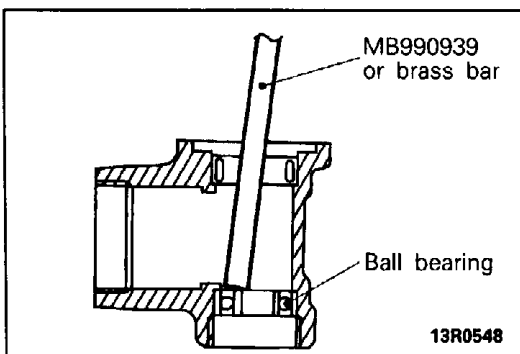
At this time also take out the rack stopper and the rack bushing simultaneously.

**38. REMOVAL OF OIL SEAL**

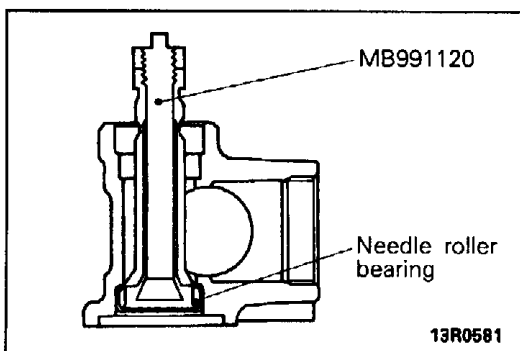
Partially bend oil seal and remove from rack bushing.

Caution

Do not damage oil seal press fitting surface.

**41. REMOVAL OF BALL BEARING**

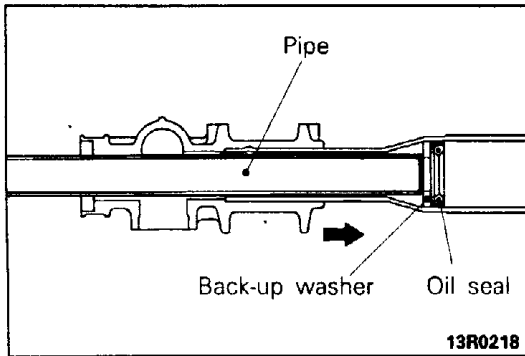
Use a brass bar or special tool to remove the ball bearing from the gear housing.

**42. REMOVAL OF NEEDLE ROLLER BEARING**

Use the special tool to remove the needle roller bearing from the rack housing.

Caution

Do not open special tool excessively to prevent damaging housing interior.

**43. REMOVAL OF OIL SEAL/44. BACK-UP WASHER**

Use a piece of pipe or similar tool to remove the back-up washer and oil seal from the gear housing.

Caution

Be careful not to damage the inner surface of the rack cylinder of the gear housing.

INSPECTION

E37PGAG

RACK

- Check the rack tooth surfaces for damage or wear.
- Check the oil seal contact surfaces for uneven wear.
- Check the rack for bends.

PINION AND VALVE ASSEMBLY

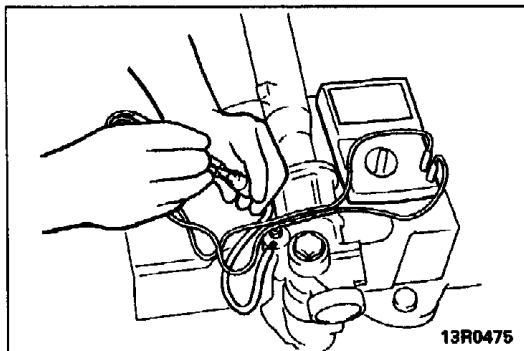
- Check the pinion gear tooth surfaces for damage or wear.
- Check for worn or defective seal ring.

BEARING

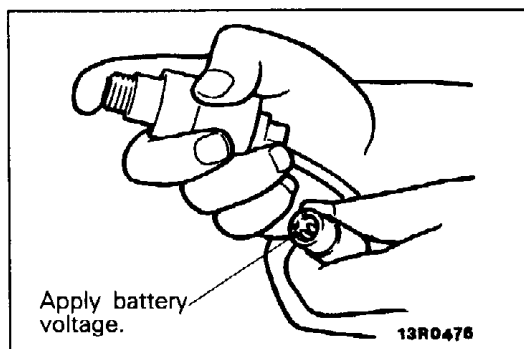
- Check for roughness or abnormal noise during bearing operation.
- Check the bearing for play.
- Check the needle roller bearings for roller slip-off.

OTHERS

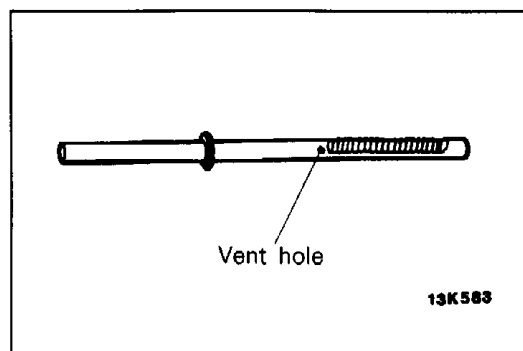
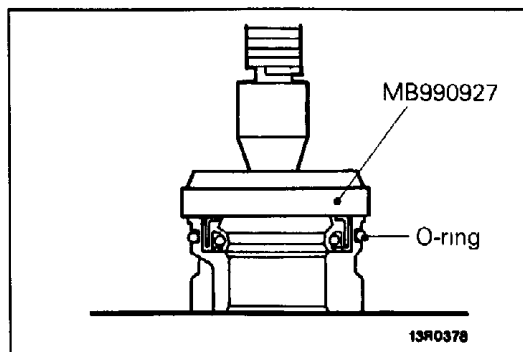
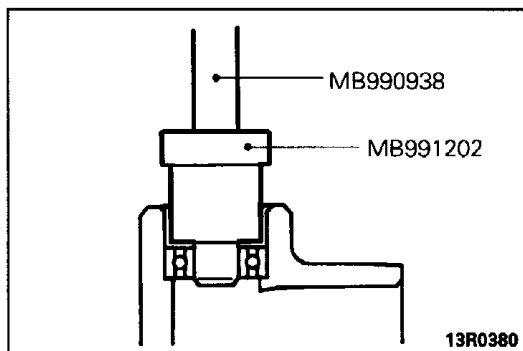
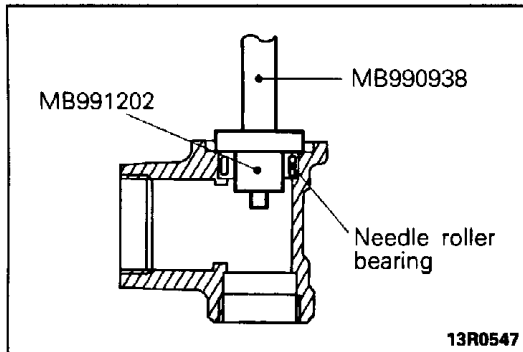
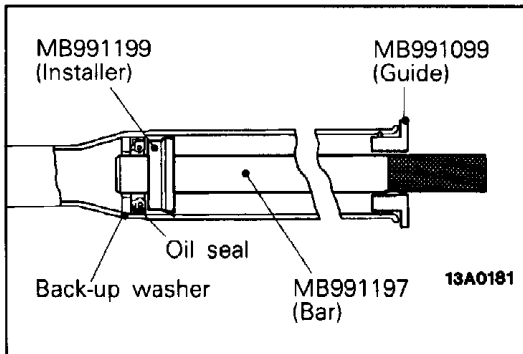
- Check the cylinder inner surface of the rack housing for damage.
- Check the boots for damage, cracking or deterioration.
- Check the rack support for uneven wear or dents.
- Check the rack bushing for uneven wear or damage.

**SOLENOID VALVE**

- (1) Remove the solenoid valve connector, and then check whether or not there is continuity between the two terminals.



- (2) While pressing the solenoid end inward by using a finger, connect to the battery and then check whether or not the solenoid is pushed out.

**SERVICE POINTS OF REASSEMBLY**

E37PHA0

44. INSTALLATION OF BACK-UP WASHER/43. OIL SEAL

- (1) Apply a coating of the specified fluid to the outside of the oil seal.

**Specified fluid: Automatic transmission fluid
DEXRON or DEXRON II**

- (2) Using the special tools, press the back-up washer and the oil seal into the rack housing to the specified position (where the upper surface of press-in guide coincides with the stepped part of the press-in tool).

42. INSTALLATION OF NEEDLE ROLLER BEARING

- (1) Apply specified fluid to housing, bearing and oil seal press fitting surface.

**Specified fluid: Automatic transmission fluid
DEXRON or DEXRON II**

- (2) Press fit needle roller bearing with special tools.

Caution

Press fit straight as valve housing is aluminum.

41. INSTALLATION OF BALL BEARING**38. INSTALLATION OF OIL SEAL/37. O-RING**

- (1) Apply a coating of the specified fluid to the outside of the oil seal and o-ring.

**Specified fluid: Automatic transmission fluid
DEXRON or DEXRON II**

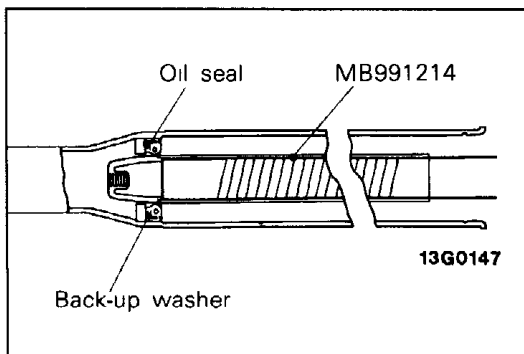
- (2) Use special tool to press fit oil seal until touches rack bush end.

36. INSTALLATION OF RACK

- (1) Apply a coating of multipurpose grease to the rack teeth face.

Caution

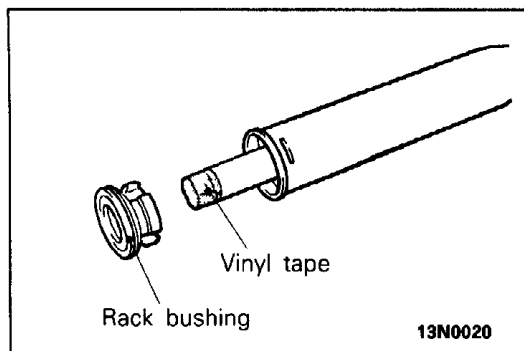
Do not close the vent hole in the rack with grease.



- (2) Cover rack serrations with special tool.
- (3) Apply specified fluid on special tool.

**Specified fluid: Automatic transmission fluid
DEXRON or DEXRON II**

- (4) Match oil seal centre with rack to prevent retainer spring from slipping and slowly insert rack from power cylinder side.



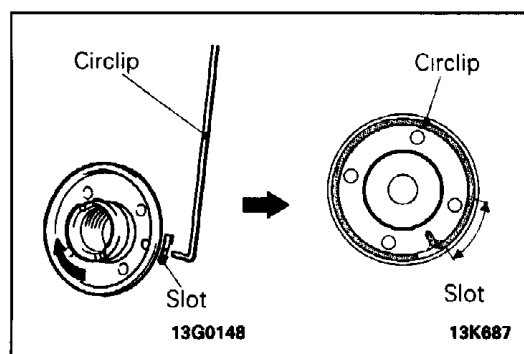
35. INSTALLATION OF RACK BUSHING ASSEMBLY

Wrap the rack end with vinyl tape, apply a coating of the specified fluid, and then install the rack bushing and rack stopper.

**Specified fluid: Automatic transmission fluid
DEXRON or DEXRON II**

Caution

Do not allow oil seal retainer spring to slip out.

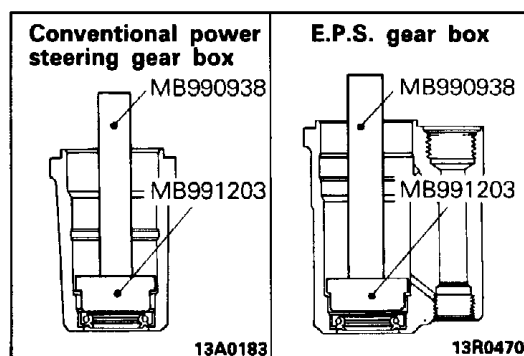


33. INSTALLATION OF CIRCLIP

Insert circlip to rack stopper hole through cylinder hole. Turn rack stopper clockwise and insert circlip firmly.

Caution

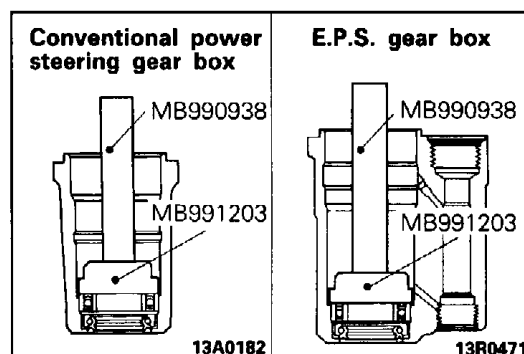
Insert circlip to rack stopper hole whilst turning rack stopper clockwise.



31. INSTALLATION OF OIL SEAL

Apply a coating of the specified fluid to the outside of the oil seal. Using the special tools, press the oil seal into the valve housing.

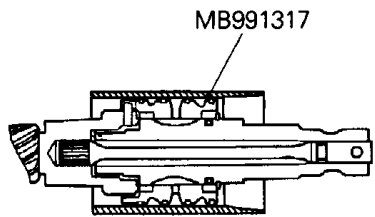
**Specified fluid: Automatic transmission fluid
DEXRON or DEXRON II**



30. INSTALLATION OF BALL BEARING

Apply a coating of the specified fluid to the outside of the ball bearing. Using the special tools, press the oil seal into the valve housing.

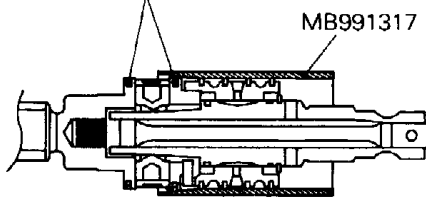
**Specified fluid: Automatic transmission fluid
DEXRON or DEXRON II**

Conventional power steering gear box

13N0086

E.P.S. gear box

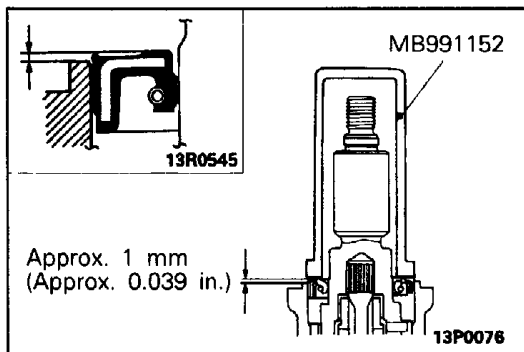
Press down by hand.



13N0095

29./27. INSTALLATION OF SEAL RING

Because the seal rings expand at the time of installation, tighten after installation by using the special tool to compress the rings, or press down by hand.

Approx. 1 mm
(Approx. 0.039 in.)

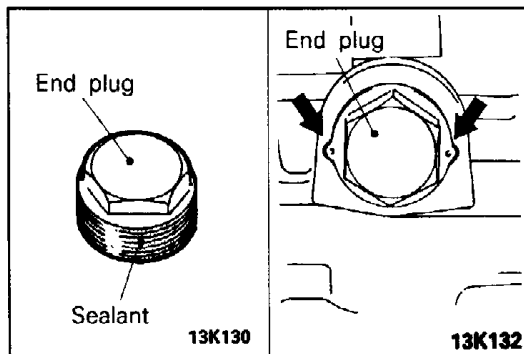
13P0076

25. INSTALLATION OF OIL SEAL

Using the special tool, press the oil seal into the valve housing.

Caution

In order to eliminate a seal malfunction at the valve housing alignment surface, the upper surface of the oil seal should project outward approximately 1 mm (0.039 in.) from the housing edge surface.



13K130

13K132

16. INSTALLATION OF END PLUG

- (1) Apply the specified sealant to the threaded part of the end plug.

Specified sealant: 3M ATD Part No. 8661 or equivalent

- (2) Secure the threaded portion of the end plug at two places by using a punch.

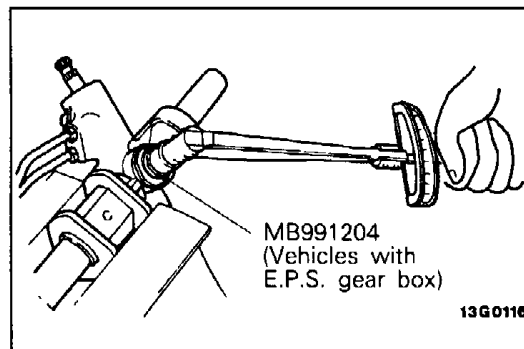
- **ADJUSTMENT OF TOTAL PINION PRELOAD**

- (1) Position rack at its centre. Tighten rack support cover to 15 Nm (1.5 kgm, 11 ft.lbs.).

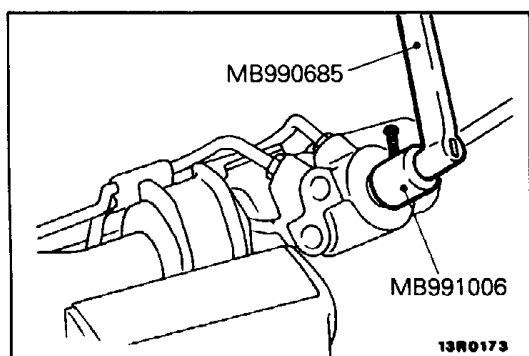
NOTE

For an E.P.S. gear box, use the special tool.

- (2) In neutral position, rotate pinion shaft clockwise one turn/4–6 seconds with special tool. Return rack support cover 30°–60° and adjust torque to the standard value.



13G0116



- (3) Using the special tools, rotate the pinion gear at the rate of one rotation in approximately 4 to 6 seconds to check the total pinion preload.

Standard value:

		Total pinion preload	Change in torque
Conventional power steering gear box	0° (Neutral position)–60°	1.3–1.8 Nm (13–18 kgcm, 11–16 in.lbs.)	0.3 Nm (3 kgcm, 3 in.lbs.)
	60°–180°	0.7–1.2 Nm (7–12 kgcm, 6–10 in.lbs.)	0.3 Nm (3 kgcm, 3 in.lbs.)
E.P.S. gear box	Vehicles without 4WS	1.3 Nm (13 kgcm, 11 in.lbs.)	0.3 Nm (3 kgcm, 3 in.lbs.)
	Vehicles with 4WS	0.7–1.6 Nm (7–16 kgcm, 6–14 in.lbs.)	0.5 Nm (5 kgcm, 4 in.lbs.)

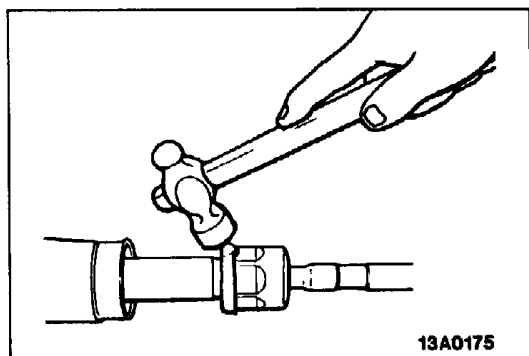
Caution

1. When adjusting, set the standard value at its highest value.
2. Assure no ratcheting or catching when operating rack towards the shaft direction.

NOTE

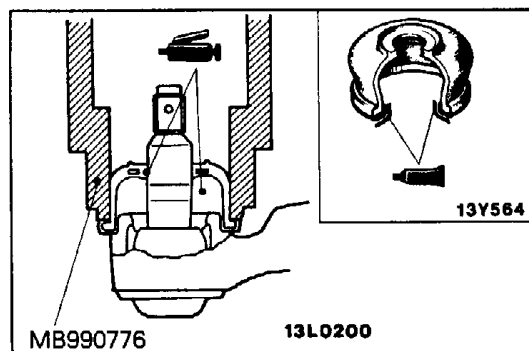
When it cannot be adjusted within the specified return angle, check rack support cover components or replace.

- (4) After adjusting, lock rack support cover with lock nut.



10. INSTALLATION OF TAB WASHER/9. TIE ROD

After installing tie-rod to rack, fold tab washer end (2 locations) to tie rod notch.

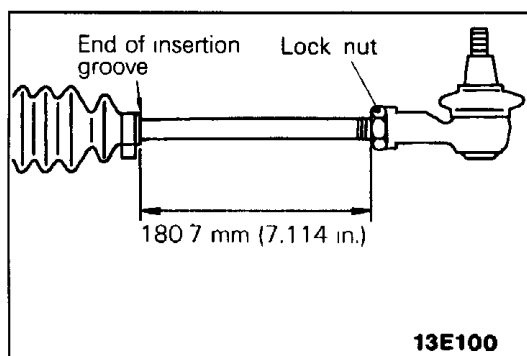


5. INSTALLATION OF DUST COVER

- (1) Pack dust cover interior with multipurpose grease.
- (2) Apply specified sealant to dust cover lip.

Specified sealant: 3M ATD Part No. 8661 or equivalent

- (3) Using the special tool, install the dust cover to the tie rod end ball joint.



4. INSTALLATION OF TIE ROD END

Screw in tie-rod end to have its right and left length as illustrated. Lock with lock nut.

POWER STEERING OIL PUMP REMOVAL AND INSTALLATION

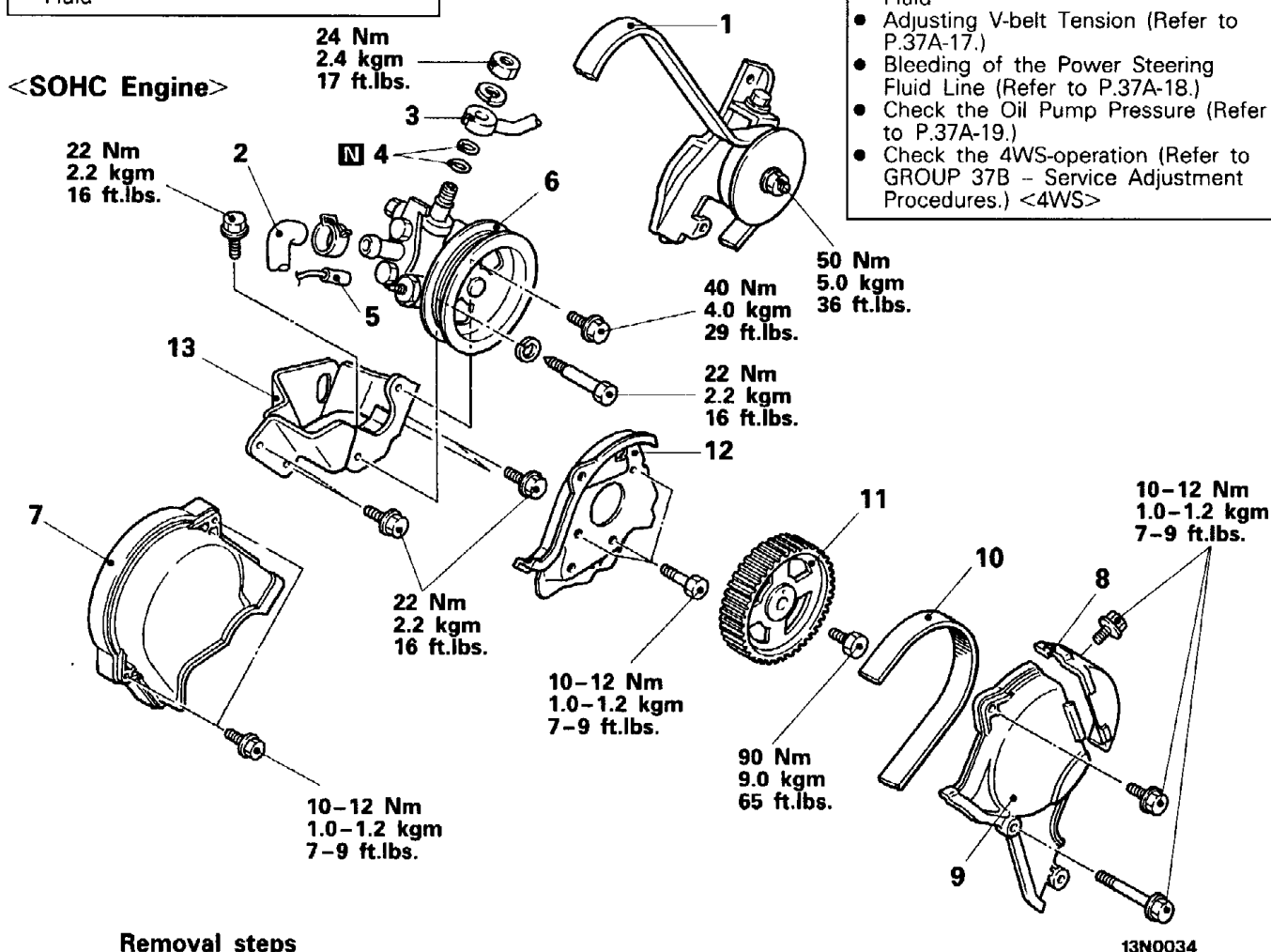
F37RA--

Pre-removal Operation

- Draining of the Power Steering Fluid

Post-installation Operation

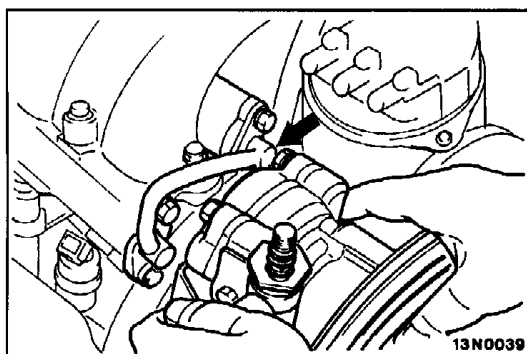
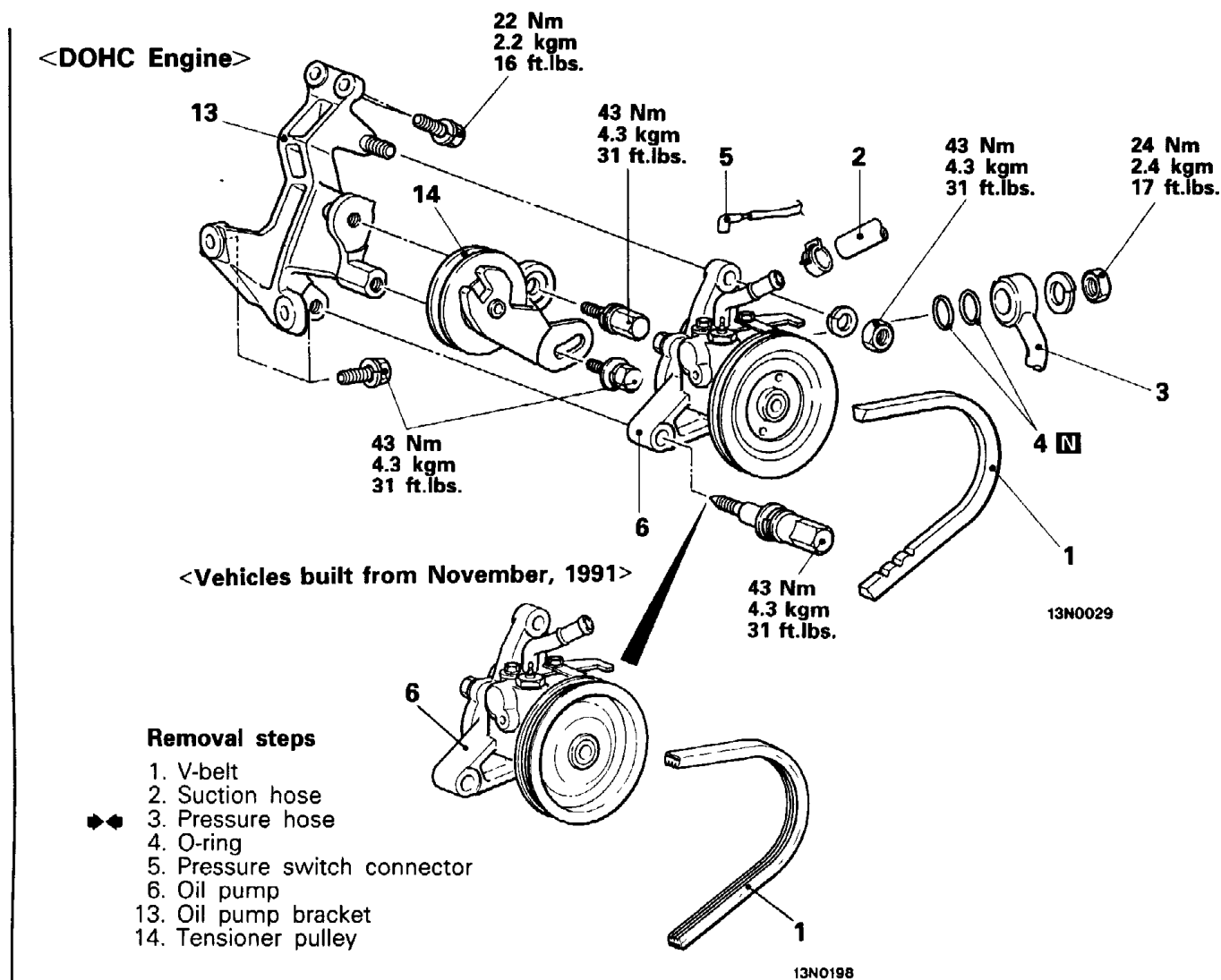
- Supplying of the Power Steering Fluid
- Adjusting V-belt Tension (Refer to P.37A-17.)
- Bleeding of the Power Steering Fluid Line (Refer to P.37A-18.)
- Check the Oil Pump Pressure (Refer to P.37A-19.)
- Check the 4WS-operation (Refer to GROUP 37B - Service Adjustment Procedures.) <4WS>



Removal steps

1. V-belt
2. Suction hose
3. Pressure hose
4. O-ring
5. Pressure switch connector
6. Oil pump
7. Front timing belt cover, right
8. Timing belt cover cap
9. Front timing belt cover, left
10. Timing belt
11. Camshaft sprocket
12. Rear timing belt cover, left
13. Oil pump bracket

(Refer to
GROUP 11 –
Timing Belt.)

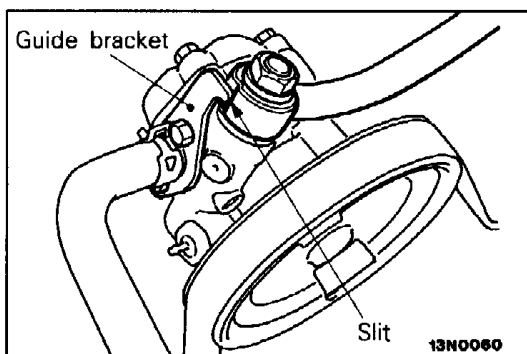


SERVICE POINTS OF REMOVAL

E37RBAH

6. REMOVAL OF OIL PUMP <SOHC Engine>

- (1) Raise the connector of the oil pressure hose upright and lift it upward.
- (2) Align the concave portion of the pump cover with the fuel pipe, as illustrated, and remove the oil pump.



SERVICE POINTS OF INSTALLATION

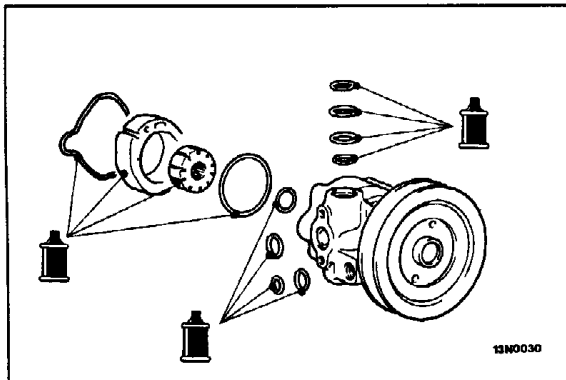
E37RDAJ

3. INSTALLATION OF PRESSURE HOSE

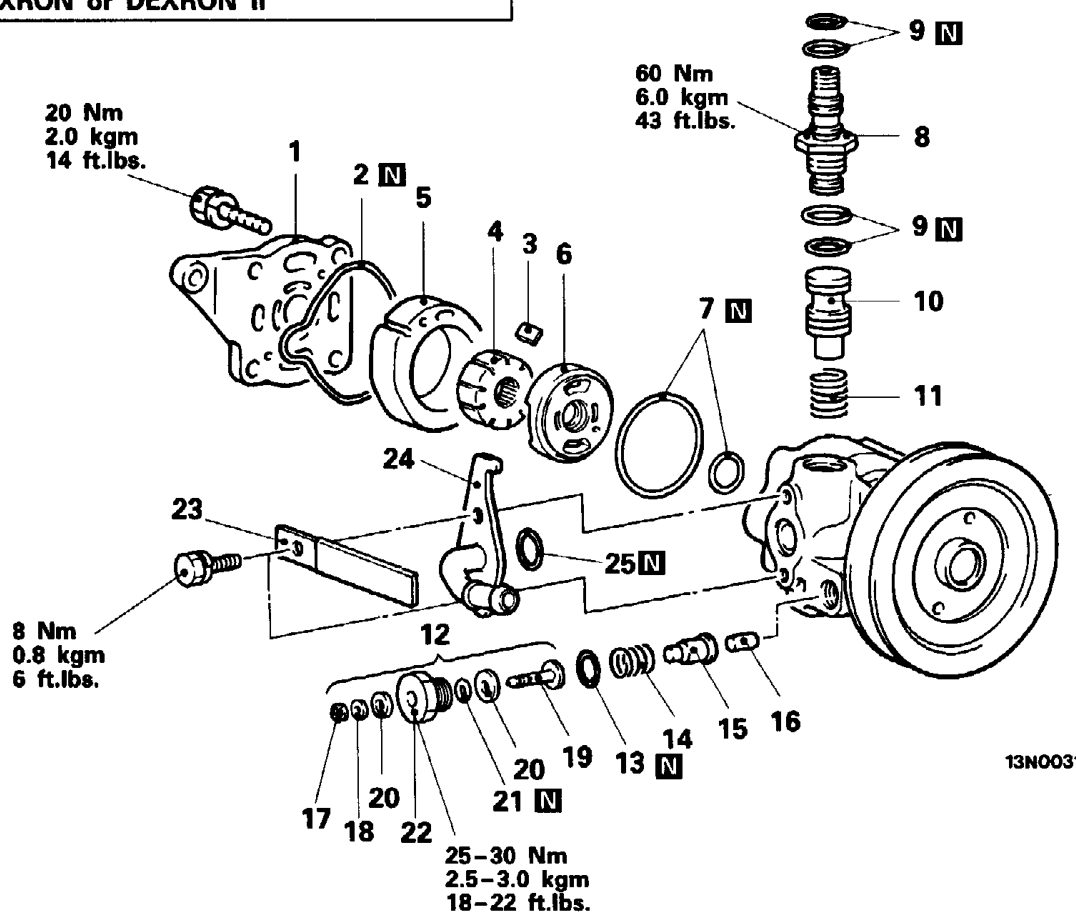
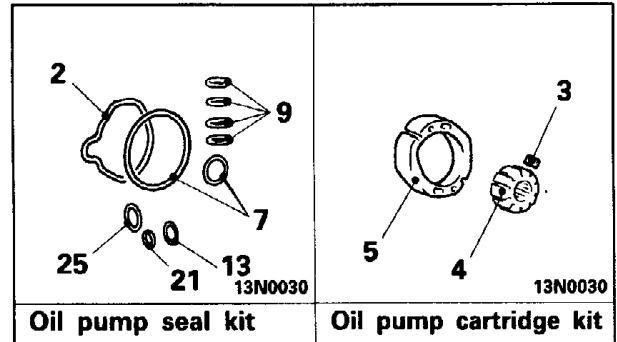
Connect the pressure hose so that its slit part contacts the oil pump's guide bracket.

DISASSEMBLY AND REASSEMBLY

E37RE--



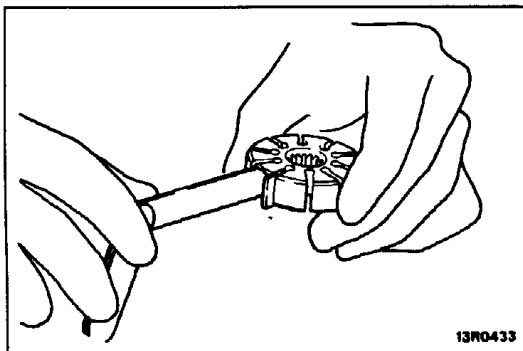
Fluid:
Automatic transmission fluid
DEXRON or DEXRON II

**Disassembly steps**

1. Pump cover
2. O-ring
3. Vanes
4. Rotor
5. Cam ring
6. Side plate
7. O-ring
8. Connector
9. O-ring
10. Flow control valve
11. Flow control spring
12. Terminal assembly
13. O-ring
14. Spring

15. Plunger
16. Piston rod
17. Snap ring
18. Terminal
19. Washer
20. Insulator
21. O-ring
22. Plug
23. Clip
24. Suction connector
25. O-ring
26. Oil pump body and Pulley assembly

Caution
Do not disassemble the flow control valve.

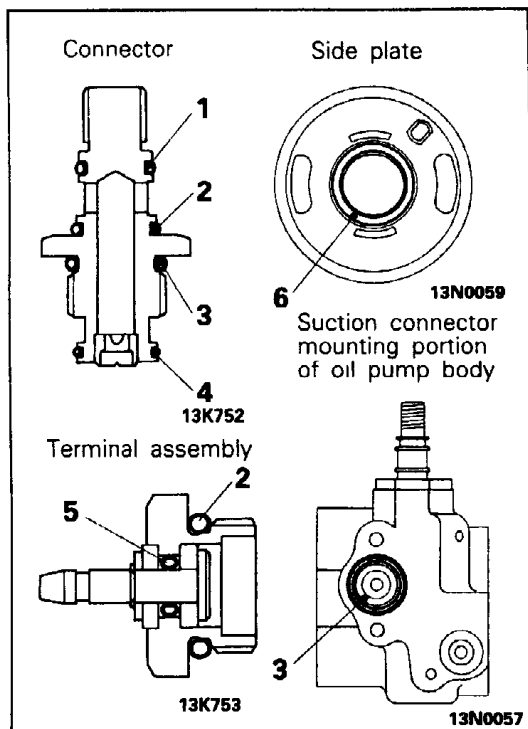
**INSPECTION**

E37RGAG

CHECK OF GAP BETWEEN VANE AND ROTOR GROOVE

Install vane to rotor groove as illustrated. Measure the gap between vane and rotor groove with thickness gauge.

Limit: 0.06 mm (0.0024 in.)

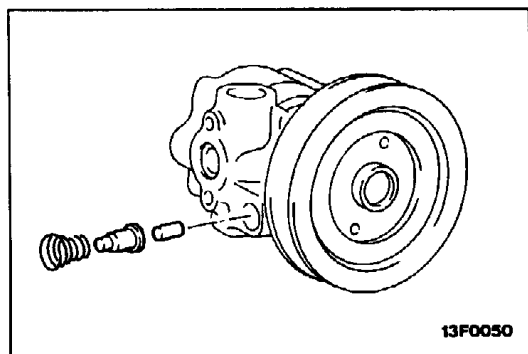
**SERVICE POINTS OF REASSEMBLY**

E37RHAK

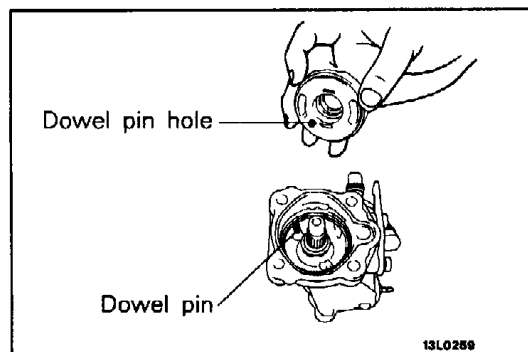
25. 21. 13. 9. 7. INSTALLATION OF O-RINGS

Apply specified fluid on O-rings to install.

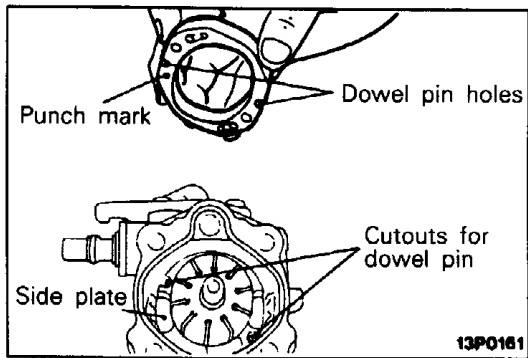
No.	I.D. × Width	mm (in.)
1	11 × 1.9	(0.433 × 0.075)
2	13 × 1.9	(0.512 × 0.075)
3	17.8 × 2.4	(0.701 × 0.094)
4	13.5 × 1.5	(0.531 × 0.059)
5	3.8 × 1.9	(0.150 × 0.075)
6	16.8 × 2.4	(0.661 × 0.094)

**14. INSTALLATION OF SPRING**

Fit the spring to the oil pump body with the larger-diameter end at the terminal assembly side.

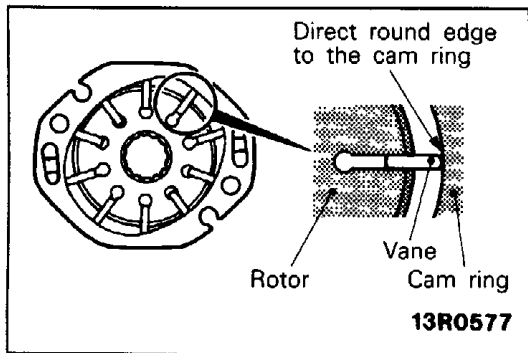
**6. INSTALLATION OF SIDE PLATE**

Line up the dowel pin hole of the side plate with the dowel pin of the pump body when installing the side plate.



5. INSTALLATION OF CAM RING

Install the cam ring with the punch mark facing the side plate.



3. INSTALLATION OF VANES

Install the vanes on the rotor, paying close attention to the installation direction.

POWER STEERING HOSES

REMOVAL AND INSTALLATION

E37TA--

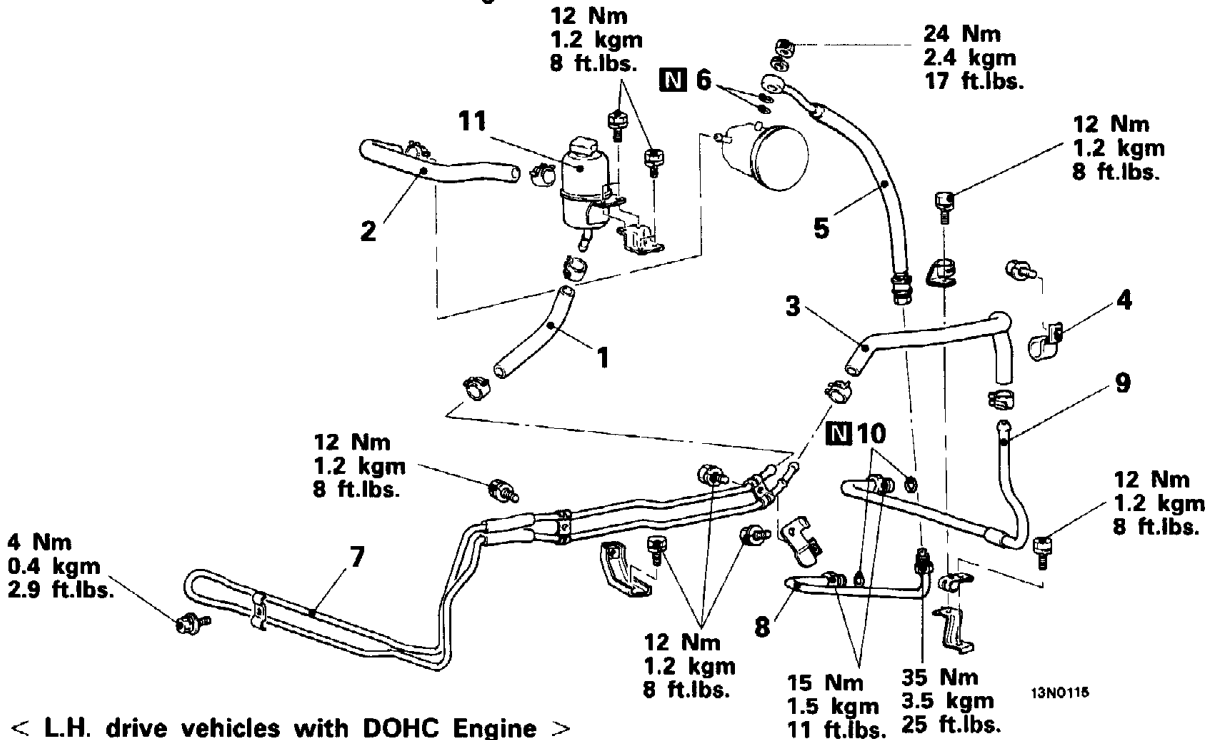
Pre-removal Operation

- Draining of the Power Steering Fluid

Post-installation Operation

- Supplying of the Power Steering Fluid
- Bleeding of the Power Steering Fluid Line (Refer to P.37A – 18.)

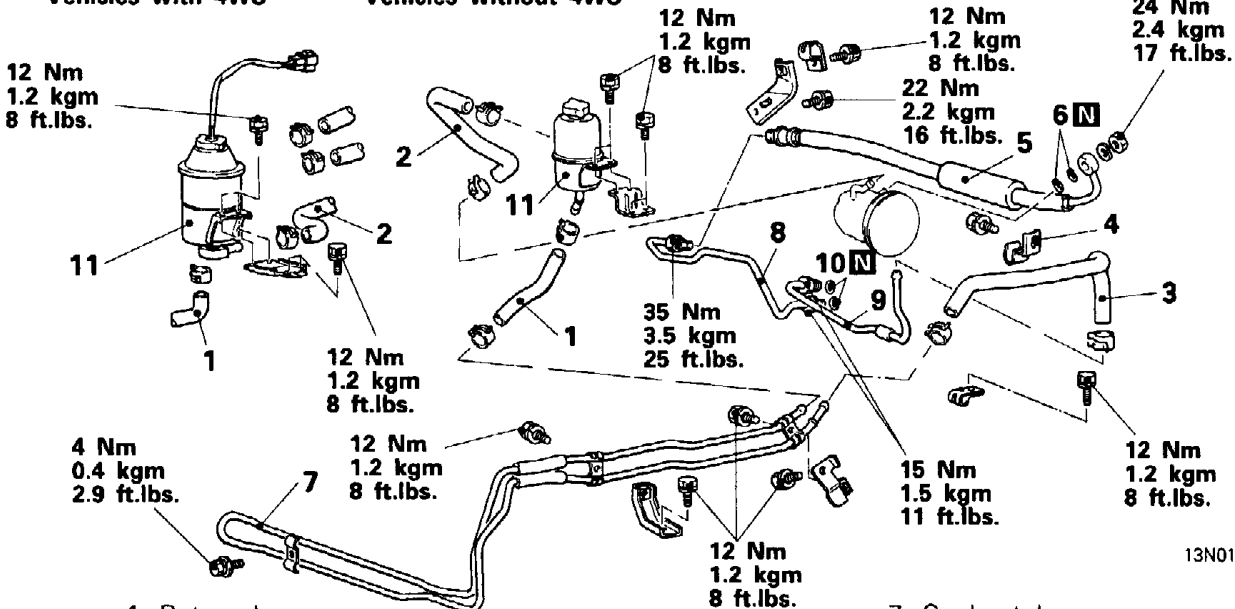
< L.H. drive vehicles with SOHC Engine >



< L.H. drive vehicles with DOHC Engine >

Vehicles with 4WS

Vehicles without 4WS



1. Return hose
2. Suction hose
3. Return hose
4. Hose clip <Vehicles without 4WS>
5. Pressure hose
6. O-ring

7. Cooler tube
8. Pressure tube
9. Return tube
10. O-ring
11. Oil reservoir

Exploded view diagram of a vehicle's fuel system, showing the fuel tank, fuel lines, fuel filter, and various fittings. The diagram is labeled with numbers 1 through 11 and includes torque specifications in Nm, kgm, and ft.lbs. for many of the components.

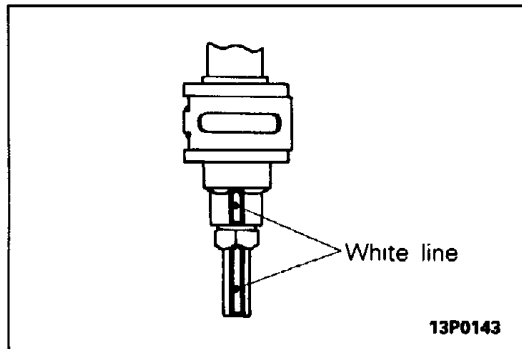
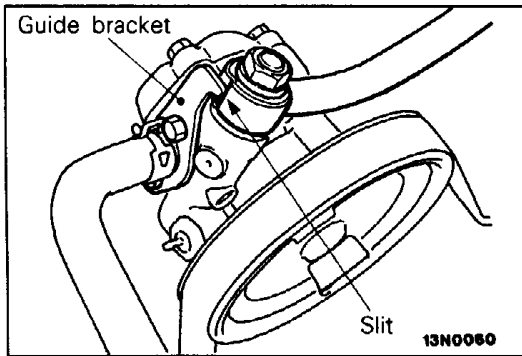
- 1: Fuel line (Torque: 4 Nm, 0.4 kgm, 2.9 ft.lbs.)
- 2: Fuel line (Torque: 12 Nm, 1.2 kgm, 8 ft.lbs.)
- 3: Fuel line (Torque: 12 Nm, 1.2 kgm, 8 ft.lbs.)
- 4: Fuel line (Torque: 12 Nm, 1.2 kgm, 8 ft.lbs.)
- 5: Fuel line (Torque: 24 Nm, 2.4 kgm, 8 ft.lbs.)
- 6: Fuel filter (Torque: 15 Nm, 1.5 kgm, 11 ft.lbs.)
- 7: Fuel line (Torque: 12 Nm, 1.2 kgm, 8 ft.lbs.)
- 8: Fuel line (Torque: 35 Nm, 3.5 kgm, 25 ft.lbs.)
- 9: Fuel line (Torque: 12 Nm, 1.2 kgm, 8 ft.lbs.)
- 10: Fuel line (Torque: 12 Nm, 1.2 kgm, 8 ft.lbs.)
- 11: Fuel line (Torque: 12 Nm, 1.2 kgm, 8 ft.lbs.)

13N00

[illegible]

- 1. Return hose
- 2. Suction hose
- 3. Return hose
- 4. Hose clip <Vehicles without 4WS>
- 5. Pressure hose
- 6. O-ring

7. Cooler tube
8. Pressure tube
9. Return tube
10. O-ring
11. Oil reservoir

**SERVICE POINT OF INSTALLATION**

E37TDAF

5. INSTALLATION OF PRESSURE HOSE

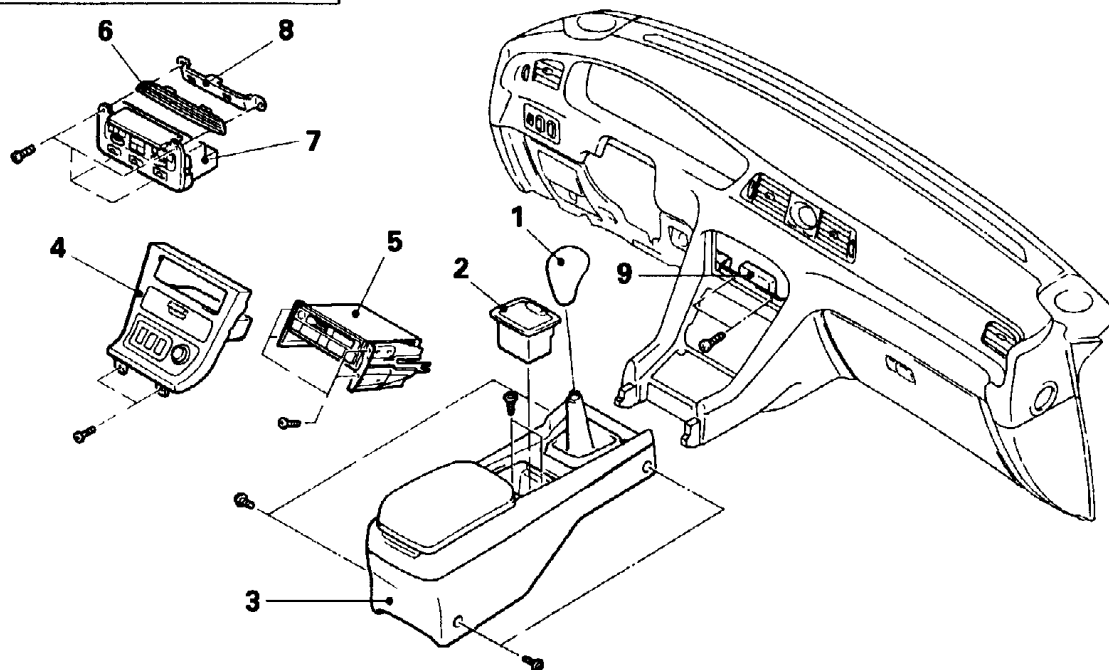
- (1) Connect the pressure hose so that its slit part contacts the oil pump's guide bracket.
- (2) When the pressure hose is installed, align the white line on the pressure hose with the white line on the pressure tube so that together they form a straight line.

E.P.S. CONTROL UNIT REMOVAL AND INSTALLATION

E37XA--

CAUTION: SRS

When removing and installing the floor console assembly from vehicles equipped with SRS, do not let it bump against the SRS diagnostic unit or other components.



13N0151

Removal steps

1. Shift lever knob <M/T>
2. Ashtray
3. Floor console assembly
4. Audio panel
5. Radio and tape player
6. Heater control garnish
7. Heater control panel assembly
8. Heater control garnish bracket
9. E.P.S. control unit

INSPECTION

E37XCAC

To check the control unit, refer to troubleshooting for measurement of the voltage of each terminal and the current in the solenoid.

4-WHEEL STEERING SYSTEM (4WS)

CONTENTS

E37AA-1

SPECIFICATIONS	2	POWER CYLINDER	7
General Specifications	2	CONTROL VALVE	10
Service Specifications	2	REAR OIL LINE	11
SPECIAL TOOLS	3	REAR OIL PUMP	12
TROUBLESHOOTING	4		
SERVICE ADJUSTMENT PROCEDURES	5		
Bleeding	5		
Function Check	6		
Rear Oil Pump Discharge Flow Volume Check	6		
Ball Joint Rotation Starting Torque Check	6		

SPECIFICATIONS

GENERAL SPECIFICATIONS

E37CA-1

Items	Specifications
Power steering gear box	
Type	Rack and pinion
Oil pump	
Type	Vane type
Displacement	cm ³ /rev. (cu.in./rev.) 9.6 (0.59)
Relief set pressure	MPa (kg/cm ² , psi) 8 (80, 1,138)
Rear oil pump	
Type	Vane type
Displacement	cm ³ /rev. (cu.in./rev.) 3.3 (0.20)
Relief set pressure	MPa (kg/cm ² , psi) 4 (40, 569)
Power cylinder	
Type	Hydraulic double action type
Stroke	mm (in.) 10 (0.39) [one side 0.5 (0.20)]

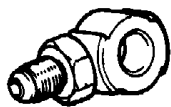
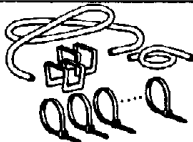
SERVICE SPECIFICATIONS

E37CB-1

Items	Specifications
Standard value	
Rear oil pump displacement [at speedometer reading of 50 km/h (31 mph) for 30 seconds]	Approx. 1.0 (1.06, 0.88)
lit. (U.S.qts., Imp.qts.)	
Power cylinder ball joint rotation starting torque	0.5 (5, 4) or less
Nm (kgcm, in.lbs.)	
Power cylinder tie rod swing torque	9–55 (0.9–5.5, 2–12)
N (kg, lbs.) [Nm (kgcm, in.lbs.)]	[0.5–3.0 (5–30, 4–26)]

SPECIAL TOOLS

E37DA-1

Tool	Number	Name	Use
	MB990993	Power steering oil pressure gauge adaptor	Measurement of fluid flow volume
	MB991230	Air bleeder set	Air bleed
	MB990685 MB991151	Torque wrench	Measurement of the ball joint starting torque
	MB990326	Preload socket	Measurement of the power cylinder ball joint rotation-starting torque

TROUBLESHOOTING

E37EAAK

Before inspecting, check the following items:

- Ensure that the suspension has not been modified
- Tyre and wheel size, specifications, air pressure, balance and amount of wear
- Steering wheel type
- Wheel alignment
- Oil pump drive belt tension
- Power steering fluid level, and air in the system
- Engine idle speed and even idle
- Oil leakage

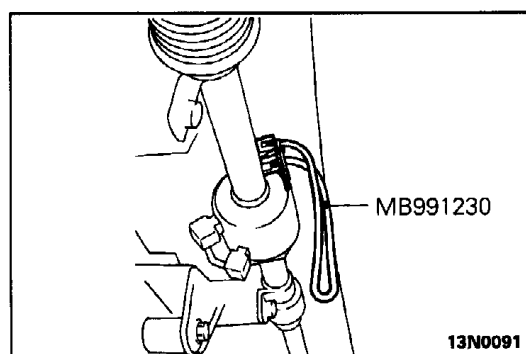
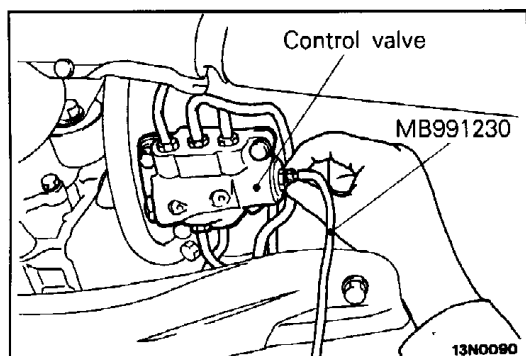
Malfunction symptom	Malfunctioning system	Inspection item
4WS does not operate	Power cylinder	Tie rod swing torque
		Power cylinder slide resistance
	Rear oil pump	Flow volume check
	Control valve	–
Poor steering feeling Feeling of friction in steering Poor steering return	Steering gears and linkage	Rack cracks or deformation
Steering wheel efforts excessive	Control valve	Oil leakage from control valve joint
	Power cylinder	Oil leakage from piston rod
	Oil line	Pressure hose breakage
	Oil reservoir	Oil reservoir deformation or oil leakage
Rear wheels cannot be steered Poor rear wheels return Hydraulic pressure for rear wheel is constantly high	Control valve	Stuck control valve spool
	Power cylinder	Stuck power cylinder
	Rear oil pump	Relief valve remains open
Long rear wheel steering delay Poor steering response Poor steering return	Power cylinder	Excessive power cylinder friction
		Looseness in power cylinder tie rod ball joint
		Ball joint dust cover cracks
Poor rear wheel steering response Poor rear wheel steering range	Control valve	Oil leakage from control valve spool
	Power cylinder	Oil leakage from power cylinder
	Rear oil pump	Extreme oil pump internal wear
Poor steerability (extreme tyre wear)	Power cylinder	Tie rod length improperly adjusted after toe-in adjustment

SERVICE ADJUSTMENT PROCEDURES

BLEEDING

37FKA-Ja

- (1) Bleed air from power steering system (Refer to GROUP 37A – Service Adjustment Procedures.)
- (2) Lift up the vehicle.
- (3) Start the engine and let it idle.



- (4) Loosen the bleeder screw on the front of the control valve and set the special tool to the bleeder screw.
- (5) Turn the steering wheel all the way to the left, immediately returning it half way back.
At this time confirm that air is discharged with the fluid.
- (6) Repeat step (5) two or three times, then check to ensure that all air has been bled from the system.
Tighten the bleeder screw and remove the special tool.
- (7) Repeat steps (4) through (6) for the rear bleeder screw, turning the steering wheel to the right this time.

- (8) Loosen the power cylinder bleeder screw and set the special tool to the bleeder screw.

Caution

Loosen the bleeder screw about 30 to 45 degrees, and secure it with the special tool (rotation prevention metal fixtures) so as not to be loosened more.

- (9) Start the engine, hold the front wheels in the straight-forward position, and increase the engine speed so that the speedometer reading is 70–80km/h (43–50mph) to make the rear wheel oil pump operate.

Caution

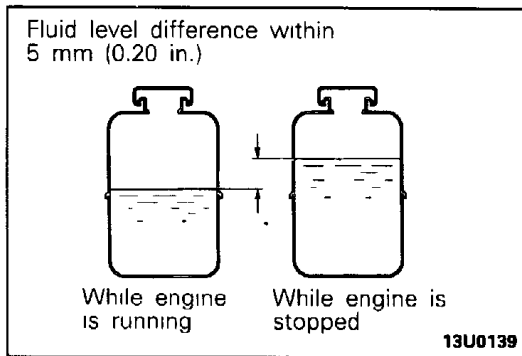
When replenishing the fluid, take special care as all four wheels will be rotating.

NOTE

If the engine speed is increased, the fluid in the oil pump for the rear wheels will be recirculated, but the oil inside the tube (special tool) will not be recirculated.

- (10) Maintain an indicated speed of about 30–40 km/h (19–25 mph), turning the steering wheel all the way to both left and right.
When the wheel is steered all the way in either direction, pressure will rise and air will circulate inside the tube (special tool). Check to ensure that this air is discharged into the oil reservoir.
- (11) Repeat step (10) several times until that all air in the system has been bled.
Tighten the bleeder screw and remove the special tool.

37B-6 4-WHEEL STEERING SYSTEM (4WS) – Service Adjustment Procedures



- (12) Ensure that the difference in the fluid levels when the engine is running and when it is stopped are within 5 mm (0.20 in.).

If the difference exceeds 5 mm (0.20 in.), there is still air in the system and it must be bled again.

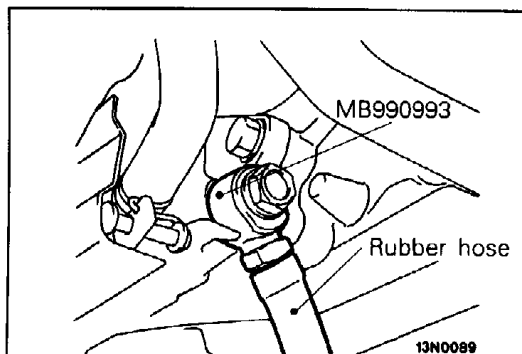
Caution

If air has not been completely bled from the system, the pump will make a humming sound or an unusual noise will come from the flow control valve; this also contributes to shortened pump life.

FUNCTION CHECK

E37FRAA

- (1) Raise the vehicle so that all four wheels may turn freely.
- (2) Start the engine, running the vehicle at an indicated speed of about 40 km/h (25 mph).
- (3) Turn the steering wheel all the way to left and right and turn it swiftly, checking to ensure that the rear wheels steer to the same directions as the front wheels.



REAR OIL PUMP DISCHARGE FLOW VOLUME CHECK

E37FSA-B

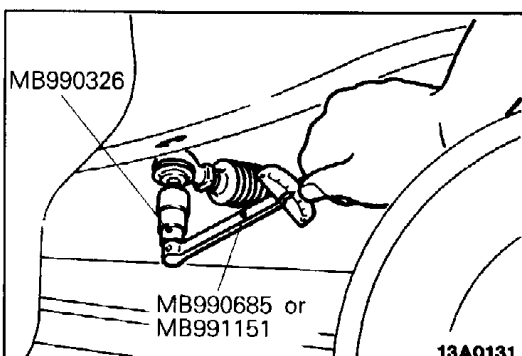
- (1) Lift up the vehicle
- (2) Set the special tool onto the rear oil pump.
- (3) Connect a rubber hose about 1.5 m (4.9 ft.) in length to the special tool, then place the other end into a container by which flow volume may be measured [a graduated cylinder of about 2 liters (2.1 U.S.qts., 1.8 Imp.qts.) capacity].
- (4) Start the engine. Increase speed slowly, then hold the indicated speed of 50 km/h (31 mph), measuring discharge flow volume for 30 seconds.

Caution

While performing this work, continuously add fluid into the oil reservoir.

Standard value: Approximately 1.0 lit. (1.06 U.S.qts., 0.88 Imp.qts.)

- (5) If the discharge flow volume is extremely high or low, the rear oil pump should be replaced.



BALL JOINT ROTATION STARTING TORQUE CHECK

E37FTA-B

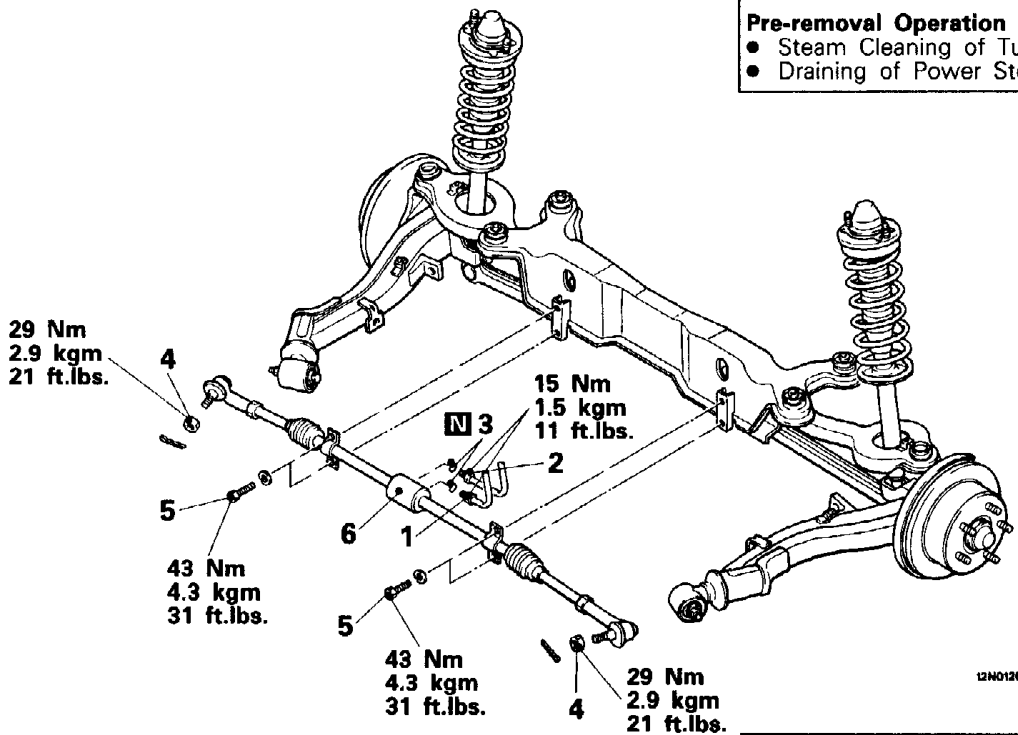
After swinging the ball joint stud several times, install the stud nut, then measure the ball joint rotation starting torque with the special tool.

Standard value: 0.5 Nm (5 kgcm, 4 in.lbs.) or less

POWER CYLINDER

REMOVAL AND INSTALLATION

E37KA---

**Pre-removal Operation**

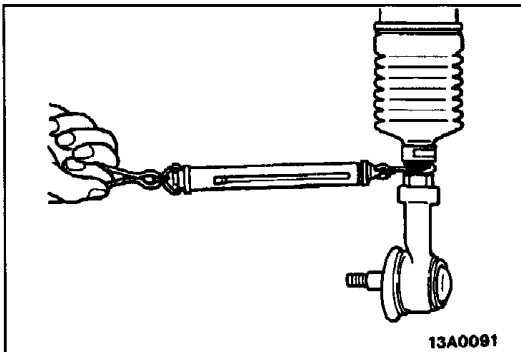
- Steam Cleaning of Tubing
- Draining of Power Steering Fluid

Removal steps

1. Pressure pipe RR
2. Pressure pipe RL
3. O-ring
4. Tie-rod end nuts
5. Bolts
6. Power cylinder

Post-installation Operation

- Supply of Power Steering Fluid
- Bleeding of Power Steering Fluid Line (Refer to P. 37B-5.)
- 4WS Function Check
- Wheel Alignment Inspection and Adjustment (Refer to GROUP 34 – Service Adjustment Procedures.)



INSPECTION

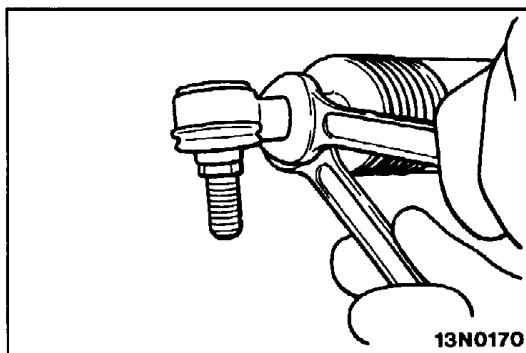
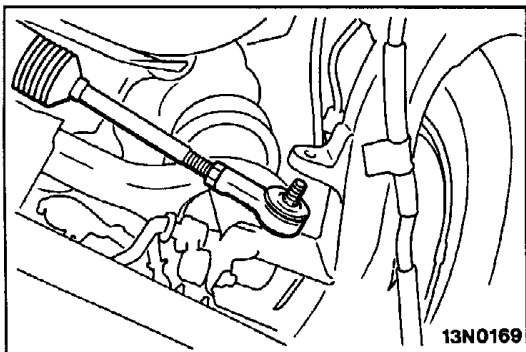
E37KCAA

TIR ROD SWING TORQUE INSPECTION

- (1) Swing the tie rod ten times, hard.
- (2) Point the tie rod end down, then attach a spring balance as shown in the illustration to measure swing resistance (swing torque).

Standard value: 9–55 N (0.9–5.5 kg, 2–12 lbs.)
[0.5–3 Nm (5–30 kgcm, 4–26 in.lbs.)]

- (3) If the swing resistance exceeds the standard value, replace the tie rod.
- (4) If the swing resistance is less than the standard value, the ball joint may be reused as long as it is not loose and operates smoothly.



SERVICE POINTS OF INSTALLATION

4. INSTALLATION OF TIE-ROD END NUTS

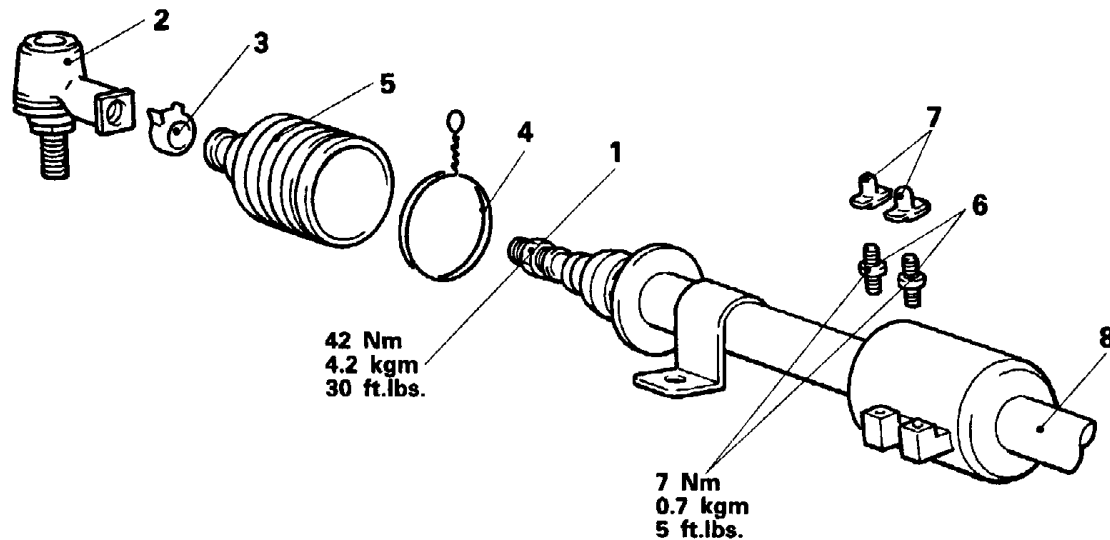
- (1) Secure the power cylinder to the crossmember.
- (2) Move the power cylinder piston rod over its full stroke to determine its neutral position.
- (3) Align tie rod ends and the installation holes at trailing arm.
- (4) When the tie rod ends and the installation holes at the trailing arm do not meet, loosen the tie rod end securing nut, then adjust the length. The dust cover fastener clip should be removed for this.
- (5) The difference between the lengths of the left and right tie rods should be less than 1 mm (0.039 in.).

NOTE

The threads of the tie rod ends may be used as a guide for this.

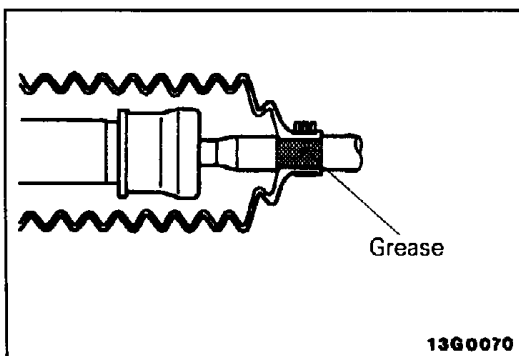
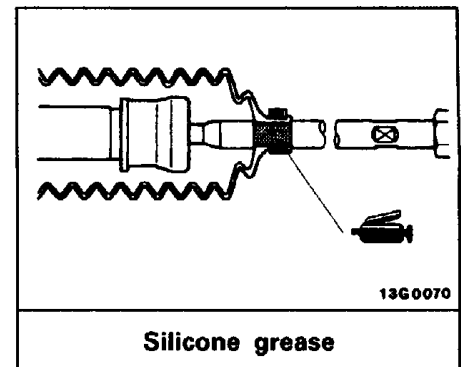
DISASSEMBLY AND REASSEMBLY

E37KE---

**Disassembly steps**

- 1. Nut
- ◆◆ 2. Tie rod end assembly
- 3. Clip
- 4. Wire
- ◆◆ 5. Dust cover
- 6. Bleeder caps
- 7. Bleeder screws
- 8. Cylinder assembly

13N0100

**SERVICE POINTS OF REASSEMBLY**

E37KHAA

5. INSTALLATION OF DUST COVER

Apply the specified grease to the place indicated in the illustration, then install the dust cover to the cylinder assembly.

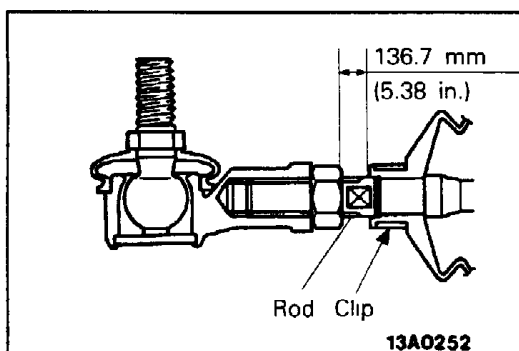
Specified grease: Silicone grease

2. INSTALLATION OF TIE ROD END ASSEMBLY

Temporarily attach the tie rod end assembly to the cylinder assembly at the place of dimension as illustrated.

NOTE

To adjust the assembly dimensions of the tie rod end assembly, remove the dust cover clip and rotate the rod.



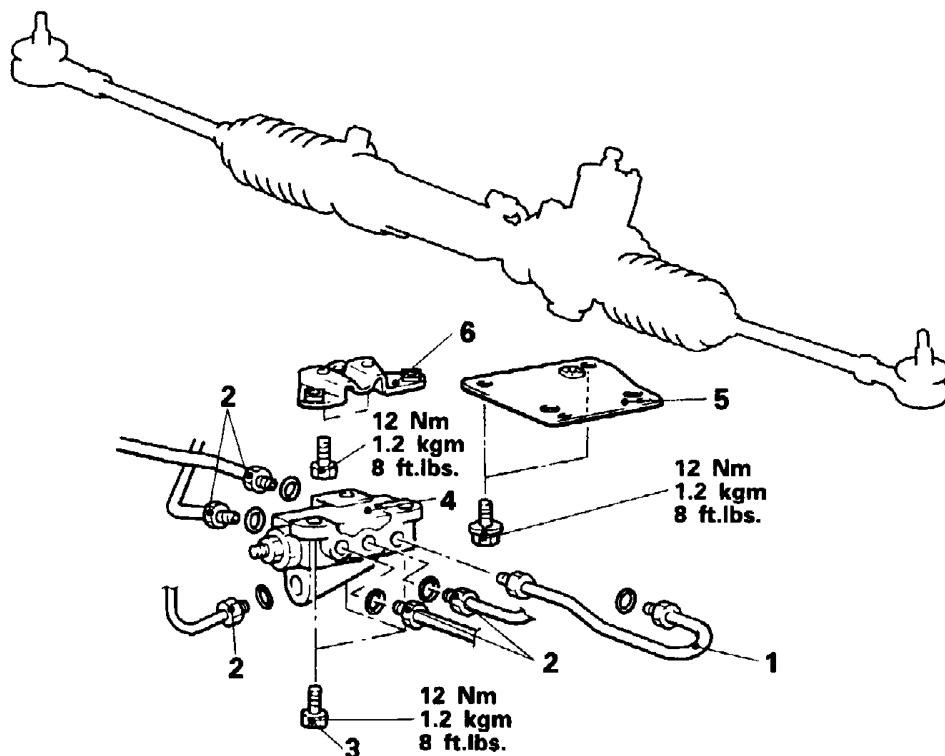
CONTROL VALVE

37MA—

REMOVAL AND INSTALLATION

Pre-removal Operation

- Removal of Left Member
(Refer to GROUP 32 – Crossmember.)



Fluid line flared nut
15 Nm
1.5 kgm
11 ft.lbs.



13N0171

Post-installation operation

- Installation of Left Member
(Refer to GROUP 32 – Crossmember.)
- Supplying of Power Steering Fluid
- Bleeding of Power Steering Fluid Line (Refer to P.37B-5.)
- 4WS Function Check

Removal steps

1. Pressure pipe (front, left)
2. Connection for feed pipe and control valve
- ◆◆ 3. Bolts
4. Control valve
5. Control valve bracket
<L.H. drive vehicles>
6. Control valve brake bracket
<R.H. drive vehicles>

SERVICE POINTS OF INSTALLATION

E37HDA-B

3. INSTALLATION OF BOLTS

Provisionally tighten the bolt, and after installing the pressure pipe (left, front), tighten the bolt securely.

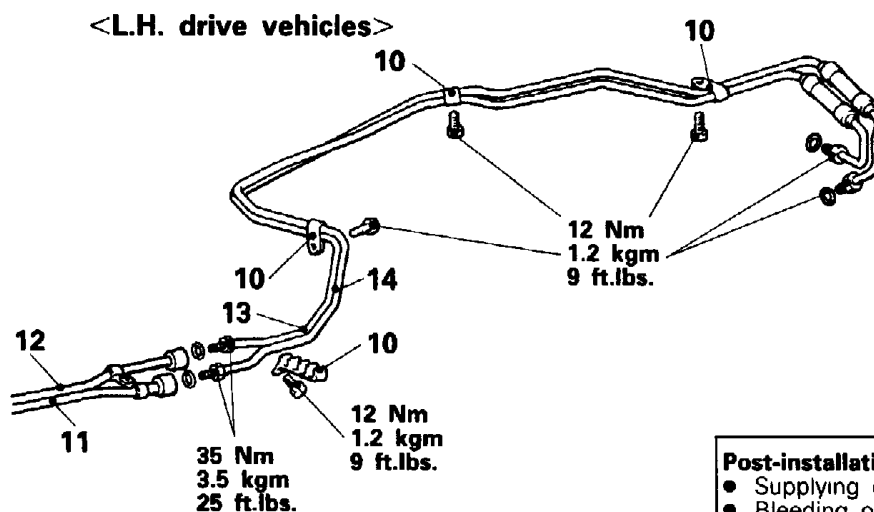
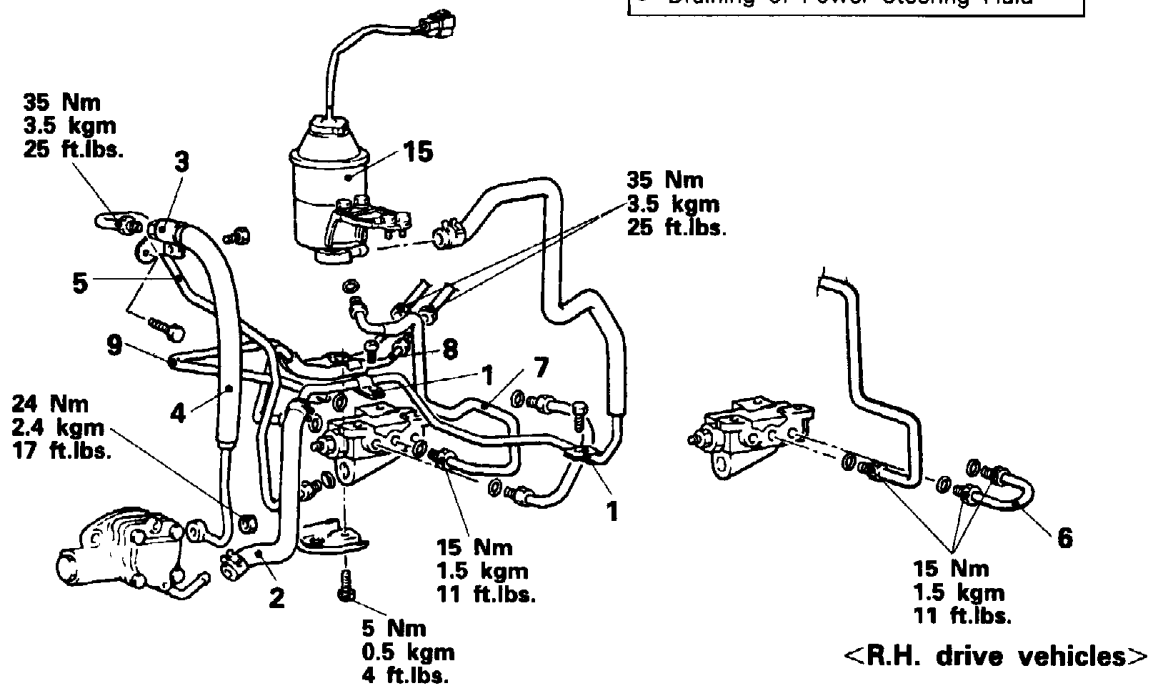
REAR OIL LINE

E370A—

REMOVAL AND INSTALLATION

Pre-removal Operation

- Steam Cleaning of Piping
- Draining of Power Steering Fluid



13N0172

Post-installation Operation

- Supplying of Power Steering Fluid
- Bleeding of Power Steering Fluid Line (Refer to P. 37B-5.)
- 4WS Function Check

Removal steps

1. Hose clamp
2. Suction hose
3. Hose clamp
4. Pressure hose
5. Pressure pipe
6. Return pipe (Front, Left)
7. Return pipe
8. Pressure pipe (Rear, Left)
9. Pressure pipe (Rear, Right)

10. Pipe clamp
11. Pressure pipe A
12. Pressure pipe B
13. Pressure pipe D
14. Pressure pipe E
15. Reserve tank

INSPECTION

E370CAA

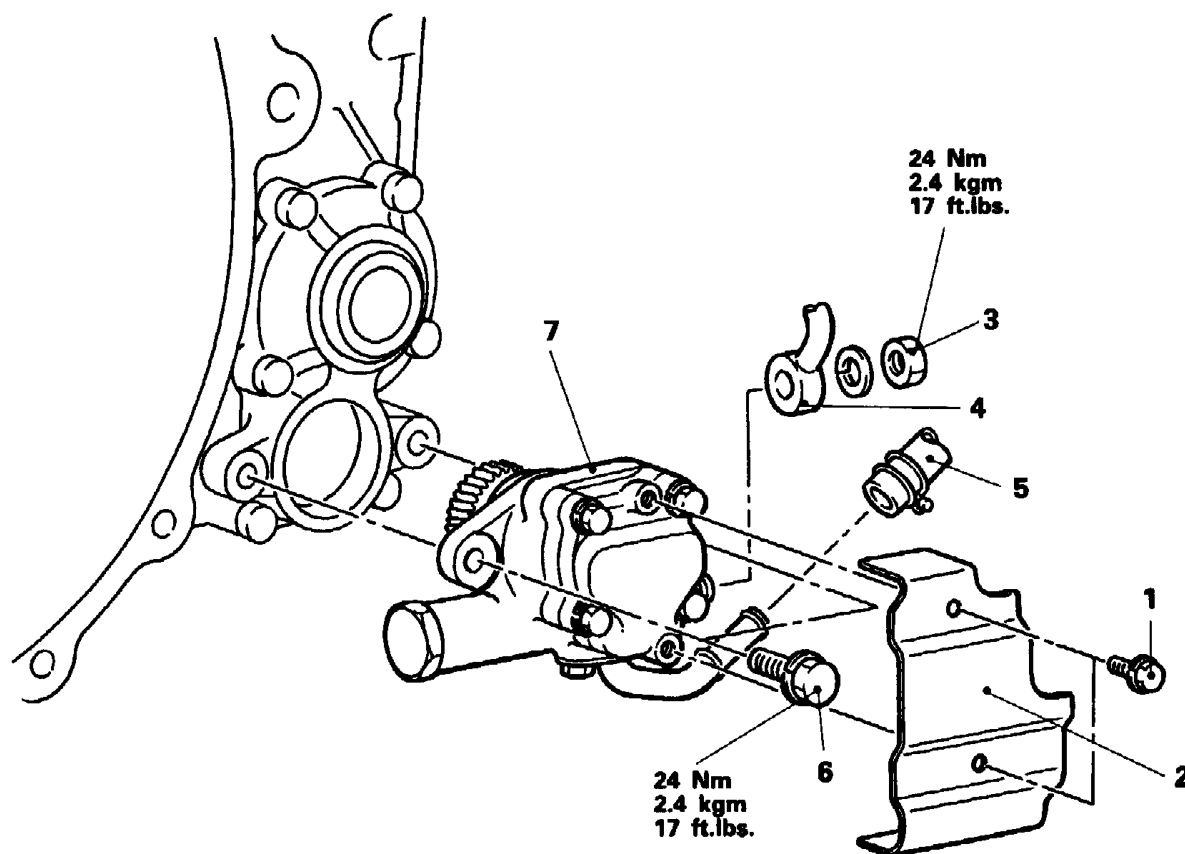
- Check pipes for cracking, damage or corrosion.
- Check hoses for cracking, damage, leakage or fluid seepage.
- Check flare nuts for damage.

REAR OIL PUMP

E37RA—

REMOVAL AND INSTALLATION**Pre-removal Operation**

- Draining of Power Steering Fluid

**Removal steps**

1. Bolts
2. Heat protector
3. Nut
4. Pressure hose
5. Suction hose
6. Bolts
7. Rear oil pump

13N0092

Post-installation Operation

- Supply of Power Steering Fluid
- Bleeding of Power Steering Fluid Line (Refer to P. 37B-5.)
- 4WS Function Check

BODY

CONTENTS

E42AA--

SPECIFICATIONS	2	SERVICE ADJUSTMENT PROCEDURES	10
General Specifications	2	Hood Alignment Adjustment	10
Service Specifications	3	Trunk Lid Adjustment	10
Sealant and Adhesive	3	Fuel Filler Door Adjustment	11
SPECIAL TOOLS	4	Door Fit Adjustment	11
TROUBLESHOOTING <SUNROOF>	5	Door Glass Adjustment	11
		Water Test	12
		Sunroof Fit Adjustment	12

CONTINUED ON NEXT PAGE

WARNINGS REGARDING SERVICING OF SUPPLEMENTAL RESTRAINT SYSTEM (SRS) EQUIPPED VEHICLES

WARNING!

- (1) Improper service or maintenance of any component of the SRS, or any SRS-related component, can lead to personal injury or death to service personnel (from inadvertent firing of the air bag) or to the driver and passenger (from rendering the SRS inoperative).
- (2) Service or maintenance of any SRS component or SRS-related component must be performed only at an authorized MITSUBISHI dealer.
- (3) MITSUBISHI dealer personnel must thoroughly review this manual, and especially its GROUP 52B—Supplemental Restraint System (SRS), before beginning any service or maintenance of any component of the SRS or any SRS-related component.

NOTE

The SRS includes the following components: impact sensors, SRS diagnosis unit, SRS warning lamp, air bag module, clock spring, and interconnecting wiring. Other SRS-related components (that may have to be removed/installed in connection with SRS service or maintenance) are indicated in the table of contents by an asterisk (*).

HOOD	14	DOOR ASSEMBLY	30
TRUNK LID	15	DOOR TRIM AND WATERPROOF FILM	33
FUEL TANK FILLER DOOR	18	DOOR GLASS AND REGULATOR	34
FENDER*	19	DOOR HANDLE AND LATCH	37
WINDSHIELD GLASS	20	DOOR RUNCHANNEL	46
QUARTER WINDOW GLASS	27	DOOR MOULDING AND DRIP LINE WEATHERSTRIP	47
REAR WINDOW GLASS	28	SUNROOF	48

SPECIFICATIONS

GENERAL SPECIFICATIONS

E42CA--

Items	Specifications	
Hood Type	Rear hinged (gas spring type), front opening type	
Front door Construction Regulator system Locking system	Front-hinged, sash construction Wire type Pin-fork type	
Rear door Construction Regulator system Locking system	Front-hinged, sash construction Wire type Pin-fork type	
Trunk lid Hinge	Single-arm type (Torsion bar type)	
Glass installation method Windshield glass Quarter window glass Rear window glass	Adhesive type Adhesive type Adhesive type	
Glass thickness Windshield glass Rear window glass Front door glass Rear door glass Quarter window glass Sunroof glass	mm (in.)	5.3 (0.21) 4.0 (0.16) 3.5 (0.14) 3.5 (0.14) 3.5 (0.14) 5.0 (0.20)
Sunroof motor Type Speed at no load Speed at load At 1 Nm (0.1 kgm, 0.72 ft.lbs.) Bound current Turning direction	r/min r/min A	DC ferrite (with built-in circuit breaker) 140 or more 120–160 35 or less Both clockwise and anti-clockwise
Power window motor Type Revolutions under no load Revolutions under load At 1 Nm (0.1 kgm, 0.72 ft.lbs.) At 2 Nm (0.2 kgm, 1.45 ft.lbs.) Bound current Direction of rotation	r/min r/min A	Permanent magnet type (built-in circuit breaker) 80 (75*) or more 65–95 50–80 34 or less Clockwise and anti-clockwise

NOTE

*: Rear door power window motor (LH)

Items	Specifications
Power window relay	
Maximum contact current	A 22
Rated coil current	A 0.135–0.215
Voltage drop between terminals (At 12V and the rated load current)	V 0.2 or less
Front door lock actuator	
Bound current (at 12V)	A 2.5–4.5
Operating voltage range	V 9–15
*Tripping time (at 12V)	Second 5–30
Rear door lock actuator	
Bound current (at 12V)	A 2.5–4.5
Operating voltage range	V 9–15
*Tripping time (at 12V)	Second 5–30

NOTE

*Tripping time is the time consumed until current reaches 0.5 A after power connection.

SERVICE SPECIFICATIONS

E42CB--

Items	Standard Value
Sunroof sliding resistance	N (kg, lbs.) 120 (12, 26)
Slipping force of sunroof motor clutch	N (kg, lbs.) 40–50 (4.0–5.0, 8.8–11)

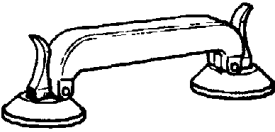
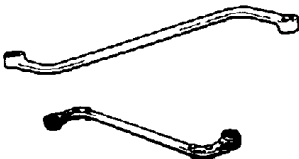
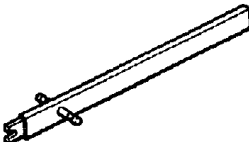
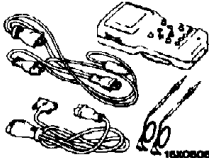
SEALANT AND ADHESIVE

E42CE--

Items	Specified sealant and adhesive	Remarks
Trunk lid weatherstrip	3M ATD Part No. 8001, 8011 or equivalent	Drying adhesive
Fender to body panel Fender to front fender insulator Front fender insulator to body Splash shield to fender Waterproof film	3M ATD Part No. 8625 or equivalent	Ribbon sealer
Windshield glass Rear window glass	3M Super Fast Urethan Auto Glass sealant Part No. 8609 or equivalent	–
	3M Super Fast Urethan Primer Part No. 8608 or equivalent	–
Quarter window glass	3M ATD Part No. 8513 or equivalent	Drying sealant
	3M ATD Part No. 8509 or equivalent	Non-drying sealant

SPECIAL TOOLS

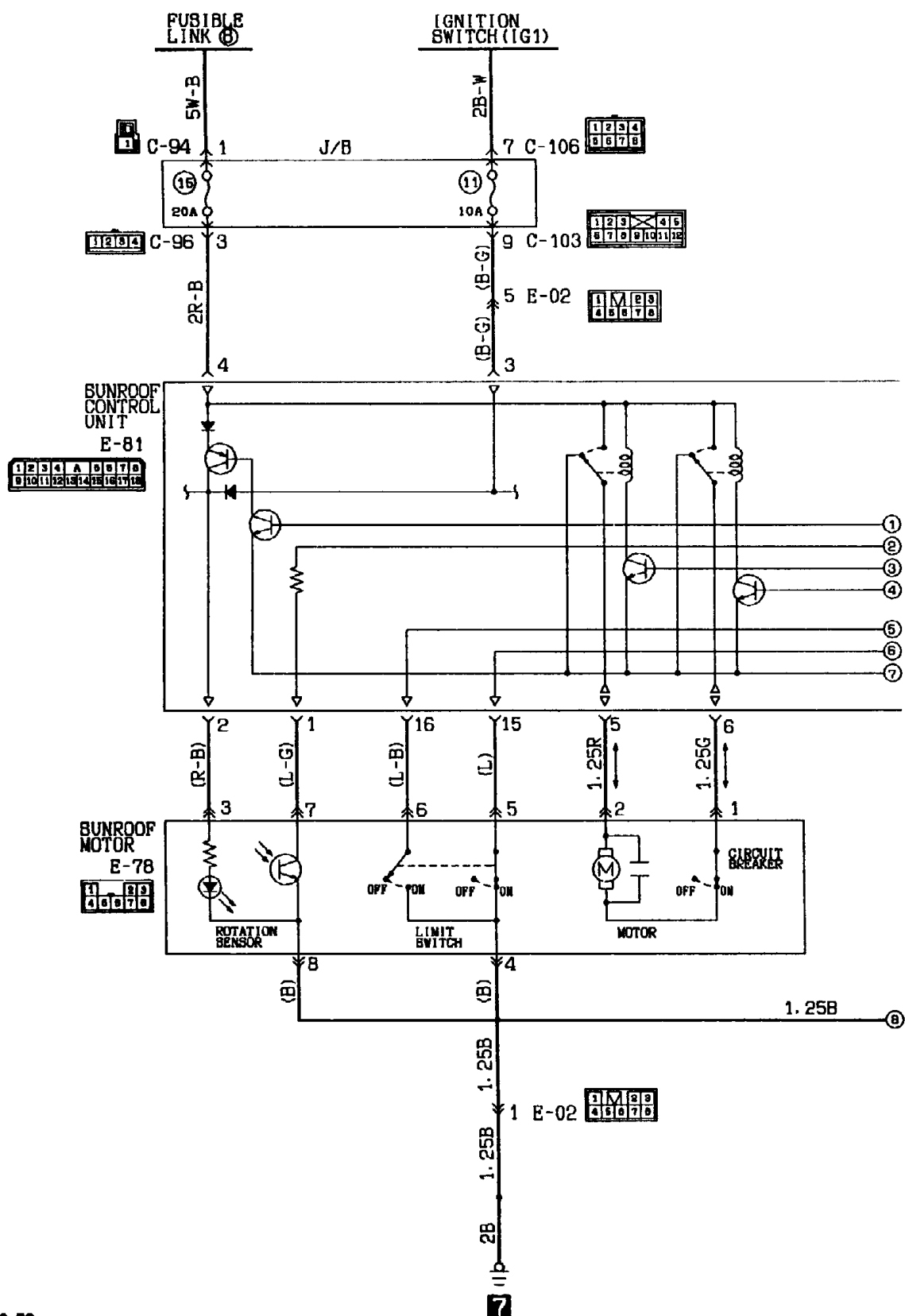
E42DA--

Tool	Number	Name	Use
	MB990480	Glass holder	Removal and installation of windshield
	MB990449	Window moulding remover	Removal of the window moulding
	MB990900 or MB991164	Door adjusting wrench	Adjustment of door fit
	MB991244	Torsion bar remover and installer	Removal and installation of trunk lid torsion bar
	MB991341	Multi-use tester sub-assembly	Up to 1993 models ETACS input check
 ROM Pack (For the number, refer to GROUP 00 - Precautions Before Service.)			
	MB991502	MUT-II	All models ETACS input check
 16X0607 ROM pack			
	MB990784	Ornament remover	Removal of the window moulding and interior parts

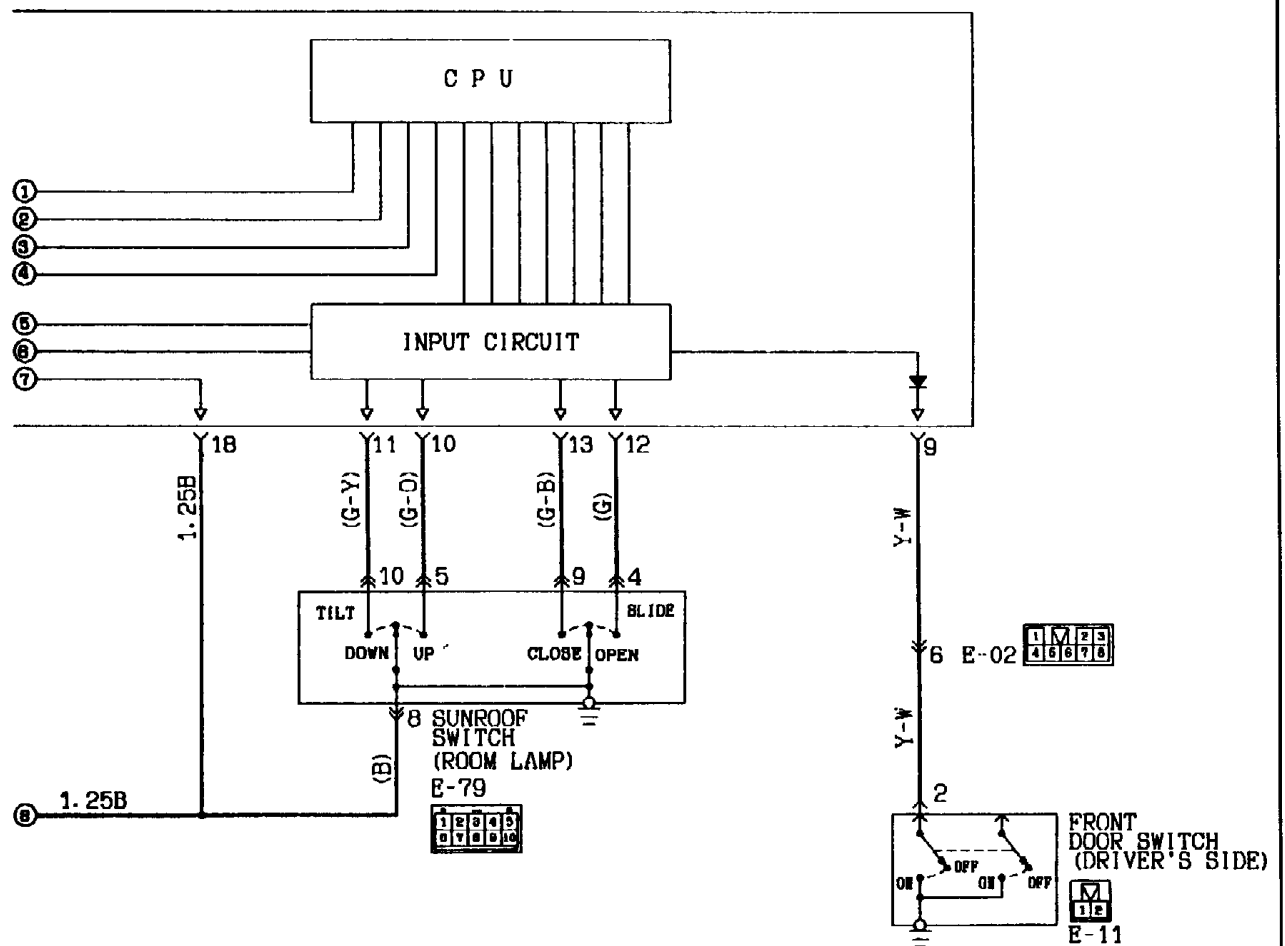
TROUBLESHOOTING <SUNROOF>

E42EE-

SUNROOF CIRCUIT DIAGRAM



KX35-AG-J1510-EC



Wire colour code

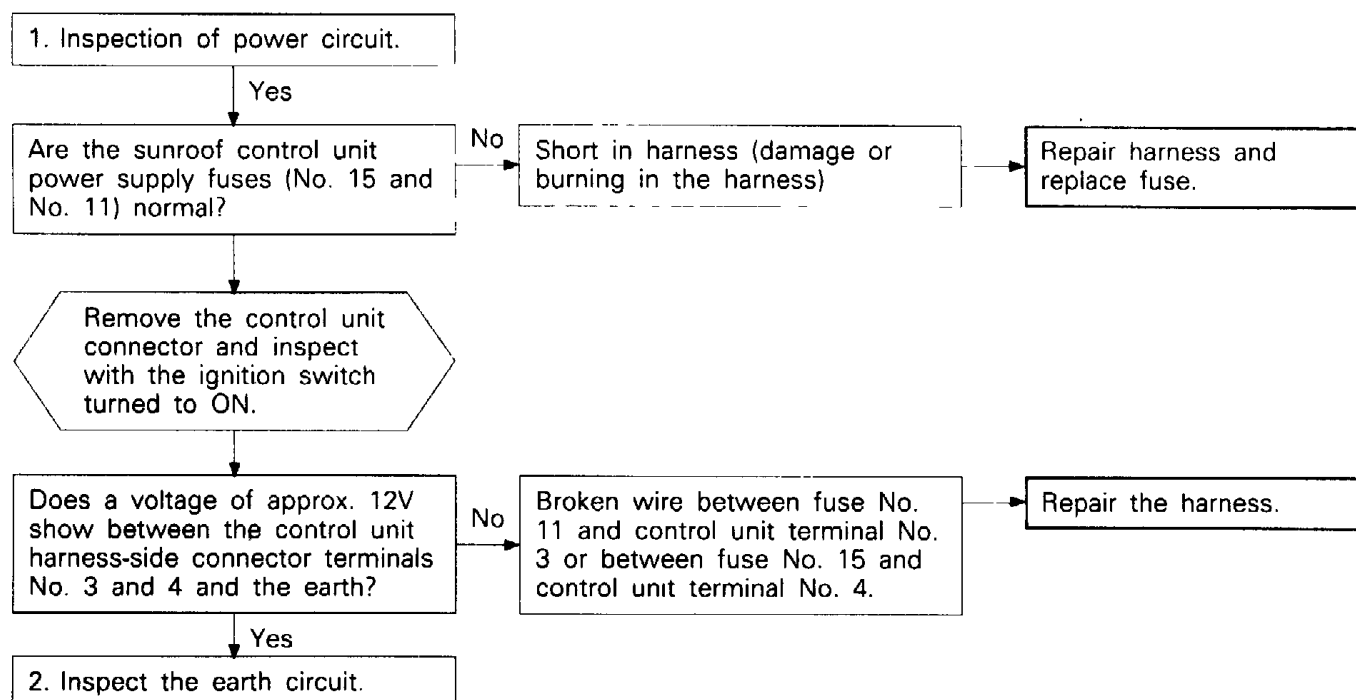
B:Black L:Light green G:Green L:Blue W:White Y:Yellow Sb:Sky blue
 Br:Brown O:Orange Gr:Gray R:Red P:Pink V:Violet

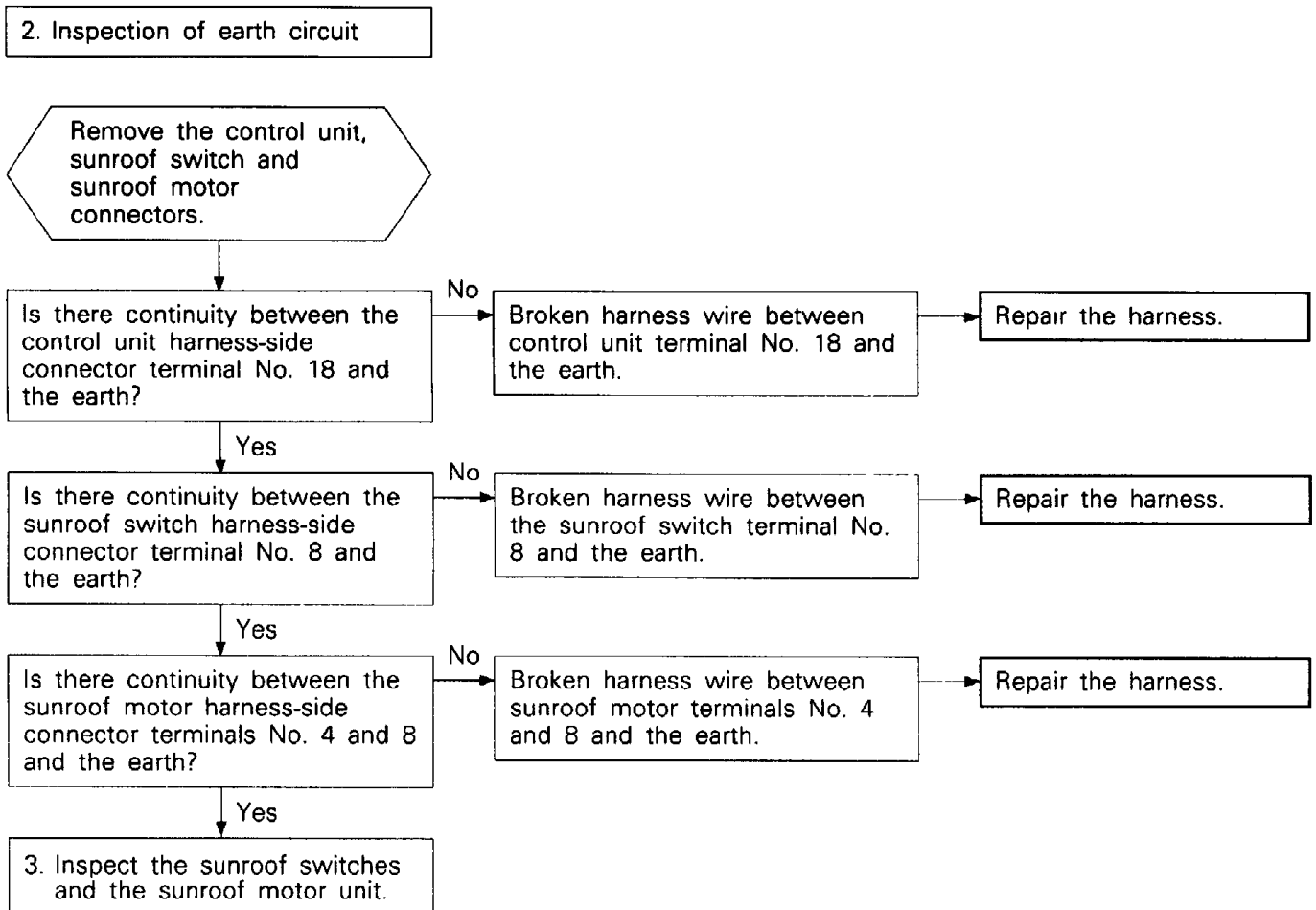
SUNROOF QUICK REFERENCE TABLE

Trouble symptom	Probable cause	Remedy
When ignition switch is turned to ON, sunroof does not operate.	● Broken wire in sunroof control unit circuit or in each harness. ● Sunroof switch is faulty. ● Sunroof motor is faulty. ● Sunroof control unit is faulty.	Inspect according to Flow Chart A (P.42-7).
When closing sunroof, motor does not reverse when a load of 270 Nm (27 kgm, 195 ft.lbs.) or more is applied.	● Sunroof control unit is faulty.	Replace sunroof control unit.
Sunroof will not close fully.	● Limit switch contact is faulty.	Replace sunroof motor
When sunroof switch is pressed, motor operates for 0.2 seconds and then stops.	● Lock plate is damaged.	Replace sunroof motor
Opening or closing of the sunroof is possible immediately after turning the ignition switch to OFF, but even if the driver's side door is opened within 30 seconds, the timer function does not operate continuously for another 30 seconds.	● Broken wire in input circuit in driver's side door switch ● Driver's side door switch is faulty ● Sunroof control unit is faulty.	Inspect according to Flow Chart B (P.42-9).
After turning the ignition switch to OFF, sunroof operation is possible even after timer operation period has elapsed.	● Sunroof control unit is faulty.	Replace sunroof control unit.
After turning the ignition switch to OFF, the timer does not operate.	● Sunroof control unit is faulty.	Replace sunroof motor

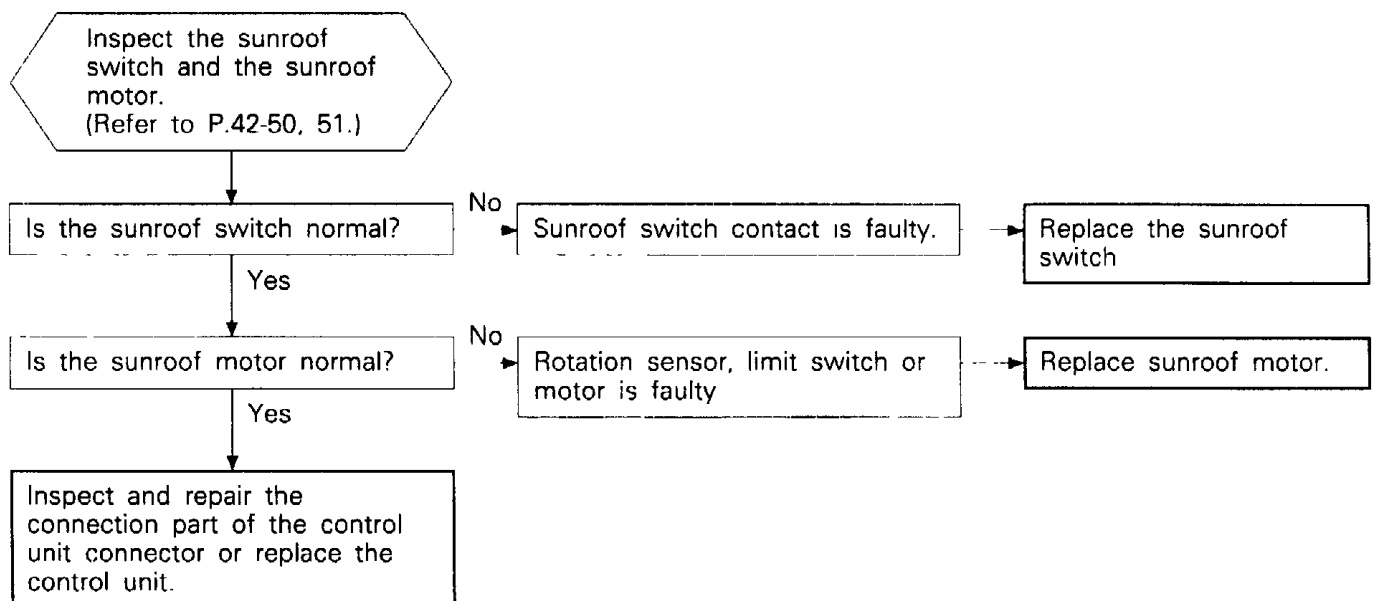
TROUBLE SYMPTOM INSPECTION CHART

A When ignition switch is turned to ON, sunroof does not operate.

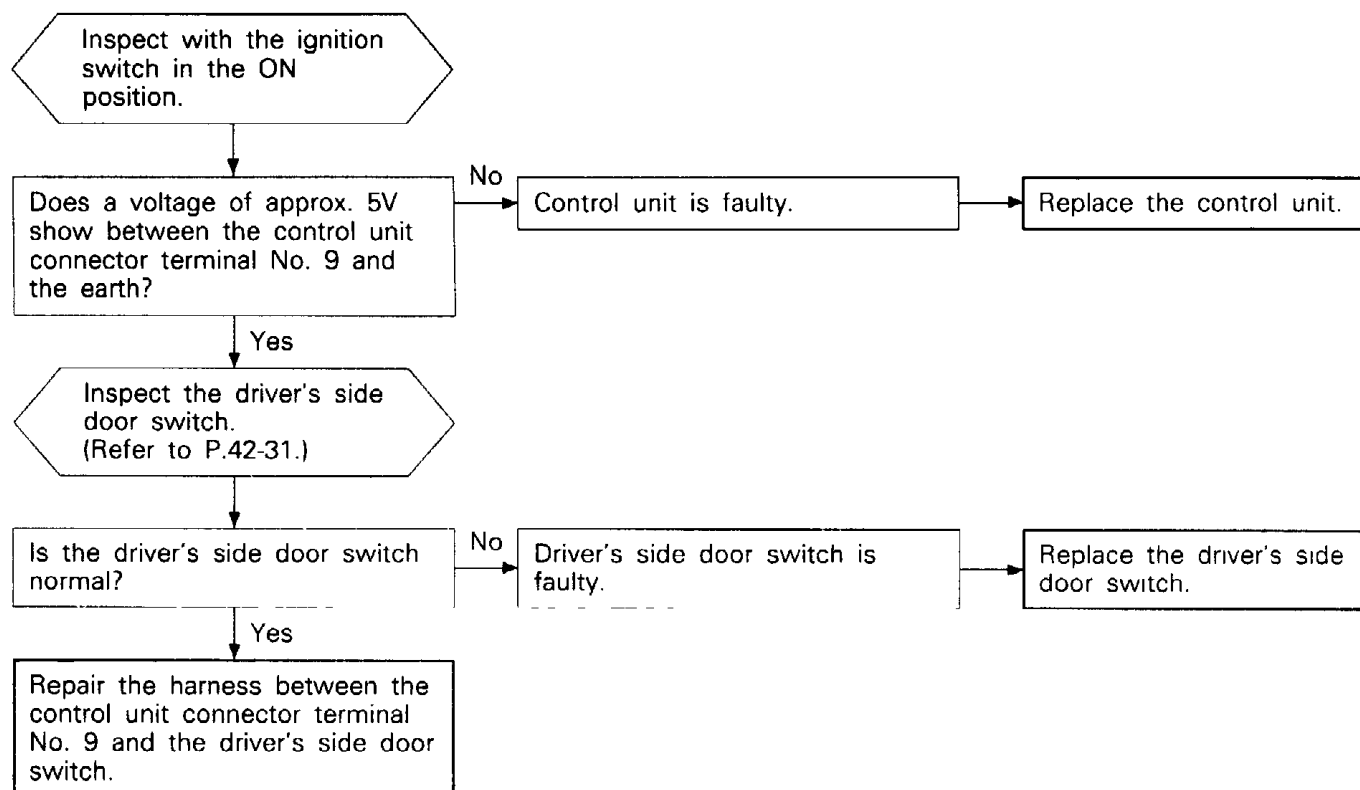


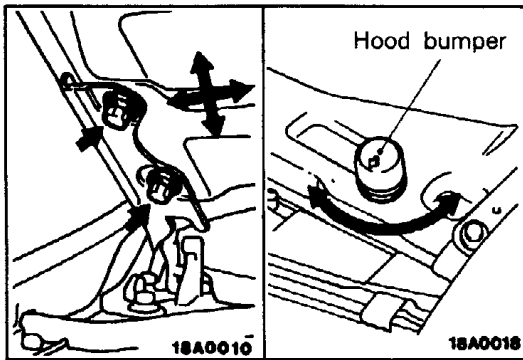


3. Inspection of sunroof switches and sunroof motor unit.



- B** Opening or closing of the sunroof is possible immediately after turning the ignition switch to OFF, but even if the driver's side door is opened within 30 seconds, the timer function does not operate continuously for another 30 seconds.

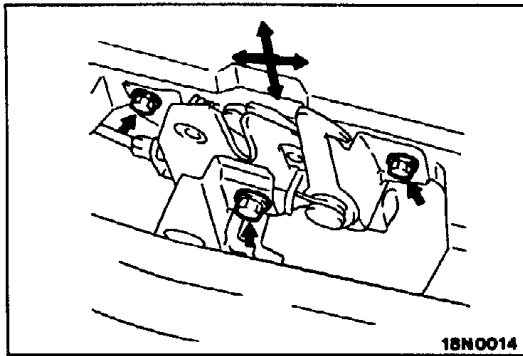




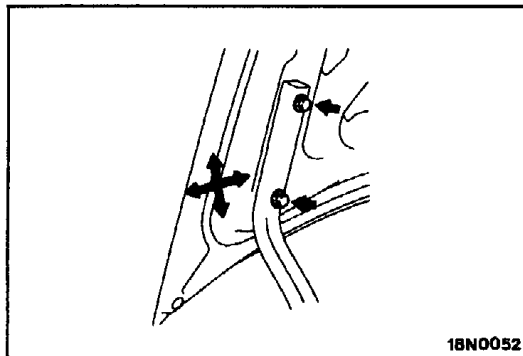
SERVICE ADJUSTMENT PROCEDURES E42FBA8

HOOD ALIGNMENT ADJUSTMENT

1. Adjust the longitudinal and lateral positions of the hood by utilizing the oblong holes in the hinge.
2. Turn the hood bumpers either left or right to adjust the height of the hood.

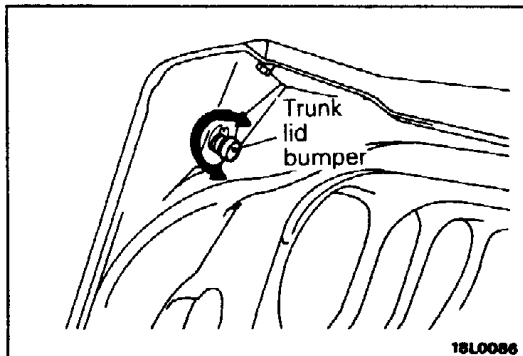


3. Loosen the hood latch mounting bolts.
4. Adjust the alignment of the hood striker and the hood latch by adjusting the horizontal and vertical position of the latch and the height of the hood.

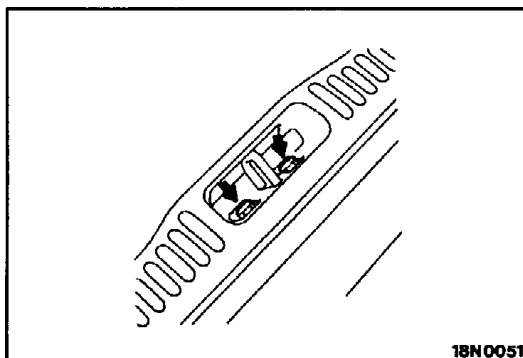


TRUNK LID ADJUSTMENT E42FPAA

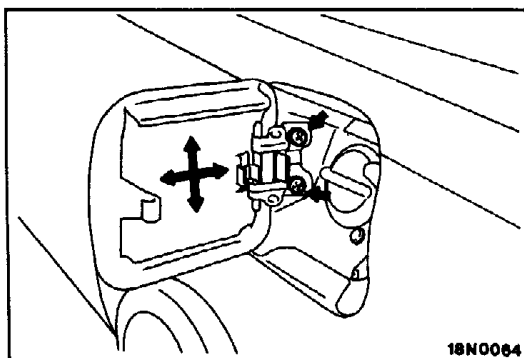
1. Loosen the trunk lid mounting bolts, adjust the trunk lid by moving it so that the clearance is equal on all sides.



2. Turn the trunk lid bumpers either left or right to adjust the height of the trunk lid.



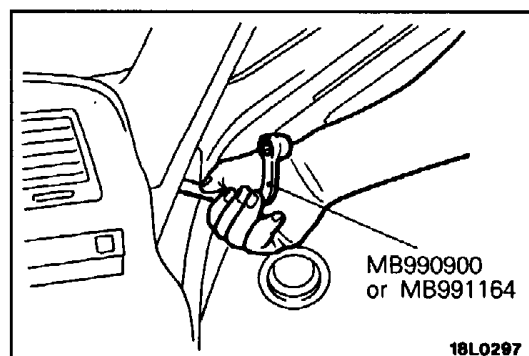
3. Loosen the trunk lid striker mounting bolts, and then adjust the alignment of the latch and striker by adjusting the horizontal and vertical positioning of the striker.



FUEL FILLER DOOR ADJUSTMENT

E42FCAF

Loosen the fuel filler door mounting screw and adjust the fuel filler door so that the clearance around the fuel filler door is even without any height differences.



DOOR FIT ADJUSTMENT

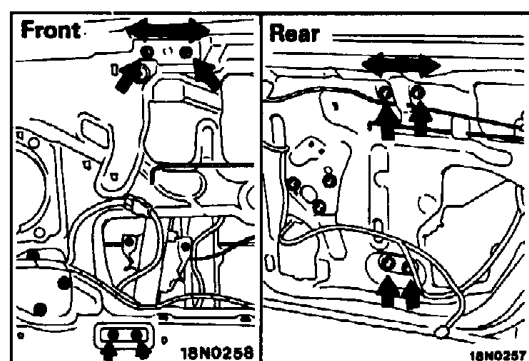
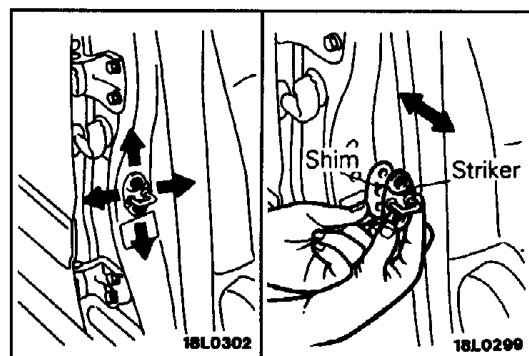
E42FDAG

1. Use the special tool to loosen the hinge mounting bolts on the body side, and then adjust the clearance around the door so that it is uniform on all sides.
2. When there is a stepped section in the door and body, use the special tool to loosen the door hinge mounting bolt on the door side and adjust the door fit.

Caution

Attach protection tape to the fender edges where the hinge is installed.

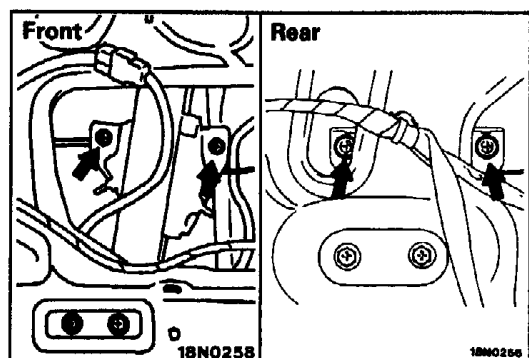
3. If the door opening and closing is stiff, adjust the linking of the striker and the door latch using the shim, while moving the striker up and down, or left and right.



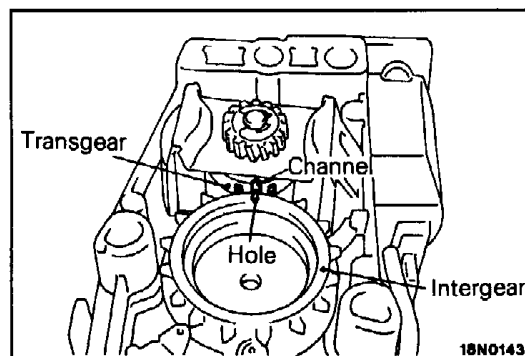
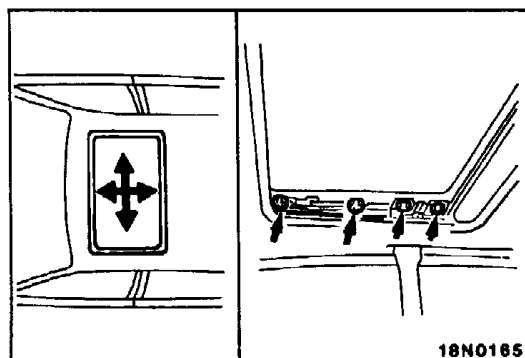
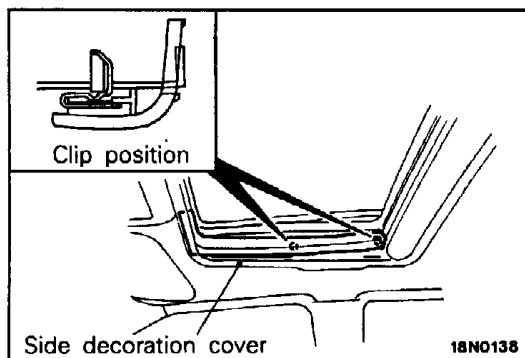
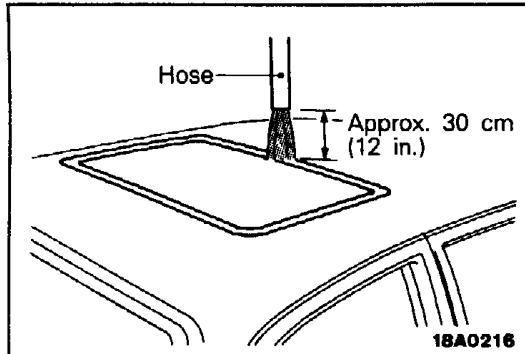
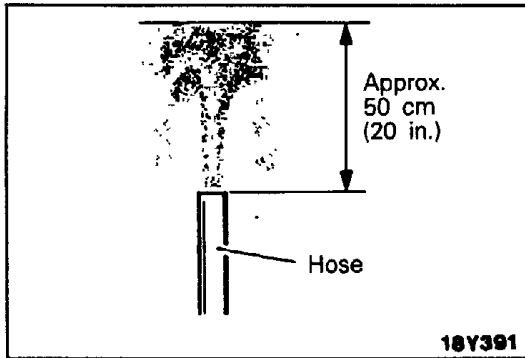
DOOR GLASS ADJUSTMENT

E42FEAH

1. Remove the door trim and waterproof film. (Refer to P.42-33.)
2. Loosen the installation bolt of the window regulator assembly; then move the upper installation back and forth and adjust the tilted angle of the glass.



3. Lower the door window glass to the position of the access hole.
4. Loosen the door glass installation screw, and adjust the forward/backward position of the glass.



WATER TEST

E42FOAA

1. Close roof lid tightly.
2. Hold hose upward and adjust water fountain to about 50 cm (20 in.) high.

3. Pour water over the roof from about 30 cm (12 in.) above roof for more than 5 minutes.
4. While pouring water, check for leak around roof lid.
5. In the event of leakage, check drain pipe, weatherstrip contact and others.

SUNROOF FIT ADJUSTMENT

E42FSAC

FORWARD, BACKWARD AND SIDEWAYS ADJUSTMENT OF THE SUNROOF GLASS

1. Fully close the sunroof glass.
2. Fully open the sun shade.
3. Remove the side decoration cover.

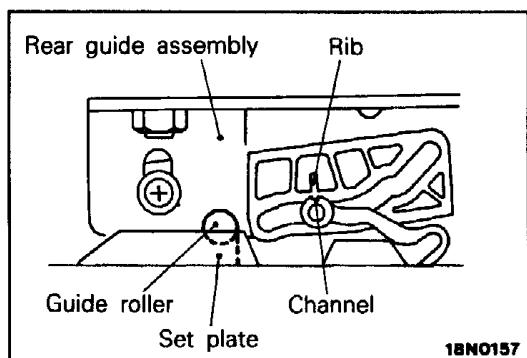
4. Loosen the 8 sunroof glass mounting nuts and adjust the glass forward, backward or sideways.

NOTE

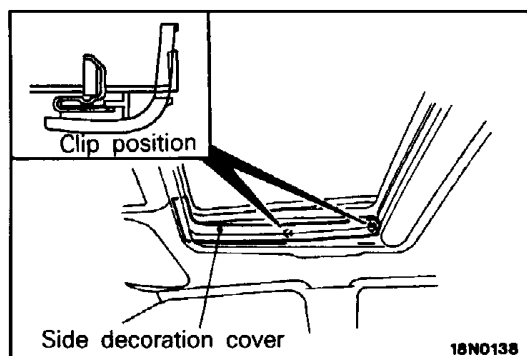
If the adjustment cannot be made by loosening the mounting nuts, the sunroof glass or the motor have not been fully closed, so they should be adjusted to the fully closed positions.

ADJUSTING SO THAT THE ROOF AND THE SUNROOF GLASS ARE PARALLEL, AND THE GLASS IS FULLY CLOSED

1. Remove the motor.
2. Align the hole of the motor internal gear with the channel in the transgear. (Motor in fully closed position.)

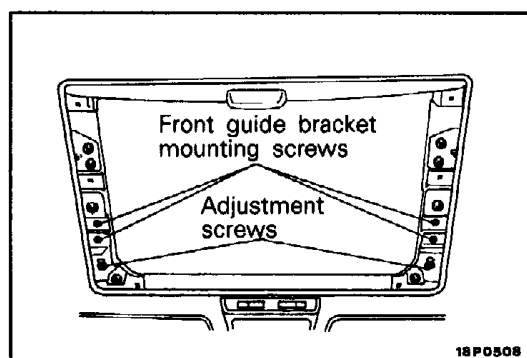


3. When the set plate and guide roller are aligned as shown in the diagram, adjust the rib of the rear guide assembly so it is aligned with the channel of the tilt cam. (Sunroof glass in fully closed position.)

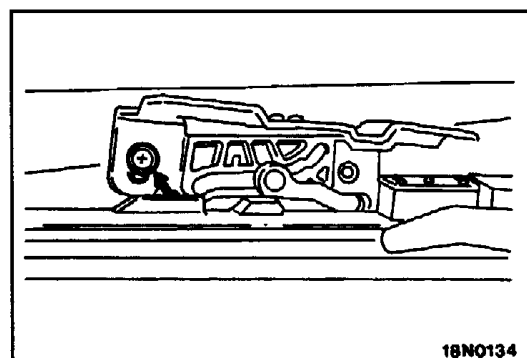


ADJUSTING THE HEIGHT OF THE SUNROOF GLASS AND THE ROOF

1. Fully close the sunroof glass.
2. Fully open the sun shade.
3. Remove the side decoration cover.



4. Loosen the front guide bracket mounting screws, and turn the adjustment screws to adjust the height.

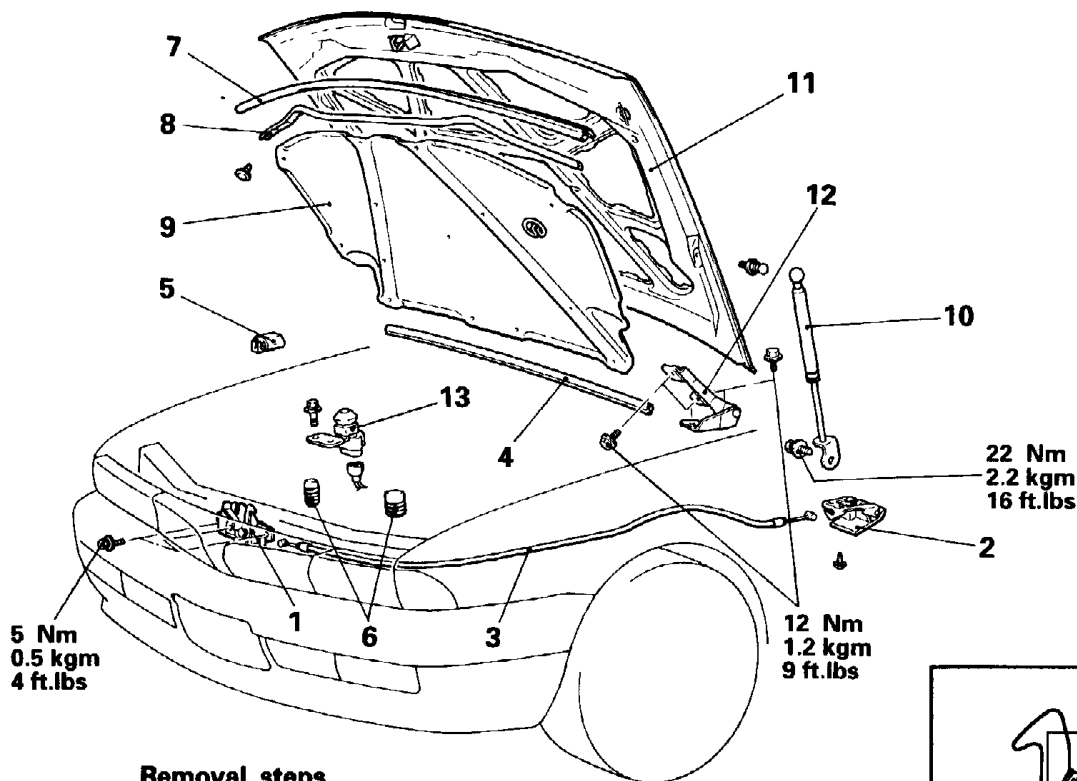


5. Loosen the rear guide assembly adjustment screws to adjust the height.

6. After adjustment, check that the sunroof operates smoothly.

HOOD

REMOVAL AND INSTALLATION

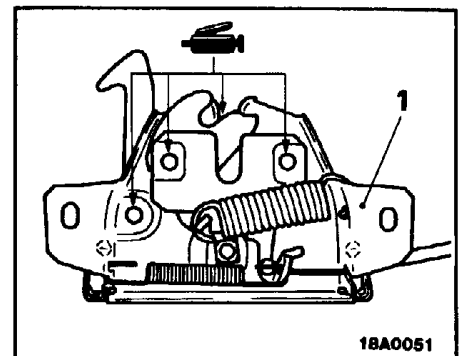
**Removal steps**

1. Hood latch
 2. Hood lock release handle
 3. Hood lock release cable
 4. Hood weatherstrip
 5. Damper
 6. Bumper
 7. Hood front weatherstrip
 8. Air conditioner hood weatherstrip
 9. Hood heat protector
 10. Hood gas spring
 13. Hood switch
- <Vehicles with theft-alarm system>

Hood and hinge removal steps

- Washer tube
(Refer to GROUP 51 – Windshield wiper and washer.)
 - Air inlet grille
(Refer to GROUP 51 – Grille.)
10. Hood gas spring
 11. Hood
 12. Hinge

18N0405



18A0051

Post-installation Operation

- Hood Alignment Adjustment
(Refer to P.42-10.)

Caution

1. Do not disassemble the hood gas spring or throw it into fire.
2. When disposing of the hood gas spring, drill a hole to let the gas escape.

INSPECTION

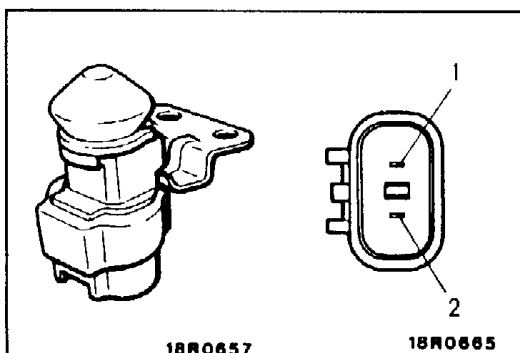
HOOD SWITCH (VEHICLES WITH THEFT-ALARM SYSTEM)

- (1) Disconnect the hood switch connector.
- (2) Check the continuity between the terminal.

Terminal	1	2
Hood switch unpressed	○	○
Hood switch depressed		

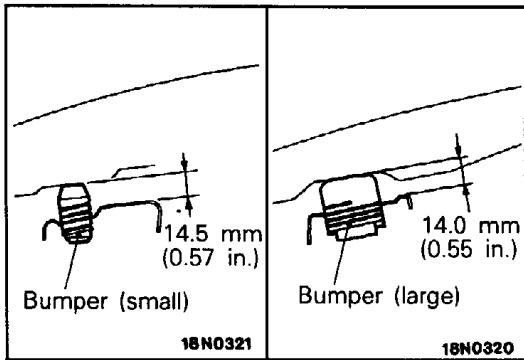
NOTE

○—○ indicates that there is continuity between the terminals.



18R0657

18R0665

**SERVICE POINTS OF INSTALLATION****6. INSTALLATION OF BUMPER**

Install the bumper as shown in the diagram.

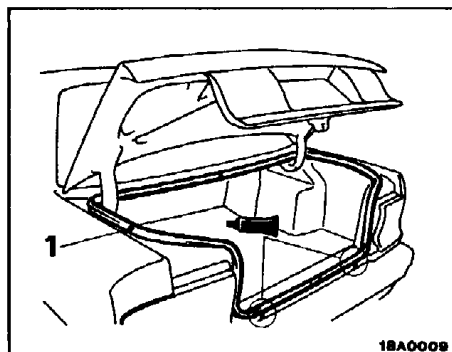
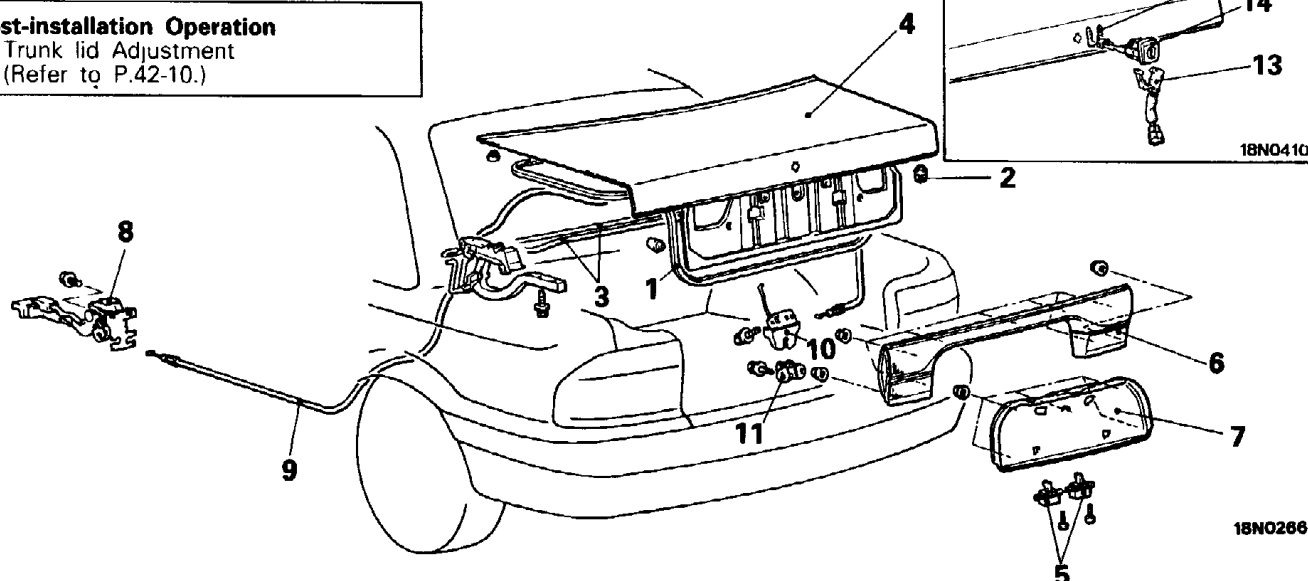
NOTES

TRUNK LID

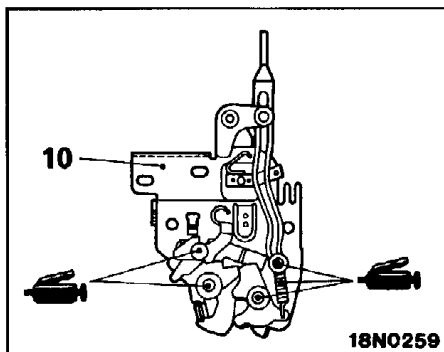
REMOVAL AND INSTALLATION

Post-installation Operation

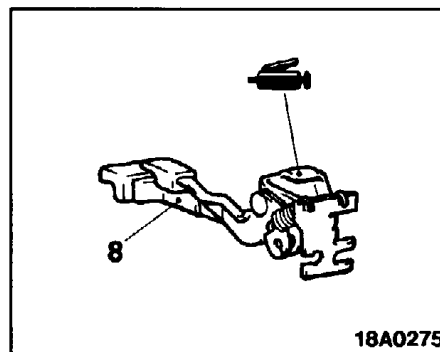
- Trunk lid Adjustment
(Refer to P.42-10.)



18A0008



18NQ259



18A0275

Adhesive:
3M ATD Part No. 8001 or 3M
ATD Part No. 8011, or
equivalent

Removal steps

- Trunk lid trim (Refer to GROUP 52 – Trims.)
- Rear lid harness connection

- ◆◆ 1. Trunk lid weatherstrip
- ◆◆ 2. Bumper
- ◆◆◆ 3. Trunk lid torsion bar
- 4. Trunk lid panel
- 5. License plate lamp
- 6. Rear lid lamp
- 7. Rear panel garnish

Trunk lid lock release handle and cable removal steps

- Front seat (driver's side) } (Refer to GROUP 52 – Seat.)
- Rear seat }
- Front scuff plate (driver's side) }
- Rear scuff plate (driver's side) } (Refer to GROUP 52 – Trims.)
- Trunk rear trim cover }
- Trunk lid trim }
- 8. Trunk lid lock release handle
- 9. Trunk lid lock release cable

Trunk lid latch removal steps

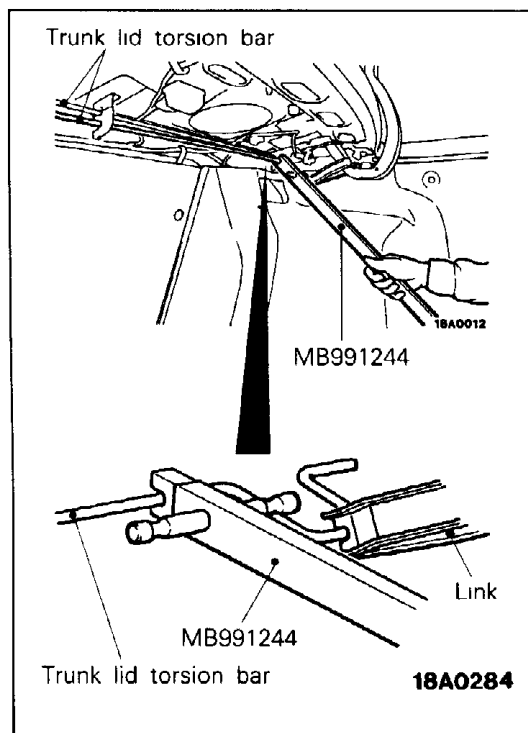
- Trunk lid trim (Refer to GROUP 52 – Trims.)
- 10. Trunk lid latch

Trunk lid striker removal steps

- Trunk lid trim cover (Refer to GROUP 52 – Trims.)
- 10. Trunk lid striker

Trunk lid lock cylinder removal steps

- Trunk lid trim (Refer to GROUP 52 – Trims.)
- Rear lid harness connection
- 1. Trunk lid weatherstrip
- 2. Bumper
- 3. Trunk lid torsion bar
- 12. Retainer
- 13. Trunk lid lock cylinder switch
<Vehicles with theft-alarm system>
- 14. Trunk lid lock cylinder



SERVICE POINTS OF REMOVAL

3. REMOVAL OF TRUNK LID TORSION BAR

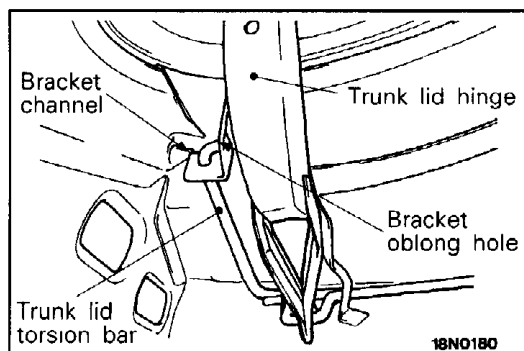
- (1) Disconnect the body harness and the harness connector of the rear shelf lower panel.
- (2) Attach the special tool to the link side of the torsion bar as shown in the figure, and push downwards to remove the torsion bar from the link.

NOTE

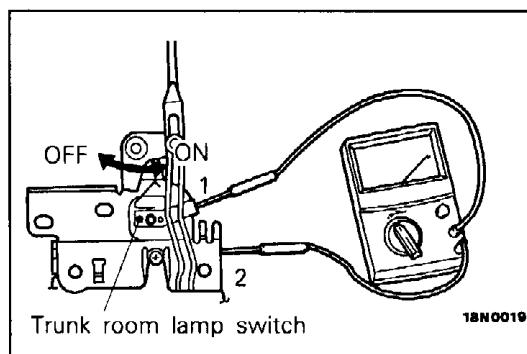
When removing the torsion bars, the left and right torsion bars cross at the centre, so the bar that is towards you at the crossed section should be removed first.

Caution

Be sure to attach the special tool properly, as the body or parts could be damaged when the torsion bar is removed from the special tool.



- (3) Raise the bracket end of the torsion bar and remove it from the bracket channel. Then, pull it from outside the vehicle to remove from the bracket oblong hole.
- (4) Remove the torsion bar by pulling from the link side hole to the outside of the vehicle.
- (5) Remove the other torsion bar using the same procedure.



INSPECTION

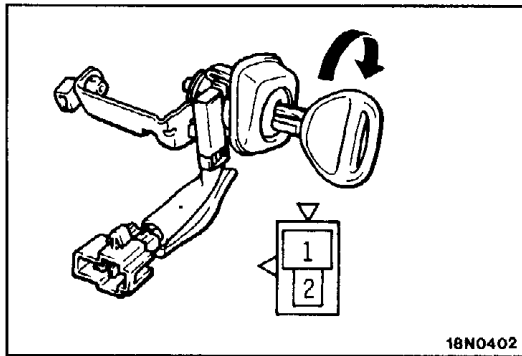
TRUNK ROOM LAMP SWITCH (INCLUDING LATCH)

Open and shut the trunk lid latch to operate the trunk room lamp switch, and check the continuity between the terminals.

Terminal	1	2
Switch position		
ON (Latch open)	○	○
OFF (Latch shut)		

NOTE

○- ○ indicates that there is continuity between the terminals.



TRUNK LID LOCK CYLINDER SWITCH <VEHICLES THEFT-ALARM SYSTEM>

- (1) Turn the key and unlock the lock cylinder.
- (2) Check for continuity between the terminals.

	Terminal	
Key position	1	2
Neutral (OFF)		
UNLOCK (ON)	○ — ○	

NOTE

○ — ○ indicates that there is continuity between the terminals

SERVICE POINTS OF INSTALLATION

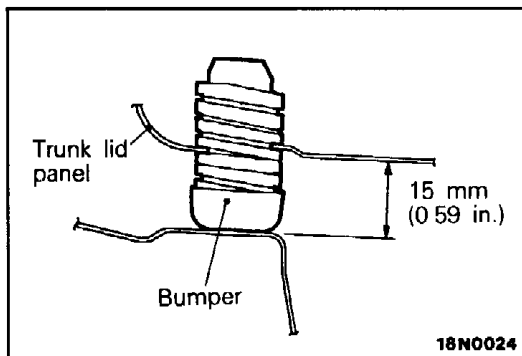
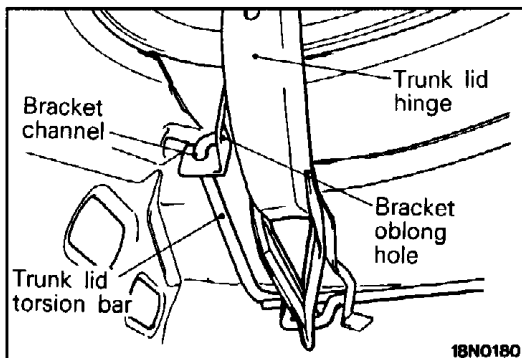
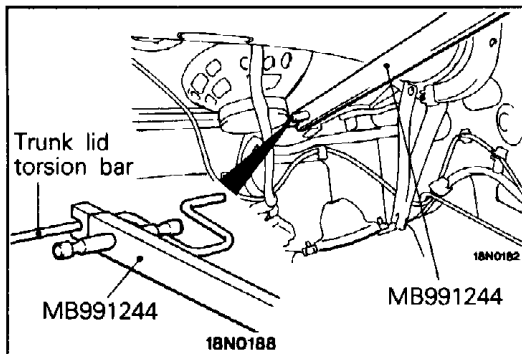
3. INSTALLATION OF TRUNK LID TORSION BAR

- (1) Insert the end of the torsion bar through the link side mounting hole.
- (2) Attach the special tool as shown in the figure.

Caution

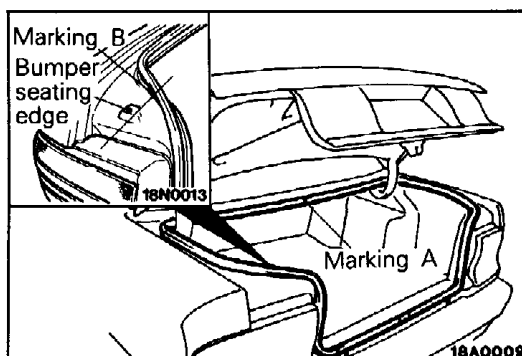
Be sure to attach the special tool properly, as the body or parts could be damaged when the torsion bar is removed from the special tool.

- (3) Raise the torsion bar at the bracket end, insert it through the bracket oblong hole, and attach securely to the bracket channel.
- (4) Push the special tool downwards to set the torsion bar against the link.
- (5) Install the other torsion bar using the same procedure.
- (6) Attach the body harness and the harness connector of the rear shelf lower panel.



2. INSTALLATION OF BUMPER

Install the bumper as shown in the figure.

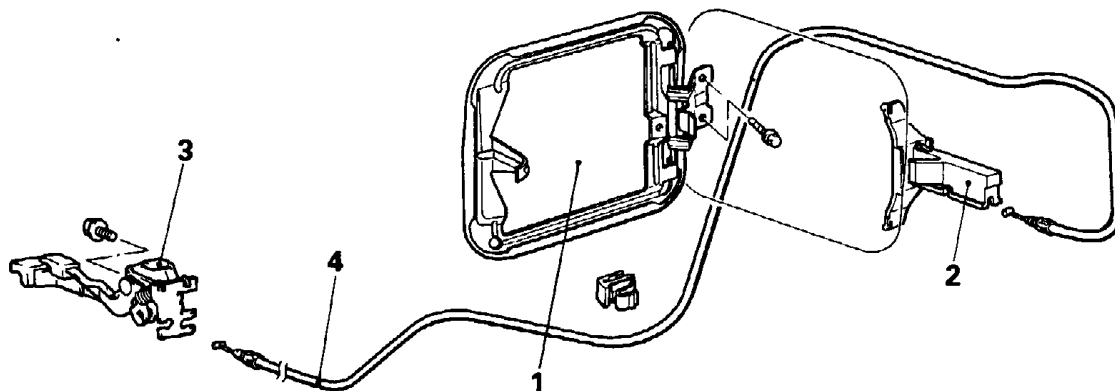


1. INSTALLATION OF TRUNK LID WEATHERSTRIP

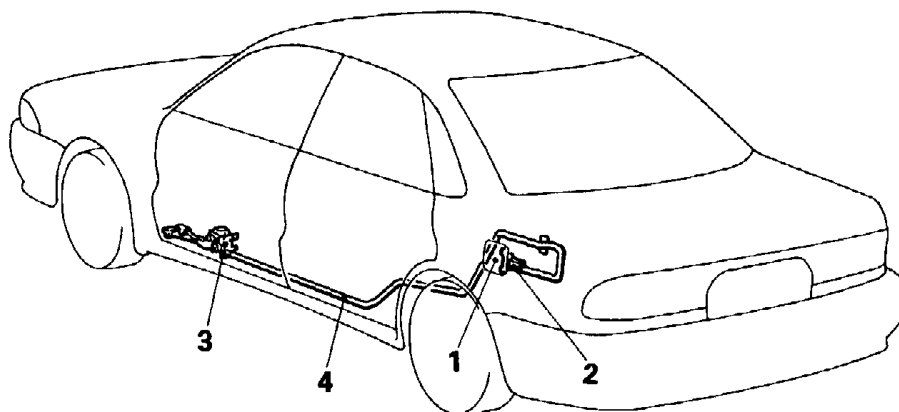
Match the marking A section of the trunk lid weatherstrip with the moulding installation hole, and the marking B section with the bumper seating edge to install.

FUEL TANK FILLER DOOR REMOVAL AND INSTALLATION

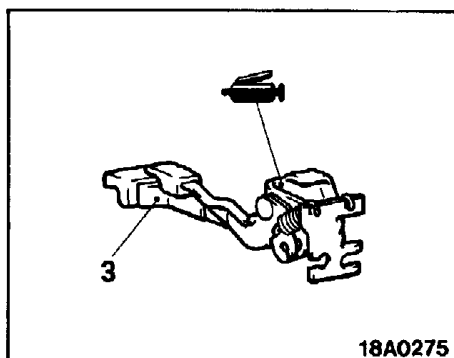
E42JBAL



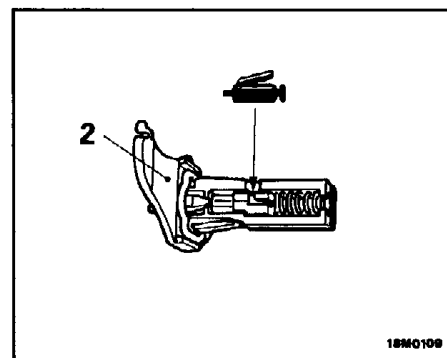
18N0264



18N0263



18A0275



18N0109

Pre-removal and Post-installation Operation

- Removal and Installation of Front Seat (driver's side), Rear Seat (Refer to GROUP 52 – Seat.)
- Removal and Installation of Front Scuff Plate (driver's side), Rear Scuff Plate (driver's side), Trunk Side Trim, Trunk Rear Trim Cover, Trunk Rear Trim (Refer to GROUP 52 – Trims.)

Adjustment

- Fuel Filler Door Adjustment (Refer to P.42 11.)

Removal steps

1. Fuel filler door
2. Fuel filler door hook
3. Fuel filler door lock release handle
4. Fuel filler door lock release cable

FENDER

REMOVAL AND INSTALLATION

E42KAASa

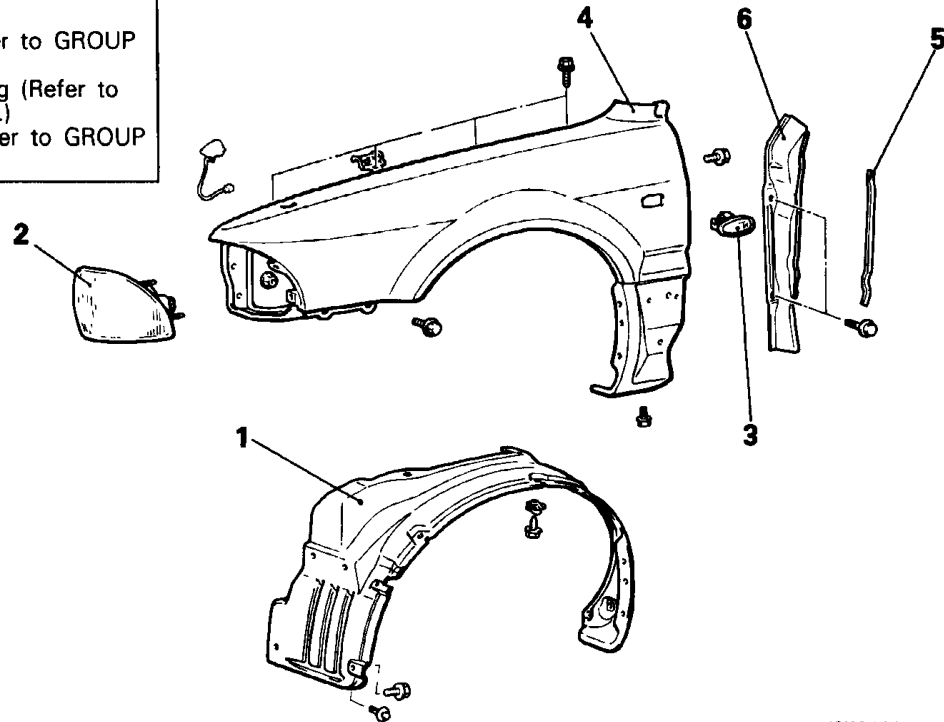
CAUTION: SRS

When removing and installing the front fender panel from vehicles equipped with SRS, do not let it bump against the front impact sensor.

Pre-removal and Post-installation Operation

Removal and Installation

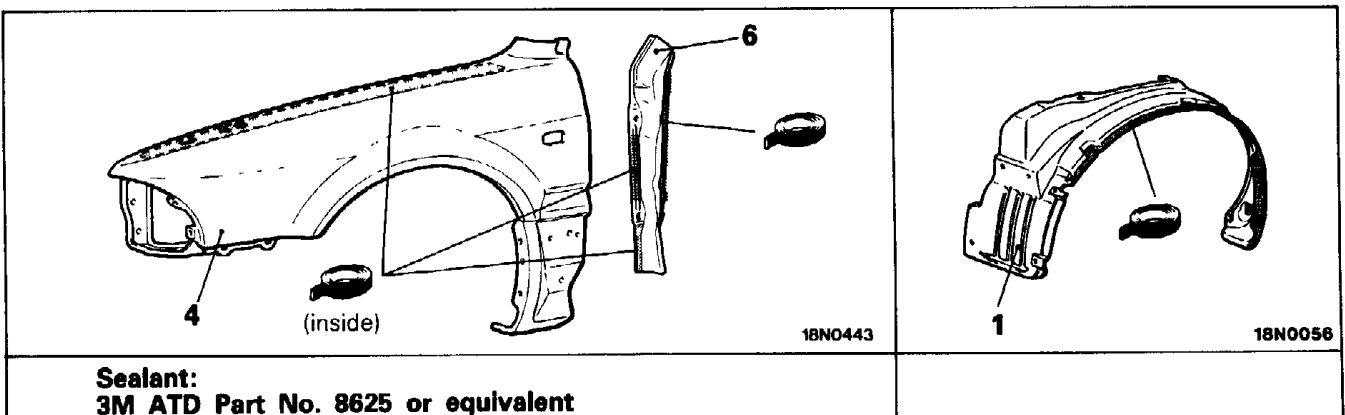
- Front Mud Guard (Refer to GROUP 51 – Mud Guard.)
- Side Protector Moulding (Refer to GROUP 51 – Moulding.)
- Front Side Airdam (Refer to GROUP 51 – Aero Parts.)



18N0444

Removal steps

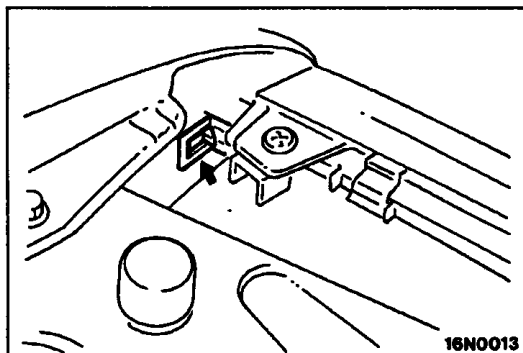
- 1. Splash shield
- 2. Front turn signal lamp
- Front bumper (Refer to GROUP 51 – Front Bumper.)
- 3. Side turn signal lamp
- 4. Front fender panel
- 5. Sealer
- 6. Front fender insulator



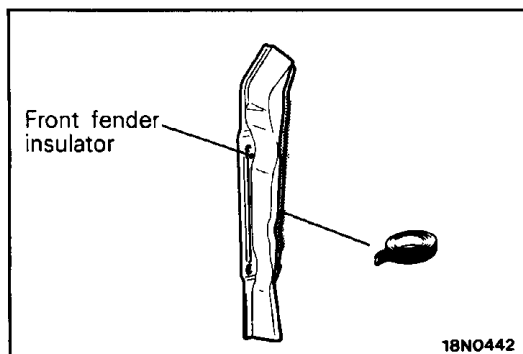
18N0443

18N0056

Sealant:
3M ATD Part No. 8625 or equivalent

**SERVICE POINTS OF REMOVAL****2. REMOVAL OF FRONT TURN SIGNAL LAMP**

Remove the front turn signal lamp set hook, and remove the front turn signal lamp by pulling it towards the front of the vehicle.

**SERVICE POINTS OF INSTALLATION****4. INSTALLATION OF FRONT FENDER PANEL**

According to the condition of the sealer, apply specified sealant to the sealer part of the front fender insulator or to the part of the sealer that hasn't been removed.

**Specified sealant : 3M ATD Part No. 8625
or equivalent**

Caution

Because the places from which old adhesive has been removed have not been coated, apply the specified sealant so that the non-coated parts are not exposed.

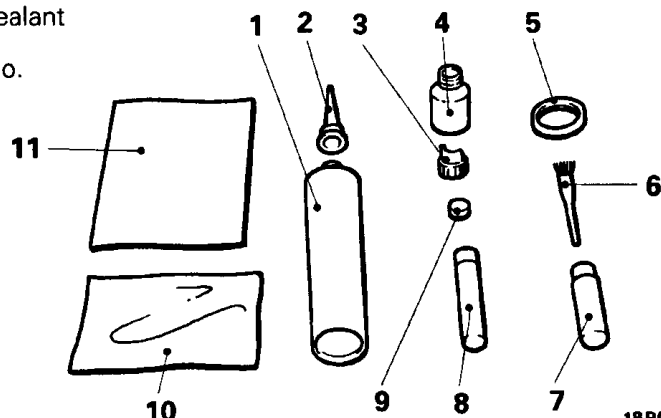
WINDSHIELD GLASS

E42LABM

WINDSHIELD REPAIR

- Adhesive: 3M Super Fast Urethan Auto Glass Sealant
Part No. 8609 or equivalent
- Primer: 3M Super Fast Urethan Primer Part No.
8608 or equivalent

- Auto Window Sealer Kit
TEROSON-127, 37V
- 1. Sealer
- 2. Nozzle
- 3. Primer container
- 4. Primer container cap
- 5. Piano wire
- 6. Brush
- 7. Cleaner
- 8. Primer
- 9. Filter
- 10. Gauge
- 11. Instruction manual



18P0466

NOTE

When using TEROSON-127, 37V, follow the instructions of the manual included in the kit.

Additional material required	
Spacers	Available as service part
Dam	Available as service part
Anti-rust solvent (or Tectyl 506T....Valvoline Oil Company)	For rust prevention
Isopropyl alcohol	For grease removal from bonded surface
Steel piano wire	Dia.×length....0.6 mm×1 m (0.024 in.×3 ft.)
	For cutting adhesive
Adhesive gun	For pressing-out adhesive

HANDLING OF AUTO WINDOW SEALER

Keep the sealant in a cool place, not exposed to the direct rays of the sun.

Do not place any heavy article on the sealant nor press it, otherwise it will become deformed.

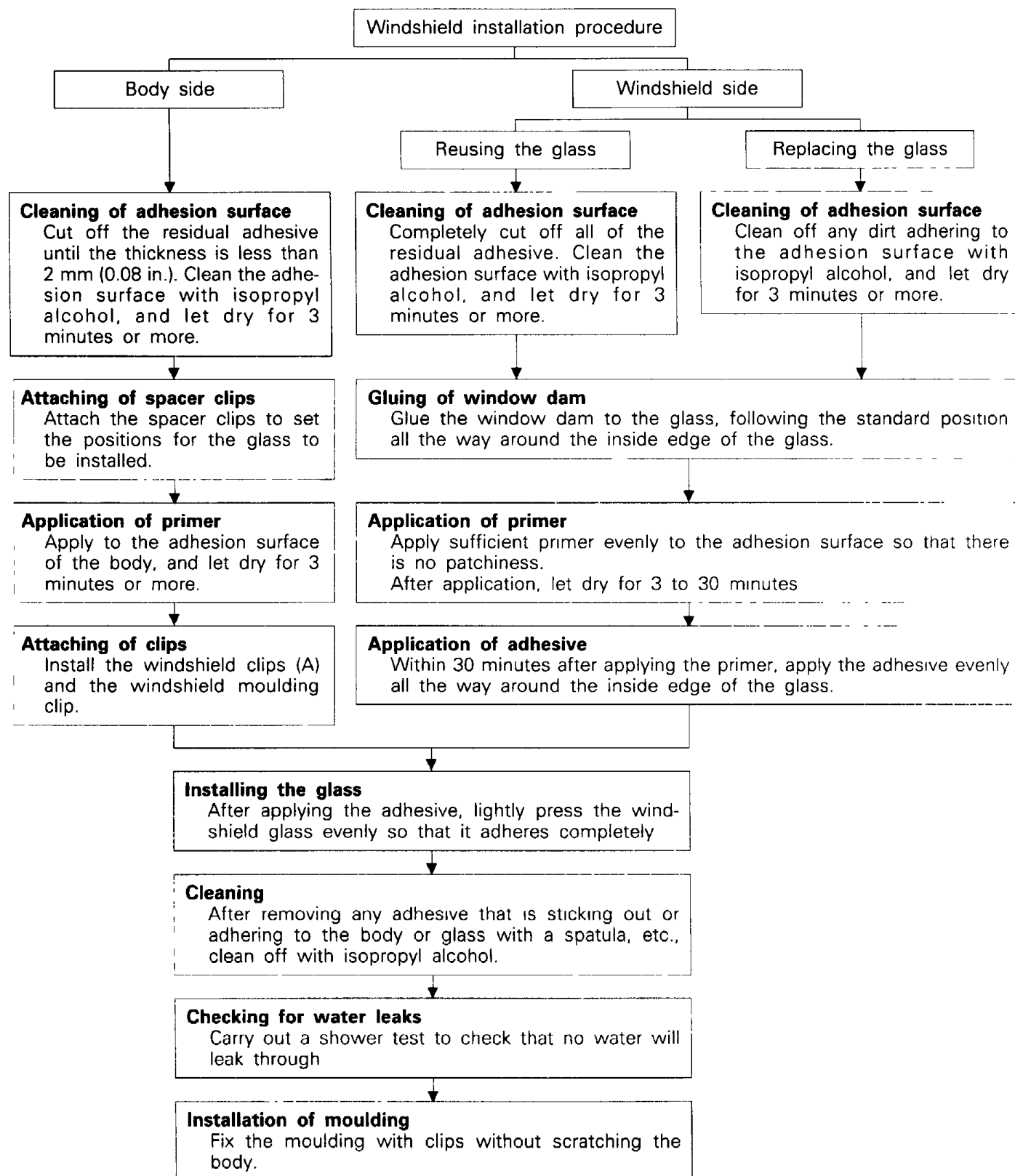
Avoid storing the sealant for more than 6 months, because it will lose its sealing effect.

BODY PINCH-WELD FLANGE SERVICING

Before servicing the body pinch-weld flange, remove old adhesive completely.

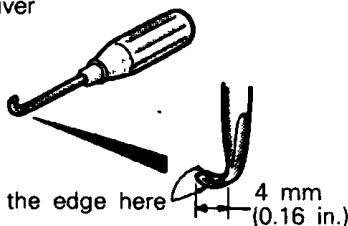
If the flange requires painting, bake it after painting is completed.

WORKING PROCESS



Recommended tool

Make the tool by
modifying a
screwdriver



18U0161

REPLACEMENT OF MOULDING (WITH CLIP ATTACHED)

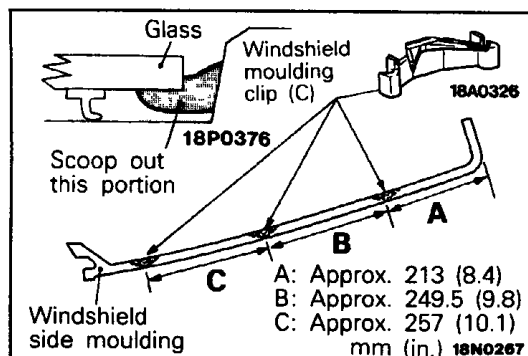
1. Remove the mouldings.
2. To cut the existing adhesive, make a tool such as the one shown.

3. Using the recommended tool, scoop out the old adhesive material at the clip installation, then apply the specified adhesive and install the moulding.

Specified adhesive: 3M Super Fast Urethan Auto Glass Sealant Part No. 8609 or equivalent

Caution

Be careful not to damage the glass and body.



REMOVAL AND INSTALLATION <VEHICLES BUILT UP TO OCTOBER, 1992>

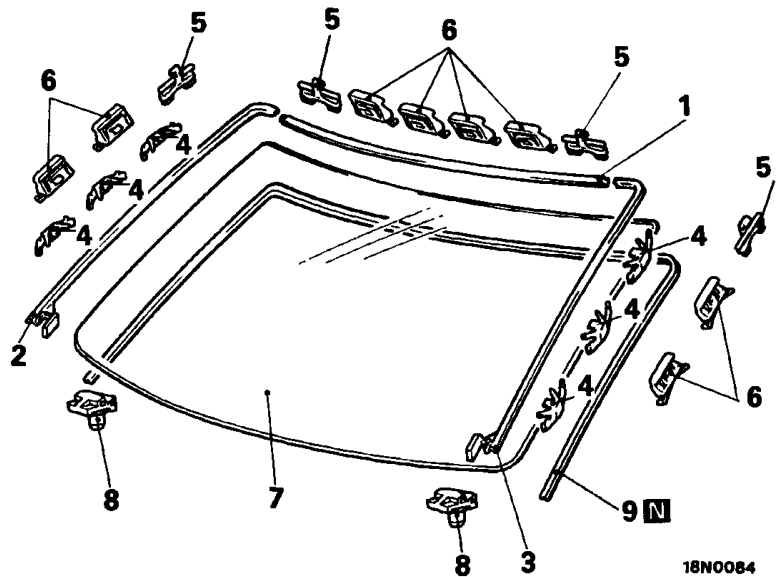
Pre-removal and Post-installation Operation

Removal and Installation

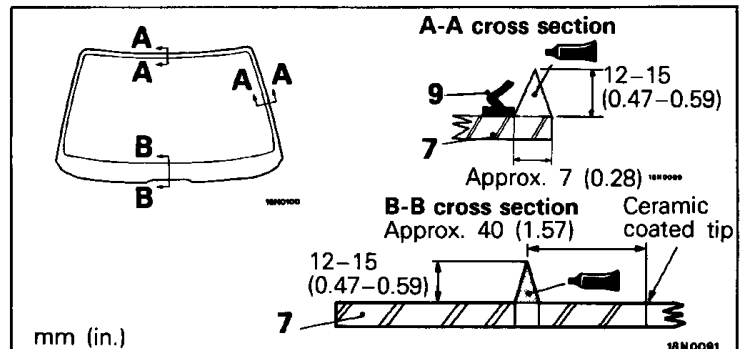
- Wiper Arm (Refer to GROUP 51 – Windshield Wiper and Washer.)
- Air Inlet Grille (Refer to GROUP 51 – Grille.)
- Headlining (Refer to GROUP 52 – Headlining.)
- Front Pillar Trim (Refer to GROUP 52 – Trims.)
- Inside Rear View Mirror (Refer to GROUP 52 – Inside Rear View Mirror.)

Removal steps

- 1. Windshield upper moulding
- 2. Windshield side moulding (RH)
- 3. Windshield side moulding (LH)
- 4. Windshield moulding clip (C)
- 5. Windshield moulding clip (A)
- 6. Windshield moulding clip
- 7. Windshield glass
- 8. Spacer clip
- 9. Window dam

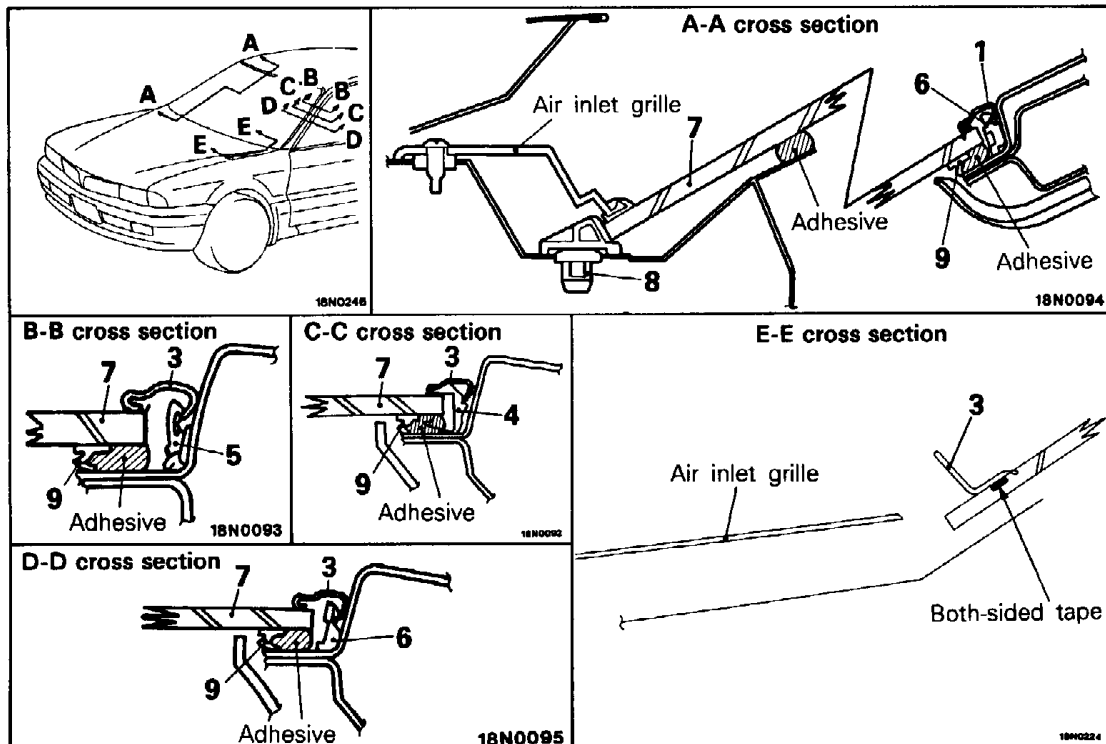


18N0084



18N0081

Adhesive:
3M Super Fast Urethan Auto Glass Sealant Part No. 8609 or equivalent



18N0248

18N0094

B-B cross section

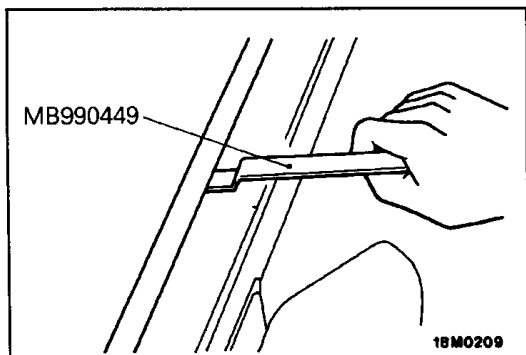
C-C cross section

E-E cross section

D-D cross section

18N0095

18N0224



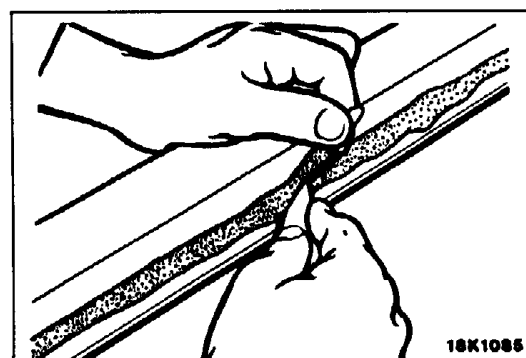
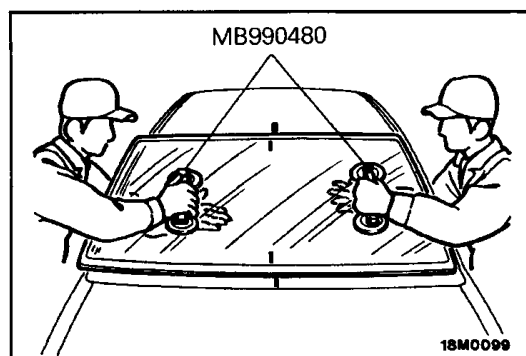
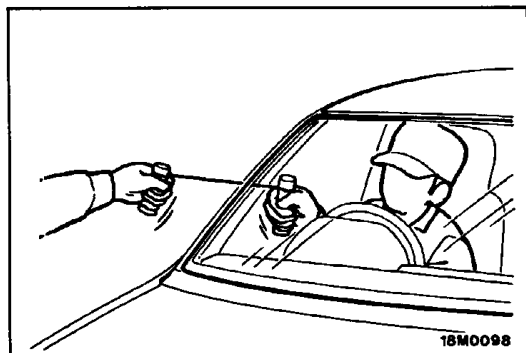
SERVICE POINTS OF REMOVAL

1./2./3. REMOVAL OF EACH MOULDING

Remove by using the special tool to lever out each moulding.

Caution

Mouldings that become warped should not be re-used.



7. REMOVAL OF WINDSHIELD GLASS

- (1) In order to protect the body (paint surface), apply cloth tape to all body areas around the installed windshield glass.
- (2) Using a sharp-point drill, make hole in the windshield glass adhesive.
- (3) Pass the piano wire from the inside of the vehicle through the hole.
- (4) Pull the piano wire alternately from the inside and outside along the windshield glass to cut the adhesive.

Caution

Do not let the piano wire touch the edge of the windshield glass.

- (5) Make mating marks on the windshield glass and body.
- (6) Use the special tool to remove the windshield glass.

- (7) Use a knife to cut away the remaining adhesive so that the thickness is within 2 mm (0.08 in.) around the entire circumference of the body flange.
- (8) Finish the flange surfaces so that they are smooth.

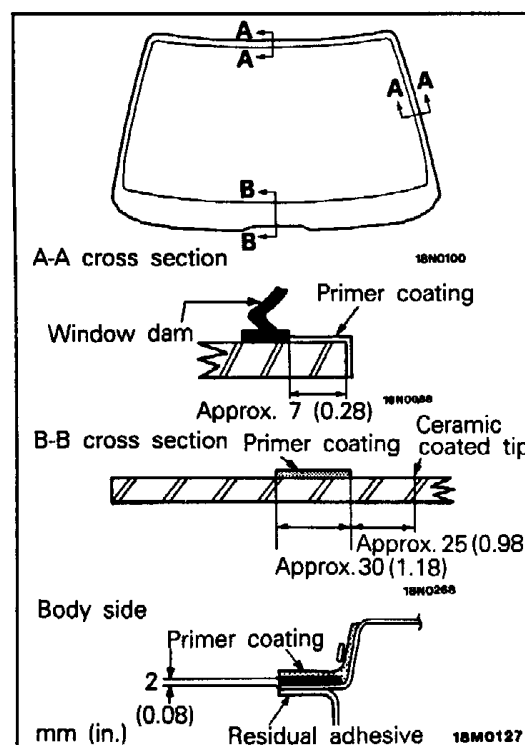
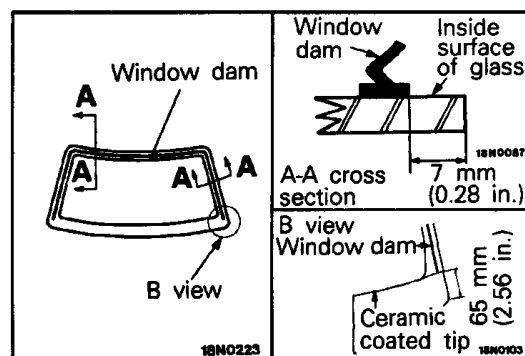
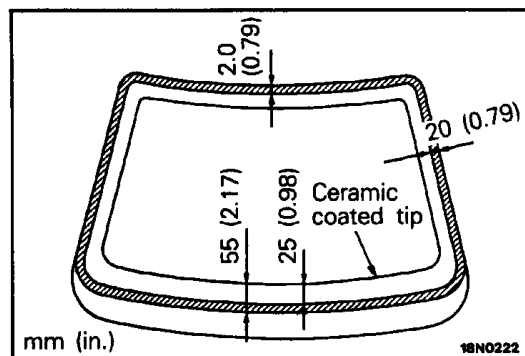
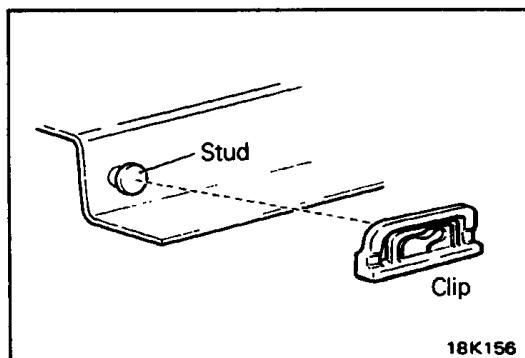
Caution

1. **Be careful not to remove more adhesive than is necessary.**
2. **Be careful also not to damage the paintwork on the body surface with the knife. If the paintwork is damaged, repair the damaged area with repair paint or anti-rust agent.**

- (9) When reusing the glass, remove the adhesive and the chips of window spacer still adhering to the glass, and clean with isopropyl alcohol.
- (10) Clean the body side in the same way.

Caution

Let the cleaned places stand for 3 minutes or more, and carry out the next procedures after they have dried. Also, do not touch any surface that has been cleaned.



INSPECTION

- Check the body flange for deformation.
- Check the window moulding clips and studs for damage.

NOTE

If the T-studs are broken, use a drill to make holes in the T-studs 3 mm (0.12 in.) in diameter, fill the holes with adhesive, and then use screws to mount the window moulding clips.

Caution

After installing the clip, apply antirust solvent to the screw head to protect them from rust.

SERVICE POINTS OF INSTALLATION

9. INSTALLATION OF WINDOW DAM

- (1) Wipe the windshield glass section in the figure with isopropyl alcohol to clean it and to remove all grease, etc.

- (2) Glue the window dam correctly to the inside of the windshield glass so that it has no bends or raised sections.

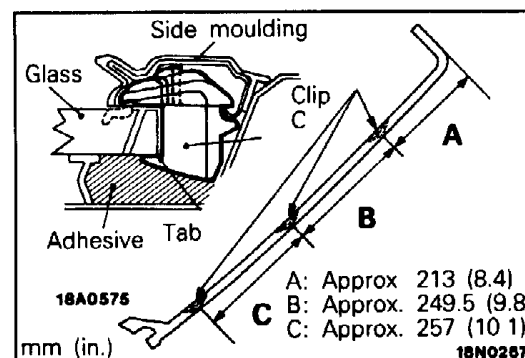
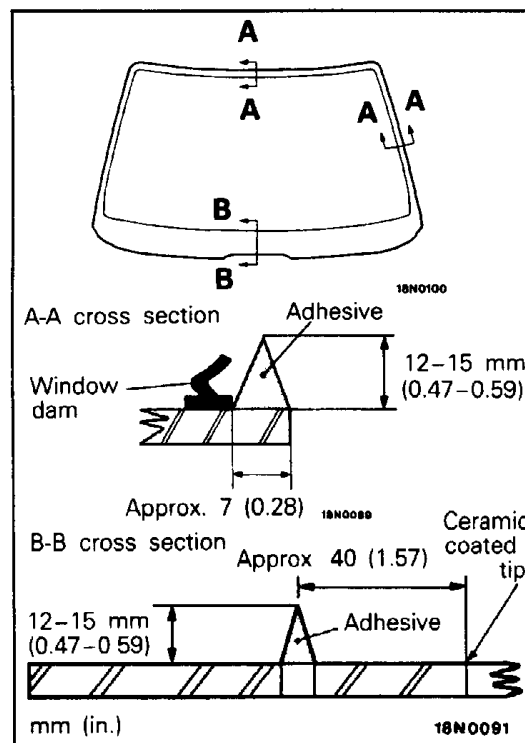
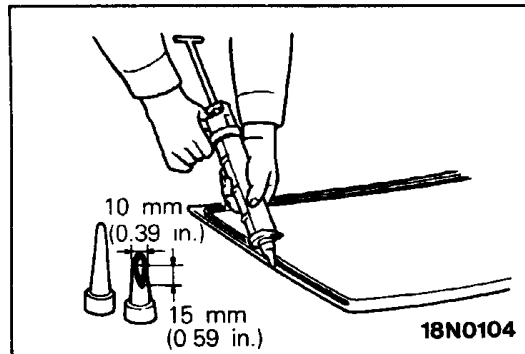
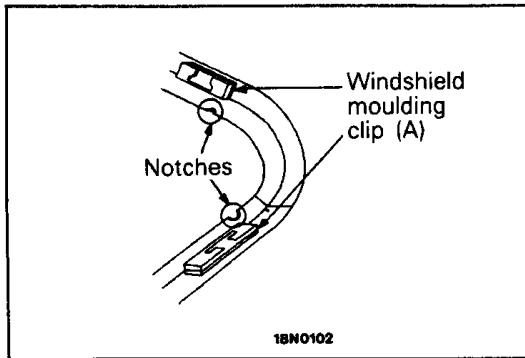
8. INSTALLATION OF SPACER CLIP/7. WINDSHIELD GLASS/6. WINDSHIELD Moulding CLIP/5. WINDSHIELD Moulding CLIP (A)

- (1) When replacing the glass, temporarily set the glass against the body, and mark the glass and body where they match.
- (2) Soak a sponge in the primer, and apply evenly to the glass and the body in the places shown in the figure.

Specified primer: 3M Super Fast Urethan Primer Part No. 8608 or equivalent

Caution

1. The primer strengthens the adhesive strength, so be sure to apply it evenly around the entire circumference. But, a too thick application will cause lowering of the adhesive strength.
 2. Do not touch the coated surface.
- (3) After applying the primer, let it dry for 3 to 30 minutes.
 - (4) Attach the spacer clip.



- (5) Glue the windshield moulding clips so that the clips' ends match the notches on the body, as shown in the figure.
- (6) Set the windshield mounting clip studs into the windshield mounting clips.

- (7) Within 30 minutes after applying the primer, fill the sealant gun with adhesive and apply the adhesive evenly around the entire circumference of the windshield.

Specified adhesive: 3M Super Fast Urethan Auto Glass Sealant Part No. 8609 or equivalent

NOTE

Cut the nozzle tip of the sealant gun into a V shape to facilitate adhesive application.

- (8) After applying the adhesive, match up the marks on the glass and the body.
- (9) After removing any adhesive that is sticking out or adhering to the body or glass with a spatula, etc., clean off with isopropyl alcohol. After completion of this operation (after installing the glass), place it somewhere where it will not be disturbed, until the adhesive sets.

Caution

If heat is applied with an infra-red lamp to shorten the setting time, keep the surface temperature of the adhesive below 100°C (212°F).

- (10) After attaching the windshield glass to the body, let it stand for 30 minutes or more, and then test for water leakage.

Caution

1. If moving the vehicle, it should be done gently.
2. When testing for water leakage, do not pinch the end of the hose to spray the water.

3./2. INSTALLATION OF WINDSHIELD SIDE MOULDING

Install the moulding before the glass's adhesive hardens. For the side moulding, install moulding clip C at the position indicated in the illustration, installing securely so that the claw of clip C catches at the lower edge of the glass.

REMOVAL AND INSTALLATION <VEHICLES BUILT FROM NOVEMBER, 1992>

Pre-removal and Post-installation Operation**Removal and Installation**

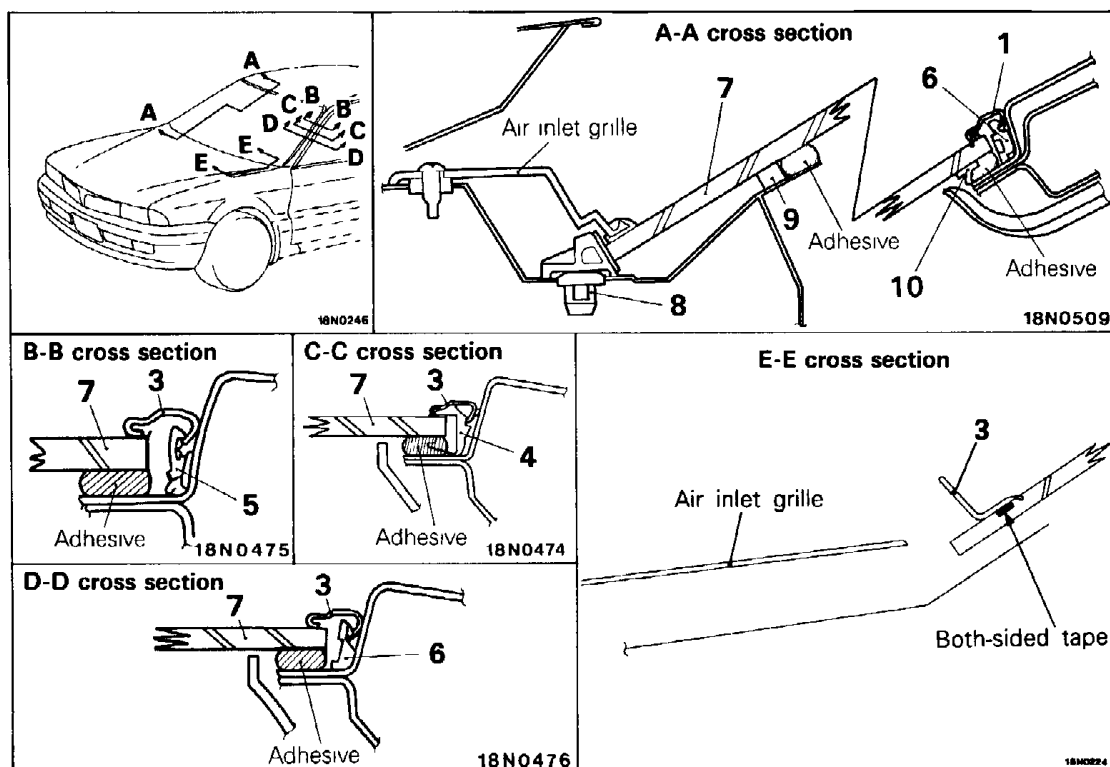
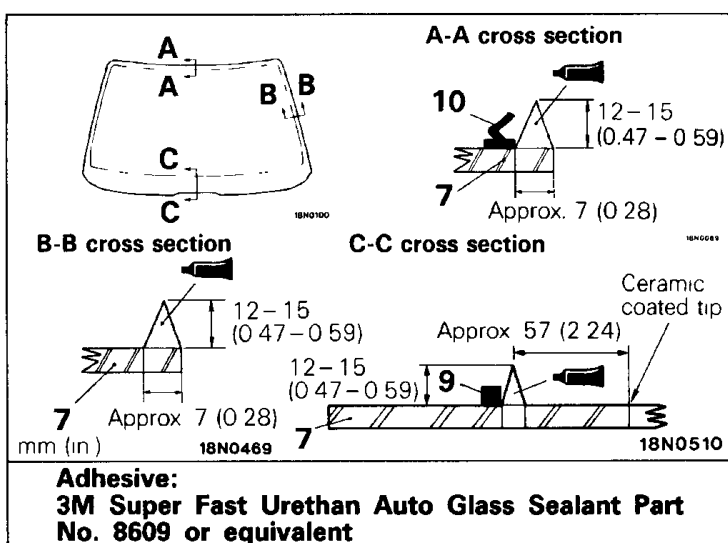
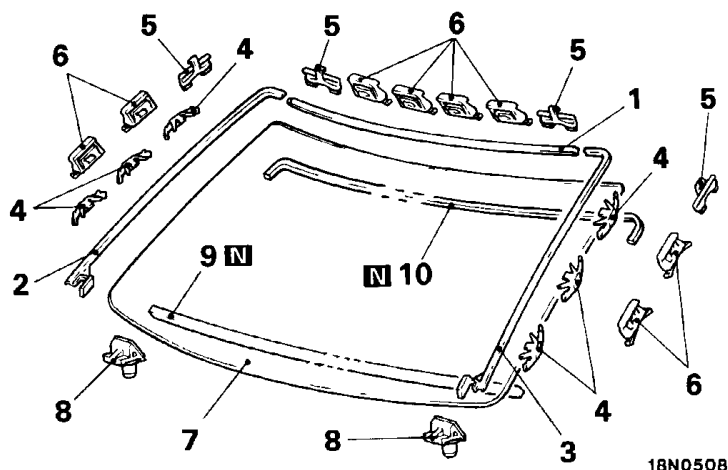
- Wiper Arm (Refer to GROUP 51 – Windshield Wiper and Washer.)
- Air Inlet-Grille (Refer to GROUP 51 – Grille.)
- Headlining (Refer to GROUP 52 – Headlining)
- Front Pillar Trim (Refer to GROUP 52 – Trims)
- Inside Rear View Mirror (Refer to GROUP 52 – Inside Rear View Mirror)

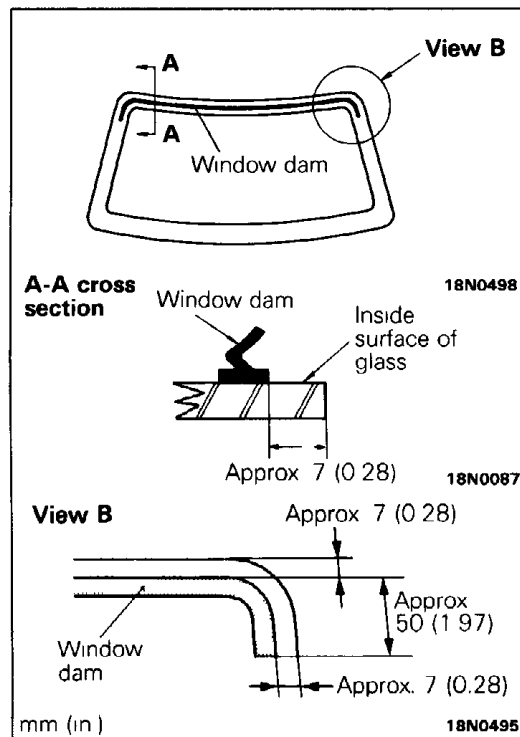
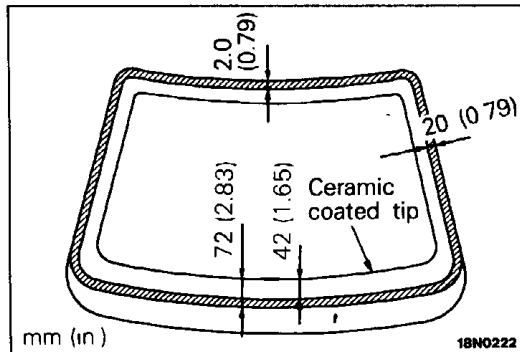
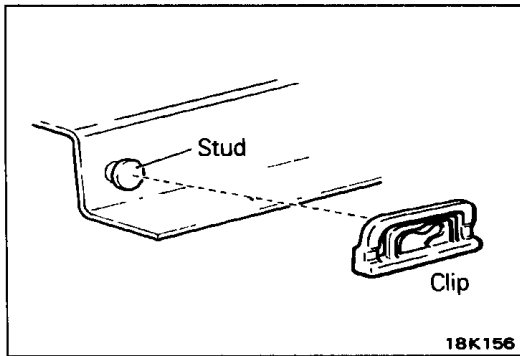
Removal steps

- 1. Windshield upper moulding
- 2. Windshield side moulding (RH)
- 3. Windshield side moulding (LH)
- 4. Windshield moulding clip (C)
- 5. Windshield moulding clip (A)
- 6. Windshield moulding clip
- 7. Windshield glass
- 8. Spacer clip
- 9. Window spacer
- 10. Window dam

NOTE

Refer to P 42-24 for "Service Points of Removal"





INSPECTION

- Check the body flange for deformation.
- Check the window moulding clips and studs for damage.

NOTE

If the T-studs are broken, use a drill to make holes in the T-studs 3 mm (0.12 in.) in diameter, fill the holes with adhesive, and then use screws to mount the window moulding clips.

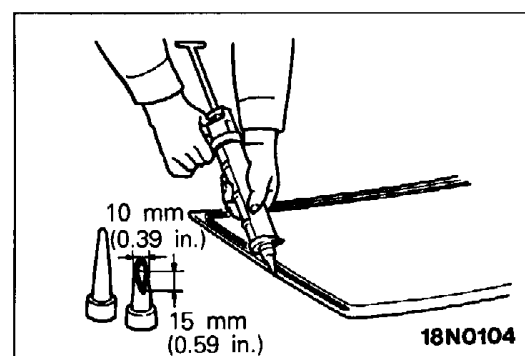
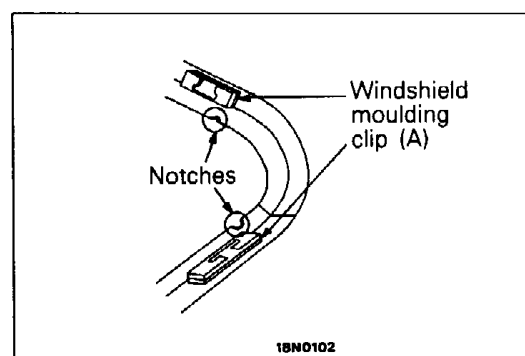
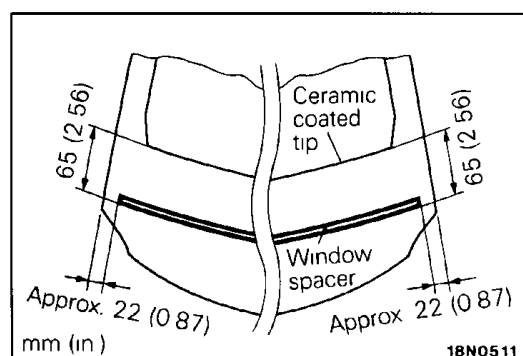
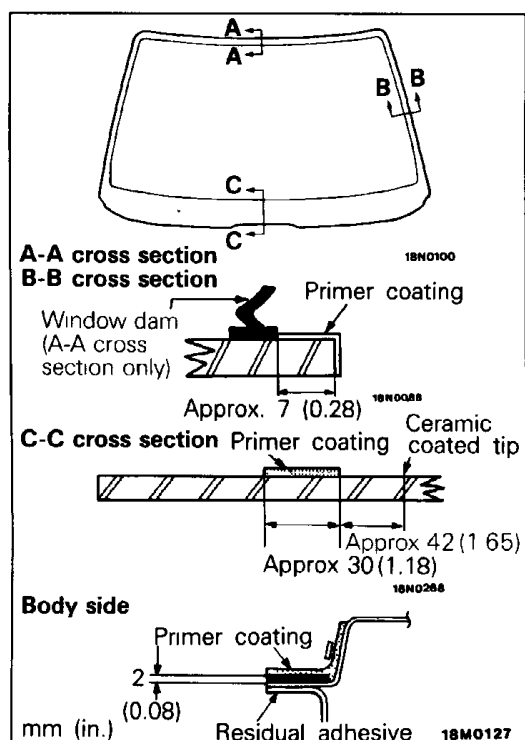
Caution

After installing the clip, apply antirust solvent to the screw head to protect them from rust.

SERVICE POINTS OF INSTALLATION

10. INSTALLATION OF WINDOW DAM

- (1) Wipe the windshield glass section in the figure with isopropyl alcohol to clean it and to remove all grease, etc.
- (2) Glue the window dam correctly to the inside of the windshield glass so that it has no bends or raised sections.



9. INSTALLATION OF WINDOW SPACER/8. SPACER CLIP/7. WINDSHIELD GLASS/6. WINDSHIELD MOUNTING CLIP/5. WINDSHIELD MOUNTING CLIP (A)

- (1) When replacing the glass, temporarily set the glass against the body, and mark the glass and body where they match.
- (2) Soak a sponge in the primer, and apply evenly to the glass and the body in the places shown in the figure.

Specified primer: 3M Super Fast Urethan Primer Part No. 8608 or equivalent

Caution

1. The primer strengthens the adhesive strength, so be sure to apply it evenly around the entire circumference. But, a too thick application will cause lowering of the adhesive strength.
2. Do not touch the coated surface.
- (3) After applying the primer, let it dry for 3 to 30 minutes.

- (4) Glue the window spacer correctly as shown in the figure to the inside of the windshield glass so that it has no bends or raised sections.
- (5) Attach the spacer clip.

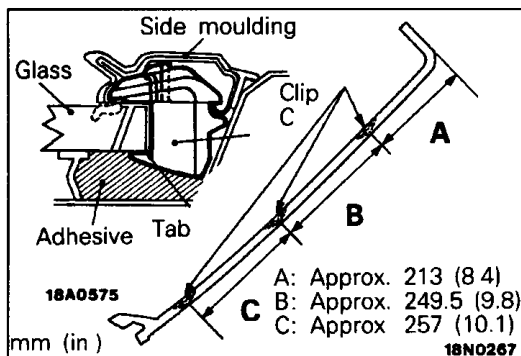
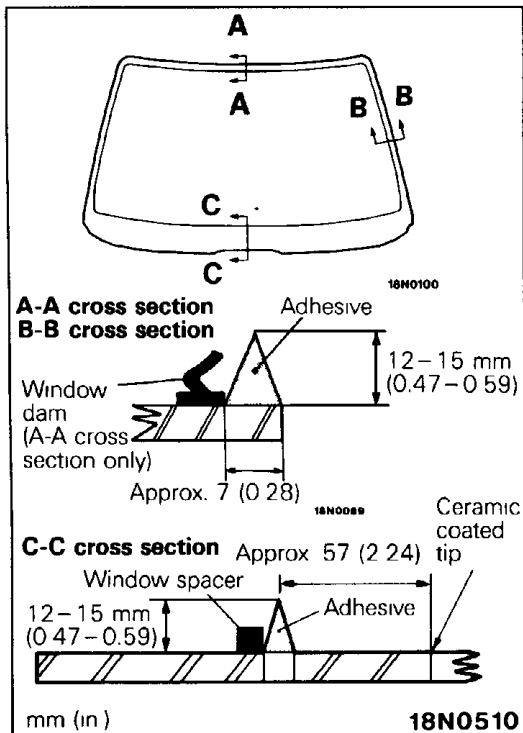
- (6) Glue the windshield moulding clips (A) so that the clips' ends match the notches on the body, as shown in the figure.
- (7) Set the windshield mounting clip studs into the windshield mounting clips.

- (8) Within 30 minutes after applying the primer, fill the sealant gun with adhesive and apply the adhesive evenly around the entire circumference of the windshield.

Specified adhesive: 3M Super Fast Urethan Auto Glass Sealant Part No. 8609 or equivalent

NOTE

Cut the nozzle tip of the sealant gun into a V shape to facilitate adhesive application.



(9) After applying the adhesive, match up the marks on the glass and the body.

(10) After removing any adhesive that is sticking out or adhering to the body or glass with a spatula, etc., clean off with isopropyl alcohol.

After completion of this operation (after installing the glass), place it somewhere there it will not be disturbed, until the adhesive sets.

Caution

If heat is applied with an infra-red lamp to shorten the setting time, keep the surface temperature of the adhesive below 100°C (212°F).

(11) After attaching the windshield glass to the body, let it stand for 30 minutes or more, and then test for water leakage.

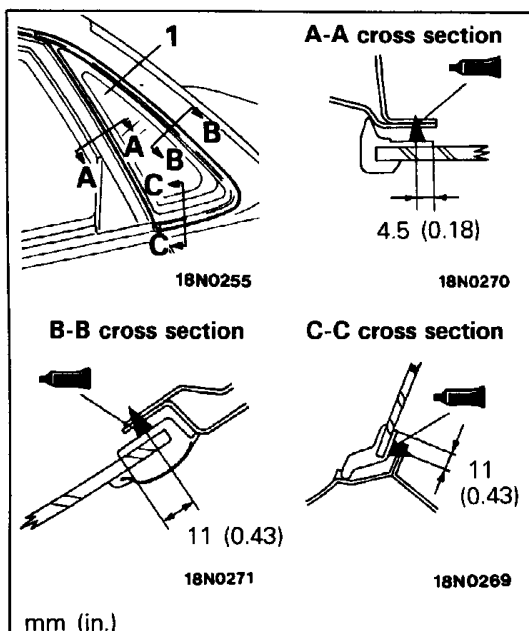
Caution

1. If moving the vehicle, it should be done gently.
2. When testing for water leakage, do not pinch the end of the hose to spray the water.

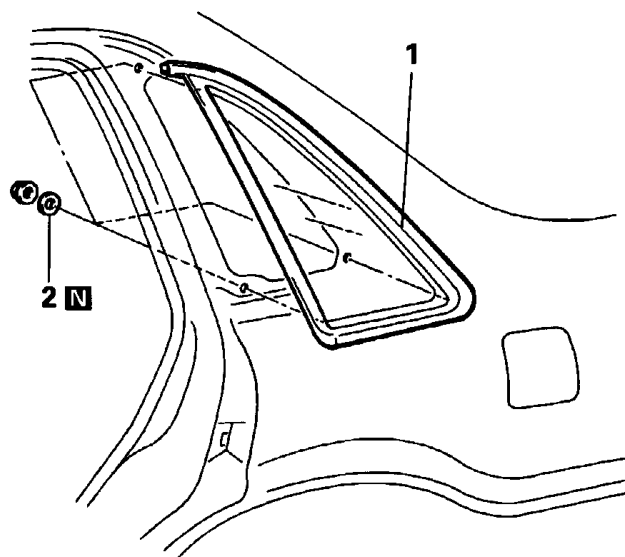
3./2. INSTALLATION OF WINDSHIELD SIDE MOULDING

Install the moulding before the glass's adhesive hardens. For the side moulding, install moulding clip C at the position indicated in the illustration, installing securely so that the claw of clip C catches at the lower edge of the glass.

QUARTER WINDOW GLASS REMOVAL AND INSTALLATION



Sealant:
3M ATD Part No. 8513 or 3M ATD Part No. 8509, or equivalent



18N0272

Pre-removal and Post-installation Operation

- Removal and Installation of Rear Pillar Trim (Refer to GROUP 52 – Trims)

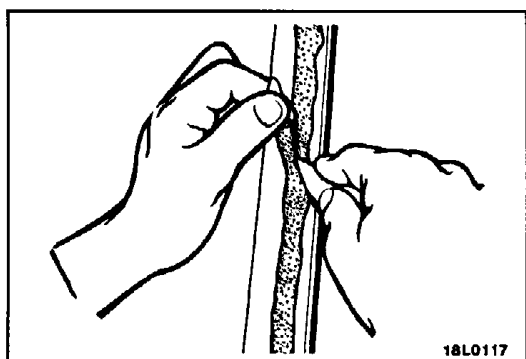
Removal steps

1. Quarter window moulding and glass assembly
2. Packing

SERVICE POINTS OF REMOVAL

1. REMOVAL OF QUARTER WINDOW MOULDING AND GLASS ASSEMBLY

- (1) Remove the quarter window moulding and glass assembly mounting nuts.
- (2) While warming the adhesive section, slowly remove the quarter window moulding and glass assembly by firmly pushing the quarter window glass from the inside of the vehicle to the outside.

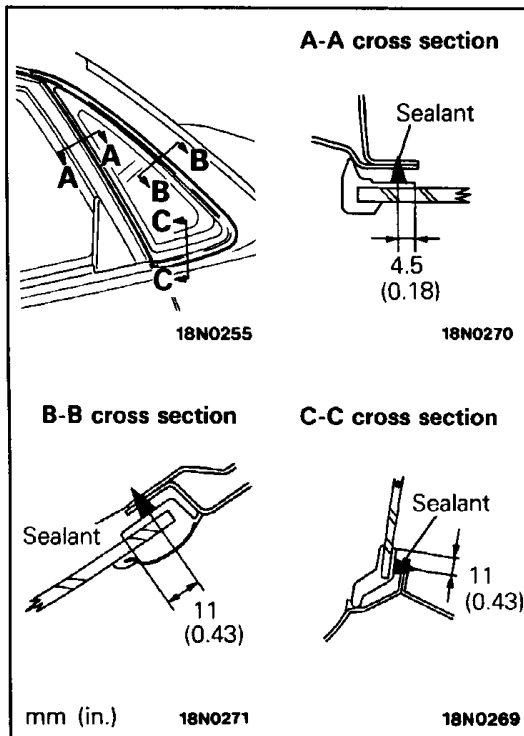


18L0117

- (3) Remove any adhesive still sticking to the body flange with a knife, etc.

Caution

Do not damage the coating surface of the body. If the coating surface is damaged, repair paint or anti-corrosion agent should be applied to the scratched portion.



SERVICE POINTS OF INSTALLATION

1. INSTALLATION OF QUARTER WINDOW MOULDING AND GLASS ASSEMBLY

- (1) Apply the specified sealant around the entire circumference of the glass as shown in the figure, and attach to the body.

Specified sealant: 3M ATD Part No. 8513 or 3M ATD Part No. 8509, or equivalent

- (2) Tighten the quarter window moulding and glass assembly mounting nuts.
- (3) After removing any adhesive that is sticking out from the moulding or adhering to the glass or body with a spatula, etc., clean off with isopropyl alcohol.
- (4) Carry out a test for water leakage.

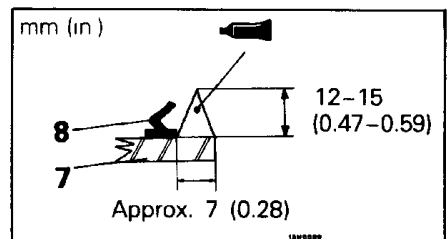
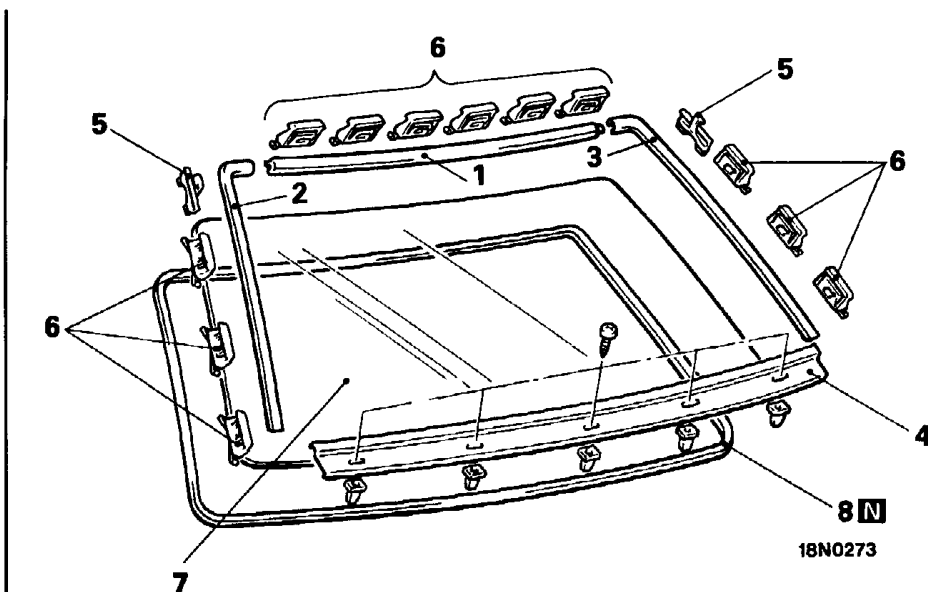
Caution

When testing for water leakage, do not pinch the end of the hose to spray the water.

REAR WINDOW GLASS

E42LDAF

REMOVAL AND INSTALLATION <VEHICLES BUILT UP TO OCTOBER, 1992>



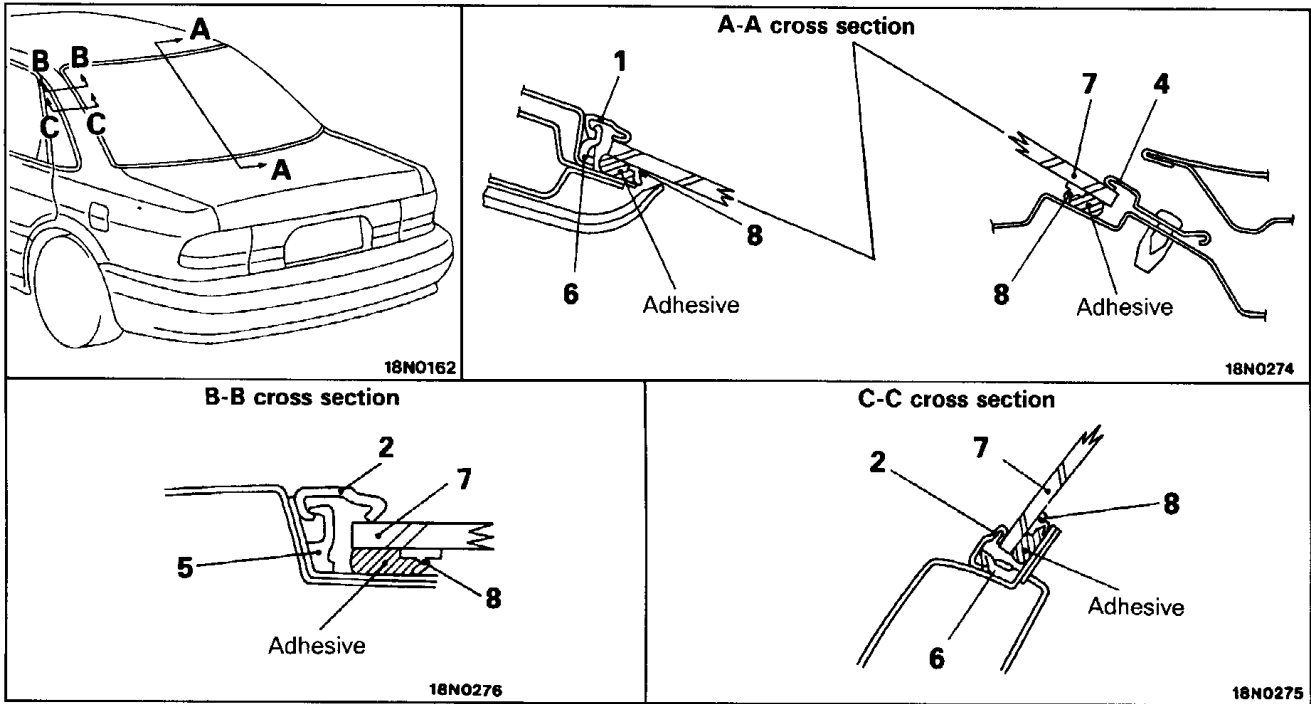
Adhesive:
3M Super Fast Urethan Auto Glass Sealant Part No. 8609 or equivalent

Removal steps

1. Rear window upper moulding
2. Rear window side moulding (LH)
3. Rear window side moulding (RH)
4. Rear window lower moulding
5. Window moulding clip (B)
6. Windshield moulding clip (RR)
7. Rear window glass
8. Window dam

Pre-removal and Post-installation Operation**Removal and Installation**

- Rear Wiper Arm (Refer to GROUP 51 – Rear Wiper and Washer)
- Rear Pillar Trim (Refer to GROUP 52 – Trim.)
- Headlining (Refer to GROUP 52 – Headlining.)



SERVICE POINTS OF REMOVAL

7. REMOVAL OF REAR WINDOW GLASS

Remove in the same way as for the windshield glass.
(Refer to P. 42-24.)

SERVICE POINTS OF INSTALLATION

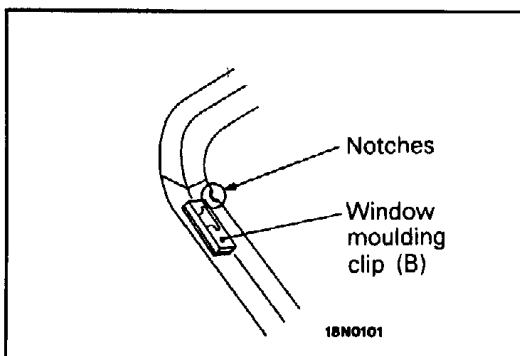
8. INSTALLATION OF WINDOW DAM

Attach all the way around in the same way as for the windshield glass.
(Refer to P. 42-25.)

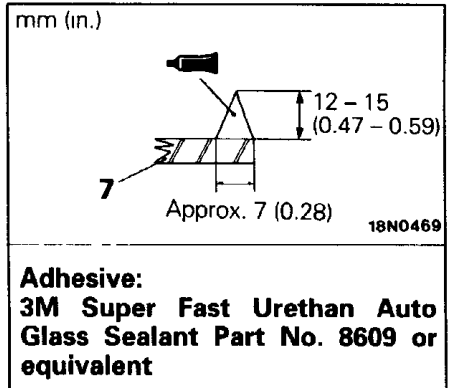
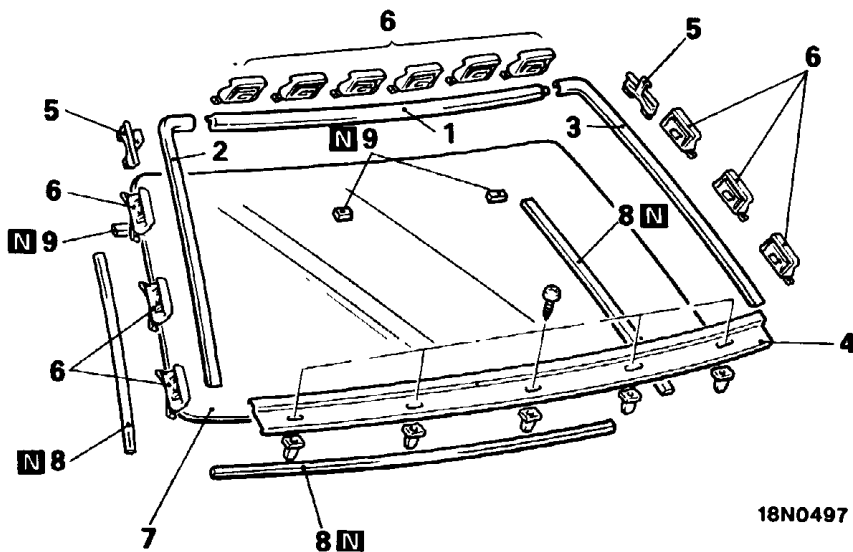
7. INSTALLATION OF REAR WINDOW GLASS/5. WINDOW Moulding CLIP (B)

(1) Install in the same way as for the windshield glass.
(Refer to P.42-25.)

(2) Glue the window moulding clip (B) so that the end of the clip matches the notch on the body, as shown in the figure.



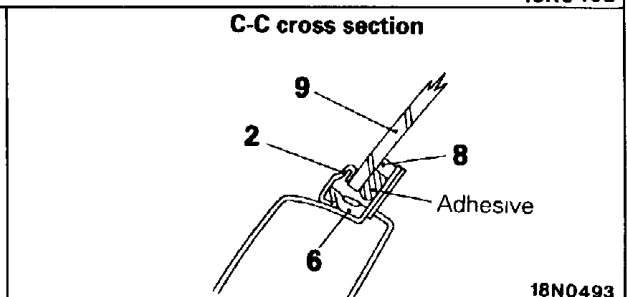
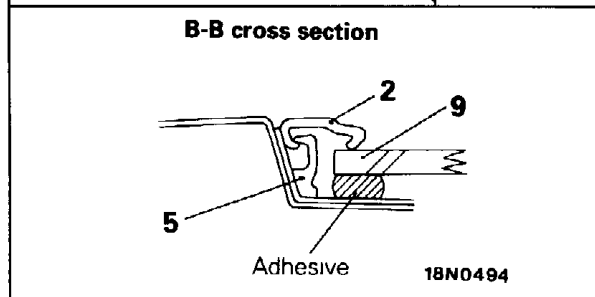
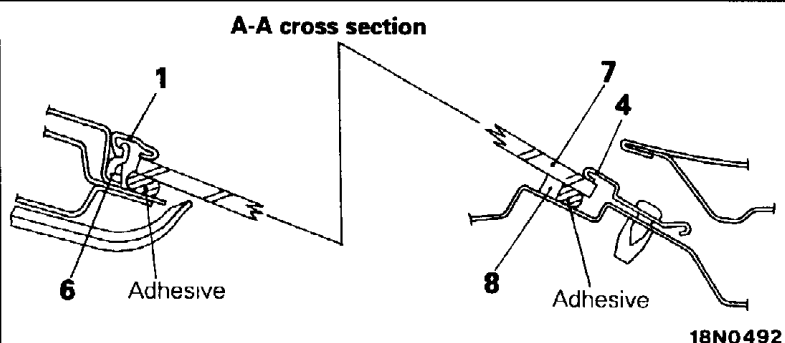
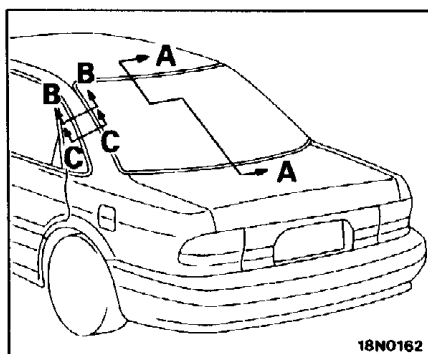
REMOVAL AND INSTALLATION <VEHICLES BUILT FROM NOVEMBER, 1992>

**Pre-removal and Post-installation
Operation****Removal and Installation**

- Rear Wiper Arm
(Refer to GROUP 51 – Rear Wiper and Washer)
- Rear Pillar Trim
(Refer to GROUP 52 – Trim)
- Headlining
(Refer to GROUP 52 – Headlining)

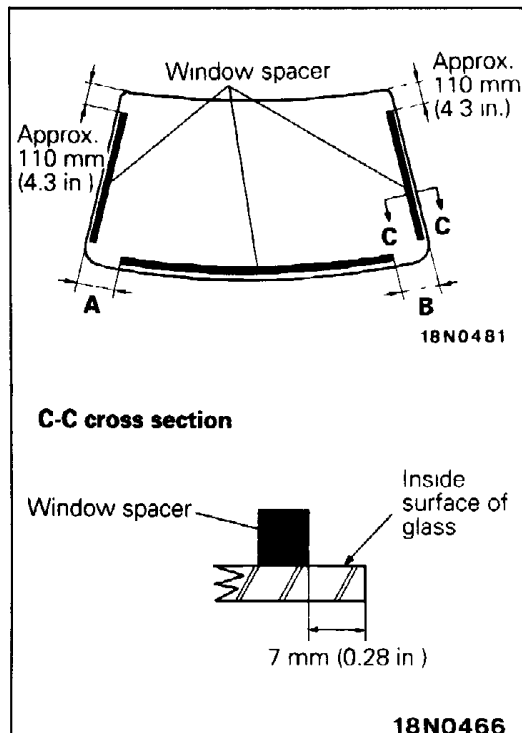
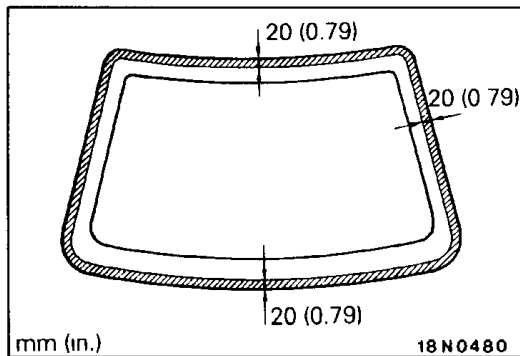
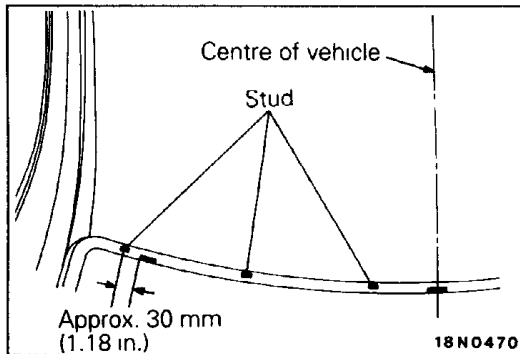
Removal steps

1. Rear window upper moulding
2. Rear window side moulding (LH)
3. Rear window side moulding (RH)
4. Rear window lower moulding
5. Window moulding clip (B)
6. Windshield moulding clip (RR)
7. Rear window glass
8. Window spacer
9. Side spacer



SERVICE POINTS OF REMOVAL**7. REMOVAL OF REAR WINDOW GLASS**

Remove in the same way as for the windshield glass. (Refer to P 42-24.)

**SERVICE POINTS OF INSTALLATION****9. INSTALLATION OF SIDE SPACER**

Install the side spacers to the body in the places shown in the illustration.

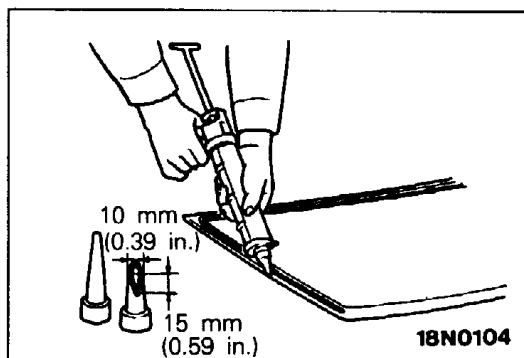
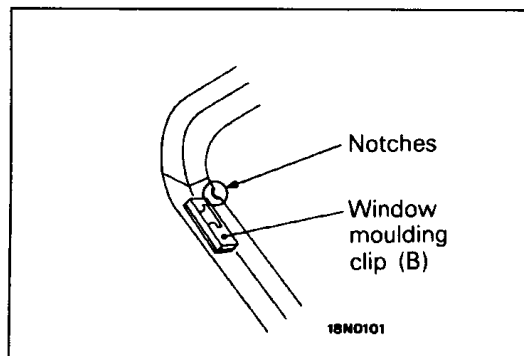
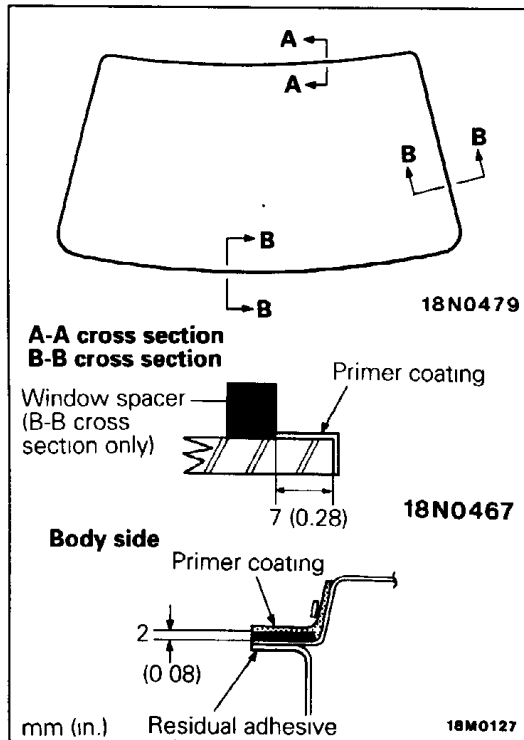
8. INSTALLATION OF WINDOW SPACER

- (1) Wipe the rear window glass section in the figure with isopropyl alcohol to clean it and to remove all grease, etc.

- (2) Glue the window spacer correctly to the inside of the windshield glass so that it has no bends or raised sections.

NOTE

Install the window spacer at the lower side of the glass so that the dimensions A and B are equal.



7. INSTALLATION OF REAR WINDOW GLASS 5. WINDOW MOULDING CLIP (B)

- (1) When replacing the glass, temporarily set the glass against the body, and mark the glass and body where they match.
- (2) Soak a sponge in the primer, and apply evenly to the glass and the body in the places shown in the figure.

Specified primer: 3M Super Fast Urethan Primer Part No. 8608 or equivalent

Caution

1. The primer strengthens the adhesive strength, so be sure to apply it evenly around the entire circumference. But, a too thick application will cause lowering of the adhesive strength.
2. Do not touch the coated surface.
- (3) After applying the primer, let it dry for 3 to 30 minutes.

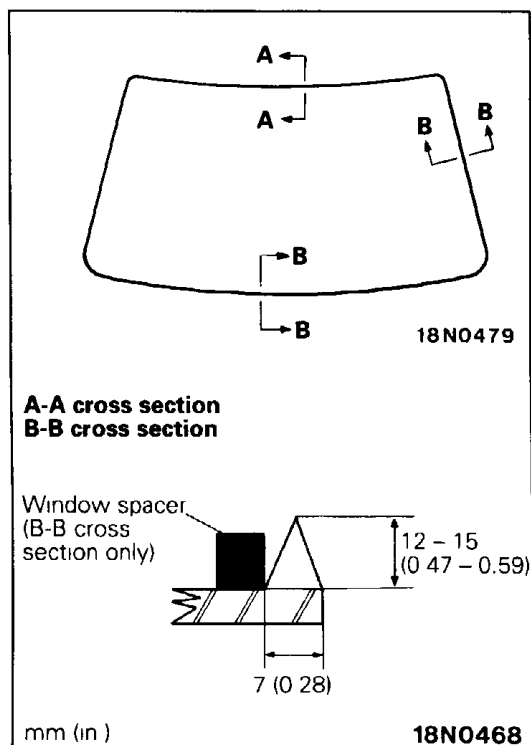
- (4) Glue the window moulding clip (B) so that the end of the clip matches the notch on the body, as shown in the figure.

- (5) Within 30 minutes after applying the primer, fill the sealant gun with adhesive and apply the adhesive evenly around the entire circumference of the windshield.

Specified adhesive: 3M Super Fast Urethan Auto Glass Sealant Part No. 8609 or equivalent

NOTE

Cut the nozzle tip of the sealant gun into a V shape to facilitate adhesive application.



- (6) After applying the adhesive, match up the marks on the glass and the body.
- (7) After removing any adhesive that is sticking out or adhering to the body or glass with a spatula, etc., clean off with isopropyl alcohol.

After completion of this operation (after installing the glass), place it somewhere it will not be disturbed, until the adhesive sets.

Caution

If heat is applied with an infra-red lamp to shorten the setting time, keep the surface temperature of the adhesive below 100°C (212°F).

- (8) After attaching the windshield glass to the body, let it stand for 30 minutes or more, and then test for water leakage.

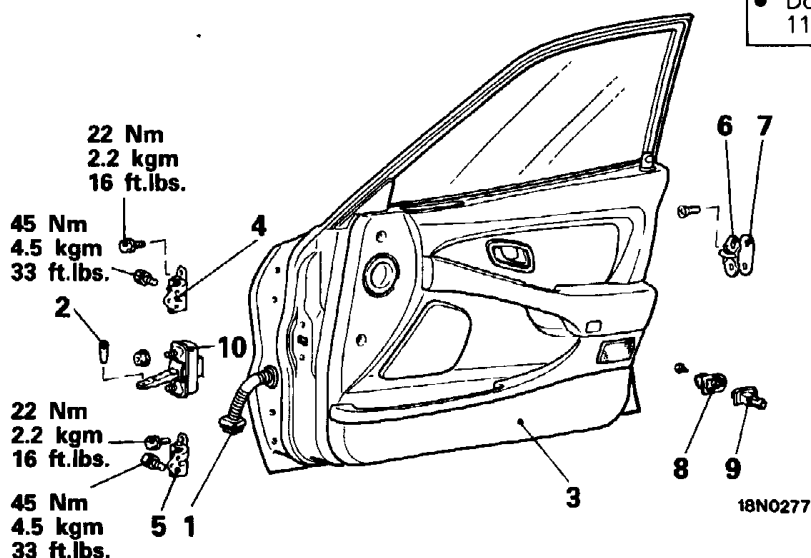
Caution

1. **If moving the vehicle, it should be done gently.**
2. **When testing for water leakage, do not pinch the end of the hose to spray the water.**

DOOR ASSEMBLY

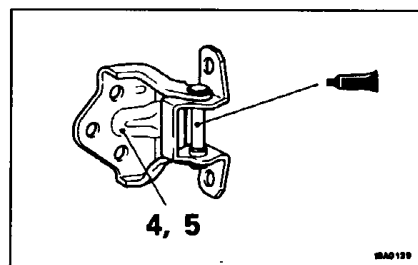
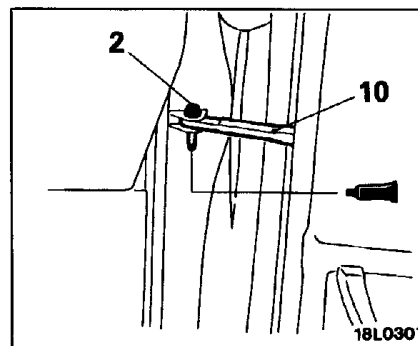
REMOVAL AND INSTALLATION

<Front door>

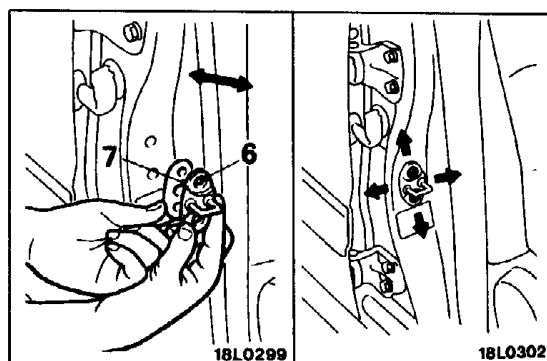
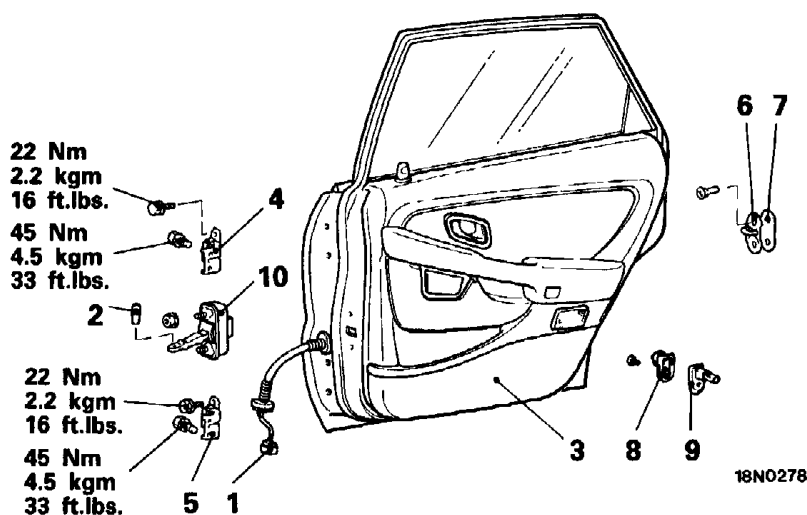


Post-installation Operation

- Door Adjustment (Refer to P. 42-11.)



<Rear door>



Adjustment of the door stepping and the door latch linkage

Door assembly removal steps

1. Door harness connector
2. Spring pin
3. Door Assembly
4. Door upper hinge
5. Door lower hinge

Striker removal steps

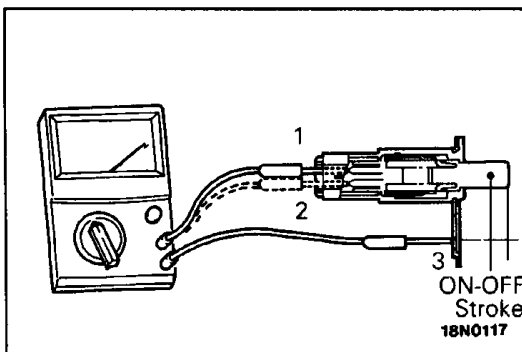
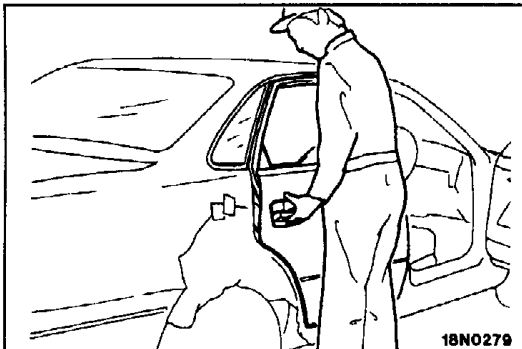
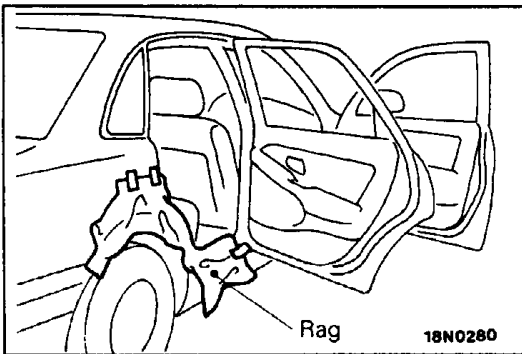
6. Striker
7. Striker shim

Door switch removal steps

8. Door switch cap
9. Door switch

Door check strap removal steps

- Door trim
 - Waterproof film
- (Refer to P. 42-33.)
2. Spring pin
 10. Door check strap



SERVICE POINTS OF REMOVAL

3. REMOVAL OF DOOR ASSEMBLY <REAR DOOR>

- (1) Attach a rag to the rear door body panel to prevent scratches, lower the rear door window as far as possible, and close the rear door.

- (2) Remove the rear door hinge mounting bolt, pull the outer handle to open the latch, and remove the rear door.

INSPECTION

DOOR SWITCH

Operate the switch, and check the continuity between the terminals.

Terminal	1	2	3
Switch position			
Open (ON)	○	○	○
Depressed (OFF)			

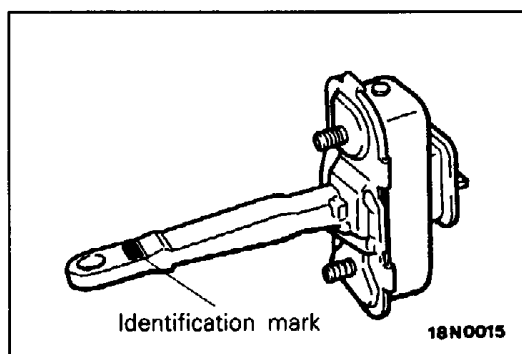
NOTE

○—○ indicates there is continuity between the terminals.

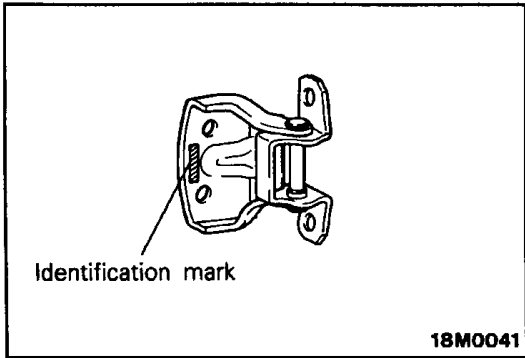
SERVICE POINTS OF INSTALLATION

10. INSTALLATION OF DOOR CHECK STRAP

Install the door check strap so that the identification mark faces upwards.



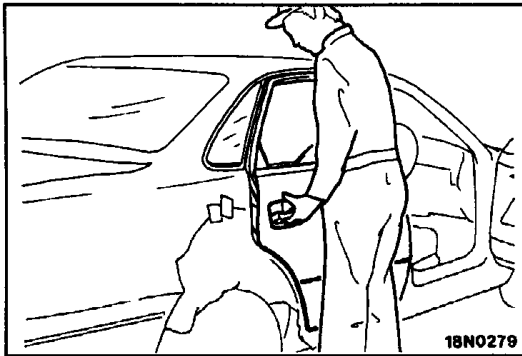
Applicable location		Identification mark
RH	Front door	UR
	Rear door	VR
LH	Front door	UL
	Rear door	VL



**5. INSTALLATION OF DOOR LOWER HIGNE
<REAR DOOR>/4. DOOR UPPER HINGE
<REAR DOOR>**

The rear door hinges differ according to where they are used, so check the identification mark before installation.

Applicable location		Identification mark
Right side	Upper hinge	H1
	Lower hinge	Z
Left side	Upper hinge	G1
	Lower hinge	Y

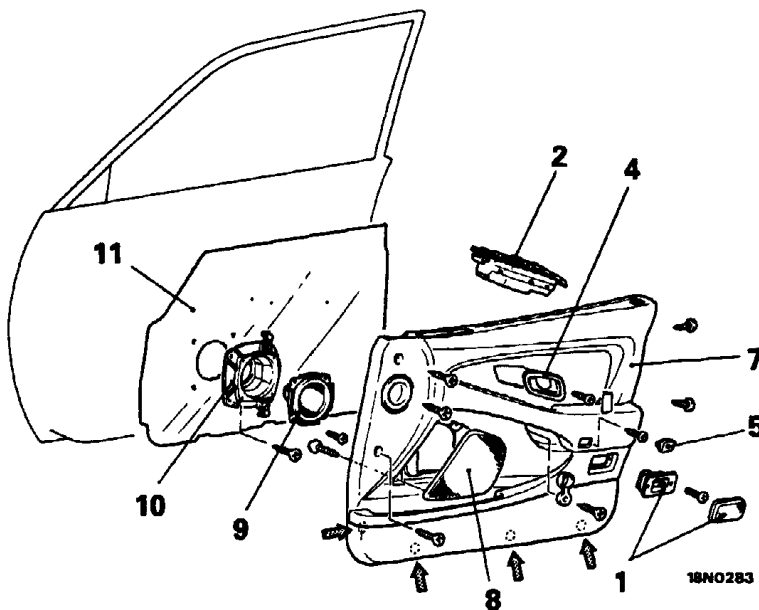


3. INSTALLATION OF DOOR ASSEMBLY <REAR DOOR>

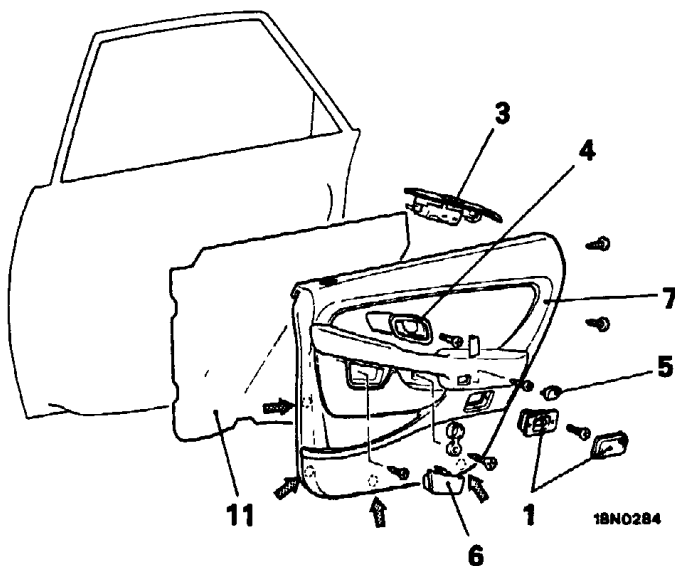
- (1) Install the rear door, and close the rear door latch.
- (2) Install the rear door hinge mounting bolt.
- (3) Open the rear door and remove the rag attached to the body panel.

DOOR TRIM AND WATERPROOF FILM REMOVAL AND INSTALLATION

<Front door>



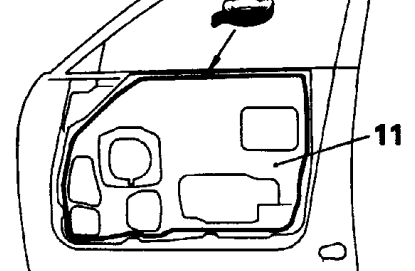
<Rear door>



NOTE

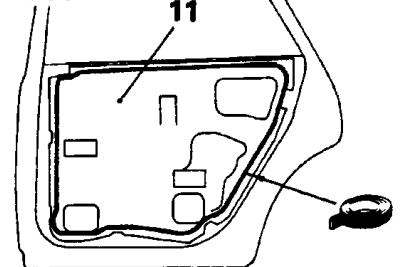
↔ : indicates the clip positions.

<Front door>



Sealant:
3M ATD Part No. 8625 or equivalent

<Rear door>



Sealant:
3M ATD Part No. 8625 or equivalent

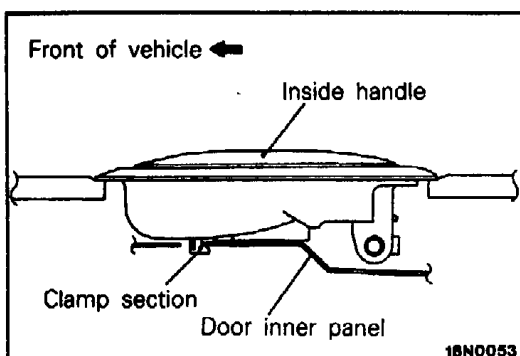
Removal steps

1. Door lamp
2. Front door control unit
3. Rear power window unit
4. Inside handle
5. Cap
6. Ashtray
7. Door trim
8. Speaker garnish
9. Speaker
10. Speaker cover
11. Waterproof film

SERVICE POINTS OF REMOVAL

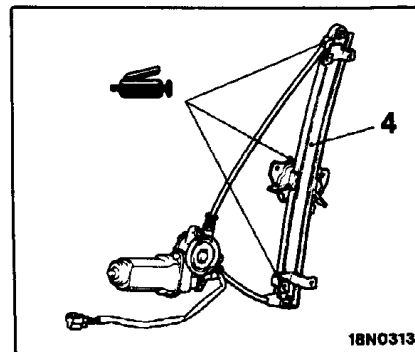
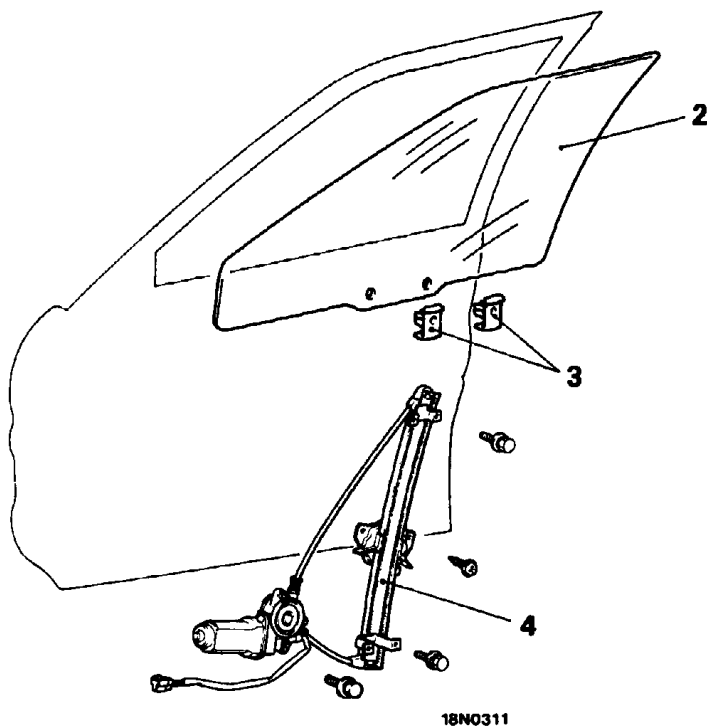
4. REMOVAL OF INSIDE HANDLE

Remove the inside handle mounting screw and remove the handle by pushing it towards the front of the vehicle to remove the clamp section from the door inner panel.



DOOR GLASS AND REGULATOR REMOVAL AND INSTALLATION

<Front door>



Pre-removal Operation

- Removal of Door Trim and Water-proof Film (Refer to P.42-33.)

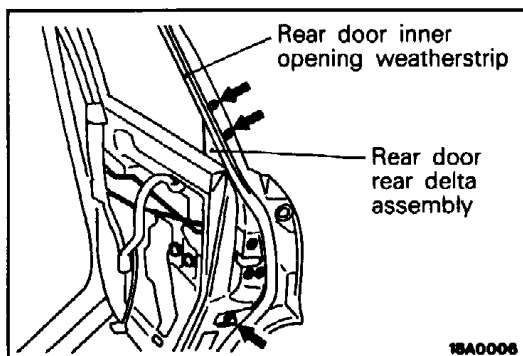
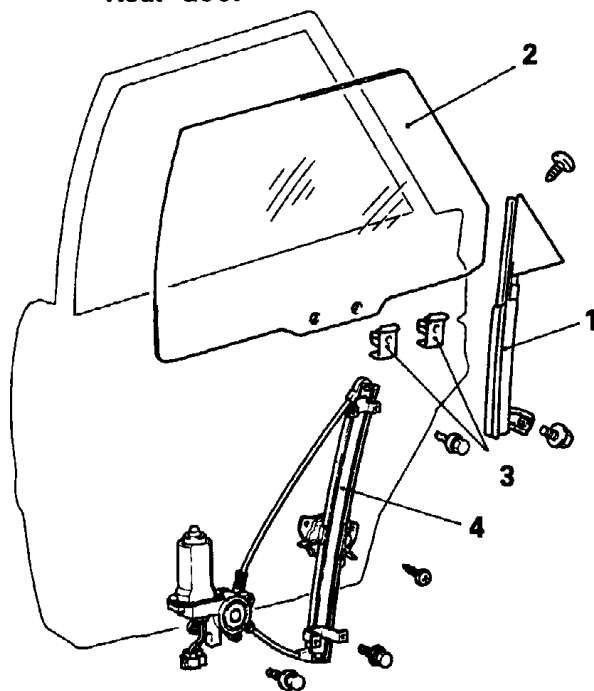
Post-installation Operation

- Door Window Glass Adjustment (Refer to P.42-11.)
- Installation of Door Trim and Water-proof Film (Refer to P.42-33.)

Removal steps

- ⇔ 1. Rear door rear delta assembly
- ⇔ 2. Door window glass
- ⇔ 3. Door glass holder
- ⇔ 4. Window regulator assembly

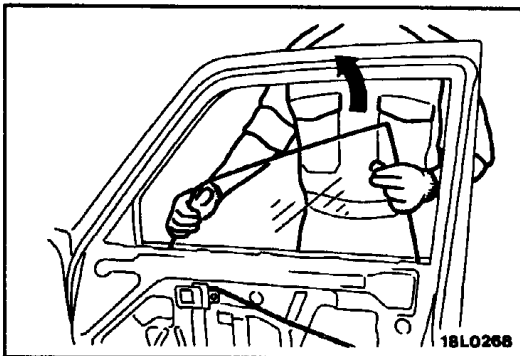
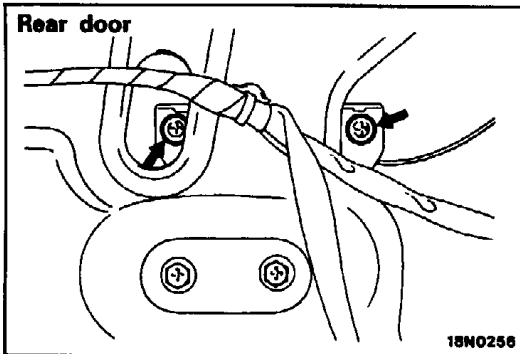
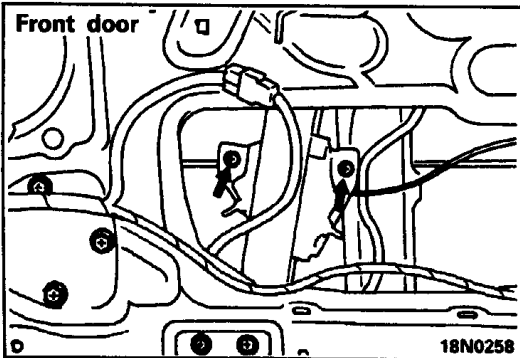
<Rear door>



SERVICE POINTS OF REMOVAL

1. REMOVAL OF REAR DOOR REAR DELTA ASSEMBLY

- (1) Remove the rear door inner opening weatherstrip (only at the rear door lower sash part).
- (2) Remove the rear door lower sash installation screw; then remove the sash from the rear door panel.



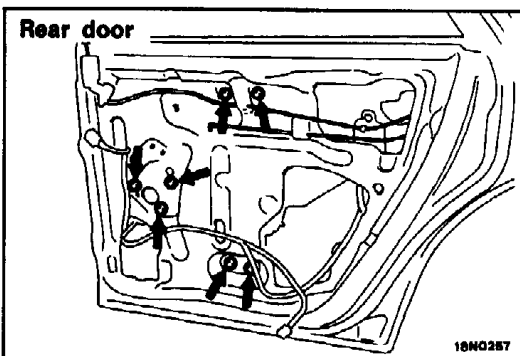
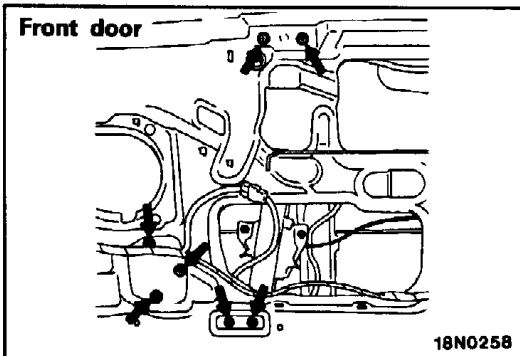
2. REMOVAL OF DOOR WINDOW GLASS

- (1) Lower the door window glass as far as the service hole.
- (2) Remove the glass mounting screw from the rear door window regulator assembly.

NOTE

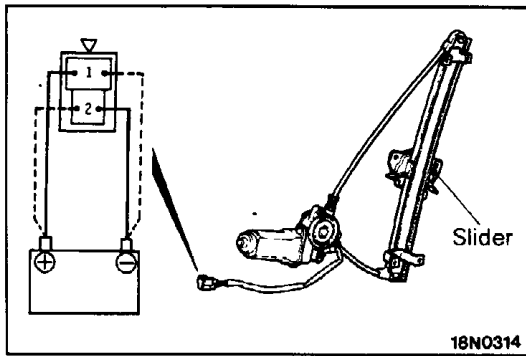
When removing the glass mounting screw, hold the door window glass so that it doesn't fall.

- (3) Lift up the door window glass to remove it from the door assembly.



4. REMOVAL OF WINDOW REGULATOR ASSEMBLY

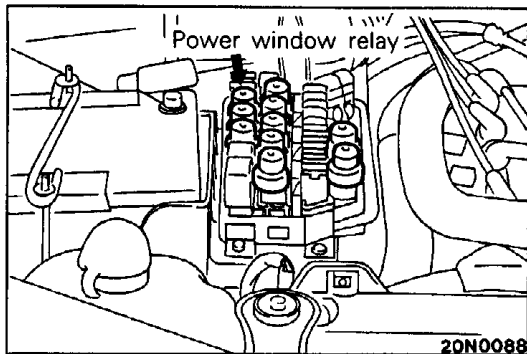
Remove the regulator mounting bolt, and remove the regulator from the door panel service hole.

**INSPECTION****POWER WINDOW MOTOR**

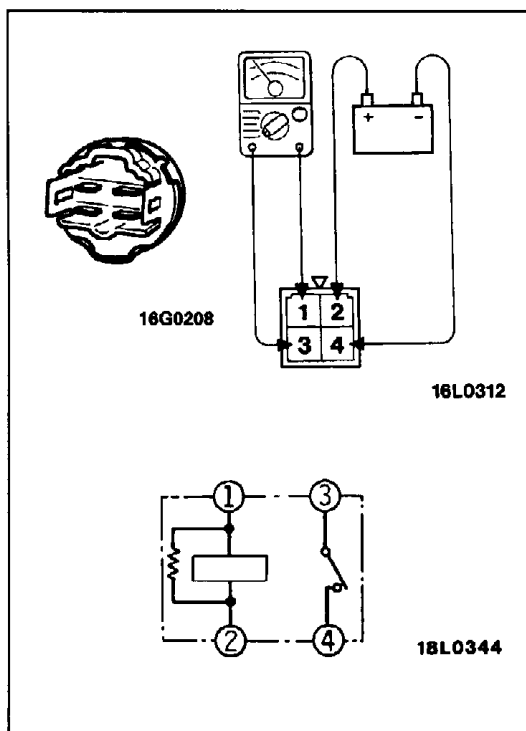
- (1) Check if the slider moves smoothly when the battery is directly connected to the motor terminals.
- (2) Check if the slider moves in the opposite direction when the battery is connected with the polarities reversed.

CIRCUIT BREAKER (INCORPORATED IN THE POWER WINDOW MOTOR)

- (1) Press the UP switch to fully close the window glass, and continue to press the switch for 10 seconds.
- (2) At the moment that the UP switch is released, press the DOWN switch. The circuit breaker can be considered good if at this time the door window glass begins to open within 60 seconds.

**POWER WINDOW RELAY**

- (1) Remove the power window relay from the engine room relay box.



- (2) Apply battery voltage to terminal 2, and check for continuity when terminal 4 is earthed.

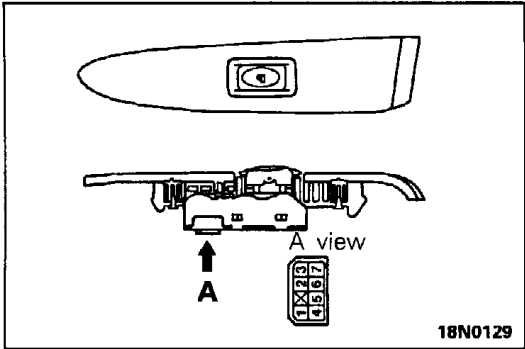
Terminal	1	2	3	4
Battery voltage				
Continuity no voltage		○		○
Continuity with voltage	○		○	

NOTE

○—○ indicates that there is continuity between the terminals.

FRONT DOOR CONTROL UNIT

For inspection of the front door control unit, refer to the troubleshooting heading in Group 54 – Multiple Transmission systems.



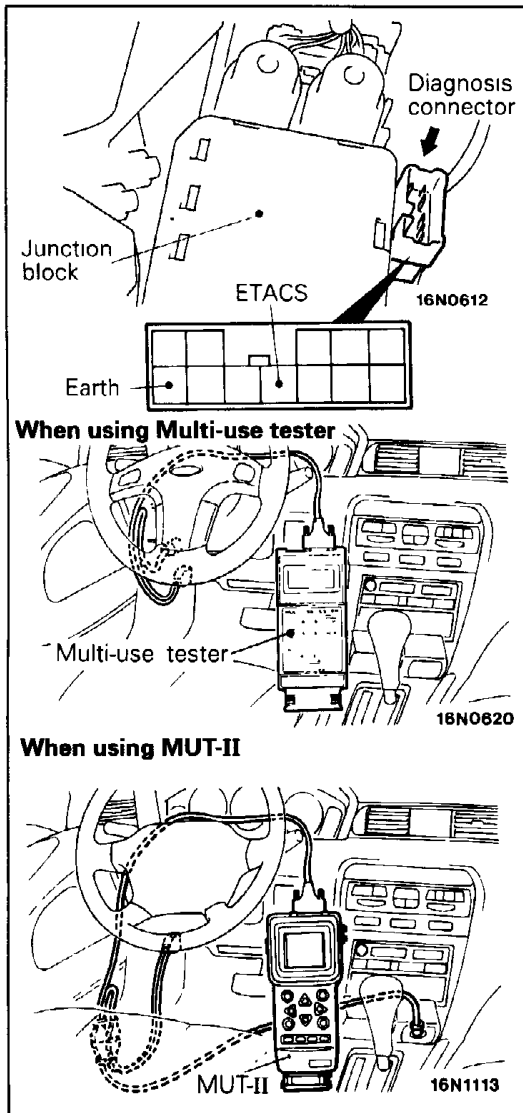
REAR POWER WINDOW UNIT

Operate the switch and check continuity between the terminals.

Terminal \ Switch position	UP	OFF		DOWN
		No continuity	Continuity	
1			○ ○	
2	○	○	⊕	○
3	○	○	○	○
4	○	○	○	○
5	○	○	○	○
6	○	○	⊖	○
7	○	○	⊕	○

NOTE
(1) ○—○ indicates that there is continuity between the terminals.
(2) ⊕ ⊖ indicates connection of battery voltage.

NOTES



DOOR HANDLE AND LATCH

TROUBLESHOOTING GUIDE (KEY REMINDER SYSTEM)

INPUT CHECK

Using the multi-use tester <Up to 1993 models> or MUT-II <All models>, check whether or not the input signals from each switch are being input to the electronic control unit.

- (1) Connect the multi-use tester or MUT-II to the diagnosis connector. (located at the right or left side of the junction block).

Caution

Connection and disconnection of the multi-use tester or MUT-II should always be made with the ignition switch in the OFF position.

- (2) Check to be sure that the buzzer of the multi-use tester or MUT-II sounds one time, when each switch noted below is operated.

If the buzzer sounds, the input signals are being input to the electronic control unit, so that switch can be considered to be functioning normally;

If there is a malfunction, there is an abnormality in the switch or in the switch input circuit, so they should be inspected.

- Driver door switch
- Key reminder switch (When ignition key is removed or inserted)
- Vehicle speed sensor

NOTE

When carrying out an inspection of the key reminder switch, connect the accessory battery harness so that the power for the multi-use tester or MUT-II comes directly from the battery.

TROUBLESHOOTING QUICK-REFERENCE TABLE

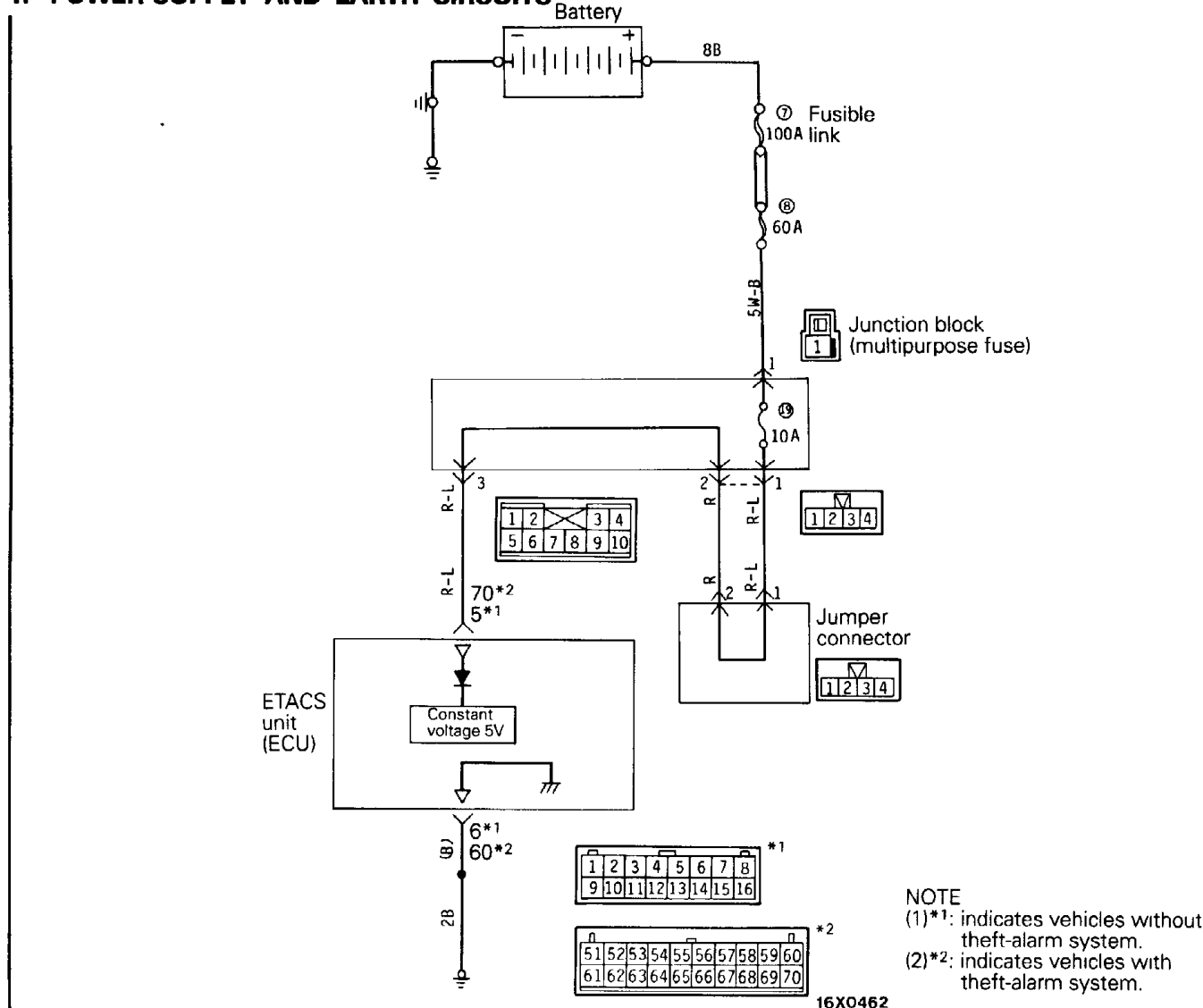
Problem	Probable cause	Check method	Remedy
When doing the following operations, unlock does not occur even if the driver's side door lock knob is pressed ● Inserting the key into the ignition switch (key reminder switch is OFF). ● Driver's side door is open (driver's side door switch is ON).	Power circuit or earth circuit wire is broken	Check by using circuit and individual part check No. 1 (P.42-39).	Repair the wiring harness.
	Short in key reminder switch input circuit	If the result of an input check shows a malfunction, check by using circuit and individual part check No. 2 (P.42-40).	Repair the harness or replace the key reminder switch.
	Short in key reminder switch		
	Driver's side door switch input circuit wire is broken	If the result of an input check shows a malfunction, check by using circuit and individual part check No. 3 (P.42-41).	Repair the harness or replace the driver's side door switch.
	Driver's side door switch wire is broken		
	Short in vehicle speed sensor input circuit	If the result of an input check is defective, check by using circuit and individual part check No. 4 (P.42-42)	Repair the harness or replace the vehicle speed sensor
	Malfunction of the electronic control unit	–	Replace the electronic control unit.

NOTE

- (1) For the door lock relay, refer to Troubleshooting for the door control unit (GROUP 54 – Multiple Transmission System).
- (2) ECU (electronic control unit) denotes the ETACS unit.

CHECKING INDIVIDUAL PART AND CIRCUIT

1. POWER-SUPPLY AND EARTH CIRCUITS



Description of operation

The battery supplies a stabilized 5V power supply to the electronic control unit, via the constant-voltage circuit and terminal ⑤ *1, ⑦⑩ *2 directly connected to the battery.

If there is an abnormal condition of the power-supply circuit, door locking functions also will not operate.

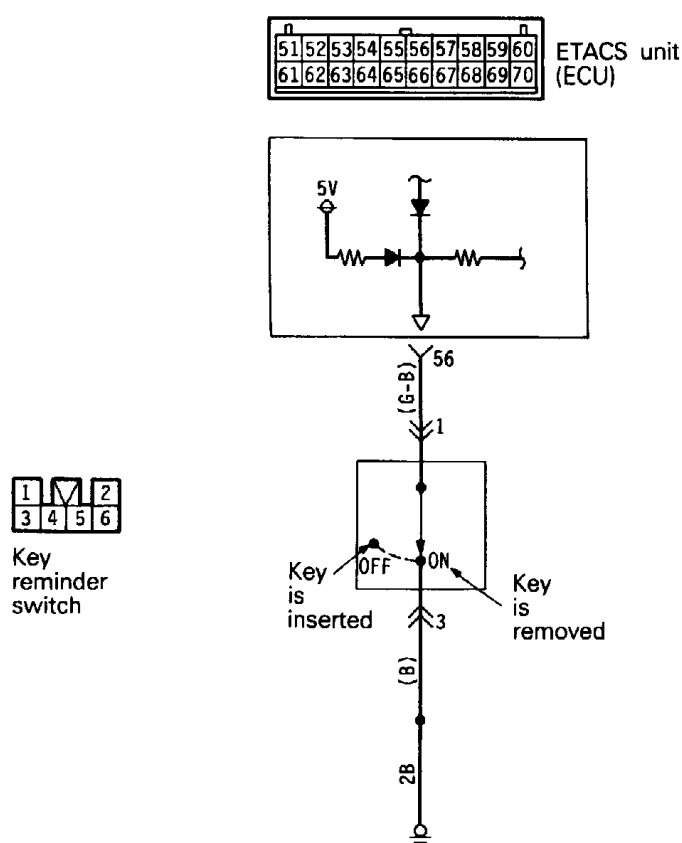
Electronic control unit voltage (connection status of the electronic control unit connector)

ECU terminal No.	Signal	Condition	Terminal voltage
5*1 70*2	Electronic control unit power supply	At all times	System voltage

Checking the earth circuit (Disconnect the connector and check the wiring harness side.)

Terminal No.	Connected to/ measured part	Measurement	Tester connection	Check conditions	Standard
6*1 60*2	Electronic control unit earth	Continuity	6-earth*1 60-earth*2	At all times	Continuity

2. KEY REMINDER SWITCH INPUT CIRCUIT



16N0711

Description of operation

When the key is left in the ignition key cylinder, the key reminder switch turns OFF and sends an H signal to the ECU, and when the key is removed, the switch turns ON and sends an L signal to the ECU.

Electronic control unit terminal voltage

(Connection status of the electronic control unit connector)

ECU terminal No.	Signal	Condition	Terminal voltage
56	Key reminder switch signal	Key is removed	0V
		Key is inserted	5V

Key reminder switch circuit check

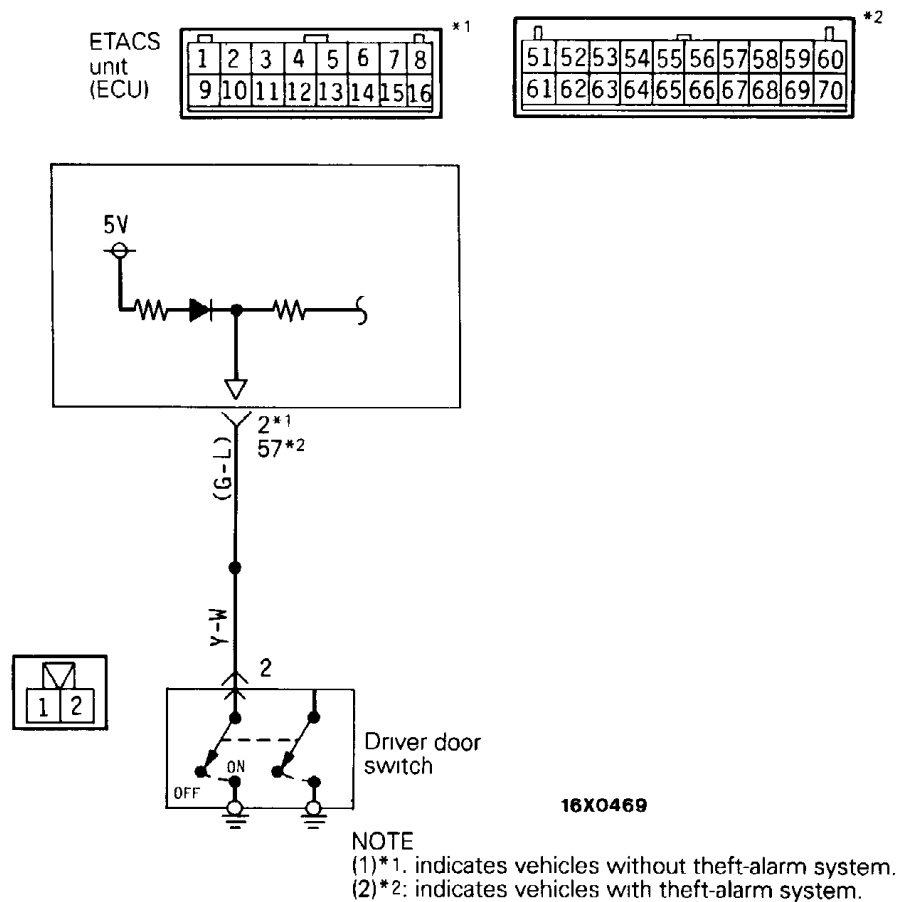
(Disconnect the connector of the electronic control unit and check the wiring harness side.)

ECU terminal No.	Connection end or measurement part	Measurement	Tester connection	Condition	Standard
56	Key reminder switch	Continuity	56-earth	Key is removed	Continuity
				Key is inserted	No continuity

Checking the individual part

Key reminder switch...Refer to GROUP 54 – Ignition Switch.

3. DRIVER DOOR SWITCH INPUT CIRCUIT



Description of operation

When the front door is closed (the door switch is switched OFF), HIGH-level signals are sent to the electronic control unit; when the driver door is opened (the door switch is switched ON), LOW-level signals are sent to the electronic control unit.

Electronic control unit terminal voltage (connection status of the electronic control unit connector)

ECU Terminal No.	Signal	Condition		Terminal voltage
2*1 57*2	Driver door switch signal	Driver door	Open	0V
			Closed	5V

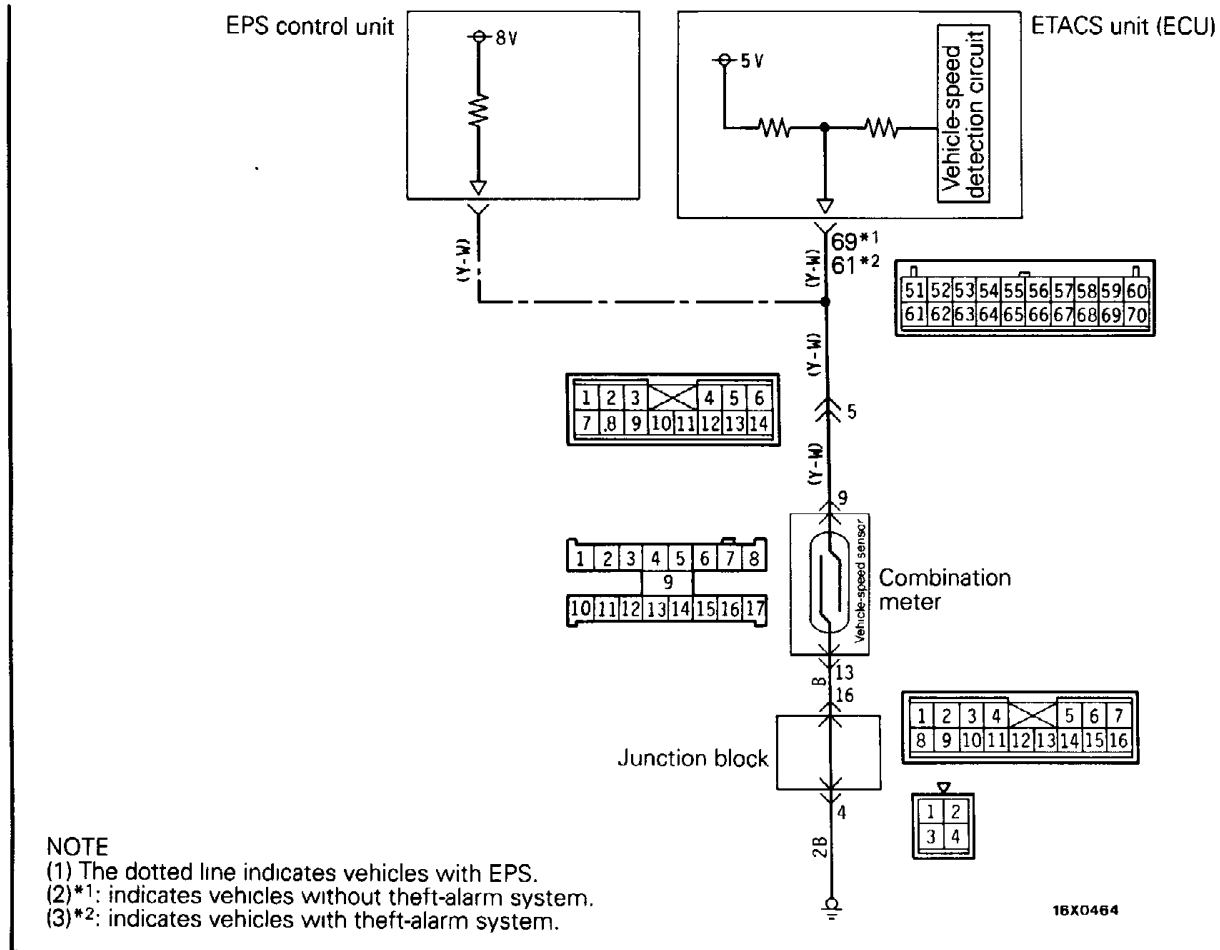
Checking the driver door switch circuit (Disconnect the connector of the electronic control unit and check the wiring harness side.)

ECU terminal No.	Connected to/measured part	Measurement	Tester connection	Check conditions		Standard
2*1 57*2	Driver door switch	Continuity	2-earth*1 57-earth*2	Driver door	Closed	No continuity
					Open	Continuity

Checking the individual part

Door switch...Refer to P. 42-31.

4. VEHICLE-SPEED SENSOR INPUT CIRCUIT



Operation Description

The vehicle-speed sensor is the reed-switch type of sensor; it outputs four pulse signals for each rotation of the transmission's output gear (speedometer cable) and inputs those pulses to the vehicle-speed detection circuit of the electronic control unit.

Electronic Control Unit Terminal Voltage (Connection Status of Electronic Control Unit Connector)

ECU terminal No.	Signal	Status	Terminal voltage
69*1 61*2	Vehicle-speed sensor signal	Vehicle-speed sensor	When ON
			When OFF
			When OFF
		Vehicles without EPS	5V
		Vehicles with EPS	8V*

NOTE

The * mark indicates that pull-up power of 8V is supplied from the EPS control unit.

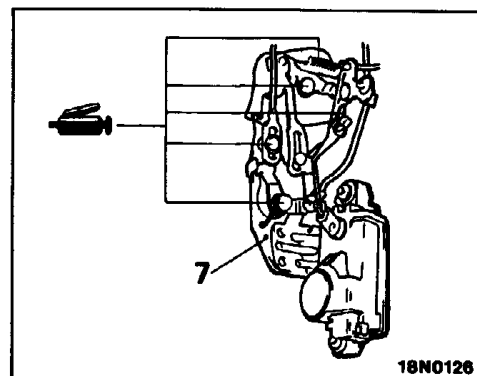
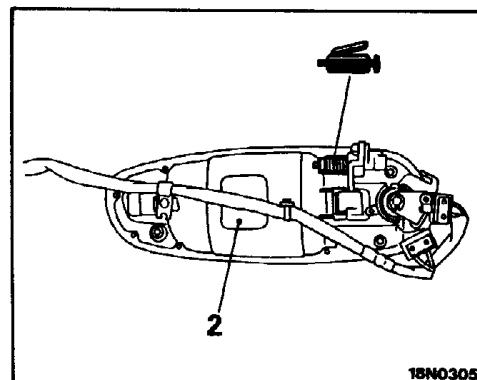
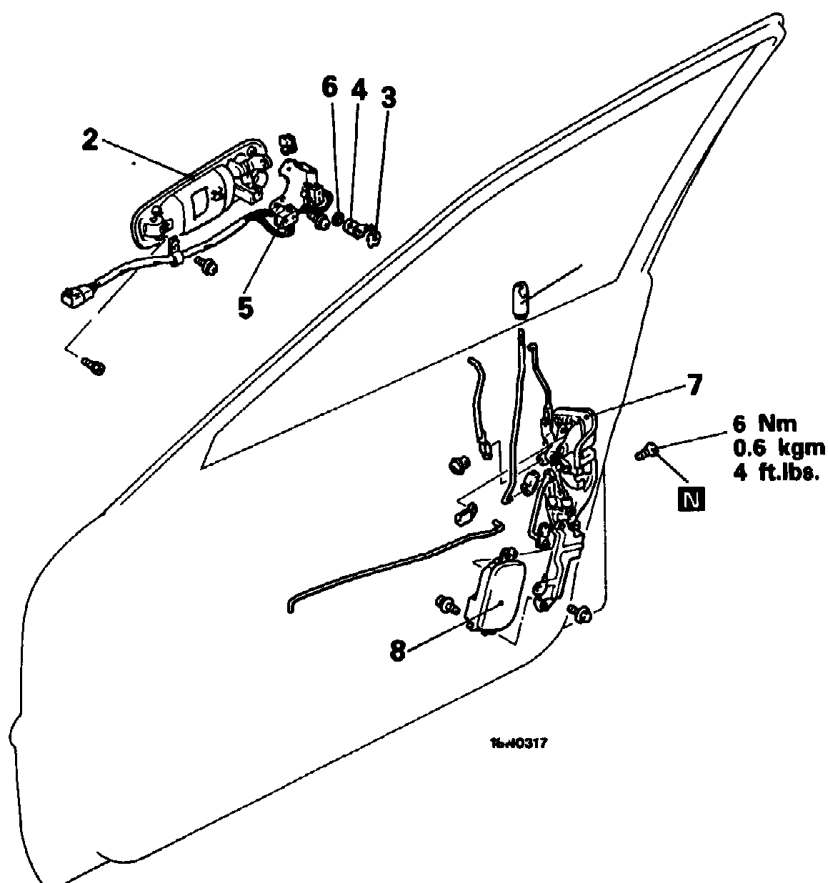
Checking the Vehicle-speed Sensor Circuit (Disconnect the Connector of Electronic Control Unit and Check at the Wiring Harness Side.)

ECU terminal No.	Connected to/measured component	Measurement	Tester connection	Check condition	Standard
69*1 61*2	Vehicle-speed sensor	Resistance	69-earth*1 61-earth*2	(1) Jack up the front end. (2) Rotate the tyres in the forward direction.	Repeats "Continuity" $\uparrow \downarrow$ No continuity"

Checking Individual Part

Vehicle-speed sensor: Refer to GROUP 54 – Meters and Gauges.

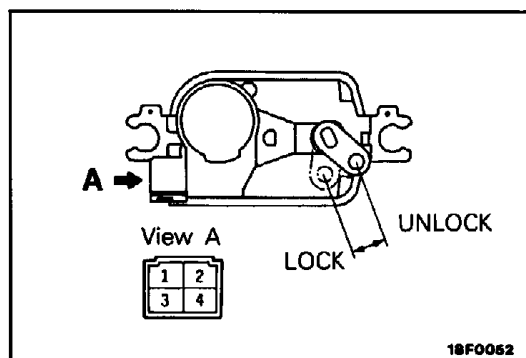
REMOVAL AND INSTALLATION <FRONT DOOR>



Removal steps

- Door trim
- Waterproof film } (Refer to P.42-33.)
- 1. Inside lock knob
- 2. Door outside handle
- 3. Ring

- 4. Door lock key cylinder
- 5. Door key switch
- 6. Spacer
- 7. Front door latch assembly
- 8. Front door lock actuator

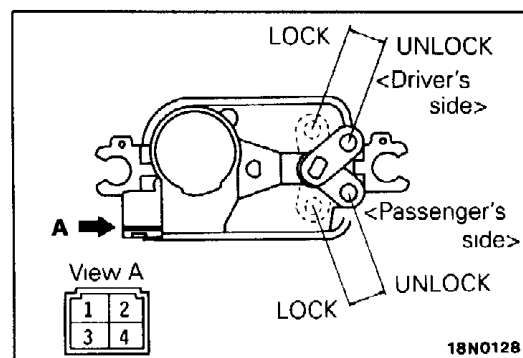
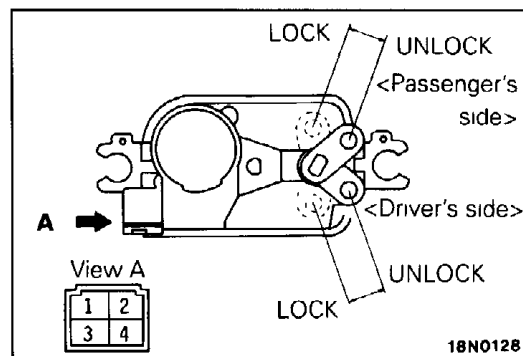
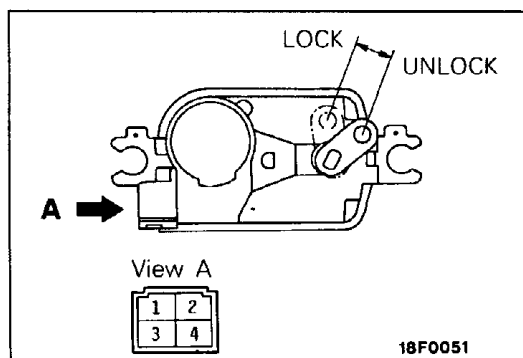


INSPECTION

FRONT DOOR ACTUATOR <VEHICLES WITHOUT THEFT-ALARM SYSTEM>

<L.H.>

- (1) After setting the rod to the LOCK position, apply the battery voltage to terminal ① and check if the rod moves to the UNLOCK position when terminal ③ is earthed.
- (2) After setting the rod to the UNLOCK position and applying battery voltage to terminal ③, check if the rod moves to the LOCK position when terminal ① is earthed.
- (3) For left-hand drive vehicles, when the actuator rod is set to the UNLOCK position, check if there is continuity between terminal ② and terminal ④, and when the rod is set to the LOCK position, check if there is no continuity.

**<R.H.>**

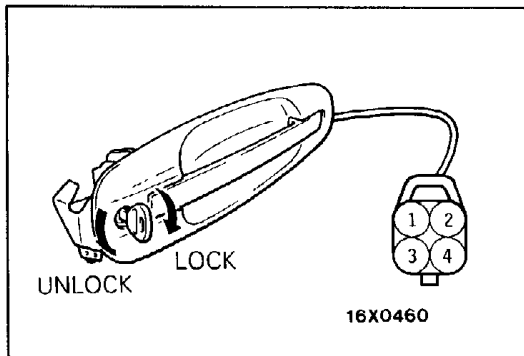
- (1) After setting the rod to the LOCK position and applying battery voltage to terminal ③, check if the rod moves to the UNLOCK position when terminal ① is earthed.
- (2) After setting the rod to the UNLOCK position and applying battery voltage to terminal ①, check if the rod moves to the LOCK position when terminal ③ is earthed.
- (3) For right-hand drive vehicles, when the actuator rod is set to the UNLOCK position, check if there is continuity between terminal ② and terminal ④, and when the rod is set to the LOCK position, check if there is no continuity.

FRONT DOOR LOCK ACTUATOR <VEHICLES WITH THEFT-ALARM SYSTEM>**<L.H.>**

- (1) After setting the rod to the LOCK position, apply battery voltage to terminal ① (driver's side actuator) or terminal ③ (passenger's side actuator) and check if the rod moves as far as the UNLOCK position when terminal ③ (driver's side actuator) or terminal ① (passenger's side actuator) is earthed.
- (2) After setting the rod to the UNLOCK position and applying battery voltage to terminal ③ (driver's side actuator) or terminal ① (passenger's side actuator), check if the rod moves as far as the LOCK position when terminal ① (driver's side actuator) or terminal ③ (passenger's side actuator) is earthed.
- (3) For left-hand drive vehicles, when the actuator rod is set to the UNLOCK position, check if there is continuity between terminal ② and terminal ④, and when the rod is set to the LOCK position, check if there is no continuity.

<R.H.>

- (1) After setting the rod to the LOCK position, apply battery voltage to terminal ③ (driver's side actuator) or terminal ① (passenger's side actuator) and check if the rod moves as far as the UNLOCK position when terminal ① (driver's side actuator) or terminal ③ (passenger's side actuator) is earthed.
- (2) After setting the rod to the UNLOCK position and applying battery voltage to terminal ① (driver's side actuator) or terminal ③ (passenger's side actuator), check if the rod moves as far as the LOCK position when terminal ③ (driver's side actuator) or terminal ① (passenger's side actuator) is earthed.
- (3) For right-hand drive vehicles, when the actuator rod is set to the UNLOCK position, check if there is continuity between terminal ② and terminal ④, and when the rod is set to the LOCK position, check if there is no continuity.

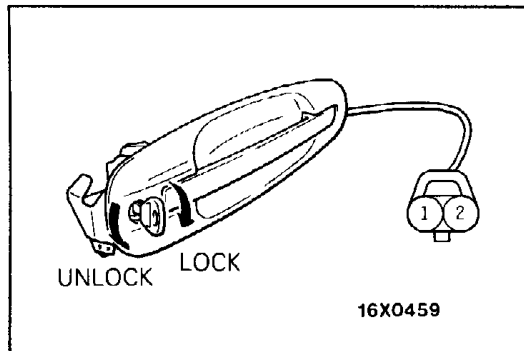
**DOOR KEY SWITCH <Passenger's side>**

Check for continuity between the terminals when the door key is turned.

Terminal	1	2	3	4
Key position				
LOCK			○—○	
Neutral				
UNLOCK	○	○		

NOTE

○—○ indicates that there is continuity between the terminals.

**DOOR KEY SWITCH <VEHICLES WITH THEFT-ALARM SYSTEM (Driver's side)>**

Check for continuity between the terminals when door key is turned.

Terminal	1	2
Key position		
LOCK	○—○	
Neutral		
UNLOCK	○—○	

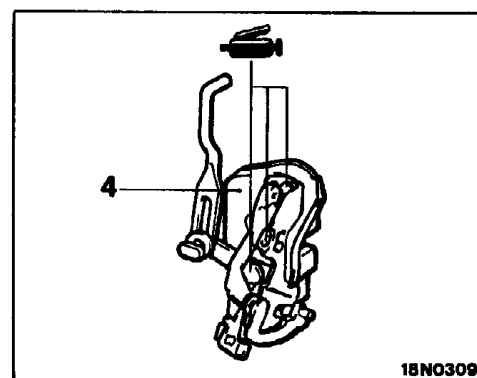
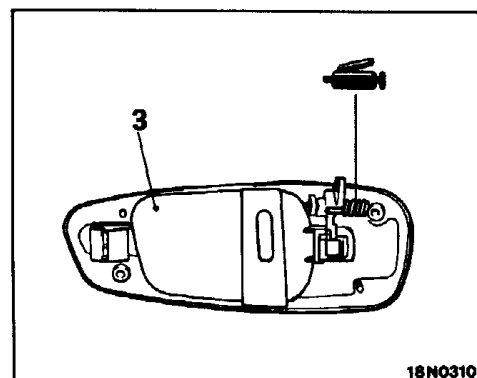
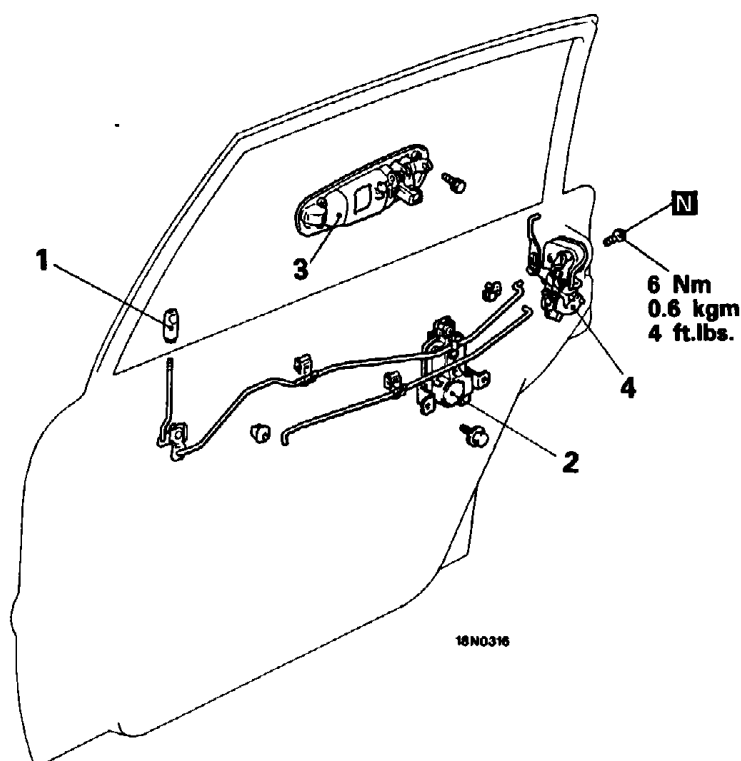
NOTE

○—○ indicates that there is continuity between the terminals.

42-44-2

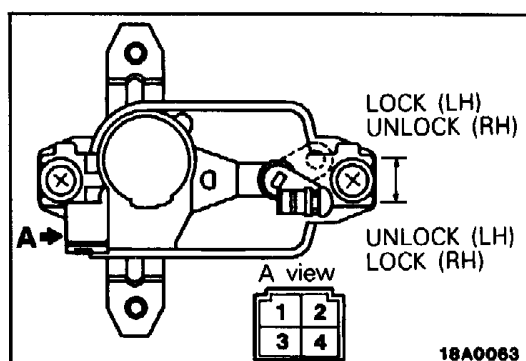
NOTES

REMOVAL AND INSTALLATION <REAR DOOR>



Removal steps

- Door trim
- Waterproof film } (Refer to P.42-33.)
- 1. Inside lock knob
- 2. Rear door lock actuator
- Door window glass (Refer to P.42-34.)
- 3. Door outside handle
- 4. Rear door latch assembly



INSPECTION

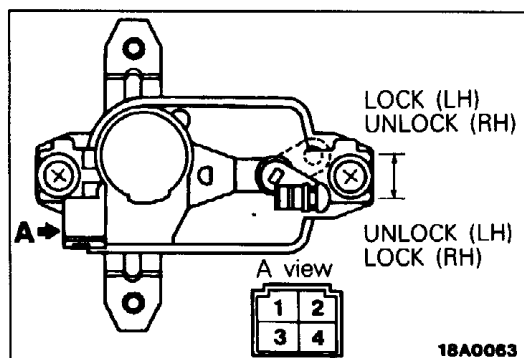
REAR DOOR LOCK ACTUATOR <VEHICLES WITHOUT THEFT-ALARM SYSTEM>

<L.H.>

- (1) After setting the rod to the LOCK position and applying battery voltage to terminal ③ and check if the rod moves to the UNLOCK position when terminal ① is earthed.
- (2) After setting the rod to the UNLOCK position and applying battery voltage to terminal ①, check if the rod moves to the LOCK position when terminal ③ is earthed.

<R.H.>

- (1) After setting the rod to the LOCK position and applying battery voltage to terminal ①, check if the rod moves to the UNLOCK position when terminal ③ is earthed.
- (2) After setting the rod to the UNLOCK position and applying battery voltage to terminal ③, check if the rod moves to the LOCK position when terminal ① is earthed.



REAR DOOR LOCK ACTUATOR <VEHICLES WITH THEFT-ALARM SYSTEM>

<L.H.>

- (1) After setting the rod to the LOCK position and applying battery voltage to terminal ③, check if the rod moves to the UNLOCK position when terminal ① is earthed.
- (2) After setting the rod to the UNLOCK position and applying battery voltage to terminal ①, check if the rod moves to the LOCK position when terminal ③ is earthed.
- (3) For left-hand drive vehicles, when the actuator rod is set to the UNLOCK position, check if there is continuity between terminal ② and terminal ④, and when the rod is set to the LOCK position, check if there is no continuity.

<R.H.>

- (1) After setting the rod to the LOCK position and applying battery voltage to terminal ①, check if the rod moves to the UNLOCK position when terminal ③ is earthed.
- (2) After setting the rod to the UNLOCK position and applying battery voltage to terminal ③, check if the rod moves to the LOCK position when terminal ① is earthed.
- (3) For right-hand drive vehicles, when the actuator rod is set to the UNLOCK position, check if there is continuity between terminal ② and terminal ④, and when the rod is set to the LOCK position, check if there is no continuity.

NOTES

DOOR RUNCHANNEL

E42MGAG

REMOVAL AND INSTALLATION

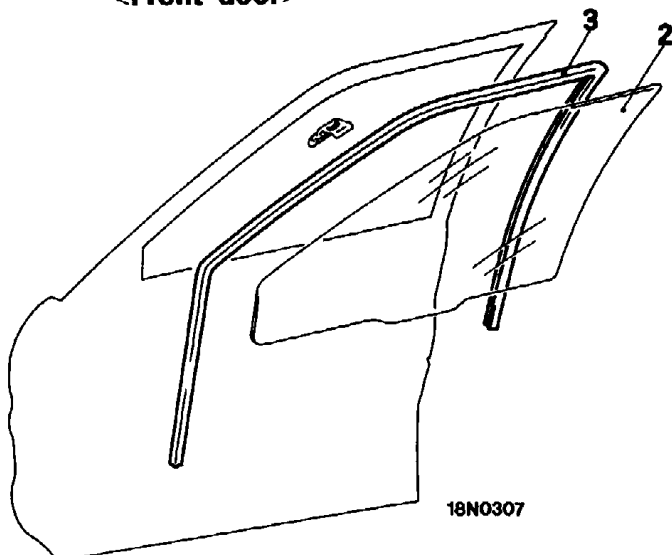
Pre-removal Operation

- Removal of Door Trim and Waterproof Film (Refer to P.42-33.)

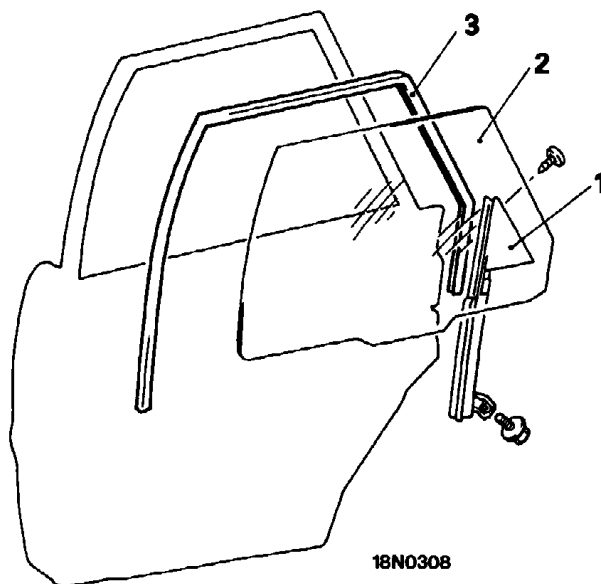
Post-installation Operation

- Door Window Glass Adjustment (Refer to P.42-11.)
- Installation of Door Trim and Waterproof Film (Refer to P.42-33.)

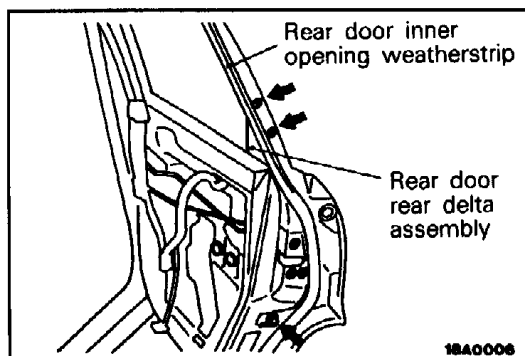
<Front door>



<Rear door>

**Removal steps**

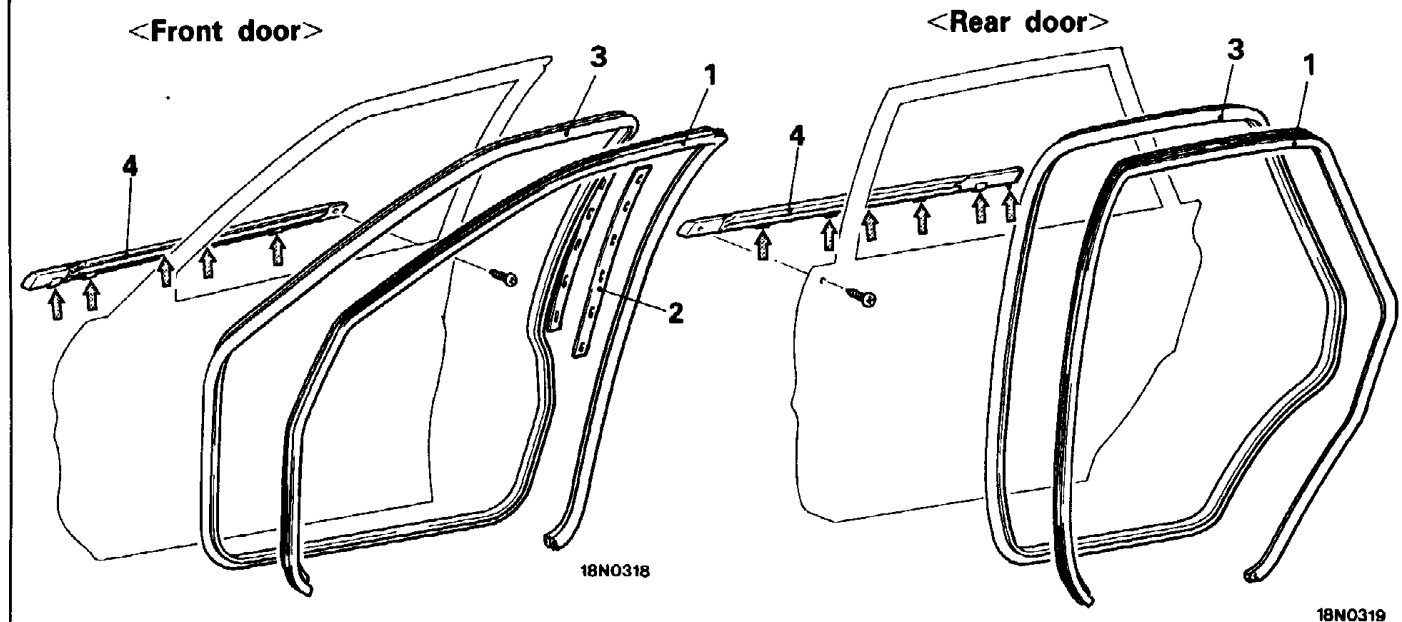
1. Rear door rear delta assembly
2. Door window glass (Refer to P. 42-34.)
3. Door runchannel

**SERVICE POINTS OF REMOVAL****1. REMOVAL OF REAR DOOR REAR DELTA ASSEMBLY**

- (1) Remove the rear door inner opening weatherstrip (only at the rear door lower sash part).
- (2) Remove the rear door lower sash installation screw; then remove the sash from the rear door panel.

DOOR MOULDING AND DRIP LINE WEATHERSTRIP REMOVAL AND INSTALLATION

E42MHAG



Door inner opening weatherstrip removal steps

- Scuff plate
 - Cowl side trim
 - Center pillar lower trim
 - Rear wheel house trim
- (Refer to GROUP 52 Trims.)
1. Door inner opening weatherstrip

Door outer opening weatherstrip removal steps

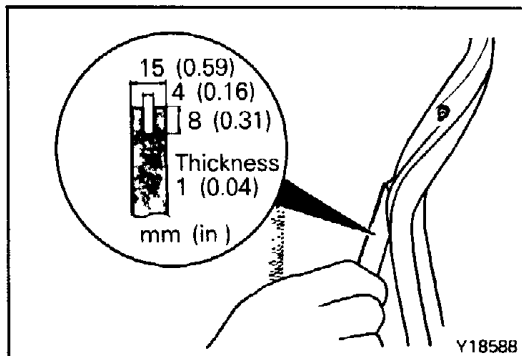
2. Weatherstrip retainer
3. Door outer opening weatherstrip

Belt line moulding removal steps

- Door mirror (Refer to GROUP 51 – Outside Mirror.)
- 4. Belt line moulding

NOTE

⇒ : Indicates the clip positions.



SERVICE POINTS OF REMOVAL

3. REMOVAL OF DOOR OUTER OPENING WEATHERSTRIP

Make a tool as shown in the illustration to remove the door opening weatherstrip.

SERVICE POINTS OF INSTALLATION

3. INSTALLATION OF DOOR OUTER OPENING WEATHERSTRIP

The clip colour identifies the left and right weatherstrips, so be sure to use the colours so as to install correctly.

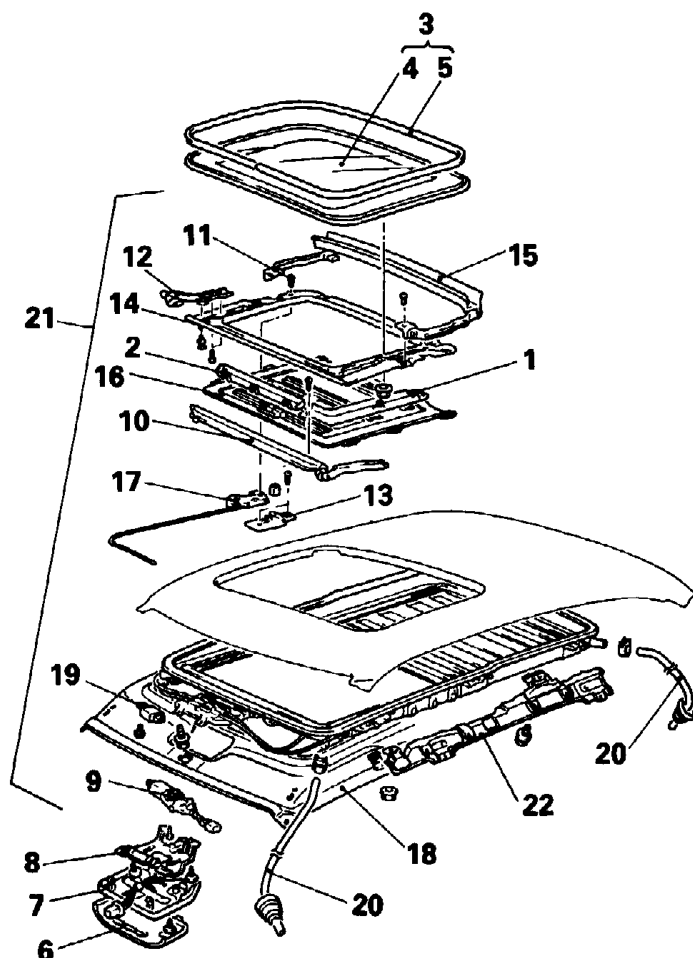
Identification colour	Applicable side
Yellow	Left door
Light blue	Right door

SUNROOF

REMOVAL AND INSTALLATION

Post-installation Operation

- Sunroof Fit Adjustment
(Refer to P.42-12.)
- Water Test (Refer to P.42-12)



18N0237

Sunroof glass removal steps

1. Side decoration cover
2. Front decoration cover
3. Glass assembly
4. Glass
5. Weatherstrip

Motor removal steps

- ◄◄ 6. Room lamp switch cover
- ◄◄ 7. Room lamp assembly
- ◄◄ ◄◄ 8. Room lamp bracket
- ◄◄ ◄◄ 9. Motor

Rear guide assembly removal steps

- ◄◄ 1. Side decoration cover
- ◄◄ 2. Front decoration cover
- ◄◄ 3. Glass assembly
- ◄◄ 6. Room lamp switch cover
- ◄◄ 7. Room lamp assembly
- ◄◄ 8. Room lamp bracket
- ◄◄ ◄◄ 9. Motor
- ◄◄ 10. Deflector
- ◄◄ 11. Lid lower panel attachment screw
- ◄◄ 12. Front guide bracket
- ◄◄ 13. Set plate
- ◄◄ 14. Lid lower panel
- ◄◄ 15. Drip rail assembly
- ◄◄ 16. Sun shade
- ◄◄ 17. Rear guide assembly

Control unit removal steps

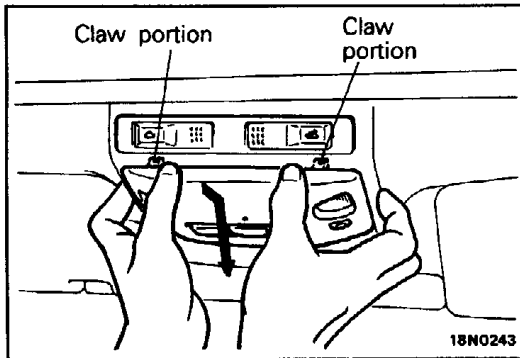
- ◄◄ ● Sun visor } (Refer to GROUP 52
- ◄◄ ● Assist grip } – Headlining.)
- ◄◄ ● Front pillar trim (Refer to GROUP 52 – Trims.)
- ◄◄ 6. Room lamp switch cover
- ◄◄ 7. Room lamp assembly
- ◄◄ 18. Headlining
- ◄◄ 19. Control unit

Drain hose removal steps

- ◄◄ ◄◄ ● Headlining (Refer to GROUP 52 – Headlining.)
- ◄◄ ◄◄ ● Splash shield
- ◄◄ ◄◄ 20. Drain hose

Sunroof assembly removal steps

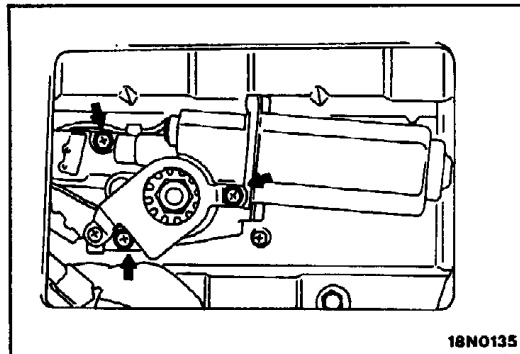
- ◄◄ ◄◄ 1. Side decoration cover
- ◄◄ ◄◄ 2. Front decoration cover
- ◄◄ ◄◄ 3. Glass assembly
- ◄◄ ◄◄ ● Headlining (Refer to GROUP 52 – Headlining.)
- ◄◄ ◄◄ 20. Connection for drain hose
- ◄◄ ◄◄ 21. Sunroof assembly
- ◄◄ ◄◄ 22. Set bracket



SERVICE POINTS OF REMOVAL

6. REMOVAL OF ROOM LAMP SWITCH COVER

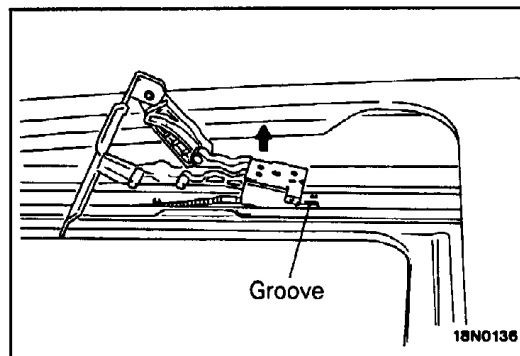
Remove the room lamp switch cover by pressing the claw portion and pulling it downwards.



9. REMOVAL OF MOTOR

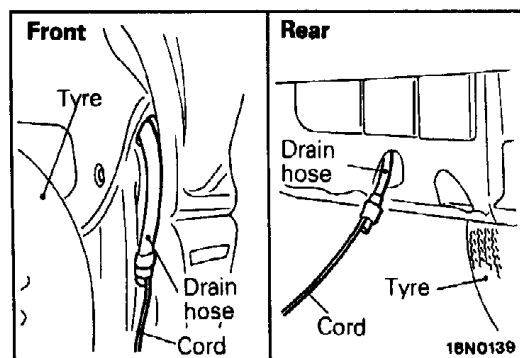
Caution

When removing the motor, the glass and the rear guide assembly should always be in the fully closed position. If there is a discrepancy between the glass position and the motor in fully closed position, the sun roof will not operate correctly.



17. REMOVAL OF REAR GUIDE ASSEMBLY

Remove the rear guide assembly by lifting up the front portion to clear the guide rail groove.

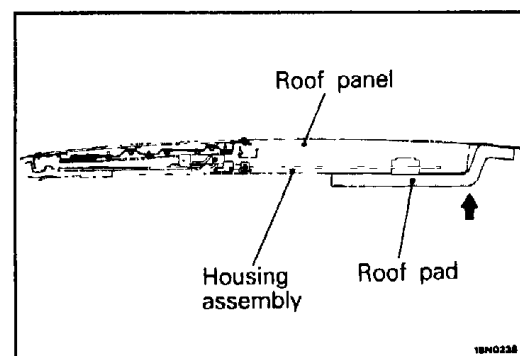


18. REMOVAL OF HEADLINING

Lower the front portion of the headlining as far as it will go to remove the control unit.

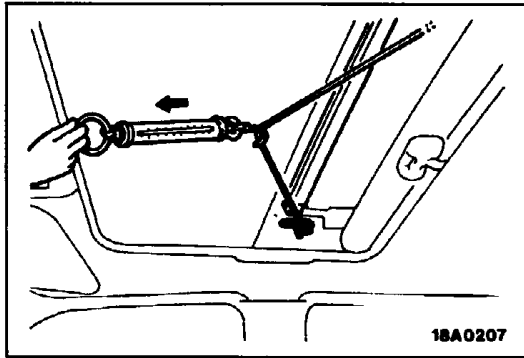
20. REMOVAL OF DRAIN HOSE

Tie a cord to the end of the drain hose and wrap it with tape so that there are no protrusions, and then pull the drain hose into the body compartment.



21. REMOVAL OF SUNROOF ASSEMBLY

When removing the sun roof assembly, first separate the housing portion from the roof by cutting the roof pad that joins them at the point of the arrow as shown in the figure, and then remove the assembly.



INSPECTION

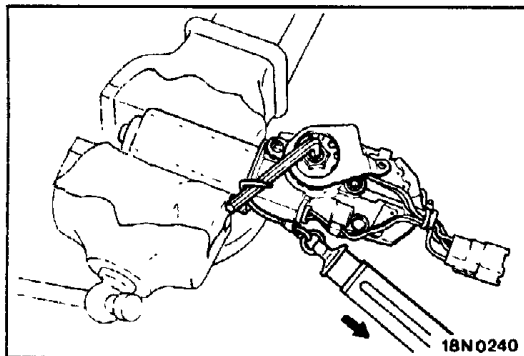
CHECKING THE SLIDING RESISTANCE OF THE GLASS

Check the sliding resistance of the glass by following the procedures below.

- (1) Remove the side decoration cover.
- (2) Loosen the nut at the front end of the glass installation, and then tie with a cord.
- (3) Remove the motor after opening the glass.
- (4) Using a spring scale, measure the sliding resistance of the glass.

Standard value: 120 N (12 kg, 26 lbs.) or less

- (5) If the sliding resistance of the glass exceeds the standard value, check the following.
 - (1) Check the installed condition of the sunroof assembly, and check for deformation, or clogging due to foreign material.
 - (2) Check for sticking of the drive cable.
 - (3) Check for an offset position of the glass.
- (6) When installing the motor, install the glass and the motor in the fully closed position. (Refer to P.42-52.)



CHECKING THE SLIDING FORCE OF THE MOTOR'S CLUTCH

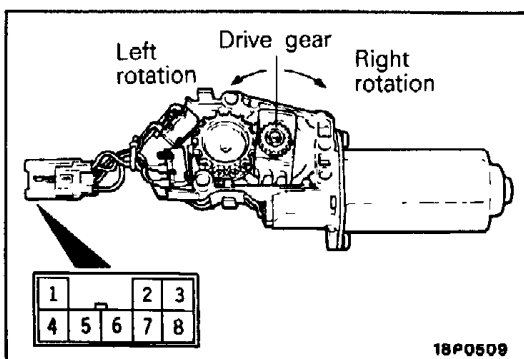
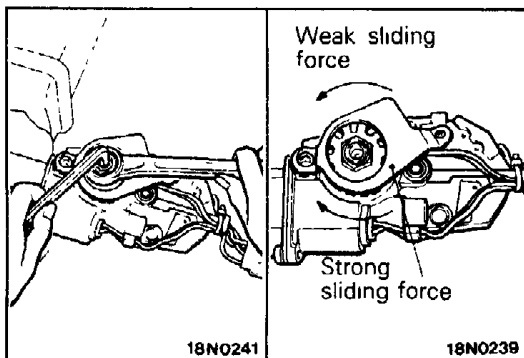
- (1) Insert one end of an allen wrench (provided in the tool bag) into the motor gear hole and hook a spring scale to the other end, and measure the force when the clutch starts to slip (when the allen wrench begins to turn).

Standard value: 40–50 N (4.0–5.0 kg, 9–11 lbs.)

Caution

Pull the spring scale in a direction at right angles to the wrench. Note that if a wrench other than the one provided in the tool bag is used, the measured value may not coincide with the standard value.

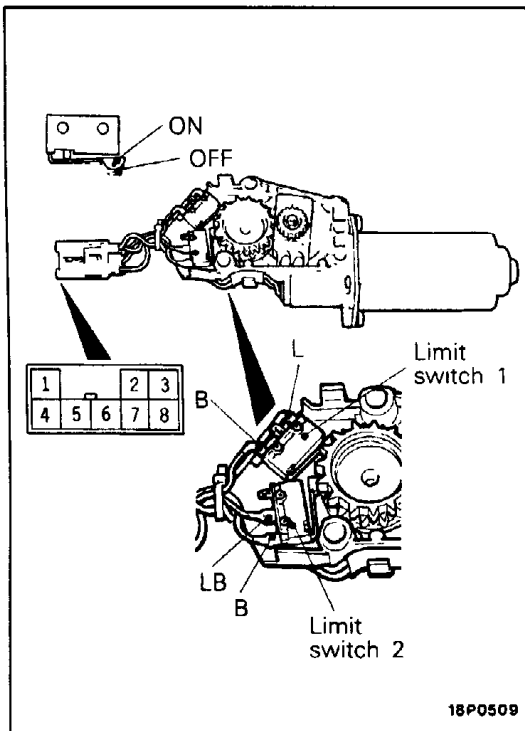
- (2) If the sliding force of the motor's clutch is not within the standard value range, adjust by turning the adjusting nut of the motor.



CHECKING THE MOTOR

Check the direction of rotation of the drive gear when the battery is connected to the connector.

Terminal 1	Terminal 2	Drive gear rotation direction
–	+	Left
+	–	Right

**CHECKING THE LIMIT SWITCH**

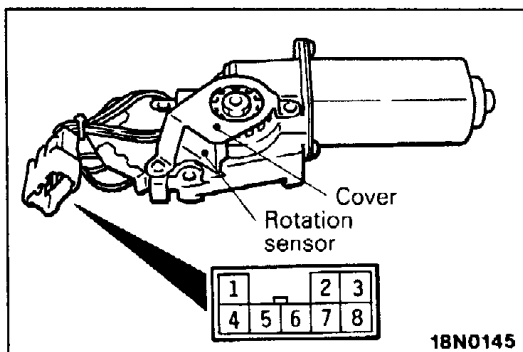
- (1) Remove the limit switch from the motor; then operate the limit switch and check for continuity between the terminals.

Terminal		4	5	6
Switch				
Limit switch 1	ON			
	OFF	○	○	
Limit switch 2	ON	○		○
	OFF			

NOTE

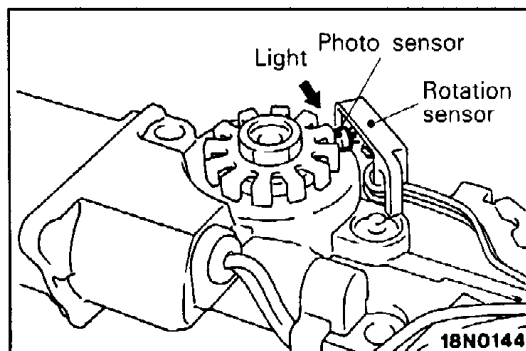
○—○ indicates that there is continuity between the terminals.

- (2) When installing the limit switch, install so that installation positions 1 and 2 and the inner and outer sides are as indicated in the illustration.

**CHECKING THE ROTATION SENSOR**

- (1) Check that there is continuity when the (–) testing probe is connected to terminal ③, and the (+) testing probe is connected to terminal ⑧. Also, check that there is no continuity when the (+) testing probe is connected to terminal ③, and the (–) testing probe is connected to terminal ⑧.

- (2) Remove the cover, and check that there is no continuity when the (–) testing probe is connected to terminal ⑦, and the (+) testing probe is connected to terminal ⑧. Also, with the testing probes in the same position, check that there is continuity when light is hitting the photo sensor.

**CHECKING THE SUNROOF SWITCH**

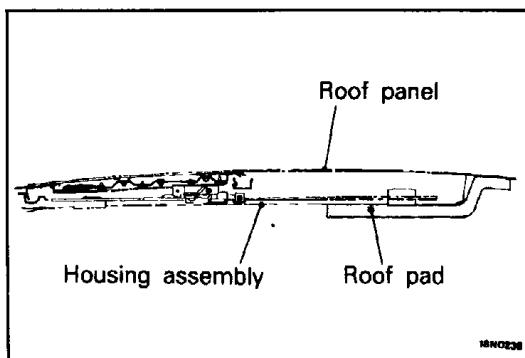
Operate the switch and check for continuity between the terminals.

Terminal		4	5	8	9	10
Switch						
Slide switch	Open	○		○		
	Close			○	○	
Tilt switch	Up		○	○		
	Down			○		○

NOTE

○—○ indicates that there is continuity between the terminals.

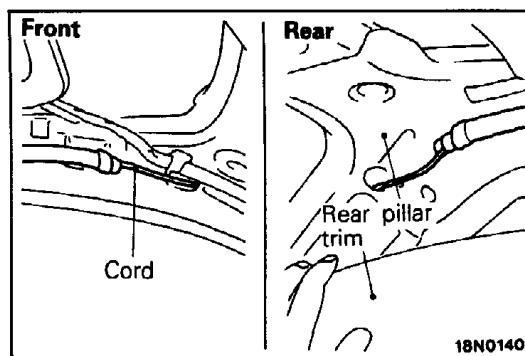
PWGE9004



SERVICE POINTS OF INSTALLATION

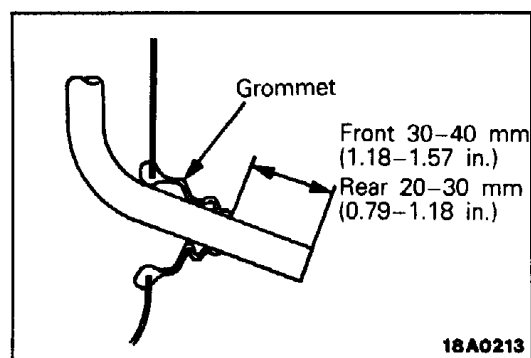
21. INSTALLATION OF SUNROOF ASSEMBLY

When fitting the sunroof assembly, the cut roof pad can be re-used. Furthermore, when changing over an old sunroof assembly for a new one, cut the accessory pad and attach to the housing only.

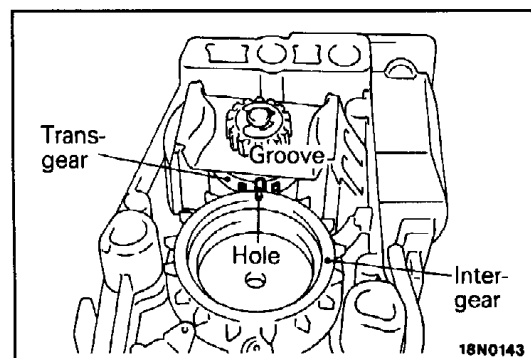


20. INSTALLATION OF DRAIN HOSE

- (1) Tie on the cord that was used when pulling out the end of the drain hose, and wrap tape around it so that there are no projections.
- (2) Pull the cord to pull through the drain hose.



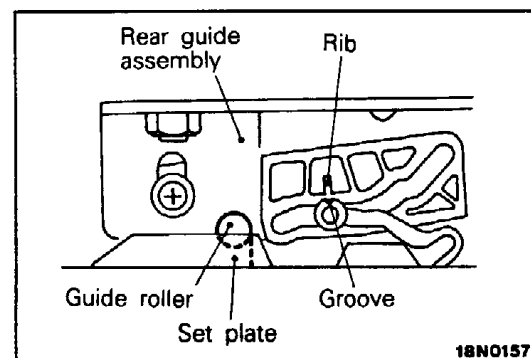
- (3) Make the protrusion from the drain hose grommet as shown in the diagram.

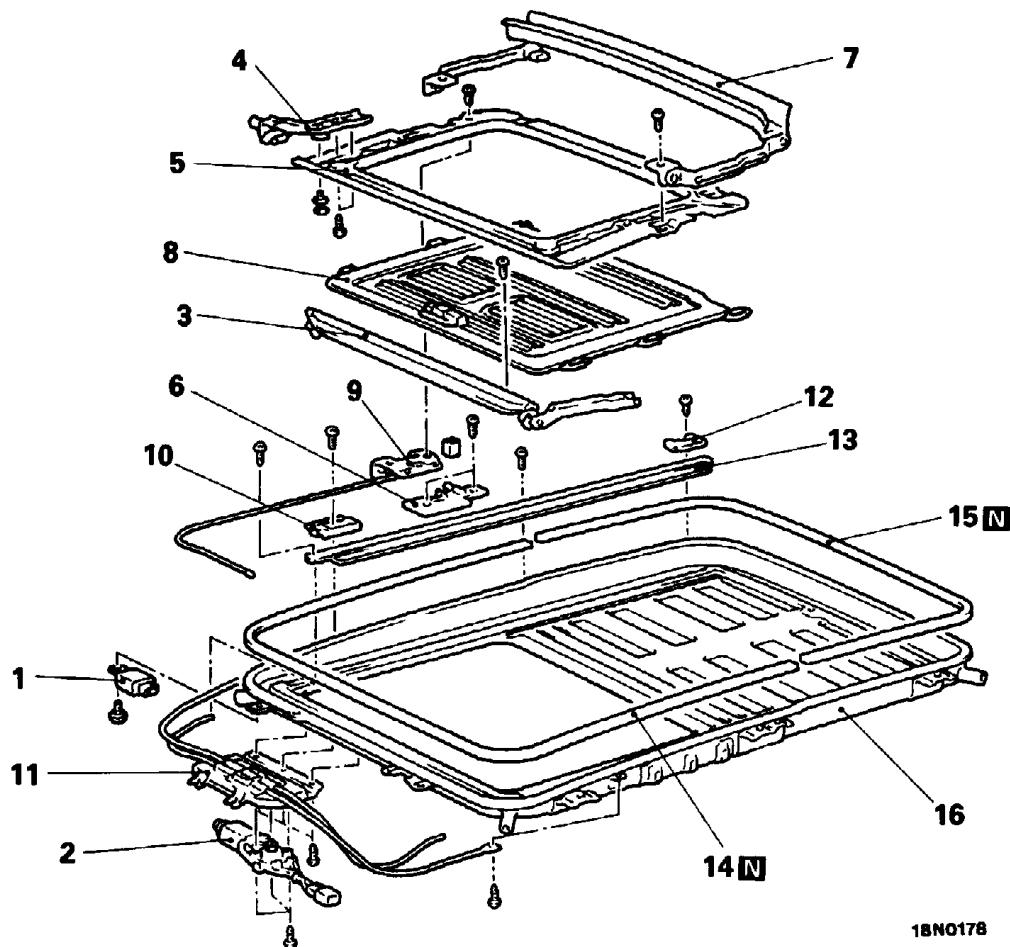


9. INSTALLATION OF MOTOR

Use the following procedure to adjust the motor and the glass so they are in the fully closed position before installing the motor.

- (1) Align the hole of the motor intergear with the groove in the transgear (motor in fully closed position).
- (2) When fitting the set plate and the guide roller together as in the diagram, adjust the rib of the rear guide assembly so that it fits into the groove on the tilt cam (glass in fully closed position).
- (3) Install the motor.



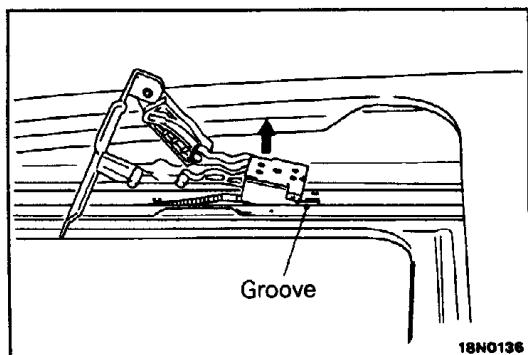
SUNROOF ASSEMBLY**DISASSEMBLY AND REASSEMBLY****Disassembly steps**

1. Control unit
 2. Motor
 3. Deflector
 4. Front guide bracket
 5. Lid lower panel
 6. Set plate
 7. Drip rail assembly
 8. Sun shade
 9. Rear guide assembly

10. Guide rail cover
 11. Tube assembly
 12. Stopper
 13. Guide rail assembly
 14. Front seal tape
 15. Rear seal tape
 16. Housing assembly

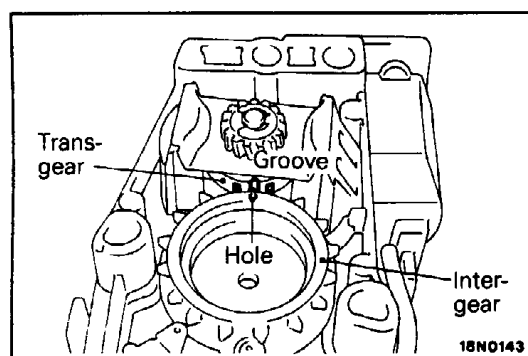
SERVICE POINTS OF DISASSEMBLY**2. REMOVAL OF MOTOR****Caution**

When removing the motor, the rear guide assembly should always be in the fully closed position. If there is a discrepancy between the glass position and the motor in fully closed position, the sunroof will not operate correctly.



9. REMOVAL OF REAR GUIDE ASSEMBLY

Remove the rear guide assembly by lifting up the front portion to clear the guide rail groove.

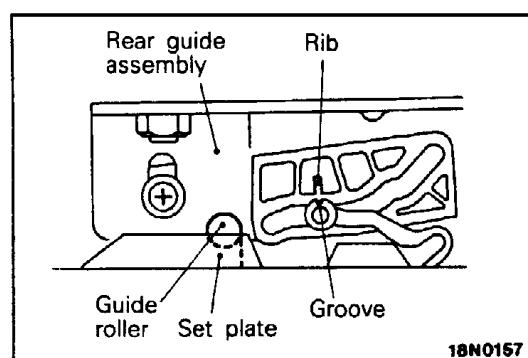


SERVICE POINTS OF REASSEMBLY

2. INSTALLATION OF MOTOR

Use the following procedure to adjust the motor and the glass so they are in the fully closed position before installing the motor.

- (1) Align the hole of the motor intergear with the groove in the transgear (motor in fully closed position).
- (2) When fitting the set plate and the guide roller together as in the diagram, adjust the rib of the rear guide assembly so that it fits into the groove on the tilt cam (glass in fully closed position).
- (3) Install the motor.



EXTERIOR

CONTENTS

E51AA-

SPECIFICATIONS	2	AERO PARTS	13
General Specifications	2	MUD GUARD	14
Service Specifications	3	WINDSHIELD WIPER AND WASHER	15
SPECIAL TOOLS	3	REAR WIPER AND WASHER	31
FRONT BUMPER	4	HEADLAMP WASHER	34
REAR BUMPER	6	DOOR MIRROR	37
GRILLES	8		
GARNISHES AND MOULDINGS	9		

SPECIFICATIONS

GENERAL SPECIFICATIONS

E51CA--

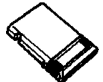
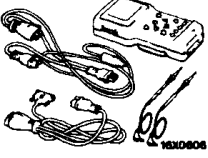
Items	Specifications
Front wiper motor rpm at load of 1 Nm (0.1 kgm, 0.72 ft.lbs.) r/min. Low speed High speed Nominal torque Nm (kgm, ft.lbs.) No-load current A	 48 ± 4 75 ± 7 28 (2.8, 20) 4.0 or less
Front wiper blade Wiping angle Driver's side Passenger's side Wiper blade length mm (in.) Driver's side Passenger's side	 77° 96.8° 500 (19.7) 475 (18.7)
Front window washer motor and pump Motor type Pump type Power consumption A Time of continuous use sec. With washer fluid Empty operation Nozzle jet pressure kPa (kg/cm ² , psi) Tank capacity lit. (U.S.qts., Imp.qts.)	 Direct current ferrite magnet type Centrifugal type 4 or less Max. 60 Max. 20 110 (1.1, 15.6) or more 1.7 (1.8, 1.5) or more
Rear wiper motor rpm at load of 1.5 Nm (0.15 kgm, 1.1 ft.lbs.) r/min.	 20 or more
Rear wiper blade Wiping angle Wiper blade length mm (in.)	 146° ± 3° 470–476 (18.5–18.7)
Rear window washer motor and pump Motor type Pump type Power consumption A Time of continuous use sec. With washer fluid Empty operation Nozzle jet pressure kPa (kg/cm ² , psi) Tank capacity lit. (U.S.qts., Imp.qts.)	 Direct current ferrite magnet type Centrifugal type 3.8 or less Max. 60 Max. 20 120 (1.2, 17) or more 1.2 (1.3, 1.1) or more
Intermittent wiper relay Intermittent interval sec.	 8 ± 2

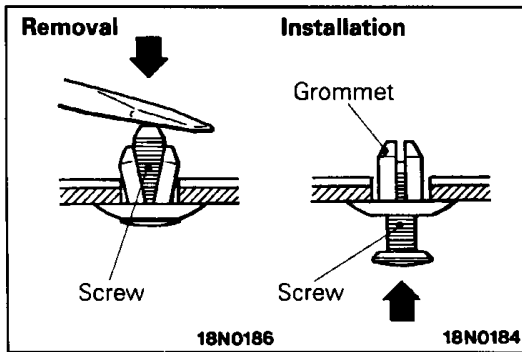
Items	Specifications
Headlamp washer motor and pump	
Motor type	Direct current ferrite magnet type
Pump type	Centrifugal type
Rated current	21 or less
Tank capacity	lit. (U.S.qts., Imp.qts.)
Check valve	3.5 (3.7, 3.1) or more
Valve opening and closing pressure	kPa (kg/cm ² , psi)
Headlamp washer relay	50–110 (0.5–1.1, 7.1–15.6)
Timer operation time	sec. 0.52

SERVICE SPECIFICATIONS
E51CB--

Items	Specifications
Standard value	
Wiper blade installation position	mm (in.) 23–33 (0.91–1.30)

SPECIAL TOOLS
E51DA--

Tool	Number	Name	Use
	MB990784	Ornament remover	Removal of rear wiper and washer switch
	MB991341	Multi-use tester assembly	Up to 1993 models Checking the ETACS input
		ROM Pack	
	(For the number, refer to GROUP 00 - Precautions Before Service.)		
	MB991502	MUT-II	All models Checking the ETACS input
		ROM pack	
16X0607			



FRONT BUMPER

E51GABD

REMOVAL AND INSTALLATION OF CLIP WITH SCREW

Normally, remove the clip with a Phillips screwdriver. If, however, there is enough space to insert a screwdriver or the like behind the clip, use the following procedure for ease of work.

1. Removal

Using a screwdriver or the like, press the screw from the inside of the bumper to remove the clip.

2. Installation

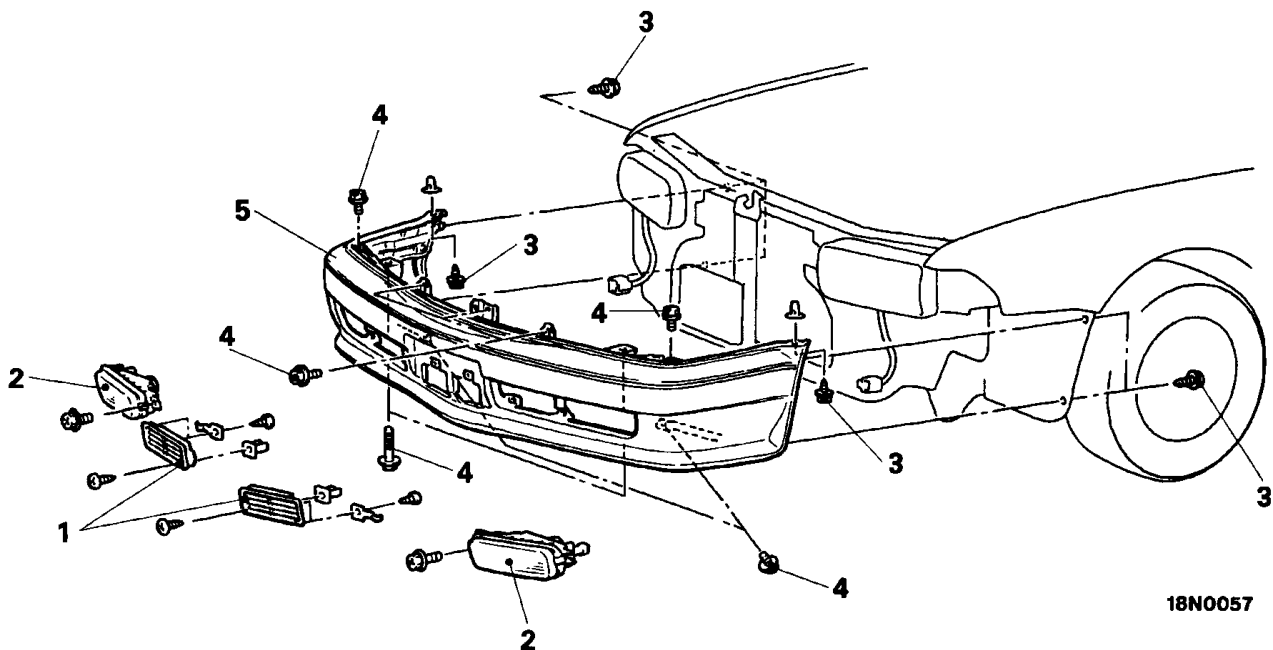
With the grommet inserted in the hole, press the screw in.

REMOVAL AND INSTALLATION

<Vehicles built up to October, 1992>

Pre-removal and Post-installation Operation

- Removal and Installation of Radiator Grille (Refer to P.51-8.)



18N0057

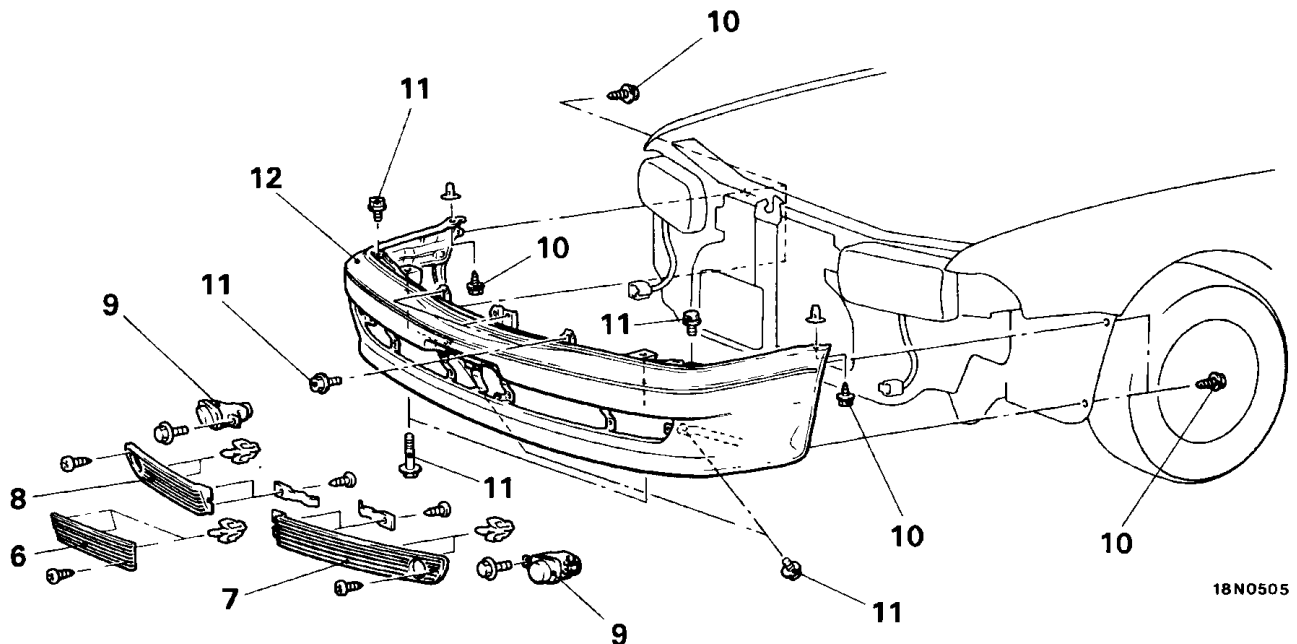
Removal steps

1. Under grille
2. Fog lamps
3. Screws
4. Bolts
5. Bumper assembly

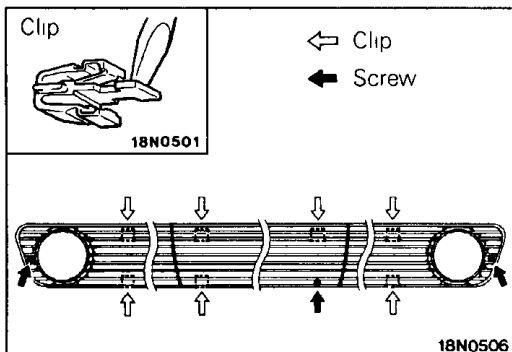
<Vehicles built from November, 1992>

Pre-removal and Post-installation Operation

- Removal and Installation of Radiator Grille
(Refer to P.51-8)

**Removal steps**

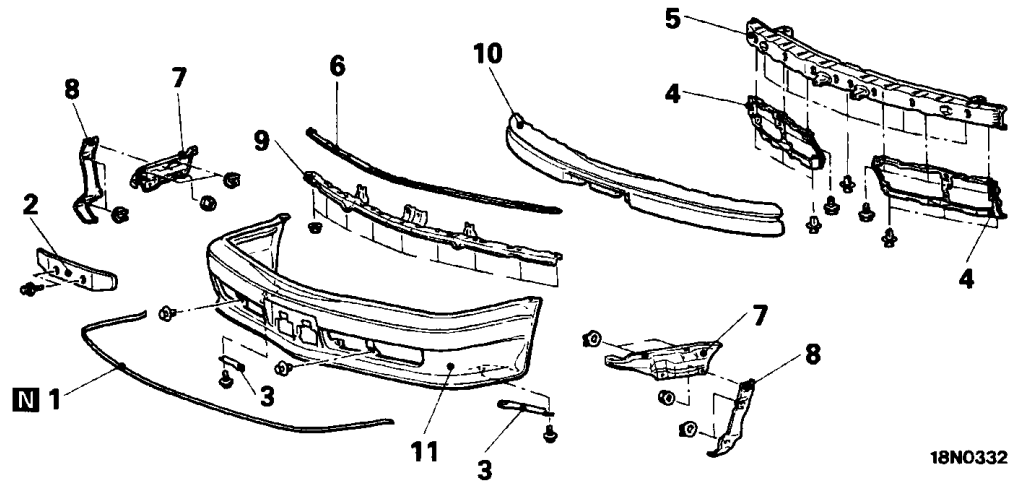
- ↔ 6. Under grille (Centre)
- ↔ 7. Under grille (L.H.)
- ↔ 8. Under grille (R.H.)
- 9. Fog lamps
- 10. Screws
- 11. Bolts
- 12. Bumper assembly

**SERVICE POINTS OF REMOVAL****6. REMOVAL OF UNDER GRILLE (CENTRE)/7. UNDER GRILLE (L.H.)/8. UNDER GRILLE (R.H.)**

Unscrew and push the tab of the clips with a flat-tipped screwdriver. Then remove the under grille by pulling it towards you.

NOTES

DISASSEMBLY AND REASSEMBLY

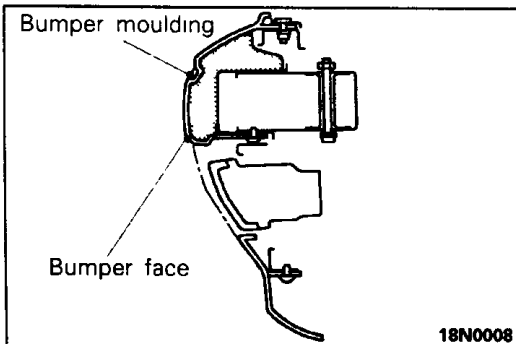


- ◆◆ 1. Bumper moulding

Bumper assembly disassembly steps

- Airdam panel assembly (Refer to P.51-13.)
- 2. License plate bracket
- 3. Side stay
- 4. Lower reinforcement
- 5. Reinforcement
- 6. Upper plate

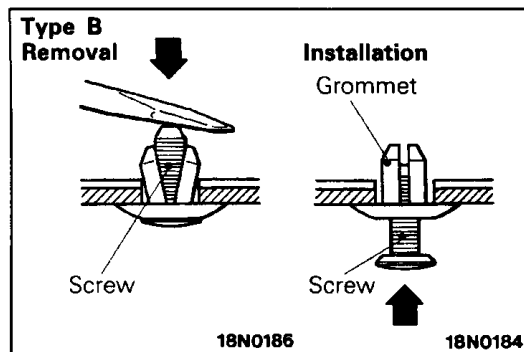
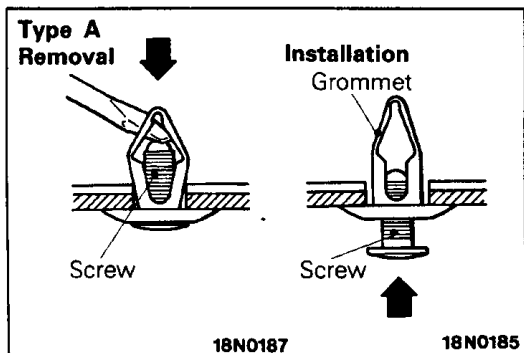
- 7. Side reinforcement upper
- 8. Side reinforcement rear
- 9. Upper support
- 10. Bumper core
- 11. Bumper face



SERVICE POINTS OF REASSEMBLY

1. INSTALLATION OF BUMPER MOULDING

- (1) Clean away oil and grease from the bumper moulding installation surface at the bumper side by using petrol.
- (2) Peel off the paper from the bumper moulding, and then install the bumper moulding along the channel for installation of the bumper moulding (on the bumper surface).



REAR BUMPER

E51GABE

REMOVAL AND INSTALLATION OF CLIP WITH SCREW

Normally, remove the clip with a Phillips screwdriver. If, however, there is enough space to insert a screwdriver or the like behind the clip, use the following procedure for ease of work.

1. Removal

Using a screwdriver or the like, press the screw from the inside of the bumper to remove the clip.

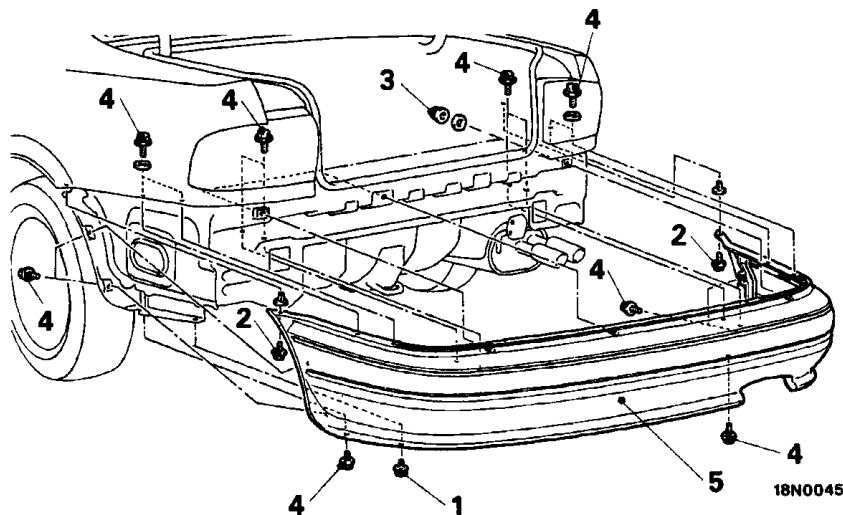
2. Installation

With the grommet inserted in the hole, press the screw in.

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation

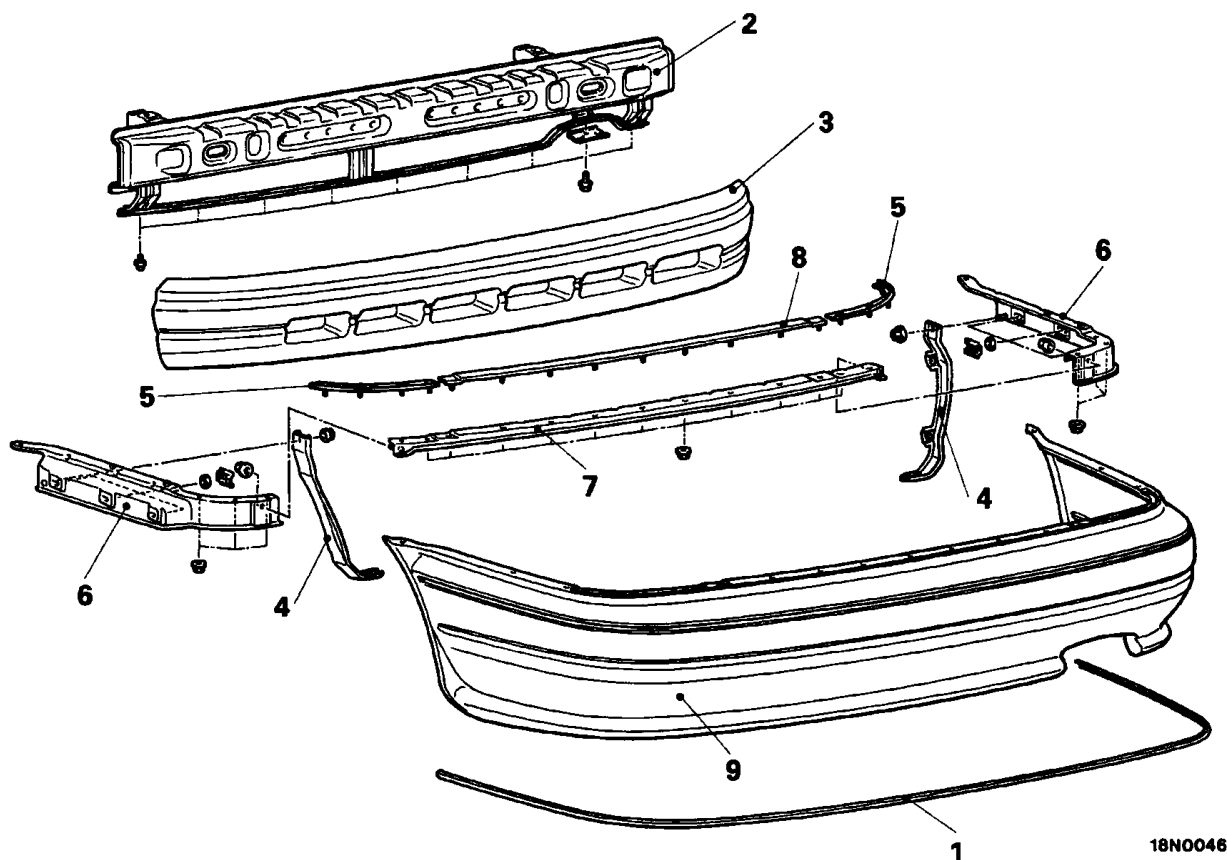
- Removal and Installation of Trunk Rear Trim and Trunk Side Trim (Refer to GROUP 52 – Trims.)
- Removal and Installation of Rear Mud Guard (Refer to P.51-14.)



Removal steps

1. Clip with screw attached
2. Screw
3. Nut
4. Bolt
5. Bumper assembly

DISASSEMBLY AND REASSEMBLY

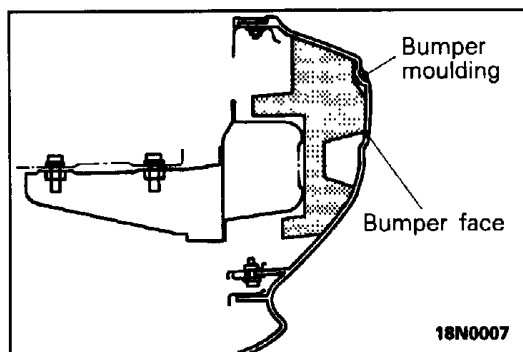


18N0046

◆◆ 1. Bumper moulding

Bumper assembly disassembly steps

2. Reinforcement
3. Bumper core
4. Side reinforcement front
5. Corner plate
6. Side reinforcement upper
7. Upper support
8. Upper plate
9. Bumper face



18N0007

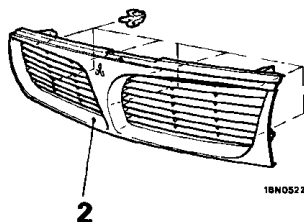
SERVICE POINTS OF REASSEMBLY**1. INSTALLATION OF BUMPER MOULDING**

- (1) Clean away oil and grease from the bumper moulding installation surface at the bumper side by using petrol.
- (2) Peel off the paper from the bumper moulding, and then install the bumper moulding along the channel for installation of the bumper moulding (on the bumper surface).

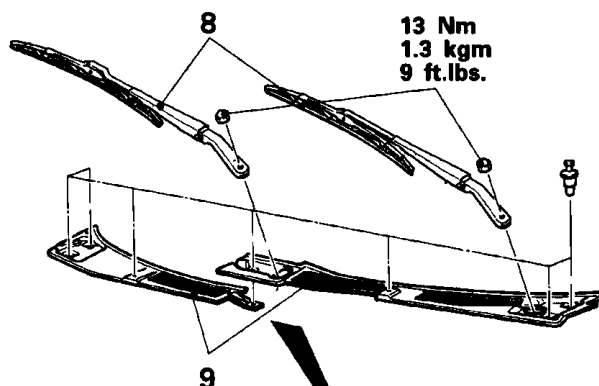
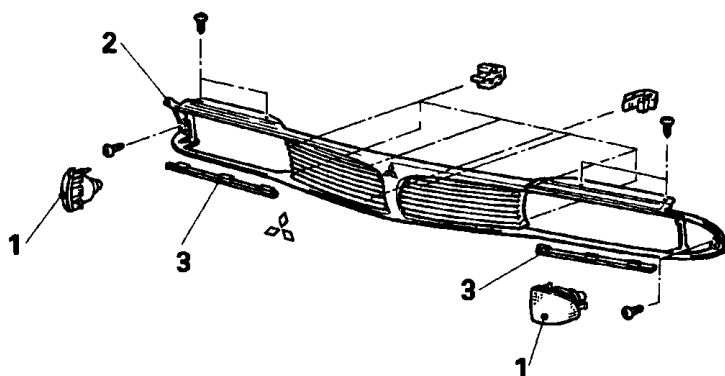
GRILLES

REMOVAL AND INSTALLATION

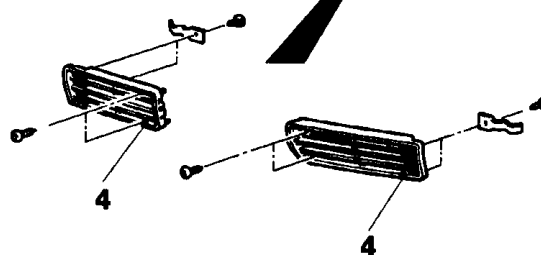
<Vehicles built from May, 1994>



<Vehicles built up to April, 1994>



<Vehicles built up to October, 1992>



18N0232

<Vehicles built from November, 1992>

Radiator grille removal steps

<Vehicles built up to April, 1994>



1. Front turn signal lamp
2. Radiator grille
3. Radiator grille reinforcement

<Vehicles built from May, 1994>



2. Radiator grille

Removal of under grille

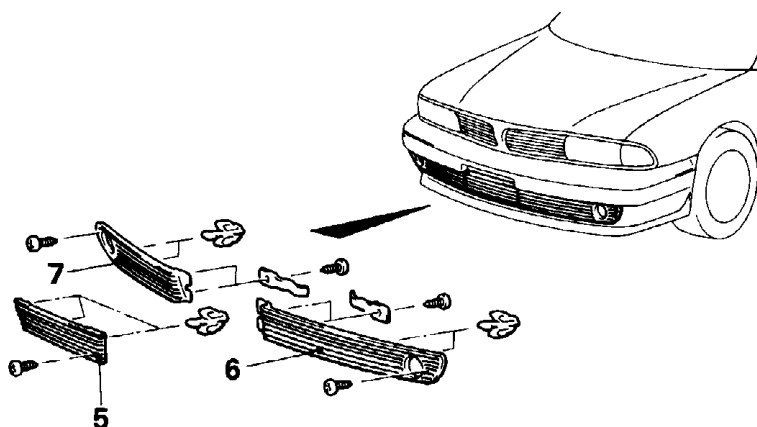
<Vehicles built up to October, 1992>

4. Under grille

<Vehicles built from November, 1992>



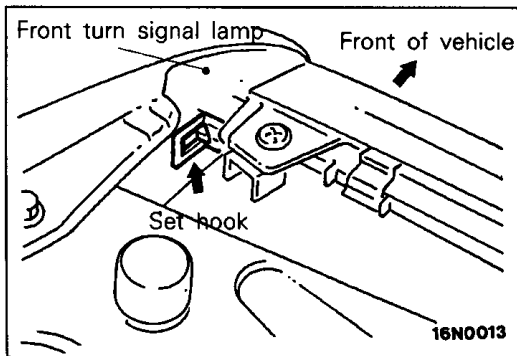
5. Under grille (Centre)
6. Under grille (L.H.)
7. Under grille (R.H.)



Air inlet grille removal steps

8. Wiper arm assembly
9. Air inlet grille

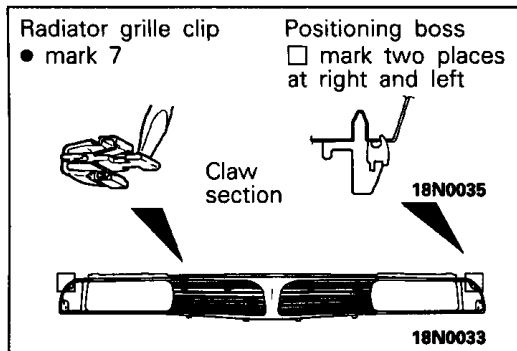
18N0507



SERVICE POINTS OF REMOVAL

1. REMOVAL OF FRONT TURN SIGNAL LAMP

Remove the front turn signal lamp set hook and then remove the front turn signal lamp by pulling it towards the front of the vehicle.



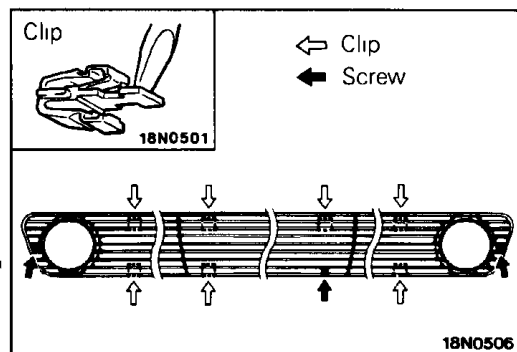
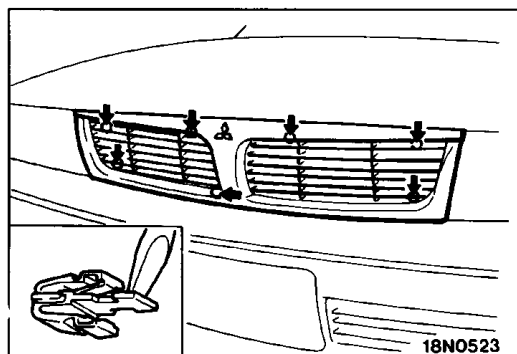
2. REMOVAL OF RADIATOR GRILLE

<Vehicles built up to April, 1994>

After removing the mounting screw, push the radiator grille clip claw section down or to the left with a (-) driver as shown in the figure, and then remove the radiator grille by pulling it towards you.

<Vehicles built from May, 1994>

While pulling the radiator grille gently towards you, push the clip tabs in the direction of the arrows with a flat-tipped screwdriver to remove the radiator grille.

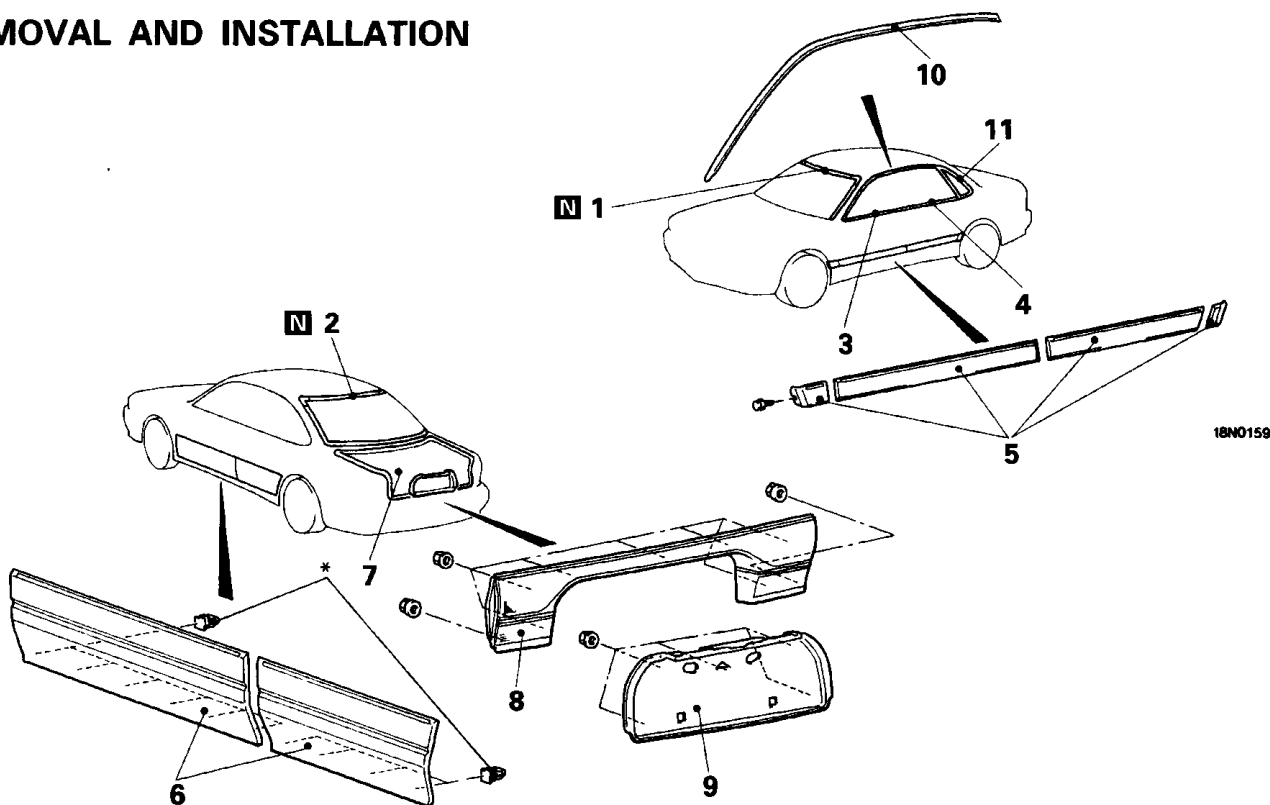


5. REMOVAL OF UNDER GRILLE (CENTRE)/6. UNDER GRILLE (L.H.)/7. UNDER GRILLE (R.H.)

Unscrew and push the tab of the clips with a flat-tipped screwdriver. Then remove the under grille by pulling it towards you.

GARNISHES AND MOULDINGS

REMOVAL AND INSTALLATION



1. Windshield moulding (Refer to GROUP 42–Windshield Glass.)
 2. Rear window moulding (Refer to GROUP 42–Rear Window Glass.)
 3. Front door belt line moulding
 4. Rear door belt line moulding
- } (Refer to GROUP 42 – Door Moulding and Drip Line Weatherstrip.)

- ◄◄ ◄◄ 5. Side protector moulding
- ◄◄ ◄◄ 6. Side garnish

NOTE

*: Vehicles built up to May, 1991

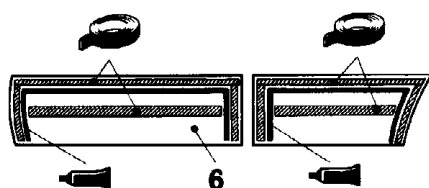
Rear panel garnish removal steps

7. Trunk lid trim
8. Rear lid lamp
9. Rear panel garnish

Drip moulding and quarter window moulding removal steps

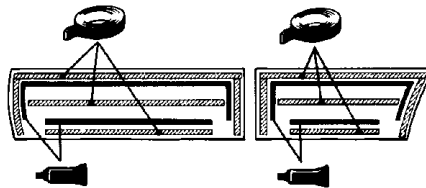
10. Drip moulding
11. Quarter window moulding (Refer to GROUP 42–Quarter Window Glass.)

<Vehicles built up to May, 1991>

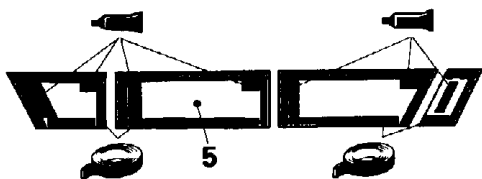


18N0010

<Vehicles built from June, 1991>



18N0456



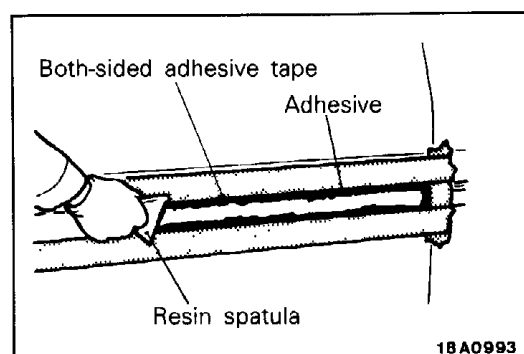
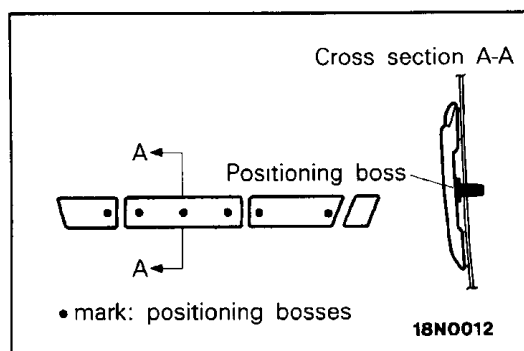
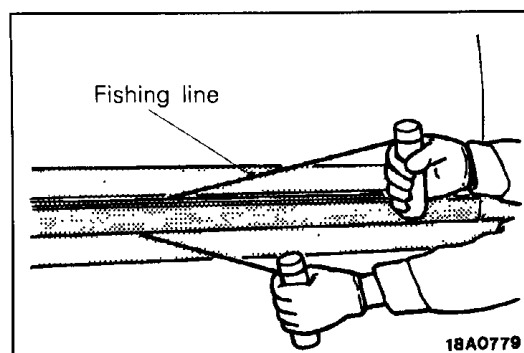
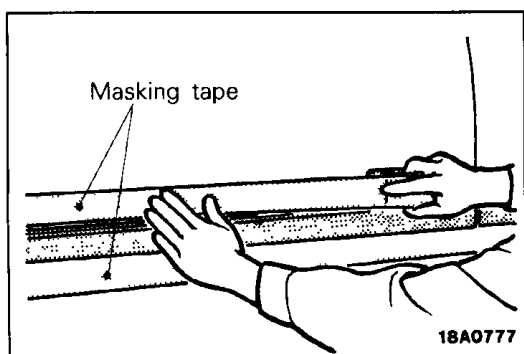
18N0009

Adhesive tape: Both-side tape

■ 15 mm (0.59 in.) wide and 1.2 mm (0.05 in.) thick

■ 10 mm (0.39 in.) wide and 1.2 mm (0.05 in.) thick

Adhesive: Drying adhesive ■



SERVICE POINTS OF REMOVAL

5. REMOVAL OF SIDE PROTECTOR MOULDING

- (1) Apply masking tape to the outside circumference of the side protector moulding.

- (2) Insert fishing line ($\phi 0.8$ mm [0.03 in.]) in between the body and the side protector moulding, and pull both ends alternately to cut the adhesive section and remove the side protector moulding.

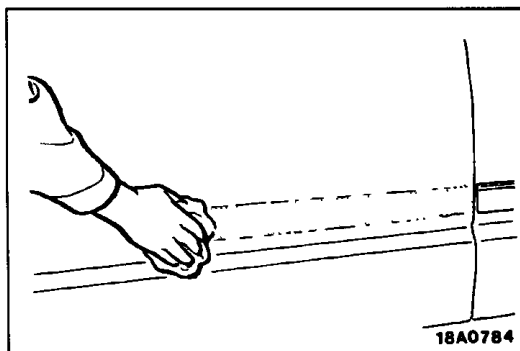
- (3) Pull the section of the side protector moulding with the positioning bosses towards you to remove the bosses from the mounting holes.

Caution

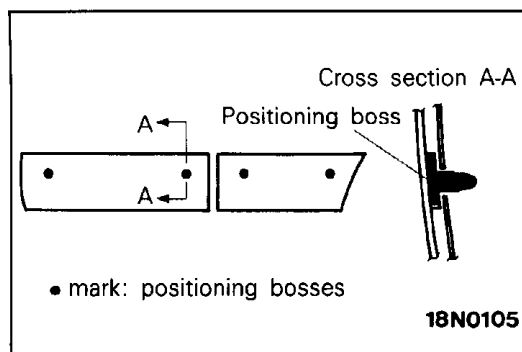
1. When reusing the side protector moulding, pull the fishing line along the edge of the body so as not to damage the edge of the side protector moulding.
2. If the adhesive is difficult to remove, heat it to 40°C (104°F).

- (4) Scrape off the both-sided adhesive tape with a resin spatula.

- (5) Tear off the masking tape.
- (6) Scrape off a small amount of the adhesive with a cutter knife.



- (7) Wipe the body surface clean with a rag moistened with unleaded petrol.



6. REMOVAL OF SIDE GARNISH

Remove by the same procedure as for the side protector moulding. (Refer to P.51-10.)

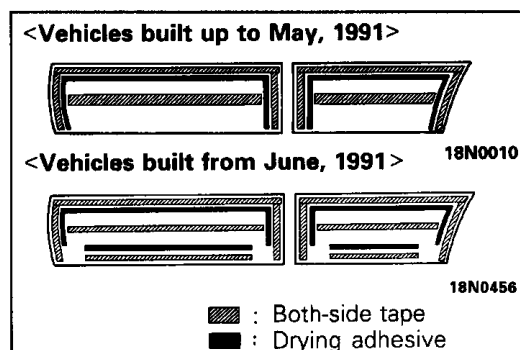
There are positioning bosses in the places shown in the figure, so pull the side garnish towards you to remove the bosses.

SERVICE POINTS OF INSTALLATION

6. INSTALLATION OF SIDE GARNISH

Install by the same procedure as for the side protector moulding.

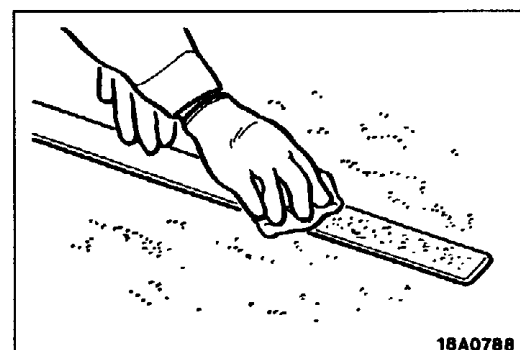
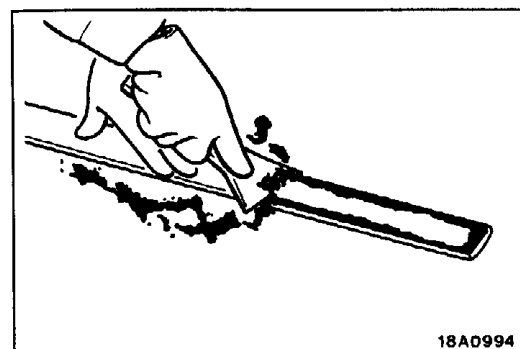
Adhesive tape: Both-side tape
10 mm (0.39 in.) wide and 1.2 mm (0.05 in.) thick



5. INSTALLATION OF SIDE PROTECTOR MOULDING

- **Affixing the both-sided tape to the side protector moulding (when reusing)**

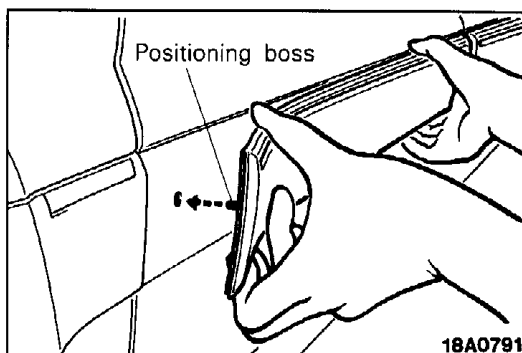
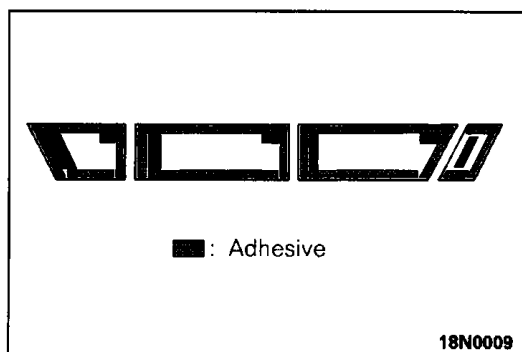
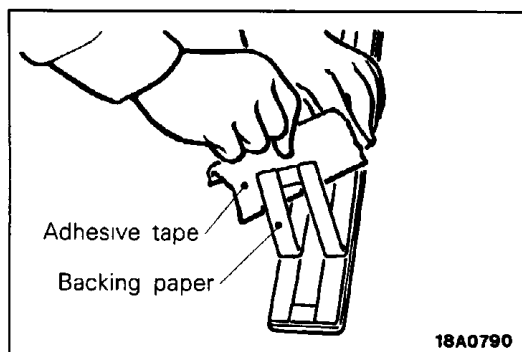
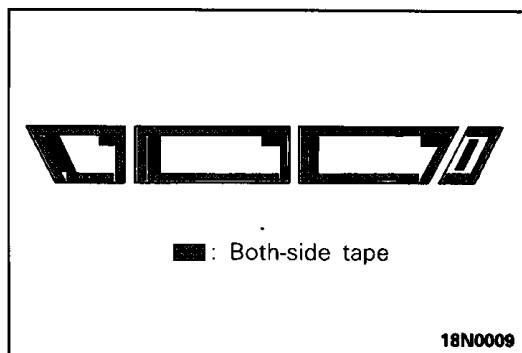
- (1) Scrape off the both-sided adhesive tape with a resin spatula or gasket scraper.



- (2) Wipe the body surface clean with a rag moistened with unleaded petrol.
- (3) Remove a small portion of the residual adhesive.

Caution

Do not remove all of the residual adhesive.



- (4) Heat the adhesive surface of the both-side tape on the side protect moulding to about 40–60°C (104–140°F).
- (5) Affix the specified both-sided adhesive tape to the side protector moulding.

Adhesive tape: Both-side tape
15 mm (0.59 in.) wide and
1.2 mm (0.05 in.) thick

● Installation of side protector moulding

- (1) Tear off the both-sided tape backing paper.

NOTE

If you attach the adhesive tape to the edge of the backing paper, it will be easy to tear off.

- (2) Apply dry adhesive to the side protector moulding.

NOTE

When reusing the side protector moulding, remove some of the residual adhesive, and apply the new adhesive over the top.

Caution

Do not get any adhesive on the adhesive surface of the tape.

- (3) Install the side protector moulding so that the positioning bosses match the body holes.

NOTE

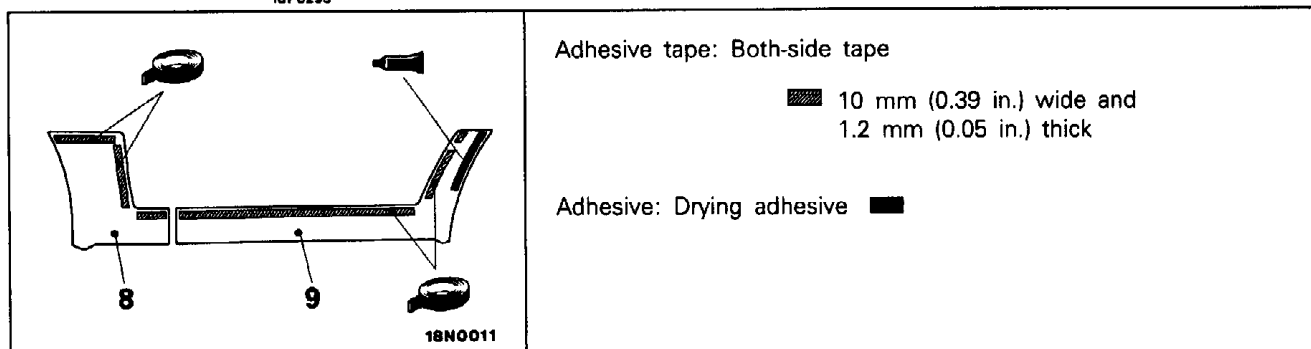
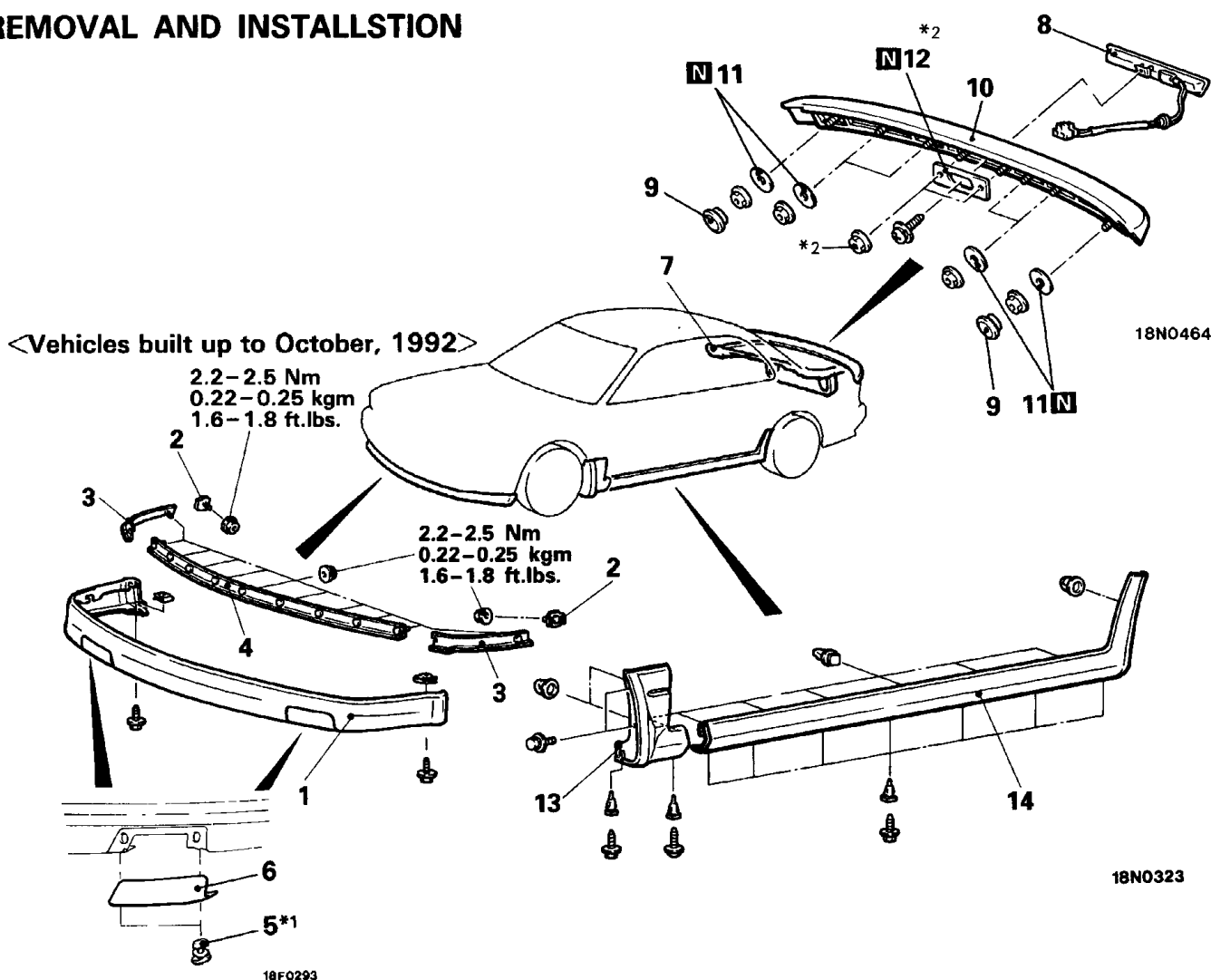
If the both-sided adhesive tape is difficult to affix during winter, etc., warm the bonding surfaces of the body and the side protector moulding to about 40–60°C (104–140°F) before affixing the tape.

- (4) Firmly press in the side protector moulding.

AERO PARTS

REMOVAL AND INSTALLATION

E51HBAM

**Air dam panel removal steps <Vehicles built up to October, 1992>**

1. Air dam panel assembly
2. Air dam side plate rear
3. Air dam side plate
4. Air dam center plate
- ↔ 5. Clip*1
- ↔ 6. Cover

Air spoiler removal steps

7. Trunk lid trim
8. High mounted stop lamp
9. Plug

10. Air spoiler
11. Packing C
12. Packing A*2

Side air dam removal steps

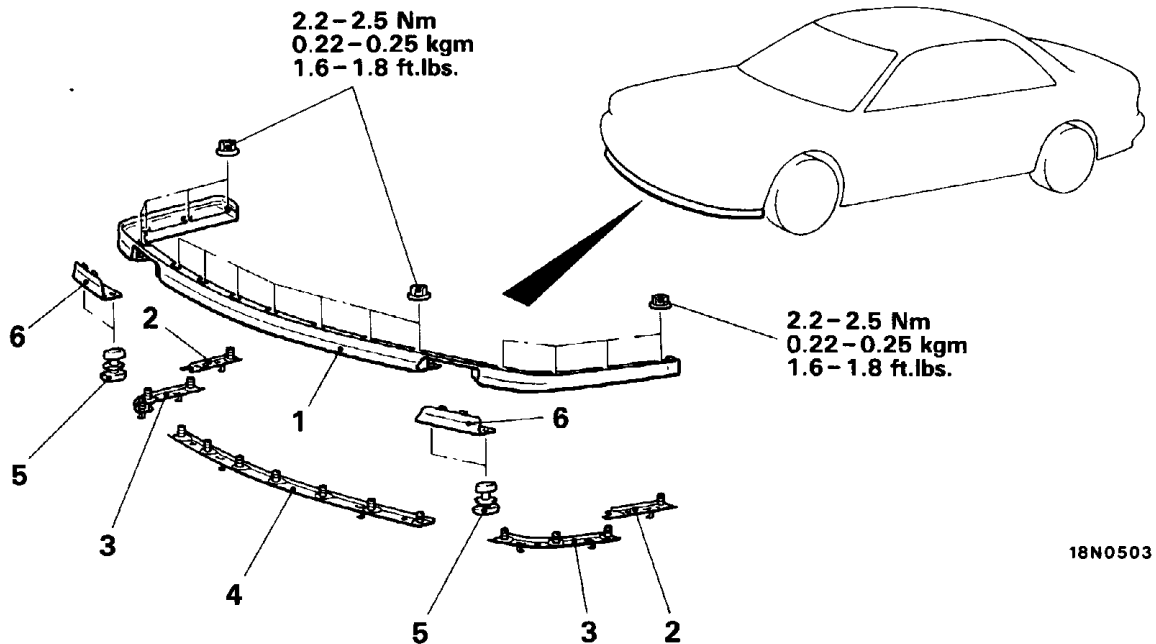
- ↔ ↔ 13. Side air dam front
- ↔ ↔ 14. Side air dam rear

NOTE

*1: Vehicles built from July, 1991

*2: Vehicles with high-mount stop lamp

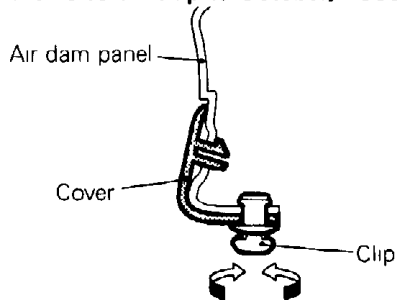
<Vehicles built from November, 1992>

**Air dam panel removal steps**

- 1 Air dam panel assembly
- 2 Air dam side plate rear
- 3 Air dam side plate
- 4 Air dam center plate
- 5 Clip
6. Cover



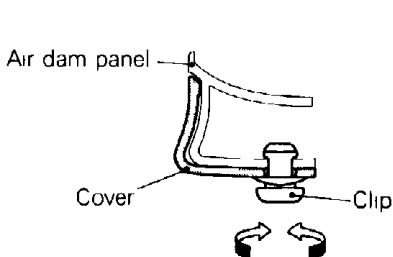
<Vehicles built up to October, 1992>

**SERVICE POINTS OF REMOVAL****5. REMOVAL OF CLIP/6. COVER**

<Vehicles built up to October, 1992>

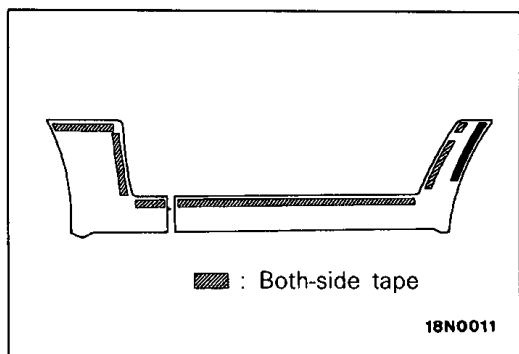
- (1) Turn the clip to either the right or left (approx. 90°) and remove it.
- (2) Remove the cover by releasing the pawl.

<Vehicles built from November, 1992>



<Vehicles built from November, 1992>

- (1) Turn the clip to either the right or left (approx. 90°) and remove it.
- (2) Remove the cover downward

**13. REMOVAL OF SIDE AIR DAM FRONT/14. SIDE AIR DAM REAR**

Remove by the same procedure as for the side protector moulding. (Refer to P.51-10.)

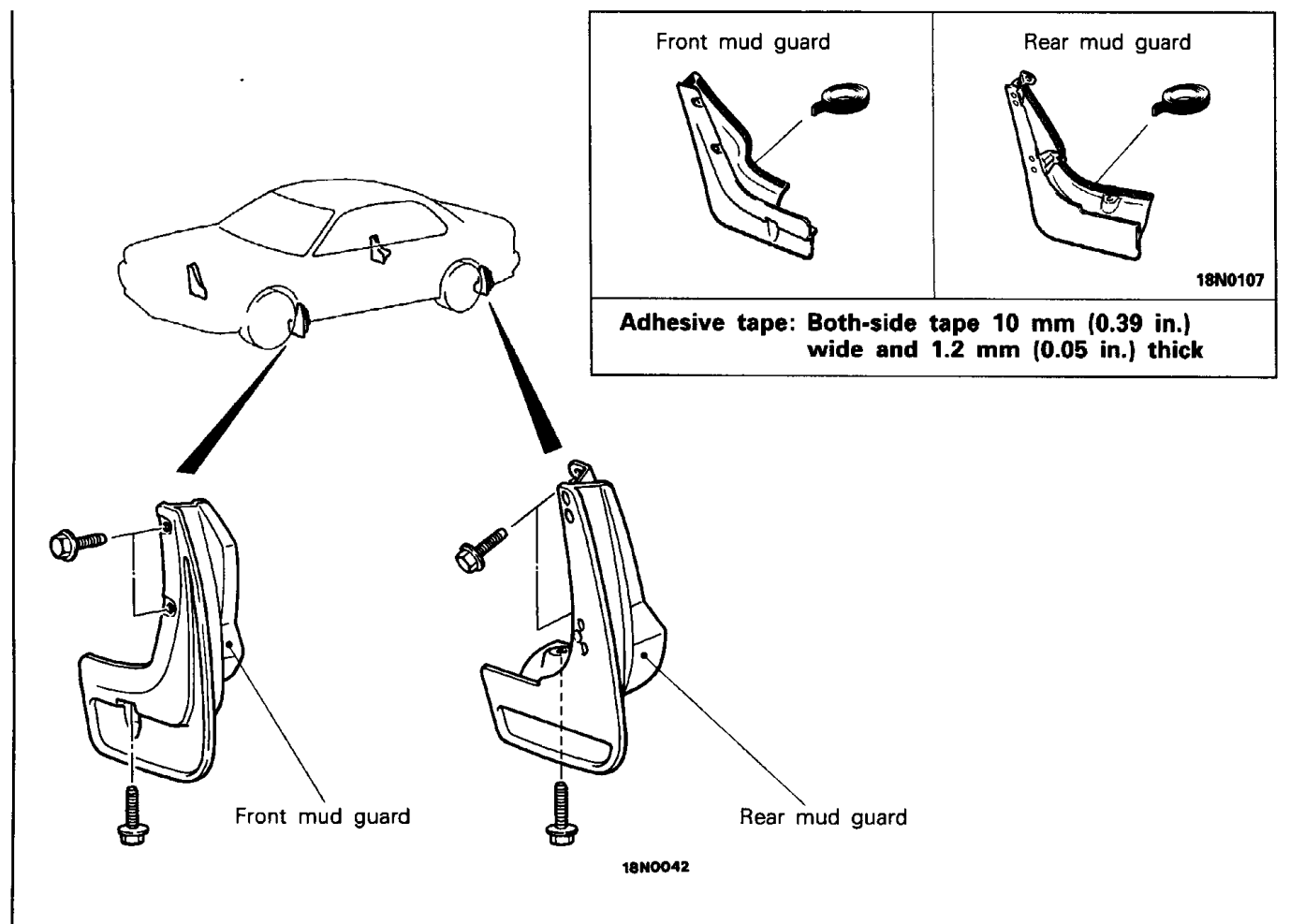
SERVICE POINTS OF INSTALLATION**14. INSTALLATION OF SIDE AIR DAM REAR/13. SIDE AIR DAM FRONT**

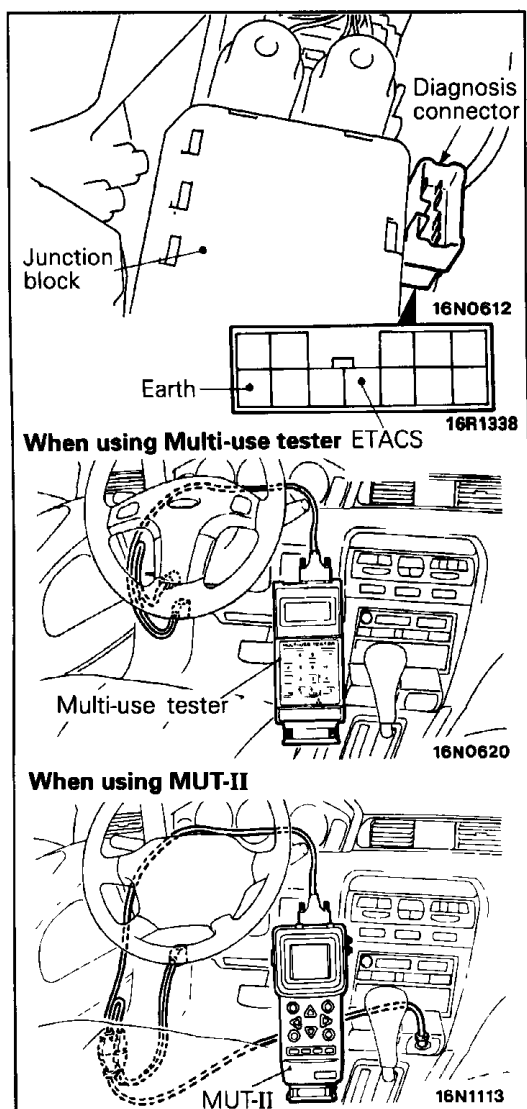
Install by the same procedure as for the side protector moulding. (Refer to P.51-11.)

Adhesive tape: Both-side tape
10 mm (0.39 in.) wide and
1.2 mm (0.05 in.) thick

MUD GUARD

E51QAAF

REMOVAL AND INSTALLATION



WINDSHIELD WIPER AND WASHER

E81KCADs

TROUBLESHOOTING GUIDE (VEHICLE-SPEED-RESPONSE TYPE INTERMITTENT WIPERS, MIST WIPERS, AND WASHER-INTERLOCKED WIPERS)

INPUT CHECK

Using the multi-use tester <Up to 1993 models> or MUT-II <All models>, check whether or not the input signals from each switch are being input to the electronic control unit.

- (1) Connect the multi-use tester or MUT-II to the diagnosis connector (located at the right or left side of the junction block).

Caution

Connection and disconnection of the multi-use tester or MUT-II should always be made with the ignition switch in the OFF position.

- (2) Check to be sure that the buzzer of the multi-use tester or MUT-II sounds one time, when each switch noted below is operated.

If the buzzer sounds, the input signals are being input to the electronic control unit, so that switch can be considered to be functioning normally.

If there is a malfunction, there is an abnormality in the switch or in the switch input circuit, so they should be inspected.

- Ignition switch
- Wiper switch (AUTO)
- Intermittent variable-volume switch
- Washer switch
- Vehicle-speed sensor

TROUBLESHOOTING QUICK-REFERENCE TABLE

MIST WIPERS/WASHER-INTERLOCKED WIPERS

Problem	Probable cause (s)	Checking procedure	Remedy
The wipers do not function when the washer switch is switched ON for 0.6 second or longer. (With the wiper switch at the "AUTO" position, however, intermittent operation of the wipers is normal, and the washer function is normal.)	Damage or disconnection of the wiring of the washer switch input circuit.	If a malfunction is discovered as a result of the checking of the input, conduct check No. 6 (P.51-27) of the individual part and circuit.	Repair the wiring harness, or replace the washer switch.
	Damage or disconnection of the wiring of the washer switch.		
	Malfunction of the electronic control unit.	–	Replace the electronic control unit.

NOTE

The electronic control unit (ECU) indicates the ETACS control unit.

Problem	Probable cause (s)	Checking procedure	Remedy
The wipers do not function when the washer switch is switched ON for less than 0.6 second. (The wipers and washer do function, however, when the washer switch is switched ON for 0.6 second or longer.)	Malfunction of the electronic control unit.	–	Replace the electronic control unit.

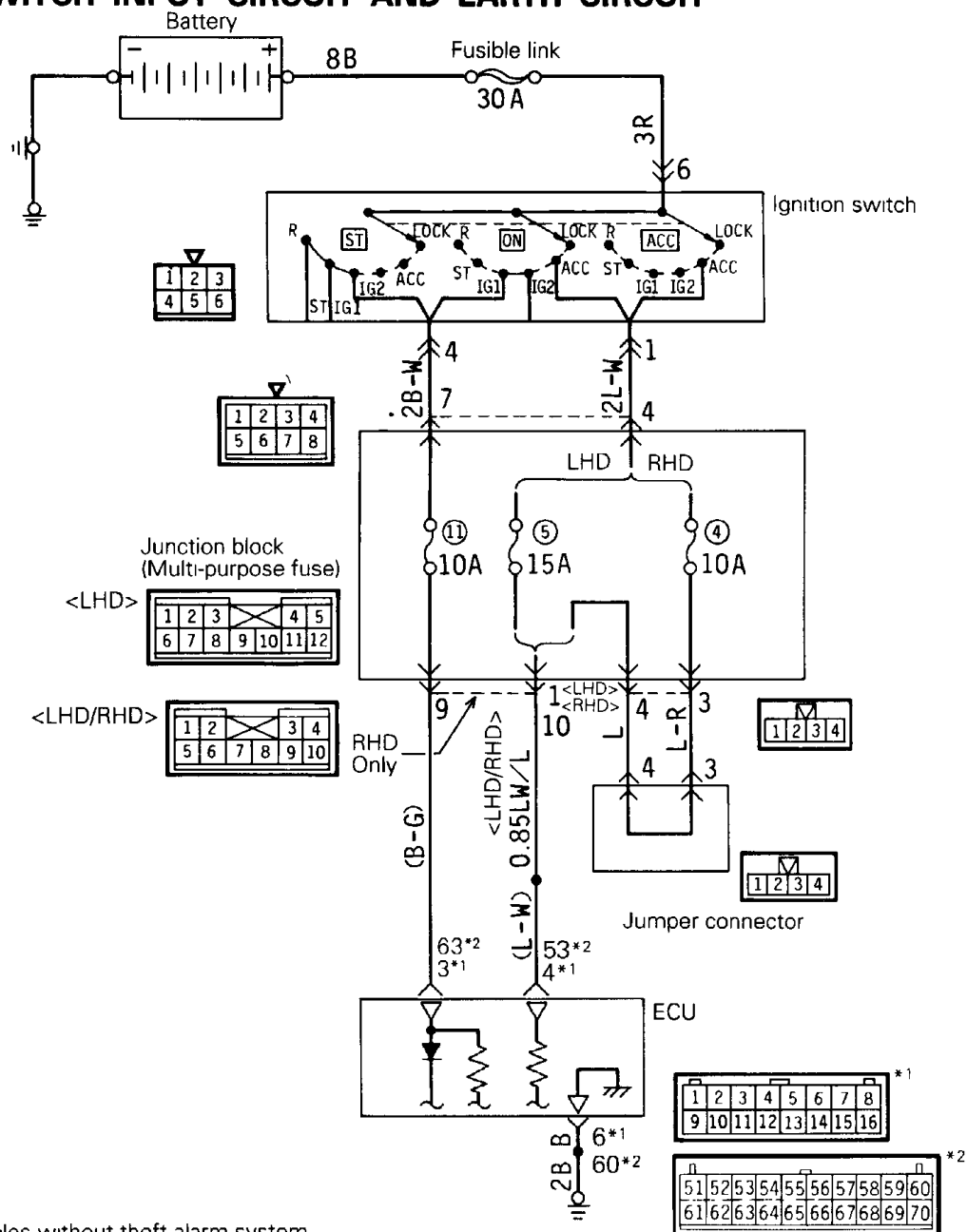
VEHICLE-SPEED-RESPONSE TYPE INTERMITTENT WIPERS

Problem	Probable cause (s)	Checking procedure	Remedy
The wipers don't operate when the wiper switch is set to the "AUTO" position. (The wipers do operate, however, when the wiper switch is set to the "1" (low speed) position.)	Damage or disconnection of the wiring of the wiper switch (AUTO) input circuit.	If a malfunction is discovered as a result of the checking of the input (P.51-15), conduct check No. 2 (P.51-20) of the individual part and circuit.	Repair the wiring harness, or replace the column switch.
	Damage or disconnection of the wiring of the wiper switch ("AUTO").		
	Damage or disconnection of the wiring of the ignition switch input circuit.	If a malfunction is discovered as a result of the checking of the input (P.51-15), conduct check No. 1 (P.51-18) of the individual part and circuit.	Repair the wiring harness.
	Damage or disconnection of the wiring of the wiper relay activation circuit.	Conduct check No. 5 (P.51-26) of the individual part and circuit.	Repair the wiring harness, or replace the wiper relay.
	Malfunction of the wiper relay.		
	Malfunction of the electronic control unit.	–	Replace the electronic control unit.
The wipers don't stop when the wiper switch is switched OFF. (This problem occurs at the low speed of the wipers.) NOTE If the wipers continue operating (without stopping) at the "2" position (high speed) of the wiper switch, there is a short-circuit in the circuit at the wiper motor high-speed side.	Short-circuit in the wiper switch ("AUTO") input circuit.	If a malfunction is discovered as a result of the checking of the input (P.51-15), conduct check No. 2 (P.51-20) of the individual part and circuit.	Repair the wiring harness, or replace the column switch.
	Short-circuit in the wiper switch ("AUTO").		
	Short-circuit in the wiper relay activation circuit.	Conduct check No. 5 (P.51-26) of the individual part and circuit.	Repair the wiring harness.
	Malfunction of the electronic control unit.	–	Replace the electronic control unit.

Problem	Probable cause (s)	Checking procedure	Remedy
When the wiper switch is set to the "AUTO" position, the wipers operate continuously at low speed, not intermittent operation. (The wipers stop, however, when the wiper switch is set to "OFF".)	Short-circuit in the wiper switch ("AUTO") input circuit.	If a malfunction is discovered as a result of the checking of the input (P.51-15), conduct check No. 2 (P.51-20) of the individual part and circuit.	Repair the wiring harness, or replace the column switch.
	Short-circuit in the wiper switch ("AUTO").		
	Malfunction of the electronic control unit.	–	Replace the electronic control unit.
The intermittent time does not change when the intermittent variable volume switch setting is changed. (The vehicle speed is a constant speed.)	Damage or disconnection of the wiring of the intermittent variable volume switch input circuit.	If a malfunction is discovered as a result of the checking of the input (P.51-15), conduct check No. 3 (P.51-22) of the individual part and circuit.	Repair the wiring harness, or replace the column switch.
	Damage or disconnection of the wiring of the intermittent variable volume switch.		
	Malfunction of the electronic control unit.	–	Replace the electronic control unit.
The wipers' intermittent time does not change according to changes in the vehicle speed. (The intermittent variable volume switch setting is fixed.)	Damage or disconnection of the wiring of the vehicle-speed sensor input circuit, or a short-circuit.	If a malfunction is discovered as a result of the checking of the input (P.51-15), conduct check No. 4 (P.51-24) of the individual part and circuit.	Repair the wiring harness, or replace the vehicle-speed sensor.
	Malfunction of the vehicle-speed sensor.		
	Malfunction of the electronic control unit.	–	Replace the electronic control unit.

CHECKING THE INDIVIDUAL PART AND CIRCUIT

1. IGNITION SWITCH INPUT CIRCUIT AND EARTH CIRCUIT



NOTE

- (1)*1. indicates vehicles without theft-alarm system
 (2)*2. indicates vehicles with theft-alarm system

16X0476

OPERATION DESCRIPTION

As the condition for operation of the system, HIGH-level signals are sent to the electronic control unit when the ignition switch is set to the "ACC" or "ON" position.

Electronic Control Unit Terminal Voltage (Disconnect the ECU Connector and Check at the Wiring Harness Side.)

ECU terminal No.	Signal	Status	Standard
3*1 63*2	Ignition switch	ON	OFF 0V
			ON System voltage
4*1 53*2		OFF	OFF 0V
			ACC System voltage

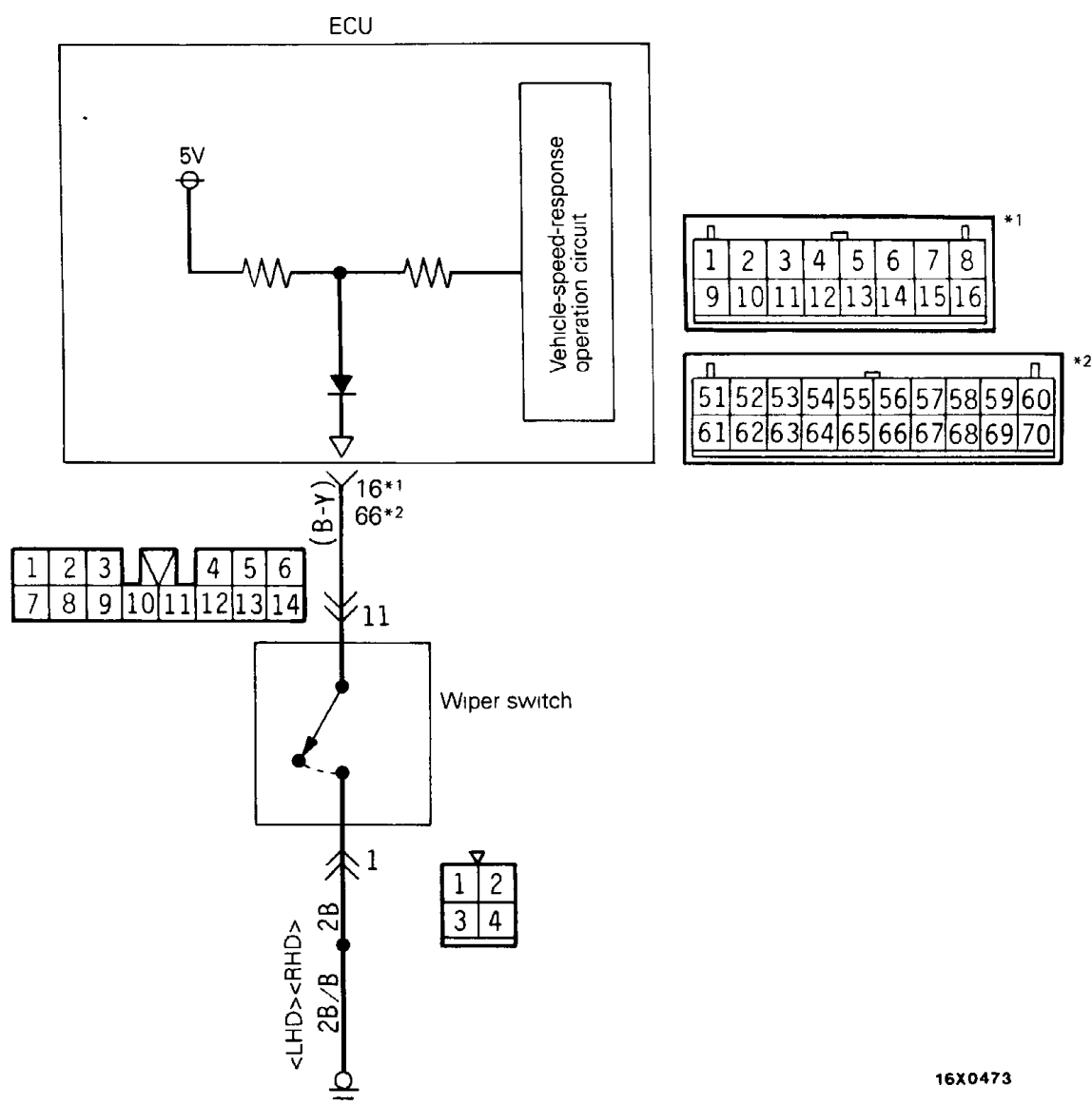
Checking the Earth Circuit (Disconnect the Connector and Check at the Wiring Harness Side.)

ECU Terminal No.	Connected to/measured component	Measurement	Tester connection	Check condition	Standard
6*1 60*2	ECU earth	Continuity	6-earth*1 60-earth*2	At all times	Continuity

Checking Individual Part

Ignition switch: Refer to GROUP 54 – Ignition Switch.

2. WIPER SWITCH "AUTO" INPUT CIRCUIT



NOTE

- (1)*1: Indicates vehicles without theft-alarm system
 (2)*2: Indicates vehicles with theft-alarm system.

OPERATION DESCRIPTION

When the wiper switch is set to the "AUTO" position, LOW-level signals are input to the electronic control unit; the vehicle-speed-response operation circuit is then activated, and the wipers operate at the intermittent time interval according to the setting of the intermittent variable volume switch and the speed of the vehicle.

Electronic Control Unit Terminal Voltage (Connection Status of Electronic Control Unit Connector)

ECU terminal No.	Signal	Status	Terminal voltage
16*1 66*2	Wiper switch "AUTO" signal	Wiper switch "OFF"	5V
		Wiper switch "AUTO"	0V

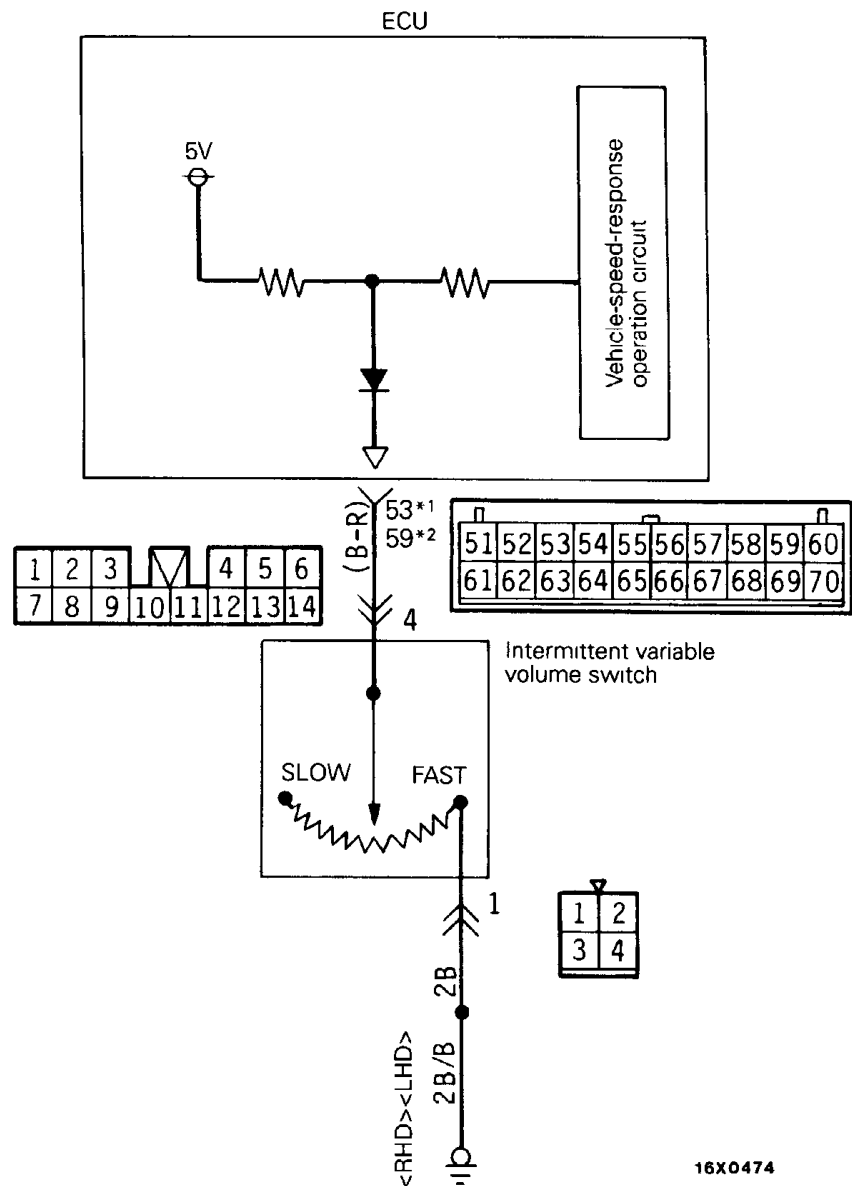
Checking the Wiper Switch ("AUTO" Position) Circuit (Disconnect the ECU Connector and Check at the Wiring Harness Side.)

ECU terminal No.	Connected to/measured component	Measurement	Tester connection	Check condition	Standard
16*1 66*2	Wiper switch "AUTO"	Continuity	16-earth*1 66-earth*2	Wiper switch "OFF"	No continuity
				Wiper switch "AUTO"	Continuity

Checking Individual Part

Wiper switch: Refer to P. 51-29

3. INTERMITTENT VARIABLE VOLUME SWITCH INPUT CIRCUIT



NOTE
(1)*1: indicates vehicles without theft-alarm system.
(2)*2: indicates vehicles with theft-alarm system.

OPERATION DESCRIPTION

This circuit functions to input (to the vehicle-speed-response operation circuit of the electronic control unit) the set value of the intermittent variable volume switch.

Electronic Control Unit Terminal Voltage (Connection Status of Electronic Control Unit Connector)

ECU terminal No.	Signal	Status	Terminal voltage
53*1 59*2	Intermittent variable volume switch signal	Intermittent variable volume switch "FAST" → "SLOW"	0 → 2.5 V

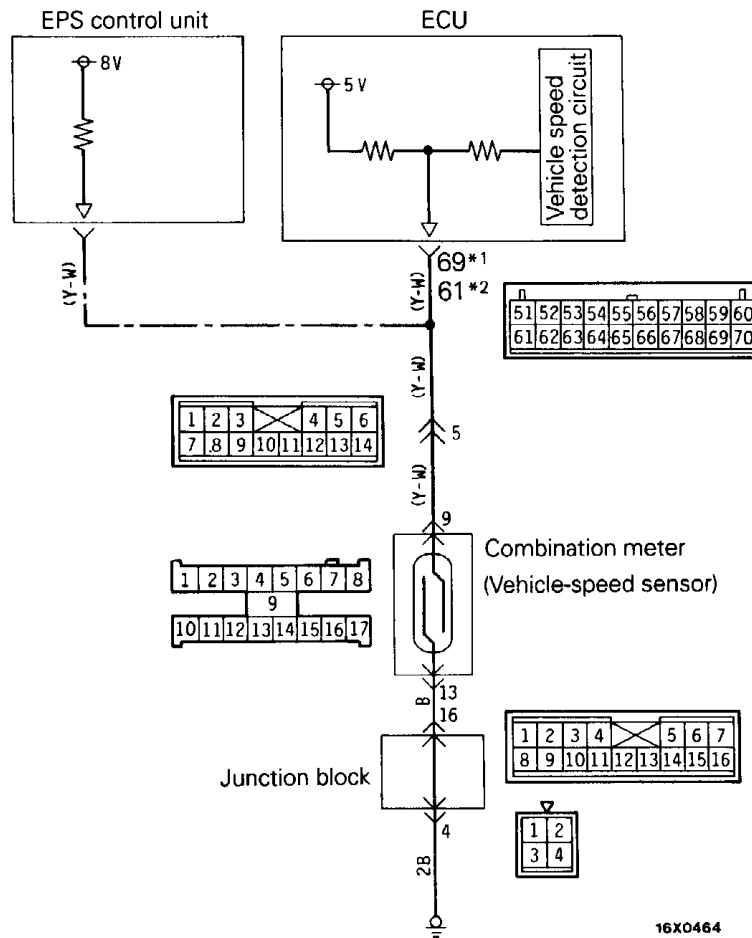
Checking the Intermittent Variable Volume Switch Circuit (Disconnect the Connector of the Electronic Control Unit and Check at the Wiring Harness Side.)

ECU terminal No.	Connected to/measured component	Measurement	Tester connection	Check condition	Standard
53* ¹ 59* ²	Intermittent variable volume switch	Resistance	53-earth* ¹ 59-earth* ²	"FAST" → "SLOW" (Should change in accordance with changes of the intermittent variable volume.)	0 → 1 kΩ

Checking Individual Part

Intermittent variable volume switch: Refer to P. 51-29.

4. VEHICLE-SPEED SENSOR INPUT CIRCUIT



16X0464

NOTE

- (1) The dotted line indicates vehicles with EPS.
 (2)*1: indicates vehicles without theft-alarm system.
 (3)*2: indicates vehicles with theft-alarm system.

OPERATION DESCRIPTION

The vehicle-speed sensor is the reed-switch type of sensor; it outputs four pulse signals for each rotation of the transmission's output gear (speedometer cable) and inputs those pulses to the vehicle-speed detection circuit of the electronic control unit.

Electronic Control Unit Terminal Voltage (Connection Status of Electronic Control Unit Connector)

ECU terminal No.	Signal	Status	Terminal voltage
69*1 61*2	Vehicle-speed sensor signal	Vehicle-speed sensor	When ON
			When OFF
			When OFF
			Vehicles without EPS
			Vehicles with EPS
			8 V*

NOTE

The * mark indicates that pull-up power of 8V is supplied from the EPS control unit.

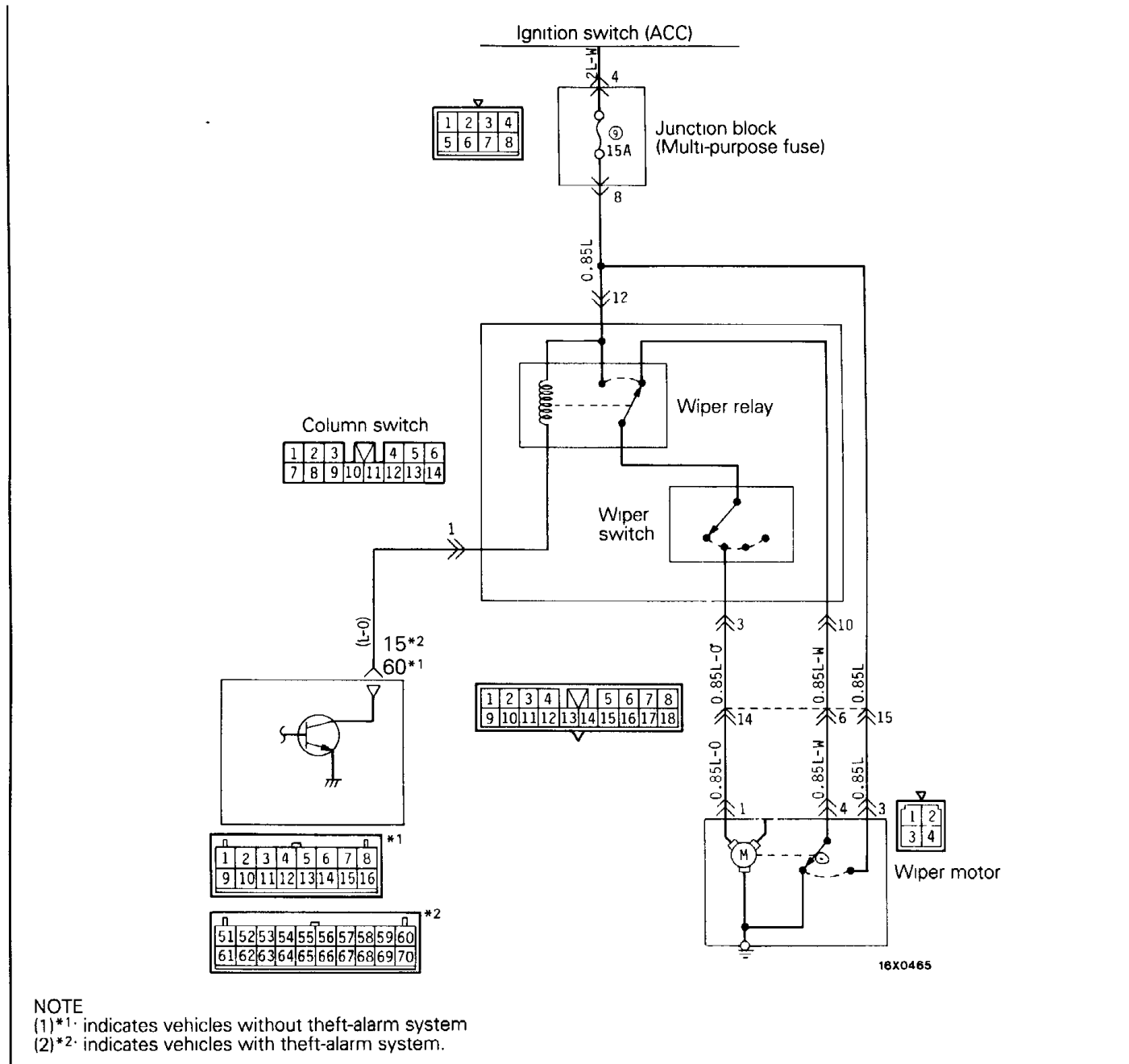
Checking the Vehicle-speed Sensor Circuit (Disconnect the Connector of the Electronic Control Unit and Check at the Wiring Harness Side.)

ECU terminal No.	Connected to/measured component	Measurement	Tester connection	Check condition	Standard
69* ¹ 61* ²	Vehicle-speed sensor	Continuity	69-earth* ¹ 61-earth* ²	(1) Jack up the front end. (2) Rotate the tyres in the forward direction.	Repeats "Continuity" ↑↓ No continuity"

Checking Individual Part

Vehicle-speed sensor: Refer to GROUP 54 – Meters and Gauges.

5. WIPER RELAY ACTIVATION CIRCUIT



OPERATION DESCRIPTION

With the wiper switch at the "AUTO" position, switch ON the transistor (by the intermittent activation signal from the electronic control unit) in order to activate the wiper relay.

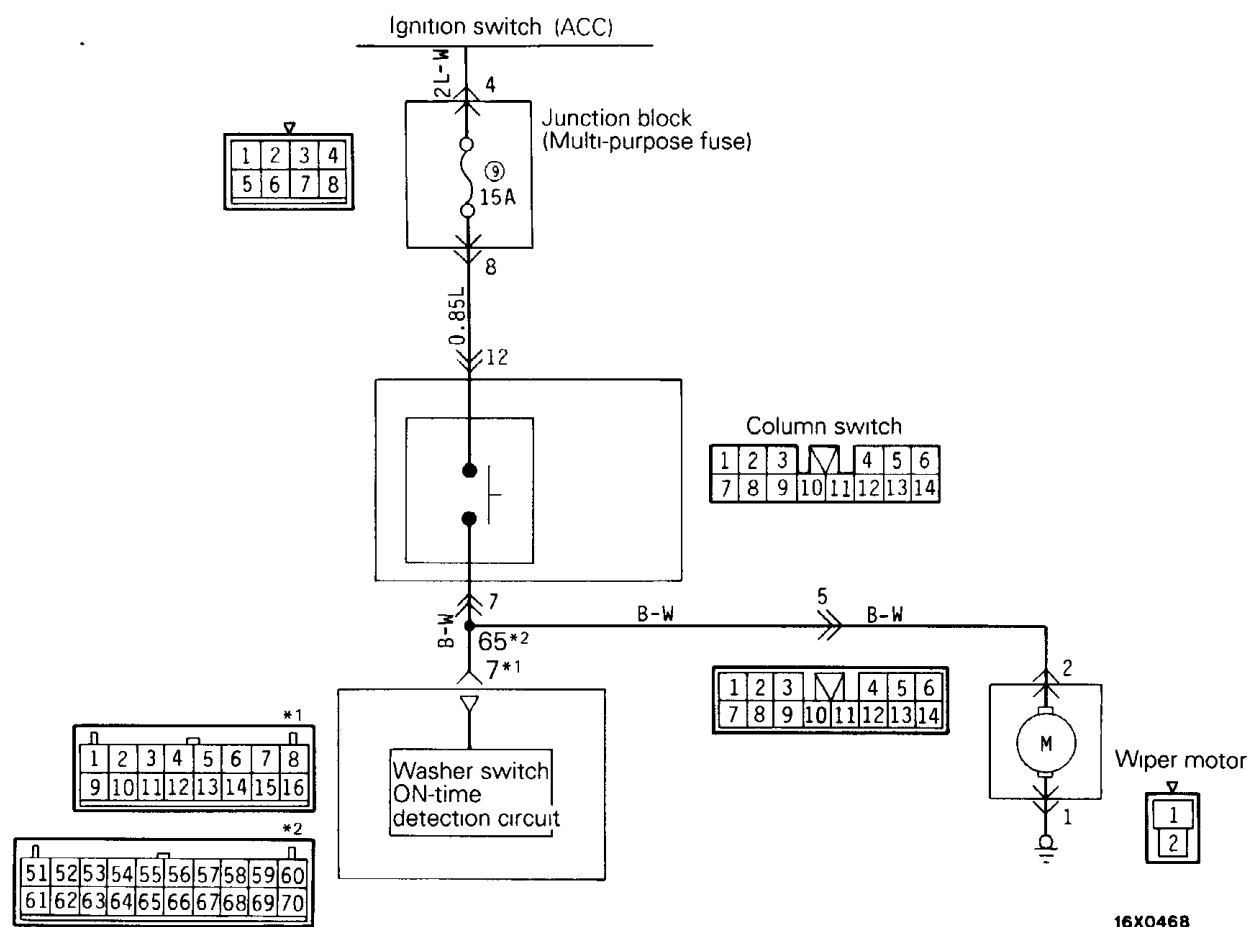
Electronic Control Unit Terminal Voltage (Connection Status of Electronic Control Unit Connector)

ECU terminal No.	Signal	Status	Terminal voltage
60*1 15*2	Wiper relay signal	Wiper switch "OFF"	0V
		Ignition switch "ACC"	System voltage

Checking Individual Part

Wiper relay: Refer to P. 51-30.

6. WASHER SWITCH INPUT CIRCUIT



16X0468

18N0358

NOTE

- (1)*1: indicates vehicles without theft-alarm system.
 (2)*2: indicates vehicles with theft-alarm system.

OPERATION DESCRIPTION

While the washer switch is ON, HIGH-level signals are sent to the washer switch ON-time detection circuit simultaneous with the activation of the washer motor, thus causing the transistor to be switched ON and the wipers to be activated for a certain fixed time

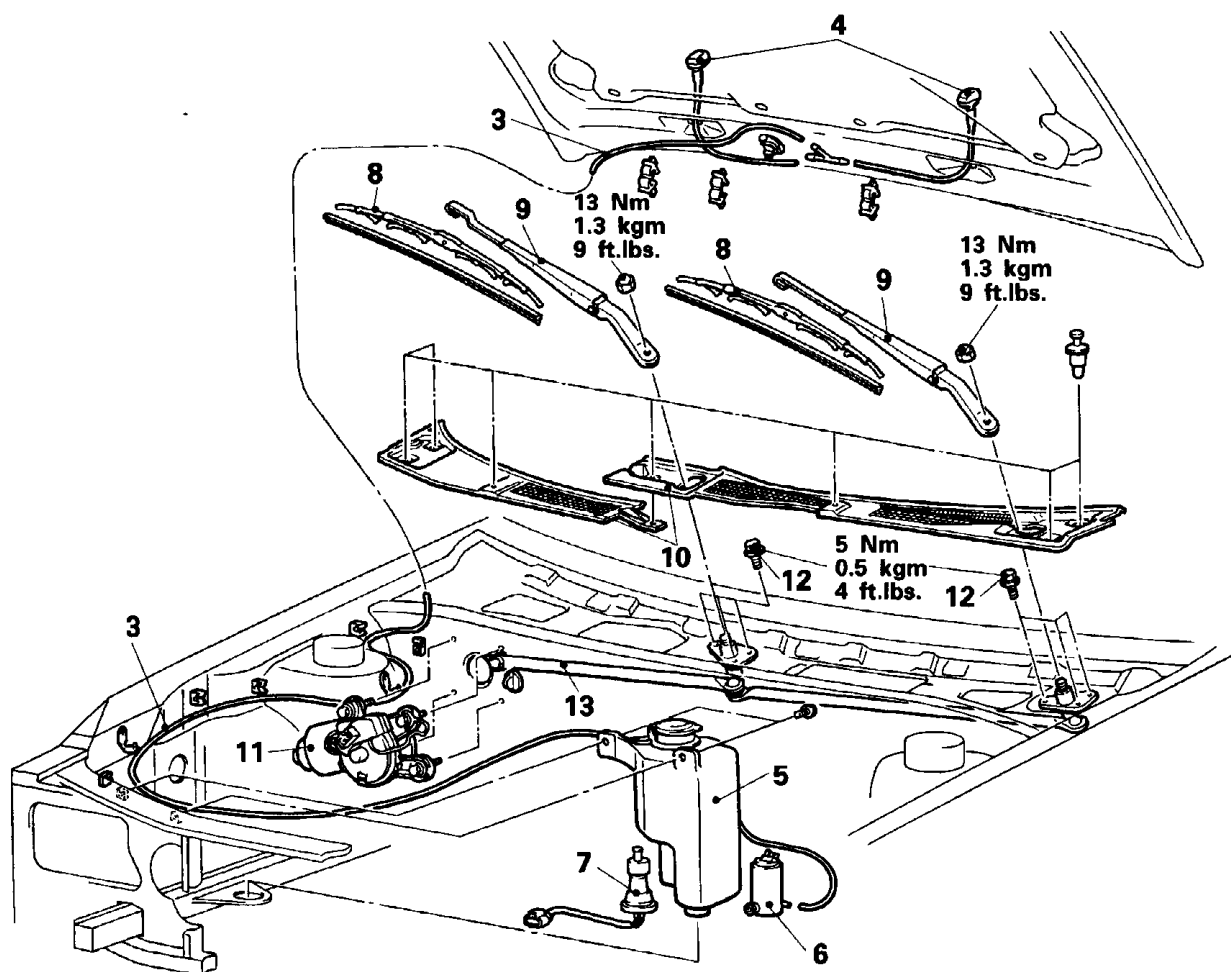
Electronic Control Unit Terminal Voltage (Connection Status of Electronic Control Unit Connector)

ECU terminal No.	Signal	Status		Terminal voltage
7*1 65*2	Washer switch signal	Ignition switch "ACC"	Washer switch "OFF"	0V
			Washer switch "ON"	System voltage

Checking Individual Part

Washer switch. Refer to P. 51-29.

REMOVAL AND INSTALLATION



18N0234

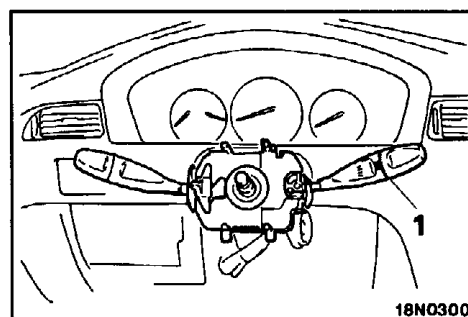
1. Column switch (with built-in wiper and washer switch and wiper relay) [Refer to GROUP 54 – Column Switch.]
2. ETACS control unit
3. Washer tube
4. Washer nozzle
- ◆◆ 5. Windshield washer tank assembly
- ◆◆ 6. Washer motor
- ◆◆ 7. Washer fluid level sensor
- ◆◆ 8. Wiper blade
- ◆◆ 9. Wiper arm

Wiper motor removal steps

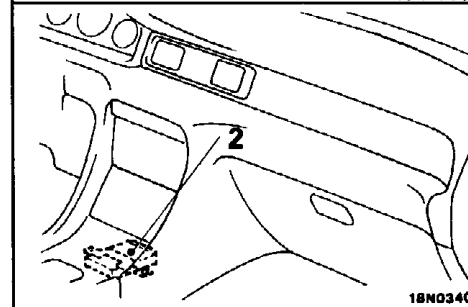
- ◆◆ 9. Wiper arm
- ◆◆ 10. Air inlet grille (RH)
- ◆◆ 11. Wiper motor

Linkage removal steps

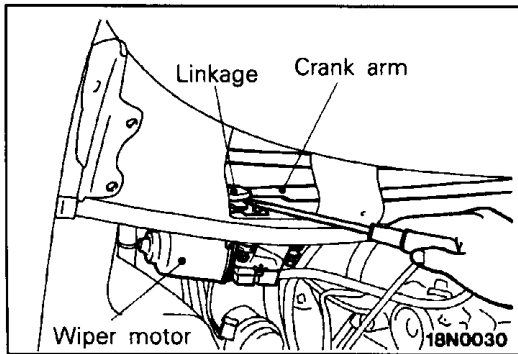
- ◆◆ 9. Wiper arm
- ◆◆ 10. Air inlet grille (RH)
- ◆◆ 11. Wiper motor assembly
- ◆◆ 12. Linkage mounting bolt
- ◆◆ 13. Linkage



18N0300



18N0340



SERVICE POINTS OF REMOVAL

11. REMOVAL OF WIPER MOTOR

Loosen the wiper motor assembly mounting bolts, and then remove the wiper motor assembly. Disconnect the linkage and the motor assembly, and then remove the linkage.

Caution

Because the installation angle of the crank arm and the motor has been set, do not remove them unless it is necessary to do so. If they must be removed, remove them only after marking their mounting positions.

INSPECTION

WIPER MOTOR

Check the wiper motor after disconnecting the wiring harness connector, and with the wiper motor remaining installed to the body.

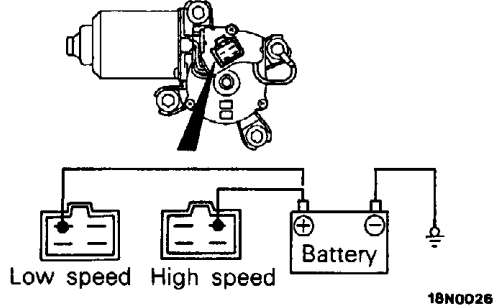
Operation of Wiper Motor at LOW speed and HIGH speed

Connect a battery to the wiper motor as shown in the illustration and inspect motor operation at LOW speed and HIGH speed.

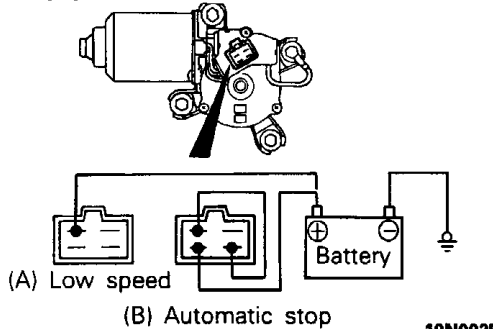
Operation of Wiper Motor at STOP Position

- (1) Run the wiper motor at LOW speed, disconnect the battery, and stop the motor.
- (2) Reconnect the battery as shown in the illustration, and confirm that after the motor starts turning at LOW speed, it stops at the automatic stop position.

Operation check



Stop position check



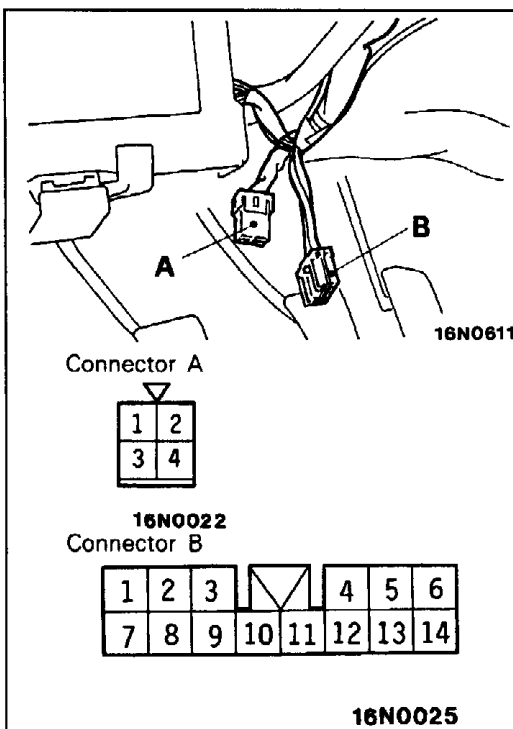
WIPER AND WASHER SWITCH

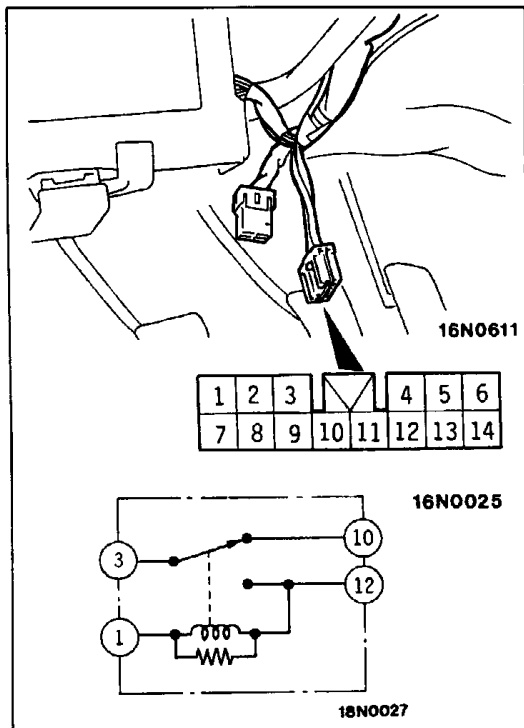
Disconnect the column switch connector and check the continuity between the terminals for each switch.

Switch position	Connector	B							
		1	3	4	7	9	10	11	12
Wiper switch	OFF		○				○		
	AUTO	○	○				○	○	
	1		○						○
	2					○			○
Intermittent variable volume switch		○	○						
Washer switch	ON				○				○

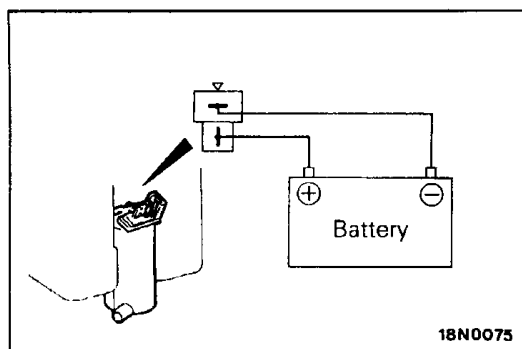
NOTE

○—○ indicates that there is continuity between the terminals.

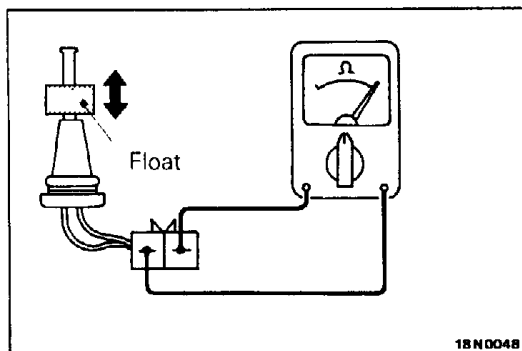


**WIPER RELAY**

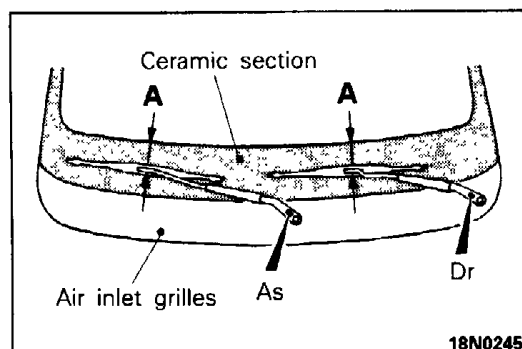
- (1) Disconnect the column switch connector and turn the column switch to the OFF or AUTO position.
- (2) Check if there is continuity between terminals ③ – ⑩ and ① – ⑫, and if there is no continuity between terminals ③ – ⑫.
- (3) When the battery (+) is connected to terminal ⑫, and the (-) is connected to terminal ①, check if there is battery voltage at terminal ③.

**WASHER MOTOR**

- (1) With the washer motor installed to the washer tank, fill the washer tank with water.
- (2) When the battery is connected as shown in the figure, check that the water squirts out strongly.

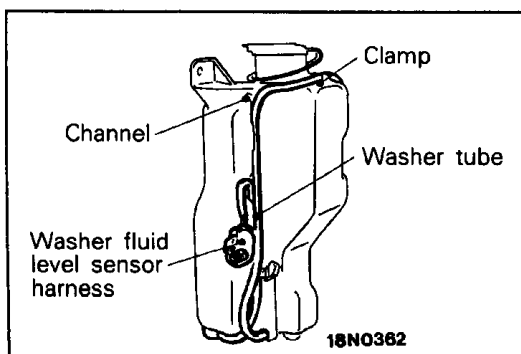
**WASHER FLUID LEVEL SENSOR**

- (1) Remove the washer fluid level sensor from the washer tank.
- (2) Connect a circuit tester to the connector of washer fluid level sensor.
- (3) Move the float up and down.
- (4) Make sure that when the float is raised, there is no continuity and when it is lowered, there is continuity.

**SERVICE POINTS OF INSTALLATION****9. INSTALLATION OF WIPER ARM/8. WIPER BLADE**

- (1) The movements of the left and right wiper arms are different, so check the identification marks.
- (2) Install the wiper blade in the specified position (standard value) as shown in the illustration.

Standard value (A): 23–33 mm (0.91–1.30 in.)

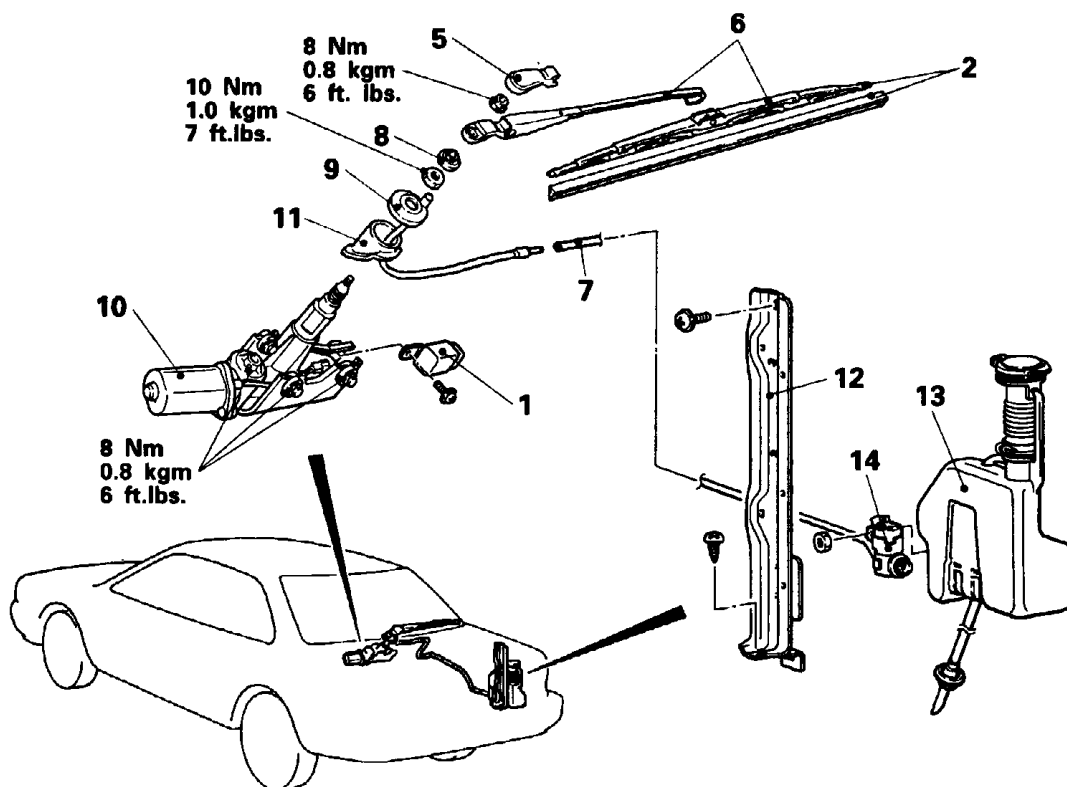


5. INSTALLATION OF THE WINDSHIELD WASHER TANK ASSEMBLY

Pass the harness of the washer fluid level sensor and the washer tube in that order along the windshield washer tank channel, and then, install the windshield washer tank.

REAR WIPER AND WASHER REMOVAL AND INSTALLATION

E51LAAJ



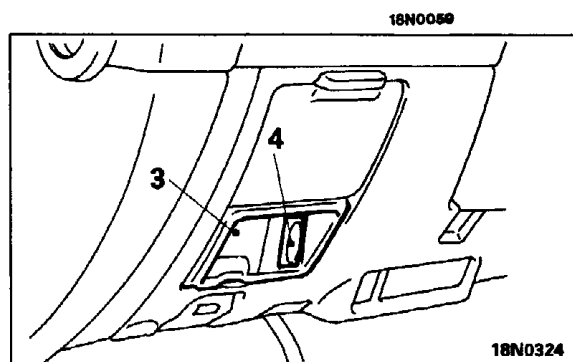
1. Rear intermittent wiper relay
2. Wiper blade

Rear wiper and washer switch removal steps

3. Instrument lower switch panel
4. Rear wiper and washer switch

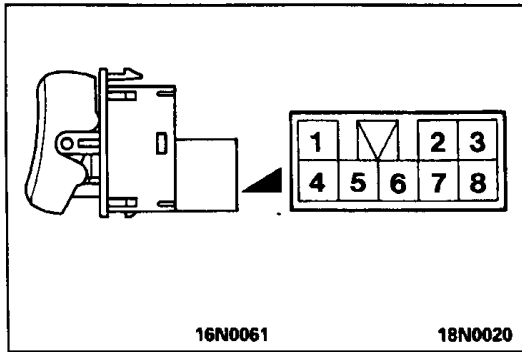
Wiper motor removal steps

5. Cover
6. Wiper arm and blade assembly
7. Washer tube connection
8. Shield cap
9. Nozzle and collar assembly
10. Wiper motor and bracket assembly
11. Packing and washer



Washer tank and motor removal steps

- Trunk side trim (Refer to GROUP 52 – Trims.)
- 12. Bracket
- 13. Washer tank assembly
- 14. Washer motor

**INSPECTION****REAR WIPER AND WASHER SWITCH**

Operate the switch, and check the continuity between the terminals.

Terminal Switch position	1	2	4	5	8	6	7
INT				○	○		
Washer	○	○	○				ILL

16A0252

NOTE

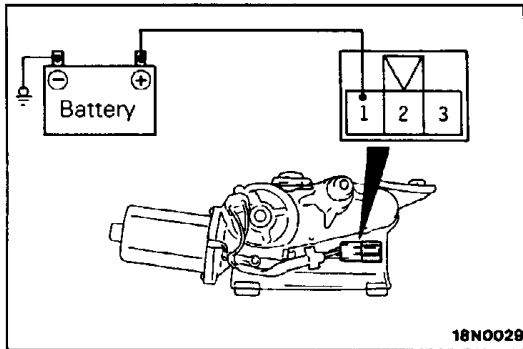
○—○ indicates that there is continuity between the terminals.

WIPER MOTOR

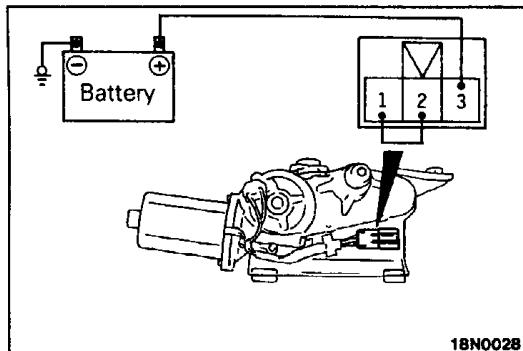
Check the wiper motor after first disconnecting the wiring harness connector, and with the wiper motor remaining installed to the body.

Operation of Wiper Motor

Connect a battery to the wiper motor as shown in the illustration and inspect the motor operation.

**Operation of Wiper Motor at STOP Position**

- (1) Run the wiper motor, disconnect the battery, and stop the motor.
- (2) Reconnect the battery as shown in the illustration, and confirm that after the motor starts turning, it stops at the automatic stop position.

**REAR INTERMITTENT WIPER RELAY**

- (1) Check if there is continuity between terminals ①–②.
- (2) Connect the battery (+) side to terminal ④, and the battery (–) side to terminal ⑥.

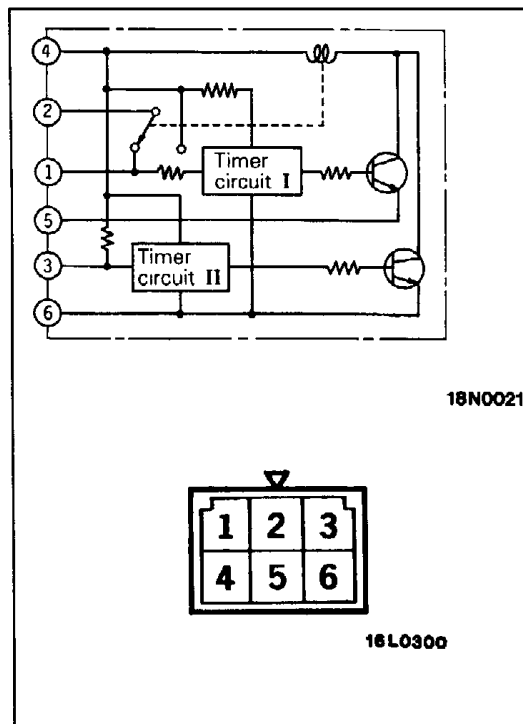
Inspection of intermittent wiper function

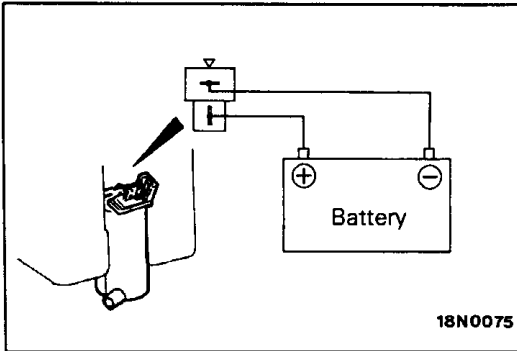
When the battery (–) side is connected to terminal ⑤, check if there is battery voltage at terminal ② at approximately every 8 seconds.

Inspection of continuous washer/wiper function

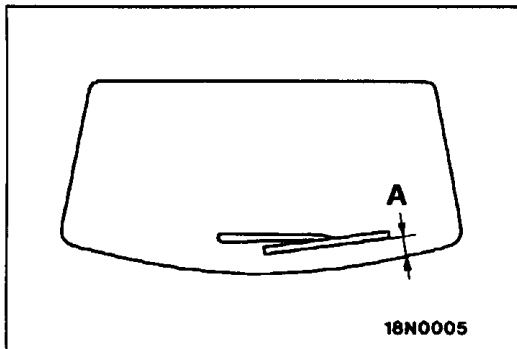
When the battery (–) side is connected to terminal ③, check if there is battery voltage at terminal ② after approximately 1 second.

When the battery is disconnected from terminal ③, check if the voltage that was at terminal ② becomes 0 V after approx. 3–4 seconds.



**WASHER MOTOR**

- (1) With the washer motor installed to the washer tank, fill the washer tank with water.
- (2) When the battery is connected as shown in the figure, check that the water squirts out strongly.

**SERVICE POINT OF INSTALLATION****6. INSTALLATION OF WIPER ARM AND BLADE ASSEMBLY**

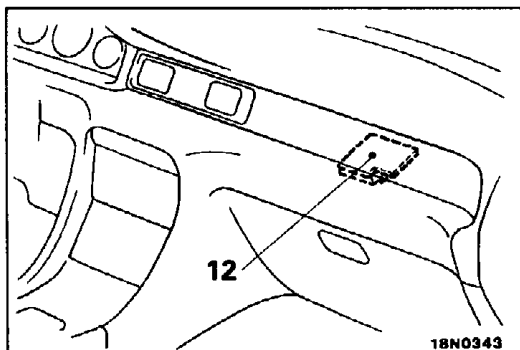
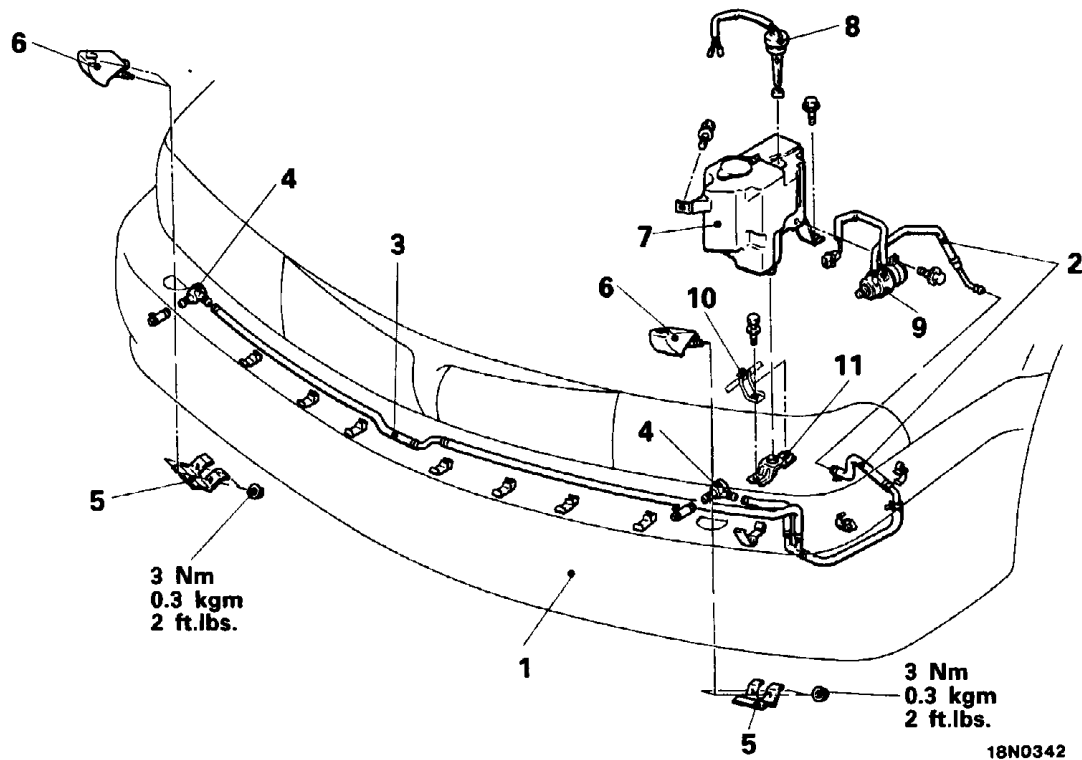
Install the wiper arm to the pivot shaft so that the wiper blade's stop position is the position shown in the illustration.

Standard value (A): 45 ± 3 mm (1.77 ± 0.12 in.)

HEADLAMP WASHER

E51MAAL

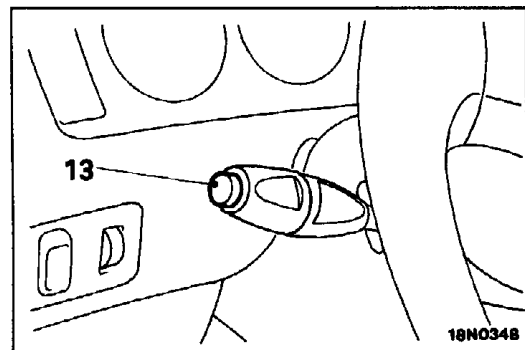
REMOVAL AND INSTALLATION

**Headlamp washer nozzle removal steps**

1. Front bumper (Refer to P.51-4.)
 2. Washer pipe connection
 - License plate bracket
 - Lower reinforcement
 - Reinforcement
 - Upper plate
 - Upper support
 - Bumper core
- } (Refer to P.51-5.)
3. Washer pipe assembly
 4. Check valve
 5. Bracket
 6. Nozzle

Headlamp washer switch removal

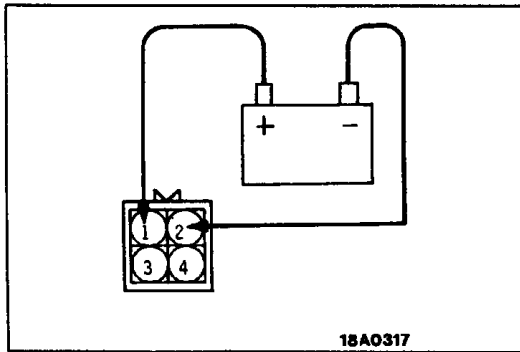
13. Headlamp washer switch (Refer to GROUP 54 – Column Switch.)

**Headlamp washer relay removal steps**

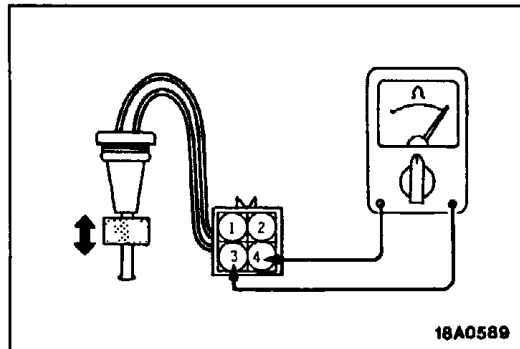
- Glove box and glove box outer case assembly (Refer to GROUP 52 – Instrument panel.)
12. Headlamp washer relay

Headlamp washer tank assembly removal steps

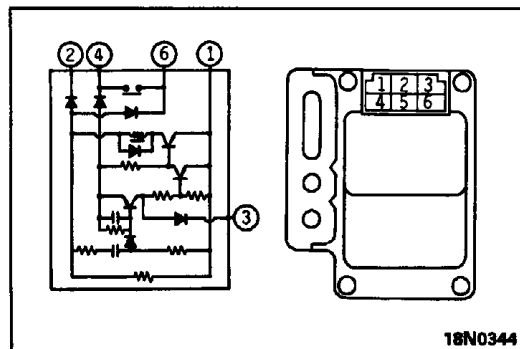
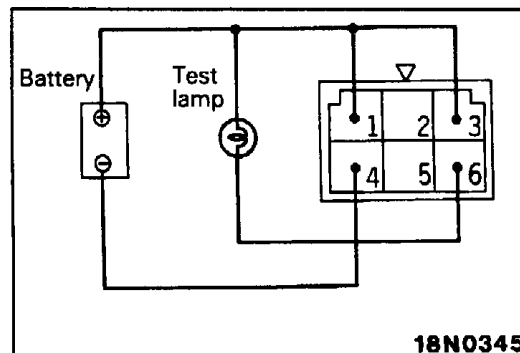
2. Washer pipe connection
7. Headlamp washer tank assembly
8. Washer fluid level sensor
9. Headlamp washer motor
10. High pressure pipe bracket
11. Bracket

**INSPECTION****HEADLAMP WASHER MOTOR**

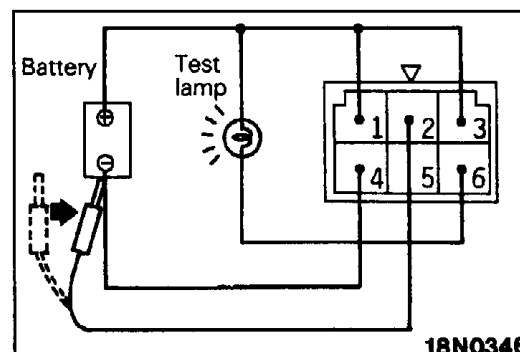
- (1) With the washer motor installed to the washer tank, fill the washer tank with water.
- (2) Connect battery (+) and (-) cables to terminals 2 and 1 respectively to see that the washer motor runs and water is injected.

**WASHER FLUID LEVEL SENSOR**

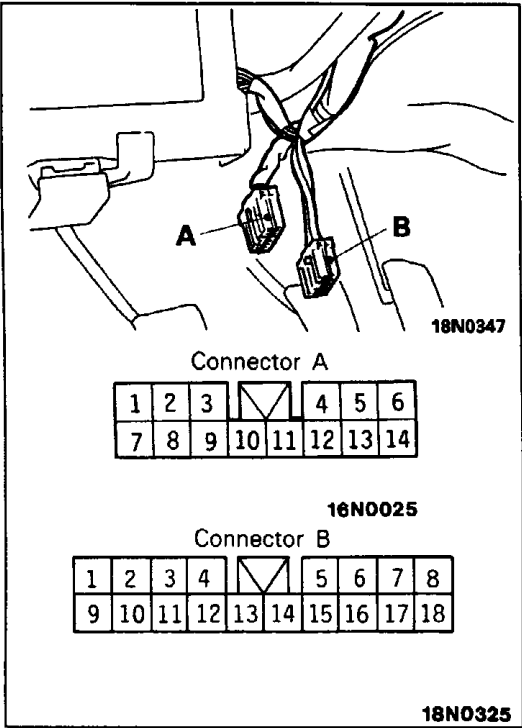
- (1) Remove the washer fluid level sensor from the washer tank.
- (2) Connect a circuit tester to the connector of washer fluid level sensor.
- (3) Move the float up and down.
- (4) Make sure that when the float is raised, there is no continuity and when it is lowered, there is continuity.

**HEADLAMP WASHER RELAY**

- (1) Connect battery and test lamp to the relay as illustrated.



- (2) The relay is normal if the lamp lights for approximately 0.5 second upon connection of terminal 2 to battery (-).

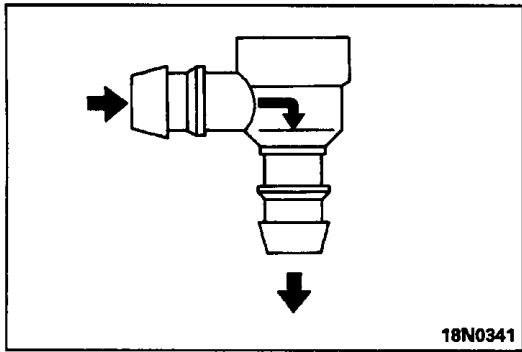


HEADLAMP WASHER SWITCH

Disconnect the column switch connector and check the continuity between the terminals for each switch.

Connector	A	B
Switch position	14	6
OFF		
ON		

NOTE
○—○ indicates that there is continuity between the terminals.



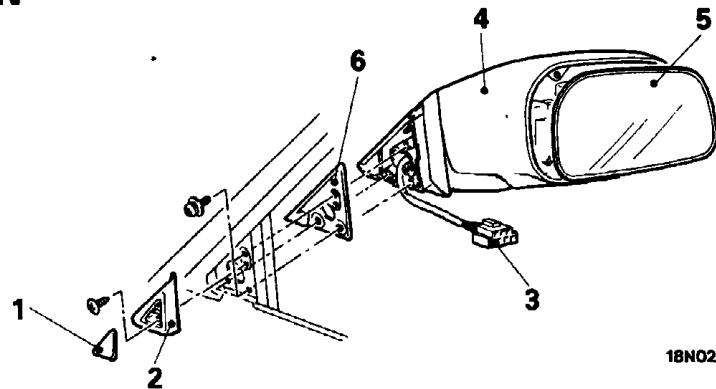
CHECK VALVE

Apply pressure to the inlet of the check valve to check its opening pressure.

Opening pressure: 50 – 110 kPa
(0.5 – 1.1 kg/cm², 7.1 – 15.6 psi)

DOOR MIRROR

E51JAA0

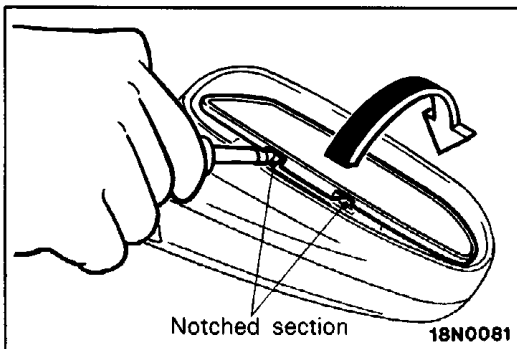
REMOVAL AND INSTALLATION

18N0289

Door mirror removal steps

- Front door trim (Refer to GROUP 42 – Door trim and Waterproof Film.)

1. Delta cover inner cap
2. Delta cover inner
3. Harness connector
4. Door mirror
5. Mirror
6. Delta outer packing

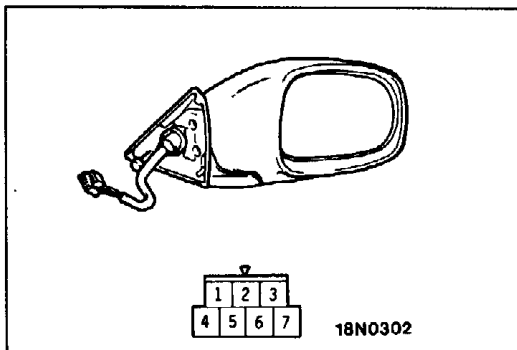


Notched section

18N0081

SERVICE POINTS OF REMOVAL**5. REMOVAL OF MIRROR**

Turn the mirror by hand so that it faces upwards, insert the (–) driver wound with masking tape into the notched section, and lever out the mirror to remove it.



18N0302

INSPECTION**REMOTE CONTROL MIRROR ASSEMBLY**

1. Check to be sure that the mirror moves as described in the table when each terminal is connected to the battery.
2. Check if there is continuity between terminals ① and ④.

Connection Direction of operation	Battery		Terminal				
	⊕	⊖	5	6	7	1*	4*
Up	○	○	○		○		
Down	○	○	○		○		
Left	○	○	○	○			
Right	○	○	○	○			

NOTE

○—○ indicates each terminal is connected to the battery.

*: Vehicles with heated mirror

DOOR MIRROR CONTROL SWITCH

Refer to GROUP 54 – Multiple Transmission Systems.

INTERIOR

CONTENTS

E52AA--

SPECIFICATIONS	2	HEADLINING	8
General Specifications	2	INSIDE REAR VIEW MIRROR	9
Service Specifications	2	FRONT SEAT*	10
Adhesives	2	REAR SEAT	20
SPECIAL TOOLS	3	FRONT SEAT BELT*	22
INSTRUMENT PANEL*	3	REAR SEAT BELT	23
FLOOR CONSOLE*	6		
TRIMS	6		

WARNINGS REGARDING SERVICING OF SUPPLEMENTAL RESTRAINT SYSTEM (SRS) EQUIPPED VEHICLES

WARNING!

- (1) Improper service or maintenance of any component of the SRS, or any SRS-related component, can lead to personal injury or death to service personnel (from inadvertent firing of the air bag) or to the driver and passenger (from rendering the SRS inoperative).
- (2) Service or maintenance of any SRS component or SRS-related component must be performed only at an authorized MITSUBISHI dealer.
- (3) MITSUBISHI dealer personnel must thoroughly review this manual, and especially its GROUP 52B—Supplemental Restraint System (SRS), before beginning any service or maintenance of any component of the SRS or any SRS-related component.

NOTE

The SRS includes the following components: impact sensors, SRS diagnosis unit, SRS warning lamp, air bag module, clock spring, and interconnecting wiring. Other SRS-related components (that may have to be removed/installed in connection with SRS service or maintenance) are indicated in the table of contents by an asterisk (*).

SPECIFICATIONS

GENERAL SPECIFICATIONS

E52CA--

Items	Specifications
Heated seats	
Power consumption	
W [When room temperature is 20°C (68°F)]	
HIGH	43.9
LOW	10.9
Thermostat working temperature	°C (°F)
ON→OFF	35–45 (95–113)
OFF→ON	25–35 (77–95)

SERVICE SPECIFICATIONS

E52CB--

Items	Specifications
Standard value	
Heated seats	
Seatback heater resistance (between terminals)	
Ω [When ambient temperature is 20°C (68°F)]	Approx. 5.8
Seat cushion heater resistance (between terminals)	
Ω [When ambient temperature is 20°C (68°F)]	
Between terminals 1 and 3	Approx. 7.1
Between terminals 2 and 3	Approx. 7.4
Between terminals 1 and 2	Approx. 0.4

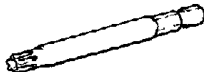
ADHESIVES

E52CE--

Item	Specified adhesive	Characteristics
Headlining (Front of sunroof opening)	Both-side tape [15 mm (0.6 in.) wide and 0.15 mm (0.006 in.) thick], dry adhesive	Drying adhesive
Front seat		
Lower rail and nut housing mounting bolts	3M Stud Locking Part No. 4170 or equivalent	Anaerobic sealant

SPECIAL TOOLS

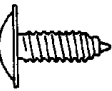
E52DA--

Tool	Number	Name	Use
	MB990784	Ornament remover	Removal of switch, trim, etc.
	MB990826	Torx wrench	Removal and installation of special bolt

INSTRUMENT PANEL

E52GAAL

For installation of the instrument panel, the bolts and screws described below are used. They are indicated by symbols in the illustration.

Name	Symbol	Size mm (in.) (D×L)	Colour	Shape
Tapping screw	A	5×12 (0.20×0.47)	–	
	B	5×16 (0.20×0.62)	–	
	C	5×20 (0.20×0.79)	–	
	D	5×20 (0.20×0.79)	Black	
	E	4×16 (0.16×0.62)	Black	
	F	5×16 (0.20×0.62)	Black	
	G	5×20 (0.20×0.79)	Black	
	H	5×16 (0.20×0.62)	Black	
Washer assembled screw	I	5×16 (0.20×0.62)	–	
Washer assembled bolt	J	6×16 (0.24×0.62)	–	
	K	6×20 (0.24×0.79)	Black	
Wing nut	L	5 (0.20)	–	
Machine screw	M	4×10 (0.16×0.39)	Black	

19N0001

D=Tread diameter
L=Effective thread length

REMOVAL AND INSTALLATION

E52GB--

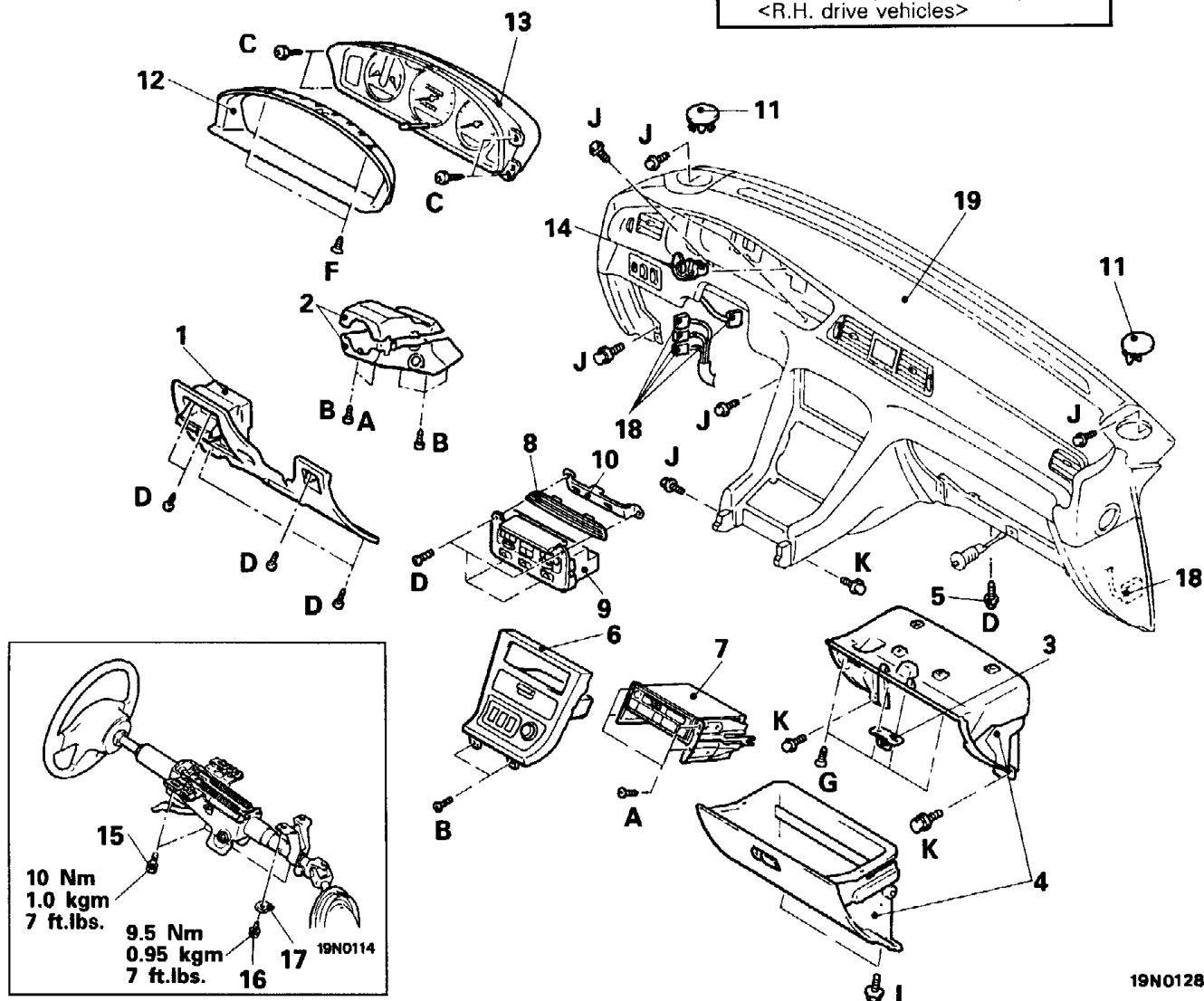
<Vehicles without front passenger's air bag>

Pre-removal and Post-installation Operation

- Removal and Installation of Floor Console Assembly (Refer to P.52-6)

CAUTION: SRS
When removing and installing the following parts from vehicles equipped with SRS, do not let it bump against the SRS diagnostic unit or other components.

- Floor console assembly
<L.H. drive vehicles>
- Instrument panel assembly
<R.H. drive vehicles>

**Removal steps**

1. Driver side lower panel
2. Column cover
3. Glove box striker
4. Glove box and glove box outer case
5. Under cover installation screw
6. Audio panel
7. Radio and tape player
8. Heater control garnish
9. Heater control panel assembly
10. Heater control garnish bracket
11. Plug
12. Meter bezel
13. Combination meter
14. Speedometer cable adapter

15. Steering column assembly installation bolts



16. Special bolt
17. Special washer
18. Harness connector
19. Instrument panel assembly

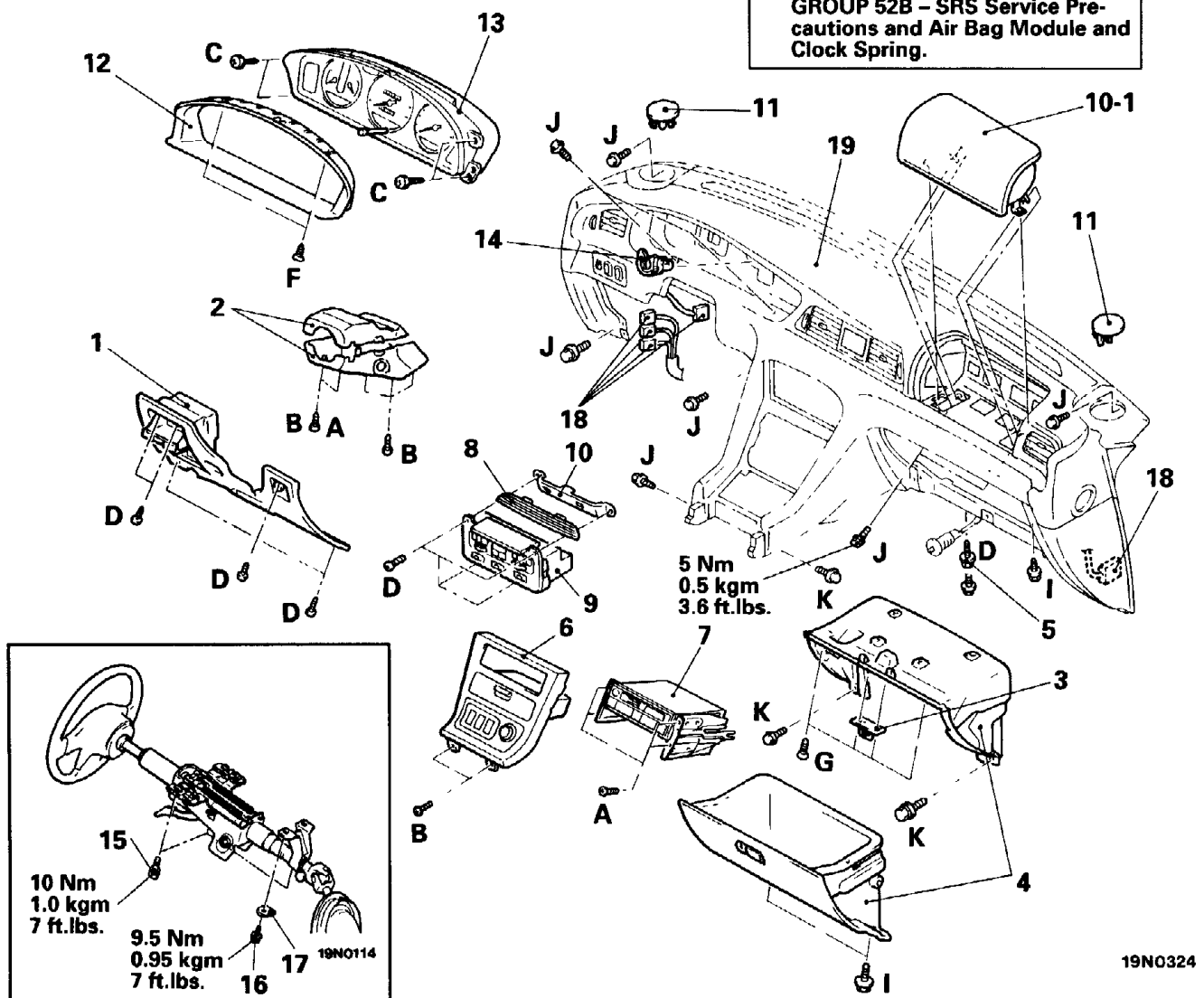
<Vehicles with front passenger's air bag>

Pre-removal and Post-installation Operation

- Removal and Installation of Floor Console Assembly (Refer to P.52-6.)

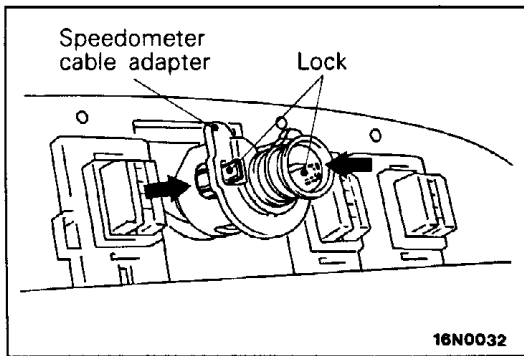
CAUTION: SRS

- When removing and installing the floor console assembly from vehicles equipped with SRS, do not let it bump against the SRS diagnostic unit or other components.
- Before removal of front passenger's air bag module, refer to GROUP 52B – SRS Service Precautions and Air Bag Module and Clock Spring.



Removal steps

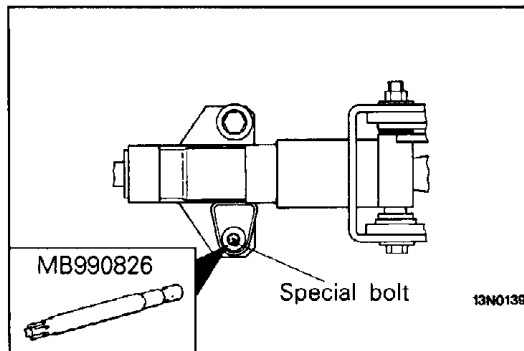
- | | |
|--|---|
| 1. Driver side lower panel | 11. Plug |
| 2. Column cover | 12. Meter bezel |
| 3. Glove box striker | 13. Combination meter |
| 4. Glove box and glove box outer case | 14. Speedometer cable adapter |
| 5. Under cover installation screw | 15. Steering column assembly installation bolts |
| 6. Audio panel | 16. Special bolt |
| 7. Radio and tape player | 17. Special washer |
| 8. Heater control garnish | 18. Harness connector |
| 9. Heater control panel assembly | 19. Instrument panel assembly |
| 10. Heater control garnish bracket | |
| 10-1. Front passenger's air bag module
(Refer to GROUP 52B –Air bag module
and Clock Spring) | |

**SERVICE POINTS OF REMOVAL**

E52GCAH

14. REMOVAL OF SPEEDOMETER CABLE ADAPTER

- (1) Disconnect the speedometer cable at the transmission end of the cable.
- (2) Remove the lock of the speedometer cable adapter from the instrument panel.
- (3) Pull the speedometer cable slightly toward the vehicle interior, and then remove the speedometer cable adapter.

**16. REMOVAL OF SPECIAL BOLT**

Steering column assembly is installed with a special bolt. Remove it by using the special tool.

SERVICE POINT OF INSTALLATION

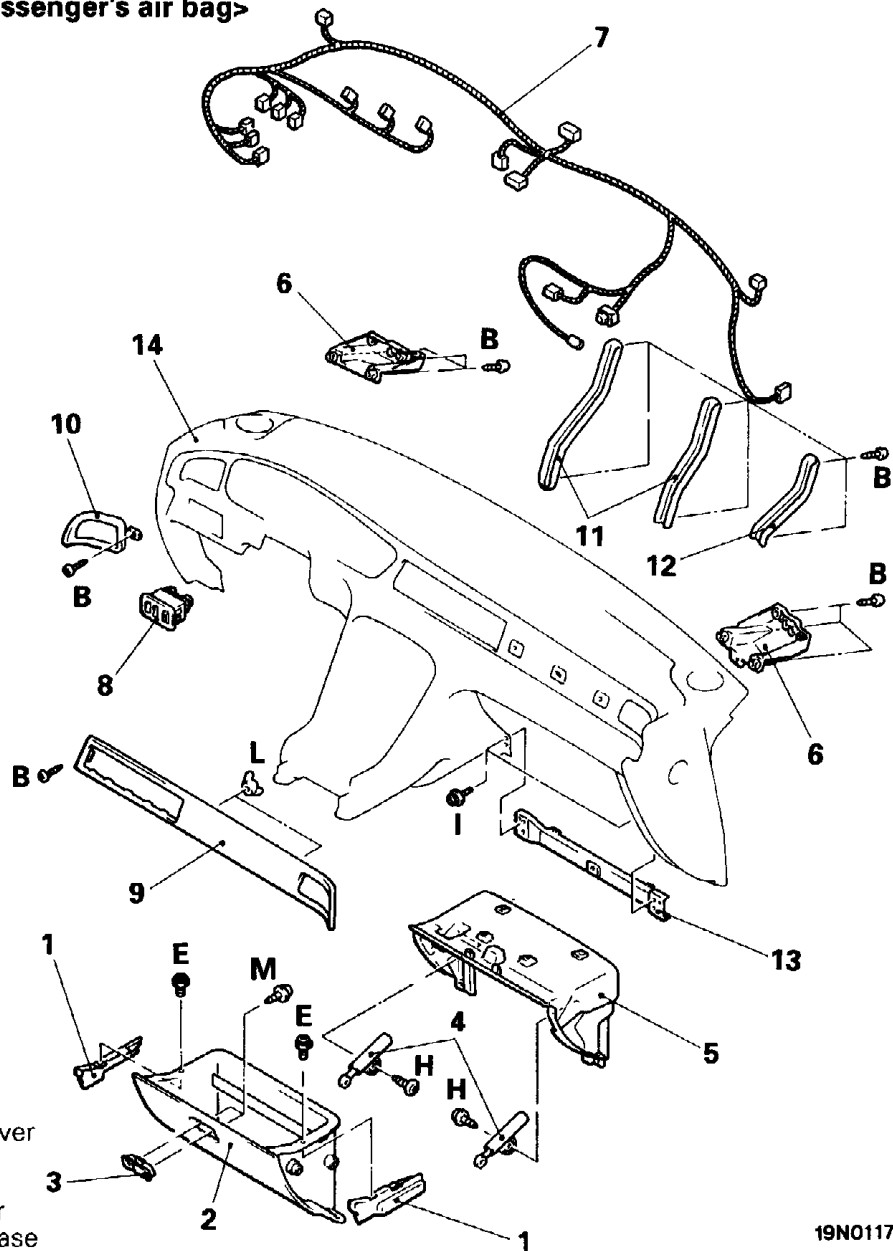
E52GEAH

16. INSTALLATION OF SPECIAL BOLT

Tighten the special bolt using the special tool.

DISASSEMBLY AND REASSEMBLY

<Vehicles without front passenger's air bag>

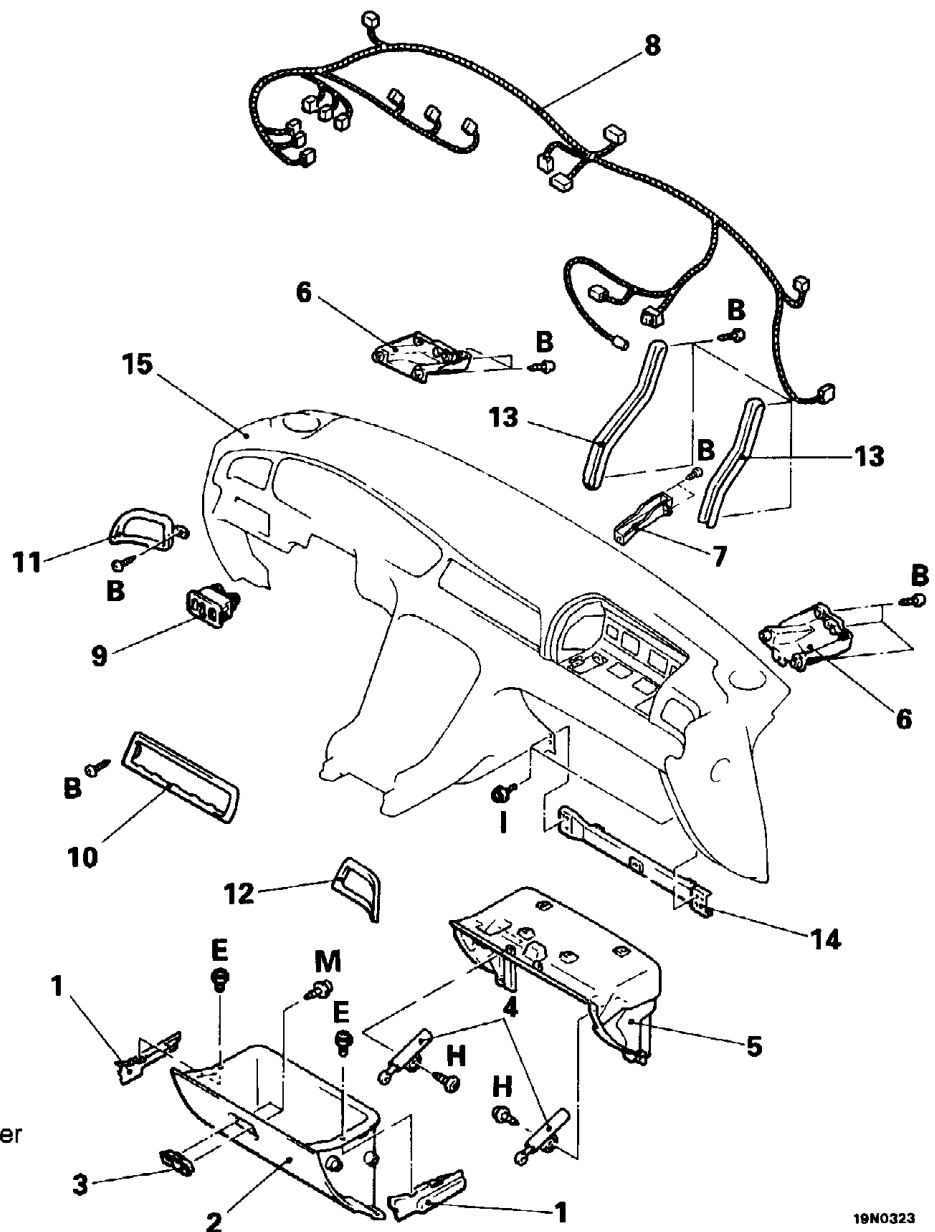


Disassembly steps

1. Glove box side cover
2. Glove box
3. Glove box lock
4. Glove box damper
5. Glove box outer case
 - Heater ducts
 - Defroster garnish
 - Photo sensor
 [Refer to GROUP 55 – Ventilators (Instrument Panel)]
6. Instrument panel support panel
7. Instrument panel wiring harness
8. Instrument panel side switch
- Center air outlet assembly
 [Refer to GROUP 55 – Ventilators (Instrument Panel)]
9. Instrument trim panel A
10. Instrument trim panel B
 - Side air outlet assembly
 [Refer to GROUP 55 – Ventilators (Instrument Panel)]
11. Instrument panel center reinforcement
12. Instrument panel passenger side reinforcement
13. Glove box frame
14. Instrument panel

19N0117

<Vehicles with front passenger's air bag>

**Disassembly steps**

1. Glove box side cover
 2. Glove box
 3. Glove box lock
 4. Glove box damper
 5. Glove box outer case
 - Heater ducts
 - Defroster garnish
 - Photo sensor
 - Center air outlet assembly
 - Side air outlet assembly
 10. Instrument trim panel, center
 11. Instrument trim panel B
 12. Instrument trim panel C
 13. Instrument panel center reinforcement
 14. Glove box frame
 15. Instrument panel
- [Refer to GROUP 55 – Ventilators (Instrument Panel)]

19N0323

NOTES

FLOOR CONSOLE

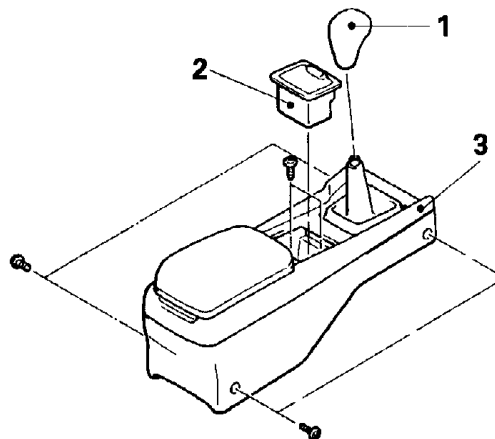
REMOVAL AND INSTALLATION

E52HA--

CAUTION: SRS <L.H. drive vehicles>
When removing and installing the floor console assembly from vehicles equipped with SRS, do not let it bump against the SRS diagnostic unit or other components.

Removal steps

1. Shift lever knob <M/T>
2. Ashtray
3. Floor console assembly



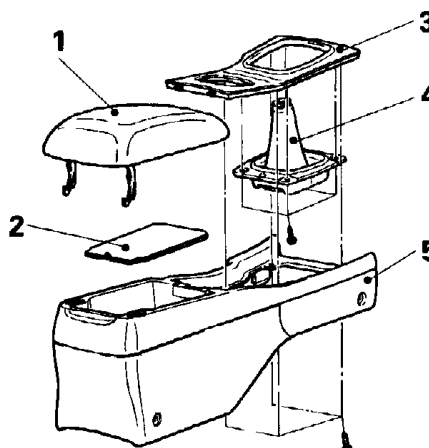
19N0118

DISASSEMBLY AND REASSEMBLY

E52HE--

Disassembly steps

1. Lid assembly
2. Floor console mat
3. Console panel
4. Shift lever boot <M/T>
5. Floor console

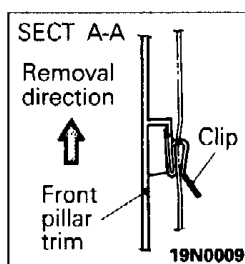


19N0116

TRIMS

REMOVAL AND INSTALLATION

E52JA--



19N0009

1. Front pillar trim

Center pillar trim removal steps

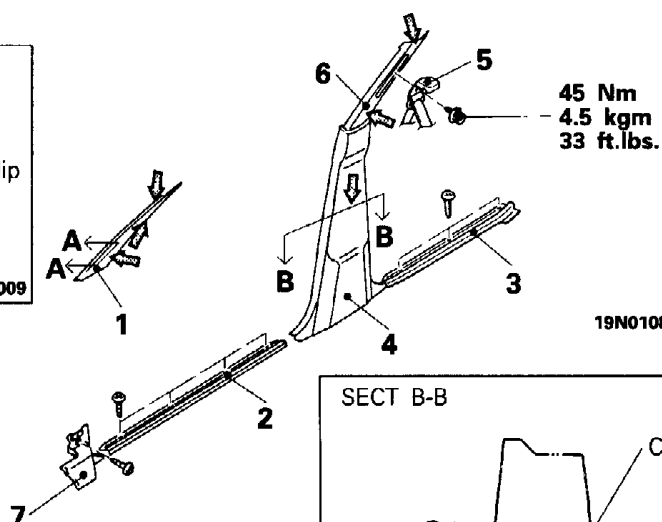
2. Front scuff plate
3. Rear scuff plate
4. Center pillar lower trim
5. Sash guide
6. Center pillar upper trim

Cowl side trim removal steps

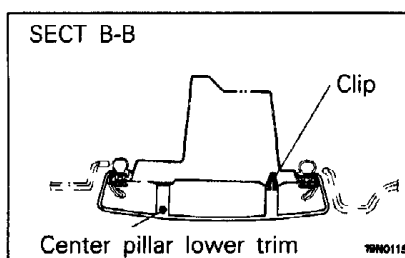
2. Front scuff plate
7. Cowl side trim

NOTE

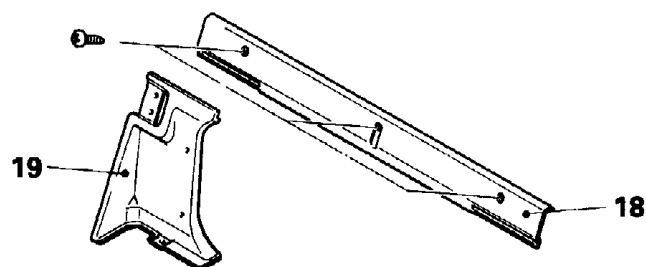
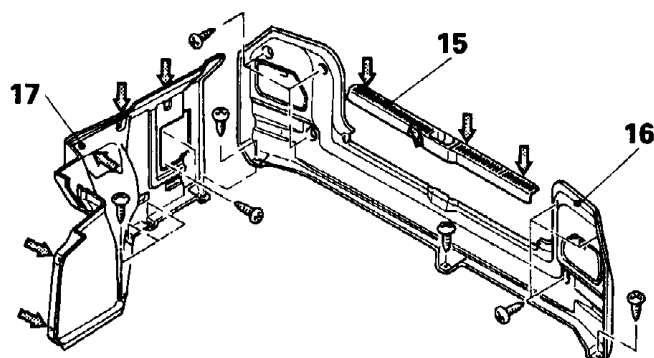
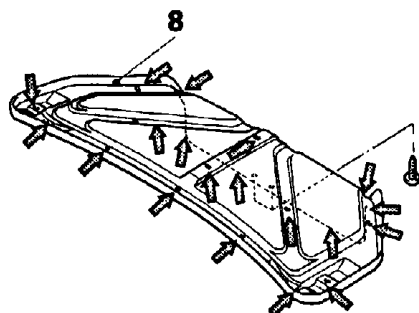
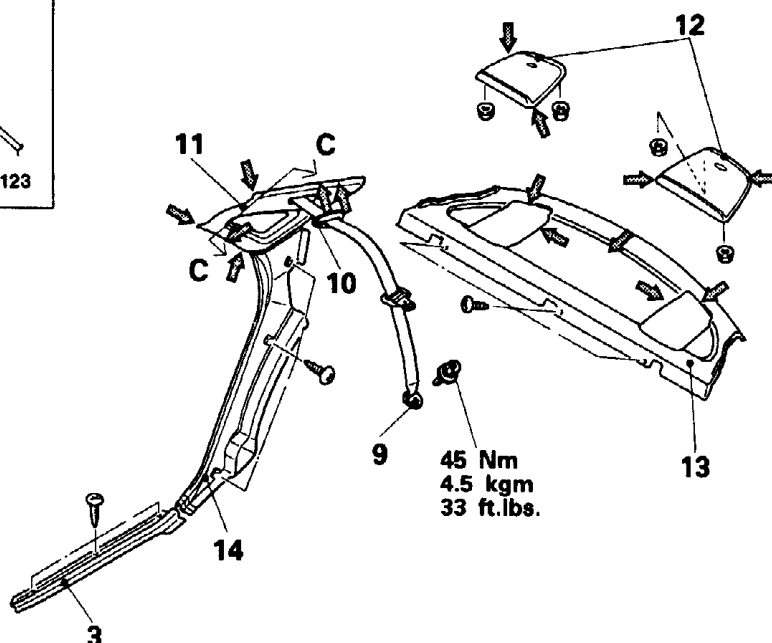
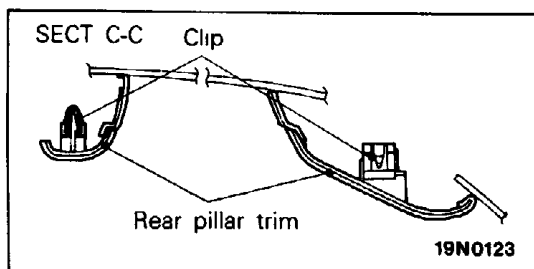
←: Location of clip



19N0108



19N0115



19N0170

8. Trunk lid trim

Rear pillar trim and rear shelf trim removal steps

- Rear seat cushion (Refer to P.52-20.)
- 9. Rear seat belt anchor plate
- 10. Trim guide
- 11. Rear pillar trim
- Rear seatback (Refer to P.52-20.)
- 12. Speaker garnish
- 13. Rear shelf trim

Rear wheelhouse trim removal steps

- 3. Rear scuff plate
- Rear seat (Refer to P.52-20.)
- 14. Rear wheelhouse trim

Trunk trim removal steps

- 15. Trunk rear trim cover
- 16. Trunk rear trim
- 17. Trunk side trim
- 18. Front shelf cover
- 19. Rear seat back brace trim

NOTE

←: Location of clip

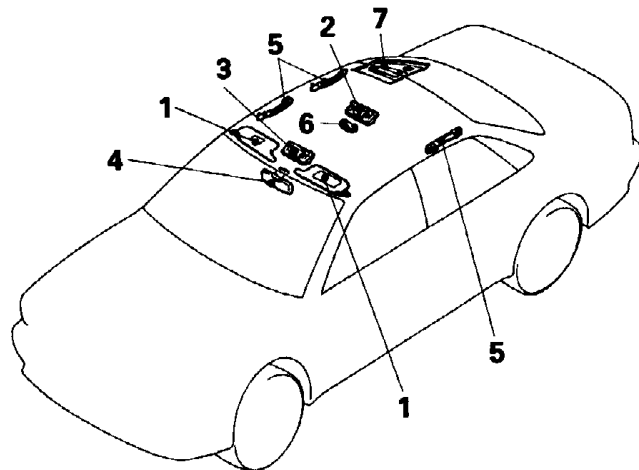
HEADLINING

E521A--

REMOVAL AND INSTALLATION

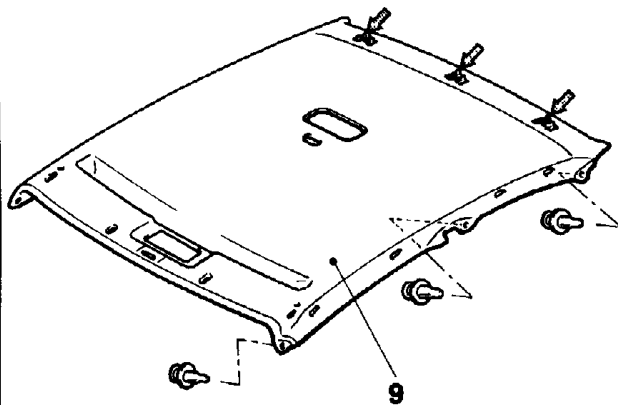
Pre-removal and Post-installation Operation

- Removal and Installation of Front Pillar Trim and Center Pillar Upper Trim (Refer to P.52-6.)
- Removal and Installation of Front Seat (Driver's side) (Refer to P.52-10.)



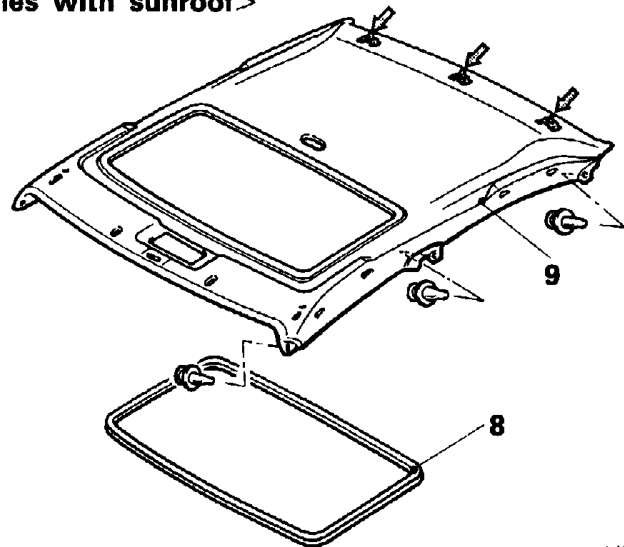
19N0113

<Vehicles without sunroof>



19N0106

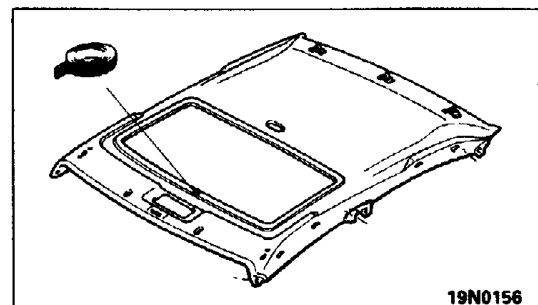
<Vehicles with sunroof>



19N0107

NOTE

Location of clip

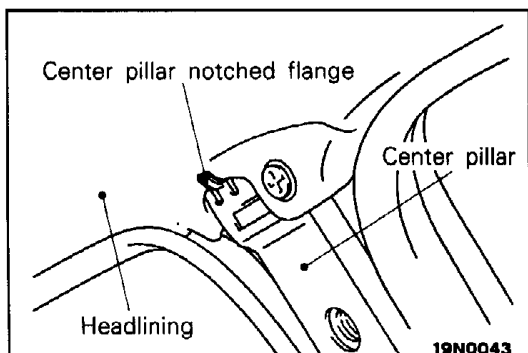


19N0156

Removal steps

1. Sunvisors and sunvisor bracket
2. Room lamp <Vehicles without sunroof>
3. Map lamp <Vehicles without sunroof> or sunroof switch and room lamp assembly <Vehicles with sunroof>
4. Center sunvisors
5. Assist grip
6. Room temperature sensor
7. Rear pillar trim
8. Headlining trim <Vehicles with sunroof>
9. Headlining

Adhesive: Both-side tape [15 mm (0.6 in.) wide and 0.15 mm (0.006 in.) thick, dry adhesive]

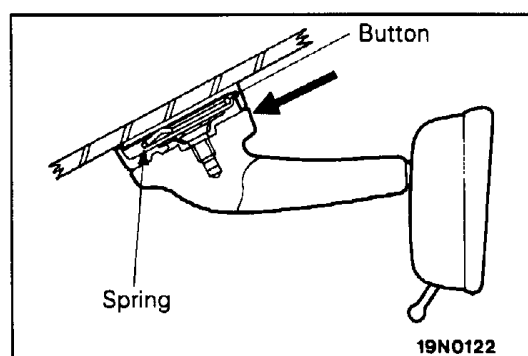
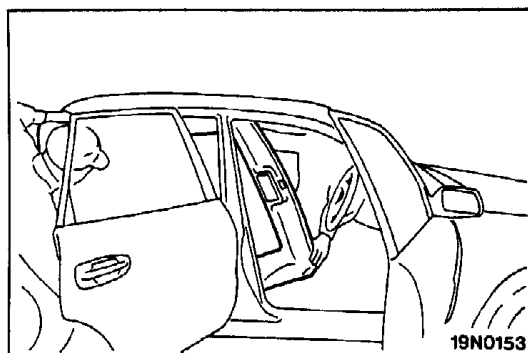


SERVICE POINT OF REMOVAL

E52IBC/M

9. REMOVAL OF HEADLINING

- (1) Remove the headlining from the center pillar notched flange.
- (2) While bending the headlining slightly, pull it through the rear door opening to the outside of the vehicle.



INSIDE REAR VIEW MIRROR

E52NA--

REMOVAL AND INSTALLATION

Remove by pushing in the direction of the arrow in the illustration.

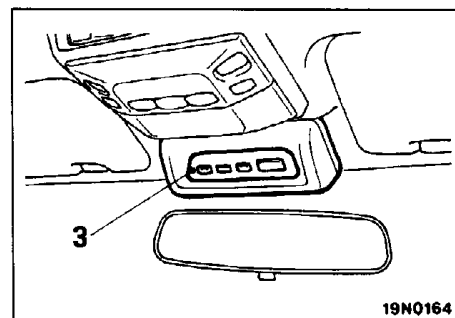
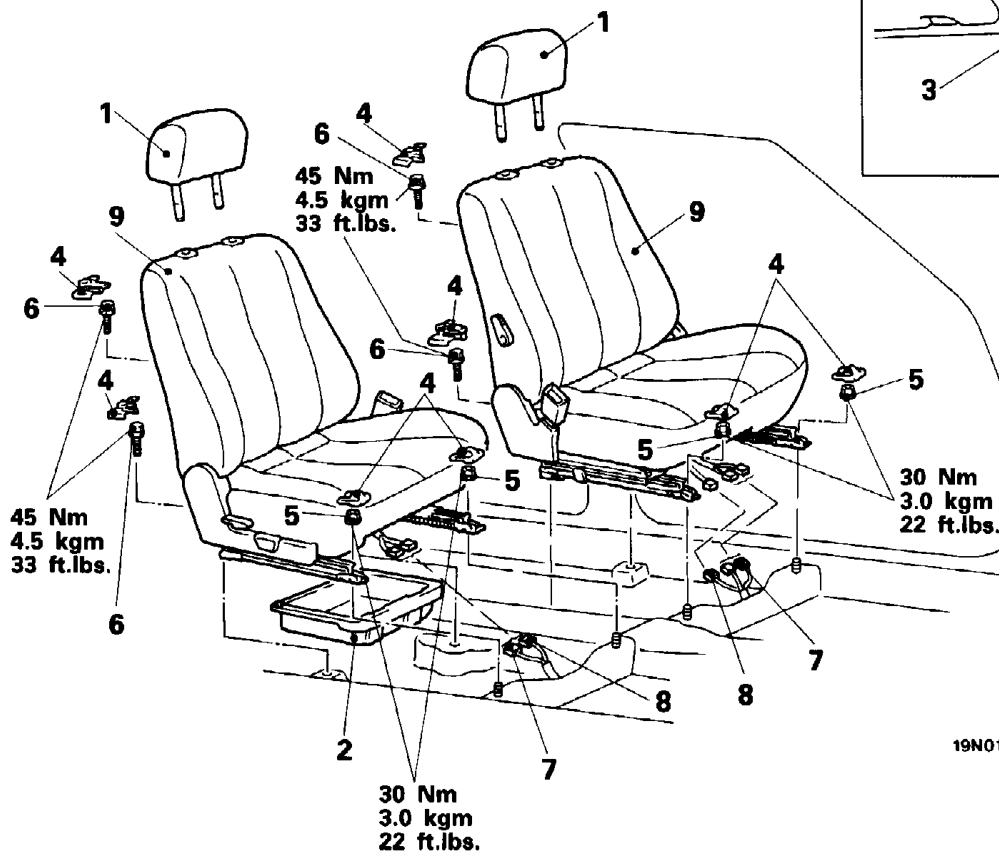
NOTE

- (1) The mirror spring fits firmly in the groove of the button that is attached to the glass.
- (2) The mirror breaking load is within 450 N (45 kg, 99 lbs.).

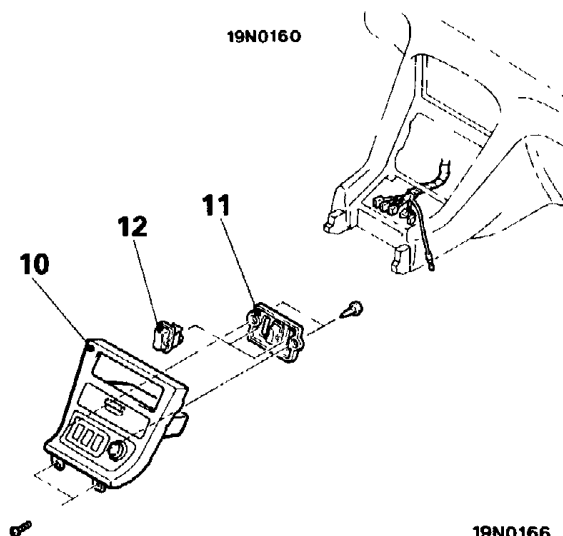
FRONT SEAT

REMOVAL AND INSTALLATION

E52KA--



CAUTION: SRS <L.H.drive vehicles>
 When removing and installing the floor console assembly from vehicles equipped with SRS, do not let it bump against the SRS diagnostic unit or other components.



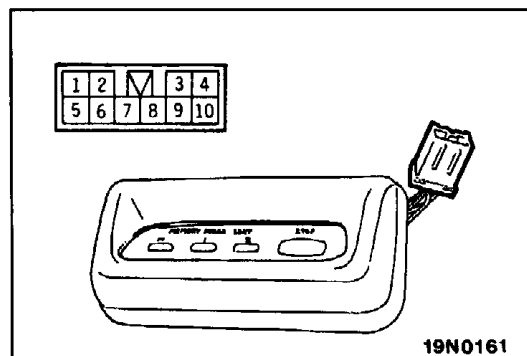
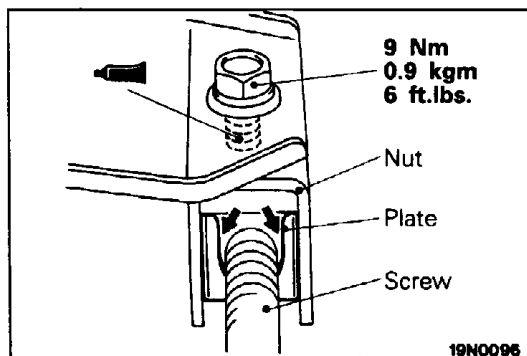
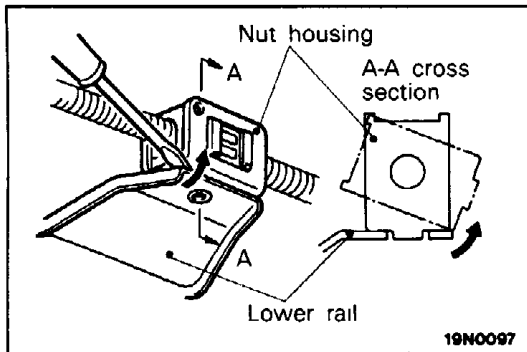
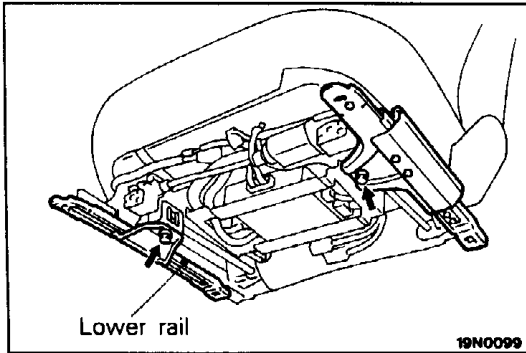
1. Headrest
2. Seat under-tray <Vehicles built up to April, 1994>
3. Memory power seat switch

Removal steps for front seat assembly

- ◆◆ 4. Seat anchor cover
- ◆◆ 5. Seat mounting nuts
- ◆◆ 6. Seat mounting bolts
- ◆◆ 7. Power seat connector
- ◆◆ 8. Heated seat connector
- ◆◆ 9. Front seat assembly

Removal steps for heated seat switch

- Floor console (Refer to P.52-6.)
- 10. Audio panel
- 11. Console switch panel
- 12. Heated seat switch



REMOVAL AND INSTALLATION POINTS OF FRONT SEAT ASSEMBLY WHEN THERE IS A MALFUNCTION IN THE POWER SEAT SLIDE MECHANISM

E52KBAM

If removal of the seat mounting nut and bolt is impossible when there is a malfunction in the slide motor or the slide switch and the seat cannot slide, remove and install the front seat assembly by the following procedure.

(1) Remove the bolts below the seat cushion as shown in the diagram.

(2) Insert a (–) driver in between the lower rail and the nut housing, and detach the nut housing from the lower rail hole and turn it.

(3) Slide the seat, and remove the seat mounting nuts and bolts.

(4) When reusing the power height adjuster assembly, apply specified adhesive to the mounting bolt, and tighten to the specified torque.

Specified adhesive: 3M Stud Locking Part No. 4170 or equivalent

Caution

(1) Match to the left and right nut housing positions.

(2) Install so that the screw and nut housing plate do not cause interference.

INSPECTION

E52KCBA

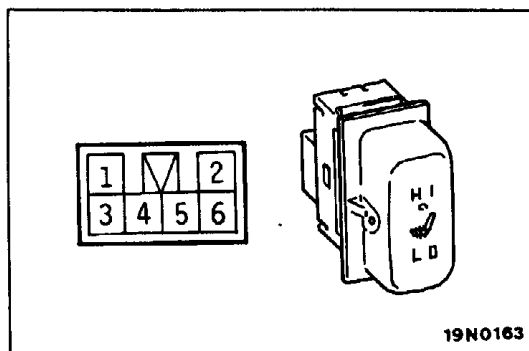
MEMORY POWER SEAT SWITCH

Operate the memory power seat switch to check for continuity.

Terminal No.		3	6	7	8	9	4	10
Switch position								
Memory key	ON	○		○			ILL	
Position key 1	ON	○				○		
Position key 2	ON	○			○			
Stop key	ON	○	○					
All switches	OFF							

NOTE

○—○ indicates there is continuity between the terminals.

**HEATED SEAT SWITCH**

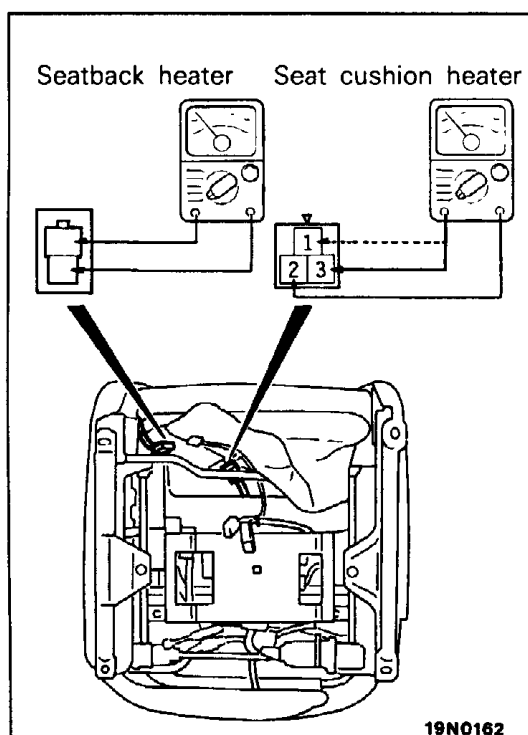
E52KCAC

Operate the switch to check continuity between terminals.

Terminal No.	1	2	3	6	4	5
Switch position						
HI	○	○	○	○	ILL	
LO	○	○	○	○		
OFF						

NOTE

○—○ indicates there is continuity between the terminals

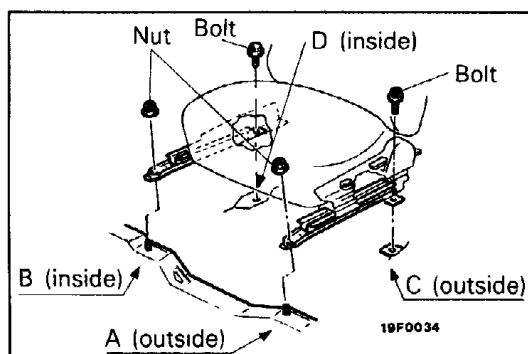
**SEATBACK HEATER**

Measure the resistance between terminals.

Standard value [When ambient temperature is 20°C (168°F)]: Between terminals approx. 5.8 Ω**SEAT CUSHION HEATER**

Measure the resistance between terminals.

Standard value [When ambient temperature is 20°C (168°F)]: Between terminals 1 and 3 approx 7.1 Ω**Between terminals 2 and 3 approx 7.4 Ω****Between terminals 1 and 2 approx 0.4 Ω**

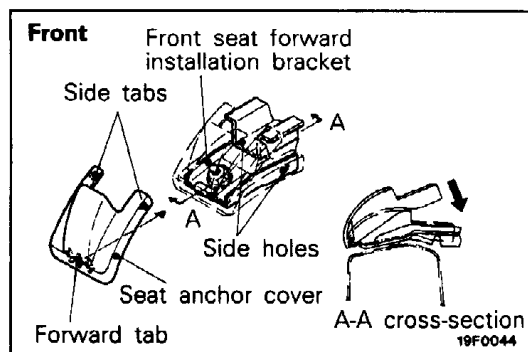


SERVICE POINTS OF INSTALLATION

E52KDAK

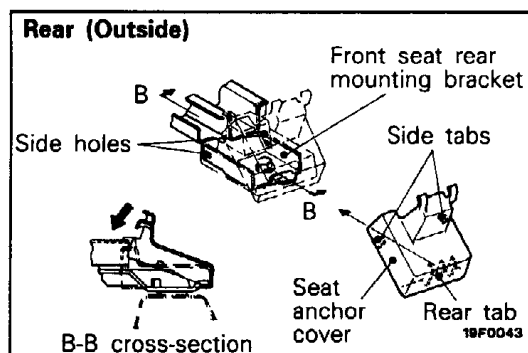
9. INSTALLATION OF FRONT SEAT ASSEMBLY

- (1) Install the lower rail so it matches the left and right front seat mounting hole positions, and lock both sides of the seat adjuster. (Not including power seat.)
- (2) Provisionally tighten the seat mounting nuts and seat mounting bolts in the order A, B, C and D, and then tighten them to the specified torque.

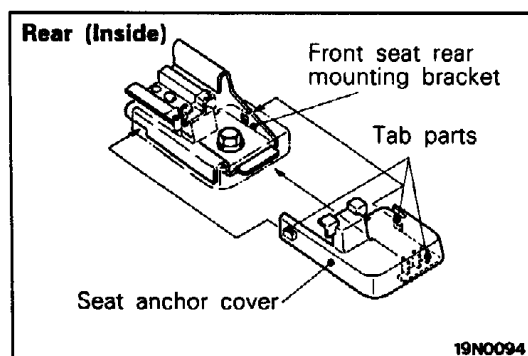


4. INSTALLATION OF SEAT ANCHOR COVERS

- (1) After securely inserting the front seat anchor cover forward tab into the front seat forward mounting bracket, turn it in the direction of the arrow as shown in the figure to install the side tab into the bracket hole.



- (2) After securely inserting the rear seat anchor cover (outside) rear tab into the front seat rear mounting bracket, turn it in the direction of the arrow as shown in the figure to install the side tab into the bracket hole.

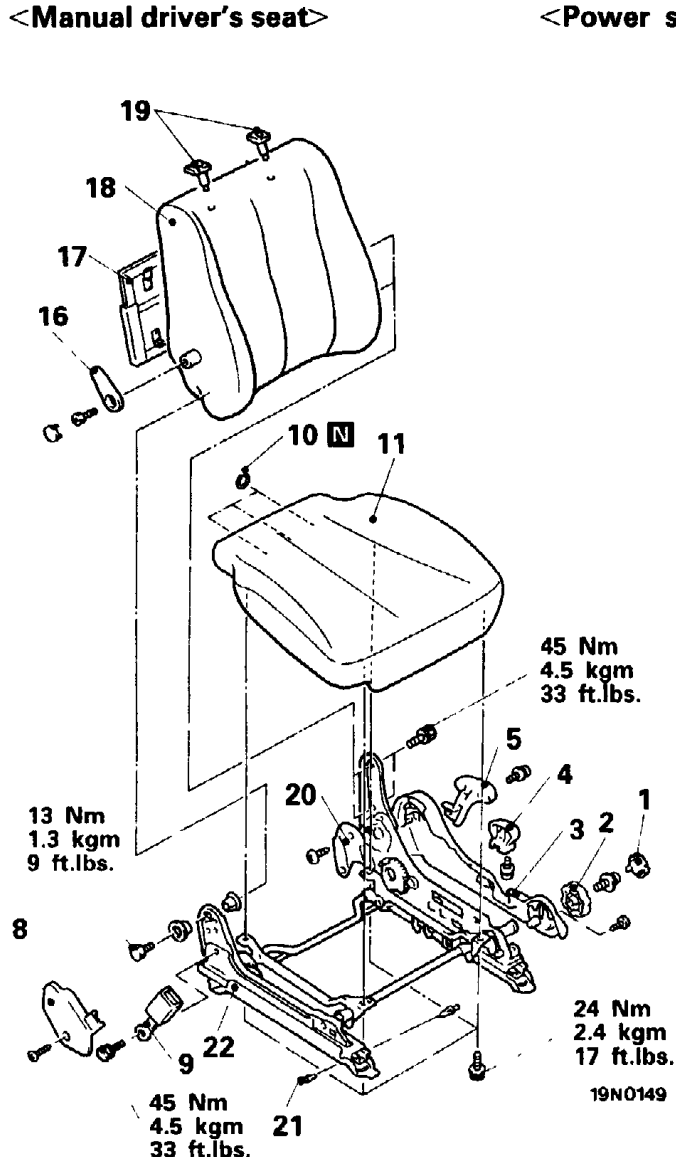


- (3) Insert the rear side seat anchor cover (inner side) from the rear to the front seat rearward installation bracket, and then attach each tab of the seat anchor cover to the bracket.

DISASSEMBLY AND REASSEMBLY

E52KE--

<Manual driver's seat>

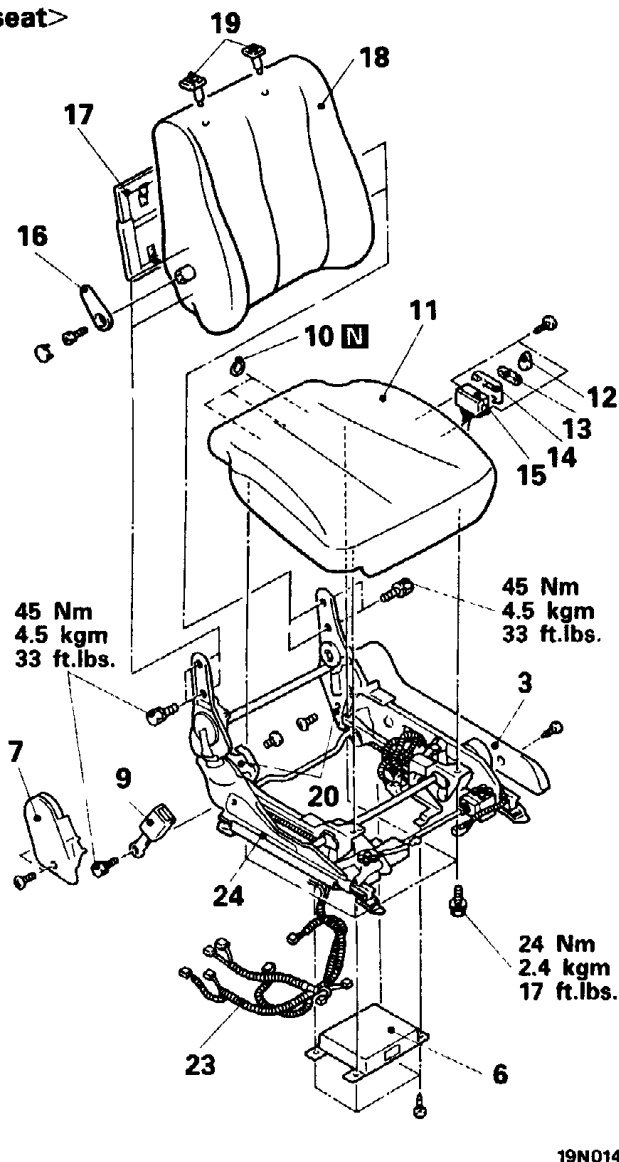
**Disassembly steps for manual driver's seat**

1. Height adjuster lever cap
2. Height adjuster lever
3. Front seat side shield cover
4. Seat adjuster lever
5. Reclining lever
8. Front seat hinge cover
9. Inner seat belt
10. Hog ring
11. Seat cushion assembly
16. Lumber support lever
17. Front-back panel assembly
18. Seatback assembly
19. Head restraint guide
20. Reclining adjuster inner cover
21. Pull wire
22. Height adjuster assembly

NOTE

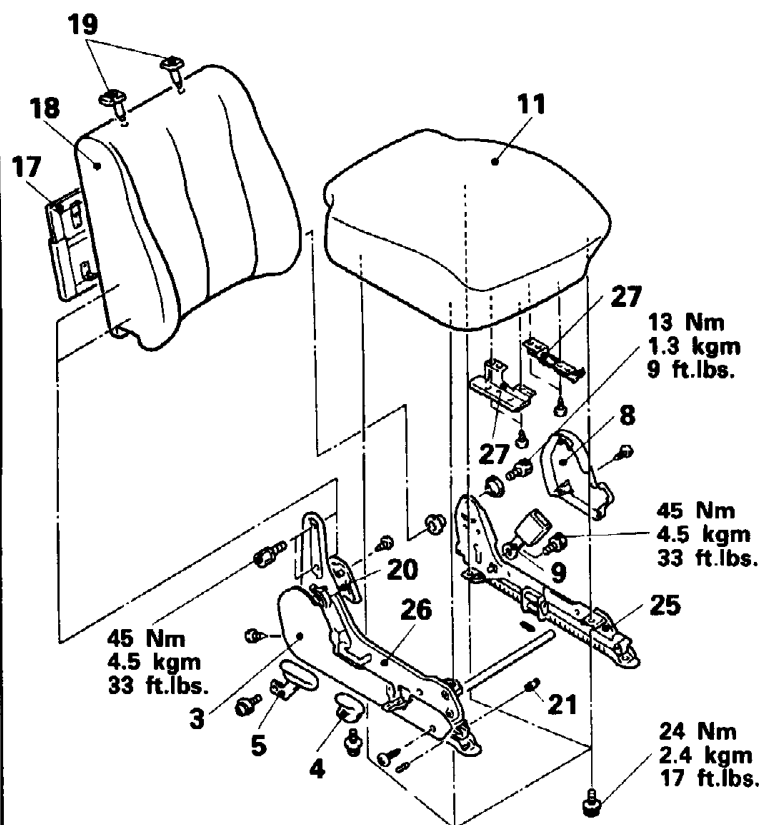
The power seat figure shows the driver's seat. The front passenger seat is symmetrical, except that it has no memory power seat control unit.

<Power seat>

**Disassembly steps for power seat**

3. Front seat side shield cover
6. Memory power seat control unit (driver's seat only)
7. Reclining adjuster cover
9. Inner seat belt
10. Hog ring
11. Seat cushion assembly
12. Power seat reclining lever
13. Power seat adjuster lever
14. Garnish
15. Power seat switch
16. Lumber support lever
17. Front-back panel assembly
18. Seatback assembly
19. Head restraint guide
20. Reclining adjuster inner cover
23. Power seat wiring harness
24. Power height adjuster assembly

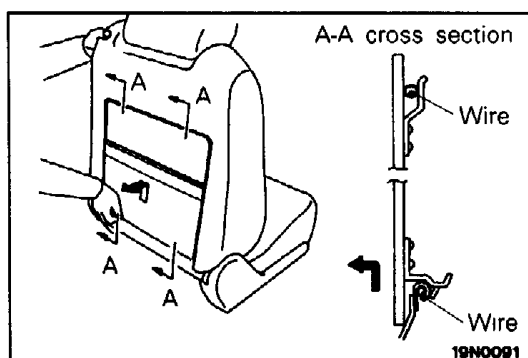
<Manual front passenger seat>



19N0148

Disassembly steps for manual front passenger seat

3. Front seat side shield cover
4. Seat adjuster lever
5. Reclining lever
8. Front seat hinge cover
9. Inner seat belt
11. Seat cushion assembly
17. Front-back panel assembly
18. Seatback assembly
19. Head restraint guide
20. Reclining adjuster inner cover
21. Pull wire
25. Seat inner adjuster
26. Seat outer adjuster
27. Under tray rail



19N0091

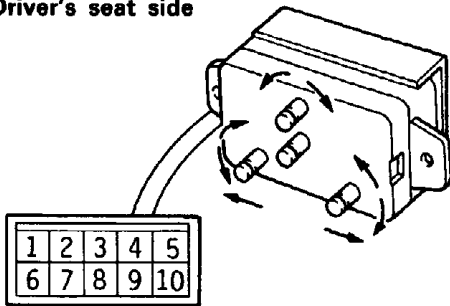
SERVICE POINT OF DISASSEMBLY

E52KFDA

17. REMOVAL OF FRONT-BACK PANEL ASSEMBLY

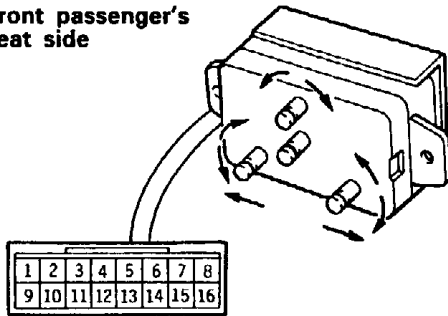
Lift the front-back panel assembly upwards, and pull the lower portion towards you to remove.

Driver's seat side



19N0093

Front passenger's seat side



19N0092

INSPECTION**POWER SEAT SWITCH**

Operate the power seat switch and check for continuity.

Driver's seat side

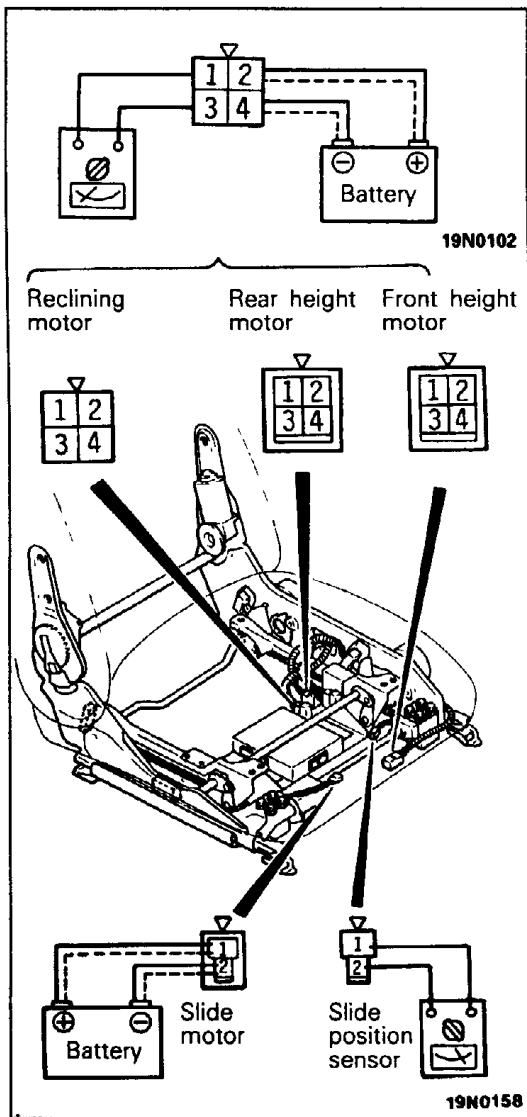
Terminal No.		1	2	3	5	6	7	8	9	10
Switch position										
Reclining switch	Forward								○	○
	Backward				○					○
Slide switch	Forward	○								○
	Backward					○				○
Front height switch	Up		○							○
	Down						○			○
Rear height switch	Up			○						○
	Down							○		○
All switches	OFF									

Front passenger's seat side

Terminal No.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Switch position																	
Reclining switch	Forward								○					○			○
	Backward								○					○	○		○
Slide switch	Forward	○		○	○												○
	Backward		○	○	○												○
Front height switch	Up									○			○				○
	Down										○	○	○				○
Rear height switch	Up					○	○	○									○
	Down					○										○	○
All switches	OFF																

NOTE

○—○ indicates that there is continuity between the terminals.



EACH MOTOR AND POSITION SENSOR FOR THE DRIVER'S POWER SEAT

EE2KGDA

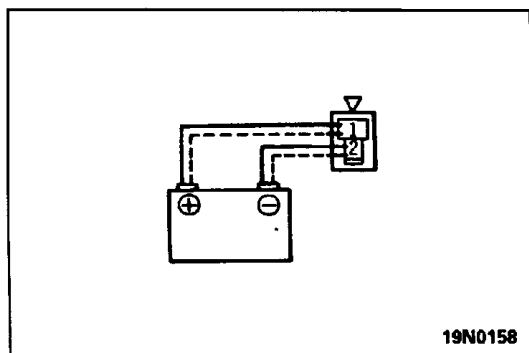
A position sensor is built into each of the front height, rear height and reclining motors, and the slide motor has a separate slide position sensor. Inspect the operation of each motor and position sensor according to the following procedures.

- (1) Disconnect the connectors for each motor and position sensor.
- (2) When the battery is connected directly to the motor terminals, check if the motors run smoothly, and check if each setting mechanism runs in the directions shown in the table below until the limit switch turns OFF, for each motor.
- (3) Connect a circuit tester to the position sensor terminals as shown in the figure, and check if the resistance in the position sensor changes when each motor is stopped and when each motor is running.
- (4) If there is an abnormality, replace the power height adjuster assembly.

Terminal No.					
Name of motor	Direction of Operation	2	4	1	3
Front height, rear height	Up	⊕	⊖		
	Down	⊖	⊕		
Reclining	Forward	⊕	⊖		
	Backward	⊖	⊕		

Connector and Terminal No.		Motor		Position sensor	
Name of motor	Direction of Operation	1	2	1	2
Slide	Backward	⊕	⊖		
	Forward	⊖	⊕		

19N0100



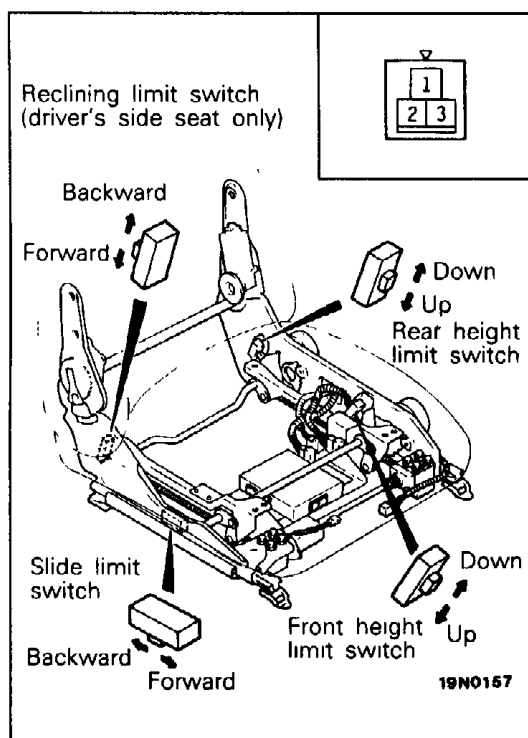
EACH MOTOR FOR THE PASSENGER SIDE POWER SEAT

E52KGDB

Inspect the operation of each motor according to the following procedures.

- (1) Disconnect the connectors for each motor.
- (2) When the battery is connected directly to the motor terminals, check if the motors run smoothly, and check if each setting mechanism runs in the directions shown in the table below for each motor.
- (3) If there is an abnormality, replace the power height adjuster assembly.

Name of Motor	Direction of Operation	Terminal No.		Stop Position
		1	2	
Front height, Rear height	Down	⊕	⊖	Stops when limit switch is OFF
	Up	⊖	⊕	
Slide	Backward	⊕	⊖	
	Forward	⊖	⊕	
Reclining	Backward	⊕	⊖	Stops at operating range limit
	Forward	⊖	⊕	



POWER SEAT LIMIT SWITCHES

E52KGEA

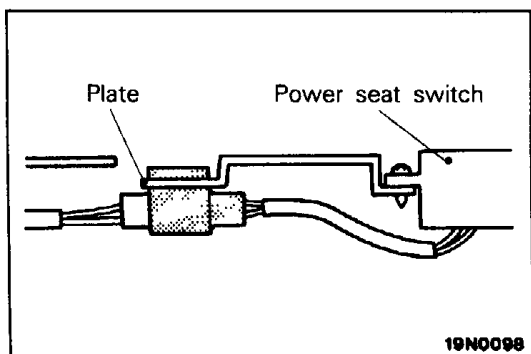
- (1) Disconnect each limit switch connection and connect a circuit tester to the terminals.
- (2) Operate each switch and check for continuity between the terminals.
- (3) If there is an abnormality, replace the power height adjuster assembly.

Switch	Terminal No. Switch position	1	2	3
Slide limit switch	Forward	○—○		
	Backward	○—	—○	○
Reclining limit switch	Forward	○—		○
	Backward	○—○		
Front height, rear height limit switches	Up	○—		○
	Down	○—○		
All limit switches	Middle (ON)	○—○	○—○	○—○

NOTE

○—○ indicates there is continuity between the terminals.

PWGE9004

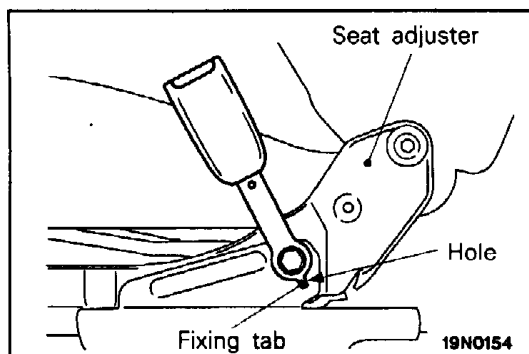


SERVICE POINT OF REASSEMBLY

E52KHAD

15. INSTALLATION OF POWER SEAT SWITCH

After connecting the harness connector, hang the harness connector on the seat cushion assembly plate.



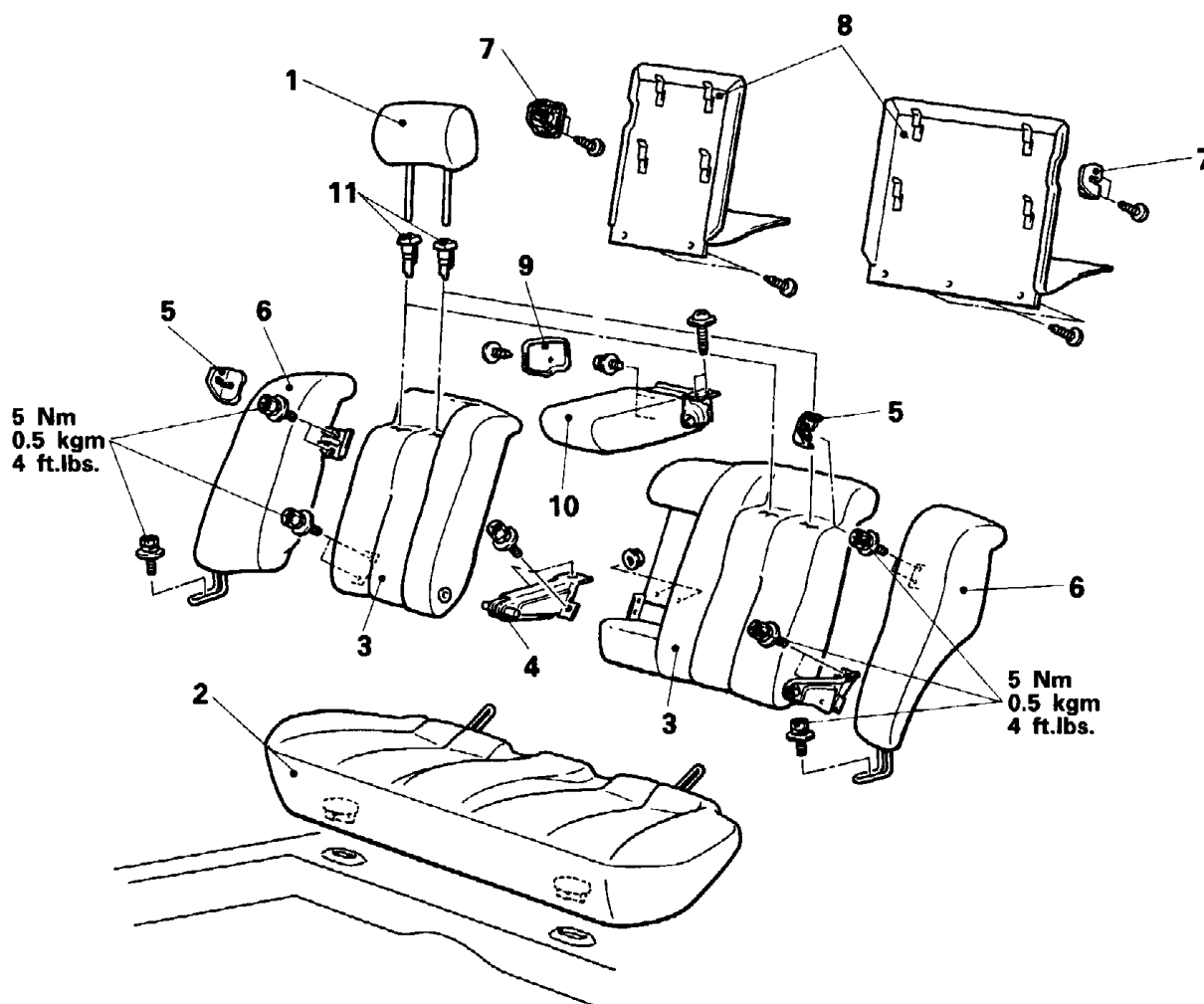
9. INSTALLATION OF INNER SEAT BELT

Insert the inner seat belt fixing tab securely into the seat adjuster hole.

REAR SEAT

E52KA-

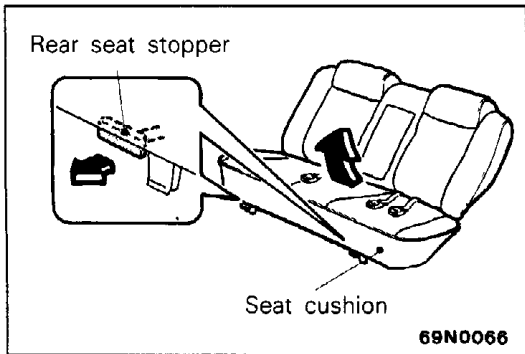
REMOVAL AND INSTALLATION



19N0152

1. Head restraint
 2. Seat cushion
 Removal steps for rear seat back assembly
 3. Rear seatback assembly
 4. Center hinge bracket
 Removal steps for side seat back assembly
 2. Seat cushion
 5. Rear seat striker cover
 6. Side seatback assembly

- Removal steps for arm rest
 3. Rear seatback (LH)
 7. Cover
 8. Back board assembly (LH)
 9. Arm rest hinge cover
 10. Arm rest
 Removal steps for head restraint guide
 7. Cover
 8. Back board assembly
 11. Head restraint guide

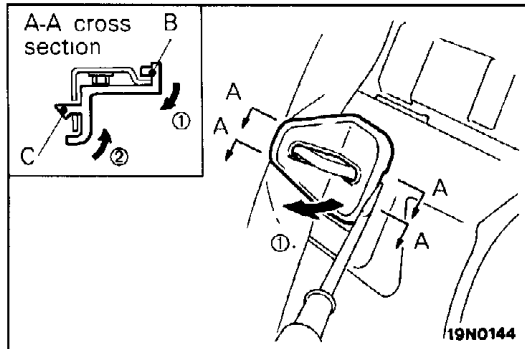


SERVICE POINTS OF REMOVAL

E52KBAN

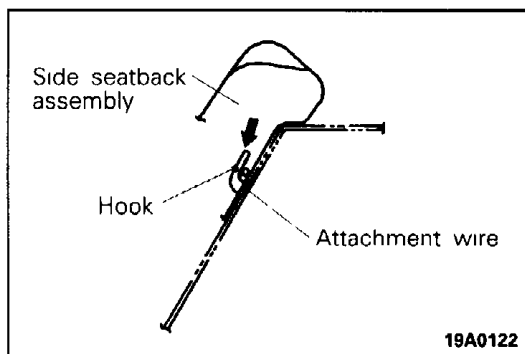
2. REMOVAL OF SEAT CUSHION

While keeping the rear seat stopper pulled, lift up the cushion to remove it.



5. REMOVAL OF REAR SEAT STRIKER COVER/6. SIDE SEATBACK ASSEMBLY

- (1) After pushing in the direction of arrow ① as shown in the figure to remove the tab B lock, press in the direction of arrow ② to remove tab C, and remove the rear seat striker cover.
- (2) Remove the side seatback assembly mounting bolts.
- (3) Lift up the side seatback assembly to remove it.

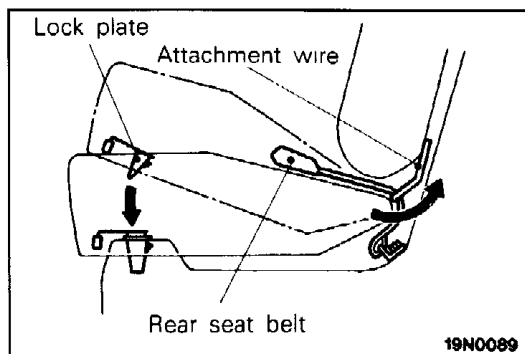


SERVICE POINTS OF INSTALLATION

E52KDAL

6. INSTALLATION OF SIDE SEATBACK ASSEMBLY

Push the side seatback assembly in the direction indicated in the illustration; then securely attach the attachment wire to the body side hook and install the side seatback assembly.



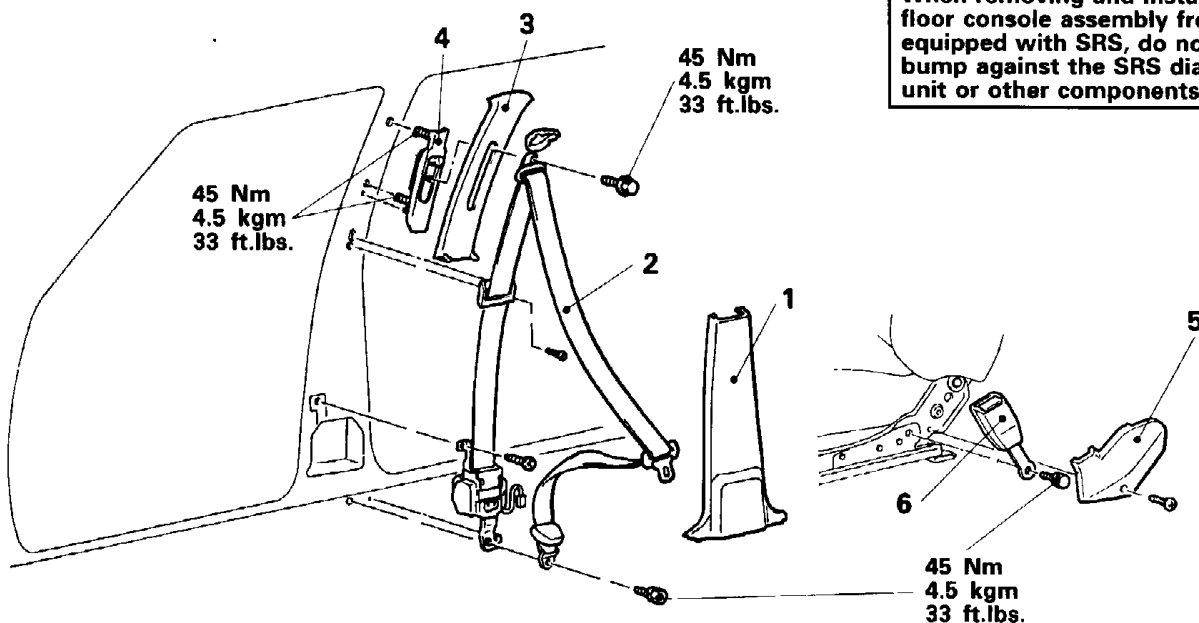
2. INSTALLATION OF SEAT CUSHION

- (1) Pull the rear seat belt on top of the seat cushion.
- (2) Insert the seat cushion attachment wire securely below the seatback.
- (3) Insert the seat cushion lock plate securely into the floor holes.

FRONT SEAT BELT REMOVAL AND INSTALLATION

E52MA-A

CAUTION: SRS <L.H.drive vehicles>
When removing and installing the floor console assembly from vehicles equipped with SRS, do not let it bump against the SRS diagnostic unit or other components.



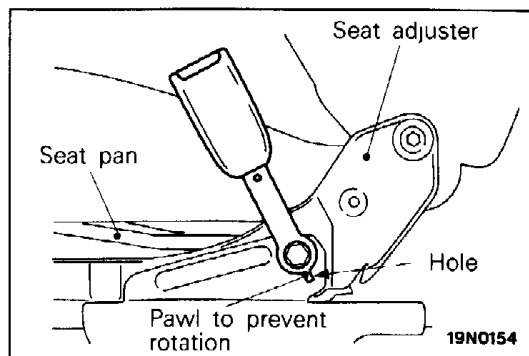
19N0041

Outer seat belt removal steps

1. Center pillar lower trim
(Refer to P.52-6.)
- ◆◆ 2. Outer seat belt assembly
3. Center pillar upper trim
(Refer to P.52-6.)
- ◆◆ 4. Adjustable seat belt anchor

Inner seat belt removal steps

- Floor console assembly
(Refer to P.52-6.)
- 5. Hinge cover
- ◆◆ 6. Inner seat belt



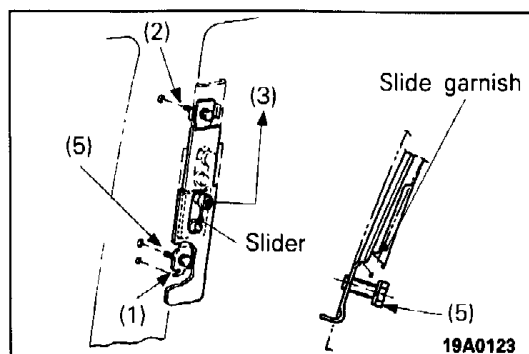
19N0154

SERVICE POINTS OF INSTALLATION

E52MDAO

6. INSTALLATION OF INNER SEAT BELT

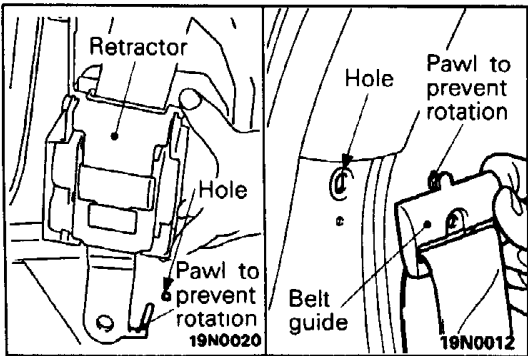
Positively insert the pawl to prevent the inner seat belt from rotating in the hole provided on the seat adjuster.



19A0123

4. INSTALLATION OF ADJUSTABLE SEAT BELT ANCHOR

- (1) Securely fit the tab of the adjustable seat belt anchor into the hole in the center pillar.
- (2) Provisionally tighten the installation bolt at the upper side.
- (3) Lock the slider at the uppermost position.
- (4) Raise the slide garnish to the upper side.
- (5) Tighten the lower mounting bolt to the specified torque.
- (6) Lower the slide garnish and the slider, and fully tighten the upper mounting bolt to the specified torque.

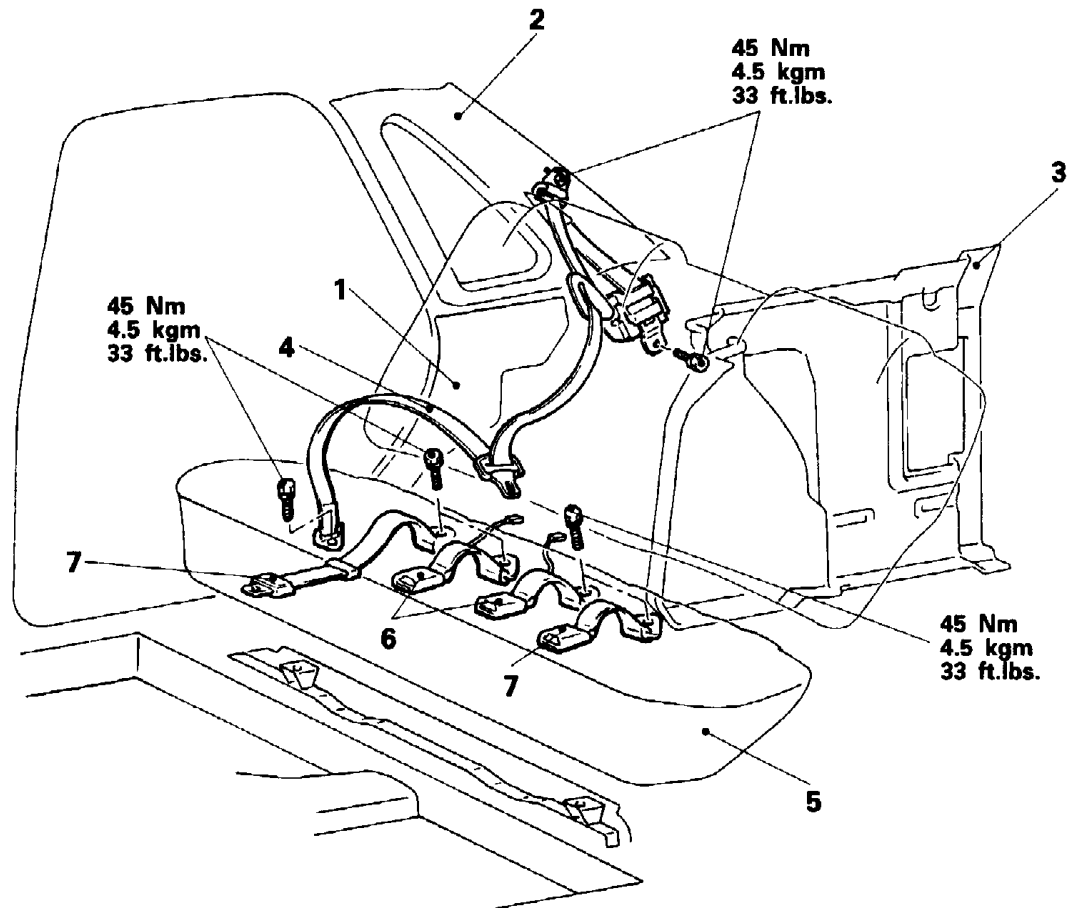


2. INSTALLATION OF OUTER SEAT BELT ASSEMBLY

- (1) Positively insert the pawl to prevent the retractor from rotating in the hole provided on the body.
- (2) Positively insert the pawl to prevent the belt guide from rotating in the hole provided on the body.

REAR SEAT BELT REMOVAL AND INSTALLATION

E52MA-B



19N0111

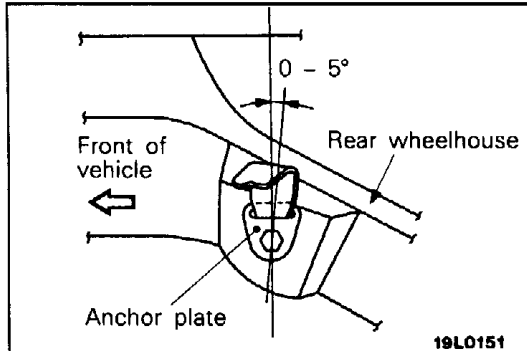
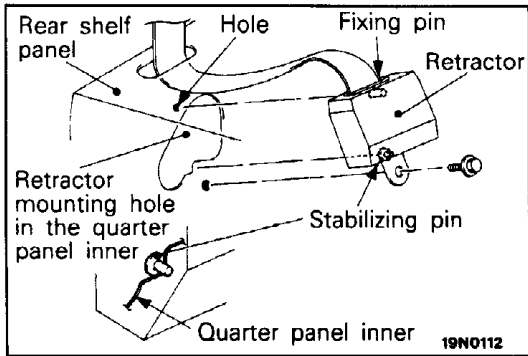
Outer seat belt removal steps

1. Rear wheelhouse trim
2. Rear pillar trim (Refer to P.52-6.)
3. Trunk side trim
4. Outer seat belt assembly



Inner seat belt and center seat belt removal steps

5. Rear seat cushion
6. Inner seat belt assembly
7. Center seat belt assembly

**SERVICE POINTS OF INSTALLATION**

E52MDBP

4. INSTALLATION OF OUTER SEAT BELT ASSEMBLY

- (1) Pull the anchor plate, tongue, sash guide and trim guide from the trunk into the inside of the vehicle through the rear shelf panel hole.
- (2) Insert the retractor fixing pin securely into the quarter panel inner hole.
- (3) Insert the quarter panel inner securely into the channel of the retractor stabilizing pin.
- (4) Install so that the anchor plate is within the range of the angle indicated in the illustration.

SUPPLEMENTAL RESTRAINT SYSTEM (SRS)

CONTENTS

E52AA--

GENERAL INFORMATION <Vehicles without front passenger's air bag>	2	INDIVIDUAL COMPONENT SERVICE	76
Construction Diagram	2	WARNING/CAUTION LABELS	76
GENERAL INFORMATION <Vehicles with front passenger's air bag>	3	FRONT IMPACT SENSORS	78
Construction Diagram	3	SRS DIAGNOSIS UNIT (SDU)	80
SRS SERVICE PRECAUTIONS	4	AIR BAG MODULE AND CLOCK SPRING	88
SPECIFICATIONS	9	AIR BAG MODULE DISPOSAL PROCEDURES	102
Service Specification	9	Undeployed Air Bag Module Disposal	102
SPECIAL TOOLS AND TEST EQUIPMENT	9	Deployed Air Bag Module Disposal Procedures	109
TROUBLESHOOTING	12		
SRS Diagnostic Procedures – Initial Steps	12		
Diagnostic Sequence	13		
SRS MAINTENANCE	67		
POST-COLLISION DIAGNOSIS	72		

CAUTION

- Carefully read and observe the information in the SRS SERVICE PRECAUTIONS (P.52B-4) Prior to any service.
- For information concerning troubleshooting or maintenance, always observe the procedures in the Troubleshooting (P.52B-12) or the SRS Maintenance (P.52B-67) sections respectively.
- If any SRS components are removed or replaced in connection with any service procedures, be sure to follow the procedures in the INDIVIDUAL COMPONENT SERVICE section (P.52B-76) for the components involved.
- If you have any questions about the SRS, please contact your local distributor.

GENERAL INFORMATION

E52BAAF

<Vehicles without front passenger's air bag>

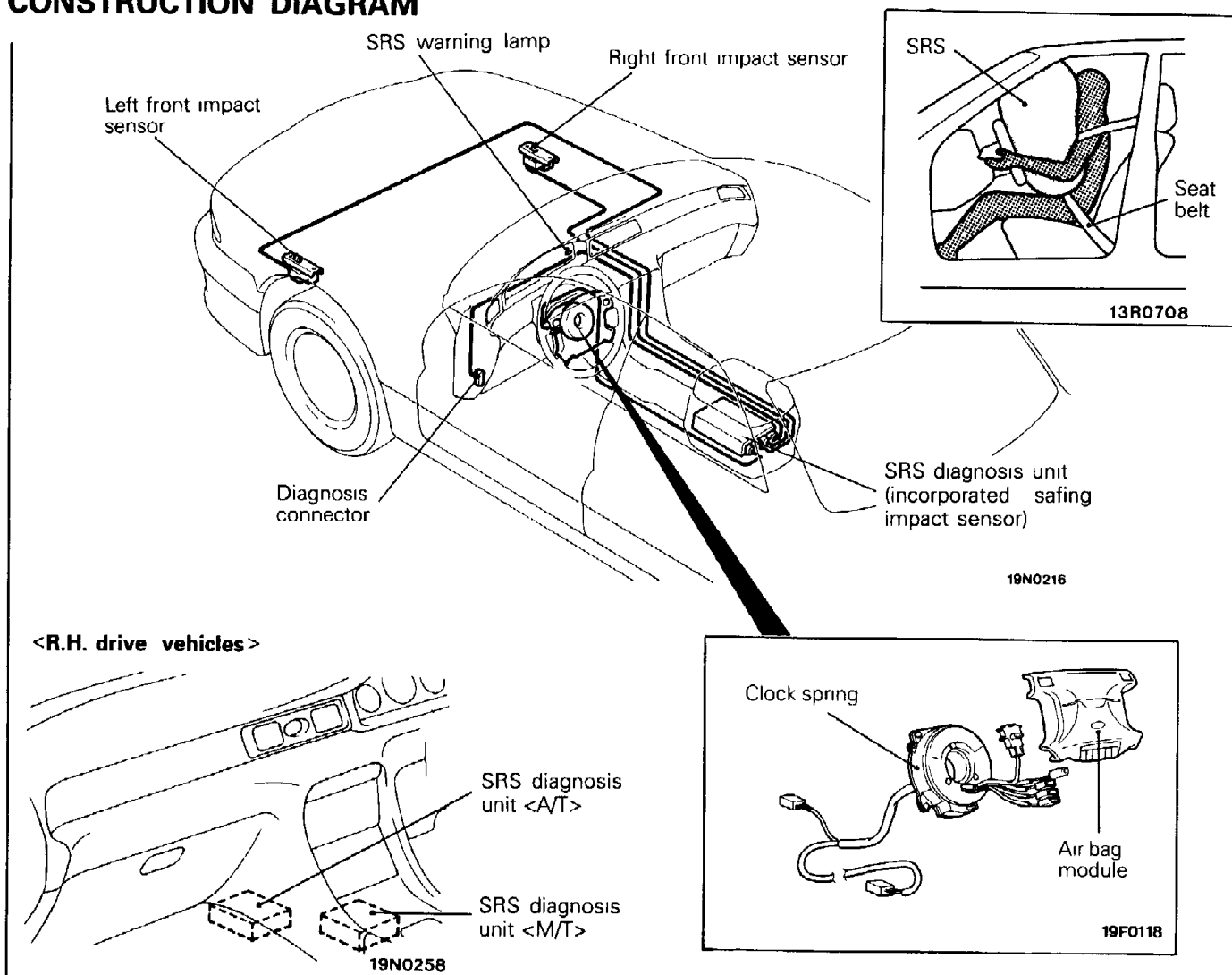
The Supplemental Restraint System (SRS) is designed to supplement the driver's seat belt to help reduce the risk or severity of injury to the driver by activating and deploying an air bag in certain frontal collisions.

The SRS consists of: left front and right front impact sensors one located, on the right and left side lower members; an air bag module located in the centre of the steering wheel, which contains the folded air bag and an inflator unit; the SRS diagnosis unit located under the floor console assembly, (underneath the centre of the instrument panel for R.H. drive vehicles) which monitors the system, and which contains a safing impact sensor; an SRS warning lamp located on the instrument panel, which indicates the operational status of the SRS; a clock spring interconnection located within the steering

column; wiring.

The SRS is designed so that the air bag will deploy when the safing sensor, plus either or both of the left front and right front impact sensors simultaneously activate while the ignition switch is "ON". That is designed to occur in frontal or near-frontal impacts of moderate to severe force. Only authorized service personnel should do work on or around the SRS components. Those service personnel should read this manual carefully before starting any such work. Extreme care must be used when servicing the SRS, to avoid injury to the service personnel (by inadvertent deployment of the air bag) or the driver (by rendering the SRS inoperative).

CONSTRUCTION DIAGRAM



GENERAL INFORMATION

<Vehicles with front passenger's air bag>

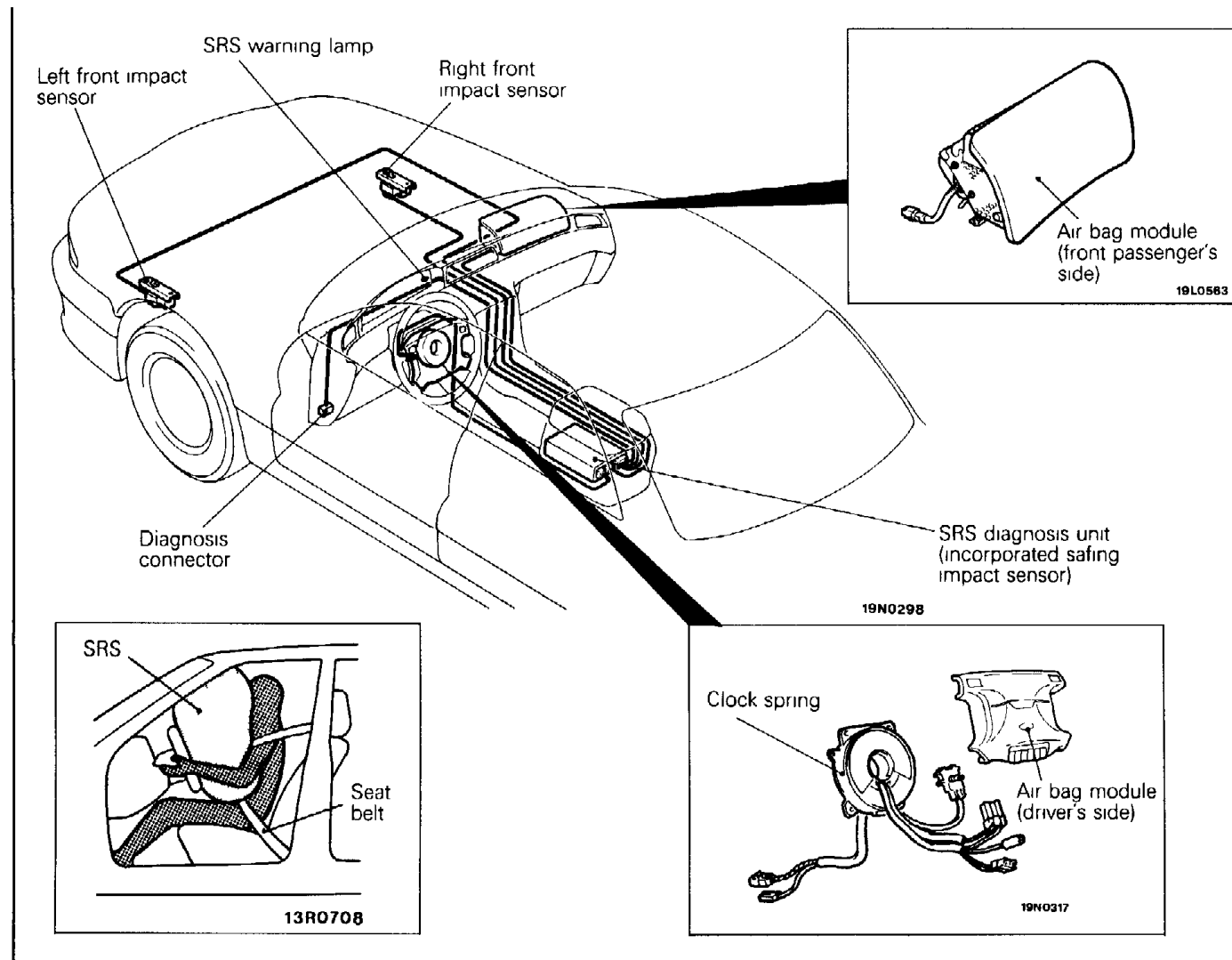
The Supplemental Restraint System (SRS) is designed to supplement the front seat belts to help reduce the risk or severity of injury to the front seat occupants by activating and deploying two air bags during certain frontal collisions.

The SRS consists of: left front and right front impact sensors (located on the right and left side lower members), air bag modules for the driver (located in the centre of the steering wheel) and for the front seat passenger (located above the glove box). Each module contains a folded air bag and an inflator unit. The SRS also contains: and SRS Diagnosis Unit with safing impact sensor (located under the floor console assembly); and SRS warning lamp to indicate the operational status of the SRS (located on the instrument panel); clock spring (mounted behind the steering wheel); and wiring.

The SRS is designed so that the air bags will deploy when the safing sensor, plus either or both of the left front and right front impact sensors simultaneously activate while the ignition switch is in the ON position. These sensors are designed to activated in frontal or near-frontal impacts of moderate to server force

Only authorized service personnel should work on or around SRS components. Those personnel should read this manual carefully before starting such work. Extreme care must be used when servicing the SRS to avoid injury to service personnel (by inadvertent deployment of the air bags) or vehicle occupant (by rendering the SRS inoperative).

CONSTRUCTION DIAGRAM



SRS SERVICE PRECAUTIONS

E52QAAA

1. In order to avoid injury to yourself or others from accidental deployment of the air bag during servicing, read and carefully follow all the precautions and procedures described in this manual.
2. Do not use any electrical test equipment on or near SRS components, except those specified on P.52B-9
Never use an analogue ohmmeter.
3. **Never Attempt to Repair the Following Components:**
 - Front Impact Sensors
 - SRS Diagnosis Unit (SDU)
 - Clock Spring
 - Air Bag Module

If any of these components are diagnosed as faulty, they should only be replaced, in accordance with the INDIVIDUAL COMPONENT SERVICE procedures in this manual, starting at page [52B-76].
4. Do not attempt to repair the wiring harness connectors of the SRS. If any of the connectors are diagnosed as faulty, replace the wiring harness. If the wires are diagnosed as faulty, replace or repair the wiring harness according to the following table.

<VEHICLES WITHOUT FRONT PASSENGER'S AIR BAG>

L.H. DRIVE VEHICLES

SDU Terminal No	Harness Connector (No of Terminals, Color)	Destination of Harness	Corrective Action	
1	2 pins, red	Clock spring → Air bag module	Replace clock spring	
2				
3	2 pins, yellow	Front wiring harness → Front impact sensor (LH)	Replace with sensor cable.*	
4				
5	2 pins, blue	Front wiring harness → Front impact sensor (RH)		
6				
7 and 8	14 pins, red	—		—
9		Body wiring harness → Diagnosis check pin		Correct or replace each wiring harness
10		Body wiring harness → Front wiring harness → Control wiring harness → Front wiring harness → Body wiring harness → Ignition switch (ST)		
11		Body wiring harness → Junction block (fuse No. 18)		
12		Body wiring harness → Instrument panel wiring harness → Junction block (fuse No 12)		
13		Body wiring harness → Instrument panel wiring harness → SRS warning lamp		
14				
15 to 18		—	—	
19		Body wiring harness → Earth	Correct or replace body wiring harness.	
20				

NOTE

- (1) The sensor cable marked with * is available as service part
- (2) The sensor cable used as a replacement part is routed along the front wiring harness.

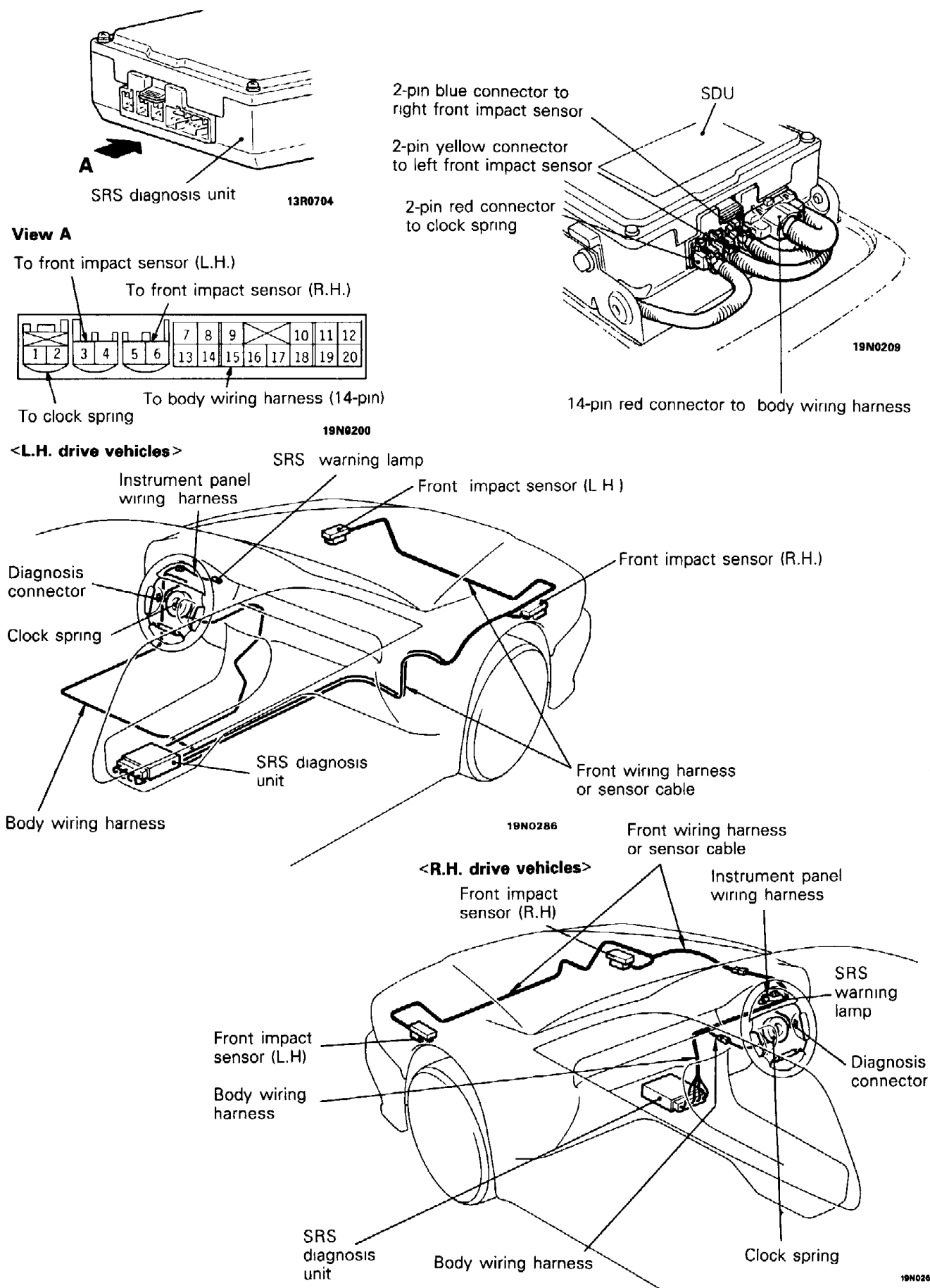
R.H. DRIVE VEHICLES

SDU Terminal No.	Harness Connector (No. of Terminals, Color)	Destination of Harness	Corrective Action
1 2	2 pins, red	Body wiring harness → Clock spring → Air bag module	Correct or replace body wiring harness or replace clock spring.
3 4	2 pins, yellow	Body wiring harness → Front wiring harness → Front impact sensor (LH)	Replace with sensor cable.*
5 6	2 pins, blue	Body wiring harness → Front wiring harness → Front impact sensor (RH)	
7 and 8	14 pins, red	–	–
9		Body wiring harness → Diagnosis check pin	Correct or replace each wiring harness.
10		Body wiring harness → Front wiring harness → Control wiring harness → Front wiring harness → Body wiring harness → Ignition switch (ST)	
11		Body wiring harness → Junction block (fuse No. 18)	
12		Body wiring harness → Instrument panel wiring harness → Junction block (fuse No. 12)	
13 14		Body wiring harness → Instrument panel wiring harness → SRS warning lamp	
15 or 18		–	–
19 20		Body wiring harness → Earth	Correct or replace body wiring harness.

NOTE

(1) The sensor cable marked with * is available as service part.

(2) The sensor cable used as a replacement part is routed along the body wiring harness and front wiring harness.

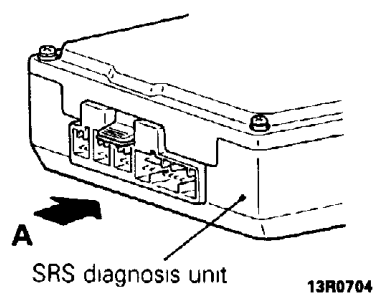


<VEHICLES WITH FRONT PASSENGER'S AIR BAG>

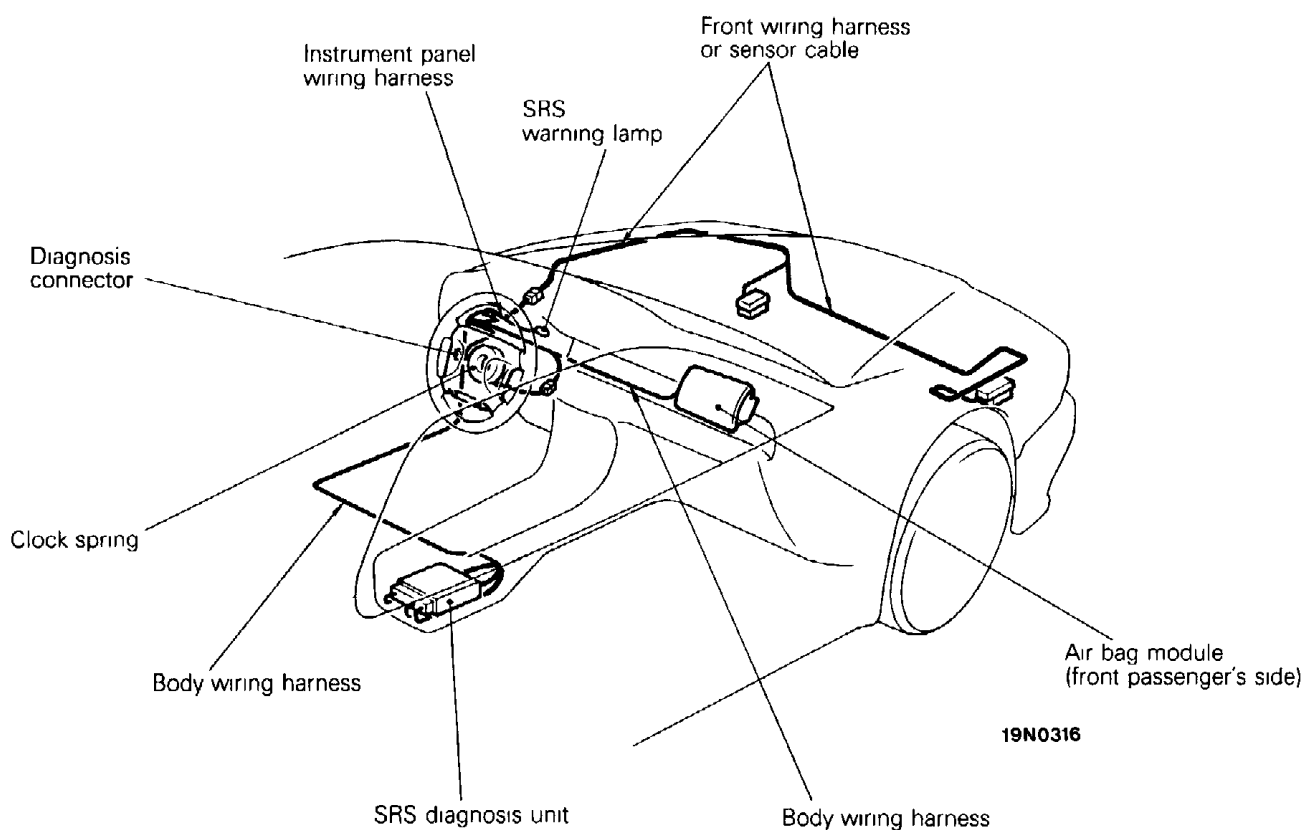
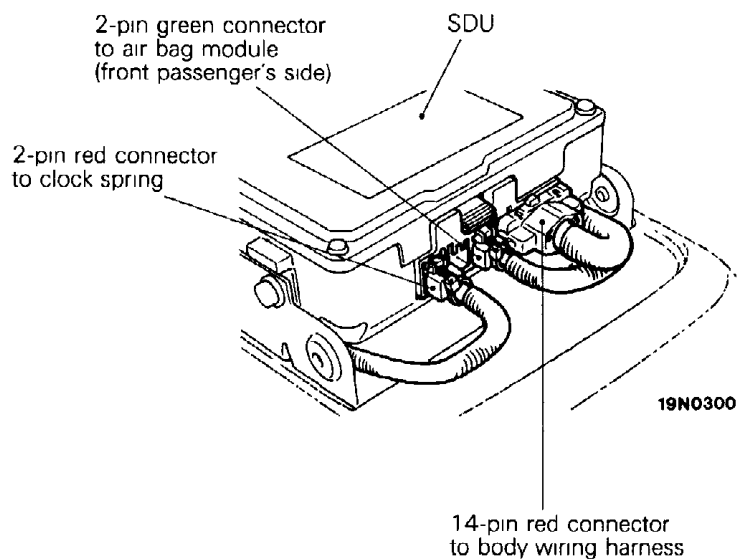
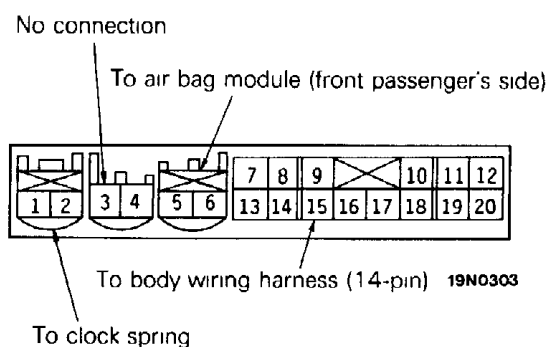
SDU Terminal No.	Harness Connector (No of Terminals, Color)	Destination of Harness	Corrective Action
1	2 pins, red	Body wiring harness → Clock spring → Air bag module (Driver's side)	Correct or replace body wiring harness or replace clock spring
2			
3	No connection	—	—
4			
5	2 pins, green	Body wiring harness → Air bag module (Front passenger's side)	Correct or replace body wiring harness
6			
7 and 8	14 pins, red	—	—
9		Body wiring harness → Diagnosis check pin	Correct or replace each wiring harness
10		Body wiring harness → Front wiring harness → Control wiring harness → Front wiring harness → Body wiring harness → Ignition switch (ST)	
11		Body wiring harness → Junction block (fuse No. 18)	
12		Body wiring harness → Instrument panel wiring harness → Junction block (fuse No. 12)	
13		Body wiring harness → Instrument panel wiring harness → SRS warning lamp	
14			
15		Body wiring harness → Front wiring harness → Front impact sensor (RH)	Correct or replace body wiring harness or replace with sensor cable*
18			
16		Body wiring harness → Front wiring harness → Front impact sensor (LH)	
17			
19		Body wiring harness → Earth	Correct or replace body wiring harness.
20			

NOTE

- (1) The sensor cable marked with * is available as service part.
 (2) The sensor cable used as a replacement part is routed along the body wiring harness and front wiring harness



View A



5. After disconnecting the battery cable, wait 60 seconds or more before proceeding with the following work. The SRS system is designed to retain enough voltage to deploy the air bag for a short time even after the battery has been disconnected, so serious injury may result from unintended air bag deployment if work is done on the SRS system immediately after the battery cables are disconnectd.
6. SRS components should not be subjected to heat over 93°C (200°F), so remove the front impact sensors, SRS diagnosis unit, air bag module and clock spring before drying or baking the vehicle after painting.
Recheck SRS system operability after re-installing the components.
7. Whenever you finish servicing the SRS, check the SRS warning lamp operation to make sure that the system functions properly. (Refer to P.52B-12.)
8. Make certain that the ignition switch is OFF when the Multi-use Tester or MUT-II is connected or disconnected.
9. If you have any questions about the SRS, please contact your local distributor.

NOTE

SERIOUS INJURY CAN RESULT FROM UNINTENDED AIR BAG DEPLOYMENT, SO USE ONLY THE PROCEDURES AND EQUIPMENT SPECIFIED IN THIS MANUAL.

SPECIFICATIONS

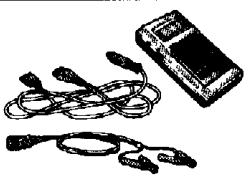
E52CB--

SERVICE SPECIFICATION

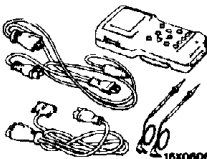
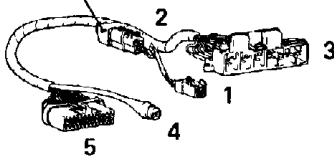
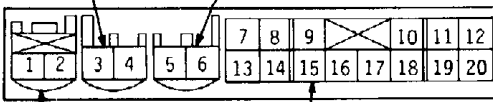
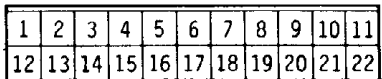
Items	Specifications
Standard value	
Front impact sensor resistance	Ω 2,000 $\pm$ 40
Clock spring resistance	Ω less than 0.4

SPECIAL TOOLS AND TEST EQUIPMENT

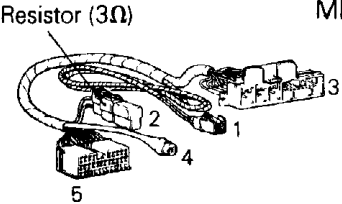
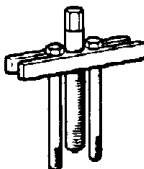
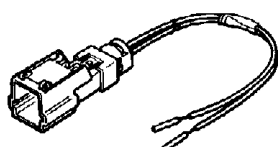
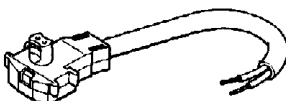
E52DA--

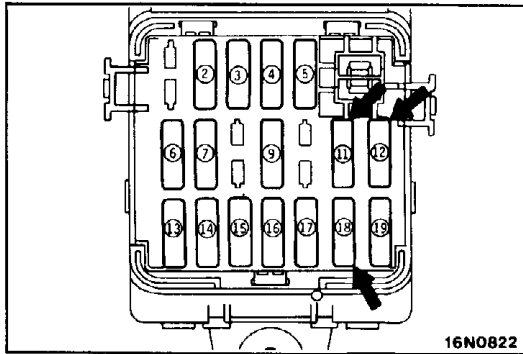
Tool	Number	Name	Use
	MB991341	Multi-use tester sub assembly	<Vehicles without front passenger's air bag> ● Reading diagnosis codes ● Erasing diagnosis code ● Reading trouble period ● Reading erase times [Refer to MULTI-USE TESTER INSTRUCTION MANUAL]
		ROM pack (for multi-use tester)	
	(For the number, refer to GROUP 00 – Precautions Before Service.)		

52B-10 SUPPLEMENTAL RESTRAINT SYSTEM (SRS) – Special Tools and Test Equipment

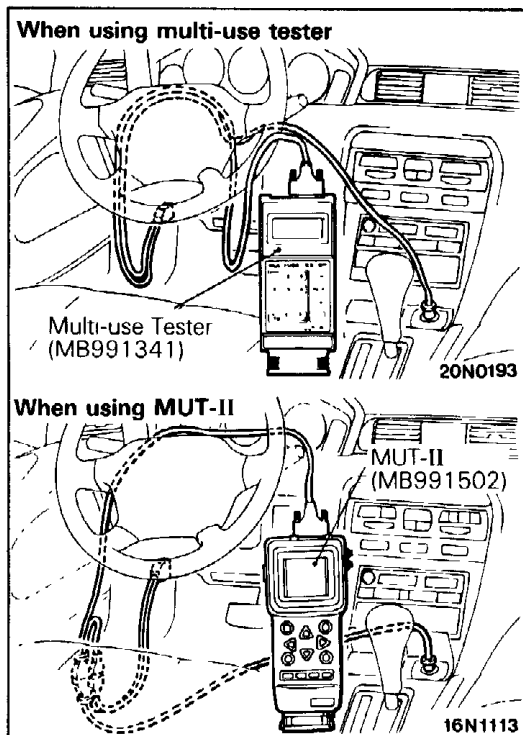
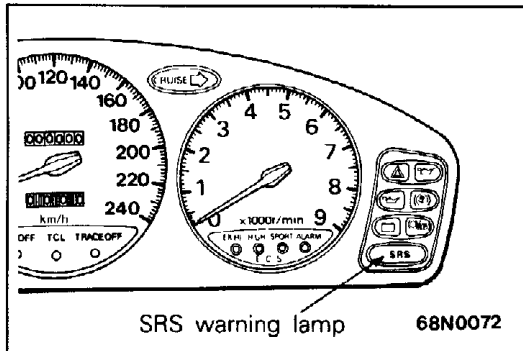
Tool	Number	Name	Use
	MB991502	MUT-II	<All models> • Reading diagnosis codes • Erasing diagnosis code • Reading trouble period • Reading erase times [Refer to MUT-II OPERATING INSTRUCTIONS]
 16X0607		ROM pack (for MUT-II)	
Resistor (3Ω) 	MB991349	SRS Check Harness	<Vehicles without front passenger's air bag> • Checking the SRS electrical circuitry with a digital multi-meter NOTE SRS check harness is used on various Diagnostic Tests For details, refer to DIAGNOSTIC SEQUENCE (P.52B-13 – P.52B-66)
1  → To SDU connector for clock spring			
2  (connected 3Ω resistor)			
To front impact sensor (L.H.) To front impact sensor (R.H.) 3  To clock spring To body wiring harness (14-pin)			
			4  White paint → To clock spring connector for air bag module
			5  (check connector)

19S0258

Tool	Number	Name	Use
 Resistor (3Ω) 1 To SDU connector for clock spring 2 (connected 3Ω resistor) 3 To clock spring To body wiring harness (14-pin) 4 To clock spring connector for air bag module 5 (check connector) 19N0303	MB991530	SRS Check Harness	<Vehicles with front passenger's bag> Checking the SRS electrical circuitry with a digital multi-meter NOTE SRS check harness is used on various Diagnostic Tests. For details, refer to DIAGNOSTIC SEQUENCE (P.52B-13 – P.52B-66)
 13R0746		Digital multi-meter	Checking the SRS electrical circuitry with SRS Check Harness
	MB990803	Steering wheel puller	Removal of steering wheel
 13R0732	MB686560	SRS AIR BAG ADAPTER HARNESS A	- Deployment of air bag module inside the vehicle - Deployment of air bag module (front passenger's side) outside the vehicle
 13R0751	MB628919	SRS AIR BAG ADAPTER HARNESS B	Deployment of air bag module (driver's side) outside the vehicle



16N0822



TROUBLESHOOTING

E52EA--

SRS DIAGNOSTIC PROCEDURES – INITIAL STEPS

FOLLOW THESE STEPS WHEN BEGINNING ANY SRS SERVICE:

1. Check the SRS fuses (multi-purpose fuses No. 11, No. 12, and No. 18).
If either is loose, tighten it; if damaged or blown, replace it.
2. After performing step 1, turn the ignition key "ON". Does "SRS" warning lamp illuminate for about 7 seconds and then turn OFF? If yes, SRS system is functioning properly. If no, continue with following steps.

NOTE

< Vehicles built up to March, 1992 >

If the vehicle has a discharged battery or the battery power supply (multi-purpose fuses No. 12 or No. 18) is disconnected with the ignition key in the "ON" position, the SRS warning lamp will continue to illuminate even after the battery is recharged or the fuses are replaced in their original positions.

In this case, the SRS warning lamp can be extinguished by turning the ignition switch ON and OFF 10 times.

< Vehicles built from April, 1992 >

The SRS warning lamp will also illuminate if the battery voltage drops. In such cases, if the battery voltage returns to normal, the SRS warning lamp will switch off.

3. Turn the ignition key to the "LOCK" position.
4. Connect the Multi-use tester <vehicles without front passenger's air bag> or MUT-II <all models> to the diagnosis connector located at the right side of the junction block.

Caution

Make certain that the ignition switch is OFF when the Multi-use Tester or MUT-II is connected or disconnected.

5. Start the SRS diagnosis, by conducting TEST 1 (SRS warning lamp does not extinguish) or TEST 2 (SRS warning lamp does not illuminate) which begins on next page.

DIAGNOSTIC SEQUENCE

TEST 1	SRS WARNING LAMP DOES NOT EXTINGUISH
---------------	---

- (1) Read (and write down) all of the displayed diagnosis codes and service data (fault duration and how many time memories are erased) using the Multi-use Tester <Vehicles without front passenger's air bag> or MUT-II <all models>.

NOTE

- (1) If the Multi-use Tester or MUT-II displays "CANT COMM", check the Multi-use Tester or MUT-II and vehicle side diagnosis connector for poor connections (Refer to the previous page.) and perform TEST 3.
- (2) Maximum stored period: 9999 minutes (approximately 7 days)
- (3) Maximum number of times to be stored: 250
- (2) Erase in diagnosis codes following the Multi-use Tester or MUT-II messages.
- (3) Start engine.
Does "SRS" warning lamp illuminate for about 7 seconds, turn OFF and then remain extinguished for at least 45 seconds?
If yes, SRS system is functioning properly now.
If no, check the diagnosis codes written down at step (1), refer to SELF-DIAGNOSIS QUICK REFERENCE CHART (P.52B-14) and perform service indicated there.

52B-14 SUPPLEMENTAL RESTRAINT SYSTEM (SRS) – Troubleshooting

TEST 2 SRS WARNING LAMP DOES NOT ILLUMINATE

- (1) Read (and write down) all of the displayed diagnosis codes and service data (fault duration and how many times memories are erased) using the Multi-use Tester <vehicles without front passenger's air bag> or MUT-II <all models>.

NOTE

- (1) If the Multi-use Tester or MUT-II displays "CAN'T COMM", check the Multi-use Tester or MUT-II and vehicle side diagnosis connector for poor connections (Refer to P.52B-12) and perform TEST 4
 - (2) Maximum stored period: 9999 minutes (approximately 7 days)
 - (3) Maximum number of times to be stored: 250
- (2) Check diagnosis codes against SELF-DIAGNOSIS QUICK REFERENCE CHART and perform service indicated there.

SELF-DIAGNOSIS QUICK REFERENCE CHART

After carrying out test 1 or 2, use the following table to repair.

Diagnosis code No.	Explanation	Service
—	Normal. The SRS is in good order	—
11	The circuits for the front impact sensor are shorted together, the (–) side of the harness between the air bag module and the SDU is shorted to the earth, or the (+) side of the harness between the front impact sensor and the SDU is shorted to the earth.	Perform TEST 5 <Vehicles without front passenger's air bag> L H drive vehicles: refer to P 52B-22 R H drive vehicles: refer to P 52B-26 <Vehicles with front passenger's air bag>: refer to P 52B-32
12	Right or left impact sensor circuit is open or the wire from the sensor to the SDU is open-circuit	
13	Right and left impact sensor circuits are open or the wires from the sensors to the SDU are open-circuit.	
21	The circuits for the driver's side air bag module (squib) are shorted together other or the circuit is earthed	Perform TEST 6 <Vehicles without front passenger's air bag> L H drive vehicles: refer to P 52B-35 R H drive vehicles: refer to P 52B-39 <Vehicles with front passenger's air bag>: refer to P 52B-45
22	The driver's side air bag module (squib) circuit is open or the wire from the driver's side air bag module to the SDU (clock spring) is open circuit, the harness connection is defective, or the (+) side of the harness between the driver's side air bag module and the SDU is shorted to the earth	
24	The circuits for the front passenger's side air bag module (squib) are shorted together other or the circuit is earthed	Perform TEST 13 (Refer to P.52B-64.)
25	The front passenger's side air bag module (squib) circuit is open or the wire from the front passenger's side air bag module to the SDU (clock spring) is open circuit, the harness connection is defective or the (+) side of the harness between the front passenger's side air bag module and the SDU is shorted to the earth	

Diagnosis code No	Explanation	Service
31	The capacitor (integrated in the SDU) terminal voltage is higher than the specified value for 5 seconds.	Replace the SDU. (Refer to P.52B-80.)
32	The capacitor (integrated in the SDU) terminal voltage is lower than the specified value for 5 seconds Or the battery runs short	If the battery voltage is normal, replace SDU (Refer to P.52B-80.) If the battery is run down, turn the ignition key to the "LOCK" position, disconnect the negative battery cable and wrap the terminal with tape for insulation. Then, charge the battery
33*2	The circuit for the cranking signal is shorted to some power supply circuits It takes at least 45 seconds that the SDU detects this fault.	Perform TEST 7 (Refer to P.52B-51.)
34*2	The lock switch (short bar) of the SDU double lock connector is open.	Perform TEST 8 (Refer to P.52B-55)
41*1, *2	The multi-purpose fuse (No. 12) is blown or the wire from the fuse to the SDU is open-circuit or its resistance value is increased, or the battery runs short. It takes at least 5 seconds that the SDU detects this fault	If the battery voltage is normal, perform TEST 9. (Refer to P.52B-56.) If the battery is run down, turn the ignition key to the "LOCK" position, disconnect the negative battery cable and wrap the terminal with tape for insulation. Then, charge the battery.
42*1, *2	The multi-purpose fuse (No. 18) is blown or the wire from the fuse to the SDU is open-circuit or its resistance value is increased, or the battery runs short. It takes at least 5 seconds that the SDU detects this fault.	If the battery voltage is normal, perform TEST 10 (Refer to P.52B-56) If the battery is run down, turn the ignition key to the "LOCK" position, disconnect the negative battery cable and wrap the terminal with tape for insulation. Then, charge the battery.
43*2	The SRS warning lamp circuits are open or the wire from the lamp to the SDU is earthed It takes at least 5 seconds with the lamp OFF that the SDU detects this fault	When SRS warning lamp does not extinguish: Perform TEST 11 (Refer to P.52B-59) When SRS warning lamp does not illuminate: Perform TEST 12 (Refer to P.52B-61.)
44	The SRS warning lamp drive transistor (integrated in the SDU) is open-circuit.	Replace the SDU (Refer to P.52B-80.)
45	The EEPROM or A/D converter (integrated in the SDU) is defective.	

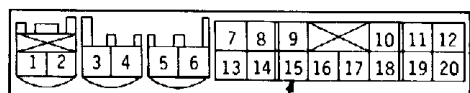
NOTE

- (1) **After repairing the SRS, reconnect the battery cable, erase the diagnosis code memory from the Multi-use Tester or MUT-II and check the SRS warning lamp operation to verify the system functions properly. (Refer to TEST 1.)**
- (2) SDU = SRS Diagnosis Unit
- (3) *. If the vehicle has a discharged battery it will store the fault codes 41 or 42. When these diagnosis codes are displayed, check the battery.
- (4) If a malfunction that corresponds to codes marked by *2 reoccurs, the SRS warning lamp will switch off and the function will return to normal <Vehicles built from April, 1992>

TEST 3

**NO COMMUNICATION BETWEEN MULTI-USE TESTER OR MUT-II AND SDU
(SRS warning lamp does not extinguish)**

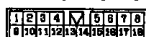
SDU connector



To body wiring harness (14-pin)

19N0200

<L.H. drive vehicles>



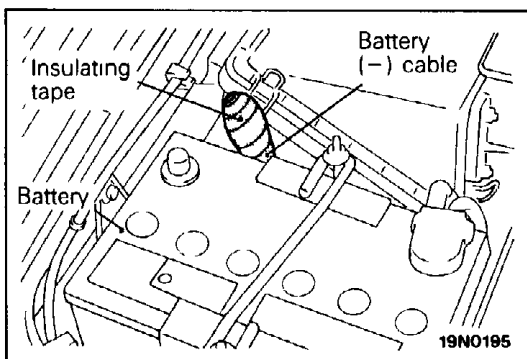
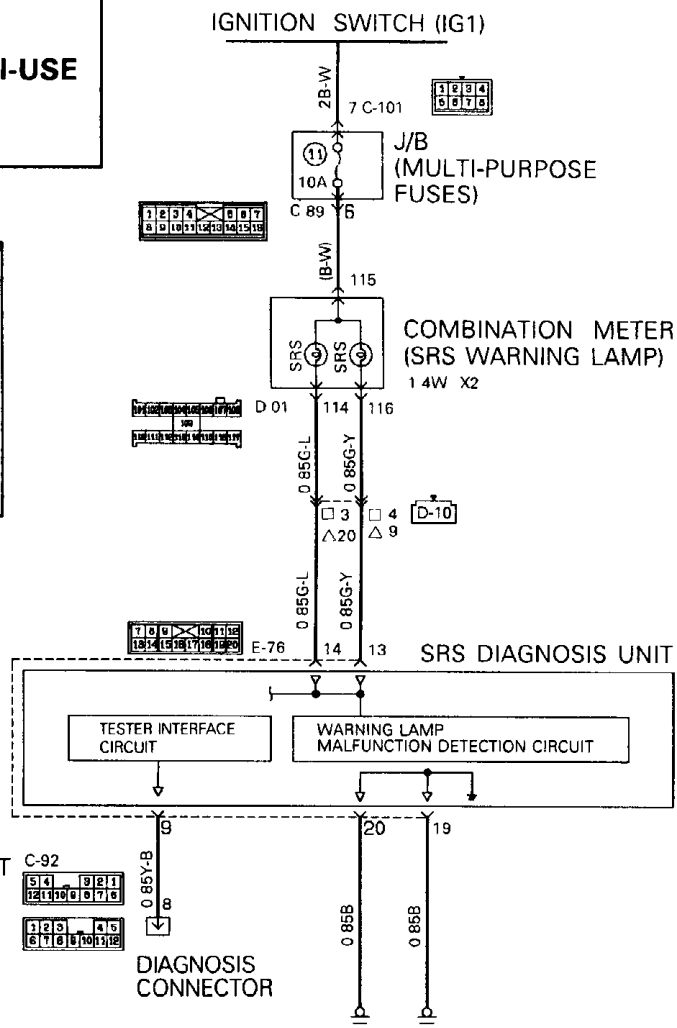
<R.H. drive vehicles>



NOTE

- : <L.H. drive vehicles>
- △ : <R.H. drive vehicles>

KX35-AK-J1504-EC

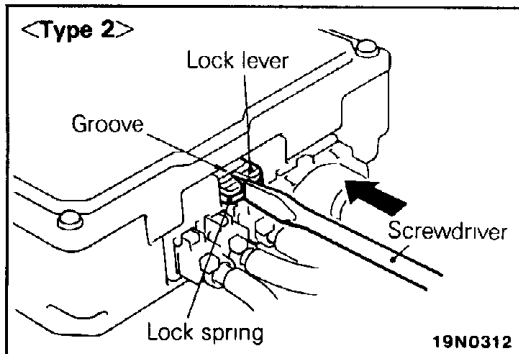
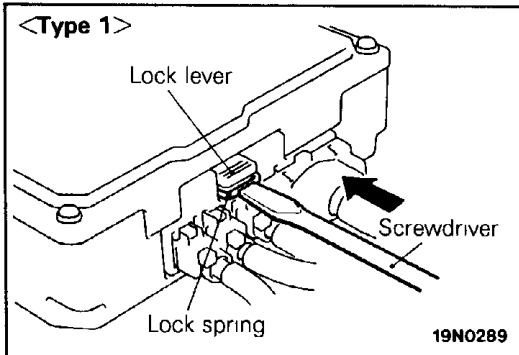


- (1) Turn the ignition key to the "LOCK" position, disconnect the negative battery cable and tape the terminal.

Caution

Wait at least 60 seconds after disconnecting the battery cable before doing any further work. (Refer to P.52B-9 No. 5.)

- (2) Remove the peripheral SDU parts. (Refer to P.52B-81, 84.)



- (3) Release the lock of SDU connector in accordance with the following procedure:

In case that there is no groove on the lock lever (Type 1)

Place a (–) screwdriver against the lock spring (metal section) of the connector lock lever as shown in the illustration, and push the spring horizontally toward the inside of the unit.

Caution

- (1) Do not use excessive force to raise the lock lever.
(2) Do not insert the screwdriver into the gap between the lock lever and the lock spring.

In case that there is a groove on the lock lever (Type 2)

Place a (–) screwdriver against the lock spring (metal section) of the connector lock lever groove as shown in the illustration, and push it toward the inside of the unit.

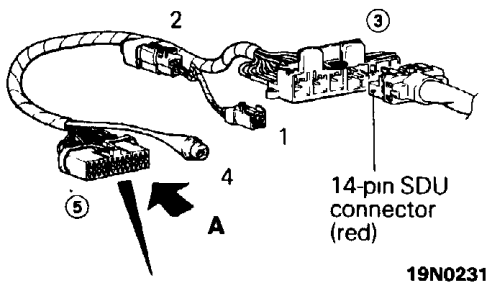
Caution

Do not use excessive force to raise the lock lever.

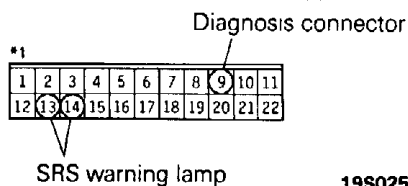
- (4) Disconnect the red 14-pin connector from the SDU.

(5) Connect the red harness-side SDU connector (14-pin) to the connector ③ or the SRS Check Harness.
(6) Check according to the flow chart below, using the specified digital multi-meter.

**MB991349*1
MB991530*2
SRS Check Harness**

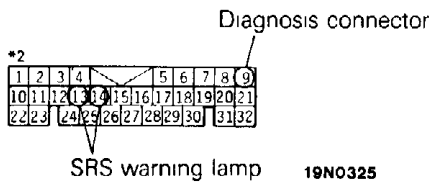


View A
SRS Check Harness connector (5)

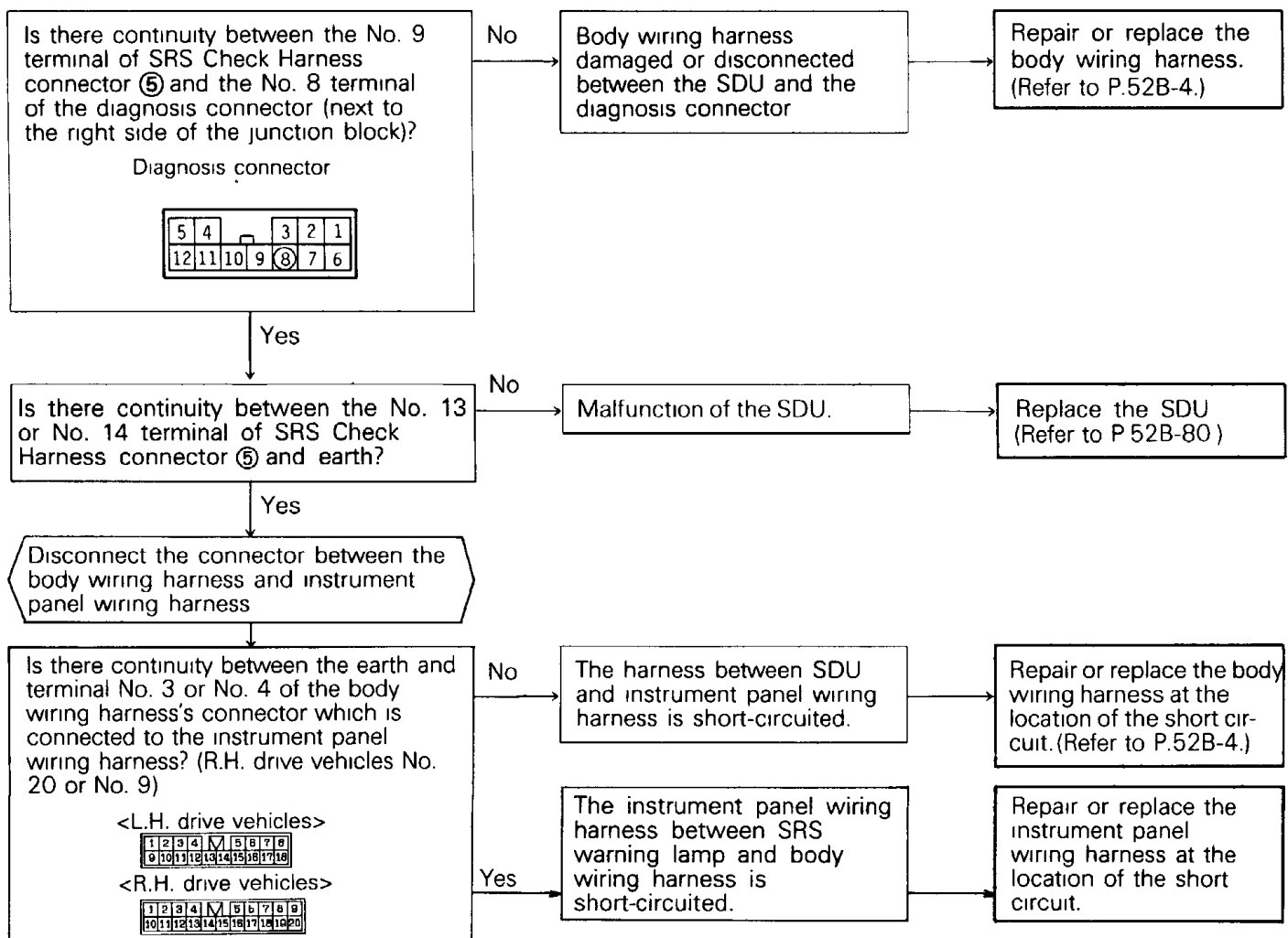


NOTE

- *1 Vehicles without front passenger's air bag
*2 Vehicles with front passenger's air bag



52B-18 SUPPLEMENTAL RESTRAINT SYSTEM (SRS) – Troubleshooting



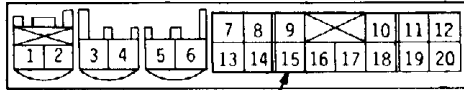
NOTE – IMPORTANT

- (1) After repairing the SRS, reconnect the battery cable, erase the diagnosis code memory from the Multi-use Tester or MUT-II and check the SRS warning lamp operation to verify the system functions properly. (Refer to TEST 1.)
- (2) SDU = SRS Diagnosis Unit

TEST 4

**NO COMMUNICATION BETWEEN MULTI-USE TESTER OR MUT-II AND SDU
(SRS warning lamp does not illuminate)**

SDU connector



To body wiring harness (14-pin)

19N0200

<L.H. drive vehicles>



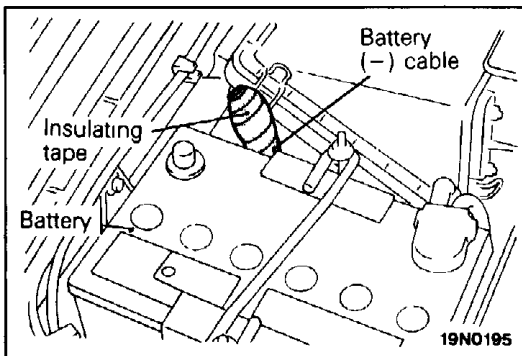
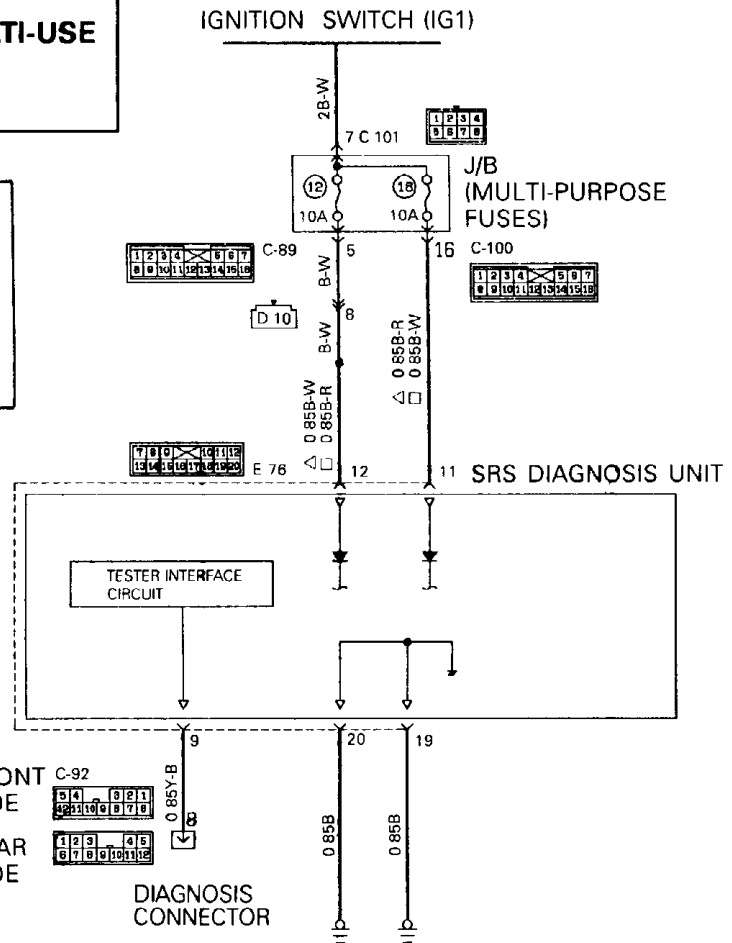
<R.H. drive vehicles>



NOTE

- : <L.H. drive vehicles>
- △ : <R.H. drive vehicles>

KX35-AK-J1505-EC

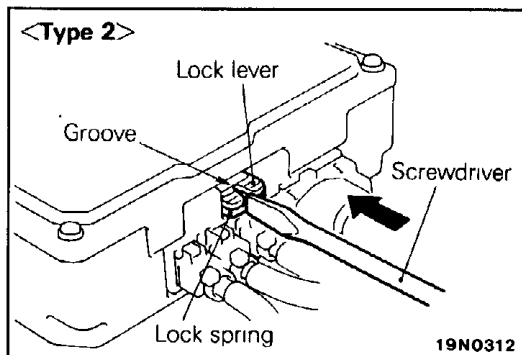
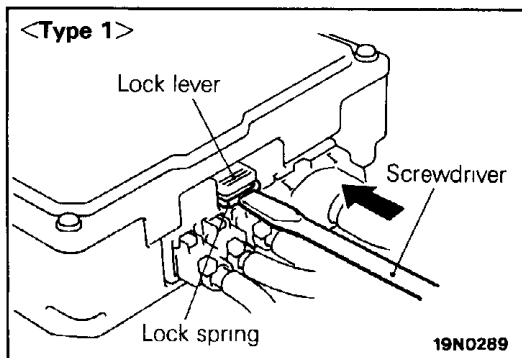


- (1) Turn the ignition key to the "LOCK" position, disconnect the negative battery cable and tape the terminal.

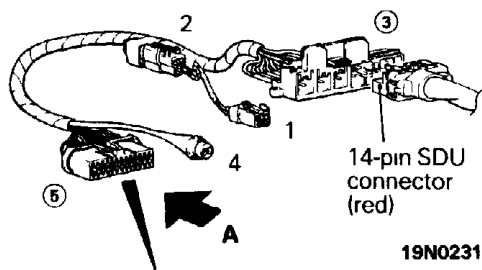
Caution

Wait at least 60 seconds after disconnecting the battery cable before doing any further work. (Refer to P.52B-9 No. 5.)

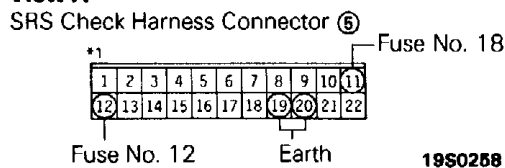
- (2) Remove the peripheral SDU parts. (Refer to P.52B-81, 84.)



MB991349*1
MB991530*2
SRS Check Harness



View A



- (3) Release the lock of SDU connector in accordance with the following procedure:

In case that there is no groove on the lock lever (Type 1)

Place a (–) screwdriver against the lock spring (metal section) of the connector lock lever as shown in the illustration, and push the spring horizontally toward the inside of the unit.

Caution

- (1) Do not use excessive force to raise the lock lever.
 (2) Do not insert the screwdriver into the gap between the lock lever and the lock spring.

In case that there is a groove on the lock lever (Type 2)

Place a (–) screwdriver against the lock spring (metal section) of the connector lock lever groove as shown in the illustration, and push it toward the inside of the unit.

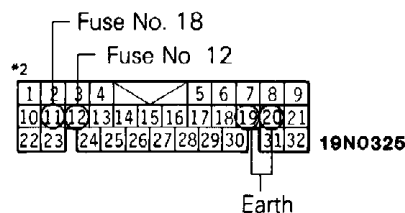
Caution

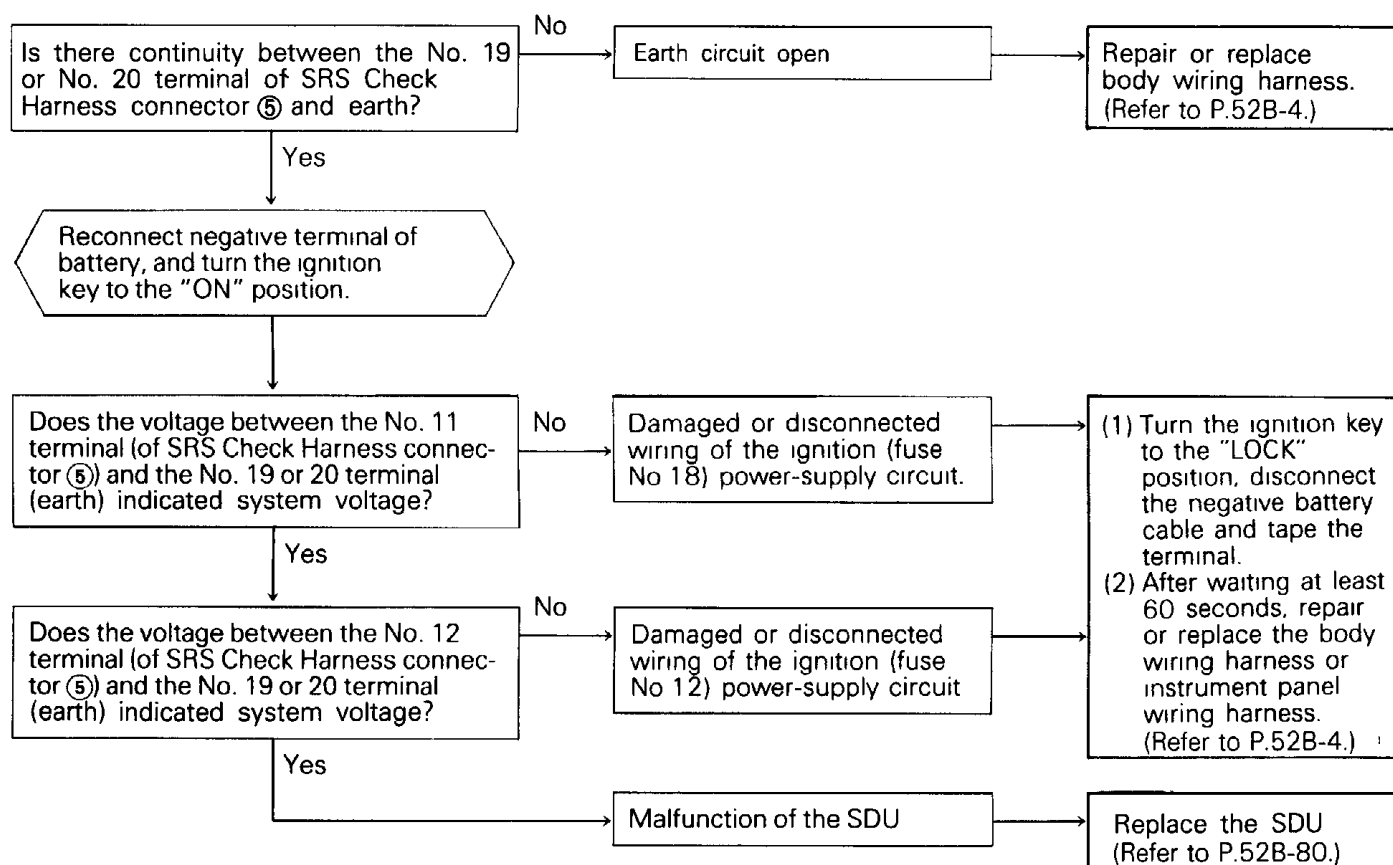
Do not use excessive force to raise the lock lever.

- (4) Disconnect the red 14-pin connector from the SDU.
- (5) Connect the red harness-side SDU connector (14-pin) to the connector ③ of the SRS Check Harness.
- (6) Check according to the flow chart below, using the specified digital multi-meter.

NOTE

- *1: Vehicles without front passenger's air bag
 *2: Vehicles with front passenger's air bag





NOTE – IMPORTANT

(1) After repairing the SRS, reconnect the battery cable, erase the diagnosis code memory from the Multi-use Tester or MUT-II and check the SRS warning lamp operation to verify the system functions properly. (Refer to TEST 1.)

(2) SDU = SRS Diagnosis Unit

52B-22 SUPPLEMENTAL RESTRAINT SYSTEM (SRS) – Troubleshooting

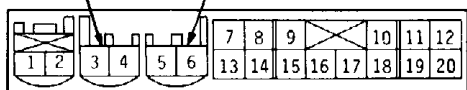
TEST 5 <Vehicles without front passenger's air bag (L.H. drive vehicles)>

WHEN DIAGNOSIS CODE NO. 11, NO. 12 OR NO. 13 IS DISPLAYED

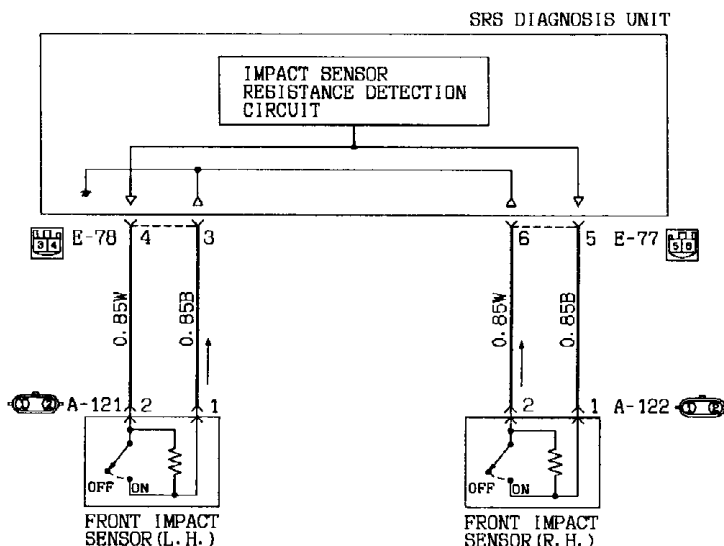
SDU connector

To front impact sensor (L.H.)

To front impact sensor (R.H.)



19N0200



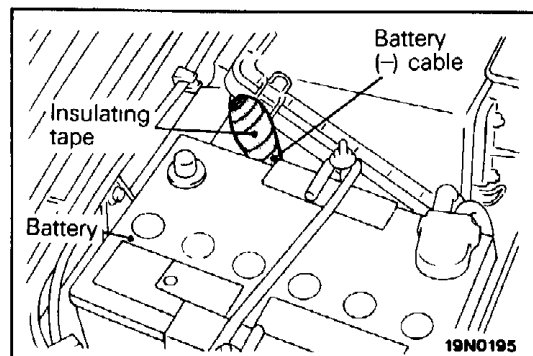
KX35-AK-J1508-EC

NOTE

If combined front impact sensor and air bag module (squib) failure modes simultaneously occur in two places, the preconditions for the respective detection circuits will go out of order. For this reason, both diagnosis codes may not be stored but only one of them may be indicated. Their relationships are shown in the following table.

		Front impact sensors		
		Short-circuited	One open-circuited	Two open-circuited
Air bag module (Squib)	Short-circuited	11 and/or 21	12 and/or 21	13 and/or 21
	Open-circuited	11 and/or 22	12 and/or 22	13 and/or 22

The numbers in the boxes are diagnosis codes numbers. (Refer to P 52B-14.)

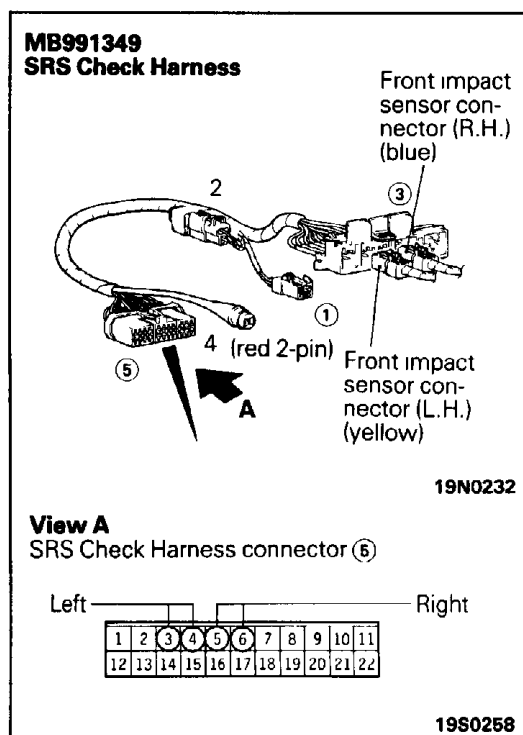
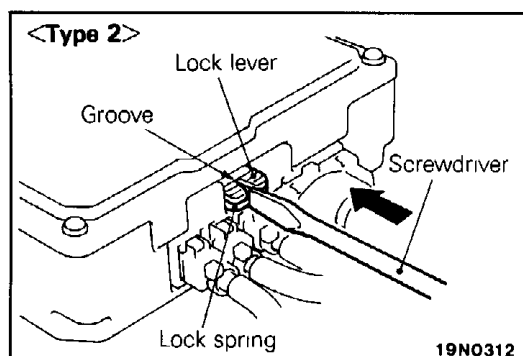
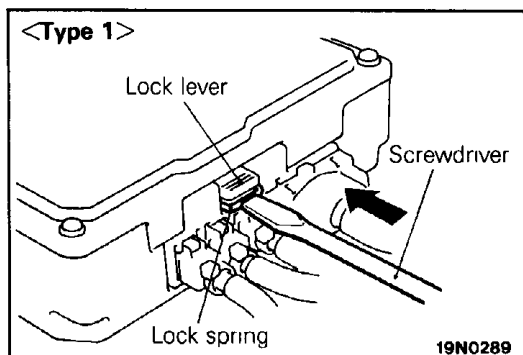


- (1) Turn the ignition key to the "LOCK" position, disconnect the negative battery cable and tape the terminal.

Caution

Wait at least 60 seconds after disconnecting the battery cable before doing any further work. (Refer to P.52B-9 No. 5.)

- (2) Remove the floor console assembly. (Refer to GROUP 52 – Floor Console.)



- (3) Release the lock of SDU connector in accordance with the following procedure:

In case that there is no groove on the lock lever (Type 1)

Place a (–) screwdriver against the lock spring (metal section) of the connector lock lever as shown in the illustration, and push the spring horizontally toward the inside of the unit.

Caution

- (1) Do not use excessive force to raise the lock lever.
- (2) Do not insert the screwdriver into the gap between the lock lever and the lock spring.

In case that there is a groove on the lock lever (Type 2)

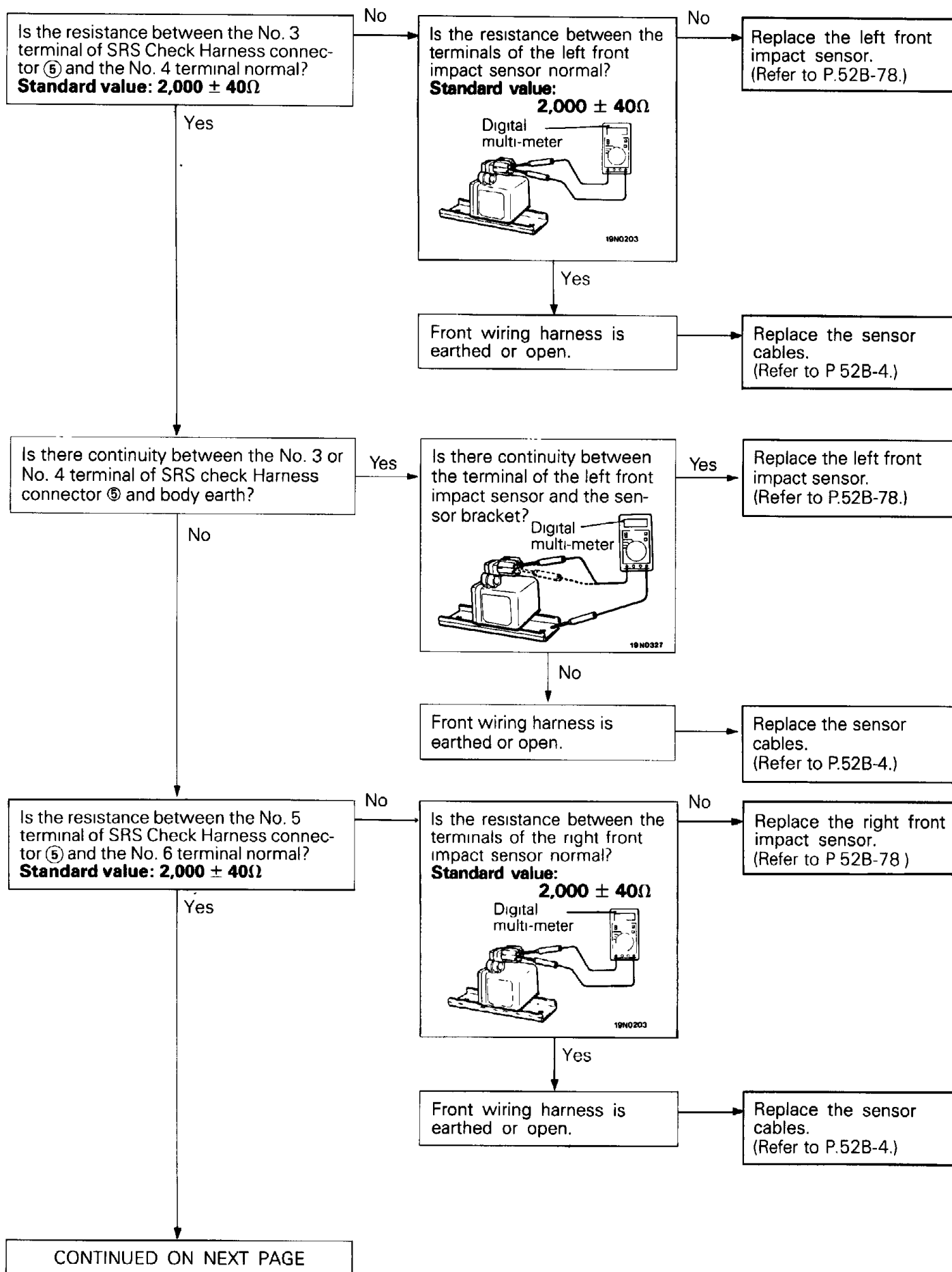
Place a (–) screwdriver against the lock spring (metal section) of the connector lock lever groove as shown in the illustration, and push it toward the inside of the unit.

Caution

Do not use excessive force to raise the lock lever.

- (4) Disconnect each connector other than 14-pin connector from the SDU.
- (5) Locate the blue and yellow connectors for the wiring leading to the front impact sensors, which were connected to the now-disconnected harness-side connector of the SDU. Connect those blue and yellow connectors to connector ③ of the SRS Check Harness.
- (6) Check according to the flow chart on next page, using the specified digital multi-meter and Multi-use Tester or MUT-II.

52B-24 SUPPLEMENTAL RESTRAINT SYSTEM (SRS) – Troubleshooting



CONTINUED FROM PREVIOUS PAGE

Yes

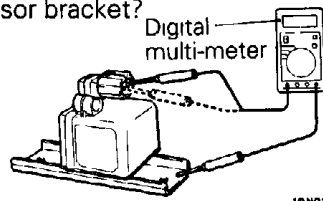
Is there continuity between the No. 5 or No. 6 terminal of SRS check Harness connector ⑥ and body earth?

Yes

Is there continuity between the terminal of the right front impact sensor and the sensor bracket?

Yes

Replace the right front impact sensor.
(Refer to P.52B-78.)

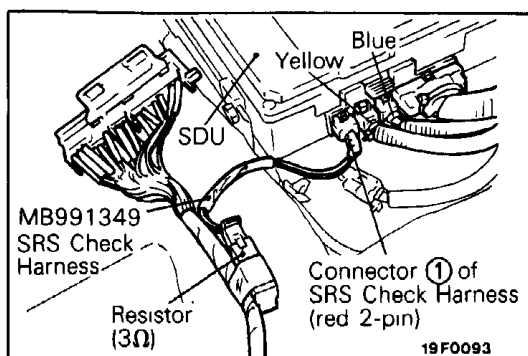


No

Front wiring harness is earthed or open.

Replace the sensor cables.
(Refer to P.52B-4.)

No



- (1) Connect the red 2-pin connector ① of the SRS Check Harness to the SDU in place of the now-disconnected clock spring-SDU connector.

NOTE

A 3-ohm resistor that corresponds to the resistance of the air bag module (squib) and the wiring resistance is connected between the terminals of the connector ① of the SRS Check Harness.

- (2) Reconnect blue and yellow connectors, for the wiring leading to the front impact sensors, to the SDU and double lock them.

NOTE

If double locking cannot be made, the connector is incorrectly or incompletely inserted; re-check to insert the connector correctly and securely.

CONTINUED ON P.52B-37* (TEST 6 <Vehicles without front passenger's air bag (L.H. drive vehicles)>)

NOTE – IMPORTANT

(1) After repairing the SRS, reconnect the battery cable, erase the diagnosis code memory from the Multi-use Tester or MUT-II and check the SRS warning lamp operation to verify the system functions properly. (Refer to TEST 1.)

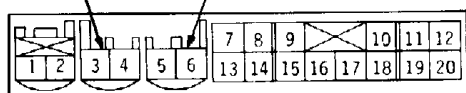
(2) SDU = SRS Diagnosis Unit

NOTES

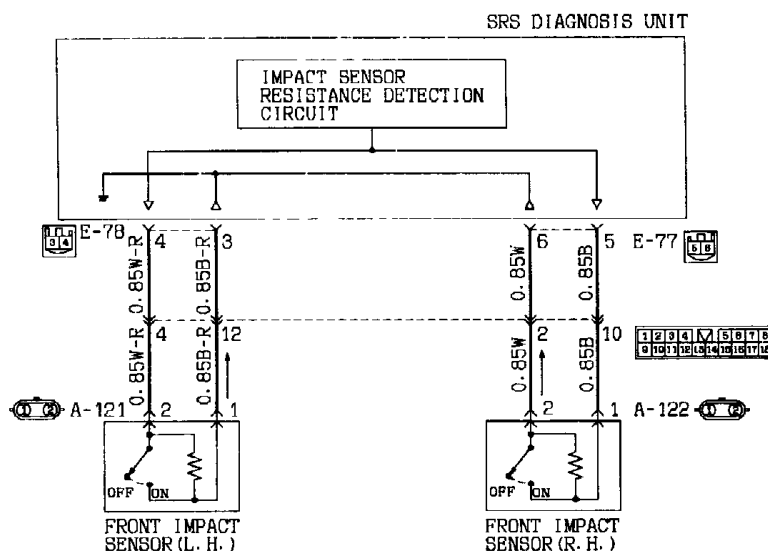
TEST 5 <Vehicles without front passenger's air bag
(R.H. drive vehicles)>**WHEN DIAGNOSIS CODE NO. 11, NO. 12 OR
NO. 13 IS DISPLAYED****SDU connector**

To front impact sensor (LH)

To front impact sensor (RH)



19N0200



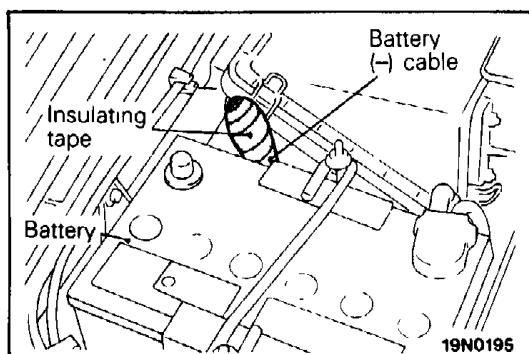
KX35-AK-J1506-EC

NOTE

If combined front impact sensor and air bag module (squib) failure modes simultaneously occur in two places, the preconditions for the respective detection circuits will go out of order. For this reason, both diagnosis codes may not be stored but only one of them may be indicated. Their relationships are shown in the following table.

		Front impact sensors		
		Short-circuited	One open-circuited	Two open-circuited
Air bag module (Squib)	Short-circuited	11 and/or 21	12 and/or 21	13 and/or 21
	Open-circuited	11 and/or 22	12 and/or 22	13 and/or 22

The numbers in the boxes are diagnosis codes numbers. (Refer to P 52B-14.)



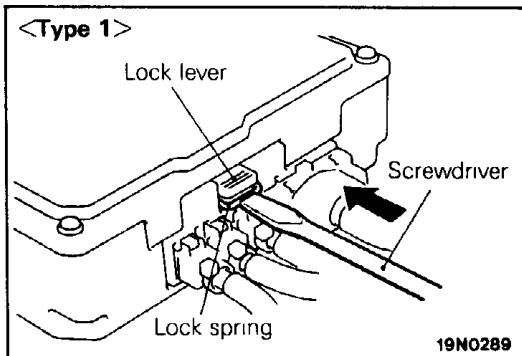
19N0195

- (1) Turn the ignition key to the "LOCK" position, disconnect the negative battery cable and tape the terminal

Caution

Wait at least 60 seconds after disconnecting the battery cable before doing any further work. (Refer to P.52B-9 No. 5.)

- (2) Remove the peripheral SDU parts. (Refer to P.52B-84.)



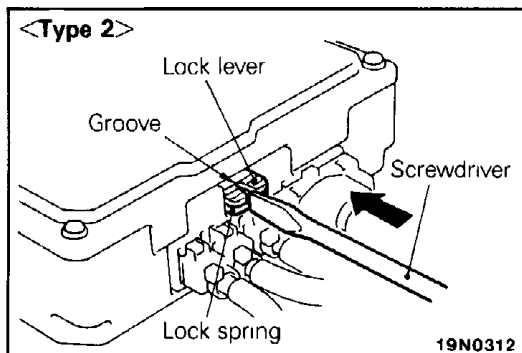
- (3) Release the lock of SDU connector in accordance with the following procedure

In case that there is no groove on the lock lever (Type 1)

Place a (–) screwdriver against the lock spring (metal section) of the connector lock lever as shown in the illustration, and push the spring horizontally toward the inside of the unit

Caution

- (1) Do not use excessive force to raise the lock lever.
- (2) Do not insert the screwdriver into the gap between the lock lever and the lock spring.



In case that there is a groove on the lock lever (Type 2)

Place a (–) screwdriver against the lock spring (metal section) of the connector lock lever groove as shown in the illustration, and push it toward the inside of the unit.

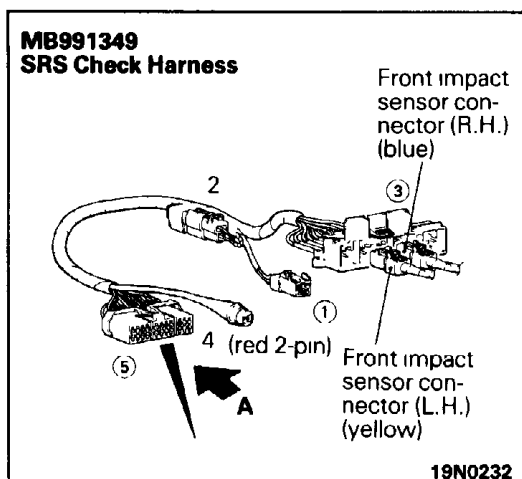
Caution

Do not use excessive force to raise the lock lever.

- (4) Disconnect each connector other than 14-pin connector from the SDU

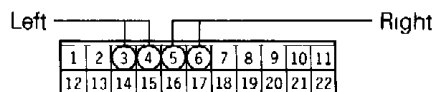
- (5) Locate the blue and yellow connectors for the wiring leading to the front impact sensors, which were connected to the now-disconnected harness-side connector of the SDU. Connect those blue and yellow connectors to connector ③ of the SRS Check Harness

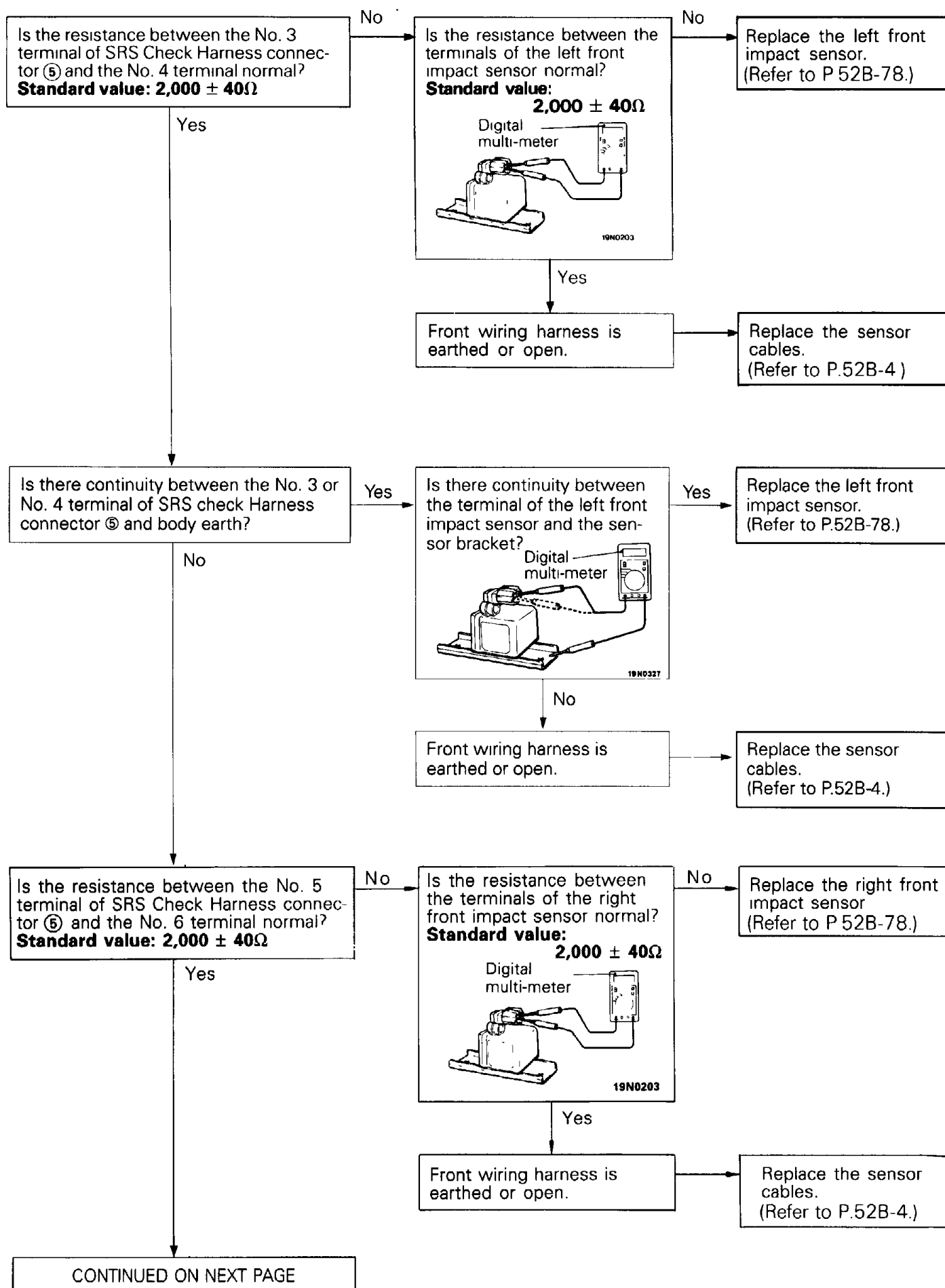
- (6) Check according to the flow chart on next page, using the specified digital multi-meter and Multi-use Tester or MUT-II.



View A

SRS Check Harness connector ⑤





CONTINUED ON NEXT PAGE

52B-28-1 SUPPLEMENTAL RESTRAINT SYSTEM (SRS) – Troubleshooting

CONTINUED FROM PREVIOUS PAGE

Yes

Is there continuity between the No. 5 or No. 6 terminal of SRS check Harness connector ⑤ and body earth?

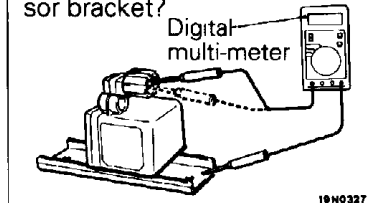
Yes

Is there continuity between the terminal of the right front impact sensor and the sensor bracket?

Yes

Replace the right front impact sensor.
(Refer to P.52B-78.)

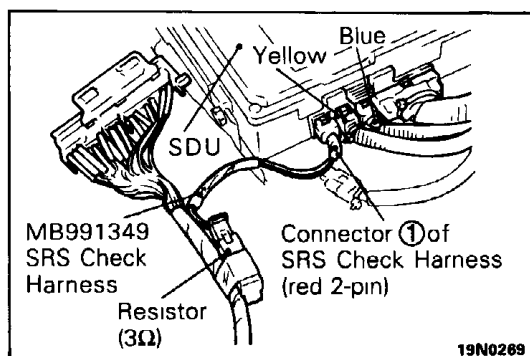
No



No

Front wiring harness is earthed or open.

Replace the sensor cables.
(Refer to P.52B-4.)



- (1) Connect the red 2-pin connector 1 of the SRS Check Harness to the SDU in place of the now-disconnected clock spring-SDU connector.

NOTE

A 3-ohm resistor that corresponds to the resistance of the air bag module (squib) and the wiring resistance is connected between the terminals of the connector 1 of the SRS Check Harness.

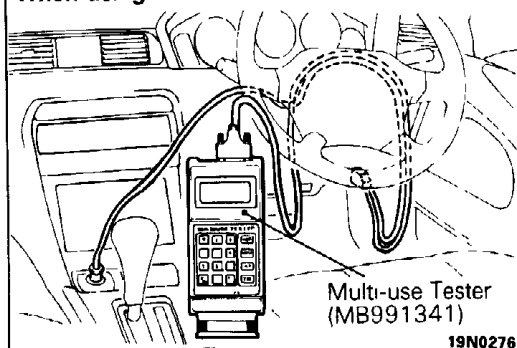
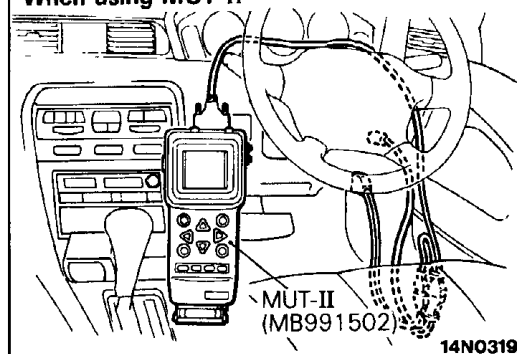
- (2) Reconnect blue and yellow connectors, for the wiring leading to the front impact sensors, to the SDU and double lock them.

NOTE

If double locking cannot be made, the connector is incorrectly or incompletely inserted; re-check to insert the connector correctly and securely.

CONTINUED ON NEXT PAGE

CONTINUED FROM PREVIOUS PAGE

When using multi-use tester**When using MUT-II**

- (1) Reconnect negative terminal of battery, and turn the ignition key to the "ON" position.
- (2) Using the Multi-use Tester or MUT-II, erase the diagnosis code memory. (Refer to TEST 1)
- (3) Return the ignition key from the "ON" to the "LOCK" position and then back to the "ON" position.

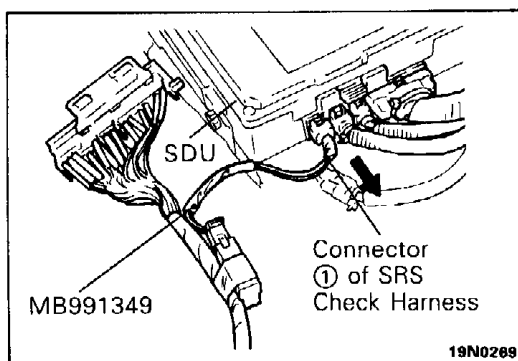
Is the SRS warning lamp operation normal?

No

Malfunction of the SDU.

Replace the SDU.
(Refer to P 52B-80.)

Yes



- (1) Turn the ignition key to the "LOCK" position, disconnect the negative battery cable and tape the terminal.

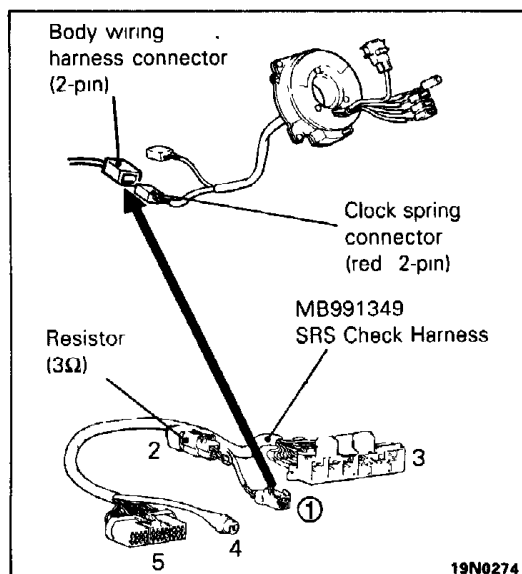
Caution

Wait at least 60 seconds after disconnecting the battery cable before doing any further work.
(Refer to P.52B-9 No. 5.)

- (2) Disconnect the red 2-pin connector 1 of the SRS Check Harness from the SDU.

CONTINUED ON NEXT PAGE

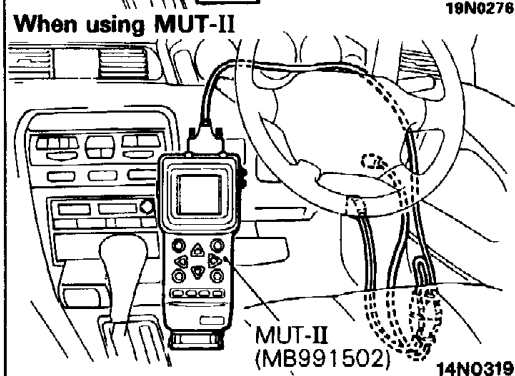
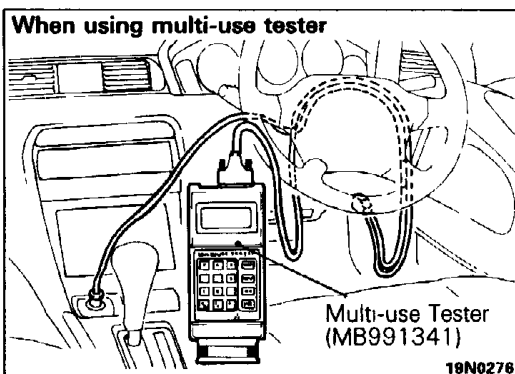
CONTINUED FROM PREVIOUS PAGE



- (1) Remove the steering column cover lower.
- (2) Remove the connection between the clock spring connector (red, 2-pin) and the body wiring harness connector
- (3) Connect the SRS check harness connector 1 to the body wiring harness connector.

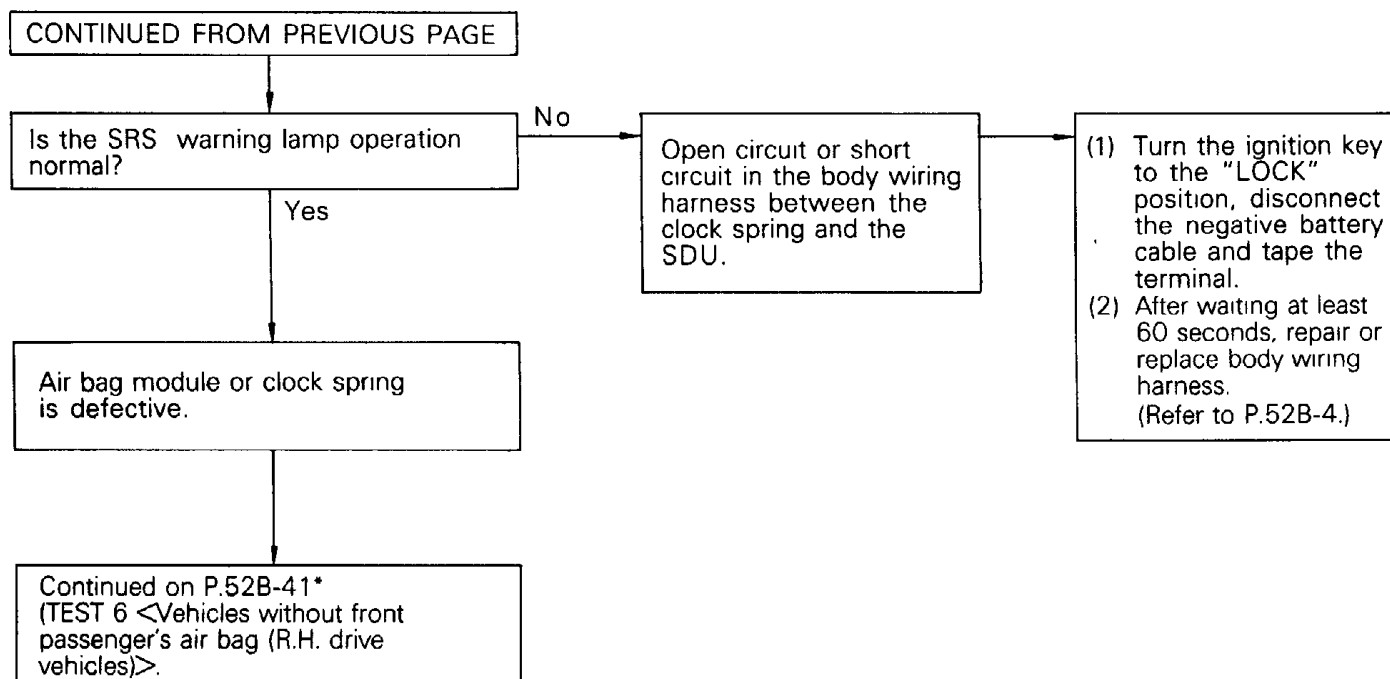
NOTE

A 3-ohm resistor that corresponds to the resistance of the air bag module (squib) and the wiring resistance is connected between the terminals of the connector 1 of the SRS Check Harness.



- (4) Reconnect negative terminal of battery, and turn the ignition key to the "ON" position.
- (5) Using the Multi-use Tester or MUT-II, erase the diagnosis code memory. (Refer to TEST 1.)
- (6) Return the ignition key from the "ON" to the "LOCK" position and then back to the "ON" position.

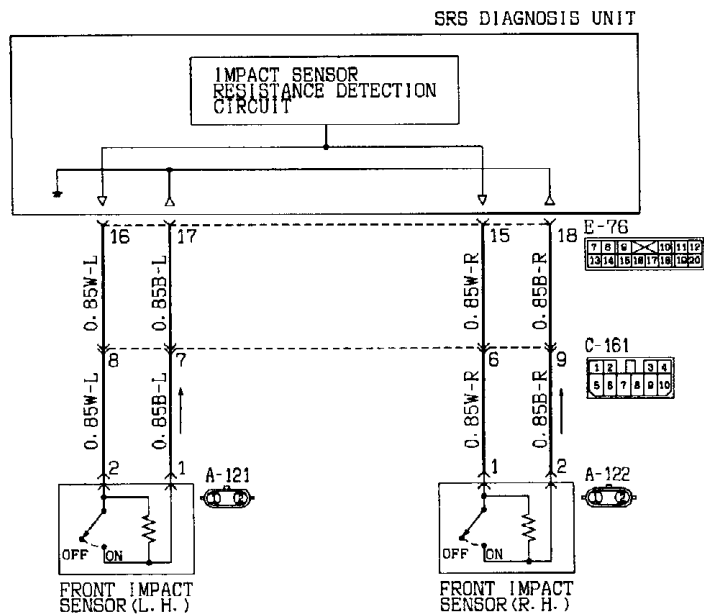
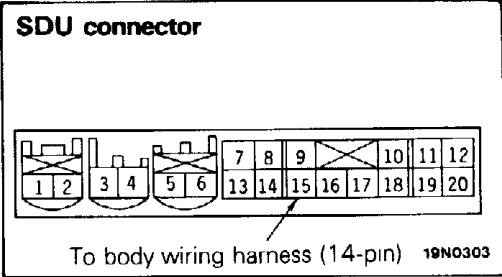
CONTINUED ON NEXT PAGE



NOTE – IMPORTANT

- (1) After repairing the SRS, reconnect the battery cable, erase the diagnosis code memory from the Multi-use Tester or MUT-II and check the SRS warning lamp operation to verify the system functions properly. (Refer to TEST 1.)**
- (2) SDU = SRS Diagnosis Unit

TEST 5 <Vehicles with front passenger's air bag>
WHEN DIAGNOSIS CODE NO. 11, NO. 12 OR NO. 13 IS DISPLAYED

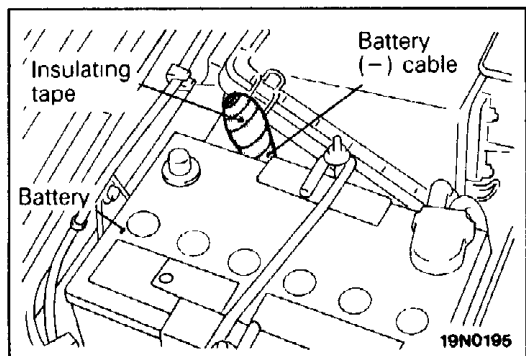


KX35-AK-J1527-EC

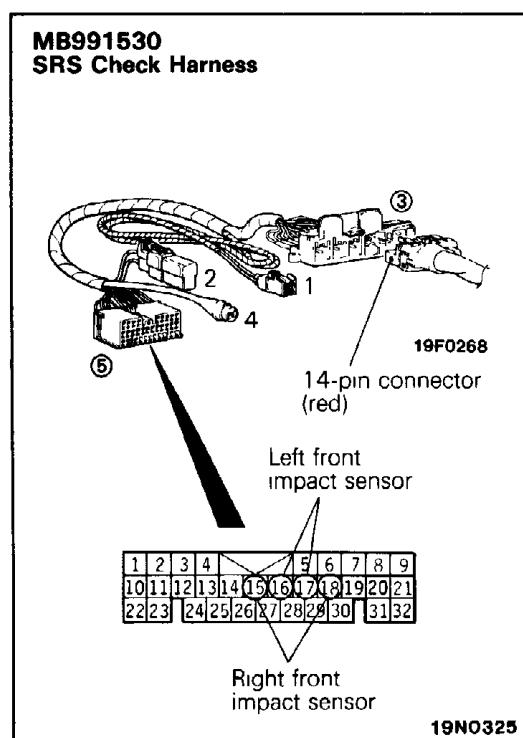
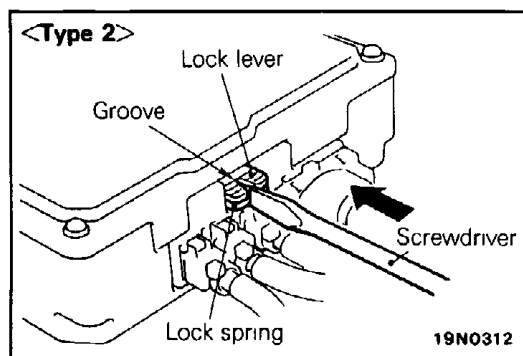
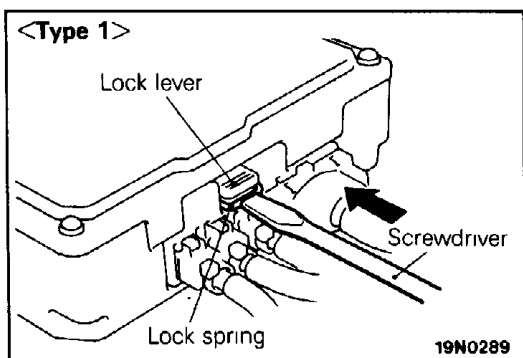
NOTE
If combined front impact sensor and air bag module (squib) failure modes simultaneously occur in two places, the preconditions for the respective detection circuits will go out of order. For this reason, both diagnosis codes may not be stored but only one of them may be indicated. Their relationships are shown in the following table.

		Front impact sensors		
		Short-circuited	One open-circuited	Two open-circuited
Driver's side air bag module (Squib)	Short-circuited	11 and/or 21	12 and/or 21	13 and/or 21
	Open-circuited	11 and/or 22	12 and/or 22	13 and/or 22
Front passenger's side air bag module (Squib)	Short-circuited	11 and/or 24	12 and/or 24	13 and/or 24
	Open-circuited	11 and/or 25	12 and/or 25	13 and/or 25

The numbers in the boxes are diagnosis codes numbers (Refer to P 52B-14.)



- (1) Turn the ignition key to the "LOCK" position, disconnect the negative battery cable and tape the terminal.
Caution
Wait at least 60 seconds after disconnecting the battery cable before doing any further work. (Refer to P.52B-9 No. 5.)
- (2) Remove the floor console assembly. (Refer to GROUP 52 – Floor Console.)



- (3) Release the lock of SDU connector in accordance with the following procedure:

In case that there is no groove on the lock lever (Type 1)

Place a (–) screwdriver against the lock spring (metal section) of the connector lock lever as shown in the illustration, and push the spring horizontally toward the inside of the unit.

Caution

- (1) Do not use excessive force to raise the lock lever.
(2) Do not insert the screwdriver into the gap between the lock lever and the lock spring.

In case that there is a groove on the lock lever (Type 2)

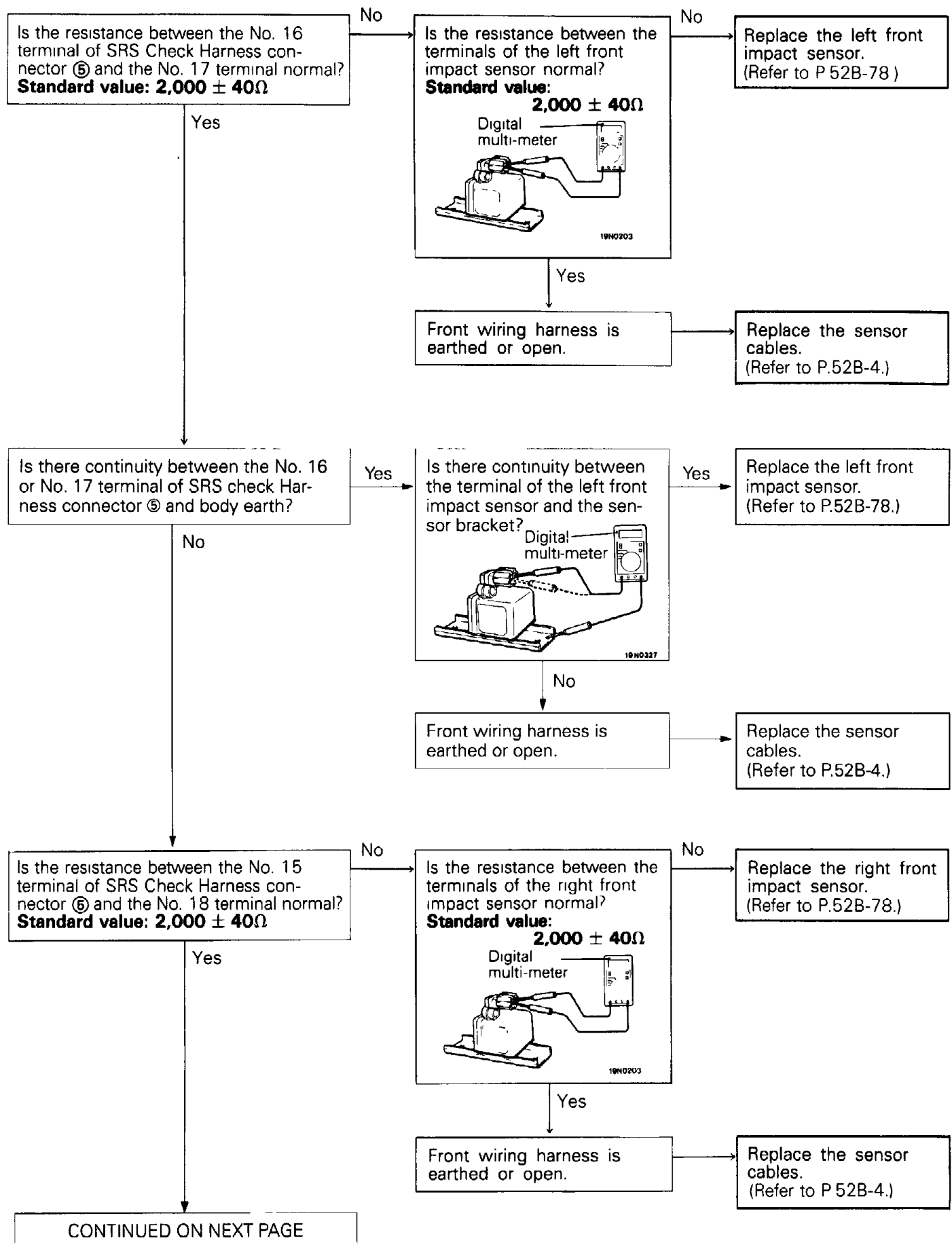
Place a (–) screwdriver against the lock spring (metal section) of the connector lock lever groove as shown in the illustration, and push it toward the inside of the unit.

Caution

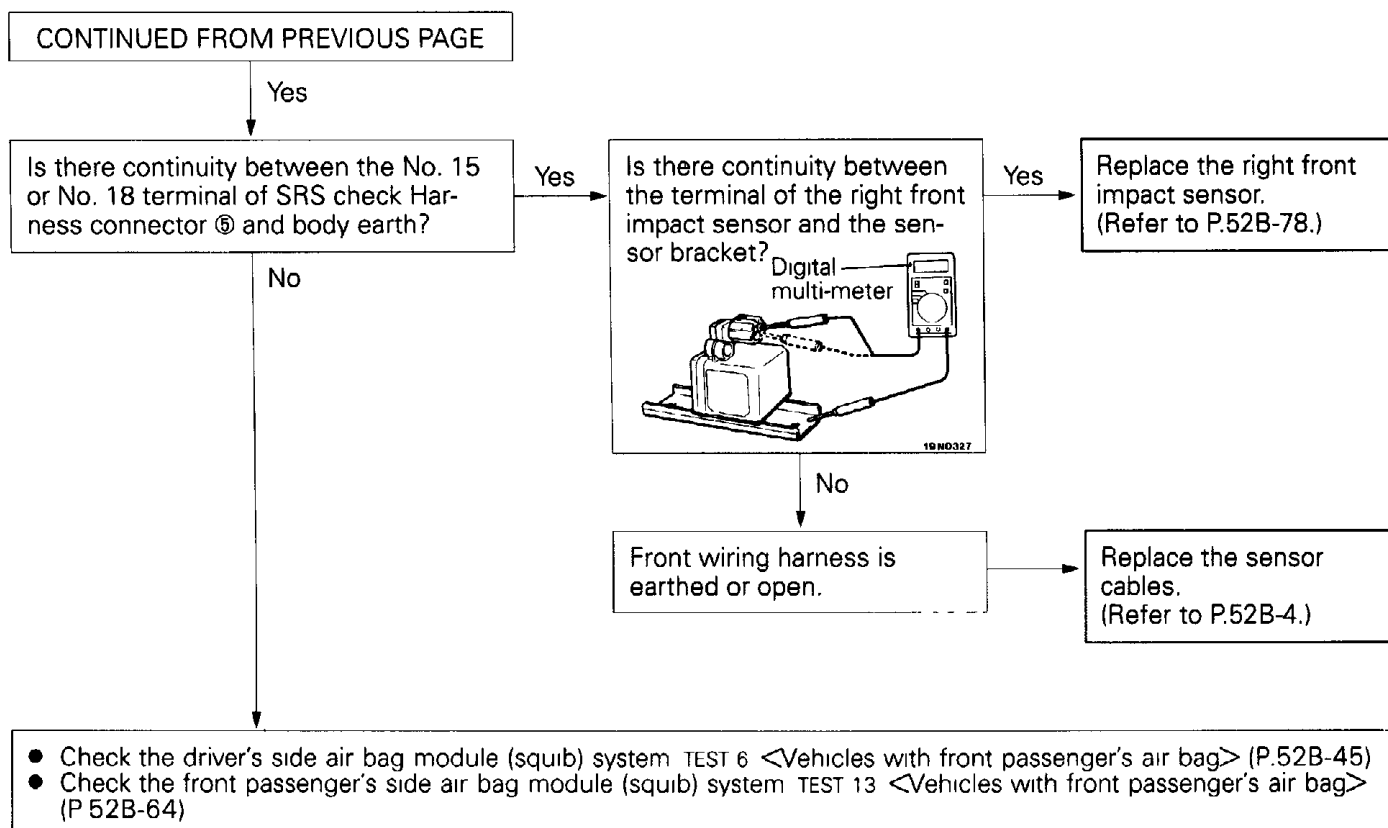
Do not use excessive force to raise the lock lever.

- (4) Disconnect the red 14-pin connector from the SDU.
- (5) Connect the now disconnected red harness-side SDU connector (14-pin) to the connector ③ of the SRS Check Harness.
- (6) Check according to the flow chart on next page, using the specified digital multi-meter and MUT-II.

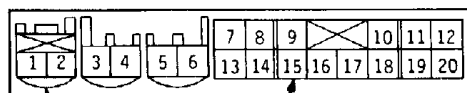
52B-34 SUPPLEMENTAL RESTRAINT SYSTEM (SRS) – Troubleshooting



SUPPLEMENTAL RESTRAINT SYSTEM (SRS) – Troubleshooting 52B-34-1



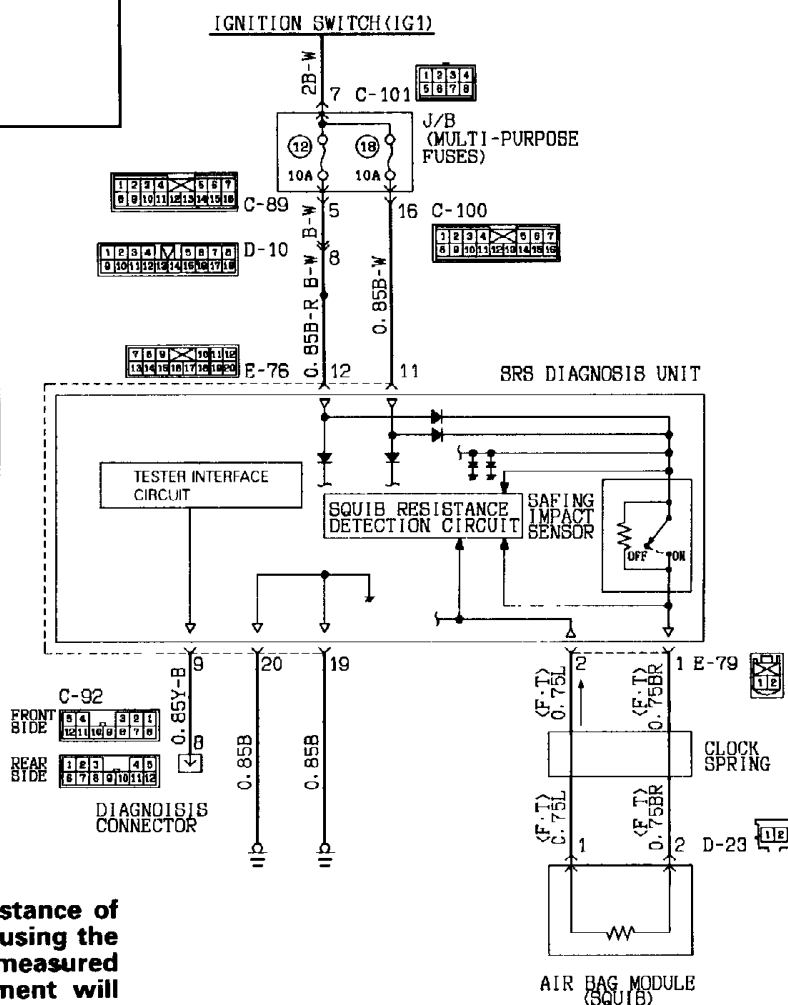
NOTES

TEST 6<Vehicles without front passenger's air bag
(L.H. drive vehicles)>**WHEN DIAGNOSIS CODE NO. 21 OR
NO. 22 IS DISPLAYED****SDU connector**

To clock spring

To body wiring harness (14-pin)

19N0200



KN35-AK-J1507-EC

Caution

Never attempt to measure the circuit resistance of the air bag module (squib) even if you are using the specified tester. If the circuit resistance is measured with a tester, accidental air bag deployment will result in serious personal injury.

Have the other diagnosis code test(s) been finished?

No

Perform the other diagnosis code test(s) prior to this test.

Yes

NOTE

If combined front impact sensor and air bag module (squib) failure modes simultaneously occur in two places, the preconditions for the respective detection circuits will go out of order. For this reason, both diagnosis codes may not be stored but only one of them may be indicated.

Their relationships are shown in the following table.

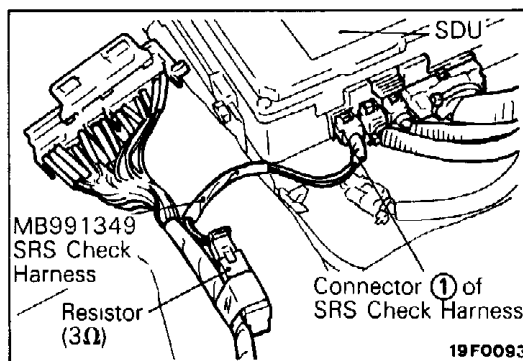
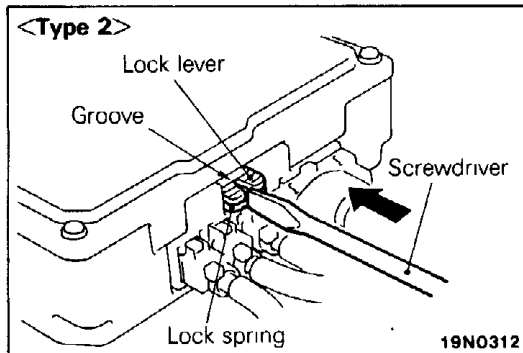
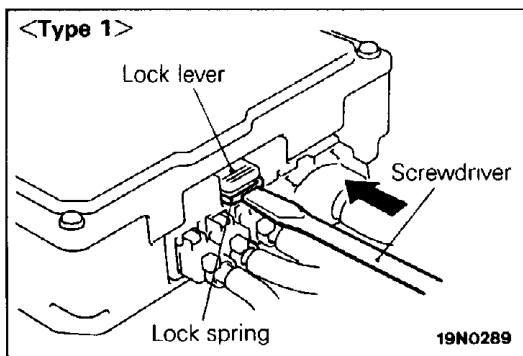
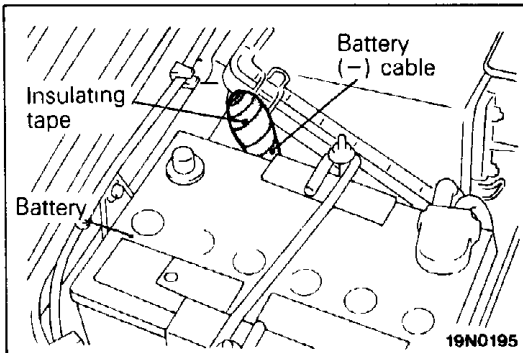
Perform **TEST 5** if it does not become proper even through **TEST 6** is executed.

		Front impact sensors		
		Short-circuited	One open-circuited	Two open-circuited
Air bag module (Squib)	Short-circuited	11 and/or 21	12 and/or 21	13 and/or 21
	Open-circuited	11 and/or 22	12 and/or 22	13 and/or 22

The numbers in the boxes are diagnosis codes numbers. (Refer to P 52B-14.)

CONTINUED ON NEXT PAGE

CONTINUED FROM PREVIOUS PAGE



- (1) Turn the ignition key to the "LOCK" position, disconnect the negative battery cable and tape the terminal.

Caution

Wait at least 60 seconds after disconnecting the battery cable before doing any further work. (Refer to P.52B-9 No. 5.)

- (2) Remove the floor console assembly (Refer to GROUP 52 – Floor Console.)
- (3) Release the lock of SDU connector in accordance with the following procedure:

In case that there is no groove on the lock lever (Type 1)

Place a (–) screwdriver against the lock spring (metal section) of the connector lock lever as shown in the illustration, and push the spring horizontally toward the inside of the unit.

Caution

- (1) Do not use excessive force to raise the lock lever.
- (2) Do not insert the screwdriver into the gap between the lock lever and the lock spring.

In case that there is a groove on the lock lever (Type 2)

Place a (–) screwdriver against the lock spring (metal section) of the connector lock lever groove as shown in the illustration, and push it toward the inside of the unit.

Caution

Do not use excessive force to raise the lock lever.

- (4) Disconnect the red 2-pin connector from the SDU
- (5) Connect the red connector ① of the SRS Check Harness to the SDU instead of the now-disconnected harness-side connector of the SDU, which were connected to the air bag module (squib) through the clock spring.

NOTE

A 3-ohm resistor that corresponds to the resistance of the air bag module (squib) and the wiring resistance is connected between the terminals of the connector ① of the SRS Check Harness

- (6) Make the double locking.

NOTE

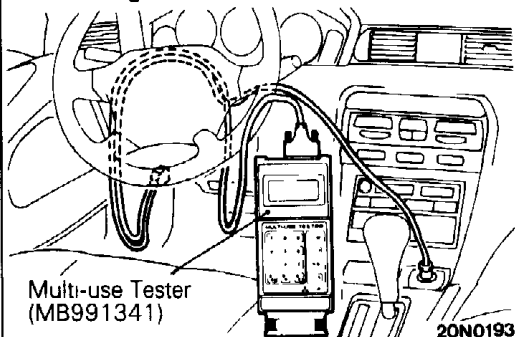
If double locking cannot be made, the connector is incorrectly or incompletely inserted; re-check to insert the connector correctly and securely.

CONTINUED ON NEXT PAGE

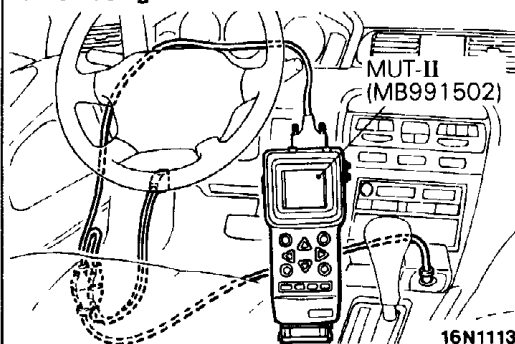
CONTINUED FROM PREVIOUS PAGE

* CONTINUED FROM P.52B-25 (TEST 5 <Vehicles without front passenger's air bag (L.H. drive vehicles)>)

When using multi-use tester



When using MUT-II



- (1) Reconnect negative terminal of battery, and turn the ignition key to the "ON" position.
- (2) Using the Multi-use Tester or MUT-II, erase the diagnosis code memory (Refer to TEST 1)
- (3) Return the ignition key from the "ON" to the "LOCK" position and then back to the "ON" position

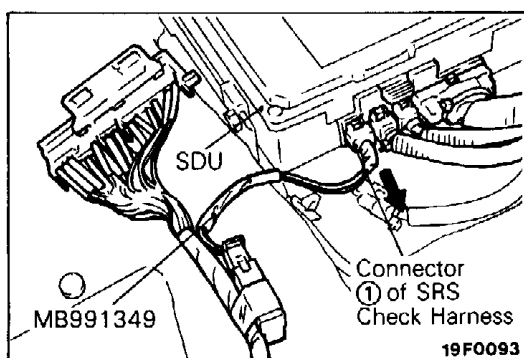
Is the SRS warning lamp operation normal?

No

Malfunction of the SDU.

Replace the SDU.
(Refer to P.52B-80.)

Yes



- (1) Turn the ignition key to the "LOCK" position, disconnect the negative battery cable and tape the terminal.

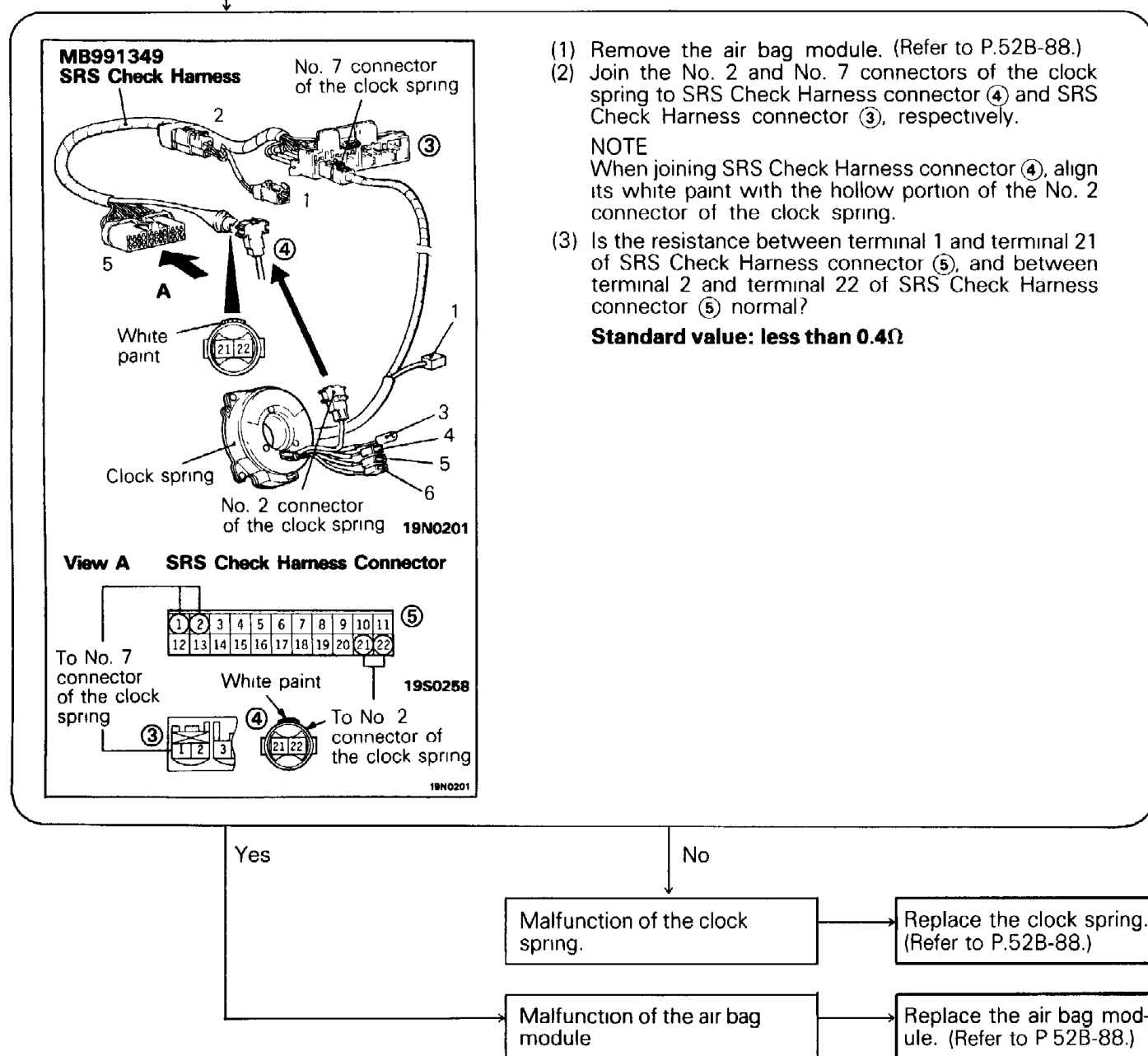
Caution

Wait at least 60 seconds after disconnecting the battery cable before doing any further work. (Refer to P.52B-9 No. 5.)

- (2) Disconnect the red 2-pin connector 1 of the SRS Check Harness from the SDU.

CONTINUED ON NEXT PAGE

CONTINUED FROM PREVIOUS PAGE



Caution

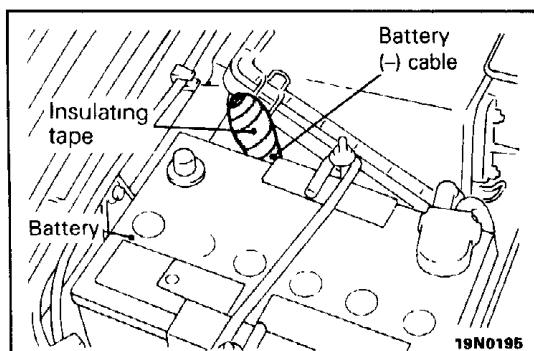
Never attempt to measure the circuit resistance of the air bag module (squib) even if you are using the specified tester. If the circuit resistance is measured with a tester, accidental air bag deployment will result in serious personal injury.

NOTE – IMPORTANT

(1) **After repairing the SRS, reconnect the battery cable, erase the diagnosis code memory from the Multi-use Tester or MUT-II and check the SRS warning lamp operation to verify the system functions properly. (Refer to TEST 1.)**

(2) SDU = SRS Diagnosis Unit

CONTINUED FROM PREVIOUS PAGE

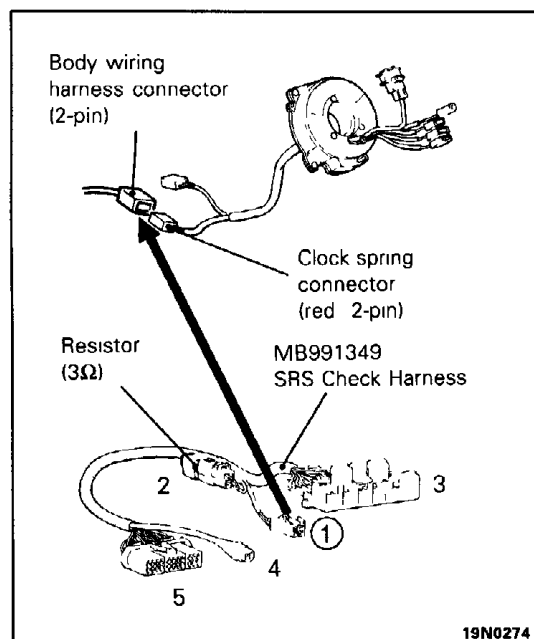


- (1) Turn the ignition key to the "LOCK" position, disconnect the negative battery cable and tape the terminal.

Caution

Wait at least 60 seconds after disconnecting the battery cable before doing any further work.

(Refer to P.52B-9 No. 5.)



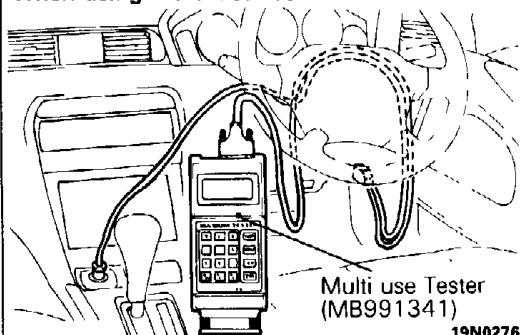
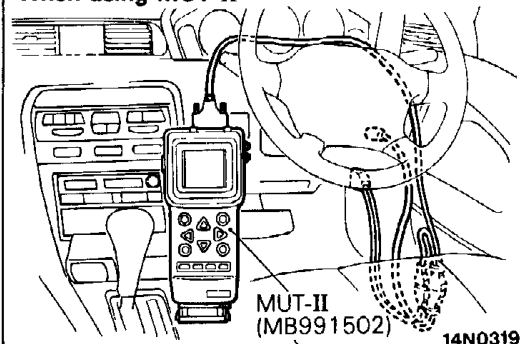
- (2) Remove the steering column cover lower.
- (3) Remove the connection between the clock spring connector (red, 2-pin) and the body wiring harness connector.
- (4) Connect the SRS check harness connector (1) to the body wiring harness connector.

NOTE

A 3-ohm resistor that corresponds to the resistance of the air bag module (squib) and the wiring resistance is connected between the terminals of the connector 1 of the SRS Check Harness.

CONTINUED ON NEXT PAGE

CONTINUED FROM PREVIOUS PAGE

When using multi-use tester**When using MUT-II**

- (1) Reconnect negative terminal of battery, and turn the ignition key to the "ON" position.
- (2) Using the Multi-use Tester or MUT-II, erase the diagnosis code memory. (Refer to TEST 1)
- (3) Return the ignition key from the "ON" to the "LOCK" position and then back to the "ON" position.

Is the SRS warning lamp operation normal?

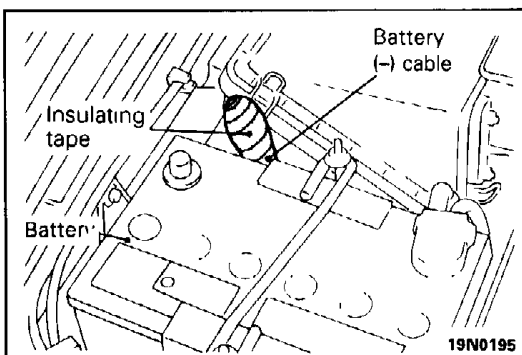
No

Body wiring harness
between the clock spring
and the SDU is defective,
or SDU is defective.

Continued on
P 52B-43.

Yes

From P 52B-31 (TEST 5 <Vehicles without front passenger's air bag
(R H drive vehicles)> *



- (1) Turn the ignition key to the "LOCK" position, disconnect the negative battery cable and tape the terminal.

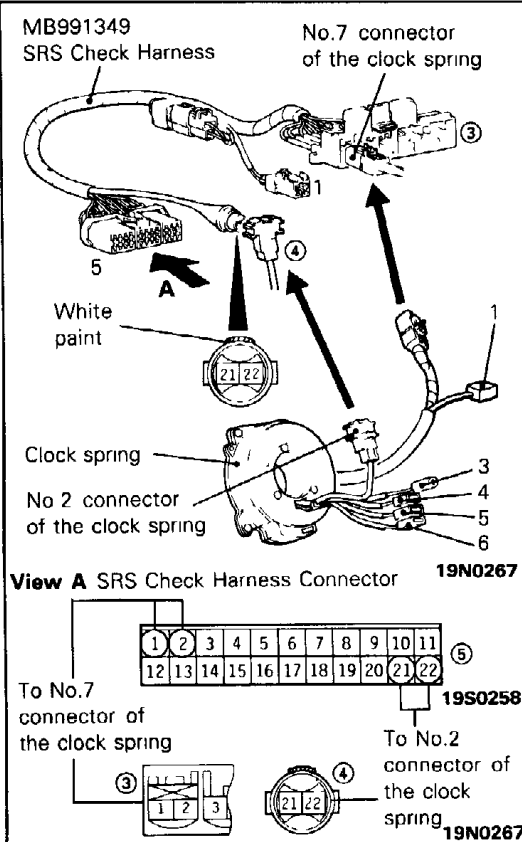
Caution

Wait at least 60 seconds after disconnecting the battery cable before doing any further work.
(Refer to P.52B-9 No. 5.)

- (2) Remove the connection between the SRS check harness connector 1 and the body wiring harness connector.

CONTINUED ON NEXT PAGE

CONTINUED ON NEXT PAGE



- (1) Remove the air bag module. (Refer to P.52B-88)
- (2) Join the No. 2 and No. 7 connectors of the clock spring to SRS Check Harness connector ④ and SRS Check Harness connector ③ respectively

NOTE

When joining SRS Check Harness connector ④, align its white paint with the hollow portion of the No. 2 connector of the clock spring.

- (3) Is the resistance between terminal 1 and terminal 22 of SRS Check Harness connector ⑤, and between terminal 2 and terminal 21 of SRS Check Harness connector ⑤ normal?

Standard value: less than 0.4Ω

Yes

No

Malfunction of the clock spring

Replace the clock spring.
(Refer to P.52B-88.)

Malfunction of the air bag module.

Replace the air bag module.
(Refer to P.52B-88.)

Caution

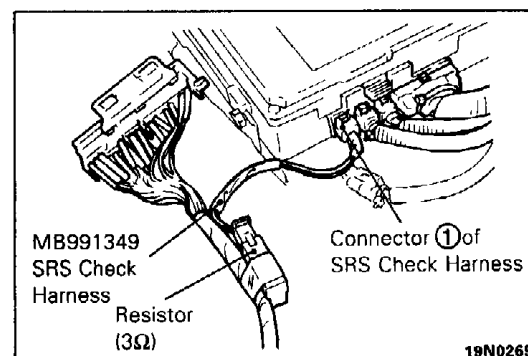
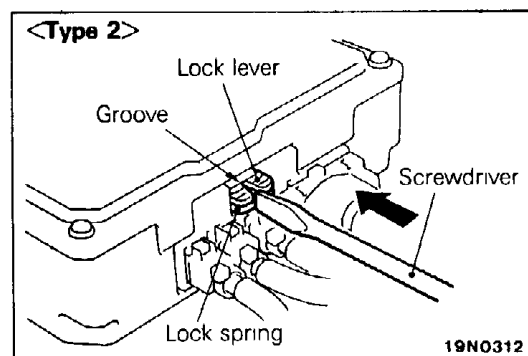
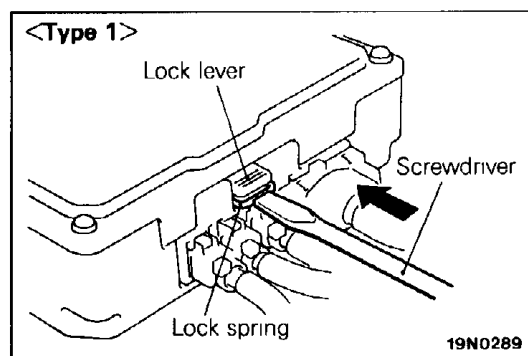
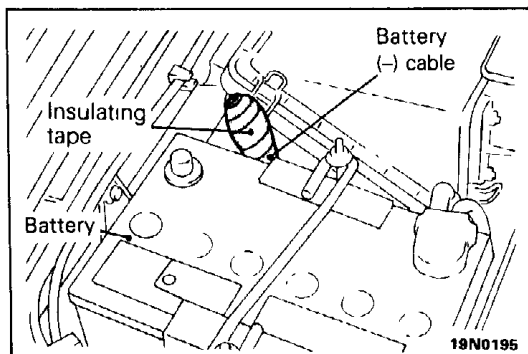
Never attempt to measure the circuit resistance of the air bag module (squib) even if you are using the specified tester. If the circuit resistance is measured with a tester, accidental air bag deployment will result in serious personal injury.

NOTE – IMPORTANT

(1) After repairing the SRS, reconnect the battery cable, erase the diagnosis code memory from the Multi-use Tester or MUT-II and check the SRS warning lamp operation to verify the system functions properly. (Refer to TEST 1.)

(2) SDU = SRS Diagnosis Unit

CONTINUED FROM P.52B-41



- (1) Turn the ignition key to the "LOCK" position, disconnect the negative battery cable and tape the terminal.

Caution

Wait at least 60 seconds after disconnecting the battery cable before doing any further work.

(Refer to P.52B-9 No. 5.)

- (2) Remove the connection between the SRS check harness connector 1 and the body wiring harness connector.
- (3) Remove the peripheral SDU parts (Refer to P.52B-84.)
- (4) Release the lock of SDU connector in accordance with the following procedure

In case that there is no groove on the lock lever (Type 1)

Place a (-) screwdriver against the lock spring (metal section) of the connector lock lever as shown in the illustration, and push the spring horizontally toward the inside of the unit

Caution

- (1) Do not use excessive force to raise the lock lever.
- (2) Do not insert the screwdriver into the gap between the lock lever and the lock spring.

In case that there is a groove on the lock lever (Type 2)

Place a (-) screwdriver against the lock spring (metal section) of the connector lock lever groove as shown in the illustration, and push it toward the inside of the unit

Caution

Do not use excessive force to raise the lock lever.

- (5) Disconnect the red 2-pin connector from the SDU.
- (6) Connect the red connector 1 of the SRS Check Harness to the SDU instead of the now-disconnected harness-side connector of the SDU, which were connected to the air bag module (squib) through the clock spring.

NOTE

A 3-ohm resistor that corresponds to the resistance of the air bag module (squib) and the wiring resistance is connected between the terminals of the connector 1 of the SRS Check Harness.

- (7) Make the double locking.

NOTE

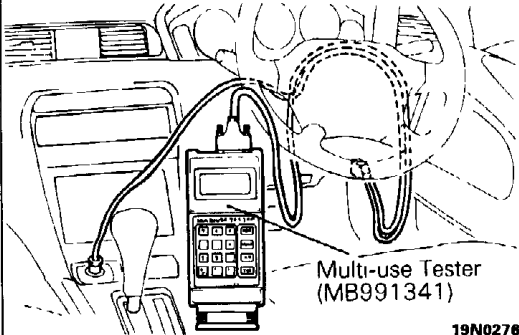
If double locking cannot be made, the connector is incorrectly or incompletely inserted; re-check to insert the connector correctly and securely.

CONTINUED ON NEXT PAGE

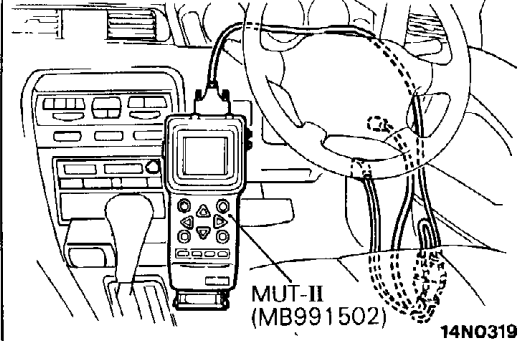
52B-44 SUPPLEMENTAL RESTRAINT SYSTEM (SRS) – Troubleshooting

CONTINUED FROM PREVIOUS PAGE

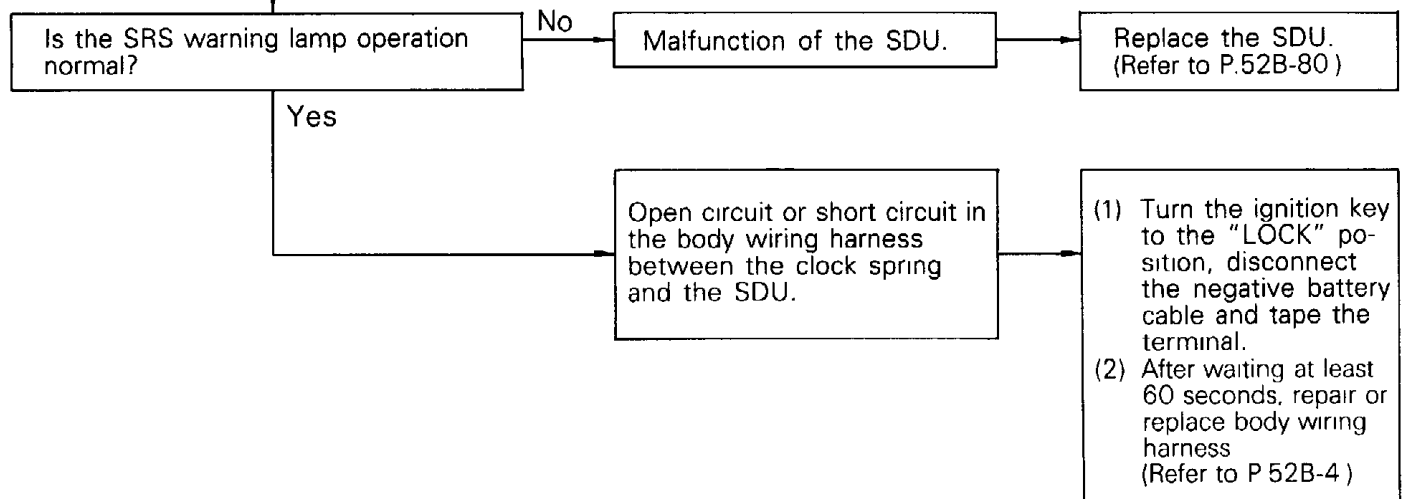
When using multi-use tester



When using MUT-II



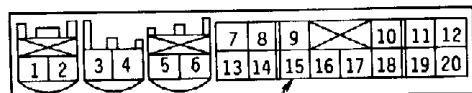
- (1) Reconnect negative terminal of battery and turn the ignition key to the "ON" position.
- (2) Using the Multi-use Tester or MUT-II, erase the diagnosis code memory. (Refer to TEST 1.)
- (3) Return the ignition key from the "ON" to the "LOCK" position and then back to the "ON" position



NOTE – IMPORTANT

(1) After repairing the SRS, reconnect the battery cable, erase the diagnosis code memory from the Multi-use Tester or MUT-II and check the SRS warning lamp operation to verify the system functions properly. (Refer to TEST 1.)

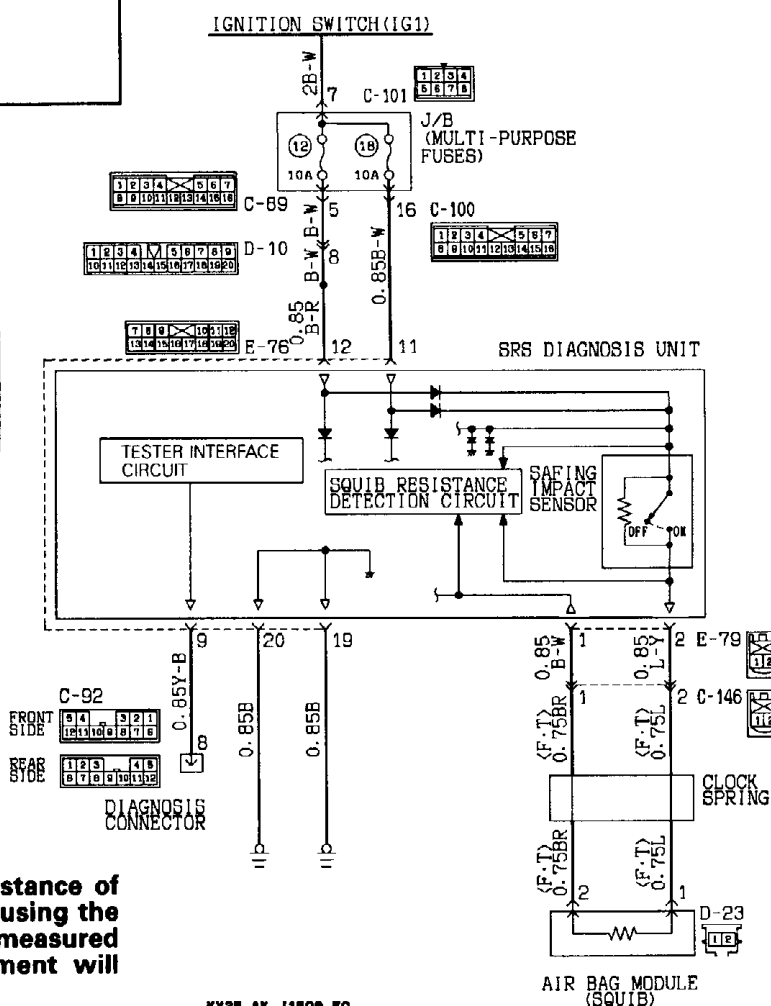
(2) SDU = SRS Diagnosis Unit

TEST 6 <Vehicles with front passenger's air bag>
WHEN DIAGNOSIS CODE NO. 21 OR NO. 22 IS DISPLAYED
SDU connector


To clock spring

To body wiring harness (14-pin)

19N0303



KX35-AK-J1520-EC

Caution

Never attempt to measure the circuit resistance of the air bag module (squib) even if you are using the specified tester. If the circuit resistance is measured with a tester, accidental air bag deployment will result in serious personal injury.

Have the other diagnosis code test(s) been finished?

No

Perform the other diagnosis code test(s) prior to this test

Yes

NOTE

If combined front impact sensor and air bag module (squib) failure modes simultaneously occur in two places, the preconditions for the respective detection circuits will go out of order. For this reason, both diagnosis codes may not be stored but only one of them may be indicated.

Their relationships are shown in the following table.

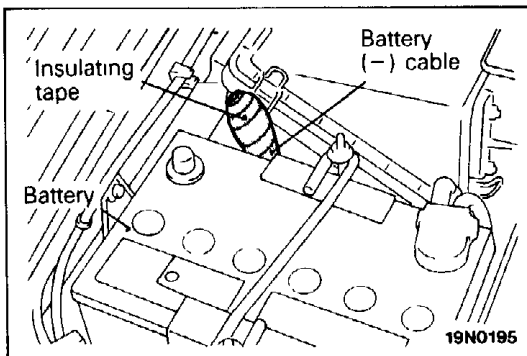
Perform **TEST 5** if it does not become proper even through **TEST 6** is executed.

		Front impact sensors		
		Short-circuited	One open-circuited	Two open-circuited
Driver's side air bag module (Squib)	Short-circuited	11 and/or 21	12 and/or 21	13 and/or 21
	Open-circuited	11 and/or 22	12 and/or 22	13 and/or 22

The numbers in the boxes are diagnosis codes numbers. (Refer to P.52B-14.)

CONTINUED ON NEXT PAGE

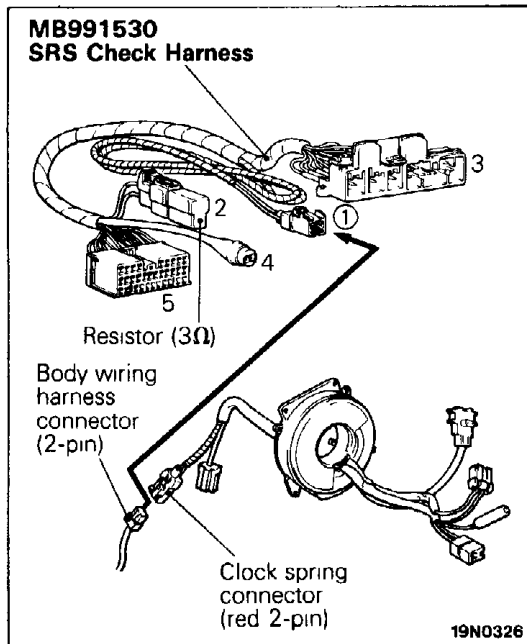
CONTINUED FROM PREVIOUS PAGE



- (1) Turn the ignition key to the "LOCK" position, disconnect the negative battery cable and tape the terminal.

Caution

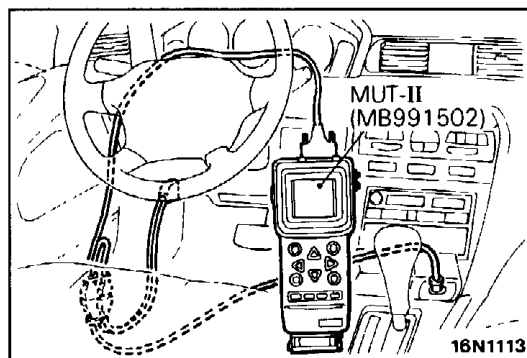
Wait at least 60 seconds after disconnecting the battery cable before doing any further work.
(Refer to P.52B-9 No. 5.)



- (2) Remove the steering column cover lower.
- (3) Remove the connection between the clock spring connector (red, 2-pin) and the body wiring harness connector.
- (4) Connect the SRS check harness connector (1) to the body wiring harness connector.

NOTE

A 3-ohm resistor that corresponds to the resistance of the air bag module (squib) and the wiring resistance is connected between the terminals of the connector 1 of the SRS Check Harness.



- (5) Reconnect negative terminal of battery, and turn the ignition key to the "ON" position.
- (6) Using the MUT-II, erase the diagnosis code memory (Refer to TEST 1)
- (7) Return the ignition key from the "ON" to the "LOCK" position and then back to the "ON" position.

CONTINUED ON NEXT PAGE

CONTINUED FROM PREVIOUS PAGE

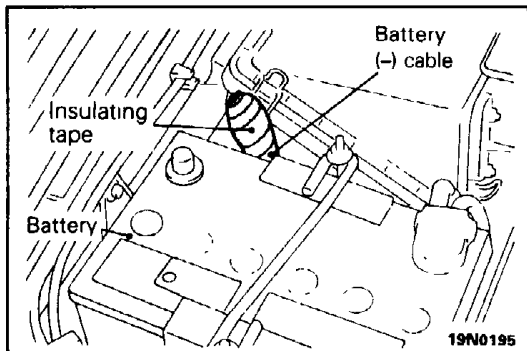
Is the SRS warning lamp operation normal?

No

Body wiring harness between the clock spring and the SDU is defective, or SDU is defective.

Continued on P.52B-49.

Yes



- (1) Turn the ignition key to the "LOCK" position, disconnect the negative battery cable and tape the terminal.

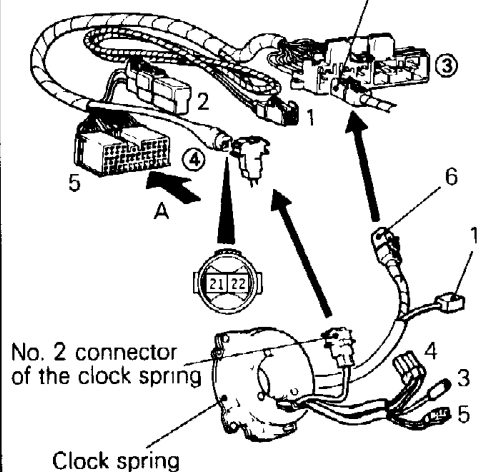
Caution

Wait at least 60 seconds after disconnecting the battery cable before doing any further work.
(Refer to P.52B-9 No. 5.)

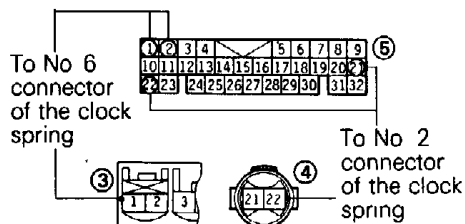
- (2) Remove the connection between the SRS check harness connector 1 and the body wiring harness connector

**MB991530
SRS Check Harness**

No. 6 connector of the clock spring



View A SRS Check harness connector



- (1) Remove the air bag module. (Refer to P.52B-88.)
- (2) Join the No. 2 and No. 6 connectors of the clock spring to SRS Check Harness connector ④ and SRS Check Harness connector ③ respectively.

NOTE

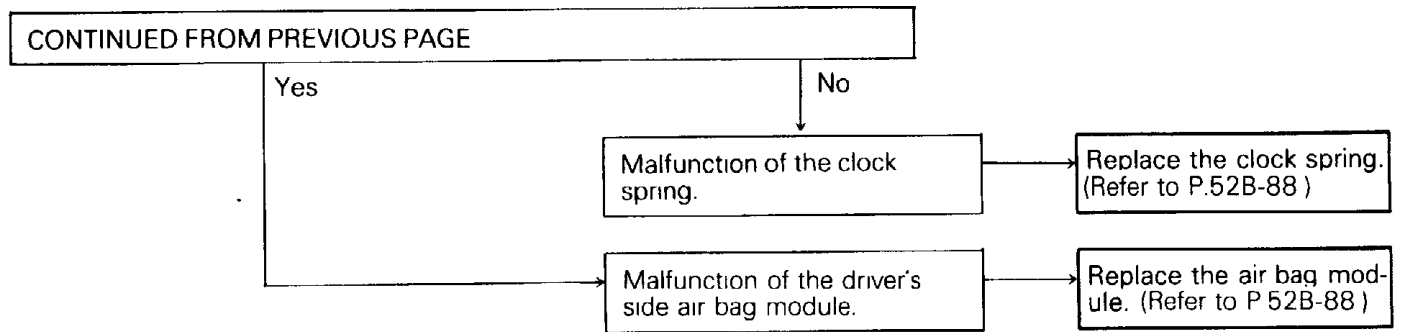
When joining SRS Check Harness connector ④, align its white paint with the hollow portion of the No. 2 connector of the clock spring.

- (3) Is the resistance between terminal 1 and terminal 22 of SRS Check Harness connector ⑤, and between terminal 2 and terminal 21 of SRS Check Harness connector ⑤ normal?

Standard value: less than 0.4Ω

CONTINUED ON NEXT PAGE

52B-48 SUPPLEMENTAL RESTRAINT SYSTEM (SRS) – Troubleshooting



Caution

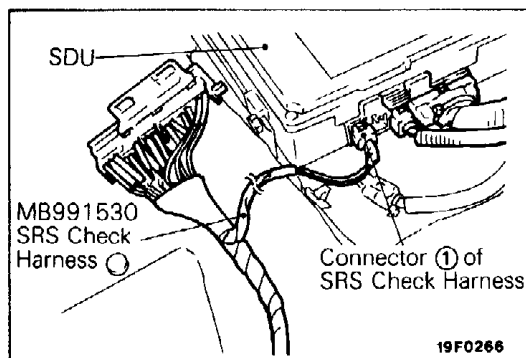
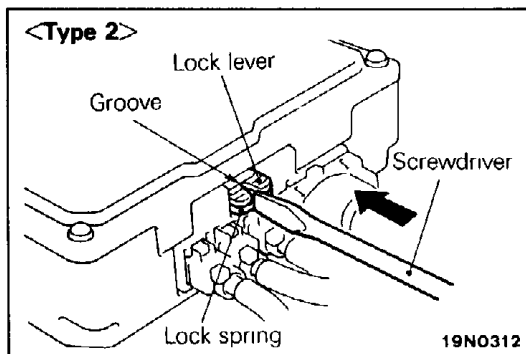
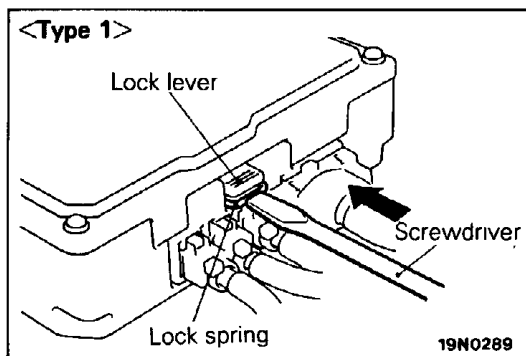
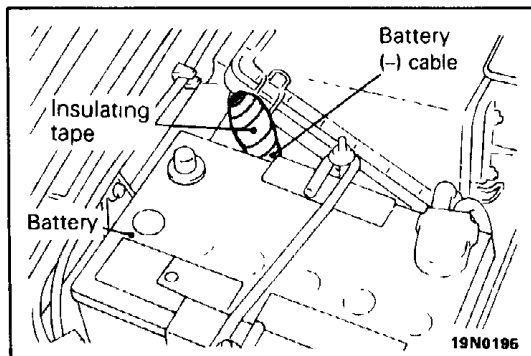
Never attempt to measure the circuit resistance of the air bag module (squib) even if you are using the specified tester. If the circuit resistance is measured with a tester, accidental air bag deployment will result in serious personal injury.

NOTE – IMPORTANT

(1) After repairing the SRS, reconnect the battery cable, erase the diagnosis code memory from the MUT-II and check the SRS warning lamp operation to verify the system functions properly. (Refer to TEST 1.)

(2) SDU = SRS Diagnosis Unit

CONTINUED FROM P.52B-47



- (1) Turn the ignition key to the "LOCK" position, disconnect the negative battery cable and tape the terminal.

Caution

Wait at least 60 seconds after disconnecting the battery cable before doing any further work.

(Refer to P.52B-9 No. 5.)

- (2) Remove the connection between the SRS check harness connector 1 and the body wiring harness connector.
- (3) Remove the floor console assembly. (Refer to GROUP 52 – Floor Console)

- (4) Release the lock of SDU connector in accordance with the following procedure.

In case that there is no groove on the lock lever (Type 1)

Place a (–) screwdriver against the lock spring (metal section) of the connector lock lever as shown in the illustration, and push the spring horizontally toward the inside of the unit

Caution

(1) Do not use excessive force to raise the lock lever.

(2) Do not insert the screwdriver into the gap between the lock lever and the lock spring.

In case that there is a groove on the lock lever (Type 2)

Place a (–) screwdriver against the lock spring (metal section) of the connector lock lever groove as shown in the illustration, and push it toward the inside of the unit.

Caution

Do not use excessive force to raise the lock lever.

- (5) Disconnect the red 2-pin connector from the SDU.
- (6) Connect the red connector 1 of the SRS Check Harness to the SDU instead of the now-disconnected harness-side connector of the SDU, which were connected to the air bag module (squib) through the clock spring.

NOTE

A 3-ohm resistor that corresponds to the resistance of the air bag module (squib) and the wiring resistance is connected between the terminals of the connector 1 of the SRS Check Harness.

- (7) Make the double locking.

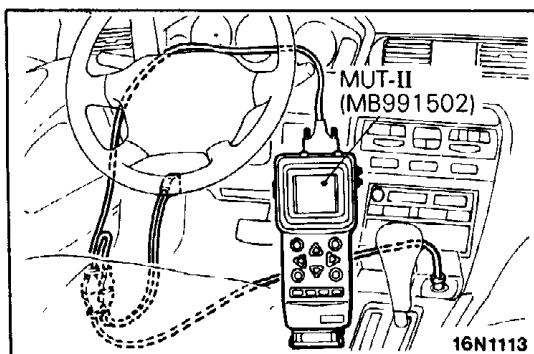
NOTE

If double locking cannot be made, the connector is incorrectly or incompletely inserted; re-check to insert the connector correctly and securely.

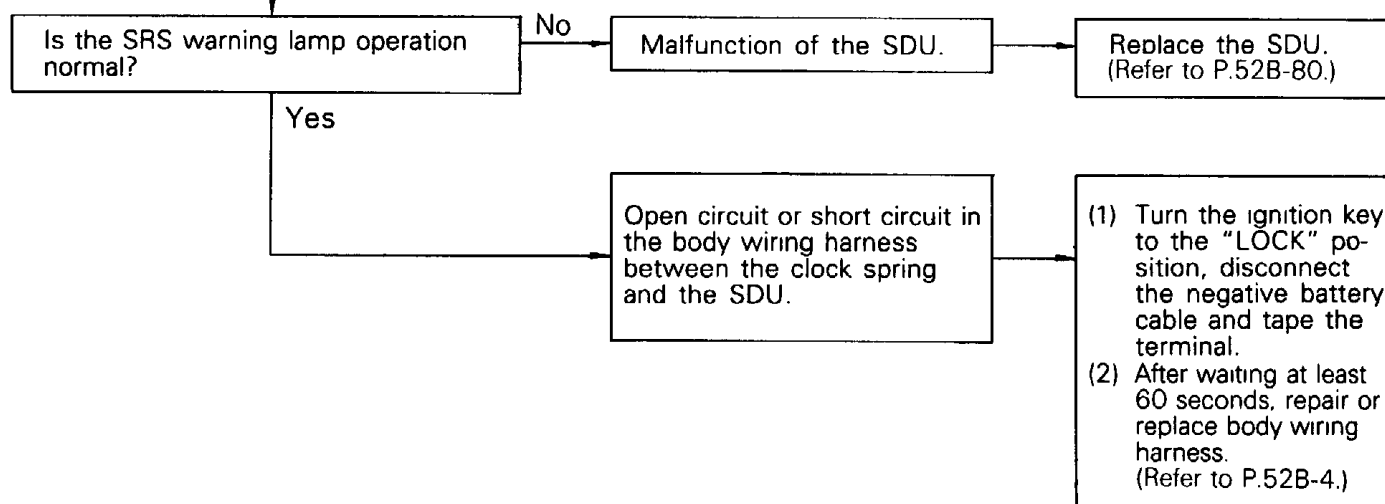
CONTINUED ON NEXT PAGE

52B-50 SUPPLEMENTAL RESTRAINT SYSTEM (SRS) – Troubleshooting

CONTINUED FROM PREVIOUS PAGE



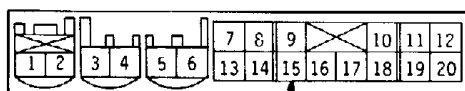
- (1) Reconnect negative terminal of battery, and turn the ignition key to the "ON" position.
- (2) Using the MUT-II, erase the diagnosis code memory. (Refer to TEST 1.)
- (3) Return the ignition key from the "ON" to the "LOCK" position and then back to the "ON" position.



NOTE – IMPORTANT

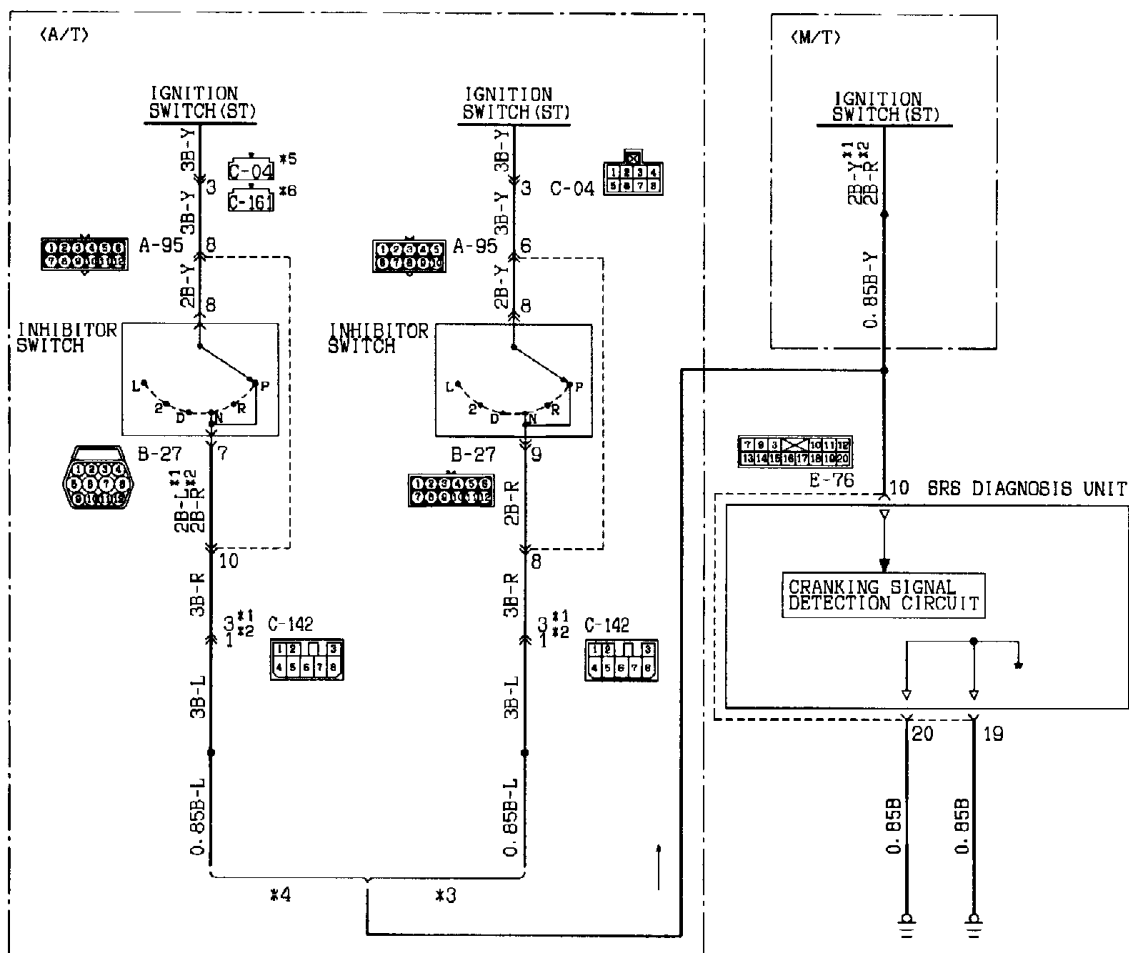
(1) After repairing the SRS, reconnect the battery cable, erase the diagnosis code memory from the MUT-II and check the SRS warning lamp operation to verify the system functions properly. (Refer to TEST 1.)

(2) SDU = SRS Diagnosis Unit

TEST 7
WHEN DIAGNOSIS CODE NO. 33 IS DISPLAYED
SDU connector


To body wiring harness (14-pin)

19N0200

<L.H. drive vehicles>

NOTE

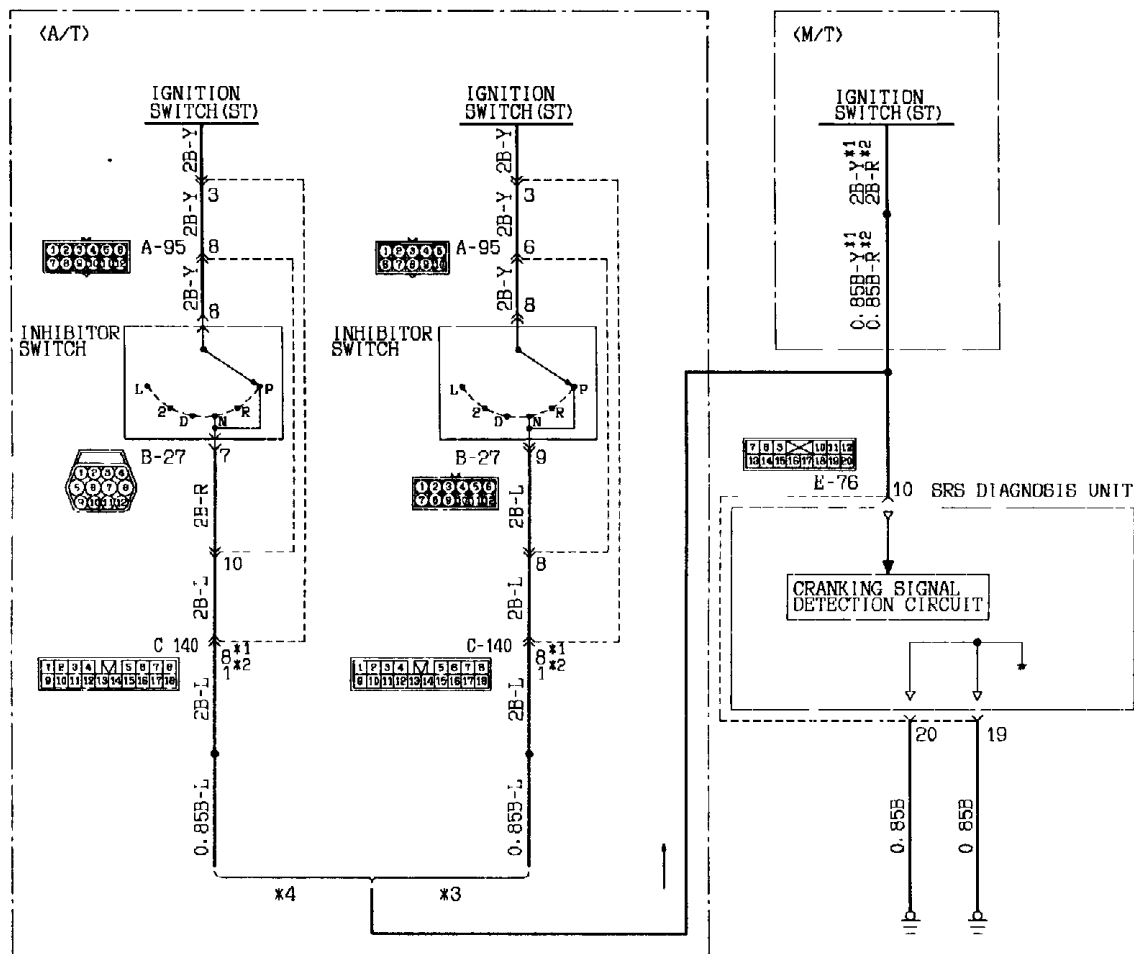
- *1: Vehicles without theft-alarm system
- *2: Vehicles with theft-alarm system
- *3: Vehicles built up to October, 1992
- *4: Vehicles built from November, 1992
- *5: Vehicles without front passenger's air bag
- *6: Vehicles with front passenger's air bag



KX35-AK-J1520-EC

52B-52 SUPPLEMENTAL RESTRAINT SYSTEM (SRS) – Troubleshooting

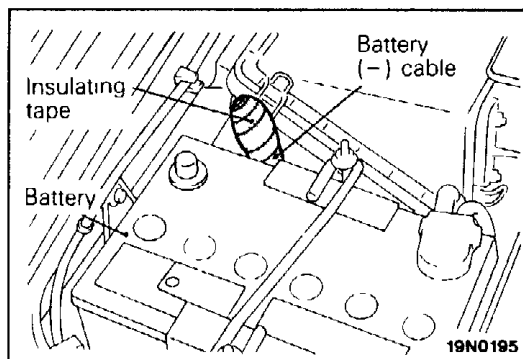
<R.H. drive vehicles>



NOTE

- *1: Vehicles without theft-alarm system
- *2: Vehicles with theft-alarm system
- *3: Vehicles built up to October, 1992
- *4: Vehicles built from November, 1992

KX35-AK-J1525-EC

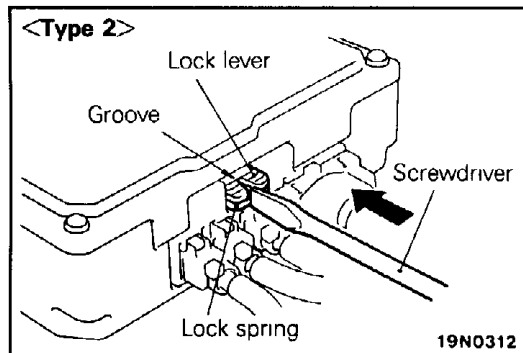
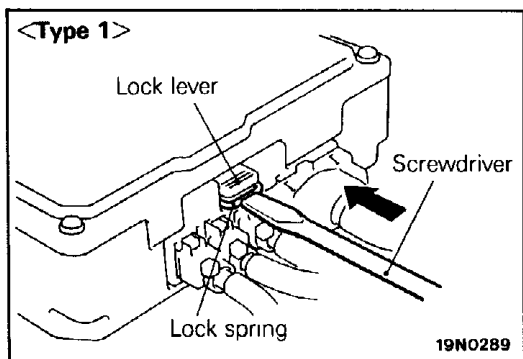


- (1) Turn the ignition key to the "LOCK" position, disconnect the negative battery cable and tape the terminal.

Caution

Wait at least 60 seconds after disconnecting the battery cable before doing any further work. (Refer to P.52B-9 No. 5.)

- (2) Remove the peripheral SDU parts. (Refer to P.52B-81, 84.)



- (3) Release the lock of SDU connector in accordance with the following procedure:

In case that there is no groove on the lock lever (Type 1)

Place a (-) screwdriver against the lock spring (metal section) of the connector lock lever as shown in the illustration, and push the spring horizontally toward the inside of the unit.

Caution

- (1) Do not use excessive force to raise the lock lever.
(2) Do not insert the screwdriver into the gap between the lock lever and the lock spring.

In case that there is a groove on the lock lever (Type 2)

Place a (-) screwdriver against the lock spring (metal section) of the connector lock lever groove as shown in the illustration, and push it toward the inside of the unit.

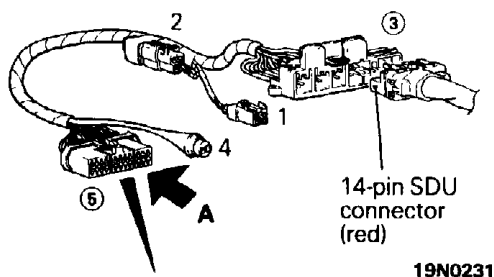
Caution

Do not use excessive force to raise the lock lever.

- (4) Disconnect the red 14-pin connector from the SDU.

- (5) Connect the red harness-side SDU connector (14-pin) to the connector 3 or the SRS Check Harness.
(6) Check according to the flow chart below, using the digital multi-meter.

MB991349*1
MB991530*2
SRS Check Harness



View A
SRS Check Harness connector (6)

*1

1	2	3	4	5	6	7	8	9	10	11
12	13	14	15	16	17	18	19	20	21	22

Earth

19S0258

NOTE

- *1 Vehicles without front passenger's air bag
*2 Vehicles with front passenger's air bag

Ignition switch (ST)

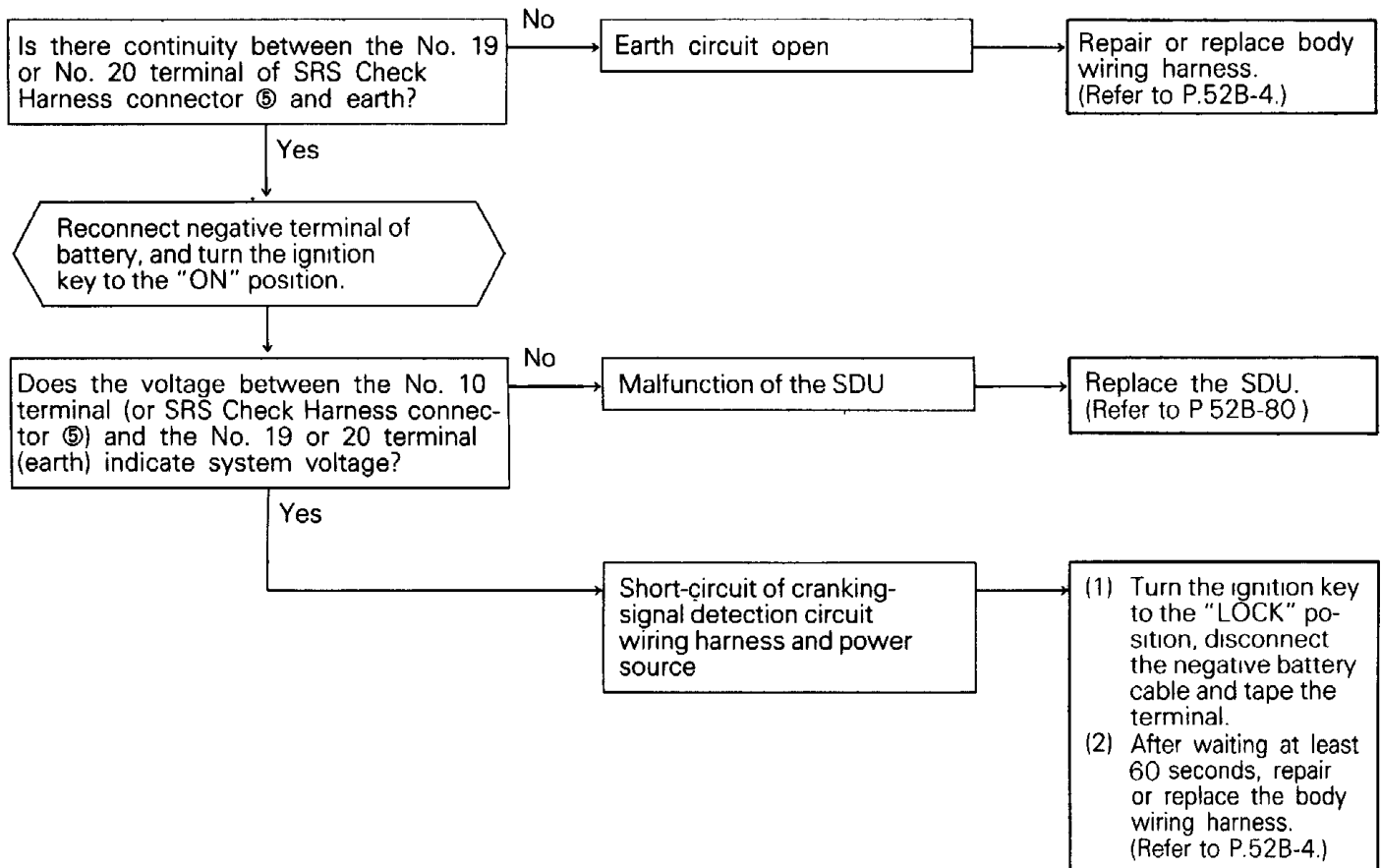
*2

1	2	3	4	5	6	7	8	9
10	11	12	13	14	15	16	17	18
19	20	21	22	23	24	25	26	27
28	29	30	31	32				

Earth

19N0325

52B-54 SUPPLEMENTAL RESTRAINT SYSTEM (SRS) – Troubleshooting

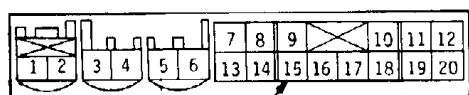


NOTE – IMPORTANT

- (1) If more than 45 seconds of cranking is required to start up the engine, the diagnosis code will be stored in memory, but if there is no problem, the diagnosis code will be cleared and the SRS will return to normal.
- (2) < Vehicles built up to March, 1992 >
After repairing the SRS, reconnect the battery cable, erase the diagnosis code memory from the Multi-use Tester or MUT-II and check the SRS warning lamp operation to verify the system functions properly. (Refer to TEST 1.)
< Vehicles built from April, 1992 >
After repairing the SRS, reconnect the battery cable and check the SRS warning lamp operation to verify the system functions properly. (Refer to TEST 1.)
- (3) SDU = SRS Diagnosis Unit

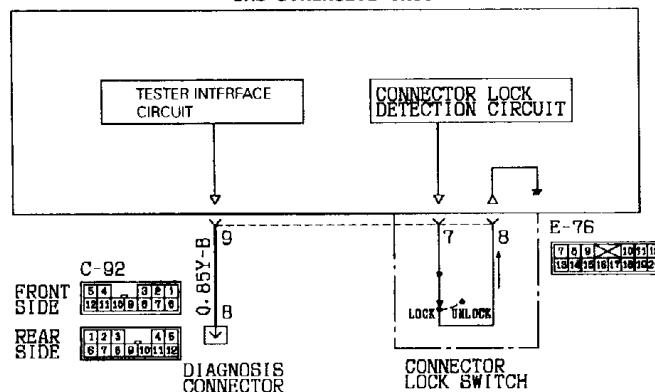
TEST 8

WHEN DIAGNOSIS CODE NO. 34 IS DISPLAYED

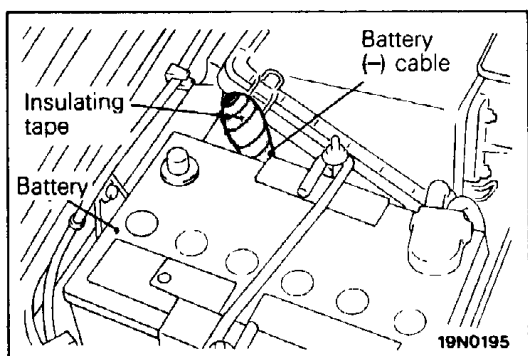
SDU connector

To body wiring harness (14-pin)

19N0200

SRS DIAGNOSIS UNIT

KX95-AK-J1509-BC

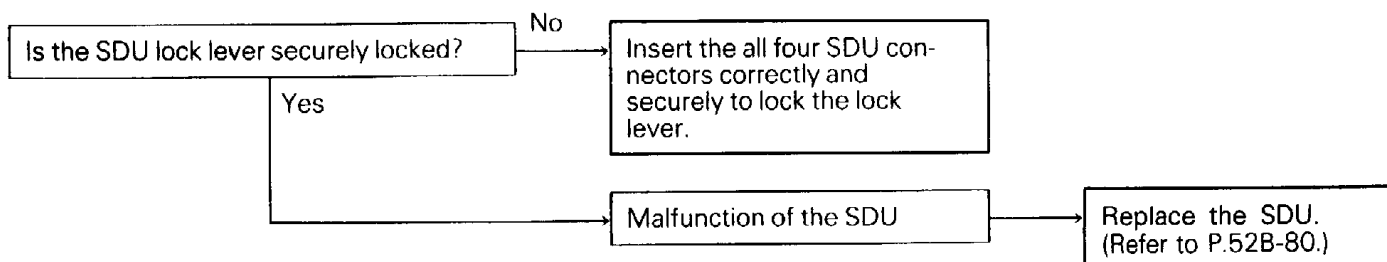


- (1) Turn the ignition key to the "LOCK" position, disconnect the negative battery cable and tape the terminal.

Caution

Wait at least 60 seconds after disconnecting the battery cable before doing any further work. (Refer to P.52B-9 No. 5.)

- (2) Remove the peripheral SDU parts. (Refer to P.52B-81, 84.)

**NOTE – IMPORTANT****(1) < Vehicles built up to March, 1992 >**

After repairing the SRS, reconnect the battery cable, erase the diagnosis code memory from the Multi-use Tester or MUT-II and check the SRS warning lamp operation to verify the system functions properly. (Refer to TEST 1.)

< Vehicles built from April, 1992 >

After repairing the SRS, reconnect the battery cable and check the SRS warning lamp operation to verify the system functions properly. (Refer to TEST 1.)

(2) SDU = SRS Diagnosis Unit

52B-56 SUPPLEMENTAL RESTRAINT SYSTEM (SRS) – Troubleshooting

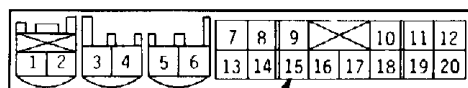
TEST 9

WHEN DIAGNOSIS CODE NO. 41 IS DISPLAYED

TEST 10

WHEN DIAGNOSIS CODE NO. 42 IS DISPLAYED

SDU connector



To body wiring harness (14-pin)

19N0200

<L.H. drive vehicles>



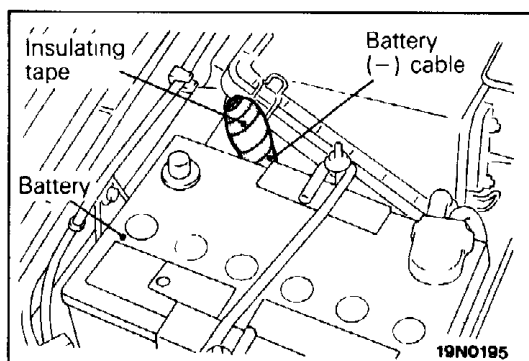
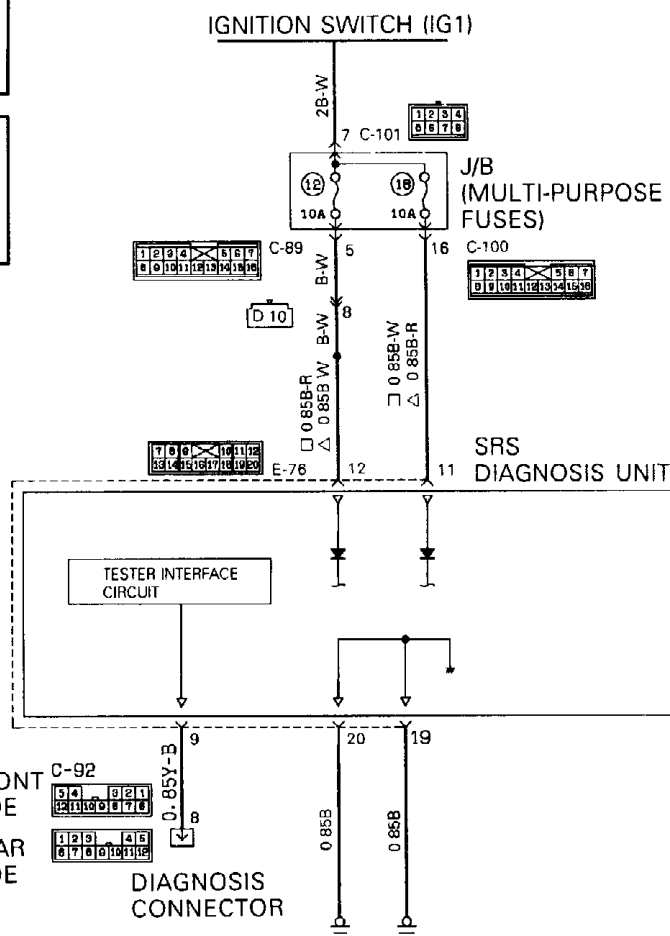
<R.H. drive vehicles>



NOTE

□ : <L.H. drive vehicles>

△ : <R.H. drive vehicles>

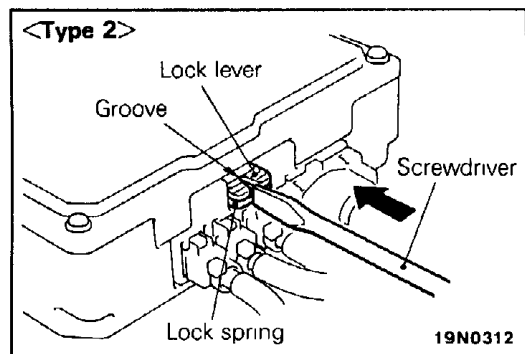
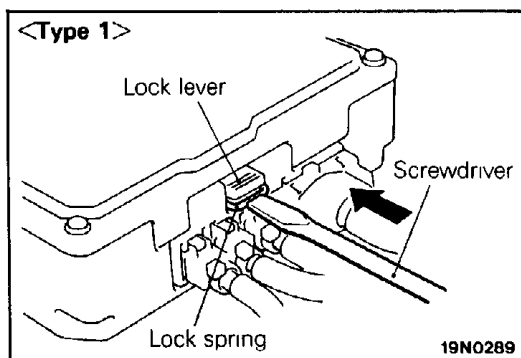


- (1) Turn the ignition key to the "LOCK" position, disconnect the negative battery cable and tape the terminal.

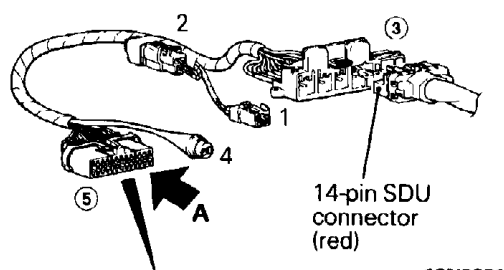
Caution

Wait at least 60 seconds after disconnecting the battery cable before doing any further work. (Refer to P.52B-9 No. 5.)

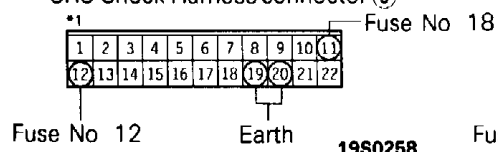
- (2) Remove the peripheral SDU parts (Refer to P.52B-81, 84.)



MB991349*1
MB991530*2
SRS Check Harness



View A
SRS Check Harness connector (5)



- (3) Release the lock of SDU connector in accordance with the following procedure:

In case that there is no groove on the lock lever (Type 1)

Place a (–) screwdriver against the lock spring (metal section) of the connector lock lever as shown in the illustration, and push the spring horizontally toward the inside of the unit.

Caution

- (1) Do not use excessive force to raise the lock lever.
 (2) Do not insert the screwdriver into the gap between the lock lever and the lock spring.

In case that there is a groove on the lock lever (Type 2)

Place a (–) screwdriver against the lock spring (metal section) of the connector lock lever groove as shown in the illustration, and push it toward the inside of the unit.

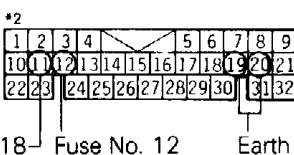
Caution

Do not use excessive force to raise the lock lever.

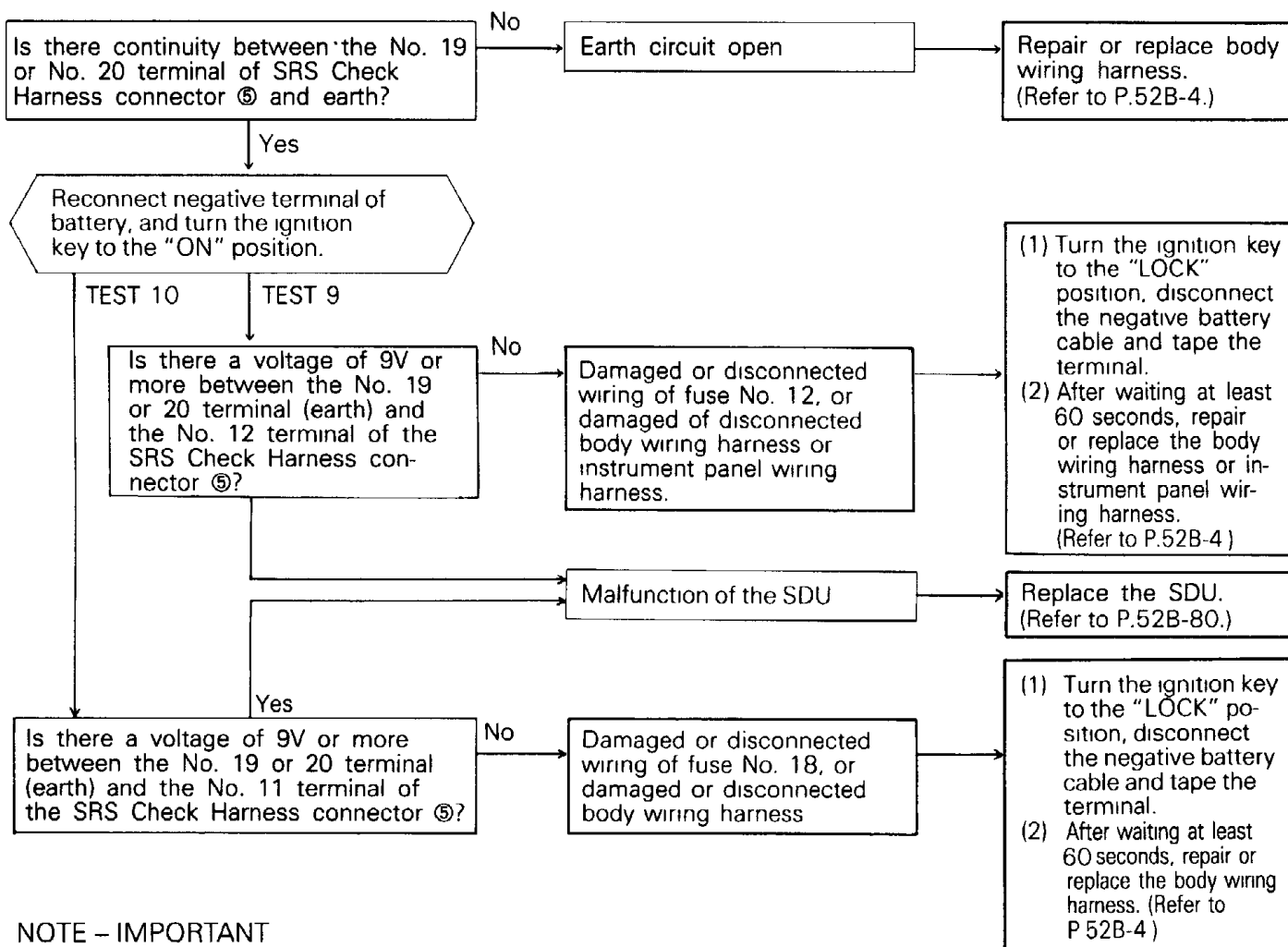
- (4) Disconnect the red 14-pin connector from the SDU
- (5) Connect the now disconnected red harness-side SDU connector (14-pin) to the connector ③ of the SRS Check Harness.
- (6) Check according to the flow chart below, using the specified digital multi-meter.

NOTE

- *1 Vehicles without front passenger's air bag
 *2 Vehicles with front passenger's air bag



52B-58 SUPPLEMENTAL RESTRAINT SYSTEM (SRS) – Troubleshooting



NOTE – IMPORTANT

(1) < Vehicles built up to March, 1992 >

After repairing the SRS, reconnect the battery cable, erase the diagnosis code memory from the Multi-use Tester or MUT-II and check the SRS warning lamp operation to verify the system functions properly. (Refer to TEST 1.)

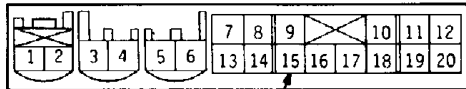
< Vehicles built from April, 1992 >

After repairing the SRS, reconnect the battery cable and check the SRS warning lamp operation to verify the system functions properly. (Refer to TEST 1.)

(2) SDU = SRS Diagnosis Unit

TEST 11

**WHEN DIAGNOSIS CODE NO. 43 IS
DISPLAYED**
(SRS warning lamp does not extinguish)

SDU connector

To body wiring harness (14-pin)

19N0200

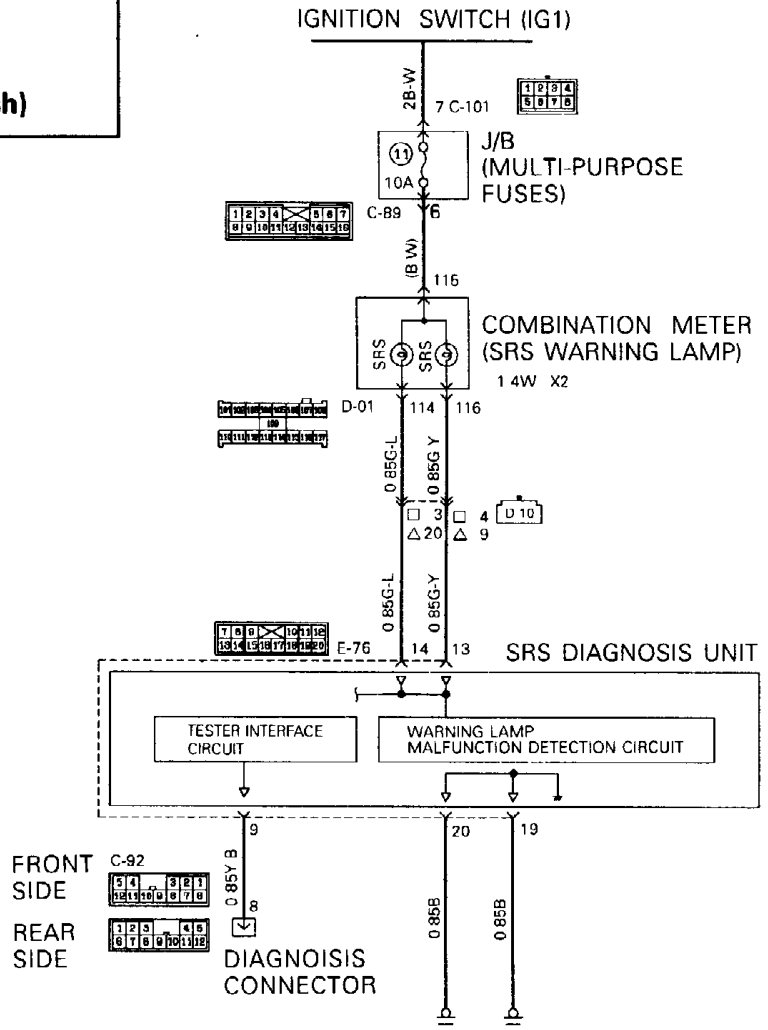
<L.H. drive vehicles>



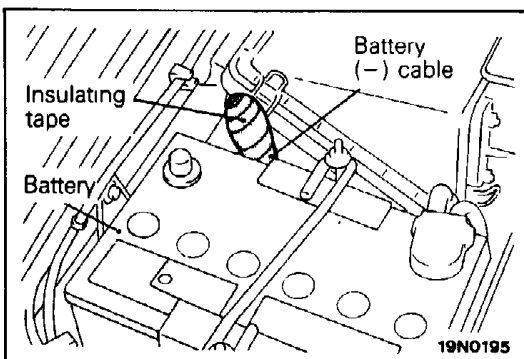
<R.H. drive vehicles>

**NOTE**

- : <L.H. drive vehicles>
△ : <R.H. drive vehicles>



KX35-AK-J1504-EC



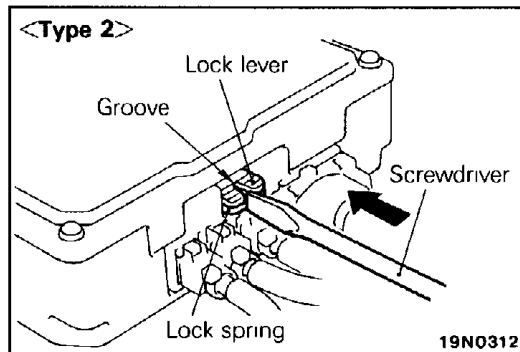
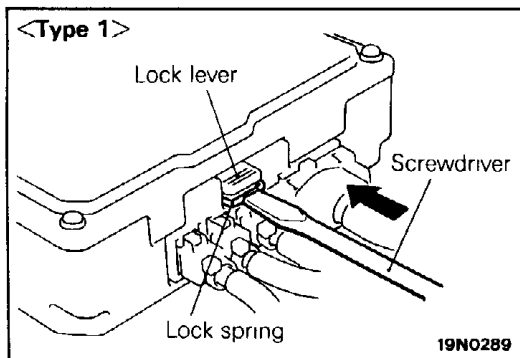
- (1) Turn the ignition key to the "LOCK" position, disconnect the negative battery cable and tape the terminal.

Caution

Wait at least 60 seconds after disconnecting the battery cable before doing any further work. (Refer to P.52B-9 No. 5.)

- (2) Remove the peripheral SDU parts. (Refer to P.52B-81, 84.)

52B-60 SUPPLEMENTAL RESTRAINT SYSTEM (SRS) – Troubleshooting



- (3) Release the lock of SDU connector in accordance with the following procedure:

In case that there is no groove on the lock lever (Type 1)

Place a (–) screwdriver against the lock spring (metal section) of the connector lock lever as shown in the illustration, and push the spring horizontally toward the inside of the unit

Caution

- (1) Do not use excessive force to raise the lock lever.
- (2) Do not insert the screwdriver into the gap between the lock lever and the lock spring.

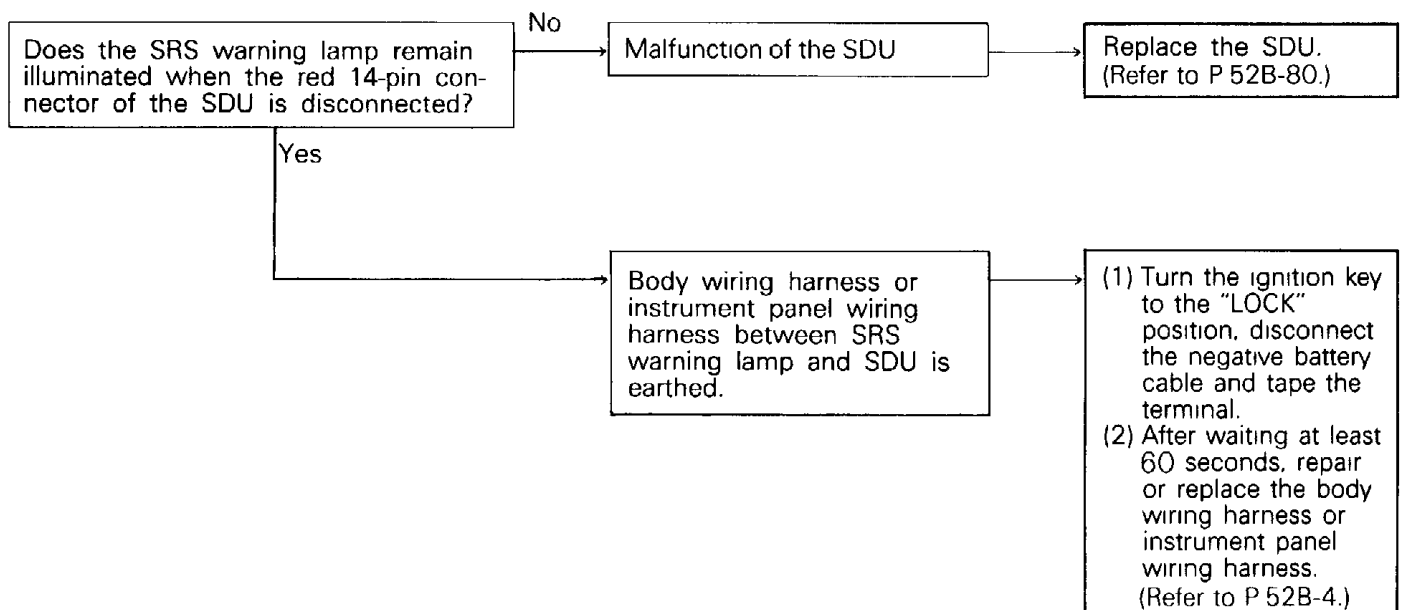
In case that there is a groove on the lock lever (Type 2)

Place a (–) screwdriver against the lock spring (metal section) of the connector lock lever groove as shown in the illustration, and push it toward the inside of the unit.

Caution

Do not use excessive force to raise the lock lever.

- (4) Disconnect the red 14-pin connector from the SDU.
- (5) Reconnect negative terminal of battery, and turn the ignition key to the "ON" position.
- (6) Check according to the flow chart below.



NOTE – IMPORTANT

(1) < Vehicles built up to March, 1992 >

After repairing the SRS, reconnect the battery cable, erase the diagnosis code memory from the Multi-use Tester or MUT-II and check the SRS warning lamp operation to verify the system functions properly. (Refer to TEST 1.)

< Vehicles built from April, 1992 >

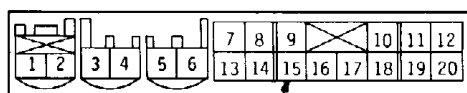
After repairing the SRS, reconnect the battery cable and check the SRS warning lamp operation to verify the system functions properly. (Refer to TEST 1.)

- (2) SDU = SRS Diagnosis Unit

TEST 12

**WHEN DIAGNOSIS CODE NO. 43 IS
DISPLAYED**
(SRS warning lamp does not illuminate)

SDU connector



To body wiring harness (14-pin)

19N0200

<L.H. drive vehicles>



<R.H. drive vehicles>

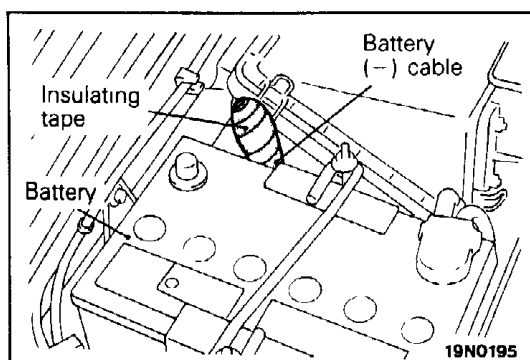
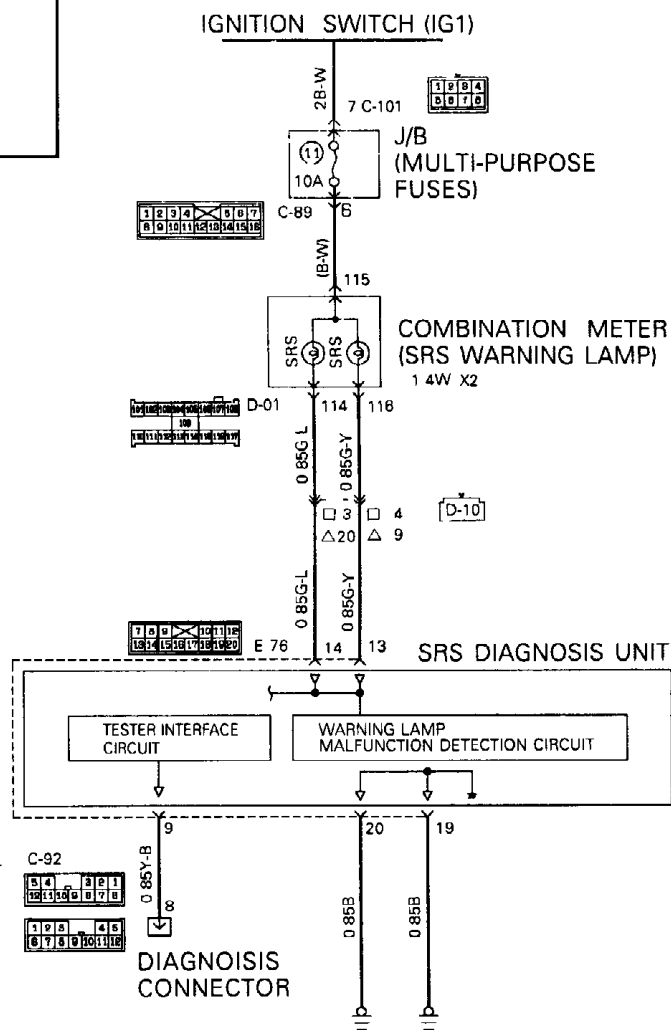


NOTE

□ : <L.H. drive vehicles>

△ : <R.H. drive vehicles>

KX35-AK-J1504-EC



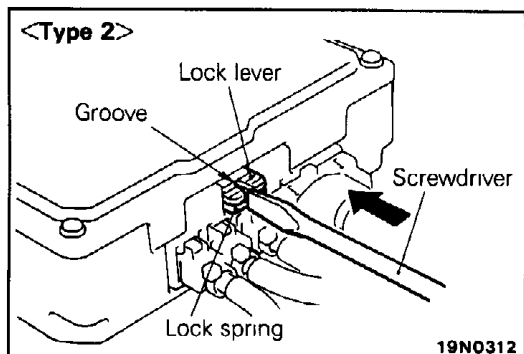
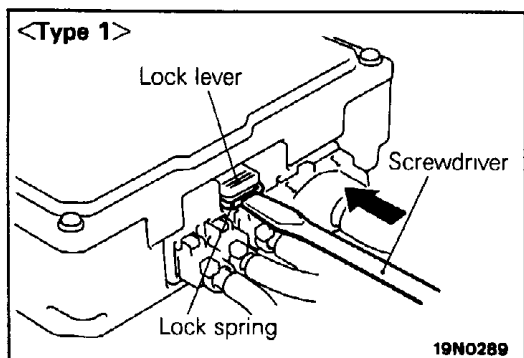
- (1) Turn the ignition key to the "LOCK" position, disconnect the negative battery cable and tape the terminal.

Caution

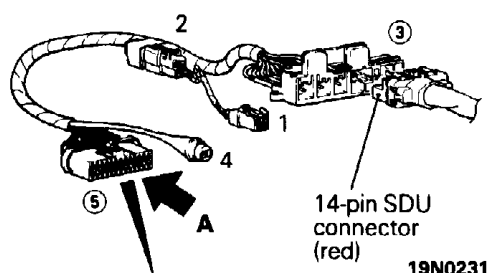
Wait at least 60 seconds after disconnecting the battery cable before doing any further work. (Refer to P.52B-9 No. 5.)

- (2) Remove the peripheral SDU parts. (Refer to P.52B-81, 84.)

52B-62 SUPPLEMENTAL RESTRAINT SYSTEM (SRS) – Troubleshooting



MB991349*1
MB991530*2
SRS Check Harness



View A
SRS Check Harness connector (5)

*1

1	2	3	4	5	6	7	8	9	10	11
12	13	14	15	16	17	18	19	20	21	22

SRS warning lamp Earth

19S0258

NOTE

*1 . Vehicles without front passenger's air bag

*2 . Vehicles with front passenger's air bag

*2

1	2	3	4	5	6	7	8	9
10	11	12	13	14	15	16	17	18
19	20	21	22	23	24	25	26	27
28	29	30	31	32				

SRS warning lamp Earth

19N0325

- (3) Release the lock of SDU connector in accordance with the following procedure:

In case that there is no groove on the lock lever (Type 1)

Place a (–) screwdriver against the lock spring (metal section) of the connector lock lever as shown in the illustration, and push the spring horizontally toward the inside of the unit.

Caution

- (1) Do not use excessive force to raise the lock lever.
 (2) Do not insert the screwdriver into the gap between the lock lever and the lock spring.

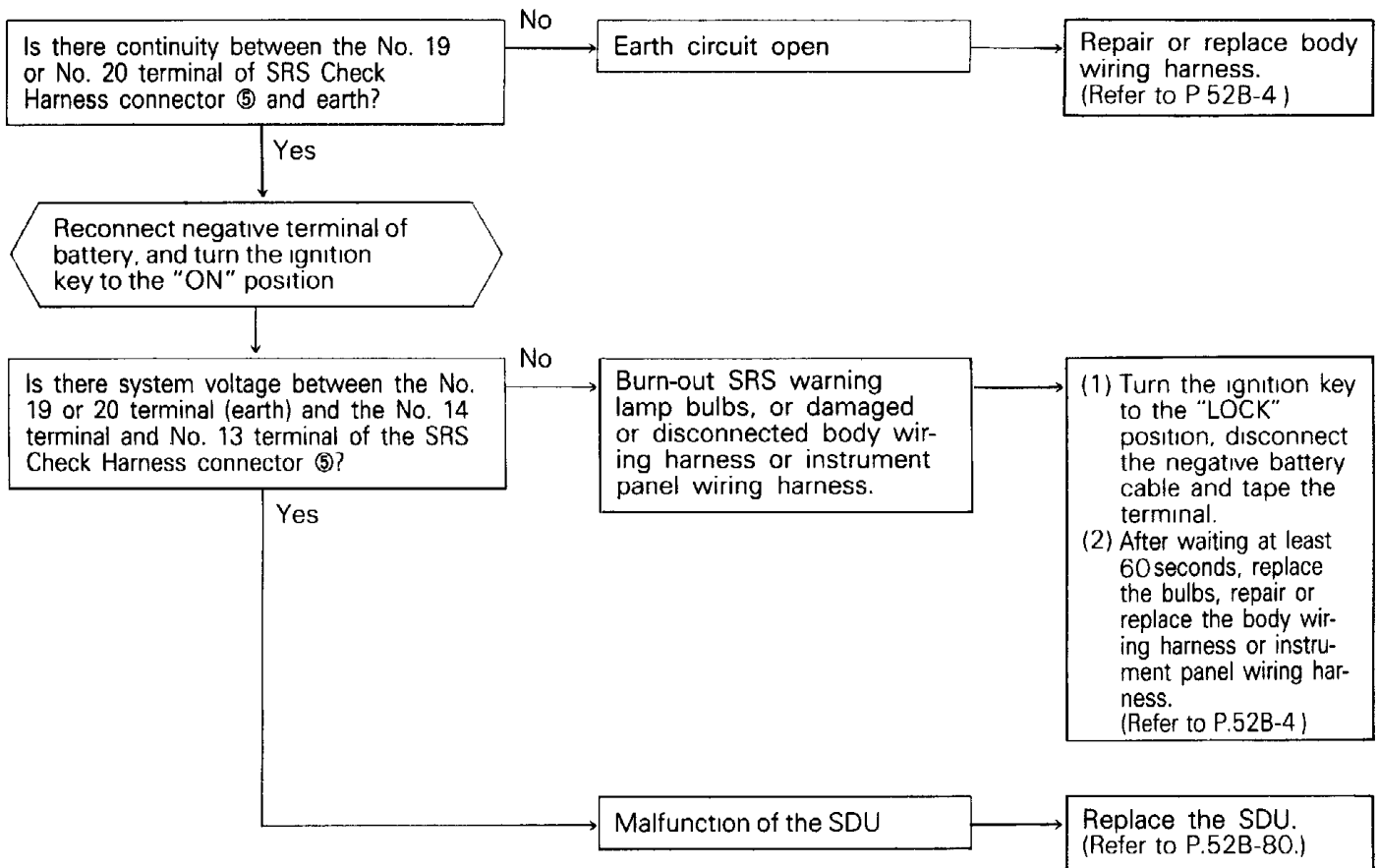
In case that there is a groove on the lock lever (Type 2)

Place a (–) screwdriver against the lock spring (metal section) of the connector lock lever groove as shown in the illustration, and push it toward the inside of the unit.

Caution

Do not use excessive force to raise the lock lever.

- (4) Disconnect the red 14-pin connector from the SDU.
 (5) Connect the now disconnected red harness-side SDU connector (14-pin) to the connector ③ of the SRS Check Harness.
 (6) Check according to the flow chart on next page, using the specified digital multi-meter.



NOTE – IMPORTANT

(1) < Vehicles built up to March, 1992 >

After repairing the SRS, reconnect the battery cable, erase the diagnosis code memory from the Multi-use Tester or MUT-II and check the SRS warning lamp operation to verify the system functions properly. (Refer to TEST 1.)

< Vehicles built from April, 1992 >

After repairing the SRS, reconnect the battery cable and check the SRS warning lamp operation to verify the system functions properly. (Refer to TEST 1.)

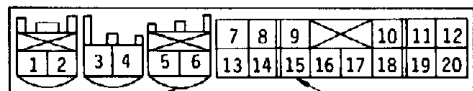
(2) SDU = SRS Diagnosis Unit

52B-64 SUPPLEMENTAL RESTRAINT SYSTEM (SRS) – Troubleshooting

TEST 13 <Vehicles with front passenger's air bag>

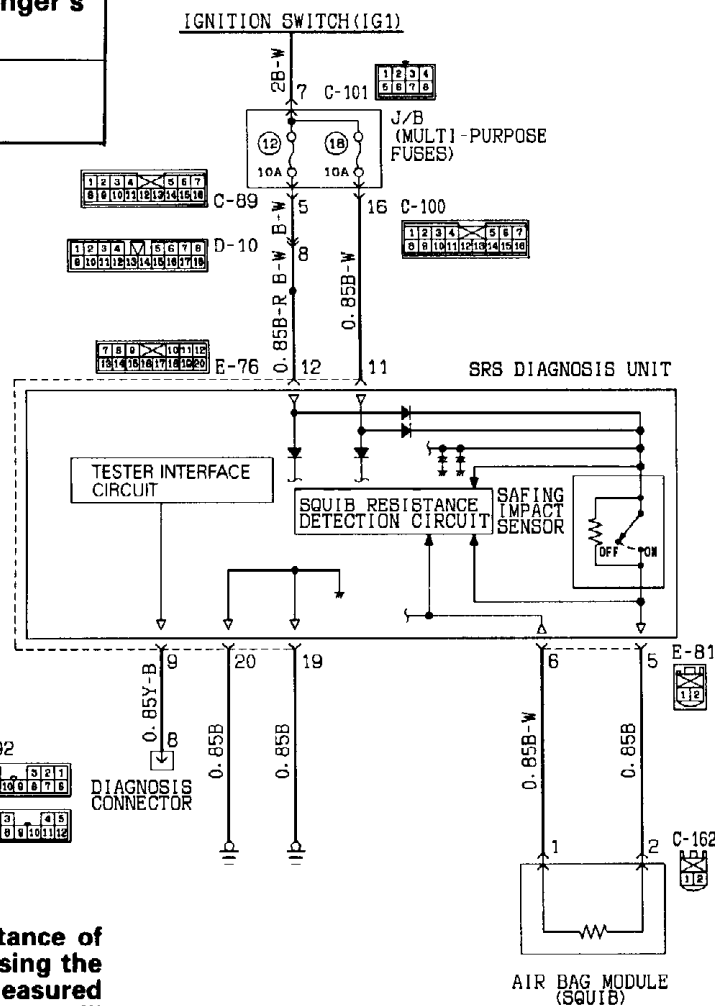
WHEN DIAGNOSIS CODE NO. 24 OR NO. 25 IS DISPLAYED

SDU connector



To the front passenger's side air bag module
To body wiring harness (14-pin)

19N0303



Caution

Never attempt to measure the circuit resistance of the air bag module (squib) even if you are using the specified tester. If the circuit resistance is measured with a tester, accidental air bag deployment will result in serious personal injury.

KX35-AK-J1530-EC

Have the other diagnosis code test(s) been finished?

No

Perform the other diagnosis code test(s) prior to this test.

Yes

NOTE

If combined front impact sensor and air bag module (squib) failure modes simultaneously occur in two places, the preconditions for the respective detection circuits will go out of order. For this reason, both diagnosis codes may not be stored but only one of them may be indicated.

Their relationships are shown in the following table.

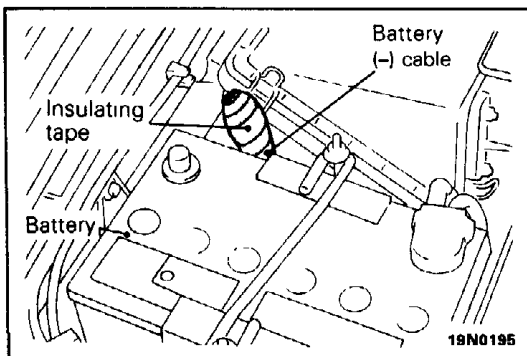
Perform **TEST 9** if it does not become proper even through **TEST 6** is executed

		Front impact sensors		
		Short-circuited	One open-circuited	Two open-circuited
Front passenger's side air bag module (Squib)	Short-circuited	11 and/or 24	12 and/or 24	13 and/or 24
	Open-circuited	11 and/or 25	12 and/or 25	13 and/or 25

The numbers in the boxes are diagnosis code numbers. (Refer to P.52B-14.)

CONTINUED ON NEXT PAGE

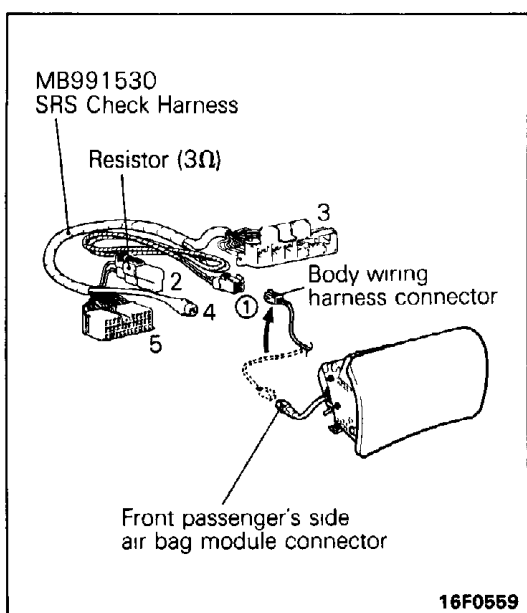
CONTINUED FROM PREVIOUS PAGE



- (1) Turn the ignition key to the "LOCK" position, disconnect the negative battery cable and tape the terminal.

Caution

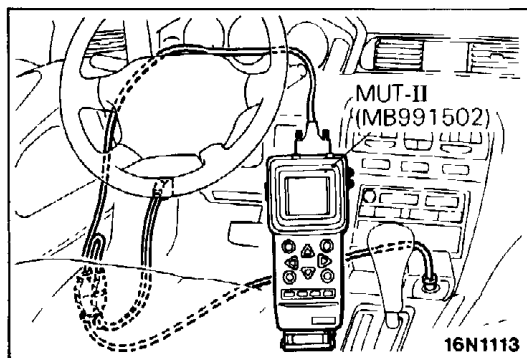
Wait at least 60 seconds after disconnecting the battery cable before doing any further work.
(Refer to P.52B-9 No. 5.)



- (2) Remove the glove box and glove box outer case.
- (3) Remove the connection between the front passenger's air bag module connector (2-pin) and the body wiring harness connector.
- (4) Connect the SRS check harness connector ① to the body wiring harness connector

NOTE

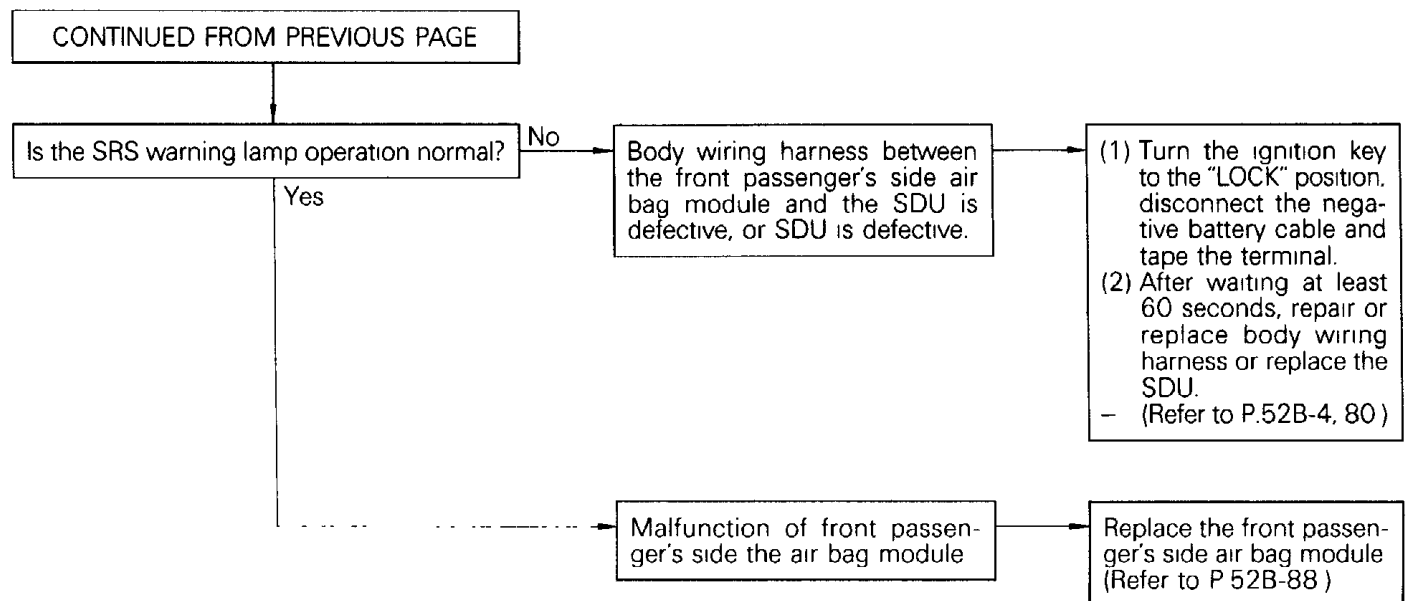
A 3-ohm resistor that corresponds to the resistance of the air bag module (squib) and the wiring resistance is connected between the terminals of the connector 1 of the SRS Check Harness.



- (5) Reconnect negative terminal of battery, and turn the ignition key to the "ON" position.
- (6) Using the MUT-II, erase the diagnosis code memory (Refer to TEST 1)
- (7) Return the ignition key from the "ON" to the "LOCK" position and then back to the "ON" position.

CONTINUED TO NEXT PAGE

52B-66 SUPPLEMENTAL RESTRAINT SYSTEM (SRS) – Troubleshooting



Caution

Never attempt to measure the circuit resistance of the air bag module (squib) even if you are using the specified tester. If the circuit resistance is measured with a tester, accidental air bag deployment will result in serious personal injury.

NOTE – IMPORTANT

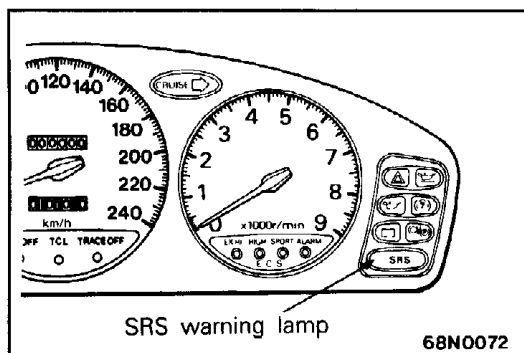
(1) After repairing the SRS, reconnect the battery cable, erase the diagnosis code memory from the MUT-II and check the SRS warning lamp operation to verify the system functions properly. (Refer to TEST 1.)

(2) SDU = SRS Diagnosis Unit

SRS MAINTENANCE

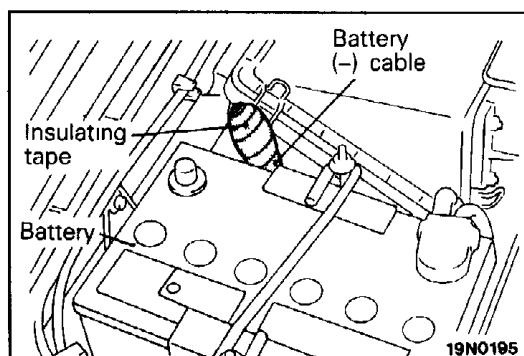
E52RAAAa

The SRS must be inspected by an authorized dealer 10 years after the date of vehicle registration.



1. "SRS" WARNING LAMP CHECK

Turn the ignition with the key "ON" position. Does the "SRS" warning lamp illuminate for about 7 seconds, turn OFF and then remain extinguished for at least 45 seconds? If yes, SRS system is functioning properly. If no, consult page 52B-12.



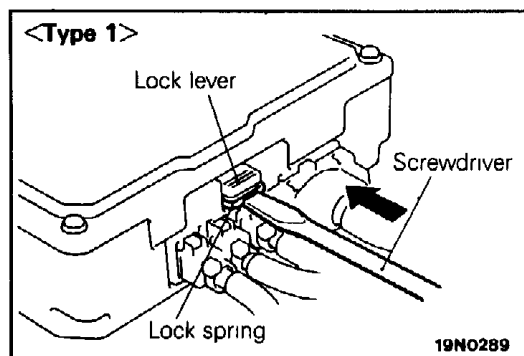
2. SRS COMPONENTS VISUAL CHECK

- (1) Turn the ignition key to "LOCK" position, disconnect the negative battery cable and tape the terminal.

Caution

Wait at least 60 seconds after disconnecting the battery cable before doing any further work. (Refer to P.52B-9 No. 5.)

- (2) Remove the peripheral SDU parts. (Refer to P.52B-81, 84.)
- (3) Release the lock of SDU connector in accordance with the following procedure:

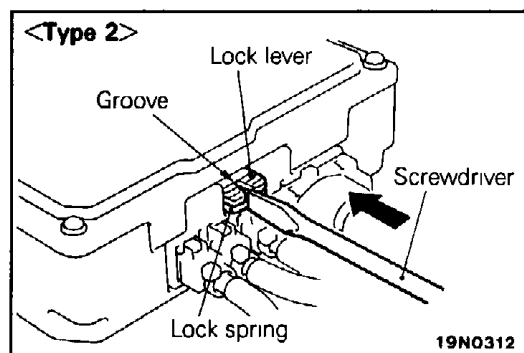


In case that there is no groove on the lock lever (Type 1)

Place a (-) screwdriver against the lock spring (metal section) of the connector lock lever as shown in the illustration, and push the spring horizontally toward the inside of the unit.

Caution

- (1) Do not use excessive force to raise the lock lever.
- (2) Do not insert the screwdriver into the gap between the lock lever and the lock spring.



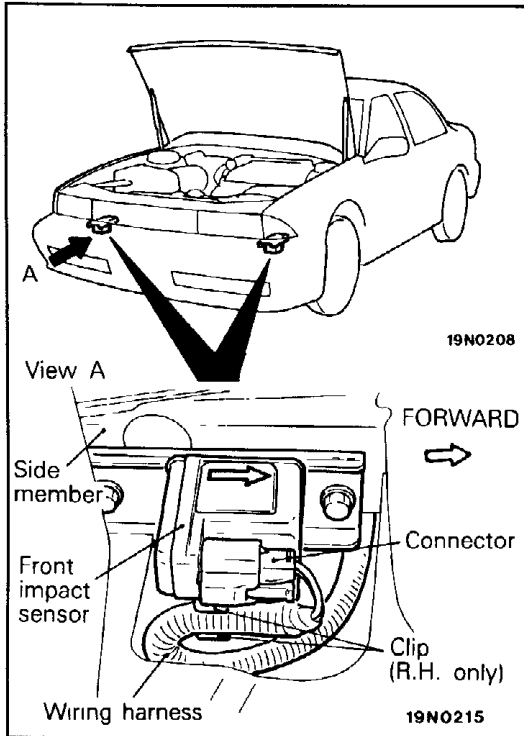
In case that there is a groove on the lock lever (Type 2)

Place a (-) screwdriver against the lock spring (metal section) of the connector lock lever groove as shown in the illustration, and push it toward the inside of the unit.

Caution

Do not use excessive force to raise the lock lever.

- (4) Disconnect the connectors from the SDU.



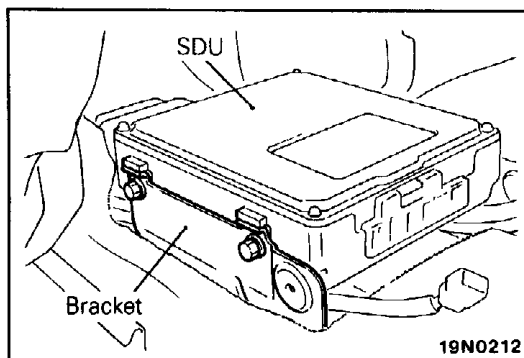
2-1 Front Impact Sensors

- (1) Check sensors to ensure the arrow marks face the front of the vehicle.
- (2) Check side member and front impact sensor for deformities or rust.

Caution

The SRS may not activate if a front impact sensor is not installed properly, which could result in serious injury or death to the vehicle's driver and passenger.

- (3) Check wiring harness (for front impact sensor) for binds, connector for damage, and terminals for deformities. Replace sensor and/or wiring harness if it fails visual check. (Refer to P.52B-78 and P.52B-4.)

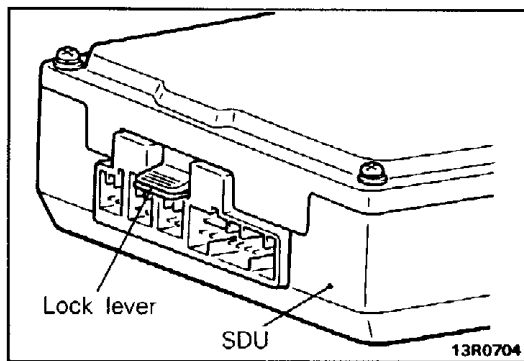


2-2 SRS Diagnosis Unit (SDU)

- (1) Check SDU case and brackets for dents, cracks, deformities or rust

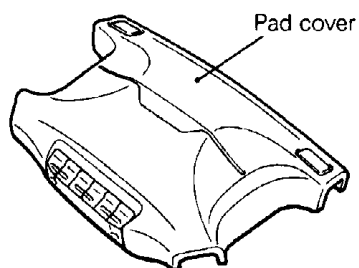
Caution

The SRS may not activate if SRS diagnosis unit is not installed properly, which could result in serious injury or death to the vehicle's driver and passenger.



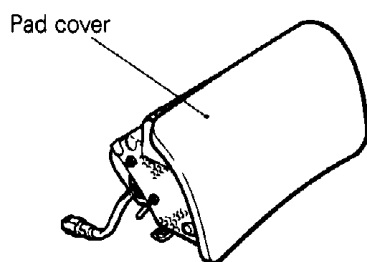
- (2) Check connectors and lock lever for damage, and terminals for deformities or rust. Replace SDU if it fails visual check. (Refer to P 52B-80.)

<Driver's side>



19N0198

<Front passenger's side>



19L0563

2-3 Air Bag Modules, Steering Wheel and Clock Spring.

- (1) Remove the air bag modules, steering wheel and clock spring. (Refer to P.52B-88.)

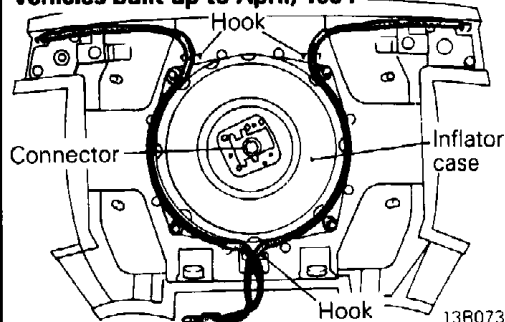
Caution

The removed air bag modules should be stored in a clean, dry place with the pad cover face up.

- (2) Check pad cover for dents, cracks or deformities.

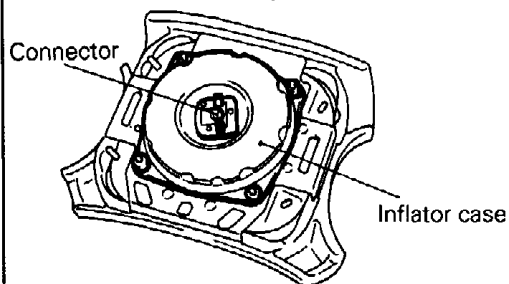
<Driver's side>

Vehicles built up to April, 1994



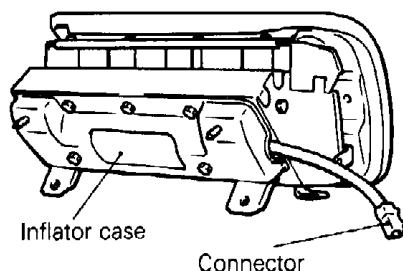
13R0737

Vehicles built from May, 1994



19L0515

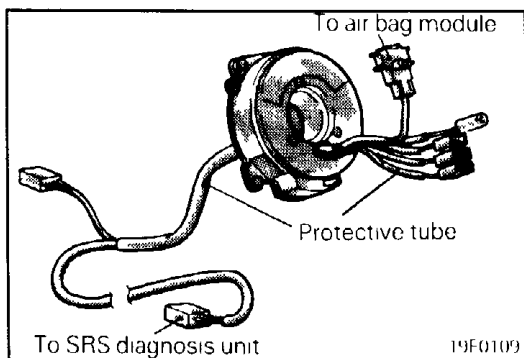
<Front passenger's side>



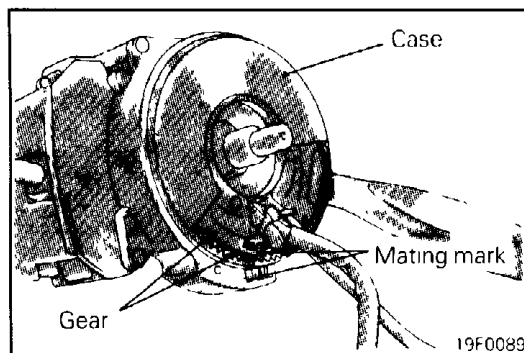
19L0505

- (3) Check hooks and connectors for damage, terminals deformities, and harness for binds.
- (4) Check air bag inflator case for dents, cracks or deformities.
- (5) Check harness and connectors for damage, and terminals for deformities.

52B-70 SUPPLEMENTAL RESTRAINT SYSTEM (SRS) – SRS Maintenance



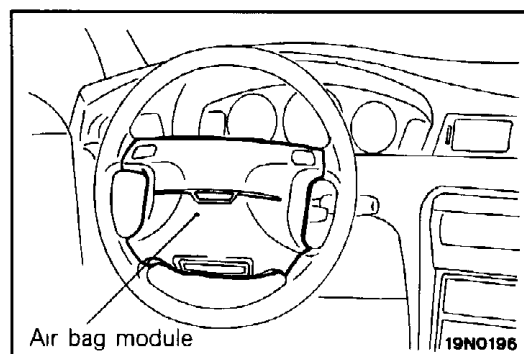
- (6) Check clock spring connectors and protective tube for damage, and terminals for deformities.



- (7) Visually check the clock spring case and the gears for damage.
(8) Align the mating mark and "NEUTRAL" position indicator and, after turning the vehicle's front wheels to straight-ahead position, install the clock spring to the column switch.

Caution

If the clock spring's mating mark is not properly aligned, the steering wheel may not be completely rotational during a turn, or the flat cable within the clock spring may be severed, obstructing normal operation of the SRS and possibly leading to serious injury to the vehicle's driver and passenger.



- (9) Install the steering column covers lower, driver side lower panel, steering wheel and the air bag module.
(10) Check steering wheel for noise, binds or difficult operation.
(11) Check steering wheel for excessive free play.

REPLACE ANY VISUALLY INSPECTED PART IF IT FAILS THAT INSPECTION.

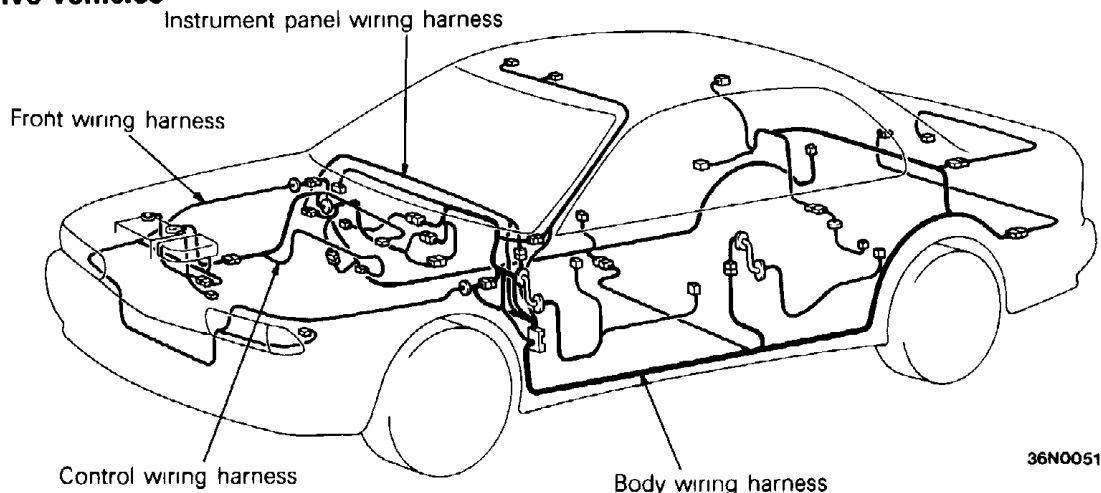
(Refer to P 52B-88.)

Caution

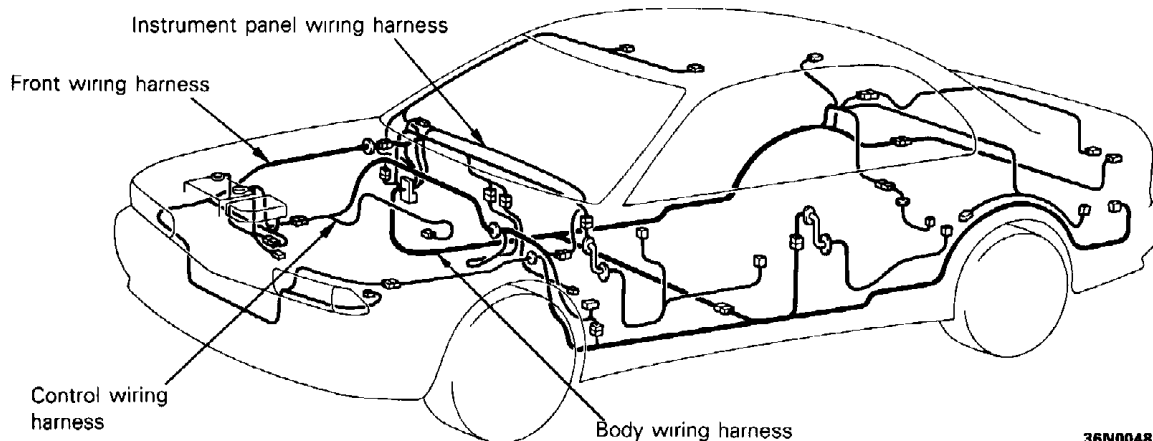
The SRS may not activate if any of the above components is not installed properly, which could result in serious injury or death to the vehicle's driver and passenger.

2-4 Front Wiring Harness, Instrument Panel Wiring Harness, Control Wiring Harness and Body Wiring Harness

<L.H. drive vehicles>



<R.H. drive vehicles>



- (1) Check connector for poor connection.
- (2) Check harnesses for binds, connectors for damage, and terminals for deformities.

REPLACE ANY CONNECTORS OR HARNESS THAT FAIL THE VISUAL INSPECTION.

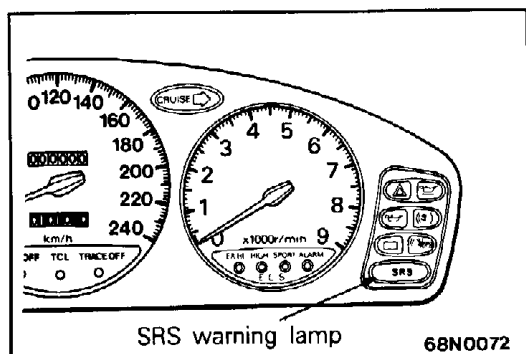
(Refer to P.52B-4.)

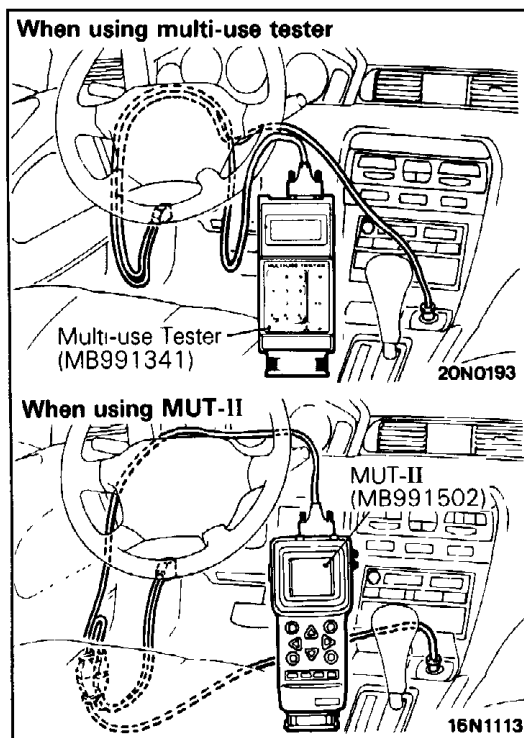
Caution

The SRS may not activate if SRS harnesses or connectors are damaged or improperly connected, which could result in serious injury or death to the vehicle's driver and passenger.

3. POST-INSTALLATION INSPECTION

Reconnect the negative battery terminal. Turn the ignition key to the "ON" position. Does the "SRS" warning lamp illuminate for about 7 seconds, turn OFF and then remain extinguished for at least 45 seconds? If yes. SRS system is functioning properly. If no. consult page 52B-14.





POST-COLLISION DIAGNOSIS

E52SAAA

To inspect and service the SRS after a collision (whether or not the air bag has deployed), perform the following steps.

1. SRS Diagnosis Unit Memory Check

- (1) Connect the Multi-use Tester <vehicles without front passenger's air bag> or MUT-II <all models> to the diagnosis connector located at the right side of the junction block.

Caution

Make certain that the ignition switch is OFF when the Multi-use Tester or MUT-II is connected or disconnected.

- (2) Read (and write down) all displayed diagnosis codes. (Refer to P.52B-14.)

NOTE

If the battery power supply has been disconnected or disrupted by the collision, the Multi-use Tester or MUT-II cannot communicate with the SRS diagnosis unit. Inspect and, if necessary, repair the body wiring harness before proceeding further.

- (3) Read the service data (fault duration and how many times memories are erased) using the Multi-use Tester or MUT-II.

NOTE

- Maximum stored period. 9999 minutes (approximately 7 days)
- Maximum number of times to be stored: 250

- (4) Erase the diagnosis codes and after waiting 45 seconds or more read (and write down) all displayed diagnosis codes. (Refer to P.52B-14.)

2. Repair Procedure

2-1. When air bag deploys collision.

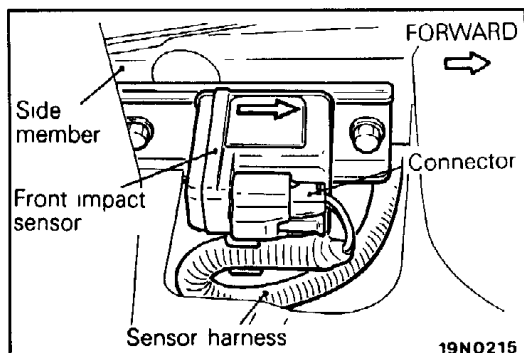
1. Replace the following parts with new ones.
 - Front impact sensors (Refer to P.52B-78.)
 - SRS diagnosis unit (SDU) (Refer to P.52B-80.)
 - Air bag modules (Refer to P.52B-88.)
2. Check the following parts and replace if there are any malfunctions.
 - Clock spring (Refer to P.52B-88.)
 - Steering wheel, steering column and intermediate joint.
 - (1) Check wiring harness (built into steering wheel) and connectors for damage, and terminals for deformities.
 - (2) Install air bag module to check fit or alignment with steering wheel.
 - (3) Check steering wheel for noise, binds or difficult operation and excessive free play.
3. Check harnesses for binding, connectors for damage, poor connections, and terminals for deformities. (Refer to P.52B-4.)

2-2. When air bag does not deploy in low-speed collision

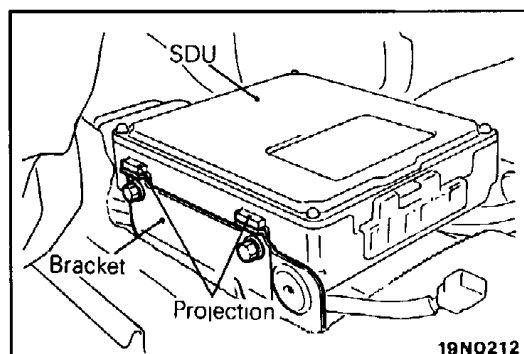
Check the SRS components.

If the SRS components are showing any visible damage such as dents, cracks, or deformation, replace them with new ones.

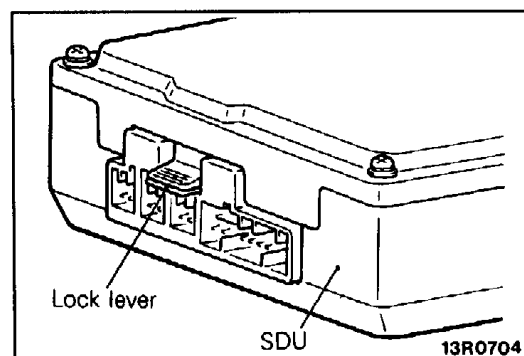
Concerning parts removed for inspection, replacement with new parts and cautionary points for working, refer to appropriate INDIVIDUAL COMPONENT SERVICE, P.52B-76

**Front Impact Sensors**

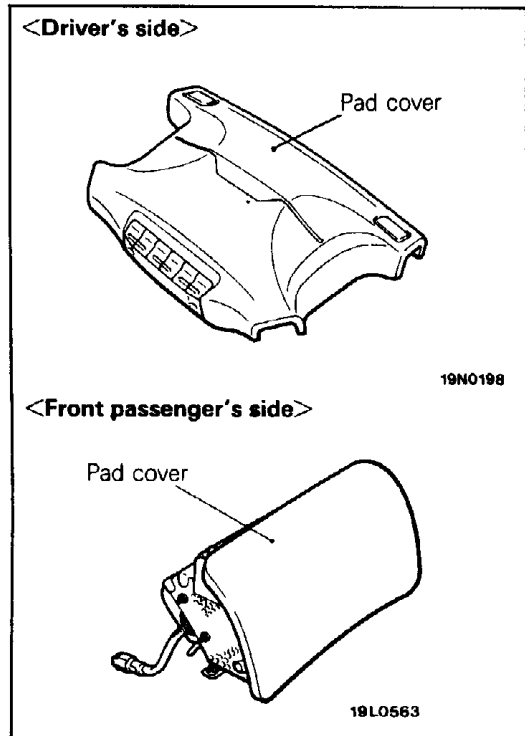
- (1) Check side member for deformities or rust.
- (2) Check front impact sensor for dents, cracks deformities or rust.
- (3) Check sensor harnesses for binds, connectors for damage, and terminals for deformities.

**SRS Diagnosis Unit (SDU)**

- (1) Check SDU case and brackets for dents, cracks or deformities.

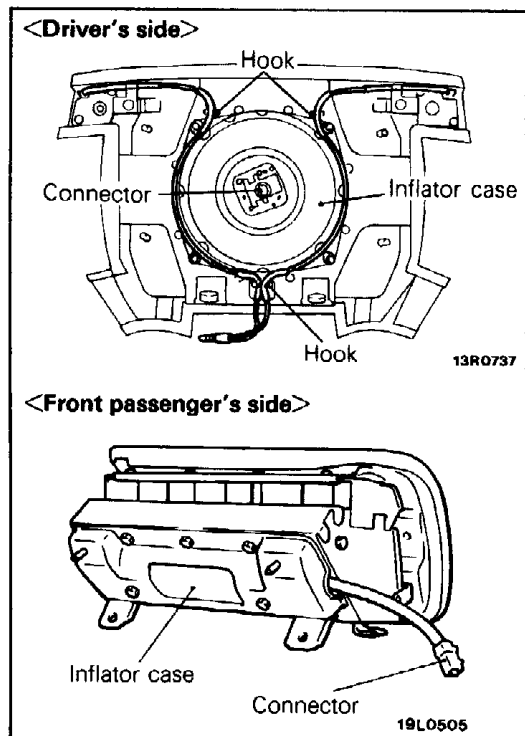


- (2) Check connectors and lock lever for damage, and terminals for deformities.

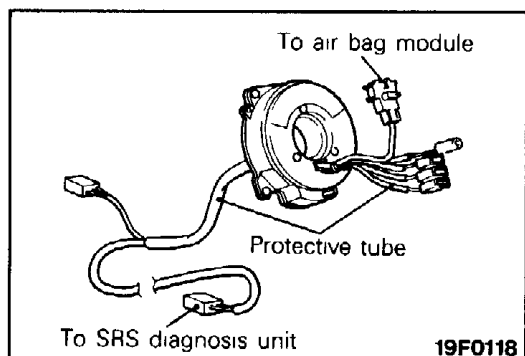


Air Bag Modules

- (1) Check pad cover for dents, cracks or deformities.

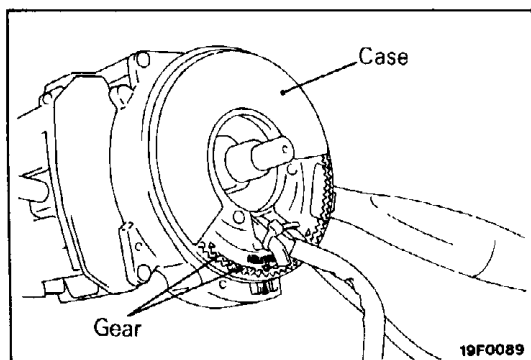


- (2) Check hooks and connectors for damage, terminals deformities, and harness for binds.
- (3) Check air bag inflator case for dents, cracks or deformities.
- (4) Install air bag module to steering wheel to check fit or alignment with the wheel.



Clock Spring

- (1) Check clock spring connectors and protective tube for damage, and terminals for deformities.



- (2) Visually check the case and the gear for damage.

Steering Wheel, Steering Column and Intermediate Joint

- (1) Check wiring harness (built into steering wheel) and connectors for damage, and terminals for deformities.
- (2) Install air bag module to check fit or alignment with steering wheel.
- (3) Check steering wheel for noise, binds or difficult operation and excessive free play.

Harness Connector (Body and Front wiring harness)

Check harnesses for binding, connectors for damage, poor connections, and terminals for deformities.

(Refer to P.52B-4)

INDIVIDUAL COMPONENT SERVICE

E52TAAA

If the SRS components are to be removed or replaced as a result of maintenance, troubleshooting, etc., follow each procedure (P.52B-78 – P.52B-101).

Caution

1. SRS components should not be subjected to heat over 93°C (200°F), so remove the front impact sensors, SRS diagnosis unit and air bag module and clock spring before drying or baking the vehicle after painting. Recheck SRS system operability after re-installing them.
2. If the SRS components are removed for the purpose of check, sheet metal repair, painting, etc., they should be stored in a clean, dry place until they are reinstalled.

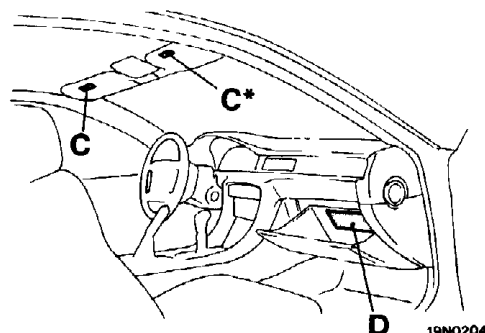
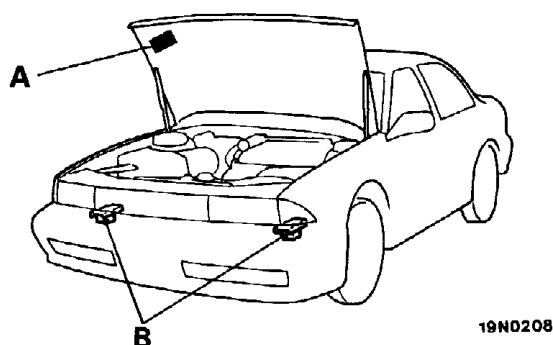
WARNING/CAUTION LABELS

E52TBAA

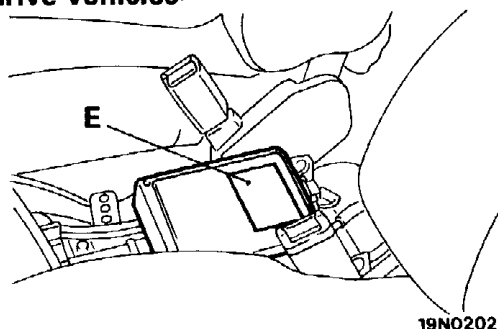
A number of caution labels relating to the SRS are found in the vehicle, as shown in the following illustration. Follow label instructions when servicing

SRS.

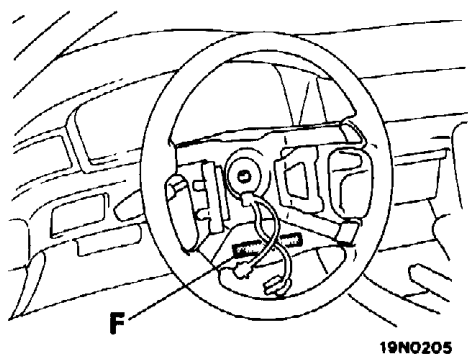
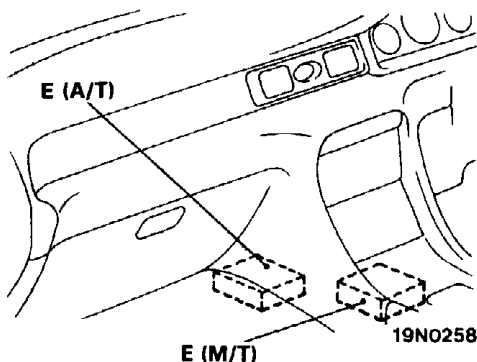
If labels are dirty or damaged, replace them with new ones.



<L.H. drive vehicles>

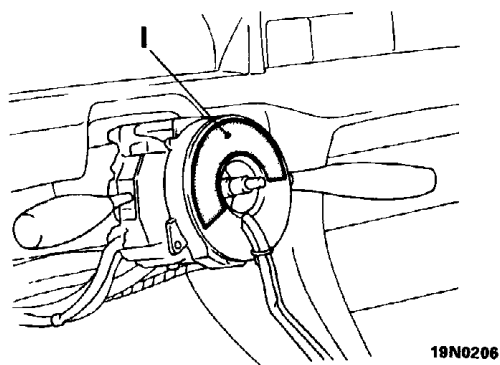
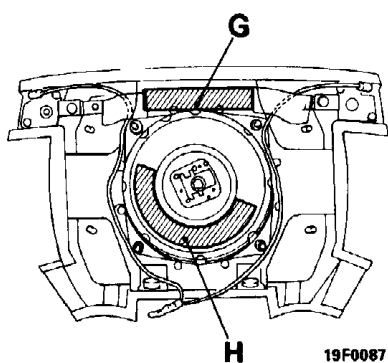


<R.H. drive vehicles>

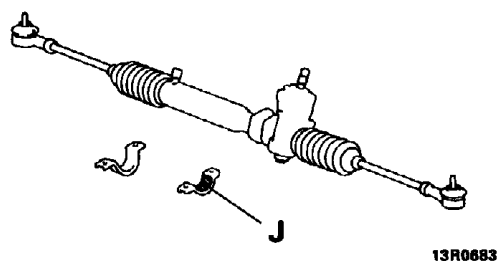


NOTE

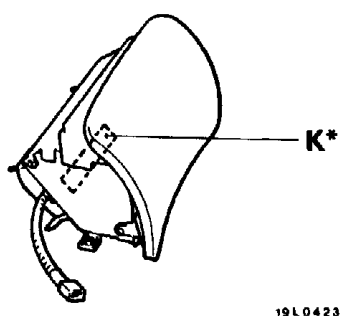
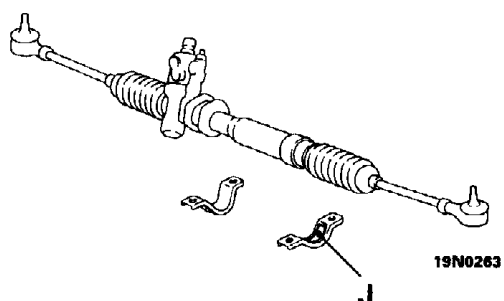
* : Vehicles with front passenger's air bag



<L.H. drive vehicles>



<R.H. drive vehicles>



NOTE

* . Vehicles with front passenger's air bag

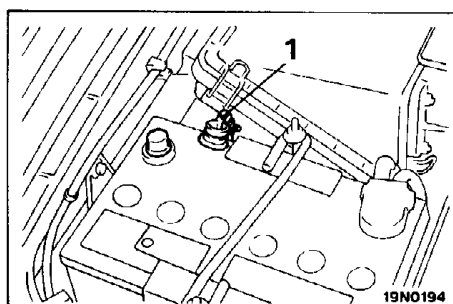
FRONT IMPACT SENSORS

E52TCAA

Caution

1. Never repair or disassemble a front impact sensor. If faulty, replace it.
2. Handle the front impact sensors very carefully, taking care not to drop them or otherwise subject them to impact. If a sensor is seen to be dented, cracked, deformed or rusted, replace it with a new one.
3. Replace sensors with new ones after the air bag has deployed.

REMOVAL AND INSTALLATION

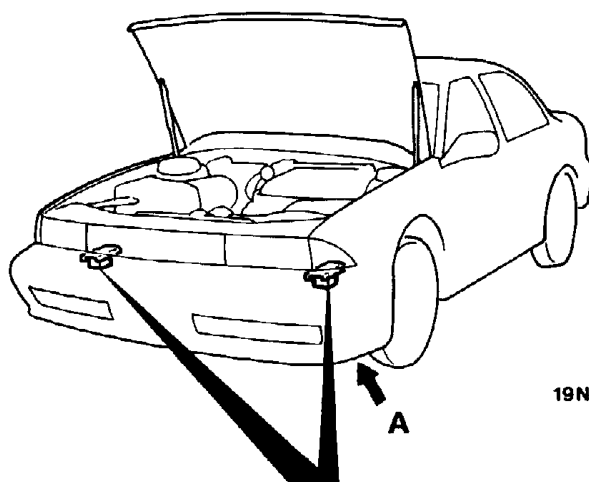


Pre-removal Operation

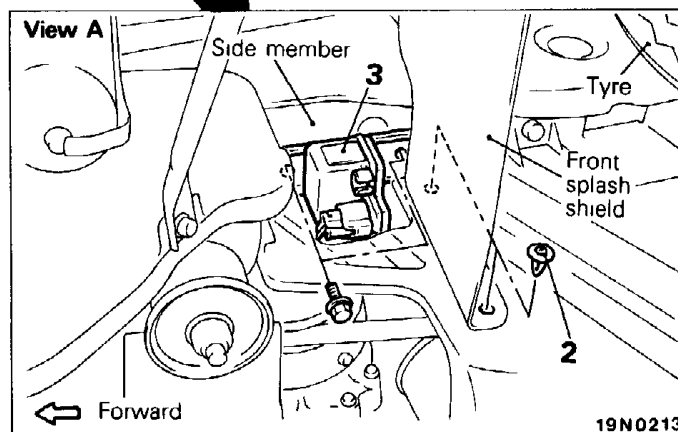
- Turn the ignition key to the "LOCK" position

Removal steps

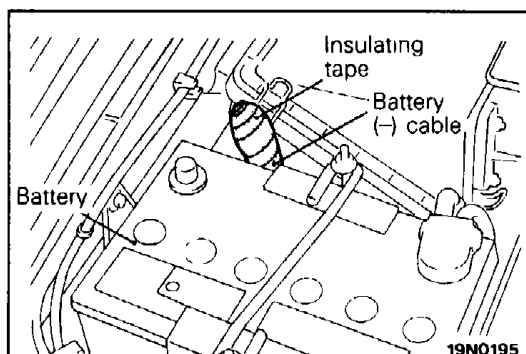
- ◆◆◆ Post-installation inspection
- ◆◆ 1 Connection of the negative (–) battery cable to the battery
- ◆◆ 2 Front splash shield attaching clips
- ◆◆ 3 Front impact sensor
- ◆◆◆ Pre-installation inspection



19N0208



19N0213



19N0195

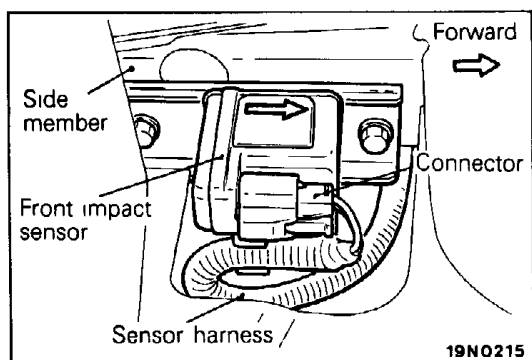
SERVICE POINTS OF REMOVAL

1. DISCONNECTION OF THE NEGATIVE (–) BATTERY CABLE FROM THE BATTERY

Disconnect the negative battery cable and tape the terminal.

Caution

Wait at least 60 seconds after disconnecting the battery cable before doing any further work. (Refer to P.52B-9 No. 5)

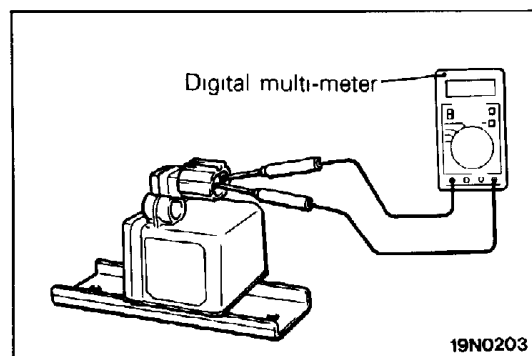


INSPECTION

- (1) Check side member for deformities or rust.
- (2) Check sensor harness for binds, connectors for damage, and terminals for deformities.
- (3) Check for dents, cracks, deformation or rust of the front impact sensor.

Caution

If a dent, crack, deformation or rust is detected, replace with a new sensor.

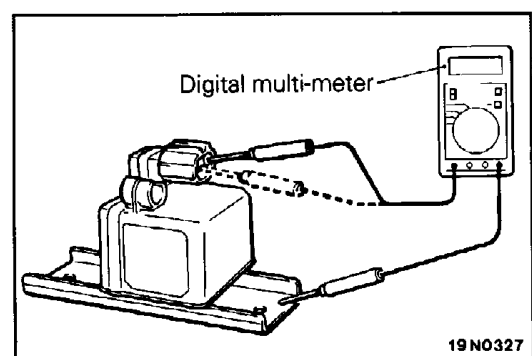


- (4) Measure the resistance between terminals and check whether it is within the standard value

Standard value: $2,000 \pm 40 \Omega$

Caution

Always replace the sensor with a new one if the resistance is not within the standard value.

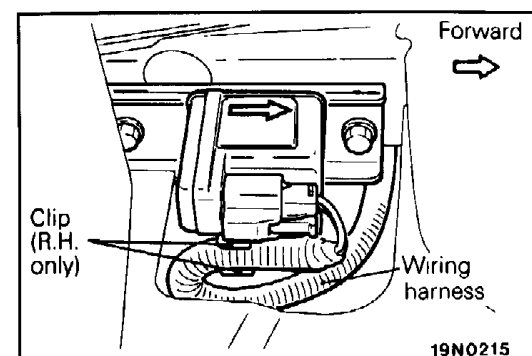


- (5) Check for continuity between the terminal and the bracket. If there is continuity, the sensor insulation is defective, so replace the sensor with a new one.

SERVICE POINT OF INSTALLATION

PRE-INSTALLATION INSPECTION

To mount the new front impact sensor, visually check it and measure the resistance between the terminals.
(Refer to the previous item "INSPECTION".)



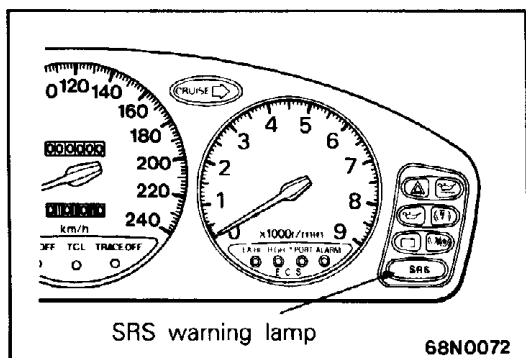
3. INSTALLATION OF FRONT IMPACT SENSOR

- (1) Install the front impact sensor with the arrow facing the front of the vehicle.

Caution

The SRS may not activate properly if a front impact sensor is not installed properly, which could result in serious injury or death to the vehicle's driver.

- (2) Bend the wiring harness slightly (to the extent that there is no slack), and clip the right side securely by using the clip of the front impact sensor.

**POST-INSTALLATION INSPECTION**

Reconnect the negative battery terminal. Turn the ignition key to the "ON" position. Does the "SRS" warning lamp illuminate for about 7 seconds, turn OFF and then remain extinguished for at least 45 seconds? If yes, SRS system is functioning properly. If no, consult page 52B-14.

SRS DIAGNOSIS UNIT (SDU)**Caution**

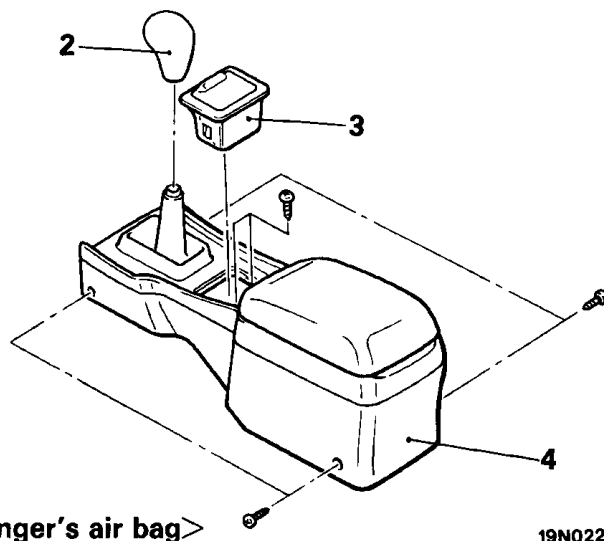
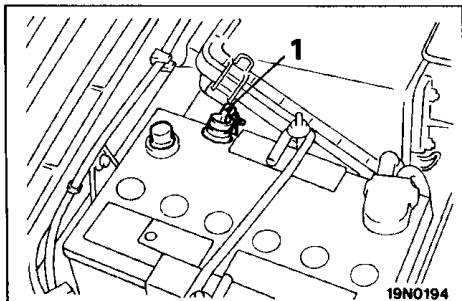
1. Never attempt to disassemble or repair the SDU. If faulty, replace it.
2. Do not drop or subject the SDU to impact or vibration.
If denting, cracking, deformation, or rust are discovered in the SDU, replace it with a new SDU. Discard the old one.
3. After deployment of an air bag, replace the SDU with a new one.
4. Never use an ohmmeter on or near the SDU, and use only the special test equipment described on P.52B-9.

REMOVAL AND INSTALLATION

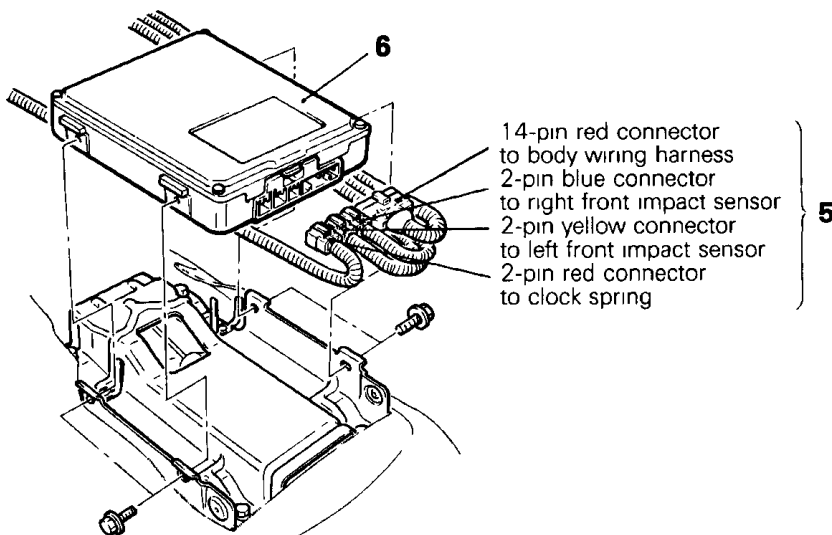
<L.H. DRIVE VEHICLES>

Pre-removal Operation

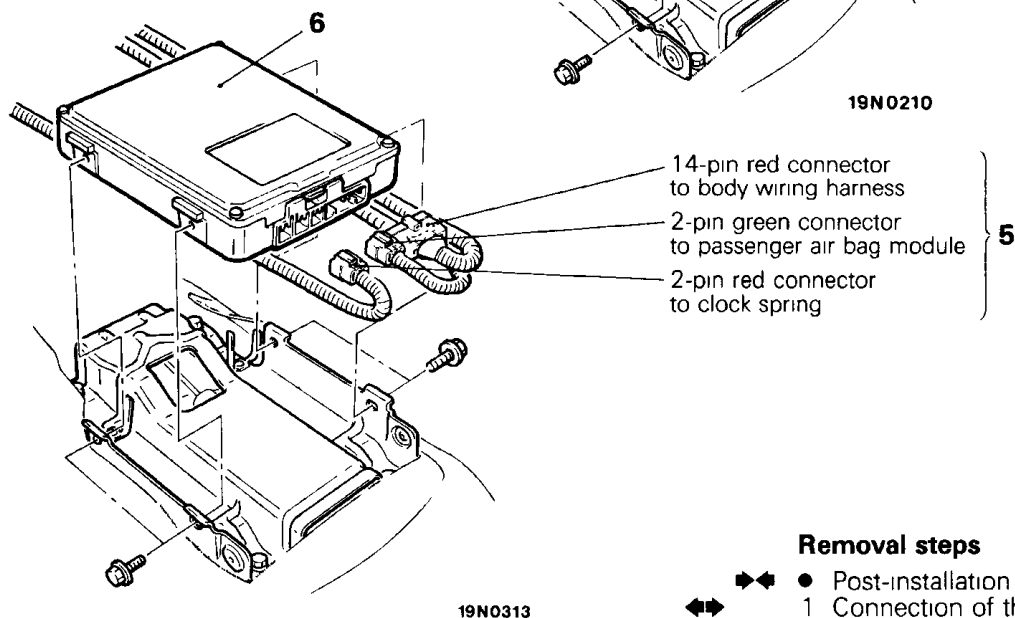
- Turn the ignition key to the "LOCK" position



<Vehicles without front passenger's air bag>

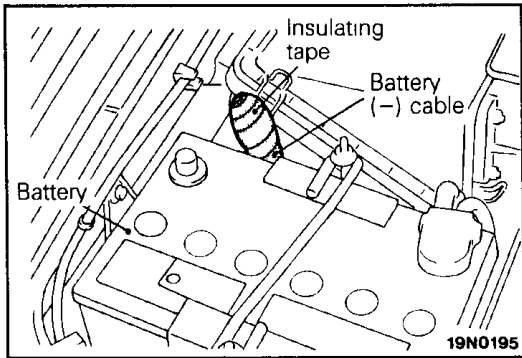


<Vehicles with front passenger's air bag>



Removal steps

- ◆◆ ● Post-installation inspection
- ◆◆ 1 Connection of the negative (-) battery cable to the battery
- ◆◆ 2 Shift lever knob <M/T>
- ◆◆ 3 Ashtray
- ◆◆ 4 Floor console assembly
- ◆◆◆◆ 5. Connection of the SDU and each harness connector
- ◆◆ 6. SRS diagnosis unit (SDU)



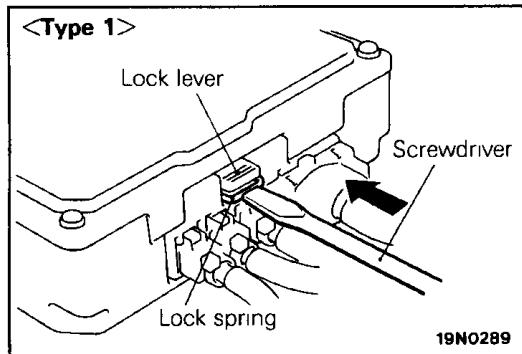
SERVICE POINTS OF REMOVAL

1. DISCONNECTION OF THE NEGATIVE (-) BATTERY CABLE FROM THE BATTERY

Disconnect the negative battery cable and tape the terminal.

Caution

Wait at least 60 seconds after disconnecting the battery cable before doing any further work. (Refer to P.52B-9 No. 5.)



5. DISCONNECTION OF THE SDU AND EACH HARNESS CONNECTOR

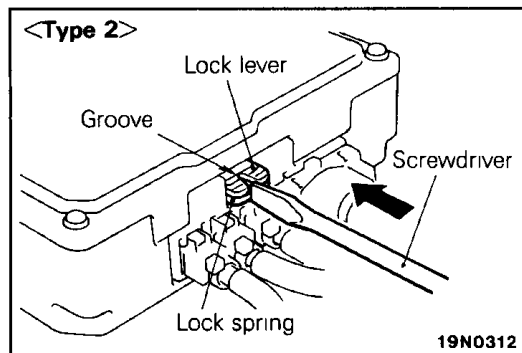
Release the lock of SDU connector in accordance with the following procedure:

In case that there is no groove on the lock lever (Type 1)

Place a (-) screwdriver against the lock spring (metal section) of the connector lock lever as shown in the illustration, and push the spring horizontally toward the inside of the unit.

Caution

- (1) Do not use excessive force to raise the lock lever.
- (2) Do not insert the screwdriver into the gap between the lock lever and the lock spring.

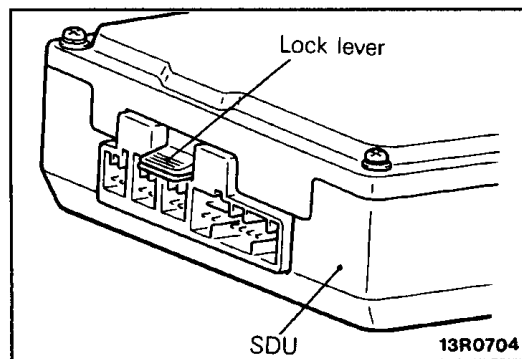


In case that there is a groove on the lock lever (Type 2)

Place a (-) screwdriver against the lock spring (metal section) of the connector lock lever groove as shown in the illustration, and push it toward the inside of the unit.

Caution

Do not use excessive force to raise the lock lever.



INSPECTION

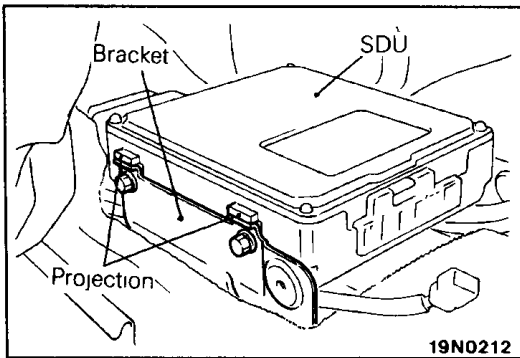
- Check the SDU case and brackets for dents, cracks or deformities.
- Check connectors and lock lever for damage, and terminals for deformities.

Caution

If a dent, cracks, deformation or rust discovered, replace the SDU with a new one.

NOTE

For checking of the SDU other than described above, refer to the section concerning troubleshooting. (Refer to P.52B-14.)



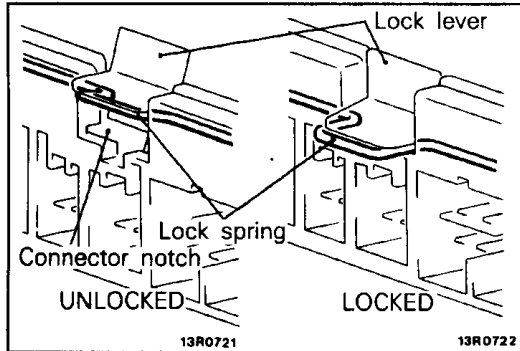
SERVICE POINTS OF INSTALLATION

6. INSTALLATION OF SRS DIAGNOSIS UNIT (SDU)

With the projection part of the SDU placed against the bracket as shown in the figure, securely install the SDU

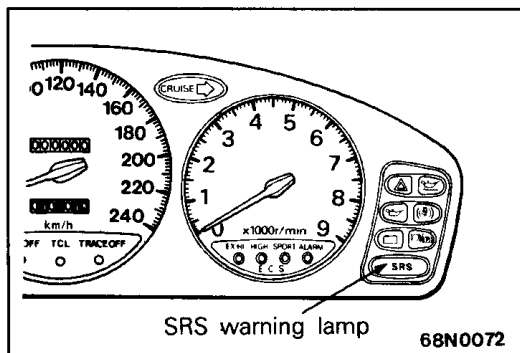
Caution

The SRS may not activate if SDU is not installed properly, which could result in serious injury or death to the vehicle's driver and passenger.



5. CONNECTION OF THE SDU AND EACH HARNESS CONNECTOR

After connecting each harness connector securely and correctly to the SDU, be sure to press down the lock lever of the SDU.

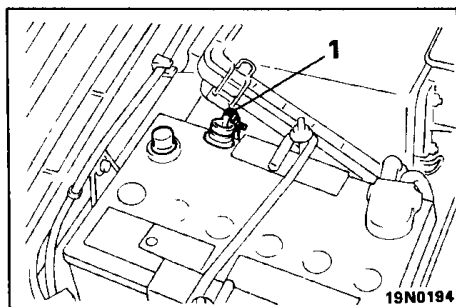


POST INSTALLATION INSPECTION

Reconnect the negative battery terminal. Turn the ignition key to the "ON" position. Does the "SRS" warning lamp illuminated for about 7 seconds, turn OFF and then remain extinguished for at least 45 seconds? If yes, SRS system is functioning properly. If no, consult page 52B-14.

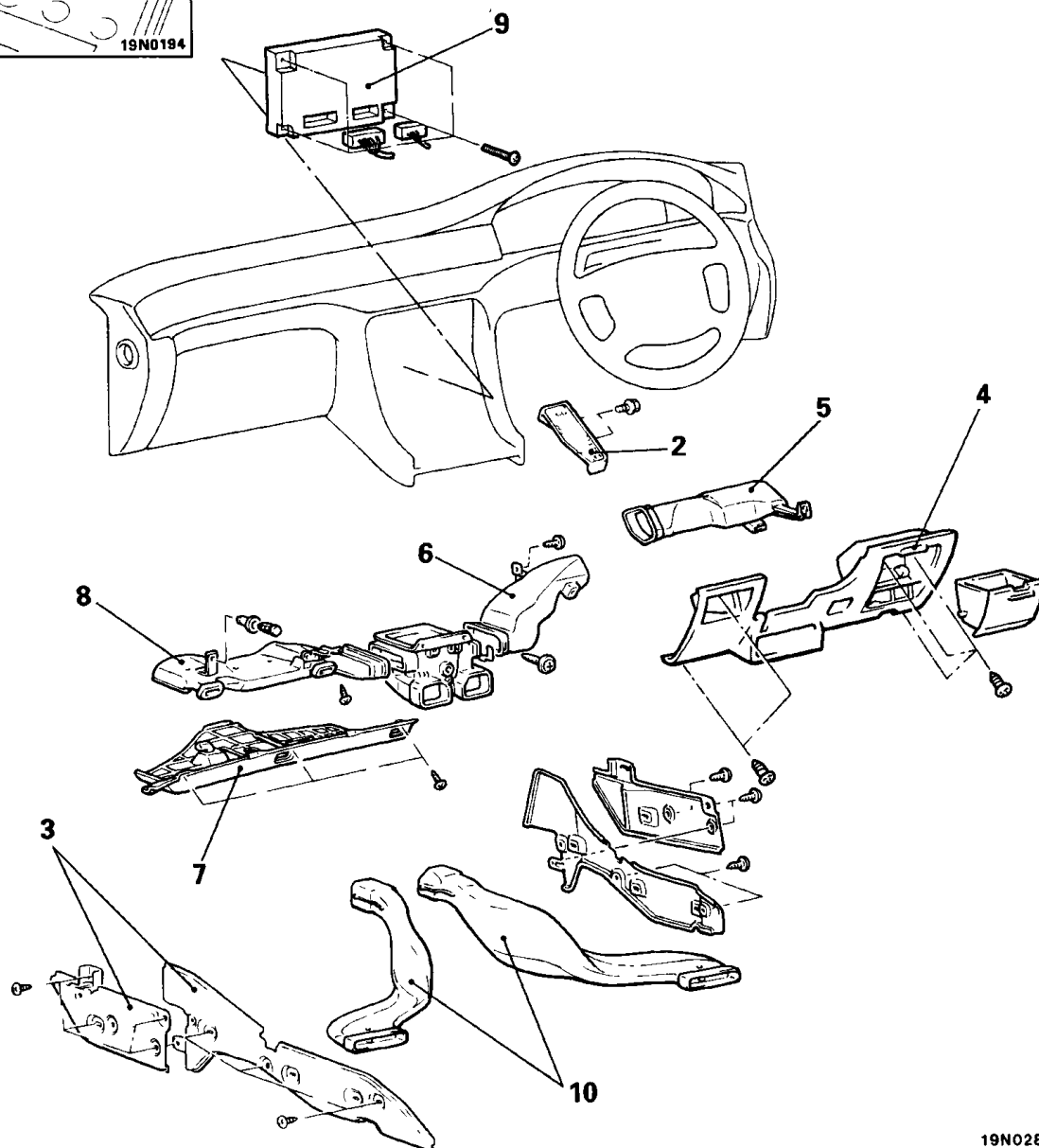
REMOVAL AND INSTALLATION

<R.H. DRIVE VEHICLES>



Pre-removal Operation

- Turn the ignition key to the "LOCK" Position.

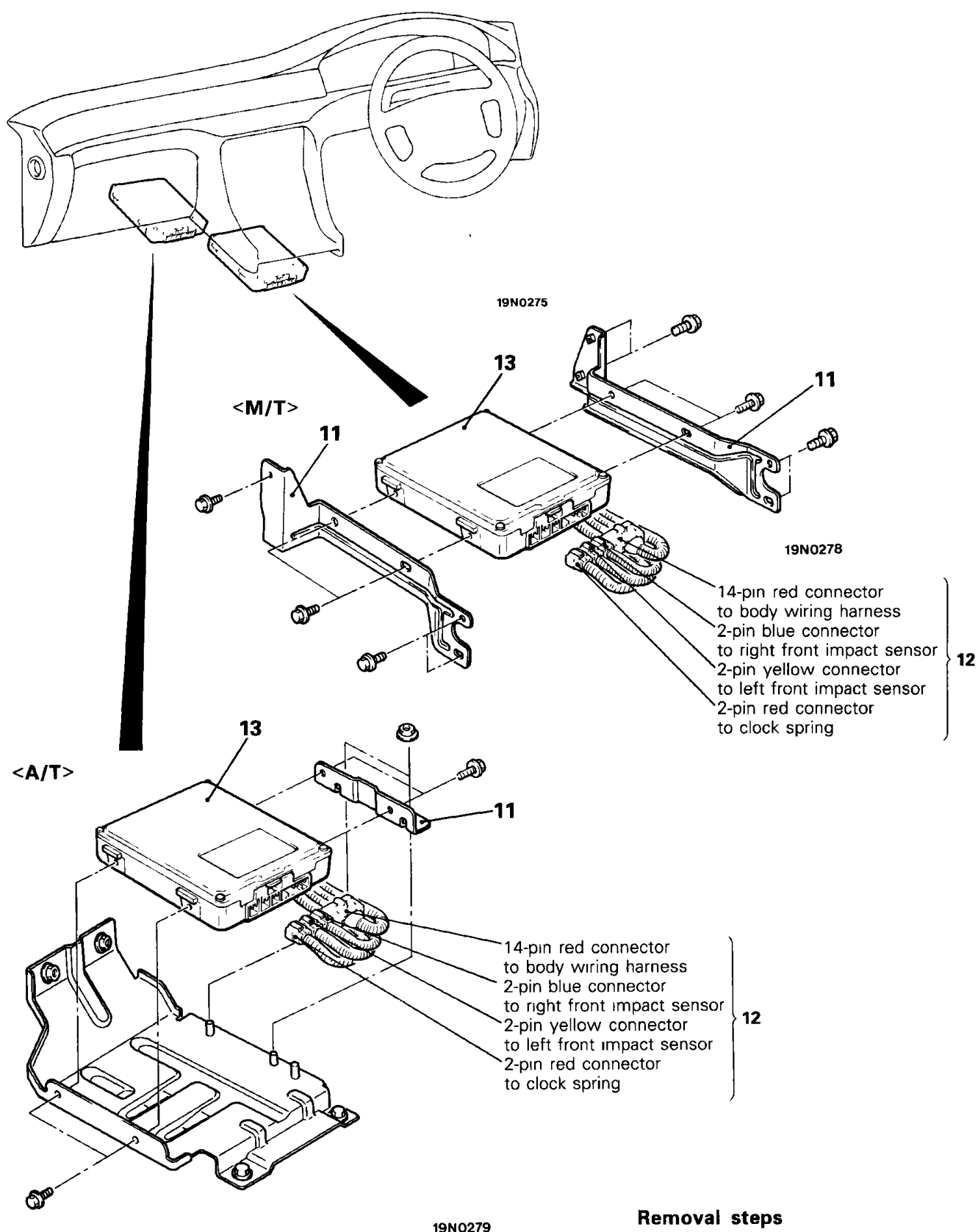


19N0287

Removal steps

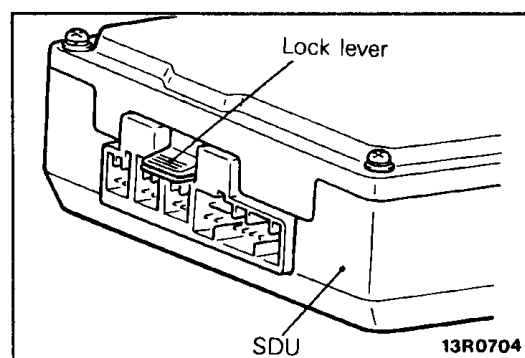
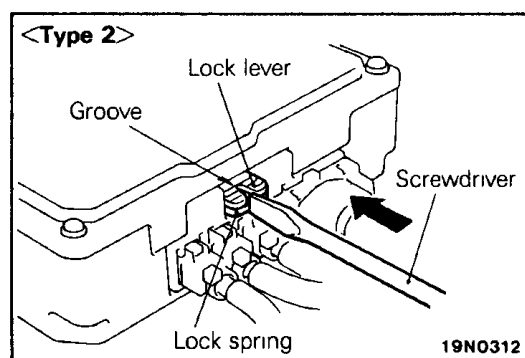
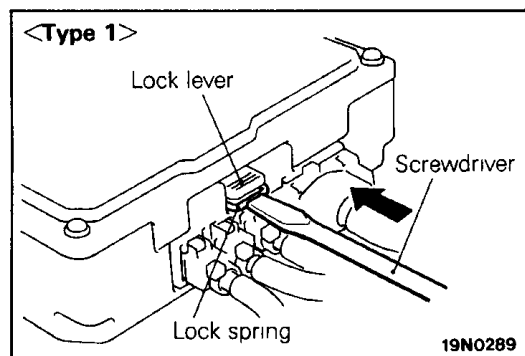
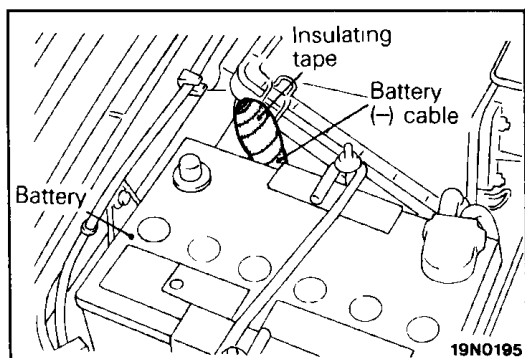
- ◆◆◆ Post-installation inspection
- ◆◆ 1. Connection of the negative (-) battery cable to the battery
- Radio and tape player (Refer to GROUP 54-Radio and Tape Player)
- 2. Foot rest
- 3. Front and rear reinforcement

- 4. Driver side lower panel
 - 5. Foot shower nozzle
 - 6. Foot shower duct (L.H.)
 - 7. Passenger side under cover
 - 8. Foot shower duct (R.H.)
 - 9. A/C control unit
 - 10. Rear heater duct
- <A/T>



Removal steps

11. SDU bracket
12. Connection of the SDU and each harness connector
13. SRS diagnosis unit (SDU)



SERVICE POINTS OF REMOVAL

1. DISCONNECTION OF THE NEGATIVE (-) BATTERY CABLE FROM THE BATTERY

Disconnect the negative battery cable and tape the terminal.

Caution

Wait at least 60 seconds after disconnecting the battery cable before doing any further work. (Refer to P.52B-9 No. 5.)

12. DISCONNECTION OF THE SDU AND EACH HARNESS CONNECTOR

Release the lock of SDU connector in accordance with the following procedure:

In case that there is no groove on the lock lever (Type 1)

Place a (-) screwdriver against the lock spring (metal section) of the connector lock lever as shown in the illustration, and push the spring horizontally toward the inside of the unit.

Caution

- (1) Do not use excessive force to raise the lock lever.
- (2) Do not insert the screwdriver into the gap between the lock lever and the lock spring.

In case that there is a groove on the lock lever (Type 2)

Place a (-) screwdriver against the lock spring (metal section) of the connector lock lever groove as shown in the illustration, and push it toward the inside of the unit.

Caution

Do not use excessive force to raise the lock lever.

INSPECTION

- Check the SDU case and brackets for dents, cracks or deformities.
- Check connectors and lock lever for damage, and terminals for deformities.

Caution

If a dent, cracks, deformation or rust discovered, replace the SDU with a new one.

NOTE

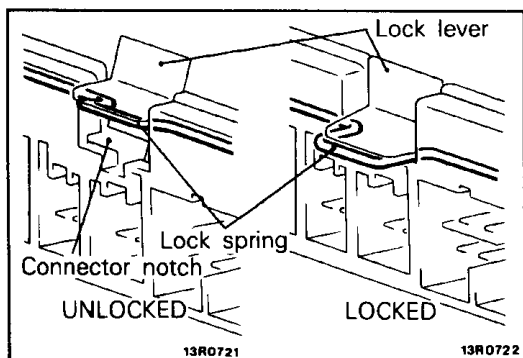
For checking of the SDU other than described above, refer to the section concerning troubleshooting. (Refer to P.52B-14.)

SERVICE POINTS OF INSTALLATION

13. INSTALLATION OF SRS DIAGNOSIS UNIT (SDU)

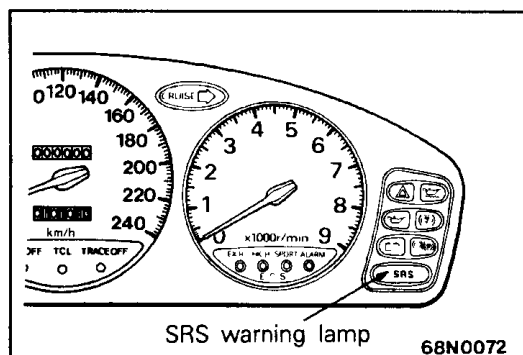
Caution

The SRS may not activate if SDU is not installed properly, which could result in serious injury or death to the vehicle's driver.



12. CONNECTION OF THE SDU AND EACH HARNESS CONNECTOR

After connecting each harness connector securely and correctly to the SDU, be sure to press down the lock lever of the SDU.



POST INSTALLATION INSPECTION

Reconnect the negative battery terminal. Turn the ignition key to the "ON" position. Does the "SRS" warning lamp illuminate for about 7 seconds, turn OFF and then remain extinguished for at least 45 seconds? If yes, SRS system is functioning properly. If no, consult page 52B-14.

AIR BAG MODULE AND CLOCK SPRING

Caution

1. Never attempt to disassemble or repair the air bag module or clock spring.
If faulty, replace it.
2. Do not drop the air bag module or clock spring or allow contact with water, grease or oil.
Replace it if a dent, crack, deformation or rust are detected.
3. The air bag module should be stored on a flat surface and placed so that the pad surface is facing upward.
Do not place anything on top of it.
4. Do not expose the air bag module to temperature over 93°C (200°F).
5. After deployment of an air bag, replace the clock spring with a new one.
6. Wear gloves and safety glasses when handling an air bag that has already deployed.
7. An undeployed air bag module should only be disposed of in accordance with the procedures [P.52B-102 – P.52B-109.].

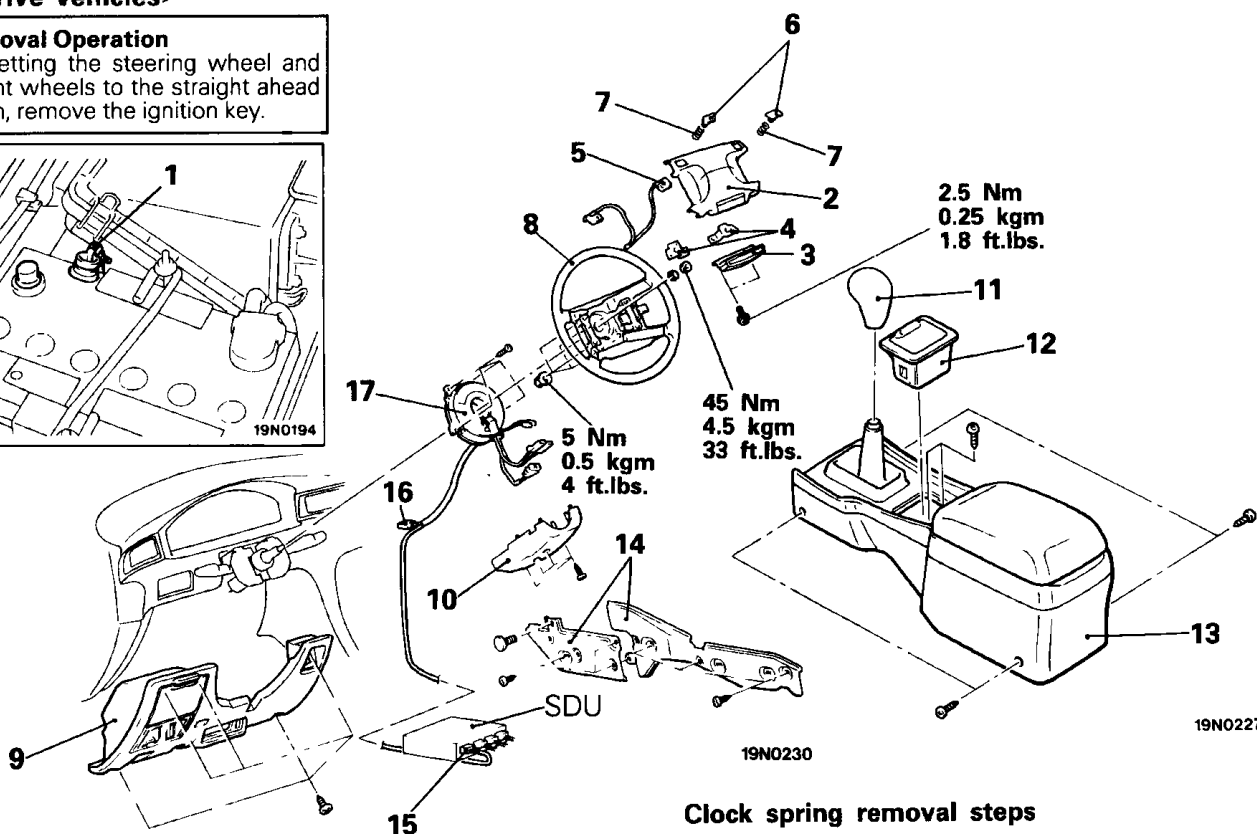
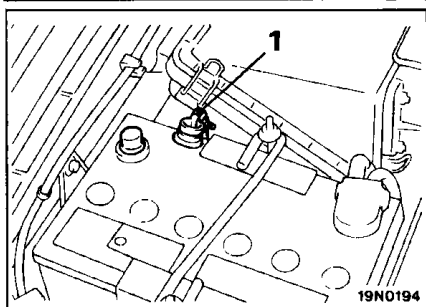
REMOVAL AND INSTALLATION

<Vehicles without front passenger's air bag>

<L.H. drive vehicles>

Pre-removal Operation

- After setting the steering wheel and the front wheels to the straight ahead position, remove the ignition key.



Air bag module removal steps

- Post-installation inspection
- 1. Connection of the negative (-) battery cable to the battery
- 2. Air bag module
- 3. Cover
- 4. Horn contact plate
- 5. Horn contact plate and wire
- 6. Horn button
- 7. Spring
- Pre-installation inspection

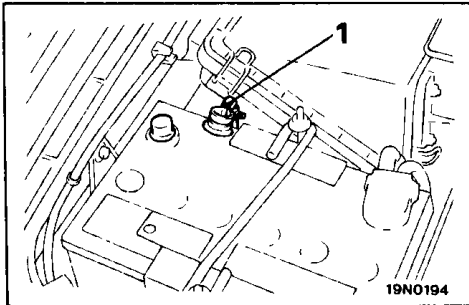
Clock spring removal steps

- Post-installation inspection
- 1. Connection of the negative (-) battery cable to the battery
- 2. Air bag module
- 8. Steering wheel
- 9. Driver side lower panel
- 10. Column cover lower
- 11. Shift lever knob (M/T)
- 12. Ashtray
- 13. Floor console
- 14. Centre reinforcement (LH)
- 15. Clock spring and SRS diagnosis unit connection
- 16. Clock spring and body wiring harness connection
- 17. Clock spring
- Pre-installation inspection

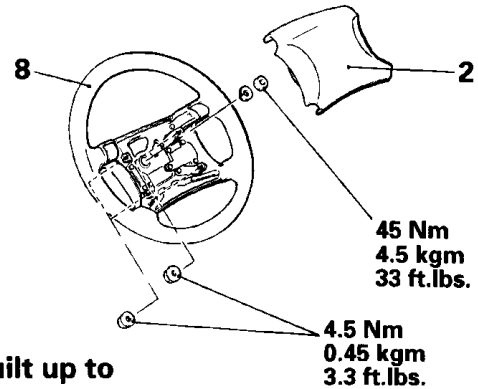
<R.H. drive vehicles>

Pre-removal Operation

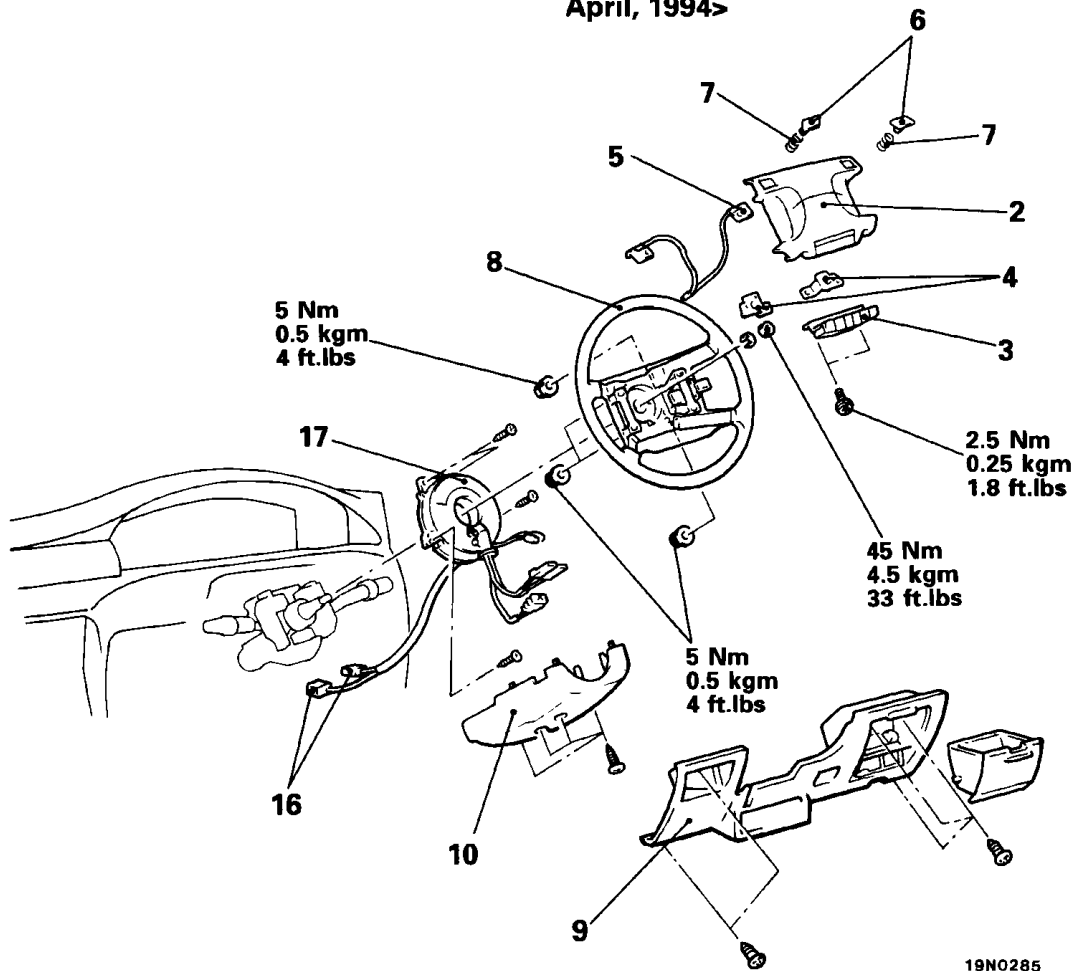
- After setting the steering wheel and the front wheels to the straight ahead position, remove the ignition key.



<Vehicles built from May, 1994>



<Vehicles built up to April, 1994>

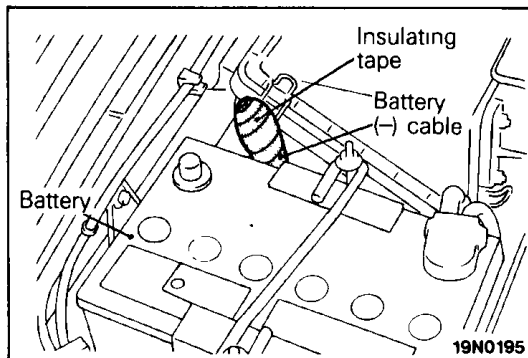


Air bag module removal step

- ◆◆◆ Post-installation inspection
- ◆◆ 1. Connection of the negative (–) battery cable to the battery
- ◆◆◆◆ 2. Air bag module
- ◆◆ 3. Cover
- ◆◆ 4. Horn contact plate
- ◆◆ 5. Horn contact plate and wire
- ◆◆ 6. Horn button
- ◆◆ 7. Spring
- ◆◆◆ Pre-installation inspection

Clock spring removal steps

- ◆◆◆ Post-installation inspection
- ◆◆ 1. Connection of the negative (–) battery cable to the battery
- ◆◆◆◆ 2. Air bag module
- ◆◆◆◆ 8. Steering wheel
- ◆◆ 9. Driver side lower panel
- ◆◆ 10. Column cover lower
- ◆◆ 16. Clock spring and body wiring harness connection
- ◆◆◆ 17. Clock spring
- ◆◆◆ Pre-installation inspection



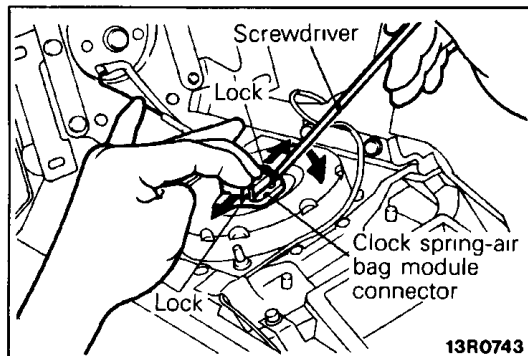
SERVICE POINTS OF REMOVAL

1. DISCONNECTION OF THE NEGATIVE (-) BATTERY CABLE FROM THE BATTERY

Disconnect the negative battery cable and tape the terminal.

Caution

Wait at least 60 seconds after disconnecting the battery cable before doing any further work. (Refer to P.52B-9 No. 5)

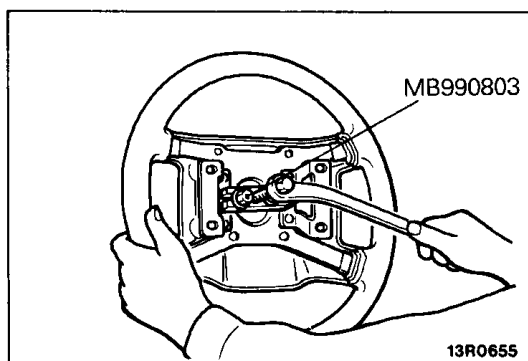
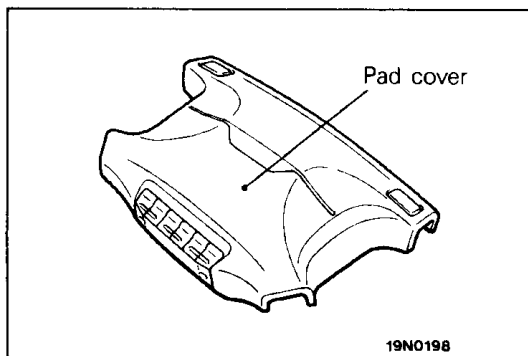


2. REMOVAL OF AIR BAG MODULE

- (1) Remove the air bag module mounting nut using a socket wrench from the back side.
- (2) When disconnecting the connector of the clock spring from the air bag module, press the air bag's lock toward the outer side to spread it open. Use a screwdriver, as shown in the figure at the left, to pry so as to remove the connector gently.

Caution

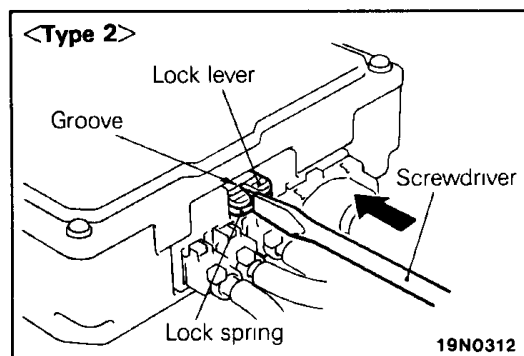
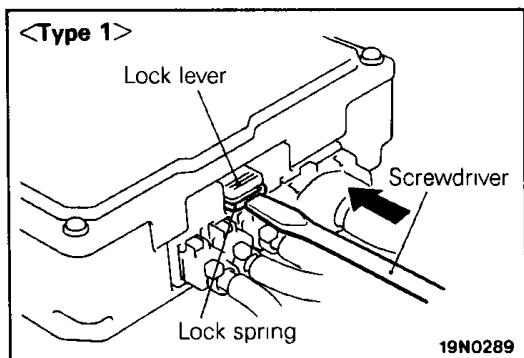
1. When disconnecting the air bag module-clock spring connector, take care not to apply excessive force to it.
2. The removed air bag module should be stored in a clean, dry place with the pad cover face up.



8. REMOVAL OF STEERING WHEEL

Caution

Do not hammer on the steering wheel. Doing so may damage the collapsible column mechanism.



15. DISCONNECTION OF THE CLOCK SPRING AND SRS DIAGNOSIS UNIT CONNECTOR <L.H. DRIVE VEHICLES>

- (1) Release the lock of SDU connector in accordance with the following procedure:

In case that there is no groove on the lock lever (Type 1)

Place a (–) screwdriver against the lock spring (metal section) of the connector lock lever as shown in the illustration, and push the spring horizontally toward the inside of the unit.

Caution

- (1) Do not use excessive force to raise the lock lever.
- (2) Do not insert the screwdriver into the gap between the lock lever and the lock spring.

In case that there is a groove on the lock lever (Type 2)

Place a (–) screwdriver against the lock spring (metal section) of the connector lock lever groove as shown in the illustration, and push it toward the inside of the unit.

Caution

Do not use excessive force to raise the lock lever.

- (2) Disconnect the clock spring connector (red 2-pin) from the SRS diagnosis unit.

INSPECTION

AIR BAG MODULE

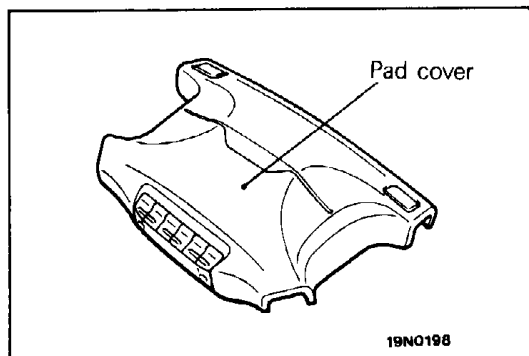
If any improper part is found during the following inspection, replace the air bag module with a new one.

Dispose of the old one according to the specified procedure. (Refer to P.52B-102 to P.52B-109.)

Caution

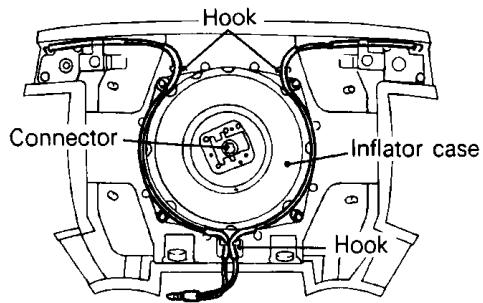
Never attempt to measure the circuit resistance of the air bag module (squib) even if you are using the specified tester. If the circuit resistance is measured with a tester, accidental air bag deployment will result in serious personal injury.

- (1) Check pad cover for dents, cracks or deformities.



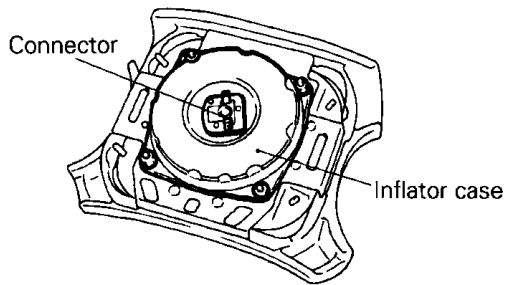
52B-92 SUPPLEMENTAL RESTRAINT SYSTEM (SRS) – Air Bag Module and Clock Spring

<Vehicles built up to April, 1994>



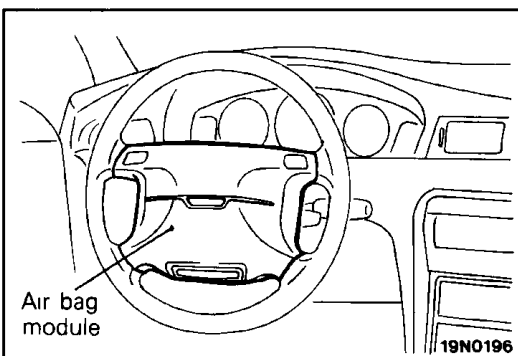
13R0737

<Vehicles built from May, 1994>

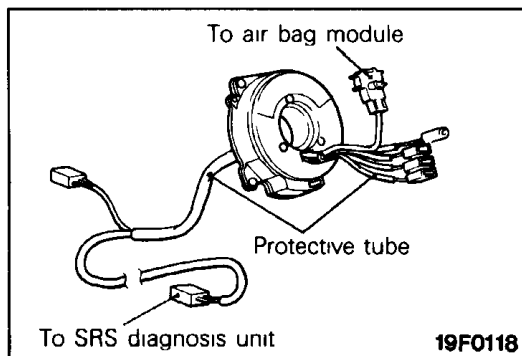


19L0515

- (2) Check the air bag module for denting, cracking or deformation.
- (3) Check hooks and connectors for damage, terminals for deformities, and harness for binds.
- (4) Check air bag inflator case for dents, cracks or deformities.



- (5) Install the air bag module to steering wheel to check fit or alignment with the wheel.

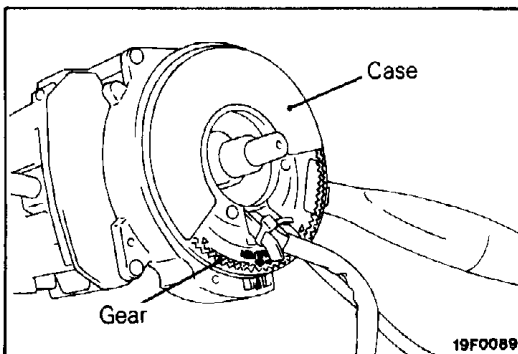


19F0118

CLOCK SPRING

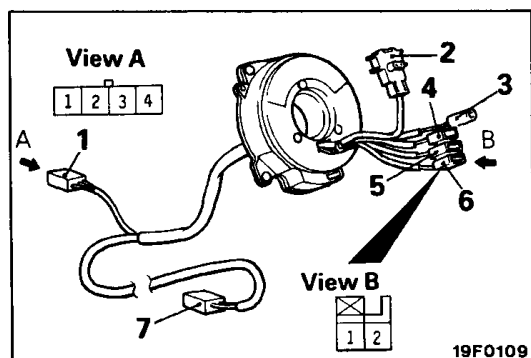
If, as result of following checks, even one abnormal point is discovered, replace the clock spring with a new one.

- (1) Check connectors and protective tube for damage, and terminals for deformities.



19F0089

- (2) Visually check the case and the gears for damage.

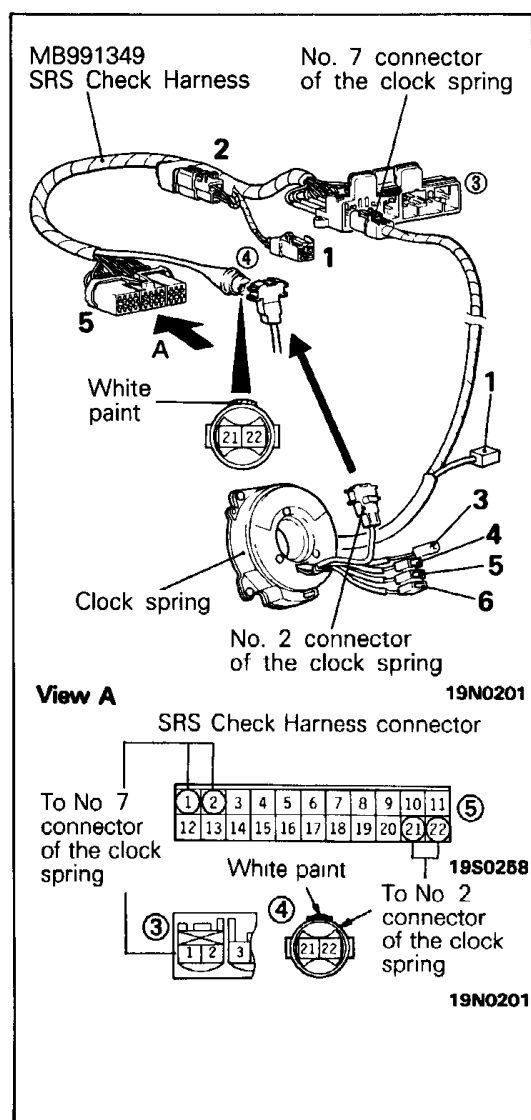


(3) Check for continuity between the No. 1 connector of the clock spring and connectors No. 3, 4, 5 and 6.

No 1 connector				No. 3 connector	No. 4 connector	No. 5 connector	No. 6 connector	
Terminal 1	Terminal 2	Terminal 3	Terminal 4				Terminal 1	Terminal 2
○	○	○	○	○	○	○	○	○
To cruise control unit	To ACC power	To horn relay	To radio	To horn switch	To steering remote control switch		To cruise control switch	

NOTE

○—○ indicates that there is continuity between the terminal.



(4) Check of resistance between the terminals.

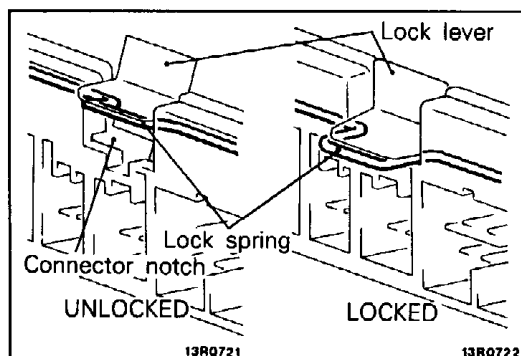
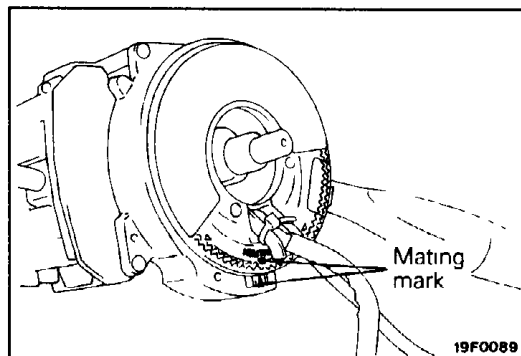
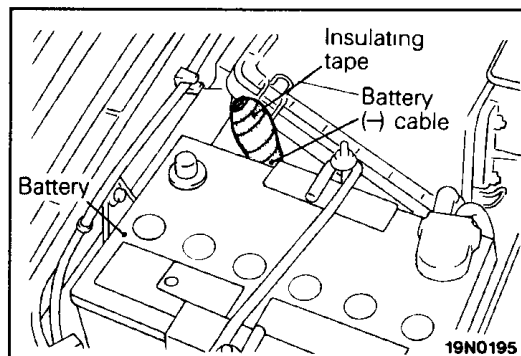
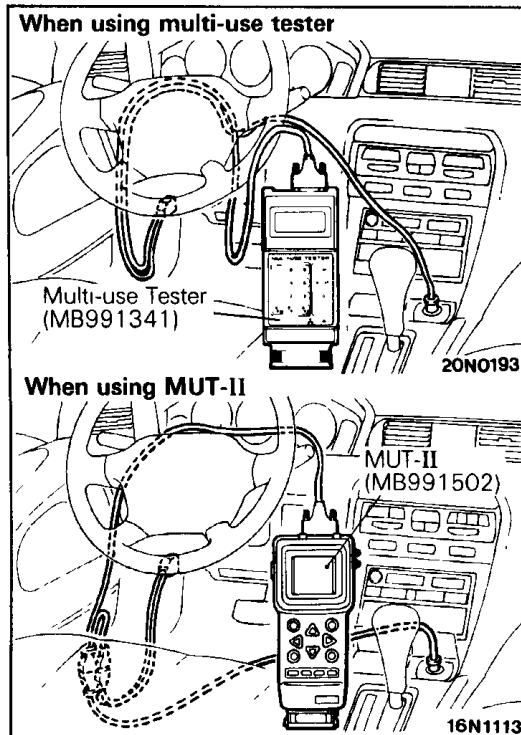
- Joint the No. 2 connector and No. 7 connector of the clock spring to connector ④ and connector ③, respectively, of the SRS Check Harness.

NOTE

When joining SRS Check Harness connector ④, align its white paint with the hollow portion of the No. 2 connector of the clock spring.

- Check for continuity between terminal 1 and terminal 22, and terminal 2 and terminal 21, of SRS Check Harness connector ⑤, using a digital multi-meter.

Standard value: less than 0.4Ω



SERVICE POINTS OF INSTALLATION

PRE-INSTALLATION INSPECTION

- (1) When installing the new air bag module and clock spring, refer to "INSPECTION".

Caution

Dispose of an air bag module only according to the specified procedure. (Refer to P.52B-102 to P.52B-109.)

- (2) Connect the Multi-use Tester or MUT-II to the diagnosis connector located at the right side of the junction block.

Caution

Make certain that the ignition switch is OFF when the Multi-use Tester is connected or disconnected.

- (3) Reconnect negative terminal of battery, and turn the ignition key to the "ON" position.
- (4) Conduct self-diagnosis using Multi-use Tester or MUT-II to ensure entire SRS operates properly, except open circuit of air bag module (Diagnosis code No. 22). (Refer to P.52B-14.)

- (5) Turn the ignition key to the "LOCK" position, disconnect the negative battery cable and tape the terminal.

Caution

Wait at least 60 seconds after disconnecting the battery cable before doing any further work. (Refer to P.52B-9 No. 5.)

17. INSTALLATION OF CLOCK SPRING

Align the mating mark and "NEUTRAL" position indicator of the clock spring, and, after turning the front wheels to the straight-ahead position, install the clock spring to the column switch.

Caution

If the clock spring's mating mark is not properly aligned, the steering wheel may not be completely rotational during a turn, or the flat cable within the clock spring may be severed, obstructing normal operation of the SRS and possibly leading to serious injury to the vehicle's driver.

15. CONNECTOR OF SRS DIAGNOSIS UNIT AND CLOCK SPRING HARNESS CONNECTOR **<L.H. DRIVE VEHICLES>**

After connecting the harness connector securely and correctly to the SRS diagnosis unit, be sure to press down the lock lever of the SRS diagnosis unit.

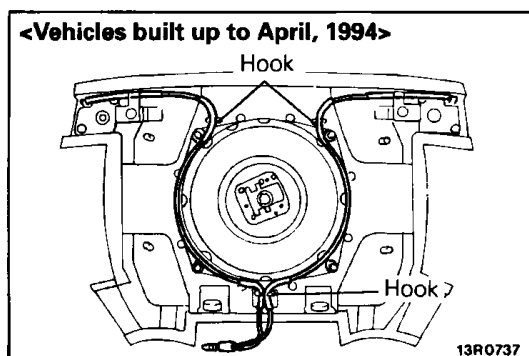
8. INSTALLATION OF STEERING WHEEL

- (1) Before installing the steering wheel, be sure to first turn the vehicle's front wheels to the straight-ahead position and align the mating mark and "NEUTRAL" position indicator of the clock spring.

Caution

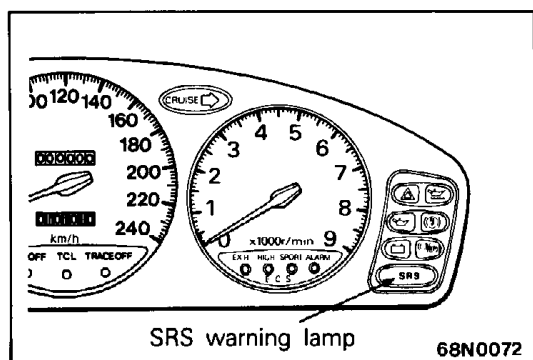
Be sure when installing the steering wheel, that the harness of the clock spring does not become caught or tangled.

- (2) After clamping, turn the steering wheel all the way in both directions to confirm that steering is normal.



2. INSTALLATION OF AIR BAG MODULE

- (1) For vehicles built up to April, 1994, arrange the wiring of the horn switch as shown in the figure at the left, and hook up in place.
- (2) Install the air bag module, taking care that no wiring is caught by it.



POST-INSTALLATION INSPECTION

- (1) After installing the clock spring, the steering wheel, the column covers and the air bag module, check steering wheel of noise, binds or difficult operation.
- (2) Reconnect the negative battery terminal. Turn the ignition key to the "ON" position. Does the "SRS" warning lamp illuminate for about 7 seconds, turn OFF and then remain extinguished for at least 45 seconds? If yes, SRS system is functioning properly. If no, consult page 52B-14.

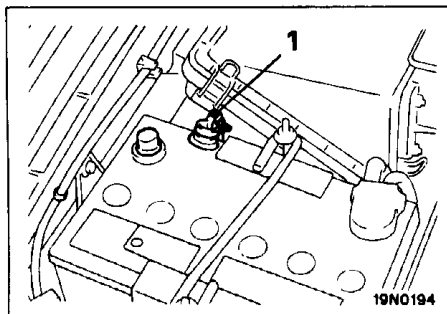
REMOVAL AND INSTALLATION

<Vehicles with front passenger's air bag>

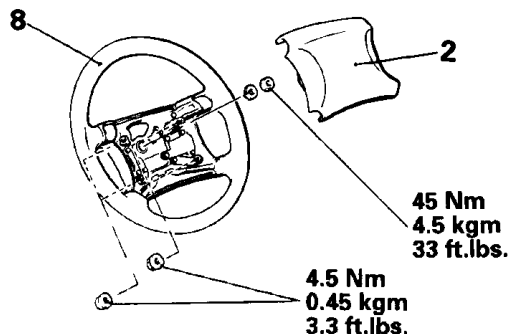
<Driver's side>

Pre-removal Operation

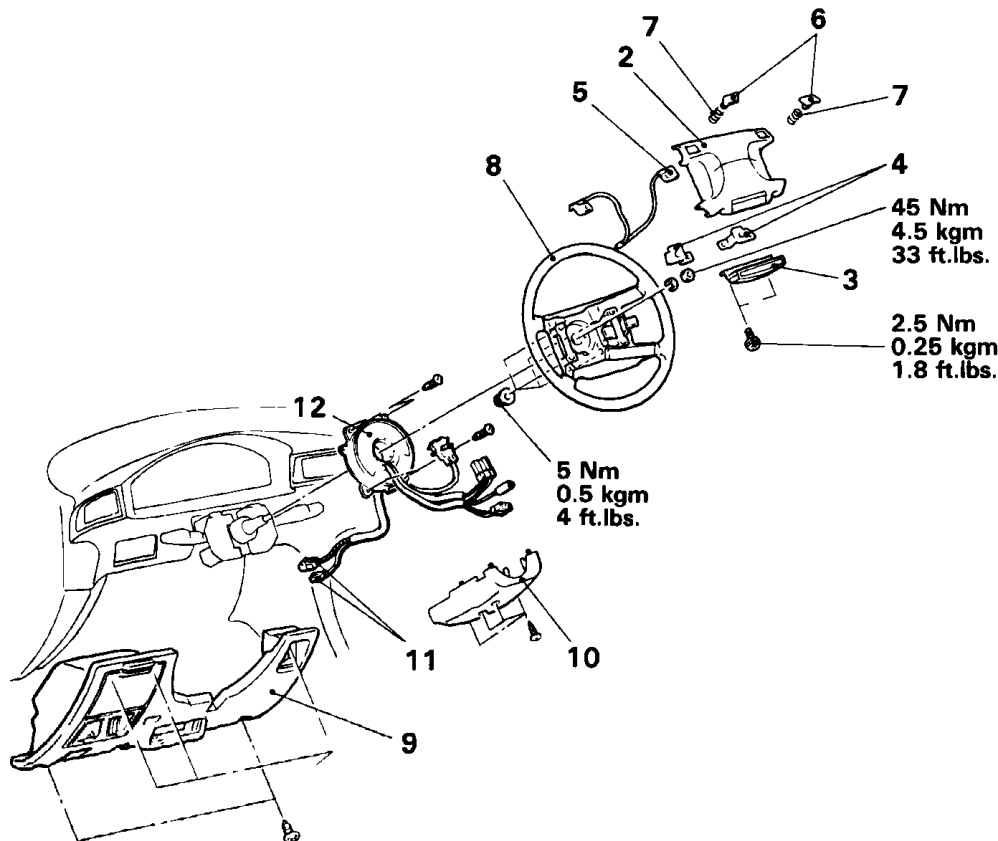
- After setting the steering wheel and the front wheels to the straight ahead position, remove the ignition key



<Vehicles built from May, 1994>



<Vehicles built up to April, 1994>



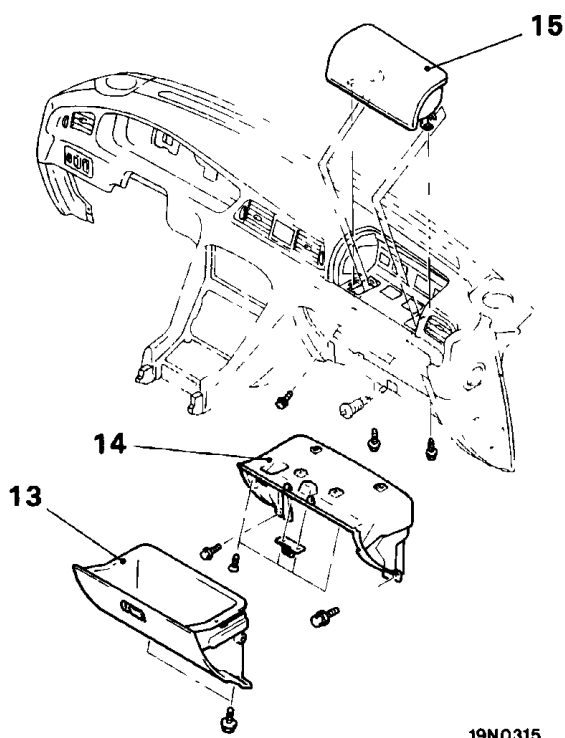
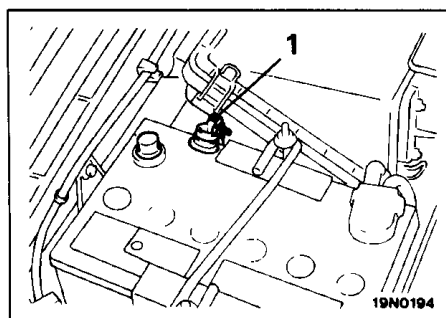
Air bag module (driver's side) removal steps

- ◆◆ ● Post-installation inspection
- ◆◆ 1. Connection of the negative (-) battery cable to the battery
- ◆◆ 2. Air bag module
- ◆◆ 3. Cover
- ◆◆ 4. Horn contact plate
- ◆◆ 5. Horn contact plate and wire
- ◆◆ 6. Horn button
- ◆◆ 7. Spring
- ◆◆ ● Pre-installation inspection

Clock spring removal steps

- ◆◆ ● Post-installation inspection
- ◆◆ 1. Connection of the negative (-) battery cable to the battery
- ◆◆ 2. Air bag module
- ◆◆ 8. Steering wheel
- ◆◆ 9. Driver side lower panel
- ◆◆ 10. Column cover lower
- ◆◆ 11. Clock spring and body wiring harness connection
- ◆◆ 12. Clock spring
- ◆◆ ● Pre-installation inspection

<Front passenger's side>

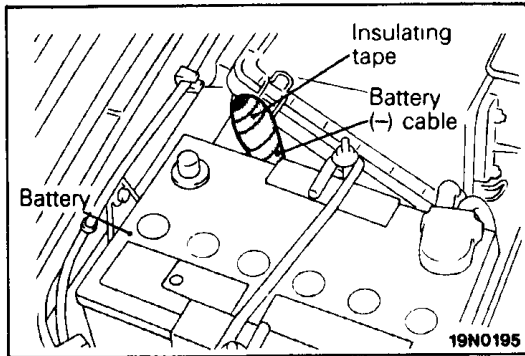


**Air bag module (front passenger's side)
removal steps**

- ◆◆ ● Post-installation inspection
- ◆◆ 1. Connection of the negative (-) battery cable to the battery
- 13. Glove box

- ◆◆ 14. Glove box outer case
- ◆◆ 15. Air bag module (front passenger's side)
- ◆◆ ● Pre-installation inspection

NOTES



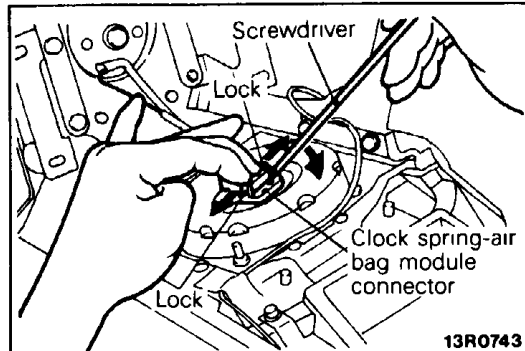
SERVICE POINTS OF REMOVAL

1. DISCONNECTION OF THE NEGATIVE (-) BATTERY CABLE FROM THE BATTERY

Disconnect the negative battery cable and tape the terminal.

Caution

Wait at least 60 seconds after disconnecting the battery cable before doing any further work. (Refer to P.52B-9 No. 5)

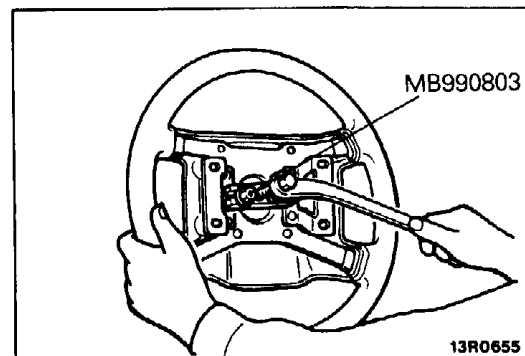
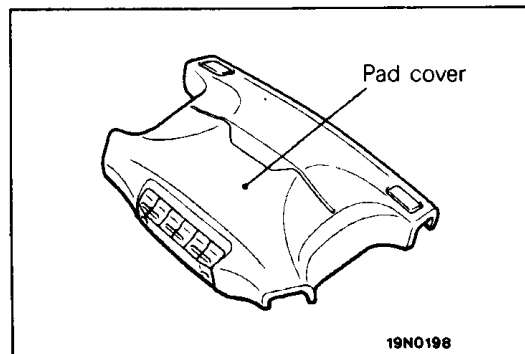


2. REMOVAL OF AIR BAG MODULE (DRIVER'S SIDE)

- (1) Remove the air bag module (driver's side) mounting nut using a socket wrench from the back side.
- (2) When disconnecting the connector of the clock spring from the air bag module (driver's side), press the air bag's lock toward the outer side to spread it open. Use a screwdriver, as shown in the figure at the left, to pry so as to remove the connector gently.

Caution

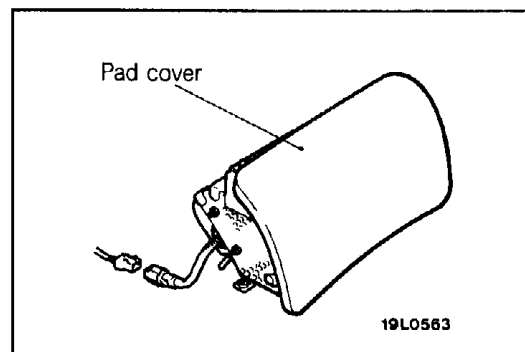
1. When disconnecting the air bag module-clock spring connector, take care not to apply excessive force to it.
2. The removed air bag module should be stored in a clean, dry place with the pad cover face up.



8. REMOVAL OF STEERING WHEEL

Caution

Do not hammer on the steering wheel. Doing so may damage the collapsible column mechanism.



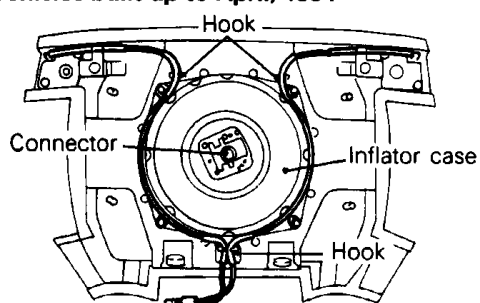
15. REMOVAL OF AIR BAG MODULE (FRONT PASSENGER'S SIDE)

Caution

The removed air bag module should be stored in a clean, dry place with the pad cover face up.

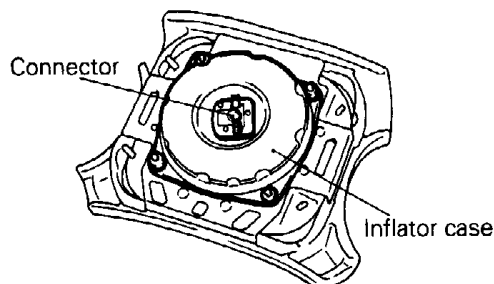
<Driver's side>

Vehicles built up to April, 1994



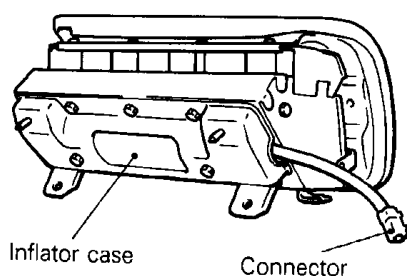
13R0737

Vehicles built from May, 1994

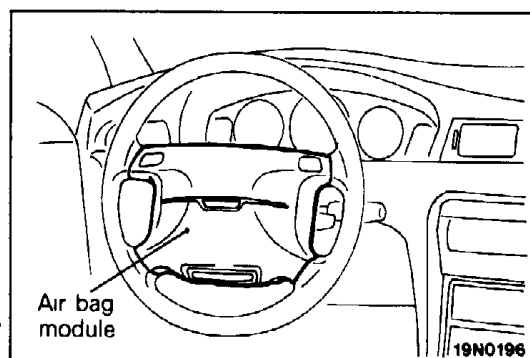


19L0515

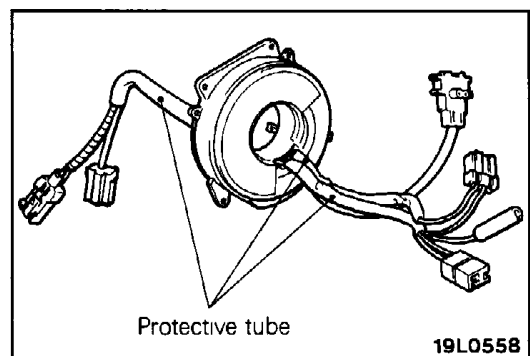
<Front passenger's side>



19L0505



19N0196



19L0558

INSPECTION

AIR BAG MODULES

If any improper part is found during the following inspection, replace the air bag modules with a new one. Dispose of the old one according to the specified procedure. (Refer to P.52B-102 to P.52B-109.)

Caution

Never attempt to measure the circuit resistance of the air bag module (squib) even if you are using the specified tester. If the circuit resistance is measured with a tester, accidental air bag deployment will result in serious personal injury.

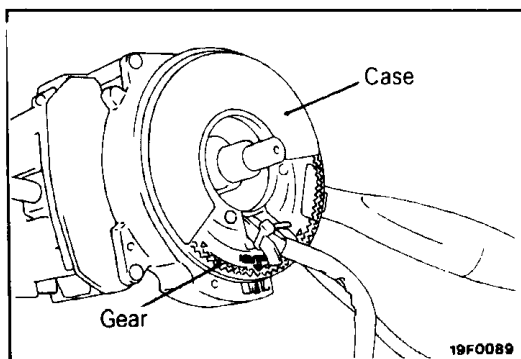
- (1) Check pad cover for dents, cracks or deformities.
- (2) Check the air bag module for denting, cracking or deformation.
- (3) Check hooks and connectors for damage, terminals for deformities, and harness for binds.
- (4) Check air bag inflator case for dents, cracks or deformities.

- (5) Install the air bag module (driver's side) to steering wheel to check fit or alignment with the wheel.

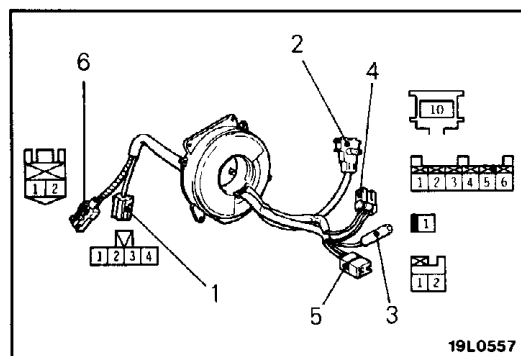
CLOCK SPRING

If, as result of following checks, even one abnormal point is discovered, replace the clock spring with a new one.

- (1) Check connectors and protective tube for damage, and terminals for deformities.



(2) Visually check the case and the gears for damage.



(3) Check for continuity between the No 1 connector of the clock spring and connectors No 3, 4 and 5

No. 1 connector				No. 3 connector	No. 4 connector		No. 5 connector	
Terminal 1	Terminal 2	Terminal 3	Terminal 4		Terminal 4	Terminal 6	Terminal 1	Terminal 2
○	○	○	○	○	○	○	○	○
To cruise control unit	To ACC power	To horn relay	To radio	To horn switch	To steering remote control switch	To cruise control switch		

NOTE

○—○ indicates that there is continuity between the terminal.

(4) Check of resistance between the terminals.

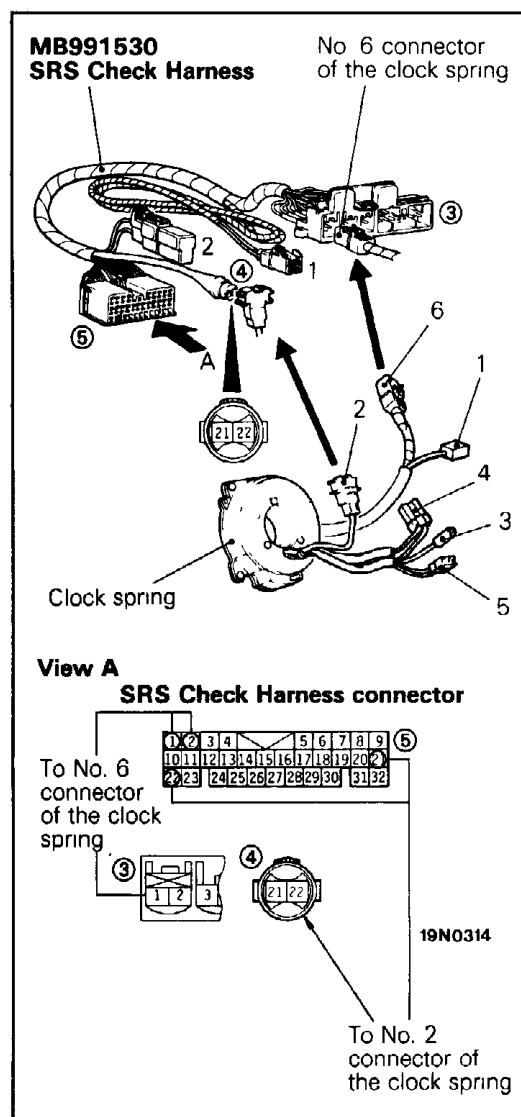
- Joint the No 2 connector and No. 6 connector of the clock spring to connector (4) and connector (3), respectively, of the SRS Check Harness.

NOTE

When joining SRS Check Harness connector (4), align its white paint with the hollow portion of the No. 2 connector of the clock spring.

- Check for continuity between terminal 1 and terminal 22, and terminal 2 and terminal 21, of SRS Check Harness connector (5), using a digital multi-meter.

Standard value: less than 0.4Ω



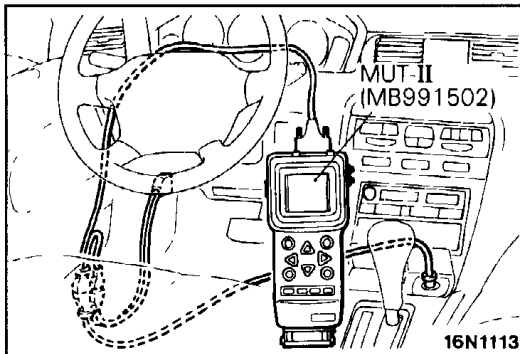
SERVICE POINTS OF INSTALLATION

PRE-INSTALLATION INSPECTION

- (1) When installing the new air bag modules and clock spring, refer to "INSPECTION".

Caution

Dispose of an air bag module only according to the specified procedure. (Refer to P.52B-102 to P.52B-109.)

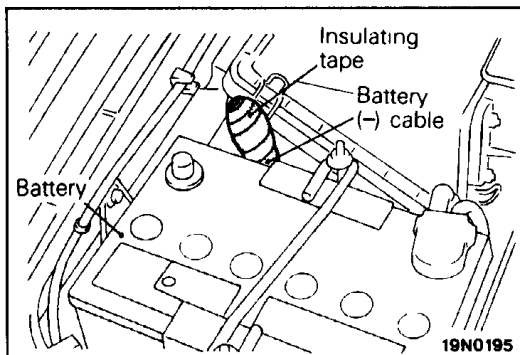


- (2) Connect the MUT-II to the diagnosis connector located at the right side of the junction block.

Caution

Make certain that the ignition switch is OFF when the MUT-II is connected or disconnected.

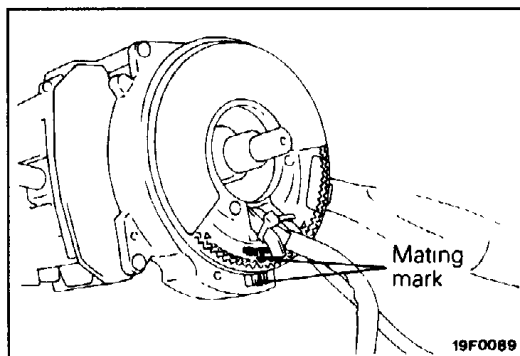
- (3) Reconnect negative terminal of battery, and turn the ignition key to the "ON" position.
- (4) Conduct self-diagnosis using MUT-II to ensure entire SRS operates properly, except open circuit of air bag module (Diagnosis code No. 22 and 25). (Refer to P.52B-14.)



- (5) Turn the ignition key to the "LOCK" position, disconnect the negative battery cable and tape the terminal.

Caution

Wait at least 60 seconds after disconnecting the battery cable before doing any further work. (Refer to P.52B-9 No. 5.)



17. INSTALLATION OF CLOCK SPRING

Align the mating mark and "NEUTRAL" position indicator of the clock spring, and, after turning the front wheels to the straight-ahead position, install the clock spring to the column switch.

Caution

If the clock spring's mating mark is not properly aligned, the steering wheel may not be completely rotational during a turn, or the flat cable within the clock spring may be severed, obstructing normal operation of the SRS and possibly leading to serious injury to the vehicle's driver.

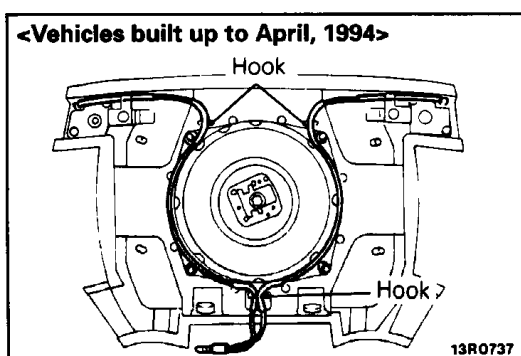
8. INSTALLATION OF STEERING WHEEL

- (1) Before installing the steering wheel, be sure to first turn the vehicle's front wheels to the straight-ahead position and align the mating mark and "NEUTRAL" position indicator of the clock spring.

Caution

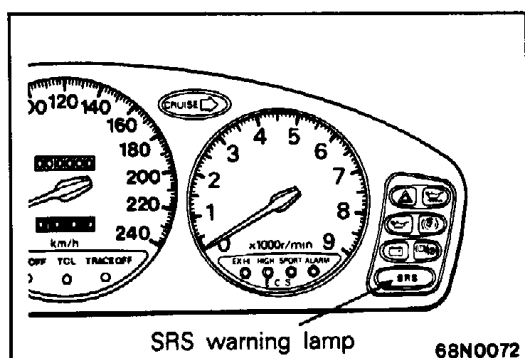
Be sure when installing the steering wheel, that the harness of the clock spring does not become caught or tangled.

- (2) After clamping, turn the steering wheel all the way in both directions to confirm that steering is normal.



2. INSTALLATION OF AIR BAG MODULE (DRIVER'S SIDE)

- (1) For vehicles built up to April, 1994, arrange the wiring of the horn switch as shown in the figure at the left, and hook up in place.
- (2) Install the air bag module, taking care that no wiring is caught by it.



POST-INSTALLATION INSPECTION

- (1) After installing the clock spring, the steering wheel, the column covers and the air bag module (driver's side), check steering wheel of noise, binds or difficult operation.
- (2) Reconnect the negative battery terminal. Turn the ignition key to the "ON" position. Does the "SRS" warning lamp illuminate for about 7 seconds, turn OFF and then remain extinguished for at least 45 seconds? If yes, SRS system is functioning properly. If no, consult page 52B-14.

AIR BAG MODULE DISPOSAL PROCEDURES

E52UAAAa

Before either disposing of a vehicle equipped with an air bag, or prior to disposing of the air bag

module, be sure to first follow the procedures described below to and deploy the air bag.

UNDEPLOYED AIR BAG MODULE DISPOSAL

Caution

1. If the vehicle is to be scrapped, or otherwise disposed of, deploy the air bag inside the vehicle.
If the vehicle will continue to be operated and only the air bag module is to be disposed of, deploy the air bag outside the vehicle.
2. Since a large amount of smoke is produced when the air bag is deployed, select a well-ventilated site. Moreover, never attempt the test near a smoke sensor.
3. Since there is a loud noise when the air bag is deployed, avoid residential areas whenever possible. If anyone is nearby, give warning of the impending noise.
4. Suitable ear protection must be worn by personnel performing these procedures or by people in the surrounding area.

1. DEPLOYMENT INSIDE THE VEHICLE (when disposing a vehicle)

FOR VEHICLES WITHOUT FRONT PASSENGER'S AIR BAG (L.H. DRIVE VEHICLES)

- (1) Open all windows and doors of the vehicle. Move the vehicle to an isolated spot.
- (2) Disconnect the negative (–) and positive (+) battery cables from the battery terminals, and then remove the battery from the vehicle.

Caution

Wait at least 60 seconds after disconnecting the battery cables before doing any further work. (Refer to P.52B-9 No. 5.)

- (3) Remove the floor console assembly (Refer to GROUP 52 – Floor Console.)

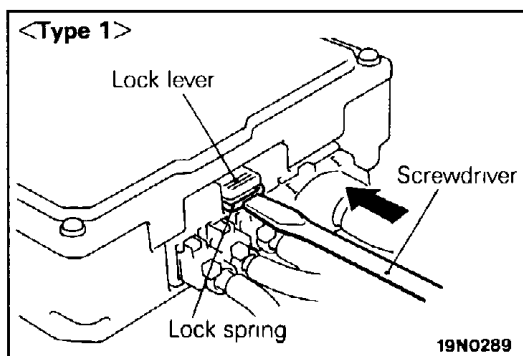
- (4) Release the lock of SDU connector in accordance with the following procedure.

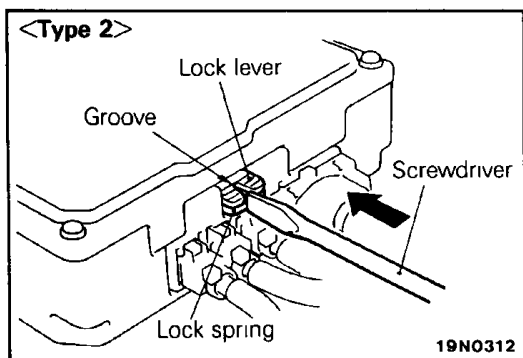
In case that there is no groove on the lock lever (Type 1)

Place a (–) screwdriver against the lock spring (metal section) of the connector lock lever as shown in the illustration, and push the spring horizontally toward the inside of the unit

Caution

- (1) Do not use excessive force to raise the lock lever.
- (2) Do not insert the screwdriver into the gap between the lock lever and the lock spring.



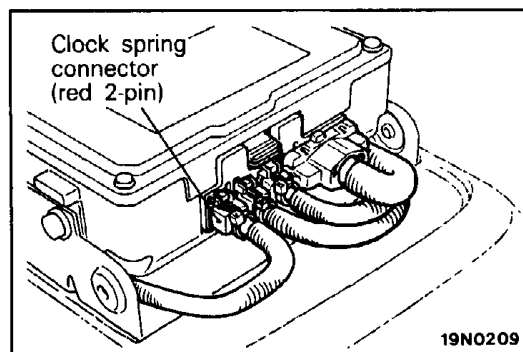


In case that there is a groove on the lock lever (Type 2)

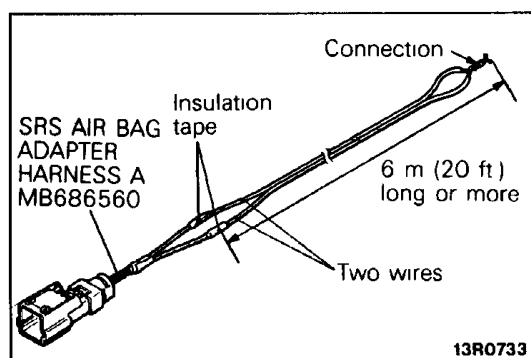
Place a (–) screwdriver against the lock spring (metal section) of the connector lock lever groove as shown in the illustration, and push it toward the inside of the unit.

Caution

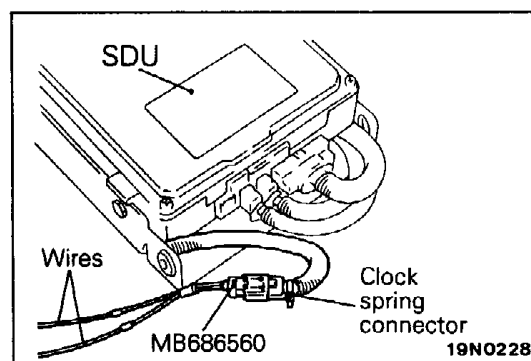
Do not use excessive force to raise the lock lever.



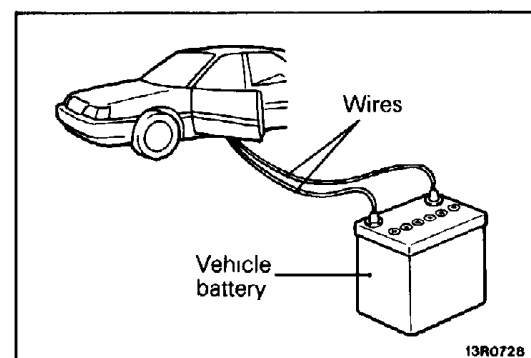
- (5) Disconnect the clock spring connector from the SRS diagnosis unit.



- (6) Connect two wires, each six meters (20 feet) long or more, to the two leads of SRS AIR BAG ADAPTER HARNESS A and cover the connections with insulation tape. The other ends of the two wires should be connected to each other (short-circuited), to prevent sudden unexpected deployment of the air bag.



- (7) Connect the SRS AIR BAG ADAPTER HARNESS A to the clock spring connector (which has been disconnected from the SRS diagnosis unit), and then lead the two connected wires outside the vehicle



- (8) At a location as far away from the vehicle as possible, disconnect the two connected wires from each other, and connect them to the two terminals of the battery (removed from the vehicle) to deploy the air bag.

Caution

- Before deploying the air bag in this manner, first check to be sure that there is no one in or near the vehicle. Wear safety glasses.**
- The inflator will be quite hot immediately following the deployment, so wait at least 30 minutes to allow it to cool before attempting to handle it.**

Although not poisonous, do not inhale gas from air bag deployment.

See Deployed Air Bag Module Disposal Procedures (P.52B-109) for post-deployment handling instructions.

3. If the air bag module fails to deploy when the procedures above are followed, do not go near the module.

Contact your local distributor.

FOR VEHICLES WITHOUT FRONT PASSENGER'S AIR BAG (R.H. DRIVE VEHICLES) AND VEHICLES WITH FRONT PASSENGER'S AIR BAG

- (1) Open all windows and doors of the vehicle, Move the vehicle to an isolated spot.
- (2) Disconnect the negative (–) and positive (+) battery cables from the battery terminals, and then remove the battery from the vehicle.

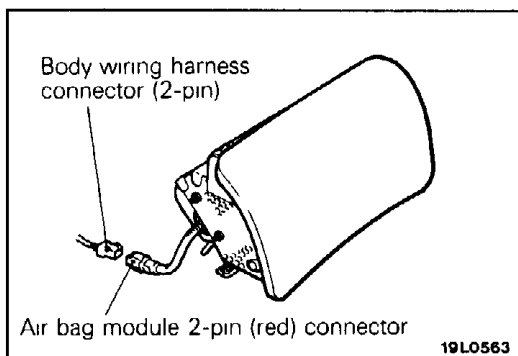
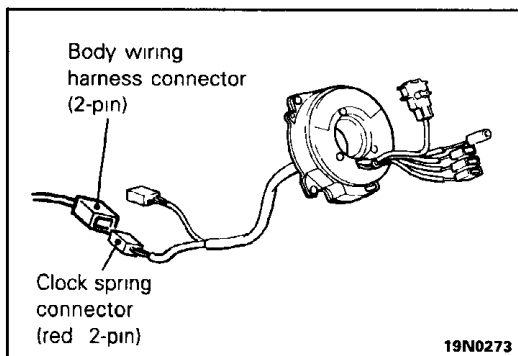
Caution

Wait at least 60 seconds after disconnecting the battery cables before doing any further work. (Refer to P.52B-9 No. 5.)

- (3) WHEN THE AIR BAG (DRIVER'S SIDE) IS DEPLOYED

Remove the steering column cover lower.

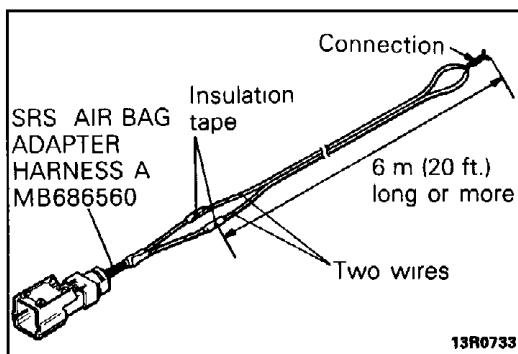
Remove the connection between the clock spring connector (red 2-pin) and the body wiring harness connector.



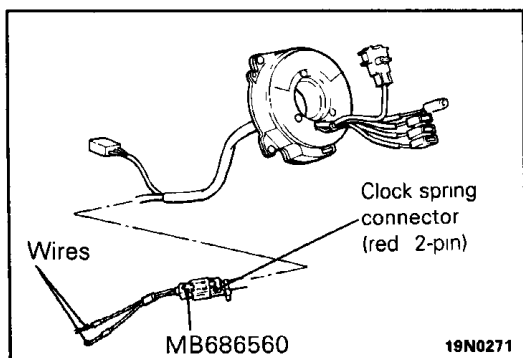
WHEN THE AIR BAG (FRONT PASSENGER'S SIDE) IS DEPLOYED

Remove the glove box and glove box outer case.

Remove the connection between the air bag module (front passenger's side) connector (red 2-pin) and the body wiring harness connector

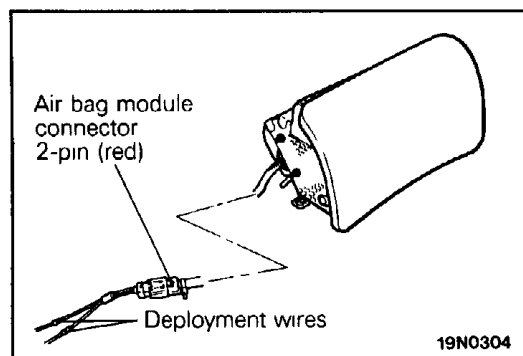


- (4) Connect two wires, each six meters (20 feet) long or more, to the two leads of SRS AIR BAG ADAPTER HARNESS A and cover the connections with insulation tape. The other ends of the two wires should be connected to each other (short-circuited), to prevent sudden unexpected deployment of the air bag.



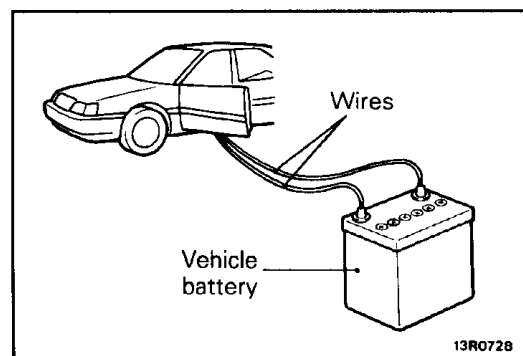
(5) WHEN THE AIR BAG (DRIVER'S SIDE) IS DEPLOYED

Connect the SRS AIR BAG ADAPTER HARNESS A to the clock spring connector (red 2-pin) and then lead the two connected wires outside the vehicle.



WHEN THE AIR BAG (FRONT PASSENGER'S SIDE) IS DEPLOYED

Connect the SRS AIR BAG ADAPTER HARNESS A to the air bag module (front passenger's side) connector (red 2-pin) and then lead the two connected wires outside the vehicle.



- (6) At a location as far away from the vehicle as possible, disconnect the two connected wires from each other, and connect them to the two terminals of the battery (removed from the vehicle) to deploy the air bag.

Caution

1. Before deploying the air bag in this manner, first check to be sure that there is not one in or near the vehicle. Wear safety glasses.
2. The inflator will be quite hot immediately following the deployment, so wait at least 30 minutes to allow it to cool before attempting to handle it.
Although not poisonous, do not inhale gas from air bag deployment.
See Deployed Air Bag Module Disposal Procedures (P.52B-109) for post-deployment handling instructions.
3. If the air bag module fails to deploy when the procedures above are followed do not go near the module.
Contact your local distributor.

2. DEPLOYMENT OUTSIDE THE VEHICLE

Caution

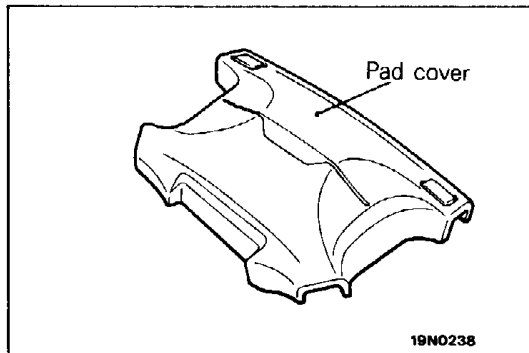
1. Should be carried out in a wide, flat area at least 6 m (20 feet) away from obstacles and other people.
2. Do not perform deployment outside, if a strong wind is blowing, and if there is even a slight breeze, the air bag module should be placed and deployed downwind from the battery.

When the air bag (driver's side) is deployed

- (1) Disconnect the negative (–) and positive (+) battery cables from the battery terminals, and then remove the battery from the vehicle.

Caution

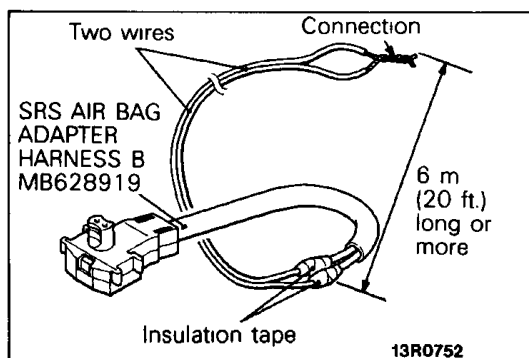
Wait at least 60 seconds after disconnecting the battery cables before doing any further work. (Refer to P.52B-9 No. 5.)



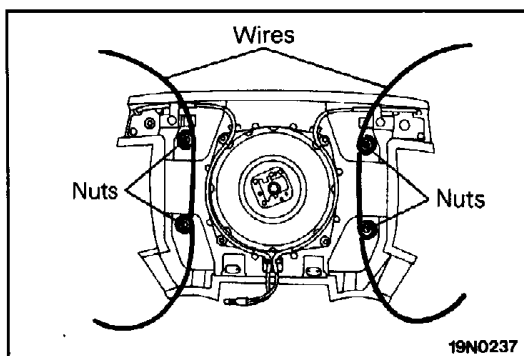
- (2) Remove the air bag module for the vehicle. (Refer to P.52B-88.)

Caution

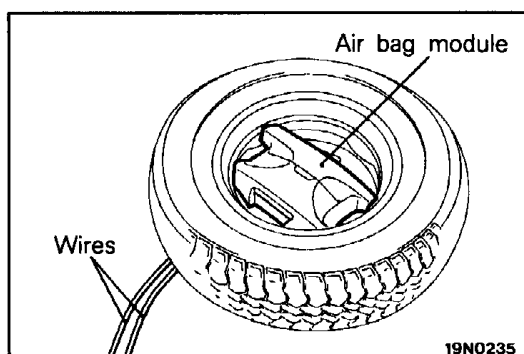
The air bag module should be stored on a flat surface and placed so that the pad cover face up. Do not place anything on top of it.



- (3) Connect two wires, each six meters (20 feet) long or more, to the two leads of SRS AIR BAG ADAPTER HARNESS B, and cover the connections with insulation tape. The other ends of the two wires should be connected to each other (short-circuited), to prevent sudden unexpected deployment of the air bag.



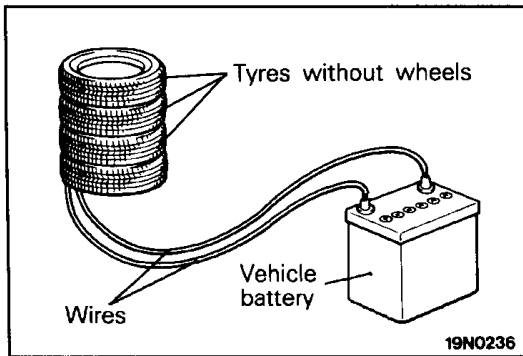
- (4) Install nuts that are no longer needed to the four bolts on the rear side of the air bag module, and tie on some thick wire to secure to the wheel.
- (5) Take the SRS air bag adaptor harness B that is connected to the wires, pass it beneath the old tyre that is attached to the wheel, and connect it to the air bag module.



- (6) Insert the air bag module into the wheel on which the old tyre has been installed, and secure it with the wires that are tied to the bolts, with the air bag facing upward.

Caution

Leave some space below the wheel for the adaptor harness. If there is no space, the reaction when the air bag deploys could damage the adaptor harness.



- (7) Place three old tyres with no wheels on top of the tyre secured to the air bag module.

- (8) At a location as far away from the air bag module as possible, and from a shielded position, if possible, disconnect the two connected wires from each other and connect them to the two terminals of the battery (removed from the vehicle) to deploy the air bag.

Caution

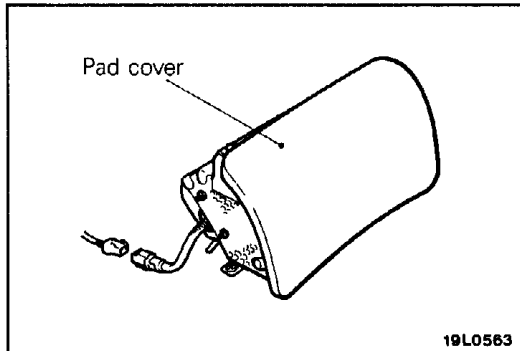
1. Before deployment, check carefully to be sure that no one is nearby.
2. The inflator will be quite hot immediately following deployment, so wait at least 30 minutes to allow it to cool before attempting to handle it. Although not poisonous, do not inhale gas from air bag deployment. See Deployed Air Bag Module Disposal Procedures (refer to P.52B-109) for post-deployment handling instructions.
3. If the air bag module fails to deploy when the procedures above are followed, do not go near the module. Contact your local distributor.

When the air bag (front passenger's side) is deployed

- (1) Disconnect the negative (-) and positive (+) battery cables from the battery terminals, and then remove the battery from the vehicle.

Caution

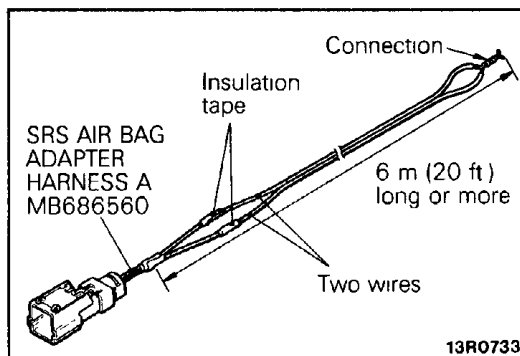
Wait at least 60 seconds after disconnecting the battery cables before doing any further work. (Refer to P.52B-9 No. 5.)



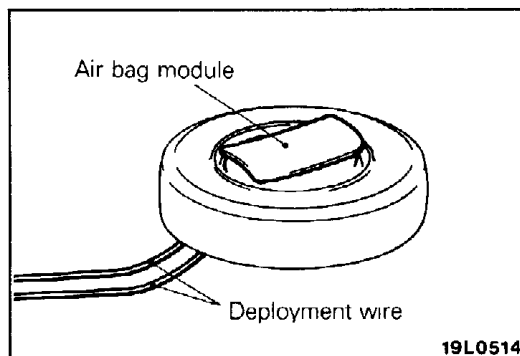
- (2) Remove the air bag module for the vehicle (Refer to P.52B-88)

Caution

The air bag module should be stored on a flat surface and placed so that the pad cover face up. Do not place anything on top of it.



- (3) Connect two wires, each six meters (20 feet) long or more, to the two leads of SRS AIR BAG ADAPTER HARNESS A, and cover the connections with insulation tape. The other ends of the two wires should be connected to each other (short-circuited), to prevent sudden unexpected deployment of the air bag.



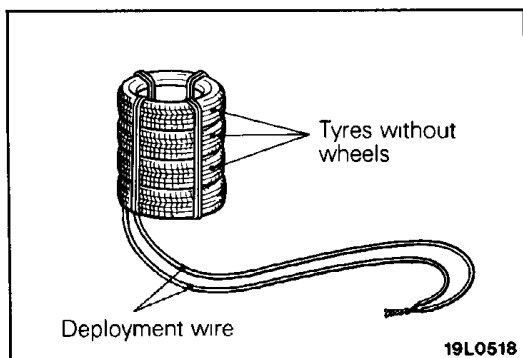
- (4) Connect the deployment wires to the SRS air bag adapter harness A. Pass it beneath the tyre and wheel assembly, and connect it to the air bag module.
- (5) Pass the thick wires into the hole of the air bag module bracket, and secure it to the wheel of the old tyre with wheel (4 locations), with the air bag facing upwards.

Caution

1. **Leave some space below the wheel for the deployment wires.**

If there is no space, the reaction of the air bag deployment could result in damage of the adapter harness.

2. **While deployment takes place, do not have the connector of the SRS air bag adapter harness A inserted between the tyres.**



- (7) Place three old tyres with no wheels on top of the tyre secured to the air bag module, and secure all tyres with ropes (4 locations).

- (8) At a location as far away from the air bag module as possible, and from a shielded position. If possible, disconnect the two connected wires from each other and connect them to the two terminals of the battery (removed from the vehicle) to deploy the air bag

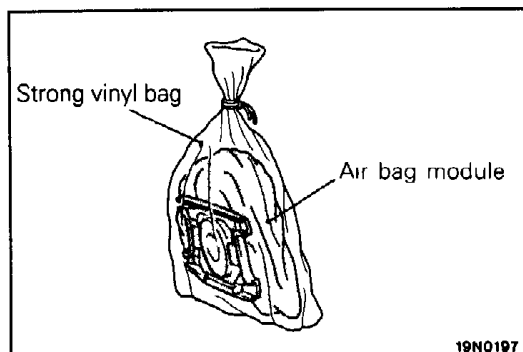
Caution

1. Before deployment, check carefully to be sure that no one is nearby.
2. The inflator will be quite hot immediately following deployment, so wait at least 30 minutes to allow it to cool before attempting to handle it. Although not poisonous, do not inhale gas from air bag deployment. See Deployed Air Bag Module Disposal Procedures (as shown below) for post-deployment handling instructions.
3. If the air bag module fails to deploy when the procedures above are followed, do not go near the module. Contact your local distributor.

DEPLOYED AIR BAG MODULE DISPOSAL PROCEDURES

After deployment, the air bag module should be disposed of in the same manner as any other scrap parts, except that the following points should be carefully noted during disposal.

- (1) The inflator will be quite hot immediately following deployment, so wait at least 30 minutes to allow it to cool before attempting to handle it.
- (2) Do not put water or oil on the air bag after deployment.
- (3) There may be, adhered to the deployed air bag module, material that could irritate the eyes and/or skin, so wear gloves and safety glasses when handling a deployed air bag module. IF DESPITE THESE PRECAUTIONS, THE MATERIAL DOES, GET INTO THE EYES OR ON THE SKIN, IMMEDIATELY RINSE THE AFFECTED AREA WITH A LARGE AMOUNT OF CLEAN WATER. IF ANY IRRITATION DEVELOPS, SEEK MEDICAL ATTENTION.
- (4) Tightly seal the air bag module in a strong vinyl bag for disposal.
- (5) Be sure to always wash your hands after completing this operation.



CHASSIS ELECTRICAL

CONTENTS

E54AA--

BATTERY	2	LIGHTING SYSTEM	20
Specification	2	Specifications	20
Service Adjustment Procedures	2	Special Tools	20
IGNITION SWITCH	4	Troubleshooting	21
Special Tools	4	Service Adjustment Procedures	28
Troubleshooting	5	Headlamp and Front Turn Signal Lamp	33
Ignition Switch*	10	Front Fog Lamp	34
METERS AND GAUGES	12	Rear Combination Lamp	34-1
Specifications	12	Rear Lid Lamp	35
Service Adjustment Procedures	13	Room Lamp	35
Combination Meter	17	High Mounted Stop Lamp	35-1
Indicators and Warning Lamps	19	Relay	36
		Resistor	37
		Switch	39
		Lighting Monitor Buzzer	39-1

CONTINUED ON NEXT PAGE

WARNINGS REGARDING SERVICING OF SUPPLEMENTAL RESTRAINT SYSTEM (SRS) EQUIPPED VEHICLES

WARNING!

- (1) Improper service or maintenance of any component of the SRS, or any SRS-related component, can lead to personal injury or death to service personnel (from inadvertent firing of the air bag) or to the driver and passenger (from rendering the SRS inoperative).
- (2) Service or maintenance of any SRS component or SRS-related component must be performed only at an authorized MITSUBISHI dealer.
- (3) MITSUBISHI dealer personnel must thoroughly review this manual, and especially its GROUP 52B – Supplemental Restraint System (SRS) before beginning any service or maintenance of any component of the SRS or any SRS-related component.

NOTE

The SRS includes the following components: impact sensors, SRS diagnosis unit, SRS warning lamp, air bag module, clock spring and interconnecting wiring. Other SRS-related components (that may have to be removed/installed in connection with SRS service or maintenance) are indicated in the table of contents by an asterisk (*).

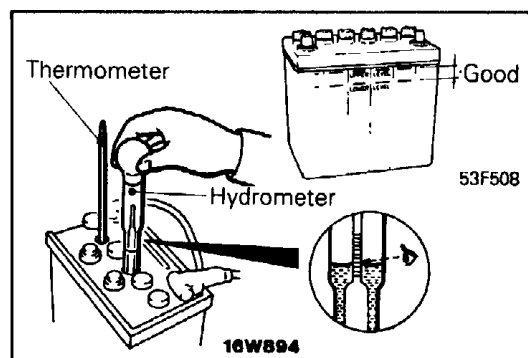
COLUMN SWITCH	40	SWS (SIMPLIFIED WIRING SYSTEM)	75
Special Tool	40	Troubleshooting	75
Column Switch*	40	THEFT-ALARM SYSTEM	80
HORN	41-3	Special Tools	80
Horn Switch*	41-3	Troubleshooting	80-1
Horn Relay	41-3	DOOR GLASS AND REGULATOR (POWER WINDOWS)	Refer to GROUP 42
AUDIO SYSTEM	42	DOOR HANDLE AND LATCH (DOOR LOCKING)	Refer to GROUP 42
Troubleshooting	42	SUNROOF	Refer to GROUP 42
Radio and Tape Player	64	WINDSHIELD WIPER AND WASHER	Refer to GROUP 51
Door Speaker	64	REAR WIPER AND WASHER	Refer to GROUP 51
Motor Antenna and Antenna Feeder Cable	65	HEADLAMP WASHER	Refer to GROUP 51
REAR WINDOW DEFOGGER	68	OUTSIDE MIRROR (ELECTRONIC CONTROLLED DOOR MIRROR)	Refer to GROUP 51
Special Tools	68		
Troubleshooting	68-1		
Service Adjustment Procedures	73		
Rear Window Defogger Switch	73		
Rear Window Defogger Relay	73		

BATTERY SPECIFICATION

SERVICE SPECIFICATION

E54CB--

Item	Specification
Specific gravity of the battery fluid	1.220–1.290 [20°C (68°F)]



SERVICE ADJUSTMENT PROCEDURES

E54CBAD

INSPECTION OF FLUID LEVEL AND SPECIFIC GRAVITY

1. Inspect whether or not the battery fluid is between the UPPER LEVEL and LOWER LEVEL marks.
2. Use a hydrometer and thermometer to check the specific gravity of the battery fluid.

Standard value: 1.220–1.290 [20°C (68°F)]

The specific gravity of the battery fluid varies with the temperature, so use the following formula to calculate the specific gravity for 20°C (68°F). Use the calculated value to determine whether or not the specific gravity is satisfactory.

$$D_{20} = D_t + 0.0007 (t - 20)$$

D_{20} : specific gravity of the battery fluid calculated for 20°C (68°F).

D_t : actually measured specific gravity

t : actually measured temperature

VISUAL INSPECTION

Inspect after removing the battery.

Caution

If battery fluid has leaked from the battery, use rubber gloves to protect your hands when removing the battery.

- (1) If there is corrosion of the battery stays or battery brackets from the battery fluid, clean by washing in warm or cold water.
- (2) If there is a leak from a crack in the battery case, replace the battery.
- (3) Clean the battery terminals with a wire brush, and replace any parts that are damaged.

CHARGING

1. When charging a battery while still installed in the vehicle, disconnect the battery cables to prevent damage to electrical parts.
2. The current normally used to charge a battery should be approximately 1/10th the battery capacity.

3. When quick charging due to lack of time, etc., the charging current should never exceed the battery capacity as indicated in amperes.
4. Determining if charging is completed.

(1) If the specific gravity of the battery fluid reaches 1.250–1.290 and remains constant for at least one hour.

(2) If the voltage of each cell reaches 2.5–2.8 V and remains constant for at least one hour.

Caution

(1) Take care since the battery fluid level may rise during charging.

(2) Keep all sources of fire away while charging because there is danger of explosion.

(3) Take care not to do anything that could generate sparks while charging.

(4) When charging is completed, replace the battery caps, pour clean water over the battery to remove any sulfuric acid any dry.

BATTERY TEST

E54CBAA

TEST STEP	RESULT	ACTION TO TAKE
A0 VISUAL INSPECTION		CLEAN terminals and clamps. Go to A1.
- Remove negative cable, then positive cable. - Check for dirty or corroded connections.		Go to A1.
A1 LOOSE BATTERY POST		REPLACE battery.
Check for loose battery post		Go to A2.
A2 CRACKED BATTERY COVER		REPLACE battery.
- Remove hold-downs and shields. - Check for broken/cracked case or cover.		Go to A3.
A3 OPEN CIRCUIT VOLTAGE TEST.		CHARGE battery at 5 amps, then go to A3.
- Turn headlamps on for 15 seconds. - Turn headlamps off for 2 minutes to allow battery voltage to stabilize. - Disconnect cables. - Read open circuit voltage.	OPEN CIRCUIT VOLTAGE UNDER 12.4 VOLTS	
		Go to A4.
A4 LOAD TEST		REPLACE battery.
- Connect a load tester to the battery. - Load the battery at the recommended discharge rate (See LOAD TEST RATE CHART) for 15 seconds. - Read voltage after 15 seconds, then remove load.	VOLTAGE IS LESS THAN MINIMUM LISTED	
		Battery OK.
	VOLTAGE IS MORE THAN MINIMUM LISTED	

LOAD TEST RATE CHART

Load test (amps)	Cranking rating [–18°C (0°F)]	Reserve capacity (min.)	Application
170	356	99	55D23R
240	490	123	75D26R

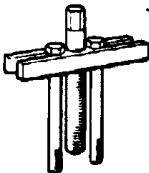
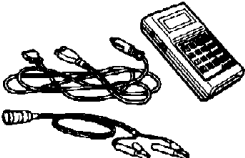
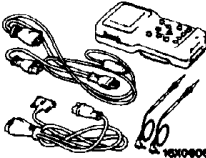
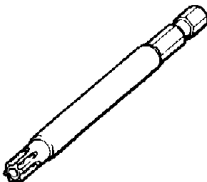
LOAD TEST CHART

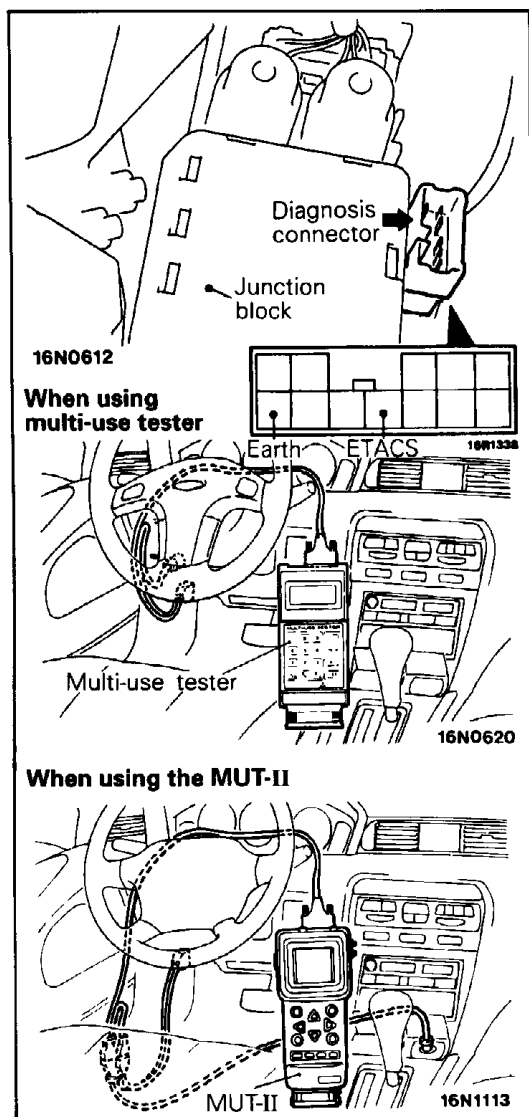
Minimum voltage	Temperature	
	°C	°F
9.6	21 and above	70 and above
9.5	16	60
9.4	10	50
9.3	4	40
9.1	–1	30
8.9	–7	20
8.7	–12	10
8.5	–18	0

IGNITION SWITCH

SPECIAL TOOLS

E54DA--

Tool	Number	Name	Use
	MB990803	Steering wheel puller	Removal of steering wheel (LH drive vehicles only)
	MB991341	Multi-use tester assembly	Up to 1993 models ETACS input checking
		ROM pack (For the number, refer to GROUP 00 – Precautions Before Service.)	
	MB991502	MUT-II	All models ETACS input checking
 16X0607		ROM pack	
	MB990826	Torx wrench	Removal and installation of steering column



TROUBLESHOOTING (KEY ILLUMINATION TIMER)

INPUT CHECK

Using the multi-use tester <Up to 1993 models> or MUT-II <All models> check whether or not the input signals from each switch are being input to the electronic control unit.

- (1) Connect the multi-use tester or MUT-II to the diagnosis connector (located at the right or left side of the junction block).

Caution

Connection and disconnection of the multi-use tester or MUT-II should always be made with the ignition switch in the OFF position.

- (2) Check to be sure that the buzzer of the multi-use tester or MUT-II sounds one time, when each switch noted below is operated.

If the buzzer sounds, the input signals are being input to the electronic control unit, so that switch can be considered to be functioning normally. If there is a malfunction, there is an abnormality in the switch or in the switch input circuit, so they should be inspected.

- Ignition switch
- Driver door switch

QUICK-REFERENCE TABLE

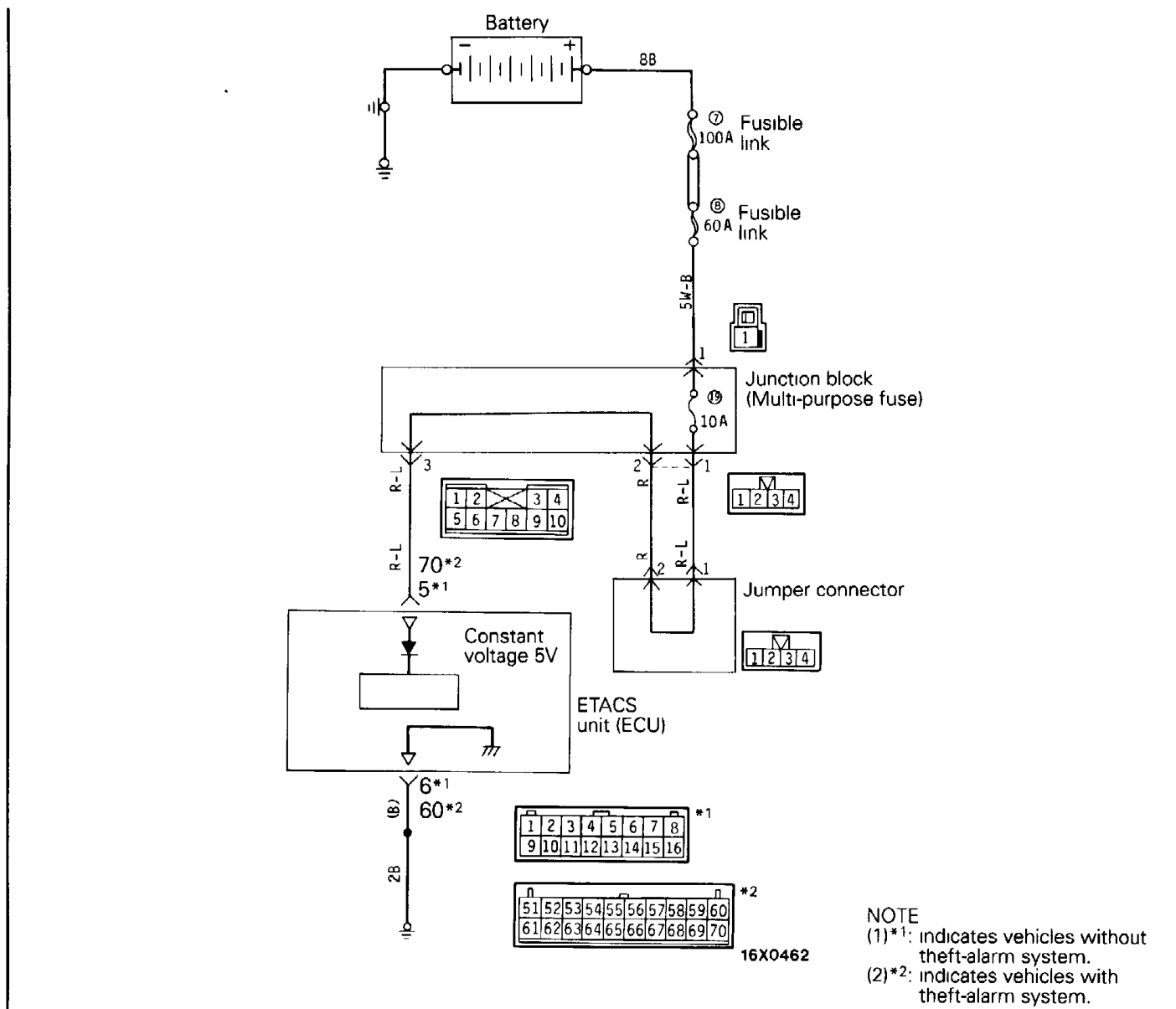
Problem	Probable cause (s)	Checking procedure	Remedy
Ignition key illumination light doesn't illuminate when driver's door is opened.	Damage or disconnection of the wiring of the wiring of the power supply or earth circuit	Check by using check chart No. 1 (P.54-6).	Repair the harness.
	Damaged or disconnected wiring of either (or both) driver door switch	If input checks indicate a malfunction, check by using check chart No. 3 (P.54-8).	Repair the harness or replace driver door switch.
	Damaged or disconnected wiring of ignition key illumination light driver or power-supply circuit.	Check by using check chart No.4 (P.54-9).	Repair the harness or replace the ignition key illumination light.
	Malfunction of the ECU	–	Replace the ECU.
Ignition key illumination light remains illuminated when ignition key is turned to ON.	Damaged or disconnected wiring of ignition switch ON input circuit	Check by using check chart No. 2 (P.54-7).	Repair the harness.
	Malfunction of the ECU	–	Replace the ECU.

ECU (Electronic Control Unit): ETACS unit

NOTES

CHECKING INDIVIDUAL PART AND CIRCUIT

1. ETACS POWER-SUPPLY AND EARTH CIRCUIT

**Description of operation**

The battery supplies a stabilized 5V power supply to the electronic control unit, via the constant-voltage circuit and terminal ⑤*1, ⑦⑩*2 directly connected to the battery.

If there is an abnormal condition of the power-supply circuit, illumination functions also will not operate.

Electronic control unit voltage (connection status of the electronic control unit connector)

ECU terminal No.	Signal	Condition	Terminal voltage
5*1, 70*2	Electronic control unit power supply	At all times	System voltage

Checking the ground circuit (Disconnect the connector and check the wiring harness side.)

Terminal No.	Connected to/measured part	Measurement	Tester connection	Check conditions	Standard
6*1, 60*2	Electronic control unit earth	Continuity	6-earth*1 60-earth*2	At all times	Continuity

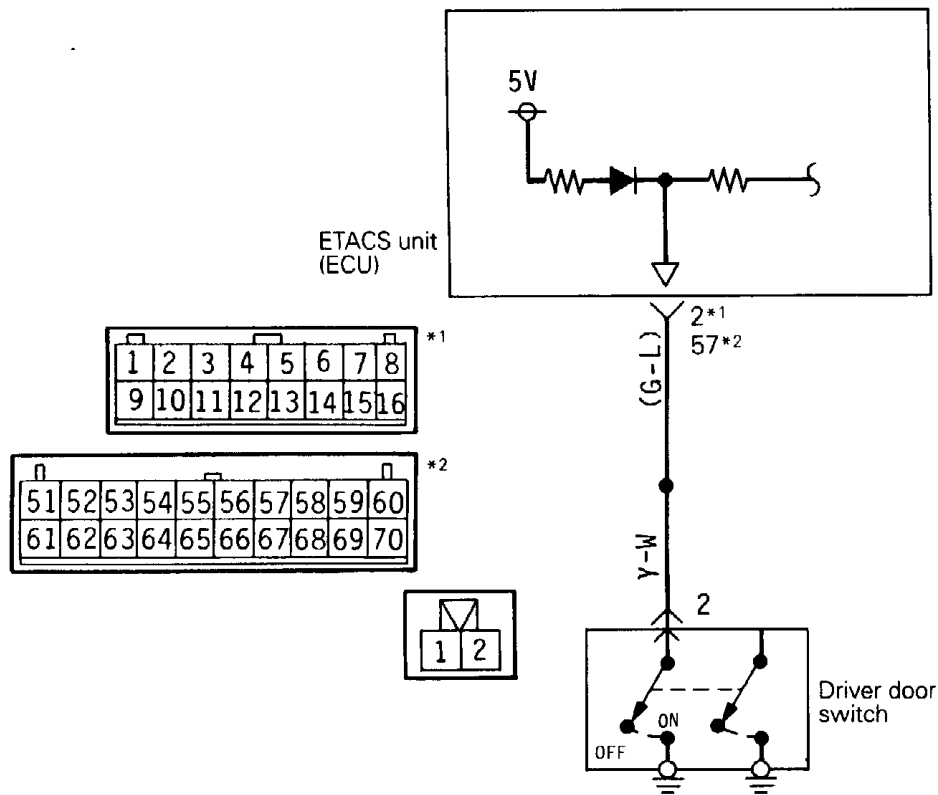
(1)*1: indicates vehicles without theft-alarm system.
(2)*2: indicates vehicles with theft-alarm system.

Electronic control unit terminal voltage (Disconnect the connector of the electronic control unit and check the wiring harness side.)

ECU terminal No.	Signal	Condition		Standard
3*1 63*2	Ignition switch: "ON"	Ignition switch	OFF	0V
			ON	System voltage

Ignition switch ... Refer to P.54-11.

3. DRIVER DOOR SWITCH INPUT CIRCUIT



NOTE

(1)*1: indicates vehicles without theft-alarm system.
 (2)*2: indicates vehicles with theft-alarm system.

Description of operation

When the front door is closed (the door switch is switched OFF), HIGH-level signals are sent to the electronic control unit; when the driver door

is opened (the door switch is switched ON), LOW-level signals are sent to the electronic control unit.

Electronic control unit terminal voltage (connection status of the electronic control unit connector)

ECU terminal No.	Signal	Condition		Terminal voltage
2*1 57*2	Driver door switch signal	Driver door	Open	0V
			Closed	5V

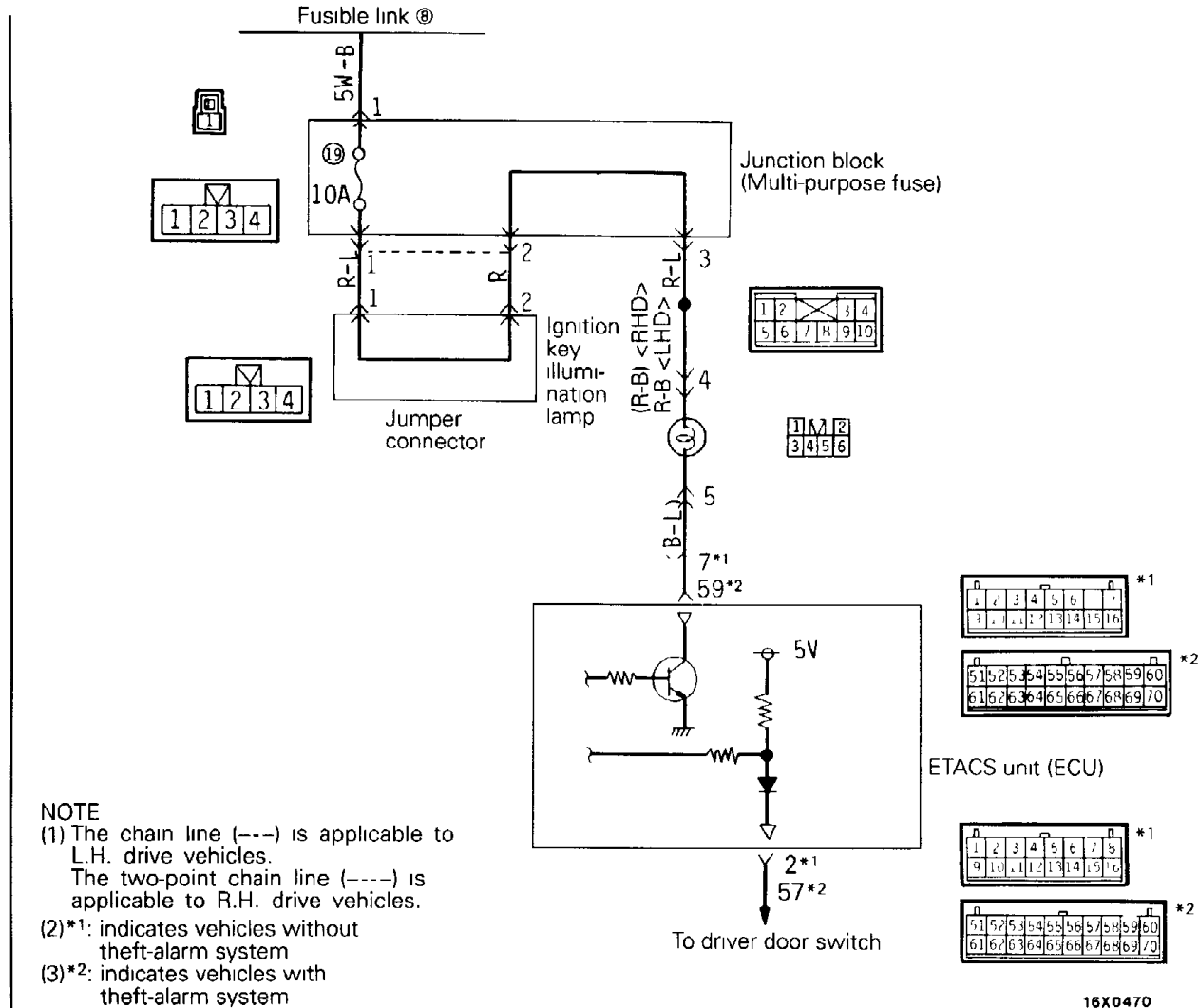
Checking the driver door switch circuit (Disconnect the connector of the electronic control unit and check the wiring harness side.)

ECU terminal No.	Connected to/measured part	Measurement	Tester connection	Check conditions		Standard
2*1 57*2	Driver door switch	Continuity	2-earth*1 57-earth*2	Driver door	Closed	No continuity
					Open	Continuity

Checking the individual part

Door switch ... Refer to GROUP 42 – Door Assembly.

4. KEY ILLUMINATION LAMP DRIVE CIRCUIT



Description of operation

When the driver side door is opened, the door switch operates, turning the transistor ON, and the ignition key hole is illuminated.

Electronic control unit terminal voltage (status of the electronic control unit connector)

ECU terminal No.	Signal	Conditions	Terminal voltage
59*2, 7*1	Ignition key illumination lamp signal	At all times	System voltage

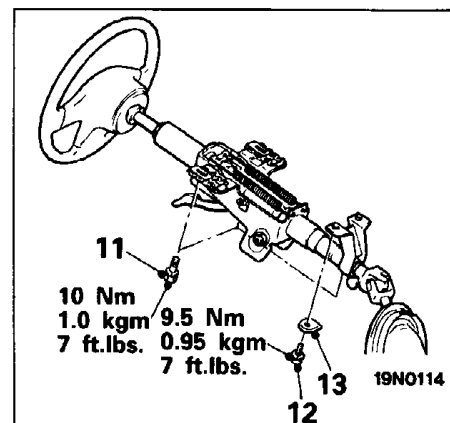
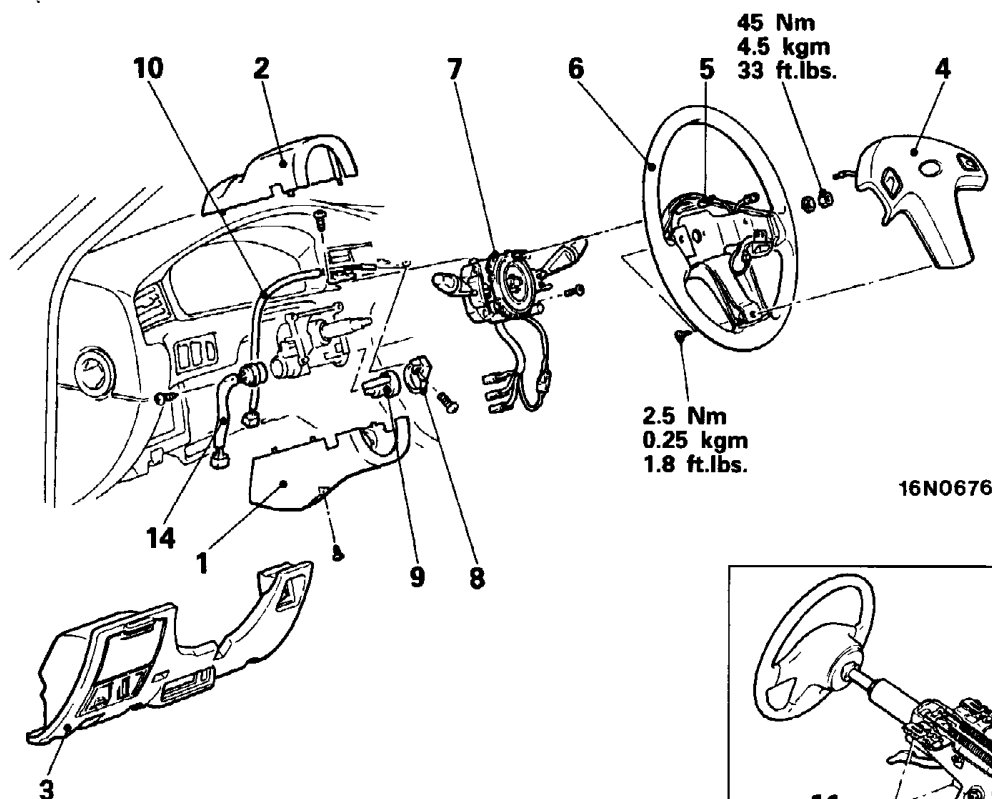
Checking the individual part

Ignition switch ... Refer to P.54-11.

IGNITION SWITCH <EXCEPT L.H. DRIVE VEHICLES WITH SRS>

E54DH-

REMOVAL AND INSTALLATION

**Removal steps of key reminder switch segment**

1. Column cover lower
2. Column cover upper
3. Driver side lower panel (Refer to GROUP 52 – Instrument Panel)
4. Horn pad *¹
5. Harness connector <LH drive vehicles with cruise control>
6. Steering wheel *¹
7. Column switch *¹
10. Key reminder switch segment

Removal steps of ignition switch segment

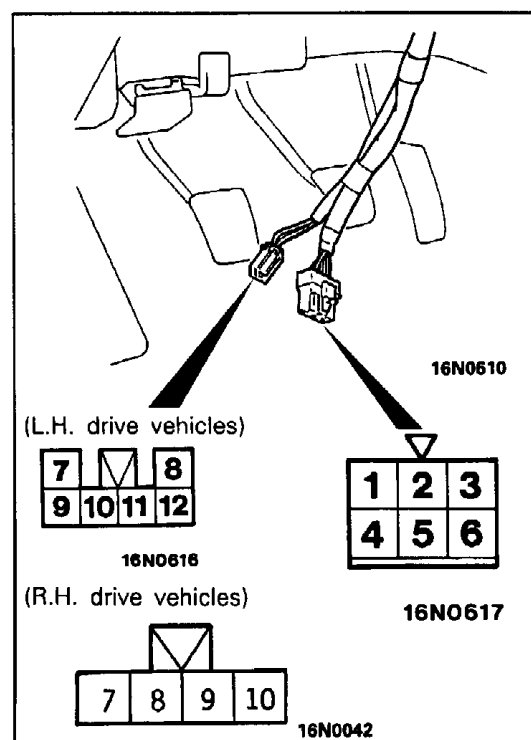
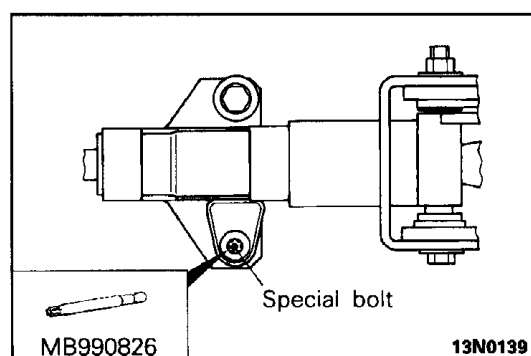
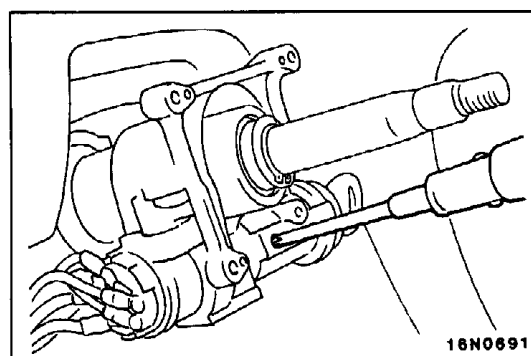
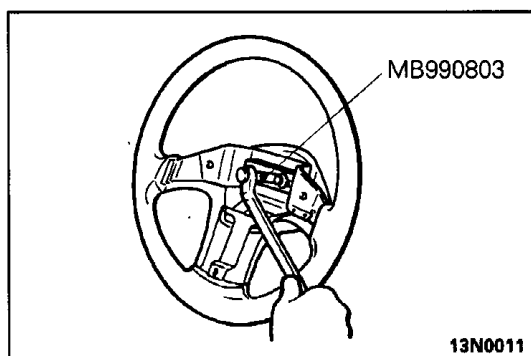
1. Column cover lower
2. Column cover upper
3. Driver side lower panel (Refer to GROUP 52 – Instrument Panel)
11. Steering column installation bolts *²
12. Special bolt *²
13. Special washer *²
14. Ignition switch segment

Removal steps of steering lock cylinder

1. Column cover lower
2. Column cover upper
3. Driver side lower panel *¹ (Refer to GROUP 52 – Instrument Panel)
4. Horn pad *¹
5. Harness connector <LH drive vehicles with cruise control>
6. Steering wheel *¹
7. Column switch *¹
8. Ignition key illumination ring
9. Steering lock cylinder

NOTE

- (1) *¹ indicates removal for LH drive vehicles only.
 (2) *² indicates removal for RH drive vehicles only.



SERVICE POINTS OF REMOVAL

E54DIAE

6. REMOVAL OF STEERING WHEEL (LH DRIVE VEHICLES ONLY)

Remove the steering wheel by using the special tool.

9. REMOVAL OF STEERING LOCK CYLINDER

- (1) Insert the key in the steering lock cylinder and turn it to the "ACC" position.
- (2) Using a cross-tip (+) screwdriver (small) or a similar tool, push the lock pin of the steering lock cylinder inward and then pull the steering lock cylinder toward you.

12. REMOVAL OF SPECIAL BOLT (RH DRIVE VEHICLES ONLY)

Remove the special bolt by using the special tool.

INSPECTION

E54DJAM

IGNITION SWITCH

- (1) Remove the column cover lower and the driver side lower panel. (Refer to P.54-10.)
- (2) Disconnect the wiring connector from the ignition switch and the key reminder switch, and connect an ohmmeter to the switch side connector.
- (3) Operate the switch, and check the continuity between the terminals.

Position	Terminal	Ignition switch						Key reminder switch		Ignition key illumination lamp	
		1	2	3	4	5	6	7	9 (10)	10 (8)	11 (9)
LOCK	Removed							○—○		○—○	
ACC	Inserted			○—○			○				
ON			○—○	○—○			○				
START		○—○		○—○	○—○		○				

NOTE

- (1) The terminal numbers inside () indicate RH drive vehicles.
- (2) ○—○ indicates that there is continuity between the terminals.

PWG9004

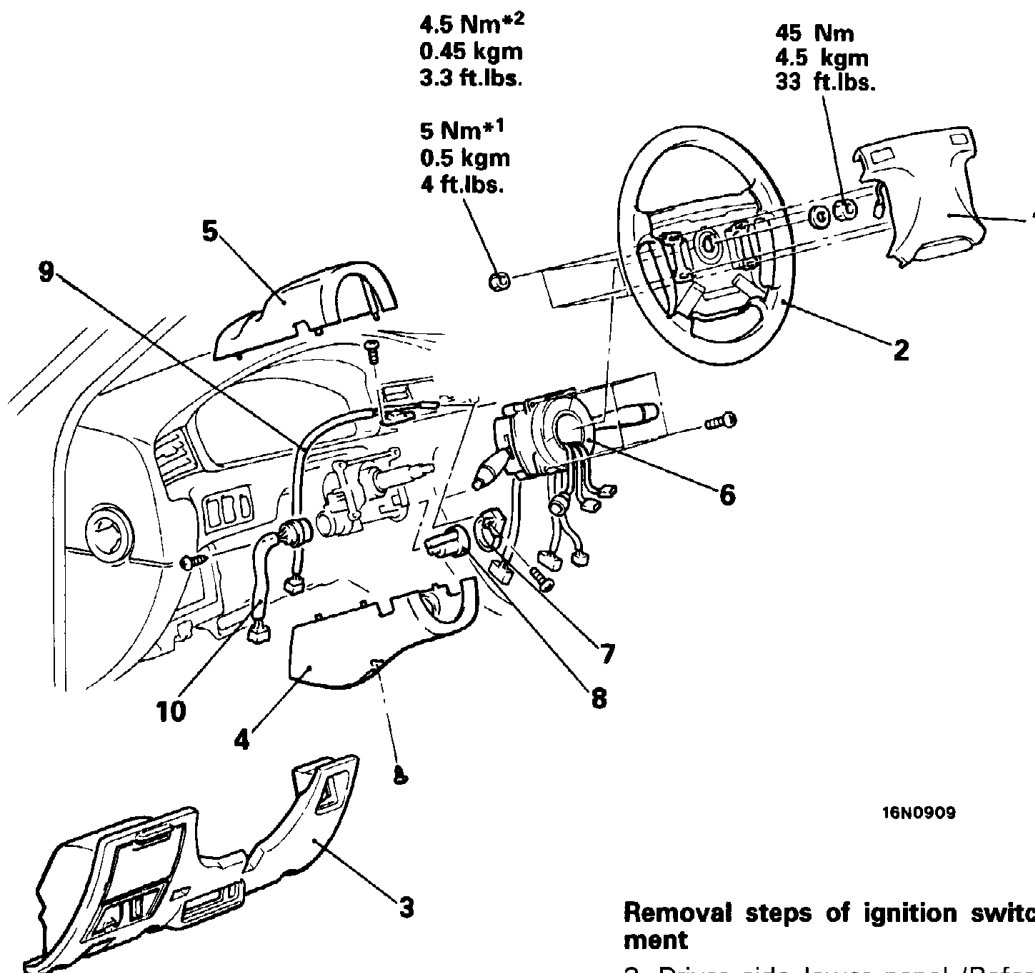
IGNITION SWITCH <L.H. DRIVE VEHICLES WITH SRS>

E54DH-A

REMOVAL AND INSTALLATION

CAUTION: SRS

Before removal of air bag module and clock spring, refer to GROUP 52B – SRS Service Precautions and Air Bag Module and Clock Spring.



16N0909

Removal steps of key reminder switch segment

1. Air bag module (Refer to GROUP 52B – Air Bag Module and Clock Spring)
2. Steering wheel
3. Driver side lower panel (Refer to GROUP 52 – Instrument Panel)
4. Column cover lower
5. Column cover upper
6. Column switch and clock spring (Refer to GROUP 52B – Air Bag Module and Clock Spring)
9. Key reminder switch segment

NOTE

*1: Vehicles built up to April, 1994

*2: Vehicles built from May, 1994

Removal steps of ignition switch segment

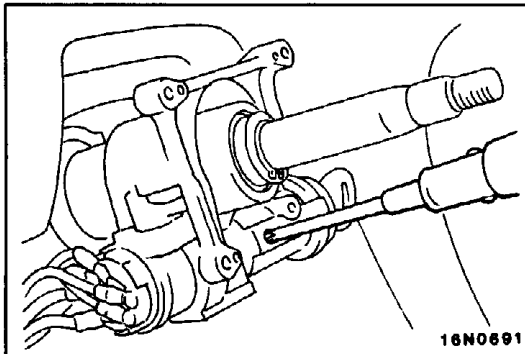
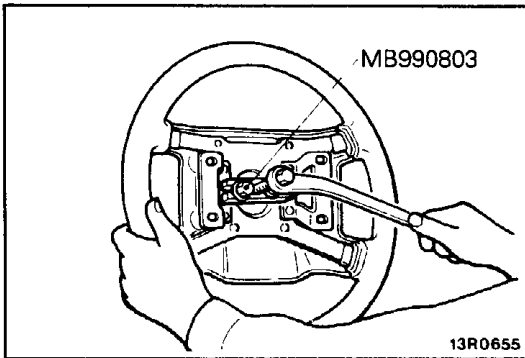
3. Driver side lower panel (Refer to GROUP 52 – Instrument Panel)
4. Column cover lower
5. Column cover upper
10. Ignition switch segment

Removal steps of steering lock cylinder

1. Air bag module (Refer to GROUP 52B – Air Bag Module and Clock Spring)
2. Steering wheel
3. Driver side lower panel (Refer to GROUP 52 – Instrument Panel)
4. Column cover lower
5. Column cover upper
6. Column switch and clock spring (Refer to GROUP 52B – Air Bag Module and Clock Spring)
7. Ignition key illumination ring
8. Steering lock cylinder

SERVICE POINTS OF REMOVAL

2. REMOVAL OF STEERING WHEEL



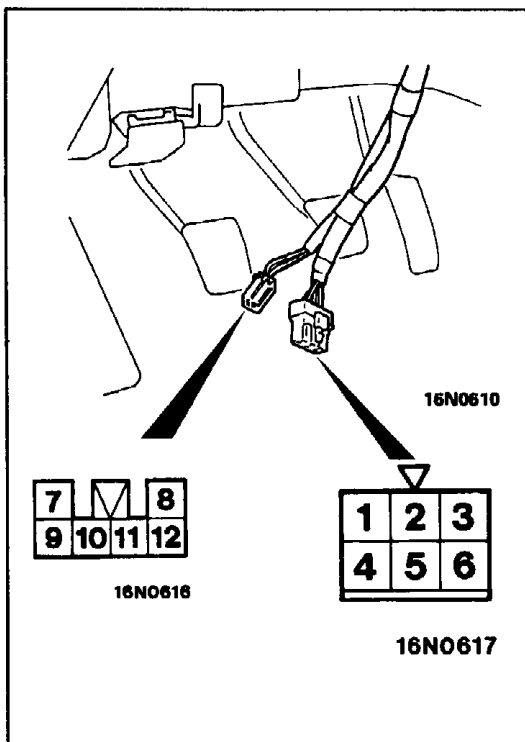
8. REMOVAL OF STEERING LOCK CYLINDER

- (1) Insert the key in the steering lock cylinder and turn it to the "ACC" position.
- (2) Using a cross-tip (+) screwdriver (small) or a similar tool, push the lock pin of the steering lock cylinder inward and then pull the steering lock cylinder toward you.

INSPECTION

IGNITION SWITCH

- (1) Remove the column cover lower and the driver side lower panel. (Refer to P.54-10.)
- (2) Disconnect the wiring connector from the ignition switch and the key reminder switch, and connect an ohmmeter to the switch side connector.
- (3) Operate the switch, and check the continuity between the terminals.



Position	Terminal	Ignition switch						Key reminder switch		Ignition key illumination lamp	
		1	2	3	4	5	6	7	9	10	11
LOCK	Removed							○—○		○—○	
	Inserted										
ACC	Inserted			○—○			○				
ON	Inserted			○—○	○—○		○				
START	Inserted	○			○—○	○—○	○				

NOTE

○—○ indicates that there is continuity between the terminals.

METERS AND GAUGES

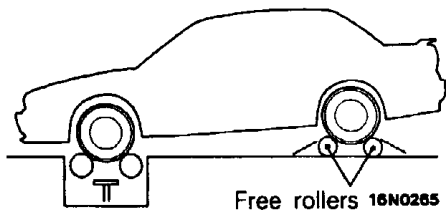
SPECIFICATIONS

SERVICE SPECIFICATIONS

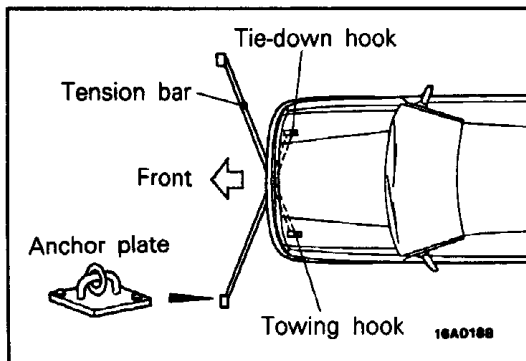
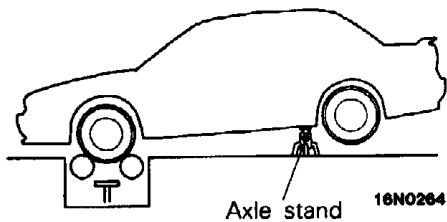
E54EB-

Items	Specifications
Standard value	
Speedometer indication error	km/h (mph)
40 (20)	40–48 (20–25)
80 (40)	80–92 (40–47)
120 (60)	120–136 (60–69)
160 (80)	160–180 (80–91)
– (100)	– (100–114)
Tachometer indication error	r/min
1,000	± 100
3,000	± 150
5,000	± 250
6,000	± 300
Fuel gauge unit resistance	Ω
Float point "F"	3 ± 1
Float point "E"	110 ± 1
Fuel gauge unit float height	mm (in.)
A (Float point "F")	40.95 (1.6)
B (Float point "E")	173.25 (6.8)
Fuel gauge resistance	Ω
power supply and earth	274 ± 27
power supply and fuel gauge	86 ± 8
fuel gauge and earth	188 ± 18
Engine coolant temperature gauge resistance	Ω
power supply and engine coolant temperature gauge	51 ± 5
power supply and earth	130 ± 13
engine coolant temperature gauge and earth	181 ± 18

<Rear wheel free roller type>



<Rear wheel jack up type>



SERVICE ADJUSTMENT PROCEDURES

ES4EGAS

SPEEDOMETER INSPECTION

- (1) Adjust the pressure of the tyres to the specified level. (Refer to GROUP 31 – General Specifications.)
- (2) Place the vehicle on a speedometer tester drum.
- (3) Place securely the free rollers to the floor, under the rear wheels so that they are fitted for the wheel base and the wheel tread. <Rear wheel free roller type>
- (4) Jack up the rear wheels and place the axle stands in the specified places. <Rear wheel jack-up type>
- (5) Turn the TCL switch OFF.
<Vehicles with traction control system>
- (6) Make sure the parking brake has been set.
- (7) To prevent the front wheel from moving from side to side, attach tension bars to the towing hook and tie-down hook, and secure both ends to anchor plates.
- (8) To prevent the vehicle from starting, attach a chain or wire to the rear traction hook, and make sure the end of the chain or wire is secured firmly.
- (9) Check if the speedometer indication range is within the standard values.

Caution

Do not operate the clutch suddenly or increase/ decrease speed rapidly while testing.

Standard values:**Standard indication**

km/h (mph)

40 (20)

80 (40)

120 (60)

160 (80)

– (100)

Allowable range

km/h (mph)

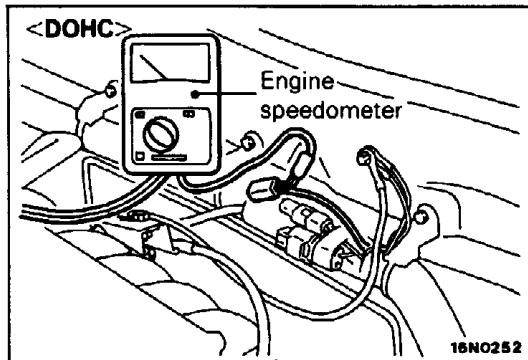
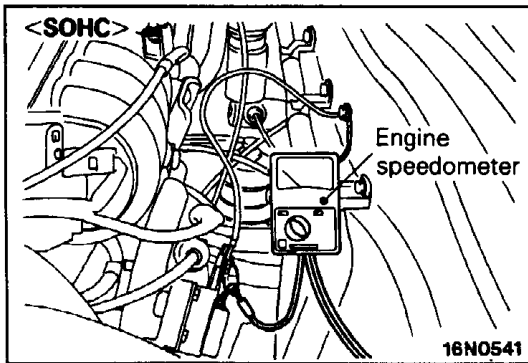
40–48 (20–25)

80–92 (40–47)

120–136 (60–69)

160–180 (80–91)

– (100–114)



TACHOMETER INSPECTION

- (1) Insert a paper clip in the connector from the harness side, and attach the engine speedometer.

Caution

As the tachometer is negative earthed, do not connect battery conversely to prevent damaging transistor and diode.

NOTE

For tachometer inspection, use of a fluxmeter-type engine speedometer is recommended. (Because a fluxmeter only needs to be clipped to the high tension cable.)

- (2) Compare the readings of the engine speedometer and the tachometer at every engine speed, and check if the variations are within the standard values.

Standard value:

Engine speed

1,000 r/min.:

3,000 r/min.:

5,000 r/min.:

6,000 r/min.:

Indicated variation

± 100 r/min.

± 150 r/min.

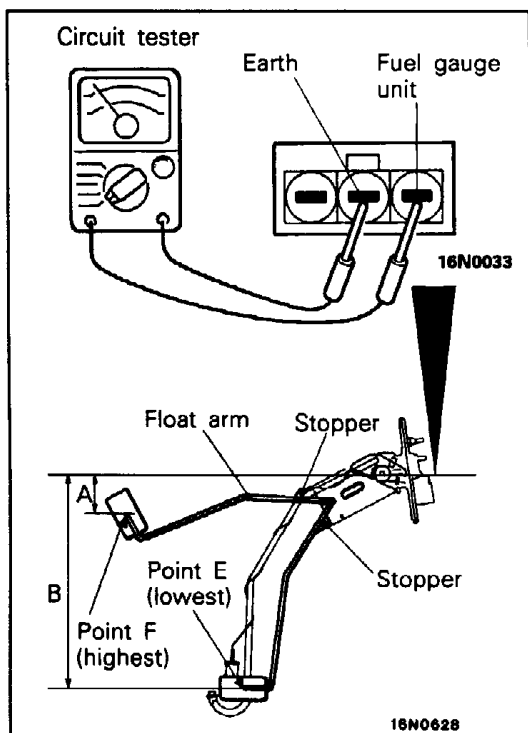
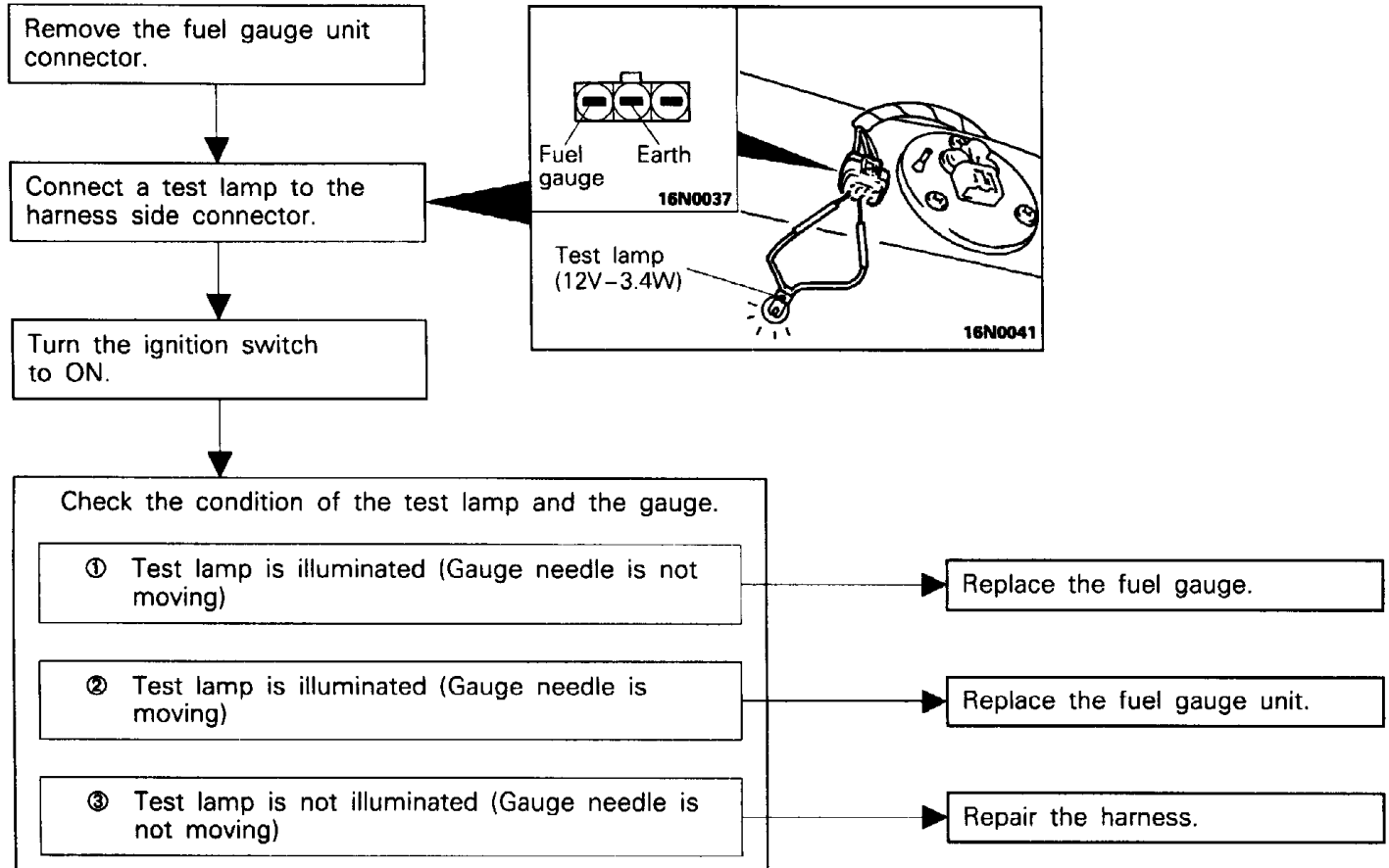
± 250 r/min.

± 300 r/min.

Caution

The signal output from the engine speed inspection terminal in DOHC engines represents one-third of the full engine speed, so always take the measurement with the speedometer range matching a two-cylinder range. (Shows actual revolutions.)

FUEL GAUGE SIMPLE INSPECTION



FUEL GAUGE UNIT INSPECTION

To check, remove fuel gauge unit from fuel tank. (Refer to GROUP 13 – Fuel Tank.)

Fuel Gauge Unit Resistance

- (1) Check that resistance value between the fuel gauge terminal and earth terminal is at standard value when fuel gauge unit float is at point F (highest) and point E (lowest).

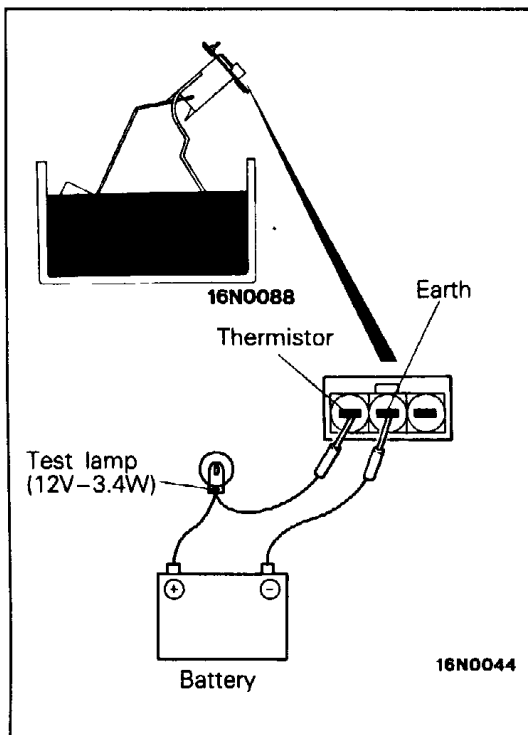
Standard value: Point F $3 \pm 1 \Omega$
Point E $110 \pm 1 \Omega$

- (2) Check that resistance value changes smoothly when float moves slowly between point F (highest) and point E (lowest).

Fuel Gauge Unit Float Height

Move float and measure the height A at point F (highest) and B at point E (lowest) with float arm touching stopper.

Standard value: A: 40.95 mm (1.6 in.)
B: 173.25 mm (6.8 in.)

**FUEL SENSOR INSPECTION**

Connect fuel gauge unit to battery via test lamp (12V-3.4W). Immerse in water. Condition good if lamp goes off when unit thermistor is in water and lights when unit is removed from water.

Caution

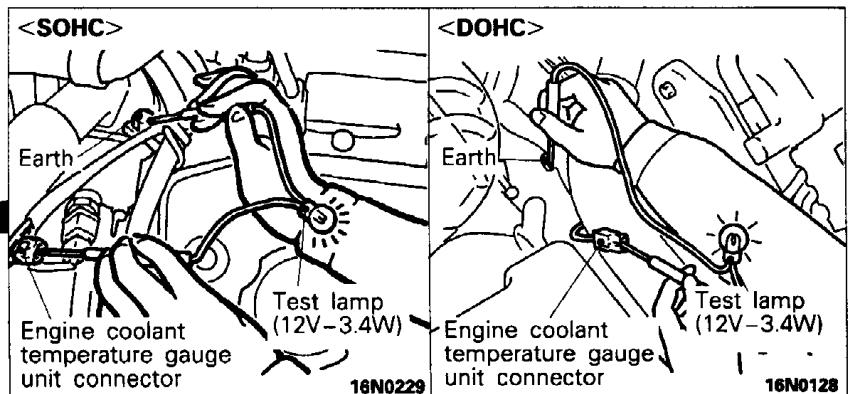
After completing this test, wipe the unit dry and install it in the fuel tank.

ENGINE COOLANT TEMPERATURE GAUGE SIMPLE INSPECTION

Remove the water temperature gauge unit connector.

Connect a test lamp between the harness side connector and the earth.

Turn the ignition switch ON.



Check the condition of the test lamp and the gauge.

① Test lamp is illuminated (Gauge needle is not moving)

② Test lamp is illuminated (Gauge needle is moving)

③ Test lamp is not illuminated (Gauge needle is not moving)

Replace the water temperature gauge.

Replace the water temperature gauge unit.

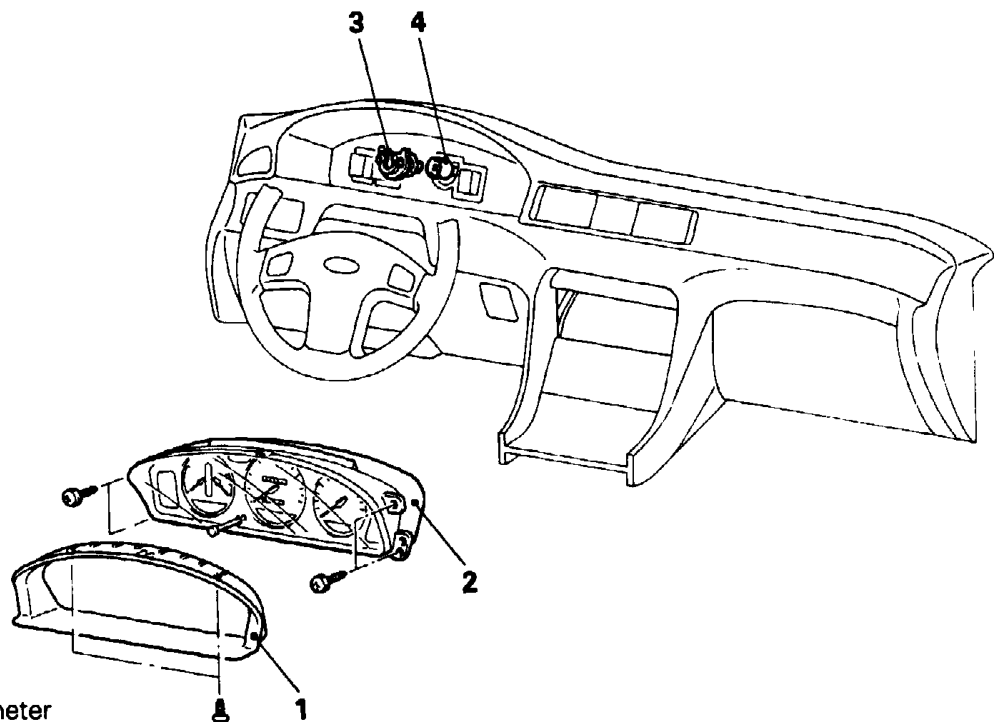
Repair the harness.

ENGINE COOLANT TEMPERATURE GAUGE UNIT INSPECTION

Refer to GROUP 14 – Engine Coolant Temperature Gauge Unit.

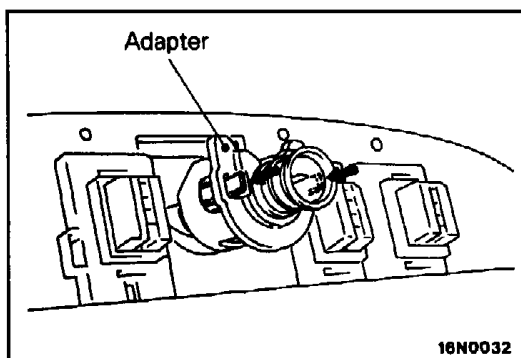
**COMBINATION METER
REMOVAL AND INSTALLATION**

ES4EH-

**Removal steps**

1. Meter bezel
2. Combination meter
3. Adapter
4. Speedometer cable

16N0713



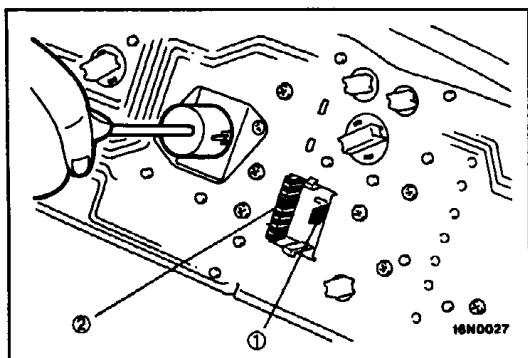
16N0032

SERVICE POINT OF REMOVAL

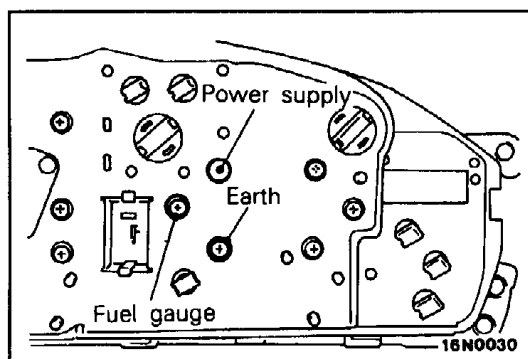
ES4EIAI

3. REMOVAL OF ADAPTER

- (1) Disconnect the speedometer cable at the transmission end of the cable.
- (2) Plug the speedometer cable slightly toward the vehicle interior, release the lock by turning the adapter to the left or right, and then remove the adapter.

**INSPECTION****REED SWITCH**

Using an ohmmeter, check that continuity and discontinuity alternates between terminals 1 and 2 four times at every rotation of the shaft of the speedometer cable connection.

**FUEL GAUGE RESISTANCE**

- (1) Remove the power supply tightening screw.
- (2) Use a circuit tester to measure the resistance value between the terminals.

Standard value

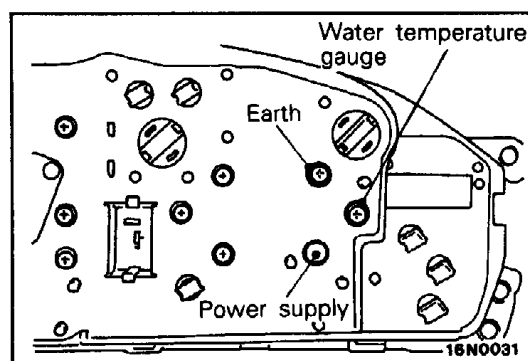
Power supply – earth: $274 \pm 27 \Omega$

Power supply – fuel gauge: $86 \pm 8 \Omega$

Fuel gauge – earth: $188 \pm 18 \Omega$

Caution

When inserting the testing probe into the power supply terminal, be careful not to touch the printed board.

**ENGINE COOLANT TEMPERATURE GAUGE RESISTANCE**

- (1) Remove the power supply tightening screw.
- (2) Use a circuit tester to measure the resistance value between the terminals.

Caution

The measured current should be 4 mA or less.

Standard values

Power supply – water temperature gauge: $51 \pm 5 \Omega$

Power supply – earth: $130 \pm 13 \Omega$

Water temperature gauge – earth: $181 \pm 18 \Omega$

Caution

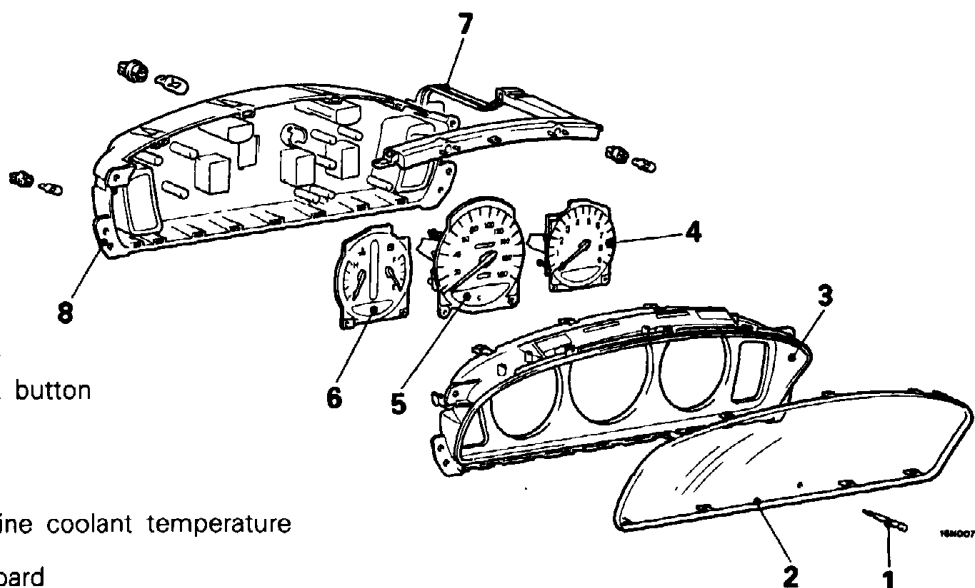
When inserting the testing probe into the power supply terminal, be careful not to touch the printed board.

DISASSEMBLY AND REASSEMBLY

E54EL-

Disassembly steps

1. Trip meter reset button
2. Meter glass
3. Window plate
4. Tachometer
5. Speedometer
6. Fuel gauge Engine coolant temperature gauge
7. Printed-circuit board
8. Meter case



INDICATORS AND WARNING LAMPS

E54FBAB

Unit: W

Items	Specifications
Upper-beam indication lamp	1.4
Turn-signal indication lamp	3.0
Hazard indication lamp	1.4
Rear fog lamp indication lamp	1.4
Overdrive off indication lamp (A/T)	1.12
Power/Economy indication lamp (A/T)	1.12
Automatic transmission indication lamp	1.12
Cruise control indication lamp	1.4
Traction control indication lamp	1.4
Electronic control suspension indication lamp	Light-emitting diode (LED)
Oil pressure warning lamp	1.4
Brake warning lamp	1.4
Charge warning lamp	1.4
Low fuel warning lamp	3.0
Door ajar warning lamp	1.12
Low washer fluid warning lamp	1.4
Check engine warning lamp	1.4
4-wheel steering warning lamp	1.4
Anti-lock braking system warning lamp	1.4
Low engine oil warning lamp	1.4
Supplemental restraint system warning lamp	1.4

LIGHTING SYSTEM SPECIFICATIONS

SERVICE SPECIFICATION

E54GB-

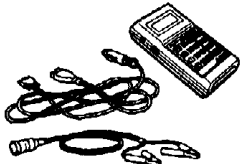
Items	Specifications
Standard value	
Headlamp aiming	
For lower beam adjustment	
Vertical direction	60 mm (2.36 in.) below horizontal (H)
Horizontal direction	Position where the 15° sloping section intersects the vertical line (V)
For upper beam adjustment	
Vertical direction	22 mm (0.87 in.) below horizontal (H)
Horizontal direction	Parallel to direction of vehicle travel
Front fog lamp aiming	
Vertical direction	100 mm (3.94 in.) below horizontal (H)* ¹
	192 mm (7.56 in.) below horizontal (H)* ²
Horizontal direction	Parallel to direction of vehicle travel
Resistance between resistor terminals <R.H. drive vehicles with dim-dip lamp>	Approx. 1Ω
Resistance between headlamp leveling switch terminals	
Switch position	
0	120 Ω
1	300 Ω
2	620 Ω
3	1,100 Ω
4	2,000 Ω
Limit	
Headlamp intensity	30,000 cd or more

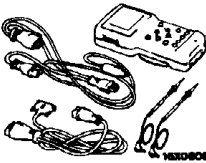
NOTE

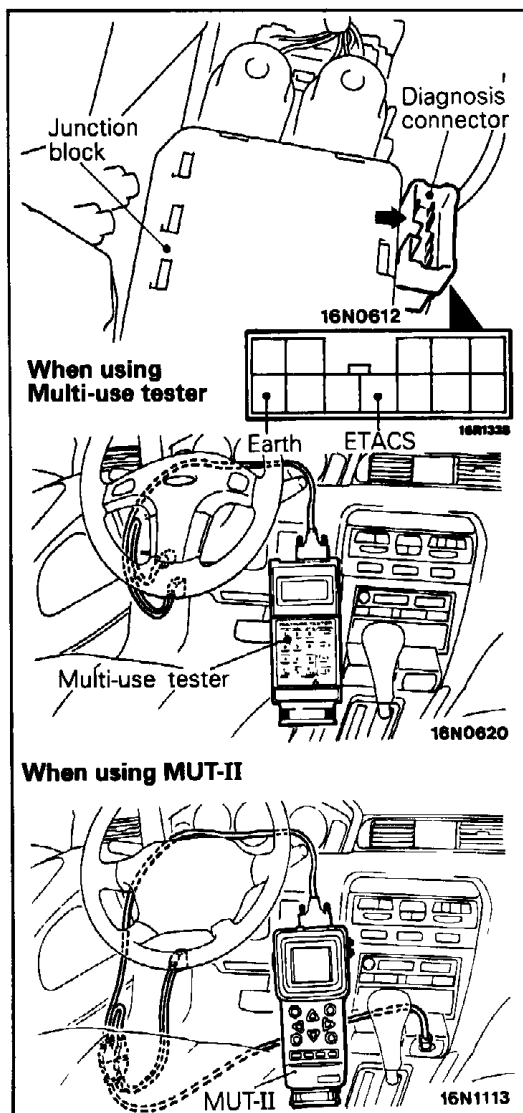
*¹ · <Vehicles built up to October, 1992>*² · <Vehicles built from November, 1992>

SPECIAL TOOLS

E54GF-

Tool	Number	Name	Use
	MB991341	Multi-use tester assembly	Up to 1993 models ETACS input checking
		ROM pack (For the number, refer to GROUP 00 – Precautions Before Service)	

Tool	Number	Name	Use
	MB991502	MUT-II	All models ETACS input checking
	 16X0607	ROM pack (for MUT-II)	



TROUBLESHOOTING (DELAYED SWITCH-OFF ROOM LAMP AND FOOT LIGHT)

INPUT CHECK

Using the multi-use tester <Up to 1993 models> or MUT-II <All models> check whether or not the input signals from each switch are being input to the electronic control unit.

- (1) Connect the multi-use tester or MUT-II to the diagnosis connector (located at the right or left side of the junction block).

Caution

Connection and disconnection of the multi-use tester or MUT-II should always be made with the ignition switch in the OFF position.

- (2) Check to be sure that the buzzer of the multi-use tester or MUT-II sounds one time, when each switch noted below is operated.

If the buzzer sounds, the input signals are being input to the electronic control unit, so that switch can be considered to be functioning normally.

If there is a malfunction, there is an abnormality in the switch or in the switch input circuit, so they should be inspected.

- Ignition switch
- All door switches

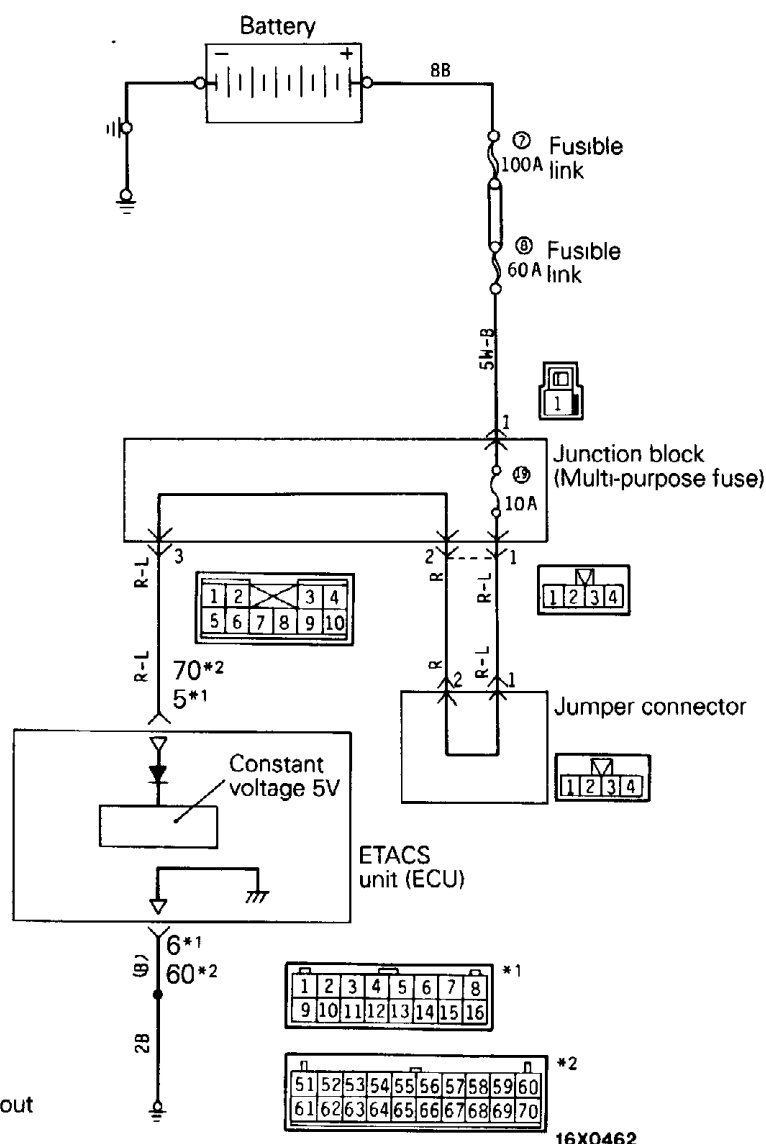
TROUBLESHOOTING QUICK-REFERENCE TABLE

Problem	Probable cause	Check method	Remedy
With the room lamp switch set to the position interlocked with the doors, the lights don't illuminate when any door is opened. (The room lamp should illuminate, however, when the room lamp switch is at the ON position.)	Damaged or disconnected wiring of door switches input circuit	If input checks indicate a malfunction, check by using check chart No. 3 (P.54-25).	Replace the door switches or repair the harness.
	Damaged or disconnected wiring of room lamp drive circuit	Check by using check chart No. 4 (P.54-26).	Replace the room lamp switch or repair the harness.
	Malfunction of the ECU	–	Replace the ECU.
Even when the door is closed, the room lamp and the foot lamp do not become dimmed.	Broken wire in the power circuit or earth circuit	Check by using circuit and individual part check No. 1 (P.54-23).	Repair the harness.
	Malfunction of the ECU	–	Replace the ECU.
When any door is opened, the foot lamp does not illuminate.	Broken wire in the door switch input circuits (all doors)	If the result of an input check is defective, check by using circuit and individual part check No. 3 (P.54-25).	Replace the door switch or repair the harness.
	Broken wire in the foot lamp drive circuit	Check by using circuit and individual part check No. 5 (P.54-27).	Replace the foot lamp or repair the harness.
	Malfunction of the ECU	–	Replace the ECU.
While the foot lamp is dimmed, even if the ignition switch is turned to ON, the room lamp does not switch off.	Broken wire in the ignition switch input circuit.	If the result of an input check shows a malfunction, check by using circuit and individual part check No. 2 (P.54-24).	Repair the harness.
	Malfunction of the ECU	–	Replace the ECU.
While the room lamp is dimmed, even if the ignition switch is turned to ON, the foot lamp does not switch off.	Broken wire in the ignition switch input circuit.	If the result of an input check is defective, check by using circuit and individual part check No. 2 (P.54-24).	Repair the harness.
	Malfunction of the ECU	–	Replace the ECU.

ECU (Electronic control unit): ETACS unit

CHECKING INDIVIDUAL PART AND CIRCUIT

1. ETACS POWER-SUPPLY AND EARTH CIRCUIT

**Description of operation**

The battery supplies a stabilized 5V power supply to the electronic control unit, via the constant-voltage circuit and terminal ⑤*1, ⑦⑩*2 directly connected to the battery.

If there is an abnormal condition of the power-supply circuit, delayed switch-off functions also will not operate.

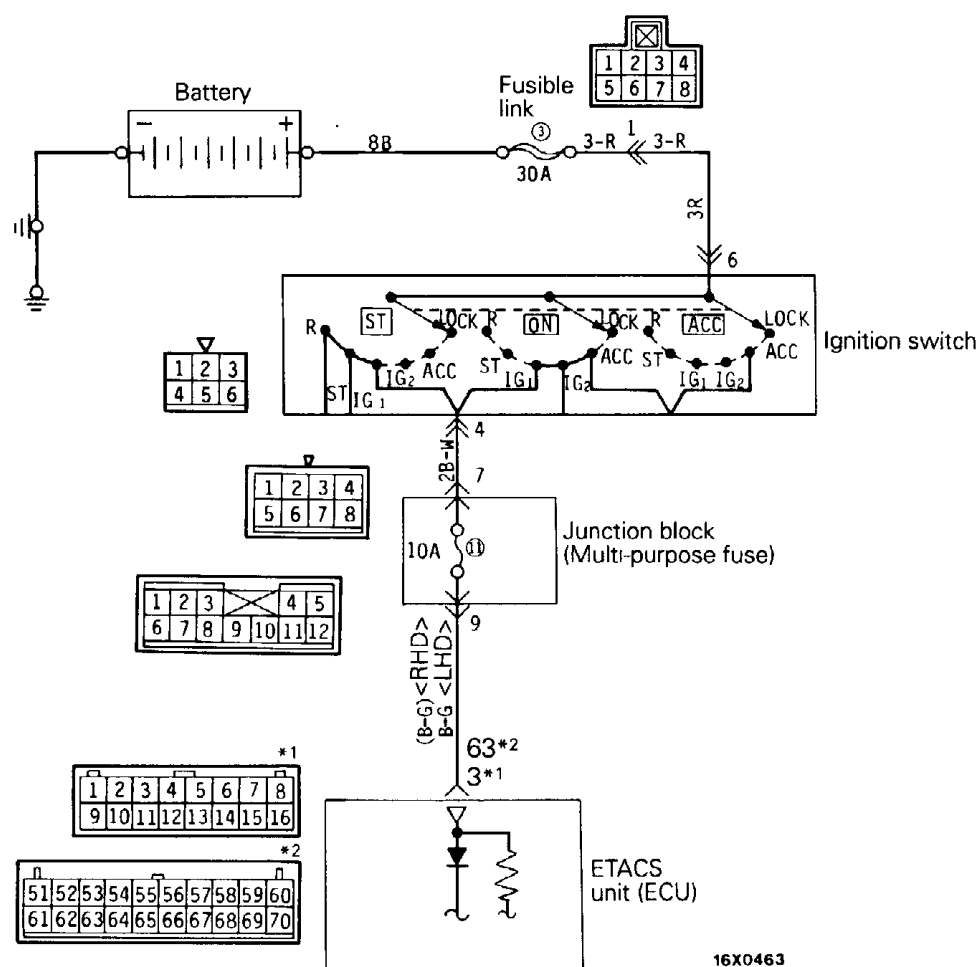
Electronic control unit voltage (connection status of the electronic control unit connector)

ECU terminal No.	Signal	Condition	Terminal voltage
5*1, 70*2	Electronic control unit power supply	At all times	System voltage

Checking the ground circuit (Disconnect the connector and check the wiring harness side.)

Terminal No.	Connected to/measured part	Measurement	Tester connection	Check conditions	Standard
6*1, 60*2	Electronic control unit earth	Continuity	6-earth*1 60-earth*2	At all times	Continuity

2. IGNITION SWITCH INPUT CIRCUIT



NOTE

- (1)*1: indicates vehicles without theft-alarm system.
 (2)*2: indicates vehicles with theft-alarm system.

16X0463

Description of operation

When the ignition switch is ON, an H signal is sent to the ECU. The timer circuit is switched OFF, and dimmer operation is interrupted.

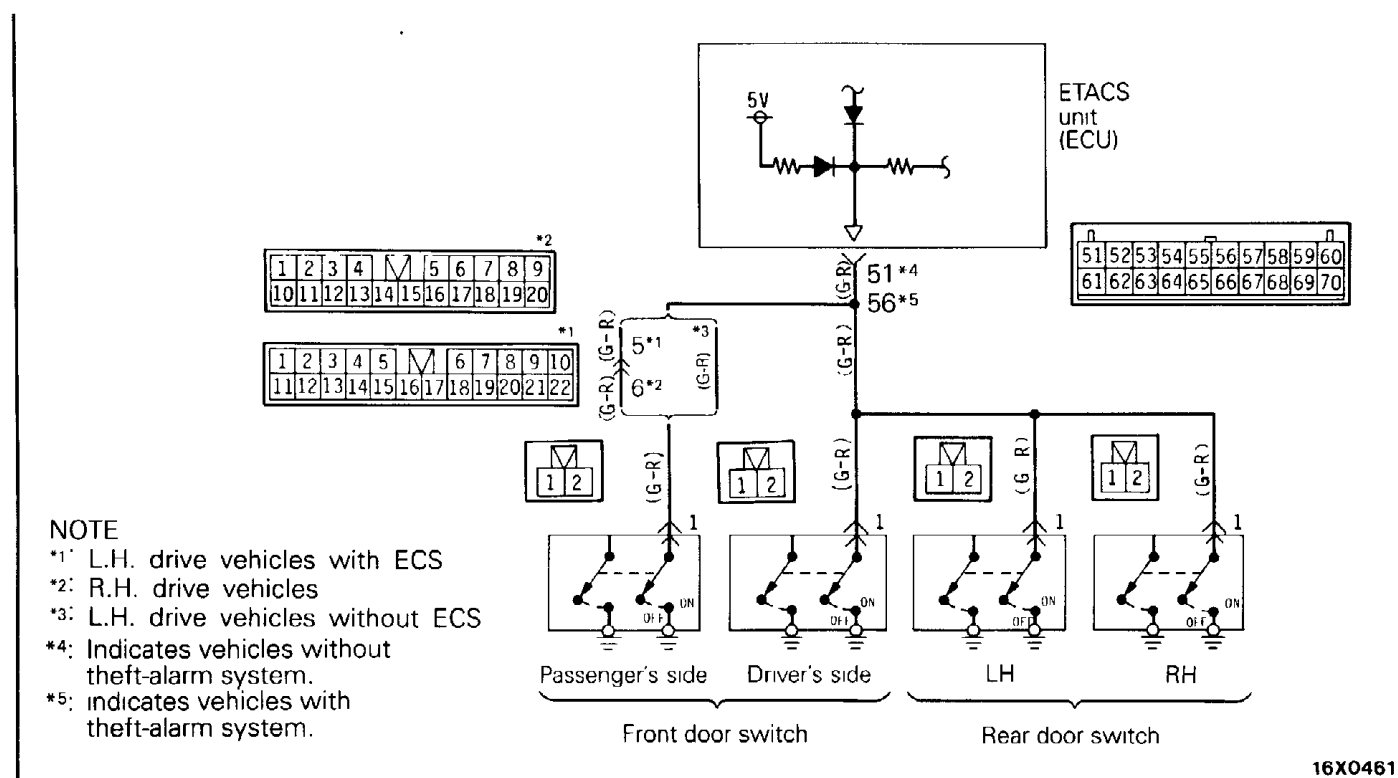
Electronic control unit terminal voltage (Disconnect the connector of the electronic control unit and check the wiring harness side.)

ECU terminal No.	Signal	Condition	Standard
3*1 63*2	Ignition switch: "ON"	Ignition switch OFF	0V
		Ignition switch ON	System voltage

Checking the individual part

Ignition switch ... Refer to P.54-11.

3. DOOR SWITCH (ALL DOORS) INPUT CIRCUIT



Operation description

When all doors are closed and the ignition switch is turned to OFF, an H signal is sent to the ECU.

If there is an abnormal condition of the door switch system, the room lamp will not function normally at the door-interlocked setting of its switch.

Electronic control unit terminal voltage (status of the electronic control unit connector)

ECU terminal No.	Signal	Conditions	Terminal voltage
51*4 56*5	Door switch signal	Door is opened (door switch: ON)*	0V
		All doors are closed (door switch: OFF)	5V

Checking the door switch circuit

(Disconnect the electronic control unit connector and check the wiring harness side.)

Terminal No.	Connected to/measured component	Measurement	Tester connection	Check conditions	Standard
51*4 56*5	Door switch	Continuity	51-earth*4 56-earth*5	All doors are closed	No continuity
				Door is opened*	Continuity

Individual part check

Door switch ... Refer to GROUP 42 – Door Assembly.

NOTE

When making the checks indicated by the * symbol, conduct the check for each individual door, checking to be sure that only the door being checking is open.

Fusible link ⑧

5W-B

10A

Junction block (Multi-purpose fuse)

Jumper connector

Room lamp <Without sunroof>

<With sunroof>

ETACS unit (ECU)

NOTE

(1) Δ: Vehicles with sunroof

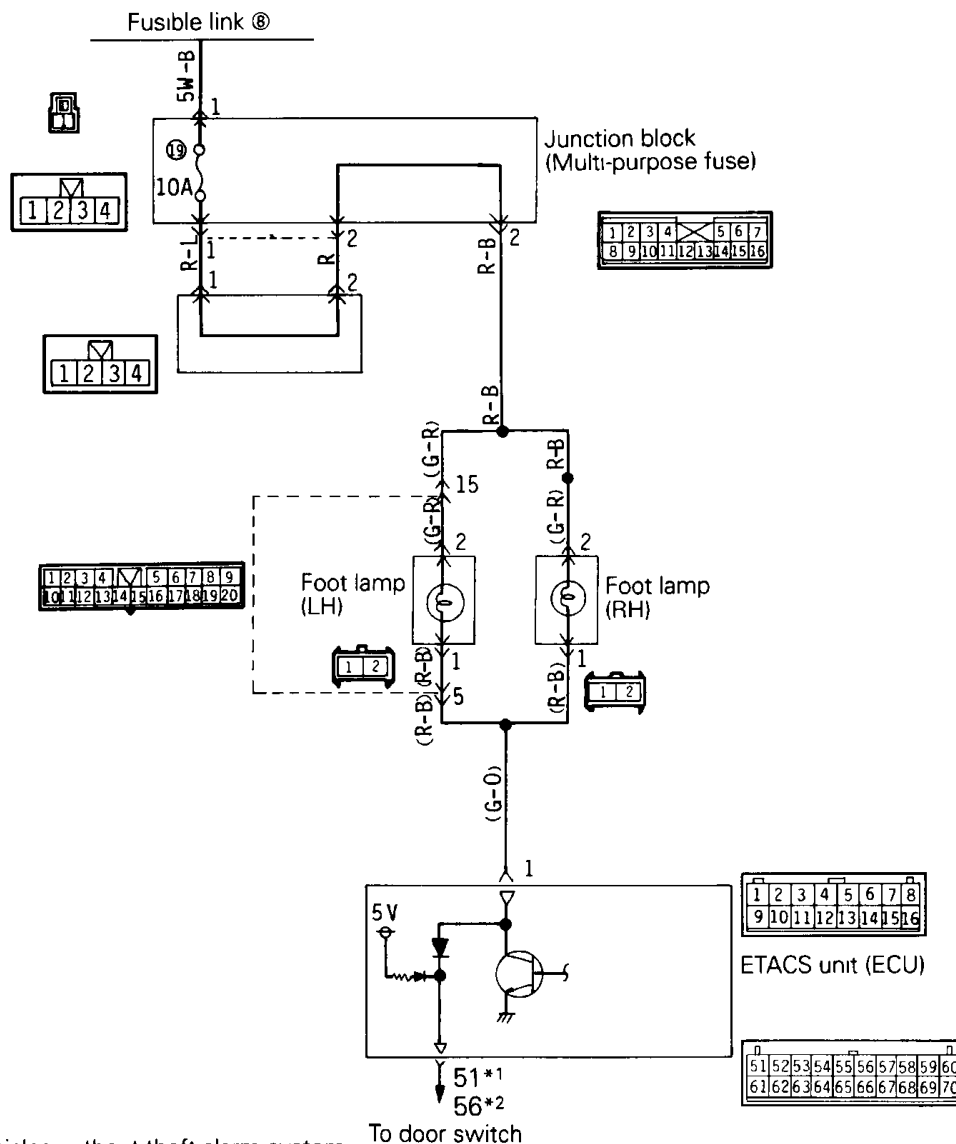
(2)*1: indicates vehicles without theft-alarm system.

(3)*2: indicates vehicles with theft-alarm system

16X0472

ECU terminal No.	Signal	Condition			Terminal voltage
1	Room lamp signal	All doors closed	Room lamp switch position	Except DOOR	0V
				DOOR	System voltage

5. FOOT LAMP DRIVE CIRCUIT



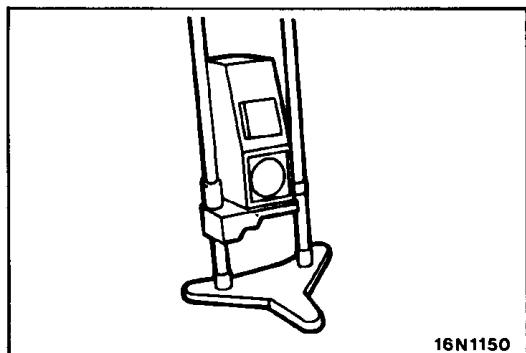
Description of operation

When a door is opened, the foot light (if the room light switch is at the door-interlock position) are grounded, via the electronic control unit, at

the door switch. When the door is closed in that condition, the transistor is ON and the lamps are dimmed.

Electronic control unit terminal voltage (status of the electronic control unit connector)

ECU Terminal No.	Signal	Condition	Terminal voltage
1	Foot lamp signal	At all times	System voltage



SERVICE ADJUSTMENT PROCEDURES

E54GGAV

HEADLAMP AIMING

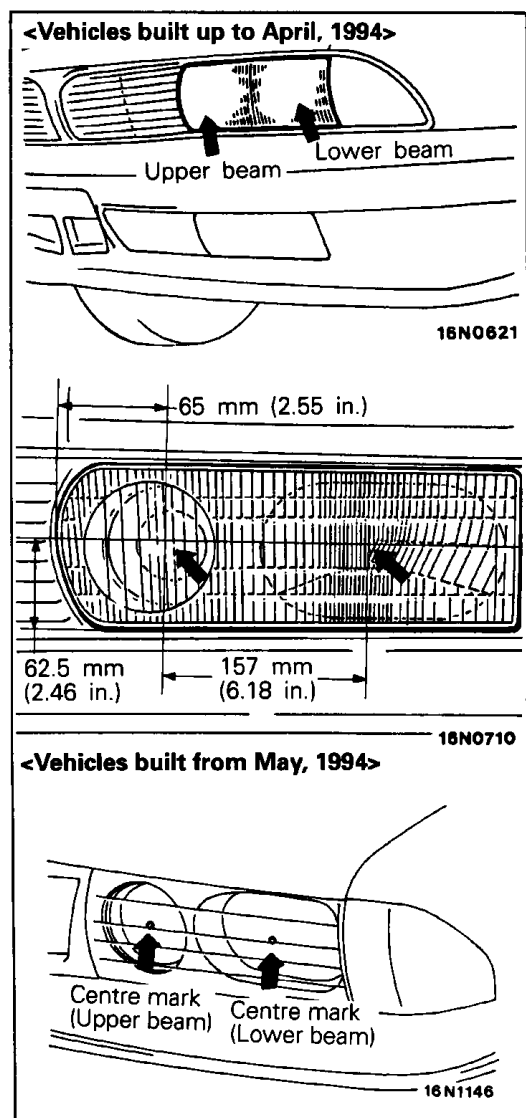
<Using a Beamsetting Equipment>

- (1) The headlamps should be aimed with the proper beamsetting equipment, and in accordance with the equipment manufacture's instructions.

NOTE

If there are any regulations pertinent to the aiming of headlamps in the area where the vehicle is to be used, adjust so as to meet those requirements.

- (2) Alternately turn the adjusting screw to adjust the headlamp aiming. (Refer to P.54-29.)



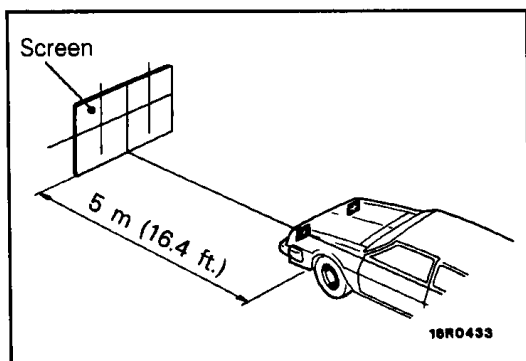
<Using a Screen>

- (1) For vehicles built up to April, 1994, measure the centre of the headlamp as shown in the illustration.

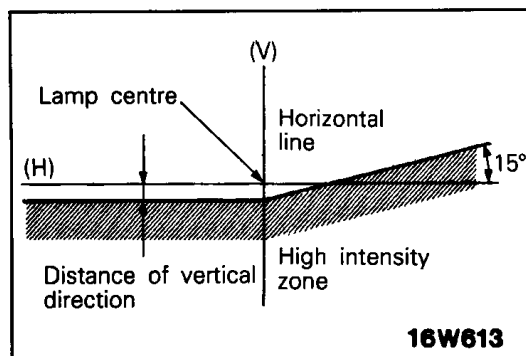
NOTE

For vehicles built from May, 1994, this is not necessary as the headlamps are provided with a centre mark.

- (2) Inflate the tyres to the specified pressures and remove the load from the vehicle (except a driver).



- (3) Set the distance between the screen and the centre of the headlamps as shown in the illustration.
- (4) With the engine running at 2,000 r/min, aim the headlamps.



- (5) Check if the beam shining onto the screen is at the standard value.

Standard value: <For lower beam adjustment>

(Vertical direction)

60 mm (2.36 in.) below horizontal (H)

(Horizontal direction)

Position where the 15° sloping section intersects the vertical line (V)

Standard value: <For upper beam adjustment>

(Vertical direction)

22 mm (0.87 in.) below horizontal (H)

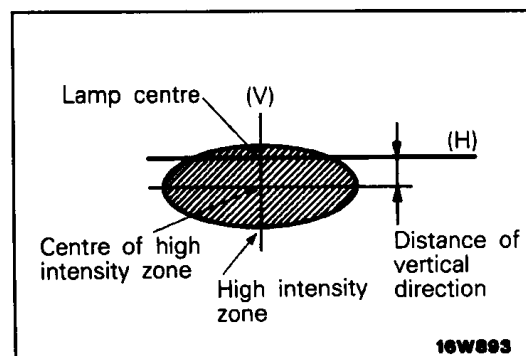
(Horizontal direction)

Parallel to direction of vehicle travel

Caution

When making the aiming adjustment, be sure to mask those lamps which are not being adjusted.

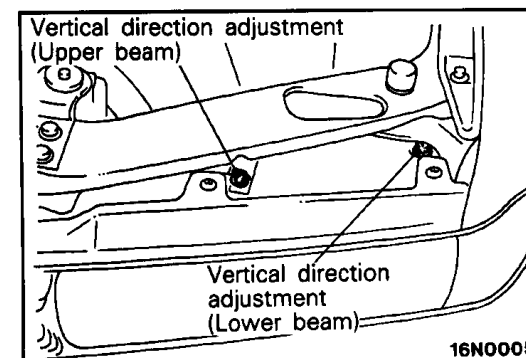
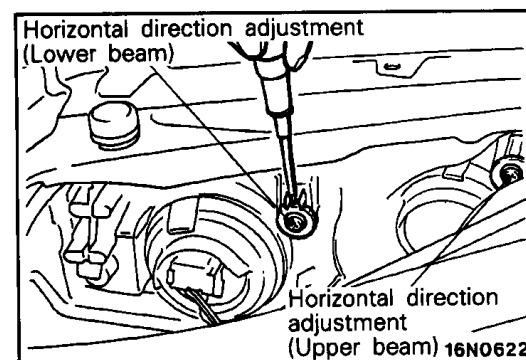
When it is difficult, because of outside light, to distinguish the light/dark dividing line, use a curtain, screen or similar material to reduce the effects of the outside light.



- (6) Alternately turn the adjusting screw to adjust the headlamp aiming.

Caution

Be sure to adjust the aiming adjustment screw in the tightening direction.



INTENSITY MEASUREMENT

Using a photometer, and following its manufacture's instruction manual, measure the headlamp intensity and check to be sure that the limit value is satisfied.

Limit: 30,000 cd or more

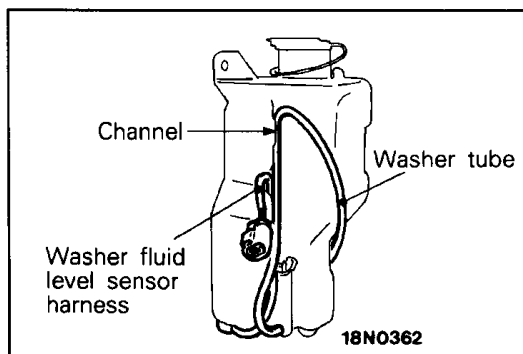
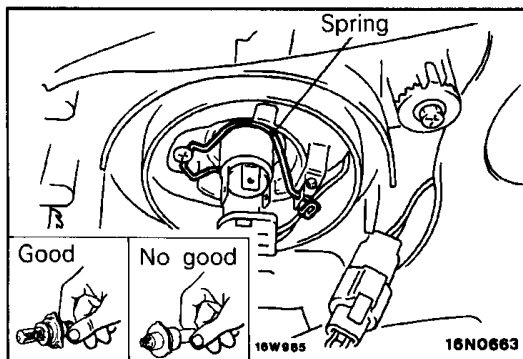
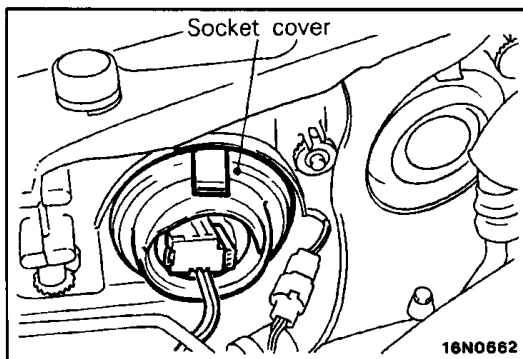
NOTE

1. When measuring the intensity, maintain an engine speed of 2,000 r/min., with the battery in the charging condition.
2. There may be special local regulations pertaining to headlamp intensity; be sure to make any adjustments necessary to satisfy such regulations.
3. If an illuminometer is used to make the measurements, convert its values to photometer values by using the following formula.

$$I = E r^2 \text{ Where: } I = \text{intensity (cd)}$$

$$E = \text{illumination (lux)}$$

$$r = \text{distance (m) from headlamps to illuminometer}$$



REPLACEMENT OF REPLACEABLE BULB

<Headlamp Bulb>

1. Remove the washer tank. (When replacing only the right side) (Refer to GROUP 51 – Windshield Wiper and Washer.)
2. Disconnect the connector. (When replacing only the lower beam)
3. Remove the socket cover.

4. Remove the bulb attachment spring and pull out the bulb.

Caution

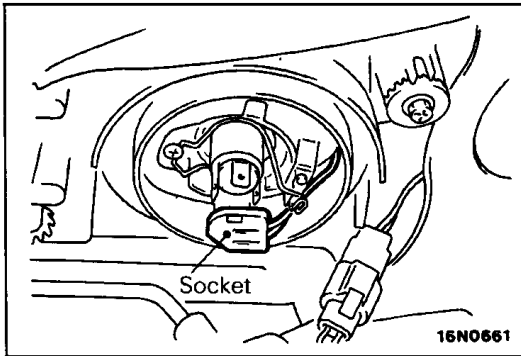
Do not touch the surface of the headlamp bulb with hands or dirty gloves. If the surface does become dirty, clean it with alcohol or thinner, and let it dry thoroughly before installing.

5. Install the socket cover securely.

NOTE

If the socket cover is not securely installed, the lens will be out of focus, or water will get inside the lamp unit, so the cover should be securely installed.

Pass the harness of the washer fluid level sensor and the washer tube in that order along the windshield washer tank channel, and then install the windshield washer tank (when only replacing the right side).



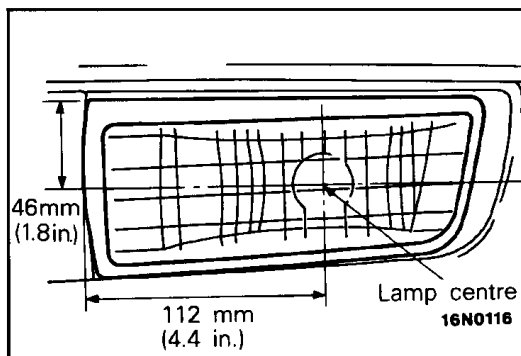
<Position Lamp Bulb>

1. Remove the washer tank. (When replacing only the right side bulb) (Refer to GROUP 51 – Windshield Wiper and Washer.)
2. Remove the socket cover and then remove the bulb.
3. Install the socket cover securely.

NOTE

If the socket cover is not securely installed, the lens will be out of focus, or water will get inside the lamp unit, so the cover should be securely installed.

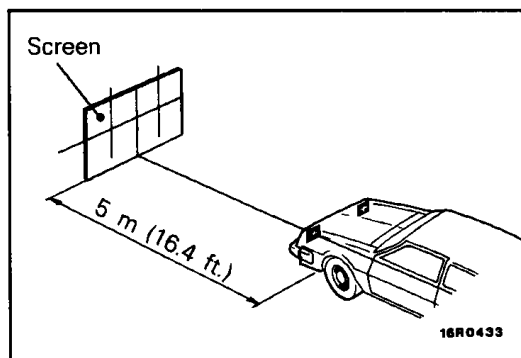
4. When only replacing the right side, install the windshield washer tank.



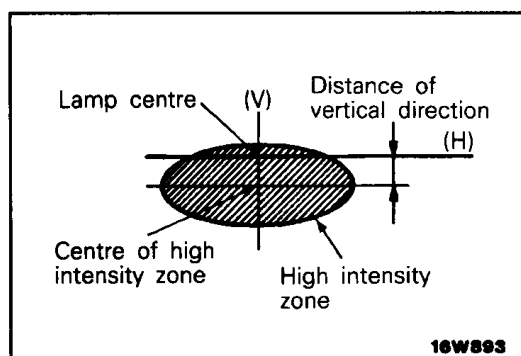
FRONT FOG LAMP AIMING

<Vehicles built up to October, 1992>

1. Measure the centre of the fog lamps, as shown in the illustration.
2. Inflate the tyres to the specified pressures and remove the load from the vehicle (except a driver).



3. Set the distance between the screen and the centre of the fog lamps at 5 m (16.4 ft.).
4. With the engine running at 2,000 r/min., aim the fog lamp.



5. Check if the beam shining onto the screen is at the standard value.

Standard value:

(Vertical direction)

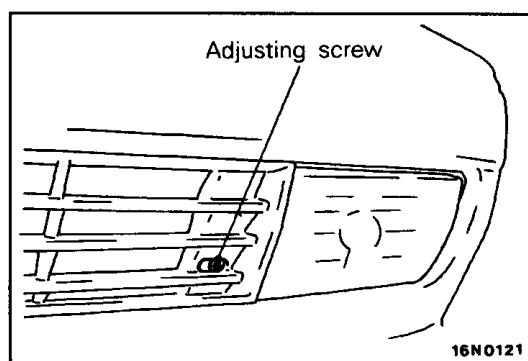
100 mm (3.94 in.) below horizontal (H)

(Horizontal direction)

Parallel to direction of vehicle travel

Caution

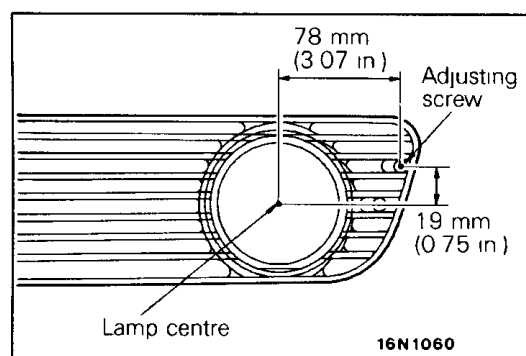
When making the aiming adjustment, be sure to mask those lamps which are not being adjusted.



6. Alternately turn the adjustment screw to adjust the fog lamp aiming.

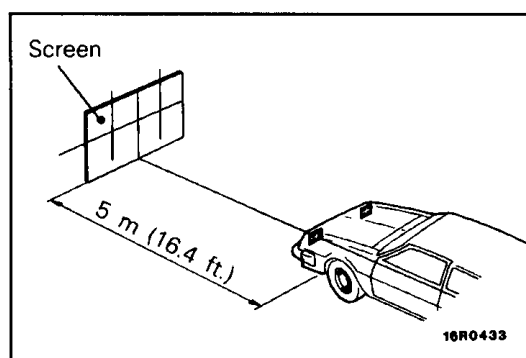
Caution

Be sure to adjust the aiming adjustment screw in the tightening direction.

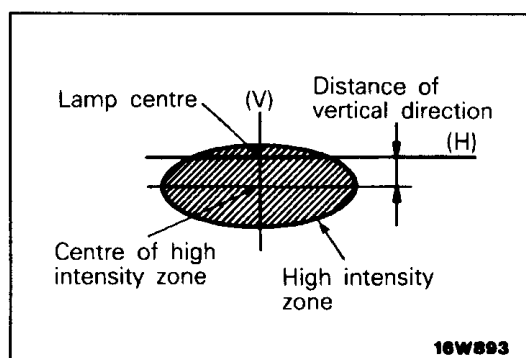


<Vehicles built from November, 1992>

1. Measure the centre of the fog lamps, as shown in the illustration.
2. Inflate the tyres to the specified pressures and remove the load from the vehicle (except a driver).



3. Set the distance between the screen and the centre of the fog lamps at 5 m (16.4 ft.).
4. With the engine running at 2,000 r/min., aim the fog lamp.



5. Check if the beam shining onto the screen is at the standard value.

Standard value:

(Vertical direction)

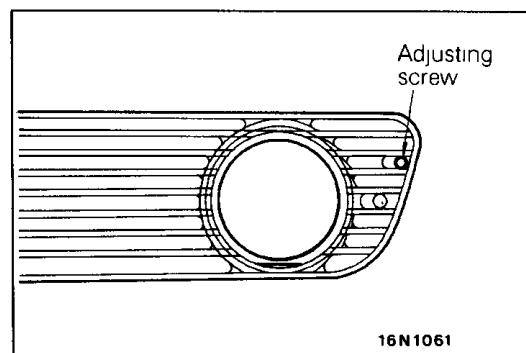
192 mm (7.56 in.) below horizontal (H)

(Horizontal direction)

Parallel to direction of vehicle travel

Caution

When making the aiming adjustment, be sure to mask those lamps which are not being adjusted.

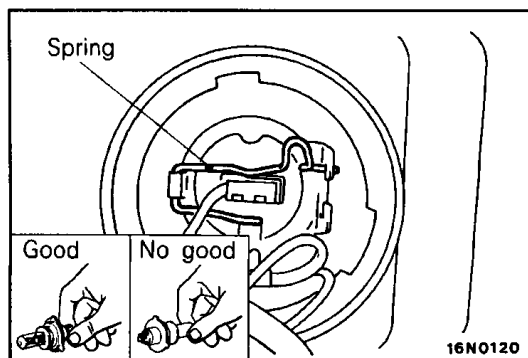
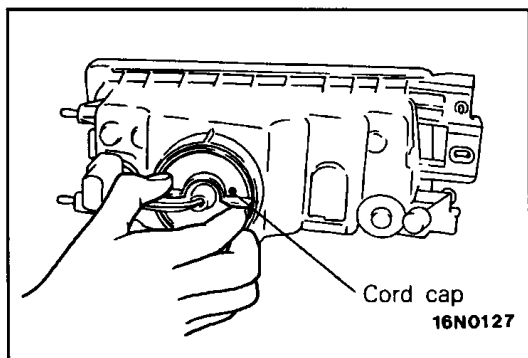


6. Alternately turn the adjustment screw to adjust the fog lamp aiming.

Caution

Be sure to adjust the aiming adjustment screw in the tightening direction.

NOTES

**REPLACEMENT OF REPLACEABLE BULB**

1. Remove the fog lamp (Refer to P.54-34).
2. Disconnect the cord cap.

3. Remove the bulb attachment spring and pull out the bulb.

Caution

Do not touch the surface of the bulb with hands or dirty gloves. If the surface does become dirty, clean it with alcohol or thinner, and let it dry thoroughly before installing.

4. Install the cord cap securely.

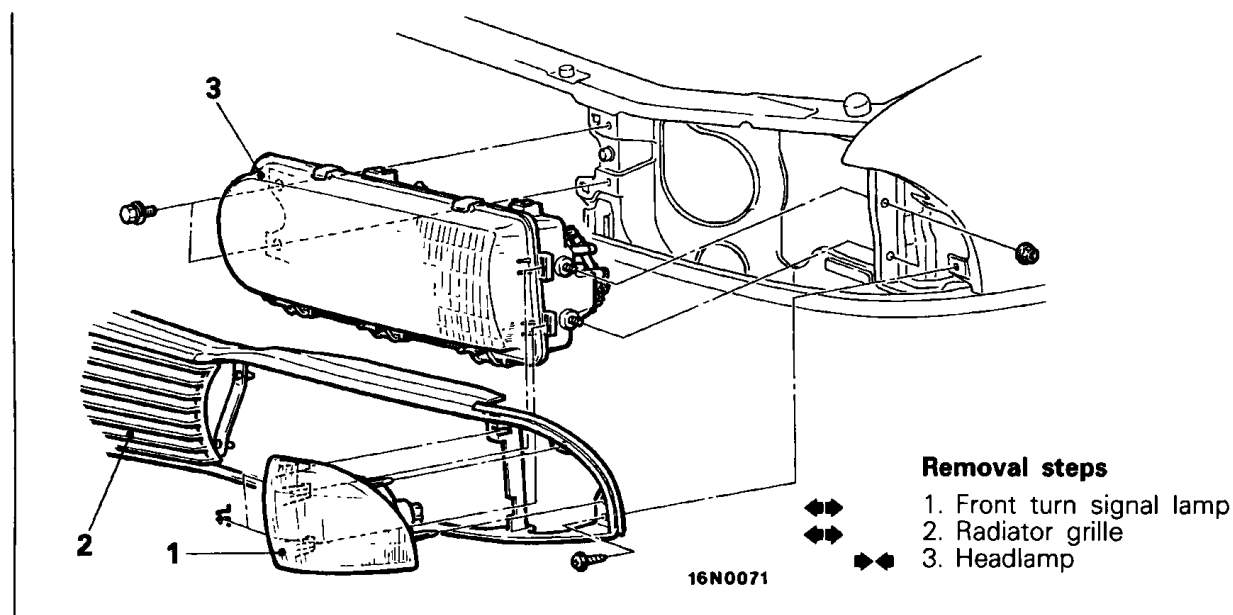
NOTE

If the cord cap is not securely installed, the lens will be out of focus, or water will get inside the lamp unit, so the cord cap should be securely installed.

HEADLAMP AND FRONT TURN SIGNAL LAMP

E54GHAM

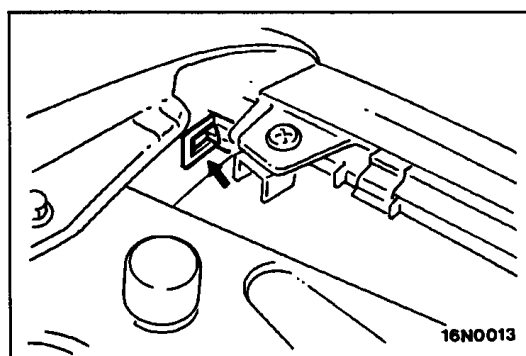
REMOVAL AND INSTALLATION <Vehicles built up to April, 1994>



SERVICE POINTS OF REMOVAL

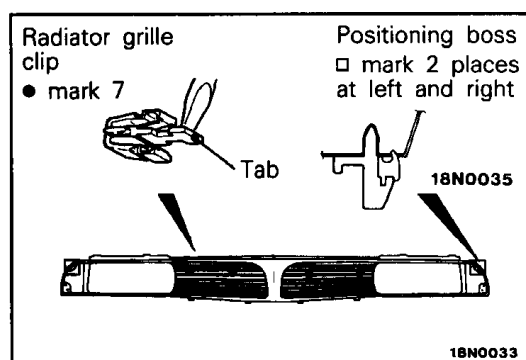
1. REMOVAL OF FRONT TURN SIGNAL LAMP

Remove the front turn signal lamp setting hooks, and remove the front turn signal lamp by pulling it towards the front of the vehicle.



2. REMOVAL OF RADIATOR GRILLE

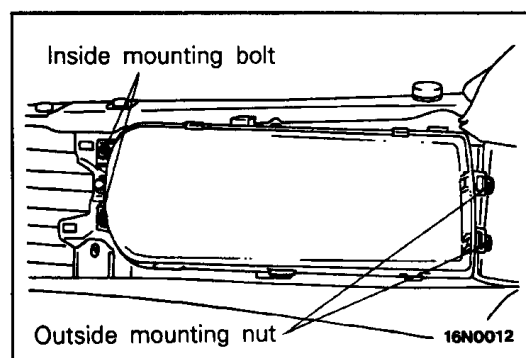
After removing the mounting screw, push the tab of the radiator grille clip downwards and to the left with a (-) driver as shown in the illustration, and remove the radiator grille by pulling it towards you.



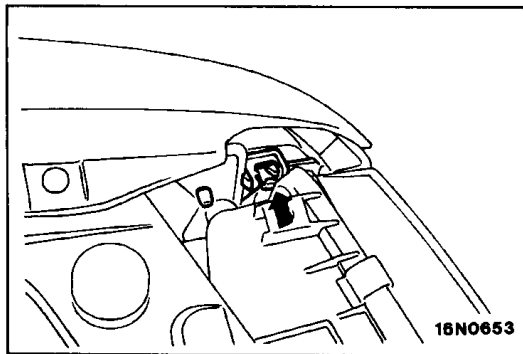
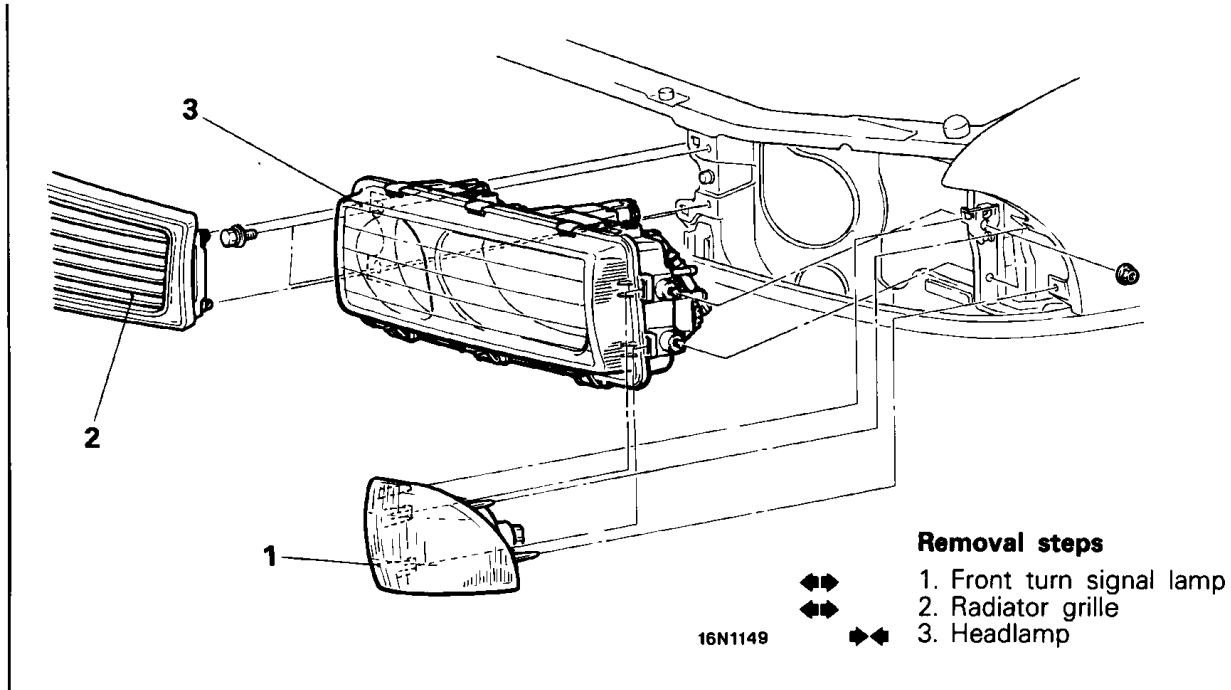
SERVICE POINT OF INSTALLATION

3. INSTALLATION OF HEADLAMP

After tightening the outside mounting nuts, tighten the inside mounting bolt.



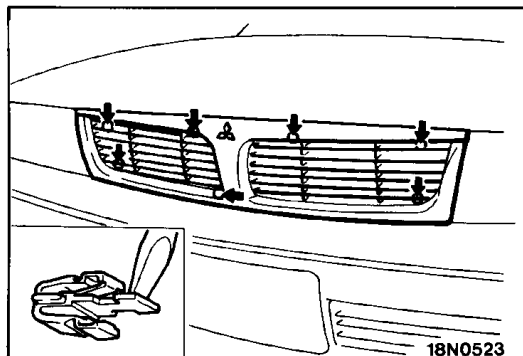
REMOVAL AND INSTALLATION <Vehicles built from May, 1994>



SERVICE POINTS OF REMOVAL

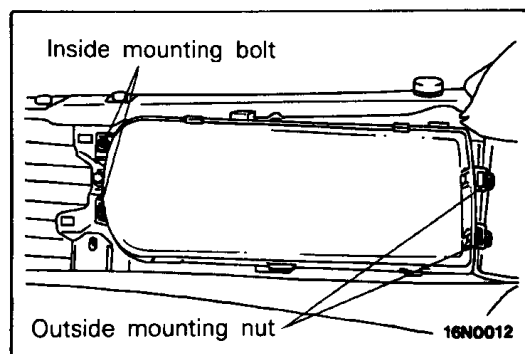
1. REMOVAL OF FRONT TURN SIGNAL LAMP

Remove the front turn signal lamp setting hooks, and remove the front turn signal lamp by pulling it towards the front of the vehicle.



2. REMOVAL OF RADIATOR GRILLE

While pulling the radiator grille gently towards you, push the clip tabs in the direction of the arrows with a flat-tipped screwdriver to remove the radiator grille.



SERVICE POINT OF INSTALLATION

3. INSTALLATION OF HEADLAMP

After tightening the outside mounting nuts, tighten the inside mounting bolt.

NOTES

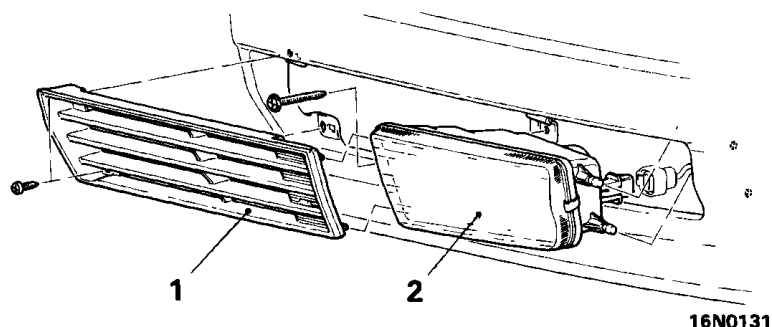
FRONT FOG LAMP

REMOVAL AND INSTALLATION

<Vehicles built up to October, 1992>

Removal steps

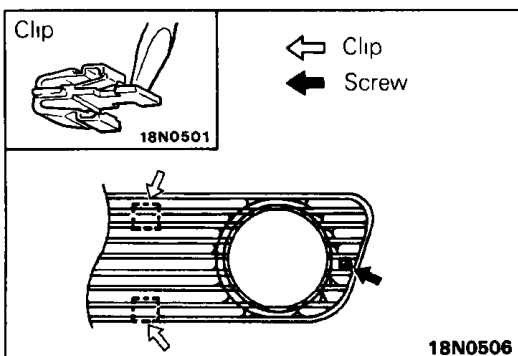
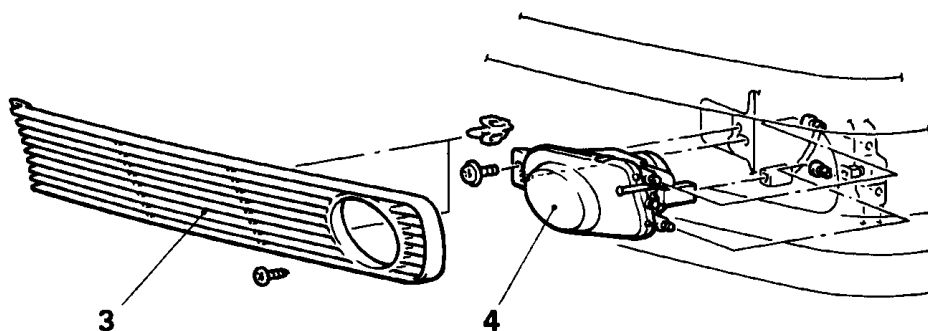
- 1 Under grille
- 2 Fog lamp



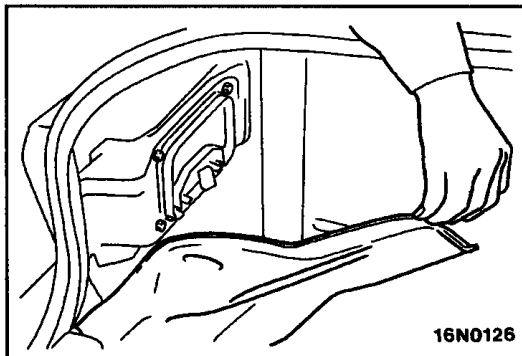
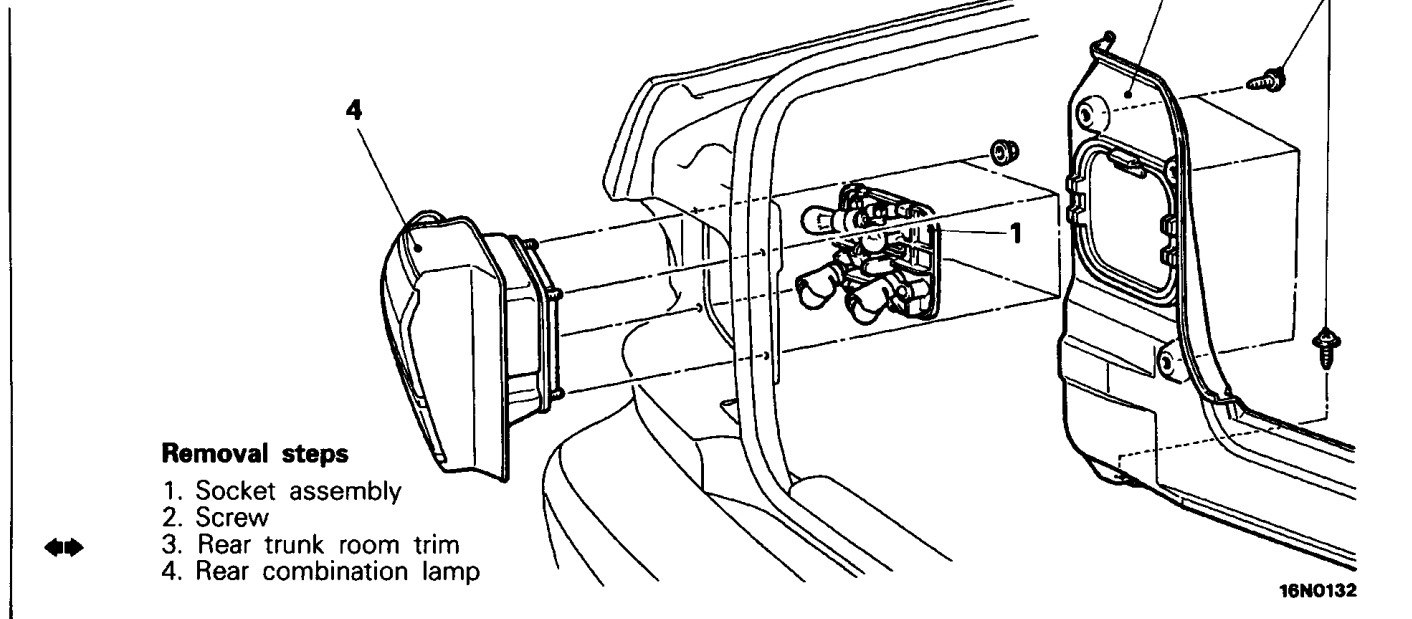
<Vehicles built from November, 1992>

Removal steps

- 3 Under grille
- 4 Fog lamp

**SERVICE POINTS OF REMOVAL****3. REMOVAL OF UNDER GRILLE**

Unscrew and push the tab of the clips with a flat-tipped screwdriver. Then remove the under grille by pulling it towards you.

REAR COMBINATION LAMP**REMOVAL AND INSTALLATION****SERVICE POINTS OF REMOVAL****3. REMOVAL OF REAR TRUNK ROOM TRIM**

Remove the screws (4 places) and roll up the rear trunk room trim inside the vehicle.

NOTES

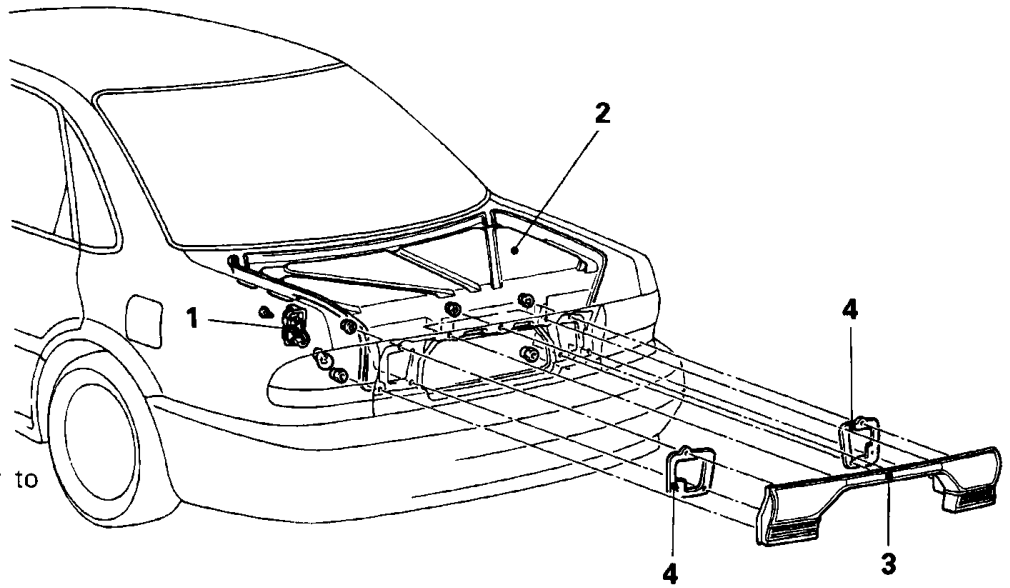
REAR LID LAMP

E54GPAC

REMOVAL AND INSTALLATION

Removal steps

1. Socket assembly
2. Rear lid trim (Refer to GROUP 52 – Trim)
3. Rear lid lamp
4. Base gasket



16N0654

ROOM LAMP <Vehicles With Sunroof>

E54GEAB

REMOVAL AND INSTALLATION

Removal steps

<Removal of room lamp bulb>

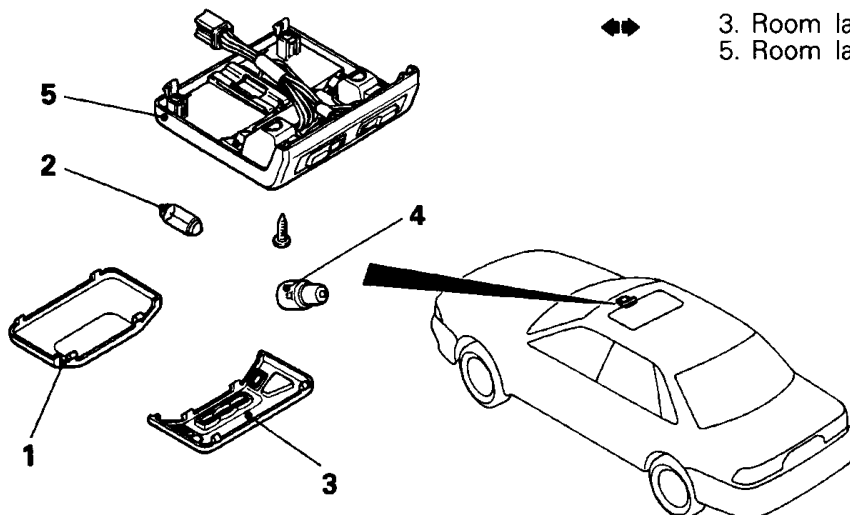
- ↔
1. Room lamp lens
 2. Room lamp bulb

<Removal of spot lamp bulb>

- ↔
3. Room lamp switch cover
 4. Spot lamp bulb

<Removal of room lamp body>

- ↔
3. Room lamp switch cover
 5. Room lamp body



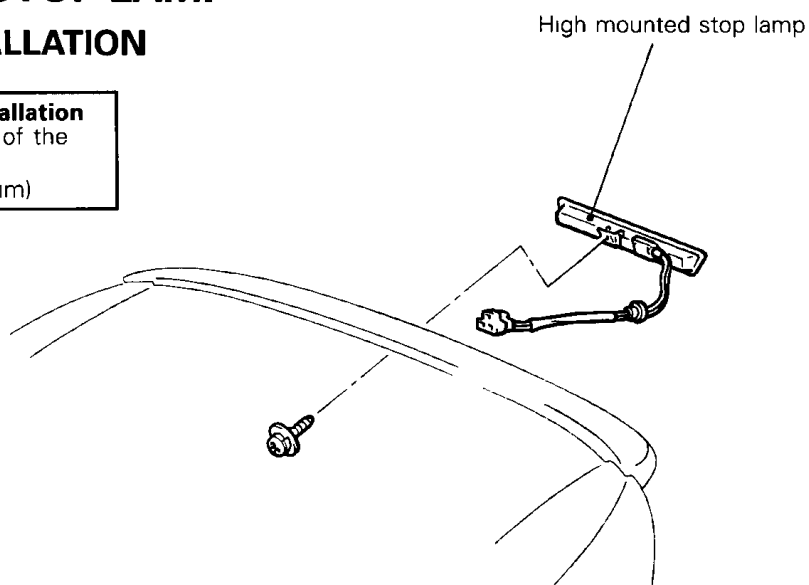
16N0650

HIGH MOUNTED STOP LAMP

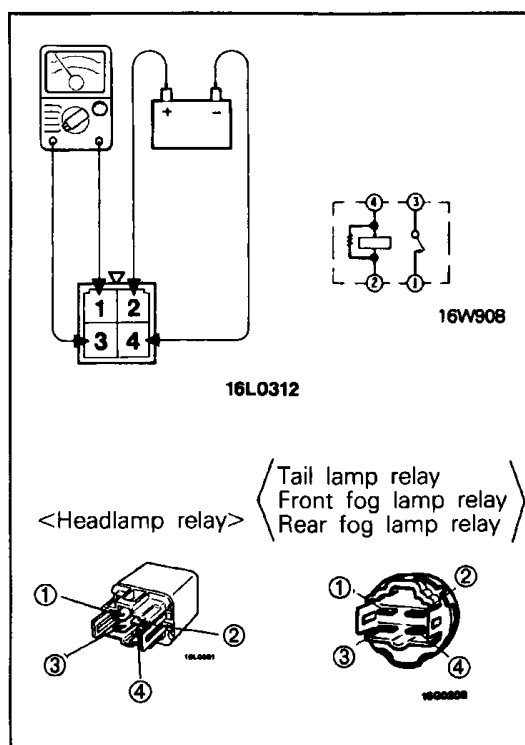
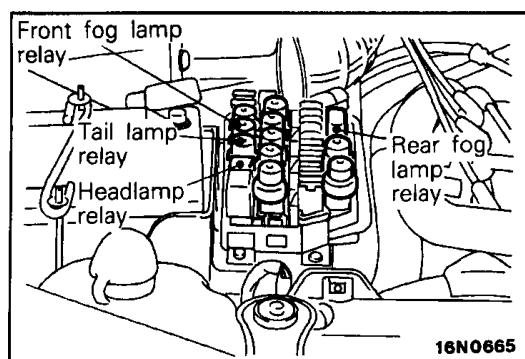
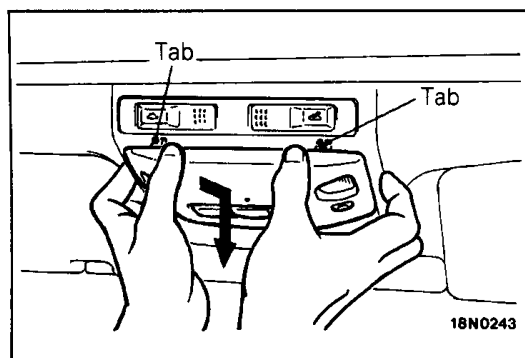
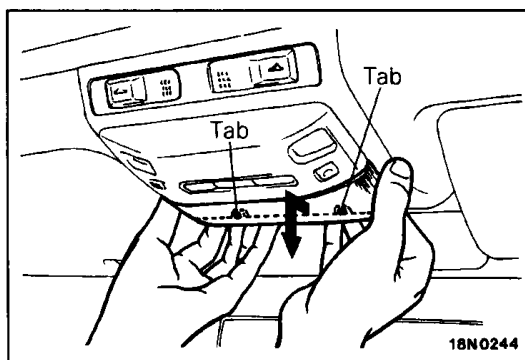
REMOVAL AND INSTALLATION

Pre-removal and Post-installation

- Removal and Installation of the Trunk Lid Trim.
(Refer to GROUP 52 – Trim)



18N0465



SERVICE POINTS OF REMOVAL

1. REMOVAL OF ROOM LAMP LENS

To remove, press the room lamp tab while pulling downwards.

3. REMOVAL OF ROOM LAMP SWITCH COVER

To remove, press the room lamp switch cover tab while pulling downwards.

RELAY

E54GIAM

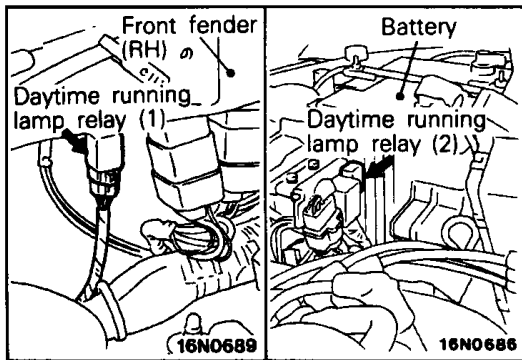
INSPECTION

HEADLAMP RELAY, TAIL LAMP RELAY, FRONT FOG LAMP RELAY AND REAR FOG LAMP RELAY CHECKING

(1) Remove the headlamp relay, tail lamp relay, front fog lamp relay and rear fog lamp relay from the engine compartment relay box.

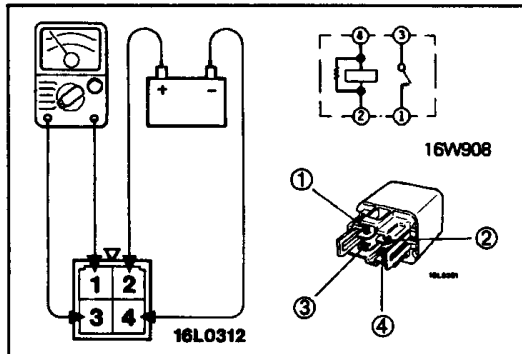
(2) Apply battery voltage to terminal ②, and check the continuity between the terminals when terminal ④ is earthed.

Power is supplied	①-③ terminals	Continuity
Power is not supplied	①-③ terminals	No continuity
	②-④ terminals	Continuity



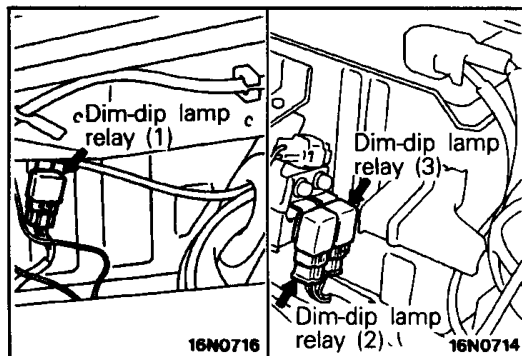
DAYTIME RUNNING LAMP RELAY (1), (2)
<Vehicles for Norway, Sweden and Iceland>

- (1) Remove the battery.
- (2) Remove the intake air cleaner duct and then remove the daytime running lamp relay (1).
- (3) Remove the relay box and remove daytime running lamp relays (2).



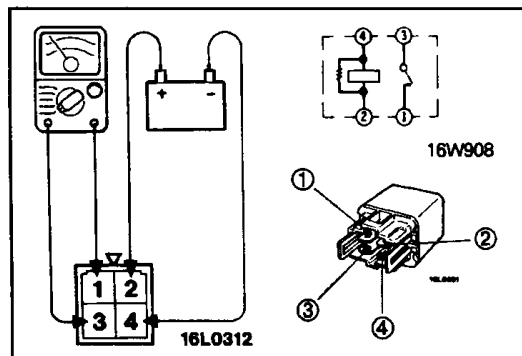
- (4) Apply battery voltage to terminal ②, and check the continuity between the terminals when terminal ④ is earthed.

Power is supplied	①-③ terminals	Continuity
Power is not supplied	①-③ terminals	No continuity
	②-④ terminals	Continuity



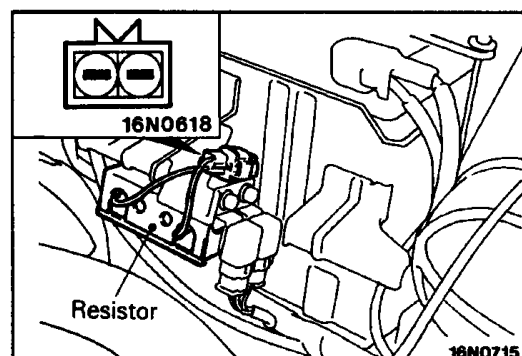
DIM-DIP LAMP RELAY (1), (2), (3) <R.H. Drive Vehicles>

- (1) Remove the battery.
- (2) Remove the intake air cleaner duct and then remove the dim-dip lamp relay (1).
- (3) Remove the relay box and remove dim-dip lamp relays (2) and (3).



- (4) Apply battery voltage to terminal ②, and check the continuity between the terminals when terminal ④ is earthed.

Power is supplied	①-③ terminals	Continuity
Power is not supplied	①-③ terminals	No continuity
	②-④ terminals	Continuity

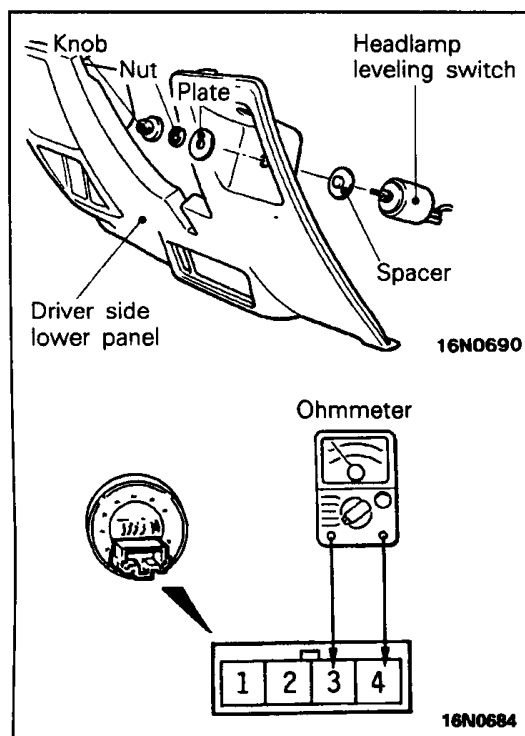


RESISTOR <R.H. Drive Vehicle>

INSPECTION

- (1) Remove the relay box and remove the resistor connector.
- (2) Connect an ohmmeter to the resistor connector terminal and check the resistance value.

Standard value: Approx. 1Ω



SWITCH

E54GYAD

INSPECTION

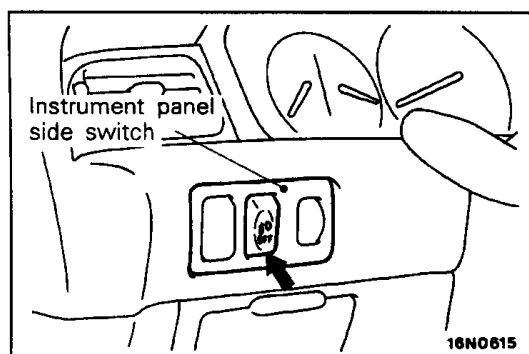
HEADLAMP LEVELING SWITCH

- (1) Remove the driver side lower panel. (Refer to GROUP 52 - Instrument Panel.)

- (2) Connect the ohmmeter to headlamp levelling switch connector terminals ③ and ④.
- (3) Operate the switch and check the resistance values in each switch position.

Standard value:

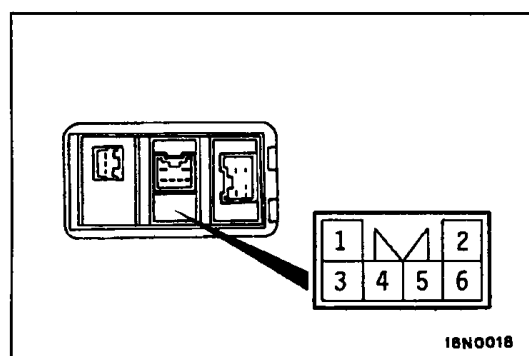
Switch position	0	1	2	3	4
Resistance Ω	120	300	620	1,100	2,000



FRONT FOG LAMP SWITCH

E54GWAB

- (1) Remove the instrument panel side switch from the instrument panel.



- (2) Operate the switch and check for continuity between the terminals.

Switch position \ Terminal No.	1	2	3	4	5	6
OFF		ILL				
ON	○	○	○	○	○	○

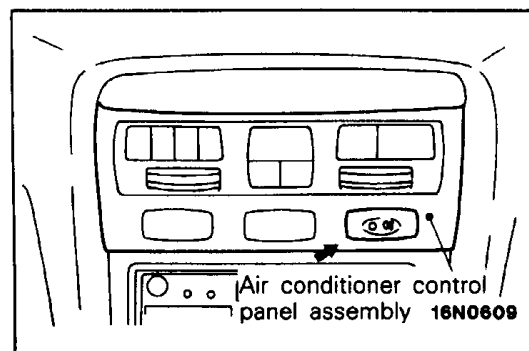
NOTE

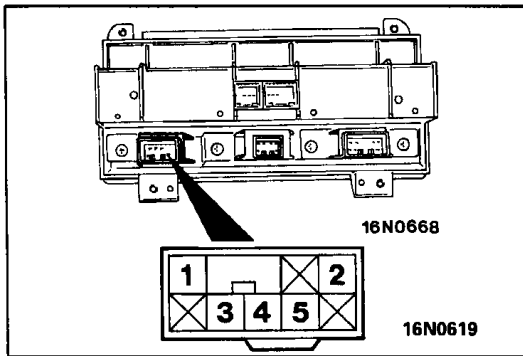
○—○ indicates that there is continuity between the terminals.

REAR FOG LAMP SWITCH

E54GMAG

- (1) Remove the air conditioner control panel assembly. (Refer to GROUP 55 - Air Conditioner Control Unit)





- (2) Operate the switch and check for continuity between the terminals.

Terminal No. / Switch position	1	IND	3	4	2	5
OFF	○	○	○	○	○	○
ON					ILL	

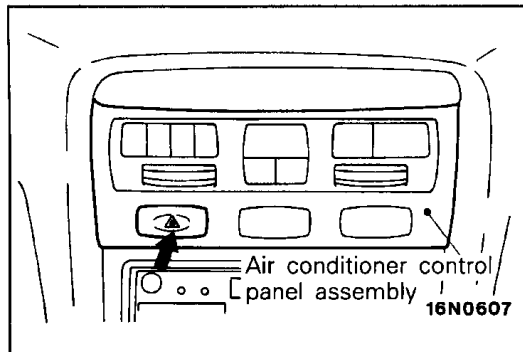
NOTE

○—○ indicates that there is continuity between terminals.

HAZARD SWITCH

E54GLAI

- (1) Remove the air conditioner control panel assembly. (Refer to GROUP 55 – Air Conditioner Control Unit)



- (2) Operate the switch and check for continuity between the terminals.

Terminal No. / Switch position	1	2	3	4	5	6	7	8	9	10
OFF			ILL		○			○		
ON	○	○	○				○	○		○

NOTE

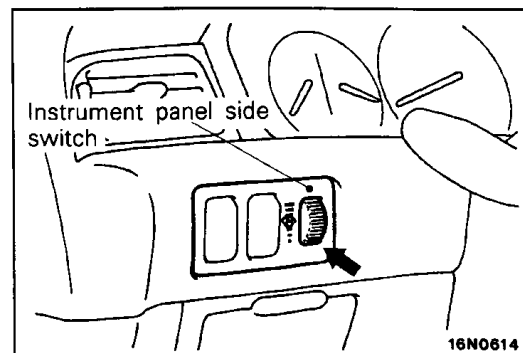
○—○ indicates that there is continuity between the terminals.

RHEOSTAT

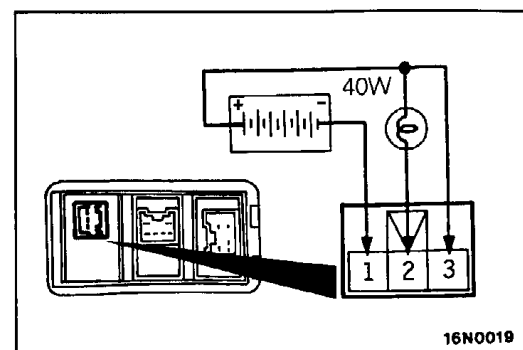
E54GNAF

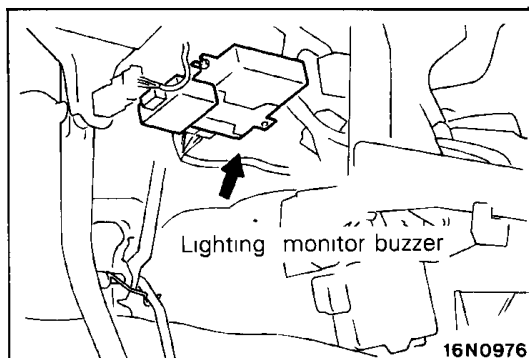
INSPECTION

- (1) Remove the instrument panel side switch from the instrument panel.



- (2) Connect the battery and the test bulb (40W) as shown in the illustration.
 (3) Operate the rheostat, and if the brightness changes smoothly without switching off, then the rheostat function is normal.

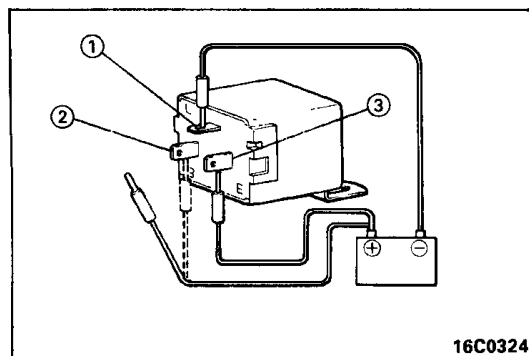




LIGHTING MONITOR BUZZER

<VEHICLES BUILT FROM NOVEMBER, 1991> INSPECTION

(1) Remove the lighting monitor buzzer.

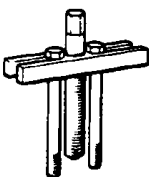


(2) Apply the battery voltage to lighting monitor buzzer terminal No.③, and check to be sure that the buzzer sounds when terminal No.①, is earthed.

(3) When the battery voltage is applied to terminal No.②, check to be sure that the buzzer stops sounding.

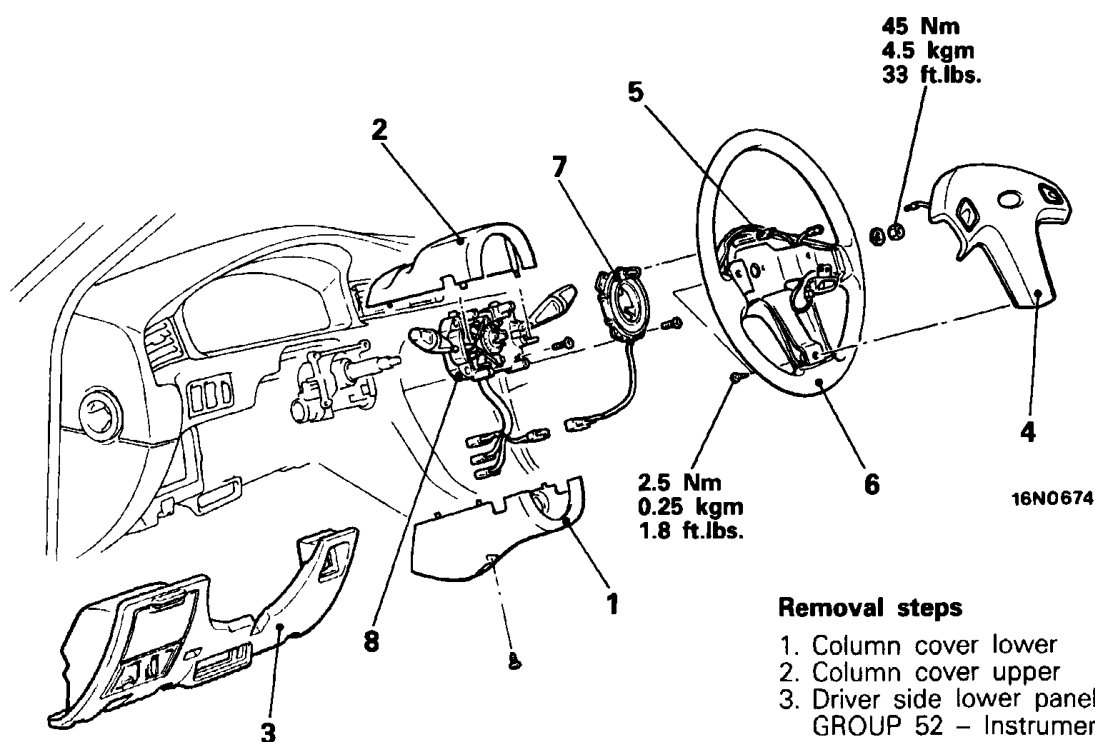
COLUMN SWITCH SPECIAL TOOL

E54HF--

Tool	Number	Name	Use
	MB990803	Steering wheel puller	Removal of steering wheel

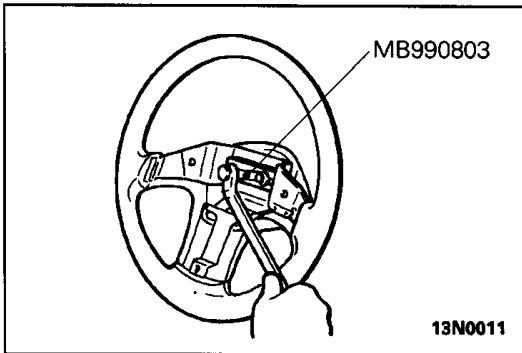
COLUMN SWITCH <VEHICLES WITHOUT SRS> REMOVAL AND INSTALLATION

E54HH--



Removal steps

1. Column cover lower
2. Column cover upper
3. Driver side lower panel (Refer to GROUP 52 – Instrument Panel)
4. Horn pad
5. Harness connector
- <Vehicles with cruise control>
6. Steering wheel
7. Slip ring
- <Vehicles with cruise control>
8. Column switch



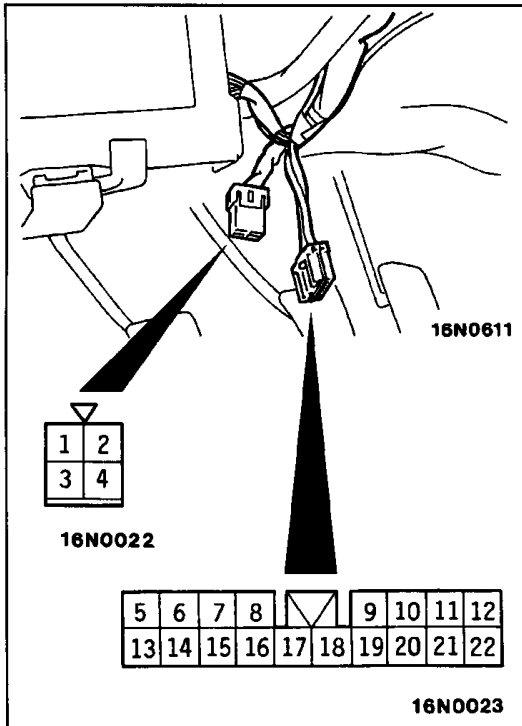
SERVICE POINTS OF REMOVAL

E54HIAG

6. REMOVAL OF STEERING WHEEL

INSPECTION

- (1) Remove the column cover lower.
- (2) Remove the driver side lower panel. (Refer to GROUP 52 – Instrument Panel)
- (3) Remove the column switch connector.



- (4) Operate the switch and check for continuity between the terminals.

Terminal No.		1	3	4	5	8	9	10	17	18	19
Switch position											
TURN SIGNAL	RH									○—○	
	OFF										
	LH						○—○				
LIGHTING	OFF										
	TAIL					○—○					
	HEAD					○—○		○—○			
DIMMER/PASSING	LOWER	○—○									
	UPPER	○—○									
	PASSING	○—○		○—○							

NOTE

○—○ indicates that there is continuity between the terminals.

WIPER AND WASHER SWITCH

Refer to GROUP 51 – Windshield Wiper and Washer

HEADLAMP WASHER SWITCH

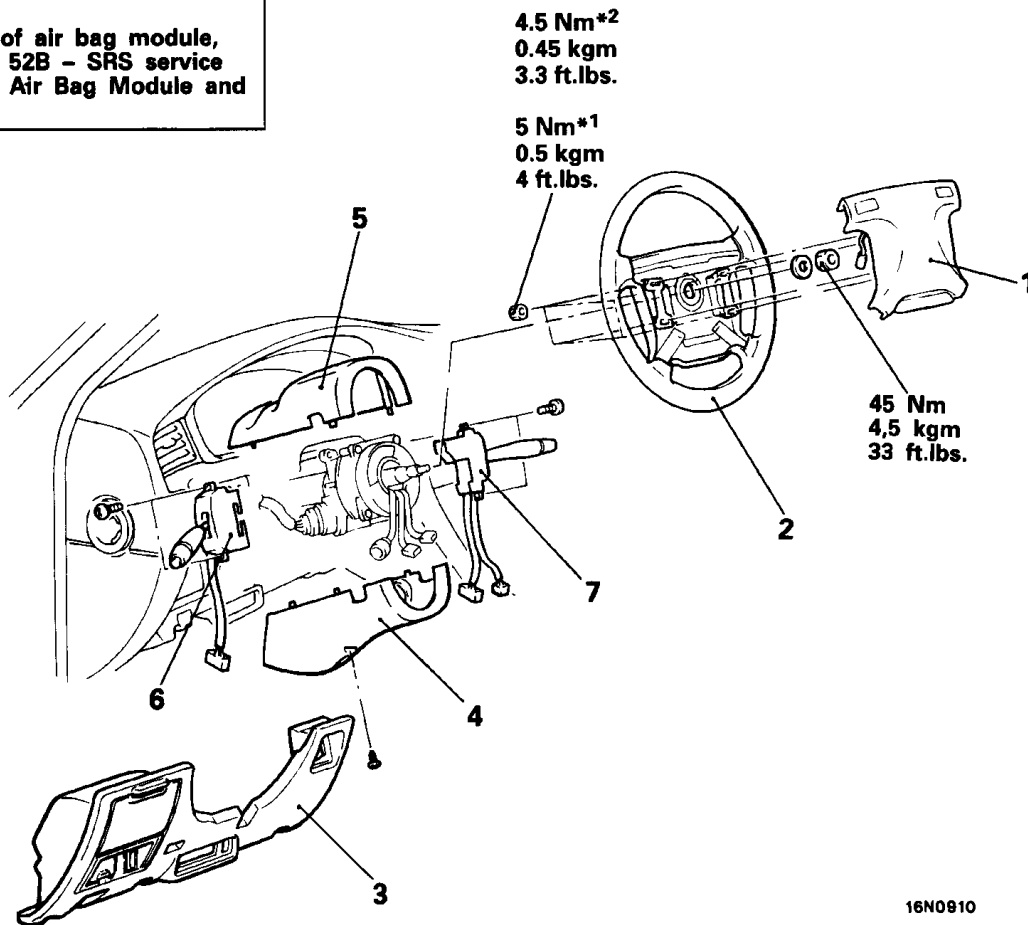
Refer to GROUP 51 – Headlamp Washer.

COLUMN SWITCH <VEHICLES WITH SRS>

E54HH-A

REMOVAL AND INSTALLATION

CAUTION: SRS
Before removal of air bag module, refer to GROUP 52B – SRS service Precautions and Air Bag Module and Clock Spring



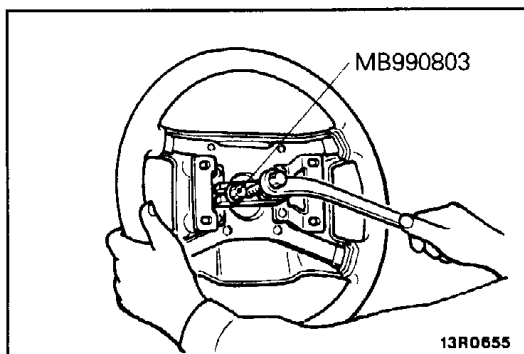
16N0910

Removal steps

1. Air bag module
(Refer to GROUP 52B – Air Bag Module and Clock Spring)
2. Steering wheel
3. Driver side lower panel
(Refer to GROUP 52 – Instrument panel)
4. Column cover lower
5. Column cover upper
6. Column switch left (For lighting switch, dimmer/passing switch and turn signal switch)
7. Column switch right (for wiper and washer switch)

NOTE

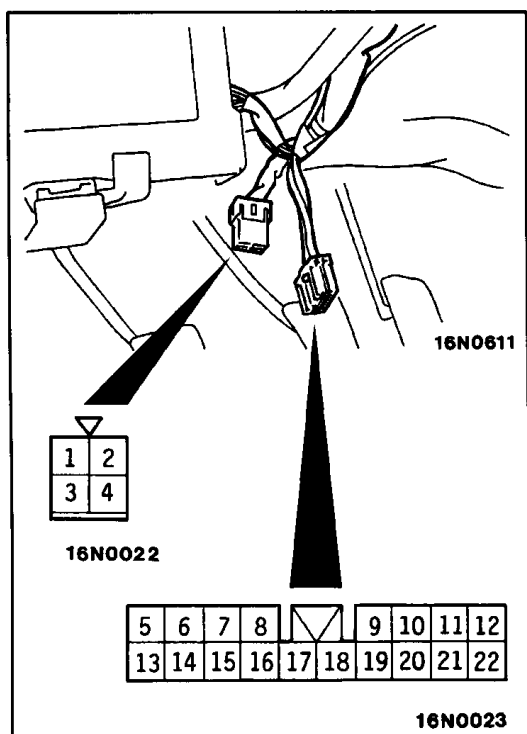
- *1: Vehicles built up to April, 1994
*2: Vehicles built from May, 1994



13R0655

SERVICE POINTS OF REMOVAL**2. REMOVAL OF STEERING WHEEL**

E54HAGa



INSPECTION

- (1) Remove the column cover lower.
- (2) Remove the driver side lower panel. (Refer to GROUP 52 – Instrument Panel)
- (3) Remove the column switch connector.

- (4) Operate the switch and check for continuity between the terminals.

Terminal No.		1	3	4	5	8	9	10	17	18	19
Switch position											
TURN SIGNAL	RH									○—○	
	OFF										
	LH						○—○				
LIGHTING	OFF										
	TAIL					○—○		○			
	HEAD					○—○		○—○			
DIMMER/ PASSING <L.H. drive vehicles>	LOWER (PASSING)	○—○									
	UPPER (PASSING)	○—○		○							
DIMMER/ PASSING <R.H. drive vehicles>	LOWER	○—○									
	UPPER	○—○		○							
	PASSING	○—○		○—○							

NOTE

○—○ indicates that there is continuity between the terminals.

WIPER AND WASHER SWITCH

Refer to GROUP 51 – Windshield Wiper and Washer

HEADLAMP WASHER SWITCH

Refer to GROUP 51 – Headlamp Washer.

HORN

HORN SWITCH <VEHICLES WITH SRS>

E541QAH

REMOVAL AND INSTALLATION

<Vehicles built up to April, 1994>

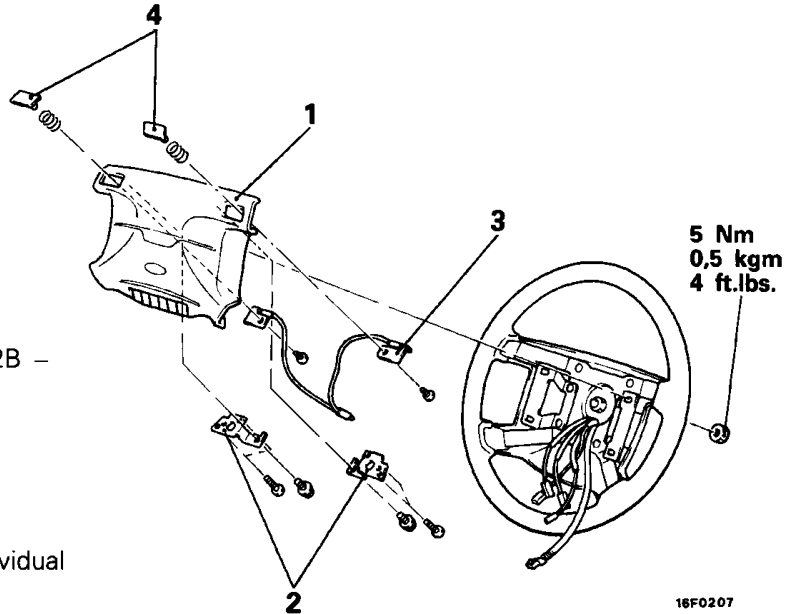
CAUTION: SRS
Before removal of air bag module, refer to GROUP 52B – SRS Service Precautions and Air Bag Module and Clock Spring.

Removal steps

1. Air bag module (Refer to GROUP 52B – Air Bag Module and Clock Spring)
2. Horn contact switch
3. Horn contact plate and wire
4. Horn switch

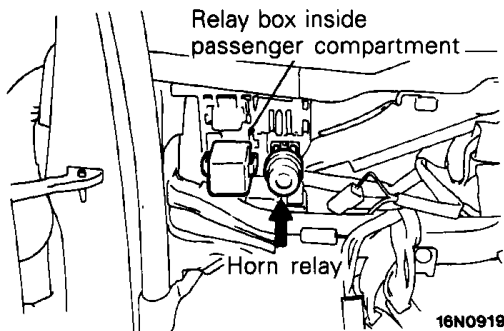
<Vehicles built from May, 1994>

Because a horn switch is not supplied as an individual part, replace it as a steering wheel assembly.



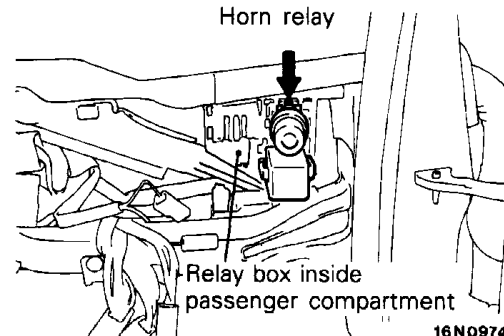
16F0207

<L.H. drive vehicles>



16N0919

<R.H. drive vehicles>



16N0974

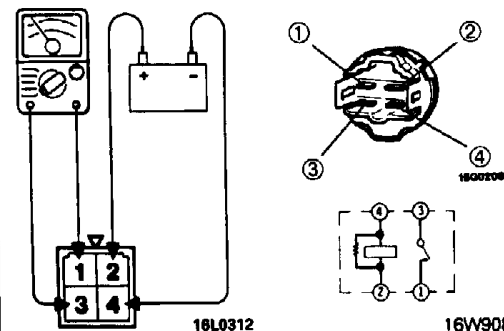
HORN RELAY <VEHICLES WITH SRS>

E541RAA

INSPECTION

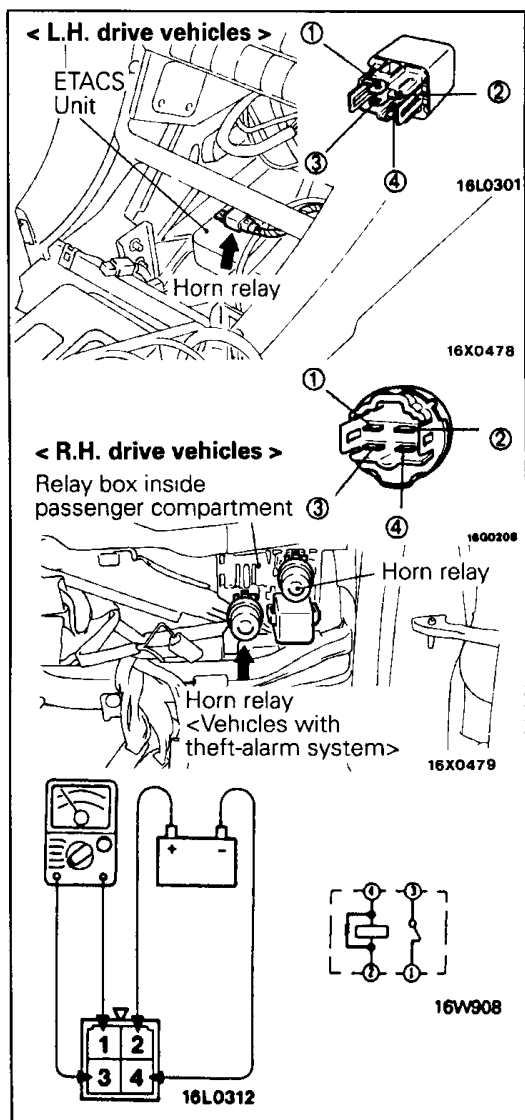
Apply battery voltage to terminal 2, and check the continuity between the terminals when terminal 4 is earthed.

Power is supplied	1-3 terminals	Continuity
Power is not supplied	1-3 terminals	No continuity
	2-4 terminals	Continuity



16L0312

16V908



HORN RELAY <VEHICLES WITH THEFT-ALARM SYSTEM>

INSPECTION

Apply battery voltage to terminal ②, and check the continuity between the terminals when terminal ④ is earthed.

Power is supplied	1-3 terminals	Continuity
Power is not supplied	1-3 terminals	No continuity
	2-4 terminals	Continuity

AUDIO SYSTEM

TROUBLESHOOTING

QUICK-REFERENCE TROUBLESHOOTING CHART

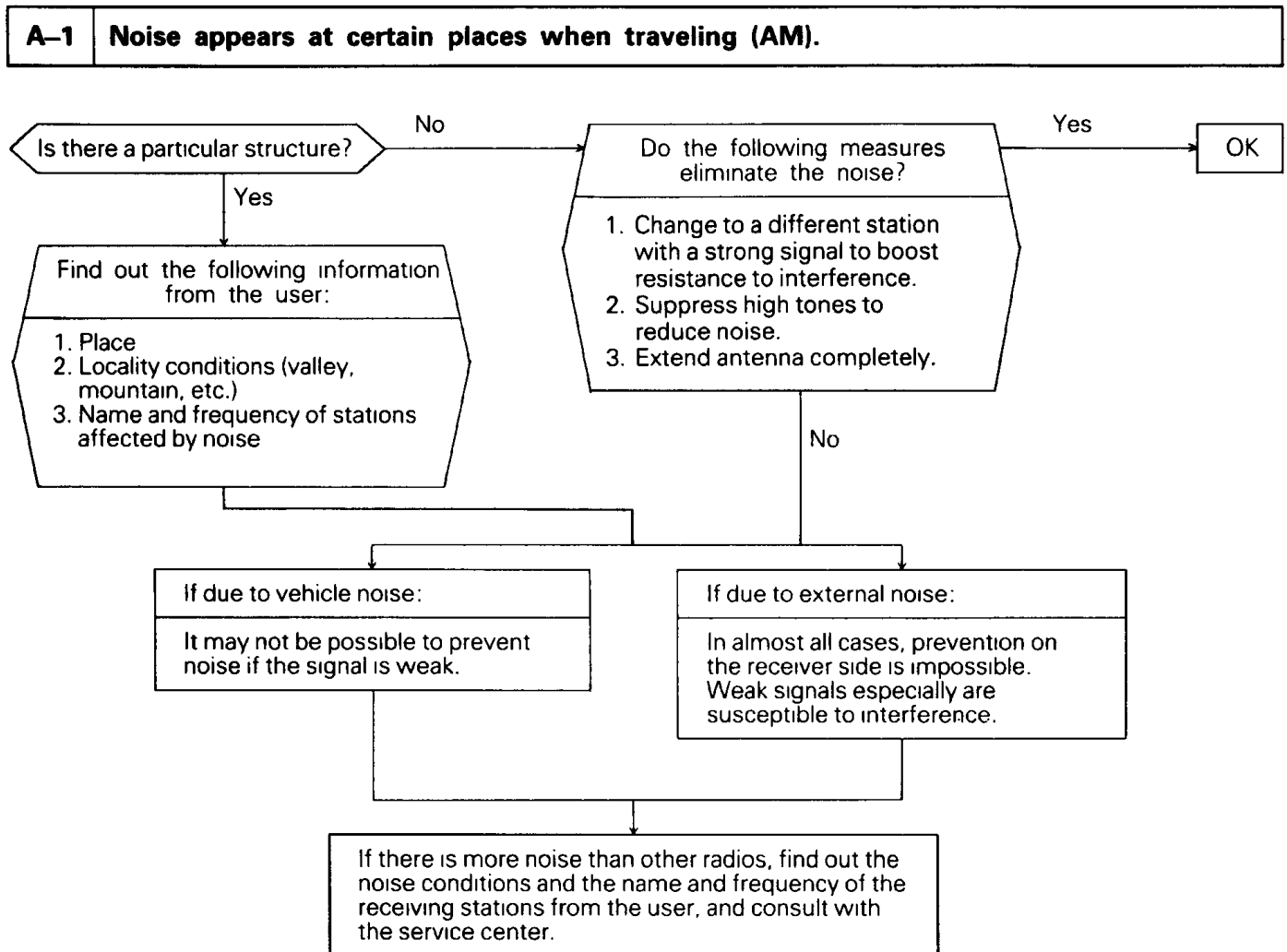
Item	Problem symptom	Relevant chart
Noise	Noise appears at certain places when traveling (AM).	A-1
	Noise appears at certain places when traveling (FM).	A-2
	Mixed with noise, only at night (AM).	A-3
	Broadcasts can be heard but both AM and FM have a lot of noise	A-4
	There is more noise either on AM or on FM.	A-5
	There is noise when starting the engine.	A-6
	Some noise appears when there is vibration or shocks during traveling	A-7
	Noise sometimes appears on FM during traveling.	A-8
	Ever-present noise.	A-9
Radio	When switch is set to ON, no power is available.	B-1
	No sound from one speaker.	B-2
	There is noise but no reception for both AM and FM or no sound from AM, or no sound from FM.	B-3
	Insufficient sensitivity.	B-4
	Distortion on AM or on both AM and FM.	B-5
	Distortion on FM only.	B-6
	Too few automatic select stations.	B-7
	Insufficient memory (preset stations are erased).	B-8
Cassette player	Cassette tape will not insert.	C-1
	No sound.	C-2
	No sound from one speaker.	C-3
	Sound quality is poor, or sound is weak.	C-4
	Cassette tape will not eject.	C-5
	Uneven revolution. Tape speed is fast or slow.	C-6
	Automatic search does not work.	C-7
	Faulty auto reverse.	C-8
	Tape gets caught in mechanism.	C-9
Motor antenna	Motor antenna won't extend or retract.	D-1
	Motor antenna extends and retracts but does not receive.	D-2

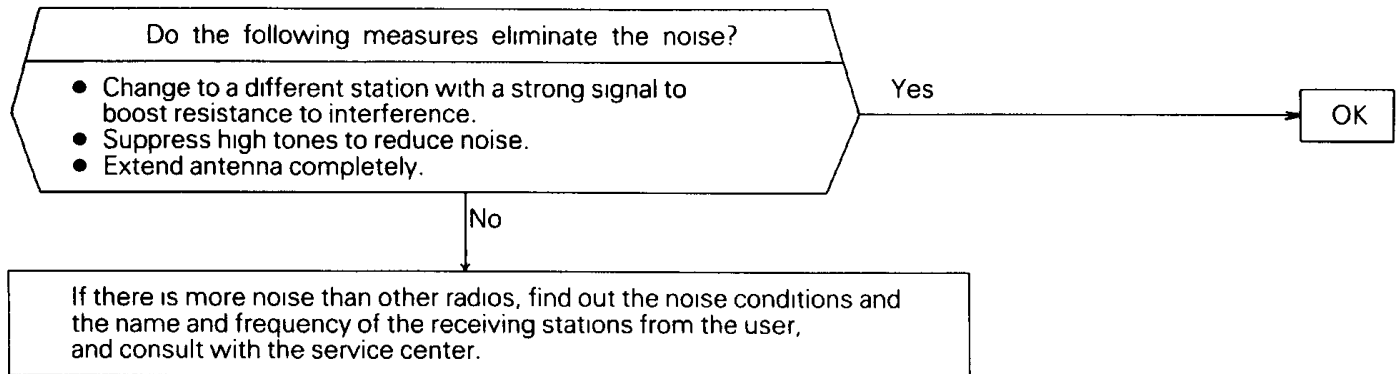
NOTE

Refer to problem symptoms of AM radio for LW and MW radio.

CHART

A. NOISE



A-2 Noise appears at certain places when traveling (FM).**NOTE**

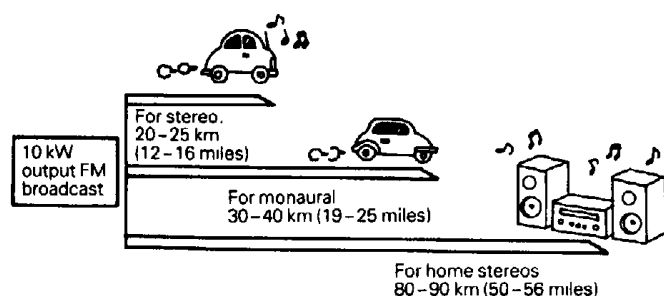
About FM waves:

FM waves have the same properties as light, and can be deflected and blocked. Wave reception is not possible in the shadow of obstructions such as buildings or mountains.

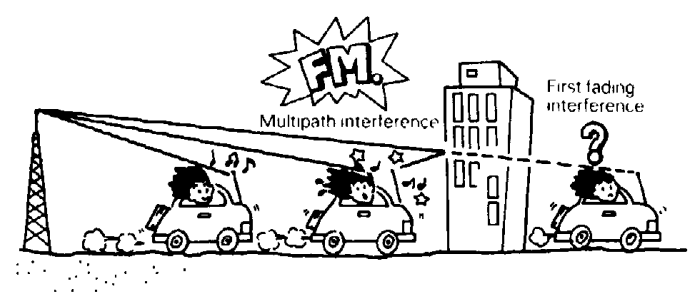
1. The signal becomes weak as the distance from the station's transmission antenna increases. Although this may vary according to the signal strength of the transmitting station and intervening geographical formations or buildings, the area of good reception is approx. 20 – 25 km (12 – 16 miles) for stereo reception, and 30 – 40 km (19 – 25 miles) for monaural reception.
2. The signal becomes weak when an area of shadow from the transmitting antenna (places where there are obstructions such as mountains or buildings between the antenna and the car),

and noise will appear. <This is called first fading, and gives a steady buzzing noise.>

3. If a direct signal hits the antenna at the same time as a signal reflected by obstructions such as mountains or buildings, interference of the two signals will generate noise. During traveling, noise will appear each time the vehicle's antenna passes through this kind of obstructed area. The strength and interval of the noise varies according to the signal strength and the conditions of deflection. <This is called multipath noise, and is a repetitious buzzing.>
4. Since FM stereo transmission and reception has a weaker field than monaural, it is often accompanied by a hissing noise.

FM Broadcast Good Reception Areas

16A0663

FM Signal Characteristics and Signal Interference

16A0664

A-3 Mixed with noise, only at night (AM).

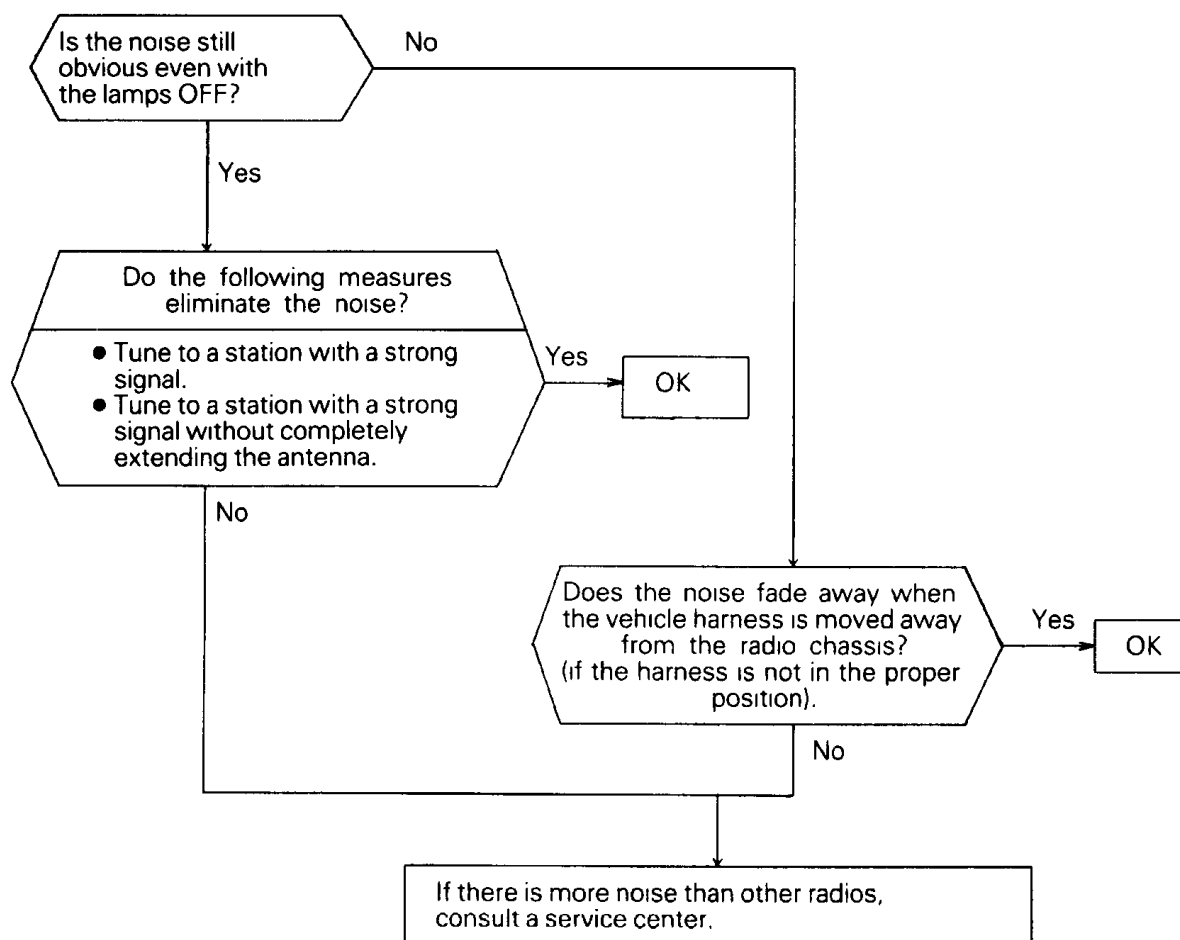
The following factors can be considered as possible causes of noise appearing at night.

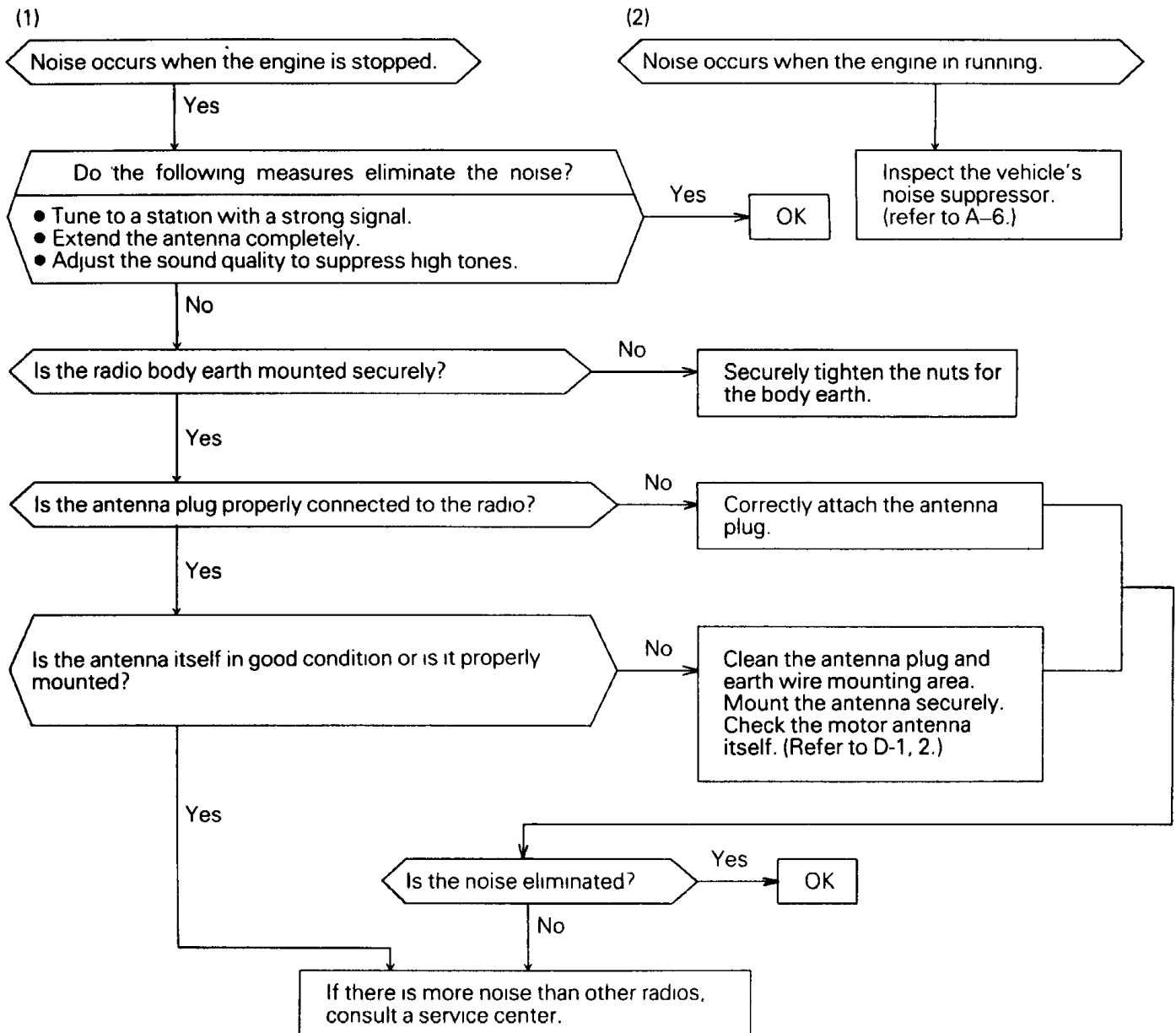
1. Factors due to signal conditions: Due to the fact that long-distance signals are more easily received at night, even stations that are received without problem during the day may experience interference in a general worsening of reception conditions. The weaker a station is the more susceptible it is to interference, and a change to a different station or the appearance of a beating

sound* may occur.

Beat sound*: Two signals close in frequency interfere with each other, creating a repetitious high-pitched sound. This sound is generated not only by sound signals but by electrical waves as well.

2. Factors due to vehicle noise: Alternator noise may be a cause.



A-4 Broadcasts can be heard but both AM and FM have a lot of noise.**NOTE**

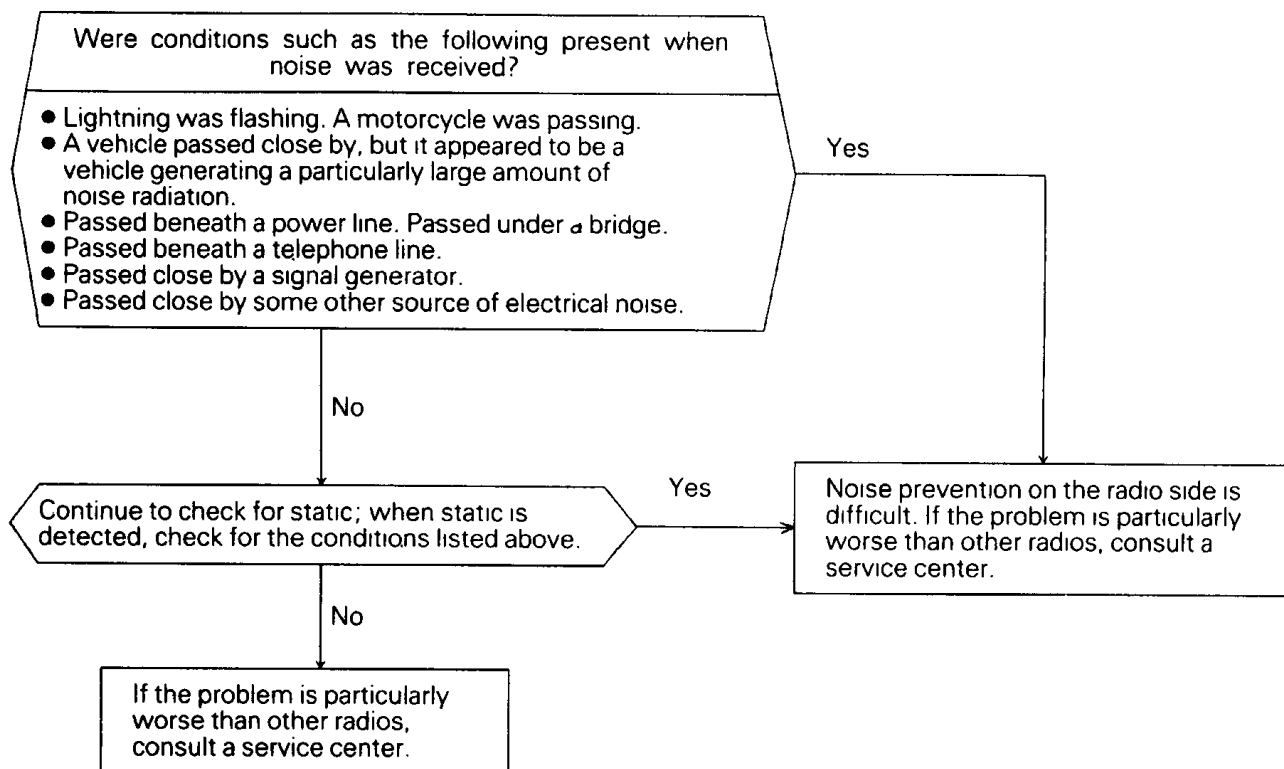
About noise encountered during FM reception only. Due to differences in FM and AM systems, FM is not as susceptible as AM to interference from engines, power lines, lightning, etc. On the other hand, there are cases due to the characteristics of FM waves of noise or distortion generated by typical

noise interference (first fading and multipath). (Refer to A-2.)

<Noise (hissing) occurs in weak signal areas such as mountainous regions, but this is not due to a problem with the radio.>

A-5 There is more noise either on AM or on FM.

1. There is much noise only on AM
Due to differences in AM and FM systems, AM is more susceptible to noise interference.



2. There is much noise only on FM
Due to differences in FM and AM systems, FM is not as susceptible as AM to interference from engines, power lines, lightning, etc. On the other hand, there are cases due to the characteristics of FM waves of noise or distortion

generated by typical noise interference (first fading and multipath). (Refer to A-2) <Noise (hissing) occurs in weak signal areas such as mountainous regions, but this is not due to a problem with the radio.>

A-6 There is noise when starting the engine.

Noise type Sounds are in parentheses ().	Conditions	Cause	Inspection or replacement	
			Noise- preventive part	Mounting place (next page)
AM, FM: Ignition noise (Popping, Snapping, Cracking, Buzzing)	- Increasing the engine speed causing the popping sound to speed up, and volume decreases. - Disappears when the ignition switch is turned to ACC.	- Mainly due to the spark plugs. - Due to the engine noise.	- Noise filter - Earth cable - Noise capacitor	2 2, 3 1, 2
Other electrical components	—	Noise may appear as electrical components become older.	Repair or replace electrical components.	
Static electricity (Cracking, Crinkling)	- Disappears when the vehicle is completely stopped. - Severe when the clutch is engaged.	Occurs when parts or wiring move for some reason and contact metal parts of the body.	Return parts or wiring to their proper position.	
	Various noises are produced depending on the body part of the vehicle.	Due to detachment from the body of the front hood, bumpers, exhaust pipe and muffler, suspension, etc.	Earth parts by bonding. Cases where the problem is not eliminated by a single response to one area are common, due to several body parts being imperfectly earthed.	

Caution

1. **Connecting a high tension cable to the noise filter may destroy the noise filter and should never be done.**
2. **Check that there is no external noise. Since failure due to this may result in misdiagnosis due to inability to identify the noise source, this operation must be performed.**
3. **Noise prevention should be performed by suppressing strong sources of noise step by step.**

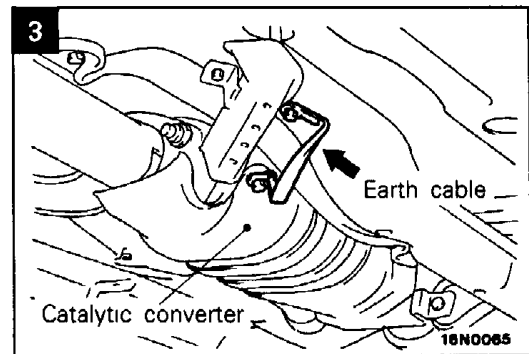
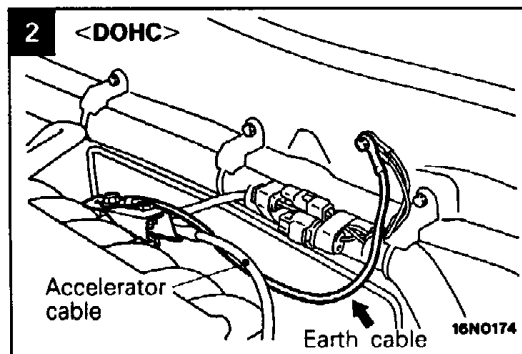
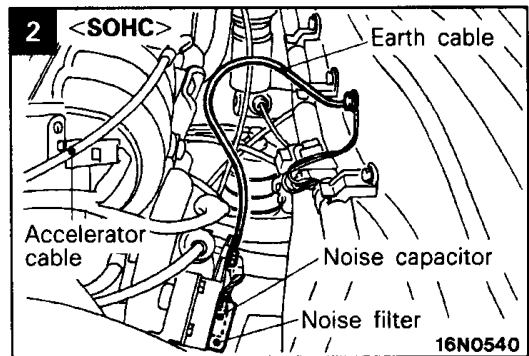
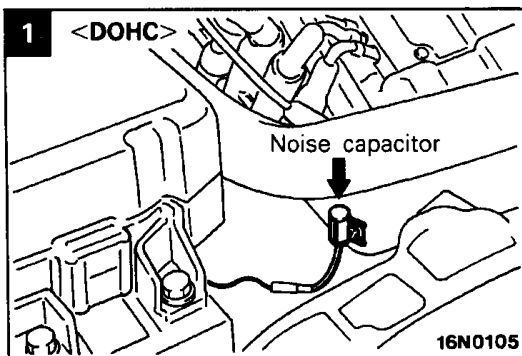
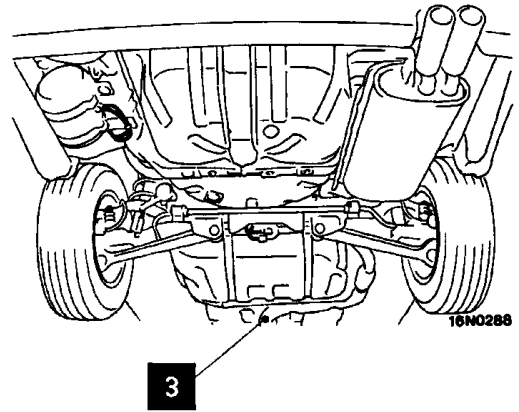
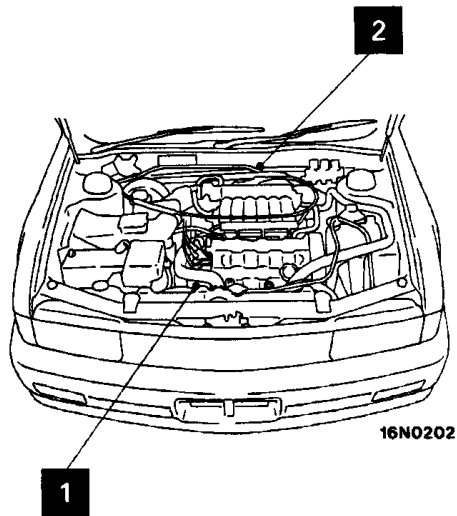
NOTE

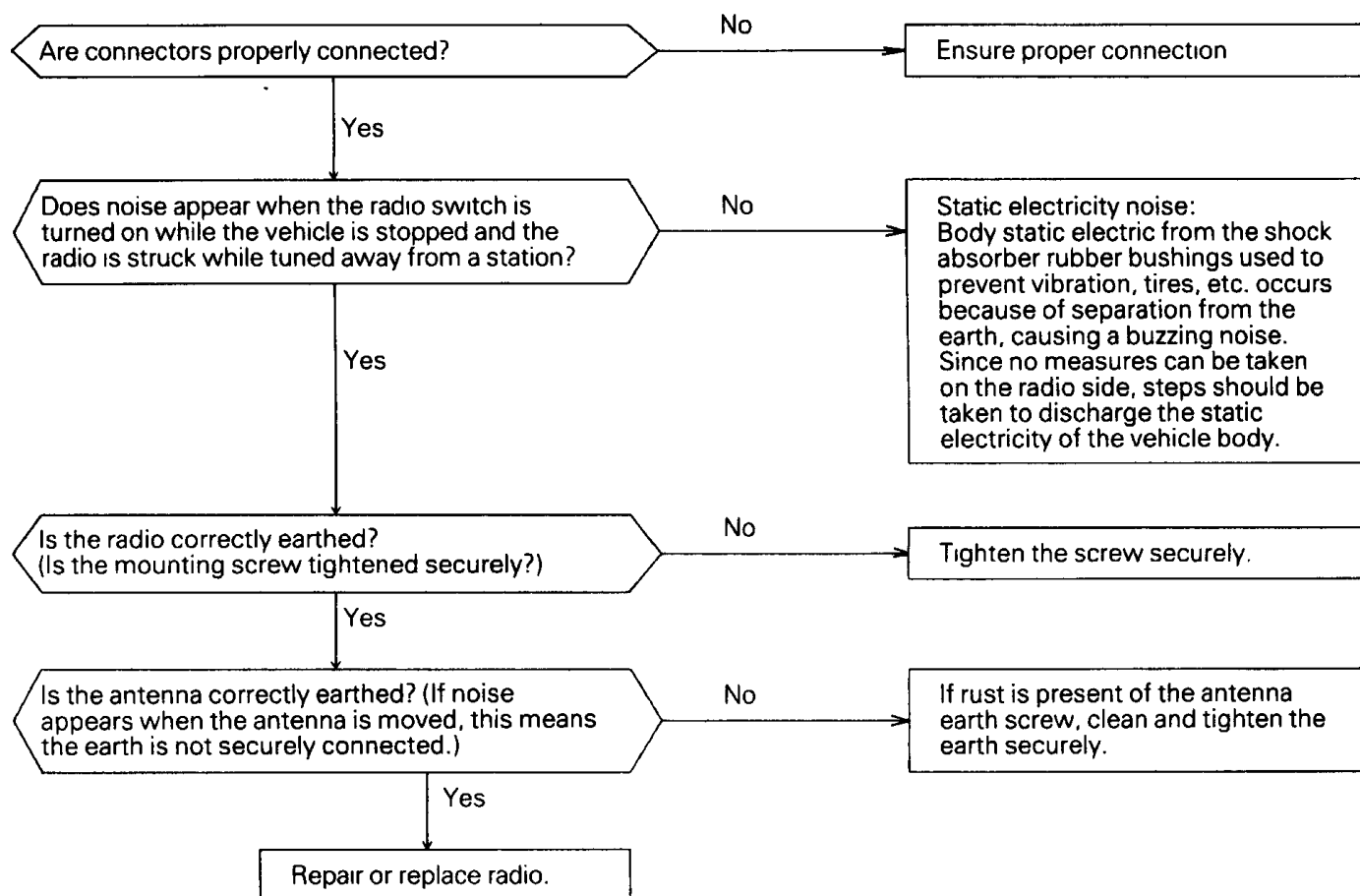
1. Capacitor
The capacitor does not pass D.C. current, but as the number of waves increases when it passes A.C. current, impedance (resistance against

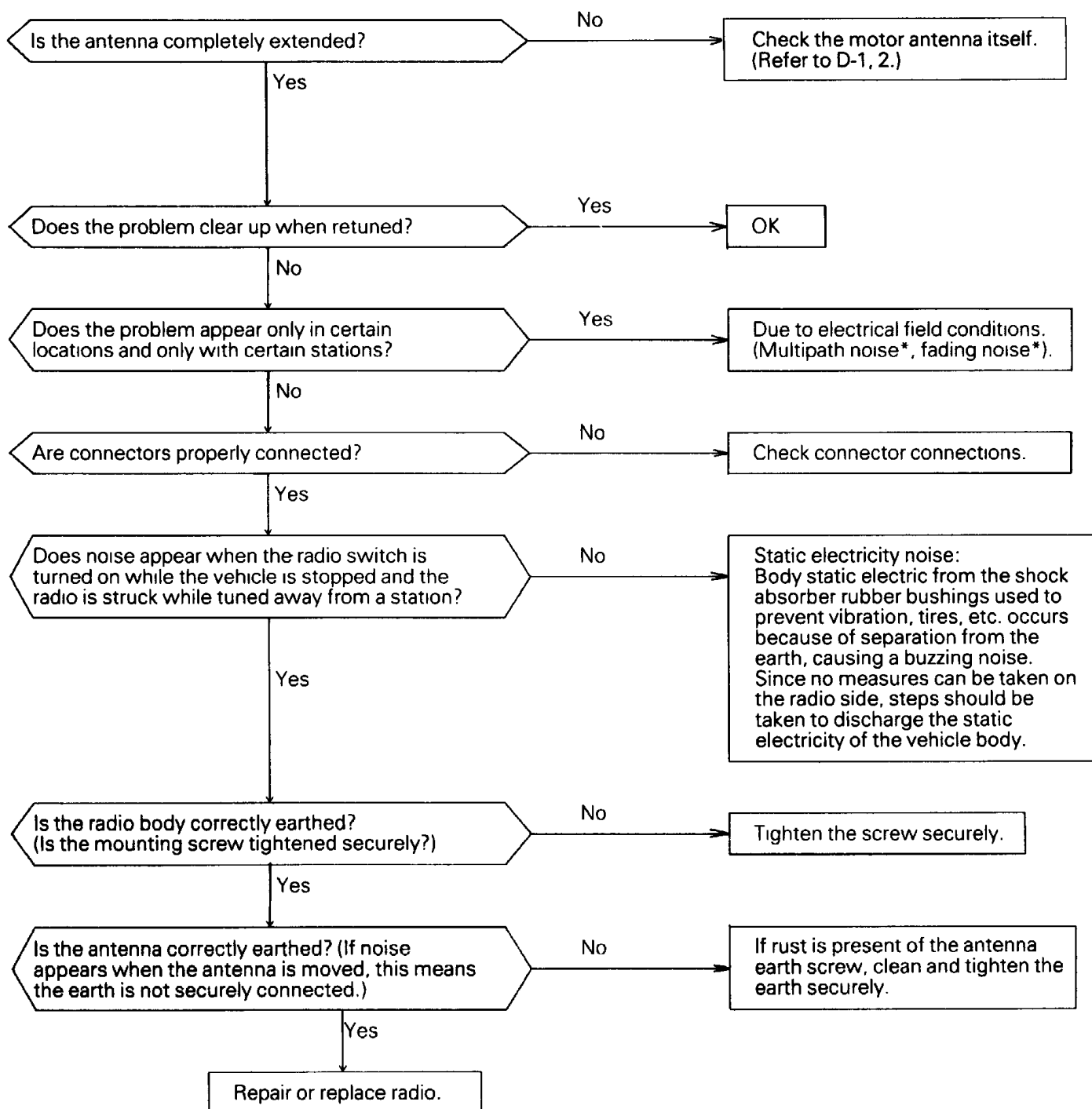
A.C.) decreases, and current flow is facilitated. A noise suppressing condenser which takes advantage of this property is inserted between the power line for the noise source and the earth. This suppresses noise by earthing the noise component (A.C. or pulse signal) to the body of the vehicle.

2. Coil
The coil passes D.C. current, but impedance rises as the number of waves increases relative to the A.C. current. A noise suppressing coil which takes advantage of this property is inserted into the power line for the noise source, and works by preventing the noise component from flowing or radiating out of the line.

NOISE SUPPRESSOR MOUNTING LOCATION



A-7 Some noise appears when there is vibration or shocks during traveling.

A-8 Noise sometimes appears on FM during traveling.

- * About multipath noise and fading noise
Because the frequency of FM waves is extremely high, it is highly susceptible to effects from geological formations and buildings. These effects disrupt the broadcast signal and obstruct reception in several ways.

- **Multipath noise**
This describes the echo that occurs when the broadcast signal is reflected by a large obstruction and enters the receiver with a slight time delay relative to the direct signal (repetitious buzzing).

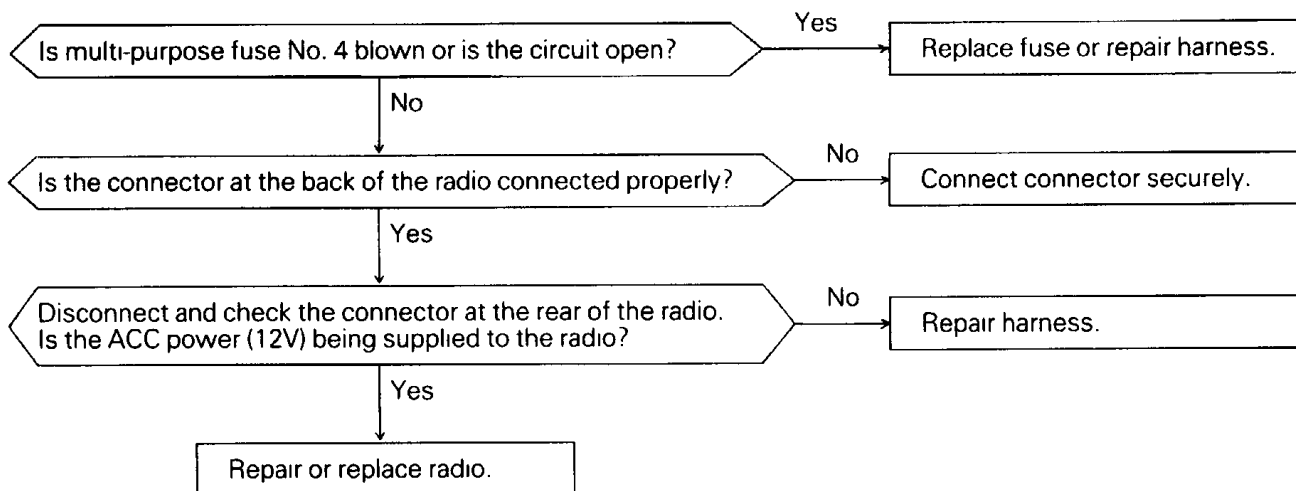
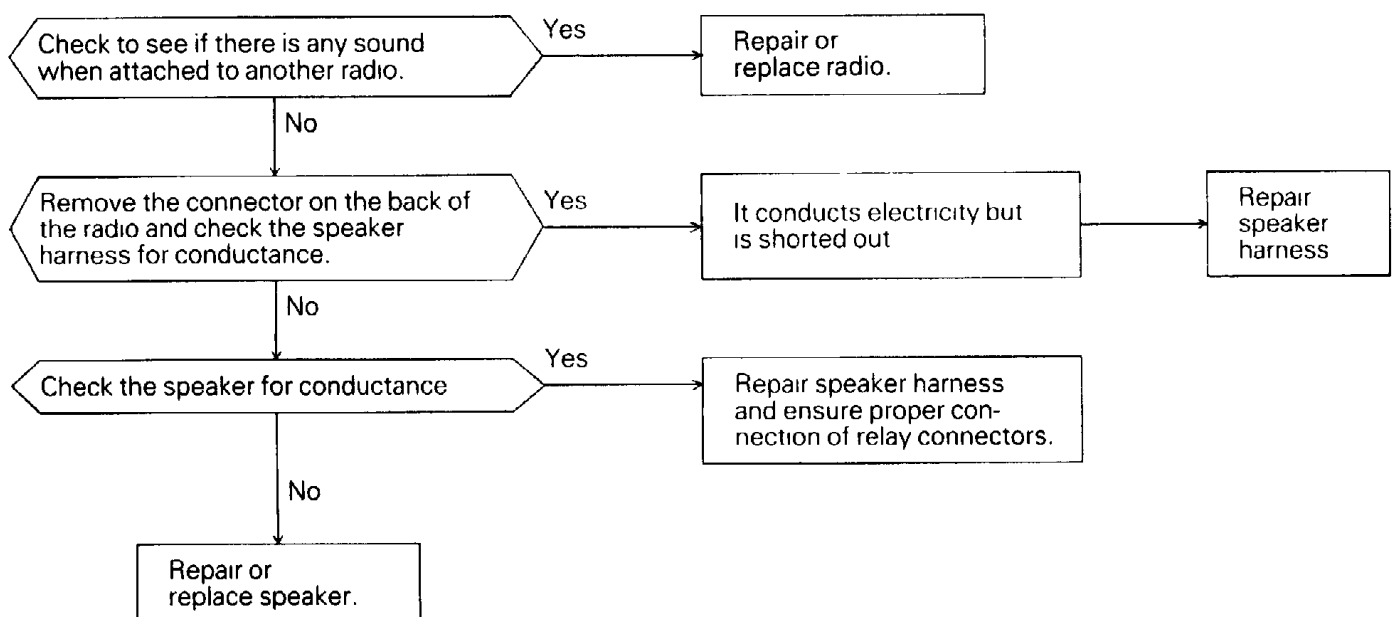
- **Fading noise**
This is a buzzing noise that occurs when the broadcast beam is disrupted by obstructing objects and the signal strength fluctuates intricately within a narrow range.

A-9 Ever-present noise.

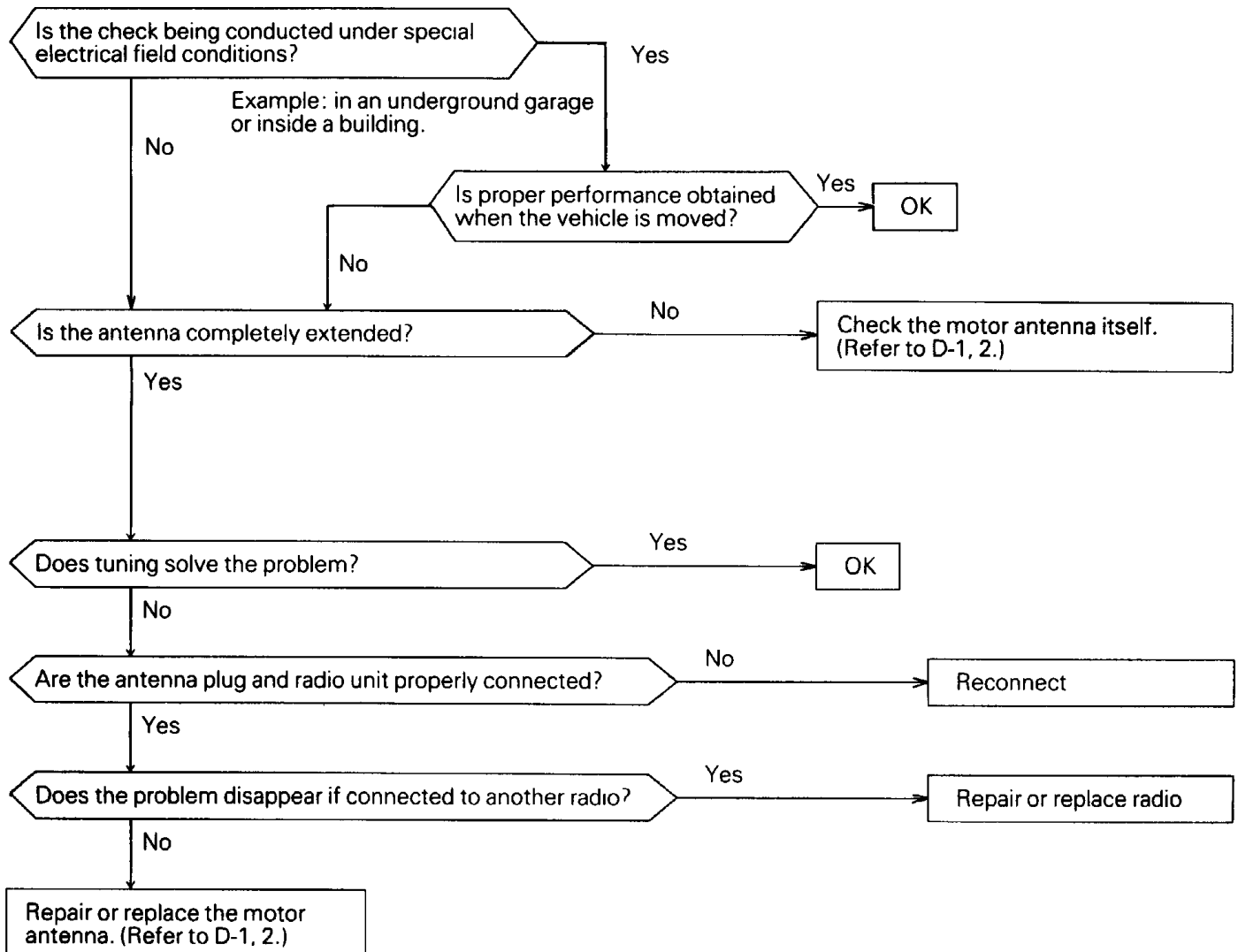
Noise is often created by the following factors, and often the radio is OK when it is checked individually.

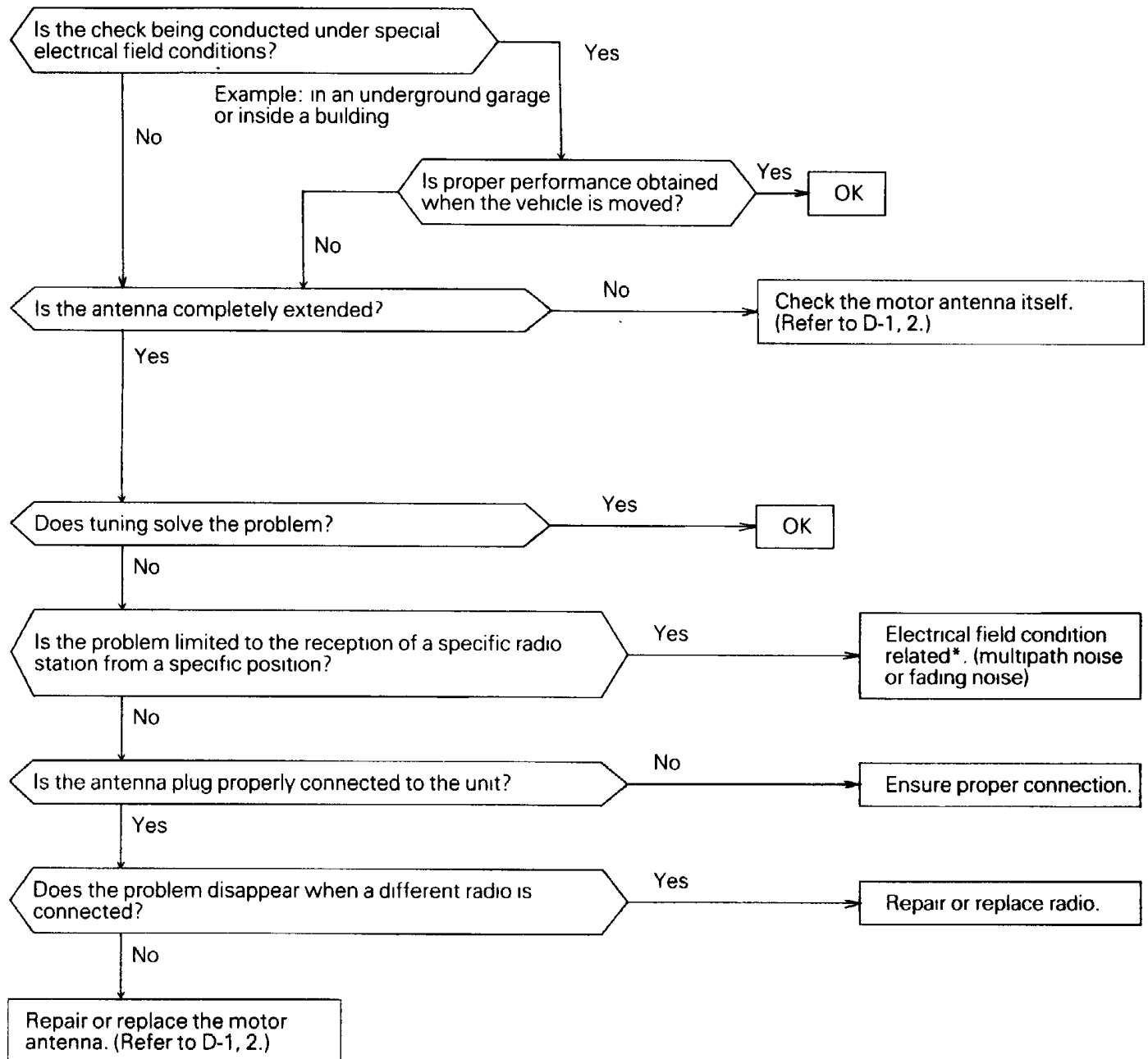
- Traveling conditions of the vehicle
- Terrain of area traveled through
- Surrounding buildings
- Signal conditions
- Time period

For this reason, if there are still problems with noise even after the measures described in steps A-1 to A-8 have been taken, get information on the factors listed above as well as determining whether the problem occurs with AM or FM, the station names, frequencies, etc., and contact a service center.

B. RADIO**B-1 No power is supplied when the switch is set to ON.****B-2 No sound from one speaker.**

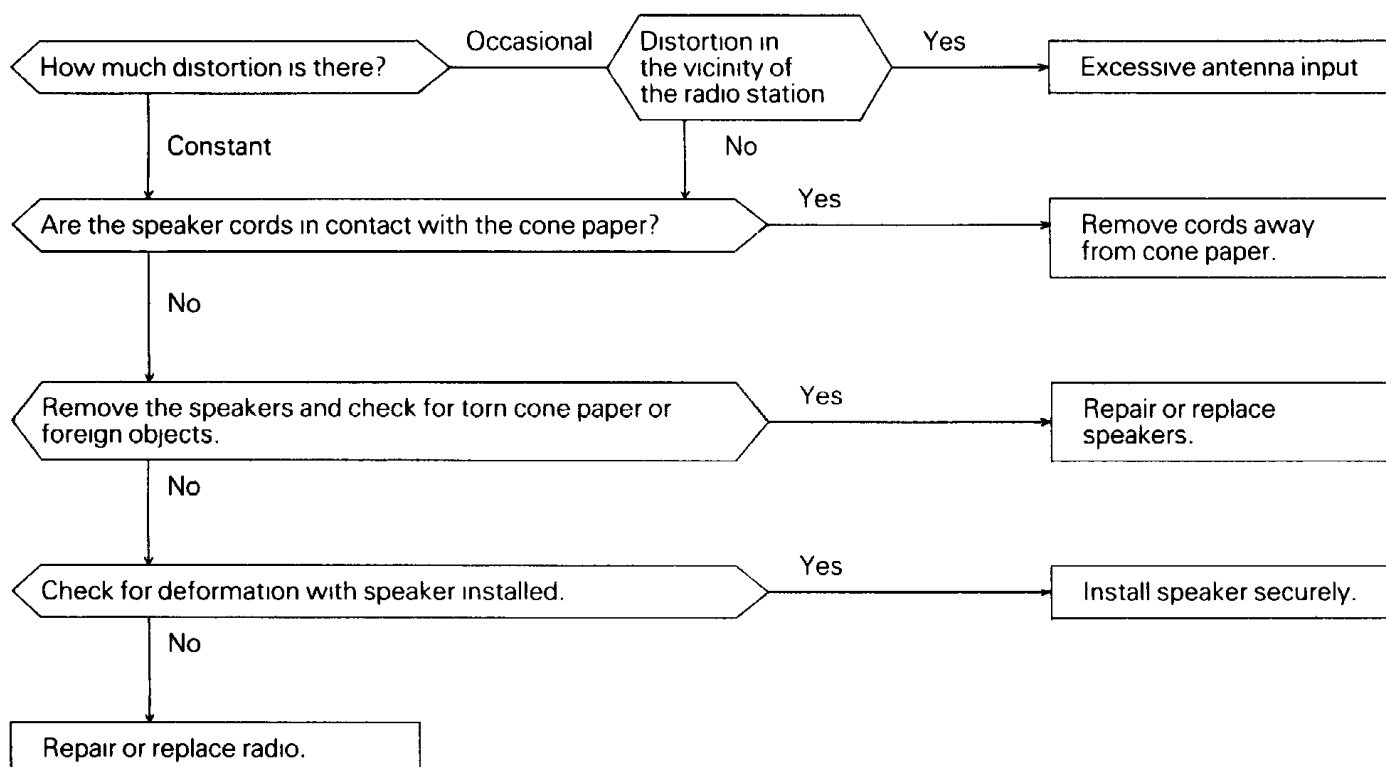
B-3 There is noise but no reception for both AM and FM or no sound from AM, or no sound from FM.



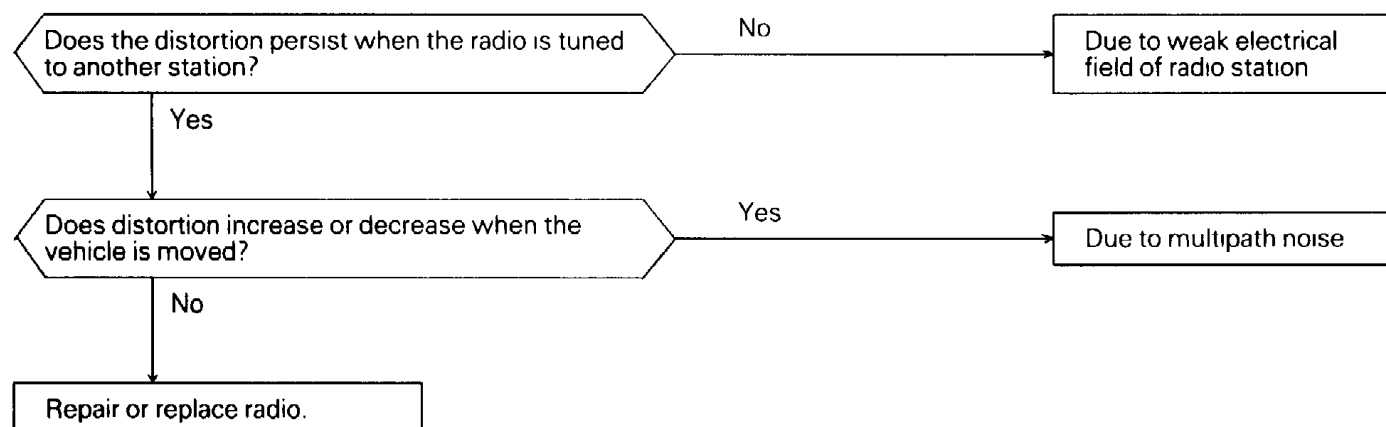
B-4 Insufficient sensitivity.

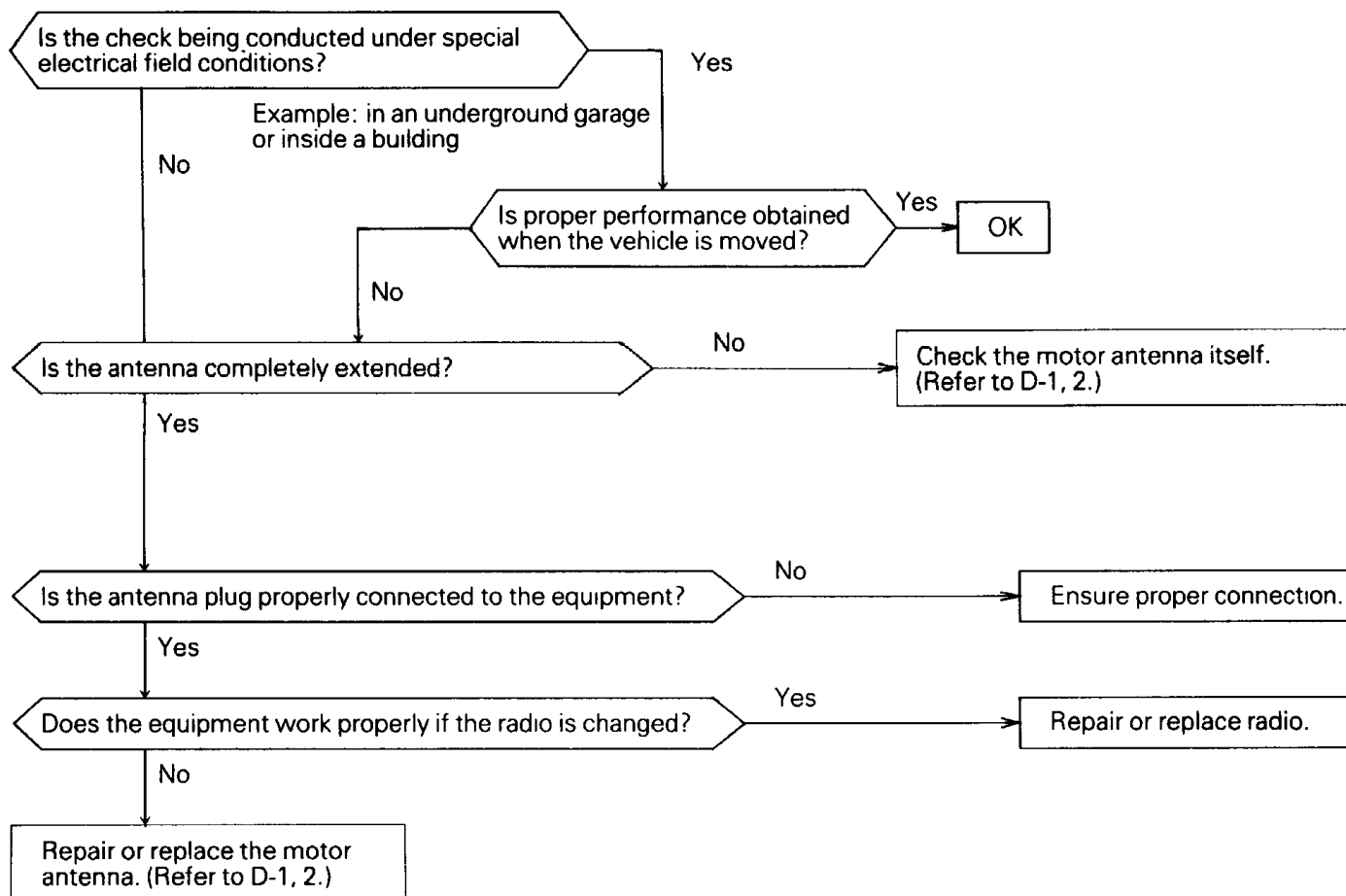
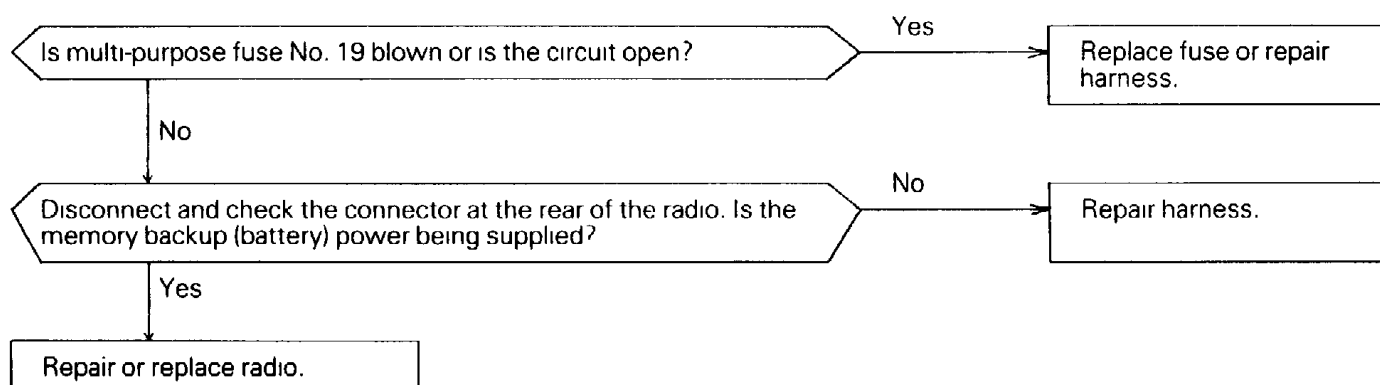
* For multipath noise and fading noise problems, refer to P.54-51.

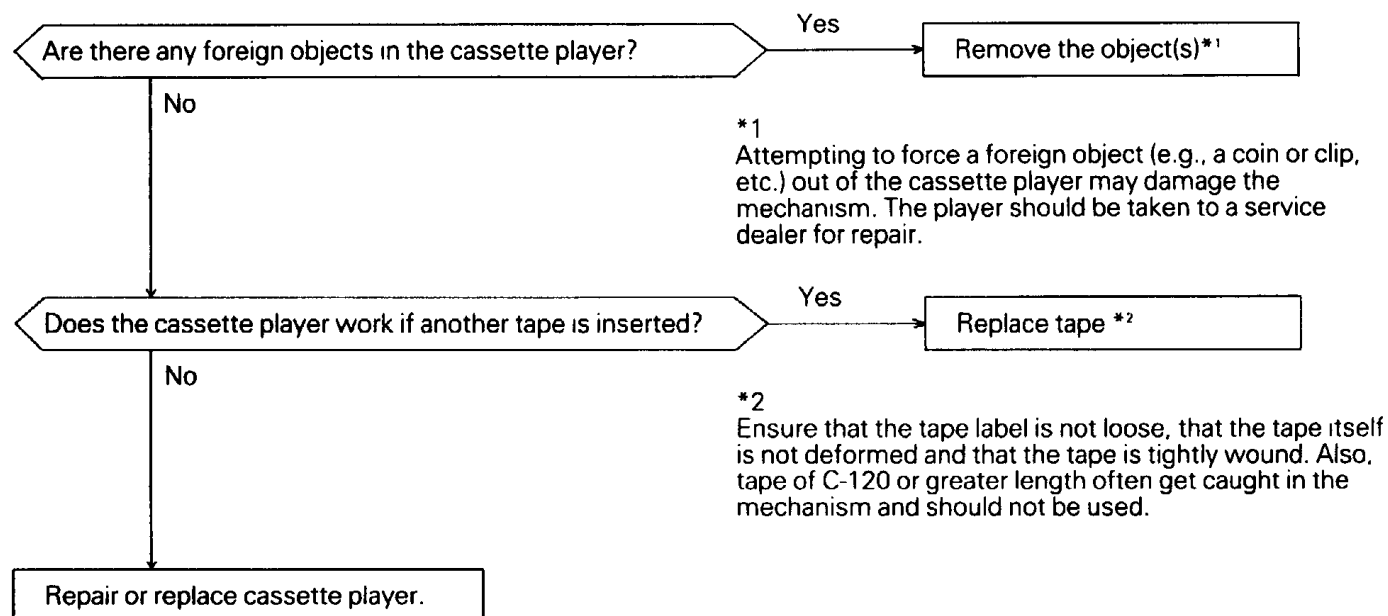
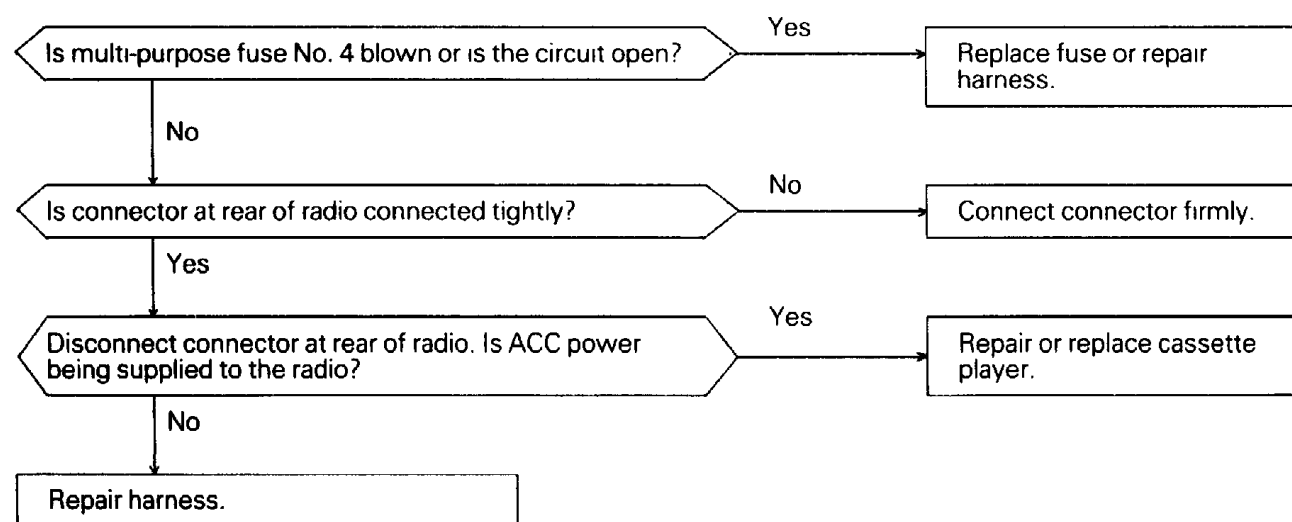
B-5 Distortion on AM or on both AM and FM.

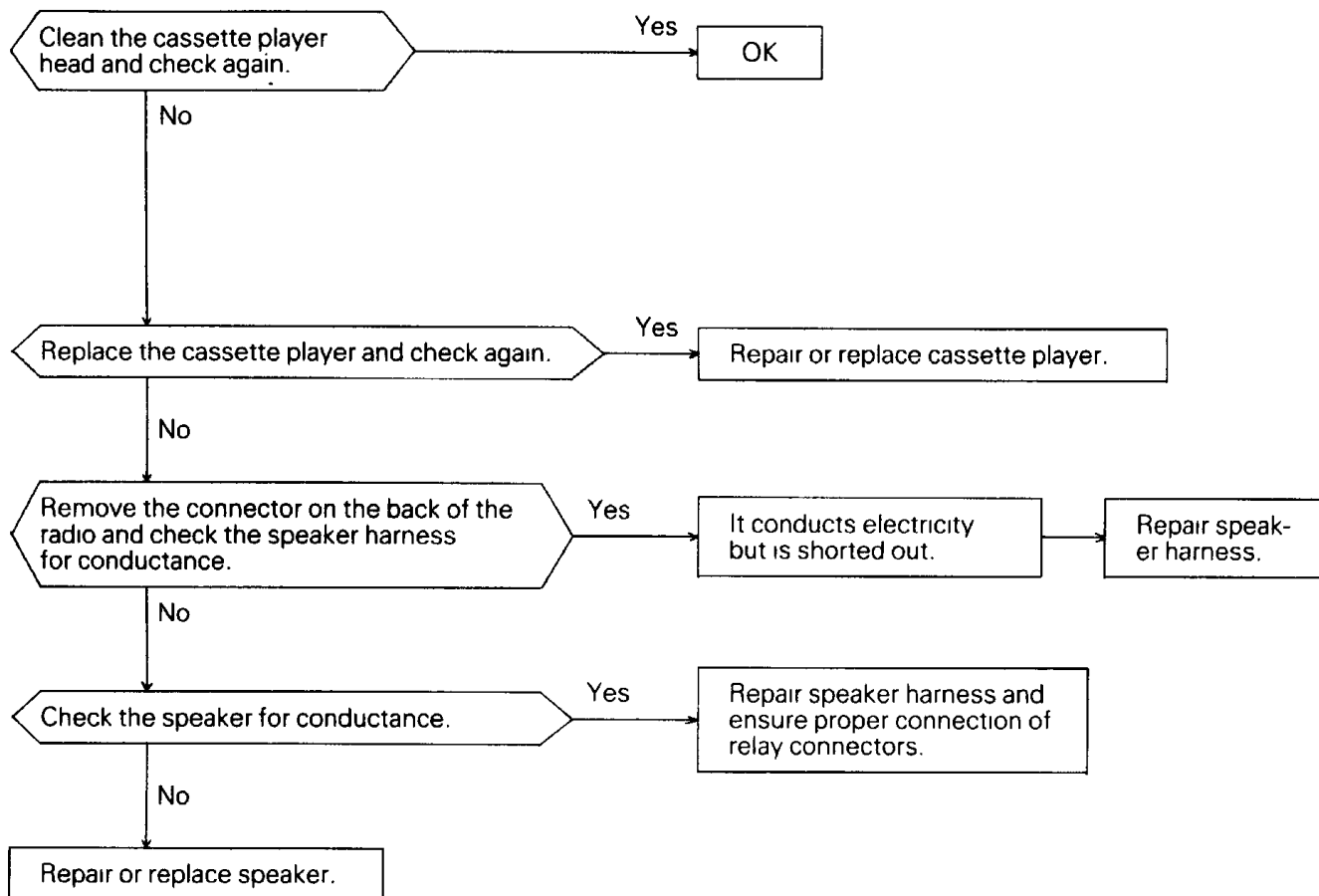


B-6 Distortion on FM only

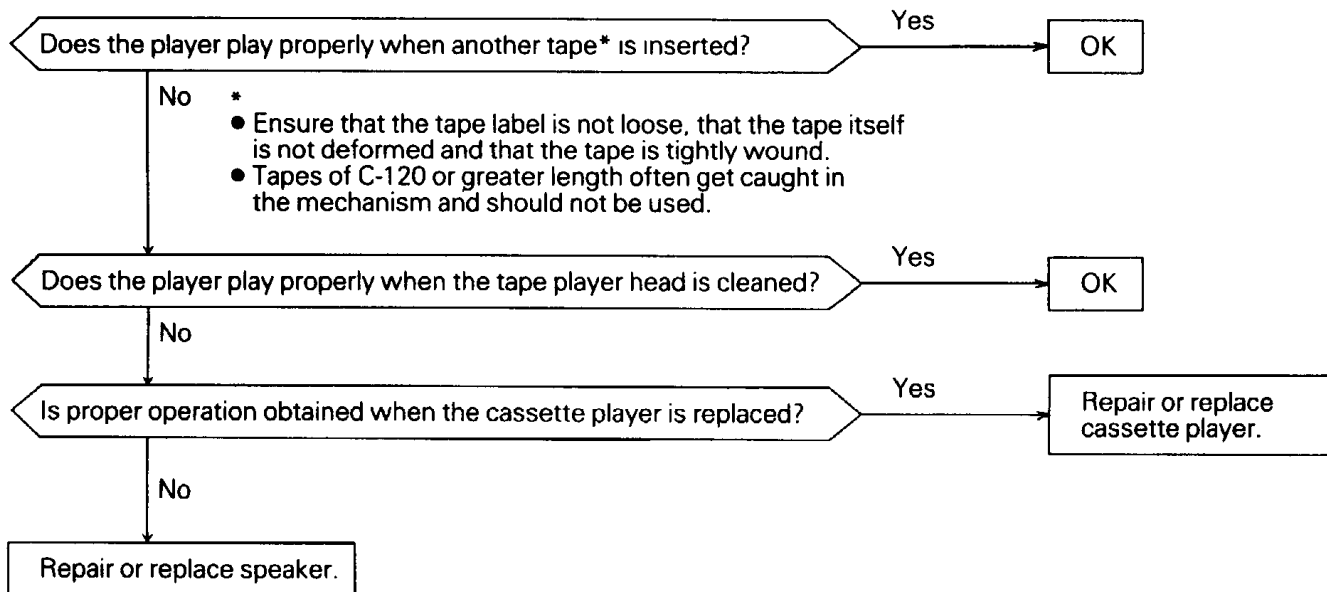


B-7 Too few automatic select stations.**B-8 Insufficient memory (preset stations are erased).**

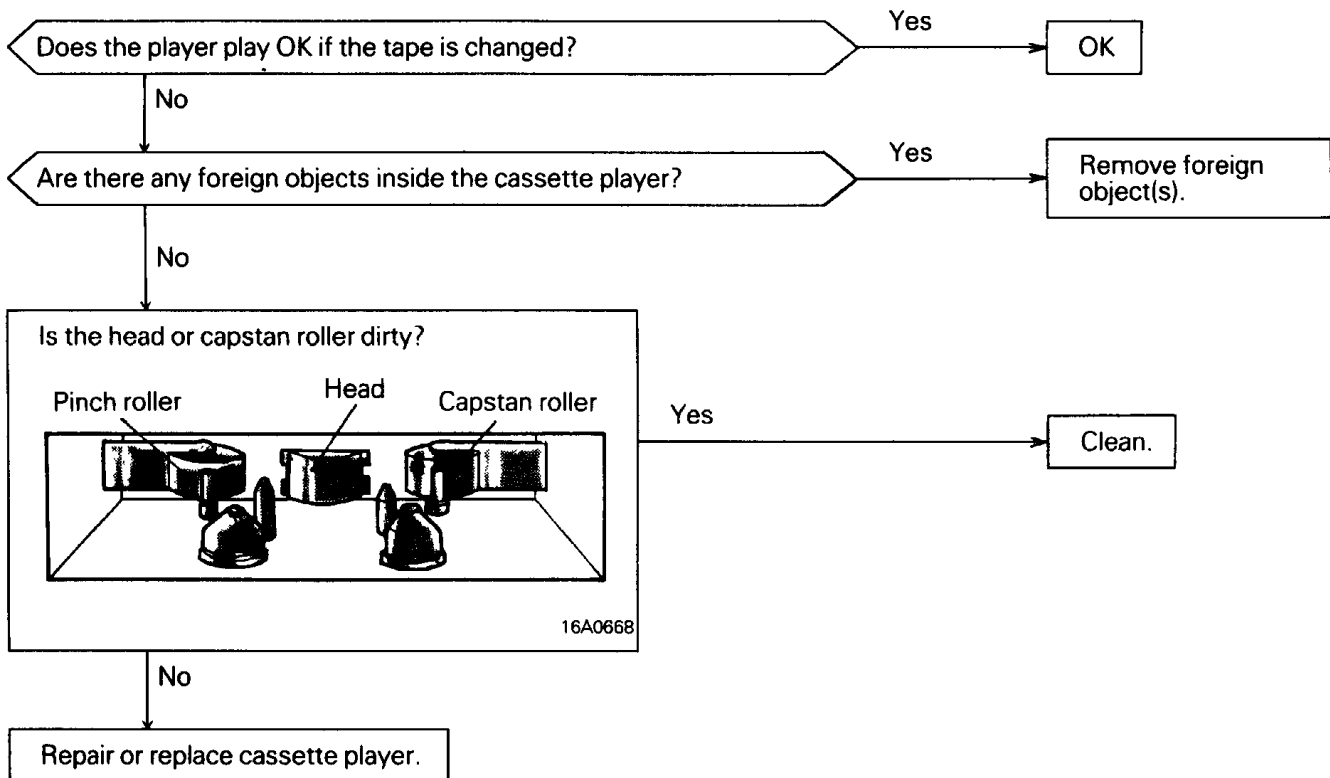
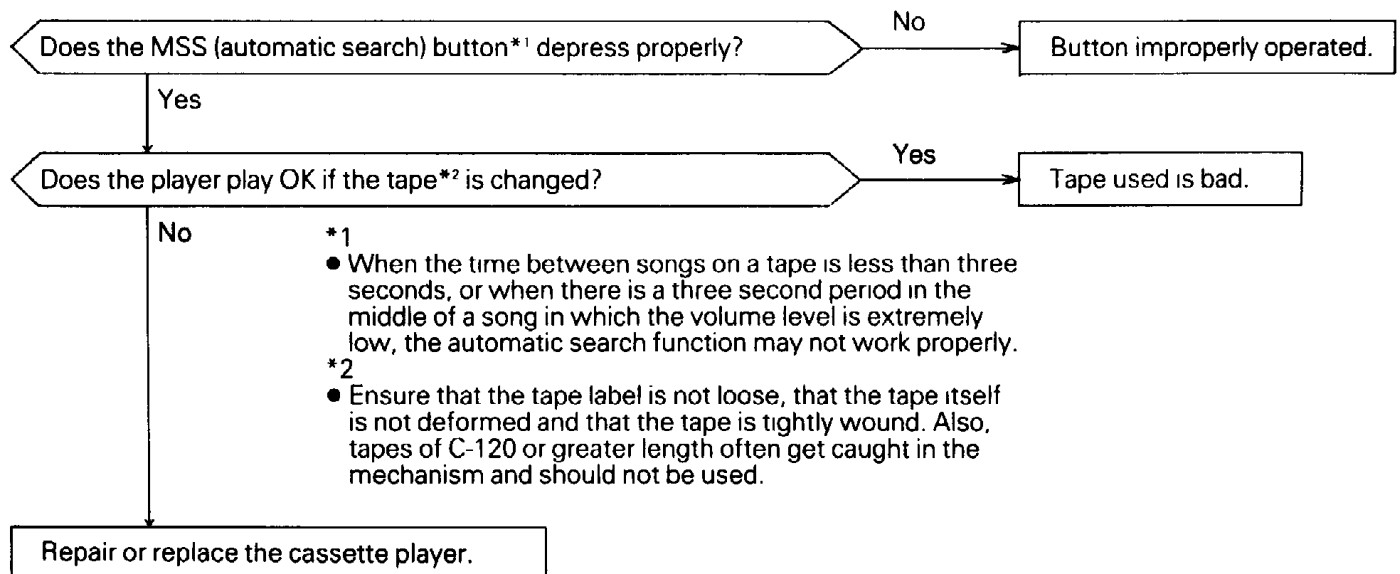
C. CASSETTE PLAYER**C-1 Cassette tape will not be inserted.****C-2 No sound (even after a tape has been inserted).**

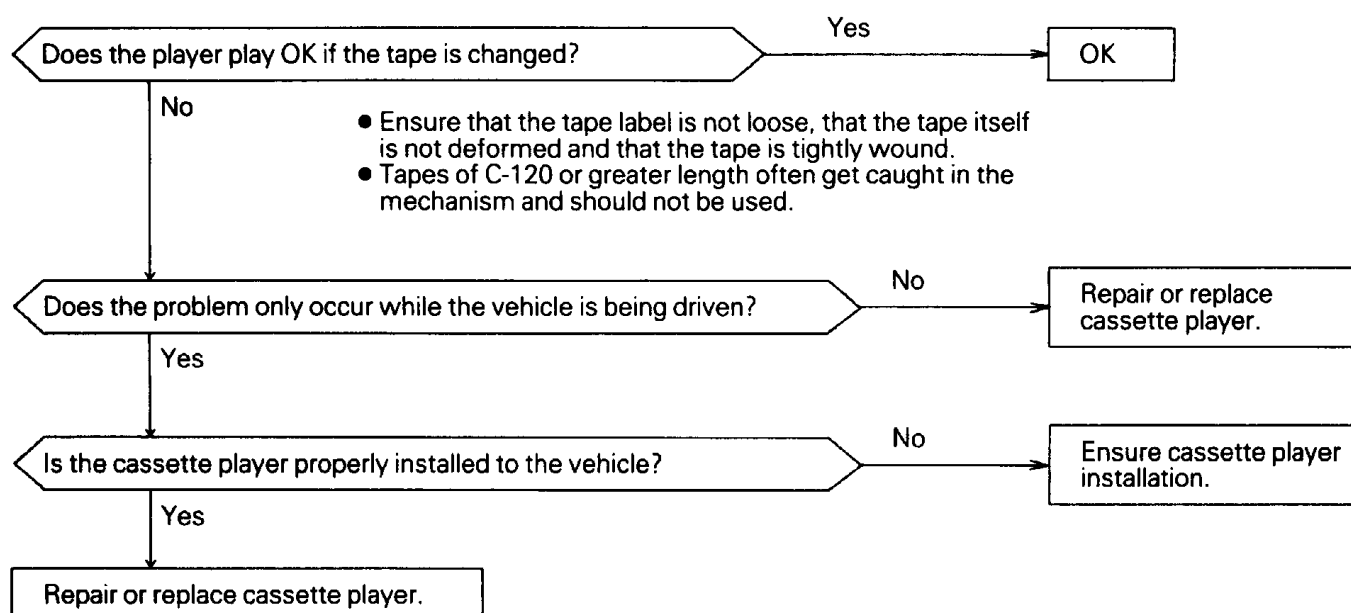
C-3 No sound from one speaker.

- Ensure that the tape label is not loose, that the tape itself is not deformed and that the tape is tightly wound.
- Tapes of C-120 or greater length often get caught in the mechanism and should not be used.

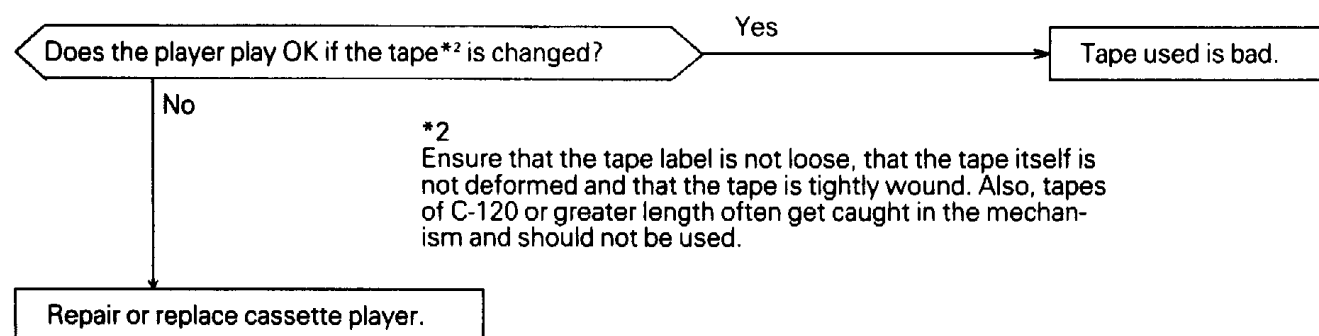
C-4 Sound quality is poor, or sound is weak.**C-5 Cassette tape will not eject.**

The problems covered here are all the result of the use of a bad tape (deformed or not properly tightened) or of a malfunction of the cassette player itself. Malfunctions involving the tape becoming caught in the mechanism and ruining the case are also possible, and attempting to force the tape out of the player can cause damage to the mechanism. The player should be taken to a service dealer for repair.

C-6 Uneven revolution. Tape speed is fast or slow.**C-7 Automatic search does not work.**

C-8 Faulty auto reverse.**C-9 Tape gets caught in mechanism*1.**

*1
When the tape is caught in the mechanism, the case may not eject. When this occurs, do not try to force the tape out as this may damage the tape player mechanism. Take the cassette to a service dealer for repair.

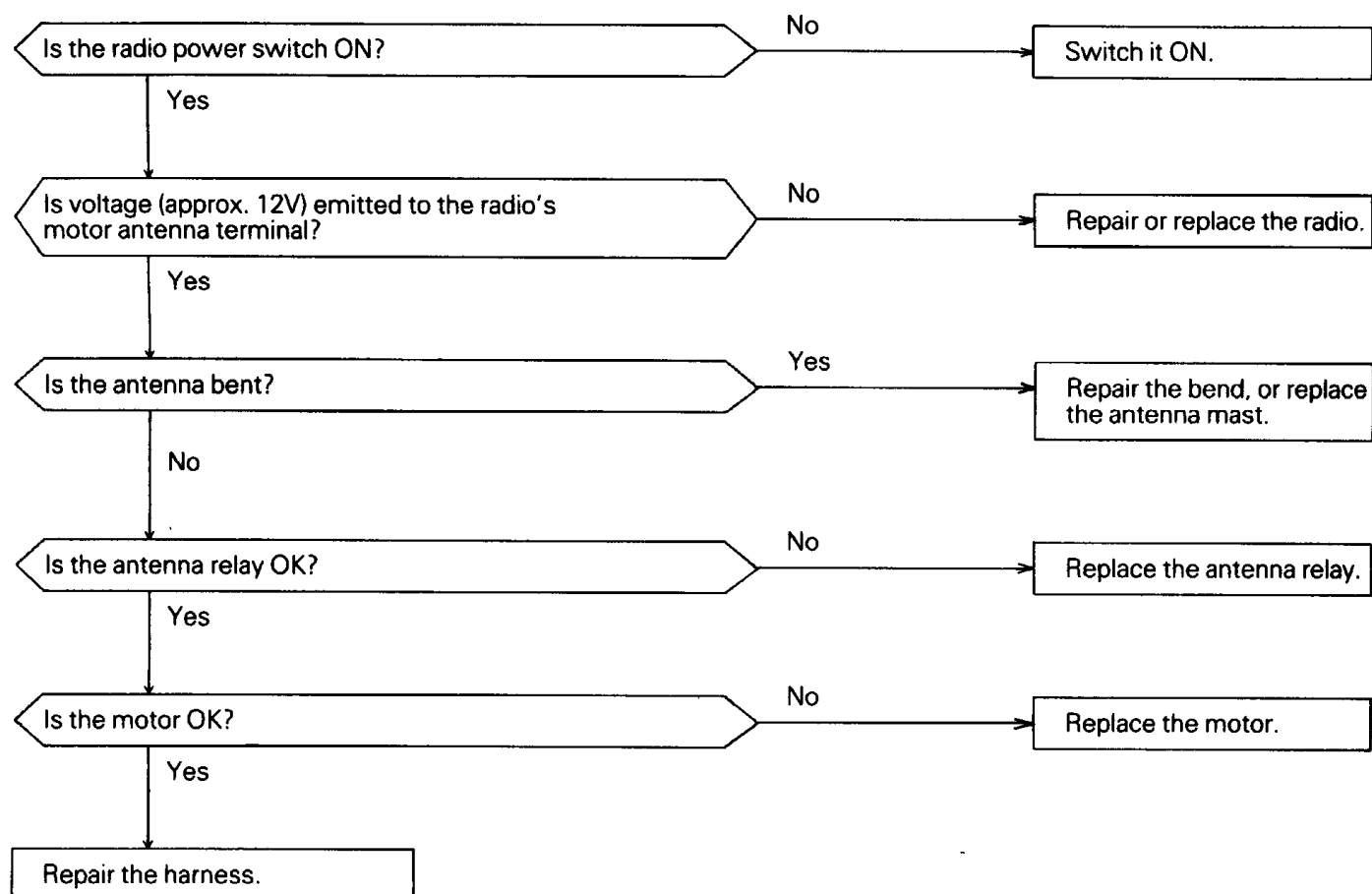


*2
Ensure that the tape label is not loose, that the tape itself is not deformed and that the tape is tightly wound. Also, tapes of C-120 or greater length often get caught in the mechanism and should not be used.

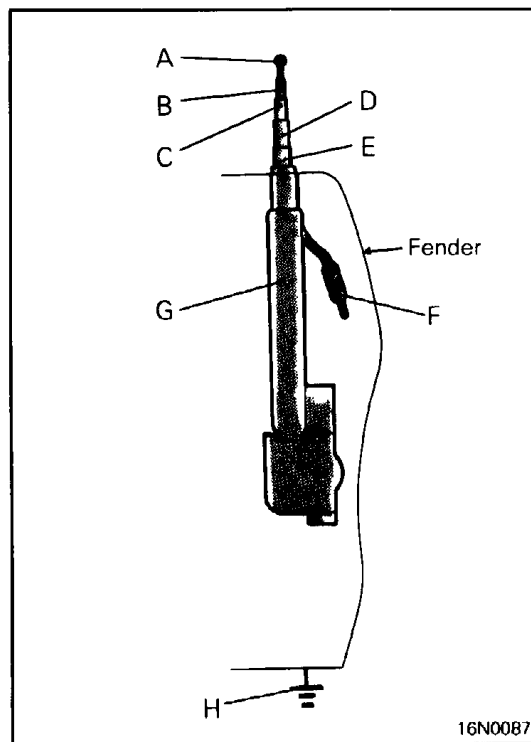
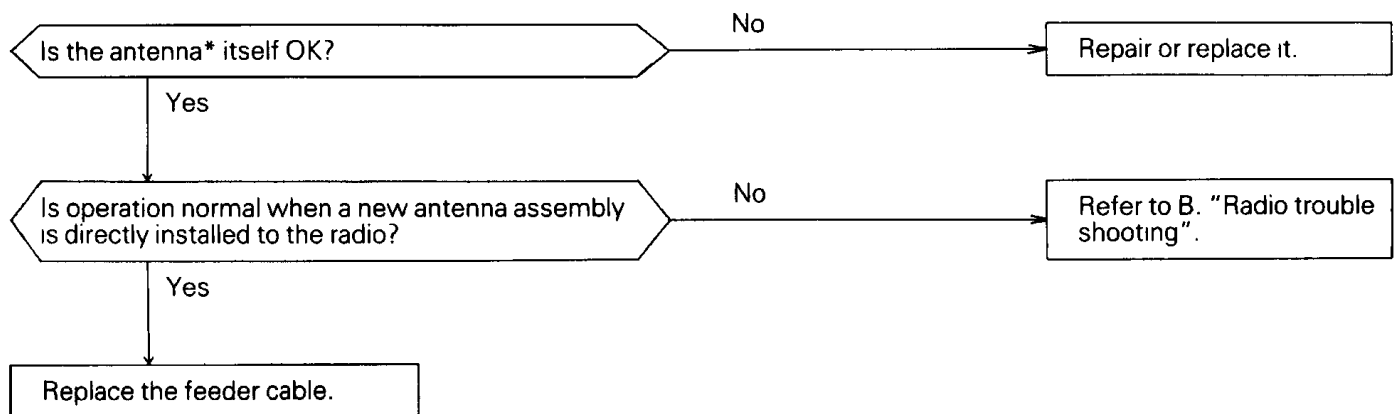
D. MOTOR ANTENNA

D-1 Motor antenna won't extend or retract.

Clean and polish the surface of the antenna rod.



D-2 Motor antenna extends and retracts but does not receive.



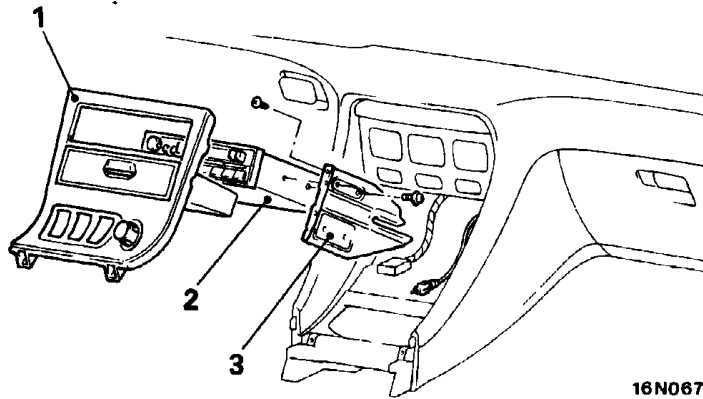
Checking the antenna*

Ohmmeter measurement locations	Result
Circuits from F to A, B, C, D and E	Continuity
Circuit between G and H	Continuity
Circuits from H to A, B, C, D and E	No continuity

RADIO AND TAPE PLAYER

E54LHAK

REMOVAL AND INSTALLATION



16N0671

CAUTION: SRS <L.H. drive vehicles>
When removing and installing the floor console assembly from vehicles equipped with SRS, do not let it bump against the SRS diagnostic unit or other components.

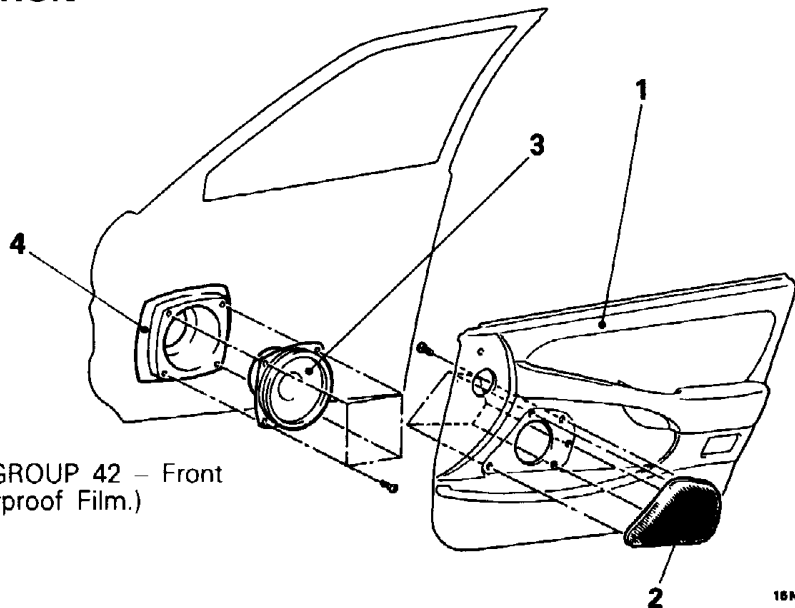
Removal steps

- Floor console (Refer to GROUP 52 – Floor Console)
- 1. Audio panel
- 2. Radio and tape player
- 3. Audio bracket

DOOR SPEAKER

E54LICD

REMOVAL AND INSTALLATION



16N0069

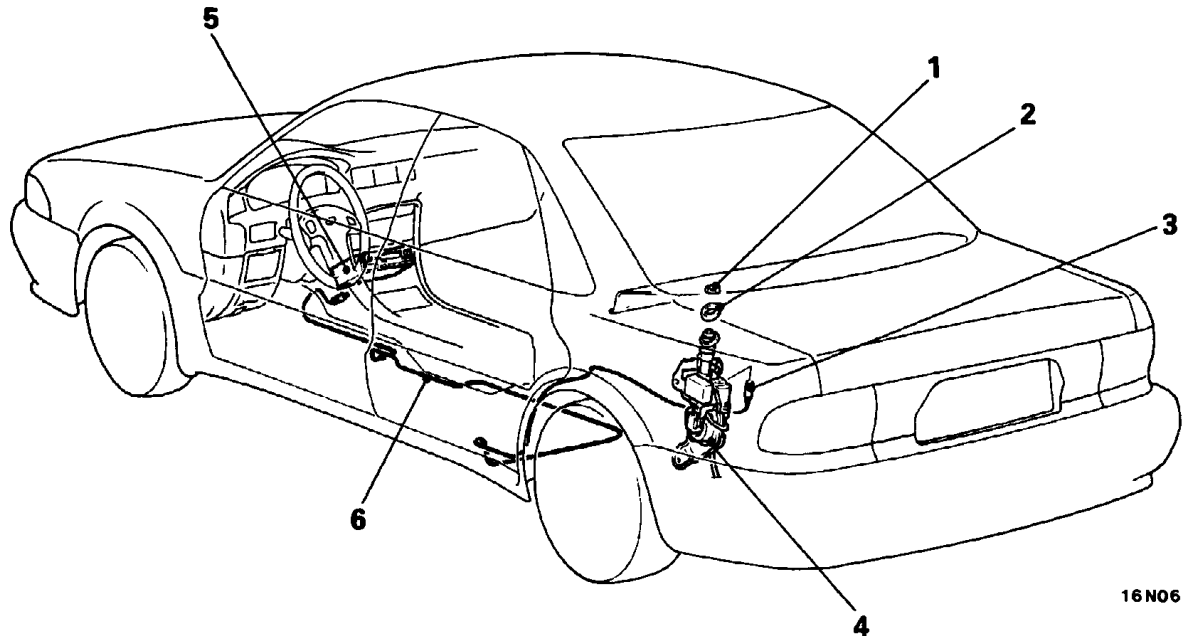
Removal steps

1. Door trim (Refer to GROUP 42 – Front Door Trim and Waterproof Film.)
2. Speaker garnish
3. Speaker
4. Speaker cover

MOTOR ANTENNA AND ANTENNA FEEDER CABLE

REMOVAL AND INSTALLATION

E54LJBD



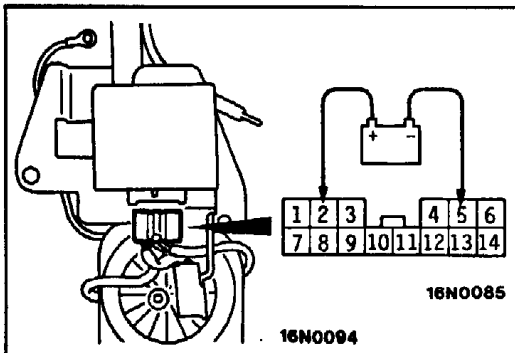
16N0685

Removal steps of antenna feeder cable

- Trunk side trim (LH)
 - Rear wheel arch trim (LH)
 - Front scuff plate (LH)
 - Rear scuff plate (LH)
 - Front seat (LH) and rear seat (Refer to GROUP 52 – Seat)
- } [Refer to GROUP 52]
– Trims.
3. Motor antenna and antenna feeder cable connection
 5. Radio and tape player (P.54-64)
 6. Antenna feeder cable

Removal steps of motor antenna

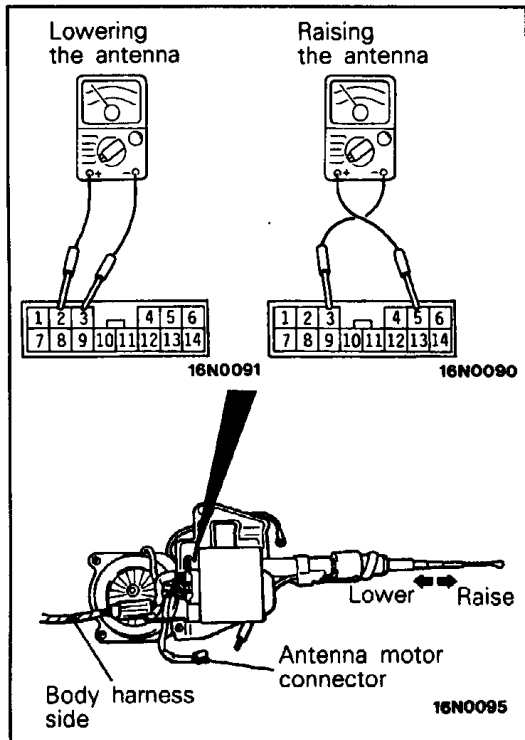
- Trunk side trim (LH) (Refer to GROUP 52 – Trims.)
1. Ring nut
 2. Base
 3. Motor antenna and antenna feeder cable connection
 4. Motor antenna



INSPECTION

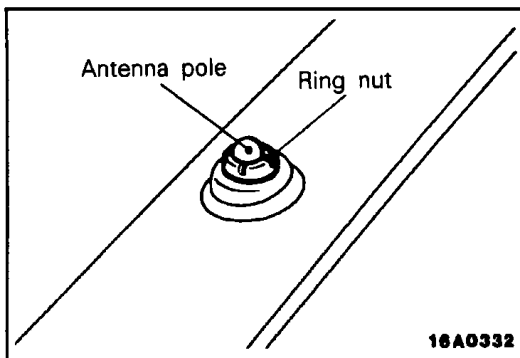
ANTENNA MOTOR INSPECTION

Remove the motor antenna control unit connector and check if the antenna goes up when the battery (+) side is connected to terminal ②, and the battery (-) side to terminal ⑤, and check if it goes down when the connections are reversed.

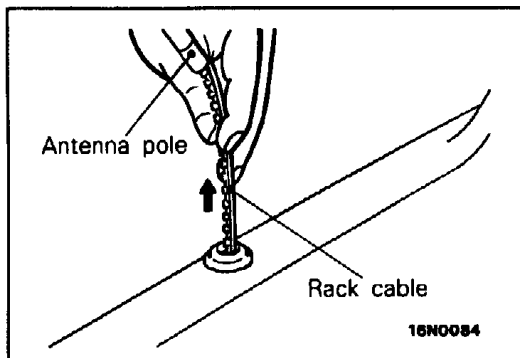
**MOTOR ANTENNA CONTROL UNIT CHECKING**

- (1) Connect the antenna to the harness connector (Body harness).
- (2) Remove the antenna motor connector.
- (3) With the ignition switch turned to ACC or ON, operate the radio switch and check the voltage between the terminals while the antenna is moving up and down.

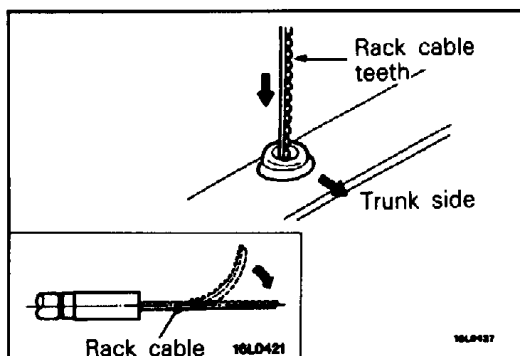
Antenna Operation Direction	Measurement Terminals	Voltage (V)
While moving down	2-3	10-13
While moving up	5-3	10-13

**ANTENNA POLE REPLACEMENT**

- (1) Remove the ring nut.



- (2) After turning the ignition switch to ACC or ON, turn the radio switch to ON to raise the antenna pole, and remove it, together with the rack cable.

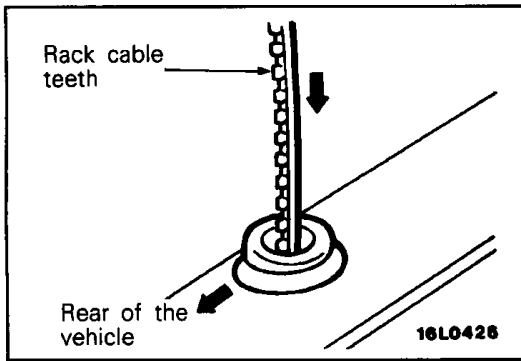


- (3) Draw out the antenna pole to the maximum extension.

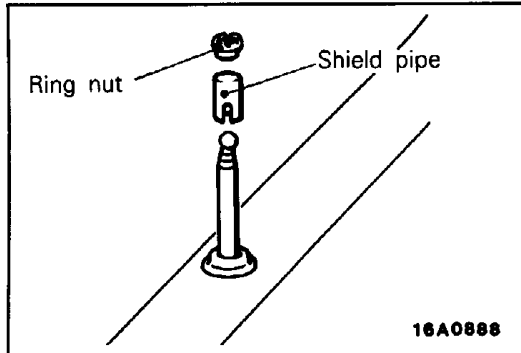
NOTE

If there is a bend in the motor end of the rack cable, remove the bend.

- (4) Insert the rack cable into the motor assembly with the rack cable teeth facing the trunk side.



- (5) Turn the rack cable teeth towards the rear of the vehicle (right 90°) so that the rack cable meshes with the motor gear.
- (6) If the rack cable pulls out with no resistance when it is lightly pulled, then the cable is not meshed with the motor gear, so check that there are no bends in the end of the rack cable, and then repeat steps (4) and (5) above.
- (7) Set the antenna pole vertically and turn the radio switch OFF to wind up the rack cable. Insert the antenna to the motor antenna side to align it with the wound-up rack cable.

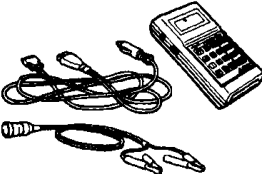
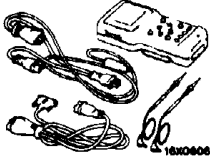


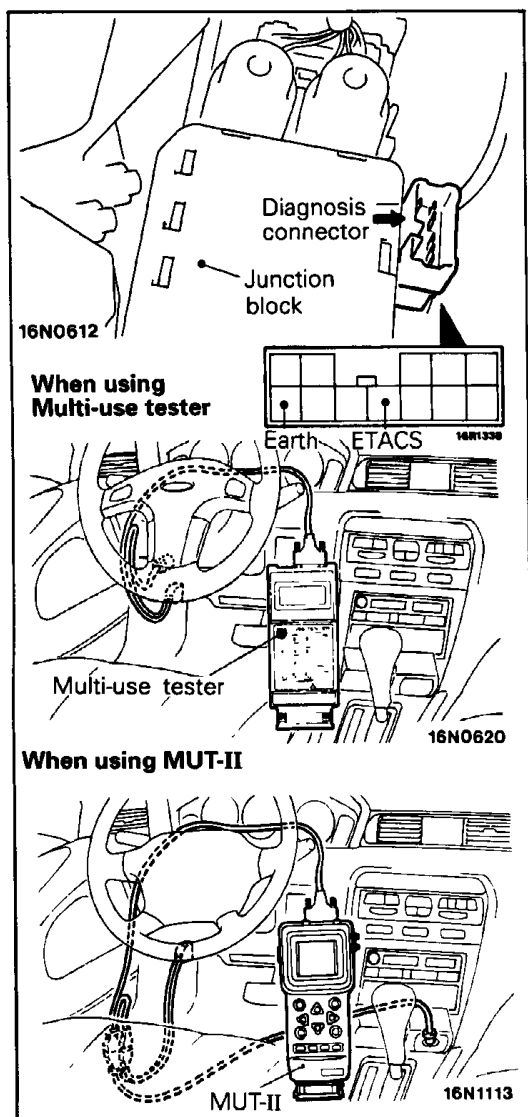
- (8) Attach the shield pipe to the antenna.
- (9) After tightening the ring nut, check the movement of the antenna by turning the radio switch ON and OFF.

REAR WINDOW DEFOGGER

SPECIAL TOOLS

EB4MF-

Tool	Number	Name	Use
	MB991341	Multi-use tester assembly	Up to 1993 models ETACS input checking
	 (For the number, refer to GROUP 00 – Precautions Before Service.)	ROM pack	
	MB991502	MUT-II	All models ETACS input checking
 16X0607		ROM pack (for MUT-II)	



TROUBLESHOOTING (DEFOGGER TIMER)

INPUT CHECK

Using the multi-use tester <Up to 1993 models> or MUT-II <All models> check whether or not the input signals from each switch are being input to the electronic control unit.

- (1) Connect the multi-use tester or MUT-II to the diagnosis connector (located at the right or left side of the junction block).

Caution

Connection and disconnection of the multi-use tester or MUT-II should always be made with the ignition switch in the OFF position.

- (2) Check to be sure that the buzzer of the multi-use tester or MUT-II sounds one time, when each switch noted below is operated.

If the buzzer sounds, the input signals are being input to the electronic control unit, so that switch can be considered to be functioning normally.

If there is a malfunction, there is an abnormality in the switch or in the switch input circuit, so they should be inspected.

- Ignition switch
- Defogger switch

54-68-2

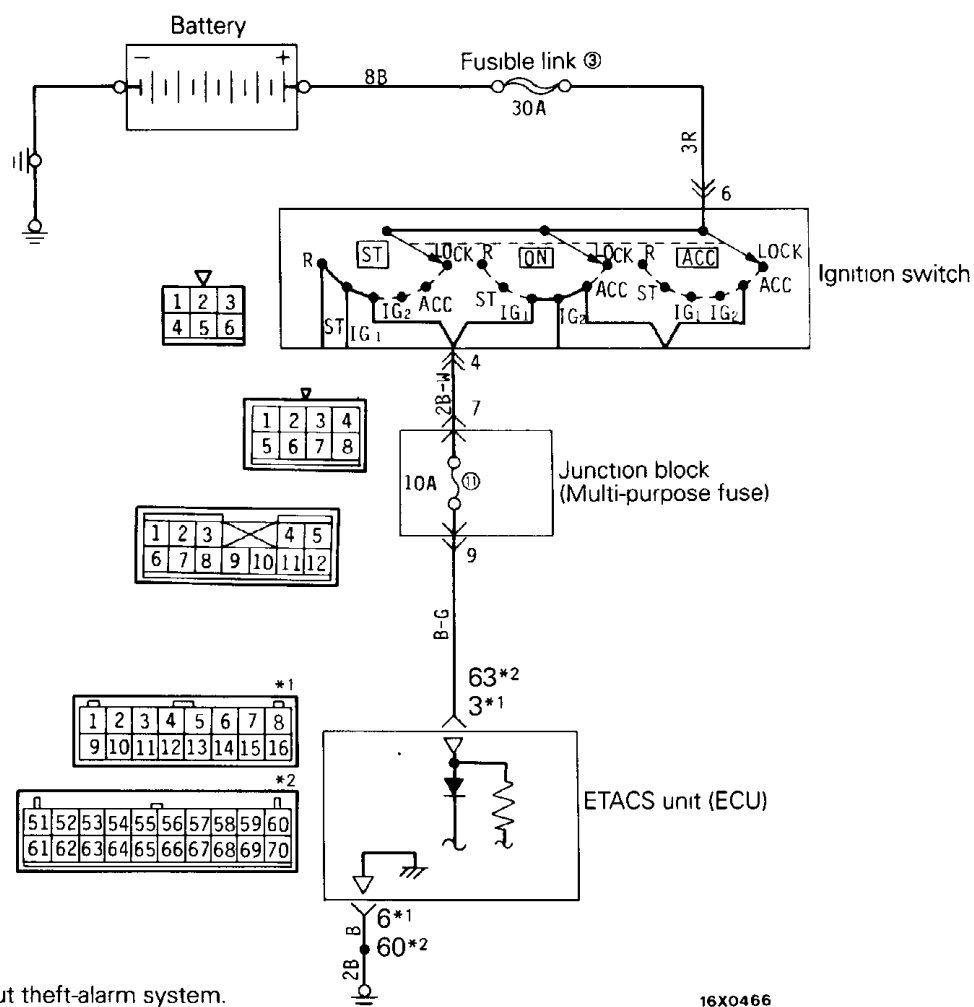
NOTES

TROUBLESHOOTING QUICK-REFERENCE TABLE

Problem	Probable cause	Check method	Remedy
The rear window defogger does not function when the defogger switch is pressed.	Damaged or disconnected wiring of the and earth circuit ignition switch input circuit and earth circuit	If a malfunction is indicated as a result of checking the input signals, check by following individual part and the circuit check No. 1 procedures (P.54-70).	Repair the wiring harness.
	Damaged or disconnected wiring of the defogger switch input circuit	If a malfunction is indicated as a result of checking the input signals, check by following individual part and the circuit check No. 2 procedures (P.54-71).	Repair the harness or replace the defogger switch.
	Damaged or disconnected wiring of the defogger relay drive circuit	Check by following individual part and circuit check No. 3 procedures (P.54-72).	Repair the harness or replace the defogger relay
	Malfunction of the electronic control unit	—	Replace the electronic control unit.
While the rear window defogger is operating, even if the defogger switch is pressed once more, the defogger remains operating.	Short-circuit of defogger relay drive circuit	Check by following individual part and circuit check No. 3 procedures (P.54-73).	Repair the harness.
	Malfunction of the electronic control unit	—	Replace the electronic control unit.

CHECKING INDIVIDUAL PART AND CIRCUIT

1. IGNITION SWITCH INPUT CIRCUIT AND EARTH CIRCUITS



Description of operation

A condition for operation of this system is the sending of HIGH-level signals to the electronic control unit when the ignition switch is switched to the "ON" position.

Electronic control unit terminal voltage (Disconnect the connector of the electronic control unit and check the wiring harness side.)

ECU terminal No	Signal	Status	Standard
3*1 63*2	Ignition switch (ON)	Ignition switch OFF	0V
		ON	System voltage

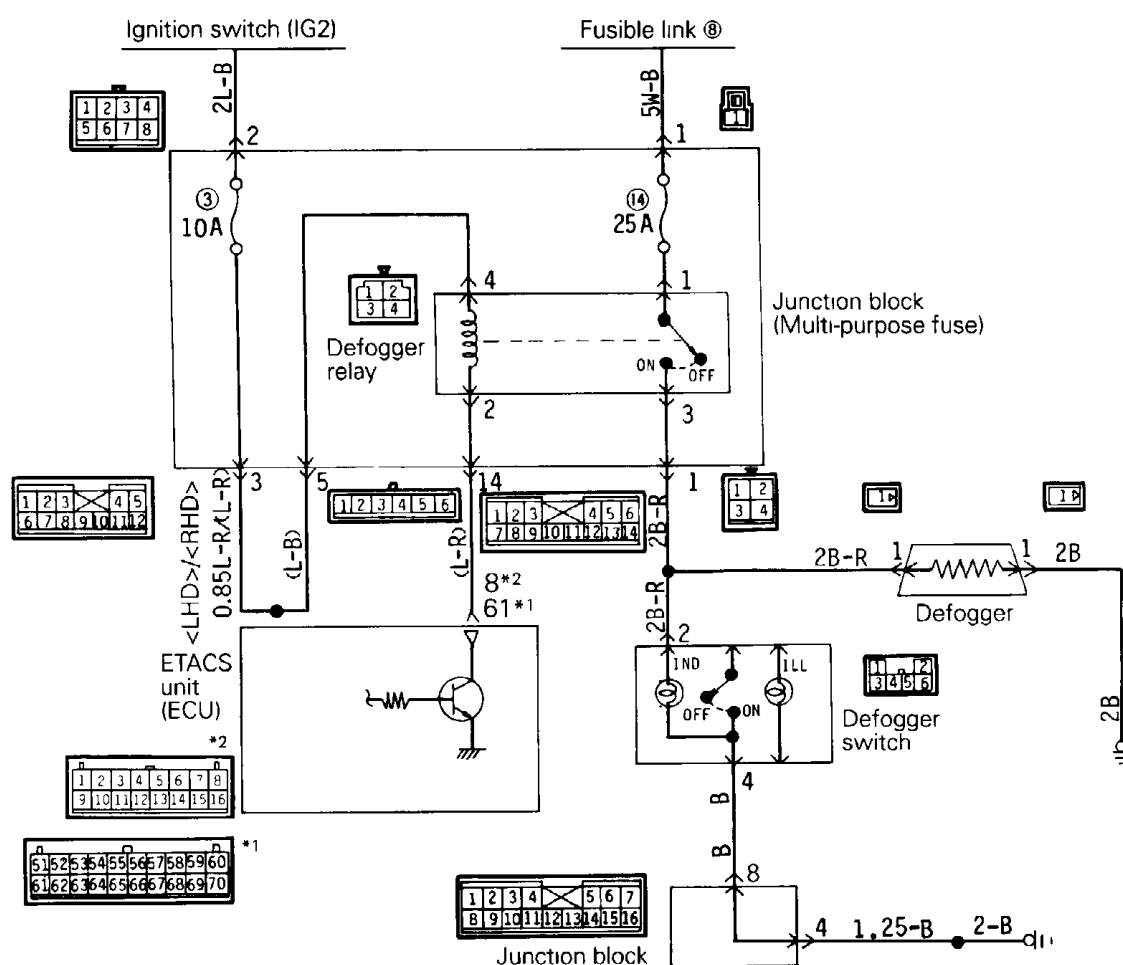
Checking the ground circuit (Disconnect the connector and check the wiring harness side.)

Terminal No	Connected to/measured part	Measurement	Tester connection	Check conditions	Standard
6*1, 60*2	Electronic control unit earth	Continuity	6-earth*1 60-earth*2	At all times	Continuity

Checking the individual part

Ignition switch .. Refer to P.54-11.

3. DEFOGGER RELAY DRIVE CIRCUIT



NOTE

(1)*1: indicates vehicles without theft-alarm system.
(2)*2: indicates vehicles with theft-alarm system.

16X0471

Description of operation

When the ignition switch is ON, if the defogger switch is switched to ON, the ECU transistor turns ON and power is supplied to the defogger relay via the fusible link ⑧.

Furthermore, when the defogger relay turns ON, power is supplied to the defogger indicator (IND) lamp and to the defogger.

Electronic control unit terminal voltage (Disconnect the connector of the electronic control unit and check the wiring harness side.)

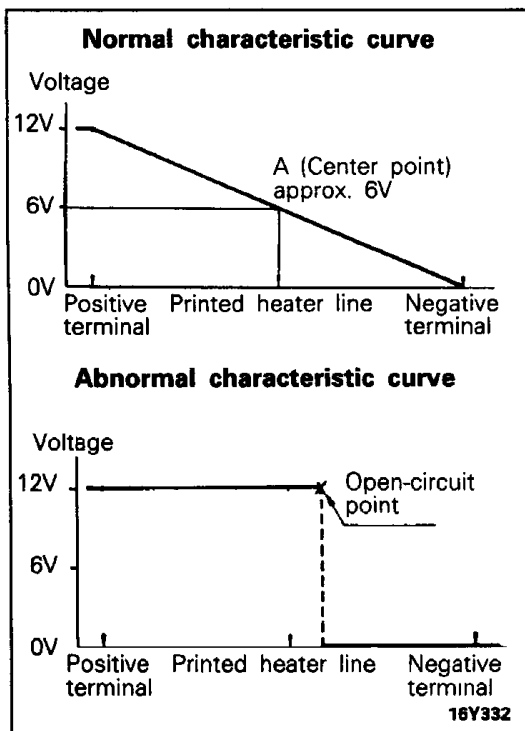
ECU terminal No.	Signal	Condition	Terminal voltage
61*1, 8*2	Defogger relay signal	At all times	System voltage

Checking the individual part

Defogger relay ... Refer to P.54-73.

NOTE

While the defogger is operating, if the defogger switch is pressed once more, the ECU transistor turns OFF, turning the defogger relay OFF and stopping the power supply.



SERVICE ADJUSTMENT PROCEDURES

E54MLAA

PRINTED-HEATER LINE CHECK

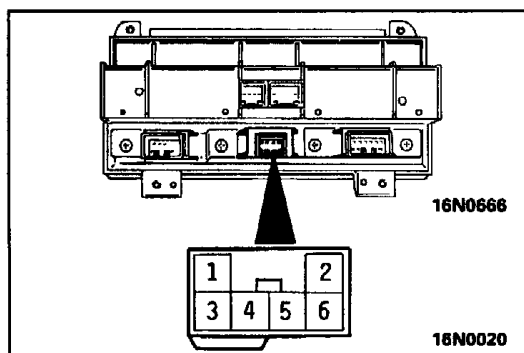
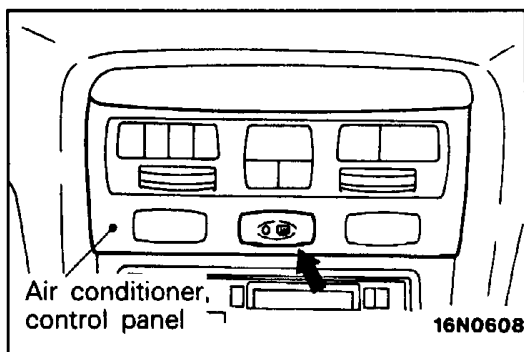
- (1) Run engine at 2,000 r/min. Check heater element with battery at full.
- (2) Turn ON rear window defogger switch. Measure heater element voltage with circuit tester at rear window glass centre A.
Condition good if indicating about 6V.
- (3) If 12V is indicated at A, there is a break in the negative terminals from A.
Move test bar slowly to negative terminal to detect where voltage changes suddenly (0V).
- (4) If 0V is indicated at A, there is a break in the positive terminals from A. Detect where the voltage changes suddenly (12V) with the same method described.

REAR WINDOW DEFOGGER SWITCH

E54MHAD

INSPECTION

- (1) Remove the air conditioner control panel assembly.
(Refer to GROUP 55 – Air Conditioner Control Unit.)



- (2) Operate the switch and check for continuity between the terminals.

Terminal No.	4	6		1	5		2
Switch position							
OFF	○	—	IND	○	○	ILL	○
ON	○	○	IND	○	○	○	○

NOTE

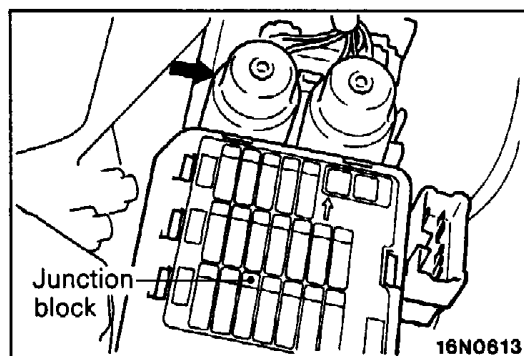
○—○ indicates that there is continuity between the terminals.

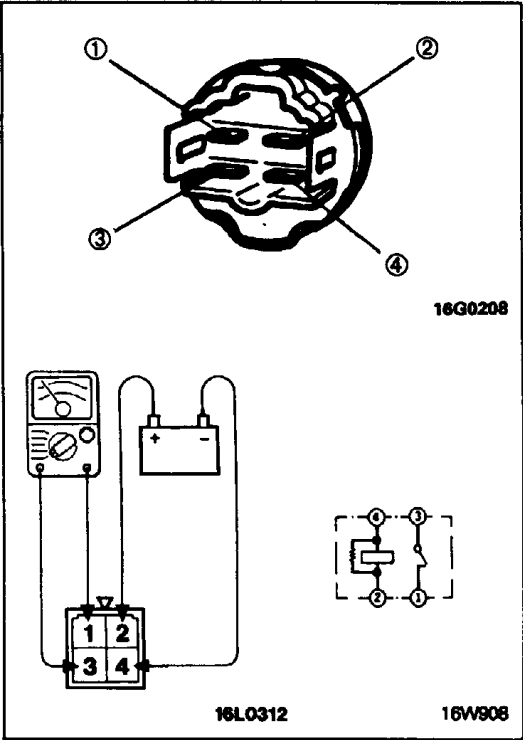
REAR WINDOW DEFOGGER RELAY

E54MIAE

INSPECTION

- (1) Remove the rear window defogger relay from the junction block.





(2) Apply battery voltage to terminal ②, and check the continuity between the terminals when terminal ④ is earthed.

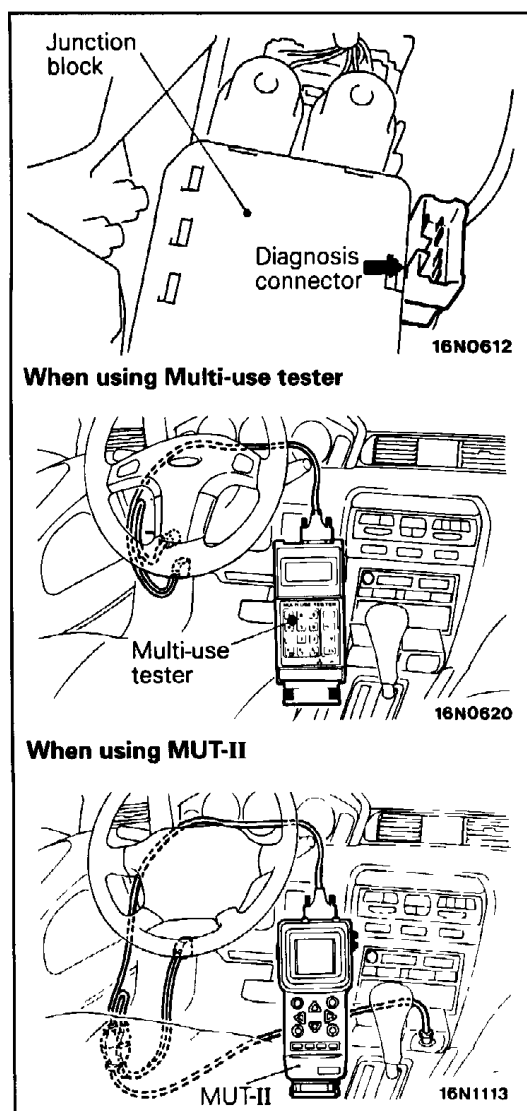
When power is supplied	Between terminals ① and ③	Continuity
When power is not supplied	Between terminals ① and ③	No continuity
	Between terminals ② and ④	Continuity

SWS (Simplified Wiring System)

TROUBLESHOOTING

When a malfunction develops in only a single function, the malfunction is probably in the switch, motor or harness, so check the switch input. If the switch is normal, check the motor or harness. If

several malfunctions develop at the same time, the malfunction is probably in the data wires or the power supply, so use the quick reference troubleshooting guide to carry out an inspection.



INPUT INSPECTION

Using the multi-use tester <Up to 1993 models> or MUT-II <All models>, test to see if each switch in the front door module LH is functioning normally.

- (1) Connect the multi-use tester or MUT-II to the diagnosis connector on the right or left side of the junction block.

Caution

Connection and disconnection of the multi-use tester or MUT-II should always be made with the ignition switch in the OFF position.

- (2) Check if the multi-use tester or MUT-II buzzer sounds once when the switches below are operated:
 - Remote control mirror R/L changeover switch
 - Remote control mirror switch
 - FR power window switch
 - FL power window switch
 - RR power window switch
 - RL power window switch
 - Power window lock switch
- (3) If the buzzer sounds, the switch signal is being input into the ETACS control unit, and therefore that switch system and the data wire are normal. If neither happens, there is an abnormality in the switch or in the front door control unit LH inside circuit, so replace the front door control unit LH.

QUICK REFERENCE TROUBLESHOOTING GUIDE**HOW TO USE THE QUICK REFERENCE TROUBLESHOOTING GUIDE**

- (1) Check for malfunctions by carrying out all of the following operations that are controlled by the SWS:
 - Operation of the remote control mirror.
 - Operation of all of the power windows by the front door control unit LH.
 - Operation of the power window by the front door control unit RH.
 - Operation of the power windows by the rear power window units (RH and LH).
 - Operation of the central door lock by the driver's inside locking knob.
- (2) After examining the malfunction problem that has been checked against the quick reference troubleshooting guide, follow the procedure indicated to rectify the fault.
If the malfunction is not in the quick reference troubleshooting guide, inspect the related fuses and connectors.

NOTES

QUICK REFERENCE TROUBLESHOOTING GUIDE

○: Operating normally

×: Not operating at all

△: (for power window only)

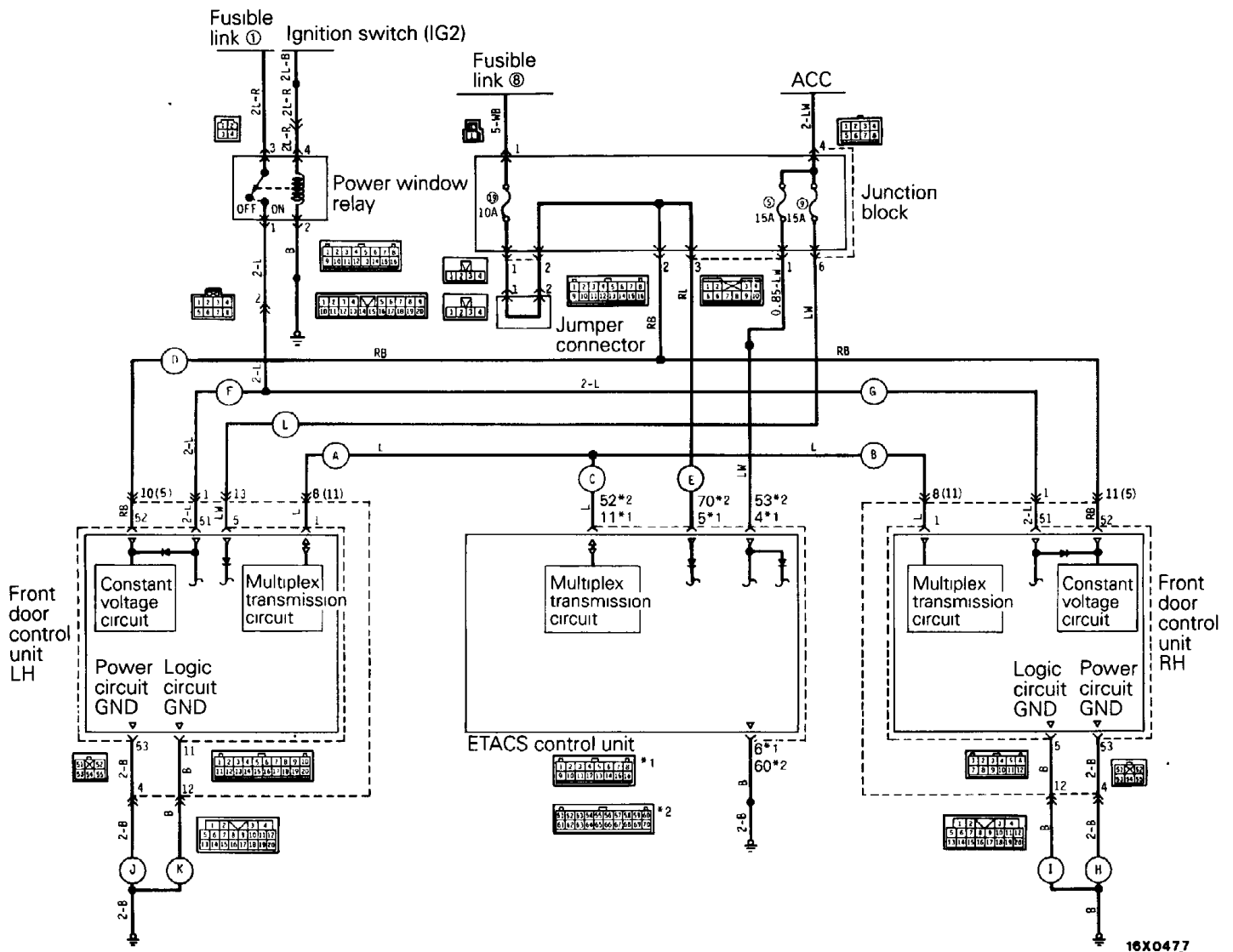
Cannot operate from front door control unit LH, but individual window switches can be operated.

Malfunctioning condition						Probable cause	Suggested remedy (inspect with the ignition switch ON)	
Power windows			Remote-controlled mirror		Central door lock			
Front LH	Front RH	Rear seats	LH	RH				
○	△	△	○	×	○*1	Data wire has short-circuit Data wire ④ is broken Front door control unit LH is defective	Rectify by following flow chart 1	
○	△	○*2	○	×	○	Data wire ③ is broken. Front door control unit RH is defective	Measure the voltage between the body earth and the harness side connector No. 1 terminal of the front door control unit RH.	Battery voltage. Replace the front door control unit RH. 0V: Repair the harness
○	○	△	○	○	○*1	Data wire ⑤ is broken. System power cable ⑥ is broken. ETACS control unit is defective.	Measure the voltage between the body earth and the harness side connector No. 5 and No. 11 terminals of the ETACS control unit	Battery voltage. Replace the ETACS control unit. 0V: Repair the harness
○	○	○	○	○	×	System power cable ⑥ is broken. Front door control unit LH is defective	Measure the voltage between the body earth and the harness side connector No. 52 terminal of the front door control unit LH	Battery voltage. Replace the front door control unit LH. 0V: Repair the harness
×	△	△	○	○	○	Power window power cable ⑦ is broken. Front door control unit LH is defective.	Measure the voltage between the body earth and the harness side connector No. 51 terminal of the front door control unit LH	Battery voltage. Replace the front door control unit LH. 0V: Repair the harness
○	×	×	○	○	○	Power window power cable ⑧ is broken. Power earth wire ⑨ is broken. Front door control unit RH is defective.	Rectify by following flow chart 3	
○	×	△	○	×	○	Logic circuit earth wire ⑩ is broken. Front door control unit RH is defective.	Inspect the continuity between the body earth and the harness side connector No. 5 terminal of the front door control unit RH	Continuity: Replace front door control unit RH. No continuity: Repair harness.
×	○	○	○	○	×	Power earth wire ⑪ is broken. Front door control unit LH is defective	Inspect the continuity between the body earth and the harness side connector No. 53 terminal of the front door control unit LH.	Continuity: Replace front door control unit LH. No continuity: Repair harness
×	△	△	×	×	×	Logic circuit earth wire ⑫ is broken. Front door control unit LH is defective.	Inspect the continuity between the body earth and the harness side connector No. 11 terminal of the front door control unit LH	
○	○	○	×	×	○	Multipurpose fuse 9 is blown. ACC power cable ⑬ is broken. Front door control unit LH is defective.	Measure the voltage between the body earth and the harness side connector No. 5 terminal of the front door control unit LH	Battery voltage. Replace the front door control unit LH. 0V: Inspect the fuse, repair the harness.
×	×	×	○	○	○	Sub fusible link 1 is blown. Power window relay is defective. Power window power cable ⑭ is broken. ETACS control unit is defective	Measure the voltage between the body earth and the harness side connector No. 58 terminal of the ETACS control unit	Battery voltage. Replace the ETACS control unit. 0V: Inspect the fuse, repair the harness. Inspect power window relay itself (Refer to GROUP 42 – Door Glass and Regulator.)

*1: The key reminder warning will not function

*2: Power window lock will not function

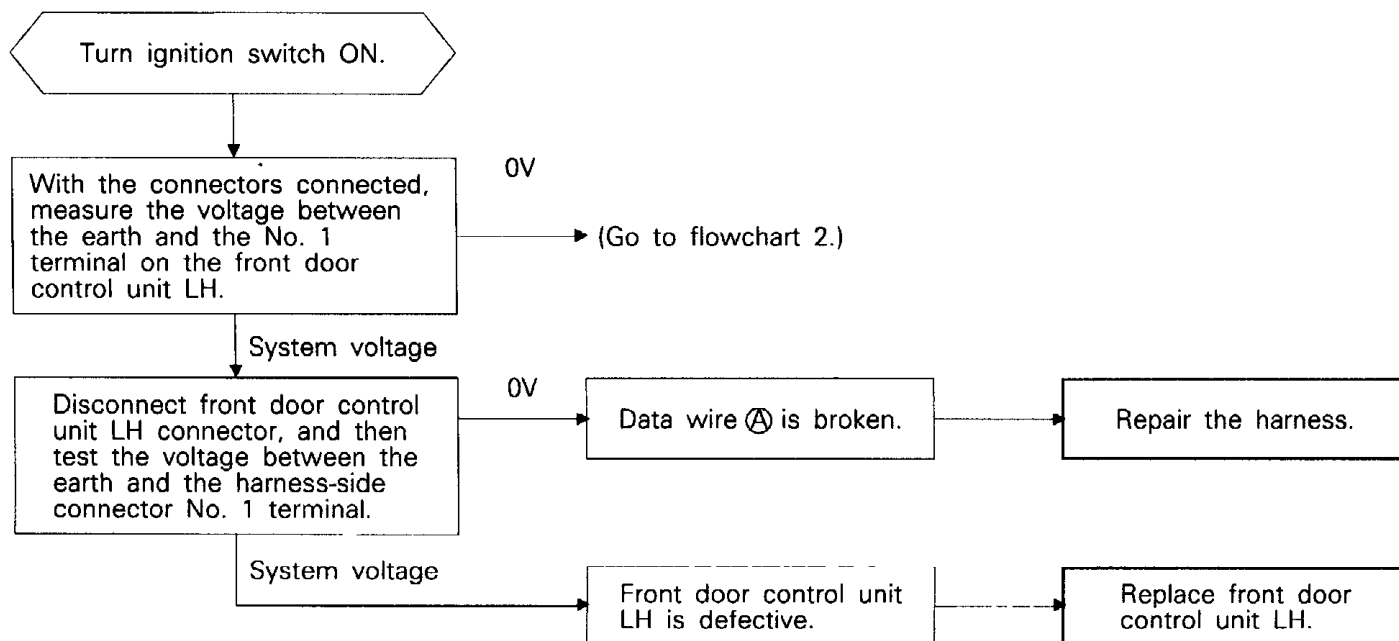
DIAGRAM OF DATA WIRES AND POWER SYSTEM CONNECTIONS



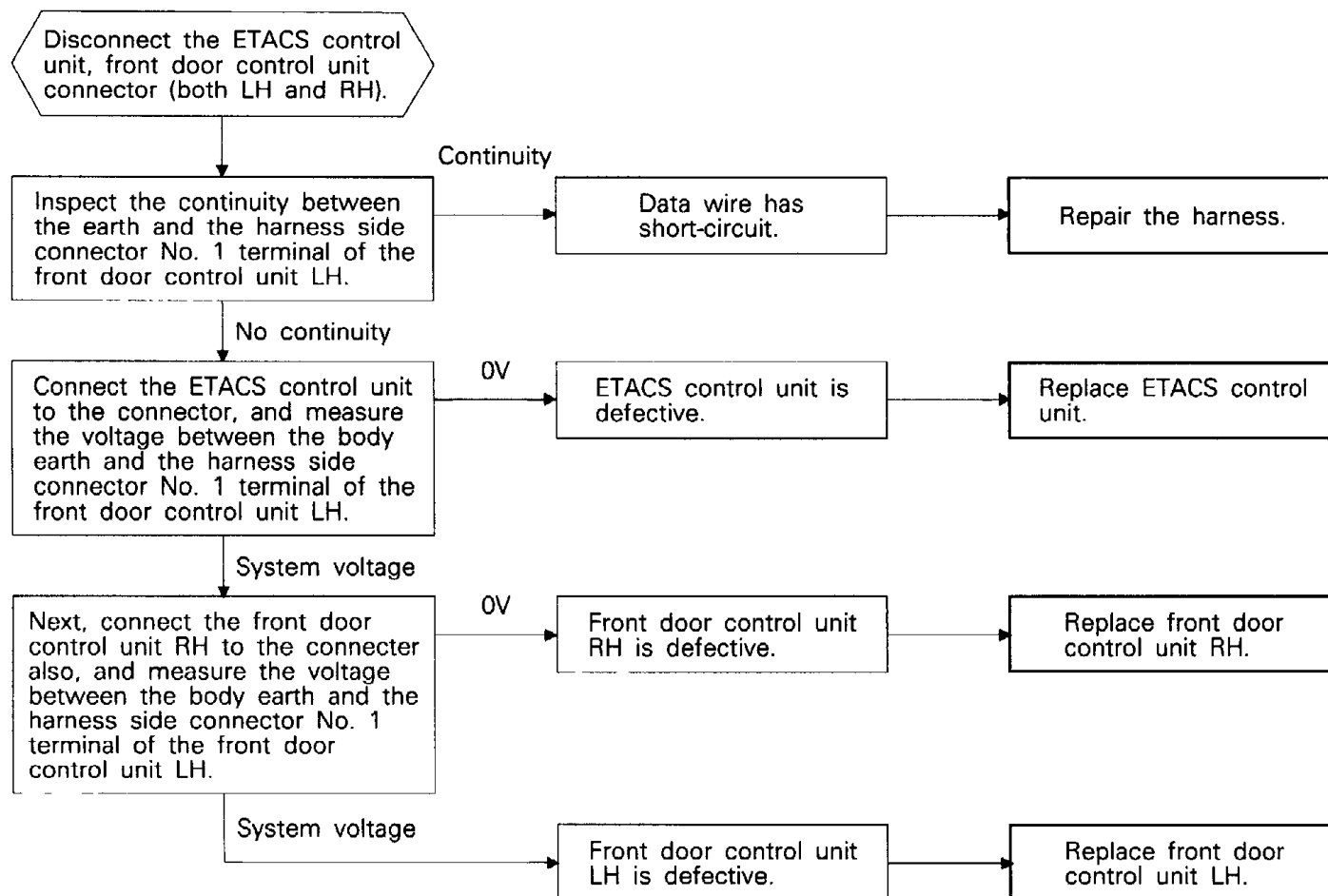
NOTE

- (1) The numbers inside () indicate the terminal numbers of the R.H. drive vehicles.
(2) *1: indicates vehicles without theft-alarm system.
(3) *2: indicates vehicles with theft-alarm system.

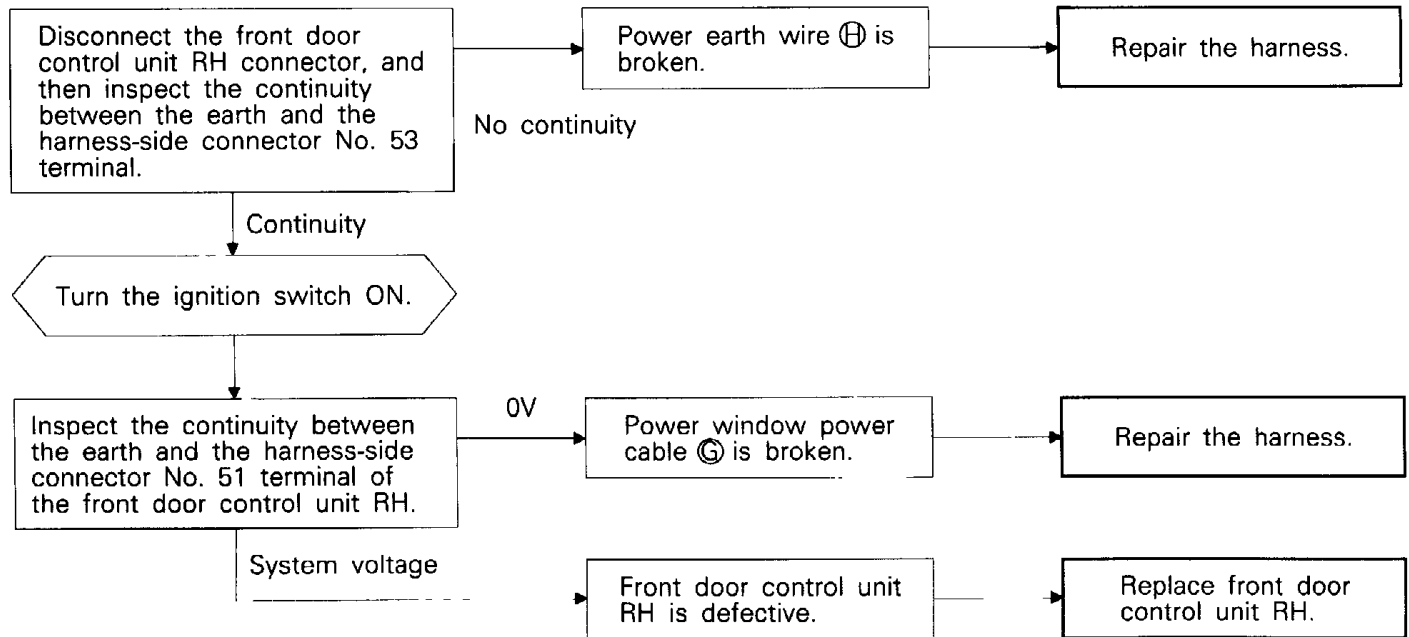
FLOW CHART 1 (INSPECTION OF BROKEN DATA WIRES)



FLOW CHART 2 (INSPECTION OF DATA WIRE SHORT-CIRCUITS)



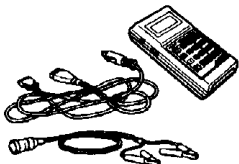
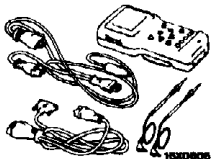
FLOW CHART 3 (INSPECTION OF FRONT RH POWER WINDOW POWER CIRCUIT)

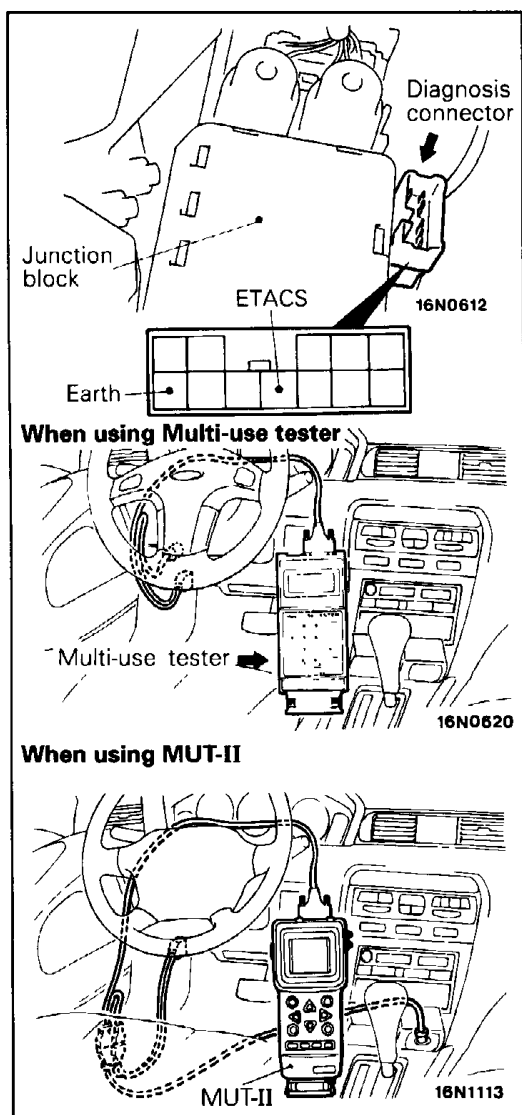


THEFT-ALARM SYSTEM

SPECIAL TOOLS

E54QN-

Tool	Number	Name	Use
	MB991341	Multi-use tester assembly	Up to 1993 models ETACS input checking
	 (For the number, refer to GROUP 00 – Precautions Before Service)	ROM pack	
	MB991502	MUT-II	All models ETACS input checking
	 16X0607	ROM pack	



TROUBLESHOOTING

INPUT CHECK

Using the multi-use tester <Up to 1993 models> or MUT-II <All models>, check whether or not the input signals from each switch are being input to the electronic control unit.

- (1) Connect the multi-use tester or MUT-II to the diagnosis connector (located at the right or left side of the junction block).

Caution

Connection and disconnection of the multi-use tester or MUT-II should always be made with the ignition switch in the OFF position.

- (2) Check to be sure that the buzzer of the multi-use tester or MUT-II sounds one time, when each switch noted below is operated.

If the buzzer sounds, the input signals are being input to the electronic control unit, so that switch can be considered to be functioning normally;

If there is a malfunction, there is an abnormality in the switch or in the switch input circuit, so they should be inspected.

- Driver and front passenger door switches
- Front passenger door lock actuator switches
- Hood switch
- Luggage compartment lamp switch
- Front passenger door key cylinder switch
- Trunk lid lock cylinder switch

54-80-2

NOTES

TROUBLESHOOTING QUICK-REFERENCE TABLE**1. ARMING / DISARMING RELATIONSHIP**

Trouble symptom	Cause	Check method	Remedy
The system is not armed (The SECURITY lamp doesn't illuminate, and the alarm doesn't function.) (The central door locking system functions normally.)	Damaged or disconnected wiring of ECU power supply circuit	Check by using check chart No. 1	Replace the fusible link No. ⑧ or the fuse No. ⑨. Repair the harness.
	Damaged or disconnected wiring of door switch input circuit	Check by using check chart No. 4.	Repair the harness or replace the door switch.
The arming procedures are followed, but the SECURITY lamp does not illuminate. (There is an alarm, however, when an alarm test is conducted after about 20 seconds have passed.)	Damaged or disconnected wiring of SECURITY lamp activation circuit.	Check by using check chart No. 8	Replace the fusible link No. ⑧ or the fuse No. ⑨. Repair the harness.
	Blown SECURITY lamp bulb		Replace the bulb.
	Malfunction of the ECU.	—	Replace the ECU.
The alarm sounds in error when, while the system is armed, a door or the trunk lid is unlocked by using the key.	Damaged or disconnected wiring of a door key cylinder and the trunk lid lock cylinder switch input circuit.	If input checks indicate a malfunction, check by using check chart No. 6.	Repair the harness or replace a door key cylinder and the trunk lid lock cylinder switch.
	Malfunction of a door key cylinder and the trunk lid lock cylinder switch.		
	Malfunction of the ECU.	—	Replace the ECU.

2. ACTIVATION / DEACTIVATION RELATIONSHIP

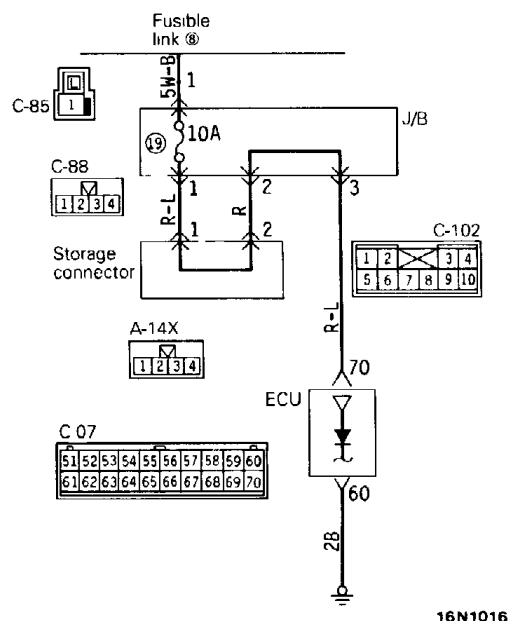
Trouble symptom	Cause	Check method	Remedy
There is no alarm when, as an alarm test, a door is opened without using the key. (The arming and disarming are normal, and the alarm is activated when the trunk lid or hood is opened.)	Damaged or disconnected wiring of door switch (all doors) input circuit	If input checks indicate a malfunction, check by using check chart No. 4.	Repair the harness or replace the door switch.
	Malfunction of the door switch		
	Malfunction of the ECU	—	Replace the ECU.
There is no alarm when, as an alarm test, the trunk lid is opened without using the key (The alarm is activated, however, by opening a door or the hood.)	Damaged or disconnected wiring of luggage compartment lamp switch input circuit	If input checks indicate a malfunction, check by using check chart No. 7	Repair the harness or replace the luggage compartment lamp switch.
	Malfunction of the luggage compartment lamp switch		
	Malfunction of the ECU.	—	Replace the ECU.

Trouble symptom	Cause	Check method	Remedy
There is no alarm when, as an alarm test the hood is opened from within the vehicle. (The alarm is activated, however, by opening a door or the trunk lid.)	Damaged or disconnected wiring of hood switch input circuit.	If input checks indicate a malfunction, check by using check chart No. 3.	Repair the harness or replace the hood switch.
	Malfunction of the hood switch.		
	Malfunction of the ECU.	—	Replace the ECU.
Engine does not start even when the starter relay switch is ON (normal closed condition).	● Malfunction of the starter relay ● Damage or disconnected wiring of starter relay activation circuit.	Check by using check chart No. 15	Repair the harness. Replace the starter relay. Replace the magnet switch.
	Malfunction of the ECU.		Replace the ECU.
The theft-alarm horn does not sound when testing the alarm. The theft-alarm horn does not sound.	Damaged or disconnected wiring of the theft-alarm horn relay power supply circuit or the theft-alarm horn activation circuit.	Check by using check chart No. 9, 10.	Repair the harness. Replace the theft-alarm horn. Replace the theft-alarm horn relay.
	Malfunction of the ECU.		Replace the ECU.
The system is not deactivated when, during an alarm test in which the alarm is intentionally activated, the door or trunk lid is unlocked by using the key. (The system also cannot be disarmed.)	Damaged or disconnected wiring of door key cylinder and trunk lid lock cylinder switch input circuit	If input checks indicate a malfunction, check by using check chart No. 6.	Repair the harness. Replace the key cylinder switch or the trunk lid lock cylinder switch.
	Malfunction of door key cylinder or trunk lid lock cylinder switch.		
	Malfunction of the ECU.		Replace the ECU.

ECU: ETACS Unit

CHECKING THE CIRCUIT AND INDIVIDUAL PART

1. ETACS POWER-SUPPLY AND GROUND CIRCUITS



Description of operation

The battery supplies a stabilized 5V power supply to the ECU, via the constant-voltage circuit and terminal ⑦⑩ (which is directly connected to the battery).

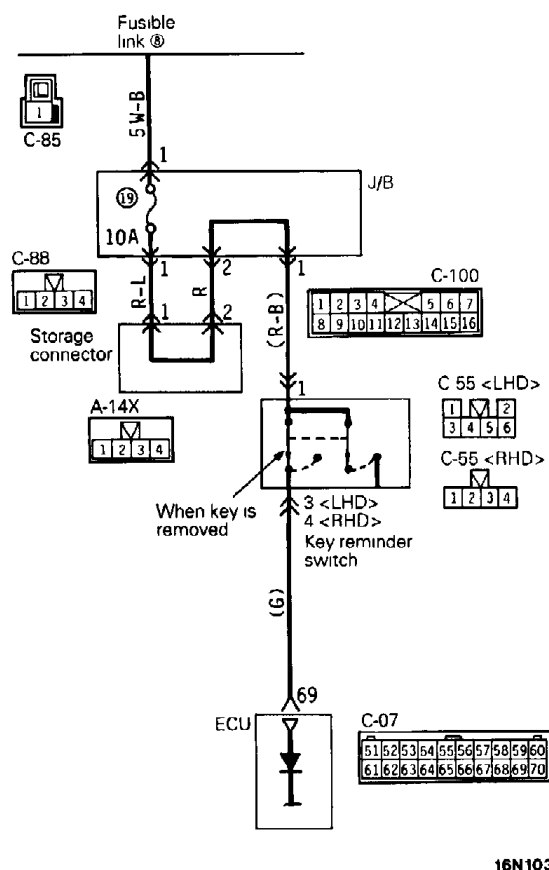
ECU terminal voltage (Connection condition of the ECU connector.)

ECU terminal No.	Signal	Condition	Terminal voltage
70	ECU power supply	At all times	System voltage

Checking the earth circuit (Disconnect the connector and check at the wiring harness side.)

ECU Terminal No.	Connected to/ measured component	Measurement	Tester connection	Check condition	Standard
60	ECU earth	Resistance	60 -earth	At all times	Continuity

2. KEY-REMINDER SWITCH INPUT CIRCUIT



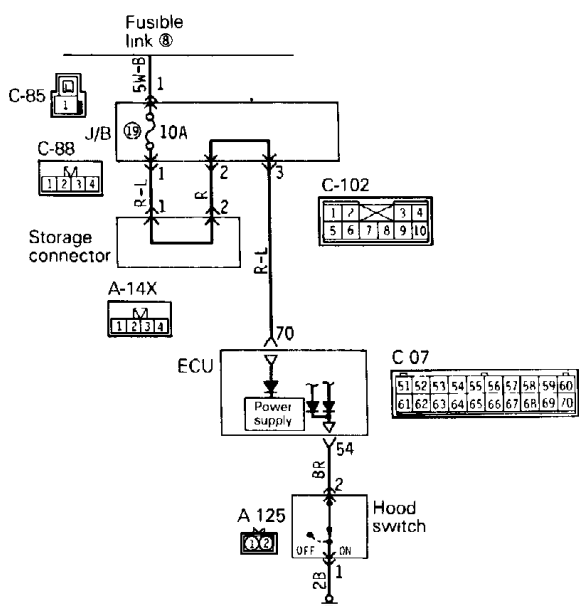
Description of operation

The key-reminder switch is switched OFF and HIGH-level signals are sent to the ECU when the key is inserted into the ignition key cylinder: when the key is removed, the key-reminder switch is switched ON and LOW-level signals are sent to the ECU.

ECU terminal voltage (Connection condition of the ECU connector).

ECU terminal No.	Signal	Condition	Terminal voltage
69	Key-reminder switch	Key removed	System voltage
		Key inserted	0V

3. HOOD SWITCH INPUT CIRCUIT



Description of operation

When the hood is closed (the hood switch is switched OFF), HIGH-level signals are sent to the ECU:

When the hood is opened (the hood switch is switched ON), LOW-level signals are sent to the ECU.

ECU terminal voltage (Connection condition of the ECU connector).

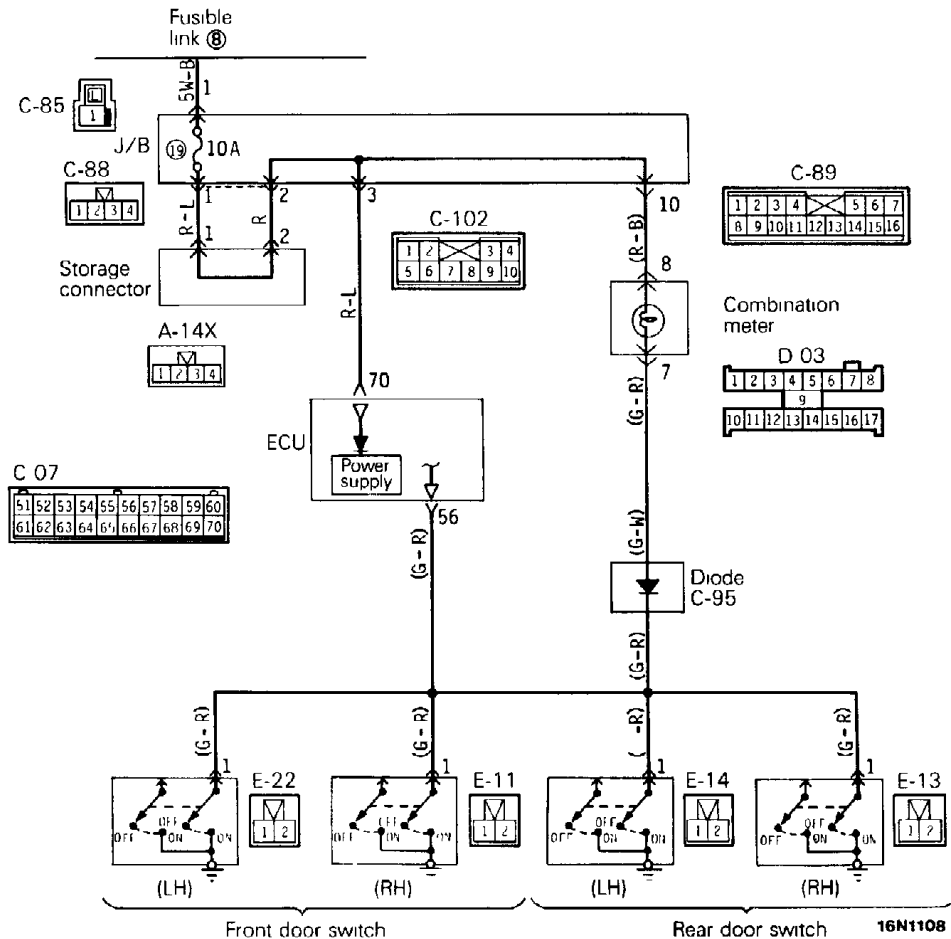
ECU terminal No	Signal	Condition		Terminal voltage
54	Hood switch	Hood	Open	0V
			Closed	5V*

* Measurement is not possible by using a voltmeter, but is possible by using an oscilloscope.

Checking the hood switch circuit (Disconnect the connector of the ECU and check at the wiring harness side.)

ECU terminal No	Connected to/measured part	Measurement	Tester connection	Check condition		Standard
54	Hood switch	Resistance	54 - earth	Hood	Closed	No continuity
					Open	Continuity

4. DOOR SWITCH INPUT CIRCUIT



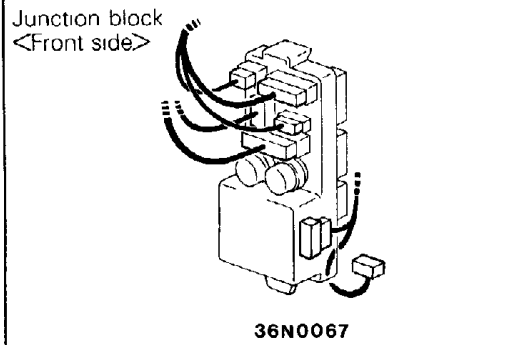
Description of operation

When the door is closed (the door switch is switched OFF), HIGH-level signals are sent to the ECU:

When the door is opened (the door switch is switched ON), LOW-level signals are sent to the ECU.

ECU terminal voltage (Connection condition of the ECU).

ECU terminal No.	Signal	Condition		Terminal voltage
56	Door switch	Door	Open	0V
			Closed	System voltage*

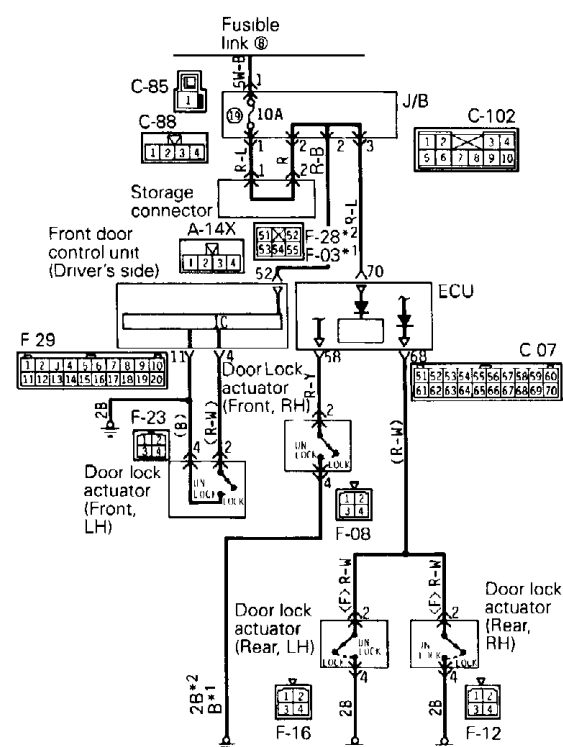


- * 1 Both the ECU and the door-ajar warning lamp of the combination meter are connected to the door switch. Because of this, the power supply voltage of the door-ajar warning lamp is detected as the ECU terminal voltage.
- 2 When the junction block (which is located at the left, under of the instrument panel) connector, indicated in the figure is disconnected, ECU terminal voltage, 5V (pulse), is detected. As measurement is not possible by using a voltmeter, but is possible by using an oscilloscope.

Checking the door switch circuit (Disconnect the connector of the ECU and check at the wiring harness side.)

ECU terminal No.	Connected to/measured part	Measurement	Tester connection	Check condition		Standard
56	Door switch	Resistance	56 - earth	Door	Closed	No continuity
					Open	Continuity

5. DOOR LOCK ACTUATOR SWITCH INPUT CIRCUIT



Remarks
(1)*1 RHD
(2)*2 LHD

16N1023

Description of operation

When a door is locked by the lock knob or the key, the door lock actuator switch is switched OFF, and HIGH-level signals are sent to the ECU. These signals activate the timer circuit of the ECU, thereby causing the activation circuit to function, thus activating the door lock actuator of all doors.

ECU terminal voltage (Connection condition of the ECU connector).

ECU terminal No	Signal	Condition		Terminal voltage
58	Front door lock actuator switch (RHD)	Door lock actuator switch	Lock: OFF	5V*
68	Rear door lock actuator switch (LH or RH)		Unlock: ON	0V

Front door control unit (Driver's side) terminal voltage (Connection condition of the front door control unit connector)

Front door control unit terminal No.	Signal	Condition		Terminal voltage
4	Front door lock actuator switch (LH)	Door lock actuator switch	Lock: OFF	5V*
			Unlock: ON	0V

* Measurement is not possible by using a voltmeter, but is possible by using an oscilloscope.

Checking the door lock switch circuit (Disconnect the connector of the ECU and check at the wiring harness side.)

ECU terminal No.	Connected to/measured part	Measurement	Tester connection	Check condition		Standard
58	Front door lock actuator switch (RH)	Resistance	58 - earth	Door lock actuator switch	Lock OFF	No continuity
68	Rear door lock actuator switch (LH or RH)	Resistance	68 - earth		Unlock: ON	Continuity

Disconnect the connector of the front door control unit (Driver's side)

Front door control unit terminal No	Connected to/measured part	Measurement	Tester connection	Check condition		Standard
4	Front door Lock actuator switch (LH)	Resistance	4 - earth	Door lock actuator switch	Lock OFF	No continuity
					Unlock: ON	Continuity

6. DOOR KEY CYLINDER AND TRUNK LID LOCK CYLINDER SWITCH INPUT CIRCUIT

Description of operation

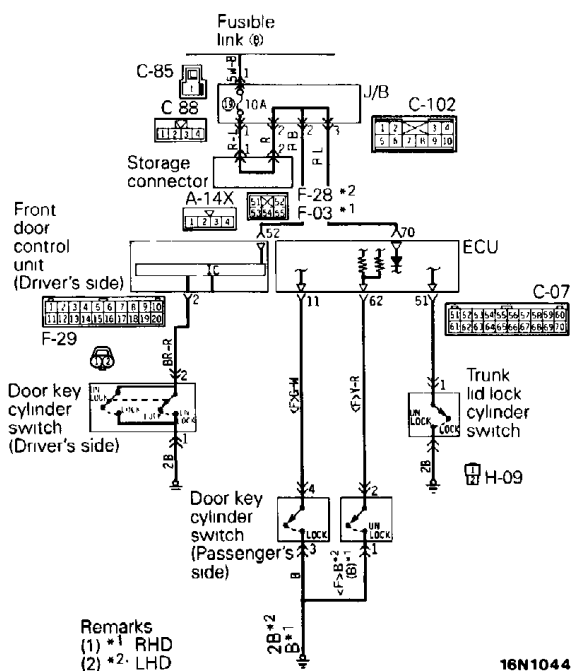
When the door key is rotated or the trunk lid key is unlocked. LOW-level signals are sent to the ECU.

ECU terminal voltage (Connection condition of the ECU connector).

ECU terminal No.	Signal	Condition		Terminal voltage
62	Front door key cylinder switch (Passenger's side)	Door key cylinder	Neutral	5V
			Unlock	0V
11	Front door key cylinder switch (Passenger's side)	Door key cylinder	Neutral	5V
			Lock	0V
51	Trunk lid lock cylinder switch	Trunk lid	Lock	5V
			Unlock	0V

Front door control unit (Driver's side) terminal voltage
(Connection condition of the front door control unit connector)

Front door control unit terminal No	Signal	Condition		Terminal voltage
2	Front door cylinder switch (driver's side)	Door key cylinder	Not rotate	5V
			Rotate	0V



Checking the door key cylinder and trunk lid lock cylinder switch circuit

(Disconnect the connector of the ECU and check at the wiring harness side.)

ECU terminal No.	Connected to/measured part	Measurement	Tester connection	Check condition		Standard
62	Door key cylinder switch (passenger's side)	Resistance	62 - earth	Door key cylinder (Passenger's side)	Neutral	No continuity
					Unlock	Continuity
11	Door key cylinder switch (passenger's side)	Resistance	11 - earth	Door key cylinder (Passenger's side)	Neutral	No continuity
					Lock	Continuity
51	Trunk lid lock cylinder switch	Resistance	51 - earth	Trunk lid	Lock	No continuity
					Unlock	Continuity

Disconnect the connector of the front door control unit (Driver's side)

Front door control unit terminal No.	Connected to/measured part	Measurement	Tester connection	Check condition		Standard
2	Door key cylinder switch (Driver's side)	Resistance	2 - earth	Door key cylinder (Driver's side)	Not rotate	No continuity
					Rotate	Continuity

7. LUGGAGE COMPARTMENT LAMP SWITCH INPUT CIRCUIT

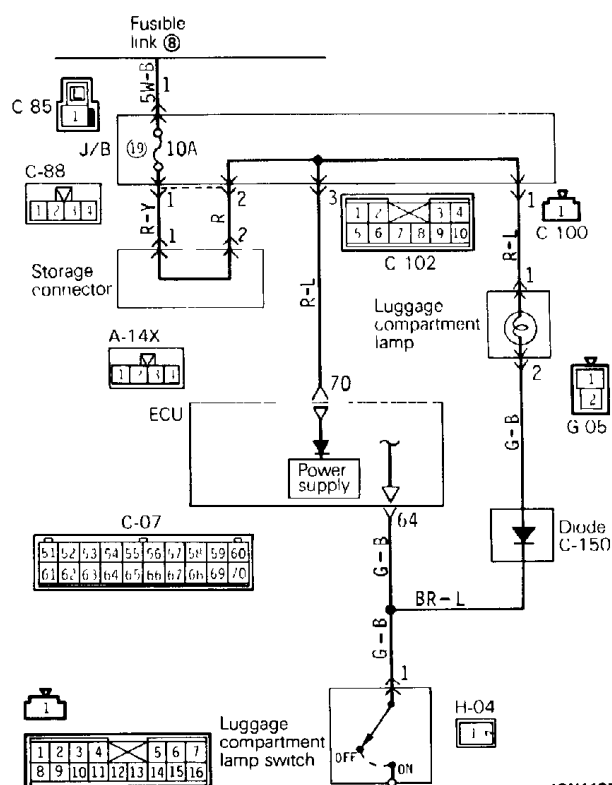
Description of operation

When the trunk lid is closed (the luggage compartment lamp switch is switched OFF), HIGH-level signals are sent to the ECU. When the trunk lid is opened (the luggage compartment lamp switch is switched ON), LOW-level signals are sent to the ECU.

ECU terminal voltage (Connection condition of the ECU connector).

ECU terminal No.	Signal	Condition		Terminal voltage
		Trunk lid		
64	Luggage compartment lamp switch	Neutral		0V
		Closed		System voltage*

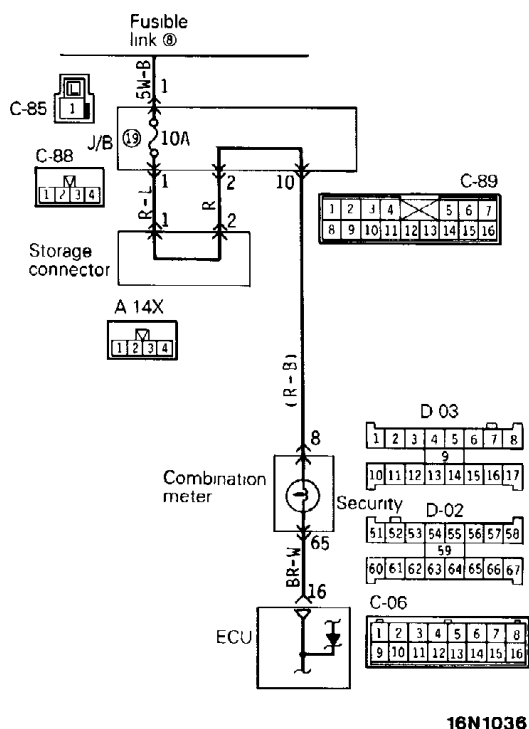
- * 1 Both the ECU and the luggage compartment lamp are connected to the luggage compartment lamp switch. Because of this, the power supply voltage of the luggage compartment lamp is detected as the ECU terminal voltage.
2. When the connection of the luggage compartment lamp is disconnected, the ECU terminal voltage, 5V (pulse), is detected. As measurement is not possible by using a voltmeter, but is possible by using an oscilloscope.



16N1107 Checking the liftgate switch circuit (Disconnect the connector of the ECU and check at the wiring harness side.)

ECU terminal No.	Connected to/measured part	Measurement	Tester connection	Check condition		Standard
64	Luggage compartment lamp switch	Resistance	64 - earth	Trunk lid	Closed	No continuity
					Open	Continuity

8. SECURITY LIGHT ACTIVATION CIRCUIT



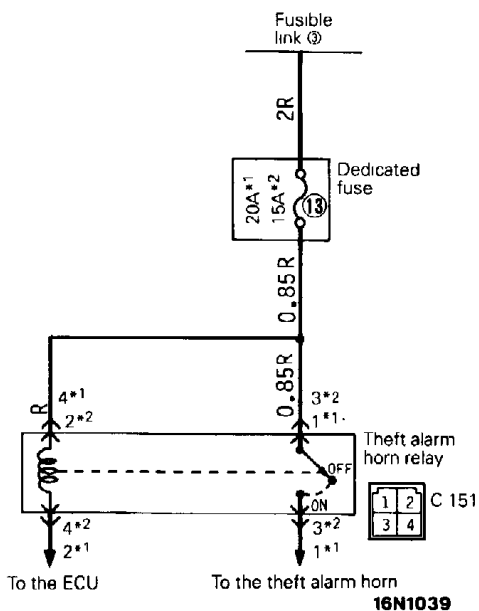
Description of operation

If all doors are in locked state after key locking or key-less locking, the ECU transistor is turned on and the security lamp comes on.

Checking the security lamp activation circuit (Disconnect the connector of the ECU and check at the wiring harness side.)

Step	Check object	Judgement		Cause	Remedy
		Normal	Mal function		
1	D-03 connector terminal voltage 8	System voltage	0V	Fuse (10) damaged or disconnected	Replace the fuse
				Harness damaged or disconnected, or short-circuit	Repair the harness
2	D-02 connector terminal voltage 65	System voltage	0V	Damaged or disconnected wiring of SECURITY lamp bulb	Replace the bulb
				Harness damaged or disconnected	Repair the harness
3	ECU terminal voltage 16	System voltage	0V	Harness damaged or disconnected, or short-circuit	Repair the harness

9. THEFT ALARM HORN RELAY POWER-SUPPLY CIRCUIT



Description of operation

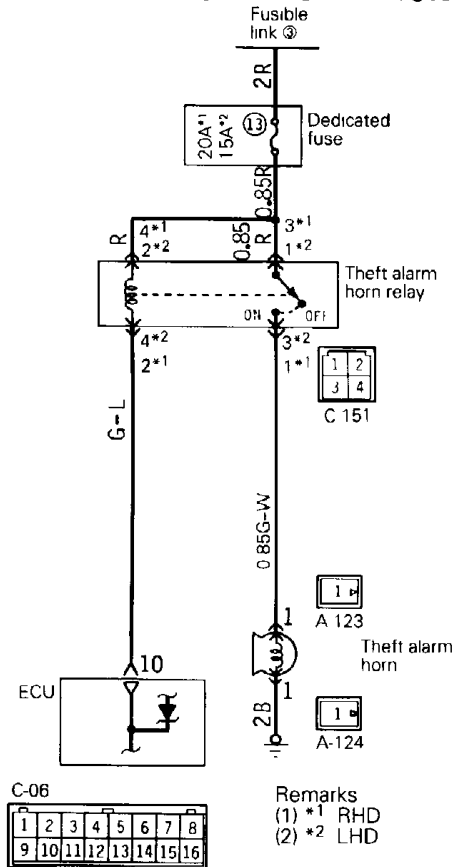
Power voltage is always supplied to the horn relay.

Checking the horn relay power-supply circuit (Disconnect the theft alarm horn relay)

Check object	Judgement		Cause	Remedy
	Normal	Mal-function		
HORN RELAY connector terminal voltage 1*1, 3*2	System voltage	0V	Fuse damaged or disconnected	Replace the fuse
			Damaged or disconnected harness	Repair the harness

Remarks
(1) *1: RHD
(2) *2: LHD

10. THEFT ALARM HORN ACTIVATION CIRCUIT



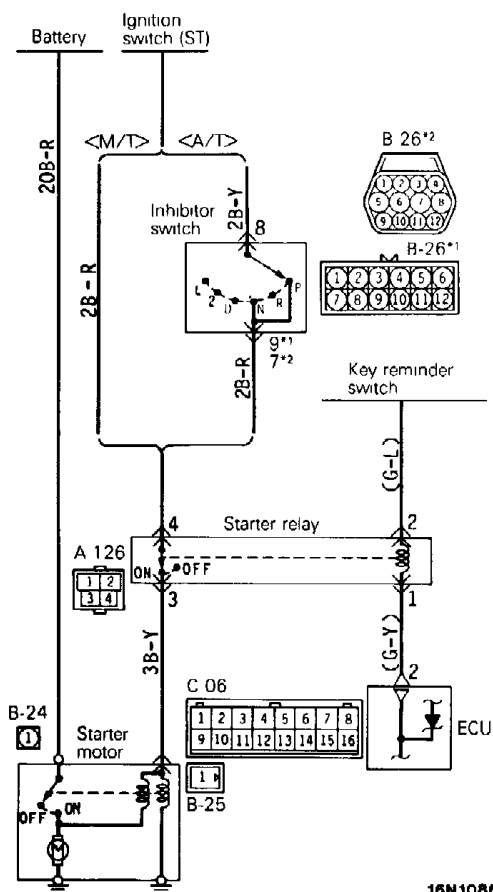
Description of operation

The ECU transistor is turned ON if the vehicle door, etc. are opened without use of the key.
This energizes the horn relay to activate the horn.

Checking the horn activation circuit (Disconnect the connector of the ECU, then short-circuit terminal connector No. 10, and activate the horn relay.)

Step	Check object	Judgement		Cause	Remedy
		Normal	Mal function		
1	Horn relay terminal voltage (3*2, 1*1-earth)	System voltage	0V	Malfunction of the horn relay	Check the horn relay
2	Horn terminal voltage (1*2, 3*1-earth)	System voltage	0V	Harness damaged or disconnected	Repair the harness
3	Horn terminal voltage (1'-earth)	Horn sounds (0V)	Horn doesn't sound (0V)	Malfunction of the horn	Replace the horn
			Battery voltage	Damaged or disconnected wiring of earth circuit	Repair the harness

11. STARTER RELAY ACTIVATION CIRCUIT



Description of operation

The ECU transistor is turned ON if the vehicle door etc. are opened without use of the key. This turns OFF the starter relay and power ceases to be supplied to the starter magnet switch.

Checking the starter relay activation circuit (Disconnect the connector of the ECU)

Step	Check object	Judgement		Cause	Remedy
		Normal	Mal-function		
1	Starter relay terminal voltage (3-earth)	System voltage	0V	Malfunction of the starter relay	Check the starter relay
2	Starter motor terminal (1-earth)	System voltage	0V	Harness damaged or disconnected	Repair the harness
(Starter motor connector B-25 Separation)					
3	Continuity between "B-25" connector and earth	0 Ω	∞ Ω	Damaged magnet switch	Replace magnet switch

NOTE

*1 Vehicles built up to October, 1992

*2 Vehicles built from November, 1992

HEATER, AIR CONDITIONER AND VENTILATION

CONTENTS

E55AA--

SPECIFICATIONS	1-2	SPECIAL TOOLS	3
General Specifications	1-2	TROUBLESHOOTING	4
Service Specifications	2	SAFETY PRECAUTIONS	23
Lubricants	3		
Sealant	3		

CONTINUED ON NEXT PAGE

WARNINGS REGARDING SERVICING OF SUPPLEMENTAL RESTRAINT SYSTEM (SRS) EQUIPPED VEHICLES

WARNING!

- (1) Improper service or maintenance of any component of the SRS, or any SRS-related component, can lead to personal injury or death to service personnel (from inadvertent firing of the air bag) or to the driver and passenger (from rendering the SRS inoperative).
- (2) Service or maintenance of any SRS component or SRS-related component must be performed only at an authorized MITSUBISHI dealer.
- (3) MITSUBISHI dealer personnel must thoroughly review this manual, and especially its GROUP 52B—Supplemental Restraint System (SRS), before beginning any service or maintenance of any component of the SRS or any SRS-related component.

NOTE

The SRS includes the following components: impact sensors, SRS diagnosis unit, SRS warning lamp, air bag module, clock spring, and interconnecting wiring. Other SRS-related components (that may have to be removed/installed in connection with SRS service or maintenance) are indicated in the table of contents by an asterisk (*).

SERVICE ADJUSTMENT PROCEDURES	24	HEATER UNIT*	41
Test Procedures	24	DAMPER CONTROL MOTOR	
Compressor Drive Belt Adjustment	25	ASSEMBLY*	42
Charging Procedures		SENSOR	45
<Vehicles using R-12 refrigerant>	26	BLOWER ASSEMBLY	47
Charging the Refrigerant		EVAPORATOR	48
<Vehicles using R-12 refrigerant>	28	COMPRESSOR	51
Charging		CONDENSER AND CONDENSER FAN	
<Vehicles using R-134a refrigerant>	31-2	MOTOR	59
Performance Test	32	REFRIGERANT LONE	61
Refrigerant Leak Repair Procedure	33	VENTILATORS (INSTRUMENT PANEL	
Handling Tubing and Fittings	34	AND FLOOR)*	63
Compressor Noise	34	VENTILATORS (AIR INLET AND AIR	
Inspection of Engine Coolant Temperature		OUTLET)	64
Switches for Condenser Fan (Vehicles			
with air conditioner) and Radiator Fan	35		
Power Relay Check	36		
Idle Operation Check	37		
AIR CONDITIONER CONTROL PANEL			
ASSEMBLY*	38		
A/C CONTROL UNIT*	40		
POWER TRANSISTOR			
BELT LOCK CONTROLLER	40		

NOTES

55-2 HEATER, AIR CONDITIONER AND VENTILATION – Specifications

SPECIFICATIONS

E56CA--

GENERAL SPECIFICATIONS

Items	Specifications
Heater unit	
Type	Three-way-flow full-air-mix system
Air conditioner control assembly	Push button and dial type
Compressor	
Model	Scroll type (FX-105VS)
Refrigerant unit lubricant	cc (cu.in.) FREOL S-83 or SUNISO 5GS 160 ¹²⁰ / ₀ (9.8 ¹¹² / ₀)
V belt size	mm (in.) <DOHC>: 1150 (45.3), <SOHC>: 940 (37.0)
Dual pressure switch	
High pressure switch	kPa (kg/cm ² , psi) OFF: 2,700 (27, 384) ON: 2,100 (21, 299)
Low pressure switch	kPa (kg/cm ² , psi) OFF: 210 (2.1, 30) ON: 235 (2.35, 33)
Freezer prevention	°C (°F) Fin thermo sensor
	OFF: 3.2 (37.8) ON: 4.2 (39.6)
Fusible plug	°C (°F) Burn out temperature 105 (221)
Refrigerant and quantity	g (oz) R-12 MAX. 950 (34)

SERVICE SPECIFICATIONS

E55CB--

Items	Specifications
Standard value	
Engine coolant-temperature switch*1	°C (°F)
For radiator fan	ON: 82–88 (180–190) OFF: 78 (172) or less
For condenser fan	ON: 96–104 (205–219) OFF: 92 (198) or less
Idle speed	r/min 700 ± 100
Idle up speed	r/min 900 ± 100
Heater control panel	kΩ
Blower switch resistance	Blower speed (MIN): 2 ± 10% Blower speed (MAX): 0.25
Temperature control switch resistance	MAX COOL position: 0.275 MAX HOT position: ∞
Mode changeover switch resistance	FOOT mode: 0.33 ± 5% FOOT/DEF. mode: 1 ± 5% FACE/FOOT mode: 3.3 ± 5%
Potentiometer assembly for air-mixing damper	kΩ MAX. HOT position: approx. 0.2 MAX. COOL position: approx. 4.9
Potentiometer assembly for air outlet changeover damper	kΩ DEF. position: approx. 2.0 FACE position: approx. 4.3
Engine coolant temperature switch (air conditioner cut) <Vehicles with air conditioner>*1	°C (°F) OFF: 108–115 (226–239)

NOTE

*1 : <Vehicles built up to October, 1992>

LUBRICANTS

E55CD--

<Vehicles using R-12 refrigerant>

Items	Specified lubricants	Quantity
Each connection of refrigerant line Compressor refrigerant unit cc (cu.in.) lubricant	FREOL S-83 or SUNISO 5GS	As required 160^{+20}_0 ($9.8^{+1.2}_0$)

<Vehicles using R-134a refrigerant>

Items	Specified lubricants	Quantity
Each connection of refrigerant line Compressor refrigerant unit cc (cu.in.) lubricant	SUN PAG 56	As required 170^{+20}_0 ($10.4^{+1.2}_0$)

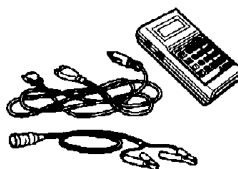
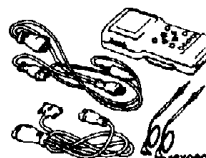
SEALANT

E55CE--

Items	Specified sealant	Characteristics
Engine coolant temperature switch threaded part	3M Nut Locking Part No. 4171 or equivalent	Drying sealant

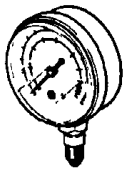
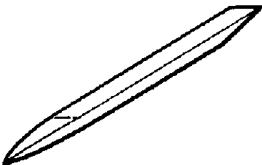
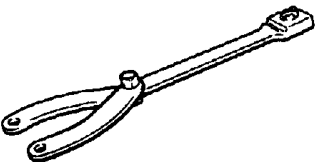
SPECIAL TOOLS

E55DA--

Tool	Number	Name	Use
	MB991341	Multi-use tester sub-assembly	Up to 1993 models Inspection of fully automatic air conditioner or heater
	(For the number, refer to GROUP 00 – Precautions Before Service.)		
	MB991502	MUT-II	All models Inspection of fully automatic air conditioner or heater
 16X0607	ROM pack		

16X0607

55-4 HEATER, AIR CONDITIONER AND VENTILATION – Special Tools/Troubleshooting

Tool	Number	Name	Use
	MB991402	Vacuum gauge	Vacuum check <Vehicles with air conditioner>
	MB991403 (For high pressure) MB991404 (For low pressure)	Adaptor valve	Supplying refrigerant gas Replenishing refrigerant gas Draining refrigerant gas Function test <Vehicles with air conditioner>
	MB990784	Ornament remover	Removal of photo sensor <Vehicles with air conditioner> Removal of passenger compartment temperature sensor Removal of defroster garnish
	MB991367	Special spanner	Removal and installation of armature mounting nut of compressor <Vehicles with air conditioner>
	MB991386	Pin	

TROUBLESHOOTING

E55EAA0

TROUBLESHOOTING PROCEDURE

- (1) Check that the air ducts and rods are not off.
- (2) Using the Multi-Use Tester <Up to 1993 models> or MUT-II <All models>, check diagnosis outputs. If failure code is being output, check the failing system and repair as necessary. (Refer to P.55-19.)
- (3) If the diagnosis outputs are normal, check for terminal voltage or continuity with a circuit tester according to the troubleshooting chart by symptom. (Refer to control unit terminal voltage list on P.55-10.)
- (4) In carrying out the troubleshooting procedure, first look up the Troubleshooting Quick-Reference Chart to know the inspection items and then start the inspection procedure detailed in the following pages.
- (5) When checking components, be sure to disconnect the connectors first.

TROUBLESHOOTING QUICK-REFERENCE CHART

Symptom		Inspection item																											
		Fuse	Harness (incl. connectors)	Compressor relay	Magnetic clutch	Sensors	Water temperature switch	Pressure switch	Air-conditioner control panel	Amount of refrigerant	Receiver	Expansion valve	Compressor	Thermostat	Belt lock controller <DOHC>	Air conditioner control unit	MPI control unit	Diagnosis outputs	Air mix damper motor and potentiometer	Heater link	Heater relay	Power transistor	Blower motor	Blower motor relay	Inside/outside air selector damper motor	Outlet selector damper motor/potentiometer	Condenser fan relay	Resistor	Condenser fan motor
1	Air conditioner does not operate when the ignition switch in the ON position.	①	②	③	④		⑥	⑦	⑧					⑤	⑩		⑪	⑫											
2	Interior temperature does not raise even the air conditioner is operating (No warm air coming out)			⑤		②			⑥							⑦		⑫	①	③	④								
3	Interior temperature does not lower even the air conditioner is operating (No cold air coming out)	①	④	⑤	⑬	⑪	⑫		⑭	⑥	⑦	⑧	⑨	⑩		⑮		②	③										
4	Blower motor does not rotate.	①	④						⑥							⑦					②	③	⑤						
5	Blower motor does not stop rotating.		③						④							⑤						②		①					
6	Inside/outside-air selector damper does not operate		②						③							④									①				
7	Outlet selector damper does not operate		③						④							⑤		①								②			
8	Condenser fan does not operate when the air conditioner is activated	①																									②	③	④
9	Air conditioner colour monitor cannot be displayed.*		①						②							③													
10	Set temperature returns to 25°C (122°F) when the ignition switch is turned ON and OFF.	①	②																										

NOTE

- (1) ○ indicates the component requiring inspection (Numbers in ○ are the priority order)
 (2) Use an analog voltmeter to check the control unit
 (3) * <Vehicles built from November, 1992>

55-6 HEATER, AIR CONDITIONER AND VENTILATION – Troubleshooting

No.	Trouble symptom	Problem cause	Remedy	Reference page
1	When the ignition switch is "ON", the air conditioner does not operate.	Broken wire in the power circuit harness.	Repair the harness.	–
		Compressor relay in the relay box is defective.	Replace.	–
		Magnetic clutch is defective.	Replace.	P.55-55
		Thermostat is defective.	Replace.	P.55-55
		Coolant temperature switch to cut-off air conditioner is defective.	Replace.	P.55-45
		Dual pressure switch is defective.	Replace.	P.55-61
		Refrigerant leak.	Replenish the refrigerant, and repair the leak.	–
		Excess refrigerant.	Extract some of the refrigerant.	–
		Air conditioner control panel is defective.	Replace the air conditioner control panel.	P.55-38
		Belt lock controller is defective <DOHC>.	Replace the belt lock controller.	P.55-40
		Air conditioner control unit is defective.	Replace the air conditioner control unit.	P.55-40
		MPI control unit is defective.	Replace the MPI control unit.	–
2	When the air conditioner is operating, temperature inside the passenger compartment doesn't increase (hot air is not emitted).	Passenger compartment temperature sensor input circuit is defective	Check the diagnosis output. Replace the defective component.	P.55-18
		Air-mixing damper potentiometer input circuit is defective.		
		Air-mixing damper drive motor is defective.	Replace the air-mixing damper drive motor.	P.55-42
		Air-mixing damper drive motor lever and air-mixing damper connection is defective.	Repair the connection.	–
		Air-mixing damper is stuck.	Repair the air-mixing damper.	–
		Broken harness wire between the air-mixing damper drive motor and the air conditioner control unit	Repair the harness.	–
		Air conditioner control panel is defective.	Replace the air conditioner control panel.	P.55-38
		Air conditioner control unit is defective.	Replace the air conditioner control unit.	P.55-40

No.	Trouble symptom	Problem cause	Remedy	Reference page
3	When the air conditioner is operating, temperature inside the passenger compartment doesn't decrease (cool air is not emitted).	Passenger compartment temperature sensor input circuit is defective.	Check the diagnosis output. Replace the defective component.	P.55-18
		Air inlet sensor input circuit is defective.		
		Fin thermo sensor input circuit defective.		
		Air-mixing damper potentiometer input circuit is defective.		
		Air-mixing damper drive motor is defective.	Replace the air-mixing damper driver motor.	P.55-42
		Air-mixing damper drive motor lever and air-mixing damper connection is defective.	Repair the connection.	–
		Air-mixing damper is stuck.	Repair the air-mixing damper.	–
		Broken harness wire between the air-mixing damper drive motor and the air conditioner control unit.	Repair the harness.	–
		Compressor relay in the relay box is defective.	Replace	–
		Refrigerant leak.	Replenish the refrigerant and repair the leak	–
		Excess refrigerant	Extract some of the refrigerant.	–
		Receiver is blocked.	Replace the receiver.	P.55-61
		Expansion valve is blocked.	Replace the expansion valve.	P.55-49
		Compressor is defective.	Replace the compressor.	P.55-51
		Thermostat is defective.	Replace the thermostat.	P.55-55
		Revolution pick-up sensor is defective. <DOHC>	Replace the revolution pick-up sensor.	P.55-55
		Magnetic clutch is defective.	Replace	P.55-55
		Belt lock controller is defective. <DOHC>	Replace the belt lock controller.	P.55-40
		Air conditioner control panel is defective	Replace the air conditioner control panel.	P.55-38
		Air conditioner control unit is defective.	Replace the air conditioner control unit.	P.55-40

55-8 HEATER, AIR CONDITIONER AND VENTILATION – Troubleshooting

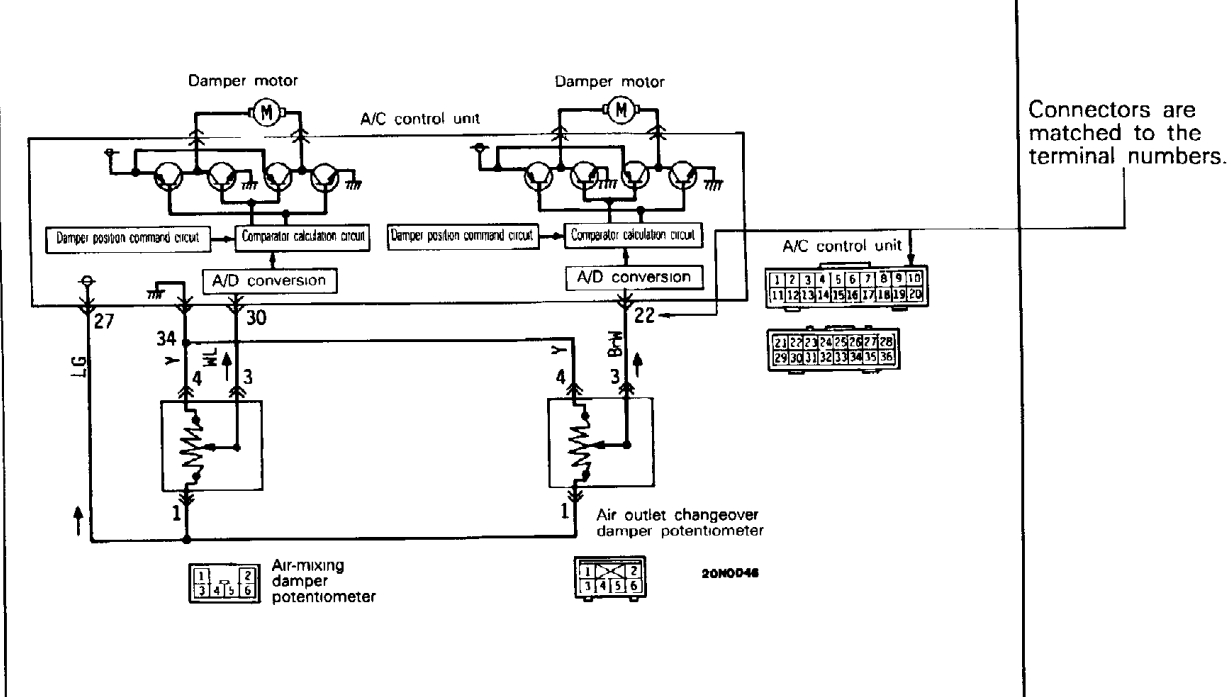
No.	Trouble symptom	Problem cause	Remedy	Reference page
4	Blower motor doesn't turn.	Heater relay is defective.	Replace the heater relay.	–
		Temperature fuse in the power transistor is blown.	Replace the power transistor.	P.55-40
		Broken harness wire between the fuse and the heater relay.	Repair the harness.	–
		Broken harness wire between the heater relay and the blower motor.		
		Broken harness wire between the power transistor and the air conditioner control unit.		
		Blower motor is defective.	Replace the blower motor.	P.55-47
		Air conditioner control panel is defective.	Replace the air conditioner control panel.	P.55-38
		Air conditioner control unit is defective.	Replace the air conditioner control unit.	P.55-40
5	Blower motor doesn't stop turning.	Blower motor relay is defective.	Replace the blower motor HI relay.	–
		Power transistor is defective.	Replace the power transistor.	P.55-40
		Shorted harness between the blower motor relay, power transistor and air conditioner control unit	Repair the harness.	–
		Air conditioner control panel is defective.	Replace the air conditioner control panel.	P.55-38
		Air conditioner control unit is defective.	Replace the air conditioner control unit.	P.55-40
6	Inside/outside air changeover damper does not operate.	Inside/outside air changeover damper motor is defective.	Replace the inside/outside air changeover drive motor.	P.55-42
		Linkage between inside/outside air changeover drive motor and inside/outside air changeover damper is defective.	Repair the linkage.	–
		Inside/outside air changeover damper operation is defective.	Repair the inside/outside air changeover damper.	–
		Broken harness wire between the inside/outside air changeover motor and the air conditioner control unit	Repair the harness.	–
		Air conditioner control panel is defective.	Replace the air conditioner control panel	P.55-38
		Air conditioner control unit is defective.	Replace the air conditioner control unit.	P.55-40

No.	Trouble symptom	Problem cause	Remedy	Reference page
7	Air outlet changeover damper does not operate.	Air outlet changeover damper potentiometer input circuit is defective.	Check the diagnosis output. Replace the defective component.	P.55-18
		Air outlet changeover drive motor is defective.	Replace the air outlet changeover drive motor.	P.55-42
		Linkage between air outlet changeover drive motor and air outlet changeover damper assembly is defective.	Repair the linkage.	—
		Malfunction in the DEF.FACE and FOOT damper	Repair the DEF.FACE and FOOT damper.	—
		Broken harness wire between the air outlet changeover motor and the air conditioner control unit	Repair the harness.	—
		Air conditioner control panel is defective	Replace the air conditioner control panel.	P.55-38
8	When the air conditioner is operating, condenser fan does not turn.	Air conditioner control unit is defective.	Replace the air conditioner control unit	P.55-40
		Condenser fan motor relay is defective.	Replace the power relay.	Group 14
		Resistor is defective.	Replace the resistor.	P.55-59
9	Air conditioner colour monitor cannot be displayed. <Vehicles built from November, 1992>	Condenser fan motor is defective.	Replace the condenser fan motor.	P.55-59
		Air conditioner control panel is defective	Replace the air conditioner control panel.	P.55-39-1
		Open-circuit of the harness between the air conditioner control panel and the air conditioner control unit	Repair the harness.	—
		Air conditioner control unit is defective	Replace the air conditioner control unit	P.55-40
10	When the ignition switch is "ON" or "OFF", set temperature returns to 25°C (122°F).	Rheostat is defective	Replace the rheostat.	Group 54
		Broken harness wire in the power circuit	Repair the harness.	—
		Air conditioner control unit is defective.	Replace the air conditioner control unit.	P.55-40

READING THE "CIRCUIT AND UNIT CHECK"

E56EDAA

2. Inspection of potentiometer circuit



Troubleshooting Hints

- Diagnosis
 - No. 31 (Fix air mix damper at MAX. HOT position. However, fix at MAX. COOL position only when setting MAX. COOL.)
 - No. 32 (Fix outlet selector damper at FACE position. However, fix at FACE position only when setting FACE mode)
- Air conditioner control unit terminal voltages

Shows the diagnosis output code number and the system condition when the code is output

Terminal No	Signal name	Condition	Terminal voltage
30	Air mix damper potentiometer (input)	Air mix damper at MAX. COOL position	0.1–0.3V
		Air mix damper at MAX. HOT position	4.7–5.0V
22	Outlet selector damper potentiometer (input)	Outlet selector damper at FACE position	0.1–0.5V
		Outlet selector damper at DEF. position	4.7–5.0V
27	Air mix damper and outlet selector damper potentiometer (–)	Normally	0V
34	Sensor power source	Normally	4.8–5.2V

Shows the terminal number inspected

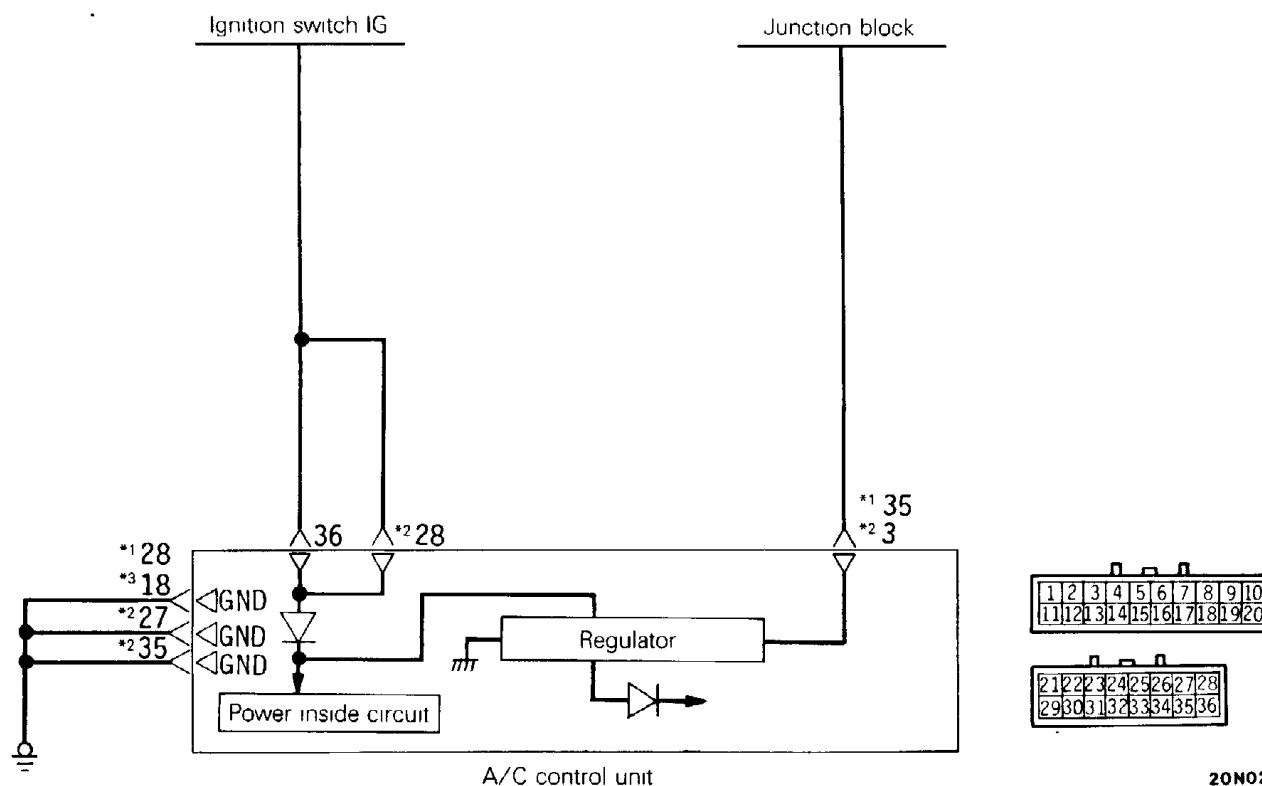
Shows the condition when the terminal is inspected.

Shows the specifications that are the acceptable diagnosis standard. Especially when the condition in the column is not registered, the normal specifications are registered.

CIRCUIT AND BENCH CHECK

E55EEAA

1. Inspection of air conditioner control unit power source circuit



NOTE

- *1 · <Vehicles built up to October, 1992>
- *2 · <Vehicles built from November, 1992>
- *3 · <SOHC built from November, 1992>

Troubleshooting Hints

Air conditioner control unit terminal voltage

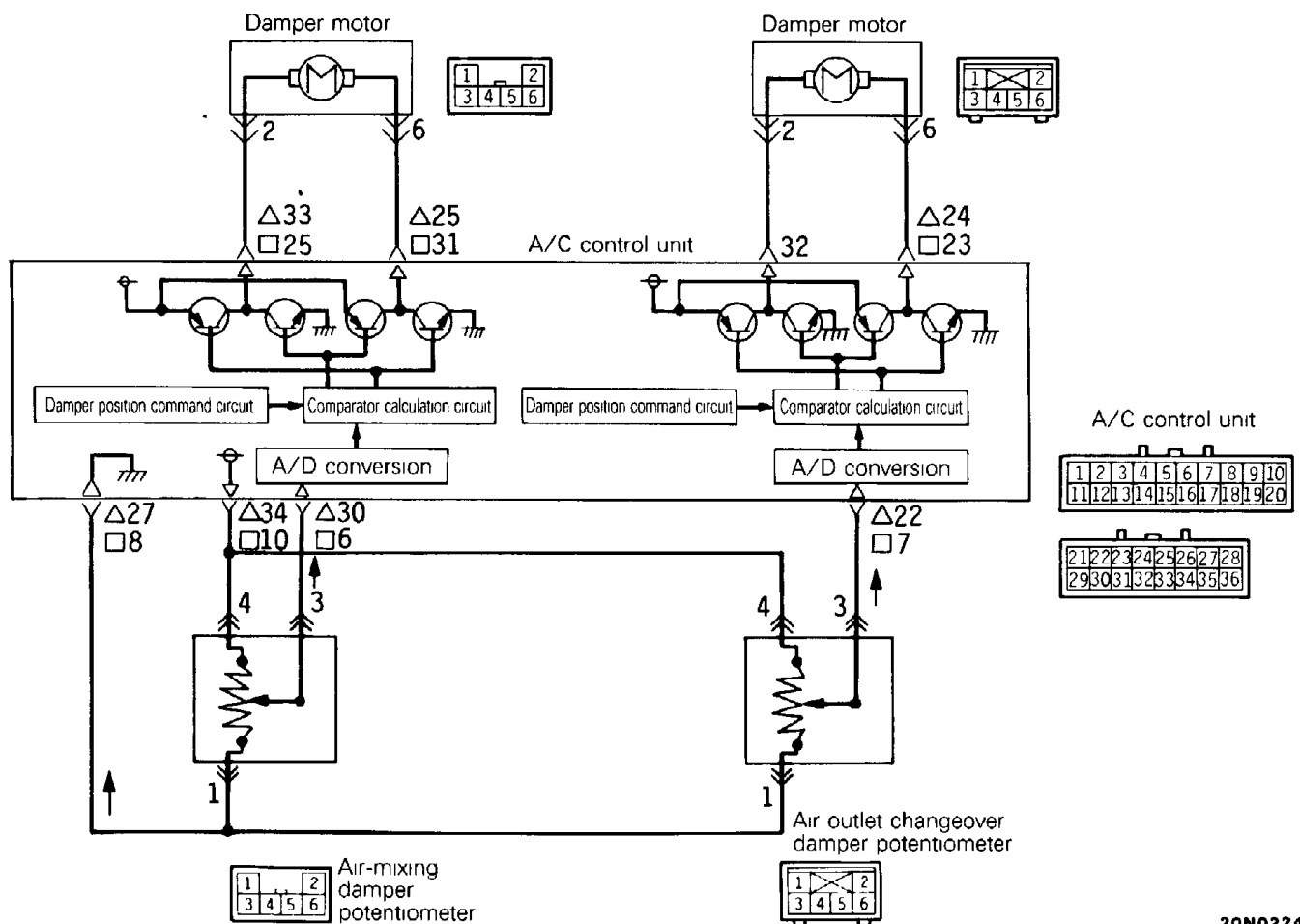
Terminal No.	Signal name	Condition	Terminal voltage
35*1 or 3*2	Back up power source	Normally	System voltage
36 and 28*2	A/C control unit power source	Ignition switch ON	System voltage
28*1 or 18*3	A/C control unit earth	Normally	0V
27*2 and 35*2	A/C control unit earth	Normally	0V

NOTE

- *1 · <Vehicles built up to October, 1992>
- *2 · <Vehicles built from November, 1992>
- *3 · <SOHC built from November, 1992>

55-12 HEATER, AIR CONDITIONER AND VENTILATION – Troubleshooting

2. Inspection of potentiometer circuit



20N0224

Troubleshooting Hints

- Diagnosis
 No. 31 (Fix air mix damper at MAX. HOT position. However, fix at MAX. COOL position only when setting MAX. COOL.)
 No. 32 (Fix outlet selector damper at FACE position. However, fix at FACE position only when setting FACE mode.)
- Air conditioner control unit terminal voltages

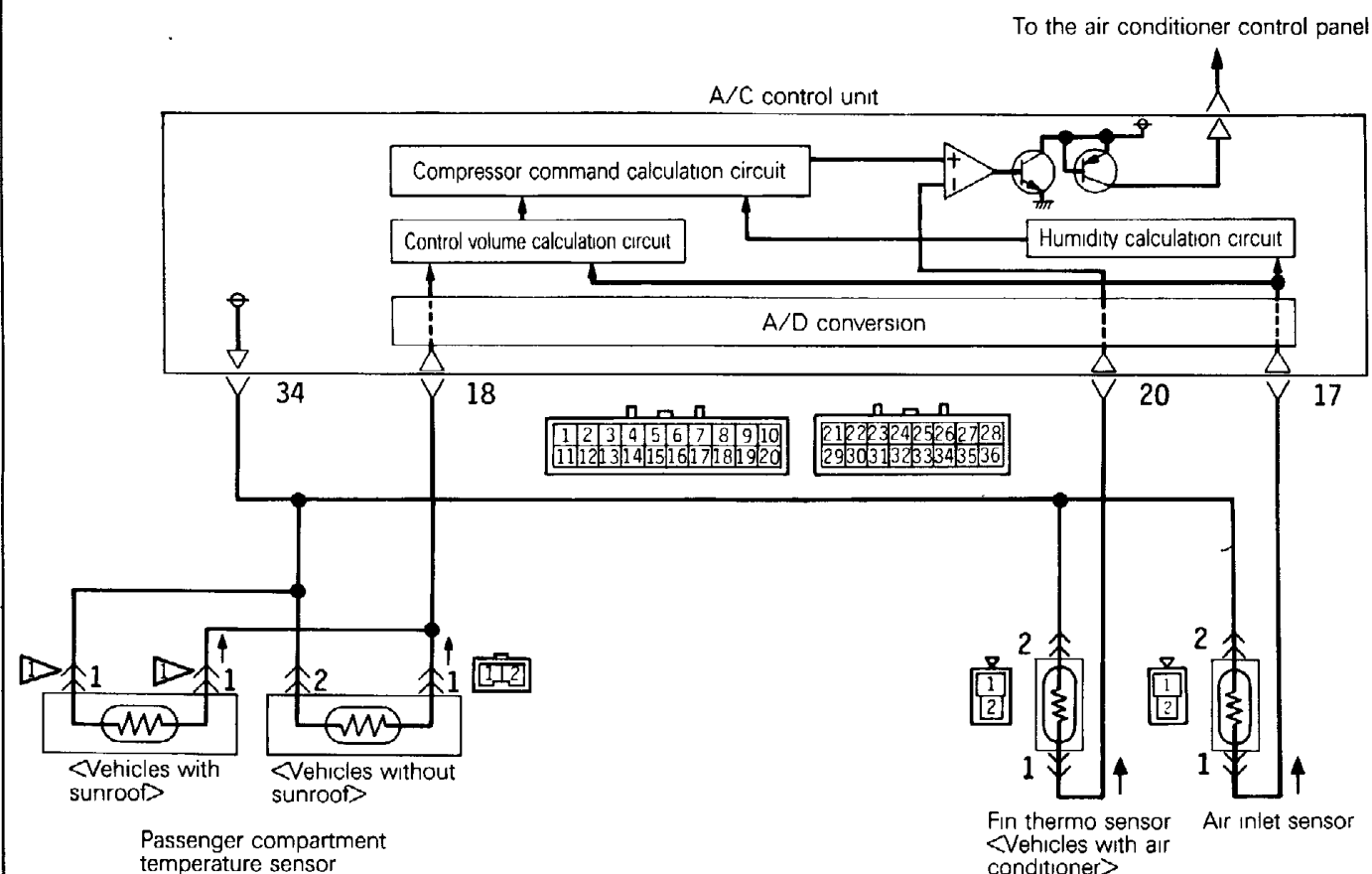
Terminal No.	Signal name	Condition	Terminal voltage
30*1 or 6*2	Air mix damper potentiometer (input)	Air mix damper at MAX. COOL position	0.1 – 0.3V
		Air mix damper at MAX. HOT position	4.7 – 5.0V
22*1 or 7*2	Air outlet changeover damper potentiometer (input)	Air outlet changeover damper at FACE position	0.1 – 0.5V
		Air outlet changeover damper at DEF. position	4.7 – 5.0V
27*1 or 8*2	Air mix damper and air outlet changeover damper potentiometer (–)	Normally	0V
34*1 or 10*2	Sensor power source	Normally	4.8 – 5.2V

NOTE

*1 : <Vehicles built up to October, 1992>
 *2 : <Vehicles built from November, 1992>

3. Inspection of passenger compartment temperature sensor, air inlet sensor, outside thermo sensor, and fin thermo sensor <Vehicles with air conditioner> circuits

<Vehicles built up to October, 1992>



20N0245

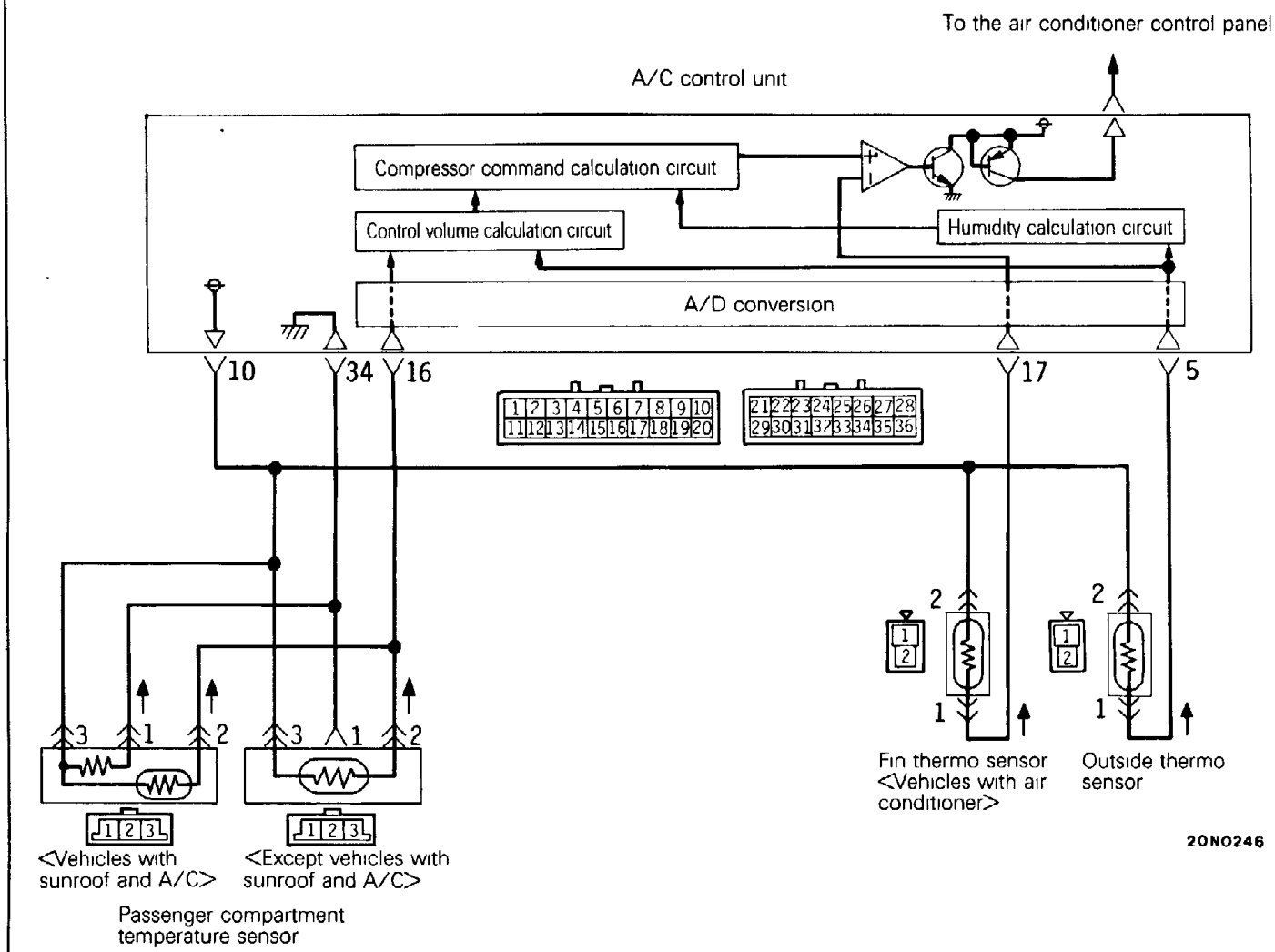
Troubleshooting Hints

- Diagnosis
 - No. 11, 12 [Fix passenger compartment temperature sensor input signal at 25°C (77°F).]
 - No. 13, 14 [Fix air inlet sensor input signal at 20°C (68°F).]
 - No. 21, 22 [Fix fin thermo sensor input signal at -2°C (28°F).] <Vehicles with air conditioner>
- Air conditioner control unit terminal voltages.

Terminal No.	Signal name	Condition	Terminal voltage
17	Air inlet sensor	Temperature at sensor 25°C (77°F) (4 kΩ)	2.3–2.6V
34	Sensor power source	Normally	4.8–5.2V
18	Passenger compartment temperature sensor	Temperature at sensor 25°C (77°F) (4 kΩ)	2.5–2.7V
20	Fin thermo sensor <Vehicles with air conditioner>	Temperature at sensor 25°C (77°F) (4 kΩ) when air conditioner is OFF	2.5–2.7V

55-13-1 HEATER, AIR CONDITIONER AND VENTILATION – Troubleshooting

<Vehicles built from November, 1992>

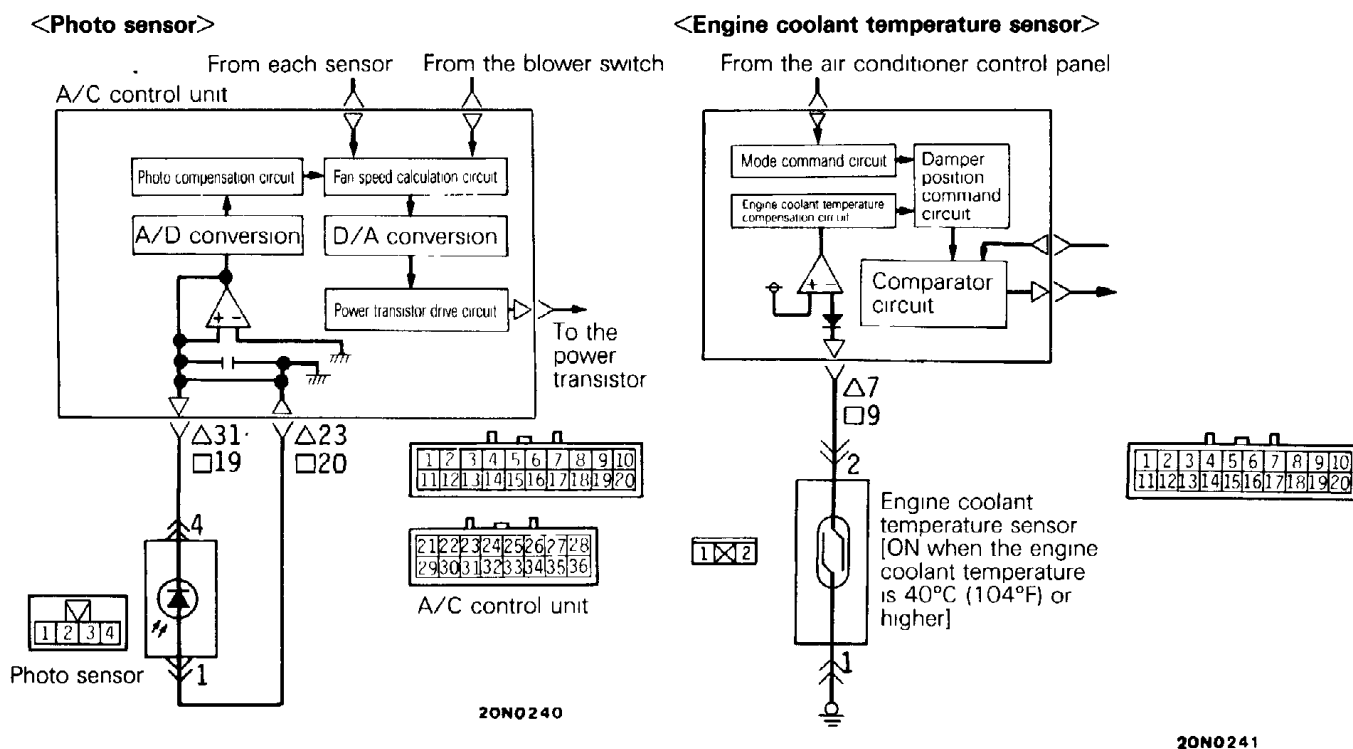


Troubleshooting Hints

- **Diagnosis**
 No. 11, 12 [Fix passenger compartment temperature sensor input signal at 25°C (77°F)]
 No. 13, 14 [Fix outside thermo sensor input signal at 20°C (68°F).]
 No. 21, 22 [Fix fin thermo sensor input signal at -2°C (28°F).] <Vehicles with air conditioner>
- **Air conditioner control unit terminal voltages.**

Terminal No.	Signal name	Condition	Terminal voltage
5	Outside thermo sensor	Temperature at sensor 25°C (77°F) (4 kΩ)	2.3–2.6V
10	Sensor power source	Normally	4.8–5.2V
16	Passenger compartment temperature sensor	Temperature at sensor 25°C (77°F) (4 kΩ)	2.5–2.7V
17	Fin thermo sensor <Vehicles with air conditioner>	Temperature at sensor 25°C (77°F) (4 kΩ) when air conditioner is OFF	2.5–2.7V

4. Inspection of photo sensor <Vehicles with air conditioner> and engine coolant temperature sensor circuits



Troubleshooting Hints

Air conditioner control unit terminal voltages

Terminal No.	Signal name	Condition	Terminal voltage
23*1 or 20*2	Photo sensor (–) <Vehicles with air conditioner>	Normally	0V
31*1 or 19*2	Photo sensor (+) <Vehicles with air conditioner>	Illuminance 100,000 lux or more	–0.1 to –0.2V
		Illuminance less than 0 lux	0V
7*1 or 9*2	Engine coolant temperature sensor (+)	Switch OFF [Engine coolant temperature less than 40°C (104°F)]	1.2V
		Switch ON [Engine coolant temperature 40°C (104°F) or higher]	0V

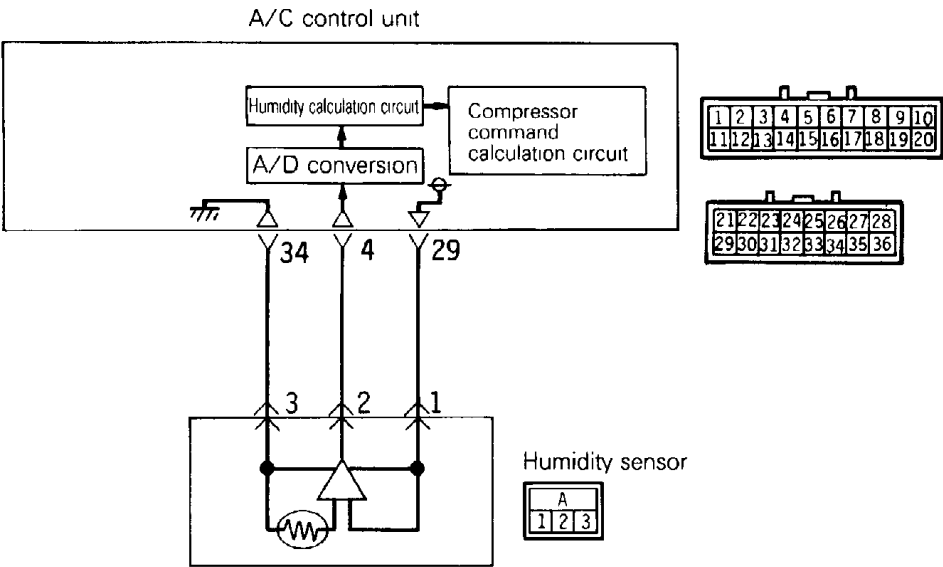
NOTE

*1 : <Vehicles built up to October, 1992>

*2 : <Vehicles built from November, 1992>

55-14 HEATER, AIR CONDITIONER AND VENTILATION – Troubleshooting

5. Inspection of humidity sensor circuit <Vehicles built from November, 1992>



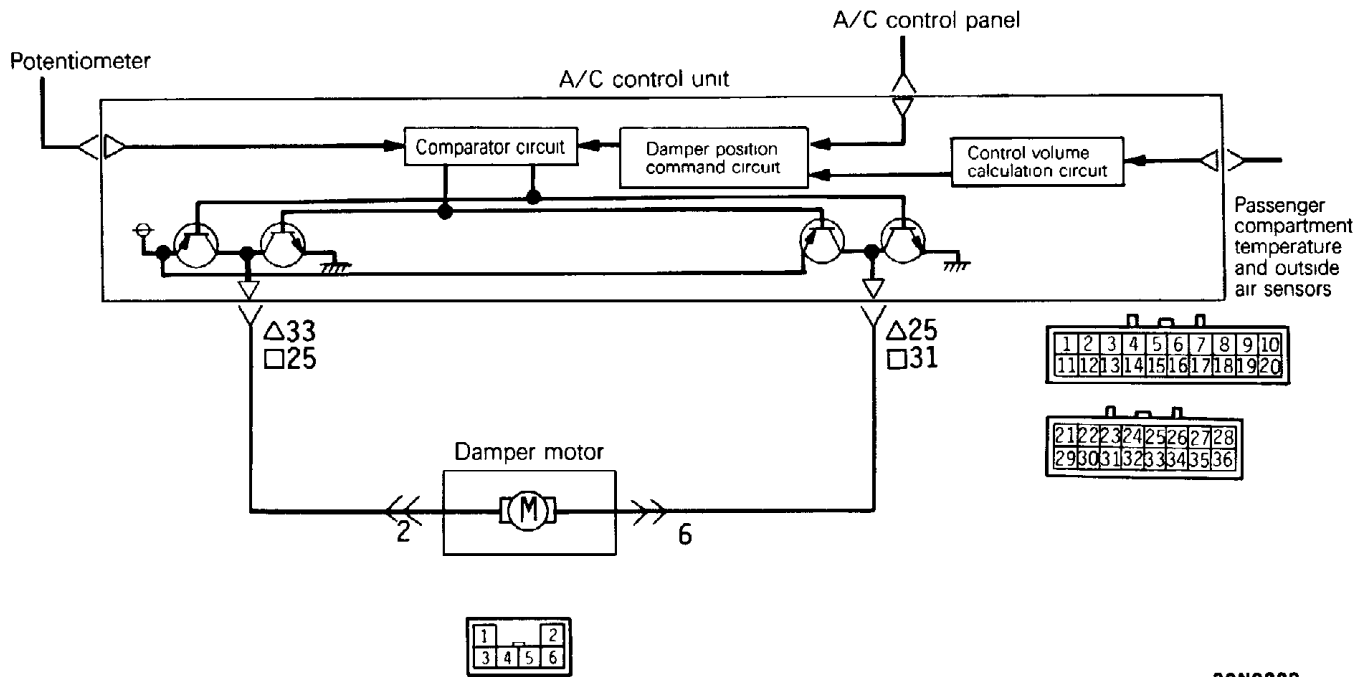
Troubleshooting Hints

Air conditioner control unit terminal voltage

Terminal No.	Signal name	Condition	Terminal voltage
4	Sensor input	Normally	4.8–5.2V
29	Humidity sensor (+)	Humidity 50 %	2–2.4V
34	Humidity sensor (–)	Normally	0V

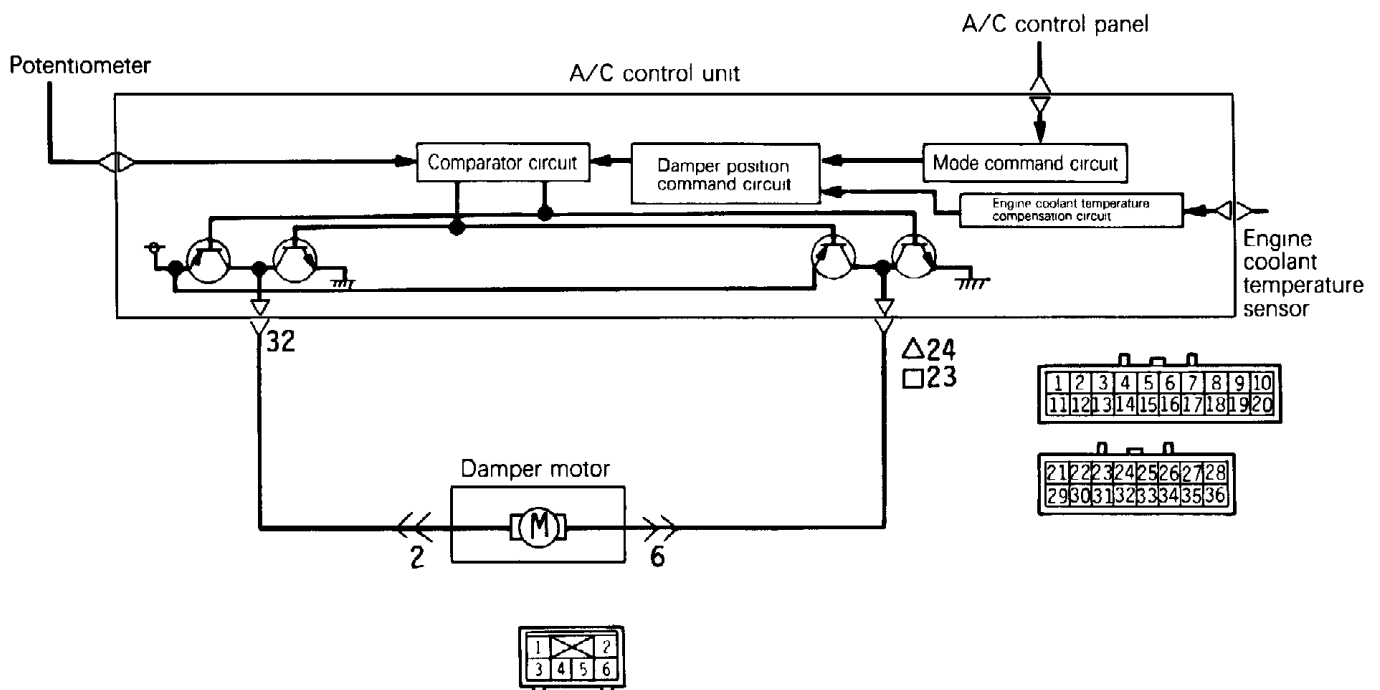
6. Inspection of air mix damper, outlet selector damper circuits

<Air-mixing damper motor>



20N0220

<Air outlet changeover damper motor>



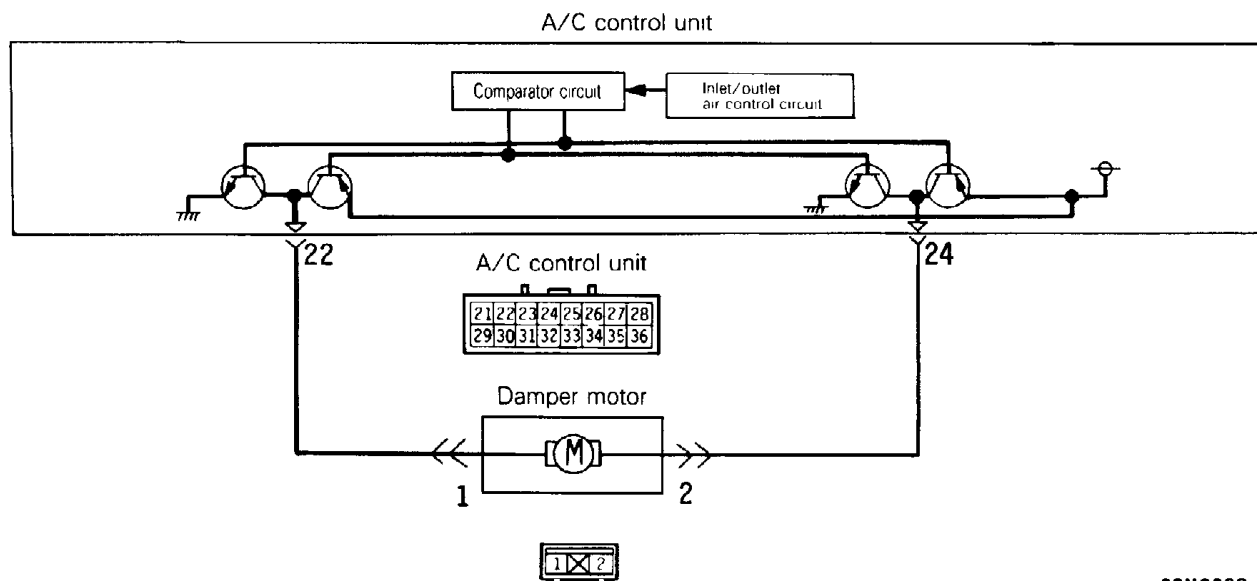
20N0215

NOTE

- △: <Vehicles built up to October, 1992>
- : <Vehicles built from November, 1992>

55-16 HEATER, AIR CONDITIONER AND VENTILATION – Troubleshooting

<Inlet/outlet air changeover damper motor (Vehicles built from November, 1992)>



Troubleshooting Hints

Air conditioner control unit terminal voltages

Terminal No.	Signal name	Condition	Terminal voltage
24* ²	Inlet/outlet air changeover damper motor (–)	Inlet air circulation switch: ON (Output turns OFF 40 seconds after the damper moved to inlet air circulation position)	0.5V
		Outlet air introduction switch. ON (Output turns OFF 40 seconds after the damper moved to outlet air introduction position)	10 to system voltage
24* ¹ or 23* ²	Outlet selector damper motor (–)	FACE switch ON (Output turns OFF 40 seconds after the damper moved to FACE position)	0.5V
		DEF switch ON (Output turns OFF 40 seconds after the damper moved to DEF position)	10 to system voltage
25* ¹ or 31* ²	Air mix damper motor (–)	Temperature is set at 17°C (62.6°F) (Output turns OFF 40 seconds after the damper moved to MAX. COOL position.)	10 to system voltage
		Temperature is set at 32.5°C (90.5°F) (Output turns OFF 40 seconds after the damper moved to MAX. HOT position.)	0.5V

NOTE

*¹: <Vehicles built up to October, 1992>

*²: <Vehicles built from November, 1992>

HEATER, AIR CONDITIONER AND VENTILATION – Troubleshooting 55-16-1

Terminal No.	Signal name	Condition	Terminal voltage
22*2	Inlet/outlet air changeover damper motor (+)	Inlet air circulation switch: ON (Output turns OFF 40 seconds after the damper moved to inlet air circulation position)	10 to system voltage
		Outlet air introduction switch: ON (Output turns OFF 40 seconds after the damper moved to outlet air introduction position)	0.5V
32	Outlet selector damper drive motor (+)	FACE switch ON (Output turns OFF 40 seconds after the damper moved to FACE position.)	10 to system voltage
		DEF. switch ON (Output turns OFF 40 seconds after the damper moved to DEF. position.)	0.5V
33*1 or 25*2	Air mix damper drive motor (+)	Temperature is set at 17°C (62.6°F). (Output turns OFF 40 seconds after the damper moved to MAX. COOL position.)	0.5V
		Temperature is set at 32.5°C (90.5°F). (Output turns OFF 40 seconds after the damper moved to MAX. HOT position.)	10 to system voltage

NOTE

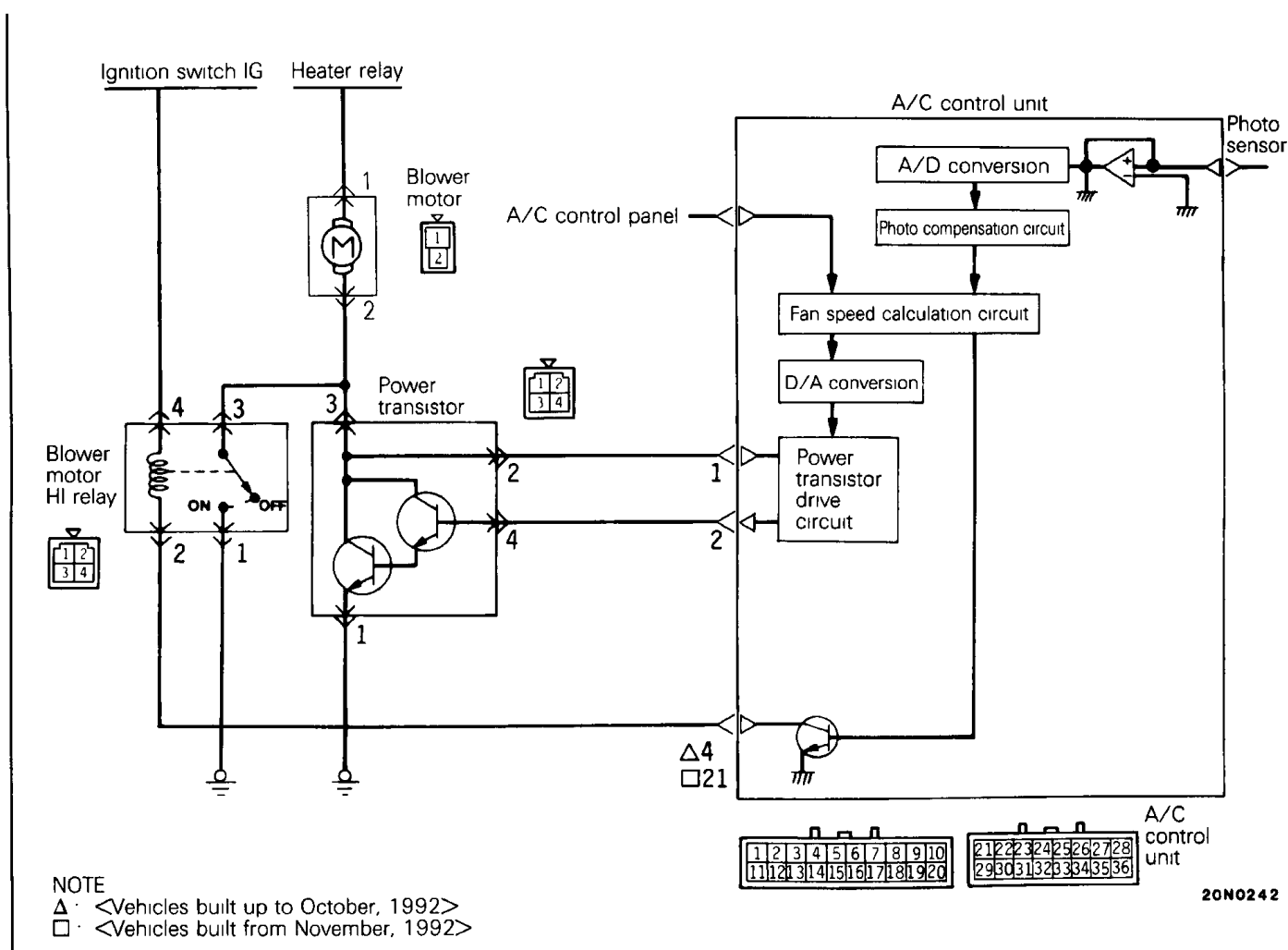
*1 : <Vehicles built up to October, 1992>

*2 : <Vehicles built from November, 1992>

55-16-2

NOTES

6. Inspection of power transistor and blower motor relay circuits



Troubleshooting Hints

Air conditioner control unit terminal voltages

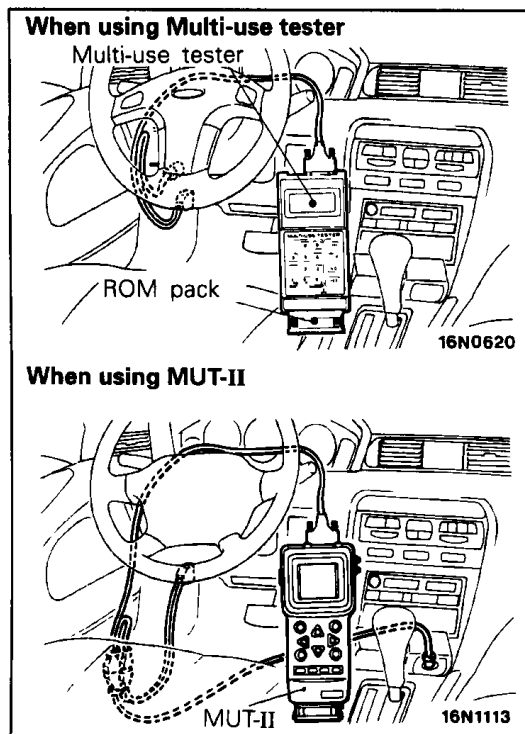
Terminal No.	Signal name	Condition	Terminal voltage
1	Power transistor collector	Switch is turned OFF.	System voltage
		Switch is placed in LO.	Approx. 7V
		Switch is placed in HI.	0
2	Power transistor base	Blower switch is turned OFF.	0
		Blower switch is placed in LO.	Approx. 1.3V
		Blower switch is placed in HI.	Approx. 1.2V
4*1 or 21*2	Blower motor relay	Fan switch H is ON.	1.5V or less
		Fan switch in M, L, or OFF.	System voltage

NOTE

*1 : <Vehicles built up to October, 1992>

*2 : <Vehicles built from November, 1992>

55-18 HEATER, AIR CONDITIONER AND VENTILATION – Troubleshooting



SELF-DIAGNOSIS CHECKING

Caution

Connection and disconnection of the multi-use tester <Up to 1993 models> or MUT-II <All models> should always be made with the ignition switch in the OFF position.

- (1) Check the self-diagnosis codes.
- (2) After the malfunction has been repaired, erase the self-diagnosis codes.
- (3) Recheck the self-diagnosis codes, and make sure that the self-diagnosis codes are normal.

CHECKING WITH THE MULTI-USE TESTER (MUT) OR MUT-II

Inspection item	Inspection		Probable cause of malfunction or remedy
	Inspection conditions	Normal diagnosis value	
Passenger compartment temperature sensor MUT or MUT-II (11)	Ignition switch: "ON"	Passenger compartment temperature and multi-use display temperature are the same.	Passenger compartment temperature sensor or related circuitry is defective.
Air inlet sensor*1 Outside thermo sensor*2 MUT or MUT-II (13)	Ignition switch: "ON"	Atmospheric temperature and multi-use display temperature are the same.	Passenger outside air sensor or related circuitry is defective.
Air-mixing damper potentiometer MUT or MUT-II (31)	Ignition switch: "ON"	Damper position	Air-mixing damper potentiometer or related circuitry is defective.
		MAX. HOT	
		MAX. COOL	
Air outlet changeover damper potentiometer MUT or MUT-II (32)	Ignition switch: "ON"	Damper position	Air outlet changeover damper potentiometer or related circuitry is defective.
		FACE	
		FOOT	
		FOOT/DEF.	
		DEF.	

NOTE

*1 : <Vehicles built up to October, 1992>

*2 : <Vehicles built from November, 1992>

DIAGNOSIS DISPLAY CODES

Code No.	Cause	Fail safe
0	Normal	–
11	Open-circuited passenger compartment temperature sensor	Condition in which 25°C (77°F) is detected
12	Short-circuited passenger compartment temperature sensor	
13	Open-circuited air inlet sensor*1 or Outside thermo sensor*2	Condition in which 20°C (68°F) is detected
14	Short-circuited air inlet sensor*1 or Outside thermo sensor*2	
21	Open-circuited fin thermo sensor <Vehicles with air conditioner>	Condition in which –2°C (28°F) is detected
22	Short-circuited fin thermo sensor <Vehicles with air conditioner>	
31	Open-circuited and short-circuited air mix damper potentiometer	MAX. HOT Becomes MAX. COOL only when MAX. COOL is set.
32	Open-circuited and short-circuited mode selector damper potentiometer	DEF. Becomes FACE only when FACE mode is set.
41	Defective air mix damper motor	–
42	Defective mode selector damper motor	–

NOTE

- (1) If two or more abnormal conditions occur at the same time, the code numbers are alternately displayed, in order, repeatedly.
- (2) The nature of the malfunction is entered and stored in the memory from the time the malfunction occurs until the ignition switch is next turned to OFF.
- (3) *1 : <Vehicles built up to October, 1992>
- (4) *2 : <Vehicles built from November, 1992>

55-20 HEATER, AIR CONDITIONER AND VENTILATION – Troubleshooting

SERVICE DATA

Item No.	Inspection location	Inspection point	Diagnosis		Problem cause	Remedy
			Normal	Abnormal		
11	Passenger compartment temperature sensor	Measure the sensor resistance when the passenger compartment temperature is 25°C (77°F).	Approx. 4kΩ	Outside approx 4kΩ	Passenger compartment temperature sensor is defective	Replace the passenger compartment temperature sensor.
		Measure the voltage between the air conditioner control unit terminal ⑬* ¹ or ⑬* ² and the earth when the passenger compartment temperature is 25°C (77°F)	Within the range of approx 2.3–2.9V	–	Broken harness wire between the passenger compartment temperature sensor and the air conditioner control unit.	Repair the harness.
			–	Outside the range of approx 2.3–2.9V	Air conditioner control unit connector contact is defective, or air conditioner control unit is defective	Repair the connector contact or replace the air conditioner control unit.
13	Air inlet sensor* ¹ Outside thermo sensor* ²	Measure the sensor resistance when the atmospheric temperature is 25°C (77°F).	Approx 4kΩ	Outside approx. 4kΩ	Sensor is defective	Replace the sensor
		Measure the voltage between the air conditioner control unit terminal ⑦* ¹ or ⑦* ² and the earth when the atmospheric temperature is 25°C (77°F)	Within the range of approx. 2.3–2.8V	–	Broken harness wire between the sensor and the air conditioner control unit	Repair the harness
			–	Outside the range of approx 2.3–2.8V	Air conditioner control unit connector contact is defective, or air conditioner control unit is defective.	Repair the connector contact or replace the air conditioner control unit.
15	Engine coolant temperature sensor	Check the continuity in the sensor when the engine coolant temperature is 29.5°C–42.5°C (85.1°F–108.5°F)	Continuity	No continuity	Engine coolant temperature sensor is defective.	Replace the engine coolant temperature sensor.
		Measure the voltage between the air conditioner control unit terminal ⑦* ¹ or ⑦* ² and the earth when the engine coolant temperature is 29.5°C–42.5°C (85.1°F–108.5°F)	Approx. 12V	–	Broken harness wire between the engine coolant temperature sensor and the air conditioner control unit	Repair the harness.
			–	Outside approx 12V	Air conditioner control unit connector contact is defective, or air conditioner control unit is defective.	Repair the connector contact or replace the air conditioner control unit.

NOTE

*¹: <Vehicles built up to October, 1992>

*²: <Vehicles built from November, 1992>

HEATER, AIR CONDITIONER AND VENTILATION – Troubleshooting 55-21

Item No.	Inspection location	Inspection point	Diagnosis		Problem cause	Remedy
			Normal	Abnormal		
21	Fin thermo sensor <Vehicles with air conditioner>	Measure the resistance in the sensor when the sensor detected temperature is 25°C (77°F).	Approx. 4kΩ	Outside approx. 4kΩ	Fin thermo sensor is defective.	Replace the fin thermo sensor.
		Measure the voltage between the air conditioner control unit terminal ⑩* ¹ or ⑪* ² and the earth when the sensor detected temperature is 25°C (77°F)	Within the range of approx. 2.3–2.9V	—	Broken harness wire between the fin thermo sensor and the air conditioner control unit	Repair the harness
			—	Outside the range of approx. 2.3–2.9V	Air conditioner control unit connector contact is defective, or air conditioner control unit is defective	Repair the connector contact or replace the air conditioner control unit.
31	Air-mixing damper potentiometer	Refer to P.55-43			Air-mixing damper potentiometer is defective	Replace the air-mixing damper potentiometer
		Measure the voltage between the air conditioner control unit terminal ⑩* ¹ or ⑪* ² and the earth when the potentiometer is in the MAX COOL position.	Within the range of approx. 0.1–0.3V	—	Broken harness wire between the air-mixing damper potentiometer and the air conditioner control unit	Repair the harness
			—	Outside the range of approx. 0.1–0.3V	Air conditioner control unit connector contact is defective, or air conditioner control unit is defective.	Repair the connector contact or replace the air conditioner control unit.
33	Air outlet changeover damper potentiometer	Refer to P.55-43.			Air outlet changeover damper potentiometer is defective	Replace the air outlet changeover damper potentiometer.
		Measure the voltage between the air conditioner control unit terminal ⑩* ¹ or ⑪* ² and the earth when the potentiometer is in the FACE position	Within the range of approx. 0.1–0.3V	—	Broken harness wire between the air outlet changeover damper potentiometer and the air conditioner control unit	Repair the harness
			—	Outside the range of approx. 0.1–0.3V	Air conditioner control unit connector contact is defective, or air conditioner control unit is defective.	Repair the connector contact or replace the air conditioner control unit

NOTE

*¹ : <Vehicles built up to October, 1992>

*² : <Vehicles built from November, 1992>

55-22 HEATER, AIR CONDITIONER AND VENTILATION – Troubleshooting

ACTUATOR TEST

Item No.	Actuator test item	Item No.	Actuator test item
01	Blower fan motor OFF command	08	Air outlet mode FACE drive
02	Blower fan motor LO drive	09	Air outlet mode FOOT drive
03	Blower fan motor ME drive	10	Air outlet mode DEF drive
04	Blower fan motor HI drive	11	Magnetic clutch OFF command <Vehicles with air conditioner>
05	Air-mixing damper 0% drive	12	Magnetic clutch ON command <Vehicles with air conditioner>
06	Air-mixing damper 50% drive	13	Inside/outside changeover FRESH drive
07	Air-mixing damper 100% drive	14	Inside/outside changeover RECIRC drive

SAFETY PRECAUTIONS

<Vehicles using R-12 refrigerant>

R-12 refrigerant is a chlorofluoro-carbon (CFC) that can contribute to the depletion of the ozone layer in the upper atmosphere.

Ozone filters out harmful radiation from the sun. To assist in protecting the ozone layer, Mitsubishi Motors Corporation recommends that a R-12 refrigerant recycling device that meets SAE standard J1991 be used.

Contact an automotive service equipment supplier for refrigerant recycling equipment that is available in your area.

The refrigerant used in all air conditioner is R-12. It is transparent and colorless in both the liquid and vapor state. Since it has a boiling point of -29.8°C (-21.7°F) at atmospheric pressure, it will be a vapor at all normal temperatures and pressures.

The vapor is heavier than air, non-flammable, and nonexplosive. It is noncorrosive except when it is in direct contact with open flame. It is noncorrosive except when combined with water. The following precautions must be observed when handling R-12.

Caution

Wear safety goggles when servicing the refrigeration system.

R-12 evaporates so rapidly at normal atmospheric pressures and temperatures that it tends to freeze anything it contacts. For this reason, extreme care must be taken to prevent any liquid refrigerant from contacting the skin and especially the eyes. Always wear safety goggles when servicing the refrigeration part of the air conditioning system. Keep a bottle of sterile mineral oil handy when working on the refrigeration system. Should any liquid refrigerant get into the eyes, use a few drops of mineral oil to wash them out. R-12 is rapidly absorbed by the oil. Next splash the eyes with plenty of cold water. Call your doctor immediately even though irritation has ceased after treatment.

Caution

Do not heat R-12 above 52°C (125.6°F)

In most instances, moderate heat is required to bring the pressure of the refrigerant in its container above the pressure of the system when charging or adding refrigerant.

A bucket or large pan of hot water not over 52°C (125.6°F) is all the heat required for this purpose. Do not heat the refrigerant container with a blow torch or any other means that would raise temperature and pressure above this temperature. **Do not weld or steam clean on or near the system components or refrigerant lines.**

Caution

Keep R-12 containers upright when charging the system.

When metering R-12 into the refrigeration system keep the supply tank or cans in an upright position. If the refrigerant container is on its side or upside down, liquid refrigerant will enter the system and damage the compressor.

Caution

Always work in a well-ventilated room.

Good ventilation is vital in the working area. Although R-12 vapor is normally nonpoisonous contact with an open flame can cause the vapor to become very poisonous. A poisonous gas is produced when using the flame-type leak detector. Avoid inhaling the fumes from the leak detector.

Caution

Do not allow liquid refrigerant to touch bright metal.

Refrigerant will tarnish bright metal and chrome surfaces, and in combination with moisture can severely corrode all metal surfaces.

<Vehicles using R-134a refrigerant>

Because R-134a refrigerant is a hydrofluorocarbon (HFC) which contains hydrogen atoms in place of chlorine atoms, it will not cause damage to the ozone layer.

Refrigerant R-134a is transparent and colourless in both the liquid and vapour state. Since it has a boiling point of -29.8°C (-21.7°F) at atmospheric pressure, it will be a vapour at all normal temperatures and pressures. The vapour is heavier than air, non-flammable, and nonexplosive. The following precautions must be observed when handling R-134a.

Caution

Wear safety goggles when servicing the refrigeration system.

R-134a evaporates so rapidly at normal atmospheric pressures and temperatures that it tends to freeze anything it contacts. For this reason, extreme care must be taken to prevent any liquid refrigerant from contacting the skin and especially the eyes. Always wear safety goggles when servicing the refrigeration part of the A/C system. Keep a bottle of sterile mineral oil handy when working on the refrigeration system. Should any liquid refrigerant get into the eyes, use a few drops of mineral oil to wash them out. R-134a is rapidly absorbed by the oil. Next splash the eyes with plenty of cold water. Call your doctor immediately even though irritation has ceased after treatment.

Caution

Do not heat R-134a above 40°C (104°F)

In most instances, moderate heat is required to bring the pressure of the refrigerant in its container above the pressure of the system when charging or adding refrigerant.

A bucket or large pan of hot water not over 40°C (104°F) is all the heat required for this purpose. Do not heat the refrigerant container with a blow torch or any other means that would raise temperature and pressure above this temperature. Do not weld or steam clean on or near the system components or refrigerant lines.

Caution

Keep R-134a containers upright when charging the system.

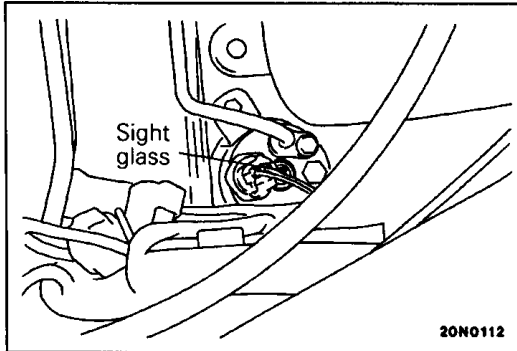
When metering R-134a into the refrigeration system keep the supply tank or cans in an upright position. If the refrigerant container is on its side or upside down, liquid refrigerant will enter the system and damage the compressor.

Caution

- 1. The leak detector for R-134a should be used to check for refrigerant gas leaks.**
- 2. Do not allow liquid refrigerant to touch bright metal.**

Refrigerant will tarnish bright metal and chrome surfaces, and in combination with moisture can severely corrode all metal surfaces.

NOTES



SERVICE ADJUSTMENT PROCEDURES

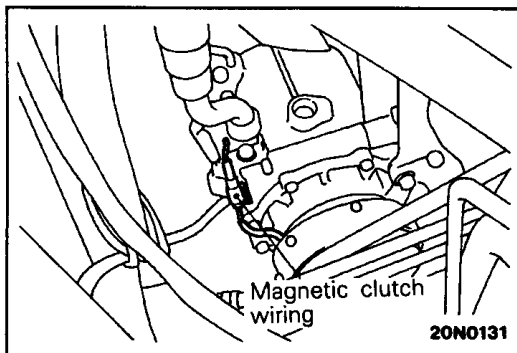
E55FABAa

TEST PROCEDURES

SIGHT GLASS REFRIGERANT LEVEL TEST

The sight glass is a refrigerant level indicator. To check the refrigerant level, clean the sight glass and start the vehicle engine. Push the air conditioner button to operate the compressor, place the blower switch to high and move the temperature control lever to max cool. After operating for a few minutes in this manner, check the sight glass.

- (1) If the sight glass is clear, the magnetic clutch is engaged, the compressor discharge line is warm and the compressor inlet line is cool; the system has a full charge.
- (2) If the sight glass is clear, the magnetic clutch is engaged and there is no significant temperature difference between compressor inlet and discharge lines; the system has lost some refrigerant.
- (3) If the sight glass shows foam or bubbles, the system could be low on charge. The system has to be recharged with refrigerant.



MAGNETIC CLUTCH

- (1) Disconnect the wiring to the magnetic clutch.
- (2) Connect battery (+) voltage directly to the wiring for the magnetic clutch.
- (3) If the magnetic clutch is normal, there will be a "click". If the pulley and armature do not make contact ('click'), there is a malfunction.

COMPRESSOR CHECK

After driving the compressor for 5 minutes, inspect the following contents to determine whether it is okay or not.

	Inspection contents			Judgement criteria	Probable cause	Remedy
	High lateral pressure	Low lateral pressure	Performance test			
Case 1	Saturation pressure of outside air	150 ~ 200 kPa (1.5 ~ 2.0 kg/cm ²) (21.3 ~ 28.4 psi)	Pass	Good	–	–
Case 2	200 ~ 500 kPa (2.0 ~ 5.0 kg/cm ²) (28.4 ~ 71.1 psi)	100 kPa or less (1.0 kg/cm ² or less) (14.2 psi or less)	Pass	Abnormality Magnetic clutch goes ON and OFF frequently.	Compressor is defective* ¹	Replace the compressor.
Case 3	Almost saturation pressure of outside air		Fail	Abnormality No difference between high pressure and low pressure.	Compressor is defective* ²	
Case 4	Lower than case 1	150 ~ 200 kPa (1.5 ~ 2.0 kg/cm ²) (21.3 ~ 28.4 psi)	Fail	Abnormality Outlet temperature is high.	Expansion valve is blocked.	Replace the expansion valve.

NOTE

(1) Saturation pressure of outside air

Temperature °C (°F)	15 (59)	20 (68)	25 (77)	30 (86)	35 (95)	40 (104)
Saturation pressure of outside air kPa (kg/cm ² , psi)	400 (4.0, 56.9)	470 (4.7, 66.8)	560 (5.6, 79.7)	650 (6.5, 92.5)	760 (7.6, 108.1)	870 (8.7, 123.7)

(2) For a summary of the efficiency tests, refer to P.55-33.

(3) *¹ is when the compressor is locked in a fully loaded condition (100% discharge).

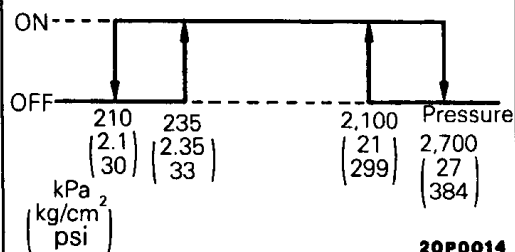
(4) *² is when the compressor is locked in a full capacity control condition (amount of discharge is 0).

RECEIVER DRIER

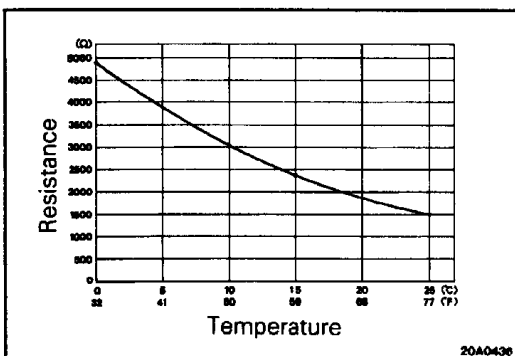
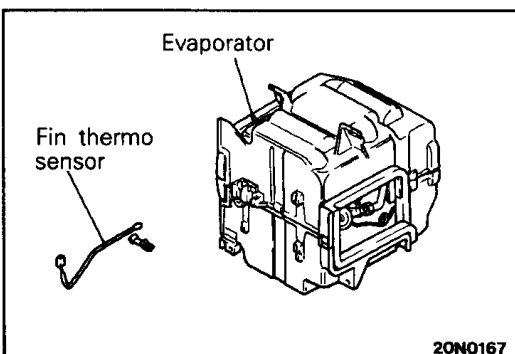
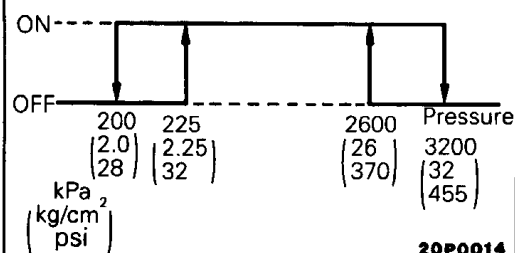
To Test the Receiver Drier

- Operate the unit and check the piping temperature by touching the receiver drier outlet and inlet.
- If there is a difference in the temperatures, the receiver drier is restricted.
Replace the receiver drier.

<Vehicles using R-12 refrigerant>



<Vehicles using R-134a refrigerant>



DUAL PRESSURE SWITCH (LOW PRESSURE SWITCH)

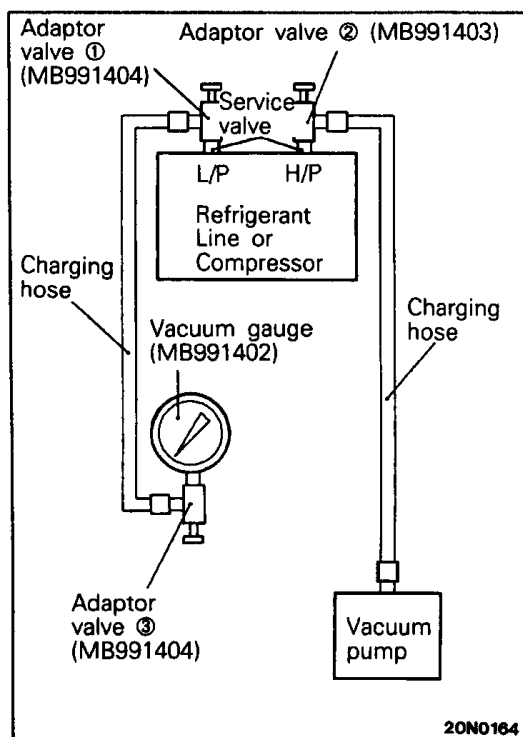
- (1) Turn back the adaptor valve handle all the way and install it to the low pressure side service valve.
- (2) With the gauge manifold low pressure service valves closed, connect the gauge manifold high pressure side charging hose to the adaptor valve.
- (3) Tighten the adaptor valve handle and open the service valve.
- (4) If there is continuity between the dual pressure switch terminals when the low pressure side pressure is at the level of dual pressure switch ON condition shown to the left, the switch is functioning normally. If not, replace the switch.

FIN-THERMO SENSOR

- (1) Disconnect the sensor's connector at the evaporator case, and by using an ohmmeter, measure the resistance. If the resistance is within $\pm 10\%$ of value of the characteristic curve, the sensor is functioning normally.
- (2) If the sensor is normal, there is a malfunction of the air conditioner control unit, and it should be replaced.

COMPRESSOR DRIVE BELT ADJUSTMENT **EB3FWAE**

Refer to GROUP 11 – Engine Adjustment.



CHARGING PROCEDURES

<Vehicles using R-12 refrigerant>

INSTALLATION OF CHARGE EQUIPMENT

<When Using a Vacuum Gauge>

- (1) Turn the adaptor valves ① and ② handles back fully (valves shut) and attach adaptor valves ① and ② to the high and low pressure service valves respectively.

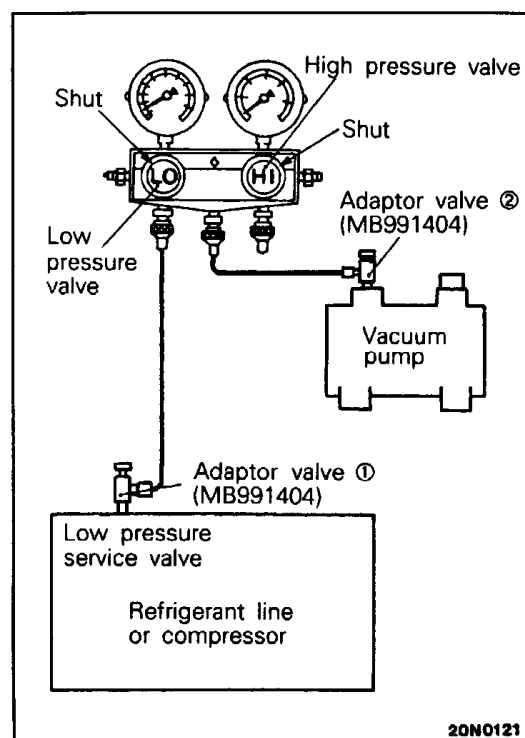
NOTE

The high-pressure service valve is on high-pressure pipe, and the low-pressure service valve is on the suction hose.

- (2) Fully tighten the handles of adaptor valves ① and ② (valves open) and open the high and low pressure service valves.
- (3) Connect the charging hoses to adaptor valves ① and ②.
- (4) Attach the fully tightened adaptor valve ③ (valve open) handle to the low pressure charging hose.
- (5) Attach the vacuum gauge to adaptor valve ③.
- (6) Attach the vacuum pump to the high pressure charging hose.

NOTE

- (1) Do not connect the high and low pressure sides adversely. (Connect high pressure side to the condenser and low pressure side to the evaporator.)
- (2) The indications "DIS" and "SUC" on the compressor indicate high and low pressure sides respectively.



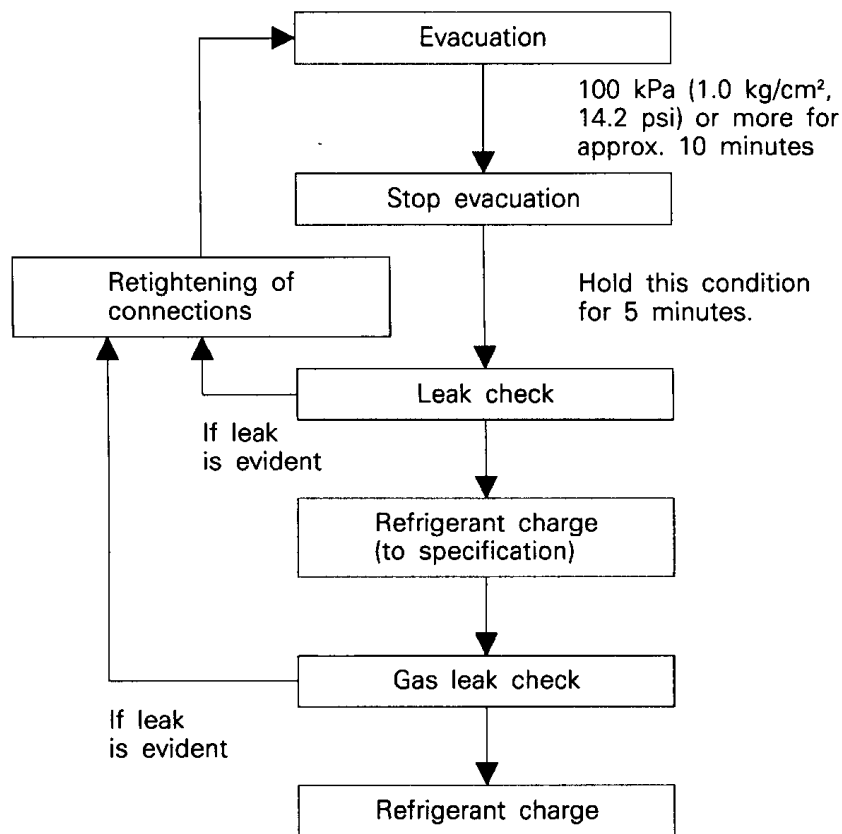
<When Using a Gauge Manifold>

- (1) Turn the adaptor valve handles anti-clockwise (valve shut) and attach the respective adaptor valves ① and ③ to the low pressure service valve and to the vacuum pump.
- (2) Shut the gauge manifold high and low pressure valves.
- (3) Connect the charging hoses to each adaptor valve as shown in the diagram.
- (4) Turn the adaptor valves ① and ③ handles clockwise (valve open) to open the line the service valves and to the vacuum pump.

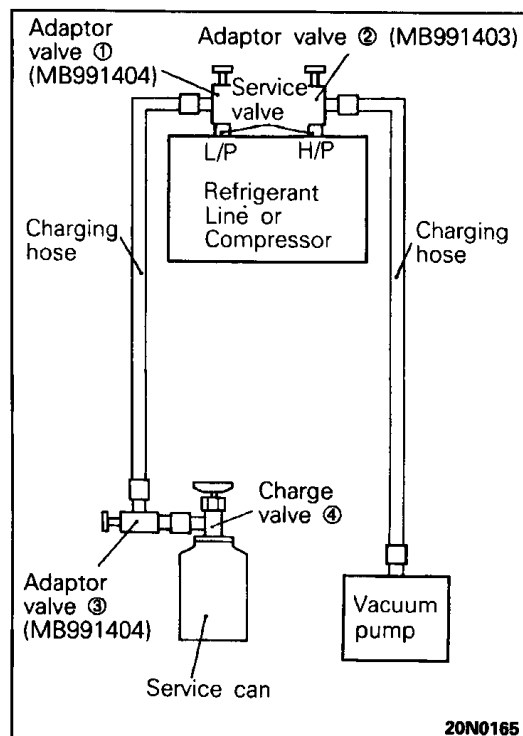
NOTE

- (1) Do not connect the high and low pressure sides adversely. (Connect high pressure side to the condenser and low pressure side to the evaporator.)
- (2) The indications "DIS" and "SUC" on the compressor indicate high and low pressure sides respectively.

CHARGING SYSTEM



The refrigerant system must have been evacuated using the previous procedure before charging. Charge using only R-12 refrigerant. R-12 is available in bulk tanks or small cans. Follow the safety precautions for handling R-12 as listed in this group.



CHARGING THE REFRIGERANT

<Vehicles using R-12 refrigerant>

CHARGING WITH SMALL CANS

<When Using a Vacuum Gauge>

When using disposable cans of this type, follow carefully the can manufactures instructions:

- (1) Start up the vacuum pump.

Caution

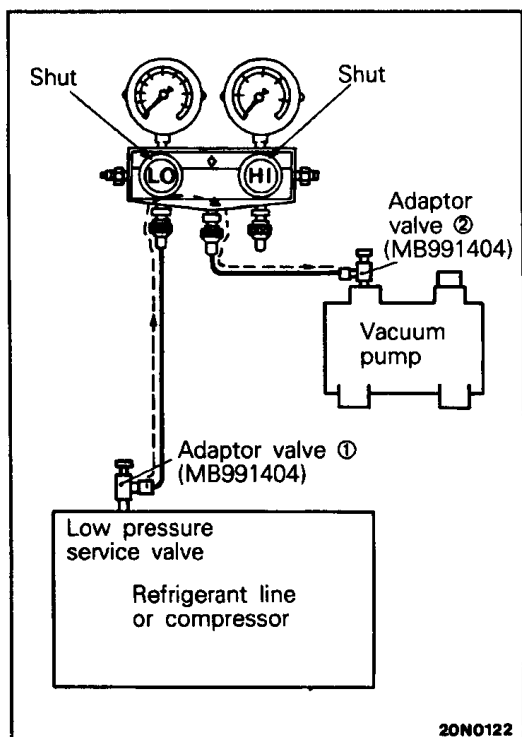
1. Do not use the compressor for evacuation.
2. Do not operate the compressor in the vacuum condition; damage may occur.

- (2) Evacuate to a vacuum reading of 100 kPa (1.0 kg/cm², 14.2 psi) or higher (approx. 10 minutes).
- (3) Turn the high pressure adaptor valve ② handle all the way anti-clockwise (valve shut).
- (4) Stop the vacuum pump and allow to stand for 5 minutes.
- (5) Check for leaks. (Good if the vacuum is held.)
- (6) Turn the charge valve ④ handle back (valve open), and attach it to the service can.
- (7) Turn the adaptor valve ③ handle back fully (valve shut), remove the vacuum meter and attach the service can.
- (8) Tighten the charge valve handle to puncture the service can.
- (9) Turn the charge valve handle back, tighten the handle of adaptor valve ③ fully (valve open).
- (10) If the refrigerant is not drawn in, turn the adaptor valve ① handle all the way anti-clockwise (valve shut).
- (11) Check for gas leaks using a leak detector.
- (12) Start the engine.
- (13) Operate the air conditioner and set at the lowest temperature (MAX. COOL).
- (14) Fix the engine speed at 1,500 r/min.
- (15) Turn the adaptor valve ① handle fully clockwise (valve open) and to charge the required volume of refrigerant.

Caution

If the service can is inverted, liquid refrigerant may be drawn into the compressor damaging it by liquid compression. Keep the service can upright to ensure that refrigerant is charged in gas state.

- (16) After charging with refrigerant, turn the adaptor valve ① handle fully anti-clockwise (valve shut).



<When Using a Gauge Manifold>

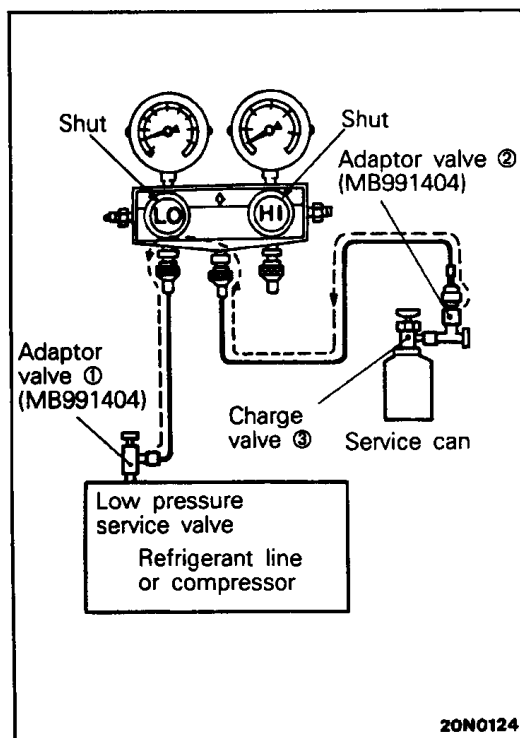
When using disposable cans of this type, follow carefully the can manufacturers instructions:

- (1) Start up the vacuum pump.

Caution

1. Do not use the compressor for evacuation.
2. Do not operate the compressor in the vacuum condition; damage may occur.

- (2) Evacuate to a vacuum reading of 100 kPa (1.0 kg/cm², 14.2 psi) or higher (approx. 10 minutes).
- (3) Turn the adaptor valve ② handle fully anticlockwise (valve shut).
- (4) Stop the vacuum pump and allow to stand for 5 minutes.
- (5) Check for leaks. (Good if the vacuum is held.)



- (6) Tighten the charge valve ② handle to puncture the service can.
- (7) Turn the charge valve ③ handle back, tighten the adaptor valve ③ handle fully, and open the service valves.
- (8) Charge the gas from the low pressure valve on the manifold gauge by opening valve.

Caution

If the service can is inverted, liquid refrigerant may be drawn into the compressor damaging it by liquid compression. Keep the service can upright to ensure that refrigerant is charged in gas state.

- (9) If the refrigerant is not drawn in, turn the adaptor valve ① handle all the way anticlockwise (valve shut).
- (10) Use a gas leak detector to check for leaking gas.

- (11) Start the engine.
- (12) Turn on the air conditioner, and adjust the setting to the lowest temperature (MAX. COOL).
- (13) Run the engine revolutions at 1,500 r/min.
- (14) Turn the low pressure adaptor valve handle all the way clockwise (valve open) and to charge the required volume of refrigerant.

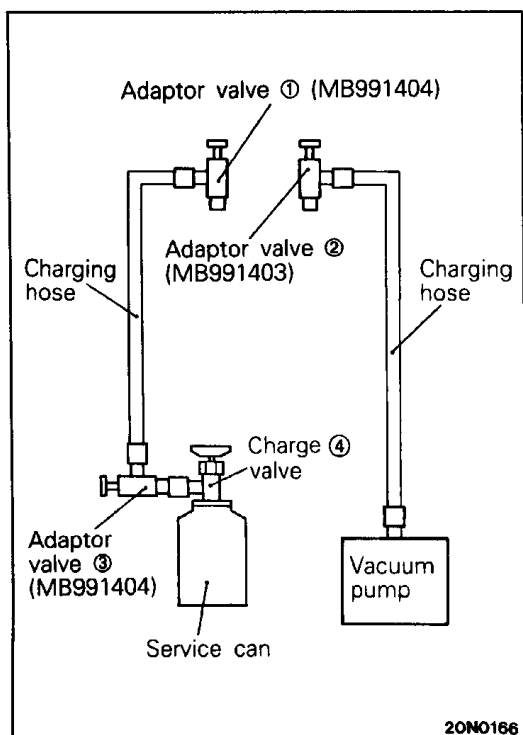
Caution

If the service can is inverted, liquid refrigerant may be drawn into the air compressor, damaging it by liquid compression. Keep the service can upright to ensure that the refrigerant is charged in gas state.

- (15) After charging the refrigerant, turn the low pressure adapter valve ① handle completely back (valve shut).

CHARGING WITH REFRIGERANT RECOVERY AND RECYCLING UNIT

When using refrigerant recovery and recycling unit, follow carefully the instruction manual for the unit.



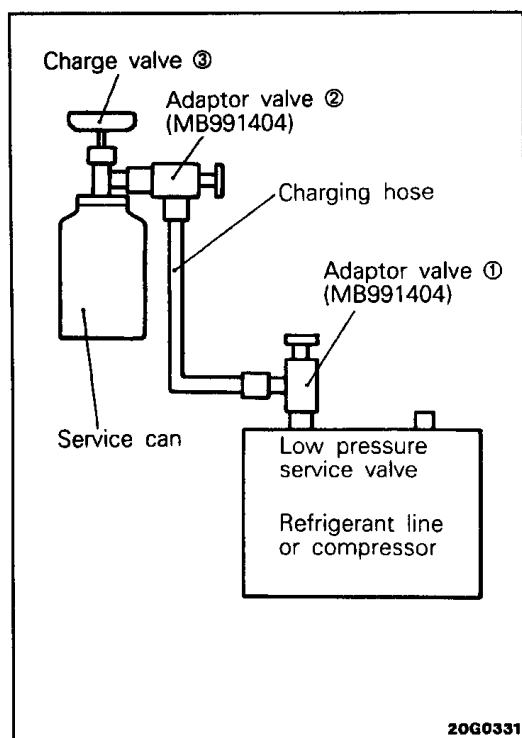
REMOVAL OF CHARGE EQUIPMENT

- (1) Close the charge valve ④ (valve shut).
- (2) Remove the adaptor valve ① and ② from each service valve.
- (3) Remove the service can.

Caution

If some refrigerant is remaining, keep the charge valve ④ and adaptor valves ① and ③ connected to the service can until after the next operation.

- (4) Remove the charge valve ④.
- (5) Remove the adaptor valve ③.
- (6) Remove the adaptor valve ①.
- (7) Remove the adaptor valve ②.
<When using a gauge manifold>
- (8) Remove the vacuum pump.



CORRECTING LOW REFRIGERANT LEVEL

- (1) Install the charge valve ③ to the service can with its handle turned back all the way (valve open).
- (2) Attach the adaptor valve ② with the handle tightened to the charge valve ③ (valve open).
- (3) Attach the charge hose to adaptor valve ②.
- (4) Turn the handle of adaptor valve ① back fully (valve shut) and attach the charging hose.
- (5) Tighten the charge valve ③ handle to puncture the service can.
- (6) Turn the charge valve ③ handle back fully (valve open).
- (7) Operate the handle of adaptor valve ① to bleed the air.
- (8) Install the adaptor valve ① to the low pressure side service valve.

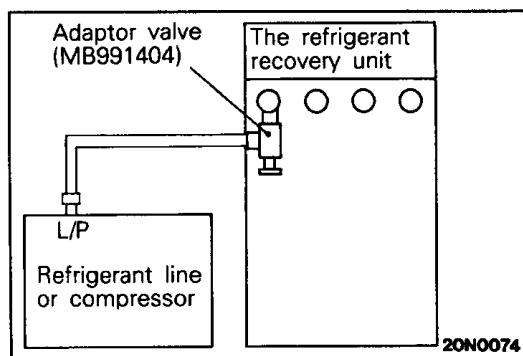
Caution

Never use the high pressure side as this may cause refrigerant to flow back, using rupture of the service can.

- (9) Start the engine.
- (10) Operate the air conditioner and set at the lowest temperature (MAX. COOL).
- (11) Fix the engine speed at 1,500 r/min.
- (12) Tighten the adaptor valve ① handle (valve open) and charge refrigerant checking level with the sight glass.
- (13) Upon completion of charging, the adaptor valve ① handle turn back all the way (valve shut).
- (14) Remove the adaptor valve ① from the service valve.

NOTE

If the service can is not emptied completely, keep the charge valve and adaptor valves ① and ② closed until after the next operation.



DISCHARGING SYSTEM

Use the refrigerant recovery unit to discharge refrigerant gas from the system.

NOTE

Refer to that Refrigerant Recovery and Recycling Unit Instruction Manual for operation of the unit.

REFILLING OF OIL IN THE AIR-CONDITIONER SYSTEM

Too little oil will provide inadequate compressor lubrication and cause a compressor failure. Too much oil will increase discharge air temperature.

When a FX-105VS compressor is installed at the factory, it contains 160 cc (9.8 cu.in.) of refrigerant oil. While the air conditioning system is in operation, the oil is carried through the entire system by the refrigerant.

Some of this oil will be trapped and retained in various parts of the system.

When the following system components are charged, it is necessary to add oil to the system to replace the oil being removed with the component.

Compressor oil: FREOL S-83 or SUNISO 5GS

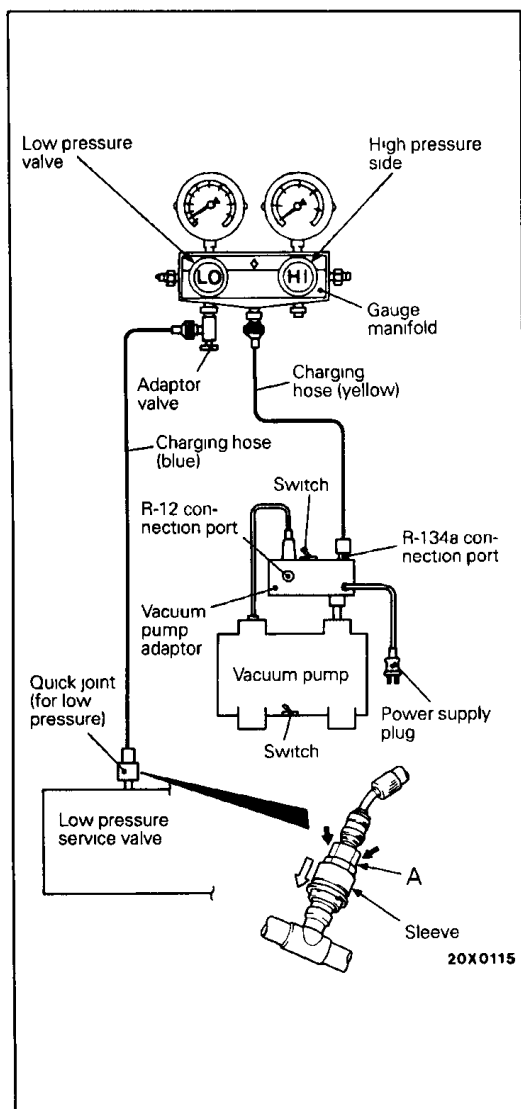
Quantity:

Evaporator: 60 cc (3.66 cu.in.)

Condenser: 15 cc (0.92 cu.in.)

Suction hose: 10 cc (0.61 cu.in.)

Receiver: 10 cc (0.61 cu.in.)



CHARGING <Vehicles using R-134a refrigerant>

1. With the handles turned back all the way (valve closed), install the adaptor valve to the low-pressure side of the gauge manifold.
2. Connect the charging hose (blue) to the adaptor valve.
3. Connect the quick joint (for low pressure) to the charging hose (blue).
4. Connect the quick joint (for low pressure) to the low pressure service valve.

NOTE

The low-pressure service valve is on the suction hose.

Caution

1. Use tools that are suited to R-134a.
2. To install the quick joint, press section A firmly against the service valve until a click is heard. When connecting, run your hand along the hose while pressing to ensure that there are no bends in the hose.
5. Close the high and low pressure valves of the gauge manifold.
6. Install the vacuum pump adaptor to the vacuum pump.
7. Connect the vacuum pump plug to the vacuum pump adaptor.
8. Connect the charging hose (yellow) to the R-134a connection port of the vacuum pump adaptor.
9. Tighten the adaptor valve handle (valve open).
10. Open the low pressure valve of the gauge manifold.
11. Turn the power switch of the vacuum pump to the ON position.

NOTE

Even if the vacuum pump power switch is turned ON, the vacuum pump will not operate because of the power supply connection in step (7).

12. Turn the vacuum pump adaptor switch to the R-134a side to start the vacuum pump.

Caution

Do not operate the compressor for evacuation.

13. Evacuate to a vacuum reading of 100 kPa (1.0 kgm/cm², 14.2psi) or higher (takes approx. 10 minutes).
14. Turn the vacuum pump adaptor switch OFF and allow to stand it for 5 minutes.

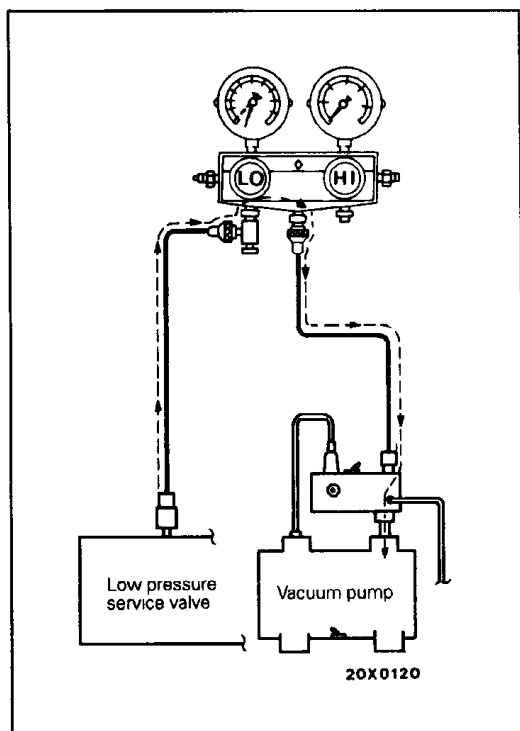
Caution

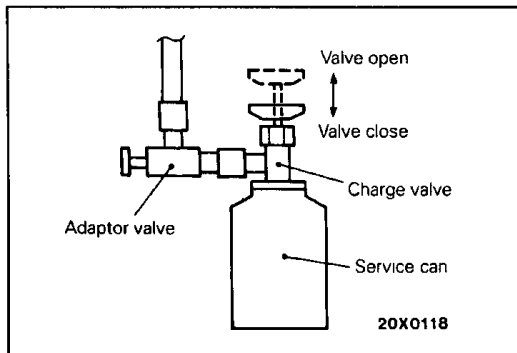
Do not operate the compressor in the vacuum condition; damage may occur.

15. Carry out a leak test. (Good if the negative pressure dose not drop.)

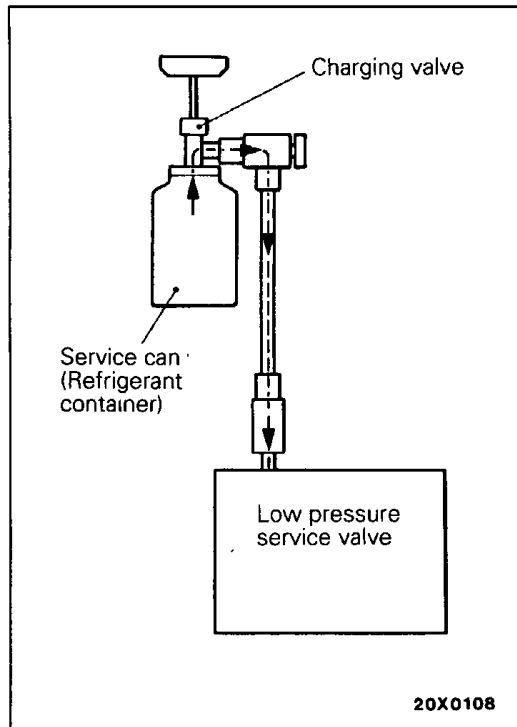
Caution

If the negative pressure drops, increase the tightness of the connections, and then repeat the evacuation procedure from step (12).





16. With the handle turned back all the way (valve open), install the charging valve to the service can.
17. Turn the handle of the adaptor valve back all the way (valve closed), remove it from the gauge manifold and install the service can.
18. Tighten the handle of the charging valve (valve closed) to puncture the service can.



19. Turn the handle of the charging valve back (valve open) and tighten the handle of the adaptor valve (valve open) to charge the system with refrigerant.

Caution

If the service can is inverted, liquid refrigerant may be drawn into the compressor damaging it by liquid compression. Keep the service can upright to ensure that refrigerant is charged in gas state.

20. If the refrigerant is not drawn in, turn the handle of the adaptor valve back all the way (valve closed).
21. Check for gas leaks using a leak detector.
If a gas leak is detected, re-tighten the connections, and then repeat the charging procedure from evacuation in step (12)

Caution

The leak detector for R-134a should be used.

22. Start the engine.
23. Operate the A/C and set to the lowest temperature (MAX. COOL).
24. Fix the engine speed at 1,500 r/min.
25. Tighten the handle of the adaptor valve (valve open) to charge the required volume of refrigerant.

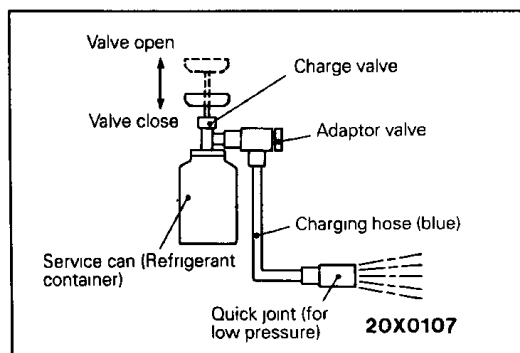
Caution

If the service can is inverted, liquid refrigerant may be drawn into the compressor damaging it by liquid compression. Keep the service can upright to ensure that refrigerant is charged in gas state.

26. After charging with refrigerant, turn the handle of the adaptor valve back all the way (valve closed).
27. Tighten the charging valve handle (valve closed).
Remove the quick joint (for low pressure) from the low-pressure service valve.

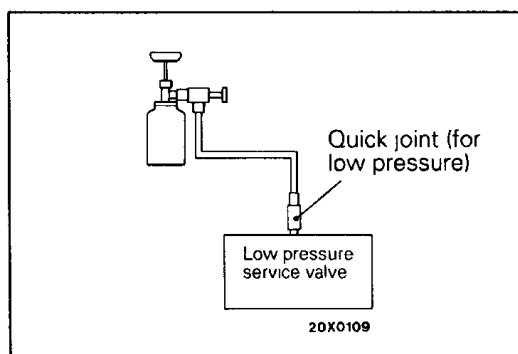
NOTE

If the service can is not emptied completely, keep the handles of the charging valve and adaptor valve closed for the next charging.



CORRECTING LOW REFRIGERANT LEVEL IN CASE THE SERVICE CAN IS USED

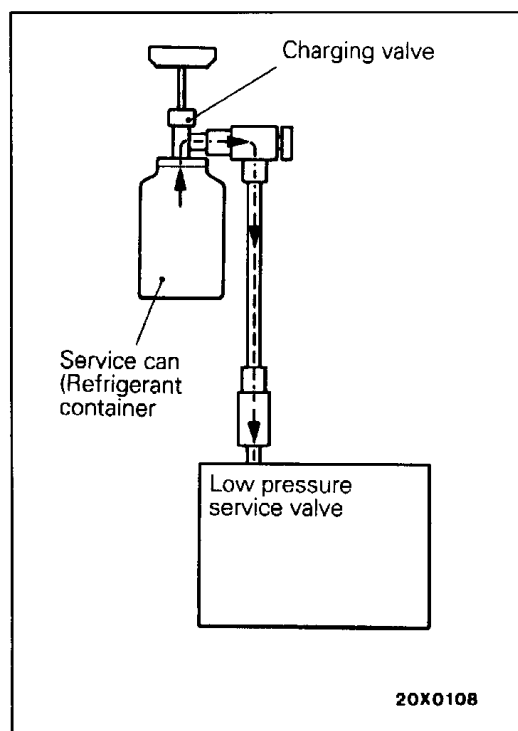
1. Install the charge valve with the handle turned all the way back (valve open) to the service can.
2. Install the adaptor valve with the handle turned all the way back (valve close) to the charging valve.
3. Connect the charging hose (blue) to the adaptor valve.
4. Connect the charging hose (blue) to the quick joint (for low pressure).
5. Tighten the handle of the charge valve (valve close), and pierce the service can.
6. Turn the handle of the adaptor valve to bleed the air.



7. Install the quick joint (for low pressure) to the low pressure service valve.

NOTE

The low-pressure service valve is on the suction hose.



8. Start the engine.
9. Operate the air conditioner and set at the lowest temperature (MAX. COOL)
10. Fix the engine speed at 1,500 r/min.
11. Tighten the handle of the adaptor valve (valve open), and replenish refrigerant checking the quantity through the sight glass.

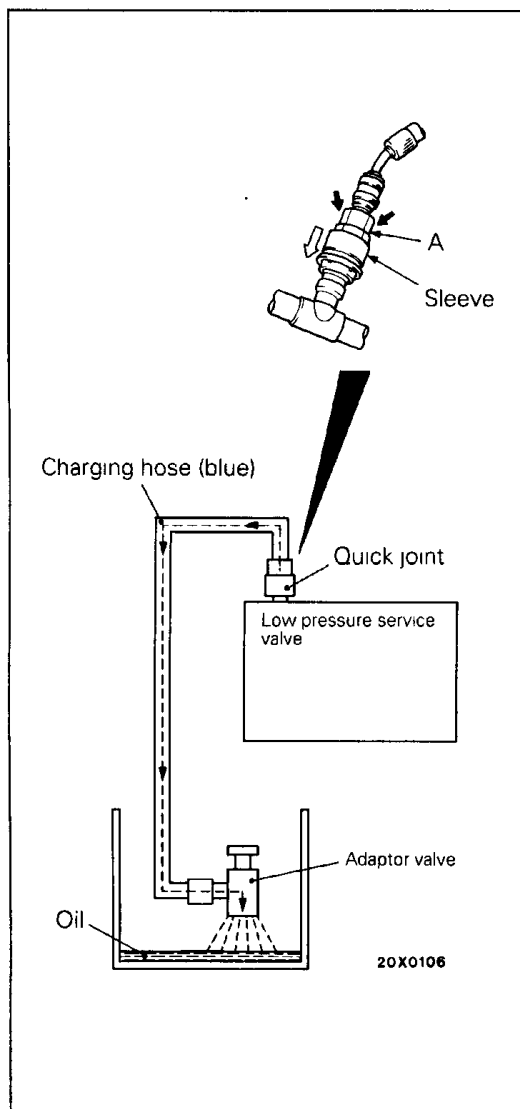
Caution

If the service can is inverted, liquid refrigerant may be drawn into the compressor damaging it by liquid compression. Keep the service can upright to ensure that refrigerant is charged in gas state.

12. After replenishing is completed, turn the handle of the adaptor valve all the way back (valve close), and remove the quick joint.

NOTE

When there is remainder of refrigerant in the service can, keep it for next use with the charge valve and the valve of the adaptor valve being closed.



DISCHARGING SYSTEM

1. Run the engine at an engine speed of 1200–1500 r/min for approximately 5 minutes with the A/C operating to return the oil.

NOTE

Returning the oil will be more effective if it is done while driving.

2. Stop the engine.
3. Connect the charging hose (blue) to the adaptor valve with its handle turned back all the way (valve closed).
4. Connect the quick joint to the charging hose (blue).
5. Install the quick joint to the low pressure service valve.

NOTE

The low-pressure service valve is on the suction hose.

Caution

To connect the quick joint, press section A firmly against the service valve until a click is heard.

When connecting, run your hand along the hose while pressing to ensure that there are no bends in the hose.

6. Place the adaptor valve inside the container and discharge the refrigerant by opening the handle gradually so that oil does not gush out.

NOTE

Any oil remaining in the container should be returned to the A/C system.

REFILLING OF OIL IN THE A/C SYSTEM

Too little oil will provide inadequate compressor lubrication and cause a compressor failure. Too much oil will increase discharger air temperature.

When a compressor is installed at the factory, it contains 170 cc (10.4 cu.in.) of refrigerant oil.

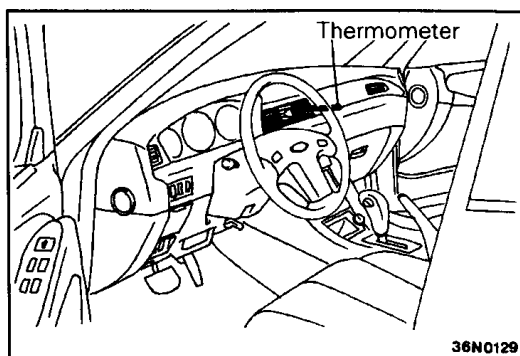
While the A/C system is in operation, the oil is carried through the entire system by the refrigerant. Some of this oil will be trapped and retained in various parts of the system.

When the following system components are charged, it is necessary to add oil to the system to replace the oil being removed with the component.

Compressor oil: SUN PAG56

Quantity:

Evaporator:	60 cc (3.66 cu.in.)
Condenser:	15 cc (0.92 cu.in.)
Suction hose:	10 cc (0.61 cu.in.)
Receiver:	10 cc (0.61 cu.in.)



PERFORMANCE TEST

E24FWAH

<Vehicles using R-12 refrigerant>

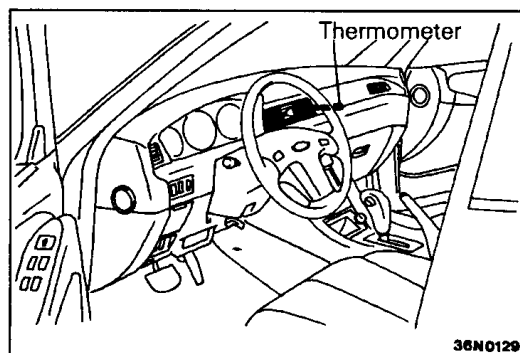
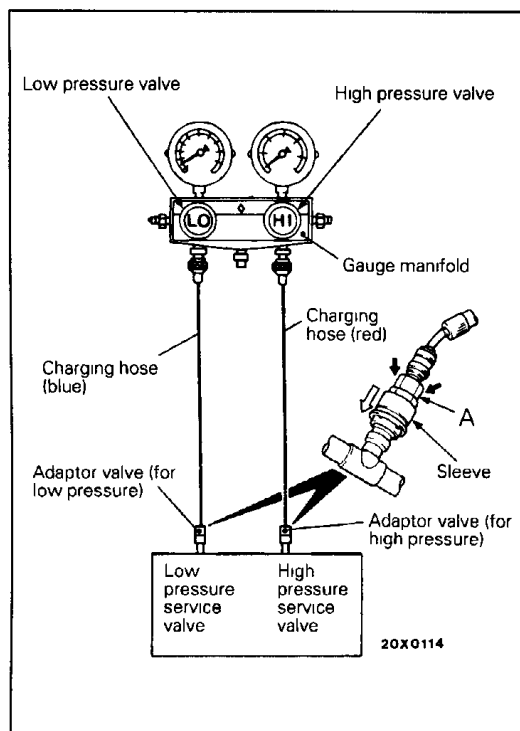
- (1) Park the tested vehicle at the area which is not exposed to the direct sunlight.
- (2) Connect a tachometer.
- (3) Turn back the adaptor valve handle all the way and install the adaptor valves to the high pressure and low pressure service valves.
- (4) Connect the gauge manifold to the adaptor valves.
- (5) Tighten the adaptor valve handle and open the service valves.
- (6) Start the engine.
- (7) Set the controls to the air conditioner as follows:
Air conditioning switch: Air conditioner – ON position
Mode selection: Face position
Temperature control: Max. cooling position
Air selection: Recirculation position
Blower switch: HI (Fast) position
- (8) Adjust engine speed to 1,000 r/min. with air conditioner clutch engaged.
- (9) Engine should be warmed up with doors, windows close, and hood open.
- (10) Insert a thermometer in the center air conditioner outlet and operate the engine for 20 minutes.
- (11) Note the discharge air temperature.

NOTE

If the clutch cycles, take the reading before the clutch disengages.

Performance Temperature Chart

Garage ambient temperature °C (°F)	21 (70)	26.7 (80)	32.2 (90)	37.8 (100)	43.3 (110)
Discharge air temperature °C (°F)	0.0–3.0 (32.0–37.4)	0.0–3.0 (32.0–37.4)	0.0–4.0 (32.0–39.2)	0.0–4.0 (32.0–39.2)	0.0–4.0 (32.0–39.2)
Compressor discharge pressure kPa (kg/cm ² , psi)	650–700 (6.5–7.0) (92.5–99.6)	740–790 (7.4–7.9) (105.3–112.4)	980–1020 (9.8–10.2) (139.4–145.1)	1150–1200 (11.5–12.0) (163.6–170.7)	1320–1370 (13.2–13.7) (187.7–194.9)
Compressor suction pressure kPa (kg/cm ² , psi)	130–190 (1.3–1.9) (18.5–27.5)	130–190 (1.3–1.9) (18.5–27.5)	130–190 (1.3–1.9) (18.5–27.5)	130–190 (1.3–1.9) (18.5–27.5)	130–190 (1.3–1.9) (18.5–27.5)



PERFORMANCE TEST

<Vehicles using R-134a refrigerant>

1. The vehicle to be tested should be in a place that is not in direct sunlight.
2. Close the high and low pressure valve of the gauge manifold.
3. Connect the charging hose (blue) to the low pressure valve and connect the charging hose (red) to the high pressure valve of the gauge manifold.
4. Install the quick joint (for low pressure) to the charging hose (blue), and connect the quick joint (for high pressure) to the charging hose (red).
5. Connect the quick joint (for low pressure) to the low-pressure service valve and connect the quick joint (for high pressure) to the high-pressure service valve.

NOTE

The high-pressure service valve is on the liquid pipe B, and the low-pressure service valve is on the suction hose.

Caution

To connect the quick joint, press section A firmly against the service valve until a click is heard. When connection, run your hand along the hose while pressing to ensure that there are no bends in the hose.

6. Start the engine.
7. Set the controls to the A/C as follows:
A/C switch: A/C – ON position
Mode selection: Face position
Temperature control: Max. cooling position
Air selection: Recirculation position
Blower switch: HI (Fast) position
8. Adjust engine speed to 1,000 r/min with A/C clutch engaged.
9. Engine should be warmed up with doors and windows closed.
10. Insert a thermometer in the left center A/C outlet and operate the engine for 20 minutes.
11. Note the discharge air temperature.

NOTE

If the clutch cycles, take the reading before the clutch disengages.

Performance Temperature Chart

Garage ambient temperature °C (°F)	21 (70)	26.7 (80)	32.2 (90)	37.8 (100)	43.3 (110)
Discharge air temperature °C (°F)	0.0–3.0 (3.20–37.4)	0.0–3.0 (32.0–37.4)	0.0–4.0 (32.0–39.2)	0.0–4.0 (32.0–39.2)	0.0–4.0 (32.0–39.2)
Compressor discharge pressure kPa (kg/cm ² , psi)	650–700 (6.5–7.0) (92.5–99.6)	740–790 (7.4–7.9) (105.3–112.4)	980–1020 (9.8–10.2) (139.4–145.1)	1150–1200 (11.5–12.0) (163.6–170.7)	1320–1370 (13.2–13.7) (187.7–194.9)
Compressor suction pressure kPa (kg/cm ² , psi)	130–190 (1.3–1.9) 18.5–27.5)	130–190 (1.3–1.9) 18.5–27.5)	130–190 (1.3–1.9) 18.5–27.5)	130–190 (1.3–1.9) (18.5–27.5)	130–190 (1.3–1.9) 18.5–27.5)

REFRIGERANT LEAK REPAIR PROCEDURE E24FHA0**LOST CHARGE**

If the system has lost all charge due to a leak:

- (1) Evacuate the system. (See procedure.)
- (2) Charge the system with approximately one pound of refrigerant.
- (3) Check for leaks.
- (4) Discharge the system.
- (5) Repair leaks.
- (6) Replace receiver drier.

Caution

Replacement filter-drier units must be sealed while in storage. The drier used in these units will saturate water quickly upon exposure to the atmosphere. When installing a drier, have all tools and supplies ready for quick reassembly to avoid keeping the system open any longer than necessary.

- (7) Evacuate and charge the system.

LOW CHARGE

If the system has not lost all of its refrigerant charge; locate and repair all leaks. If it is necessary to increase the system pressure to find the leak (because of an especially low charge) add of refrigerant. If it is possible to repair the leak without discharging the refrigerant system, use the procedure for correcting low refrigerant level.

HANDLING TUBING AND FITTINGS

E24FIAF

Kinks in the refrigerant tubing or sharp bends in the refrigerant hose lines will greatly reduce the capacity of the entire system. High pressures are produced in the system when it is operating. Extreme care must be exercised to make sure that all connections are pressure tight. Dirt and moisture can enter the system when it is opened for repair or replacement of lines or components. The following precautions must be observed. The system must be completely discharged before opening any fitting or connection in the refrigeration system. Open fittings with caution even after the system has been discharged. If any pressure is noticed as a fitting is loosened, allow trapped pressure to bleed off very slowly.

Never attempt to rebend formed lines to fit. Use the correct line for the installation you are servicing.

A good rule for the flexible hose lines is keep the radius of all bends at least 10 times the diameter of the hose.

Sharper bends will reduce the flow of refrigerant. The flexible hose lines should be routed so that they are at least 80 mm (3 in.) from the exhaust manifold. It is good practice to inspect all flexible hose lines at least once a year to make sure they are in good condition and properly routed.

Unified plumbing connections with O-rings. These O-rings are not reusable.

COMPRESSOR NOISE

E24FLAD

When investigating an air conditioning related noise, you must first know the conditions when the noise occurs. These conditions are: weather, vehicle speed, in gear on neutral, engine temperature or any other special conditions.

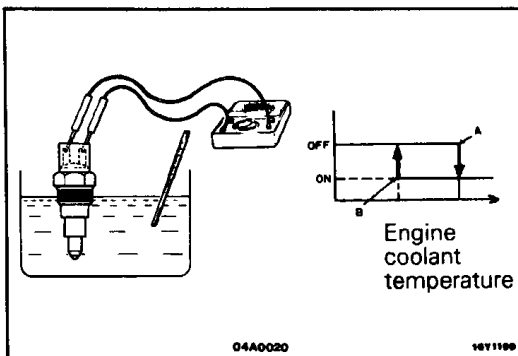
Noises that develop during air conditioning operation can often be misleading. For example: what sounds like a failed front bearing or connecting rod, may be caused by loose bolts, nuts, mounting brackets, or a loose clutch assembly. Verify accessory drive belt tension (power steering or alternator).

Improper accessory drive belt tension can cause a misleading noise when the compressor is engaged and little or no noise when the compressor is disengaged.

Drive belts are speed sensitive. That is, at different engine speeds, and depending upon belt tension, belts can develop unusual noises that are often mistaken for mechanical problems within the compressor.

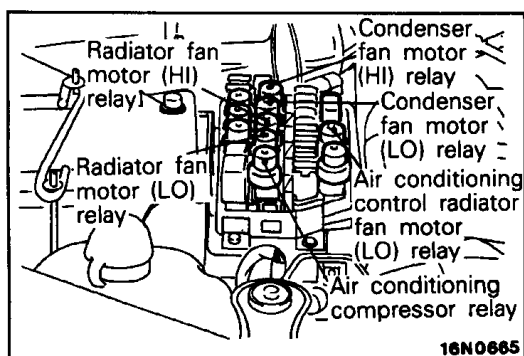
ADJUSTMENT PROCEDURES

- (1) Select a quiet area for testing. Duplicate conditions as much as possible. Switch compressor on and off several times to clearly identify compressor noise. To duplicate high ambient conditions (high head pressure), restrict air flow through condenser. Install manifold gauge set to make sure discharge pressure doesn't exceed 2,070 kPa (21.4 kg/cm², 300 psi).
- (2) Tighten all compressor mounting bolts, clutch mounting bolt, and compressor drive belt. Check to assure clutch coil is tight (no rotation or wobble).
- (3) Check refrigerant hoses for rubbing or interference that can cause unusual noises.
- (4) Check refrigerant charge. (See "Charging System".)
- (5) Recheck compressor noise as in Step 1.
- (6) If noise still exists, loosen compressor mounting bolts and retorque. Repeat Step 1.
- (7) If noise continues, replace compressor and repeat Step 1.


INSPECTION OF ENGINE COOLANT TEMPERATURE SWITCHES FOR CONDENSER FAN <VEHICLES WITH AIR CONDITIONER> AND FOR RADIATOR FAN

- (1) As shown in the figure, dip the engine coolant temperature switch into warm water or oil as far as the screw.
- (2) Check the continuity when the temperature of the water or oil changes using a circuit tester, and if it is within the following ranges, the switch is functioning properly.

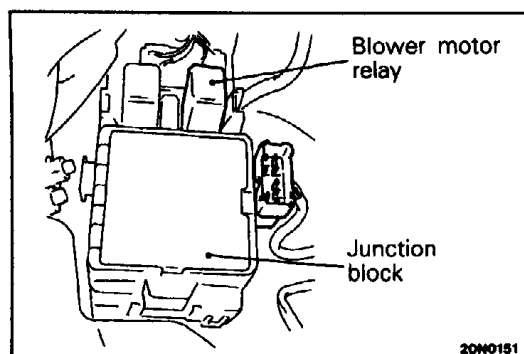
Item	Condenser fan <Vehicles with air conditioner>	Radiator fan
Continuity (temperature at point A)	96–100°C (205–212°F) or more	82–88°C (180–190°F) or more
No continuity (temperature at point B)	92°C (198°F) or less	78°C (172°F) or less



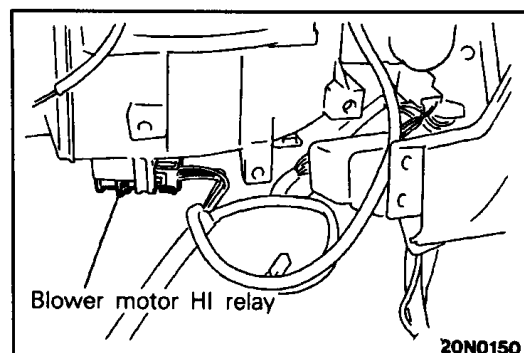
POWER RELAY CHECK

(1) Disconnect each power relay.

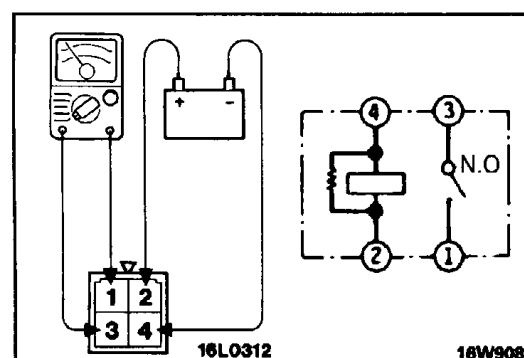
- ① Remove the radiator fan motor (HI) and (LO) relays, air conditioning control radiator fan motor (LO) relay <vehicles with air conditioner>, condenser fan motor (HI) and (LO) relays and the air conditioner compressor relay from the relay box inside the engine compartment.



- ② Remove the blower motor relay from the junction block.



- ③ Remove the blower motor HI relay from the blower case assembly.



(2) Inspect the continuity between the terminals when battery power is applied to terminal 2 and terminal 4 is earthed, or when there is no current flowing.

Current	Between terminals 1 and 3	Continuity
No current	Between terminals 1 and 3	No continuity
	Between terminals 2 and 4	Continuity

IDLE-UP OPERATION CHECK

E24FOAB

- (1) Before inspection and adjustment set vehicle in the following condition:
- Engine coolant temperature: 80–95°C (176–203°F)
 - Lights, electric cooling fan and accessories: Set to OFF
 - Transmission: Neutral (N or P for vehicles with A/T)
 - Steering wheel: Straightforward
- (2) Check that the idling speed is at the standard value.
- Standard value: 700±100 r/min**
- (3) Check to be sure that the idling speed becomes the standard value when the air conditioner switch is switched ON and the air conditioner is activated.

Standard value: 900±100 r/min

NOTE

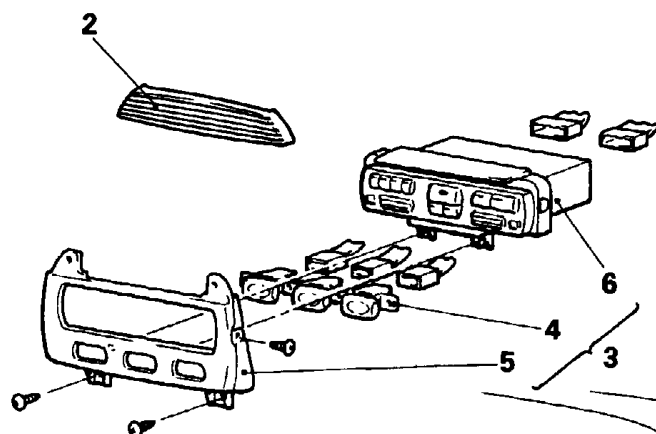
It is not necessary to make an adjustment, because the idling speed is automatically adjusted by the ISC* system. If, however, there occurs a deviation from the standard value for some reason, check the ISC* system.

ISC: Idle Speed Control

AIR CONDITIONER CONTROL PANEL ASSEMBLY

E55GEAA

REMOVAL AND INSTALLATION <VEHICLES WITHOUT AIR CONDITIONER AND VEHICLES WITH AIR CONDITIONER BUILT UP TO OCTOBER, 1992>



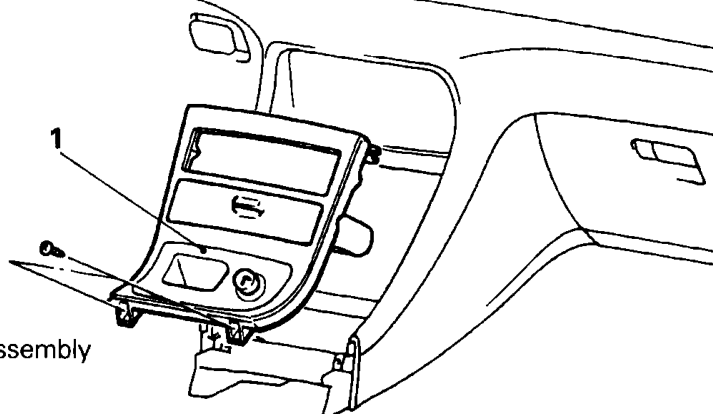
Pre-removal and Post-installation Operation

- Removal and Installation of the Floor Console (Refer to GROUP 52 – Floor Console.)

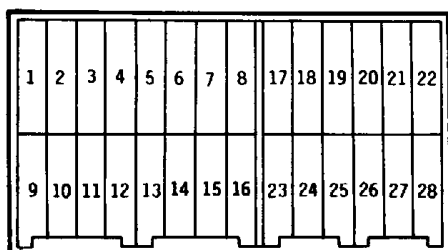
CAUTION: SRS <L.H. drive vehicles>
When removing and installing the floor console in vehicles equipped with SRS, do not let it bump against the SRS diagnostic unit or other components.

Removal steps

1. Audio panel
2. Heater control garnish
3. Air conditioner control panel assembly
4. Center switch
5. Heater panel
6. Air conditioner control panel



20N0142



20N0069

INSPECTION

E55GCAK

BLOWER SWITCH INSPECTION

- (1) When the AUTO mode switch is ON, check the continuity between terminals ⑧ and ⑳.
- (2) Operate the switch and measure the resistance between terminals ⑧ and ㉔.

Switch position	Resistance kΩ (Standard value)
Blower speed MIN.	0.25
Blower speed MAX.	2 ± 10%

TEMPERATURE CONTROL SWITCH INSPECTION

Operate the switch and measure the resistance between terminals ④ and ⑪.

Switch position	Resistance kΩ (Standard value)
MAX. COOL	0.275
MAX. HOT	∞

INSPECTION OF AIR CONDITIONER SWITCH <VEHICLES WITH AIR CONDITIONER>, MODE CHANGEOVER SWITCH AND INSIDE/OUTSIDE AIR CHANGEOVER SWITCH

(1) Operate the switch and check the continuity between the terminals.

Terminal	6	13	14	17	18	20	23	24	28
Switch									
AUTO Mode switch					○—○				
FACE Mode switch DEF. Mode switch				○—○					
A/C switch <Vehicles with air conditioner>							○—○		
ECONO switch <Vehicles with air conditioner>								○—○	
Outside air inlet switch	○—○			○—○					○—○
Inside air circulation switch	○—○	○—○							○—○

NOTE

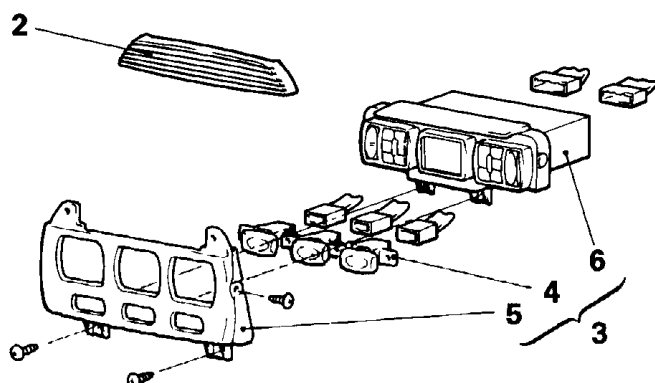
○—○ indicates that there is continuity between the terminals.

- After checking the FACE mode switch, press the DEF. mode switch and check the continuity between terminals ⑰ and ⑳. If there is no continuity, it is normal.
- Operate the switch and measure the resistance between terminals ⑰ and ㉑.

Switch operation	Resistance kΩ (Standard value)
FOOT Mode	0.33 ± 5%
FOOT/DEF. Mode	1 ± 5%
FACE/FOOT Mode	3.3 ± 5%

REMOVAL AND INSTALLATION

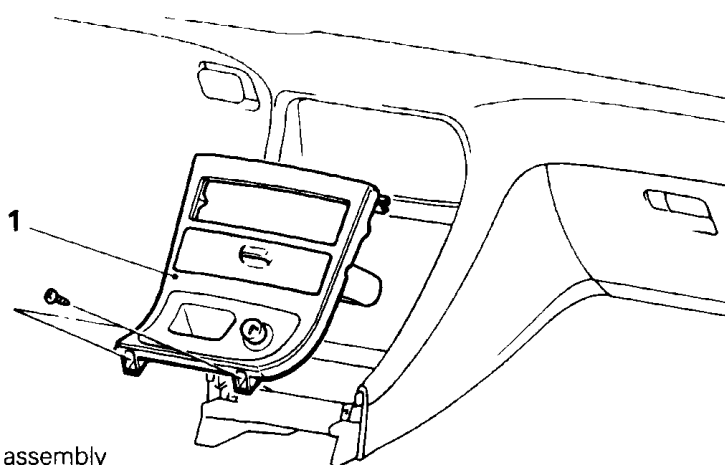
<VEHICLES WITH AIR CONDITIONER BUILT FROM NOVEMBER, 1992>



Pre-removal and Post-installation Operation

- Removal and Installation of the Floor Console (Refer to GROUP 52 – Floor Console)

CAUTION: SRS <L.H. drive vehicles>
When removing and installing the floor console in vehicles equipped with SRS, do not let it bump against the SRS diagnostic unit or other components.



Removal steps

- 1 Audio panel
- 2 Heater control garnish
- 3 Air conditioner control panel assembly
- 4 Center switch
- 5 Heater panel
- 6 Air conditioner control panel

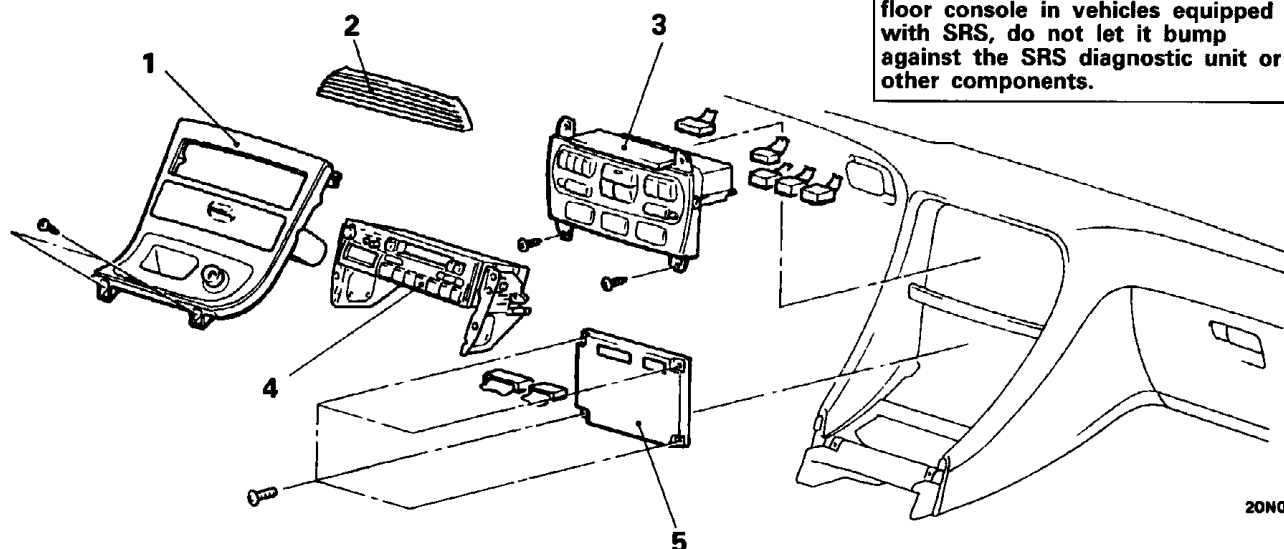
20N0236

NOTES

A/C CONTROL UNIT

E55HBAH

REMOVAL AND INSTALLATION



Pre-removal and Post-installation Operation

- Removal and Installation of the Floor Console (Refer to GROUP 52 – Floor Console.)

CAUTION: SRS <L.H. drive vehicles>
When removing and installing the floor console in vehicles equipped with SRS, do not let it bump against the SRS diagnostic unit or other components.

20N0141

Removal steps

1. Audio panel
2. Heater control garnish
3. Air conditioner control panel assembly
4. Radio and tape player
5. A/C control unit

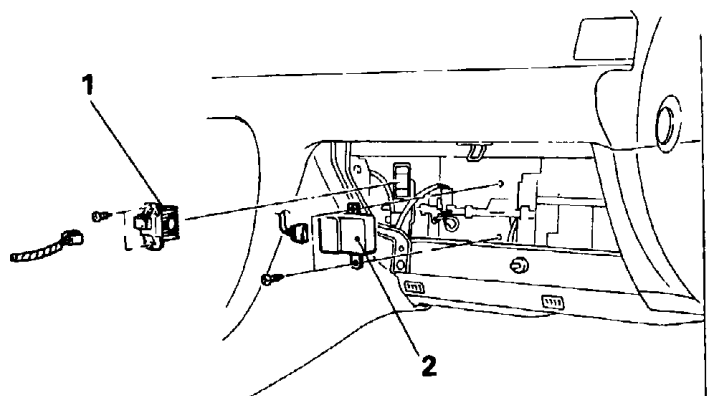
POWER TRANSISTOR, BELT LOCK CONTROLLER

E55HBAI

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation

- Removal and Installation of the glove box (Refer to GROUP 52 – Instrument Panel.)



1. Power transistor
2. Belt lock controller <DOHC>

20N0152

HEATER UNIT

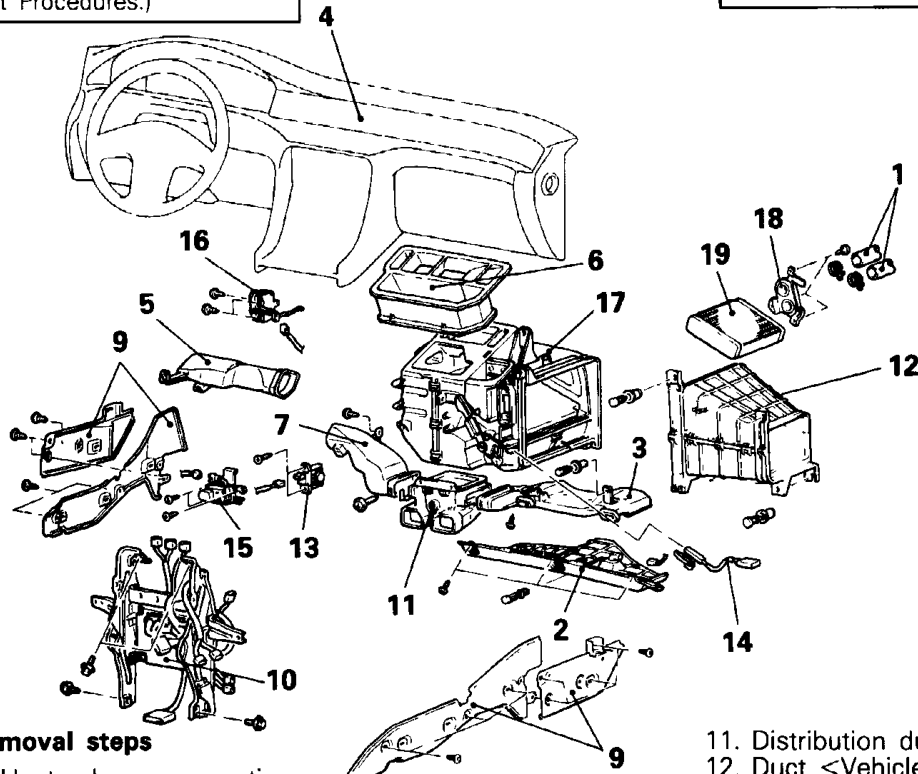
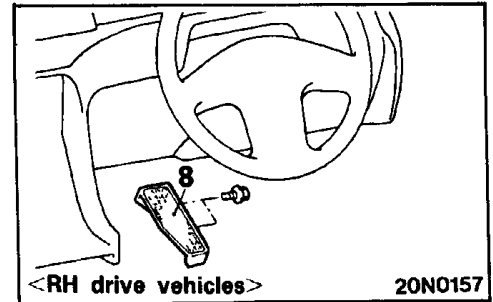
E55IBAK

REMOVAL AND INSTALLATION

CAUTION: SRS <R.H. drive vehicles>
When removing and installing the instrument panel in vehicles equipped with SRS, do not let it bump against the SRS diagnostic unit or other components.

Pre-removal and Post-installation Operation

- Draining and Supplying of the Coolant (Refer to GROUP 14 – Service Adjustment Procedures.)



20N0154

Removal steps

1. Heater hose connection
2. Passenger side under cover
3. Foot shower duct (right side)
4. Instrument panel (Refer to GROUP 52 – Instrument Panel.)
5. Foot shower nozzle
6. Center duct assembly
7. Foot shower duct (left side)
8. Foot rest <RH drive vehicles>
9. Front and rear center reinforcement
10. Center stay assembly
11. Distribution duct assembly
12. Duct <Vehicles without air conditioner>
13. Power transistor
14. Engine coolant temperature sensor
15. Air-mixing damper motor assembly
16. Air outlet changeover damper motor assembly
17. Heater unit
18. Plate
19. Heater core

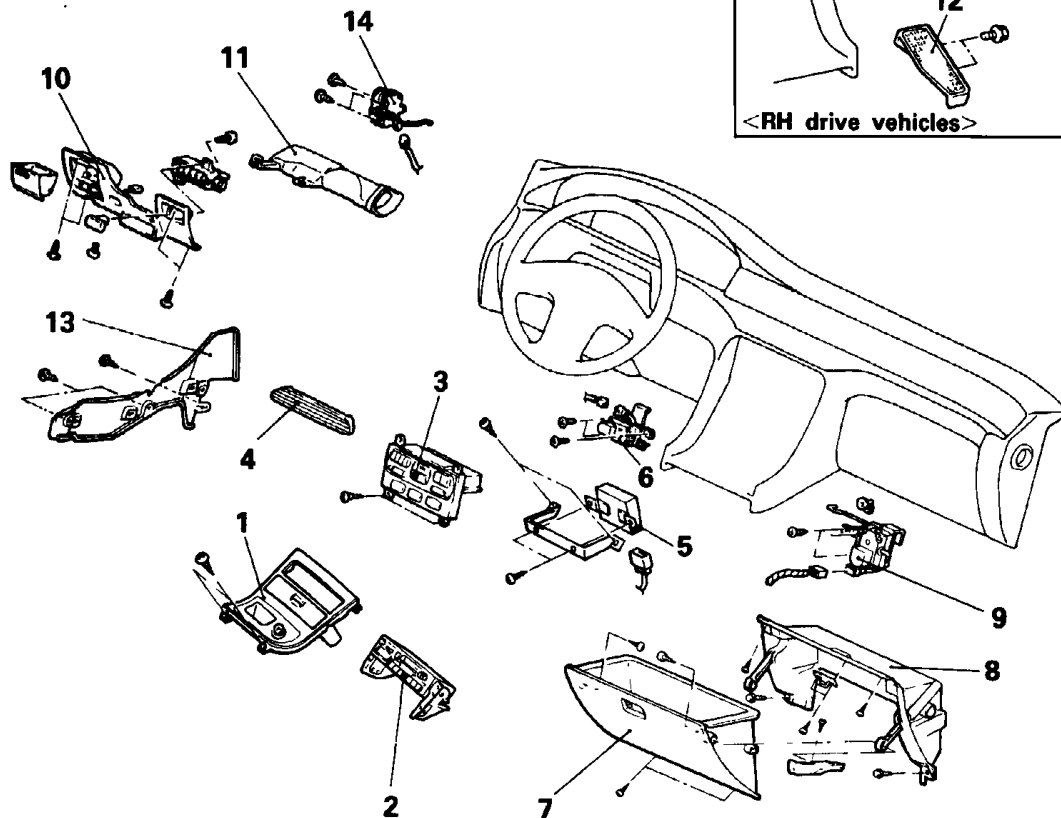
INSPECTION

E55ICAG

- Check the operation of dampers and link mechanism.
- Check the heater core for clogging and water leakage.

DAMPER CONTROL MOTOR ASSEMBLY

REMOVAL AND INSTALLATION



E55HA--

<RH drive vehicles>

20N0157

CAUTION: SRS <L.H. drive vehicles>
When removing and installing the floor console in vehicles equipped with SRS, do not let it bump against the SRS diagnostic unit or other components.

20N0144

Air-mixing damper motor assembly removal steps

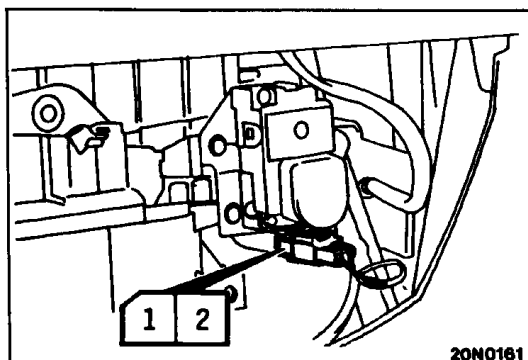
- Floor console (Refer to GROUP 52 – Console Box.)
- 1. Audio panel
- 2. Radio and tape player
- 3. A/C control panel
- 4. Heater control garnish
- 5. EPS control unit <DOHC>
- 6. Air-mixing damper motor assembly

Inside/outside air changeover damper motor assembly removal steps

- 7. Glove box
- 8. Glove box outer case
- 9. Inside/outside air changeover damper motor assembly

Air outlet changeover damper motor assembly removal steps

- 10. Driver's side lower panel
- 11. Foot shower nozzle
- 12. Foot rest <RH drive vehicles>
- 13. Center reinforcement
- 14. Air outlet changeover damper motor assembly



INSPECTION

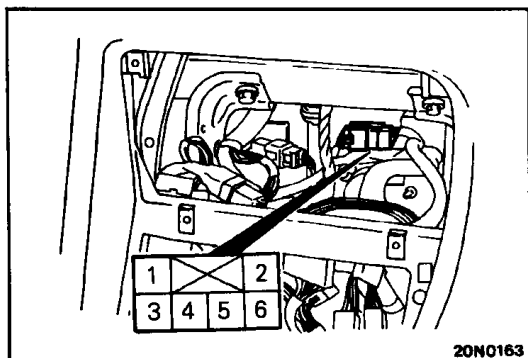
E55HCAM

INSPECTION OF INSIDE/OUTSIDE-AIR DAMPER MOTOR ASSEMBLY

Check that the motor rotates when battery voltage is applied to the connector on the motor assembly side. Check also that the motor rotates in the backward direction when polarity is changed.

Caution

1. Cut off the voltage when the damper is in the **RECIRCULATION** or **FRESH** position.
2. Cut off the voltage if the motor does not turn when battery voltage is applied.

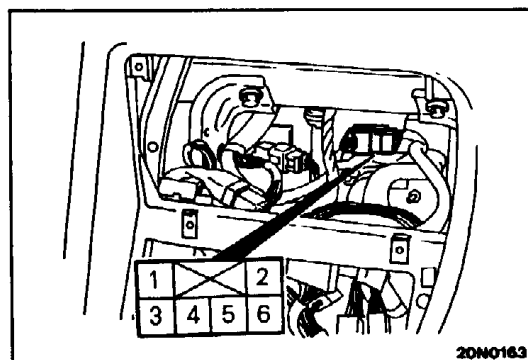


INSPECTION OF AIR MIX DAMPER MOTOR

Check that the motor rotates when battery voltage is applied across terminals ② and ⑥ of motor assembly side connector. Check also that the motor turns in the backward direction when polarity is changed.

Caution

1. Cut off the voltage when the damper is in the **MAX. HOT** or **MAX. COOL** position.
2. Cut off the voltage if the motor does not turn when battery voltage is applied.



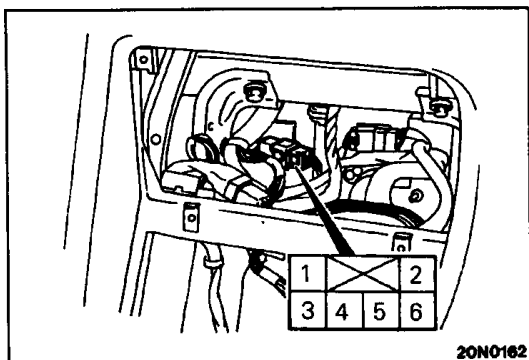
INSPECTION OF AIR MIX DAMPER POTENTIOMETER

Connect a circuit tester across terminals ③ and ④ of the motor assembly connector and check that resistance gradually changes as the damper is moved from **MAX. HOT** to **MAX. COOL** position.

Standard value

MAX. HOT: Approx. 0.2 k Ω

MAX. COOL: Approx. 4.9 k Ω

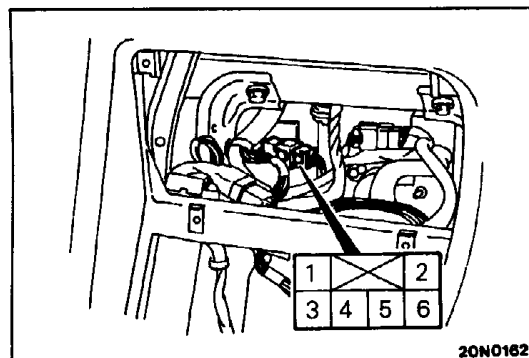


INSPECTION OF OUTLET SELECTOR DAMPER MOTOR

Check that the motor turns when battery voltage is applied across terminals ② and ⑥ of the motor assembly connector. Check also that the motor turns in the backward direction when polarity is changed.

Caution

1. Cut off the voltage when the damper is in the DEF. or FACE position.
2. Cut off the voltage if the motor does not turn when battery voltage is applied.



INSPECTION OF OUTLET SELECTOR DAMPER POTENTIOMETER

Connect a circuit tester across terminals ③ and ④ of the motor assembly connector and check that resistance gradually changes as the damper is moved from DEF. to FACE position.

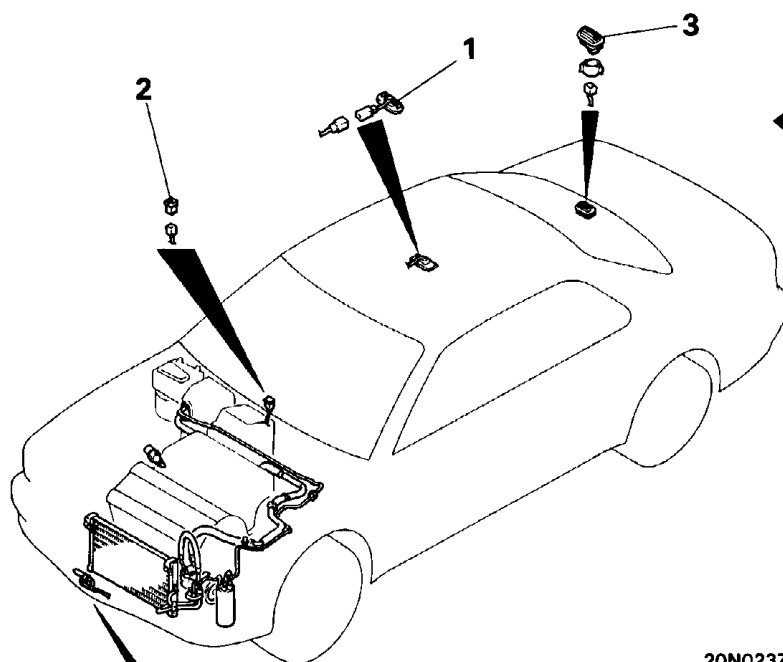
Standard value

DEF. position: Approx. 2.0 k Ω

FACE position: Approx. 4.3 k Ω

SENSORS

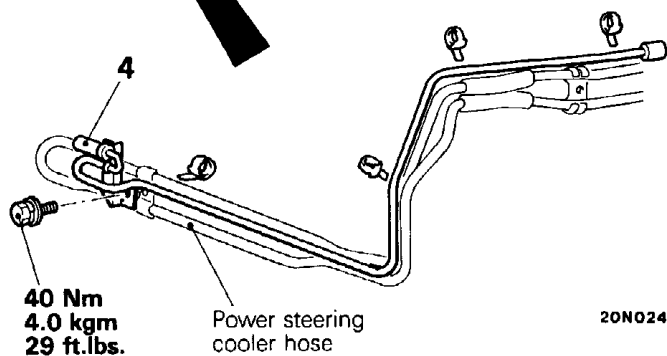
REMOVAL AND INSTALLATION



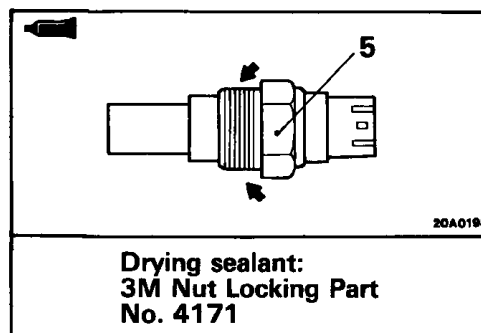
1. Passenger compartment temperature sensor
2. Photo sensor*1
- ↔ 3. Humidity sensor <Vehicles built from November, 1992>*1

Outside thermo sensor removal steps
<Vehicles built from November, 1992>

- Front bumper
- 4 Outside thermo sensor



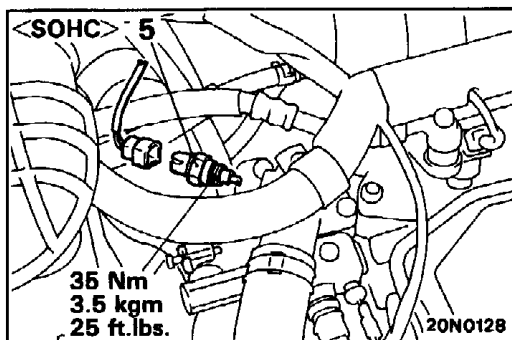
20N0237



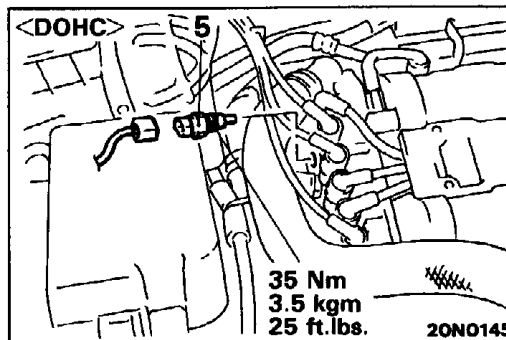
20A0198

Engine coolant temperature switch
(air conditioner cut) removal steps
<Vehicles built up to October, 1992>

- Draining and supplying of engine coolant
- 5. Engine coolant temperature switch*1 (air conditioner cut)



20N0128



20N0145

NOTE

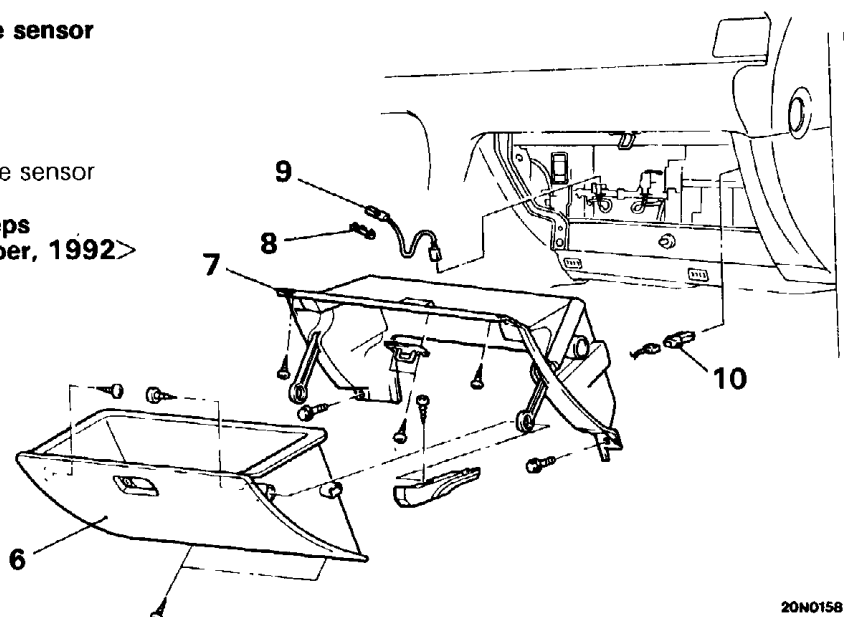
*1: Vehicles with air conditioner

Engine coolant temperature sensor removal steps

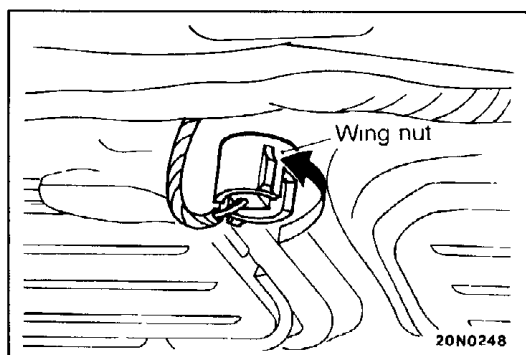
- 6. Glove box
- 7. Glove box outer case
- 8. Clip
- 9. Engine coolant temperature sensor

**Air inlet sensor removal steps
<Vehicles built up to October, 1992>**

- 6. Glove box
- 7. Glove box outer case
- 10. Air inlet sensor



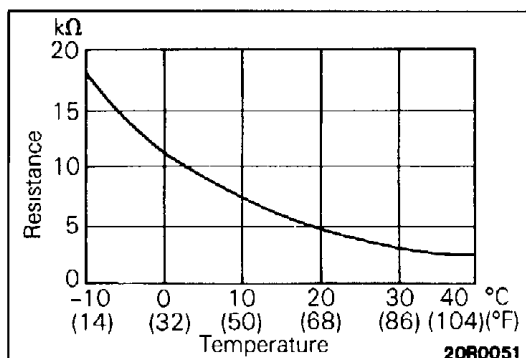
20N0158



20N0248

SERVICE POINTS OF REMOVAL**3. REMOVAL OF HUMIDITY SENSOR <Vehicles built from November, 1992>**

- (1) Turn to remove the wing nut on the back side of the rear shelf panel from the humidity sensor.
- (2) Remove the connector of the humidity sensor



20R0051

INSPECTION

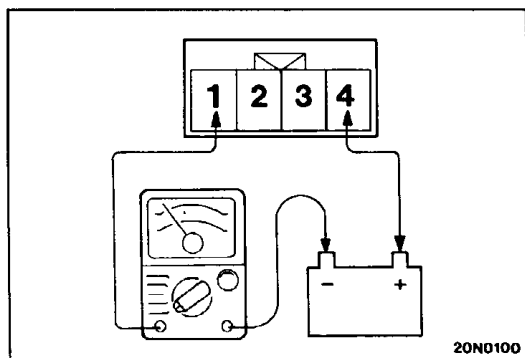
E55HCAN

PASSENGER COMPARTMENT TEMPERATURE SENSOR AND AIR INLET SENSOR <VEHICLES BUILT UP TO OCTOBER, 1992> INSPECTION

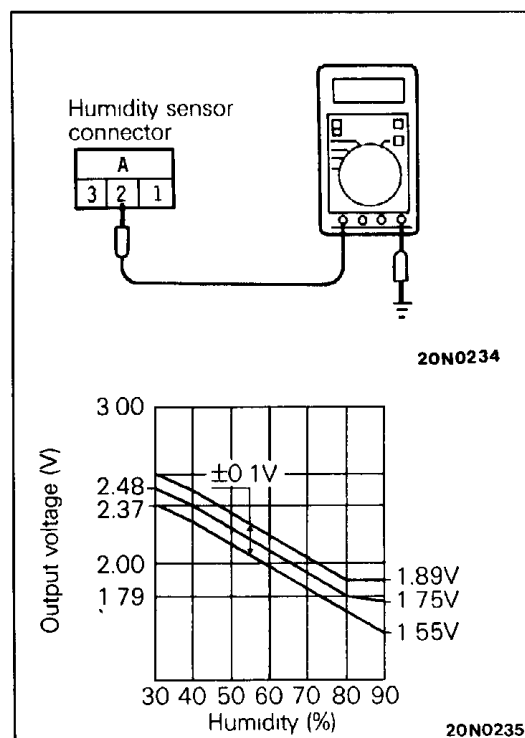
The resistance values should approximately be the same as shown in the figure when resistance values between the terminals are measured under two or more temperature conditions.

NOTE

The temperature conditions should not exceed the temperature shown in the characteristics graph at the time when the check is being made

**PHOTO SENSOR INSPECTION**

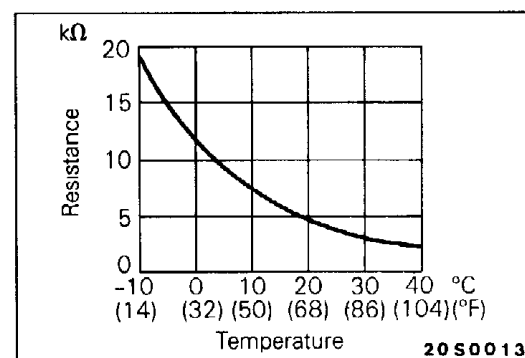
Compare the current between terminals ① and ④ when the light receiver of the photo sensor is covered by hand. If the current when the covering is removed is greater, then the sensor is normal.

**HUMIDITY SENSOR INSPECTION <Vehicles built from November, 1992>**

- (1) With the ignition switch and air conditioner switch in the ON position, check by connecting the humidity sensor connector.
- (2) The output voltage should approximately be the same as shown in the figure when output voltage of the sensor terminal 2 is measured under two or more humidity conditions

NOTE

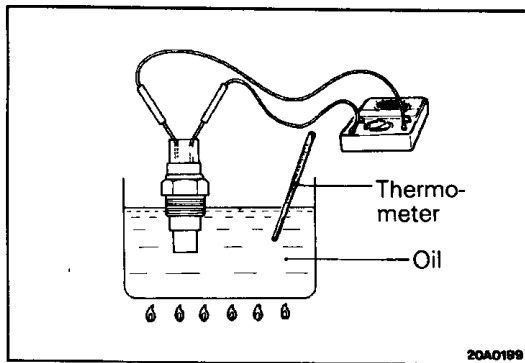
The humidity conditions should not exceed the temperature shown in the characteristics graph at the time when the check is being made

**OUTSIDE THERMO SENSOR INSPECTION <Vehicles built from November, 1992>**

The resistance values should approximately be the same as shown in the figure when resistance values between the sensor terminals are measured under two or more temperature conditions.

NOTE

The temperature conditions should not exceed the temperature shown in the characteristics graph at the time when the check is being made.



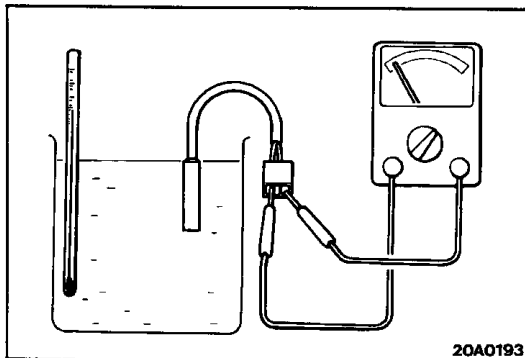
ENGINE COOLANT TEMPERATURE SWITCH CHECK (AIR CONDITIONER CUT) <Vehicles built up to October, 1992>

- (1) Remove the engine coolant temperature switch from the water outlet fitting.
- (2) Immerse the engine coolant temperature switch in oil and heat by a gas stove or similar method so as to increase the oil temperature.
- (3) Check to be sure that the engine coolant temperature switch is switched OFF when the oil temperature reaches the standard value.

Standard value: 108–115°C (226–239°F)

Caution

Use engine oil for this test; stir it well while heating, and do not heat more than necessary.



ENGINE COOLANT TEMPERATURE SENSOR CHECK

- (1) Dip the engine coolant temperature sensor in hot water and using a stove, etc., raise the water temperature.
- (2) Check that the engine coolant temperature sensor is conductive when the water temperature reaches the specified temperature.

Standard value: 29.5–42.5° (85.1–108.5°F)

E55KA--

BLOWER ASSEMBLY**REMOVAL AND INSTALLATION****Pre-removal and Post-installation Operation**

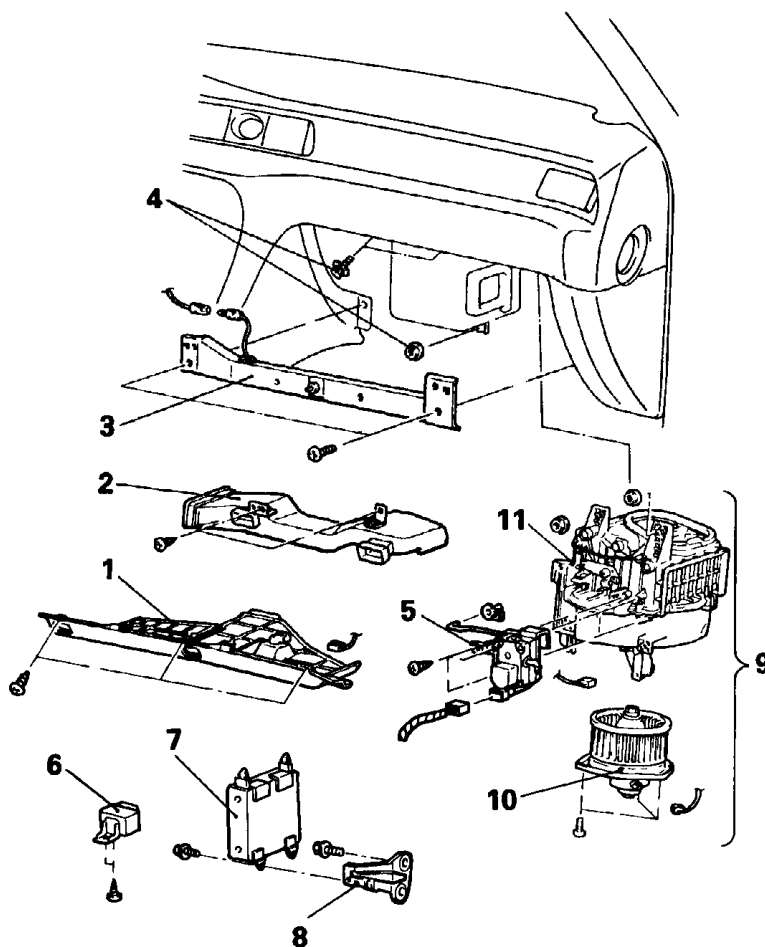
- Removal and Installation of the Glove Box and Glove Box Outer Case (Refer to GROUP 52 – Instrument Panel.)

Removal steps

1. Passenger side under cover
2. Foot shower duct
3. Glove box flame
4. Evaporator mounting bolt and nut
5. Inside/outside air changeover damper motor assembly
6. MPI control relay
7. MPI control unit
8. Instrument panel passenger side lower bracket
9. Blower assembly
- ◆◆ 10. Blower motor assembly
11. Blower case

Removal steps of Blower motor assembly

1. Passenger side under cover
2. Foot shower duct
- ◆◆ 10. Blower motor assembly

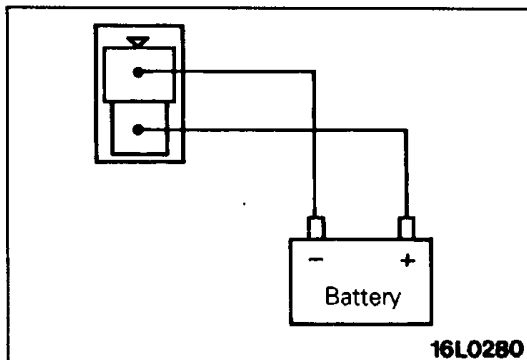


20N0156

INSPECTION

E55KCAG

- Check for bending or abnormal deflection of the rotating shaft of the blower motor assembly.
- Check for cracking or deterioration of the packing.
- Check for damage to the fan.
- Check for damage to the blower case.
- Check the operation of the inside/outside air-selection damper, and for damage.

**BLOWER MOTOR ASSEMBLY CHECK**

- (1) Disconnect the blower motor terminals.
- (2) Connect the blower motor terminals directly to the battery and check that the blower motor operates smoothly.
- (3) Next, reverse the polarity and check that the blower motor operates smoothly in the reverse direction.

SERVICE POINTS OF INSTALLATION

E24KDAF

10. INSTALLATION OF BLOWER MOTOR ASSEMBLY

Before installing the blower motor assembly, carefully clean away and dust, dirt, etc. adhering to the inner surface of the blower case.

E56JA--

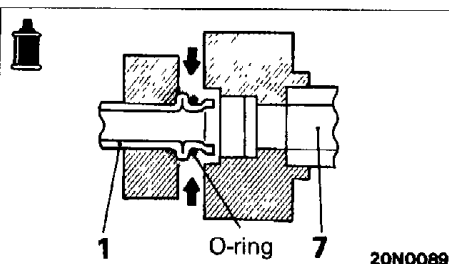
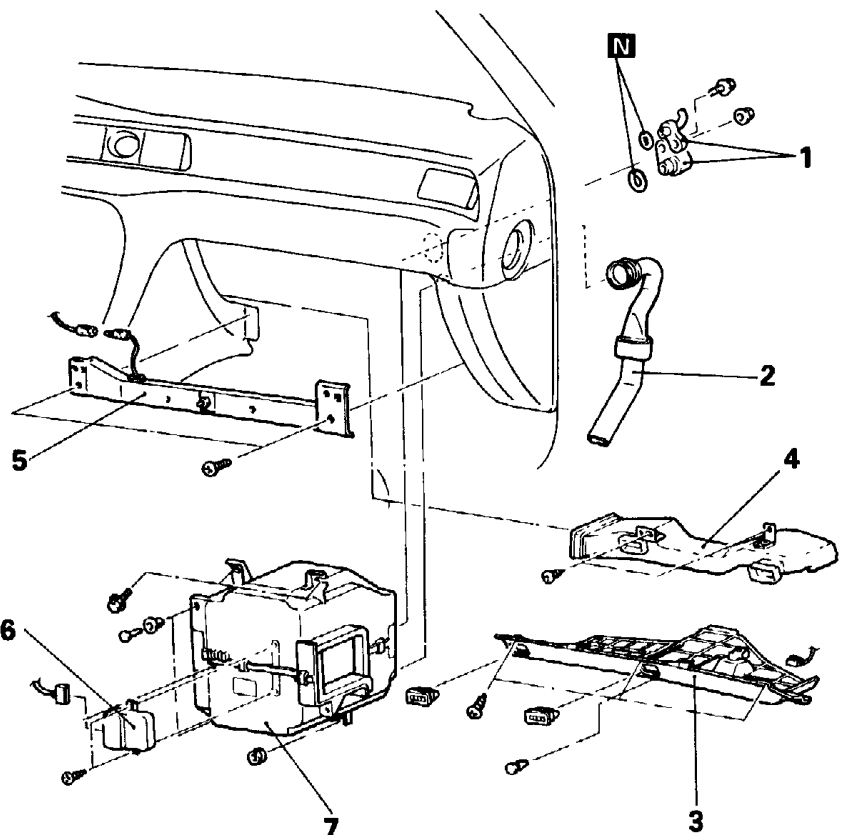
EVAPORATOR**REMOVAL AND INSTALLATION****Pre-removal and Post-installation Operation**

- Discharge and Charging of Refrigerant
(R-12: Refer to P.55-31-1, 26)
(R-134a: Refer to P.55-31-5, 31-2)
- Removal and Installation of the Glove Box and the Glove Box Outer Case (Refer to GROUP 52-Instrument panel.)

Caution
Plug refrigerant lines to prevent air from mixing when disconnecting them.

Removal steps

1. Discharge pipe and suction hose
2. Drain hose
3. Passenger side under cover
4. Foot shower duct
5. Glove box frame
6. Belt lock controller <DOHC>
- ◆◆ 7. Evaporator



Compressor oil:
<Vehicles using R-12 refrigerant
FREOL S-83 or SUNISO 5GS
<Vehicles using R-134a refrigerant>
SUN PAG 56

20N0155

INSPECTION

E55JFAB

- Check for damage of the evaporator fin part.
- Check for damage or collapse of the drain hose.
- Check for peeling or cracking of the insulator.

SERVICE POINTS OF INSTALLATION

7. INSTALLATION OF EVAPORATOR

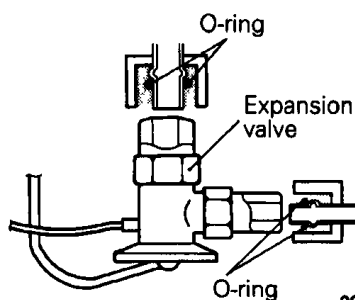
When replacing the evaporator with new one, refill the evaporator with a specified amount of compressor oil and install it (to the vehicle).

Compressor oil: <Vehicles using R-12 refrigerant>
FREOL S-83 or SUNISO 5GS
<Vehicles using R-134a refrigerant>
SUN PGA 56

Quantity: 60 cc (3.66 cu.in.)

DISASSEMBLY AND REASSEMBLY

E55JC--



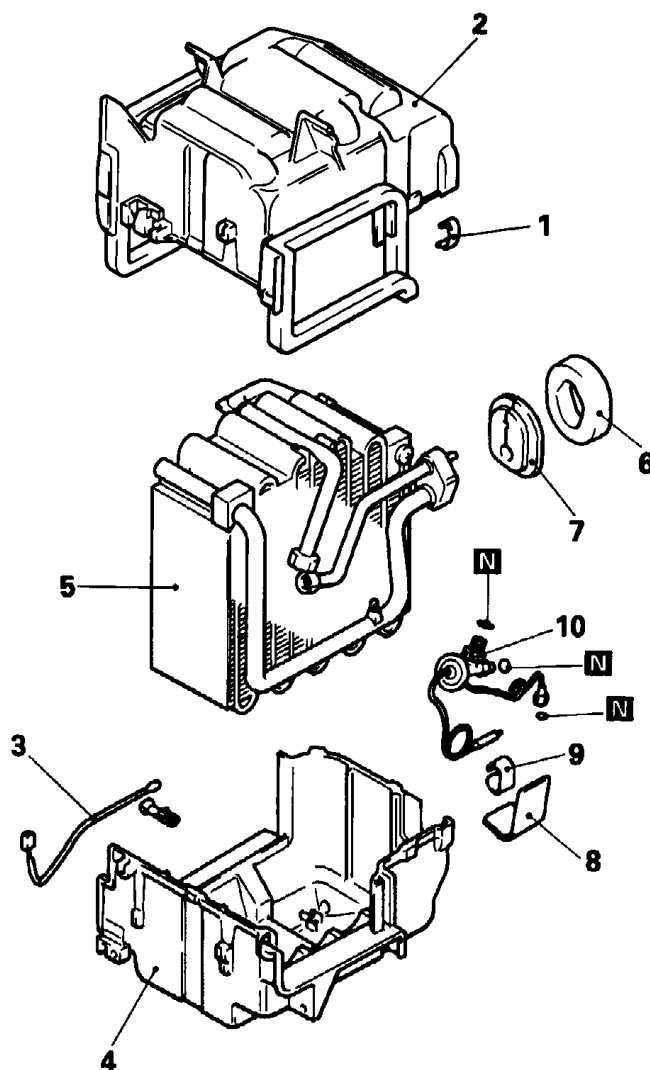
20N0148

Compressor oil:
<Vehicles using R-12 refrigerant>
FREOL S-83 or SUNISO 5GS
<Vehicles using R-134a refrigerant>
SUN PAG 56

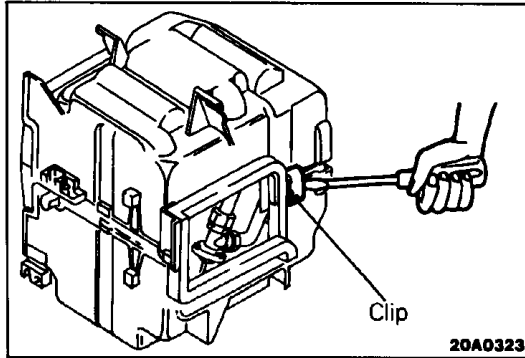
Disassembly steps



1. Clips
2. Evaporator case (upper)
3. Fin thermo sensor
4. Evaporator case (lower)
5. Evaporator assembly
6. Grommet
7. Insulator
8. Rubber insulator
9. Clip
10. Expansion valve



20N0149

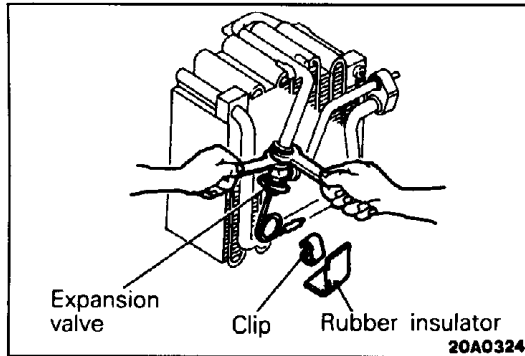


SERVICE POINTS OF DISASSEMBLY

E55JDAB

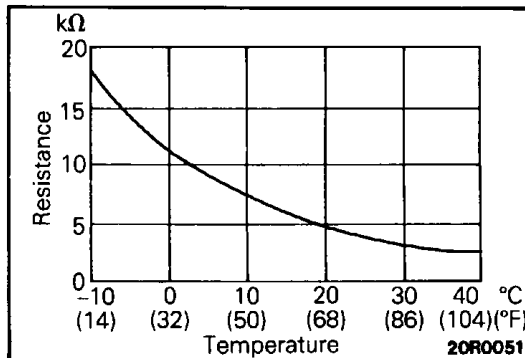
1. REMOVAL OF CLIPS

Remove the clips with a flat-blade screwdriver covered with a shop towel to prevent damage to case surfaces.



10. REMOVAL OF EXPANSION VALVE

Loosen the flare nut by using two wrenches (for both the inlet and outlet).



INSPECTION

E55JFAG

FIN THERMO SENSOR CHECK

The resistance between the sensor terminals should be basically equal to the values in the figure at left when the temperature is measured in at least two points.

NOTE

The temperature condition when measuring should not exceed the range indicated in the figure.

COMPRESSOR

E55LA--

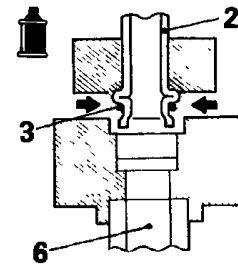
REMOVAL AND INSTALLATION

<SOHC>

Caution
Plug refrigerant lines to prevent air from mixing when disconnecting them.

Post-installation Operation

- Adjustment of the Compressor Drive Belt (Refer to P.55-25.)



20N0089

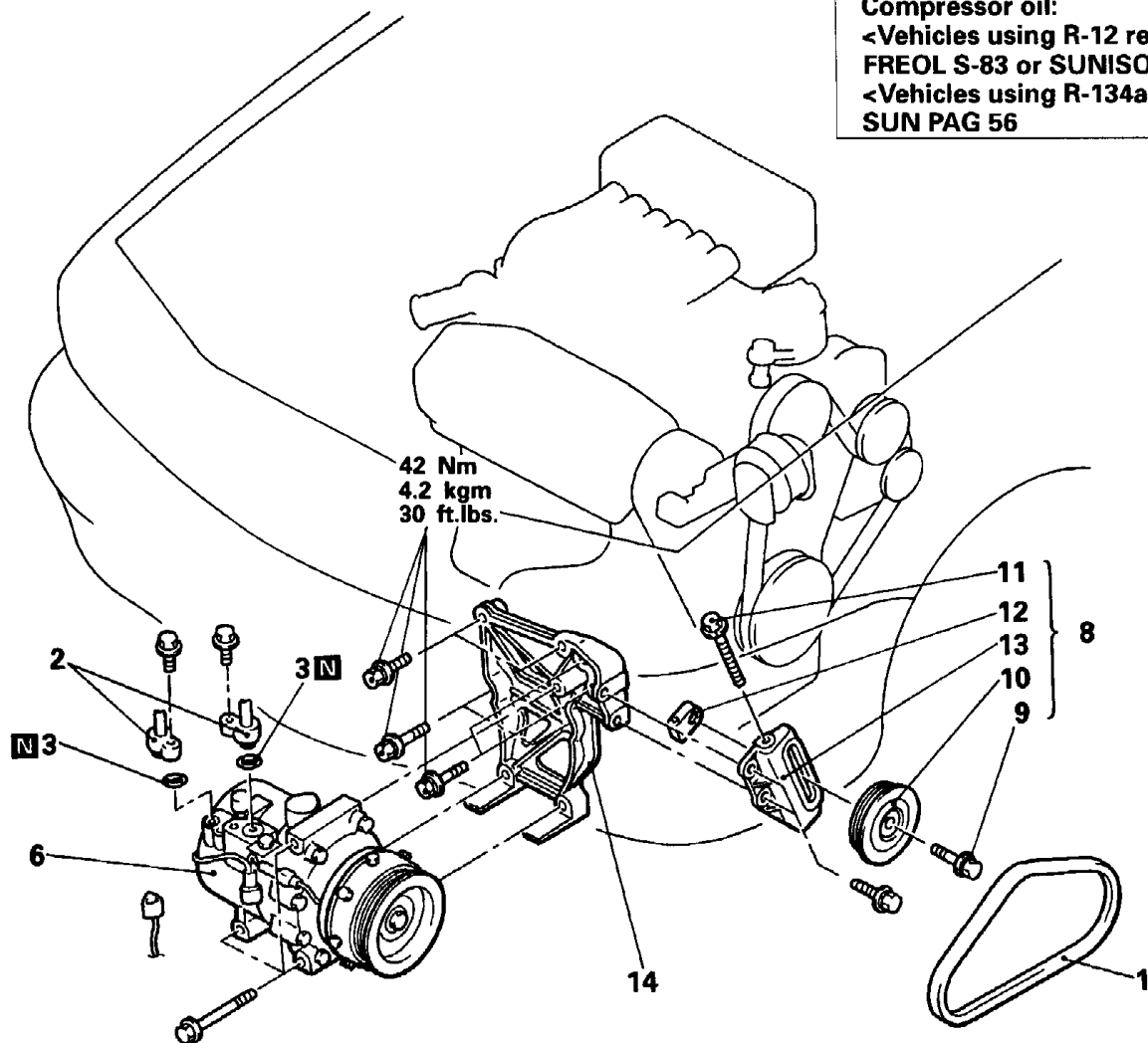
Compressor oil:

<Vehicles using R-12 refrigerant>

FREOL S-83 or SUNISO 5GS

<Vehicles using R-134a refrigerant>

SUN PAG 56



20N0021

Removal steps of compressor

- Discharge and charging of refrigerant
(R-12: Refer to P.55-31-1, 26)
(R-134a: Refer to P.55-31-5, 31-2)

- ◄◄ 1. Compressor drive belt
- ◄◄ 2. High pressure and suction hose connections
- ◄◄ 3. O-rings
- ◄◄ ◄◄ 6. Compressor
- ◄◄ 8. Tension pulley assembly
- 14. Compressor bracket

Removal steps of tension pulley

- 1. Compressor drive belt
- 8. Tension pulley assembly
- 9. Tension pulley installation bolt
- 10. Tension pulley
- 11. Bolt
- 12. Adjustment plate
- 13. Tension pulley bracket

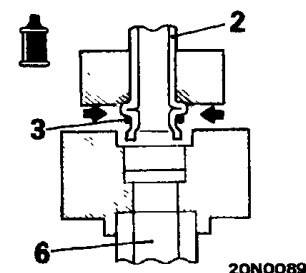
<DOHC>

Pre-removal Operation

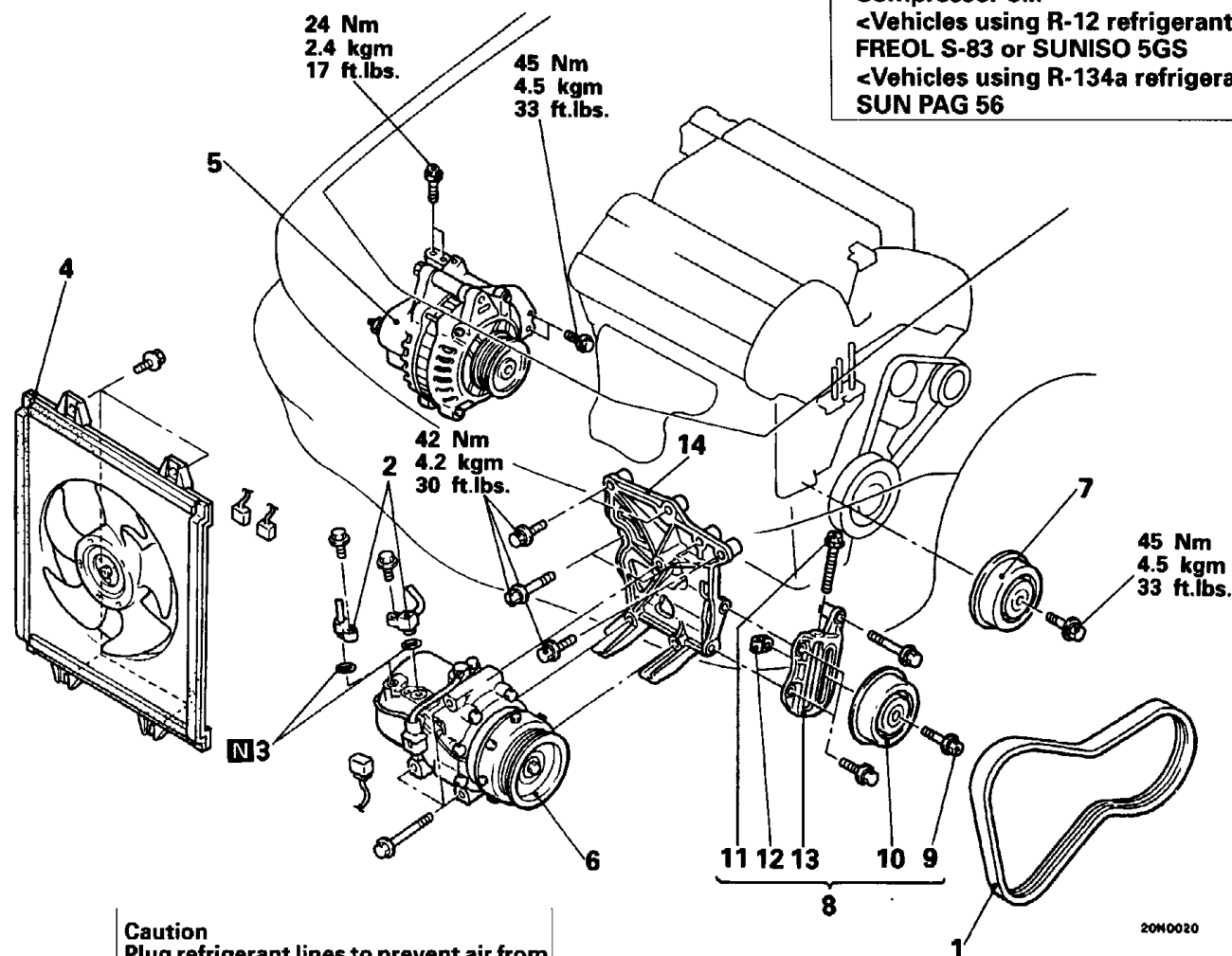
- Removal of Radiator Upper Insulator

Post-installation Operation

- Adjustment of the Compressor Drive Belt (Refer to P.55-25.)
- Installation of Radiator Upper Insulator



Compressor oil:
 <Vehicles using R-12 refrigerant>
 FREOL S-83 or SUNISO 5GS
 <Vehicles using R-134a refrigerant>
 SUN PAG 56



Caution
 Plug refrigerant lines to prevent air from mixing when disconnecting them.

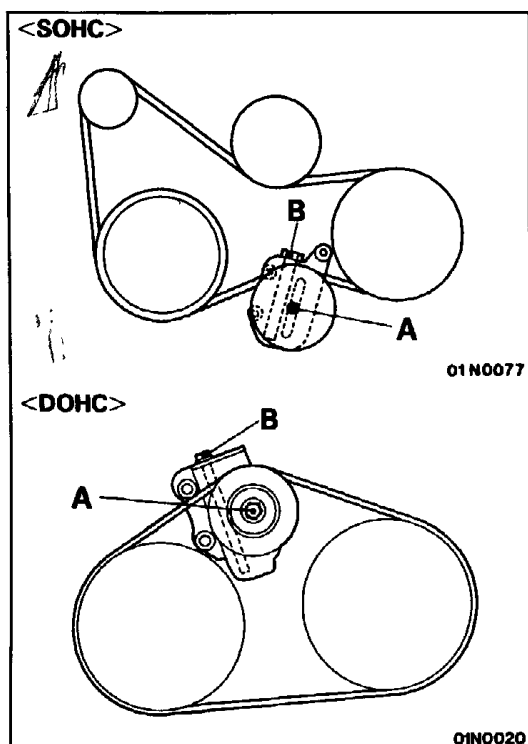
Removal steps of compressor

- Discharge and charging of refrigerant
 (R-12: Refer to P.55-31-1, 26
 (R-134a. Refer to P.55-31-5, 31-2)

- ◀▶ 1. Compressor drive belt
- ◀▶ 2. High pressure and suction hose connections
- 3. O-rings
- 4. Condenser fan assembly
- 5. Alternator (Refer to GROUP 16 – Alternator.)
- ◀▶ ▶▶▶ 6. Compressor
- 8. Tension pulley assembly
- 14. Compressor bracket

Removal steps of tension pulley

- 1. Compressor drive belt
- 8. Tension pulley assembly
- 9. Tension pulley installation bolt
- 10. Tension pulley
- 11. Bolt
- 12. Adjustment plate
- 13. Tension pulley bracket

**SERVICE POINTS OF REMOVAL**

E55LFAE

1. REMOVAL OF COMPRESSOR DRIVE BELT

- (1) Loosen bolt "A" for holding the tension pulley.
- (2) Loosen bolt "B" for adjustment, and remove the compressor drive belt.

2. REMOVAL OF SUCTION HOSE

If the hoses or pipes are disconnected, cap the hoses or pipes with a blank plug to prevent entry of dust, dirt, and water.

6. REMOVAL OF COMPRESSOR

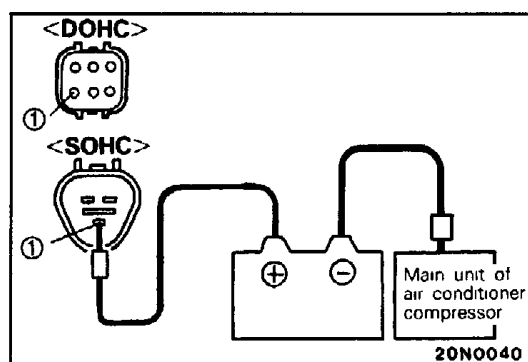
When doing this work, be careful not to spill the compressor oil.

For DOHC engines, remove the compressor with the compressor mounting bolt set in the compressor.

INSPECTION

E55LGAE

- Checking for heat damage of the tension pulley.
- Check for excessive play or deflection of the tension pulley.
- Check for unusual wear of the tension pulley.
- Check for hardening of the air conditioner belt.
- Check for unusual wear or abrasion of the air conditioner belt.

**OPERATION CHECK OF THE COMPRESSOR'S MAGNETIC CLUTCH**

- (1) Connect terminal ① at the compressor side to the positive (+) terminal of the battery, and earth the negative (-) terminal of the battery to the compressor.
- (2) The condition of the compressor's magnetic clutch can be considered satisfactory if the operation sound (a "click" sound) of the magnetic clutch can be heard when this check is made.

SERVICE POINTS OF INSTALLATION

E56LHAE

6. INSTALLATION OF COMPRESSOR

- (1) If a new compressor is installed, first adjust the amount of oil according to the procedures described below, and then install the compressor.

① Measure the amount (X cc) of oil within the removed compressor.

② Wipe away (from the new compressor) the amount of oil calculated according to the following formula, and then install the new compressor.

<Vehicles using R-12 refrigerant>

New compressor oil amount

$160 \text{ cc (9.8 cu.in.)} - X \text{ cc} = Y \text{ cc}$

<Vehicles using R-134a refrigerant>

New compressor oil amount

$170 \text{ cc (10.4 cu.in.)} - X \text{ cc} = Y \text{ cc}$

NOTE

(1) Ycc indicates the amount of oil in the refrigerant line, the condenser, the cooling unit, etc.

(2) When replacing the following parts at the same time as the compressor, subtract the rated oil amount of the each part from Y cc and discharge from the new compressor.

Quantity:

Evaporator: 60 cc (3.66 cu.in.)

Condenser: 15 cc (0.92 cu.in.)

Suction hose: 10 cc (0.61 cu.in.)

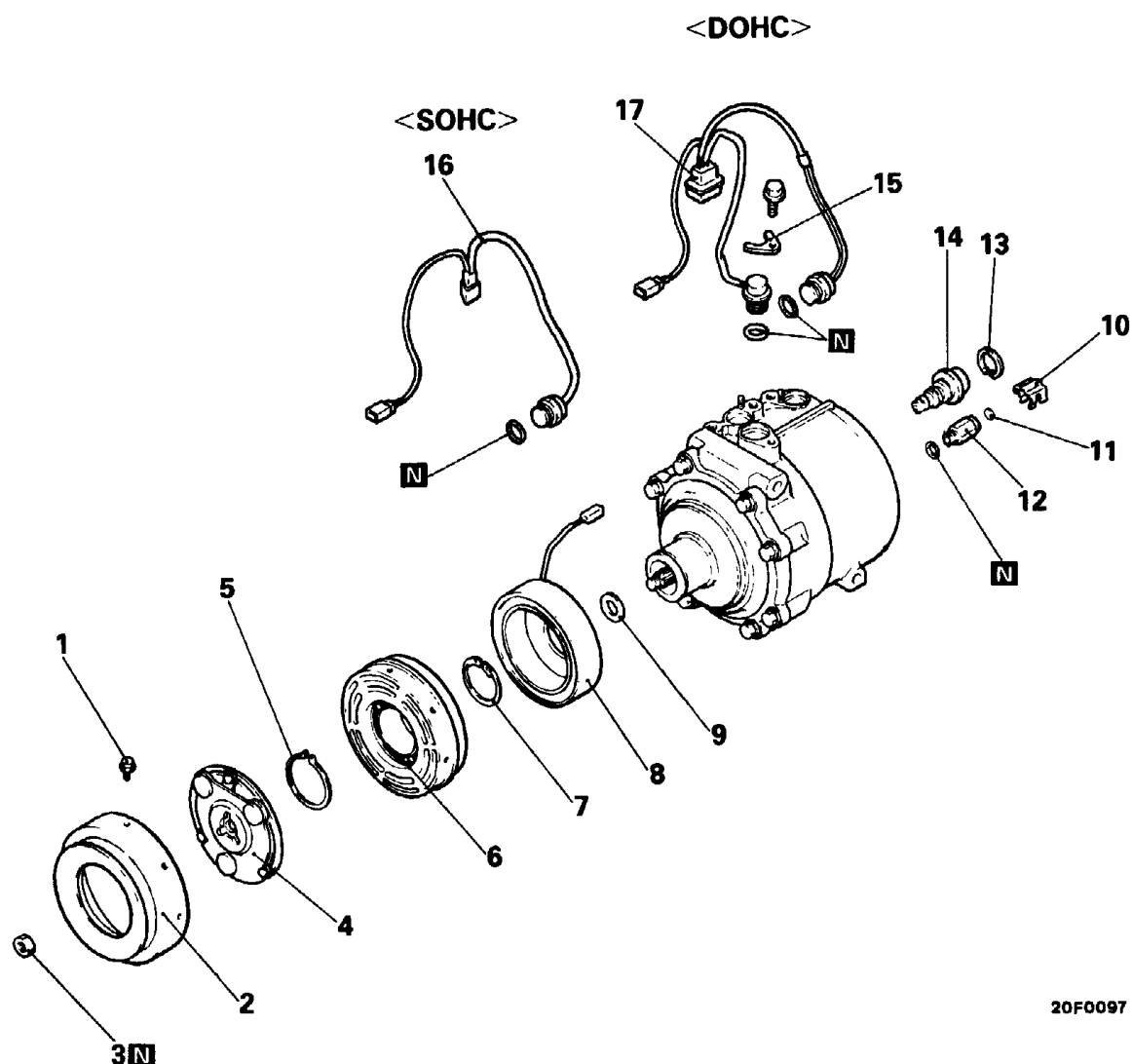
Receiver: 10 cc (0.61 cu.in.)

- (2) For DOHC engines, install the compressor with the compressor mounting bolt set in the compressor.

DISASSEMBLY AND REASSEMBLY

E55LB-

<Vehicles using R-12 refrigerant>



20F0097

Magnetic clutch disassembly steps

1. Bolts
2. Pulley
3. Nut
4. Armature plate
5. Snap ring
6. Rotor
7. Snap ring
8. Clutch coil
9. Shims

High pressure relief valve disassembly steps

10. Cover
11. Dust cover
12. High pressure relief valve

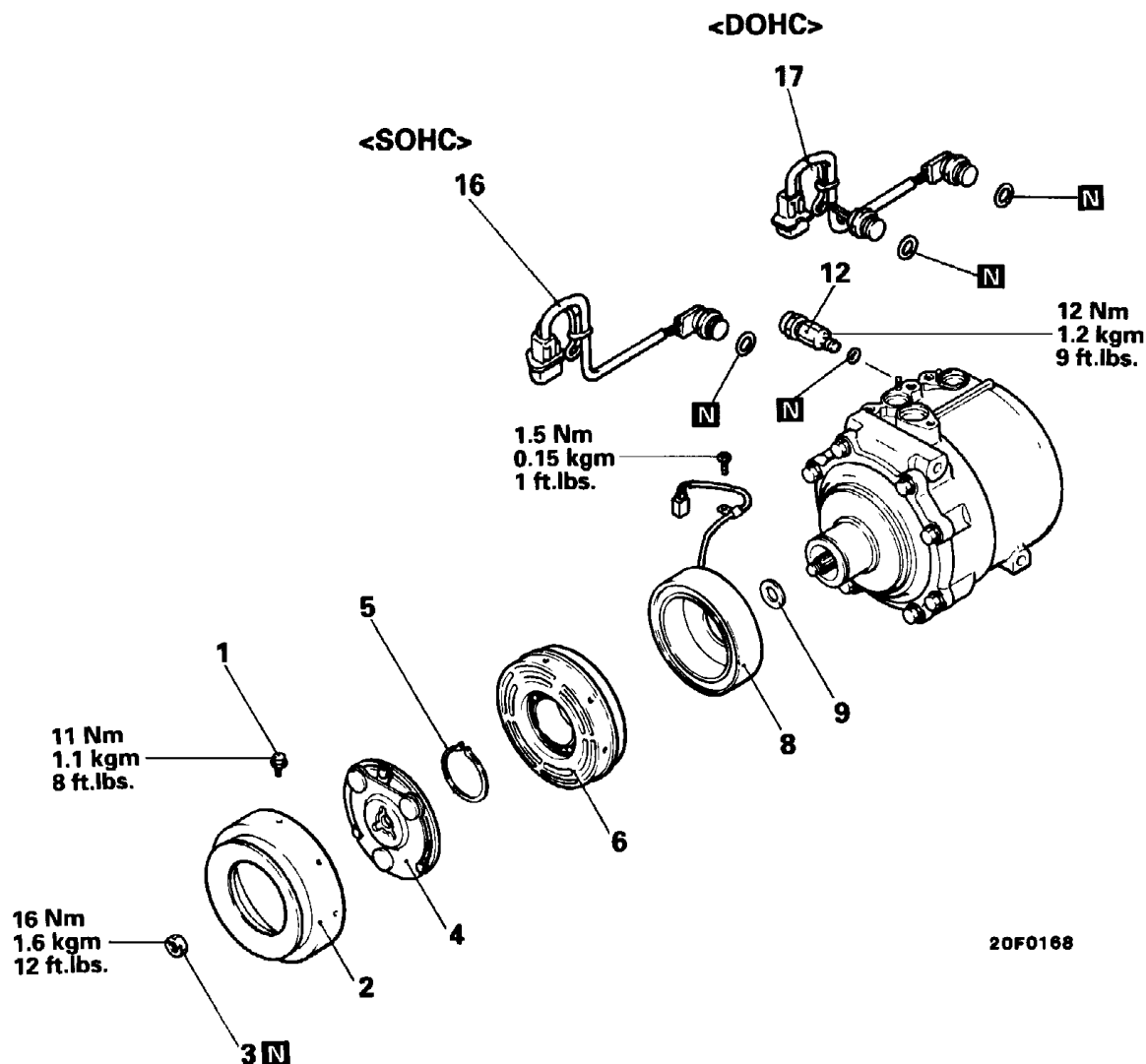
Control valve disassembly steps

13. Snap ring
14. Control valve

Thermostat and revolution pick up sensor disassembly steps

15. Plate <DOHC>
16. Thermostat <SOHC>
17. Thermostat and revolution pick up sensor <DOHC>

<Vehicles using R-134a refrigerant>



20F0168

Magnetic clutch disassembly steps

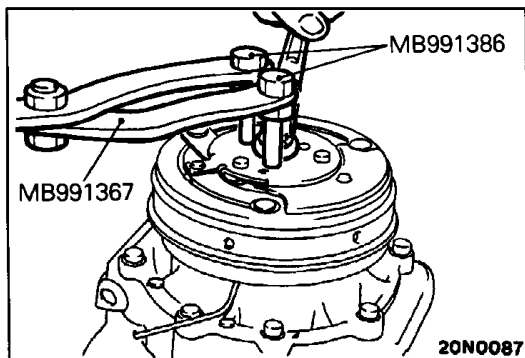
1. Bolts
2. Pulley
- Air gap adjustment
3. Nut
4. Armature plate
5. Snap ring
6. Rotor
8. Clutch coil
9. Shims

Thermostat and revolution pick up sensor disassembly steps

16. Thermostat <SOHC>
17. Thermostat and revolution pick up sensor <DOHC>

High pressure relief valve disassembly

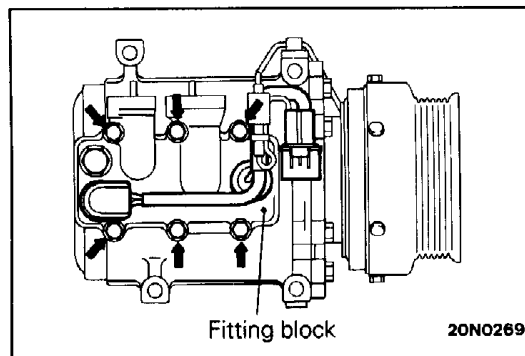
12. High pressure relief valve



SERVICE POINTS OF DISASSEMBLY

E55LCAJ

3. REMOVAL OF NUT



16. REMOVAL OF THERMOSTAT <SOHC>/17. THERMOSTAT AND REVOLUTION PICK UP SENSOR <DOHC>

In case of vehicles using refrigerant R-134a, remove the thermostat and revolution pick up sensor according to the following procedure:

- (1) Remove the fitting block from the compressor.
- (2) Remove the snap ring from the inside of the fitting block, and remove the thermostat from the fitting block.
- (3) Remove the revolution pick up sensor from the fitting block.

INSPECTION

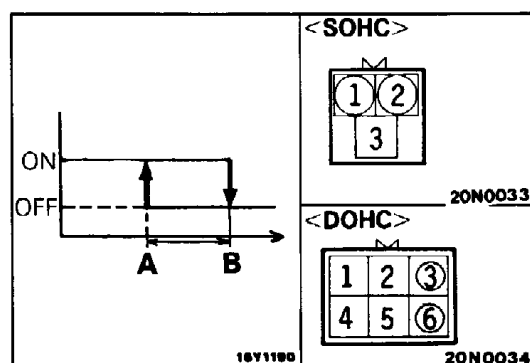
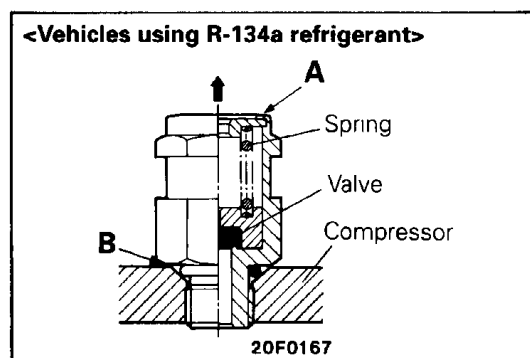
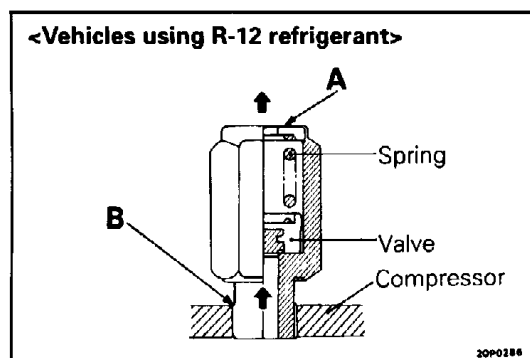
E55LDAF

- Check the surface of the armature for scoring or bluing.
- Check the surface of the rotor for scoring or bluing.
- Check the sealing surfaces for cracks, scratches and deformation.
- Check the front housing for cracks or scoring on the sealing surfaces.
- Check the compressor shaft for scoring.

HIGH PRESSURE RELIEF VALVE CHECK

The high pressure relief valve is a safety feature which releases part of the refrigerant inside the system into the atmosphere when the high pressure level exceeds 3,550 kPa (35.5 kg/cm², 505 psi): R-12, 3,740 kPa (37.4 kg/cm², 532 psi): R-134a during air conditioner operation. Once the pressure inside the system has been reduced to 2,400 kPa (24.0 kg/cm², 341 psi): R-12, 2,940 kPa (29.4 kg/cm², 418 psi): R-134a or lower, the high pressure relief valve closes, thus allowing continued operation.

- (1) If a leak is detected at section A, replace the high pressure relief valve. The valve can be used unless there is a leak from that section.
- (2) If a leak is detected at section B, retighten the valve. If the leak still persists after retightening the valve, replace the packing.



REFRIGERANT TEMPERATURE SENSOR CHECK

- (1) Dip the refrigerant temperature sensor in engine oil.
- (2) Check for continuity across terminals ① and ② <SOHC> or ③ and ⑥ <DOHC> when the engine oil is heated.

Standard value:

<Vehicles using R-12 refrigerant>

Continuity at

approx. 110°C (230°F) or less at A point

No continuity at

approx. 155°C (311°F) or more at B point

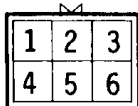
<Vehicles using R-134a refrigerant>

Continuity at

approx. 130°C (226°F) or less at A point

No continuity at

approx. 160°C (320°F) or more at B point



20N0034

REVOLUTION PICK UP SENSOR CHECK

Measure the resistance between terminals ② and ⑤ of the connector.

Normal resistance: $405 \pm 35 \Omega$ when ambient temperature is 20°C (68°F)

If the measurement deviates greatly from the above resistance, replace the revolution pick up sensor assembly.

CONTROL VALVE CHECK

The control valve detects a low pressure level during the operation of the air conditioner, and adjusts the amount of refrigerant to be bypassed.

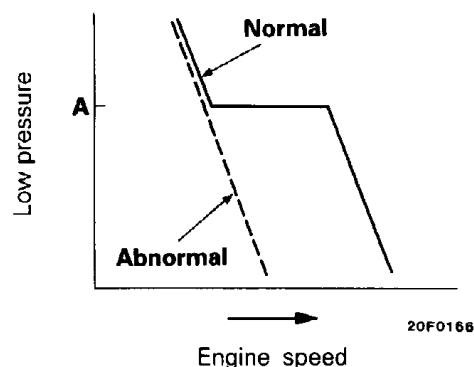
NOTE

In case of vehicles using refrigerant R-134a, the control valve is incorporated in the compressor.

- (1) Operate the air conditioner under a high temperature load condition (when vehicle interior temperature is high).
- (2) Connect a low pressure gauge to the air compressor.
- (3) Operate the air conditioner with the engine running at idle.
- (4) Gradually increase the engine speed while observing the low pressure gauge.

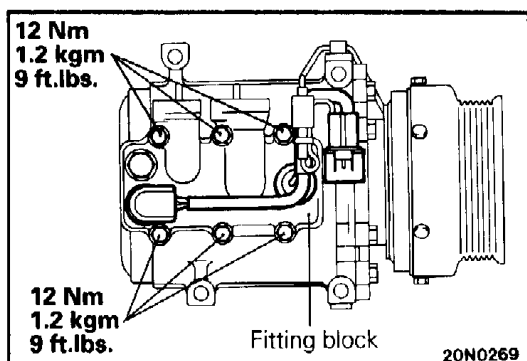
If the valve is normal, the low pressure drops slowly as the engine speed increases until a pressure of 180 kPa (1.8 kg/cm², 25 psi): R-12, 150–200 kPa (1.5–2.0 kg/cm², 20–30 psi): R-134a is reached, at which point the pressure temporarily ceases to drop. Then, the pressure again starts dropping as the engine speed further increases.

If the valve is abnormal, the low pressure drops in direct proportion to the increase in engine speed without temporary leveling off at the 180 kPa (1.8 kg/cm², 25 psi): R-12, 150–200 kPa (1.5–2.0 kg/cm², 20–30 psi): R-134a pressure level. If the low pressure drops like this, replace the control valve.



20F0166

**A: <Vehicles using R-12 refrigerant>
180 kPa (1.8 kg/cm², 25 psi)
<Vehicles using R-134a refrigerant>
150–200 kPa (1.5–2.0 kg/cm²,
20–30 psi)**



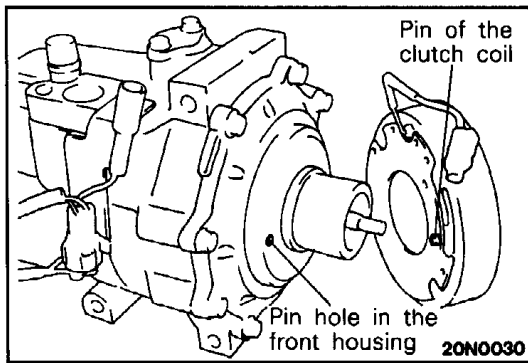
20N0269

SERVICE POINTS OF REASSEMBLY

E55LEAI

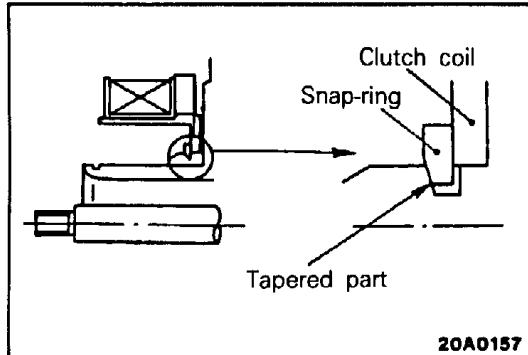
17. INSTALLATION OF THERMOSTAT AND REVOLUTION PICK UP SENSOR <DOHC> / 16. THERMOSTAT <SOHC>

- (1) Clamp the revolution pickup sensor and the thermostat in the fitting block, and then clamp the snap ring from the inside.
- (2) Tighten the fitting block to the specified torque.

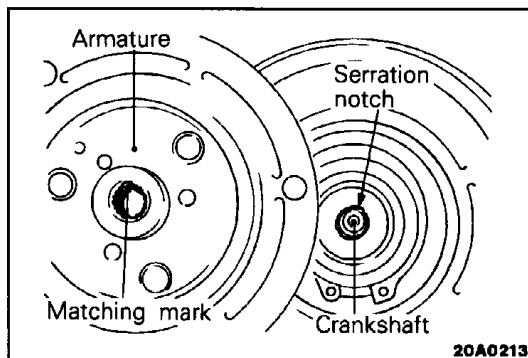


8. INSTALLATION OF CLUTCH COIL

- (1) Align the pin of the clutch coil with the pin hole in the front housing, and then fit it into the hole.

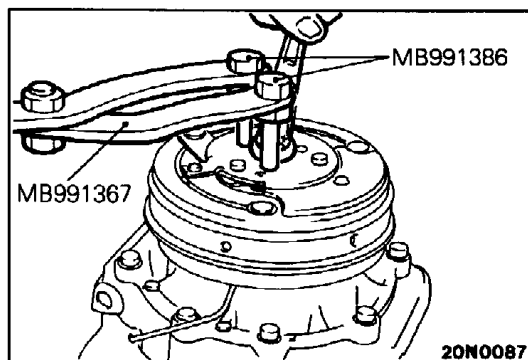


- (2) Install the snap ring so that the tapered surface is at the outer side.

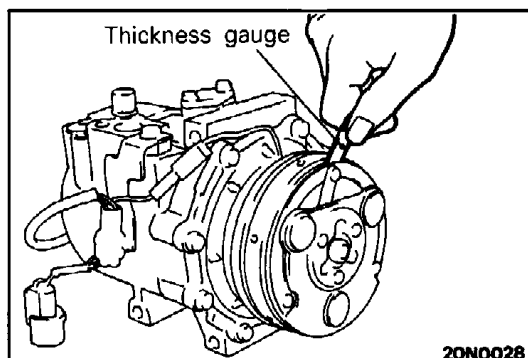


4. INSTALLATION OF ARMATURE PLATE

Align the mating mark of the crankshaft spline and the mating mark of the armature plate, and then fit them together.



3. INSTALLATION OF NUT



AIR GAP ADJUSTMENT

Check whether or not the air gap of the clutch is within the standard value.

Standard value:

<Vehicles using R-12 refrigerant>

0.4 – 0.65 mm (0.016 – 0.026 in.)

<Vehicles using R-134a refrigerant>

0.4 – 0.6 mm (0.016 – 0.024 in.)

NOTE

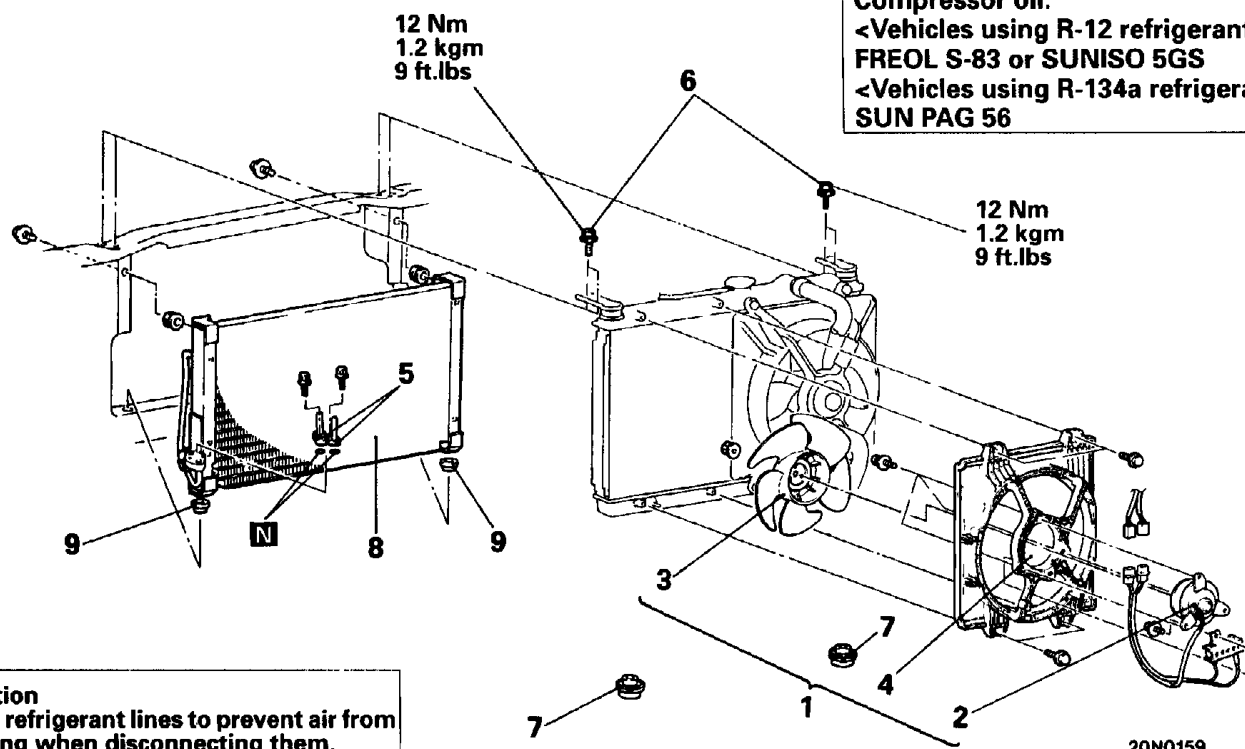
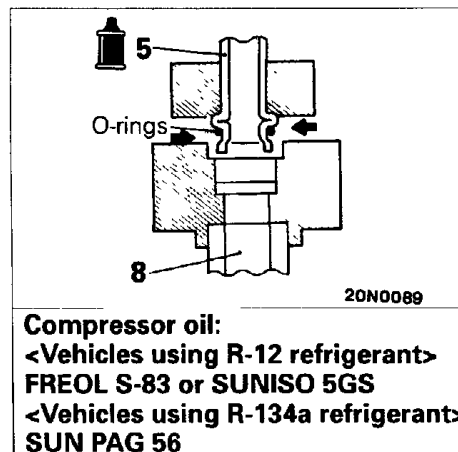
If there is a deviation of the air gap from the standard value, make the necessary adjustment by adjusting the number of shims.

CONDENSER AND CONDENSER FAN MOTOR

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation

- Discharge and Charging of Refrigerant (R-12: Refer to P.55-31-1, 26)
(R-134a: Refer to P.55-31-5, 31-2)
- Removal and Installation of the Radiator Grille (Refer to GROUP 51 – Radiator Grille.)



Caution
 Plug refrigerant lines to prevent air from mixing when disconnecting them.

Removal steps

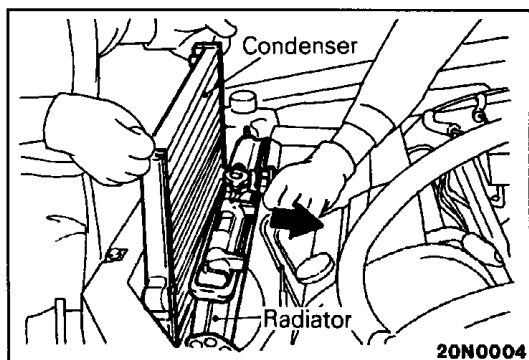
1. Condenser fan motor
2. Fan motor assembly
3. Fan
4. Shroud
5. Connection for the liquid pipe and liquid hose
6. Insulator mounting bolt
7. Lower insulator
8. Condenser
9. Bushings

**SERVICE POINTS OF REMOVAL**

E55NBAH

5. DISCONNECTION OF CONNECTION OF THE LIQUID PIPE AND LIQUID HOSE

Plug the disconnected hose and pipes and the openings of the condenser in order to prevent dust, dirt and other foreign materials from entering.



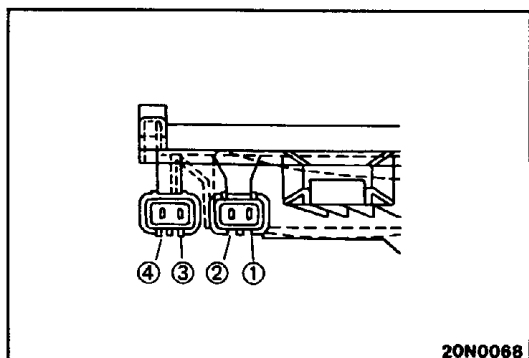
8. REMOVAL OF CONDENSER

Move the radiator toward the engine, and then remove the condenser upward.

INSPECTION

E55NEAA

- Check the condenser fin for crushing or other damage.
- Check the condenser's high-pressure hose and pipe installation parts for damage or deformation.
- Check the condenser fan shroud for damage.



CONDENSER FAN MOTOR CHECK

Apply battery voltage to terminal ③ and check that the condenser fan motor turns when terminal ④ is earthed.

RESISTOR CHECK

Measure the resistance between terminals ① and ②.

Standard value: 0.29Ω

SERVICE POINTS OF INSTALLATION

8. INSTALLATION OF CONDENSER

When replacing the condenser with a new one, refill the condenser with a specified amount of compressor oil and install it (to the vehicle).

Compressor oil: <Vehicles using R-12 refrigerant>
FREOL S-83 or SUNISO 5GS
<Vehicles using R-134a refrigerant>
SUN PAG 56

Quantity: 60 cc (3.66 cu.in.)

REFRIGERANT LINE

REMOVAL AND INSTALLATION

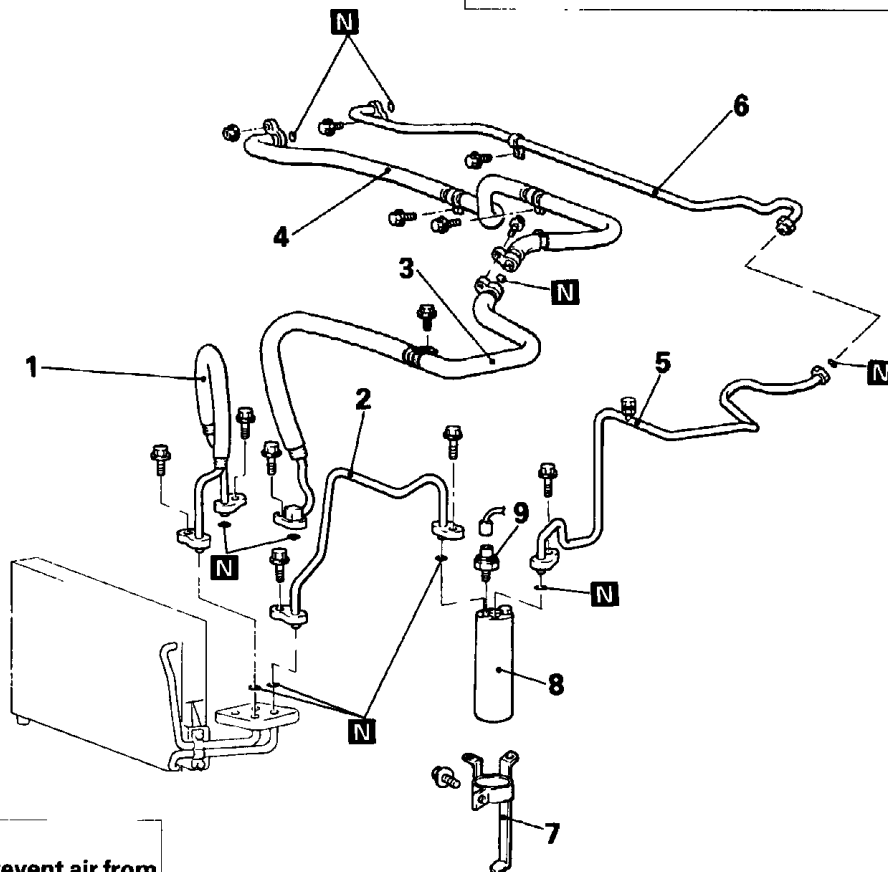
<LH drive vehicles>

Pre-removal Operation

- Discharge of Refrigerant
(R-12: Refer to P.55-31-1)
(R-134a: Refer to P.55-31-5)

Post-installation Operation

- Charging of Refrigerant
(R-12: Refer to P.55-26)
(R-134a: Refer to P.55-31-2)
- Checking for Gas Leakage
- Performance Test (Refer to P.55-32.)



Caution
Plug refrigerant lines to prevent air from mixing when disconnecting them.

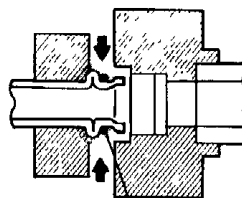
20N0120

Removal steps

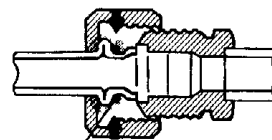
1. Discharge hose
2. Liquid pipe A
- ◆◆ 3. Suction hose
4. Suction pipe
5. Liquid pipe B
6. Liquid pipe C
7. Receiver bracket
- ◆◆ 8. Receiver
9. Dual-pressure switch



Piping assembly



O-ring



O-ring

20N0089

Compressor oil:

<Vehicles using R-12 refrigerant>

FREOL S-83 or SUNISO 5GS

<Vehicles using R-134a refrigerant>

SUN PAG 56

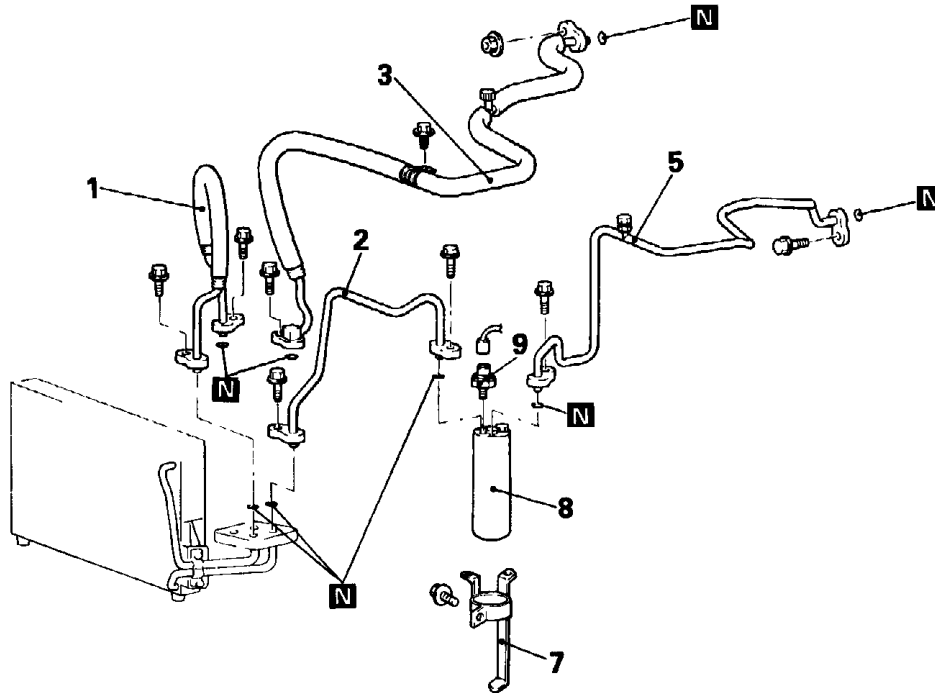
< RH drive vehicles >

Pre-removal Operation

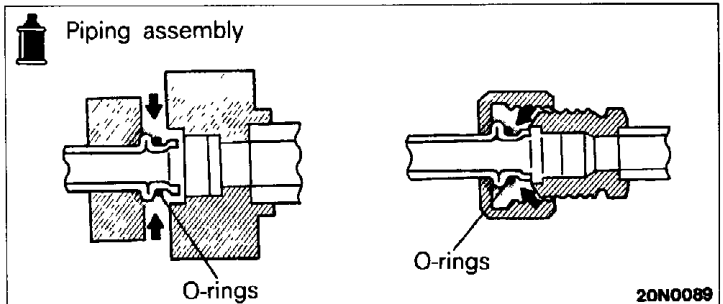
- Discharge of Refrigerant
(R-12: Refer to P.55-31-1)
(R-134a: Refer to P.55-31-5)

Post-installation Operation

- Charging of Refrigerant
(R-12: Refer to P.55-26)
(R-134a: Refer to P.55-31-2)
- Checking for Gas Leakage
- Performance Test (Refer to P.55-32.)



20N0119



20N0089

Compressor oil:

<Vehicles using R-12 refrigerant>

FREOL S-83 or SUNISO 5GS

<Vehicles using R-134a refrigerant>

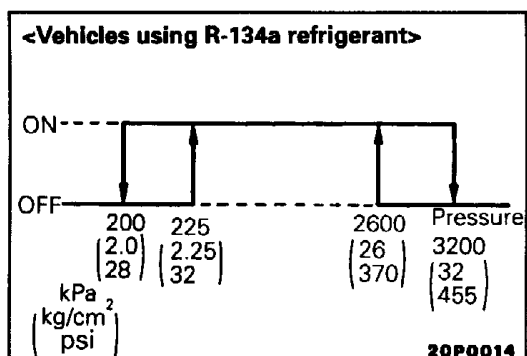
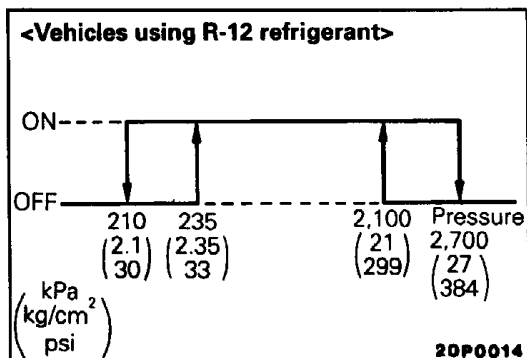
SUN PAG 56

Caution

Plug refrigerant lines to prevent air from mixing when disconnecting them.

Removal steps

1. Discharge hose
2. Liquid pipe A
- ◆◆ 3. Suction hose
5. Liquid pipe B
7. Receiver bracket
- ◆◆ 8. Receiver
9. Dual-pressure switch



INSPECTION

E55NEAB

DUAL PRESSURE SWITCH CHECK

Measure the pressure at the high pressure side. When the dual pressure switch is ON as in the figure at left, and if there is continuity between the dual pressure switch terminals, then the condition is normal; if there is no continuity, replace the switch.

SERVICE POINTS OF INSTALLATION

8. INSTALLATION OF RECEIVER/3. SUCTION HOSE

When replacing the suction hose, or the receiver with new ones, refill them with a specified amount of compressor oil, and then install each of them.

Compressor oil: <Vehicles using R-12 refrigerant>

FREOL S-83 or SUNISO 5GS

<Vehicles using R-134a refrigerant>

SUN PAG 56

Quantity:

Suction hose: 10 cc (0.61 cu.in.)

Receiver: 10 cc (0.61 cu.in.)

NOTES

VENTILATORS (INSTRUMENT PANEL AND FLOOR)

E55MA--

REMOVAL AND INSTALLATION

CAUTION: SRS

When removing and installing the following parts in vehicles equipped with SRS, do not let it bump against the SRS diagnostic unit or other components.

- Floor console <L.H. drive vehicles>
- Instrument panel <R.H. drive vehicles>

Pre-removal Operation

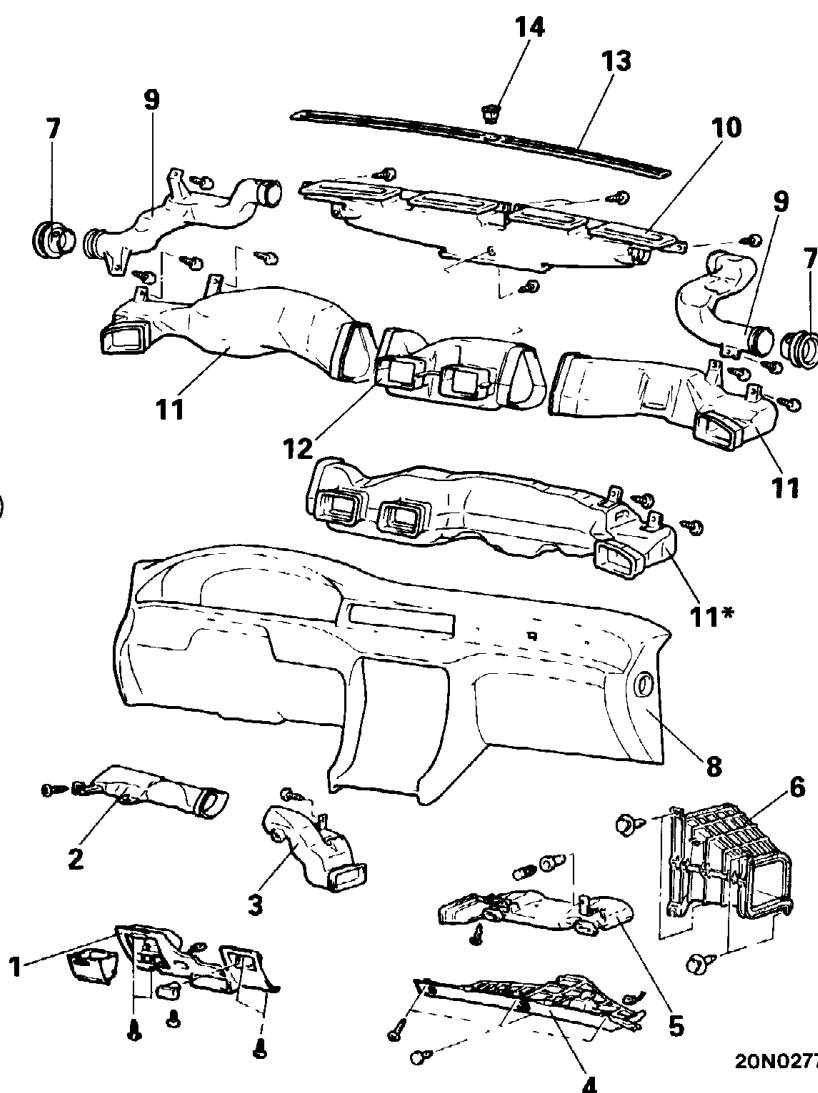
- Removal of the Front Seat (Refer to GROUP 52 – Front Seat.)
- Removal of the Floor Console (Refer to GROUP 52 – Floor Console.)
- Remove the Front Scuff Plate and the Cowl Side Trim, and then Pull up the Carpet. (Refer to GROUP 52 – Trim.)

Post-installation Operation

- Return the Front Carpet as it was, and then install the Cowl Side Trim and the Front Scuff Plate. (Refer to GROUP 52 – Trim.)
- Installation of the Floor Console (Refer to GROUP 52 – Floor Console.)
- Installation of the Front Seat (Refer to GROUP 52 – Front Seat.)

Removal steps

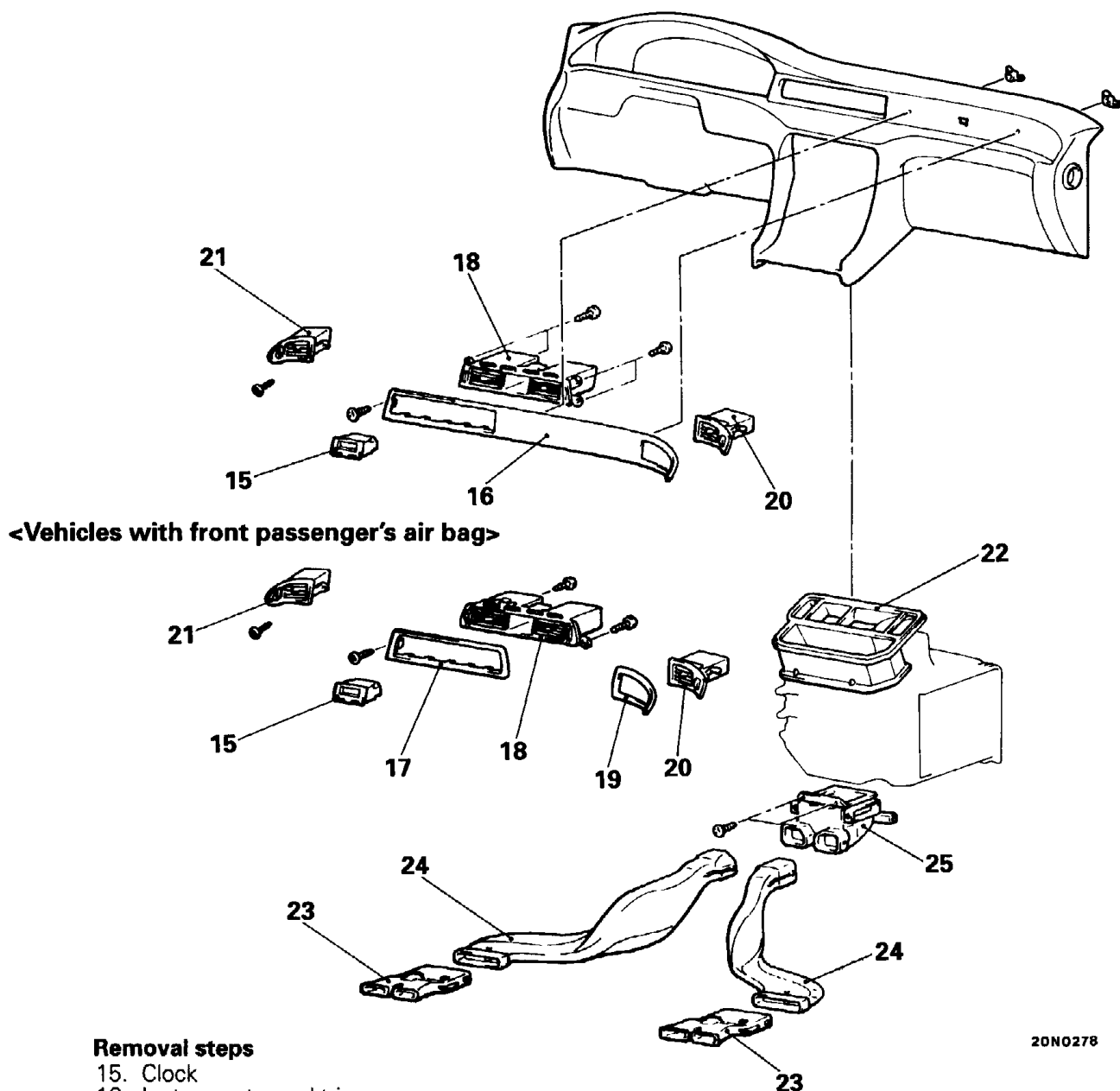
1. Driver side lower panel
2. Foot shower nozzle
3. Foot shower duct (Left side)
4. Passenger side under cover
5. Foot shower duct (Right side)
6. Duct <Vehicles without air conditioner>
7. Grommet
8. Instrument panel (Refer to GROUP 52 – Instrument Panel)
9. Side defroster hose
10. Defroster nozzle
11. Air duct
12. Distribution duct
13. Defroster garnish
14. Photo sensor



20N0277

NOTE

* : Vehicles with front passenger's air bag



Removal steps

15. Clock
16. Instrument panel trim
17. Instrument panel trim, center
18. Center outlet assembly
19. Instrument panel trim C
20. Side outlet assembly (Right side)
21. Side outlet assembly (Left side)
22. Center duct assembly
23. Rear heater nozzle
24. Rear heater duct
25. Distribution duct

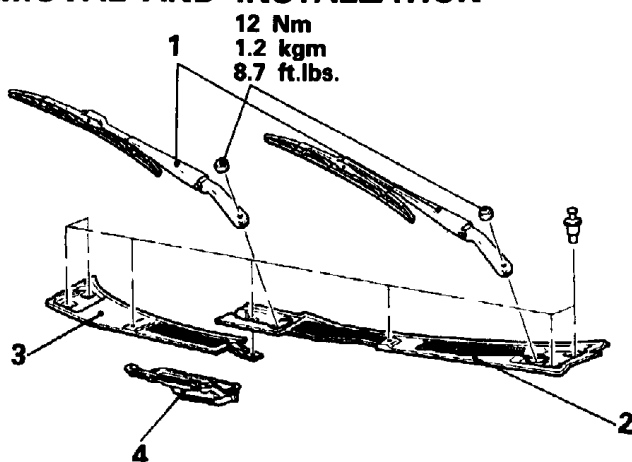
20N0278

NOTES

VENTILATORS (AIR INLET AND AIR OUTLET)

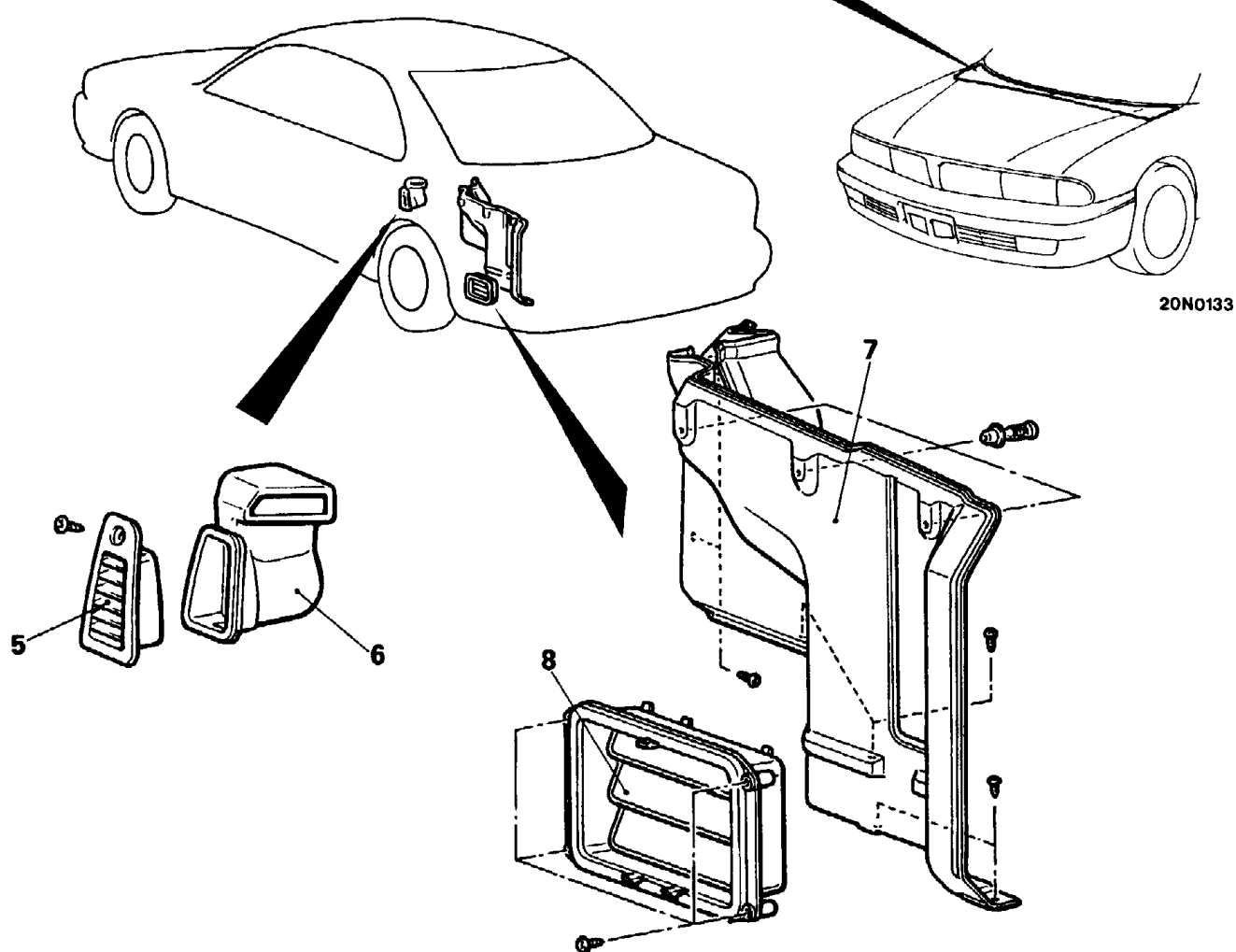
E55MA-B

REMOVAL AND INSTALLATION



Air intake garnish removal steps

1. Wiper arm
2. Front deck grille (Left side)
3. Front deck grille (Right side)
4. Air intake garnish



20N0133

20N0104

Rear ventilation duct removal steps

5. Rear vent garnish assembly
6. Rear vent duct
- Rear bumper (Refer to GROUP 51 – Rear Bumper.)
7. Trunk side trim
8. Rear vent duct assembly