AUTOMATIC TRANSMISSION

CONTENTS

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: SRS-ECU, 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 (*).

GENERAL

The following service procedures have been established to correspond to the introduction of the F4A42 type transmission.

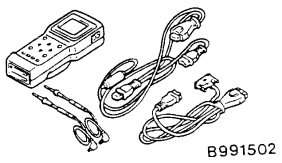
SERVICE SPECIFICATIONS

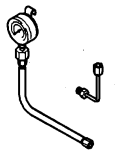
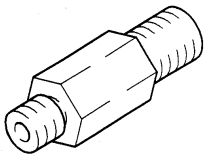
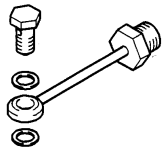
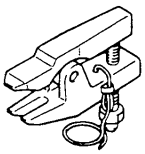
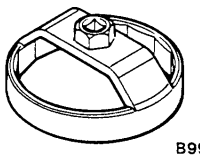
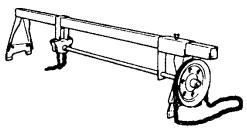
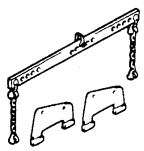
Items		Standard value
Oil temperature sensor kΩ	at 0°C	16.7 – 20.5
	at 20°C	7.3 – 8.9
	at 40°C	3.4 – 4.2
	at 60°C	1.9 – 2.2
	at 80°C	1.0 – 1.2
	at 100°C	0.57 – 0.69
Resistance of damper clutch control solenoid valve coil (at 20°C) Ω		2.7 – 3.4
Resistance of Low-Reverse solenoid valve coil (at 20°C) Ω		2.7 – 3.4
Resistance of second solenoid valve coil (at 20°C) Ω		2.7 – 3.4
Resistance of underdrive solenoid valve coil (at 20°C) Ω		2.7 – 3.4
Resistance of overdrive solenoid valve coil (at 20°C) Ω		2.7 – 3.4
Stall speed r/min		2,200 – 2,700

LUBRICANT

Items	Specified lubricant	Quantity L
Transmission fluid	DIA QUEEN ATF SPII M or ATF SPIII	7.8

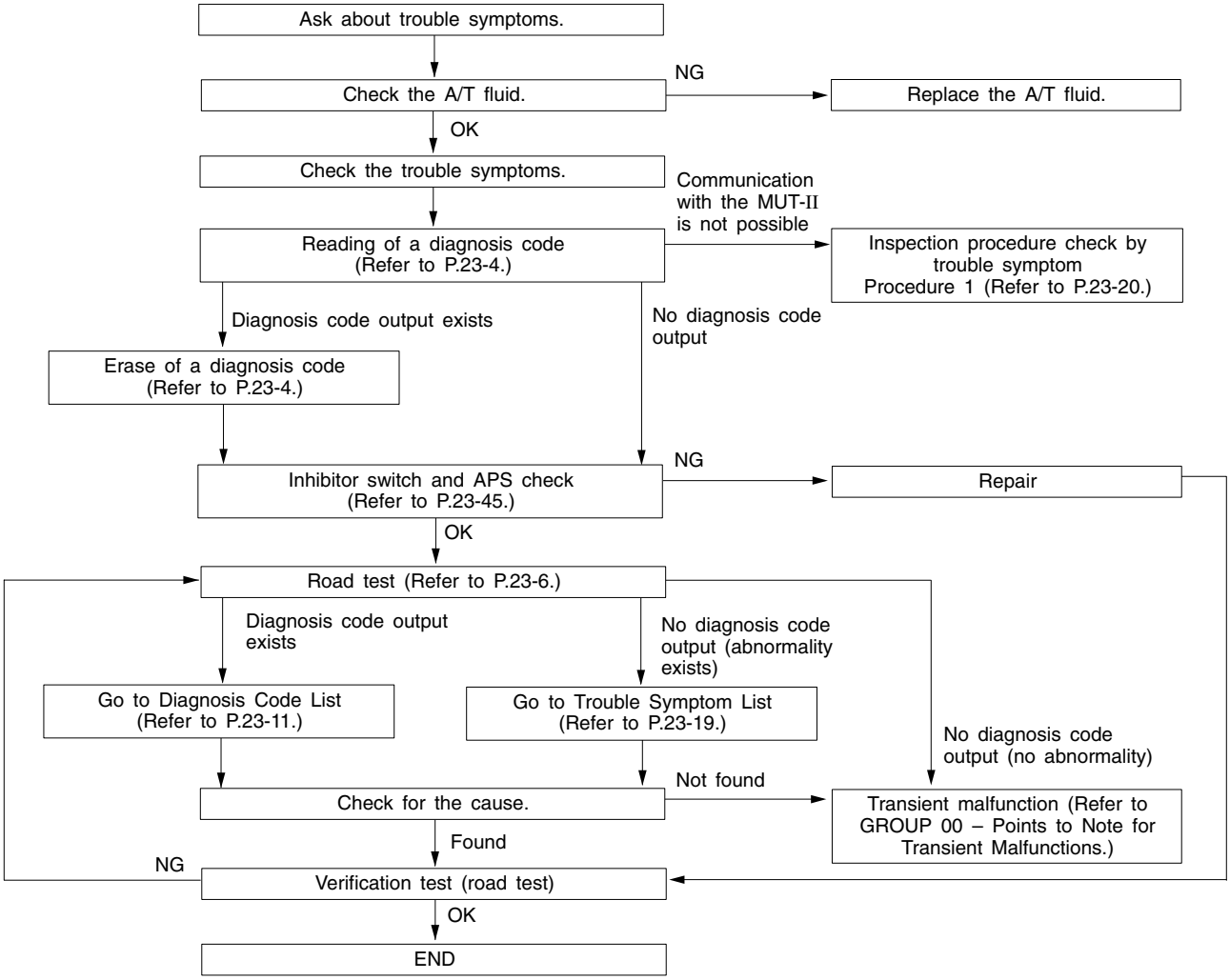
SPECIAL TOOLS

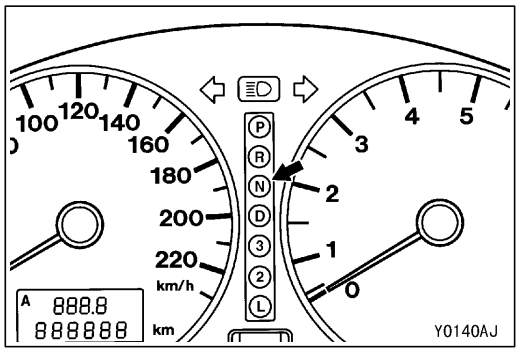
Tool	Number	Name	Use
 B991502	MB991502	MUT-II sub assembly	Checking of the diagnosis code

Tool	Number	Name	Use
	MD998330 (including MD998331)	Oil pressure gauge (2,942 kPa)	Measurement of oil pressure
	MD998332	Adapter	
	MD998900	Adapter	
 B991113	MB990635 or MB991113	Steering linkage puller	Ball joint disconnection
 B991610	MB991610	Oil filter wrench	Removal and installation of automatic transmission oil filter
 Z203827	GENERAL SERVICE TOOL MZ203827	Engine lifter	Supporting the engine assembly during removal and installation of the transmission
 B991453	MB991453	Engine hanger assembly	Supporting the engine assembly during removal and installation of the transmission

TROUBLESHOOTING <A/T>

STANDARD FLOW OF DIAGNOSIS TROUBLESHOOTING





DIAGNOSIS FUNCTION

1. N range lamp

The N range lamp flashes at a frequency of approximately 1 Hz if there is an abnormality in any of the items in the table below which are related to the A/T system. Check the diagnosis code output if the N range lamp is flashing at a frequency of approximately 1 Hz.

N range lamp flashing items

Input shaft speed sensor
Output shaft speed sensor
Each solenoid valve
Out of phase at each shift point
A/T control relay

Caution
If the N range lamp is flashing at a frequency of approximately 2 Hz (faster than at 1 Hz), it means that the automatic transmission fluid temperature is too high. Stop the vehicle in a safe place and wait until the N range lamp switches off.

2. Method of reading the diagnosis code

Use the MUT-II or the N range lamp to take a reading of the diagnosis codes. (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points.)

ROAD TEST

Check by the following procedure.

No.	State prior to test and operation	Test and operation	Judgement value	Check item	Diagnosis code No.	Inspection procedure page if there is an abnormality
1	Ignition switch: OFF	Ignition switch (1) ON	Data list No. 54 Battery voltage [V]	Control relay	54	A/T Control relay system (23-18)

No.	State prior to test and operation	Test and operation	Judgement value	Check item	Diagnosis code No.	Inspection procedure page if there is an abnormality
2	Ignition switch: ON Engine: Stopped Selector lever position: P	Selector lever position (1) P, (2) R, (3) N, (4) D	Data list No. 61 (1) P, (2) R, (3)N, (4) D	Inhibitor switch	–	Inhibitor switch system (23-29)
		Selector lever position (1) D (1st gear) (2) Selector sports mode (1st gear) (3) Upshift and hold the selector lever (2nd gear) (4) Downshift and hold the selector lever (1st gear)	Data list No.67 No.68 No.69 (1) OFF OFF OFF (2) ON OFF OFF (3) ON ON OFF (4) ON OFF ON Shift indicator lamp (1) D and 1 illuminate (2) Only 1 illuminates (3) Only 2 illuminates (4) Only 1 illuminates	Select switch Upshift switch Downshift switch	–	Shift switch assembly system (23-29)
		Accelerator pedal (1) Released (2) Half depressed (3) Depressed	Data list No. 11 (1) 400 – 1,000 mV (2) Gradually rises from (1) (3) 4,500 – 5,000 mV	Accelerator pedal position sensor	11 12 14	Accelerator pedal position sensor system (23-12)
			Data list No. 25 (1) OFF (2) ON	Wide open throttle switch	25	Wide open throttle switch system (23-14)
		Brake pedal (1) Depressed (2) Released	Data list No. 26 (1) ON (2) OFF	Stop lamp switch	26	Stop lamp switch system (23-15)
3	Ignition switch: ST Engine: Stopped	Starting test with lever P or N range	Starting should be possible	Starting possible or impossible	–	Starting impossible (23-20)
4	Warming up	Drive for 15 minutes or more so that the A/T fluid temperature becomes 70 – 80°C.	Data list No. 15 Gradually rises to 70 – 80°C	A/T fluid temperature sensor	15	A/T fluid temperature sensor system (23-12)

No.	State prior to test and operation	Test and operation	Judgement value	Check item	Diagnosis code No.	Inspection procedure page if there is an abnormality
5	Engine: Idling Selector lever position: N	Brake pedal (Retest) (1) Depressed (2) Released	Data list No. 26 (1) ON (2) OFF	Stop lamp switch	26	Stop lamp switch system (23-15)
		A/C switch (1) ON (2) OFF	Data list No. 65 (1) ON (2) OFF	Dual pressure switch	–	Dual pressure switch system (23-30)
		Accelerator pedal (1) Released (2) Half depressed	Data list No. 21 (1) 550 – 850 r/min Gradually rises from (1)	Crank angle sensor	21	Crank angle sensor system (23-12)
		Selector lever position (1) N → D (2) N → R	Should be no abnormal shifting shocks Time lag should be within 2 seconds	Malfunction when starting	–	Engine stalling during shifting (23-23)
					–	Shocks when changing from N to D and large time lag (23-23)
					–	Shocks when changing from N to R and large time lag (23-24)
					–	Shocks when changing from N to D,N to R and large time lag (23-25)
				Driving impossible	–	Does not move forward (23-21)
					–	Does not reverse (23-22)
					–	Does not move (forward or reverse) (23-22)

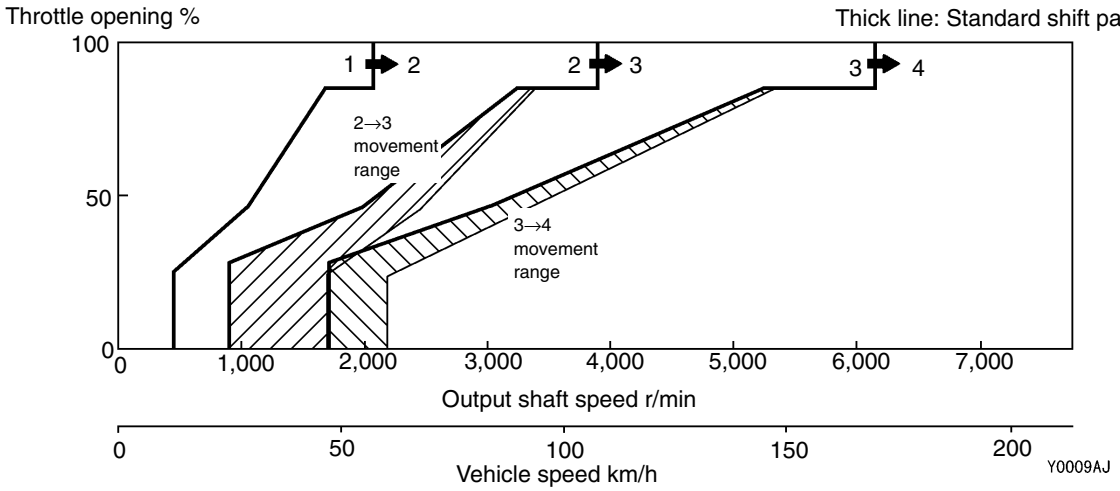
No.	State prior to test and operation	Test and operation	Judgement value	Check item	Diagnosis code No.	Inspection procedure page if there is an abnormality
6	Selector lever position: Sports mode (Carry out on a flat and straight road.)	Selector lever position and vehicle speed (1) Idling in 1st (Vehicle stopped) (2) Driving at constant speed of 10 km/h in 1st (3) Driving at constant speed of 30 km/h in 2nd (4) Driving at 50 km/h in 3rd with accelerator fully closed (5) Driving at constant speed of 50 km/h in 4th (Each condition should be maintained for 10 seconds or more.)	Data list No. 63 (2) 1st, (4) 3rd, (3) 2nd, (5) 4th	Shift condition	–	–
			Data list No. 31 (2) 0 %, (4) 100 %, (3) 100 %, (5) 100 %	Low and reverse solenoid valve	31	Low and reverse solenoid valve system (23-15)
			Data list No. 32 (2) 0 %, (4) 0 %, (3) 0 %, (5) 100 %	Underdrive solenoid valve	32	Underdrive solenoid valve system (23-15)
			Data list No. 33 (2)100 %, (4) 100 %, (3) 0 %, (5) 0 %	Second solenoid valve	33	Second solenoid valve system (23-15)
			Data list No. 34 (2) 100 %, (4) 0 %, (3) 100 %, (5) 0 %	Overdrive solenoid valve	34	Overdrive solenoid valve system (23-15)
			Data list No. 29 (1) 0 km/h (4) 50 km/h	Vehicle speed sensor	–	Vehicle speed sensor system (23-31)
			Data list No. 22 (4) 1,800 – 2,100 r/min	Input shaft speed sensor	22	Input shaft speed sensor system (23-13)
			Data list No. 23 (4) 1,800 – 2,100 r/min	Output shaft speed sensor	23	Output shaft speed sensor system (23-14)
7	Selector lever position: Sports mode (Carry out on a flat and straight road.)	Selector lever position and vehicle speed (1) Release the accelerator pedal fully while driving at 50 km/h in 3rd gear. (2) Driving at constant speed of 50 km/h in 3rd gear.	Data list No. 36 (1) 0 % (2) Approx. 70 – 90 %	Damper clutch control solenoid valve	36 52	Damper clutch control solenoid valve system (23-16)
			Data list No. 52 (1) Approx. 100 – 300 r/min (2) Approx. 0 – 10 r/min			

No.	State prior to test and operation	Test and operation	Judgement value	Check item	Diagnosis code No.	Inspection procedure page if there is an abnormality
8	Use the MUT-II to stop the INVECS-II function. Selector lever position: D (Carry out on a flat and straight road.)	Monitor data list No. 11, 23, and 63 with the MUT-II. (1) Accelerate to 4th gear at a throttle position sensor output of 1.5V (accelerator opening angle of 30 %). (2) Gently decelerate to a standstill. (3) Accelerate to 4th gear at a throttle position sensor output of 2.5 V (accelerator opening angle of 50%). (4) While driving at 60 km/h in 4th gear, shift down to 3rd (5) While driving at 40 km/h in 3rd gear, shift down to 2nd (6) While driving at 20 km/h in 2nd gear, shift down to 1st	For (1), (2) and (3), the reading should be the same as the specified output shaft speed and no abnormal shocks should occur. For (4), (5) and (6), downshifting should occur immediately after the shifting operation is made.	Malfunction when shifting	–	Shocks and running up (23-25)
				Displaced shifting points	–	All points (23-26)
					–	Some points (23-27)
				Does not shift	–	No diagnosis code (23-27)
					22	Input shaft speed sensor system (23-13)
					23	Output shaft speed sensor system (23-13)
				Does not shift from 1 to 2 or 2 to 1	31	Low and reverse solenoid valve system (23-15)
					33	Second solenoid valve system (23-15)
					41	1st gear ratio is not specified (23-17)
					42	2nd gear ratio is not specified (23-17)
				Does not shift from 2 to 3 or 3 to 2	33	Second solenoid valve system (23-15)
					34	Overdrive solenoid valve system (23-15)
					42	2nd gear ratio is not specified (23-17)
					43	3rd gear ratio is not specified (23-17)
				Does not shift from 3 to 4 or 4 to 3	32	Underdrive solenoid valve system (23-15)
					33	Second solenoid valve system (23-15)
					43	3rd gear ratio is not specified (23-17)
					44	4th gear ratio is not specified (23-17)

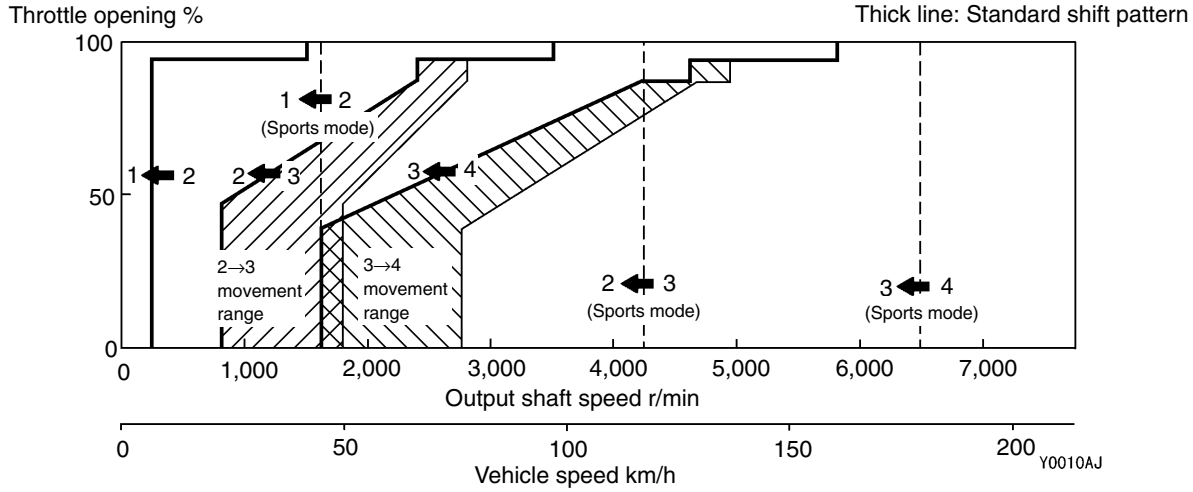
No.	State prior to test and operation	Test and operation	Judgement value	Check item	Diagnosis code No.	Inspection procedure page if there is an abnormality
9	Selector lever position: N (Carry out on a flat and straight road.)	Monitor data list No. 22 and No. 23 with the MUT-II. (1) Move selector lever to R range, drive at constant speed of 10 km/h.	The ratio between data list No. 22 and No. 23 should be the same as the gear ratio when reversing.	Does not shift	22	Input shaft speed sensor system (23-13)
					23	Output shaft speed sensor system (23-13)
					46	Reverse gear ratio is not specified (23-17)

SHIFT PATTERN

UPSHIFT PATTERN



DOWNSHIFT PATTERN

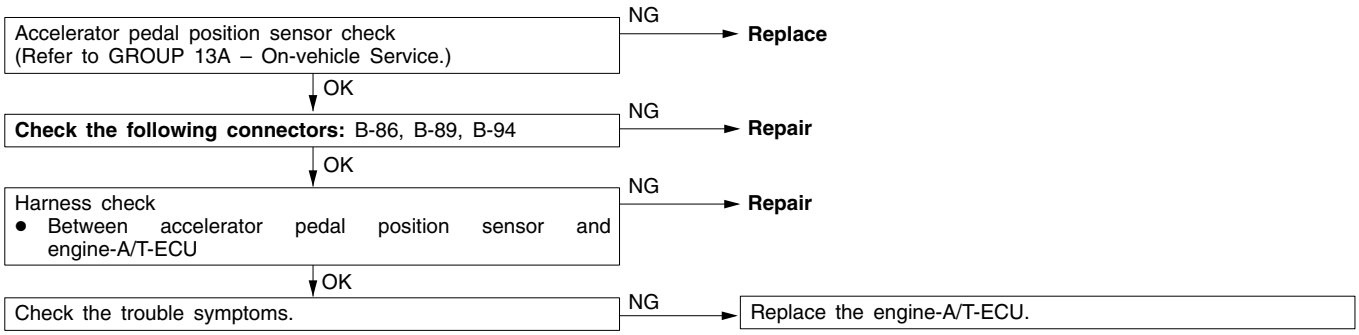


INSPECTION CHART FOR DIAGNOSIS CODE

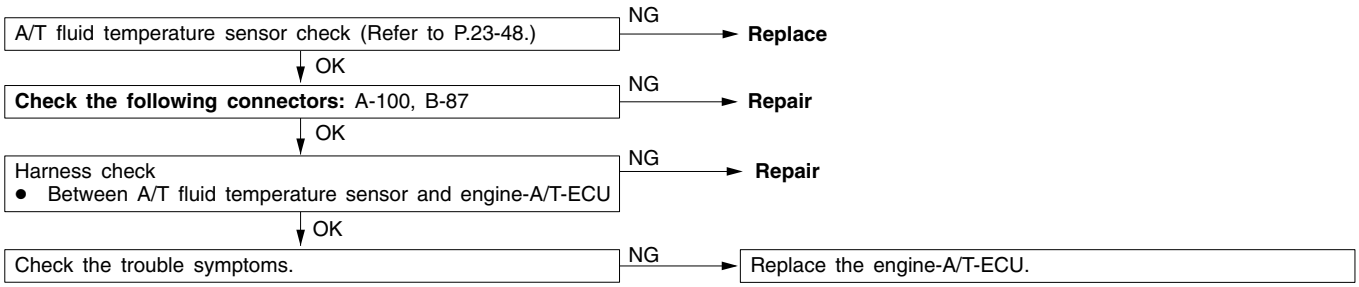
Code	Diagnosis item		Reference page
11	Accelerator pedal position sensor system (APS)	Short circuit	23-12
12		Open circuit	23-12
14		Sensor maladjustment	23-12
15	A/T fluid temperature sensor system	Open circuit	23-12
21	Crank angle sensor system	Open circuit	23-12
22	Input shaft speed sensor system	Short circuit/open circuit	23-13
23	Output shaft speed sensor system	Short circuit/open circuit	23-14
25	Wide open throttle switch system	Short circuit	23-14
26	Stop lamp switch system	Short circuit/open circuit	23-15
31	Low and reverse solenoid valve system	Short circuit/open circuit	23-15
32	Underdrive solenoid valve system	Short circuit/open circuit	23-15
33	Second solenoid valve system	Short circuit/open circuit	23-15
34	Overdrive solenoid valve system	Short circuit/open circuit	23-15
36	Damper control clutch solenoid valve system	Short circuit/open circuit	23-16
41	1st gear ratio does not meet the specification		23-17
42	2st gear ratio does not meet the specification		23-17
43	3rd gear ratio does not meet the specification		23-17
44	4th gear ratio does not meet the specification		23-17
46	Reverse gear ratio does not meet the specification		23-17
51	Abnormal communication with engine-ECU		23-18
52	Damper control clutch solenoid valve system	Defective defect	23-16
54	A/T Control relay system	Short circuit to earth/ open circuit	23-18
56	N range lamp system	Short circuit to earth	23-18

INSPECTION PROCEDURES FOR DIAGNOSIS CODES

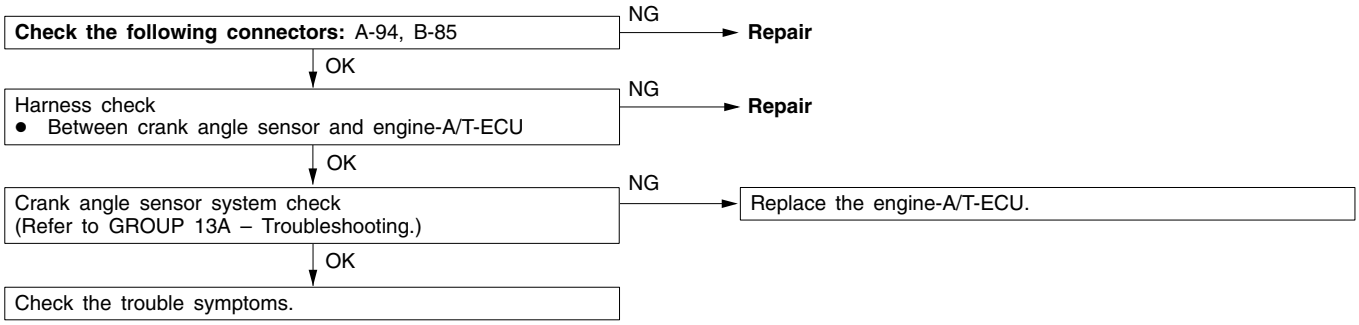
Code No. 11, 12, 14 Accelerator pedal position sensor <APS>	Probable cause
If the APS output voltage is 4.8 V or higher when the engine is idling, the output is judged to be too high and diagnosis code No. 11 is output. If the APS output voltage is 0.2 V or lower at times other than when the engine is idling, the output is judged to be too low and diagnosis code No. 12 is output. If the APS output voltage is 0.2 V or lower or if it is 1.2 V or higher when the engine is idling, the APS adjustment is judged to be incorrect and diagnosis code No. 14 is output.	• Malfunction of the accelerator pedal position sensor • Malfunction of connector • Malfunction of the engine-A/T-ECU



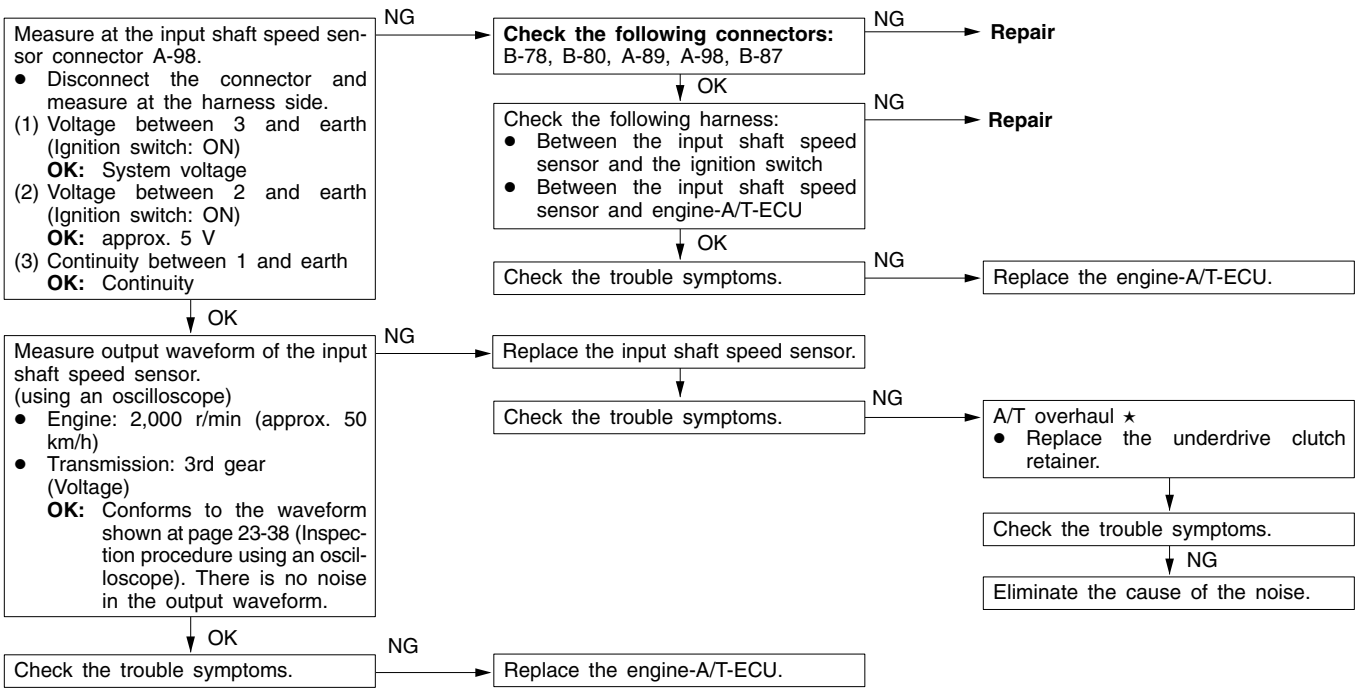
Code No. 15 A/T fluid temperature sensor system	Probable cause
If the oil temperature sensor output voltage is 2.6 V or more even after driving for 10 minutes or more (if the oil temperature does not increase), it is judged that there is an open circuit in the A/T fluid temperature sensor and diagnosis code No. 15 is output.	• Malfunction of the A/T fluid temperature sensor • Malfunction of connector • Malfunction of the engine-A/T-ECU



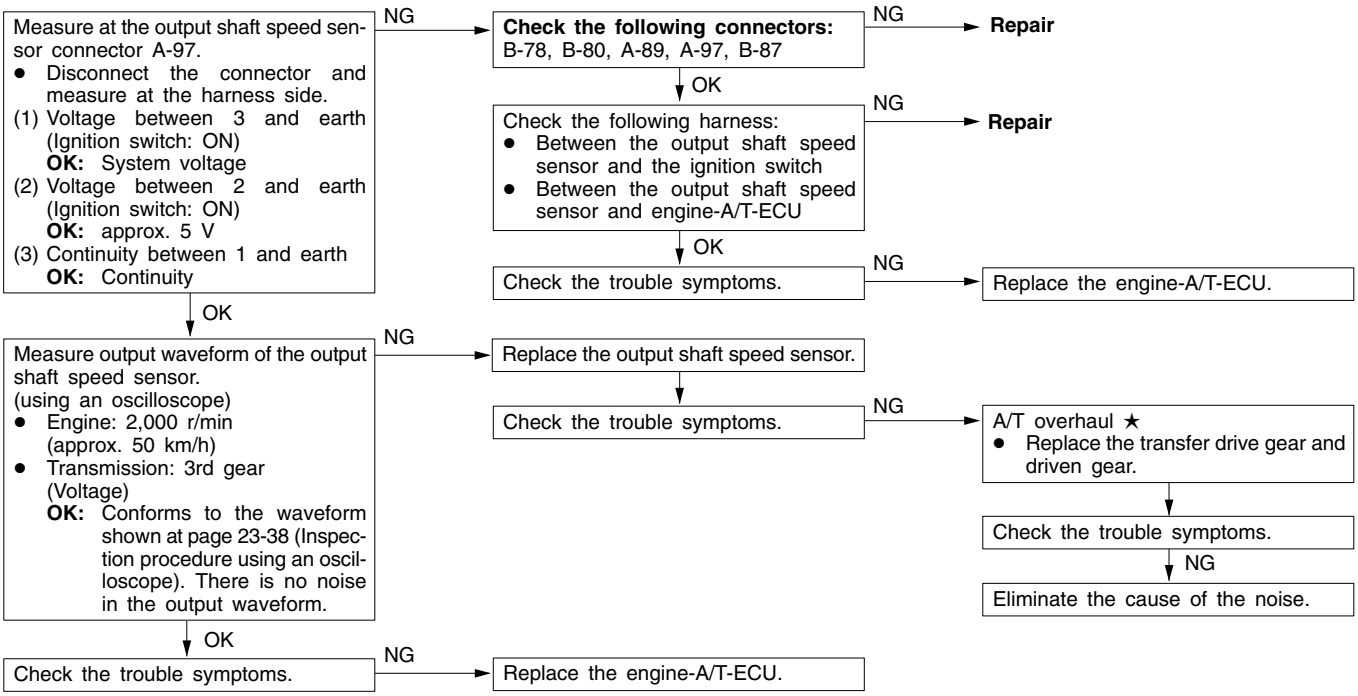
Code No. 21 Crank angle sensor system	Probable cause
If no output pulse is detected from the crank angle sensor for 5 seconds or more while driving at 25 km/h or more, it is judged that there is an open circuit in the crank angle sensor and diagnosis code No. 21 is output.	• Malfunction of the crank angle sensor • Malfunction of connector • Malfunction of the engine-A/T-ECU



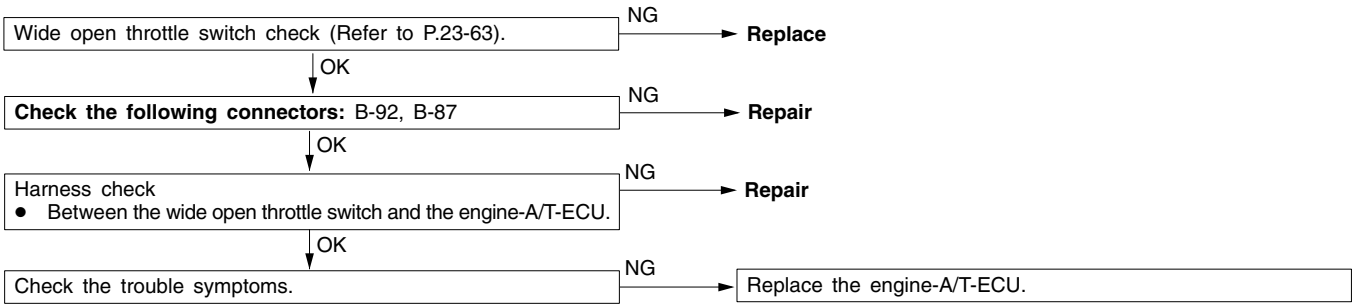
Code No. 22 Input shaft speed sensor system	Probable cause
If no output pulse is detected from the input shaft speed sensor for 1 second or more while driving in 3rd or 4th gear at a speed of 30 km/h or more, there is judged to be an open circuit or short-circuit in the input shaft speed sensor and diagnosis code No. 22 is output. If diagnosis code No. 22 is output four times, the transmission is locked into 3rd gear (D range) or 2nd gear (downshifting at Sports mode) as a fail-safe measure, and the N range lamp flashes at a frequency of 1 Hz.	• Malfunction of the input shaft speed sensor • Malfunction of the underdrive clutch retainer • Malfunction of connector • Malfunction of the engine-A/T-ECU



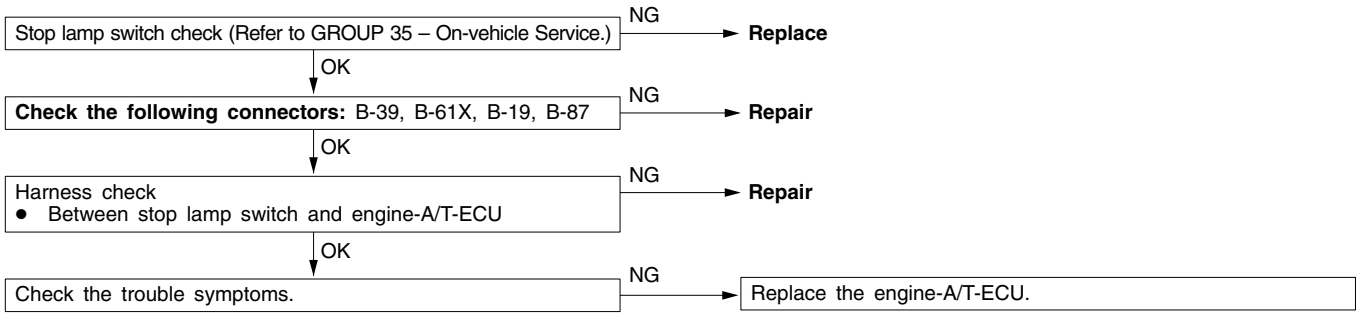
Code No. 23 Output shaft speed sensor system	Probable cause
If the output from the output shaft speed sensor is continuously 50% lower than the vehicle speed for 1 second or more while driving in 3rd or 4th gear at a speed of 30 km/h or more, there is judged to be an open circuit or short-circuit in the output shaft speed sensor and diagnosis code No. 23 is output. If diagnosis code No. 23 is output four times, the transmission is locked into 3rd gear (D range) or 2nd gear (downshifting at Sports mode) as a fail-safe measure, and the N range lamp flashes at a frequency of 1 Hz.	• Malfunction of the output shaft speed sensor • Malfunction of the transfer drive gear or driven gear • Malfunction of connector • Malfunction of the engine-A/T-ECU



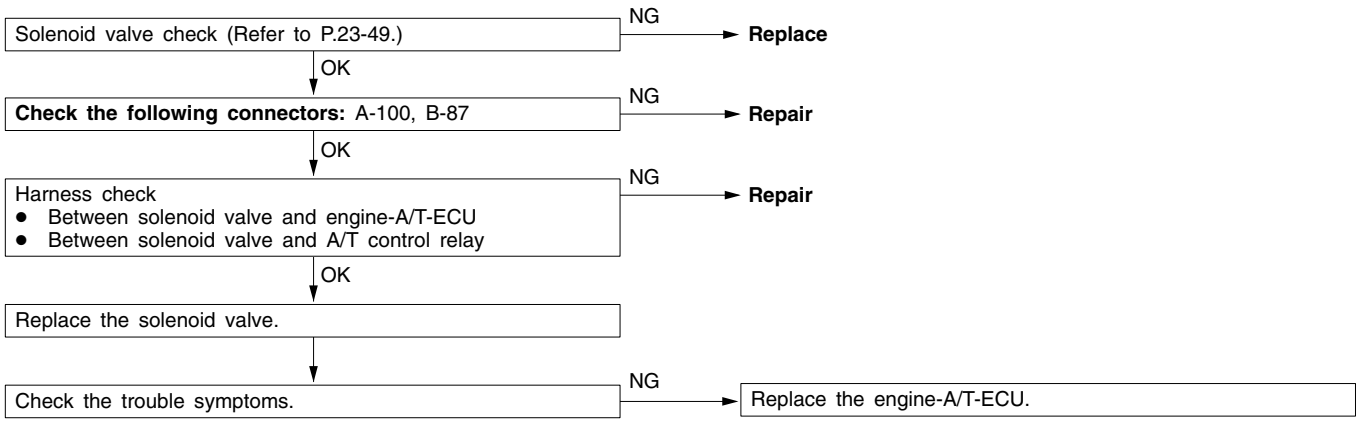
Code No. 25 Wide open throttle switch system	Probable cause
If the wide open throttle switch is on for 1 second or more with the throttle valve opening angle at 70% or less, it is judged that there is a short circuit in the wide open throttle switch and diagnosis code No. 25 is output.	• Malfunction of the wide open throttle switch • Malfunction of connector • Malfunction of the engine-A/T-ECU



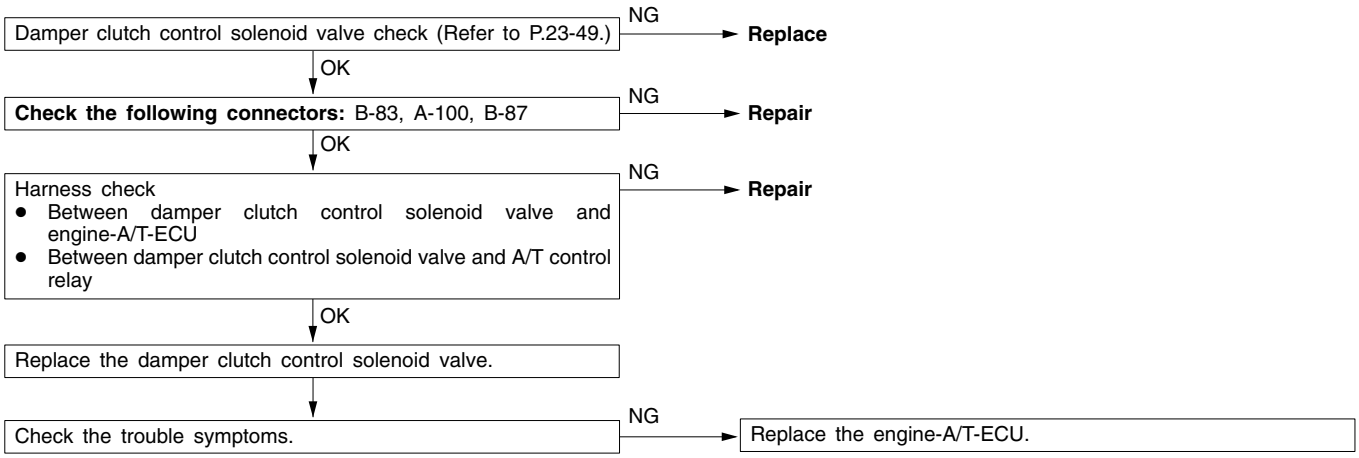
Code No. 26 Stop lamp switch system	Probable cause
If the stop lamp switch is on for 5 minutes or more while driving, it is judged that there is a short circuit in the stop lamp switch and diagnosis code No. 26 is output.	• Malfunction of the stop lamp switch • Malfunction of connector • Malfunction of the engine-A/T-ECU



Code No. 31 Low and reverse solenoid valve system Code No. 32 Underdrive solenoid valve system Code No. 33 Second solenoid valve system Code No. 34 Overdrive solenoid valve system	Probable cause
If the resistance value for a solenoid valve is too large or too small, it is judged that there is a short-circuit or an open circuit in the solenoid valve and the respective diagnosis code is output. The transmission is locked into 3rd gear as a fail-safe measure, and the N range lamp flashes at a frequency of 1 Hz.	• Malfunction of solenoid valve • Malfunction of connector • Malfunction of the engine-A/T-ECU

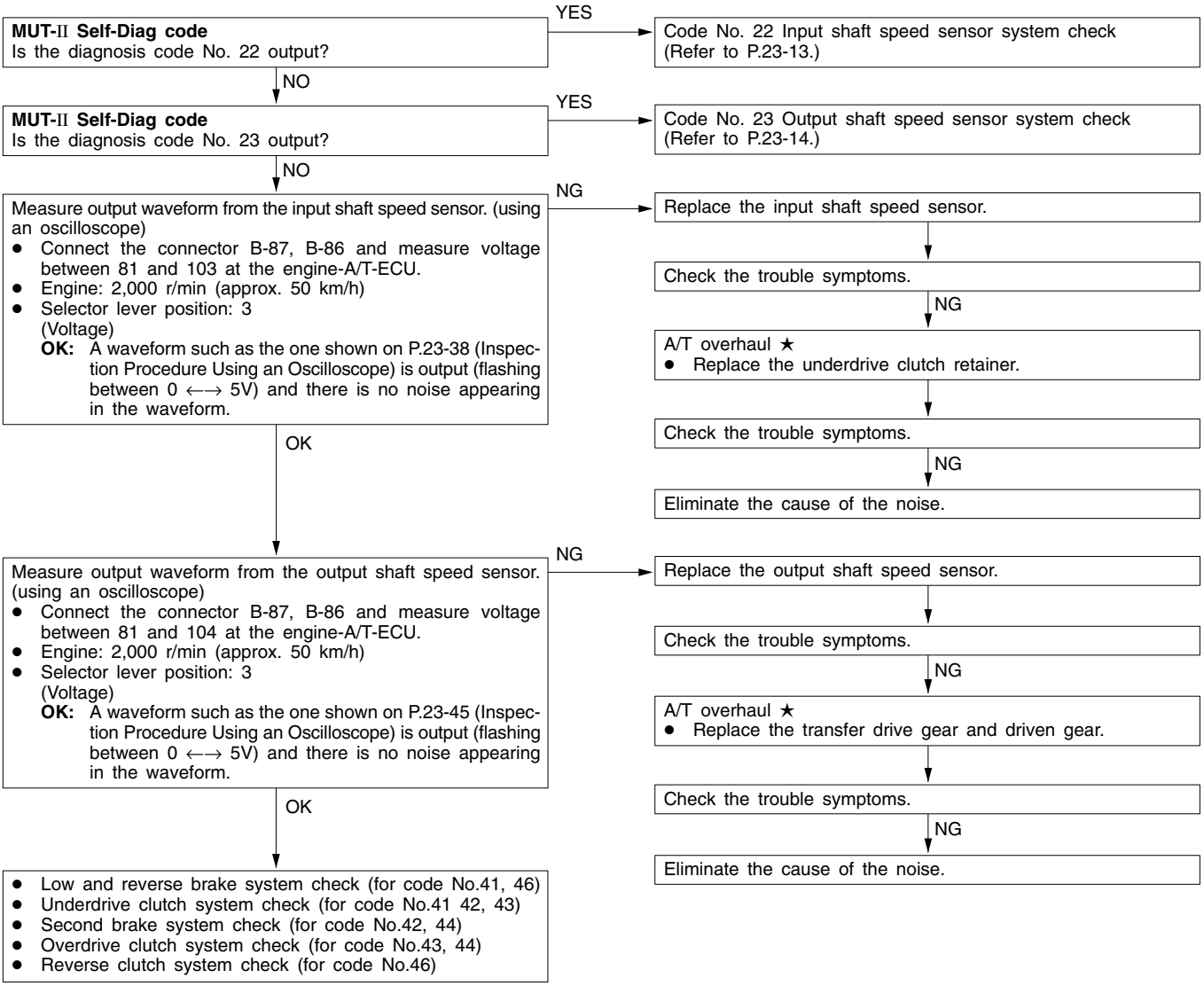


Code No. 36, 52 Damper clutch control solenoid valve system	Probable cause
If the resistance value for the damper clutch control solenoid valve is too large or too small, it is judged that there is a short-circuit or an open circuit in the damper clutch control solenoid valve and diagnosis code No. 36 is output. If the drive duty rate for the damper clutch control solenoid valve is 100 % for a continuous period of 4 seconds or more, it is judged that there is an abnormality in the damper clutch control system and diagnosis code No. 52 is output. When diagnosis code No. 36 is output, the transmission is locked into 3rd gear as a fail-safe measure, and the N range lamp flashes at a frequency of 1 Hz.	• Malfunction of the damper clutch control solenoid valve • Malfunction of connector • Malfunction of the engine-A/T-ECU



Code No. 41 1st gear ratio does not meet the specification Code No. 42 2nd gear ratio does not meet the specification Code No. 43 3rd gear ratio does not meet the specification Code No. 44 4th gear ratio does not meet the specification Code No. 46 Reverse gear ratio does not meet the specification	Probable cause
If the output from the output shaft speed sensor multiplied by each gear ratio is not the same as the output from the input shaft speed sensor after shifting to each gear has been completed, each diagnosis code is output. If each diagnosis code is output four times, the transmission is locked into 3rd gear as a fail-safe measure, and the N range lamp flashes at a frequency of 1 Hz.	• Malfunction of the input shaft speed sensor • Malfunction of the output shaft speed sensor • Malfunction of the underdrive clutch retainer • Malfunction of the transfer drive gear or driven gear • Malfunction of the low and reverse brake system (for code No.41, 46) • Malfunction of the underdrive clutch system (for code No.41 42, 43) • Malfunction of the second brake system (for code No.42, 44) • Malfunction of the overdrive clutch system (for code No.43, 44) • Malfunction of the reverse clutch system (for code No.46) • Noise generated

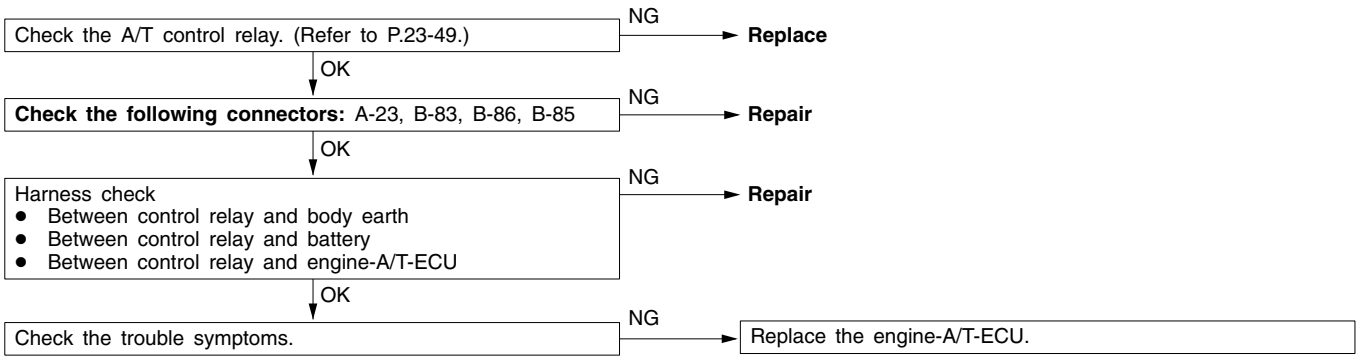
★: Refer to the Transmission Workshop Manual.



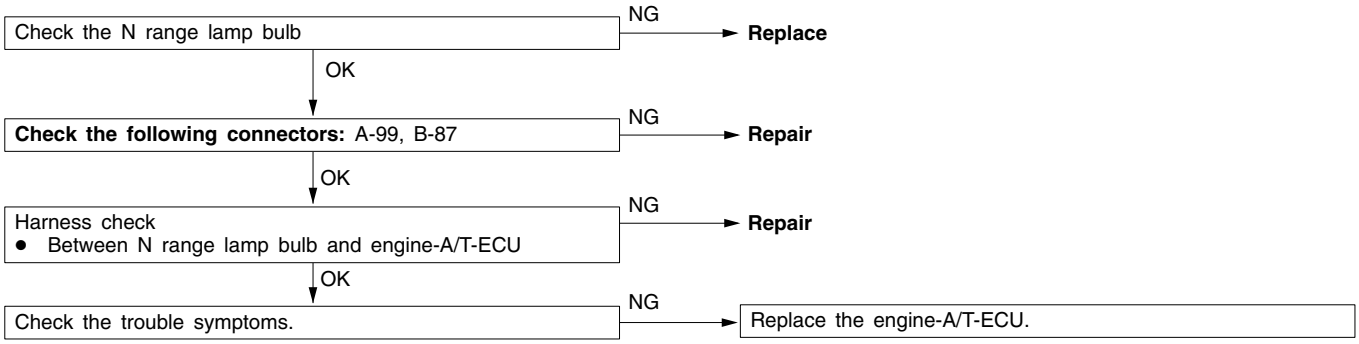
Code No. 51 Abnormal communication with engine-ECU	Probable cause
If normal communication is not possible for a continuous period of 1 second or more when the ignition switch is at the ON position, the battery voltage is 10 V or more and the engine speed is 450 r/min or more, diagnosis code No. 51 is output. Diagnosis code No. 51 is also output if the data being received is abnormal for a continuous period of 4 seconds under the same conditions.	• Malfunction of connector • Malfunction of the engine-A/T-ECU

Replace the engine-A/T-ECU.

Code No. 54 A/T control relay system	Probable cause
If the A/T control relay voltage is less than 7 V after the ignition switch has been turned ON, it is judged that there is an open circuit or a short-circuit in the A/T control relay earth and diagnosis code No. 54 is output. Then the transmission is locked into 3rd gear as a fail-safe measure, and the N range lamp flashes at a frequency of 1 Hz.	• Malfunction of the A/T control relay • Malfunction of connector • Malfunction of the engine-A/T-ECU



Code No. 56 N range lamp system	Probable cause
If the N range signal is off after an N range lamp illumination instruction (ON instruction) has been given, it is judged that there is a short-circuit in the N range lamp earth and diagnosis code No. 56 is output.	• Malfunction of the N range lamp bulb • Malfunction of connector • Malfunction of the engine-A/T-ECU



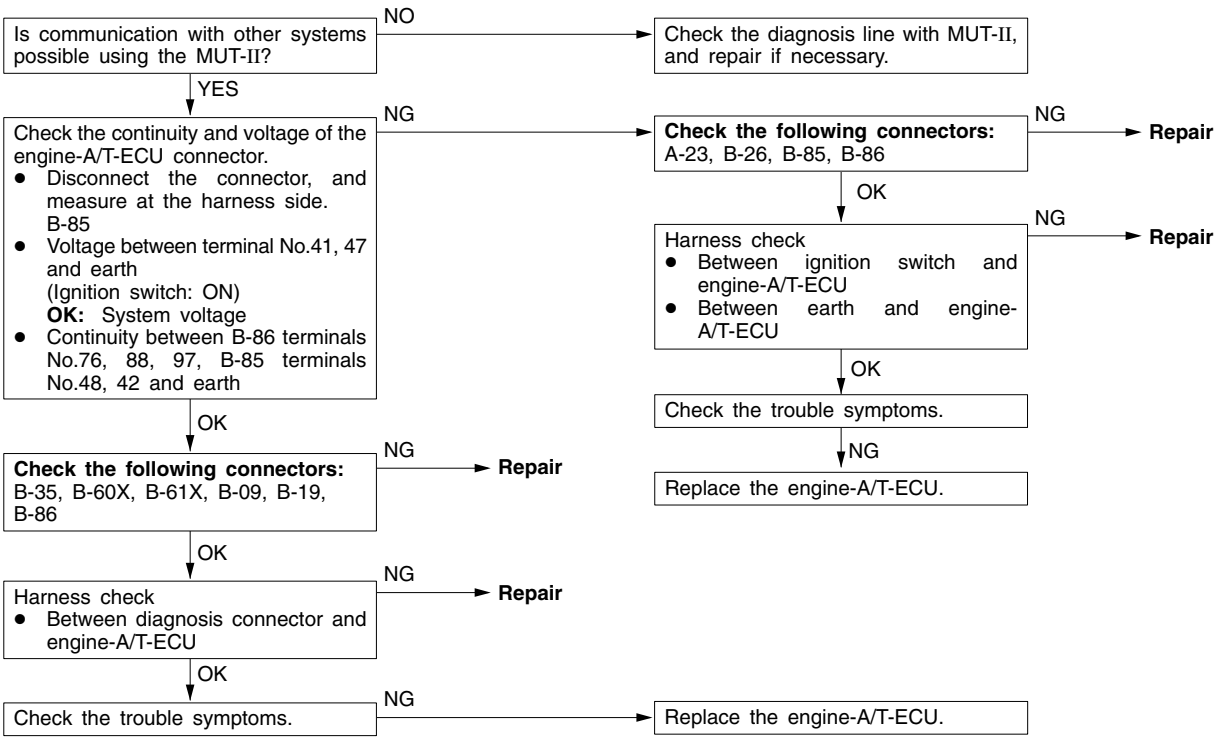
INSPECTION CHART FOR TROUBLE SYMPTOMS

Trouble symptom		Inspection procedure No.	Reference page
Communication with MUT-II is not possible		1	23-20
Driving impossible	Starting impossible	2	23-20
	Does not move forward	3	23-21
	Does not reverse	4	23-22
	Does not move (forward or reverse)	5	23-22
Malfunction when starting	Engine stalling during shifting	6	23-23
	Shocks when changing from N to D and large time lag	7	23-23
	Shocks when changing from N to R and large time lag	8	23-24
	Shocks when changing from N to D, N to R and large time lag	9	23-25
Malfunction when shifting	Shocks and running up	10	23-25
Displaced shifting points	All points	11	23-26
	Some points	12	23-27
Does not shift	No diagnosis codes	13	23-27
Malfunction while driving	Poor acceleration	14	23-28
	Vibration	15	23-28
Inhibitor switch system		16	23-29
Shift switch assembly system		17	23-29
Dual pressure switch system		18	23-30
Vehicle speed sensor system		19	23-31

INSPECTION PROCEDURE FOR TROUBLE SYMPTOMS

INSPECTION PROCEDURE 1

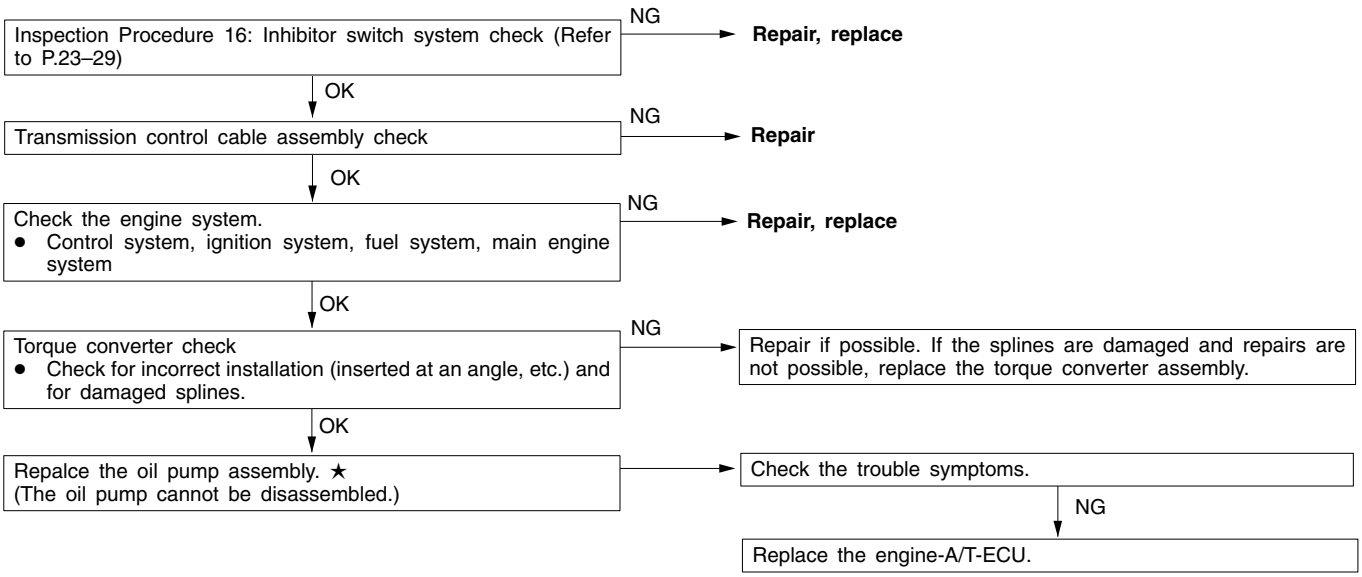
Communication with MUT-II is not possible	Probable cause
If communication with the MUT-II is not possible, the cause is probably a defective diagnosis line or the engine-A/T-ECU is not functioning.	• Malfunction of diagnosis line • Malfunction of connector • Malfunction of the engine-A/T-ECU



INSPECTION PROCEDURE 2

Starting impossible	Probable cause
Starting is not possible when the selector lever is in P or N range.In such cases, the cause is probably a defective engine system, torque converter or oil pump.	• Malfunction of the engine system • Malfunction of the torque converter • Malfunction of the oil pump

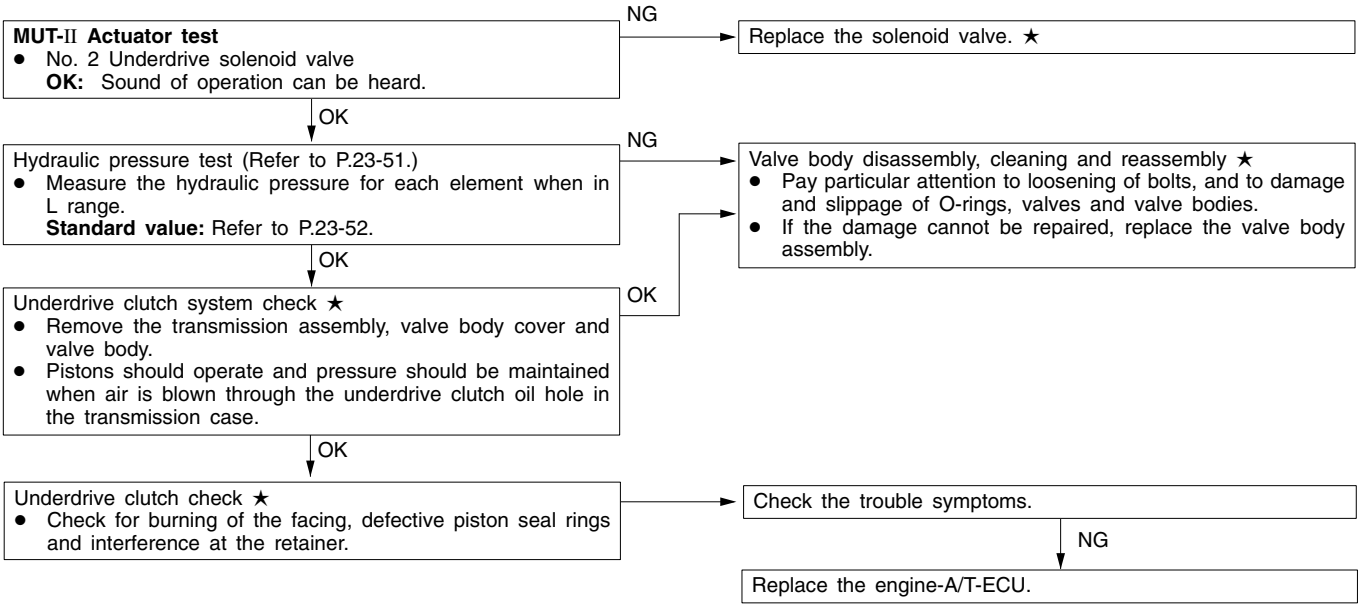
★: Refer to the Transmission Workshop Manual.



INSPECTION PROCEDURE 3

Does not move (forward)	Probable cause
If the vehicle does not move forward when the selector lever is shifted from N to D, Sports mode 1st or 2nd range while the engine is idling, the cause is probably abnormal line pressure or a malfunction of the underdrive clutch or valve body.	• Abnormal line pressure • Malfunction of the underdrive solenoid valve • Malfunction of the underdrive clutch • Malfunction of the valve body

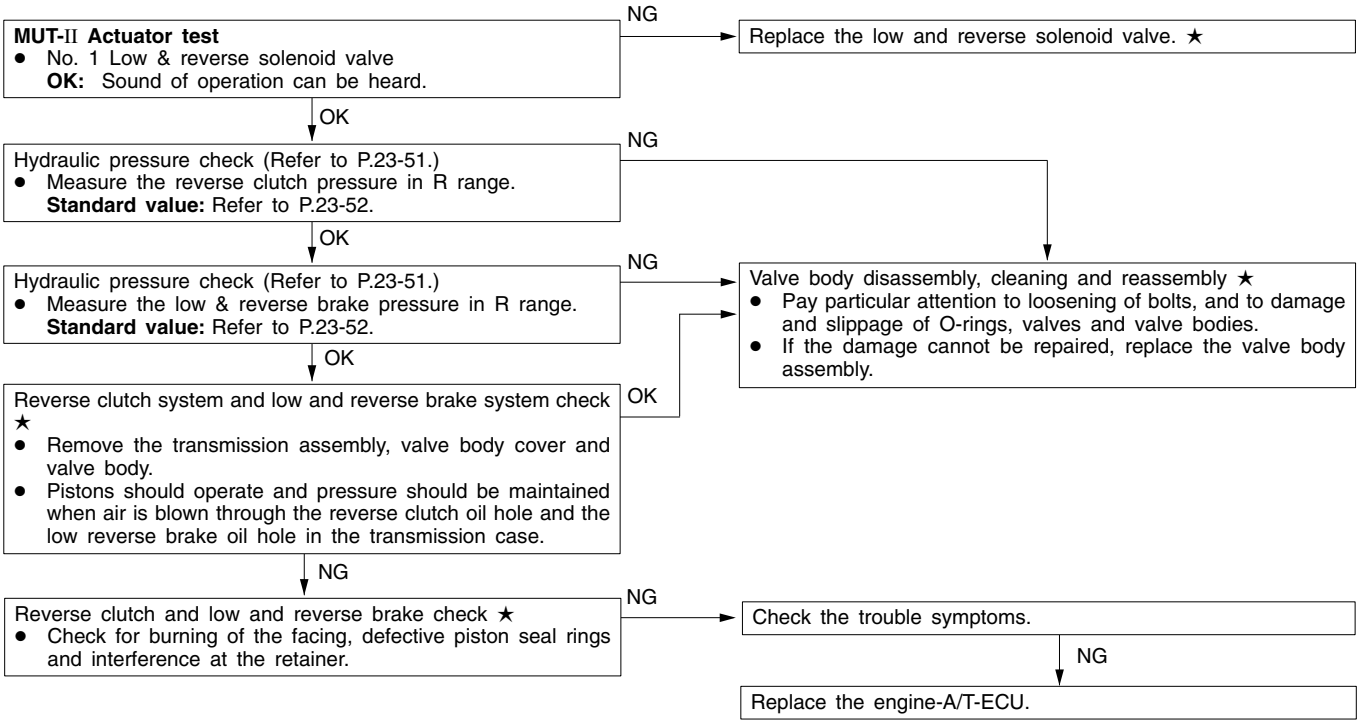
★: Refer to the Transmission Workshop Manual.



INSPECTION PROCEDURE 4

Does not reverse	Probable cause
If the vehicle does not reverse when the selector lever is shifted from N to R range while the engine is idling, the cause is probably abnormal pressure in the reverse clutch or low and reverse brake or a malfunction of the reverse clutch, low and reverse brake or valve body.	• Abnormal reverse clutch pressure • Abnormal low and reverse brake pressure • Malfunction of the low & reverse solenoid valve • Malfunction of the reverse clutch • Malfunction of the low and reverse brake • Malfunction of the valve body

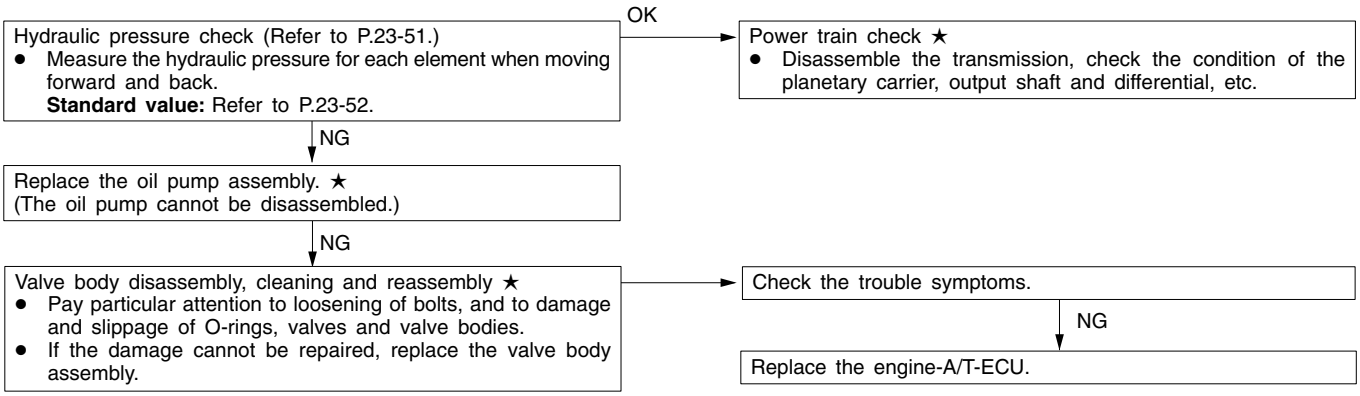
★: Refer to the Transmission Workshop Manual.



INSPECTION PROCEDURE 5

Does not move (forward or reverse)	Probable cause
If the vehicle does not move forward or reverse when the selector lever is shifted to any position while the engine is idling, the cause is probably abnormal line pressure, or a malfunction of the power train, oil pump or valve body.	• Abnormal line pressure • Malfunction of power train • Malfunction of the oil pump • Malfunction of the valve body

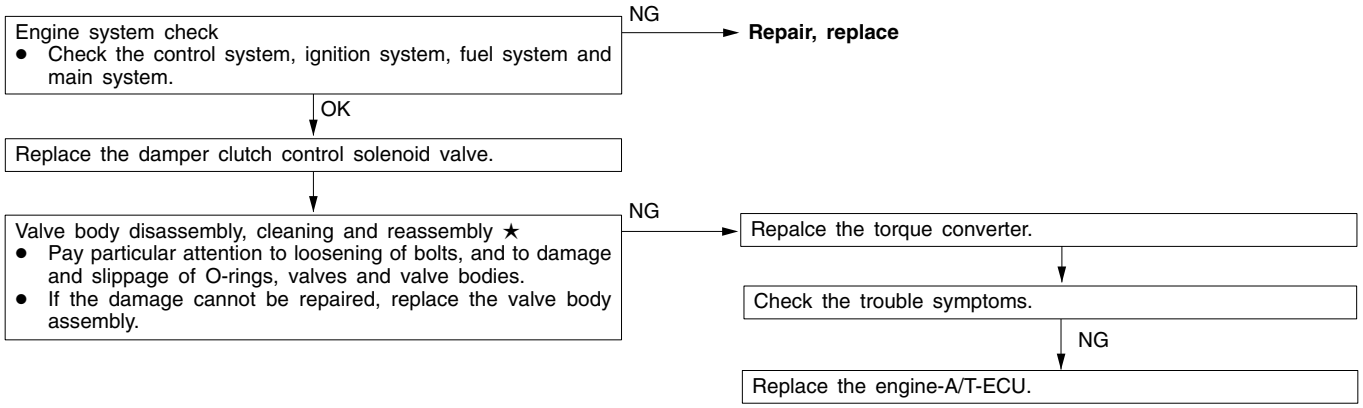
★: Refer to the Transmission Workshop Manual.



INSPECTION PROCEDURE 6

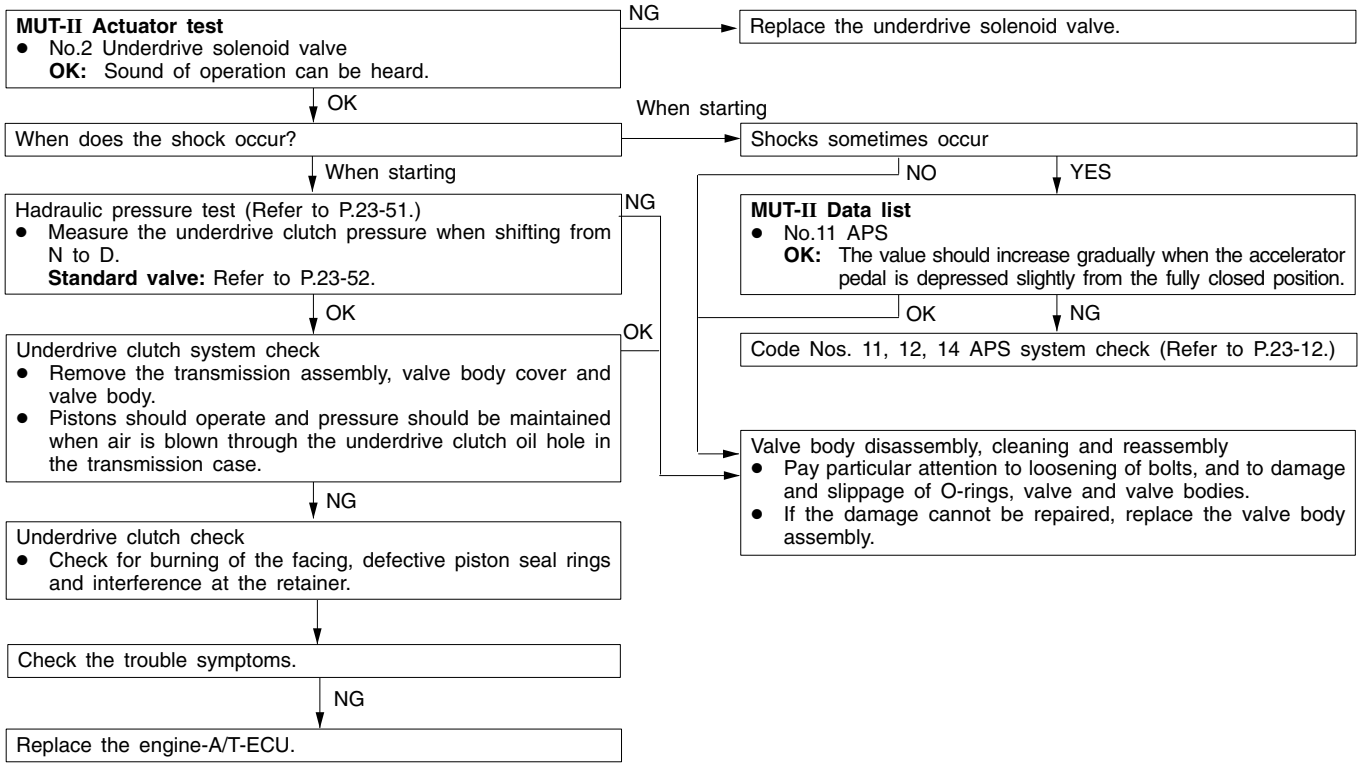
Engine stalling during shifting	Probable cause
If the engine stalls when the selector lever is shifted from N to D or R range while the engine is idling, the cause is probably a malfunction of the engine system, damper clutch solenoid valve, valve body or torque converter (damper clutch malfunction).	• Malfunction of the engine system • Malfunction of the damper clutch control solenoid valve • Malfunction of the valve body • Malfunction of the torque converter (Malfuction of the damper clutch)

★: Refer to the Transmission Workshop Manual.



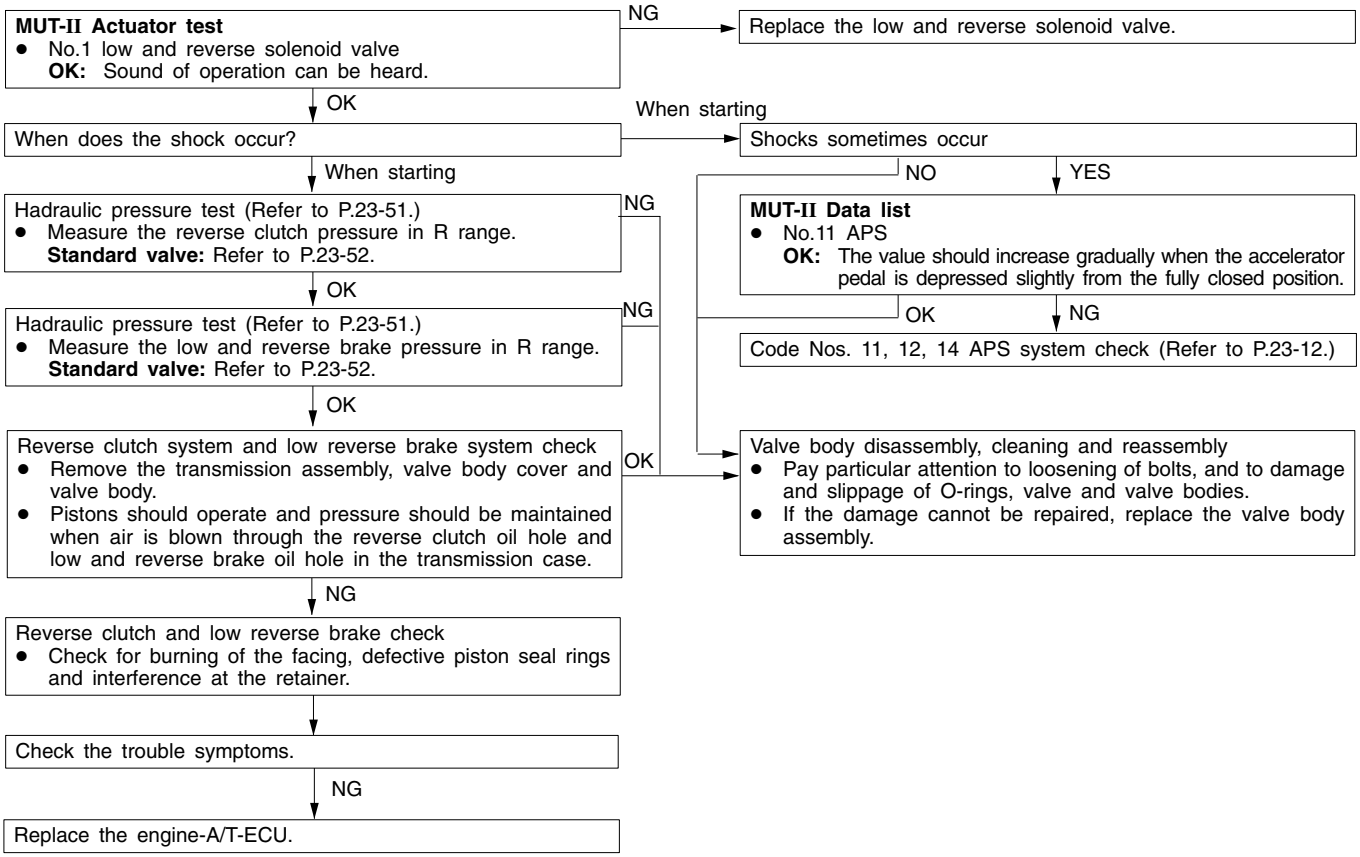
INSPECTION PROCEDURE 7

Shocks when changing from N to D and large time lag	Probable cause
If abnormal shocks or a time lag of 2 seconds or more occur when the selector lever is shifred from N to D range while the engine is idling, the cause is probadly abnormal underdrive clutch pressure or a malfuntion of the underdrive clutch, valve body, APS.	• Abnormal underdrive clutch pressure • Malfunction of the underdrive solenoid valve • Malfunction of the underdrive clutch • Malfunction of the valve body • Malfunction of the APS



INSPECTION PROCEDURE 8

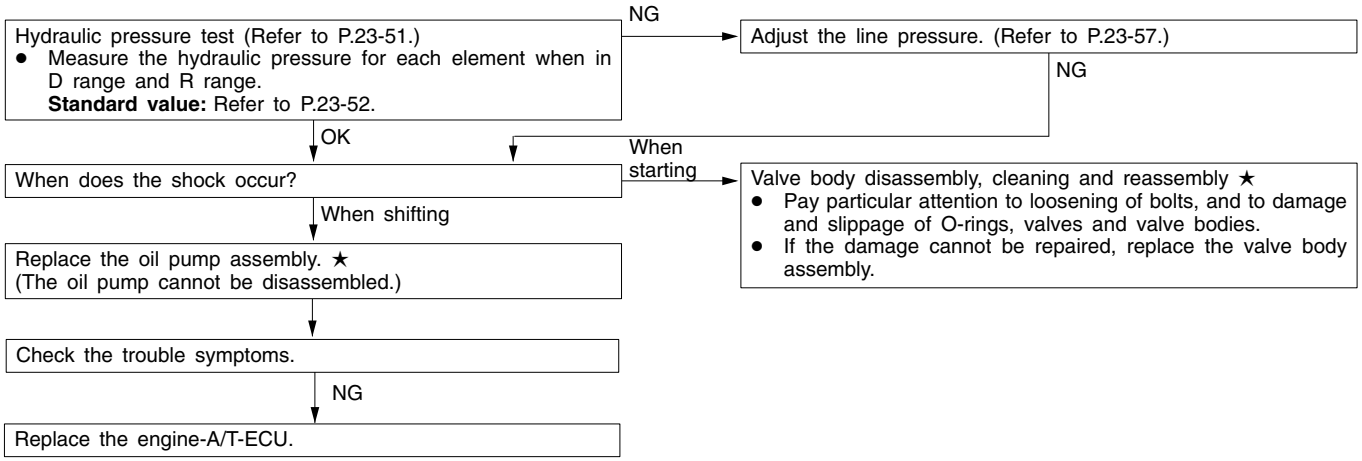
Shocks when changing from N to R and large time lag	Probable cause
If abnormal shocks or a time lag of 2 seconds or more occur when the selector lever is shifred from N to R range while the engine is idling, the cause is probadly abnormal reverse clutch pressure or low and reverse brake pressure, or a malfuntion of the reverse clutch, low and reverse brake, valve body, APS.	• Abnormal reverse clutch pressure • Abnormal low and reverse brake pressure • Malfunction of the low and reverse solenoid valve • Malfunction of the reverse clutch • Malfunction of the low and reverse brake • Malfunction of the valve body • Malfunction of the APS



INSPECTION PROCEDURE 9

Shocks when changing from N to D, N to R and large time lag	Probable cause
If abnormal shocks or a time lag of 2 seconds or more occur when the selector lever is shifted from N to D range and from N to R range while the engine is idling, the cause is probably abnormal line pressure or a malfunction of the oil pump or valve body.	• Abnormal line pressure • Malfunction of the oil pump • Malfunction of the valve body

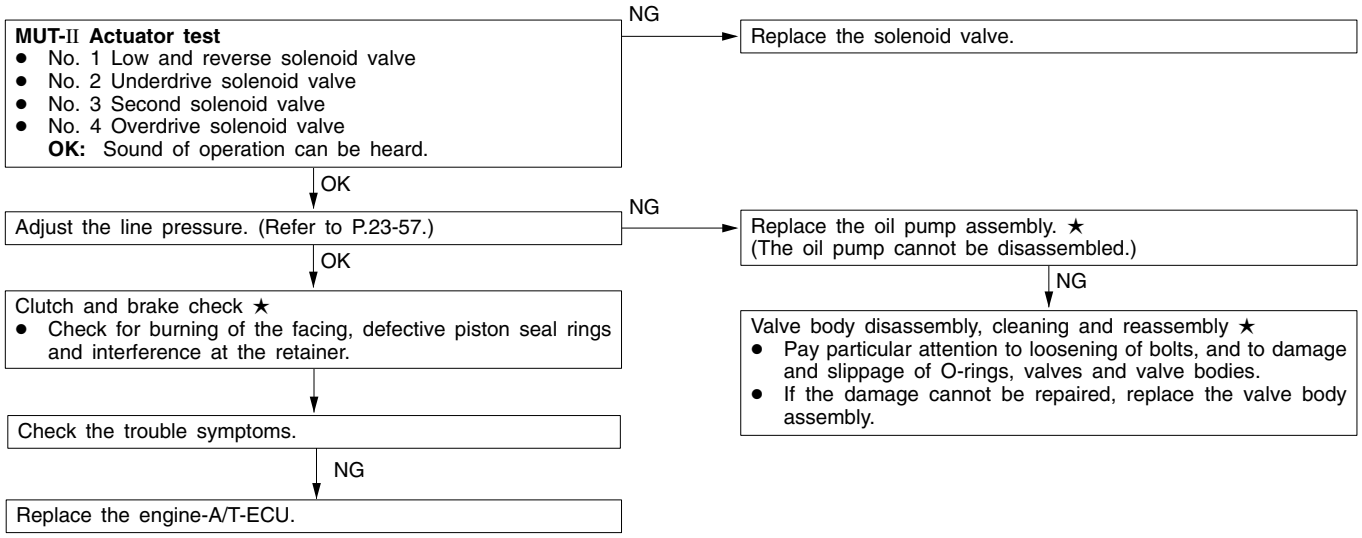
★: Refer to the Transmission Workshop Manual.



INSPECTION PROCEDURE 10

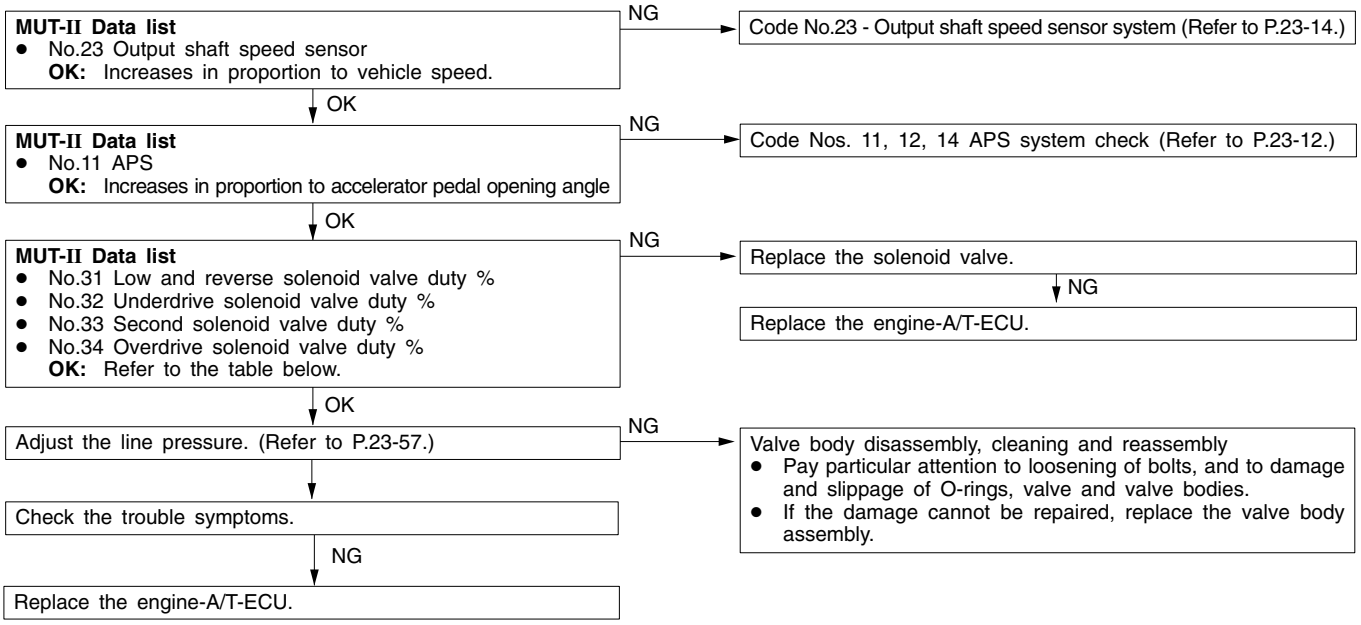
Shocks and running up	Probable cause
If shocks occur when driving due to upshifting or downshifting and the transmission speed becomes higher than the engine speed, the cause is probably abnormal line pressure or a malfunction of a solenoid valve, oil pump, valve body or of a brake or clutch.	• Abnormal line pressure • Malfunction of each solenoid valve • Malfunction of the oil pump • Malfunction of the valve body • Malfunction of each brake or each clutch

★: Refer to the Transmission Workshop Manual.



INSPECTION PROCEDURE 11

All points (Displaced shifting points)	Probable cause
If all shift points are displaced while driving, the cause is probably a malfunction of the output shaft speed sensor, APS of a solenoid valve.	• Malfunction of the output shaft speed sensor • Malfunction of the APS • Malfunction of each solenoid valve • Abnormal line pressure • Malfunction of the valve body • Malfunction of the engine-A/T-ECU

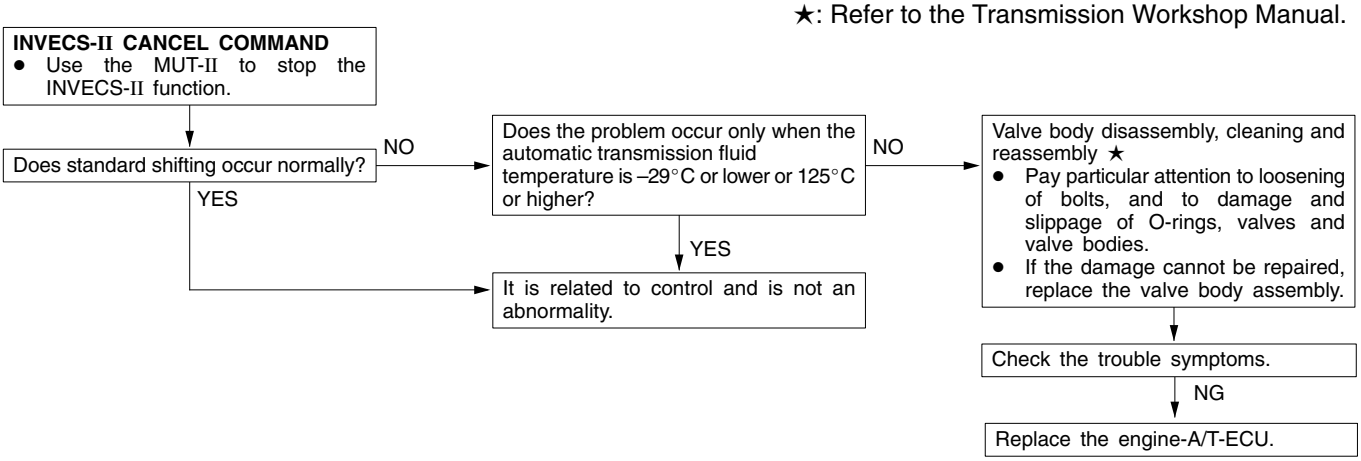


	No. 31	No. 32	No. 33	No. 34
Drining at constant speed in 1st gear	0 %	0 %	100 %	100 %
Drining at constant speed in 2nd gear	100 %	0 %	0 %	100 %
Drining at constant speed in 3rd gear	100 %	0 %	100 %	0 %
Drining at constant speed in 4th gear	100 %	100 %	0 %	0 %

INSPECTION PROCEDURE 12

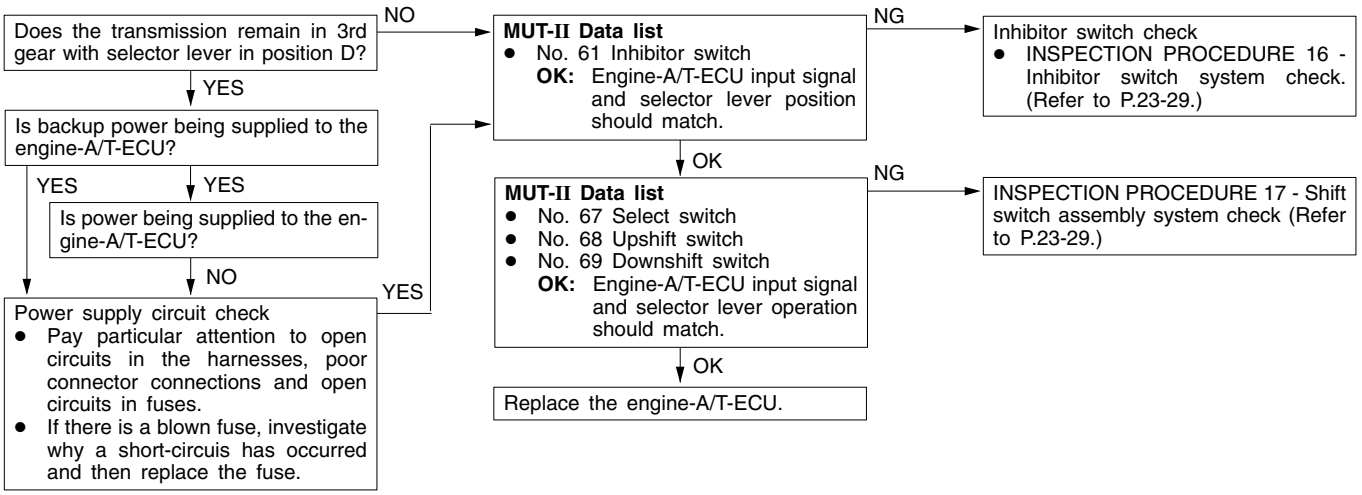
Some points (Displaced shifting points)	Probable cause
If some of the shift points are displaced while driving, the cause is probably a malfunction of the valve body, or it is related to control and is not an abnormality.	• Malfunction of the valve body

★: Refer to the Transmission Workshop Manual.



INSPECTION PROCEDURE 13

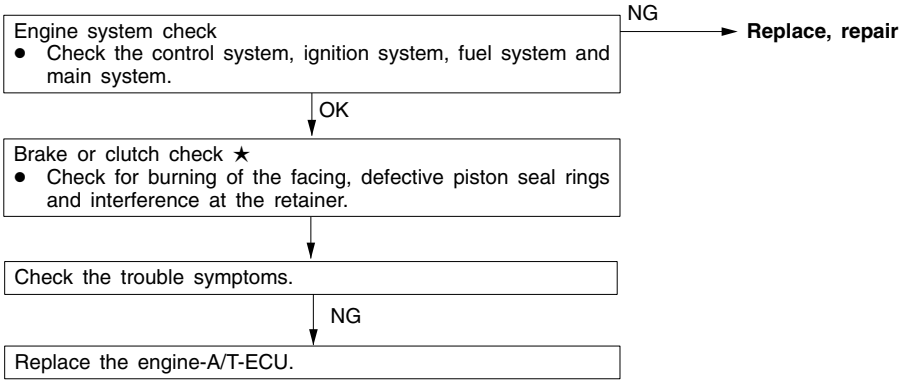
No diagnosis codes (Does not shift)	Probable cause
If shifting does not occur while driving and no diagnosis codes are output, the cause is probably a malfunction of the inhibitor switch, or engine-A/T-ECU.	• Malfunction of the inhibitor switch • Malfunction of the shift switchassembly • Malfunction of the engine-A/T-ECU



INSPECTION PROCEDURE 14

Poor acceleration	Probable cause
If acceleration is poor even if downshifting occurs while driving, the cause is probably a malfunction of the engine system or of a brake or clutch.	• Malfunction of the engine system • Malfunction of the brake or clutch

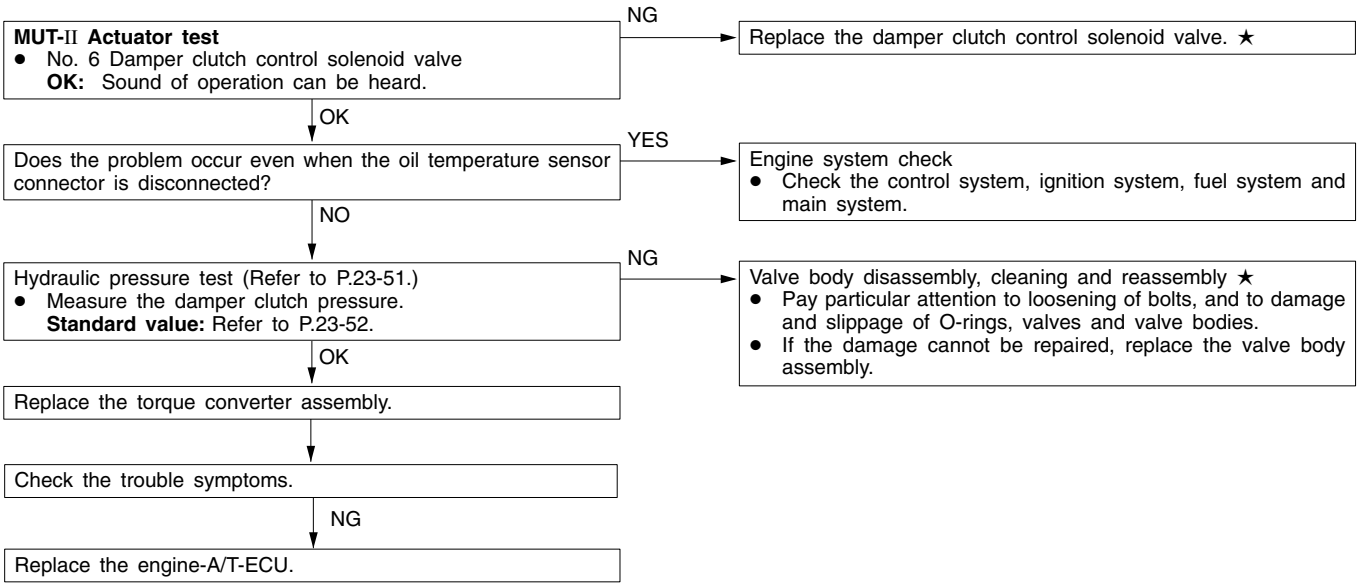
★: Refer to the Transmission Workshop Manual.



INSPECTION PROCEDURE 15

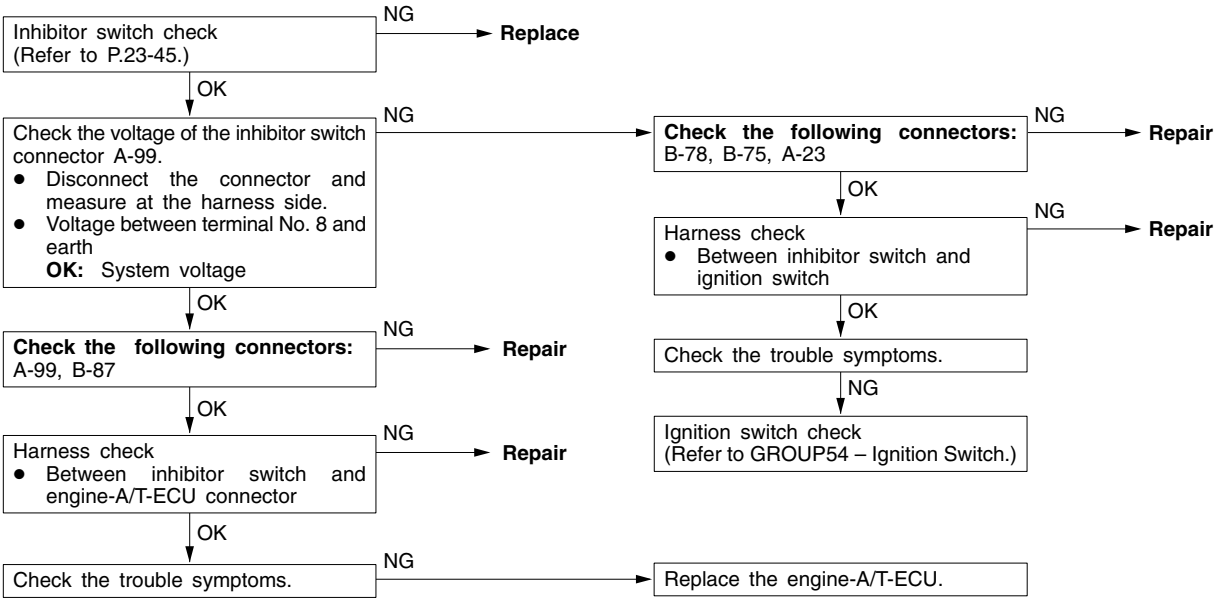
Vibration	Probable cause
If vibration occurs when driving at constant speed or when accelerating and deceleration in top range, the cause is probably abnormal damper clutch pressure or a malfunction of the engine system, damper clutch control solenoid valve, torque converter or valve body.	• Abnormal damper clutch pressure • Malfunction of the engine system • Malfunction of the damper clutch control solenoid valve • Malfunction of the torque converter • Malfunction of the valve body

★: Refer to the Transmission Workshop Manual.



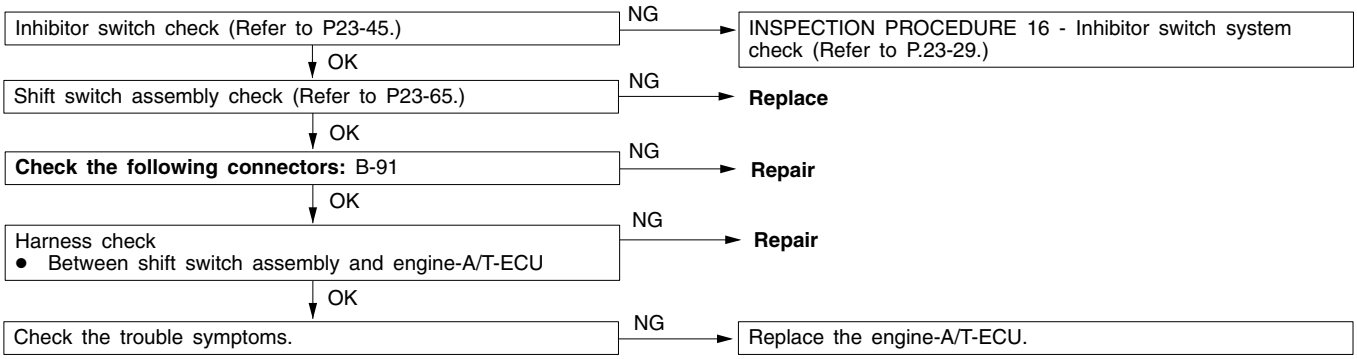
INSPECTION PROCEDURE 16

Inhibitor switch system	Probable cause
The cause is probably a malfunction of the inhibitor switch circuit, ignition switch circuit or a defective engine-A/T-ECU.	• Malfunction of the inhibitor switch • Malfunction of the ignition switch • Malfunction of connector • Malfunction of the engine-A/T-ECU



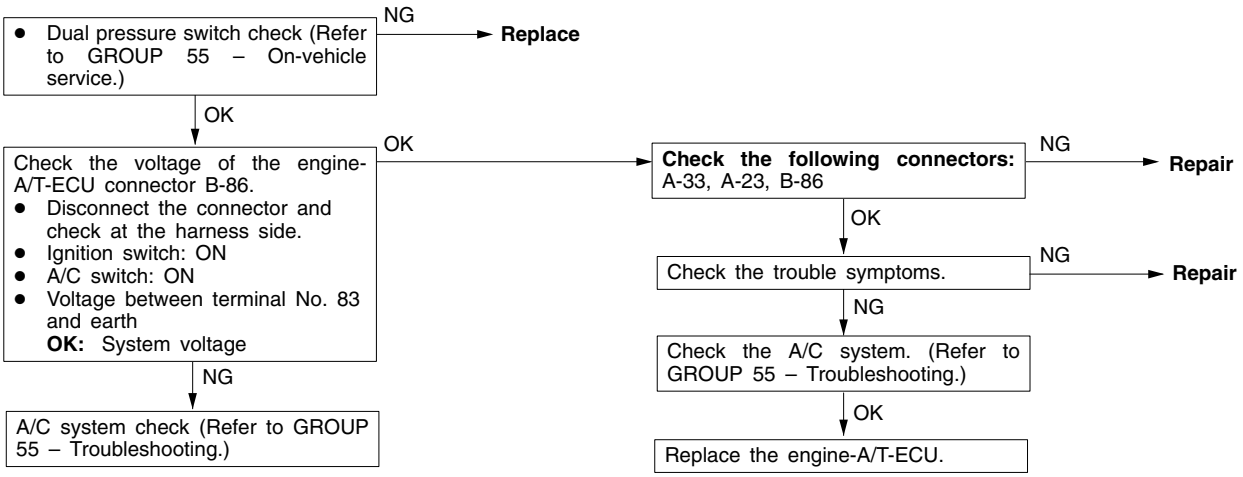
INSPECTION PROCEDURE 17

Shift switch assembly system	Probable cause
The cause is probably a malfunction of the inhibitor switch circuit, shift switch assembly circuit or a engine-A/T-ECU.	• Malfunction of the inhibitor switch • Malfunction of the shift switch assembly • Malfunction of connector • Malfunction of the engine-A/T-ECU



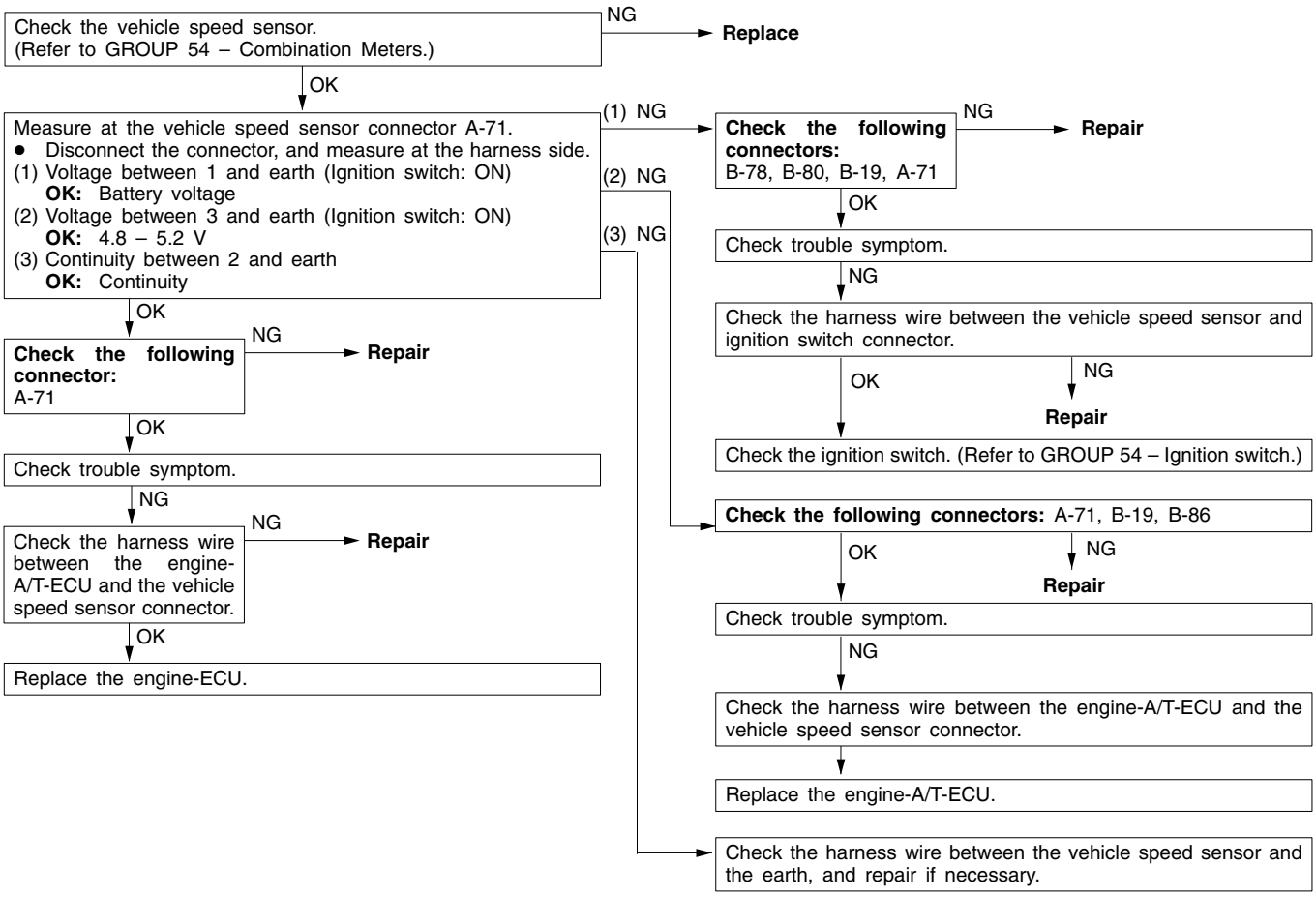
INSPECTION PROCEDURE 18

Dual pressure switch system	Probable cause
The cause is probably a defective dual pressure switch circuit or a defective engine-A/T-ECU.	• Malfunction of the dual pressure switch • Malfunction of connector • Malfunction of A/C system • Malfunction of the engine-A/T-ECU



INSPECTION PROCEDURE 19

Vehicle speed sensor system	Probable cause
The cause is probably a defective vehicle speed sensor circuit or a defective engine-A/T-ECU.	• Malfunction of the vehicle speed sensor • Malfunction of connector • Malfunction of the engine-A/T-ECU



DATA LIST REFERENCE TABLE

Item No.	Check item	Check requirement		Normal value
13	Accelerator pedal position sensor (APS)	Engine: Stopped Selector lever position: P	Accelerator pedal: Released	400 – 1,000 mV
			Accelerator pedal: Halfly depressed	Gradually rises from the above value
			Accelerator pedal: Depressed	4,500 – 5,000 mV
15	A/T fluid temperature sensor	Warming up	Drive for 15 minutes or more so that the automatic transmission fluid temperature becomes 70 – 80 °C.	Gradually rises to 70 – 80 °C
21	Crank angle sensor	Engine: Idling Selector lever position: P	Accelerator pedal: Released	550 – 900 r/min
			Accelerator pedal: Halfly depressed	Gradually rises from the above value
22	Input shaft speed sensor	Selector lever position: Sports mode	Driving at constant speed of 50 km/h in 3rd gear	1,800 – 2,100 r/min
23	Output shaft speed sensor	Selector lever position: Sports mode	Driving at constant speed of 50 km/h in 3rd gear	1,800 – 2,100 r/min
25	Wide open throttle switch	Accelerator pedal position	Released	OFF
			Depressed	ON
26	Stop lamp switch	Ignition switch: ON Engine: Stopped	Brake pedal: Depressed	ON
			Brake pedal: Released	OFF
29	Vehicle speed sensor	Selector lever position: Sports mode	Idling with 1st gear (Vehicle stopped)	0 km/h
			Driving at constant speed of 50 km/h in 3rd gear	50 km/h
31	Low and reverse solenoid valve duty %	Selector lever position: Sports mode	10 km/h in 1st gear	No. 31: 0 %, No. 32: 0 %, No. 33: 100 %, No. 34: 100%
32	Underdrive solenoid valve duty %		30 km/h in 2nd gear	No. 31: 100 %, No. 32: 0 %, No. 33: 0 %, No. 34: 100%
33	Second solenoid valve duty %		50 km/h in 3rd gear	No. 31: 100 %, No. 32: 0 %, No. 33: 100 %, No. 34: 0%
34	Overdrive solenoid valve duty %		70 km/h in 4th gear	No. 31: 100 %, No. 32: 100 %, No. 33: 0 %, No. 34: 0%

Item No.	Check item	Check requirement		Normal value
36	Damper clutch control solenoid valve duty %	Selector lever position: Sports mode	Driving at 50 km/h in 3rd gear with accelerator released	0 %
			Driving at constant speed of 70 km/h in 3rd gear	Approx. 70 – 90 %
52	Amount of damper clutch slippage	Selector lever position: Sports mode	Driving at 50 km/h in 3rd gear with accelerator fully closed	Approx. 100 – 300 r/min
			Driving at constant speed of 70 km/h in 3rd gear	Approx. 0 – 10 r/min
54	Control relay output voltage	Ignition switch : OFF	Ignition switch: ON → OFF	Battery voltage (mV) → 0 mV
61	Inhibitor switch	Ignition switch: ON Engine: Stopped	Selector lever position: P	P
			Selector lever position: R	R
			Selector lever position: N	N
			Selector lever position: D	D
63	Shift position	Selector lever position: Sports mode	Driving at constant speed of 10 km/h in 1st gear	1st
			Driving at constant speed of 30 km/h in 2nd gear	2nd
			Driving at constant speed of 50 km/h in 3rd gear	3rd
			Driving at constant speed of 70 km/h in 4th gear	4th
65	Dual pressure switch	Engine: Idling Selector lever position: N	A/C switch: ON	ON
			A/C switch: OFF	OFF
66	Auto-cruse-ECU signal	While auto-cruise operating	Plain road	OFF
			Sloping road	ON

Item No.	Check item	Check requirement		Normal value
67	Select switch	Ignition switch: ON Engine: Stopped		Selector lever position: D Data list No.67: OFF, Data list No.68: OFF, Data list No.69: OFF Selector lever operation: Select sports mode Data list No.67: ON, Data list No.68: OFF, Data list No.69: OFF Selector lever operation: Upshift and hold the selector lever Data list No.67: ON, Data list No.68: ON, Data list No.69: OFF Selector lever operation: Downshift and hold the selector lever Data list No.67: ON, Data list No.68: OFF, Data list No.69: ON
68	Up shift switch			
69	Down shift switch			
73	Engine target effective pressure	Selector lever position: N	N range with accelerator pedal released to depressed	Data changes

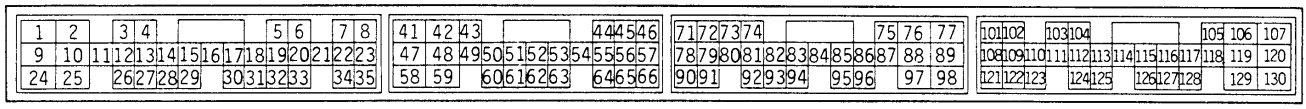
ACTUATOR TEST JUDGEMENT VALUE

Item No.	Check item	Test content	Check requirement	Normal value
1	Low reverse solenoid valve	Drive the solenoid valve specified by the MUT-II at 50 % duty for 5 seconds. No other solenoid valve should be energised.	Ignition switch: ON Selector lever position: P Engine: 0 r/min Vehicle speed: 0 km/h (Vehicle stopped) Throttle (Accelerator) opening voltage: Less than 0 V	The operation sound should be audible when the solenoid valve is driven.
2	Underdrive solenoid valve			
3	Second solenoid valve			
4	Overdrive solenoid valve			
6	Damper clutch control solenoid valve			
7	1st indicator lamp	Illuminate each indicator lamp for three seconds according to the signal from the MUT-II.		Shift indicator lamp illuminates.
8	2nd indicator lamp			
9	3rd indicator lamp			
10	4th indicator lamp			
12	A/T control relay	Control relay is OFF for 3 seconds.		Data list No. 54 (1) During test: 0 mV (2) Normal: Battery voltage [mV]

INVECS-II CANCEL COMMAND

Item No.	Item	Content	Remarks
14	INVECS-II	Stop the INVECS-II control and change gears according to the standard shift pattern.	Use this function when carrying out procedure 8 in the road tests.

CHECK AT ENGINE-A/T-ECU TERMINALS



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Terminal No.	Check item	Check requirement	Standard value
45	Crank angle sensor	Engine: Idling	2.0 - 2.4 V
50	A/T control relay	Ignition switch: OFF	0 V
		Ignition switch: ON	System voltage
66	Backup power supply	Ignition switch: OFF	System voltage
76	Earth	Aiways	0 V
77	Solenoid valve power supply	Ignition switch: OFF	0 V
		Ignition switch: ON	System voltage
80	Vehicle speed sensor	When stopped	0 V
		Move forward slowly	0 → 5 V flashing
81	Sensor earth	Always	0 V
83	A/C compressor load signal	A/C switch: OFF	0 V
		A/C switch: ON	0 V
84	Diagnosis control	-	-
85	Diagnosis output	Normal (No diagnosis code output)	0 → 5 V flashing
88	Earth	Aiways	0 V
89	Solenoid valve power supply	Ignition switch: OFF	0 V
		Ignition switch: ON	System voltage
95	Accelerator pedal position sensor (APS)	Accelerator pedal: Released (Engine stopped)	0.5 - 1.0 V
		Accelerator pedal: Depressed (Engine stopped)	4.5 - 5.0 V
97	Earth	Aiways	0 V
101	Inhibitor switch P	Selector lever position: P	System voltage
		Selector lever position: Other than above	0 V

Terminal No.	Check item	Check requirement	Standard value
102	Inhibitor switch D	Selector lever position: D	Battery voltage
		Selector lever position: Other than above	0 V
103	Input shaft speed sensor	Measure between terminal No. 31 and No.43 by an oscilloscope. Engine: 2,000 r/min Selector lever position: Sports mode (3rd gear)	Refer to P.23-38, Oscilloscope inspection procedure.
104	Output shaft speed sensor	Measure between terminal No. 32 and No.43 by an oscilloscope. Engine: 2,000 r/min Selector lever position: Sports mode (3rd gear)	Refer to P.23-38, Oscilloscope inspection procedure.
105	1st gear shift indicator lamp	Gear: 1st gear	System voltage
		Gear: Other than above	0 V
106	Second solenoid valve	Selector lever position: Sports mode (2nd gear)	System voltage
		Selector lever position: P	Approx. 7 - 9 V
107	Damper clutch control solenoid valve	Selector lever position: Sports mode (1st gear)	System voltage
		Selector lever position: Sports mode (50 km/h in 3rd gear)	Other than system voltage
108	Inhibitor switch R	Selector lever position: R	System voltage
		Selector lever position: Other than above	0 V
109	Select switch	Selector lever position: Sports mode	System voltage
		Selector lever position: Other than above	0 V
110	Down shift switch	Selector lever position: Downshift and lever held	System voltage
		Selector lever position: Other than above	0 V
115	Wide open throttle switch	Accelerator pedal: Released	4.5 - 5.5 V
		Accelerator pedal: Depressed	Less than 0.4 V
117	3rd gear shift indicator lamp	Gear: 3rd gear	System voltage
		Gear: Other than above	0 V
118	2nd gear shift indicator lamp	Gear: 2nd gear	System voltage
		Gear: Other than above	0 V
120	Underdrive solenoid valve	Selector lever position: Sports mode (1st gear)	System voltage
		Selector lever position: P	Approx. 7 - 9 V
121	Inhibitor switch N	Selector lever position: N	System voltage
		Selector lever position: Other than above	0 V

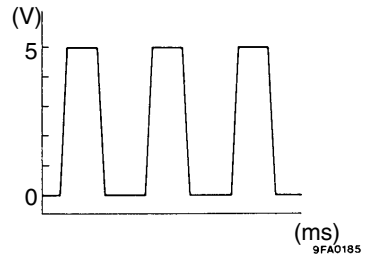
Terminal No.	Check item	Check requirement	Standard value
122	Up shift switch	Selector lever position: Upshift and lever held	System voltage
		Selector lever position: Other than above	0 V
123	Stop lamp switch	Brake pedal: Depressed	System voltage
		Brake pedal: Released	0 V
124	A/T fluid temperature sensor	A/T fluid temperature: 20°C (68°F)	3.8 - 4.0 V
		A/T fluid temperature: 40°C (104°F)	3.2 - 3.4 V
		A/T fluid temperature: 80°C (176°F)	1.7 - 1.9 V
128	4th gear shift indicator lamp	Gear: 4th gear	System voltage
		Gear: Other than above	0 V
129	Low-reverse solenoid valve	Selector lever position: D (1st gear)	System voltage
		Selector lever position: D (2nd gear)	Approx. 7 - 9 V
130	Overdrive solenoid valve	Selector lever position: Sports mode (3rd gear)	System voltage
		Selector lever position: P	Approx. 7 - 9 V

OSCILLOSCOPE INSPECTION PROCEDURE

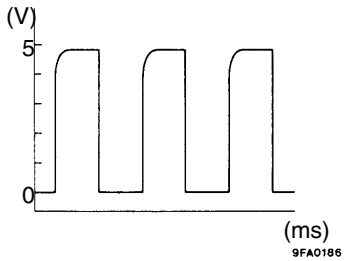
Check item	Check requirement		Normal condition (Waveform sample)
Crank angle sensor	Selector lever position: N	Idling (Vehicle stopped)	Waveform A
Input shaft speed sensor	Selector lever position: Sports mode	Driving at constant speed of 50 km/h in 3rd gear (Engine: 1,800 – 2,100 r/min)	Waveform B
Output shaft speed sensor			
Vehicle speed sensor			
Low reverse solenoid valve	Ignition switch: ON Selector lever position: P Engine: 0 r/min Vehicle speed: 0 km/h (Vehicle stopped) Throttle (Accelerator) opening angle: Less than 1 V	Force drive each solenoid valve (Actuator test)	Waveform C
Underdrive solenoid valve			
Second solenoid valve			
Overdrive solenoid valve			
Damper clutch control solenoid valve			

Waveform sample

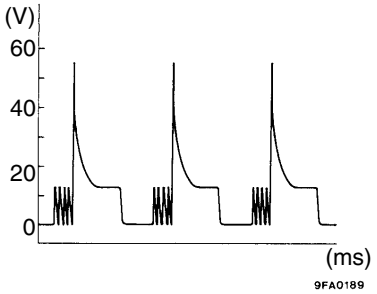
Waveform A



Waveform B



Waveform C



TROUBLESHOOTING <A/T KEY INTERLOCK AND SHIFT LOCK MECHANISMS>

TROUBLE SYMPTOM TABLE

Symptom	Inspection procedure No.	Reference page
Can move selector lever from “P” to “R” without depressing brake pedal when ignition key is at positions other than “LOCK”	1	23-39
Cannot move selector lever from “P” to “R” with brake pedal depressed when ignition key is at positions other than “LOCK”	2	23-39
Can move selector lever from “P” to “R” with brake pedal depressed when ignition key is at “LOCK”	3	23-40
Cannot move selector lever from “P” to “R” smoothly	4	23-40
Cannot move selector lever from “R” to “P”	5	23-40
Cannot turn ignition key to “LOCK” when selector lever is at “P”	6	23-40
Can turn ignition key to “LOCK” when selector lever is at positions other than “P”	7	23-40

INSPECTION PROCEDURE FOR TROUBLE SYMPTOMS

INSPECTION PROCEDURE 1

Can shift selector lever from “P” to “R” without depressing brake pedal when ignition key is at positions other than “LOCK”	**Probable cause**
Lock cam or lock cable is suspected to be faulty.	• Malfunction of lock cam • Defective shift lock cable

Check by referring to the probable cases.

INSPECTION PROCEDURE 2

Cannot shift selector lever from “P” to “R” with brake pedal depressed when ignition key is at positions other than “LOCK”	**Probable cause**
Selector lever assembly, shift lock cable, key interlock cable transmission control cable or lock cam is suspected to be faulty.	• Malfunction of selector lever assembly • Malfunction of shift lock cable • Defective key interlock cable • Defective transmission control cable • Malfunction of lock cam

Check by referring to the probable cases.

INSPECTION PROCEDURE 3

Can move selector lever from "P" to "R" with brake pedal depressed when ignition key is at "LOCK"	Probable cause
Lock cam or key interlock cable is suspected to be faulty.	• Malfunction of lock cam • Defective key interlock cable

Check by referring to the probable cases.

INSPECTION PROCEDURE 4

Cannot move selector lever from "P" to "R" smoothly	Probable cause
Key interlock cable, shift lock cable, lock cam or selector lever assembly is suspected to be faulty.	• Defective key interlock cable • Defective shift lock cable • Malfunction of lock cam • Malfunction of selector lever assembly

Check by referring to the probable cases.

INSPECTION PROCEDURE 5

Cannot move selector lever from "R" to "P"	Probable cause
Selector lever assembly or transmission control cable is suspected to be faulty.	• Malfunction of selector lever assembly • Defective transmission control cable

Check by referring to the probable cases.

INSPECTION PROCEDURE 6

Cannot turn ignition key to "LOCK" when selector lever is at "P"	Probable cause
Lock cam key interlock cable or key cylinder slider is suspected to be faulty.	• Malfunction of lock cam • Defective key interlock cable • Malfunction of slider

Check by referring to the probable cases.

INSPECTION PROCEDURE 7

Can turn ignition key to "LOCK" when selector lever is at positions other than "P"	Probable cause
Lock cam, key cylinder cover or key interlock cable is suspected to be faulty.	• Malfunction of lock cam • Defective key cylinder cover • Malfunction of key inter lock cable

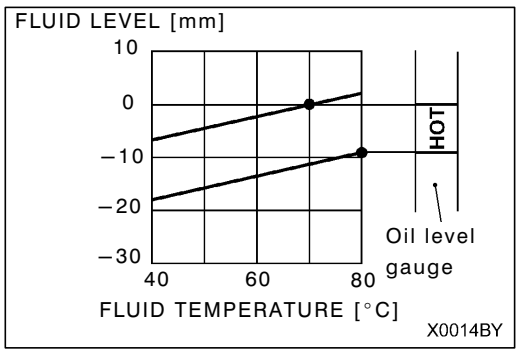
Check by referring to the probable cases.

ON-VEHICLE SERVICE

ESSENTIAL SERVICE

AUTOMATIC TRANSMISSION FLUID CHECK

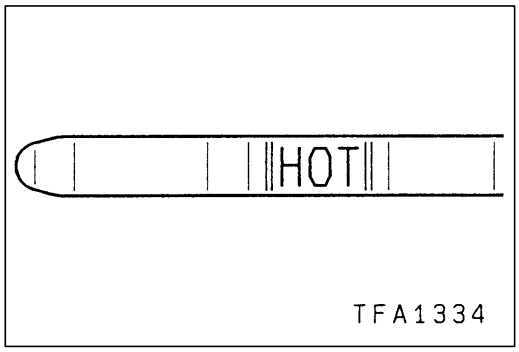
Caution
When the transmission has been replaced or overhauled, or driving has been carried out under the severe condition, the A/T fluid cooler line flushing should always be carried out and also, the A/T fluid and oil filters (special filters for transmission only) should always be replaced.



1. Drive the vehicle until the fluid temperature rises to the normal temperature (70 – 80°C).

   NOTE
   1) Measure ATF temperature using MUT-II.
   2) Check the oil level referring to the characteristics chart shown at left if it takes some time to reach the normal operation temperature of ATF (70 – 80°C).
2. Park the vehicle on a level surface.
3. Move the selector lever through all positions to fill the torque converter and the hydraulic circuits with fluid, and then move the selector lever to the N position.
4. After wiping off any dirt around the oil level gauge, remove the oil level gauge and check the condition of the fluid.

   NOTE
   If the fluid smells as if it is burning, it means that the fluid has been contaminated by the particles from the bushes and friction materials, a transmission overhaul and flushing the cooler line may be necessary.

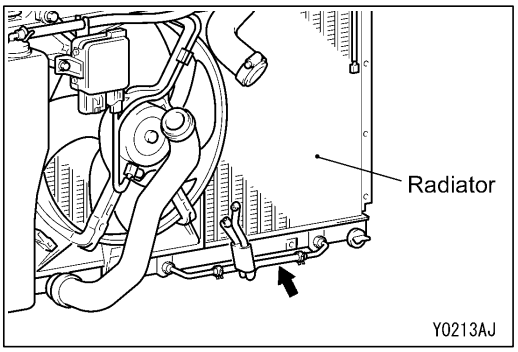


5. Check that the fluid level is at the HOT mark on the oil level gauge. If the fluid level is lower than this, pour in more fluid until the level reaches the HOT mark.

   Automatic transmission fluid:

   Dia Queen ATF SP II M, ATF SP III or equivalent

   NOTE
   If the fluid level is low, the oil pump will draw in air along with the fluid, which will cause bubbles to form inside the hydraulic circuit. This will in turn cause the hydraulic pressure to drop, which will result in late shifting and slipping of the clutches and brakes.
   If there is too much fluid, the gears can churn it up into foam and cause the same conditions that can occur with low fluid levels.
   In either case, air bubbles can cause overheating and oxidation of the fluid which can interfere with normal valve, clutch, and brake operation. Foaming can also result in fluid escaping from the transmission vent, in which case it may be mistaken for a leak.
6. Securely insert the oil level gauge.



AUTOMATIC TRANSMISSION FLUID REPLACEMENT

Caution
When the transmission has been replaced or overhauled, the transmission fluid cooler line flushing should always be carried out before installing the transmission fluid cooler hose.

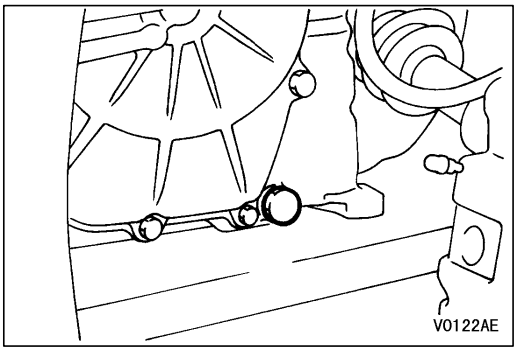
If you have a fluid changer, use this changer to replace the fluid. If you do not have a fluid changer, replace the fluid by the following procedure.

1. Disconnect the hose shown in the illustration which connects the transmission and the oil cooler (inside the radiator).
2. Start the engine and let the fluid drain out.

   Running conditions: N range with engine idling

   Caution
   The engine should be stopped within one minute after it is started. If the fluid has all drained out before then, the engine should be stopped at that point.

   Discharge volume: Approx. 3.5 L



3. Remove the drain plug from the bottom of the transmission case to drain the fluid.

   Discharge volume: Approx. 2.0 L

4. Replace the oil filters. (Refer to P.23-44.)
5. Install the drain plug via a new gasket, and tighten it to the specified torque.

   Tightening torque: 32 Nm

6. Pour the new fluid in through the oil filler tube.

   Adding volume: Approx. 5.5 L

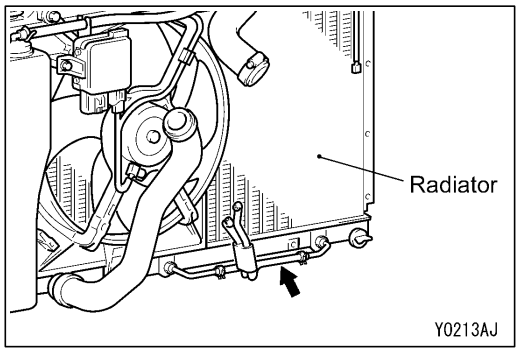
   Caution
   Stop pouring if the full volume of fluid cannot be poured in.

7. Repeat the procedure in step 2.

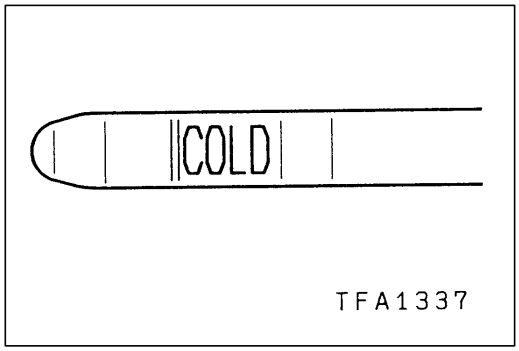
   NOTE
   Drain the fluid from the cooler hose 7 L at least. Then drain the fluid a little and check the fluid for dirt.
   If it has been contaminated, repeat the steps 6 and 7.

8. Pour the new fluid in through the oil filler tube.

   Adding volume: Approx. 3.5 L

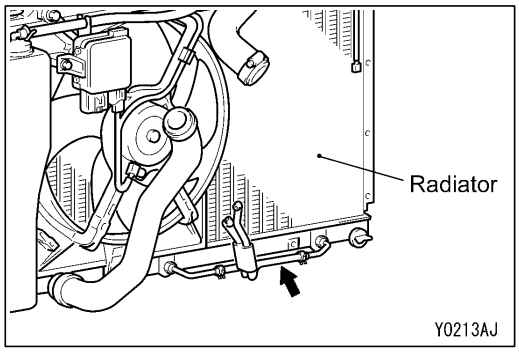


9. Reconnect the hose which was disconnected in step 1 above, and firmly replace the oil level gauge.
10. Start the engine and run it at idle for 1 – 2 minutes.
11. Move the selector lever through all positions, and then move it to the N position.



12. Check that the fluid level is at the COLD mark on the oil level gauge. If the level is lower than this, pour in more fluid.
13. Drive the vehicle until the fluid temperature rises to the normal temperature (70 – 80°C), and then check the fluid level again.
    The fluid level must be at the HOT mark.

    NOTE
    The COLD level is for reference only; the HOT level should be regarded as the standard level.
14. Firmly insert the oil level gauge into the oil filler tube.



AUTOMATIC TRANSMISSION FLUID COOLER LINE FLUSHING

Caution
When the transmission has been replaced or overhauled, or automatic transmission fluid is contaminated, the transmission fluid cooler line flushing should always be carried out.

1. Disconnect the hose shown in the illustration which connects the transmission and the oil cooler (inside the radiator).
2. Start the engine and let the fluid drain out.

   Caution
   The engine should be stopped within one minute after it is started. If the fluid has all drained out before then, the engine should be stopped at that point.

   Discharge volume: Approx. 3.5 L

3. Pour the new fluid in through the oil filler tube.

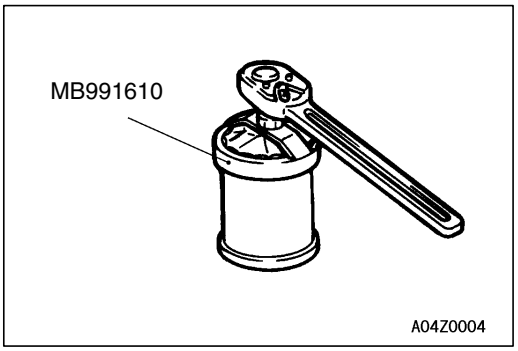
   Adding volume: Approx. 3.5 L

   Caution
   Stop pouring if the 3.5 L of fluid cannot be poured in.

4. Repeat the procedure in step 2.

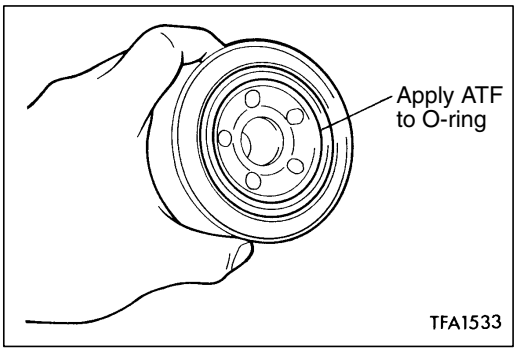
   NOTE
   Drain at least a 7.0 L of fluid through the cooler hose at steps 2 to 4.

5. Follow the automatic transmission fluid replacement procedure from step 3.



OIL FILTER REPLACEMENT

1. Use the special tool (MB991610) to remove the automatic transmission oil filter.
2. Clean the filter bracket side mounting surface.



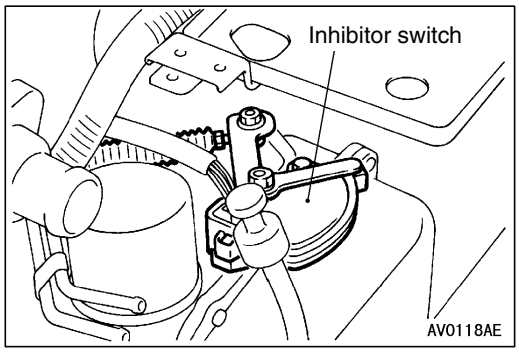
3. Apply a small amount of automatic transmission fluid to the O-ring of the new oil filter.
4. Use the special tool (MB991610) to install the automatic transmission oil filter.

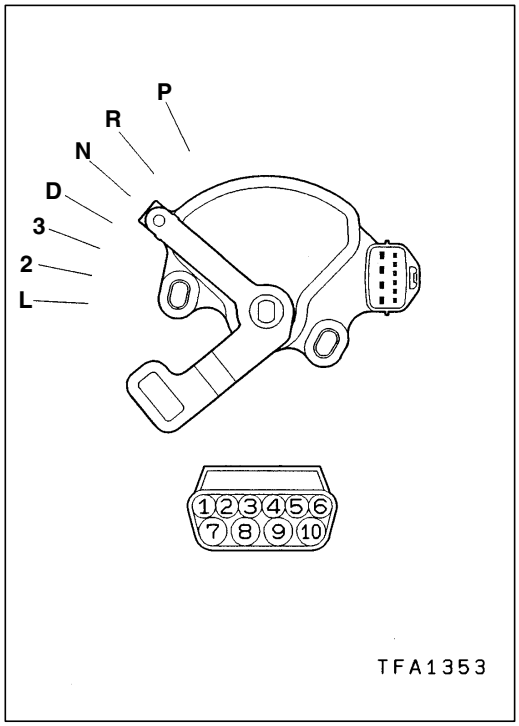
   Tightening torque: 32 Nm

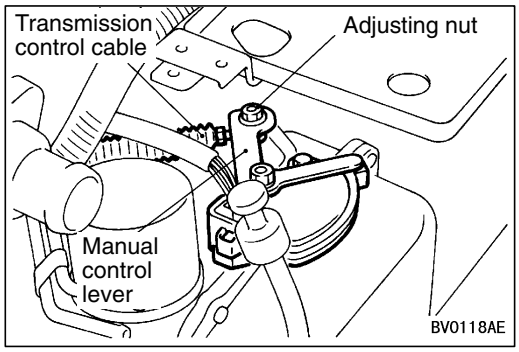
5. Check the quantity of the automatic transmission fluid. (Refer to P.23-44.)

ACCELERATOR PEDAL POSITION SENSOR ADJUSTMENT

Refer to GROUP 13A – On-vehicle Service.







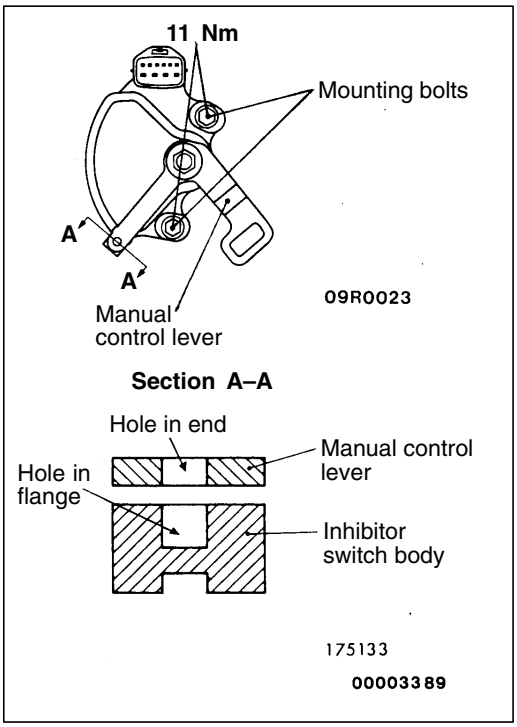
INHIBITOR SWITCH CONTINUITY CHECK

Items	Terminal No.									
	1	2	3	4	5	6	7	8	9	10
P			○					○	○	○
R							○	○		
N				○				○	○	○
D	○							○		

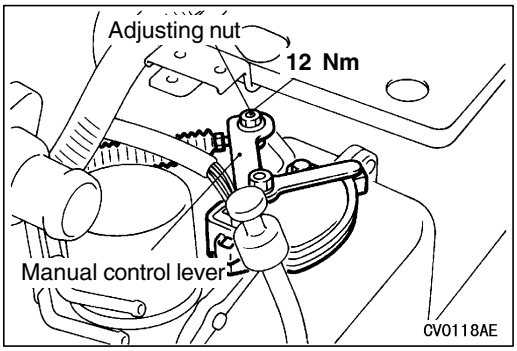
NOTE
The inhibitor switch has 7 positions, but only four positions (P, R, N and D) are used.

INHIBITOR SWITCH AND CONTROL CABLE ADJUSTMENT

1. Set the selector lever to the “N” position.
2. Loosen the control cable to manual control lever coupling nut to free the cable and lever.
3. Set the manual control lever to the neutral position.



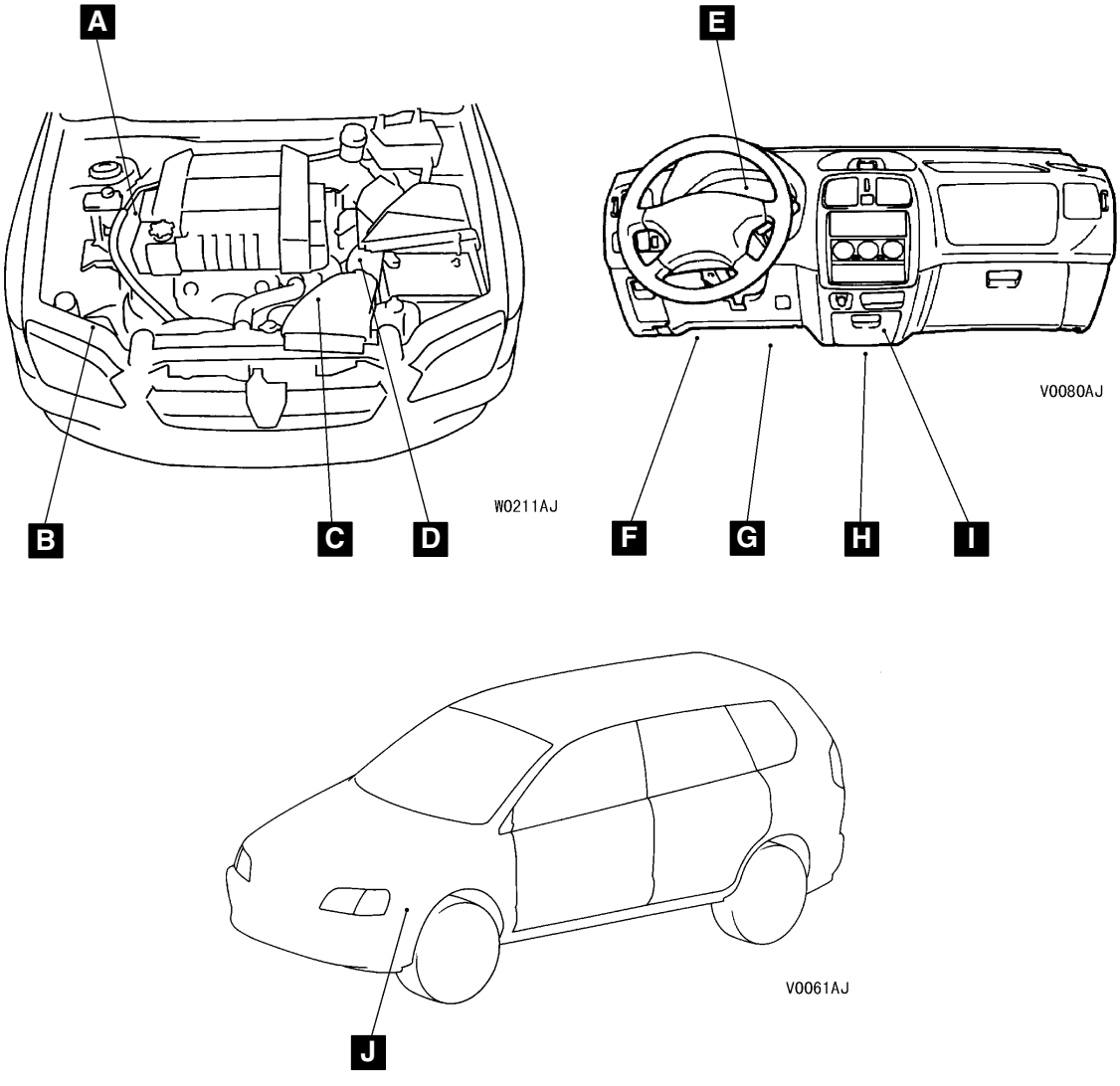
4. Loosen the inhibitor switch body mounting bolts and the turn the inhibitor switch body so the hole in the end of the manual control lever and the hole (cross section A–A in the figure on the left) in the flange of the inhibitor switch body flange are aligned.
5. Tighten the inhibitor switch body mounting bolts to the specified torque. Be careful at this time that the position of the switch body is not changed.



6. Gently pull the transmission control cable in the direction of the arrow, and then tighten the adjusting nut.
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.

A/T CONTROL COMPONENT LOCATION

Name	Symbol	Name	Symbol
Accelerator position sensor	J	Input shaft speed sensor	D
A/T control relay	I	A/T fluid temperature sensor	D
A/T control solenoid valve assembly	D	Output shaft speed sensor	D
Crank angle sensor	A	Shift indicator lamp	E
Diagnosis connector	H	Stop lamp switch	F
Dual pressure switch	B	Vehicle speed sensor	D
Engine-A/T-ECU	I	Wide open throttle switch	G
Inhibitor switch	C		



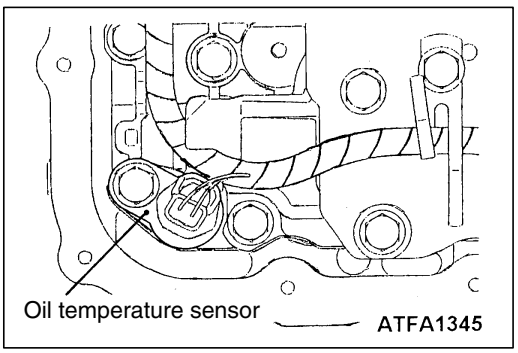
A/T CONTROL COMPONENT CHECK

CRANK ANGLE SENSOR CHECK

Refer to GROUP 13A – Troubleshooting.

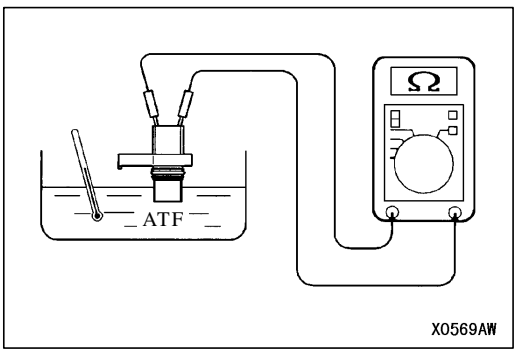
ACCELERATOR PEDAL POSITION SENSOR CHECK

Refer to GROUP 13A – On-vehicle Service.



A/T fluid TEMPERATURE SENSOR CHECK

1. Remove the A/T fluid temperature sensor.



2. Measure the resistance between terminals No. 1 and No. 2 of the oil temperature sensor connector.

Standard value:

Oil temperature (°C)	Resistance (kΩ)
0	16.7 – 20.5
20	7.3 – 8.9
40	3.4 – 4.2
60	1.9 – 2.2
80	1.0 – 1.2
100	0.57 – 0.69

INHIBITOR SWITCH CHECK

Refer to P.23A-45.

STOP LAMP SWITCH CHECK

Refer to GROUP 35 – Brake Pedal.

VEHICLE SPEED SENSOR CHECK

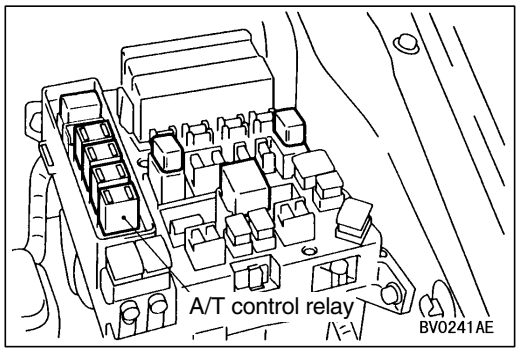
Refer to GROUP 54 – On-vehicle Service.

DUAL PRESSURE SWITCH CHECK

Refer to GROUP 55 – On-vehicle Service.

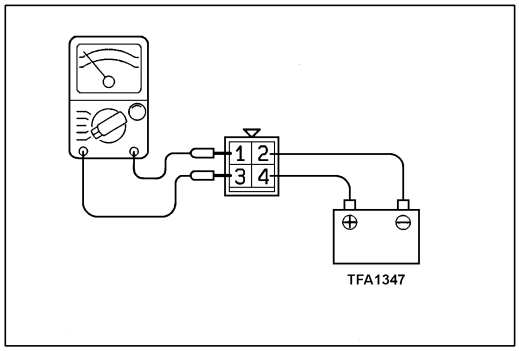
WIDE OPEN THROTTLE SWITCH CHECK

Refer to P.23-63.



A/T CONTROL RELAY CHECK

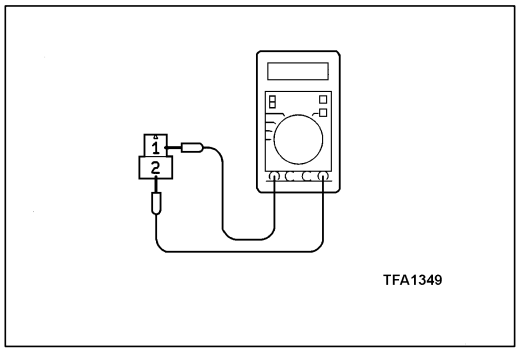
1. Remove the A/T control relay.

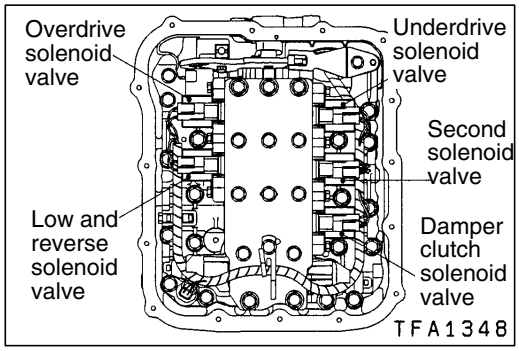


2. Use jumper wires to connect A/T control relay terminal 2 to the battery (–) terminal and terminal 4 to the battery (+) terminal.
3. Check the continuity between terminal 1 and terminal 3 of the A/T control relay when the jumper wires are connected to and disconnected from the battery.

Jumper wire	Continuity between terminals No. 1 and No. 3
Connected	Continuity
Disconnected	No continuity

4. If there is a problem, replace the A/T control relay.





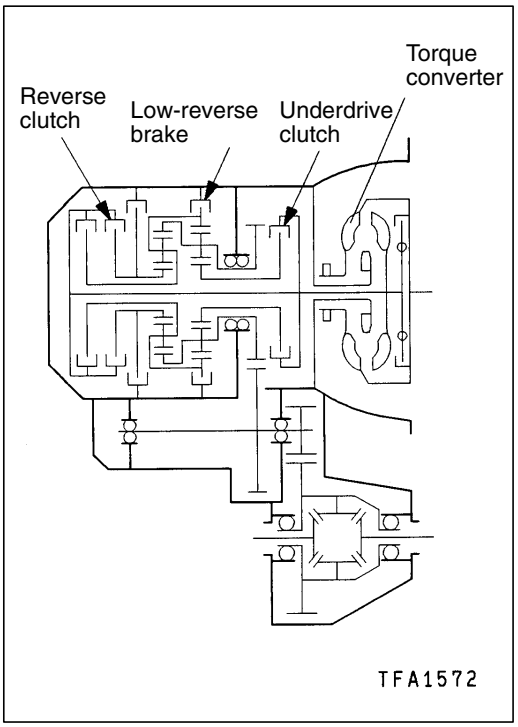
SOLENOID VALVE CHECK

1. Remove the valve body cover.
2. Disconnect the connectors of each solenoid valve.
3. Measure the resistance between terminals 1 and 2 of each solenoid valve.

Standard value:

Name	Resistance
Damper clutch solenoid valve	2.7 – 3.4 Ω (at 20°C)
Low and reverse solenoid valve	
Second solenoid valve	
Underdrive solenoid valve	
Overdrive solenoid valve	

4. If the resistance is outside the standard value, replace the solenoid valve.



TORQUE CONVERTER STALL TEST

This test measures the maximum engine speed when the selector lever is at the D or R position and the torque converter stalls to test the operation of the torque converter (stator and one-way clutch operation) and the holding performance of the clutches and brakes in the transmission.

Caution
Do not let anybody stand in front of or behind the vehicle while this test is being carried out.

1. Check the A/T fluid level and temperature and the engine coolant temperature.
   - Fluid level: At the HOT mark on the oil level gauge
   - A/T fluid temperature: 70 – 80°C
   - Engine coolant temperature: 80 – 100°C
2. Check both rear wheels (left and right).
3. Pull the parking brake lever on, with the brake pedal fully depressed.
4. Start the engine.
5. Move the selector lever to the D position, fully depress the accelerator pedal and take a reading of the maximum engine speed at this time.

   Caution
   (1) The throttle should not be left fully open for any more than eight seconds.
   (2) If carrying out the stall test two or more times, move the selector lever to the N position and run the engine at 1,000 r/min to let the automatic transmission fluid cool down before carrying out subsequent tests.

   Standard value

   Stall speed: 2,200 – 2,700 r/min

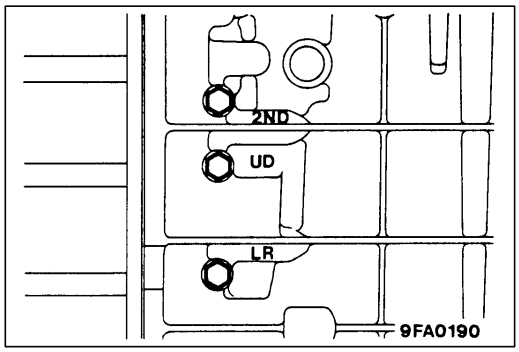
6. Move the selector lever to the R position and carry out the same test again.

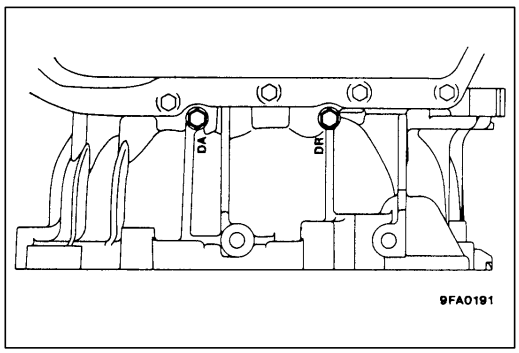
   Standard value

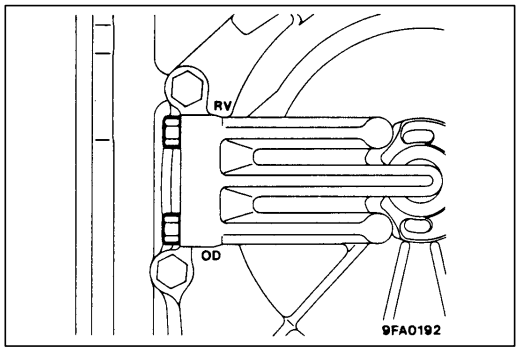
   Stall speed: 2,200 – 2,700 r/min

TORQUE CONVERTER STALL TEST JUDGEMENT RESULTS

1. Stall speed is too high in both D and R ranges
   - Low line pressure
   - Low & reverse brake slippage
2. Stall speed is too high in D range only
   - Underdrive clutch slippage
3. Stall speed is too high in R range only
   - Reverse clutch slippage
4. Stall speed too low in both D and R ranges
   - Malfunction of torque converter
   - Insufficient engine output







HYDRAULIC PRESSURE TEST

1. Warm up the engine until the A/T fluid temperature is 70 – 80°C.
2. Jack up the vehicle so that the wheels are free to turn.
3. Connect the special tools (2,942 kPa oil pressure gauge [MD998330] and joints [MD998332, MD998900]) to each pressure discharge port.

   NOTE
   2ND: Second brake pressure port
   UD: Underdrive clutch pressure port
   LR: Low & reverse brake pressure port
   DR: Torque converter pressure port
   RV: Reverse clutch pressure port
   OD: Overdrive clutch pressure port

4. Measure the hydraulic pressure at each port under the conditions given in the standard hydraulic pressure table, and check that the measured values are within the standard value ranges.
5. If a value is outside the standard range, correct the problem while referring to the hydraulic pressure test diagnosis table.

STANDARD HYDRAULIC PRESSURE TEST

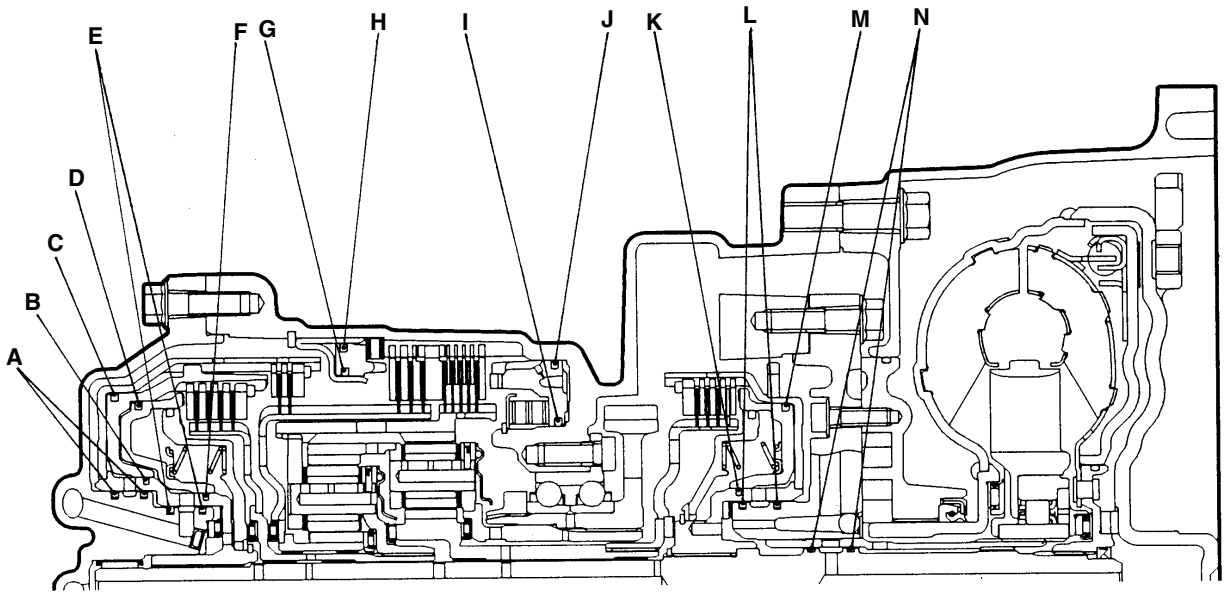
Measurement condition			Standard hydraulic pressure kPa					
Selector lever position	Shift position	Engine speed (r/min)	Underdrive clutch pressure	Reverse clutch pressure	Overdrive clutch pressure	Low and reverse brake pressure	Second brake pressure	Torque converter pressure
P	–	2,500	–	–	–	310 – 390	–	500 – 700
R	Reverse	2,500	–	1,320 – 1,720	–	1,320 – 1,720	–	500 – 700
N	–	2,500	–	–	–	310 – 390	–	500 – 700
Sport mode	1st gear	2,500	1,010 – 1,050	–	–	1,010 – 1,050	–	500 – 700
	2nd gear	2,500	1,010 – 1,050	–	–	–	1,010 – 1,050	500 – 700
	3rd gear	2,500	590 – 690	–	590 – 690	–	–	–
	4th gear	2,500	–	–	590 – 690	–	590 – 690	–

HYDRAULIC PRESSURE TEST DIAGNOSIS TABLE

Trouble symptom	Probable cause
All hydraulic pressures are high.	Incorrect transmission control cable adjustment
	Malfunction of the regulator valve
All hydraulic pressures are low.	Incorrect transmission control cable adjustment
	Malfunction of the oil pump
	Clogged internal oil filter
	Clogged external oil filter
	Clogged oil cooler
	Malfunction of the regulator valve
	Malfunction of the relief valve
	Incorrect valve body installation
Hydraulic pressure is abnormal in “R” range only.	Malfunction of the regulator valve
	Clogged orifice
	Incorrect valve body installation
Hydraulic pressure is abnormal in “3” or “4” range only.	Malfunction of the overdrive solenoid valve
	Malfunction of the overdrive pressure control valve
	Malfunction of the regulator valve
	Malfunction of the switch valve
	Clogged orifice
	Incorrect valve body installation
Only underdrive hydraulic pressure is abnormal.	Malfunction of the oil seal K, L, M
	Malfunction of the underdrive solenoid valve
	Malfunction of the underdrive pressure control valve
	Malfunction of check ball
	Clogged orifice
	Incorrect valve body installation
Only reverse clutch hydraulic pressure is abnormal.	Malfunction of the oil seal A, B, C
	Clogged orifice
	Incorrect valve body installation
Only overdrive hydraulic pressure is abnormal.	Malfunction of the oil seal D, E, F
	Malfunction of the overdrive solenoid valve
	Malfunction of the overdrive pressure control valve
	Malfunction check ball
	Clogged orifice
	Incorrect valve body installation

Trouble symptom	Probable cause
Only low and reverse hydraulic pressure is abnormal.	Malfunction of the oil seal I
	Malfunction of the oil seal J
	Malfunction of the low and reverse solenoid valve
	Malfunction of the low and reverse pressure control valve
	Malfunction of the switch valve
	Malfunction of the fail safe valve A
	Malfunction of check ball
	Clogged orifice
	Incorrect valve body installation
Only second hydraulic pressure is abnormal.	Malfunction of the oil seal G, H, O
	Malfunction of the second solenoid valve
	Malfunction of the second pressure control valve
	Malfunction of the fail safe valve B
	Clogged orifice
	Incorrect valve body installation
Only torque converter pressure is abnormal.	Malfunction of the oil cooler
	Malfunction of the oil seal N
	Malfunction of the damper clutch control solenoid valve
	Malfunction of the damper clutch control valve
	Malfunction of the torque converter pressure control valve
	Clogged orifice
	Incorrect valve body installation
Pressure applied to non operating element.	Incorrect transmission control cable adjustment
	Malfunction of the manual valve
	Malfunction of check ball
	Incorrect valve body installation

OIL SEAL LAYOUT



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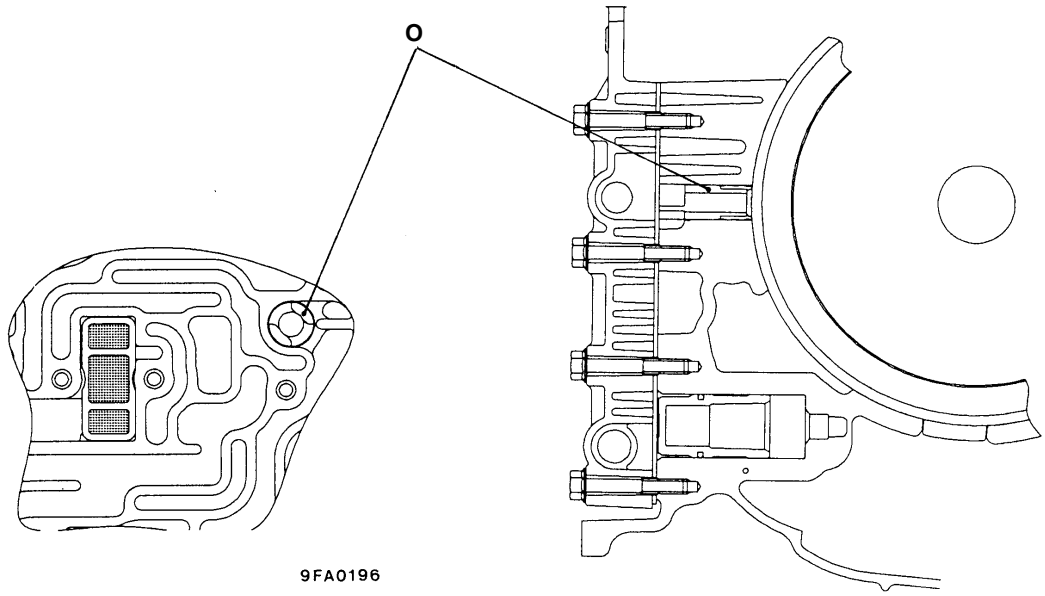

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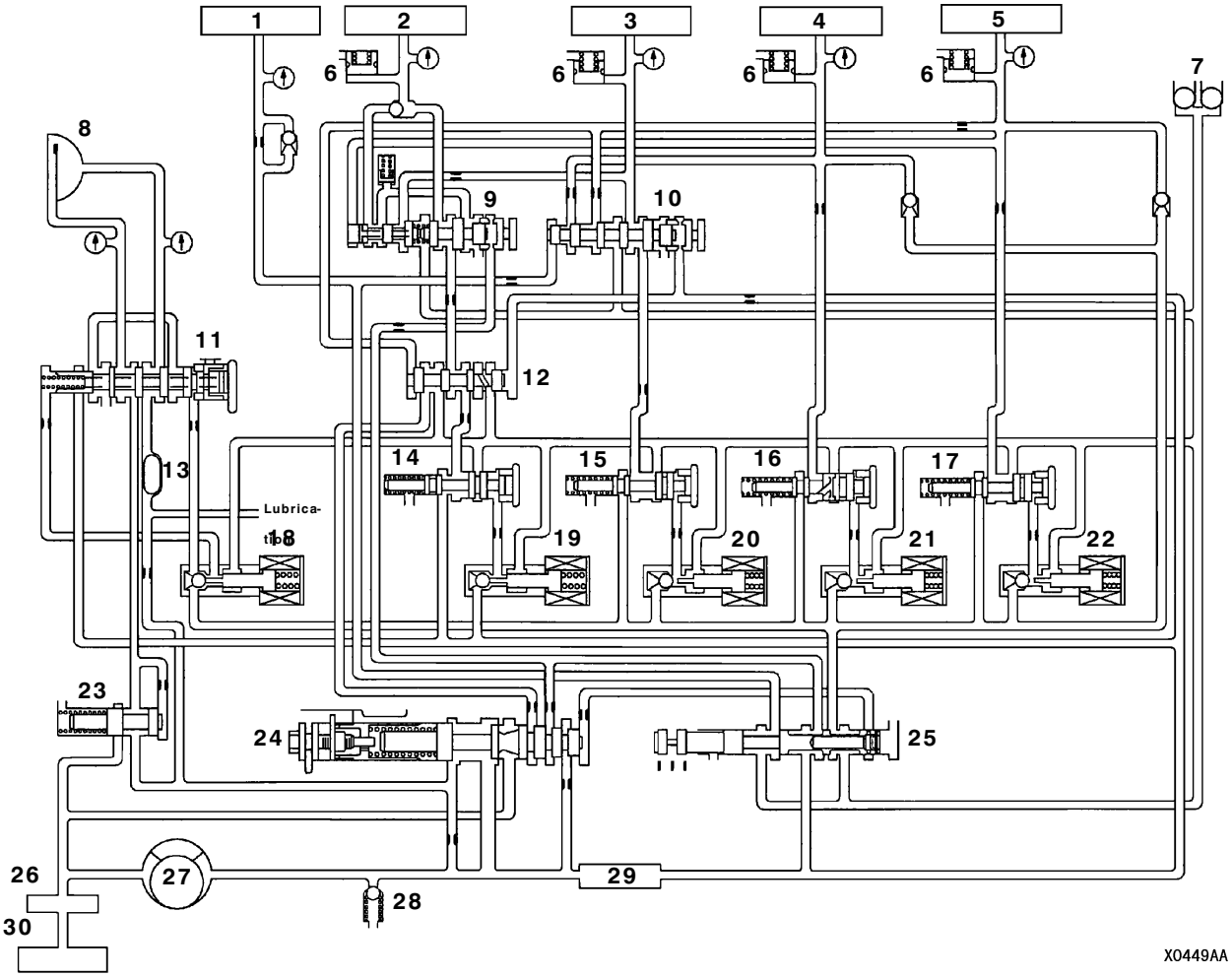
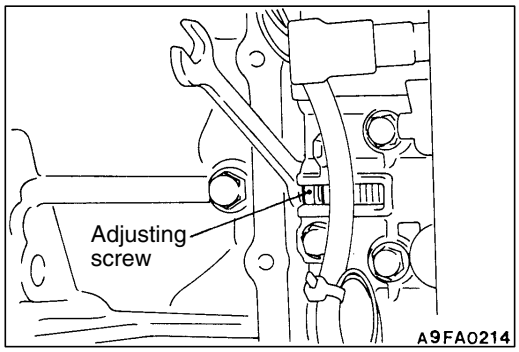
HYDRAULIC CIRCUIT

PARKING AND NEUTRAL



1. Reverse clutch
2. LR brake
3. 2ND brake
4. UD clutch
5. OD clutch
6. Accumulator
7. Check ball
8. Damper clutch
9. Fail safe valve A
10. Fail safe valve B
11. Damper clutch control valve
12. Switch valve
13. Automatic transmission fluid cooler
14. LR pressure control valve
15. 2ND pressure control valve
16. UD pressure control valve
17. OD pressure control valve
18. DCC solenoid valve
19. LR solenoid valve
20. 2ND solenoid valve
21. UD solenoid valve
22. OD solenoid valve
23. Torque converter pressure control valve
24. Regulator valve
25. Manual valve
26. Oil filter
27. Oil pump
28. Relief valve
29. Oil strainer
30. Oil pan



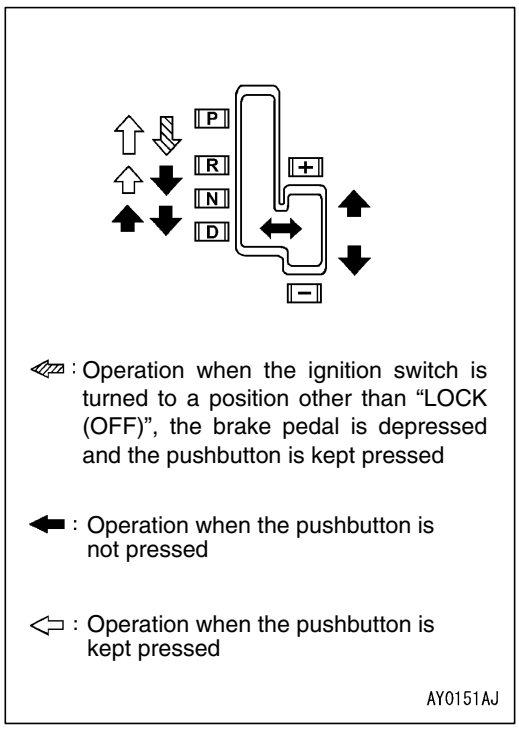
LINE PRESSURE ADJUSTMENT

1. Discharge the automatic transmission fluid, and then remove the valve body cover.
2. Turn the adjusting screw shown in the illustration at left to adjust the underdrive pressure to the standard value. The pressure increases when the screw is turned to the left.

   NOTE
   Adjusting to the middle of the standard value range when the transmission is at the 1st or 2nd gear.

   Standard value: 1,010 – 1,050 kPa

   Change in pressure for each turn of the adjusting screw: 35 kPa
3. Install the valve body cover, and pour in the standard volume of automatic transmission fluid.
4. Carry out a hydraulic pressure test. (Refer to P.23-51.) Readjust the line pressure if necessary.



SELECTOR LEVER OPERATION CHECK

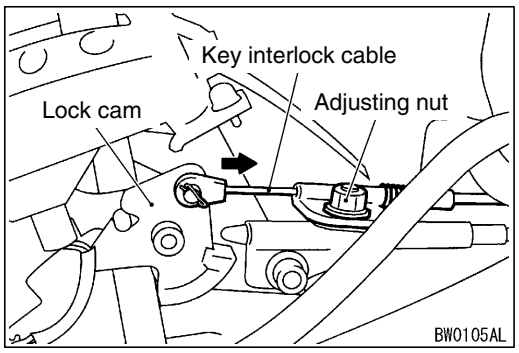
1. Apply the parking brake, and check that the selector lever moves smoothly and accurately to each range position.
2. Check that the engine starts when the selector lever is at the "N" or "P" position, and that it does not start when the selector lever is in any other position.
3. Start the engine, release the parking brake, and check that the vehicle moves forward when the selector lever is moved from "N" range to "1st" or "2nd" gear, and that the vehicle reverses when the selector lever is moved to "R" range.
4. Stop the engine.
5. Turn the ignition switch to the "ON" position, and check that the backup lamp illuminates and the buzzer sounds when the selector lever is shifted from "P" to "R" range.

   NOTE
   The A/T key interlock and shift lock mechanism is provided so that the selector lever cannot be moved from the "P" position if the ignition switch is at a position other than the "LOCK (OFF)" position and the brake pedal is not depressed.

KEY INTERLOCK MECHANISM CHECK

1. Carry out the following check.

Inspection procedure	Inspection conditions		Check details (Normal condition)
1	Brake pedal: Depressed	Ignition switch position: “LOCK (OFF)” or pulled out	The selector lever cannot be moved from the “P” position to any other position when the pushbutton on the selector lever is not being pressed.
2		Ignition switch position: Other than “LOCK (OFF)” or pulled out	The selector lever can easily be moved from the “P” position to some other position when the pushbutton on the selector lever is being pressed.
3	Brake pedal: Released	Selector lever position: Other than “P”	The ignition switch will not turn to the “LOCK” position.
4		Selector lever position: “P”	The ignition switch can turn smoothly to the “LOCK (OFF)” position.



2. When the above operations are defective, adjust the shift lock cable as follows:
   (1) Remove the front floor console, and then provisionally install the selector lever knob.
   (2) Move the selector lever to the “P” position.
   (3) Turn the ignition key to “LOCK (OFF)” position.
   (4) Loosen the locking nut of the key interlock cable.
   (5) Push the cable joint on the lock cam gently toward the arrow until the cable stops. Tighten the locking nut.

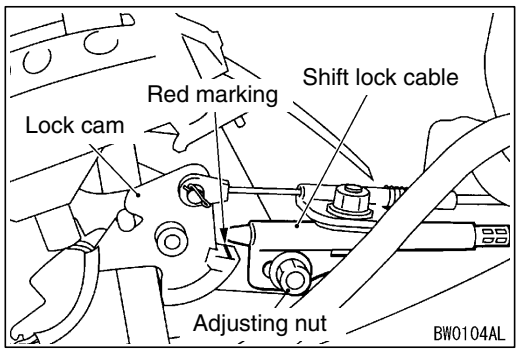
       Tightening torque: 12 Nm

   (6) Install the floor console.
3. After adjusting, check the operation once more. If the operation is still incorrect, replace the key interlock cable. (Refer to P.23-66.)

SHIFT LOCK MECHANISM CHECK

1. Carry out the following check.

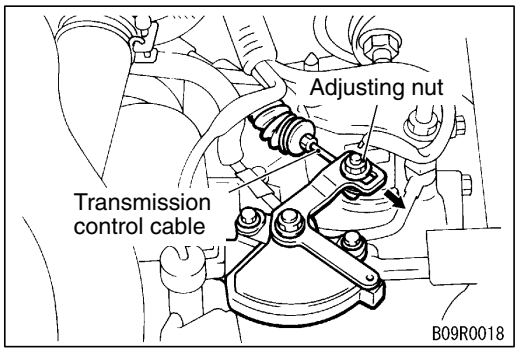
Inspection procedure	Inspection conditions		Check details (Normal condition)
1	Brake pedal: Depressed	Ignition switch position: "ACC"	The selector lever cannot be moved from the P position to any other position when the pushbutton on the selector lever is not being pressed.
2			The selector lever can easily be moved from the P position to some other position when the pushbutton on the selector lever is being pressed.
3	Brake pedal: Released		The selector lever can easily be moved from the R position to the P position when the pushbutton on the selector lever is being pressed.



2. If the above operations do not occur correctly, adjust the shift lock cable unit by the following procedure.
   (1) Remove the front floor console, and then provisionally install the selector lever knob.
   (2) Move the selector lever to the "P" position.
   (3) Turn the ignition key to "LOCK (OFF)" position.
   (4) Loosen the locking nut of the shift lock cable.
   (5) Tighten the locking nut so that the end of the shift lock cable comes above the red marking of the lock cam.

   Tightening torque: 12 Nm

   (6) Install the floor console.
3. After adjusting, check the operation once more. If the operation is still incorrect, replace the shift lock cable. (Refer to P.23-66.)



TRANSMISSION CONTROL CABLE ADJUSTMENT

1. Move the selector lever to the “N” position.
2. Loosen the upper control lever adjusting nut.
3. Check that the inhibitor switch is at “N” range.
4. Gently pull the transmission control cable in the direction of the arrow, and then tighten the adjusting nut.

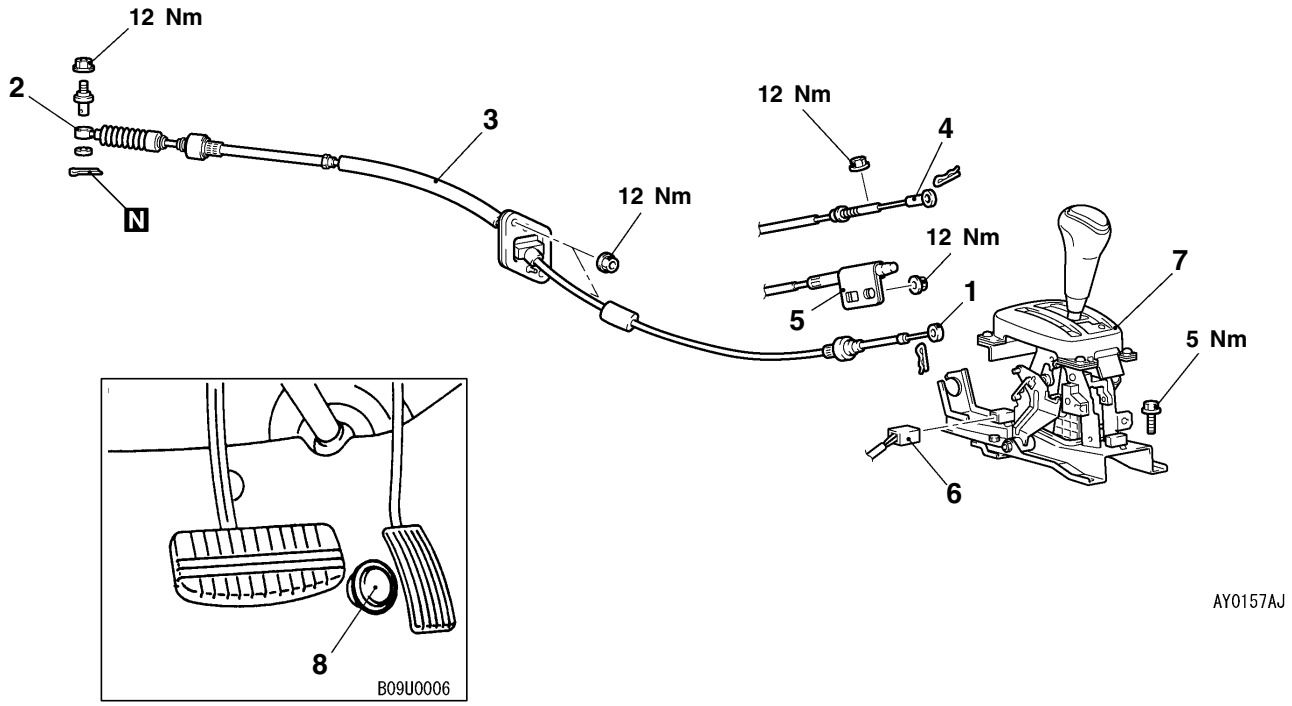
   Tightening torque: 12 Nm

5. Check that the transmission shifts to the correct range corresponding to the position of the selector lever, and that it functions correctly in that range.

TRANSMISSION CONTROL

REMOVAL AND INSTALLATION

NOTE
When removing and installing the transmission control cable and shift lock cable unit, be careful not to hit them against the SRS-ECU.



Transmission control cable removal steps

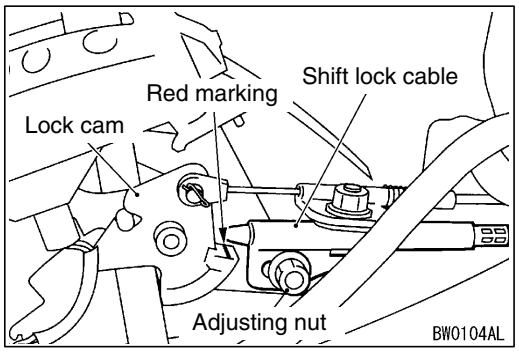
- Front floor console
1. Transmission control cable connection (Shift lever side)
▶C◀ 2. Transmission control cable connection (Transmission side)
- SRS-ECU
3. Transmission control cable

Selector lever assembly removal steps

- Front floor console
1. Transmission control cable connection (Shift lever side)
▶B◀ 4. Key interlock cable connection
▶A◀ 5. Shift lock cable connection
6. Indicator lamp connector connection
7. Selector lever assembly

Wide open throttle switch removal

8. Wide open throttle switch

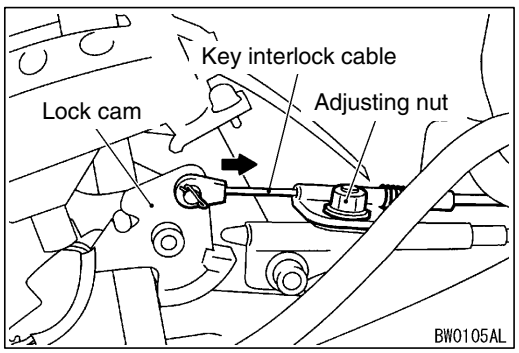


INSTALLATION SERVICE POINTS

▶A◀ SHIFT LOCK CABLE (SELECTOR LEVER SIDE) INSTALLATION

1. Provisionally install the selector lever knob, and then move the selector lever to the “P” position and turn the ignition switch to the “LOCK (OFF)” position.
2. Tighten the locking nut so that the end of the shift lock cable comes above the red marking of the lock cam.

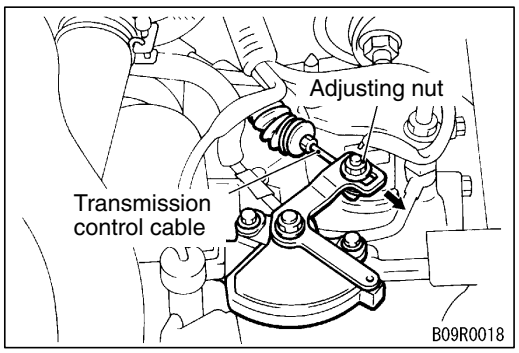
   Tightening torque: 12 Nm
3. Check the operation of the selector lever assembly. (Refer to P.23-57.)



▶B◀ KEY INTER LOCK CABLE (SELECTOR LEVER SIDE) INSTALLATION

1. Install the key interlock cable on the lock cam.
2. Install the spring and washer of the key interlock cable as shown.
3. While lightly pushing the cable coupling portion of the lock cam in the direction, tighten the nut to the specified torque.

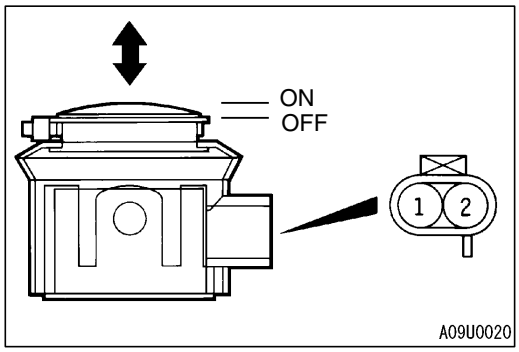
   Tightening torque: 12 Nm
3. Check the operation of the selector lever assembly. (Refer to P.23-57.)



▶C◀ TRANSMISSION CONTROL CABLE (TRANSMISSION SIDE) INSTALLATION

1. Move the selector lever to the “N” position.
2. Check that the inhibitor switch is at “N” range.
3. Gently pull the transmission control cable in the direction of the arrow, and then tighten the adjusting nut.

   Tightening torque: 12 Nm

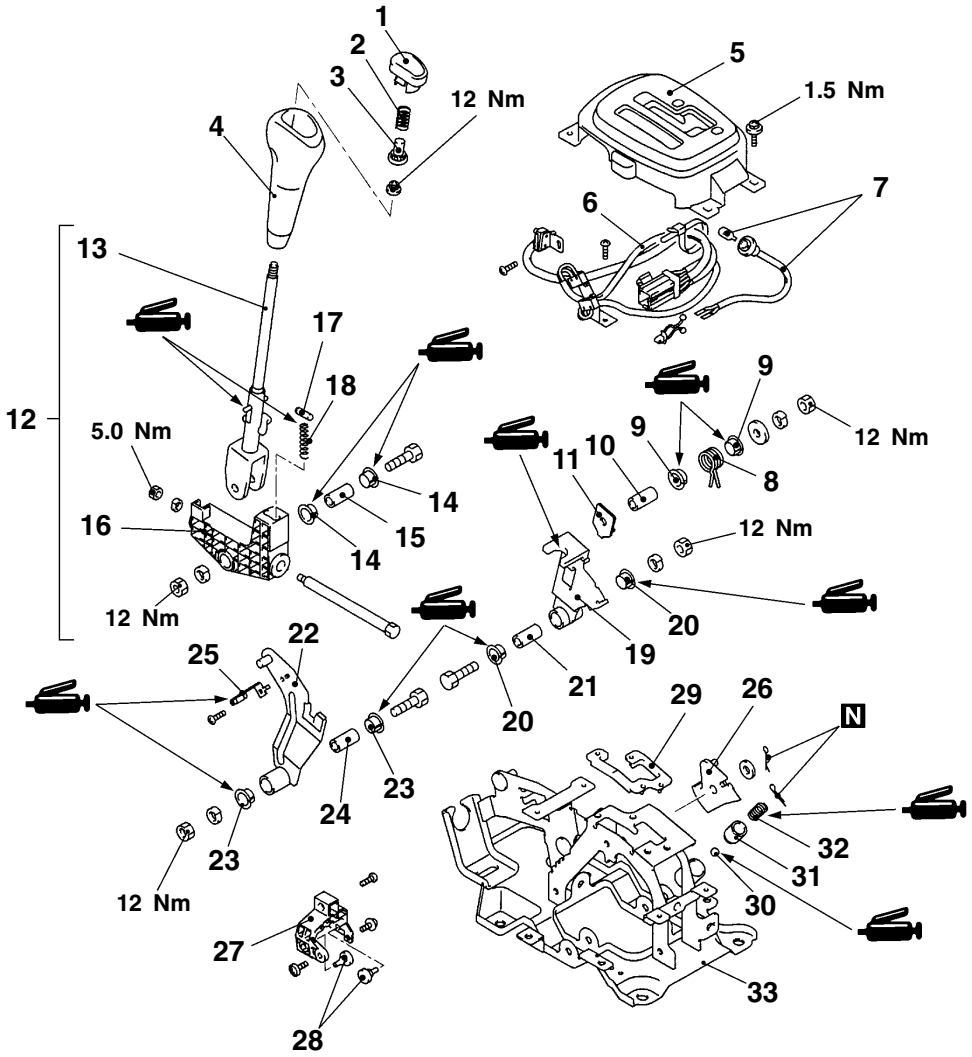


INSPECTION

WIDE OPEN THROTTLE SWITCH CHECK

Switch position	Terminal No.	
	1	2
ON	○	○
OFF		

SELECTOR LEVER ASSEMBLY
DISASSEMBLY AND REASSEMBLY



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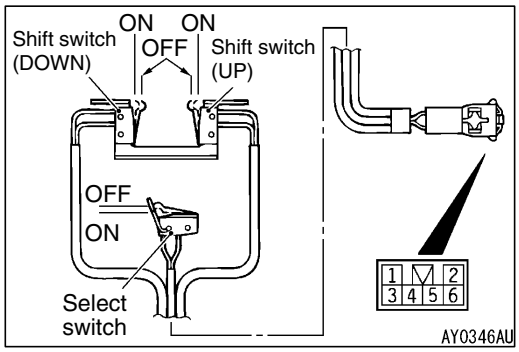
Disassembly steps

1. Push button
2. Spring
3. Adjuster
4. Shift knob
5. Indicator panel assembly
6. Shift switch assembly
7. Position indicator lamp assembly
8. Return spring
9. Bushing
10. Pipe
11. Bracket
12. Lever assembly
13. Lever
14. Shift bushing
15. Pipe
16. Select lever
17. Roller
18. Spring
19. Manual lever
20. Shift bushing
21. Pipe
22. Cable lever
23. Shift bushing
24. Pipe
25. Detent spring assembly
26. Lock cam
27. Guide block
28. Rubber stopper
29. Cushion
30. Steel ball
31. Ball support
32. Spring
33. Bracket assembly



INSPECTION

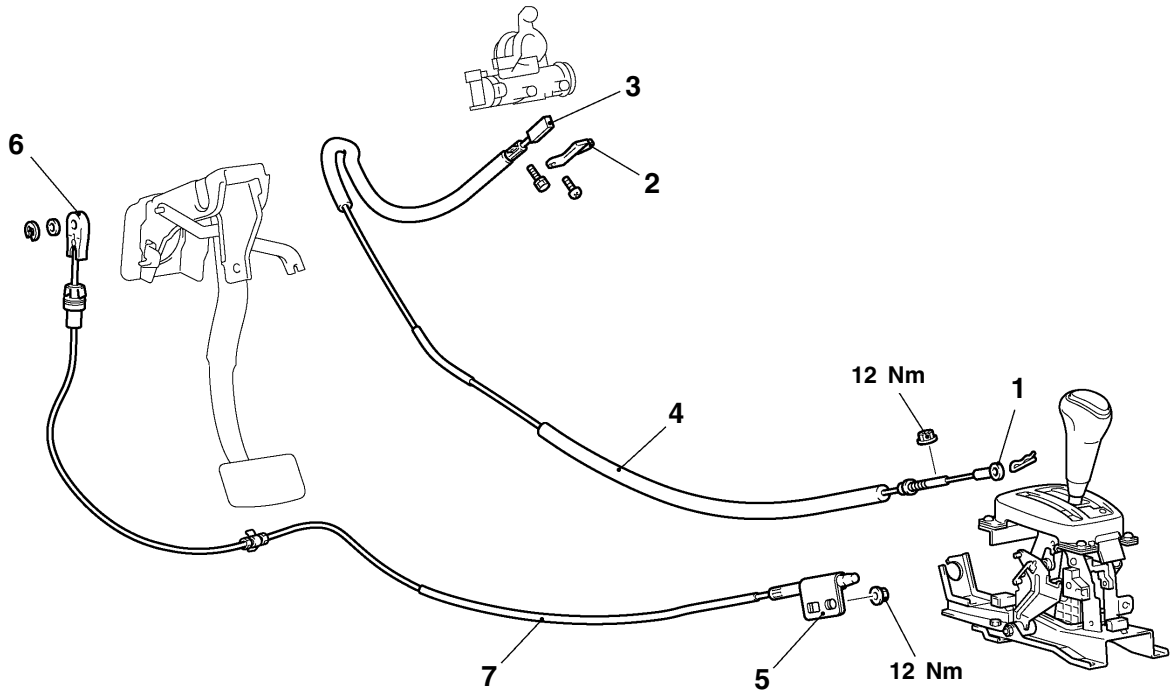
SHIFT SWITCH ASSEMBLY CONTINUITY CHECK

Switch position		Terminal No.					
		1	2	3	4	5	6
Select switch	ON	○			○		
	OFF	○	○				
Shift switch (UP)	ON			○		○	
	OFF						
Shift switch (DOWN)	ON			○			○
	OFF						

SHIFT LOCK AND KEY INTERLOCK MECHANISMS

REMOVAL AND INSTALLATION

NOTE
When removing and installing the transmission control cable and shift lock cable unit, be careful not to hit them against the SRS-ECU.



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Key interlock cable removal steps

- Front floor console

▶B◀ 1. Key interlock cable connection (Selector lever side)

- Lower column cover

2. Cover

◀A▶ 3. Key interlock cable connection (Steering lock cylinder side)

4. Key interlock cable

Shift lock cable removal steps

- Front floor console

▶A◀ 5. Shift lock cable connection (Selector lever side)

- Under cover

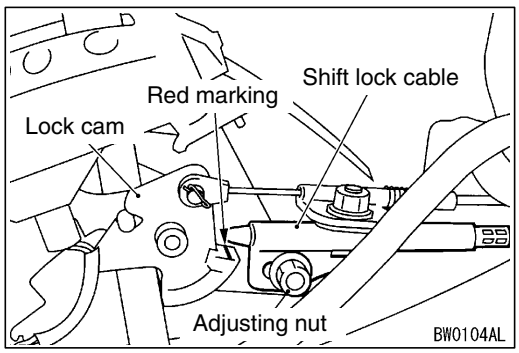
6. Shift lock cable connection (Brake pedal side)

7. Shift lock cable

REMOVAL SERVICE POINT

◀A▶ KEY INTERLOCK CABLE REMOVAL

Turn the ignition switch to the “ACC” position, and then pull the key interlock cable out from the ignition key cylinder.

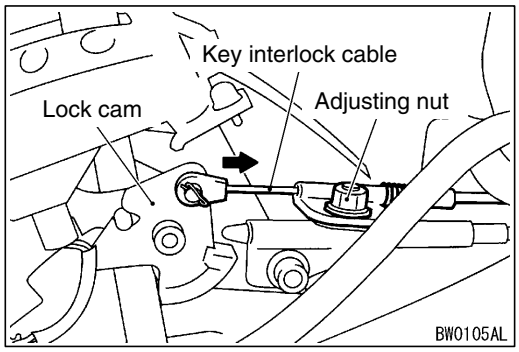


INSTALLATION SERVICE POINTS

▶A◀ SHIFT LOCK CABLE (SELECTOR LEVER SIDE) INSTALLATION

1. Provisionally install the selector lever knob, and then move the selector lever to the “P” position and turn the ignition switch to the “LOCK (OFF)” position.
2. Tighten the locking nut so that the end of the shift lock cable comes above the red marking of the lock cam.

   Tightening torque: 12 Nm
3. Check the operation of the selector lever assembly.(Refer to P.23-57.)



▶B◀ KEY INTER LOCK CABLE (SELECTOR LEVER SIDE) INSTALLATION

1. Install the key interlock cable on the lock cam.
2. Install the spring and washer of the key interlock cable as shown.
3. While lightly pushing the cable coupling portion of the lock cam in the direction, tighten the nut to the specified torque.

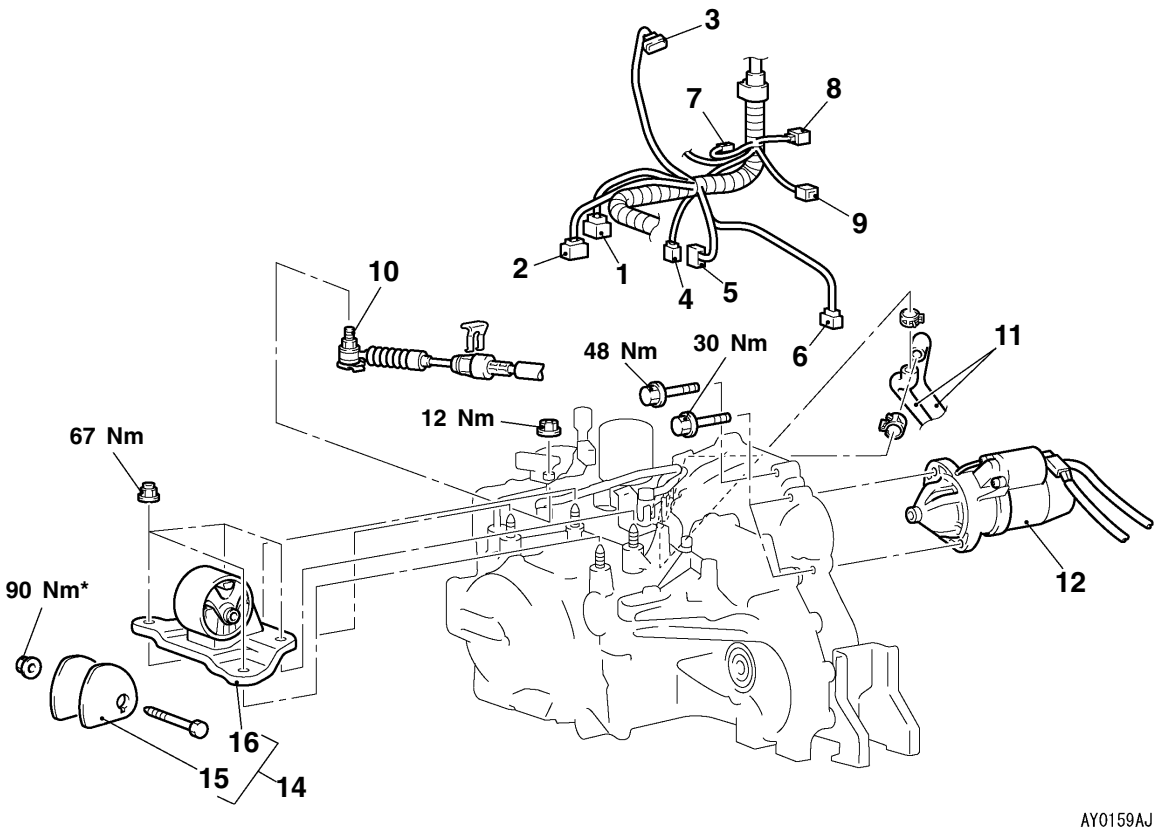
   Tightening torque: 12 Nm
3. Check the operation of the selector lever assembly.(Refer to P.23-57.)

TRANSMISSION ASSEMBLY

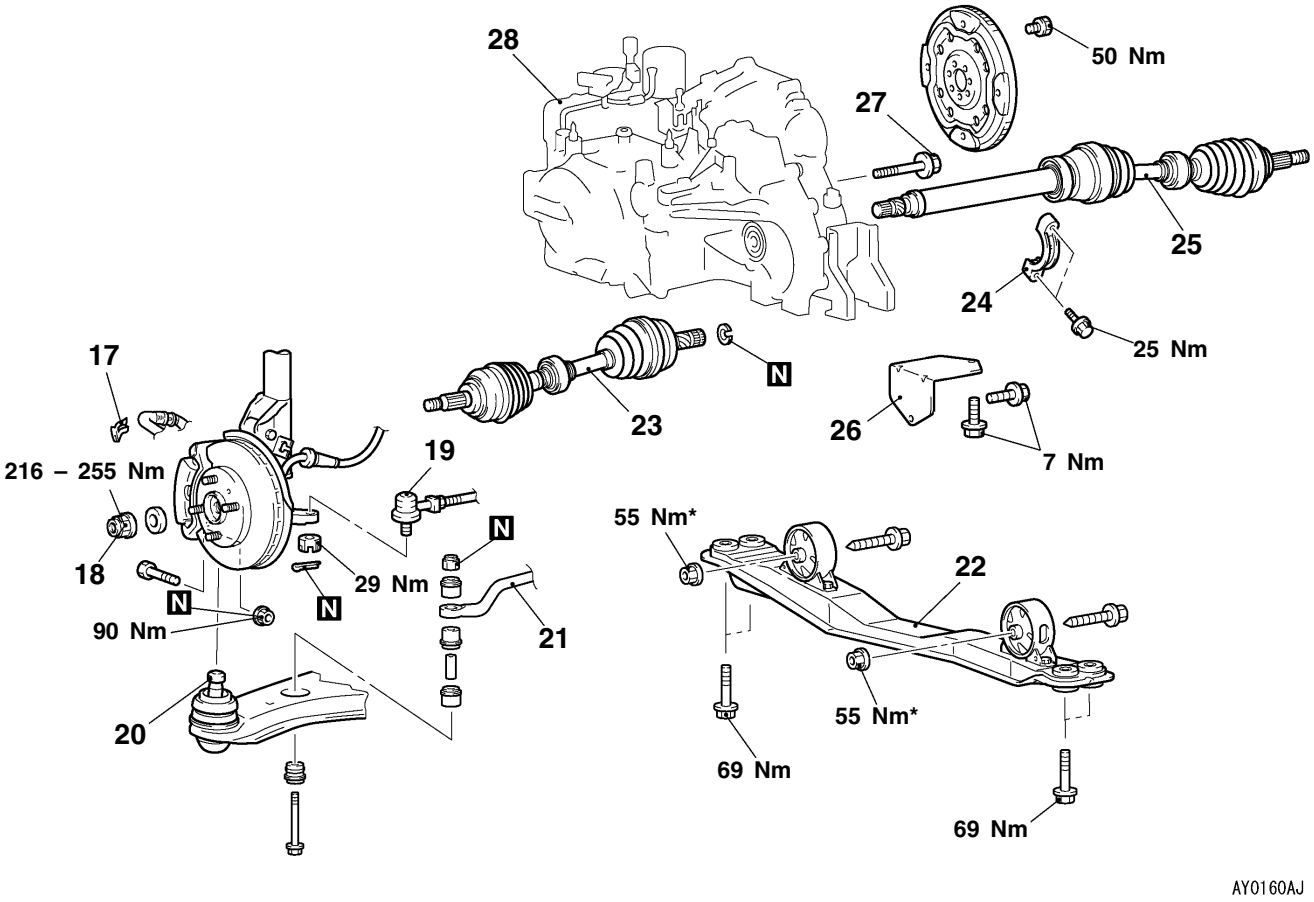
REMOVAL AND INSTALLATION

Caution
In order to prevent the insulator from being damaged, mounting locations marked by * should be provisionally tightened, and then fully tightened when the body is supporting the full weight of the engine.

Pre-removal and Post-installation Operations
- Under Cover Removal and Installation
- Engine Coolant Draining and Supplying
- Transmission Fluid Draining and Filling (Refer to P.23-42.)
- Engine Cover Removal and Installation (Refer to GROUP 11A – Camshaft and Camshaft Oil Seal.)
- Air Cleaner Removal and Installation
- Battery and Battery Tray Removal and Installation
- Front Exhaust Pipe Removal and Installation (Refer to GROUP 15.)
- Front Wheel Alegnment Check And Adjustment <Post-Installation only>



Removal steps
1. Inhibitor switch connector
2. A/T control solenoid valve assembly connector
3. Air flow sensor connector
4. Input shaft speed sensor connector
5. Output shaft speed sensor connector
6. Vehicle speed sensor connector
7. Engine coolant temperature sensor connector
8. Engine coolant temperature gauge unit connector
9. Detonation sensor connector
10. Transmission control cable connection
11. Transmission oil cooler tube
- ◀A▶ 12. Starter mortar
- ◀B▶ 13. Transmission assembly upper part coupling bolts
- ◀C▶ 14. Transmission mount bracket assembly
- ▶B◀ 15. Transmission mount stopper
16. Transmission mount
- ◀D▶ • Engine assembly supporting



Lifting up of the vehicle

17. Brake hose clamp
18. Drive shaft nut
◀E▶ 19. Tie rod end connection
20. Lower arm ball joint connection
▶A◀ 21. Stabilizer bar connection
22. Centermember assembly
◀F▶ 23. Drive shaft <L.H.> connection
24. Bearing bracket cap
25. Drive shaft <R.H.> connection
26. Cover
27. Transmission assembly lower part coupling bolts
28. Transmission assembly

REMOVAL SERVICE POINTS

◀A▶ STARTER MOTOR REMOVAL

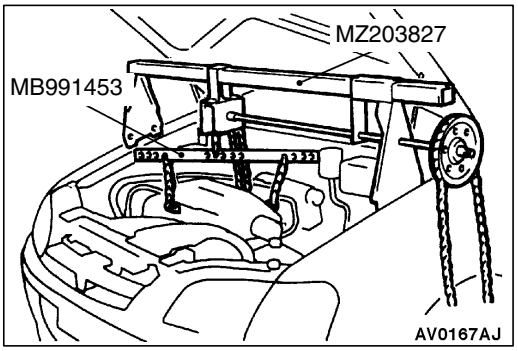
Remove the starter motor with the starter motor harness still connected and secure it inside the engine compartment.

◀B▶ CLUTCH RELEASE CYLINDER REMOVAL

Remove the clutch release cylinder without disconnecting the oil line connection, and fix it to the vehicle chassis.

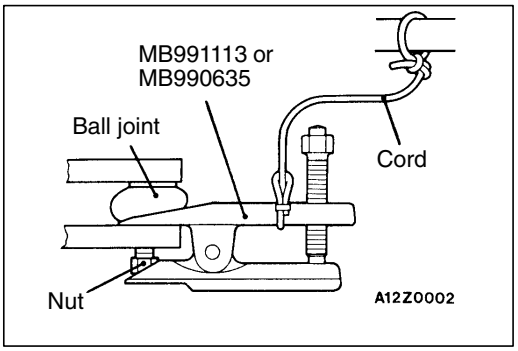
◀C▶ TRANSMISSION MOUNT BRACKET ASSEMBLY REMOVAL

Jack up the transmission assembly gently with a garage jack, and then remove the transmission mount bracket.



◀D▶ ENGINE ASSEMBLY SUPPORTING

Set the special tool to the vehicle to support the engine assembly.



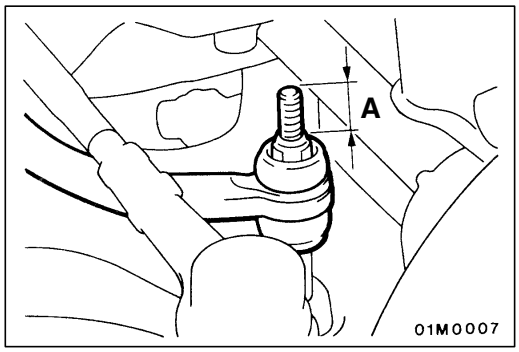
◀E▶ TIE ROD END DISCONNECTION

Caution

1. **Loosen the nut only; do not remove it from the ball joint. Otherwise ball joint thread will be damaged.**
2. **The special tool should be suspended by a cord to prevent it from coming off.**

◀F▶ DRIVE SHAFT <L.H.> REMOVAL

1. Remove the drive shaft with the hub and knuckle, etc., still attached.
2. Suspend the removed drive shaft inside the wheel housing with wire so that there are no sharp bends in any of the joints.

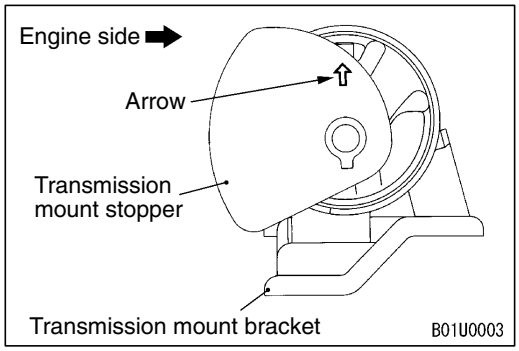


INSTALLATION SERVICE POINTS

▶A◀ STABILIZER BAR INSTALLATION

Tighten the self-locking nut so that the stabilizer bar mounting bolt protrudes as shown.

Standard value (A): 22 mm



▶B◀ TRANSMISSION MOUNT STOPPER INSTALLATION

Install the transmission mount stopper so that the arrow points as shown in the illustration.

NOTES