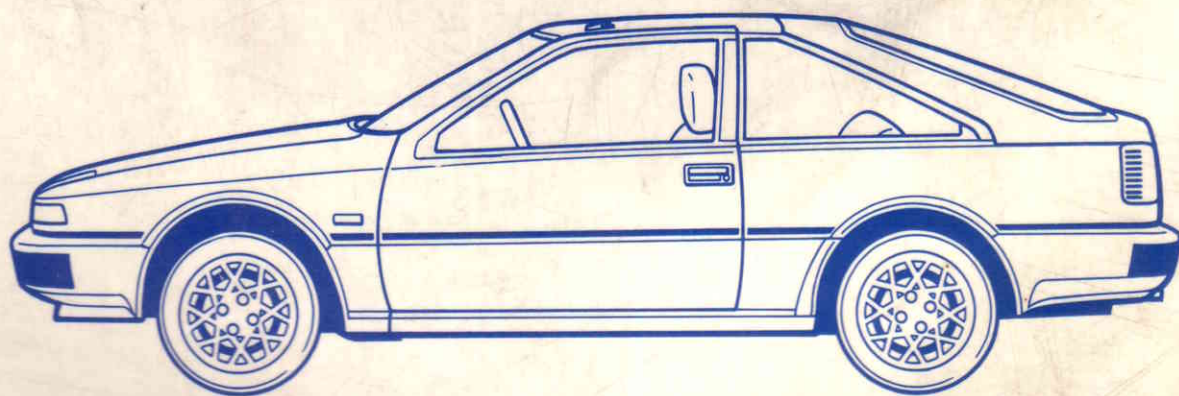




NISSAN

MODEL **S12** SERIES



SERVICE MANUAL

\$20 commission
SPCN

BARRY. S

QUICK REFERENCE INDEX

GENERAL INFORMATION _____	GI
MAINTENANCE _____	MA
ENGINE MECHANICAL _____	EM
ENGINE LUBRICATION & COOLING SYSTEMS _____	LC
ENGINE FUEL _____	EF
EMISSION CONTROL SYSTEM _____	EC
ENGINE CONTROL, FUEL & EXHAUST SYSTEMS -	FE
CLUTCH _____	CL
MANUAL TRANSMISSION _____	MT
AUTOMATIC TRANSMISSION _____	AT
PROPELLER SHAFT & DIFFERENTIAL CARRIER _____	PD
FRONT AXLE & FRONT SUSPENSION _____	FA
REAR AXLE & REAR SUSPENSION _____	RA
BRAKE SYSTEM _____	BR
STEERING SYSTEM _____	ST
BODY _____	BF
HEATER & AIR CONDITIONER _____	HA
ELECTRICAL SYSTEM _____	EL

CONTENTS

PRECAUTIONS
HOW TO USE THIS MANUAL
IDENTIFICATION INFORMATION
RECOMMENDED FUEL AND LUBRICANTS
LIFTING, TOWING AND TIE-DOWN PROCEDURES
TIGHTENING TORQUE OF STANDARD BOLTS AND NUTS

NISSAN

MODEL S12 SERIES

NOTICE

For both the safety of the vehicle and the safety of the operator, it is essential that the vehicle be properly maintained and that the operator be properly trained. The following information is provided for your reference. It is especially important that you read and understand the information provided in this manual before operating the vehicle. It is also important that you read and understand the information provided in this manual before performing any maintenance or repair work on the vehicle. The information provided in this manual is for general reference only. It is not intended to be a substitute for the information provided in the service manual or the parts catalog. The information provided in this manual is for general reference only. It is not intended to be a substitute for the information provided in the service manual or the parts catalog.

SECTION BF

CONTENTS

GENERAL SERVICING	BF- 2
BODY END AND DOOR	BF- 5
INSTRUMENT	BF-12
SEAT	BF-13
TRIM AND MOLDING	BF-17
WINDSHIELD AND WINDOWS	BF-25
MANUAL SUN ROOF (Hatchback)	BF-30
ELECTRICAL SUN ROOF (Coupe)	BF-31
MIRROR	BF-36
REAR AIR SPOILER (Hatchback)	BF-37
BODY ALIGNMENT	BF-38

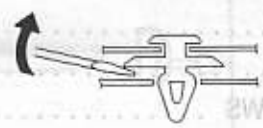
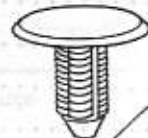
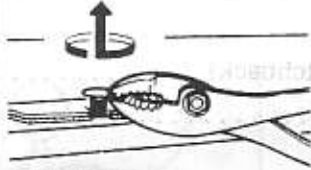
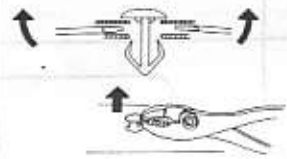
GENERAL SERVICING

Precautions

- When removing or installing various parts, place a cloth or padding onto the vehicle body to prevent scratches.
- Handle trim, molding, instruments, grille, etc. carefully during removing or installation. Be careful not to soil or damage them.
- Apply sealing compound where necessary while installing parts.
- When applying sealing compound, be careful that the sealing compound does not protrude from parts.
- When replacing any metal parts (for example body outer panel, members, etc.), be sure to take rust prevention measures.

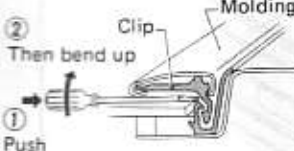
Clip and Fastener

- Clips and fasteners in BF section correspond to the following numbers and symbols.
- Replace any clips and/or fasteners which are damaged during removal or installation.

No.	Symbol	Shape	Removal & installation	Location
C101	 SBF092B	 SBF109B	Removal: Remove by bending up with a flat-bladed screwdriver.  SBF094B	• Door trim • Rear side lower trim • Rear side upper trim (Coupe) • Luggage side upper trim (Hatchback)
C102	 SBF113B	 SBF114B  SBF137B	 Removal: Pull up by rotating SBF115B	• Trunk front trim (Coupe) • Trunk side trim (Coupe) • Trunk rear trim (Coupe) • Luggage floor mat (Hatchback)
C103	 SBF110B	 SBF111B	Removal: Remove with flat-bladed screwdrivers or pliers.  SBF112B	• Front bumper spacer (Type 2-standard type) • Rear bumper fascia • Rear bumper spacer (Type 2-standard type)
C104	 SBF141B	 SBF142B	Removal: Tilt clip as indicated by arrow, then draw out.  SBF143B	• Rear side upper trim (Coupe) • Parcel shelf (Coupe) • Rear seatback board - Behind rear seatback (Coupe) • Luggage side upper trim (Hatchback) • Luggage side lower trim (Hatchback) • Luggage rear trim (Hatchback) • Back door lower trim (Hatchback) • Luggage floor mat (Hatchback)

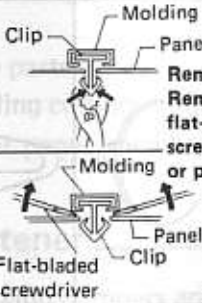
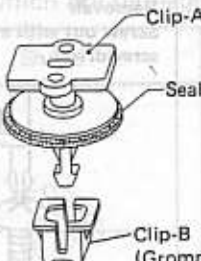
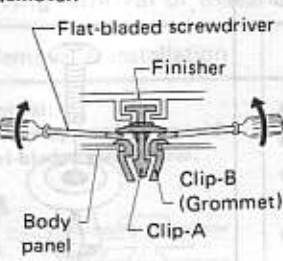
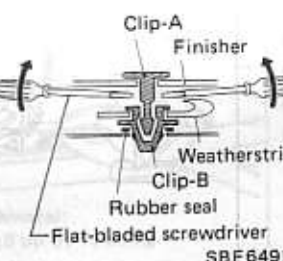
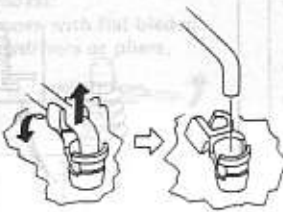
GENERAL SERVICING

Clip and Fastener (Cont'd)

No.	Symbol	Shape	Removal & installation	Location	
C106		 	Removal: Remove with flat-bladed screwdrivers or pliers.  	• Hood front sealing rubber • Hood rear sealing rubber • Rear bumper fascia	
CS102			Removal: Screw out with a Phillips screwdriver. 	• Front bumper fascia • Fender protector • Dash side trim	
CG101		 	Removal:  Rotate 45° to remove. 	Installation: 	• Front grille
CE103			Removal: 	• Door weatherstrip	
CE106			Removal:  ② Then bend up ① Push	• Back window molding (Coupe) • Back door window molding (Hatchback)	

GENERAL SERVICING

Clip and Fastener (Cont'd)

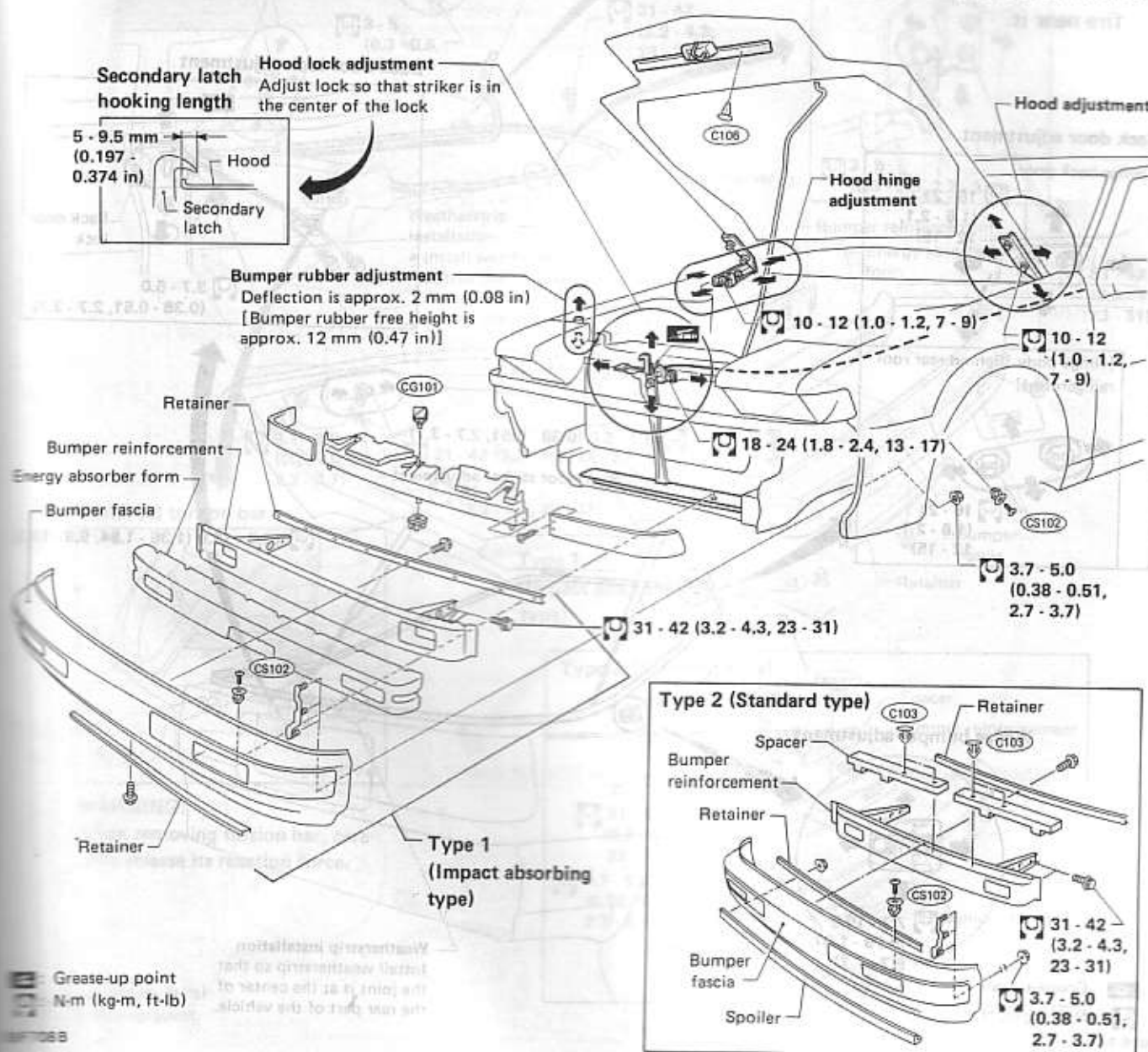
No.	Symbol	Shape	Removal & installation	Location
CF107			 Removal: Remove using flat-bladed screwdrivers or pliers.	Back door side trim (Hatchback)
CF109		 Clip-A Seal Clip-B (Grommet)	Removal:  Flat-bladed screwdriver Finisher Clip-B (Grommet) Clip-A Body panel	Air outlet grille (Coupe)
CF110		 Clip-A Seal rubber Clip-B	Removal:  Clip-A Finisher Weatherstrip Clip-B Rubber seal Flat-bladed screwdriver	- Body side weatherstrip - Windshield side molding
CR101			Removal: 	- Front door lock system - Back door lock key cylinder

BODY END AND DOOR

- When removing and installing hood, trunk lid or back door, place a cloth or other padding on hood, trunk lid or back door corners to avoid scratching vehicle body.
- When removing clip or fastener, refer to CLIP & FASTENER.
- Apply sealing compound where necessary when installing parts.

Front End

- Hood adjustment: Adjust at hinge portion.
- Hood lock adjustment: After adjusting, check hood lock control operation. Apply a coat of grease to hood locks engaging mechanism.
- Hood opener: Do not attempt to bend cable forcibly. Doing so increases effort required to unlock hood.
- Bumper fascia: It is made of plastic, so do not use excessive force and take care to keep oil away from it.



BODY END AND DOOR

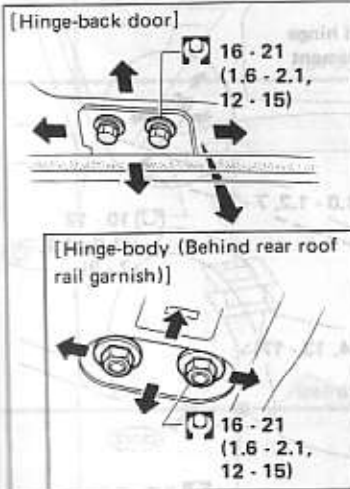
Rear End

- Back door adjustment (Hatchback): Adjust at hinge for proper back door fit.
- Trunk lid adjustment (Coupe): Adjust at hinge-trunk lid portion for proper trunk lid fit.
- Back door lock system adjustment (Hatchback): Adjust lock & striker so that they are in the center. After adjustment, check back door lock operation.
- Trunk lid lock system adjustment (Coupe): Adjust striker so that it is in the center of the lock. After adjustment, check trunk lid lock operation.
- Bumper fascia: It is made of plastic, so do not use excessive force and take care to keep oil away from it.

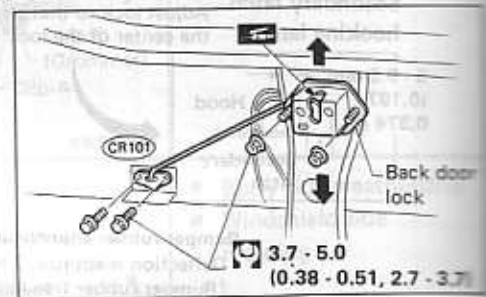
WARNING:

- Be careful not to scratch back door stay when installing back door. A scratched stay may cause gas leakage.
- The contents of the back door stay are under pressure. Do not take apart, puncture, apply heat or allow fire near it.

Back door adjustment



Back door lock adjustment



Wedge bumper adjustment



Back door striker adjustment

3.7 - 5.0 (0.38 - 0.51, 2.7 - 3.7)

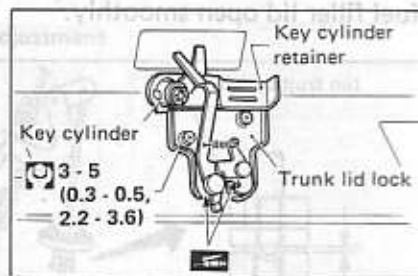
13.3 - 18.0 (1.36 - 1.84, 9.8 - 13.3)

Weatherstrip installation
Install weatherstrip so that the joint is at the center of the rear part of the vehicle.

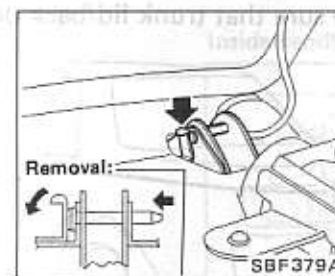
BODY END AND DOOR

Rear End (Cont'd)

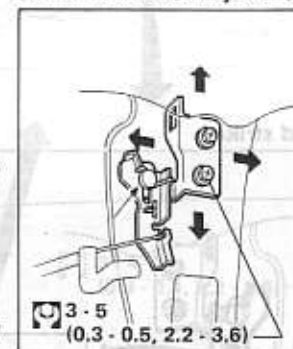
Trunk lid lock



Trunk lid hinge



Trunk lid striker adjustment



Trunk lid adjustment

3.7 - 5.0
(0.38 - 0.51, 2.7 - 3.7)

3 - 5
(0.3 - 0.5, 2.2 - 3.6)

31 - 42
(3.2 - 4.3, 23 - 31)

Weatherstrip installation
• Install weatherstrip so that the joint is at the center of the rear part of the vehicle.

3.7 - 5.0
(0.38 - 0.51, 2.7 - 3.7)

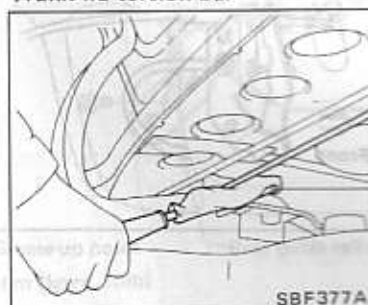
31 - 42 (3.2 - 4.3, 23 - 31)

31 - 42
(3.2 - 4.3, 23 - 31)

Bumper reinforcement
Energy absorber form

31 - 42
(3.2 - 4.3, 23 - 31)

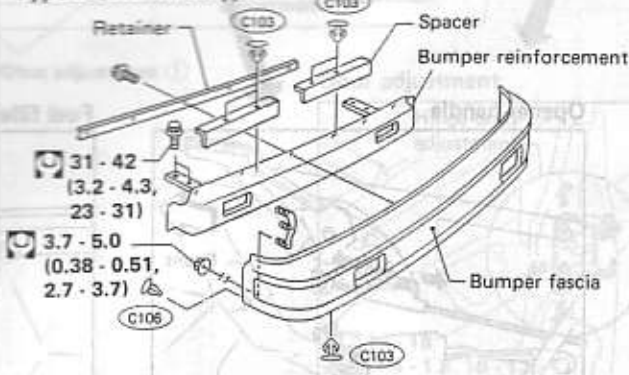
Trunk lid torsion bar



WARNING:
When removing torsion bar, carefully release its reaction force.

Type 1
(Impact absorbing type)

Type 2 (Standard type)



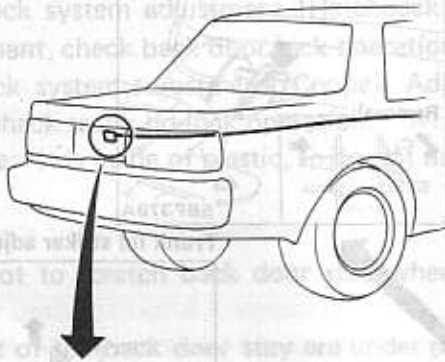
: N-m (kg-m, ft-lb)
 : Grease-up point

SBF709B

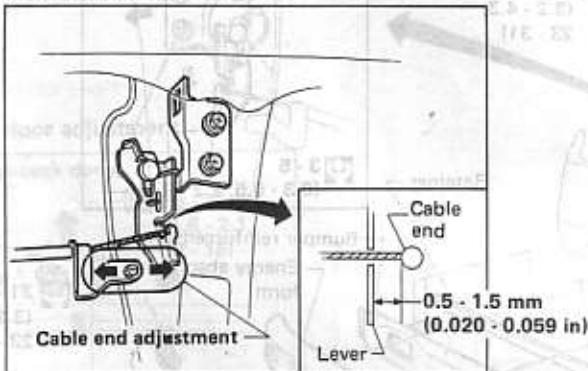
BODY END AND DOOR

Trunk Lid/Back Door and Fuel Filler Lid Opener

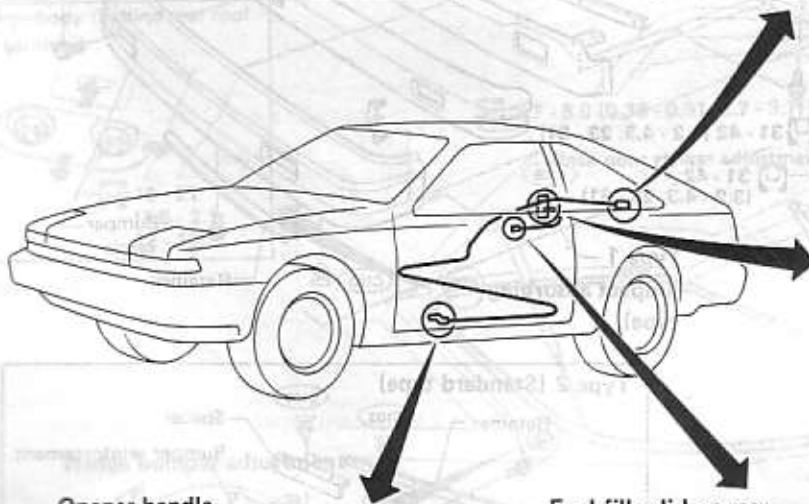
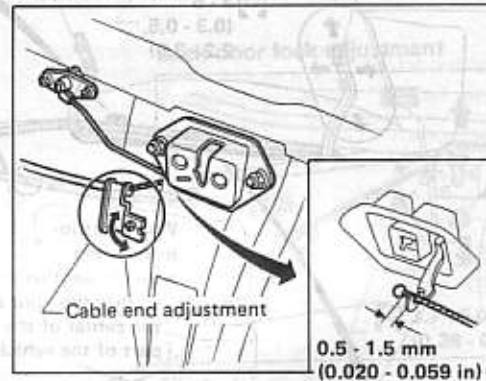
- Opener cable: Do not attempt to bend cable using excessive force.
- After installation, make sure that trunk lid/back door and fuel filler lid open smoothly.



Trunk lid striker

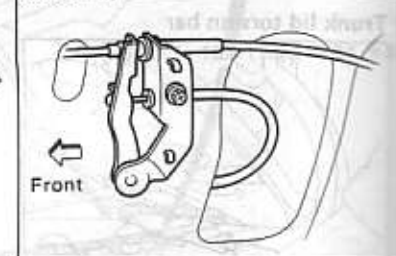


Back door lock

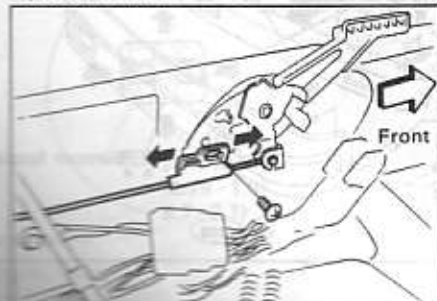


Fuel filler lid control

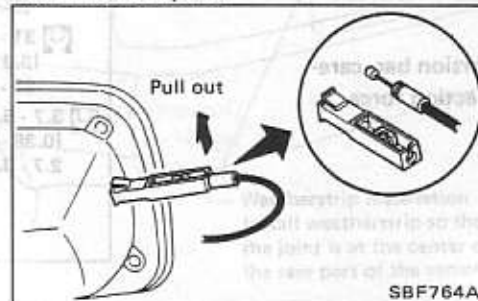
(Behind R.H. luggage/trunk room side trim)



Opener handle



Fuel filler lid opener

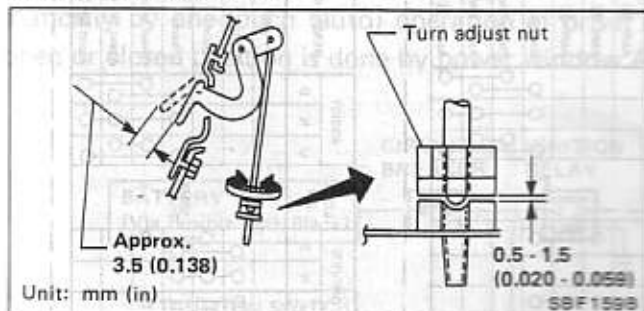


BODY END AND DOOR

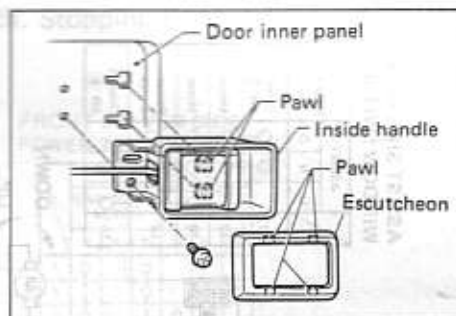
Front Door

- When adjusting door or door lock, check door lock operation.

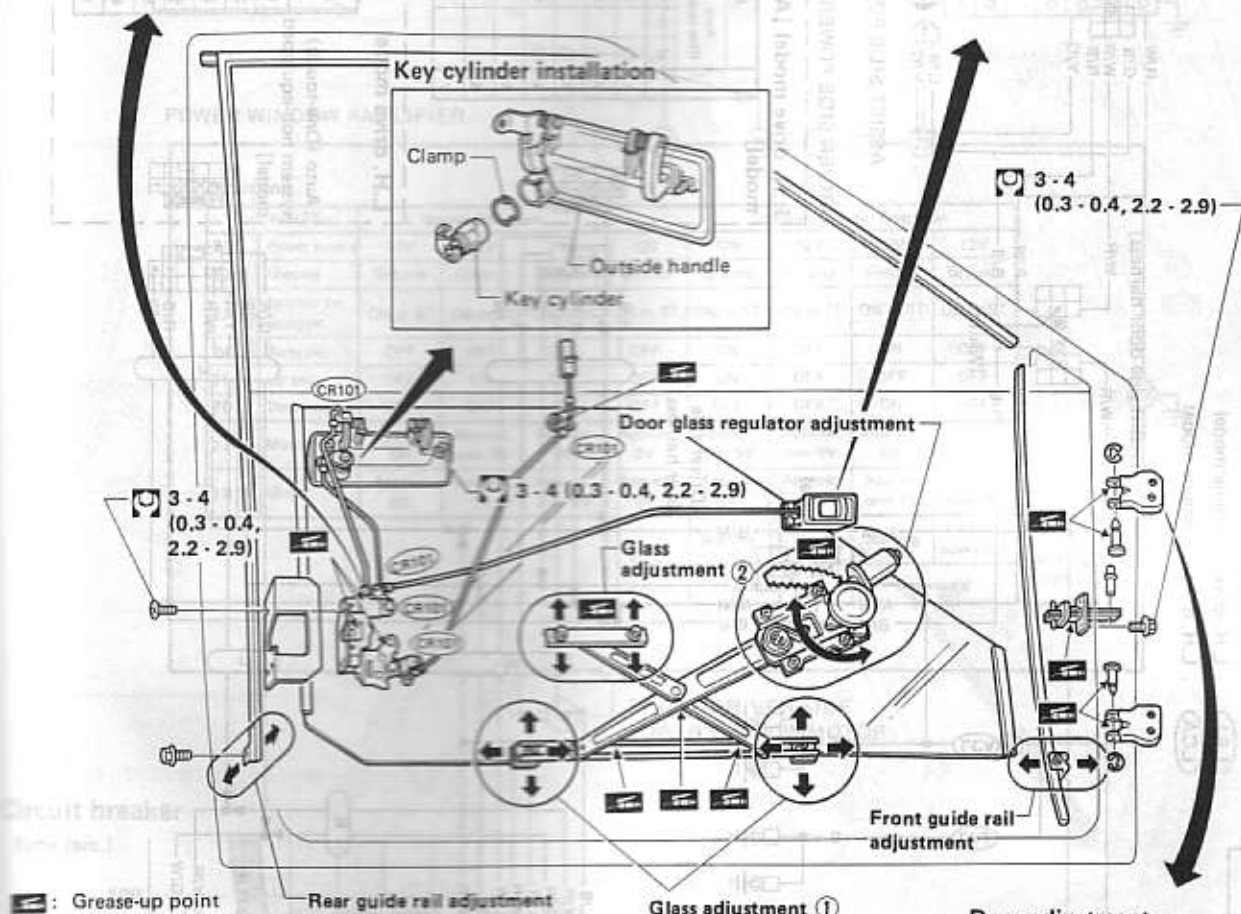
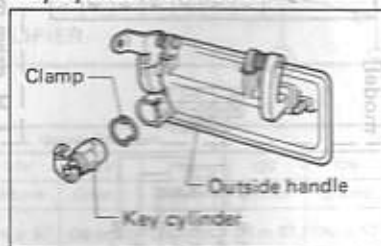
Outside handle adjustment



Inside handle installation



Key cylinder installation

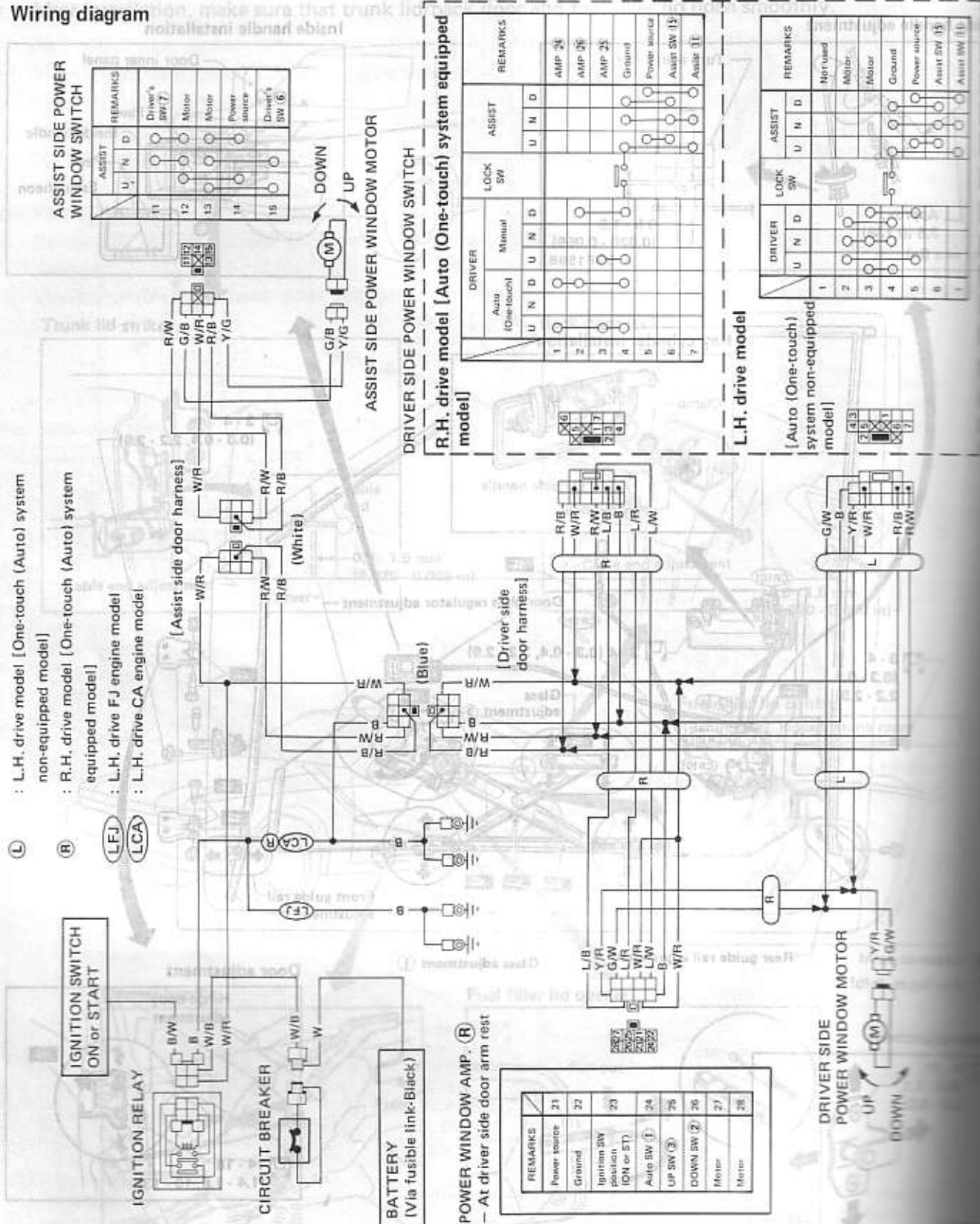


BODY END AND DOOR

Front Door (Cont'd)

POWER WINDOW

Wiring diagram

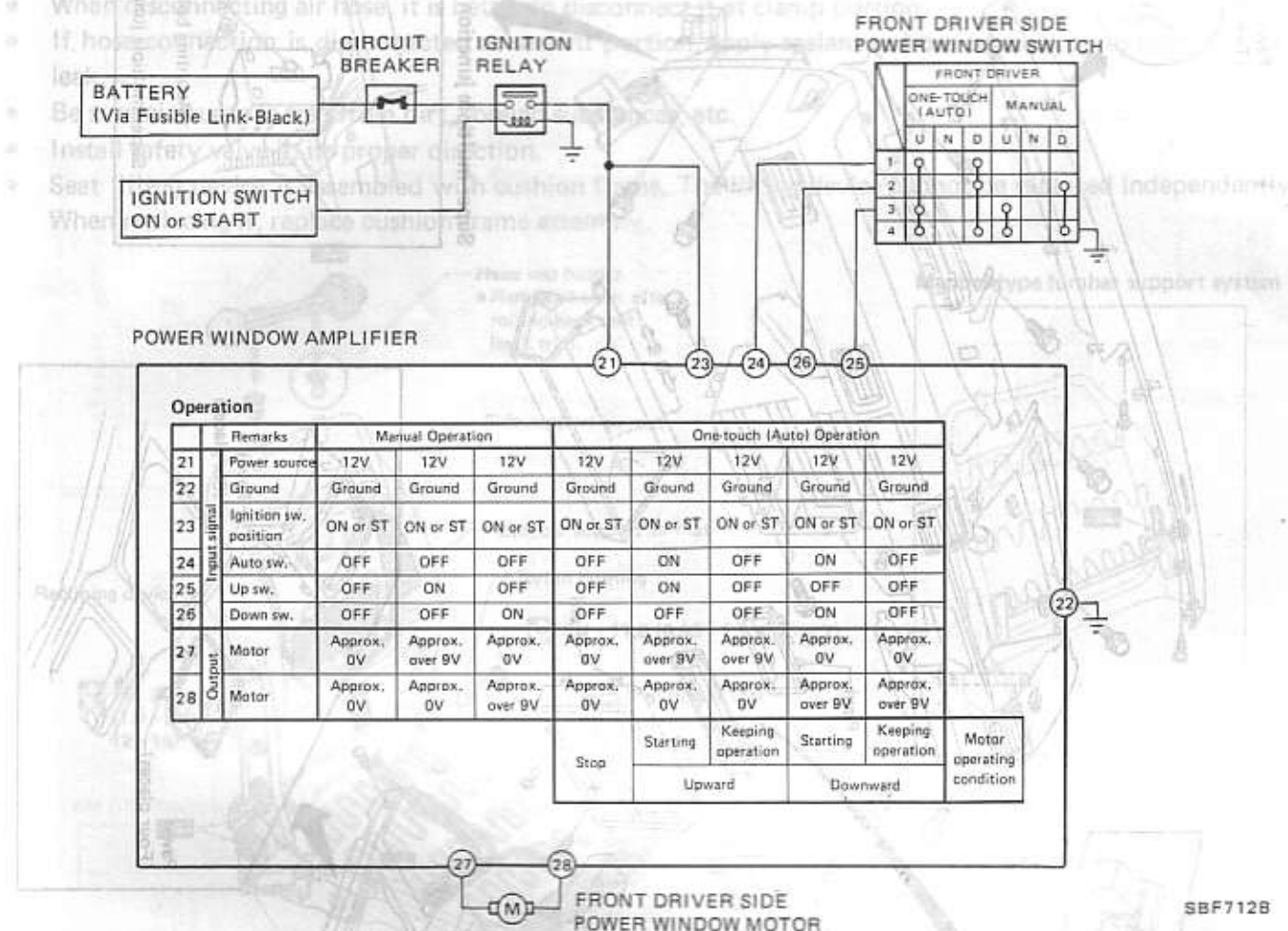


BODY END AND DOOR

Front Door (Cont'd)

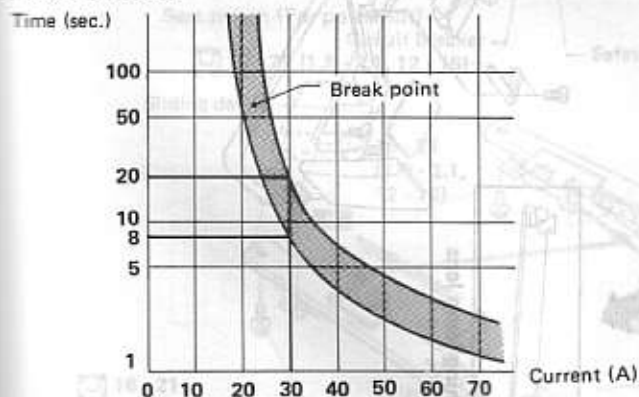
One-touch (Auto) system

Power window system for R.H. drive model is designed to fully open or close the driver's window automatically by one-touch (auto) operation of driver's door window switch. Stopping the window at the fully open or closed position is done by power window AMP.



SBF7128

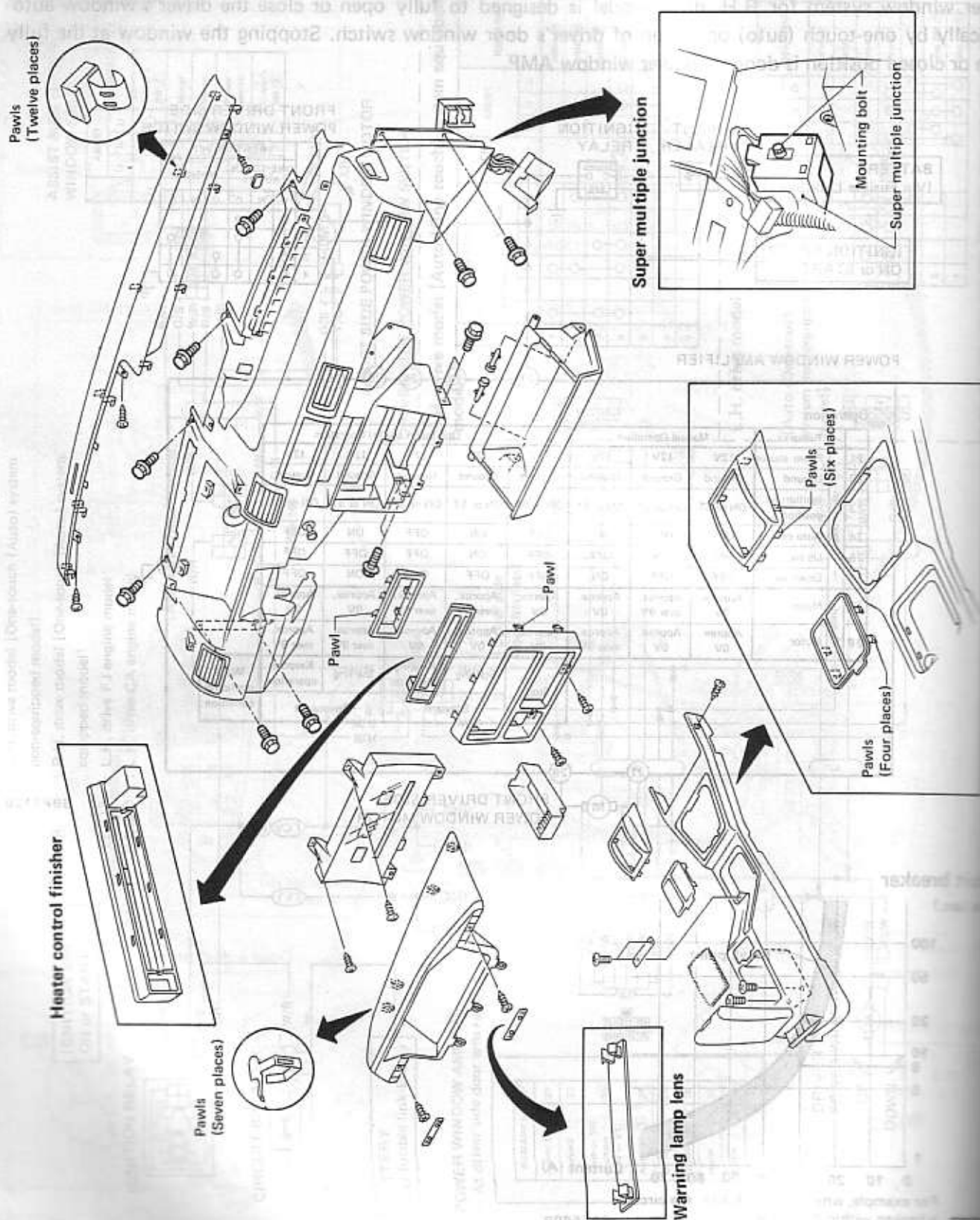
Circuit breaker



For example, when current is 30A, the circuit is broken within 8 to 20 seconds.

SBF5608

- These parts are made of plastic, so do not use excessive force and be careful not to damage them.

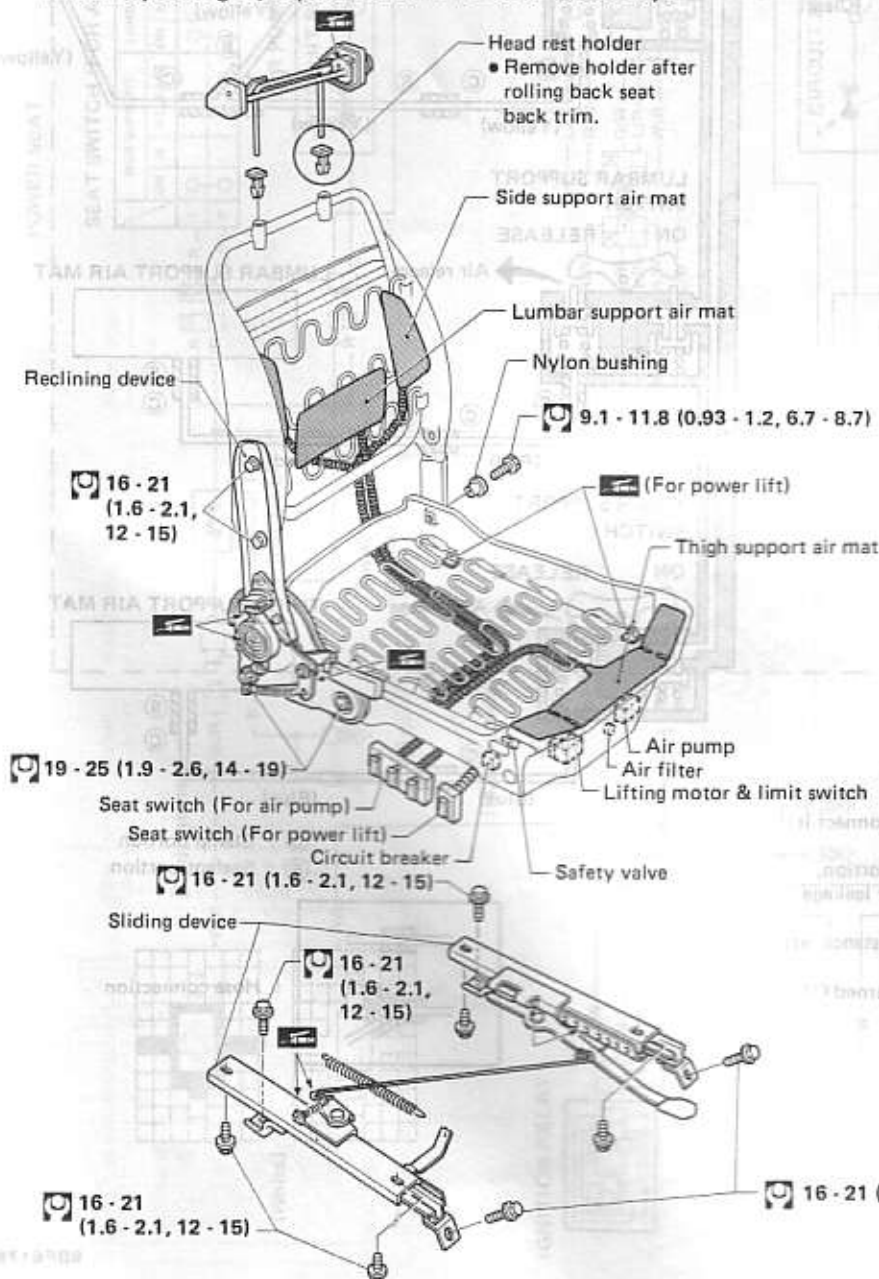


SEAT

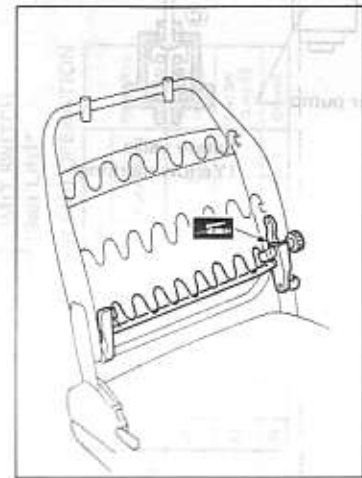
- When removing or installing the seat trim, carefully handle it to keep dirt out and avoid damage.

Front Seat

- Be sure air hose is not crushed.
- When disconnecting air hose, it is better to disconnect it at clamp portion.
- If hose connection is disconnected at sealant portion, apply sealant to hose connection to prevent an air leak.
- Be sure air pump is free from dirt, foreign substances, etc.
- Install safety valve in its proper direction.
- Seat lifting device is assembled with cushion frame. The lifting device cannot be replaced independently. When replacing it, replace cushion frame assembly.

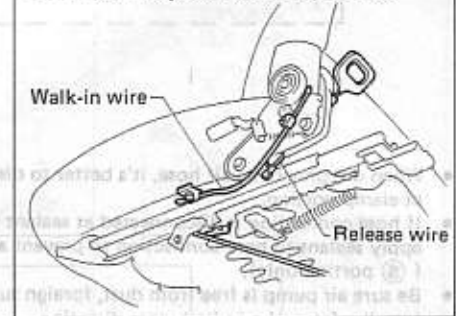


Manual type lumbar support system



Walk-in mechanism

- The walk-in system is non-adjustable.

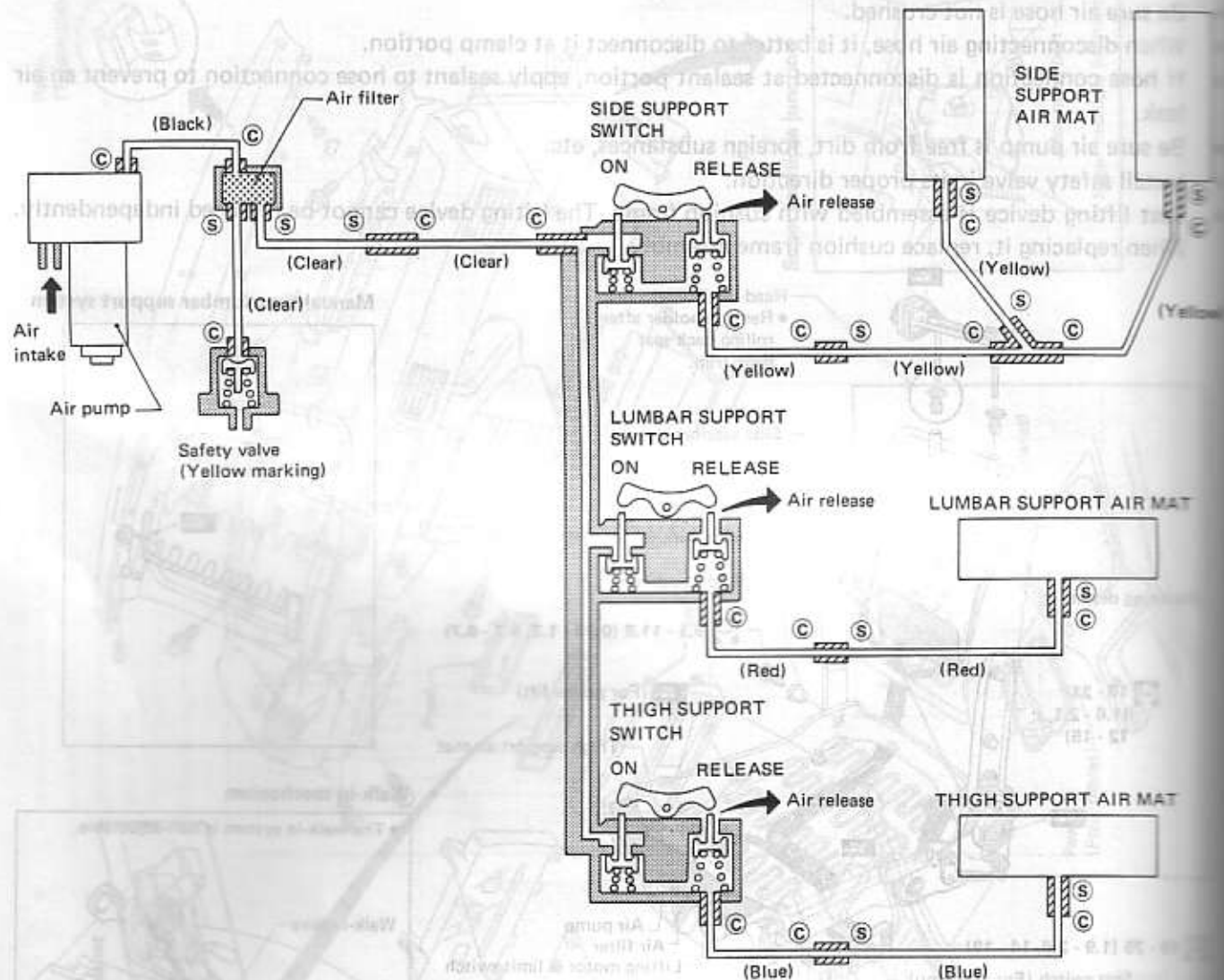


- N·m (kg-m, ft-lb)
- Grease-up point
(Do not apply too much grease as it will drip.)

SBF713B

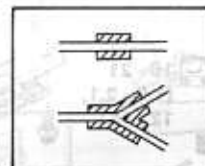
Front Seat (Cont'd)

AIR DIAGRAM – Power Seat



- When disconnecting air hose, it's better to disconnect it at clamp portion.
- If hose connection is disconnected at sealant portion, apply sealant to hose connection to prevent air leakage ( portion only).
- Be sure air pump is free from dust, foreign substance, etc.
- Install safety valve in its proper direction.
- Air pump operates only when each switch is turned ON.

(C) : Clamp portion
 (S) : Sealant portion

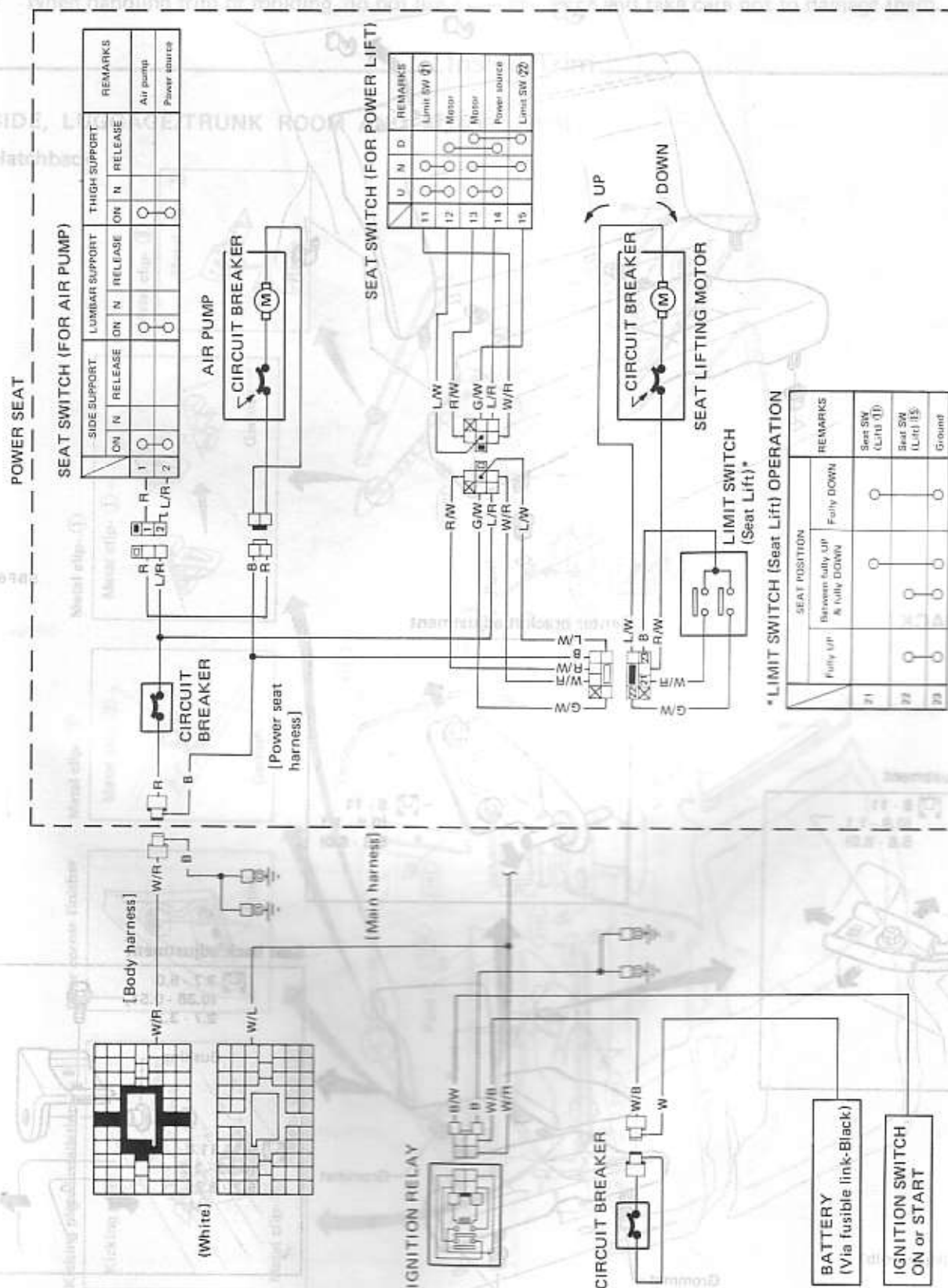


: Hose connection

SEAT

Front Seat (Cont'd)

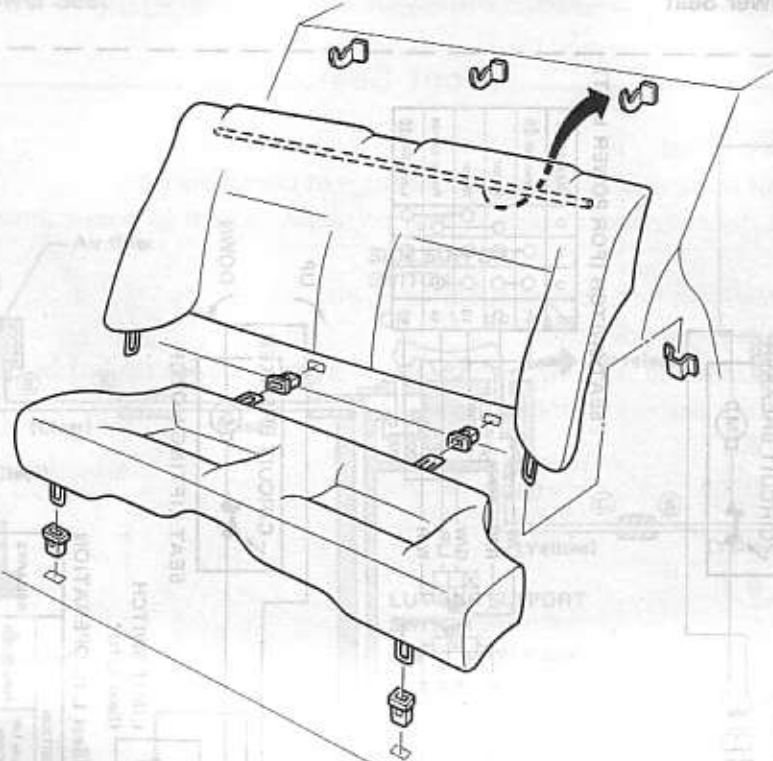
WIRING DIAGRAM – Power Seat



SEAT

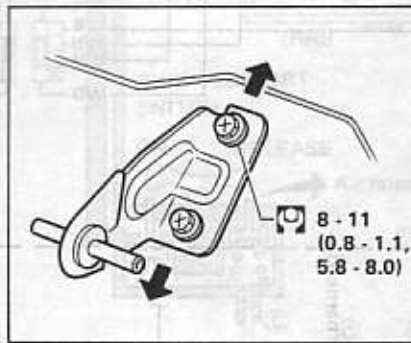
Rear Seat

COUPE



HATCHBACK

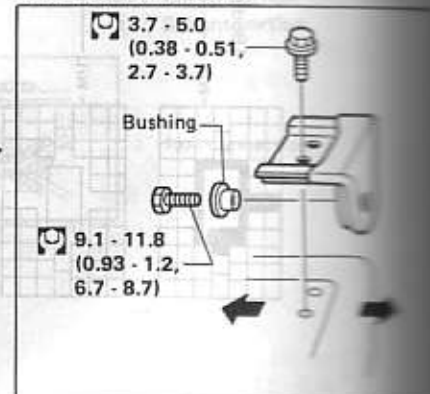
Center bracket adjustment



Striker adjustment



Seat back adjustment



: N·m (kg-m, ft-lb)

SBF620B

Grommet

Grommet

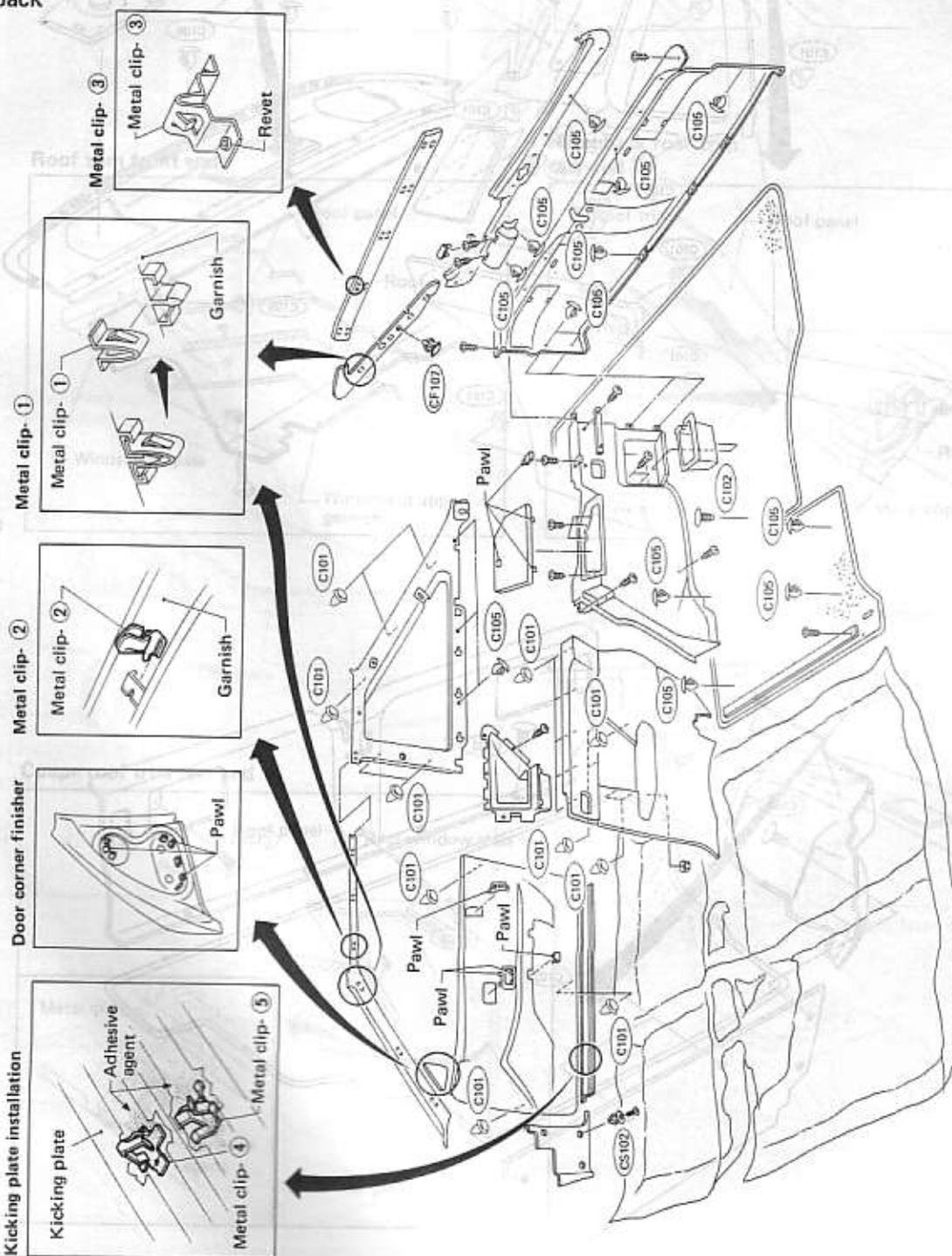
TRIM AND MOLDING

- When removing clip or fastener, refer to CLIP & FASTENER.
- When handling trim or molding, do not use excessive force and take care not to damage them.

Inside Trim

SIDE, LUGGAGE/TRUNK ROOM AND FLOOR TRIM

Hatchback



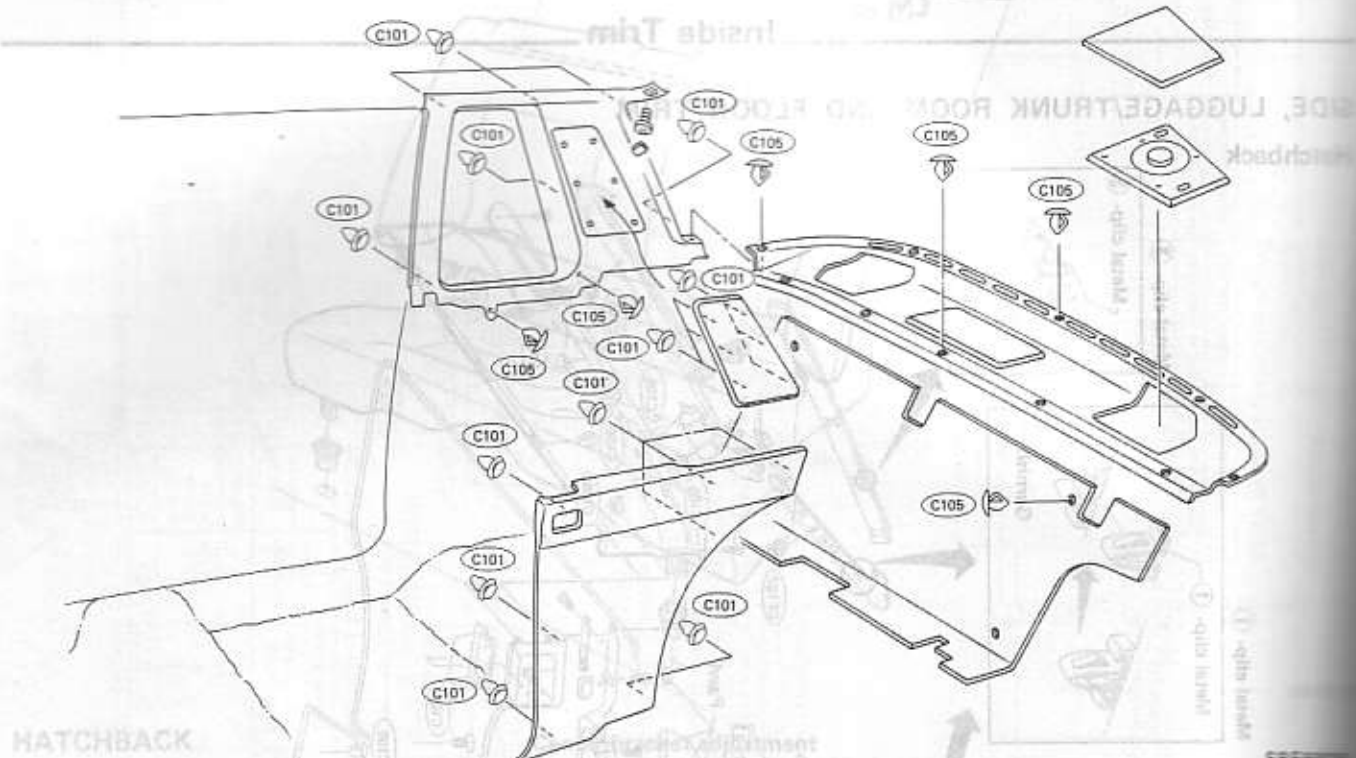
SBF589B

TRIM AND MOLDING

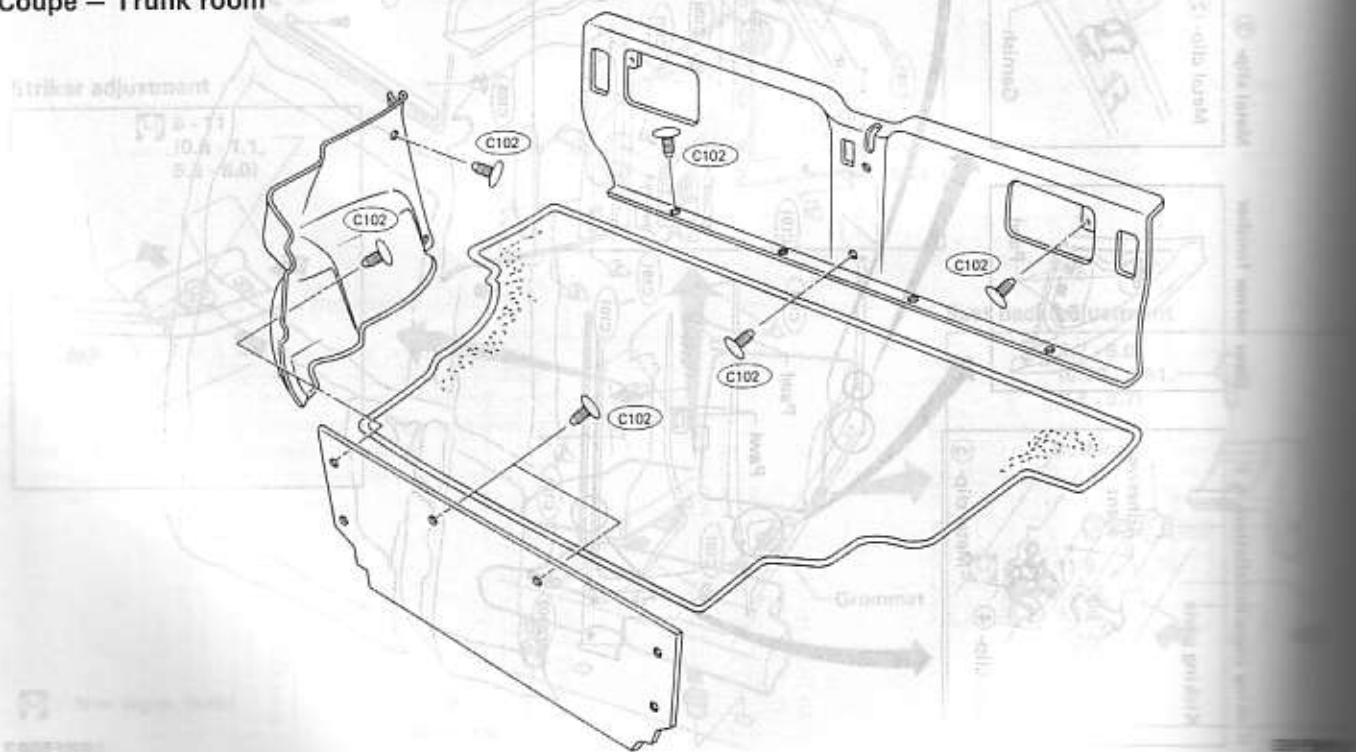
Inside Trim (Cont'd)

Coupe — Passenger room

- Front portion of passenger room trim is the same as that of Hatchback.



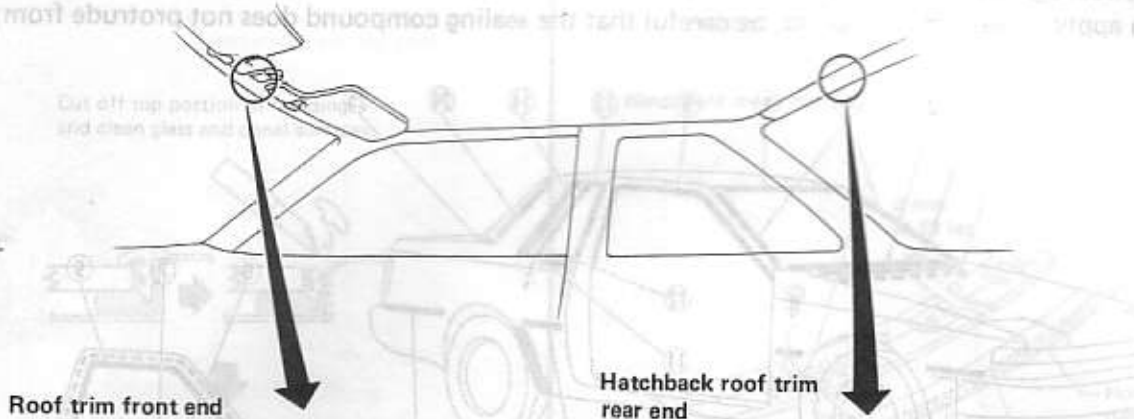
Coupe — Trunk room



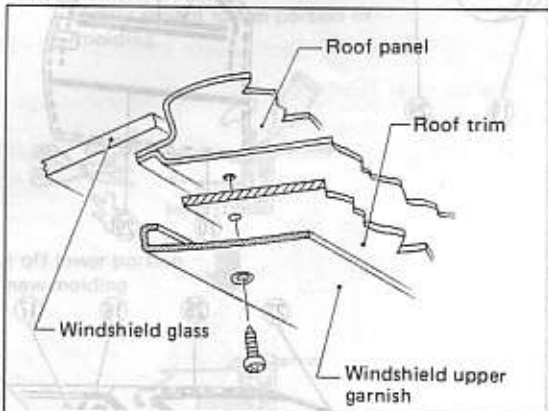
TRIM AND MOLDING

Inside Trim (Cont'd)

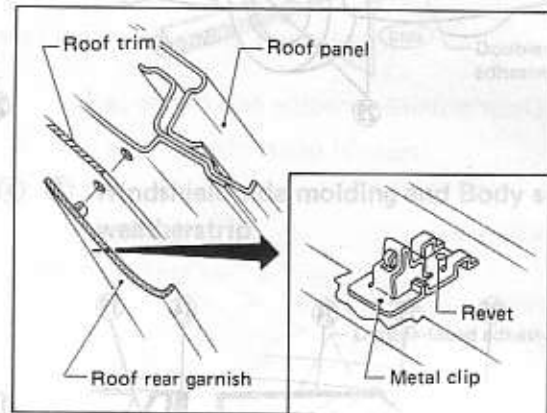
ROOF TRIM



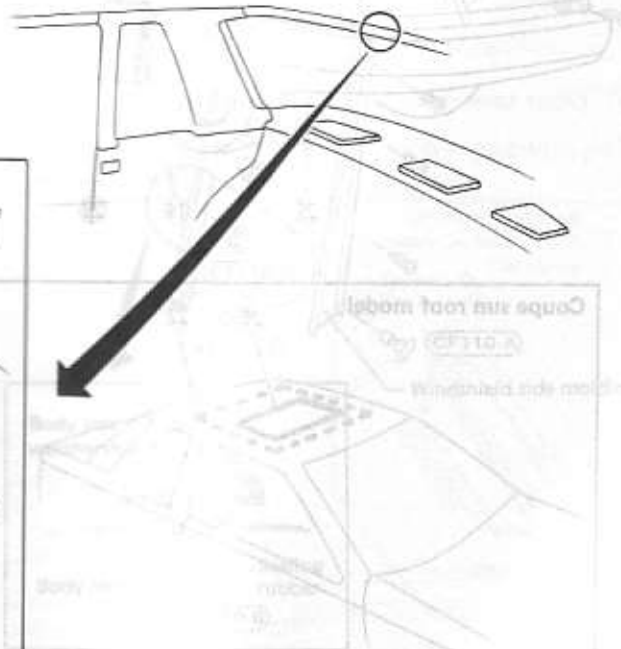
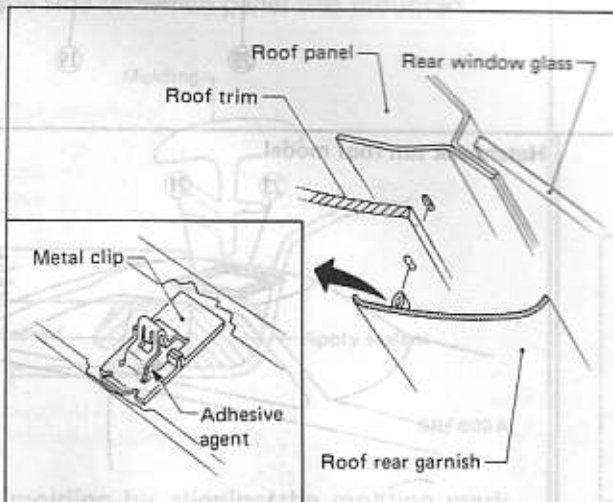
Roof trim front end



Hatchback roof trim rear end



Coupe roof trim rear end

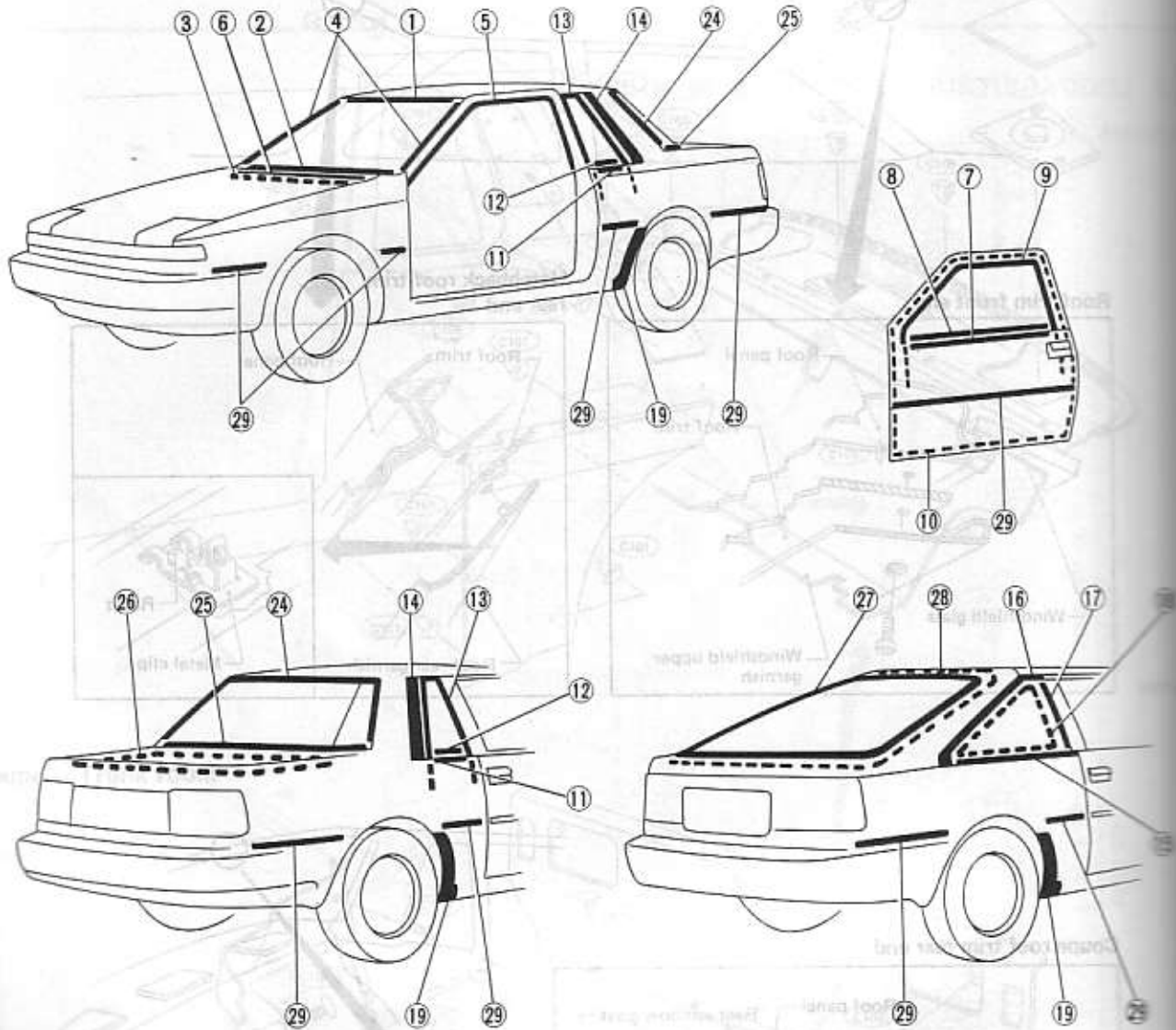


SBF592B

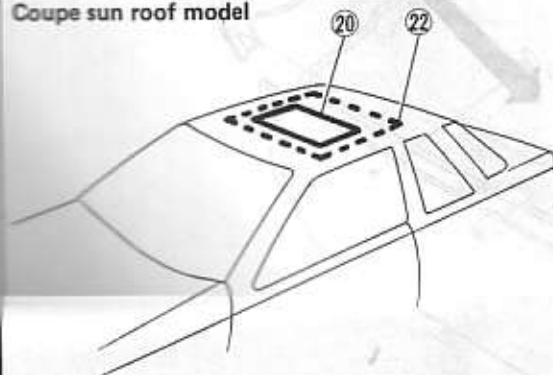
TRIM AND MOLDING

Weatherstrip and Exterior

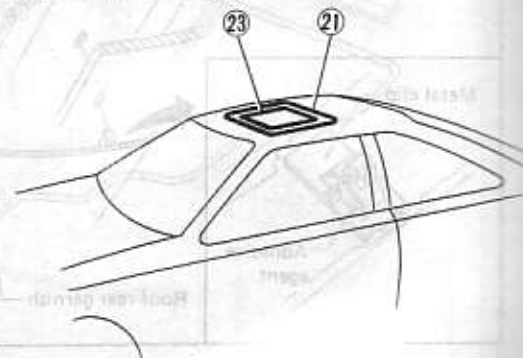
- Apply sealing compound where necessary while installing parts.
- When applying sealing compound, be careful that the sealing compound does not protrude from parts.



Coupe sun roof model



Hatchback sun roof model



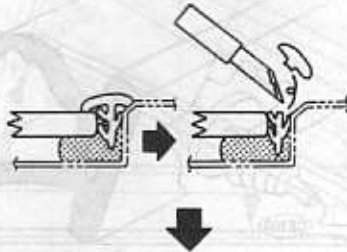
TRIM AND MOLDING

Weatherstrip and Exterior (Cont'd)

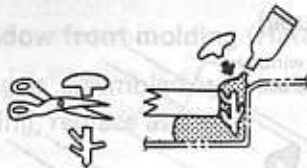
① Windshield upper molding

Method 1

Cut off top portion of molding and clean glass and panel surfaces.



Apply sealant to top portion of molding.



Cut off lower portion of new molding

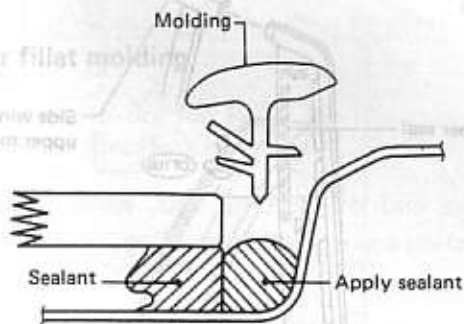


Finish well to give it a good appearance.

SBF628B

Method 2

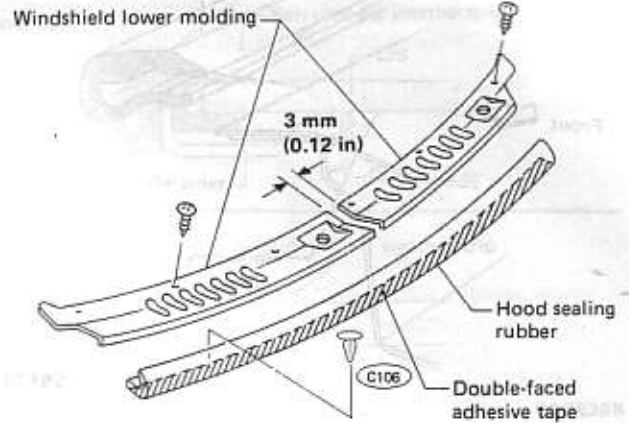
1. Cut off sealant at glass end.
2. Clean the side on which panel was mounted.



SBF809A

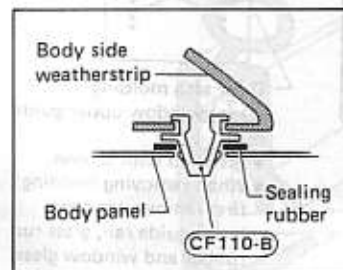
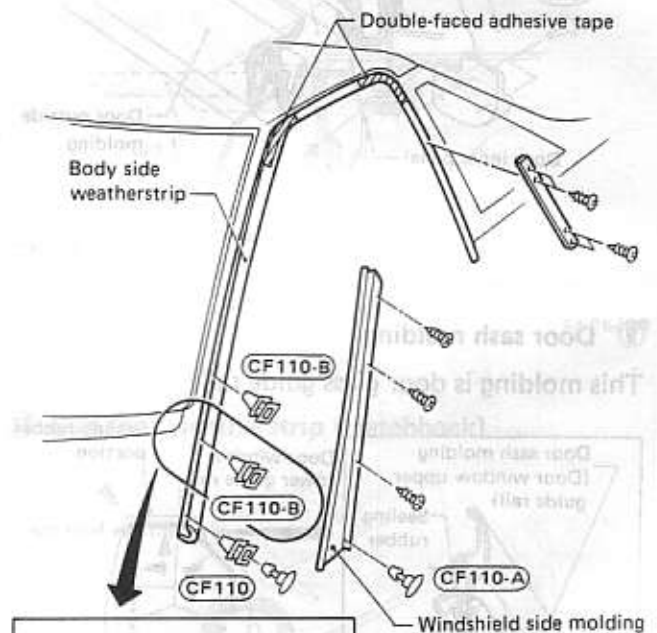
3. Install molding by aligning the molding mark located on center with vehicle center.

② ③ Windshield lower molding and Hood sealing rubber



SBF629B

④ ⑤ Windshield side molding and Body side weatherstrip

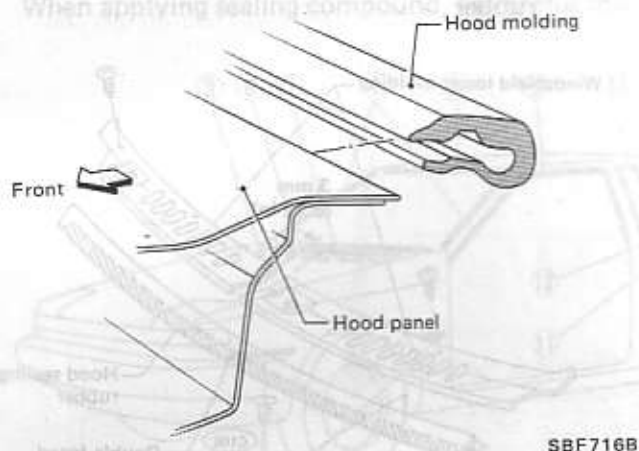


SBF630B

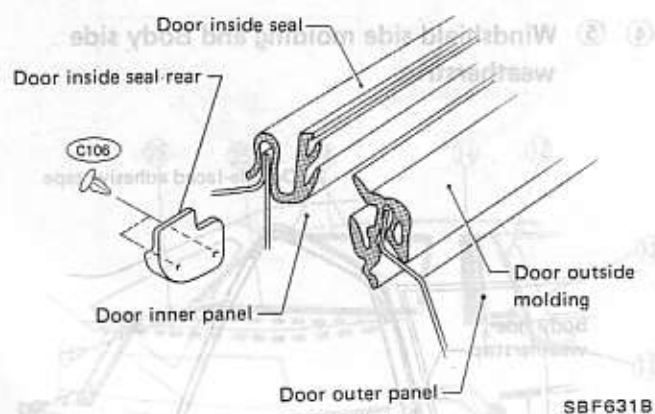
TRIM AND MOLDING

Weatherstrip and Exterior (Cont'd)

⑥ Hood molding

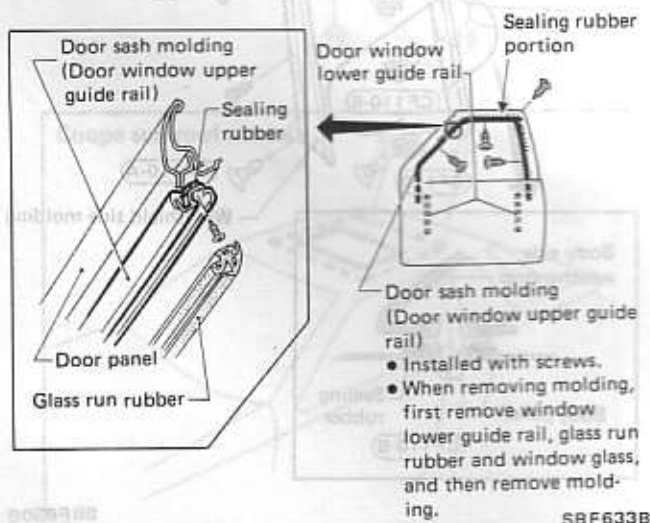


⑦ ⑧ Door outside molding and inside seal



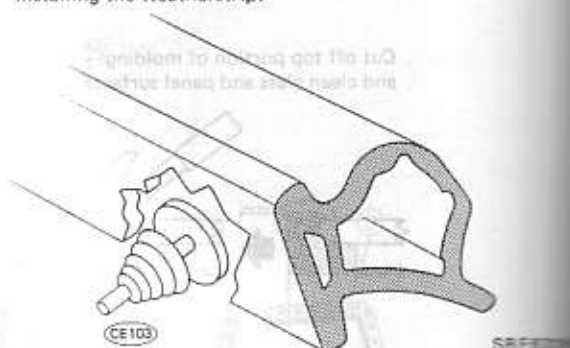
⑨ Door sash molding

This molding is door glass guide rail.

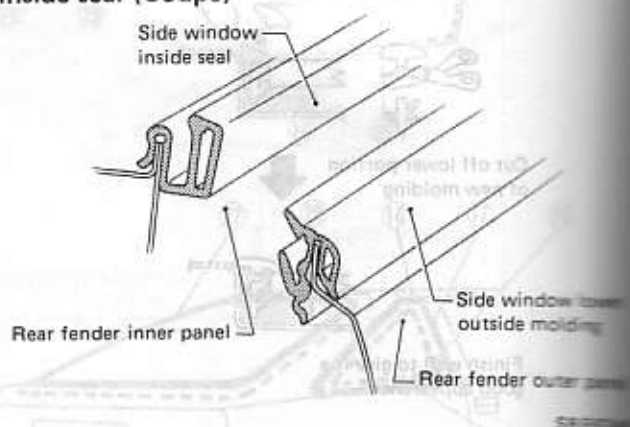


⑩ Door weatherstrip

Apply sealant where necessary when installing the weatherstrip.



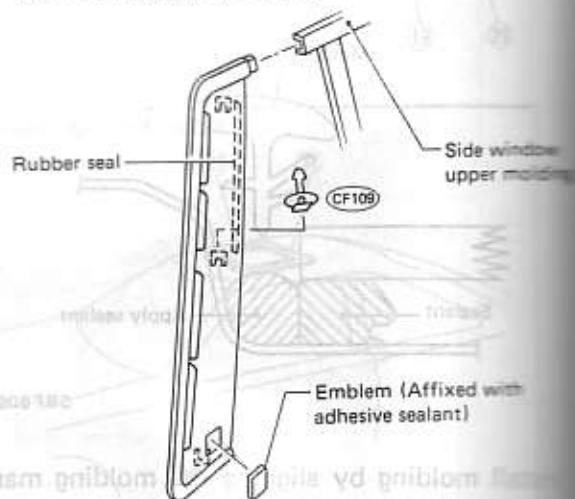
⑪ ⑫ Side window lower outside molding and inside seal (Coupe)



⑬ Side window upper & side molding (Coupe)

It's same as door sash molding. So refer to "Door sash molding" and "Side Window".

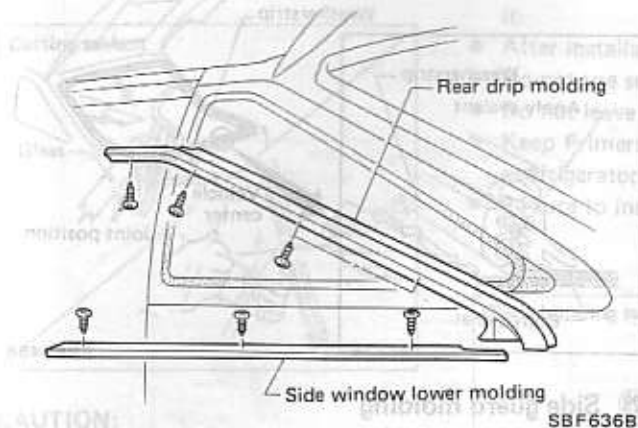
⑭ Air outlet grille (Coupe)



TRIM AND MOLDING

Weatherstrip and Exterior (Cont'd)

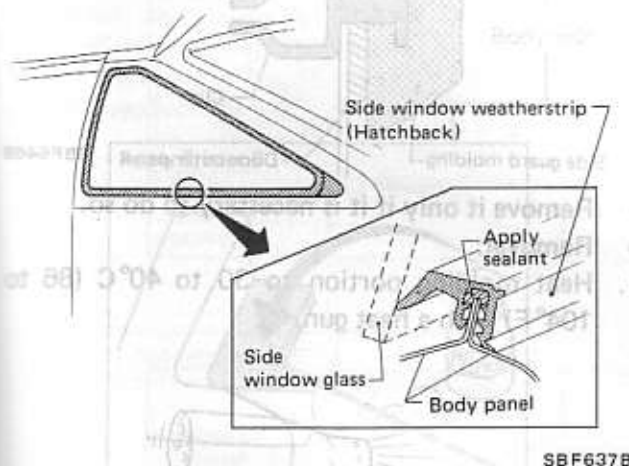
- 15 16 Side window lower molding and rear drip molding (Hatchback)



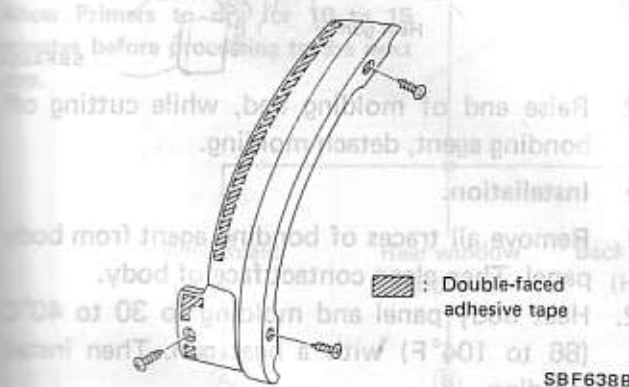
- 17 Side window front molding (Hatchback)

This molding is assembled with window glass. So when replacing, replace as a set.

- 18 Side window weatherstrip (Hatchback)

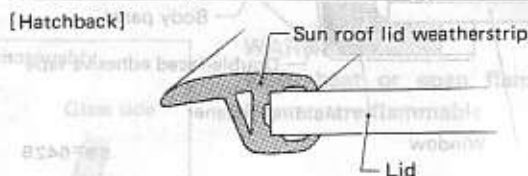
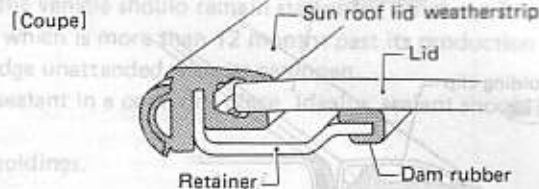


- 19 Rear fillet molding

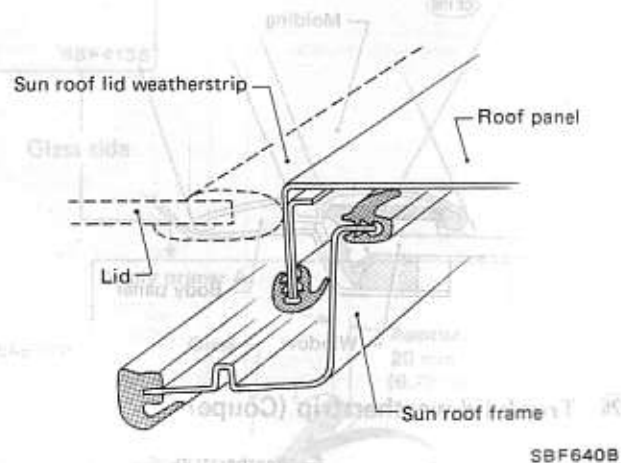


- 20 21 Sun roof lid weatherstrip

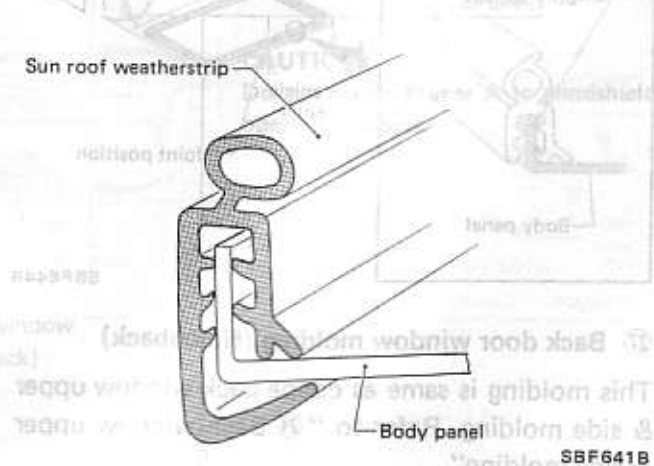
Sun roof lid weatherstrip is bonded to lid. Apply primer before bonding it.



- 22 Sun roof weatherstrip (Coupe)



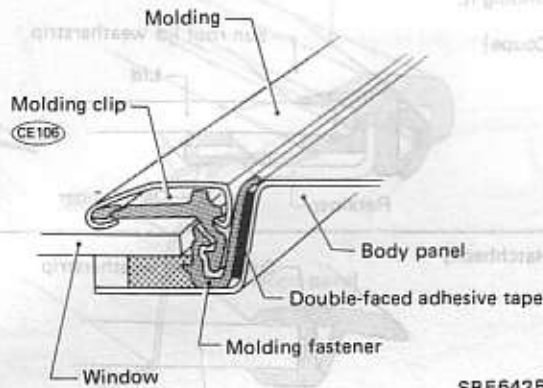
- 23 Sun roof weatherstrip (Hatchback)



TRIM AND MOLDING

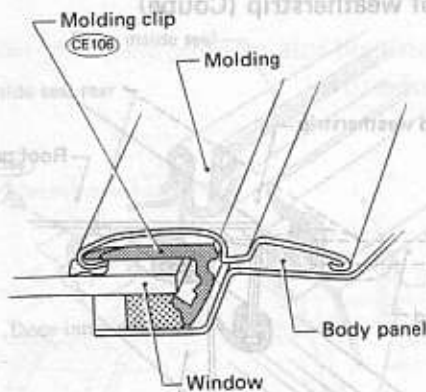
Weatherstrip and Exterior (Cont'd)

24 Back window upper & side molding (Coupe)



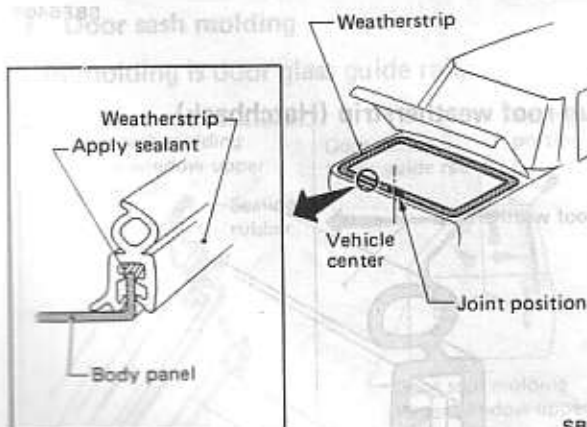
SBF642B

25 Back window lower molding (Coupe)



SBF643B

26 Trunk lid weatherstrip (Coupe)

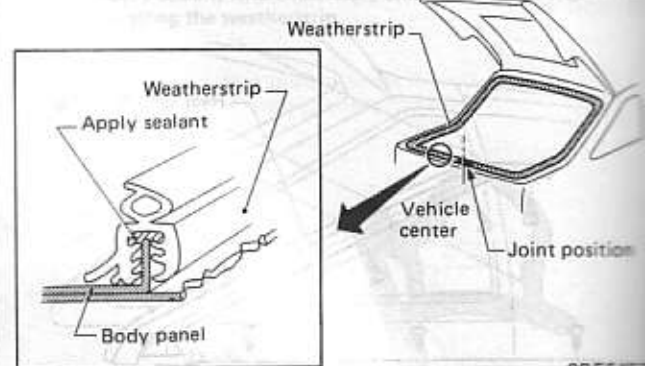


SBF644B

27 Back door window molding (Hatchback)

This molding is same as coupe back window upper & side molding. Refer to "24 Back window upper & side molding".

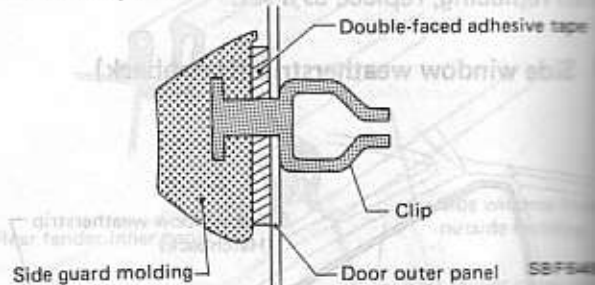
28 Back door weatherstrip (Hatchback)



SBF645B

29 Side guard molding

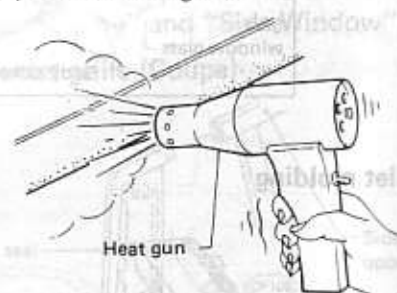
- Side guard molding on fender side is affixed to fender panel with double-faced adhesive tape, and on door side it is affixed to door panel with clip and double-faced adhesive tape.



SBF646B

- Remove it only if it is necessary to do so.
- Removal:

- Heat molding portion to 30 to 40°C (86 to 104°F) with a heat gun.



SBF647B

- Raise end of molding and, while cutting off bonding agent, detach molding.

- Installation.

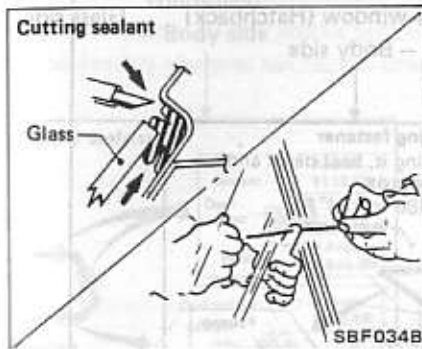
- Remove all traces of bonding agent from body panel. Then clean contact face of body.
- Heat body panel and molding to 30 to 40°C (86 to 104°F) with a heat gun. Then install molding.

WINDSHIELD AND WINDOWS

— Windshield, Rear Window (Coupe) and Back Door Window (Hatchback) —

REMOVAL

After removing moldings, remove glass.



CAUTION:

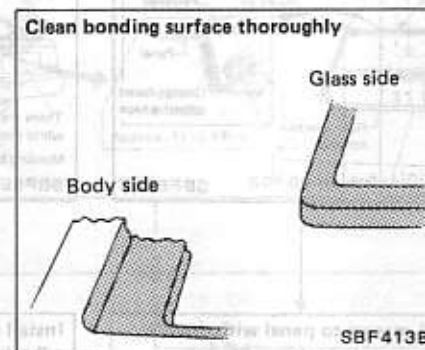
Be careful not to scratch glass when removing.

INSTALLATION

- Use genuine Nissan Sealant Kit or equivalent. Follow instructions furnished with it.
- After installation, the vehicle should remain stationary for about 24 hours.
- Do not use sealant which is more than 12 months past its production date.
- Do not leave cartridge unattended with its cap open.
- Keep Primers and sealant in a cool, dry place. Ideally, sealant should be stored in a refrigerator.
- Be sure to install moldings.

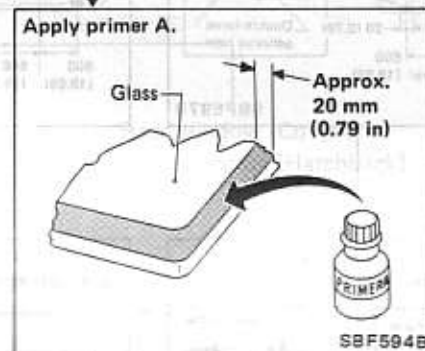
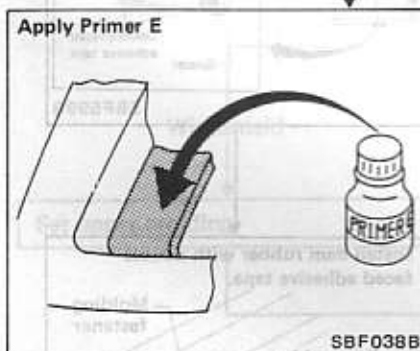
WARNING:

Keep heat or open flames away as Primers are flammable.



Body side

Glass side



CAUTION:

Allow Primers to dry for 10 to 15 minutes before processing to the next step.

CAUTION:

Do not apply Primer A to windshield operating flanges.

Windshield

Rear window
(Coupe)

Back door window
(Hatchback)

A

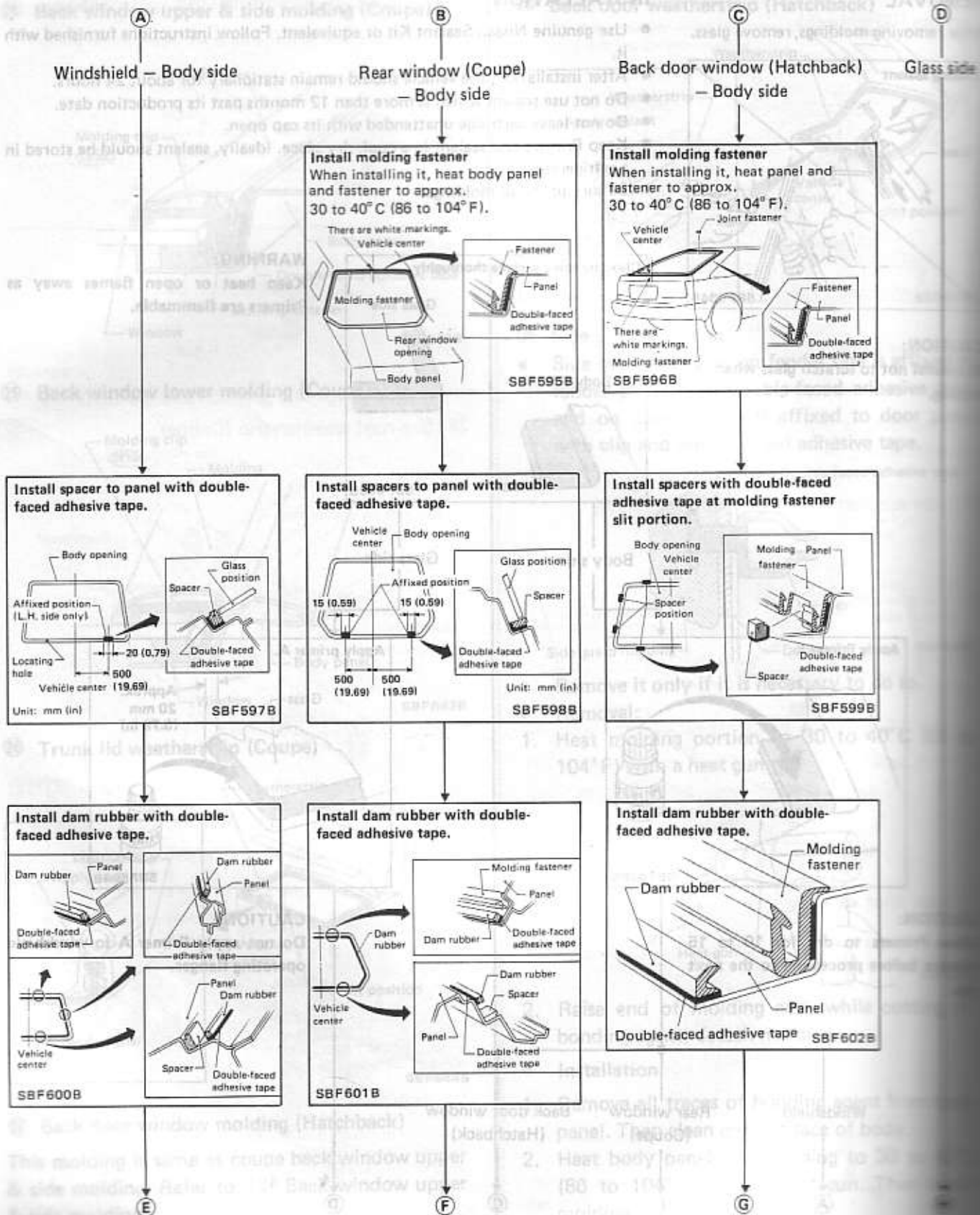
B

C

D

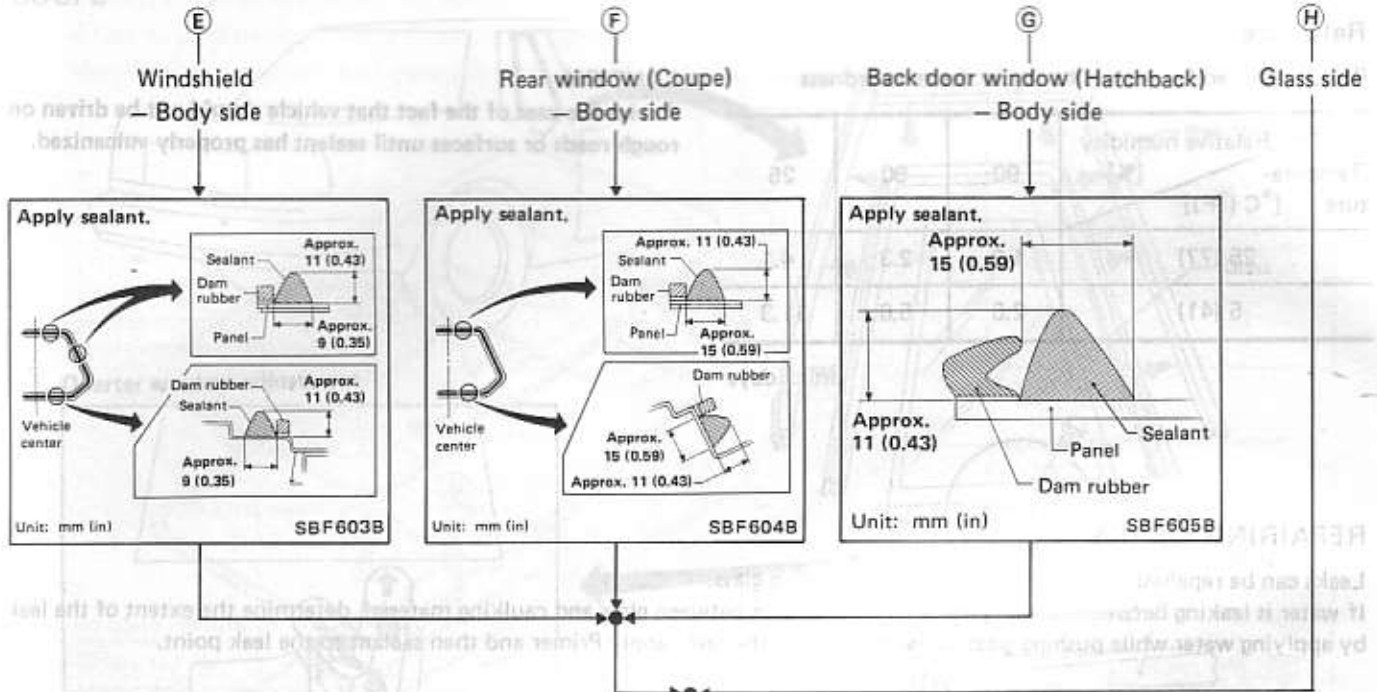
WINDSHIELD AND WINDOWS

Windshield, Rear Window (Coupe) and Back Door Window (Hatchback) (Cont'd)



WINDSHIELD AND WINDOWS

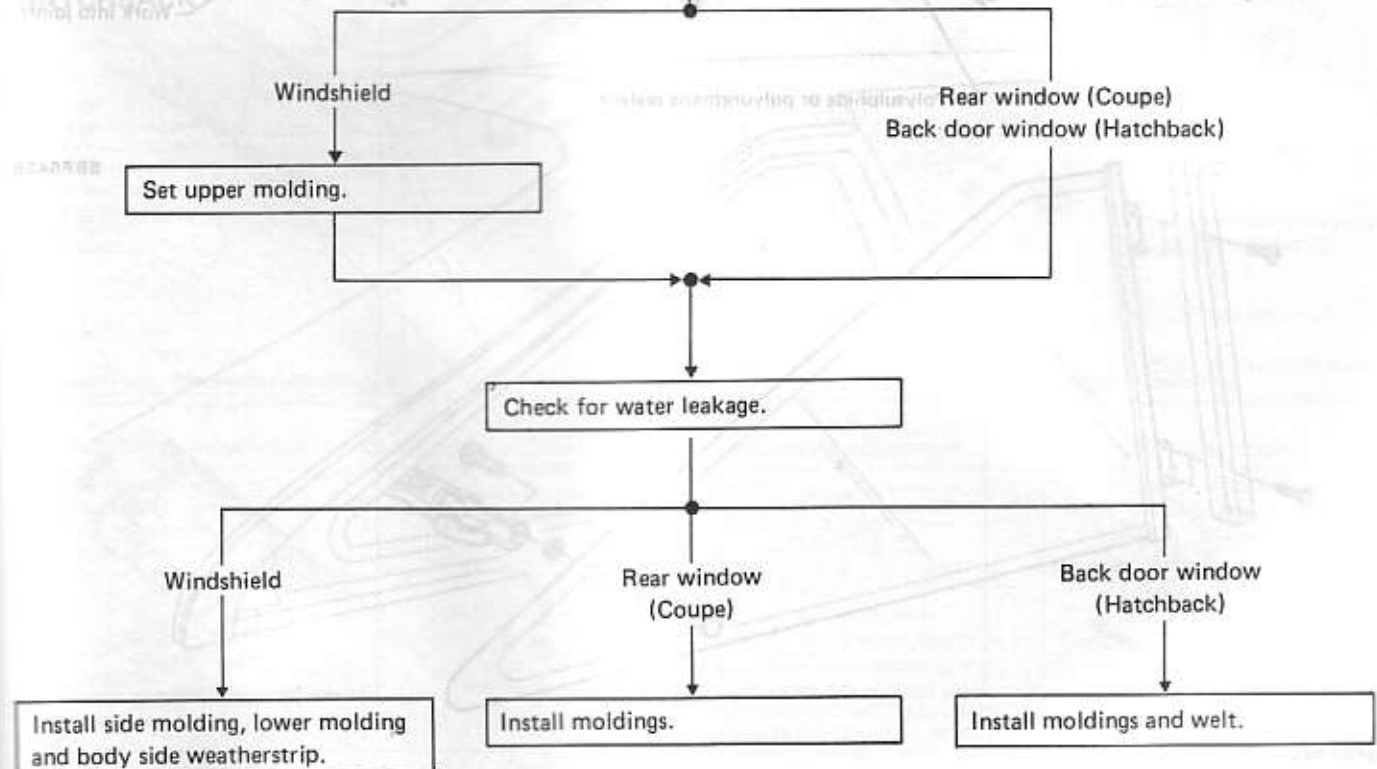
Windshield, Rear Window (Coupe) and Back Door Window (Hatchback) (Cont'd)



CAUTION:

Windshield glass should be installed within 15 minutes of applying sealant. Sealant starts to harden 15 minutes after it is applied.

Set glass in position and press glass lightly and evenly.



WINDSHIELD AND WINDOWS

— Windshield, Rear Window (Coupe) and Back Door Window (Hatchback) — (Cont'd)

Reference

Period required for sealant to dry to desired hardness

Relative humidity [%]	90	50	25
Temperature [°C (°F)]			
25 (77)	1.2	2.3	4.1
5 (41)	2.6	5.6	11.3

Unit: days

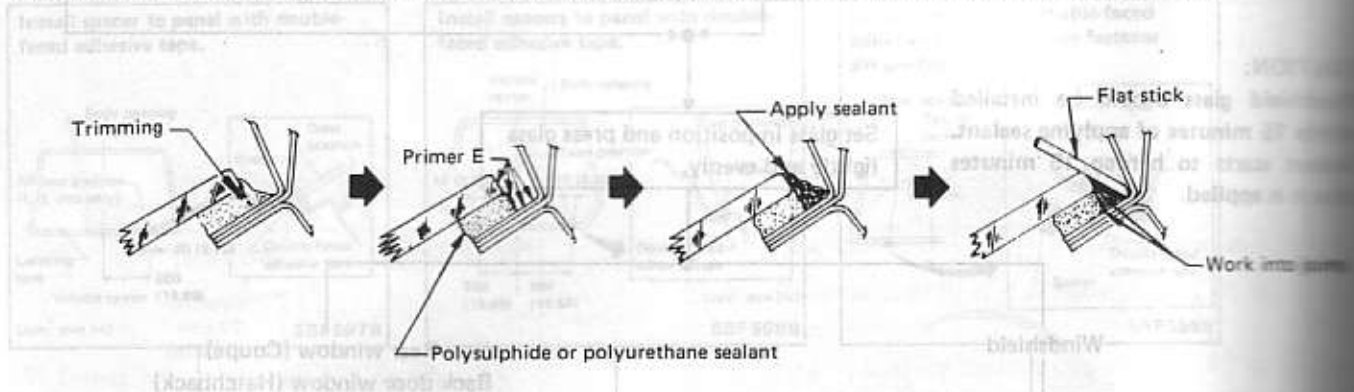
CAUTION:

Advise the user of the fact that vehicle should not be driven on rough roads or surfaces until sealant has properly vulcanized.

REPAIRING LEAKS

Leaks can be repaired without removing and reinstalling glass.

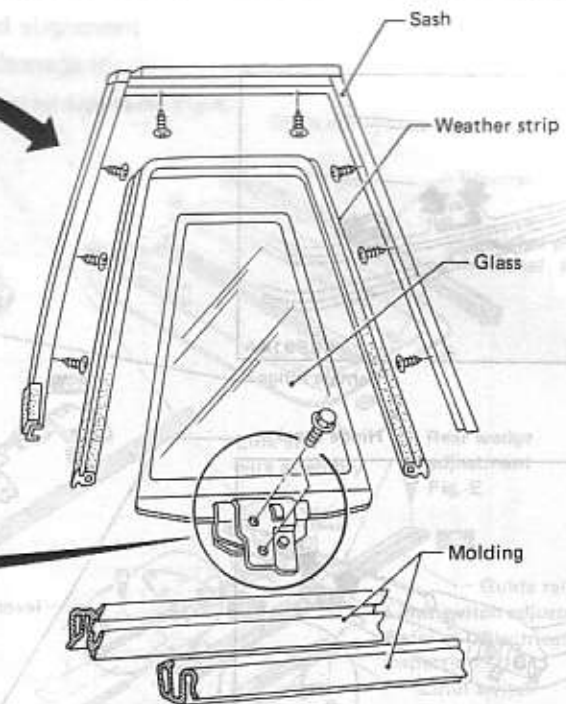
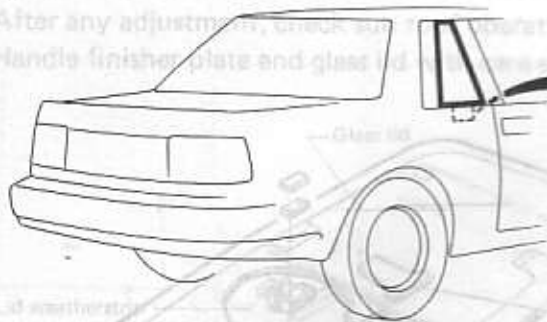
If water is leaking between caulking material and body or between glass and caulking material, determine the extent of the leak by applying water while pushing glass outward. To stop the leak, apply Primer and then sealant to the leak point.



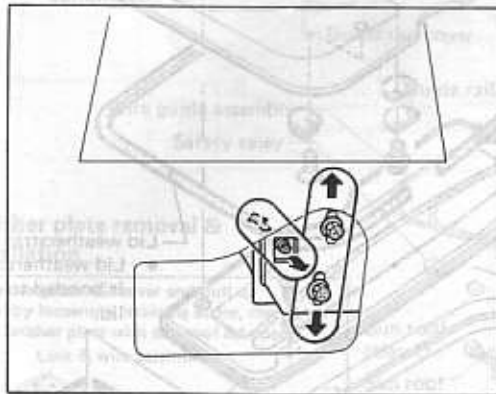
WINDSHIELD AND WINDOWS

Side Window

COUPE

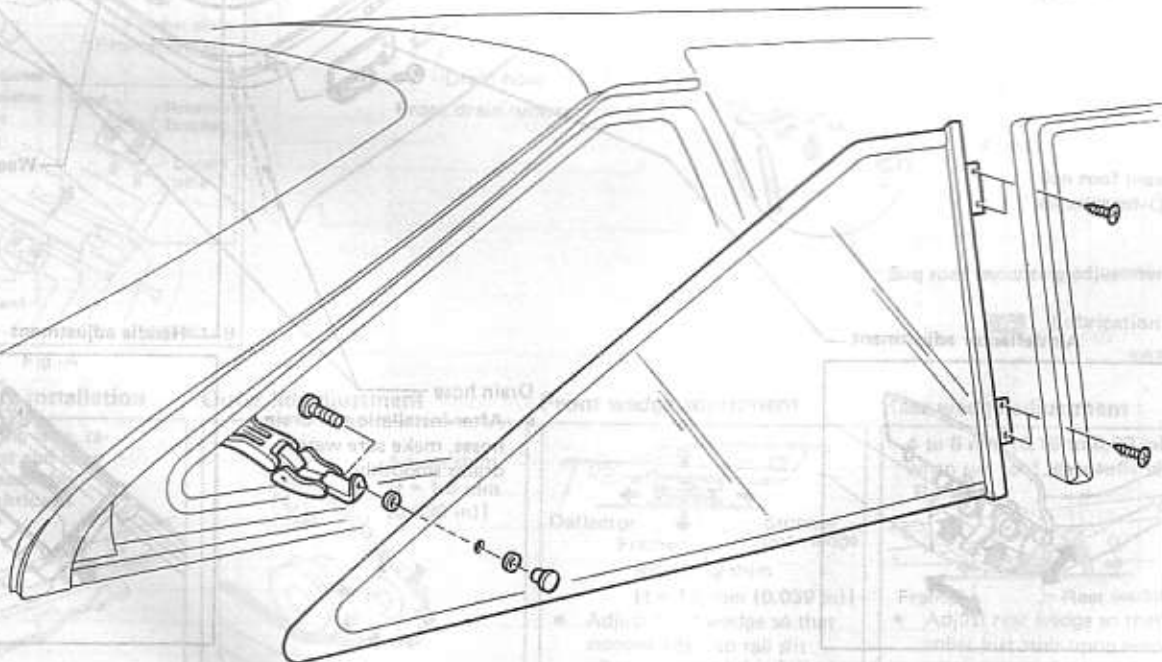


Quarter window adjustment



SBF606B

HATCHBACK

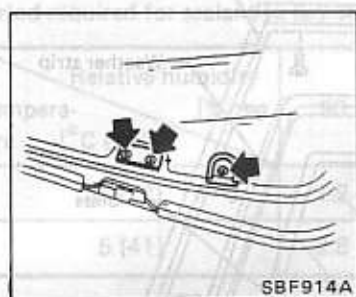


SBF607B

MANUAL SUN ROOF (Hatchback)

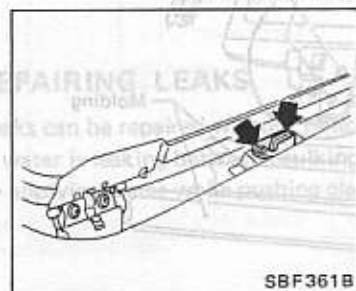
Service Procedure

- Handle glass lid with care so not to damage it.

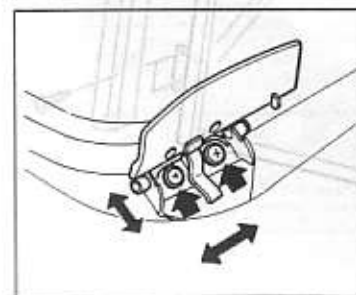
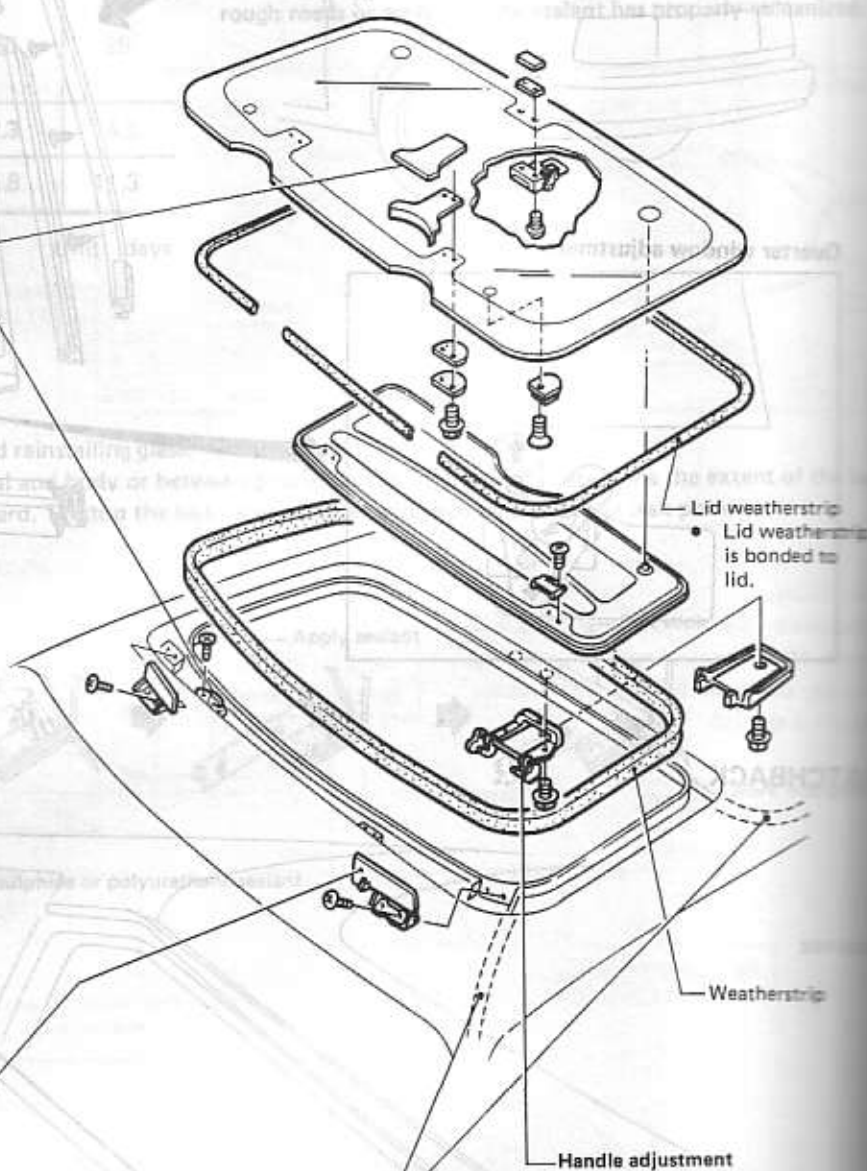


Female hinge

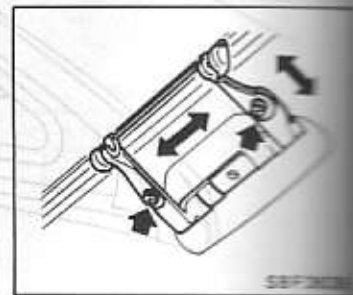
Hinge bracket



SBF361B



Air deflector adjustment

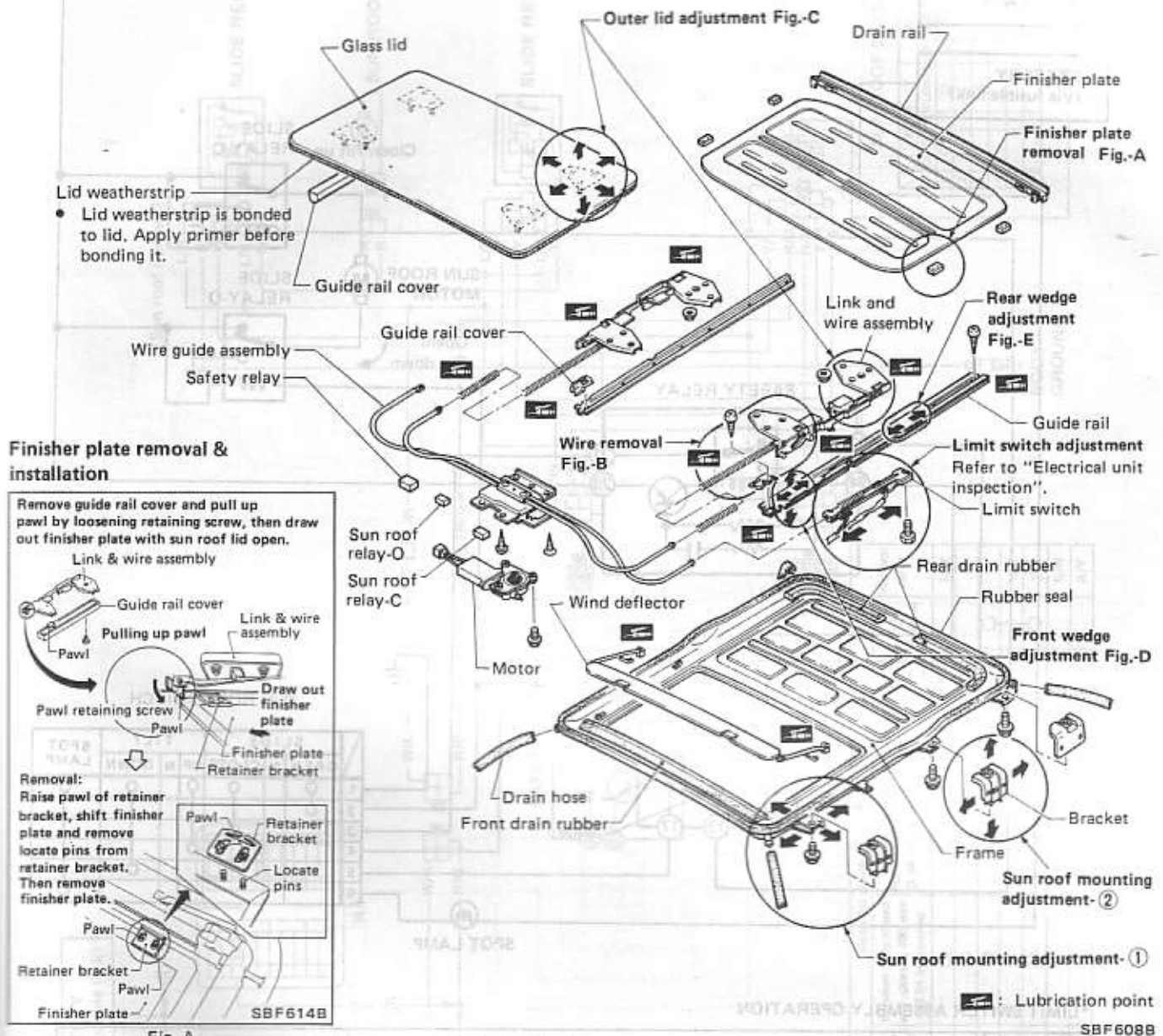


Handle adjustment

ELECTRICAL SUN ROOF (Coupe)

Service Procedure

- Do not move or remove limit switch unless it is necessary.
- After any adjustment, check sun roof operation and lid alignment.
- Handle finisher plate and glass lid with care so not to damage it.



Wire removal & installation

- When replacing wire, remove rail first and then link & wire assembly.
- Be sure to lubricate.

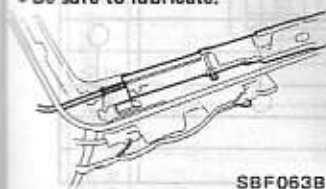


Fig.-B

Outer lid adjustment

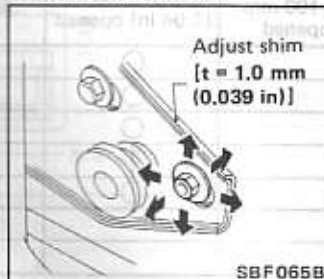


Fig.-C

Front wedge adjustment

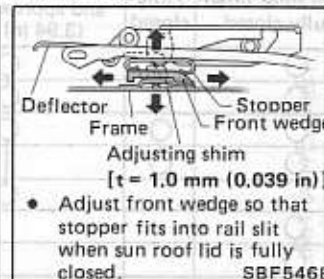


Fig.-D

Rear wedge adjustment

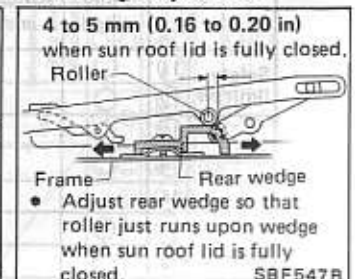
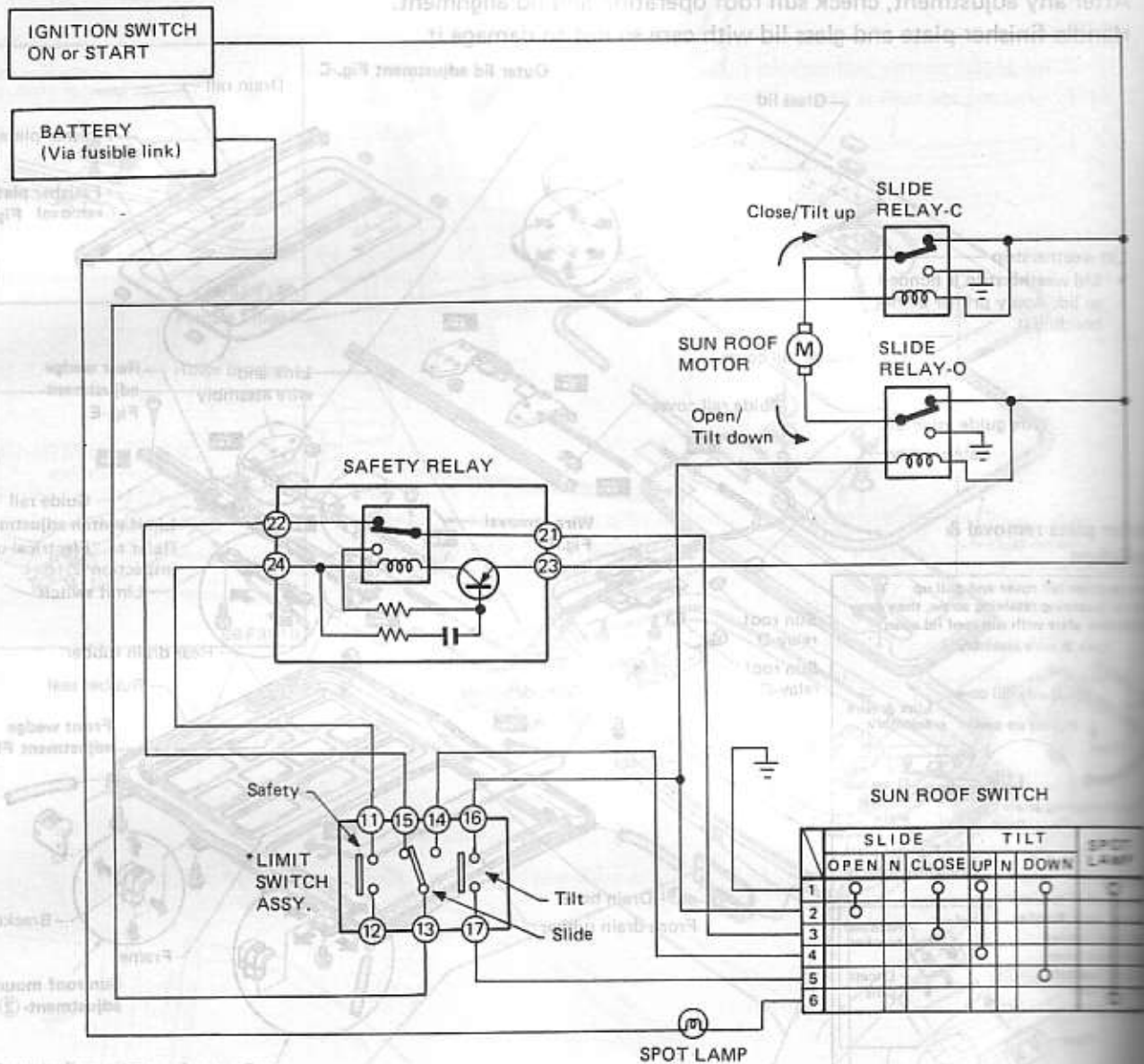


Fig.-E

ELECTRICAL SUN ROOF (Coupe)

Electrical Circuit

SCHEMATIC



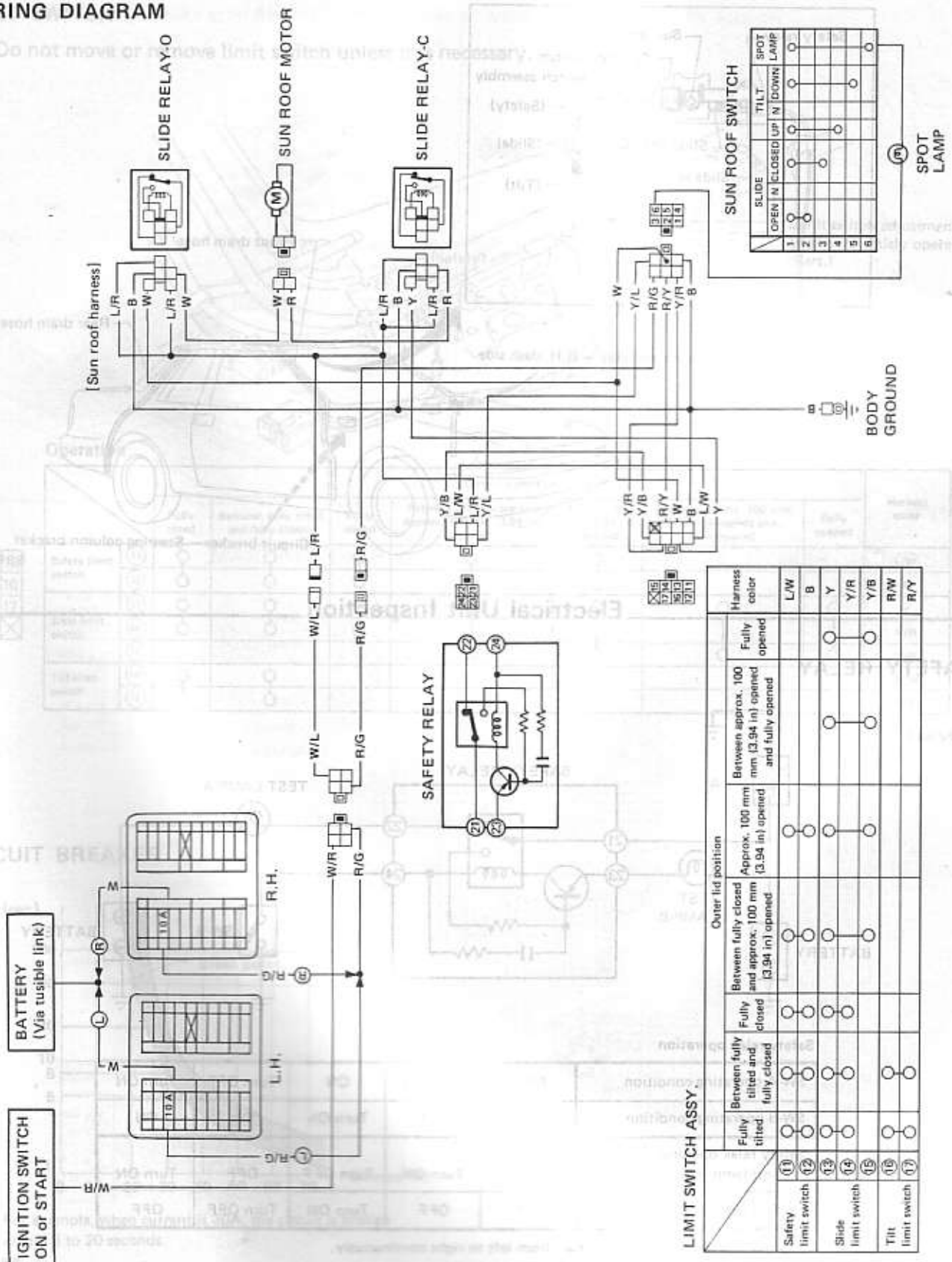
*LIMIT SWITCH ASSEMBLY OPERATION

		Outer lid position						
		Fully tilted	Between fully tilted and fully closed	Fully closed	Between fully closed and approx. 100 mm (3.94 in) opened	Approx. 100 mm (3.94 in) opened	Between approx. 100 mm opened (3.94 in) and fully opened	Fully opened
Safety limit sw.	(11)							
	(12)							
Slide limit	(13)							
	(14)							
Tilt limit sw.	(15)							
	(16)							
	(17)							

ELECTRICAL SUN ROOF (Coupe)

Electrical Circuit (Cont'd)

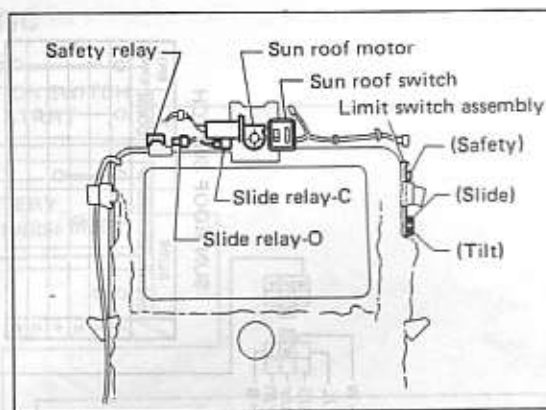
WIRING DIAGRAM



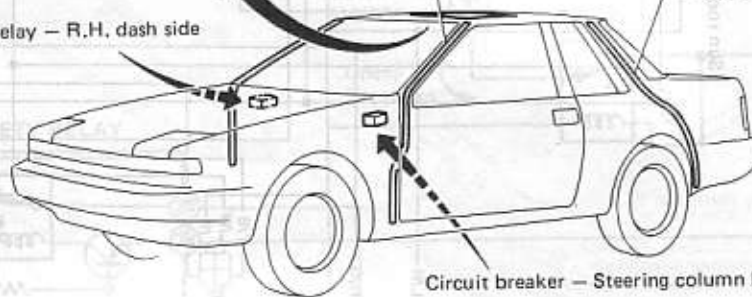
SBF718B

ELECTRICAL SUN ROOF (Coupe)

Drain Hose & Electrical Unit Location



Ignition relay — R.H. dash side



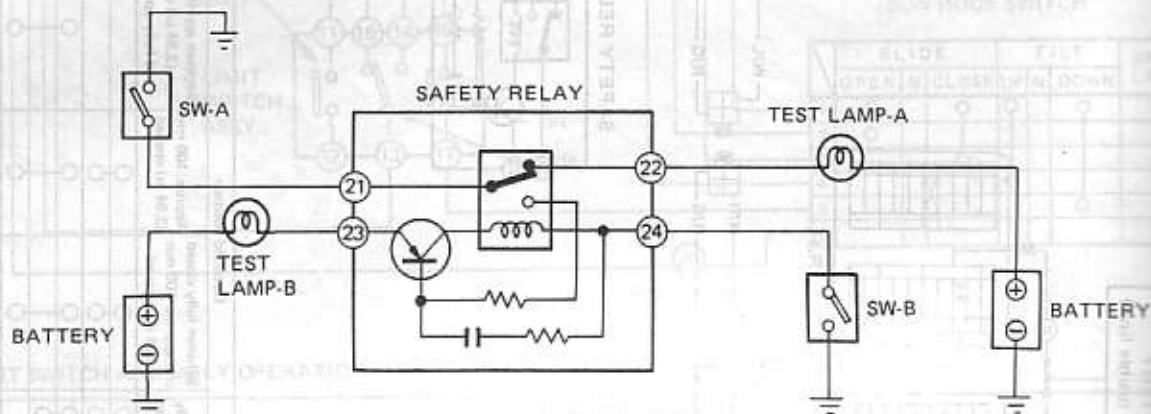
Front drain hose

Rear drain hose

Circuit breaker — Steering column bracket

Electrical Unit Inspection

SAFETY RELAY



Safety relay operation

SW-A operating condition	OFF	Turn ON	ON	Turn OFF	Turn ON
SW-B operating condition	OFF	OFF	Turn ON	ON	ON
Safety relay operation					
Test lamp-A	OFF	Turn ON	Turn OFF	OFF	Turn ON
Test lamp-B	OFF	OFF	Turn ON	Turn OFF	OFF

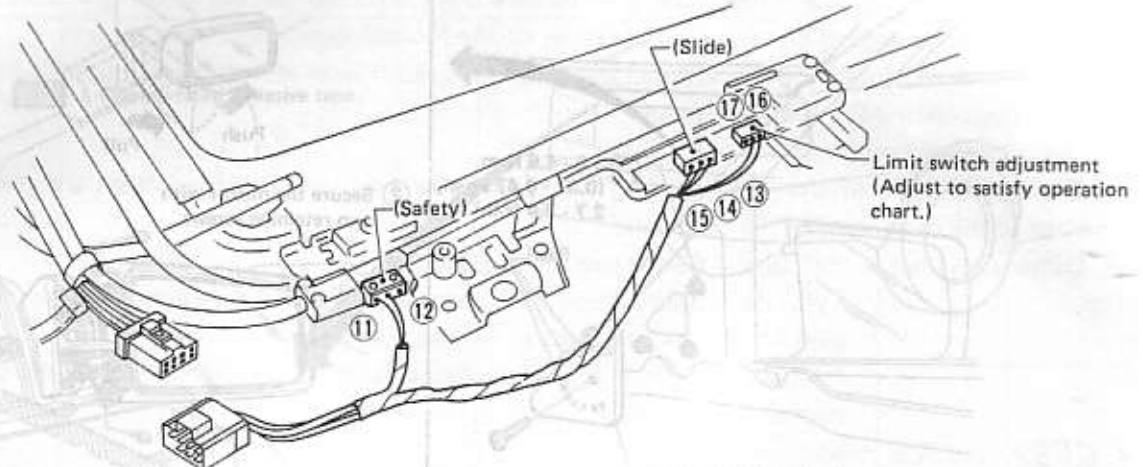
Carry out this inspection in this chart from left to right continuously.

ELECTRICAL SUN ROOF (Coupe)

Electrical Unit Inspection (Cont'd)

LIMIT SWITCH

- Do not move or remove limit switch unless it is necessary.

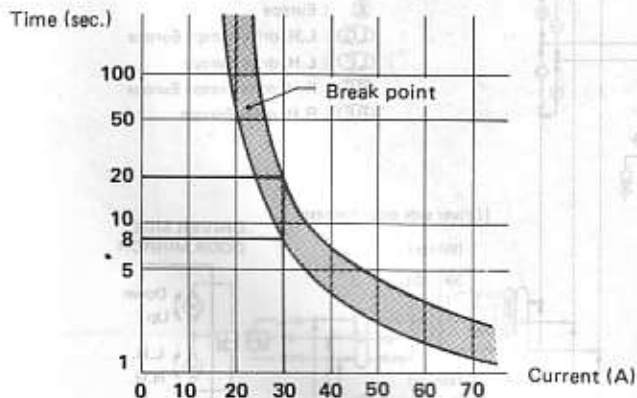


Operation

		Outer lid position						Harness color
		Fully tilted	Between fully tilted and fully closed	Fully closed	Between fully closed and approx. 100 mm (3.94 in) opened	Approx. 100 mm (3.94 in) opened	Between approx. 100 mm (3.94 in) opened and fully opened	
Safety limit switch	(11)	○	○	○	○	○		L/W
	(12)	○	○	○	○	○		B
Slide limit switch	(13)	○	○	○	○	○	○	Y
	(14)	○	○	○	○	○	○	Y/R
	(15)	○	○	○	○	○	○	Y/B
Tilt limit switch	(16)	○	○					R/W
	(17)	○	○					R/Y

SBF552B

CIRCUIT BREAKER

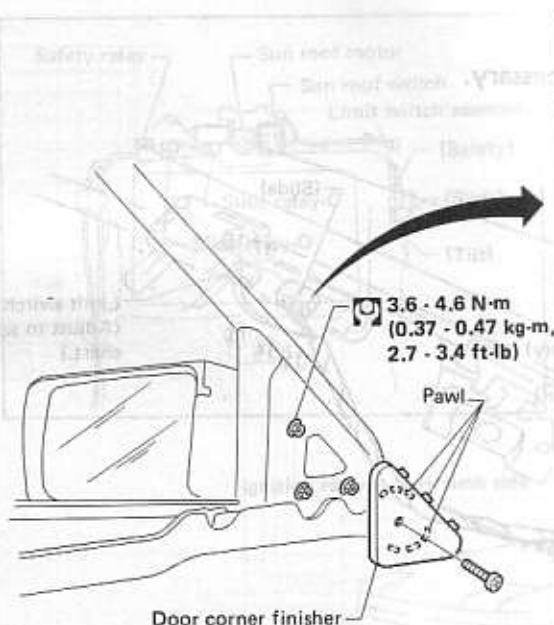


For example, when current is 30A, the circuit is broken within 8 to 20 seconds.

SBF560B

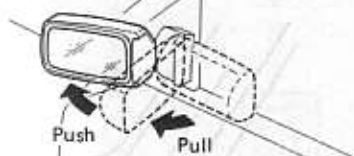
MIRROR

Door Mirror

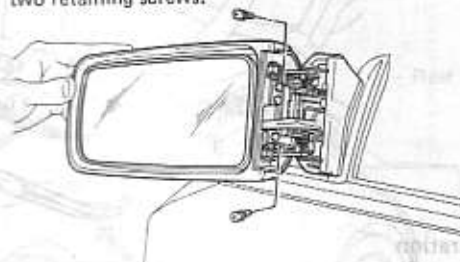


Initial setting (For P.D.I.)

- 1 Pull the mirror out and push it up.

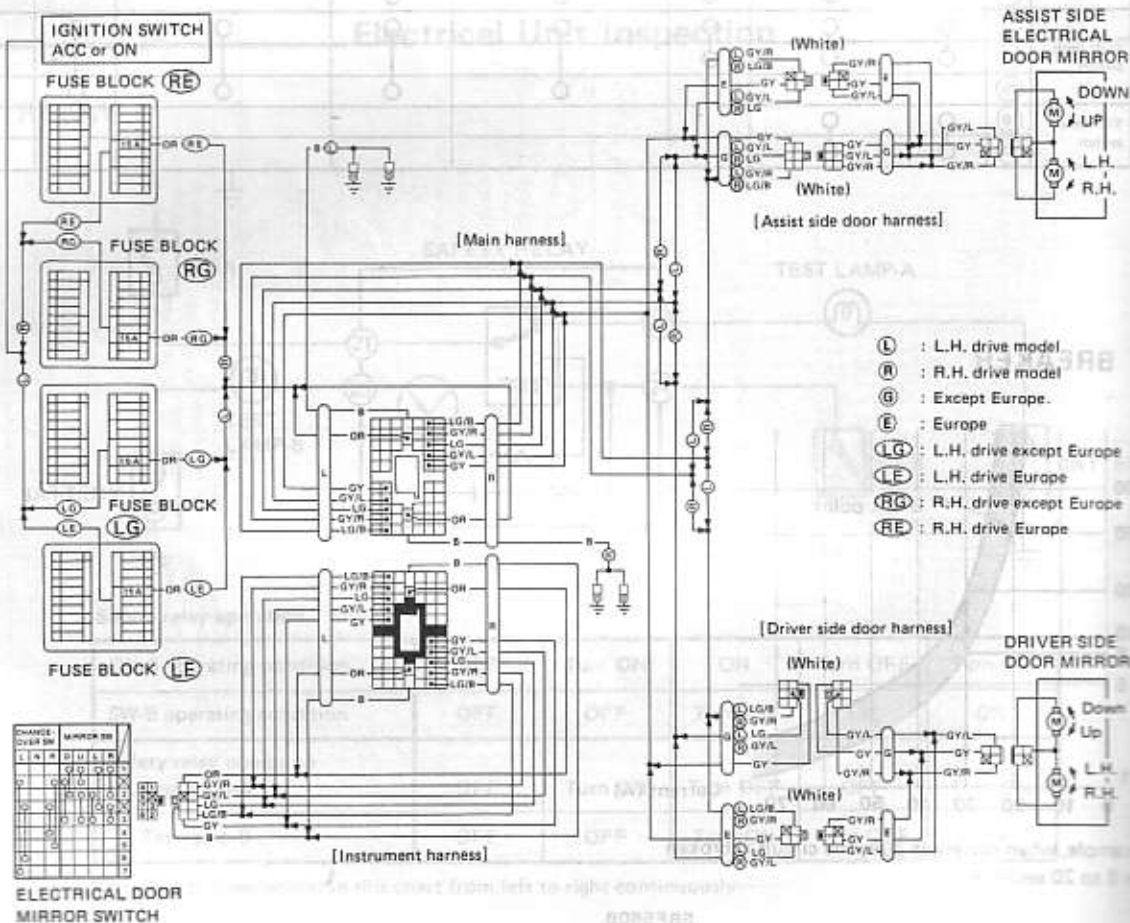


- 2 Secure the mirror with two retaining screws.



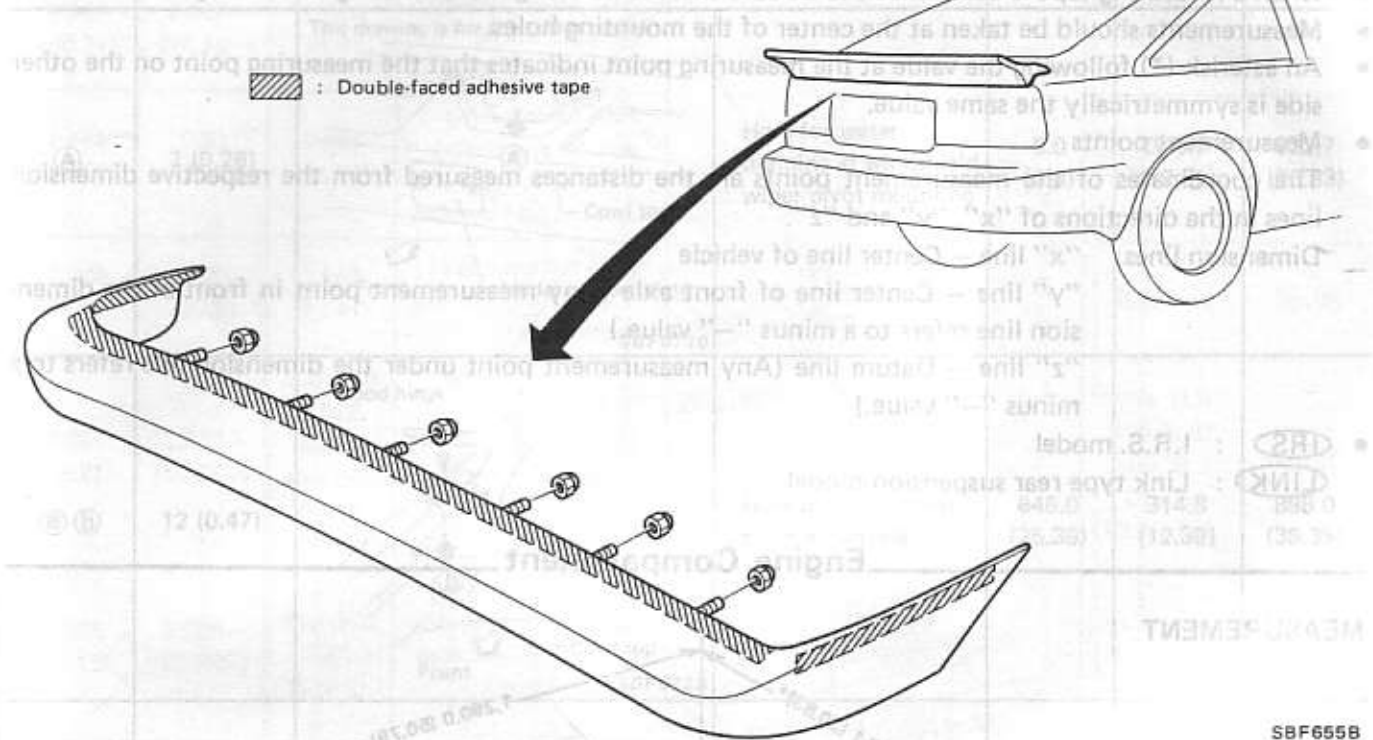
SBF720B

ELECTRICAL REMOTE CONTROL DOOR MIRROR / WIRING DIAGRAM



Enzyme Commitment (Cont'd)

- | |
|--------|
| Point | 10 mm | 15 mm | 20 mm | 25 mm | 30 mm | 35 mm | 40 mm | 45 mm | 50 mm | 55 mm | 60 mm | 65 mm | 70 mm | 75 mm | 80 mm | 85 mm | 90 mm | 95 mm | 100 mm |
|--------|



REAR BODY ALIGNMENT

- All dimensions indicated in figures are actual ones.
- When a tram tracking gauge is used, adjust both pointers to equal length and check the pointers and gauge itself to make sure there is no free play.
- When a measuring tape is used, check to be sure there is no elongation, twisting or bending.
- Measurements should be taken at the center of the mounting holes.
- An asterisk (*) following the value at the measuring point indicates that the measuring point on the other side is symmetrically the same value.
- Measurement points

The coordinates of the measurement points are the distances measured from the respective dimension lines in the directions of "x", "y" and "z".

Dimension lines: "x" line — Center line of vehicle

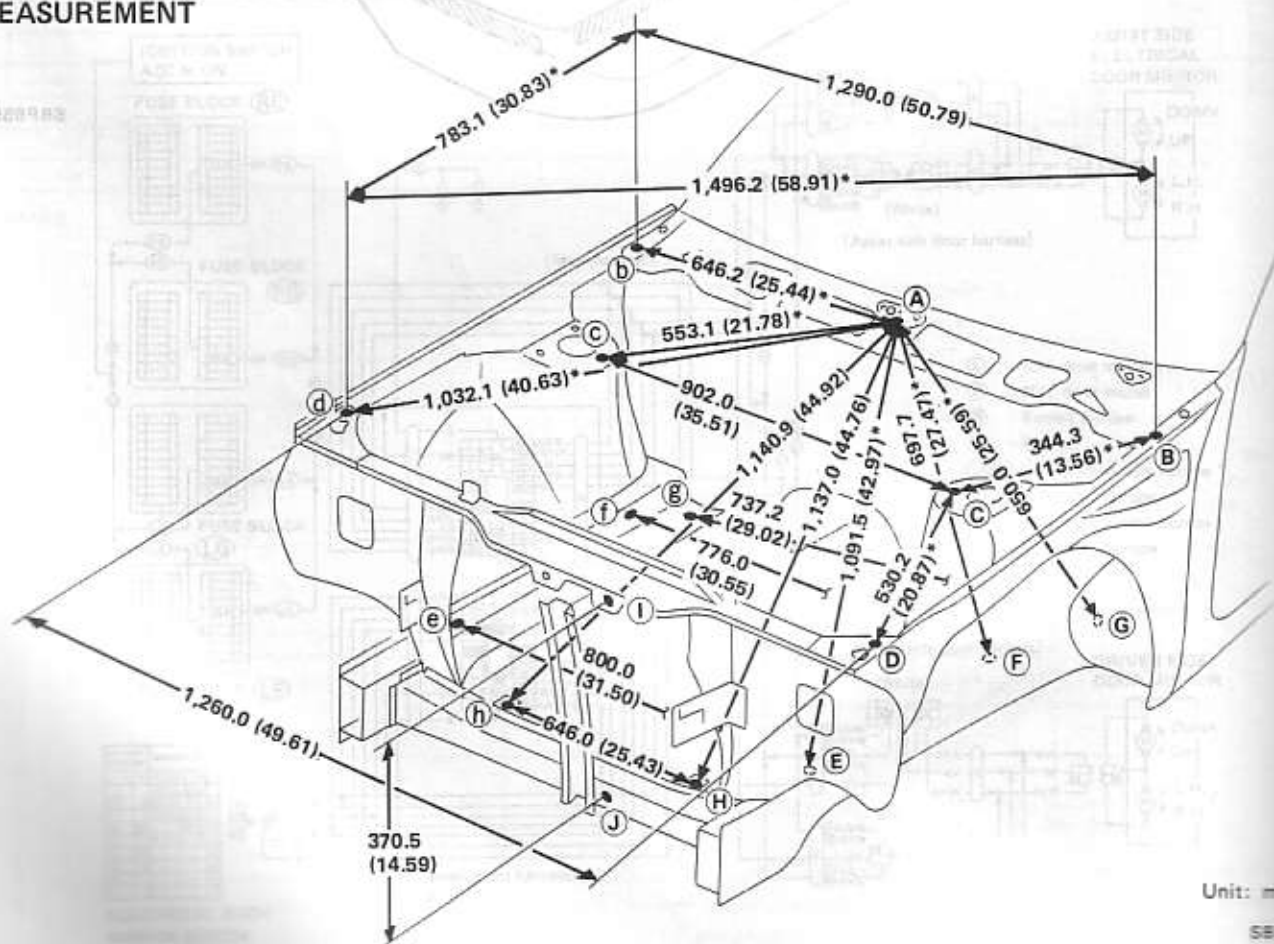
"y" line — Center line of front axle (Any measurement point in front of the dimension line refers to a minus "-" value.)

"z" line — Datum line (Any measurement point under the dimension line refers to a minus "-" value.)

- **IRS** : I.R.S. model
- **LINK** : Link type rear suspension model

Engine Compartment

MEASUREMENT



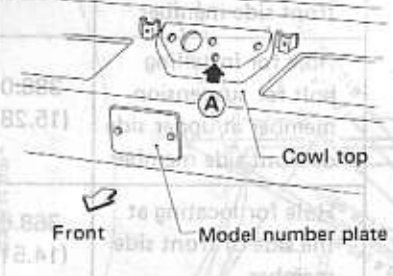
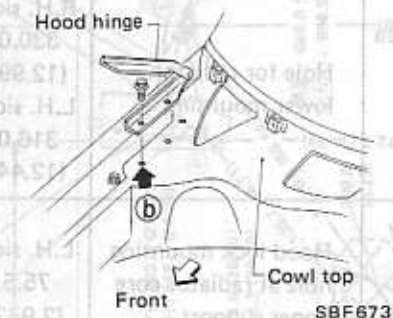
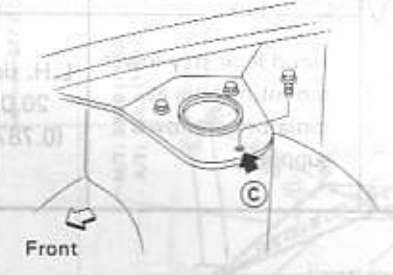
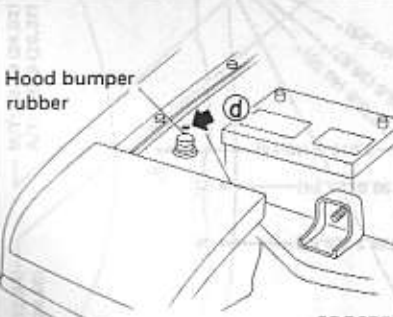
Unit: mm (in)

55FEM0

BODY ALIGNMENT

Engine Compartment (Cont'd)

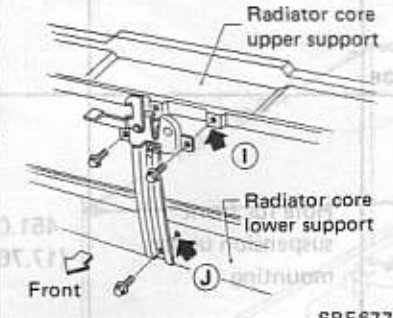
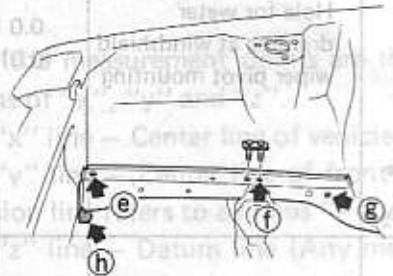
MEASUREMENT POINTS

Points	Hole dia. mm (in)	Detailed points	Coordinates mm (in)		
			"X"	"Y"	"Z"
(A)	7 (0.28)	This drawing is for L.H. drive model.  SBF672B	0.0 (0.0)	345.9 (13.62)	922.7 (36.33)
(B) (b)	12 (0.47)	 SBF673B	645.0 (25.39)	314.8 (12.39)	898.0 (35.35)
(C) (c)	11 (0.43)	 SBF674B	451.0 (17.76)	35.5 (1.398)	844.4 (33.24)
(D) (d)	8 (0.31)	 SBF675B	630.0 (24.80)	-460.2 (-18.12)	786.4 (30.96)

BODY ALIGNMENT

Engine Compartment (Cont'd)

Points	Hole dia. mm (in)	Detailed points	Coordinates mm (in)		
			"x"	"y"	"z"
E e	16 (0.63)	Hole for air bleeding at upper side of front side member	400.0 (15.75)	-550.0 (-21.65)	444.4 (17.50)
F f	14 (0.55)	Hole for installing bolt for suspension member at upper side of front side member	388.0 (15.28)	18.0 (0.709)	444.4 (17.50)
G g	16 (0.63)	Hole for locating at the side of front side member	368.6 (14.51)	230.0 (9.06)	400.0 (15.75)
H h	R.H. side 16 (0.63) L.H. side 16 x 22 (0.63 x 0.87)	Hole for radiator lower mounting	R.H. side 330.0 (12.99) L.H. side 316.0 (12.44)	-568.2 (-22.37)	325.0 (12.80)
I i	12 (0.47)	Hood lock mounting hole at radiator core upper support	L.H. side 75.5 (2.972)	-683.9 (-26.93)	706.4 (27.81)
J j	11 (0.43)	Hood lock stay lower mounting hole at radiator core lower support	L.H. side 20.0 (0.787)	-636.6 (-25.06)	343.1 (13.51)

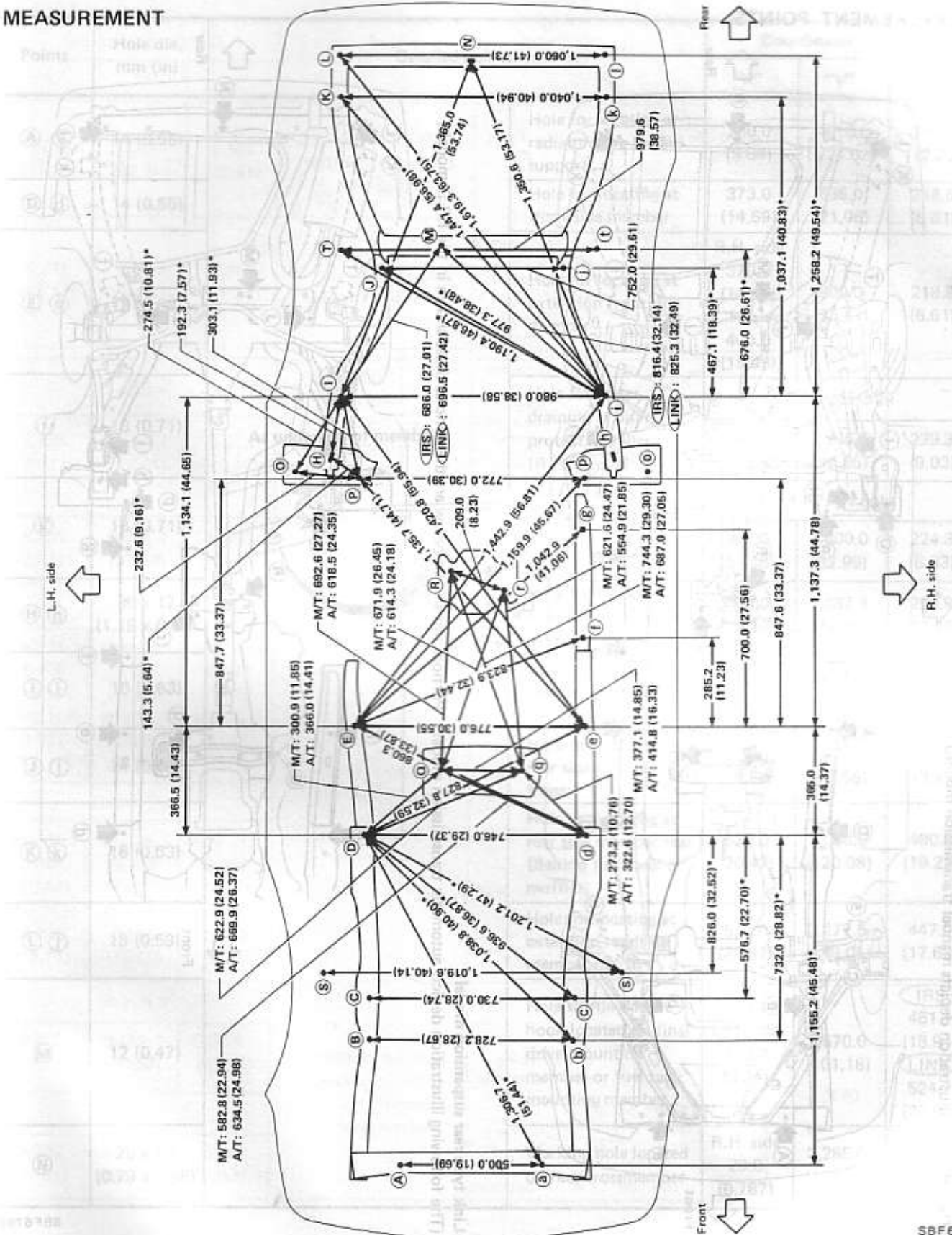


BODY ALIGNMENT

Underbody

MEASUREMENT

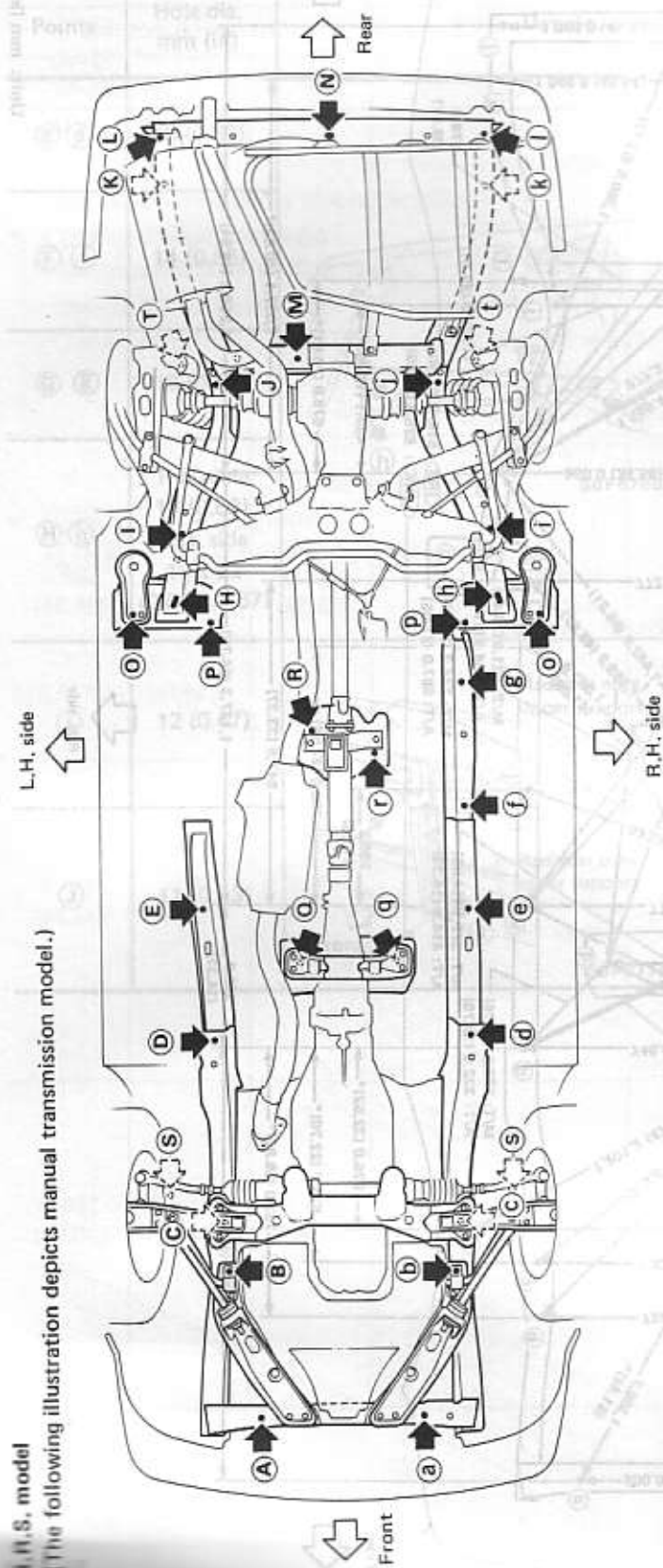
Unit: mm (in)



BODY ALIGNMENT

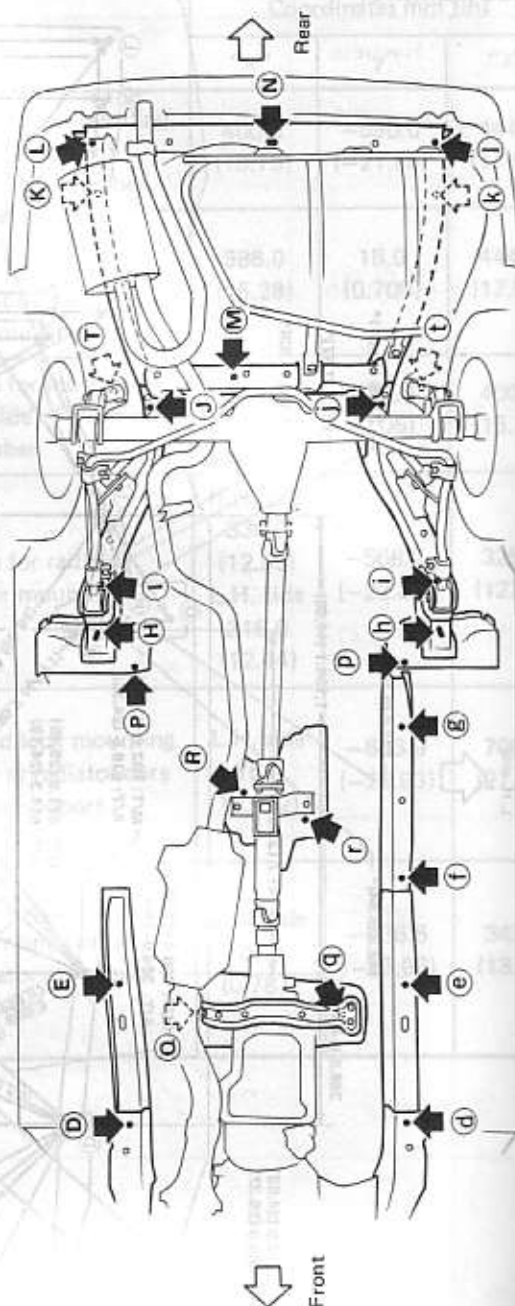
Underbody (Cont'd)

MEASUREMENT POINTS



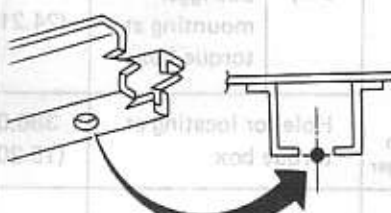
Link type rear suspension model

(The following illustration depicts automatic transmission model.: Portions not shown below are the same as those shown in the I.R.S. model.)



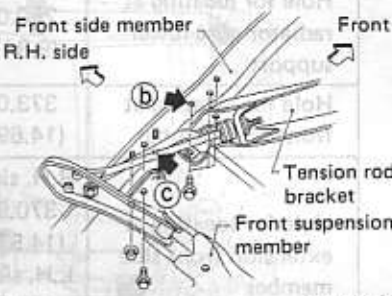
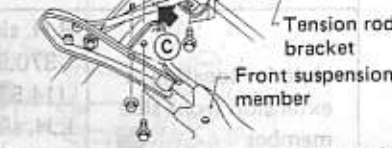
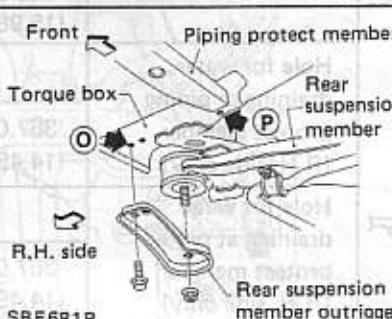
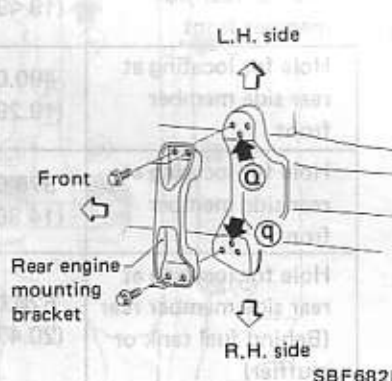
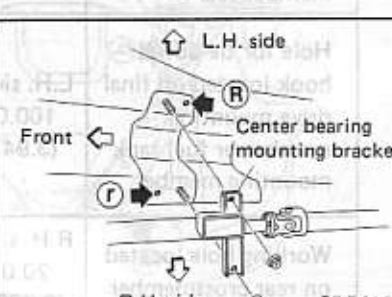
BODY ALIGNMENT

Underbody (Cont'd)

Points	Hole dia. mm (in)	Detailed points	Coordinates mm (in)			
			"x"	"y"	"z"	
(A) (a)	14 (0.55)		Hole for locating at radiator core lower support	250.0 (9.84)	-610.0 (-24.02)	309.8 (12.20)
(D) (d)	14 (0.55)		Hole for locating at front side member	373.0 (14.69)	535.0 (21.06)	218.6 (8.61)
(E) (e)	16 (0.63)		Hole for locating at extension front side member	R.H. side 370.0 (14.57) L.H. side 406.0 (15.98)	900.0 (35.43)	218.8 (8.61)
(f)	18 (0.71)		Hole for water draining at piping protect member (R.H. side only)	R.H. side only		
(g)	18 (0.71)		Hole for water draining at piping protect member (R.H. side only)	R.H. side only		
(H) (h)	30 x 17 (1.18 x 0.67)		Hole for tie-down hook at rear side member front	495.0 (19.49)	1,837.8 (72.35)	290.8 (11.45)
(I) (i)	16 (0.63)		Hole for locating at rear side member front	490.0 (19.29)	2,025.0 (79.72)	334.6 (13.17)
(J) (j)	14 (0.55)		Hole for locating at rear side member front	376.0 (14.80)	2,478.0 (97.56)	337.0 (13.27)
(K) (k)	16 (0.63)		Hole for locating at rear side member rear (Behind fuel tank or muffler)	520.0 (20.47)	3,050.0 (120.08)	490.0 (19.29)
(L) (l)	15 (0.59)		Hole for locating at extension rear side member rear	530.0 (20.87)	3,277.5 (129.04)	447.9 (17.63)
(M)	12 (0.47)	Hole for tie-down hook located on final drive mounting member or fuel tank mounting member	L.H. side 100.0 (3.94)	2,570.0 (101.18)	IRS 481.1 (18.94) LINK 524.2 (20.64)	
(N)	20 x 25 (0.79 x 0.98)	Working hole located on rear crossmember	R.H. side 20.0 (0.787)	3,285.0 (129.33)	459.2 (18.08)	

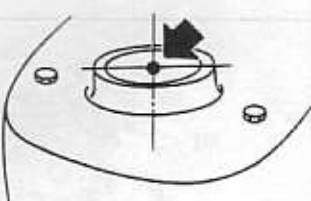
BODY ALIGNMENT

Underbody (Cont'd)

Points	Hole dia. mm (in)	Detailed points	Coordinates mm (in)			
			"x"	"y"	"z"	
(B) (b)	13 (0.51)		Hole for tension rod bracket & stabilizer bar mounting	364.1 (14.33)	-180.0 (-7.09)	375.2 (14.77)
(C) (c)	14 (0.55)		Hole for locations behind front suspension member mounting	365.0 (14.37)	-20.0 (-0.787)	375.2 (14.77)
(O) (o)	13 (0.51)		(IRS) only Hole for rear suspension member outrigger mounting at torque box	615.0 (24.21)	1,786.0 (70.31)	283.3 (11.15)
(P) (p)	10 (0.39)		Hole for locating at torque box	386.0 (15.20)	1,745.0 (68.70)	283.3 (11.15)
(Q) (q)	12 (0.47)		Hole for rear engine mounting	M/T model L.H. side 167.0 (6.57) L.H. side 737.0 (29.02) L.H. side 304.0 (11.97) R.H. side 210.0 (8.27) R.H. side 740.0 (29.13) R.H. side 296.5 (11.67) A/T model L.H. side 180.0 (7.09) L.H. side 814.0 (32.05) L.H. side 350.0 (13.78) R.H. side 231.0 (9.09) R.H. side 813.0 (32.01) R.H. side 300.0 (11.81)		
(R) (r)	10 (0.39)		Hole for locating at center bearing mounting reinforcement	82.0 (3.228)	1,424.0 (56.06)	330.0 (12.99)
				L.H. side 82.0 (3.228) 1,424.0 (56.06) 330.0 (12.99) R.H. side 102.0 (4.02) 1,351.0 (53.19) 250.0 (9.84)		

BODY ALIGNMENT

Underbody (Cont'd)

Points	Hole dia. mm (in)	Detailed points	Coordinates mm (in)			
			"X"	"Y"	"Z"	
(S) (S)	84 (3.31)	 S8F430B	Front suspension upper mounting	509.8 (20.07)	36.0 (1.417)	862.5 (33.96)
(T) (t)	12.5 (0.492)		Rear suspension shock absorber upper mounting	489.8 (19.28)	2,535.0 (99.80)	778.3 (30.64)

AIR FLOW AND COMPONENT LAYOUT	HA-2
DOOR CONTROL	HA-5
HEATER ELECTRICAL CIRCUIT	HA-9
HEATER ELECTRICAL COMPONENTS	HA-10
DESCRIPTION OF AIR CONDITIONER	HA-11
DISCHARGING, EVACUATING, CHARGING AND CHECKING	HA-14
A/C PERFORMANCE TEST	HA-20
PRECAUTIONS FOR REFRIGERANT REPLETION	HA-22
PIPING, COMPRESSOR MOUNTING	HA-23
COMPRESSOR OIL — For MJS170	
COMPRESSOR OIL — For DKS-16N	
COMPRESSOR OIL — For DKV-148	
COMPRESSOR — Model MJS170 (HITACHI make)	
COMPRESSOR — Model DKS-16N (DIESEL-KIKI make)	HA-38
COMPRESSOR — Model DKV-148 (DIESEL-KIKI make)	HA-42
A/C ELECTRICAL CIRCUIT	HA-45
A/C ELECTRICAL COMPONENT	HA-48
A/C COMPONENT LAYOUT	HA-50
SERVICE DATA AND SPECIFICATIONS	HA-52
SPECIAL SERVICE TOOLS	HA-55

CLUTCH

SECTION CL

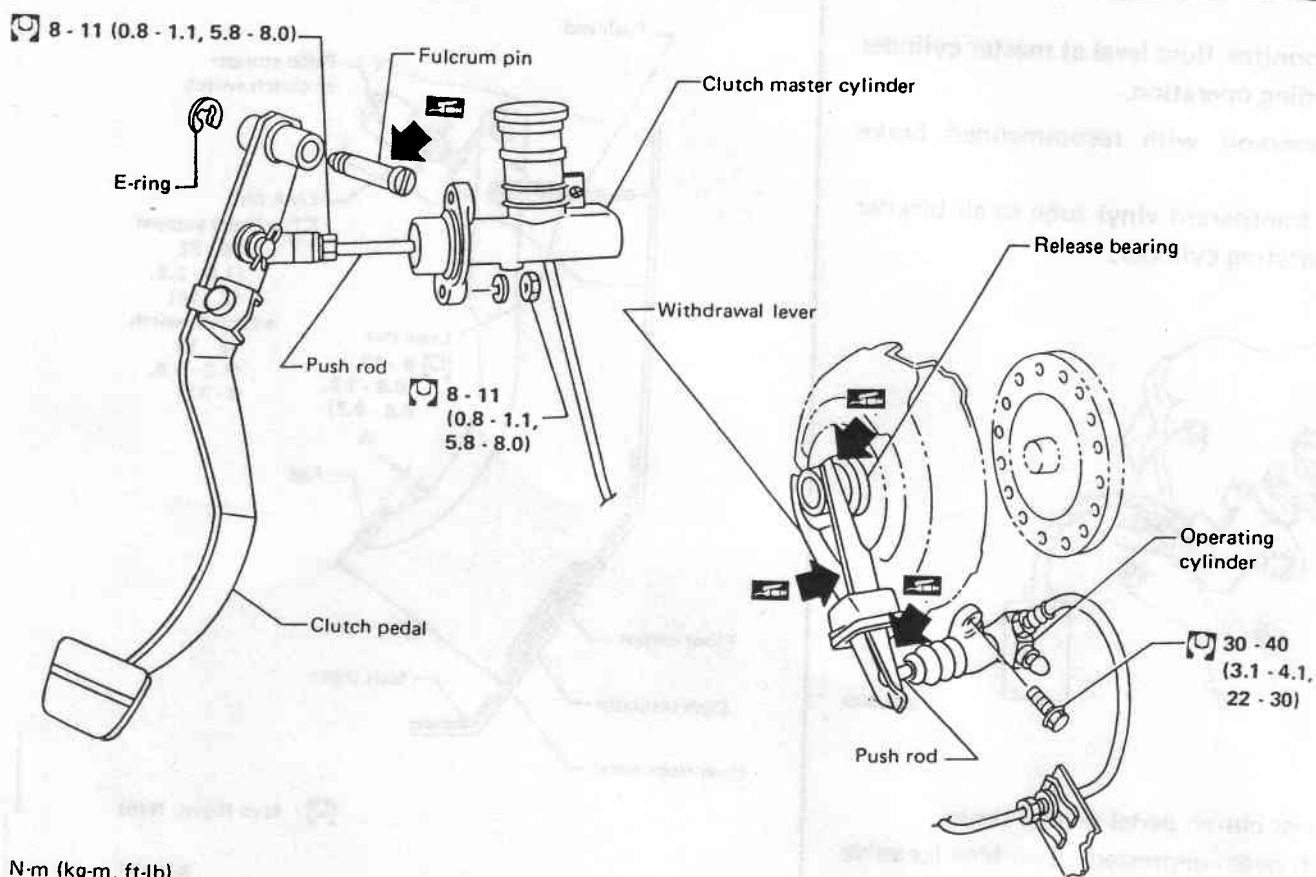
CONTENTS

HYDRAULIC CLUTCH CONTROL	CL- 2
CLUTCH UNIT	CL- 7
SERVICE DATA AND SPECIFICATIONS	CL-10
SPECIAL SERVICE TOOLS	CL-12

CL



HYDRAULIC CLUTCH CONTROL



□ : N·m (kg-m, ft-lb)

Precautions

- Recommended fluid is brake fluid "DOT 3".
- Do not reuse drained brake fluid.
- Be careful not to splash brake fluid on painted areas.
- When removing and installing clutch tube, use Tool GG94310000.
- To clean or wash all parts of master cylinder, operating cylinder and clutch damper, clean brake fluid must be used.
- Never use mineral oils such as gasoline or kerosene. It will ruin the rubber parts of the hydraulic system.

SCL180

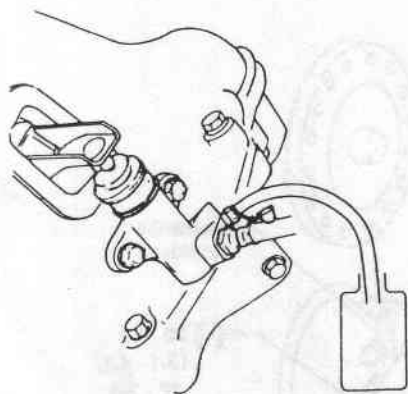
HYDRAULIC CLUTCH CONTROL

Bleeding Procedure

Carefully monitor fluid level at master cylinder during bleeding operation.

Top up reservoir with recommended brake fluid.

Connect a transparent vinyl tube to air bleeder valve of operating cylinder.



SCL009

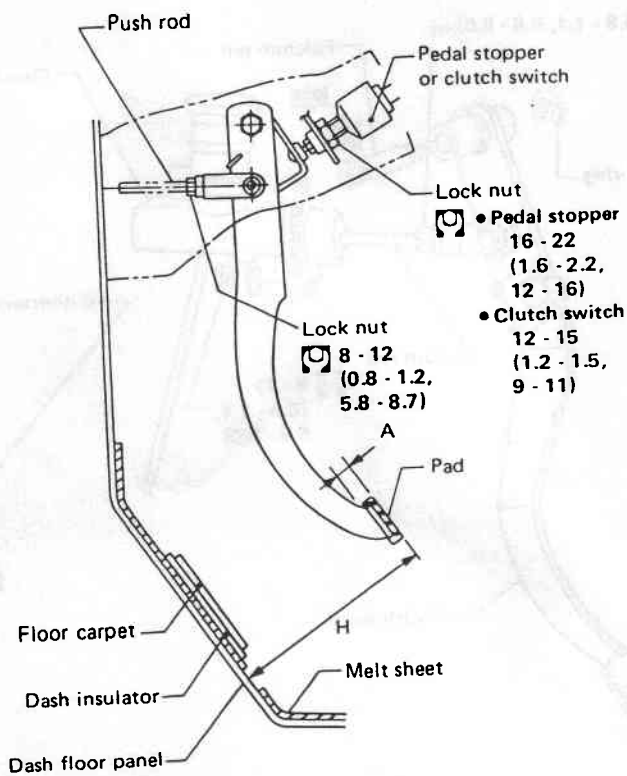
Fully depress clutch pedal several times.

With clutch pedal depressed, open bleeder valve to release air.

Close bleeder valve.

Repeat steps 3 through 5 above until clear brake fluid comes out of air bleeder valve.

Adjusting Clutch Pedal



: N·m (kg-m, ft-lb)

SCL181

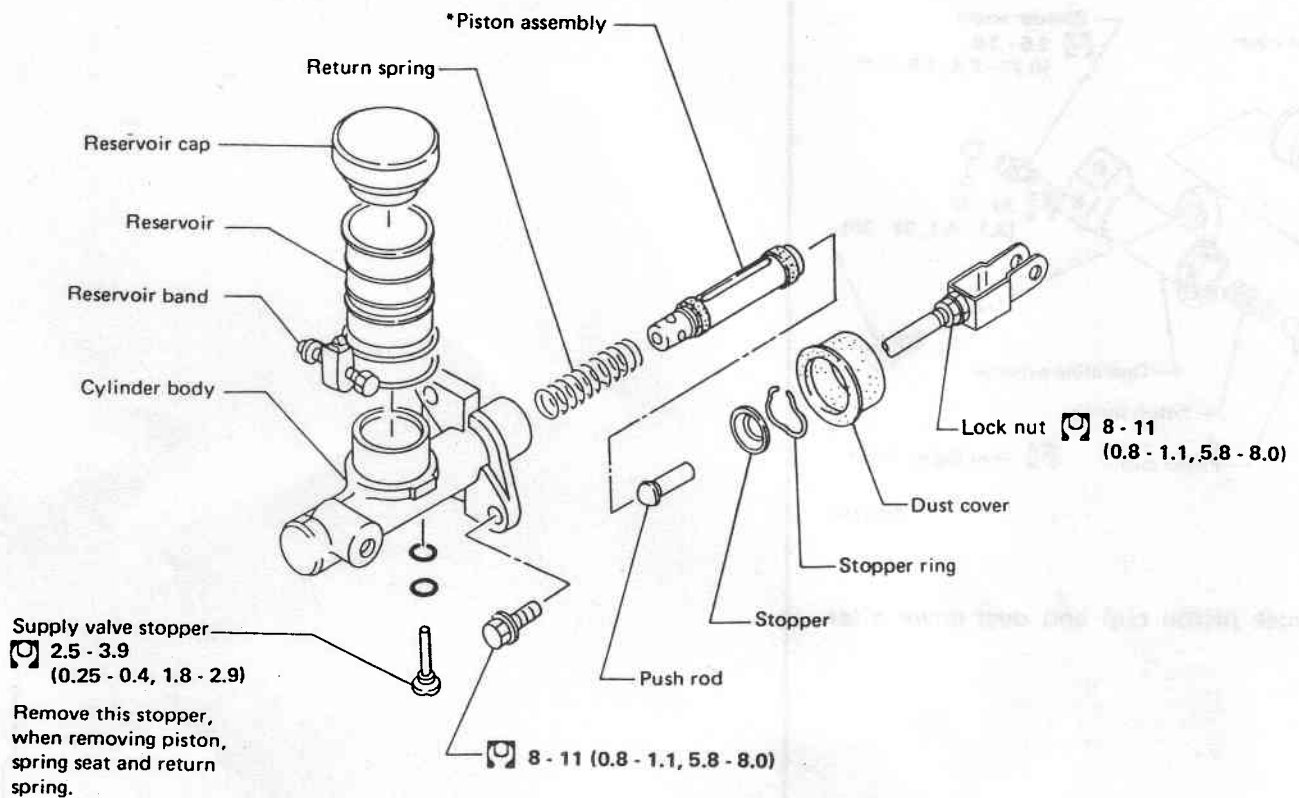
Pedal height "H"
193 - 203 mm (7.60 - 7.99 in)

Pedal free play "A"
1 - 1.5 mm (0.039 - 0.059 in)

1. Adjust pedal height with pedal stopper or clutch switch.
2. Adjust pedal free play with push rod.

HYDRAULIC CLUTCH CONTROL

Clutch Master Cylinder



* Do not reuse it after removal.

N·m (kg-m, ft-lb)

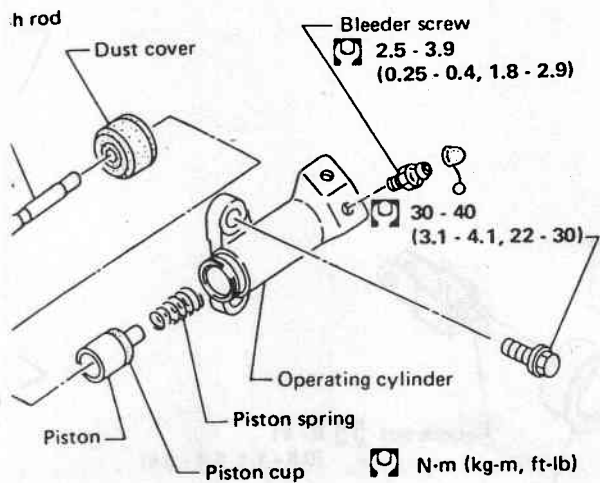
SCL163

INSPECTION

- Check parts for wear or damage. Replace if any of above conditions are observed.

HYDRAULIC CLUTCH CONTROL

Operating Cylinder



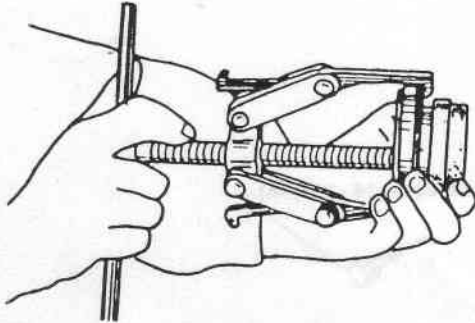
SCL164

Do not reuse piston cup and dust cover after removal.

HYDRAULIC CLUTCH CONTROL

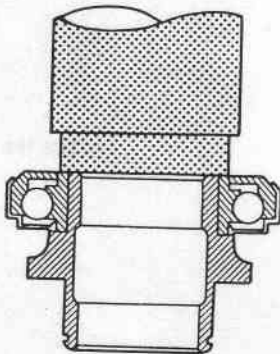
Release Bearing

REMOVAL AND INSTALLATION



CL145

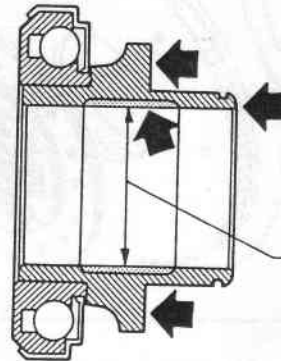
Press



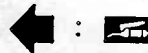
SCL166

LUBRICATION

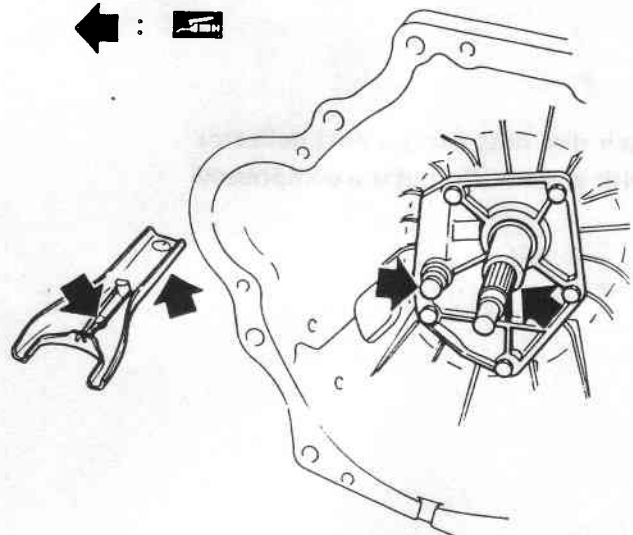
- Apply recommended grease to contact surface and sliding surface.
- A small amount of recommended grease should be applied.



Pack this recess



SCL167



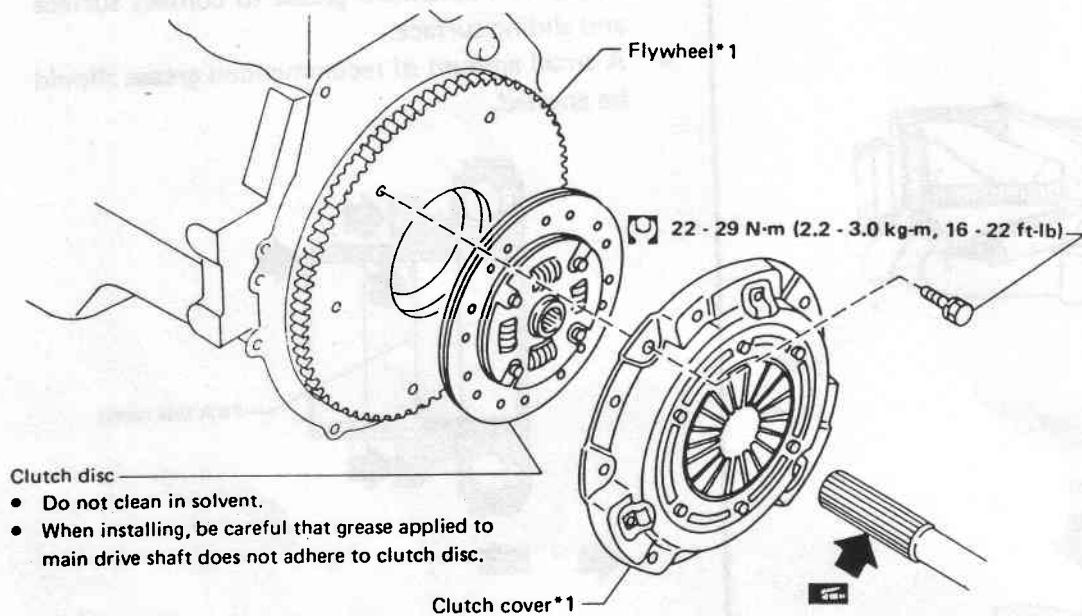
SCL168

W/
Cl
af
air

CLUTCH UNIT

Clutch Unit

- *1: Slight burn or discoloration of contact surface with clutch disc can be fixed by polishing with emery paper.



SCL158

WARNING:

- Keep away clutch disc dust using a dust collector
- cleaning with a cloth. Do not use compressed

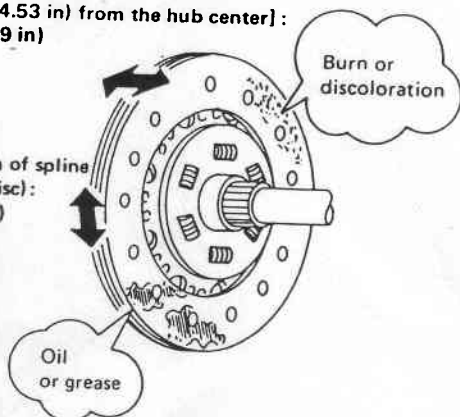
CLUTCH UNIT

Inspecting Clutch Disc

Check clutch disc for runout, etc.

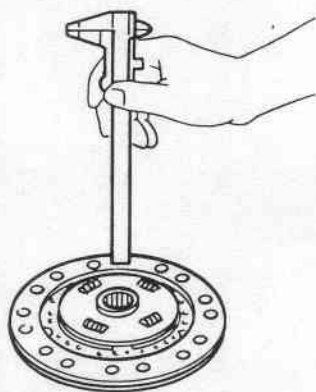
Runout limit of facing
[at 115 mm (4.53 in) from the hub center]:
1.0 mm (0.039 in)

Maximum backlash of spline
(at outer edge of disc):
1.0 mm (0.039 in)



SCL153

Check clutch disc for wear.



- Measure the depth of rivet head.
More than 0.3 mm (0.012 in)

SCL169

Inspecting Clutch Cover

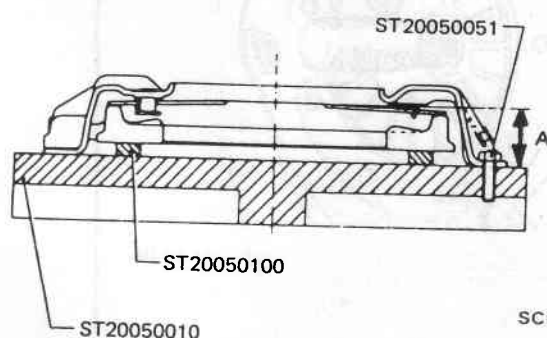
- Check height and unevenness of diaphragm spring after setting Tool.

Diaphragm spring height "A":

33 - 35 mm (1.30 - 1.38 in)

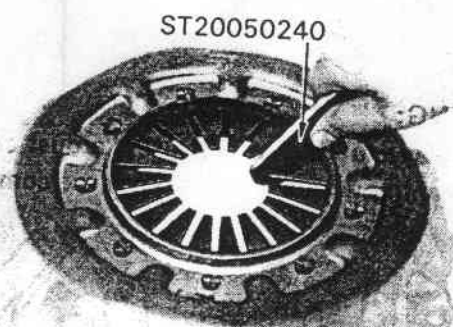
Unevenness:

Less than 0.5 mm (0.020 in)



SCL155

- Adjust unevenness of diaphragm spring with Tool.

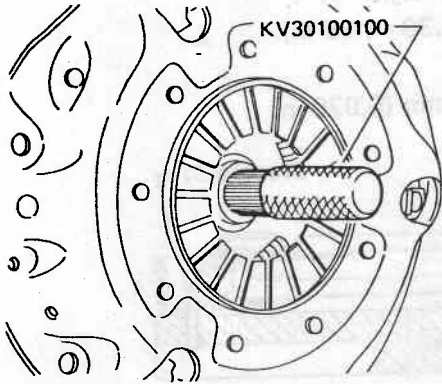


- Check thrust rings for wear or damage by shaking cover assembly up and down to listen for chattering noise, or lightly hammering on rivets for a slightly cracked noise.

CLUTCH UNIT

Installing Clutch Cover

Insert Tool into clutch disc hub when installing clutch cover and disc.



SCL170

SERVICE DATA AND SPECIFICATIONS

General Specifications

Inspection and Adjustment

CLUTCH CONTROL SYSTEM

Type of clutch control	Hydraulic
------------------------	-----------

CLUTCH MASTER CYLINDER

Inner diameter	mm (in)	15.87 (5/8)
----------------	---------	-------------

CLUTCH OPERATING CYLINDER

Inner diameter	mm (in)	17.46 (11/16)
----------------	---------	---------------

CLUTCH DISC

Model	225TBL 240TBL
-------	---------------

Facing size	225 x 150 x 3.5 (8.86 x 5.91 x 0.138)
Outer dia. x inner dia. x thickness	mm (in)

Thickness of disc assembly		
Free	mm (in)	8.3 - 9.0 (0.327 - 0.354)

With load 3,923 N (400 kg, 882 lb)	mm (in)	7.6 - 8.0 (0.299 - 0.315)
---------------------------------------	---------	---------------------------

Number of torsion springs	6
---------------------------	---

CLUTCH COVER

Model	C225S
Full load	N (kg, lb)
CA20E engine	3,923 (400, 882)
CA18ET, FJ20E engines	4,413 (450, 992)

CLUTCH PEDAL

Unit: mm (in)

Pedal height*	193 - 203 (7.60 - 7.99)
---------------	-------------------------

Pedal free play	1 - 1.5 (0.039 - 0.059)
-----------------	-------------------------

*Measured from floor panel to pedal pad.

CLUTCH DISC

Unit: mm (in)

Model	225TBL
-------	--------

Wear limit of facing surface to rivet head	0.3 (0.012)
--	-------------

Runout limit	1.0 (0.039)
--------------	-------------

Distance of runout checkpoint (from the hub center)	107.5 (4.23)
---	--------------

Maximum backlash of spline (at outer edge of disc)	1.0 (0.039)
--	-------------

CLUTCH COVER

Unit: mm (in)

Model	C225S
-------	-------

Diaphragm spring height	33 - 35 (1.30 - 1.38)
-------------------------	-----------------------

Unevenness of diaphragm spring toe height	Less than 0.5 (0.020)
---	-----------------------

SERVICE DATA AND SPECIFICATIONS

Tightening Torque

Unit	N·m	kg-m	ft-lb
Pedal stopper lock nut	16 - 22	1.6 - 2.2	12 - 16
Clutch switch lock nut	12 - 15	1.2 - 1.5	9 - 11
Master cylinder push rod lock nut	8 - 11	0.8 - 1.1	5.8 - 8.0
Supply valve stopper	2.5 - 3.9	0.25 - 0.4	1.8 - 2.9
Master cylinder securing nut	8 - 11	0.8 - 1.1	5.8 - 8.0
Clutch tube flare nut	15 - 18	1.5 - 1.8	11 - 13
Bleeder screw	2.5 - 3.9	0.25 - 0.4	1.8 - 2.9
Operating cylinder securing nut	30 - 40	3.1 - 4.1	22 - 30
Clutch hose to operating cylinder securing nut	17 - 20	1.7 - 2.0	12 - 14
Clutch cover securing bolt	22 - 29	2.2 - 3.0	16 - 22

EMISSION CONTROL SYSTEM

SECTION **EC**

CONTENTS

CRANKCASE EMISSION CONTROL SYSTEM — CA Engine	EC- 2
CRANKCASE EMISSION CONTROL SYSTEM — FJ20 Engine	EC- 3
EXHAUST EMISSION CONTROL SYSTEM	EC- 4
EXHAUST EMISSION CONTROL SYSTEM — For Australia Model	EC- 5
EVAPORATIVE EMISSION CONTROL SYSTEM — For Australia Model	EC- 9
SERVICE DATA AND SPECIFICATIONS	EC-11

EC

Exhaust Gas Recirculation(EGR) Reduces NO_x emissions by diluting oxygenated intake air.

 : Fresh air
 : Blow-by gas

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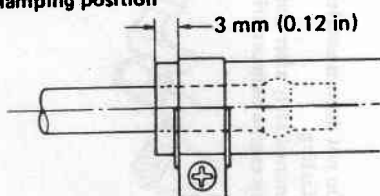
EC-3

SERVICE DATA AND SPECIFICATIONS

Tightening Torque

Unit	N·m	kg·m	ft·lb
E.G.R. control valve	18 - 23	1.8 - 2.3	13 - 17
E.G.R. tube securing nut	34 - 44	3.5 - 4.5	25 - 33
Thermal vacuum valve	15 - 22	1.5 - 2.2	11 - 16
B.P.T. valve mounting screw	3.7 - 5.0	0.38 - 0.51	2.7 - 3.7
Water temperature sensor	15 - 20	1.5 - 2.0	11 - 14
Throttle valve switch	2.0 - 2.4	0.20 - 0.24	1.4 - 1.7
Detonation sensor	25 - 34	2.5 - 3.5	18 - 25
Air regulator	5 - 6	0.5 - 0.6	3.6 - 4.3
Injector	2.5 - 3.2	0.25 - 0.33	1.8 - 2.4
Throttle chamber securing screw	18 - 22	1.8 - 2.2	13 - 16
Turbocharger outlet to housing	22 - 29	2.2 - 3.0	16 - 22
Fuel hose clamp	1.0 - 1.5	0.10 - 0.15	0.7 - 1.1

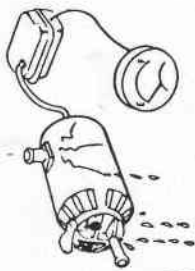
Fuel hose clamping position



EF336A

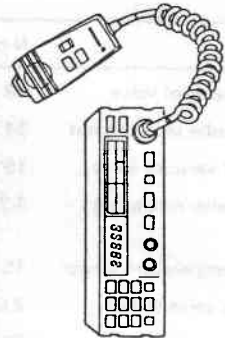
PRECAUTIONS FOR E.F.I. ENGINE

- Do not operate fuel pump when there is no fuel in lines.
- Do not use anti-freeze agents in fuel.
- Do not reuse fuel hose clamps.
- Tighten fuel hose clamps sufficiently.



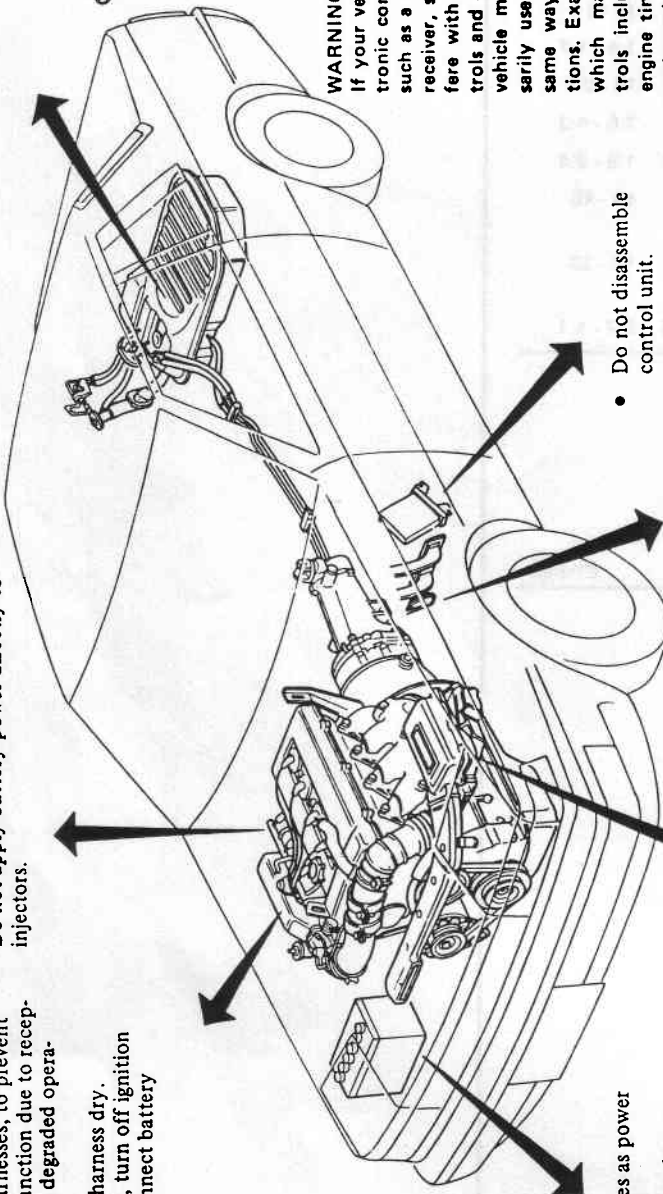
WARNING:

If your vehicle is equipped with electronic controls, use of a transmitter, such as a radio transmitter (but not a receiver, such as a radio) may interfere with unshielded electronic controls and cause them to malfunction. vehicle manufacturers do not necessarily use electronic controls in the same ways or for the same operations. Examples of vehicle functions which may involve electronic controls include fuel delivery systems, engine timing, brakes, emission control and cruise control. Definite information regarding the type of electronic controls in your vehicle can only be obtained from the manufacturer. Consult your NISSAN/DATSUN dealer regarding the need for modifications to your vehicle's electronic controls before installation or use of a transmitter.



- Securely connect E.F.I. harness connector. A poor connection can cause an extremely high (surge) voltage to develop in coil and condenser, thus resulting in damage to IC circuit.
- Keep E.F.I. harness at least 10 cm (3.9 in) away from adjacent harnesses, to prevent an E.F.I. system malfunction due to reception of external noise, degraded operation of IC circuit, etc.
- Keep E.F.I. parts and harness dry.
- Before removing parts, turn off ignition switch and then disconnect battery ground cable.

- Do not apply battery power directly to injectors.



- Do not disassemble control unit.

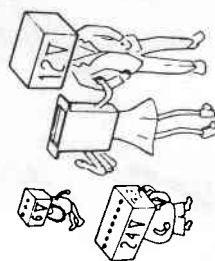
- Do not depress accelerator pedal when starting.
- Immediately after starting, do not rev up engine unnecessarily.



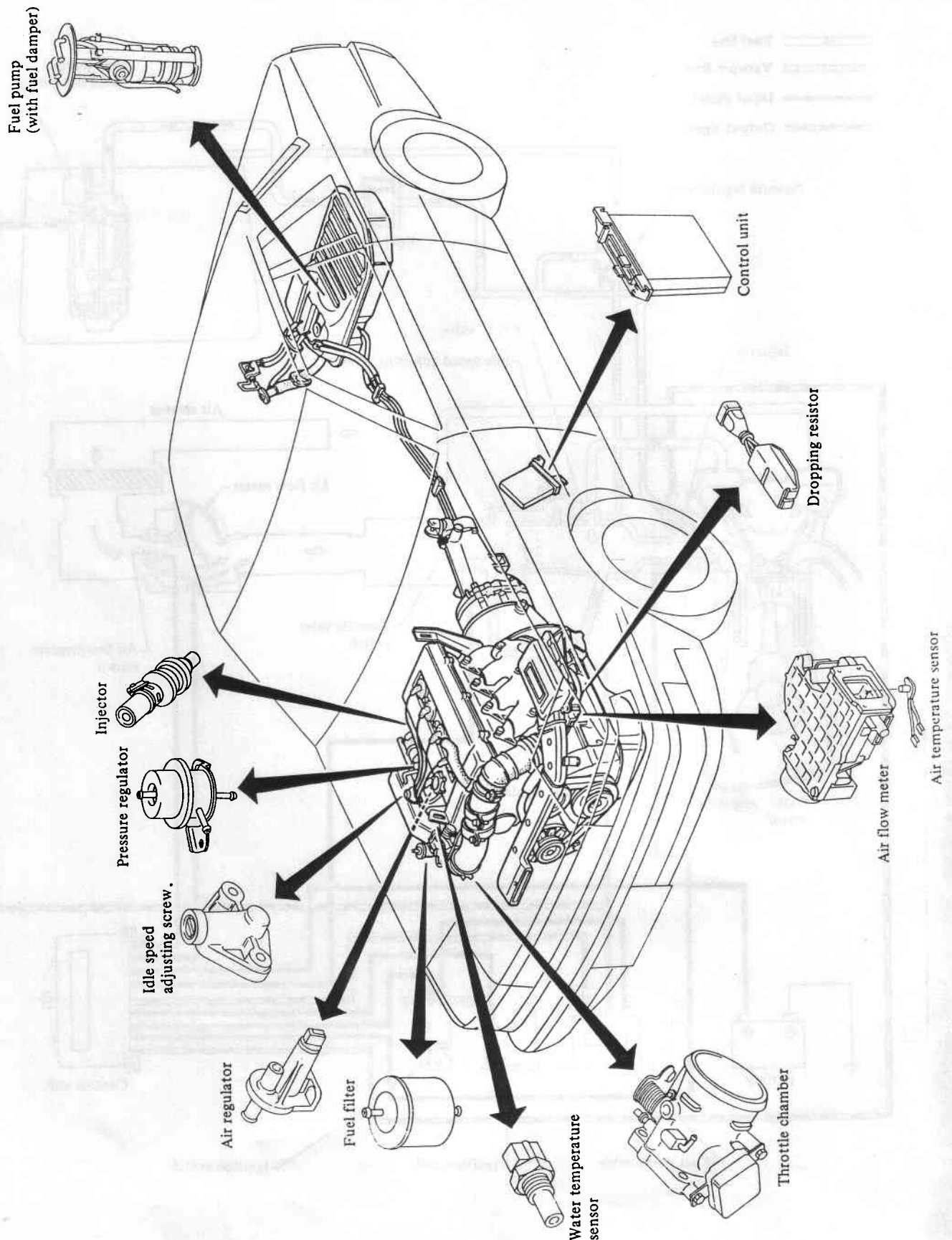
- Handle air flow meter carefully to avoid damage.
- There should not occur even a slight leak in air intake system.



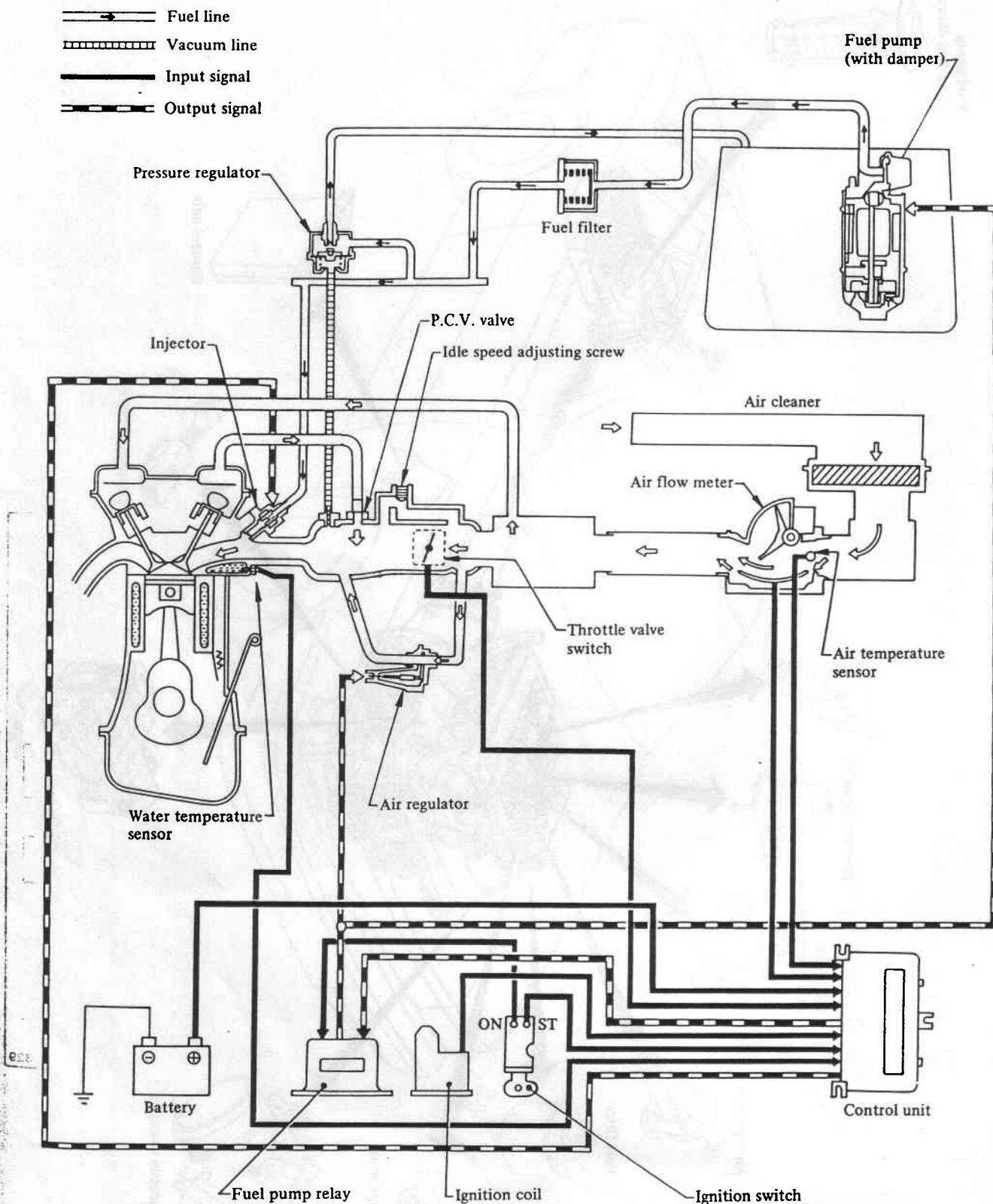
- Always use 12-volts batteries as power source.
- Do not attempt to disconnect battery cables while engine is operating.
- If a receiver-transmitter is installed, route antenna feeder cable along opposite side from E.F.I. harness and control unit. Make sure that there is no interference while engine is idling.



E.F.I. COMPONENT PARTS LOCATION



E.F.I. CONTROL SYSTEM DIAGRAM



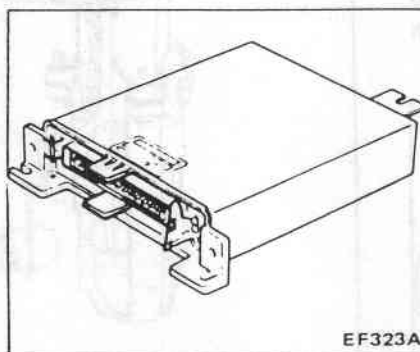
E.F.I. SYSTEM DESCRIPTION

FUEL INJECTION CONTROL

The fuel injectors are electrically connected, in parallel, in the control unit. All injectors receive the injection signal from the control unit at the same time. Therefore, injection is made independently of the engine stroke cycle (intake, combustion, and exhaust). In the four-cycle engine, injection is made once every revolution of the engine, triggered by the ignition coil.

Fuel in this E.F.I. system is not injected directly into the cylinder, but is injected into the intake port. Therefore, the air-fuel mixture is drawn into the cylinder when the intake valve opens to start the intake stroke.

CONTROL UNIT



The control unit is connected to the E.F.I. harness by means of a multi-connector, and the E.F.I. harness is connected to other sensors.

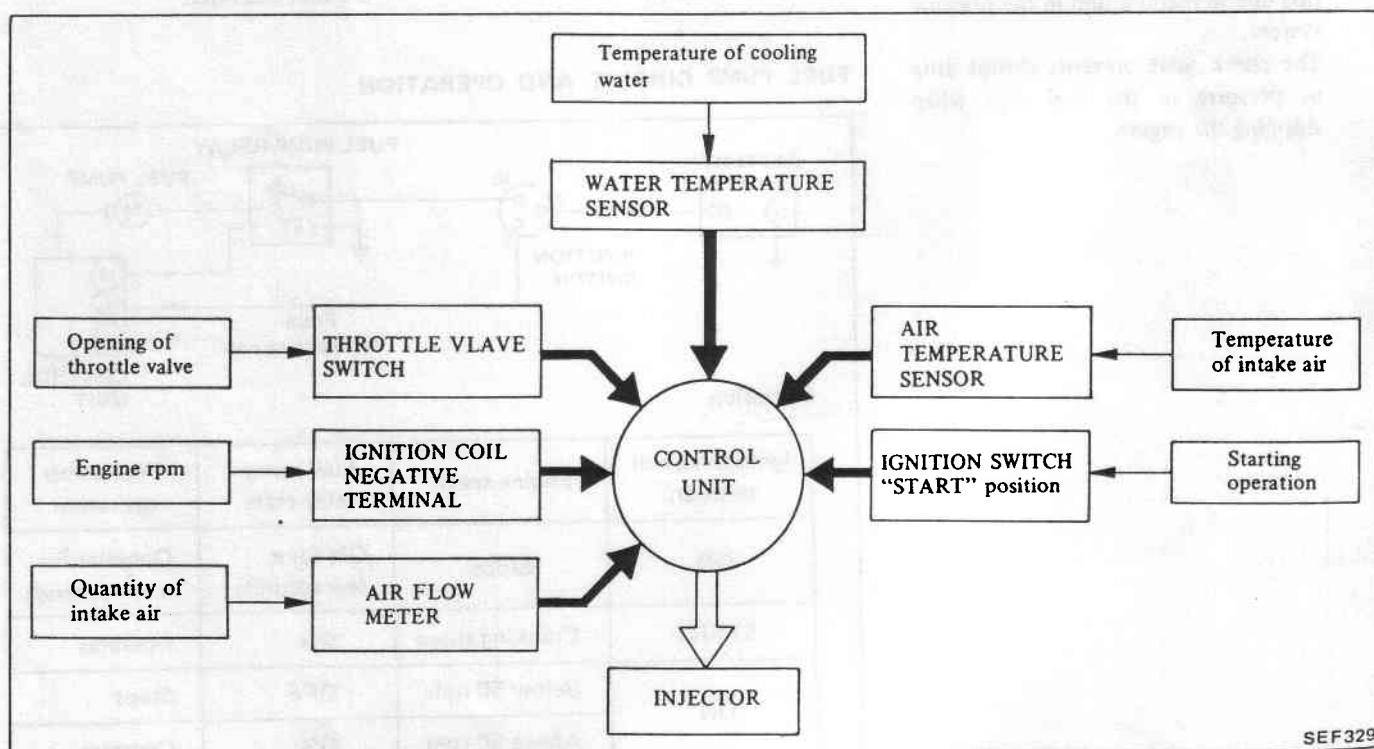
The essential role of the control unit is to generate a pulse. Upon receiving an electrical signal from each sensor,

the control unit generates a pulse whose duration (injector open-valve time period) is controlled to provide an optimum quantity of fuel according to the engine characteristics.

The control unit consists mainly of three integrated circuits formed on the printed circuit board. This construction provides superior control unit reliability.

SIGNALS FOR CONTROL UNIT

An electrical signal from each sensor is introduced into the control unit for computation. The open-valve time period of the injector is controlled by the duration of the pulse computed in the control unit.

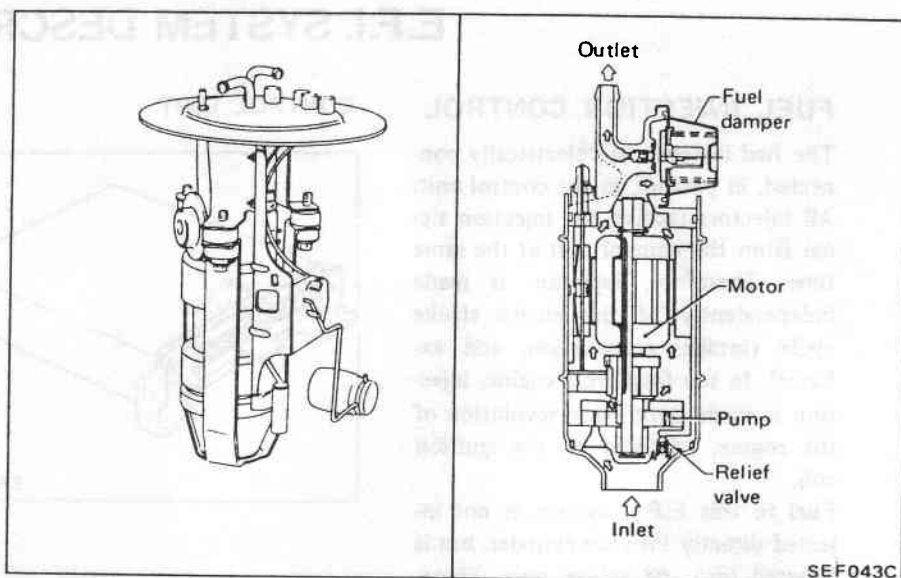
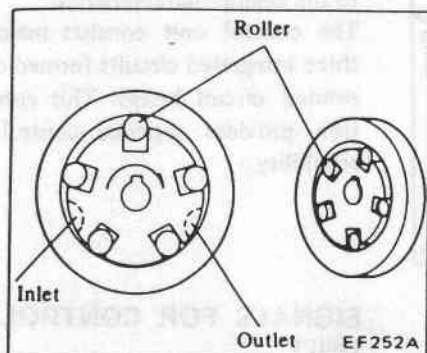


SEF329

FUEL SYSTEM

FUEL PUMP

The fuel pump is a wet type pump where the vane rollers are directly coupled to a motor which is filled with fuel.



A relief valve in the pump is designed to open when the pressure in the fuel line rises over 422 to 490 kPa (4.22 to 4.90 bar, 4.3 to 5.0 kg/cm², 61 to 71 psi) due to malfunction in the pressure system.

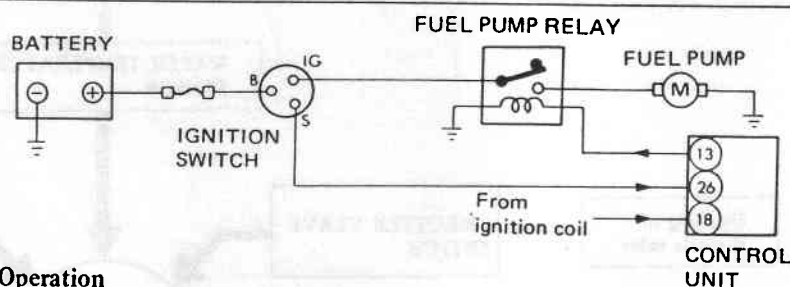
The check valve prevents abrupt drop of pressure in the fuel pipe when stopping the engine.

FUEL DAMPER

The fuel damper acts like a shock absorber in fuel flow discharged from the fuel pump. There are not adjustments on this damper.

Change in the pump discharge pressure is monitored by the diaphragm and spring, which vary the volume of the fuel chamber.

FUEL PUMP CIRCUIT AND OPERATION

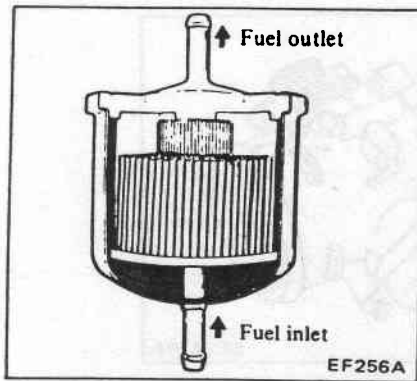


Operation

Ignition switch position	Engine speed	Fuel pump relay state	Fuel pump operation
ON	Stops	ON for a few seconds	Operates for a few seconds
START	Cranking speed	ON	Operates
ON	Below 50 rpm	OFF	Stops
	Above 50 rpm	ON	Operates

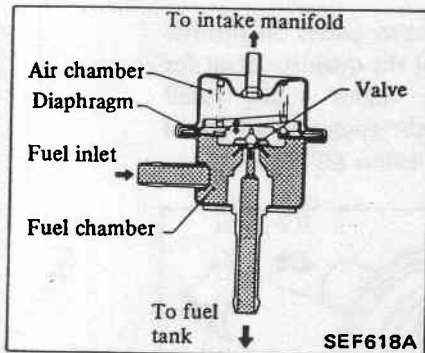
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FUEL FILTER

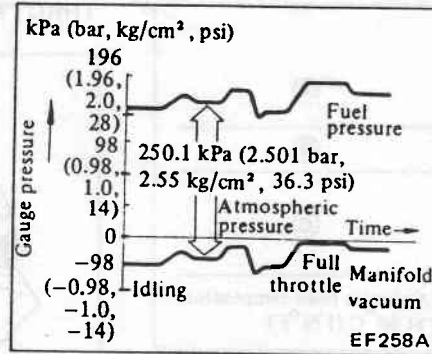


The fuel filter is placed between the fuel damper and the injector, and is used to remove foreign matter in the fuel. Water in the fuel is collected at the bottom of the filter casing.

PRESSURE REGULATOR

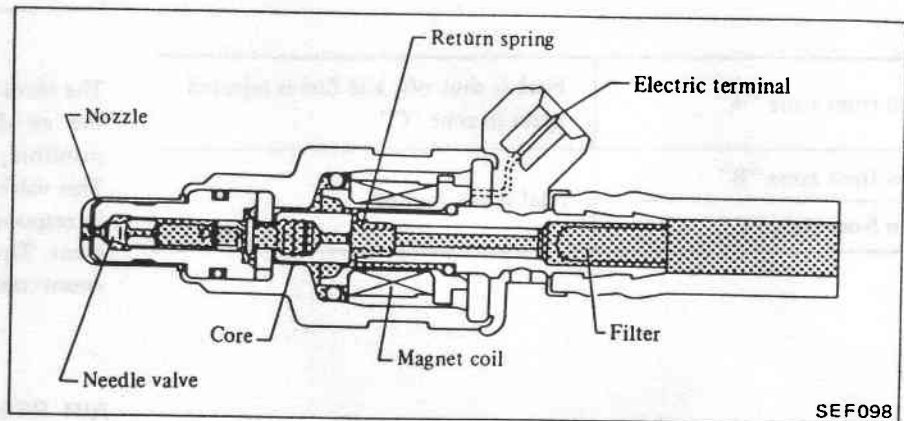


The pressure regulator controls the pressure of fuel so that a pressure difference of 250.1 kPa (2.501 bar, 2.55 kg/cm², 36.3 psi) can be maintained between the fuel pressure and intake manifold vacuum. The pressure regulator is divided into the air chamber and fuel chamber by the diaphragm. Intake manifold vacuum is introduced into the air chamber, thereby keeping differential pressure constant causing excessive fuel to return to the fuel tank through the return side port. This constant differential pressure provides optimum fuel injection in every mode of engine operation.



INJECTOR

The injector receives the pulse signal from the control unit, and injects the fuel toward the intake valve in the cylinder head.



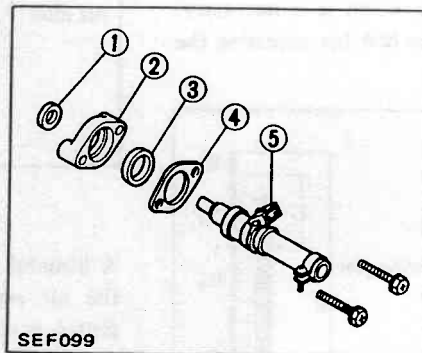
The injector operates on the solenoid valve principle. When an electric signal is applied to the coil built into the injector, the plunger is pulled into the solenoid, thereby opening the needle valve for fuel injection. The quantity of injected fuel is in proportion to the duration of the pulse applied from the control unit.

DROPPING RESISTOR

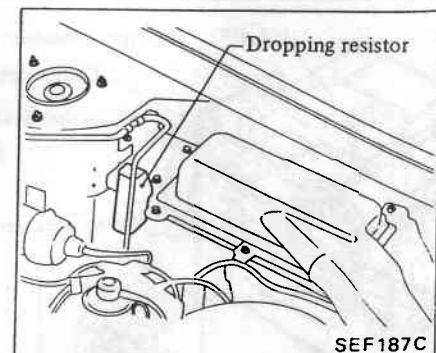
The dropping resistor is used to lower the source voltage to a level suitable for the injector.

The dropping resistor is connected in series with the injector. It reduces the voltage to approximately 1/4 of the source voltage.

These resistors protect the injectors from alternator voltage surges and the effects of other components in the vehicle's electrical system.



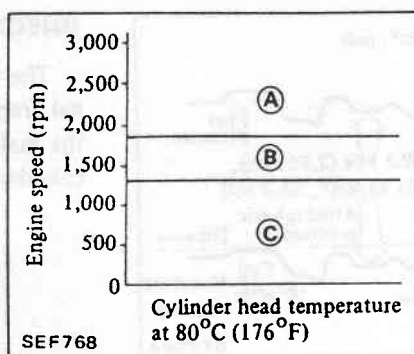
- 1 Injector lower rubber insulator
- 2 Injector lower holder
- 3 Injector upper rubber insulator
- 4 Injector upper holder
- 5 Injector



FUEL SHUT-OFF

Fuel shut-off is accomplished during deceleration when the engine does not require fuel.

The graph on the right shows the fuel shut-off range.



Deceleration from zone "A"	Fuel is shut off; and fuel is injected again in zone "C".
Deceleration from zone "B"	Fuel is not shut off.
Deceleration from zone "C"	

AIR FLOW SYSTEM

AIR FLOW METER

The air flow meter measures the quantity of intake air, and sends a signal to the control unit so that the base pulse width can be determined for correct fuel injection by the injector. The air flow meter is provided with a flap in the air passage. As the air flows through the passage, the flap rotates and its angle of rotation electronically signals the control unit.

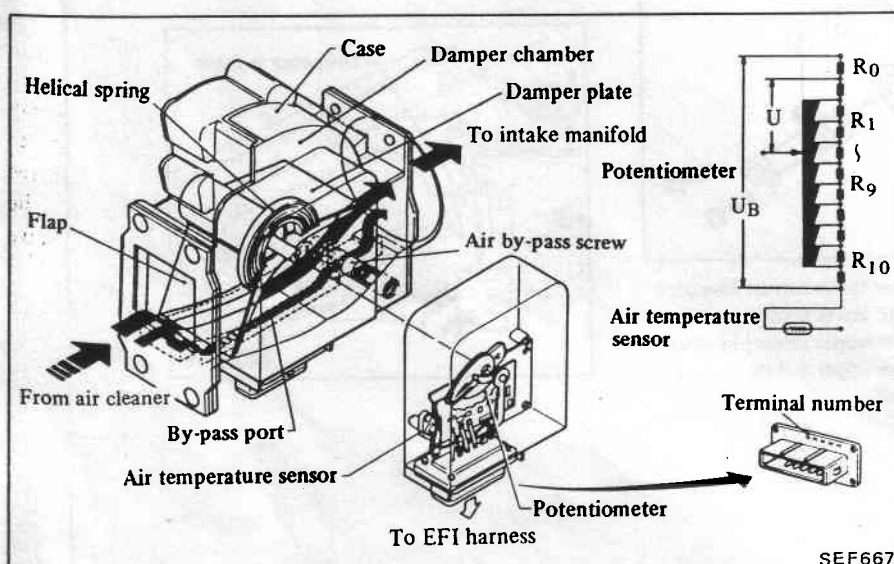
During idling operation when the

amount of intake air is extremely small, the air flows parallel with the flap through the by-pass port so that the specified intake air flow can be provided correctly.

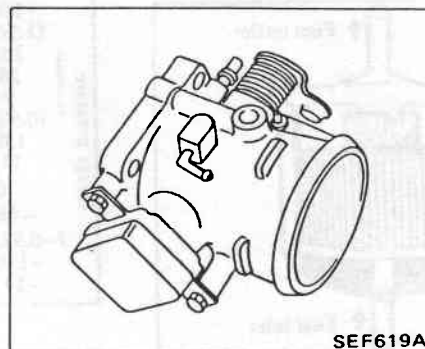
An air temperature sensor is installed in the air passage.

The by-pass port has the air by-pass screw which regulates the idle mixture ratio.

Adjusting the idle mixture should be performed only when it is necessary. Refer to Section MA for adjusting the idle mixture.



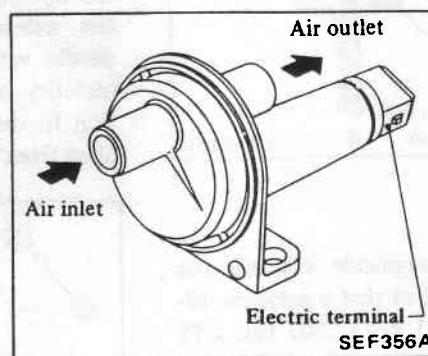
THROTTLE CHAMBER



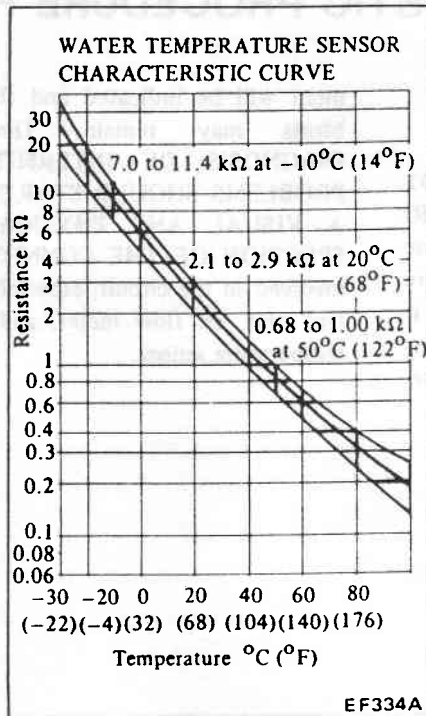
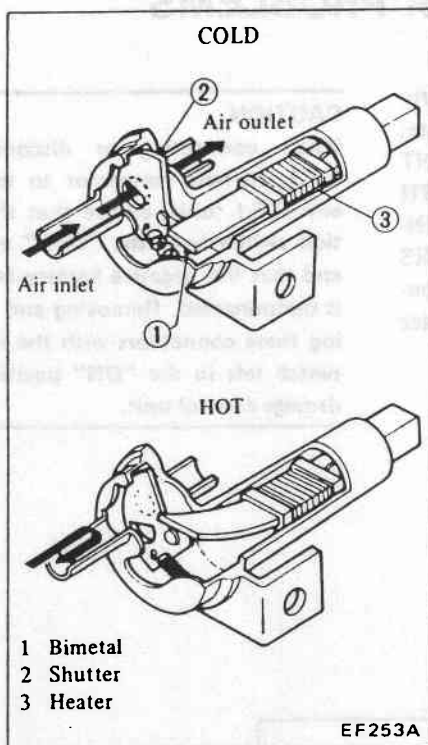
The throttle chamber, located between the air flow meter and the intake manifold, is equipped with a valve. This valve controls the intake air flow in response to accelerator pedal movement. The rotary shaft of this valve is connected to the throttle valve switch.

AIR REGULATOR

The air regulator by-passes the throttle valve to control the quantity of air for increasing the engine idling speed when starting the engine at a bimetal temperature of below 80°C (176°F).

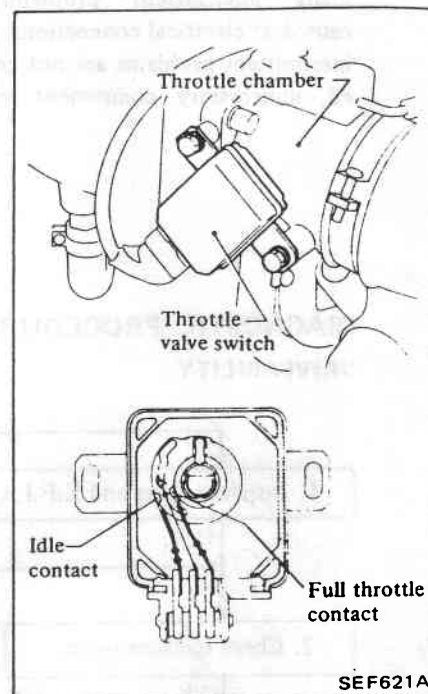


A bimetal and a heater are built into the air regulator. When the ignition switch is turned to the "START" position or engine running, electric current flows through the heater, and the bimetal, as it is heated by the heater, begins to move and closes the air passage in a few minutes. The air passage remains closed until the engine is stopped and the bimetal temperature drops to below 80°C (176°F).



THROTTLE VALVE SWITCH

The throttle valve switch is attached to the throttle chamber and actuates in response to accelerator pedal movement. This switch has two sets of contact points. One set monitors the idle position and the other set monitors full throttle position.



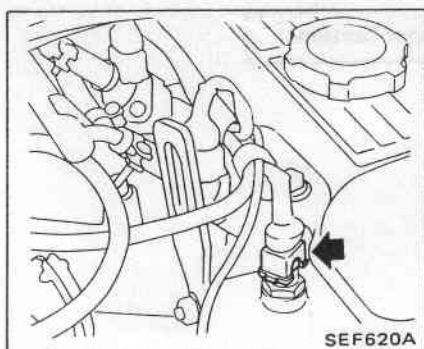
ELECTRICAL SIGNAL

WATER TEMPERATURE SENSOR

The water temperature sensor, built into the thermostat housing, monitors change in water temperature and transmits a signal to increase the pulse duration during the warm-up period.

The temperature sensing unit employs a thermistor which is very sensitive in the low temperature range.

The electrical resistance of the thermistor decreases in response to the temperature rise.

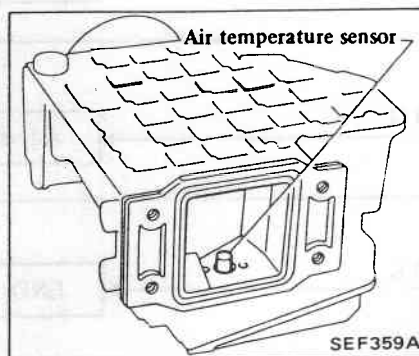


AIR TEMPERATURE SENSOR

The air temperature sensor, built into the air flow meter, monitors change in the intake air temperature and transmits a signal for the fuel enrichment to change the pulse duration.

The temperature sensing unit employs a thermistor which is very sensitive in the low temperature range.

The electrical resistance of the thermistor decreases in response to air temperature rise.



Idle contact

The idle contact closes when the throttle valve is positioned at idle and opens when it is at any other position. The idle contact compensates for after idle enrichment, and sends the fuel shut-off signal.

Full throttle contact

The full throttle contact closes only when the throttle valve is positioned at full throttle (more than 35 degree opening of the throttle valve). The contact is open while the throttle valve is at any other position. The full contact compensates for enrichment in full throttle.

DIAGNOSTIC PROCEDURE FOR PROBLEMS

DIAGNOSIS

INTERMITTENT PROBLEM

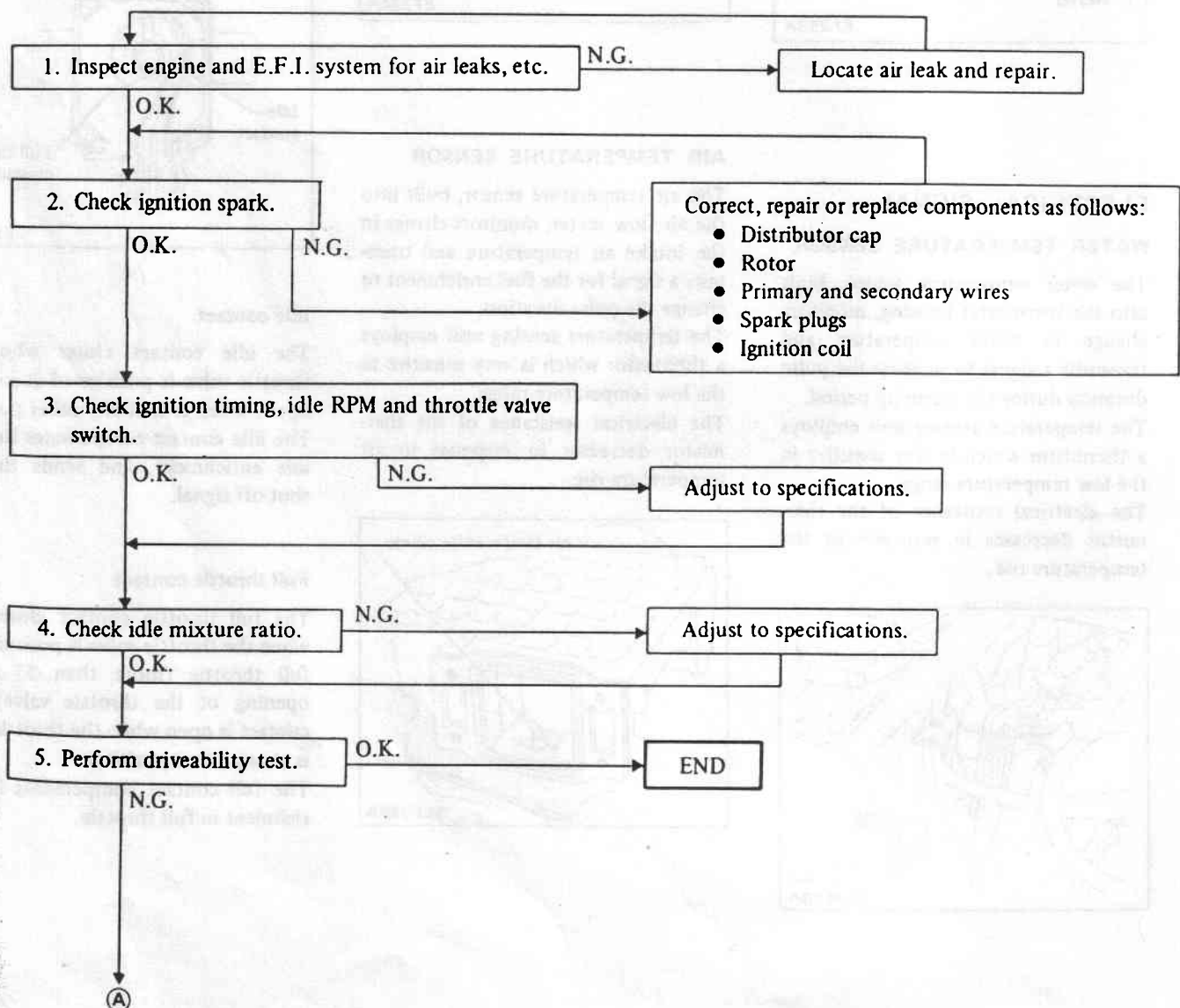
DIAGNOSTIC CHARTS CANNOT BE USED TO DIAGNOSE INTERMITTENT FAILURES. This is because many intermittent problems are caused at electrical connections, and if intermittent problems are not corrected, unnecessary component replace-

ment will be indicated and the problems may remain. Therefore, DIAGNOSIS OF INTERMITTENT PROBLEMS SHOULD START WITH A VISUAL AND PHYSICAL INSPECTION OF THE CONNECTORS involved in the circuit, especially control unit, air flow meter, and water temperature sensor.

CAUTION:

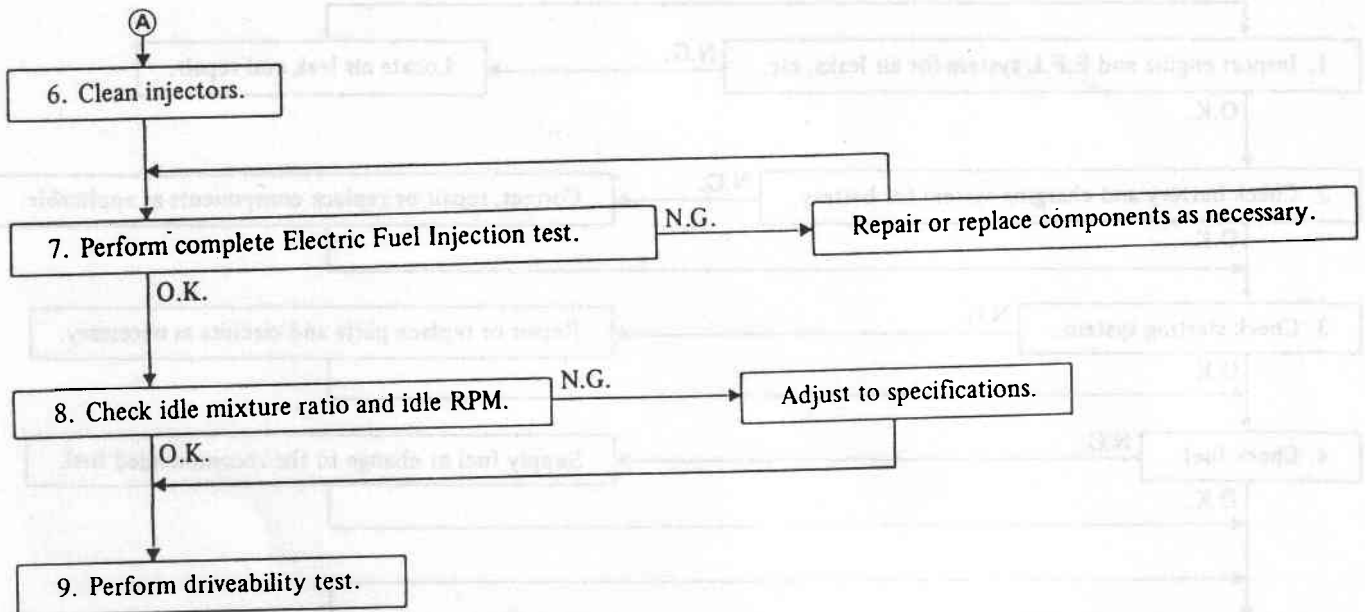
When connecting or disconnecting E.F.I. harness connector to or from any E.F.I. unit, ensure that the ignition switch is in the "OFF" position and that the negative battery terminal is disconnected. Removing and installing these connectors with the ignition switch left in the "ON" position will damage control unit.

DIAGNOSTIC PROCEDURE DRIVEABILITY

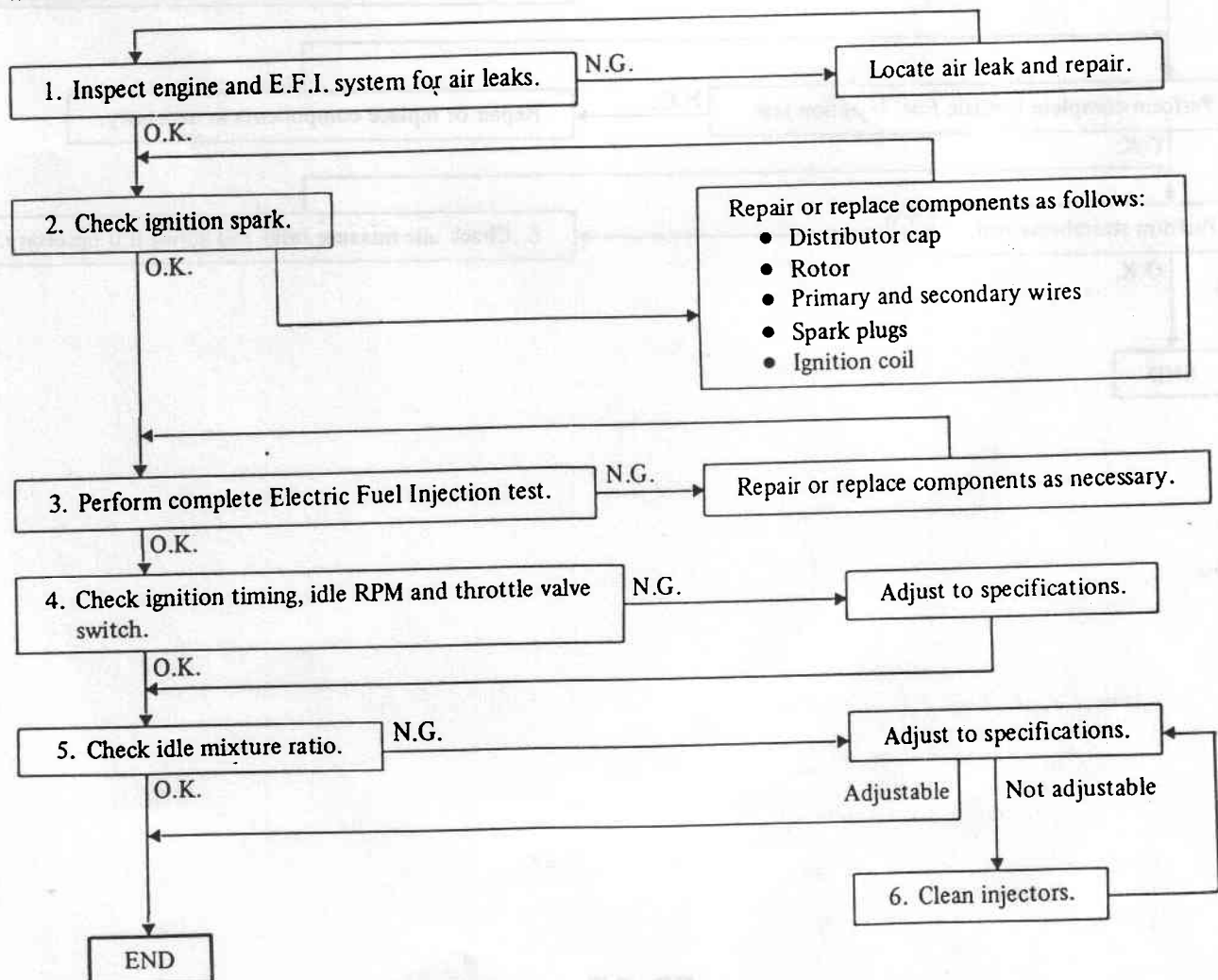


DIAGNOSTIC PROCEDURE FOR PROBLEMS

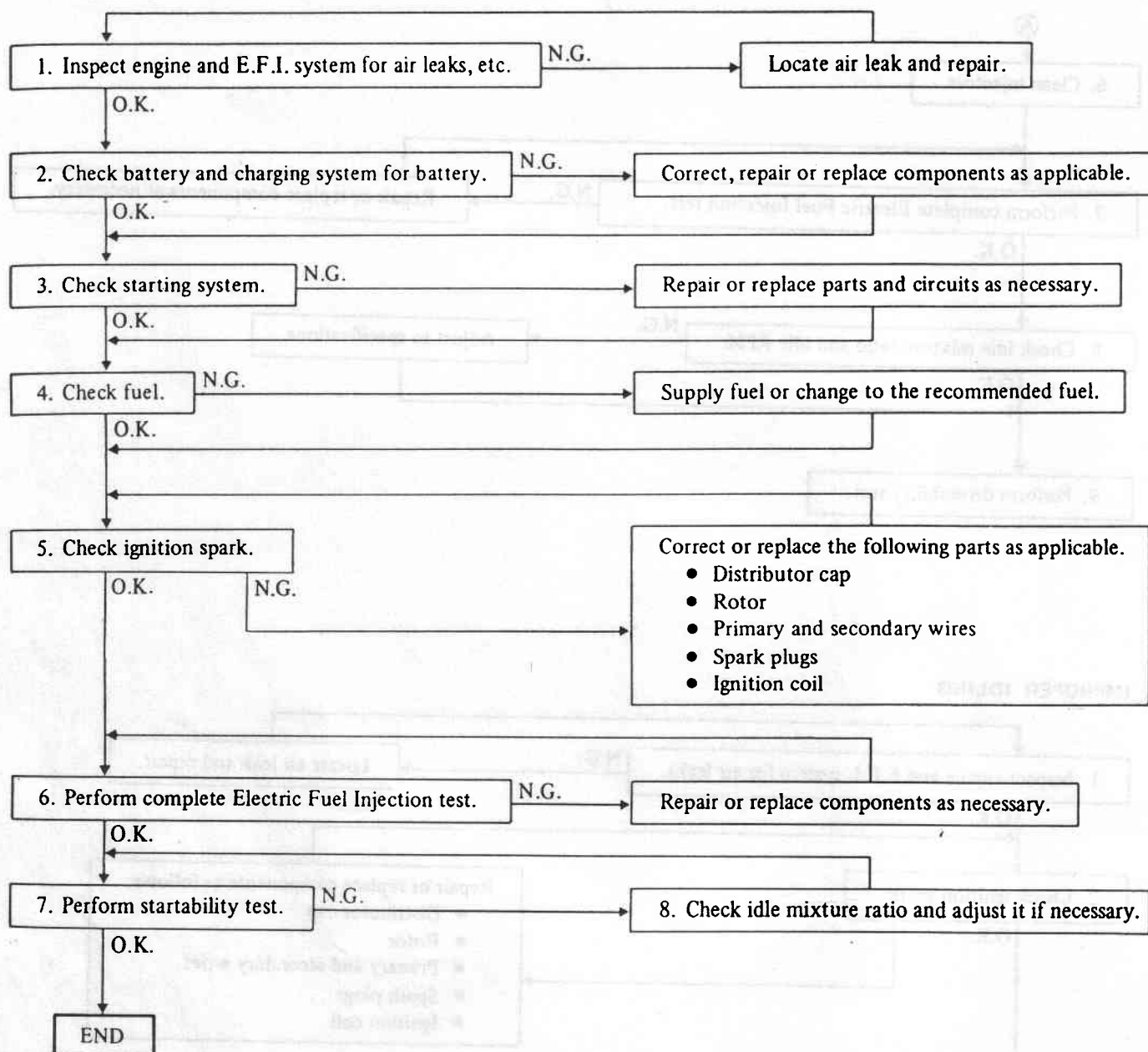
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IMPROPER IDLING

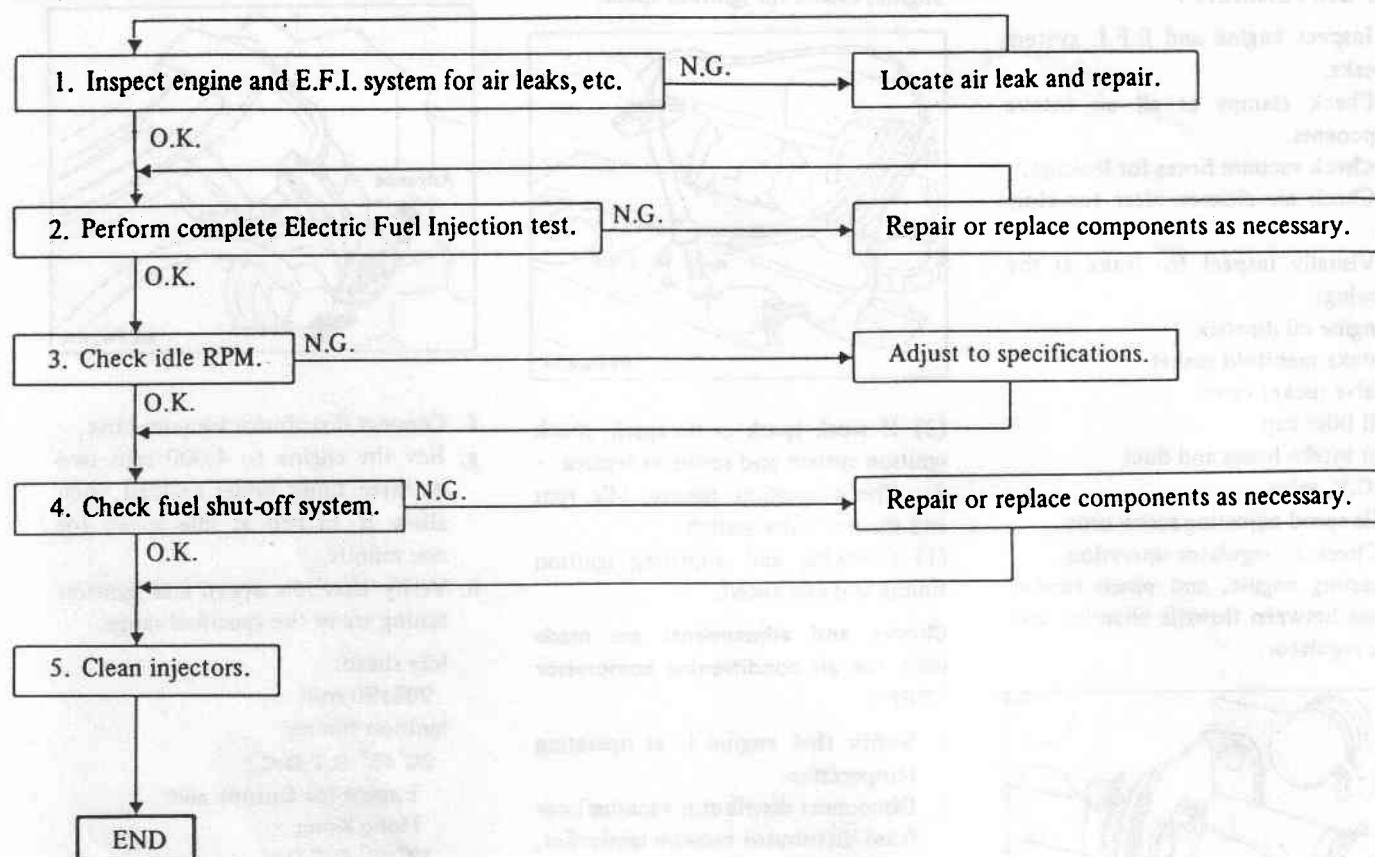


ENGINE STARTABILITY



DIAGNOSTIC PROCEDURE FOR PROBLEMS

ENGINE STALL



DIAGNOSTIC STEPS FOR DRIVEABILITY

1. Inspect engine and E.F.I. system for leaks.

(1) Check clamps at all air intake components.

(2) Check vacuum hoses for leakage.

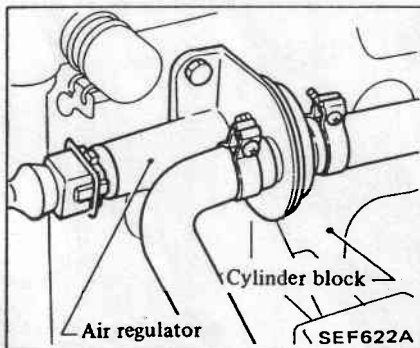
(3) Check air cleaner filter for clogging.

(4) Visually inspect for leaks at the following:

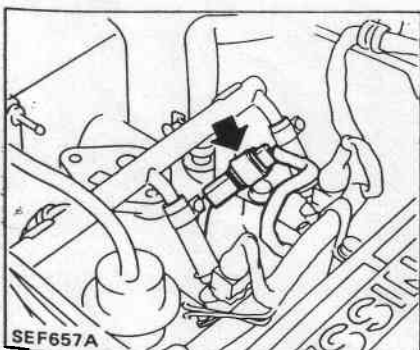
- Engine oil dipstick
- Intake manifold gasket
- Valve rocker cover
- Oil filler cap
- Air intake hoses and duct
- P.C.V. valve
- Idle speed adjusting screw unit

(5) Check air regulator operation.

- a. Starting engine, and pinch rubber hose between throttle chamber and air regulator.



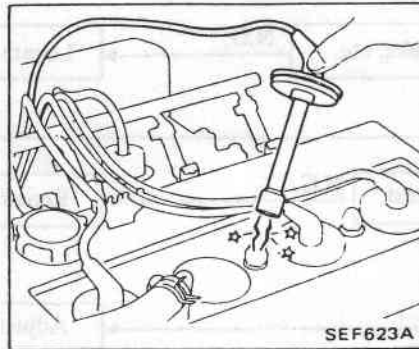
- Engine speed decreases during warm-up O.K.
 - Engine speed remains unchanged after warm-up O.K.
- b. Disconnect electric connector of air regulator, and check continuity. Continuity should exist. If not, air regulator is faulty.



2. Check ignition spark.

- (1) Disconnect high tension cable.

(2) Hold high tension cable and crank engine. Check for ignition spark.



(3) If weak spark or no spark, check ignition system and repair or replace.

3. Check ignition timing, idle rpm and throttle valve switch.

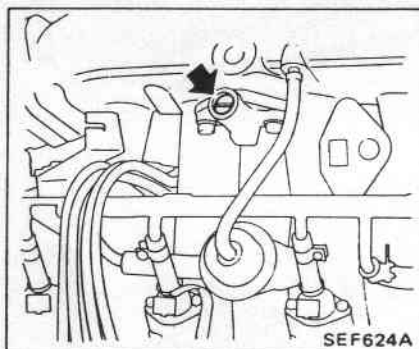
(1) Checking and adjusting ignition timing and idle speed.

Checks and adjustments are made with the air conditioning compressor "OFF".

- a. Verify that engine is at operating temperature.
- b. Disconnect distributor vacuum hose from distributor vacuum controller, and plug hose with proper plug.
- c. Rev the engine to 4,000 rpm two or three times under no-load, then allow it to run at idle speed for one minute.
- d. Check idle speed.

900±50 rpm

If necessary, adjust to the specified rpm by turning the idle speed adjusting screw.



e. Check ignition timing with a timing light.

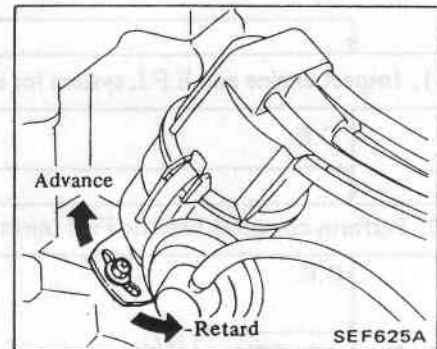
4°±1° B.T.D.C.:

Except for Europe and Hong Kong

8°±1° B.T.D.C.:

For Europe and Hong Kong

Adjust as necessary.



f. Connect distributor vacuum hose.

g. Rev the engine to 4,000 rpm two or three times under no-load, then allow it to run at idle speed for one minute.

h. Verify that idle speed and ignition timing are in the specified range.

Idle speed:

900±50 rpm

Ignition timing:

20°±5° B.T.D.C.:

Except for Europe and Hong Kong

12°±4° B.T.D.C.:

For Europe and Hong Kong

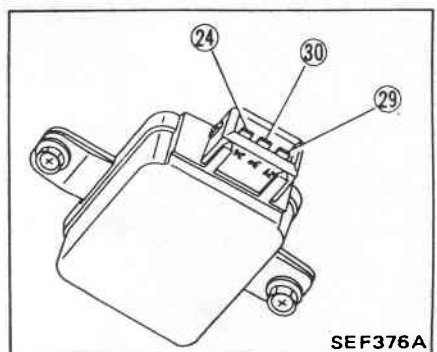
(2) Check throttle valve switch.

A) Idle contact

Use ohmmeter.

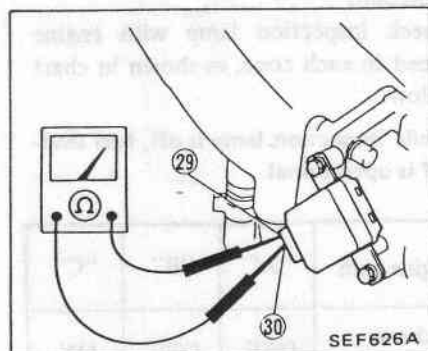
a. Disconnect throttle valve switch harness connector from throttle switch body.

b. Connect an ohmmeter between terminals ②⑨ and ③①, make sure continuity exists.



c. Increase engine speed. The ohmmeter should show continuity until about 1,100 rpm, and at that point the circuit should break and cause the ohmmeter to indicate an open

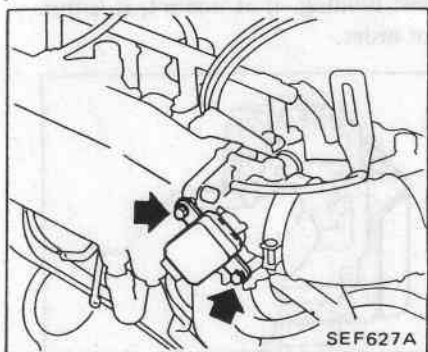
circuit. If incorrect, adjust as follows.



- d. Hold engine speed at about 1,100 rpm by manually opening the throttle.

Important: Do not use the idle speed screw.

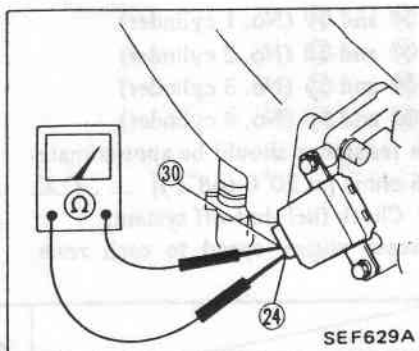
- e. Loosen the throttle switch mounting screws and turn the switch body until the ohmmeter shows a closed circuit.
- f. Slowly rotate the switch counter-clockwise until the ohmmeter indicates an open circuit; at that exact point, tighten the mounting screws.



- g. Recheck the adjustment.
- h. Reset idle speed if necessary.

B) Full throttle contact

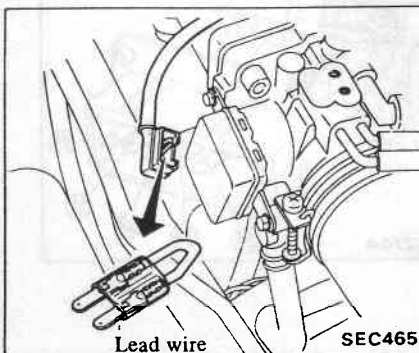
- a. Disconnect ground cable from battery.
- b. Remove throttle valve switch connector.
- c. Connect ohmmeter between terminals 24 and 30, and make sure continuity does not exist.



- d. Depress accelerator pedal to floor. If continuity exists between terminals 24 and 30, full throttle contact is functioning properly.

4. Check idle mixture ratio.

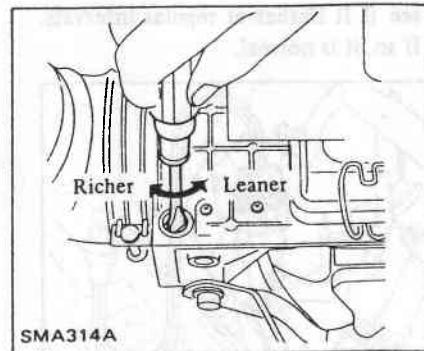
- (1) Verify that engine is at operating temperature.
- (2) With the hood open, run engine at 2,000 rpm for 2 minutes at no-load, to stabilize its condition.
- (3) Reset idle speed to the specified speed.
- (4) Turn the ignition switch to the "OFF" position.
- (5) Disconnect the throttle valve switch harness connector.
- (6) Connect a lead wire, as shown between terminals No. 24 and No. 30 of the throttle valve switch harness connector.



- (7) Rev the engine to 4,000 rpm 2 or 3 times under no-load, finally, allow it to run at idle speed for one minute.

- (8) Adjust mixture ratio with engine speed set at maximum by turning air by-pass screw.

When adjusting mixture ratio, remove blind plug from air flow meter. After adjustment, install the plug on air flow meter.



- (9) Stop engine, remove the lead wire and reconnect the throttle valve switch harness to the throttle valve switch.
- (10) Check the idle speed. Readjust to the specified speed.

5. Perform driveability test.

- (1) Evaluate effectiveness of adjustments by driving vehicle.
- (2) If unsatisfactory, proceed to step 6.

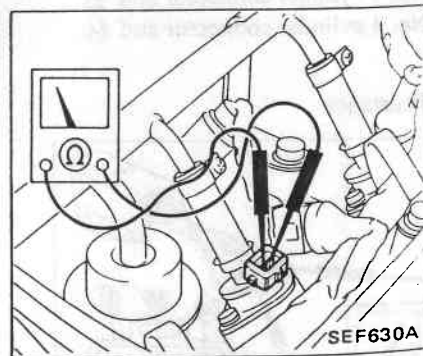
6. Clean injectors.

7. Perform complete Electric Fuel Injection test.

- (1) Use E.F.I. harness checker and adapter or circuit tester. Refer to Electrical System Inspection.

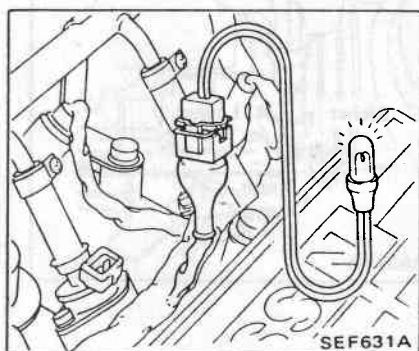
(2) Check injector.

- a. Disconnect ground cable from battery.
- b. Disconnect electric connectors from injectors.
- c. Check continuity between the two terminals. Continuity should exist. If not, injector(s) are faulty.



- d. Connect inspection lamp to injection harness connector and start engine. Check inspection lamp to

see if it flashes at regular intervals. If so, it is normal.



- 50 and 51 (No. 1 cylinder)
- 50 and 52 (No. 2 cylinder)
- 50 and 53 (No. 3 cylinder)
- 50 and 54 (No. 4 cylinder)

The resistance should be approximately 6 ohms [at 20°C (68°F)] . . . O.K.

(4) Check fuel shut off system.

Increase engine speed to each zone,

respectively, and release accelerator pedal. Check inspection lamp illumination.

Check inspection lamp with engine speed in each zone, as shown in chart below.

While inspection lamp is off, fuel shut-off is operational.

	* Engine rpm	"A"	"B"	"C"
Deceleration from zone "A"	Above 1,900	OFF	OFF	ON
Deceleration from zone "B"	1,300 - 1,900	—	ON	ON
Deceleration from zone "C"	Below 1,300	—	—	ON

*: Engine rpm at water temperature of 80°C (176°F).

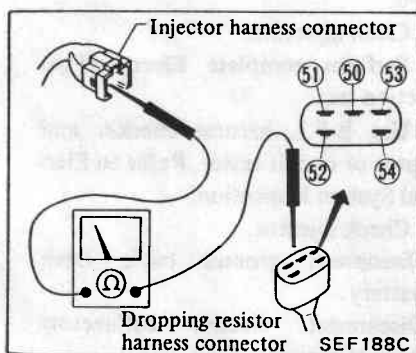
ON: Lamp ON

OFF: Lamp OFF

- e. Connect injector harness, start engine and listen for the "clicking" sound which confirms the injector is operating. The interval between clicks shortens when engine speed is increased.

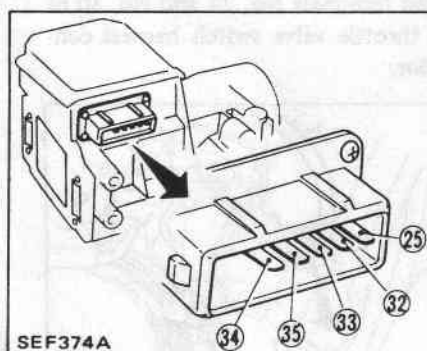
(3) Check dropping resistor circuit.

a. Continuity

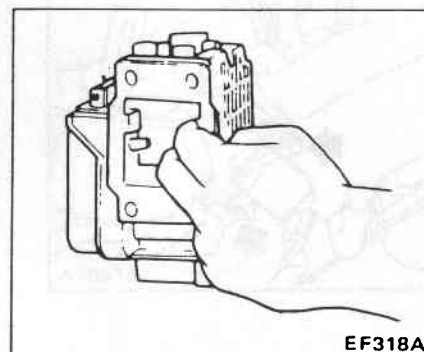


- No. 1 cylinder connector and 51
- No. 2 cylinder connector and 52
- No. 3 cylinder connector and 53
- No. 4 cylinder connector and 54

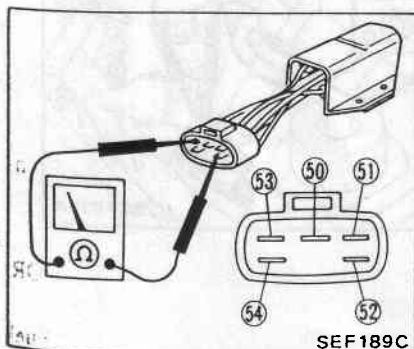
(5) Check air flow meter.



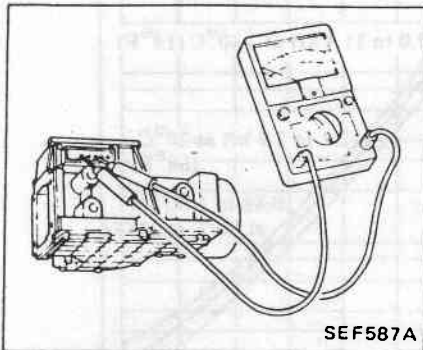
- a. Fully open the flap by hand to check that it opens smoothly without binding. If it doesn't, it is out of order.



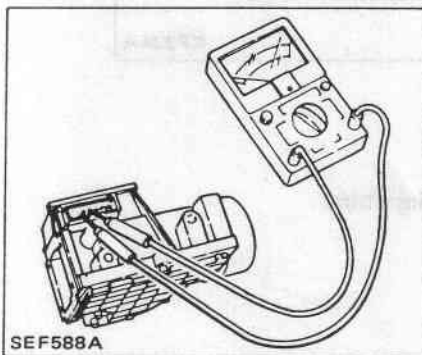
b. Resistance



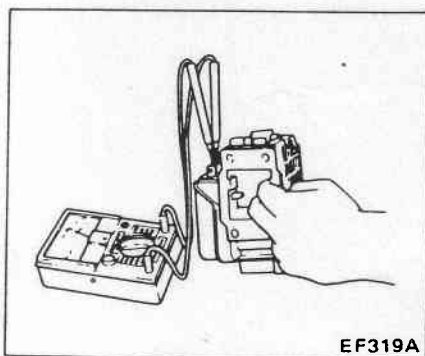
- b. Measure the resistance between terminals ③③ and ③④. The standard resistance is 100 to 400 ohms.



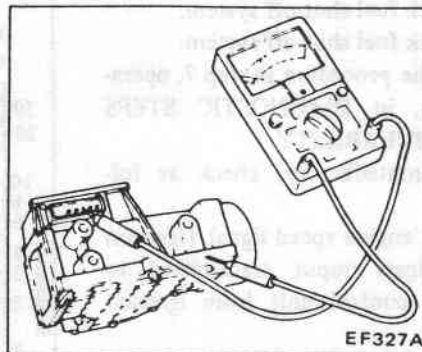
- c. Measure the resistance between terminals ③④ and ③⑤. The standard resistance is 200 to 500 ohms.



- d. While sliding flap, measure resistance between terminals ③② and ③④. If resistance is at any value other than 0 and ∞ ohm, air flow meter is normal.

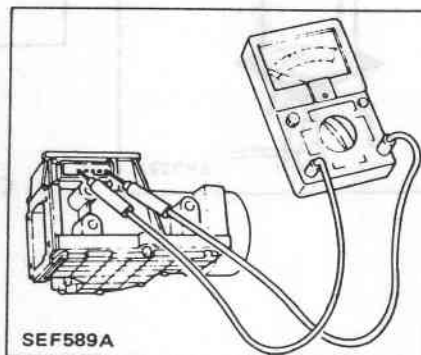


- e. Check insulation resistance between the air flow meter body and any one of the terminals ③②, ③③, ③④ and ③⑤. If continuity exists, the air flow meter is out of order.

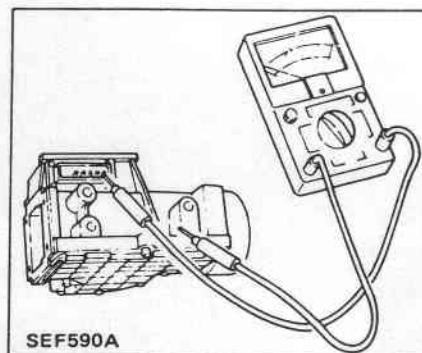


- f. Check air temperature sensor.

- Measure the outside air temperature.
- Measure resistance between terminals ②⑤ and ③④ of the air flow meter connector.



- Check insulation resistance between terminal ②⑤ and air flow meter body.



8. Check idle mixture ratio and idle rpm. Follow the procedure in step 4, operations (1) through (5).
9. Perform driveability test. Re-evaluate vehicle performance.

DIAGNOSTIC STEPS FOR IMPROPER IDLING

1. Inspect engine and E.F.I. system for leaks.
2. Check ignition spark.
3. Perform complete Electric Fuel Injection test.
4. Check ignition timing, idle rpm and throttle valve switch.
5. Check idle mixture ratio.
6. Clean injectors.

Refer to DIAGNOSTIC STEPS FOR DRIVEABILITY on the inspection procedure of each item.

ENGINE STARTABILITY

1. Inspect engine and E.F.I. system for leaks.

Refer to DIAGNOSTIC STEPS FOR DRIVEABILITY.

2. Check battery and charging system for battery.

- (1) Check battery voltage.

- (2) If poor battery voltage, check charging system for battery.

- Alternator
- Voltage regulator
- Others

Refer to EL section.

3. Check starting system.

- (1) Check starter operation.

- (2) If it does not operate, check the following:

- Starter
- Ignition relay
- Ignition switch
- Others

Refer to EL section.

4. Check fuel.

- (1) Check fuel level.

If low or empty, add fuel.

- (2) Check fuel octane rating.

If not proper, change to the recommended gasoline.

5. Check ignition spark.

Refer to DIAGNOSTIC STEPS FOR DRIVEABILITY.

6. Perform complete Electric Fuel Injection test.

Refer to DIAGNOSTIC STEPS FOR DRIVEABILITY.

7. Perform startability test.

(1) Start engine with the recommended starting procedure.

(2) If engine does not start, proceed to step 8.

8. Check and adjust idle mixture ratio.

Follow the procedure in step 4, operations (1) through (5) in DIAGNOSTIC STEPS FOR DRIVEABILITY.

ENGINE STALL

1. Inspect engine and E.F.I. system for leaks.

Refer to DIAGNOSTIC STEPS FOR DRIVEABILITY.

2. Perform complete Electric Fuel Injection test.

Refer to DIAGNOSTIC STEPS FOR DRIVEABILITY.

3. Check idle rpm.

Check idle rpm. Follow the procedure in step 3, operations (1)-a through (1)-h, in DIAGNOSTIC STEPS FOR DRIVEABILITY.

4. Check fuel shut-off system.

(1) Check fuel shut-off system.

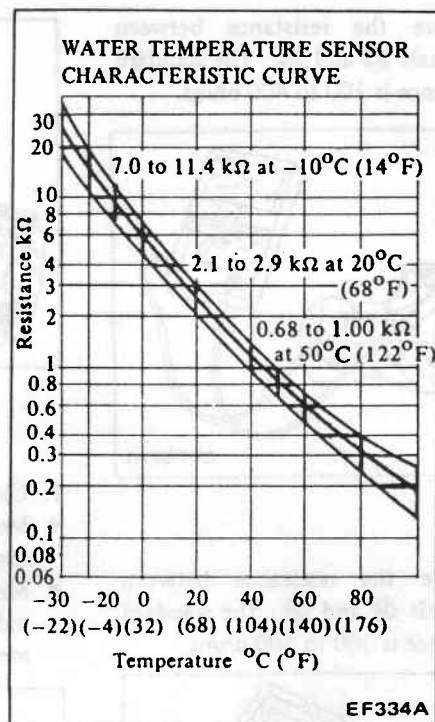
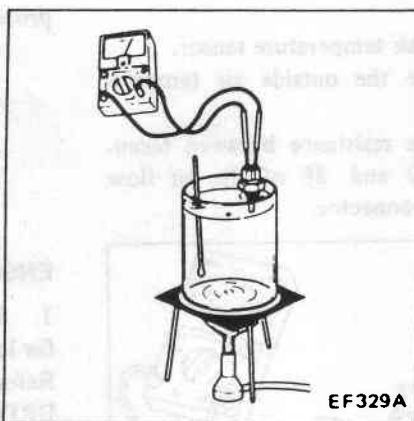
Follow the procedure in step 7, operation (4), in DIAGNOSTIC STEPS FOR DRIVEABILITY.

(2) If unsatisfactory, check as follows:

a. Check engine speed signal. (ignition coil-trigger input transmitted to E.F.I. control unit from ignition coil)

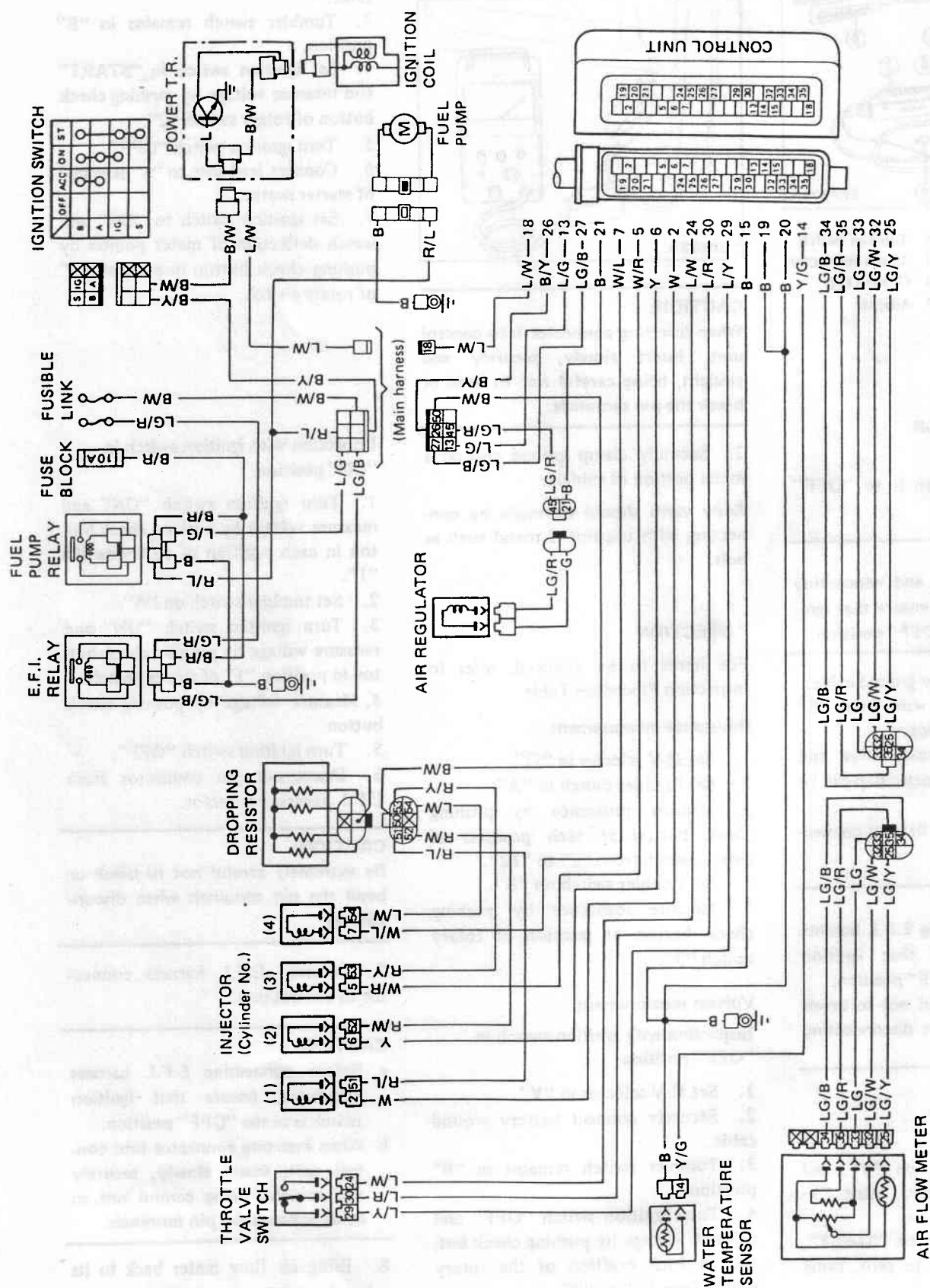
b. Check water temperature sensor.

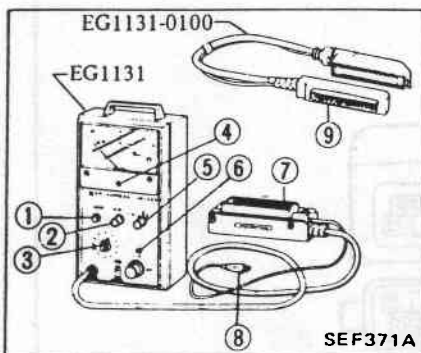
• Check component as follows:



5. Clean injectors.

E.F.I. WIRING DIAGRAM



WITH E.F.I. HARNESS
CHECKER

- | | |
|-----------------|--------------------|
| 1 Check button | 6 Tumbler switch |
| 2 Ω-SET knob | 7 35-pin connector |
| 3 Rotary switch | 8 Ground clip |
| 4 V-SET screw | 9 Adapter |
| 5 Ω-V selector | |

PREPARATIONS FOR
INSPECTION

1. Turn ignition switch to "OFF" position.

CAUTION:

Before disconnecting and connecting electrical connectors, ensure that ignition switch is in the "OFF" position.

2. Disconnect battery ground cable.
3. Disconnect lead wire from "S" terminal of starter motor.
4. Remove air cleaner cover and filter so that air flow meter flap can be moved by hand.
5. Disconnect E.F.I. harness connector from control unit.

CAUTION:

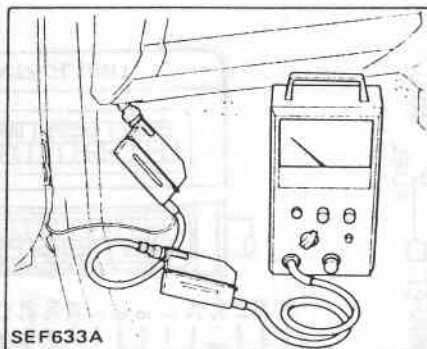
- a. Before disconnecting E.F.I. harness connector, ensure that ignition switch is in the "OFF" position.
- b. Be extremely careful not to break or bend pins when disconnecting terminal.

Checker preparations

1. Set Ω-V selector on "V", and adjust voltmeter to zero, using "V-SET" screw.
2. Set Ω-V selector on "Ω-SET", and adjust ohmmeter to zero, using "Ω-SET" knob.

Connecting checker

1. Securely connect E.F.I. harness connector to checker connector via adapter.

**CAUTION:**

When inserting connector into control unit, insert slowly, securely and straight, being careful not to bend or break the pin terminals.

2. Securely clamp ground clip on a metal portion of vehicle.

Body earth should be made by connecting with unpainted metal such as bolt.

INSPECTION

For items to be checked, refer to Inspection Procedure Table.

Resistance measurement

1. Set Ω-V selector in "Ω".
2. Set tumbler switch in "A".
3. Measure resistance by pushing check button at each position of rotary switch from "2" to "12".
4. Set tumbler switch on "B".
5. Measure resistance by pushing check button at position of rotary switch "3".

Voltage measurement

Inspection with ignition switch in "OFF" position

1. Set Ω-V selector in "V".
2. Securely connect battery ground cable.
3. Tumbler switch remains in "B" position.
4. Turn ignition switch "OFF" and measure voltage by pushing check button in each position of the rotary switch from "5" to "8".

Inspection with ignition switch in "START" position

1. Set Ω-V selector in "V".
2. Securely connect battery ground cable.
3. Tumbler switch remains in "B" position.
4. Set ignition switch in "START" and measure voltage by pushing check button of rotary switch "2".
5. Turn ignition switch "OFF".
6. Connect lead wire to "S" terminal of starter motor.
7. Set ignition switch to "ON" and watch deflection of meter pointer by pushing check button in position "4" of rotary switch.

Inspection with ignition switch in "ON" position

1. Turn ignition switch "ON" and measure voltage by pushing check button in each position of rotary switch "1".
2. Set tumbler switch on "A".
3. Turn ignition switch "ON" and measure voltage by pushing check button in position "1" of rotary switch.
4. Measure voltage by pushing check button
5. Turn ignition switch "OFF".
6. Disconnect pin connector from E.F.I. harness connector.

CAUTION:

Be extremely careful not to break or bend the pin terminals when disconnecting.

7. Connect E.F.I. harness connector to control unit.

CAUTION:

- a. Before connecting E.F.I. harness connector, ensure that ignition switch is in the "OFF" position.
- b. When inserting connector into control unit, insert slowly, securely and straight, being careful not to bend or break the pin terminals.

8. Bring air flow meter back to its original condition.

ELECTRICAL SYSTEM INSPECTION

FJ20E

INSPECTION PROCEDURE TABLE

How to use

1. Inspection procedure table is designed so that items to inspect are arranged in a sequential order according

to measurements to be made with E.F.I. Harness Checker.

2. After measuring, compare measured values with standard values to determine whether circuits/parts are malfunctioning or not.

3. When a malfunctioning circuit is

located, again check measurements involved in that circuit. In this case, check ignition switch, Ω -V selector, tumbler switch, rotary switch, ground clip, etc. to be certain they are set at proper positions.

Inspection procedure table (With E.F.I. harness checker)

Note: Before disconnecting and connecting electrical connectors and terminals, ensure that ignition switch is in "OFF" position.

* Although voltage may drop below battery voltage, this is not an indication of abnormality.

Step	Inspection circuit	Ignition switch	Ω -V selector	Tumbler switch	Rotary switch	Auxiliary operation or condition	Standard value	
1. Disconnect battery negative terminal, starter motor "S" terminal and E.F.I. harness connector from control unit.								
2. Connect checker connector to E.F.I. harness connector and clamp ground clip.								
3. Arrange so that air-flow meter flap can be pushed from air cleaner side.								
1	Air flow meter (potentiometer) sliding resistor and circuit	OFF	Ω	A	2	Push air flow meter flap.	Any value except 0 and $\infty \Omega$	
2	Ground circuit				3		0 Ω	
3					4			
4					5			
5	Throttle valve switch idle contact and circuit				7	Accelerator pedal	Fully depressed	$\infty \Omega$
6	Throttle valve switch full throttle contact and circuit				8		Released	0 Ω
						Fully depressed	0 Ω	
						Released	$\infty \Omega$	
7	Water temperature sensor and circuit				9	Water temperature	20°C (68°F) or above	Below 2.9 k Ω
							Below 20°C (68°F)	2.1 k Ω or above
8	Air temperature sensor and circuit	10	Intake air temperature		20°C (68°F) or above	Below 2.9 k Ω		
					Below 20°C (68°F)	2.1 k Ω or above		
9	Air flow meter (potentiometer) resistor and circuit	11		100 to 400 Ω				
10		12		200 to 500 Ω				
11	Circuit between air regulator and fuel pump		B	3	Below 300 Ω			
Connect battery negative terminal.								
12	Battery, E.F.I. relay, dropping resistor and injector circuits	Injector 1	ON	V	B	5	Battery voltage	
13		Injector 2				6		
14		Injector 3				7		
15		Injector 4				8		
16	*Circuit between ignition switch and control unit power source	START			2			
Connect starter motor "S" terminal. CAUTION: Exercise care in performing step 17 as it involves turning engine.								
17	Ignition coil trigger circuit	START	V	B	4	Pointer deflects		
18	Battery, E.F.I. relay and control unit power source circuits	ON		A	1	Battery voltage		
Disconnect checker connector from E.F.I. harness connector and connect E.F.I. harness connector to control unit.								

WITH CIRCUIT TESTER**PREPARATIONS FOR INSPECTION**

1. Turn ignition switch to "OFF" position.

CAUTION:

Before disconnecting and connecting electrical connectors, ensure that ignition switch is in the "OFF" position.

2. Disconnect battery ground cable.
3. Disconnect lead wire from "S" terminal of starter motor.
4. Arrange so that air flow meter flap can be pushed by hand from air cleaner side.
5. Disconnect E.F.I. harness connector from control unit.

CAUTION:

- a. Before disconnecting E.F.I. harness connector, ensure that ignition

switch is in the "OFF" position.

- b. Be extremely careful not to break or bend pins when disconnecting terminal.

Do not touch the circuit tester probe to any unnecessary pin on the connector. Doing so could cause damage to the circuit tester.

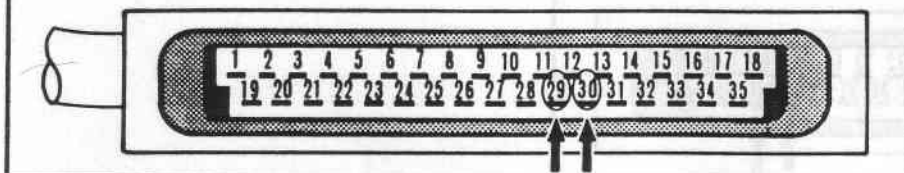
- c. After inspection or replacement, securely connect E.F.I. harness connector with control unit, and then test it to make sure.

THROTTLE VALVE SWITCH TESTS

Test No. 1 Idle contacts

Tester	Leads to Pins		Notes	Should Read
	(+)	(-)		
Ohmmeter			Throttle released	Continuity
	29	30	Throttle depressed	No continuity

If test is O.K., go to Test No. 2.
If test is not O.K., go to Throttle Valve Switch Adjustment.

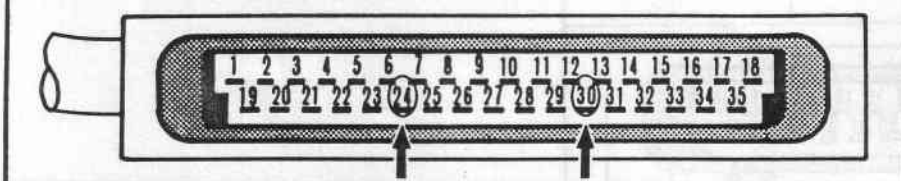


SEF681

Test No. 2 Full throttle contacts

Tester	Leads to Pins		Notes	Should Read
	(+)	(-)		
Ohmmeter			Throttle released	No continuity
	24	30	Full throttle	Continuity

If test is O.K., go to Test No. 3.
If test is not O.K., go to Full Throttle Contact Check.



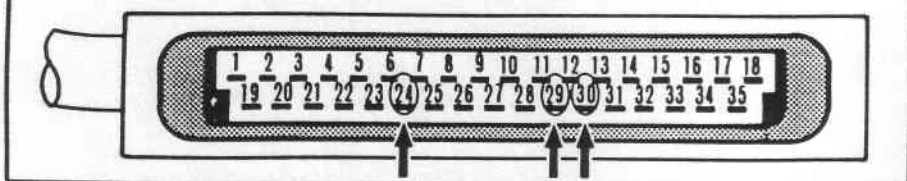
SEF682

Test No. 3 Insulation test

Tester	Leads to Pins		Notes	Should Read
	(+)	(-)		
Ohmmeter	24	Body ground		$\infty \Omega$
	29			
	30			

If test is O.K., go to Throttle Valve Switch Adjustment.

If test is not O.K., go to Component Check.

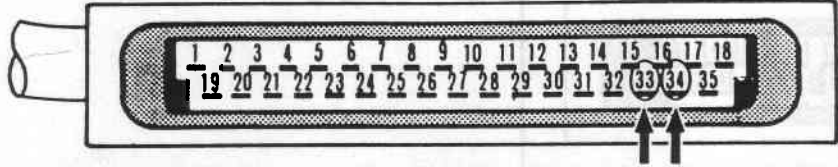


SEF683

AIR FLOW METER TESTS

Test No. 1 Air flow meter resistance

Tester	Leads to Pins		Notes	Should Read
	(+)	(-)		
Ohmmeter	33	34		100 to 400 Ω



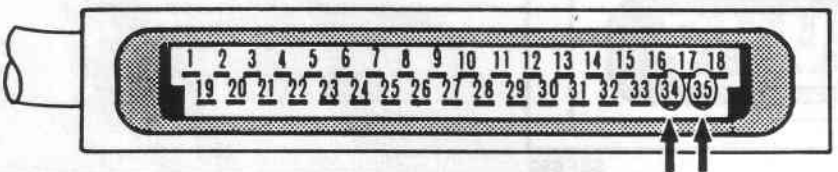
SEF689

If test is O.K., go to Test No. 2.

If test is not O.K., perform component check.

Test No. 2 Air flow meter resistance

Tester	Leads to Pins		Notes	Should Read
	(+)	(-)		
Ohmmeter	34	35		200 to 500 Ω



SEF690

If test is O.K., go to Test No. 3.

If test is not O.K., perform component check.

ELECTRICAL SYSTEM INSPECTION

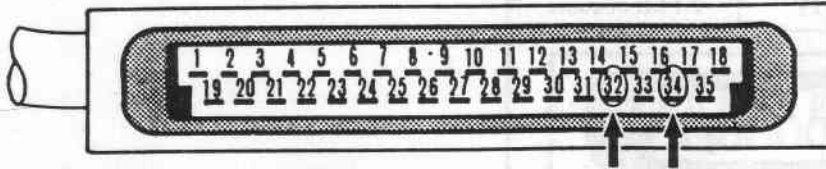
FJ20E

Test No. 3 Air flow meter resistance

Tester	Leads to Pins		Notes	Should Read
Ohmmeter	(+)	(-)		Except 0 and $\infty\Omega$
	32	34		

If test is O.K., go to Test No. 4.

If test is not O.K., perform component check.

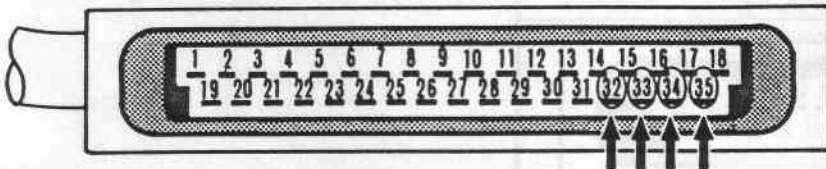


SEF691

Test No. 4 Insulation resistance

Tester	Leads to Pins		Notes	Should Read
Ohmmeter	(+)	(-)		$\infty\Omega$
	32 33 34 35	Body ground		

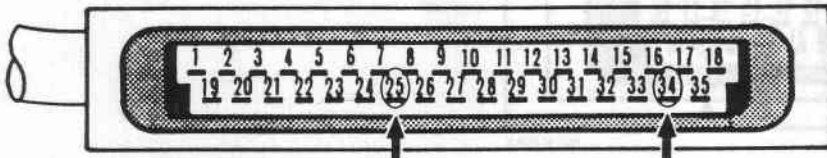
If test is not O.K., perform component check.



SEF692

AIR TEMPERATURE SENSOR TESTS

Test No. 1 Air Temperature Sensor				
Tester	Leads to Pins		Notes	Should Read
	(+)	(-)		
Ohmmeter	25	34	Intake air temperature	Below 2.9 k Ω
			20°C (68°F) or above	
			Below 20°C (68°F)	2.1 k Ω or above



If test is O.K., go to test No. 2.

If test is not O.K., perform component check.

SEF772

Test No. 2 Insulation Resistance				
Tester	Leads to Pins		Notes	Should Read
	(+)	(-)		
Ohmmeter	25	Body ground		$\infty \Omega$



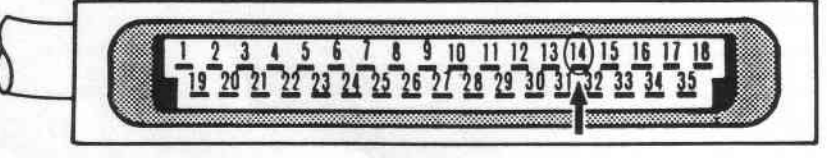
If test is O.K., air temperature sensor is O.K.

If test is not O.K., perform component check.

SEF773

WATER TEMPERATURE SENSOR TEST

Water temperature sensor test				
Tester	Leads to Pins		Notes	Should Read
	(+)	(-)		
Ohmmeter	14	Body ground	20°C (68°F) or above	Below 2.9 k Ω
			Below 20°C (68°F)	2.1 k Ω or above



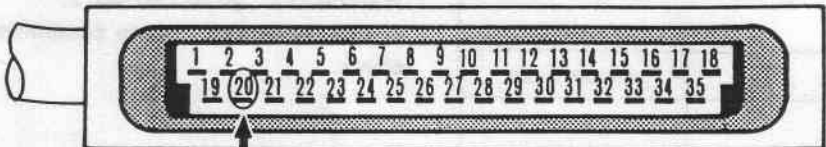
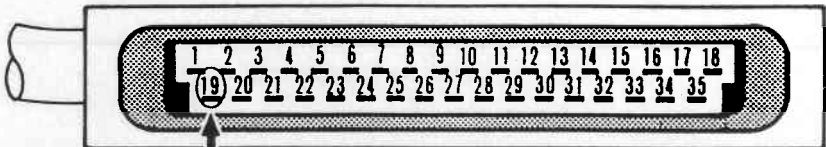
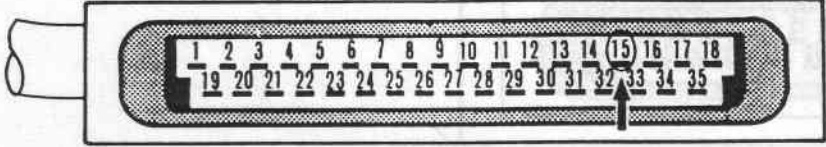
If test is O.K., test is complete.

If test is not O.K., perform component check.

SEF693

CONTROL UNIT GROUND CIRCUIT TESTS

Tester	Leads to Pins		Notes	Should Read
Ohmmeter	(+)	(-)		Continuity
	15	Body ground		
	19 20			



SEF634A

If tests are O.K., ground circuits are O.K.

If test are not O.K., check wiring diagram and harness.

AIR REGULATOR CIRCUIT TESTS

Test No. 1 Air regulator resistance				
Tester	Leads to Pins		Notes	Should Read
Ohmmeter	(+)	(-)		25 to 90Ω
	21	Body ground		



The diagram shows a 35-pin connector with pins numbered 1 through 35. An arrow points to pin 21, which is the pin to be tested for resistance against body ground.

SEF698

If test is O.K., go to Test No. 2.

If test is not O.K., check air regulator.

Test No. 2 Air regulator and fuel pump power circuit

1. Connect E.F.I. harness connector to E.F.I. control unit.

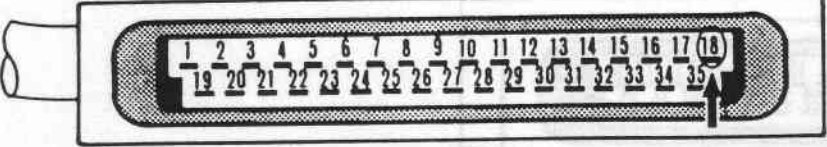
2. Turn ignition switch to "ON".
3. Listen for fuel pump operating sound for a few seconds.
4. If no sound is heard, check fuel

pump relay.

If fuel pump operates, check air regulator.

IGNITION COIL TRIGGER INPUT TEST

Ignition coil trigger input test			
Tester	Leads to Pins		Notes
Voltmeter	(+)	(-)	1. Connect starter motor "S" terminal and battery ground cable. 2. Ignition "ON".
	18	Body ground	



SEF705

If test is O.K., trigger input to control unit is O.K.

If test is not O.K., check ignition coil and wire harness.

INJECTOR CIRCUIT TESTS

Test No. 1 Cylinder No. 1			
Tester	Leads to Pins		Notes
Voltmeter	(+)	(-)	Connect battery ground cable.
	2	Body ground	



SEF706

If test is O.K., go to Test No. 2.

If test is not O.K., go to component check.

Test No. 2 Cylinder No. 2			
Tester	Leads to Pins		Notes
Voltmeter	(+)	(-)	
	6	Body ground	



SEF707

If test is O.K., go to Test No. 3.

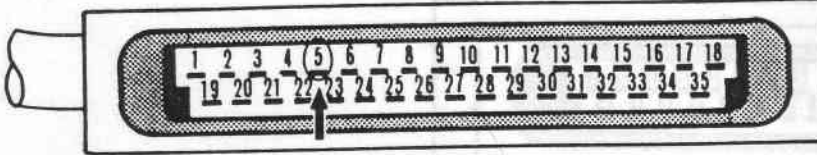
If test is not O.K., perform component check.

ELECTRICAL SYSTEM INSPECTION

FJ20E

Test No. 3 Cylinder No. 3

Tester	Leads to Pins		Notes	Should Read
Voltmeter	(+)	(-)		Battery voltage
	5	Body ground		

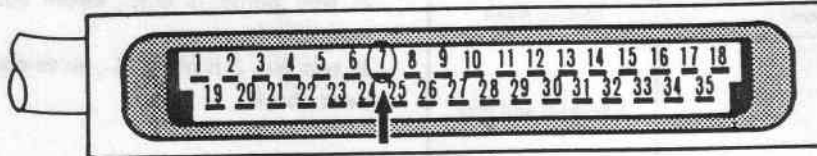


SEF708

If test is O.K., go to Test No. 4.
If test is not O.K., go to component check.

Test No. 4 Cylinder No. 4

Tester	Leads to Pins		Notes	Should Read
Voltmeter	(+)	(-)		Battery voltage
	7	Body ground		



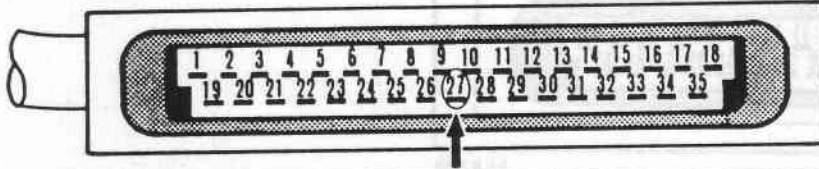
SEF709

If test is O.K., all injectors are O.K.
If test is not O.K., go to component check.

E.F.I. RELAY AND FUEL PUMP RELAY TESTS

Test No. 1 E.F.I. relay test (Control unit power input circuit test)

Tester	Leads to Pins		Notes	Should Read
	(+)	(-)		
Voltmeter	27	Body ground	1. Connect battery ground cable. 2. Ignition "ON".	Battery voltage



SEF713

If test is O.K., E.F.I. relay is O.K., go to Test No. 2.

If test is not O.K., check E.F.I. relay.

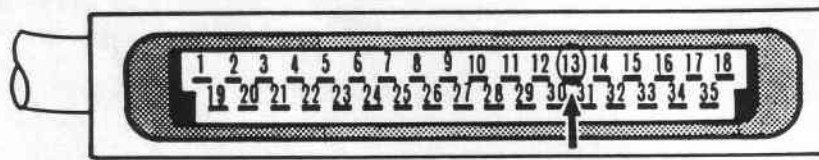
Test No. 2 Fuel pump relay

If no sound is heard, go to test No. 3.

1. Ignition "ON".
2. Listen to fuel pump operating sound for a few seconds after turning ignition switch to "ON".

Test No. 3 Fuel pump relay test

Tester	Leads to Pins		Notes	Should Read
	(+)	(-)		
Ohmmeter	13	Body ground		Except 0 and $\infty\Omega$



SEF343A

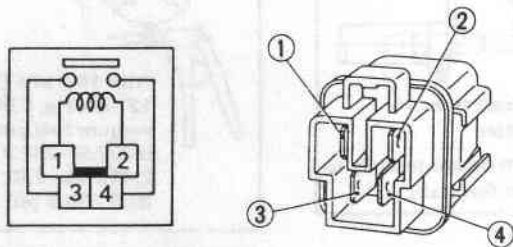
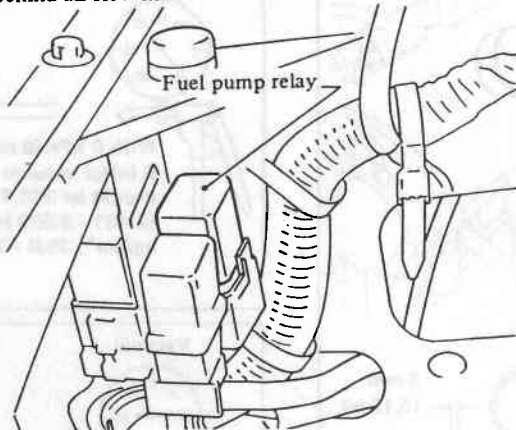
If test No. 3 is O.K., check fuel pump and circuit.

If fuel pump is O.K., check component check.

If test No. 3 is not O.K., go to component check.

Check fuel pump relay.

Behind air flow meter

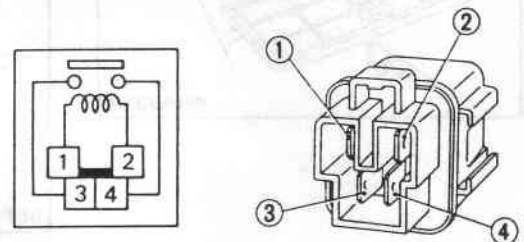
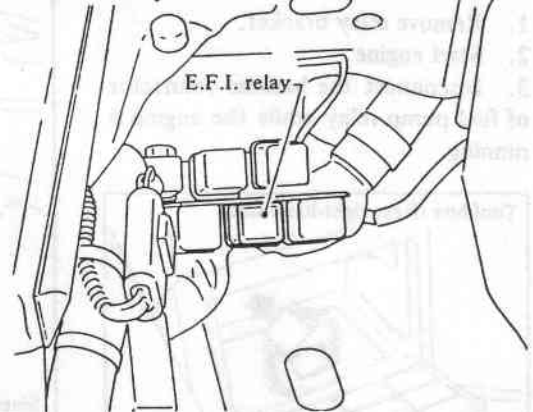


Check terminals	Normal condition	12V direct current is applied between terminals ① and ②
① - ②	Continuity	—
③ - ④	No continuity	Continuity

SEF083C

Check E.F.I. relay.

Behind the battery



Check terminals	Normal condition	12V direct current is applied between terminals ① and ②
① - ②	Continuity	—
③ - ④	No continuity	Continuity

SEF076C

If E.F.I. relay and fuel pump relay are O.K., check harness.

If fuel pump and harness are O.K., replace control unit.

IGNITION START SIGNAL TEST

Ignition start signal test				
Tester	Leads to Pins		Notes	Should Read
Voltmeter	(+)	(-)	1. Disconnect starter motor "S" terminal. 2. Connect battery ground cable. 3. Ignition "START".	Battery voltage
	26	Body ground		



SEF715

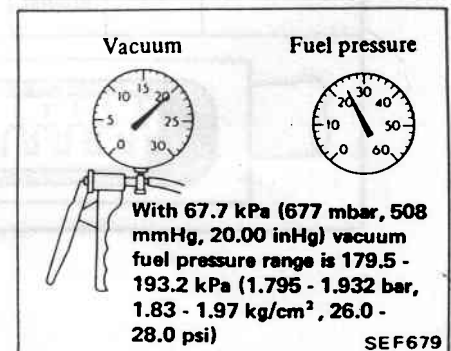
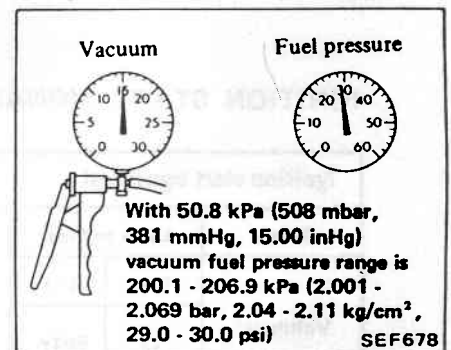
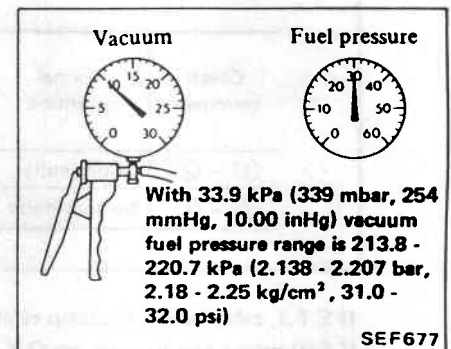
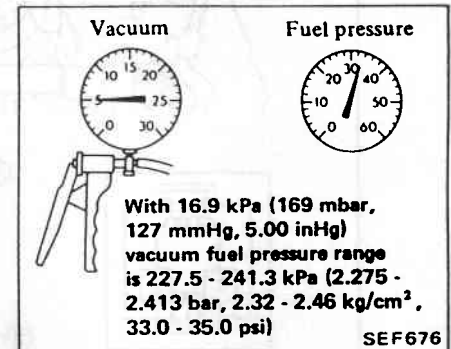
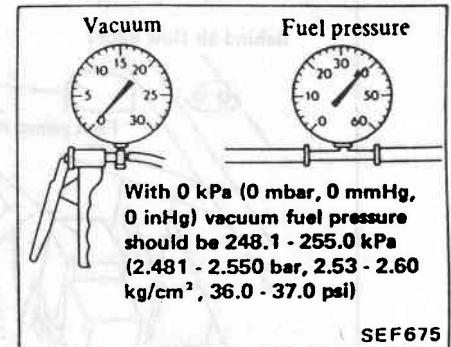
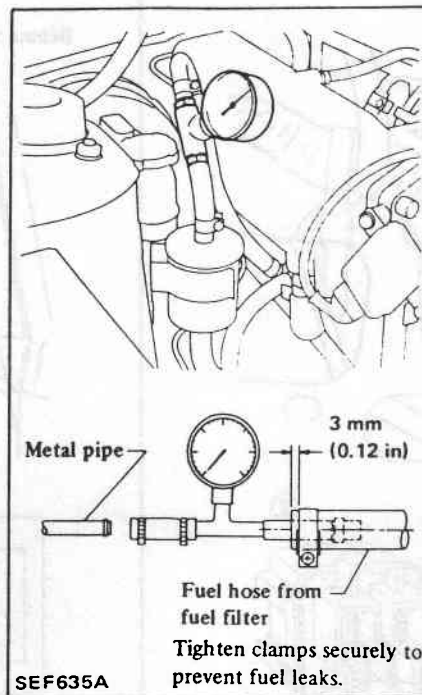
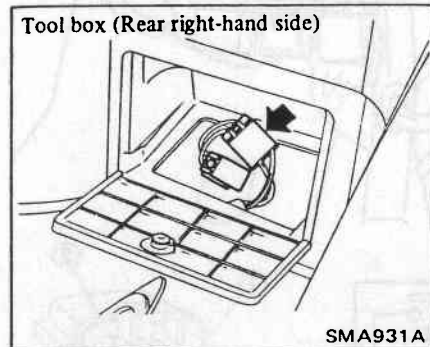
If test is O.K., ignition start signal is O.K.

If test is not O.K., inspect ignition coil and harness.

FUEL SYSTEM INSPECTION

RELEASING FUEL PRESSURE

1. Remove relay bracket.
2. Start engine.
3. Disconnect the harness connector of fuel pump relay while the engine is running.



4. After the engine stalls, crank the engine several times.
5. Turn the ignition switch "OFF".
6. Reconnect the harness connector of fuel pump relay.

3. Start engine and read fuel pressure gauge.

At idling:

Approximately 206 kPa (2.06 bar, 2.1 kg/cm², 30 psi)

The moment accelerator pedal is fully depressed:

Approximately 255 kPa (2.55 bar, 2.6 kg/cm², 37 psi)

4. If fuel pressure is not as specified, replace pressure regulator, and repeat fuel pressure check.

If below the specified value, check for clogged or deformed fuel lines, and if necessary, replace fuel pump as an assembly or check valve.

5. Connect variable vacuum source, a handy vacuum gauge or its equivalent, to fuel regulator. Disconnect fuel pressure regulator vacuum hose from intake manifold and attach hose to variable vacuum source.

6. Start engine at idle speed.

7. Observe fuel pressure readings as vacuum is changed.

FUEL PRESSURE CHECK

When reconnecting the lines, always use new clamps and be sure to position them correctly.

Use a torque driver to tighten clamps.

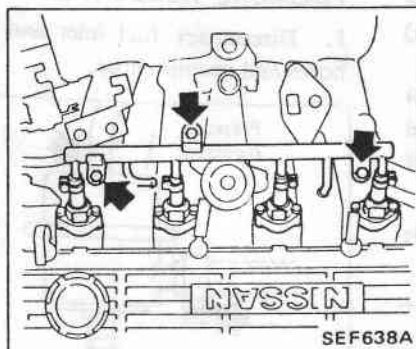
1. Release fuel pressure in fuel line. Refer to Releasing Fuel Pressure.
2. Install Pressure Gauge between fuel filter hose and metal pipe at point shown. For convenience in later tests, position gauge so that it can be read from driver's seat.

Fuel pressure must decrease as vacuum increases. If results are unsatisfactory, replace pressure regulator.

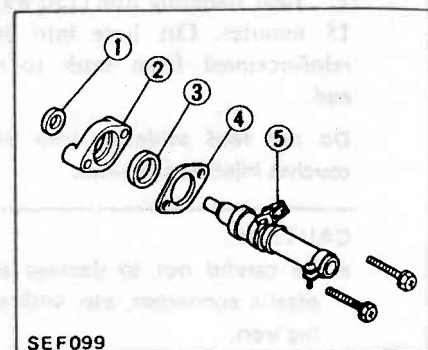
8. Release fuel pressure until it is about 49 kPa (0.49 bar, 0.5 kg/cm², 7 psi).

9. Turn key to "OFF".

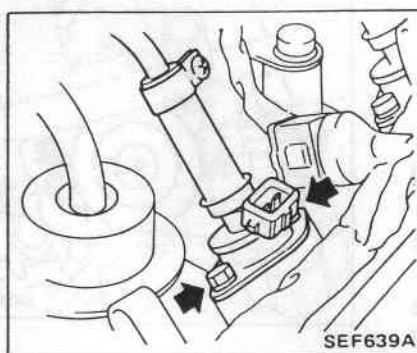
10. Disconnect variable vacuum source and connect fuel pressure regulator vacuum hose to intake manifold.



Place a rag under injector when disconnecting fuel pipe to prevent splashing of fuel.



5. Remove bolts securing fuel injectors.



- 1 Injector lower rubber insulator
- 2 Injector lower holder
- 3 Injector upper rubber insulator
- 4 Injector upper holder
- 5 Injector

9. To install injector and fuel pipe, reverse the order of removal.

- a. When installing injector, check that there are no scratches or abrasion at lower rubber insulator, and securely install it, making sure it is air-tight.
- b. For installation of fuel hose, refer to Fuel Hose.

REMOVAL AND INSTALLATION

Before removing or replacing the fuel system line, release fuel pressure from fuel line for safety reasons.

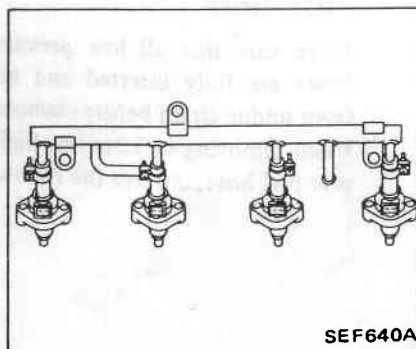
INJECTOR AND FUEL PIPE

1. Release fuel pressure in fuel line. Refer to Releasing Fuel Pressure.
2. Remove or disconnect the following parts and connectors.
 - Injector harness connector.
 - High tension cable.
 - Vacuum hose connecting pressure regulator to intake manifold.
3. Disconnect fuel feed hose and fuel return hose from fuel pipe.

Place a rag under fuel pipe to prevent splashing of fuel.

4. Remove bolts securing fuel pipe.

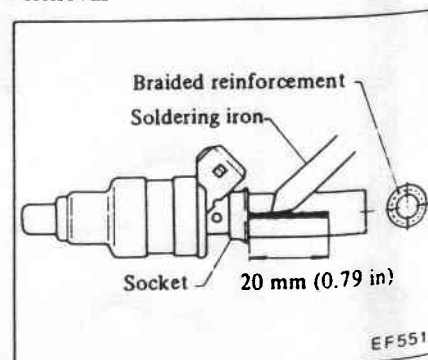
6. Remove fuel pipe and injector as an assembly.



Injector rubber hose

If necessary, replace injector rubber hose, proceed as follows:

Removal



7. Unfasten hose clamp on fuel injector and remove fuel injector from fuel pipe.

1. On injector rubber hose, measure off a point approx. 20 mm (0.79 in) from socket end.
2. Heat soldering iron (150 watt) for 15 minutes. Cut hose into braided reinforcement from mark to socket end.

Do not feed soldering iron until it touches injector tail piece.

CAUTION:

- a. Be careful not to damage socket, plastic connector, etc. with soldering iron.
 - b. Never place injector in a vise when disconnecting rubber hose.
3. Then pull rubber hose out with hand.

Installation

1. Clean exterior of injector tail piece.
2. Wet inside of new rubber hose with fuel.
3. Push end of rubber hose with hose socket onto injector tail piece by hand as far as they will go.

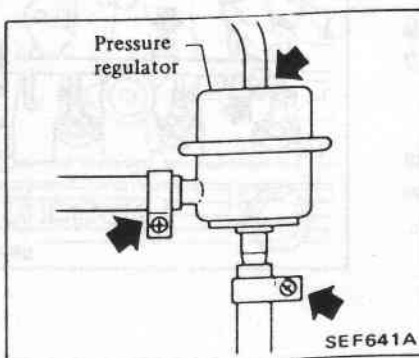
Clamp is not necessary at this connection.

CAUTION:

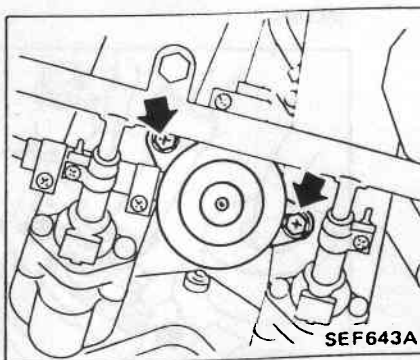
After properly connecting fuel hose to injector, check connection for fuel leakage.

PRESSURE REGULATOR

1. Disconnect fuel inlet and outlet hoses and vacuum hose.



2. Remove pressure regulator from intake manifold.



3. To install pressure regulator, reverse the order of removal.

For installation of fuel hose, refer to Fuel Hose.

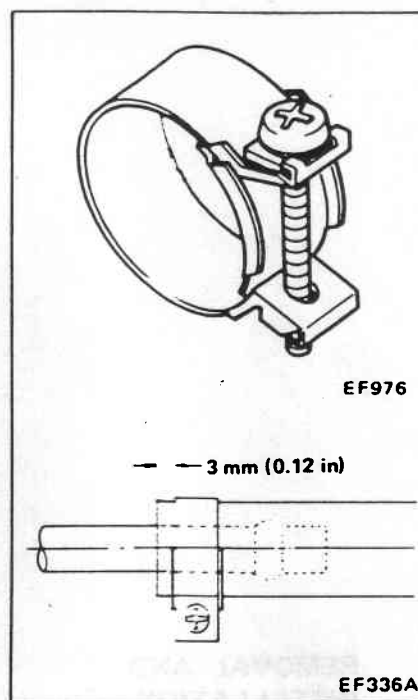
FUEL HOSE

Make sure that all low pressure fuel hoses are fully inserted and are free from undue strain before clamping. When removing or installing high pressure fuel hose, observe the following.

CAUTION:

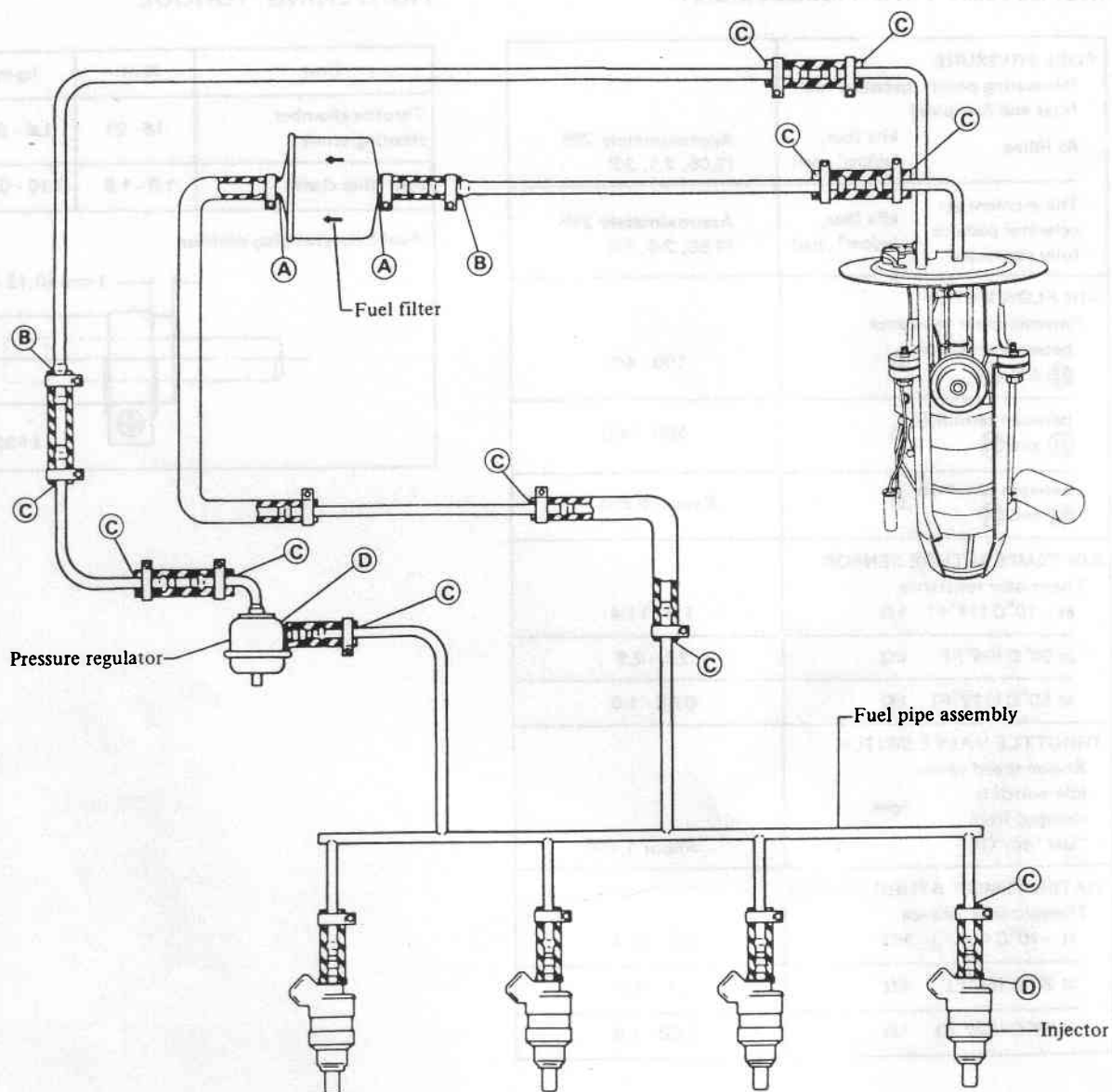
- a. Do not reuse fuel hose clamps after loosening.
- b. Clean dust and dirt from parts with compressed air when assembling.
- c. Tighten high pressure rubber hose clamp so that clamp end is 3 mm (0.12 in) from hose end or screw position (wider than other portions of clamp) is flush with hose end. Tightening torque specifications are the same for all rubber hose clamps.

- ① : Fuel hose clamps
- 1.0 - 1.5 N·m
 - (0.10 - 0.15 kg-m,
 - 0.7 - 1.1 ft-lb)



- d. When tightening hose clamp, ensure that screw does not come into contact with adjacent parts.

FUEL PIPING



Type (A) : Insert rubber hose until its end contacts unit.

Type (B) : Push end of rubber hose onto fuel pipe until it contacts inner bulge.

Type (C) : Push end of rubber hose onto fuel pipe until it is 28 mm (1.10 in) from end of pipe.

Type (D) : Push end of rubber hose with hose socket onto unit by hand as far as they will go. Clamp is not necessary at this connection.

SEF059C

SERVICE DATA AND SPECIFICATIONS

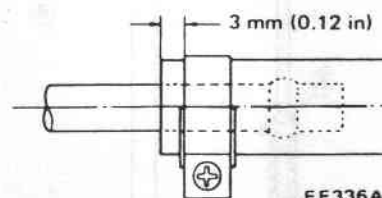
INSPECTION AND ADJUSTMENT

FUEL PRESSURE (Measuring point: between fuel filter and fuel pipe)		
At idling	kPa (bar, kg/cm ² , psi)	Approximately 206 (2.06, 2.1, 30)
The moment accelerator pedal is fully depressed	kPa (bar, kg/cm ² , psi)	Approximately 255 (2.55, 2.6, 37)
AIR FLOW METER		
Potentiometer resistance between terminals ③③ and ③④	Ω	100 - 400
between terminals ③④ and ③⑤	Ω	200 - 500
between terminals ③⑤ and ③⑥	Ω	Except 0 and ∞
AIR TEMPERATURE SENSOR		
Thermistor resistance at -10°C (14°F)	kΩ	7.0 - 11.4
at 20°C (68°F)	kΩ	2.1 - 2.9
at 50°C (122°F)	kΩ	0.68 - 1.0
THROTTLE VALVE SWITCH		
Engine speed when idle switch is changed from "ON" to "OFF"	rpm	About 1,100
WATER TEMPERATURE SENSOR		
Thermistor resistance at -10°C (14°F)	kΩ	7.0 - 11.4
at 20°C (68°F)	kΩ	2.1 - 2.9
at 50°C (122°F)	kΩ	0.68 - 1.0

TIGHTENING TORQUE

Unit	N·m	kg·m	ft·lb
Throttle chamber securing screw	16 - 21	1.6 - 2.1	12 - 15
Fuel hose clamp	1.0 - 1.5	0.10 - 0.15	0.7 - 1.1

Fuel hose clamping position



ELECTRICAL SYSTEM

SECTION EL

CONTENTS

HOW TO READ DIAGRAMS	EL- 2
STANDARDIZED RELAY	EL- 4
POWER SUPPLY ROUTING	EL- 5
BATTERY	EL- 9
STARTING SYSTEM	EL- 12
STARTING SYSTEM — Starter —	EL- 13
CHARGING SYSTEM	EL- 22
CHARGING SYSTEM — Alternator —	EL- 24
IGNITION SYSTEM (Non-turbocharger model)	EL- 30
IGNITION SYSTEM (Non-turbocharger model) — Distributor —	EL- 36
COMBINATION SWITCH	EL- 44
HEADLAMP	EL- 47
EXTERIOR LAMP	EL- 74
INTERIOR LAMP	EL- 79
METER AND GAUGES	EL- 83
WARNING LAMPS AND CHIME	EL- 87
TIME CONTROL SYSTEM	EL- 93
WIPER AND WASHER	EL-103
HORN, CIGARETTE LIGHTER, CLOCK	EL-108
REAR WINDOW DEFOGGER	EL-109
AUDIO AND POWER ANTENNA	EL-113
AUTOMATIC SPEED CONTROL DEVICE (A.S.C.D.)	EL-116
LOCATION OF ELECTRICAL UNITS	EL-123
HARNESS LAYOUT	EL-128
SUPER MULTIPLE JUNCTION (S.M.J.)	EL-143

EL

HOW TO READ DIAGRAMS

POWER SUPPLY ROUTING

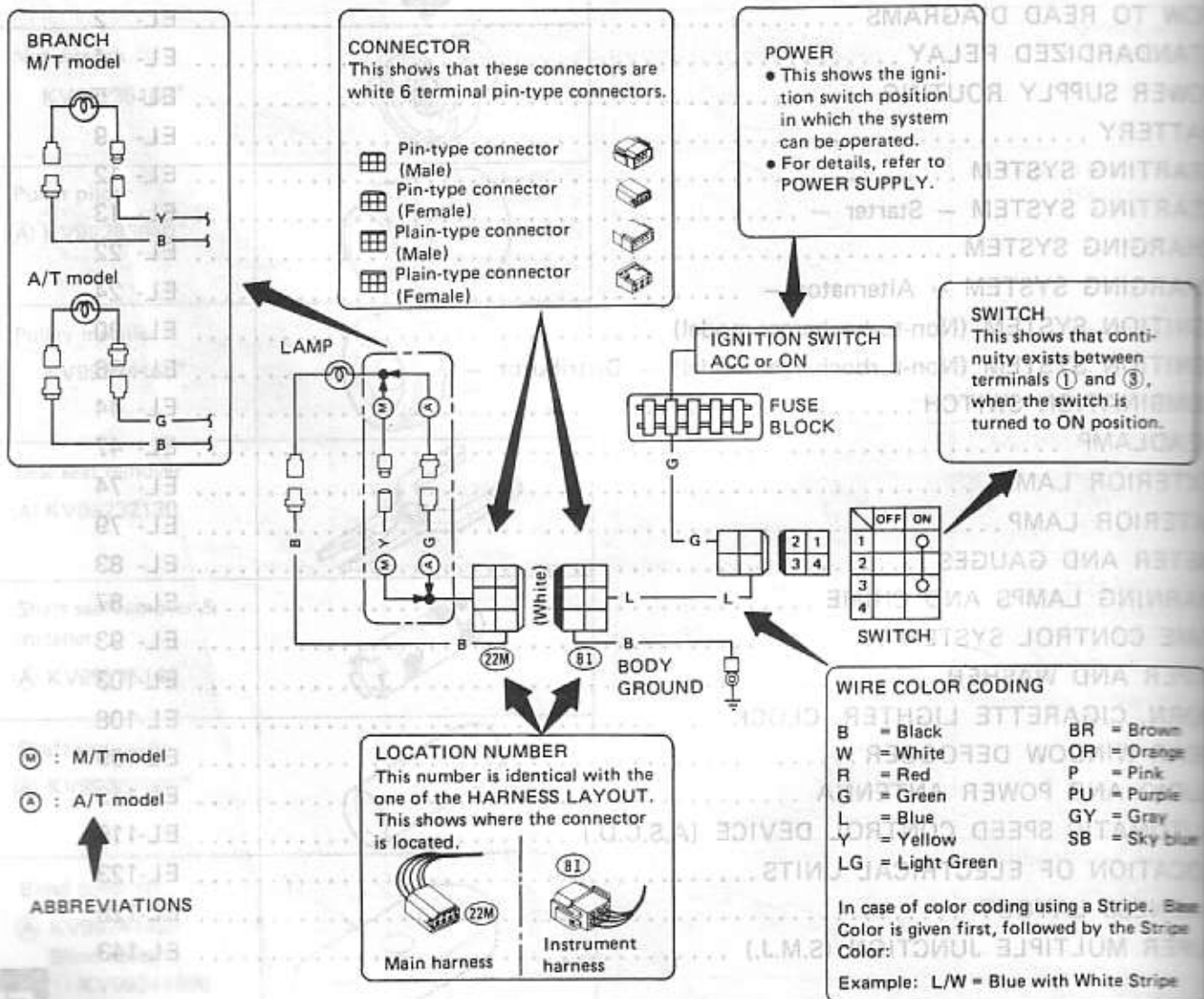
This diagram is helpful in identifying specific problems in the power supply portion of the electrical circuits. For example, let's say a vehicle has an inoperative rear window defogger. A quick check proves that meter and gauges in the vehicle are operative. The power supply diagram shows that there cannot be a problem between the battery, ignition relay, ignition switch or fuse since the power supply circuit for the rear window defogger

is common with the meter and gauges. Therefore, the cause of this specific problem must lie past the fuse, such as in the wiring, rear window defogger, or ground.

WIRING DIAGRAM

This diagram identifies types and number of connectors, electrical terminal positions in the connector, color coding of wires, and connector codes. Refer to the following example.

Example



HOW TO READ DIAGRAMS

POWER SUPPLY ROUTING

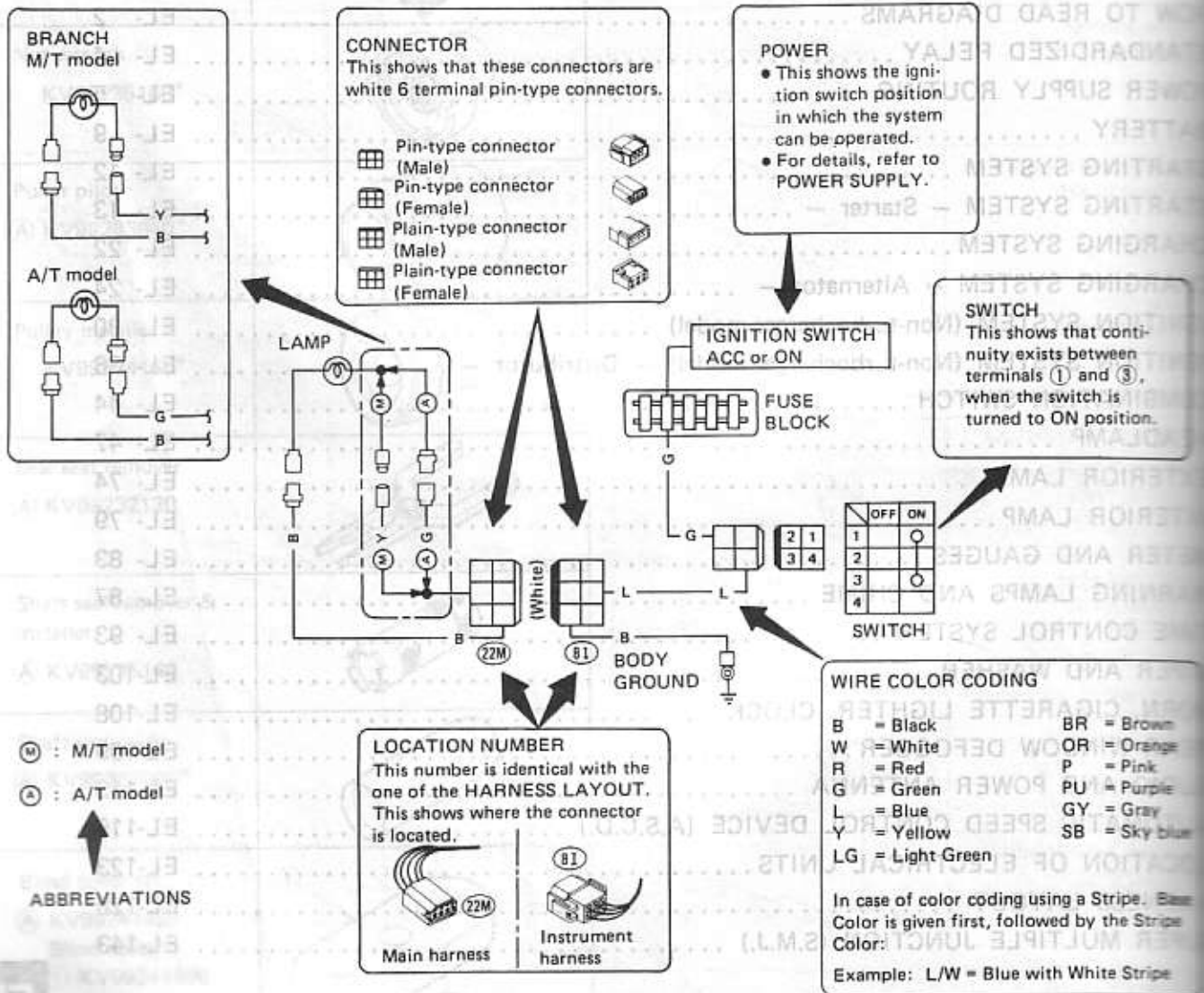
This diagram is helpful in identifying specific problems in the power supply portion of the electrical circuits. For example, let's say a vehicle has an inoperative rear window defogger. A quick check proves that meter and gauges in the vehicle are operative. The power supply diagram shows that there cannot be a problem between the battery, ignition relay, ignition switch or fuse since the power supply circuit for the rear window defogger

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WIRING DIAGRAM

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Example

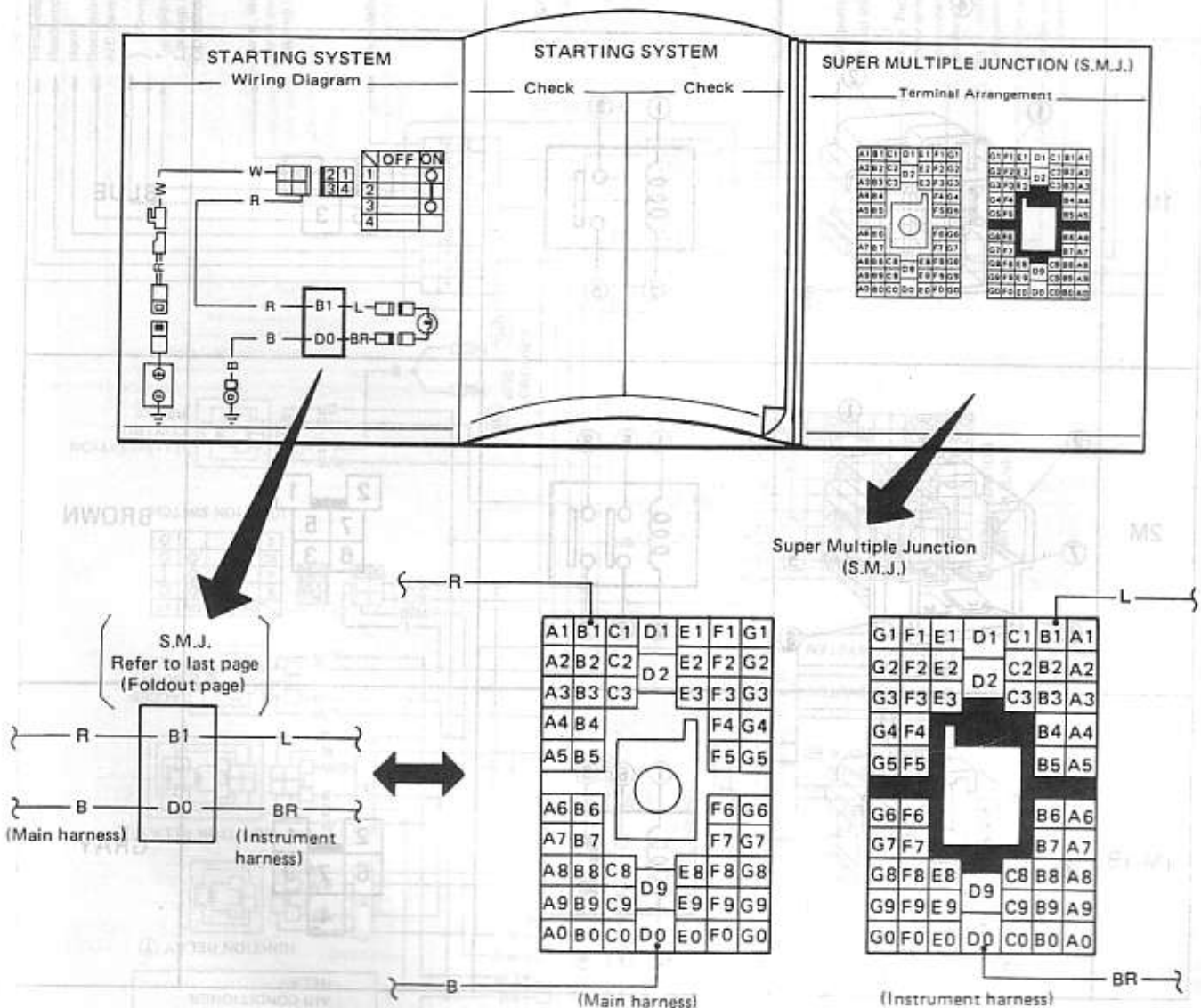


HOW TO READ DIAGRAMS

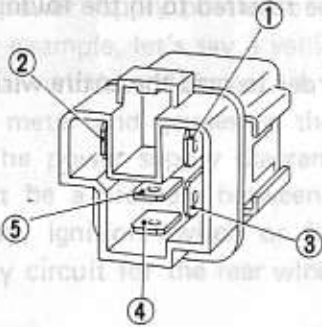
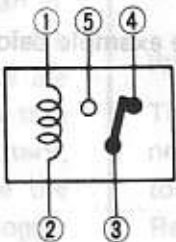
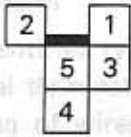
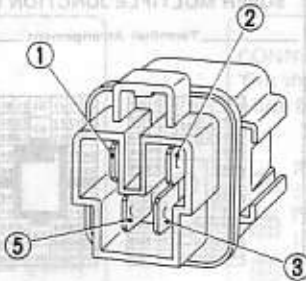
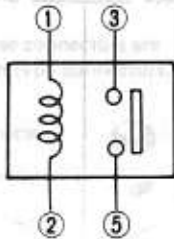
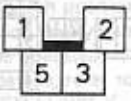
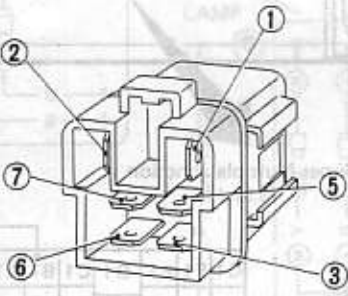
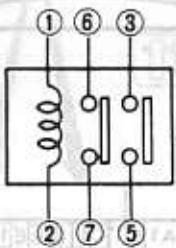
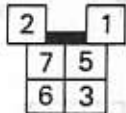
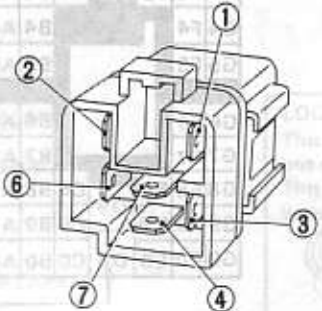
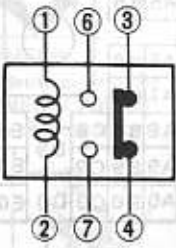
SUPER MULTIPLE JUNCTION (S.M.J.)

- The "S.M.J." indicated in wiring diagrams refers to the super multiple junction, and is drawn in a simplified form. The location of connector terminals should therefore be referred to in the foldout at the end of the Service Manual.
- The foldout should be spread, as shown in the example below, in order to read the entire wiring diagram.

Example



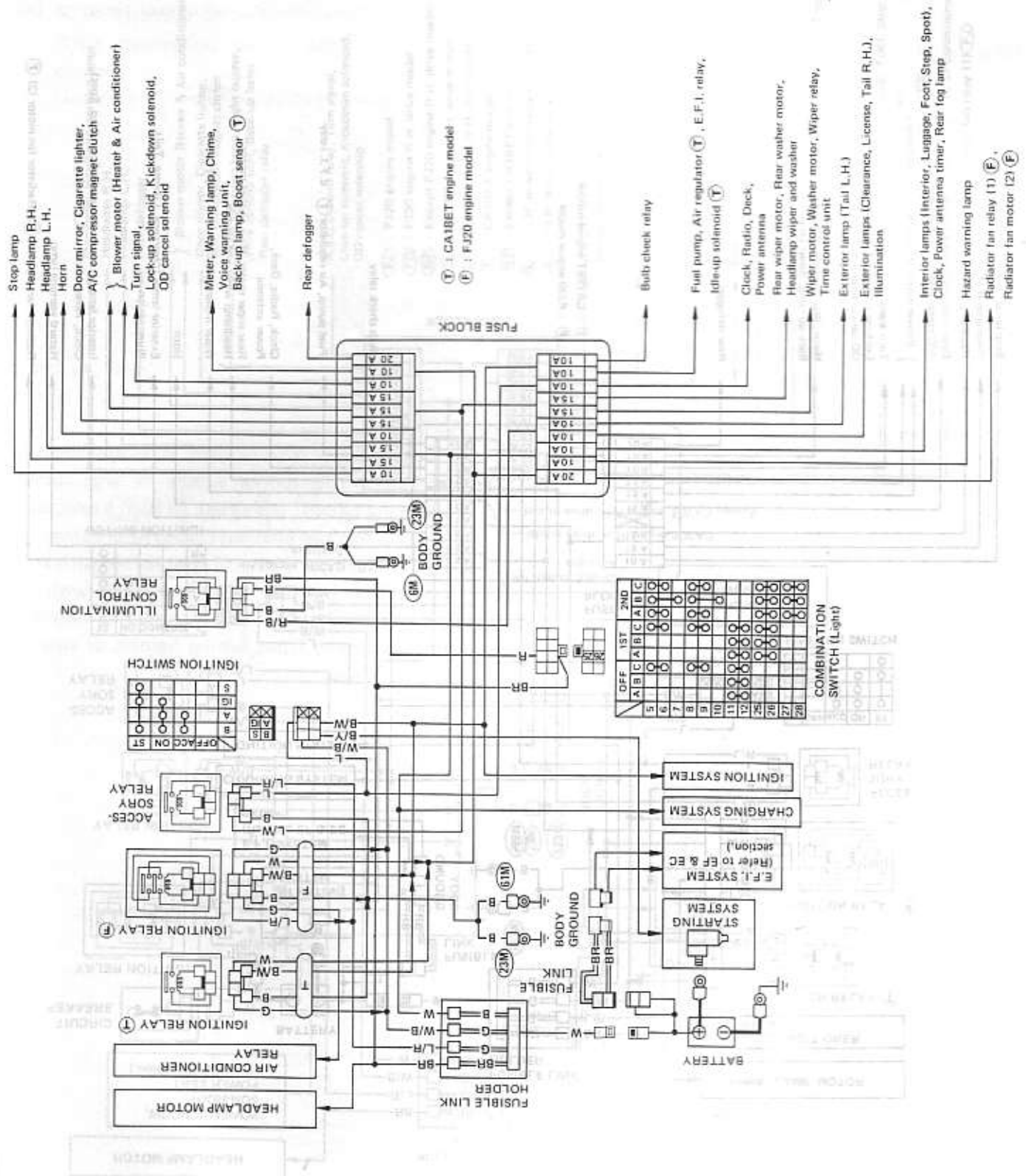
STANDARDIZED RELAY

Type	Outer view	Circuit	Symbols	Case color
1T				BLACK
1M				BLUE
2M				BROWN
1M-1B				GRAY

Example: LW = Blue with White SEL639D

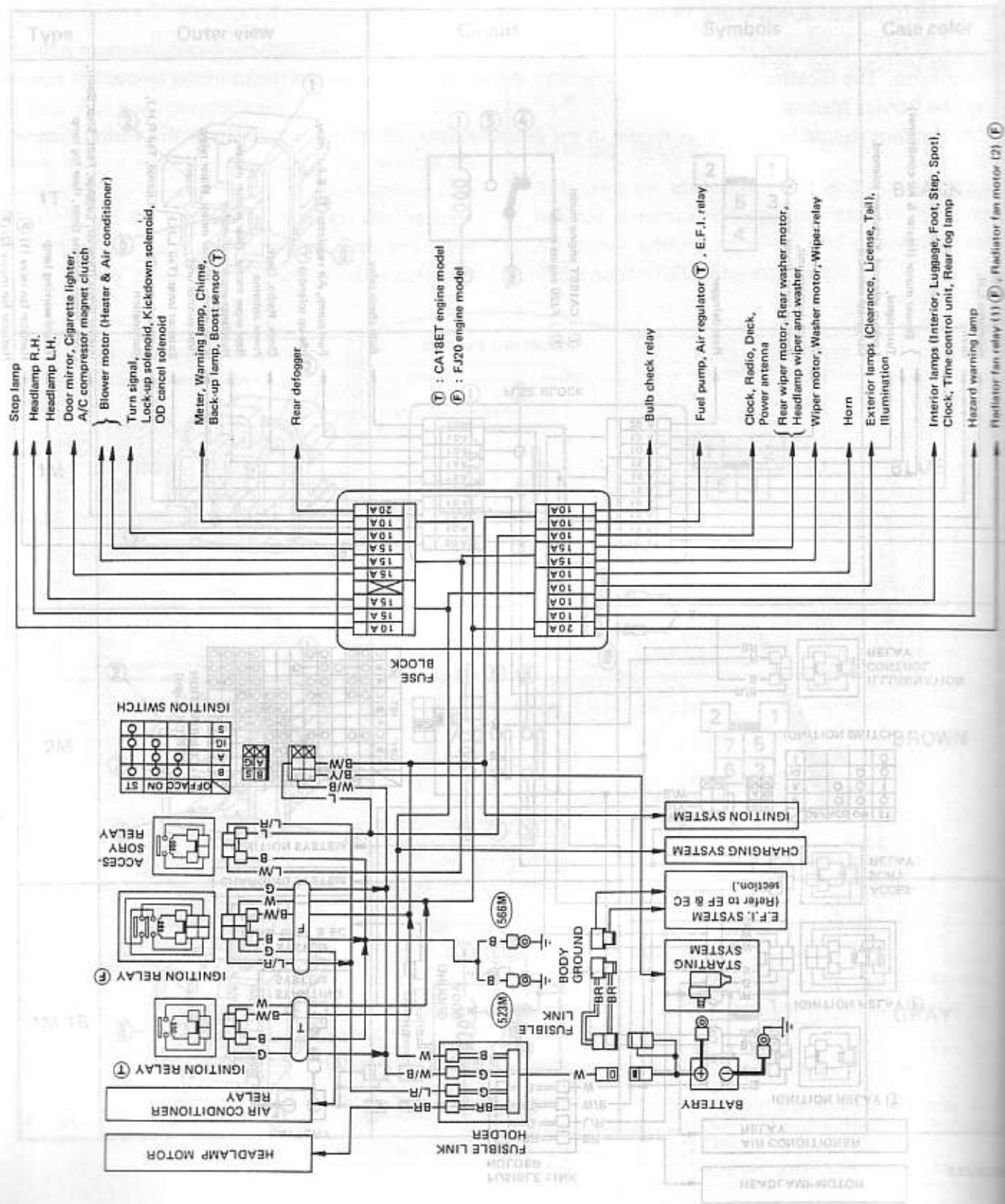
POWER SUPPLY ROUTING

Wiring Diagram (For Europe L.H. drive model)



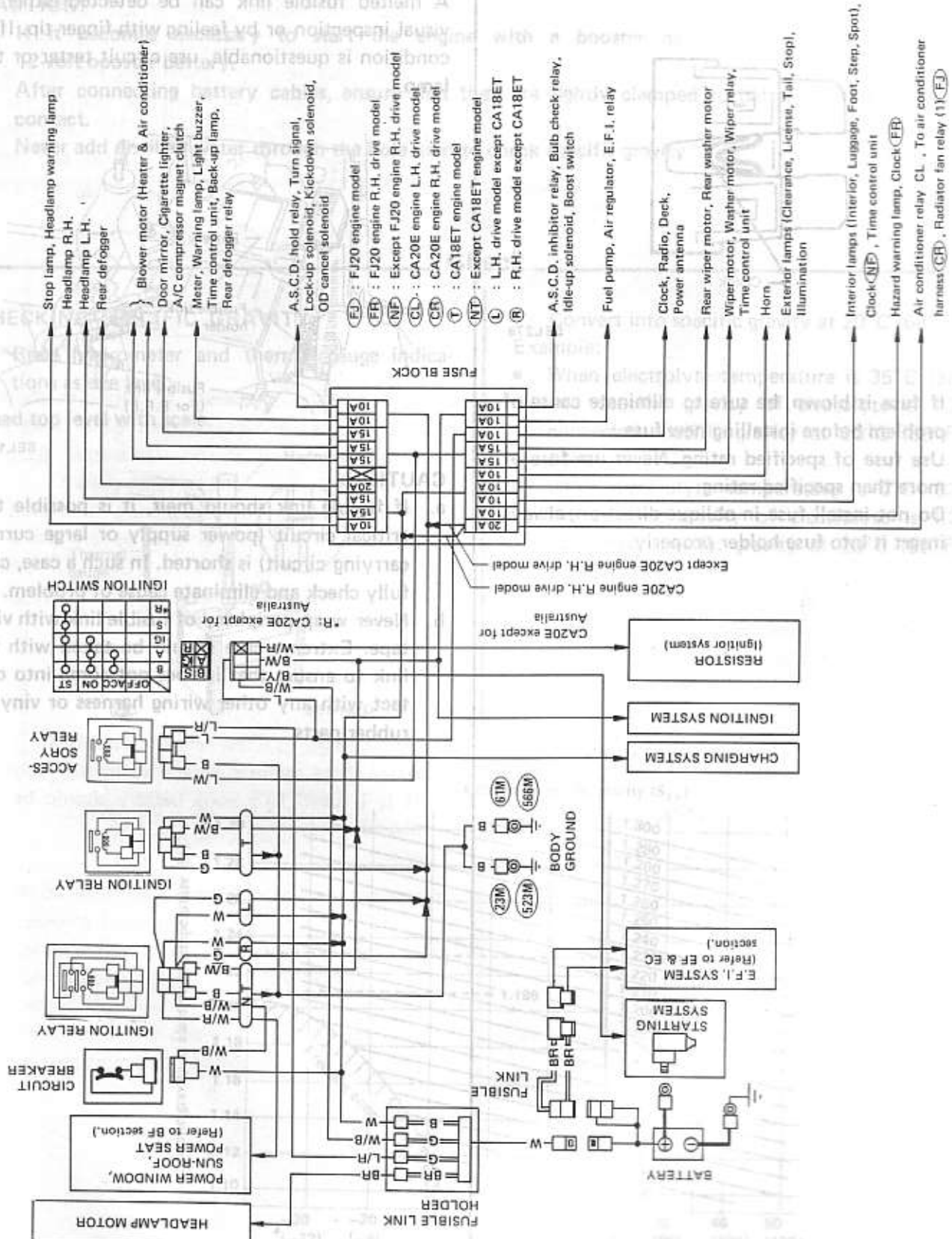
POWER SUPPLY ROUTING

Wiring Diagram (For Europe R.H. drive model)



POWER SUPPLY ROUTING

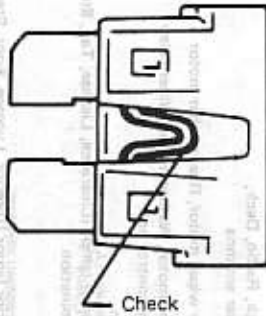
Wiring Diagram (Except for Europe model)



SEL510E

POWER SUPPLY ROUTING

Check

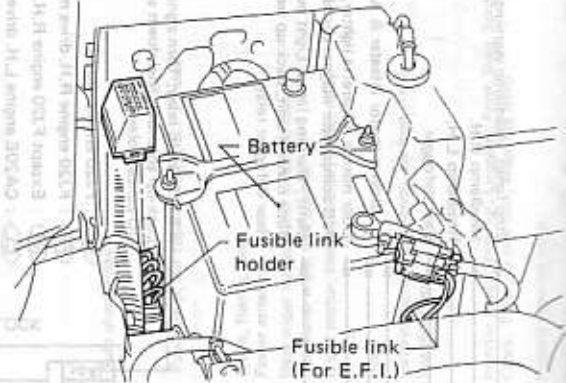


SEL276

- If fuse is blown, be sure to eliminate cause of problem before installing new fuse.
- Use fuse of specified rating. Never use fuse of more than specified rating.
- Do not install fuse in oblique direction; always insert it into fuse holder properly.

Fusible Link

A melted fusible link can be detected either by visual inspection or by feeling with finger tip. If its condition is questionable, use circuit tester or test lamp.



SEL172E

CAUTION:

- If fusible link should melt, it is possible that critical circuit (power supply or large current carrying circuit) is shorted. In such a case, carefully check and eliminate cause of problem.
- Never wrap periphery of fusible link with vinyl tape. Extreme care should be taken with this link to ensure that it does not come into contact with any other wiring harness or vinyl or rubber parts.

BATTERY

CAUTION:

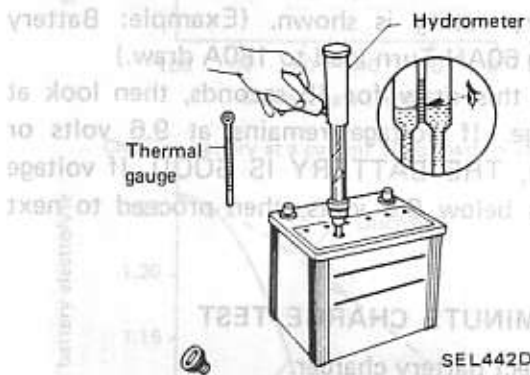
- If it becomes necessary to start the engine with a booster battery and jumper cables, use a 12-volt booster battery.
- After connecting battery cables, ensure that they are tightly clamped to battery terminals for good contact.
- Never add distilled water through the hole used to check specific gravity.

Check

CHECKING SPECIFIC GRAVITY

- Read hydrometer and thermal gauge indications as eye level.

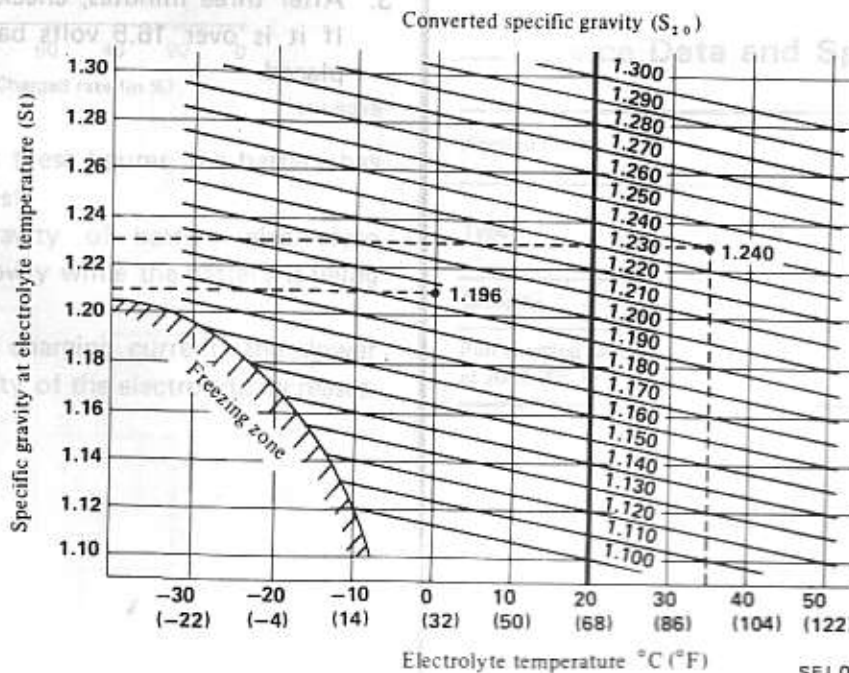
Read top level with scale.



- Convert into specific gravity at 20°C (68°F).

Example:

- When electrolyte temperature is 35°C (95°F) and specific gravity of electrolyte is 1.230, converted specific gravity at 20°C (68°F) is 1.240.
- When electrolyte temperature is 0°C (32°F) and specific gravity of electrolyte is 1.210, converted specific gravity at 20°C (68°F) is 1.196.



Check (Cont'd)

3. Determine charging condition of battery.

- If specific gravity converted at 20°C (68°F) is smaller than values shown below, battery should be recharged.

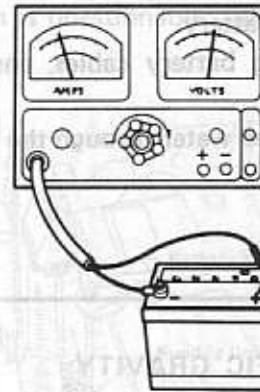
Full charging specific gravity at 20°C (68°F)	Converted specific gravity at 20°C (68°F)
1.26	1.20
1.28	1.22

BELOW

Recharging necessary

Test

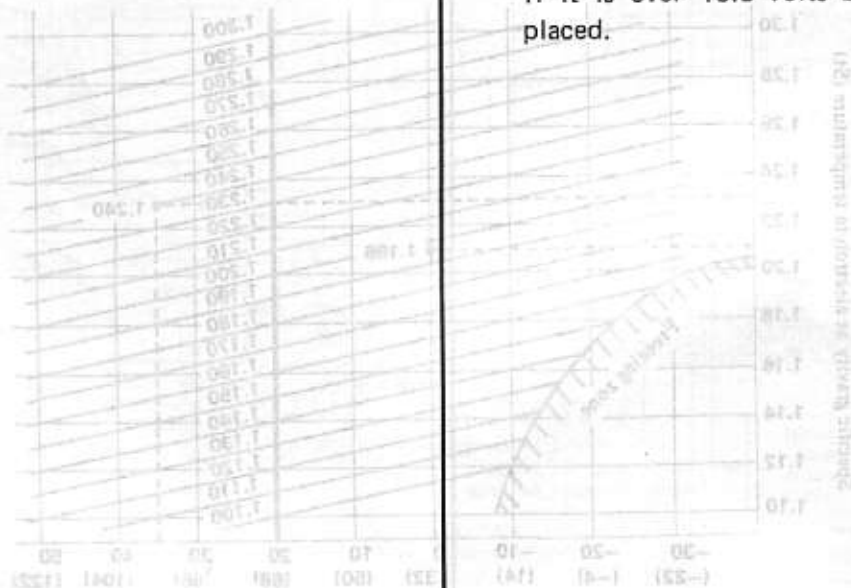
BATTERY CAPACITY TEST



1. With battery connected to tester as shown, turn load knob until a draw of 3 times the battery rating is shown. (Example: Battery rating 60AH Turn load to 180A draw.)
2. Hold this draw for 15 seconds, then look at voltage. If voltage remains at 9.6 volts or above, THE BATTERY IS GOOD. If voltage drops below 9.6 volts, then proceed to next test.

THREE-MINUTE CHARGE TEST

1. Connect battery charger.
2. Turn charger to a fast rate not over 40A.
3. After three minutes, check voltmeter reading. If it is over 16.5 volts battery should be replaced.

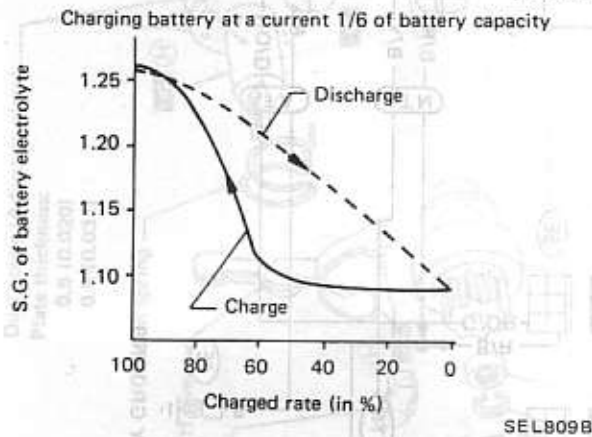
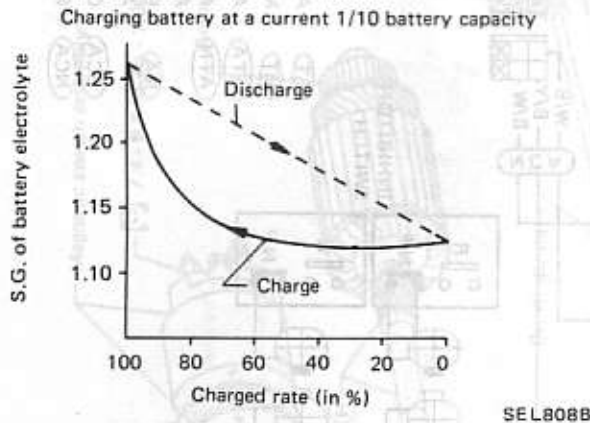


BATTERY

Charging

CHARGING RATE AND SPECIFIC GRAVITY OF BATTERY ELECTROLYTE

The relationship between the charged condition of the battery and the specific gravity of battery electrolyte differs, as shown in figures below, when the battery is discharging and when it is being charged.



As can be seen from these figures, the battery has the following features:

- The specific gravity of battery electrolyte increases very slowly while the battery is being charged.
- The smaller the charging current, the slower the specific gravity of the electrolyte increases.

WARNING:

- Keep battery away from open flame while it is being charged.
- When connecting charger, connect leads first, then turn on charger. Do not turn on charger first, as this may cause a spark.
- Do not allow electrolyte temperature to go over 45°C (113°F).

CHARGING CURRENT AND TIME REQUIRED FOR CHARGING

Charge the battery at 1/10 the current of battery capacity.

Charging current	Time required
1/10 of battery capacity	Approx. 8 - 10 hours
1/6 of battery capacity (But not more than 10-ampere)	Approx. 4 - 5 hours

CAUTION:

Do not use more than 10-ampere current flow to charge the battery quickly, as this will shorten the battery's service life.

Service Data and Specifications

Applied model	Except for Europe	Europe
Type	NS40ZA(S)-MF	55D23R-MF
	Maintenance-free	
Capacity V-AH	12-33	12-60
Full charging specific gravity at 20°C (68°F)	1.26	

Wiring Diagram

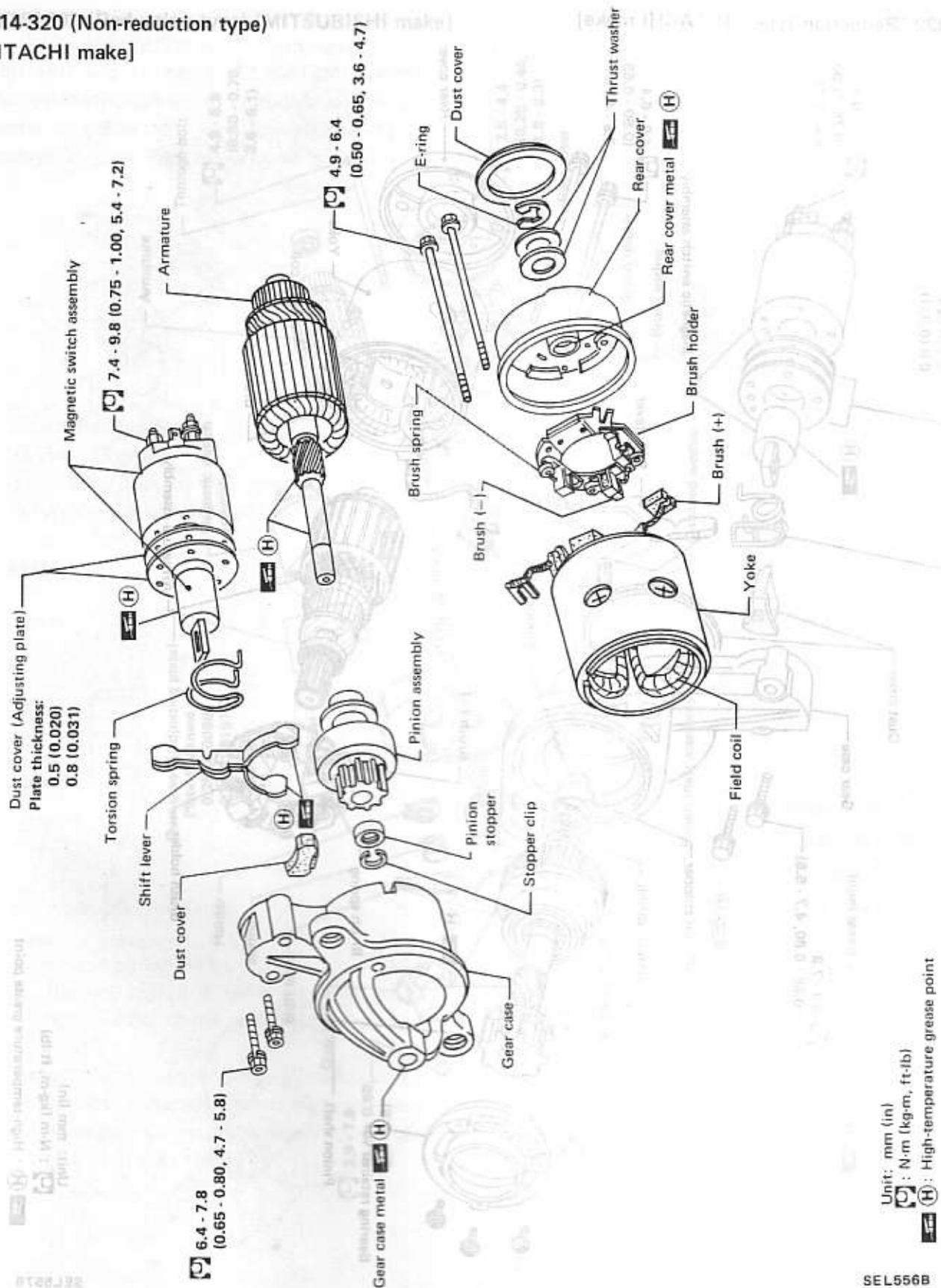


STARTING SYSTEM — Starter —

Construction

S114-320 (Non-reduction type)

[HITACHI make]

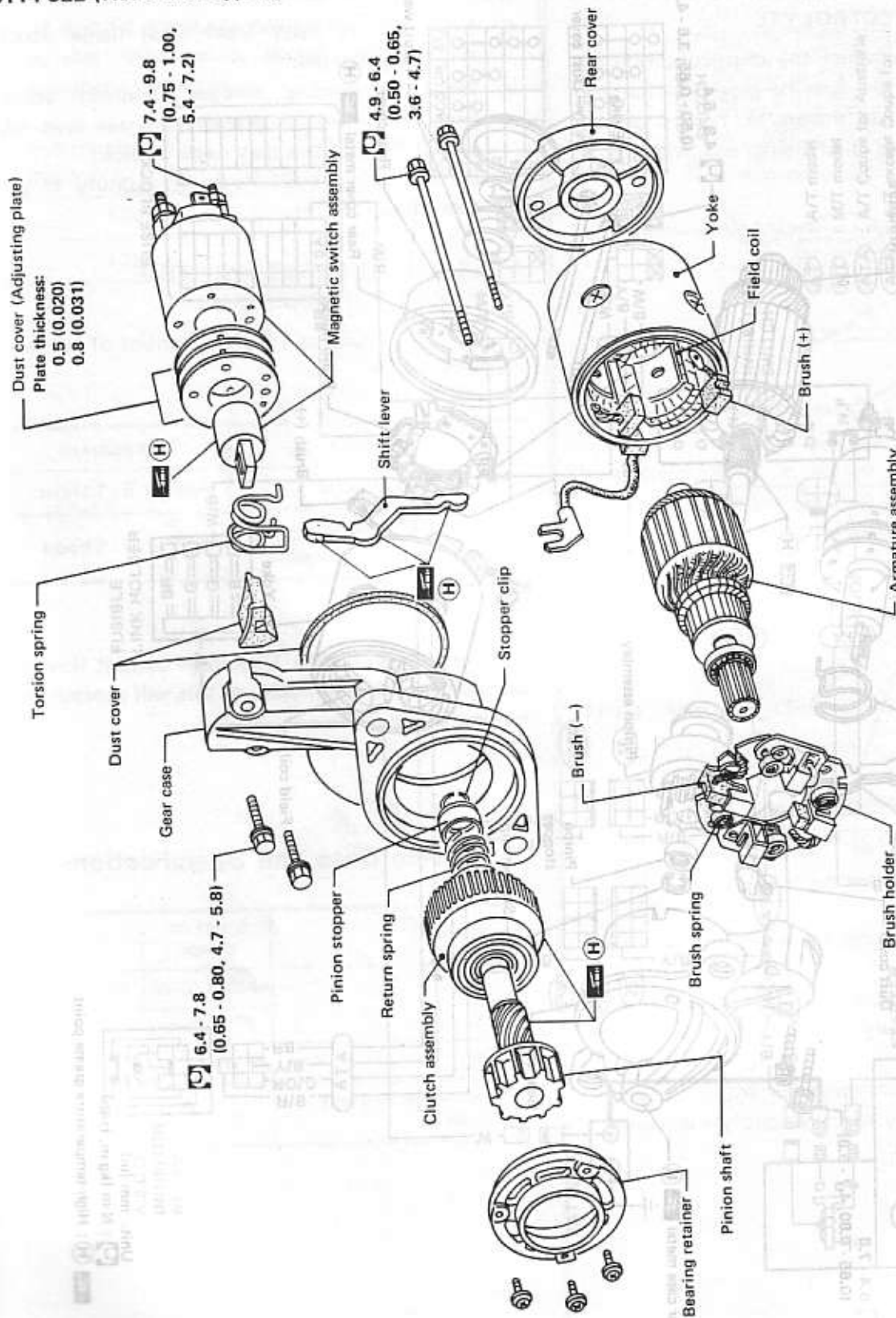


SEL556B

STARTING SYSTEM — Starter —

Construction (Cont'd)

S114-322 (Reduction type) [HITACHI make]



Unit: mm (in)
N·m (kg·m, ft·lb)

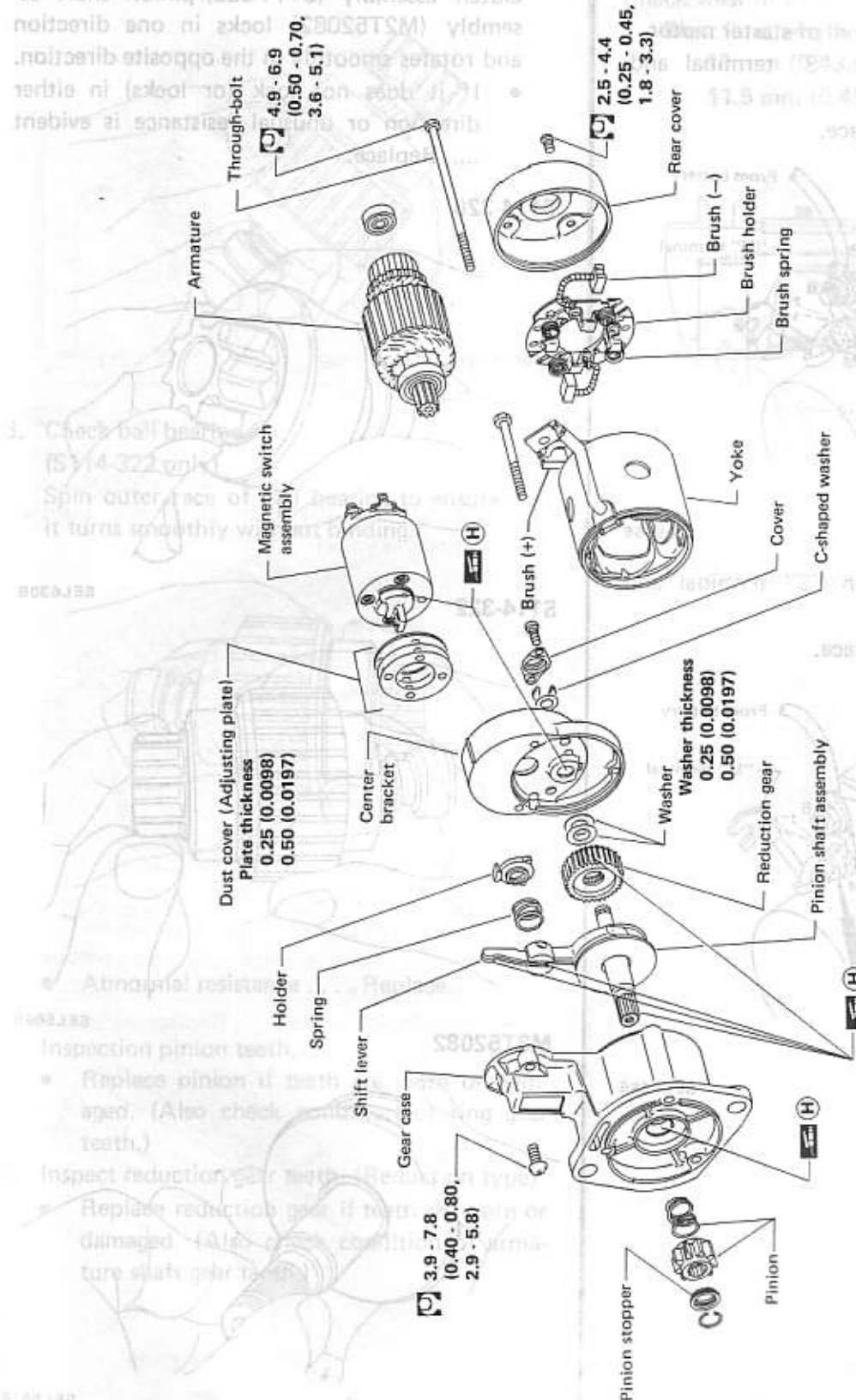
(H) : High-temperature grease point

SEL5578

STARTING SYSTEM — Starter —

Construction (Cont'd)

M2T52082 (Reduction type) [MITSUBISHI make]

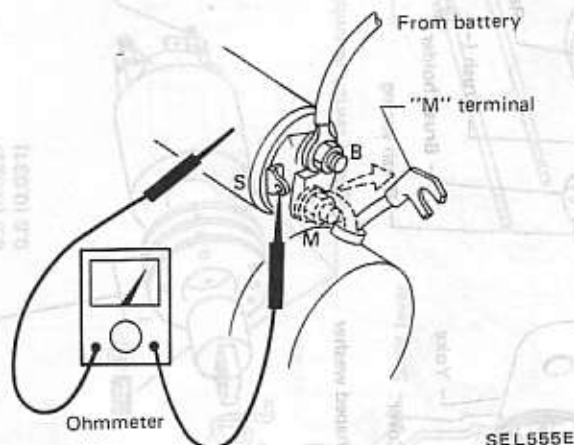


Unit: mm (in)
N·m (kg·m, ft·lb)
High-temperature grease point

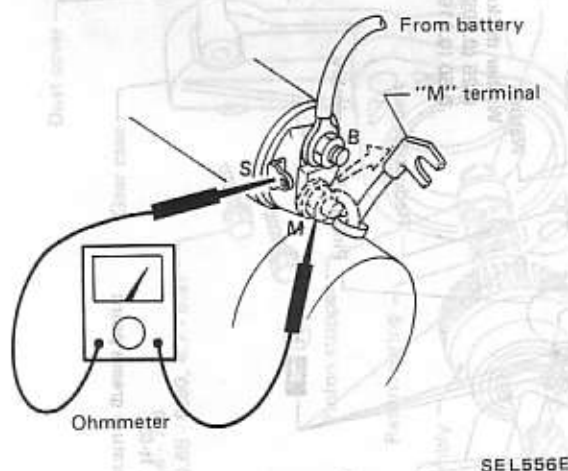
STARTING SYSTEM — Starter —

Magnetic Switch Check

- Before starting to check, disconnect battery ground cable.
 - Disconnect "M" terminal of starter motor.
1. Continuity test (between "S" terminal and switch body).
 - No continuity ... Replace.



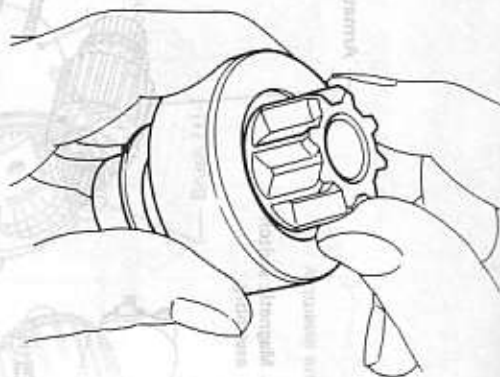
2. Continuity test (between "S" terminal and "M" terminal).
 - No continuity ... Replace.



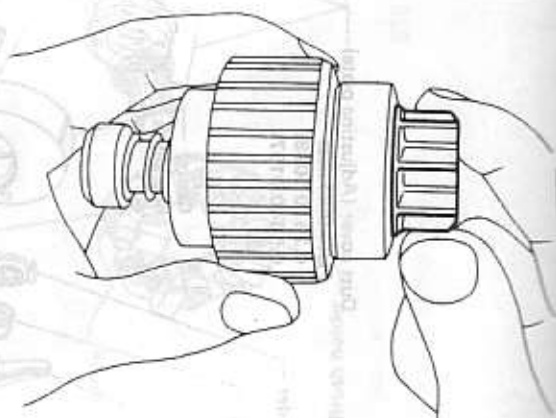
Pinion/Clutch Check

1. Check to see if pinion assembly (S114-320)/clutch assembly (S114-322)/pinion shaft assembly (M2T52082) locks in one direction and rotates smoothly in the opposite direction.
 - If it does not lock (or locks) in either direction or unusual resistance is evident Replace.

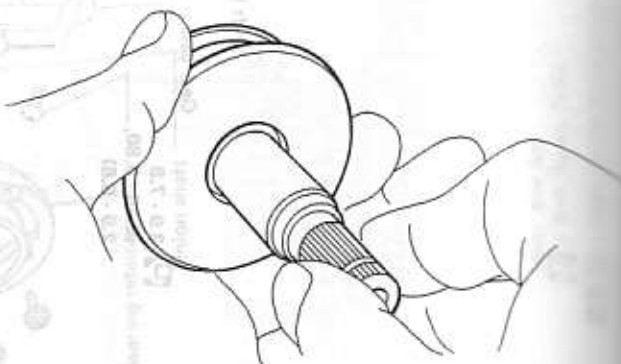
S114-320



S114-322



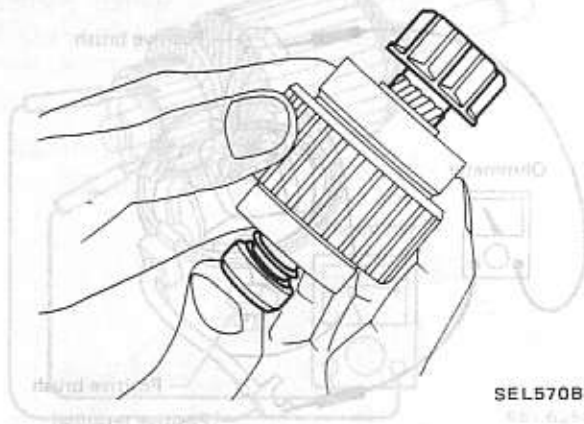
M2T52082



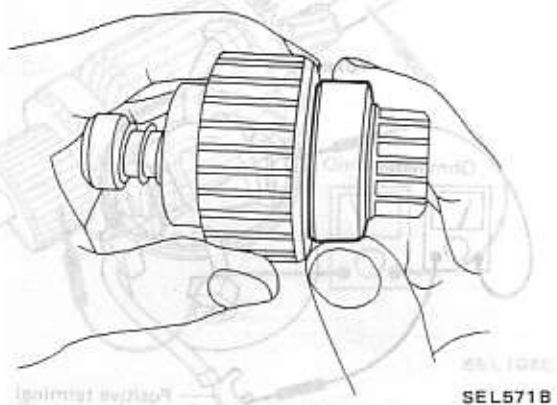
STARTING SYSTEM—Starter—

Pinion/Clutch Check (Cont'd)

2. Check pinion movement. (Reduction type)
(S114-322 only)



3. Check ball bearing.
(S114-322 only)
Spin outer race of ball bearing to ensure that it turns smoothly without binding.



- Abnormal resistance . . . Replace.

4. Inspection pinion teeth.

- Replace pinion if teeth are worn or damaged. (Also check condition of ring gear teeth.)

5. Inspect reduction gear teeth. (Reduction type)

- Replace reduction gear if teeth are worn or damaged. (Also check condition of armature shaft gear teeth.)

Brush Check

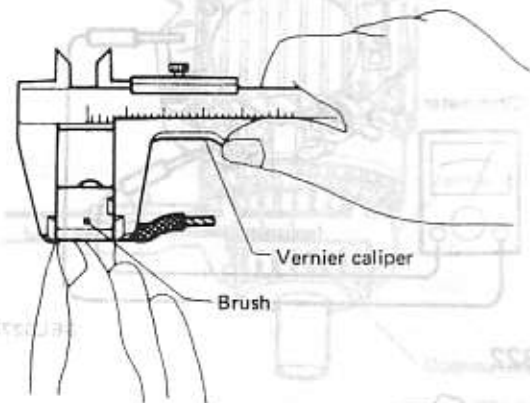
BRUSH

Check wear of brush.

Wear limit length:

11 mm (0.43 in) ... S114-320, S114-322

11.5 mm (0.453 in) ... M2T52082



- Excessive wear . . . Replace.

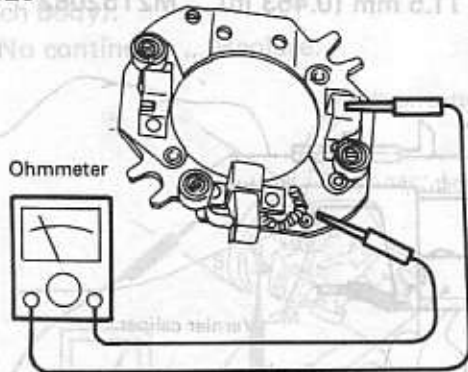
STARTING SYSTEM —Starter—

Brush Check (Cont'd)

BRUSH HOLDER

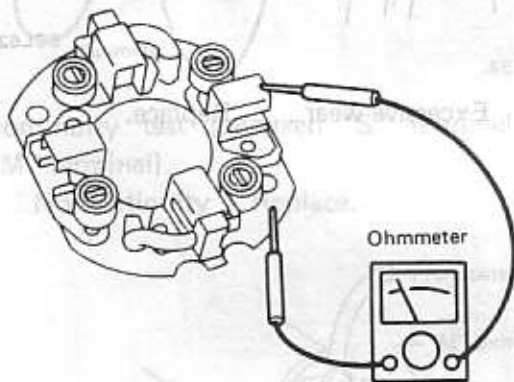
1. Perform insulation test between brush holder (positive side) and its base (negative side).

S114-320



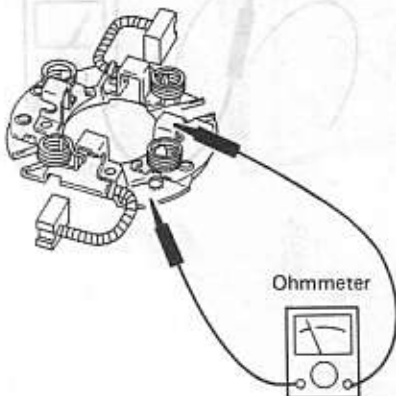
SEL627B

S114-322



SEL568B

M2T52082

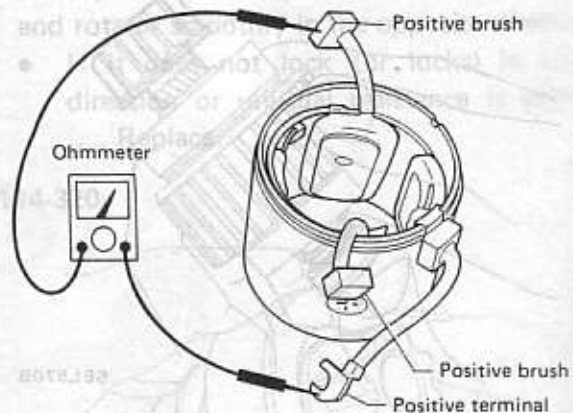


SEL558E

- Continuity exists . . . Replace.
2. Check brush to see if it moves smoothly.
 - If brush holder is bent, replace it; if sliding surface is dirty, clean.

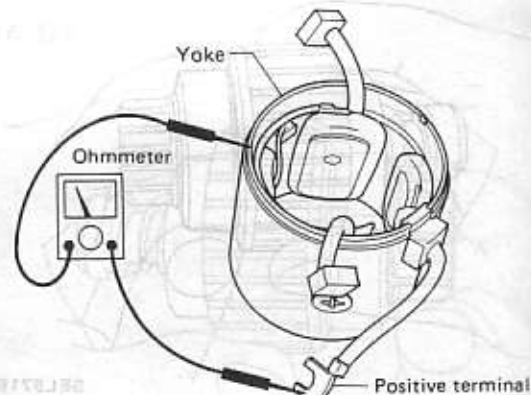
Field Coil Check

1. Continuity test (between field coil positive terminal and positive brushes).



SEL102E

- No continuity . . . Replace field coil.
2. Insulation test (between field coil positive terminal and yoke).



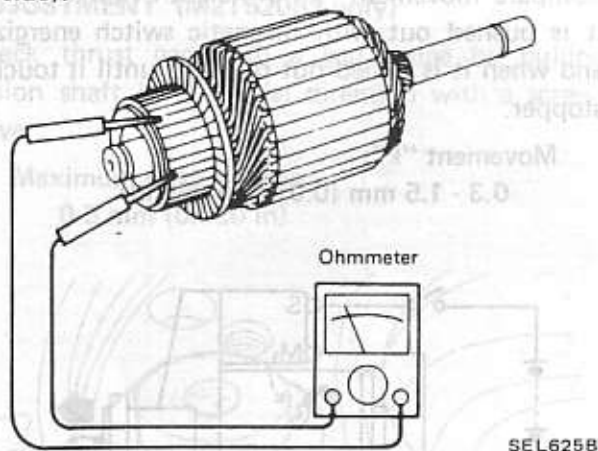
SEL103E

- Continuity exists . . . Replace field coil.

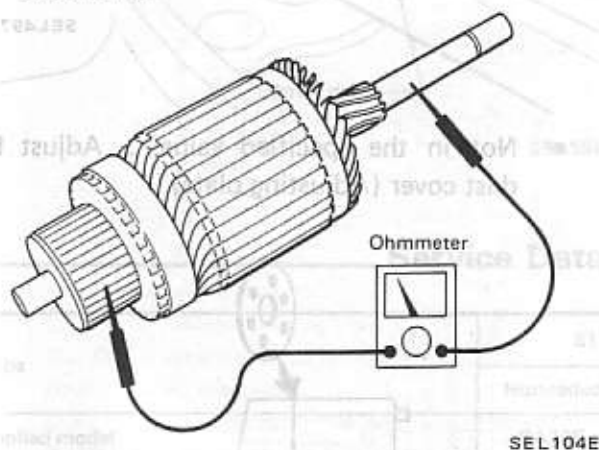
STARTING SYSTEM — Starter —

Armature Check

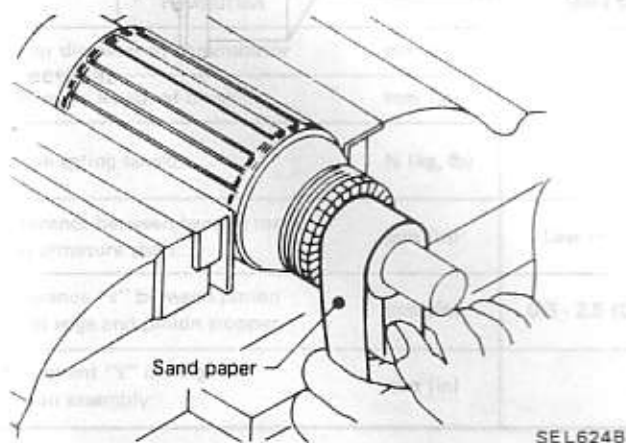
1. Continuity test (between two segments side by side).



- No continuity . . . Replace
2. Insulation test (between each commutator bar and shaft).



- Continuity exists . . . Replace.
3. Check commutator surface.
 - Rough ... Sand lightly with No. 500 - 600 sandpaper.



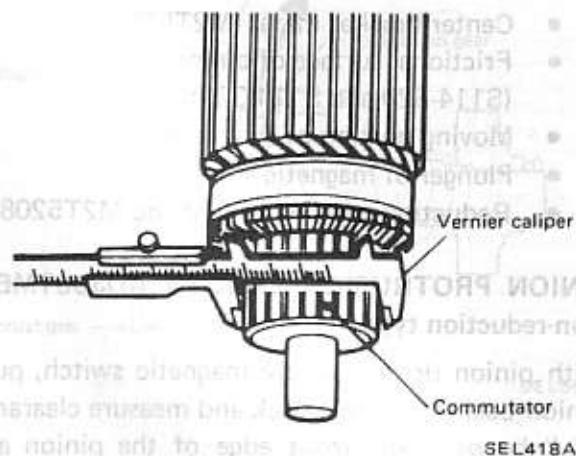
4. Check diameter of commutator.

Commutator minimum diameter:

29 mm (1.14 in) . . . S114-322, M2T52082

39 mm (1.54 in) . . . S114-320

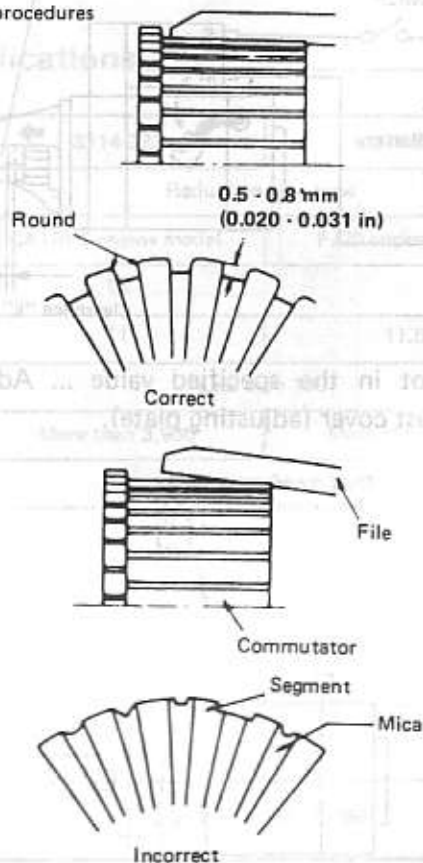
- Less than specified value . . . Replace.



5. Check depth of insulating mica from commutator surface.

- Less than 0.2 mm (0.008 in) ... Undercut to 0.5 - 0.8 mm (0.020 - 0.031 in)

Undercut procedures



STARTING SYSTEM — Starter —

Assembly

Carefully observe the following instructions.

GREASE POINT

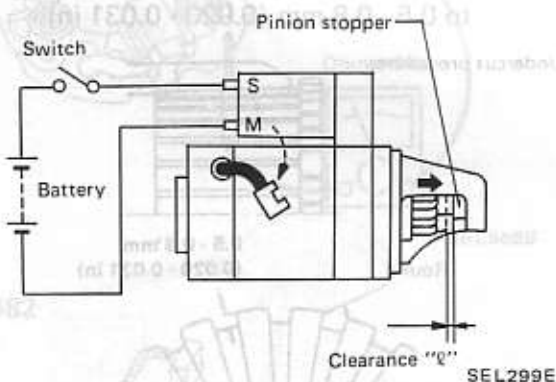
- Rear cover metal (S114-320 only)
- Gear case metal (S114-320 and M2T52082)
- Center bracket metal (M2T52082)
- Frictional surface of pinion (S114-320 and S114-322)
- Moving portion of shift lever
- Plunger of magnetic switch
- Reduction gear (S114-322 and M2T52082)

PINION PROTRUSION LENGTH ADJUSTMENT Non-reduction type

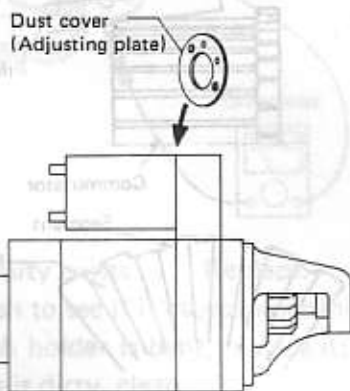
With pinion driven out by magnetic switch, push pinion back to remove slack and measure clearance "ℓ" between the front edge of the pinion and the pinion stopper.

Clearance "ℓ":

0.3 - 2.5 mm (0.012 - 0.098 in)



- Not in the specified value ... Adjust by dust cover (adjusting plate).

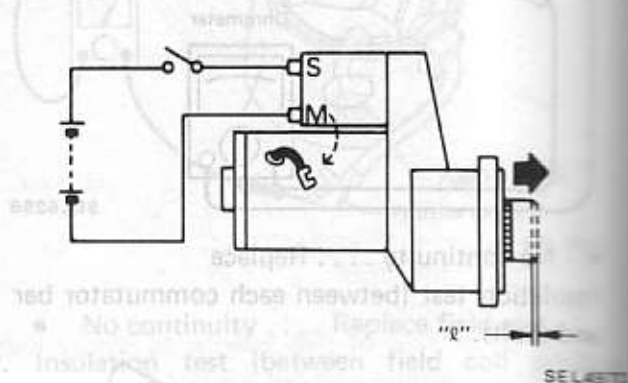


S114-322, M2T52082

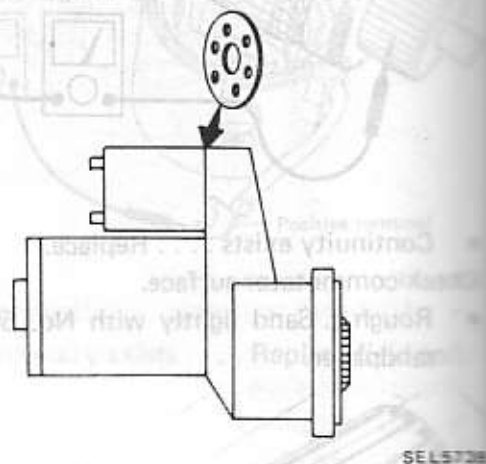
Compare movement "ℓ" in height of pinion when it is pushed out with magnetic switch energized and when it is pulled out by hand until it touches stopper.

Movement "ℓ":

0.3 - 1.5 mm (0.012 - 0.059 in)



- Not in the specified value ... Adjust by dust cover (Adjusting plate).



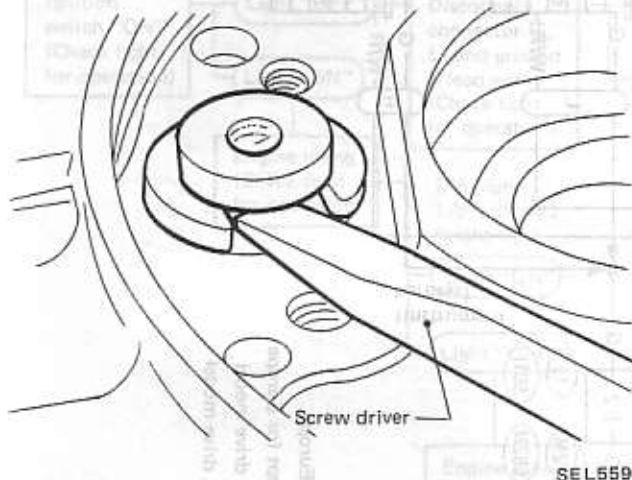
STARTING SYSTEM —Starter—

Assembly (Cont'd)

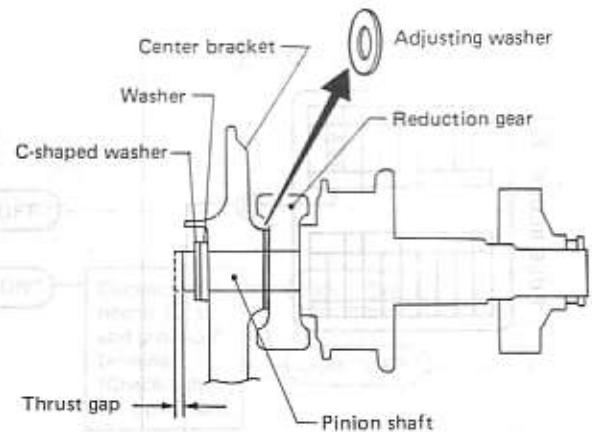
PINION SHAFT THRUST GAP ADJUSTMENT (M2T52082 only)

Check thrust gap with a gap gauge by pulling pinion shaft in the axial direction with a screwdriver.

Maximum of thrust gap:
0.5 mm (0.020 in)



- If thrust gap is over the specified value, adjust it with adjusting washer.



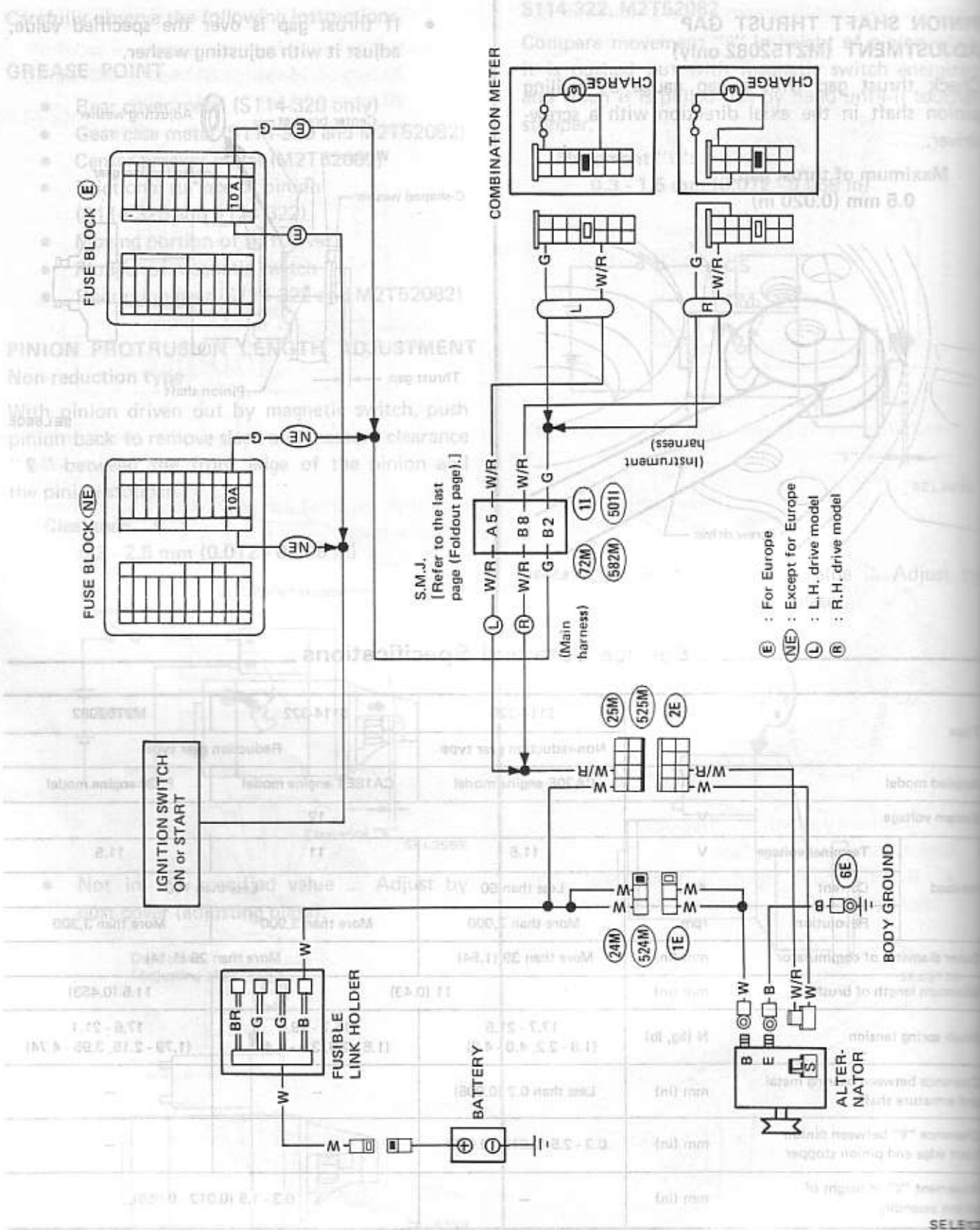
SEL560E

Service Data and Specifications

Type		S114-320		S114-322		M2T52082	
		Non-reduction gear type		Reduction gear type			
Applied model		CA20E engine model		CA18ET engine model		FJ20 engine model	
System voltage		V		12			
No-load	Terminal voltage	V	11.5	11		11.5	
	Current	A	Less than 60	Less than 100			
	Revolution	rpm	More than 7,000	More than 3,900		More than 3,300	
Outer diameter of commutator		mm (in)	More than 39 (1.54)	More than 29 (1.14)			
Minimum length of brush		mm (in)	11 (0.43)			11.5 (0.453)	
Brush spring tension		N (kg, lb)	17.7 - 21.6 (1.8 - 2.2, 4.0 - 4.9)	15.7 - 19.6 (1.6 - 2.0, 3.5 - 4.4)		17.6 - 21.1 (1.79 - 2.15, 3.95 - 4.74)	
Clearance between bearing metal and armature shaft		mm (in)	Less than 0.2 (0.008)	—		—	
Clearance "ℓ" between pinion front edge and pinion stopper		mm (in)	0.3 - 2.5 (0.012 - 0.098)	—		—	
Movement "ℓ" in height of pinion assembly		mm (in)	—	0.3 - 1.5 (0.012 - 0.059)			

CHARGING SYSTEM

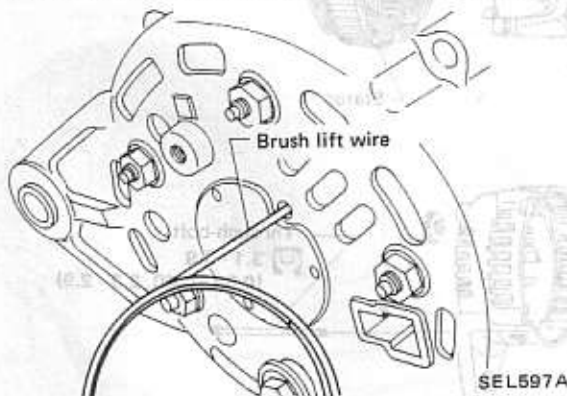
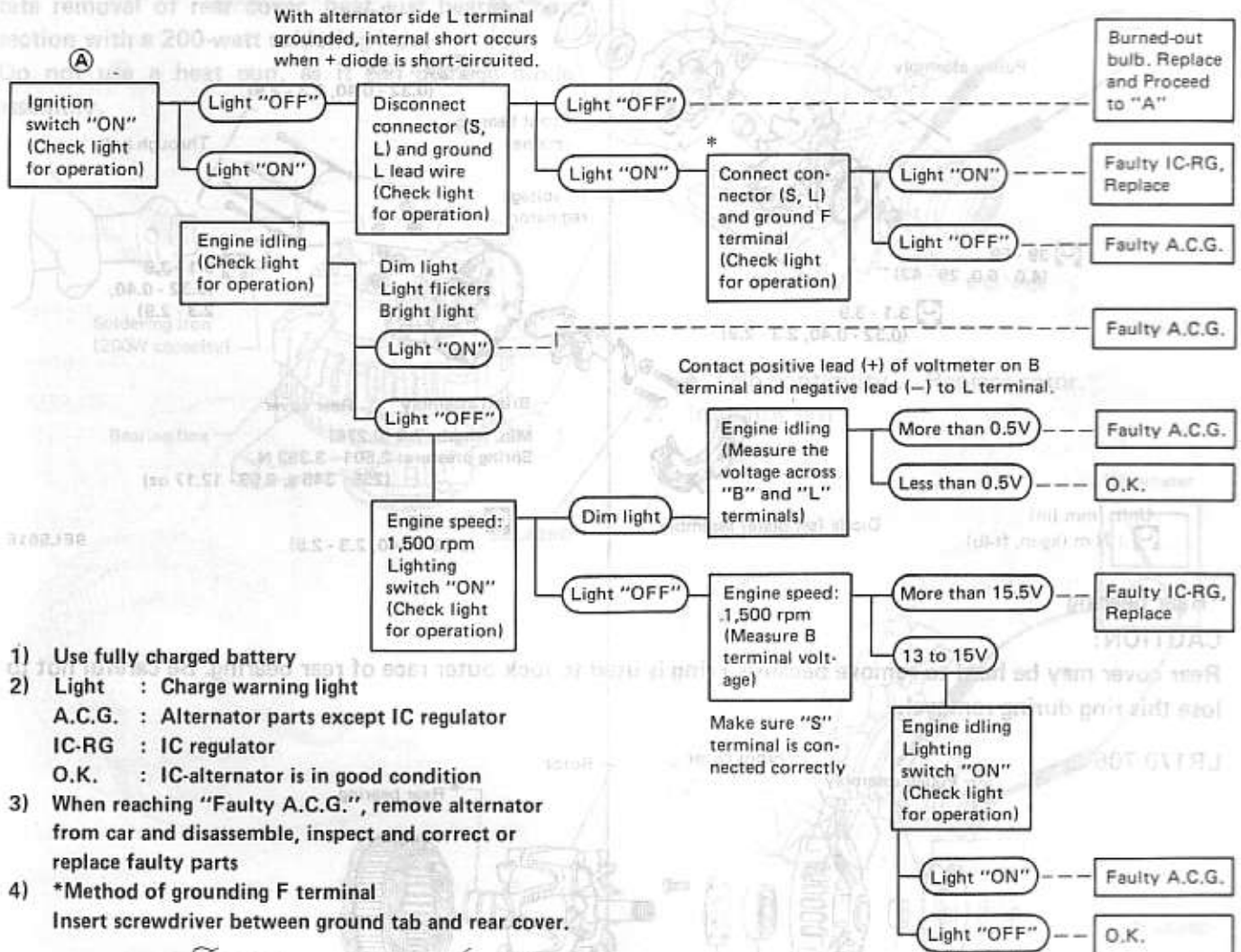
Wiring Diagram



CHARGING SYSTEM

Trouble-shooting

Before conducting an alternator test, make sure that the battery is fully charged. A 30-Volt voltmeter and suitable test probes are necessary for the test. The alternator can be checked easily by referring to the Inspection Table.

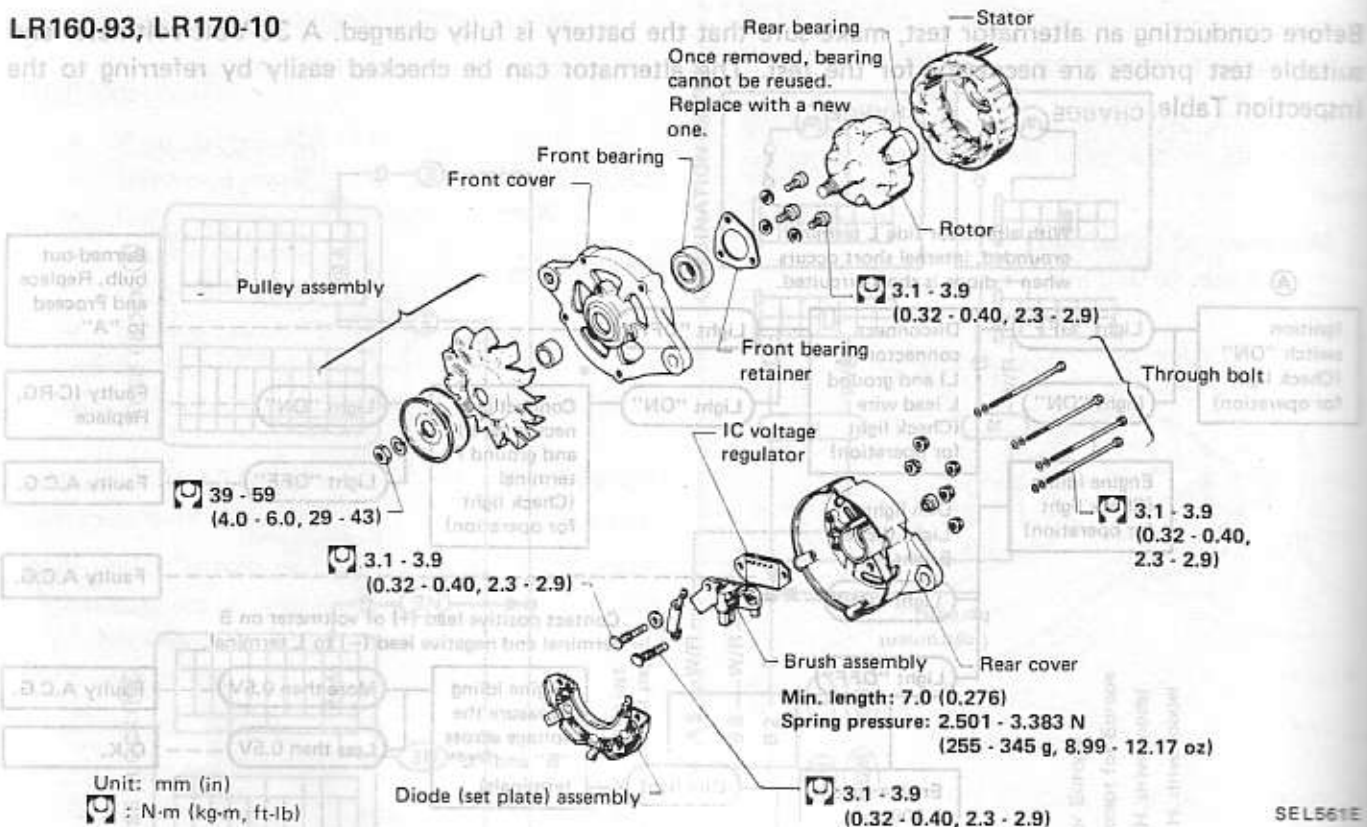


- 5) Terminals "S", "L", "BAT" and "E" are marked on rear cover of alternator.

CHARGING SYSTEM — Alternator —

Construction

LR160-93, LR170-10

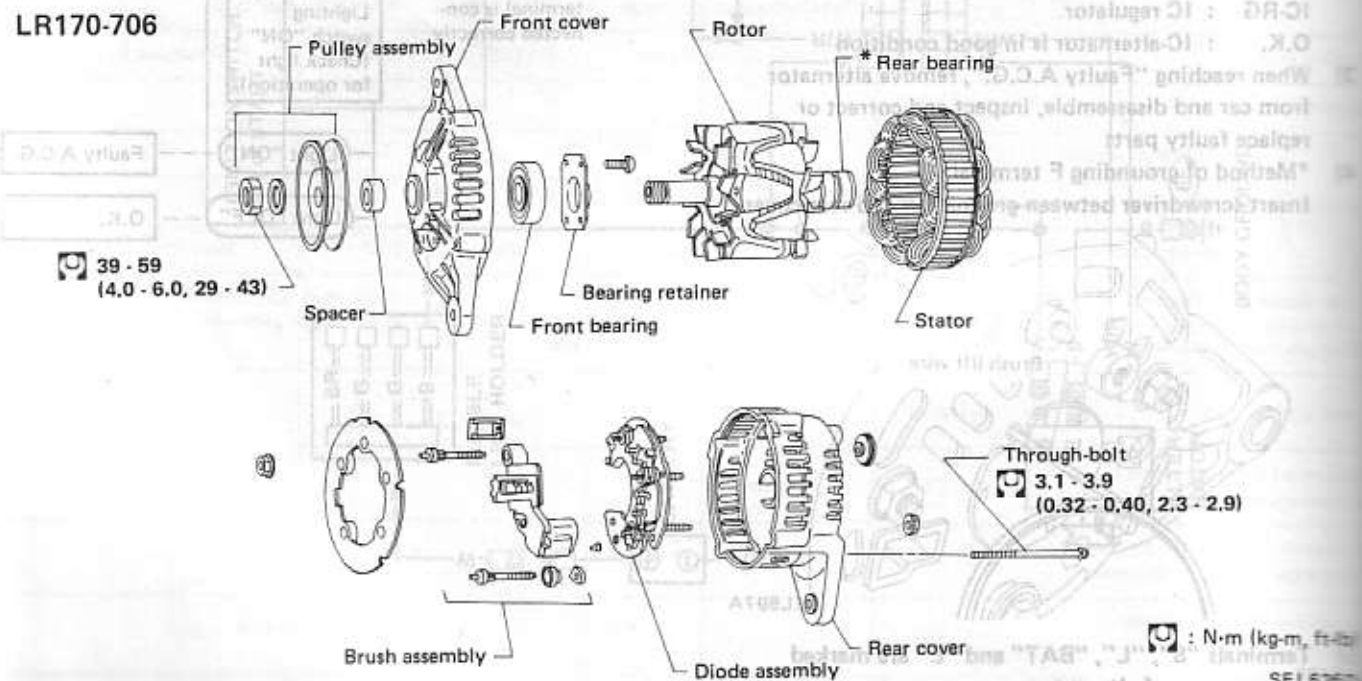


*Rear bearing

CAUTION:

Rear cover may be hard to remove because a ring is used to lock outer race of rear bearing. Be careful not to lose this ring during removal.

LR170-706



CHARGING SYSTEM — Alternator —

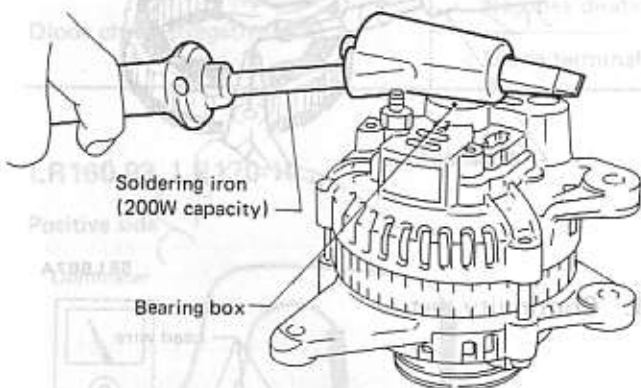
Disassembly

LR170-706

CAUTION:

Rear cover may be hard to remove because a ring is used to lock outer race of rear bearing. To facilitate removal of rear cover, heat just bearing box section with a 200-watt soldering iron.

Do not use a heat gun, as it can damage diode assembly.



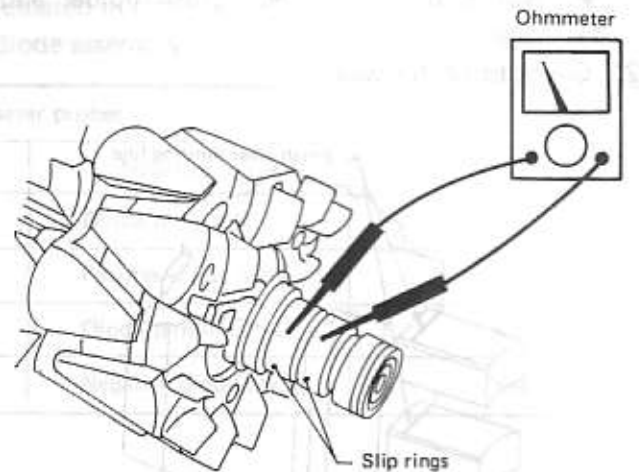
SEL628D



Continuity exists ... Replace stator.

Rotor Slip Ring Check

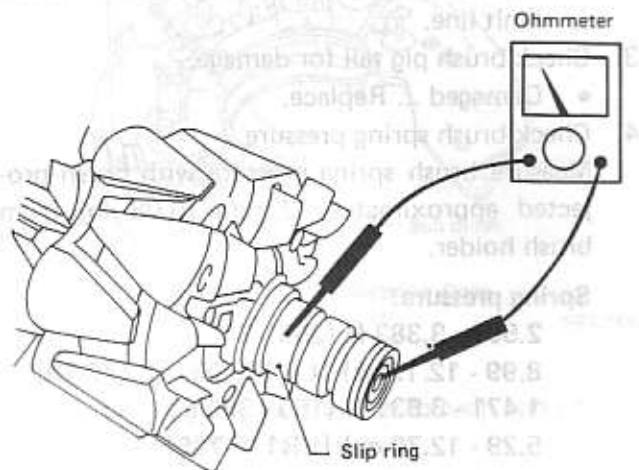
1. Continuity test



SEL629D

- No continuity ... Replace rotor.

2. Insulator test



SEL630D

- Continuity exists ... Replace rotor.

3. Check slip ring for wear.

Slip ring minimum outer diameter:

30.0 mm (1.181 in) [LR160-93]

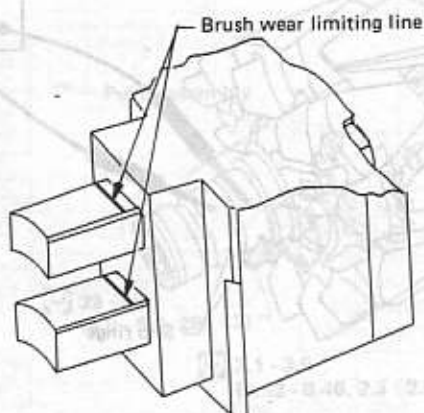
21.6 mm (0.850 in) [LR170-706]

30.6 mm (1.205 in) [LR170-10]

CHARGING SYSTEM — Alternator —

Brush Check

1. Check smooth movement of brush.
 - Not smooth ... Check brush holder and clean.
2. Check brush for wear.



SEL631D

- Replace brush if it is worn down to the limit line.

3. Check brush pig tail for damage.

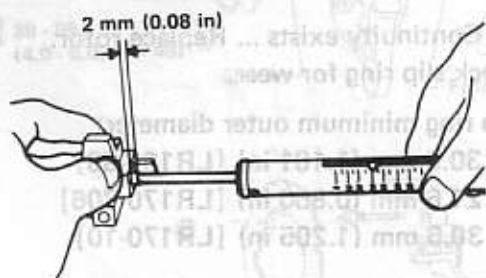
- Damaged ... Replace.

4. Check brush spring pressure.

Measure brush spring pressure with brush projected approximately 2 mm (0.08 in) from brush holder.

Spring pressure:

2.501 - 3.383 N (255 - 345 g,
8.99 - 12.17 oz) [LR160-93, LR170-10]
1.471 - 3.531 N (150 - 360 g,
5.29 - 12.70 oz) [LR170-706]



EE049

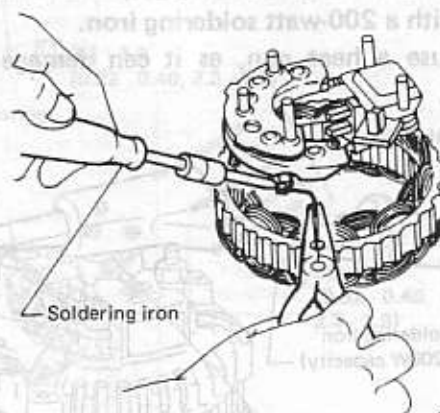
- Not in the specified value ... Replace.

Stator Check

To test the stator or diode, you must separate them by unsoldering the connecting wires.

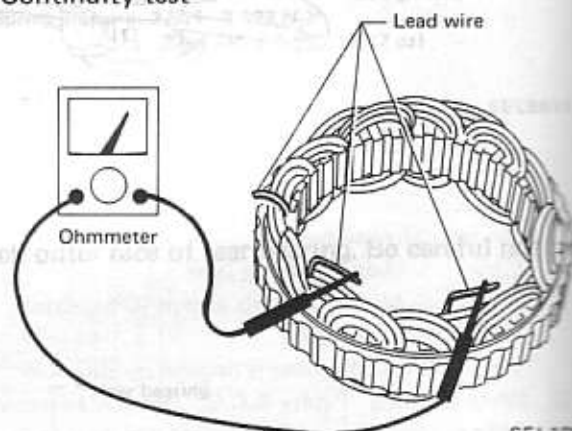
CAUTION:

Use only as much heat as required to melt solder. Diodes will be damaged by excessive heat.



SEL587A

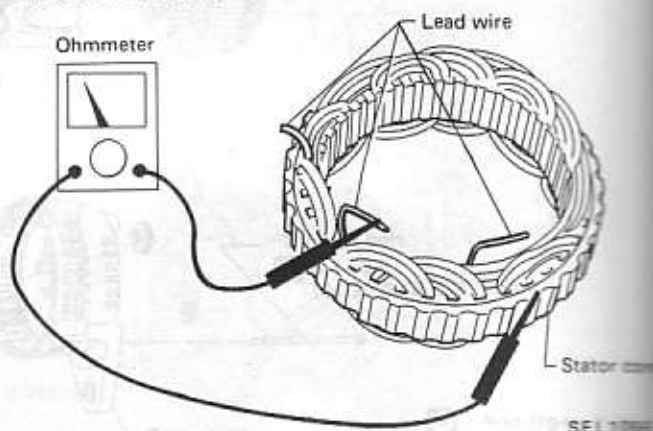
1. Continuity test



SEL10EE

- No continuity ... Replace stator.

2. Ground test



SEL10EE

- Continuity exists ... Replace stator.

CHARGING SYSTEM — Alternator —

Diode Check

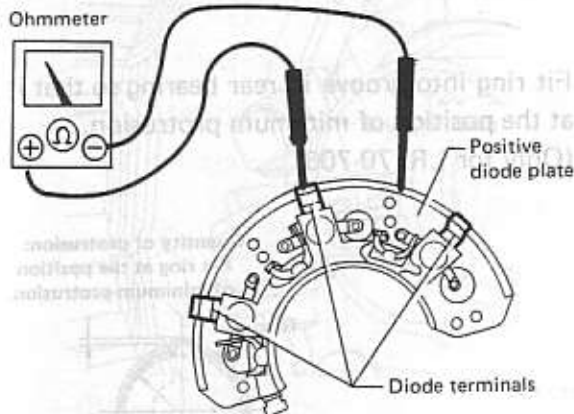
DIODE

- Use an ohmmeter to check condition of diodes as indicated in chart below.
- If any of the test results is not satisfactory, replace diode assembly.

	Ohmmeter probes		Continuity
	Positive ⊕	Negative ⊖	
Diode check (Positive side)	Positive diode plate	Diode terminals	Yes
	Diode terminals	Positive diode plate	No
Diode check (Negative side)	Negative diode plate	Diode terminals	No
	Diode terminals	Negative diode plate	Yes

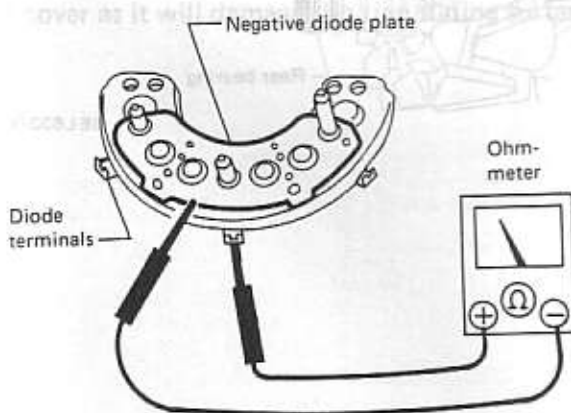
LR160-93, LR170-10

Positive side



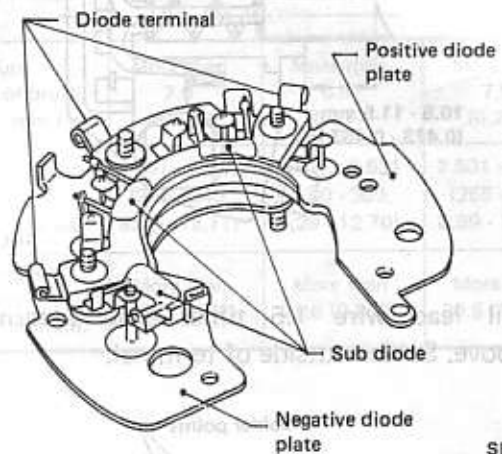
SEL319E

Negative side



SEL320E

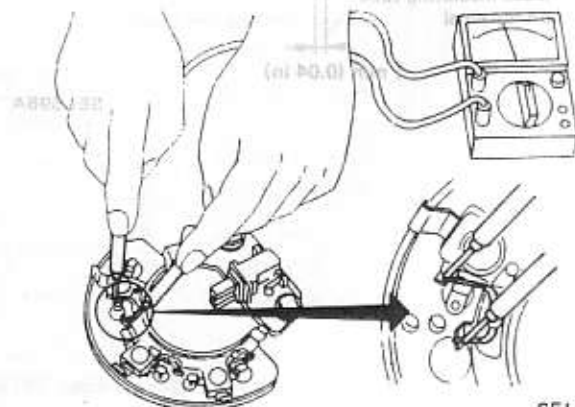
LR170-706



SEL768D

SUB-DIODE

- Attach ohmmeter's probe to each end of diode to check for continuity.
- If, after reversing ohmmeter probes, continuity still exists, or still does not exist, sub-diode is faulty and diode assembly must be replaced.



SEL593A

CHARGING SYSTEM —Alternator—

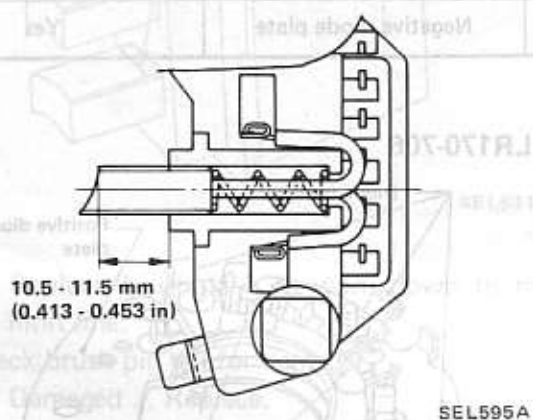
Reassembly

Carefully observe the following instructions.

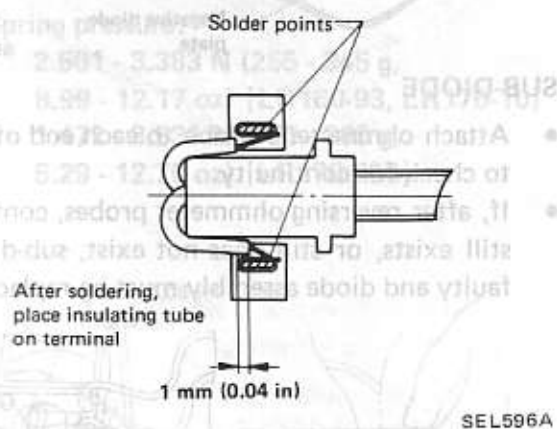
1. When soldering each stator coil lead wire to diode assembly terminal, carry out the operation as fast as possible.
2. When soldering brush lead wire, observe the following.

LR160-93, LR170-10

- (1) Position brush so that it extends 11 mm (0.43 in) from brush holder.

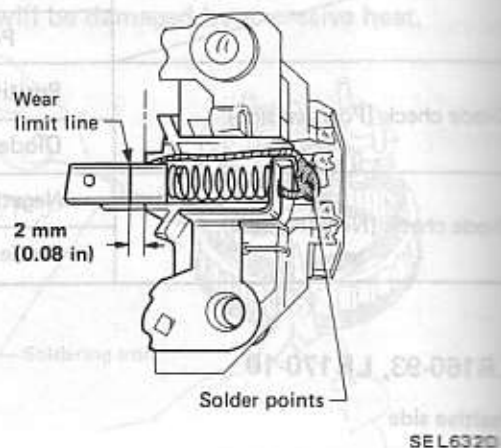


- (2) Coil lead wire 1.5 times around terminal groove. Solder outside of terminal.

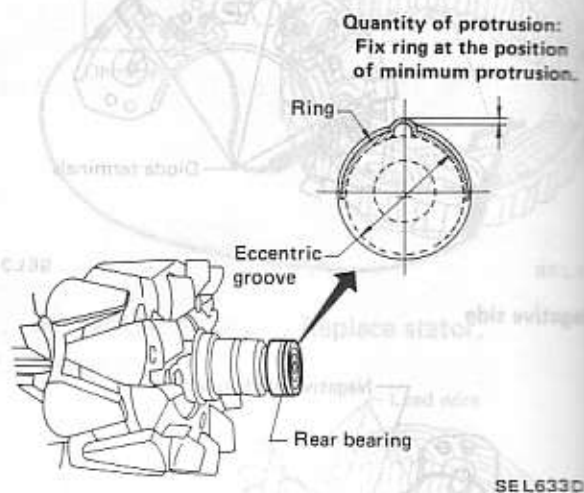


LR170-706

- Position brush so that its wear limit line protrudes 2 mm (0.08 in) beyond end face of brush holder.



3. Fit ring into groove in rear bearing so that it is at the position of minimum protrusion.
(Only for LR170-706)

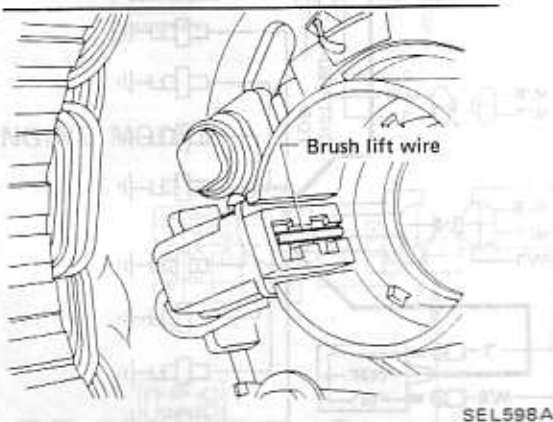
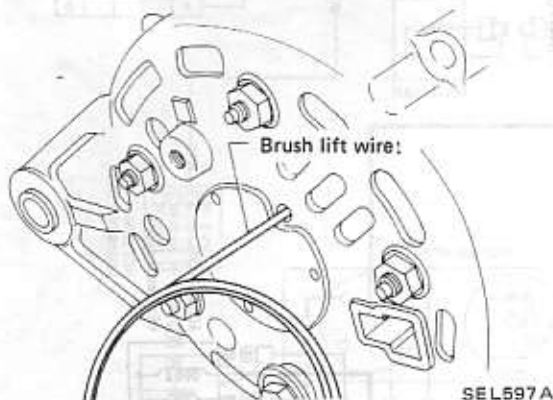


CHARGING SYSTEM — Alternator —

Reassembly (Cont'd)

- Before installing front cover with pulley and rotor with rear cover, push brush up with fingers and retain brush, by inserting brush lift into brush lift hole from outside.

After installing, remove wire for brush lift.



- After installing front and rear sides of alternator, pull brush lift by pushing toward center.

Do not pull brush lift by pushing toward outside of cover as it will damage slip ring sliding surface.

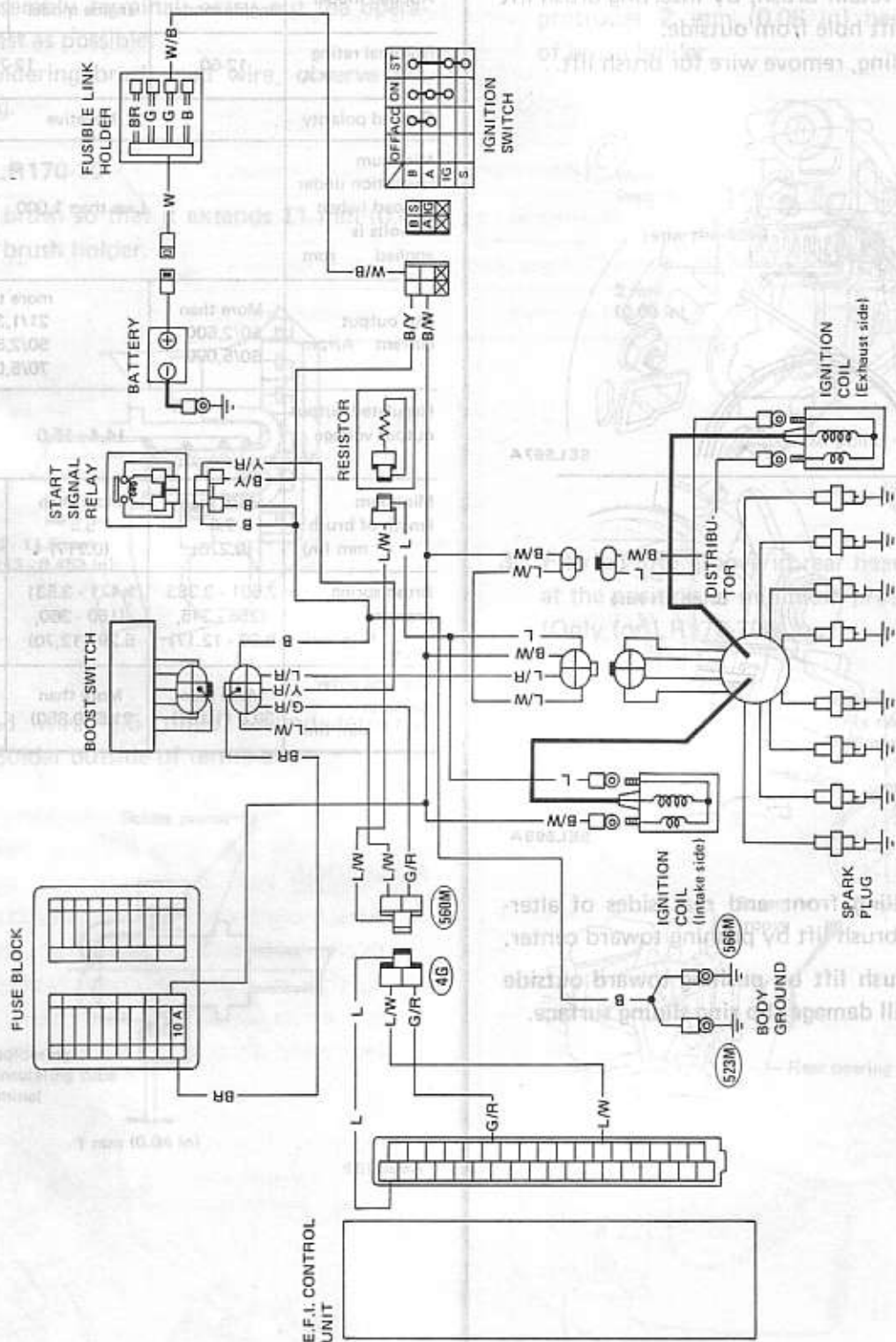
Service Data and Specifications

Type	LR160-93	LR170-706	LR170-10
Applied model	CA20E engine model	CA18ET engine model	FJ20 engine model
Nominal rating V-A	12-60	12-70	
Ground polarity	Negative		
Minimum revolution under no-load (when 14 volts is applied rpm	Less than 1,000		
Hot output current A/rpm	More than 50/2,500 60/5,000	more than 21/1,300 50/2,500 70/5,000	
Regulated output output voltage V	14.4 - 15.0		
Minimum length of brush mm (in)	More than 7.0 (0.276)	More than 5.5 (0.217)	More than 7.0 (0.276)
Brush spring pressure N (g, oz)	2.501 - 3.383 (255 - 345, 8.99 - 12.17)	1.471 - 3.531 (150 - 360, 5.29 - 12.70)	2.501 - 3.383 (255 - 345, 8.99 - 12.17)
Slip ring outer diameter mm (in)	More than 30.0 (1.181)	More than 21.6 (0.850)	More than 30.6 (1.205)

IGNITION SYSTEM (Non-turbocharger model)

Wiring Diagram

CA20E ENGINE MODEL FOR AUSTRALIA



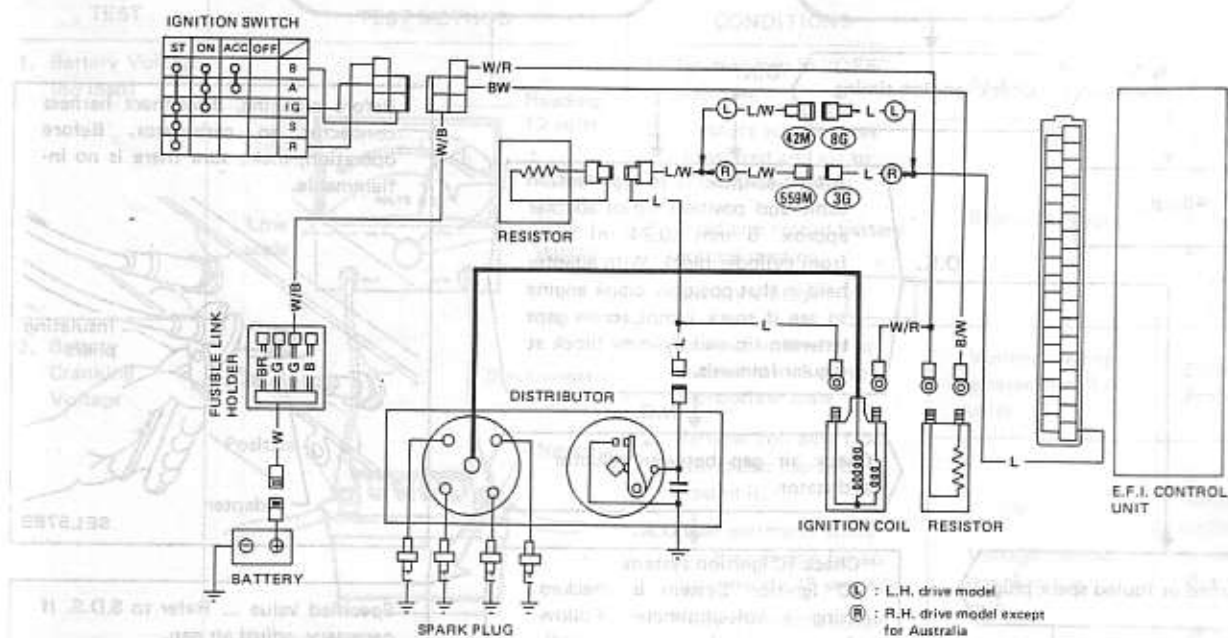
- For ignition system for turbocharger model, refer to EF section.

SELSTE

IGNITION SYSTEM (Non-turbocharger model)

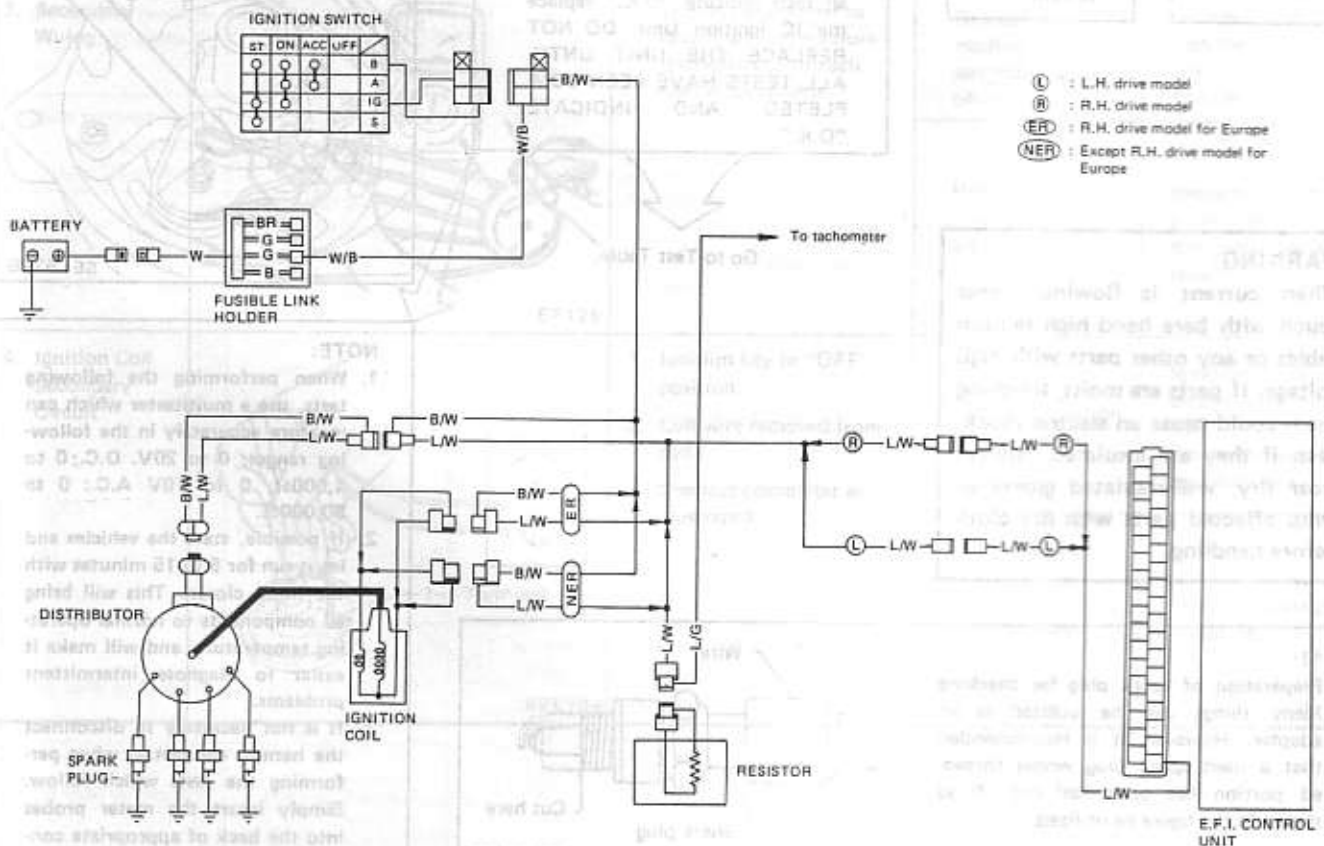
Wiring Diagram (Cont'd)

CA20E ENGINE MODEL EXCEPT FOR AUSTRALIA



SEL514E

FJ20 ENGINE MODEL

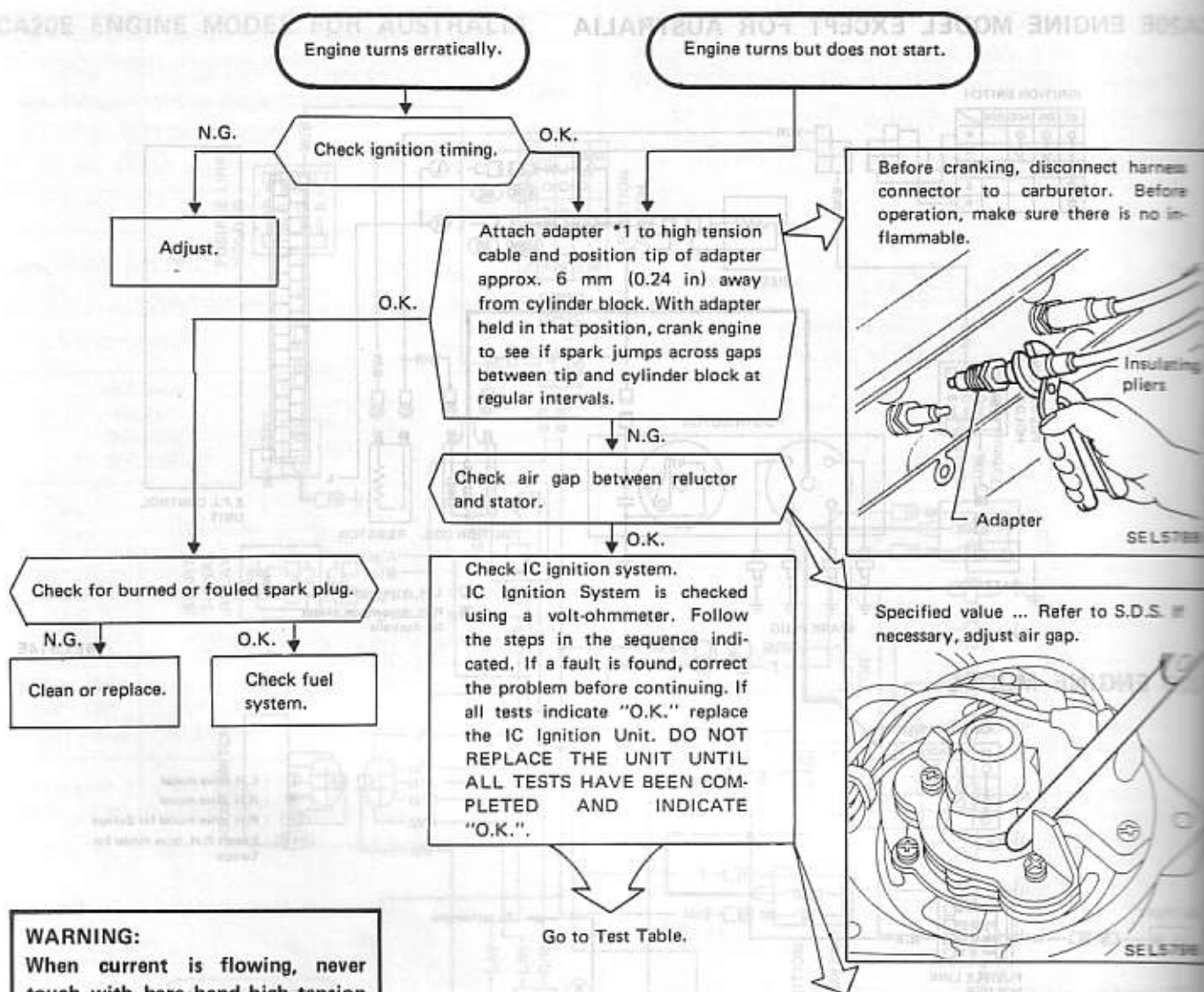


SEL515E

- For ignition system for the turbocharger model, refer to EF section.

IGNITION SYSTEM (Non-turbocharger model)

IC Ignition System—Trouble-shooting

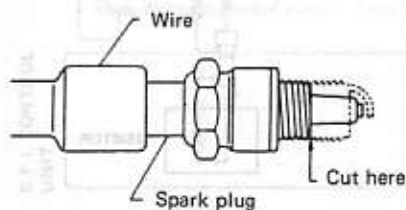


WARNING:

When current is flowing, never touch with bare hand high tension cables or any other parts with high voltage. If parts are moist, touching them could cause an electric shock, even if they are insulated. Always wear dry, well-insulated gloves or wrap affected parts with dry cloth before handling.

*1:

Preparation of spark plug for checking
Many things can be utilized as an adapter. However, it is recommended that a used spark plug whose threaded portion has been half cut off as shown in the figure be utilized.



SEL581B

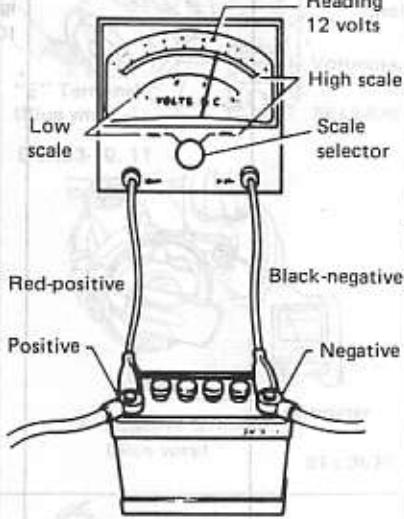
NOTE:

1. When performing the following tests, use a multimeter which can measure accurately in the following ranges; 0 to 20V. D.C.; 0 to 1,000Ω, 0 to 10V A.C.; 0 to 50,000Ω.
2. If possible, start the vehicles and let it run for 5 to 15 minutes with the hood closed. This will bring all components to normal operating temperature, and will make it easier to diagnose intermittent problems.
3. It is not necessary to disconnect the harness connectors when performing the tests which follow. Simply insert the meter probes into the back of appropriate connector cavity.

IGNITION SYSTEM (Non-turbocharger model)

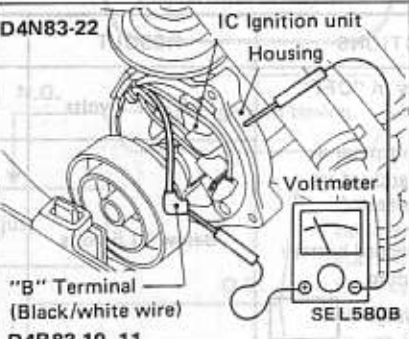
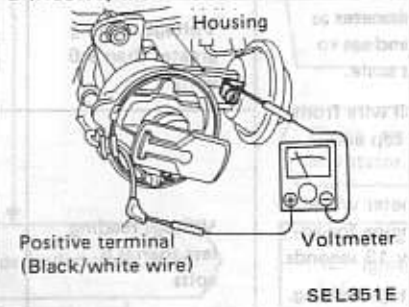
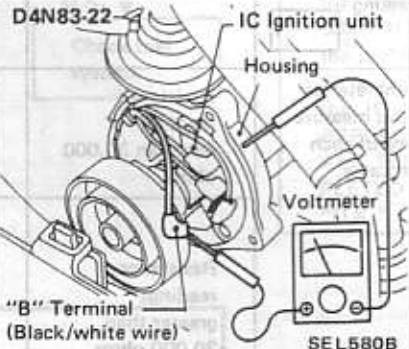
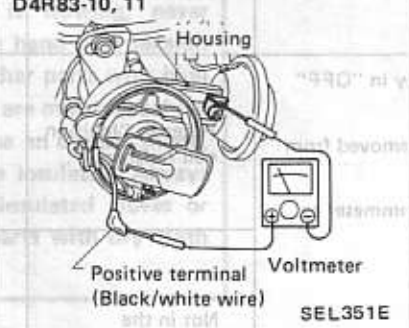
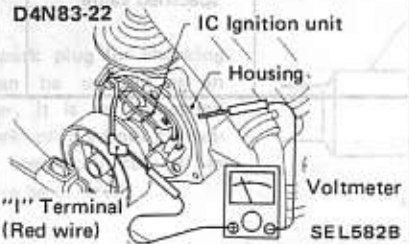
IC Ignition System—Trouble-shooting (Cont'd)

TEST TABLE

TEST	TEST METHOD	CONDITIONS	RESULT	ACTION
1. Battery Voltage (no load)	 SEL103	1. Ignition key in "OFF" position. 2. Connect voltmeter as illustrated and set to appropriate scale. 3. Read and record battery voltage reading. Battery voltage	11.5 - 12.5 volts	Proceed to Step 2.
2. Battery Cranking Voltage		1. Connect voltmeter as illustrated and set to appropriate scale. 2. Remove coil wire from distributor cap and ground it. 3. Read voltmeter while cranking engine for approximately 15 seconds. 4. Record voltage reading. Battery cranking voltage	Voltage reading greater than 9.6 volts Voltage reading less than 9.6 volts	Battery O.K. Proceed to Step 3. Battery, charging system or starting system — Faulty. Refer to applicable sections in Service Manual to correct the situation.
3. Secondary Wiring	 EF 125	1. Connect ohmmeter as illustrated and measure the resistance of each high tension cable.	Resistance readings less than 30,000 ohms	Distributor cap and high tension cables — O.K. Proceed to Step 4.
4. Ignition Coil Secondary Circuit		1. Ignition key in "OFF" position. 2. Coil wire removed from coil. 3. Connect ohmmeter as illustrated.	Refer to "Ignition coil resistance". Not in the specified value	Ignition coil secondary windings — O.K. Proceed to step 5 for California. Faulty ignition coil — replace.

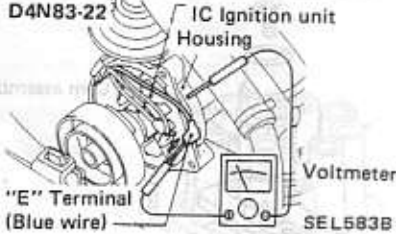
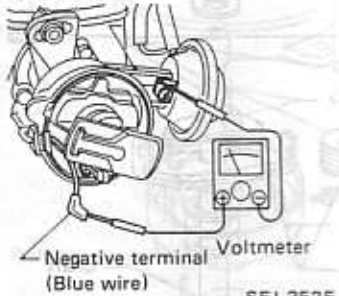
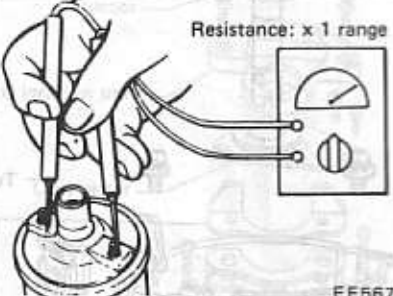
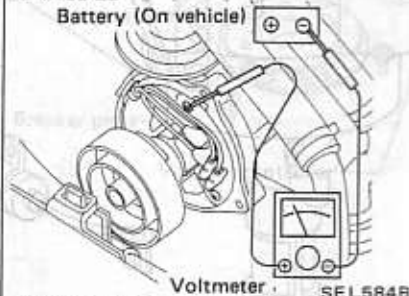
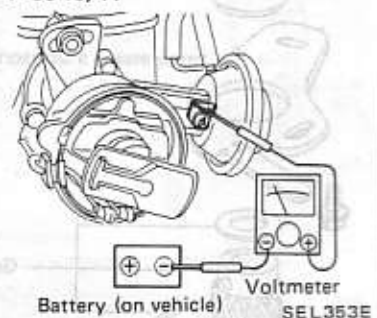
IGNITION SYSTEM (Non-turbocharger model)

IC Ignition System—Trouble-shooting (Cont'd)

TEST	TEST METHOD	CONDITIONS	RESULT	ACTION
5. Power Supply Circuit	D4N83-22  "B" Terminal (Black/white wire)	1. Connect voltmeter as illustrated and set to appropriate scale. 2. Turn ignition key to "ON" position.	11.5 - 12.5 volts	Proceed to Step 6.
	D4R83-10, 11  Positive terminal (Black/white wire)		Below 11.5 volts	Check wiring from ignitio switch to IC unit.
6. Power Supply Circuit (Cranking)	D4N83-22  "B" Terminal (Black/white wire)	1. Connect voltmeter as illustrated and set to appropriate scale. 2. Pull out coil wire from distributor cap and ground it. 3. Turn key to "START" position and observe voltmeter while engine is cranking.	Voltage reading is less than 1 volt below battery cranking voltage and is greater than 8.6 volts.	Proceed to Step 7-A (D4N83-22) Proceed to Step 7-B (D4R83-10, 11)
	D4R83-10, 11  Positive terminal (Black/white wire)		Voltage reading is more than 1 volt below battery cranking voltage and/or is below 8.6 volts.	Check ignition switch and wiring from switch to IC unit.
7-A. Ignition Primary Circuit	D4N83-22  "I" Terminal (Red wire)	1. Connect voltmeter as illustrated and set to appropriate scale. 2. Ignition key in "ON" position.	11.5 - 12.5 volts	Proceed to Step 7-B.
			Below 11.5 volts	Proceed to Step 8.

IGNITION SYSTEM (Non-turbocharger model)

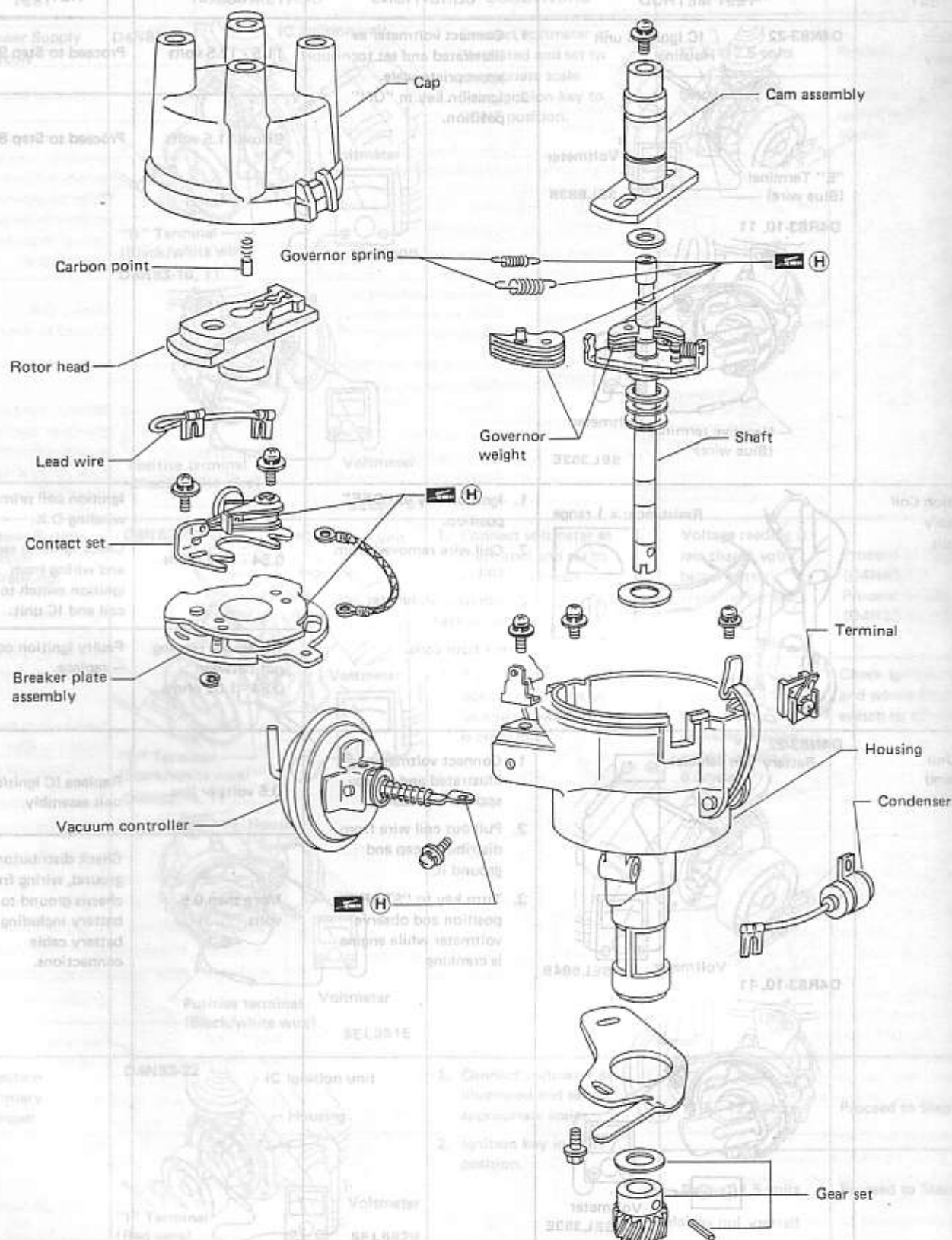
IC Ignition System—Trouble-shooting (Cont'd)

TEST	TEST METHOD	CONDITIONS	RESULT	ACTION
7-B. Ignition Primary Circuit	D4N83-22  "E" Terminal (Blue wire) SEL583B	1. Connect voltmeter as illustrated and set to appropriate scale. 2. Ignition key in "ON" position.	11.5 - 12.5 volts	Proceed to Step 9.
	D4R83-10, 11  Negative terminal (Blue wire) SEL352E		Below 11.5 volts	Proceed to Step 8.
8. Ignition Coil Primary Circuit	 Resistance: x 1 range EE567	1. Ignition key in "OFF" position. 2. Coil wire removed from coil. 3. Connect ohmmeter as illustrated. Check both coils.	0.84 - 1.02 ohms	Ignition coil primary winding O.K. Check ignition switch and wiring from ignition switch to coil and IC unit.
			Resistance reading not between 0.84 - 1.02 ohms	Faulty ignition coil — replace.
9. IC Unit Ground Circuit	D4N83-22 Battery (On vehicle)  Voltmeter SEL584B	1. Connect voltmeter as illustrated and set to appropriate scale. 2. Pull out coil wire from distributor cap and ground it. 3. Turn key to "START" position and observe voltmeter while engine is cranking	0.5 volts or less	Replace IC ignition unit assembly.
	D4R83-10, 11  Battery (on vehicle) Voltmeter SEL353E		More than 0.5 volts	Check distributor ground, wiring from chassis ground to battery including battery cable connections.

IGNITION SYSTEM (Non-turbocharger model) —Distributor—

Construction

D410-A5



SEL562E

IGNITION SYSTEM (Non-turbocharger model) —Distributor—

Cap and Rotor Head Construction (Cont'd)

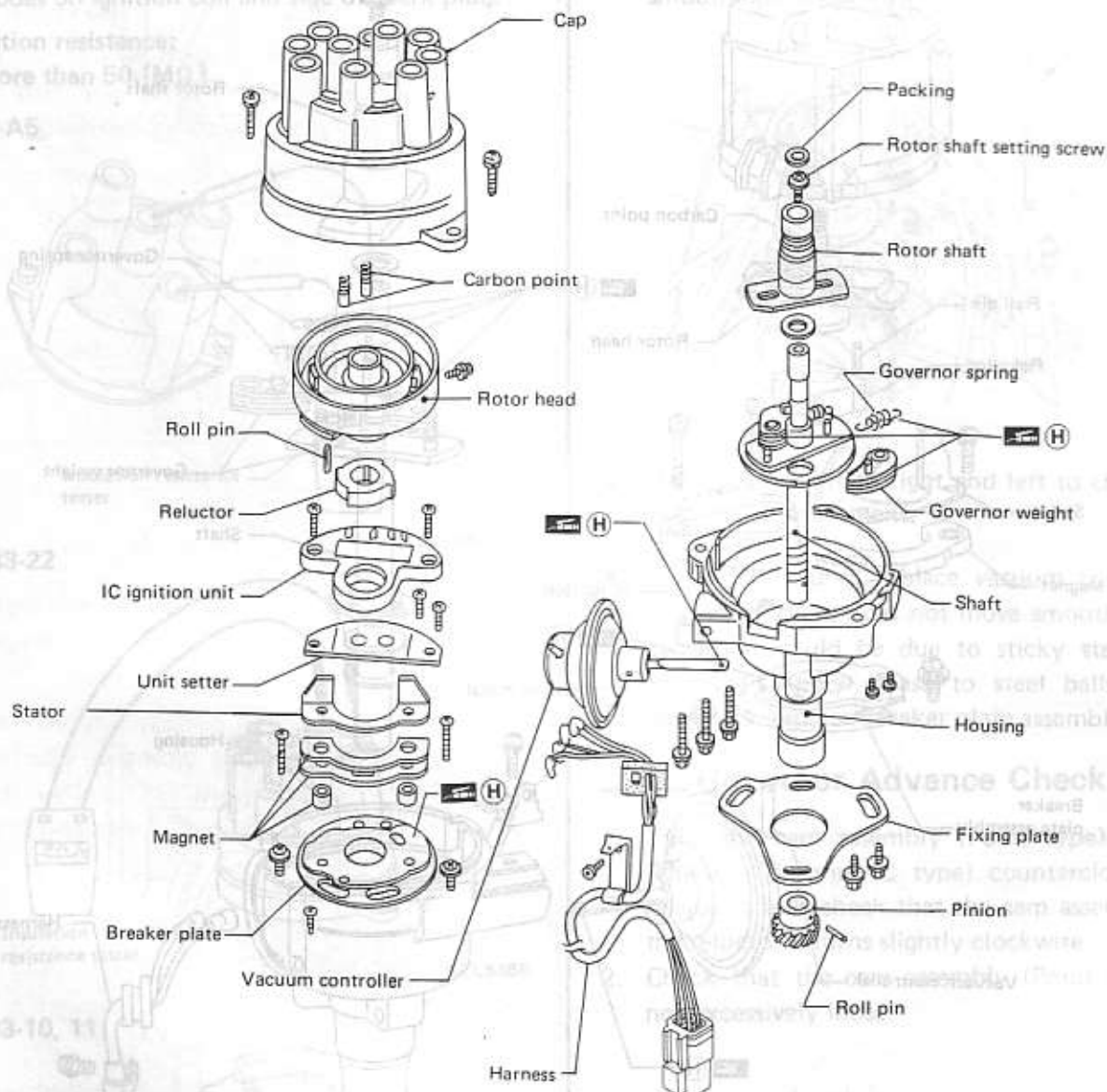
D4N83-22

2. Measure insulation resistance between electrodes on ignition coil and side of spark plug.

Insulation resistance:

More than 50 MΩ

D410-A5



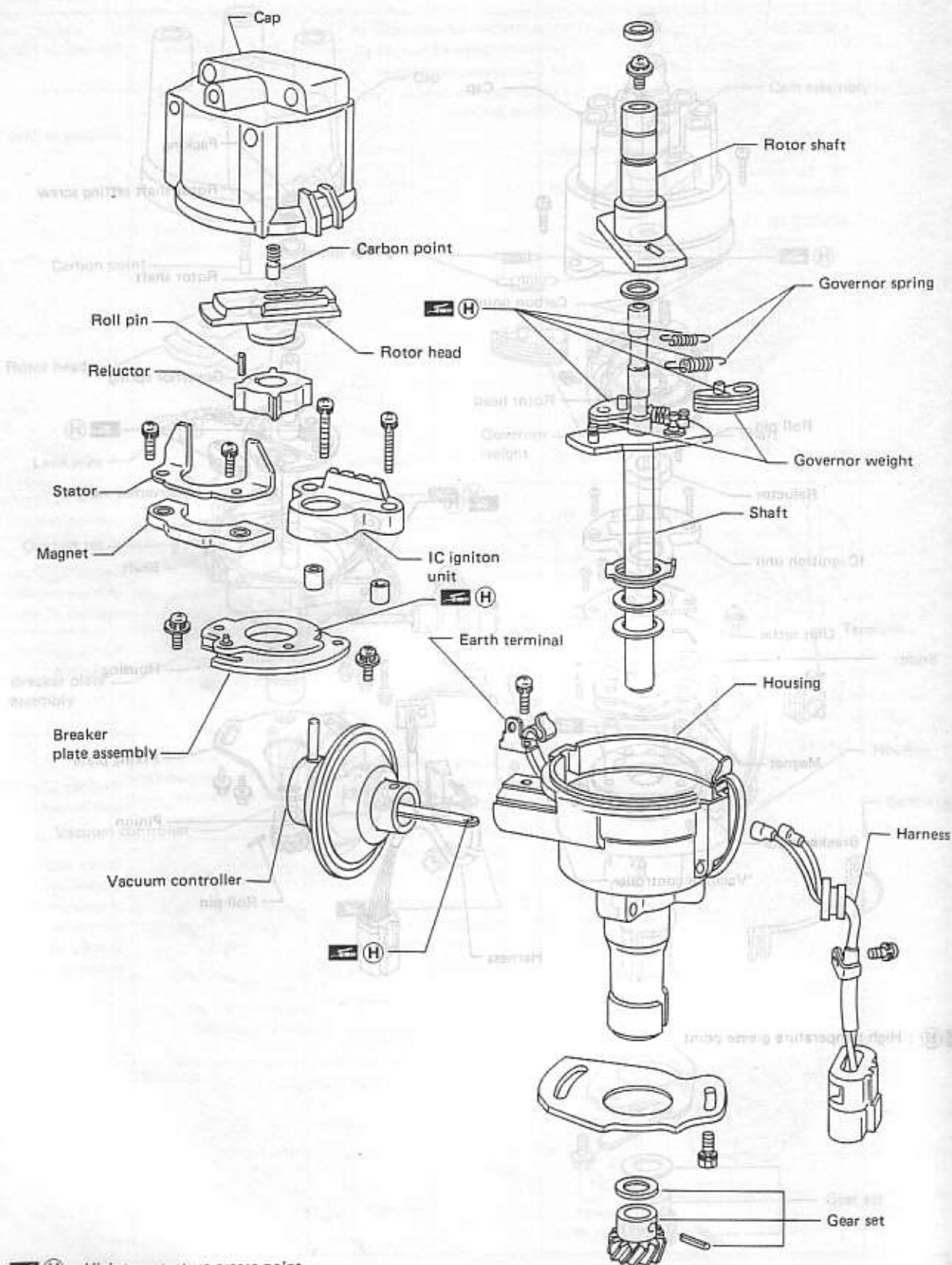
(H) : High-temperature grease point

SEL563E

IGNITION SYSTEM (Non-turbocharger model) —Distributor—

Construction (Cont'd)

D4R83-10, 11



SEL554E

IGNITION SYSTEM (Non-turbocharger model) —Distributor—

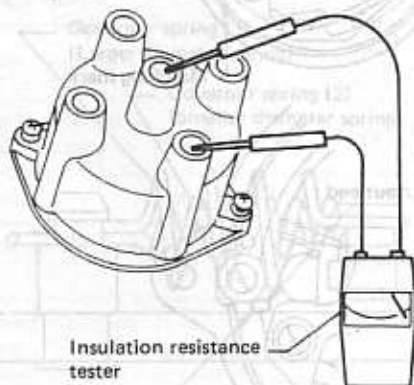
Cap and Rotor Head Check

1. Check cap and rotor head for dust, carbon deposits and cracks.
2. Measure insulation resistance between electrodes on ignition coil and side of spark plug.

Insulation resistance:

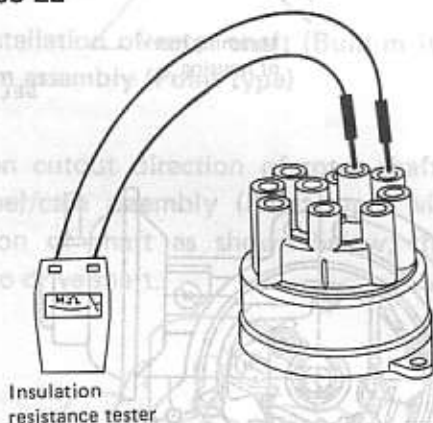
More than 50 [MΩ]

D410-A5



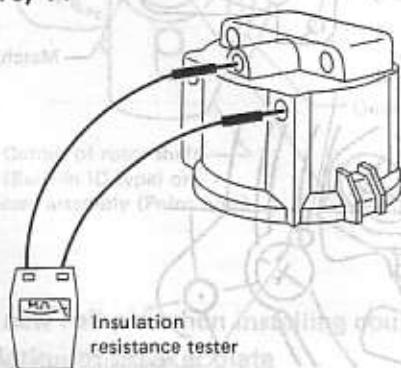
SEL656B

D4N83-22



SEL565E

D4R83-10, 11

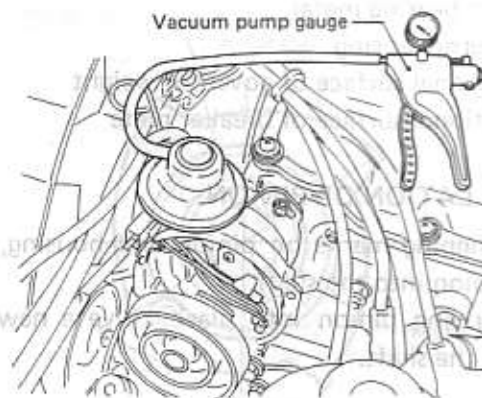


SEL566E

- Less than specified value ... Replace.

Vacuum Advance Check

1. Connect vacuum pump to the vacuum controller and gradually draw a vacuum while watching breaker plate movement. Check for smooth operation with no evidence of binding.

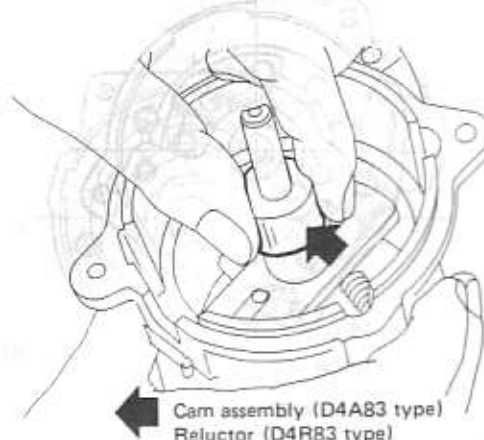


SEL302E

2. Turn breaker plate right and left to check for freedom of movement.
3.
 - If leak is found, replace vacuum controller.
 - If breaker plate does not move smoothly, this condition could be due to sticky steel balls or pivot. Apply grease to steel balls or, if necessary, replace breaker plate assembly.

Governor Advance Check

1. Turn the cam assembly (Point type) or the retractor (Built-in IC type) counterclockwise, release it and check that the cam assembly or the retractor returns slightly clockwise.
2. Check that the cam assembly (Point type) is not excessively loose.



SEL115E

IGNITION SYSTEM (Non-turbocharger model) —Distributor—

Assembly

To assemble, reverse order of disassembly. Note the following:

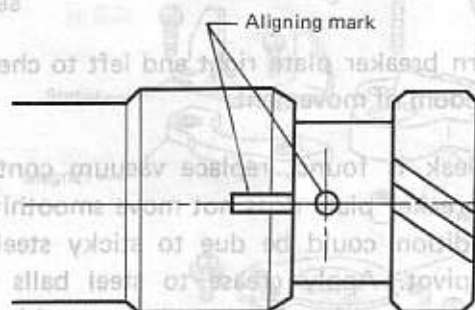
GREASE POINT

- Shaft bearing metal
- Governor spring
- Frictional surface of governor weight
- Frictional surface of breaker plate

INSTALLATION OF PINION

Align aligning marks on pinion and housing, and drive pinion into the shaft.

After driving pinion into place, drive a new roll pin into the shaft.



SEL599B

INSTALLATION OF BREAKER PLATE

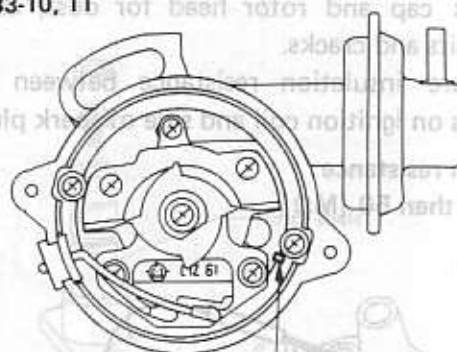
Ensure that aligning marks on breaker plate and housing are lined up properly.

D4N83-22



SEL600B

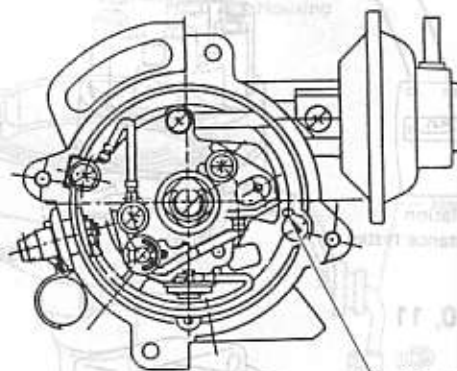
D4R83-10, 11



Base cutout end

Matching mark of housing

D410-A5



Base cutout end

Matching mark of housing

IGNITION SYSTEM (Non-turbocharger model) —Distributor—

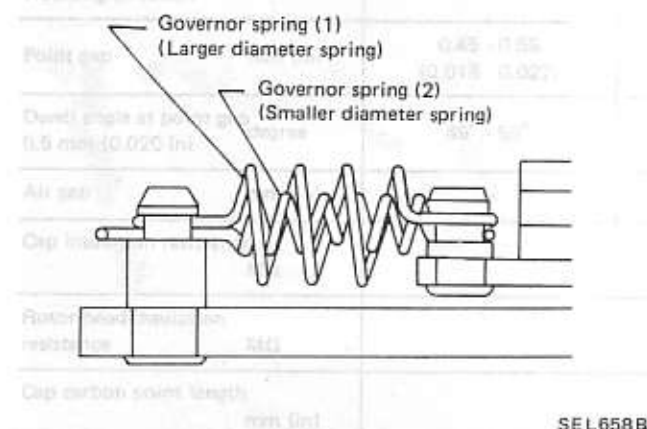
Assembly (Cont'd)

Note the following:

a. Installation of governor springs

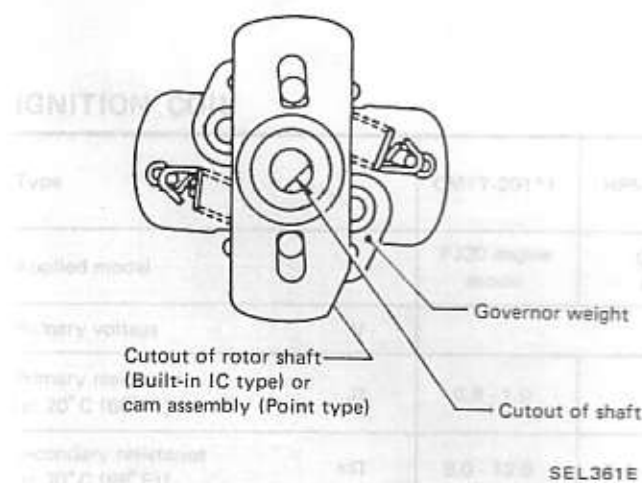
Built-in IC type only

Attach the smaller diameter spring to the hanger pins of shaft and governor weight first; then install the larger diameter spring.



b. Installation of rotor shaft (Built-in IC type) or cam assembly (Point type)

Position cutout direction of rotor shaft (Built-in IC type)/cam assembly (Point type) with cutout direction of shaft as shown below; then install rotor to drive shaft.



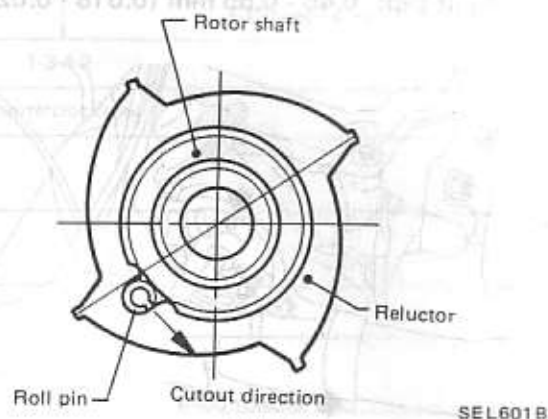
c. Use a new roll pin when installing coupling.

d. Installation of breaker plate

Ensure that alignment marks on breaker plate and housing are lined up properly.

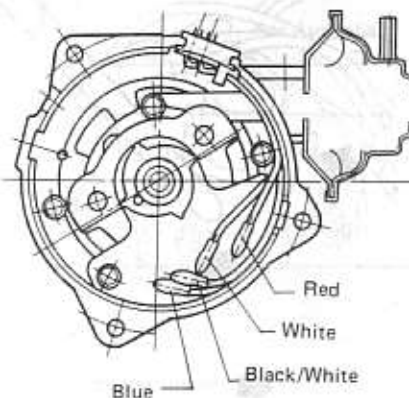
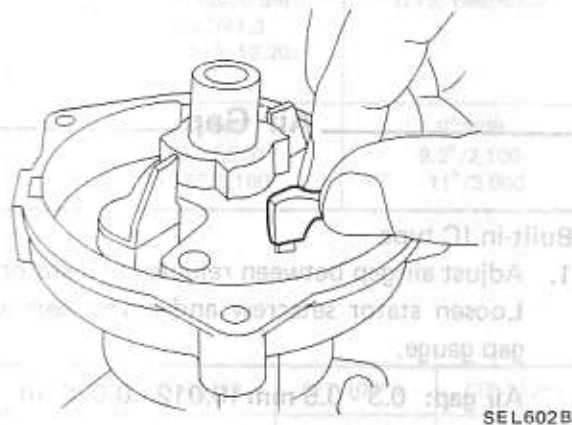
INSERTING ROLL PIN INTO RELUCTOR

Position cutout direction of roll pin as shown below.



CONNECTING HARNESS

Ensure that harness to IC ignition unit is tightly secured.



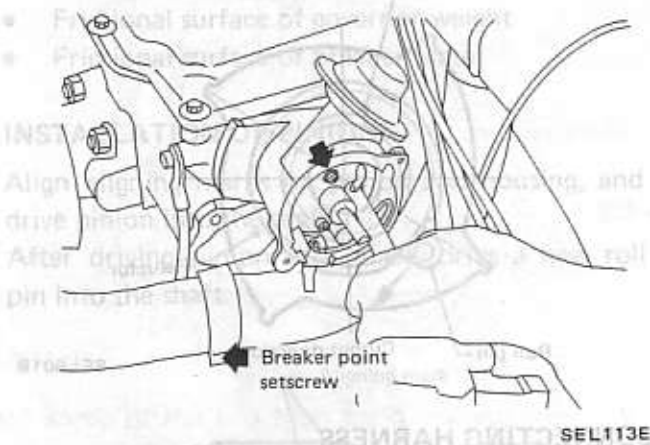
IGNITION SYSTEM (Non-turbocharger model) —Distributor—

Contact Point

Point type

1. Adjust point gap.
Loosen breaker point set screw and adjust gap with a gap gauge.

Point gap: 0.45 - 0.55 mm (0.018 - 0.022 in)



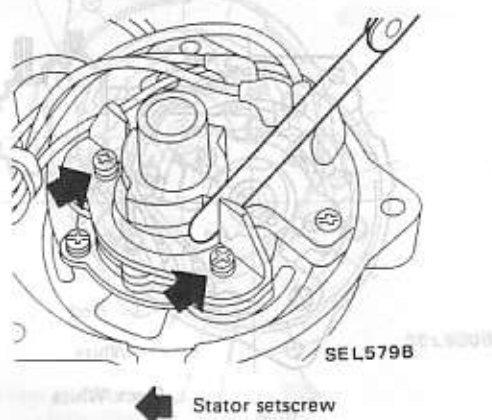
2. Check the point surface.
Take off any irregularities with fine sandpaper (No. 500 or 600) or with oil stone.

Air Gap

Built-in IC type

1. Adjust air gap between reluctor and stator.
Loosen stator setscrew and adjust gap with a gap gauge.

Air gap: 0.3 - 0.5 mm (0.012 - 0.020 in)



IGNITION SYSTEM (Non-turbocharger model) — Distributor —

Service Data and Specifications

DISTRIBUTOR

Type	D410-A5		D4N83-22	D4R83-11	D4R83-10
Applied model	Except for Australia		For Australia	Except for Europe, Hong Kong and Singapore	For Europe, Hong Kong and Singapore
	CA20E engine model			FJ20 engine model	
Firing order	1-3-4-2				
Rotating direction	Counterclockwise				
Point gap	mm (in)	0.45 - 0.55 (0.018 - 0.022)	—		
Dwell angle at point gap 0.5 mm (0.020 in)	degree	49° - 55°	—		
Air gap	mm (in)	—	0.3 - 0.5 (0.012 - 0.020)		
Cap insulation resistance	MΩ	More than 50			
Rotor head insulation resistance	MΩ	More than 50			
Cap carbon point length	mm (in)	More than 10 (0.39)			
Vacuum advance [Distributor degree/distributor kPa (mbar, mmHg, inHg)]		0°/9.3 (93, 70, 2.76) 4°/15.66 (156.6, 117.5, 4.626) 10°/46.7 (467, 350, 13.78)	0°/10.7 (107, 80, 3.15) 4°/15.66 - 20.0 (156.6 - 200, 117.5 - 150, 4.626 - 5.91) 7.5°/26.7 (267, 200, 7.87)	0°/16.0 (160, 120, 4.72) 7.5°/29.3 (293, 220, 8.66) 10.5°/41.3 (413, 310, 12.20)	0°/18.7 (187, 140, 5.51) 2°/21.3 (213, 160, 6.30)
Centrifugal advance [Distributor degree/ distributor rpm]		0°/600 10°/1,800	0°/600 10.5°/1,900	0°/600 7.5°/1,200 13.5°/3,100	0°/600 9.2°/2,100 11°/3,000

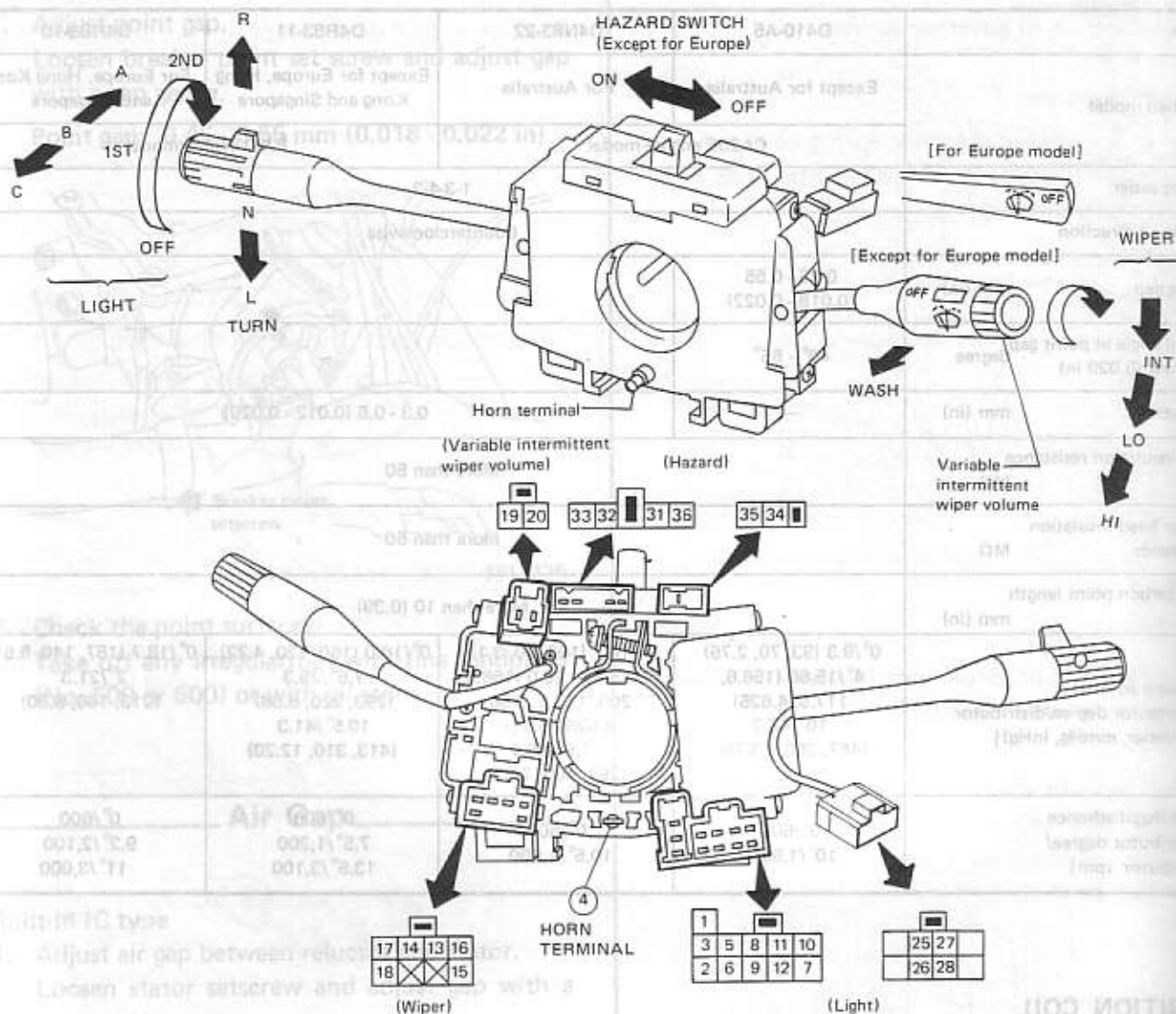
IGNITION COIL

Type	CM1T-201*1	HP5-13E*2	C6R-246*1	CIT-106*1	CIT-109*1	CIT-112*1
				STC-106*2	STC-109*2	STC-112*2
Applied model	FJ20 engine model	CA20E engine model except for Australia		For Australia		
Primary voltage	V	12				
Primary resistance [at 20° C (68° F)]	Ω	0.8 - 1.0	1.3 - 1.7			
Secondary resistance [at 20° C (68° F)]	kΩ	8.0 - 12.0	7.4 - 11.2	6.8 - 10.2	7.4 - 11.3	

*1 HITACHI make *2 HANSHIN make

COMBINATION SWITCH

Check (L.H. drive model)

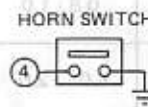
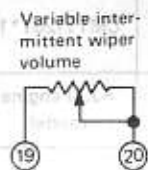


LIGHTING SWITCH

	OFF			1ST			2ND		
	A	B	C	A	B	C	A	B	C
5									
6									
7									
8									
9									
10									
11									
12									
25									
26									
27									
28									

WIPER SWITCH

	OFF	INT	LO	HI	WASH
13					
14					
15					
16					
17					
18					



HAZARD SWITCH (Except for Europe)

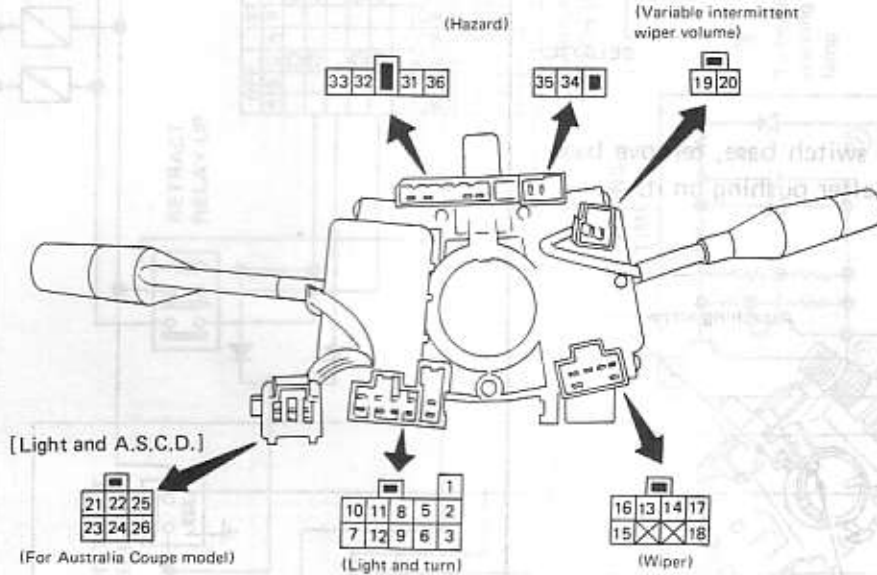
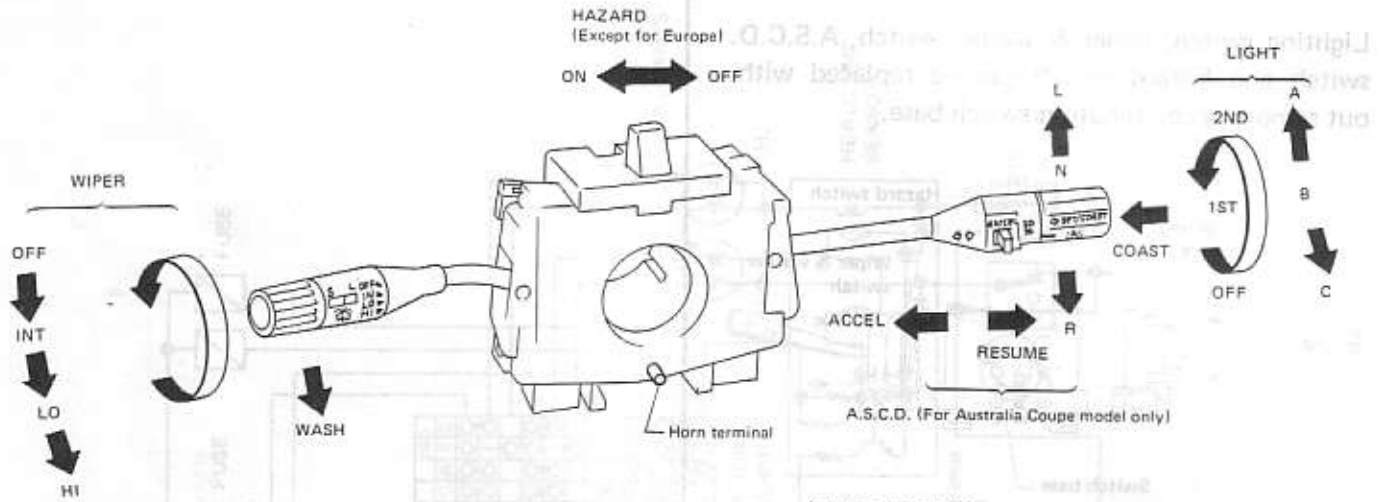
	OFF	ON
31		
32		
33		
34		
35		
36		

TURN SIGNAL SWITCH

	R	N	L
1			
2			
3			

COMBINATION SWITCH

Check (R.H. drive model)



(For Australia Hatchback and except for Europe model)

(For Europe model)

LIGHTING SWITCH

	OFF			1ST			2ND		
	A	B	C	A	B	C	A	B	C
5									
6									
7									
8									
9									
10									
11									
12									
25									
26									
27									
28									

(For Europe model)

WIPER SWITCH

	OFF			ST			ND		
	A	B	C	A	B	C	A	B	C
5									
6									
7									
8									
9									
10									
11									
12									
25									
26									

(Except for Europe model)

WIPER SWITCH

	OFF	INT	LO	HI	WASH
13					
14					
15					
16					
17					
18					

(Variable intermittent wiper volume)

NORN SWITCH

A.S.C.D. SWITCH
(For Australia Coupe model)

	COAST/SET	RESUME	ACCEL
21			
22			
23			
24			

TURN SIGNAL SWITCH

	R	N	L
1			
2			
3			

	OFF	ON
31		
32		
33		
34		
35		
36		

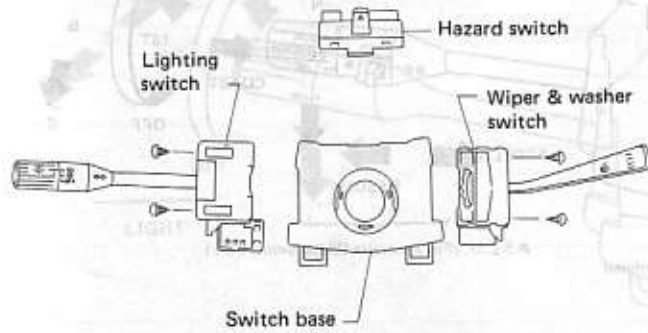
HAZARD SWITCH
(Except for Europe)

SEL568E

COMBINATION SWITCH

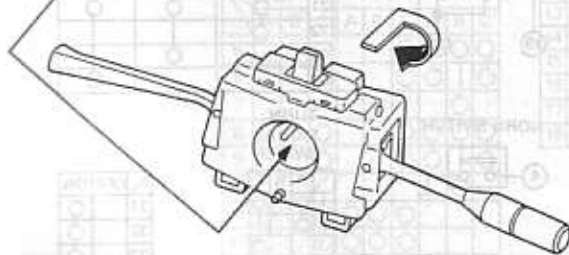
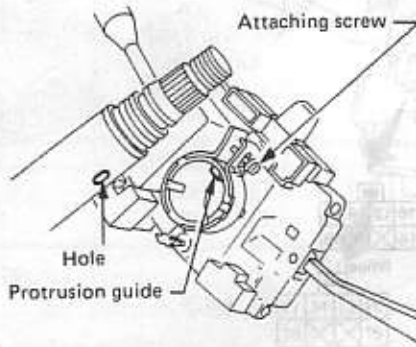
Replacement

Lighting switch, wiper & washer switch, A.S.C.D. switch and hazard switch can be replaced without removing combination switch base.



SEL977C

To remove combination switch base, remove base attaching screw and turn after pushing on it.



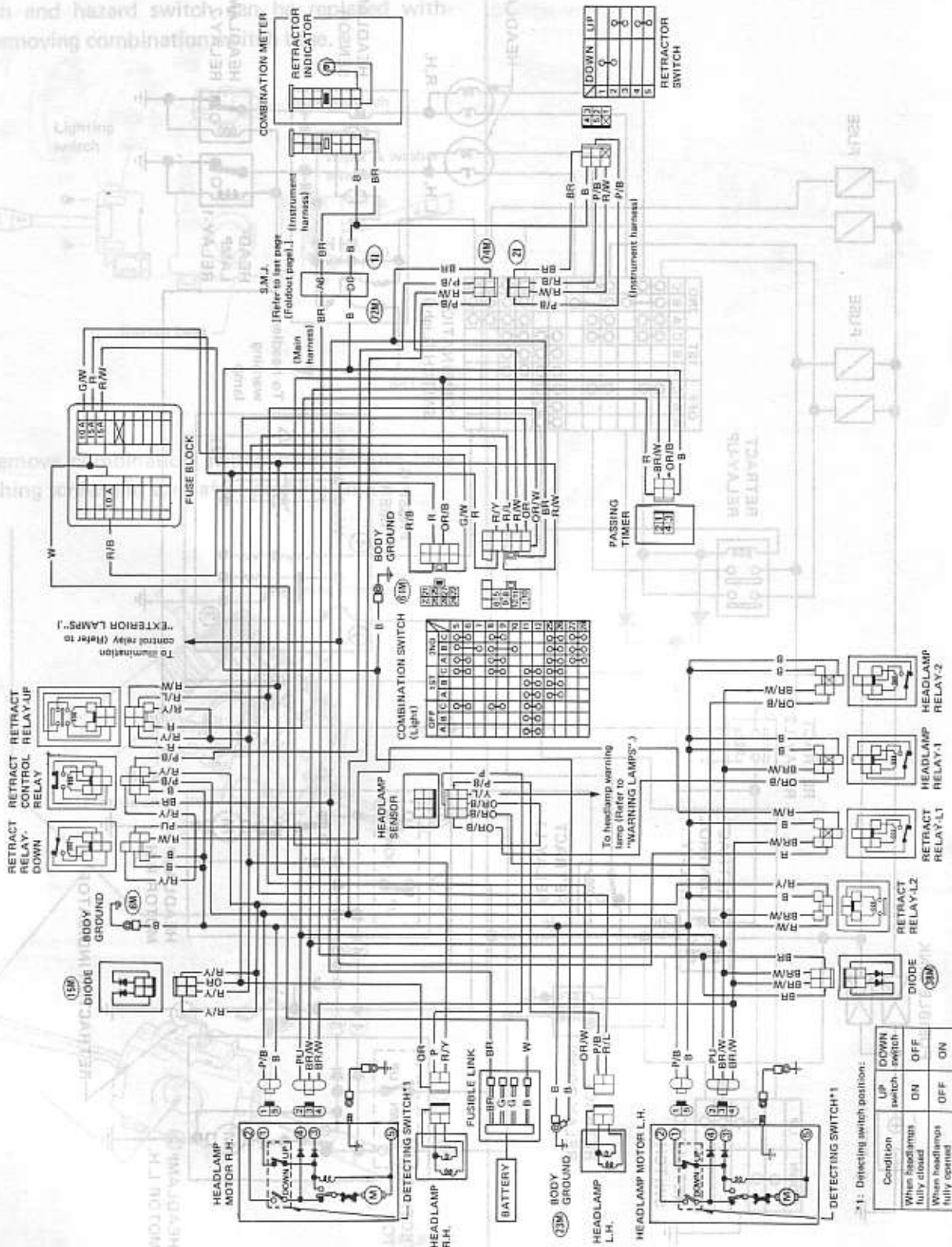
SEL989C

Schematic (L.H. drive model except for Europe)



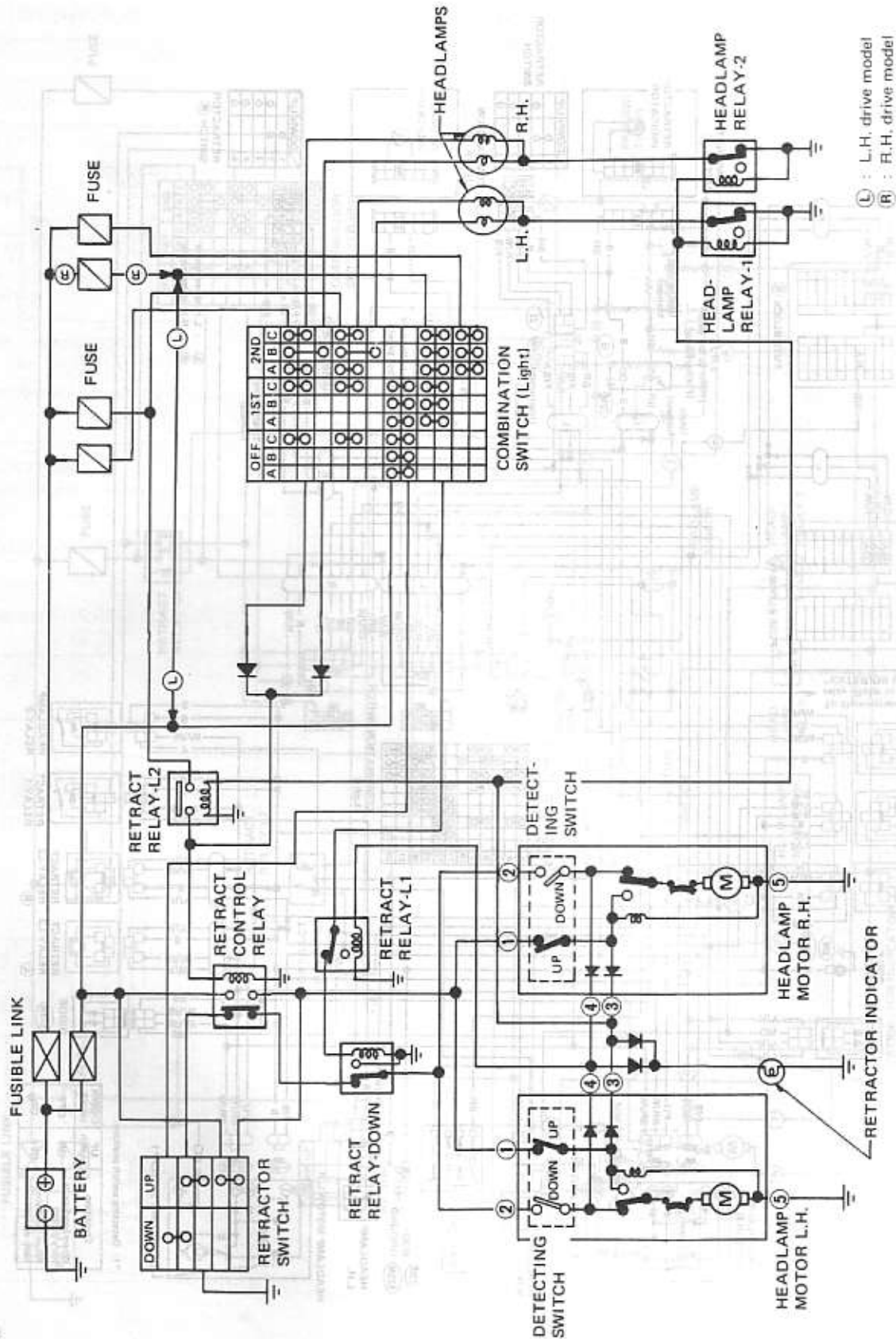
COMB HEADLAMP

Wiring Diagram (L.H. drive model except for Europe)



HEADLAMP

Schematic (For Europe model)



SEL573E

Wiring Diagram (For Europe model)

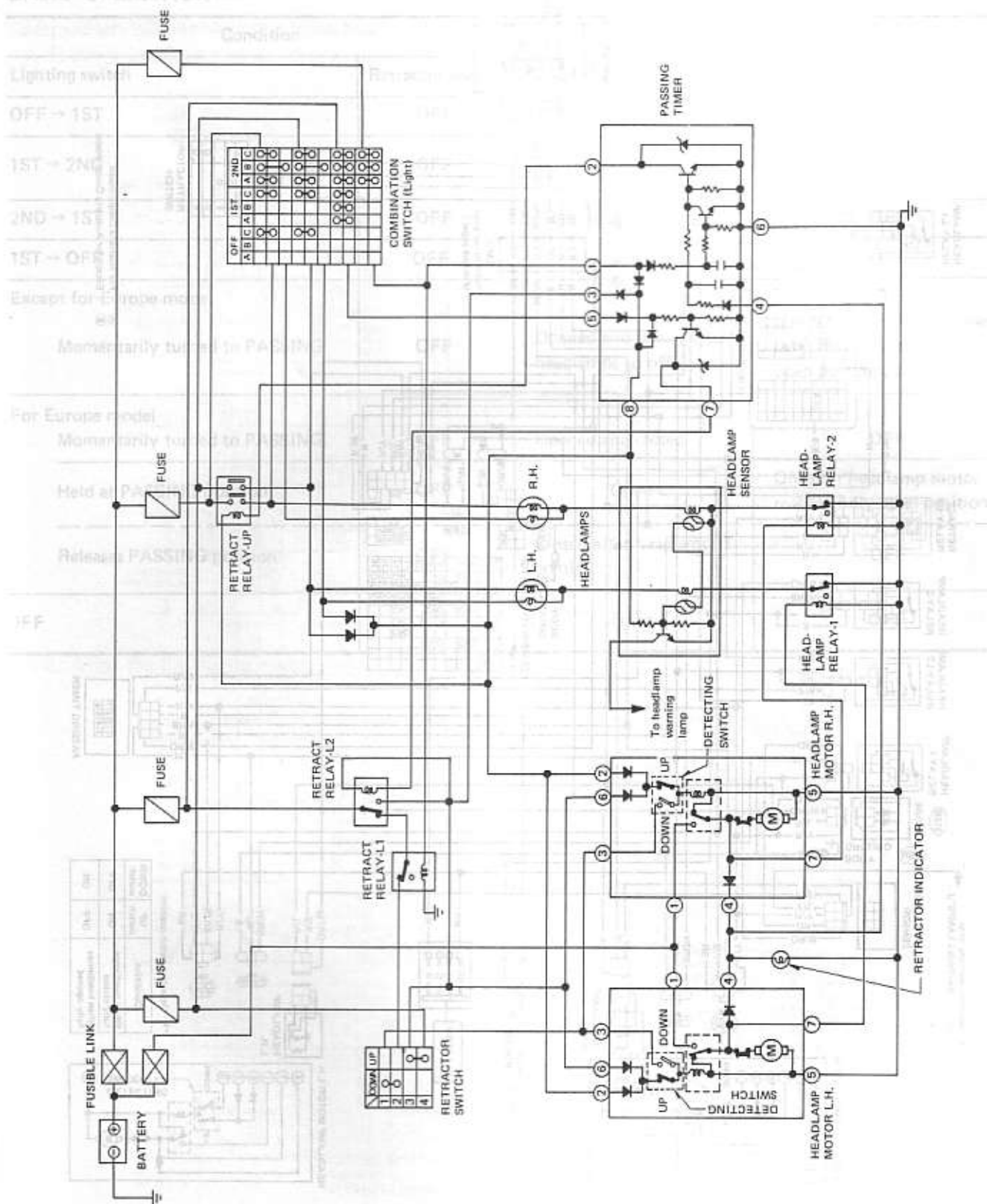


Condition	UP switch	DOWN switch
When headlamps fully closed	ON	OFF
When headlamps fully open	OFF	ON

HEADLAMP

Schematic (R.H. drive model except for Europe)

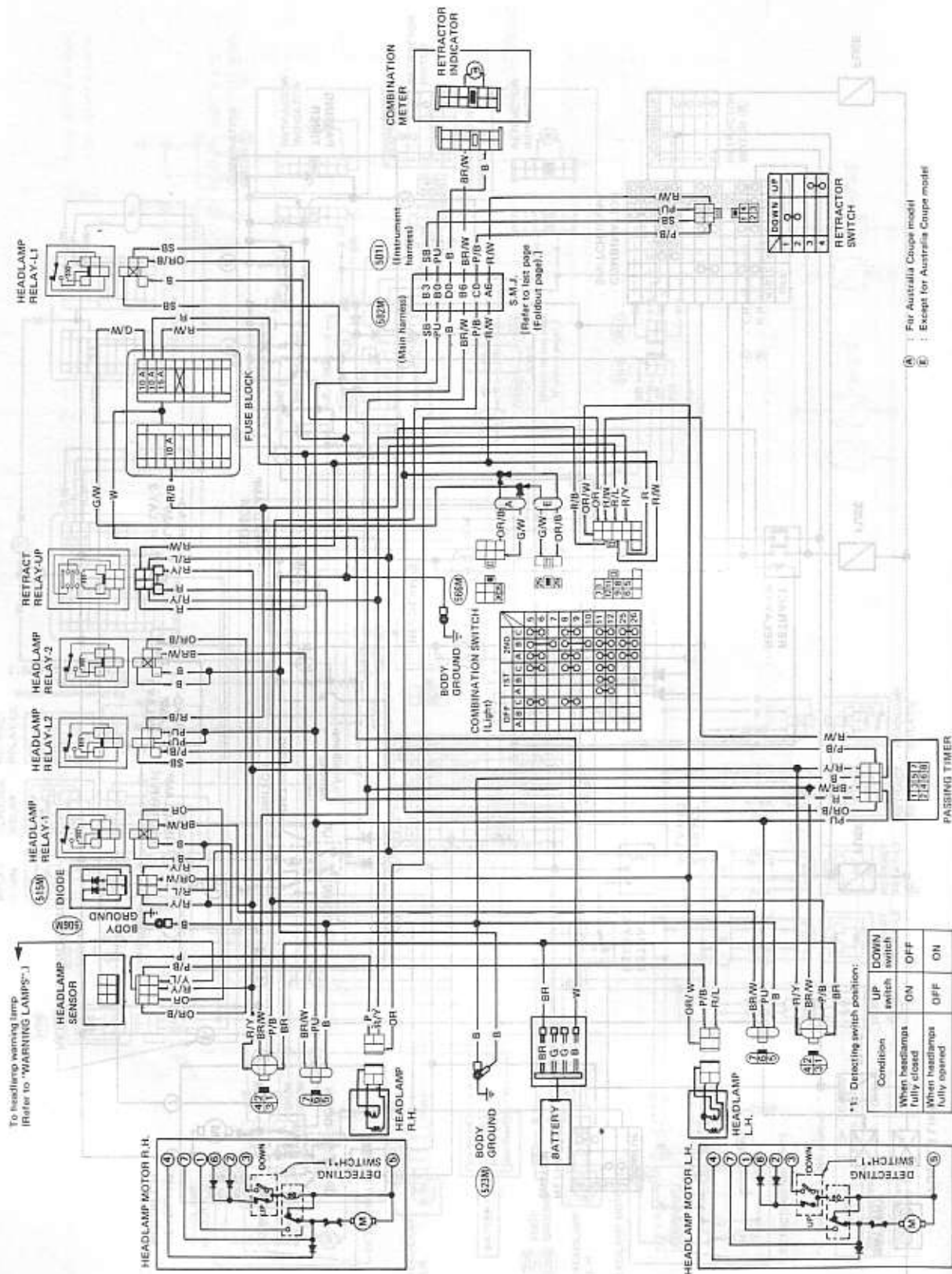
BASIC OPERATION



SEL571E

HEADLAMP

Wiring Diagram (R.H. drive model except for Europe)

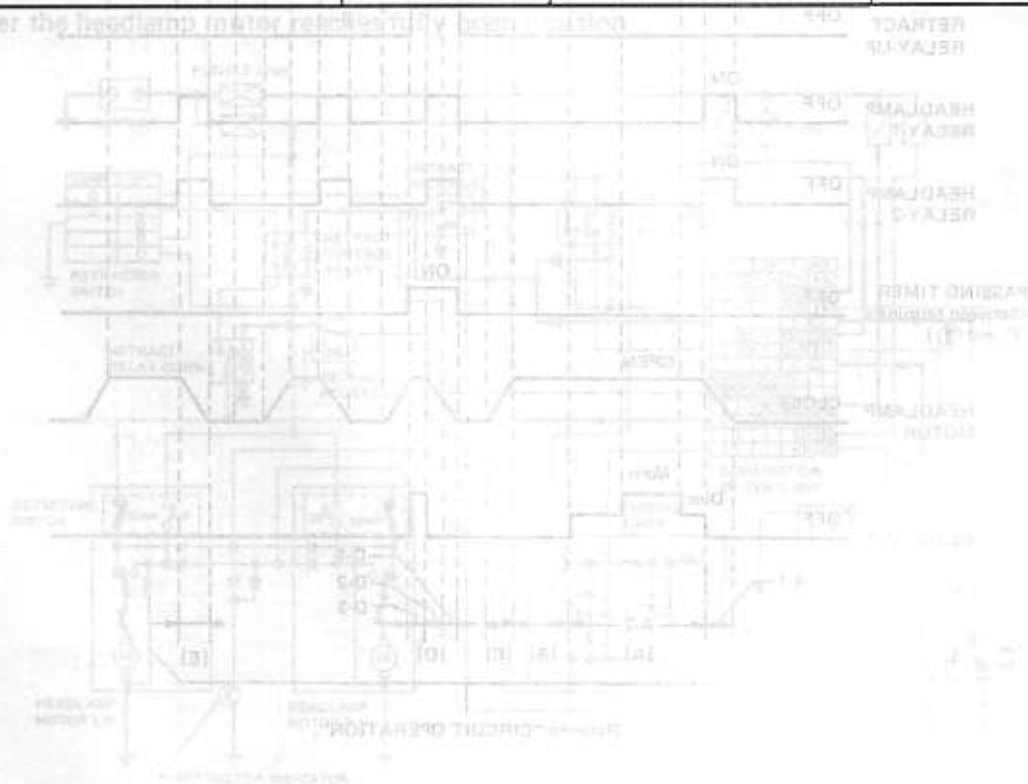


HEADLAMP

Description

BASIC OPERATION

Condition		Operation	
Lighting switch	Retractor switch	Headlamp motor	Headlamps
OFF → 1ST	OFF	No operation	OFF
1ST → 2ND	OFF	Open	ON after headlamp motor reaches fully open position.
2ND → 1ST	OFF	Held to open position	OFF
1ST → OFF	OFF	Closed	OFF
Except for Europe model			
Momentarily turned to PASSING	OFF	Opened and closed after headlamps go off.	Momentarily ON after headlamp motor reaches fully open position, and then go off.
For Europe model			
Momentarily turned to PASSING	OFF	Opened and closed	OFF
Held at PASSING position	OFF	Open	ON after headlamp motor reaches fully open position.
Releases PASSING position	OFF	Closed after headlamps go off.	OFF
OFF	ON	Open	OFF



Description (L.H. drive model except for Europe)

- Lighting switch



EL-54

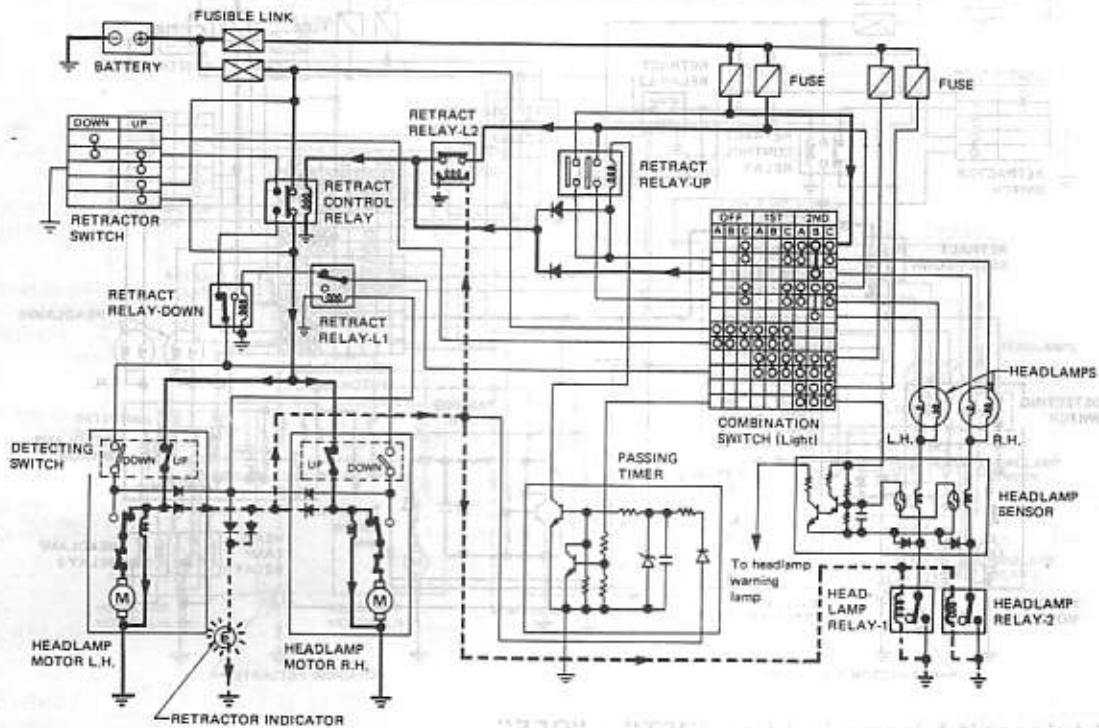
HEADLAMP

Description (L.H. drive model except for Europe) (Cont'd)

CIRCUIT OPERATION

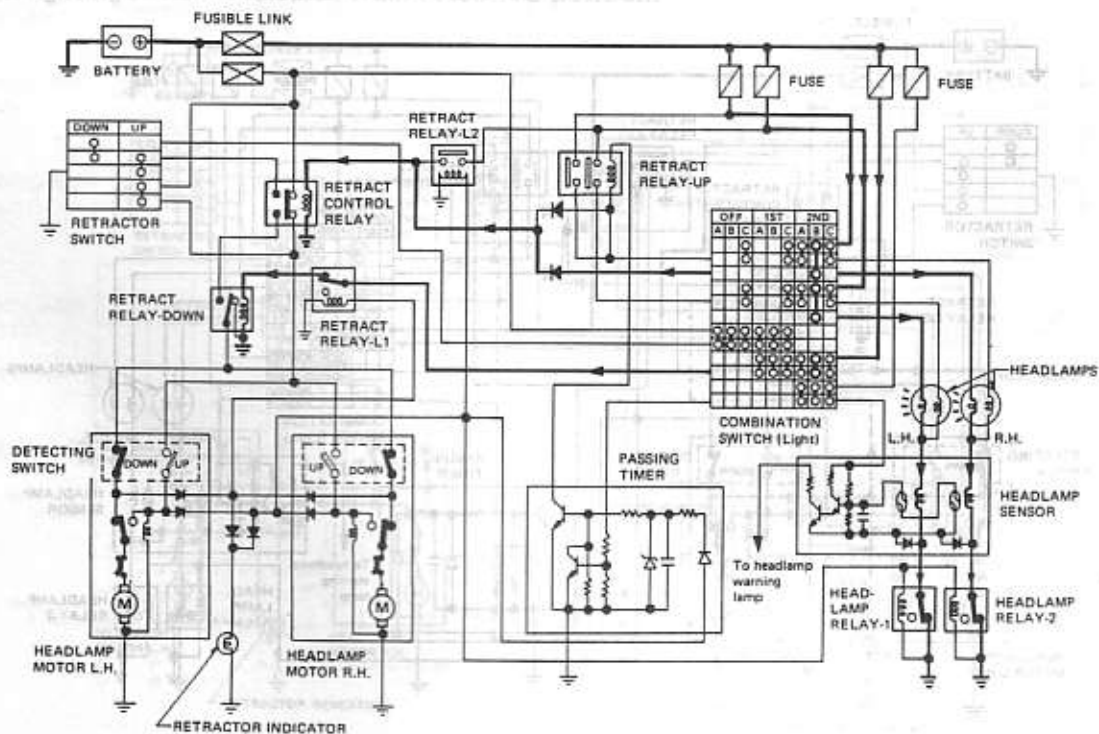
[A] When lighting switch is from "1ST" → "2ND"

A-1: While headlamp motor is operating headlamps to the open position



SEL600E

A-2: After the headlamp motor reaches fully open position

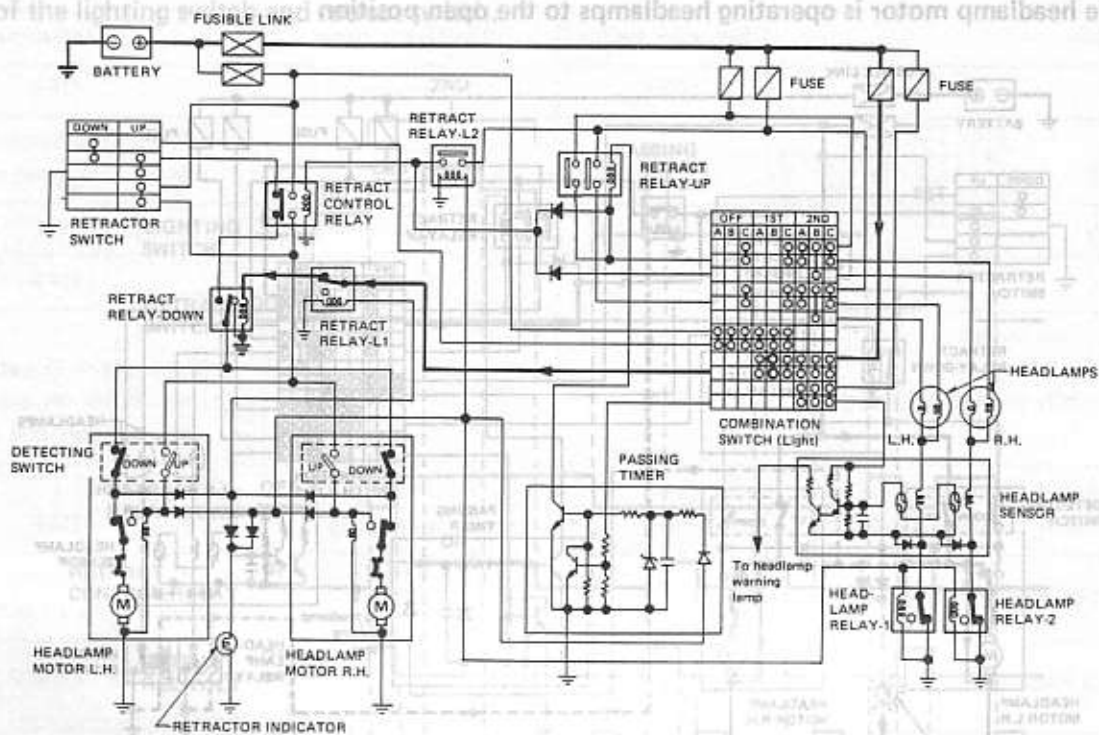


SEL601E

HEADLAMP

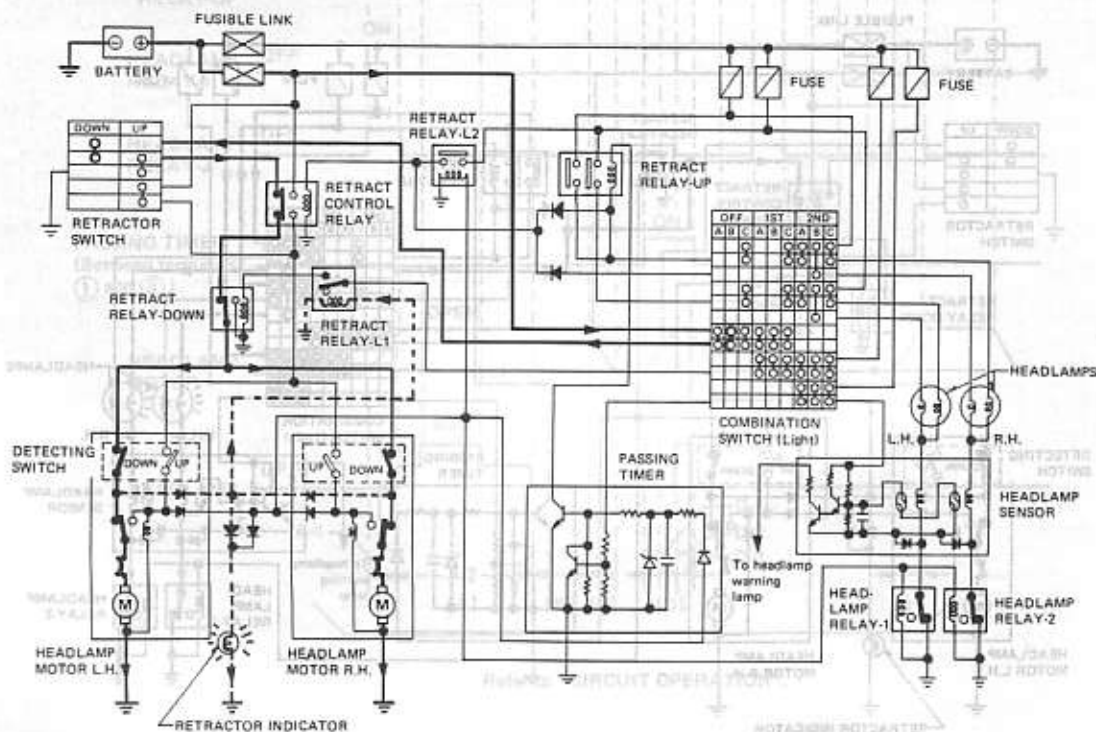
Description (L.H. drive model except for Europe) (Cont'd)

- [B] When lighting switch is switched from "2ND" → "1ST"
(Headlamp motor holds open position)



SEL602E

- [C] When lighting switch is switched from "1ST" → "OFF"
(While headlamp motor is operating headlamps to the closed position)



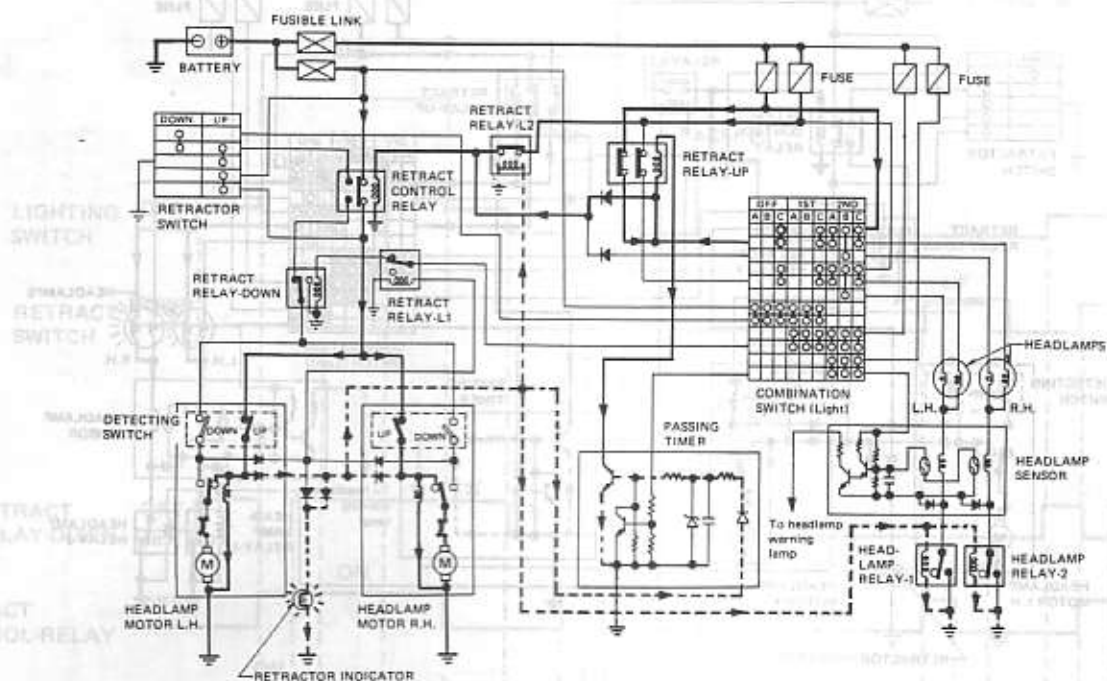
SEL603E

HEADLAMP

Description (L.H. drive model except for Europe) (Cont'd).

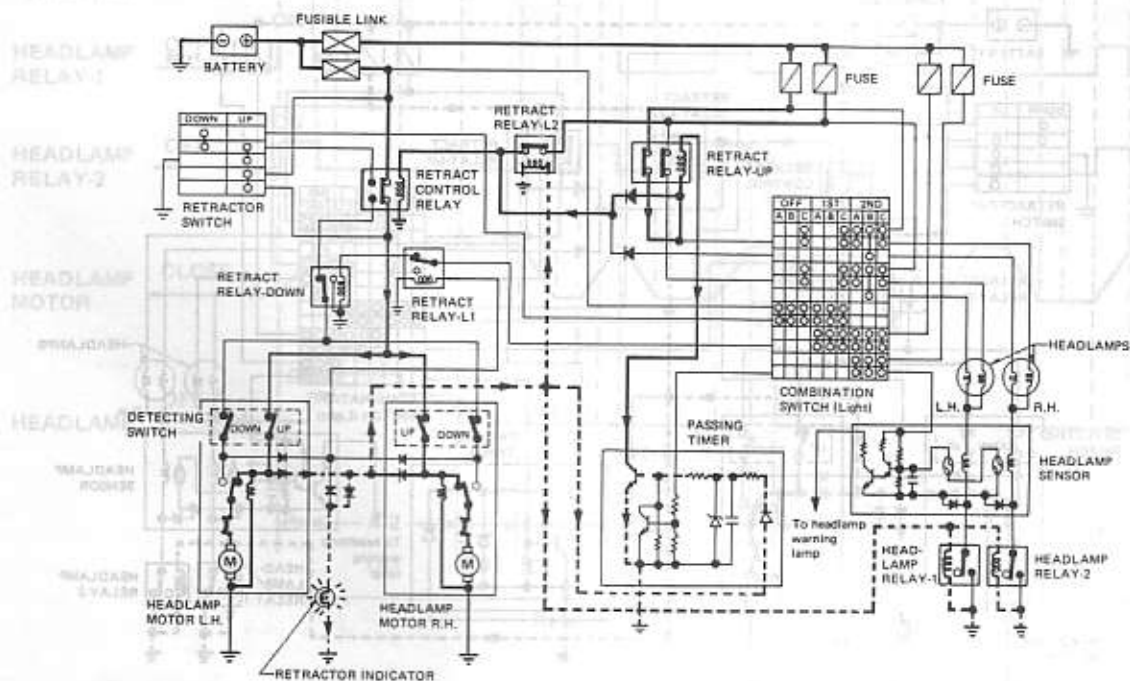
[D] When lighting switch is switched to "PASSING"

D-1: While headlamp motor is operating headlamps to the open position
(The moment lighting switch is turned to PASSING position)



SEL604E

D-2: While headlamp motor is operating headlamps to the open position
(When lighting switch is released from PASSING position)

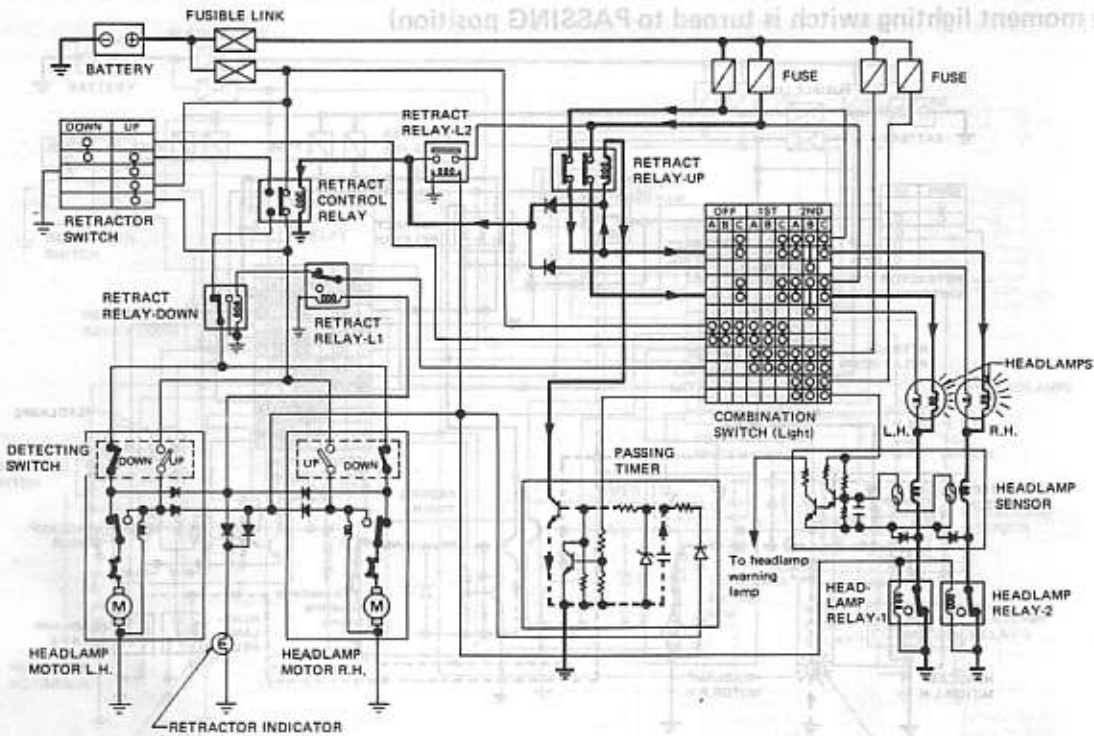


SEL605E

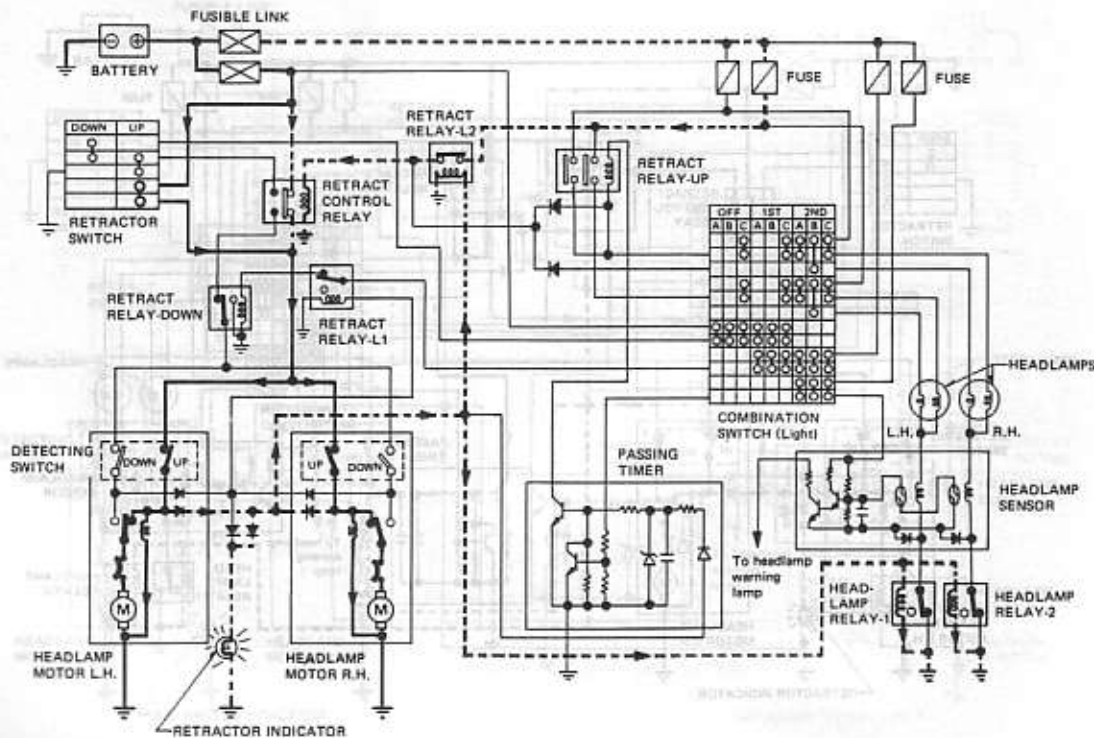
HEADLAMP

Description (L.H. drive model except for Europe) (Cont'd)

D-3: After the headlamp motor reaches fully open position



[E] When retractor switch is turned ON
(While headlamp motor is operating headlamps to the open position)

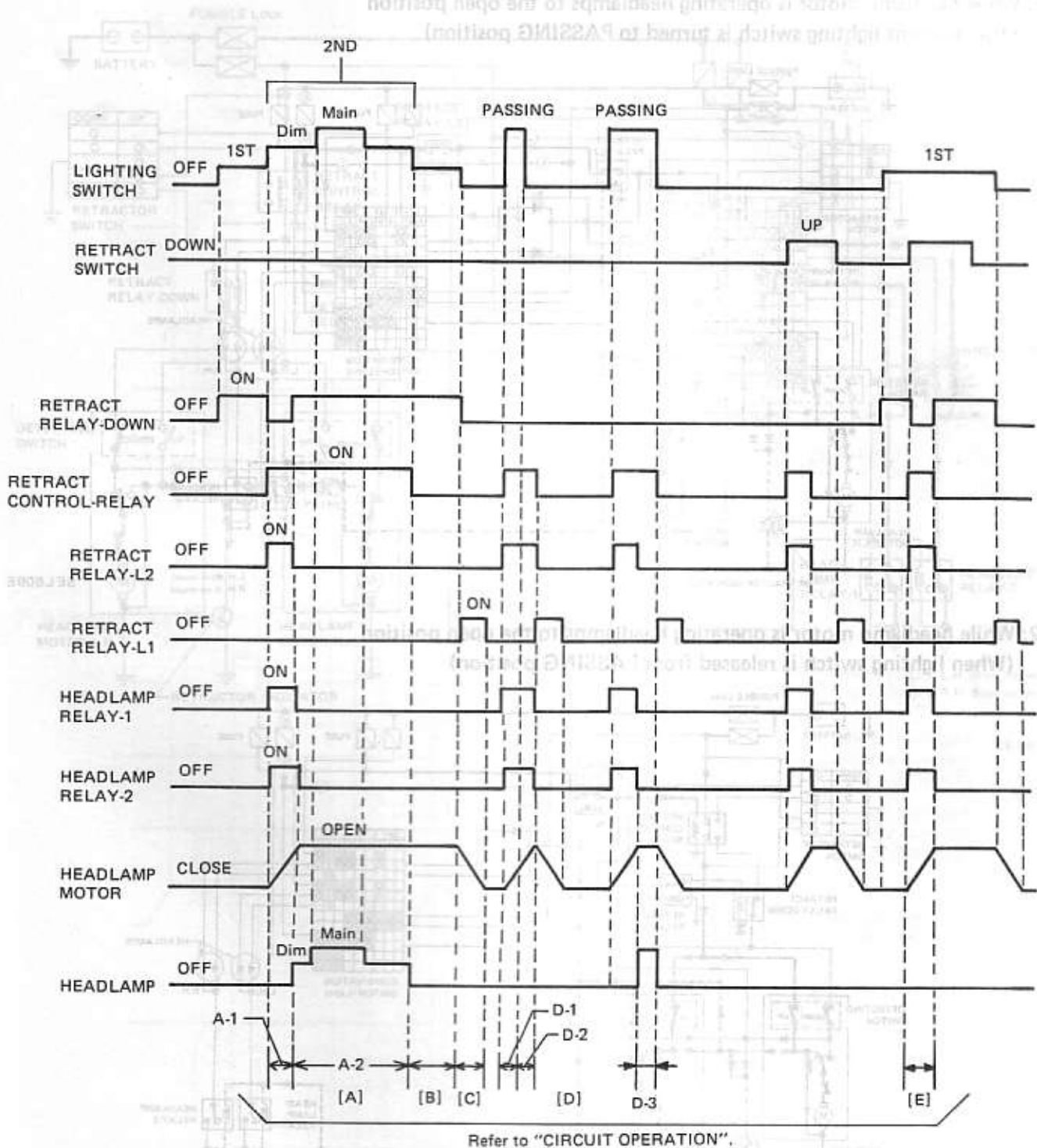


HEADLAMP

Description (For Europe model)

TIMING CHART

- The following chart depicts the operational models of relays and headlamp motors in relation to the positions of the lighting switch and retract switch.



HEADLAMP

Description (For Europe model) (Cont'd)

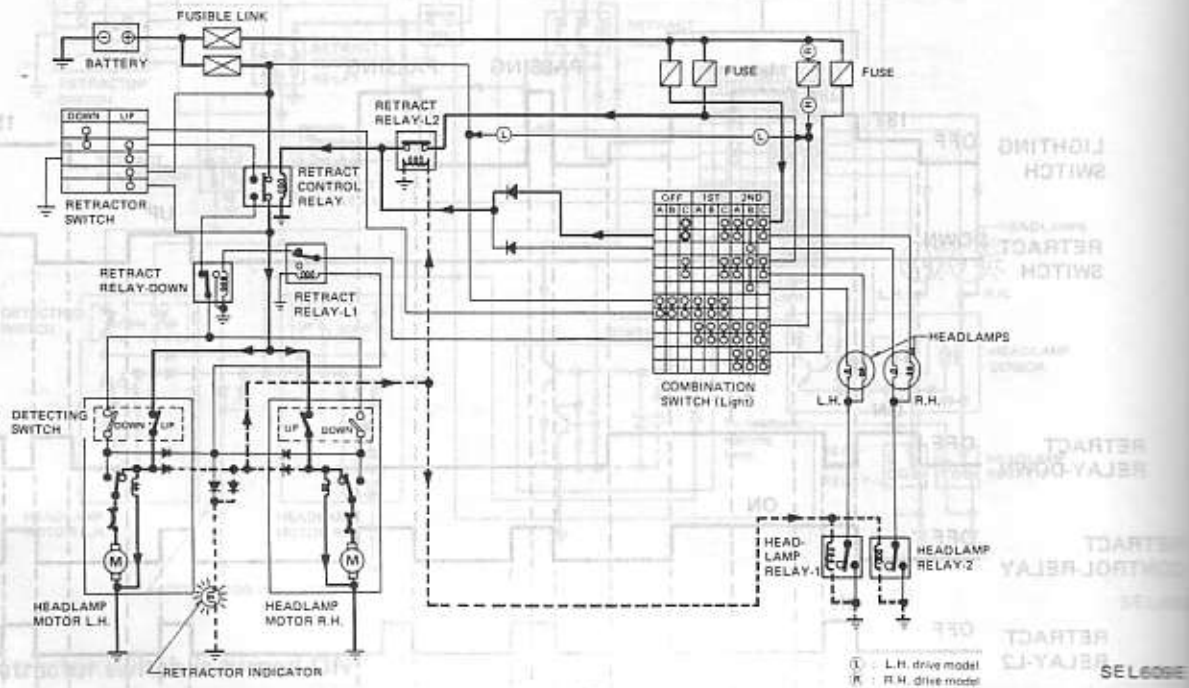
CIRCUIT OPERATION

Circuit operation for [A], [B], [C] and [E] is the same as those for L.H. drive model except for Europe.

[D] When lighting switch is switched to "PASSING"

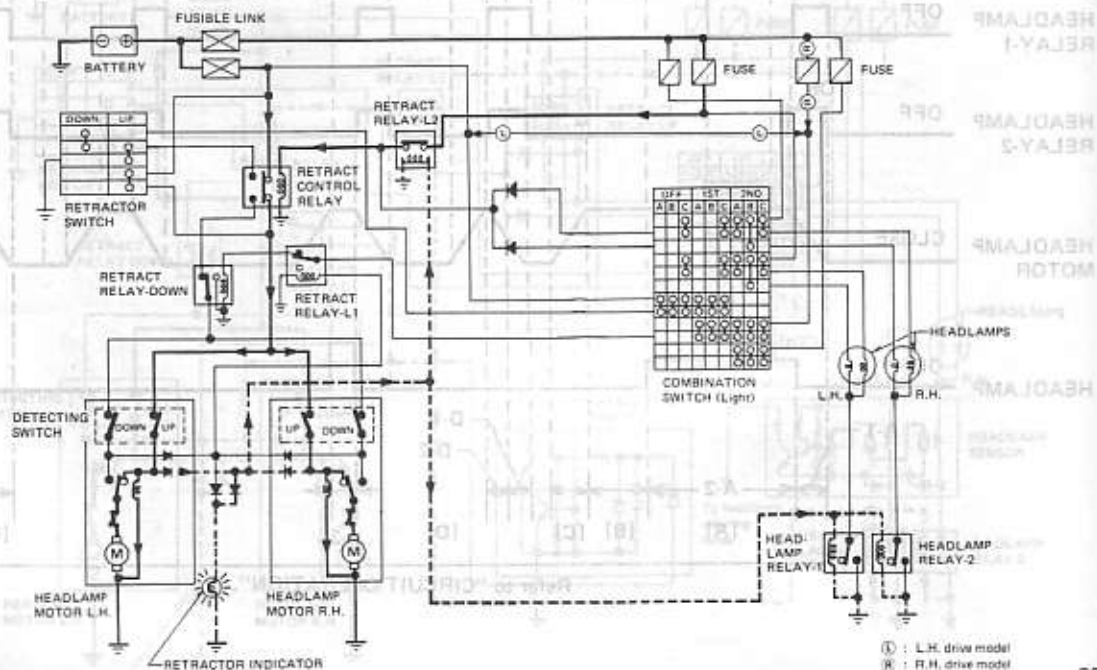
D-1: While headlamp motor is operating headlamps to the open position

(The moment lighting switch is turned to PASSING position)



D-2: While headlamp motor is operating headlamps to the open position

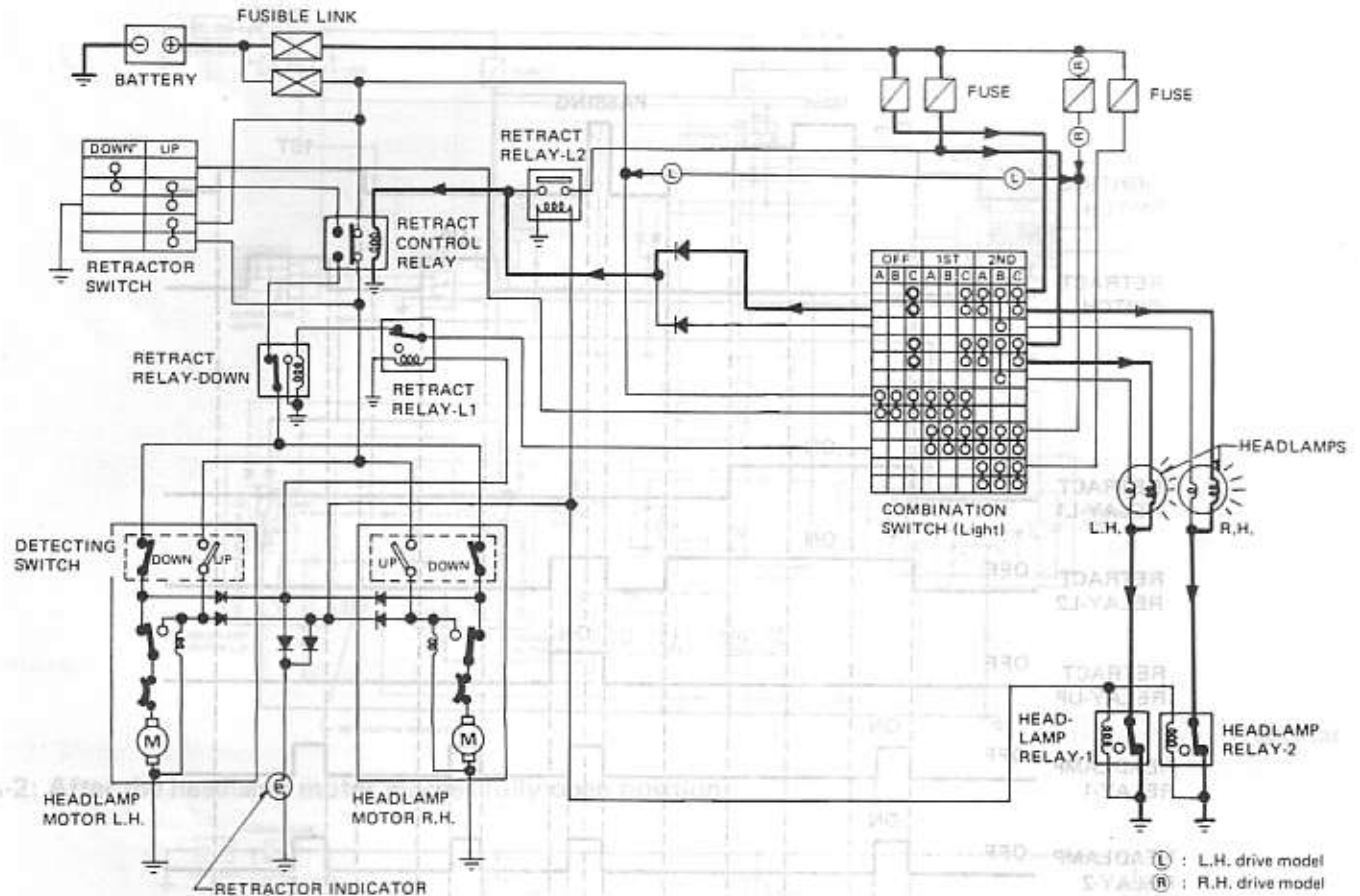
(When lighting switch is released from PASSING position)



HEADLAMP

Description (For Europe model) (Cont'd)

D-3: After the headlamp motor reaches fully open position
(When lighting switch is kept in PASSING position)



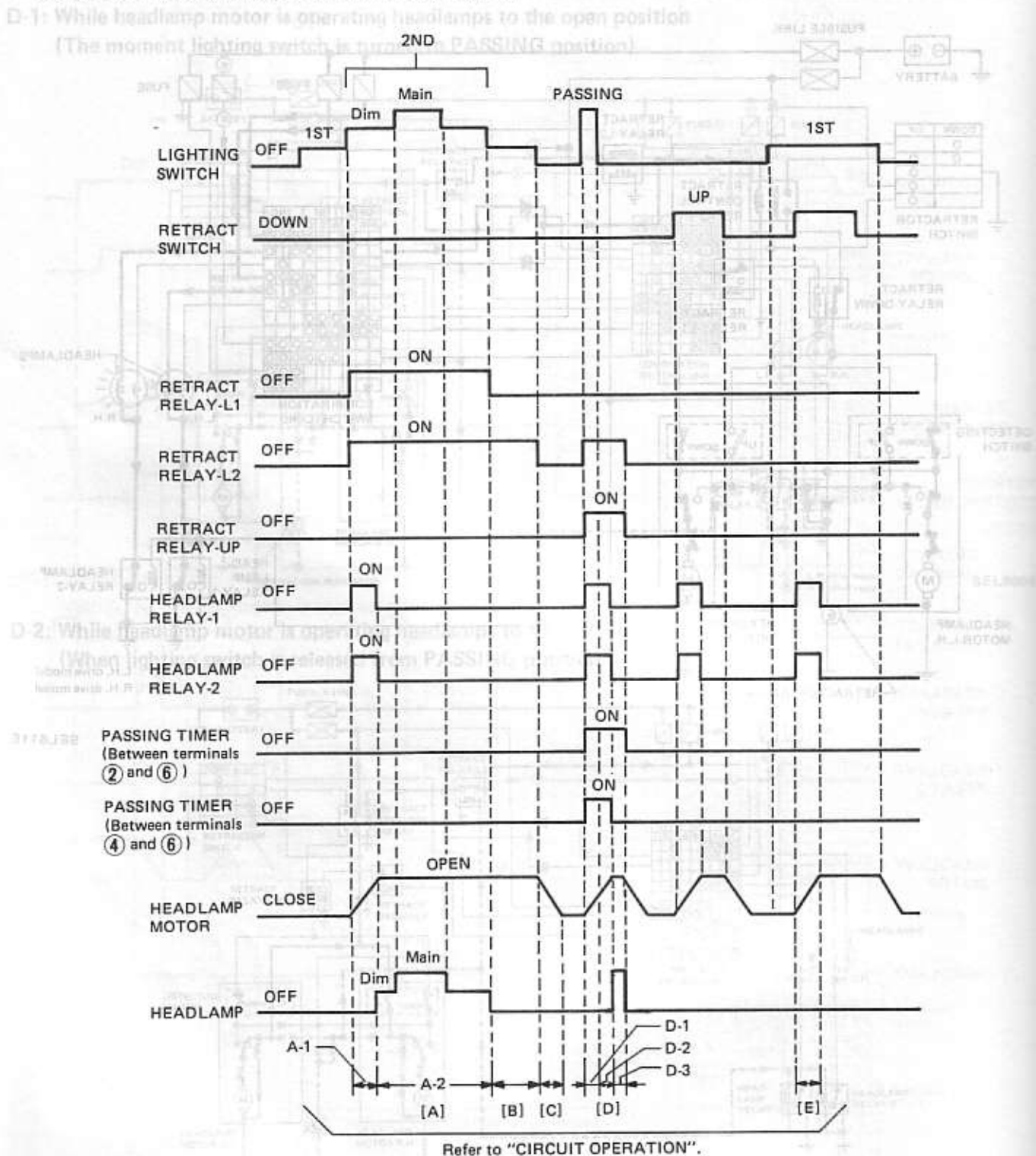
SEL611E

HEADLAMP

Description (R.H. drive model except for Europe)

TIMING CHART

- The following chart depicts the operational models of relays and headlamp motors in relation to the positions of the lighting switch and retract switch.



SEL612E

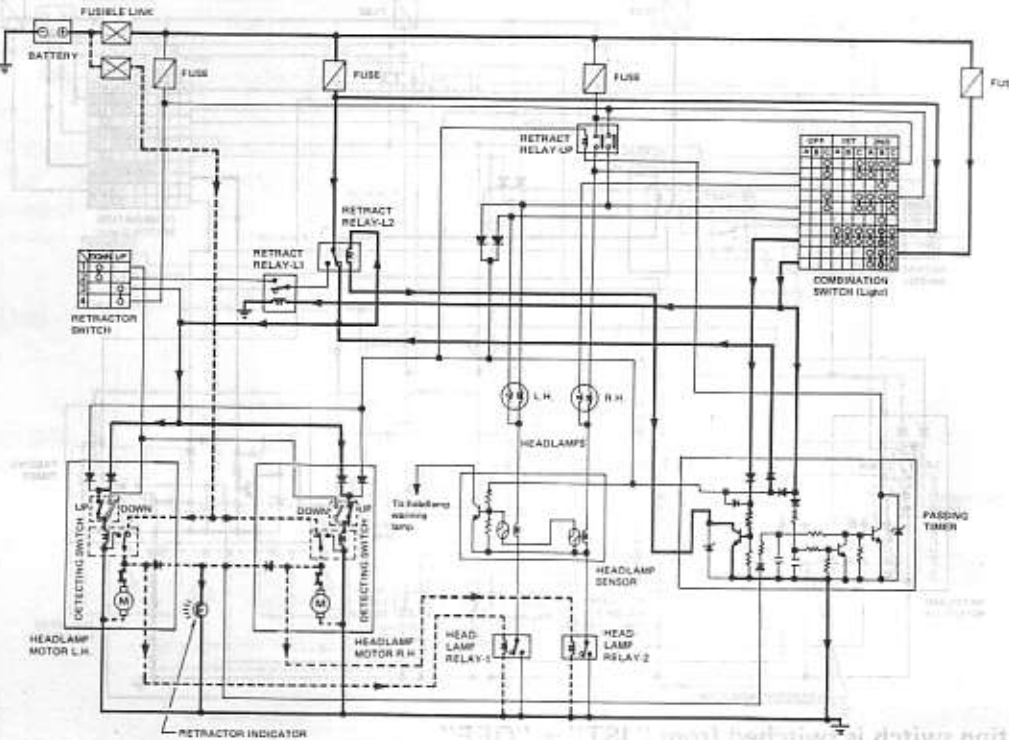
HEADLAMP

Description (R.H. drive model except for Europe) (Cont'd)

CIRCUIT OPERATION

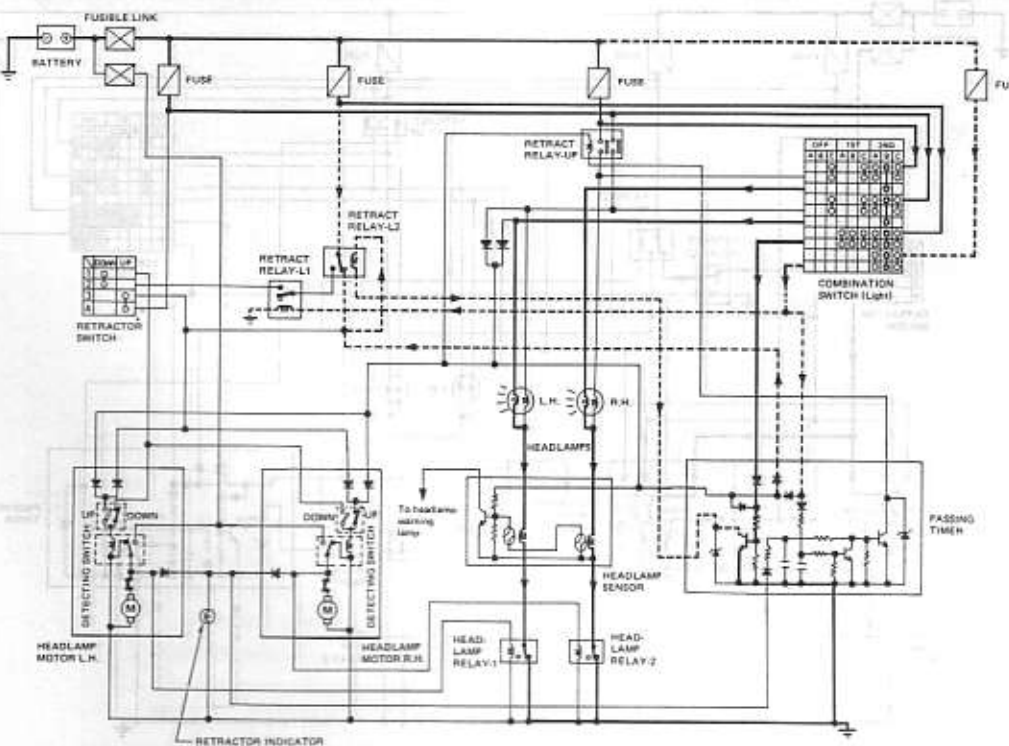
[A] When lighting switch is switched from "1ST" → "2ND"

A-1: While headlamp motor is operating headlamps to the open position



SEL613E

A-2: After the headlamp motor reaches fully open position

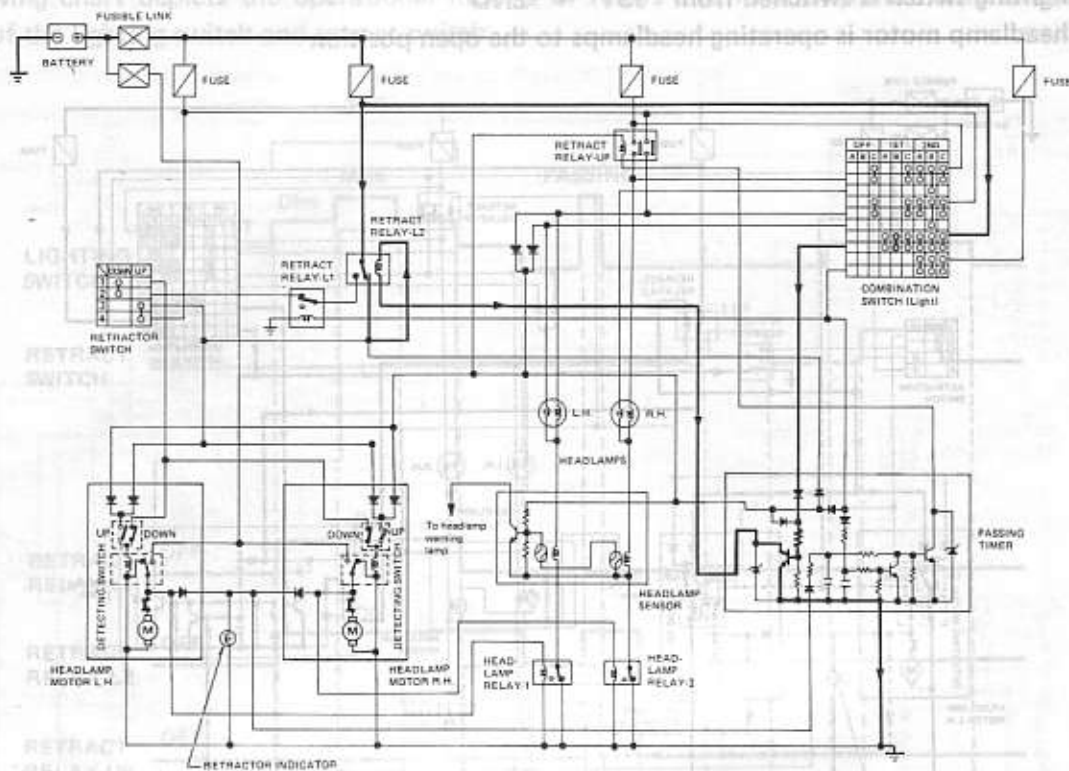


SEL614E

HEADLAMP

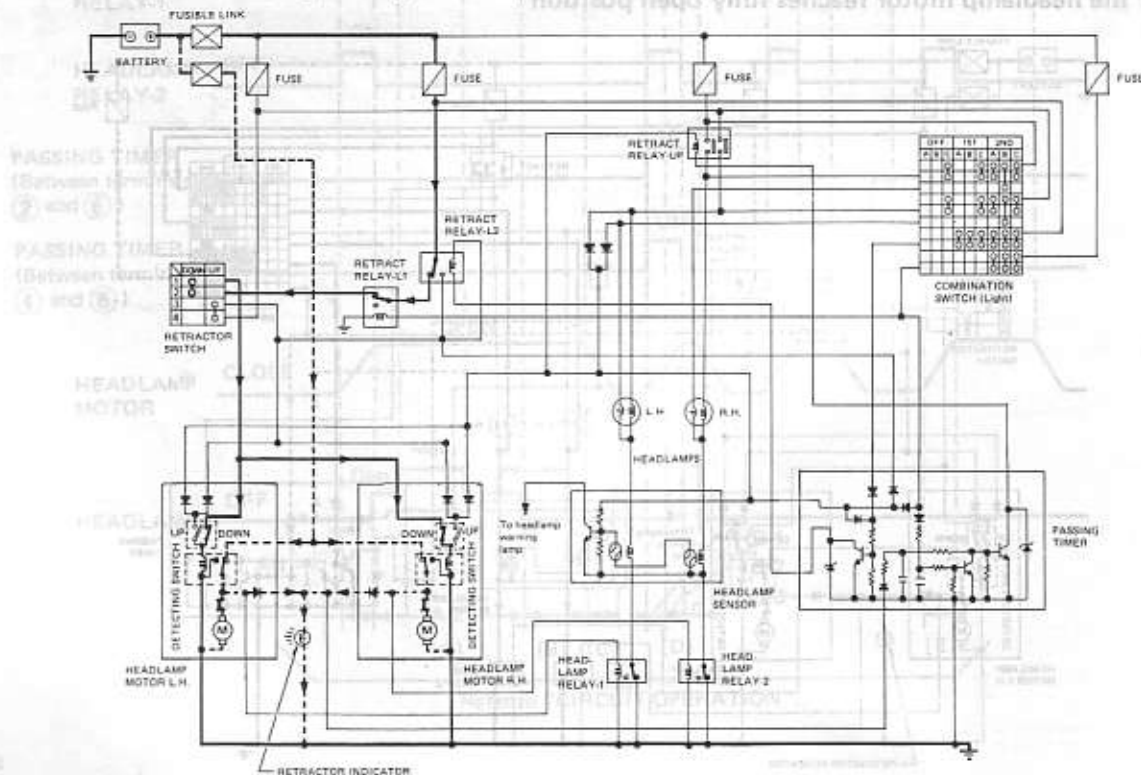
Description (R.H. drive model except for Europe) (Cont'd)

- [B] When lighting switch is switched from "2ND" → "1ST"
(Headlamp motor holds open position)



SEL615E

- [C] When lighting switch is switched from "1ST" → "OFF"
(While headlamp motor is operating headlamps to the close position)



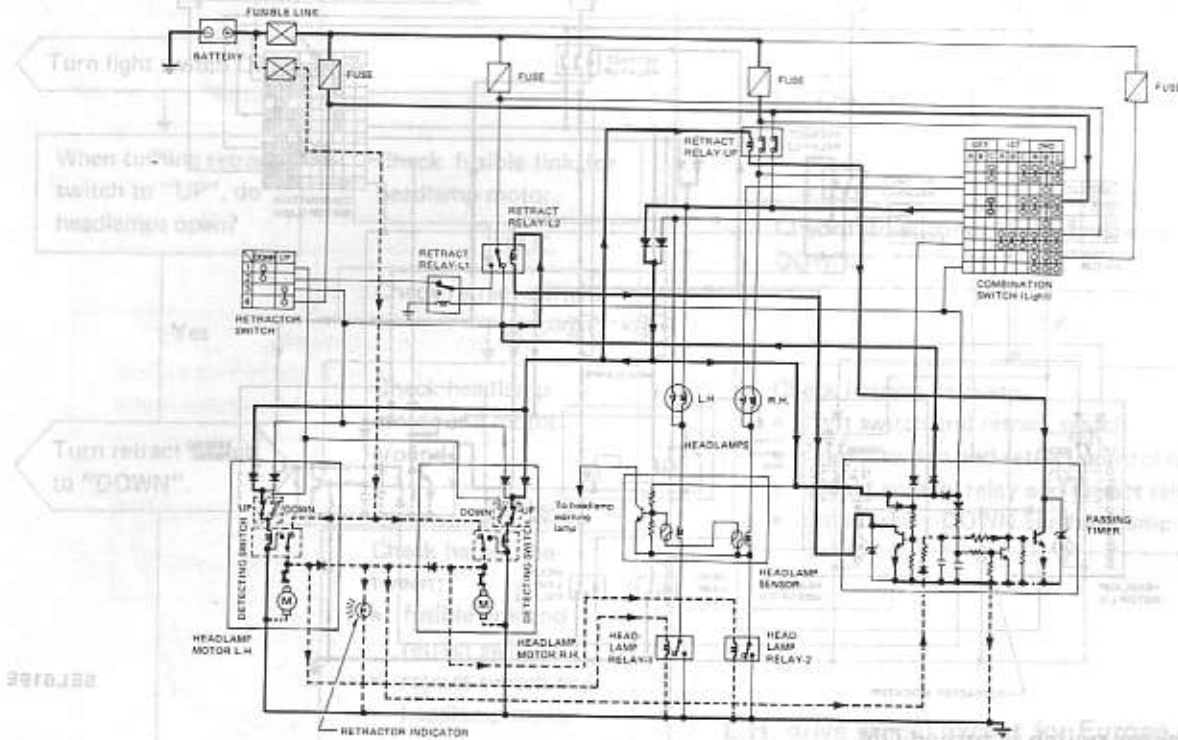
SEL615E

HEADLAMP

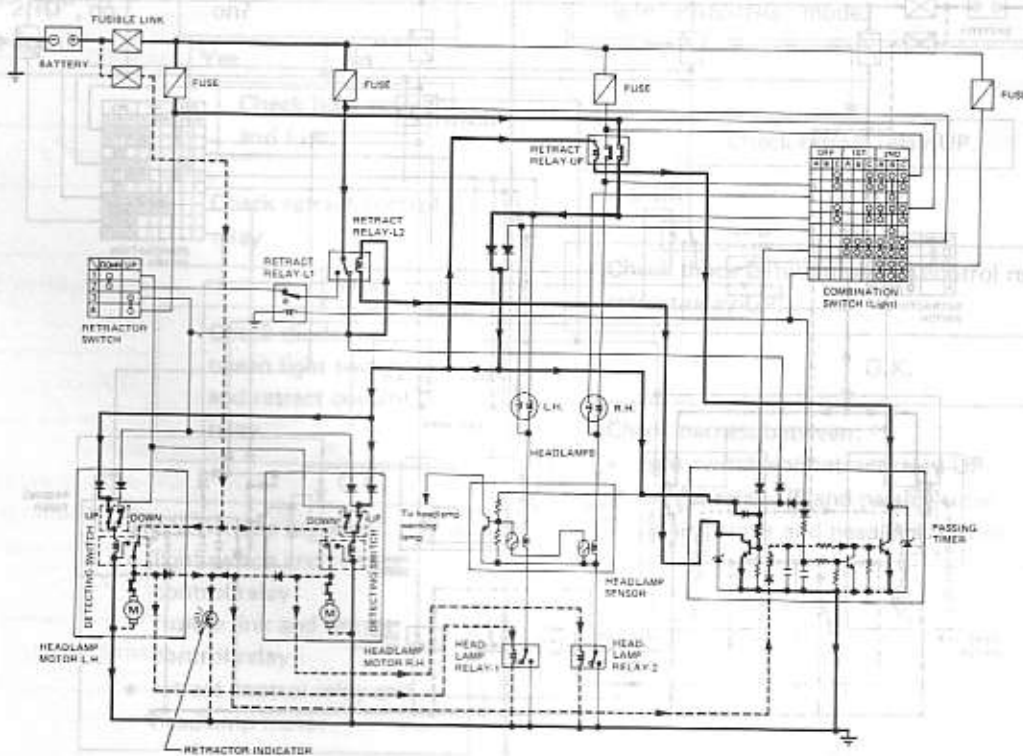
Description (R.H. drive model except for Europe) (Cont'd)

[D] When lighting switch is switched to "PASSING"

D-1: While headlamp motor is operating headlamps to the open position
(The moment lighting switch is turned to PASSING position)



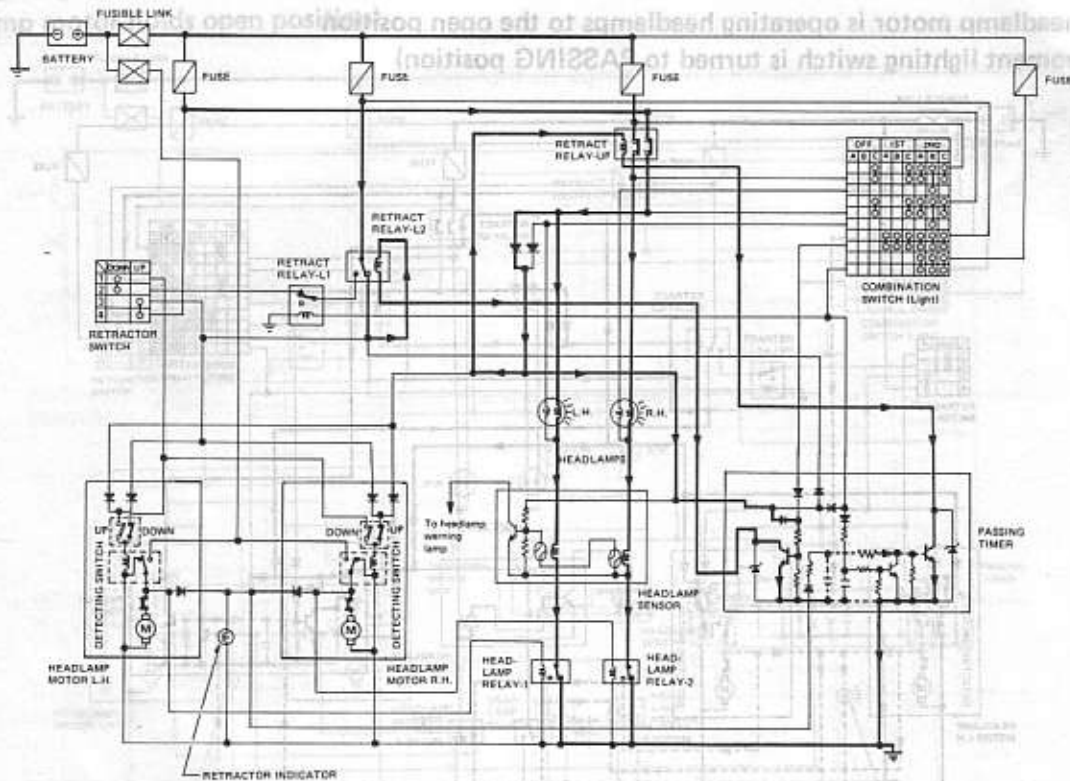
D-2: While headlamp motor is operating headlamps to the open position
(When lighting switch is released from PASSING position)



HEADLAMP

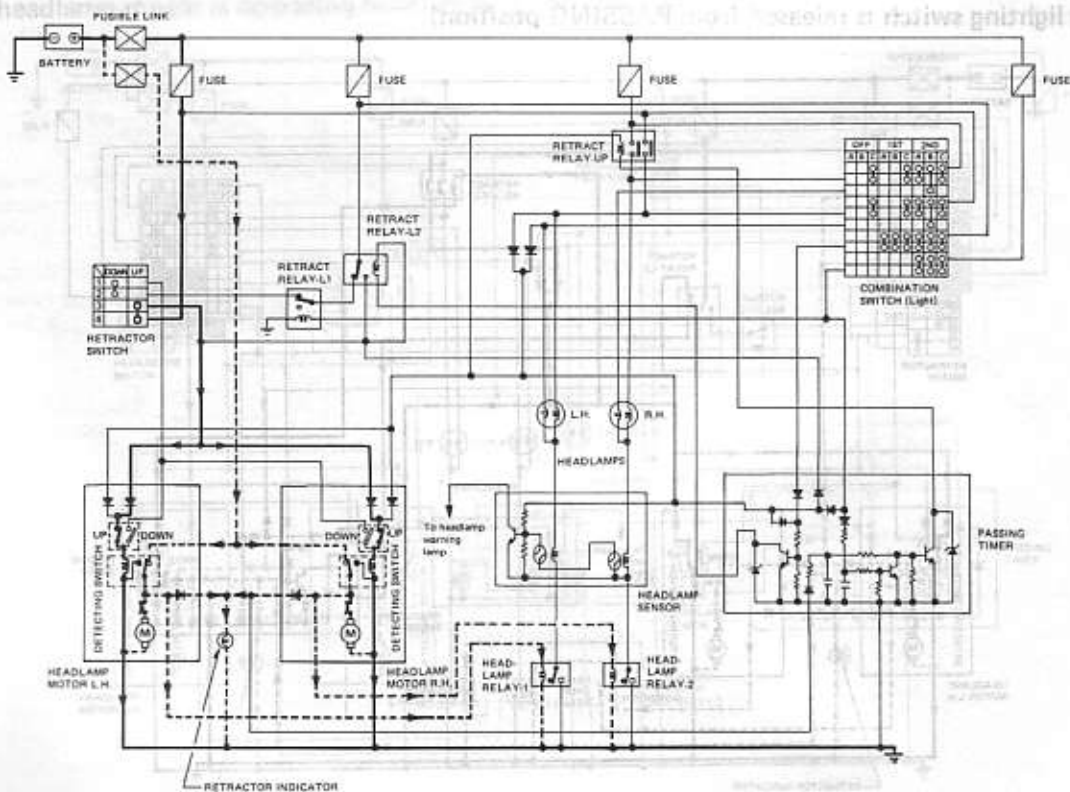
Description (L.H. drive model except for Europe) (Cont'd)

D-3: After the headlamp motor reaches fully open position



SEL619E

[E] When retractor switch is turned ON
(While headlamp motor is operating headlamps to the open position)

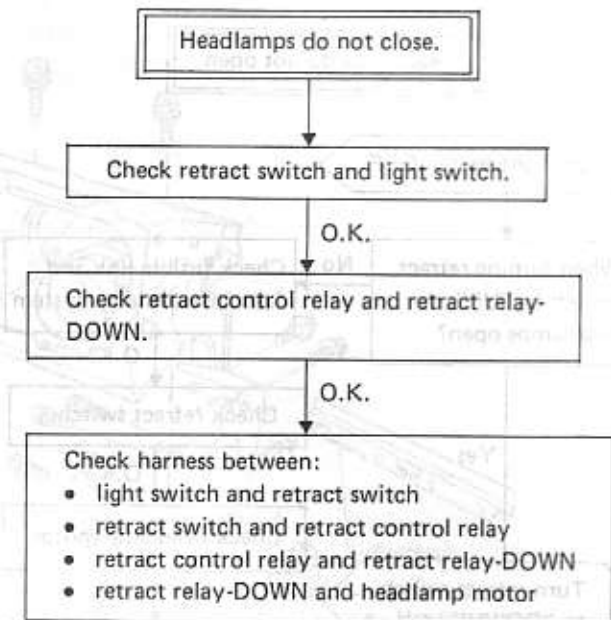
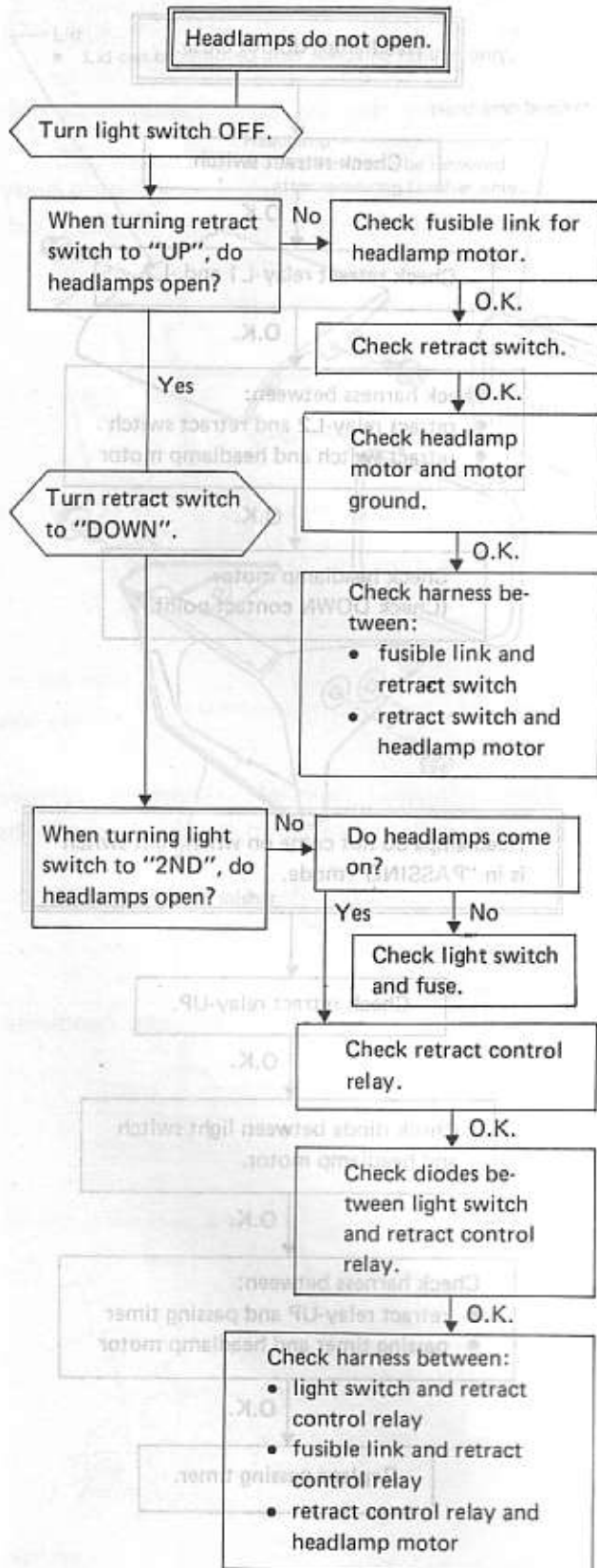


SEL620E

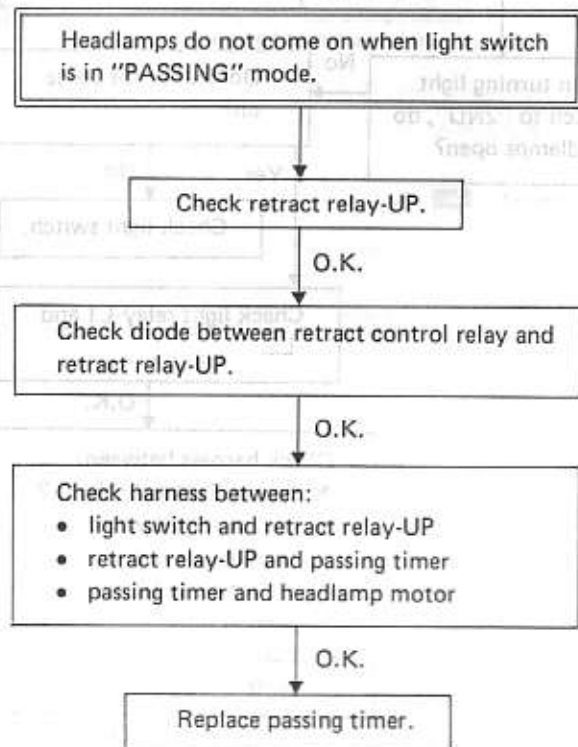
HEADLAMP

Trouble-shooting

EUROPE MODEL AND L.H. DRIVE MODEL EXCEPT FOR EUROPE



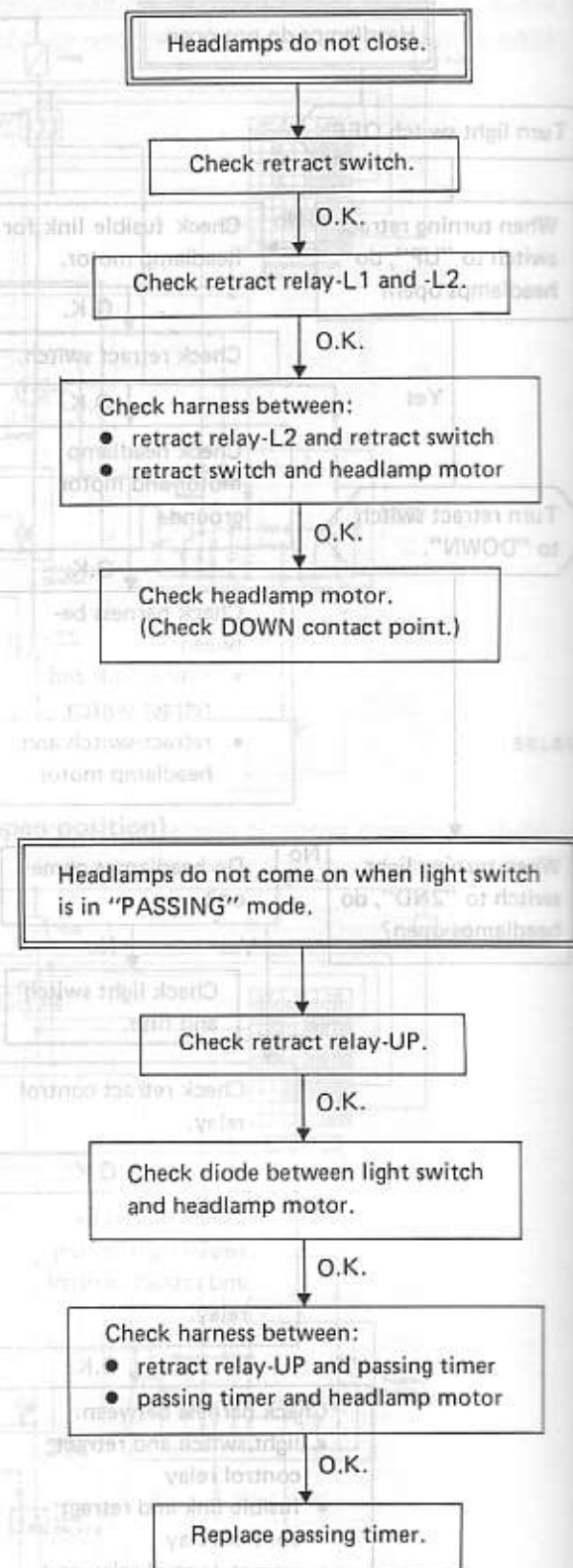
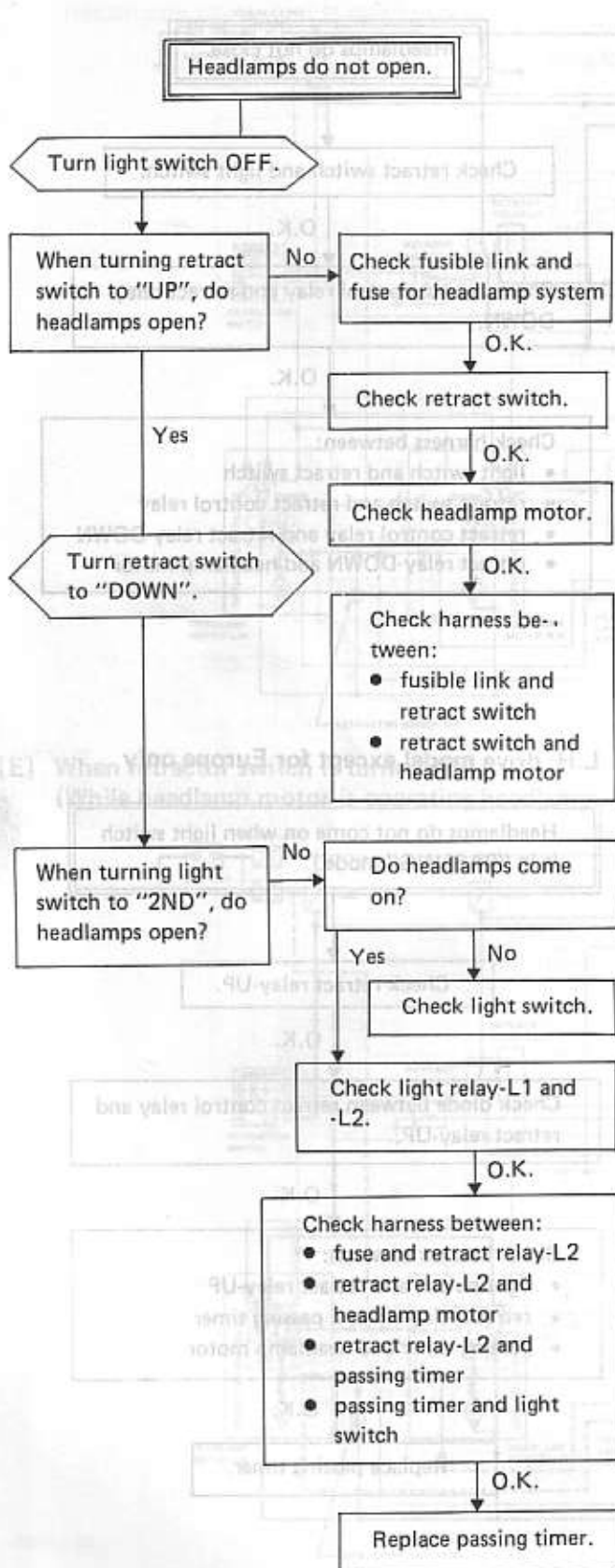
L.H. drive model except for Europe only



HEADLAMP

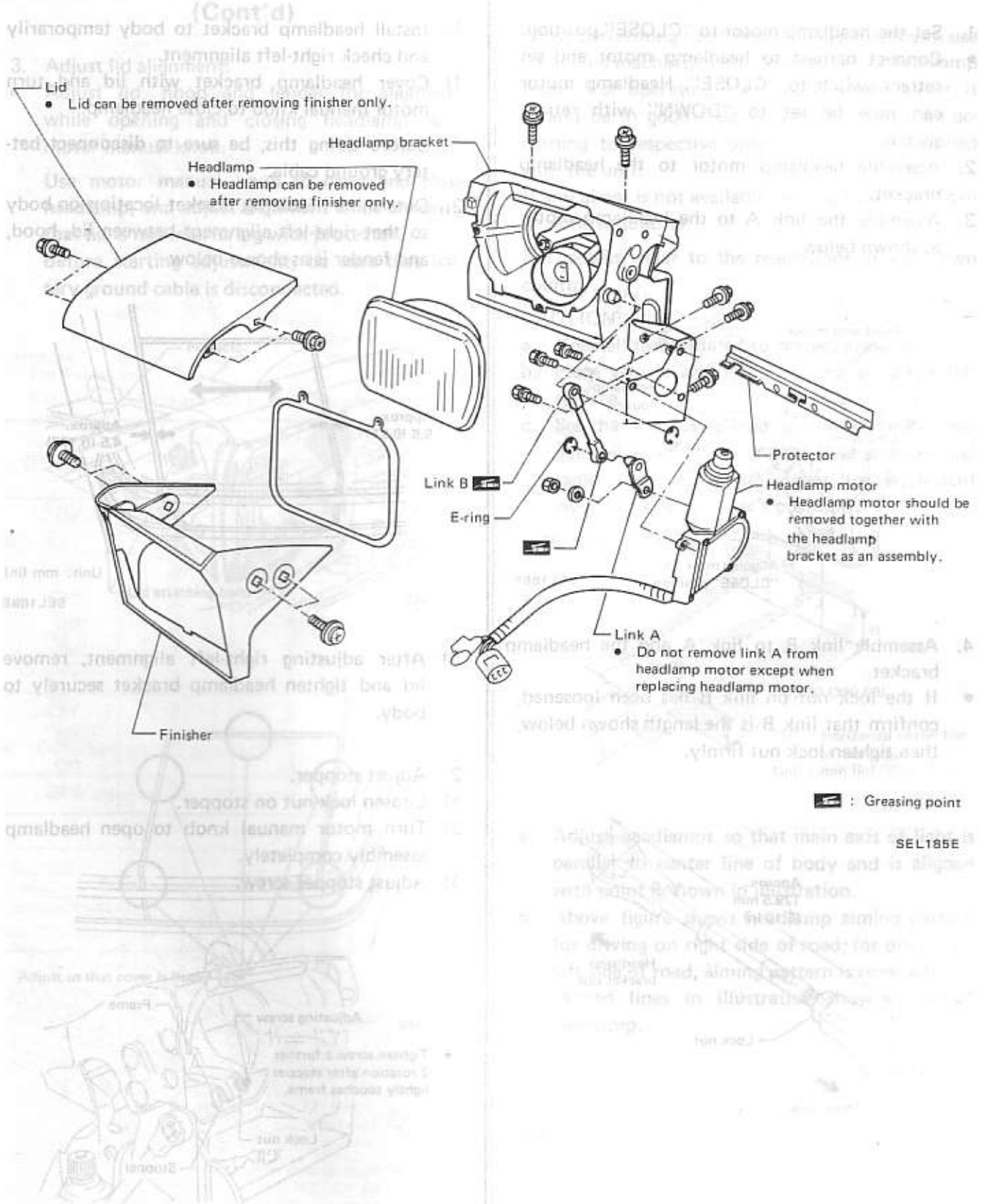
Trouble-shooting

R.H. DRIVE MODEL EXCEPT FOR EUROPE



HEADLAMP

Removal

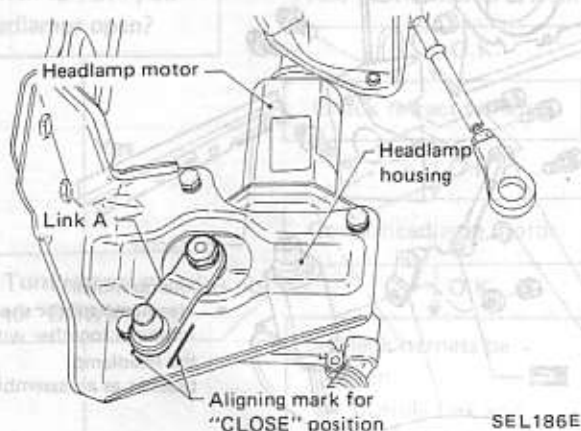


HEADLAMP

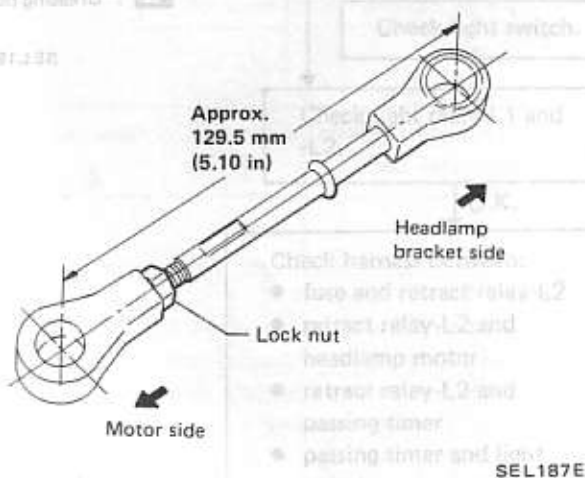
Assembly

Installation and Adjustment

1. Set the headlamp motor to "CLOSE" position.
 - Connect harness to headlamp motor and set retract switch to "CLOSE". Headlamp motor can now be set to "DOWN" with retract switch.
2. Assemble headlamp motor to the headlamp bracket.
3. Assemble the link A to the headlamp motor as shown below.



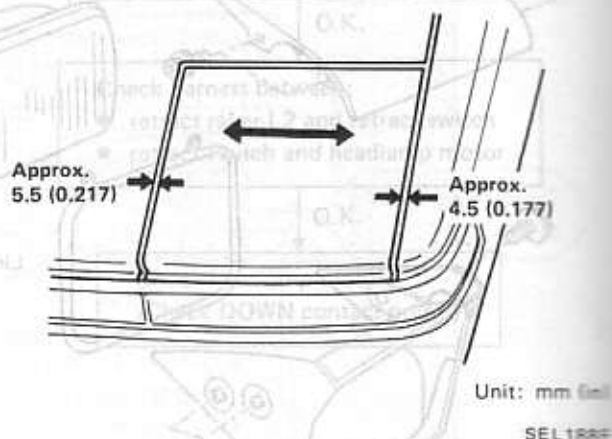
4. Assemble link B to link A and the headlamp bracket.
 - If the lock nut on link B has been loosened, confirm that link B is the length shown below, then tighten lock nut firmly.



1. Install headlamp bracket to body temporarily and check right-left alignment.
 - 1) Cover headlamp bracket with lid and turn motor manual knob to close headlamp.

Before doing this, be sure to disconnect battery ground cable.

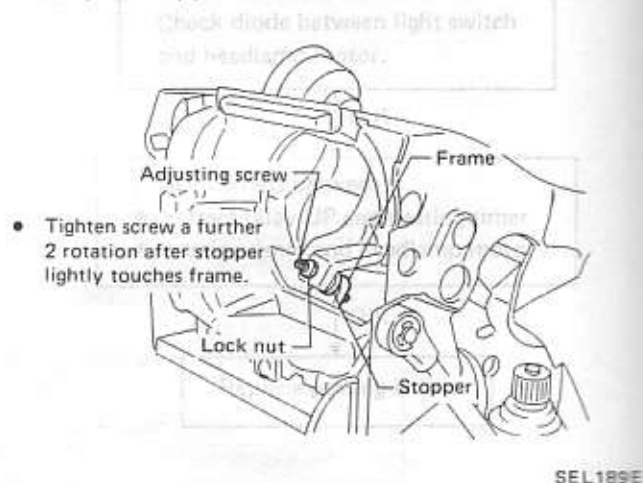
- 2) Determine headlamp bracket location on body so that right-left alignment between lid, hood, and fender is as shown below.



- 3) After adjusting right-left alignment, remove lid and tighten headlamp bracket securely to body.

2. Adjust stopper.

- 1) Loosen lock nut on stopper.
- 2) Turn motor manual knob to open headlamp assembly completely.
- 3) Adjust stopper screw.



HEADLAMP

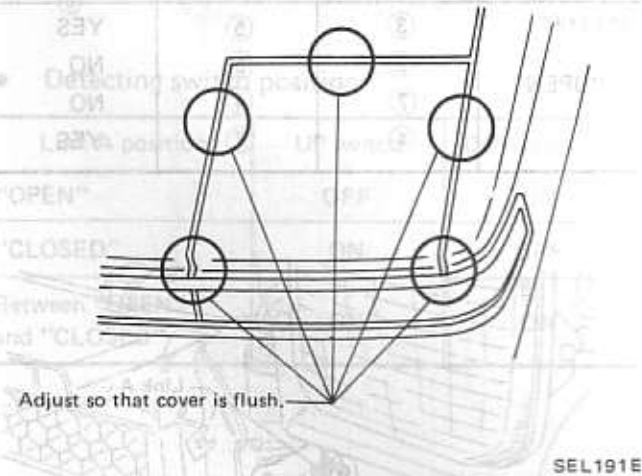
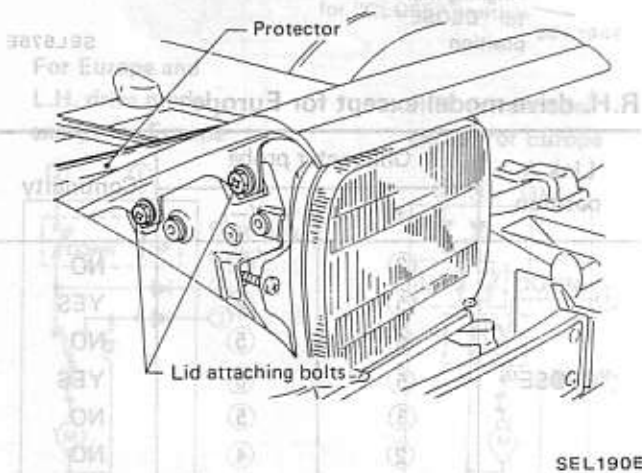
Installation and Adjustment

(Cont'd)

3. Adjust lid alignment.
 - Adjust lid, hood and fender for alignment while opening and closing headlamp with motor manual knob.

Use motor manual knob to open and close headlamp, and adjust alignment while checking that lid is not interfering with protector.

Before starting adjustment, be sure that battery ground cable is disconnected.



Aiming Adjustment

When performing headlamp aiming adjustment, use an aiming machine, aiming wall screen or headlamp tester. For operating instructions of any aimer, it should be in good repair, calibrated and used according to respective operation manuals supplied with the unit.

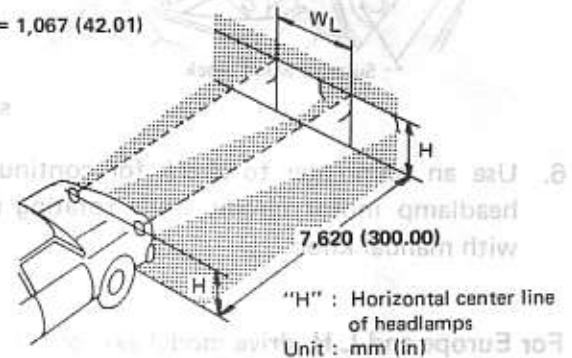
If any aimer is not available, aiming adjustment can be done as follows:

For details, refer to the regulations in your own country.

CAUTION:

- a. Keep all tires inflated to correct pressures.
- b. Place vehicle and tester on one and same flat surface.
- c. See that there is no load in vehicle (coolant, engine oil filled up to correct level and full fuel tank) other than the driver (or equivalent weight placed in driver's position).

$$W_L = 1,067 (42.01)$$

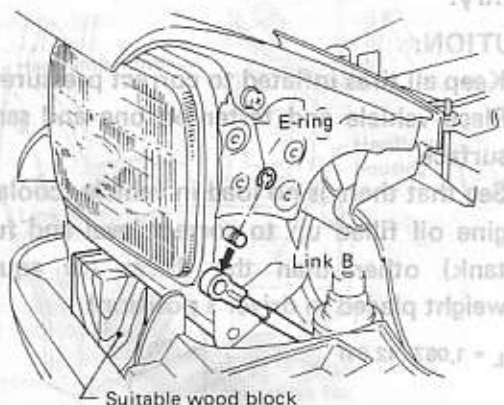


- a. Adjust headlamps so that main axis of light is parallel to center line of body and is aligned with point P shown in illustration.
- b. Above figure shows headlamp aiming pattern for driving on right side of road; for driving on left side of road, aiming pattern is reversed.
- c. Dotted lines in illustration show center of headlamp.

HEADLAMP

Headlamp Motor Check

1. Disconnect battery ground cable.
2. Fully open the headlamp with motor manual knob.
3. Remove headlamp finisher and front combination lamp.
4. Support headlamp bracket with a suitable block of wood from below.
5. Remove E-ring, and link B from headlamp bracket.

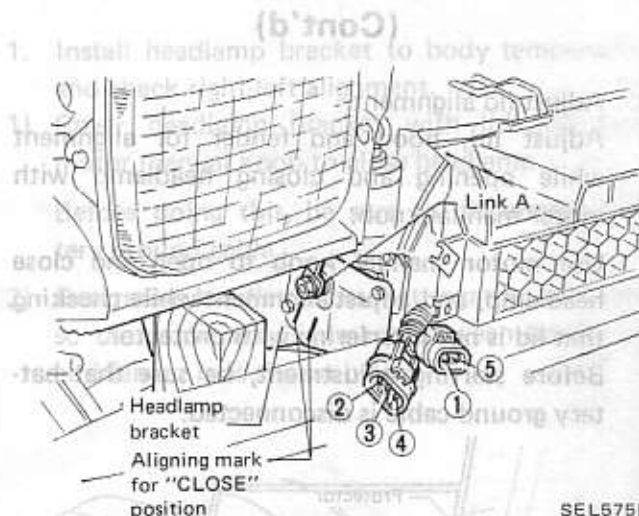


SEL192E

6. Use an ohmmeter to check for continuity in headlamp motor circuit while rotating motor with manual knob.

For Europe and L.H. drive model except for Europe

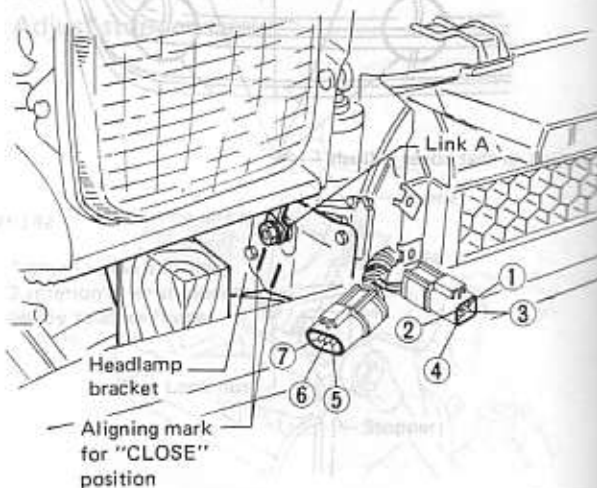
Link A position	Ohmmeter probe		Continuity
	(+)	(-)	
"CLOSE"	①	⑤	YES
	②	⑤	NO
	①	③	NO
	③	①	YES
"OPEN"	①	⑤	NO
	②	⑤	YES
	②	④	NO
	④	②	YES



SEL575E

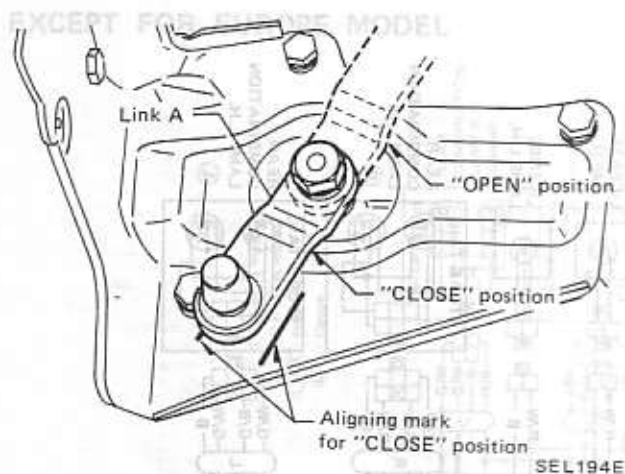
R.H. drive model except for Europe

Link A position	Ohmmeter probe		Continuity
	(+)	(-)	
"CLOSE"	②	⑤	NO
	⑤	②	YES
	⑥	⑤	NO
	⑤	⑥	YES
	③	⑤	NO
	②	④	NO
"OPEN"	④	②	YES
	③	⑤	YES
	②	⑤	NO
	⑦	④	NO
	④	⑦	YES

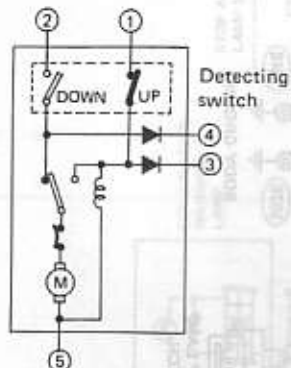


SEL576E

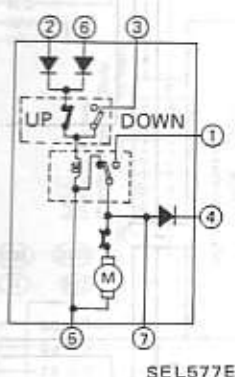
Headlamp Motor Check (Cont'd)



For Europe and
L.H. drive model
except for Europe



R.H. drive model
except for Europe



- Detecting switch position:

Link A position	UP switch	DOWN switch
"OPEN"	OFF	ON
"CLOSED"	ON	OFF
Between "OPEN" and "CLOSED"	ON	ON

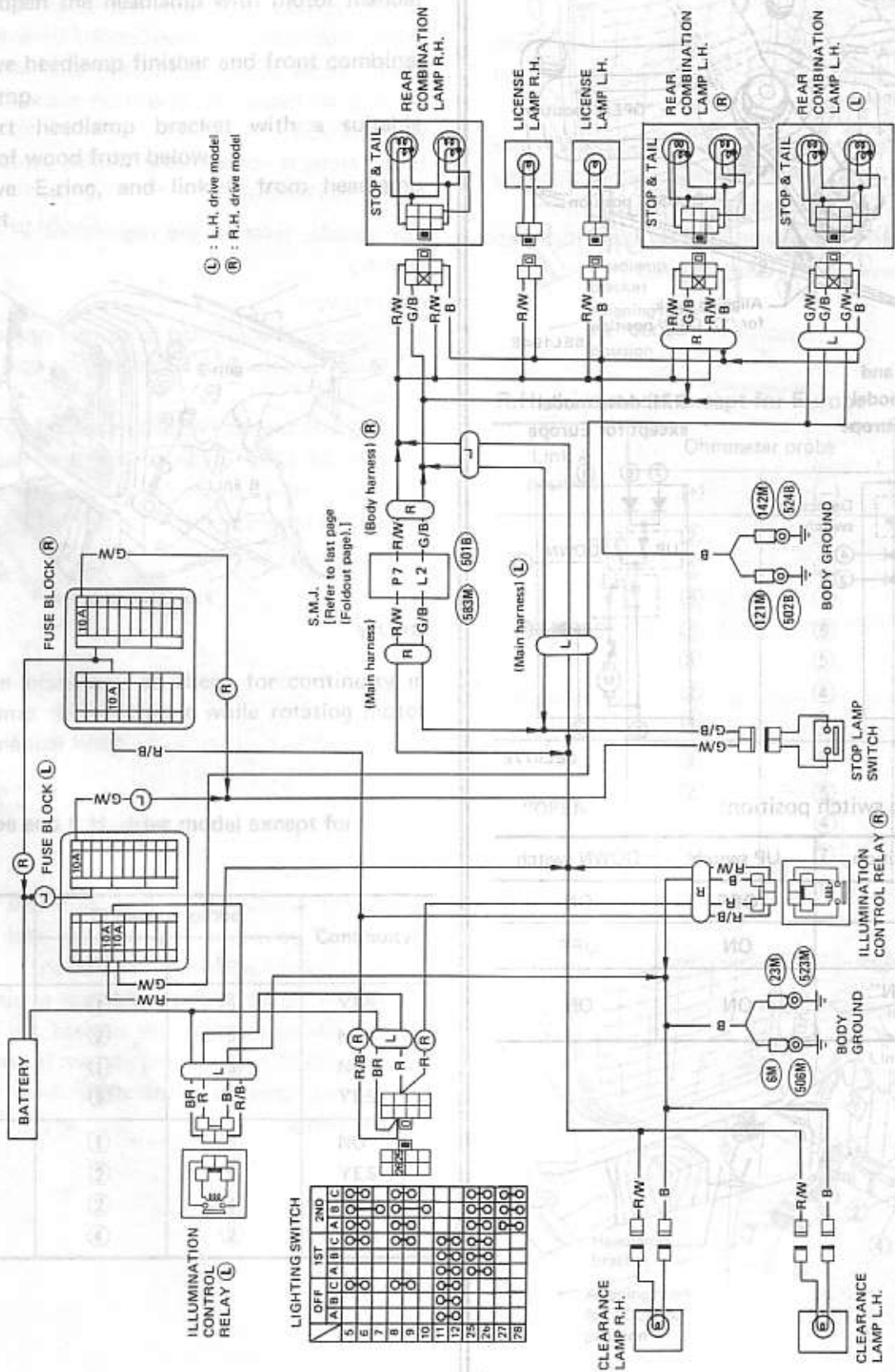
EXTERIOR LAMP

Clearance, License, Tail and Stop Lamps/Wiring Diagram

FOR EUROPE MODEL

1. Fully open the headlamp with motor manual knob.
2. Remove headlamp finisher and front combination lamp.
3. Support headlamp bracket with a suitable block of wood from below.
4. Remove E-ring, and link from headlamp bracket.

Ⓛ : L.H. drive model
Ⓡ : R.H. drive model

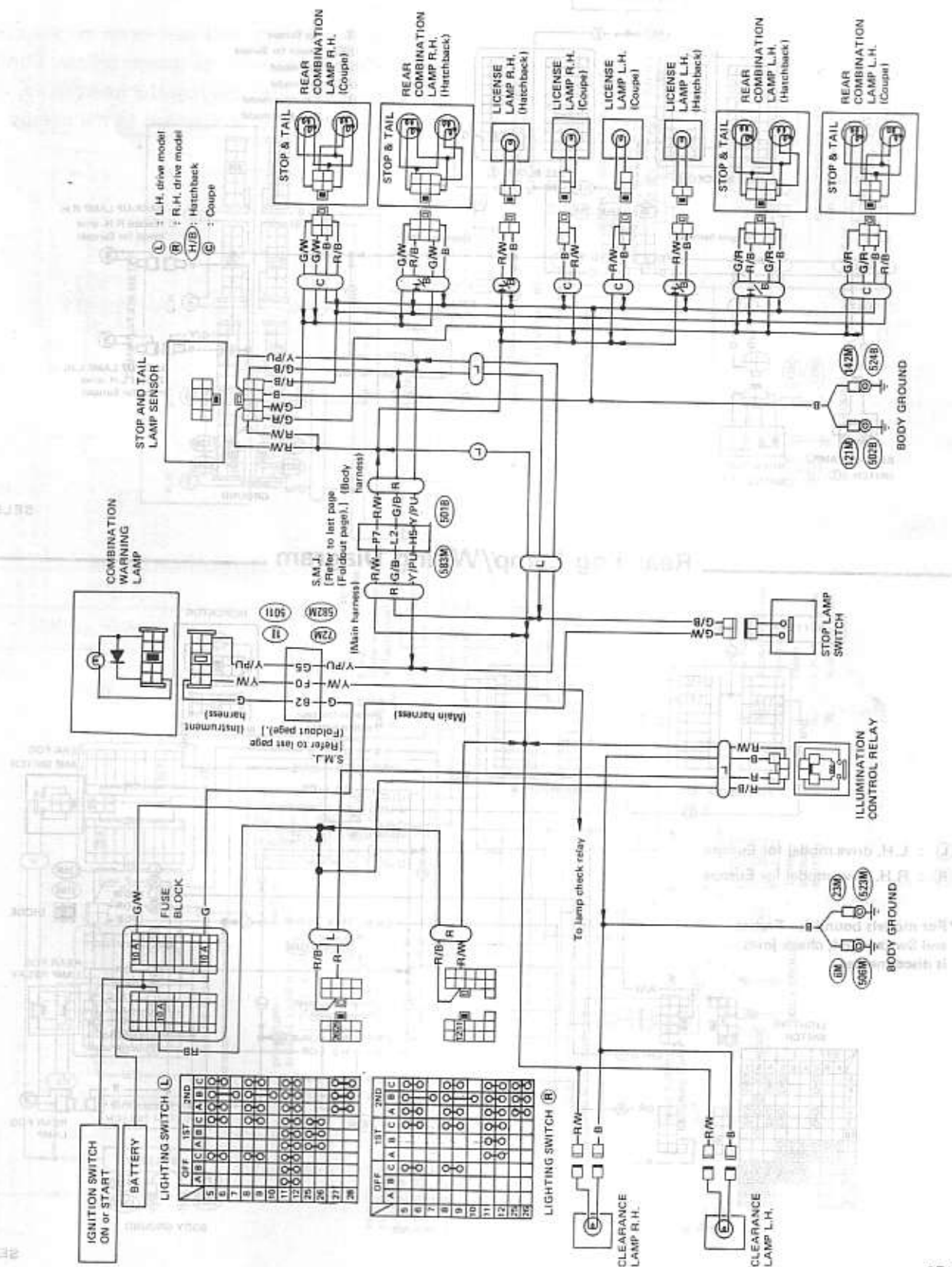


SEL516E

EXTERIOR LAMP

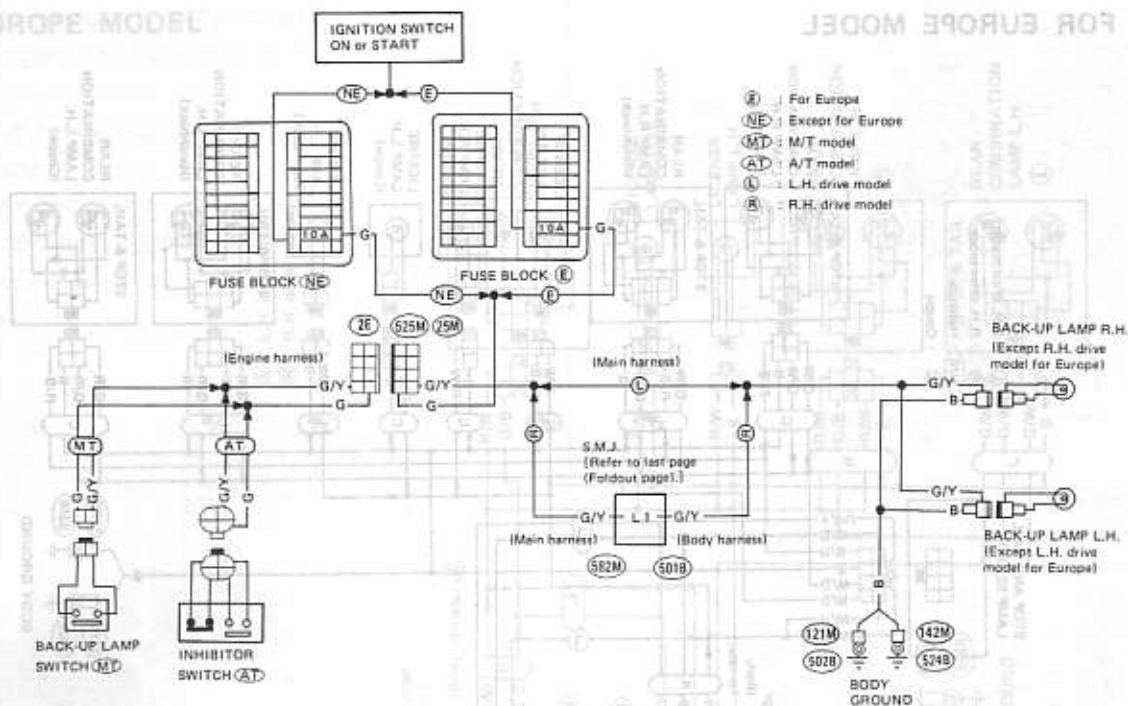
Clearance, License, Tail and Stop Lamps/Wiring Diagram (Cont'd)

EXCEPT FOR EUROPE MODEL

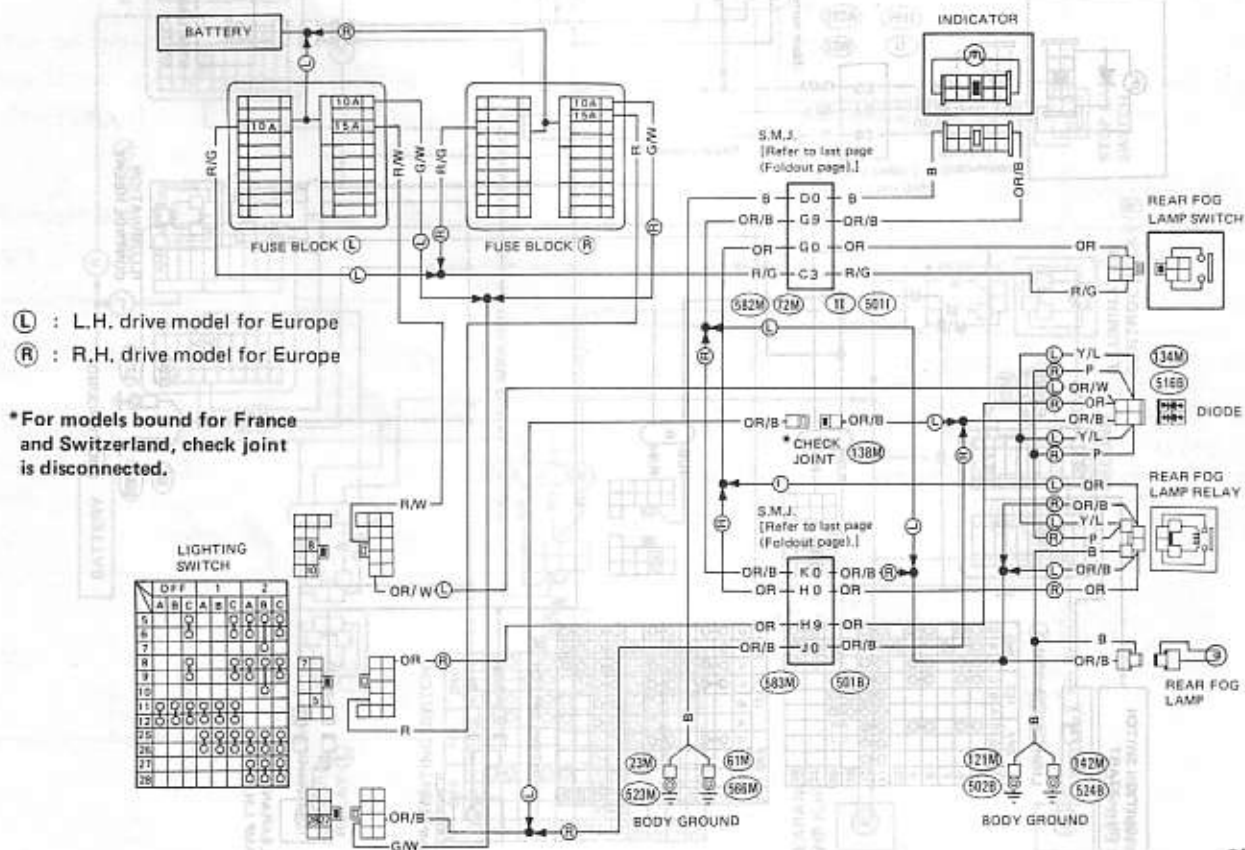


EXTERIOR LAMP

Back-up Lamp/Wiring Diagram

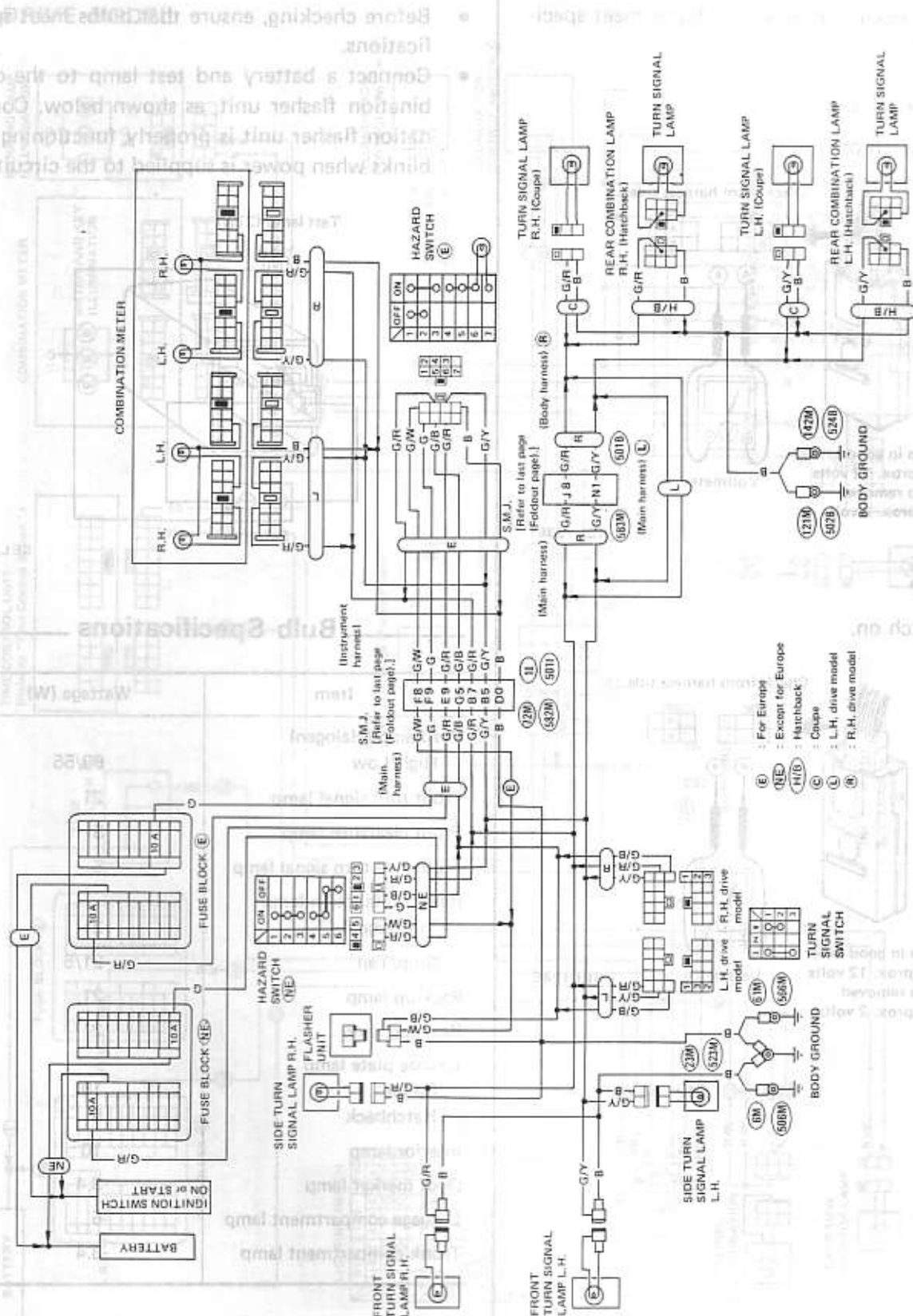


Rear Fog Lamp/Wiring Diagram



EXTERIOR LAMP

Turn Signal and Hazard Warning Lamps/Wiring Diagram



SEL520E

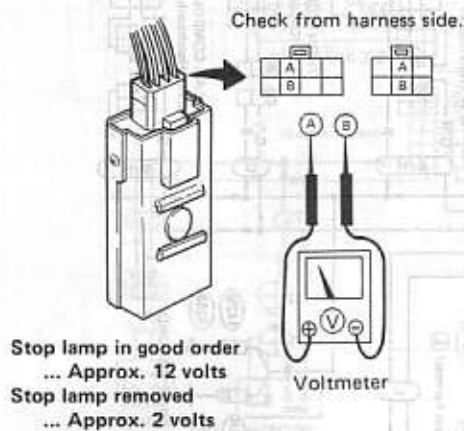
EXTERIOR LAMP

—Stop and Tail Lamp Sensor Check—

- Before checking, ensure that bulbs meet specifications.

STOP LAMP

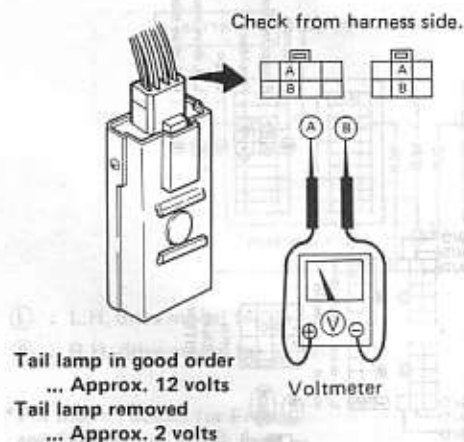
Stop lamp switch on.



SEL123E

TAIL LAMP

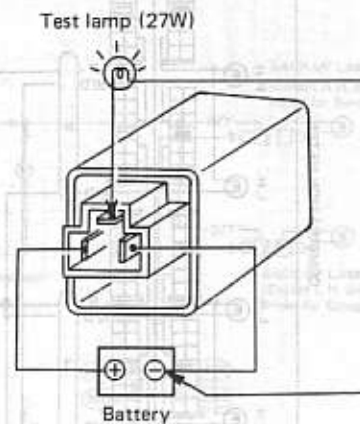
Lighting switch on.



SEL124E

Combination Flasher Unit Check

- Before checking, ensure that bulbs meet specifications.
- Connect a battery and test lamp to the combination flasher unit, as shown below. Combination flasher unit is properly functioning if it blinks when power is supplied to the circuit.



SEL122E

Bulb Specifications

Item	Wattage (W)
Headlamp (Halogen)	
High/Low	60/55
Front turn signal lamp	21
Front clearance lamp	5
Front side turn signal lamp	5
Rear combination lamp	
Turn signal	21
Stop/Tail	21/5
Back-up lamp	21
Rear fog lamp	21
License plate lamp	
Coupe	10
Hatchback	5
Interior lamp	10
Door marker lamp	3.4
Luggage compartment lamp	5
Trunk compartment lamp	3.4

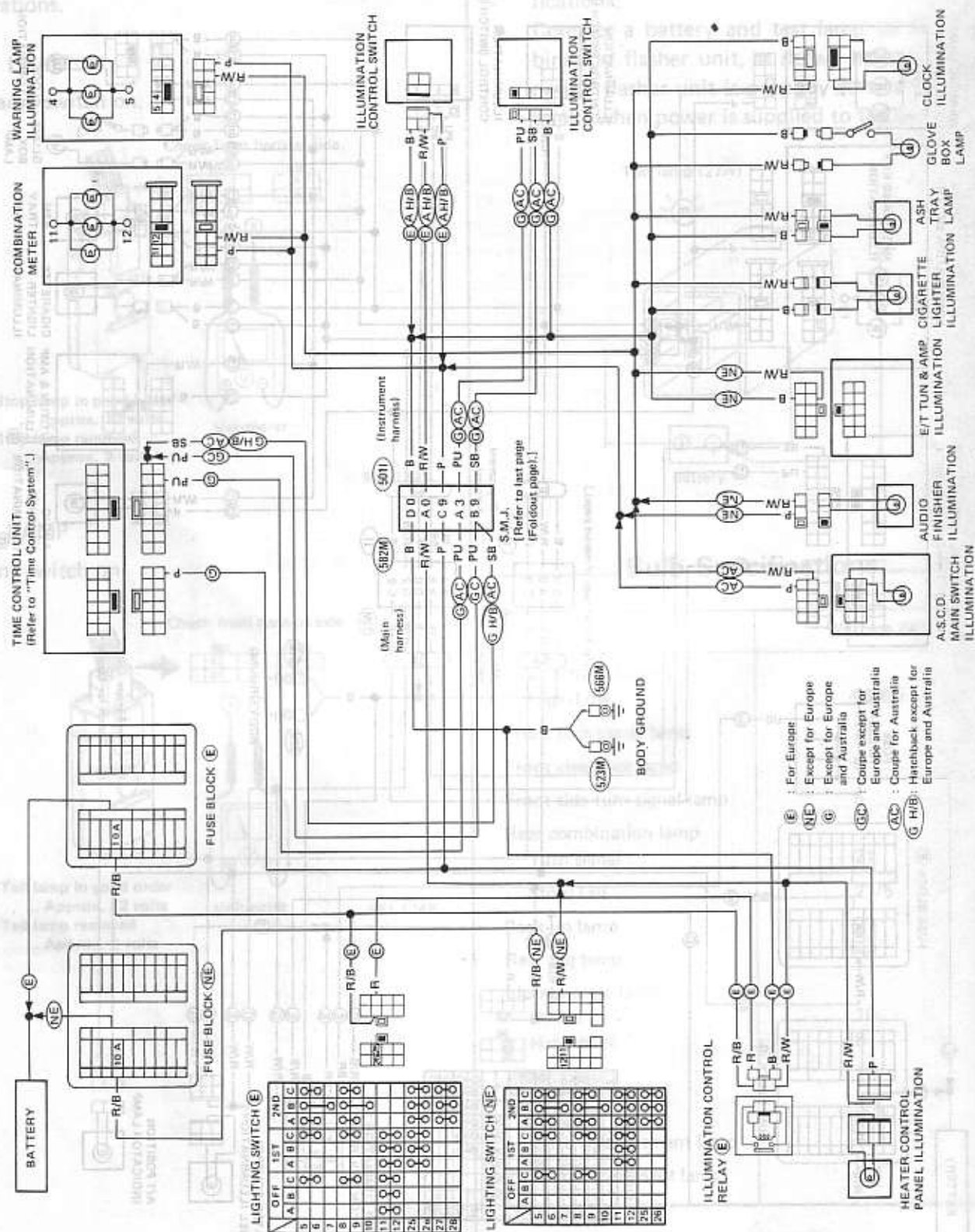
Illumination/Wiring Diagram

SEL521E

INTERIOR LAMP

Illumination/Wiring Diagram (Cont'd)

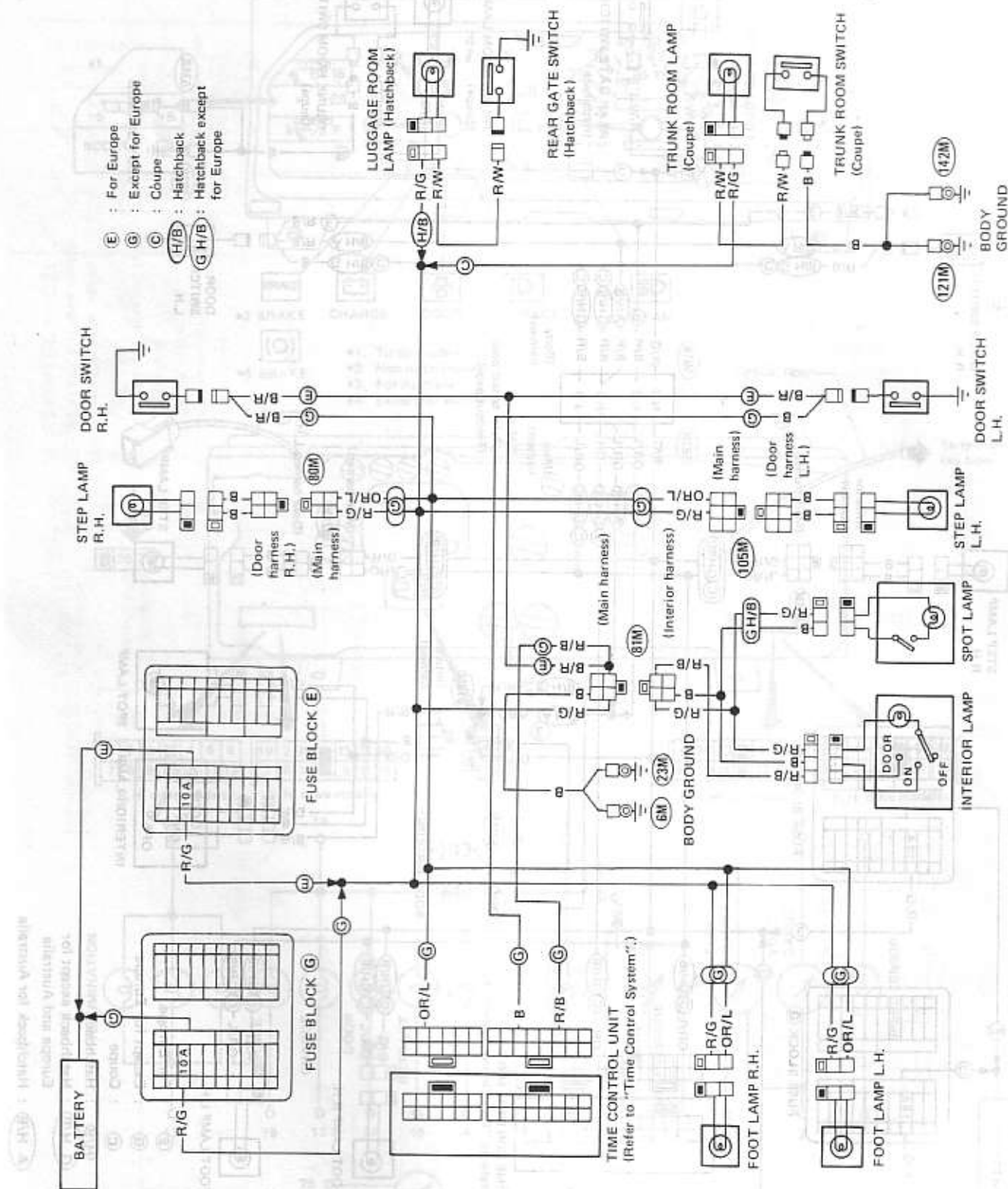
R.H. DRIVE MODEL



INTERIOR LAMP

Interior, Luggage, Foot, Step and Spot Lamps/Wiring Diagram

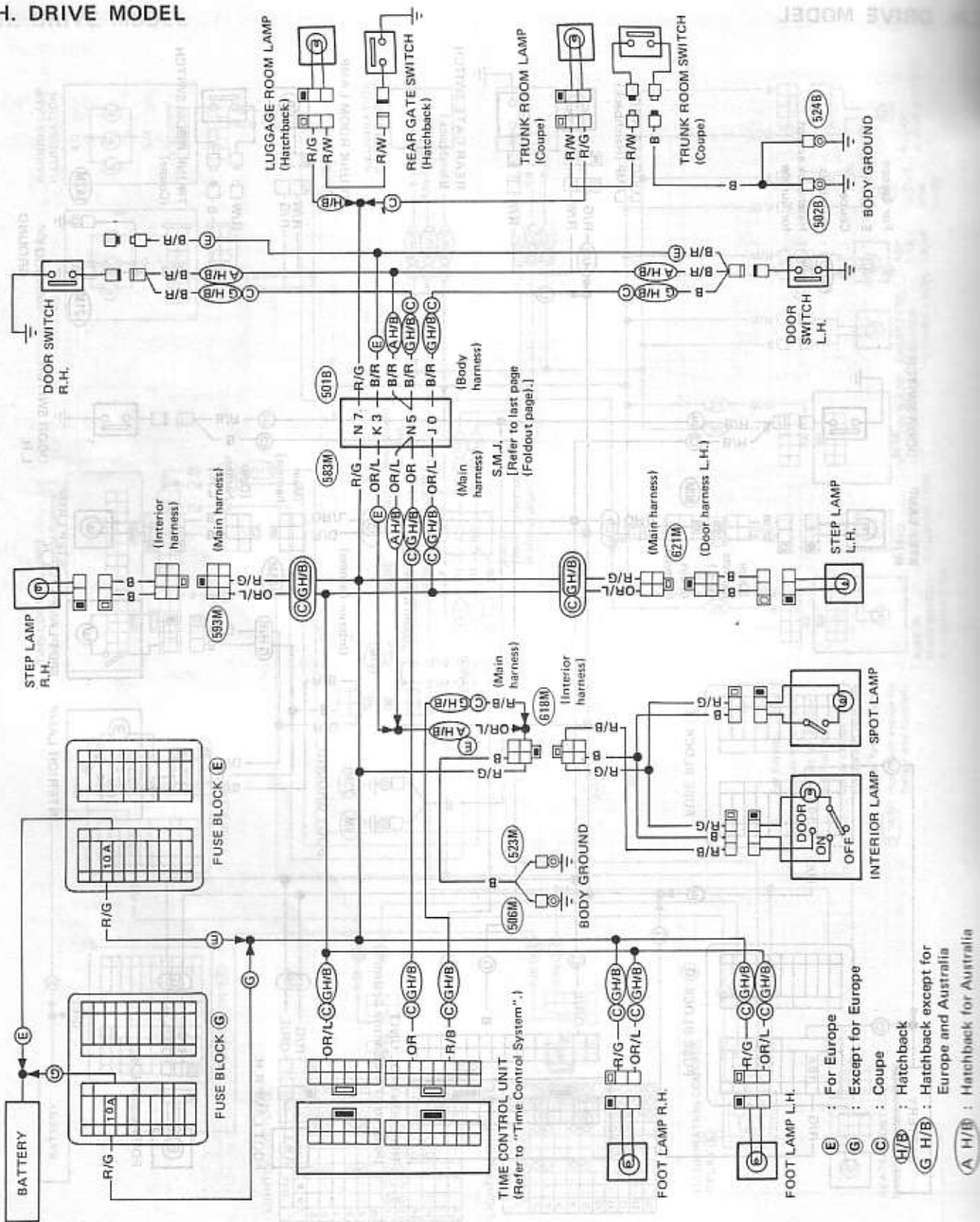
L.H. DRIVE MODEL



INTERIOR LAMP

— Interior, Luggage, Foot, Step and Spot Lamps/Wiring Diagram (Cont'd) —

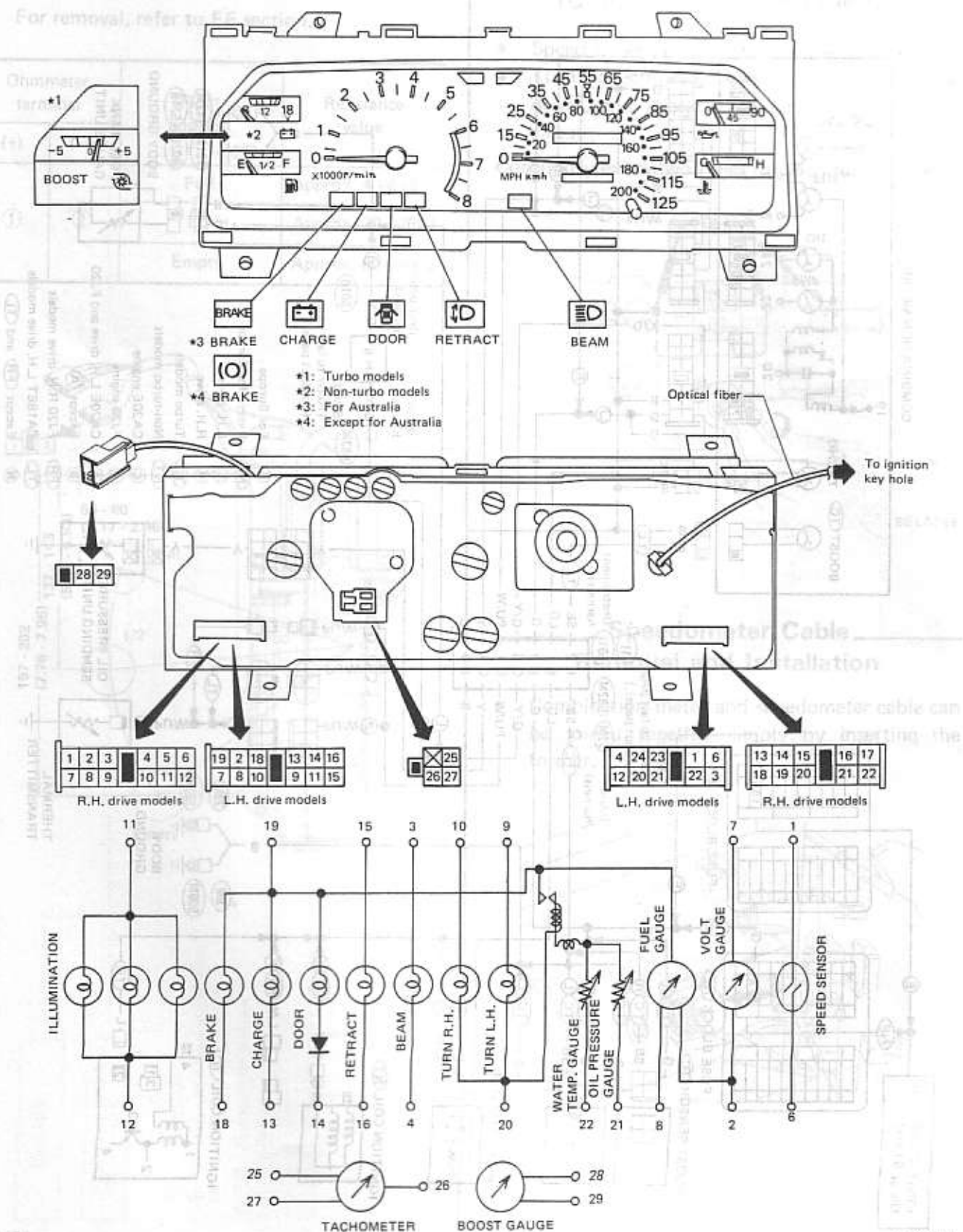
R.H. DRIVE MODEL



SEL524E

METER AND GAUGES

Combination Meter

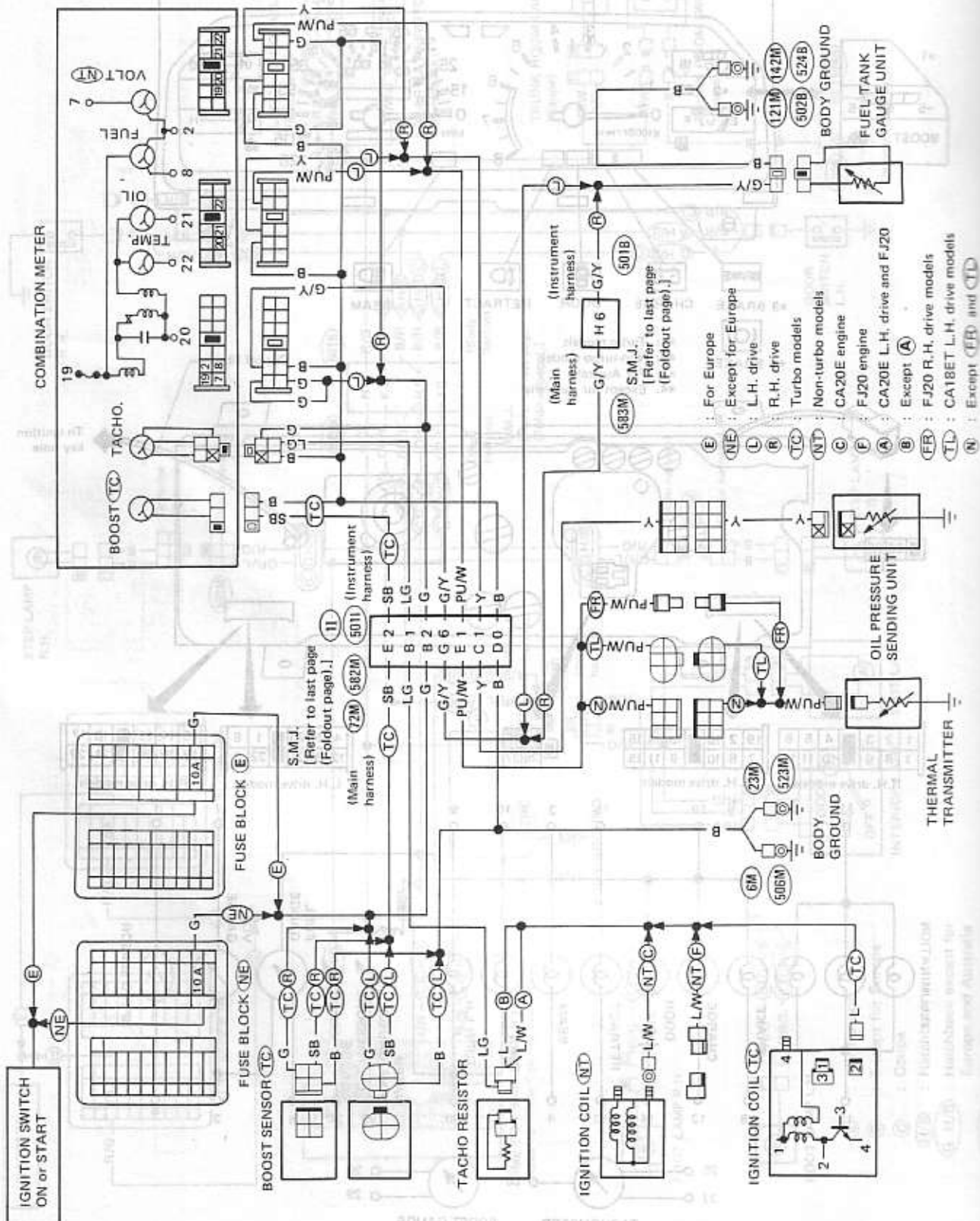


SEL525E

METER AND GAUGES

Tacho, Temp., Oil, Fuel, Volt and Boost Gauges/Wiring Diagram

R.H. DRIVE MODEL



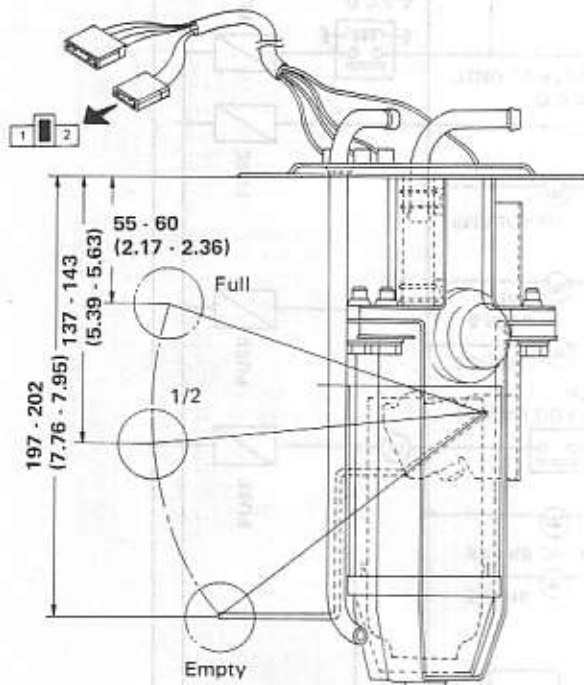
SEL526E

METER AND GAUGES

Fuel Tank Gauge Unit Check

- For removal, refer to FE section.

Ohmmeter terminal		Float position	Resistance value
(+)	(-)		
①	②	Full	Approx. 4 - 6 Ω
		1/2	Approx. 30 - 35 Ω
		Empty	Approx. 80 - 90 Ω



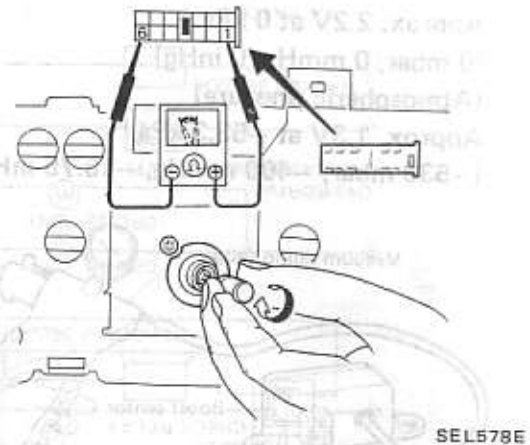
Unit: mm (in)

SEL237E

Speed Sensor Signal Check (Coupe for Australia model)

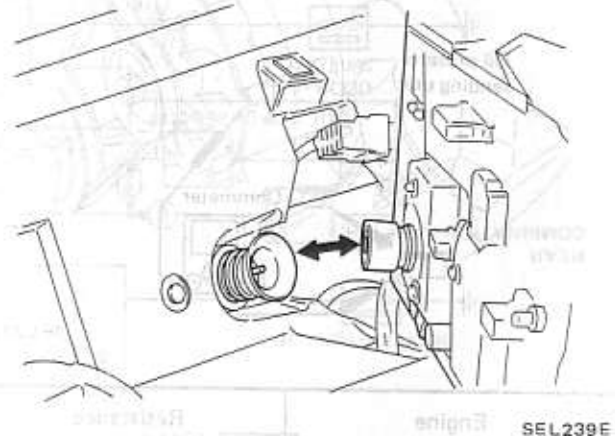
- Speed sensor is built into the speedometer.
- Turn speedometer slowly using small screwdriver, and check continuity of speed sensor circuit.

Continuity exists two times for each turn ... O.K.



Speedometer Cable Removal and Installation

- Combination meter and speedometer cable can be joined together simply by inserting the former.



METER AND GAUGES

Boost Sensor Check

1. Connect vacuum pump gauge to boost sensor vacuum hose.
2. Disconnect harness connector from boost sensor and connect battery and voltmeter as shown.
3. Apply vacuum pressure to boost sensor by vacuum pump gauge and measure voltages.

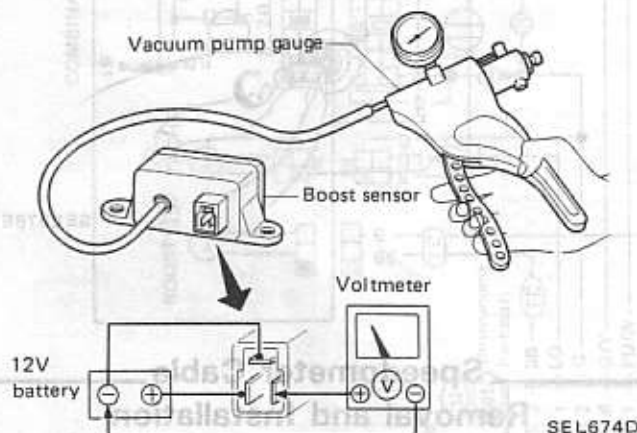
Approx. 2.2V at 0 kPa

(0 mbar, 0 mmHg, 0 inHg)

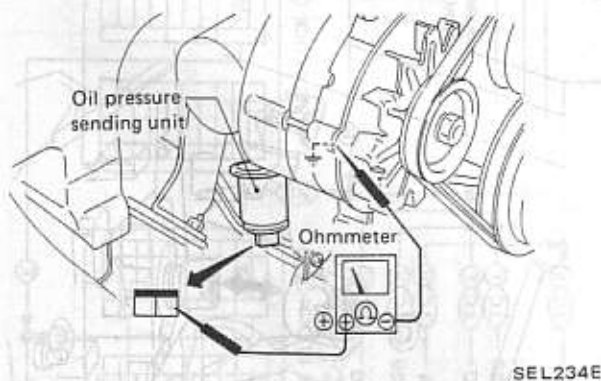
(Atmospheric pressure)

Approx. 1.3V at -53.3 kPa

(-533 mbar, -400 mmHg, -15.75 inHg)



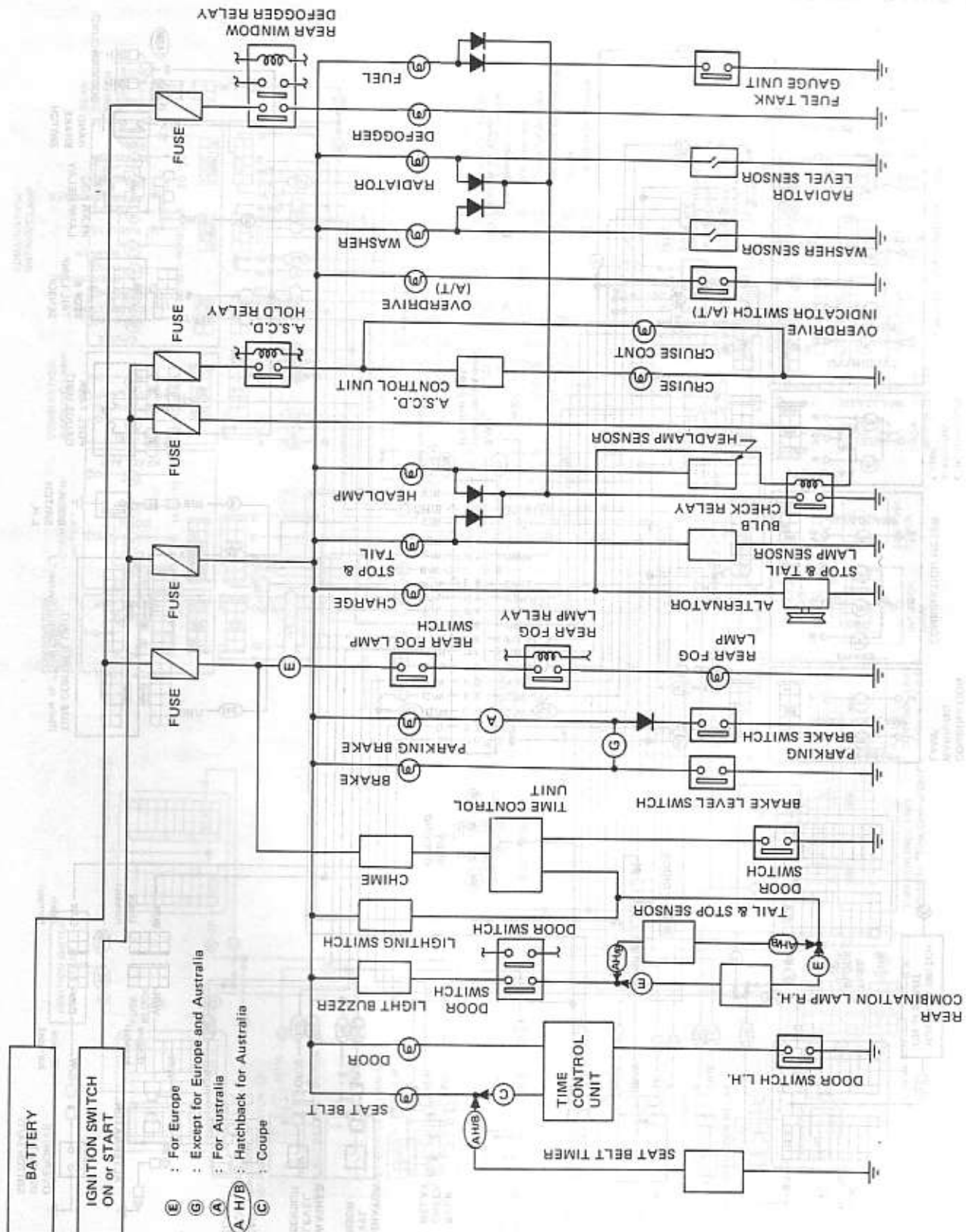
Oil Pressure Sending Unit Check



Engine	Resistance
When engine is stopped	More than 73 Ω
When engine is running (idling)	Less than 50 Ω

WARNING LAMPS AND CHIME

Warning Lamps/Schematic



SEL527E

Warning Lamps/Wiring Diagram

L.H. DRIVE MODEL

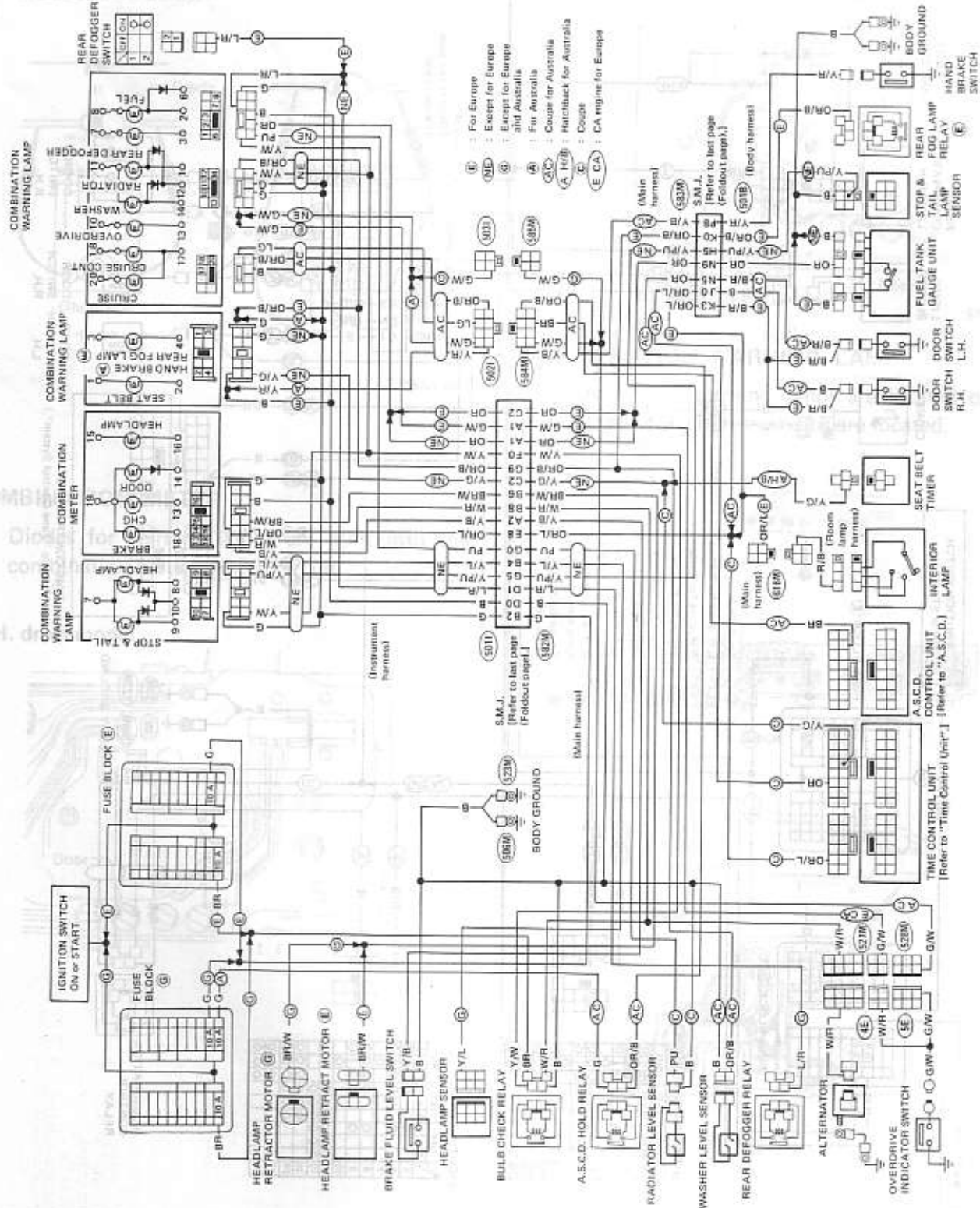


WARNING LAMPS AND CHIME

Warning Lamps/Wiring Diagram (Cont'd)

R.H. DRIVE MODEL

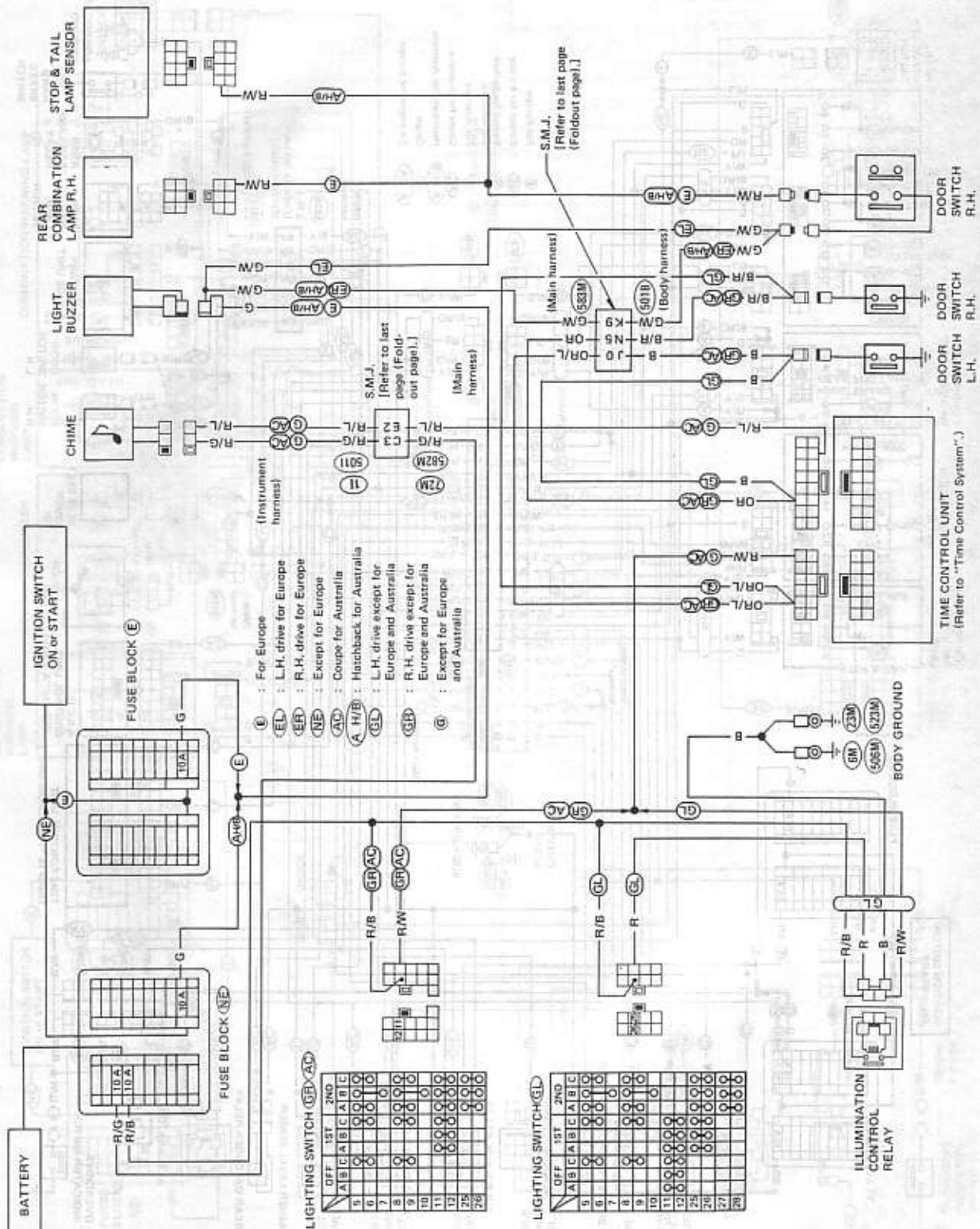
Diode is functioning properly if test results are as shown below



WARNING LAMPS AND CHIME

Warning Chime/Wiring Diagram

- Chime is designed as to give a light warning. For trouble-shooting, refer to "TIME CONTROL SYSTEM".

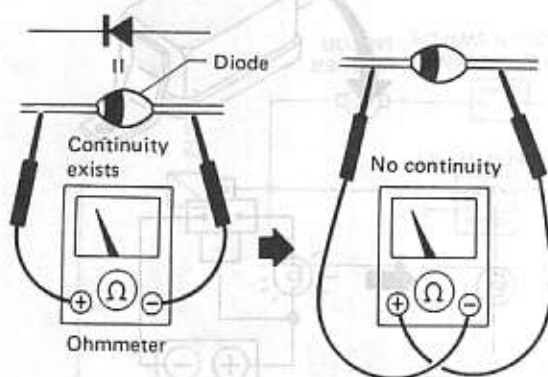


SEL530E

WARNING LAMPS AND CHIME

Diode Check

- Check continuity using an ohmmeter.
- Diode is functioning properly if test results are as shown below.

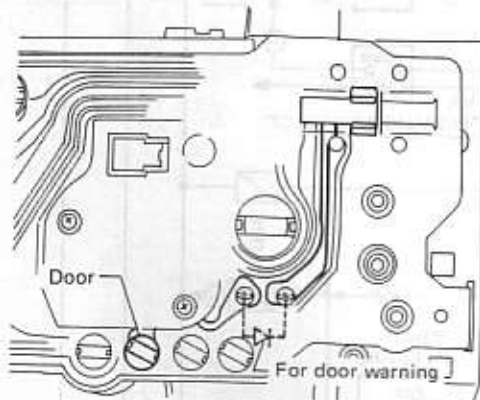


SEL700D

COMBINATION METER

- Diodes for warning lamps are built into the combination meter printed circuit.

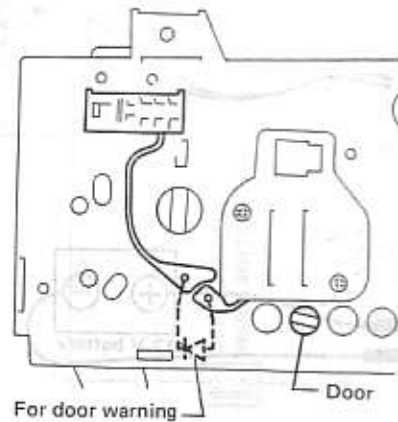
L.H. drive model



SEL250E



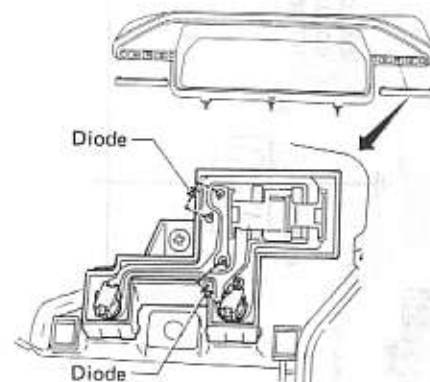
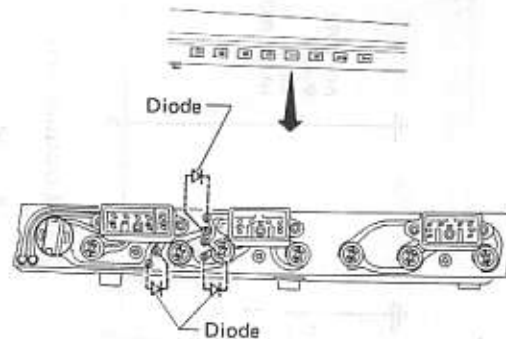
R.H. drive model



SEL579E

COMBINATION WARNING LAMP

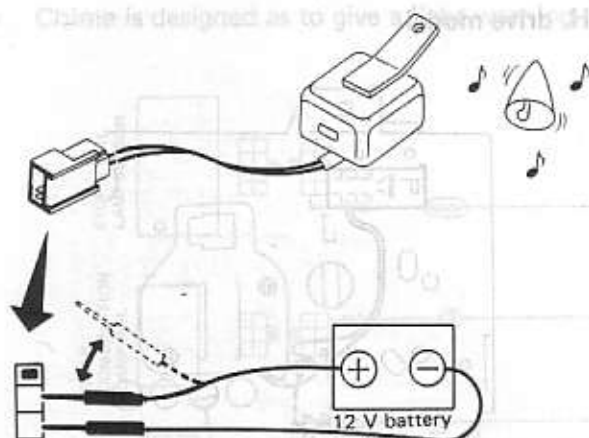
- Diodes for warning lamps are located on the panel where warning bulbs are located.



SEL580E

WARNING LAMPS AND CHIME

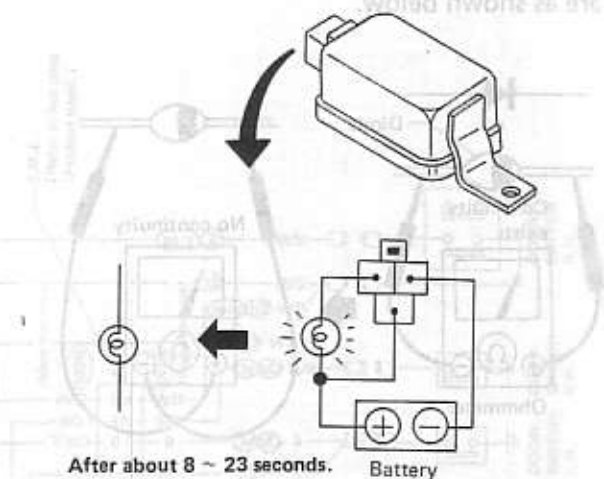
Warning Chime Check



SEL875D

Seat Belt Warning Timer (For Australia Hatchback model)

• Diode is functioning properly if test results are as shown below



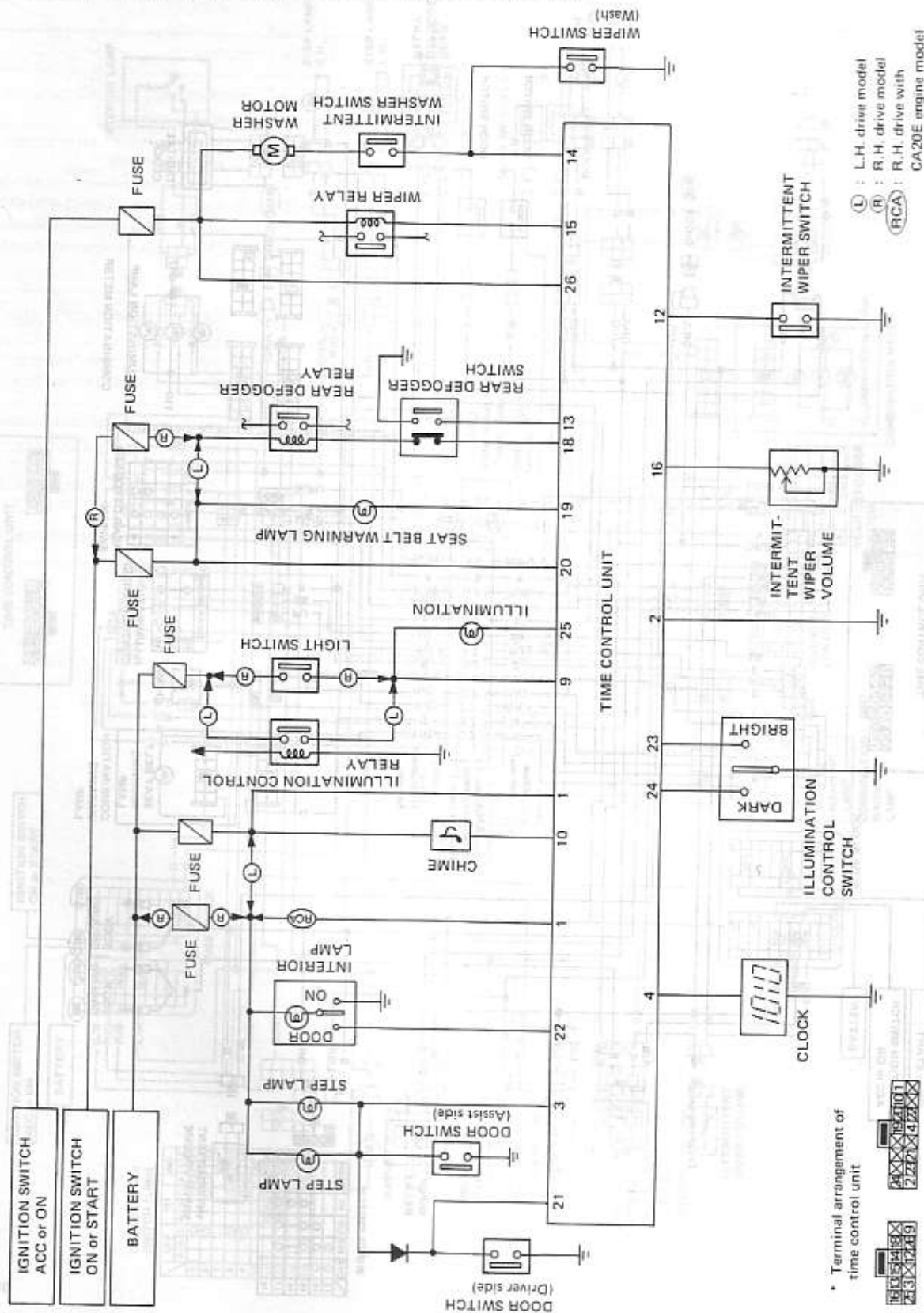
SEL593E

TIME CONTROL SYSTEM

Schematic

CAUTION:

Never touch the terminals of time control unit with bare hands.



* Terminal arrangement of time control unit

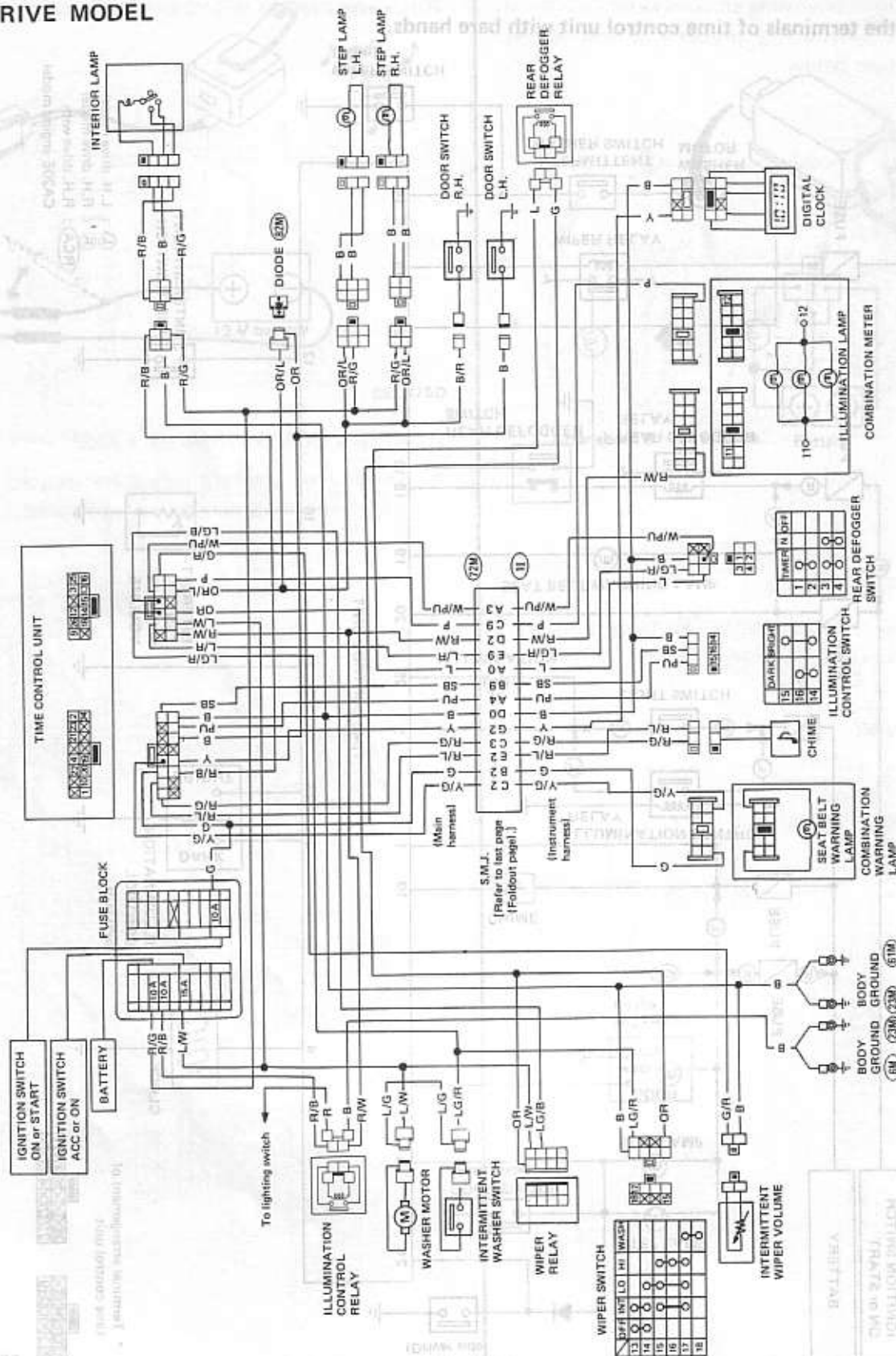


SEL581E

W TIME CONTROL SYSTEM

Wiring Diagram

L.H. DRIVE MODEL



Wiring Diagram (Cont'd)

[illegible]

EL-95

TIME CONTROL SYSTEM

Description

FUNCTION

- Time control unit has the following functions.

	Item	Details of control
1	Intermittent wiper control	Regulates intermittent time from approximately 3 to 12 seconds depending on the intermittent wiper volume setting.
2	Washer and wiper combination control	Wiper is operated in conjunction with washer switch.
3	Interior lamp timer	Fades out interior lamp when driver's side door is opened and closed.
4	Illumination control	Regulates brightness of illumination in 16 stages depending on the illumination control switch setting.
5	Light warning chime timer	Sounds warning chime if driver's side door is opened when light switch is "ON" and ignition switch "OFF".
6	Seat belt warning lamp timer	Seat-belt warning lamp blinks for about 7 seconds when ignition switch is turned to "ON".
7	Rear defogger timer	Operates rear defogger for about 15 minutes when rear defogger switch is turned to "TIME".
8	Clock	Generates clock pulses and drive clock.

Date	Description (Cont'd)	Amount

Date	Description (Cont'd)	Amount

Input terminal
Output terminal

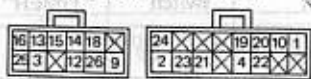
which is turned ON when door is opened.

TIME CONTROL SYSTEM

Preparation for Trouble-shooting

1. Remove R.H. dash side cover.
2. Remove time control unit with harness connected.

Check from harness side.

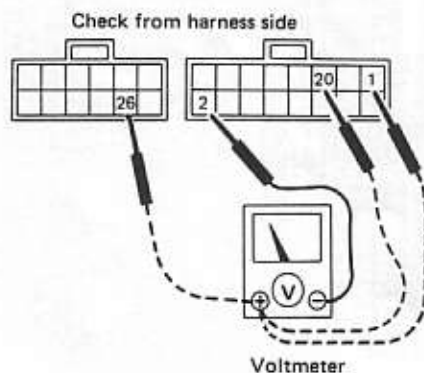


Time control unit

SEL584E

Power Supply Circuit Check

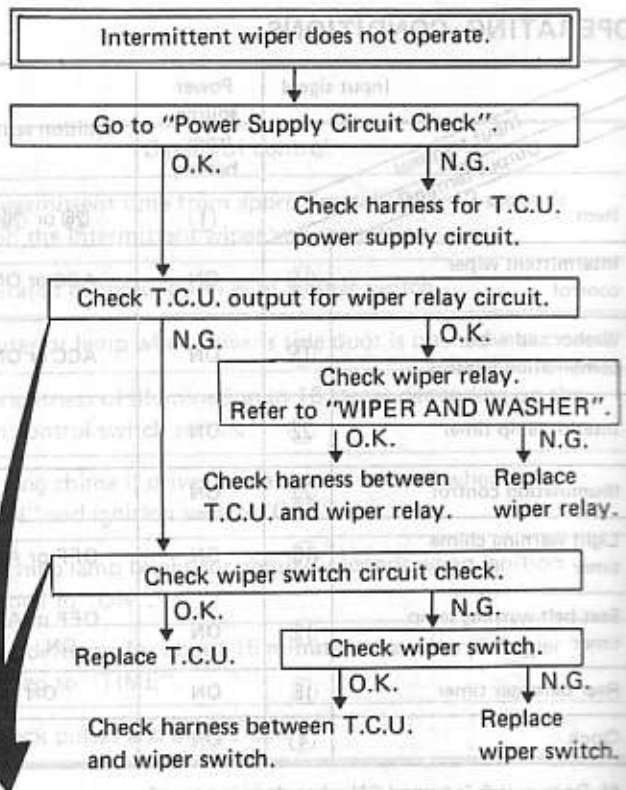
Voltmeter terminals		Ignition switch position		
(+)	(-)	OFF	ACC	ON
①	②	Approx. 12V	Approx. 12V	Approx. 12V
②①	②	0V	0V	Approx. 12V
②⑤	②	0V	Approx. 12V	Approx. 12V
Ohmmeter terminals		Continuity		
(+)	(-)			
②	Body ground	Yes		



Voltmeter

SEL724D

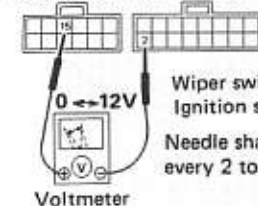
Trouble-shooting



T.C.U. OUTPUT FOR WIPER RELAY CIRCUIT CHECK

1. Turn wiper switch to "INT".
2. Turn ignition switch to "ACC".
3. Measure voltage across ①⑤ and ②.

Check from harness side.



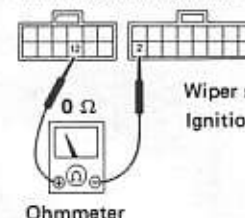
Voltmeter

SEL708D

WIPER SWITCH CIRCUIT CHECK

1. Turn wiper switch to "INT".
2. Turn ignition switch to "OFF".
3. Check continuity between ①② and ②.

Check from harness side



Ohmmeter

SEL709D

TIME CONTROL SYSTEM

Trouble-shooting (Cont'd)

Intermittent time of wiper cannot be adjusted.

Check intermittent wiper volume circuit.

O.K.

N.G.

Replace T.C.U.

Check intermittent wiper volume.

O.K.

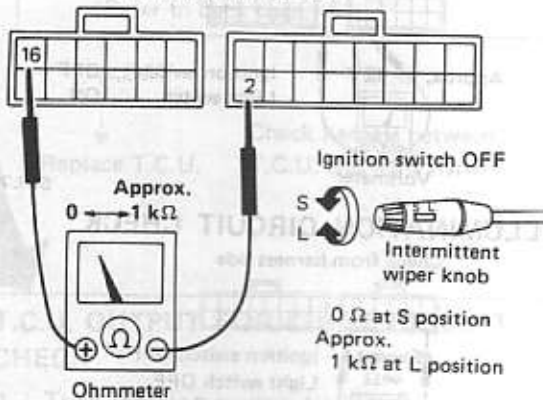
N.G.

Check harness between T.C.U. and intermittent wiper volume.

Replace wiper switch.

1. Turn ignition switch to "OFF".
2. Measure resistance between ①⑥ and ② while turning intermittent wiper volume.

Check from harness side



SEL710D

Wiper and washer activate individually but not in combination.

Check washer switch circuit.

O.K.

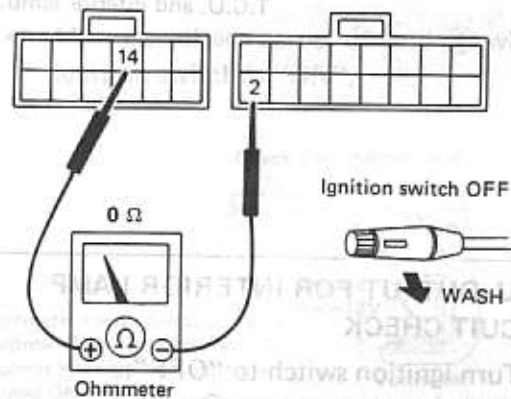
N.G.

Replace T.C.U.

Check harness between T.C.U. and washer switch.

1. Turn ignition switch to "OFF".
2. Turn washer switch to "ON".
3. Check continuity between ①④ and ②.

Check from harness side



SEL711D

TIME CONTROL SYSTEM

Trouble-shooting (Cont'd)

Interior lamp does not fade out after driver's side door is closed.

Check if door warning lamp goes off after all doors are closed.

O.K.

N.G.

Check door switch and harness between T.C.U. and driver's side door switch.

Go to "Power Supply Circuit Check".

O.K.

N.G.

Check harness for T.C.U. power supply circuit.

Check T.C.U. output for interior lamp circuit.

N.G.

O.K.

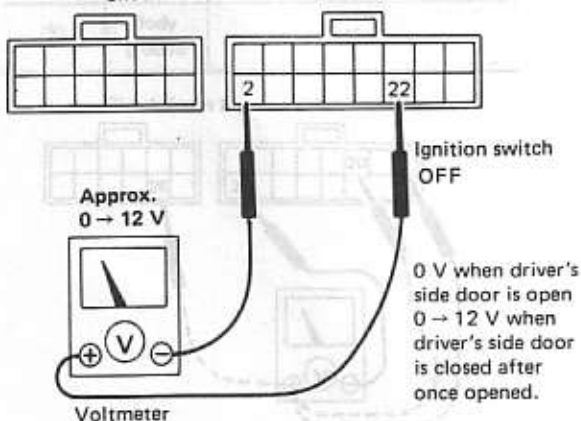
Replace T.C.U.

Check harness between T.C.U. and interior lamp.

T.C.U. OUTPUT FOR INTERIOR LAMP CIRCUIT CHECK

1. Turn ignition switch to "OFF".
2. Measure voltage across 22 and 2.

Check from harness side



SEL712D

Illumination control system does not actuate.

Check light switch circuit.

O.K.

N.G.

Check harness between T.C.U. and light switch.

Check illumination circuit.

O.K.

N.G.

Check for loose harness connector.

Check illumination control circuit.

O.K.

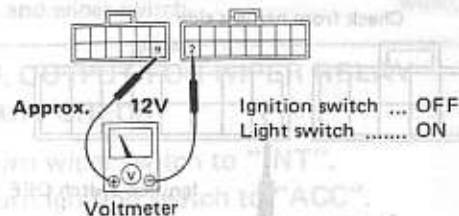
N.G.

Replace T.C.U.

Check illumination control switch.

LIGHT SWITCH CIRCUIT CHECK

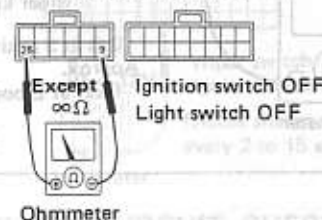
Check from harness side.



SEL715D

ILLUMINATION CIRCUIT CHECK

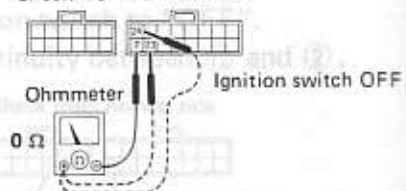
Check from harness side



SEL716D

ILLUMINATION CONTROL CIRCUIT CHECK

Check from harness side



Ohmmeter (+)	Ohmmeter (-)	Illumination control switch	
		DARK	BRIGHT
24	2	0 Ω	Except 0 Ω
23	2	Except 0 Ω	0 Ω

SEL157E

TIME CONTROL SYSTEM

Trouble-shooting (Cont'd)

Light warning chime does not activate.

Do other warning chimes activate?

N.G.

Go to "Power Supply Circuit Check".

O.K.

N.G.

Check harness for T.C.U. power supply circuit.

Check T.C.U. output for chime circuit.

N.G.

O.K.

Check chime, and harness between T.C.U. and chime.

Go to "Light switch circuit check".
(Refer to back page.)

O.K.

N.G.

Replace T.C.U.

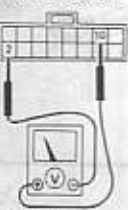
Check harness between T.C.U. and light switch.

T.C.U. OUTPUT FOR CHIME CIRCUIT CHECK

1. Turn ignition switch to "OFF".
2. Measure voltage across ⑩ and ② when driver's door is opened and closed.

Check from harness side.

- Ignition switch ... OFF
Light switch ... 1ST
- Approx. 12V when driver's side door is closed.
 - Voltmeter needle swings (0 ↔ 12V) when driver's side door is opened.



Voltmeter

SEL718D

Seat belt warning lamp does not come on.

Go to "Power Supply Circuit Check".

O.K.

N.G.

Check harness for T.C.U. power supply circuit.

Check T.C.U. output for belt warning lamp circuit.

N.G.

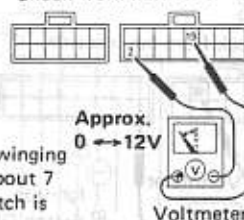
O.K.

Check warning lamp, and harness between T.C.U. and warning lamp.

T.C.U. OUTPUT FOR BELT WARNING LAMP CIRCUIT CHECK

- Measure voltage across ⑩ and ② when ignition switch is "ON".

Check from harness side.



Voltmeter needle keeps swinging (approx. 0 ↔ 12V) for about 7 seconds after ignition switch is turned ON.

Voltmeter

SEL720D

TIME CONTROL SYSTEM

Trouble-shooting (Cont'd)

Rear defogger does not activate, or does not go off automatically.

Go to "Power Supply Circuit Check".

O.K.

N.G.
Check harness for T.C.U.
power supply circuit.

Check T.C.U. output for rear defogger circuit.

N.G.

O.K.
Check rear defogger relay,
and harness between T.C.U.
and rear defogger relay.

Check defogger switch circuit.

O.K.

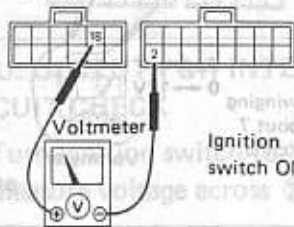
Replace T.C.U.

N.G.
Check defogger switch,
and harness between T.C.U.
and defogger switch.

T.C.U. OUTPUT FOR REAR DEFOGGER CIRCUIT CHECK

1. Turn ignition switch to "ON".
2. Measure voltage across ①⑧ and ② while operating rear defogger switch.

Check from harness side.

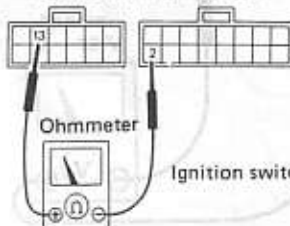


OFF N
TIMER
(AUTO
RETURN)

- Rear defogger switch "N": Approx. 12V
- Rear defogger switch "TIMER": Approx. 0V SEL158E

DOFOGGER SWITCH CIRCUIT CHECK

Check from harness side



OFF N
TIMER
(AUTO
RETURN)

- Rear defogger switch "OFF": Except 0Ω
- Rear defogger switch "TIMER": 0Ω

SEL159E

Clock does not activate.

Go to "Power Supply Circuit Check".

O.K.

N.G.

Check harness for T.C.U.
power supply circuit.

Check T.C.U. output for clock.

O.K.

N.G.

Replace T.C.U.

Check clock circuit.

O.K.

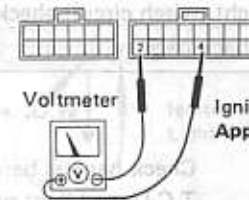
N.G.

Replace
clock.

Check harness between:
• fuse and clock
• T.C.U. and clock

T.C.U. OUTPUT FOR CLOCK

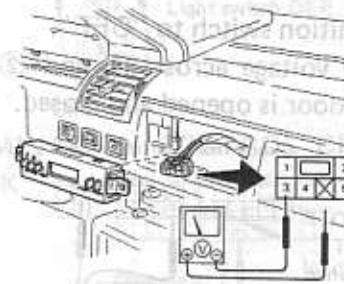
Check from harness side.



Ignition switch OFF
Approx. 6V

CLOCK CIRCUIT CHECK

1. Remove clock.
2. Disconnect harness connector for clock.
3. Check terminal voltage at instrument harness connector for clock.

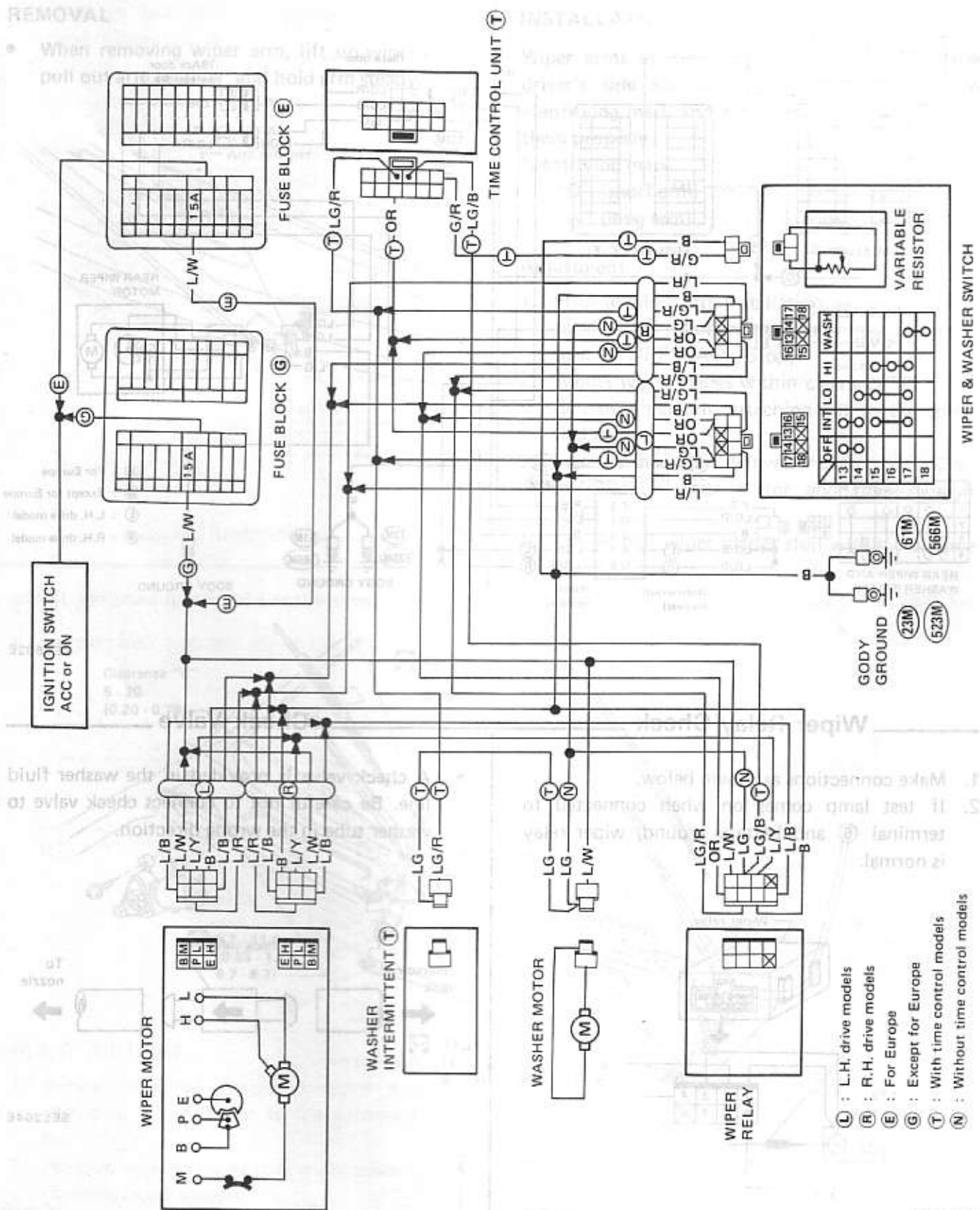


SEL158E

Voltmeter terminal		Ignition switch position		
(+)	(-)	OFF	ACC	ON
①	③	Approx. 12V	Approx. 12V	Approx. 12V
④		0	Approx. 12V	Approx. 12V
⑥		Approx. 6V	Approx. 6V	Approx. 6V

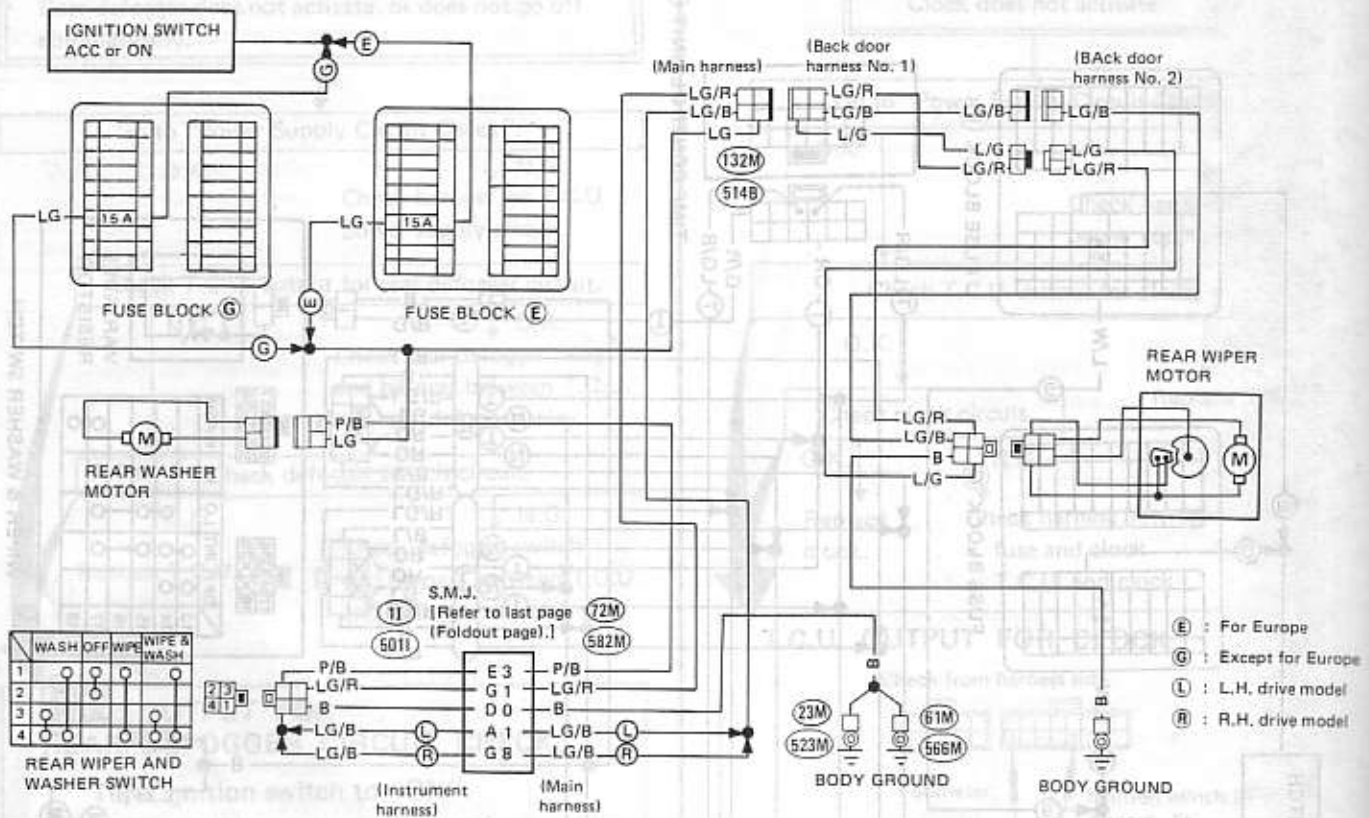
WIPER AND WASHER

Windshield Wiper and Washer/Wiring Diagram



WIPER AND WASHER

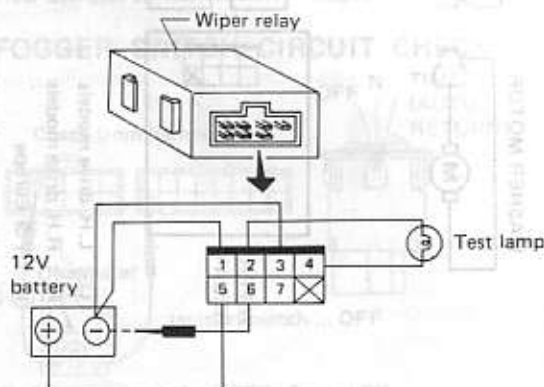
Rear Wiper and Washer/Wiring Diagram



SEL532E

Wiper Relay Check

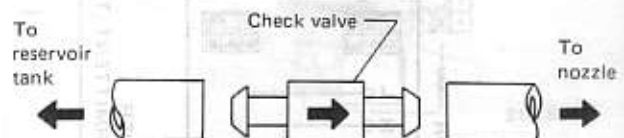
1. Make connections as shown below.
2. If test lamp comes on when connected to terminal ⑥ and battery ground, wiper relay is normal.



SEL263E

Check Valve

- A check valve is provided in the washer fluid line. Be careful not to connect check valve to washer tube in the wrong direction.



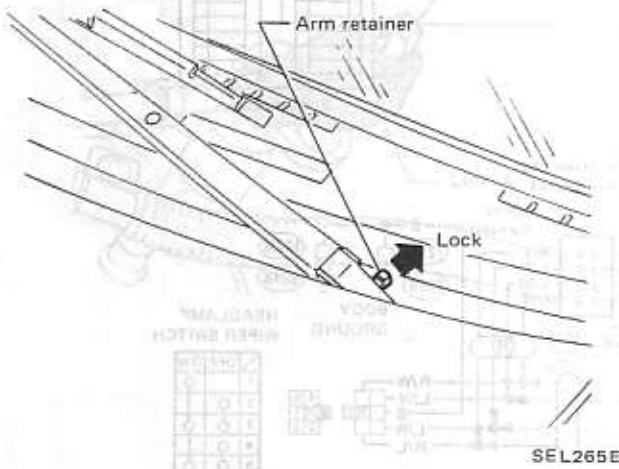
SEL264E

WIPER AND WASHER

Windshield Wiper Removal and Installation

REMOVAL

- When removing wiper arm, lift up wiper arm, pull out arm retainer, and hold arm steady.



INSTALLATION

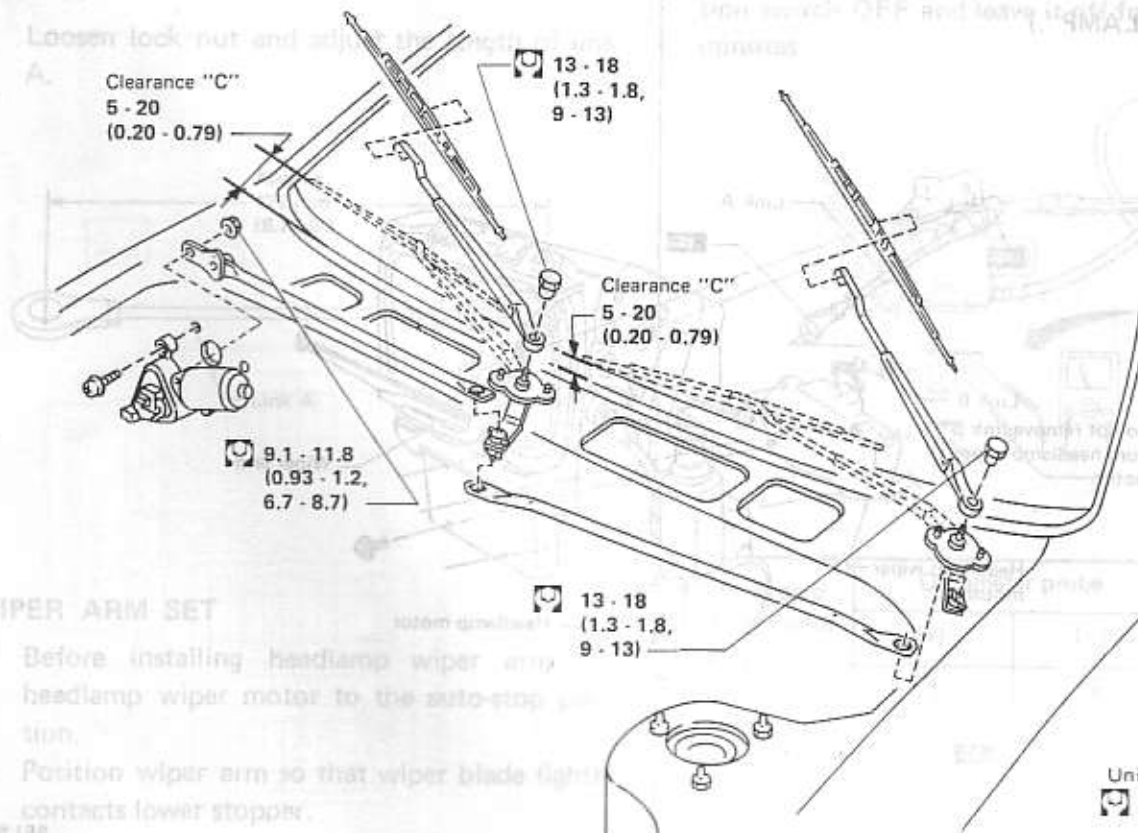
Wiper arms of different length are used for the driver's side and passenger side. They have an identifying mark and care must be taken to install them properly.

Identifying mark

"D" (short arm) Driver's side
 "A" (long arm) Passenger side

Adjustment

- Prior to wiper arm installation, set wiper switch to "LOW" to operate wiper motor and then turn it "OFF" (Auto Stop).
- Adjust wiper blades within clearance "C", and tighten wiper arm attaching nut to the specified torque.
- Eject washer fluid. Set wiper switch to "LOW" to operate wiper motor and then turn it "OFF".
- Ensure that wiper blades stop within clearance "C".



WIPER ARM SET

- Before installing headlamp wiper arm, headlamp wiper motor to the auto-stop position.
- Position wiper arm so that wiper blade contacts lower stopper.

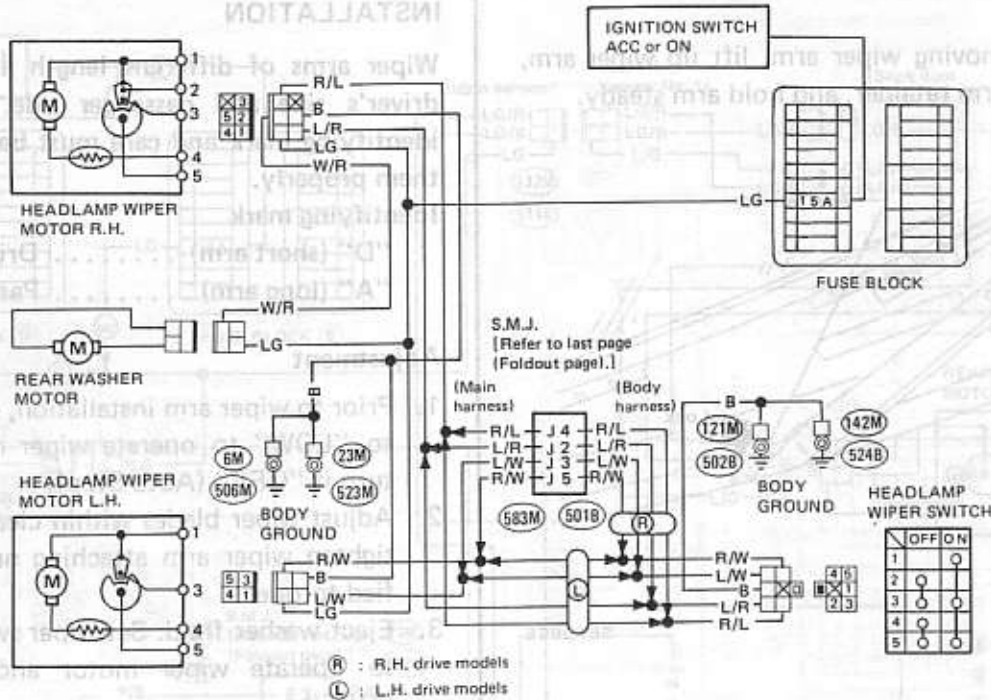
Unit: mm (in)

: N·m (kg·m, ft·lb)

SEL266E

WIPER AND WASHER

Headlamp Wiper and Washer/Wiring Diagram



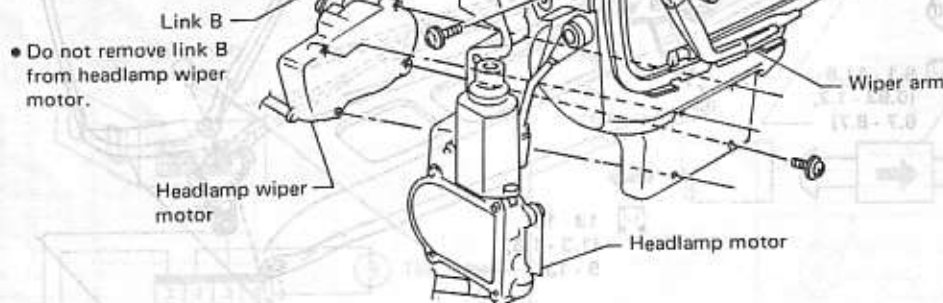
SEL533E

Removal

- Do not remove headlamp wiper motor as a single unit. Always remove it as a headlamp assembly. (Refer to "HEADLAMP".)

Wiper Relay Check

- Make connections as shown.
- If test lamp comes on, wiper relay is normal.



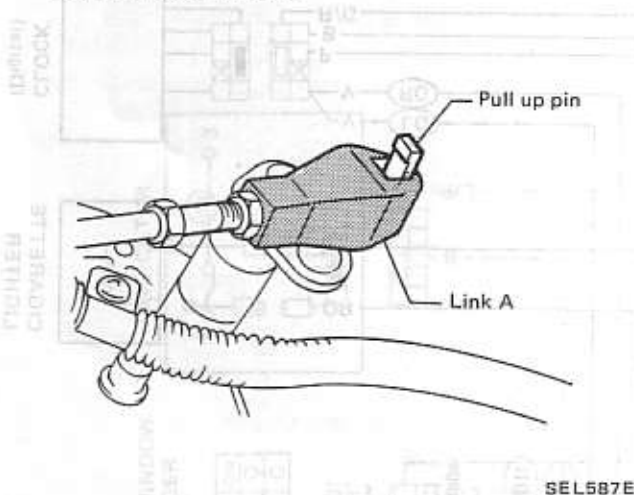
: Grease-up point

SEL586E

WIPER AND WASHER

Removal (Cont'd)

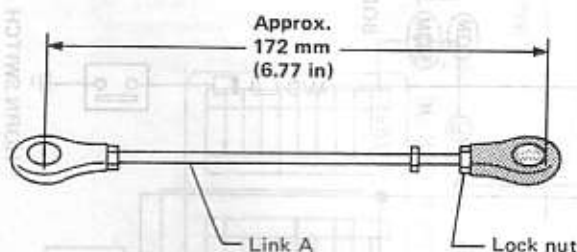
- Pry up pin with a flat-bladed screwdriver and remove link A.



Adjustment

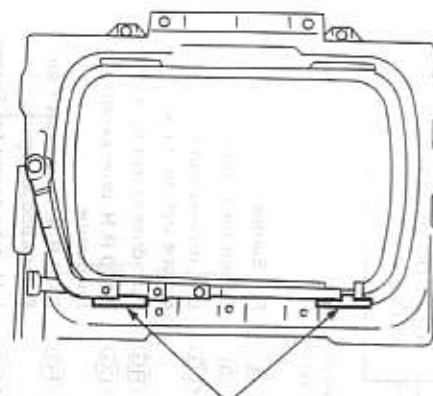
LINK A

- Loosen lock nut and adjust the length of link A.



WIPER ARM SET

- Before installing headlamp wiper arm, set headlamp wiper motor to the auto-stop position.
- Position wiper arm so that wiper blade lightly contacts lower stopper.



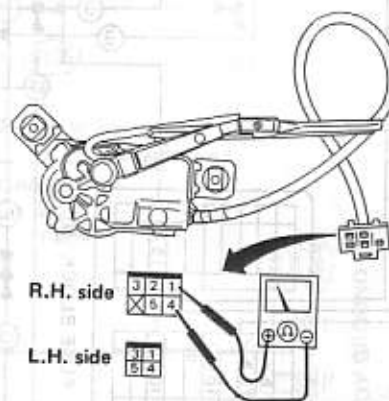
Position wiper blade so that it lightly touches stoppers.

SEL589E

- Check for proper operation of wiper system.

Headlamp Wiper Motor Check

When wiper motor is locked, a protective circuit built into wiper motor activates to stop wiper motor. If wiper motor will not re-start even after cause of problems has been eliminated, turn ignition switch OFF and leave it off for approx. 1 to 3 minutes.



SEL590E

Headlamp wiper motor	Ohmmeter probe		Continuity
	(+)	(-)	
Stop position	①	④	Yes
	①	②	Yes
	①	③	Yes
	③	⑤	No

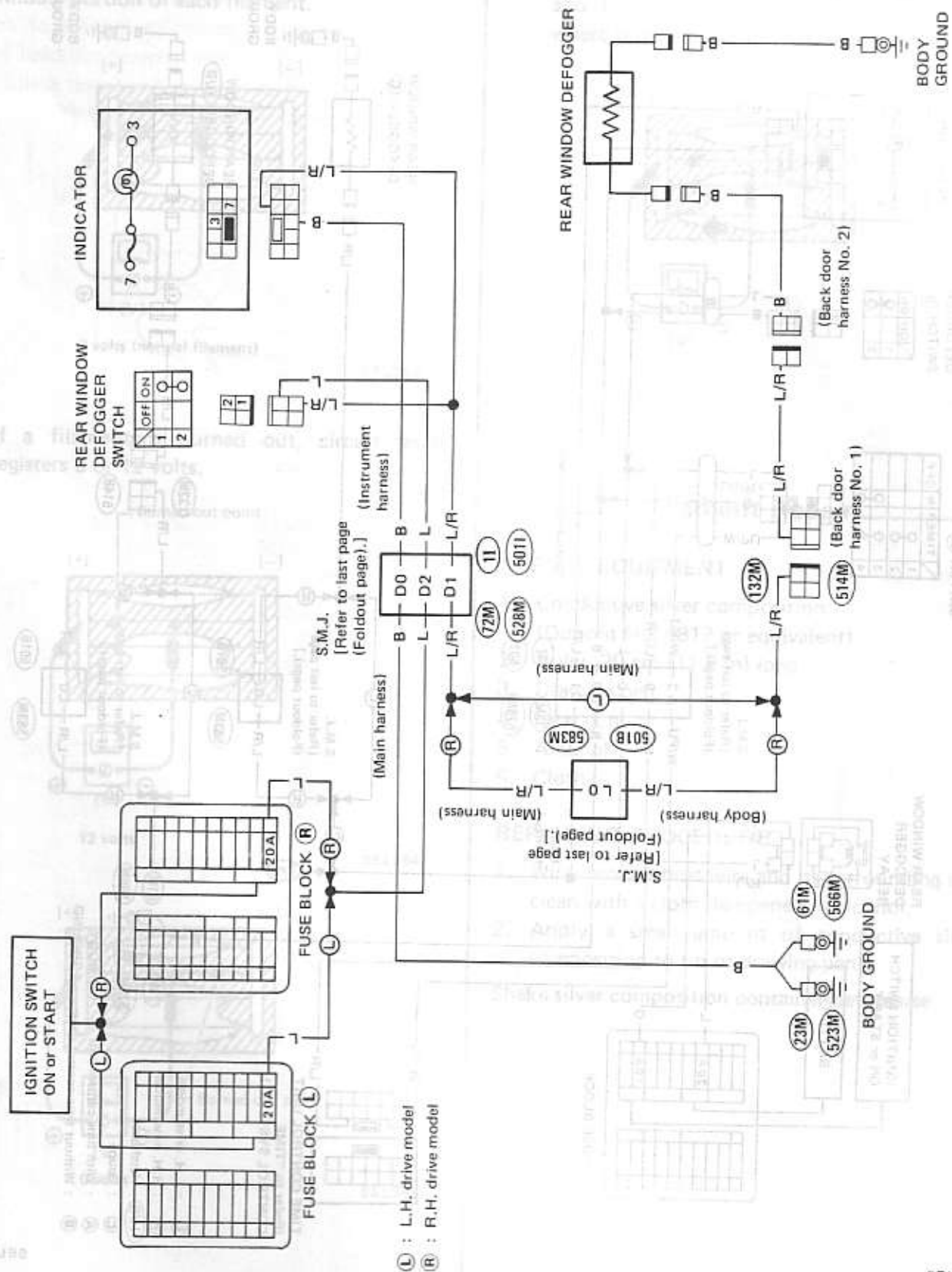
Wiring Diagram



REAR WINDOW DEFOGGER

Wiring Diagram

FOR EUROPE MODEL

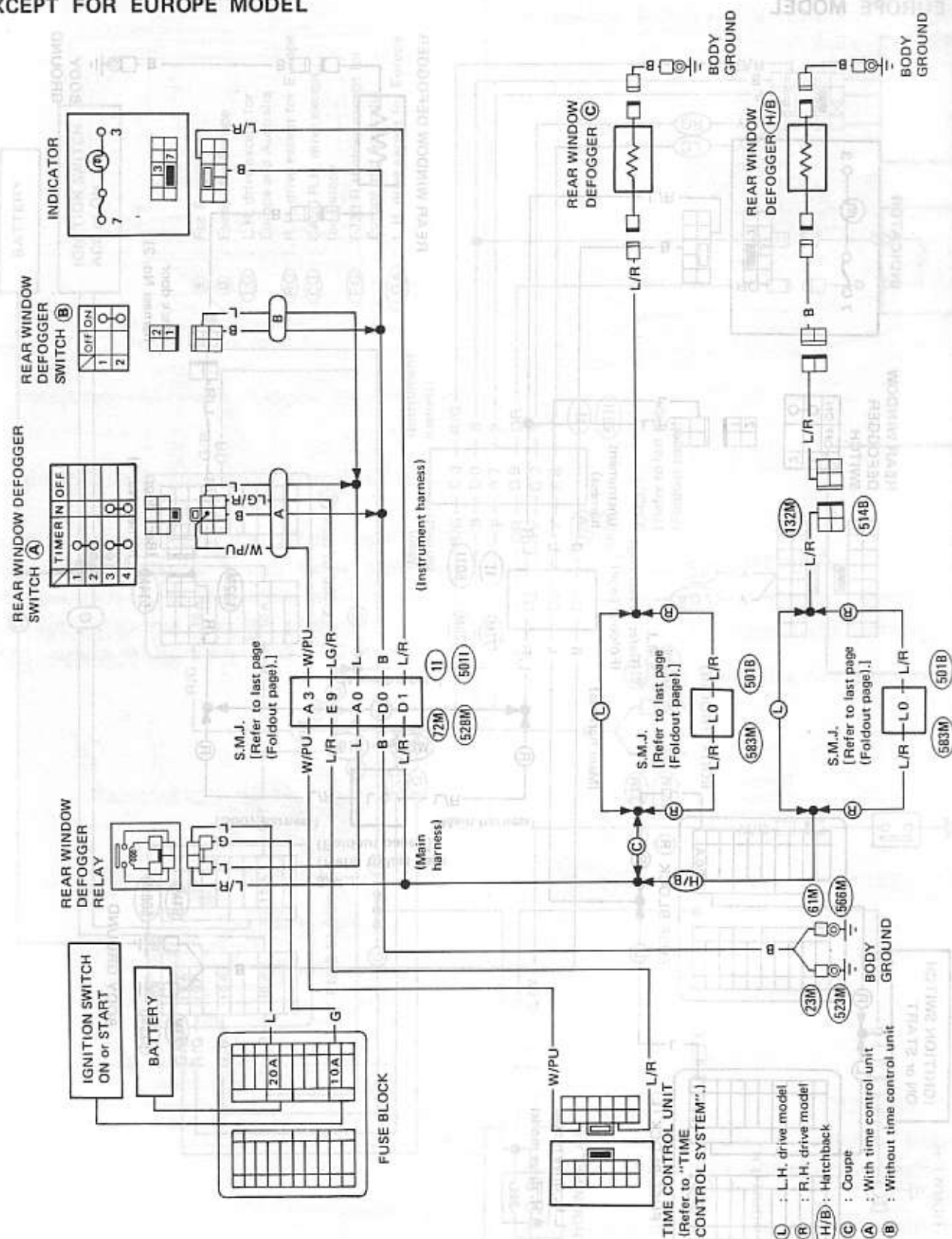


SEL535E

REAR WINDOW DEFOGGER

Wiring Diagram (Cont'd)

EXCEPT FOR EUROPE MODEL

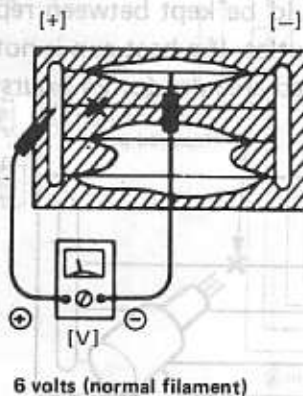


SEL536E

REAR WINDOW DEFOGGER

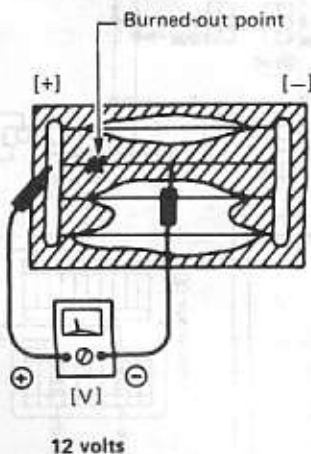
Filament Check

1. Attach probe circuit tester (in volt range) to middle portion of each filament.

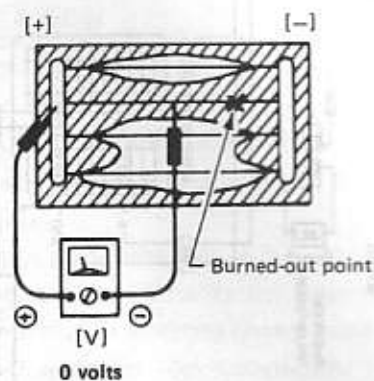


SEL263

2. If a filament is burned out, circuit tester registers 0 or 12 volts.

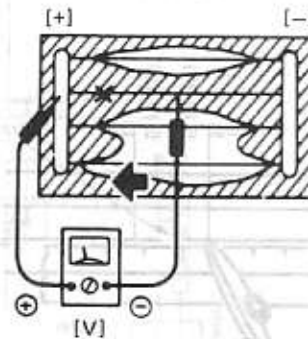


SEL264



SEL265

3. To locate burned out point, move probe to left and right along filament to determine point where tester needle swings abruptly.



SEL266

Filament Repair

REPAIR EQUIPMENT

1. Conductive silver composition (Dupont No. 4817 or equivalent)
2. Ruler, 30 cm (11.8 in) long
3. Drawing pen
4. Heat gun
5. Alcohol
6. Cloth

REPAIRING PROCEDURE

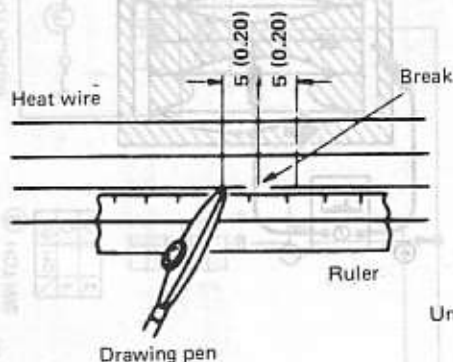
1. Wipe broken heat wire and its surrounding area clean with a cloth dampened in alcohol.
2. Apply a small amount of conductive silver composition to tip of drawing pen.

Shake silver composition container before use.

REAR WINDOW DEFOGGER

Filament Repair (Cont'd)

- Place ruler on glass along broken line. Deposit conductive silver composition on break with drawing pen. Slightly overlap existing heat wire on both sides [preferably 5 mm (0.20 in)] of the break.

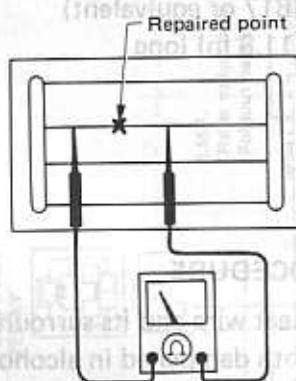


Unit: mm (in)

BE540

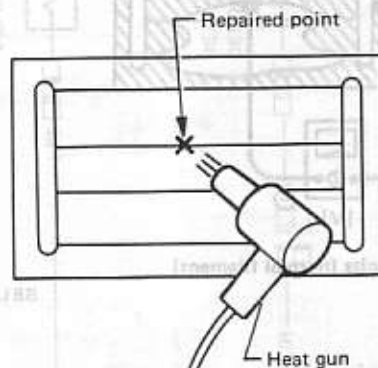
- After repair has been completed, check repaired wire for continuity. This check should be conducted 10 minutes after silver composition is deposited.

Do not touch repaired area while test is being conducted.



SEL012D

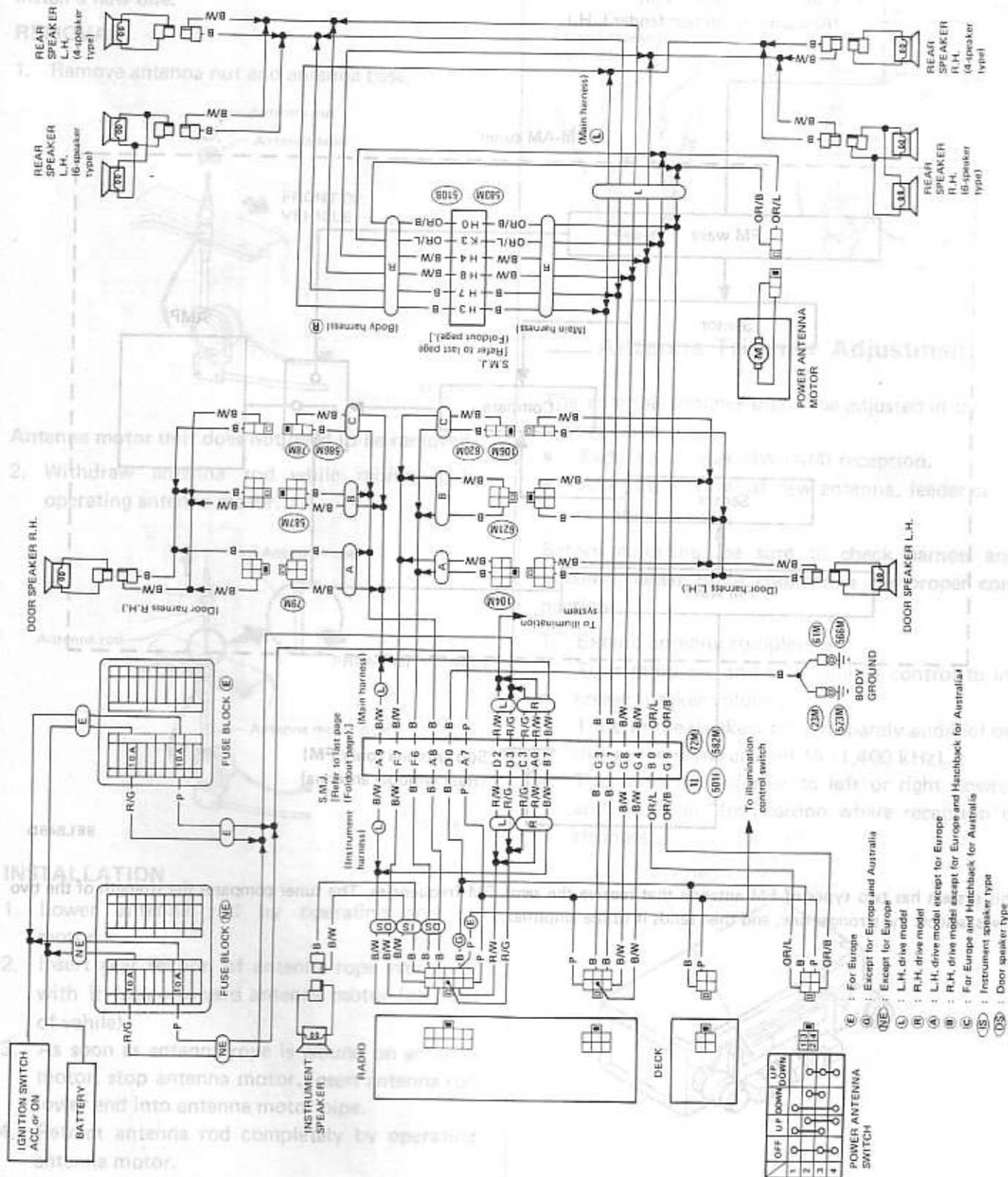
- Apply a constant stream of hot air directly to the repaired area for approximately 20 minutes with a heat gun. A minimum distance of 3 cm (1.2 in) should be kept between repaired area and hot air outlet. If a heat gun is not available, let the repaired area dry for 24 hours.



SEL013D

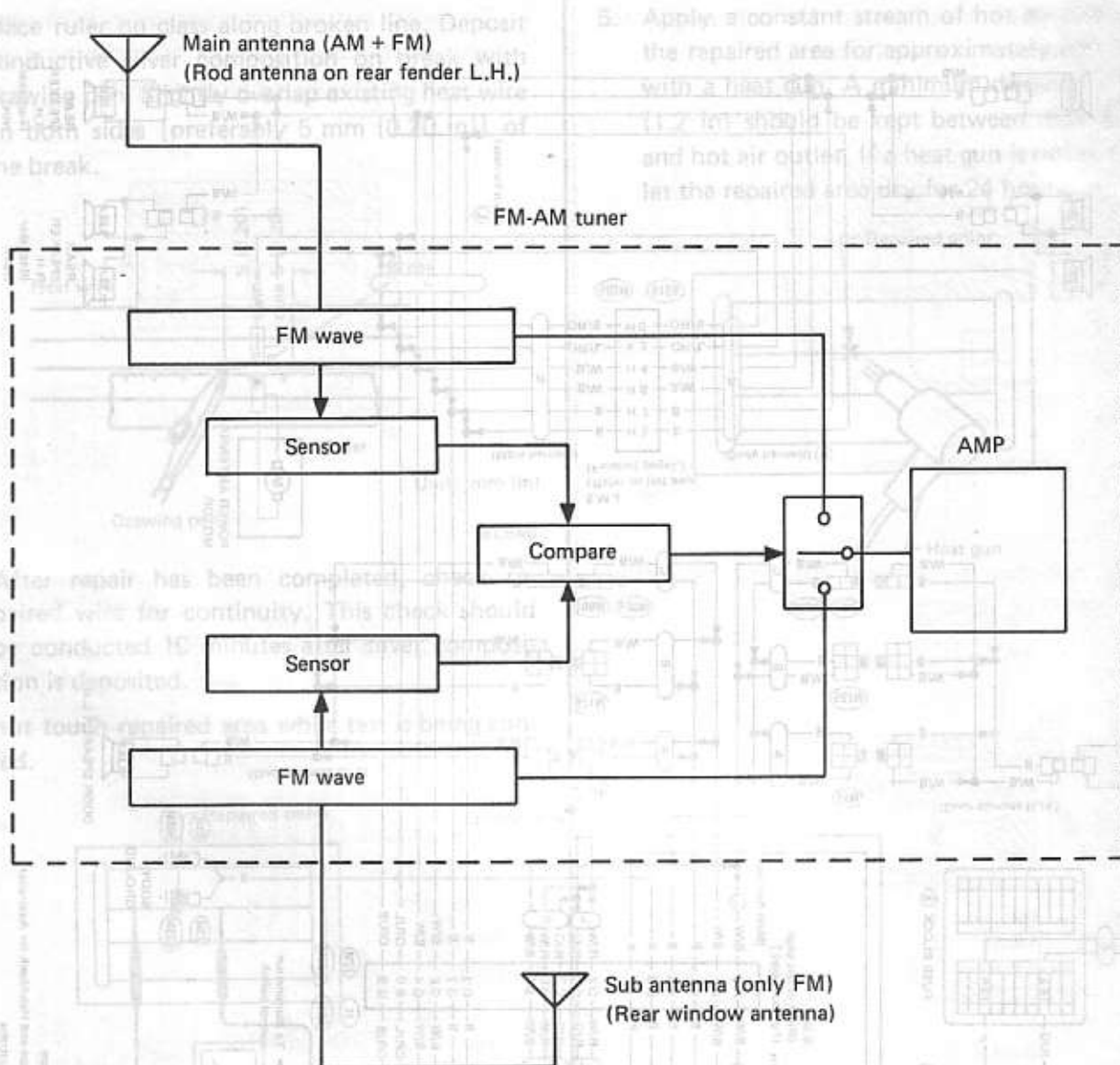
AUDIO AND POWER ANTENNA

Wiring Diagram



AUDIO AND POWER ANTENNA

Space Diversity System



This system has two types of FM antenna that receive the same FM frequencies. The tuner compares the strength of the two waves, selects the stronger one, and then sends it to the amplifier.

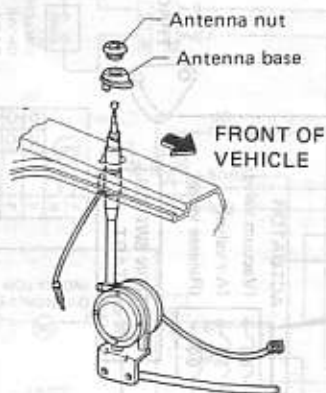
AUDIO AND POWER ANTENNA

Antenna Rod Replacement

Discard antenna rod after it has been removed and install a new one.

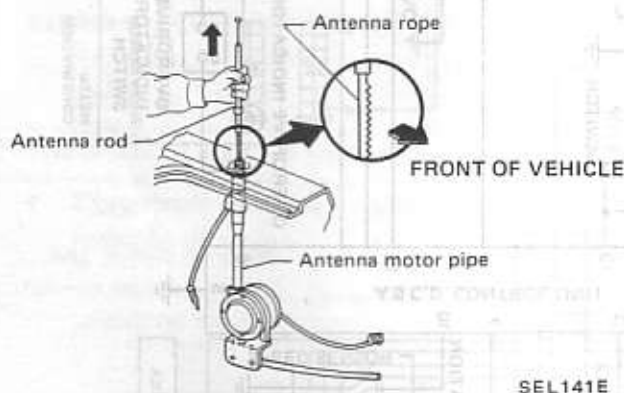
REMOVAL

1. Remove antenna nut and antenna base.



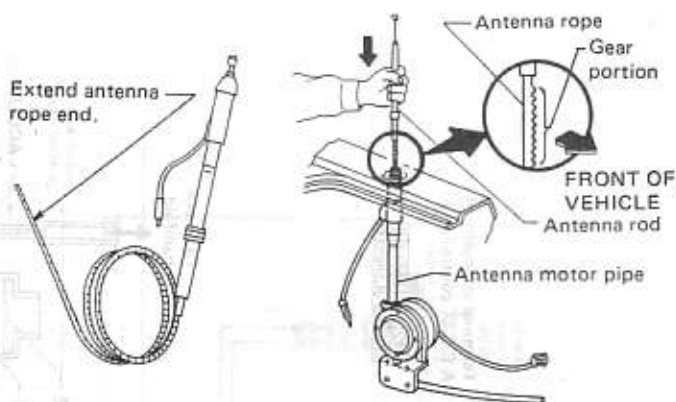
Antenna motor unit does not need to be removed.

2. Withdraw antenna rod while raising it by operating antenna motor.



INSTALLATION

1. Lower antenna rod by operating antenna motor.
2. Insert gear section of antenna rope into place with it facing toward antenna motor (at front of vehicle).
3. As soon as antenna rope is wound on antenna motor, stop antenna motor. Insert antenna rod lower end into antenna motor pipe.
4. Retract antenna rod completely by operating antenna motor.
5. Install antenna nut and base.



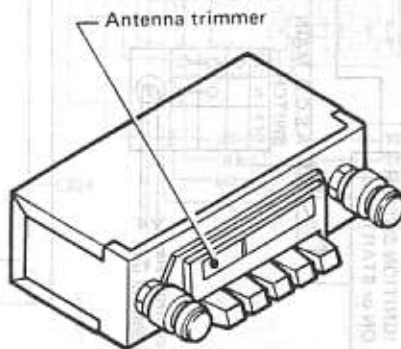
Antenna Trimmer Adjustment

The antenna trimmer should be adjusted in the following cases:

- Fading and weak MW (AM) reception.
- After installation of new antenna, feeder cable or radio receiver.

Before adjusting, be sure to check harness and antenna feeder cable connectors for proper connection.

1. Extend antenna completely.
2. Turn radio on, and turn volume control to increase speaker volume.
3. Tune in the weakest station (barely audible) on dial at the range around 14 (1,400 kHz).
4. Turn antenna trimmer to left or right slowly, and set it in the position where reception is strongest.

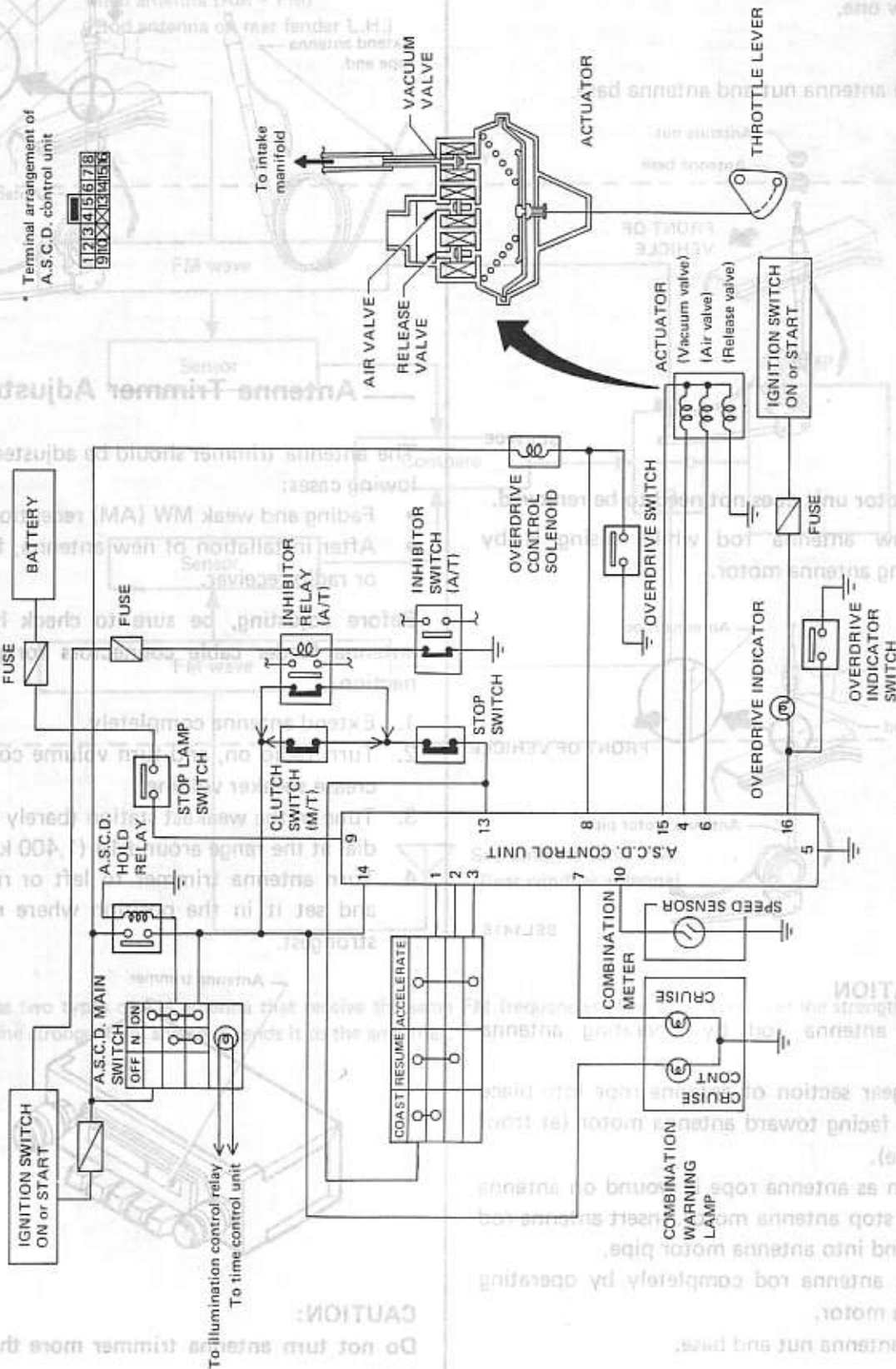


CAUTION:

Do not turn antenna trimmer more than one-half turn.

AUTOMATIC SPEED CONTROL DEVICE (A.S.C.D.)

Schematic



SEL591E

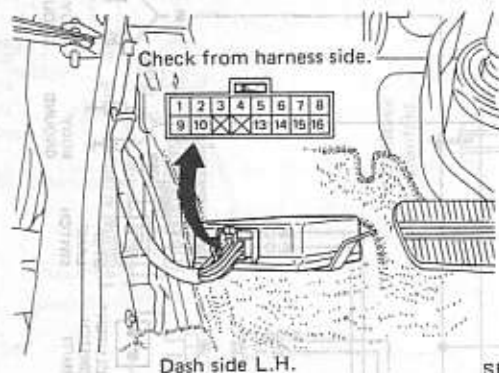
Wiring Diagram



AUTOMATIC SPEED CONTROL DEVICE (A.S.C.D.)

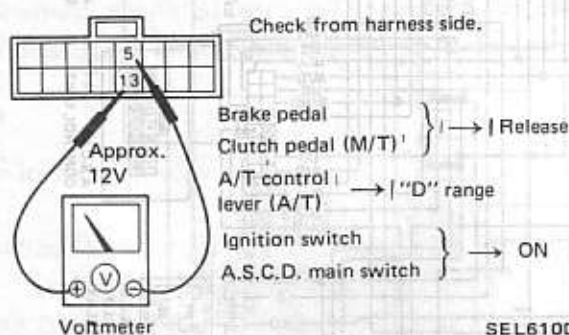
Preparation for Trouble-shooting Trouble-shooting

- Remove A.S.C.D. control unit with harness connected.



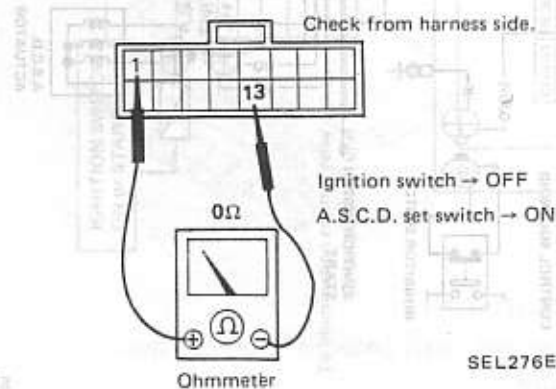
POWER SUPPLY CIRCUIT CHECK

- Release brake and clutch pedals.
- Turn ignition switch to "ON".
- Turn A.S.C.D. main switch to "ON".
- Check voltage between ⑬ and ⑤.



SET SWITCH CIRCUIT CHECK

- Turn ignition switch to "OFF".
- Push A.S.C.D. set switch.
- Check continuity between ① and ⑬.



A.S.C.D. control unit cannot be set properly.

Turn A.S.C.D. main switch "OFF" and then "ON" to make sure indicator (located above combination meter) illuminates.

Yes

No

Check for loose vacuum hose.

Check A.S.C.D. main switch and A.S.C.D. relay.

O.K.

Check power supply circuit for A.S.C.D. control unit.

O.K.

N.G.

Check stop switch, clutch switch (M/T model), inhibitor relay and inhibitor switch (A/T model).

O.K.

Check harness between A.S.C.D. power supply circuit.

Check set switch circuit for A.S.C.D. control unit.

O.K.

N.G.

Check set switch, and harness between control unit and set switch.

Go to "A.S.C.D. Actuator Check".

O.K.

N.G.

(Next page)

Replace actuator.

AUTOMATIC SPEED CONTROL DEVICE (A.S.C.D.)

Trouble-shooting (Cont'd)

Check speed sensor circuit.

O.K.

N.G.

Go to "Speed Sensor Signal Check".
(Refer to "METER AND GAUGES".)

Replace A.S.C.D.
control unit.

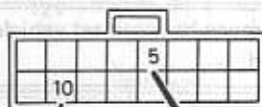
Check harness between A.S.C.D.
control unit and speed sensor
signal output terminal of
combination meter.

O.K.

1. Turn ignition switch to "OFF".
2. Disconnect speedometer cable from transmission.
3. Connect an ohmmeter between ⑩ and ⑤.
4. Turn ignition switch to "ON".
5. Slowly turn speedometer cable pinion by hand to make sure ohmmeter pointer deflects.

- Ohmmeter pointer deflects twice per rotation of pinion.

Check from harness side



Ohmmeter

SEL763D

AUTOMATIC SPEED CONTROL DEVICE (A.S.C.D.)

Trouble-shooting (Cont'd)

Resume switch will not operate.

Check resume switch circuit.

O.K.

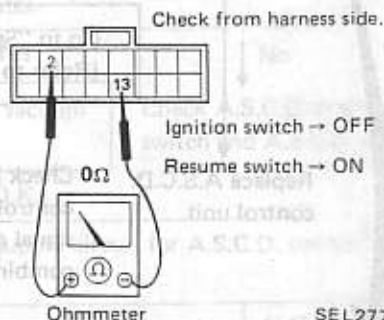
Replace A.S.C.D.
control unit.

N.G.

Check resume switch.

RESUME SWITCH CIRCUIT CHECK

1. Turn ignition switch to "OFF".
2. Turn resume switch to "ON".
3. Check continuity between ② and ⑬.



Accelerate switch will not operate.

Check accelerate switch circuit.

O.K.

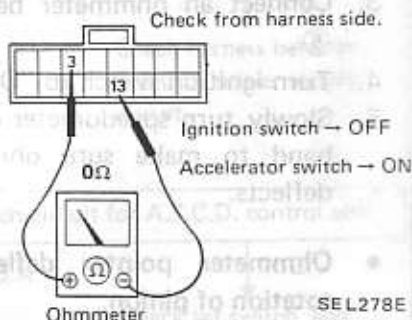
Replace A.S.C.D.
control unit.

N.G.

Check accelerate switch.

ACCELERATE SWITCH CIRCUIT CHECK

1. Turn ignition switch to "OFF".
2. Turn accelerate switch to "ON".
3. Check continuity between ③ and ⑬.



Engine hunts.

Check vacuum hose for breakage, cracks or fracture.

O.K.

Repair or replace hose.

N.G.

Does A.S.C.D. wire move smoothly?

O.K.

Repair or replace wire.

N.G.

Go to "Actuator Check".

O.K.

Replace A.S.C.D. control unit.

N.G.

Replace actuator.

Large difference between set vehicle speed and actual speed.

Check A.S.C.D. wire and actuator move smoothly.

O.K.

Replace wire or actuator.

N.G.

Check vacuum hose for breakage, cracks or fracture.

O.K.

Repair or replace hose.

N.G.

Go to "Actuator Check".

O.K.

Replace A.S.C.D.
control unit.

N.G.

Replace actuator.

AUTOMATIC SPEED CONTROL DEVICE (A.S.C.D.)

Trouble-shooting (Cont'd)

A.S.C.D. Actuator Check

A/T model only:

- When A.S.C.D. is set while vehicle is operating in "O.D." range, O.D. will be cancelled and shifting to O.D. cannot be made thereafter.
- O.D. will not be cancelled even if actual car speed is 6 km/h lower than set speed. (Set speed cannot be maintained.)
- O.D. will not be cancelled even if accelerator switch is turned "ON".

Check O.D. cancel circuit for A.S.C.D. control unit.

O.K.

Replace A.S.C.D. control unit.

N.G.

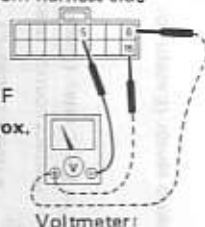
Check harness between O.D. cancel solenoid, O.D. cancel switch and A.S.C.D. control unit.

- Turn ignition switch to "ON".
- Turn O.D. cancel switch to "OFF".
- Check voltage (8)-(5) and (16)-(5).

Check from harness side

Ignition switch → ON
O.D. cancel switch → OFF

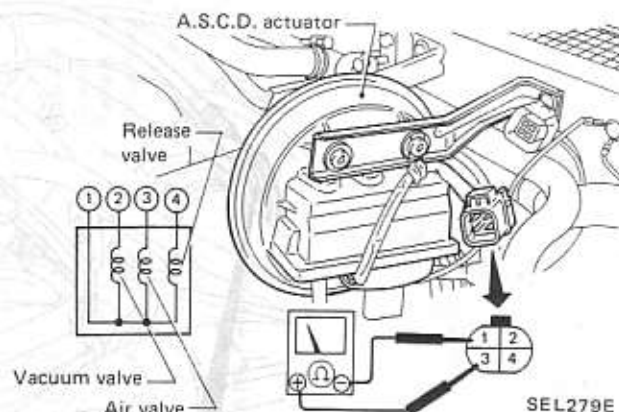
Approx.
12V



SEL741D

1. Check continuity between terminal ① and terminals ②, ③ and ④.

Continuity exist ... O.K.



CAUTION:

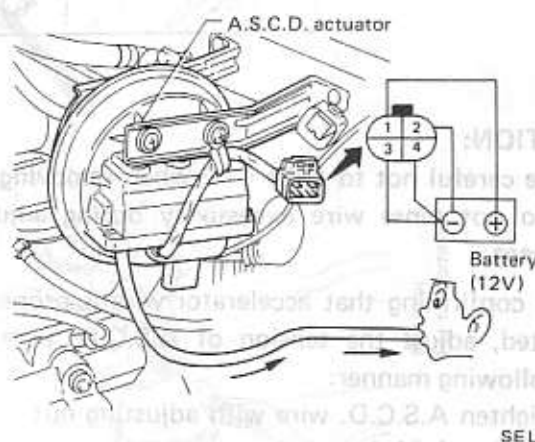
Do not attempt to remove valves from actuator.

2. Connect battery (approx. 12V) to harness connector of actuator as shown below, and apply vacuum to actuator.

If diaphragm moves smoothly, actuator is O.K.

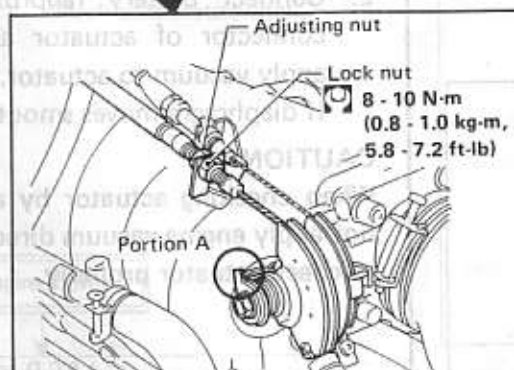
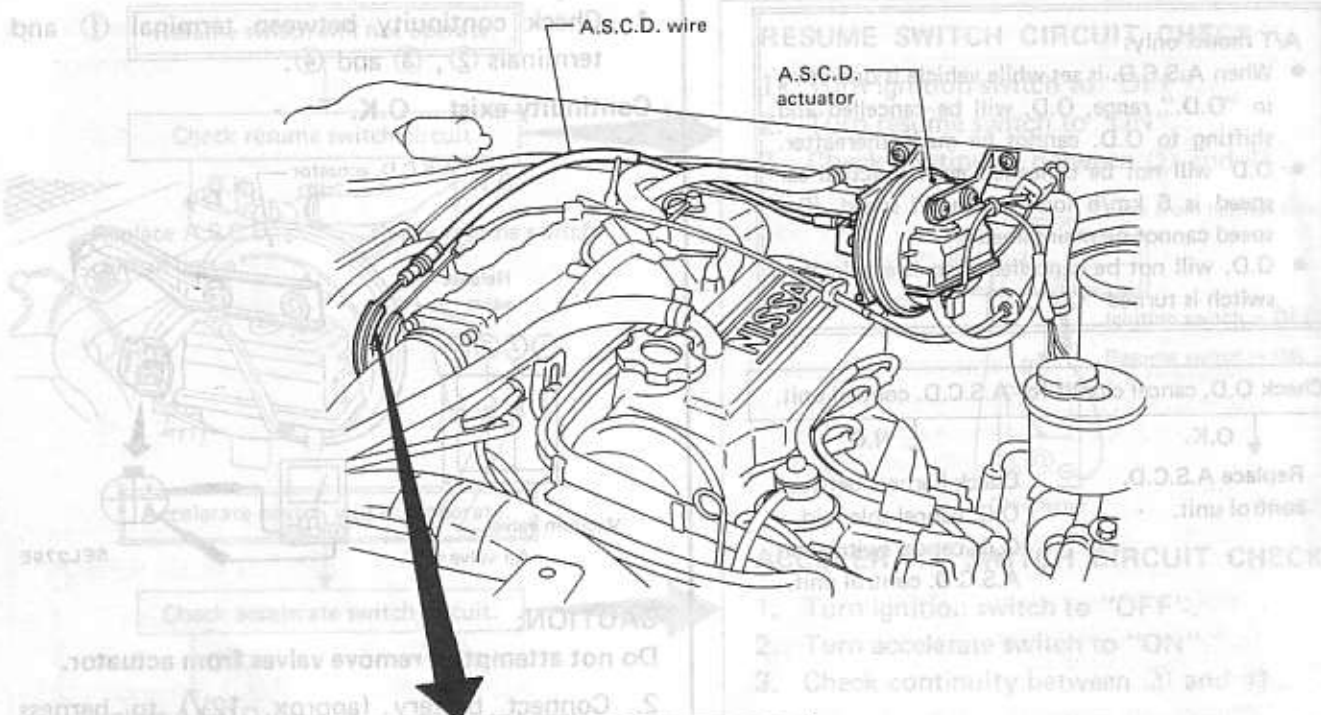
CAUTION:

When checking actuator by applying vacuum, do not apply engine vacuum directly as it is too strong to check actuator properly.



AUTOMATIC SPEED CONTROL DEVICE (A.S.C.D.)

A.S.C.D. Wire Adjustment



CAUTION:

- Be careful not to twist wire when removing it.
- Do not tense wire excessively during adjustment.

After confirming that accelerator wire is properly adjusted, adjust the tension of A.S.C.D. wire in the following manner:

- (1) Tighten A.S.C.D. wire with adjusting nut until portion A of throttle lever comes into contact.
- (2) Then, back off adjusting nut 1/2 to 1 turn.
- (3) Securely tighten lock nut to hold adjusting nut in place.

- For A.S.C.D. stop switch and clutch switch adjustment, refer to BR and CL sections.

SEL281E

Diagram illustrating the rear view of the vehicle's rear window assembly, showing the location of various electrical components and their wiring:

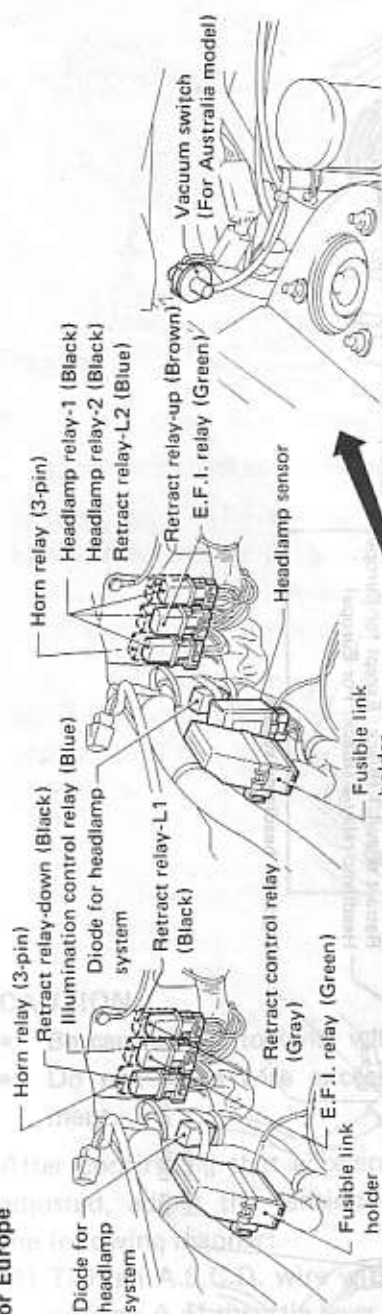
- Horn relay (3-pin)
- Retract relay-down (Black)
- Illumination control relay (Blue)
- Retract relay-up (Brown: Except for Europe)
- Retract relay-L1
- Retract control relay (Gray)

• Retract relay-up (Brown: Except for Europe)

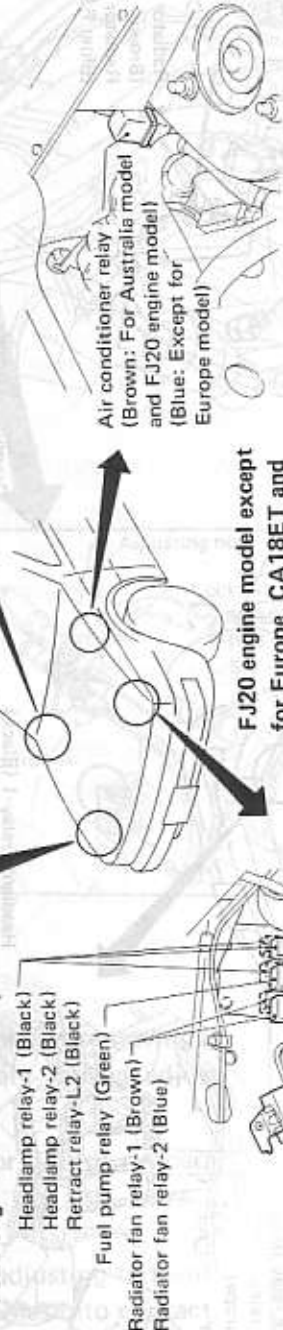


R.H. DRIVE MODEL

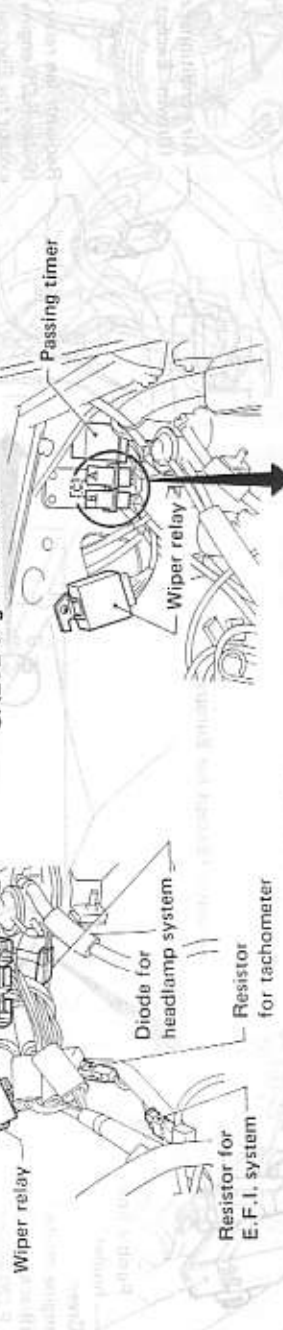
For Europe



FJ20 engine model for Europe



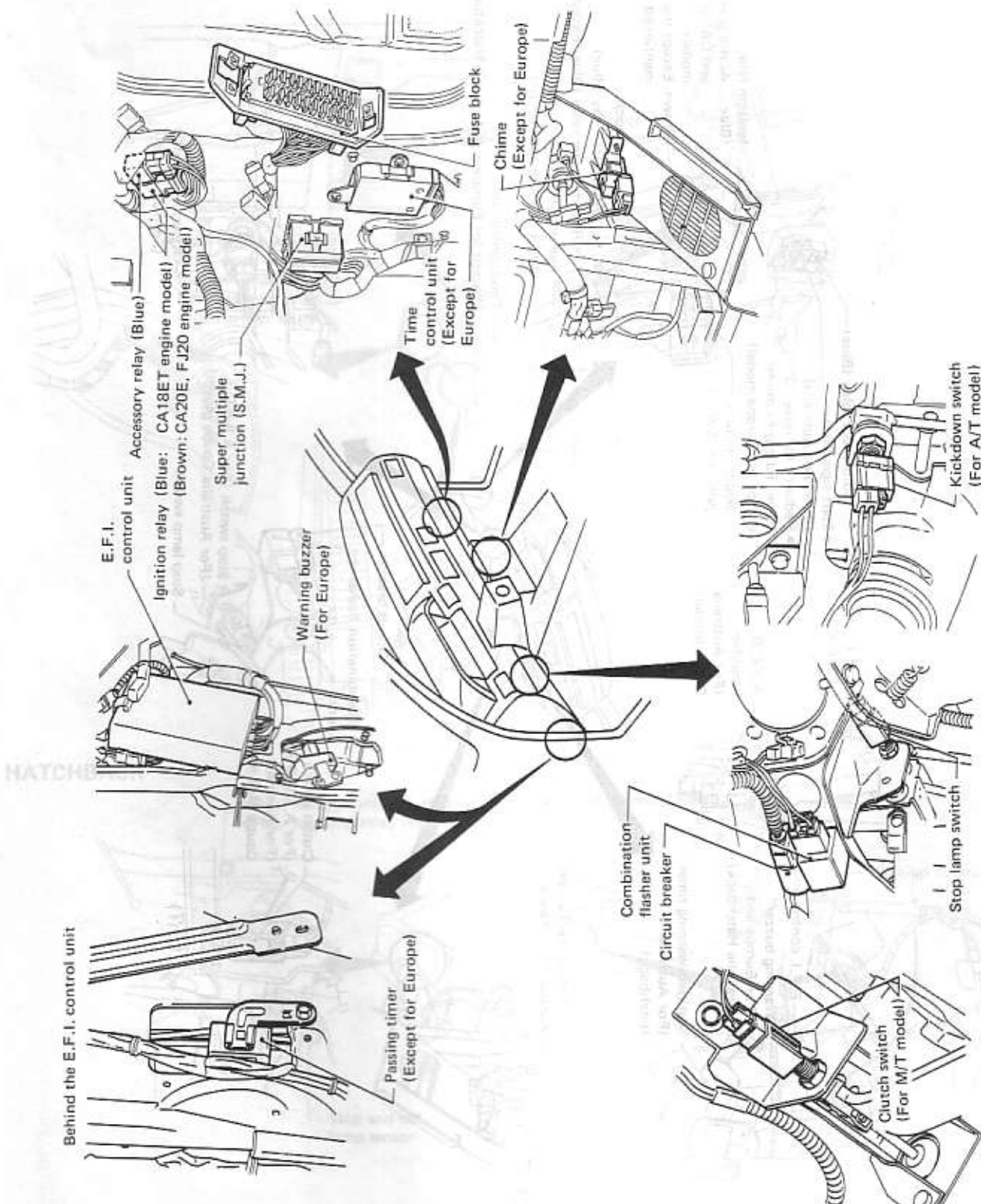
FJ20 engine model except for Europe, CA18ET and CA20E engine model



Relay	Fuel pump relay (Green)	Headlamp relay-1, 2 (Black)	Retract relay-L2 (Blue)	Radiator fan relay-1 (Brown)	(Not used) Radiator fan relay-2 (Blue)	A.S.C.D. hold relay (Blue)	A.S.C.D. inhibitor relay (Gray)
Model							
For Europe CA18ET engine	B	B, C	A			A	C
For Australia Coupe	B			C	A		
FJ20 engine	B						
CA20E engine model except for Australia Coupe	A						

LOCATION OF ELECTRICAL UNITS

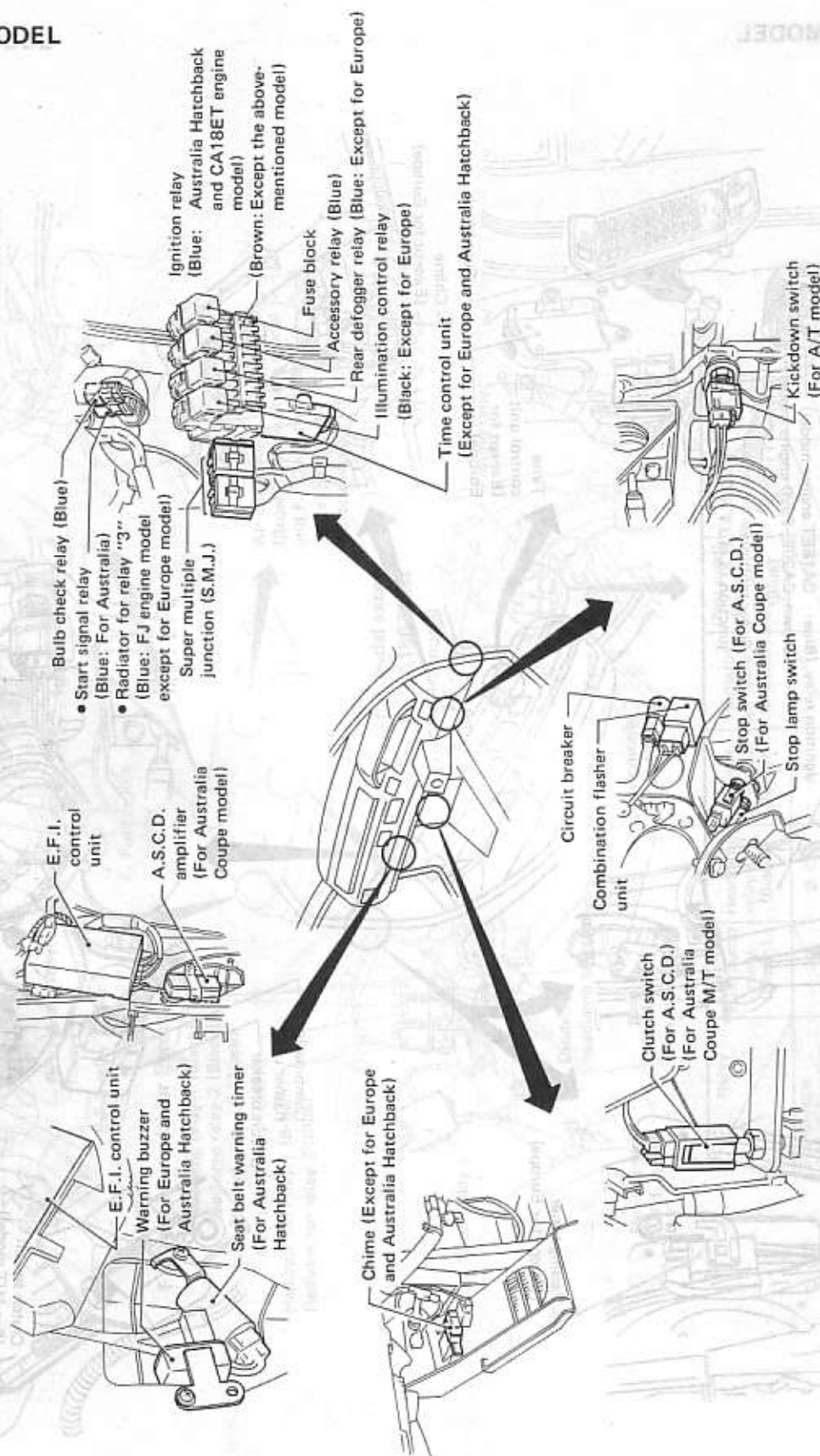
L.H. DRIVE MODEL



SEL594E

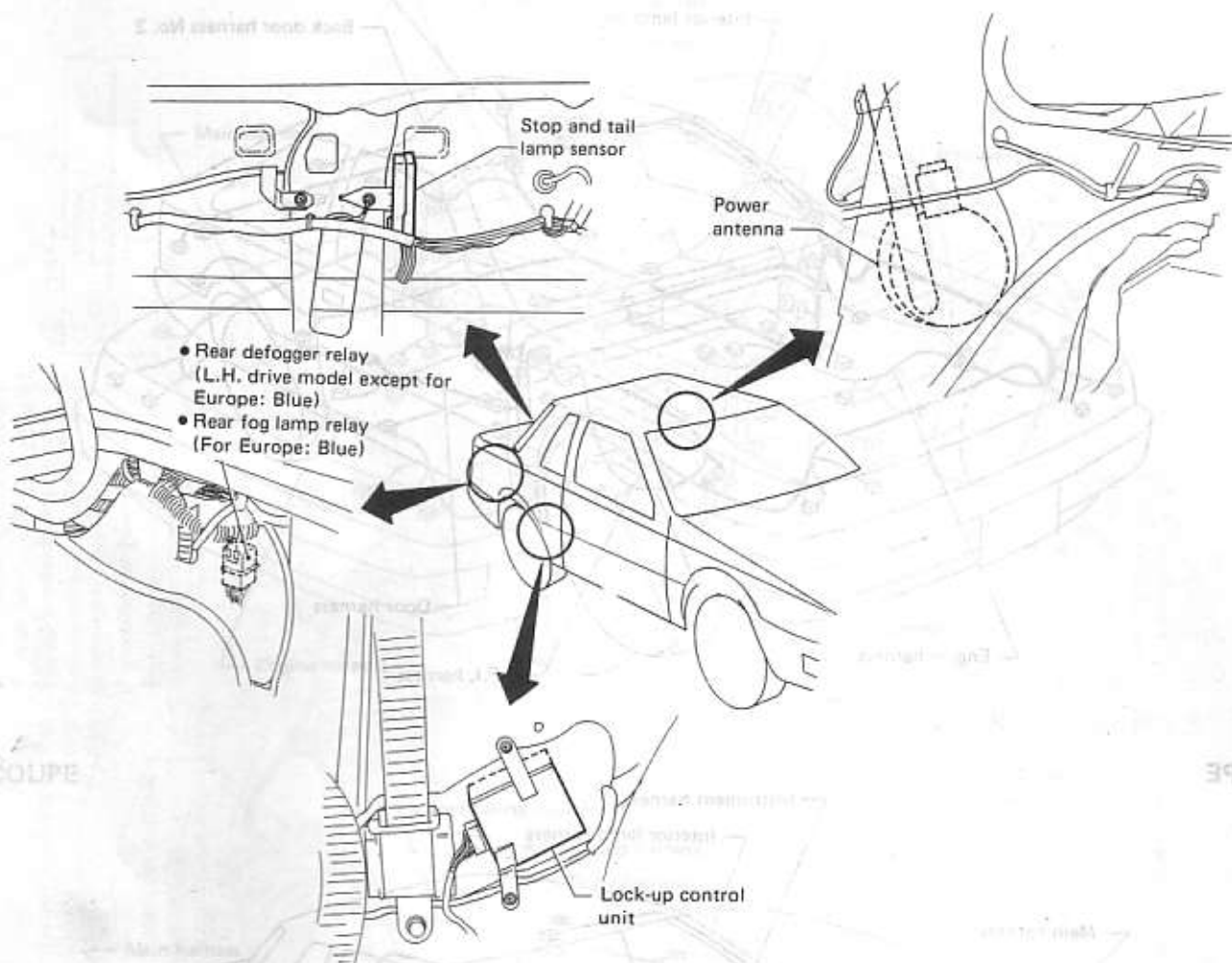
LOCATION OF ELECTRICAL UNITS

R.H. DRIVE MODEL

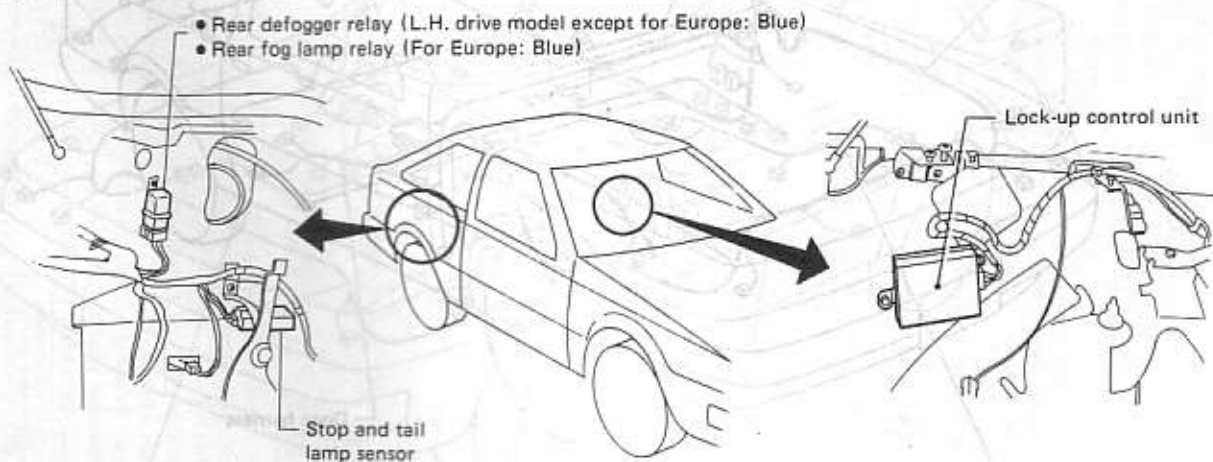


LOCATION OF ELECTRICAL UNITS

COUPE



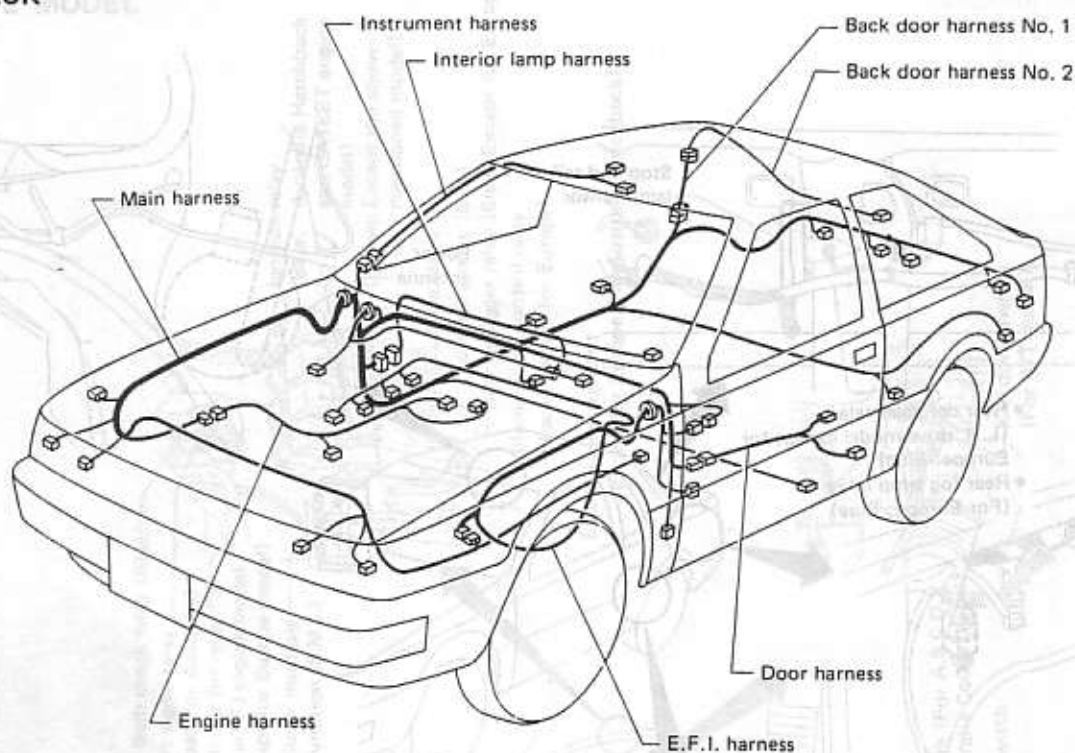
HATCHBACK



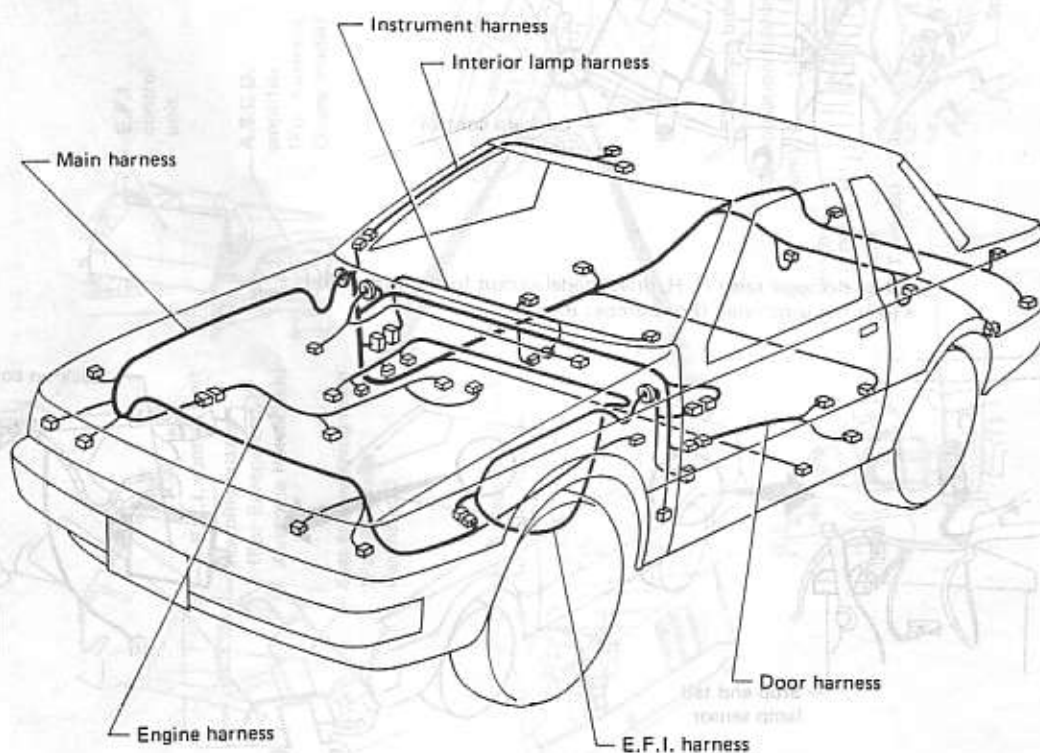
HARNESS LAYOUT

Outline (L.H. drive model)

HATCHBACK



COUPE

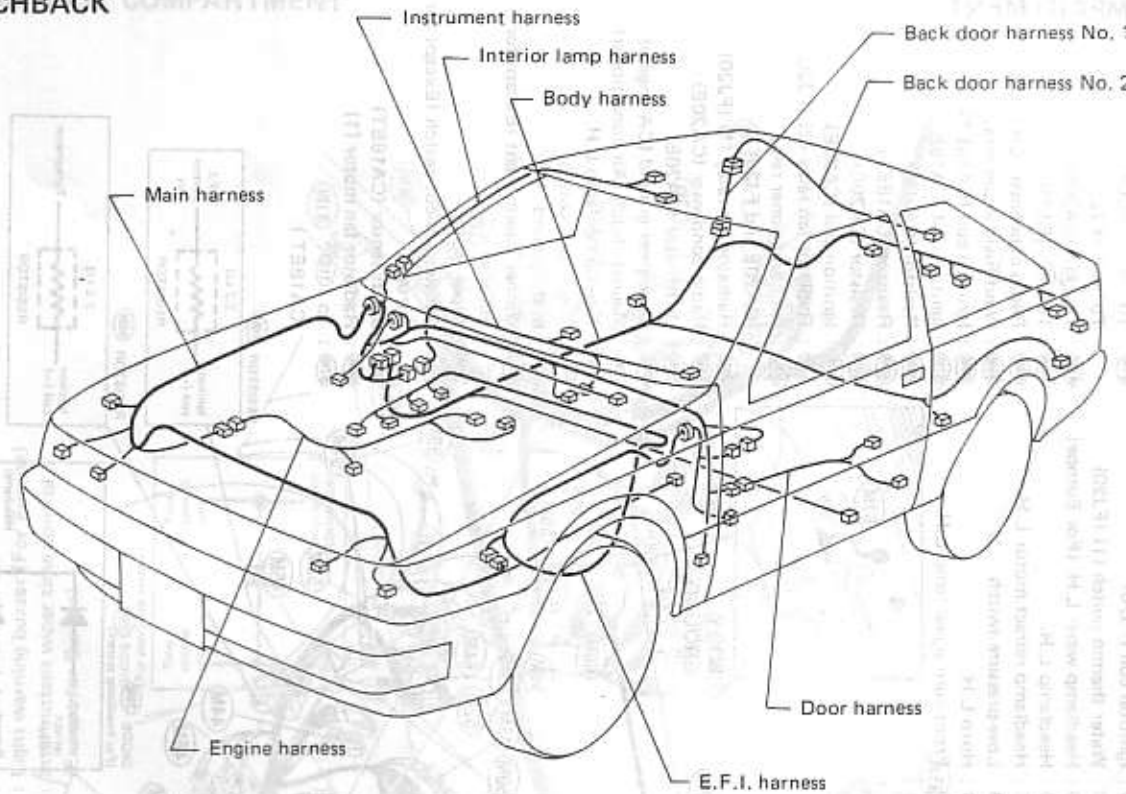


SEL289E

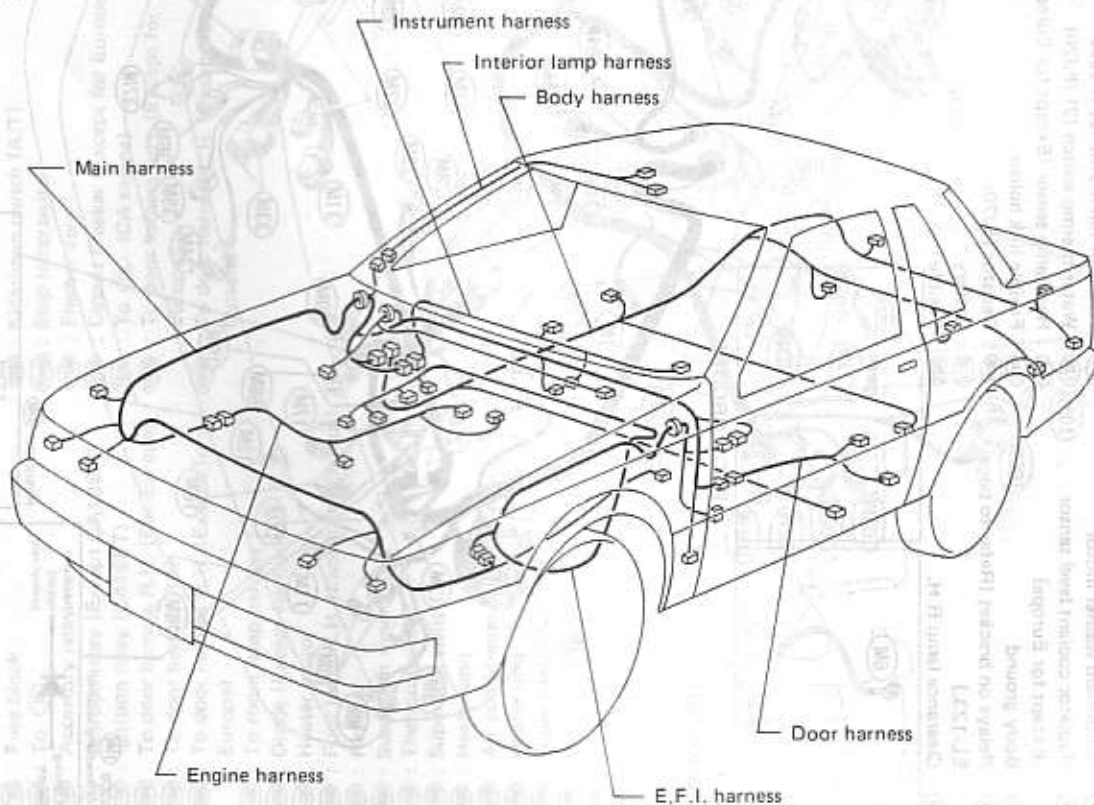
HARNESS LAYOUT

Outline (R.H. drive model) (Cont'd)

HATCHBACK



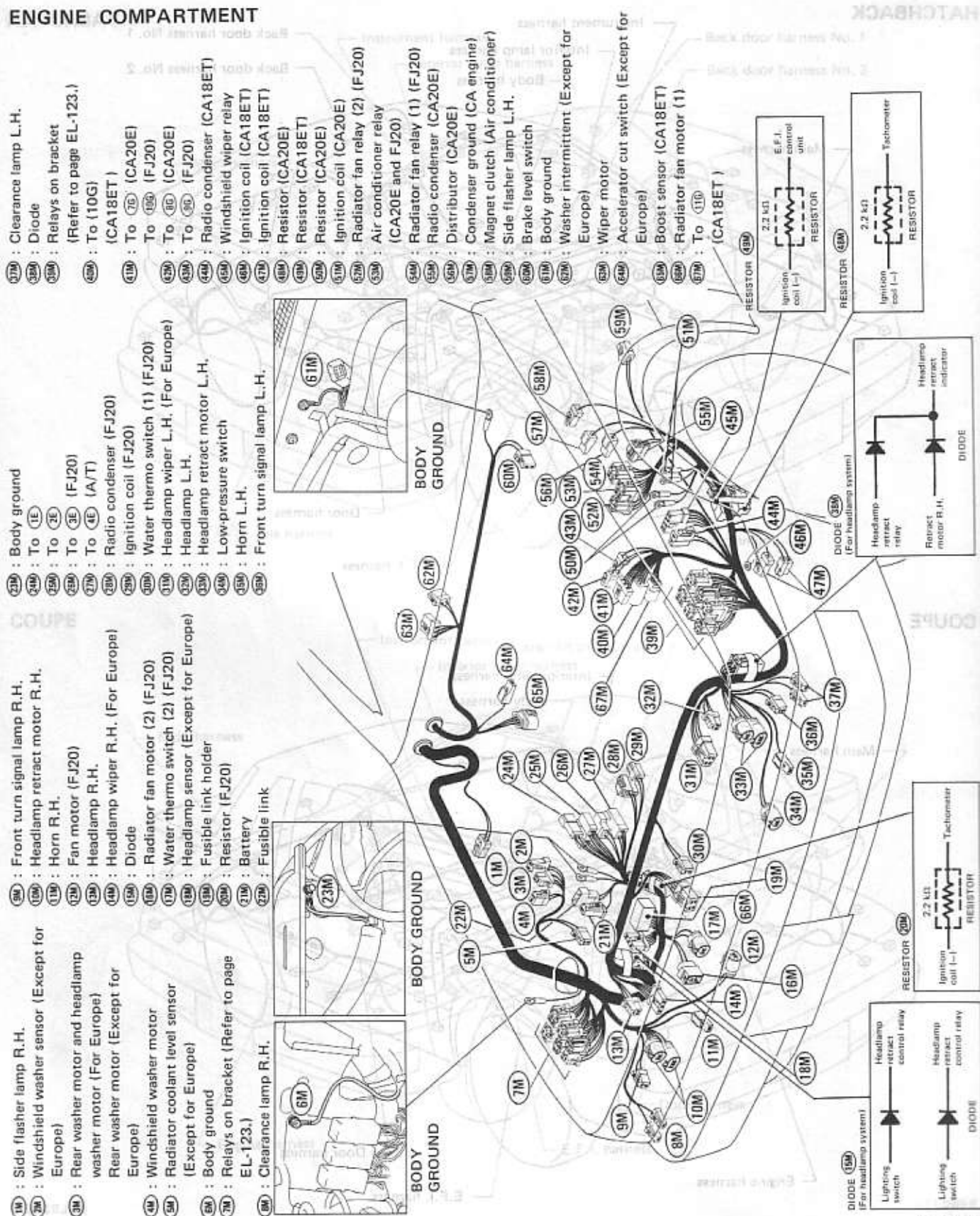
COUPE



SEL539E

Main Harness (L.H. drive model)

ENGINE COMPARTMENT



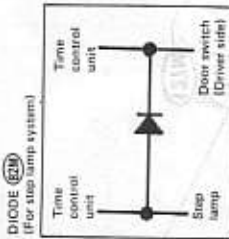
HARNESS LAYOUT

Main Harness (L.H. drive model) (Cont'd)

PASSENGER COMPARTMENT

HATCHBACK

- 71M : Time control unit (Except for Europe)
 72M : To ①
 73M : Fuse block
 74M : To ②
 75M : Accessory relay
 76M : Ignition relay (Except CA18ET)
 77M : Ignition relay (CA18ET)
 78M : To door harness R.H. (For Europe)
 79M : To door harness R.H. (Except for Europe)
 80M : To door harness R.H. (Except for Europe)
 81M : To room lamp harness
 82M : Diode (Except for Europe)
 83M : Heater motor
 84M : Foot lamp R.H. (Except for Europe)
 85M : Resistor
 86M : Superheat timer
 87M : Thermo switch
 88M : Superheat switch
 89M : Heater unit
 90M : Air conditioner unit
 91M : Heater unit
 92M : Wiper switch
 93M : Horn switch
 94M : Headlamp retract switch
 95M : Lighting switch
 96M : Hazard switch
 97M : Ignition switch
 98M : Foot lamp L.H. (Except for Europe)
 99M : Kickdown switch (A/T)
 100M : Stop lamp switch
 101M : Flasher unit
 102M : Circuit breaker (Except for Europe)
 103M : To ③ (CA engine)
 104M : To door harness L.H. (Except for Europe)
 105M : To door harness L.H. (Except for Europe)

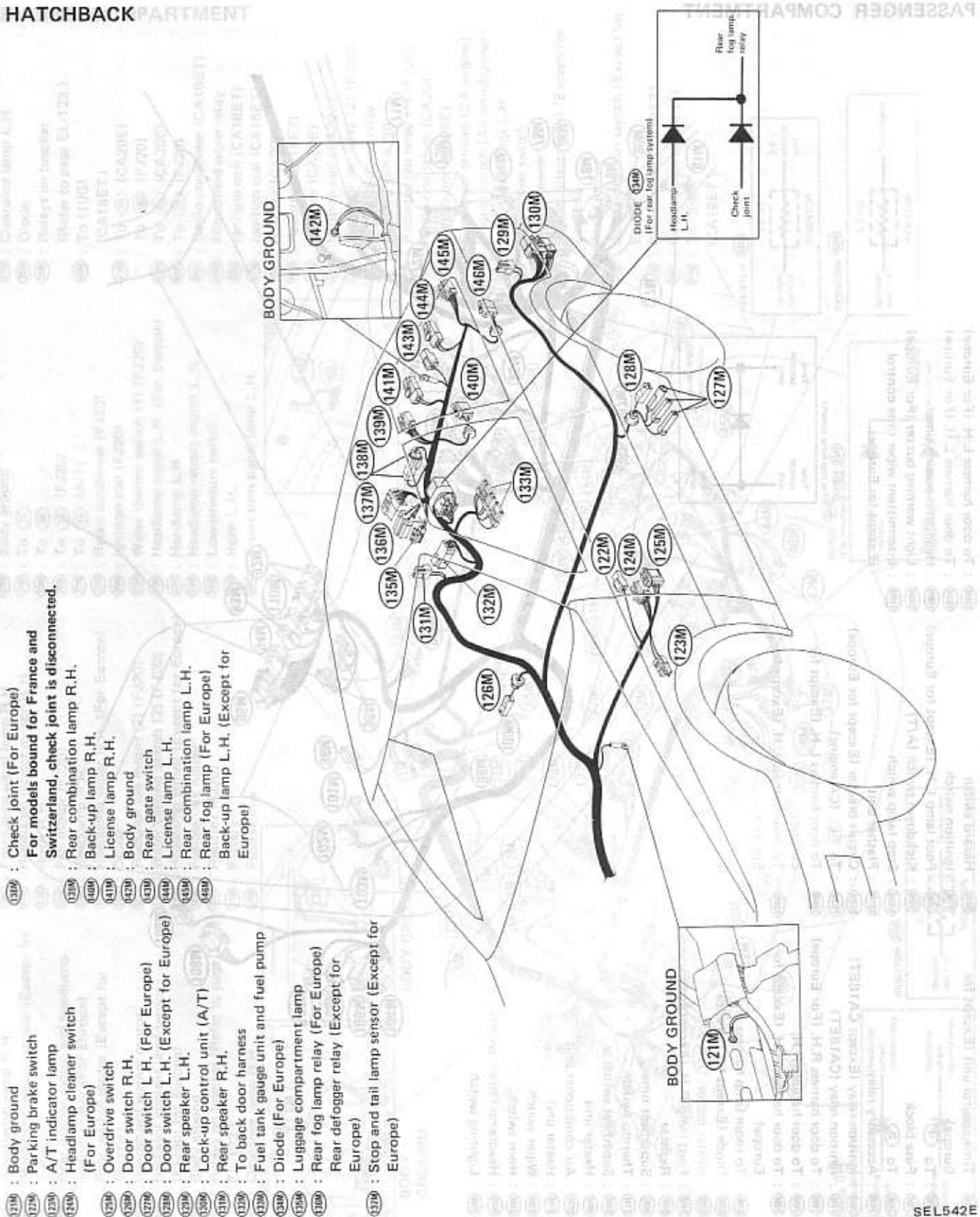


SEL541E

HARNESS LAYOUT

Main Harness (L.H. drive model) (Cont'd)

HATCHBACK

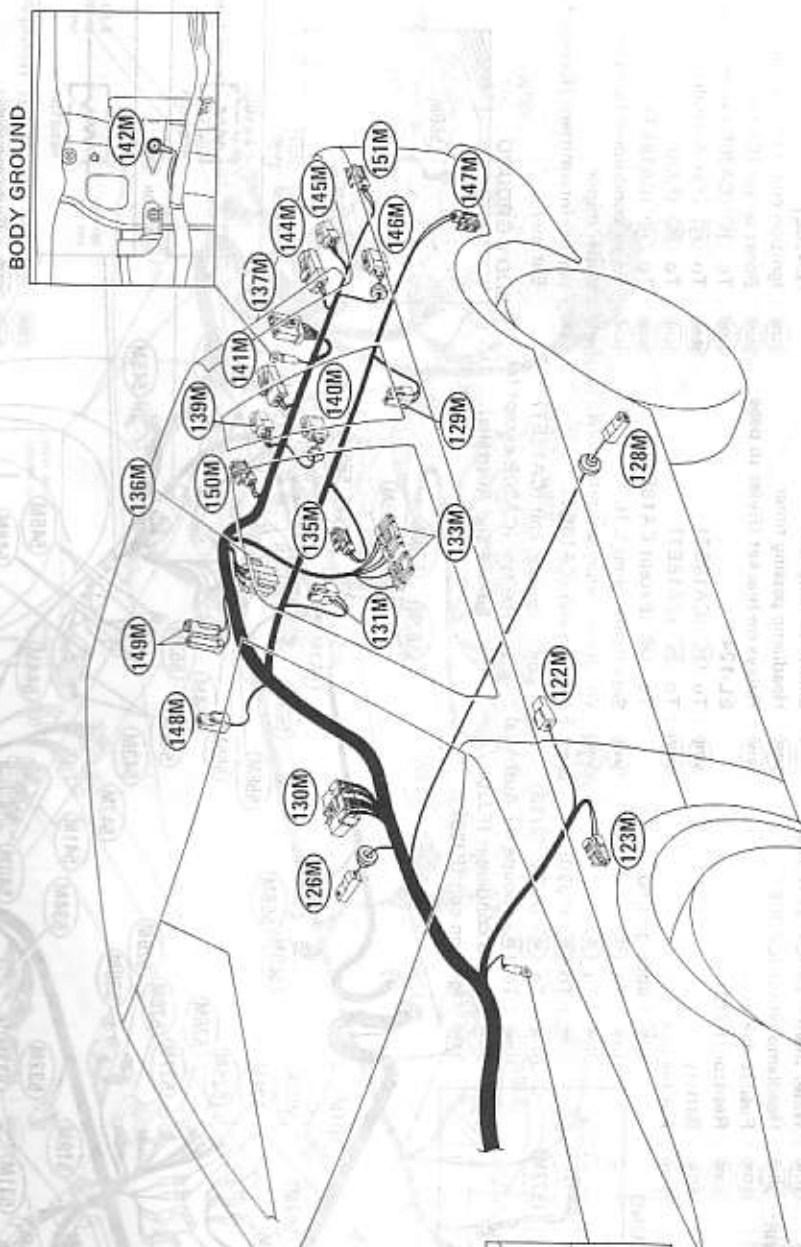


SEL542E

Main Harness (L.H. drive model) (Cont'd)

COUPE

- | | | | |
|------|--------------------------------------|------|------------------------------|
| 1314 | : Body ground | 1315 | : License lamp R.H. |
| 1324 | : Parking brake switch | 1325 | : Body ground |
| 1334 | : A/T indicator lamp | 1335 | : License lamp L.H. |
| 1344 | : Door switch R.H. | 1345 | : Rear combination lamp L.H. |
| 1354 | : Door switch L.H. | 1355 | : Back-up lamp L.H. |
| 1364 | : Rear speaker L.H. | 1365 | : Power antenna motor |
| 1374 | : Lock-up control unit (A/T) | 1375 | : Rear defogger |
| 1384 | : Rear speaker R.H. | 1385 | : Trunk room lamp switch |
| 1394 | : Fuel tank gauge unit and fuel pump | 1395 | : Rear turn signal lamp R.H. |
| 1404 | : Trunk room lamp | 1405 | : Rear turn signal lamp L.H. |
| 1414 | : Rear defogger relay | | |
| 1424 | : Stop and tail lamp sensor | | |
| 1434 | : Rear combination lamp R.H. | | |
| 1444 | : Back-up lamp R.H. | | |

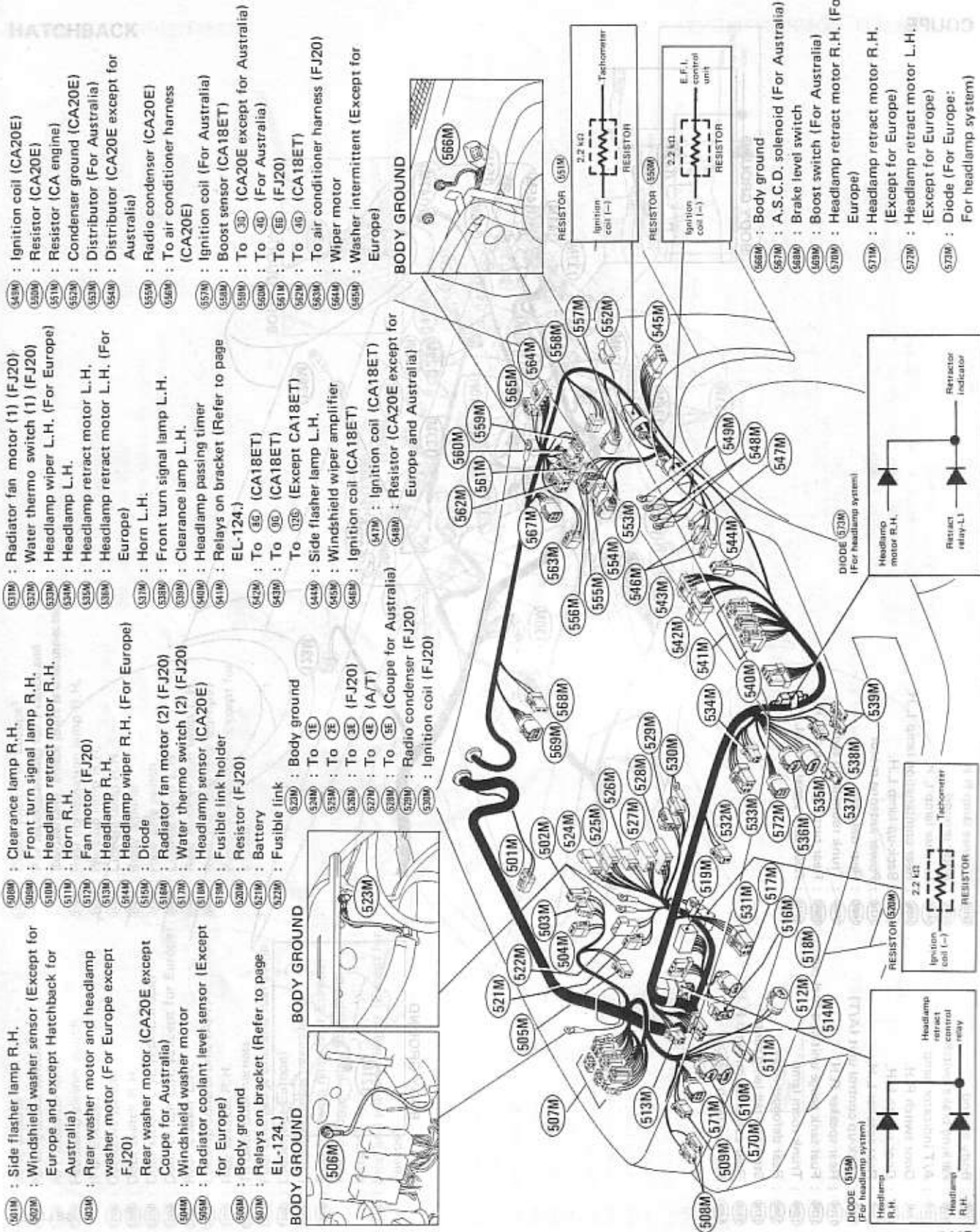


BODY GROUND.



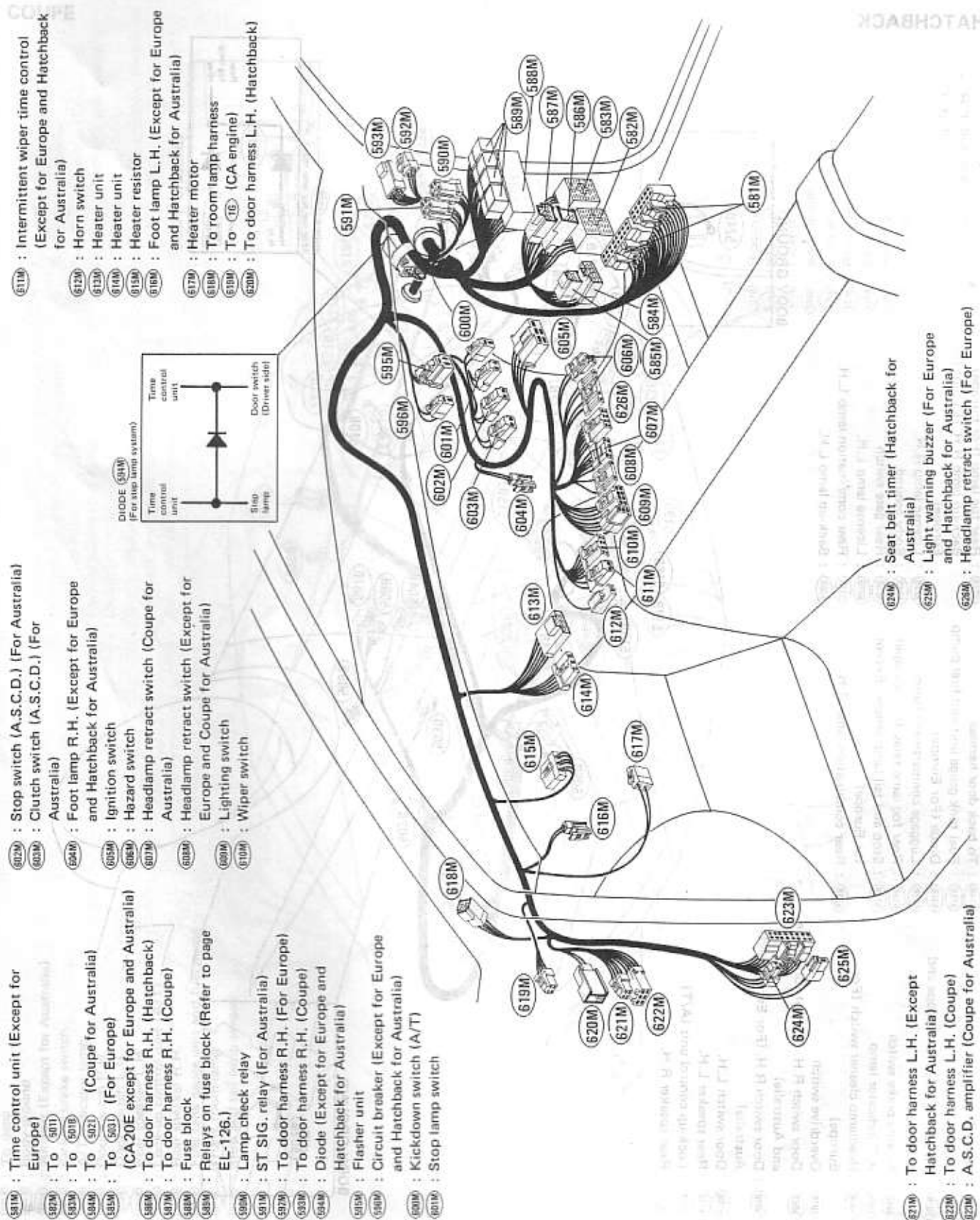
HARNESS LAYOUT

Main Harness (R.H. drive model)



HARNESS LAYOUT

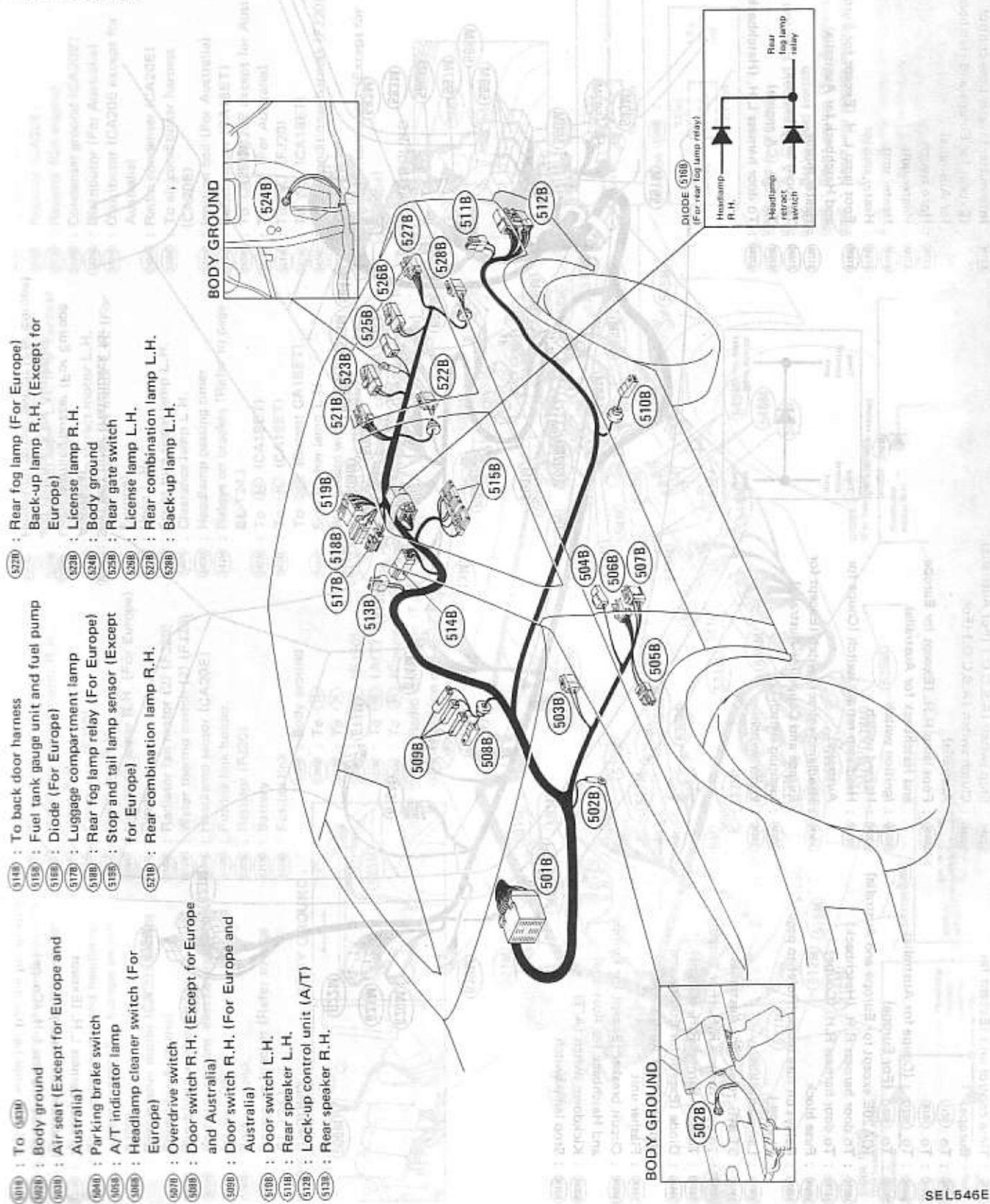
Main Harness (R.H. drive model) (Cont'd)



HARNESS LAYOUT

Body Harness (R.H. drive model only)

HATCHBACK

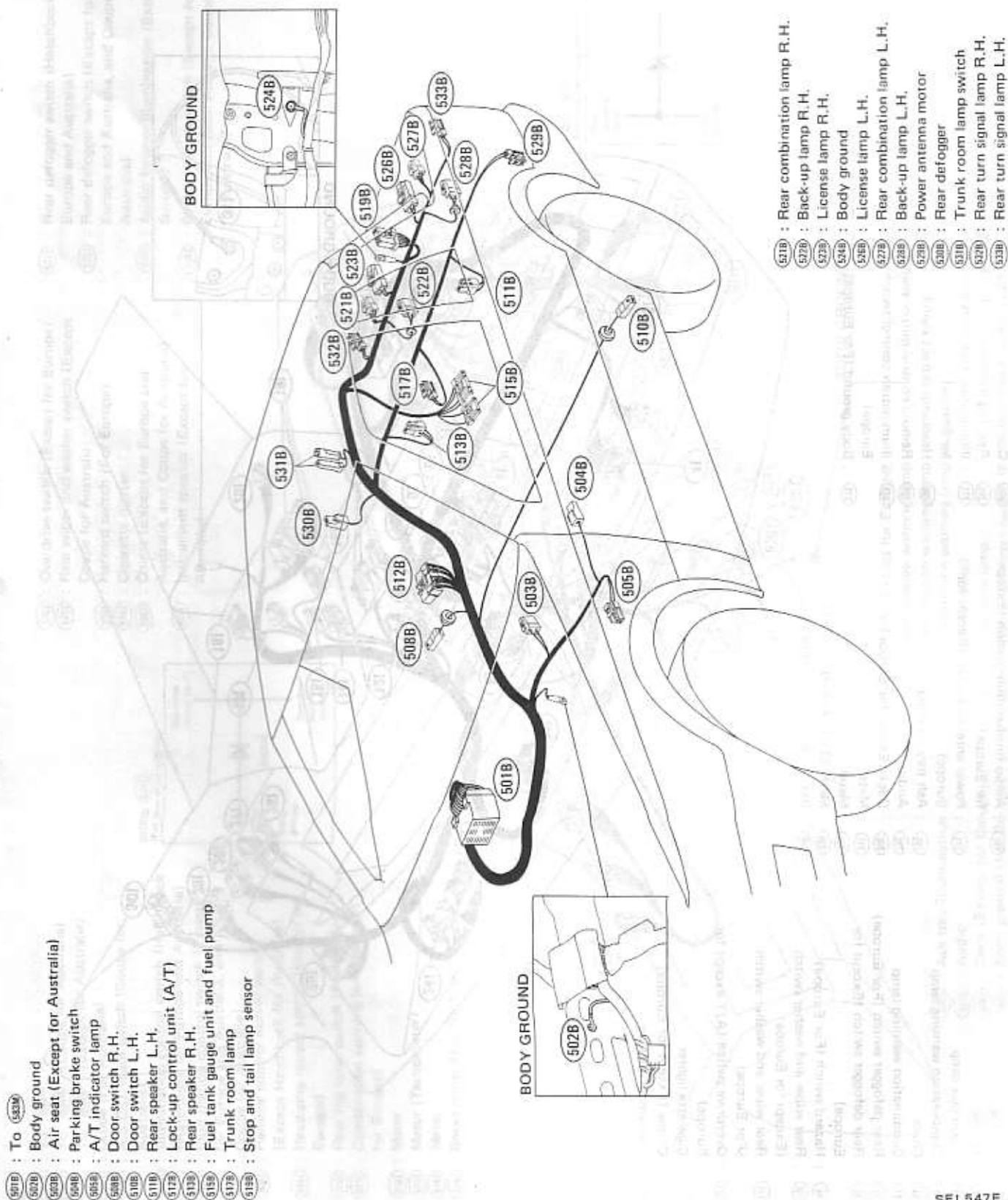


SEL546E

HARNESS LAYOUT

Body Harness (R.H. drive model only) (Cont'd)

COUPE



SEL547E

HARNESS LAYOUT

Instrument Harness (L.H. drive model)

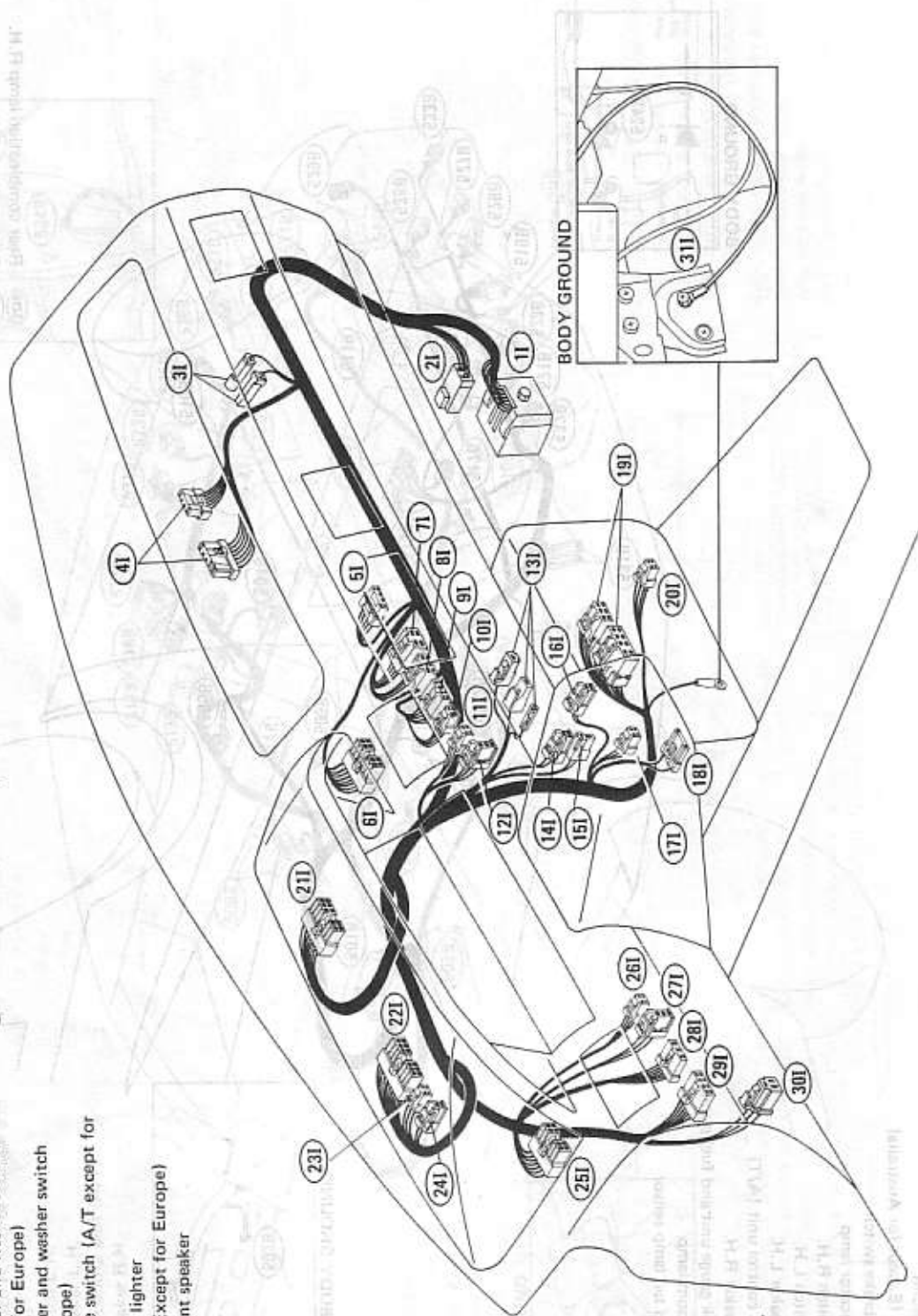
HATCHBACK

COUPE

- (25) : Combination warning lamp
- (26) : Rear fog lamp switch (For Europe)
- (27) : Illumination control switch (Except for Europe)
- (28) : Headlamp retract switch
- (29) : Remote control mirror switch
- (30) : Illumination control switch (For Europe)
- (31) : Body ground (For Europe)

- (18) : Audio finisher illumination (Except for Europe)
- (17) : Power antenna switch (Except for Europe)
- (16) : Ash tray illumination
- (15) : Audio
- (14) : Deck (Except for Europe)
- (13) : Meter
- (12) : Meter (Tachometer)
- (11) : Boost meter (For Europe)

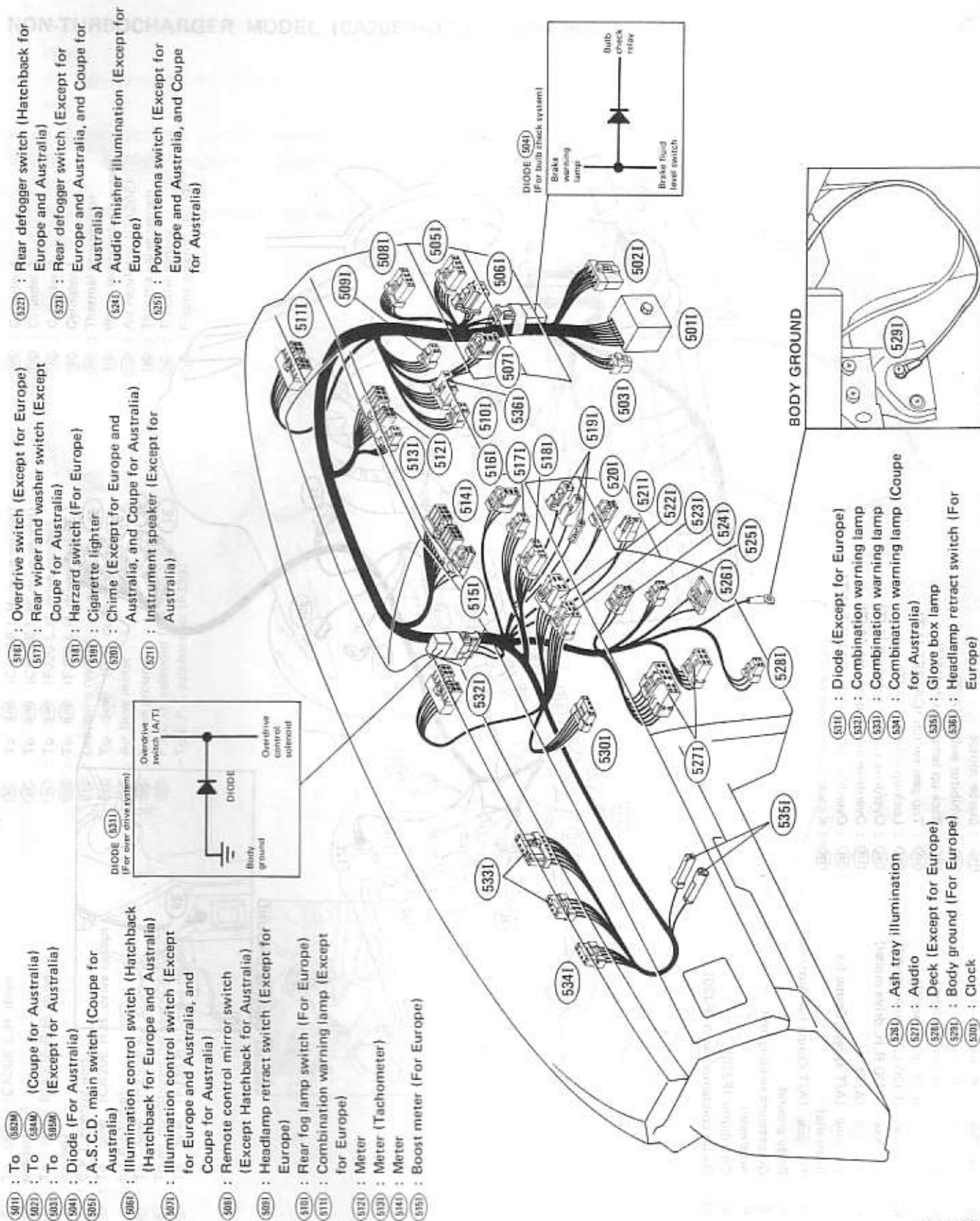
- (1) : To (26)
- (2) : To (26)
- (3) : Glove box lamp
- (4) : Combination warning lamp
- (5) : Clock
- (6) : Combination warning lamp
- (7) : Rear defogger switch (For Europe)
- (8) : Rear defogger switch (Except for Europe)
- (9) : Hazard switch (For Europe)
- (10) : Rear wiper and washer switch (Except for Europe)
- (11) : Rear wiper and washer switch (For Europe)
- (12) : Overdrive switch (A/T except for Europe)
- (13) : Cigarette lighter
- (14) : Chime (Except for Europe)
- (15) : Instrument speaker



SEL548E

HARNESS LAYOUT

Instrument Harness (R.H. drive model) (Cont'd)

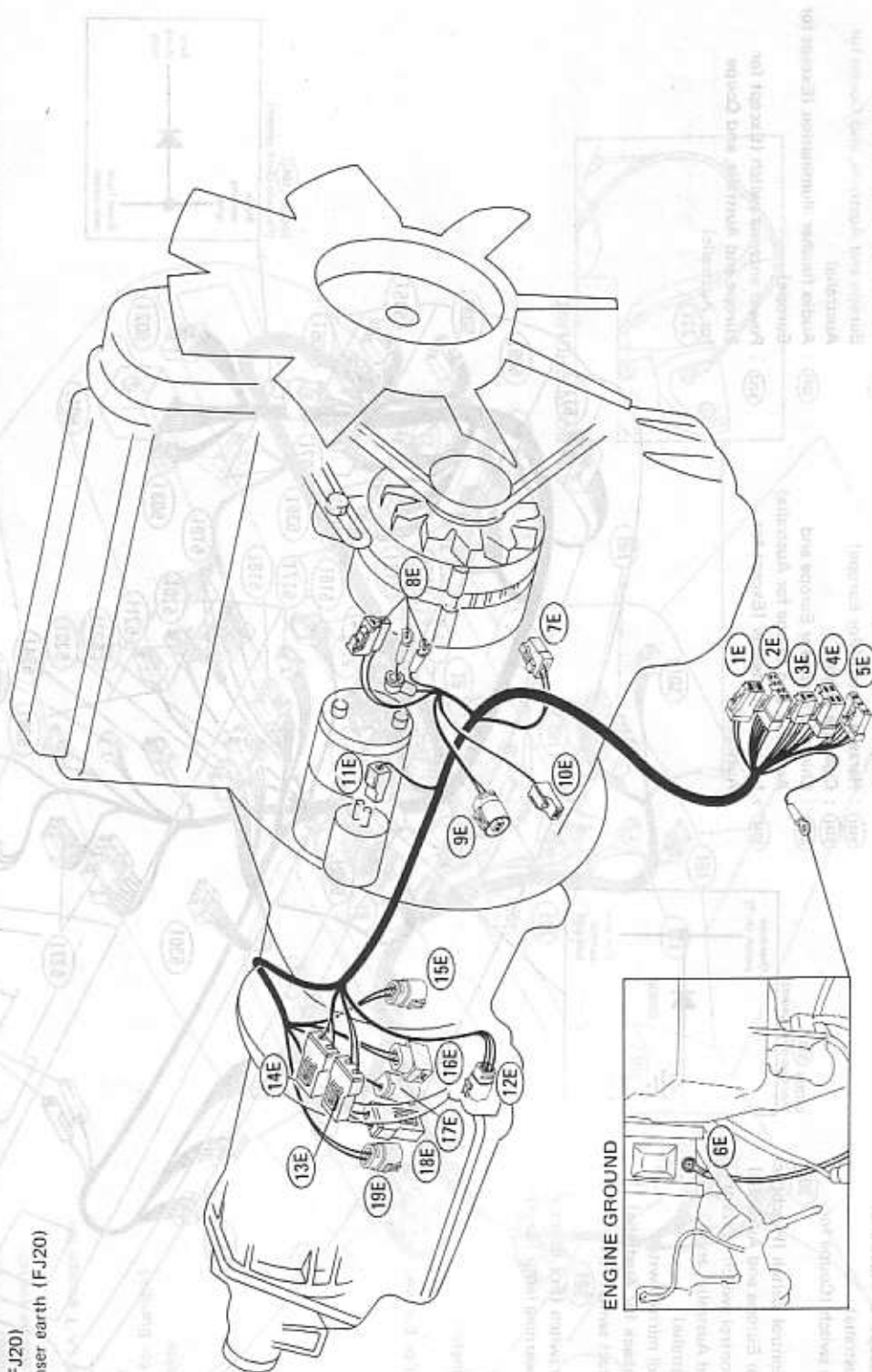


SEL549E

HARNESS LAYOUT

Engine Harness

- (1E) : To (24N) (L.H. drive model)
- (2E) : To (24N) (R.H. drive model)
- (3E) : To (25N) (L.H. drive model)
- (4E) : To (25N) (R.H. drive model)
- (5E) : To (26N) (FJ20 L.H. drive model)
- (6E) : To (26N) (FJ20 R.H. drive model)
- (7E) : To (27N) (A/T)
- (8E) : To (32N) (A/T except Coupe for Australia)
- (9E) : To (32N) (A/T Coupe for Australia)
- (10E) : Body ground
- (11E) : Oil pressure sending unit
- (12E) : Alternator
- (13E) : Distributor (FJ20)
- (14E) : Radio condenser earth (FJ20)
- (15E) : Starter motor
- (16E) : Inhibitor switch (A/T)
- (17E) : Back-up lamp switch (M/T)
- (18E) : Top gear switch (CA18ET M/T)
- (19E) : Lock-up solenoid (A/T)
- (20E) : Overdrive control solenoid (A/T)
- (21E) : Overdrive indicator switch (A/T)
- (22E) : Overdrive gear switch (CA18ET M/T)
- (23E) : Kickdown solenoid (A/T)



SEL550E

HARNESS LAYOUT

E.F.I. Harness

NON-TURBOCHARGER MODEL (CA20E and FJ20 engine model)

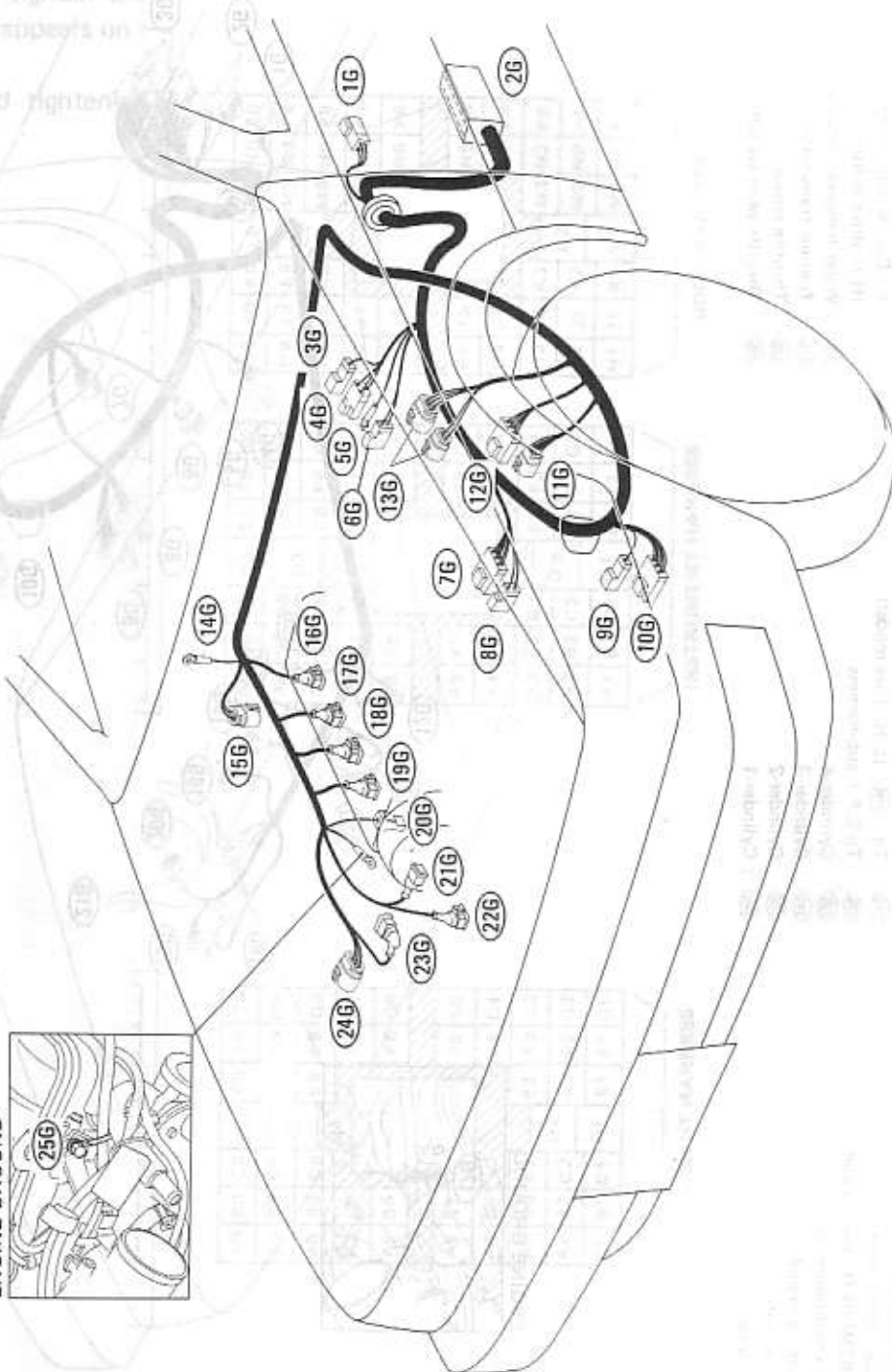
- To disconnect the S.M.J., loosen bolt
- To connect the S.M.J., tighten the "for-tight" marking appears on surface

- 15G : Cylinder-4
- 16G : Cylinder-3
- 17G : Cylinder-2
- 18G : Cylinder-1
- 19G : Thermal transmitter
- 20G : Water temperature sensor
- 21G : Air regulator (CA20E)
- 22G : Throttle valve switch
- 23G : Throttle sensor
- 24G : Engine ground (FJ20)

- 25G : To 419 (CA20E L.H. drive model)
- 26G : To 420 (CA20E L.H. drive model)
- 27G : To 430 (FJ20 L.H. drive model)
- 28G : To 419 (FJ20 L.H. drive model)
- 29G : Dropping resistor
- 30G : To 543M (R.H. drive model)
- 31G : Air flow meter
- 32G : Engine ground
- 33G : F.I.C.D. solenoid (CA20E)
- 34G : To E.F.I. sub-harness (FJ20)

- 35G : To 103W (CA20E L.H. drive model)
- 36G : To 613W (CA20E R.H. drive model)
- 37G : E.F.I. control unit
- 38G : To 559W (CA20E R.H. drive except for Australia)
- 39G : To 560W (CA20E for Australia)
- 40G : To air conditioner harness (CA20E)
- 41G : To 581W (FJ20 R.H. drive model)

ENGINE GROUND



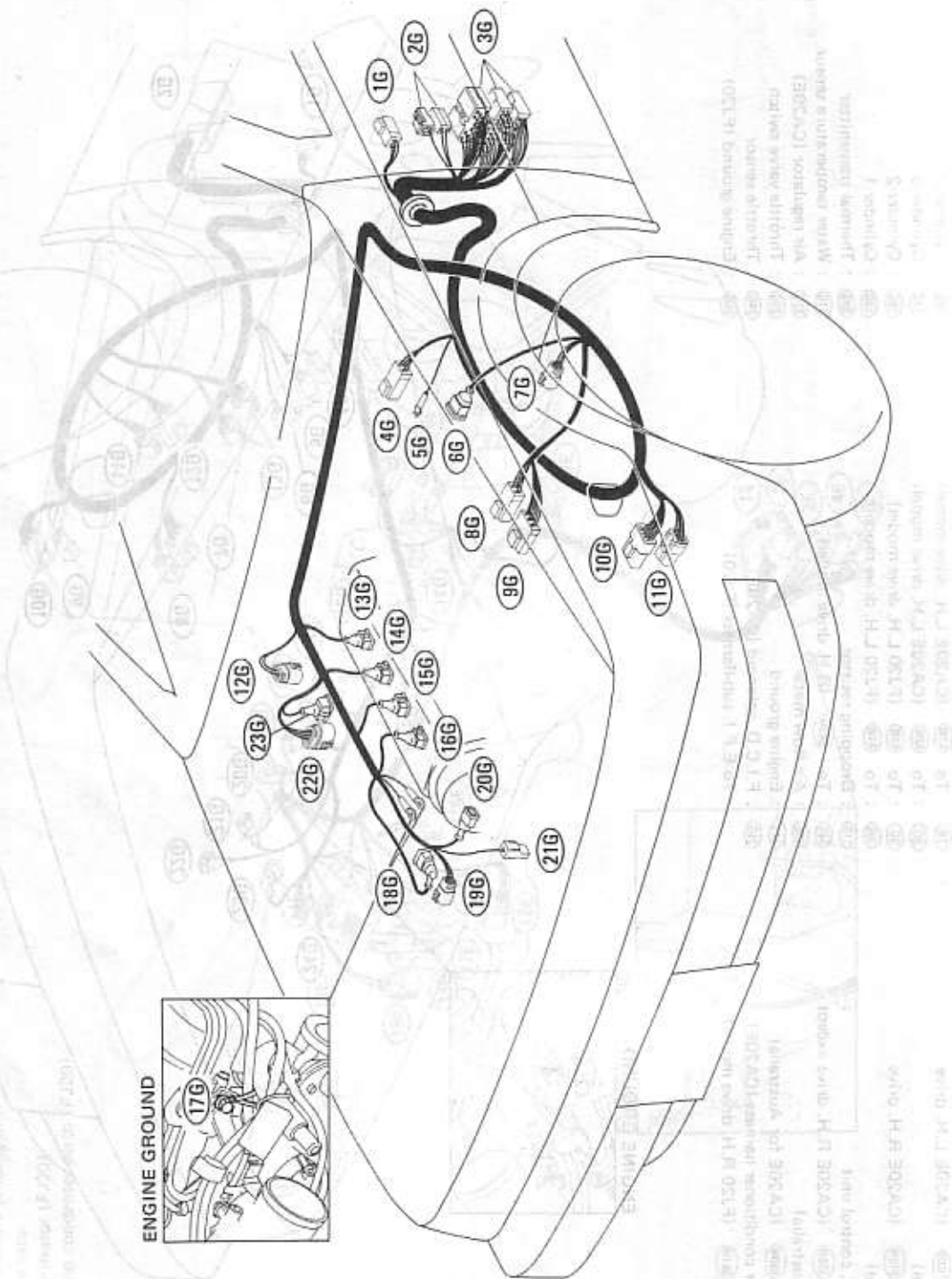
SEL551E

E.F.I. Harness (Cont'd)

- ①79 : Engine ground
- ①85 : Air regulator
- ①94 : F.I.C.D. solenoid (L.H. drive model)
F.I.C.D. & load solenoid
(R.H. drive model)
- 205 : Water temperature sensor
- 216 : Thermal transmitter
- 225 : Throttle sensor
- 235 : Throttle valve switch¹

(86)	: To	(94M)	(R.H. drive model)
(90)	: To	(53M)	(R.H. drive model)
(100)	: To	(60M)	(L.H. drive model)
(110)	: To	(67M)	(L.H. drive model)
(120)	: To	E.F.I. sub-harness	
(126)	: Cylinder-4		
(160)	: Cylinder-3		
(130)	: Cylinder-2		
(130)	: Cylinder-1		

(11) : To (101) (L.H. drive model)
 To (110) (R.H. drive model)
 (20) : Check connector
 (30) : E.C.C.S. control unit
 (40) : To (562M) (R.H. drive model)
 (50) : To air conditioner harness
 (R.H. drive model)
 (60) : Air flow meter
 (70) : Distributor

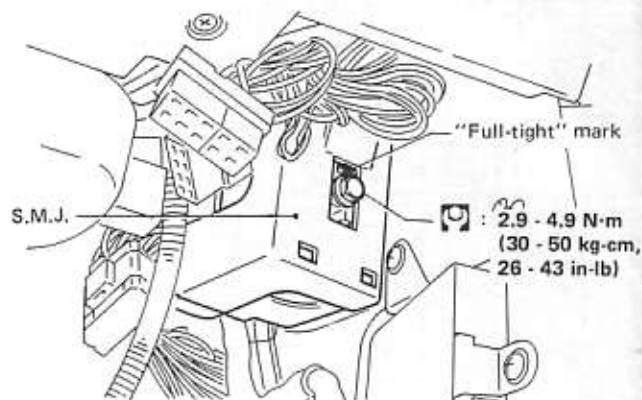


EL-142

SUPER MULTIPLE JUNCTION (S.M.J.)

Disconnecting and Connecting

- S.M.J. is located on the right side of the dash.
 - To disconnect the S.M.J., loosen the fixing bolt.
 - To connect the S.M.J., tighten the bolt until the "full-tight" marking appears on the housing surface.
- Make sure the specified tightening torque is used.



SEL318E

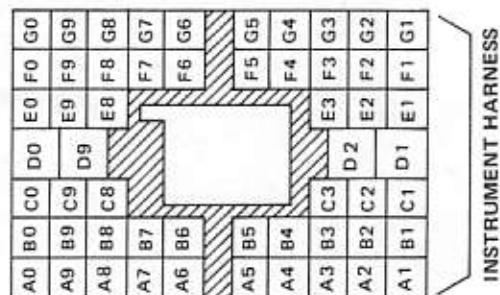
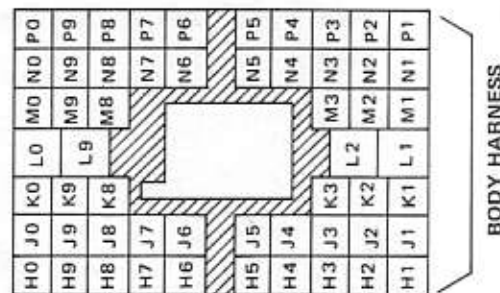
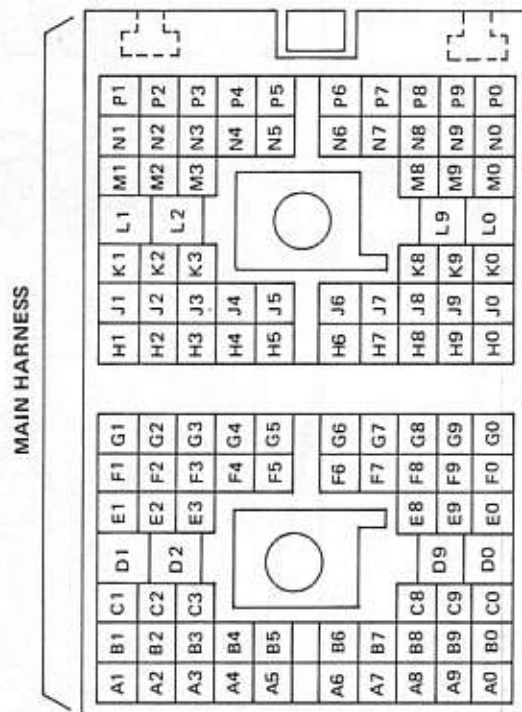
NISSAN MODEL S12 SERIES
CIRCUIT DIAGRAM

SUPER MULTIPLE JUNCTION (S.M.J.)

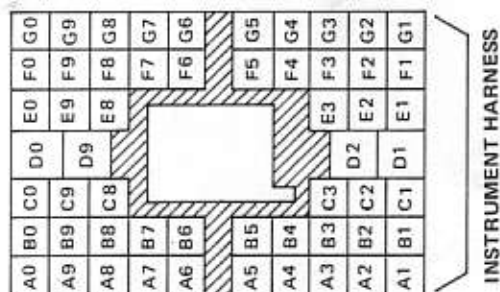
Terminal Arrangement

- Terminal numbers, i.e. "B1", "D0", etc, are identical to those which are shown as "S.M.J." in the wiring diagrams.

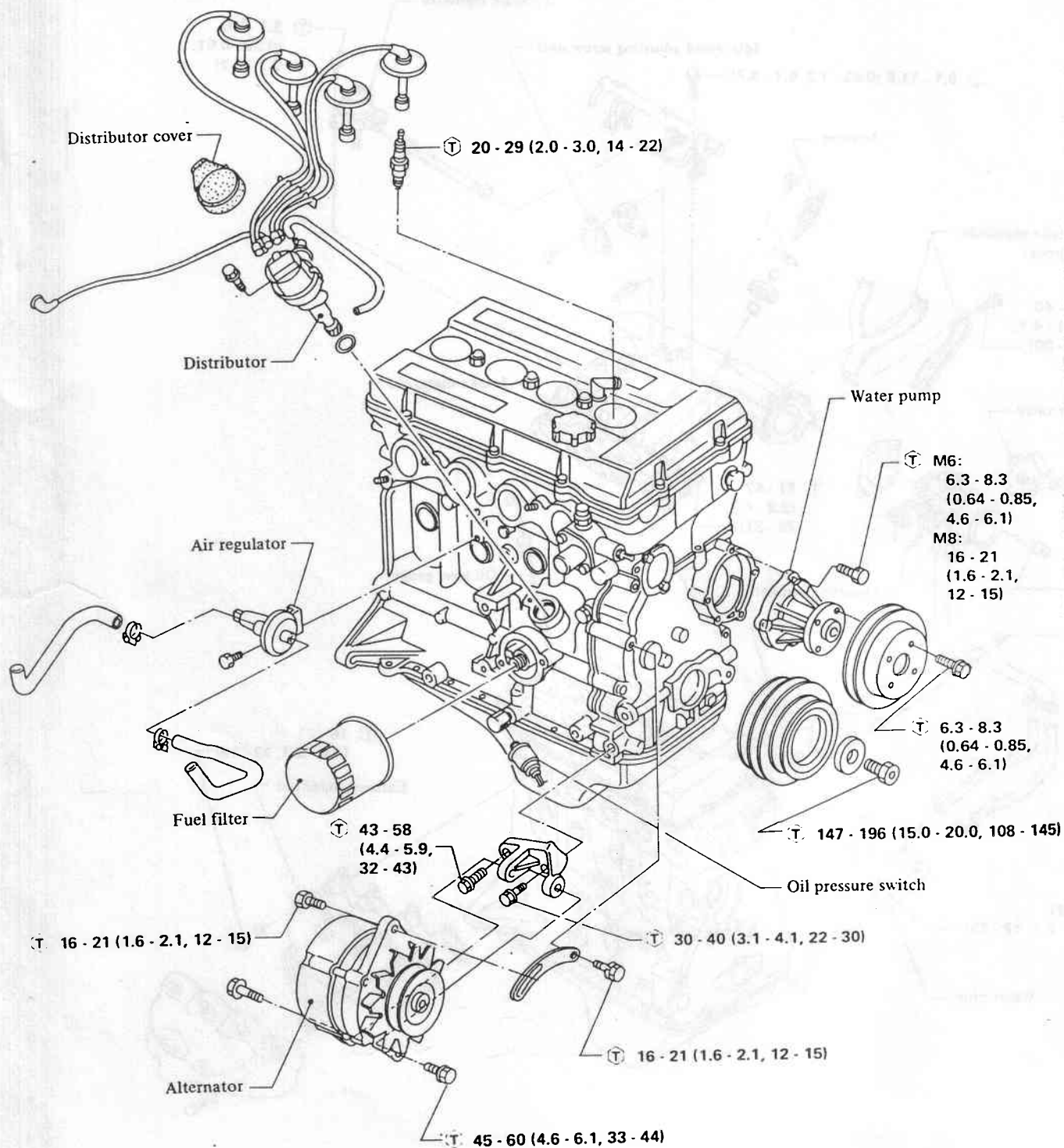
R.H. DRIVE MODEL



L.H. DRIVE MODEL

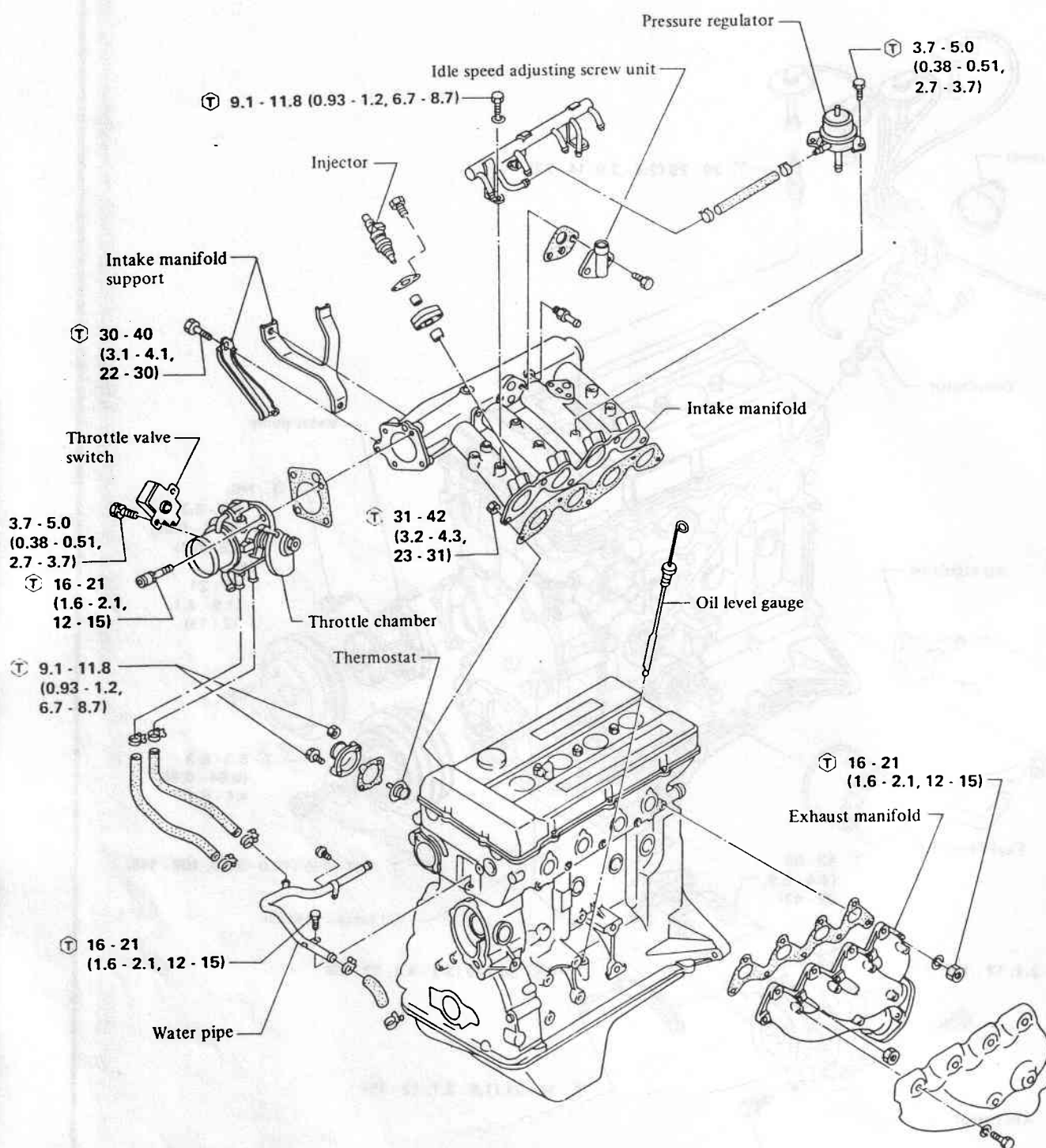


ENGINE COMPONENTS (Outer parts)



T : N-m (kg-m, ft-lb)

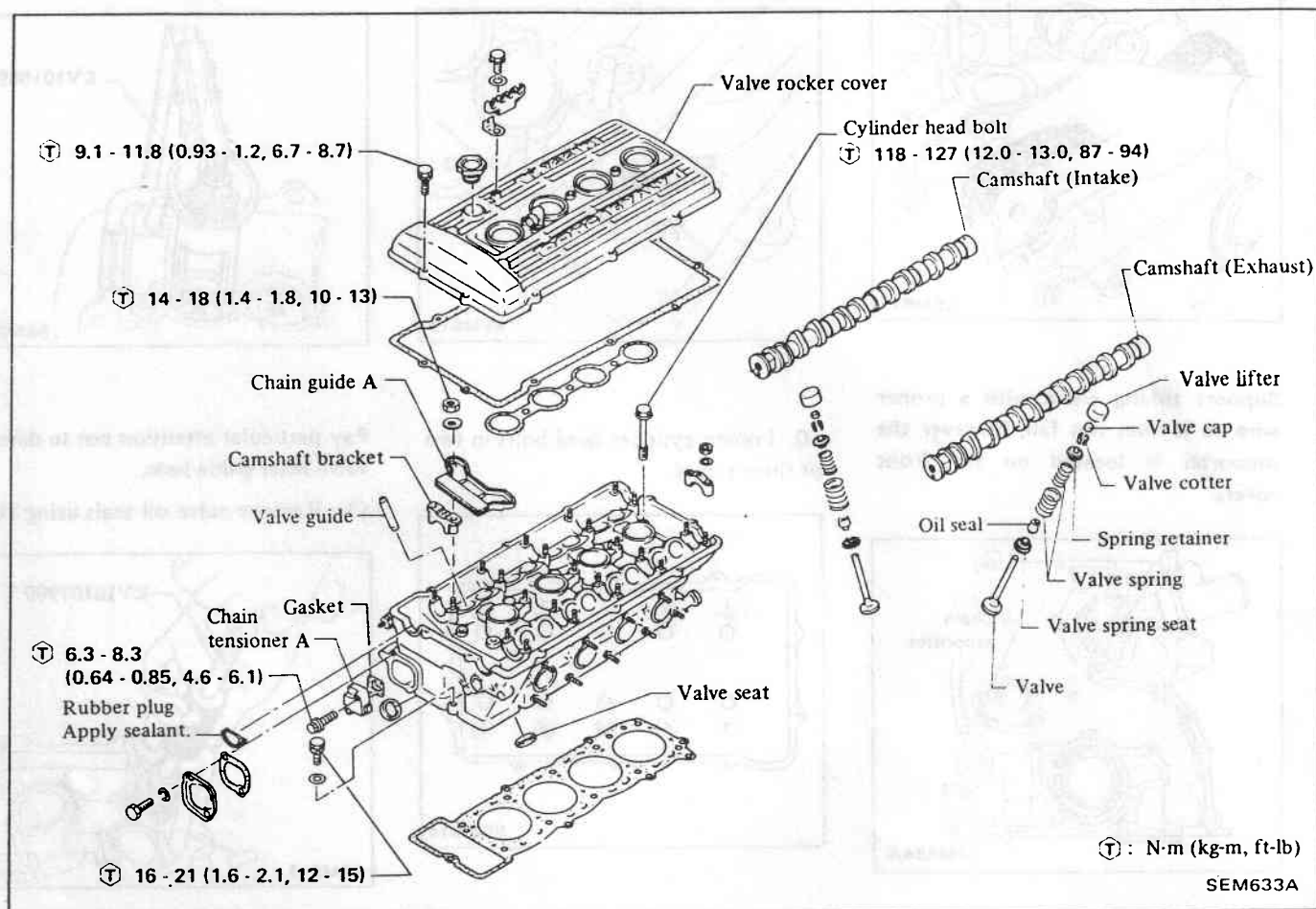
SEM631A



T : N·m (kg-m, ft-lb)

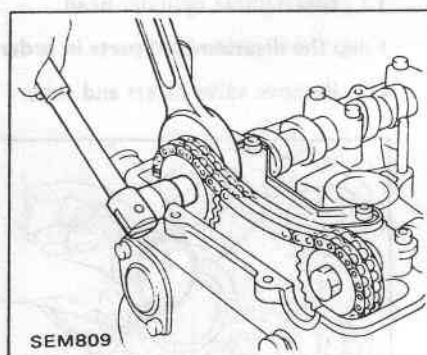
SEM632A

CYLINDER HEAD

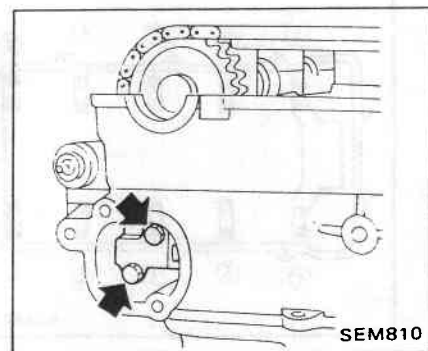
CYLINDER HEAD
DISASSEMBLY

CAUTION:

- Do not rotate crankshaft and camshaft separately, because valves will hit piston heads.
- Always use new cylinder head gasket.



- Remove chain tensioner A cover and chain tensioner A.

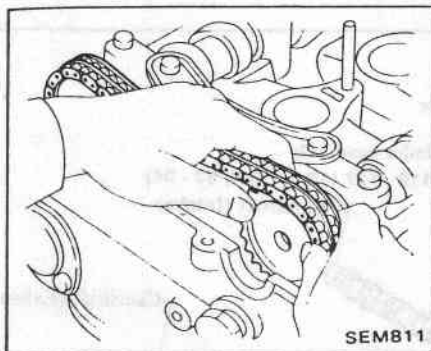


CYLINDER HEAD REMOVAL

- Remove outer parts attached to cylinder head.
- Turn crankshaft until No. 1 piston is at top dead center on its compression stroke.
- Scribe marks on timing chain and camshaft sprockets with paint before removal.
- Loosen camshaft sprocket bolts.

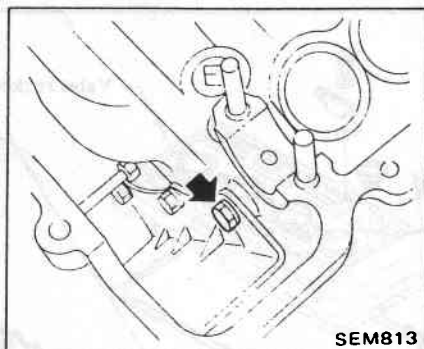
Be careful not to drop chain tensioner sleeve and spring.

6. Remove camshaft sprockets.

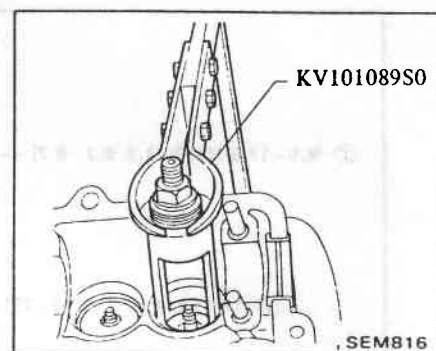


8. Remove camshafts.

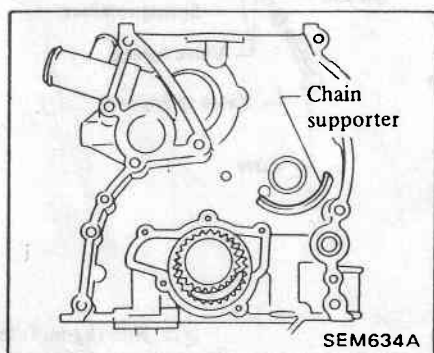
9. Remove chain guide C upper bolt.



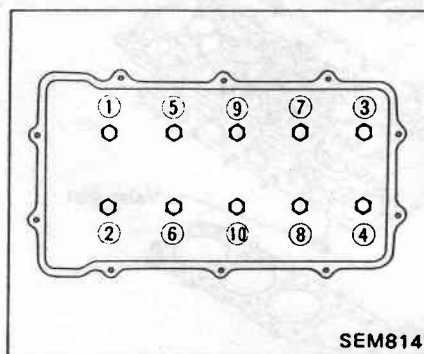
(2) Remove valves and springs using Tool.



Support timing chain with a proper wire so it does not fall, however the supporter is located on the front cover.

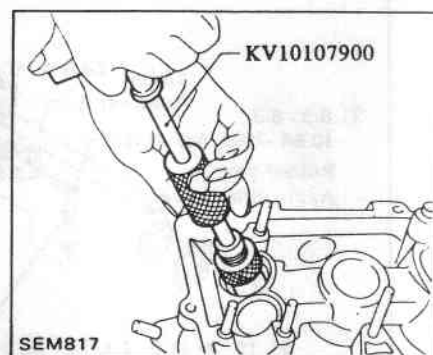


10. Loosen cylinder head bolts in two or three stages.



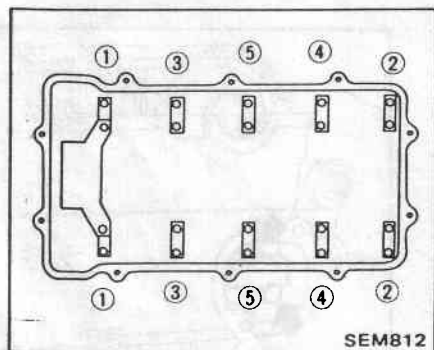
Pay particular attention not to damage valve lifter guide hole.

(3) Remove valve oil seals using Tool.



7. Remove camshaft brackets and chain guide A in the sequence below.

Keep the removed brackets in order.

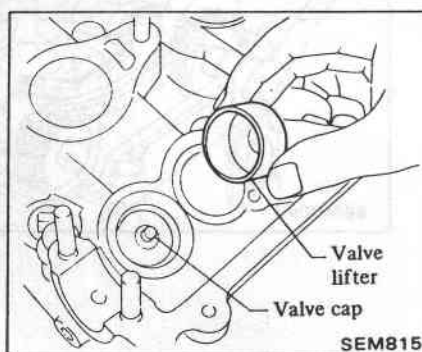


11. Remove cylinder head.

12. Disassemble cylinder head.

Keep the disassembled parts in order.

(1) Remove valve lifters and caps.



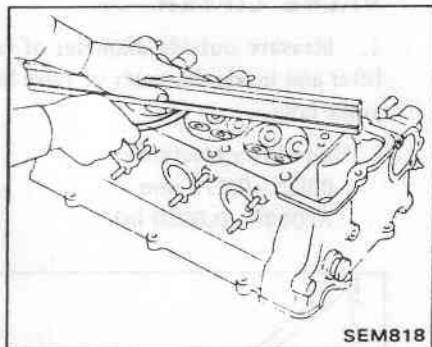
(4) Remove valve spring seats.

Valve lifter can be removed easier by using magnet or suction rubber.

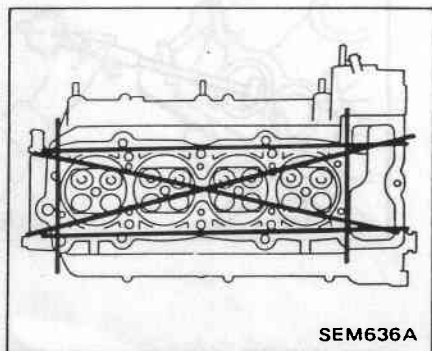
CYLINDER HEAD DISTORTION

Warpage of surface:

Less than 0.1 mm (0.004 in)



SEM818



SEM636A

If beyond the specified limit, correct with a surface grinder.

Surface grinding limit:

The grinding limit of cylinder head is determined by the cylinder block grinding.

Depth of cylinder head grinding is "A"

Depth of cylinder block grinding is "B"

The limit is as follows:

$$A + B = 0.2 \text{ mm (0.008 in)}$$

VALVE GUIDE

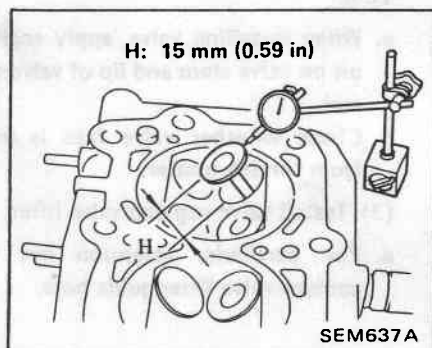
VALVE GUIDE CLEARANCE

1. Check valve deflection.

Valve deflection:

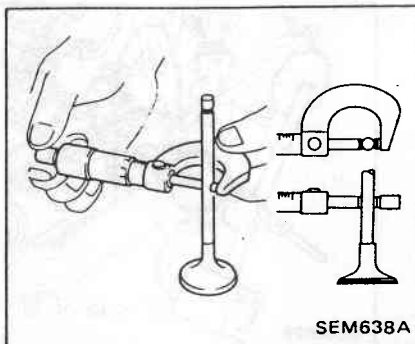
Limit

0.2 mm (0.008 in)



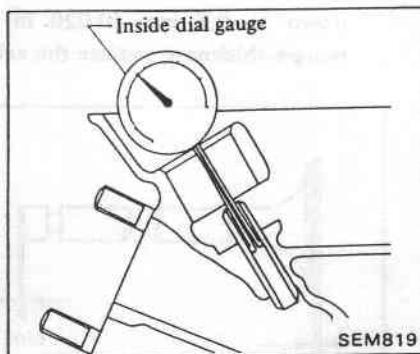
SEM637A

2. Measure the diameter of valve stem with a micrometer in three places; top, center and bottom.



SEM638A

3. Measure valve guide bore using inside dial gauge.



SEM819

4. Subtract the highest reading of valve stem diameter from valve guide bore to obtain the stem to guide clearance.

Stem to guide clearance:

Intake

0.025 - 0.055 mm
(0.0010 - 0.0022 in)

Exhaust

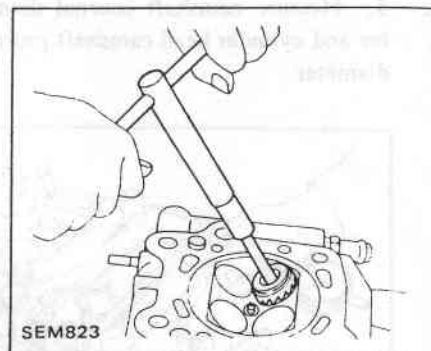
0.040 - 0.077 mm
(0.0016 - 0.0030 in)

VALVE SEAT INSERTS

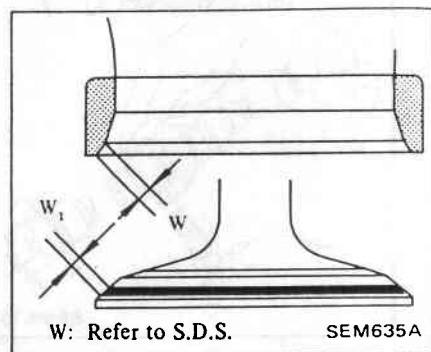
Check valve seat inserts for any evidence of pitting at valve contact surface, and reseal if worn out excessively.

Correct valve seat surface with Tool and grind with a grinding compound.

- When repairing valve seat, check valve and valve guide for wear beforehand. Then correct valve seat.
- The cutting should be done with both hands for uniform cutting.



SEM823



W: Refer to S.D.S.

SEM635A

CAMSHAFT AND CAMSHAFT BEARING

CAMSHAFT BEARING CLEARANCE

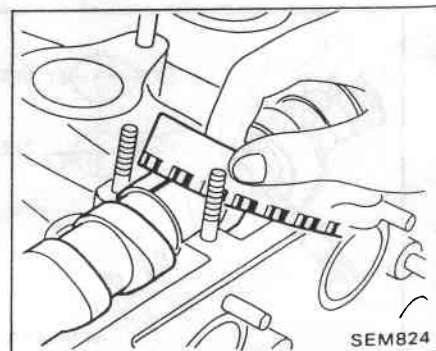
1. Clean camshaft journal and bearing.
2. Place plastigage across journal.
3. Install caps and tighten.

Ⓘ : 14 - 18 N·m
(1.4 - 1.8 kg-m,
10 - 13 ft-lb)

4. Remove caps and measure plastigage.

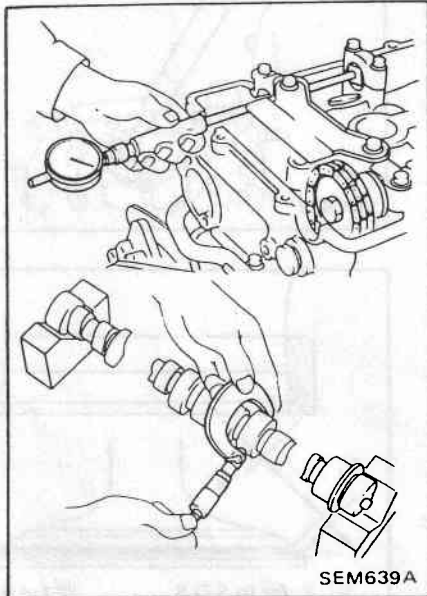
Max. tolerance of camshaft bearing clearance:

0.1 mm (0.004 in)



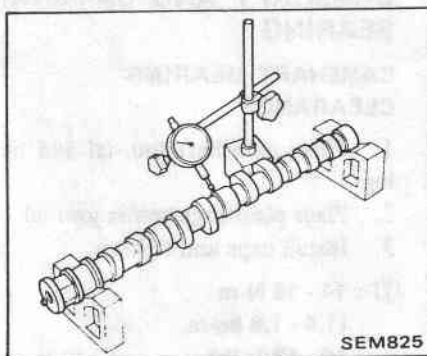
SEM824

5. Measure camshaft journal diameter and cylinder head camshaft journal diameter.



CAMSHAFT BEND

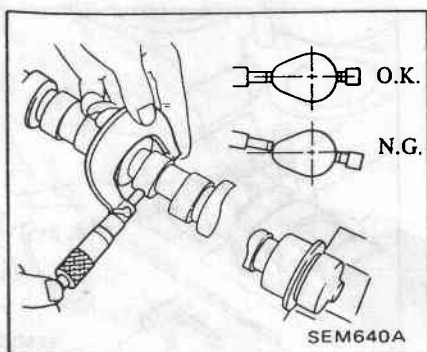
Camshaft bend:
Limit 0.05 mm (0.0020 in)



CAMSHAFT CAM HEIGHT

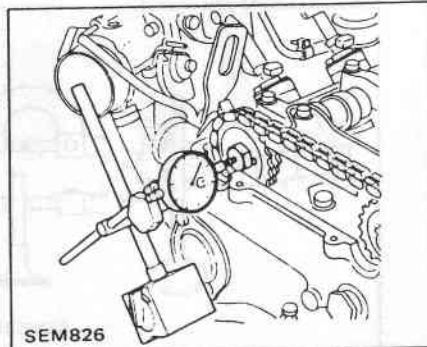
Cam height:
42.835 - 42.865 mm
(1.6864 - 1.6876 in)

Wear limit:
0.1 mm (0.004 in)



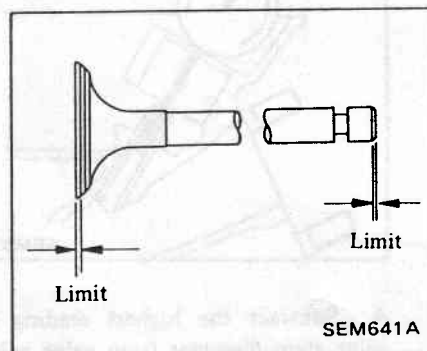
CAMSHAFT END PLAY

End play:
Limit 0.3 mm (0.012 in)



VALVE

- When valve head has been worn down to 0.5 mm (0.020 in) in margin-thickness, replace the valve.



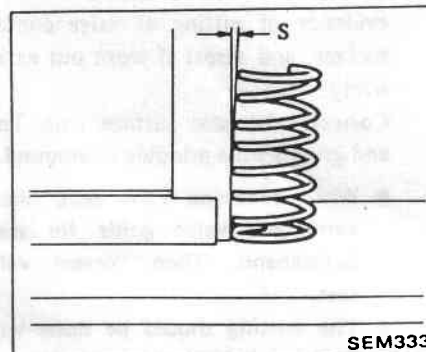
- Stem worn down: Limit 0.2 mm (0.008 in)

VALVE SPRING

- Check valve spring for squareness using a steel square and surface plate.

Out of square ("S"):

Outer
Limit 2.0 mm (0.079 in)
Inner
Limit 1.8 mm (0.071 in)

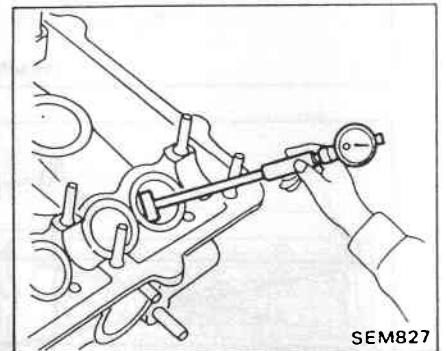


- Measure the free length and the tension of each spring.
Refer to S.D.S.

VALVE LIFTER

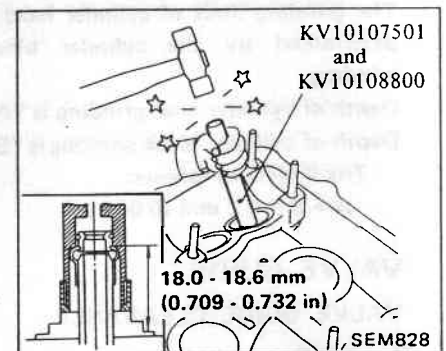
- Measure outside diameter of valve lifter and inside diameter of valve lifter guide hole.

Valve lifter clearance:
0.025 - 0.075 mm
(0.0010 - 0.0030 in)



CYLINDER HEAD ASSEMBLY

- Install valve and valve spring.
(1) Install valve spring seat and valve oil seal using Tool.

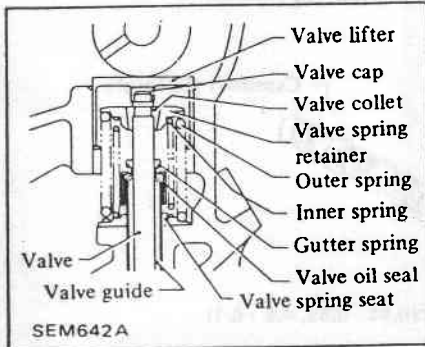


- Install valve, valve spring inner and outer, valve spring retainer, using Tool.

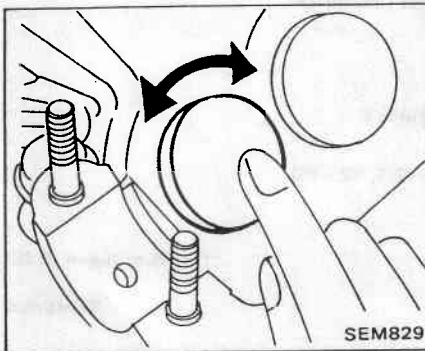
- When installing valve, apply engine oil on valve stem and lip of valve oil seal.
- Check whether valve face is free from foreign matter.
- Install valve cap and valve lifter.
 - Pay particular attention not to damage valve lifter guide hole.

CYLINDER HEAD

- b. Apply engine oil on valve cap and outer wall of valve lifter.



- (4) Check valve lifter for smooth rotation.



2. Install cylinder head onto cylinder block.

Always use new gasket.

3. Tighten cylinder head bolts in the reverse order of removal.

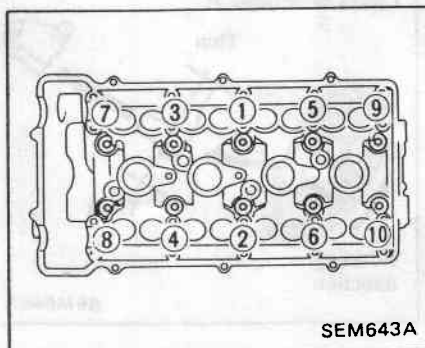
Ⓙ : Cylinder head bolt

1st

49 - 59 N·m
(5.0 - 6.0 kg-m,
36 - 43 ft-lb)

2nd

118 - 127 N·m
(12.0 - 13.0 kg-m,
87 - 94 ft-lb)



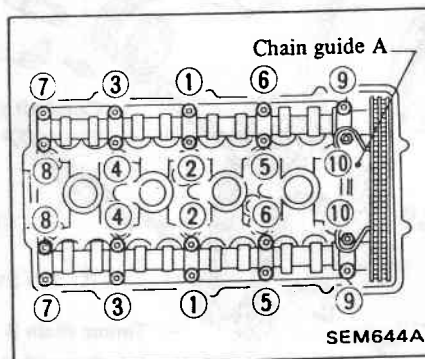
- 3rd (Retighten after loosening to 1st torque)

118 - 127 N·m
(12.0 - 13.0 kg-m,
87 - 94 ft-lb)

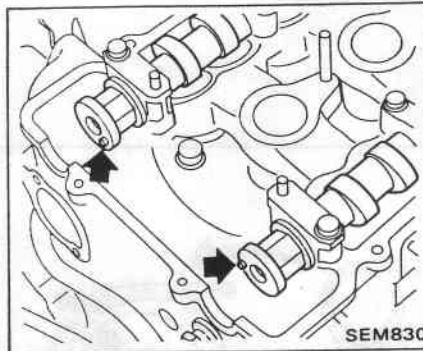
4. Tighten chain guide C upper bolt.
5. Install camshafts and tighten camshaft bracket nuts with chain guide A in the reverse order of removal in two or three stages.

Ⓙ : Camshaft bracket nut

14 - 18 N·m
(1.4 - 1.8 kg-m,
10 - 13 ft-lb)



- a. Install camshafts so that No. 1 cams are at top dead center.



- b. Apply engine oil on cam, camshaft journal, camshaft bearing and valve lifter upper surface.

6. Adjust intake and exhaust valve clearance. Refer to Adjusting Intake And Exhaust Valve Clearance in section MA.

Valve clearance [Cold]:
at 20°C (68°F)

Intake

0.20 - 0.26 mm
(0.0079 - 0.0102 in)

Exhaust

0.28 - 0.34 mm
(0.0110 - 0.0134 in)

Valve clearances should ultimately be adjusted to the hot values.

7. Set timing chain on camshaft sprockets by aligning each mark scribed before removal. Then, install camshaft sprockets to camshafts.

Ⓙ : Camshaft sprocket bolt

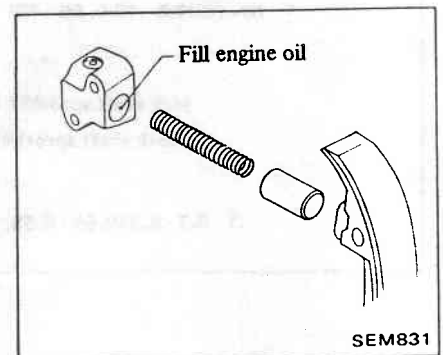
127 - 177 N·m
(13.0 - 18.0 kg-m,
94 - 130 ft-lb)

8. Install chain tensioner A.

Ⓙ : Chain tensioner A bolt

6.3 - 8.3 N·m
(0.64 - 0.85 kg-m,
4.6 - 6.1 ft-lb)

Before installation, fill chain tensioner A with engine oil.



9. Install chain tensioner cover.
10. Install rubber plug with sealant.
11. Install valve rocker cover.

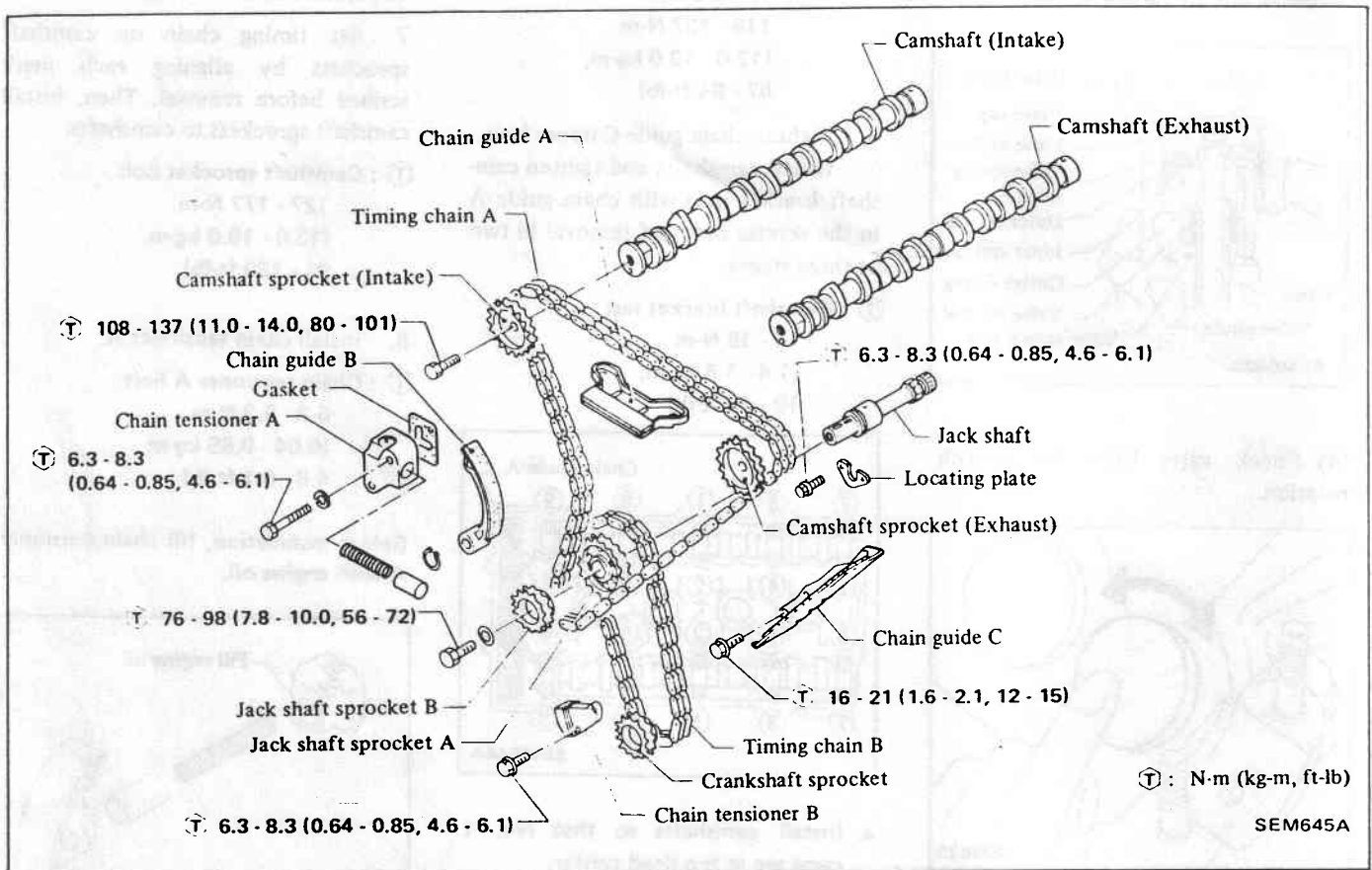
Ⓙ : Valve rocker cover bolt and nut

9.1 - 11.8 N·m
(0.93 - 1.2 kg-m,
6.7 - 8.7 ft-lb)

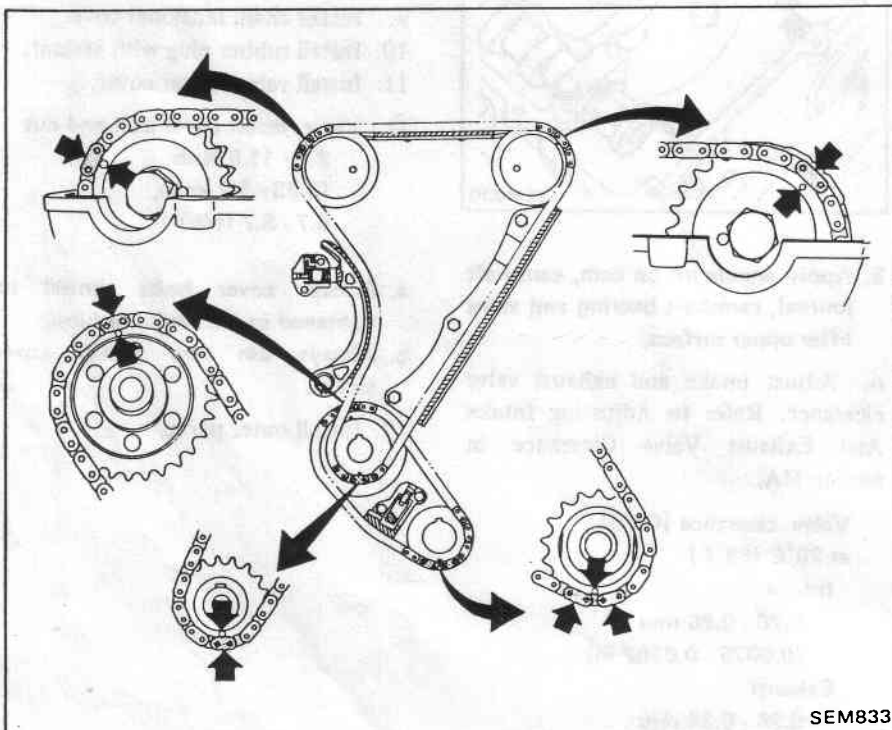
- a. Rocker cover bolts should be tightened in criss-cross fashion.
b. Always use new rocker cover gasket.

12. Install outer parts.

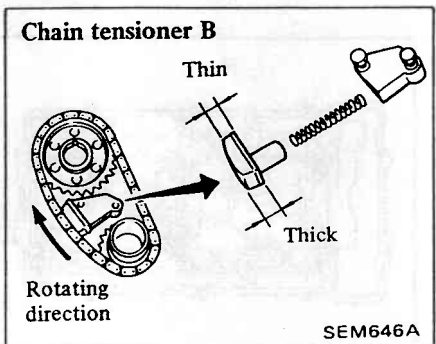
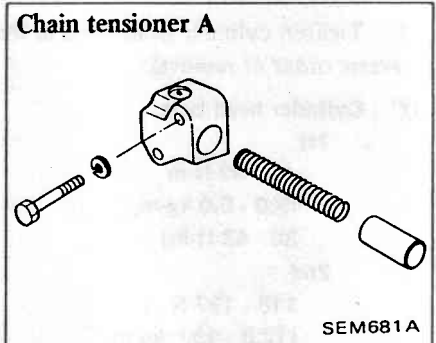
CAMSHAFT AND JACK SHAFT DRIVE



VALVE TIMING

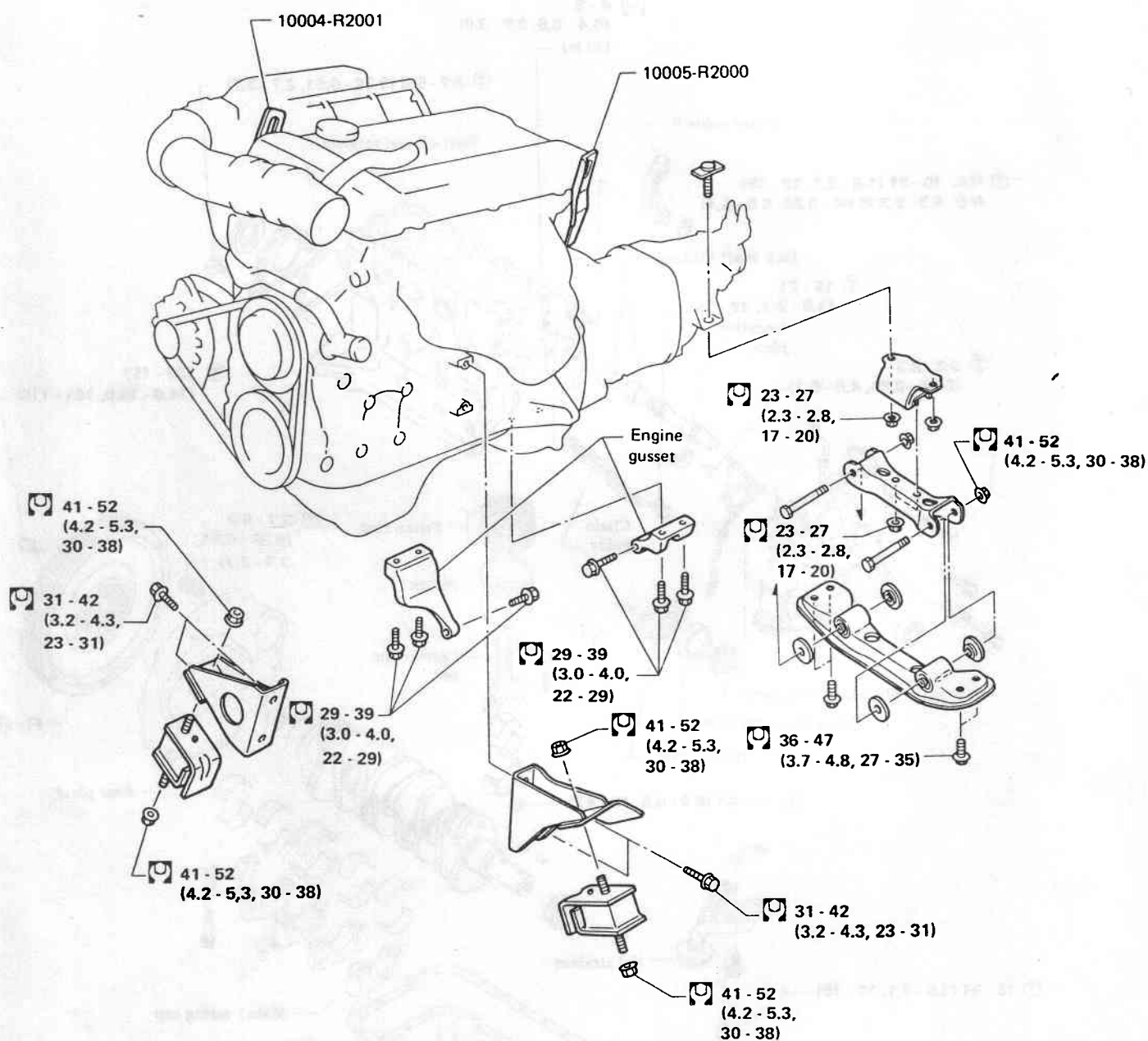


CHAIN TENSIONER



ENGINE REMOVAL

FJ20E

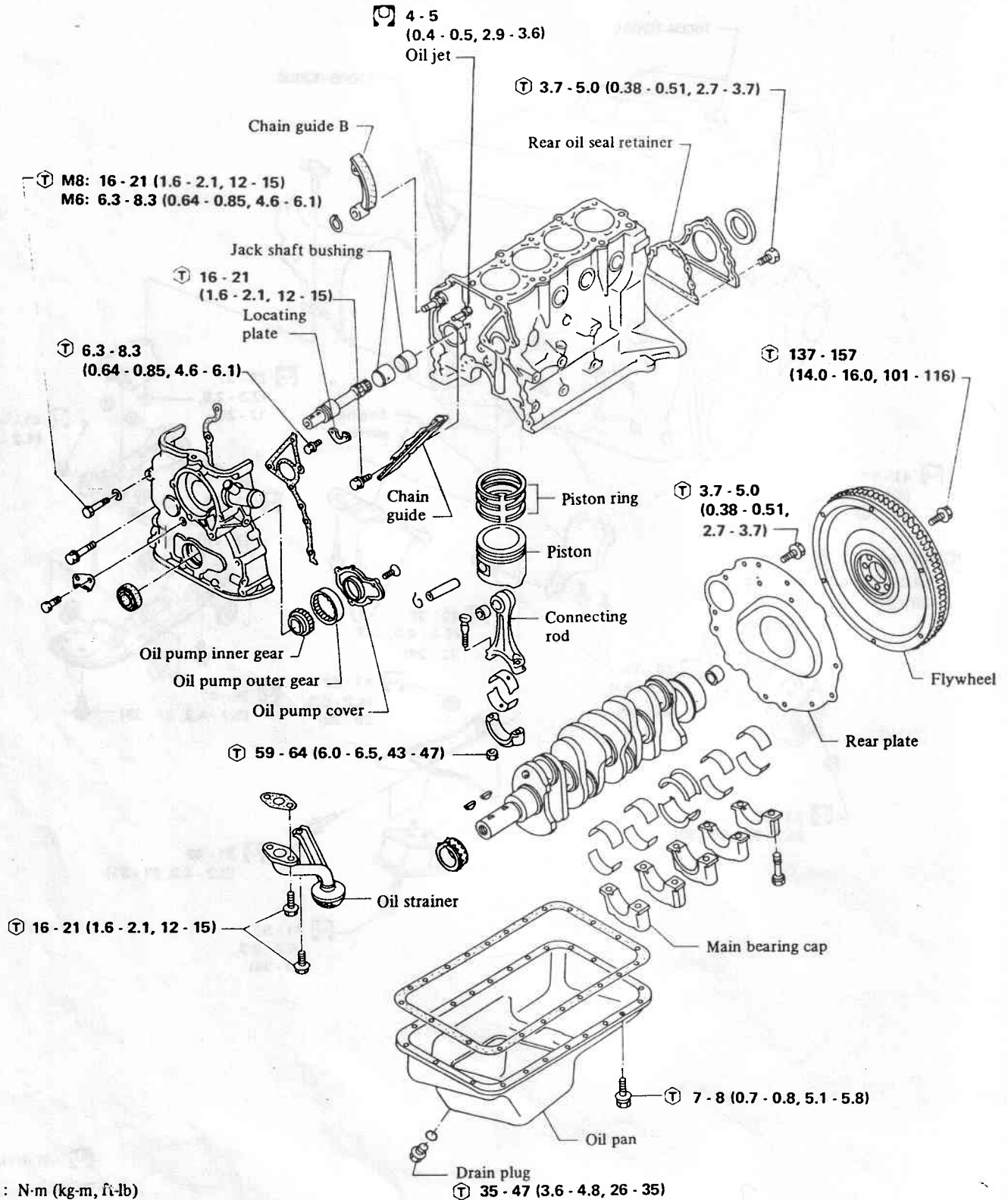


□ : N·m (kg·m, ft·lb)

SER322

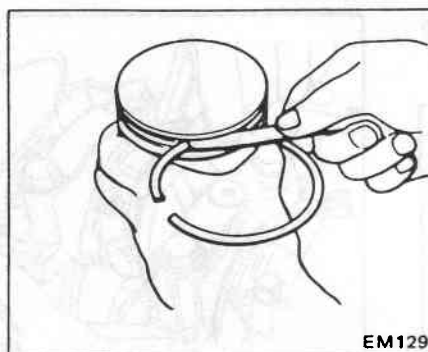
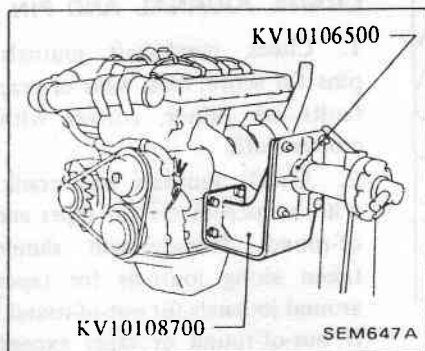
CYLINDER BLOCK, CRANKSHAFT AND PISTON

- When installing sliding parts such as bearings, be sure to apply engine oil
- Use new packings and oil seals.
- Be careful not to damage oil seal.

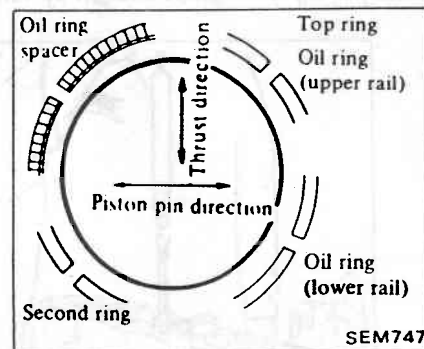


⊕ : N·m (kg-m, ft-lb)

ENGINE ATTACHMENT



- Set piston rings as shown below.

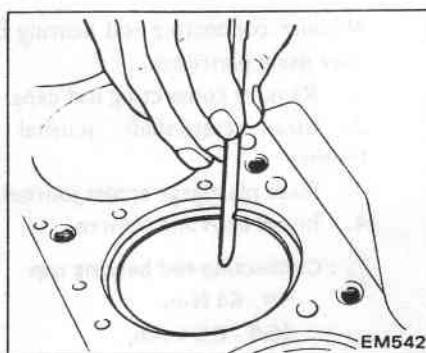


PISTON AND CONNECTING ROD

- Piston can be easily removed by scraping carbon off top face of cylinder with a scraper.
- Numbers are stamped on the connecting rod and cap corresponding to each cylinder. Care should be taken to avoid a wrong combination including bearing.
- Arrange so that the front mark on piston head faces to the front of engine.
- Arrange so that oil hole of connecting rod big end is directed toward the right side of cylinder block.

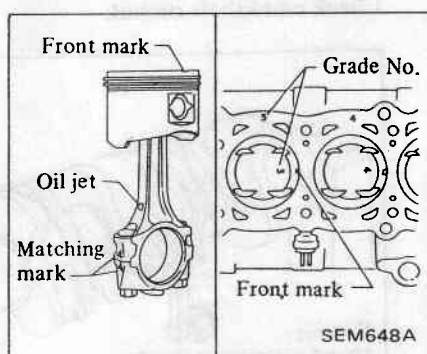
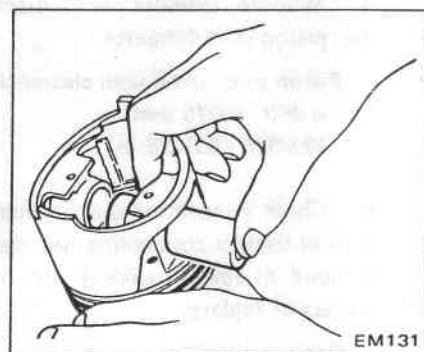
Measure ring gap with a feeler gauge, placing ring squarely in cylinder using piston at upper or lower part of cylinder.

Max. tolerance of ring gap:
1.0 mm (0.039 in)

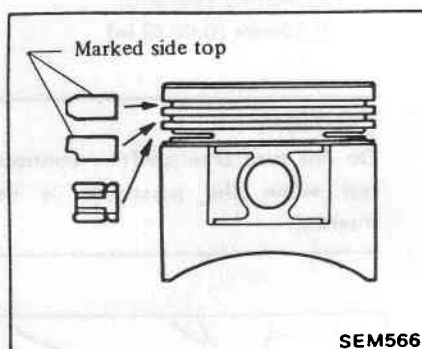


PISTON, PISTON PIN AND CONNECTING ROD

1. Check for smooth movement, pushing piston pin with a finger at room temperature.



Install piston rings so that stamped mark on ring faces upward.



PISTON RING

Measure the side clearance of rings in ring grooves as each ring is installed.

Max. tolerance of side clearance:
0.1 mm (0.004 in)

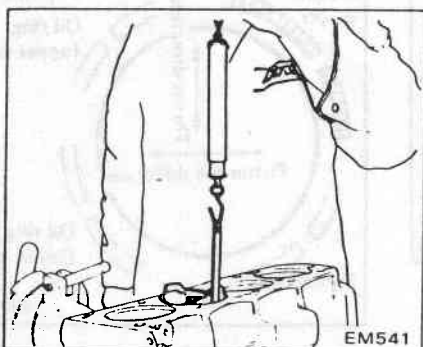
2. Measure inside diameter of connecting rod small end bearing and outer diameter of piston pin.

Connecting rod small end bearing clearance:
0.004 - 0.017 mm
(0.0002 - 0.0007 in) at
20°C (68°F)

3. Measure inner diameter of piston pin hole and outer diameter of piston pin.

Piston pin to piston pin hole clearance:
-0.005 - 0.004 mm
(-0.0002 - 0.0002 in) at
20°C (68°F)

4. Measure the extracting force by pulling feeler gauge straight upward.



Feeler gauge thickness:

0.04 mm (0.0016 in)

Extracting force:

2.0 - 14.7 N

(0.2 - 1.5 kg, 0.4 - 3.3 lb)

5. Measure cylinder bore diameter and piston skirt diameter.

Piston to cylinder wall clearance:

0.050 - 0.070 mm

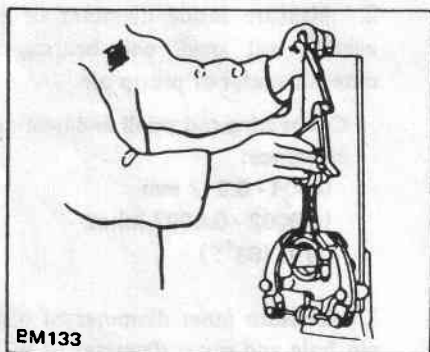
(0.0020 - 0.0028 in)

6. Check connecting rod for bend or torsion using a connecting rod aligner. If bend or torsion exceeds the limit, correct or replace.

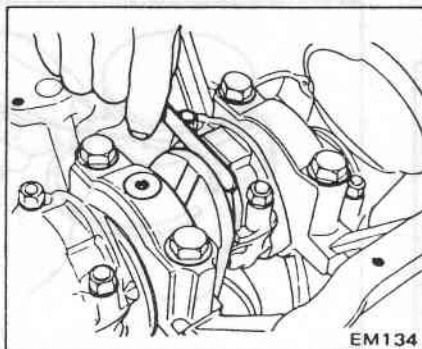
Bend and torsion

[per 100 mm (3.94 in) length]:

Less than 0.05 mm (0.0020 in)



7. Measure the thrust clearance. If the measured value exceeds the limit, replace such connecting rod.



CAUTION:

Connecting rod with same weight tolerance is available only as a set of four.

CONNECTING ROD BEARING

Measure connecting rod bearing clearance using plastigage.

1. Remove connecting rod caps.
2. Clean crankshaft journal and bearing.
3. Place plastigage across journal.
4. Install caps and tighten.

Ⓣ : Connecting rod bearing cap

59 - 64 N·m

(6.0 - 6.5 kg-m,

43 - 47 ft-lb)

5. Remove cap and measure plastigage.

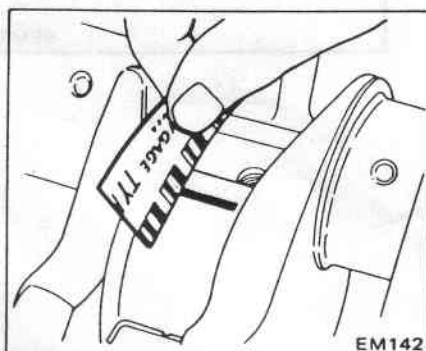
Max. tolerance of connecting

rod bearing clearance:

0.10 mm (0.0039 in)

CAUTION:

Do not turn crankshaft or connecting rod while the plastigage is being inserted.



CRANKSHAFT

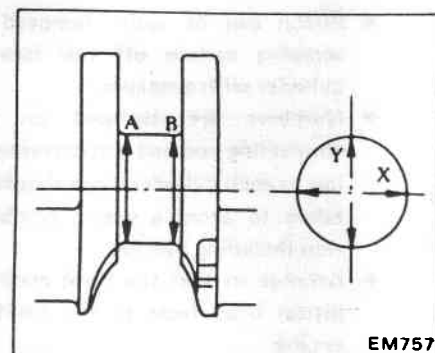
CRANK JOURNAL AND PIN

1. Check crankshaft journals and pins for score, bias, wear or cracks. If faults are minor, correct with fine crocus cloth.
2. Check journals and crank pins with a micrometer for taper and out-of-round. Measurement should be taken along journals for taper and around journals for out-of-round. If out-of-round or taper exceeds the specified limit, replace or repair.

Out-of-round (X-Y) and

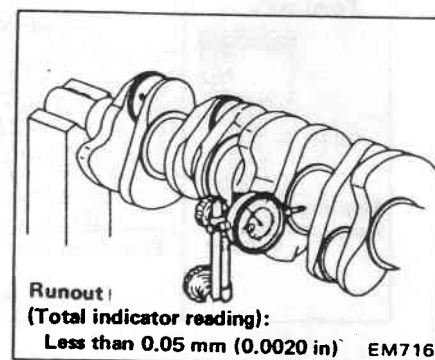
Taper (A-B):

Less than 0.01 mm (0.0004 in)



CRANKSHAFT RUNOUT

Check crankshaft runout.



Runout:

(Total indicator reading):

Less than 0.05 mm (0.0020 in)

MAIN BEARING

Measure main bearing clearance using plastigage.

Ⓣ : Main bearing cap

83 - 98 N·m

(8.5 - 10.0 kg-m,

61 - 72 ft-lb)

Max. tolerance of main bearing clearance:

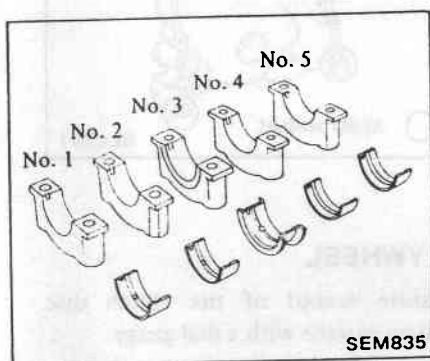
0.10 mm (0.0039 in)

CYLINDER BLOCK, CRANKSHAFT AND PISTON

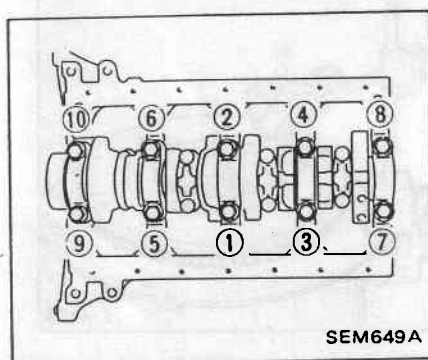
CRANKSHAFT INSTALLATION

1. Set upper main bearings in the proper position on cylinder block.

- Only center bearing (No. 3) is a flange type.
- Front bearing (No. 1) is also the same type as rear bearing (No. 5).
- Other inter bearings, except center bearing, are the same type.



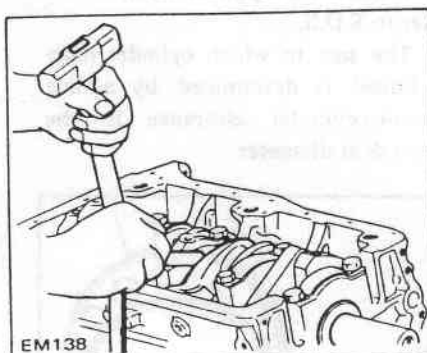
2. Install main bearing cap and tighten bolts to specified torque.



- Arrange the parts so that the figure on bearing cap faces toward the water pump.
- Prior to tightening bearing cap bolts, place bearing cap in proper position by shifting crankshaft in the axial direction.
- Tighten bearing cap bolts gradually in separating two to three stages and in sequence outwardly from center bearing.
- After securing bearing cap bolts, ascertain that crankshaft turns smoothly by hand.

3. Measure crankshaft free end play at the center bearing:

Crankshaft free end play limit:
0.30 mm (0.0118 in)

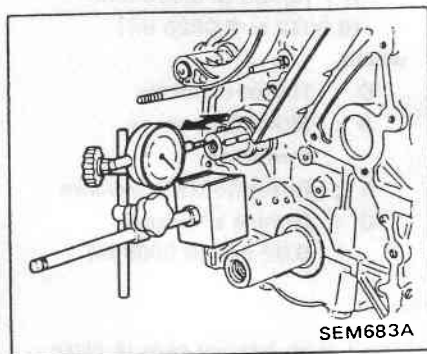


JACK SHAFT AND JACK SHAFT BUSHING

JACK SHAFT FREE END PLAY

Measure jack shaft free end play.

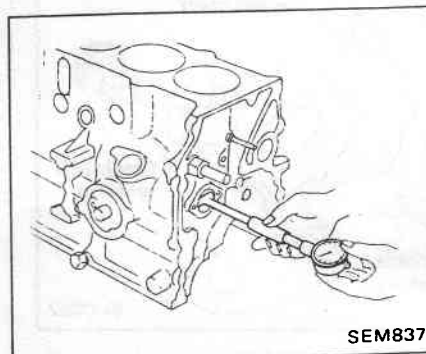
Free end play:
0.045 - 0.105 mm
(0.0018 - 0.0041 in)



JACK SHAFT BUSHING CLEARANCE

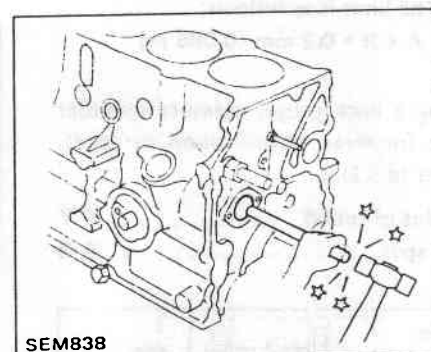
Journal diameters should be checked with a micrometer, and bushings with an inside dial gauge. Measurements should then be compared to determine whether bushings are worn.

Max. tolerance of jack shaft
bushing clearance:
0.15 mm (0.0059 in)



REPLACING JACK SHAFT BUSHING

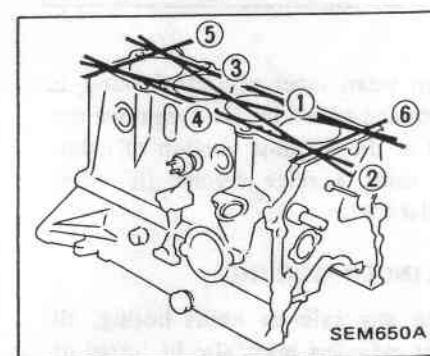
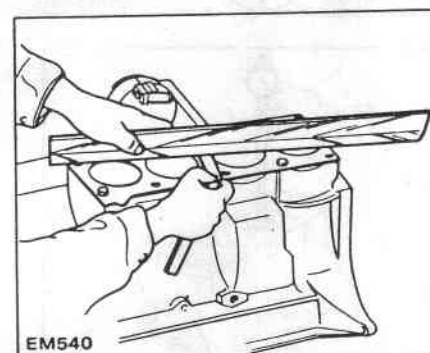
- Align cylinder block oil hole and bushing oil hole.
- Check bushing clearance.
- Install welch plug into cylinder block, applying sealant.



CYLINDER BLOCK

CYLINDER BLOCK DISTORTION AND WEAR

Warpage of surface:
Less than 0.1 mm (0.004 in)



If beyond the specified limit, correct with surface grinder.

Surface grinding limit:

The grinding limit of cylinder block is determined by the cylinder head grinding.

Depth of cylinder head grinding is A

Depth of cylinder block grinding is B

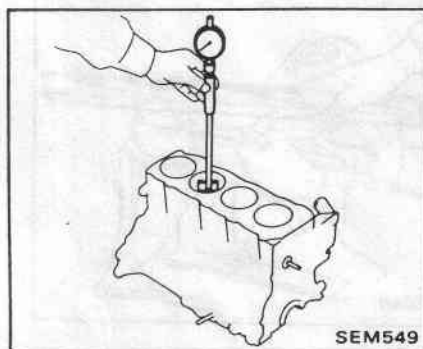
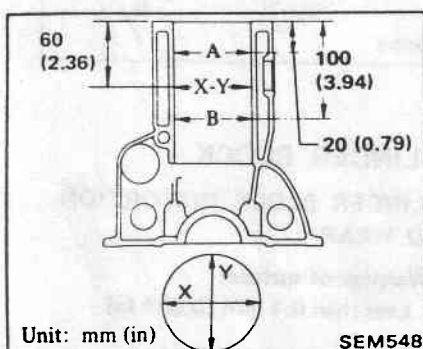
The limit is as follows:

$$A + B = 0.2 \text{ mm (0.008 in)}$$

Using a bore gauge, measure cylinder bore for wear, out-of-round or taper. Refer to S.D.S.

Out-of-round X-Y

Taper A-B



When wear, taper or out-of-round is minor and within the limit, remove the step at the topmost portion of cylinder using a ridge reamer or other similar tool.

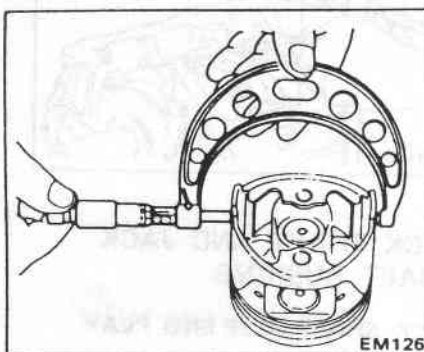
CYLINDER BORING

When any cylinder needs boring, all other cylinders must also be bored at the same time.

Determining bore size

1. Determine piston oversize according to amount of cylinder wear. Refer to S.D.S.

2. The size to which cylinder must be honed is determined by adding piston-to-cylinder clearance to the piston skirt diameter.



Rebored size calculation:

$$\begin{aligned} D &= A + B - C \\ &= A + [0.030 \text{ to } 0.050 \text{ mm} \\ &\quad (0.0012 \text{ to } 0.0020 \text{ in})] \end{aligned}$$

where,

D : Honed diameter

A : Skirt diameter as measured

B : Piston-to-wall clearance

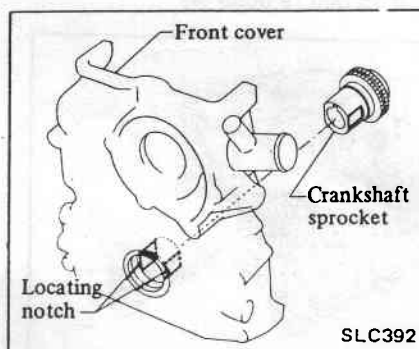
C : Honing allowance
0.02 mm (0.0008 in)

Boring

1. Install main bearing caps in place, and tighten to the specified torque to prevent distortion of the cylinder bores in final assembly.
- 2.hone the cylinders to the required size referring to S.D.S.

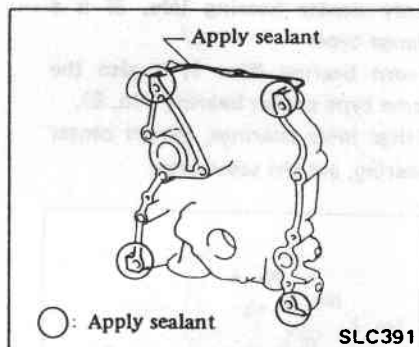
FRONT COVER

Before installing front cover, align locating notches.



APPLYING SEALANT

Use sealant to eliminate water and oil leaks. Do not apply too much sealant. Part requiring sealant is:



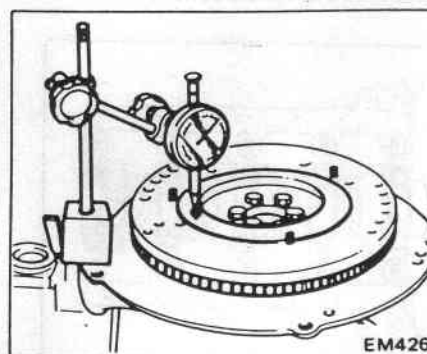
FLYWHEEL

Measure runout of the clutch disc contact surface with a dial gauge.

Runout

(Total indicator reading):

Less than 0.1 mm (0.004 in)



Check tooth surfaces of ring gear for flaws or wear.

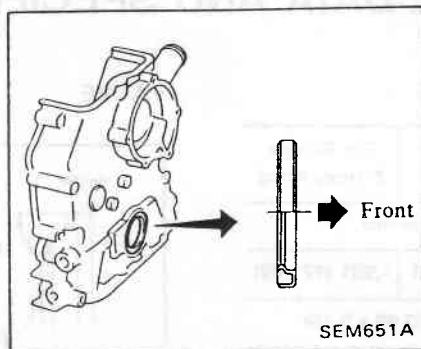
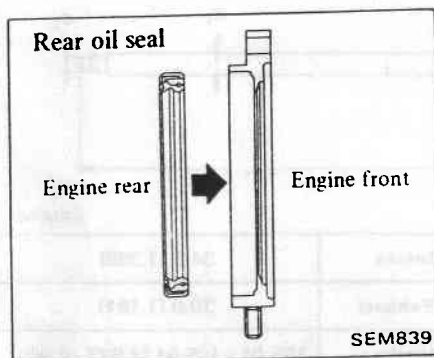
Install ring gear on flywheel, heating ring gear to about 180 to 220°C (356 to 428°F).

CYLINDER BLOCK, CRANKSHAFT AND PISTON

OIL SEAL

- It is good practice to renew oil seal whenever engine is overhauled.

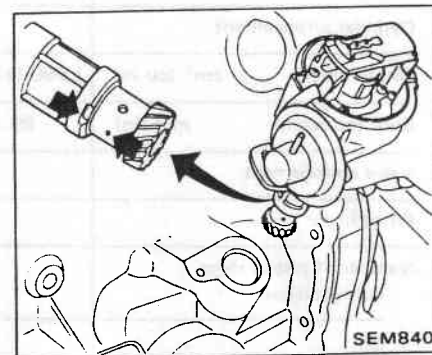
Check front, and rear oil seals for worn or folded over sealing lip and oil leakage. When installing a new front or rear seal, pay attention to its mounting direction.



- When installing oil seal retainer, give coating of engine oil to mating shaft to prevent scratches and folded lip. Also apply coating of oil to periphery of oil seal.
- Install oil seal in the direction that dust seal lip faces to the outside of crankcase.

DISTRIBUTOR

- Make sure No. 1 piston is at top dead center.
- Align distributor gear with the mark on the shaft.



- Install distributor and tighten fixing plate bolt.

SERVICE DATA AND SPECIFICATIONS

GENERAL SPECIFICATIONS

Destination	Except for Europe & Hong Kong	For Europe & Hong Kong
Cylinder arrangement	4, in-line	
Displacement cm ³ (cu in)	1,990 (121.43)	1,991 (121.49)
Bore and stroke mm (in)	89 x 80 (3.50 x 3.15)	
Valve arrangement	D.O.H.C.	
Firing order	1-3-4-2	
Number of piston rings	2	
Oil	1	
Number of main bearings	5	
Compression ratio	9.1	9.5

INSPECTION AND ADJUSTMENT

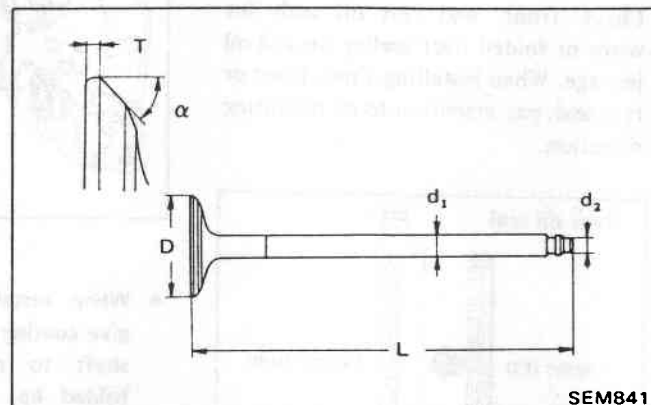
CYLINDER HEAD

Unit: mm (in)

	Standard	Limit
Head surface flatness	Less than 0.05 (0.0020)	0.1 (0.004)

VALVE

Unit: mm (in)



SEM841

Valve head diameter "D"	Intake	34.5 (1.358)
	Exhaust	30.0 (1.181)
Valve length "L"	Intake	125.01 - 125.51 (4.922 - 4.941)
	Exhaust	124.96 - 125.46 (4.920 - 4.939)
Valve stem diameter "d ₁ "	Intake	6.960 - 6.975 (0.2740 - 0.2746)
	Exhaust	6.938 - 6.960 (0.2731 - 0.2740)
Valve stem end diameter "d ₂ "	Intake & Exhaust	5.572 - 5.590 (0.2194 - 0.2201)
Valve seat angle "α"	45° 15' - 45° 45'	
Valve clearance (Hot)	Intake	0.30 (0.012)
	Exhaust	0.35 (0.014)
Valve clearance (Cold)*	Intake	0.20 - 0.26 (0.008 - 0.010)
	Exhaust	0.28 - 0.34 (0.011 - 0.013)

*Cold: Used as approximate values during engine assembly, clearances should ultimately be adjusted to the above hot values; refer to section MA for procedure.

Valve lifter

Unit: mm (in)

	Standard	Limit
Valve lifter outer diameter	33.950 - 33.975 (1.3366 - 1.3376)	—
Cylinder head valve lifter guide hole inner diameter	34.000 - 34.025 (1.3386 - 1.3396)	—
Valve lifter guide hole clearance [Oil clearance]	0.025 - 0.075 (0.0010 - 0.0030)	—

SERVICE DATA AND SPECIFICATIONS

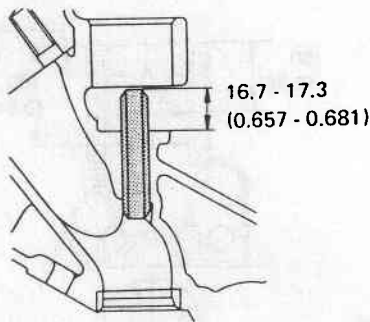
FJ20E

Valve spring

	Standard
Free length mm (in)	
Outer	45.07 (1.7744)
Inner	41.66 (1.6402)
Pressure height mm/N (mm/kg, in/lb)	
Outer	28.7/324.6 (28.7/33.1, 1.130/73.0)
Inner	25.2/172.6 (25.2/17.6, 0.992/38.8)
Assembly height mm/N (mm/kg, in/lb)	
Outer	37.2/155.9 (37.2/15.9, 1.465/35.1)
Inner	33.7/83.65 (33.7/8.53, 1.327/18.81)
Out of square mm (in)	
Outer	2.0 (0.079)
Inner	1.8 (0.071)

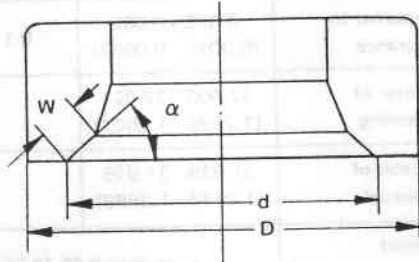
Valve guide

Unit: mm (in)

 SEM843	
Valve guide Outer diameter	12.033 - 12.044 (0.4737 - 0.4742)
Valve guide Inner diameter (Finished size)	7.000 - 7.015 (0.2756 - 0.2762)
Cylinder head valve guide hole diameter	11.970 - 11.988 (0.4713 - 0.4720)
Interference fit of valve guide	0.045 - 0.074 (0.0018 - 0.0029)
Stem to guide clearance	Intake 0.025 - 0.055 (0.0010 - 0.0022)
	Exhaust 0.040 - 0.077 (0.0016 - 0.0030)

Valve seat

Unit: mm (in)

 SEM845	
Contacting face angle "α"	45°
Contacting width "W"	Intake 1.63 (0.0642)
	Exhaust 1.55 (0.0610)
Finished diameter "d"	Intake 33.9 - 34.1 (1.335 - 1.343)
	Exhaust 29.4 - 29.6 (1.157 - 1.165)
Outer diameter "D"	Intake 36.780 - 36.796 (1.4480 - 1.4487)
	Exhaust 33.080 - 33.096 (1.3024 - 1.3030)
Cylinder head seat recess diameter	Intake 36.700 - 36.716 (1.4449 - 1.4455)
	Exhaust 33.000 - 33.016 (1.2992 - 1.2998)
Interference fit of seat insert	0.064 - 0.096 (0.0025 - 0.0038)

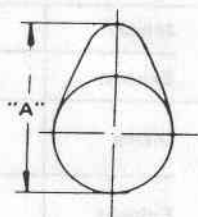
SERVICE DATA AND SPECIFICATIONS

FJ20E

CAMSHAFT AND CAMSHAFT BEARING

Unit: mm (in)

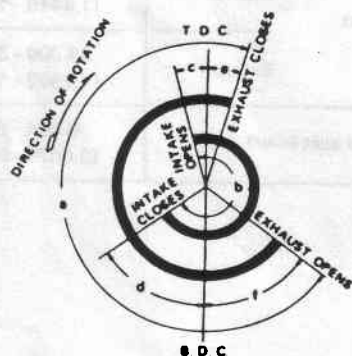
	Standard	Max. tolerance
Camshaft journal to bearing clearance	0.025 - 0.085 (0.0010 - 0.0033)	0.1 (0.004)
Inner diameter of camshaft bearing	32.000 - 32.021 (1.2598 - 1.2607)	—
Outer diameter of camshaft journal	31.936 - 31.975 (1.2573 - 1.2589)	—
Camshaft bend [Total indicator reading]	Less than 0.05 (0.0020)	
Camshaft end play	Less than 0.3 (0.012)	



EM671

Cam height "A"	42.835 - 42.865 (1.6864 - 1.6876)
Wear limit of cam height	0.1 (0.004)

Valve timing



EM120

Unit: degree

a	b	c	d	e	f
256°	256°	23°	53°	11°	65°

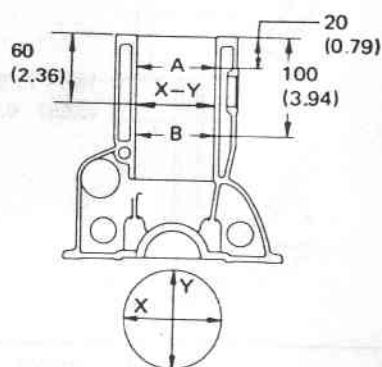
JACK SHAFT AND JACK SHAFT BUSHING

Unit: mm (in)

		Standard	Max. tolerance
Jack shaft journal to bushing clearance	Front	0.025 - 0.089 (0.0010 - 0.0035)	0.15 (0.0059)
	Rear	0.020 - 0.074 (0.0008 - 0.0029)	0.15 (0.0059)
Inner diameter of jack shaft bushing	Front	34.025 - 34.064 (1.3396 - 1.3411)	—
	Rear	29.020 - 29.053 (1.1425 - 1.1438)	—
Outer diameter of jack shaft journal	Front	33.975 - 34.000 (1.3376 - 1.3386)	—
	Rear	28.979 - 29.000 (1.1409 - 1.1417)	—
Jack shaft end play	0.045 - 0.105 (0.0018 - 0.0041)		

CYLINDER BLOCK

Unit: mm (in)



SEM548

	Standard	Limit
Surface flatness	Less than 0.05 (0.0020)	0.1 (0.0039)
Cylinder bore		
Inner diameter	89.000 - 89.050 (3.5039 - 3.5059)	—
Out-of-round (X-Y)	Less than 0.015 (0.0006)	
Taper (A-B)	Less than 0.015 (0.0006)	
Difference in inner diameter between cylinders	0.05 (0.0020)	

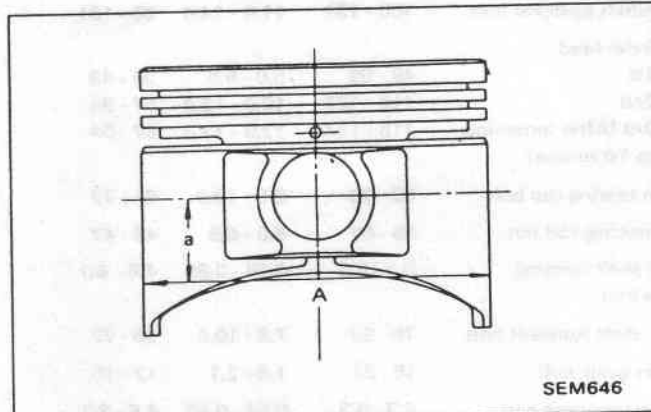
SERVICE DATA AND SPECIFICATIONS

FJ20E

PISTON, PISTON RING AND PISTON PIN

Piston

Unit: mm (in)



Piston skirt diameter "A"	
Standard	88.940 - 88.990 (3.5016 - 3.5035)
Oversize for service [0.5 (0.020)]	89.440 - 89.490 (3.5213 - 3.5232)
"a" dimension	11.0 (0.433)
Piston pin hole diameter	21.991 - 22.000 (0.8658 - 0.8661)
Piston clearance to cylinder block	0.050 - 0.070 (0.0020 - 0.0028)

Piston ring

Unit: mm (in)

	Standard	Limit
Side clearance		
Top	0.03 - 0.07 (0.0012 - 0.0028)	0.1 (0.004)
2nd	0.03 - 0.07 (0.0012 - 0.0028)	0.1 (0.004)
Oil	—	—
Ring gap		
Top	0.3 - 0.4 (0.012 - 0.016)	1.0 (0.039)
2nd	0.3 - 0.5 (0.012 - 0.020)	1.0 (0.039)
Oil (rail ring)	0.2 - 0.6 (0.008 - 0.024)	1.0 (0.039)

Piston pin

Unit: mm (in)

Piston pin outer diameter	21.991 - 22.000 (0.8658 - 0.8661)
Piston pin to piston clearance	−0.005 - 0.004 (−0.0002 - 0.0002) at 20°C [68°F]
Piston pin to connecting rod clearance	0.004 - 0.017 (0.0002 - 0.0007) at 20°C [68°F]

Connecting rod

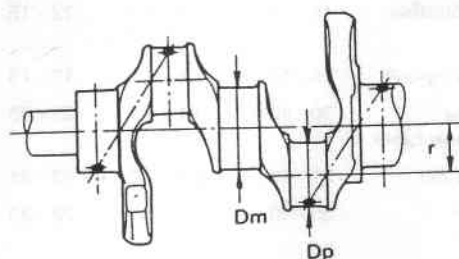
Unit: mm (in)

Center distance	140.0 (5.51)
Bend, torsion [per 100 (3.94)]	
Standard	0.025 (0.0010)
Limit	0.05 (0.0020)
Piston pin bushing diameter	22.000 - 22.013 (0.8661 - 0.8667)
Big end play	
Standard	0.05 - 0.18 (0.0020 - 0.0071)
Limit	0.3 (0.012)

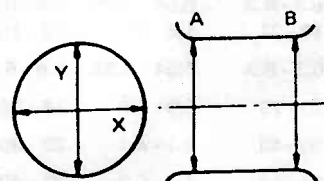
CRANKSHAFT

Unit: mm (in)

Main journal dia. "Dm"	54.942 - 54.955 (2.1631 - 2.1636)
Pin journal dia. "Dp"	49.961 - 49.974 (1.9670 - 1.9675)
Center distance "r"	40 (1.57)
Out-of-round (X-Y) and taper (A-B)	
Limit	Less than 0.01 (0.0004)
Bend (total indicator reading)	
Limit	Less than 0.05 (0.0020)
Free end play	
Standard	0.05 - 0.18 (0.0020 - 0.0071)
Limit	Less than 0.3 (0.012)



Out-of-round X-Y
Taper A-B



SERVICE DATA AND SPECIFICATIONS

FJ20E

BEARING

Bearing clearance

Unit: mm (in)

	Standard	Limit
Main bearing clearance	0.035 - 0.075 (0.0014 - 0.0030)	0.1 (0.004)
Connecting rod bearing clearance	0.035 - 0.075 (0.0014 - 0.0030)	0.1 (0.004)

Main bearing undersize

Unit: mm (in)

	Crank main journal diameter "Dm"
Standard	54.942 - 54.955 (2.1631 - 2.1636)
Undersize 0.25 (0.0098)	54.692 - 54.705 (2.1532 - 2.1537)

MISCELLANEOUS COMPONENTS

Unit: mm (in)

Camshaft pulley Runout [Total indicator reading]	0.08 (0.0031)
Flywheel Runout [Total indicator reading]	0.1 (0.004)

Engine internal parts

Unit	N-m	kg-m	ft-lb
Camshaft bracket nut	14 - 18	1.4 - 1.8	10 - 13
Camshaft sprocket bolt	108 - 137	11.0 - 14.0	80 - 101
Cylinder head			
1st	49 - 59	5.0 - 6.0	36 - 43
2nd	118 - 127	12.0 - 13.0	87 - 94
3rd (After loosening to 1st torque)	118 - 127	12.0 - 13.0	87 - 94
Main bearing cap bolt	83 - 98	8.5 - 10.0	61 - 72
Connecting rod nut	59 - 64	6.0 - 6.5	43 - 47
Jack shaft locating plate bolt	6.3 - 8.3	0.64 - 0.85	4.6 - 6.1
Jack shaft sprocket bolt	76 - 98	7.8 - 10.0	56 - 72
Chain guide bolt	16 - 21	1.6 - 2.1	12 - 15
Chain tensioner bolt	6.3 - 8.3	0.64 - 0.85	4.6 - 6.1
Front cover bolt			
M6	6.3 - 8.3	0.64 - 0.85	4.6 - 6.1
M8	16 - 21	1.6 - 2.1	12 - 15
Rear oil seal retainer bolt	3.7 - 5.0	0.38 - 0.51	2.7 - 3.7
Oil strainer bolt	16 - 21	1.6 - 2.1	12 - 15
Oil pan bolt	7 - 8	0.7 - 0.8	5.1 - 5.8
Oil pan drain plug	35 - 47	3.6 - 4.8	26 - 35
Flywheel bolt	137 - 157	14.0 - 16.0	101 - 116

TIGHTENING TORQUE

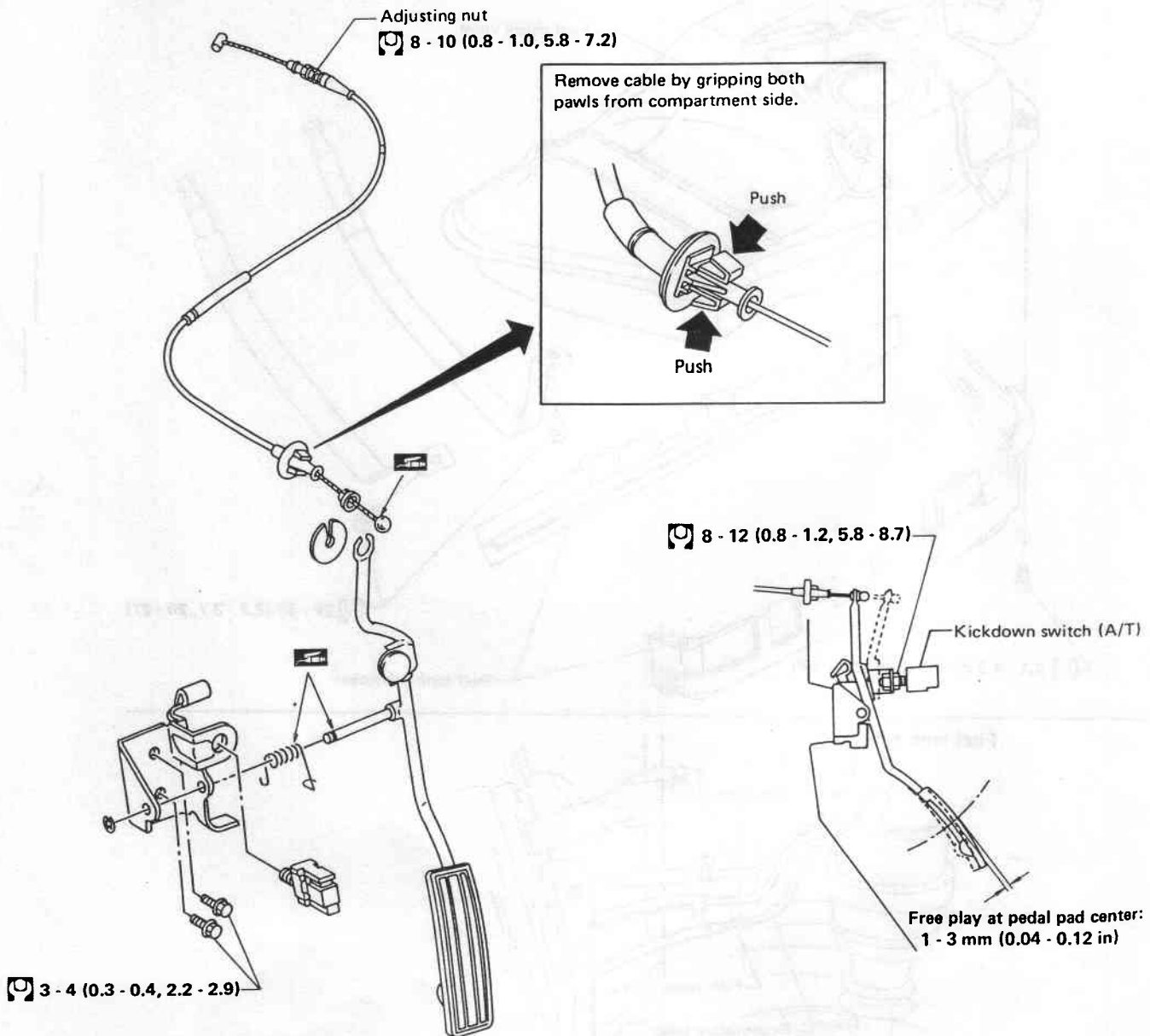
Engine outer parts

Unit	N-m	kg-m	ft-lb
Alternator bracket bolt			
Cylinder block	43 - 58	4.4 - 5.9	32 - 43
Front cover	30 - 40	3.1 - 4.1	22 - 30
Alternator to adjusting bar bolt	16 - 21	1.6 - 2.1	12 - 15
Clutch cover fixing bolt	16 - 21	1.6 - 2.1	12 - 15
Engine mounting bracket to cylinder block	30 - 40	3.1 - 4.1	22 - 30
Intake manifold nut	31 - 42	3.2 - 4.3	23 - 31
Intake manifold support bolt	30 - 40	3.1 - 4.1	22 - 30
Exhaust manifold nut	16 - 21	1.6 - 2.1	12 - 15
Throttle chamber bolt	16 - 21	1.6 - 2.1	12 - 15
Water pump bolt			
M6	6.3 - 8.3	0.64 - 0.85	4.6 - 6.1
M8	16 - 21	1.6 - 2.1	12 - 15
Cooling fan bolt	6.3 - 8.3	0.64 - 0.85	4.6 - 6.1
Spark plug	20 - 29	2.0 - 3.0	14 - 22
Compressor bracket bolt	30 - 40	3.1 - 4.1	22 - 30
Compressor to bracket	43 - 58	4.4 - 5.9	32 - 43
Crank pulley bolt	147 - 196	15.0 - 20.0	108 - 145
Distributor support bolt	6.3 - 8.3	0.64 - 0.85	4.6 - 6.1
Water outlet bolt	9.1 - 11.8	0.93 - 1.2	6.7 - 8.7

ENGINE CONTROL SYSTEM

Accelerator Control System

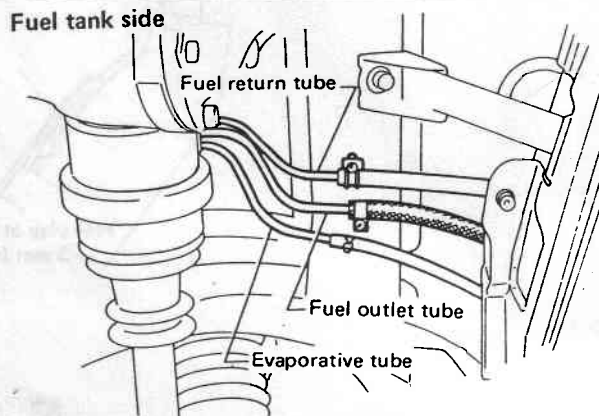
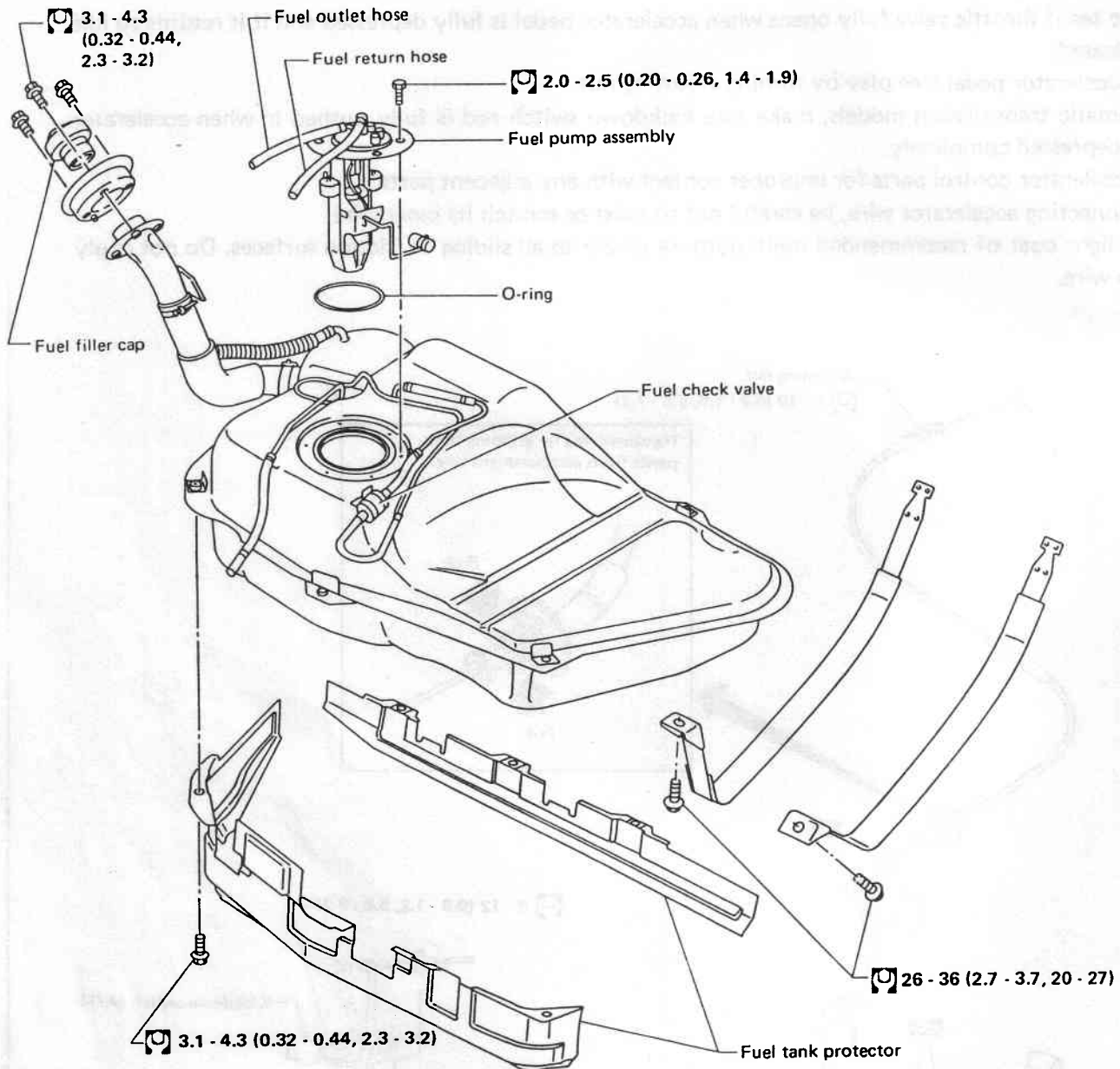
- Check to see if throttle valve fully opens when accelerator pedal is fully depressed and if it returns to idle when released.
- Adjust accelerator pedal free play by turning adjusting nut.
- On automatic transmission models, make sure kickdown switch rod is fully pushed in when accelerator pedal is depressed completely.
- Check accelerator control parts for improper contact with any adjacent parts.
- When connecting accelerator wire, be careful not to twist or scratch its inner wire.
- Apply a light coat of recommended multi-purpose grease to all sliding or friction surfaces. Do not apply grease to wire.



: N·m (kg-m, ft-lb)

SFE793

FUEL SYSTEM



SFE797

FUEL SYSTEM

WARNING:

When replacing fuel line parts, be sure to observe the following:

- Put a "CAUTION: INFLAMMABLE" sign in workshop.
- Be sure to furnish the workshop with a CO₂ fire extinguisher.
- Be sure to disconnect battery ground cable before conducting operations.
- Put drained fuel in an explosion-proof container and put lid on securely.

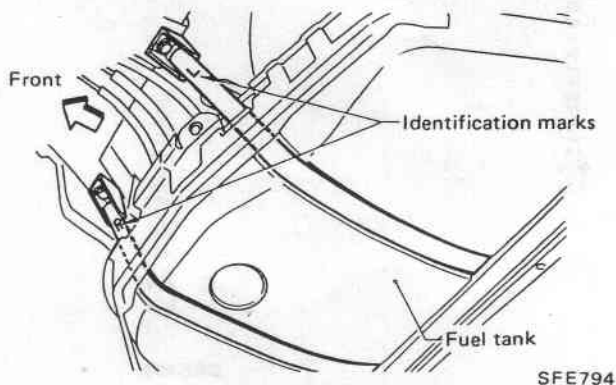
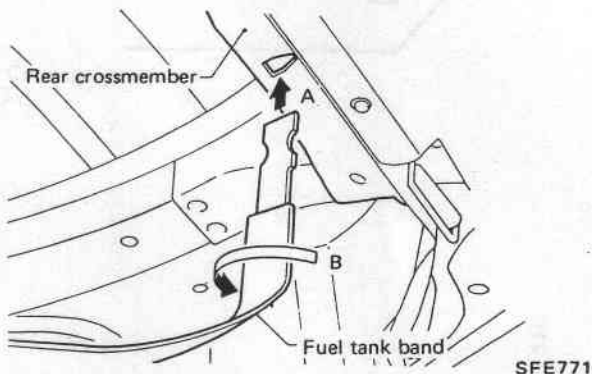
CAUTION:

Before disconnecting fuel hose, release fuel pressure from fuel line. Refer to the "Releasing Fuel Pressure" in EF & EC section.

- Do not disconnect any fuel line unless absolutely necessary.
- Plug hose and pipe openings to prevent entry of dust or dirt.
- Always replace O-ring and clamps with new ones.
- Do not kink or twist hose and tube when they are installed.
- Do not tighten hose clamps excessively to avoid damaging hoses.
- When installing fuel check valve, be careful of its designated direction (Refer to section EC).
- Run the engine and check for leaks at connections.

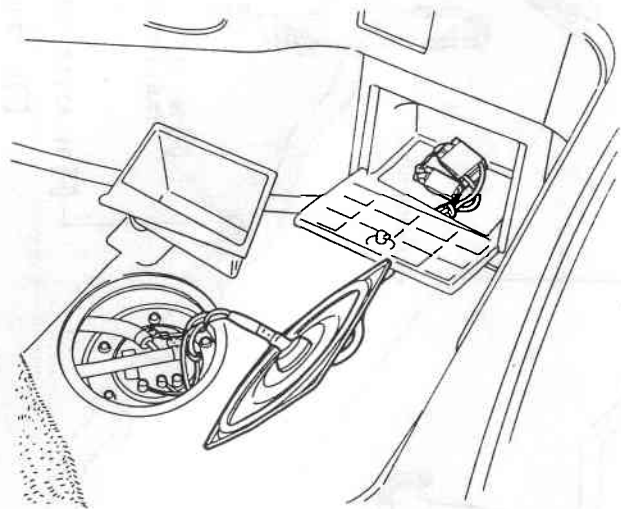
Installation of Fuel Tank Band

- Insert top of the band into the hole in the rear crossmember (A). Then turn the band 90 degrees (B).
- Install band according to identification marks indicating left and right.

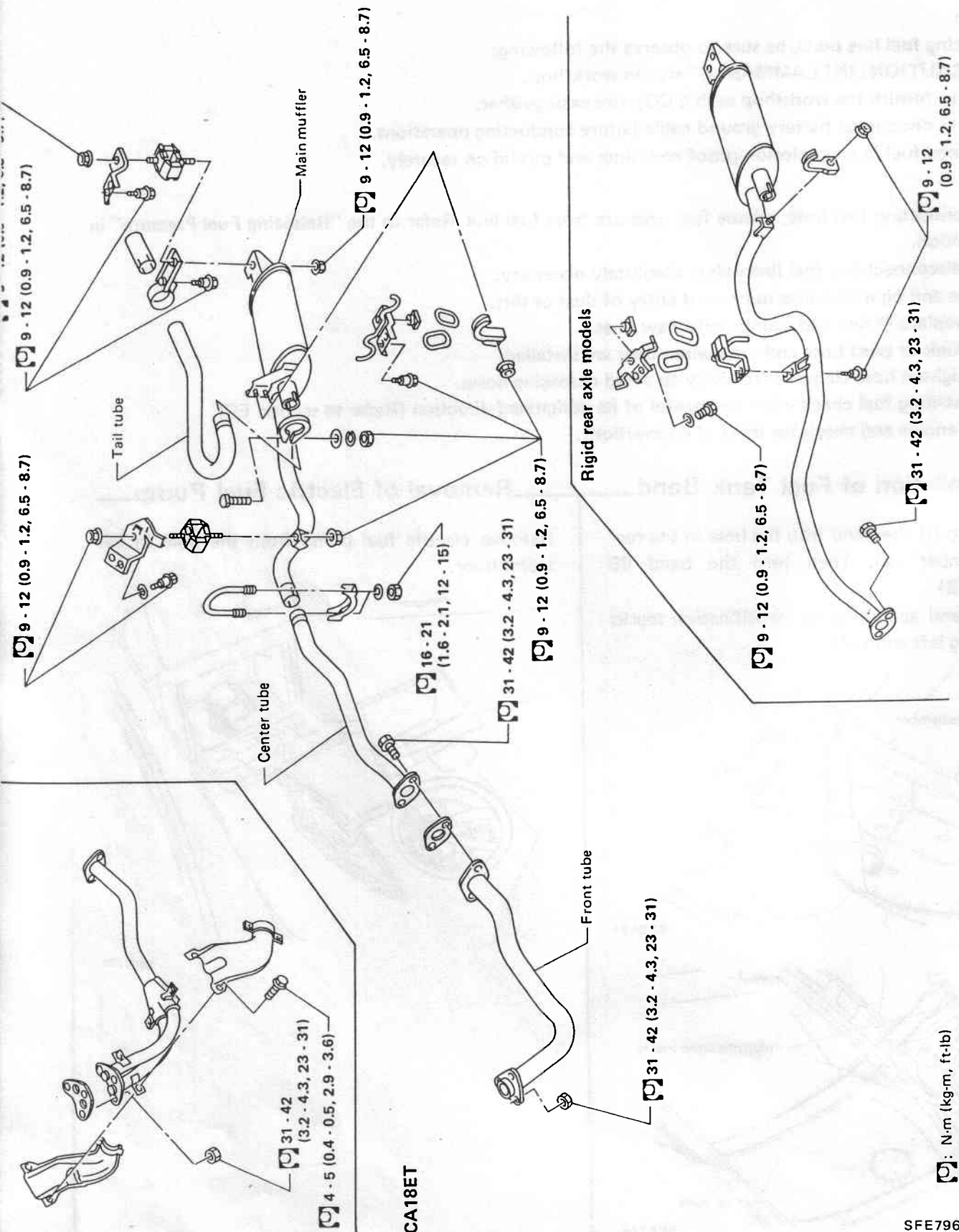


Removal of Electric Fuel Pump

Remove electric fuel pump from the hole in the trunk floor.



EXHAUST SYSTEM



SFE796

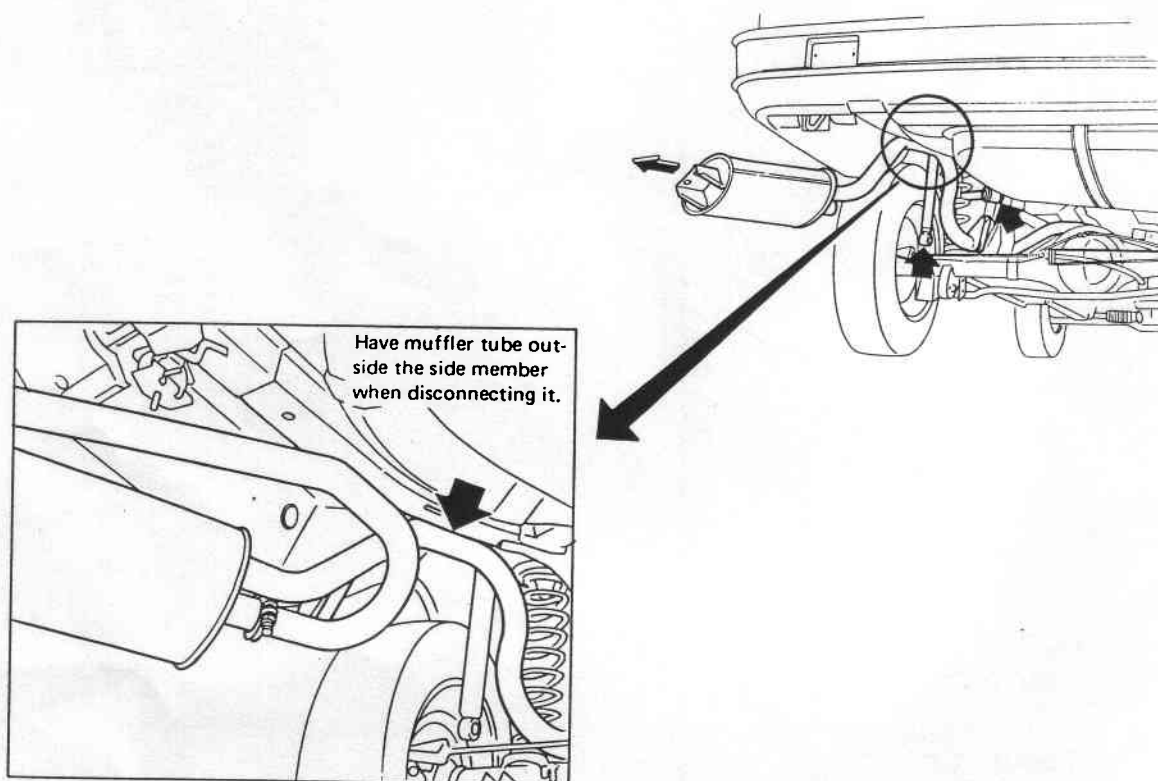
EXHAUST SYSTEM

CAUTION:

- On non-turbocharger models, when removing heat shield plates from front tube, remove the entire front tube assembly.
- After installation, check that mounting brackets and mounting insulator are free from undue stress. If any of above parts is not installed properly, excessive noises or vibrations may be transmitted to vehicle body.
- When connecting center tube and muffler assembly, use the Genuine Nissan Sealant "Exhaust Sealant Kit 20720-N2225" or an equivalent to eliminate gas leakage at the joint.
- Check all tube connections for exhaust gas leaks, and entire system for unusual noises, with engine running.

Removing Main Muffler Assembly (Rigid rear axle models)

When removing main muffler assembly on rigid rear axle models, disconnect rear shock absorber lower end on each side and release parking brake lever and left side upper link on axle case side, then lift vehicle body (or lower rear axle), to make clearance between rear axle and body to extract the muffler assembly.



SFE797

Take care not to damage brake hose, parking brake cable or earth cable.

GENERAL INFORMATION

GI

SECTION GI

3. When removing a heavy component such as the engine or gearbox/transmission, take care not to lose your balance and drop it or cause it to hit against adjacent parts, especially against the brake parts such as brake tube and master cylinder.
4. Before starting repair work, do not require battery power, always turn off the ignition switch, then disconnect the ground cable from the battery to prevent short circuit.

CONTENTS

PRECAUTIONS	GI-2
HOW TO USE THIS MANUAL	GI-5
IDENTIFICATION INFORMATION	GI-8
RECOMMENDED FUEL AND LUBRICANTS	GI-12
LIFTING, TOWING AND TIE-DOWN POINTS	GI-13
TIGHTENING TORQUE OF STANDARD BOLT	GI-17

9. Tapered roller bearings should be disassembled and cleaned.
10. To prevent electrical contact with hot metal parts such as the radiator/exhaust manifold, radiator and water pump, stand on the ground when the engine is running.
11. To prevent electrical contact with hot metal parts such as the radiator/exhaust manifold, radiator and water pump, stand on the ground when the engine is running.
12. To prevent electrical contact with hot metal parts such as the radiator/exhaust manifold, radiator and water pump, stand on the ground when the engine is running.
13. To prevent electrical contact with hot metal parts such as the radiator/exhaust manifold, radiator and water pump, stand on the ground when the engine is running.
14. To prevent electrical contact with hot metal parts such as the radiator/exhaust manifold, radiator and water pump, stand on the ground when the engine is running.
15. To prevent electrical contact with hot metal parts such as the radiator/exhaust manifold, radiator and water pump, stand on the ground when the engine is running.
16. To prevent electrical contact with hot metal parts such as the radiator/exhaust manifold, radiator and water pump, stand on the ground when the engine is running.
17. To prevent electrical contact with hot metal parts such as the radiator/exhaust manifold, radiator and water pump, stand on the ground when the engine is running.

any inflammable materials should be removed from the work area well ventilated and use of any inflammable materials should be avoided. Do not use any inflammable materials such as gasoline, kerosene, etc. If you are working in a confined space, use proper ventilation. Do not use any inflammable materials.

GI-2

GI-5

GI-8

GI-12

GI-13

GI-17

2. Before jacking up the vehicle, apply wheel chocks or other tie blocks to the wheels to prevent the vehicle from moving. After jacking up the vehicle, support the vehicle weight with rigid racks at the points designated for proper lifting and towing before working on the vehicle.

These operations should be done on a level surface.



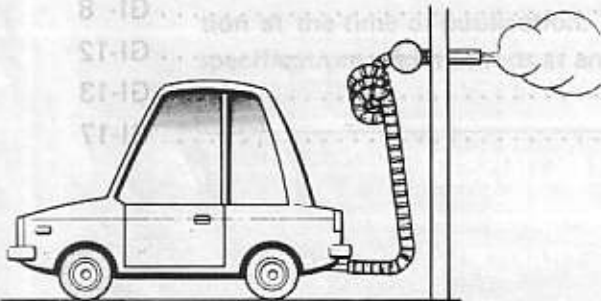
201310

PRECAUTIONS

Observe the following precautions that are not described in each individual section to ensure safe and proper service operations.

1. Do not operate the engine for an extended period of time without proper exhaust ventilation.

Keep the work area well ventilated and free of any inflammable materials. Special care should be taken when handling any inflammable or poisonous materials, such as gasoline, refrigerant gas, etc. If you are working in a pit or other enclosed area, be sure to properly ventilate before working with hazardous materials. Do not smoke while working on the vehicle.



SGI285

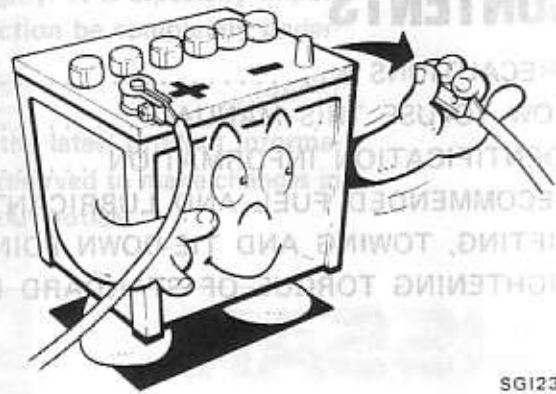
2. Before jacking up the vehicle, apply wheel chocks or other tire blocks to the wheels to prevent the vehicle from moving. After jacking up the vehicle, support the vehicle weight with rigid racks at the points designated for proper lifting and towing before working on the vehicle.

These operations should be done on a level surface.



SGI231

3. When removing a heavy component such as the engine or transaxle/transmission, take care not to lose your balance and drop it or cause it to hit against adjacent parts, especially against the brake parts such as brake tube and master cylinder.
4. Before starting repairs which do not require battery power, always turn off the ignition switch, then disconnect the ground cable from the battery to prevent accidental short circuit.



SGI232

5. To prevent serious burns, avoid contact with hot metal parts such as the radiator, exhaust manifold, tail pipe and muffler. Do not remove the radiator cap when the engine is hot.

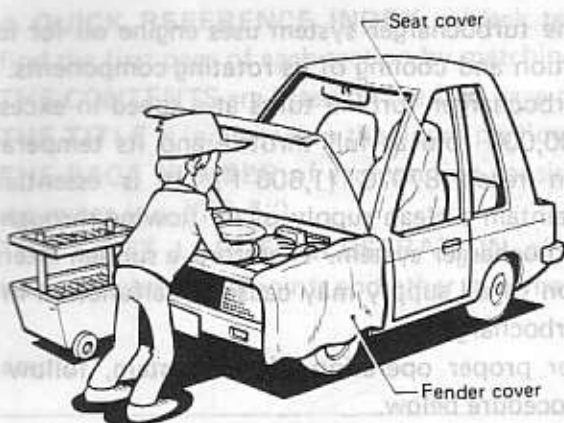


SGI233

6. To prevent scratches and soiling, protect fenders, upholstery and carpeting with appropriate covers before starting servicing. Take caution that keys, buckles or buttons on your person do not scratch the paint.

PRECAUTIONS

Precautions for a Catalyst

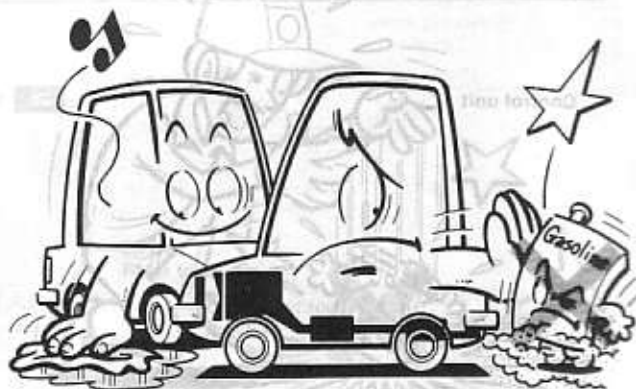


SG1234

7. Clean all disassembled parts in the designated liquid or solvent prior to inspection or assembly.
8. Replace oil seals, gaskets, packings, O-rings, locking washers, cotter pins, self-locking nuts, etc. as instructed and discard used ones.
9. Tapered roller bearings and needle bearings should be replaced as a set of inner and outer races.
10. Arrange the disassembled parts in accordance with their assembled locations and sequence.
11. Do not touch the terminals of electrical components which utilize microcomputers such as electronic control units. Static electrical charges stored in your body may damage internal electronic components.
12. After disconnecting vacuum hose or air hose, attach tag which indicates the proper connection to prevent incorrect connection.
13. Use only the lubricants specified in the applicable section or those indicated under "Recommended Fuel and Lubricants".
14. Use approved bonding agent, sealants or their equivalents when required.
15. The use of the proper tools and recommended essential tools should be used where specified for proper, safe and efficient service repairs.
16. When effecting repairs on the fuel, oil, water, vacuum or exhaust systems, make certain to check all affected lines for leaks.
17. Dispose of drained oil or the solvent used for cleaning parts in an appropriate manner.

If a large amount of unburned fuel flows into converter, the converter temperature will be excessively high. To prevent this, follow the procedure below.

1. Use unleaded gasoline only. Leaded gasoline will seriously damage catalytic converter.
2. When checking for ignition spark or measuring engine compression, make tests quickly and only when necessary.
3. Do not run engine with low fuel in the fuel tank, otherwise engine may misfire causing damage to the converter.
4. Do not place vehicle on inflammable material. Keep inflammable material off exhaust pipe.



Clean floor

SG1290

PRECAUTIONS

Precautions for E.F.I. or E.C.C.S. Engine

1. Before connecting or disconnecting E.F.I. or E.C.C.S. harness connector to or from any E.F.I. or E.C.C.S. unit, be sure to turn the ignition switch to the "OFF" position and disconnect the negative battery terminal. Otherwise, there may be damage to control unit.
2. Before disconnecting pressurized fuel line from fuel pump to injectors, be sure to release fuel pressure to eliminate danger.
3. Be careful not to jar components such as control unit and air flow meter.



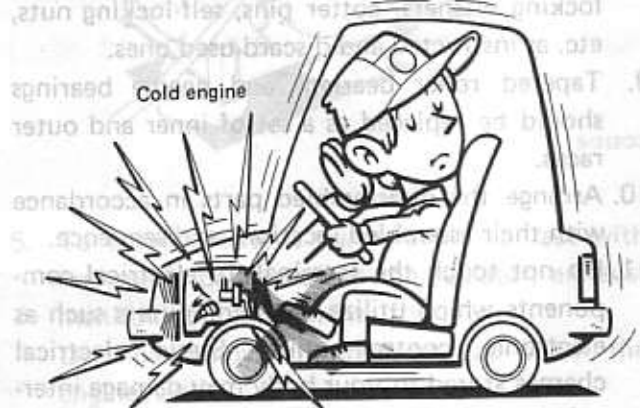
SG1291

Precautions for Turbocharger

The turbocharger system uses engine oil for lubrication and cooling of its rotating components. The turbocharger turbine turns at a speed in excess of 100,000 rpm at full throttle and its temperature can reach 870°C (1,600°F). It is essential to maintain a clean supply of oil flowing through the turbocharger system. Therefore, a sudden interruption of oil supply may cause a malfunction in the turbocharger.

For proper operation of the system, follow the procedure below.

1. Always use the recommended oil. Follow the instructions for proper time to change the oil and proper oil level.
2. Avoid accelerating engine to a high rpm immediately after starting.



SG1292

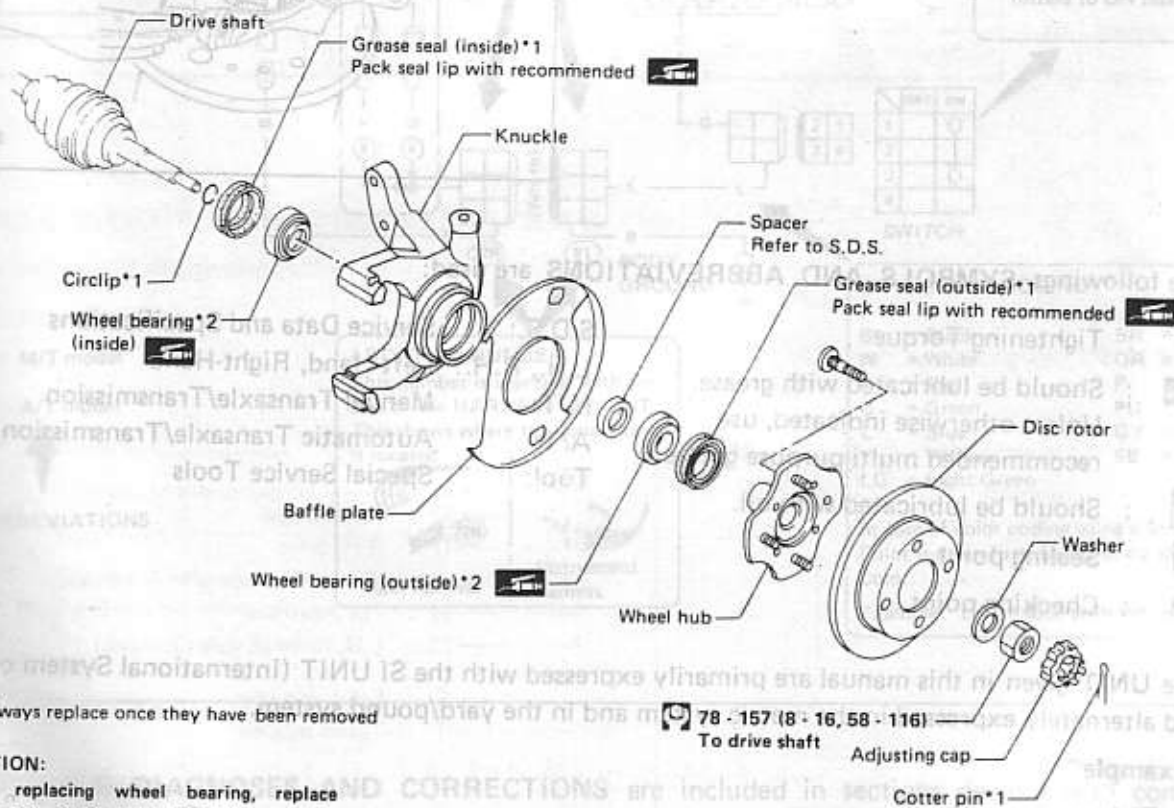
3. If engine had been operating at high rpm for an extended period of time, let it idle for a few minutes prior to shutting it off.

HOW TO USE THIS MANUAL

1. A QUICK REFERENCE INDEX, a black tab e.g. **FA** is provided on the first page. You can quickly find the first page of each section by matching it to the section's black tab.
2. THE CONTENTS are listed on the first page of each section.
3. THE TITLE is indicated on the upper portion of each page and shows the part or system.
4. THE PAGE NUMBER of each section consists of two letters, which designate the particular section, and a number (e.g. "FA-5").
5. THE FIRST LARGE ILLUSTRATION of each section is an exploded view and contains tightening torques, lubrication points and other information necessary to perform repairs.

"Example"

FRONT AXLE — Wheel Hub and Knuckle



*1 Always replace once they have been removed

*2

CAUTION:

When replacing wheel bearing, replace inner and outer wheel bearings at the same time to prevent mix use of bearings of different brands.

78 - 157 (8 - 16, 58 - 116)
To drive shaft

: N·m (kg·m, ft·lb)

SFA494

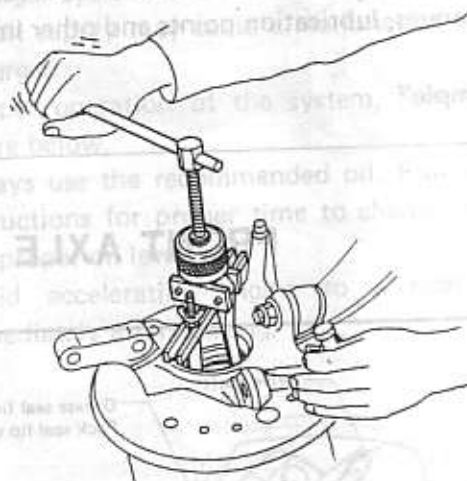
HOW TO USE THIS MANUAL

6. THE FOLLOWING SMALL ILLUSTRATION shows the important steps such as inspection, use of special tools, knacks of work and hidden or tricky steps which are not shown in the previous large illustration. Assembly, inspection and adjustment procedures for the complicated units such as the automatic transaxle or transmission, etc. are presented in a step-by-step format where necessary.

"Example"

KNUCKLE

- Remove wheel bearing outer races. When replacing wheel bearing, replace as a set of outer and inner wheel bearing assembly.



SFA540

7. The followings **SYMBOLS AND ABBREVIATIONS** are used:



: Tightening Torque



: Should be lubricated with grease.
Unless otherwise indicated, use recommended multi-purpose grease.



: Should be lubricated with oil.



: Sealing point



: Checking point

S.D.S.: Service Data and Specifications
L.H., R.H.: Left-Hand, Right-Hand
M/T: Manual Transaxle/Transmission
A/T: Automatic Transaxle/Transmission
Tool: Special Service Tools

8. The **UNIT** given in this manual are primarily expressed with the SI UNIT (International System of Unit), and alternately expressed in the metric system and in the yard/pound system.

"Example"

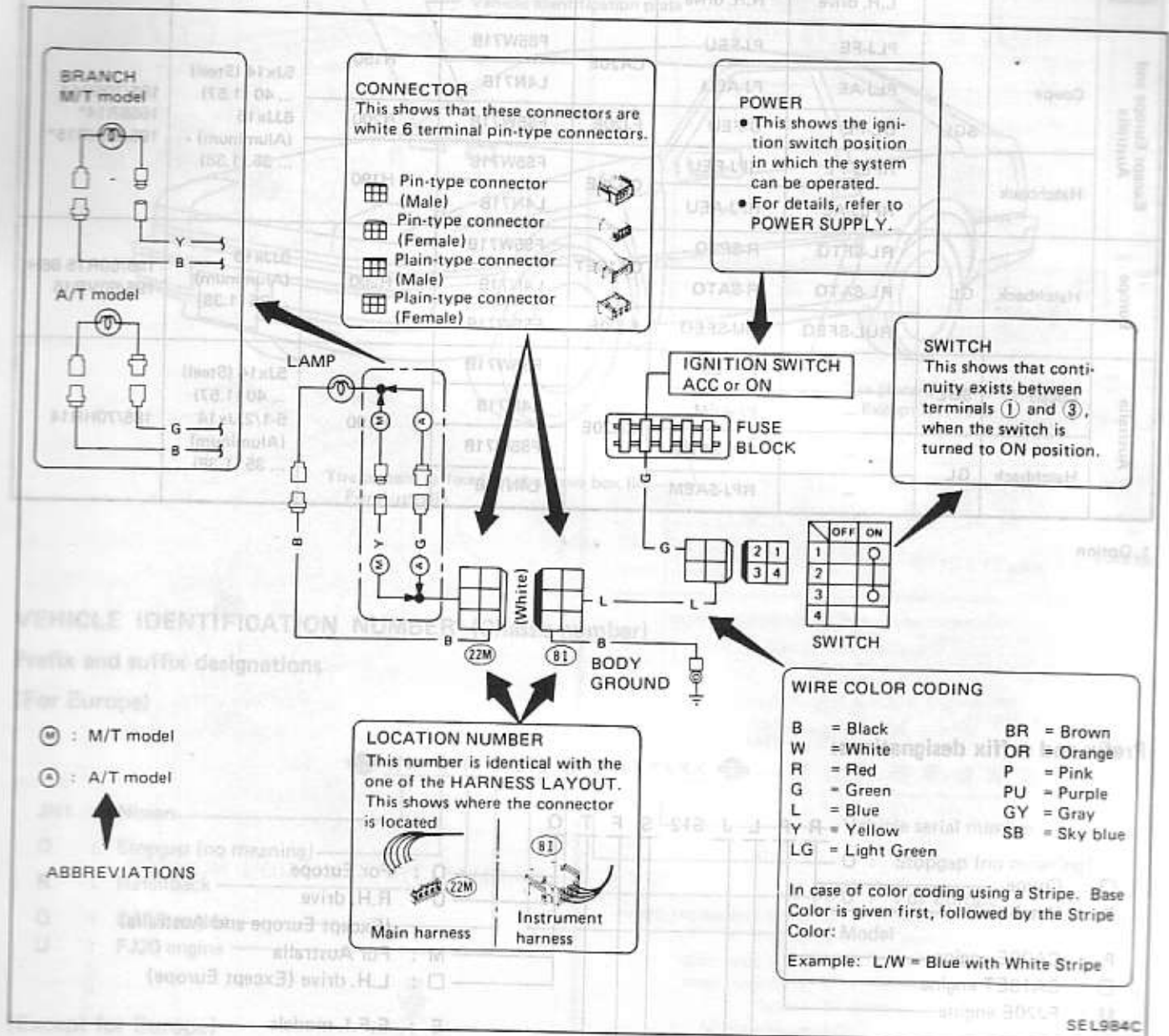
Tightening torque

59 - 78 N·m (6.0 - 8.0 kg-m, 43 - 58 ft-lb)

HOW TO USE THIS MANUAL

9. Symbols used in WIRING DIAGRAM are shown below.

"Example"



- 10. TROUBLE DIAGNOSES AND CORRECTIONS** are included in sections dealing with complicated units.
- 11. SERVICE DATA AND SPECIFICATIONS** and a list of **SPECIAL SERVICE TOOLS** are contained at the end of each section for quick reference of data and special tools.
- 12.** The captions **WARNING** and **CAUTION** warn you of steps that must be followed to prevent personal injury and/or damage to some part of the vehicle.

IDENTIFICATION INFORMATION

Model Variation

Desti- nation	Body	Grade	Model		Engine	Transmission	Differential carrier	Road wheel size ... offset mm (in)	Tire size
			L.H. drive	R.H. drive					
Except Europe and Australia	Coupe	SGL	PLJ-FE	PJ-FEU	CA20E	FS5W71B	H190	5Jx14 (Steel) ... 40 (1.57) 6JJx15 (Aluminum) ... 35 (1.38)	185/70SR14 165SR14* 195/60HR15*
			PLJ-AE	PJ-AEU		L4N71B			
			UL-FE	U-FEU	FJ20E	FS5W71B	R200		
	Hatchback	SGL	RPLJ-FE	RPJ-FEU	CA20E	FS5W71B	H190		
			RPLJ-AE	RPJ-AEU		L4N71B			
Europe	Hatchback	GL	RL-SFTQ	R-SFTQ	CA18ET	FS5W71B	R200	6JJx15 (Aluminum) ... 35 (1.38)	195/60R15 86H 195/60VR15
			RL-SATQ	R-SATQ		L4N71B			
			RUL-SFEQ	RU-SFEQ	FJ20E	FS5W71B			
Australia	Coupe	SGL	—	PJ-FEM	CA20E	FS5W71B	H190	5Jx14 (Steel) ... 40 (1.57) 5-1/2JJx14 (Aluminum) ... 35 (1.38)	185/70HR14
			—	PJ-AEM		L4N71B			
	Hatchback	GL	—	RPJ-SFEM		FS5W71B			
			—	RPJ-SAEM		L4N71B			

* Option

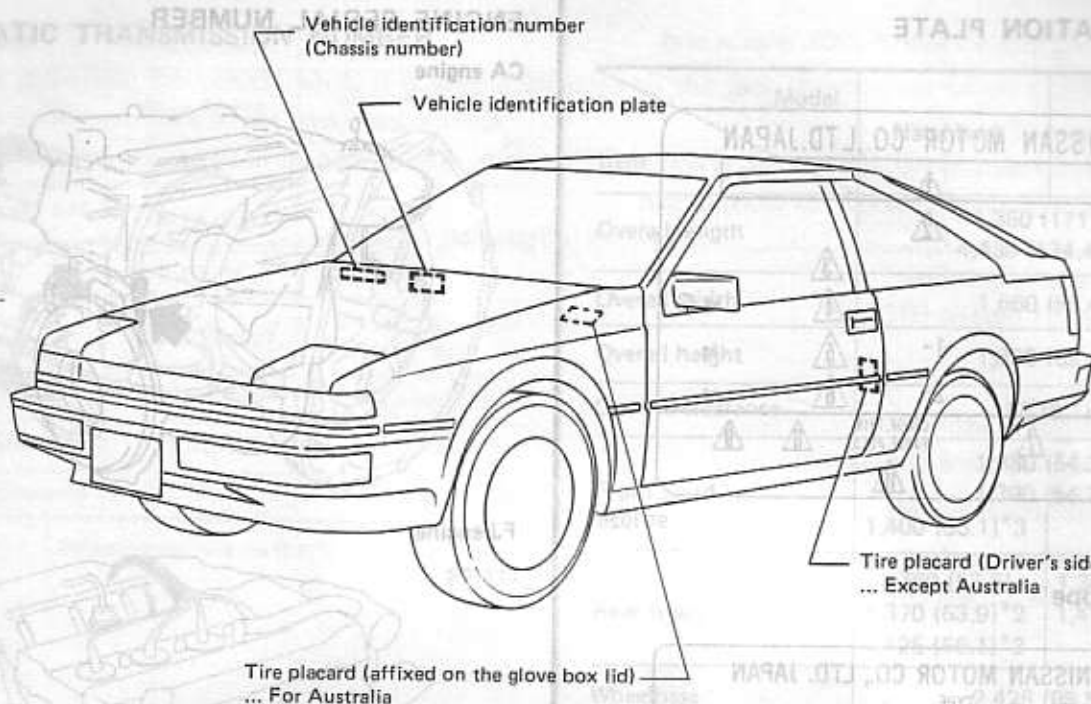
Prefix and suffix designations:

	R	P	L	J	S12	S	F	T	Q	
☐ : Coupe										Q : For Europe
R : Hatchback										U : R.H. drive (Except Europe and Australia)
P : CA20E engine										M : For Australia
☐ : CA18ET engine										☐ : L.H. drive (Except Europe)
U : FJ20E engine										E : E.F.I. models
☐ : R.H. drive										T : Turbo models
L : L.H. drive										F : 5-speed floor shift manual transmission
☐ : I.R.S.										A : Automatic transmission
J : 4-link										☐ : SGL model
										S : GL model

☐ : means no indication.

IDENTIFICATION INFORMATION

Identification Number



SGI310

VEHICLE IDENTIFICATION NUMBER (Chassis number)

Prefix and suffix designations

(For Europe)

● JN1 O R U S12 U O XXXXXX ●

JN1 : Nissan

O : Stopgap (no meaning)

R : Hatchback

O : CA18 engine

U : FJ20 engine

Vehicle serial number

O : Stopgap (no meaning)

U : For Europe

Model

(Except for Europe)

R P J S12 - XXXXXX

□ : Coupe

R : Hatchback

P : CA20 engine

U : FJ20 engine

□ : I.R.S.

J : Rear rigid axle

Vehicle serial number

Model

□ : means no indication.

IDENTIFICATION INFORMATION

Identification Number (Cont'd)

IDENTIFICATION PLATE

Europe

NISSAN MOTOR CO., LTD. JAPAN			
[Blank space for identification number]			
○	1-	3	kg ○
	2-	4	kg
		5	kg
		6	kg
TYPE TYP	△	COLOR, TRIM FARBE, POLST	△ △

SGI025

Except Europe

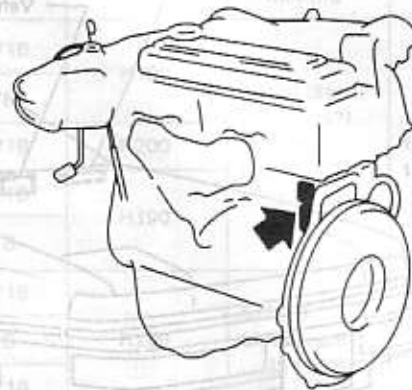
NISSAN MOTOR CO., LTD. JAPAN			
型式	TYPE TIPO	△	
CHASSIS NO. NO. DE CHASSIS	△		
MODEL MODELO	△		
○ カラー COLOR TRIM トリム COLOR GUARNIGION	△ △		○ CC
エンジン ENGINE ジン MOTOR	△ △		
ミッション TRANS, AXLE アクスル TRANS, EJE	△ △		
工場	PLANT PLANTA		
日産自動車株式会社 MADE IN JAPAN			

SGI316

- | | |
|--|----------------------------|
| 1 Type approval number | 6 Gross axle weight (Rear) |
| 2 Vehicle identification number (Chassis number) | 7 Type |
| 3 Gross vehicle weight | 8 Body color code |
| 4 Gross combination weight | 9 Trim color code |
| Gross vehicle weight | 10 Model |
| + Gross trailing capacity (Weight) | 11 Engine model |
| 5 Gross axle weight (Front) | 12 Engine displacement |
| | 13 Transmission model |
| | 14 Axle model |

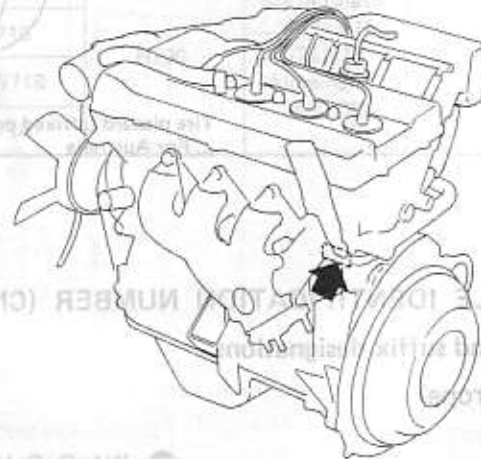
ENGINE SERIAL NUMBER

CA engine



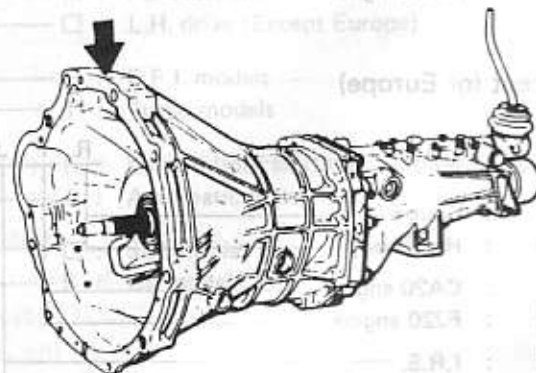
LC435

FJ engine



SGI309

MANUAL TRANSMISSION NUMBER



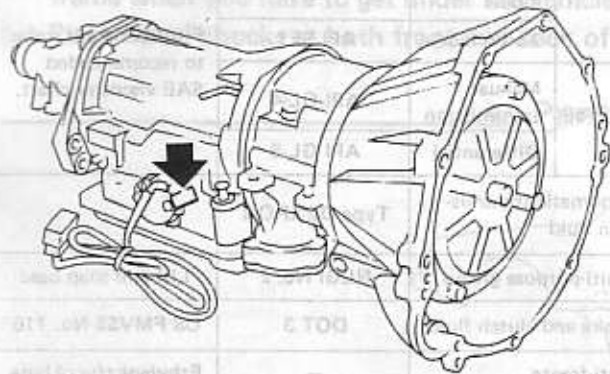
TM235

IDENTIFICATION INFORMATION

Identification Number (Cont'd)

Dimension

AUTOMATIC TRANSMISSION NUMBER



SG1273

Item	Model	
	Hatchback	Coupe
Overall length	4,350 (171.3) 4,430 (174.4)*1	
Overall width	1,660 (65.4)	
Overall height	1,330 (52.4)	
Ground clearance	155 (6.1)	
Front tread	1,380 (54.3) 1,390 (54.7)*2 1,400 (55.1)*3	
Rear tread	1,360 (53.5) 1,370 (53.9)*2 1,425 (56.1)*3	1,360 (53.5)*4 1,425 (56.1)*5
Wheelbase	2,425 (95.5)	
Turning circle [wall to wall] m (ft)	10.8 (35.4)	

- *1: Models equipped with large bumper
- *2: 5-1/2Jx14 road wheel equipped model for Australia
- *3: For Europe
- *4: Models equipped with CA20E engine
- *5: Models equipped with FJ20E engine

RECOMMENDED FUEL AND LUBRICANTS

Fuel

For Hong Kong models with FJ20E engine and Europe models

Recommended gasoline:
Above 97 octane (RON)

For FJ20E engine models except for Europe and Hong Kong

Recommended gasoline:
Above 91 octane (RON)

For Australia

Recommended gasoline:
Above 92 octane (RON)

Except for the above models

Recommended gasoline:
Above 88 octane (RON)

Approximate Refill Capacities

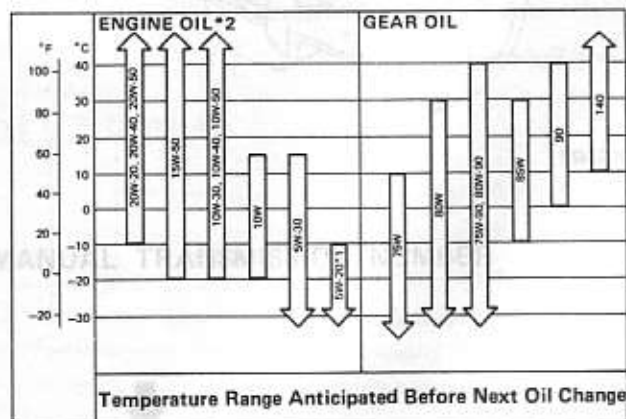
		Liter	Imp measure
Fuel tank		53	11-5/8 gal
Coolant			
With heater		8.6	7-5/8 qt
Engine			
With oil filter	CA	3.8	3-3/8 qt
change	FJ	4.7	4-1/8 qt
Without oil filter	CA	3.5	3-1/8 qt
change	FJ	4.2	3-3/4 qt
Transmission			
M/T		2.0	3-1/2 pt
A/T		7.0	6-1/8 qt
Differential carrier			
H190		1.0	1-3/4 pt
R200		1.3	2-1/4 pt
Power steering system		0.9	3/4 qt
Windshield washer tank		1.5	1-3/8 qt
Windshield and rear window washer tank		3.5	3-1/8 qt
Air conditioning system			
Refrigerant		1.0 kg	2.2 lb

Lubricants

Lubricant		Specifications	Remarks
Engine oil	Non-turbo model	API SE or SF	Further details, refer to recommended SAE viscosity chart.
	Turbo model	API SE*	
Gear oil	Manual transmission	API GL-4	
	Differential	API GL-5	
Automatic transmission fluid		Type DEXRON	
Multi-purpose grease		NLGI No. 2	Lithium soap base
Brake and clutch fluid		DOT 3	US FMVSS No. 116
Anti-freeze		—	Ethylene glycol base

*: API SF/CC and SF/CD are also recommended.

SAE Viscosity Number



*1: Not recommended for sustained high speed driving.

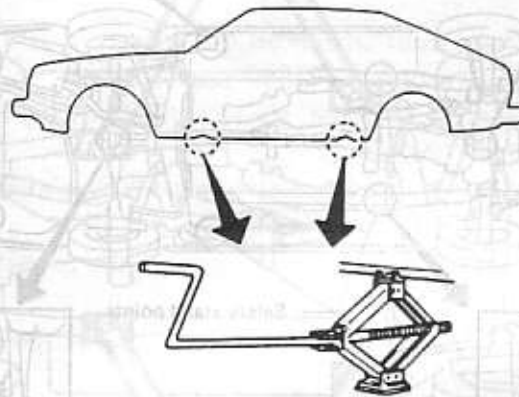
*2: On models equipped with a turbocharger, use 10W-30, 10W-40, 10W-50, 15W-50, 20W-20, 20W-40 or 20W-50 except under extremely cold conditions. Use 5W-30 only under extremely cold conditions.

LIFTING, TOWING AND TIE-DOWN POINTS

WARNING:

- Never get under the vehicle while it is supported only by the jack. Always use safety stands to support frame when you have to get under the vehicle.
- Place wheel chocks at both front and back of the wheel which is diagonally opposite the jack position.

Pantograph Jack

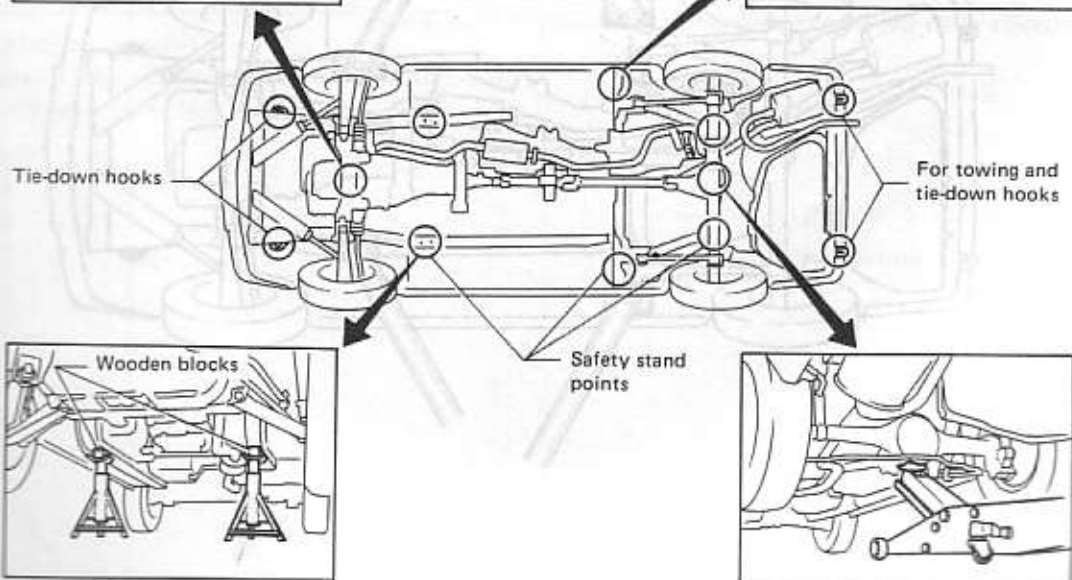
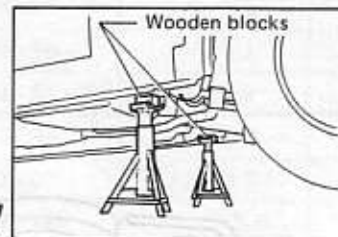
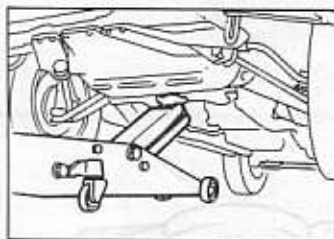


SG1154

Garage Jack and Safety Stand

CAUTION:

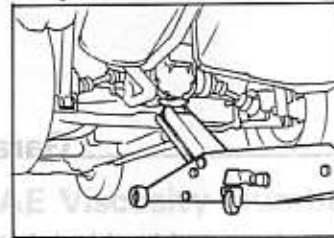
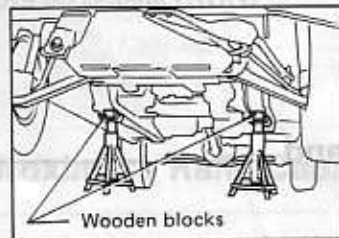
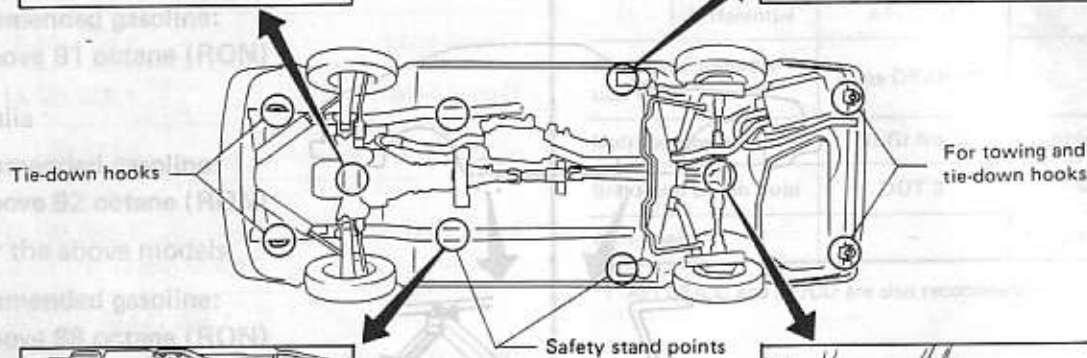
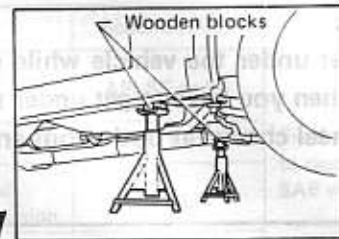
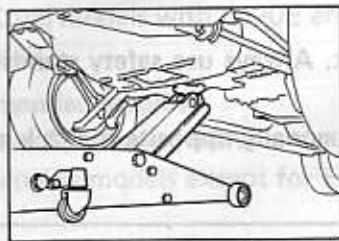
- Place a wooden or rubber block between safety stand and vehicle body when the supporting body is flat.



SG1205

LIFTING, TOWING AND TIE-DOWN POINTS

Garage Jack and Safety Stand (Cont'd)



SG1306

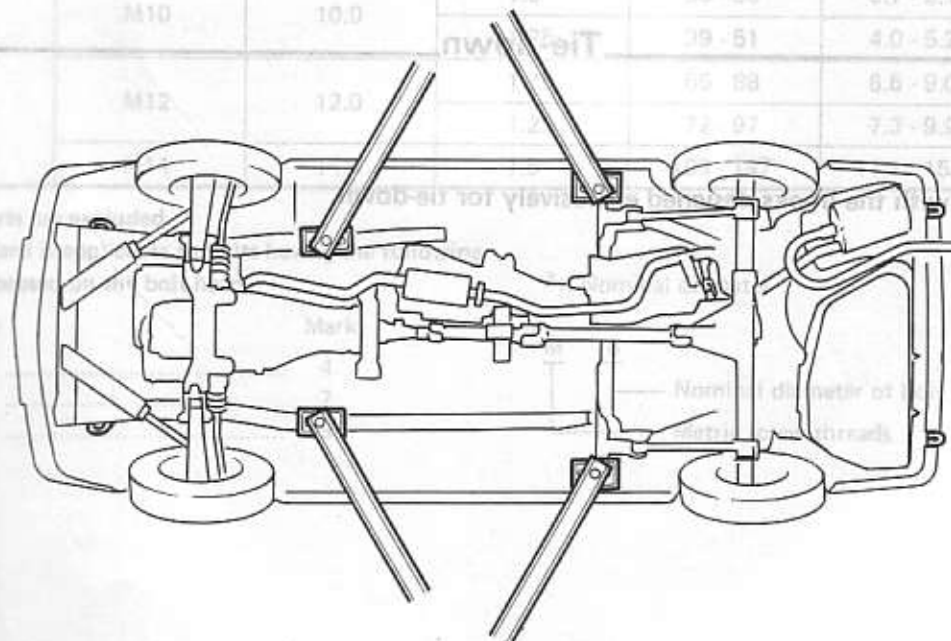
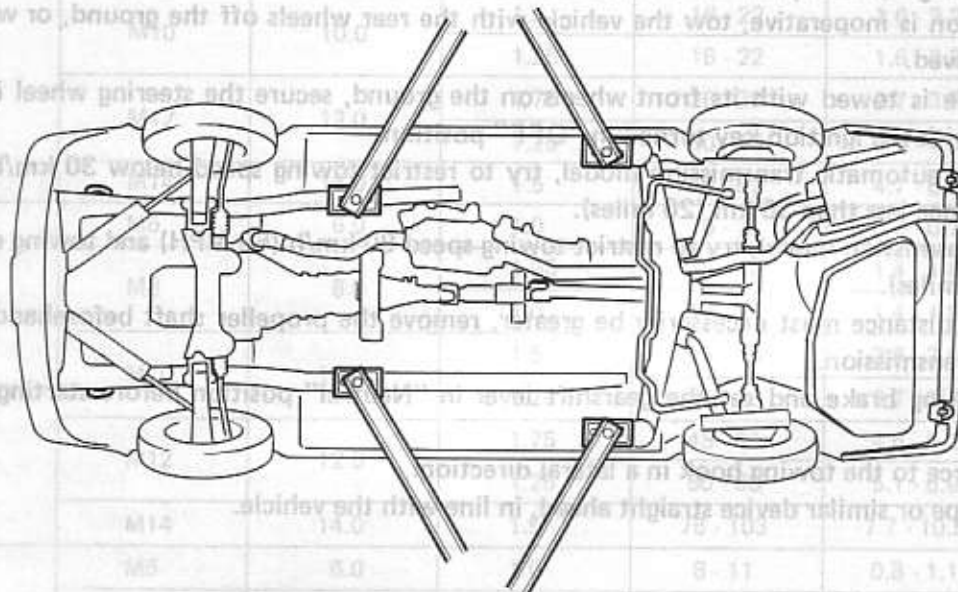
LIFTING, TOWING AND TIE-DOWN POINTS

2-point Lift

WARNING:

When lifting the vehicle, open the arms as wide as possible and ensure that the front and rear of the vehicle are well balanced.

When setting arm, be careful not to allow the arm to interfere with the brake pipe and fuel pipe.



LIFTING, TOWING AND TIE-DOWN POINTS

Towing

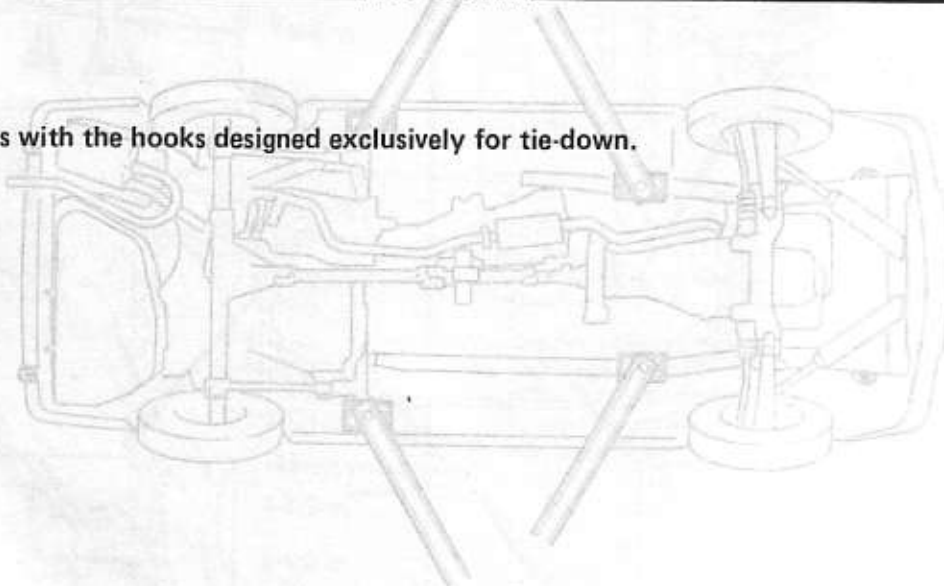
CAUTION:

- a. It is necessary to use proper towing equipment to avoid possible damage to the vehicle during a towing operation.
Towing is in accordance with Towing Procedure Manual at dealer side.
- b. Before towing, make sure that the transmission, axles, steering system and power train are in good order. If any unit is damaged, a dolly must be used.
- c. If the transmission is inoperative, tow the vehicle with the rear wheels off the ground, or with the propeller shaft removed.
- d. When the vehicle is towed with its front wheels on the ground, secure the steering wheel in a straight ahead position with the ignition key turned in "OFF" position.
- e. When towing an automatic transmission model, try to restrict towing speed below 30 km/h (20 MPH) and towing distance less than 30 km (20 miles).
With manual transmission model, try to restrict towing speed 80 km/h (50 MPH) and towing distance less than 80 km (50 miles).
If the speed or distance must necessarily be greater, remove the propeller shaft beforehand to prevent damage to the transmission.
- f. Release the parking brake and set the gearshift lever in "Neutral" position before starting to tow the vehicle.
- g. Do not apply force to the towing hook in a lateral direction.
Keep the tow rope or similar device straight ahead, in line with the vehicle.

Tie-down

CAUTION:

Do not tow vehicles with the hooks designed exclusively for tie-down.



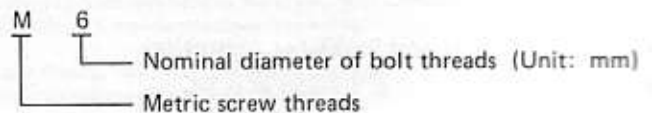
TIGHTENING TORQUE OF STANDARD BOLT

Grade	Bolt or nut size	Bolt or nut diameter* mm	Pitch mm	Tightening torque		
				N·m	kg·m	ft·lb
4T	M6	6.0	1.0	3 - 4	0.3 - 0.4	2.2 - 2.9
	M8	8.0	1.25	8 - 11	0.8 - 1.1	5.8 - 8.0
			1.0	8 - 11	0.8 - 1.1	5.8 - 8.0
	M10	10.0	1.5	16 - 22	1.6 - 2.2	12 - 16
			1.25	16 - 22	1.6 - 2.2	12 - 16
	M12	12.0	1.75	26 - 36	2.7 - 3.7	20 - 27
			1.25	30 - 40	3.1 - 4.1	22 - 30
	M14	14.0	1.5	46 - 62	4.7 - 6.3	34 - 46
7T	M6	6.0	1.0	6 - 7	0.6 - 0.7	4.3 - 5.1
	M8	8.0	1.25	14 - 18	1.4 - 1.8	10 - 13
			1.0	14 - 18	1.4 - 1.8	10 - 13
	M10	10.0	1.5	25 - 35	2.6 - 3.6	19 - 26
			1.25	26 - 36	2.7 - 3.7	20 - 27
	M12	12.0	1.75	45 - 61	4.6 - 6.2	33 - 45
			1.25	50 - 68	5.1 - 6.9	37 - 50
	M14	14.0	1.5	76 - 103	7.7 - 10.5	56 - 76
9T	M6	6.0	1.0	8 - 11	0.8 - 1.1	5.8 - 8.0
	M8	8.0	1.25	19 - 25	1.9 - 2.5	14 - 18
			1.0	20 - 27	2.0 - 2.8	14 - 20
	M10	10.0	1.5	36 - 50	3.7 - 5.1	27 - 37
			1.25	39 - 51	4.0 - 5.2	29 - 38
	M12	12.0	1.75	65 - 88	6.6 - 9.0	48 - 65
			1.25	72 - 97	7.3 - 9.9	53 - 72
	M14	14.0	1.5	109 - 147	11.1 - 15.0	80 - 108

1. Special parts are excluded.
2. This standard is applicable to bolts having the following marks embossed on the bolt head.

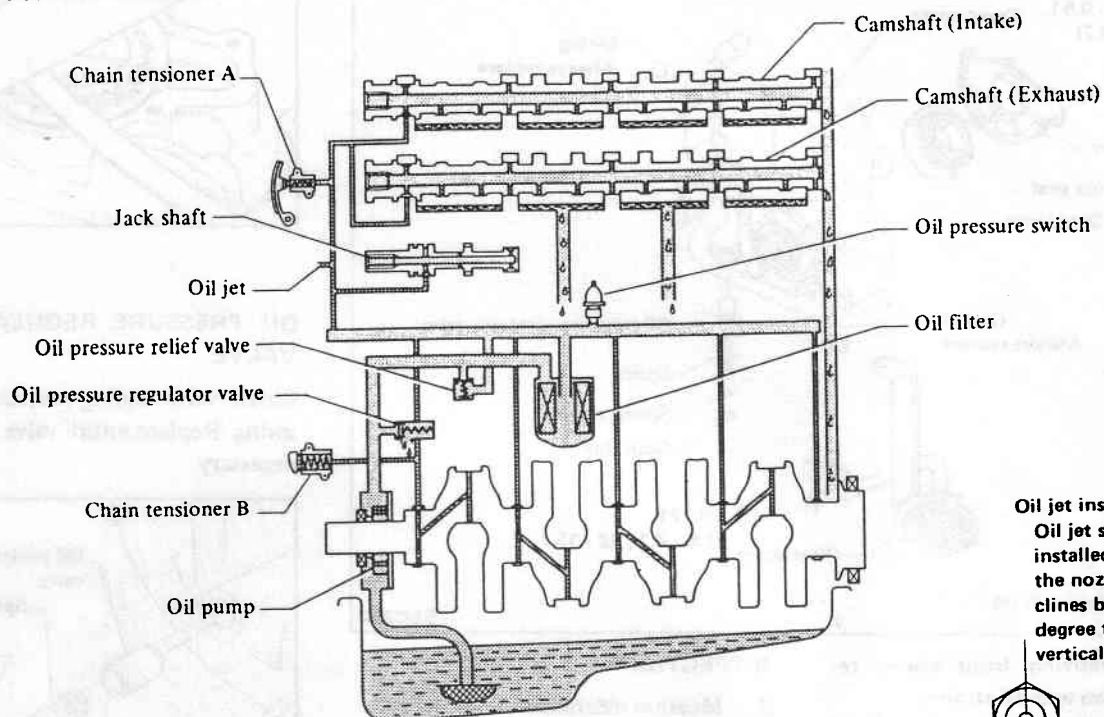
Grade	Mark
4T	4
7T	7
9T	9

*: Nominal diameter



ENGINE LUBRICATION SYSTEM

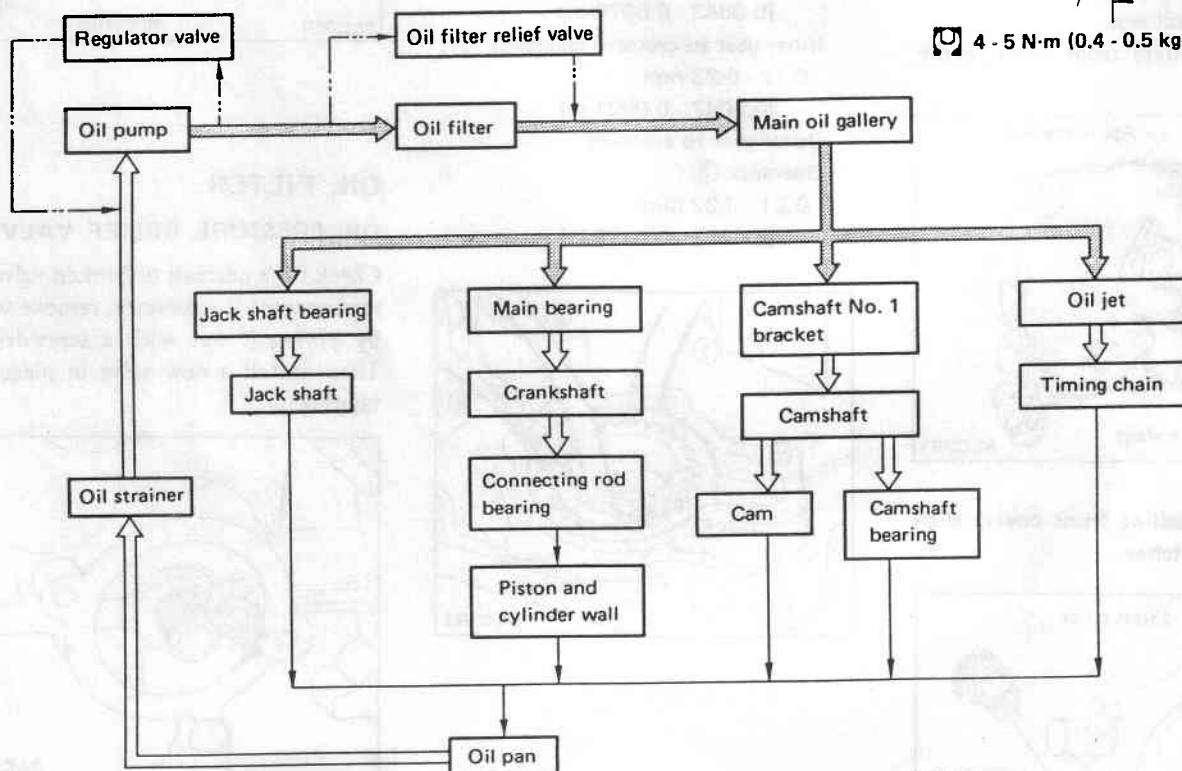
LUBRICATION CIRCUIT



Oil jet installation
Oil jet should be installed so that the nozzle inclines by 8° degree to engine vertical line.



⌚ 4 - 5 N·m (0.4 - 0.5 kg-m, 2.9 - 3.6 ft-lb)

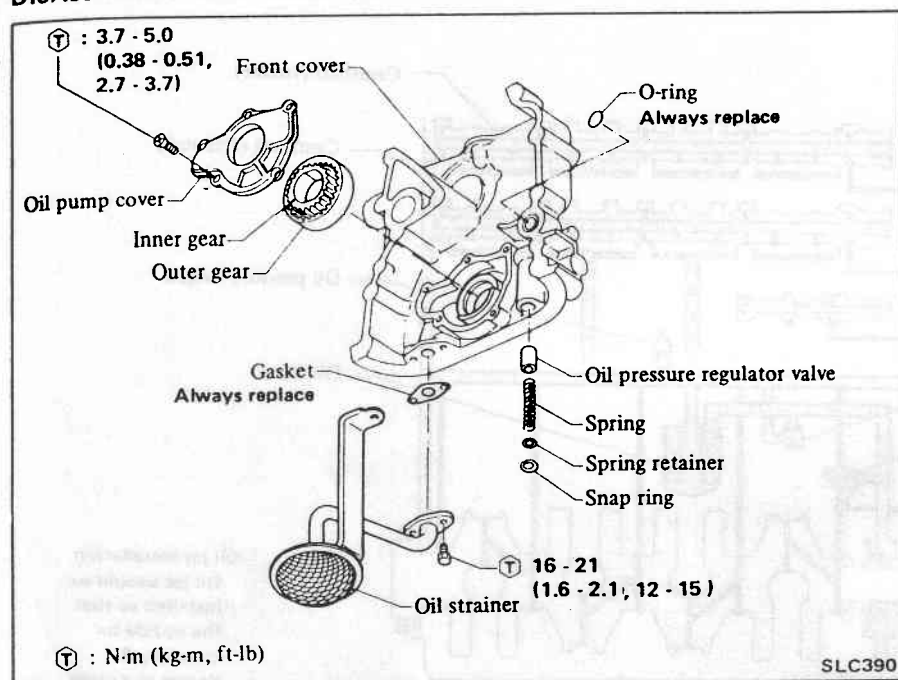


Note:

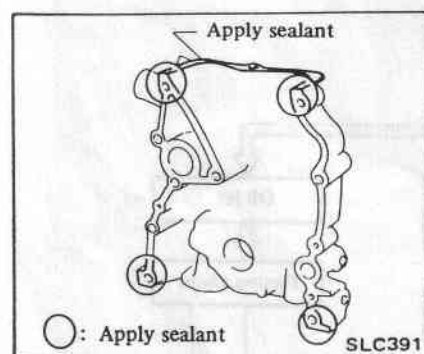
- ⇨ : Oil passage
- ⇨ : Oil gallery in cylinder block
- : By-pass passage

OIL PUMP

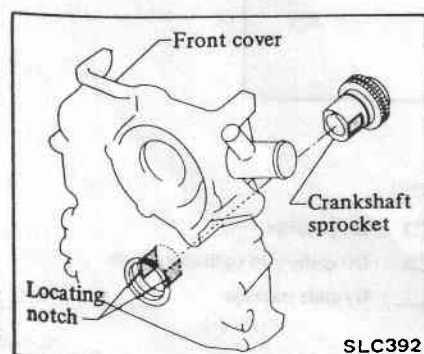
DISASSEMBLY AND ASSEMBLY



- Before removing front cover, remove oil pan and oil strainer.
- Do not damage cylinder head gasket.
- Always use new gaskets, snap ring, O-ring and oil seal.
- When installing front cover, apply sealant.



- Before installing front cover, align locating notches.



INSPECTION

- Measure clearance.

Body to outer gear clearance ①:

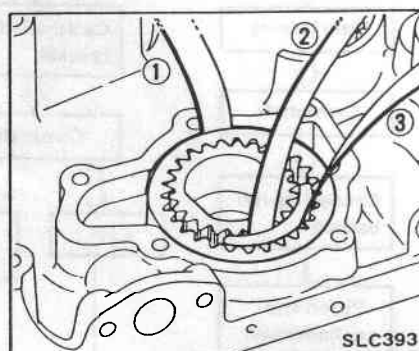
0.11 - 0.20 mm
(0.0043 - 0.0079 in)

Inner gear to crescent clearance ②:

0.12 - 0.23 mm
(0.0047 - 0.0091 in)

Outer gear to crescent clearance ③:

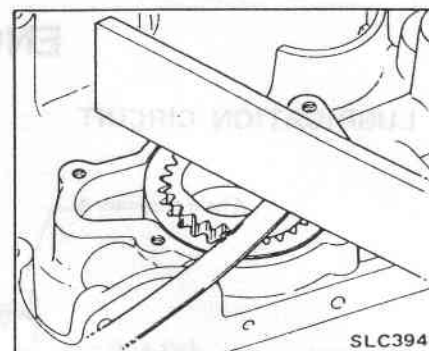
0.21 - 0.32 mm
(0.0083 - 0.0126 in)



- Measure oil pump gear end play.

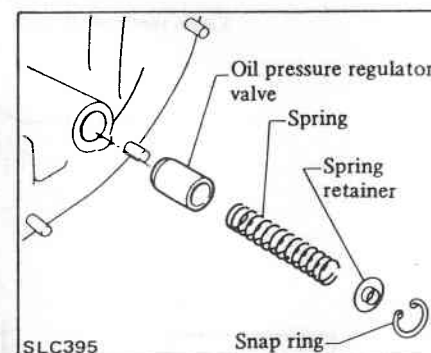
Housing to gear clearance:

0.06 - 0.12 mm
(0.0024 - 0.0047 in)



OIL PRESSURE REGULATOR VALVE

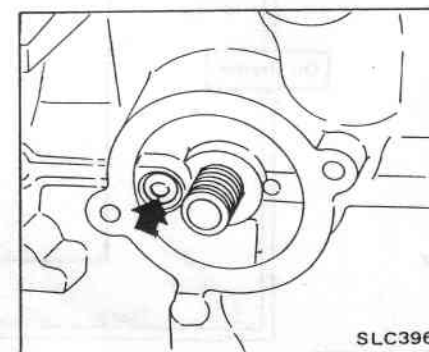
Check valve sliding surface and valve spring. Replace entire valve assembly if necessary.



OIL FILTER

OIL PRESSURE RELIEF VALVE

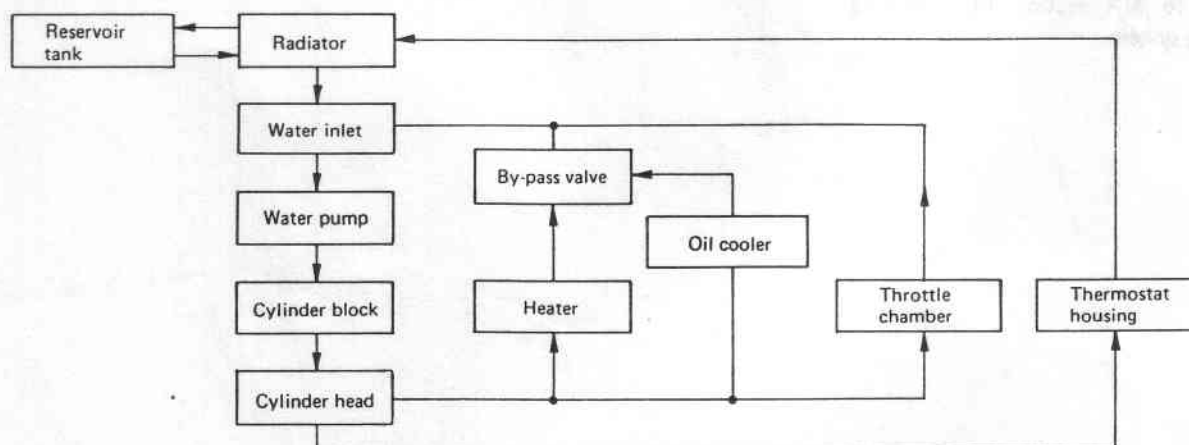
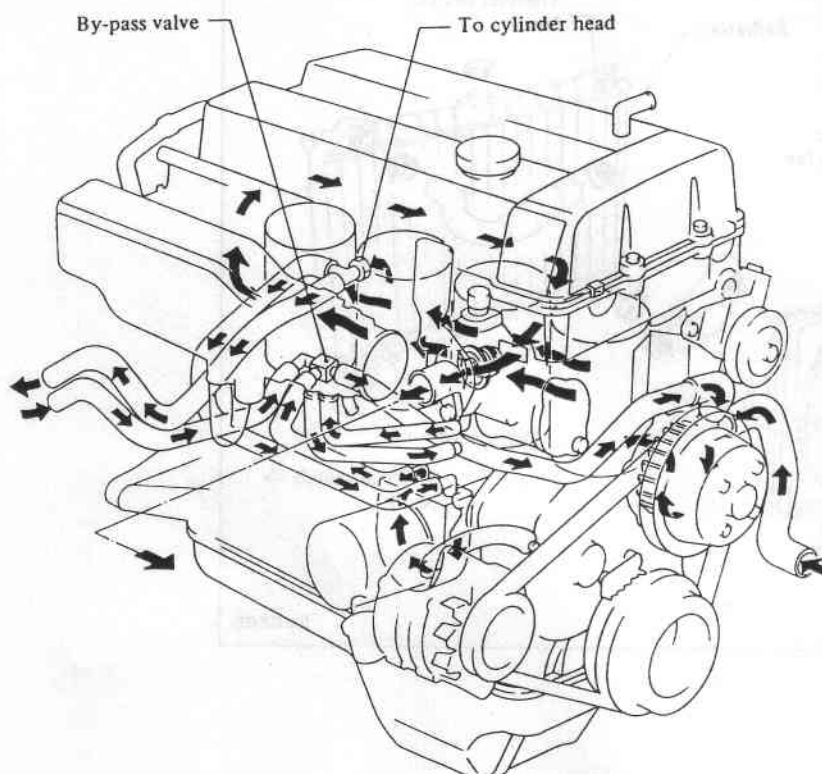
Check for a cracked or broken valve. If replacement is necessary, remove valve by prying it out with a screwdriver. Then, install a new valve in place by tapping it.



COOLING SYSTEM

COOLING SYSTEM

COOLING CIRCUIT



SLC664

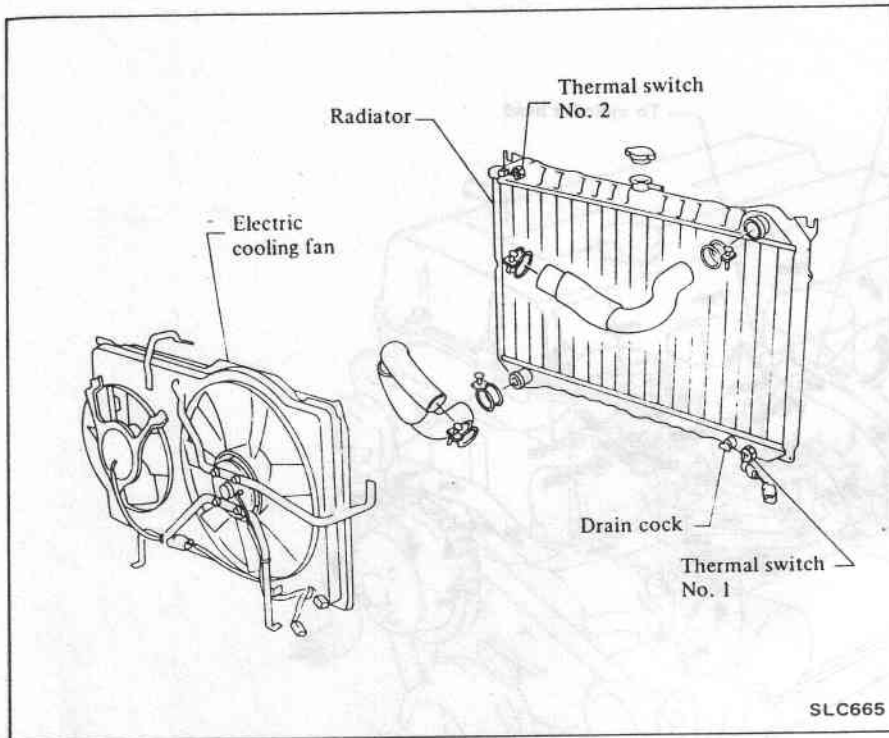
WARNING:

To avoid serious personal injury, never remove radiator cap quickly when engine is hot. Sudden release of cooling system pressure is very dangerous.

If it is necessary to remove radiator cap when radiator is hot, turn cap slowly counterclockwise to the first stop. After all pressure in the cooling system is released, turn cap passing the stop and remove it.

- Always use new gaskets.
- After installation, run engine for a few minutes, and check for leaks.

RADIATOR



INSPECTION

Refer to MA section for checking cooling system.

FJ20E

OPERATION



INSPECTION

Thermo switch	No. 1	No. 2
OFF → ON	90°C (194°F)	95°C (203°F)



INSPECTION

SLC668

 **29 - 39 N·m**
(3.0 - 4.0 kg-m, 22 - 29 ft-lb)

WATER PUMP

INSPECTION

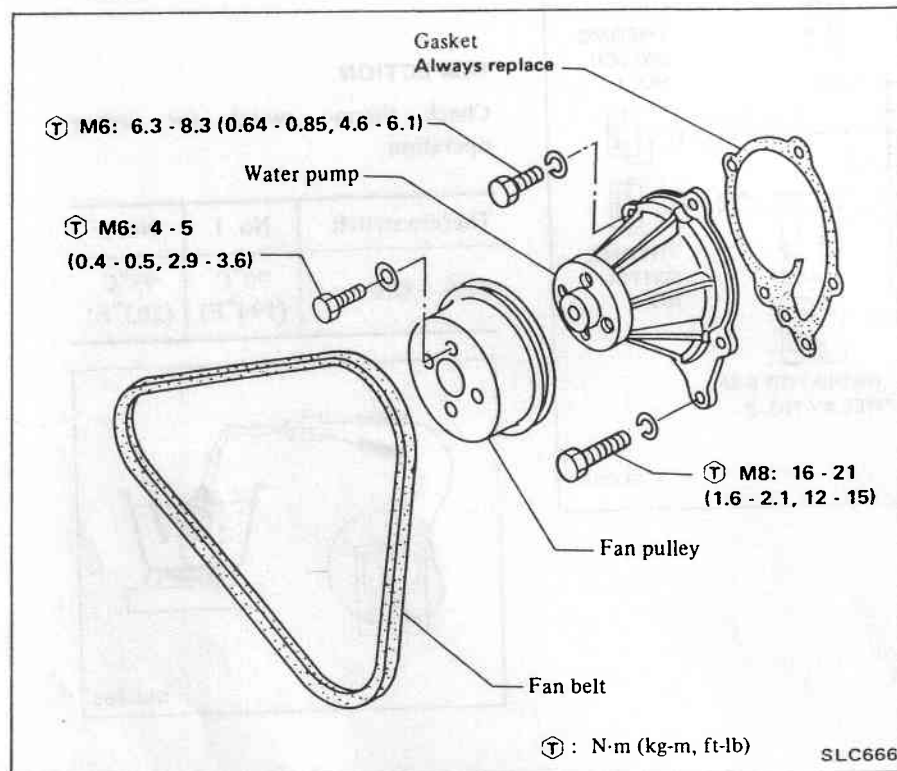
- The water pump cannot be disassembled and should be replaced as a unit.

1. Inspect water pump body and

vane for rust or corrosion.

2. Inspect water pump bearing for excessive end play or rough operation.

- After installation, adjust drive belt deflection. Refer to Section MA for drive belt deflection.

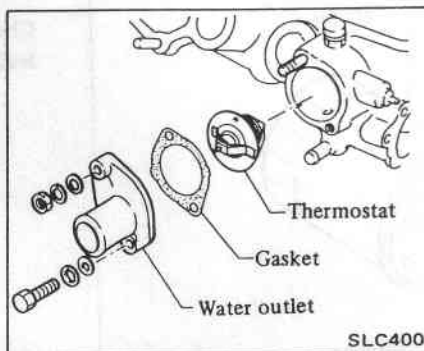


THERMOSTAT

INSPECTION

1. Check valve seating condition at ordinary temperatures. It should seat tightly.
2. Check valve opening temperature and maximum valve lift.
3. Check valve closing temperature. Valve closes at 5°C (9°F) below valve opening temperature.

- It is necessary to check the new thermostat.



	Frigid type (Standard type for Europe & Hong Kong)	Standard type	Tropical type
Valve opening temperature °C (°F)	88 (190)	82 (180)	76.5 (170)
Max. valve lift mm/°C (in/°F)	8/100 (0.31/212)	8/95 (0.31/203)	8/90 (0.31/194)

SERVICE DATA AND SPECIFICATIONS

ENGINE LUBRICATION SYSTEM

GENERAL SPECIFICATIONS

Lubrication method	Pressed feed flow
Oil pump type	Inner gear type
Oil filter type	Full flow and cartridge type

INSPECTION AND ADJUSTMENT

Oil pump

Unit: mm (in)

Body to outer gear clearance	0.11 - 0.20 (0.0043 - 0.0079)
Inner gear to crescent clearance	0.12 - 0.23 (0.0047 - 0.0091)
Outer gear to crescent clearance	0.21 - 0.32 (0.0083 - 0.0126)
Housing to gear clearance	0.06 - 0.12 (0.0024 - 0.0047)

TIGHTENING TORQUE

Unit	N-m	kg-m	ft-lb
Oil pump cover screw	3.7 - 5.0	0.38 - 0.51	2.7 - 3.7
Front cover bolt (4T)	9.1 - 11.8	0.93 - 1.2	6.7 - 8.7
(7T)	16 - 21	1.6 - 2.1	12 - 15
Crankshaft pulley bolt	147 - 196	15.0 - 20.0	108 - 145
Alternator bracket bolt to front cover	30 - 40	3.1 - 4.1	22 - 30
to block	44 - 59	4.5 - 6.0	33 - 43
Alternator adjusting bar bolt	16 - 21	1.6 - 2.1	12 - 15
Oil strainer bolt	16 - 21	1.6 - 2.1	12 - 15
Oil pan bolt	5 - 7	0.5 - 0.7	3.6 - 5.1

ENGINE COOLING SYSTEM

GENERAL SPECIFICATIONS

Cooling method	Water cooling, forced circulation
Water pump type	Centrifugal
Thermostat type	Wax-pellet
Radiator type	Corrugated fin and tube

INSPECTION AND ADJUSTMENT

Water pump

Drive belt deflection	Adjust deflection of used belt	Set deflection of new belt
Alternator mm (in)	8.5 - 12.5 (0.335 - 0.492)	8.0 - 10.5 (0.315 - 0.413)
Air conditioner compressor mm (in)	7 - 10.5 (0.28 - 0.413)	7 - 8 (0.28 - 0.31)
Power steering oil pump mm (in)	17 - 21 (0.67 - 0.83)	13 - 17 (0.51 - 0.67)
Applied pushing force N (kg, lb)	98 (10, 22)	

Thermostat

	Frigid type (Standard type for Europe & Hong Kong)	Standard type	Tropical type
Valve opening temperature °C (°F)	88 (190)	82 (180)	76.5 (170)
Max. valve lift mm/°C (in/°F)	8/100 (0.31/212)	8/95 (0.31/203)	8/90 (0.31/194)

Radiator

Unit: kPa (bar, kg/cm², psi)

Cap relief pressure	88 (0.88, 0.9, 13)
Leakage test pressure	147 (1.47, 1.5, 21)

TIGHTENING TORQUE

	N-m	kg-m	ft-lb
Water pump bolt M6	6.3 - 8.3	0.64 - 0.85	4.6 - 6.1
M8	16 - 21	1.6 - 2.1	12 - 15
Water outlet bolt	9.1 - 11.8	0.93 - 1.2	6.7 - 8.7

ENGINE MAINTENANCE

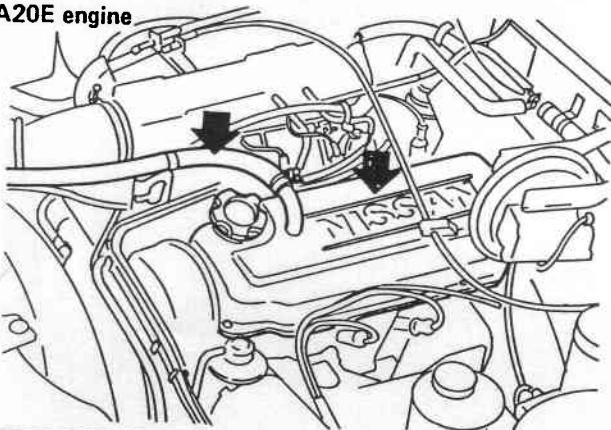
Retightening Cylinder Head Bolts, Manifolds, Exhaust Tube

Retightening should be performed while engine is cold [approximately 20°C (68°F)].

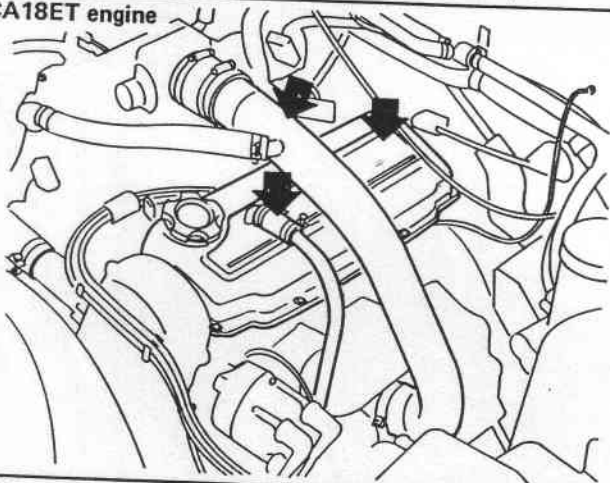
CYLINDER HEAD BOLTS

1. Remove rocker cover.

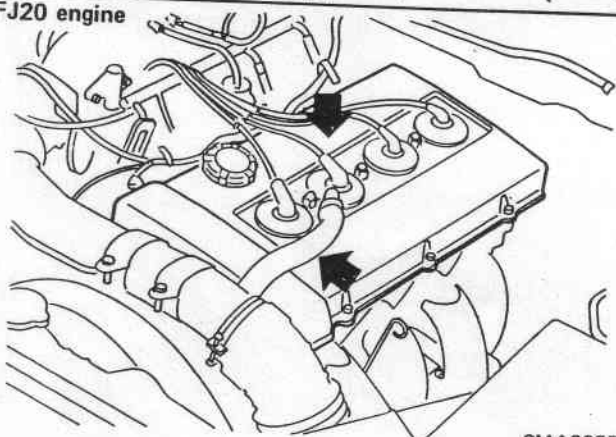
CA20E engine



CA18ET engine



FJ20 engine



SMA005B

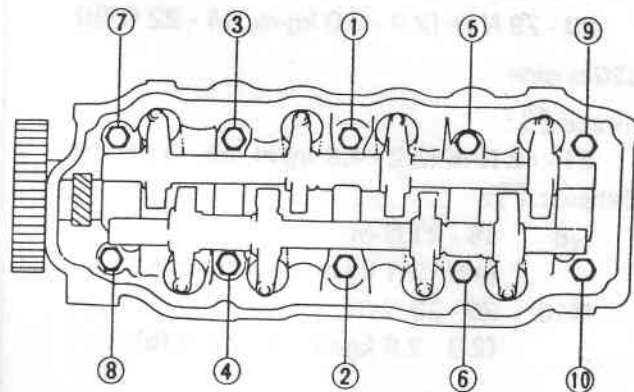
2. Retightening procedure

- CA engine

Loosen each cylinder head bolt slightly, then

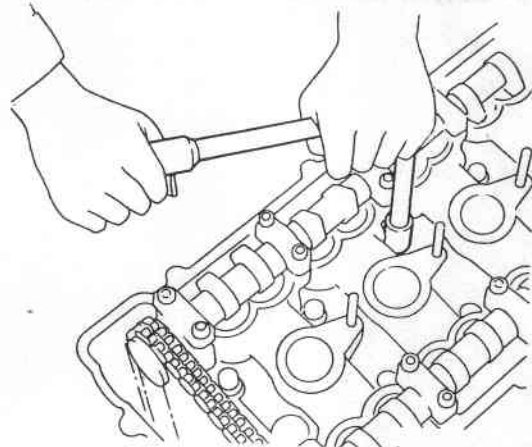
tighten to a torque of 74 to 83 N·m (7.5 to 8.5 kg-m, 54 to 61 ft-lb).

Retightening should be made in the sequence shown.

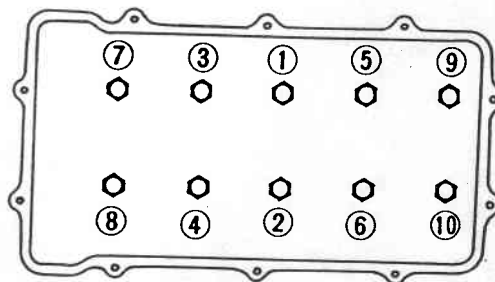


SEM627

- FJ20 engine



SMA343A



SMA344A



Cylinder head bolt

118 - 127 N·m

(12.0 - 13.0 kg-m, 87 - 94 ft-lb)

ENGINE MAINTENANCE

Retightening Cylinder Head Bolts, Manifolds & Exhaust Tube

MANIFOLD NUTS AND BOLTS

- CA engine

Intake :

20 - 25 N·m (2.0 - 2.6 kg-m, 14 - 19 ft-lb)

Exhaust :

20 - 29 N·m (2.0 - 3.0 kg-m, 14 - 22 ft-lb)

- FJ20 engine

Intake :

31 - 42 N·m (3.2 - 4.3 kg-m, 23 - 31 ft-lb)

Exhaust :

M8 16 - 21 N·m

(1.6 - 2.1 kg-m, 12 - 15 ft-lb)

M10 20 - 25 N·m

(2.0 - 2.6 kg-m, 14 - 19 ft-lb)

EXHAUST TUBE NUTS

 : 26 - 36 N·m (2.7 - 3.7 kg-m, 20 - 27 ft-lb)

ENGINE MAINTENANCE

Adjusting Intake and Exhaust Valve Clearance

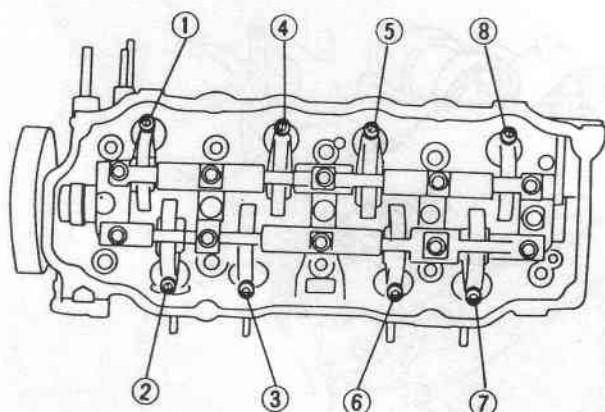
Adjustment should be made while engine is warm but not running.

CA ENGINE

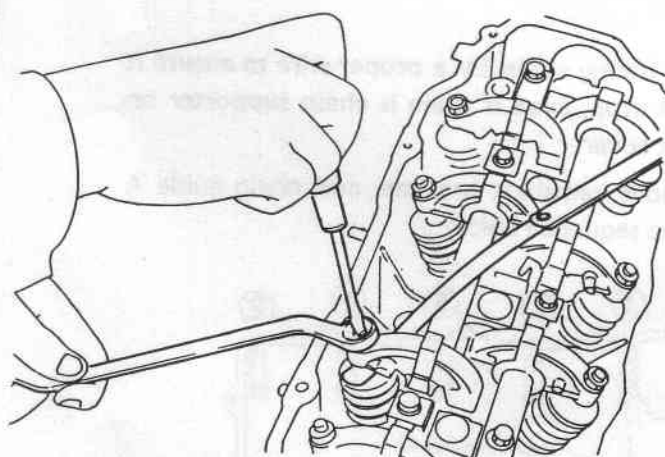
1. Set No. 1 cylinder in top dead center on its compression stroke, and adjust valve clearance ①, ②, ④ and ⑥.
2. Set No. 4 cylinder in top dead center on its compression stroke, and adjust valve clearance ③, ⑤, ⑦ and ⑧.

Adjusting screw lock nuts

□ : 18 - 22 N·m (1.8 - 2.2 kg-m, 13 - 16 ft-lb)



SMA806A



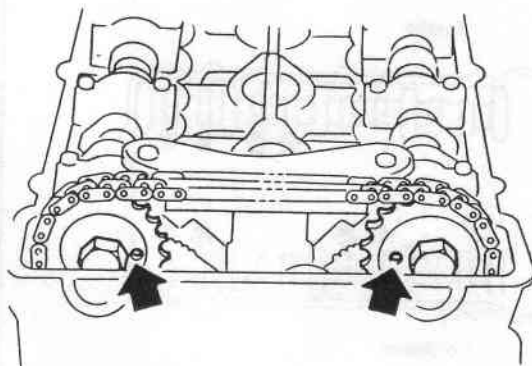
SMA807A

Valve clearance (Hot)

Intake & exhaust 0.30 mm (0.012 in)

FJ20 ENGINE

1. Set No. 1 piston at top dead center on its compression stroke.



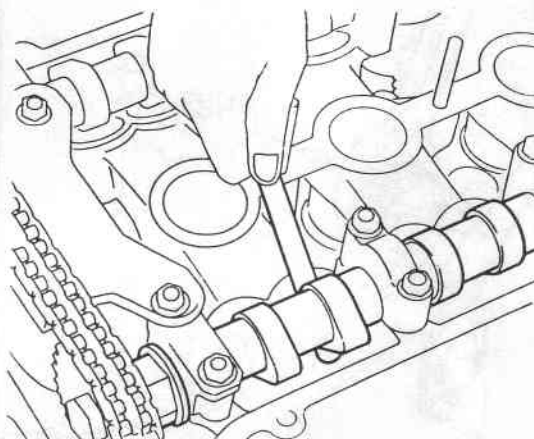
SMA345A

Measure valve clearance and write it down.

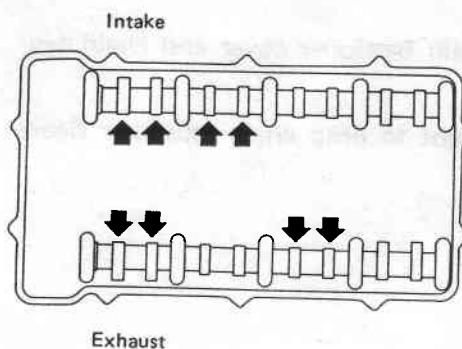
Valve clearance (Hot)

Intake 0.30 mm (0.012 in)

Exhaust 0.35 mm (0.014 in)



SMA346A

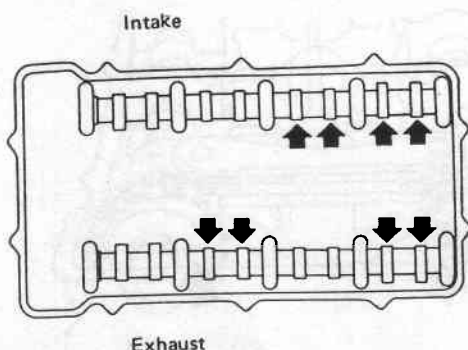


SMA347A

ENGINE MAINTENANCE

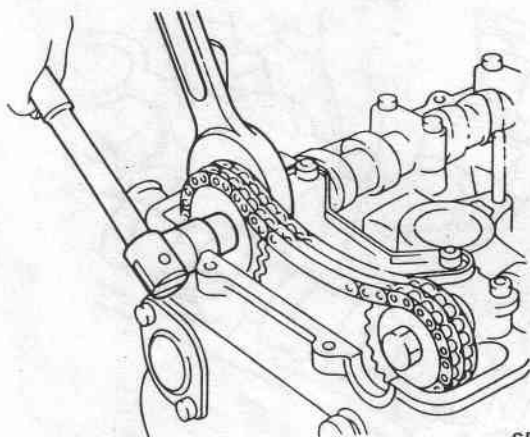
Adjusting Intake and Exhaust Valve Clearance (Cont'd)

2. Set No. 4 piston at top dead center on its compression stroke.
Measure valve clearance and write it down.



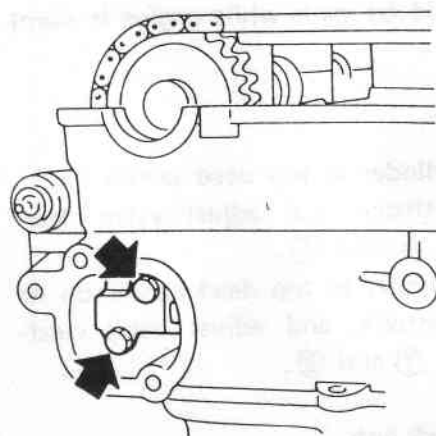
SMA348A

3. If out of specification, adjust valve clearance.
- (1) Reset No. 1 piston at top dead center on its compression stroke.
 - (2) Scribe marks on timing chain and camshaft sprockets with paint.
 - (3) Loosen camshaft sprocket bolts.



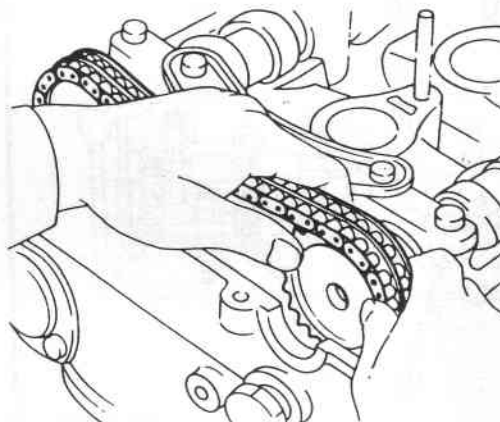
SEM809

- (4) Remove chain tensioner cover and chain tensioner A.
- Be careful not to drop chain tensioner sleeve and spring.



SEM810

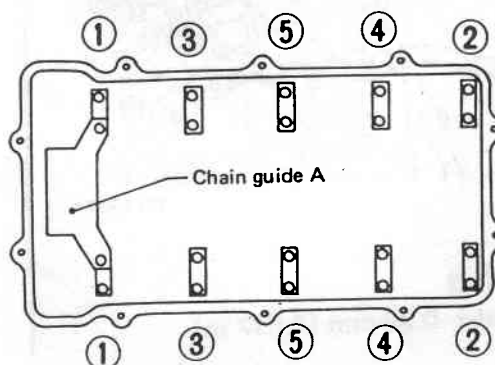
- (5) Remove camshaft sprockets.



SEM811

Support timing chain by a proper wire to ensure it does not drop, even if there is chain supporter on the front cover.

- (6) Remove camshaft brackets and chain guide A in the sequence below.



SEM812

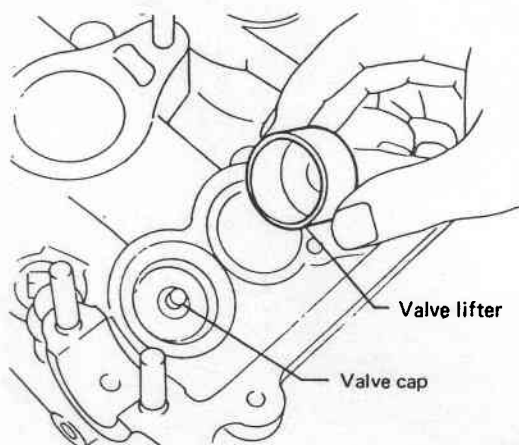
ENGINE MAINTENANCE

Adjusting Intake and Exhaust Valve Clearance (Cont'd)

Keep removed brackets in order.

(7) Remove camshafts.

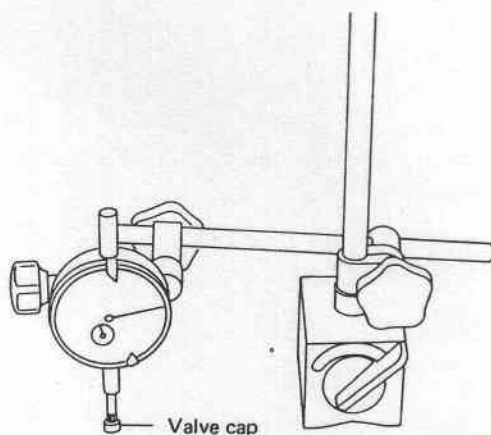
(8) Remove valve lifter and cap.



SEM815

- Valve lifter can be removed easily by using magnet or suction rubber.
- Keep valve lifter and cap in order.

(9) Measure thickness of removed valve cap using surface plate and dial gauge, and write it down.



SMA349A

(10) Calculate optimum thickness of valve cap.

Intake:

$$t = t_i + T_i - 0.30 \text{ (mm)}$$

Exhaust:

$$t = t_E + T_E - 0.35 \text{ (mm)}$$

t_i, t_E : Measured valve cap thickness (mm)

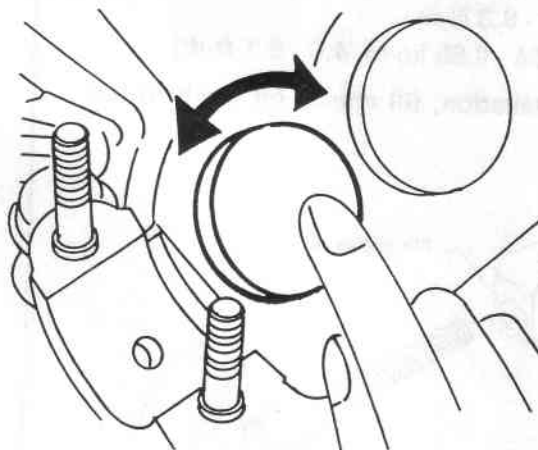
T_i, T_E : Measured valve clearance (mm)

(11) Pick out proper valve cap from the list of valve cap thicknesses in S.D.S.

Before installation, it is necessary to check thickness of new valve cap.

(12) Install valve cap and valve lifter.

- Apply engine oil on valve cap and outer wall of valve lifter.
- Pay particular attention not to damage valve lifter guide hole.
- Check valve lifter for smooth rotation.



SEM829

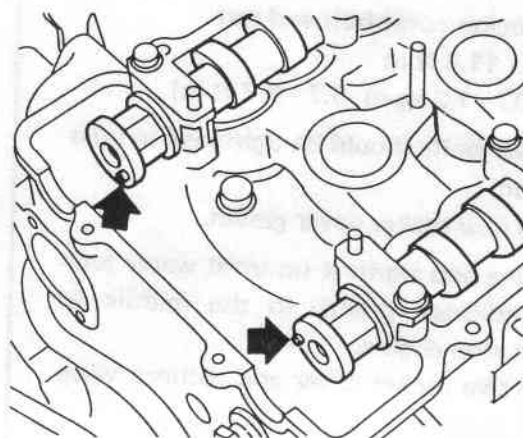
(13) Install camshafts and tighten camshaft bracket nuts with chain guide A in the reverse order of removal in two or three stages.

☐ : Camshaft bracket nut

14 - 18 N·m

(1.4 - 1.8 kg-m, 10 - 13 ft-lb)

- Install camshafts so that No. 1 cams are at top dead center.



SEM830

ENGINE MAINTENANCE

Adjusting Intake and Exhaust Valve Clearance (Cont'd)

b. Apply engine oil on cam, camshaft journal, camshaft bearing and valve lifter upper surface.

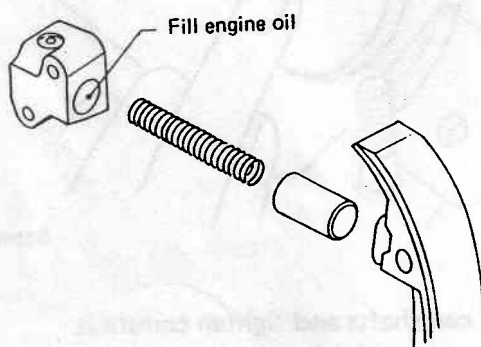
(14) Set timing chain on camshaft sprockets by aligning each mark scribed before removal. Then, install camshaft sprockets to camshafts.

☞ : Camshaft sprocket bolt
108 - 137 N·m
(11.0 - 14.0 kg-m, 80 - 101 ft-lb)

(15) Install chain tensioner A.

☞ : Chain tensioner A bolt
6.3 - 8.3 N·m
(0.64 - 0.85 kg-m, 4.6 - 6.1 ft-lb)

Before installation, fill engine oil in chain tensioner A.



SEM831

(16) Install chain tensioner cover.

(17) Install rubber plug with sealant.

(18) Install valve rocker cover.

☞ : Valve rocker cover bolt and nut
9.1 - 11.8 N·m
(0.93 - 1.2 kg-m, 6.7 - 8.7 ft-lb)

a. Rocker cover bolts should be tightened in criss-cross fashion.

b. Always use new rocker cover gasket.

(19) Start engine and warm it up until water temperature indicator points to the middle of gauge, then stop engine.

(20) Remove valve rocker cover and recheck valve clearance.

ENGINE MAINTENANCE

Checking and Adjusting Drive Belts

1. Inspect for cracks, fraying, wear of oil adhesion. Replace if necessary.

The belts should not touch the bottom of the pulley groove.

2. Check drive belt deflections by pushing mid-way between pulleys.

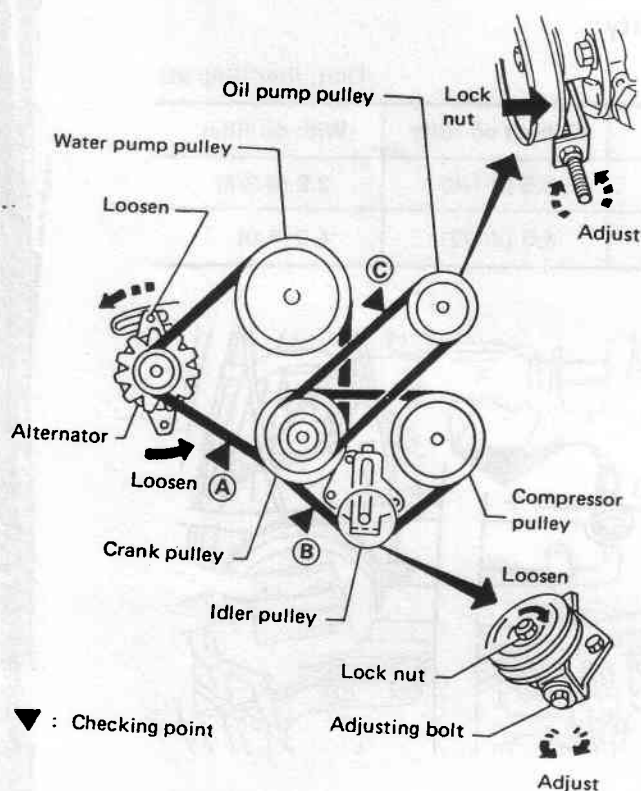
Adjust if belt deflections exceed the limit.

Belt deflection: CA ENGINE

Unit: mm (in)

	Used belt deflection		Set deflection of new belt
	Limit	Adjust	
Alternator (A)	13 (0.51)	7 - 10 (0.28 - 0.39)	6 - 8 (0.24 - 0.31)
A/C compressor (B)	7 (0.28)	3 - 5 (0.12 - 0.20)	3 - 5 (0.12 - 0.20)
P/S oil pump (C)	14 (0.55)	8 - 11 (0.31 - 0.43)	6 - 9 (0.24 - 0.35)

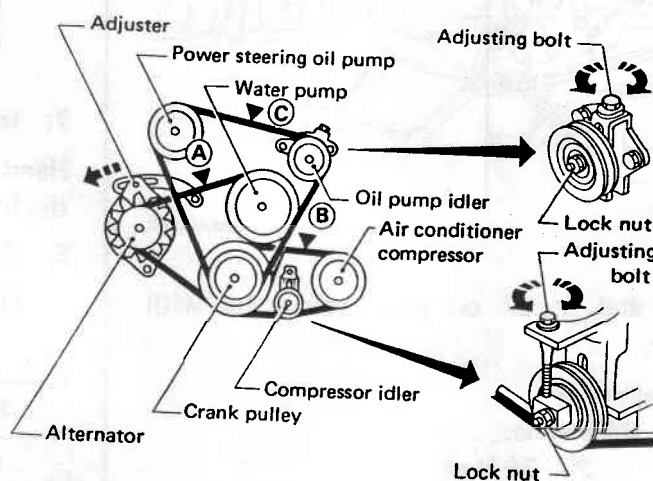
Applied pushing force: 98 N (10 kg, 22 lb)



SMA927A

Belt deflection: FJ20 ENGINE

Drive belt deflection	Adjust deflection of used belt	Set deflection of new belt
Alternator (A) mm (in)	8.5 - 12.5 (0.335 - 0.492)	8.0 - 10.5 (0.315 - 0.413)
Air conditioner compressor (B) mm (in)	7 - 10.5 (0.28 - 0.413)	7 - 8 (0.28 - 0.31)
Power steering oil pump (C) mm (in)	17 - 21 (0.67 - 0.83)	13 - 17 (0.51 - 0.67)
Applied pushing force N (kg, lb)	98 (10, 22)	



MA966A

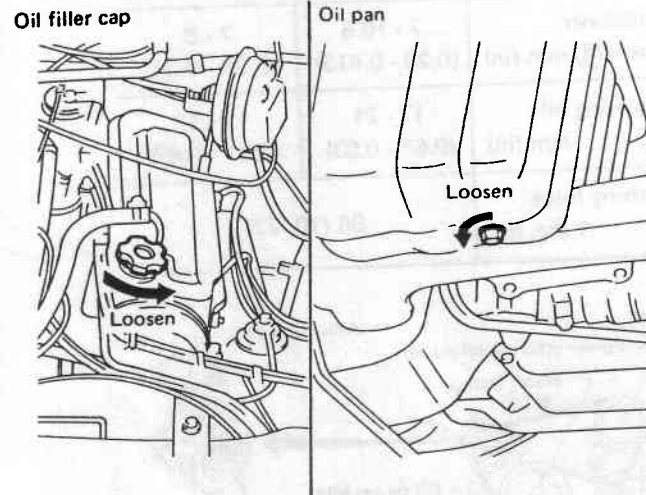
ENGINE MAINTENANCE

Changing Engine Oil and Oil Filter

1. Warm up engine, then stop it, and check for oil leakage from engine components.
2. Remove oil filler cap and drain oil.

WARNING:

Be careful not to burn yourself, as the engine oil may be hot.



SMA934A

3. Clean and install oil pan drain plug with washer.

☞ : Drain plug

CA engine:

29 - 39 N·m

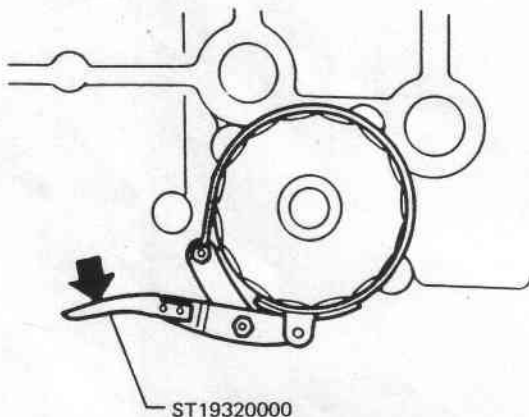
(3.0 - 4.0 kg-m, 22 - 29 ft-lb)

FJ20 engine:

35 - 47 N·m

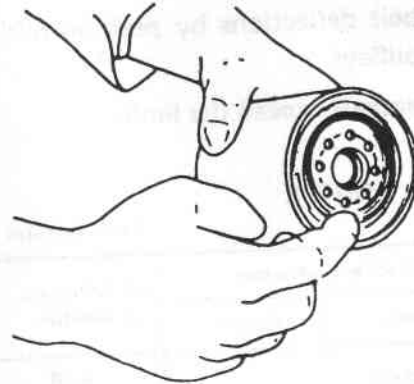
(3.6 - 4.8 kg-m, 26 - 35 ft-lb)

4. Remove oil filter.



SLC028

5. Wipe oil filter mounting surface.
6. Smear a little engine oil on rubber gasket of oil filter.



SMA010

7. Install oil filter.

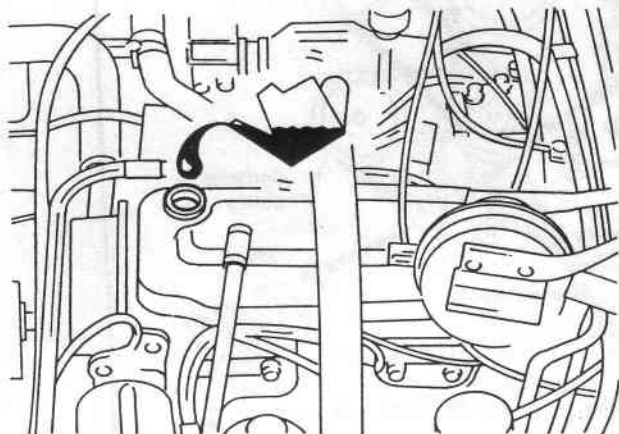
Hand-tighten only. Do not use a wrench to tighten the filter.

8. Add recommended engine oil.

Oil capacity:

Unit: liter (Imp qt)

Engine	Without oil filter	With oil filter
CA	3.5 (3-1/8)	3.8 (3-3/8)
FJ20	4.0 (3-1/2)	4.5 (4.0)



SMA935A

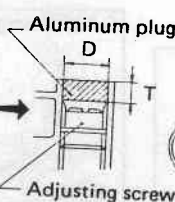
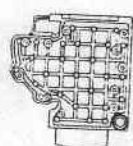
ENGINE MAINTENANCE

Checking and Adjusting Idle-rpm, Ignition Timing and Mixture Ratio

CAUTION:

- Idle mixture ratio is adjusted at factory and requires no further adjustment. If it becomes necessary to adjust it, proceed with the following steps.
- To prevent possible damage to the adjusting screw while performing the CO% check, do not exceed the depth of "T" when drilling the seal plug.

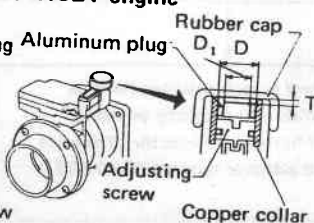
CA20E engine



T: 5 mm (0.20 in)
D: 12.6 mm (0.496 in)

SEF190C

CA18ET engine



T: 1.2 mm (0.047 in)
D: 10 mm (0.39 in)
D₁: 7 mm (0.28 in)

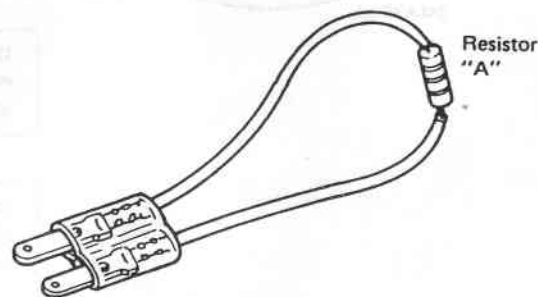
SEF191C

- The adjusting screw of CA18ET air flow meter turns only 360 degrees.

Preparation

- Make sure that the following parts are in good order.
 - Battery
 - Ignition system
 - Engine oil and coolant levels
 - Fuses
 - E.F.I. harness connectors
 - Vacuum hoses
 - Air intake system (oil filler cap, oil level gauge, etc.)
 - Valve clearance, engine compression
 - E.G.R. valve operation (For Australia model)
 - Throttle valve and throttle valve switch operation
- Set shift lever in "Neutral" position (in "N" or "P" position for the automatic transmission). Engage parking brake and lock both front and rear wheels with wheel chocks.

- Turn off air conditioner and headlamps.
- Make the check after the radiator cooling fan has stopped.
- Before disconnecting and connecting E.F.I. E.C.C.S. component parts harness connector ensure that ignition switch is in "OFF" position.
- Use "CO"-meter after it is fully warmed up and insert "CO"-meter probe into tail pipe more than 0.4 m (1.3 ft).
- Measure "CO"% with air cleaner installed.
- When adjusting idle "CO"%, prepare a resistor.



SMA211

Make lead wire as follows:

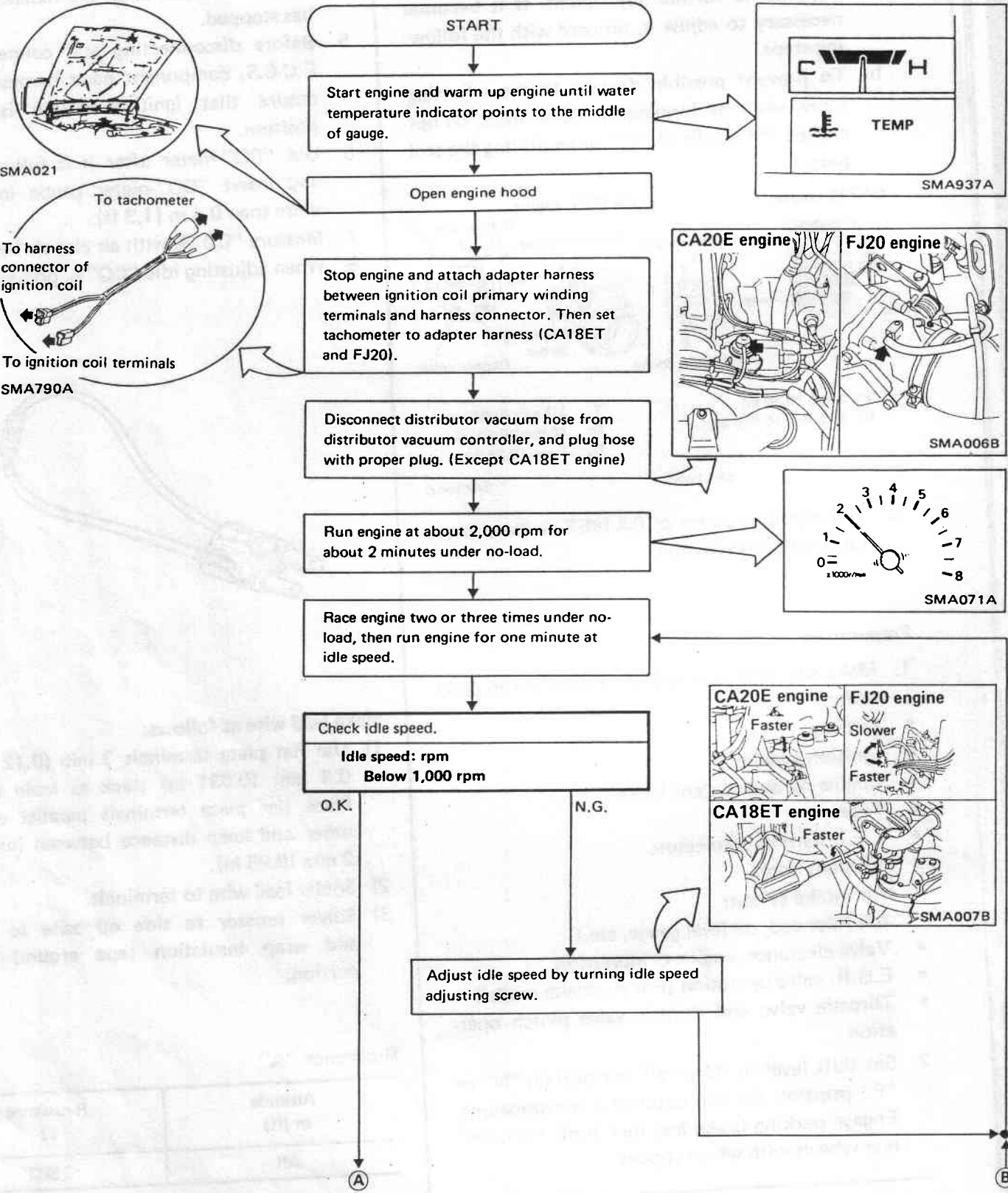
- Use flat plate terminals 3 mm (0.12 in) wide, 0.8 mm (0.031 in) thick as male terminals. Place flat plate terminals parallel with each other and keep distance between inside faces 2 mm (0.08 in).
- Solder lead wire to terminals.
- Solder resistor to side opposite to terminal and wrap insulation tape around soldered portion.

Resistance "A"

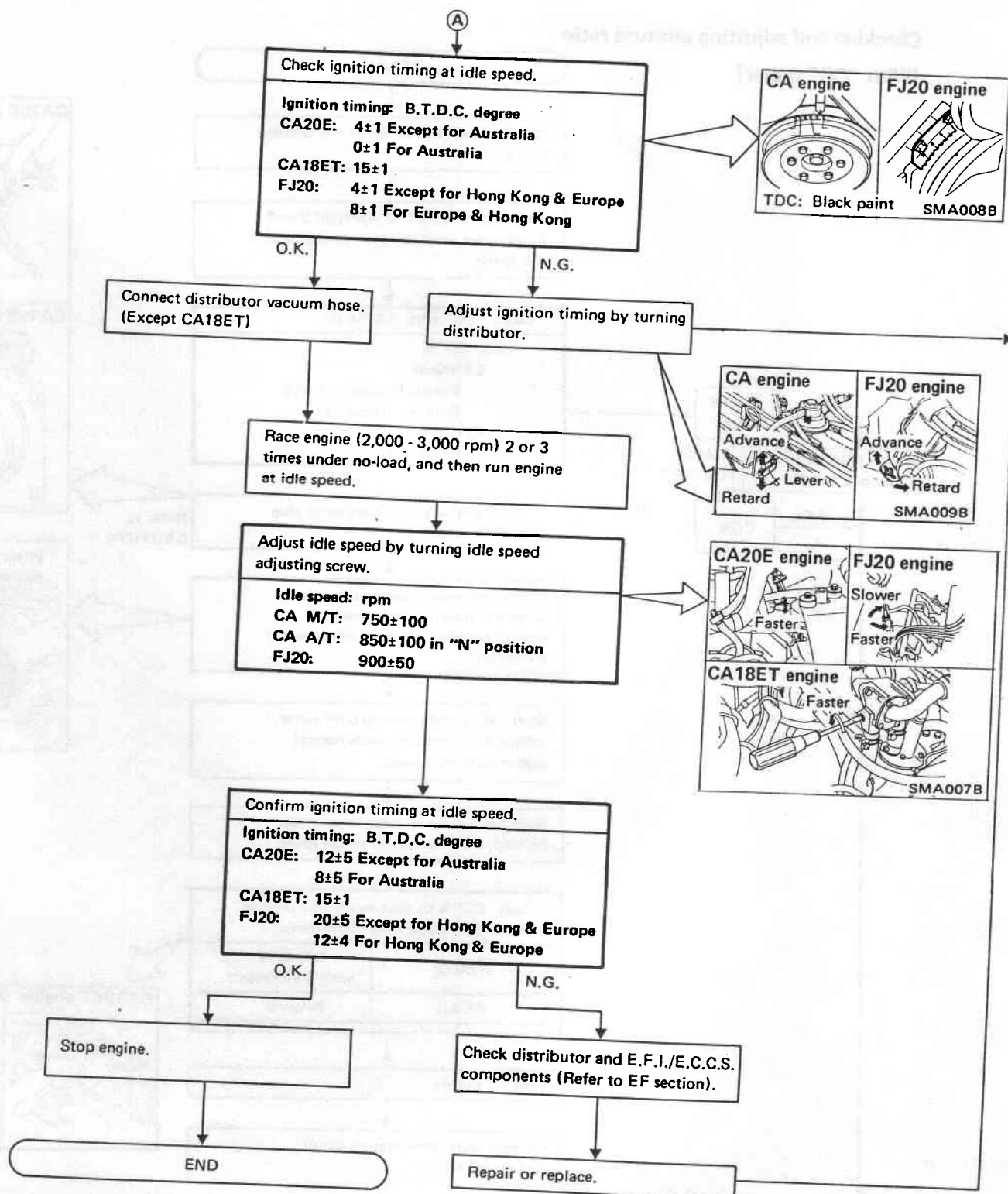
Altitude m (ft)	Resistance Ω
All	2,500

ENGINE MAINTENANCE

Checking and adjusting idle rpm and ignition timing

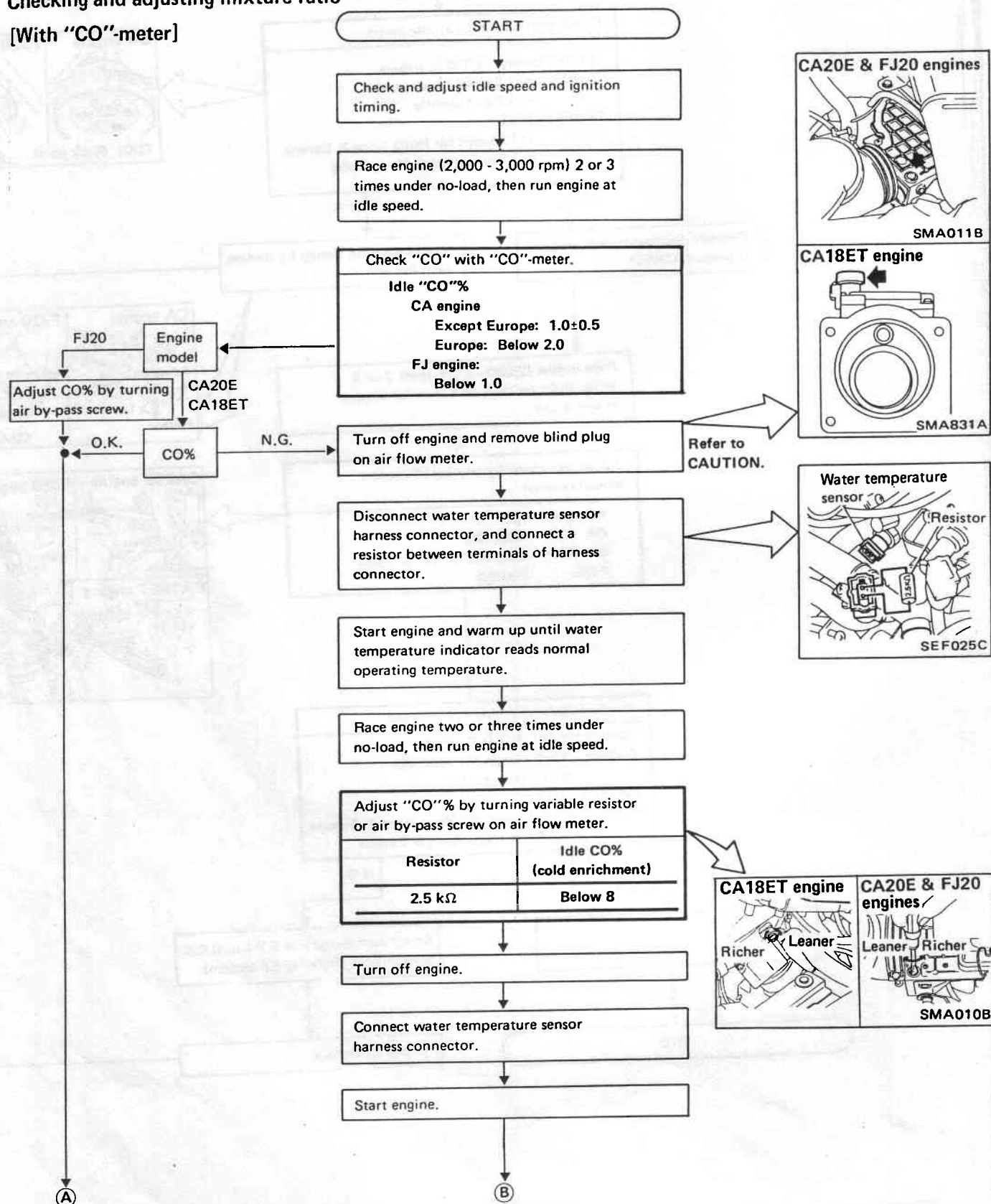


ENGINE MAINTENANCE

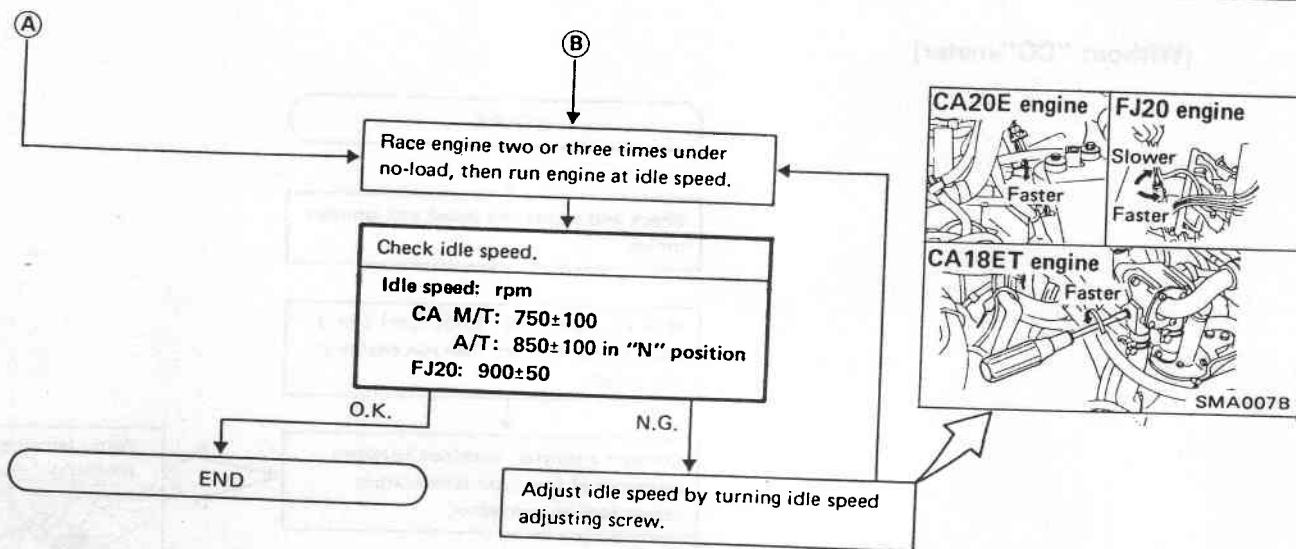


ENGINE MAINTENANCE

Checking and adjusting mixture ratio [With "CO"-meter]

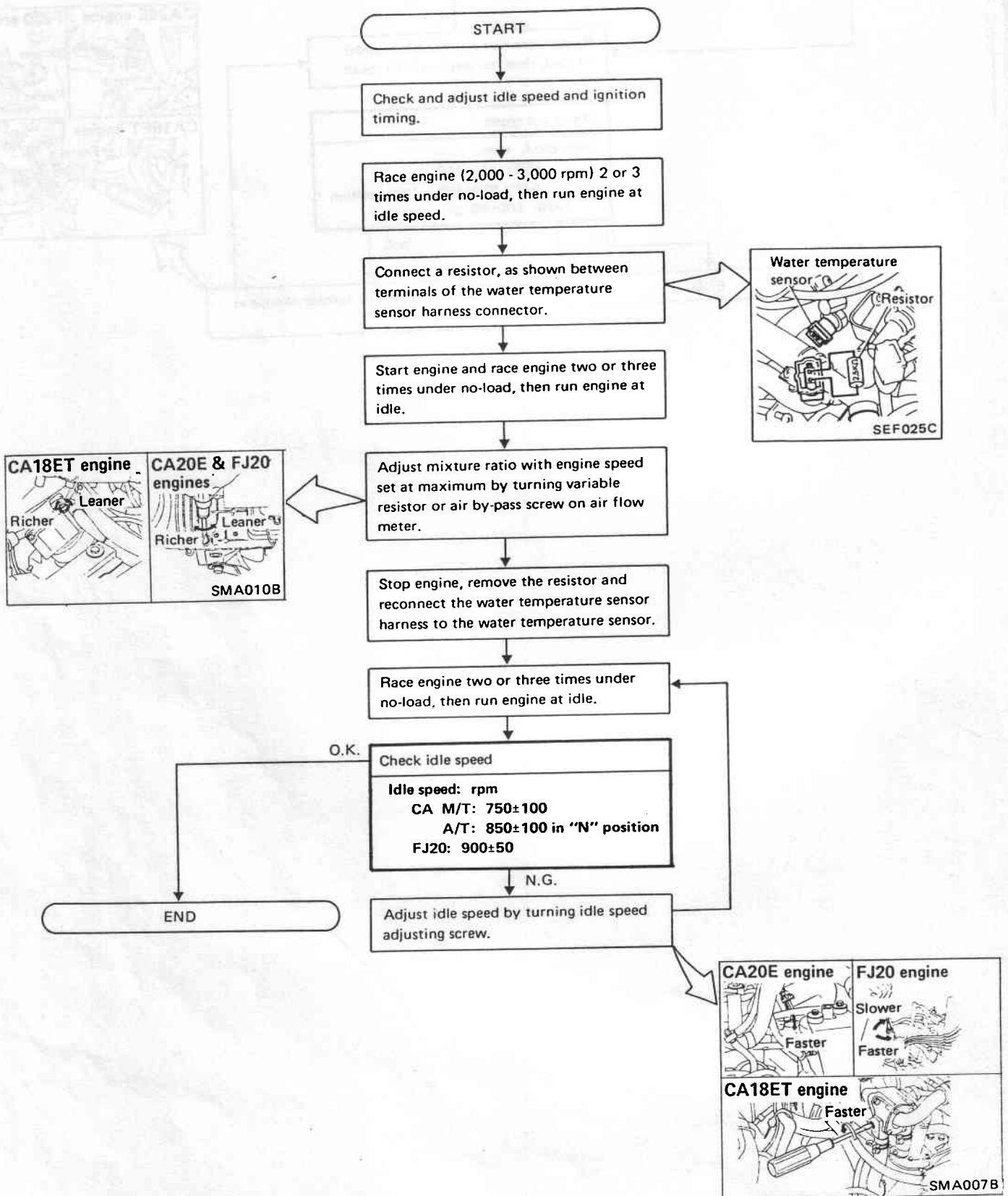


ENGINE MAINTENANCE



ENGINE MAINTENANCE

[Without "CO"-meter]



ENGINE MAINTENANCE

Replacing Fuel Filter

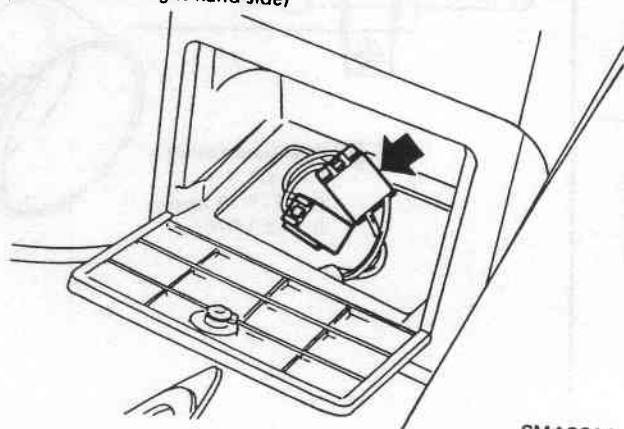
The filter is designed especially for use with the E.F.I. system. Because of the fuel pressure in fuel line is higher than 196 kPa (1.96 bar, 2.0 kg/cm², 28 psi).

Before disconnecting fuel hose, release fuel pressure from fuel line to eliminate danger.

Reduce fuel pressure to zero.

- (1) Start engine.
- (2) Disconnect the harness connector of fuel pump.

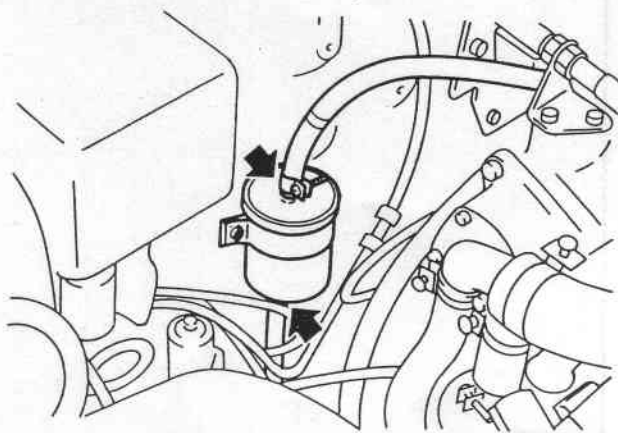
Tool box (Rear right-hand side)



SMA931A

- (3) After engine stall, crank the engine twice or three times.
- (4) Turn the ignition switch "OFF".
- (5) Reconnect the harness connector of fuel pump.

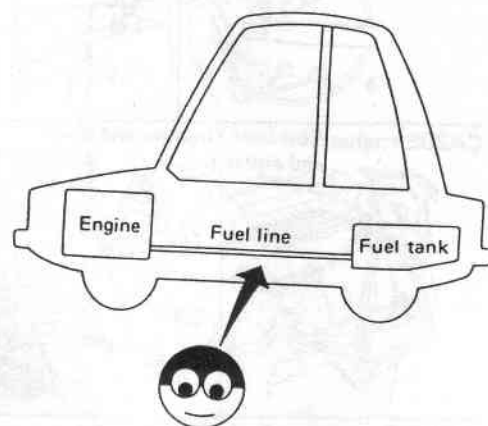
Be careful not to spill fuel over engine compartment. Place a rag to absorb fuel.



SMA932A

Checking Fuel System

Check fuel lines and tank for proper attachment leaks, cracks, damage, loose connections, chafing and deterioration.



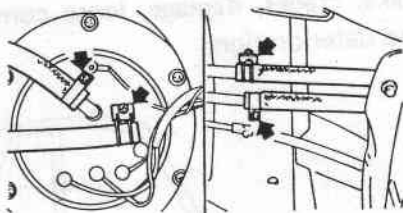
SMA803A

ENGINE MAINTENANCE

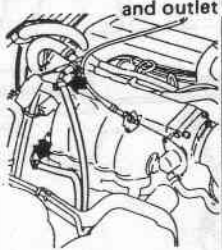
Checking Fuel System (Cont'd)

Fuel pump

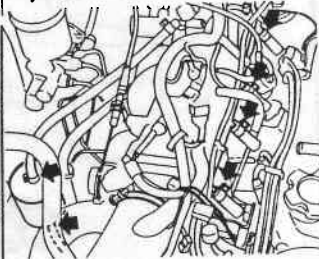
Fuel tank



CA20E engine Fuel inlet and outlet

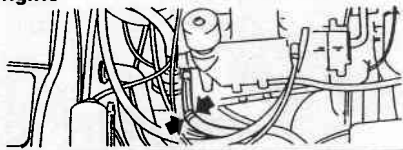


Injector and filter

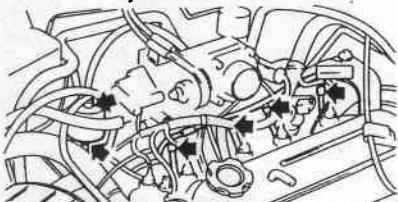


CA18ET engine

Fuel inlet and outlet

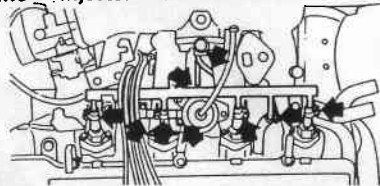


Injector and filter

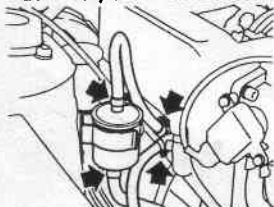


FJ20 engine

Injector and inlet and outlet



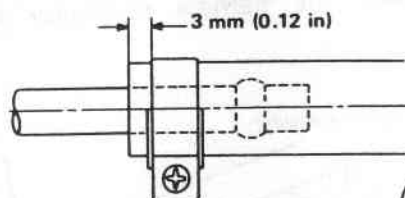
Fuel inlet, outlet and filter



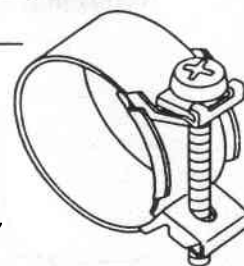
SMA012B

CAUTION:

Do not reuse fuel clamp after loosening. Tighten high pressure rubber hose clamp so that clamp end is 3 mm (0.12 in) from hose end. Ensure that screw does not come into contact with adjacent parts.



 Fuel hose clamps
1.0 - 1.5 N·m
(0.10 - 0.15 kg-m,
0.7 - 1.1 ft-lb)



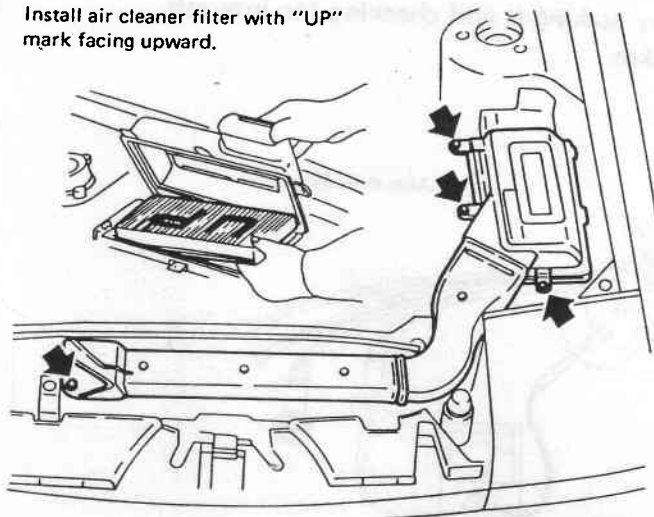
SMA804A

ENGINE MAINTENANCE

Replacing Air Cleaner Filter

The viscous paper type air cleaner filter does not require any cleaning operation between renewal.

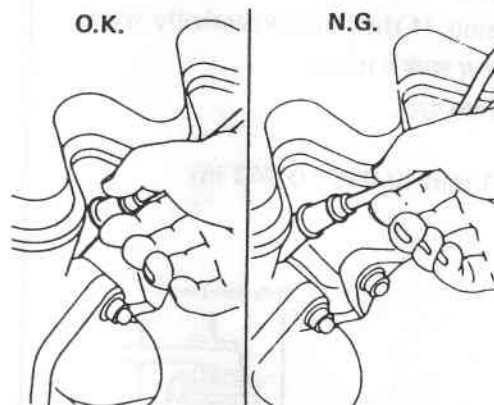
Install air cleaner filter with "UP" mark facing upward.



SMA928A

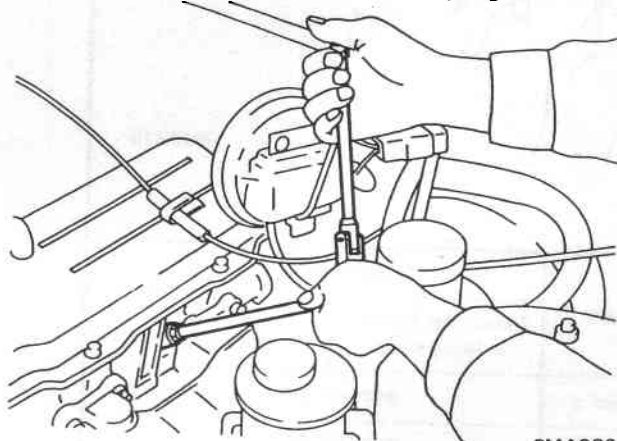
Changing and Replacing Spark Plugs

1. Disconnect spark plug wire at boot. Do not pull on the wire.



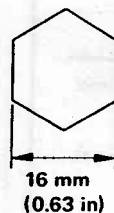
SMA037A

2. Remove spark plugs with spark plug wrench.



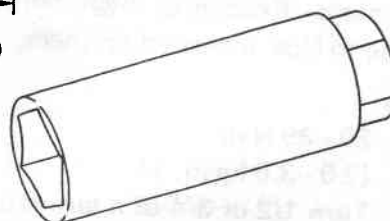
SMA936A

Use a suitable plug wrench as shown below for CA engines.



16 mm
(0.63 in)

Wrench with a magnet
to hold spark plug



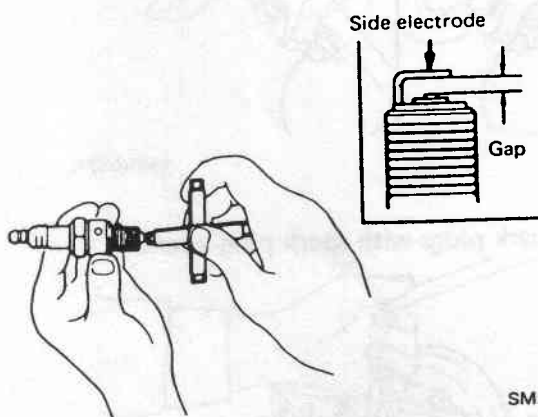
SEM294A

ENGINE MAINTENANCE

Checking and Replacing Spark Plugs (Cont'd)

4. Clean plugs in sand blast cleaner.
5. Inspect insulator for cracks or chips, gasket for damage or deterioration and electrode for wear and burning. If they are excessively worn, replace with new spark plugs.
5. Check spark plug gap.

Gap: 1.0 - 1.1 mm (0.039 - 0.043 in)



SMA476

Spark plug:

Engine	Type	Destination	
		Except for Europe & Hong Kong	For Hong Kong & Europe
CA20E	Standard	BCP6ES-11*	
	Cold	BCP7ES-11*	
CA18ET	Standard	BCP6ES-11*	BCPR6ES-11*
	Cold	BCP7ES-11*	BCPR7ES-11*
FJ20	Standard	BP6ES-11	BPR6ES-11
	Cold	BP7ES-11	BPR7ES-11

*Distance between two opposing sides of spark plug hexagonal base: 16 mm (0.63 in)

6. Install spark plugs. Reconnect high tension cables according to Nos. indicated on them.

☐ : Spark plug

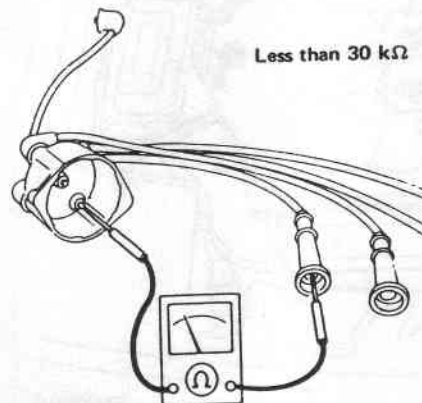
Used: 20 - 29 N·m

(2.0 - 3.0 kg-m, 14 - 22 ft-lb)

New: Turn 1/2 or 3/4 of a turn after gasket is seated.

Checking Ignition Wires

1. Check the high tension wires for cracks, damage, burned terminals and proper fit.
2. Measure the resistance of the high tension wires, by staking it and checking for intermittent breaks.



SMA015A

ENGINE MAINTENANCE

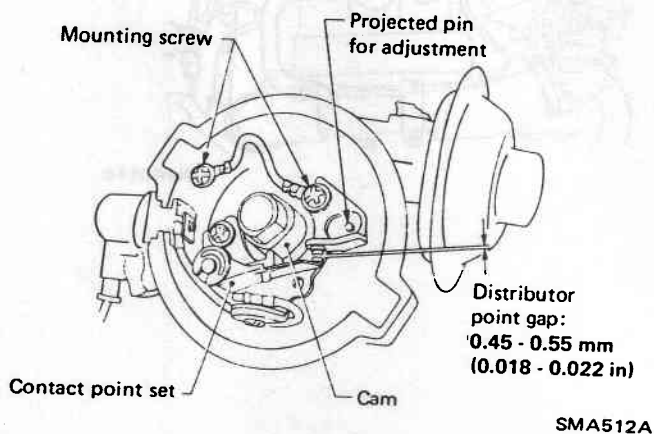
Checking and Replacing Distributor Contact Point

VISUAL CHECK

1. Inspect points for excessive burning or pitting.
2. Use a point file to clean contact area and remove scale from points.

CHECKING POINT GAP

Set contact point on the nose of cam, and check point gap with oilless thickness gauge.

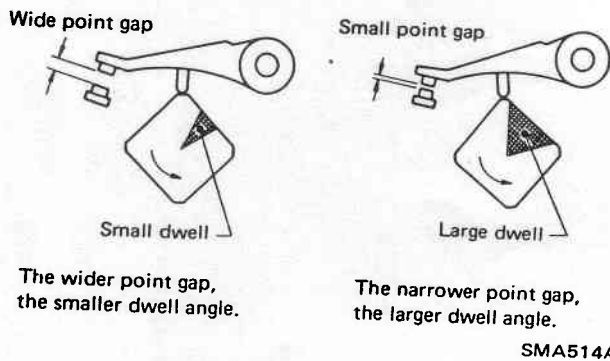


If out of specification, loosen contact point plate attaching screw and adjust point gap by pivoting projected pin.

CHECKING DWELL ANGLE

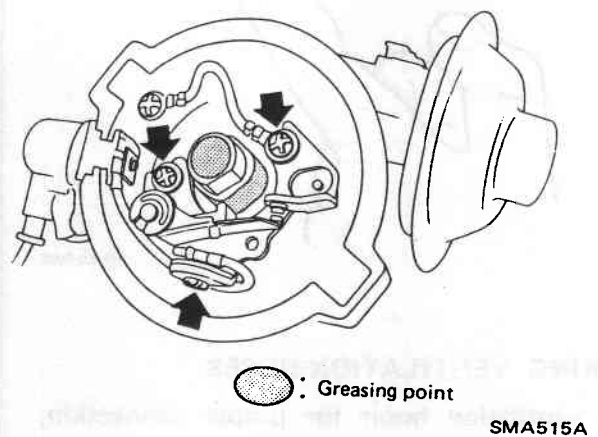
1. Run engine at idle speed and measure dwell angle with a dwell meter.

Dwell angle: 49° - 55°



2. If dwell angle is not within the specified value, turn off engine and adjust point gap.
3. If dwell angle is not within the specified value when point gap is correct, cam lobe is worn. Replace cam.

REPLACING DISTRIBUTOR CONTACT POINT



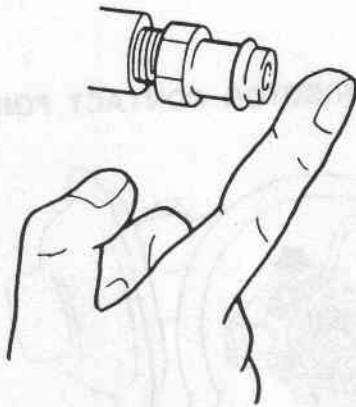
1. Install new contact point set and adjust point gap and dwell angle.
2. Apply the specified grease to cam and cam head.

ENGINE MAINTENANCE

Checking Positive Crankcase Ventilation (P.C.V.) System

CHECKING P.C.V. VALVE

Disconnect hose and check P.C.V. valve to see it is operating properly.

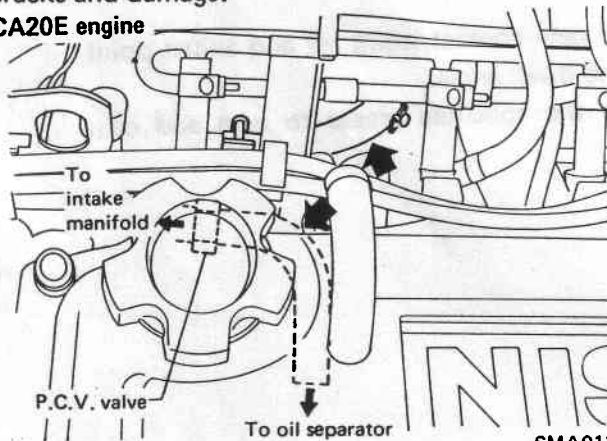


SMA048

CHECKING VENTILATION HOSES

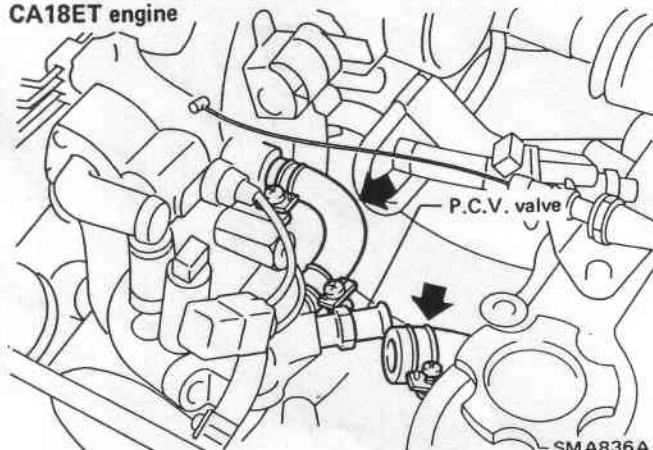
Check ventilation hoses for proper connection, cracks and damage.

CA20E engine



SMA013B

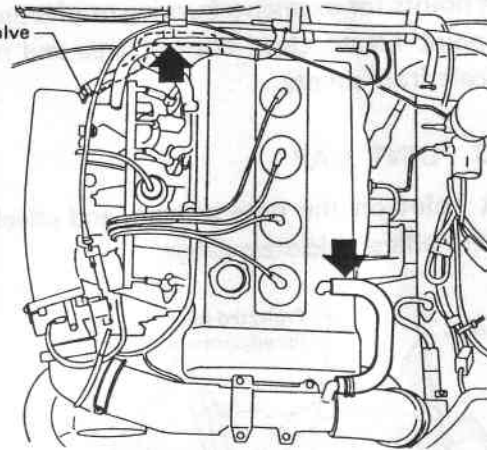
CA18ET engine



SMA836A

FJ20 engine

P.V.C. valve

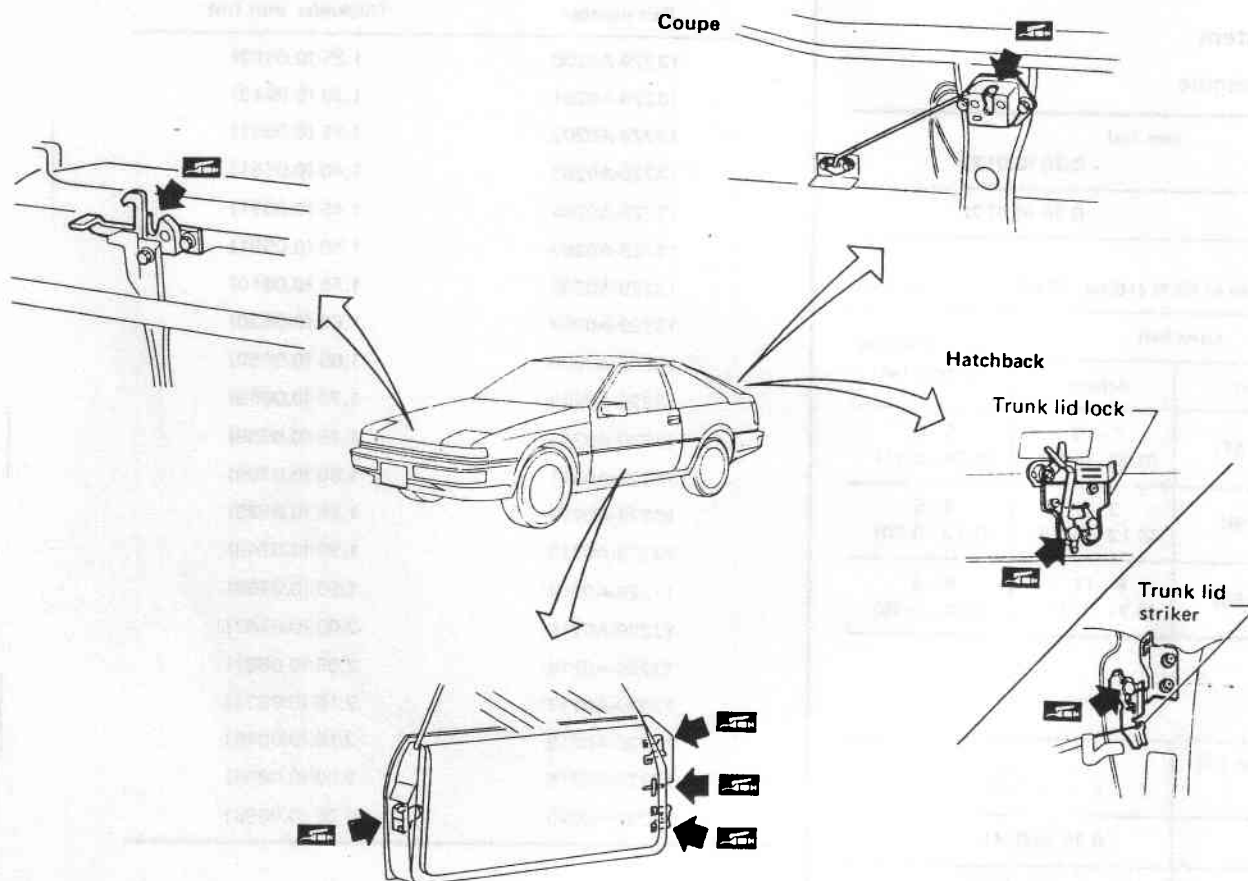


SMA014B

CHASSIS AND BODY MAINTENANCE

Body

LUBRICATING LOCKS, HINGES AND HOOD LATCHES



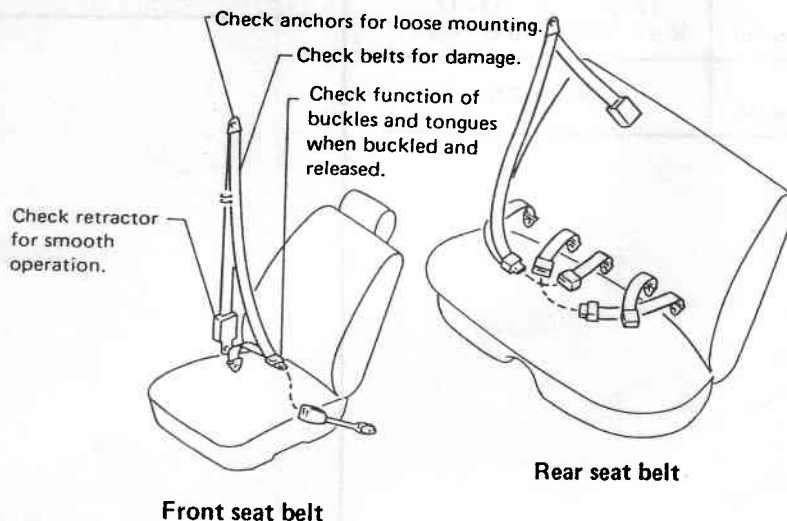
SMA925A

CHECKING SEAT BELTS, BUCKLES, RETRACTORS, ANCHORS AND ADJUSTERS

CAUTION:

1. If the vehicle is collided or overturned, replace the entire belt assembly, regardless of nature of accident.
2. If the condition of any component of a seat belt is questionable, do not have seat belt repaired, but replaced as a belt assembly.
3. If webbing is cut, frayed, or damaged, replace belt assembly.
4. Do not spill drinks, oil, etc. on inner lap belt buckle. Never oil tongue and buckle.
5. Use a NISSAN genuine seat belt assembly.

Anchor bolt
24 - 31 N·m
(2.4 - 3.2 kg·m, 17 - 23 ft·lb)



Front seat belt

Rear seat belt

SMA002B

SERVICE DATA AND SPECIFICATIONS

Engine Maintenance

SPECTION AND ADJUSTMENT

Basic mechanical system

20E & CA18ET engine

Valve clearance (Hot)	mm (in)
Intake	0.30 (0.012)
Exhaust	0.30 (0.012)

Valve belt deflection	mm (in)
When applying pushing force of 98 N (10 kg, 22 lb)	

	Used belt		Set deflection of new belt
	Limit	Adjust	
Alternator	13 (0.51)	7 - 10 (0.28 - 0.39)	6 - 8 (0.24 - 0.31)
Compressor	7 (0.28)	3 - 5 (0.12 - 0.20)	3 - 5 (0.12 - 0.20)
Oil pump	14 (0.55)	8 - 11 (0.31 - 0.43)	6 - 9 (0.24 - 0.35)

20 engine

Valve clearance (Hot)	mm (in)
Intake	0.30 (0.012)
Exhaust	0.35 (0.014)

Valve belt deflection	mm (in)	Adjust deflection of used belt	Set deflection of new belt
Alternator		8.5 - 12.5 (0.335 - 0.492)	8.0 - 10.5 (0.315 - 0.413)
Air conditioner compressor		7 - 10.5 (0.28 - 0.413)	7 - 8 (0.28 - 0.31)
Power steering oil pump	mm (in)	17 - 21 (0.67 - 0.83)	13 - 17 (0.51 - 0.67)
Applied pushing force	N (kg, lb)	98 (10, 22)	

Valve cap (FJ20 engine)

Part number	Thickness mm (in)
13229-A0200	1.25 (0.0492)
13229-A0201	1.30 (0.0512)
13229-A0202	1.35 (0.0531)
13229-A0203	1.40 (0.0551)
13229-A0204	1.45 (0.0571)
13229-A0205	1.50 (0.0591)
13229-A0206	1.55 (0.0610)
13229-A0207	1.60 (0.0630)
13229-A0208	1.65 (0.0650)
13229-A0209	1.70 (0.0669)
13229-A0210	1.75 (0.0689)
13229-A0211	1.80 (0.0709)
13229-A0212	1.85 (0.0728)
13229-A0213	1.90 (0.0748)
13229-A0214	1.95 (0.0768)
13229-A0215	2.00 (0.0787)
13229-A0216	2.05 (0.0807)
13229-A0217	2.10 (0.0827)
13229-A0218	2.15 (0.0846)
13229-A0219	2.20 (0.0866)
13229-A0220	2.25 (0.0886)

Emission control system (Australia model)

Unit: kPa (mbar, mmH₂O, inH₂O)

Vapor line leakage test	
Supplied pressure	3.923 (39.23, 400, 15.75)
Pressure variation/ 2-1/2 minutes	Less than 0.245 (2.45, 25, 0.98)

SERVICE DATA AND SPECIFICATIONS

Engine Maintenance (Cont'd)

Cooling and lubrication system

Engine model	CA20E & CA18ET	FJ20
Radiator cap relief pressure kPa (bar, kg/cm ² , psi)	88 (0.88, 0.9, 13)	
Cooling system leakage testing pressure kPa (bar, kg/cm ² , psi)	157 (1.57, 1.6, 23)	
Coolant capacity liter (Imp qt)		
With heater	8.6 (7-5/8)	7.7 (6-3/4)
Oil capacity liter (Imp qt)		
With oil filter	3.8 (3-3/8)	4.5 (4)
Without oil filter	3.5 (3-1/8)	4.0 (3-1/2)

Ignition system

Spark plug type	Standard	Cold
CA20E	BCP6ES-11	BCP7ES-11
CA18ET	BCP6ES-11 BCPR6ES-11*	BCP7ES-11 BCPR7ES-11*
FJ20	BP6ES-11 BPR6ES-11*	BP7ES-11 BPR7ES-11*
Gap mm (in)		
CA20E	0.8 - 0.9 (0.031 - 0.035)	
CA18ET & FJ20	1.0 - 1.1 (0.039 - 0.043)	
Ignition wire Resistance kΩ	Less than 30	

*Resistor built-in type for Europe & Hong Kong

Idle rpm

Engine model	Idle rpm
CA20E M/T	750±100
CA18ET A/T	850±100 (in "N" position)
FJ20	900±50

Idle CO%

Unit: %

Engine model	Except Europe	Europe
CA20E CA18ET	1.0±0.5	2.0 or lower
FJ20	1.0 or lower	

Ignition timing

Unit: °B.T.D.C.

Engine model	Without vacuum advance	With vacuum advance
CA20E	4±1: Except Australia	12±5
	0±1: Australia	8±5
CA18ET	M/T 15±1	—
	A/T 15±1	—
FJ20	4±1: Except for Hong Kong & Europe 8±1: For Hong Kong & Europe	20±5: Except for Hong Kong & Europe 12±4: For Hong Kong & Europe

TIGHTENING TORQUE

For CA engine

Item	N-m	kg-m	ft-lb
Alternator adjuster lock bolt	14 - 17	1.4 - 1.7	10 - 12
Cylinder head bolt	74 - 83	7.5 - 8.5	54 - 61
Exhaust manifold nut	20 - 29	2.0 - 3.0	14 - 22
Intake manifold nut	20 - 25	2.0 - 2.6	14 - 19
Oil pan drain plug	29 - 39	3.0 - 4.0	22 - 29
Rocker cover screw	1 - 3	0.1 - 0.3	0.7 - 2.2
Valve rocker adjusting nut	18 - 22	1.8 - 2.2	13 - 16

For FJ engine

Item	N-m	kg-m	ft-lb
Camshaft bracket nut	14 - 18	1.4 - 1.8	10 - 13
Camshaft sprocket bolt	108 - 137	11.0 - 14.0	80 - 101
Chain tensioner A bolt	6.3 - 8.3	0.64 - 0.85	4.6 - 6.1
Cylinder head bolt	118 - 127	12.0 - 13.0	87 - 94
Exhaust manifold nut			
M8	16 - 21	1.6 - 2.1	12 - 15
M10	20 - 25	2.0 - 2.6	14 - 19
Intake manifold nut	31 - 42	3.2 - 4.3	23 - 31
Oil pan drain plug	35 - 47	3.6 - 4.8	26 - 35
Valve rocker cover bolt & nut	9.1 - 11.8	0.93 - 1.2	6.7 - 8.7

SERVICE DATA AND SPECIFICATIONS

Engine Maintenance (Cont'd)

For CA & FJ engine

Item	N-m	kg-m	ft-lb
Exhaust tube nut	26 - 36	2.7 - 3.7	20 - 27
Fuel hose clamp	1.0 - 1.5	0.10 - 0.15	0.7 - 1.1
Spark plug*	20 - 29	2.0 - 3.0	14 - 22

When using a new spark plug, tighten by turning it 1/2 or 3/4 of a turn after gasket is seated.

MANUAL TRANSMISSION

SECTION MT

CONTENTS

REMOVAL AND INSTALLATION	MT- 2
ON-VEHICLE SERVICE	MT- 3
MAJOR OVERHAUL	MT- 4
DISASSEMBLY – FS5W71B	MT- 7
REPAIR FOR COMPONENT PARTS – FS5W71B	MT- 9
ASSEMBLY – FS5W71B	MT-19
SERVICE DATA AND SPECIFICATIONS	MT-21
SPECIAL SERVICE TOOLS.....	MT-23

MT

REMOVAL AND INSTALLATION

Removal

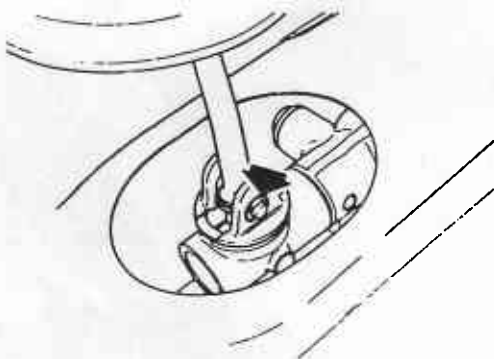
- Remove propeller shaft.
Refer to PD section.

Insert plug into rear oil seal after removing propeller shaft.

- Support engine by placing a jack under oil pan.

CAUTION:

- Be careful not to damage spline, sleeve yoke and rear oil seal, when removing propeller shaft.
- Do not place jack under the oil pan drain plug.
- Remove shift lever.



TM335

WARNING:

Support Manual Transmission, while removing it.

Installation

- Tighten bolts securing transmission to engine.
These bolts have different lengths.

Transmission to engine:

39 - 49 N·m (4.0 - 5.0 kg-m, 29 - 36 ft-lb)

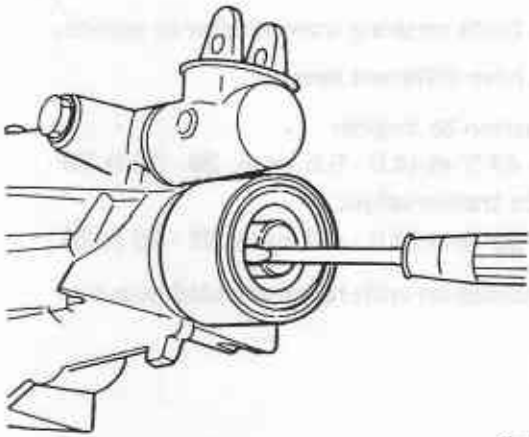
Gusset to transmission:

29 - 39 N·m (3.0 - 4.0 kg-m, 22 - 29 ft-lb)

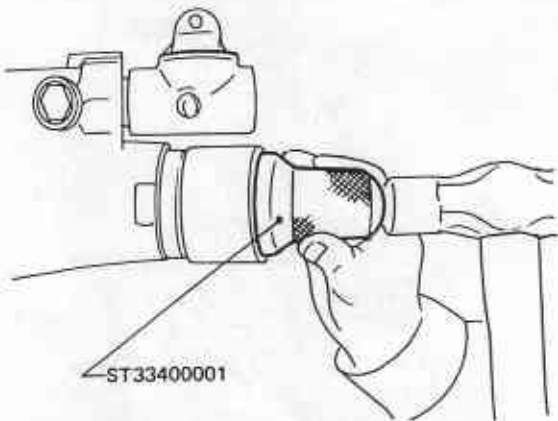
- Fill transmission with recommended gear oil.

ON-VEHICLE SERVICE

Rear Extension Oil Seal



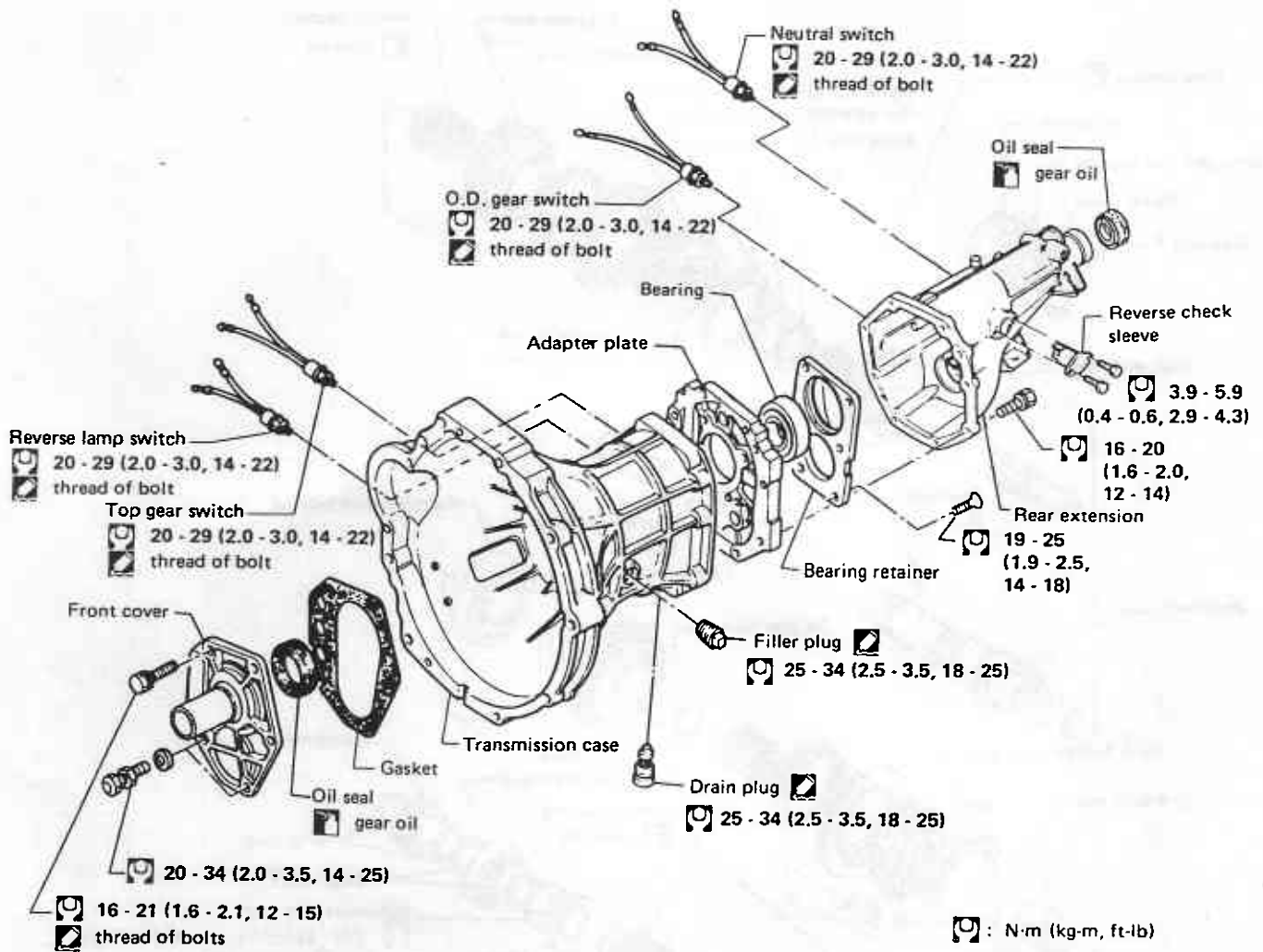
SMT037



ST33400001

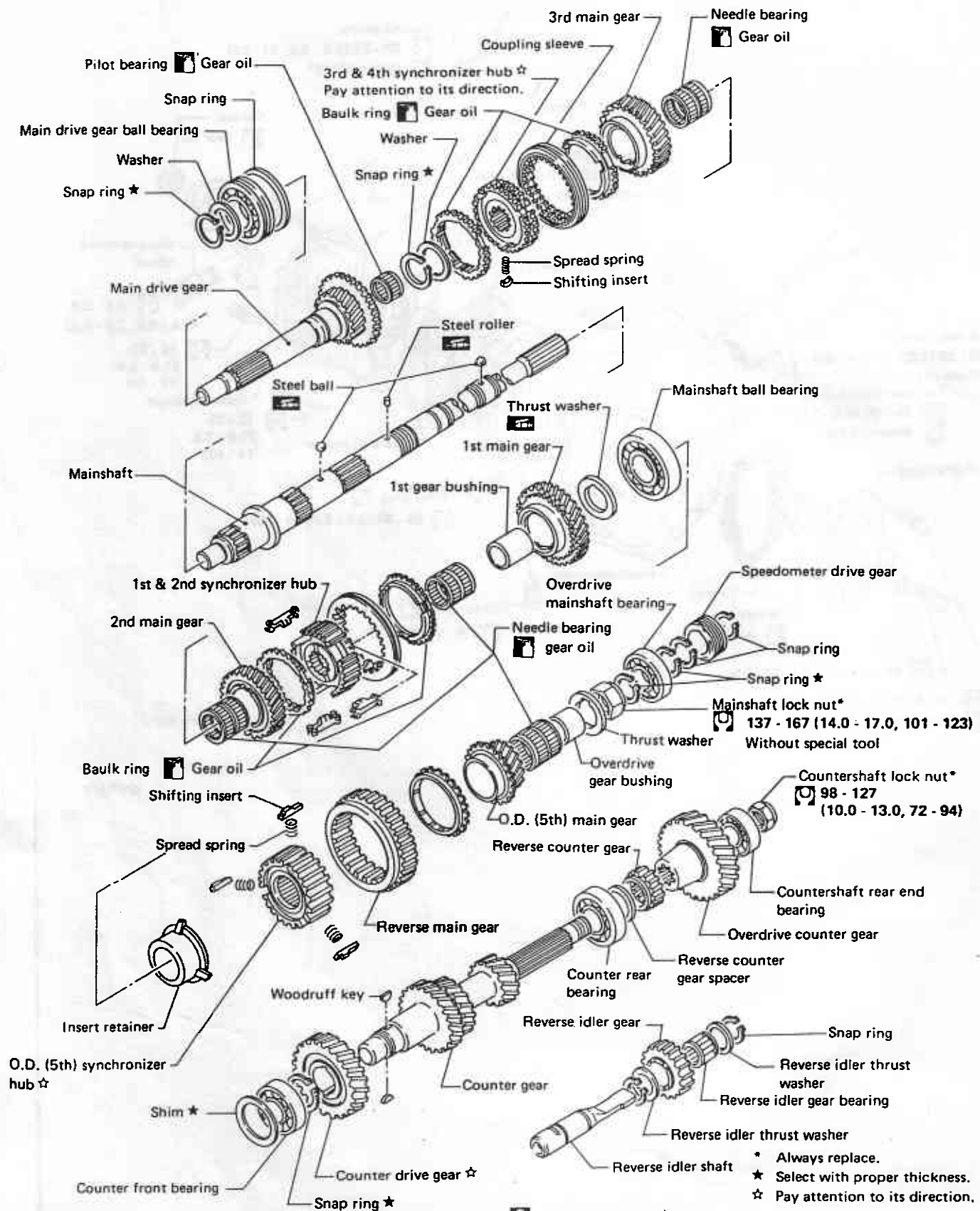
SMT066

MAJOR OVERHAUL



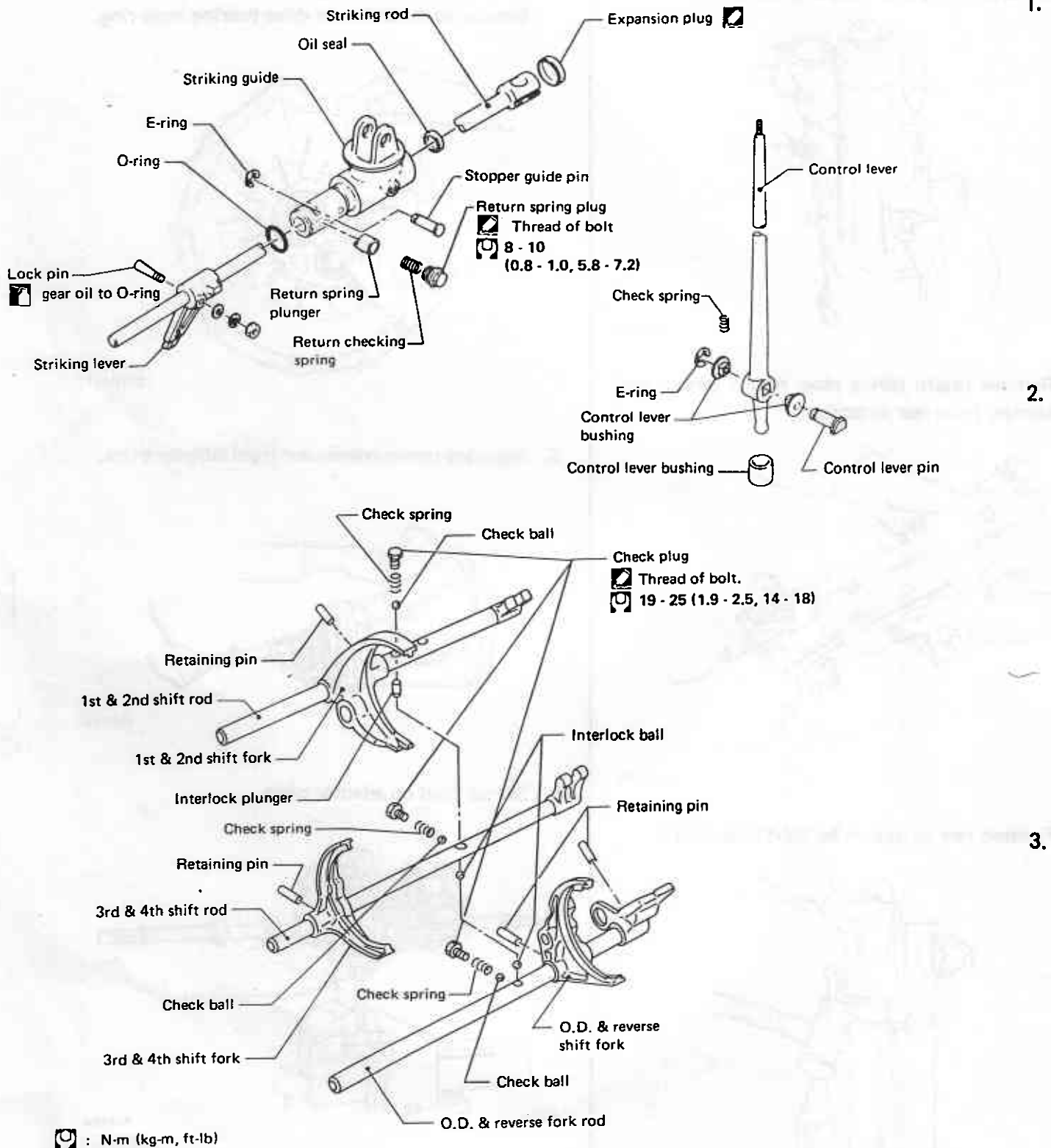
SMT358

MAJOR OVERHAUL



SMT090A

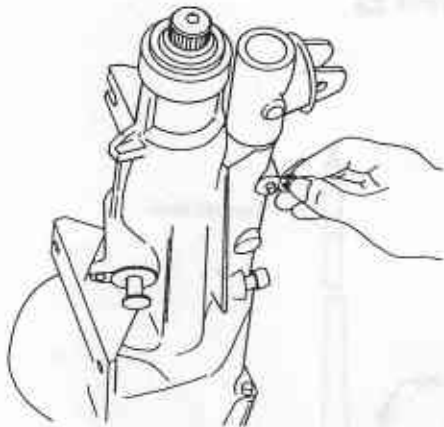
MAJOR OVERHAUL



SMT091A

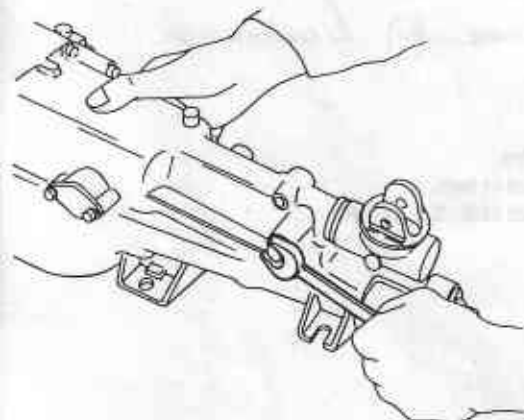
DISASSEMBLY—FS5W71B

Remove E-ring and stopper guide pin.



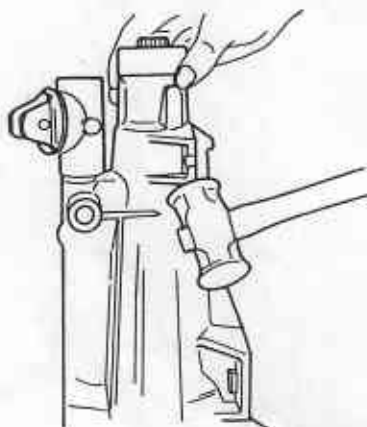
SMT361

Remove return spring plug, return spring, and plunger from rear extension.



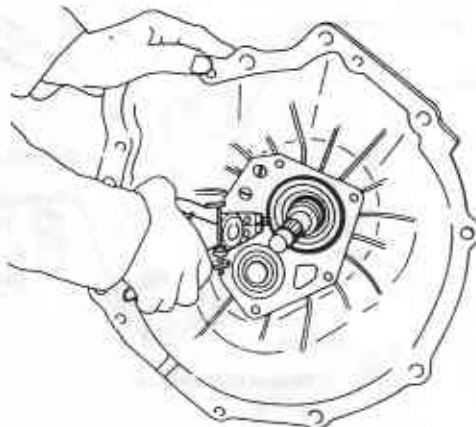
SMT362

Remove rear extension by lightly tapping it.



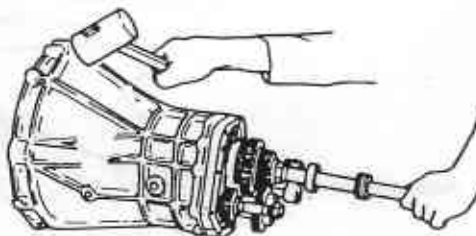
SMT363

4. Remove front cover, gasket, countershaft front bearing shim, and main drive bearing snap ring.



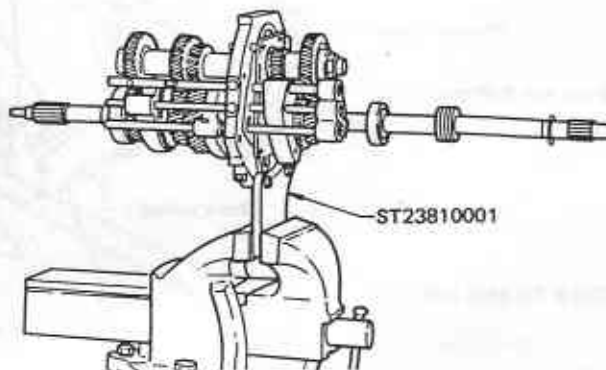
SMT011

5. Separate transmission case from adapter plate.



TM753

6. Set up Tool on adapter plate.

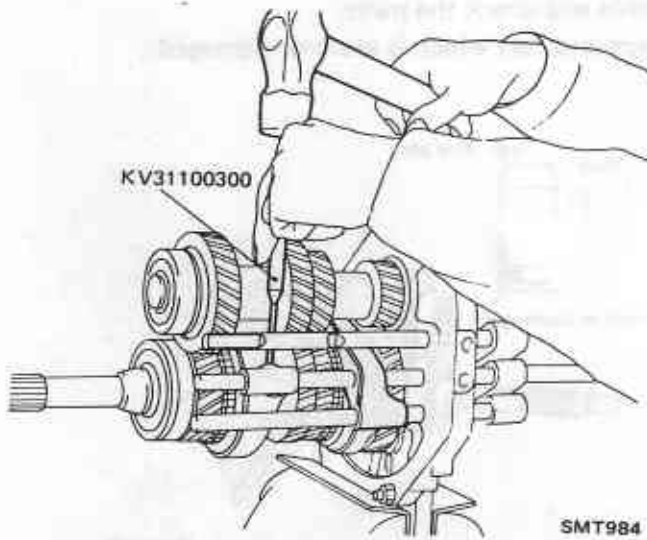


ST23810001

TM754

DISASSEMBLY—FS5W71B

7. Remove check ball plugs, check springs, and check balls.
8. Drive out retaining pins. Then drive out fork rods and remove interlock balls.

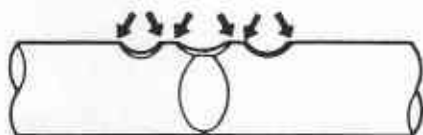


REPAIR FOR COMPONENT PARTS—FS5W71B

Forks and Fork Rods

INSPECTION

- Check for wear, scratches, projection or damage.

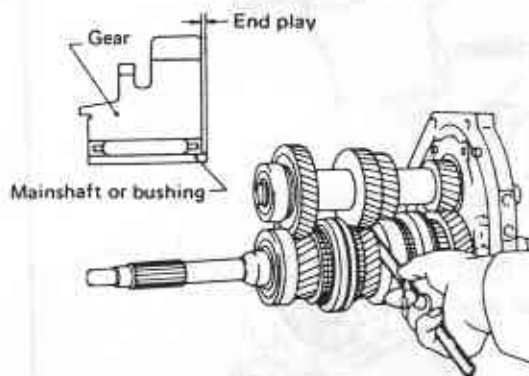


SMT137

Gears and Shafts

DISASSEMBLY

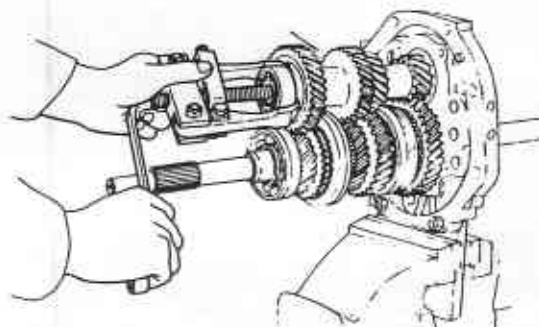
1. Before disassembly, measure each gear end play.
 - If end play is not within the specified limit, disassemble and check the parts.
 - Replace any part which is worn or damaged.



SMT025

Gear	End play mm (in)
1st	0.31 - 0.37 (0.0122 - 0.0146)
2nd	0.31 - 0.37 (0.0122 - 0.0146)
3rd	0.11 - 0.17 (0.0043 - 0.0067)
O.D.	0.32 - 0.35 (0.0126 - 0.0138)
Reverse idler	0.05 - 0.50 (0.0020 - 0.0197)

2. Mesh 2nd and reverse gear, then draw out counter front bearing.

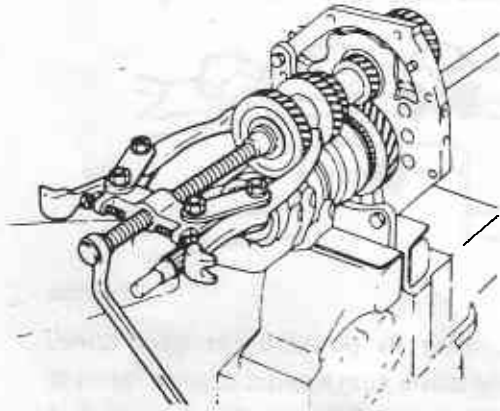


TM398

REPAIR FOR COMPONENT PARTS—FS5W71B

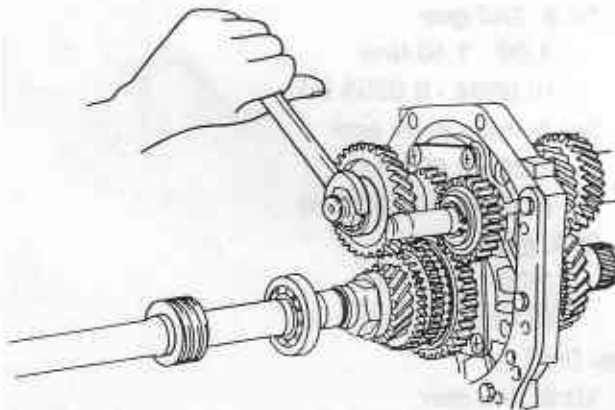
Gears and Shafts (Cont'd)

3. Remove snap ring and draw out counter drive gear with main drive gear.



SMT023

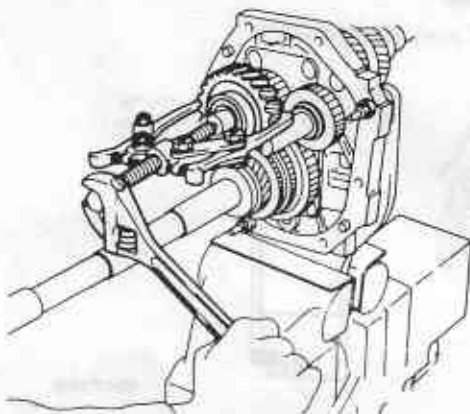
4. Remove snap ring and draw out 3rd & 4th synchronizer and 3rd gear.
5. Release staking on counter gear nut and mainshaft nut and loosen these nuts.



TM757

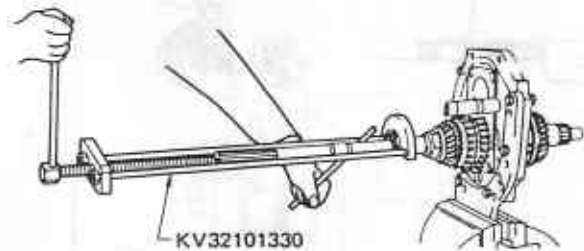
Mainshaft nut: Left-hand thread

6. Pull out counter O.D. gear with bearing.



SMT042

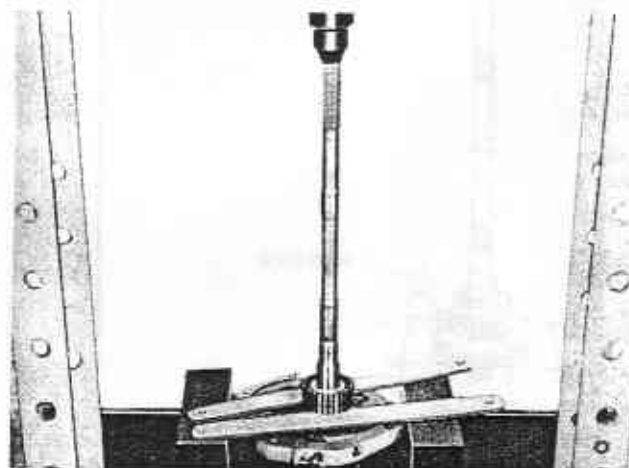
7. Draw out reverse counter gear and spacer.
8. Remove snap ring from reverse idler shaft, and draw out reverse idler gear.
9. Remove snap rings, steel ball, speedometer gear and bearing.



KV32101330

TM760

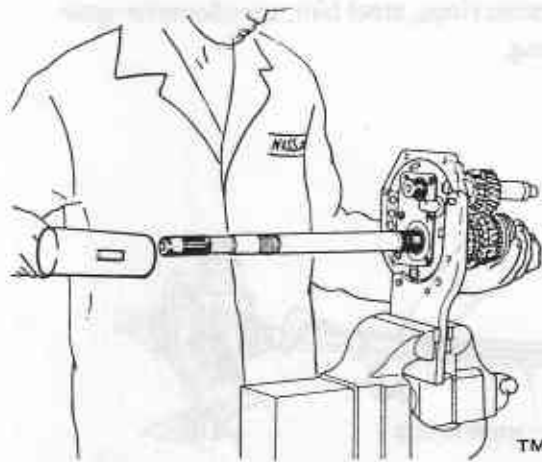
10. Remove mainshaft nut, thrust washer, steel ball, steel roller, needle bearing, O.D. gear and baulk ring.
11. Remove O.D. gear bushing, insert retainer and O.D. synchronizer.



REPAIR FOR COMPONENT PARTS—FS5W71B

Gears and Shafts (Cont'd)

12. Draw out mainshaft assembly together with counter gear, by tapping rear end of mainshaft and counter gear.

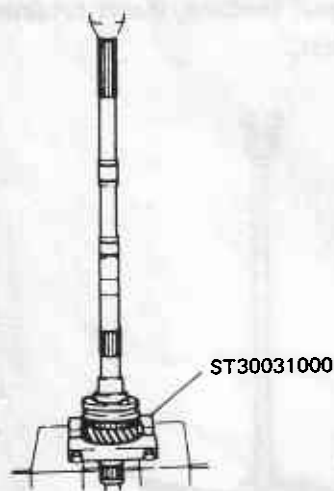


TM347

13. Remove thrust washer, steel ball, and 1st gear.

Be careful not to lose steel ball.

14. Press out 1st gear mainshaft bushing together with 2nd gear.



ST30031000

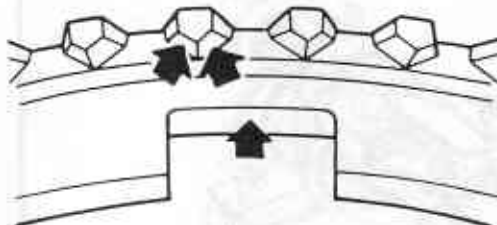
TM049A

INSPECTION

- Check all gears for excessive wear, chips and cracks; replace as required.
- Check shaft for bending, cracks and wear; if necessary, replace.

Baulk rings

- If found to be deformed, cracked or otherwise damaged excessively, replace baulk ring.



SMT026

- Place baulk ring in position on gear cone. While holding baulk ring against gear as far as it will go, measure gap between baulk ring and gear.

If the clearance is smaller than the wear limit, replace baulk ring.

Baulk ring to gear clearance:

Standard

1st & 2nd gear

1.00 - 1.40 mm

(0.0394 - 0.0551 in)

3rd & main drive gear

1.20 - 1.60 mm

(0.0472 - 0.0630 in)

O.D. gear

1.00 - 1.40 mm

(0.0394 - 0.0551 in)

Wear limit

1st & 2nd gear

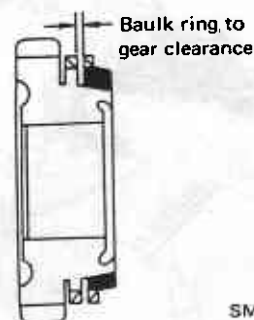
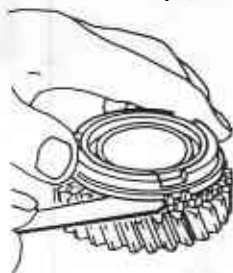
0.6 mm (0.024 in)

3rd & main drive gear

0.8 mm (0.031 in)

O.D. gear

0.6 mm (0.024 in)



Baulk ring to gear clearance

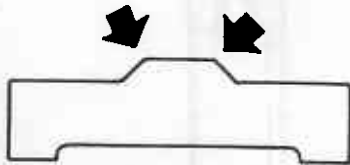
SMT140

REPAIR FOR COMPONENT PARTS—FS5W71B

Gears and Shafts (Cont'd)

Shifting inserts and springs

If worn excessively, worn unevenly, deformed, or damaged, replace.



SMT064

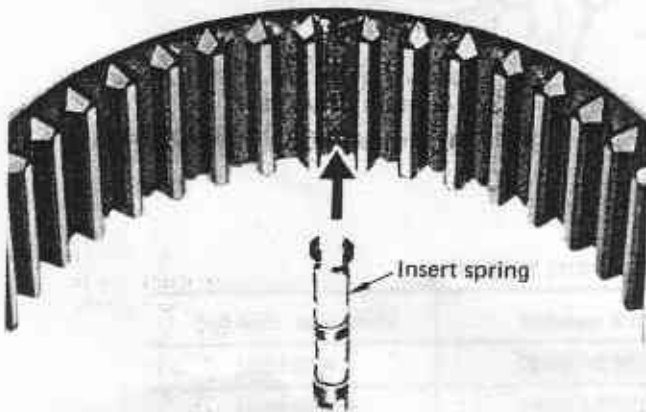
ASSEMBLY

Note:

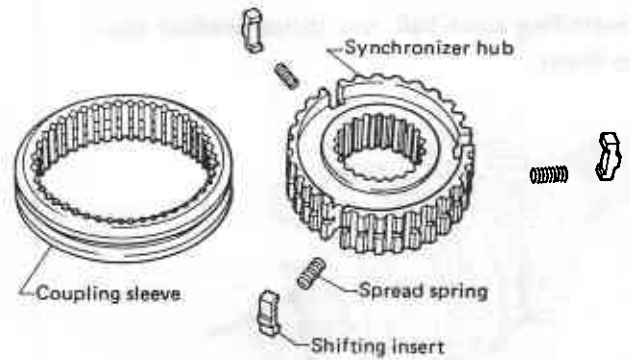
Apply gear oil to each part.

- Needle bearings
- Baulk rings
- Shafts
- Gears
- Oil seals

1. Place inserts.
- 1st & 2nd

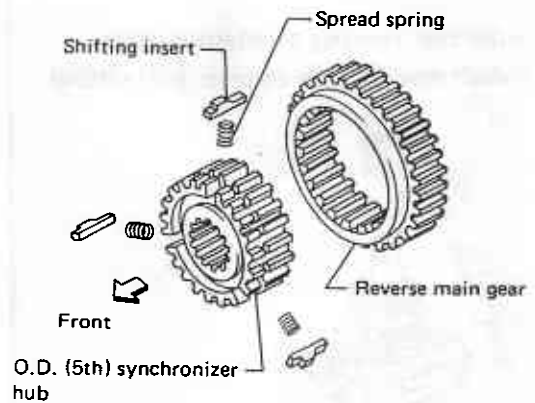


- 3rd & 4th



SMT024

- O.D.



SMT095A

2. Assemble 2nd gear and 1st & 2nd synchronizer assembly, then press 1st gear bushing on main-shaft.

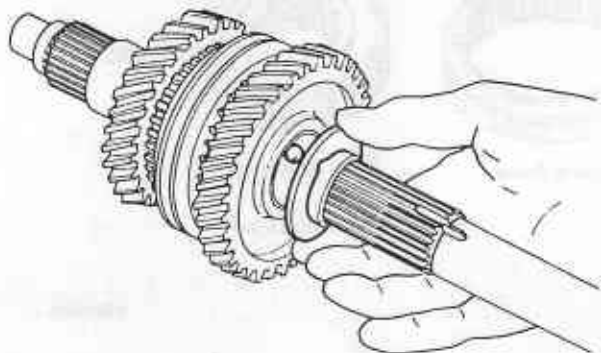


REPAIR FOR COMPONENT PARTS—FS5W71B

Gears and Shafts (Cont'd)

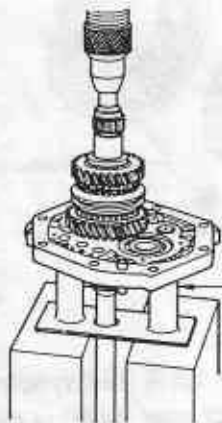
3. Assemble 1st gear, steel ball, and thrust washer on mainshaft.

Before installing steel ball and thrust washer apply grease to them.



TM358

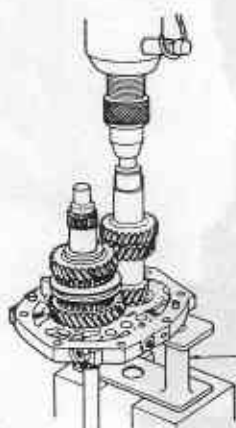
4. Install counter rear bearing to adapter plate.
5. Press mainshaft assembly to adapter plate using Tool.



KV31100401

TM439

6. Press counter gear into adapter plate.

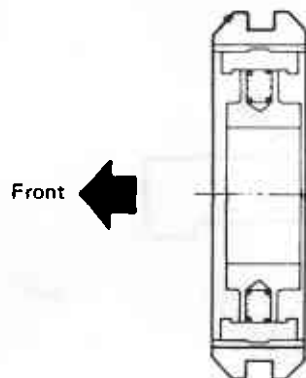


KV31100401

TM440

7. Install 3rd main gear, and 3rd & 4th synchronizer assembly.

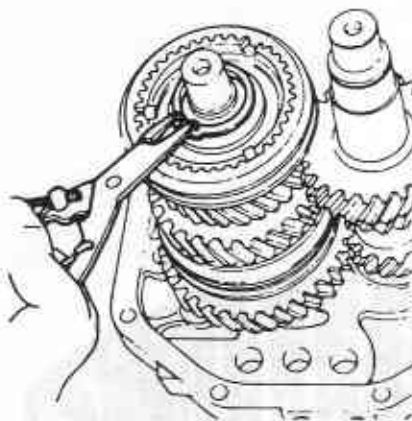
Pay attention to direction of synchronizer.



SMT031

8. Install thrust washer on mainshaft and secure it with mainshaft front snap ring.

Select proper snap ring that will minimize clearance of groove in mainshaft.



TM441

Mainshaft front snap ring:

Parts number	Thickness mm (in)
32263-E9000	1.4 (0.055)
32263-E9001	1.5 (0.059)
32263-E9002	1.6 (0.063)

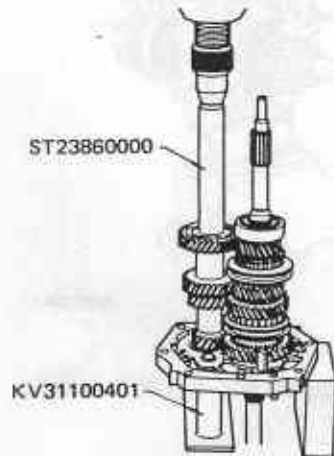
9. Apply gear oil to mainshaft pilot bearing and install it on mainshaft.

REPAIR FOR COMPONENT PARTS—FS5W71B

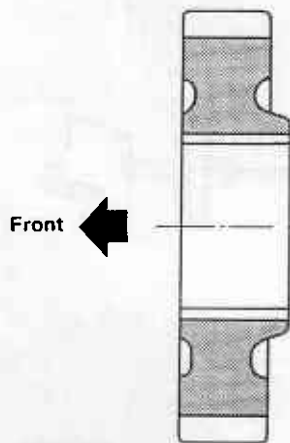
Gears and Shafts (Cont'd)

10. Press counter drive gear with main drive gear using Tool.

Pay attention to direction of counter front gear.



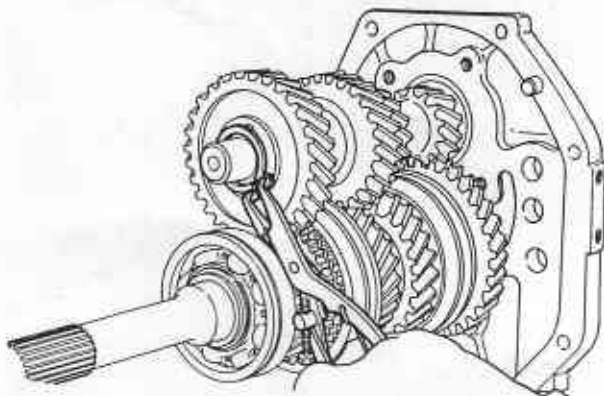
TM442



SMT065

11. Secure counter drive gear with snap ring.

Select proper snap ring that will minimize clearance of groove in countershaft.

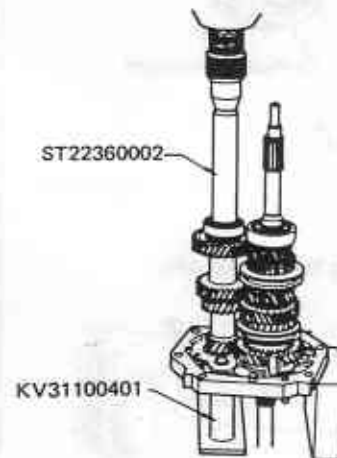


TM366

Counter drive gear snap ring:

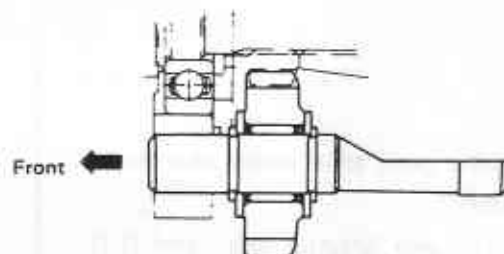
Parts number	Thickness mm (in)
32215-E9000	1.4 (0.055)
32215-E9001	1.5 (0.059)
32215-E9002	1.6 (0.063)

12. Press counter gear front bearing onto counter gear.



TM443

13. Install idler gear to reverse idler shaft.



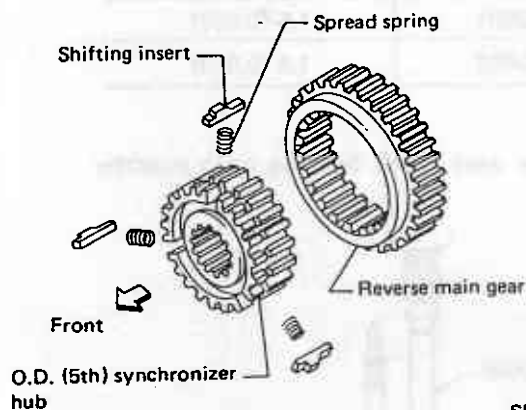
TM451

REPAIR FOR COMPONENT PARTS—FS5W71B

Gears and Shafts (Cont'd)

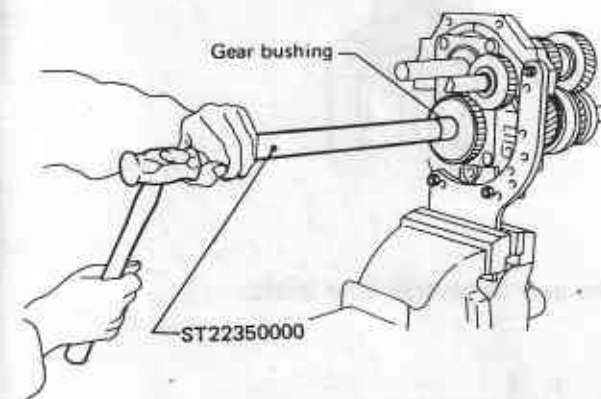
4. Install insert retainer and O.D. synchronizer to mainshaft.

Pay attention to direction of synchronizer.



SMT095A

5. Install O.D. gear bushing to mainshaft.



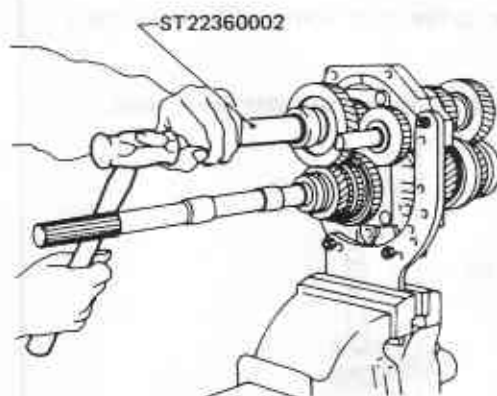
SMT531

16. Install O.D. main gear, steel roller and thrust washer to mainshaft.

17. Install spacer, reverse counter gear and O.D. counter gear to countershaft.

Main O.D. gear and counter O.D. gear should be handled as a matched set.

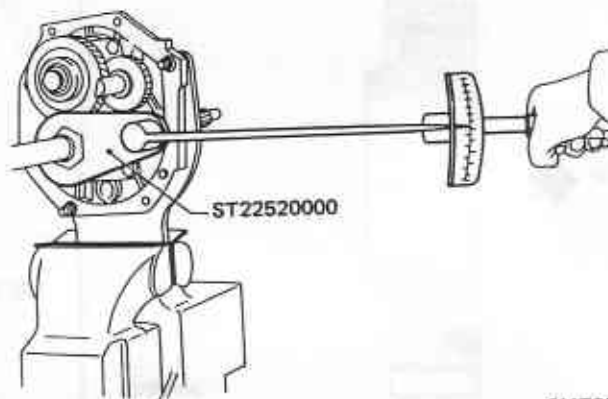
18. Install countershaft rear end bearing.



SMT043

19. Mesh 2nd and reverse gears and tighten mainshaft lock nut.

- With special tool



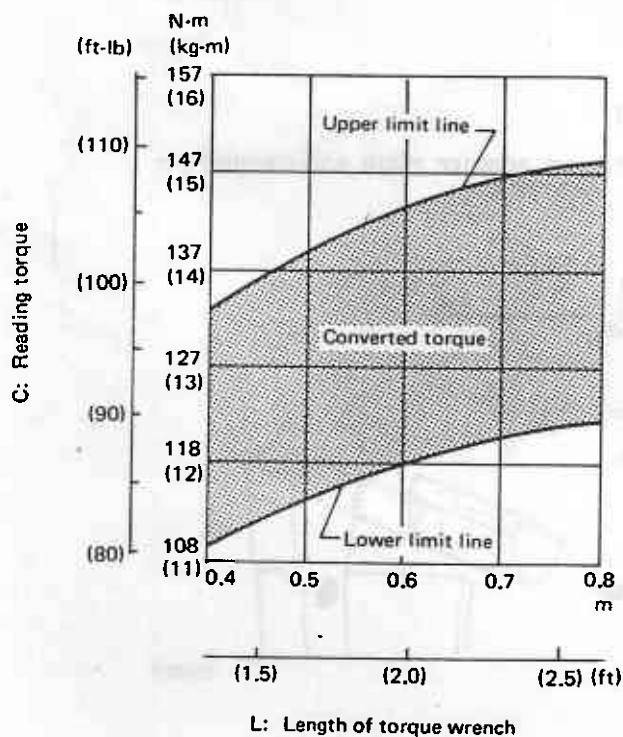
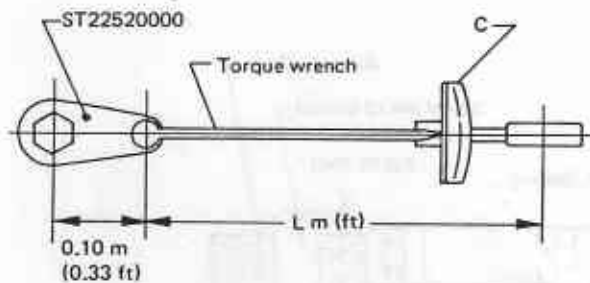
SMT003A

REPAIR FOR COMPONENT PARTS—FS5W71B

Gears and Shafts (Cont'd)

Using the following chart

(Length of torque wrench vs. setting or reading torque)



SMT004A

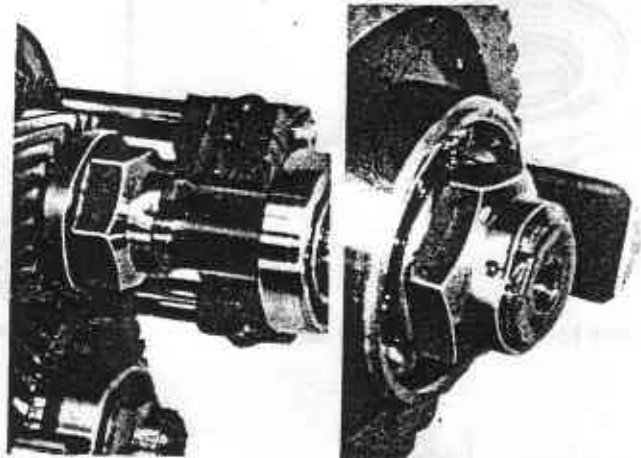
- Without special tool

☐ 137 - 167 N·m
(14.0 - 17.0 kg-m, 101 - 123 ft-lb)

20. Tighten counter gear lock nut.

☐ : 98 - 127 N·m
(10.0 - 13.0 kg-m, 72 - 94 ft-lb)

21. Stake mainshaft lock nut and counter gear lock nut with a punch.



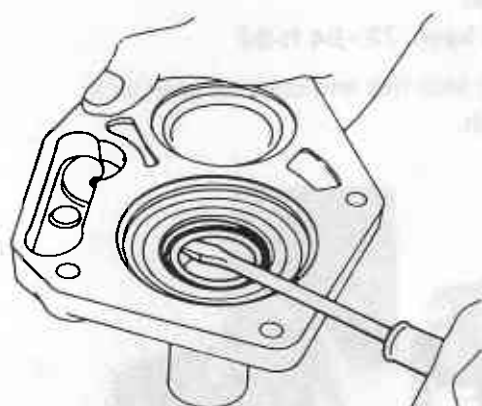
- Always use new lock nuts.

22. Measure gear end play. For the description, refer to Disassembly of Gears and Shafts.

REPAIR FOR COMPONENT PARTS—FS5W71B

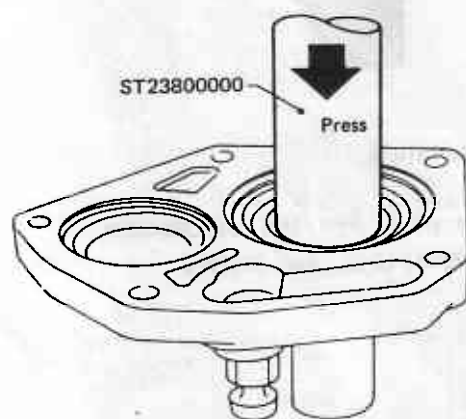
Oil Seals

FRONT COVER OIL SEAL



SMT035

Be careful not to damage lip of oil seal.

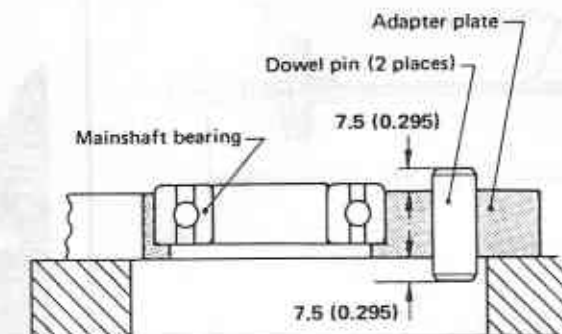


SMT036

Adapter Plate

- When replacing adapter plate parts, use the following procedures.

DOWEL PIN

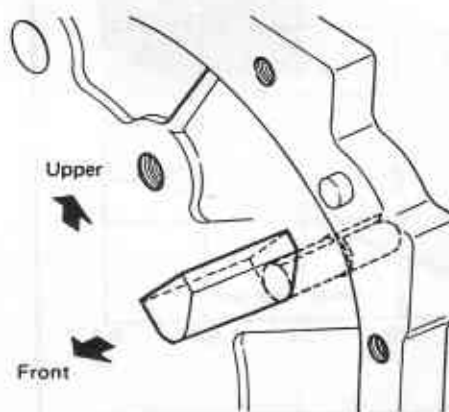


Unit: mm (in)

SMT027

OIL GUTTER

Install oil gutter on adapter plate and expand on rear side.



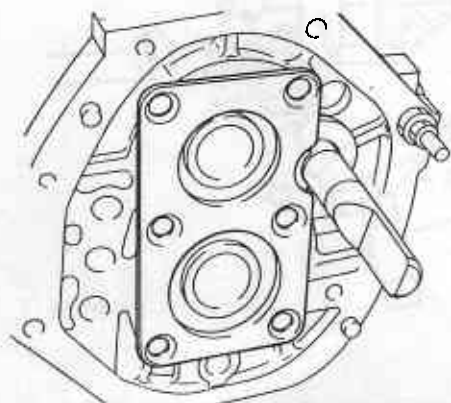
TM356

REPAIR FOR COMPONENT PARTS—FS5W71B

Adapter Plate (Cont'd)

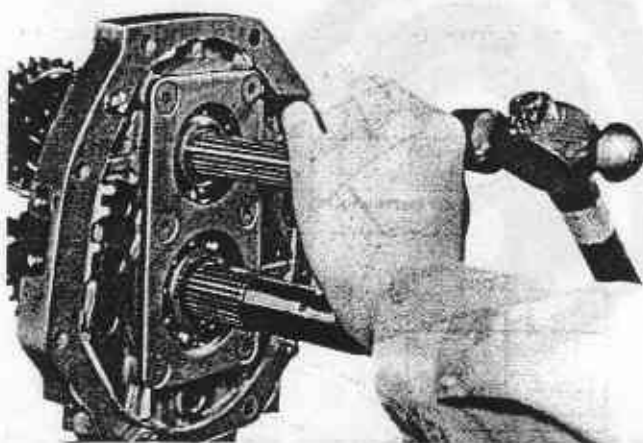
BEARING RETAINER

1. Insert reverse shaft, then install bearing retainer.



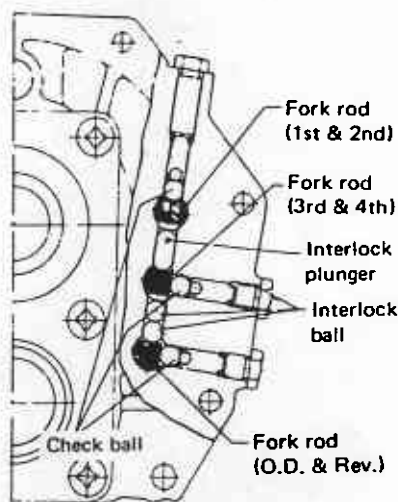
SMT028

2. Tighten each screw, then stake it at two points.

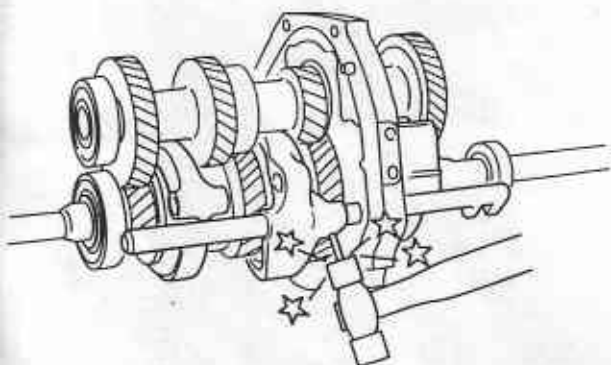


ASSEMBLY—FS5W71B

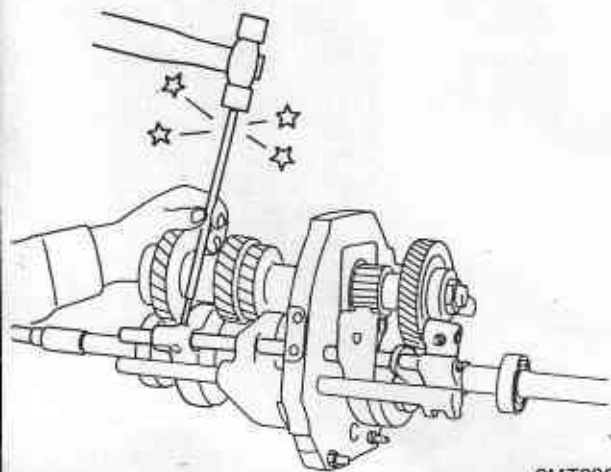
Install shift rods, interlock balls and check balls.



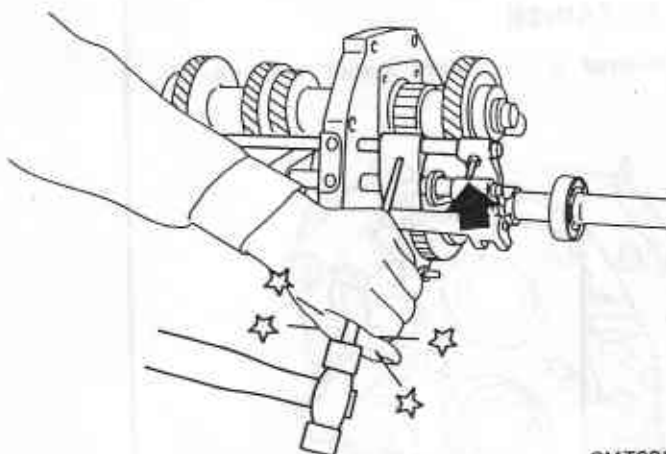
SMT992



SMT989

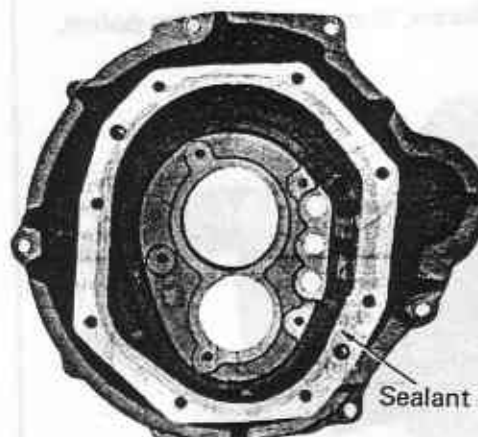


SMT990

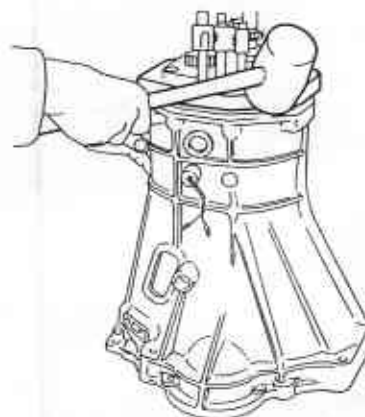


SMT991

2. Apply sealant to mating surface of transmission case.



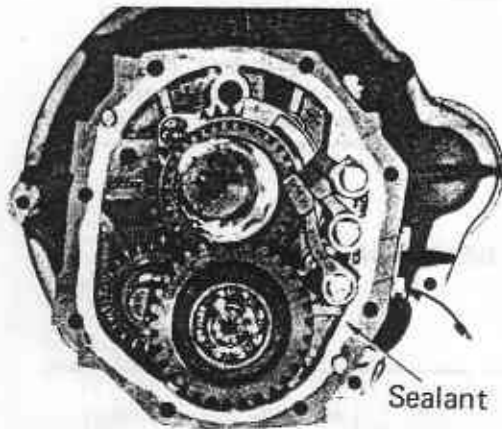
3. Slide gear assembly onto adapter plate by lightly tapping with a soft hammer.



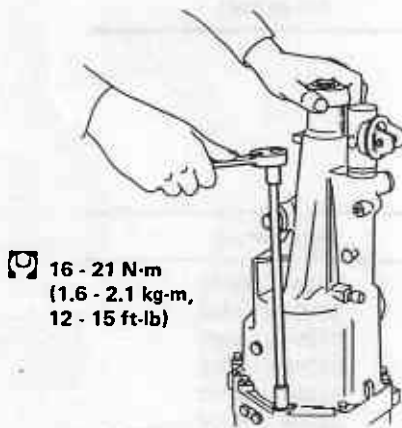
SMT013

ASSEMBLY—FS5W71B

4. Apply sealant to mating surface of adapter plate.

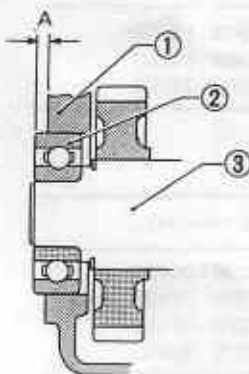


5. Install rear extension.



SMT368

6. Fit main drive bearing snap ring.
7. Select countershaft front bearing shim.



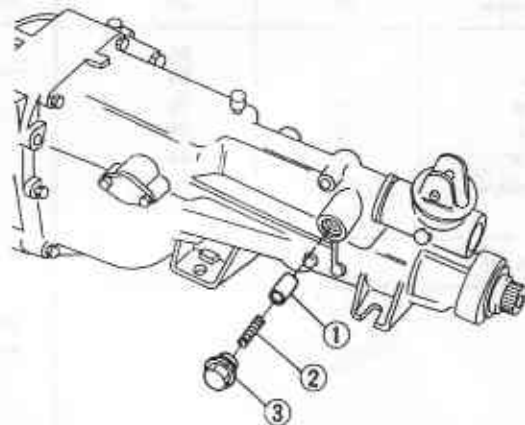
A: Distance from bearing surface to transmission case

TM371

Unit: mm (in)

"A"	Thickness of shim	Part number
3.52 - 3.71 (0.1386 - 0.1461)	Not necessary	
3.42 - 3.51 (0.1346 - 0.1382)	0.1 (0.004)	32218-V5000
3.32 - 3.41 (0.1307 - 0.1343)	0.2 (0.008)	32218-V5001
3.22 - 3.31 (0.1268 - 0.1303)	0.3 (0.012)	32218-V5002
3.12 - 3.21 (0.1228 - 0.1264)	0.4 (0.016)	32218-V5003
3.02 - 3.11 (0.1189 - 0.1224)	0.5 (0.020)	32218-V5004
2.92 - 3.01 (0.1150 - 0.1185)	0.6 (0.024)	32218-V5005

8. Install gasket and front cover.
9. Install plunger, return spring, and return spring plug.

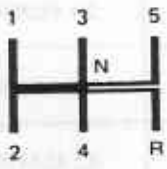


SMT366

10. Apply sealant to stopper guide pin, then install stopper guide pin and E-ring.

SERVICE DATA AND SPECIFICATIONS

General Specifications

Transmission model	FS5W71B	
Engine	CA18ET, CA20E	FJ20E
Shift pattern		
Chromesh type	Warner	
Gear ratio		
1st	3.592	3.321
2nd	2.057	1.902
3rd	1.361	1.308
4th	1.000	1.000
O.D.	0.813	0.833
Reverse	3.657	3.382
Number of teeth		
Main drive gear	21	22
Main gear		
1st	33	33
2nd	27	27
3rd	25	26
O.D.	24	26
Reverse	36	36
Counter drive gear	32	31
Counter gear		
1st	14	14
2nd	20	20
3rd	28	28
O.D.	45	44
Reverse	15	15
Reverse idler gear	21	21
Capacity liter (Imp pt)	2.1 (3-3/4)	

Inspection and Adjustment

GEAR END PLAY

	mm (in)
1st main gear	0.31 - 0.37 (0.0122 - 0.0146)
2nd main gear	0.31 - 0.37 (0.0122 - 0.0146)
3rd main gear	0.11 - 0.17 (0.0043 - 0.0067)
O.D. gear	0.32 - 0.35 (0.0126 - 0.0138)
Reverse idler gear	0.05 - 0.50 (0.0020 - 0.0197)

CLEARANCE BETWEEN BAULK RING AND GEAR

	mm (in)
Standard	
1st & 2nd gear	1.00 - 1.40 (0.0394 - 0.0551)
3rd & main drive gear	1.20 - 1.50 (0.0472 - 0.0591)
O.D. gear	1.00 - 1.40 (0.0394 - 0.0551)
Wear limit	
1st & 2nd	0.6 (0.024)
3rd & main drive gear	0.8 (0.031)
O.D. gear	0.6 (0.024)

Available snap ring

Main drive gear bearing

Thickness mm (in)	Part number
1.73 (0.0681)	32204 - 78005
1.80 (0.0709)	32204 - 78000
1.87 (0.0736)	32204 - 78001
1.94 (0.0764)	32204 - 78002
2.01 (0.0791)	32204 - 78003
2.08 (0.0819)	32204 - 78004

Mainshaft front

Thickness mm (in)	Part number
1.4 (0.055)	32263 - E9000
1.5 (0.059)	32263 - E9001
1.6 (0.063)	32263 - E9002

Mainshaft rear end bearing

Thickness mm(in)	Part number
1.1 (0.043)	32228 - 20100
1.2 (0.047)	32228 - 20101
1.3 (0.051)	32228 - 20102
1.4 (0.055)	32228 - 20103

SERVICE DATA AND SPECIFICATIONS

Inspection and Adjustment (Cont'd)

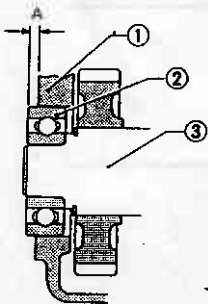
Counter drive gear

Thickness mm (in)	Part number
1.4 (0.055)	32215 - E9000
1.5 (0.059)	32215 - E9001
1.6 (0.063)	32215 - E9002

Available shim

Counter front bearing

Unit: mm (in)



A: Distance from bearing surface to transmission case

- 1 Transmission case
- 2 Counter gear front bearing
- 3 Counter gear

TM371

"A"	Thickness of shim	Part number
3.52 - 3.71 (0.1386 - 0.1461)	Not necessary	
3.42 - 3.51 (0.1346 - 0.1382)	0.1 (0.004)	32218 - V5000
3.32 - 3.41 (0.1307 - 0.1343)	0.2 (0.008)	32218 - V5001
3.22 - 3.31 (0.1268 - 0.1303)	0.3 (0.012)	32218 - V5002
3.12 - 3.21 (0.1228 - 0.1264)	0.4 (0.016)	32218 - V5003
3.02 - 3.11 (0.1189 - 0.1224)	0.5 (0.020)	32218 - V5004
2.92 - 3.01 (0.1150 - 0.1185)	0.6 (0.024)	32218 - V5005

Tightening Torque

TRANSMISSION INSTALLATION

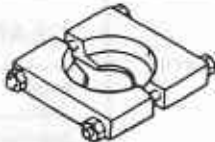
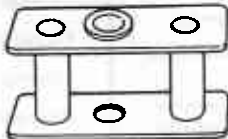
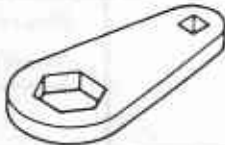
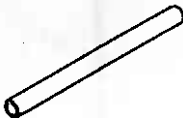
Unit	N-m	kg-m	ft-lb
Clutch operating cylinder	30 - 40	3.1 - 4.1	22 - 30
Transmission to engine	39 - 49	4.0 - 5.0	29 - 36
Gusset to transmission	29 - 39	3.0 - 4.0	22 - 29
Crossmember to body	31 - 42	3.2 - 4.3	23 - 31
Rear mounting insulator to crossmember	31 - 42	3.2 - 4.3	23 - 31
Rear mounting insulator to rear extension	31 - 42	3.2 - 4.3	23 - 31
Transmission case to rear extension	16 - 21	1.6 - 2.1	12 - 15
Starter motor to transmission	29 - 39	3.0 - 4.0	22 - 29

GEAR ASSEMBLY

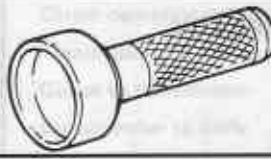
Unit	N-m	kg-m	ft-lb
Bearing retainer to adapter plate	19 - 25	1.9 - 2.5	14 - 18
Mainshaft lock nut	137 - 167	14.0 - 17.0	101 - 123
Counter gear lock nut	98 - 127	10.0 - 13.0	72 - 94
Rear extension to transmission case	16 - 20	1.6 - 2.0	12 - 14
Front cover to transmission case	16 - 21	1.6 - 2.1	12 - 15
Filler plug	25 - 34	2.5 - 3.5	18 - 25
Drain plug	25 - 34	2.5 - 3.5	18 - 25
Ball pin	20 - 34	2.0 - 3.5	14 - 25
Striking lever lock nut	9 - 12	0.9 - 1.2	6.5 - 8.7
Check ball plug	19 - 25	1.9 - 2.5	14 - 18
Speedometer sleeve installation	4 - 5	0.4 - 0.5	2.9 - 3.6
Back-up lamp switch	20 - 29	2.0 - 3.0	14 - 22
Return spring plug	8 - 10	0.8 - 1.0	5.8 - 7.2

SPECIAL SERVICE TOOLS

*: Special tool or a commercial equivalent

Tool number	Tool name
ST23810001	Adapter setting plate 
KV31100300*	Fork rod pin punch 
KV32101330	Bearing puller 
ST30031000*	Bearing puller 
KV31100401	Transmission press stand 
ST23860000*	Counter gear drift 
ST22360002*	Bearing drift 
ST22520000	Wrench 
ST22350000*	Mainshaft bearing drift 
ST23800000*	Transmission adapter 

SPECIAL SERVICE TOOLS

(Cont'd)		Tightening Torque	
Tool number	Tool name	Unit	Weight (kg)
ST33400001*	Oil seal drift		1.1
ST33400002*	Available about		1.1
ST33400003*	Counter front bearing		1.1
ST33400004*	Available about		1.1
ST33400005*	Counter front bearing		1.1
ST33400006*	Available about		1.1
ST33400007*	Counter front bearing		1.1
ST33400008*	Available about		1.1
ST33400009*	Counter front bearing		1.1
ST33400010*	Available about		1.1
ST33400011*	Counter front bearing		1.1
ST33400012*	Available about		1.1
ST33400013*	Counter front bearing		1.1
ST33400014*	Available about		1.1
ST33400015*	Counter front bearing		1.1
ST33400016*	Available about		1.1
ST33400017*	Counter front bearing		1.1
ST33400018*	Available about		1.1
ST33400019*	Counter front bearing		1.1
ST33400020*	Available about		1.1
ST33400021*	Counter front bearing		1.1

The diagram illustrates the electrical system for a vehicle, divided into two main sections: (For Europe) and (Except CA18ET).

Top Section (For Europe):

- Battery:** Connected to the starter motor and the main power distribution.
- Starter Motor:** Controlled by the starter relay.
- IC Alternator:** Provides power to the battery and other components.
- Ignition Switch:** Controls the ignition system, with positions for OFF, ACC, ON, and START.
- Ignition Relay:** Controls the ignition coil.
- Injector Relay:** Controls the fuel injectors.
- Fuel Pump Relay:** Controls the fuel pump.
- Start Signal Relay:** Provides a signal to the start system.
- Throttle Valve Switch:** Controls the throttle.
- Air Flow Meter:** Monitors air flow.
- Water Temp. Sensor:** Monitors engine temperature.
- Air Regulator:** Controls air pressure.
- Fuel Pump:** Delivers fuel to the injectors.
- Droping Resistor:** Controls the fuel pump relay.
- Combination Switch (Light):** Controls the headlights, fog lamps, and tail lamps.
- Headlamp Motor:** Controls the headlamp height.
- Headlamp Relay 1 & 2:** Control the headlights.
- Rear Fog Lamp Relay:** Controls the rear fog lamp.
- Pilot Lamp:** Controls the pilot lamp.
- Rear Fog Lamp:** Provides rear fog lighting.
- Clearance Lamp:** Provides clearance lighting.
- License Lamp:** Provides license plate lighting.
- Tail Lamp:** Provides tail lighting.

Bottom Section (Except CA18ET):

- Door Switch (Driver side):** Controls the driver's door.
- Door Switch (Assist side):** Controls the assist door.
- Step Lamp:** Controls the step lamp.
- Interior Lamp:** Controls the interior lighting.
- Chime:** Provides a chime sound.
- Seat Belt Warning Lamp:** Controls the seat belt warning lamp.
- Rear Defogger Switch:** Controls the rear defogger.
- Washer Motor:** Controls the washer motor.
- Wiper Motor:** Controls the wiper motor.
- Wiper & Washer Switch:** Controls the wiper and washer.
- Wiper Relay:** Controls the wiper.
- Intermittent Wiper Volume:** Controls the intermittent wiper volume.
- Time Control Unit:** Controls the wiper and washer.
- Washer Intermitter:** Controls the washer.
- Wiper Motor (With time control system):** Controls the wiper.
- Wiper Motor (Without time control system):** Controls the wiper.

Legend:

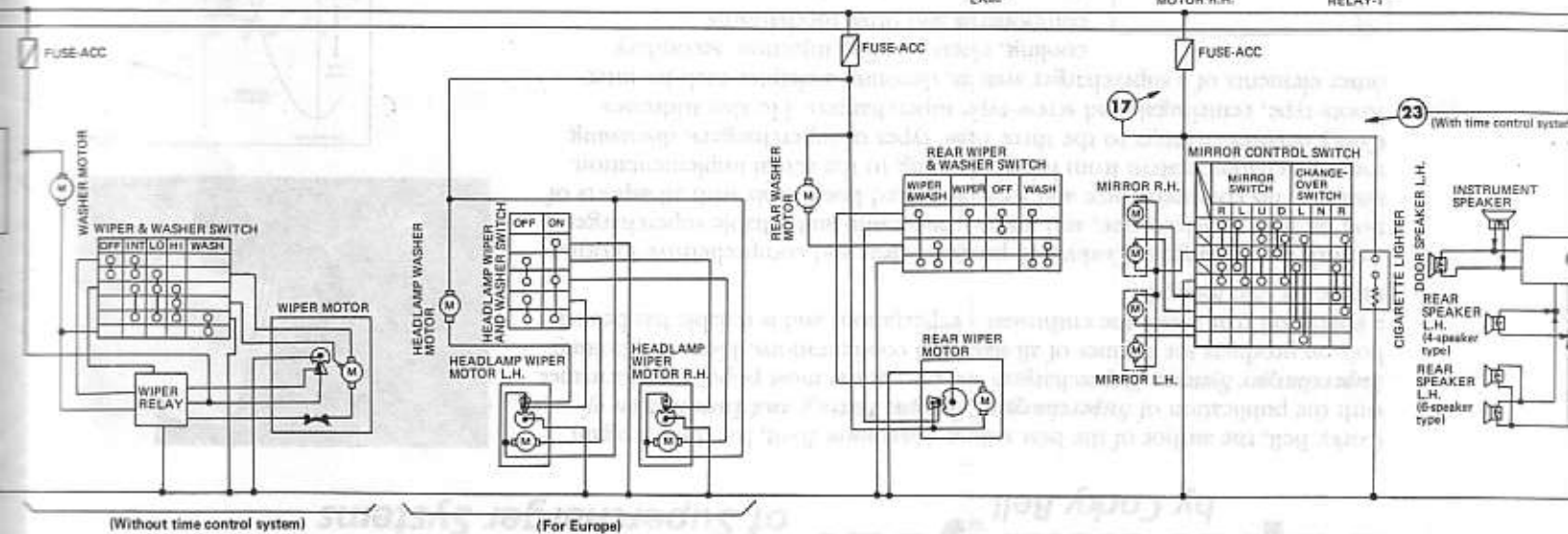
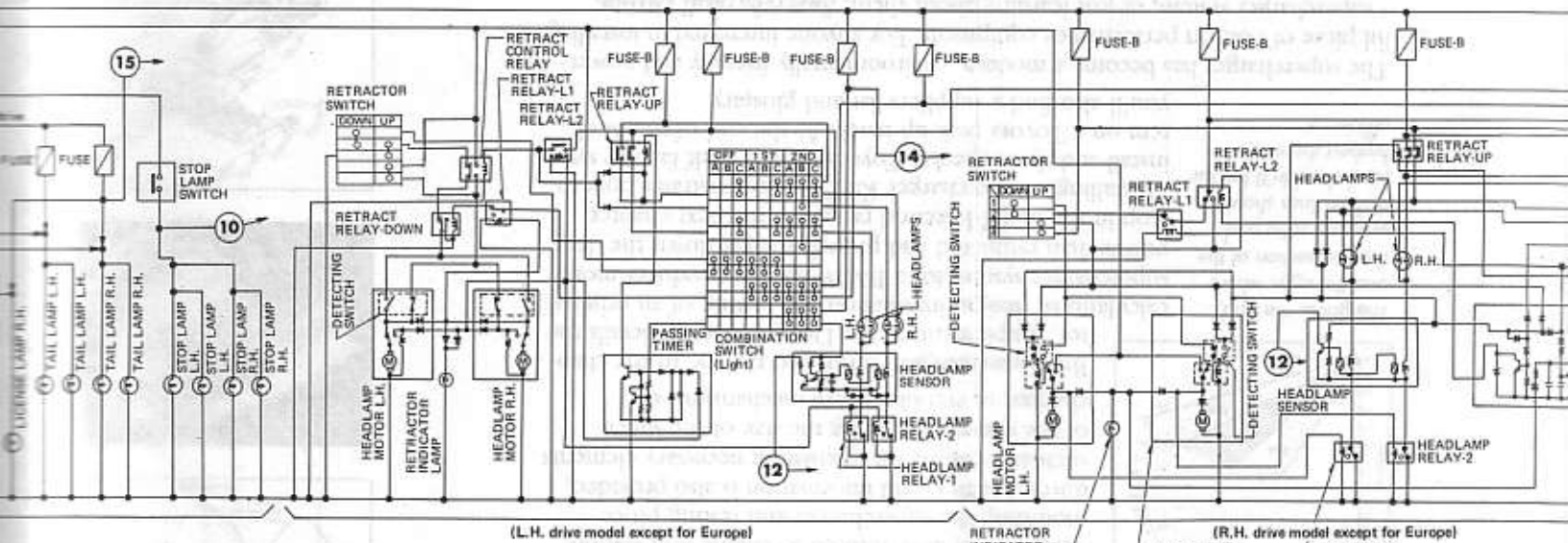
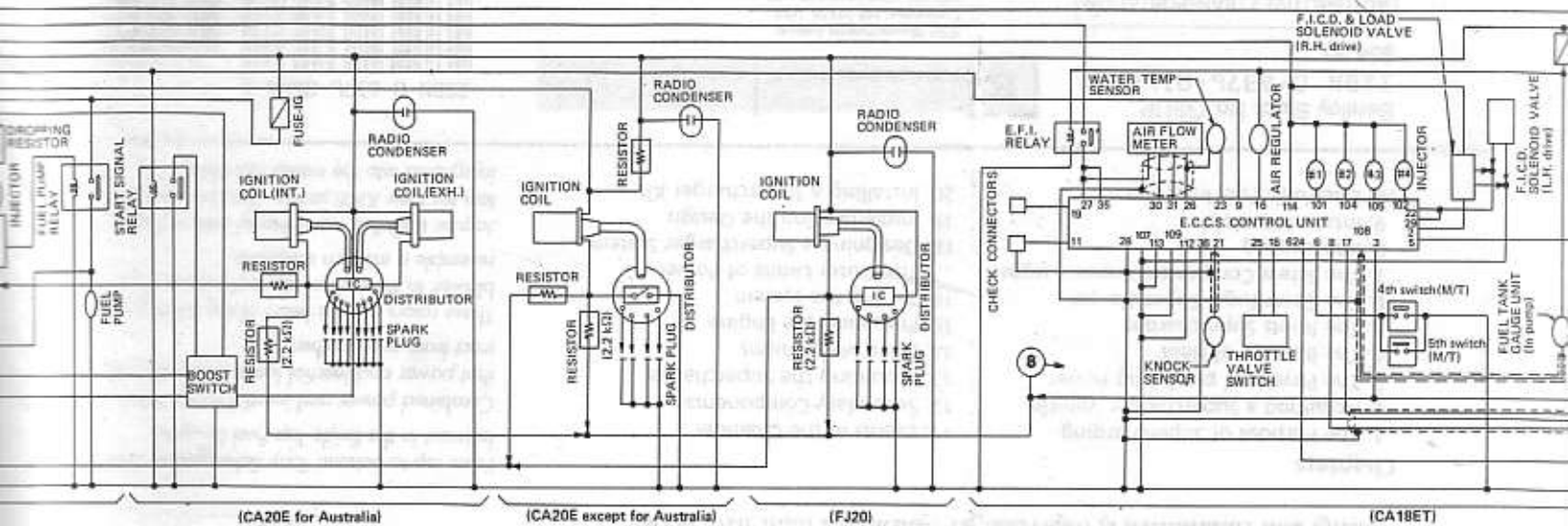
- (L) : L.H. drive model
- (R) : R.H. drive model
- (RCA) : R.H. drive with CA20E engine model

Notes:

- For models bound for France and Switzerland, check joint is disconnected.
- CA20E engine model except for Australia.
- Except CA18ET.

(With time control system)

(Without



15 10

12 14

8

17

12

23

