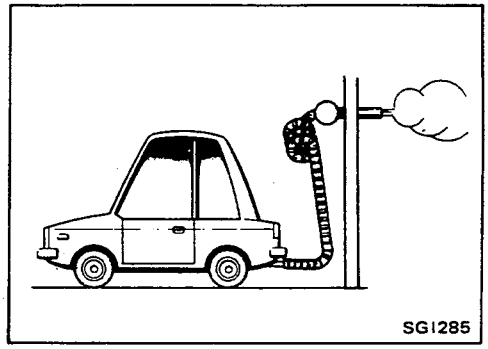
GENERAL INFORMATION

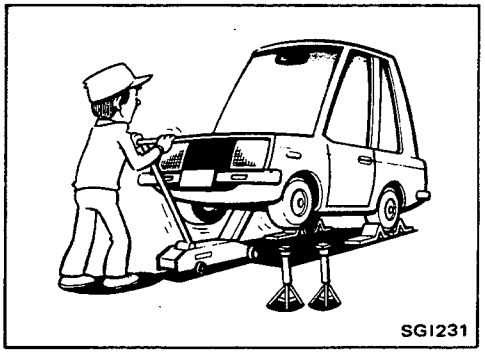
SECTION GI

CONTENTS

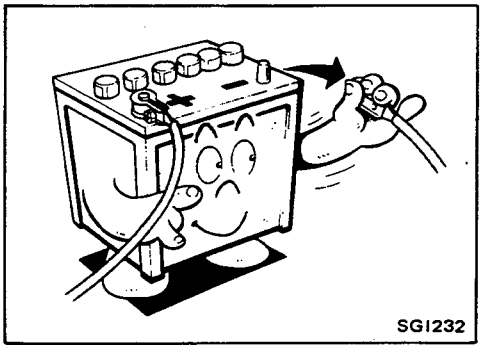
The following precautions should be observed to ensure safe and proper service operations. These precautions are not described in each individual section.


SGI285

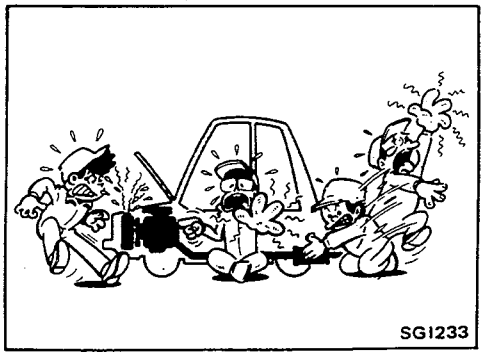
1. Do not operate the engine for an extended period of time without proper exhaust ventilation.
   Keep the work area well ventilated and free of any inflammable materials. Special care should be taken when handling any inflammable or poisonous materials, such as gasoline, refrigerant gas, etc. When working in a pit or other enclosed area, be sure to properly ventilate the area before working with hazardous materials.
   Do not smoke while working on the vehicle.


SGI231

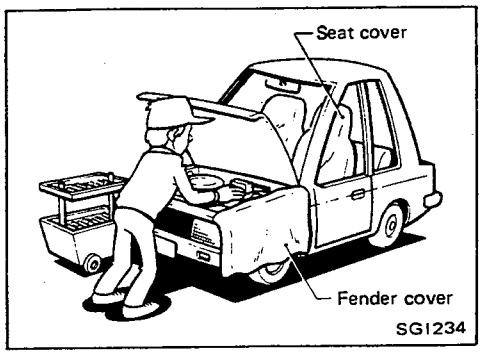
2. Before jacking up the vehicle, apply wheel chocks or other tire blocks to the wheels to prevent the vehicle from moving. After jacking up the vehicle, support the vehicle weight with safety stands at the points designated for proper lifting and towing before working on the vehicle.
   These operations should be done on a level surface.
3. When removing a heavy component such as the engine or transaxle/transmission, take care not to lose your balance and drop it. Also, do not allow it to hit against adjacent parts, especially brake tube and brake master cylinder.


SGI232

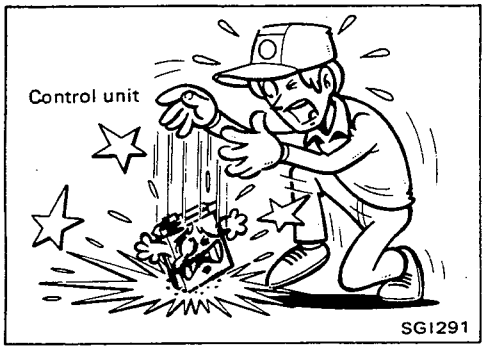
4. Before starting repairs which do not require battery power, always turn off the ignition switch, then disconnect the ground cable from the battery to prevent accidental short circuit.

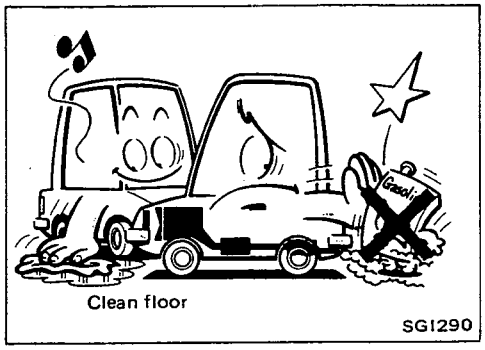

SGI233

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.



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.
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.





Precautions for E.C.C.S. Engine

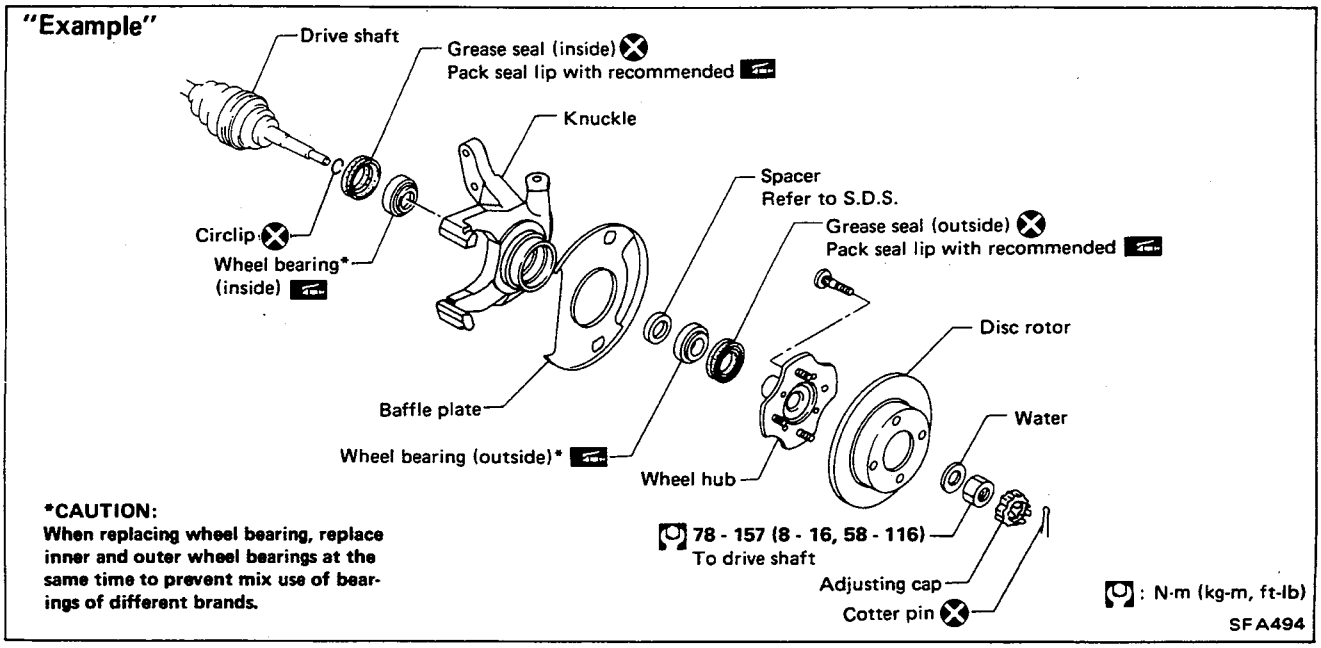
1. Before connecting or disconnecting E.C.C.S. harness connector to or from any E.C.C.S. control unit, be sure to turn the ignition switch to the "OFF" position and disconnect the negative battery terminal.
   Otherwise, there may be damage to control unit.
2. Before disconnecting pressurized fuel line 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.

Precautions for a Catalyst

If a large amount of unburned fuel flows into the 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 the catalytic converter.
2. When checking for ignition spark or measuring engine compression, make tests quickly and only when necessary.
3. Do not run engine when the fuel tank level is low, otherwise the engine may misfire causing damage to the converter.
4. Do not place the vehicle on inflammable material. Keep inflammable material off the exhaust pipe.

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 mating 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 LARGE ILLUSTRATION** is an exploded view (See below) and contains tightening torques, lubrication points and other information necessary to perform repairs.
   The illustration should be used in reference to the service matters only. When ordering parts, refer to the appropriate **PARTS CATALOG**.



6. **THE 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.
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
: Always replace when disassembled.

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"

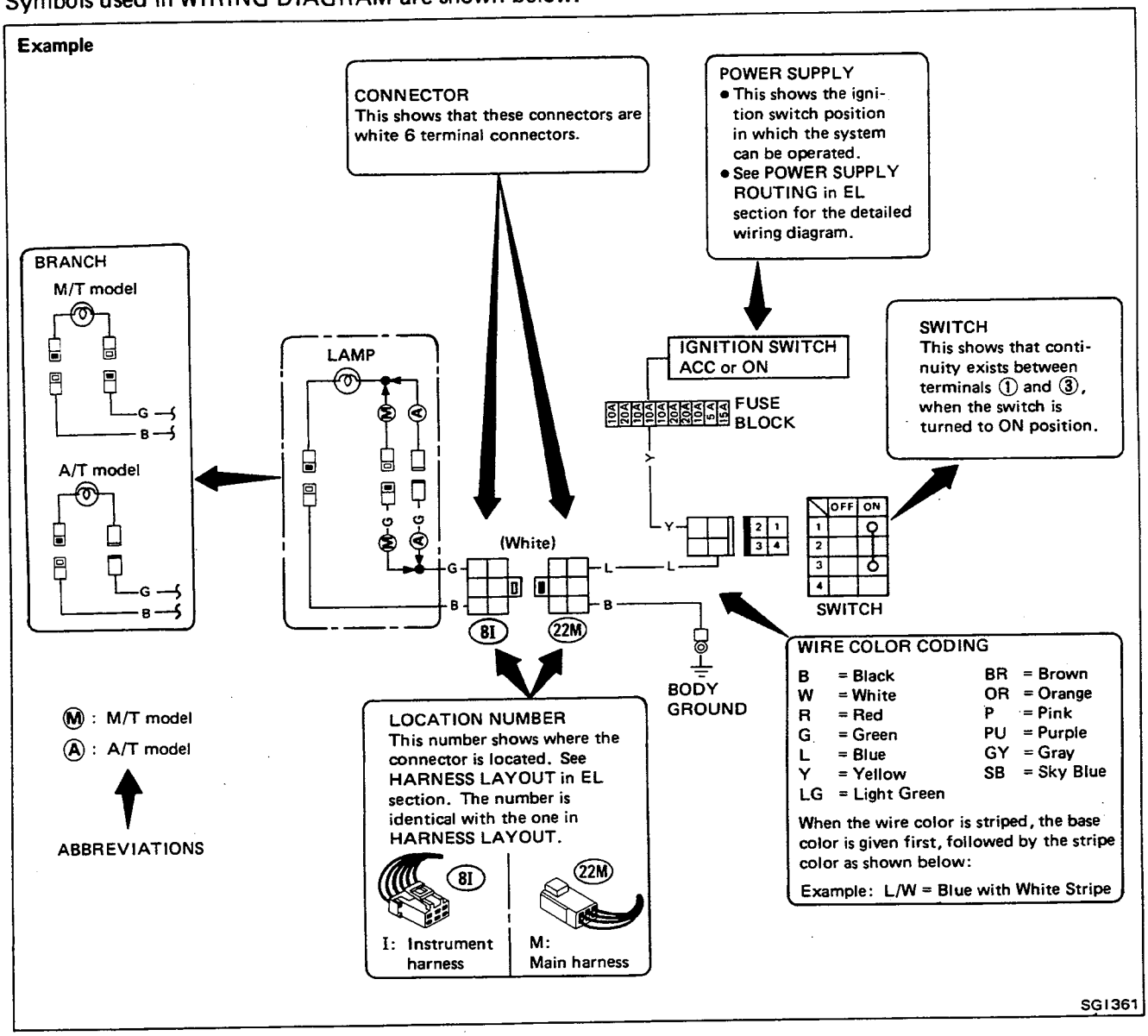
   Tightening torque

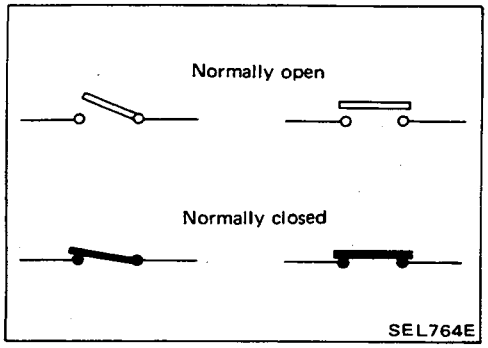
   59 - 78 N·m (6.0 - 8.0 kg-m, 43 - 58 ft-lb)

9. **TROUBLE DIAGNOSES AND CORRECTIONS** are included in sections dealing with complicated components.
10. **SERVICE DATA AND SPECIFICATIONS** is contained at the end of each section for quick reference of data.
11. 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.

WIRING DIAGRAM

Symbols used in WIRING DIAGRAM are shown below.

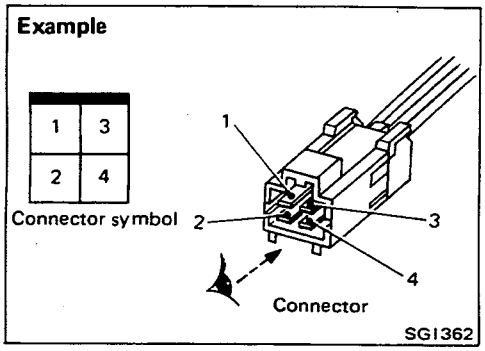




SWITCH POSITIONS

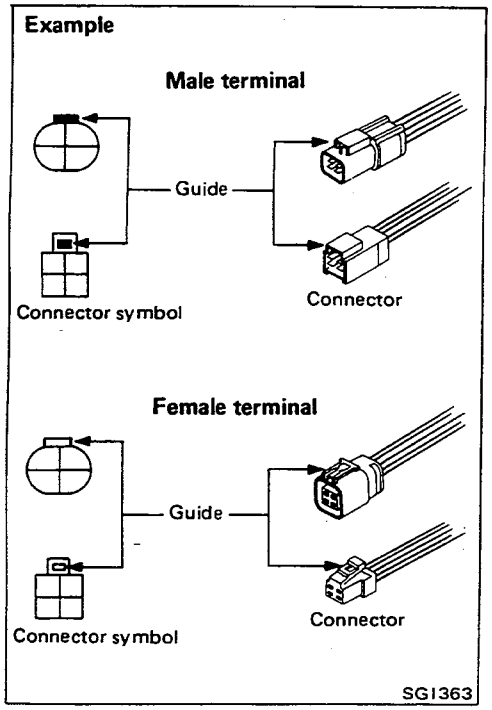
Wiring diagram switches are shown with the vehicle in the following condition:

- Ignition switch "OFF".
- Doors, hood and trunk lid/back door closed.
- Pedals are not depressed and parking brake is released.

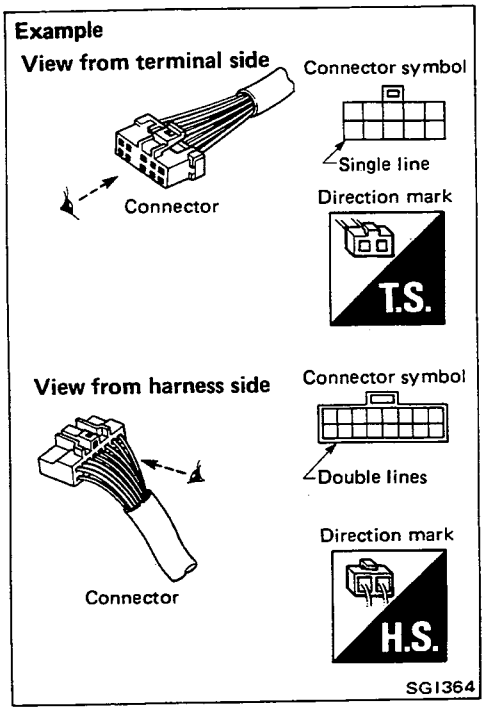


CONNECTOR SYMBOLS

- All connector symbols in wiring diagrams are shown from the terminal side.



- Male and female terminals
  Connector guides for male terminals are shown in black and female terminals in white in wiring diagrams.



DIRECTION MARK

A direction mark is shown to clarify the side of connector (terminal side or harness side).

Direction marks are mainly used in the illustrations indicating terminal inspection.

: View from terminal side . . . T.S.

- All connector symbols shown from the terminal side are enclosed by a single line.

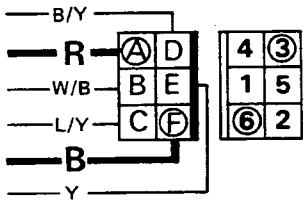
: View from harness side . . . H.S.

- All connector symbols shown from the harness side are enclosed by double lines.

MULTIPLE SWITCH

The continuity of the multiple switch is identified in the switch chart in wiring diagrams.

Example



WIPER SWITCH

	OFF	INT	LO	HI	WASH
1					○
2				○	
③	○	○	●		
4	○	○			
5		○	●		
⑥		○	●	○	○

Continuity circuit of wiper switch

SWITCH POSITION	CONTINUITY CIRCUIT
OFF	3 - 4
INT	3 - 4, 5 - 6
LO	3 - 6
HI	2 - 6
WASH	1 - 6

Example: Wiper switch in LO position
Continuity circuit: Red wire – Ⓐ terminal – ③ terminal – Wiper switch (● – ●: LO) – ⑥ terminal – Ⓕ terminal – Black wire

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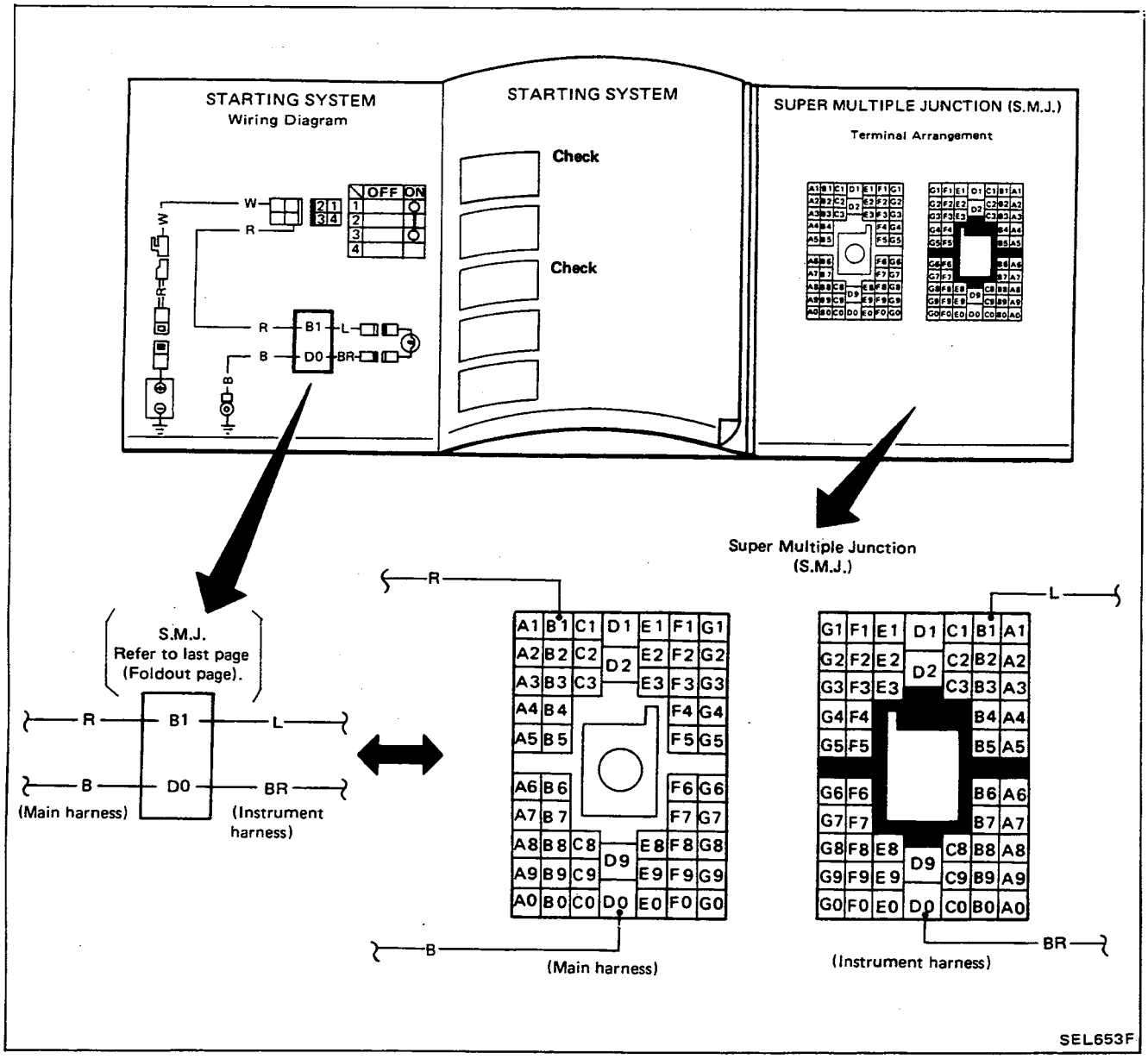
SUPER MULTIPLE JUNCTION (S.M.J.)

- The "S.M.J." indicated in wiring diagrams is shown in a simplified form. The terminal arrangement should therefore be referred to in the foldout at the end of the Service Manual.
- The foldout should be spread to read the entire wiring diagram.

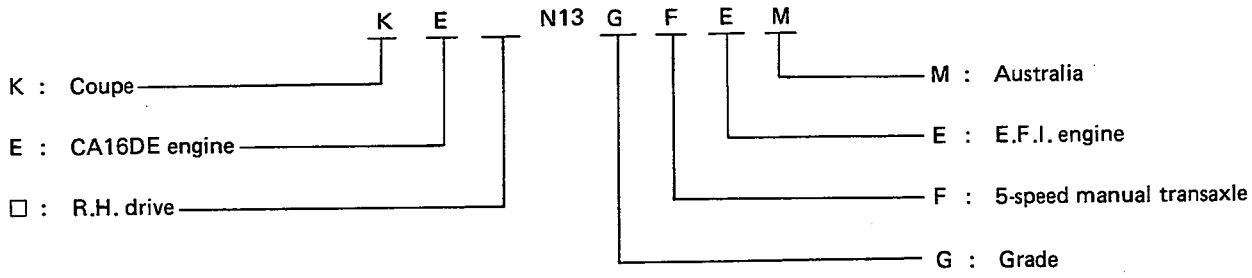
"Example"



Model Variation

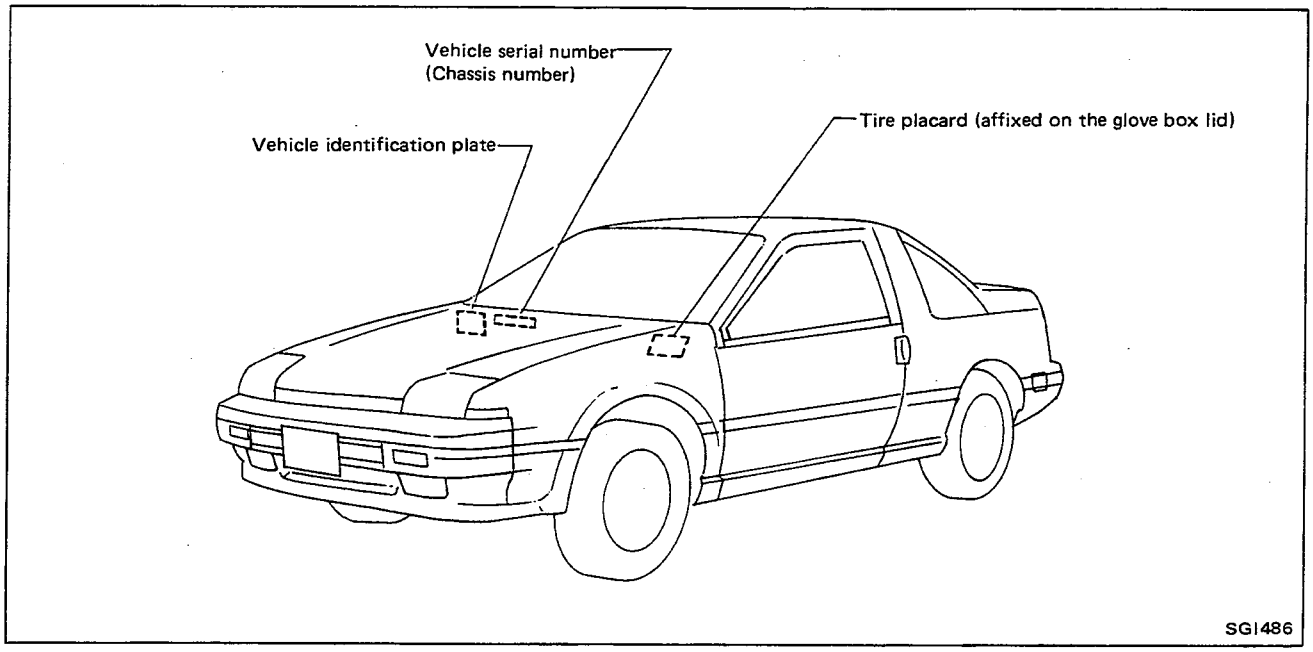
Destination	Body \ Engine / Transaxle	CA16DE / RS5F31A
Australia	Coupe	KEN13GFEM

Prefix and suffix designations

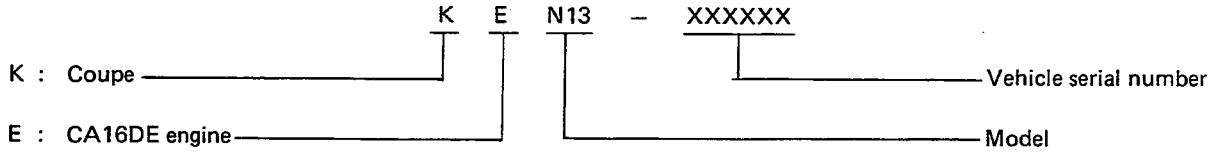


Note: □ means no indication.

Identification Number

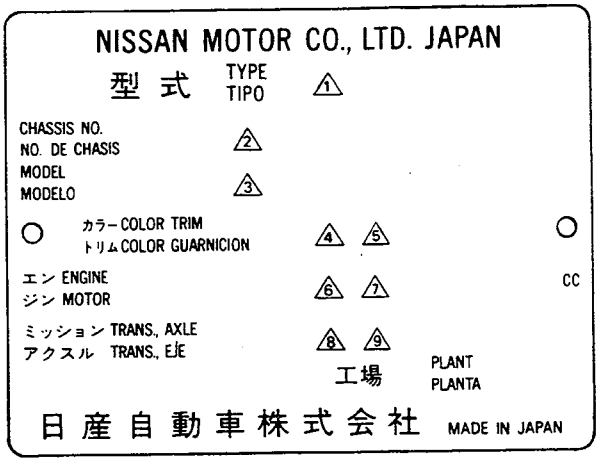


VEHICLE IDENTIFICATION NUMBER (Chassis number)
(Prefix and suffix designations)



Identification Number (Cont'd)

IDENTIFICATION PLATE

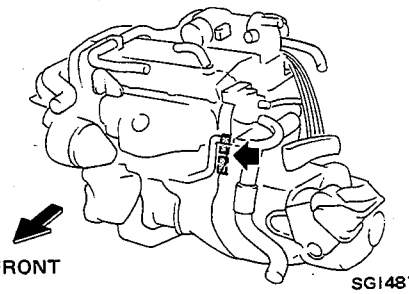


1 Type
2 Vehicle identification number (Chassis number)
3 Model
4 Body color code
5 Trim color code
6 Engine model
7 Engine displacement
8 Transaxle model
9 Axle model

SGI315

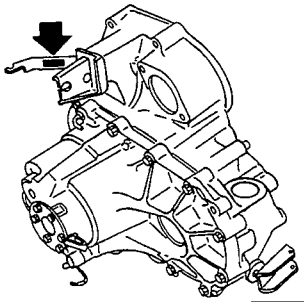
ENGINE SERIAL NUMBER

CA16DE engine



SGI487

TRANSAXLE SERIAL NUMBER



SGI488

Dimensions

Item		
Overall length	mm (in)	4,230 (166.5)
Overall width	mm (in)	1,680 (66.1)
Overall height	mm (in)	1,295 (51.0)
Ground clearance	mm (in)	140 (5.5)
Front tread	mm (in)	1,425 (56.1) 1,435 (56.5)*
Rear tread	mm (in)	1,425 (56.1) 1,435 (56.5)*
Wheelbase	mm (in)	2,430 (95.7)

*Model equipped with aluminum wheels

Wheels & Tires

		Conventional tire		Spare tire
Road wheel	Type	Steel	Aluminum	Steal
	Size/offset mm (in)	5-1/2JJx14/45 (1.77)	6-JJx14/40 (1.57)*	4Tx14/40 (1.57)
Tire	Type	Tubeless, steel radial		Tubeless, bias
	Size	195/60R14 85H		T115/70D14

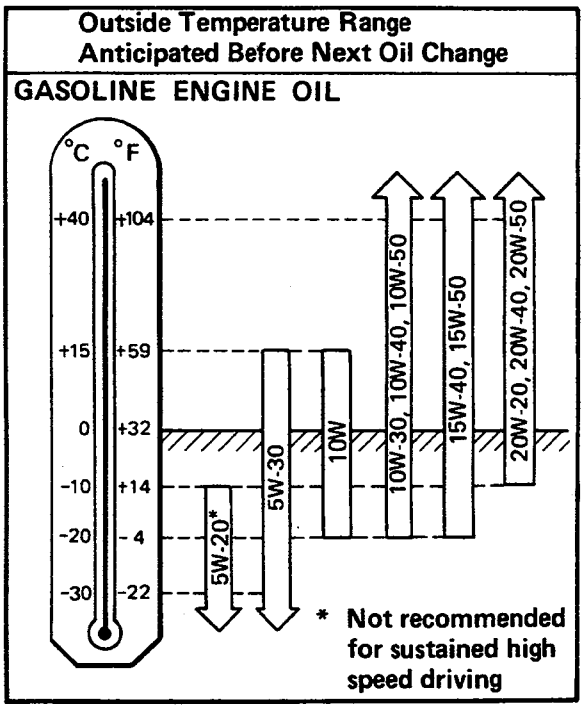
*Option

Fuel and Lubricants

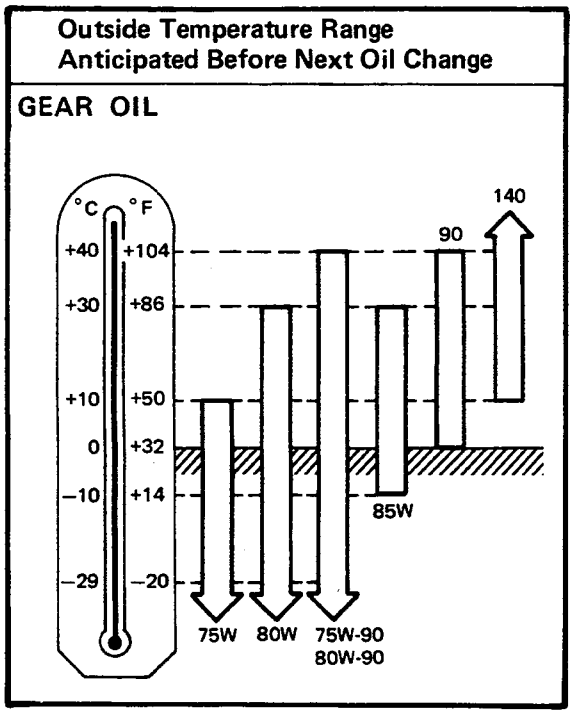
	Capacity (Approximate)		Recommended fuel and lubricants
	Imp measure	Liter	
Fuel	11 gal	50	Unleaded gasoline with an octane rating of at least RON 90
Engine oil (Refill)			
With oil filter	3-3/8 qt	3.8	API SE or SF*
Without oil filter	3 qt	3.4	
Cooling system (Reservoir tank included)	4-7/8 qt	5.6	L.L.C. (Ethylene glycol base)
Reservoir tank	1/2 qt	0.6	
Manual transaxle gear oil	4-3/4 pt	2.7	API GL-4*
Power steering fluid	3/4 qt	0.9	Type DEXRON®
Brake fluid	—	—	DOT 3 (US FMVSS No. 116)
Multi-purpose grease	—	—	NLGI No. 2 (Lithium soap base)

*: For further details, see "Recommended SAE viscosity number".

SAE Viscosity Number



- For cold and warm areas:
  10W-30 is preferable for ambient temperatures above –20°C (–4°F).
- For hot areas:
  20W-40 and 20W-50 are suitable.

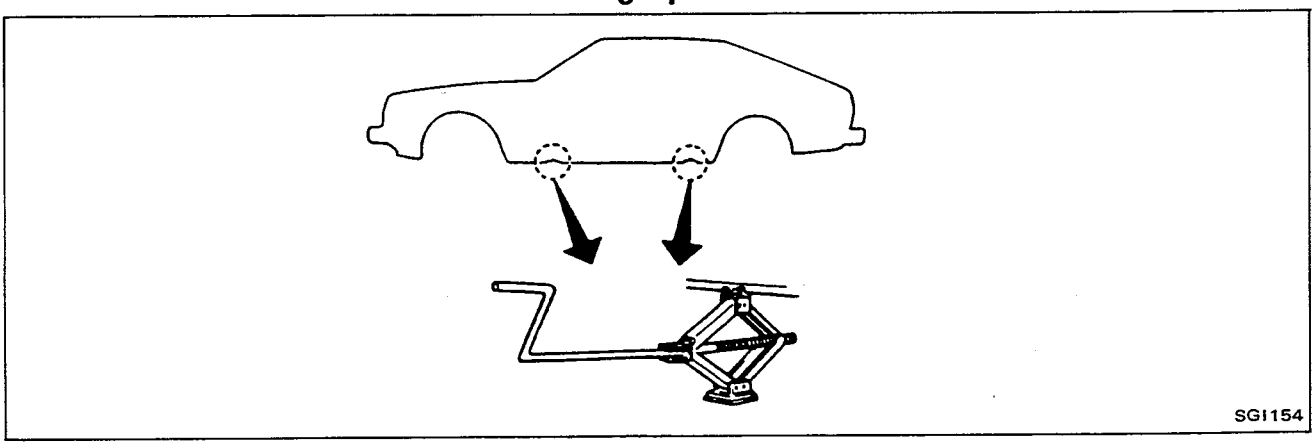


- 80W-90 is preferable if the ambient temperature is below 40°C (104°F).

WARNING:

a. Never get under the vehicle while it is supported only by the jack. Always use safety stands to support the frame when you have to get under the vehicle.
b. Place wheel chocks at both front and back of the wheel which is diagonally opposite the jack position. Example: If the jack is positioned at the L.H. front wheel, place wheel chocks at R.H. rear wheel.

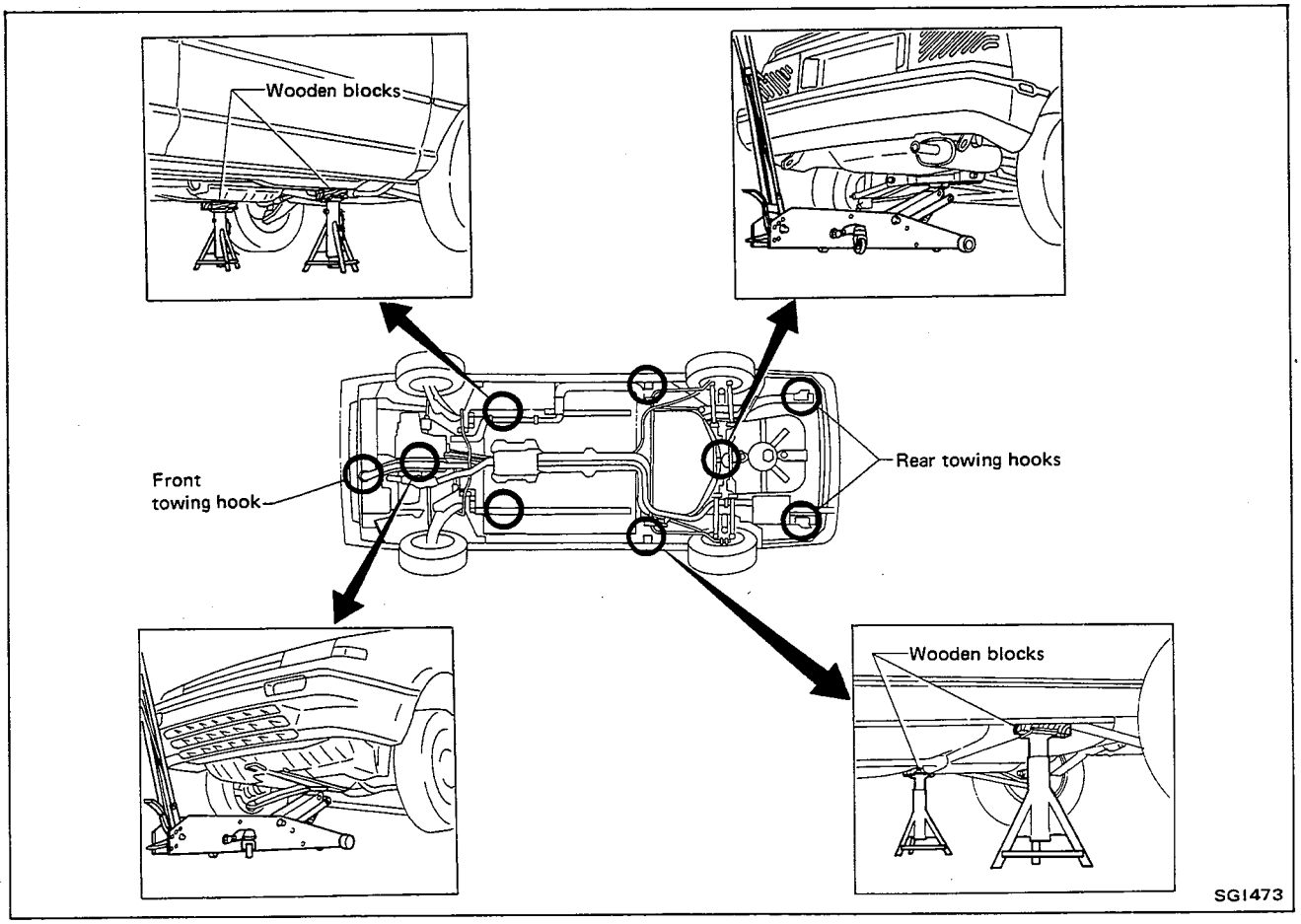
Pantograph Jack



Garage Jack and Safety Stand

CAUTION:

- Place a wooden or rubber block between safety stand and vehicle body when the supporting body is flat.

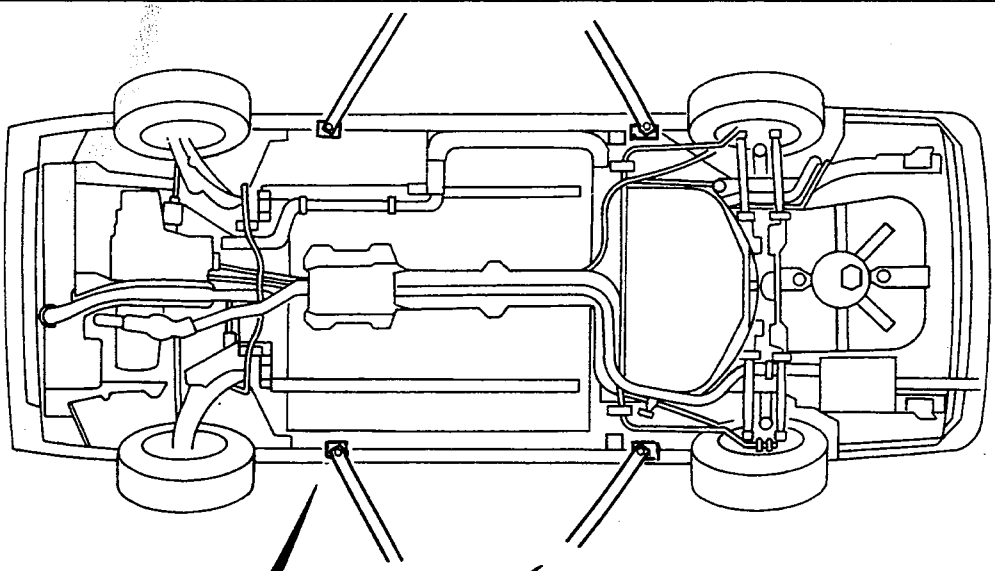


2-pole Lift

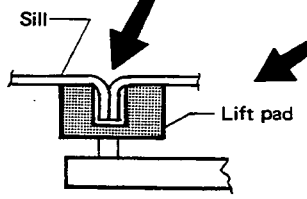
WARNING:

When lifting the vehicle, open the lift arms as wide as possible and ensure that the front and rear of the vehicle are well balanced.

When setting the lift arm, do not allow the arm to contact the brake tubes and fuel lines.



Note: Lift-up points are the same as pantograph jack points.



Put the sill in the slit of the lift pad to prevent the sill from deforming. If the pad does not have the slit, prepare a suitable attachment with slit.

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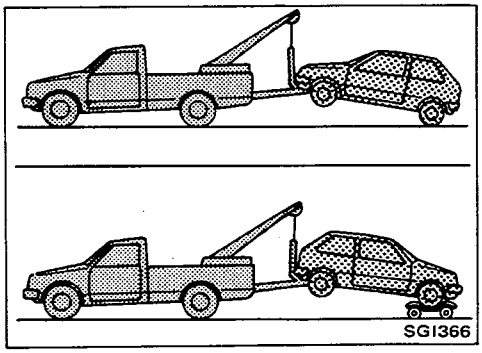
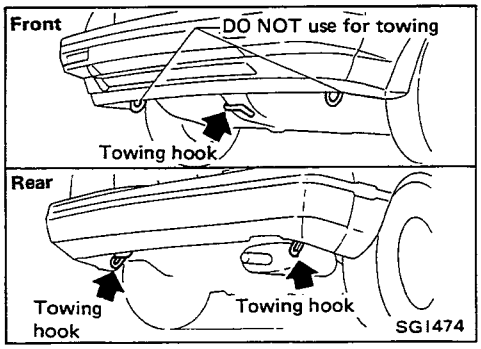
Tow Truck Towing

CAUTION:

- All applicable laws and local laws regarding the towing operation must be obeyed.
- It is necessary to use proper towing equipment to avoid possible damage to the vehicle during towing operation. Towing should be done in accordance with Towing Procedure Manual.
- Attach safety chains for all towing.
- When towing, make sure that the transmission, steering system and power train are in good order. If any unit is damaged, a dolly must be used.
- When towing with the front wheels on the ground: Turn the ignition key to the "OFF" position and secure the steering wheel in a straightahead position with a rope or similar device. Never place the ignition key in the "LOCK" position. This will result in damage to the steering lock mechanism.
- Move the gearshift lever to the neutral ("N" position).
- When towing with the rear wheels on the ground, release the parking brake.



NISSAN recommends that vehicle be towed with the driving (front) wheels off the ground as illustrated.



TOWING POINT

- Never tow the vehicle using only the towing hooks. Use proper towing equipment when towing. Otherwise, the vehicle body will be damaged.
- Always pull the cable straight out from the vehicle. Never pull on the hook at a sideways angle.

TIGHTENING TORQUE OF STANDARD BOLTS

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

M 6
- 6 — Nominal diameter of bolt threads (Unit: mm)
- M — Metric screw threads

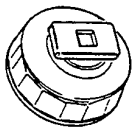
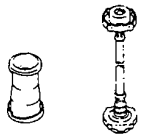
MAINTENANCE

SECTION MA

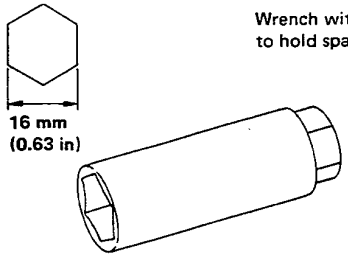
CONTENTS

SPECIAL SERVICE TOOLS

*Special tool or commercial equivalent

Tool number Tool name	Description	Engine application CA
KV10105900* Oil filter cap wrench	Removing oil filter 	X
EG17650301 Radiator cap tester adapter		X

COMMERCIAL SERVICE TOOL

Tool name	Description	Engine application CA
Spark plug wrench	Wrench with a magnet to hold spark plug  SEM294A	X

Shown below are Pre-delivery Inspection Items required for the new vehicle. It is recommended that necessary items other than those listed here be added, paying due regard to the conditions in each country.

Items marked with [X] are applicable on this model.

UNDER HOOD — engine off

- [X] Radiator coolant level and coolant hose connections for leaks
- [X] Battery fluid level, specific gravity and conditions of battery terminals
- [X] Drive belts tension
- [X] Fuel filter for water or dusts, and fuel lines and connections for leaks
- [X] Engine oil level and oil leaks
- [X] Clutch and brake reservoir fluid level and fluid lines for leaks
- [X] Windshield and rear window washer and headlamp cleaner reservoir fluid level
- [ ] Injection pump oil level (Diesel only ... if applicable)
- [X] Power steering reservoir fluid level and hose connections for leaks

ON INSIDE AND OUTSIDE

- [X] Remove front spring/strut spacer (If applicable)
- [X] Operation of all instruments, gauges, lights and accessories
- [X] Operation of horn(s), wiper and washer
- [X] Steering lock for operation
- [X] Check air conditioner for gas leaks
- [X] Front and rear seats, and seat belts for operation
- [X] All moldings, trims and fittings for fit and alignment
- [X] All windows for operation and alignment
- [X] Hood, trunk lid, door panels for fit and alignment
- [X] Latches, keys and locks for operation
- [X] Weatherstrips for adhesion and fit
- [X] Headlamp aiming
- [X] Tighten wheel nuts (Inc. inner nuts if applicable)
- [X] Tire pressure (Inc. spare tire)
- [X] Check front wheels for toe-in
- [ ] Install clock/voltmeter/room lamp fuse (If applicable)
- [ ] Install deodorizing filter to air purifier (If applicable)
- [ ] Remove wiper blade protectors (If applicable)

UNDER BODY

- [X] Manual transmission/transaxle, transfer and differential gear oil level
- [X] Brake and fuel lines and oil/fluid reservoirs for leaks
- [X] Tighten bolts and nuts of steering linkage and gear box, suspension, propeller shafts and drive shafts
- [ ] Tighten rear body bolts and nuts (Models with wooden bed only)

ROAD TEST

- [X] Clutch operation
- [X] Parking brake operation
- [X] Service brake operation
- [ ] Automatic transmission/transaxle shift timing and kickdown
- [X] Steering control and returnability
- [X] Engine performance
- [X] Squeaks and rattles

ENGINE OPERATING AND HOT

- [X] Adjust idle mixture and speed
- [ ] Automatic transmission/transaxle fluid level
- [ ] Engine idling and stop knob operation (Diesel only)

FINAL INSPECTION

- [X] Install necessary parts (outside mirror, wheel covers, seat belts, mat, carpet or mud flaps)
- [X] Inspect for interior and exterior metal and paint damage
- [X] Check for spare tire, jack, tools, (wheel chock), and literature
- [X] Wash, clean interior and exterior

MAINTENANCE SCHEDULE

The following tables show the normal maintenance schedule. Depending upon weather and atmospheric conditions, varying road surfaces, individual driving habits and vehicle usage, additional or more frequent maintenance may be required.

Periodic maintenance beyond the last period shown on the tables requires similar maintenance.

MAINTENANCE OPERATION Periodic maintenance should be performed either at number of kilometers (miles) or months, whichever comes first.	Number of kilometers in thousands (Number of miles in thousands)	MAINTENANCE INTERVAL 1 (0.6)	10 (6)	20 (12)	30 (18)	40 (24)	50 (30)	60 (36)	70 (42)	80 (48)	Reference page
	Number of months	–	6	12	18	24	30	36	42	48	
EMISSION CONTROL MAINTENANCE	**Underhood and under vehicle**										
Check drive belts for cracks, fraying, wear & tension						X				X	MA-6
Change engine oil & oil filter*			X	X	X	X	X	X	X	X	MA-10
Change engine coolant (L.L.C.)						X				X	MA-8
Check cooling system				X		X		X		X	MA-9
Replace fuel filter*						X				X	MA-7
Check fuel lines						X				X	MA-7
Replace air cleaner filter (Viscous paper type)*						X				X	MA-7
Replace spark plugs (PLATINUM-TIPPED type)						Every 100,000 km (60,000 miles)					MA-11
Check vapor lines						X				X	MA-7
Check exhaust gas sensor						X				X	MA-13
Replace timing belt						Every 100,000 km (60,000 miles)					MA-13
CHASSIS AND BODY MAINTENANCE	**Underhood**										
Check brake fluid level & for leaks			X	X	X	X	X	X	X	X	MA-25
Change brake fluid*						X				X	MA-25
Check brake booster vacuum hoses, connections & check valve						X				X	MA-25
Check power steering fluid & lines				X		X		X		X	MA-33
	Under vehicle										
Check brake, clutch & exhaust systems for proper attachment, leaks, cracks, chafing, abrasion, deterioration, etc.			X	X	X	X	X	X	X	X	MA-18, 25
Check oil level in manual transaxle				X		X		X		X	MA-18
Check steering gear & linkage, axle & suspension parts, & drive shafts for damaged, loose & missing parts & lubrication*		X		X		X		X		X	MA-19, 23, 33
	Outside and inside										
Check wheel alignment. If necessary, rotate & balance wheels				X		X		X		X	MA-20
Check brake pads, disc & other brake components for wear, deterioration & leaks*			X	X	X	X	X	X	X	X	MA-26
Check brake linings, drums & other brake components for wear, deterioration & leaks*				X		X		X		X	MA-26
Lubricate locks, hinges & hood latch*				X		X		X		X	MA-34
Check seat belts, buckles, retractors, anchors & adjuster				X		X		X		X	MA-34
Check foot brake, parking brake & clutch for free play stroke & operation				X		X		X		X	MA-18, 27

NOTE: (1) Maintenance items with "*" should be performed more frequently according to "Maintenance under severe driving conditions".

Check: Check. Correct or replace if necessary.

MAINTENANCE UNDER SEVERE DRIVING CONDITIONS

The maintenance intervals shown on the preceding pages are for normal operating conditions. If the vehicle is mainly operated under severe driving conditions as shown below, more frequent maintenance must be performed on the following items as shown in the table.

Severe driving conditions

A – Driving under dusty conditions
B – Driving repeatedly short distances
C – Towing a trailer
D – Extensive idling
E – Driving in extremely adverse weather conditions or in areas where ambient temperatures are either extremely low or extremely high
F – Driving in high humidity areas or in mountainous areas
G – Driving in areas using salt or other corrosive materials
H – Driving on rough and/or muddy roads or in the desert

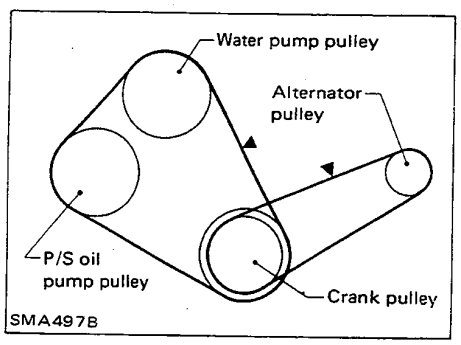
Driving condition	Maintenance item	Maintenance operation	Maintenance interval	Reference page
A	Air cleaner filter	Replace	More frequently	MA-7
A B C D	Engine oil and oil filter	Replace	Every 5,000 km (3,000 miles) or 3 months	MA-10
A . . . E . . .	Fuel filter	Replace	Every 20,000 km (12,000 miles) or 12 months	MA-7
. . . . . F . .	Brake fluid	Replace	Every 20,000 km (12,000 miles) or 12 months	MA-25
. . C	Manual transaxle oil	Replace	Every 40,000 km (24,000 miles) or 24 months	MA-18
. . . . . G H	Steering gear & linkage, axle & suspension parts & drive shafts	Check	Every 10,000 km (6,000 miles) or 6 months	MA-19, 23, 33
A . C . . . G H	Brake pads, discs & other brake components	Check	Every 5,000 km (3,000 miles) or 3 months	MA-26
A . C . . . G H	Brake linings, drums & other brake components	Check	Every 10,000 km (6,000 miles) or 6 months	MA-26
. . . . . G .	Lock, hinge & hood latch	Lubricate	Every 5,000 km (3,000 miles) or 3 months	MA-34

Maintenance operation: Check = Check. Correct or replace if necessary.

Drive Belts Inspection

1. Inspect for cracks, fraying, wear or oil adhesion. If necessary, replace with new one.
2. Inspect drive belt deflections by pushing on the belt midway between pulleys.

Inspect drive belt deflections when engine is cold. If engine is hot, check deflections in 30 minutes or more.
Adjust if belt deflections exceed the limit.



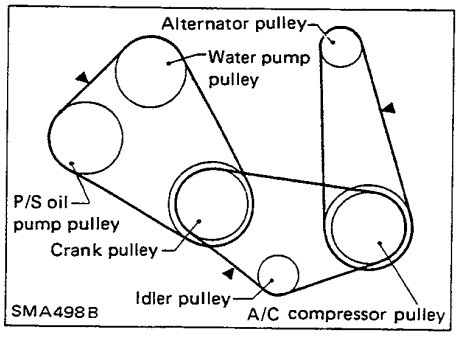
Belt deflection:

Power steering equipped model (Without air conditioner)

Unit: mm (in)

	Used belt deflection		Set deflection of new belt
	Limit	Adjust deflection	
Alternator	12 (0.47)	6 - 8 (0.24 - 0.31)	5 - 7 (0.20 - 0.28)
Power steering oil pump	12.5 (0.492)	7 - 9 (0.28 - 0.35)	6 - 8 (0.24 - 0.31)

Applied pushing force: 98 N (10 kg, 22 lb)

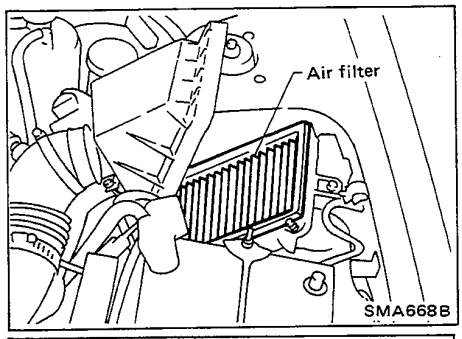


Air conditioner & power steering equipped model

Unit: mm (in)

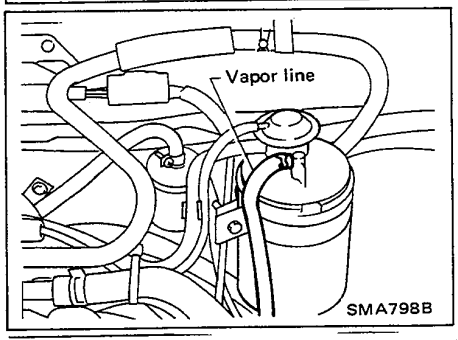
	Used belt deflection		Set deflection of new belt
	Limit	Adjust deflection	
Alternator	10 (0.39)	5 - 7 (0.20 - 0.28)	5 - 7 (0.20 - 0.28)
Power steering oil pump	12.5 (0.492)	7 - 9 (0.28 - 0.35)	6 - 8 (0.24 - 0.31)
Air conditioner compressor	6 (0.24)	3 - 4 (0.12 - 0.16)	3 - 4 (0.12 - 0.16)

Applied pushing force: 98 N (10 kg, 22 lb)



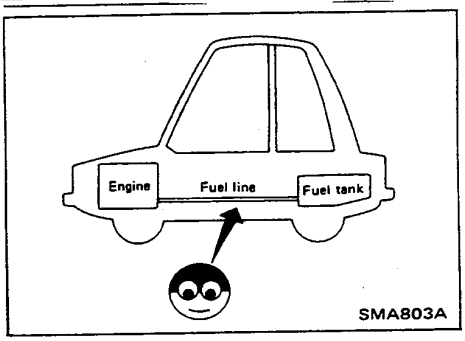
Replacing Air Cleaner Filter

The viscous paper type air cleaner filter does not require any cleaning operation between renewals.



Vaper Line Inspection

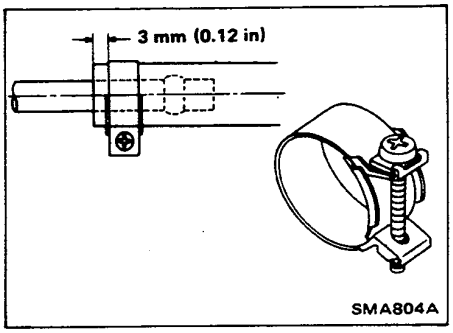
1. Visually inspect vapor lines for proper attachment, cracks, damage, loose connections, chafing and deterioration.
2. Inspect vacuum relief valve of fuel tank filter cap for clogging, sticking, etc.



Fuel Line Inspection

Inspect fuel lines and tank for proper attachment, leaks, cracks, damage, loose connections, chafing and deterioration.
If necessary, repair or replace faulty parts.

Before replace faulty parts, release fuel pressure from fuel line to eliminate danger.
Refer to Fuel Filter Replacement.



CAUTION:

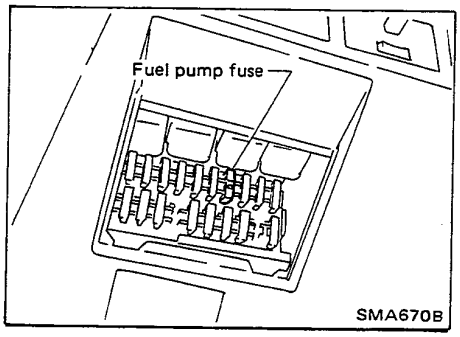
a. **Do not reuse fuel hose clamps after loosening.**
b. **Tighten high-pressure rubber hose clamp so that clamp end is 3 mm (0.12 in) from hose end.**
   Tightening torque specifications are the same for all rubber hose clamps.
   Fuel hose clamps
   1.0 - 1.5 N·m
   (0.10 - 0.15 kg-m, 0.7 - 1.1 ft-lb)
   Ensure that screw does not contact adjacent parts.

Fuel Filter Replacement

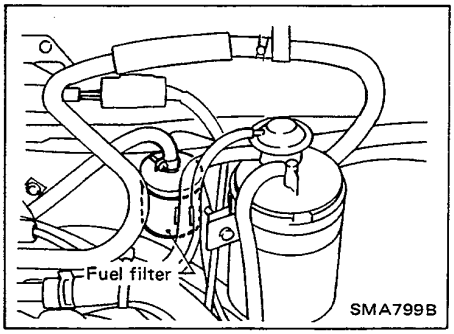
WARNING:

Before removing fuel filter, release fuel pressure from fuel line to eliminate danger.

Fuel Filter Replacement (Cont'd)



1. Remove fuse for fuel pump.
2. Start engine.
3. After engine stalls, crank engine two or three times to make sure that fuel pressure is released.
4. Turn ignition switch off and install fuse for fuel pump.



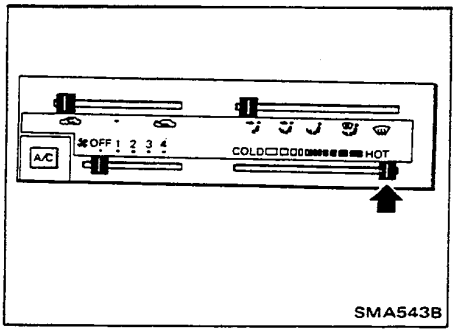
5. Loosen fuel hose clamps.
6. Replace fuel filter.

- **Do not reuse fuel hose clamps.**
- **Be careful not to spill fuel in engine compartment. Place a rag to absorb fuel.**
- **Use high-pressure type fuel filter. Do not use a synthetic resinous fuel filter.**

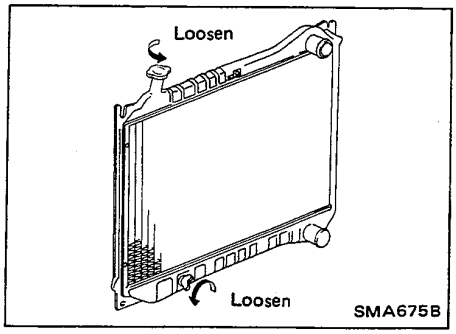
Changing Engine Coolant

WARNING:

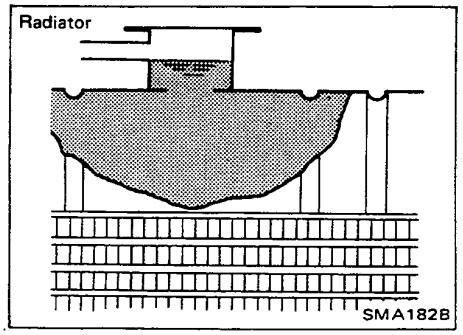
To avoid the danger of being scalded, never attempt to change the coolant when the engine is hot.



1. Move heater "TEMP" control lever all the way to "HOT" position.



2. Open drain cock at the bottom side of radiator, and remove radiator cap.
3. Close drain cock and fill radiator with water.
4. Warm up engine and repeat steps 2, 3 and 4 one or two times to drain old coolant.

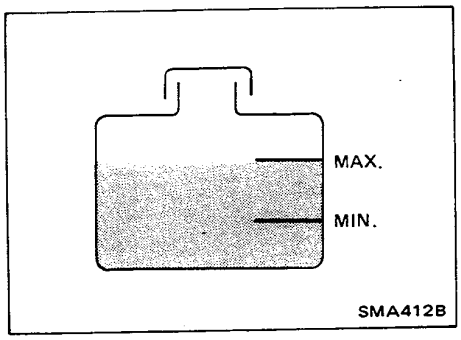


5. Fill radiator with coolant up to filler opening.
   Follow instructions attached to anti-freeze container for mixing ratio of anti-freeze to water.

Coolant capacity (Reservoir tank included):
Approx. 5.6ℓ (4-7/8 Imp qt)

Pour coolant through coolant filler neck slowly to allow air in system to escape.

Changing Engine Coolant (Cont'd)

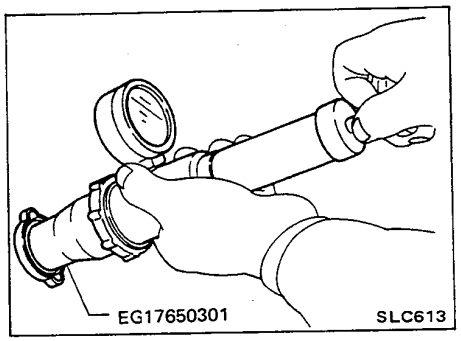


6. Fill reservoir tank up to "MAX" level.
   Reservoir tank capacity ("MAX" level):
   0.6ℓ (1/2 Imp qt)
7. Run the engine at approximately 2,000 rpm for about one minute.
8. Stop engine and cool it down, then refill radiator and reservoir tank.

Checking Cooling System

CHECKING HOSES

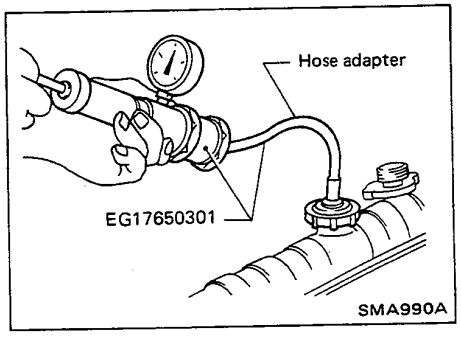
Check hoses for proper attachment, leaks, cracks, damage, loose connections, chafing and deterioration.



CHECKING RADIATOR CAP

Apply pressure to radiator cap by means of a cap tester to see if it is satisfactory.

Radiator cap relief pressure:
78 - 98 kPa
(0.8 - 1.0 kg/cm^2, 11 - 14 psi)

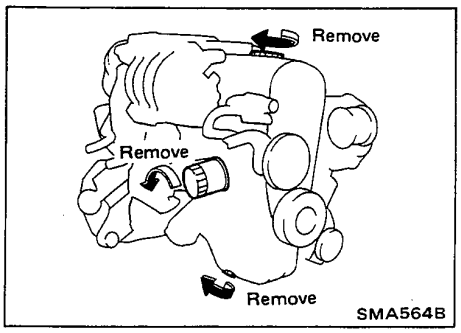


CHECKING COOLING SYSTEM FOR LEAKS

Apply pressure to the cooling system by means of a tester to check for leakage.

Testing pressure:
157 kPa (1.6 kg/cm^2, 23 psi)

CAUTION:
Higher than the specified pressure may cause radiator damage.



Changing Engine Oil

WARNING:

Be careful not to burn yourself, as engine oil is hot.

1. Warm up engine, and check for oil leakage from engine components.
2. Remove oil filter cap and drain plug.
3. Drain oil and refill with new engine oil.

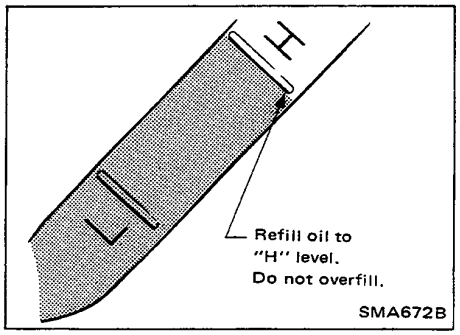
Oil capacity (Approximately):

Unit: ℓ (Imp qt)

With oil filter change	3.8 (3-3/8)
Without oil filter change	3.4 (3)

CAUTION:

a. **Be sure to clean drain plug and install with new washer.**
   Drain plug
   29 - 39 N·m (3.0 - 4.0 kg-m, 22 - 29 ft-lb)
b. **Use recommended engine oil.**
   Refer to GI section.



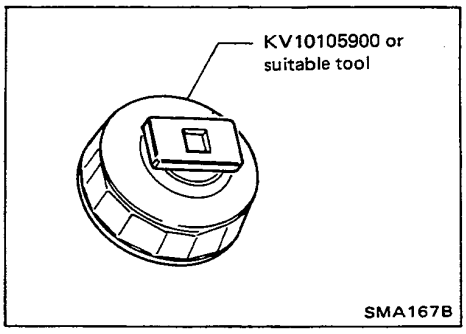
4. Check oil level.
5. Start engine. Check area around drain plug and oil filter for any sign of oil leakage.
6. Run engine for a few minutes, then turn it off. After several minutes, check oil level.

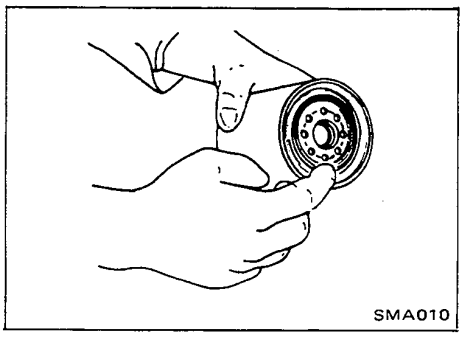
Oil Filter Replacement

1. Remove oil filter with Tool.

WARNING:

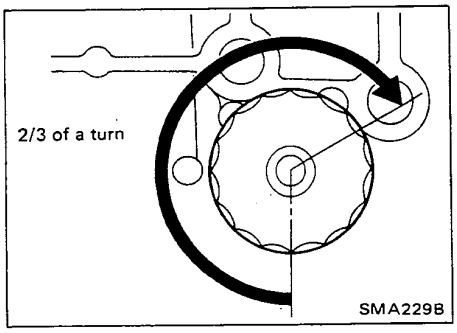
Be careful not to burn yourself, as engine and engine oil are hot.





2. Before installing new oil filter, wipe clean oil filter mounting surface on cylinder block, and smear a little engine oil on rubber seal of oil filter.

Oil Filter Replacement (Cont'd)



3. Screw oil filter on until a slight resistance is felt, then tighten an additional 2/3 turn, or more.

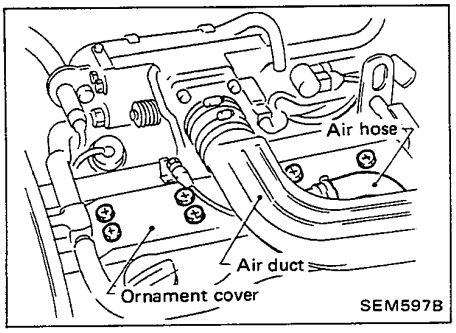
4. Add engine oil.

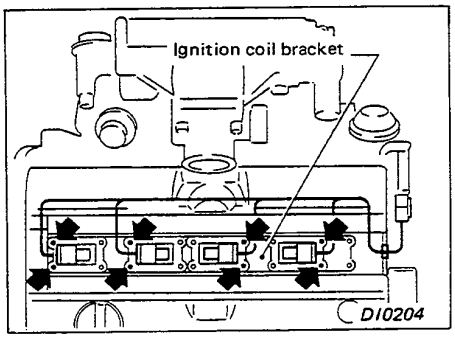
Refer to Changing Engine Oil.

Spark Plug Replacement

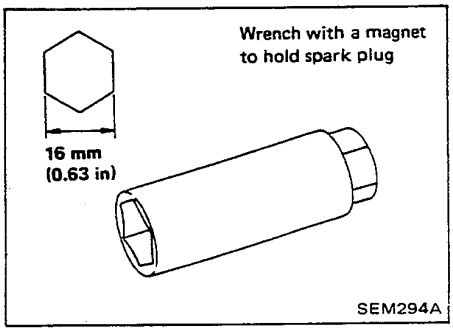
1. Disconnect air hose.
2. Remove air duct.
3. Remove ornament cover.

Acceleration wire does not need removing.





4. Disconnect harness connector between ignition coil and power transistor.
5. Remove ignition coil bracket fixing bolts and pull out this bracket with ignition coils.



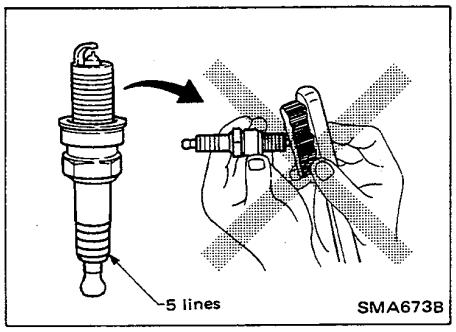
6. Remove spark plugs with suitable spark plug wrench.

Spark plug (Platinum-tipped type):

Standard type:	**PFR6A-11**
Hot type:	**PFR5A-11**
Cold type:	**PFR7A-11**

: 20 - 29 N·m (2 - 3 kg-m, 14 - 22 ft-lb)

Spark Plug Replacement (Cont'd)

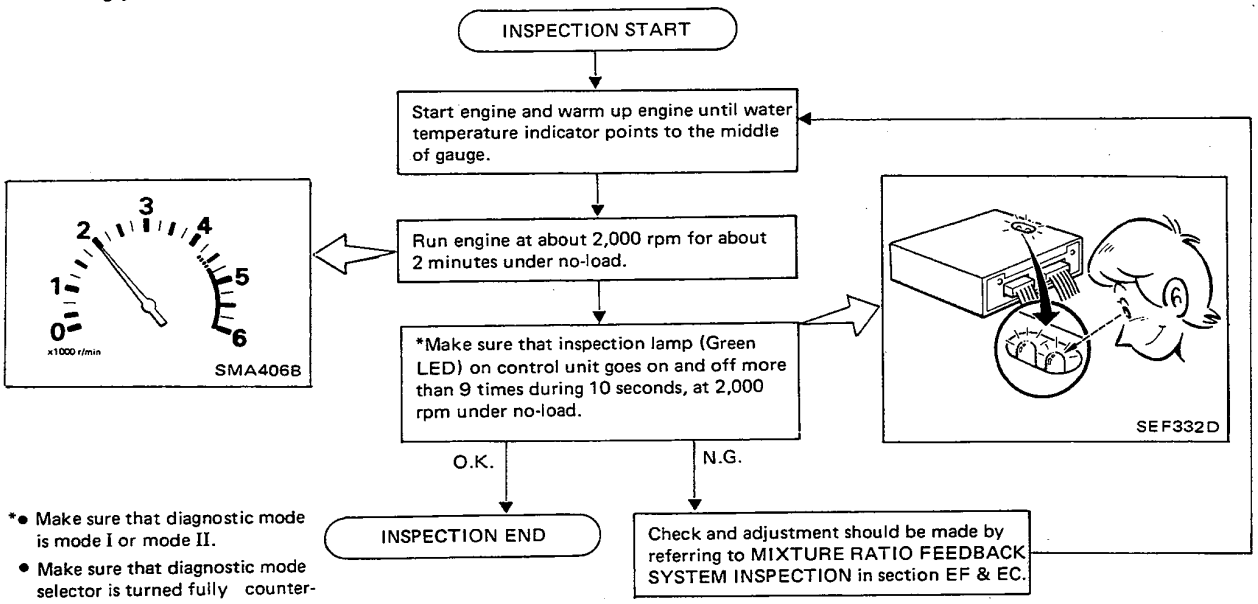


- Checking and adjusting plug gap are not required between renewals.
- Do not use a wire brush for cleaning.
- If plug tip is covered with carbon, spark plug cleaner may be used.

  Cleaner air pressure:
  Less than 588 kPa (6 kg/cm^2, 85 psi)
  Cleaning time:
  Less than 20 seconds

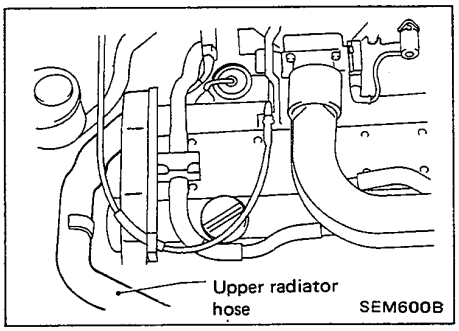
Checking Exhaust Gas Sensor

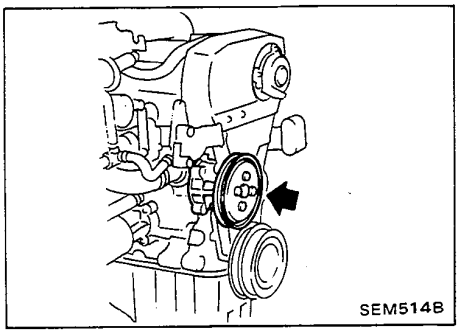
Checking procedure



*● Make sure that diagnostic mode is mode I or mode II.
● Make sure that diagnostic mode selector is turned fully counter-clockwise.

Refer to SELF-DIAGNOSIS in EF & EC section.

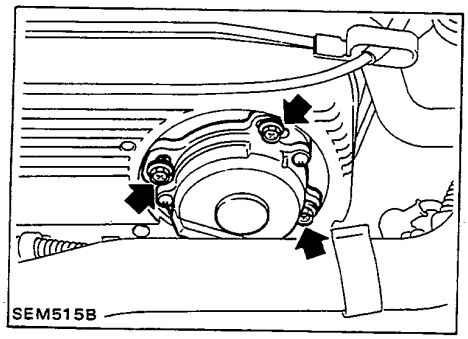




Timing Belt Replacement

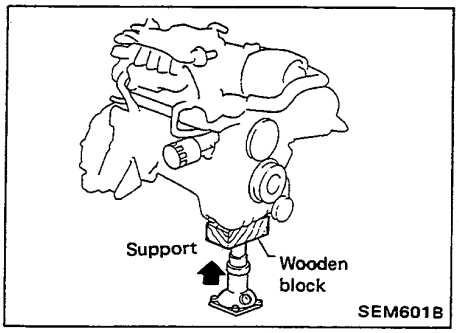
1. Drain coolant.
2. Remove upper radiator hose.
3. Remove right side under cover.
4. Remove drive belts for power steering pump, compressor and alternator.
5. Remove water pump pulley.

Timing Belt Replacement (Cont'd)

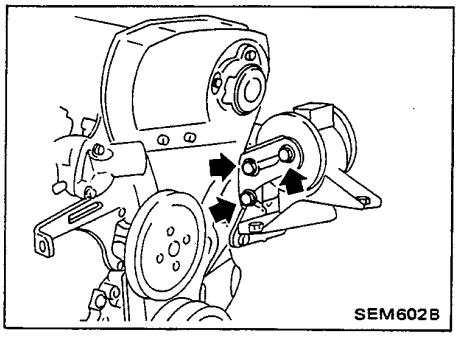


6. Remove crank angle sensor.

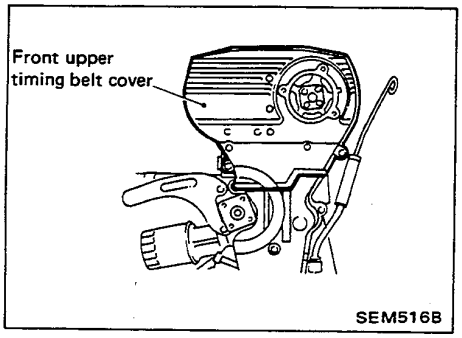
Put aligning mark on crank angle sensor and timing belt cover.



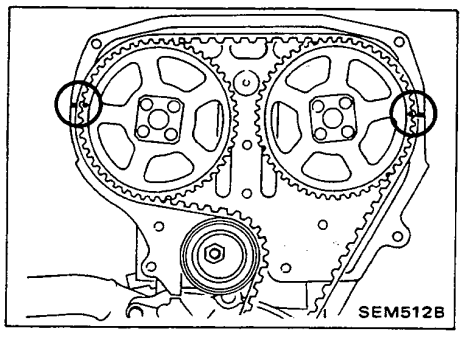
7. Support or hang the engine.



8. Remove engine mount bracket.

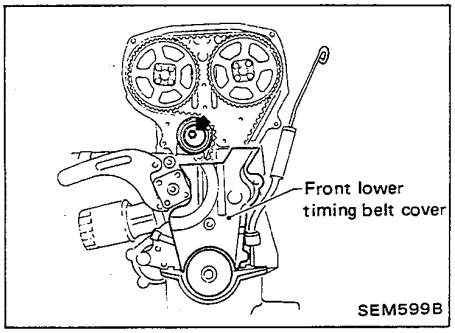


9. Remove front upper timing belt cover.

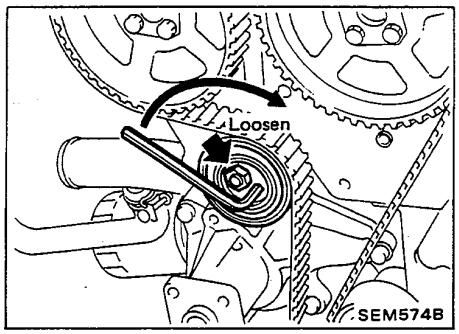


10. Align timing marks on crank pulley sprockets.

Timing Belt Replacement (Cont'd)

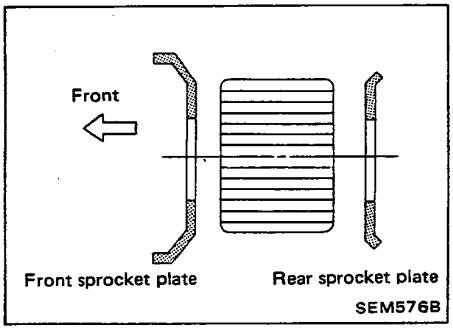


11. Remove crankshaft pulley.
12. Remove front lower timing belt cover.

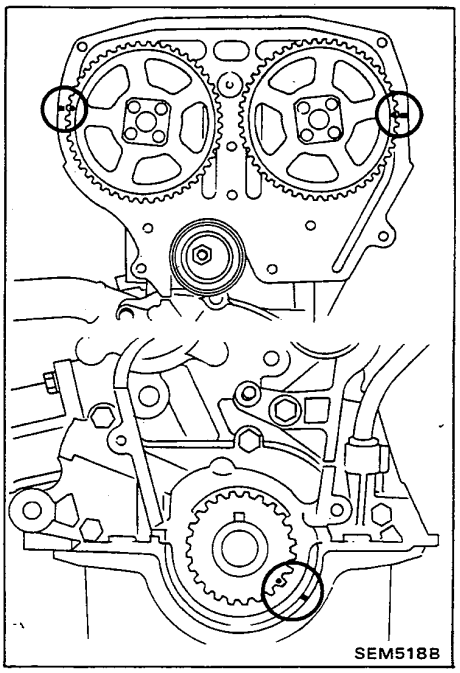


13. Loosen tensioner pulley nut to loosen timing belt.
14. Remove timing belt.

After removing timing belt, do not rotate crankshaft and camshaft separately, because valves will hit piston heads.



15. Install crankshaft sprocket with sprocket plate.



16. Confirm that No. 1 cylinder is set at T.D.C. on its compression stroke.

Timing Belt Replacement (Cont'd)

24. Install engine mount bracket.
25. Install crank angle sensor and water pump pulley.

Align marks on crank angle sensor and front cover that were marked when crank angle sensor was removed.

Crank angle sensor:

: 7 - 8 N·m (0.7 - 0.8 kg-m, 5.1 - 5.8 ft-lb)

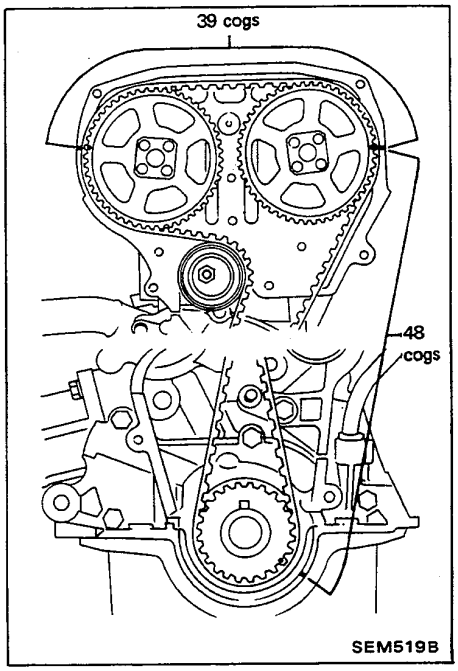
26. Install drive belts.

Refer to Drive Belt Inspection.

27. Install upper radiator hose and refill coolant.

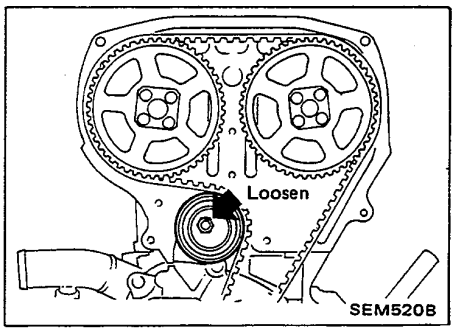
Refer to Changing Engine Coolant.

Timing Belt Replacement (Cont'd)



17. Install timing belt.

Align timing marks on timing belt and sprockets.



18. Loosen tensioner pulley nut.
19. Install lower timing belt cover.

Lower cover bolt:

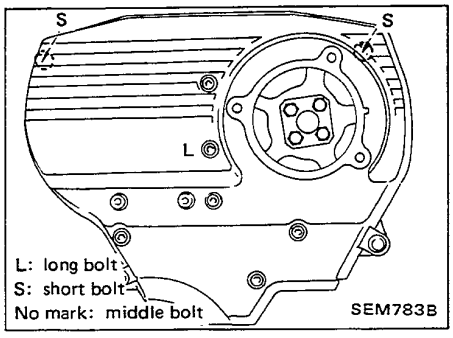
: 3 - 5 N·m (0.3 - 0.5 kg-m, 2.2 - 3.6 ft-lb)

20. Install crankshaft pulley with washer.

: 142 - 152 N·m (14.5 - 15.5 kg-m, 105 - 112 ft-lb)

21. Rotate crankshaft clockwise 2 turns completely.
22. Tighten tensioner pulley nut.

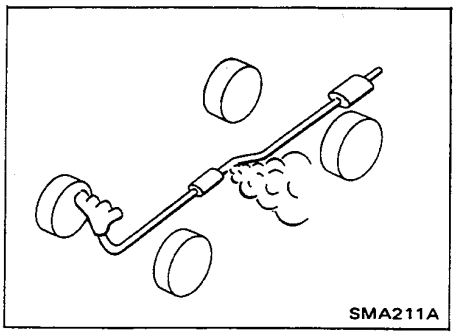
: 22 - 29 N·m (2.2 - 3.0 kg-m, 16 - 22 ft-lb)



23. Install upper timing belt covers.

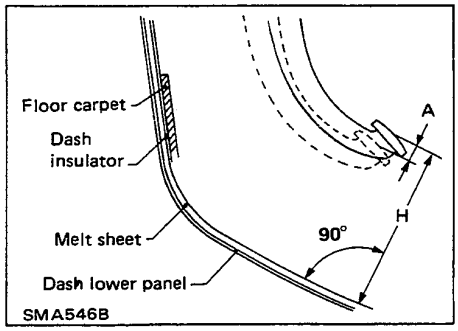
Upper cover bolt:

: 7 - 8 N·m (0.7 - 0.8 kg-m, 5.1 - 5.8 ft-lb)


SMA211A

Checking Exhaust System

Check exhaust pipes, muffler and mounting for proper attachment, leaks, cracks, damage, loose connections, chafing and deterioration.



SMA546B

Checking Clutch Pedal Operation

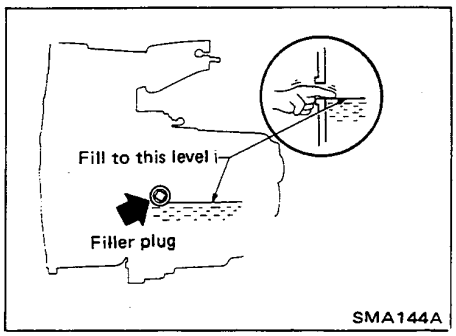
Check clutch pedal height and free travel, and ensure it operates smoothly.

Pedal height "H":
175 - 185 mm (6.89 - 7.28 in)
Pedal free travel "A":
12.5 - 17.5 mm (0.492 - 0.689 in)

If necessary, adjust clutch pedal height and free travel.
Refer to section CL.

Checking Clutch System

Check cable and links for improper attachment, chafing, wear and deterioration.

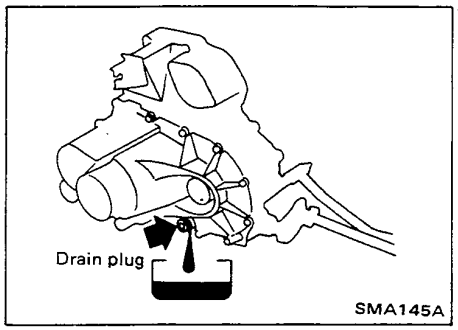


SMA144A

Checking M/T Oil Level

Never start engine while checking oil level.

1. Check for oil leaks.
2. Check oil level.



SMA145A

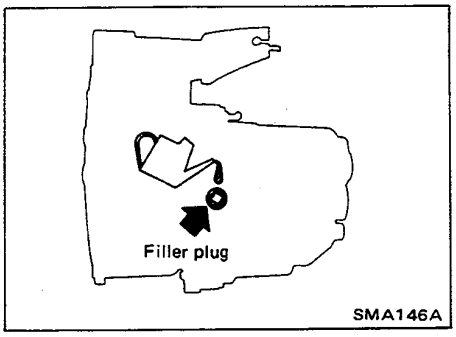
Changing M/T Oil

Oil capacity:
2.7 liters (4-3/4 Imp pt)

: Drain plug
25 - 34 N·m (2.5 - 3.5 kg-m, 18 - 25 ft-lb)

Changing M/T Oil (Cont'd)

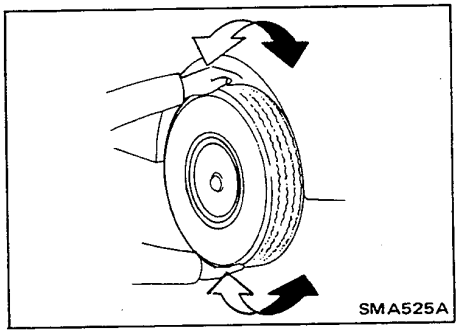
: Filler plug
25 - 34 N·m (2.5 - 3.5 kg-m, 18 - 25 ft-lb)



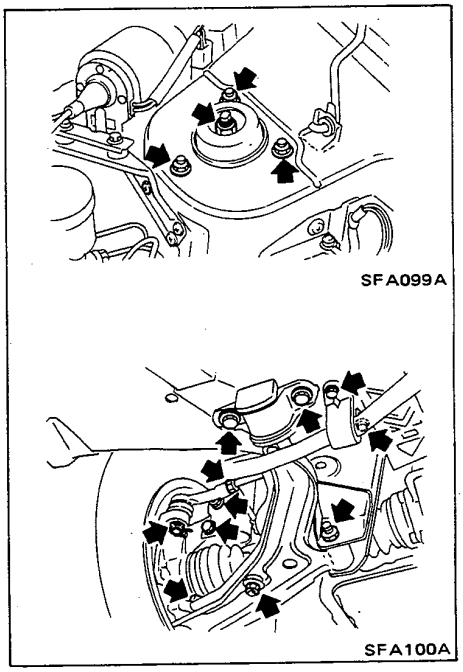
Checking Front Axle and Front Suspension Parts

- Check front axle and front suspension parts for looseness, cracks, wear or other damage.

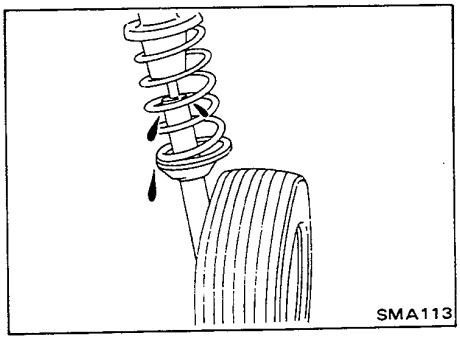
(1) Shake each front wheel.

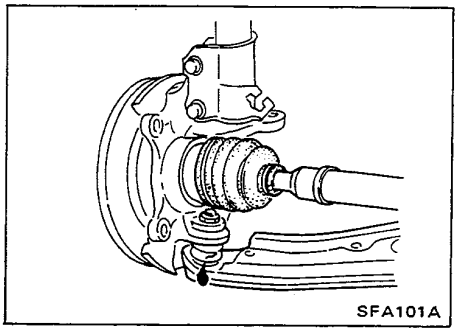


(2) Make sure that cotter pin is inserted.
(3) Retighten all nuts and bolts to the specified torque.
Tightening torque: Refer to section FA.



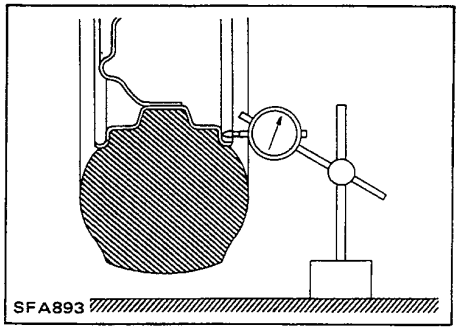
- Check strut (shock absorber) for oil leakage or other damage.




SFA101A

Checking Front Axle and Front Suspension Parts (Cont'd)

- Check suspension ball joint for grease leakage and ball joint dust cover for cracks or other damage.


SFA893

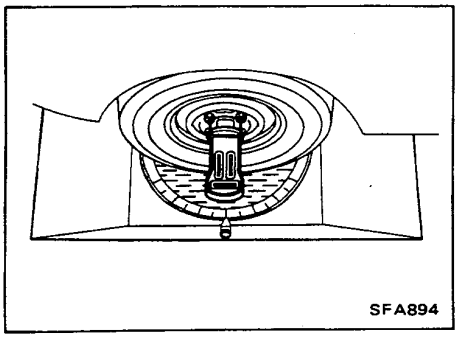
Checking Front Wheel Alignment

Before checking front wheel alignment, be sure to make a preliminary inspection.

PRELIMINARY INSPECTION

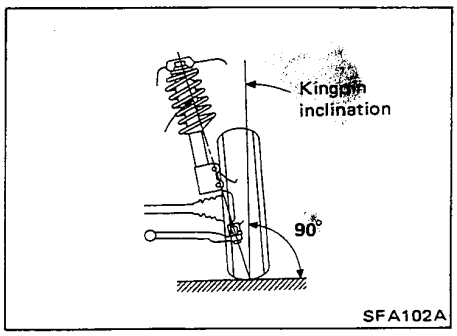
- Check tires for wear and proper inflation.
- Check wheel runout.

  Lateral runout (Total indicator reading):
  1.0 mm (0.039 in) or less
- Check front wheel bearings for looseness.
- Check front suspension for looseness.
- Check steering linkage for looseness.
- Check that front shock absorbers work properly.
- Check vehicle posture (Unladen):
  "Unladen"
  Fuel, radiator coolant and engine oil full. Spare tire, jack, hand tools and mats in designated positions.


SFA894

CAMBER, CASTER AND KINGPIN INCLINATION

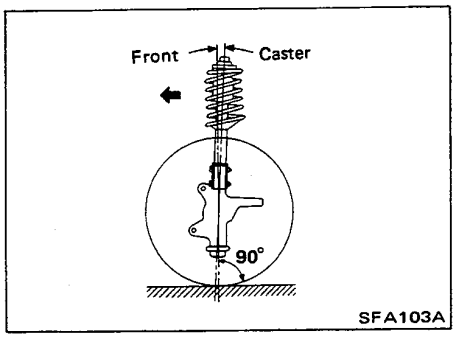
- **Caster and kingpin inclination are preset at factory and cannot be adjusted. If the caster and kingpin inclination are not within specification, inspect and replace any damaged or worn front suspension parts.**
- **Measure camber, caster and kingpin inclination of both right and left wheels with a suitable alignment gauge and adjust in accordance with the following procedures.**



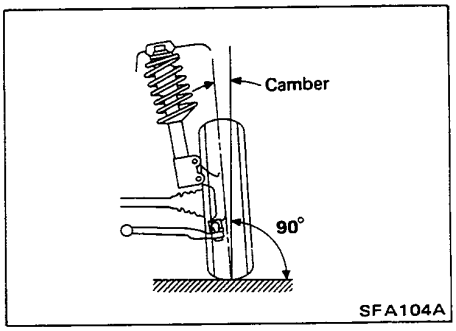
SFA102A

Kingpin inclination (Unladen):
13°40' - 15°10'

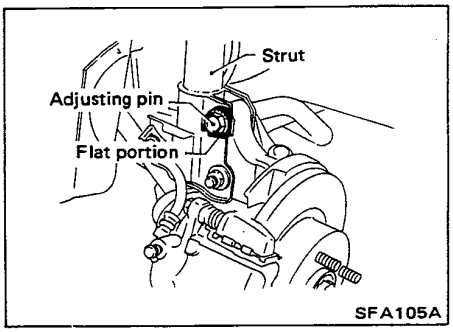
Checking Front Wheel Alignment (Cont'd)



Caster (Unladen): 1°10′ - 2°40′



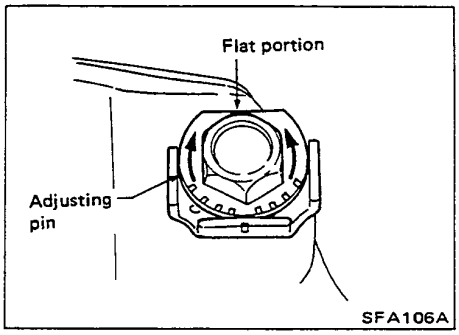
Camber (Unladen): −1°15′ to 0°15′



If camber is not within specification, adjust by turning the adjusting pin.

(1) Remove the adjusting pin.

Adjusting pin is factory-installed with the flat side facing down.



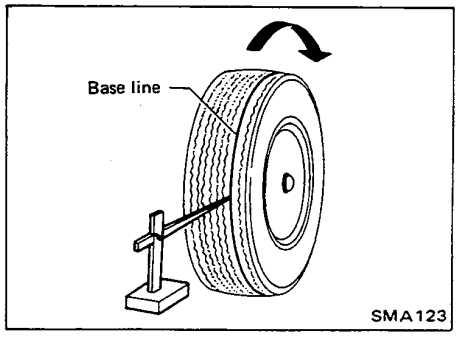
(2) Install adjusting pin with the flat side facing up.

(3) Turn the adjusting pin to adjust.

Camber changes about 15′ with each graduation of the adjusting pin.

(4) Tighten to the specified torque.

: 98 - 118 N·m (10.0 - 12.0 kg-m, 72 - 87 ft-lb)

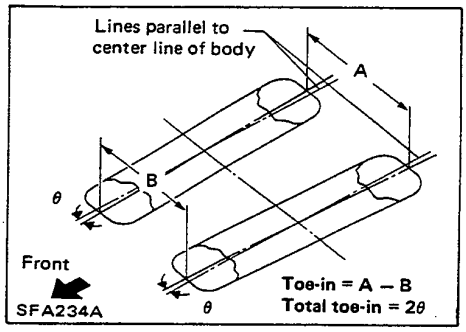


TOE-IN

1. Mark a base line across tread.

After lowering front of vehicle, move it up and down to eliminate friction, and set steering wheel in straight ahead position.

Checking Front Wheel Alignment (Cont'd)



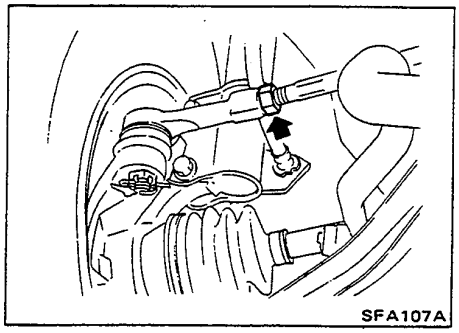
2. Measure toe-in.

Measure distance "A" and "B" at the same height as hub center.

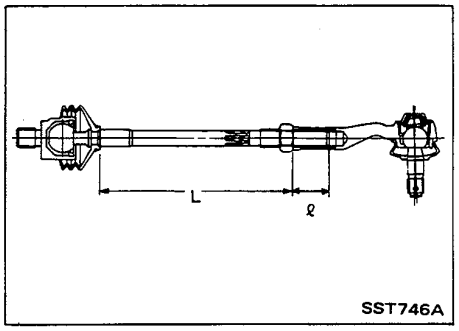
Toe-in (Unladen):

A – B: –1 to 1 mm (–0.04 to 0.04 in)

2θ: –6' to 6' (Total toe-in)



3. Adjust toe-in by varying length of steering tie-rods.



Length "ℓ" must be 25 mm (0.98 in) or more.

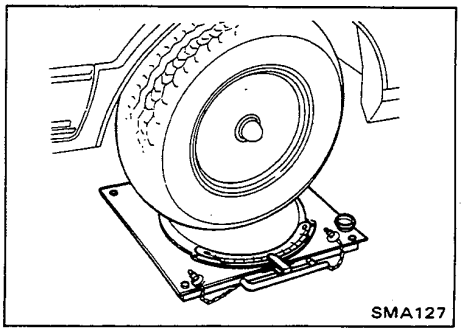
Make sure that tie-rods are the same length.

Tie-rod length "L"-reference data:

176 mm (6.93 in)

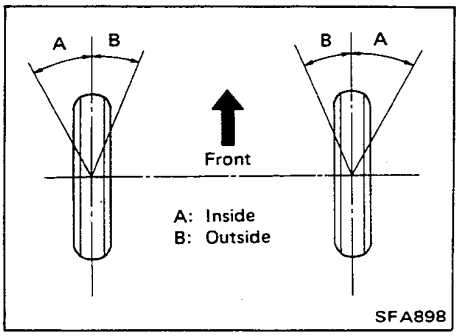
4. Tighten to the specified torque.

: 37 - 46 N·m (3.8 - 4.7 kg-m, 27 - 34 ft-lb)



FRONT WHEEL TURNING ANGLE

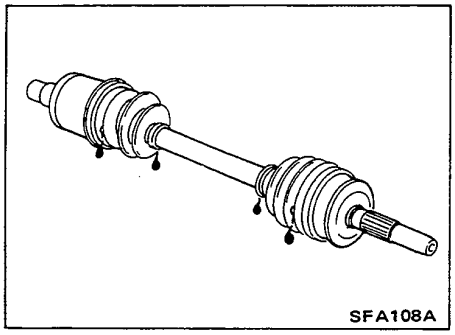
1. Set wheels in straight ahead position and then move vehicle forward until front wheels rest on turning radius gauge properly.



2. Rotate steering wheel all the way right and left; measure turning angle.

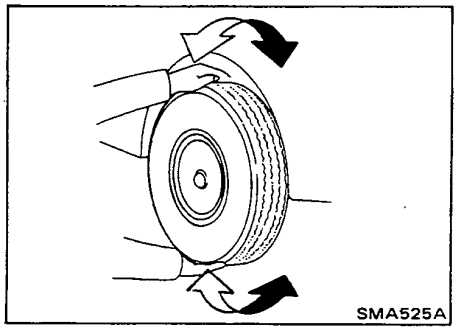
Wheel turning angle

Full turns	Inside wheel: A	36° - 39°
	Outside wheel: B	30°
Toe-out turn (at 20°)	Inside wheel: A	22°24'
	Outside wheel: B	20°


SFA108A

Checking Drive Shafts Boots

- Check drive shaft boots for clamp looseness, damage or grease leakage.

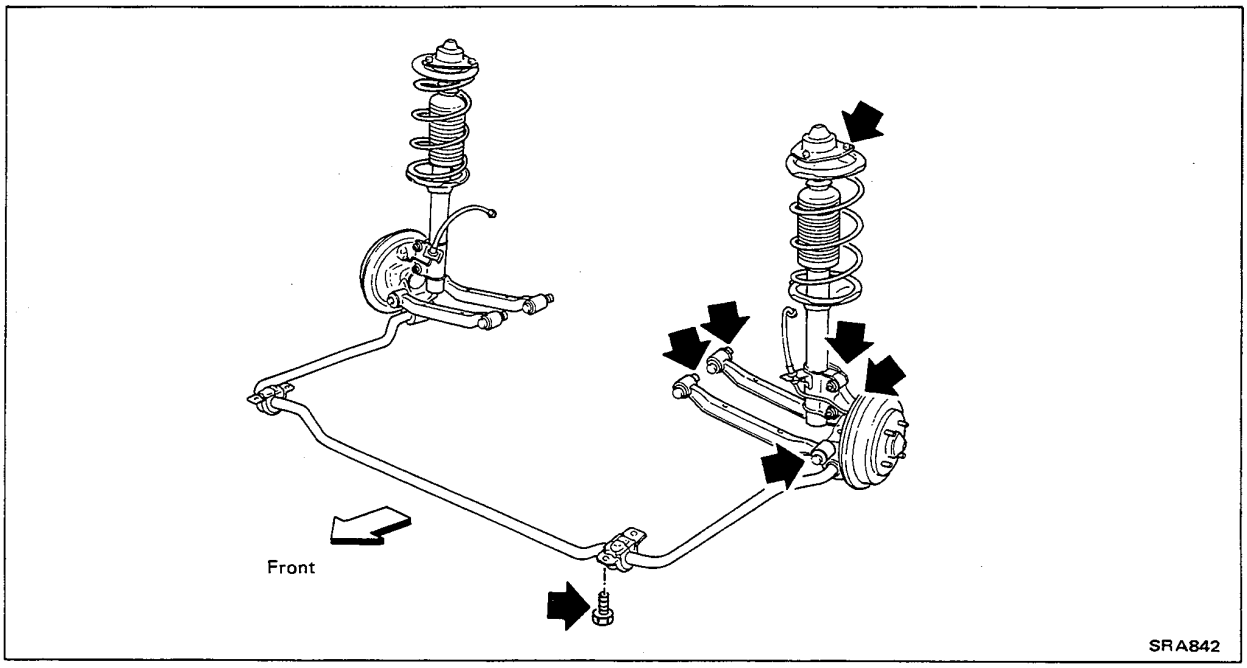

SMA525A

Checking Rear Axle and Rear Suspension Parts

- Check axle and suspension parts for looseness, wear or damage.

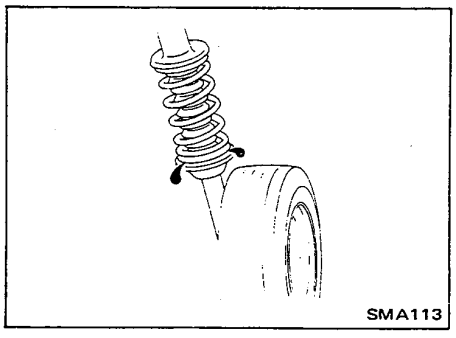
(1) Shake each rear wheel.

(2) Retighten all nuts and bolts to the specified torque.
Tightening torque: Refer to section RA.



SRA842

(3) Check strut (shock absorber) for oil leakage or other damage.


SMA113

Checking Rear Wheel Alignment

PRELIMINARY INSPECTION

Make following checks. Adjust, repair or replace if necessary.

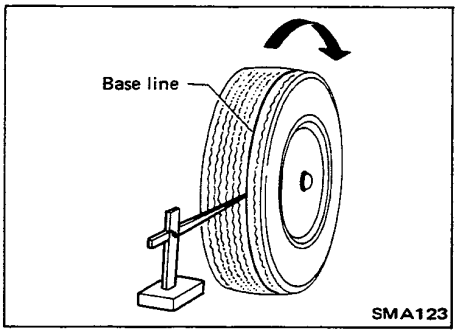
- Check tires for wear and proper inflation.
- Check rear wheel bearings for looseness.
- Check wheel runout.

  Lateral runout (Total indicator reading):
  1.0 mm (0.039 in) or less
- Check if rear strut (shock absorber) works properly.
- Check rear axle and rear suspension parts for looseness.
- Check vehicle posture (Unladen).
  "Unladen":
  Fuel tank, radiator and engine oil full. Spare tire, jack, hand tools and mats in designated positions.

CAMBER

Camber is preset at factory and cannot be adjusted.

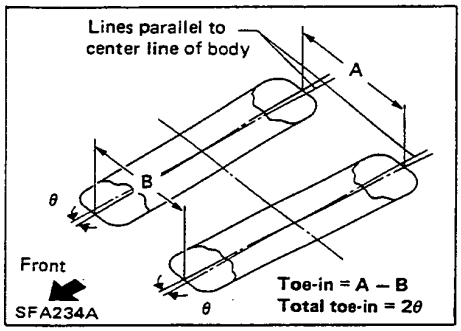
Camber: −2°00′ to −0°30′



TOE-IN

1. Mark a base line across tread.

After lowering rear of vehicle, move it up and down to eliminate friction.



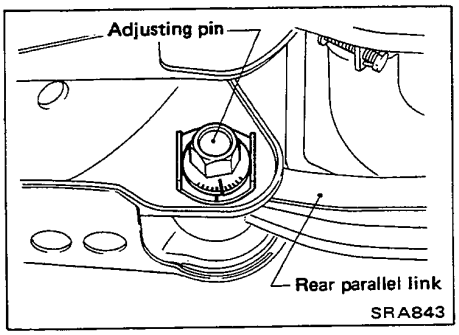
2. Measure toe-in.

Measure distance "A" and "B" at the same height as hub center.

Toe-in:

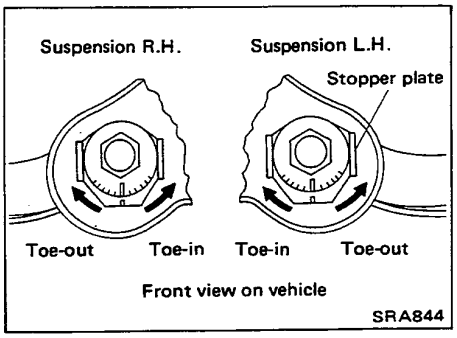
A − B: −1.5 to 2.5 mm (−0.059 to 0.098 in)

2θ : −9′ to 15′



3. Adjust toe-in by turning toe adjusting pins.

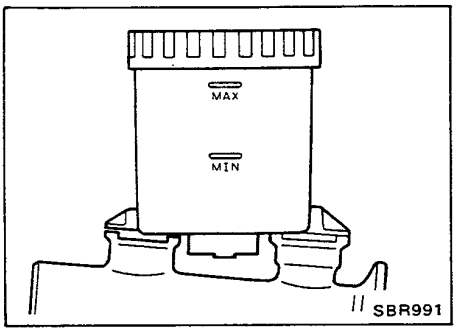
Checking Rear Wheel Alignment (Cont'd)



One graduation on toe adjusting pin makes about 2 mm (0.08 in) variance (one wheel) at base line.

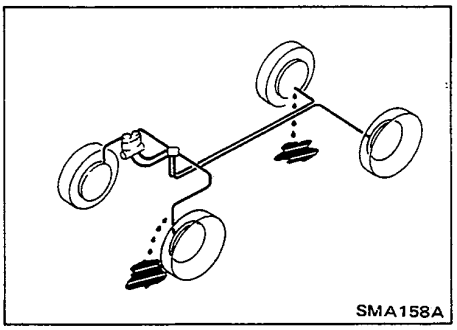
4. Tighten to the specified torque.
   ⓞ : **98 - 118 N·m (10.0 - 12.0 kg-m, 72 - 87 ft-lb)**

Checking Brake Fluid Level and for Leaks



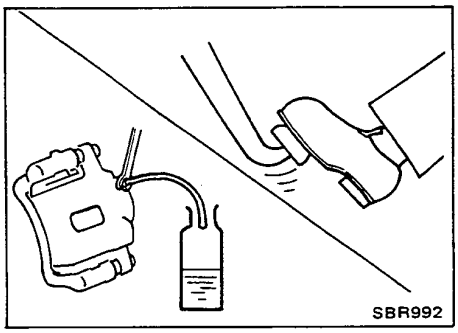
If fluid level is extremely low, check brake system for leaks.

Checking Brake System



Check brake fluid lines and parking brake cables for proper attachment, leaks, chafing, abrasion, deterioration, etc.

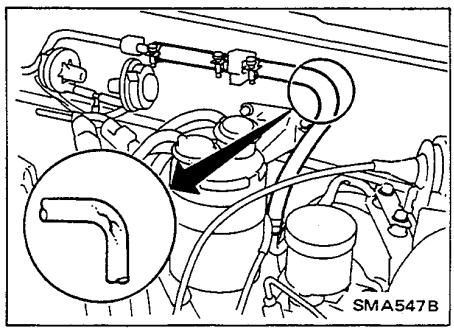
Changing Brake Fluid



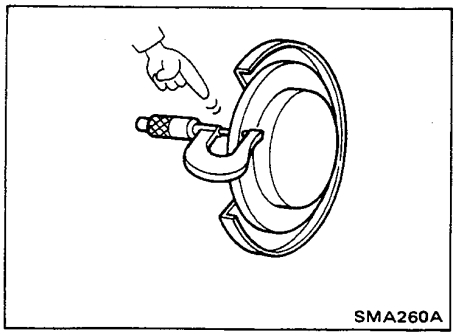
1. Drain brake fluid from each air bleeder valve.
2. Refill until new brake fluid comes out from each air bleeder valve.
   Use same procedure as in bleeding hydraulic system to refill brake fluid.
   Refer to section BR.

- **Refill with recommended brake fluid "DOT 3".**
- **Do not reuse drained brake fluid.**
- **Be careful not to splash brake fluid on painted areas.**

Checking Brake Booster Vacuum Hoses, Connections and Check Valve



Check vacuum lines, connections and check valve for proper attachment, air tightness, chafing and deterioration.


SMA260A

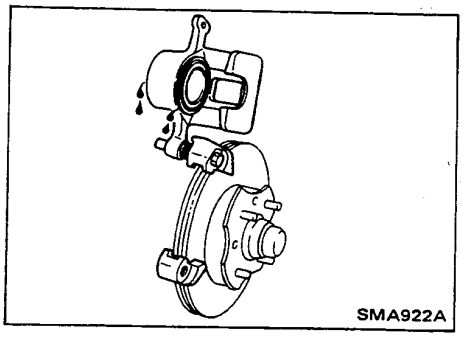
Checking Disc Brake

Check condition of disc brake components.

ROTOR

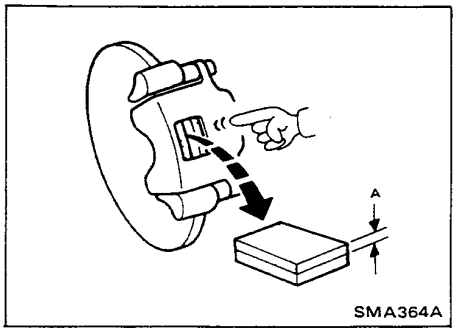
Check condition and thickness.

Minimum thickness: 16.0 mm (0.630 in)


SMA922A

CALIPER

Check operation and leakage.



SMA364A

PAD

Check wear or damage.

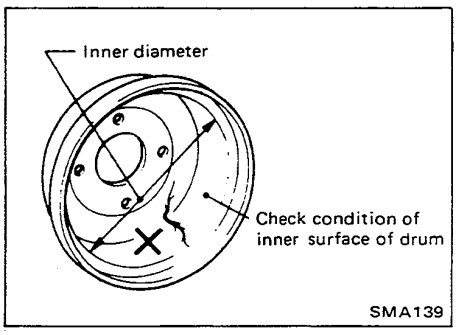
Minimum thickness "A": 2.0 mm (0.079 in)

Checking Drum Brake

Check condition of drum brake components.

WHEEL CYLINDER

Check operation and leakage.



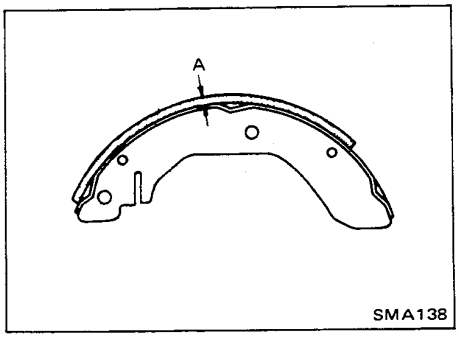
SMA139

DRUM

Check condition of inner surface.

Drum repair limit (Inner diameter):
204.5 mm (8.05 in)

Checking Disc Brake (Cont'd)



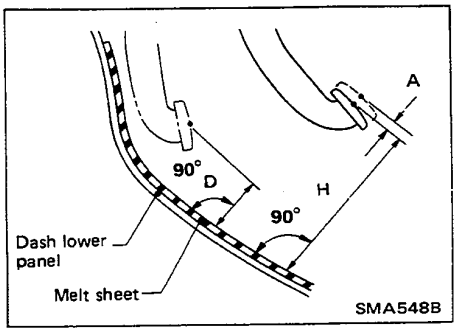
LINING

Check wear or damage.

Minimum thickness "A": 1.5 mm (0.059 in)

Refer to section BR for shoe replacement.

Checking Foot Brake Pedal Operation



H: Free height

157 - 167 mm (6.18 - 6.57 in)

D: Depressed height

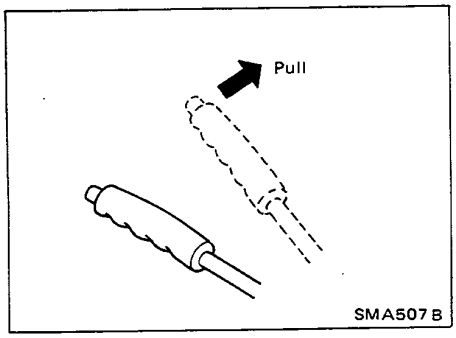
Under force of 490 N (50 kg, 110 lb) with engine running

80 mm (3.15 in) or more

A: Pedal free play

1 - 3 mm (0.04 - 0.12 in)

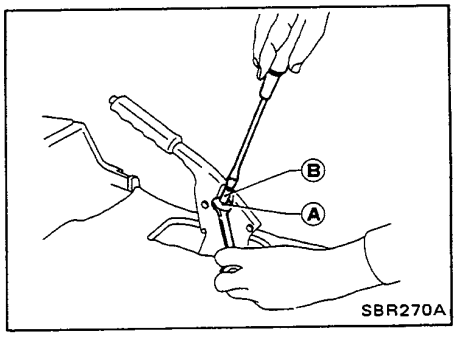
Checking Parking Brake



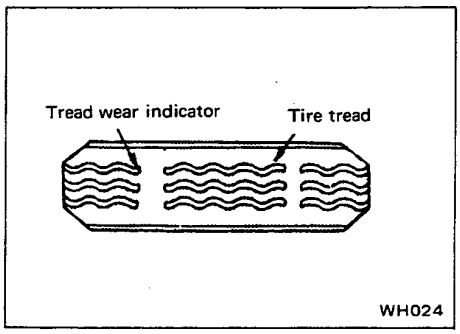
1. Pull lever with specified amount of force. Check lever stroke and for smooth operation.

Number of notches [At pulling force of 196 N (20 kg, 44 lb)] :

7 - 11 notches



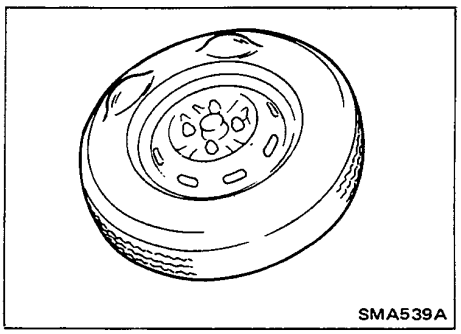
2. Use adjuster to adjust lever stroke.
(1) Loosen lock nut Ⓐ , rotate adjuster Ⓑ .
(2) Tighten lock nut Ⓐ .



Checking Tire Condition

TIRE CONDITION

- When tread wear indicators appear, replace tire with new one.



- Check tread and side walls for cracks, holes, separation or damage.
- Check tire valves for air leakage.

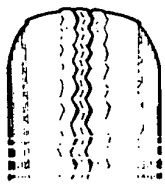
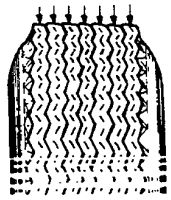
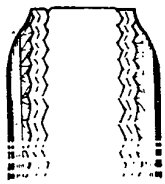
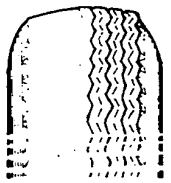
TIRE INFLATION

Tire pressure should be measured when tire is cold.

Tire pressure should be set to the specifications on tire placard affixed to the glove box door.

ABNORMAL TIRE WEAR

Correct abnormal tire wear according to chart shown below.

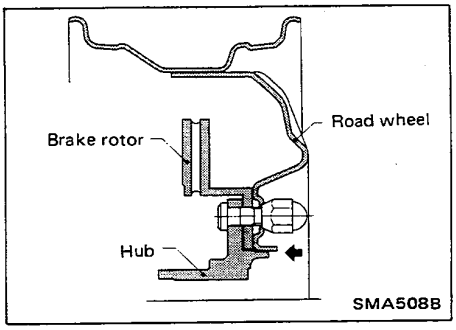
Condition	Probable cause	Corrective action	Condition	Probable cause	Corrective action
 Shoulder wear	• Underinflation (both sides wear) • Incorrect wheel camber (one side wear) • Hard cornering • Lack of rotation	• Measure and adjust pressure. • Repair, or replace axle and suspension parts. • Reduce speed. • Rotate tires.	Feathered edge  Toe-in or toe-out wear	• Incorrect toe	• Adjust toe-in.
 Center wear	• Overinflation • Lack of rotation	• Measure and adjust pressure. • Rotate tires.	 Uneven wear	• Incorrect camber or caster • Malfunctioning suspension • Unbalanced wheel • Out-of-round brake drum • Other mechanical conditions • Lack of rotation	• Repair, or replace axle and suspension parts. • Repair, replace or, if necessary, reinstall. • Balance or replace. • Correct or replace. • Correct or replace. • Rotate tires.

SMA197B

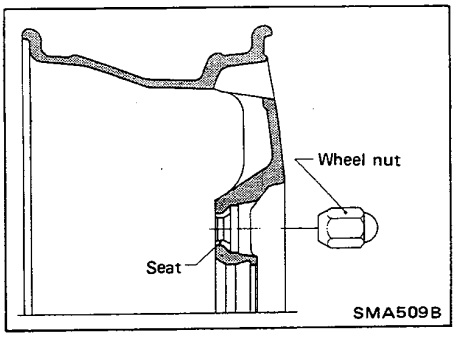
Tire Replacement

CAUTION:

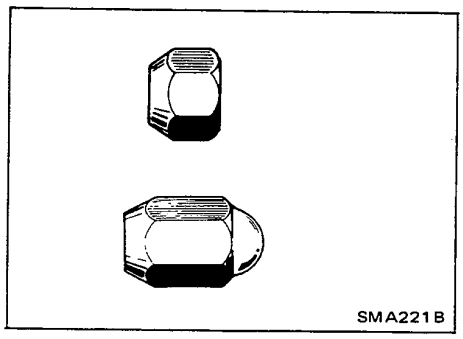
- Do not mix different types of tires, such as bias, bias belted and radial tires under any circumstances.
- When replacing a tire, use a tire of the same size.
- Use recommended tires and wheels.
- Do not mix tires of different brands or tread patterns.
- When replacing standard tires with those tires of an optional recommended size and of different diameter, the speedometer must be recalibrated.
- Install road wheel using the wheel hub boss.



- Use tapered wheel nuts for both steel and aluminum wheels.



- Tighten wheel nuts in crisscross fashion.


SMA221B

Wheel Nut

CAUTION:

- Be careful not to smear threaded portion of bolt and nut as well as seat of nut with oil or grease.

Tire Repair

CAUTION:

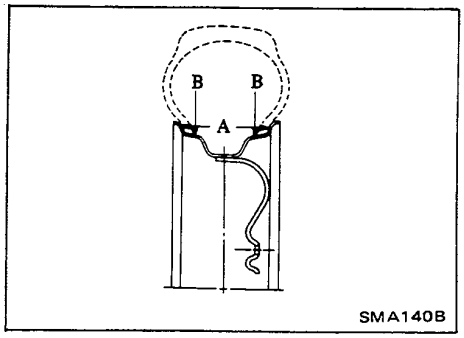
When replacing tire, take extra care not to damage tire bead, rim-flange and bead seat.

When installing tire, note the following items:

a. Install valve core and inflate to proper pressure. Check locating rings of tire to be sure they show around rim flanges on both sides.
b. Check valves for leakage after inflating tires.
c. Be sure to tighten valve caps firmly by hand.

WARNING:

To avoid serious personal injury, never stand over tire when inflating it. Never inflate to a pressure greater than 40 psi (275 kPa). If beads fail to seat at that pressure, deflate tire, lubricate it again, and then reinflate it. If tire is overinflated, the bead might break, possibly resulting in serious personal injury.



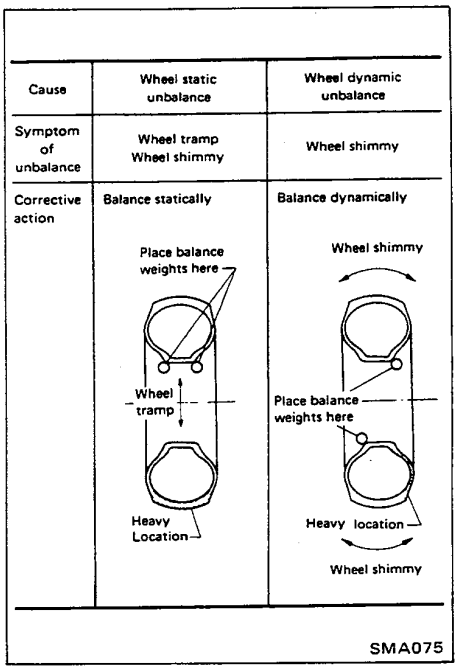
SMA140B

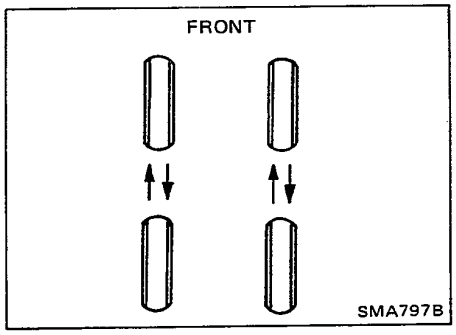
Wheel Inspection

- Check wheel rim (especially rim flange and bead seat) for rust, distortion, cracks or other damage.
- Examine wheel rim for lateral and radial runout with dial gauge.

	Steel wheel	Aluminum wheel
Lateral runout (A) and radial runout (B)	–	0.3 mm (0.012 in) or less
Average (C) of right and left radial runout	0.5 mm (0.020 in) or less	–
Average (D) of right and left lateral runout	0.8 mm (0.031 in) or less	–
Difference between right and left radial runout	0.5 mm (0.020 in) or less	0.2 mm (0.008 in) or less

- Replace wheel when any of the following conditions occur.
  a. Bent, dented or heavily rusted
  b. Elongated bolt holes
  c. Excessive lateral or radial runout
  d. Air leaks through welds
  e. Wheel nuts will not stay tight





Balancing Wheels

- Adjust wheel balance using road wheel center.

Wheel balance (Maximum allowable unbalance at rim flange):

Refer to S.D.S.

Tire balancing weight: Refer to S.D.S.

Tire Rotation

- **Do not include the T-type spare tire when rotating the tires.**

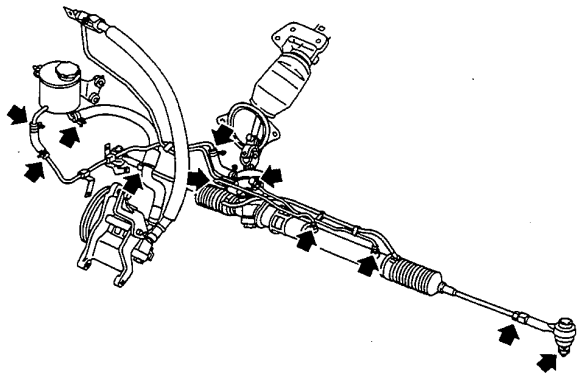
Spare Tire

T-TYPE SPARE TIRE

The T-type spare tire is designed for emergency use only.
The spare tire can be used repeatedly for emergency situations.
Precautions when using T-type spare tire

- Periodically check tire inflation pressure, and always keep it at 60 psi (412 kPa).
- Do not drive vehicle at speeds faster than 80 km/h (50 MPH).
- T-type spare tire is designed only for temporary use as a spare. Dismount it and keep it as a spare as soon as standard tire repair has been completed.
- Do not attach a tire chain.
- Do not use T-type spare tire on other vehicles.
- Do not make a sharp turn, or apply brakes suddenly while driving.
- As soon as tread wear indicator becomes visible, replace tire with a new one.
- Mounting and dismounting to and from road wheel can be carried out in the same manner as any ordinary tire.
- Use of wheel balance is unnecessary.

Checking Steering Gear and Linkage



SMA827B

- Steering gear:

(1) Check gear housing and boots for looseness, damage or grease leakage.

(2) Check connection with steering column for looseness.

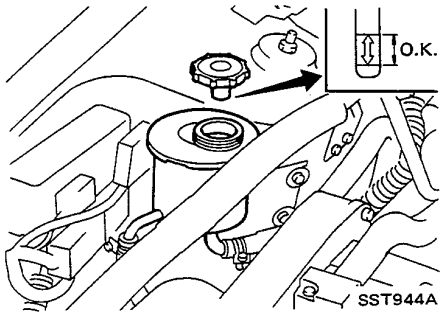
- Steering linkage:

(1) Check ball joint, dust cover and other component parts for looseness, wear, damage or grease leakage.

(2) Check for missing parts (cotter pins, washer, etc.).

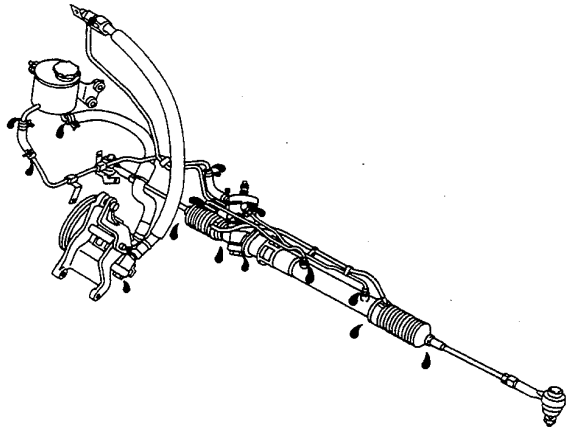
Checking Power Steering System Fluid and Lines

- Check fluid level, when the fluid is cold.



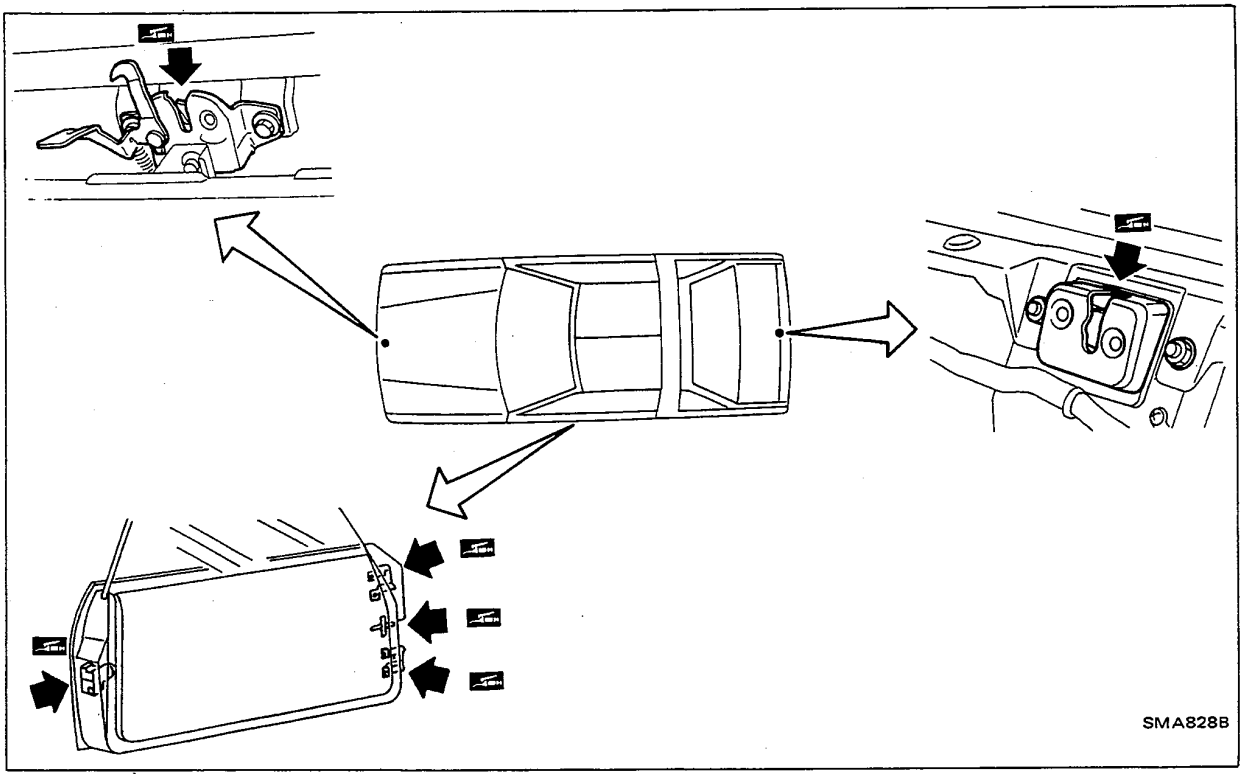
SST944A

- Check lines for proper attachment, leaks, cracks, damage, loose connections, chafing and deterioration.



SST945A

Lubricating Hood Latches, Locks and Hinges

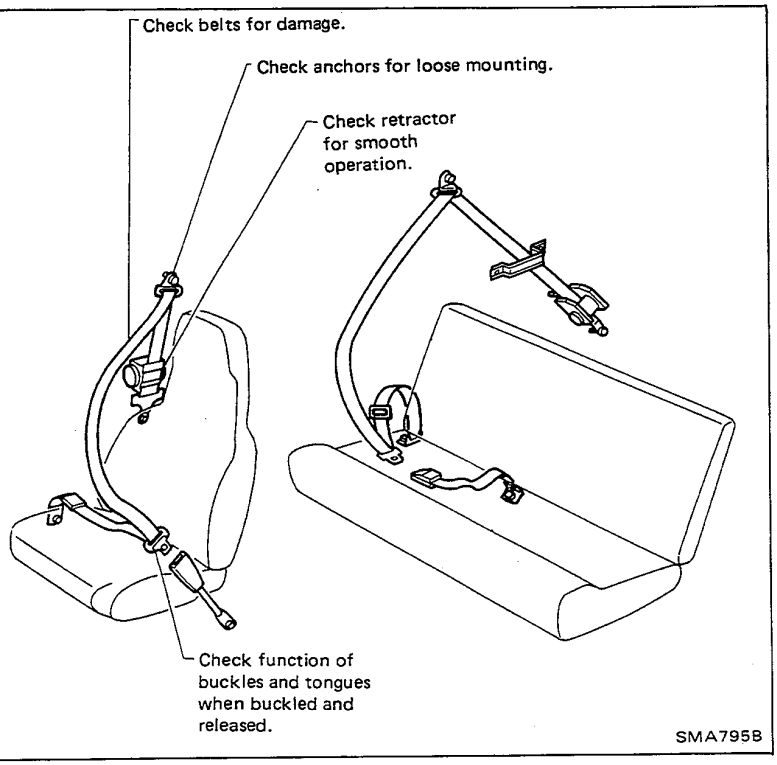


Checking Seat Belts, Buckles, Retractors, Anchors and Adjusters

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
35.8 - 45.6 N·m
(3.65 - 4.65 kg-m, 26.4 - 33.6 ft-lb)



Engine Maintenance

INSPECTION AND ADJUSTMENT

Drive belt deflection

Unit: mm (in)

	Used belt deflection		Set deflection of new belt
	Limit	Adjust deflection	
Alternator			
Models without air conditioner	12 (0.47)	6 - 8 (0.24 - 0.31)	5 - 7 (0.20 - 0.28)
Models with air conditioner	10 (0.39)	5 - 7 (0.20 - 0.28)	
Power steering oil pump	12.5 (0.492)	7 - 9 (0.28 - 0.35)	6 - 8 (0.24 - 0.31)
Air conditioner compressor	6 (0.24)	3 - 4 (0.12 - 0.16)	3 - 4 (0.12 - 0.16)

Applied pushing force: 98 N (10 kg, 22 lb)

Coolant and oil capacity

Unit: ℓ (Imp qt)

Coolant (with reservoir tank)	Approx. 5.6 (4-7/8)
Reservoir tank	0.6 (1/2)
Engine oil	
With oil filter change	Approx. 3.8 (3-3/8)
Without oil filter change	Approx. 3.4 (3)

Spark plug

Platinum type

Standard type	PFR6A-11
Hot type	PFR5A-11
Cold type	PFR7A-11

Cooling system

Radiator cap relief pressure kPa (kg/cm², psi)	78 - 98 (0.8 - 1.0, 11 - 14)
Cooling system leakage testing pressure kPa (kg/cm², psi)	157 (1.6, 23)

TIGHTENING TORQUE

Unit	N·m	kg-m	ft-lb
Oil pan drain plug	29 - 39	3.0 - 4.0	22 - 29
Spark plug	20 - 29	2.0 - 3.0	14 - 22
Crank angle sensor	7 - 8	0.7 - 0.8	5.1 - 5.8
Crankshaft pulley	142 - 152	14.5 - 15.5	105 - 112
Timing belt tensioner pulley nut	22 - 29	2.2 - 3.0	16 - 22
Engine mount bracket bolt	39 - 54	4.0 - 5.5	29 - 40

Chassis and Body Maintenance

INSPECTION AND ADJUSTMENT

Clutch

Unit: mm (in)

Pedal free height "H"	175 - 185 (6.89 - 7.28)
Pedal free travel "A"	12.5 - 17.5 (0.492 - 0.689)

Front axle and front suspension (Unladen)*

Camber	degree	−1°15′ to 0°15′
Caster	degree	1°10′ - 2°40′
Toe-in	mm (in)	−1 to 1 (−0.04 to 0.04)
	(Total toe-in) degree	−6′ to 6′
Kingpin inclination	degree	13°40′ - 15°10′
Front wheel turning angle Toe-out turn Inside/outside	degree	22°24′/20°
Full turn Inside/outside	degree	36° - 39°/30°

*: Tankful of fuel, radiator coolant and engine oil full. Spare tire, jack, hand tools, mats in designated positions.

Rear axle and rear suspension (Unladen)*

Camber	degree	−2°00′ to −0°30′
Toe-in mm (in)		−1.5 to 2.5 (−0.059 to 0.098)
(Total toe-in)	degree	−9′ to 15′

*: Tankful of fuel, radiator coolant and engine oil full. Spare tire, jack, hand tools, mats in designated positions.

Brake

Unit: mm (in)

Disc brake Pad minimum thickness	2.0 (0.079)
Rotor minimum thickness AD18V	16.0 (0.630)
Drum brake Lining minimum thickness	1.5 (0.059)
Drum maximum inner dia. LT20A	204.5 (8.05)
Pedal Free height "H"	157 - 167 (6.18 - 6.57)
Free play "A"	1 - 3 (0.04 - 0.12)
Depressed height "D" [Under force of 490 N (50 kg, 110 lb) with engine running]	80 (3.15) or more
Parking brake Number of notches [at pulling force 196 N (20 kg, 44 lb)]	7 - 11 notches

Wheel and tire

Tire inflation

Proper tire pressures are shown on the tire placard affixed to the glove box door.

Tire pressure should be checked when tires are COLD.

	Steel wheel	Aluminum wheel
Lateral runout (A) and radial runout (B)	—	0.3 mm (0.012 in) or less
Average (C) of right and left radial runout	0.5 mm (0.020 in) or less	—
Average (D) of right and left lateral runout	0.8 mm (0.031 in) or less	—
Difference between right and left radial runout	0.5 mm (0.020 in) or less	0.2 mm (0.008 in) or less
Wheel balance (Maximum allowable unbalance at rim flange) gr (oz)	10 (0.35)	
Tire balance weight gr (oz)	5 - 60 (0.18 - 2.12), Spacing 5 (0.18)	

TIGHTENING TORQUE

Unit	N·m	kg-m	ft-lb
Clutch			
Pedal stopper lock nut	16 - 22	1.6 - 2.2	12 - 16
Manual transaxle			
Drain and filler plugs	25 - 34	2.5 - 3.5	18 - 25
Front axle and front suspension			
Tie-rod lock nut	37 - 46	3.8 - 4.7	27 - 34
Camber adjusting pin	98 - 118	10.0 - 12.0	72 - 87
Rear axle and rear suspension			
Toe adjusting pin	98 - 118	10.0 - 12.0	72 - 87
Brake system			
Air bleed valve	7 - 9	0.7 - 0.9	5.1 - 6.5
Brake lamp switch lock nut	12 - 15	1.2 - 1.5	9 - 11
Brake booster input rod lock nut	16 - 22	1.6 - 2.2	12 - 16
Wheel and tire			
Wheel nut	98 - 118	10.0 - 12.0	72 - 87

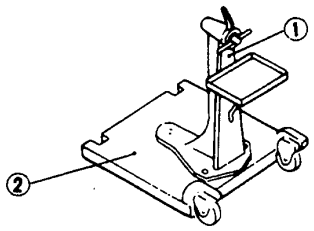
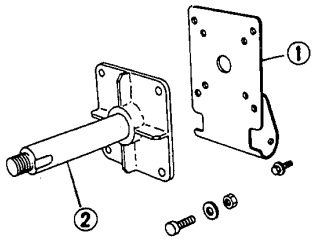
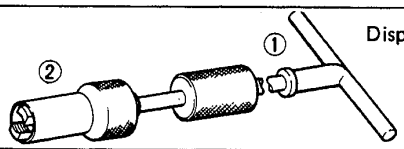
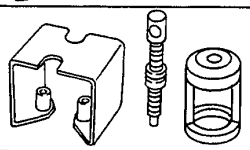
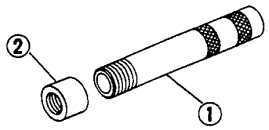
ENGINE MECHANICAL

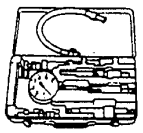
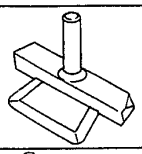
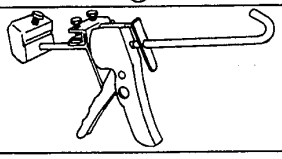
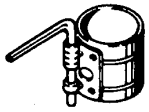
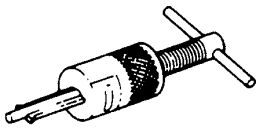
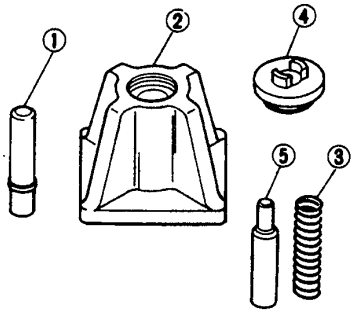
SECTION EM

EM

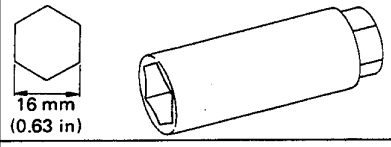
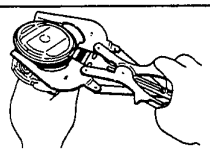
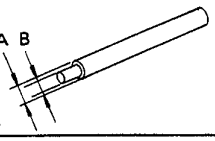
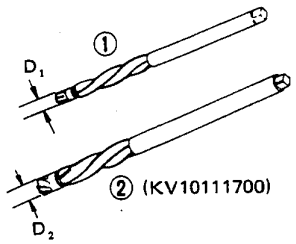
CONTENTS

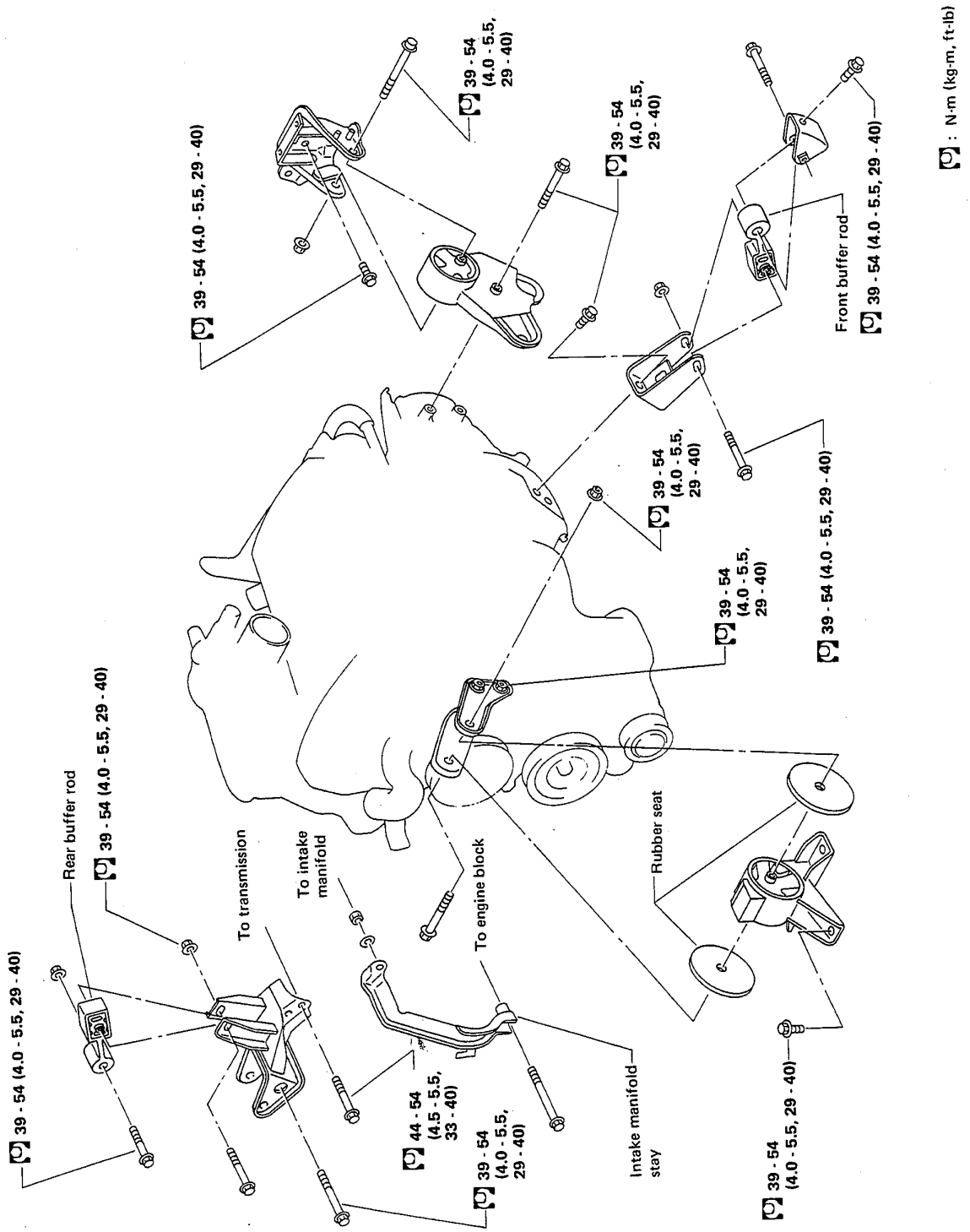
SPECIAL SERVICE TOOLS

Tool number Tool name	Description	Engine application CA
ST0501S000 Engine stand assembly ① ST05011000 Engine stand ② ST05012000 Base	 When overhauling engine	X
Engine attachment assembly ① KV10108101 Engine attachment ② KV10106500 Sub-attachment		X X
① KV10107900 Valve lip seal puller ② KV10111400 Valve lip seal puller adoptor	 Displacement valve lip seal	X
KV10111300 Valve spring compressor	 Disassembling and assembling valve components	X
① KV10107501 Valve lip seal drift ② KV10111400 Valve oil seal drift attachment	 Installing valve lip seal	X X

Tool number Tool name	Description		Engine application CA
ED19600000 Compression gauge set		Measuring compression pressure	X
KV10111100 Seal cutter		Removing oil pan	X
WS39930000 Tube presser		Pressing the tube of liquid gasket	X
EM03470000 Piston ring compressor		Installing piston assembly into cylinder bore	X
ST16610001 Pilot bushing puller		Removing crankshaft pilot bushing	X
KV101070S0 Piston pin press stand ① KV10107010 Center shaft ② ST13030020 Stand ③ ST13030030 Spring ④ KV10107020 Cap ⑤ ST13030051 Drift		Disassembling and assembling piston with connecting rod	X

COMMERCIAL SERVICE TOOLS

Tool name	Description		Engine application
			CA
Spark plug wrench		Removing and installing spark plug	X
Pulley holder		Holding camshaft pulley while tightening or loosening camshaft bolt	X
Valve seat cutter set		Finishing valve seat dimensions	X
Piston ring expander		Removing and installing piston ring	X
Valve guide drift	**Intake & Exhaust:** **A = 9.5 mm (0.374 in) dia.** **B = 5.5 mm (0.217 in) dia.** 	Removing and installing valve guide	X
Valve guide reamer		Reaming cylinder head for oversize valve guide ① . Reaming valve guide inner ② . **Intake & Exhaust:** **D_1 = 6.0 mm (0.236 in) dia.** **D_2 = 10.2 mm (0.402 in) dia.**	X


: N·m (kg-m, ft-lb)
39 - 54 (4.0 - 5.5, 29 - 40)
39 - 54 (4.0 - 5.5, 29 - 40)
39 - 54 (4.0 - 5.5, 29 - 40)
39 - 54 (4.0 - 5.5, 29 - 40)
39 - 54 (4.0 - 5.5, 29 - 40)
39 - 54 (4.0 - 5.5, 29 - 40)
39 - 54 (4.0 - 5.5, 29 - 40)
39 - 54 (4.0 - 5.5, 29 - 40)
Front buffer rod
Rear buffer rod
To transmission
To intake manifold
To engine block
Rubber seat
Intake manifold stay
44 - 54 (4.5 - 5.5, 33 - 40)
39 - 54 (4.0 - 5.5, 29 - 40)
39 - 54 (4.0 - 5.5, 29 - 40)

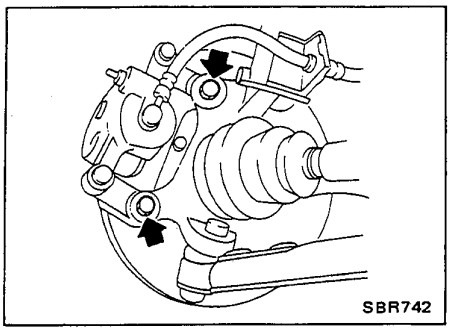
SEM508B

Removal

1. Drain water.
2. Remove drive belts for cooling fan, air compressor and power steering pump.
3. Set safety stand at the front of vehicle.

Refer to GI section.

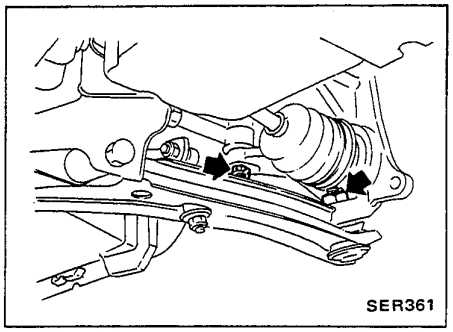
4. Remove right and left front tires.
5. Remove under covers.


SBR742

6. Remove brake calliper assembly.

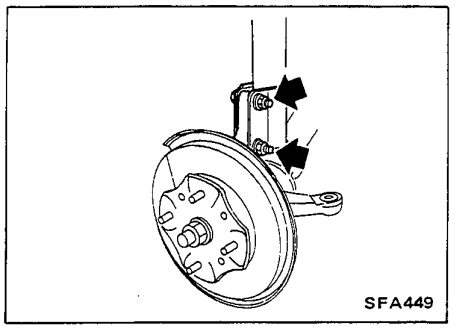
- **Brake hose does not need to be disconnected from brake calliper assembly.**
- **Never depress brake pedal.**

: 54 - 64 N·m (5.5 - 6.5 kg-m, 40 - 47 ft-lb)


SER361

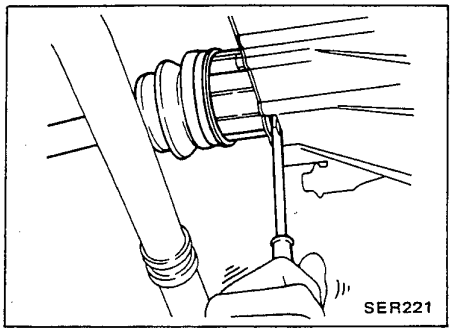
7. Disconnect transverse link ball joint (RH & LH) and tie-rod ball joint (RH & LH).

: Transverse link ball joint
59 - 74 N·m (6.0 - 7.5 kg-m, 43 - 54 ft-lb)
Tie-rod ball joint
29 - 39 N·m (3.0 - 4.0 kg-m, 22 - 29 ft-lb)


SFA449

8. Remove knuckle to strut bolts (RH & LH).

: 98 - 118 N·m (10 - 12 kg-m, 72 - 87 ft-lb)

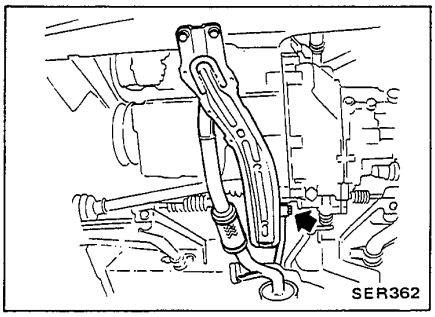

SER221

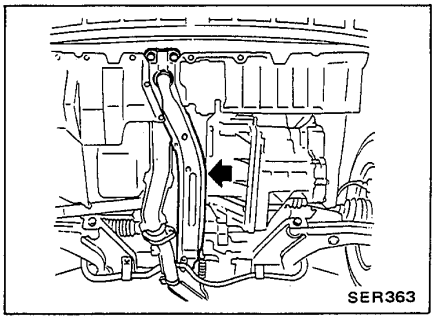
9. Remove RH & LH drive shaft.

In removing drive shaft, be careful not to damage grease seal of transaxle side.

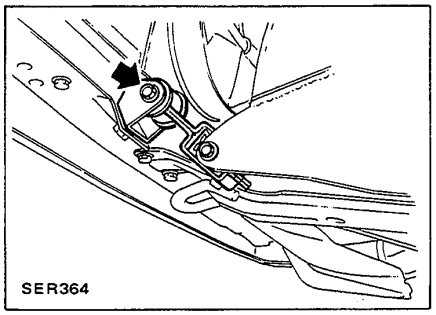
Removal (Cont'd)

10. Remove transaxle support rod bolt.





11. Remove center member.
12. Remove front exhaust tube.



13. Disconnect front buffer rod.
14. Disconnect rear buffer rod.
15. Remove air cleaner and disconnect wires, harness, pipes and hoses.
16. Lift up engine slightly and disconnect or remove all engine mountings.

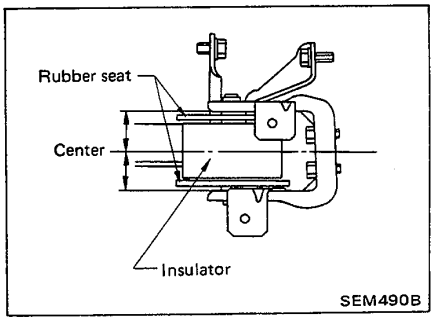
In lifting engine, be careful not to hit it against adjacent parts, especially against brake tube and brake master cylinder.

Installation

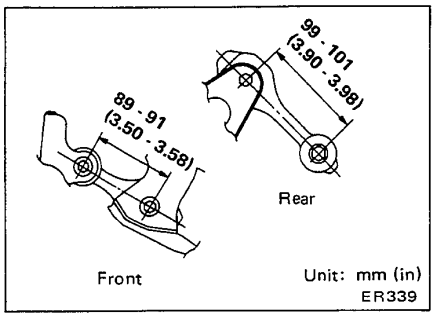
1. Install engine mounting bracket and tighten fixing bolts.

Be sure that insulators are correctly positioned on the brackets.

2. Carefully lower the engine onto engine mounting insulators.
3. Installation is in the reverse order of removal.



When install buffer rods, adjust the length between the bolts of buffer rods as shown.



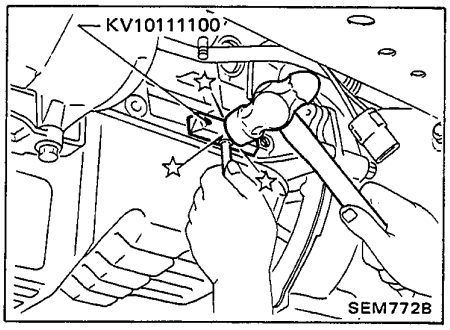
Removal

1. Drain engine oil.
2. Remove the following parts.
- Front right side splash cover
- Front right side under cover
3. Remove center member.
4. Remove front exhaust tube.
5. Remove front buffer rod and buffer rod bracket.
6. Remove engine gussets.
7. Remove oil pan.

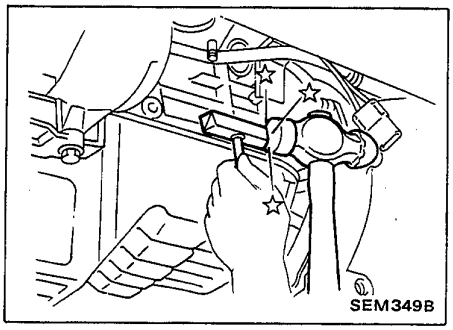
When remove oil pan

(1) Insert seal cutter (Special Tool) between cylinder block and oil pan.

Do not use screwdriver.
Oil pan flange will be deformed.

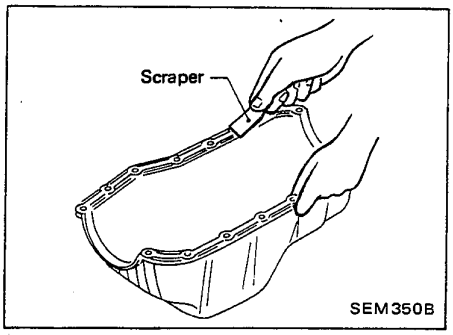


(2) Slide seal cutter by tapping its side with a hammer.

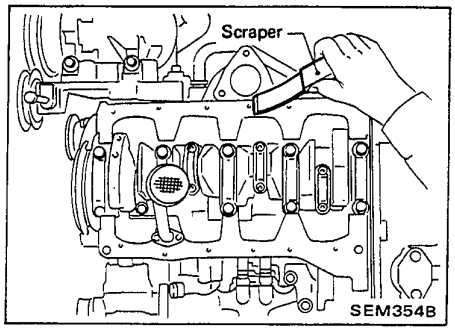


Installation

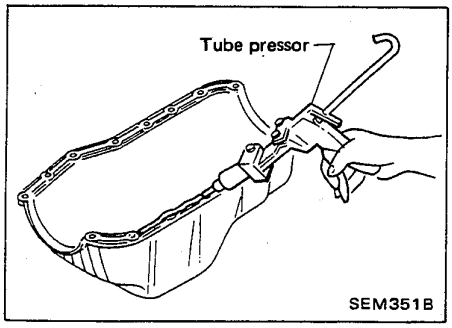
1. Before installing oil pan, remove all traces of liquid gasket from mating surface using a scraper.



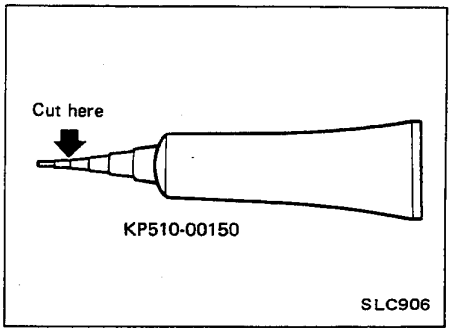
Also remove traces of liquid gasket from mating surface of cylinder block.



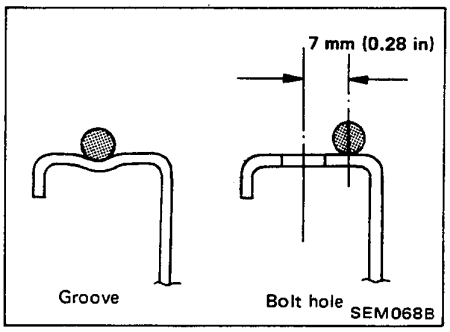
Installation (Cont'd)



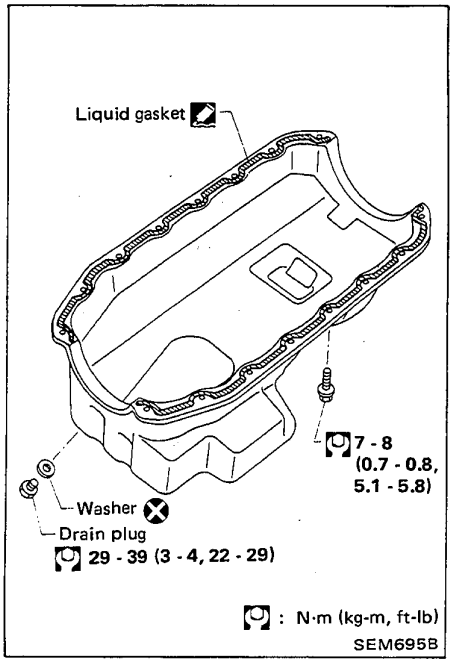
2. Apply a continuous bead of liquid gasket to mating surface of oil pan.
- **Use NISSAN Genuine part (KP510-00150) or equivalent.**

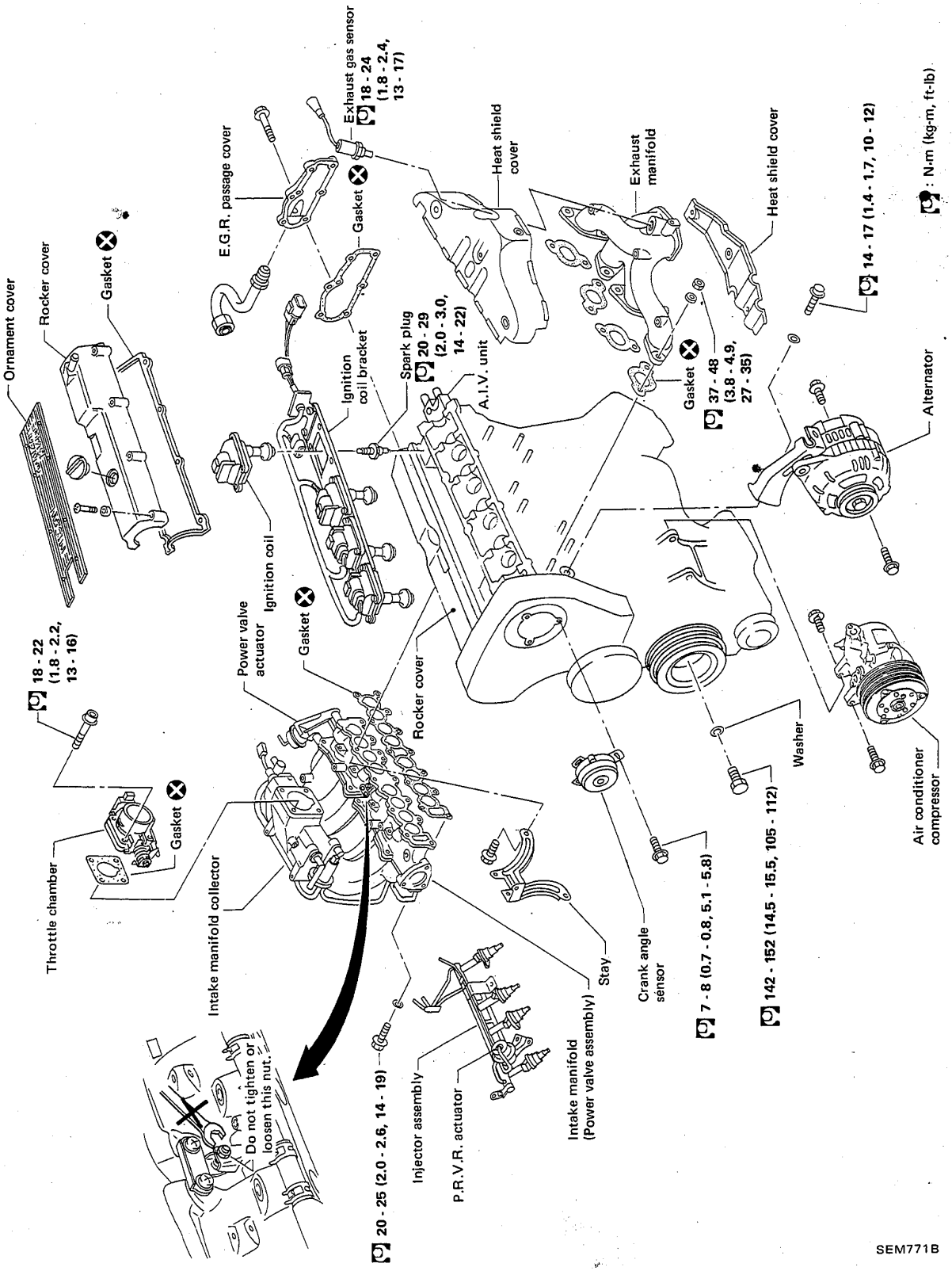


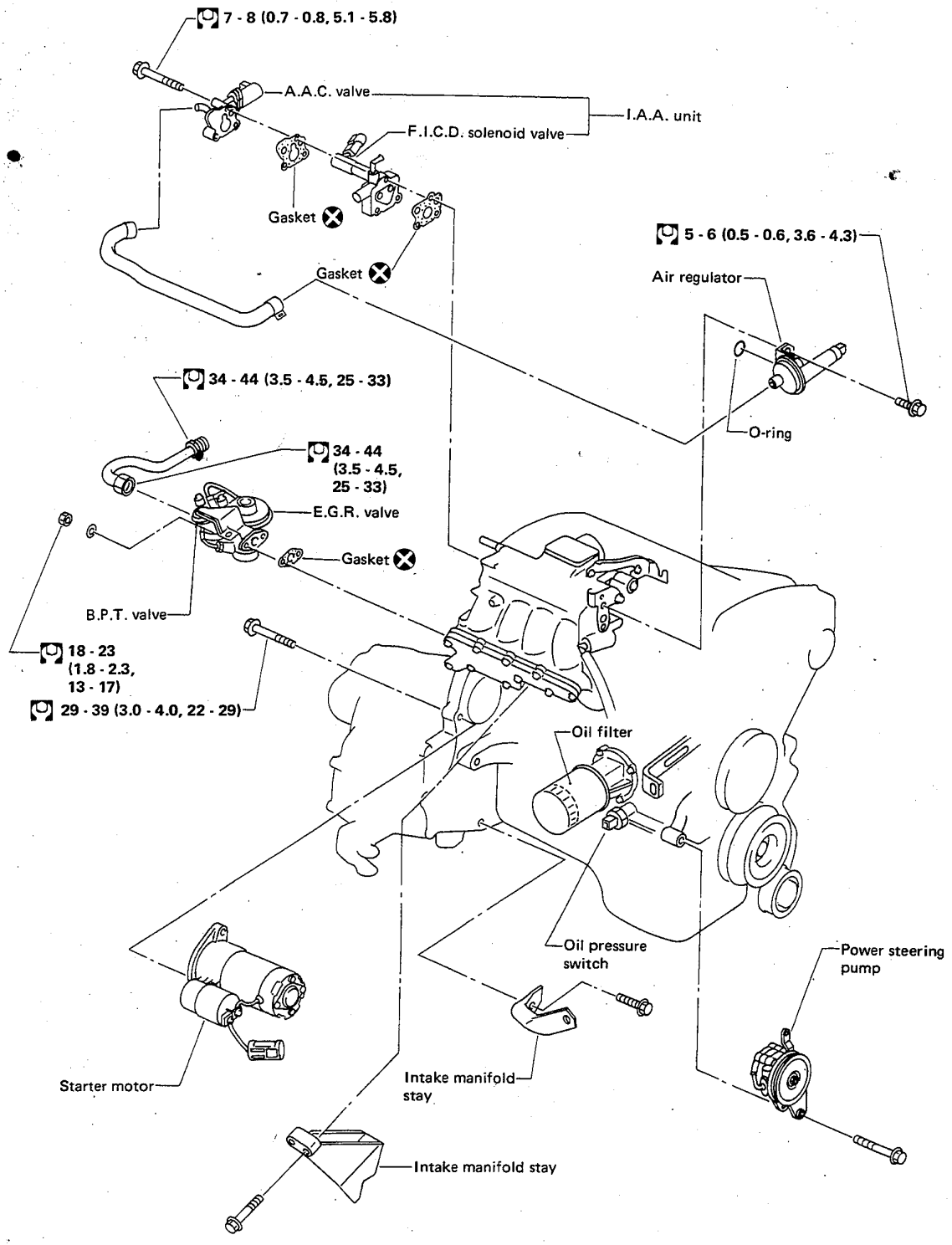
- **Be sure liquid gasket is 3.5 to 4.5 mm (0.138 to 0.177 in) wide.**



3. Apply liquid gasket as shown where there is no groove at bolt hole.
- **Attach oil pan to cylinder block within five minutes after coating.**
- **Wait at least 30 minutes before refilling engine oil or starting engine.**



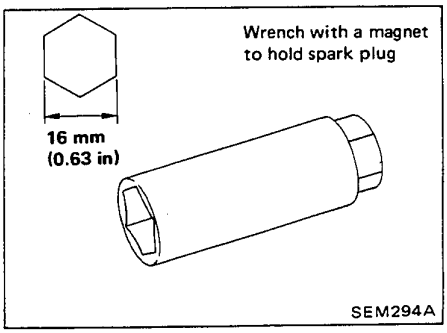

Ornament cover
Rocker cover
Gasket
E.G.R. passage cover
Exhaust gas sensor
18 - 24 (1.8 - 2.4, 13 - 17)
Gasket
Heat shield cover
Exhaust manifold
Heat shield cover
14 - 17 (1.4 - 1.7, 10 - 12)
: N·m (kg-m, ft-lb)
Ignition coil bracket
Spark plug
20 - 29 (2.0 - 3.0, 14 - 22)
A.I.V. unit
Gasket
37 - 48 (3.8 - 4.9, 27 - 35)
Alternator
Ignition coil
Gasket
Power valve actuator
18 - 22 (1.8 - 2.2, 13 - 16)
Rocker cover
Gasket
Throttle chamber
Intake manifold collector
Stay
Crank angle sensor
7 - 8 (0.7 - 0.8, 5.1 - 5.8)
142 - 152 (14.5 - 15.5, 105 - 112)
Washer
Air conditioner compressor
Do not tighten or loosen this nut.
20 - 25 (2.0 - 2.6, 14 - 19)
Injector assembly
P.R.V.R. actuator
Intake manifold (Power valve assembly)
SEM771B



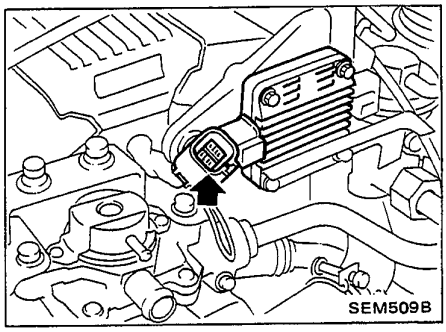
: N·m (kg-m, ft-lb)

SEM507B

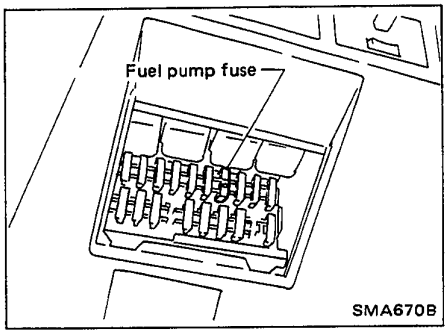
CHECKING COMPRESSION PRESSURE



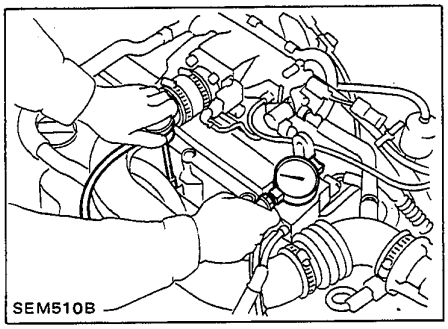
1. Warm up engine.
2. Remove ornament cover and all spark plugs.
   - **Use a suitable plug wrench.**
   - **Refer to Spark Plug Replacement in MA section.**



3. Disconnect power transistor harness connector.



4. Remove fuse for fuel pump.



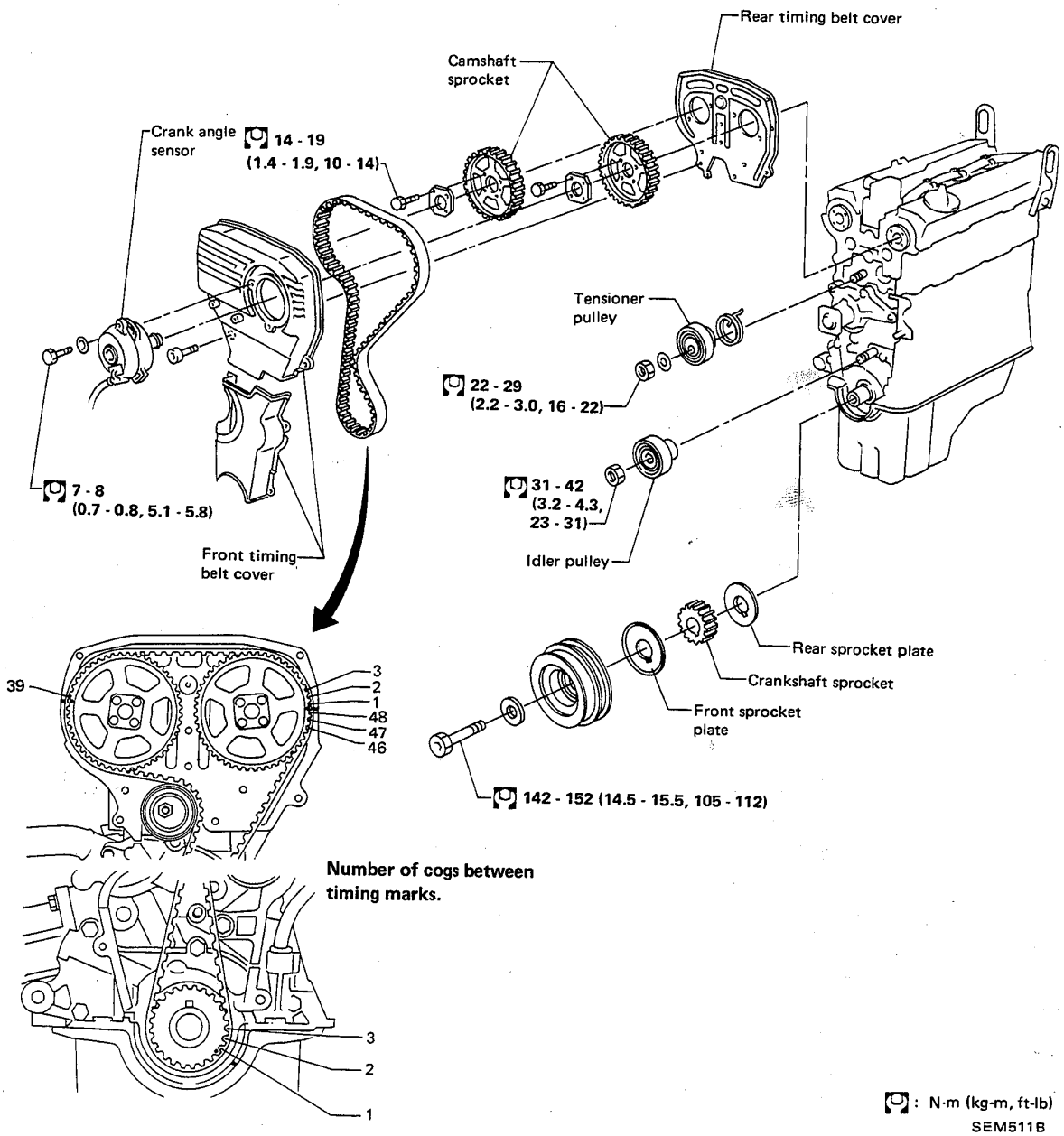
5. Attach a suitable compression tester.
6. Depress accelerator pedal to fully open throttle.
7. Crank engine and read gauge indication.

Compression pressure:
kPa (kg/cm^2 , psi) at 350 rpm
Standard
1,373 (14.0, 199)
Minimum
1,177 (12.0, 171)
Differential limit between cylinders:
98 (1.0, 14) at 350 rpm

8. If cylinder compression in one or more cylinders is low, pour a small amount of engine oil into cylinders through the spark plug holes and retest compression.
   - If adding oil helps the compression pressure, chances are that piston rings are worn or damaged.
   - If pressure stays low, valve may be sticking or seating improperly.
   - If cylinder compression in any two adjacent cylinders is low, and if adding oil does not help the compression, there is leakage past the gasket surface.

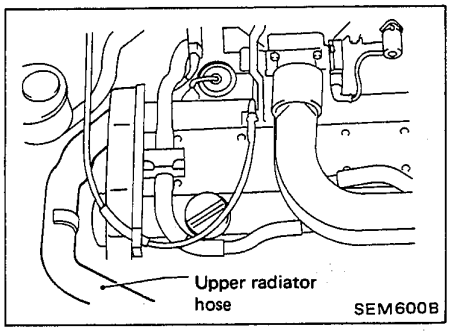
CAUTION:

a. Do not bend or twist timing belt too tightly.
b. After removing timing belt, do not rotate crankshaft and camshaft separately because valves will hit piston head.
c. Ensure timing belt, timing belt camshaft sprocket, crankshaft sprocket and belt tensioner are clean and free from oil or water.
d. Before installing timing belt, confirm that No. 1 cylinder is set at T.D.C. on compression stroke.
e. Align arrow on timing belt forward.
f. Align white lines on timing belt with punch mark on camshaft sprocket and crankshaft sprocket.
g. Adjust belt tension with all spark plugs removed.

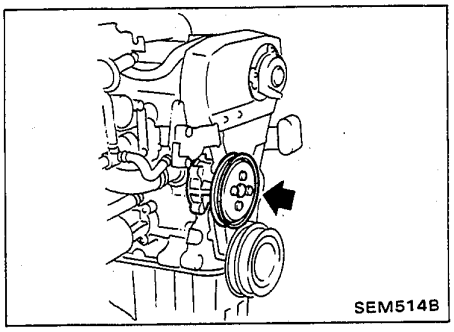


: N·m (kg-m, ft-lb)

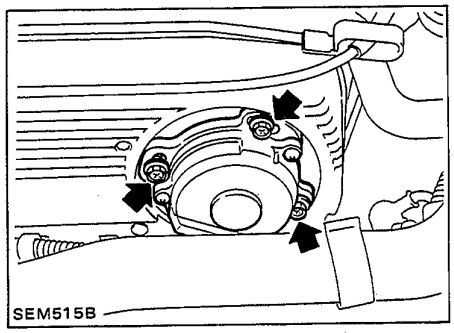
SEM511B



1. Drain coolant.
2. Remove upper radiator hose.

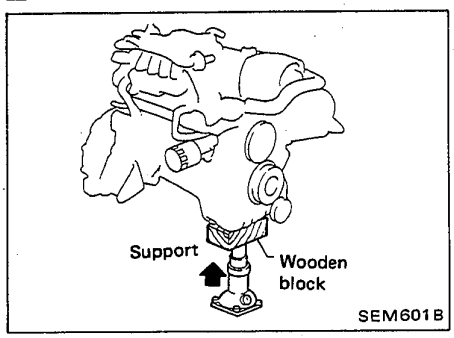


3. Remove right side under cover.
4. Remove drive belts for power steering pump and compressor.
5. Remove water pump pulley.

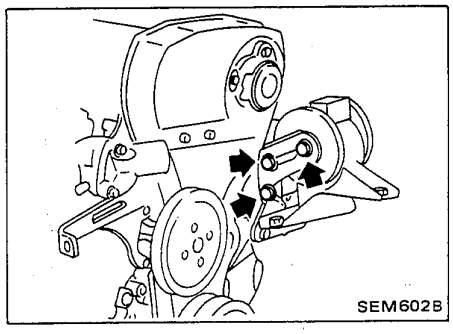


6. Remove crank angle sensor.

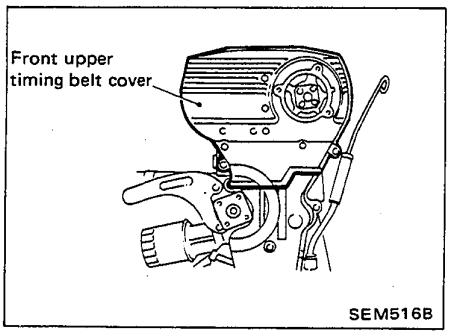
Put aligning mark on crank angle sensor and timing belt cover.



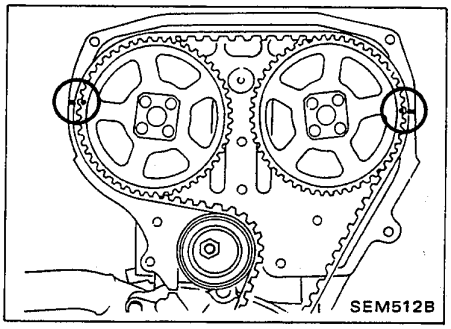
7. Support or hang the engine.



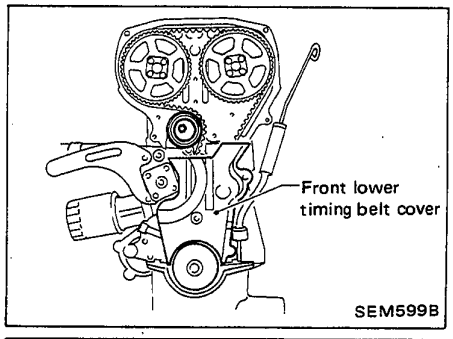
8. Remove engine mount bracket.



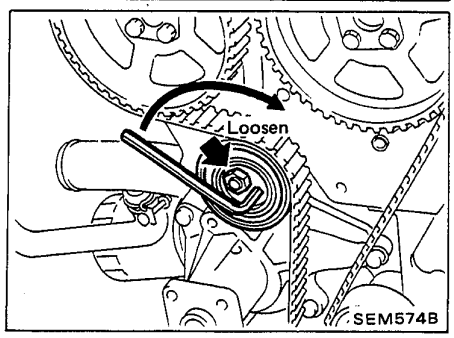
9. Remove front upper timing belt cover.



10. Align timing marks on crank pulley sprockets.



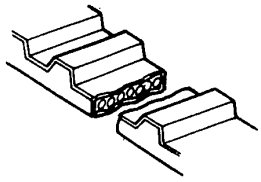
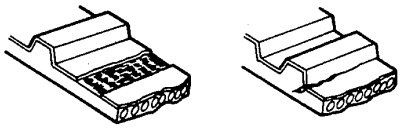
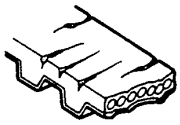
11. Remove crankshaft pulley.
Crankshaft pulley is accessible after removing side cover from inside R.H. wheel house.
12. Remove front lower timing belt cover.



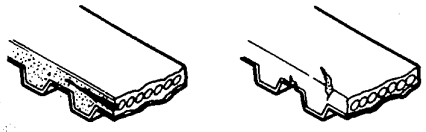
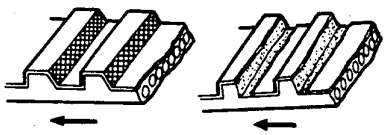
13. Loosen tensioner pulley nut to loosen timing belt.
14. Remove timing belt.

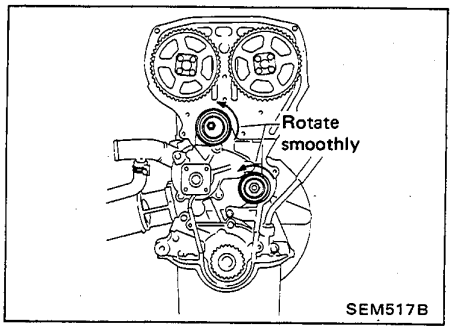
TIMING BELT—Inspection

Visually check the condition of the timing belt.
Replace if any abnormality is found.

Item to check	Problem	Cause
Belt is broken.	 SEM393A	• Improper handling • Poor belt cover sealing • Coolant leakage at water pump
Tooth is broken/ tooth root is cracked.	 SEM394A	• Camshaft jamming • Distributor jamming • Oil leakage at camshaft/crankshaft oil seal
Back surface is cracked/worn.	 SEM395A	• Tensioner jamming • Overheated engine • Interference with belt cover

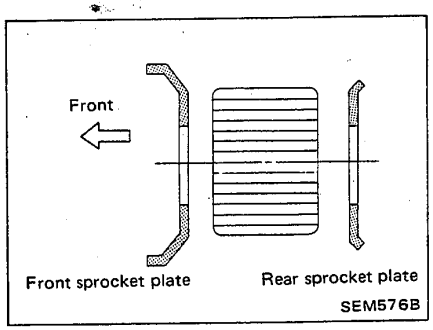
TIMING BELT—Inspection

Item to check	Problem	Cause
Side surface is worn.	 • Side surface of belt is worn to such an extent that there is no trace of cutoff performed during manufacturing process. • Belt corners are worn and round. • Wicks are frayed and coming out. SEM396A	• Improper installation of belt • Malfunctioning crank pulley plate/timing belt plate
Teeth are worn.	 • Canvas on tooth face is worn down. • Canvas on tooth is fluffy, rubber layer is worn down and faded white, or canvas texture is unclear. SEM397A	• Poor belt cover sealing • Coolant leakage at water pump • Camshaft not functioning properly • Distributor not functioning properly • Excessive belt tension
Oil/Coolant or water is stuck to belt.		• Poor oil sealing of each oil seal • Coolant leakage at water pump • Poor belt cover sealing

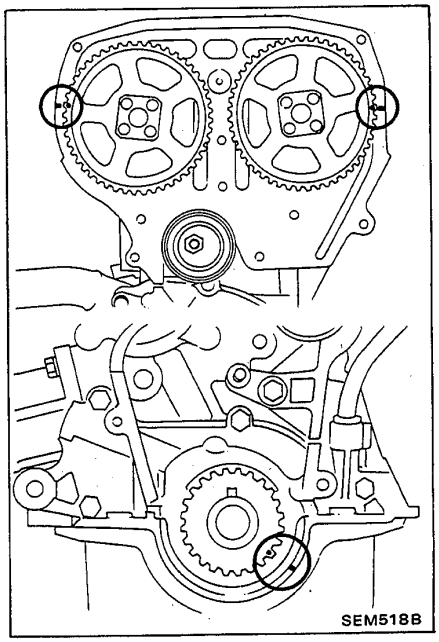


BELT TENSIONER AND IDLER PULLEY

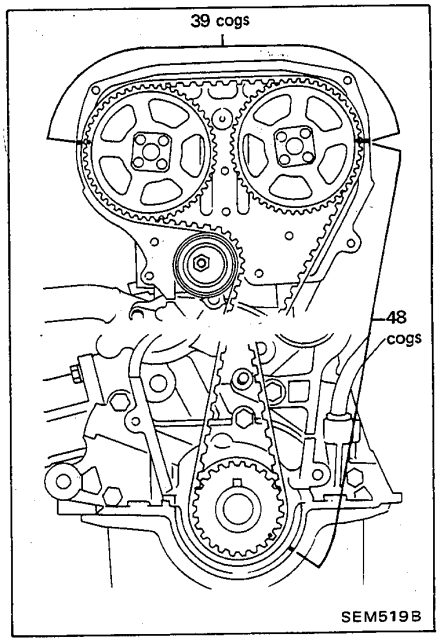
1. Visually check belt tensioner and idler pulley for seizure, rust and any evidence of breaks.
2. Confirm that tensioner and idler pulley can be rotated smoothly.
3. Visually check tensioner pulley return spring for corrosion, distortion and any abnormal signs.



1. Install crankshaft sprocket with sprocket plate.

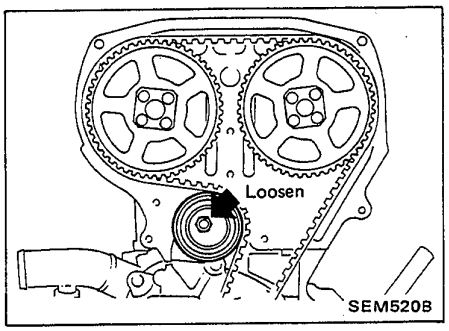


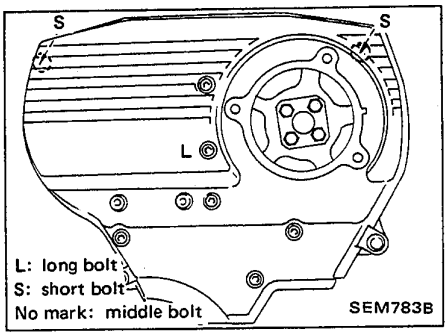
2. Confirm that No. 1 cylinder is set at T.D.C. on its compression stroke.



3. Install timing belt.

Align timing marks on timing belt and sprockets.





4. Loosen tensioner pulley nut.
5. Install lower timing belt.
6. Install crank pulley with washer.
   ⟲ : **142 - 152 N·m**
   (14.5 - 15.5 kg-m, 105 - 112 ft-lb)
7. Rotate crankshaft 2 turns completely.
8. Tighten tensioner pulley nut.
   ⟲ : **22 - 29 N·m (2.2 - 3.0 kg-m, 16 - 22 ft-lb)**
9. Install upper timing belt cover.
10. Install engine mount bracket.
11. Install crank angle sensor and water pump pulley.

Align marks on crank angle sensor and front cover that are marked when crank angle sensor is removed.

Crank angle sensor:

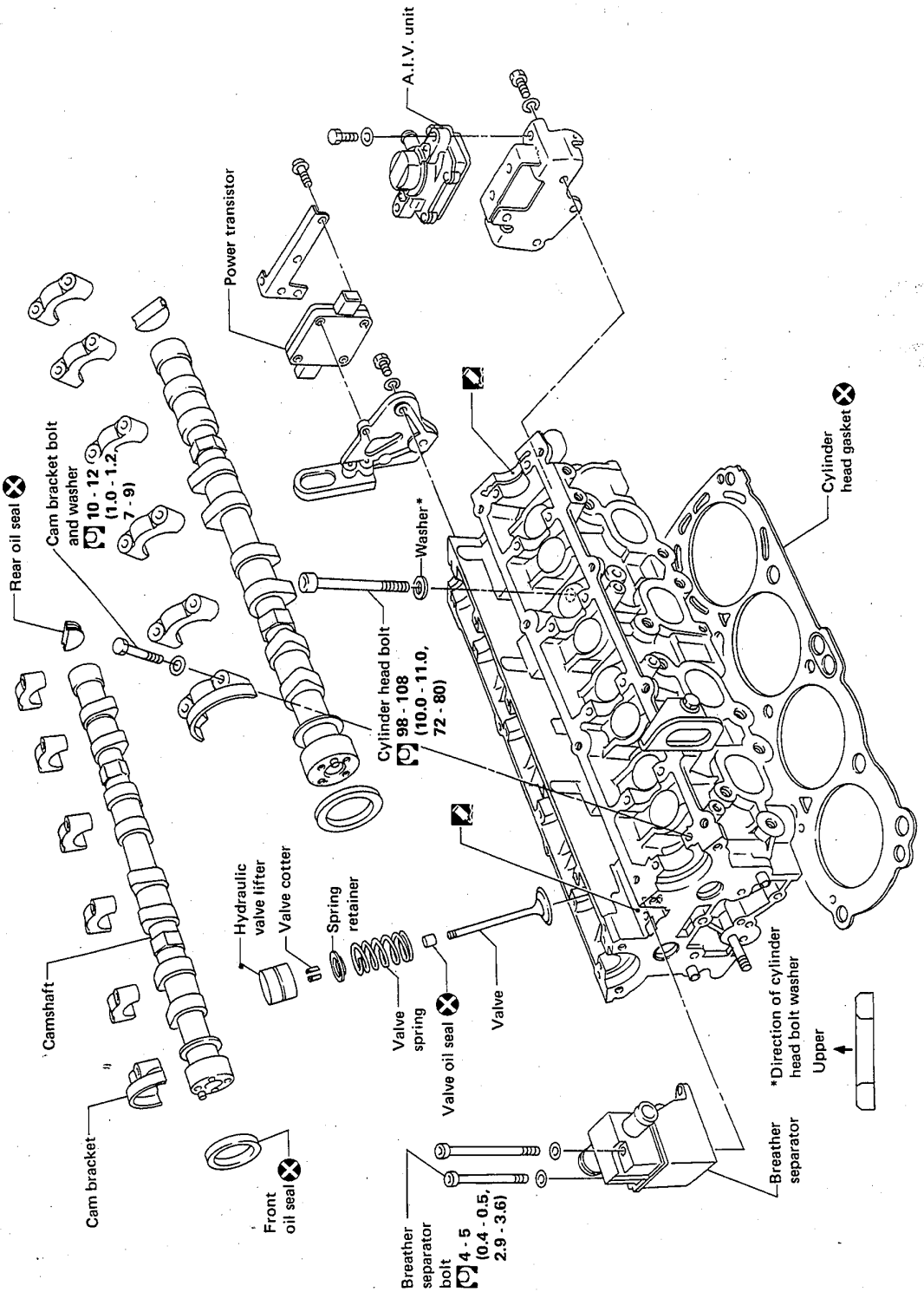
⟲ : **7 - 8 N·m (0.7 - 0.8 kg-m, 5.1 - 5.8 ft-lb)**

12. Install drive belts.

Refer to Drive Belt Inspection in MA section.

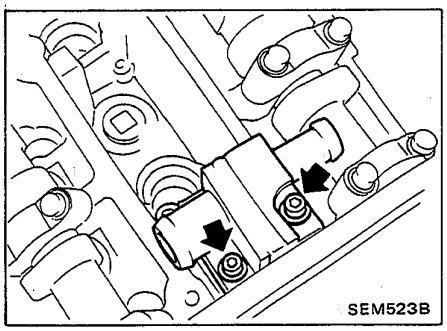
13. Install upper radiator hose and refill coolant.

Refer to Changing Engine Coolant in MA section.

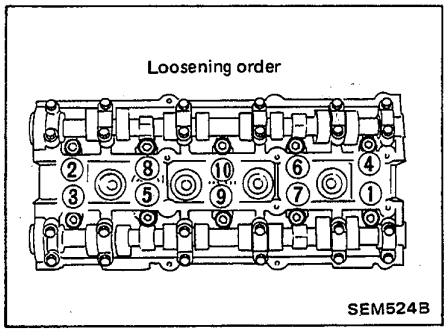

A.I.V. unit
Power transistor
Rear oil seal
Cam bracket bolt and washer
10 - 12 (1.0 - 1.2, 7 - 9)
Washer*
Cylinder head gasket
Cylinder head bolt
98 - 108 (10.0 - 11.0, 72 - 80)
Hydraulic valve lifter
Valve cotter
Spring retainer
Camshaft
Valve spring
Valve oil seal
Valve
*Direction of cylinder head bolt washer
Upper
Cam bracket
Front oil seal
Breather separator
Breather separator bolt
4 - 5 (0.4 - 0.5, 2.9 - 3.6)
: N·m (kg-m, ft-lb)

SEM522B

1. Remove timing belt.
Refer to TIMING BELT.


SEM523B

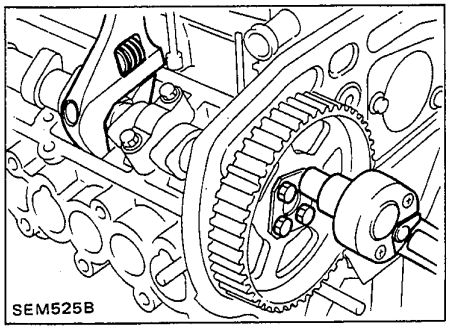
2. Remove breather separator.
To remove breather separator makes cylinder head bolts removal easy.



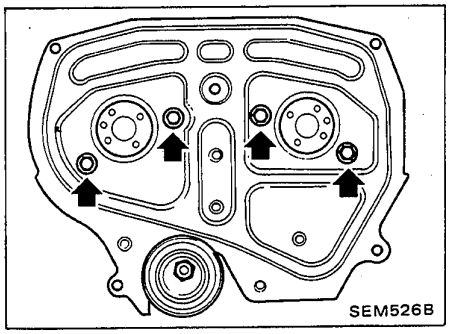
SEM524B

3. Loosen cylinder head bolts.

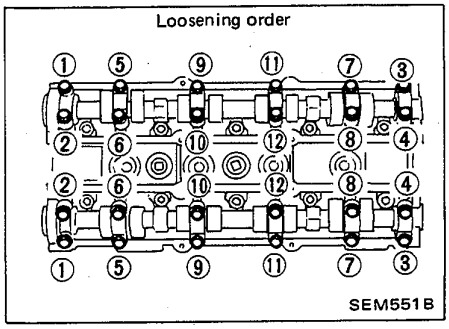
4. Remove cylinder head.



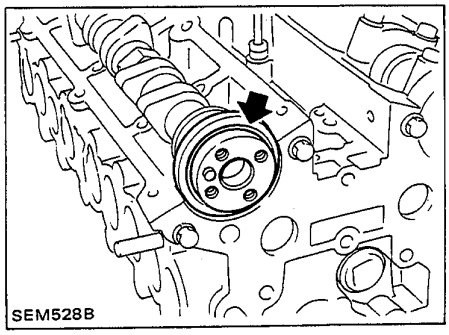
1. Remove camshaft sprockets.



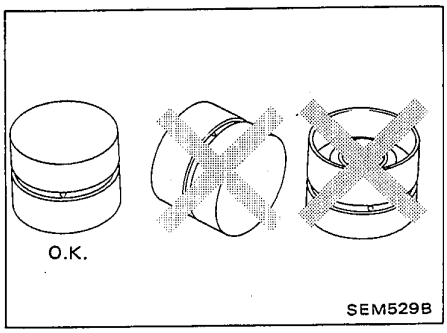
2. Remove tensioner pulley and rear cover.



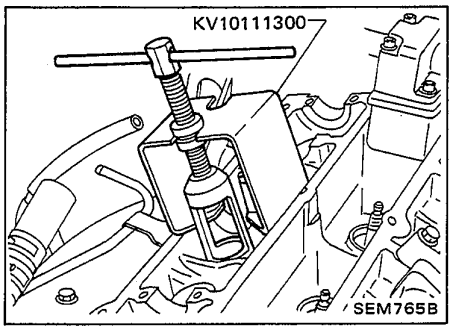
3. Remove camshaft bracket.
Loosen bolts gradually in two or three stages.



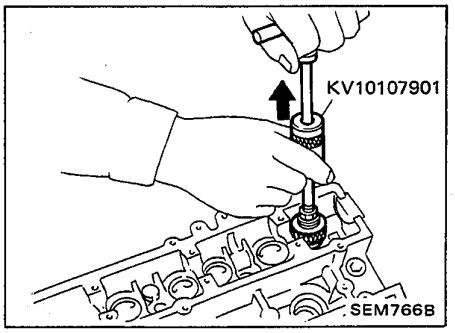
4. Remove front oil seals and then, remove camshafts.



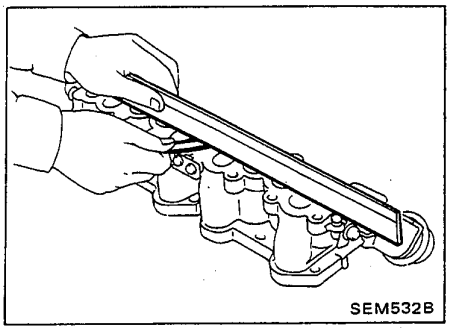
5. Remove hydraulic valve lifters.
a. **Do not put hydraulic valve lifters upside down, otherwise air will enter valve lifter, causing it to make a noise.**
b. **Do not disassemble hydraulic valve lifter.**
c. **Attach tags to valve lifters so as not to mix them up.**
d. **Valve lifters are required to put in engine oil.**



6. Disassemble valve mechanism.

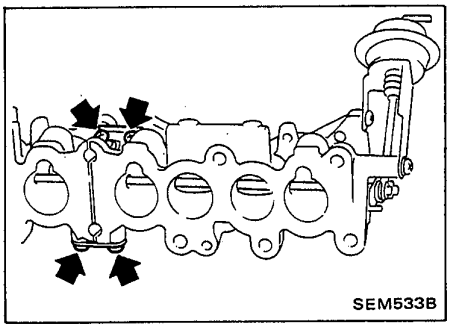


7. Remove valve oil seal.

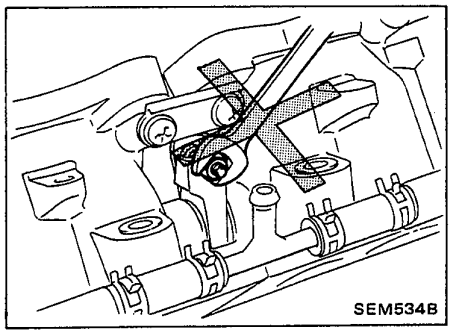

SEM532B

INTAKE MANIFOLD DISTORTION

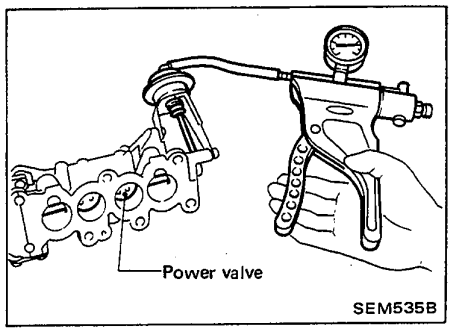
Intake manifold distortion:
Less than 0.1 mm (0.004 in)


SEM533B

If intake manifold distortion is not within the specified value, adjust distortion by loosening screws as shown.


SEM534B

Do not loosen power valve adjusting screw.
This screw is adjusted on product line.

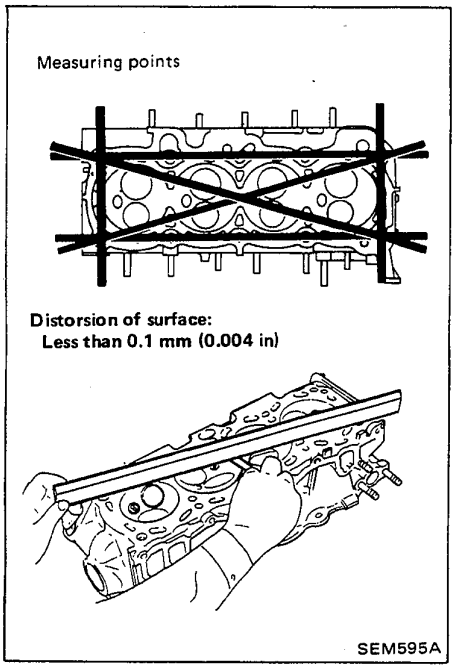


SEM535B

POWER VALVE ACTUATOR

Supply vacuum pressure and inspect actuator operation.

Vacuum pressure kPa (mmHg, inHg)	Operation
Approx. 6.7 (50, 1.97)	Begin to close
Approx. 40.0 (300, 11.81)	Fully closed



CYLINDER HEAD DISTORTION

Cylinder head distortion:

Less than 0.1 mm (0.004 in)

If beyond the specified limit, resurface it.

Nominal cylinder head height:

125.9 - 126.1 mm (4.957 - 4.965 in)

(From bottom to camshaft center)

Resurfacing limit:

The resurfacing limit of cylinder head is determined by the cylinder block resurfacing in an engine.

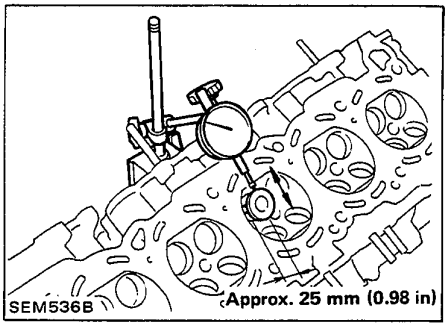
Amount of cylinder head resurfacing is "A"

Amount of cylinder block resurfacing is "B"

The maximum limit is as follows:

A + B = 0.2 mm (0.008 in)

After resurfacing the cylinder head, check that camshaft rotates freely by hand with cylinder block assembled.

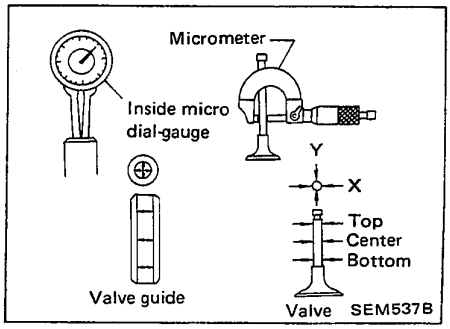


VALVE GUIDE CLEARANCE

Stem-to-guide clearance:

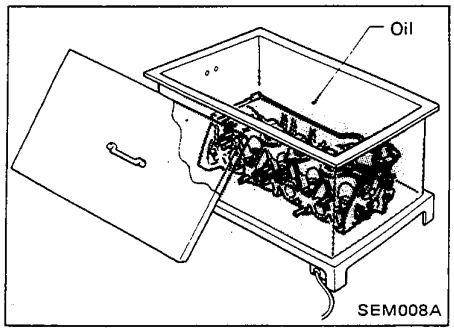
Maximum limit

0.10 mm (0.0039 in)



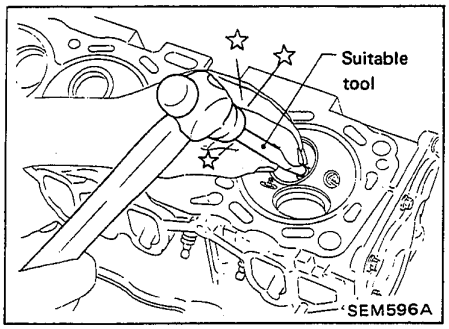
To determine the correct replacement part, measure valve stem diameter and valve guide bore.

For dimensions, refer to S.D.S.

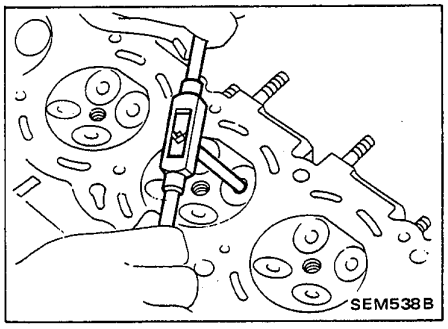


VALVE GUIDE REPLACEMENT

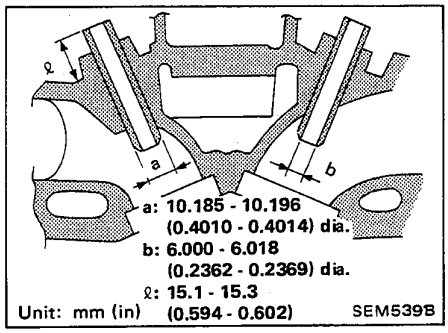
1. To remove valve guide, heat cylinder head to 150 to 160°C (302 to 320°F).



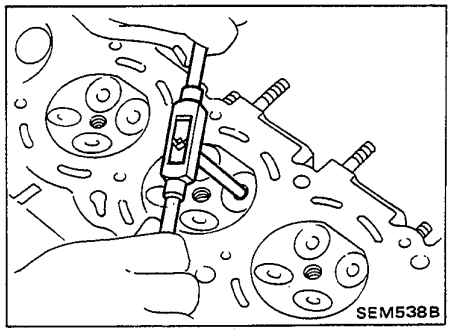
2. Drive out valve guide with a press [under a 20 kN (2t, 2.2 US ton, 2.0 Imp ton) pressure] or hammer and suitable tool.



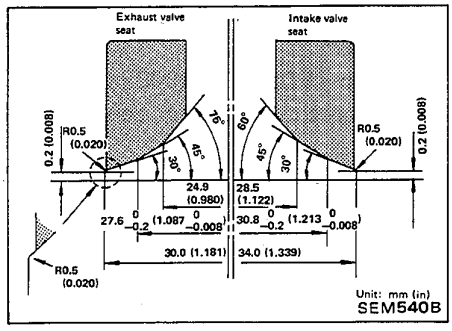
3. Ream cylinder head valve guide hole.
   Cylinder head valve guide hole diameter "a"
   [For 0.2 mm (0.008 in) oversize] :
   Intake and Exhaust:
   $10.2^{-0.004}_{-0.015}$ mm ($0.4016^{-0.0002}_{-0.0006}$ in)



4. Heat cylinder head to 150 to 160°C (302 to 320°F) and press service valve guide onto cylinder head.



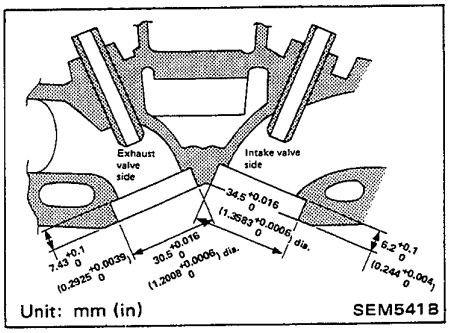
5. Ream valve guide.
   Finished size:
   Intake and Exhaust:
   $6.0^{+0.018}_{0}$ mm ($0.2362^{+0.0007}_{0}$ in)



VALVE SEATS

Check valve seats for any evidence of pitting at valve contact surface, and reseat or replace if worn out excessively.

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



REPLACING VALVE SEAT FOR SERVICE PARTS

1. Bore out old seat until it collapses.
   The machine depth stop should be set so that boring cannot continue beyond the bottom face of the seat recess in cylinder head.
2. Ream the cylinder head recess.

Reaming bore for service valve seat [Oversize 0.5 mm (0.020 in)] :

Intake:

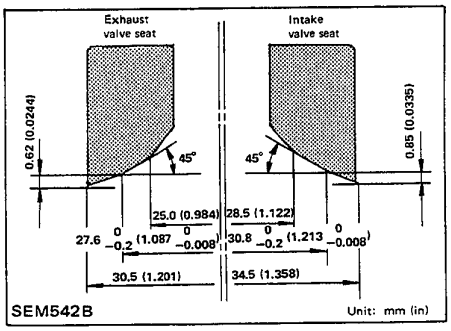
$34.5^{+0.016}_{0}$ mm ($1.3583^{+0.0006}_{0}$ in)

Exhaust:

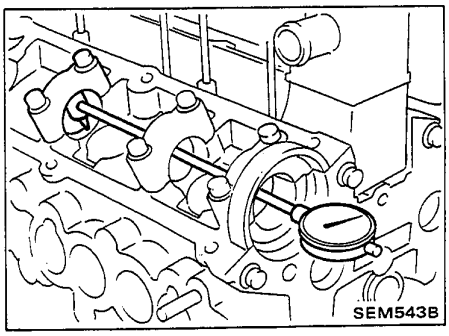
$30.5^{+0.016}_{0}$ mm ($1.2008^{+0.0006}_{0}$ in)

Reaming should be done to the concentric circles around the valve guide center so that valve seat will have the correct fit.

3. Heat cylinder head to a temperature of 150 to 160°C (302 to 320°F).
4. Press fit seat until it seats on the bottom.



5. Cut or grind valve seat using suitable tool at the specified dimensions as shown.
6. After cutting, lap valve seat with a lapping compound.
7. Check contact condition of valve seat.

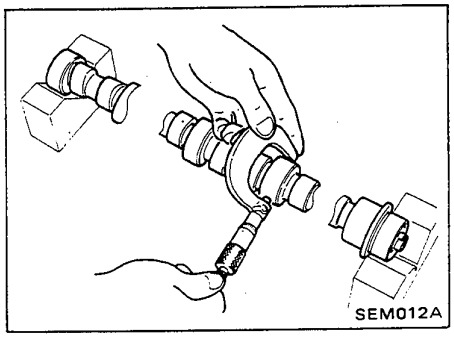


CAMSHAFT JOURNAL CLEARANCE

1. Measure the inner diameter of camshaft bearing.

   : Camshaft bracket
   10 - 12 N·m
   (1.0 - 1.2 kg-m, 7 - 9 ft-lb)

   Standard inner diameter:
   28.000 - 28.025 mm (1.1024 - 1.1033 in)

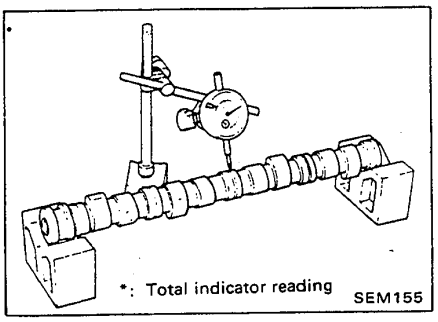


2. Measure the outer diameter of camshaft journal.

   Standard outer diameter:
   27.935 - 27.955 mm (1.0998 - 1.1006 in)

   If the clearance is greater than the maximum, replace camshaft and/or cylinder head.

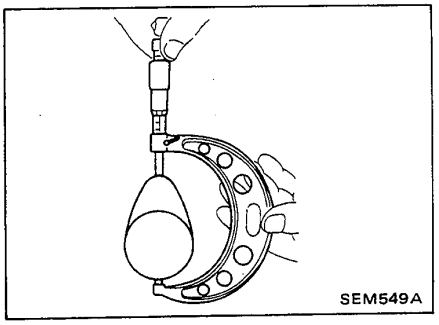
   Maximum clearance:
   0.15 mm (0.0059 in)



CAMSHAFT RUNOUT

Camshaft runout (Total indicator reading):
Limit 0.05 mm (0.0020 in)

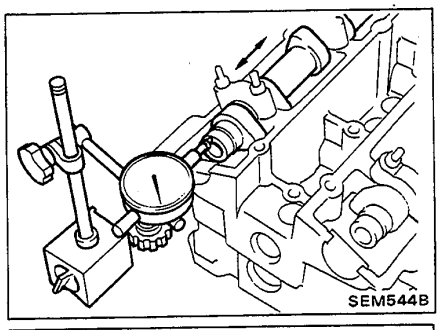
If beyond the limit, replace.



CAMSHAFT CAM HEIGHT

Standard cam height:
Intake and Exhaust:
40.485 - 40.515 mm
(1.5939 - 1.5951 in)
Cam wear:
Limit 0.2 mm (0.008 in)

If wear is beyond the limit, replace it.



CAMSHAFT VISUAL CHECK

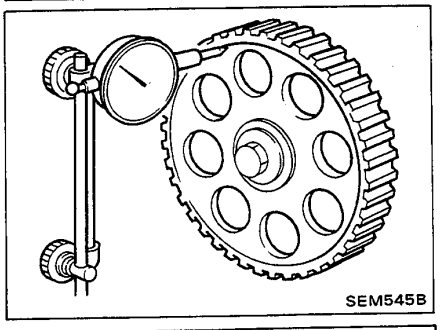
Check camshaft for scratches, seizure and wear.

CAMSHAFT END PLAY

1. Install camshaft in cylinder head.
2. Measure camshaft end play.

Camshaft end play:

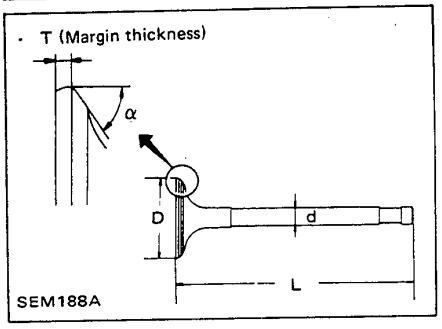
Standard	**0.07 - 0.15 mm (0.0028 - 0.0059 in)**
Limit	**0.2 mm (0.008 in)**



CAMSHAFT SPROCKET RUNOUT

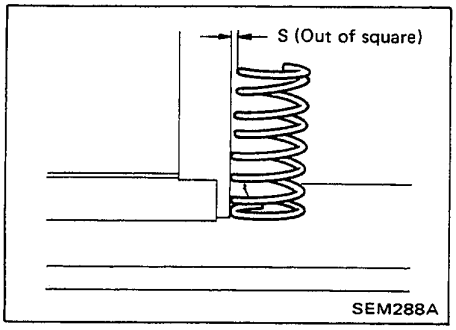
Install sprocket on camshaft and check for runout.
If runout exceeds the specified limit, replace camshaft sprocket.

Runout (Total indicator reading):
Limit 0.1 mm (0.004 in)



VALVE DIMENSIONS

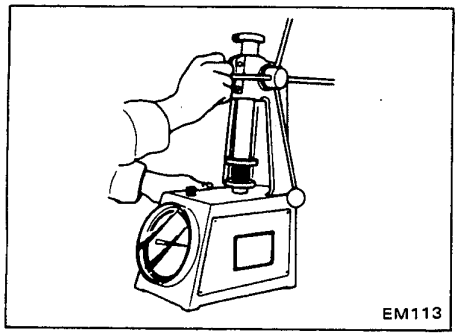
Check dimensions in each valve. For dimensions, refer to S.D.S.
When valve head has been worn down to 0.5 mm (0.020 in) in margin thickness, replace the valve.
Grinding allowance for valve stem tip is 0.2 mm (0.008 in) or less.



VALVE SPRING SQUARENESS

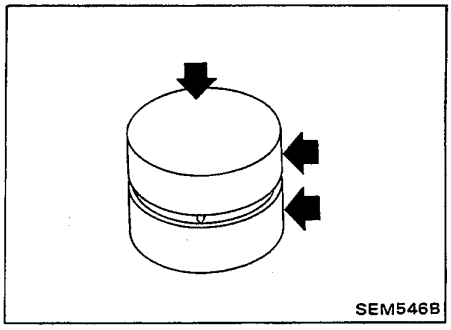
Out-of-square:

Less than 1.8 mm (0.071 in)



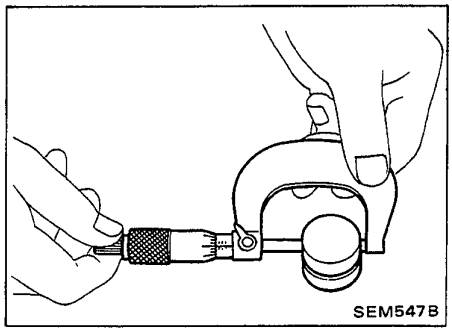
VALVE SPRING PRESSURE LOAD

Compression length mm (in)	Load N (kg, lb)
0 (0)	0 (0, 0)
8 (0.31)	Approx. 235 (24, 53)
16.5 (0.650)	Approx. 539 (55, 121)



HYDRAULIC VALVE LIFTER

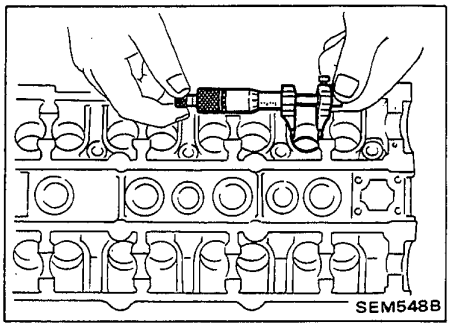
1. Check contact and sliding surfaces for wear or scratches.



2. Check diameter of a valve lifter and a valve lifter guide bore.

Valve lifter diameter:

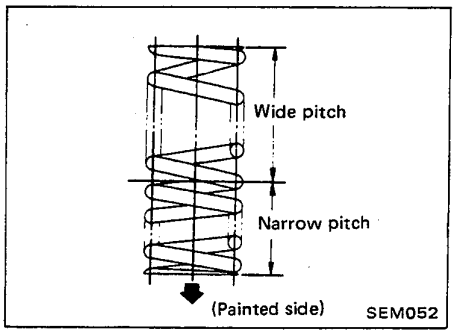
30.955 - 30.965 mm (1.2187 - 1.2191 in)



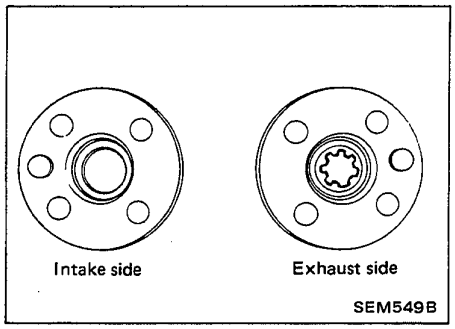
Lifter guide bore diameter:

31.000 - 31.013 mm (1.2205 - 1.2210 in)

If valve lifter can be depressed by finger more than 1 mm (0.04 in), air should be bled from it. At that time, run engine at approx. 1,000 rpm for 10 minutes.
If engine is still noisy, replace hydraulic valve lifters.

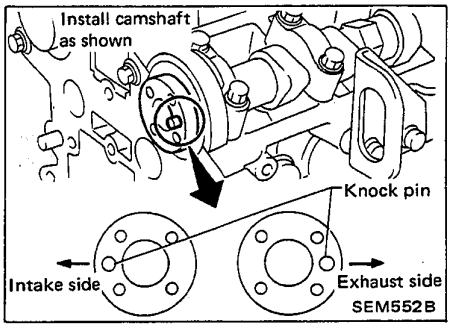


1. Install valve component parts.
- **Always use new valve oil seal. (Refer to OIL SEAL REPLACEMENT.)**
- **Install valve spring (uneven pitch type) with its narrow pitch side (painted side) toward cylinder head side.**

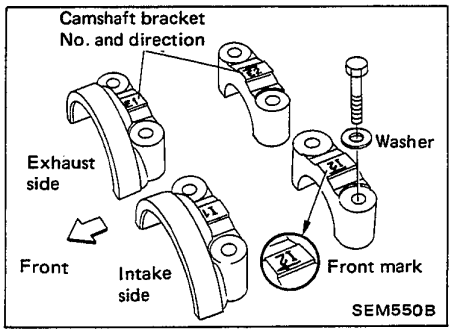


2. Install camshafts.

Exhaust side camshaft has spline for crank angle sensor.



Install camshaft as shown.



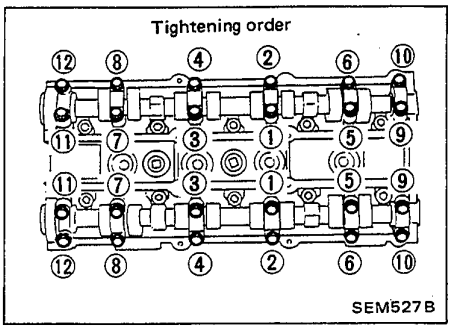
3. Install camshaft brackets.

Front mark is punched on the camshaft bracket.

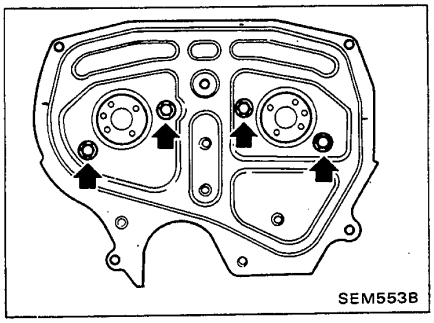
4. Apply engine oil to camshaft oil seal lip and install it in place.

Always use new camshaft oil seal.

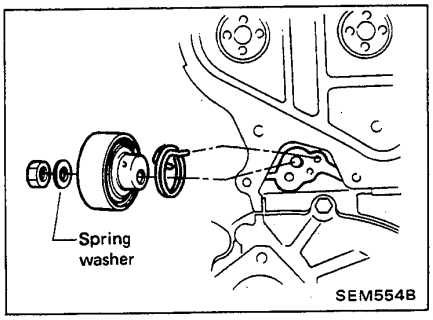
[O] : 9 - 12 N·m (0.9 - 1.2 kg-m, 6.5 - 8.7 ft-lb)



Tighten camshaft bracket bolts gradually in two or three stages.

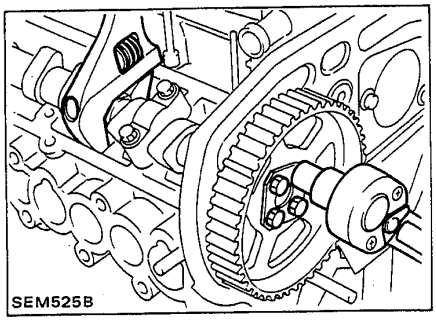

SEM553B

5. Install rear timing cover.
   : **7 - 8 N·m (0.7 - 0.8 kg-m, 5.1 - 5.8 ft-lb)**



SEM554B

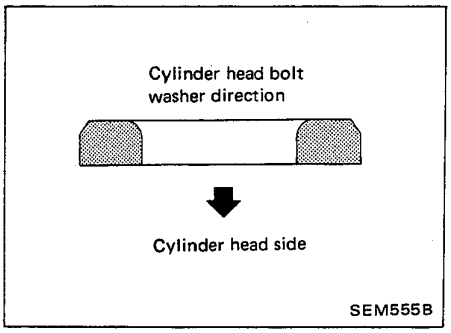
6. Install timing belt tensioner.
   : **Tensioner nut**
   22 - 29 N·m
   (2.2 - 3.0 kg-m, 16 - 22 ft-lb)


SEM525B

7. Install camshaft sprockets.
   : **Sprocket bolt**
   14 - 19 N·m
   (1.4 - 1.9 kg-m, 10 - 14 ft-lb)

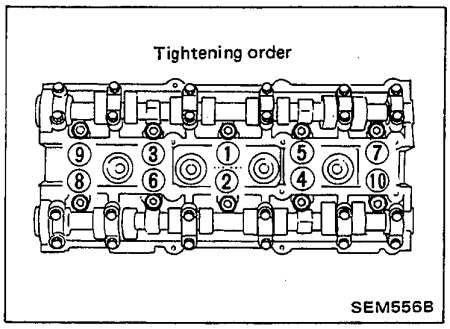
When tightening bolts, fix camshaft to prevent it from rotating.

8. Adjust timing belt tension.
   Refer to TIMING BELT.
9. Reinstall remaining parts.



1. Install cylinder head with new gasket.

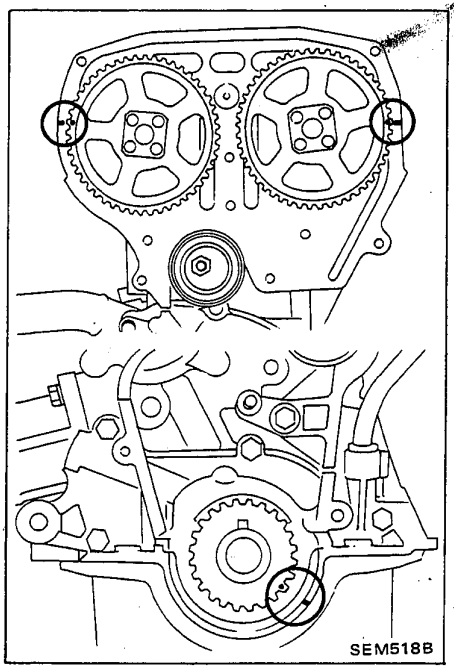
Do not rotate crankshaft and camshaft separately, because valves will hit piston heads.



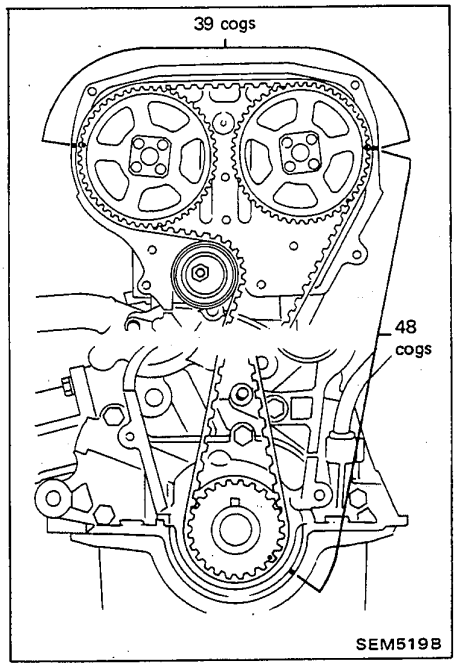
2. Apply oil to the thread portion and seat surface of bolts and tighten cylinder head bolts with washers.

- **Tightening procedure.**

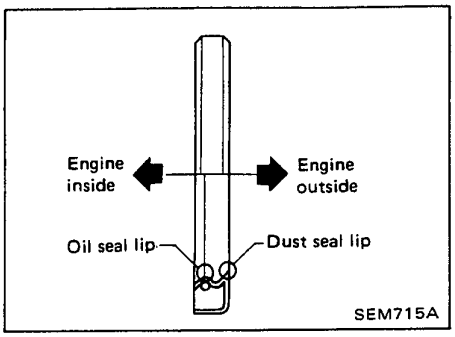
1st Tighten all bolts to 29 N·m (3.0 kg-m, 22 ft-lb).
2nd Tighten all bolts to 103 N·m (10.5 kg-m, 76 ft-lb).
3rd Loosen all bolts completely.
4th Tighten all bolts to 29 N·m (3.0 kg-m, 22 ft-lb).
5th Tighten all bolts to 103 N·m (10.5 kg-m, 76 ft-lb) or if you have an angle wrench, tighten bolts 85 to 90 degrees clockwise.



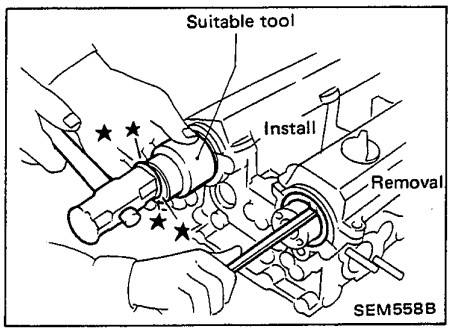
3. Confirm that No. 1 cylinder is set at T.D.C. on its compression stroke.



4. Install timing belt and adjust belt tension.
Refer to "TIMING BELT-Installation".
5. Install front timing belt covers and other remaining parts.



OIL SEAL INSTALLING DIRECTION

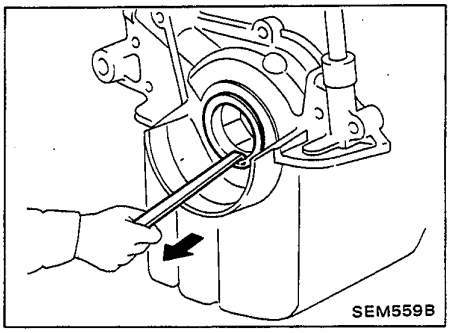


CAMSHAFT OIL SEAL

1. Set No. 1 piston at T.D.C. on its compression stroke.
2. Remove crank angle sensor, front cover, timing belt, camshaft sprockets and rear dust cover.
3. Remove camshaft oil seal.

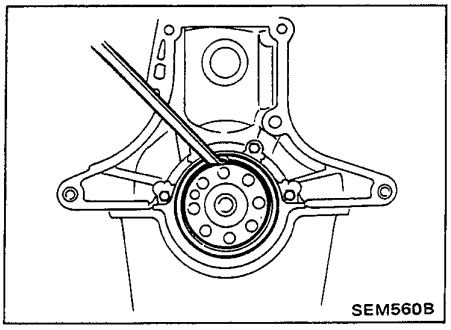
Be careful not to scratch camshaft.

4. Apply engine oil to camshaft oil seal lip and install it in place.



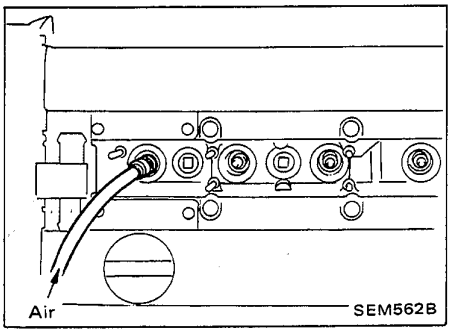
FRONT OIL SEAL

1. Set No. 1 piston at T.D.C. on its compression stroke.
2. Remove timing belt and crankshaft sprocket.
3. Remove front oil seal.
4. Apply engine oil to oil seal lip and install it in place using suitable tool.



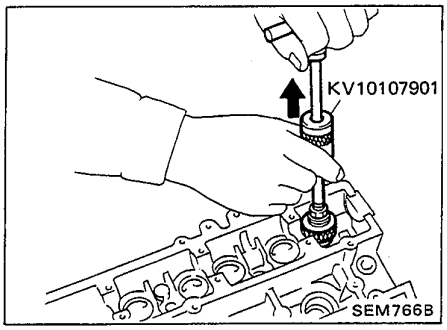
REAR OIL SEAL

1. Remove transaxle and flywheel.
2. Remove rear oil seal from the retainer.
3. Apply engine oil to oil seal lip and install it in place using suitable tool.

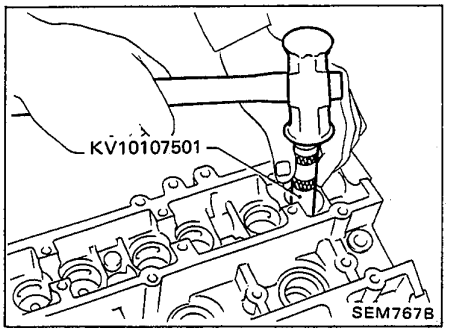


VALVE OIL SEAL

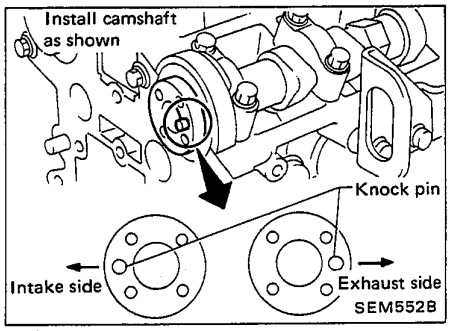
1. Remove throttle chamber and rocker covers.
2. Remove camshafts and valve lifters.
3. Remove spark plug.
4. Install air hose adapter into spark plug hole and apply air pressure to hold valves in place. [Apply pressure of 490 kPa (5 kg/cm^2, 71 psi)].



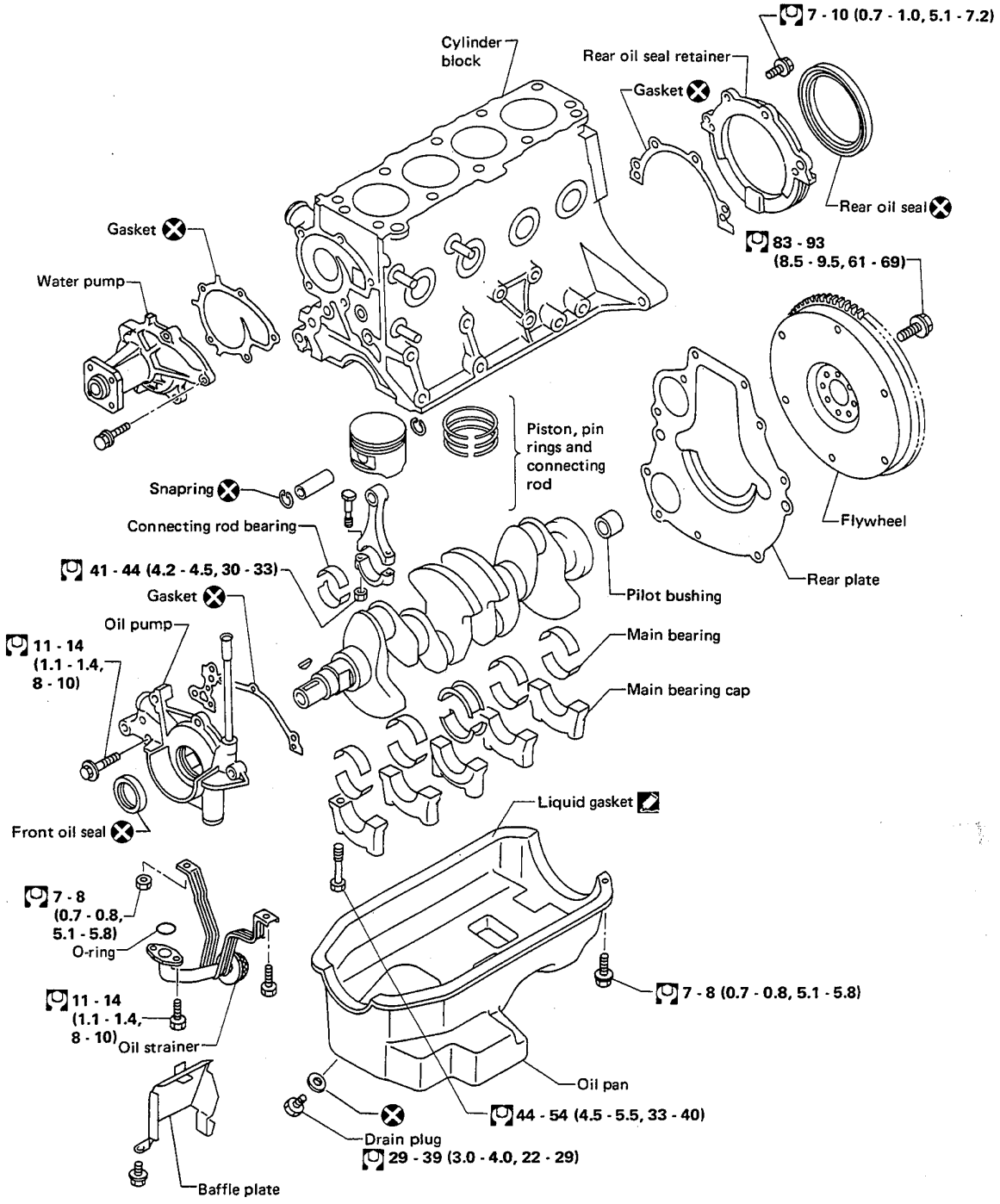
5. Remove valve springs and valve oil seals.



6. Apply engine oil to valve oil seal and install it in place.



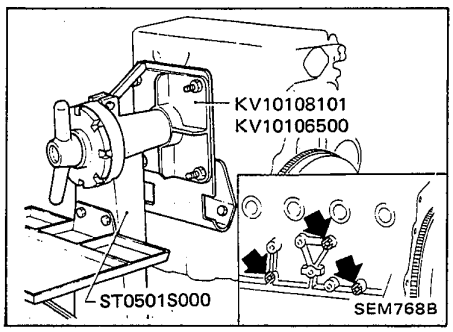
7. Assemble valve mechanism, camshafts and timing belt.
8. Reinstall remaining parts.



When installing sliding parts such as bearings, be sure to apply engine oil on the sliding surfaces.

: N·m (kg-m, ft-lb)

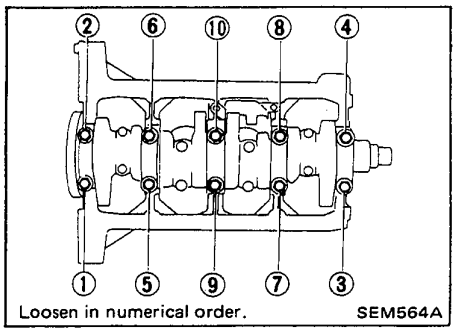
SEM564B



PISTON AND CRANKSHAFT

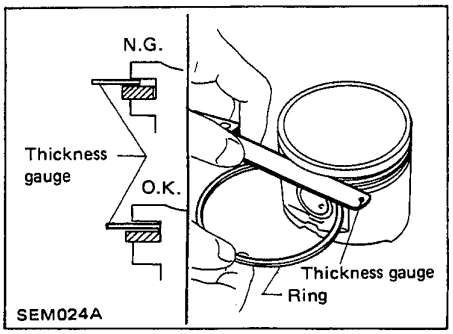
1. Place engine on work stand.
2. Drain coolant and oil.
3. Remove timing belt.
4. Remove water pump.
5. Remove oil pan and oil pump.
6. Remove cylinder head.
7. Remove pistons.

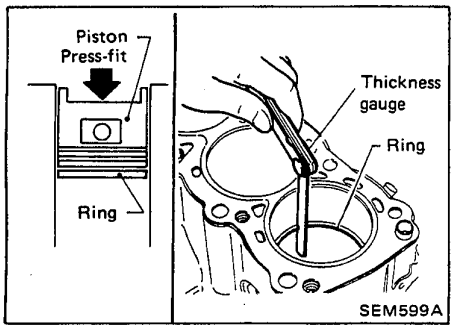
When disassembling piston and connecting rod, heat piston to 60 to 70°C (140 to 158°F) or use piston pin press stand at room temperature.



8. Remove bearing caps and crankshaft.

Place the bearings and caps in their proper order.
Upper bearings (Cylinder block side) have oil groove.





PISTON AND PISTON PIN CLEARANCE

1. Measure outer diameter of piston pin and inner diameter of piston pin hole.
2. Calculate piston to piston pin clearance.

Pin diameter:
19.989 - 20.001 mm (0.7870 - 0.7874 in)
Pin hole diameter:
19.987 - 19.999 mm (0.7869 - 0.7874 in)
Clearance:
–0.004 to 0 mm (–0.0002 to 0 in)
(Interference fit)

PISTON RING SIDE CLEARANCE

Side clearance:
Top ring
0.040 - 0.073 mm (0.0016 - 0.0029 in)
2nd ring
0.030 - 0.063 mm (0.0012 - 0.0025 in)
Oil ring
0.025 - 0.085 mm (0.0010 - 0.0033 in)
Max. limit of side clearance (Top and 2nd rings):
0.1 mm (0.004 in)

PISTON RING GAP

Standard ring gap:
Top ring
0.22 - 0.39 mm (0.0087 - 0.0154 in)
2nd ring
0.19 - 0.45 mm (0.0075 - 0.0177 in)
Oil ring
0.20 - 0.76 mm (0.0079 - 0.0299 in)
Max. limit of ring gap:
1.0 mm (0.039 in)

If out of specification, replace piston ring. If gap still exceeds the limit even with a new ring, rebore the cylinder and use oversize piston/piston ring assembly.

Refer to S.D.S.

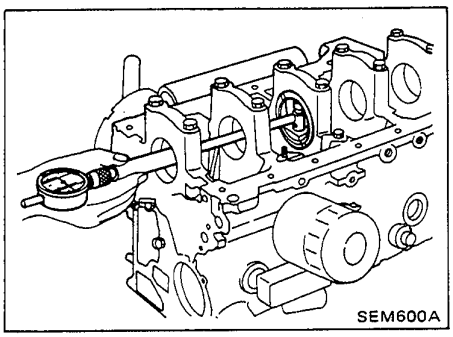
MAIN BEARING CLEARANCE

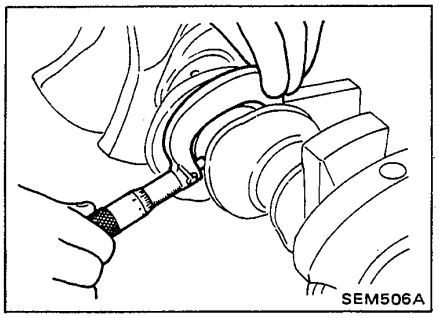
1. Install main bearings to cylinder block and main bearing cap.
2. Install main bearing cap to cylinder block.

Tighten all bolts in two or three stages.

: 44 - 54 N·m (4.5 - 5.5 kg-m, 33 - 40 ft-lb)

3. Measure inside diameter "A" of main journal.



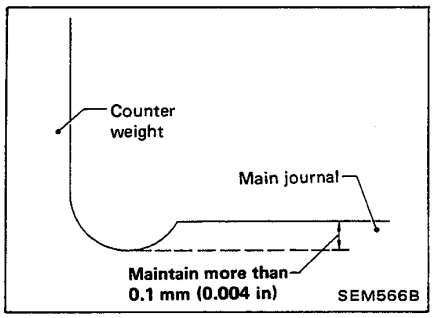


4. Measure outside diameter "Dm" of main journal of crankshaft.

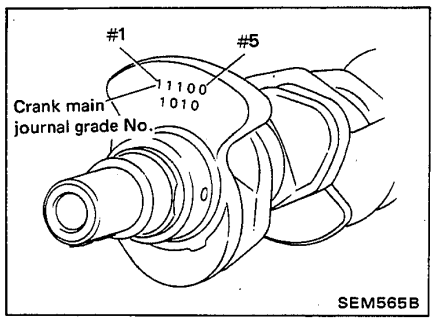
Journal diameter:
52.951 - 52.975 mm (2.0847 - 2.0856 in)

5. Calculate main bearing clearance.
Main bearing clearance = A – Dm
Standard: 0.021 - 0.048 mm (0.0008 - 0.0019 in)
Limit: 0.1 mm (0.004 in)

- If it exceeds the limit, replace the bearing.

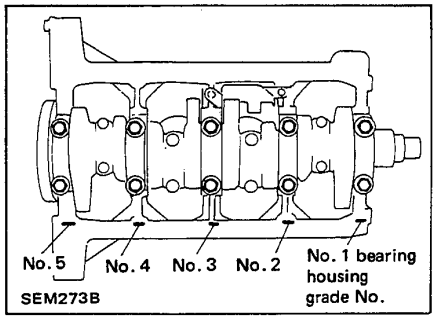


- If it still exceeds the limit even with a new bearing, regrind crank journal and use undersized bearings to maintain the specified oil clearance.
- **Refer to S.D.S. for regrinding crankshaft diameter and available service parts.**
- **When regrinding crank journal, do not grind fillet-roll.**



- **If either bearing, crankshaft or cylinder block is replaced with new one, select main bearing according to the following table.**

		Main bearing housing grade number		
		0	1	2
		Main bearing grade number		
Crankshaft main journal grade number	0	0	1	2
	1	1	2	3
	2	2	3	4



Identification color:
Grade 0: Black
Grade 1: Brown
Grade 2: Green
Grade 3: Yellow
Grade 4: Blue

For example:
Main journal grade number: 1
Crankshaft journal grade number: 2
Main bearing grade number = 1 + 2 = 3

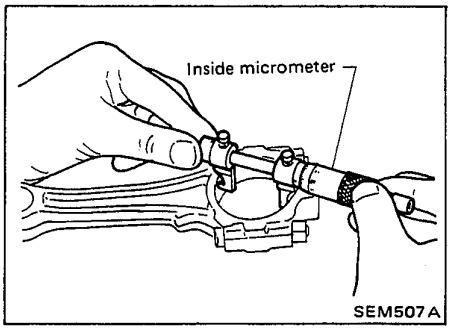
Main bearing thickness:
Refer to S.D.S.

CONNECTING ROD BEARING CLEARANCE (Big end)

1. Install connecting rod bearing to connecting rod and cap.
2. Install connecting rod cap to connecting rod.

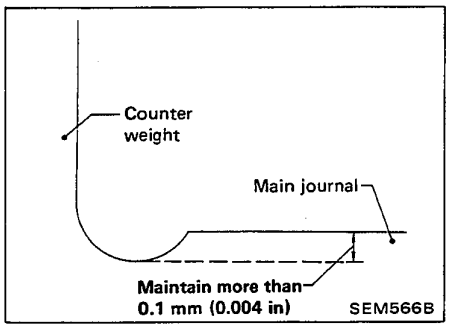
Apply oil to the thread portion of bolts and seating surface of nuts.

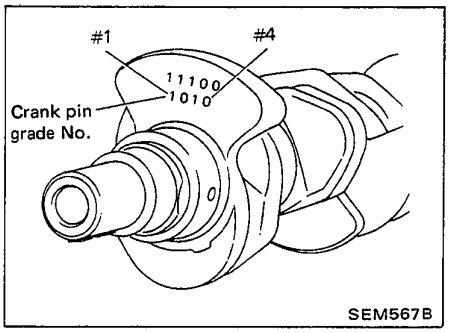
: 1st
Tighten to 14 to 16 N·m (1.4 to 1.6 kg-m, 10 to 12 ft-lb).
2nd
Tighten to 41 to 44 N·m (4.2 to 4.5 kg-m, 30 to 33 ft-lb) or if you have an angle wrench, tighten bolts 60 to 65 degrees clockwise.



3. Measure inside diameter "C" of bearing.
4. Measure outside diameter "Dp" of crankshaft pin journal.
5. Calculate connecting rod bearing clearance.
   Connecting rod bearing clearance = C — Dp
   Standard: 0.018 - 0.045 mm (0.0007 - 0.0018 in)
   Limit: 0.1 mm (0.004 in)

- If it exceeds the limit, replace the bearing.
- If it still exceeds the limit even with a new bearing, regrind crank pin and use undersized bearings to maintain the specified oil clearance.
- **Refer to S.D.S. for regrinding crankshaft pin and available service parts.**
- **When regrinding crank pin, do not grind fillet-roll.**

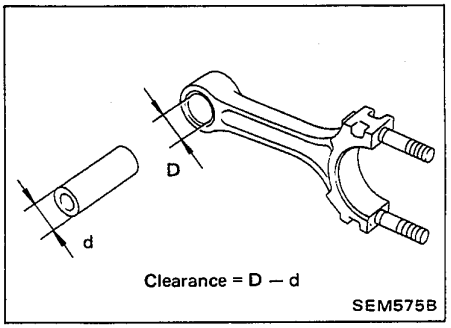




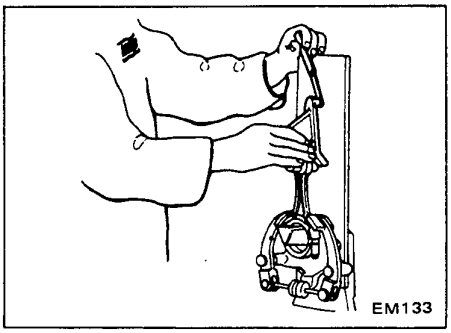
- **If either bearing, crankshaft or cylinder block is replaced with new one, select connecting rod bearing according to the following table.**

Crank pin grade number	Connecting rod bearing grade number
0	0
1	1
2	2

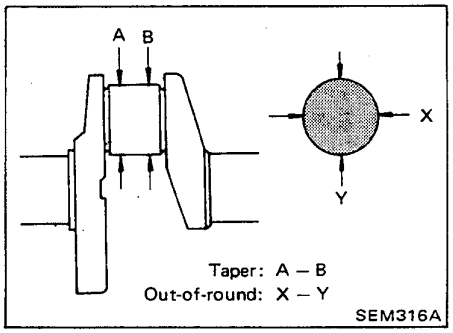
Identification color:
Grade 0: Black
Grade 1: Brown
Grade 2: Green



CONNECTING ROD BEARING CLEARANCE (Small end)
Clearance:
0.005 - 0.017 mm (0.0002 - 0.0007 in)

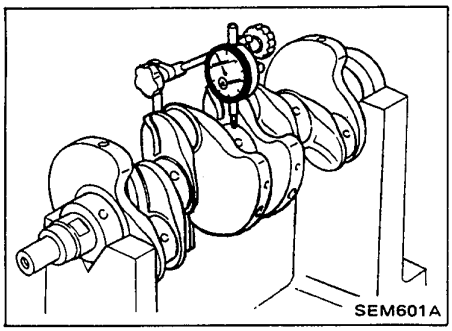


CONNECTING ROD BEND AND TORSION
Bend and torsion:
Limit 0.1 mm (0.004 in) per 100 mm (3.94 in) length

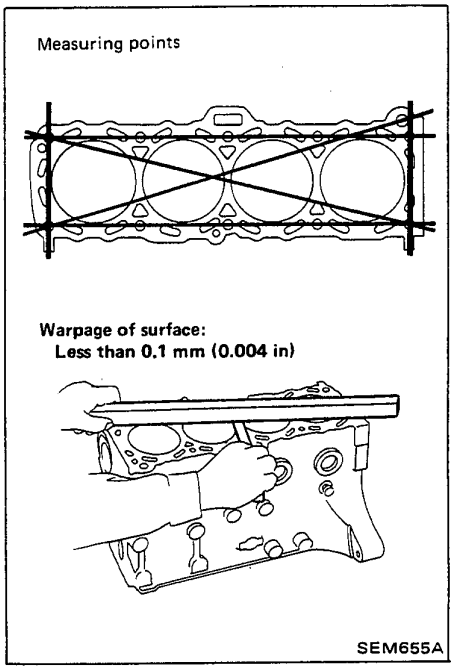


CRANKSHAFT

1. Check crankshaft journals for score, bias, wear or cracks. If faults are minor, correct with fine crocus cloth.
2. Check journals with a micrometer for taper and out-of-round.
   Out-of-round (X — Y):
   Less than 0.005 mm (0.0002 in)
   Taper (A — B):
   Less than 0.005 mm (0.0002 in)


SEM601A

3. Check crankshaft runout.
   Runout (Total indicator reading):
   Less than 0.025 mm (0.0010 in)



SEM655A

CYLINDER BLOCK DISTORTION

Clean upper face of cylinder block and measure the distortion.

Limit:
0.10 mm (0.0039 in)

If out of specification, resurface it.

The resurfacing limit of cylinder block is determined by the cylinder head resurfacing in an engine.

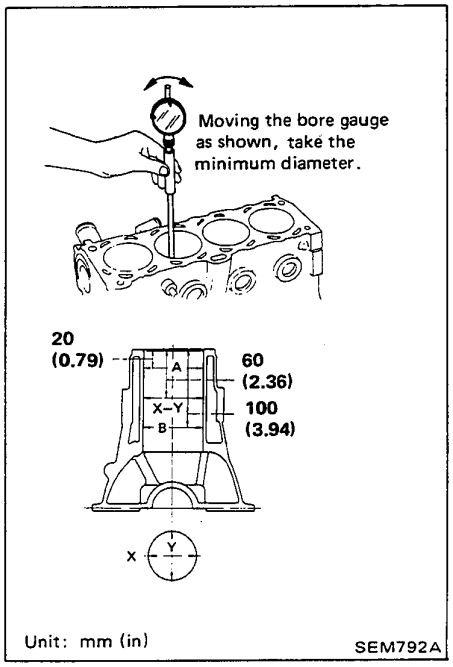
Amount of cylinder head resurfacing is "A"

Amount of cylinder block resurfacing is "B"

The maximum limit is as follows:
A + B = 0.2 mm (0.008 in)

If necessary, replace cylinder block.

Cylinder block height (Nominal):
204.75 - 204.85 mm (8.0610 - 8.0649 in)



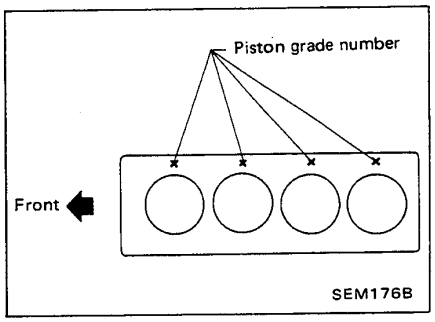
SEM792A

CYLINDER BORE

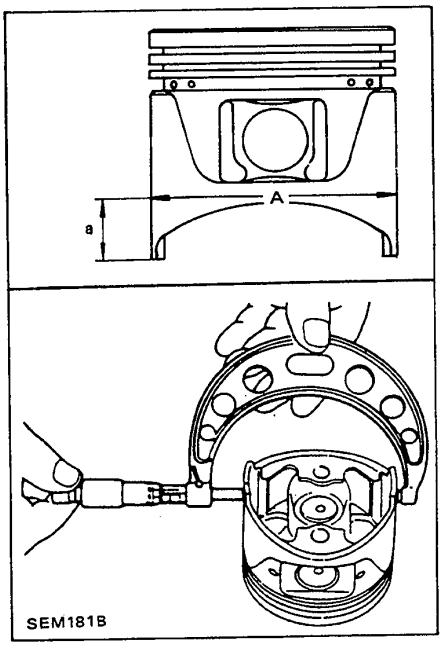
1. Using a bore gauge, measure cylinder bore for wear, out-of-round or taper.
   Standard inside diameter:
   77.95 - 78.00 mm (3.0689 - 3.0709 in)
   Wear limit:
   0.20 mm (0.0079 in)
   Out-of-round (X-Y) limit:
   0.015 mm (0.0006 in)
   Taper (A-B) limit:
   0.010 mm (0.0004 in)

   If it exceeds the limit, rebore all four cylinders. Replace cylinder block if necessary.

- Check for scratches or seizure. If seizure is found, hone it.



- **If either cylinder block or piston is replaced with new one, select the same piston as piston grade number punched on cylinder block upper surfaces.**



2. The size to which cylinders must be honed, is determined by adding piston-to-cylinder clearance to the piston skirt diameter "A".

   Dimension "a":
   Approximately 14 mm (0.55 in)

   Rebored size calculation
   D = A + B − C = A + [0.005 to 0.025 mm (0.0002 to 0.0010 in)]

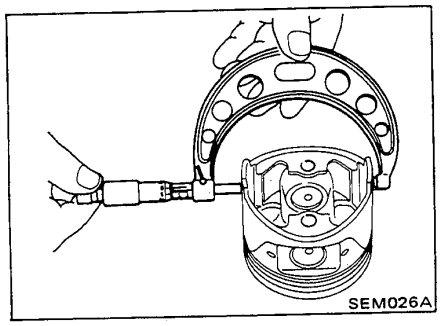
   where,
   - **D : Honed diameter**
   - **A : Skirt diameter as measured**
   - **B : Piston-to-wall clearance**
   - **C : Machining allowance 0.02 mm (0.0008 in)**

3. Install main bearing caps in place, and tighten to the specified torque to prevent distortion of the cylinder bores in final assembly.
4. Cut cylinder bores in the order of 2-4-1-3.

- **Do not cut too much out of the cylinder bore at a time. Cut only 0.05 mm (0.0020 in) or so in diameter at a time.**

5. Hone the cylinders to the required size referring to S.D.S.
6. Measure the finished cylinder bore for out-of-round and taper.

- **Measurement of a just machined cylinder bore requires utmost care since it is expanded by cutting heat.**



PISTON TO CYLINDER WALL CLEARANCE

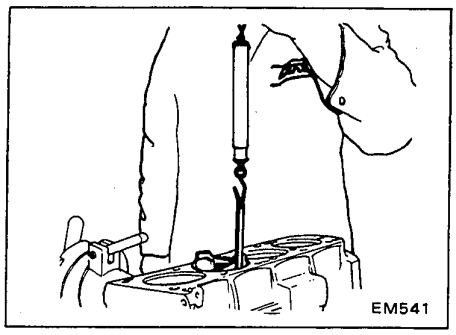
Using micrometer

1. Measure piston and cylinder bore diameter.

   Piston diameter "A":
   Refer to S.D.S.
   Measuring point "a" (Distance from the bottom):
   Approximately 14 mm (0.55 in)

2. Check that piston clearance is within the specification.

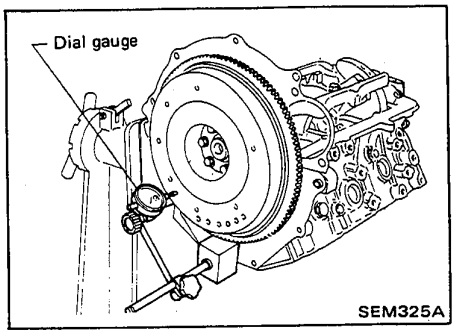
   Piston clearance:
   0.015 - 0.035 mm (0.0006 - 0.0014 in)



Using feeler gauge

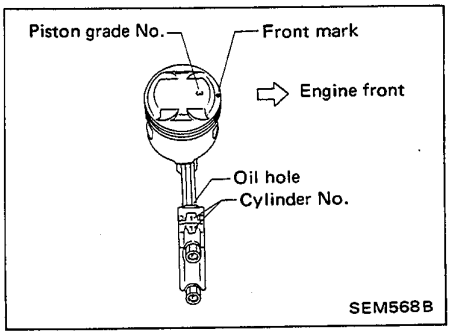
Measure the extracting force by pulling feeler gauge straight upward.

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)



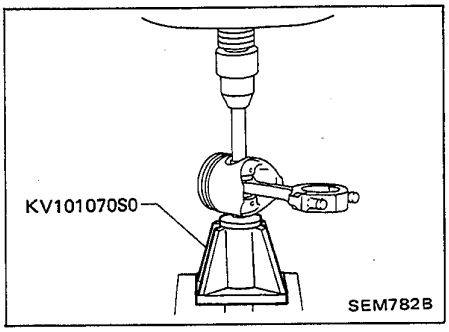
FLYWHEEL RUNOUT

Runout (Total indicator reading):
Less than 0.15 mm (0.0059 in)

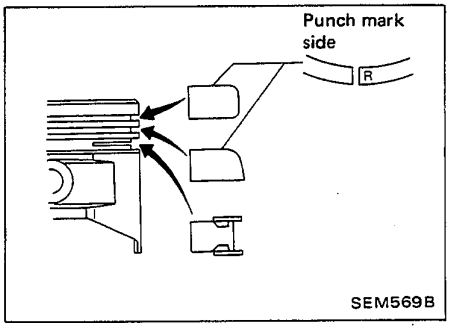


PISTON

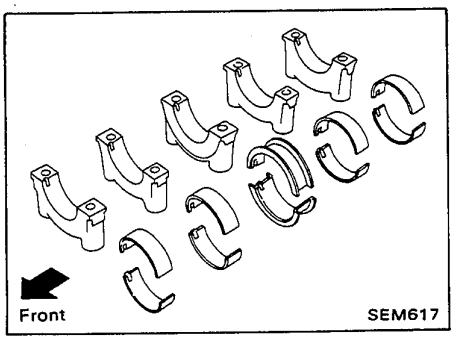
a. **Numbers stamped on the connecting rod and cap correspond to each cylinder. Care should be taken to avoid a wrong combination including bearing and connecting rod direction.**



b. **When pressing piston pin in connecting rod, apply engine oil to pin and small end of connecting rod.**
c. **After assembling, ascertain that piston swings smoothly.**



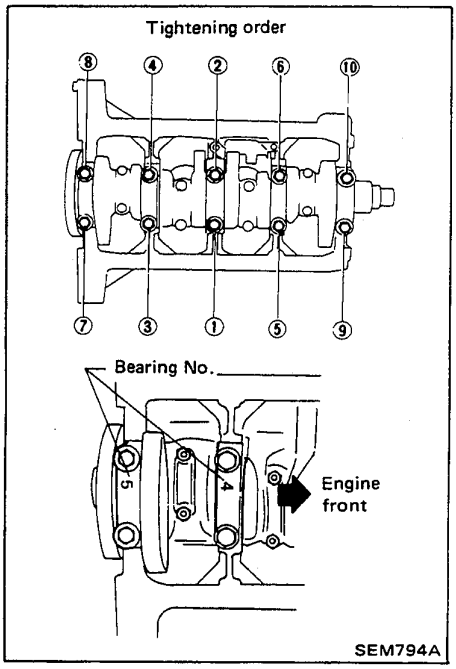
- Install piston rings.



CRANKSHAFT

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

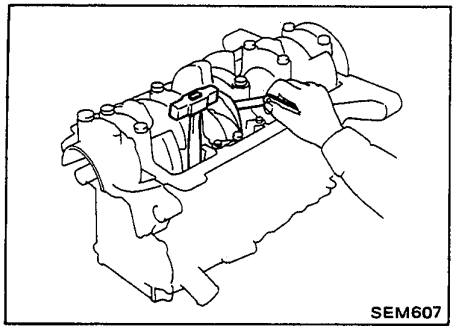
- **If either crankshaft, cylinder block or main bearing is reused again, it is necessary to measure main bearing clearance.**
- **Upper bearings (Cylinder block side) have oil groove.**



2. Apply engine oil to main bearing surfaces on both sides of cylinder block and cap.
3. Install crankshaft and main bearing caps and tighten bolts to specified torque.

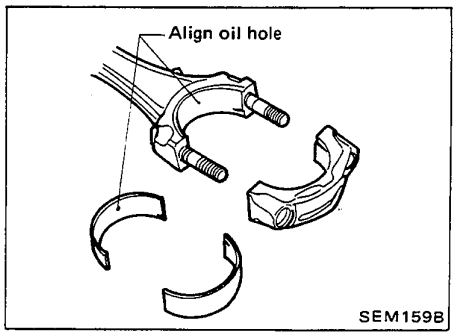
   : **Main bearing cap bolt**
   44 - 54 N·m
   (4.5 - 5.5 kg-m, 33 - 40 ft-lb)

- **Arrange the parts so that the indicated number on bearing cap is in a row from the front of engine.**
- **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 or three stages and outwardly from center bearing in sequence.**
- **After securing bearing cap bolts, ascertain that crankshaft turns smoothly.**



4. Measure crankshaft free end play at center bearing.

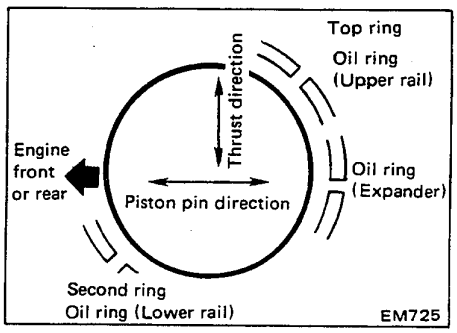
   Crankshaft free end play:
   Standard
   0.05 - 0.18 mm (0.0020 - 0.0071 in)
   Limit
   0.30 mm (0.0118 in)



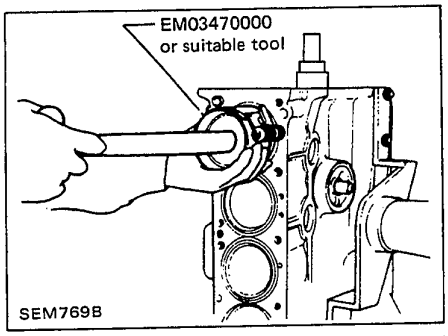
PISTON WITH CONNECTIONS ROD

1. Install connecting rod bearings in the connecting rods and connecting rod caps.

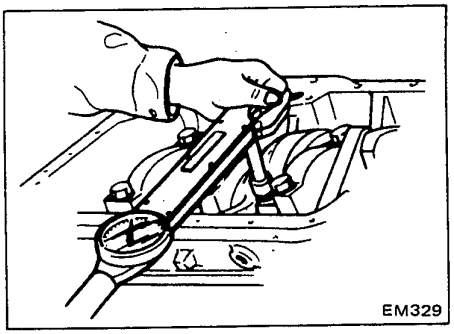
- Confirm that correct size of bearings are used. **Refer to "Inspection" of this section.**
- Install the bearings so that the oil hole in the connecting rod aligns with the oil hole of the bearing.



- **Set piston ring as shown.**



2. Install pistons with connecting rods.
(1) Install them into corresponding cylinder using Tool.
- **Be careful not to scratch cylinder wall by connecting rod.**
- **Apply engine oil to cylinder wall, piston and bearing.**
- **Arrange so that the front mark on piston head faces to the front of engine.**



(2) Install connecting rod bearing caps.
- **Tighten in two stages.**

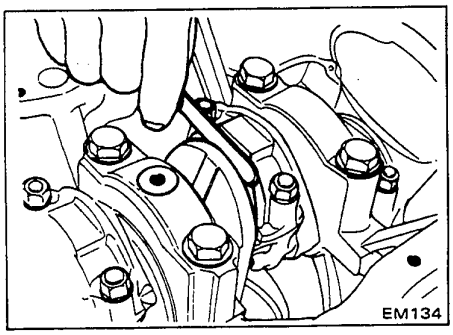
: Connecting rod bearing nut

1st

Tighten to 14 to 16 N·m (1.4 to 1.6 kg-m, 10 to 12 ft-lb).

2nd

Tighten to 41 to 44 N·m (4.2 to 4.5 kg-m, 30 to 33 ft-lb) or if you have an angle wrench, tighten bolts 60 to 65 degrees clockwise.



3. Measure connecting rod side clearance.

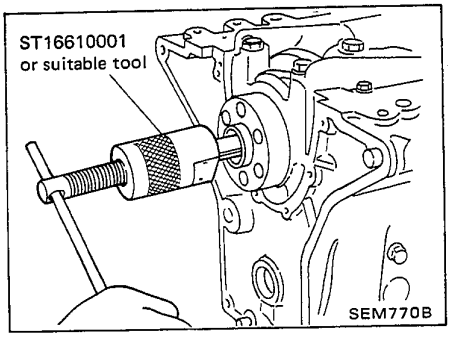
Connecting rod side clearance (Big end play):

Standard

0.20 - 0.35 mm (0.0079 - 0.0138 in)

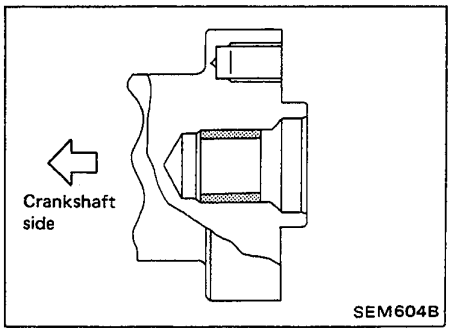
Limit

0.4 mm (0.016 in)



REPLACING PILOT BUSHING

1. Remove pilot bushing.



2. Install pilot bushing.

General Specifications

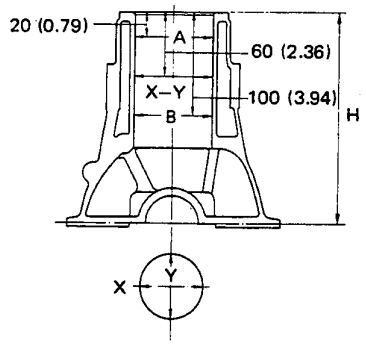
Engine model	CA16DE
Cylinder arrangement	4, in-line
Displacement cm^3 (cu in)	1,598 (97.51)
Bore x stroke mm (in)	78.0 x 83.6 (3.071 x 3.291)
Valve arrangement	D.O.H.C.
Firing order	1-3-4-2
Number of piston rings Compression	2
Oil	1
Number of main bearings	5
Compression ratio	10.0

Unit: kPa (kg/cm^2, psi)/rpm

Compression pressure Standard	1,373 (14.0, 199)/350
Minimum	1,177 (12.0, 171)/350
Differential limit between cylinders	98 (0.98, 1.0, 14)/350

Inspection and Adjustment

CYLINDER BLOCK



SEM528A

Unit: mm (in)

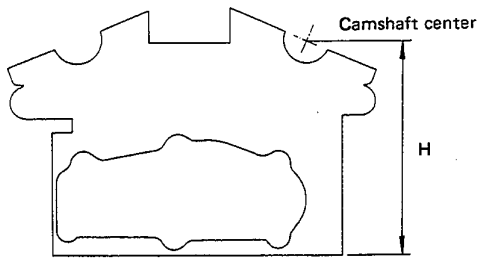
			Standard	Limit
			CA16DE	
Distortion			0.03 (0.0012)	0.1 (0.004)
Cylinder bore	Inner diameter	Grade 1	77.950 - 77.960 (3.0689 - 3.0693)	0.2 (0.008)*
		Grade 2	77.960 - 77.970 (3.0693 - 3.0697)	
		Grade 3	77.970 - 77.980 (3.0697 - 3.0701)	
		Grade 4	77.980 - 77.990 (3.0701 - 3.0705)	
		Grade 5	77.990 - 78.000 (3.0705 - 3.0709)	
	Out-of-round (X-Y)		Less than 0.015 (0.0006)	–
	Taper (A-B)		Less than 0.010 (0.0004)	–
Difference in inner diameter between cylinders			Less than 0.05 (0.0020)	0.2 (0.008)
Piston-to-cylinder clearance			0.015 - 0.035 (0.0006 - 0.0014)	–
Feeler gauge extracting force [With gauge thickness 0.04 mm (0.0016 in)]		N (kg, lb)	2.0 - 14.7 (0.2 - 1.5, 0.4 - 3.3)	–
Cylinder block height (From crankshaft center)		CA16DE	204.75 - 204.85 (8.0610 - 8.0649)	0.2 (0.008)**

* Wear limit

** Total amount of cylinder head resurfacing and cylinder block resurfacing.

Inspection and Adjustment (Cont'd)

CYLINDER HEAD



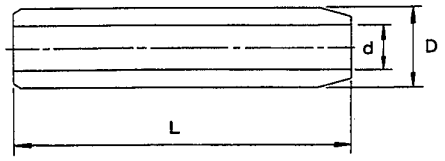
SEM570B

Unit: mm (in)

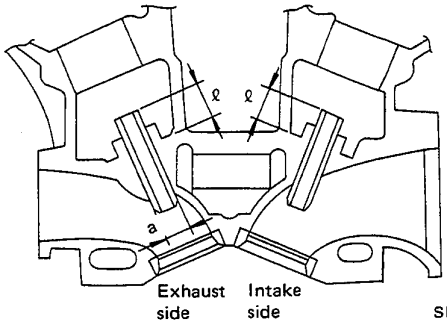
	Standard	Limit
Height (H)	125.9 - 126.1 (4.957 - 4.965)	0.2 (0.008)*
Surface distorsion	0.03 (0.0012)	0.1 (0.004)

*: Total amount of cylinder head resurfacing and cylinder block resurfacing

VALVE GUIDE



SEM571B

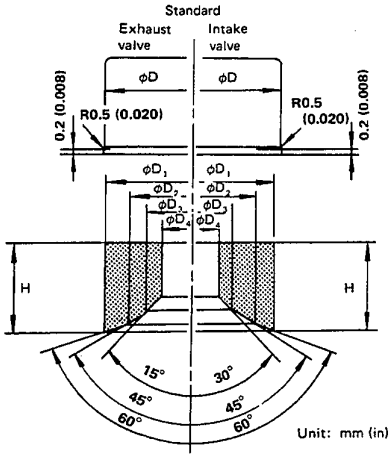


SEM572B

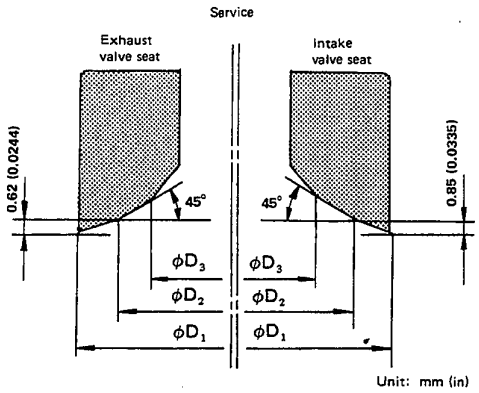
Unit: mm (in)

	Standard		Service		Limit
	Intake	Exhaust	Intake	Exhaust	–
Length (L)	40.1 (1.579)	43.1 (1.697)	40.1 (1.579)	40.1 (1.579)	–
Outer diameter (D)	10.023 - 10.034 (0.3946 - 0.3950)		10.223 - 10.234 (0.4025 - 0.4029)		–
Inner diameter (d) (Finished size)	6.000 - 6.018 (0.2362 - 0.2369)				–
Cylinder head hole diameter (a)	9.960 - 9.978 (0.3921 - 0.3928)	9.975 - 9.996 (0.3927 - 0.3935)	10.185 - 10.196 (0.4010 - 0.4014)		–
Interference fit	0.045 - 0.074 (0.0018 - 0.0029)	0.027 - 0.059 (0.0011 - 0.0023)	0.027 - 0.049 (0.0011 - 0.0019)		–
Stem to guide clearance	0.020 - 0.053 (0.0008 - 0.0021)	0.040 - 0.073 (0.0016 - 0.0029)	0.020 - 0.053 (0.0008 - 0.0209)	0.040 - 0.073 (0.0016 - 0.0029)	0.1 (0.004)
Tapping length (ℓ)	15.1 - 15.3 (0.594 - 0.602)				–

Inspection and Adjustment (Cont'd)



SEM573B



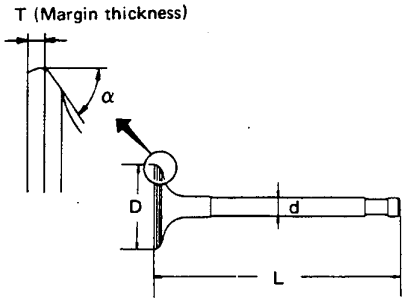
SEM542B

Unit: mm (in)

	Standard		Service	
	Intake	Exhaust	Intake	Exhaust
Cylinder head seat recess diameter (D)	34.000 - 34.016 (1.3386 - 1.3392)	30.000 - 30.016 (1.1811 - 1.1817)	34.500 - 34.516 (1.3583 - 1.3589)	30.500 - 30.516 (1.2008 - 1.2014)
Valve seat outer diameter (D_1)	34.080 - 34.096 (1.3417 - 1.3424)	30.080 - 30.096 (1.1842 - 1.1849)	34.580 - 34.596 (1.3614 - 1.3620)	30.580 - 30.596 (1.2039 - 1.2046)
Face outer diameter (D_2)	30.6 - 30.8 (1.205 - 1.213)	27.4 - 27.6 (1.079 - 1.087)	30.6 - 30.8 (1.205 - 1.213)	27.4 - 27.6 (1.079 - 1.087)
Face inner diameter (D_3)	28.5 (1.122)	24.9 (0.980)	28.5 (1.122)	25.0 (0.984)
Valve seat inner diameter (D_4)	27.0 (1.063)	23.0 (0.906)	27.0 (1.063)	23.0 (0.906)
Height (H)	5.9 - 6.0 (0.232 - 0.236)	6.4 - 6.5 (0.252 - 0.256)	5.1 - 5.2 (0.201 - 0.205)	5.75 - 5.85 (0.226 - 0.230)

Inspection and Adjustment (Cont'd)

VALVE



SEM188A

Unit: mm (in)

Engine model		CA16DE	Limit
Valve head diameter (D)	In.	31.0 - 31.2 (1.220 - 1.228)	–
	Ex.	28.0 - 28.2 (1.102 - 1.110)	–
Valve length (L)	In.	89.0 - 89.2 (3.504 - 3.512)	–
	Ex.	89.2 - 89.4 (3.512 - 3.520)	–
Valve stem diameter (d)	In.	5.965 - 5.980 (0.2348 - 0.2354)	–
	Ex.	5.945 - 5.960 (0.2341 - 0.2346)	–
Valve face angle (α)	In.	45°30′	–
	Ex.	45°30′	–
Valve head margin (T)	In.	1.3 (0.051)	0.5 (0.020)
	Ex.	1.5 (0.059)	

VALVE SPRING

Unit: mm (in)

	Standard	Limit
Free height (H)	43.1 (1.697)	–
Spring constant N/mm (kg/mm, lb/in)	28.4 (2.9, 162)	–
Out of square (S)	–	1.8 (0.071)

Valve spring pressure load

Compression length mm (in)	Load N (kg, lb)
0 (0)	0 (0,0)
8 (0.31)	Approx. 235 (24, 53)
16.5 (0.650)	Approx. 539 (55, 121)

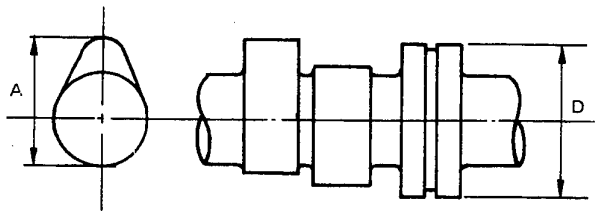
HYDRAULIC VALVE LIFTER

Unit: mm (in)

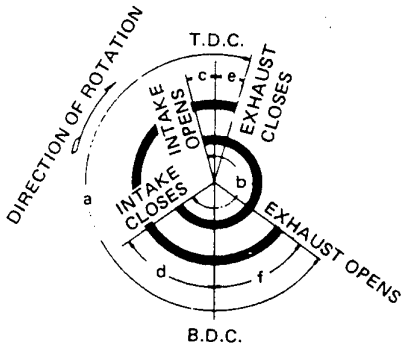
Valve lifter diameter	30.955 - 30.965 (1.2187 - 1.2191)
Lifter guide bore diameter	31.000 - 31.013 (1.2205 - 1.2210)

Inspection and Adjustment (Cont'd)

CAMSHAFT AND CAMSHAFT BEARING



SEM568A



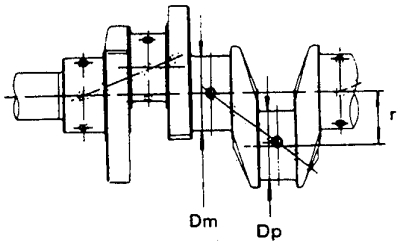
EM120

Unit: mm (in)

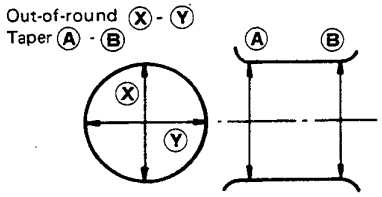
Engine model		CA16DE	
		Standard	Limit
Cam height (A)	In.	40.485 - 40.515 (1.5939 - 1.5951)	–
	Ex.	40.485 - 40.515 (1.5939 - 1.5951)	–
Valve lift (h)	In.	8.5 (0.335)	–
	Ex.	8.5 (0.335)	–
Wear limit of cam height		–	0.2 (0.008)
Camshaft journal to bearing clearance		0.045 - 0.090 (0.0018 - 0.0035)	0.15 (0.0059)
Inner diameter of camshaft bearing		28.000 - 28.025 (1.1024 - 1.1033)	–
Outer diameter of camshaft journal (D)		27.935 - 27.955 (1.0998 - 1.1006)	–
Camshaft runout		–	0.05 (0.0020)
Camshaft end play		0.07 - 0.15 (0.0028 - 0.0059)	0.2 (0.008)
Valve timing (Degree on crankshaft)	a	248	–
	b	248	–
	c	15	–
	d	53	–
	e	9	–
	f	59	–

Inspection and Adjustment (Cont'd)

CRANKSHAFT



EM737



EM715

Unit: mm (in)

Engine model	CA16DE	
Main journal diameter (Dm)	52.951 - 52.975 (2.0847 - 2.0856)	
Pin journal diameter (Dp)	44.954 - 44.974 (1.7698 - 1.7706)	
Center distance (r)	41.77 - 41.83 (1.6445 - 1.6468)	
	Standard	Limit
Taper of journal and pin (Ⓐ - Ⓑ)	–	0.005 (0.0002)
Out-of-round of journal and pin (Ⓧ - Ⓨ)	–	0.005 (0.0002)
Runout [T.I.R.] *	–	0.025 (0.0010)
Free end play	0.05 - 0.18 (0.0020 - 0.0071)	0.3 (0.012)

* Total indicator reading

Inspection and Adjustment (Cont'd)

BEARING CLEARANCE

Unit: mm (in)

	Standard	Limit
Main bearing clearance	0.021 - 0.048 (0.0008 - 0.0019)	0.1 (0.004)
Connecting rod bearing clearance	0.018 - 0.045 (0.0007 - 0.0018)	0.1 (0.004)

AVAILABLE MAIN BEARING

Standard

Grade number	Thickness mm (in)	Identification color
0	1.825 - 1.829 (0.0719 - 0.0720)	Black
1	1.829 - 1.833 (0.0720 - 0.0722)	Brown
2	1.833 - 1.837 (0.0722 - 0.0723)	Green
3	1.837 - 1.841 (0.0723 - 0.0725)	Yellow
4	1.841 - 1.845 (0.0725 - 0.0726)	Blue

Undersize (service)

Unit: mm (in)

	Thickness	Main journal diameter "Dm"
0.25 (0.0098)	1.947 - 1.960 (0.0767 - 0.0772)	Grind so that bearing clearance is the specified value.

AVAILABLE CONNECTING ROD BEARING

Standard

Grade number	Thickness mm (in)	Identification color
0	1.501 - 1.504 (0.0591 - 0.0592)	–
1	1.504 - 1.507 (0.0592 - 0.0593)	Brown
2	1.507 - 1.510 (0.0593 - 0.0594)	Green

Undersize (service)

Unit: mm (in)

	Thickness	Crank pin journal diameter "Dp"
0.08 (0.0031)	1.540 - 1.548 (0.0606 - 0.0609)	Grind so that bearing clearance is the specified value.
0.12 (0.0047)	1.560 - 1.568 (0.0614 - 0.0617)	
0.25 (0.0098)	1.625 - 1.633 (0.0640 - 0.0643)	

MISCELLANEOUS COMPONENTS

Unit: mm (in)

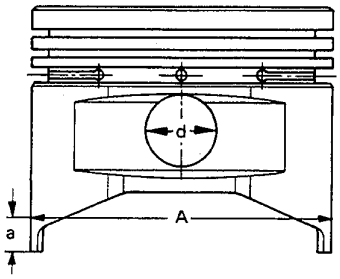
Camshaft sprocket runout [T.I.R.] *	Less than 0.1 (0.004)
Flywheel runout [T.I.R.] *	Less than 0.15 (0.0059)

* Total indicator reading

Inspection and Adjustment (Cont'd)

PISTON, PISTON RING AND PISTON PIN

Piston



SEM569A

Unit: mm (in)

Engine model			CA16DE
Piston skirt diameter (A)	Standard	Grade No. 1	77.925 - 77.935 (3.0679 - 3.0683)
		Grade No. 2	77.935 - 77.945 (3.0683 - 3.0687)
		Grade No. 3	77.945 - 77.955 (3.0687 - 3.0691)
		Grade No. 4	77.955 - 77.965 (3.0691 - 3.0695)
		Grade No. 5	77.965 - 77.975 (3.0695 - 3.0699)
	Service (Oversize)	0.5 (0.020)	78.425 - 78.475 (3.0876 - 3.0896)
		1.0 (0.039)	78.925 - 78.975 (3.1073 - 3.1092)
Dimension (a)			Approximately 14 (0.55)
Piston pin hole diameter (d)			19.987 - 19.999 (0.7869 - 0.7874)
Piston-to-cylinder bore clearance			0.015 - 0.035 (0.0006 - 0.0014)

Piston pin

Unit: mm (in)

	CA16DE
Piston pin outer diameter	19.989 - 20.001 (0.7870 - 0.7874)
Interference fit of piston pin to piston pin hole clearance	0 - 0.004 (0 - 0.0002)
Piston pin to connecting rod bearing clearance	0.005 - 0.017 (0.0002 - 0.0007)

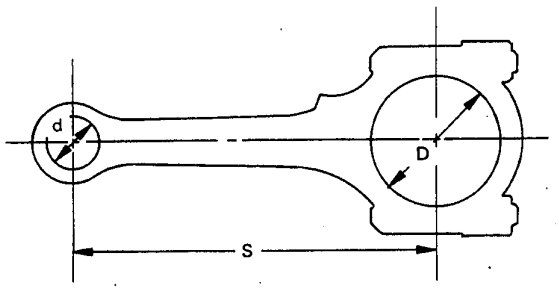
Piston ring

Unit: mm (in)

		Standard	Limit
Side clearance	Top	0.040 - 0.073 (0.0016 - 0.0029)	0.1 (0.004)
	2nd	0.030 - 0.063 (0.0012 - 0.0025)	0.1 (0.004)
	Oil	0.025 - 0.085 (0.0010 - 0.0033)	0.1 (0.004)
Ring gap	Top	0.22 - 0.39 (0.0087 - 0.0154)	1.0 (0.039)
	2nd	0.19 - 0.45 (0.0075 - 0.0177)	1.0 (0.039)
	Oil (rail ring)	0.20 - 0.76 (0.0079 - 0.0299)	1.0 (0.039)

Inspection and Adjustment (Cont'd)

CONNECTING ROD



SEM570A

Unit: mm (in)

Engine model	CA16DE	
	Standard	Limit
Center distance (S)	132.95 - 133.05 (5.2342 - 5.2382)	–
Bend [per 100 mm (3.94 in)]	–	0.1 (0.004)
Torsion [per 100 mm (3.94 in)]	–	0.1 (0.004)
Piston pin bore diameter (d)*	22.987 - 23.000 (0.9050 - 0.9055)	–
Clearance between piston pin and bearing	0.005 - 0.017 (0.0002 - 0.0007)	–
Crank pin bore diameter (D)*	48.000 - 48.013 (1.8898 - 1.8903)	–
Clearance between crank pin and bearing	0.018 - 0.045 (0.0007 - 0.0018)	–
Big end play	–	0.4 (0.016)

* Without bearing

Tightening Torque

Unit	N·m	kg-m	ft-lb
ENGINE FRONT SIDE			
Timing belt tensioner nut	22 - 29	2.2 - 3.0	16 - 22
Timing belt idler pulley nut	31 - 42	3.2 - 4.3	23 - 31
Crank angle sensor	7 - 8	0.7 - 0.8	5.1 - 5.8
Crank pulley bolt	142 - 152	14.5 - 15.5	105 - 112
INTAKE SIDE			
Intake manifold to cylinder head	20 - 25	2.0 - 2.6	14 - 19
Intake manifold collector to manifold	20 - 25	2.0 - 2.6	14 - 19
E.G.R. tube nut	34 - 44	3.5 - 4.5	25 - 33
Throttle chamber	18 - 22	1.8 - 2.2	13 - 16
E.G.R. valve	18 - 23	1.8 - 2.3	13 - 17
Air regulator valve	5 - 6	0.5 - 0.6	3.6 - 4.3
EXHAUST SIDE			
Exhaust manifold to cylinder head	37 - 48	3.8 - 4.9	27 - 35
Exhaust manifold to exhaust front tube	42 - 48	4.3 - 4.9	31 - 35
O_2 sensor	18 - 24	1.8 - 2.4	13 - 17

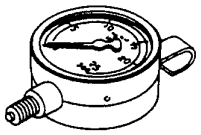
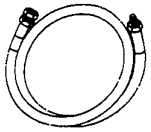
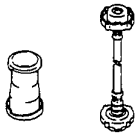
Unit	N·m	kg-m	ft-lb
ENGINE TOP SIDE			
Cylinder head bolt (Refer to CYLINDER HEAD Installation)	103	10.5	76
Camshaft pulley bolt	14 - 19	1.4 - 1.9	10 - 14
Camshaft bracket bolt	10 - 12	1.0 - 1.2	7 - 9
Spark plug	20 - 29	2.0 - 3.0	14 - 22
Water temperature sensor	20 - 29	2.0 - 3.0	14 - 22
ENGINE BOTTOM SIDE			
Main bearing cap bolt	44 - 54	4.5 - 5.5	33 - 40
Connecting rod cap bolt (Refer to ENGINE OVERHAUL)	41 - 44	4.2 - 4.5	30 - 33
Water drain plug on cylinder block	54 - 74	5.5 - 7.5	40 - 54
Oil pan	7 - 8	0.7 - 0.8	5.1 - 5.8
Oil pan drain plug	29 - 39	3.0 - 4.0	22 - 29
ENGINE REAR SIDE			
Flywheel bolt	83 - 93	8.5 - 9.5	61 - 69

ENGINE LUBRICATION & COOLING SYSTEMS

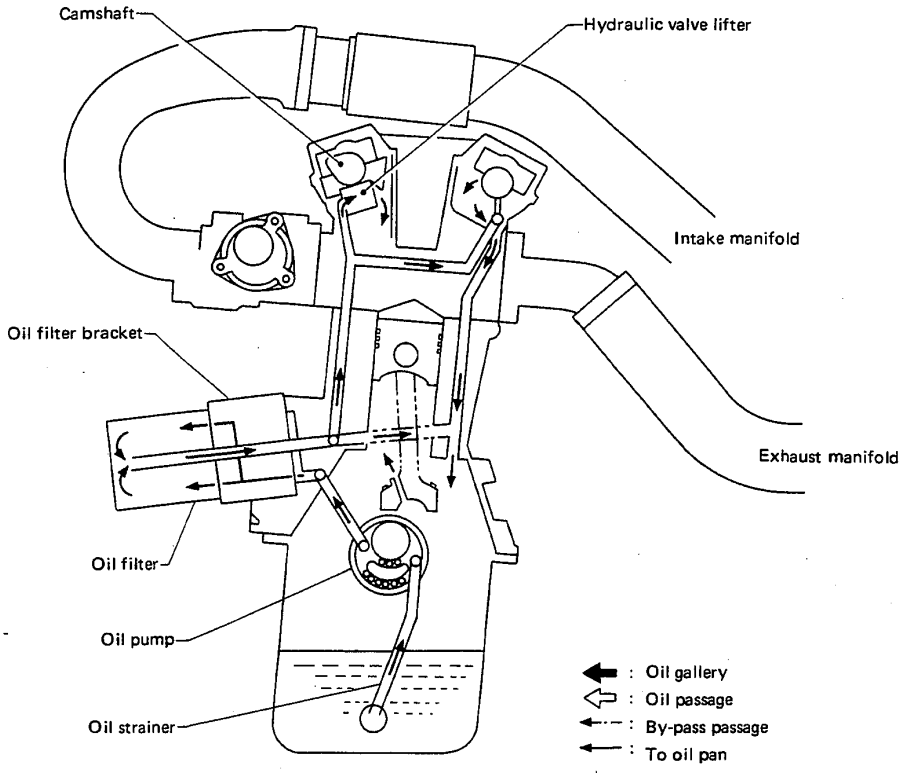
SECTION LC

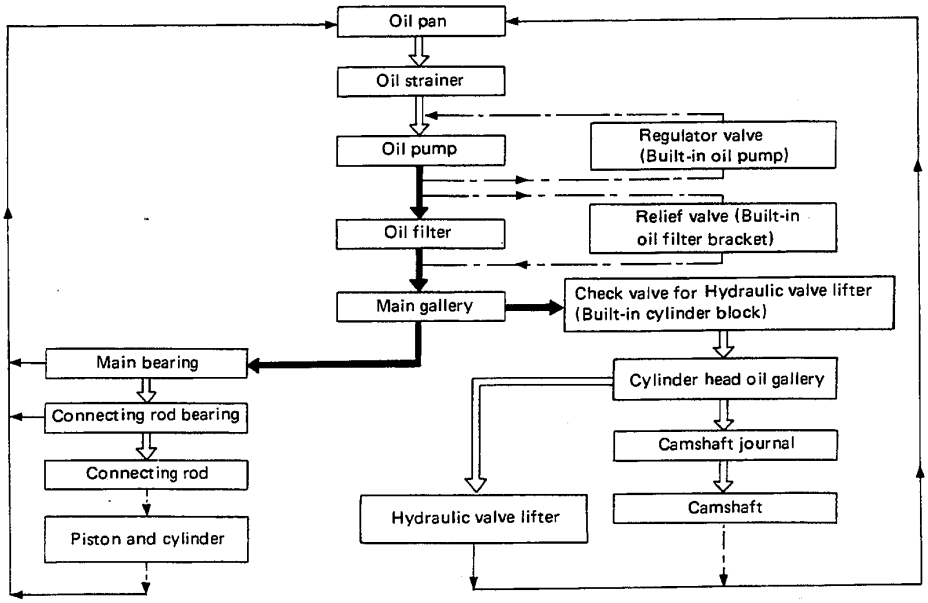
CONTENTS

SPECIAL SERVICE TOOLS

Tool number Tool name	Description	
ST25051001 Oil pressure gauge		
ST25052000 Hose		Adapting oil pressure gauge to cylinder block
EG17650301 Radiator cap tester adapter		Adapting radiator cap tester to radiator filler neck

Lubrication Circuit





SEM442B

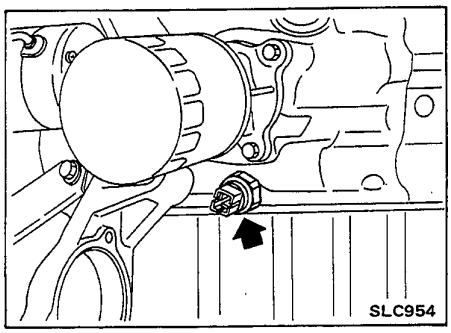
Oil Pressure Check

WARNING:

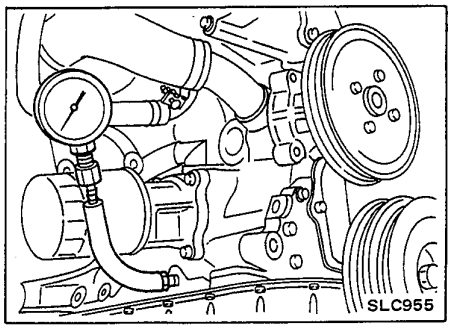
- Be careful not to burn yourself, as the engine and oil may be hot.
- Oil pressure check should be done in "Neutral" gear position.

CAUTION:

- The following data is tested using SAE 10W-30 oil and with oil temperature between 77 and 83°C (171 and 181°F). Slight difference will be found because of oil viscosity or oil temperature. If difference is extreme, check oil passage and oil pump for oil leaks.



1. Warm up engine.
2. Stop engine and remove oil pressure switch.

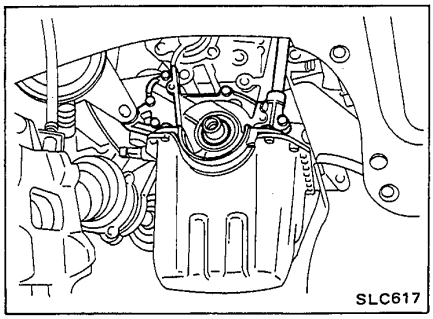


3. Install pressure gauge.
4. Start engine and check oil pressure with engine running under no-load.

Engine rpm	Approximate discharge pressure kPa (kg/cm^2, psi)
Idle speed	More than 78 (0.8, 11)
2,000	461 (4.7, 67)
6,000	588 (6.0, 85)

5. Install oil pressure switch.

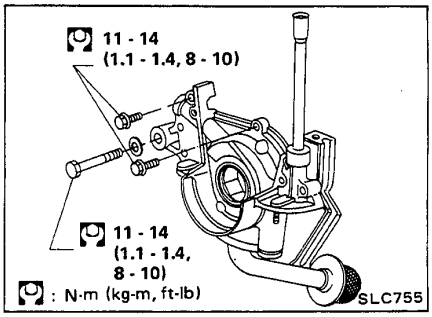
    ⓞ : **Oil pressure switch**
    10 - 16 N·m
    (1.0 - 1.6 kg-m, 7 - 12 ft-lb)



Oil Pump

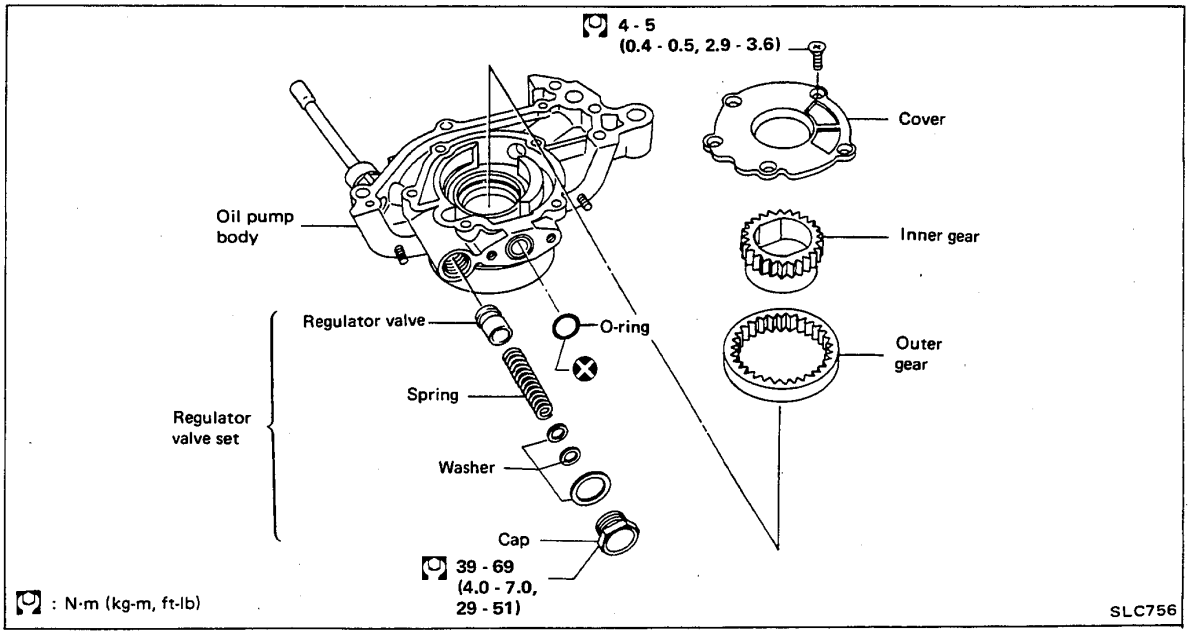
REMOVAL AND INSTALLATION

1. Remove drive belts.
2. Remove timing belt covers and timing belt.
3. Remove center member from body.
4. Remove oil pan.



5. Remove oil pump assembly with oil strainer.
6. Installation is in reverse order of removal.

DISASSEMBLY AND ASSEMBLY



- When installing oil pump, apply engine oil to inner and outer gear.
- Be sure that O-ring is properly fitted.

Oil Pump (Cont'd)

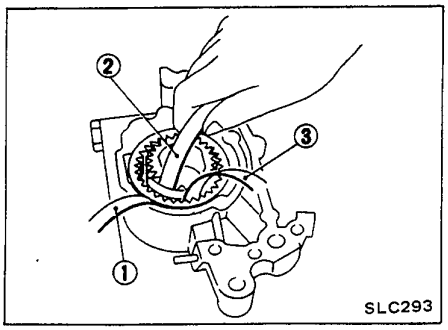
INSPECTION

Using a feeler gauge, check the following clearances.

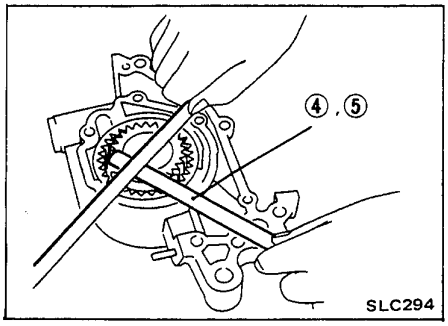
Unit: mm (in)

Body to outer gear clearance ①	0.11 - 0.20 (0.0043 - 0.0079)
Inner gear to crescent clearance ②	0.15 - 0.26 (0.0059 - 0.0102)
Outer gear to crescent clearance ③	0.21 - 0.32 (0.0083 - 0.0126)
Body to inner gear clearance ④	0.05 - 0.09 (0.0020 - 0.0035)
Body to outer gear clearance ⑤	0.05 - 0.11 (0.0020 - 0.0043)

If it exceeds the limit, replace gear set or entire oil pump assembly.



SLC293

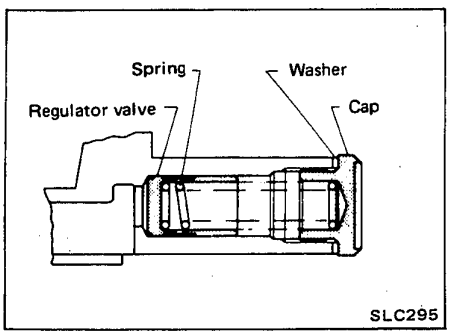


SLC294

REGULATOR VALVE INSPECTION

1. Visually inspect components for wear and damage.
2. Check oil pressure regulator valve sliding surface and valve spring.
3. Coat regulator valve with engine oil and check that it falls smoothly into the valve hole by its own weight.

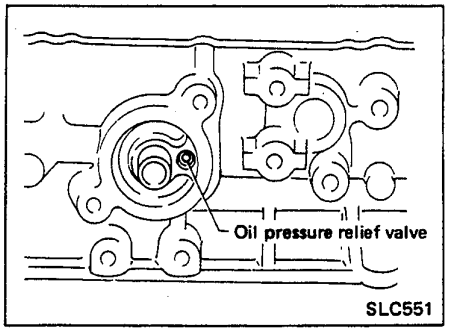
If damaged, replace regulator valve set or oil pump assembly.



SLC295

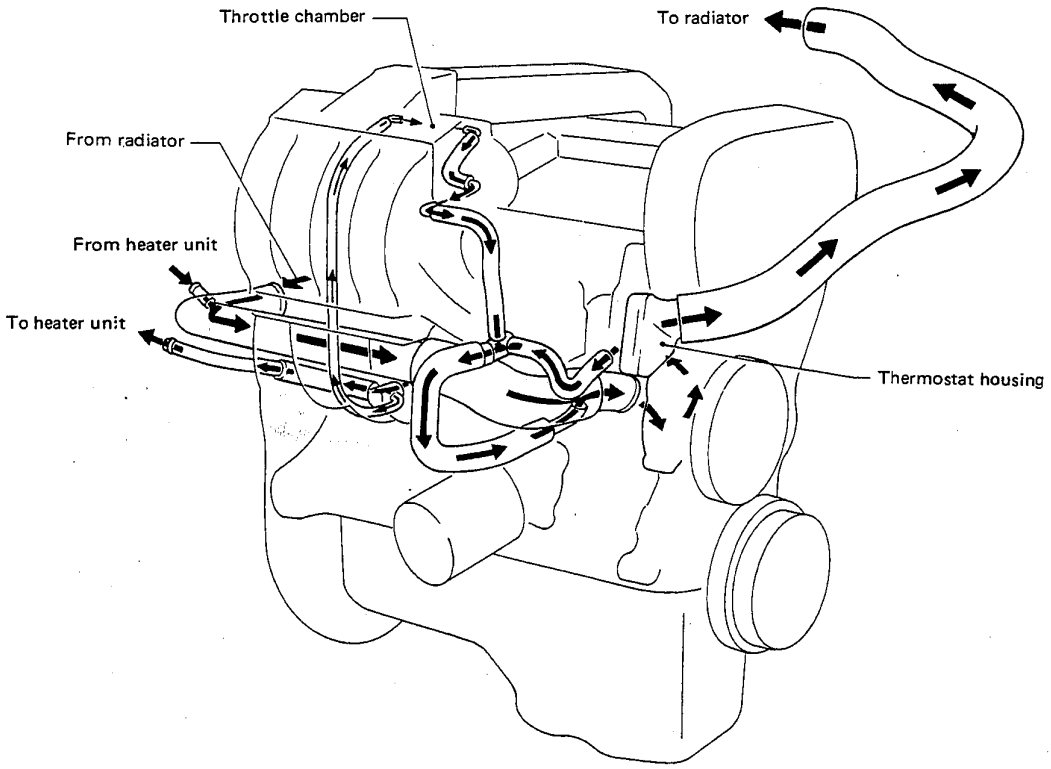
OIL PRESSURE RELIEF VALVE INSPECTION

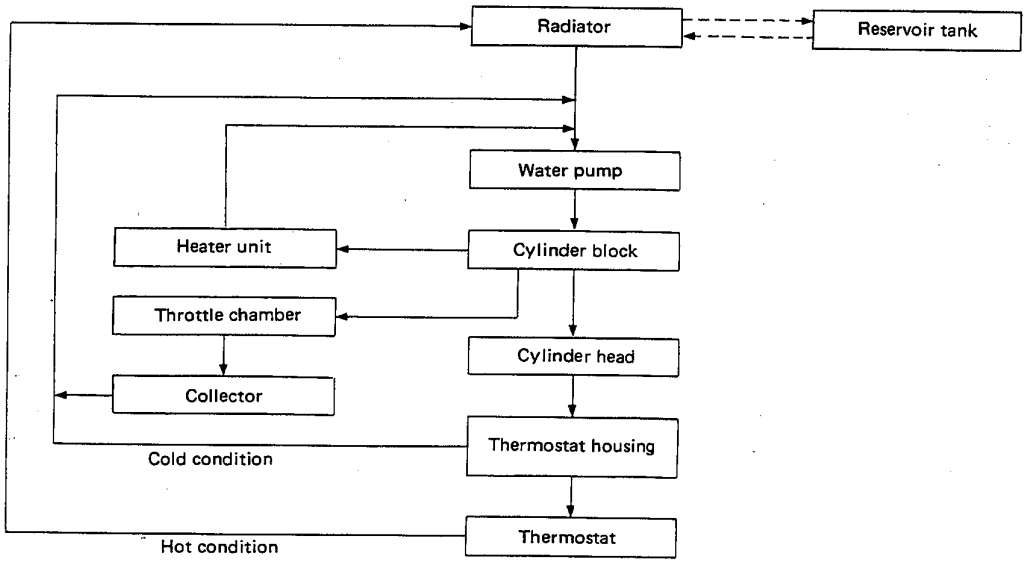
Inspect oil pressure relief valve for movement, cracks and breaks by pushing the ball. If replacement is necessary, remove valve by prying it out with a screwdriver. Install a new valve in place by tapping it.



SLC551

Cooling Circuit





SEM443B

WARNING:

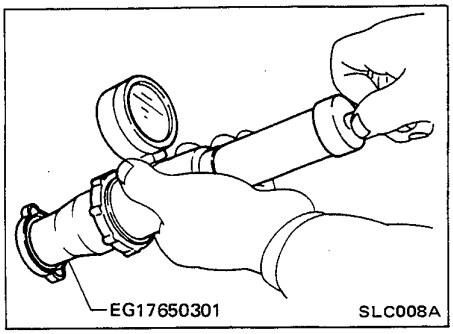
To avoid serious personal injury, never remove radiator cap quickly when engine is hot.

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 past the stop and remove it.

Cooling System Inspection

CHECKING HOSES

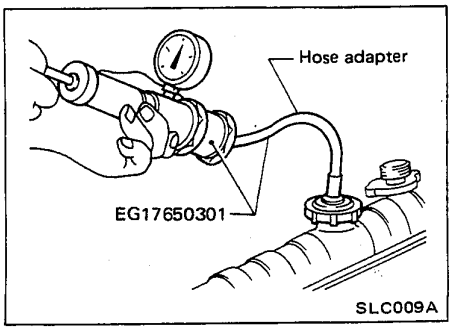
Check water hoses for proper attachment, leaks, cracks, damage, loose connections, chafing and deterioration.



CHECKING RADIATOR CAP

Apply pressure to radiator cap by means of a cap tester to see if it is satisfactory.

Radiator cap relief pressure:
78 - 98 kPa
(0.8 - 1.0 kg/cm^2, 11 - 14 psi)

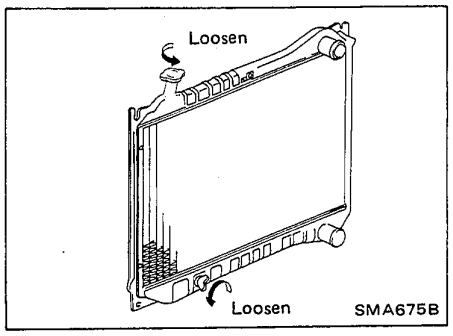


CHECKING COOLING SYSTEM FOR LEAKS

Apply pressure to the cooling system by means of a tester to check for leakage.

Testing pressure:
157 kPa (1.6 kg/cm^2, 23 psi)

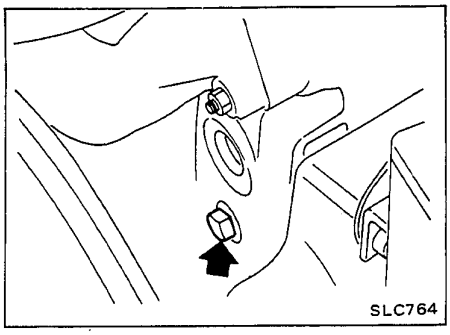
CAUTION:
Overpressure may cause radiator damage.



Water Pump

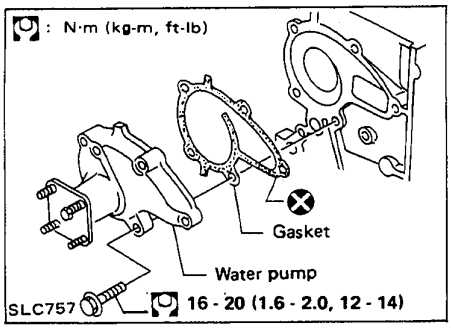
REMOVAL AND INSTALLATION

1. Drain coolant from radiator.



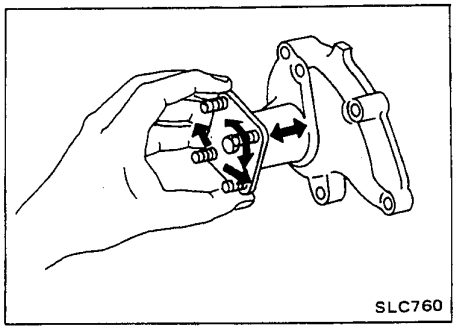
2. Remove cylinder block drain plug located at left rear of cylinder block and drain coolant.

   : 54 - 74 N·m
   (5.5 - 7.5 kg-m, 40 - 54 ft-lb)



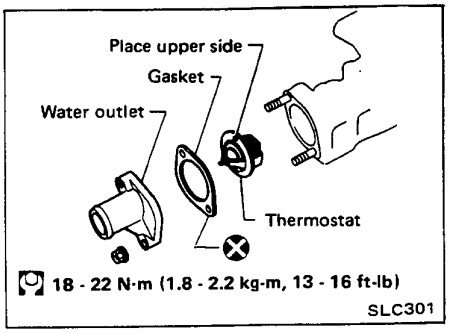
CAUTION:

- **When removing water pump assembly, be careful not to get coolant on timing belt.**
- **Water pump cannot be disassembled and should be replaced as a unit.**
- **After installing water pump, connect hose and clamp securely, then check for leaks using radiator cap tester.**



INSPECTION

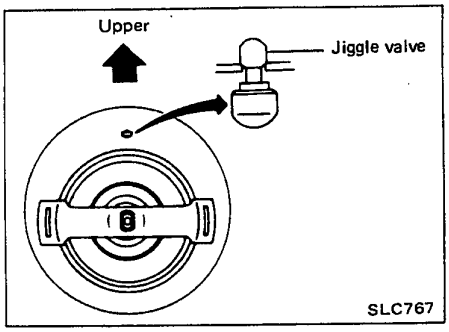
1. Check for badly rusted or corroded body assembly and vane.
2. Check for rough operation due to excessive end play.



Thermostat

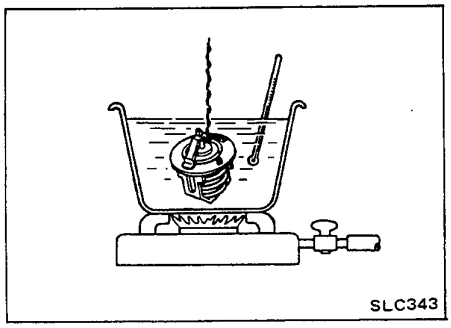
REMOVAL AND INSTALLATION

1. Drain engine coolant.
2. Remove water outlet, then take out thermostat.



3. Install thermostat with jiggle valve or air bleeder facing upward.

- **After installation, run engine for a few minutes, and check for leaks.**



INSPECTION

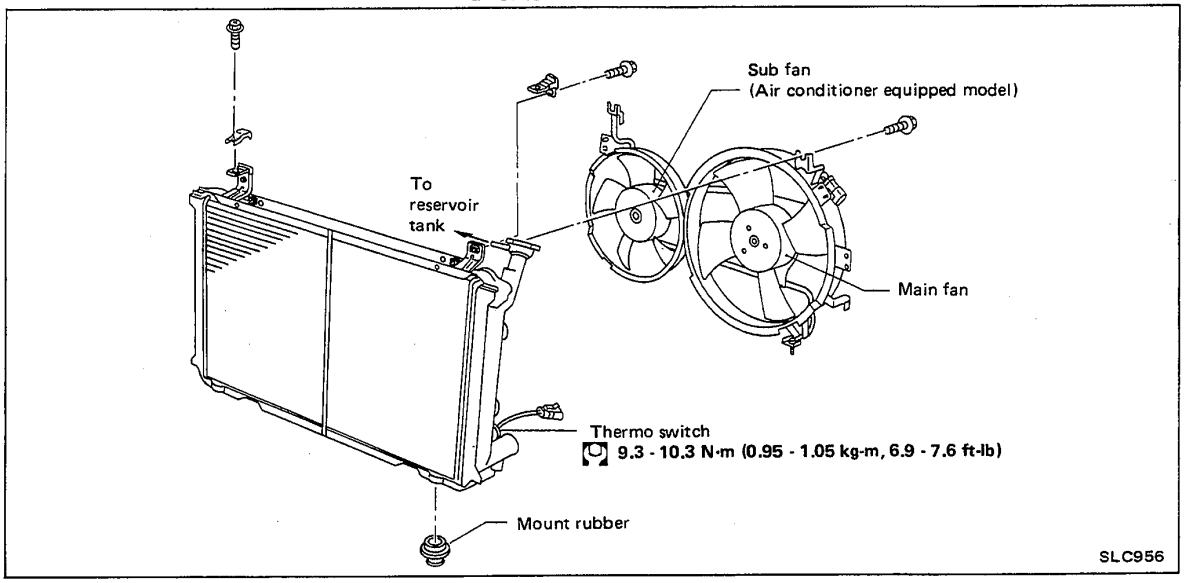
1. Check for valve seating condition at ordinary temperatures. It should seat tightly.
2. Check valve opening temperature and maximum valve lift.

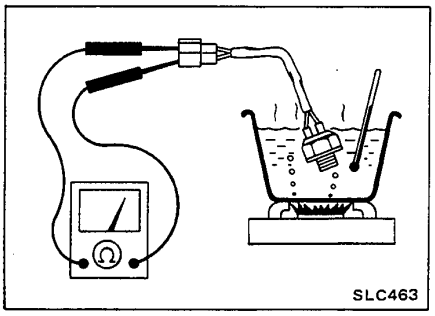
	Standard	Cold type
Valve opening temperature °C (°F)	82 (180)	88 (190)
Max. valve lift mm/°C (in/°F)	8/95 (0.31/203)	8/100 (0.31/212)

3. Then check if valve closes at 5°C (9°F) below valve opening temperature.

Radiator

DISASSEMBLY AND ASSEMBLY





Water Temperature Switch

INSPECTION

1. Drain coolant.
2. Remove thermo switches.
3. Check thermo switches for proper operation.

Operating temperature

OFF → ON 85°C (185°F)

: Water temperature switch

9.3 - 10.3 N·m

(0.95 - 1.05 kg-m, 6.9 - 7.6 ft-lb)

For cooling system wiring diagram, refer to HA section.

Engine Lubrication System

Oil pressure check

Engine rpm	Approximate discharge pressure kPa (kg/cm², psi)
Idle speed	More than 78 (0.8, 11)
2,000	461 (4.7, 67)
6,000	588 (6.0, 85)

Oil pump inspection

Unit: mm (in)

Body to outer gear clearance	0.11 - 0.20 (0.0043 - 0.0079)
Inner gear to crescent clearance	0.15 - 0.26 (0.0059 - 0.0102)
Outer gear to crescent clearance	0.21 - 0.32 (0.0083 - 0.0126)
Body to inner gear clearance	0.05 - 0.09 (0.0020 - 0.0035)
Body to outer gear clearance	0.05 - 0.11 (0.0020 - 0.0043)

Oil pressure regulator valve

kPa (kg/cm², psi)/rpm

Regulator valve opening pressure	471 - 510 (4.8 - 5.2, 68 - 74)/2,000

Tightening torque

Unit	N·m	kg-m	ft-lb
Oil pump securing bolt	11 - 14	1.1 - 1.4	8 - 10
Oil pump cover screw	4 - 5	0.4 - 0.5	2.9 - 3.6
Oil pressure regulator valve cap	39 - 69	4.0 - 7.0	29 - 51
Oil pressure switch	10 - 16	1.0 - 1.6	7 - 12

Engine Cooling System

Thermostat

	Standard	Cold type
Valve opening temperature °C (°F)	82 (180)	88 (190)
Max. valve lift mm/°C (in/°F)	8/95 (0.31/203)	8/100 (0.31/212)

Thermo switch

Operating temperature (OFF → ON)	85°C (185°F)

Tightening torque

Unit	N·m	kg-m	ft-lb
Water pump securing bolt	16 - 20	1.6 - 2.0	12 - 14
Water outlet securing nut	18 - 22	1.8 - 2.2	13 - 16
Water temperature switch	9.3 - 10.3	0.95 - 1.05	6.9 - 7.6

ENGINE FUEL & EMISSION CONTROL SYSTEM

SECTION EF & EC

EF

EC

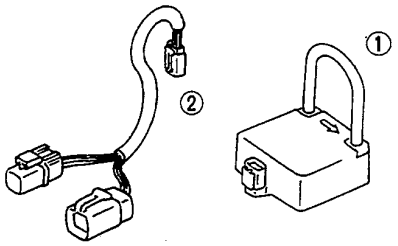
CONTENTS

Contents (Cont'd)

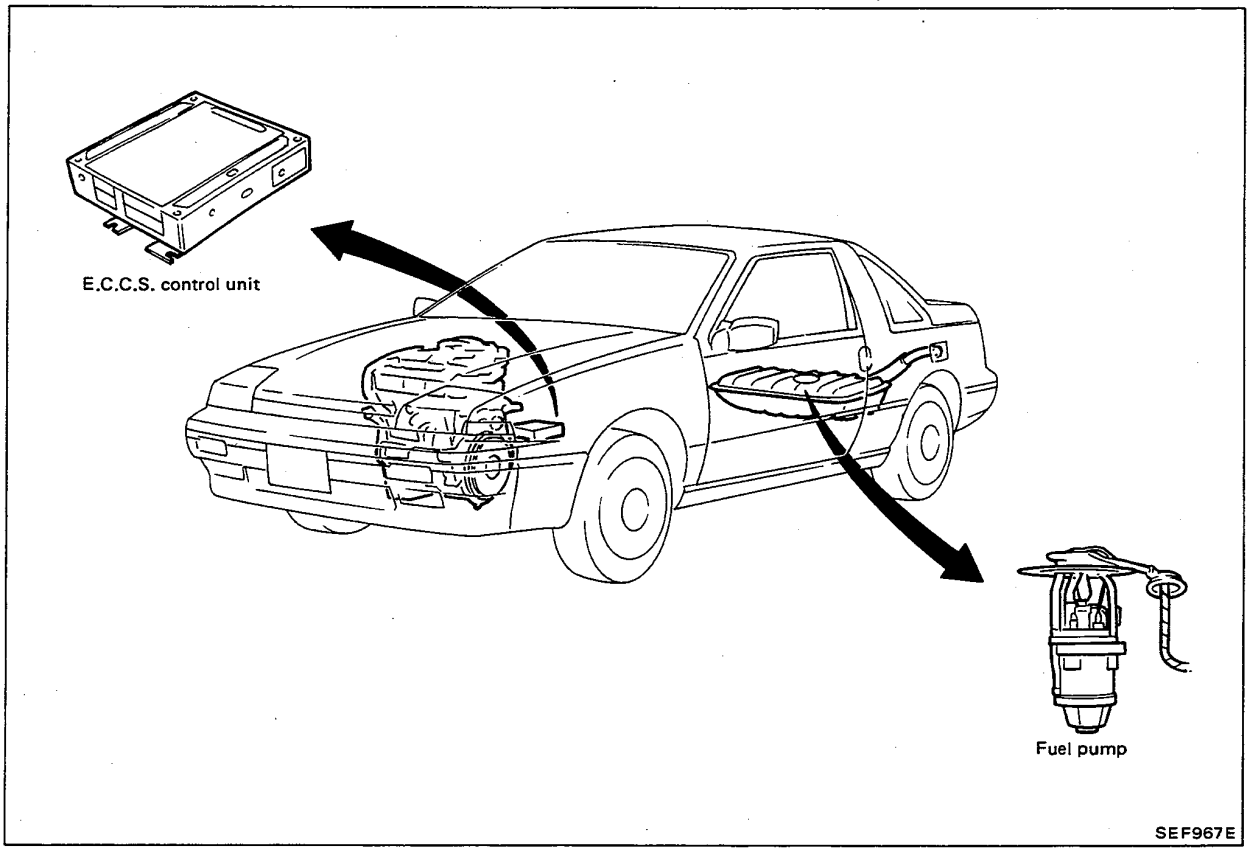
When you read wiring diagrams:

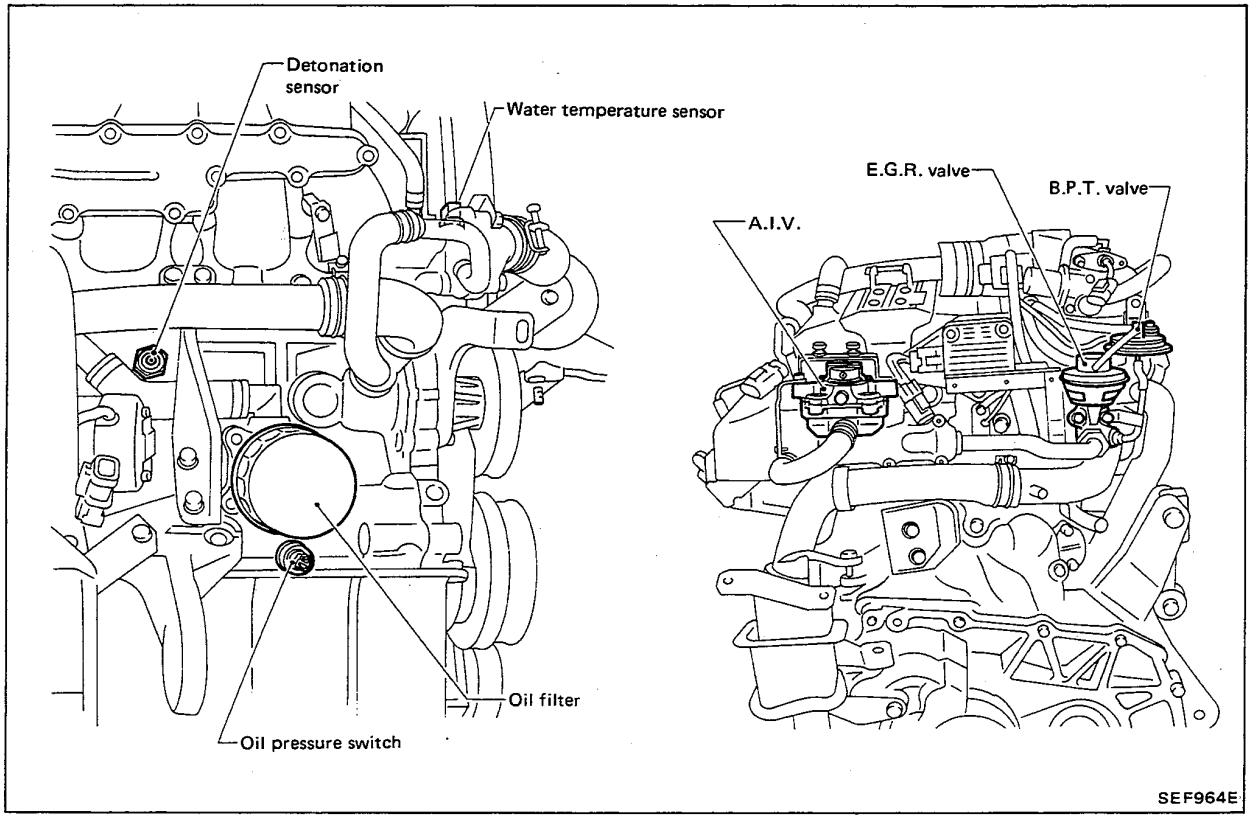
- **Read GI section, "HOW TO READ WIRING DIAGRAMS".**
- **See EL section, "POWER SUPPLY ROUTING" for power distribution circuit.**

SPECIAL SERVICE TOOL

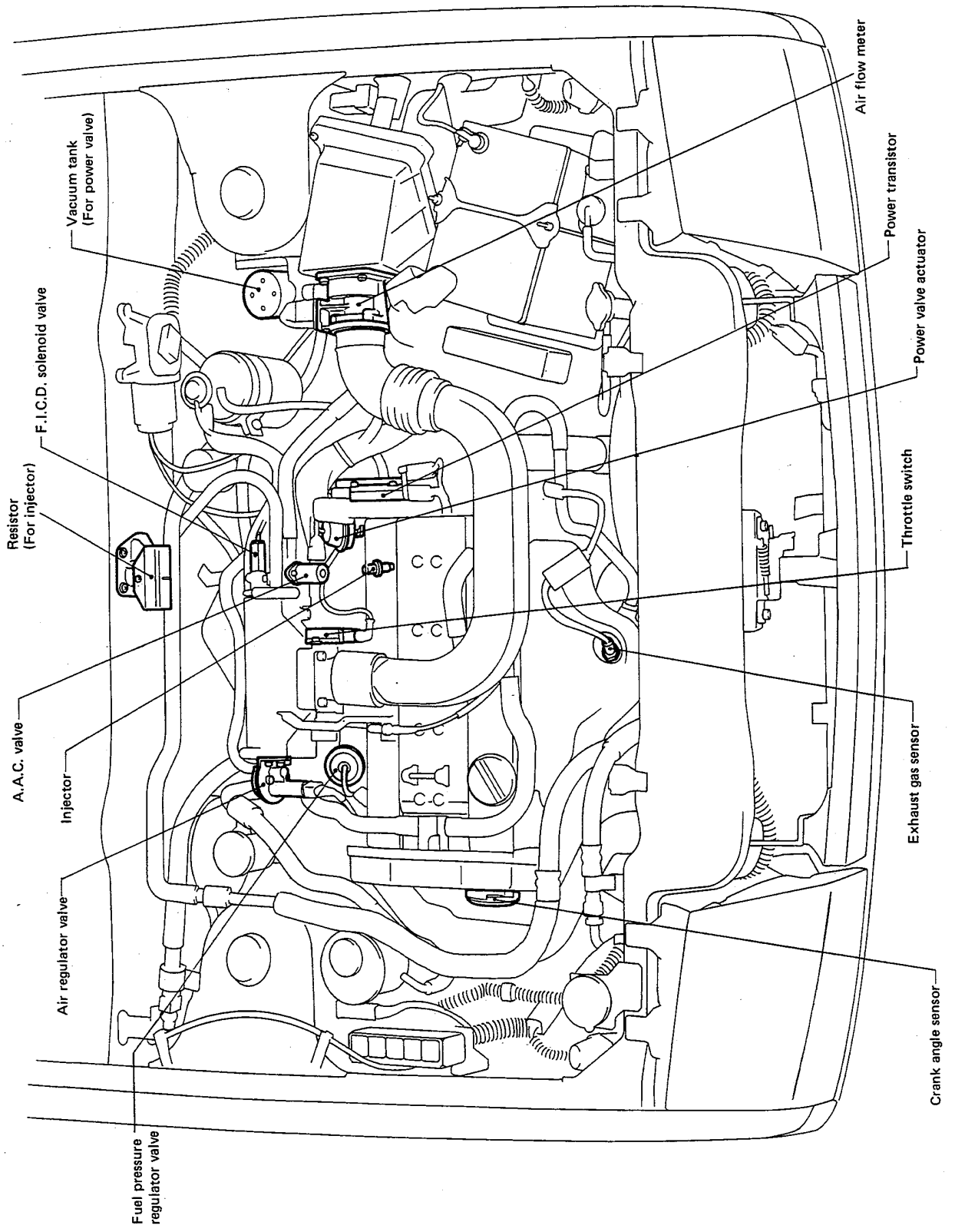
Tool number Tool name	Description	Engine Application
		CA
KV109D10S0 Ignition timing adapter coil set ① KV109D0010 Ignition timing adapter coil ② KV109D0020 Adapter harness	 Measuring ignition timing	X

E.C.C.S. COMPONENT PARTS LOCATION

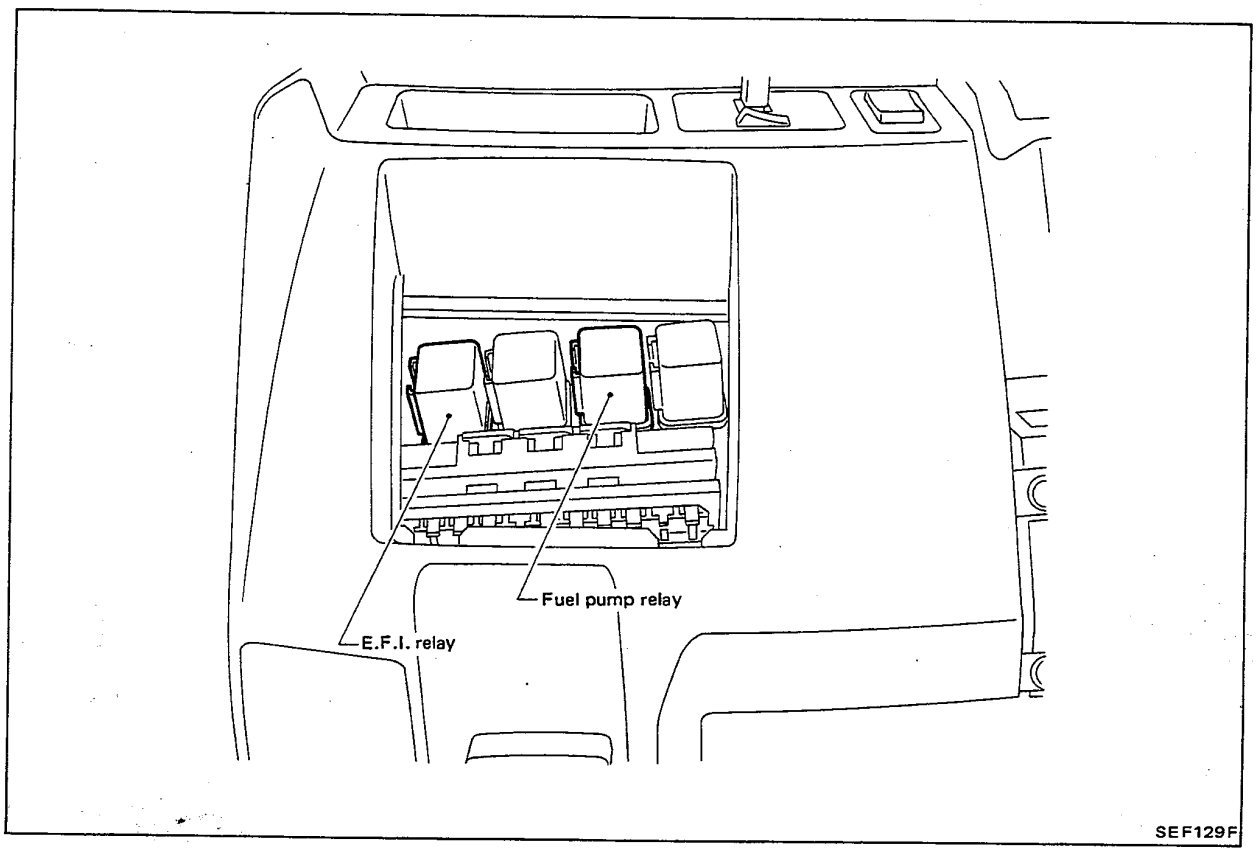


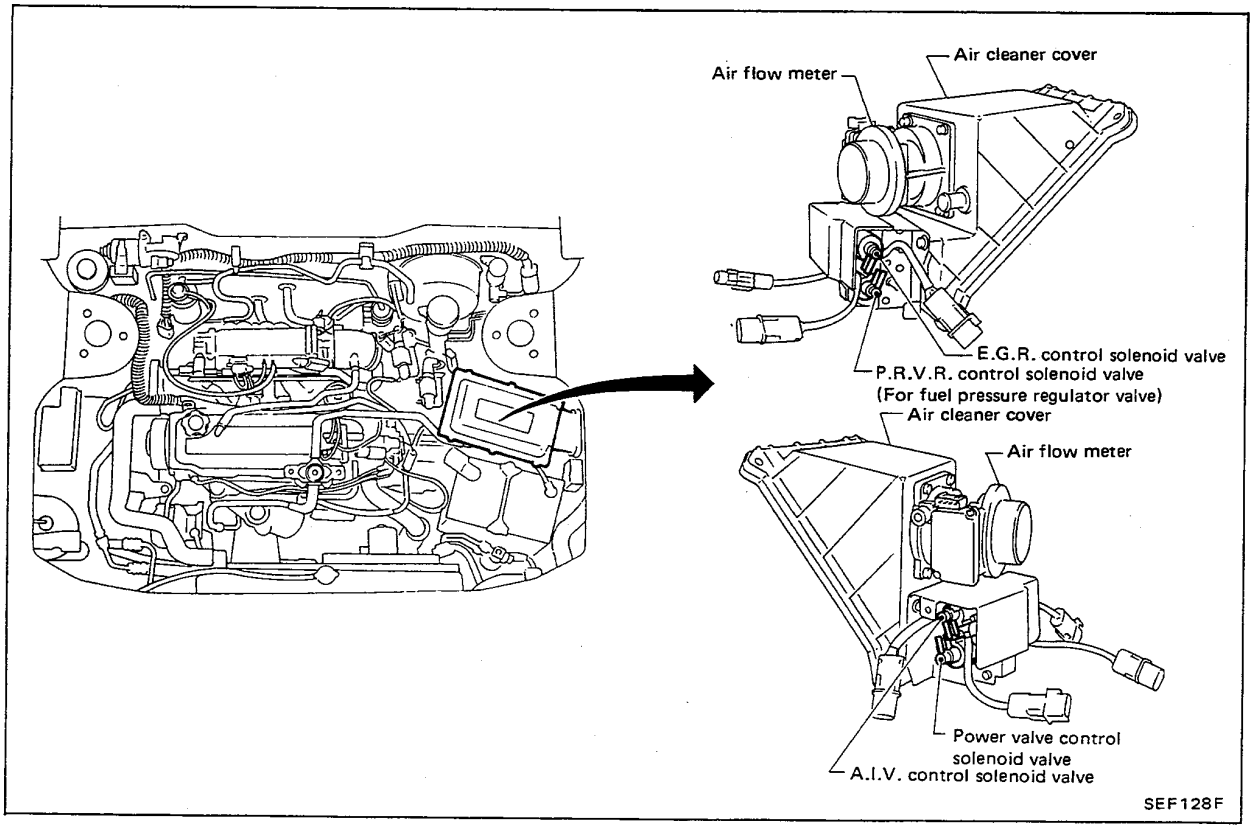


E.C.C.S. COMPONENT PARTS LOCATION

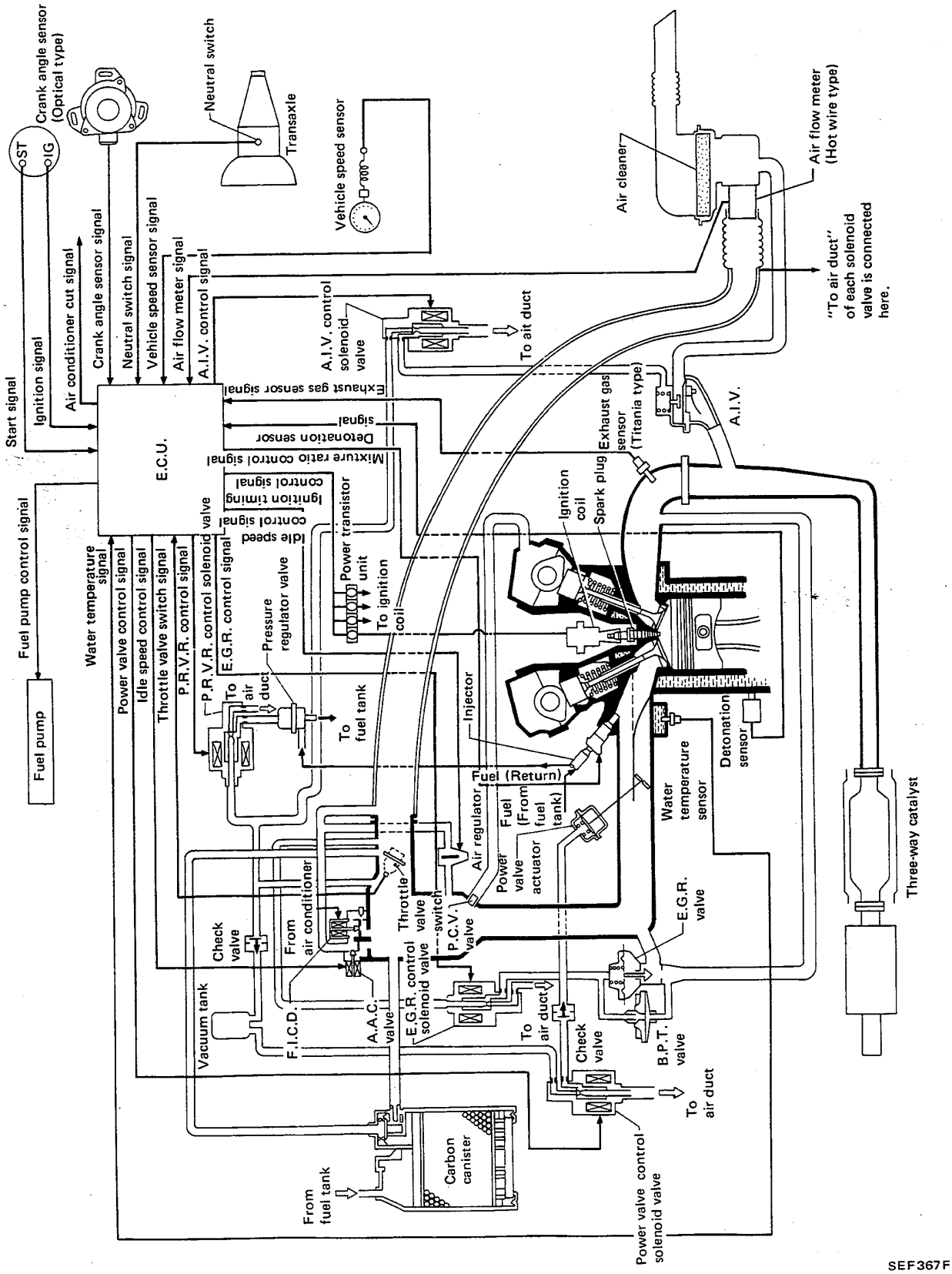


SEF368F


Fuel pump relay
E.F.I. relay
SEF129F

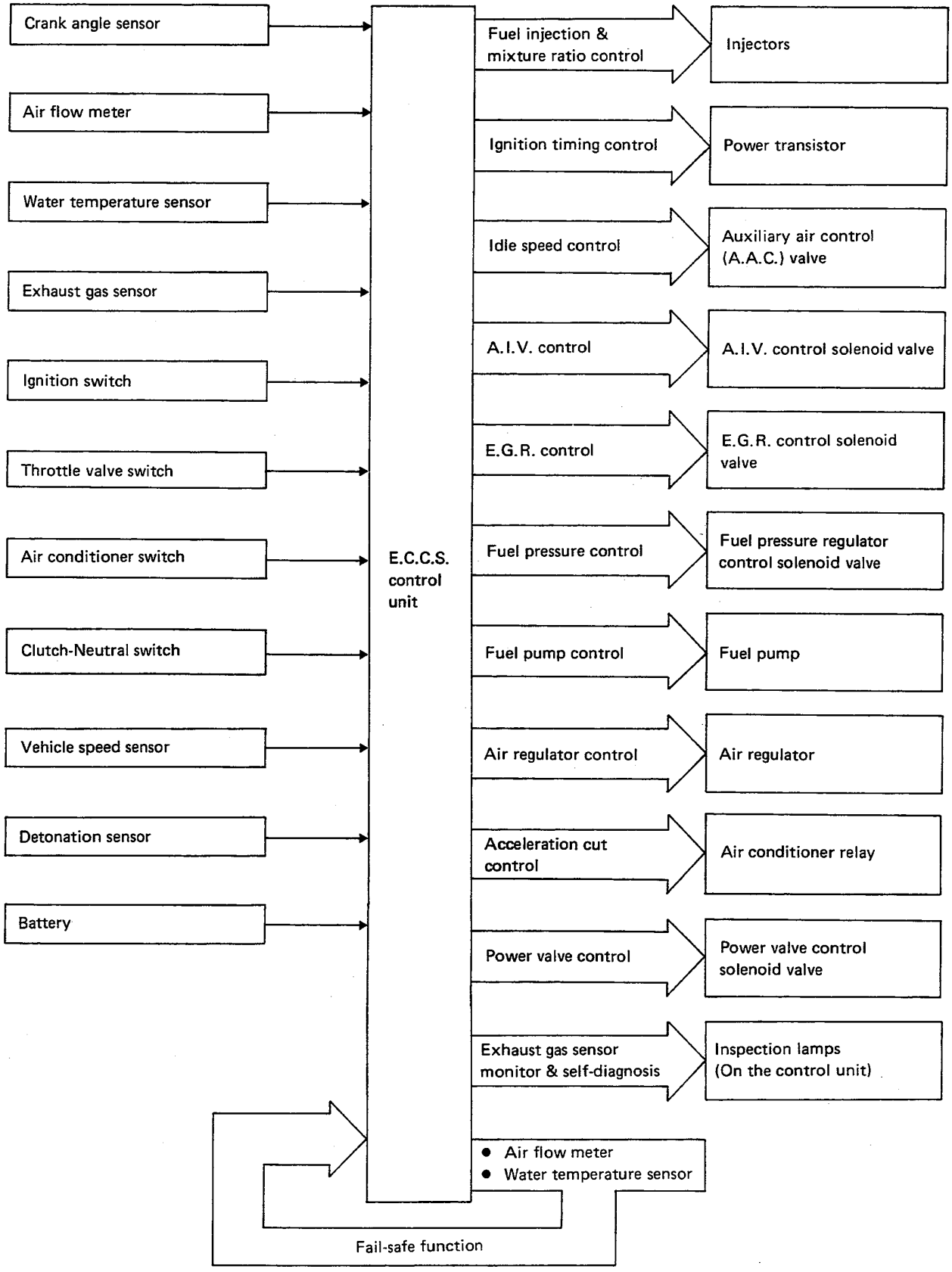

Air cleaner cover
Air flow meter
E.G.R. control solenoid valve
P.R.V.R. control solenoid valve
(For fuel pressure regulator valve)
Air cleaner cover
Air flow meter
Power valve control
solenoid valve
A.I.V. control solenoid valve
SEF128F

E.C.C.S. DIAGRAM

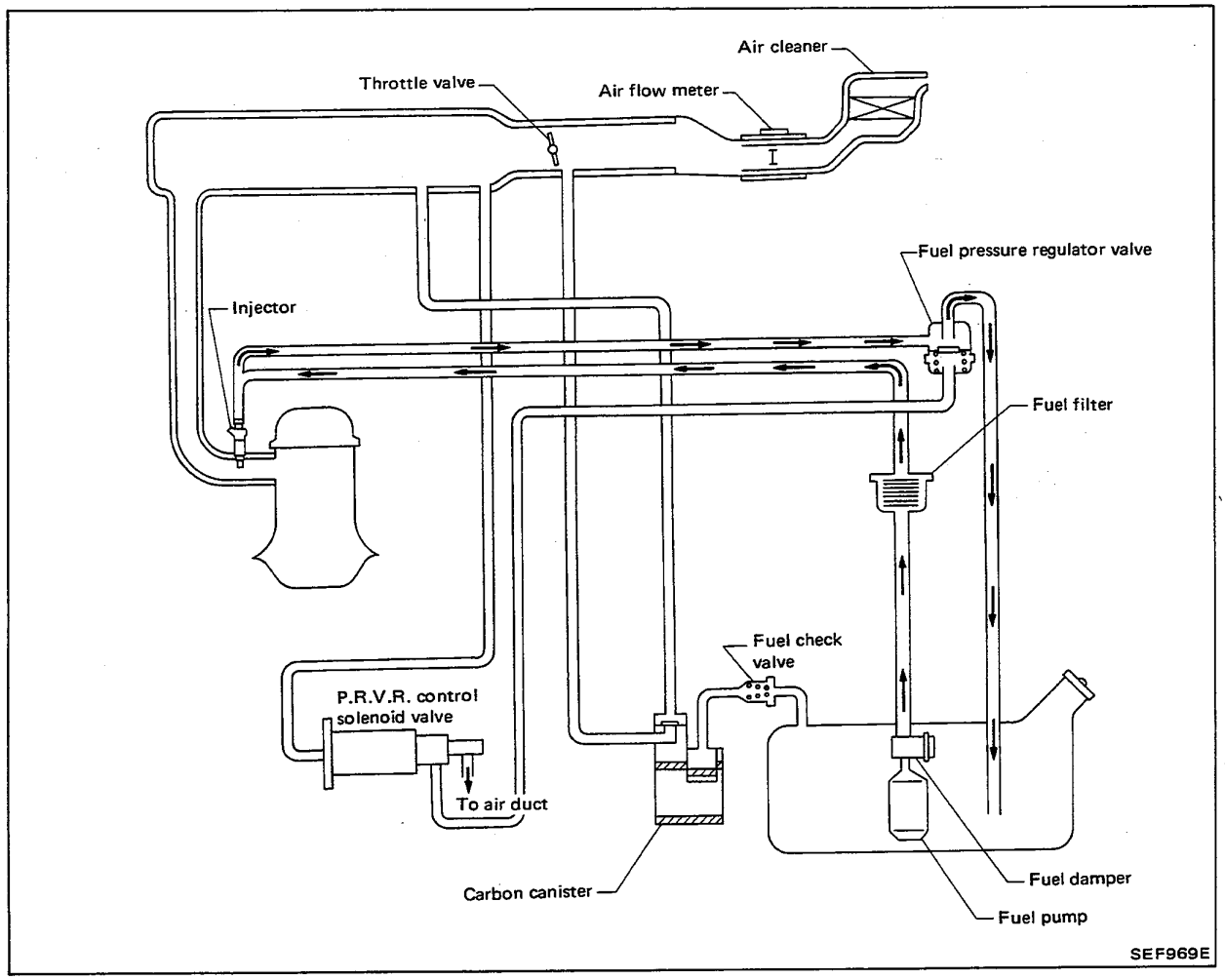


SEF367F

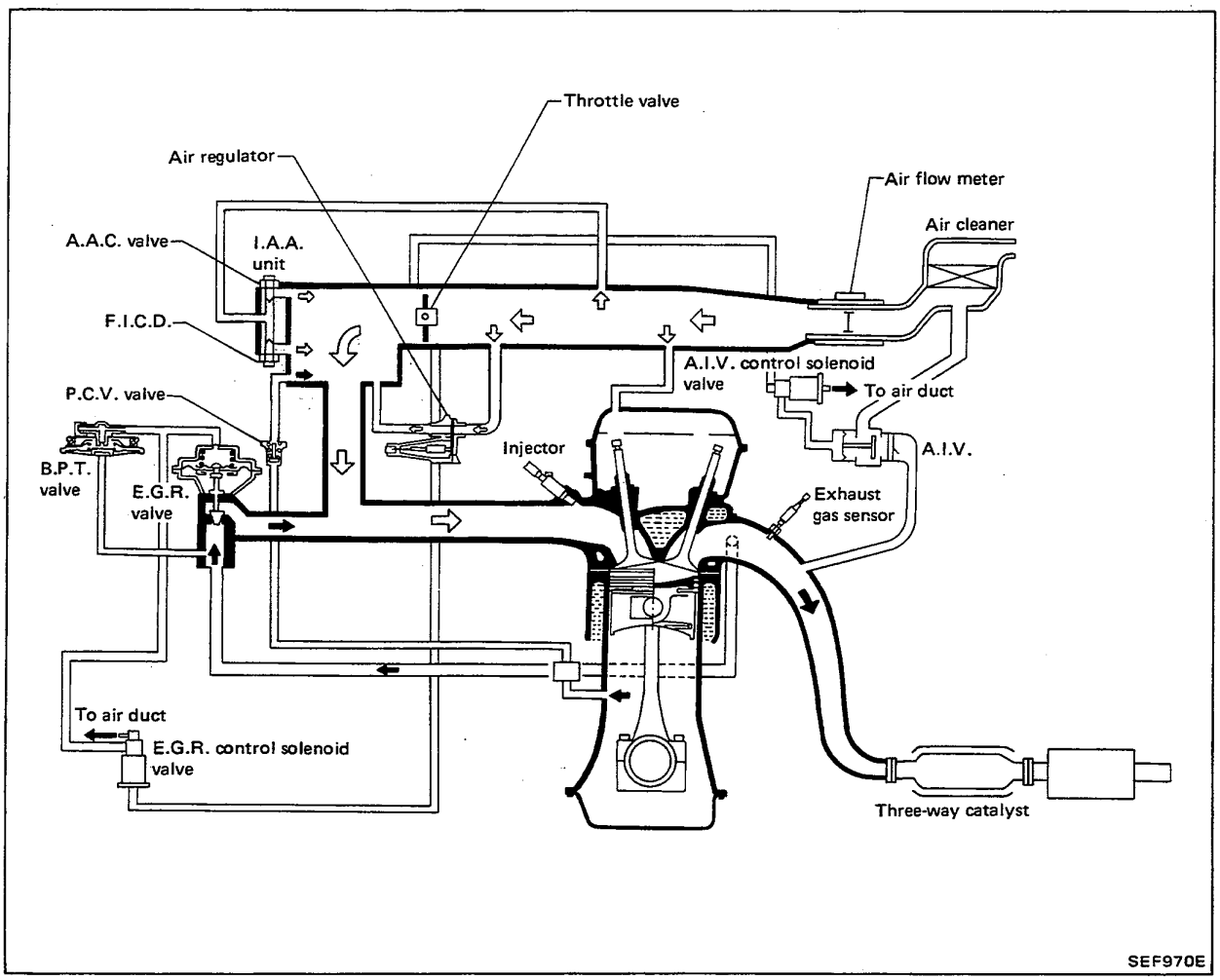
E.C.C.S. CHART


Crank angle sensor
Air flow meter
Water temperature sensor
Exhaust gas sensor
Ignition switch
Throttle valve switch
Air conditioner switch
Clutch-Neutral switch
Vehicle speed sensor
Detonation sensor
Battery
E.C.C.S. control unit
Fuel injection & mixture ratio control
Injectors
Ignition timing control
Power transistor
Idle speed control
Auxiliary air control (A.A.C.) valve
A.I.V. control
A.I.V. control solenoid valve
E.G.R. control
E.G.R. control solenoid valve
Fuel pressure control
Fuel pressure regulator control solenoid valve
Fuel pump control
Fuel pump
Air regulator control
Air regulator
Acceleration cut control
Air conditioner relay
Power valve control
Power valve control solenoid valve
Exhaust gas sensor monitor & self-diagnosis
Inspection lamps (On the control unit)
• Air flow meter
• Water temperature sensor
Fail-safe function

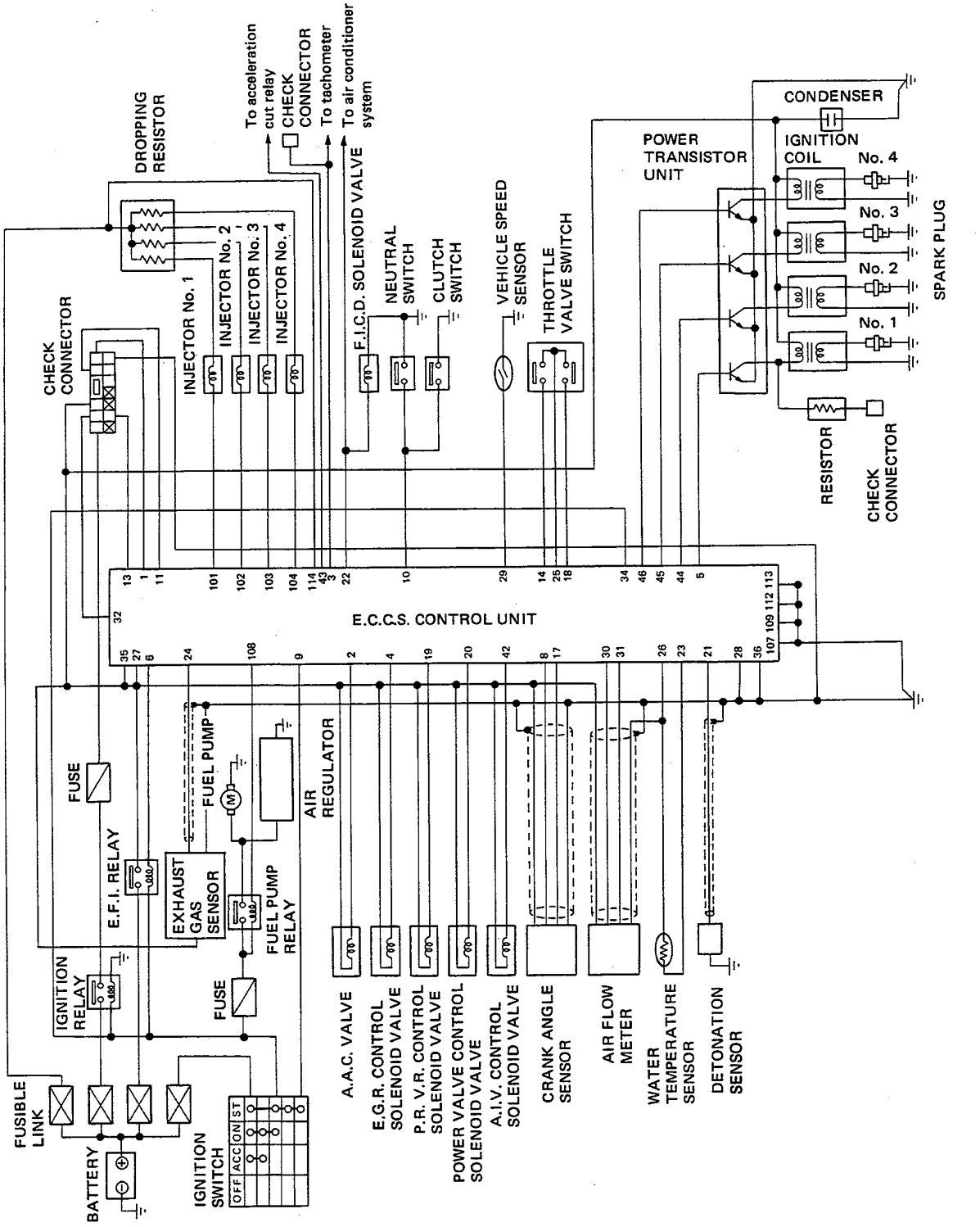
FUEL FLOW SYSTEM DESCRIPTION



AIR FLOW SYSTEM DESCRIPTION

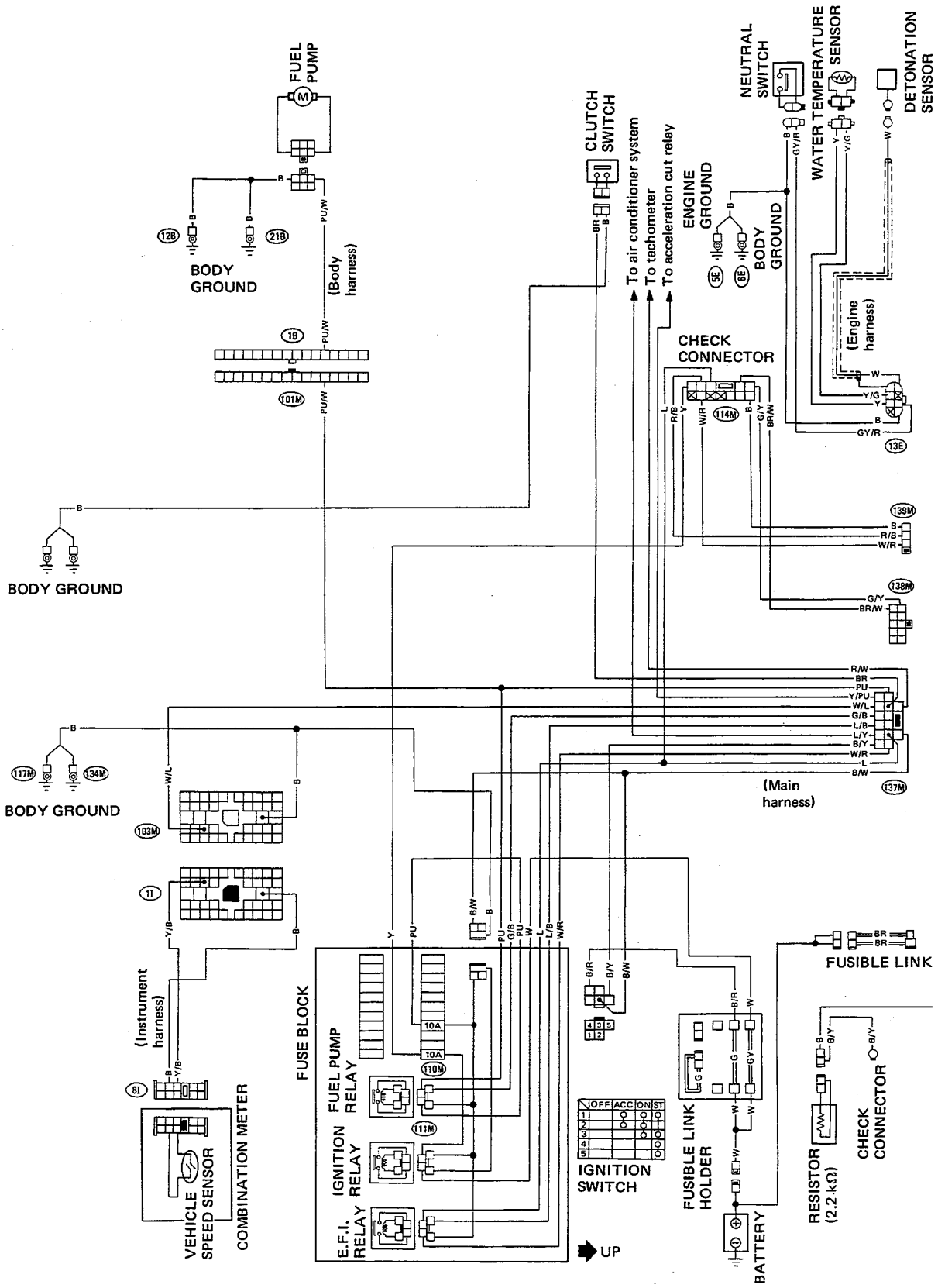


E.C.C.S. CIRCUIT DIAGRAM

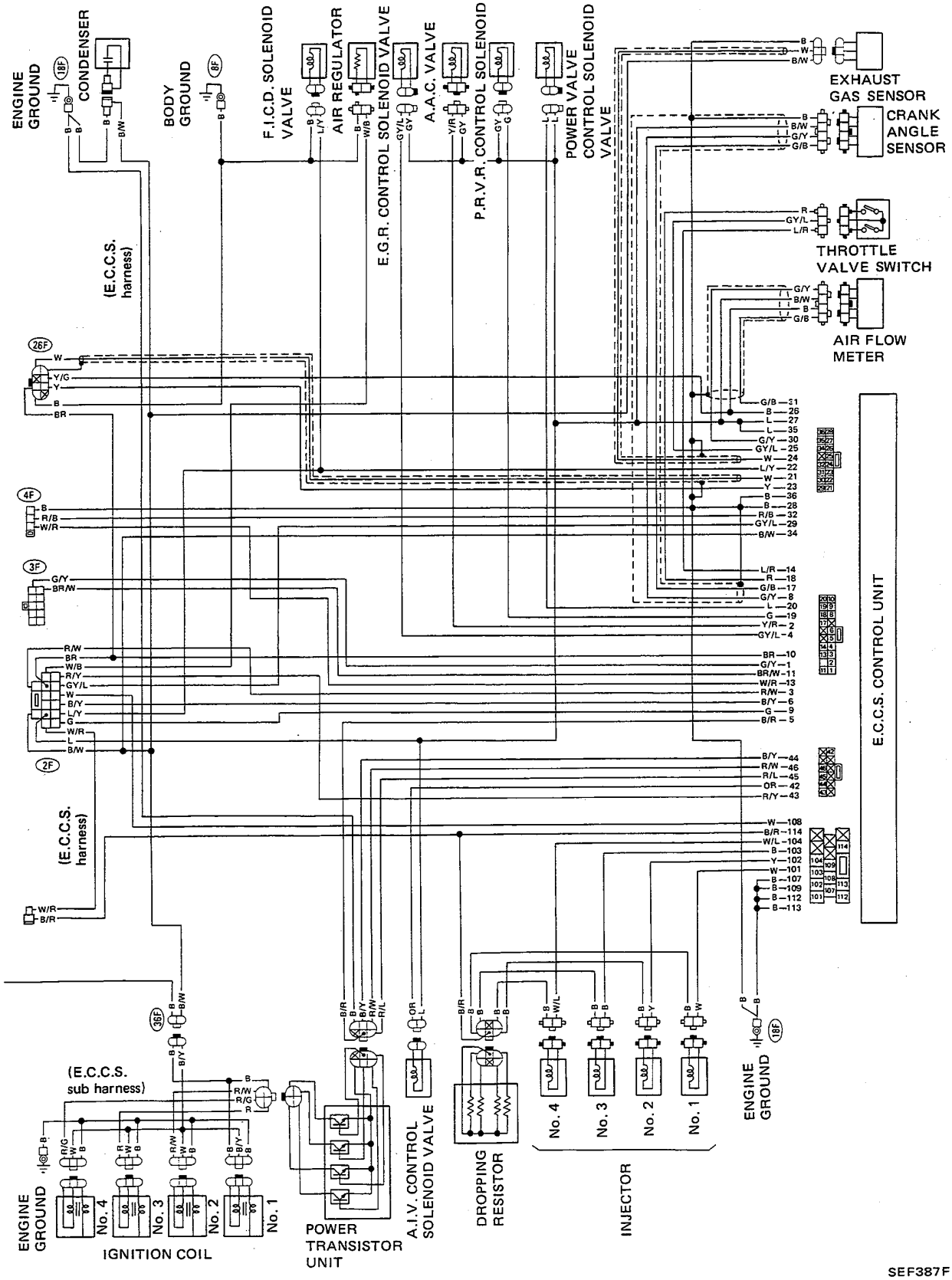


SEF386F

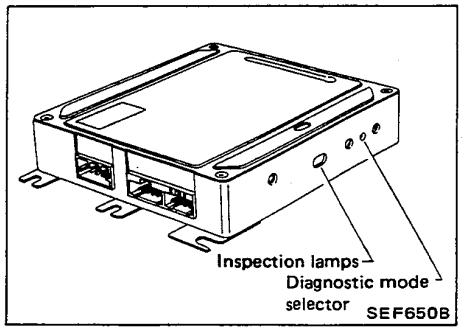
E.C.C.S. WIRING DIAGRAM



E.C.C.S. WIRING DIAGRAM



SEF387F

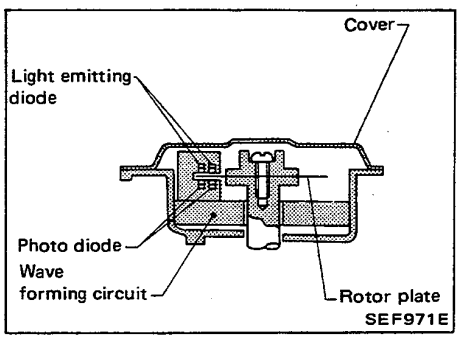


Components

E.C.U. (E.C.C.S. control unit)

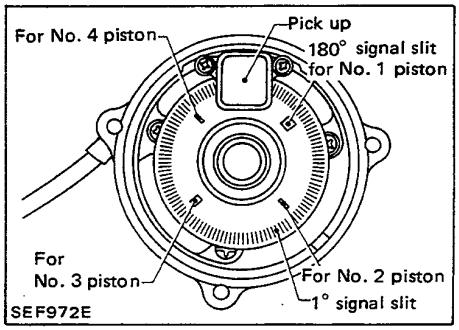
The E.C.U. consists of a microcomputer, inspection lamps and a diagnostic mode selector for signal input and output, and for power supply. The unit has control of the following functions.

- Injected fuel amount
- Mixture ratio feedback
- Ignition timing
- Idle speed
- E.G.R. operation
- A.I.V. operation
- Fuel pressure regulator operation
- Fuel pump operation
- Air regulator operation
- Power valve control
- Acceleration cut control
- Self-diagnosis



CRANK ANGLE SENSOR

The crank angle sensor is a basic component of the entire E.C.C.S. It monitors engine speed and piston position, and sends to the E.C.U. signals on which the controls of fuel injection, ignition timing and other functions are based.



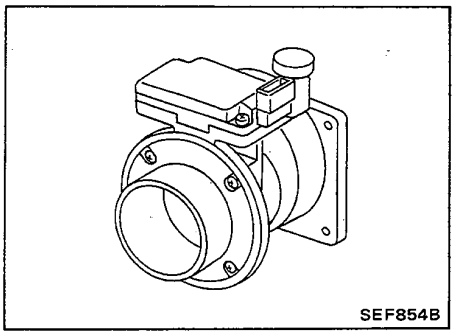
The crank angle sensor has a rotor plate and a wave forming circuit. The rotor plate has 360 slits for 1° signal (crank angle signal) and 4 slits for 180° signal (engine speed signal). Light Emitting Diodes (L.E.D.) and Photo Diodes are built in the wave forming circuit.

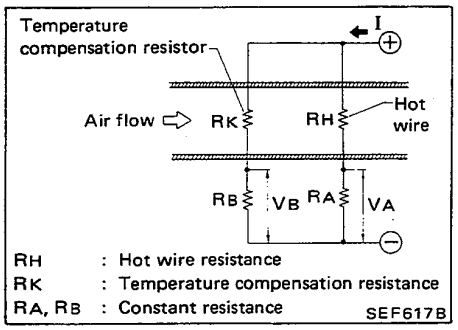
When the rotor plate passes the space between the L.E.D. and the Photo Diode, the slits of the rotor plate continually cut the light which is sent to the photo diode from the L.E.D. This causes generating rough-shaped pulses. They are then converted into on-off pulses by the wave forming circuit, which are sent to the E.C.U.

Components (Cont'd)

AIR FLOW METER

The air flow meter measures the mass flowrate of intake air. Measurements are made in such a manner that the control circuit emits an electrical output signal in relation to the amount of heat dissipated from the hot wire placed in the stream of intake air.


SEF854B



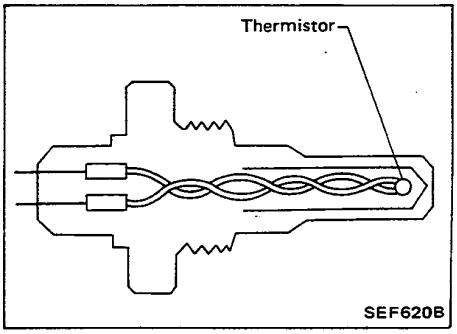
SEF617B

The air flowing around the hot wire removes the heat from the hot wire. The temperature of the hot wire is very sensitive to the mass flowrate of the air. The higher the temperature of the hot wire, the higher its resistance value. This change in the temperature (or: resistance) is determined by the mass flowrate of the air. The control circuit accurately regulates current (I) in relation to the varying resistance value (R_H) so that V_A always equals V_B. The air flow meter transmits an output for voltage V_A to the control unit where the output is converted into an intake air signal.

WATER TEMPERATURE SENSOR

The water temperature sensor, built into the thermostat housing, monitors changes in coolant temperature and transmits a signal to the E.C.U.

The temperature sensing unit employs a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the temperature rise.



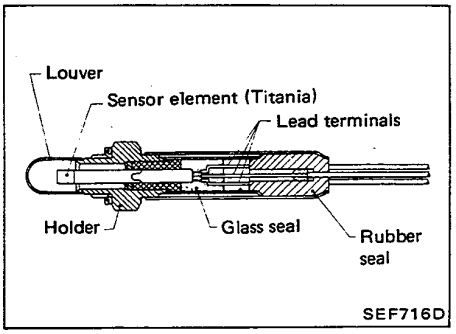
SEF620B

EXHAUST GAS SENSOR (Titania type)

The exhaust gas sensor, which is placed in the exhaust tube, monitors the amount of oxygen in the exhaust gas.

This sensor is made of ceramic titania which electric resistance drastically changes at the ideal air-fuel ratio.

The E.C.U. supplies the sensor with approximately 1V and takes an output voltage of the sensor depending on its resistance.

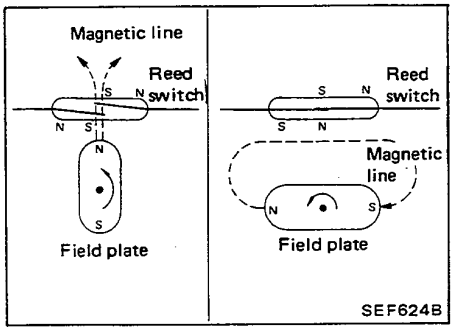


SEF716D

VEHICLE SPEED SENSOR

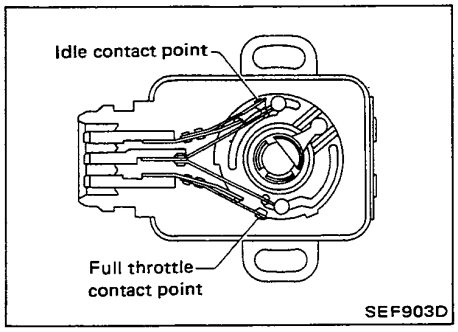
The vehicle speed sensor provides a vehicle speed signal to the E.C.U.

The speed sensor consists of a reed switch, which is installed in the speed meter unit and transforms vehicle speed into a pulse signal.



SEF624B

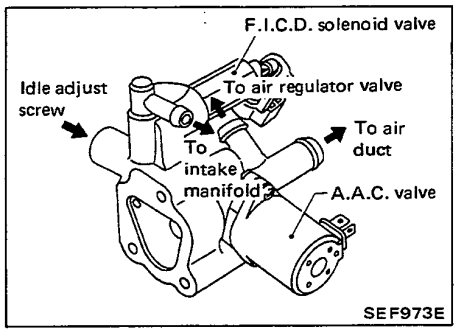
Components (Cont'd)



THROTTLE VALVE SWITCH

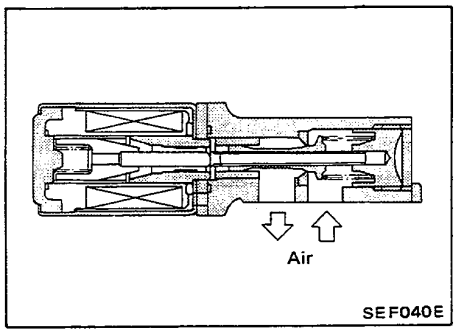
The throttle valve switch is attached to the throttle chamber and actuates in response to accelerator pedal movement.

This switch has idle contact and full throttle contact. The idle contact closes when the throttle valve is positioned at idle and opens when it is at any other position. The full throttle contact closes when the throttle valve is positioned at full throttle and opens when it is at any other position.



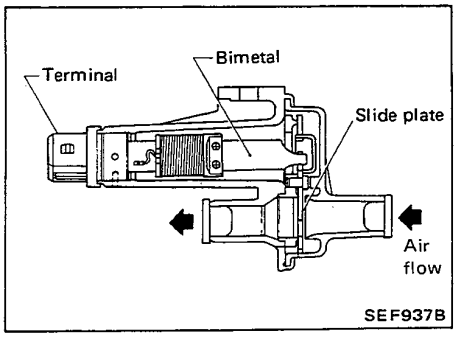
IDLE AIR ADJUSTING (I.A.A.) UNIT

The I.A.A. unit is made up of the A.A.C. valve, F.I.C.D. solenoid valve and idle adjust screw. It receives the signal from the E.C.U. and controls the idle speed at the preset value.



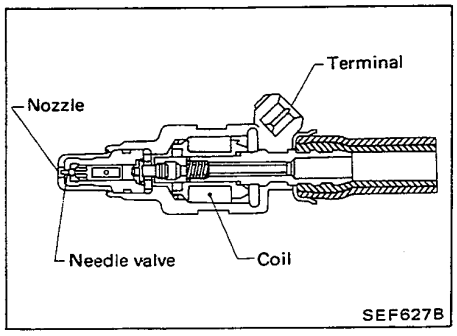
AUXILIARY AIR CONTROL (A.A.C.) VALVE

The E.C.U. actuates the A.A.C. valve by an ON/OFF pulse. The longer that ON duty is left on, the larger the amount of air that will flow through the A.A.C. valve.



AIR REGULATOR

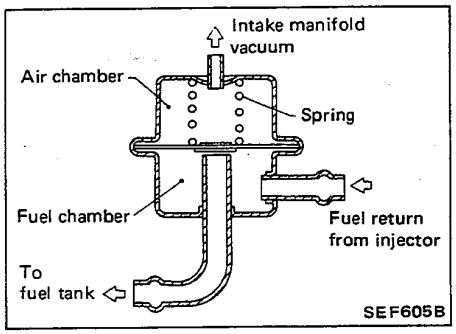
Air regulator provides an air by-pass when the engine is cold to create a fast idle during warm-up. A bimetal, heater and rotary shutter are built into the air regulator. When the bimetal temperature is low, the air by-pass port is open. As the engine starts and electric current flows through a heater, the bimetal begins to rotate the shutter to close off the by-pass port. The air passage remains closed until the engine is stopped and the bimetal temperature drops.



FUEL INJECTOR

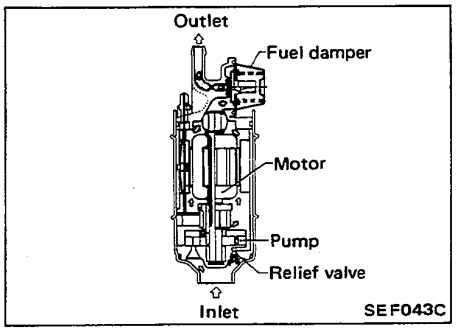
The fuel injector is a small, precision solenoid valve. As the E.C.U. outputs an injection signal to each fuel injector, the coil built into the injector pulls the needls valve back, and fuel is injected through the nozzle to intake manifold. The amount of fuel injected is controlled by the E.C.U. as an injection pulse duration.

Components (Cont'd)



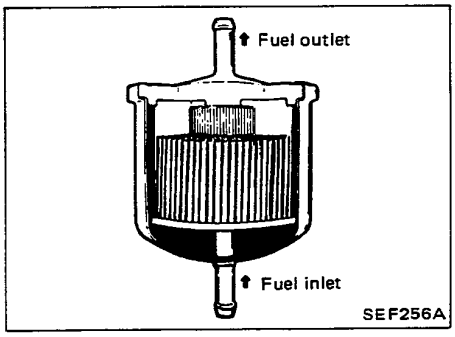
PRESSURE REGULATOR

The pressure regulator maintains the fuel pressure at 250.1 kPa (2.55 kg/cm², 36.3 psi). Since the injected fuel amount depends on injection pulse duration, it is necessary to maintain the pressure at the above value.



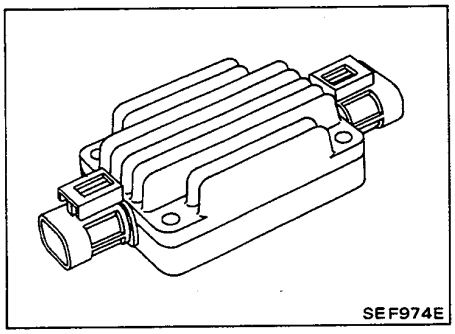
FUEL PUMP

The fuel pump with a fuel damper is an in-take type, that is the pump and damper are located in the fuel tank. The vane rollers are directly coupled to a motor which is cooled by fuel.



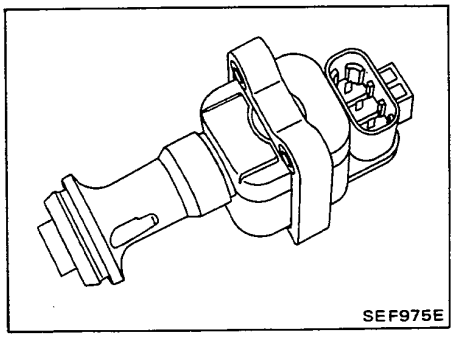
FUEL FILTER

The fuel filter is designed for the fuel injection system, and has a metal case in order to endure the high pressure of fuel.



POWER TRANSISTOR

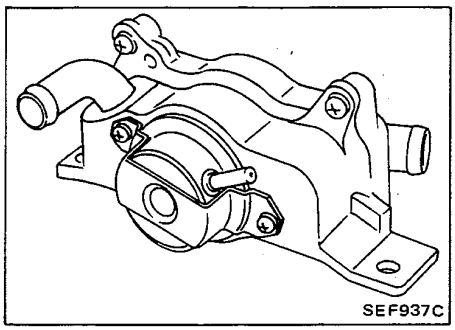
The ignition signal from the E.C.U. is amplified by the power transistor, which turns the ignition coil primary circuit on and off, inducing the proper high voltage in the secondary circuit.



IGNITION COIL

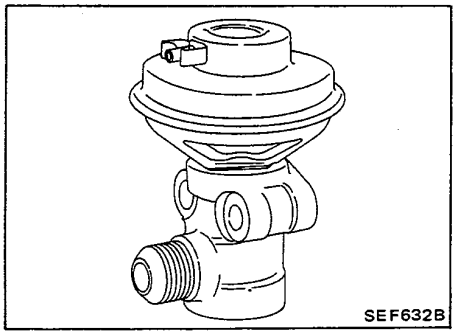
The ignition coil is a small, molded type.

Components (Cont'd)


SEF937C

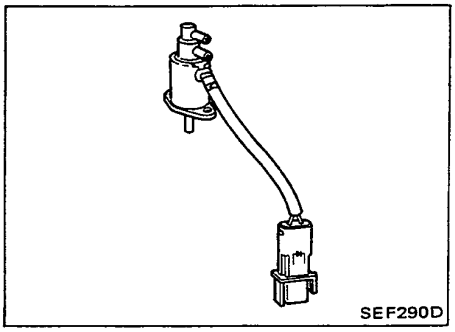
AIR INJECTION VALVE (A.I.V.)

The air injection valve sends secondary air to the exhaust manifold, utilizing a vacuum caused by exhaust pulsation in the exhaust manifold. When the exhaust pressure is below atmospheric pressure (negative pressure), secondary air is sent to the exhaust manifold. When the exhaust pressure is above atmospheric pressure, the reed valves prevent secondary air from being sent back to the air cleaner.


SEF632B

E.G.R. CONTROL VALVE

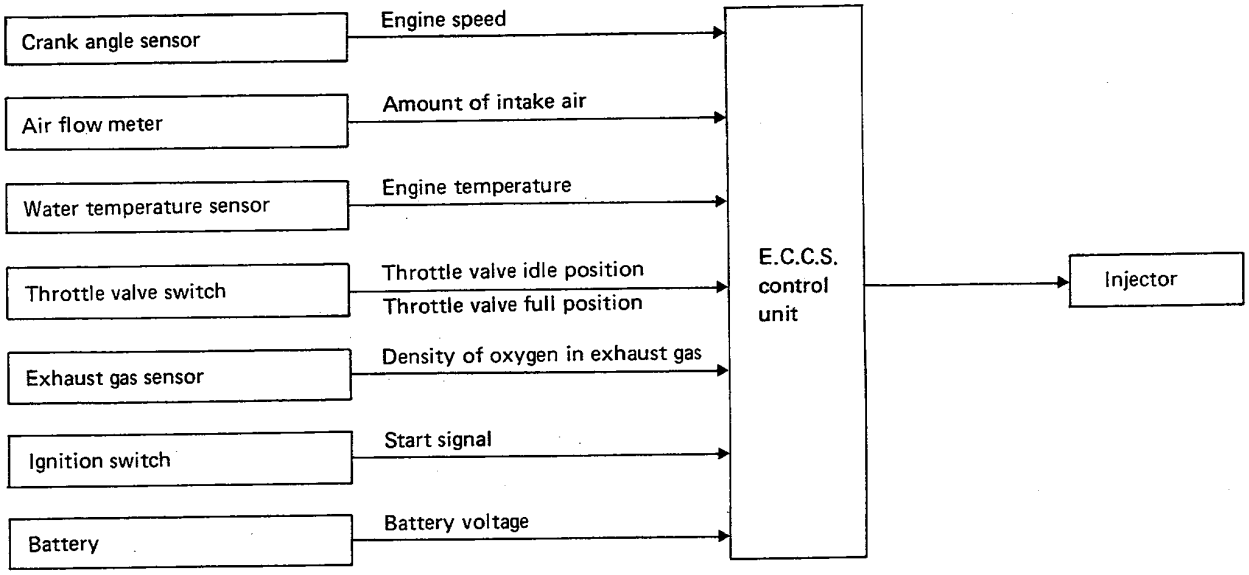
The E.G.R. control valve controls the quantity of exhaust gas to be led to the intake manifold through vertical movement of the taper valve connected to the diaphragm, to which vacuum is applied in response to the opening of the throttle valve.

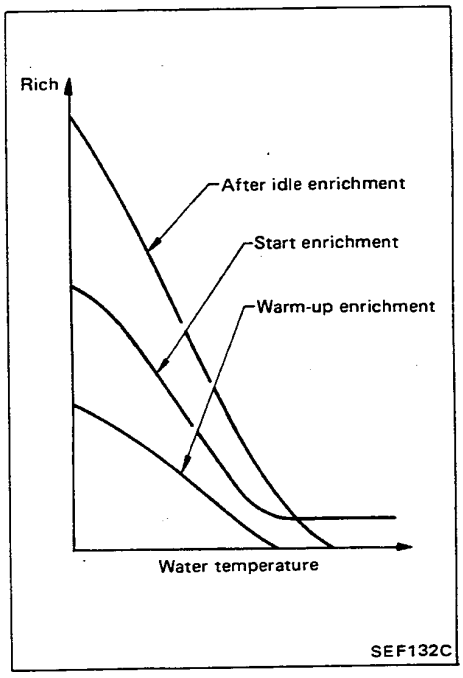

SEF290D

E.G.R. CONTROL SOLENOID VALVE, P.R.V.R. CONTROL SOLENOID VALVE, A.I.V. CONTROL SOLENOID VALVE AND POWER VALVE CONTROL SOLENOID VALVE

The three-port solenoid valve controls above systems based on signals supplied by the E.C.U.

Fuel Injection Control





The E.C.U. calculates the basic injection pulse width by processing signals from the crank angle sensor and air flow meter. Receiving signals from each sensor which detects various engine conditions, the E.C.U. adds various enrichments, which are pre-programmed in the E.C.U. to the basic injection amount. Thus, the optimum amount of fuel is injected through the injectors.

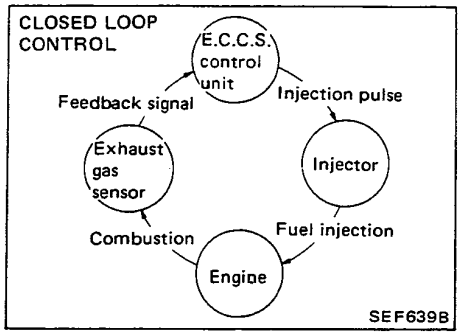
1) Fuel enrichment:
   In each of the following conditions, fuel is enriched.

- When starting
- After idle
- During warm-up
- When accelerating during warm-up period
- Full throttle (with heavy load condition)

For these enrichment conditions, signals from water temperature sensor, crank angle sensor, air flow meter and throttle switch are used.

Fuel Injection Control (Cont'd)

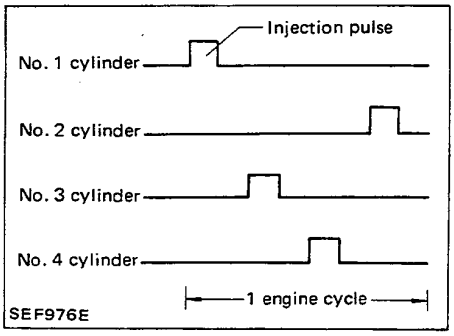
2) Fuel shut-off
The fuel shut-off is operated when the engine runs at higher than pre-set rpm and the throttle valve is closed (throttle switch idle contact "ON"). As the engine speed goes down to the "recovery rpm", which is somewhat lower than the shut-off rpm, the fuel shut-off ceases even if the throttle valve is kept closed. Both "shut-off and recovery rpm" vary with the coolant temperature.



3) Mixture ratio feedback control (Closed loop control)
Mixture ratio feedback system is designed to control the mixture ratio precisely to the stoichiometric point so that the three way catalyst can minimize CO, HC and NOx emissions simultaneously. This system uses an exhaust gas sensor located in the exhaust manifold to give an indication of whether the air-fuel ratio is richer or leaner than the stoichiometric point. The E.C.U. adjusts the injection pulse width according to the sensor voltage so the mixture ratio will be within the narrow window around the stoichiometric air fuel ratio.

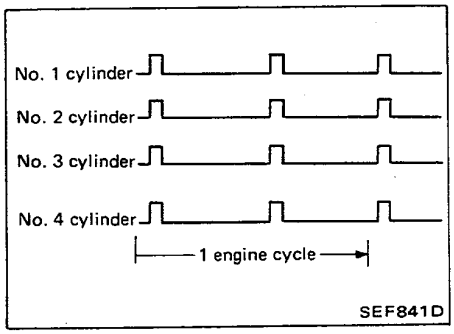
However, this system will operate under open loop under the following conditions:

- **When starting engine.**
- **When engine temperature is cold.**
- **When exhaust gas sensor temperature is cold.**
- **When driving at high speeds or under heavy load.**
- **At idle.**
- **When the exhaust gas sensor monitors a rich condition for more than a few seconds.**
- **When A.I.V. control system is operated.**



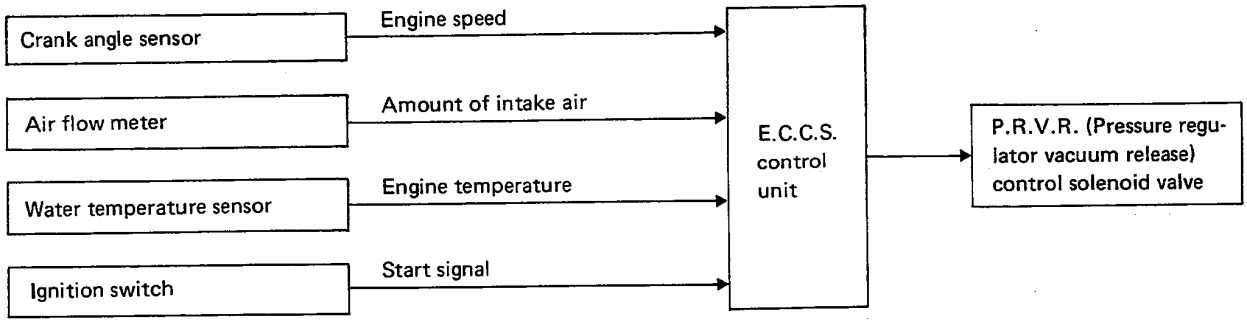
4) Fuel injection pattern.
Fuel is injected once a cycle for each cylinder.

Fuel Injection Control (Cont'd)



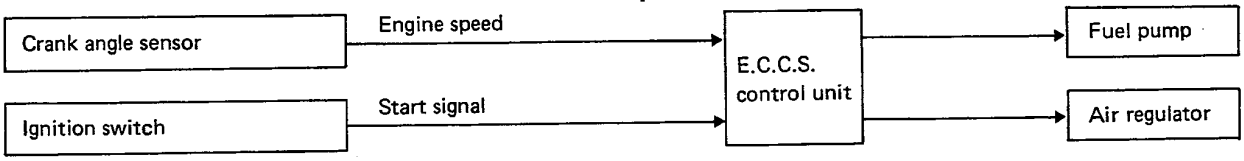
When engine temperature is low, engine starts, and engine load is heavy, fuel is injected into all four cylinders simultaneously twice a cycle.

Fuel Pressure Regulator Control



The fuel pressure regulator control improves hot-restratability by increasing fuel pressure. When the system is in operation, the P.R.V.R. control solenoid valve comes on, and the atmospheric pressure is sent to the fuel pressure regulator valve, thereby increasing the fuel pressure.
P.R.V.R. control solenoid valve is controlled by E.C.U.

Fuel Pump and Air Regulator Control

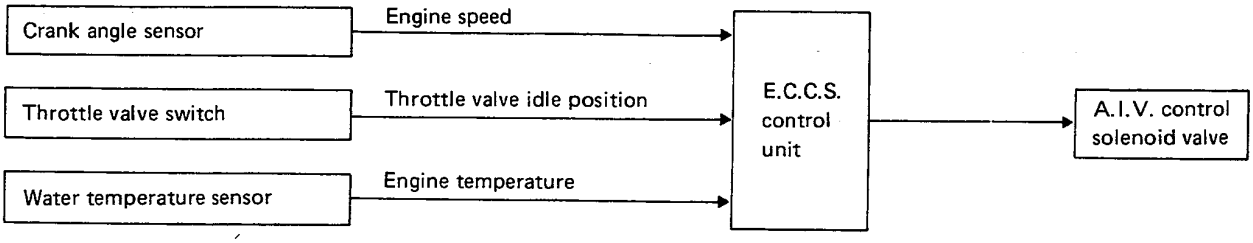


Fuel pump and air regulator control
The fuel pump and air regulator ON-OFF are simultaneously controlled by the E.C.U.

Fuel pump and air regulator ON-OFF control

Ignition switch position	Engine condition	Fuel pump/ Air regulator operation
ON	Stopped	Operates for 5 seconds
	Running	Operates
	After stall	Stops after 1 second
START	Starting	Operates

Air Injection Valve (A.I.V.) Control

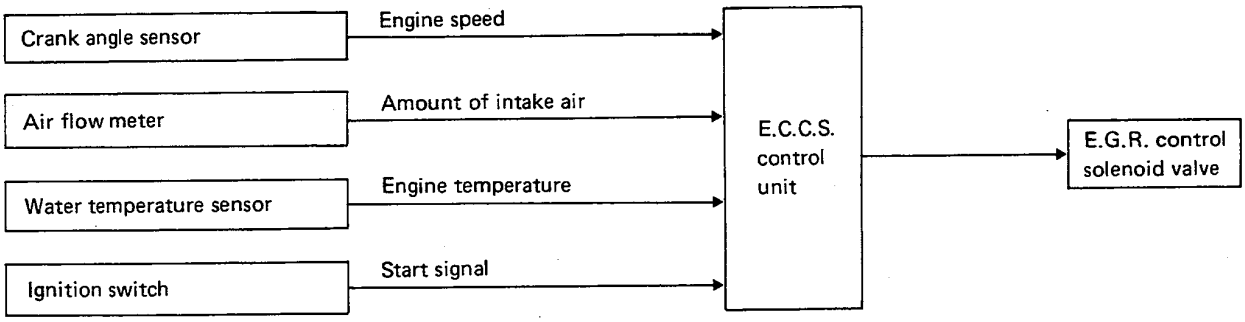


The air injection valve (A.I.V.) system is utilized to reduce HC and CO emissions by supplying air through the air injection valve. This system is composed of the air injection valve, the A.I.V. control valve and the A.I.V. solenoid valve.
The air injection valve is designed for one-way operation and consists of one-way reed valves. It inducts the secondary air into the exhaust manifold via the exhaust pressure pulsations.
The A.I.V. control valve is controlled by the A.I.V. solenoid valve which is controlled by the electrical signal from the E.C.U.

OPERATION

Water temperature	Throttle valve switch	Engine speed (rpm)	Solenoid valve	A.I.V. system
Cool (Engine warm-up condition)	Any	Any	OFF	OFF
Hot [Above approximately 70°C (158°F)]	OFF	Any	OFF	OFF
	ON (Idle contact)	High (Above approximately 1,700)	OFF	OFF
		Low	ON	ON

Exhaust Gas Recirculation (E.G.R.) Control



In the exhaust gas recirculation system, some of the exhaust gas is returned to the combustion chamber to lower the flame temperature during combustion. This results in a reduction of the nitrogen oxide density in the exhaust gas.
When the E.G.R. control valve is open, some of the exhaust gas is led from the exhaust manifold to the E.G.R. tube. The exhaust gas is then regulated by E.G.R. valve, and is introduced into the intake manifold.
The signal from the E.C.U. is sent to the E.G.R. control solenoid valve, which cuts the vacuum line for the B.P.T. valve when any of the following conditions are met.

E.G.R. control solenoid valve operation

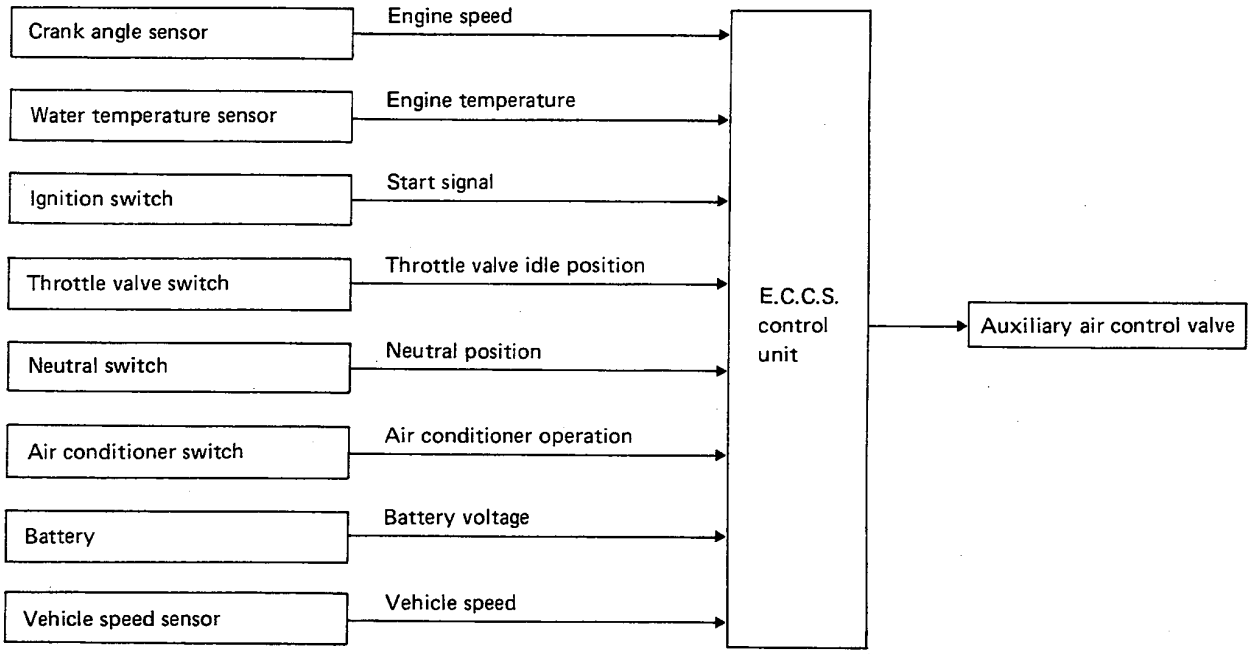
Condition		E.G.R. control solenoid valve
Water temperature °C (°F)	Below 65 (149)	ON
	Above 105 (221)	
Other conditions		OFF

E.G.R. system operation

E.G.R. system operates under only the following conditions.

Water temperature °C (°F)	B.P.T. valve		Throttle position	E.G.R. control solenoid valve	E.G.R. system
	Exhaust gas pressure	Operation			
Above 65 (149) Below 105 (221)	High	Closed	Partially open	OFF	Operates

Idle Speed Control

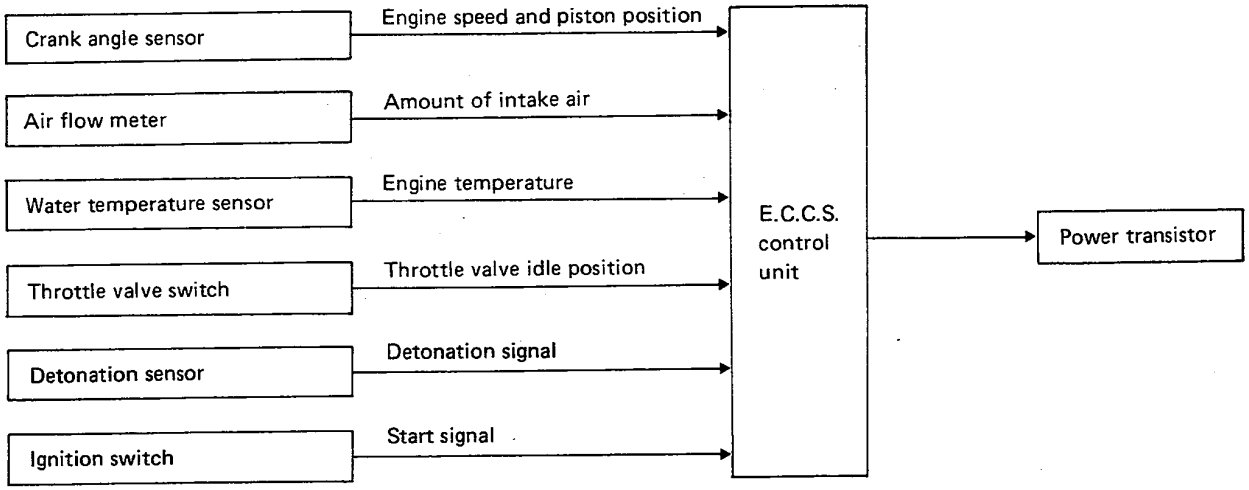


The idle speed is controlled by the E.C.U., corresponding to the engine operating conditions. The E.C.U. senses the engine condition and determines the best idle speed at water temperature and gear position. The control unit then sends an electronic signal corresponding to the difference between the best idle speed and the actual idle speed to the A.A.C. valve.

The E.C.U. controlled idle speed feedback is carried out when the following conditions are satisfied.

1) Idle switch "ON" and neutral switch "OFF" at low vehicle speed.
2) Idle switch "ON" and vehicle speed is lower than approx. 4 km/h (2 MPH).

Ignition Timing Control



Ignition timing is controlled, corresponding to the engine operating conditions, by the E.C.U. That is, as the optimum ignition timing in any driving condition has been pre-programmed in the E.C.U., the ignition timing is determined by electrical signals processed in the E.C.U.

The signal from the E.C.U. is transmitted to the power transistor, and controls ignition timing.

Fail-safe System

Air flow meter malfunctioning

When air flow meter output voltage is lower or higher than the preset value while the engine is running, the fuel injection pulse duration is fixed at the preset value (when engine speed is less than approx. 2,000 rpm) or the fuel is not injected (when engine speed is more than approx. 2,000 rpm).

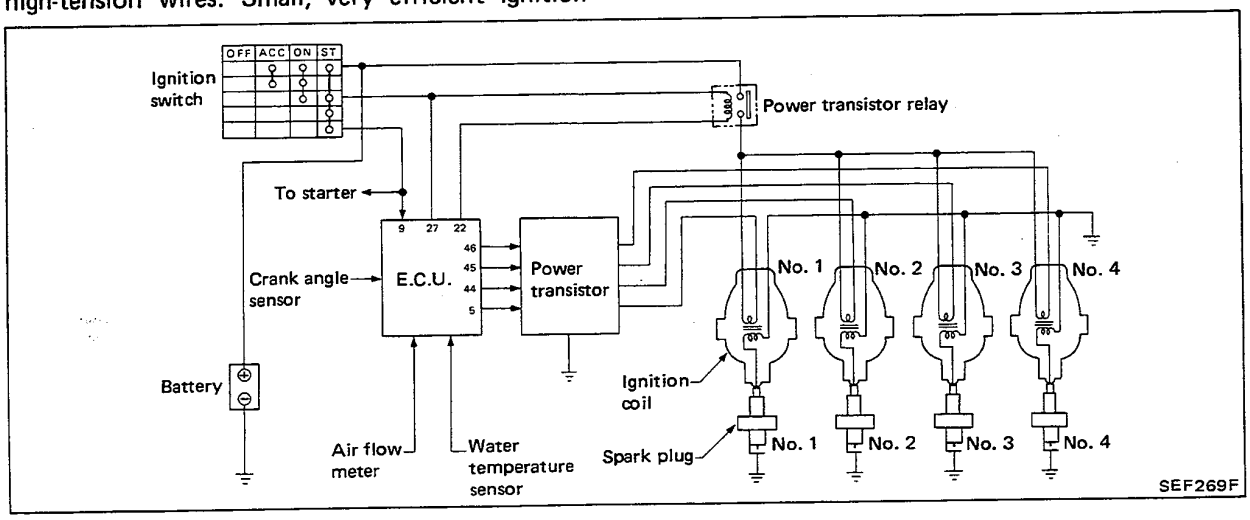
Water temperature sensor malfunctioning

When water temperature sensor output voltage is lower or higher than the specified value, water temperature is fixed at the preset value as follows:

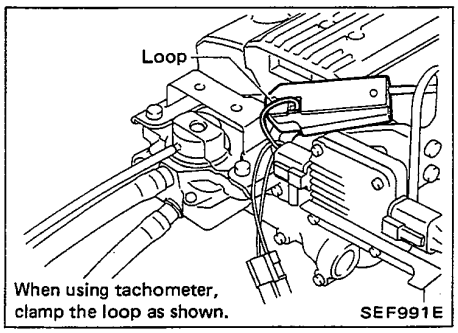
Engine condition	Water temperature preset value °C (°F)
Start	20 (68)
Running	80 (176)

Direct Ignition System

This system has no conventional distributor and high-tension wires. Small, very efficient ignition coils are fitted directly to each spark plug.



Direct Ignition System (Cont'd)



CHECKING IGNITION TIMING AND IDLE SPEED

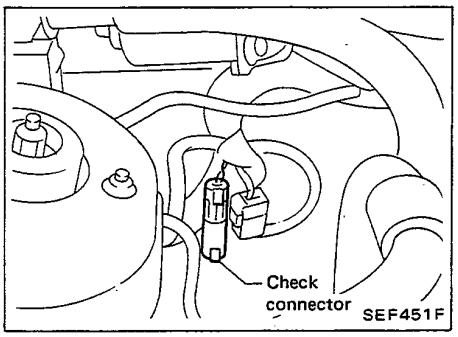
Checking idle speed

Idle speed: 800±50 rpm

If idle speed is not within specific value, refer to MIXTURE RATIO FEEDBACK SYSTEM INSPECTION.

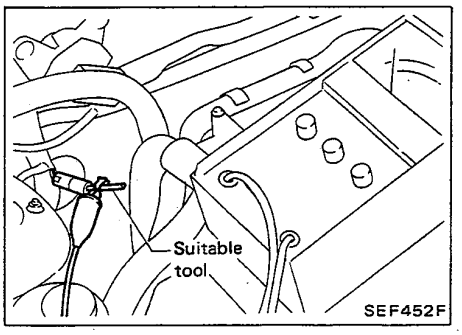
- METHOD A (With pulse type tachometer)

1. Clamp loop wire as shown.

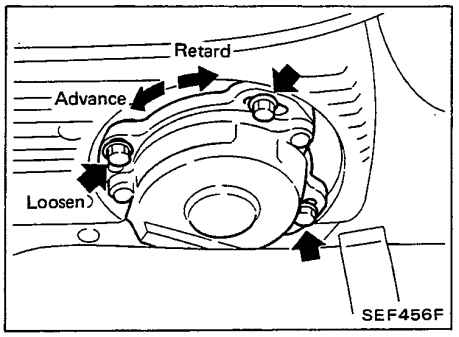


- METHOD B (With voltage type tachometer)

1. Disconnect check connector for tachometer.



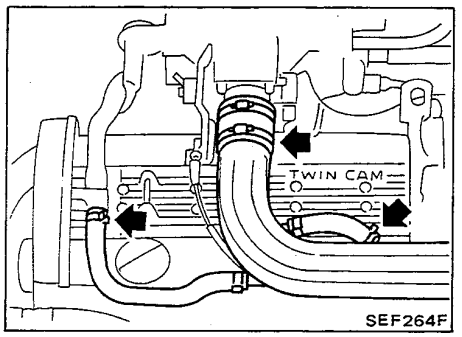
2. Connect tachometer using suitable tool.



Checking ignition timing

Ignition timing: 15°±2° B.T.D.C.

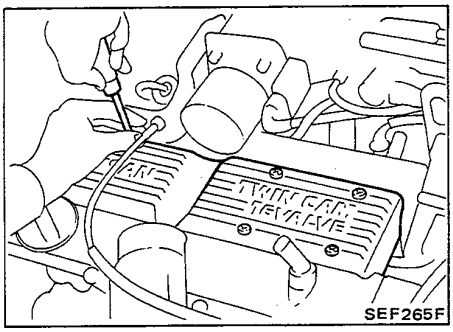
If ignition timing is not within specific value, adjust ignition timing as shown.



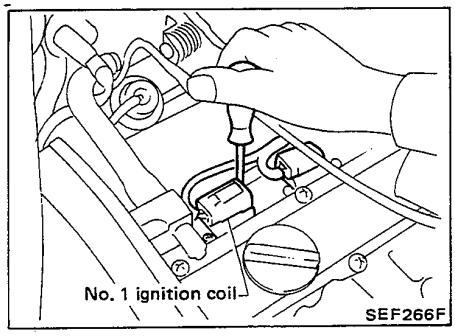
- METHOD A (Without S.S.T.)

1. Disconnect air duct and air hoses.

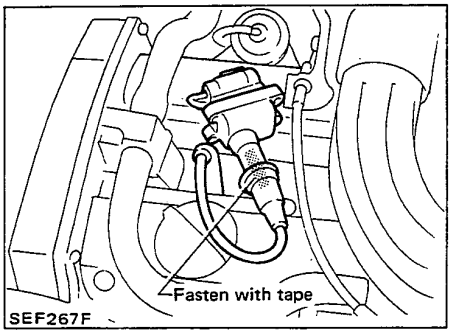
Direct Ignition System (Cont'd)



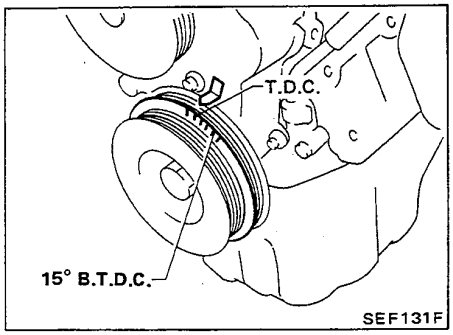
2. Remove ornament cover.
   Acceleration wire does not need removing.



3. Remove No. 1 ignition coil.



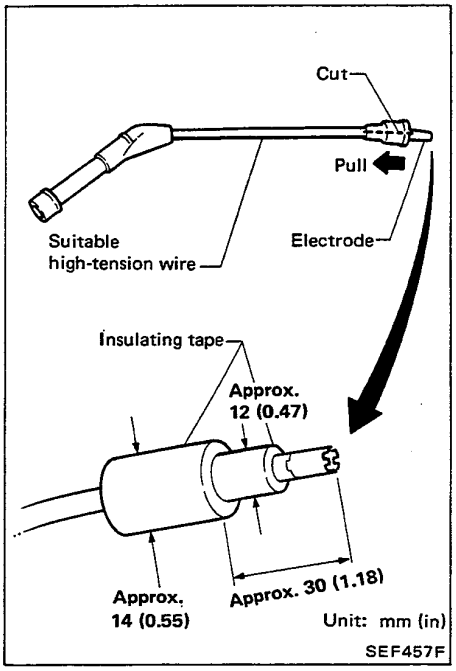
4. Connect No. 1 ignition coil and No. 1 spark plug with suitable high-tension wire as shown, and clamp this wire with timing light clamp.

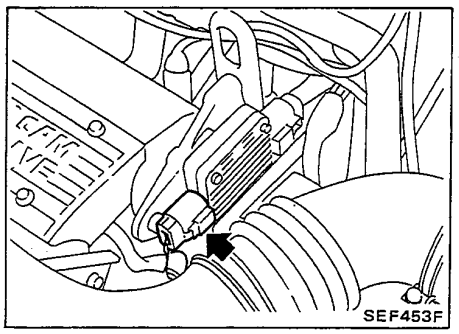


5. Connect air duct and air hoses, then start engine.
   Check ignition timing.
6. Install No. 1 ignition coil and ornament cover, and connect air duct and air hoses.

Direct Ignition System (Cont'd)

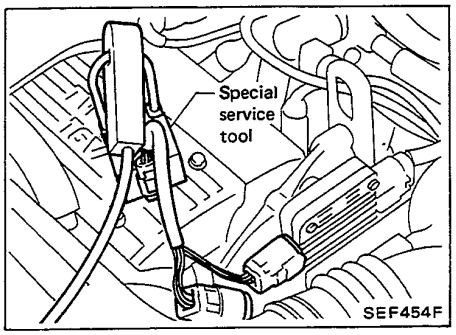
For above procedures, enlarge high-tension wire end as shown.



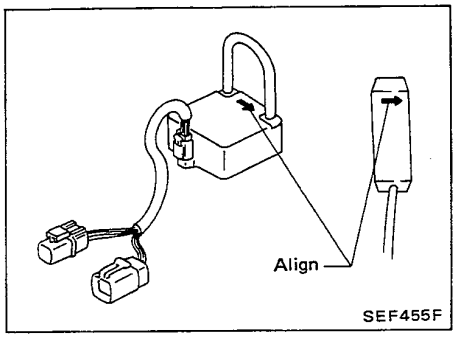


- METHOD B (With S.S.T. KV109D10S0)

1. Disconnect connector of power transistor unit.

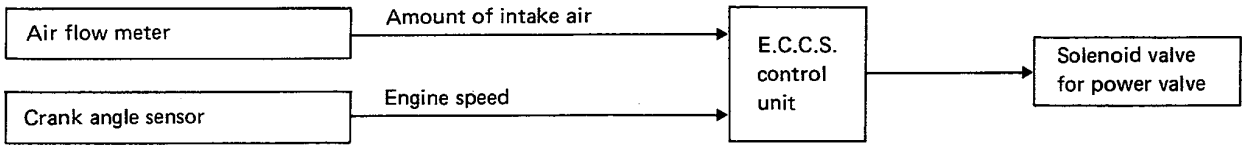


2. Connect S.S.T. and clamp wire as shown.



Align direction marks on S.S.T. and timing light clamp if aligning mark is punched.

Nissan Induction Control System (N.I.C.S.) Control



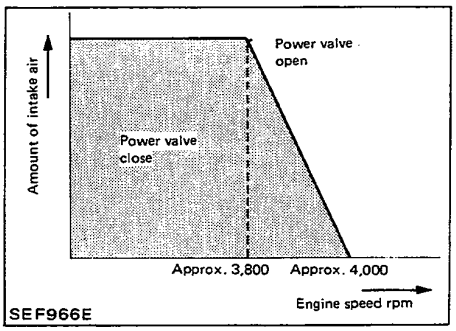
This system has an intake manifold port shut valve (power valve) to the one side of the intake passage for each cylinder.

At low engine speed or low engine load condition, the power valve is closed. Thus the velocity of the air in the intake passage increases, promoting the vapourization of the fuel and producing a swirl in the combustion chamber.

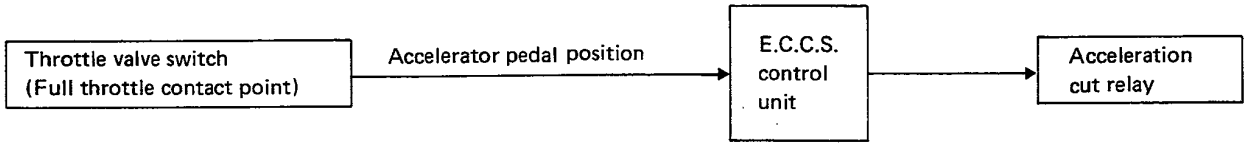
Because of this operation, this system tends to increase the burning speed of mixture gas, improve the fuel consumption, and increase the stability in running condition.

Also, at high speed or heavy engine load condition, this system opens both sides of dual intake passage (power valve is opened). In this condition, this system tends to increase power by improving intake efficiency via reduction of intake flow resistance, intake flow.

The solenoid valve controls power valve's shut/open condition. This solenoid valve is operated by the E.C.U.



Acceleration Cut Control



When full throttle contact point is turned on, (this means accelerator pedal is fully depressed) air conditioner is turned off for a few seconds.

This system improves acceleration when air conditioner is used.

NOTE

Driveability

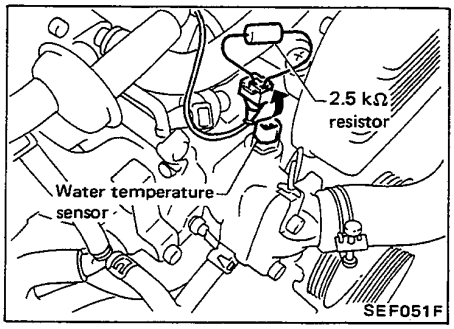
1. Make sure that the following items are in the proper condition.

CHECK DATA:

1) Idle speed
   800±50 rpm
2) Ignition timing
   15°±2° B.T.D.C.
3) Idle CO
   Less than 5% under the following conditions.
   - **Throttle valve switch harness connector disconnected (No A.I.V. controlled condition)**
   - **Water temperature sensor harness connector disconnected and then 2.5 kΩ resistor connected**
   - **Exhaust gas sensor harness connector disconnected**

See page EF & EC-98.

4) Mixture ratio at middle engine speed (Approximately 2,000 rpm).
   Number of simultaneous flashes of E.C.U. inspection green and red lamps:
   9 times or more/10 seconds
5) Idle switch OFF — ON speed
   Idle speed + 250±150 rpm
   If N.G., adjust to the specified value.



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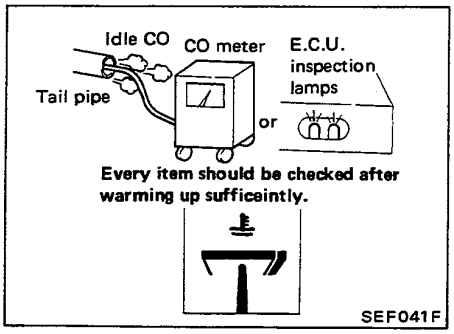
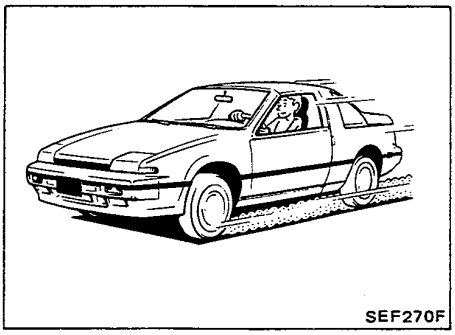


SEF041F

2. Perform driving test.
   Evaluate effectiveness of adjustments by driving vehicle.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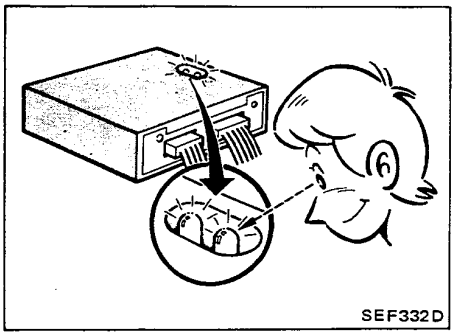
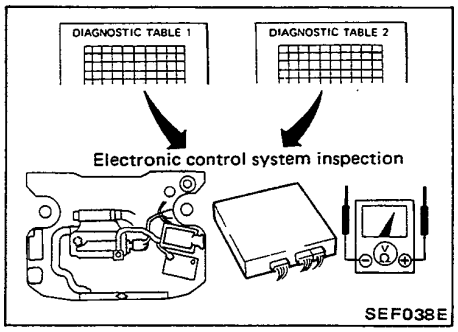
3. Perform E.C.C.S. self-diagnosis.

See page EF & EC-36.


SEF332D



Driveability (Cont'd)

4. If the result of driveability test is unsatisfactory, or malfunctioning conditions are found in performing E.C.C.S. self-diagnosis, perform general inspection and E.C.C.S. system inspection by following DIAGNOSTIC TABLE 1 and 2 in response to driveability trouble items.
   If N.G., repair.

See page EF & EC-33.

5. Perform driving test.
   Re-evaluate vehicle performance after the inspection.

Diagnostic Table 1

SYSTEM INSPECTION TABLE

Sensor & actuator / Reference pages for inspection / System	Crank angle sensor	Air flow meter	Water temperature sensor	Ignition switch	Injector	Throttle valve switch	Neutral switch	Exhaust gas sensor	Air conditioner switch
	EF & EC-54	EF & EC-56	EF & EC-58	Refer to EL section.	EF & EC-78	EF & EC-68	EF & EC-88	EF & EC-80	Refer to HA section.
Fuel injection & mixture ratio feedback control	O	O	O	O	O	O		O	
Ignition timing control	O	O	O	O		O			
A.I.V. control	O	O	O			O			
Fuel pump control				O					
Pressure regulator control	O	O	O	O	O				
Idle speed control	O		O	O		O	O		O
E.G.R. control	O	O	O	O		O			
Power valve control	O	O							
Acceleration cut control						O			O

Sensor & actuator / Reference pages for inspection / System	A.I.V. control solenoid valve	E.G.R. control solenoid valve	Pressure regulator control solenoid valve	Power valve control solenoid valve	A.A.C. valve	Air regulator	Vehicle speed sensor	E.F.I. relay	Detonation sensor	Battery voltage
	EF & EC-82	EF & EC-84	EF & EC-86	EF & EC-90	EF & EC-72	EF & EC-76	EF & EC-70	EF & EC-52	EF & EC-60	–
Fuel injection & mixture ratio feedback control								O		
Ignition timing control								O	O	
A.I.V. control	O							O		
Fuel pump control								O		
Pressure regulator control			O				O	O		
Idle speed control					O	O	O	O		O
E.G.R. control		O						O		
Power valve control				O				O		
Acceleration cut control								O		

This table indicates the inspection items for the E.C.C.S. control system. For each system, it is necessary to check sensors of actuators marked "O".

Diagnostic Table 2

DRIVEABILITY INSPECTION TABLE

INSPECTION ITEM / REFERENCE PAGES FOR INSPECTION / TROUBLE ITEMS CONCERNED WITH DRIVEABILITY			GENERAL INSPECTION																	E.C.C.S. SYSTEM INSPECTION					
			FUEL FLOW SYSTEM				ELECTRIC SYSTEM					AIR FLOW SYSTEM							A.A.C. VALVE		CRANK ANGLE SENSOR			VEHICLE SPEED SENSOR		
			Fuel level	Fuel pump	Fuel filter	Fuel line	Battery	Spark plug	Ignition coil	Alternator	Starter	Air cleaner	Air flow line	E.G.R. B.P.T. valve	A.I.V. control valve	F.I.C.D. solenoid valve	Air regulator	P.C.V.	Short	Open	180° signal noise	180° signal faults	1° signal faults	Short	Open	Poor connection
			–	EF & EC-64	–	–	–	–	–	Refer to EL section.		–	–	EF & EC-108	–	–	EF & EC-76	–	EF & EC-72		EF & EC-54			EF & EC-70		
SURGE	ROAD/ LOAD DRIVING	Heavy load			○	○		◎	○			○	○	○				○			○	○	○			
		Middle load			○	○		◎	○			○	○	◎				○			○	○	○			
		Light load			○	○		◎	○			○	○	◎				○			○	○	○			
	ACCELE-RATING DRIVING	Slow acceleration			○	○		◎	○			○	○	◎				○			○	○	○			
	DECELE-RATING DRIVING	Rapid deceleration						◎	○			○	○	○				○	○	○	○	○	○	○	○	○
		Slow deceleration						◎	○			○	○	○				○	○	○	○	○	○	○	○	○
HESITATION		Rapid acceleration			○	○		◎	○			○	○	○				○			○	○	○			
		Slow acceleration			○	○		◎	○			○	○	○				○			○	○	○			
STUMBLE		Rapid acceleration			○	○		◎	○			○	○	○				○			○	○	○			
		Slow acceleration			○	○		◎	○			○	○	○				○			○	○	○			
BACKFIRE					○	○			○				○					○			○	○	○			
AFTER FIRE								◎	○			○			○			○	○	○	○	○	○			
IDLE STABILITY								◎	○	○		○	○	◎		○	○	○	◎	◎	○	○	○	○	○	○
ENGINE STALL			○	○	○	○	○	◎	○	○		○	○	○		○	○	○	◎	◎	◎	◎	◎			
STARTABILITY			○	○			○	◎	○	○	○	○	○				○	○	○	○	◎	◎	◎			

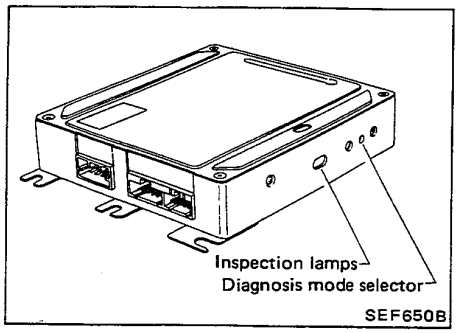
This table indicates the inspection items for each type of symptom. It is necessary for each symptom to check sensors or actuators marked "◎" or "○".
Items marked "◎" have a significant influence no driveability. Prior to items marked "○", check items marked " ".
Improper mixture ratio, improper ignition condition, and an excess of E.G.R. volume can cause any symptom.

Diagnostic Table 2 (Cont'd)

E.C.C.S. SYSTEM INSPECTION

AIR FLOW METER *	WATER TEMPERATURE SENSOR			THROTTLE VALVE SWITCH		EXHAUST GAS SENSOR		INJECTOR	NEUTRAL SWITCH	START SIGNAL		IGNITION SIGNAL		BATTERY VOLTAGE	FUEL PUMP CIRCUIT			E.G.R. CONTROL SOLENOID VALVE		A.I.V. CONTROL SOLENOID VALVE		P.R.V.R. CONTROL SOLENOID VALVE		POWER VALVE CONTROL SOLENOID VALVE (Include check valve)	DETONATION SENSOR
Poor connection	Short	Open	Poor connection	Short	Open	Short	Open	Clogging	Short	Short	Open	Short	Open	Low voltage	Short	Open	Poor connection	Short	Open	Short	Open	Short	Open	Short or open	Short or open
EF & EC-56	EF & EC-58			EF & EC-68		EF & EC-80		–	EF & EC-88	EF & EC-66		EF & EC-60		–	EF & EC-64			EF & EC-84		EF & EC-82		EF & EC-86		EF & EC-90	EF & EC-60
◎	○	○	○			○	○	◎									○	◎	◎						○
◎	○	○	○			○	○	◎									○	◎	◎						○
◎	○	○	○			○	○	◎									○	◎	◎						○
◎	○	○	○	○	○	○	○	◎									○	◎	◎						○
◎	○	○	○	○	○	○	○	◎									○	○	○						○
◎	○	○	○	○	○	○	○	◎									○	○	○						○
◎	○	○	○	○	○	○	○	◎	○								○	○	○					○	○
◎	○	○	○	○	○	○	○	◎	○								○	○	○					○	○
◎	○	○	○	○	○			◎	○								○	○	○			○	○		○
◎	○	○	○	○	○			◎	○								○	○	○			○	○		○
◎	○		○	○	○	○	○	◎	○								○								○
◎		○	○	○	○	○	○	◎										◎	◎	○	○				○
○	○	○	○	○	○	○	○	◎	○								○	○	○						○
◎	○	○	○	○	○	○	○	◎	○			○	○	○	○	○	○					○	○		○
○	○	○	○					◎	○	○	○	○	○	○	○	○	○					○	○		○

* If air flow meter circuit is short or open, the fail-safe system operates and engine revolution does not rise to approx. 2,000 rpm or more.



Description

The self-diagnosis is useful to diagnose malfunctions in major sensors and actuators of the E.C.C.S. system. There are 5 modes in the self-diagnosis system.

1. **Mode I – Mixture ratio feedback control monitor A**

- During closed loop condition:
  The green inspection lamp turns ON when lean condition is detected and goes OFF by rich condition.
  With clamping, mixture conditions (lean or rich) just before clamping are maintained.
- During open loop condition:
  The green inspection lamp keeps OFF.

2. **Mode II – Mixture ratio feedback control monitor B**
   The green inspection lamp function is the same as Mode I.

- During closed loop condition:
  The red inspection lamp turns ON and OFF simultaneously with the green inspection lamp when the mixture ratio is controlled within the specified value.
- During open loop condition:
  The red inspection lamp stays OFF.

3. **Mode III – Self-diagnosis**
   This mode is the same as the former self-diagnosis in self-diagnosis mode.
4. **Mode IV – Switches ON/OFF diagnosis**
   During this mode, the inspection lamps monitor the switch ON-OFF condition.

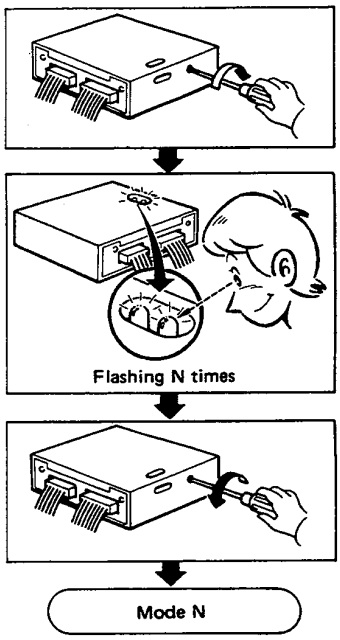
- Idle switch
- Starter switch
- Vehicle speed sensor

5. **Mode V – Real time diagnosis**
   The moment the malfunction is detected, the display will be presented immediately. That is, the condition at which the malfunction occurs can be found by observing the inspection lamps during driving test.

Description (Cont'd)

SWITCHING THE MODES

1. Turn ignition switch "ON".
2. Turn diagnostic mode selector on E.C.U. fully clockwise and wait the inspection lamps flash.
3. Count the number of the flashing time, and after the inspection lamps have flashed the number of the required mode, turn diagnostic mode selector fully counterclockwise immediately.



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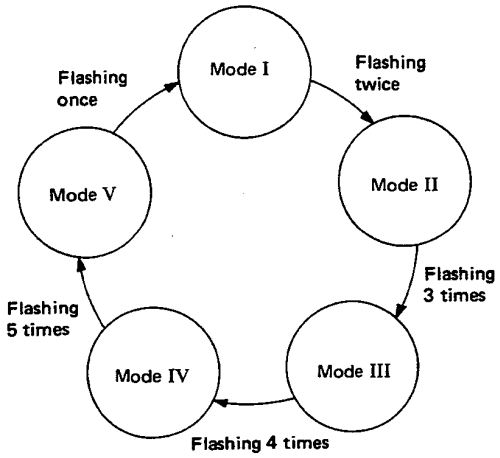

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NOTE:

When the ignition switch is turned off during diagnosis, in each mode, and then turned back on again after the power to the E.C.U. has dropped off completely, the diagnosis will automatically return to Mode I.

The stored memory would be lost if:

1. Battery terminal is disconnected.
2. After selecting Mode III, Mode IV is selected.
   However, if the diagnostic mode selector is kept turned fully clockwise, it will continue to change in the order of Mode I → II → III → IV → V → I ... etc., and in this state the stored memory will not be erased.

Modes I & II — Mixture Ratio Feedback Control Monitors A & B

In these modes, the control unit provides the Air-fuel ratio monitor presentation and the Air-fuel ratio feedback coefficient monitor presentation.

<table>
<tr><th rowspan="2">Mode</th><th rowspan="2">LED</th><th rowspan="2">Engine stopped</th><th colspan="4">Engine running</th></tr>
<tr><th>Open loop condition</th><th colspan="3">Closed loop condition</th></tr>
<tr><td rowspan="2">Mode I
(Monitor A)</td><td>Green</td><td>ON</td><td>OFF</td><td colspan="3">• OFF: rich condition
• ON: lean condition
• Maintains conditions just before clamping</td></tr>
<tr><td>Red</td><td>ON</td><td>OFF</td><td colspan="3">OFF</td></tr>
<tr><td rowspan="3">Mode II
(Monitor B)</td><td>Green</td><td>ON</td><td>OFF</td><td colspan="3">• OFF: rich condition
• ON: lean condition
• Maintains conditions just before clamping</td></tr>
<tr><td rowspan="2">Red</td><td rowspan="2">OFF</td><td rowspan="2">OFF</td><td colspan="3">Compensating mixture ratio</td></tr>
<tr><td>More than 5% rich</td><td>Between 5% lean and 5% rich</td><td>More than 5% lean</td></tr>
<tr><td>OFF</td><td>Synchronized with green LED</td><td>ON</td></tr>
</table>

Mode III — Self-Diagnostic System

The E.C.U. constantly monitors the function of these sensors and actuators, regardless of ignition key position. If a malfunction occurs, the information is stored in the E.C.U. and can be retrieved from the memory by turning on the diagnostic mode selector, located on the side of the E.C.U. When activated, the malfunction is indicated by flashing a red and a green L.E.D. (Light Emitting Diode), also located on the E.C.U. Since all the self-diagnostic results are stored in the E.C.U.'s memory even intermittent malfunctions can be diagnosed.

A malfunctioning part's group is indicated by the number of both the red and the green L.E.D.s flashing. First, the red L.E.D. flashes and the green flashes follow. The red L.E.D. refers to the number of tens while the green one refers to the number of units. For example, when the red L.E.D. flashes once and then the green one flashes twice, this means the number "12" showing the air flow meter signal is malfunctioning. In this way, all the problems are classified by the code numbers.

- **When engine fails to start, crank engine more than two seconds before starting self-diagnosis.**
- **Before starting self-diagnosis, do not erase stored memory. If doing so, self-diagnosis function for intermittent malfunctions would be lost.**

The stored memory would be lost if:

1. **Battery terminal is disconnected.**
2. **After selecting Mode III, Mode IV is selected.**

DISPLAY CODE TABLE

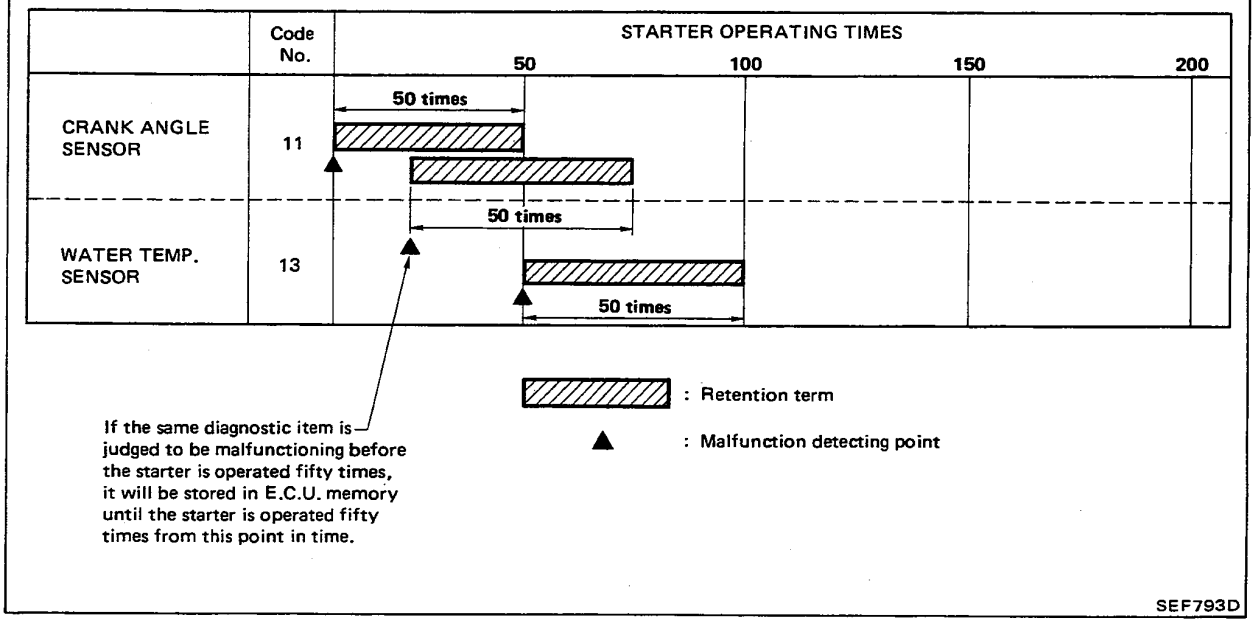
Code No.	Detected items
11	Crank angle sensor circuit
12	Air flow meter circuit
13	Water temperature sensor circuit
21	Ignition signal
34	Detonation sensor
44	No malfunctioning in the above circuit

Mode III — Self-Diagnostic System (Cont'd)

RETENTION OF DIAGNOSTIC RESULTS

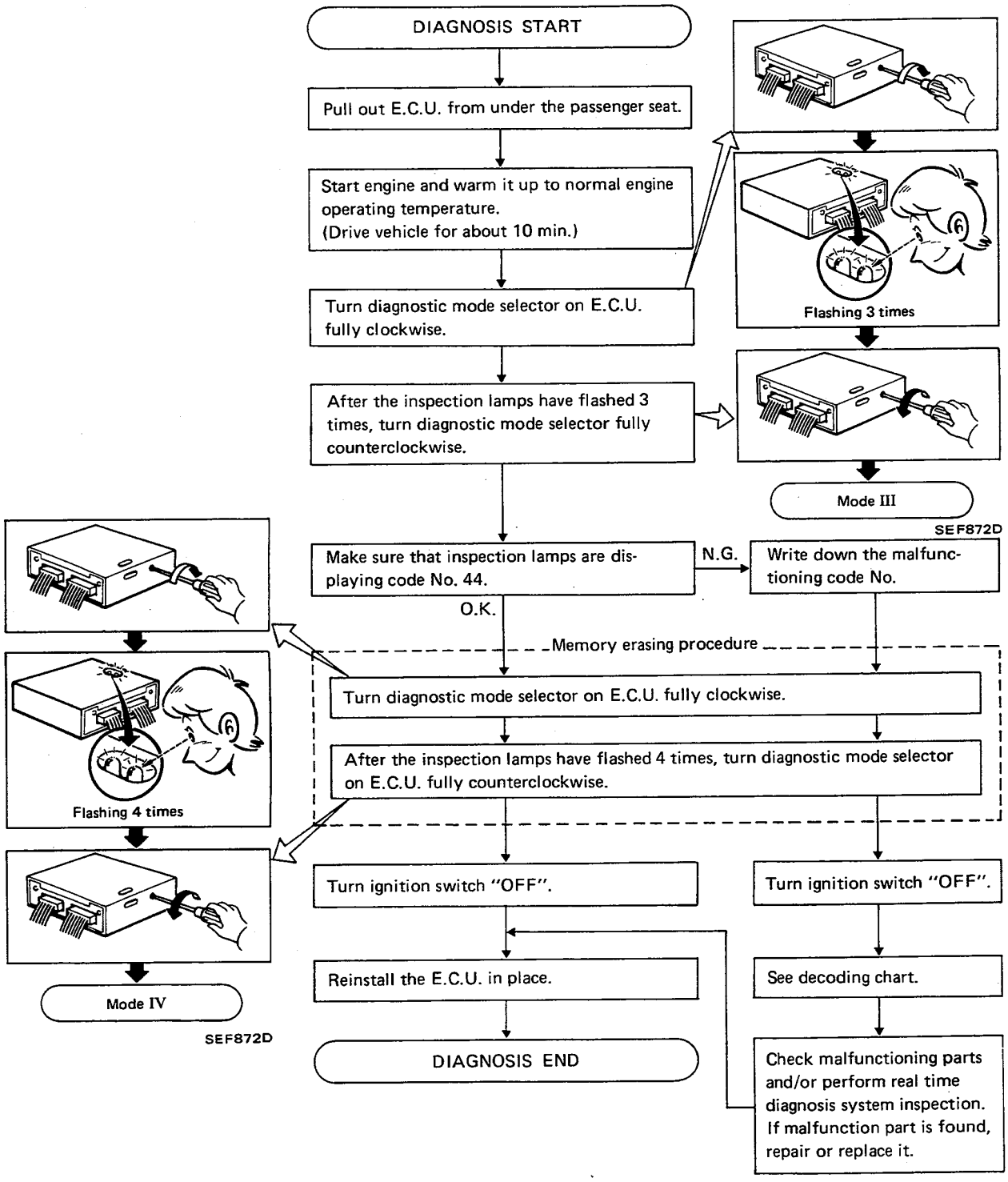
The diagnostic result is retained in E.C.U. memory until the starter is operated fifty times after a diagnostic item is judged to be malfunctioning. The diagnostic result will then be cancelled automatically. If a diagnostic item which has been judged to be malfunctioning and stored in memory is again judged to be malfunctioning before the starter is operated fifty times, the second result will replace the previous one. It will be stored in E.C.U. memory until the starter is operated fifty times more.

RETENTION TERM CHART (Example)



Mode III — Self-Diagnostic System (Cont'd)

SELF-DIAGNOSTIC PROCEDURE



CAUTION:

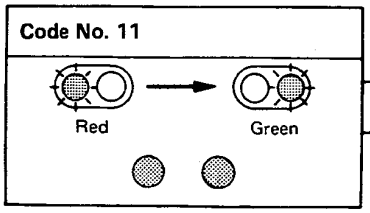
During displaying code No. in self-diagnosis mode (mode III), if the other diagnostic mode should be done, make sure to write down the malfunctioning code No. before turning diagnostic mode selector on E.C.U. fully clockwise, or select the diagnostic mode after turning switch "OFF". Otherwise self-diagnosis information stored in E.C.U. memory until now would be lost.

Mode III — Self-Diagnostic System (Cont'd)

DECODING CHART

Display code	Malfunctioning circuit or parts	Control unit shows a malfunction signal when the following conditions are detected.

CRANK ANGLE SENSOR



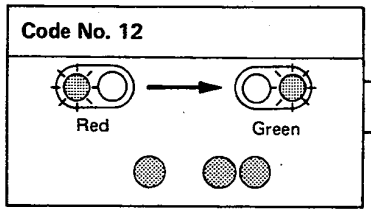
Crank angle sensor circuit

- Either 1° or 180° signal is not entered for the first few seconds during engine cranking.
- Either 1° or 180° signal is not input often enough while the engine speed is higher than the specified rpm.

SYSTEM INSPECTION
See page EF & EC-54.

SEF042F

AIR FLOW METER



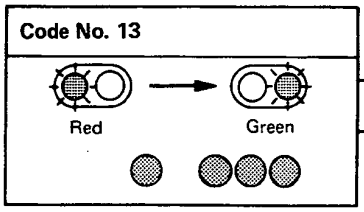
Air flow meter circuit

- The air flow meter circuit is open or shorted.
  (An abnormally high or low voltage is entered.)

SYSTEM INSPECTION
See page EF & EC-56.

SEF043F

WATER TEMPERATURE SENSOR



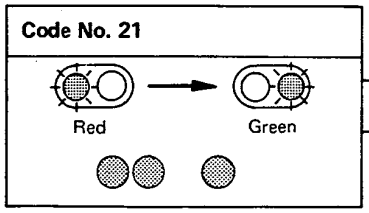
Water temperature circuit

- The water temperature sensor circuit is open or shorted.
  (An abnormally high or low output voltage is entered.)

SYSTEM INSPECTION
See page EF & EC-58.

SEF044F

IGNITION SIGNAL



Ignition signal circuit

- The circuit between power transistor unit and E.C.U. is opened.

SYSTEM INSPECTION
See page EF & EC-60.

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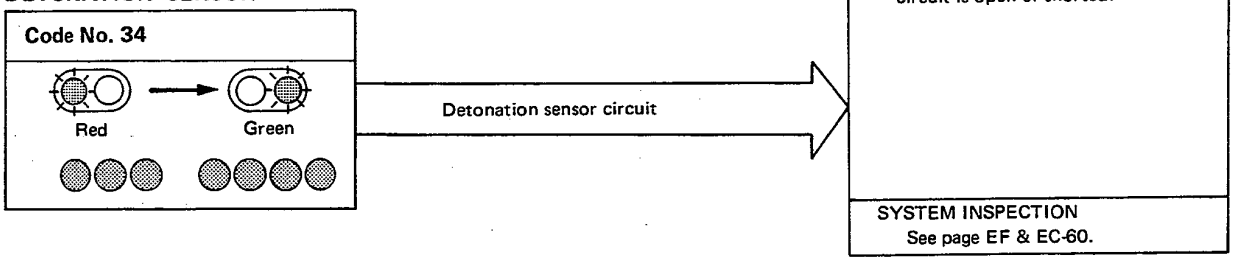
Mode III — Self-Diagnostic System (Cont'd)

Display code	Malfunctioning circuit or parts	Control unit shows a malfunction signal when the following conditions are detected
DETONATION SENSOR Code No. 34 Red → Green	Detonation sensor circuit	• The detonation sensor circuit is open or shorted. SYSTEM INSPECTION See page EF & EC-60.



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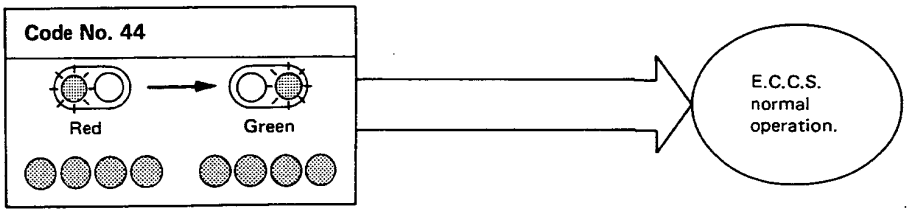
Display code	Malfunctioning circuit or parts	Control unit shows a malfunction signal when the following conditions are detected
Code No. 44 Red → Green		E.C.C.S. normal operation.



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Mode IV — Switches ON/OFF Diagnostic System

In switches ON/OFF diagnosis system, ON/OFF operation of the following switches can be detected continuously.

- Idle switch
- Starter switch
- Vehicle speed sensor

(1) Idle switch & Starter switch

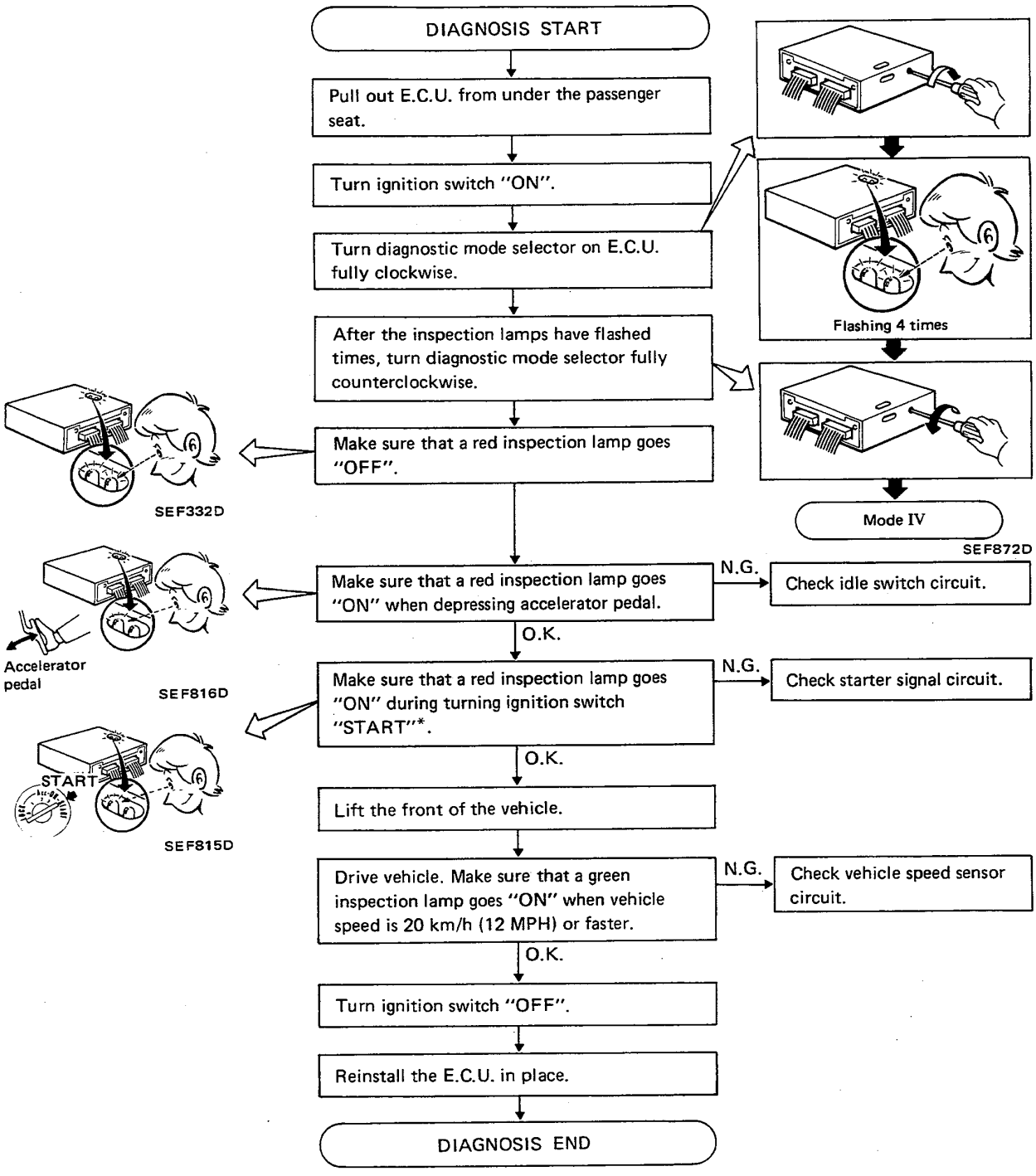
The switches ON/OFF status at the point when mode IV is selected is stored in E.C.U. memory. When either switch is turned from "ON" to "OFF" or "OFF" to "ON", the red L.E.D. on E.C.U. alternately comes on and goes off each time switching is detected.

(2) Vehicle Speed Sensor

The switches ON/OFF status at the point when mode IV is selected is stored in E.C.U. memory. When vehicle speed is 20 km/h (12 MPH) or slower, the green L.E.D. on E.C.U. is off. When vehicle speed exceeds 20 km/h (12 MPH), the green L.E.D. on E.C.U. comes "ON".

Mode IV — Switches ON/OFF Diagnostic System (Cont'd)

SELF-DIAGNOSTIC PROCEDURE



CAUTION:

- ***If ignition switch is turned to "START" an even number of times, a red inspection lamp goes "OFF" when depressing accelerator pedal.**
- **For safety, do not turn front wheel at higher speed than required.**

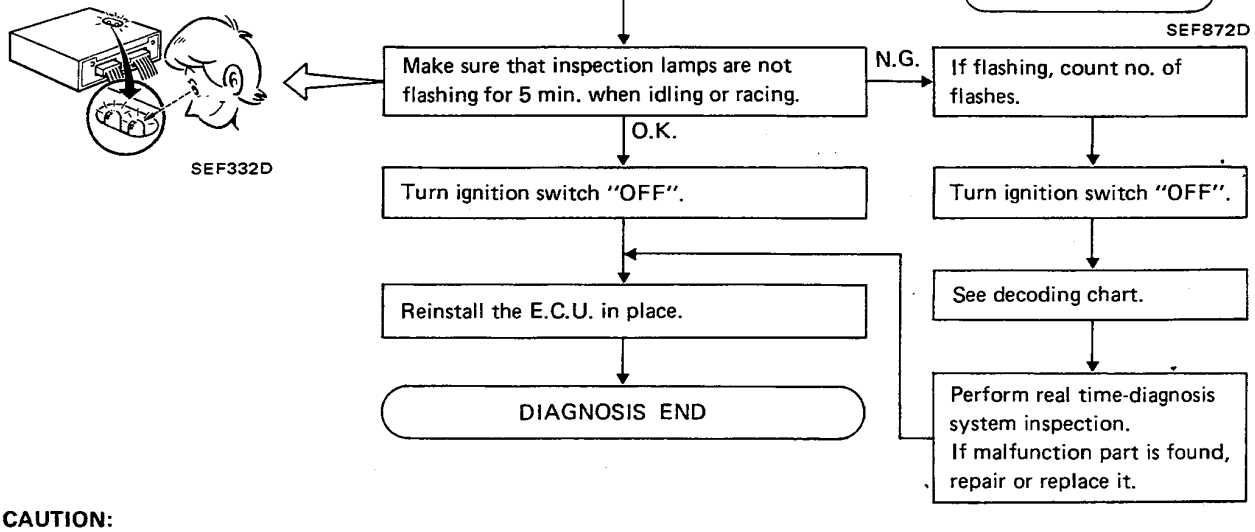
Mode V — Real Time Diagnostic System

In real time diagnosis, if any of the following items are judged to be faulty, a malfunction is indicated immediately.

- Crank angle sensor (180° signal & 1° signal)
- Ignition signal
- Air flow meter output signal

Consequently, this diagnosis is a very effective measure to diagnose whether the above systems cause the malfunction or not, during driving test. Compared with self-diagnosis, real time diagnosis is very sensitive, and can detect malfunctioning conditions in a moment. Further, items regarded to be malfunctions in this diagnosis are not stored in E.C.U. memory.

SELF-DIAGNOSITC PROCEDURE

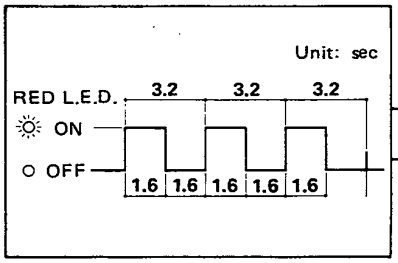
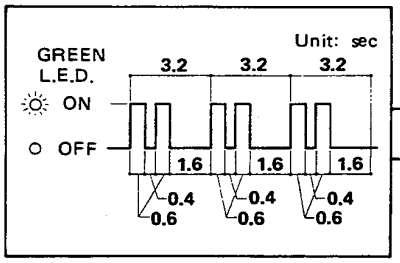
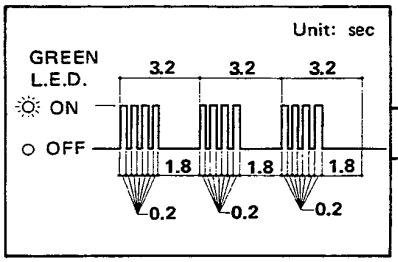


CAUTION:

In real time diagnosis, pay attention to inspection lamp flashing. E.C.U. displays the malfunction code only once, and does not memorize the inspection.

Mode V — Real Time Diagnostic System (Cont'd)

DECODING CHART

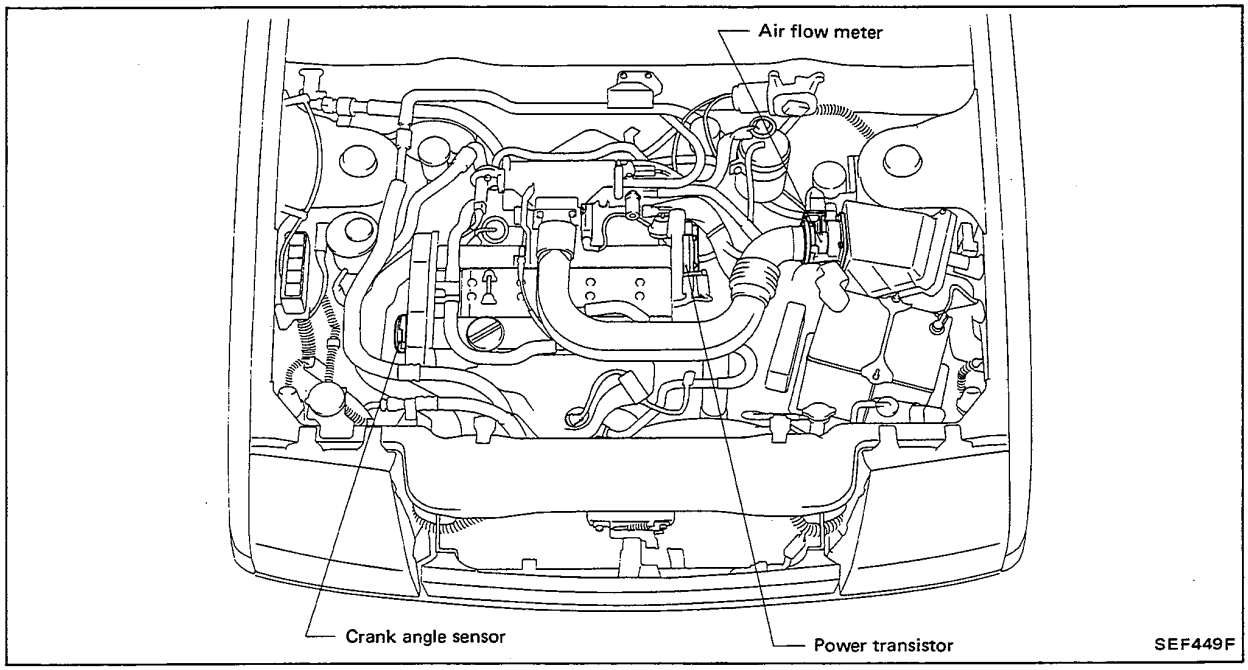
Display presentation	Malfunction circuit or parts	Control unit shows a malfunction signal when the following conditions are detected. (Compare with Self Diagnosis — Mode III.)
CRANK ANGLE SENSOR 	Malfunction of crank angle sensor circuit	The 1° or 180° signal is momentarily missing, or, multiple, momentary noise signals enter. REAL TIME DIAGNOSITC INSPECTION See page EF & EC-54.
SEF047F		
AIR FLOW METER 	Malfunction of air flow meter circuit	Abnormal, momentary increase in air flow meter output signal REAL TIME DIAGNOSITC INSPECTION See page EF & EC-56.
SEF048F		
IGNITION SIGNAL 	Malfunction of ignition signal	Signal from the primary ignition coil momentarily drops off. REAL TIME DIAGNOSITC INSPECTION See page EF & EC-60.
SEF049F		

Mode V — Real Time Diagnostic System (Cont'd)

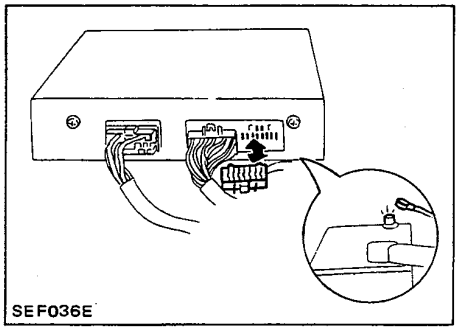
REAL TIME DIAGNOSTIC INSPECTION

Crank Angle Sensor, Air Flow Meter and Ignition Signal

Check sequence	Check items	Check conditions	Check parts			If malfunction, perform the following items.
			Harness connectors	Sensor & actuator	E.C.U. connectors	
1	Tap harness connector or component during real time diagnosis.	During real time diagnosis	O	O	O	Go to check item 2.
2	Check harness continuity at connector.	Engine stopped	O	X	X	Go to check item 3.
3	Disconnect harness connector, and then check dust adhesion to harness connector.	Engine stopped	O	X	O	Clean terminal surface.
4	Check pin terminal bend.	Engine stopped	X	X	O	Take out bend.
5	Reconnect harness connector and then recheck harness continuity at connector.	Engine stopped	O	X	X	Replace terminal.
6	Tap harness connector or component during real time diagnosis.	During real time diagnosis	O	O	O	If malfunction codes are displayed during real time diagnosis, replace terminal.

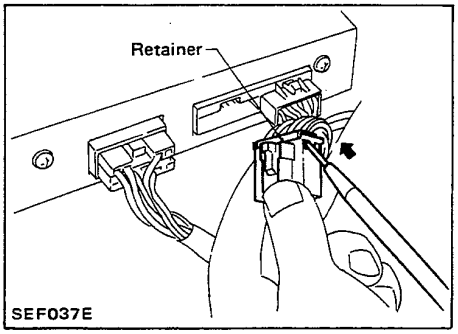


NOTE


SEF036E

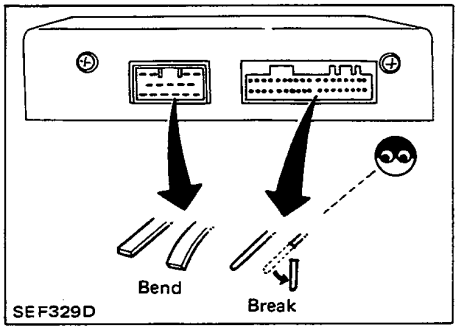
CAUTION:

1. Before connecting or disconnecting E.C.U. harness connector to or from any E.C.U., be sure to turn the ignition switch to the "OFF" position and disconnect the negative battery terminal in order not to damage E.C.U. as battery voltage is applied to E.C.U. even if ignition switch is turned off. Otherwise, there may be damage to the E.C.U.



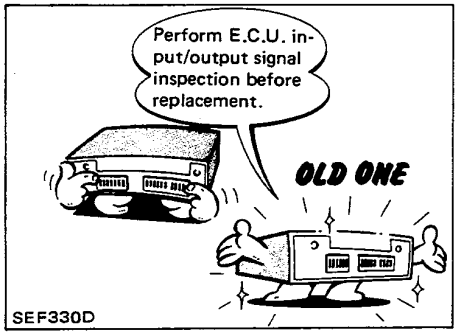
SEF037E

2. When performing E.C.U. input/output signal inspection, remove pin terminal retainer from connectors to make it easier to insert tester probe into connector.



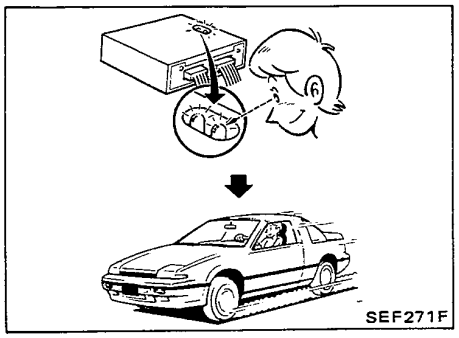
SEF329D

3. When connecting pin connectors into E.C.U. or disconnecting them from E.C.U., take care not to damage pin terminal of E.C.U. (Bend or break).
4. Make sure that there are not any bends or breaks on E.C.U. pin terminal, when connecting pin connectors into E.C.U.

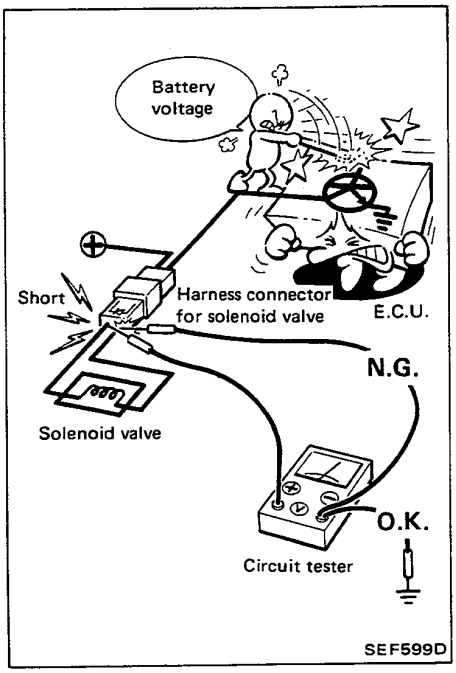


SEF330D

5. Before replacing E.C.U., perform E.C.U. input/output signal inspection and make sure whether E.C.U. functions properly or not. (See page EF & EC-93.)


SEF271F

6. After performing this "ELECTRONIC CONTROL SYSTEM INSPECTION", perform E.C.C.S. self-diagnosis and driving test.



7. When measuring supply voltage of E.C.U. controlled components with a circuit tester, separate one tester probe from the other.
   If the two tester probes accidentally make contact with each other during measurement, the circuit will be shorted, resulting in damage to the power transistor of the control unit.

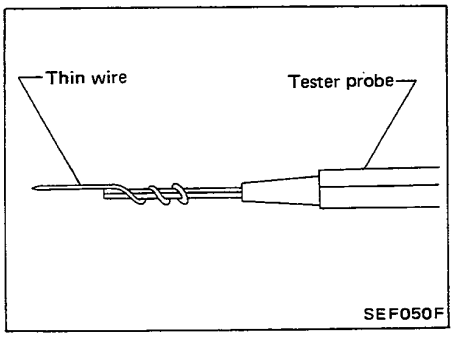
8. When measuring voltage or resistance at connector with tester probes, there are two methods of measurement; one is done from terminal side and the other from harness side. Before measuring, confirm symbol mark again.

   H.S. : Inspection should be done from harness side.

   T.S. : Inspection should be done from terminal side.

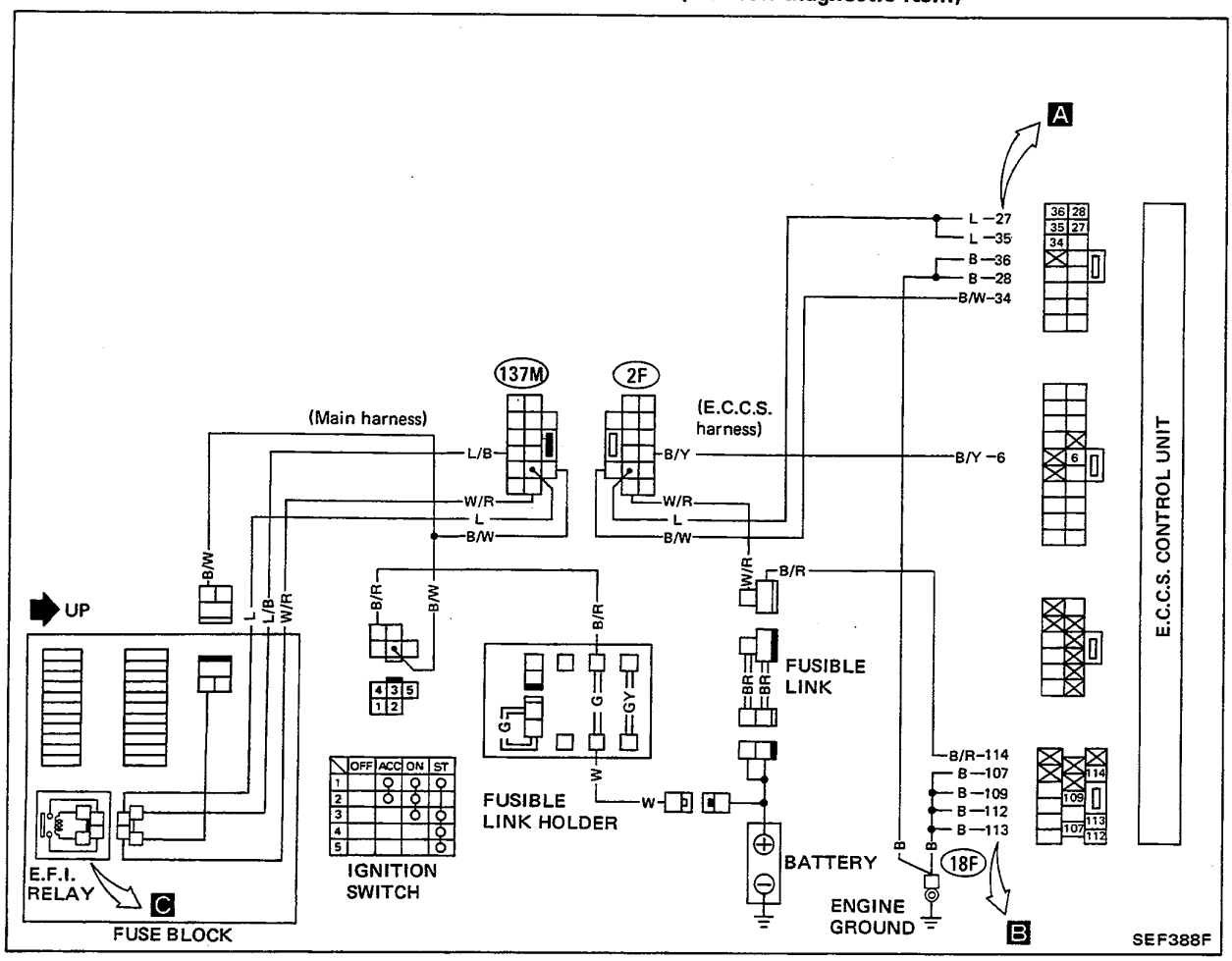
   Refer to GI section.

9. As for continuity check of joint connector, refer to EL section.

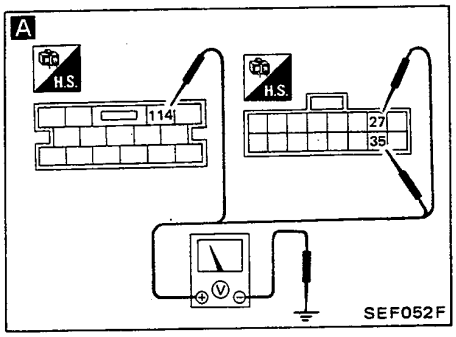


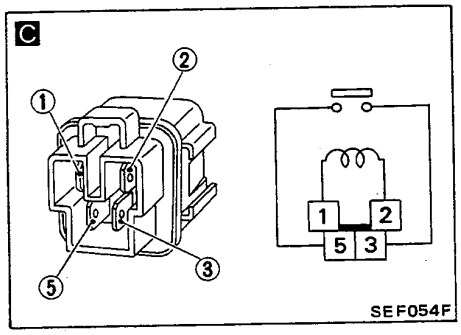
10. Improve tester probe as shown to perform test easily.
11. For the first trouble-shooting procedure, perform POWER SOURCE & GROUND CIRCUIT FOR E.C.U. check.

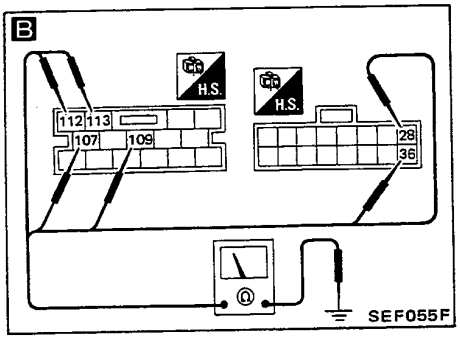
POWER SOURCE & GROUND CIRCUIT FOR E.C.U. (Not self-diagnostic item)



POWER SOURCE & GROUND CIRCUIT FOR E.C.U. (Not self-diagnostic item)







INSPECTION START

A

Check power source for E.C.U.
1) Turn ignition switch "ON".
2) Check voltage between terminals (27), (35), (114) and ground.
Voltage: Battery voltage

N.G. (114)

O.K.

N.G. (27), (35)

B

1) Turn ignition switch "OFF".
2) Check resistance between terminals (28), (36), (107), (109), (112), (113) and ground.
Resistance:
Approximately 0Ω
If N.G., repair harness or connectors.

INSPECTION END

Repair harness or connectors.

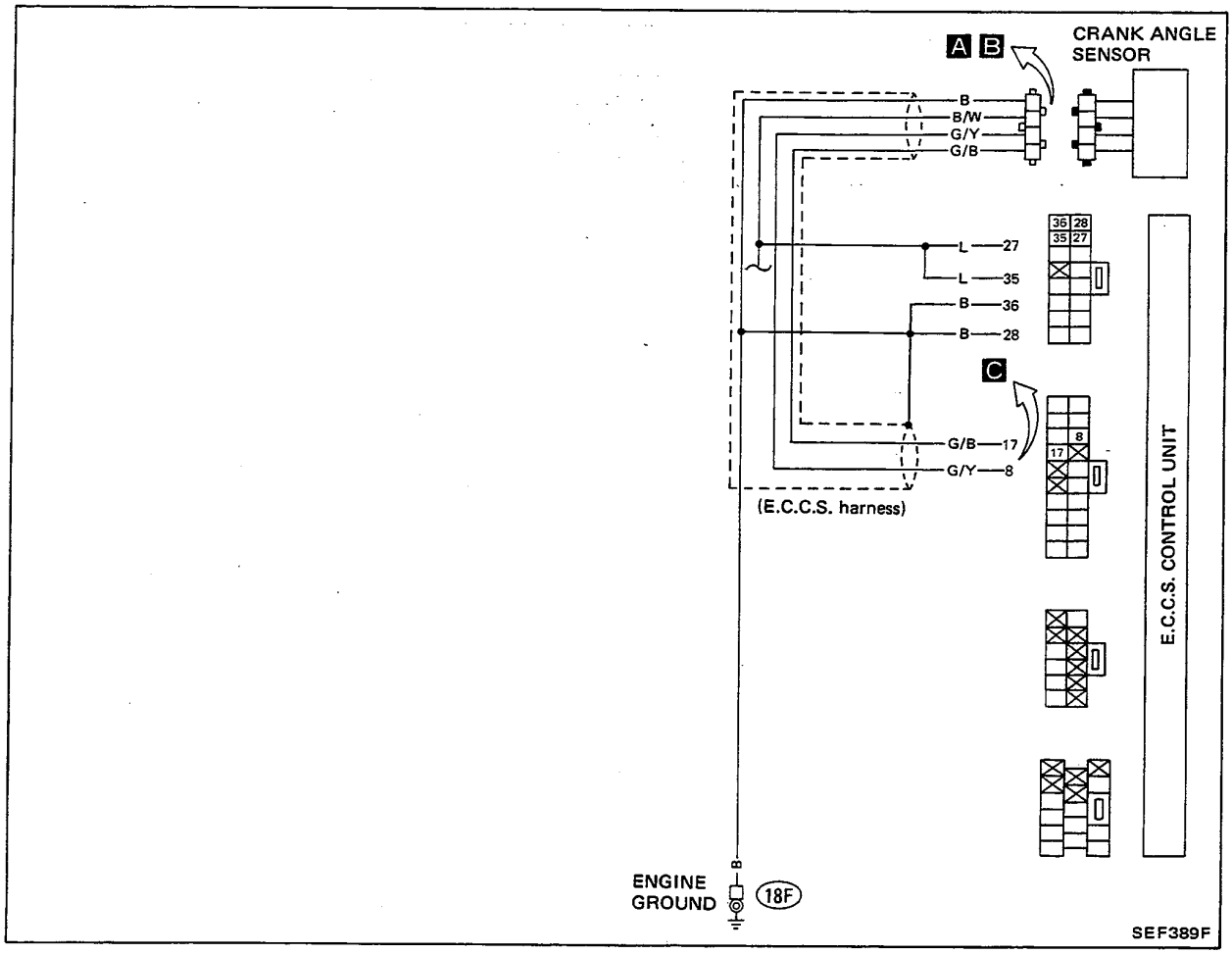
C

Check E.F.I. relay.

Condition	Continuity between terminals (3) and (5)
Supply 12V direct current between terminals (1) and (2)	Yes
Not supply	No

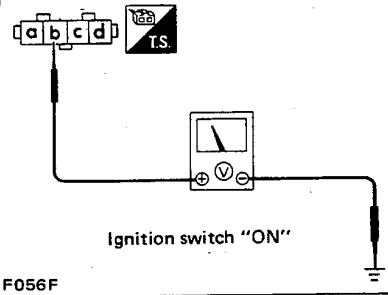
If N.G., replace E.F.I. relay.

CRANK ANGLE SENSOR (Code No. 11)



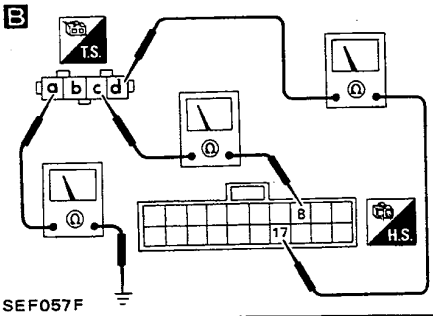
CRANK ANGLE SENSOR (Code No. 11)

A



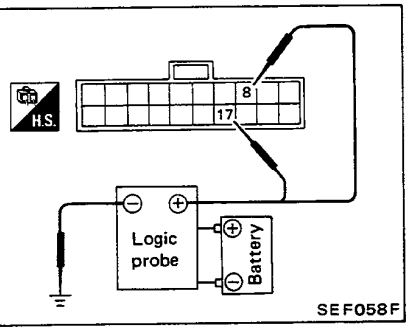
SEF056F

B



SEF057F

C



SEF058F

INSPECTION START

Perform self-diagnosis (Mode III).
Is code No. 11 indicated?

No → INSPECTION END

Yes

A

Check power source.
1) Turn ignition switch "ON".
2) Check voltage between terminal ⓑ and ground.
Voltage: Battery voltage
If N.G., repair harness or connectors.

O.K.

B

1) Turn ignition switch "OFF".
2) Check continuity between terminal ⓐ and ground, terminals ⓒ and ⑧ and terminals ⓓ and ⑰.
Resistance:
Approximately 0Ω
If N.G., repair harness or connectors.

O.K.

C

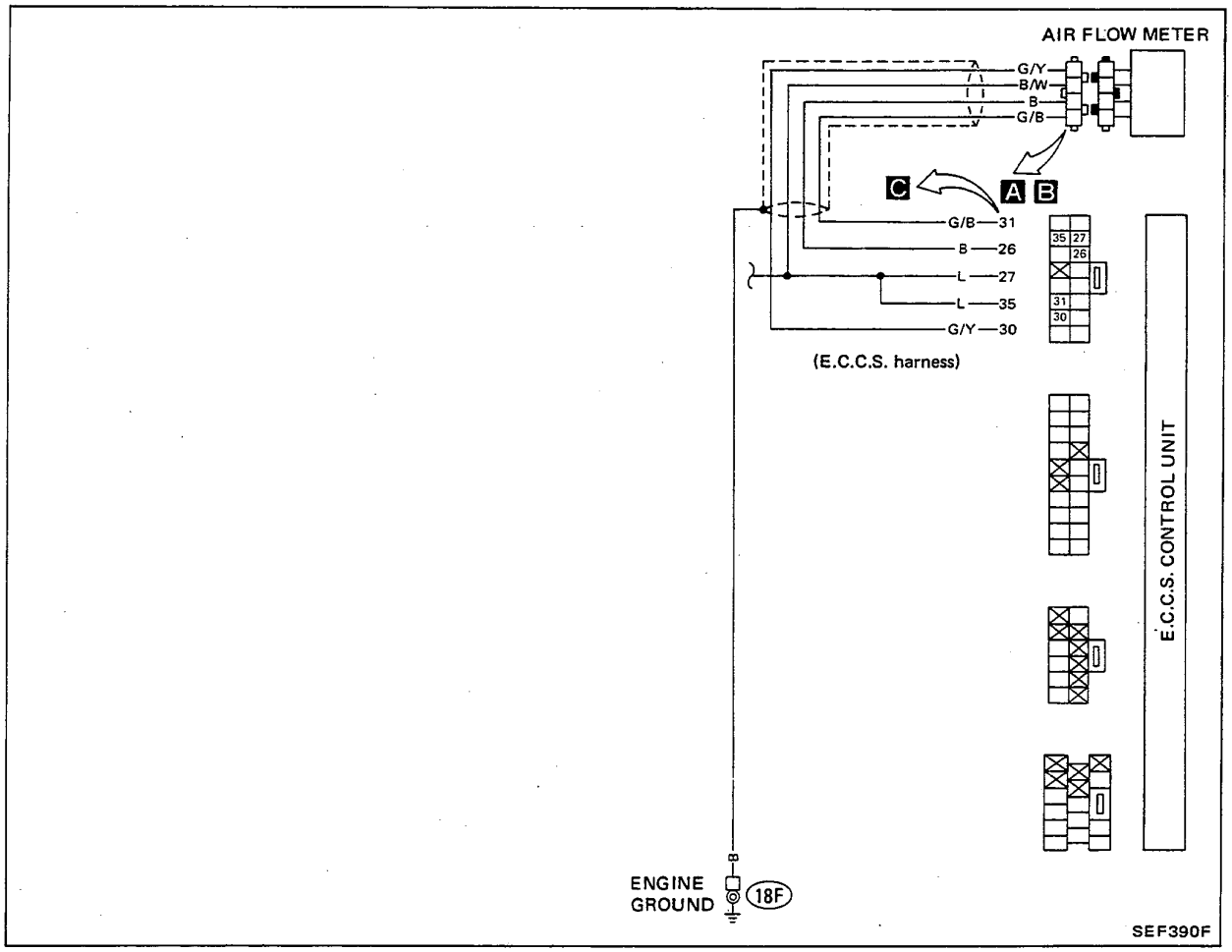
Check E.C.U. input signals.
1) Reconnect crank angle sensor harness connector.
2) Start engine.
3) Check that pulse signals exist in E.C.U. terminals ⑧ and ⑰ with logic probe.
Pulse signals should exist.
⑧ : 1° signal
⑰ : 180° signals

O.K. → INSPECTION END

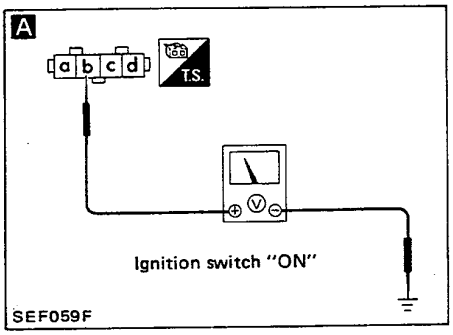
N.G.

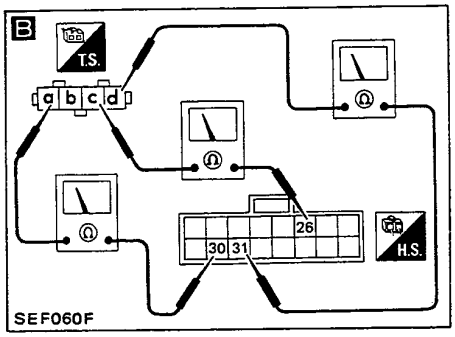
Replace crank angle sensor.

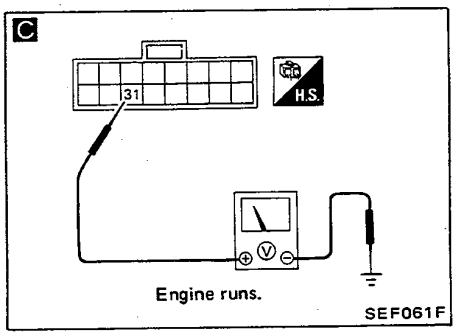
AIR FLOW METER (Code No. 12)



AIR FLOW METER (Code No. 12)







INSPECTION START

Perform self-diagnosis (Mode III).
Is code No. 12 indicated?

No → INSPECTION END

Yes

A

Check power source.
1) Turn ignition switch "ON".
2) Check voltage between terminal ⓑ and ground.
Battery voltage should exist.
If N.G., repair harness or connectors.

O.K.

B

Check continuity between terminals ⓐ and ㉚, ⓒ and ㉖ and ⓓ and ㉛.
Resistance:
Approximately 0Ω
If N.G., repair harness or connectors.

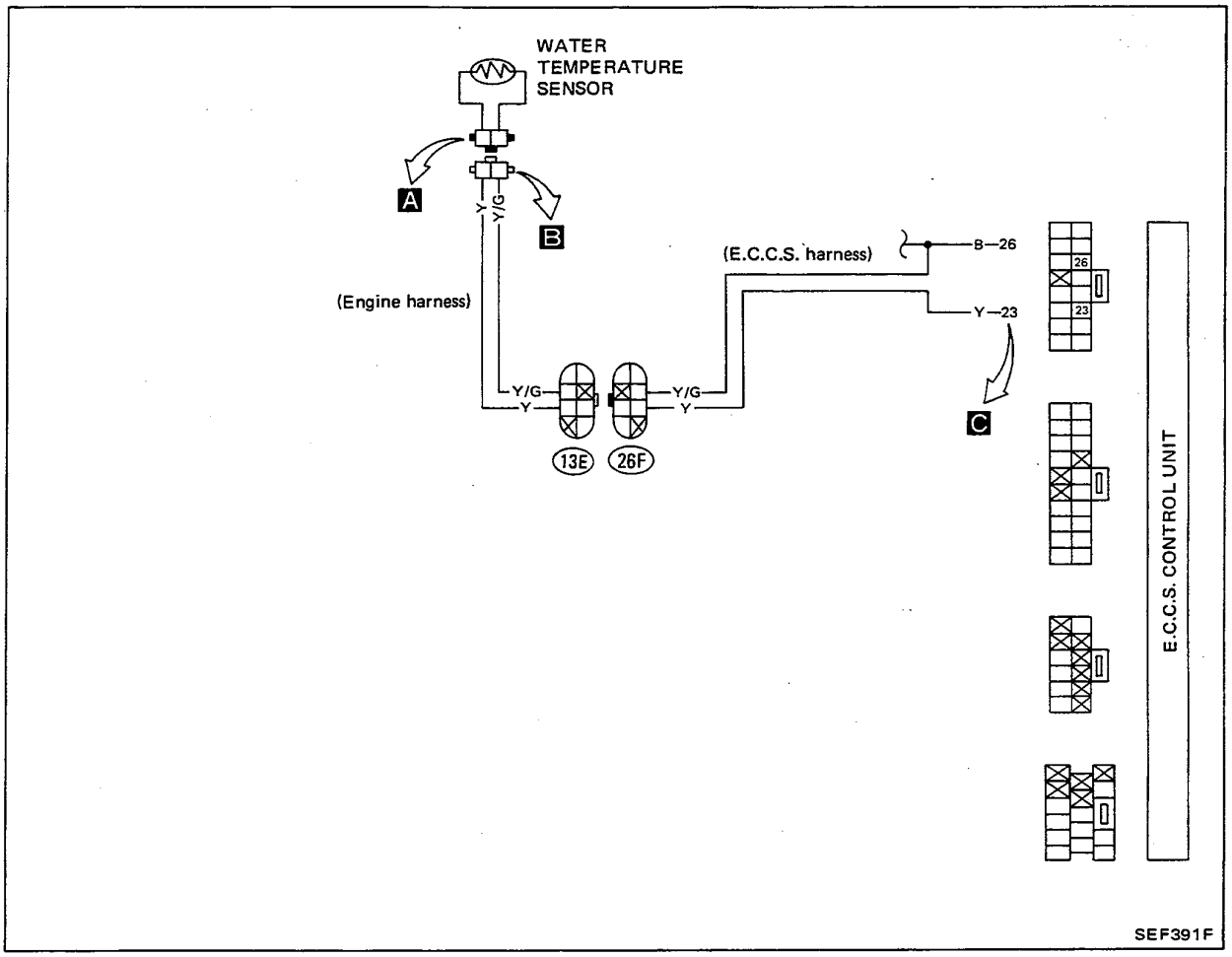
O.K.

C

Check input signal.
1) Reconnect air flow meter harness connector.
2) Start engine.
3) Make sure that voltage exists between E.C.U. terminal ㉛ and ground.
Voltage:
Approximately 1.5V (at idle)

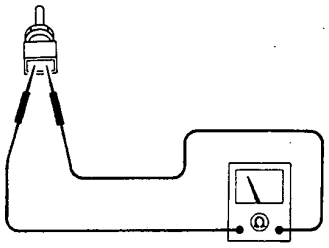
INSPECTION END

WATER TEMPERATURE SENSOR (Code No. 13)



WATER TEMPERATURE SENSOR (Code No. 13)

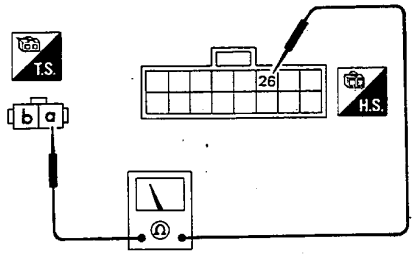
A



Temperature °C (°F)	Resistance (kΩ)
20 (68)	Approx. 2.5
80 (176)	Approx. 0.33

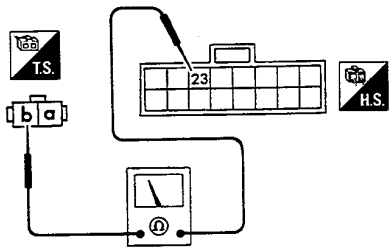
SEF062F

B



SEF063F

C



SEF064F

INSPECTION START

Perform self-diagnosis (Mode III).
Is code No. 13 indicated?

No → INSPECTION END

Yes

A

Check water temperature sensor resistance.
1) Disconnect water temperature sensor harness connector.
2) Check resistance of water temperature sensor.
Resistance is shown in illustration A.
If N.G., replace water temperature sensor.

O.K.

B

Check continuity between terminals ⓐ and ㉖.
Continuity should exist.
If N.G., repair harness or connectors.

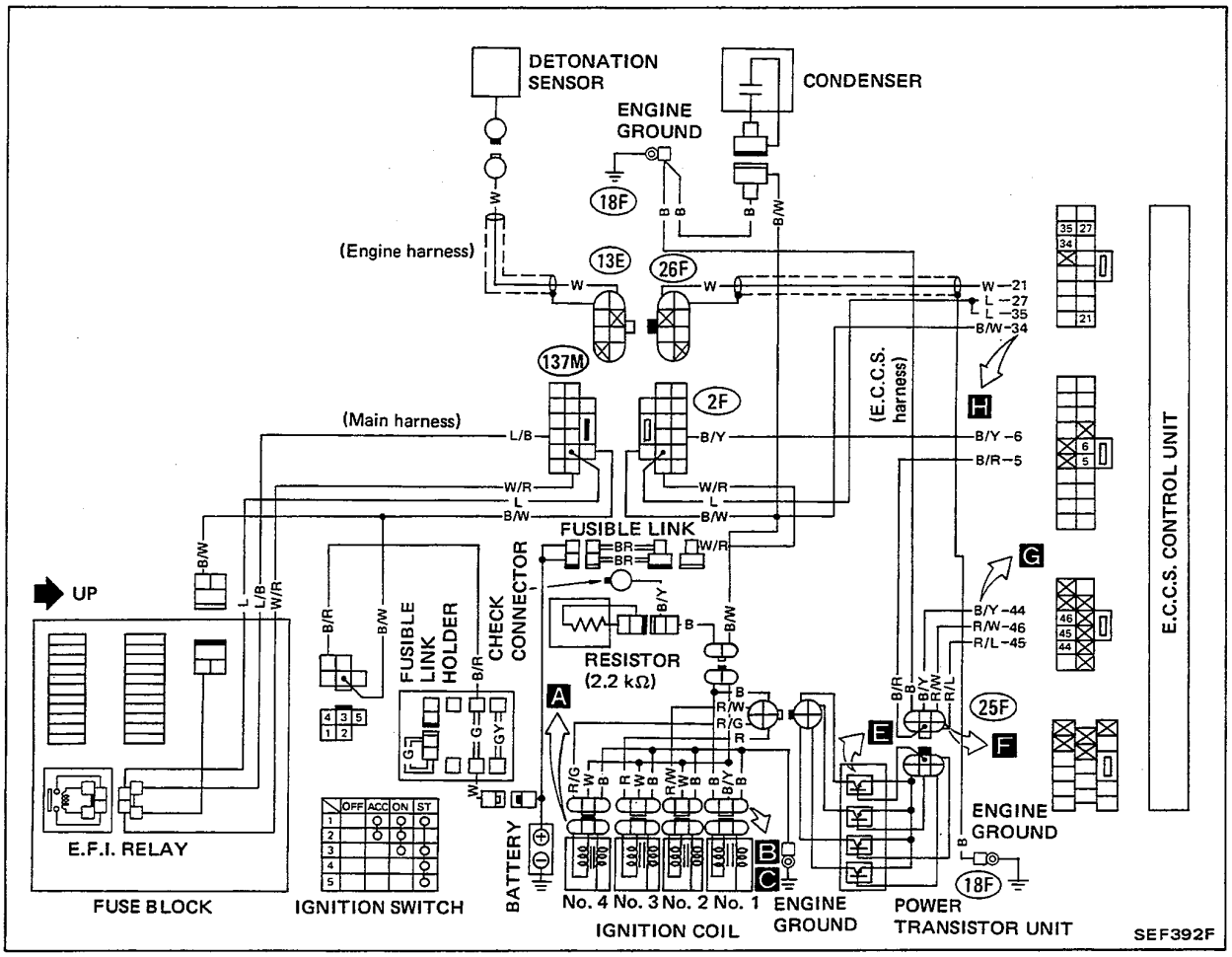
O.K.

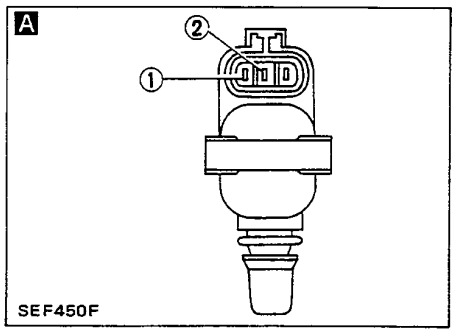
C

Check continuity between terminals ⓑ and ㉓.
Continuity should exist.
If N.G., repair harness or connectors.

INSPECTION END

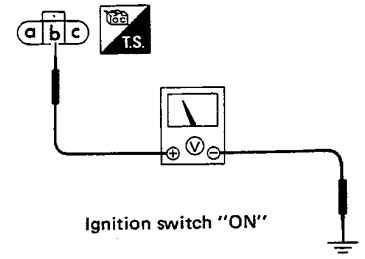
IGNITION SIGNAL (Code No. 21)



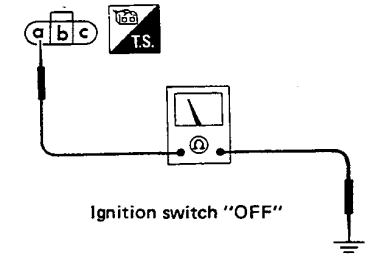


IGNITION SIGNAL (Code No. 21)

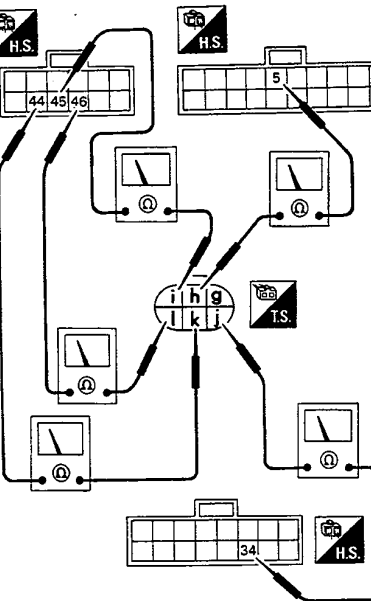
B



C



F



INSPECTION START

Perform self-diagnosis (Mode III).
Are code Nos. 21 or 34 indicated?

No → ⊕

Yes code 21

Yes code 34 → I

I
Check resistance of detonation sensor.
Resistance: 500 - 600 kΩ
If N.G., replace detonation sensor.

A
Check resistance of ignition coil.

Terminal	Resistance
① - ②	Approximately 0.7Ω

If N.G., replace ignition coil.

O.K.

B
Check power source.
1) Turn ignition switch "ON".
2) Check voltage between terminal ⓑ and ground.
Voltage: Battery voltage
If N.G., repair harness or connectors.

O.K.

C
1) Turn ignition switch "OFF".
2) Check continuity between terminal ⓖ and ground.
Continuity should exist.
If N.G., repair harness or connectors.

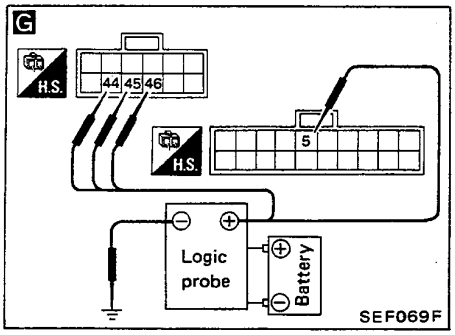
O.K.

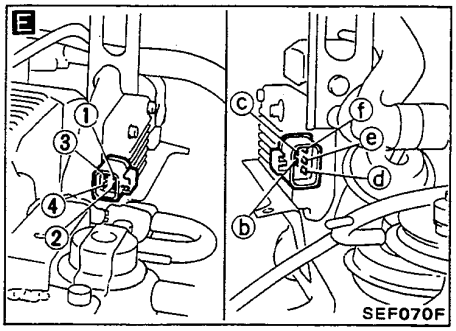
F
Check continuity between terminals ⓗ and ⑤, ⓘ and ㊺, ⓙ and ㉞, ⓚ and ㊹, ⓛ and ㊻.
Continuity:
Approximately 0Ω
If N.G., repair harness or connectors.

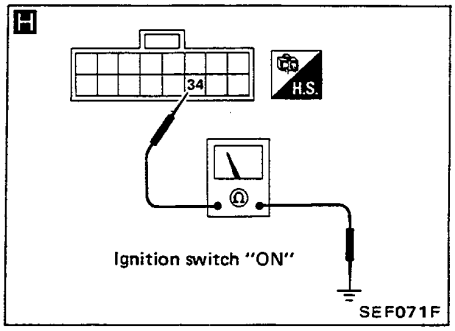
O.K.

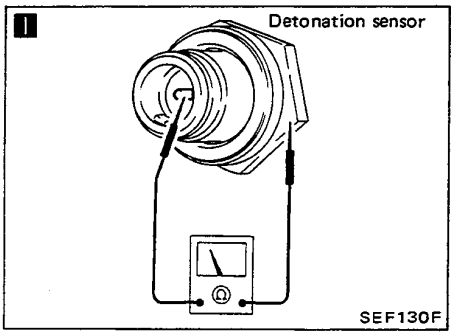
⊕⊕

IGNITION SIGNAL (Code No. 21)









G

Check output signal.
1) Start engine.
2) Make sure that pulse signals exist between E.C.U. terminals ⑤, ㊹, ㊺, ㊻ and ground with logic probe.
Pulse signal should exist.

N.G. → E

O.K.

E

Check power transistor unit.

Terminal combination				Measuring current of tester	Continuity	Measuring current of tester	Continuity
1 d	2 d	3 d	4 d	↑	Yes	↓	No
1 c	2 b	3 f	4 e	↑	Yes	↓	No
d c	d b	d f	d e	↑	Yes	↓	Yes

If N.G., replace power transistor unit.

H

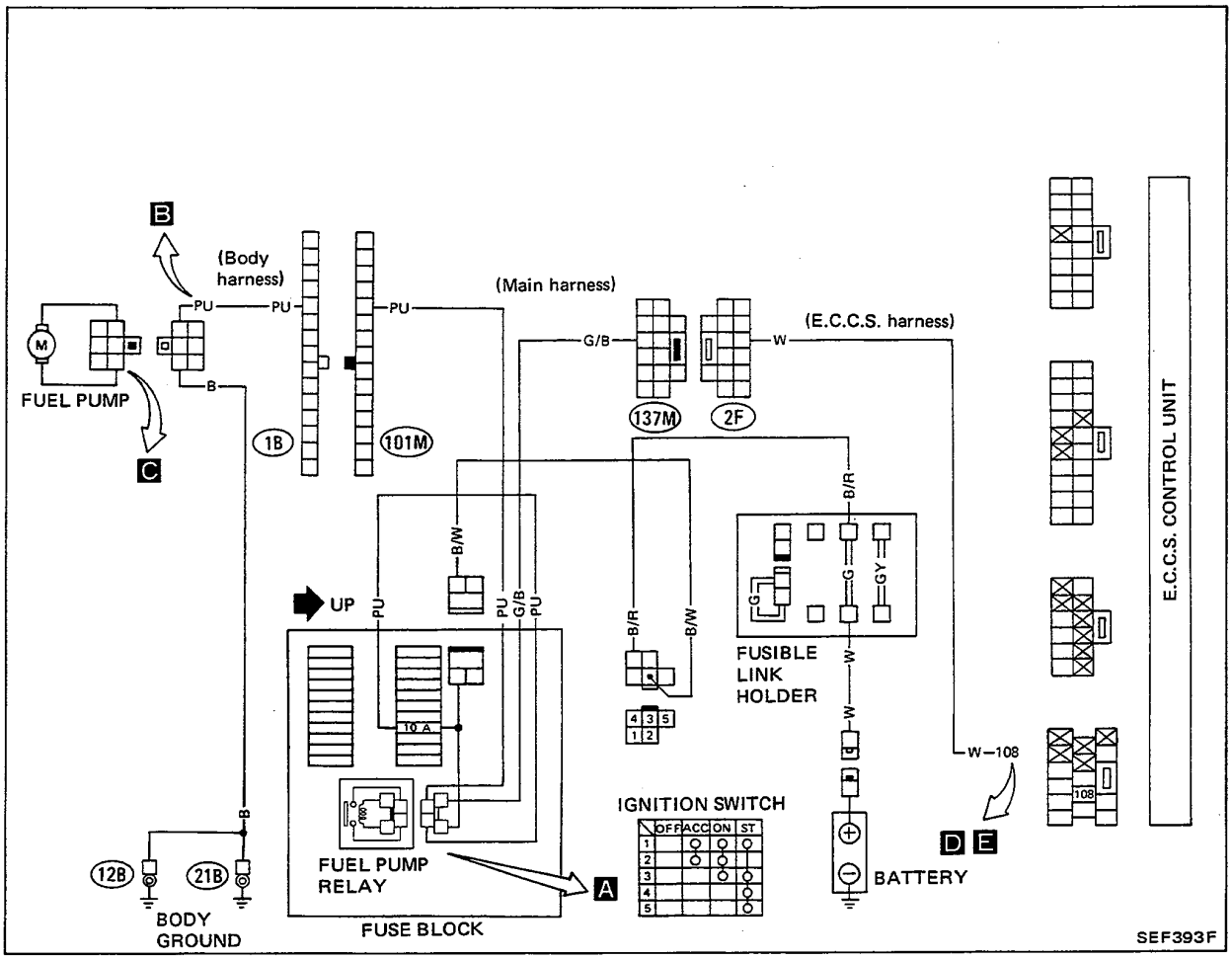
Check input signal.
1) Stop engine.
2) Turn ignition switch "ON".
3) Check voltage between E.C.U. terminal ㉞ and ground.
Voltage: Battery voltage
If N.G., repair harness or connectors.

O.K.

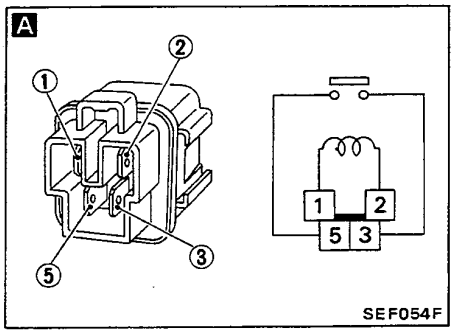
INSPECTION END

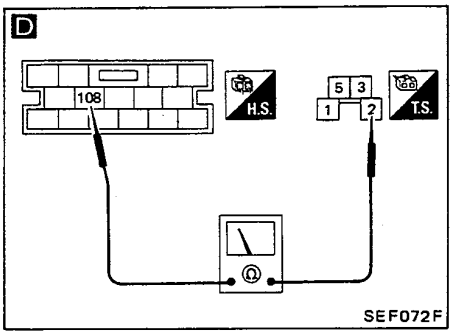
NOTE

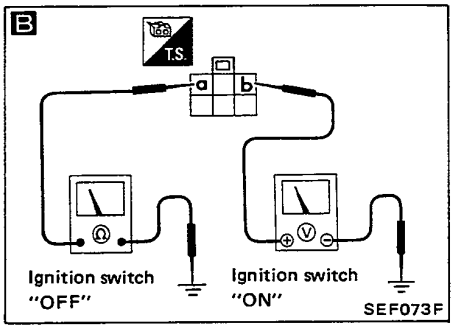
FUEL PUMP (Not self-diagnosis item)

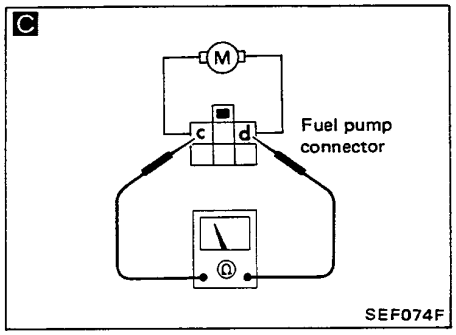


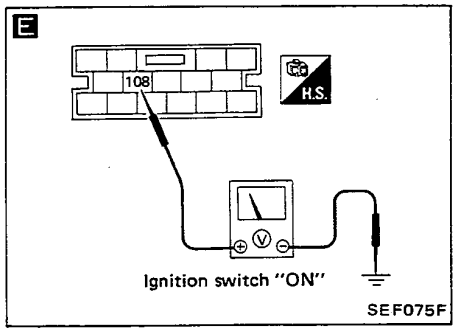
FUEL PUMP (Not self-diagnosis item)











INSPECTION START

A

Check fuel pump relay.

Condition	Continuity between terminals ③ and ⑤
Supply 12V direct current between terminals ① and ②	Yes
Not supply	No

If N.G., replace relay.

O.K.

D

Check continuity between E.C.U. terminal (108) and fuel pump relay harness terminal ③.
If N.G., repair harness or connectors.

O.K.

B

Check power source.
1) Turn ignition switch "ON" and check voltage between terminal ⓑ and ground.
Battery voltage should exist for 5 seconds after turning ignition switch "ON".
2) Turn ignition switch "OFF" and check continuity terminal ⓐ and ground.
Continuity should exist.
If N.G., repair harness or connectors.

O.K.

C

Check fuel pump.
- Disconnect fuel pump harness connector.
- Check resistance between terminals ⓐ and ⓓ.
Continuity should exist.
If N.G., replace fuel pump.

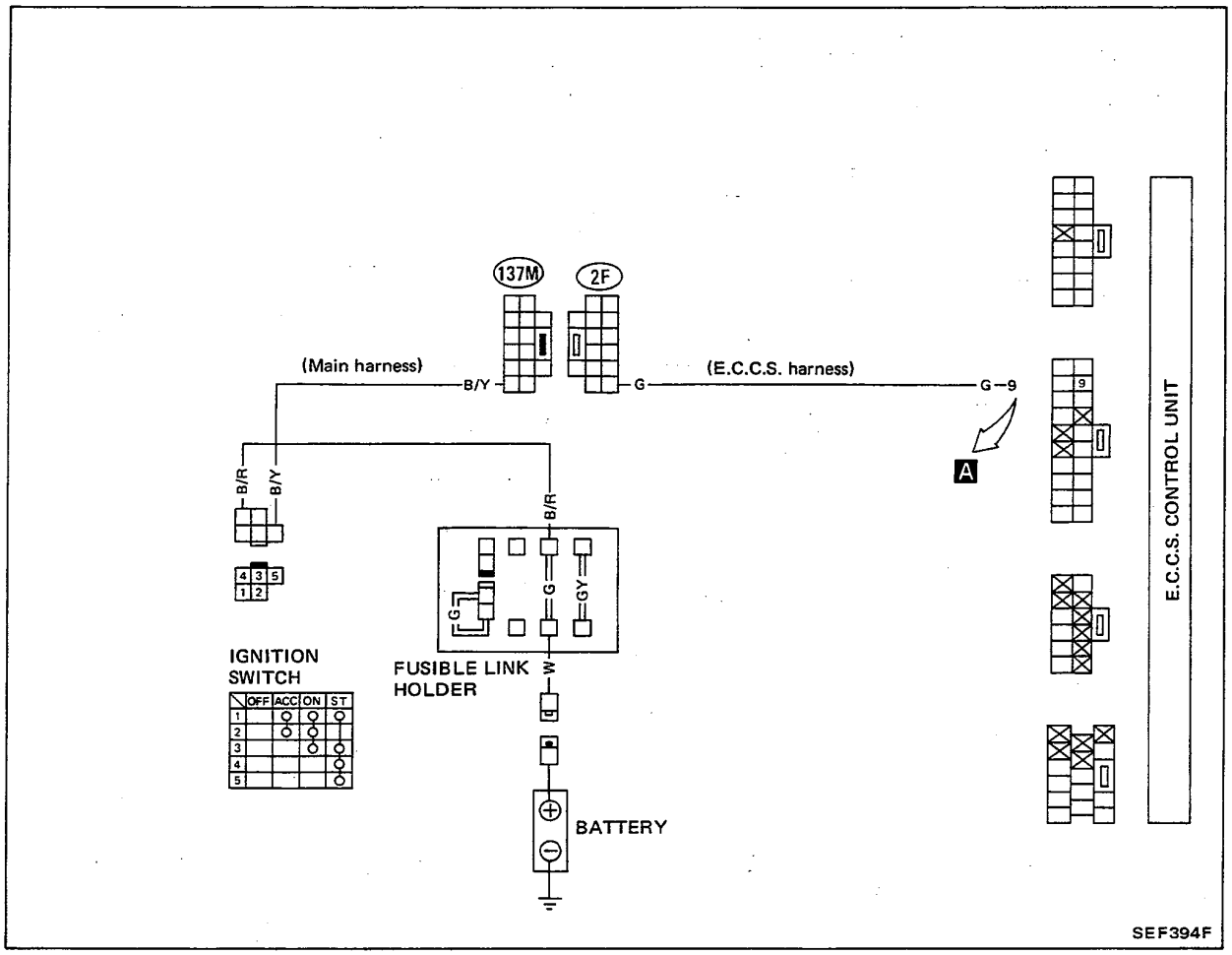
O.K.

E

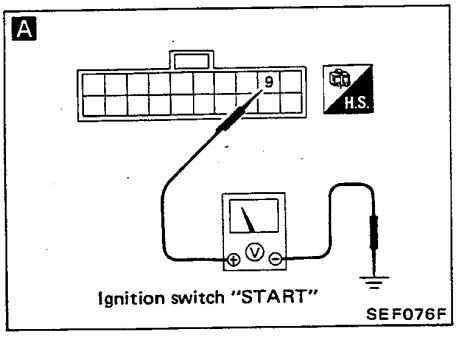
Check output signal.
1) Turn ignition switch "ON".
2) Check voltage between E.C.U. terminal (108) and ground.
Battery voltage should exist after 5 seconds.

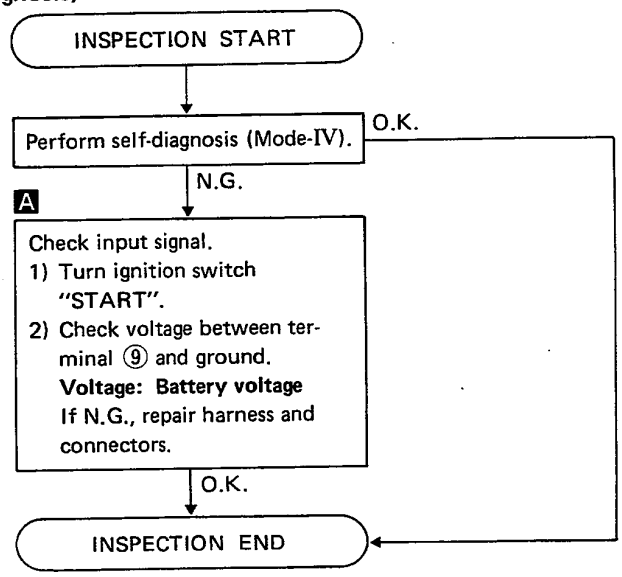
INSPECTION END

START SIGNAL (Switch ON/OFF diagnosis)

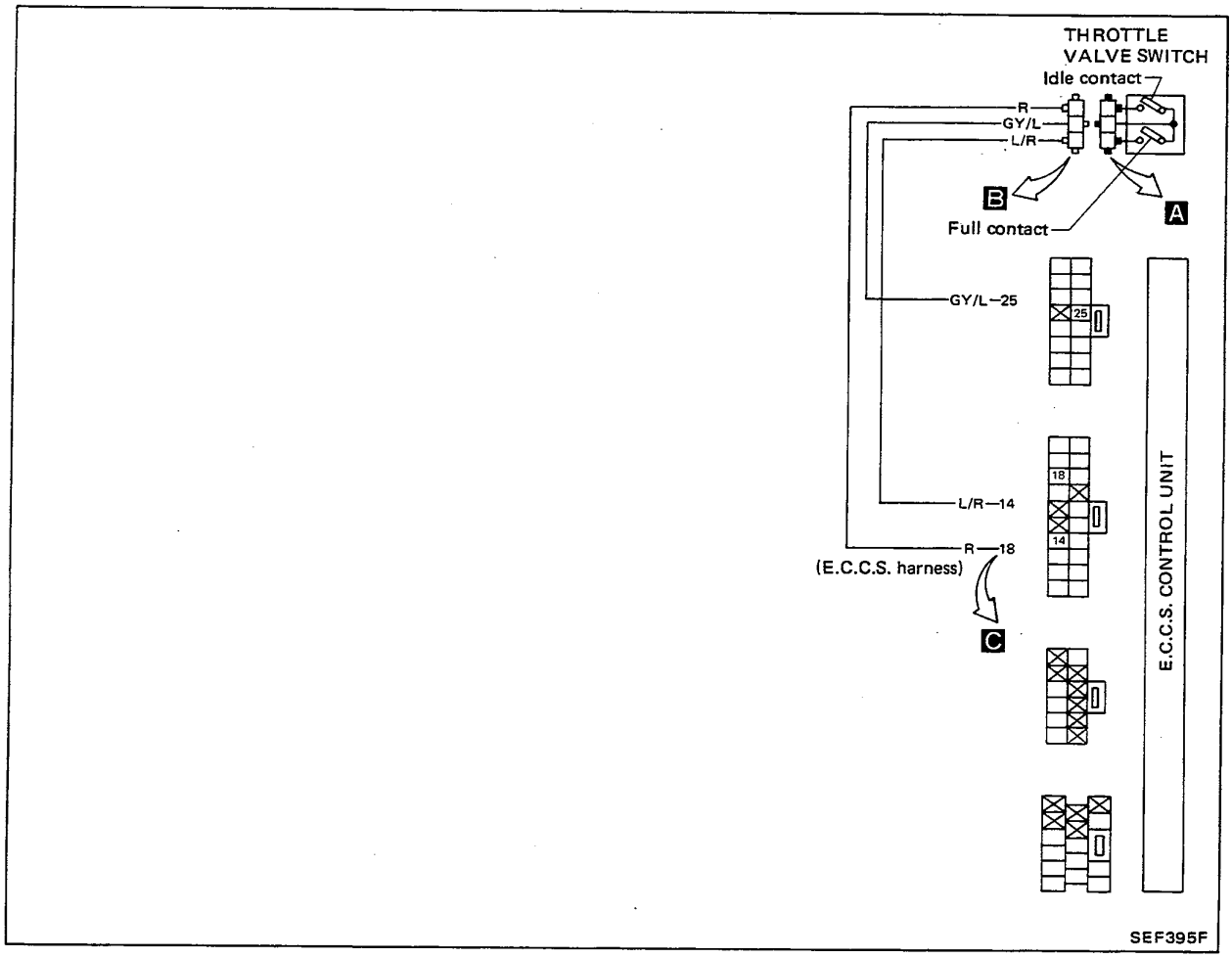


START SIGNAL (Switch ON/OFF diagnosis)

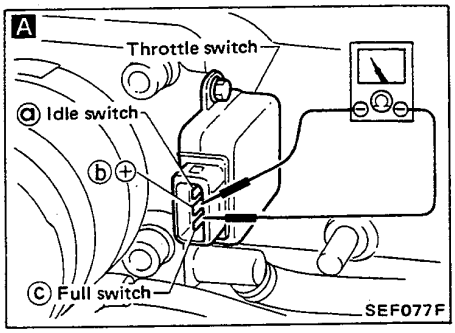


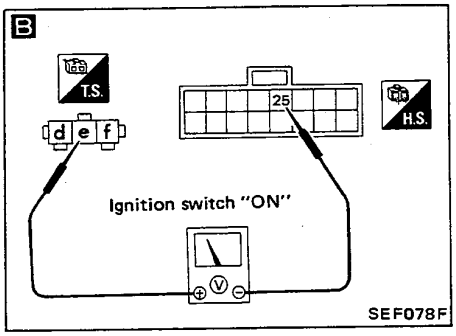


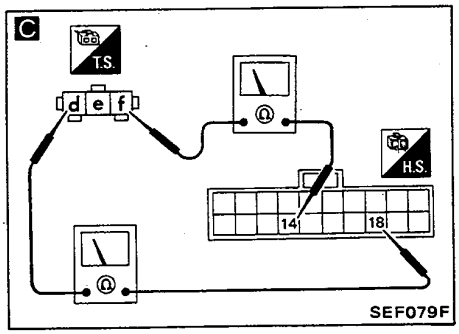
THROTTLE VALVE SWITCH (Switch ON/OFF diagnosis)



THROTTLE VALVE SWITCH (Switch ON/OFF diagnosis)







INSPECTION START

A

Check throttle valve switch (idle switch and full switch).

Accelerator pedal position	Continuity
Released	ⓐ - ⓑ
Depressed	ⓑ - ⓒ

If N.G., replace throttle valve switch.

O.K.

B

Check power source.
1) Turn ignition switch "ON".
2) Check voltage between terminals ⓔ and ㉕.
   Voltage: 9 - 10V
   If N.G., repair harness or connectors.

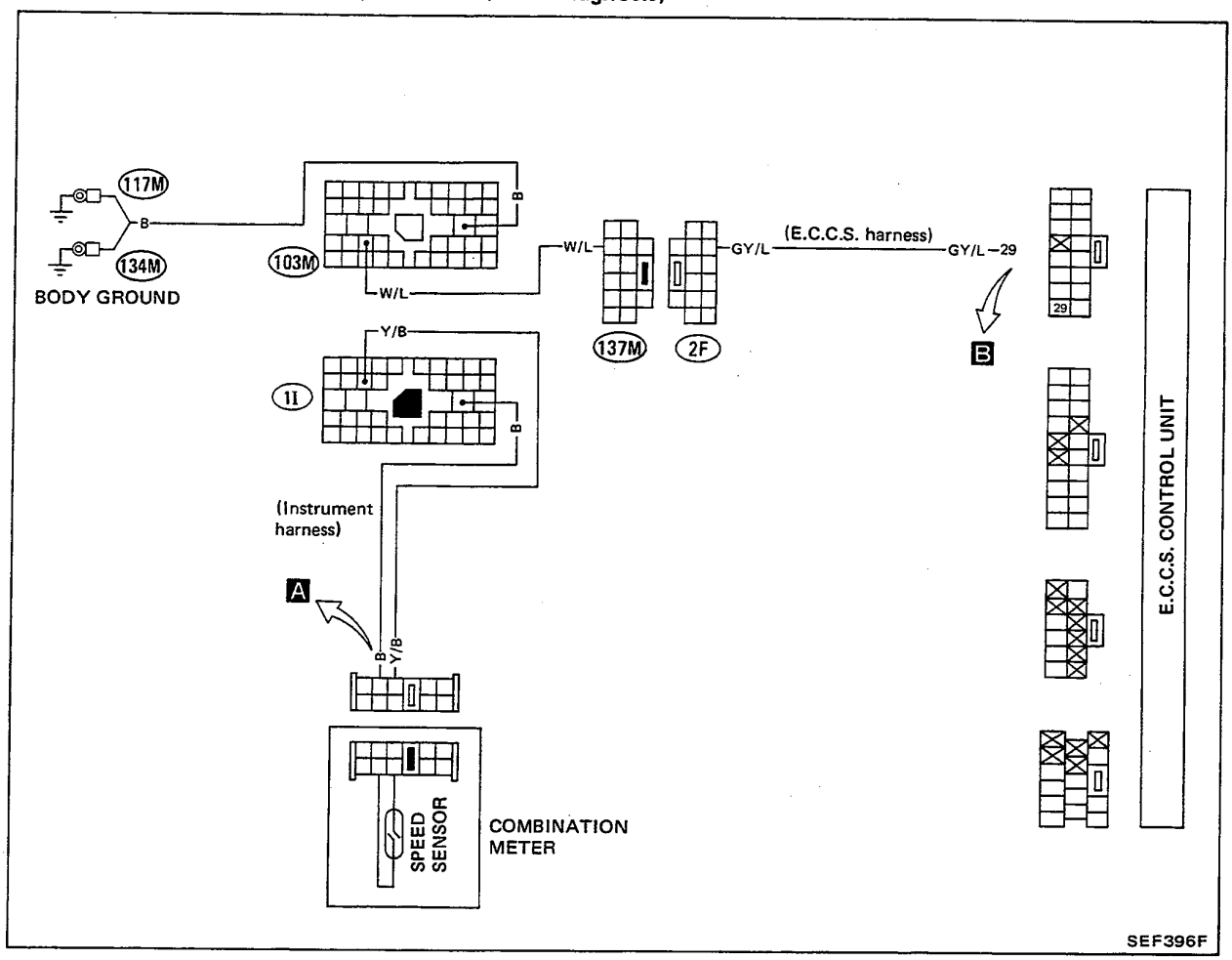
O.K.

C

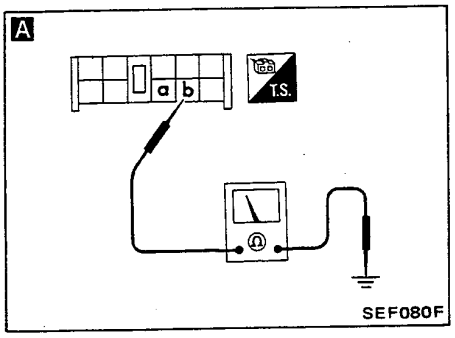
1) Turn ignition switch "OFF".
2) Check continuity between terminals ⓓ and ⑱, ⓕ and ⑭.
   Continuity should exist.
   If N.G., repair harness or connectors.

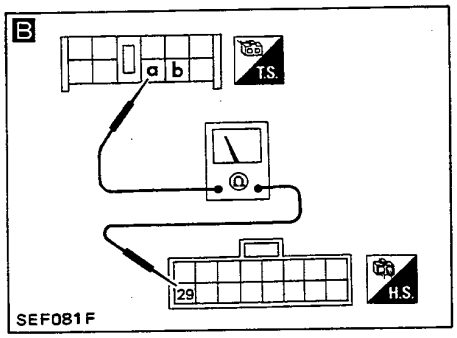
INSPECTION END

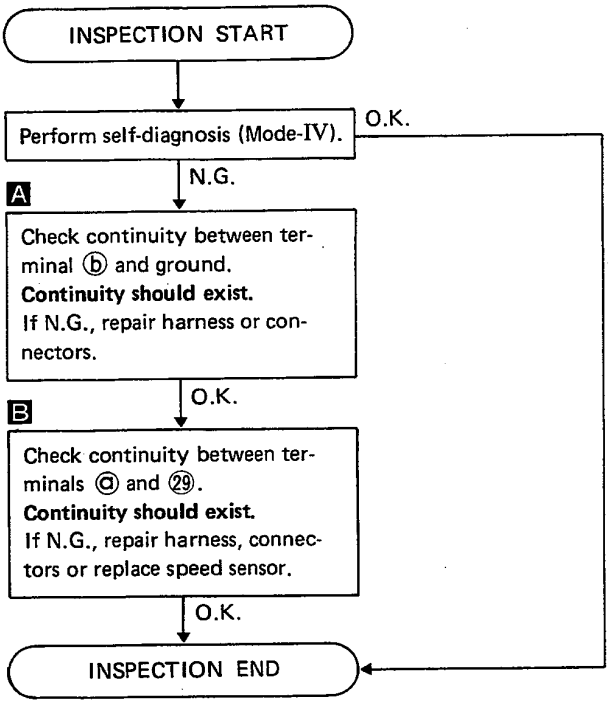
VEHICLE SPEED SENSOR (Switch ON/OFF diagnosis)



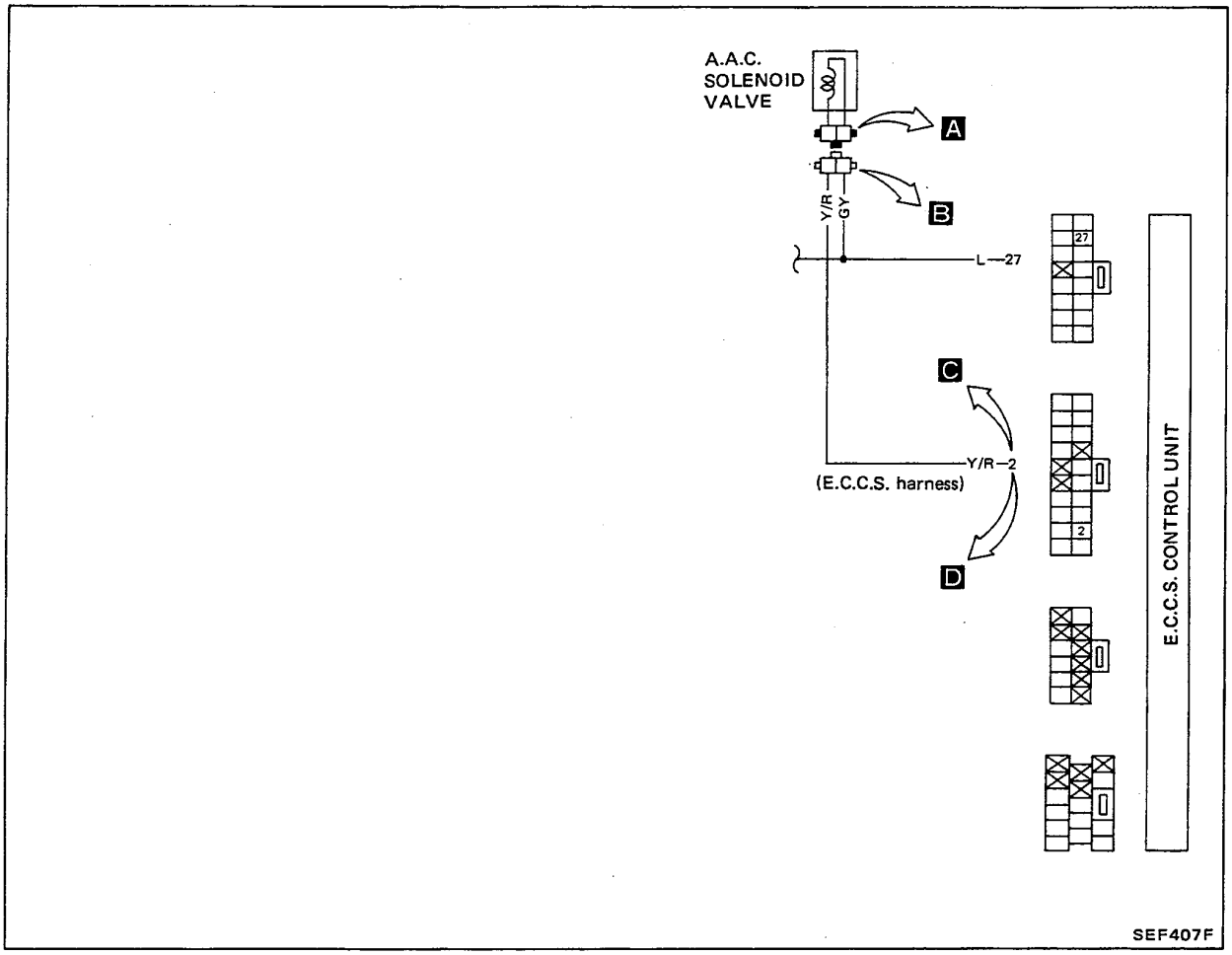
VEHICLE SPEED SENSOR (Switch ON/OFF diagnosis)



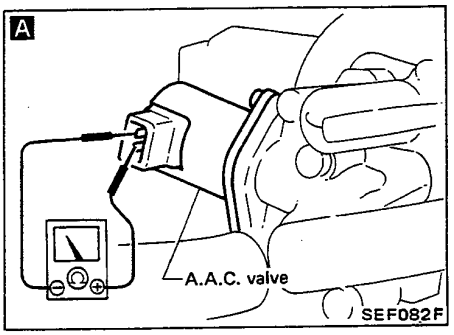


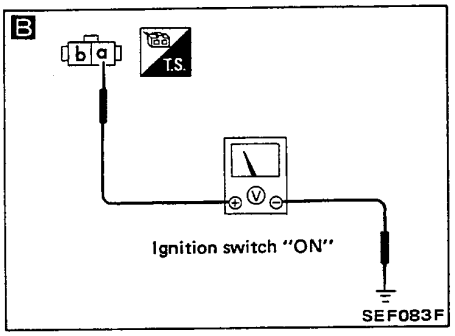


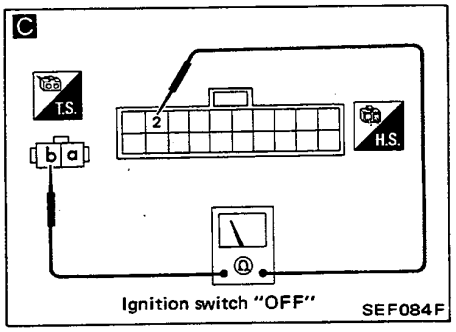
AUXILIARY AIR CONTROL (A.A.C.) VALVE (Not self-diagnostic item)

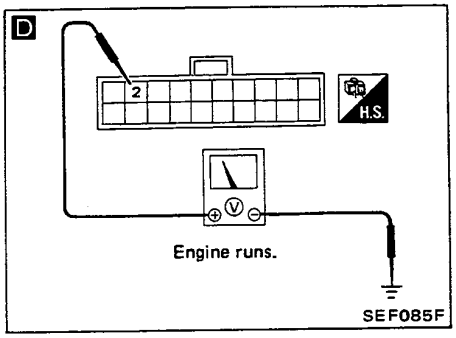


AUXILIARY AIR CONTROL (A.A.C.) VALVE (Not self-diagnostic item)









INSPECTION START

A

Check resistance of A.A.C. valve.
Resistance:
Approximately 10Ω
If N.G., replace A.A.C. valve.

B

Check power source.
1) Disconnect A.A.C. valve harness connector.
2) Turn ignition switch "ON".
3) Check voltage between terminal ⓐ and ground.
Voltage: Battery voltage
If N.G., repair harness or connectors.

C

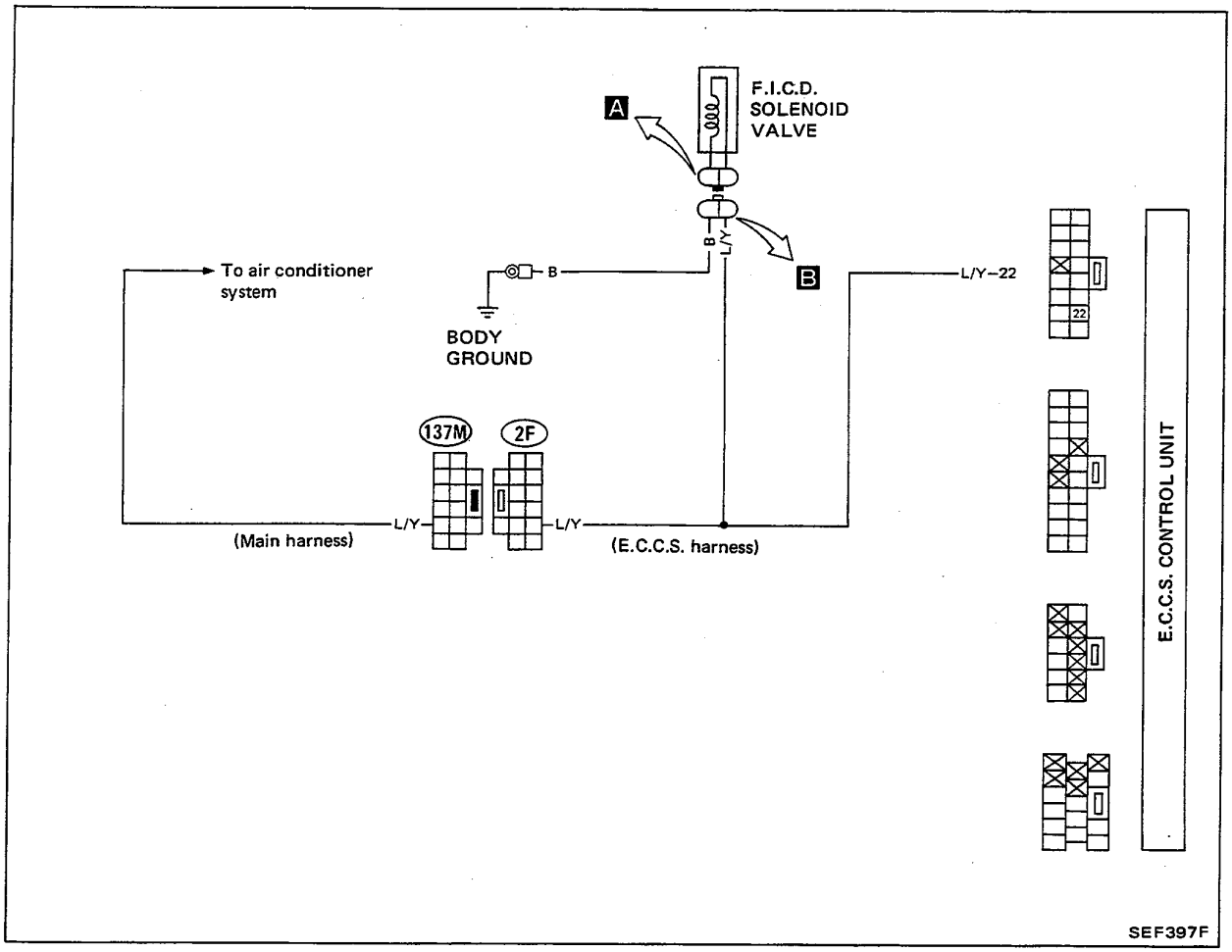
1) Turn ignition switch "OFF".
2) Check continuity between terminals ⓑ and ②.
Continuity should exist.
If N.G., repair harness or connectors.

D

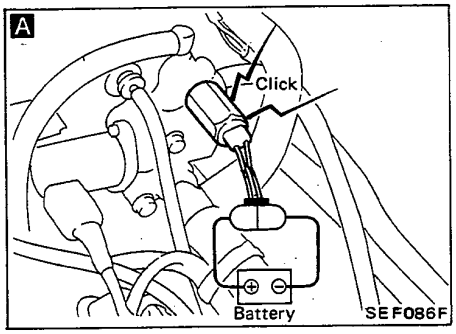
Check input signal.
1) Reconnect E.C.U. connector and A.A.C. valve harness connector.
2) Start engine and warm it up sufficiently.
3) Check voltage between E.C.U. terminal ② and ground.
Voltage: approx. 7 - 11 V

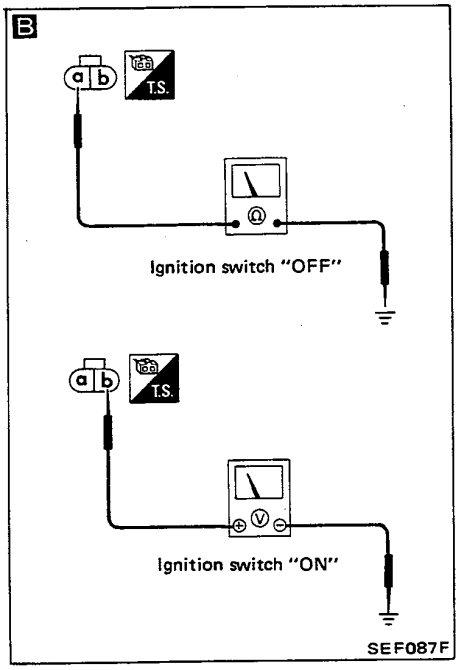
INSPECTION END

I.A.A. CONTROL (F.I.C.D. CONTROL) (Not self-diagnosis item)



I.A.A. CONTROL (F.I.C.D. CONTROL) (Not self-diagnosis item)





INSPECTION START

A

Check F.I.C.D. solenoid valve.
Supply 12V direct current to F.I.C.D. solenoid valve and check for its operating sound.

If N.G., replace F.I.C.D. solenoid valve.

O.K.

B

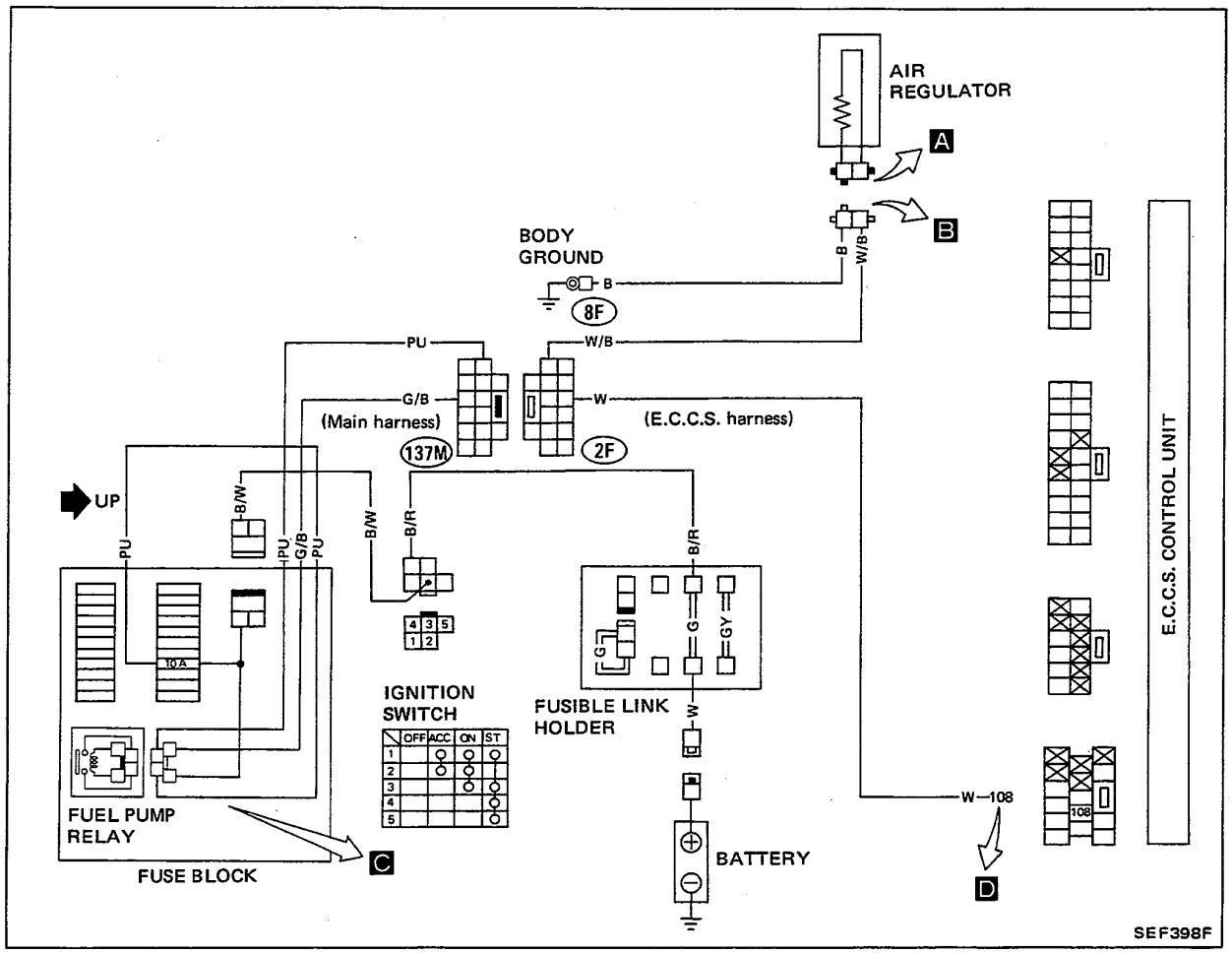
Check power source and ground circuit.
1) Check continuity between ⓐ and ground.
Continuity should exist.
2) Turn ignition switch "ON" and check voltage between terminal ⓑ and ground.

Air conditioner	Voltage between terminal ⓑ and ground
ON	Battery voltage
OFF	0V

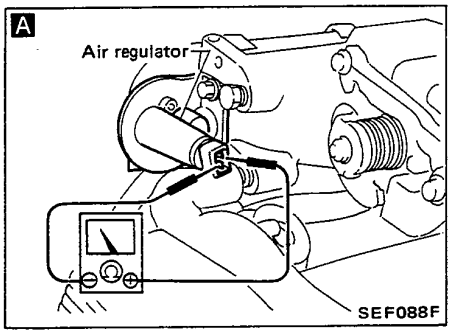
If N.G., repair harness or connectors.

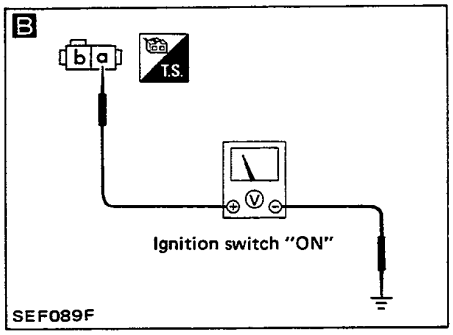
INSPECTION END

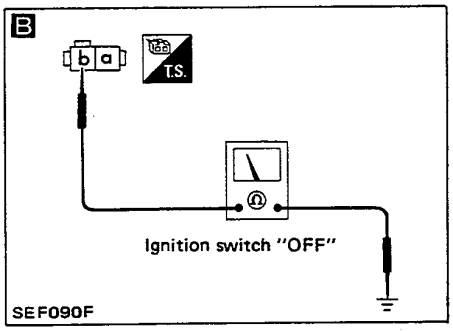
AIR REGULATOR (Not self-diagnostic item)

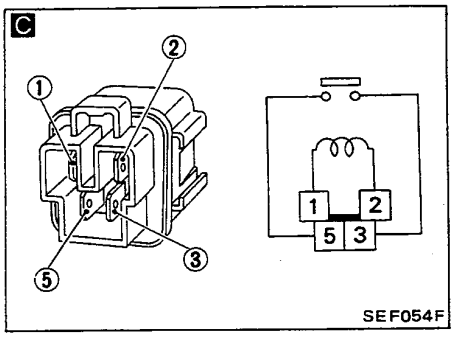


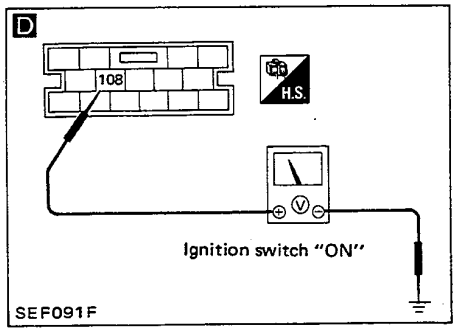
AIR REGULATOR (Not self-diagnostic item)











INSPECTION START

A

Check air regulator.
Check resistance of air regulator.
Resistance:
Approximately 70Ω
If N.G., replace air regulator valve.

B

1) Turn ignition switch "ON".
2) Check voltage between terminal ⓐ and ground.
Battery voltage should exist 5 seconds after turning ignition switch "ON".

N.G. →

C

Check fuel pump relay.

Condition	Continuity between terminals ③ and ⑤
Supply 12V direct current between terminals ① and ②	Yes
Not supply	No

If N.G., replace relay.

O.K. ↓

Repair harness or connectors.

O.K. ↓

B

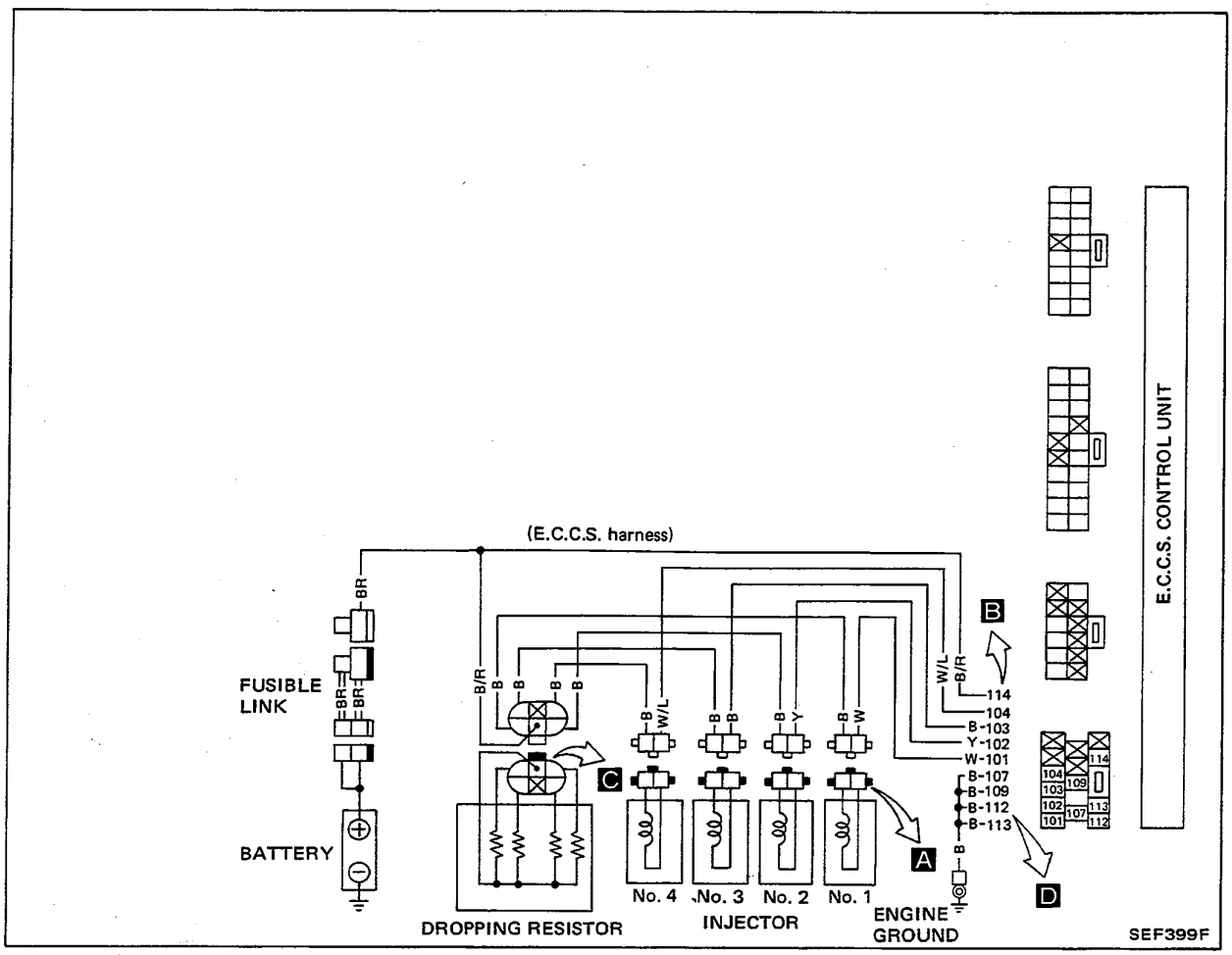
1) Turn ignition switch "OFF".
2) Check continuity between terminal ⓑ and ground.
Continuity should exist.
If N.G., repair harness or connectors.

D

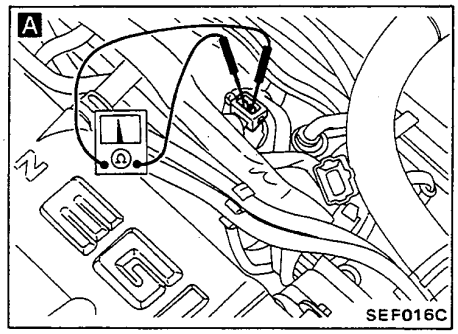
Check output signal.
1) Turn ignition switch "ON".
2) Check voltage between E.C.U. terminal (108) and ground.
Battery voltage should appear after 5 seconds.

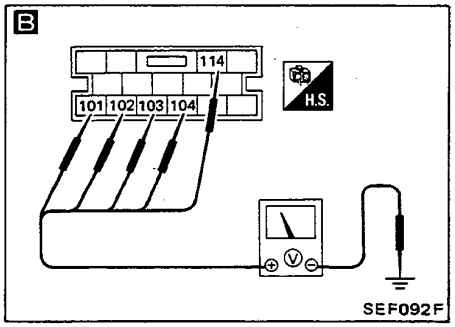
INSPECTION END

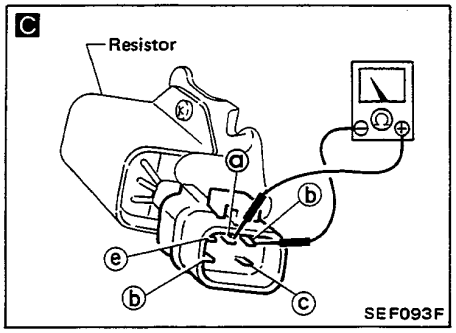
INJECTOR (Not self-diagnosis item)

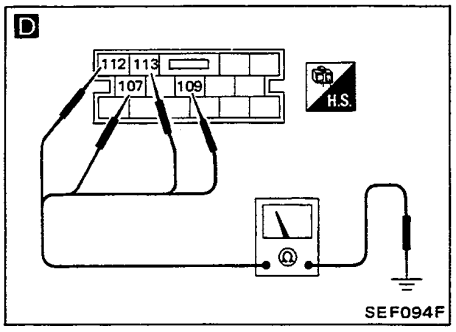


INJECTOR (Not self-diagnosis item)









INSPECTION START

A

Check resistance of each injector.
Resistance:
Approximately 2.5Ω
If N.G., replace injector.

O.K.

B

Check power source.
1) Start engine.
2) Check voltage between terminals (101), (102), (103), (104), (114) and ground.
Voltage:
(114): **Battery voltage**
(101), (102), (103), (104):
Voltage varies between 0V and 12V.

N.G.

C

Check dropping resistor.
1) Check resistance between terminals ⓐ - ⓑ, ⓐ - ⓒ, ⓐ - ⓓ and ⓐ - ⓔ.
Resistance: 6Ω
If N.G., replace resistor.

O.K.

O.K.

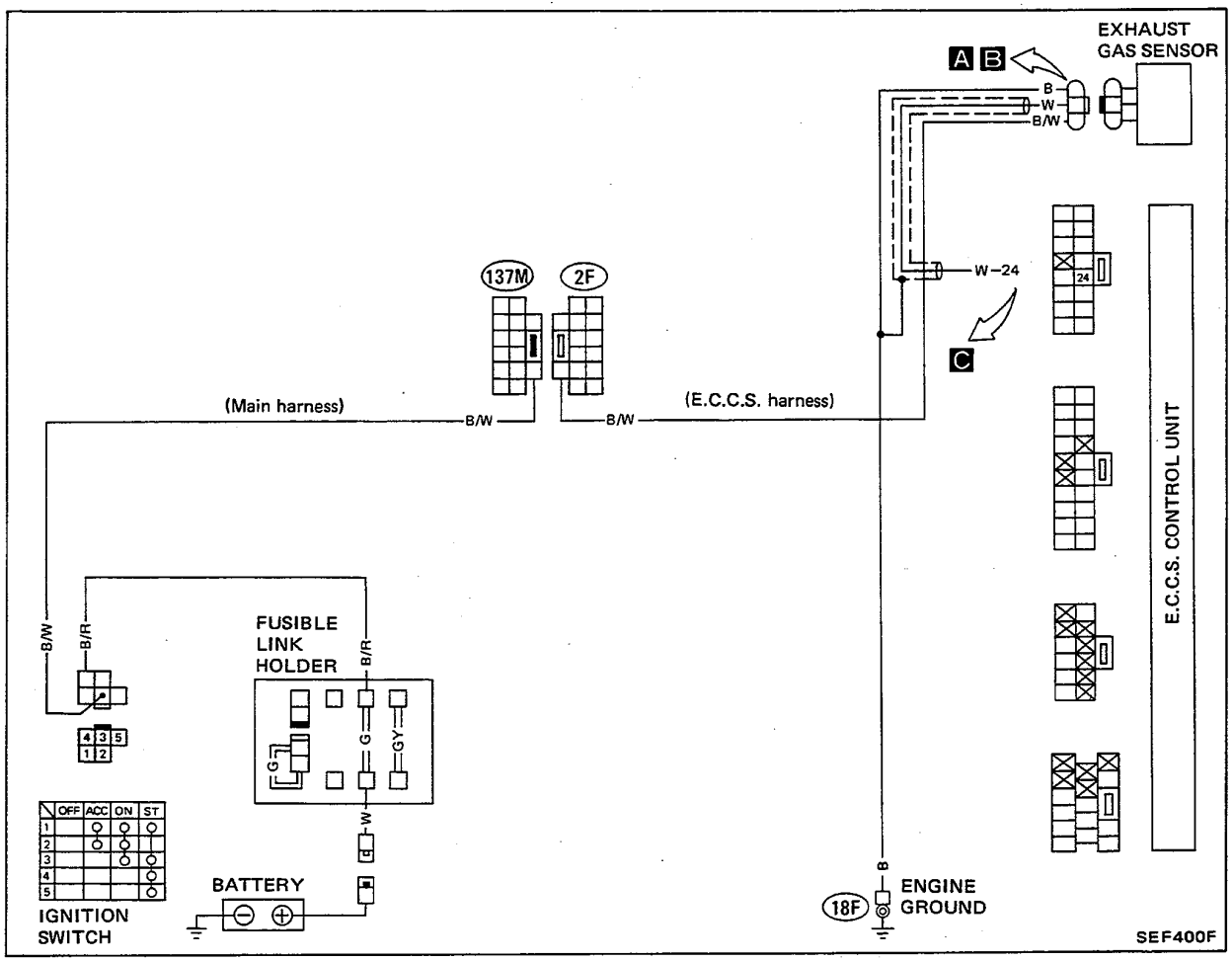
D

1) Check resistance between terminals (107), (109), (112), (113) and ground.
Resistance:
Approximately 0Ω
If N.G., repair harness.

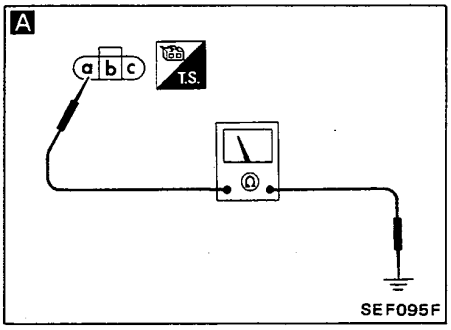
O.K.

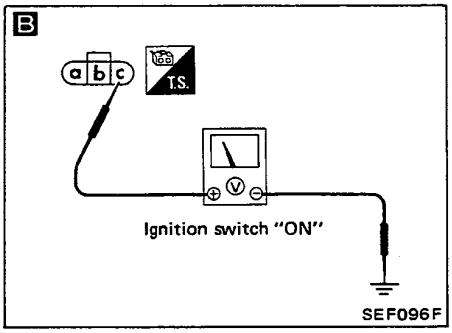
INSPECTION END

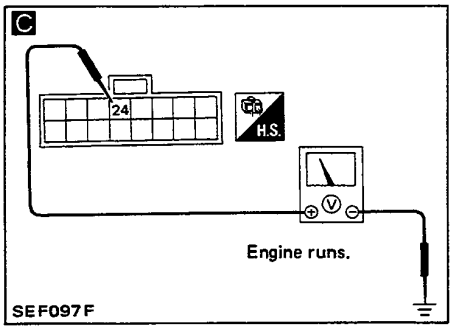
EXHAUST GAS SENSOR (Not self-diagnostic item)



EXHAUST GAS SENSOR (Not self-diagnostic item)







INSPECTION START

Check flashes of inspection lamps on E.C.U.
1) Warm up engine sufficiently.
2) Make sure that green inspection lamp goes on and off 9 times or more during 10 seconds at 2,000 rpm.

O.K. → INSPECTION END

N.G.

A

Check continuity between terminal ⓐ and ground.
Continuity should exist.
If N.G., repair harness or connectors.

O.K.

B

1) Turn ignition switch "ON".
2) Check voltage between terminal ⓒ and ground.
Voltage: Battery voltage
If N.G., repair harness or connectors.

O.K.

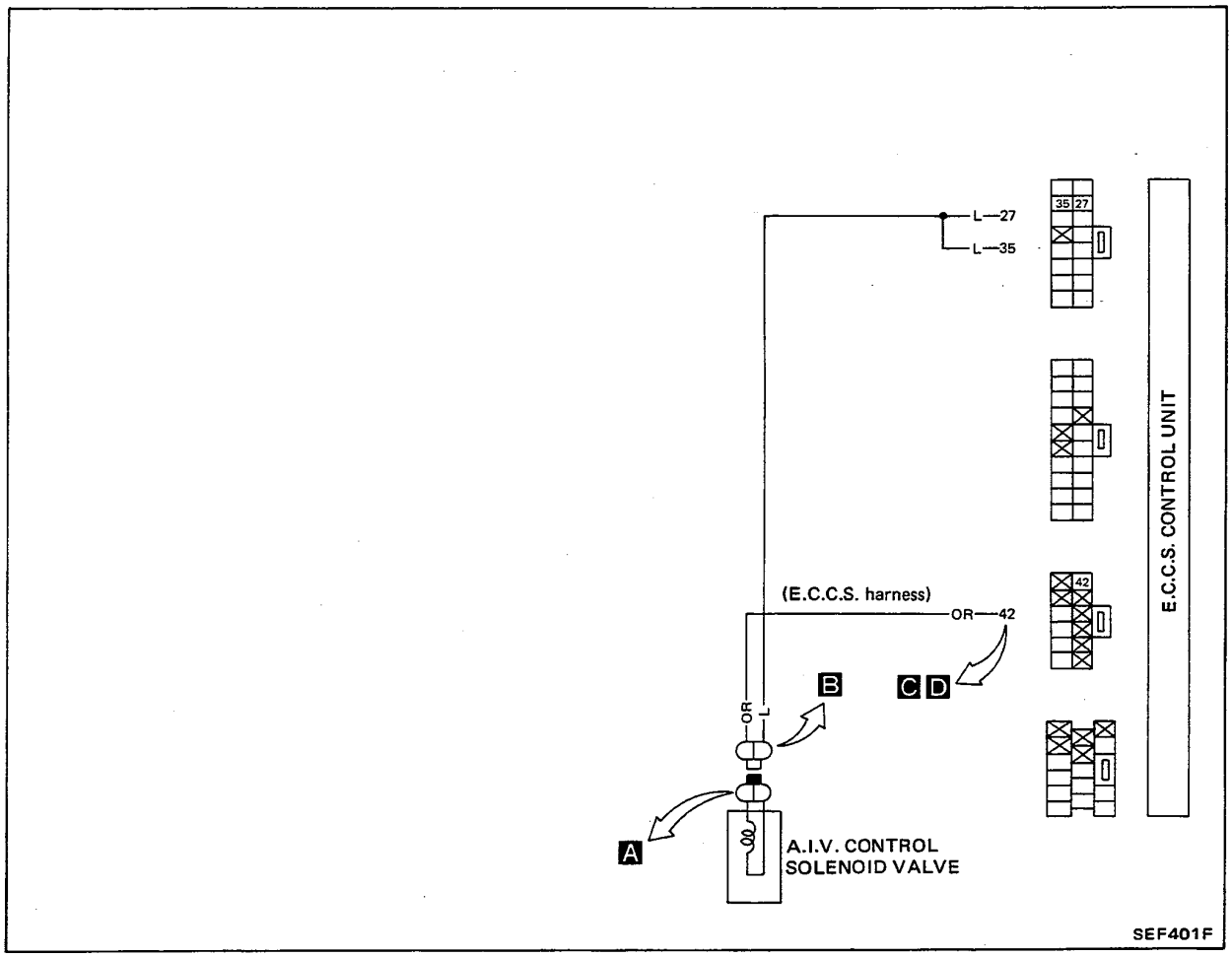
C

Check input signal to E.C.U.
1) Start engine and make sure that engine has warmed up sufficiently.
If not, warm it up.
2) Check voltage between E.C.U. terminal ㉔ and ground.
Voltage should change between 0V and 1V.
If N.G., repair harness, connectors or Exhaust gas sensor.

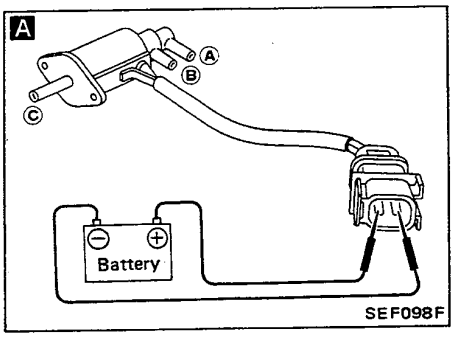
O.K.

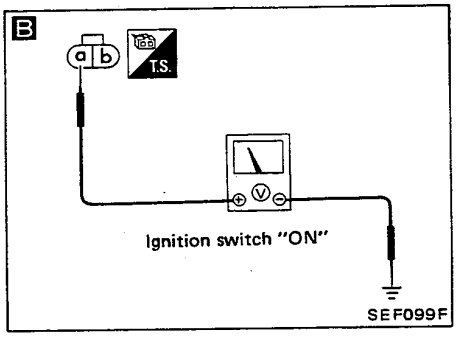
INSPECTION END

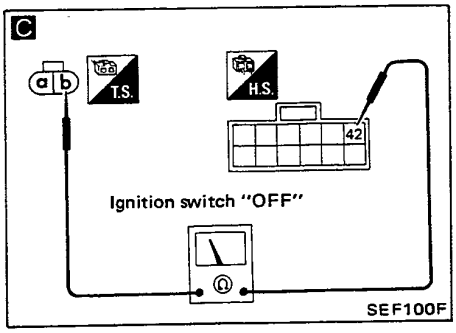
AIR INJECTION VALVE (A.I.V.) CONTROL (Not self-diagnostic item)

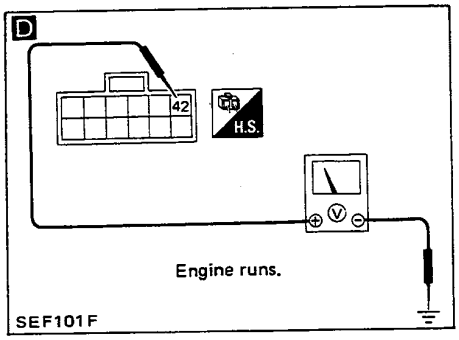


AIR INJECTION VALVE (A.I.V.) CONTROL (Not self-diagnostic item)









INSPECTION START

A

Check A.I.V. control solenoid valve.

Condition	Continuity
Supply 12V direct current to A.I.V. control solenoid valve	Only Ⓐ - Ⓑ
Not supply	Only Ⓑ - Ⓒ

If N.G., replace A.I.V. control solenoid valve.

O.K.

B

Check power source.
1) Turn ignition switch "ON".
2) Check voltage between terminal ⓐ and ground.
   Voltage: Battery voltage
   If N.G., repair harness or connectors.

O.K.

C

1) Turn ignition switch "OFF".
2) Check continuity between terminals ⓑ and ㊷.
   Continuity should exist.
   If N.G., repair harness or connectors.

O.K.

D

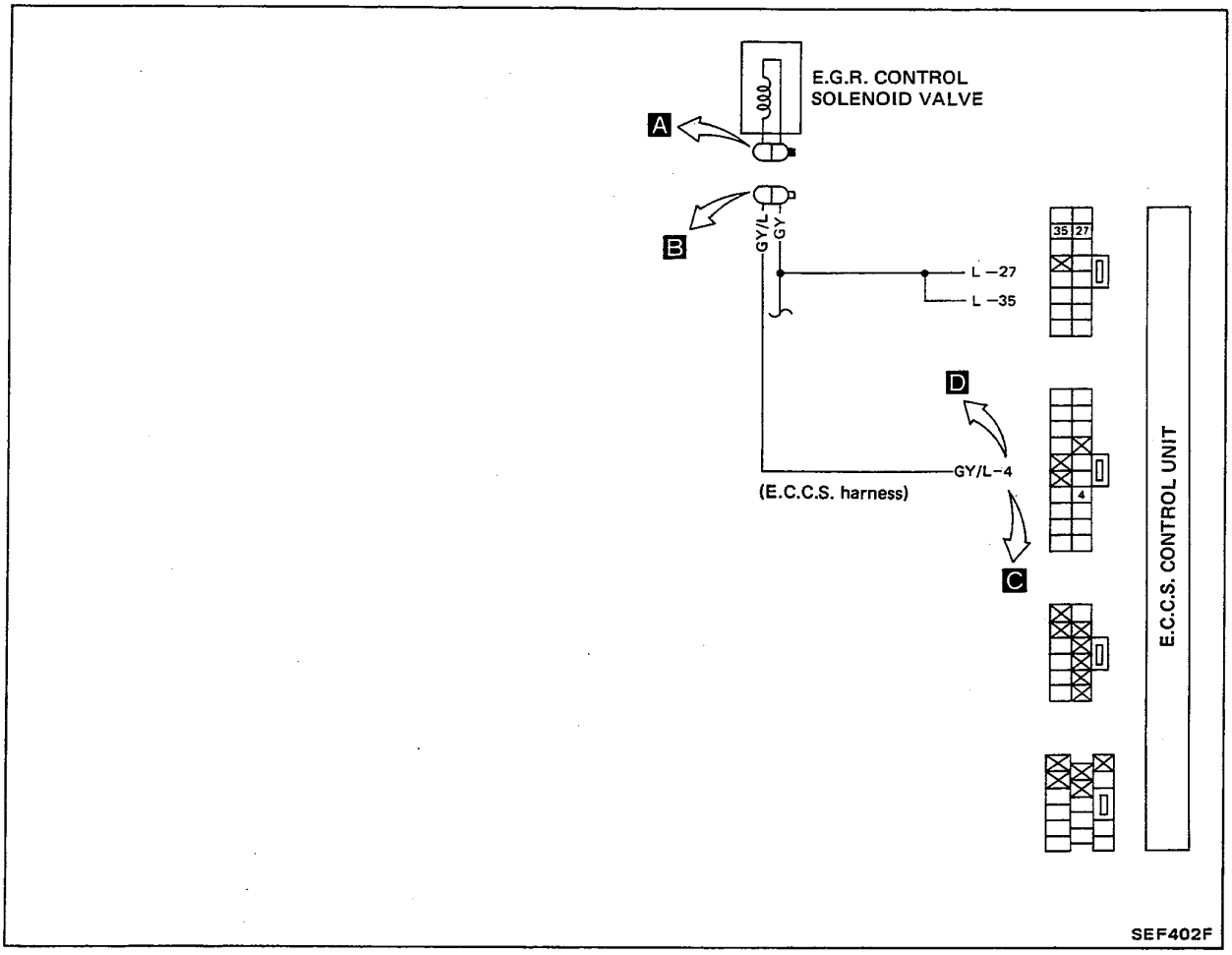
Check output signal.
1) Start engine and warm it up sufficiently.
2) Check voltage between E.C.U. terminal ㊷ and ground.

Accelerator pedal position	Voltage
Released	Approximately 0.8V
Depressed	Battery voltage

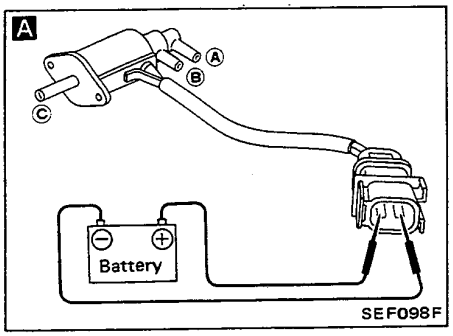
O.K.

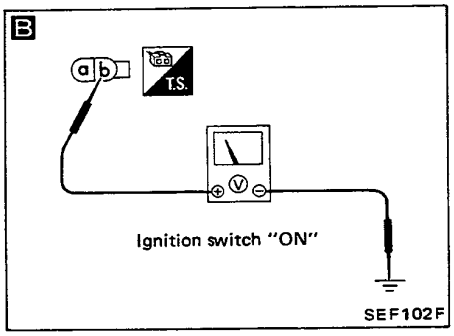
INSPECTION END

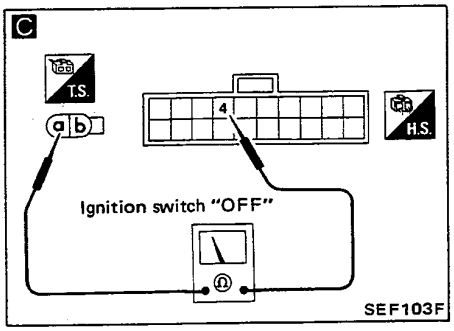
E.G.R. CONTROL (Not self-diagnosis item)

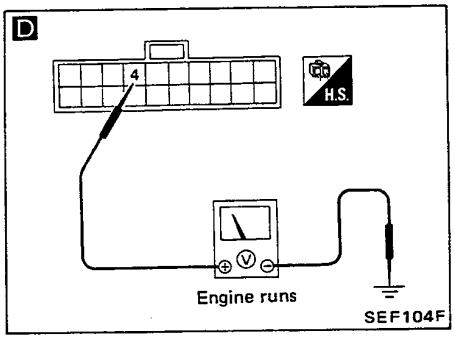


E.G.R. CONTROL (Not self-diagnosis item)









INSPECTION START

A

Check E.G.R. control solenoid valve.

Condition	Continuity
Supply 12V direct current to E.G.R. control solenoid valve	Only Ⓐ - Ⓑ
Not supply	Only Ⓑ - Ⓒ

If N.G., replace E.G.R. control solenoid valve.

O.K.

B

Check power source.
1) Turn ignition switch "ON".
2) Check voltage between terminal ⓑ and ground.
   Voltage: Battery voltage
   If N.G., repair harness.

O.K.

C

1) Turn ignition switch "OFF".
2) Check continuity between terminals ⓐ and ④.
   Continuity should exist.
   If N.G., repair harness or connectors.

O.K.

D

Check output signal.
1) Start engine and warm it up sufficiently.
2) Check voltage between E.C.U. terminal ④ and ground.

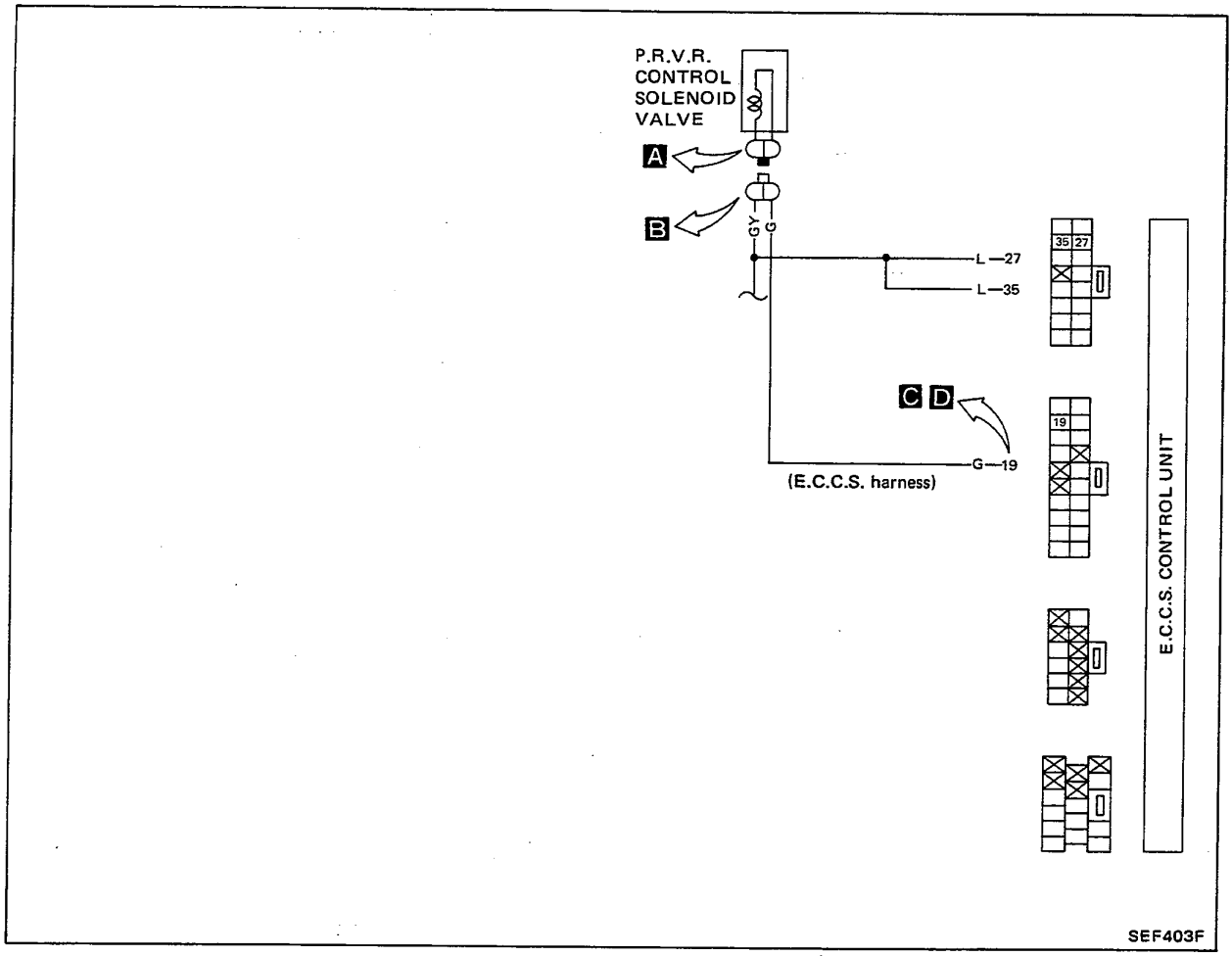
Engine condition	Voltage between ④ and ground
At idle	Battery voltage
When racing	Battery voltage → Approximately 0.8V

O.K.

INSPECTION END

PRESSURE REGULATOR VACUUM RELEASE (P.R.V.R.) CONTROL SOLENOID VALVE

(Not self-diagnostic item)

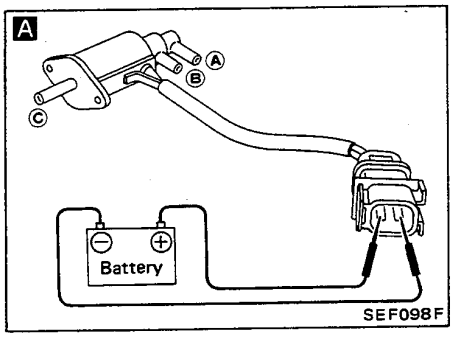


PRESSURE REGULATOR VACUUM RELEASE (P.R.V.R.) CONTROL SOLENOID VALVE

(Not self-diagnostic item)

INSPECTION START

A



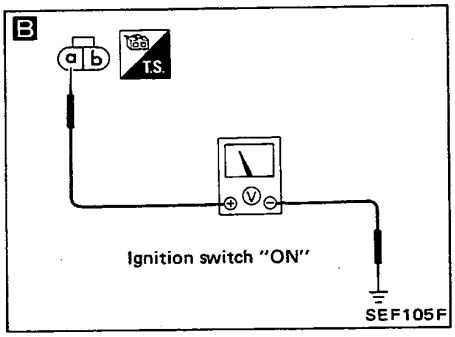
Check P.R.V.R. control solenoid valve.

Condition	Continuity
Supply 12V direct current to P.R.V.R. control solenoid valve	Only Ⓐ - Ⓑ
Not supply	Only Ⓑ - Ⓒ

If N.G., replace P.R.V.R. control solenoid valve.

O.K.

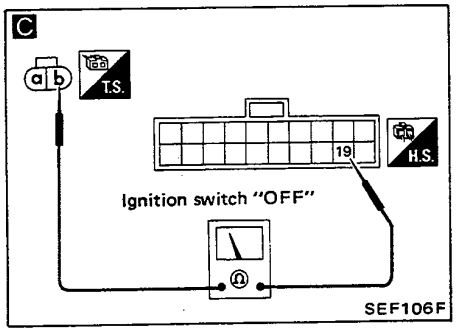
B



Check power source.
1) Turn ignition switch "ON".
2) Check voltage between terminal ⓐ and ground.
   Voltage: Battery voltage
   If N.G., repair harness.

O.K.

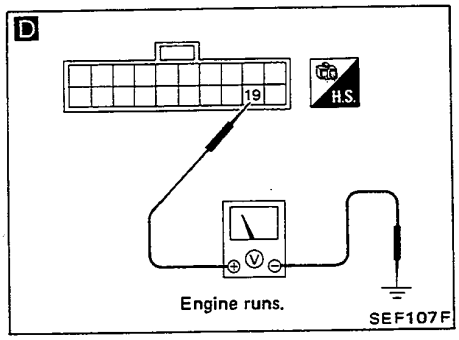
C



1) Turn ignition switch "OFF".
2) Check continuity between terminals ⓑ and ⑲.
   Continuity should exist.
   If N.G., repair harness or connectors.

O.K.

D

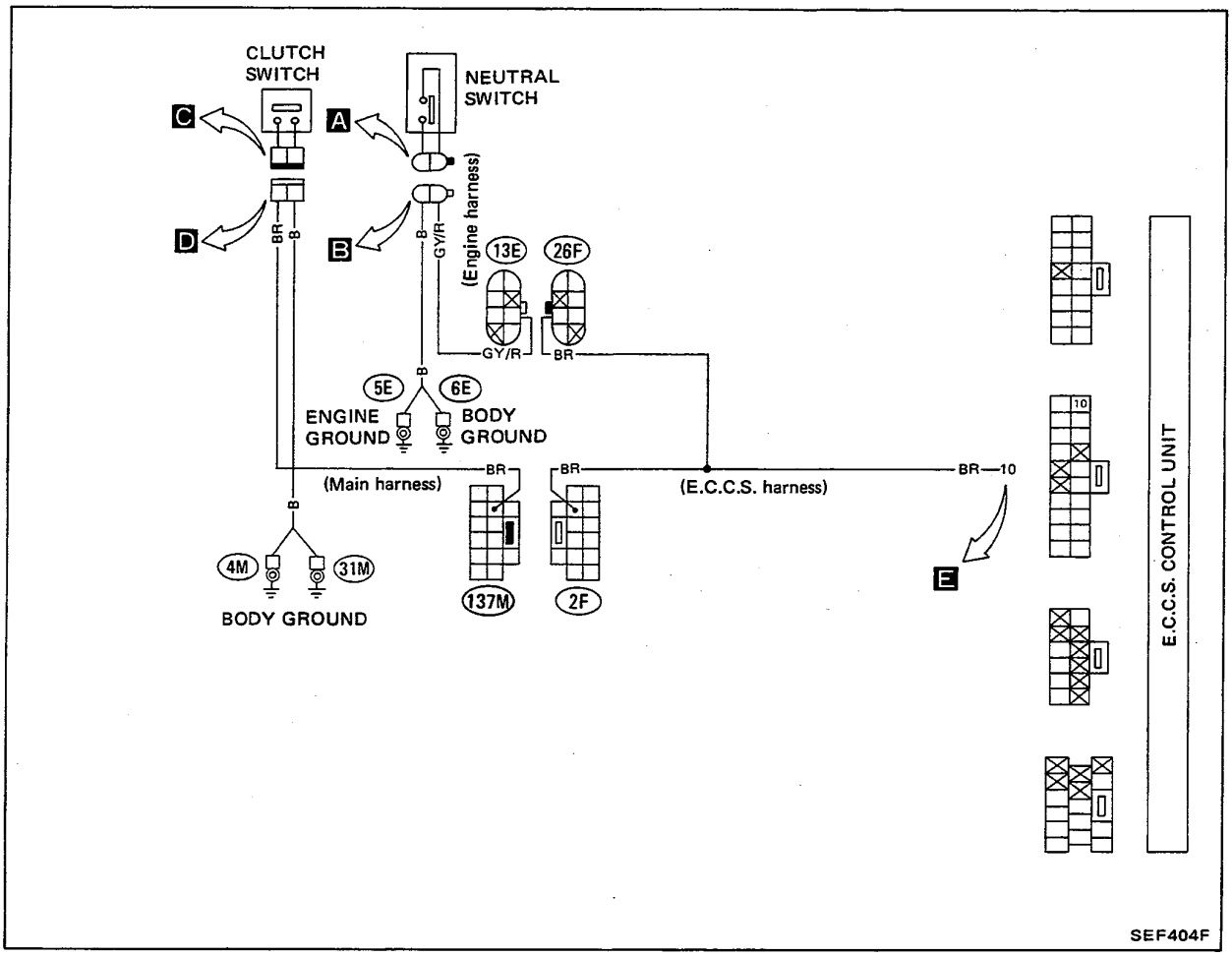


Check output signal.
1) Start engine and warm it up sufficiently.
2) Stop engine and restart engine.
3) Check voltage between E.C.U. terminal ⑲ and ground.
   Battery voltage should appear in approx. 3 minutes after turning ignition switch "START".

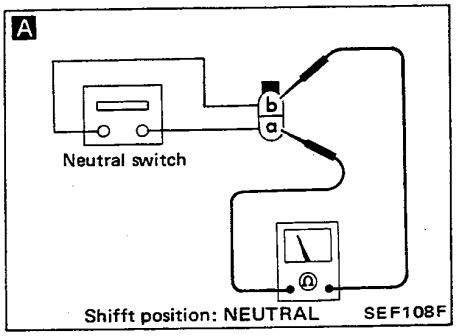
O.K.

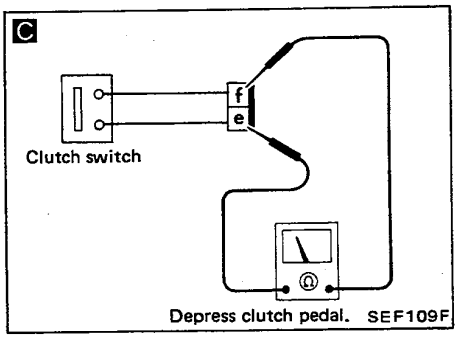
INSPECTION END

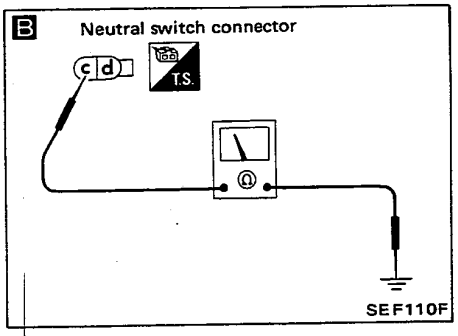
CLUTCH SWITCH AND NEUTRAL SWITCH (Not self-diagnostic item)

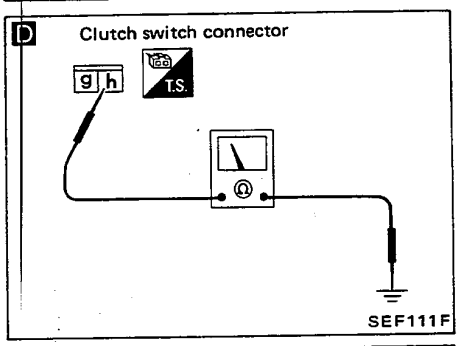


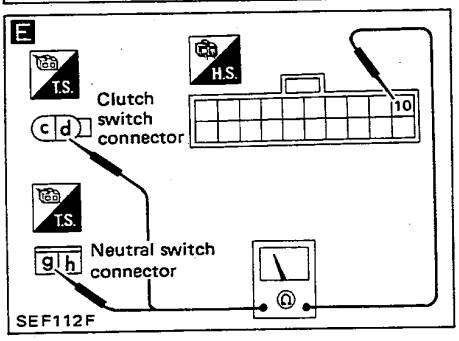
CLUTCH SWITCH AND NEUTRAL SWITCH (Not self-diagnostic item)











INSPECTION START

A C

Check clutch switch and neutral switch.

Clutch switch

Condition	Continuity between terminals ⓐ and ⓑ
Release clutch pedal	No
Depress clutch pedal	Yes

Neutral switch

Condition	Continuity between terminals ⓔ and ⓕ
Shift to "Neutral"	Yes
Shift to other positions	No

If N.G., replace switches.

O.K.

B D

Check continuity between terminal ⓒ and ground (for neutral switch) and terminal ⓗ and ground (for clutch switch).
Continuity should exist.
If N.G., repair harness or connectors.

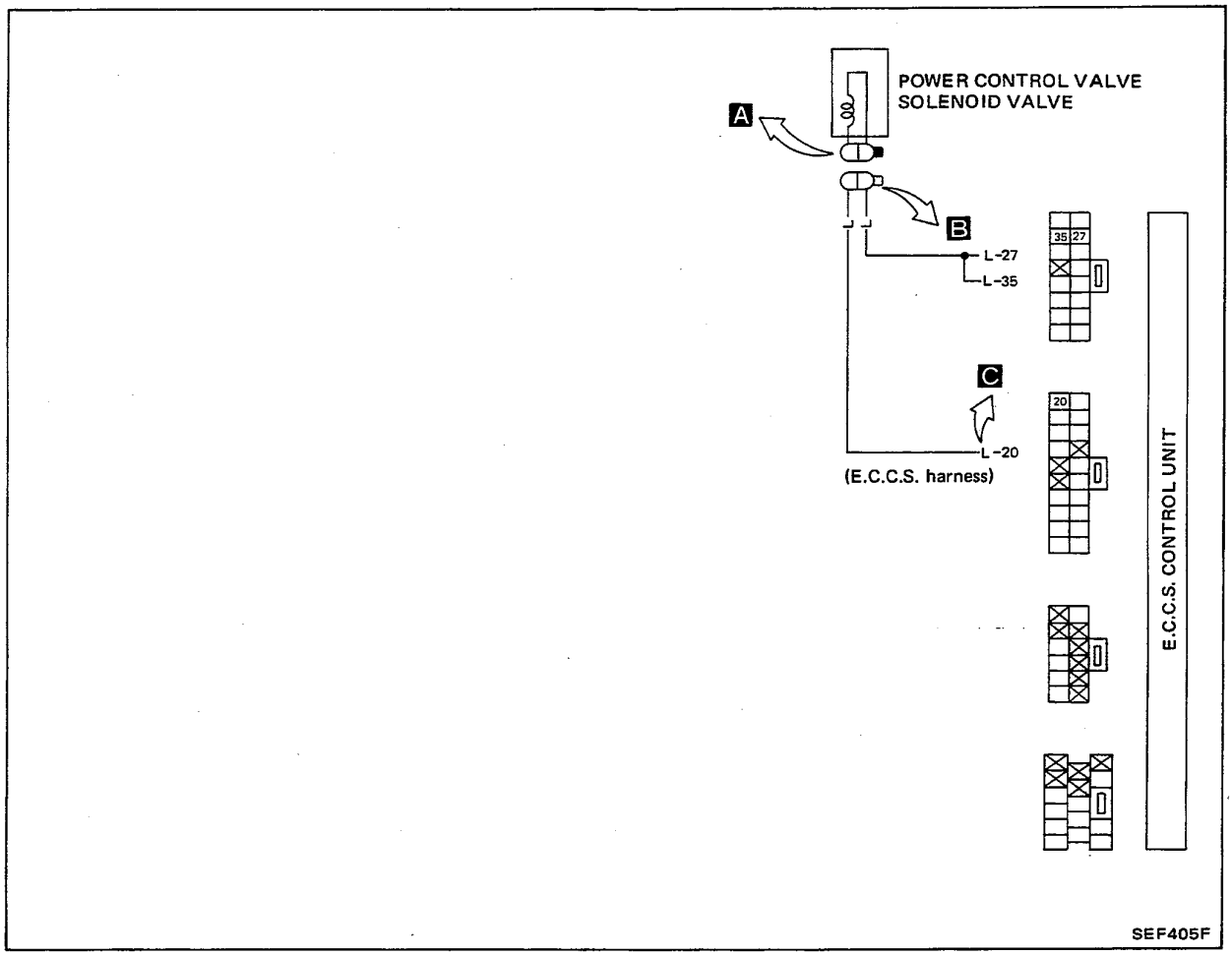
O.K.

E

Check continuity between terminals ⓓ and ⑩ (for neutral switch) and terminals ⓖ and ⑩ (for clutch switch).
Continuity should exist.
If N.G., repair harness or connectors.

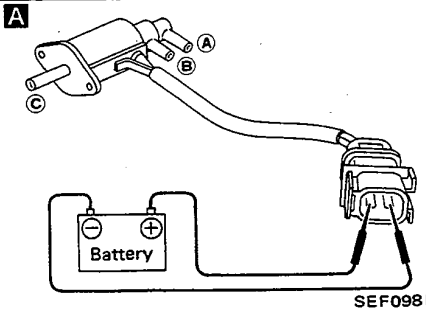
INSPECTION END

POWER VALVE CONTROL (Not self-diagnosis item)



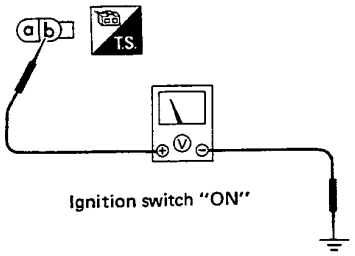
POWER VALVE CONTROL (Not self-diagnosis item)

A



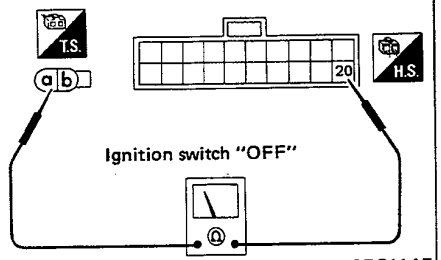
SEF098F

B



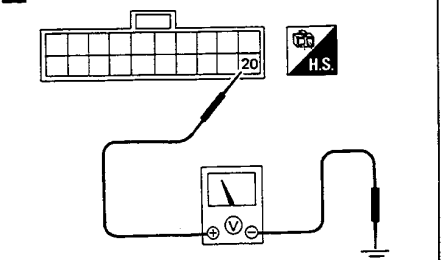
SEF113F

B



SEF114F

C



SEF115F

INSPECTION START

A

Check power control valve solenoid valve.

Condition	Continuity
Supply 12V direct current to power control valve solenoid valve	Only Ⓐ - Ⓑ
Not supply	Only Ⓑ - Ⓒ

If N.G., replace power control valve solenoid valve.

O.K.

B

Check power source.
1) Turn ignition switch "ON".
2) Check voltage between terminal ⓑ and ground.
Voltage: Battery voltage
If N.G., repair harness or connectors.

O.K.

B

1) Turn ignition switch "OFF".
2) Check continuity between terminals Ⓒ and ⑳.
Continuity should exist.
If N.G., repair harness or connectors.

O.K.

C

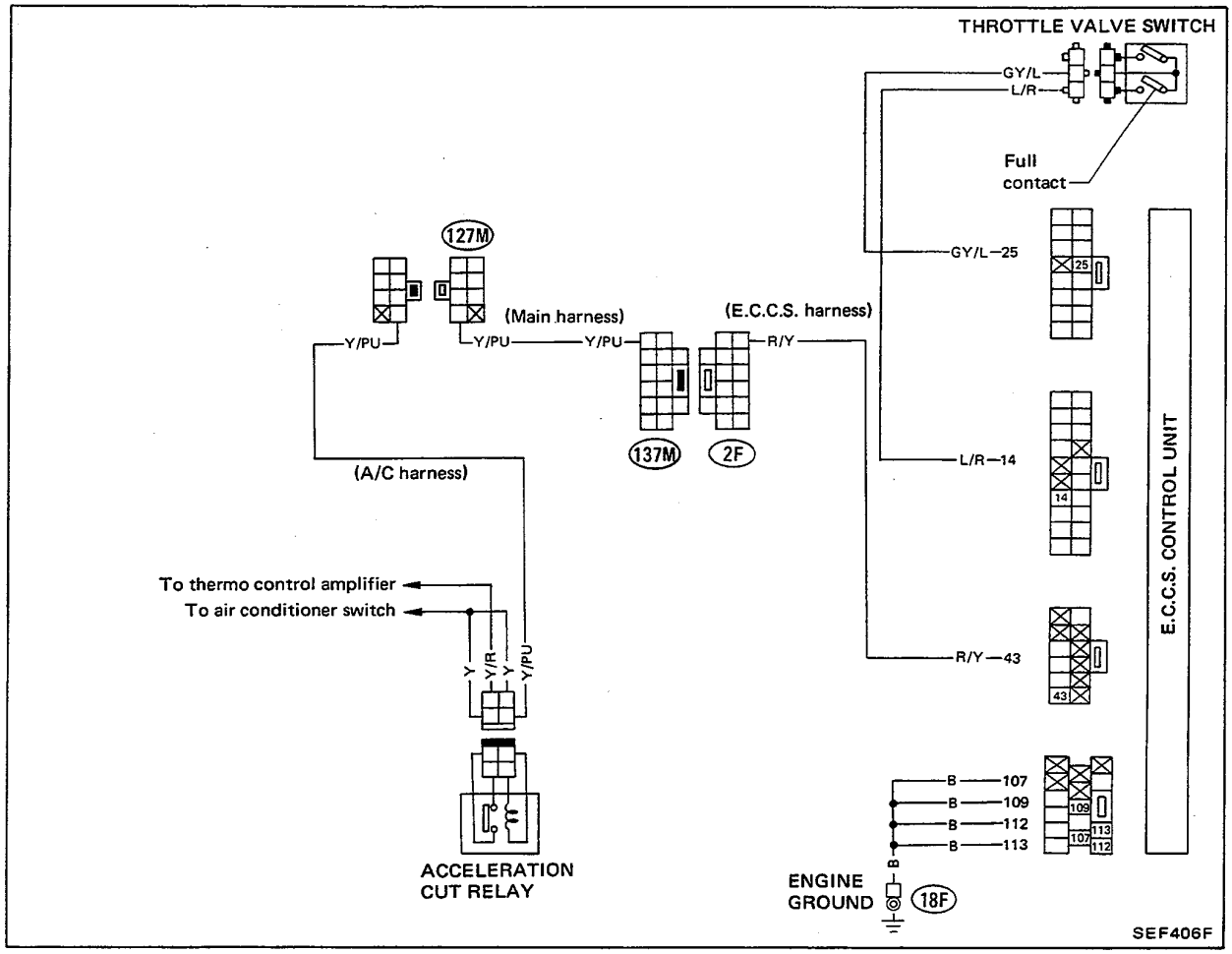
Check output signal.
1) Start engine.
2) Check voltage between terminal ⑳ and ground.

Engine speed	Voltage between terminal ⑳ and ground
Less than approx. 4,000 rpm	Approximately 1V
More than approx. 4,000 rpm	Battery voltage

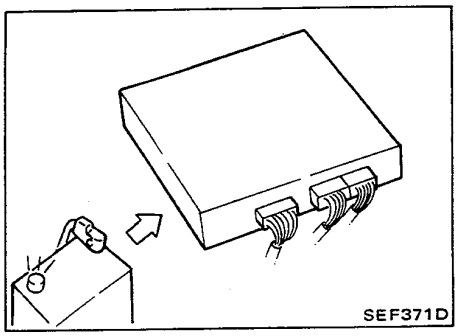
O.K.

INSPECTION END

ACCELERATION CUT CONTROL (Not self-diagnostic item)

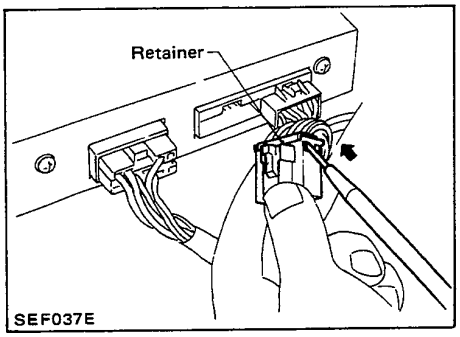


For inspection of this system, refer to HA section.

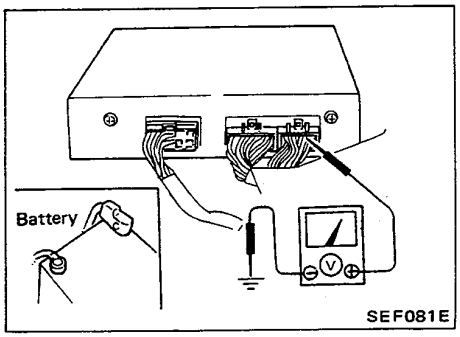


MEASUREMENT VOLTAGE OR RESISTANCE OF E.C.U.

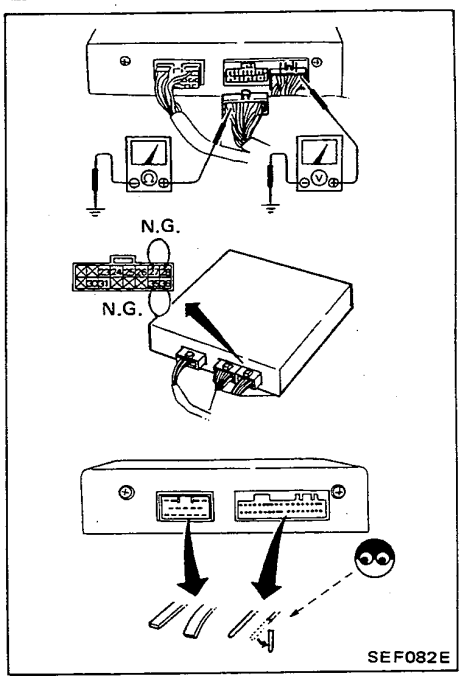
1. Disconnect battery ground cable.
2. Remove assist side or bench seat from vehicle.
3. Disconnect connectors from E.C.U.



4. Remove pin terminal retainer from connectors to make it easier to insert tester probes.



5. Connect connectors to E.C.U. carefully.
6. Connect battery ground cable.
7. Measure the voltage at each terminal by following "E.C.U. inspection table".



CAUTION:

a. **Perform all voltage measurements with the connectors connected.**
b. **Perform all resistance measurements with the connectors disconnected.**
c. **Make sure that there are not any bends or breaks on E.C.U. pin terminal before measurements.**
d. **Do not touch tester probes between terminals ㉗ and ㉘, ㉟ and ㊱.**

E.C.U. inspection table

*Data are reference values.

TERMINAL NO.	ITEM	CONDITION	*DATA
2	A.A.C. valve	Engine is running. └─At idle (after warming up)	7 - 11V (Under no-load condition)
4	E.G.R. control solenoid valve	Engine is running. └─Engine is cold. [Water temperature is below 60°C (140°F).]	0.7 - 0.9V
		Engine is running. └─After warming up [Water temperature is between 65°C (149°F) and 105°C (221°F).]	BATTERY VOLTAGE (11 - 14V)
5 44 45 46	Ignition signal (from power transistor)	Engine is running.	Voltage varies between 0V and approximately 1.0V.
6	E.F.I. relay	Ignition switch "ON"	0.8 - 1.0V
8	Crank angle sensor (position signal)	Idle speed **Do not turn engine at high speed under no-load.**	2.0 - 3.0V
9	Start signal	Ignition switch "START"	BATTERY VOLTAGE (11 - 14V)
10	Neutral signal	Ignition switch "ON" └─Gear position: Neutral	0V
		Ignition switch "ON" └─Gear position: Except neutral	BATTERY VOLTAGE (11 - 14V)

*Data are reference values.

TERMINAL NO.	ITEM	CONDITION	*DATA
14	Full throttle switch (⊖ side)	Ignition switch "ON" └Throttle valve: fully open	9 - 10V
		Ignition switch "ON" └Throttle valve: Any position except full throttle	0V
17	Crank angle sensor (Reference signal)	Idle speed **Do not turn engine at high speed under no-load.**	Approximately 0.5V
18	Idle switch (⊖ side)	Ignition switch "ON" └Throttle valve: idle position	9 - 10V
		Ignition switch "ON" └Throttle valve: except idle position	0V
19	Pressure regulator control solenoid valve	Ignition switch "ON" └For approximately 3 minutes after turning ignition switch to "START". [Water temperature is above 60°C (140°F).]	0.7 - 0.9V (Idle switch ON)
		Ignition switch "ON" └Approximately 3 minutes after turning ignition switch to "START". [Water temperature is above 60°C (140°F).]	BATTERY VOLTAGE (11 - 14V)
		Ignition switch "ON" or "START". [Water temperature is below 60°C (140°F).]	(Idle switch ON)
20	Power valve control panel	Engine speed: Less than approximately 4,000 rpm	Approximately 1.0V
		Engine speed: More than approximately 4,000 rpm	BATTERY VOLTAGE (11 - 14V)

*Date are reference values.

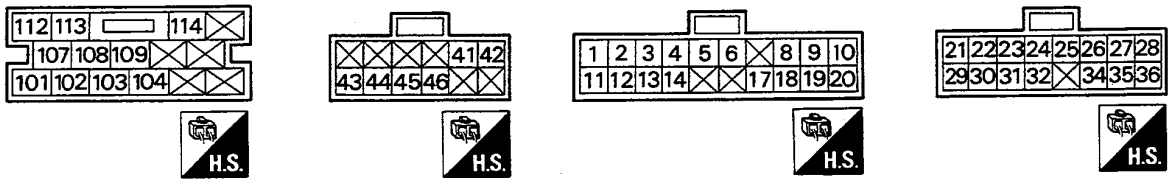
TERMINAL NO.	ITEM	CONDITION	*DATA
22	Air conditioner signal (Air conditioner equipped model)	Ignition switch "ON" & full throttle switch "OFF" └ Air conditioner switch and heater fan switch "ON" & "OFF"	0V
		Ignition switch "ON" & full throttle switch "ON" └ Air conditioner switch "ON"	BATTERY VOLTAGE (11 - 14V) (within approximately 5 seconds)
23	Water temperature sensor	Engine is running.	1.0 - 5.0V Output voltage varies with engine water temperature.
24	Exhaust gas sensor	Engine is running. └ After warming up sufficiently.	0 - Approximately 1.0V
25	Idle switch and full throttle switch (⊕ side)	Ignition switch "ON"	9 - 10V
27 35	Power source for E.C.U.	Ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)
29	Vehicle speed sensor	Ignition switch "ON" └ When rotating front wheel slowly	Voltage varies between 0V and approximately 5V.
31	Air flow meter	Idle speed **Do not turn engine at high speed under no-load.**	1.5V (Output voltage varies with engine revolution.)
34	Ignition switch signal	Ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)
42	A.I.V. control solenoid valve	Engine is running. └ At idle	0.7 - 0.9V
		Engine is running. └ When depressing accelerator pedal Water temperature is above 50°C (122°F).	BATTERY VOLTAGE (11 - 14V)

E.C.U. INPUT/OUTPUT SIGNAL INSPECTION

***Data are reference values.**

TERMINAL NO.	ITEM	CONDITION	*DATA
101 102 103 104	Injector	Engine is running.	Voltage varies between 0V and approximately 12V.
108	Fuel pump	Engine is running.	0.7 - 0.9V
		Ignition switch "ON" └ After 5 seconds	BATTERY VOLTAGE (11 - 14V)
114	Injector power supply	Engine is running.	BATTERY VOLTAGE (11 - 14V)
28 36 107 109 112 113	Ground for E.C.U.	Ignition switch "OFF"	Approximately 0Ω

E.C.U. PIN CONNECTOR TERMINAL LAYOUT



SEF493F

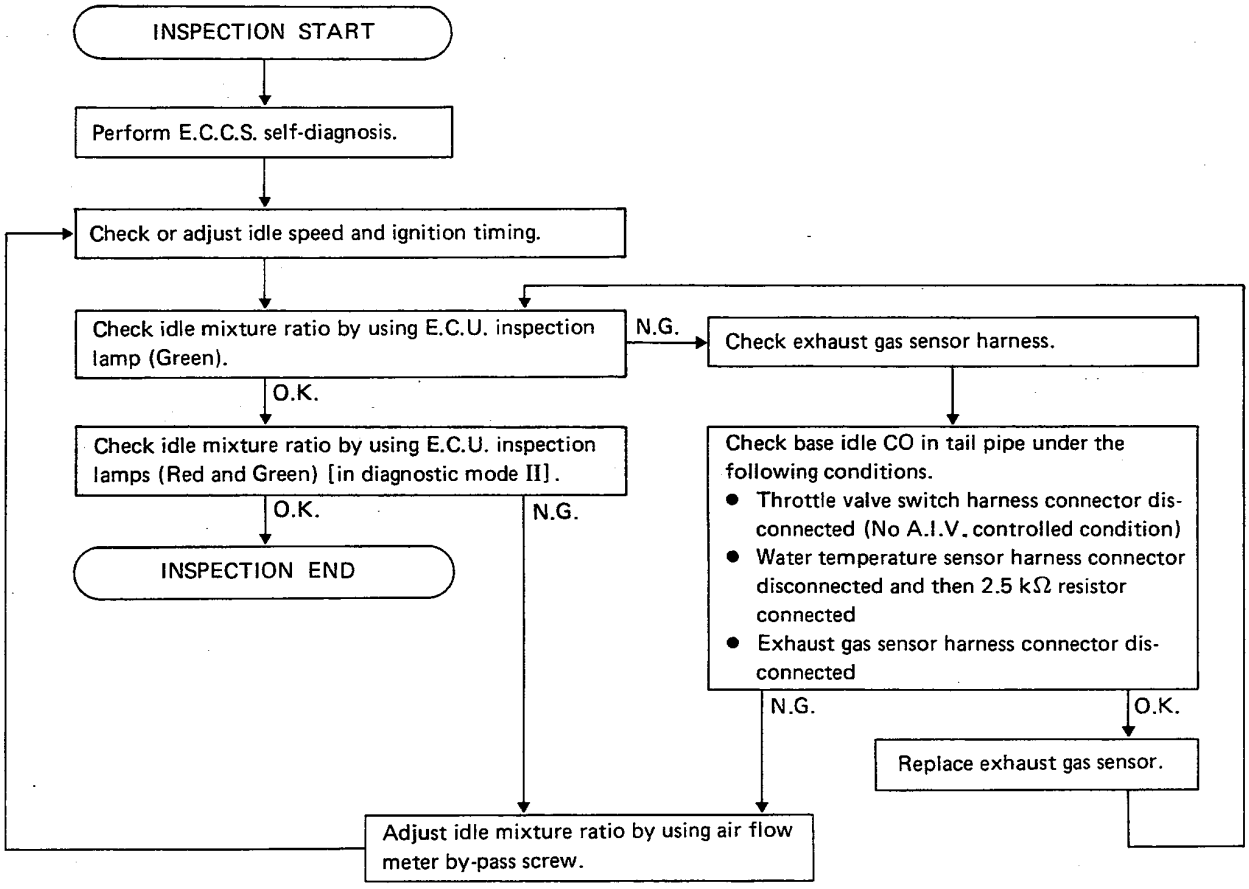
MIXTURE RATIO FEEDBACK SYSTEM INSPECTION

Preparation

1. Make sure that the following parts are in good order.
- Battery
- Ignition system
- Engine oil and coolant levels
- Fuses
- E.C.C.S. harness connectors
- Vacuum hoses
- Air intake system
  (oil filler cap, oil level gauge, etc.)
- Valve clearance, engine compression
- E.G.R. valve operation
- Throttle valve and throttle valve switch operation

2. On air conditioner equipped models, checks should be carried out while the air conditioner is "OFF".
3. When measuring "CO" percentage, insert probe more than 40 cm (15.7 in) into tail pipe.
4. Checking and adjusting should be done while the radiator cooling fan is stopped.

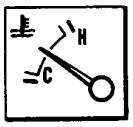
Overall inspection sequence



MIXTURE RATIO FEEDBACK SYSTEM INSPECTION

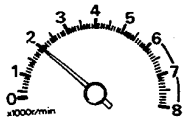
INSPECTION START

Visually check the following:
- Air cleaner clogging
- Hoses and ducts for leaks
- E.G.R. valve operation
- Electrical connectors
- Gaskets
- Throttle valve and throttle valve switch operation



SEF457C

Start engine and warm up until water temperature indicator points to the middle of gauge.



SEF477B

Open engine food and run engine at about 2,000 rpm for about 2 minutes under no-load.

Perform E.C.C.S. self-diagnosis.

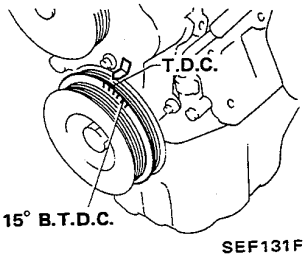
O.K. / N.G.

Check, correct or replace malfunctioning parts.

Does engine run smoothly?

O.K. / N.G.

Check and clean injectors, and replace injectors if necessary.



SEF131F

Race engine two or three times under no-load, then run engine at idle speed.

Check idle speed.

M/T: 800±50 rpm

O.K. / N.G.

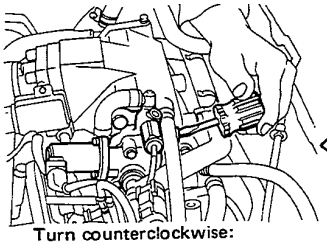
Check ignition timing with a timing light.

15°±2° B.T.D.C.

N.G.

Adjust ignition timing by turning crank angle sensor after loosing crank angle sensor fixing bolts.

O.K.


Turn counterclockwise:
Idle speed becomes lower
SEF119F

Disconnect A.A.C. valve harness connector.

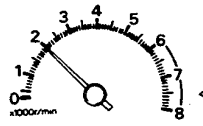
Adjust idle speed to 750 rpm by turning idle speed adjusting screw.

Connect A.A.C. valve harness connector.

Ⓐ

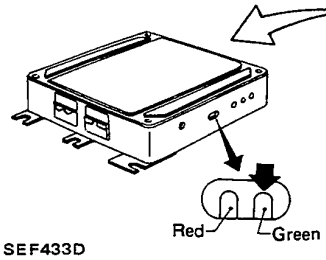
Ⓑ

MIXTURE RATIO FEEDBACK SYSTEM INSPECTION


SEF477B

Run engine at about 2,000 rpm for about 2 minutes under no-load.

Make sure that inspection lamp (Green) on control unit goes on and off periodically more than 9 times during 10 seconds at 2,000 rpm under no-load.



SEF433D

O.K.

N.G.

Race engine two or three times under no-load, then run engine at idle speed.

Set the diagnosis mode of E.C.U. to No. 2 mode and check inspection lamps (Red and Green) on control unit blink at 2,000 rpm under no load. They should blink simultaneously.

No

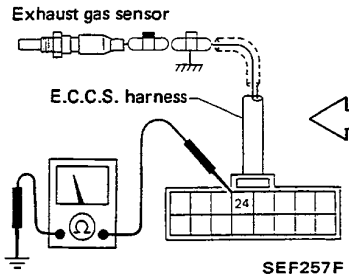
Yes

Connect throttle valve switch harness connector.

INSPECTION END

Check exhaust gas sensor harness:
1) Turn off engine and disconnect battery ground cable.
2) Disconnect connector from Control Unit.
3) Discnonect exhaust gas sensor harness connector and connect terminal for exhaust gas sensor harness connector to ground with a jumping wire.
4) Check for continuity between terminal No. 24 and ground metal on vehicle body.

Continuity exists ..... O.K.
Continuity does not exist ..... N.G.

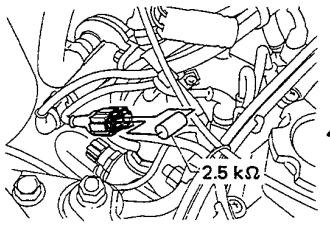


SEF257F

O.K.

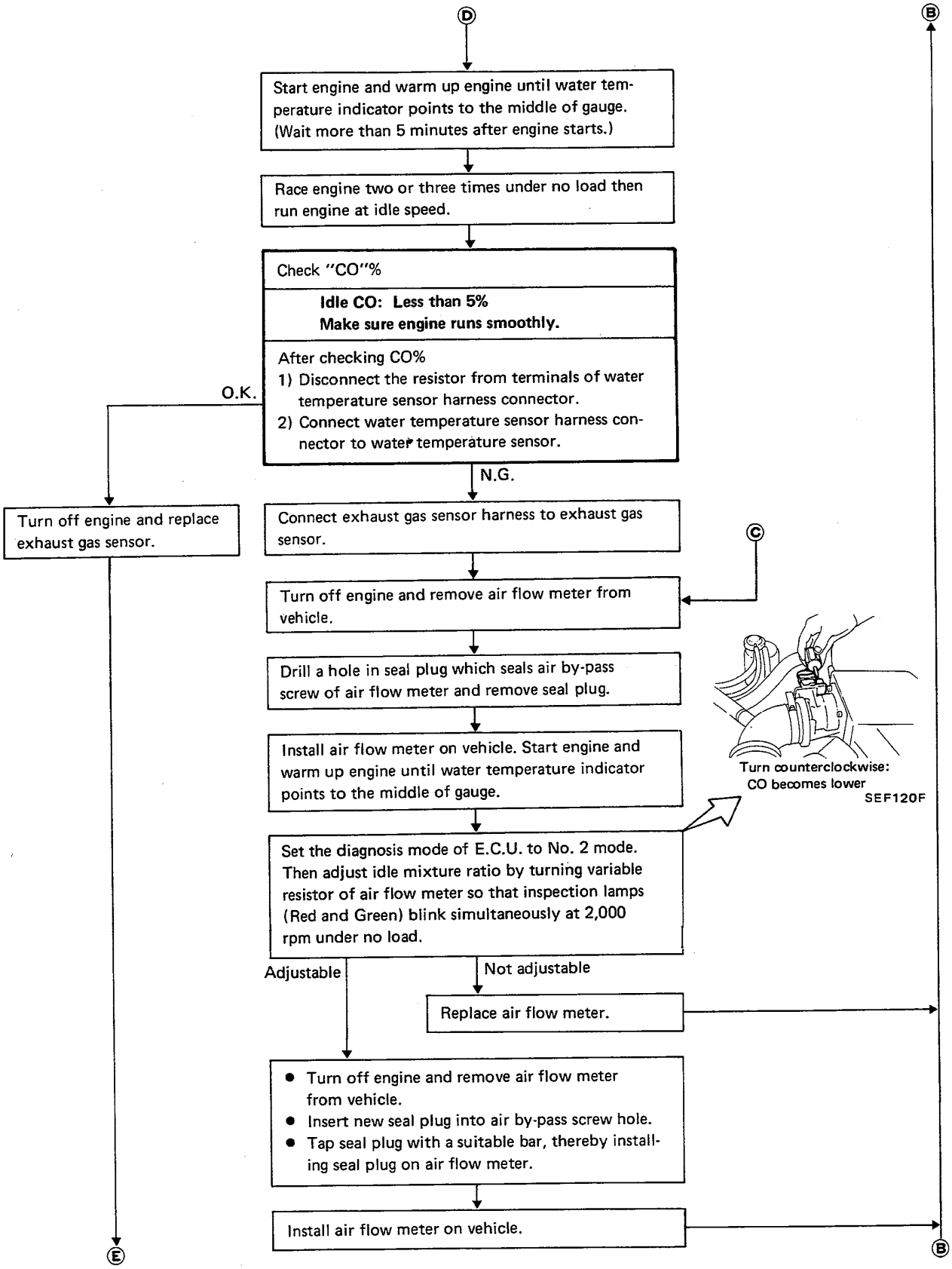
N.G.

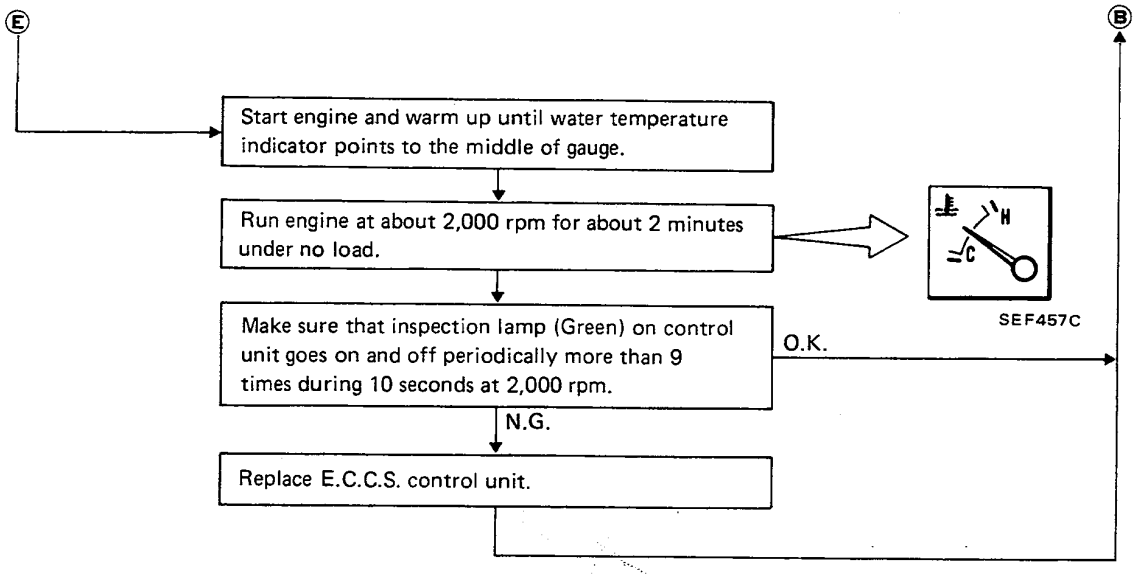
Repair or replace E.C.C.S. harness.

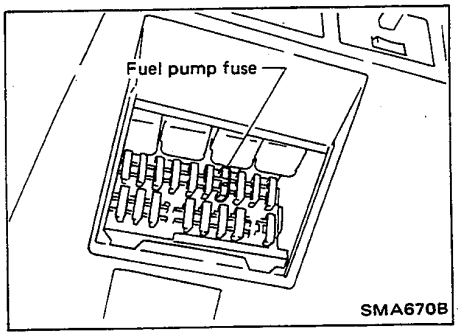


SEF333C

- Disconnect water temperature sensor harness connector.
- Connect a resistor (2.5 kΩ) between terminals of water temperature sensor harness connector.


D
Start engine and warm up engine until water temperature indicator points to the middle of gauge. (Wait more than 5 minutes after engine starts.)
Race engine two or three times under no load then run engine at idle speed.
Check "CO"%
Idle CO: Less than 5%
Make sure engine runs smoothly.
After checking CO%
1) Disconnect the resistor from terminals of water temperature sensor harness connector.
2) Connect water temperature sensor harness connector to water temperature sensor.
O.K.
N.G.
Turn off engine and replace exhaust gas sensor.
Connect exhaust gas sensor harness to exhaust gas sensor.
C
Turn off engine and remove air flow meter from vehicle.
Drill a hole in seal plug which seals air by-pass screw of air flow meter and remove seal plug.
Install air flow meter on vehicle. Start engine and warm up engine until water temperature indicator points to the middle of gauge.
Set the diagnosis mode of E.C.U. to No. 2 mode. Then adjust idle mixture ratio by turning variable resistor of air flow meter so that inspection lamps (Red and Green) blink simultaneously at 2,000 rpm under no load.
Adjustable
Not adjustable
Replace air flow meter.
Turn off engine and remove air flow meter from vehicle.
Insert new seal plug into air by-pass screw hole.
Tap seal plug with a suitable bar, thereby installing seal plug on air flow meter.
Install air flow meter on vehicle.
E
B
B
Turn counterclockwise: CO becomes lower
SEF120F

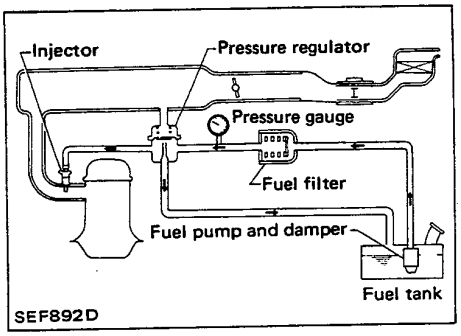

E
B
Start engine and warm up until water temperature indicator points to the middle of gauge.
Run engine at about 2,000 rpm for about 2 minutes under no load.
H
C
SEF457C
Make sure that inspection lamp (Green) on control unit goes on and off periodically more than 9 times during 10 seconds at 2,000 rpm.
O.K.
N.G.
Replace E.C.C.S. control unit.



Releasing Fuel Pressure

Before disconnecting fuel line, release fuel pressure from fuel line to eliminate danger.

1. Remove fuel pump fuse.
2. Start engine.
3. After engine stalls, crank engine two or three times to make sure that pressure is released.
4. Turn ignition switch off and connect fuel pump fuse.



Fuel Pressure Check

a. **When reconnecting fuel line, always use new clamps and be sure to position them correctly.**
b. **Use a torque driver to tighten clamps.**
c. **Use Pressure Gauge to check fuel pressure.**

1. Release fuel pressure to zero.
2. Disconnect fuel hose between fuel filter and fuel tube (engine side).
3. Install pressure gauge between fuel filter and fuel tube.
4. Start engine and check for fuel leakage.
5. Read the indication of fuel pressure gauge.

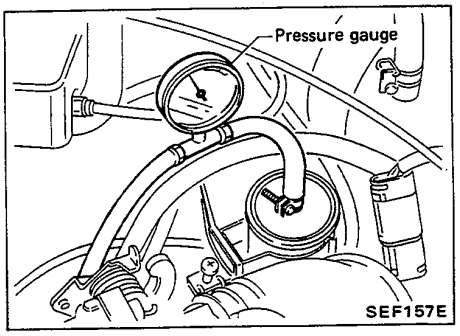
At idling:

When fuel pressure regulator valve vacuum hose is connected.

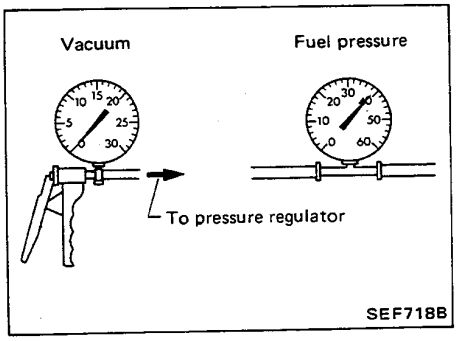
Approximately 196 kPa (2.0 kg/cm², 28 psi)

When fuel pressure regulator valve vacuum is disconnected.

Approximately 245 kPa (2.5 kg/cm², 36 psi)

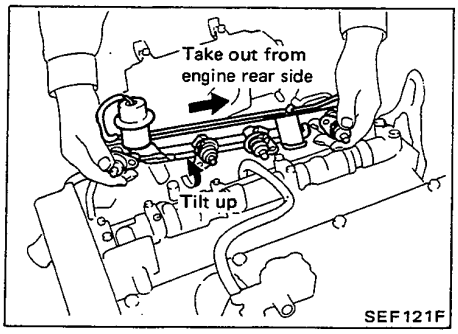


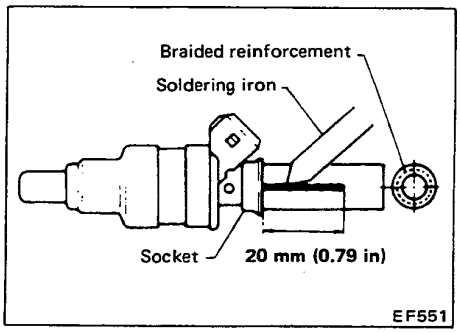
6. Stop engine and disconnect fuel pressure regulator vacuum hose from intake manifold.
7. Plug intake manifold with a rubber cap.
8. Connect variable vacuum source to fuel pressure regulator.



9. Start engine and read the indication of fuel pressure gauge as vacuum is changed.

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





Injector Removal and Installation

1. Release fuel pressure to zero.
2. Remove throttle chamber, throttle chamber stay, I.A.A. unit intake side rocker cover and P.C.V.
3. Disconnect fuel hoses and pressure regulator vacuum hose.
4. Remove injector assembly fixing bolts.
5. Take out injector assembly.

Be careful not to damage the injector, nor to deform the fuel tube.

6. Remove injectors from fuel tube.
7. Remove fuel hose.

1) Heat soldering iron (150 watt). Cut hose into braided reinforcement from mark to socket end.

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

2) Then pull rubber hose out with hand.

a. Be careful not to damage socket plastic connector, etc. with soldering iron.

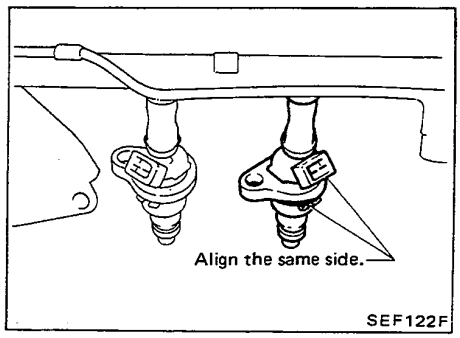
b. Never place injector in a vise when disconnecting rubber hose.

8. Install fuel hose as follows:

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

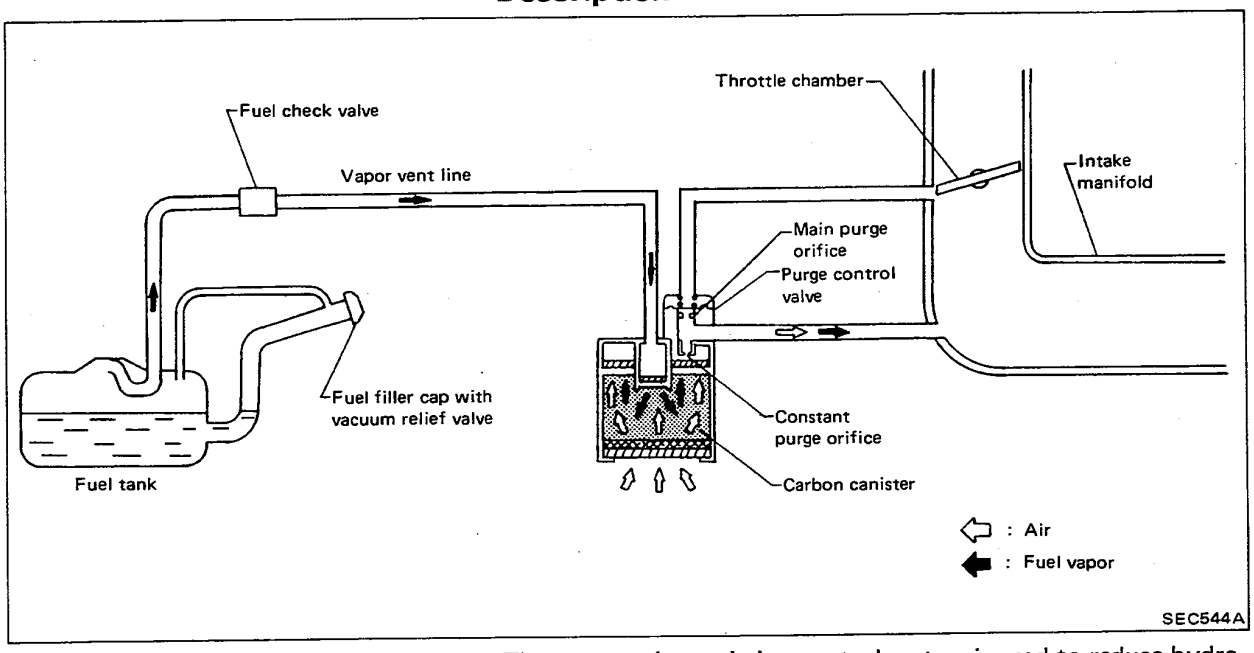
CAUTION:

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



9. Assemble injectors with fuel pipe.
10. Install injectors.

Description

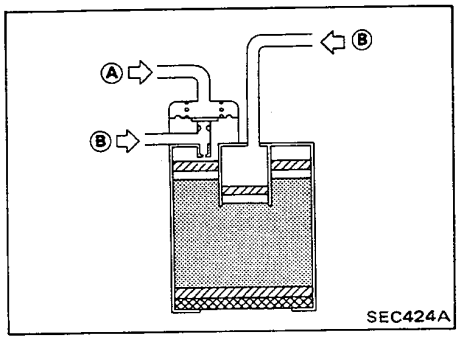


The evaporative emission control system is used to reduce hydrocarbons emitted to the atmosphere from the fuel system. This reduction of hydrocarbons is accomplished by activated charcoals in the carbon canister.

The fuel vapor from the sealed fuel tank is led into the canister which contains activated carbon and the vapor is stored there when the engine is not running.

The canister retains the fuel vapor until the canister is purged by the air drawn through the bottom of the canister to the intake manifold when the engine is running. When the engine runs at idle, the purge control valve is closed.

Only a small amount of stored vapor flows into the intake manifold through the constant purge orifice. As the engine speed increases, and the throttle vacuum rises higher, the purge control valve opens and the vapor is sucked into the intake manifold through both the main purge orifice and the constant purge orifice.



Inspection

CARBON CANISTER

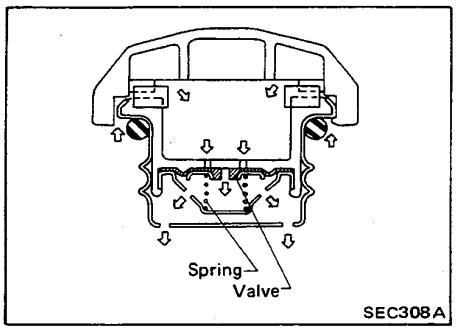
Check carbon canister as follows.

Ⓐ : Blow air and ensure that there is no leakage.

Ⓑ : Blow air and ensure that there is leakage.

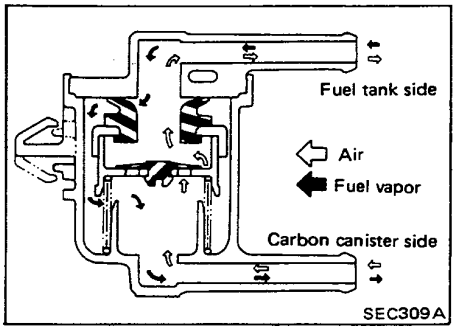
Inspection (Cont'd)

FUEL TANK VACUUM RELIEF VALVE



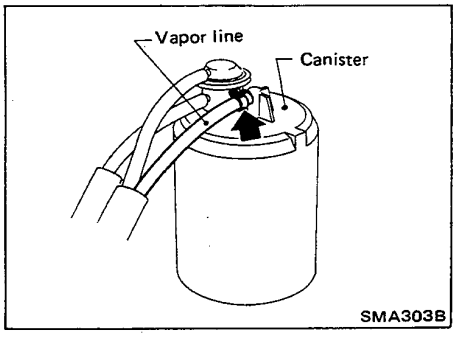
1. Wipe clean valve housing.
2. Inhale air through the cap. A slight resistance accompanied by valve clicks indicates that valve is in good mechanical condition. Note also that, by further inhaling air, the resistance should be disappeared with valve clicks.
3. If valve is clogged, or if no resistance is felt, replace cap as an assembly.

FUEL CHECK VALVE

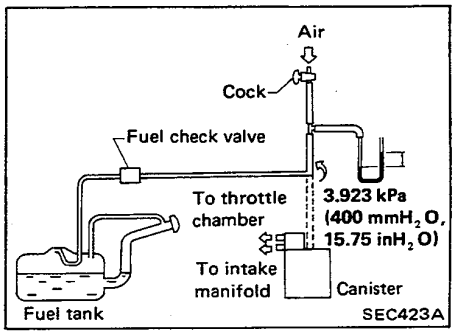


1. Blow air through connector on fuel tank side.
   A considerable resistance should be felt and a portion of air flow be directed toward the canister.
2. Blow air through connector on the canister side.
   Air flow should be smoothly directed toward fuel tank.
3. If fuel check valve is suspected of not being properly functioning in steps 1 and 2 above, replace it.

VAPOR VENT LINE

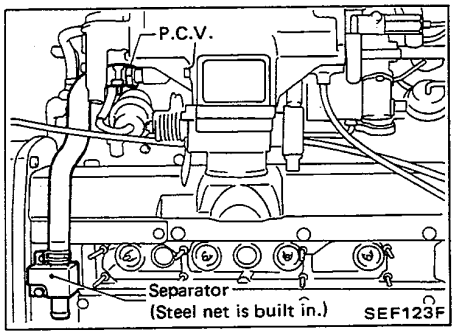


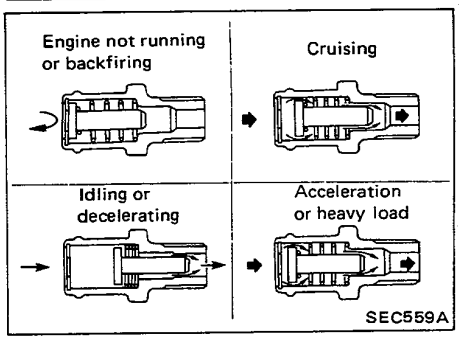
1. Check hoses and fuel tank filler cap.
2. Disconnect the vapor vent line connecting carbon canister to fuel tank.



3. Connect a 3-way connector, a manometer and a cock (or an equivalent 3-way charge cock) to the end of the vent line.
4. Supply fresh air into the vapor vent line through the cock little by little until pressure becomes 3.923 kPa (400 mmH_2O, 15.75 inH_2O).
5. Shut the cock completely and leave it unattended.
6. After 2.5 minutes, measure the height of the liquid in the manometer.
7. Variation in height should remain at 0.245 kPa (25 mmH_2O, 0.98 inH_2O).
8. When filler cap does not close completely, the height should drop to zero in a short time.
9. If the height does not drop to zero in a short time when filler cap is removed, the cause is a blocked hose or a clogged fuel check valve.

In case the vent line is blocked, the fuel tank is not vented properly causing insufficient delivery of fuel to engine, or vapor lock. It must, therefore, be repaired.





Description

This system returns blow-by gas to the intake manifold.

The positive crankcase ventilation (P.C.V.) valve is provided to conduct crankcase blow-by gas to the intake manifold.

During partial throttle operation of the engine, the intake manifold sucks the blow-by gas through the P.C.V. valve.

Normally, the capacity of the valve is sufficient to handle any blow-by and a small amount of ventilating air.

The ventilating air is then drawn from the air duct, through the hose connecting air cleaner to rocker cover, into the crankcase.

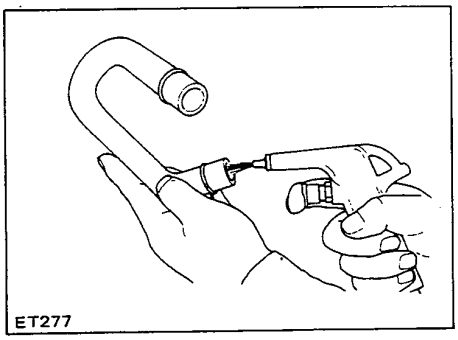
Under full-throttle condition, the manifold vacuum is insufficient to draw the blow-by flow through the valve, and its flow goes through the hose connection in the reverse direction.

On vehicles with an excessively high blow-by some of the flow will go through the hose connection to the air duct under all conditions.

Inspection

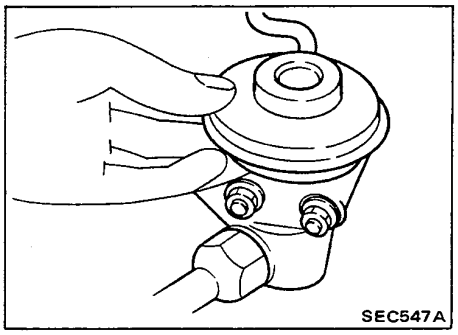
P.C.V. VALVE

With engine running at idle, remove ventilation hose from P.C.V. valve; if valve is working properly a hissing noise will be heard as air passes through it and a strong vacuum should be felt immediately when a finger is placed over valve inlet.



VENTILATION HOSE

1. Check hoses and hose connections for leaks.
2. Disconnect all hoses and clean with compressed air. If any hose cannot be freed of obstructions, replace.

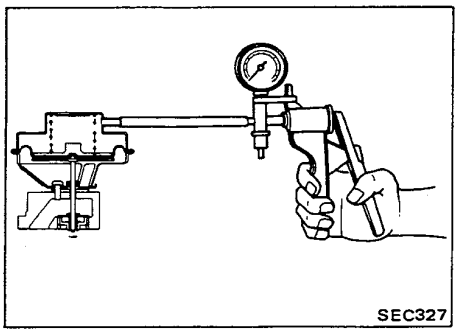

SEC547A

ENTIRE SYSTEM

Ensure that E.G.R. system is functioning properly by placing your finger on E.G.R. control valve diaphragm.

Make sure that E.G.R. control valve operates as follows when engine is revved up to 3,000 to 3,500 rpm.

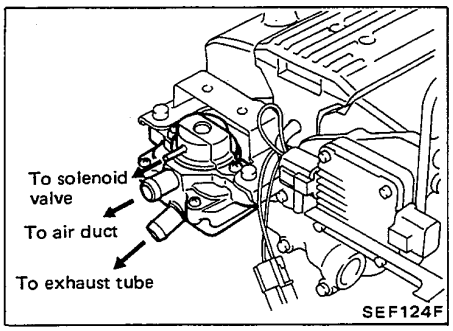
Water temperature °C (°F)	E.G.R. diaphragm
Below 65 (149)	Not moved
Above 65 (149)	Moved


SEC327

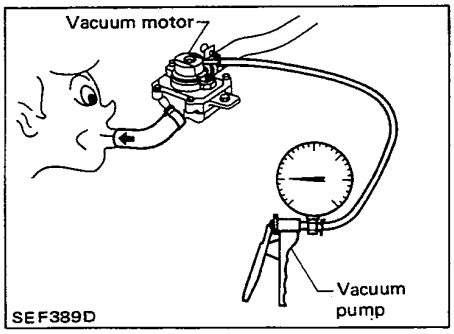
E.G.R. CONTROL VALVE

1. Supply the E.G.R. control valve with vacuum using a handy vacuum pump.
2. Place a finger on the diaphragm of the valve, and make sure that the diaphragm lifts up and down in response to the vacuum leading to the valve.

Full open of E.G.R. valve:
Over −16.0 kPa
(−120 mmHg, −4.72 inHg)



Check hoses for looseness, collapsing, damage or faulty connections, and each part for proper installation.



Air injection valve

Disconnect air injection hose on air injection pipe side. Apply vacuum to vacuum motor. Suck or blow hose to make sure that air flows only to the air injection pipe side.

General Specifications

IGNITION TIMING °B.T.D.C.		15±2
IDLE SPEED	rpm	800±50

Inspection and Adjustment

WATER TEMPERATURE SENSOR			
Thermistor resistance	kΩ	20°C (68°F)	80°C (176°F)
		Approx. 2.5	Approx. 0.33
THROTTLE VALVE SWITCH			
Engine speed when idle switch is changed from "OFF" to "ON"	rpm	Idle speed + 200±150	
FUEL PRESSURE at idling (Measuring point: between fuel filter and fuel pipe)			
Vacuum hose is connected	kPa (kg/cm², psi)	Approximately 196 (2.0, 28)	
Vacuum hose is disconnected	kPa (kg/cm², psi)	Approximately 245 (2.5, 36)	
FUEL INJECTOR			
Coil resistance	Ω	Approximately 2.5	
AIR REGULATOR			
Circuit resistance	Ω	Approximately 65	

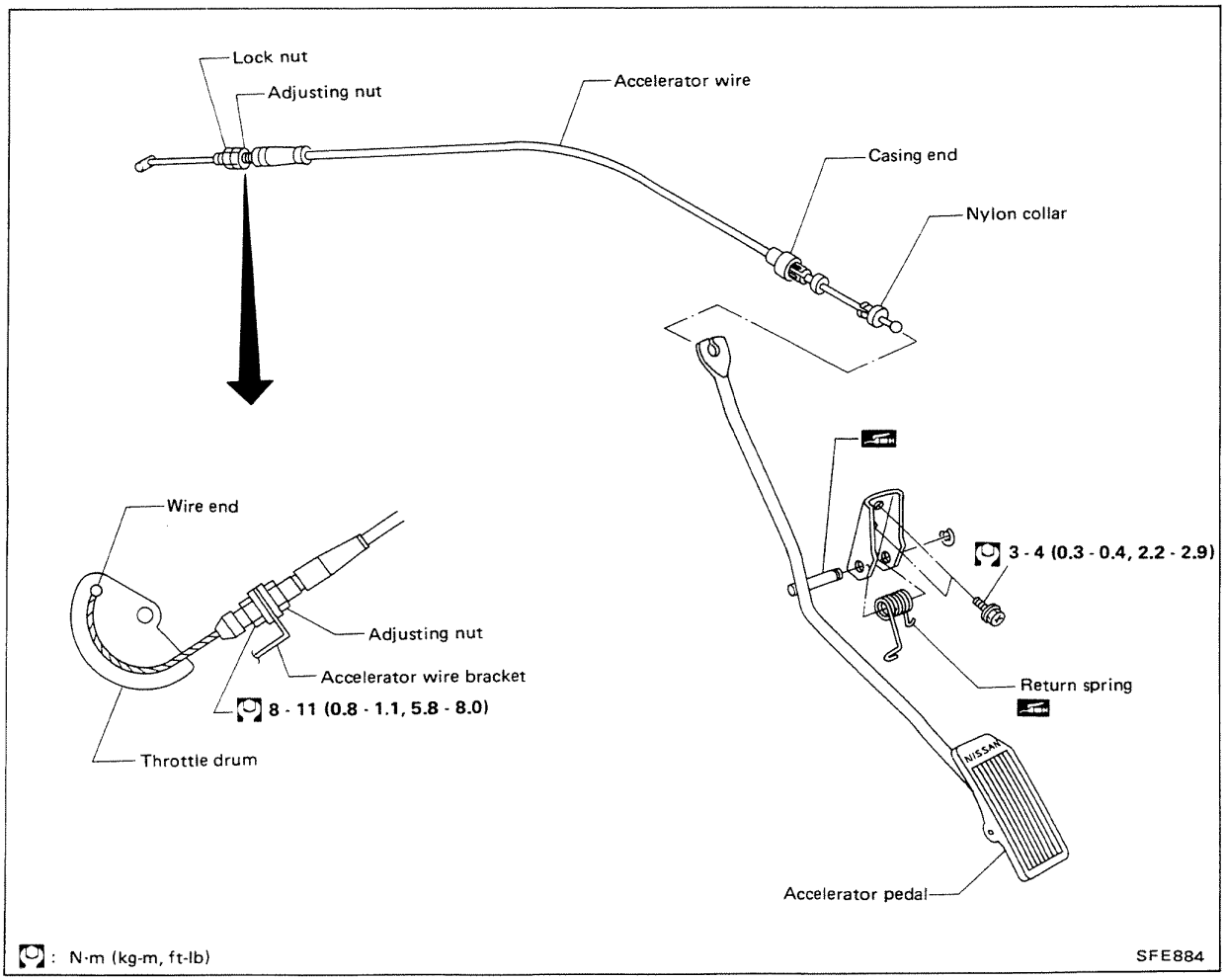
ENGINE CONTROL, FUEL & EXHAUST SYSTEMS

SECTION FE

CONTENTS

Accelerator Control System

a. Check to see if throttle valve fully opens when accelerator pedal is fully depressed and if it returns to idle when released.
b. Adjust accelerator wire according to the following procedure.
   Tighten "Adjusting nut" until "throttle drum" starts to move. From that position turn back "Adjusting nut" 1.5 - 2 turns, and fasten it with a lock nut.
c. Check accelerator control parts for improper contact with any adjacent parts.
d. When connecting accelerator wire, be careful not to twist or scratch its inner wire.
e. Apply a light coat of recommended multi-purpose grease to all sliding or friction surfaces. Do not apply grease to wire.



WARNING:

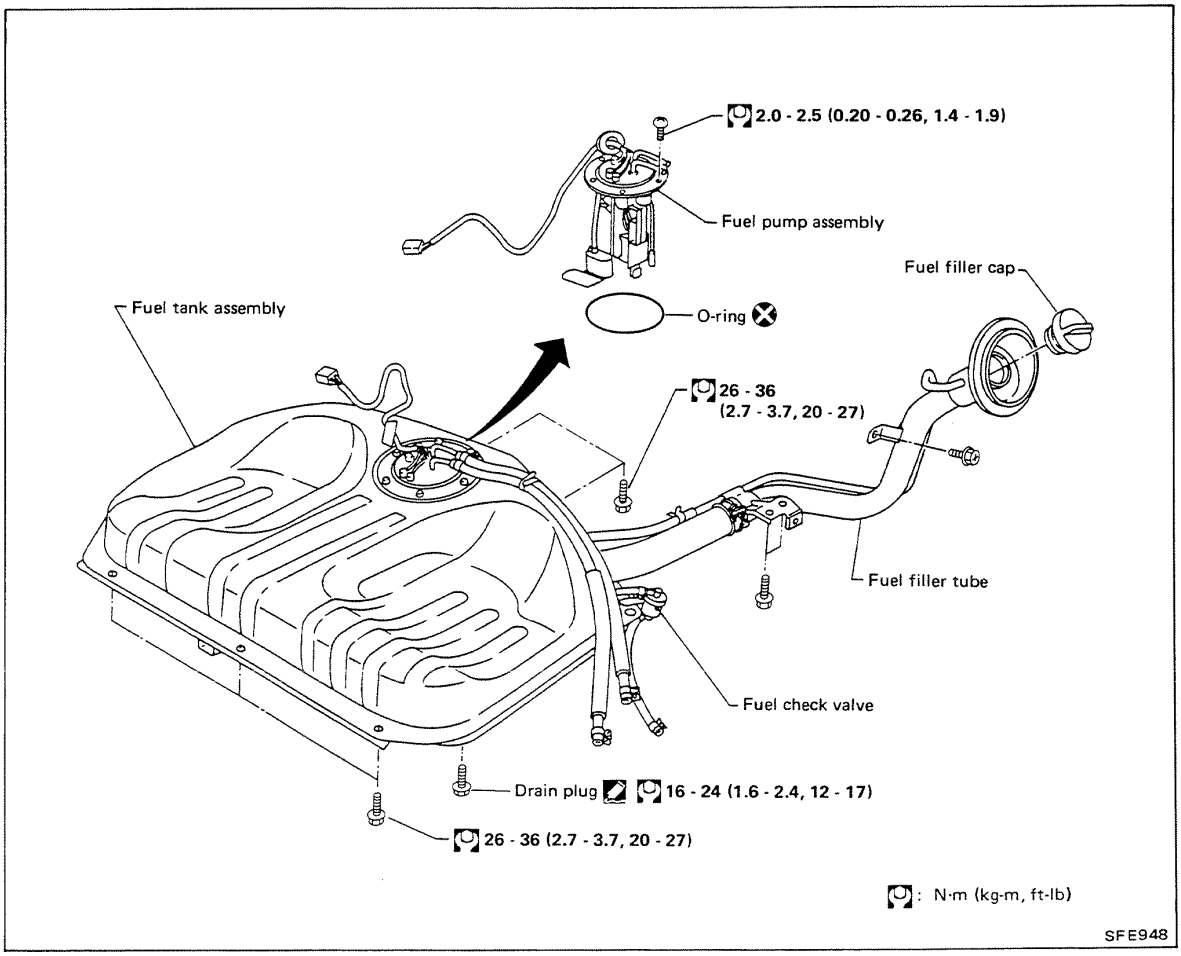
When replacing fuel line parts, be sure to observe the following:

a. Put a "CAUTION: INFLAMMABLE" sign in workshop.
b. Be sure to furnish the workshop with a CO_2 fire extinguisher.
c. Be sure to disconnect battery ground cable before conducting operations.
d. Put drained fuel in an explosion-proof container and put lid on securely.

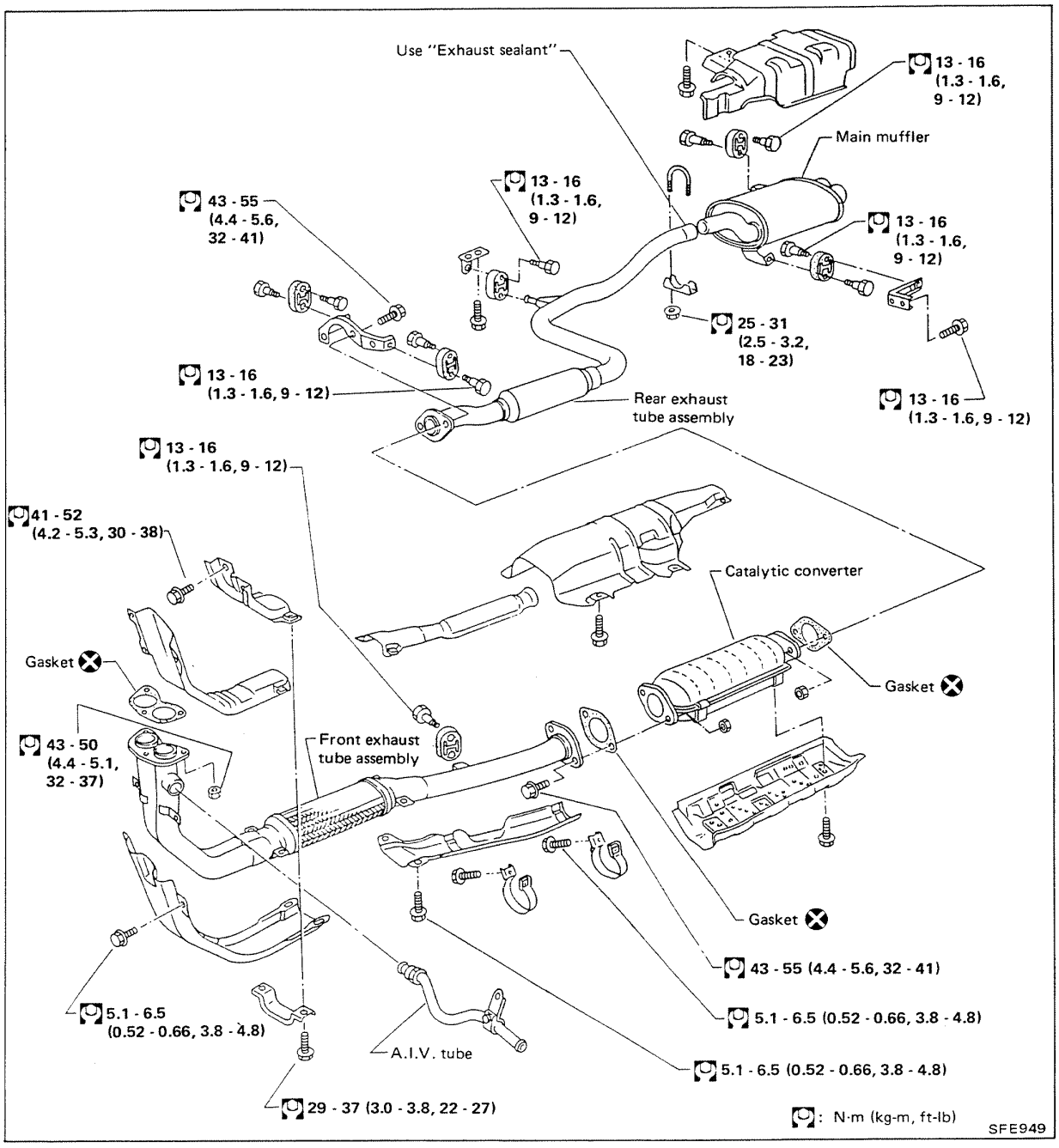
CAUTION:

Before disconnecting fuel hose, release fuel pressure from fuel line. Refer to "ENGINE MAINTENANCE" in section MA.

a. Do not disconnect any fuel line unless absolutely necessary.
b. Plug hose and pipe openings to prevent entry of dust or dirt.
c. Always replace O-ring and clamps with new ones.
d. Do not kink or twist hose and tube when they are installed.
e. Do not tighten hose clamps excessively to avoid damaging hoses.
f. When installing fuel check valve, be careful of its designated direction (Refer to "EVAPORATIVE EMISSION CONTROL SYTEM" in section EF & EC).
g. Run the engine and check for leaks at connections.



a. After installation, check that mounting brackets and mounting insulator are free from undue stress. If any of above parts are not installed properly, excessive noises or vibrations may be transmitted to vehicle body.
b. When connecting flanges, use a new gasket to eliminate gas leakage at the joint.
c. Check all tube connections for exhaust gas leaks, and entire system for unusual noises, with engine running.
d. When connecting rear exhaust tube and main muffler, use Genuine Nissan Sealant "Exhaust Sealant Kit 20720-N2225", or an equivalent to eliminate gas leakage at the joint.



CLUTCH

SECTION CL

CONTENTS

Precautions

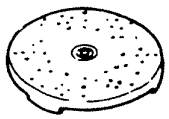
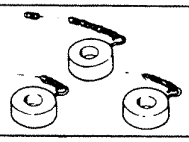
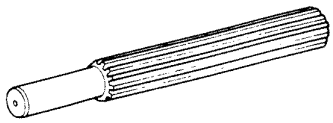
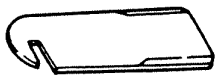
WARNING:

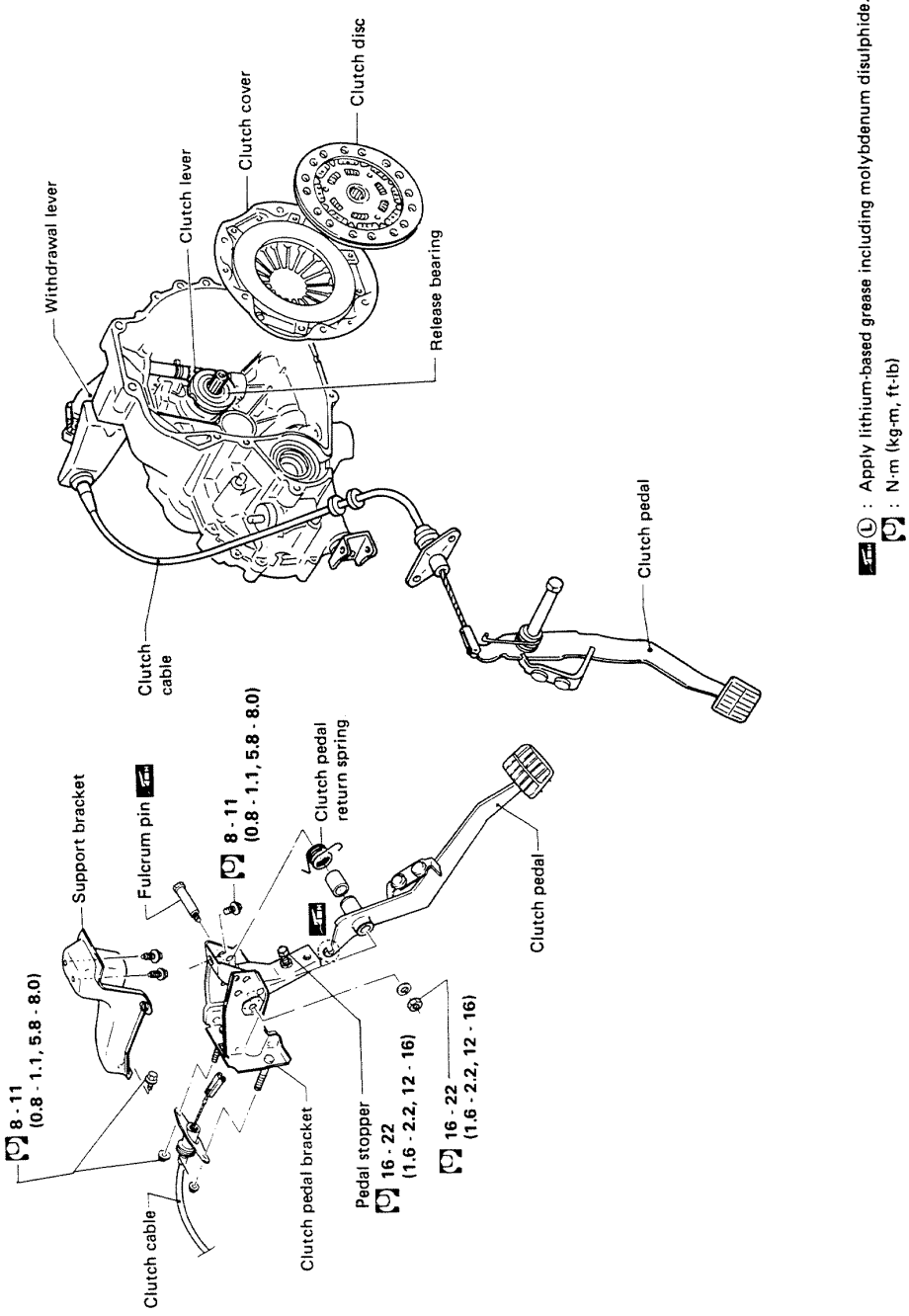
Remove all dust from clutch disc with a dust collector after cleaning with waste cloth.

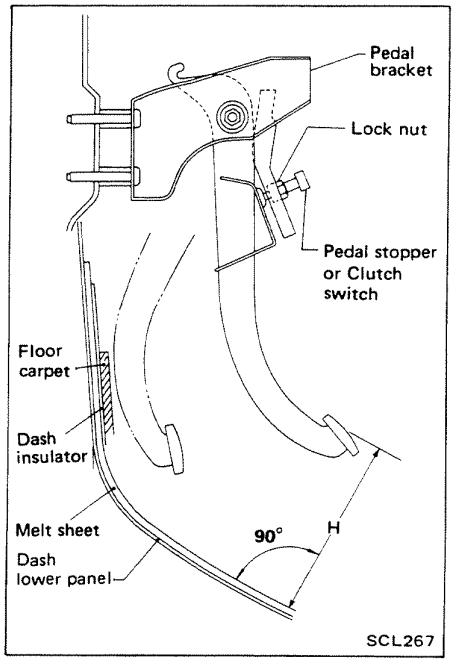
Preparation

SPECIAL SERVICE TOOLS

*: Special tools or commercial equivalent

Tool number Tool name	Description	
ST20050010 Base plate		Inspecting diaphragm spring of clutch cover
ST20050100 Distance piece		
KV30101000* Clutch aligning bar		Installing clutch cover and clutch disc
ST20050240* Diaphragm spring adjusting wrench		Adjusting unevenness of diaphragm spring of clutch cover

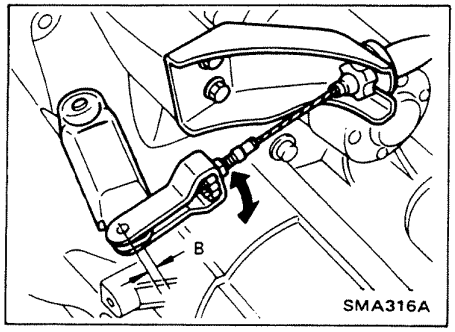

Withdrawal lever
Clutch lever
Clutch cover
Clutch disc
Release bearing
Clutch cable
Clutch pedal
Support bracket
Fulcrum pin
8 - 11 (0.8 - 1.1, 5.8 - 8.0)
8 - 11 (0.8 - 1.1, 5.8 - 8.0)
Clutch pedal return spring
Clutch pedal
Pedal stopper
16 - 22 (1.6 - 2.2, 12 - 16)
16 - 22 (1.6 - 2.2, 12 - 16)
Clutch pedal bracket
Clutch cable
: Apply lithium-based grease including molybdenum disulphide.
: N·m (kg-m, ft-lb)



Adjusting Clutch Pedal

1. Adjust pedal height with pedal stopper or clutch switch.

Pedal height "H":
175 - 185 mm (6.89 - 7.28 in)



2. Adjust withdrawal lever play "B" according to the following procedure.

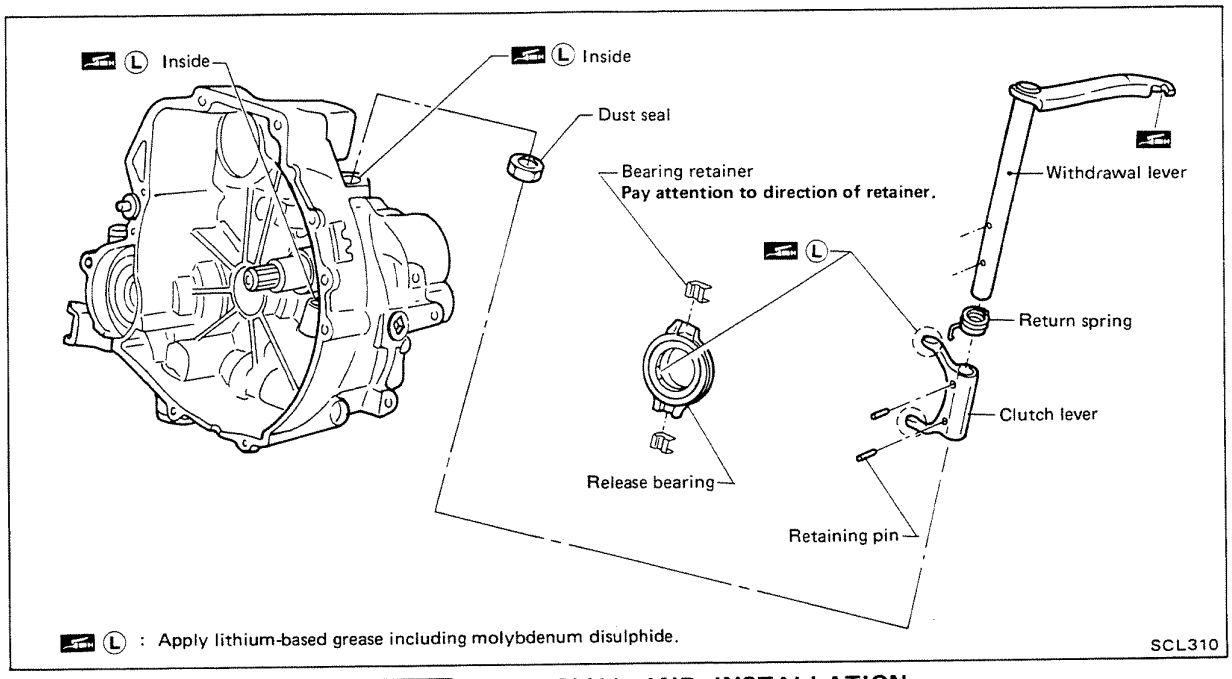
(1) Push withdrawal lever by hand until resistance is felt, and then tighten adjusting nut.

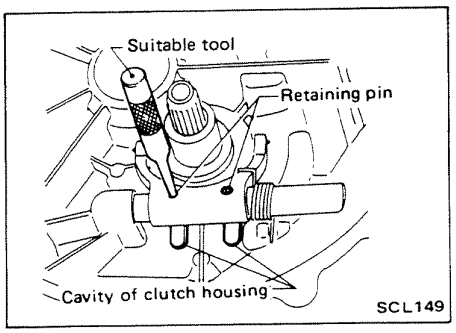
(2) Turn back adjusting nut 2.5 - 3.5 turns, and then tighten lock nut.

Withdrawal lever play "B":
2.5 - 3.5 mm (0.098 - 0.138 in)
Lock nut :
: 3 - 4 N·m (0.3 - 0.4 kg-m, 2.2 - 2.9 ft-lb)

3. As a final check, measure pedal free travel "A" at center of pedal pad.

Pedal free travel "A":
12.5 - 17.5 mm (0.492 - 0.689 in)



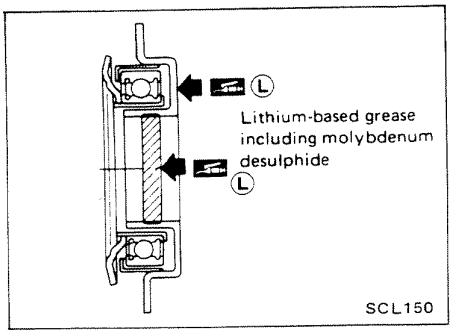


REMOVAL AND INSTALLATION

- Align retaining pin with cavity of clutch housing and tap out retaining pin.

INSPECTION

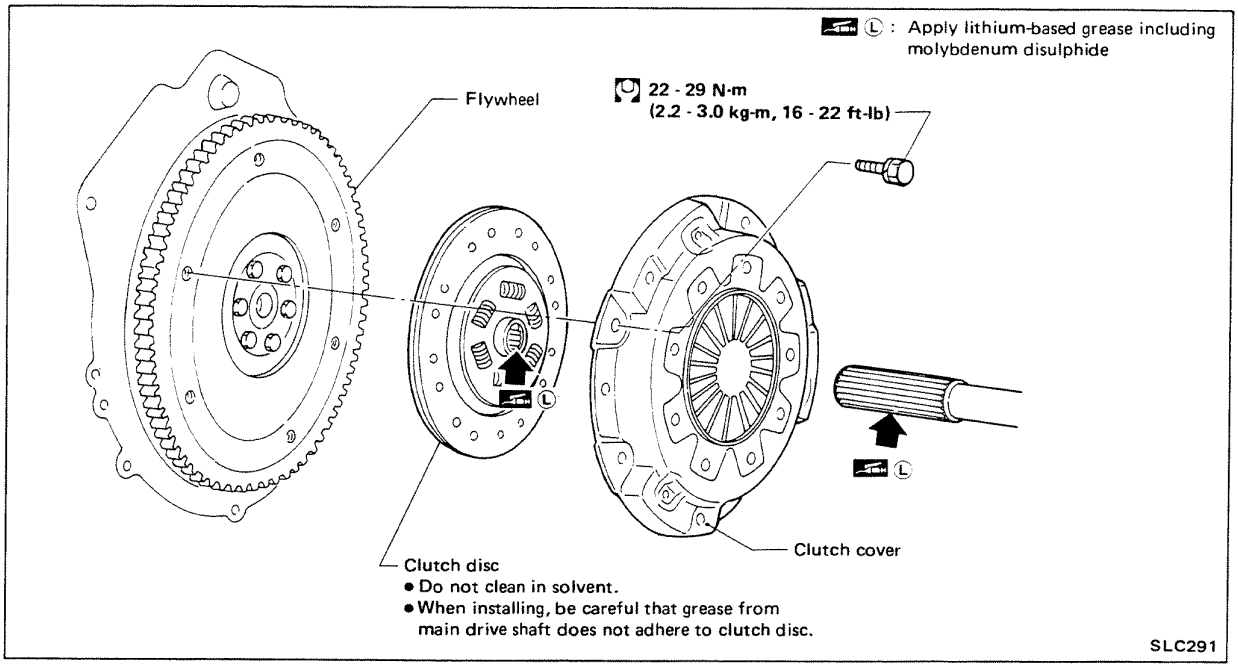
- Check release bearing to see that it rolls freely and is free from noise, cracks, pitting or wear. Replace if necessary.
- Check withdrawal lever rubbing surface for wear, rust or damage. Replace if necessary.

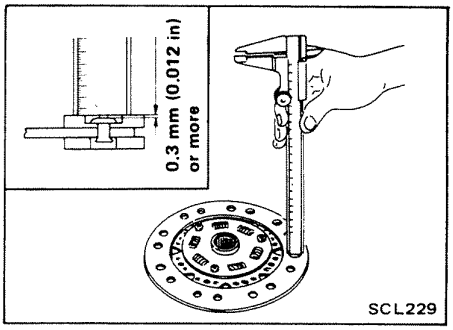


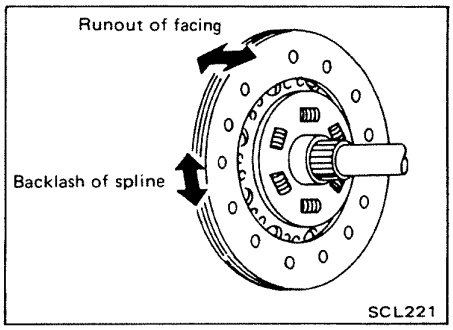
LUBRICATION

- Apply recommended grease to contact surface and rubbing surface.

Too much lubricant might cause clutch disc facing damage.







Clutch Disc

INSPECTION

Check clutch disc for wear of facing.

Wear limit of facing surface to rivet head:
0.3 mm (0.012 in)

- Check clutch disc for backlash of spline and runout of facing.

Maximum backlash of spline (at outer edge of disc):
0.8 mm (0.031 in)
Runout limit:
1.0 mm (0.039 in)
Distance of runout check point (from hub center):
95 mm (3.74 in)

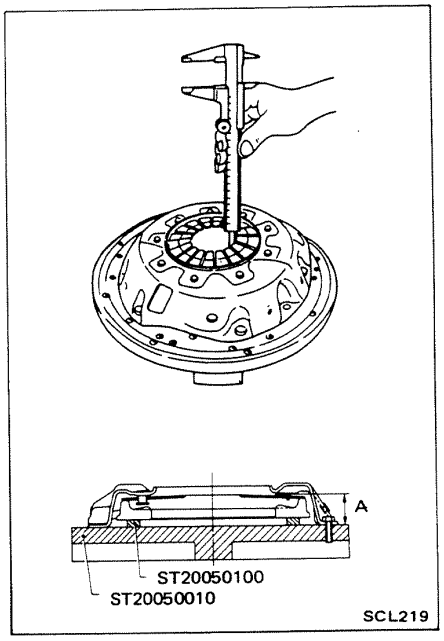
- Check clutch disc for burns, discoloration or oil or grease leakage. Replace if necessary.

Clutch Disc (Cont'd)

INSTALLATION

- Apply recommended grease to contact surface of spline portion.

Too much lubricant might cause clutch disc facing damage.



Clutch Cover and Flywheel

INSPECTION

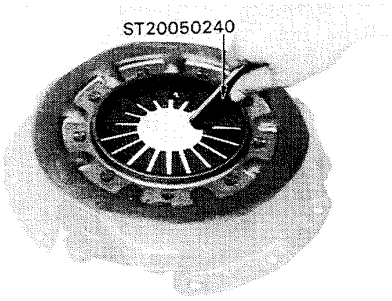
- Set Tool and 0.4 mm (0.016 in) feeler gauges on distance pieces (ST20050100) when checking height and unevenness of diaphragm spring.

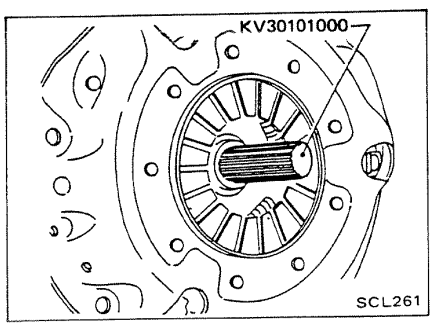
  Diaphragm spring height "A":
  31 - 33 mm (1.22 - 1.30 in)

- Adjust unevenness of diaphragm spring with Tool.

  Uneven limit:
  0.5 mm (0.020 in)

- 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. Replace clutch cover assembly if necessary.
- Check pressure plate of contact surface for slight burns or discoloration. Repair pressure plate with emery paper.
- Check pressure plate of contact surface for deformation or damage. Replace if necessary.
- Check flywheel of contact surface for slight burns or discoloration. Repair flywheel with emery paper.





INSTALLATION

- Insert Tool into clutch disc hub when installing clutch cover and disc to flywheel.

General Specifications

CLUTCH DISC

Model	200TBL
Facing size mm (in) (outer dia. x inner dia. x thickness)	200 x 130 x 3.5 (7.87 x 5.12 x 0.138)
Thickness of disc assembly with load mm (in)	8.0 - 8.4 (0.315 - 0.331) with 3,923 N (400 kg, 882 lb)

CLUTCH COVER

Model	C200S
Full load N (kg, lb)	3,923 (400, 882)

Inspection and Adjustment

CLUTCH PEDAL

Unit: mm (in)

Pedal height "H"*	175 - 185 (6.89 - 7.28)
Pedal free travel "A"	12.5 - 17.5 (0.492 - 0.689)
Withdrawal lever play "B"	2.5 - 3.5 (0.098 - 0.138)

*: Measured from surface of melt sheet

CLUTCH COVER

Unit: mm (in)

Model	C200S
Diaphragm spring height	31 - 33 (1.22 - 1.30)
Uneven limit of diaphragm spring toe height	0.5 (0.020)

CLUTCH DISC

Unit: mm (in)

Model	200TBL
Wear limit of facing surface to rivet head	0.3 (0.012)
Runout limit of facing	1.0 (0.039)
Distance of runout check point (from the hub center)	95 (3.74)
Maximum backlash of spline (at outer edge of disc)	0.8 (0.031)

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
Fulcrum pin securing nut	16 - 22	1.6 - 2.2	12 - 16
Clutch pedal bracket securing nut	8 - 11	0.8 - 1.1	5.8 - 8.0
Clutch cover securing nut	22 - 29	2.2 - 3.0	16 - 22
Clutch cable lock nut	3 - 4	0.3 - 0.4	2.2 - 2.9

MANUAL TRANSAXLE

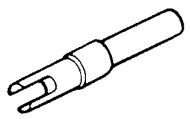
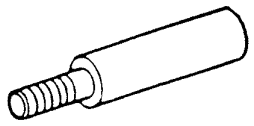
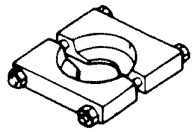
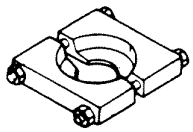
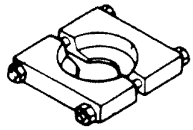
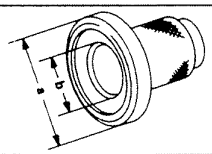
SECTION MT

CONTENTS

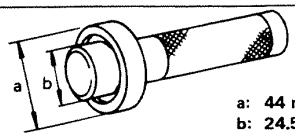
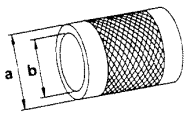
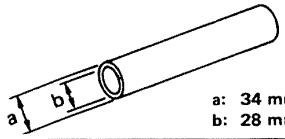
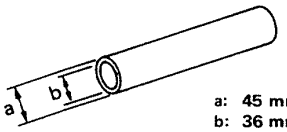
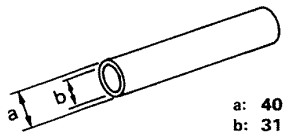
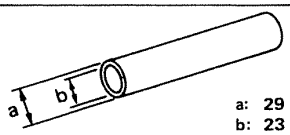
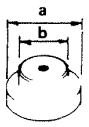
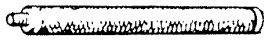
Model RS5F31A

SPECIAL SERVICE TOOLS – for RS5F31A

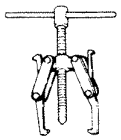
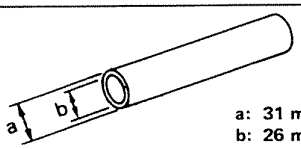
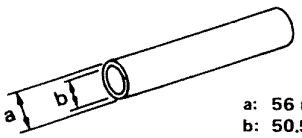
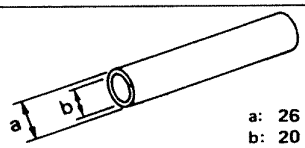
*: Special tools or commercial equivalent

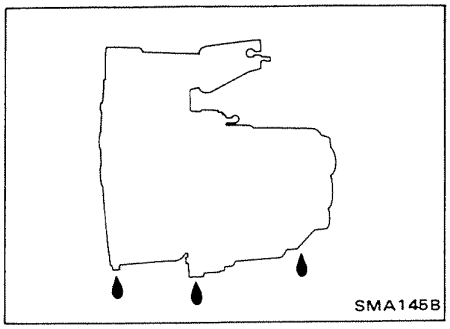
Tool number Tool name	Description	
KV38105900 Preload adapter		Measuring turning torque of final drive assembly Measuring total turning torque Measuring clearance between side gear and differential case with washer Selecting differential side bearing adjusting shim (Use with KV38106000.)
KV38106000 Height gauge adapter (diff. side bearing)		Selecting differential side bearing adjusting shim (Use with KV38105900.)
KV32101000* Pin punch		Removing and installing retaining pin
ST22730000* Puller		Removing mainshaft front and rear bearing inner race Removing 5th main gear
ST30031000* Puller		Removing differential side bearing inner race Removing 3rd & 4th synchronizer hub
ST30021000* Puller		Removing 5th synchronizer hub
ST33290001* Puller		Removing differential oil seal Removing mainshaft front bearing outer race Removing differential side bearing outer race
ST33400001* Drift	 a: 60 mm (2.36 in) dia. b: 47 mm (1.85 in) dia.	Installing differential oil seal

*: Special tools or commercial equivalent

Tool number Tool name	Description	
KV38102100* Drift	 a: 44 mm (1.73 in) dia. b: 24.5 mm (0.94 in) dia.	Installing input shaft oil seal Installing input shaft rear bearing
ST33200000* Drift	 a: 60 mm (2.36 in) dia. b: 44.5 mm (1.752 in) dia.	Installing mainshaft front bearing outer race
ST22350000* Drift	 a: 34 mm (1.34 in) dia. b: 28 mm (1.10 in) dia.	Installing input shaft front bearing
ST22452000* Drift	 a: 45 mm (1.77 in) dia. b: 36 mm (1.42 in) dia.	Installing 1st & 2nd synchronizer
ST37750000* Drift	 a: 40 mm (1.57 in) dia. b: 31 mm (1.22 in) dia.	Install 5th main gear Installing 5th synchronizer hub Installing 3rd & 4th synchronizer hub
ST22360002* Drift	 a: 29 mm (1.14 in) dia. b: 23 mm (0.91 in) dia.	Installing mainshaft rear bearing inner race
ST30621000* Drift	 a: 79 mm (3.11 in) dia. b: 59 mm (2.32 in) dia.	Installing differential side bearing outer race (Use with ST30611000.)
ST30611000* Drift		Installing differential side bearing outer race (Use with ST30621000).

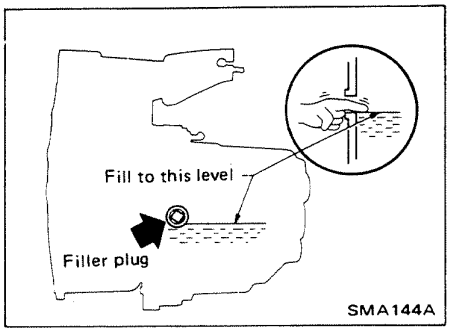
COMMERCIAL SERVICE TOOLS – for RS5F31A

Tool name	Description	
Puller		Removing input shaft front bearing
Drift	 **a: 31 mm (1.22 in) dia.** **b: 26 mm (1.02 in) dia.**	Installing mainshaft front bearing inner race
Drift	 **a: 56 mm (2.20 in) dia.** **b: 50.5 mm (1.988 in) dia.**	Installing differential side bearing inner race
Drift	 **a: 26 mm (1.02 in) dia.** **b: 20 mm (0.79 in) dia.**	Installing striking rod oil seal

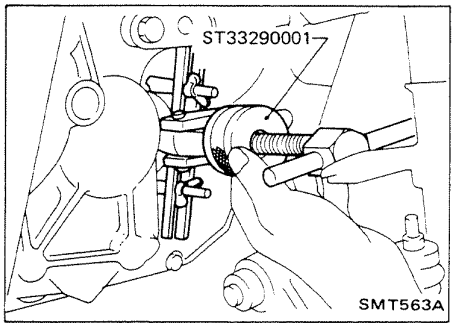


Checking M/T Oil

- Check manual transaxle for leakage.



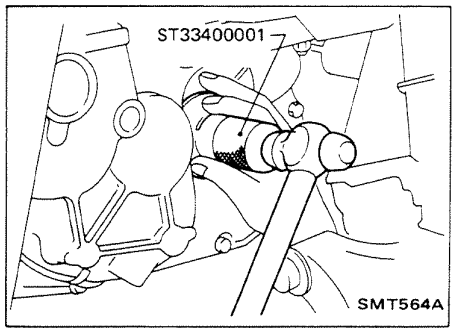
- Check oil level.



Replacing Oil Seal

DIFFERENTIAL OIL SEAL

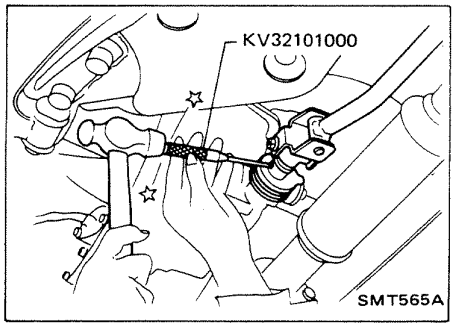
1. Drain gear oil from transaxle.
2. Remove drive shafts – Refer to section FA.
3. Remove differential oil seal.



4. Install differential oil seal.

Apply multi-purpose grease to seal lip of oil seal before installing.

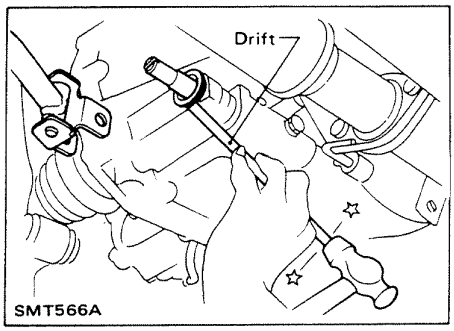
5. Install drive shafts – Refer to section FA.



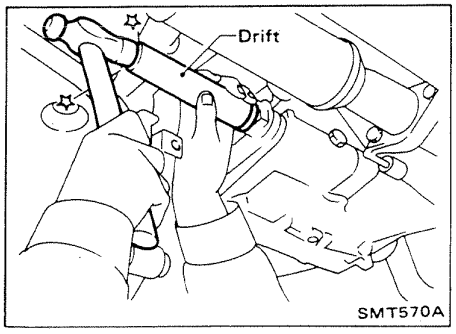
STRIKING ROD OIL SEAL

1. Remove transaxle control rod from yoke.
2. Remove retaining pin of yoke.

Be careful not to damage boot.



3. Remove striking rod oil seal.

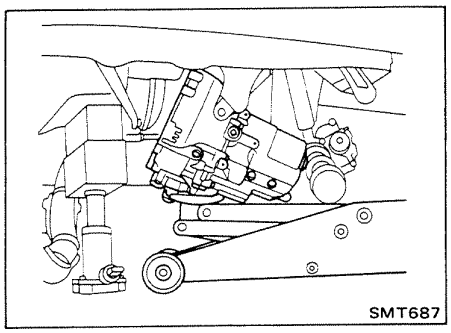


4. Install striking rod oil seal.

Apply multi-purpose grease to seal lip of oil seal before installing.

Removal

- Remove battery and its bracket.
- Draw out drive shaft – Refer to section FA.


SMT687

- Support engine by placing a jack under oil pan.

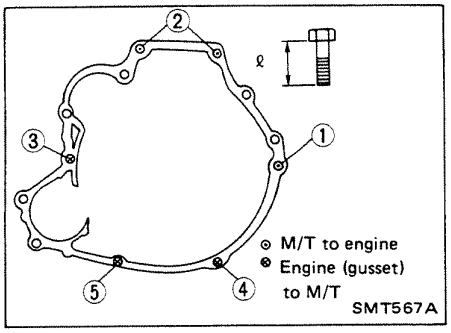
CAUTION:

Do not place jack under the oil pan drain plug.

- Lower transaxle.

WARNING:

Support Manual Transaxle while removing it.

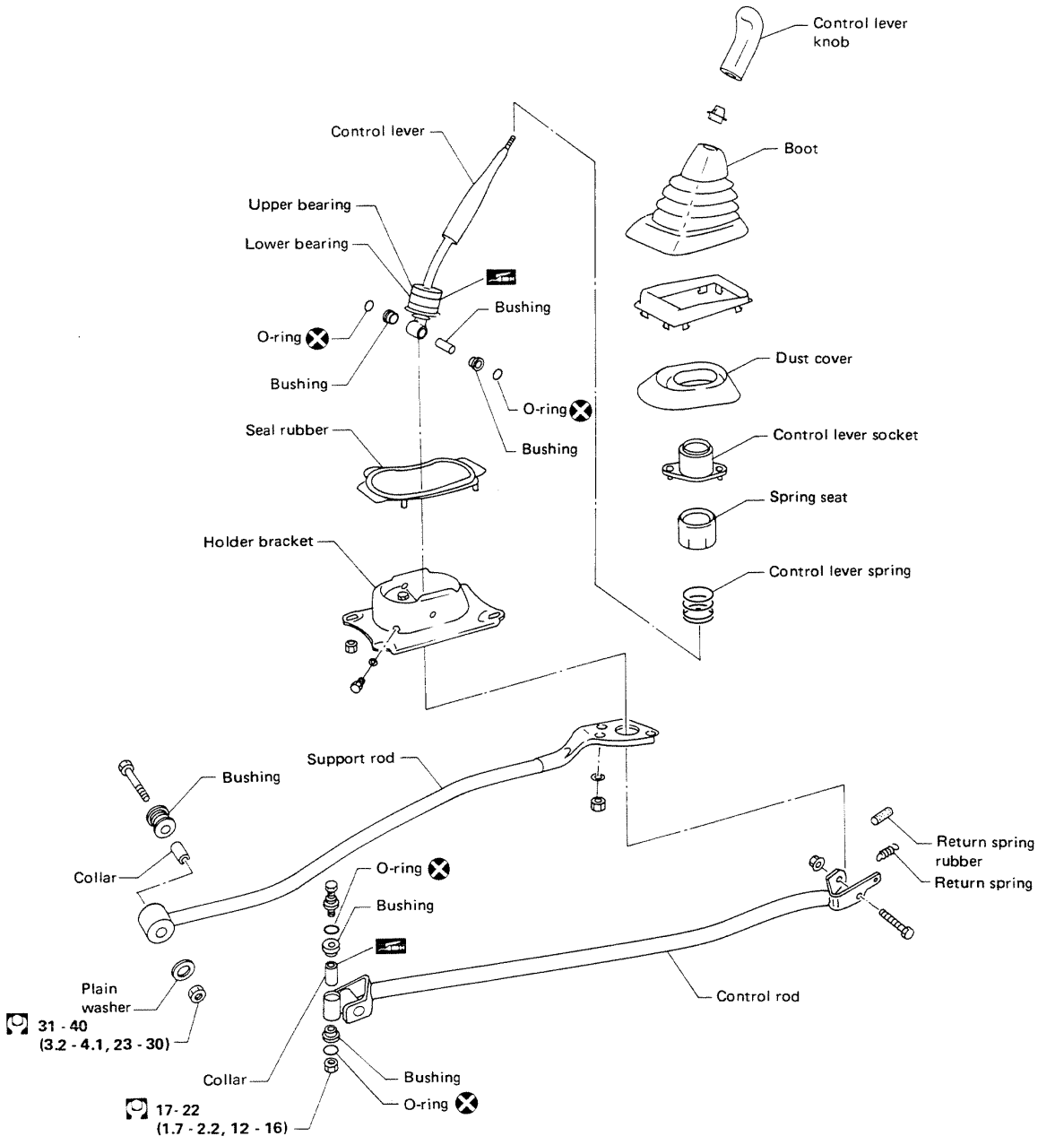


SMT567A

Installation

Tighten bolts securing transaxle.

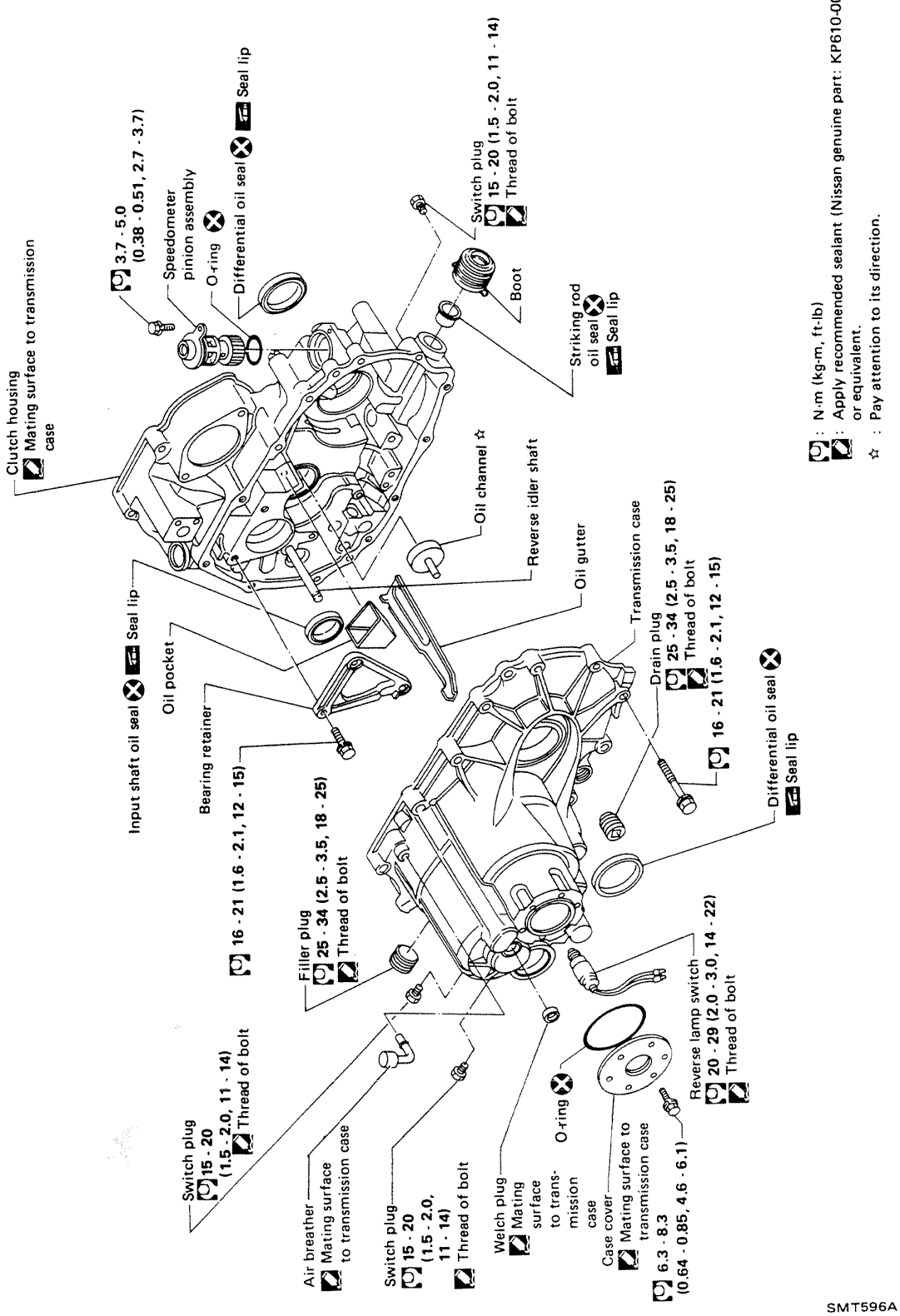
Bolt No.	Tightening torque N·m (kg-m, ft-lb)	ℓ mm (in)
1	30 - 40 (3.1 - 4.1, 22 - 30)	90 (3.54)
2	30 - 40 (3.1 - 4.1, 22 - 30)	55 (2.17)
3	30 - 40 (3.1 - 4.1, 22 - 30)	75 (2.95)
4	16 - 21 (1.6 - 2.1, 12 - 15)	40 (1.57)
5	16 - 21 (1.6 - 2.1, 12 - 15)	25 (0.98)



: N·m (kg-m, ft-lb)

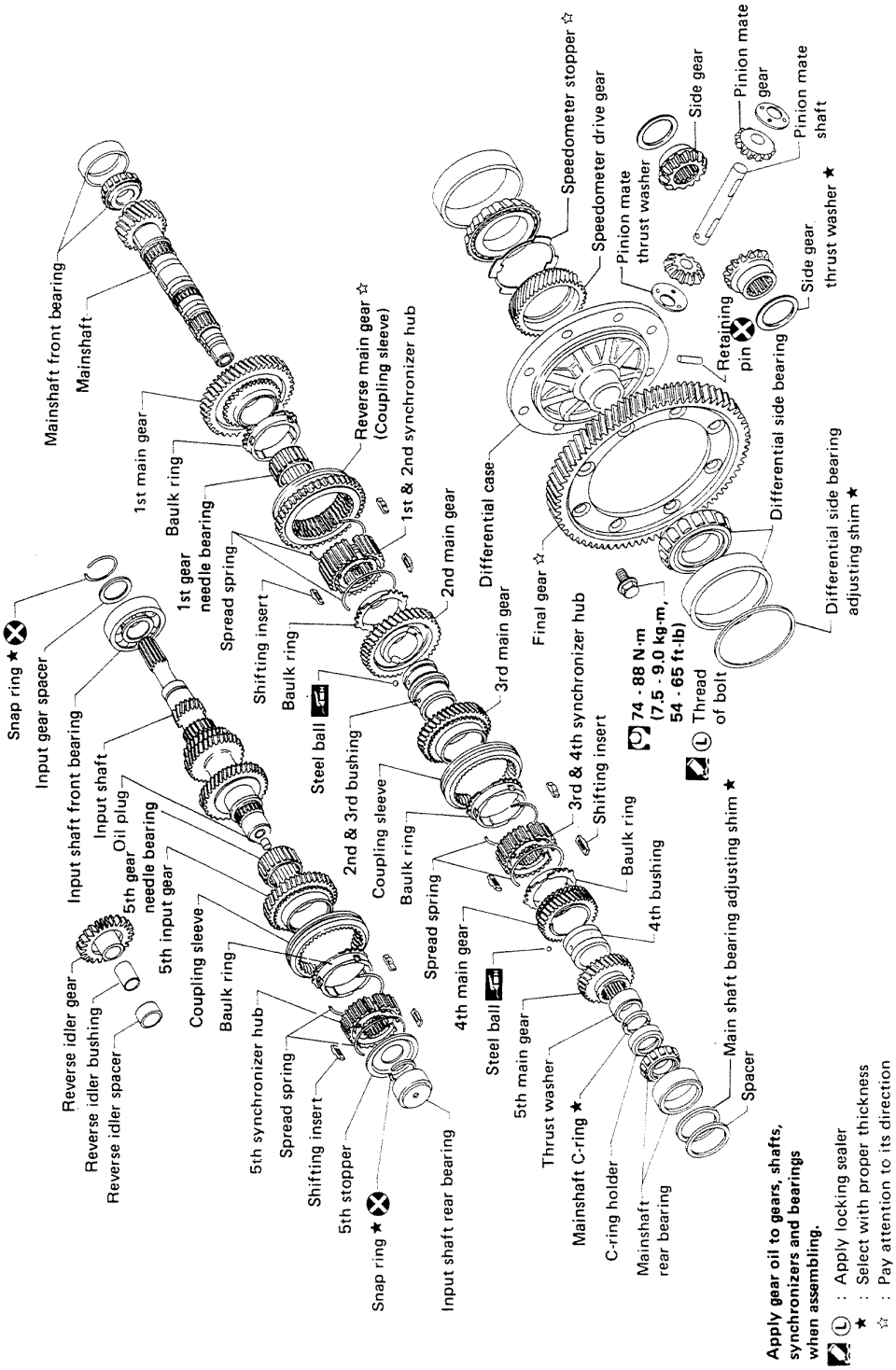
SMT818A

Case Components



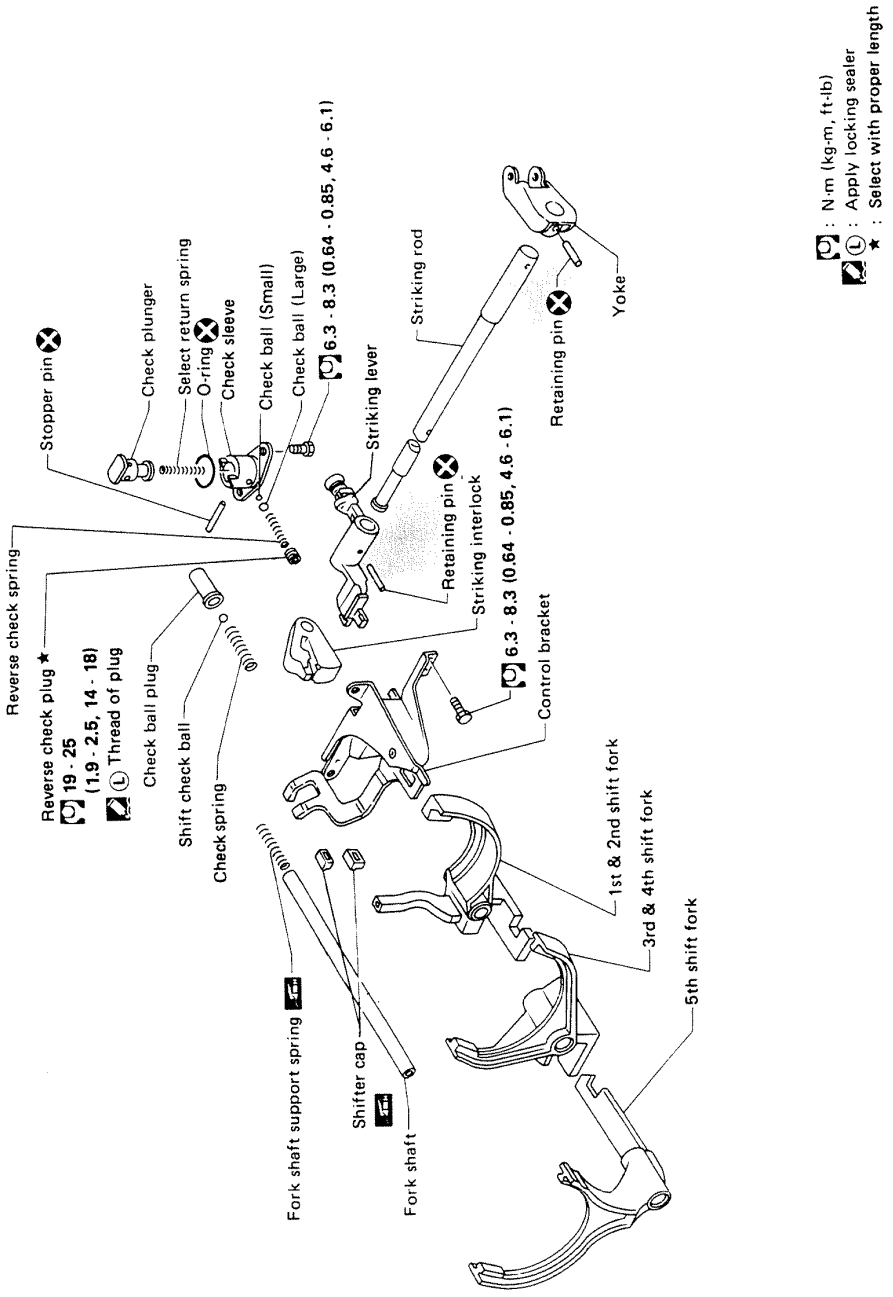
SMT596A

Gear Components

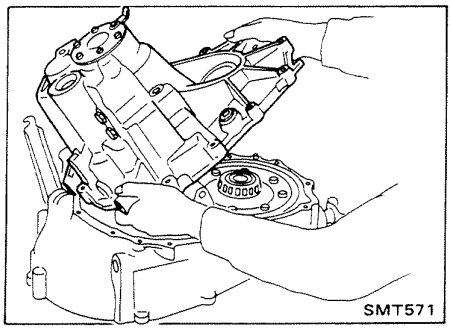


SMT597A

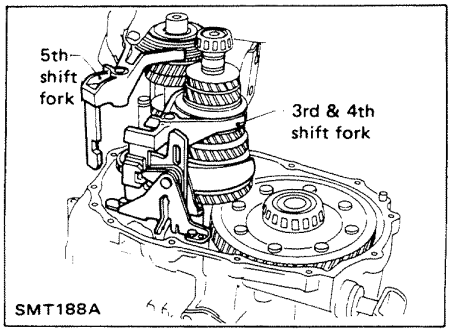
Shift Control Components



SMT598A

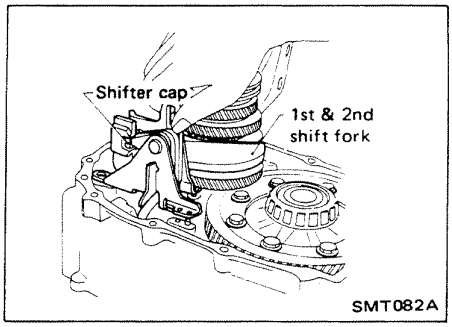


1. Remove transmission case while slightly tilting it to prevent 5th shift fork from interfering with the case.



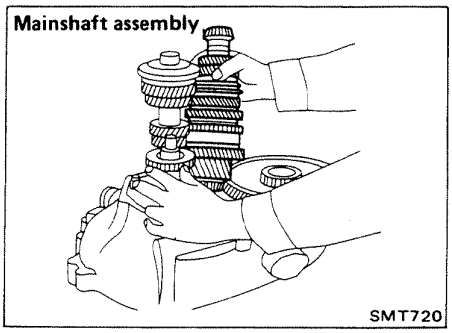
2. Draw out reverse idler spacer and fork shaft, then remove 5th and 3rd & 4th shift forks.

Be careful not to lose shifter cap.



3. Remove control bracket with 1st & 2nd shift fork.

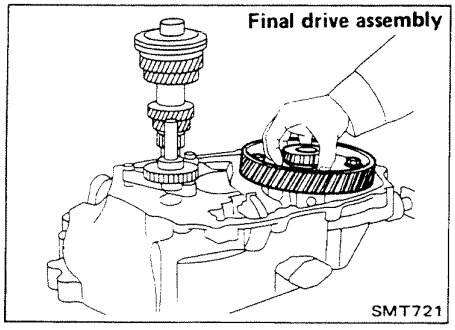
Be careful not to lose shifter cap.

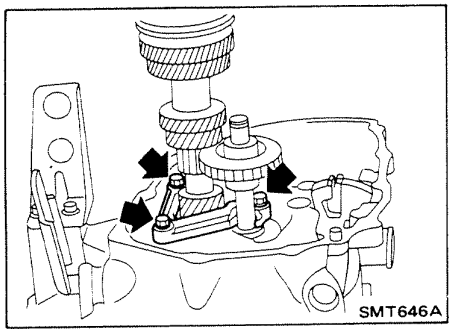


4. Remove gear components from clutch housing.

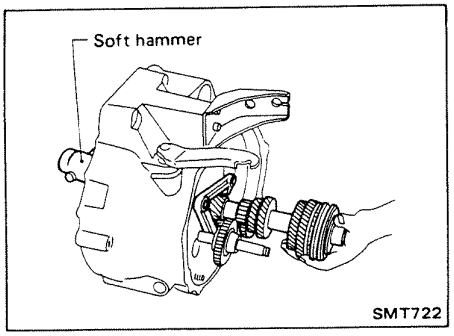
a. Remove mainshaft and final drive assembly.

Always withdraw mainshaft straight out. Failure to do so can damage resin oil channel on clutch housing side.




SMT646A

b. Remove bearing retainer securing bolts.

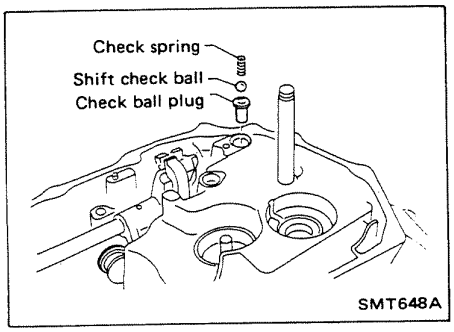


SMT722

c. Remove input shaft together with bearing retainer and reverse idler gear by tapping lightly.

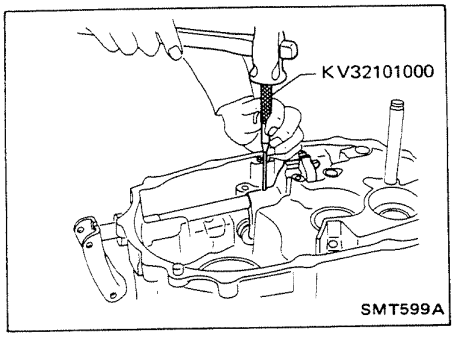
Do not draw out reverse idler shaft from clutch housing because these fittings will be loose.

When removing input shaft, be careful not to scratch oil seal lip with shaft spline.



SMT648A

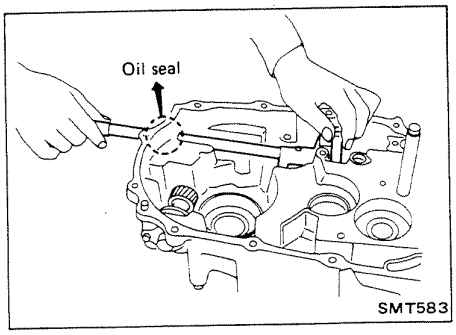
5. Remove oil pocket, shift check ball, check spring and check ball plug.



SMT599A

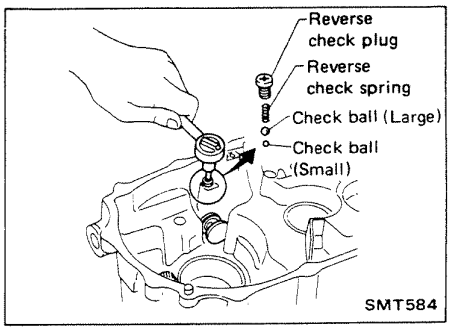
6. Drive retaining pin out of striking lever, then remove striking rod striking lever and striking interlock.

Select a position where retaining pin does not interfere with clutch housing when removing retaining pin.

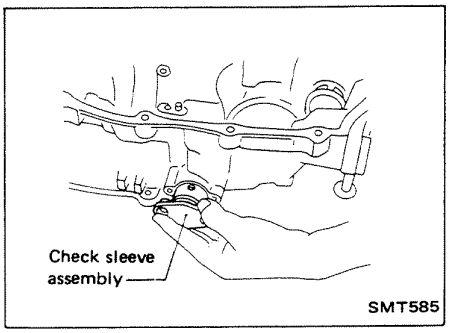


SMT583

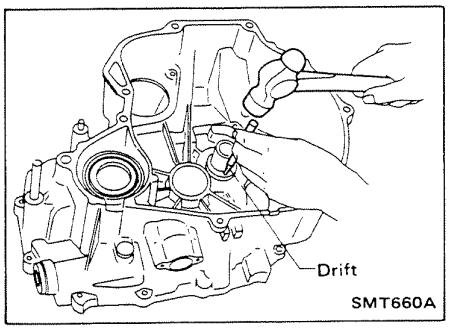
Be careful not to damage oil seal lip, when removing striking rod. If necessary, tape edges of striking rod.



7. Remove reverse check plug, then detach reverse check spring and check balls.



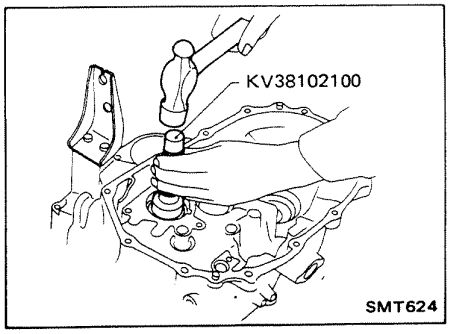
8. Remove check sleeve assembly.



Clutch Housing and Transmission Case

REMOVAL AND INSTALLATION

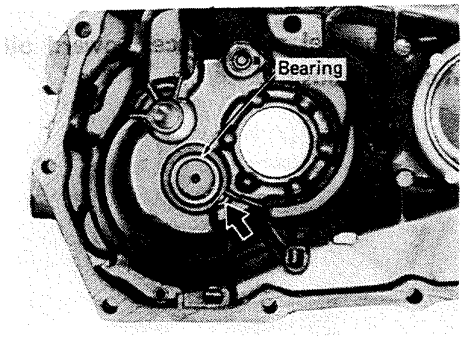
Input shaft oil seal



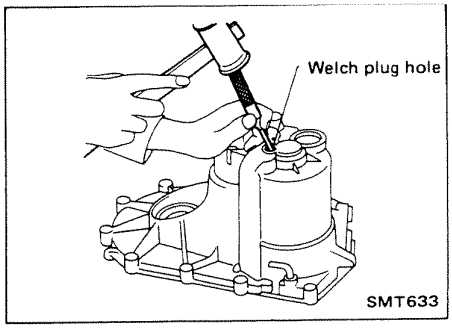
Apply multi-purpose grease to seal lip of oil seal before installing.

Input shaft rear bearing

1. Remove welch plug from transmission case.

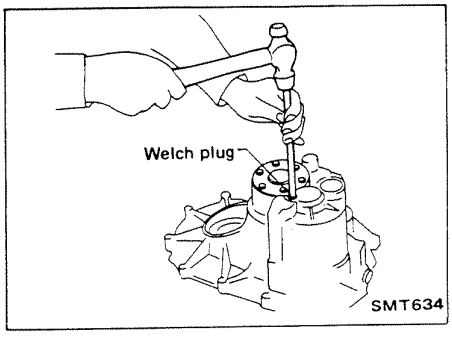


2. Remove input shaft rear bearing by tapping it from welch plug hole.

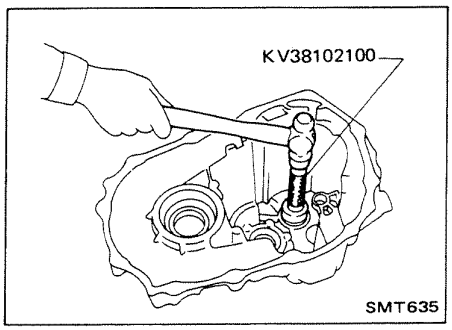


3. Install welch plug.

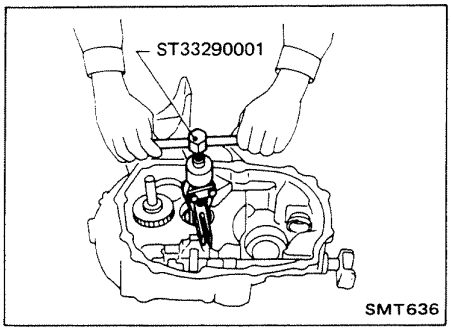
Apply recommended sealant to mating surface of transmission case.



Clutch Housing and Transmission Case (Cont'd)

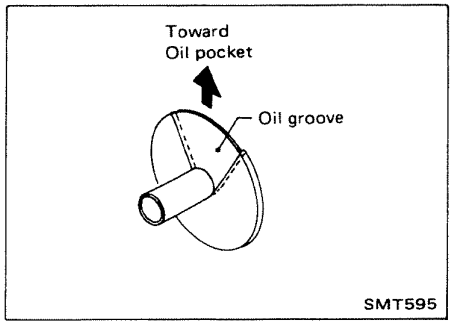


4. Install input shaft rear bearing.



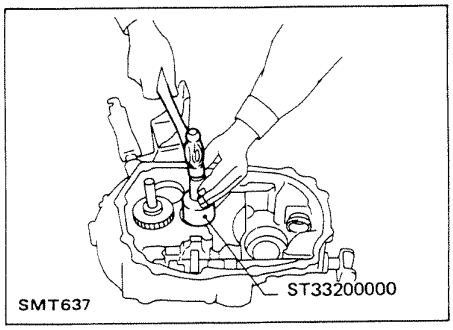
Mainshaft front bearing outer race and oil channel

1. Remove mainshaft front bearing outer race.
2. Remove oil channel.



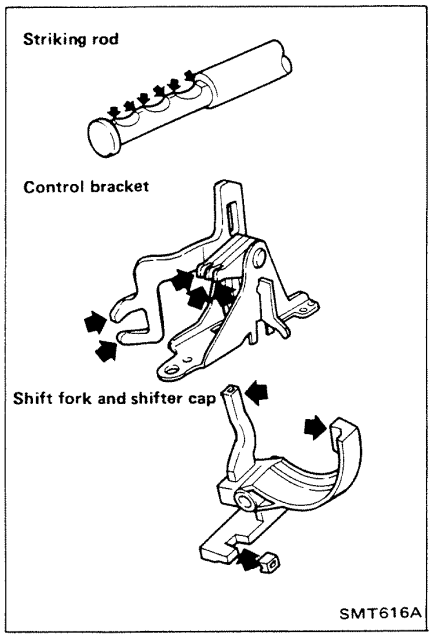
3. Install oil channel.

Ensure that oil groove in oil channel always faces toward oil pocket when installing it on clutch housing.



4. Install mainshaft front bearing outer race.

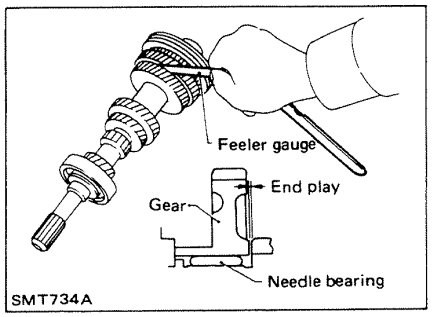
Mainshaft rear bearing outer race – Refer to "ADJUSTMENT".
Differential side bearing outer race – Refer to "ADJUSTMENT".



Shift Control Components

INSPECTION

- Check contact surface and sliding surface for wear, scratches, projections or other damage.



Input Shaft and Gears

DISASSEMBLY

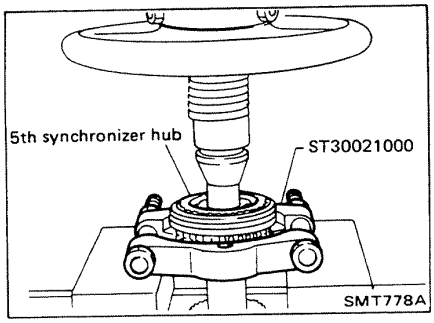
1. Before disassembly, check 5th input gear end play.

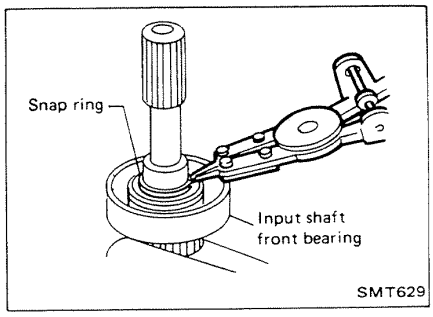
Gear end play

Gears	End play mm (in)
5th input gear	0.18 - 0.41 (0.0071 - 0.0161)

If not within specification, disassemble and check contact surface of gear, shaft and hub. Then check clearance of snap ring groove (Refer to Assembly).

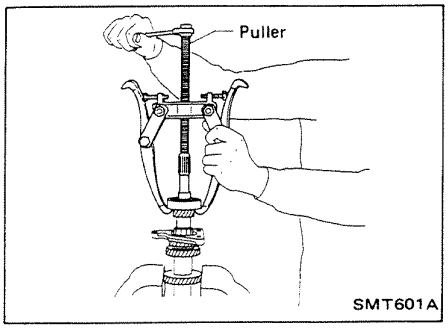
2. Remove snap ring and 5th stopper.
3. Remove 5th synchronizer, 5th input gear and 5th gear needle bearing.



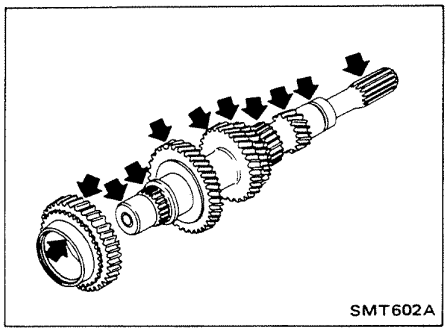


4. Remove snap ring of input shaft front bearing and input gear spacer.

Input Shaft and Gears (Cont'd)



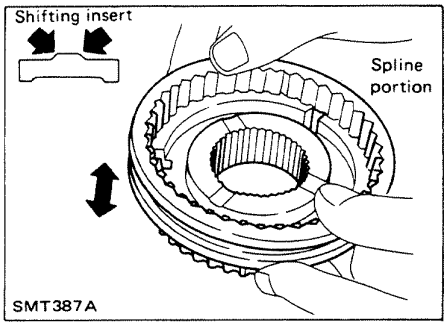
5. Pull out input shaft front bearing.
6. Remove bearing retainer.



INSPECTION

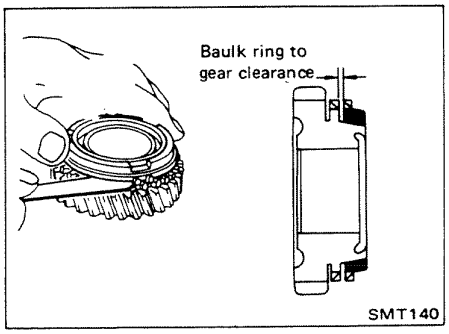
Gear and shaft

- Check shaft for cracks, wear or bending.
- Check gears for excessive wear, chips or cracks.



Synchronizer

- Check spline portion of coupling sleeve, hub and gear for wear or cracks.
- Check baulk ring for cracks or deformation.
- Check shifting inserts for wear or deformation.



- Measure clearance between baulk ring and gear.

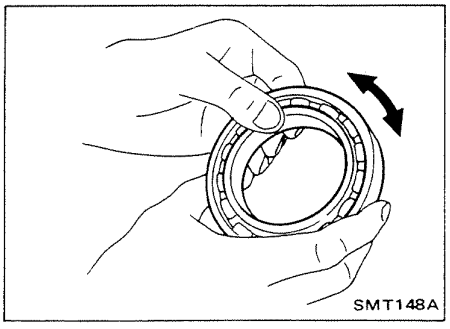
Clearance between baulk ring and 5th input gear:

Standard

1.0 - 1.3 mm (0.039 - 0.051 in)

Wear limit

0.7 mm (0.028 in)



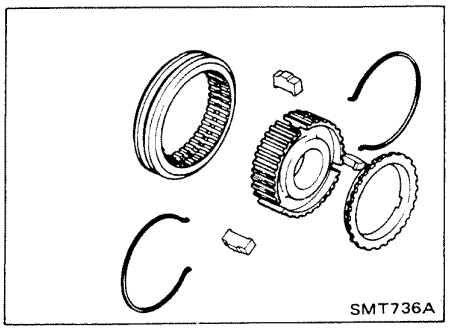
Bearing

- Make sure bearings roll freely and are free from noise, cracks, pitting or wear.

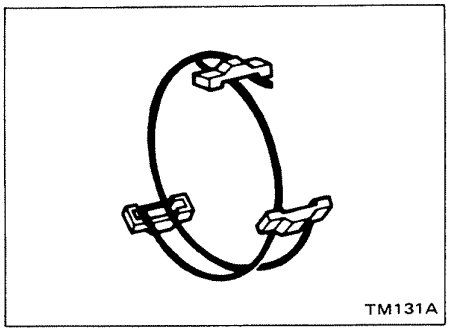
Input Shaft and Gears (Cont'd)

ASSEMBLY

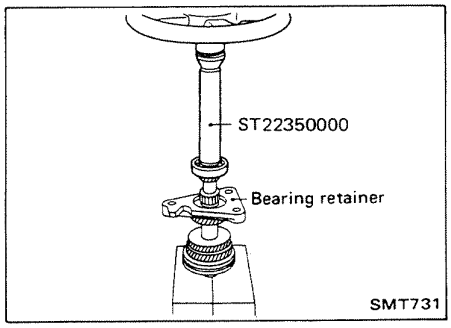
1. Assemble 5th synchronizer.



Be careful not to hook front and rear ends of spread spring to the same insert.



2. Install bearing retainer.
3. Press on input shaft front bearing.
4. Install input gear spacer.



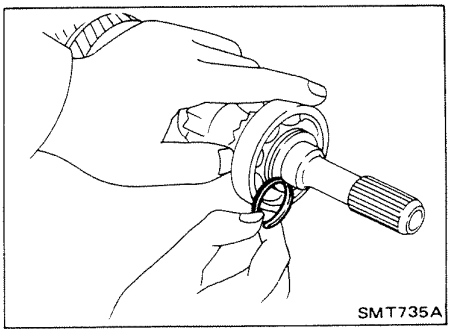
5. Select proper snap ring of input shaft front bearing to minimize clearance of groove in input shaft and then install it.

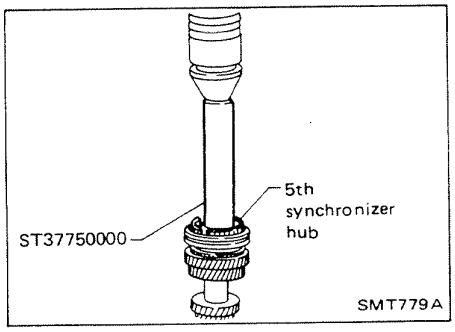
Allowable clearance of groove:

0 - 0.1 mm (0 - 0.004 in)

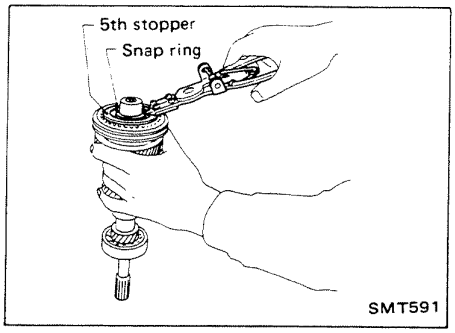
Snap ring of input shaft front bearing

Thickness mm (in)	Part number
1.27 (0.0500)	32204-M8004
1.33 (0.0524)	32204-M8005
1.39 (0.0547)	32204-M8006
1.45 (0.0571)	32204-M8007





6. Install 5th gear needle bearing, 5th input gear, 5th synchronizer and 5th stopper.
7. Measure gear end play as the final check – Refer to Disassembly.



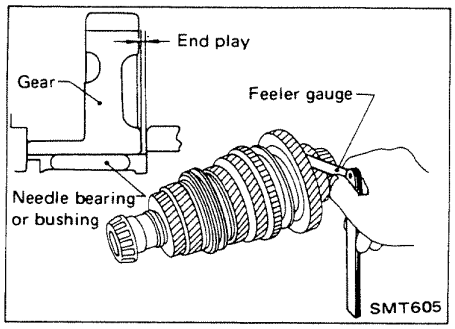
Input Shaft and Gears (Cont'd)

8. Select proper snap ring of 5th synchronizer hub to minimize clearance of groove in input shaft and install it.

Allowable clearance of groove:
0 - 0.1 mm (0 - 0.004 in)

Snap ring of 5th synchronizer

Thickness mm (in)	Part number
2.00 (0.0787)	32311-M8812
2.05 (0.0807)	32311-M8813
2.10 (0.0827)	32311-M8814
2.15 (0.0846)	32311-M8815
2.20 (0.0866)	32311-M8816
2.25 (0.0886)	32311-M8817
2.30 (0.0906)	32311-M8818



Mainshaft and Gears

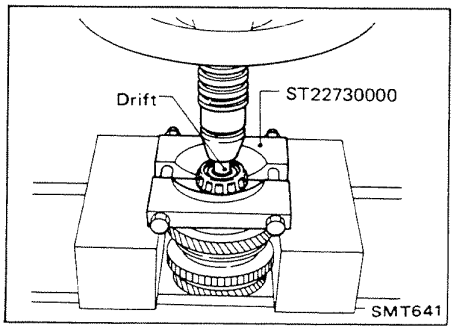
DISASSEMBLY

1. Before disassembly, check 1st, 2nd, 3rd and 4th main gear end plays.

Gear end play

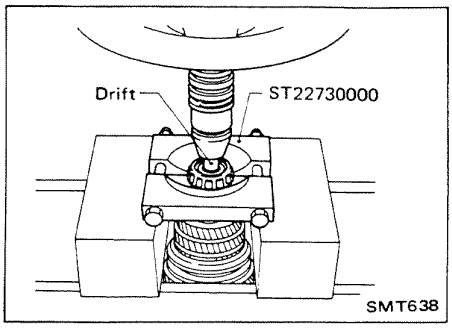
Gears	End play mm (in)
1st main gear	0.18 - 0.31 (0.0071 - 0.0122)
2nd-4th main gear	0.20 - 0.40 (0.0079 - 0.0157)

If not within specification, disassemble and check contact surface of gear, shaft and hub. Then check clearance of C-ring groove (Refer to Assembly).

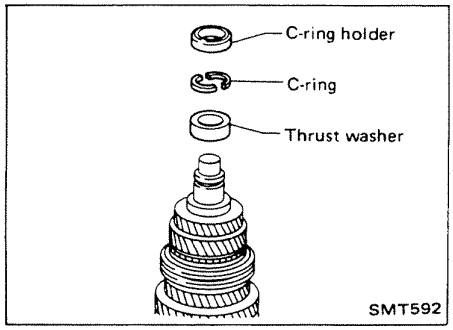


2. Press out mainshaft front bearing.

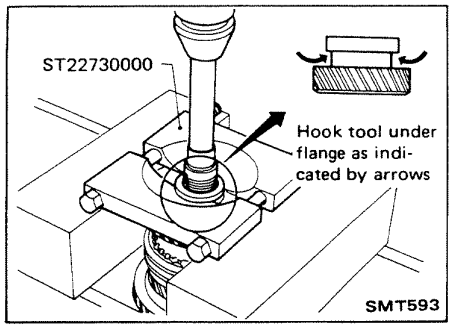
Mainshaft and Gears (Cont'd)



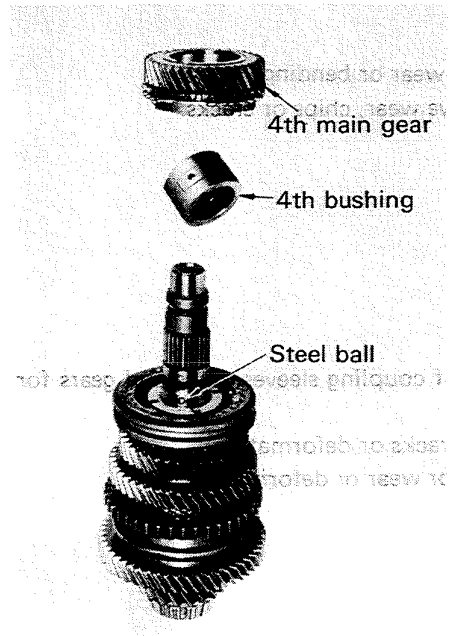
3. Press out mainshaft rear bearing.



4. Remove C-rings, C-ring holder and thrust washer.

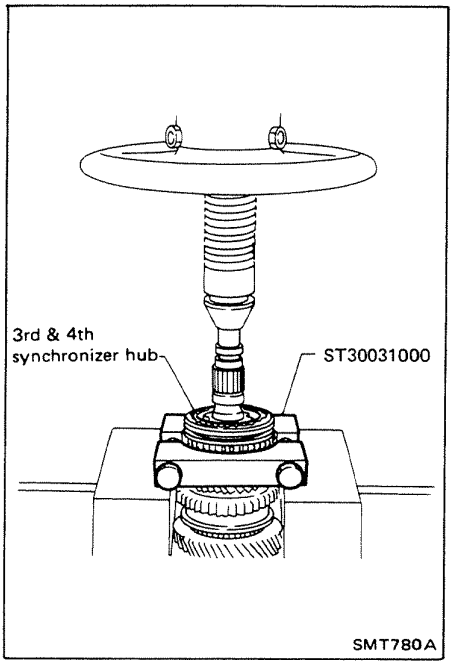


5. Press out 5th main gear.



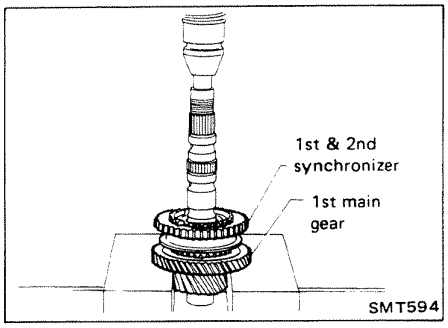
6. Remove 4th main gear, 4th bushing and steel ball.
Be careful not to lose steel ball.

Mainshaft and Gears (Cont'd)

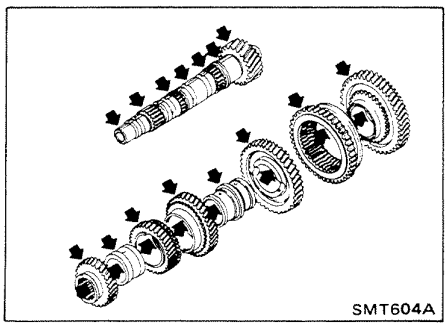


7. Remove 3rd & 4th synchronizer, 3rd main gear, 2nd & 3rd bushing, steel ball and 2nd main gear.

Be careful not to lose steel ball.



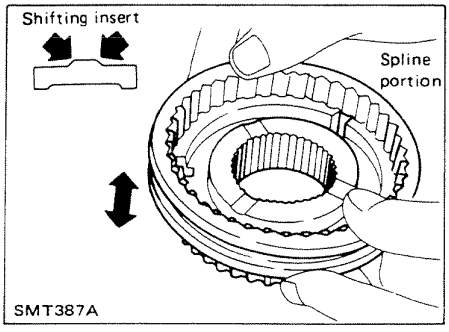
8. Remove 1st & 2nd synchronizer and 1st main gear, then remove 1st gear needle bearing.



INSPECTION

Gear and shaft

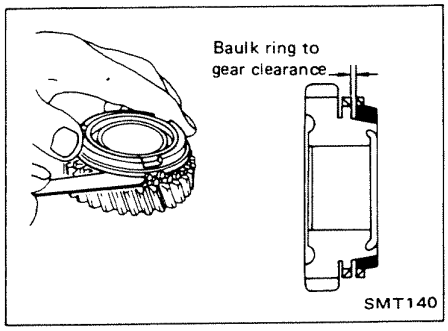
- Check shaft for cracks, wear or bending.
- Check gears for excessive wear, chips or cracks.



Synchronizer

- Check spline portion of coupling sleeves, hubs and gears for wear or cracks.
- Check baulk rings for cracks or deformation.
- Check shifting inserts for wear or deformation.

Mainshaft and Gears (Cont'd)



- Measure clearance between baulk ring and gear.

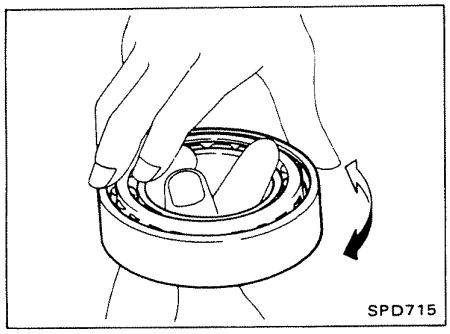
Clearance between baulk rings and 1st-4th main gears:

Standard

1.0 - 1.3 mm (0.039 - 0.051 in)

Wear limit

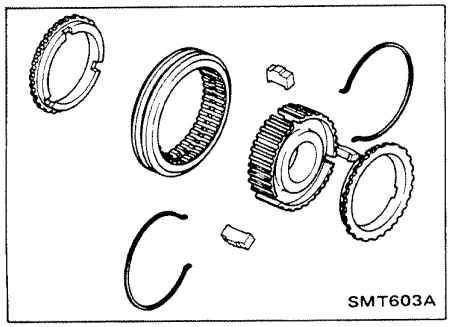
0.7 mm (0.028 in)



Bearing

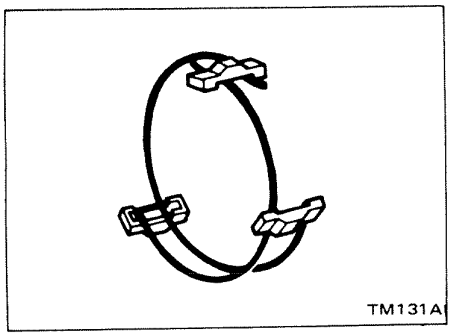
- Make sure bearings roll freely and are free from noise, cracks, pitting or wear.

When replacing tapered roller bearing, replace outer and inner race as a set.

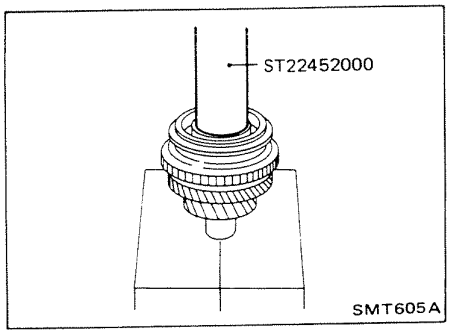


ASSEMBLY

1. Assemble 1st & 2nd and 3rd & 4th synchronizers.

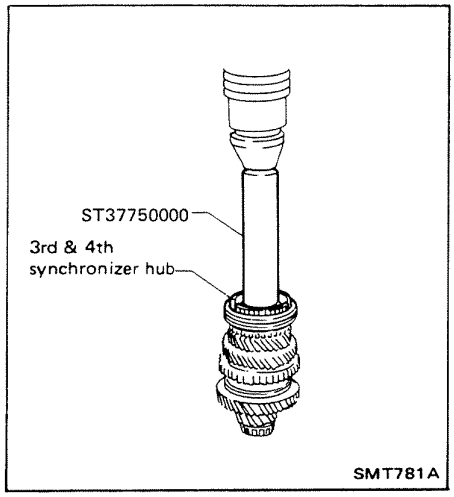


Be careful not to hook front and rear ends of spread spring to the same insert.



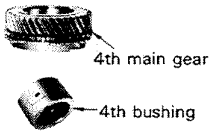
2. Install 1st gear needle bearing and 1st main gear.
3. Press on 1st & 2nd synchronizer.

Mainshaft and Gears (Cont'd)



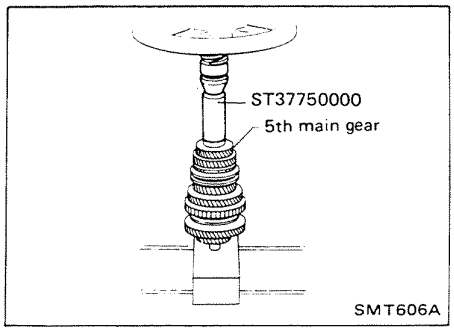
4. Install steel ball, 2nd main gear, 2nd & 3rd bushing, 3rd main gear and 3rd & 4th synchronizer.

Apply multi-purpose grease to steel ball before installing it.
2nd & 3rd bushing has a groove in which steel ball fits.



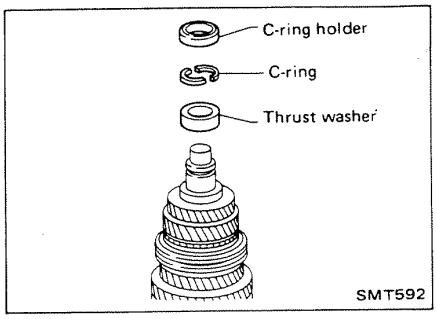
5. Install steel ball, 4th bushing and 4th main gear.

Apply multi-purpose grease to steel ball before installing it.
4th bushing has a groove in which steel ball fits.



6. Press on 5th main gear.

Mainshaft and Gears (Cont'd)



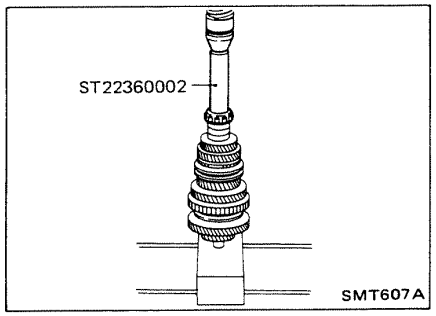
7. Install thrust washer.
8. Select proper C-ring to minimize clearance of groove in mainshaft and install it.

Allowable clearance of groove:
0 - 0.1 mm (0 - 0.004 in)

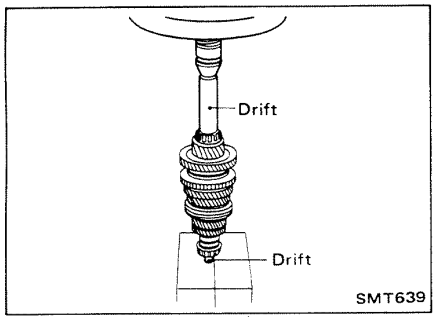
Mainshaft C-ring

Thickness mm (in)	Part number	Thickness mm (in)	Part number
3.63 (0.1429)	32348-M8800	4.12 (0.1622)	32348-M8807
3.70 (0.1457)	32348-M8801	4.19 (0.1650)	32348-M8808
3.77 (0.1484)	32348-M8802	4.26 (0.1677)	32348-M8809
3.84 (0.1512)	32348-M8803	4.33 (0.1705)	32348-M8810
3.91 (0.1539)	32348-M8804	4.40 (0.1732)	32348-M8811
3.98 (0.1567)	32348-M8805	4.47 (0.1760)	32348-M8812
4.05 (0.1594)	32348-M8806	4.54 (0.1787)	32348-M8813

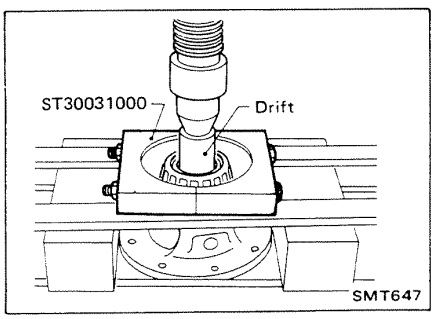
9. Install C-ring holder.



10. Press on mainshaft rear bearing.



11. Press on mainshaft front bearing.
12. Measure gear end play as the final check — Refer to "Disassembly".



Final Drive

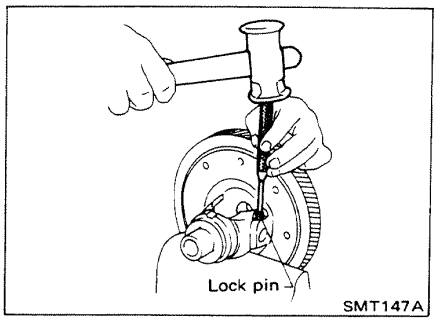
DISASSEMBLY

1. Remove final gear.
2. Remove speedometer drive gear by cutting it.
3. Press out differential side bearings.

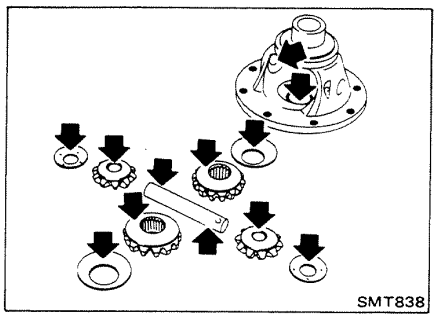
Be careful not to mix up the right and left bearings.

4. Remove speedometer stopper.

Final Drive (Cont'd)



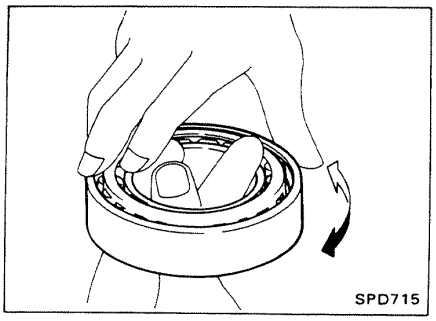
5. Drive out retaining pin and draw out pinion mate shaft.
6. Remove pinion mate gears and side gears.



INSPECTION

Gear, washer, shaft and case

- Check mating surfaces of differential case, side gears and pinion mate gears.
- Check washers for wear.



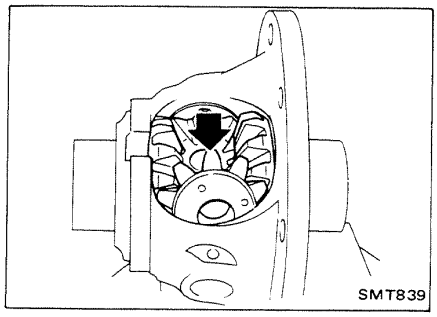
Bearing

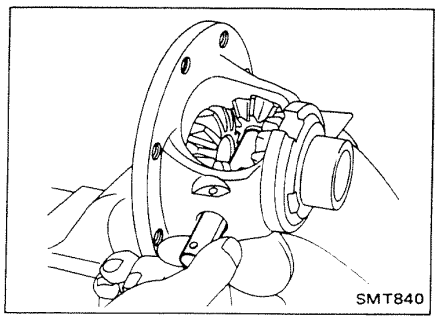
- Make sure bearings roll freely and are free from noise, cracks, pitting or wear.

When replacing tapered roller bearing, replace outer and inner race as a set.

ASSEMBLY

1. Fit side gear thrust washers and side gears, then install pinion mate washers and pinion mate gears in place.

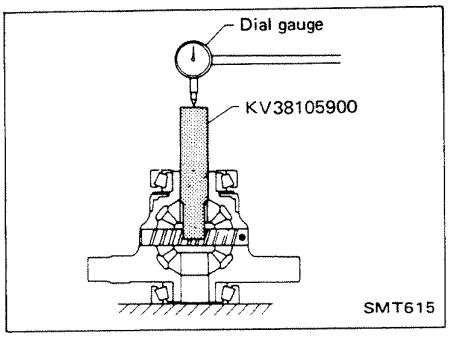




2. Insert pinion mate shaft.

When inserting, be careful not to damage pinion mate thrust washers.

Final Drive (Cont'd)

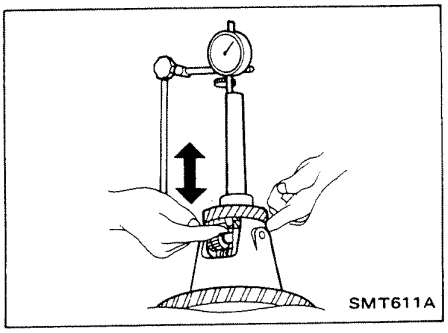


3. Measure clearance between side gear and differential case with washers following the procedure below.

a. Set Tool and dial indicator on side gear.

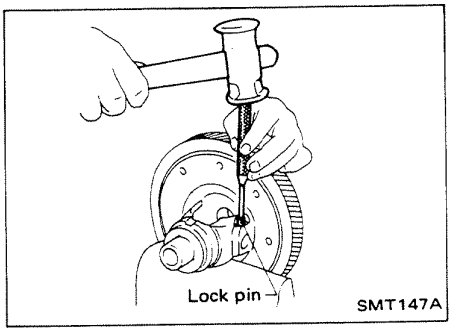
b. Move side gear up and down to measure dial indicator deflection. Always measure indicator deflection on both side gears.

Clearance between side gear and differential case with washers:
0.3 mm (0.012 in) or less



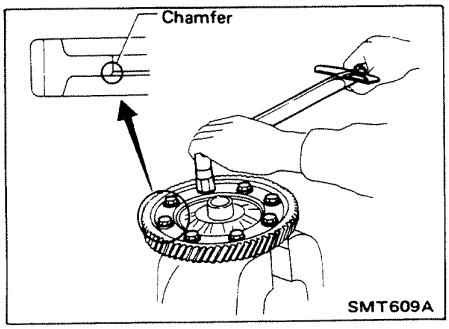
c. If not within specification, adjust clearance by changing thickness of side gear thrust washers.

Side gear thrust washer:
Refer to S.D.S.



4. Install retaining pin.

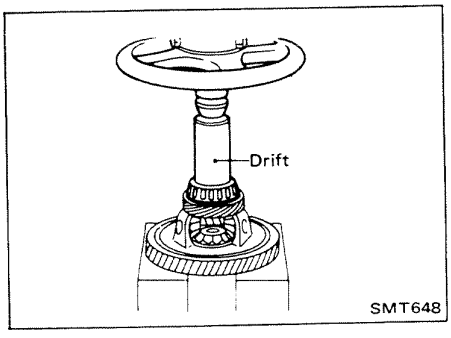
Make sure that retaining pin is flush with case.



5. Install final gear.

Apply locking sealer to final gear fixing bolts before installing them.

6. Install speedometer drive gear and stopper.

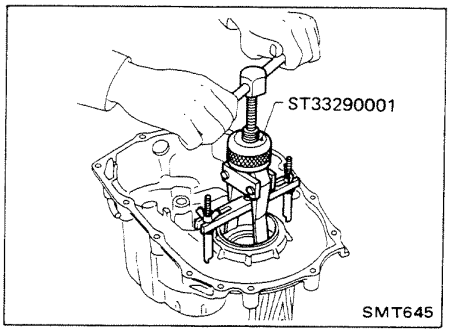


7. Press on differential side bearings.

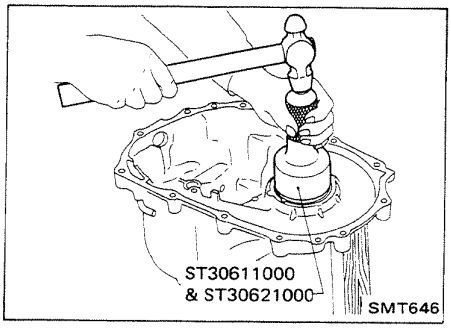
Differential Side Bearing Preload

If any of the following parts are replaced, adjust differential side bearing preload.

- **Differential case**
- **Differential side bearing**
- **Clutch housing**
- **Transmission case**

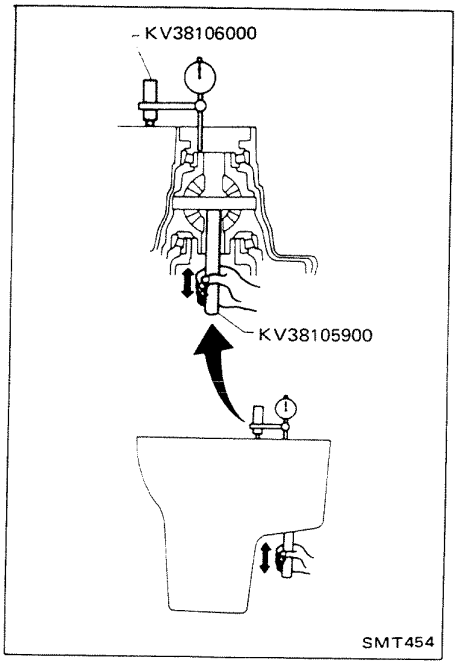


1. Remove differential side bearing outer race (transmission case side) and shim.



2. Re-install differential side bearing outer race without shim.
3. Install final drive assembly on clutch housing.
4. Install transmission case on clutch housing.

Tighten transmission case fixing bolts to the specified torque.

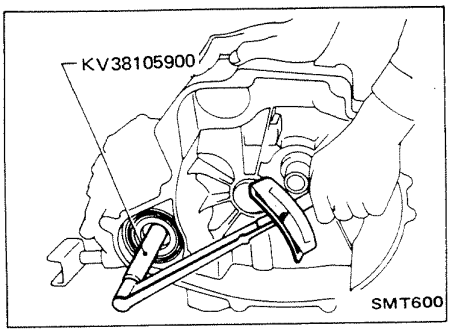


5. Set dial indicator on front end of differential case.
6. Insert Tool all the way into differential side gear.
7. Move Tool up and down and measure dial indicator deflection.
8. Select shim with S.D.S. table as a guide.
9. Install selected shim and differential side bearing outer race.
10. Check differential side bearing turning torque.

a. Install final drive assembly on clutch housing.
b. Install transmission case on clutch housing.

Tighten transmission case fixing bolts to the specified torque.

Differential Side Bearing Preload (Cont'd)



c. Measure turning torque of final drive assembly.

Turning torque of final drive assembly
(New bearing):
3.9 - 7.8 N·m
(40 - 80 kg-cm, 35 - 69 in-lb)

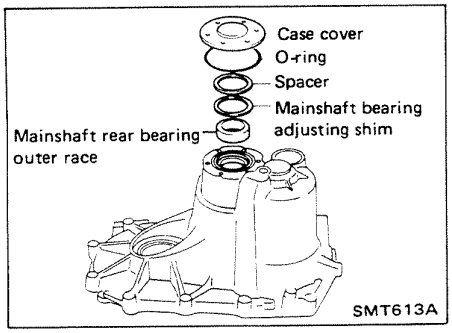
When old bearing is used again, turning torque will be slightly lower than that indicated above. Check turning torque to see if it is not far from specified range.

Changes in turning torque of final drive assembly per revolution should be within 1.0 N·m (10 kg-cm, 8.7 in-lb) without binding.

Mainshaft bearing preload

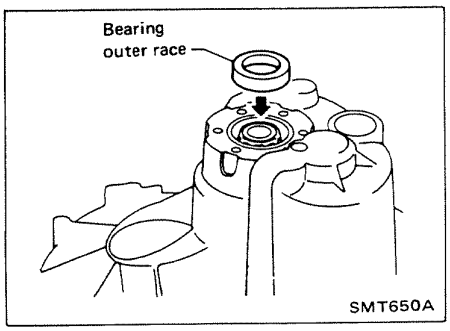
If any of the following parts are replaced, adjust mainshaft bearing preload.

- **Mainshaft**
- **Mainshaft bearings**
- **Clutch housing**
- **Transmission case**

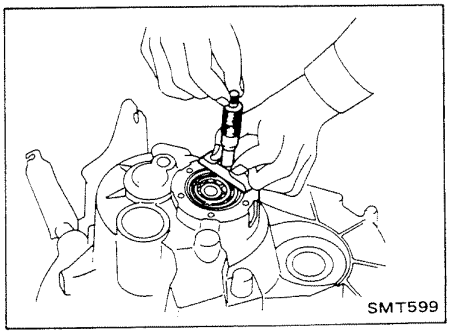


1. Remove case cover, O-ring, spacer, mainshaft bearing adjusting shim and mainshaft rear bearing outer race from transmission case.
2. Install mainshaft assembly on clutch housing.
3. Install transmission case on clutch housing.

Tighten transmission case fixing bolts to the specified torque.



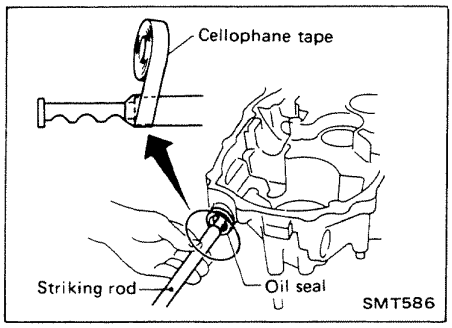
4. Re-install mainshaft rear bearing outer race on inner race.



5. Measure distance from transmission case to bearing outer race.

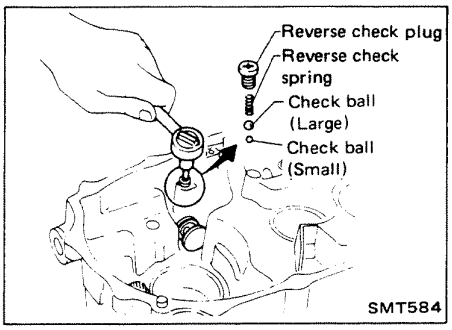
Make sure that bearing is properly seated.

6. Select shim with S.D.S. table as a guide.
7. Check total turning torque after assembling – Refer to "ASSEMBLY".

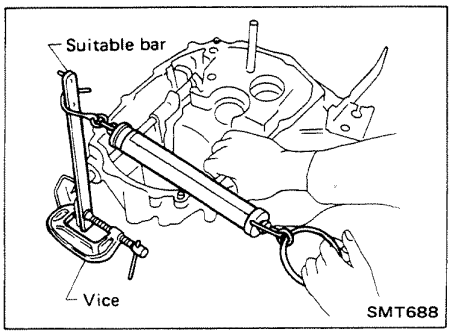


1. Install striking rod, lever and interlock.

When inserting striking rod into clutch housing, tape edges of striking rod to avoid damaging oil seal's lip if it hits against oil seal.



2. Install reverse check sleeve assembly.
3. Install check balls, reverse check spring and check plug.



4. Check reverse check force.

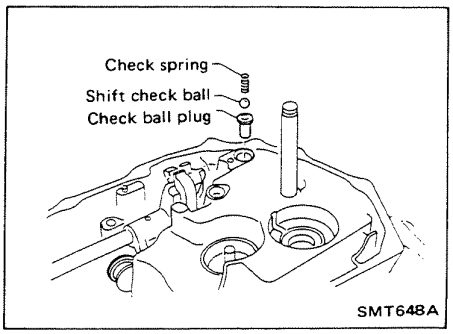
Reverse check force:
4.9 - 7.4 N·m
(50 - 75 kg-cm, 43 - 65 in-lb)

If not within specification, select another check plug having a different length and reinstall it.

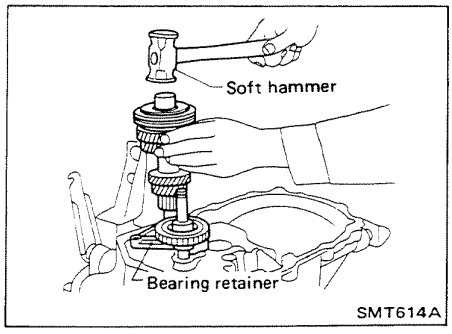
Reverse check plug: Refer to S.D.S.

5. Install selected reverse check plug.

Apply locking sealer to thread of plug before installing it.

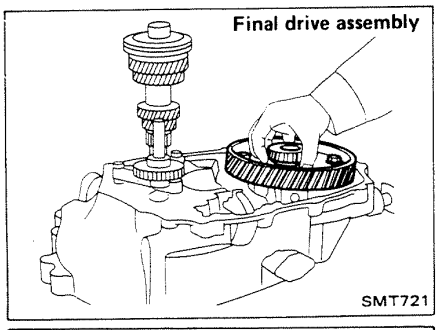


6. Install check ball plug, shift check ball and check spring.
7. Install oil pocket.

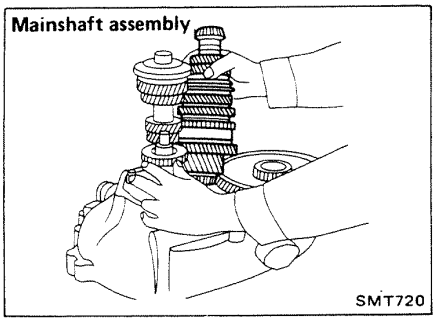


8. Install gear components onto clutch housing.
a. Install input shaft assembly and reverse idler gear.

Use care not to damage oil seal's lip by splines of input shaft while shaft is being inserted into clutch housing.

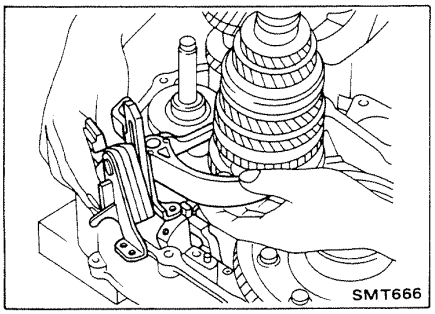


b. Install final drive assembly.

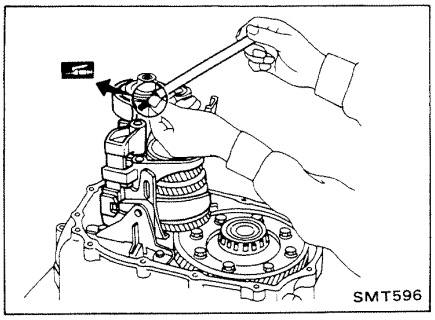


c. Install mainshaft assembly.

Use care not to damage oil channel when inserting mainshaft into clutch housing.



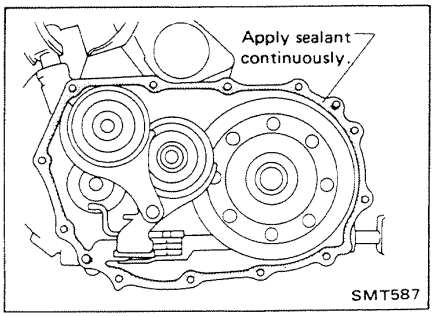
9. Apply grease to shifter caps, then install it to control bracket. Install control bracket with 1st & 2nd shift fork.
10. Install 3rd & 4th and 5th shift forks.



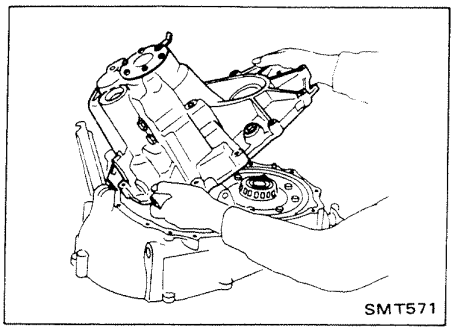
11. Insert fork shaft.

Apply multi-purpose grease to support spring before installing.

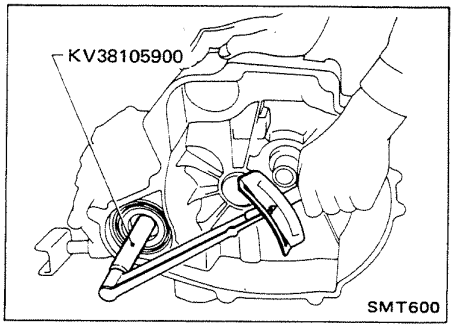
12. Install reverse idler spacer.



13. Apply recommended sealant to mating surface of clutch housing.


SMT571

14. Install transmission case on clutch housing.



SMT600

15. Measure total turning torque.

Total turning torque (New bearing):

5.9 - 13.7 N·m

(60 - 140 kg-cm, 52 - 122 in-lb)

When old bearing is used again, turning torque will be slightly lower than that indicated above. Check turning torque to see if it is not far from specified range.

General Specifications—RS5F31A

TRANSAXLE

Engine			CA16DE
Transaxle model			RS5F31A
Number of speed			5
Synchromesh type			Warner
Shift pattern			
Gear ratio		1st	3.333
		2nd	1.955
		3rd	1.286
		4th	0.975
		5th	0.810
		Rev.	3.417
Number of teeth	Input gear	1st	15
		2nd	22
		3rd	28
		4th	40
		5th	42
		Rev.	12
	Main gear	1st	50
		2nd	43
		3rd	36
		4th	29
		5th	34
		Rev.	41
	Reverse idler gear		30
Oil capacity	liter (Imp pt)		2.7 (4-3/4)

FINAL GEAR

Engine	CA16DE
Final gear ratio	4.471
Number of teeth	
Final gear/Pinion	76/17
Side gear/Pinion mate gear	16/10

Inspection and Adjustment—RS5F31A

GEAR END PLAY

Gear	End play mm (in)
1st main gear	0.18 - 0.31 (0.0071 - 0.0122)
2nd main gear	0.20 - 0.40 (0.0079 - 0.0157)
3rd main gear	0.20 - 0.40 (0.0079 - 0.0157)
4th main gear	0.20 - 0.40 (0.0079 - 0.0157)
5th input gear	0.18 - 0.41 (0.0071 - 0.0161)

CLEARANCE BETWEEN BAULK RING AND GEAR

Unit: mm (in)

	Standard	Wear limit
1st & 2nd	1.0 - 1.3 (0.039 - 0.051)	0.7 (0.028)
3rd & 4th	1.0 - 1.3 (0.039 - 0.051)	0.7 (0.028)
5th	1.0 - 1.3 (0.039 - 0.051)	0.7 (0.028)

AVAILABLE CHECK PLUG

Reverse check plug

Reverse check turning torque (At striking rod)	4.9 - 7.4 N·m (50 - 75 kg-cm, 43 - 65 in-lb)

Thickness mm (in)	Part number
8.3 (0.327)	32188-M8001*
7.1 (0.280)	32188-M8002
7.7 (0.303)	32188-M8003
8.9 (0.350)	32188-M8004

* Standard check plug

AVAILABLE SNAP RING

Input shaft front bearing

Allowable clearance	0 - 0.1 mm (0 - 0.004 in)

Thickness mm (in)	Part number
1.27 (0.0500)	32204-M8004
1.33 (0.0524)	32204-M8005
1.39 (0.0547)	32204-M8006
1.45 (0.0571)	32204-M8007

Input shaft 5th synchronizer hub

Allowable clearance	0 - 0.1 mm (0 - 0.004 in)

Thickness mm (in)	Part number
2.00 (0.0787)	32311-M8812
2.05 (0.0807)	32311-M8813
2.10 (0.0827)	32311-M8814
2.15 (0.0846)	32311-M8815
2.20 (0.0866)	32311-M8816
2.25 (0.0886)	32311-M8817
2.30 (0.0906)	32311-M8818

AVAILABLE C-RING

Mainshaft C-ring

Allowable clearance	0 - 0.1 mm (0 - 0.004 in)

Thickness mm (in)	Part number	Thickness mm (in)	Part number
3.63 (0.1429)	32348-M8800	4.12 (0.1622)	32348-M8807
3.70 (0.1457)	32348-M8801	4.19 (0.1650)	32348-M8808
3.77 (0.1484)	32348-M8802	4.26 (0.1677)	32348-M8809
3.84 (0.1512)	32348-M8803	4.33 (0.1705)	32348-M8810
3.91 (0.1539)	32348-M8804	4.40 (0.1732)	32348-M8811
3.98 (0.1567)	32348-M8805	4.47 (0.1760)	32348-M8812
4.05 (0.1594)	32348-M8806	4.54 (0.1787)	32348-M8813

Inspection and Adjustment— RS5F31A (Cont'd)

AVAILABLE WASHER

Differential side gear thrust washer

Allowable clearance between side gear and differential case with washer	0.3 mm (0.012 in) or less

Thickness mm (in)	Part number
0.75 - 0.80 (0.0295 - 0.0315)	38424-D2101
0.80 - 0.85 (0.0315 - 0.0335)	38424-D2102
0.85 - 0.90 (0.0335 - 0.0354)	38424-D2103
0.90 - 0.95 (0.0354 - 0.0374)	38424-D2104
0.95 - 1.00 (0.0374 - 0.0394)	38424-D2105

AVAILABLE SHIM

– MAINSHAFT AND DIFFERENTIAL SIDE BEARING PRELOAD AND ADJUSTING SHIM

Bearing preload

Unit: mm (in)

Mainshaft bearing	0.18 - 0.27 (0.0071 - 0.0106)
Differential side bearing	0.29 - 0.35 (0.0114 - 0.0138)

Turning torque (New bearing)

Unit: N·m (kg-cm, in-lb)

Final drive only	3.9 - 7.8 (40 - 80, 35 - 69)
Total	5.9 - 13.7 (60 - 140, 52 - 122)

Mainshaft bearing adjusting shim

Thickness mm (in)	Part number
0.10 (0.0039)	32137-M8000
0.15 (0.0059)	32137-M8001
0.20 (0.0079)	32137-M8002
0.25 (0.0098)	32137-M8003
0.30 (0.0118)	32137-M8004
0.35 (0.0138)	32137-M8005
0.40 (0.0157)	32137-M8006
0.45 (0.0177)	32137-M8007
0.50 (0.0197)	32137-M8008
0.55 (0.0217)	32137-M8009
0.60 (0.0236)	32137-M8010
0.65 (0.0256)	32137-M8011
0.70 (0.0276)	32137-M8012
0.75 (0.0295)	32137-M8013
0.80 (0.0315)	32137-M8014
0.85 (0.0335)	32137-M8015
0.90 (0.0354)	32137-M8016
0.95 (0.0374)	32137-M8017
1.00 (0.0394)	32137-M8018

Table for selecting mainshaft bearing adjusting shim

Unit: mm (in)

Measured distance	Suitable shim thickness
2.35 - 2.40 (0.0925 - 0.0945)	0.10 (0.0039)
2.40 - 2.45 (0.0945 - 0.0965)	0.15 (0.0059)
2.45 - 2.50 (0.0965 - 0.0984)	0.20 (0.0079)
2.50 - 2.55 (0.0984 - 0.1004)	0.25 (0.0098)
2.55 - 2.60 (0.1004 - 0.1024)	0.30 (0.0118)
2.60 - 2.65 (0.1024 - 0.1043)	0.35 (0.0138)
2.65 - 2.70 (0.1043 - 0.1063)	0.40 (0.0157)
2.70 - 2.75 (0.1063 - 0.1083)	0.45 (0.0177)
2.75 - 2.80 (0.1083 - 0.1102)	0.50 (0.0197)
2.80 - 2.85 (0.1102 - 0.1122)	0.55 (0.0217)
2.85 - 2.90 (0.1122 - 0.1142)	0.60 (0.0236)
2.90 - 2.95 (0.1142 - 0.1161)	0.65 (0.0256)
2.95 - 3.00 (0.1161 - 0.1181)	0.70 (0.0276)
3.00 - 3.05 (0.1181 - 0.1201)	0.75 (0.0295)
3.05 - 3.10 (0.1201 - 0.1220)	0.80 (0.0315)
3.10 - 3.15 (0.1220 - 0.1240)	0.85 (0.0335)
3.15 - 3.20 (0.1240 - 0.1260)	0.90 (0.0354)
3.20 - 3.25 (0.1260 - 0.1280)	0.95 (0.0374)
3.25 - 3.30 (0.1280 - 0.1299)	1.00 (0.0394)

Inspection and Adjustment— RS5F31A (Cont'd)

Differential side bearing adjusting shim

Thickness mm (in)	Part number
0.44 (0.0173)	38454-M8000
0.48 (0.0189)	38454-M8001
0.56 (0.0220)	38454-M8003
0.60 (0.0236)	38454-M8004
0.64 (0.0252)	38454-M8005
0.68 (0.0268)	38454-M8006
0.72 (0.0283)	38454-M8007
0.76 (0.0299)	38454-M8008
0.80 (0.0315)	38454-M8009
0.84 (0.0331)	38454-M8010
0.88 (0.0346)	38454-M8011

Table for selecting differential side bearing adjusting shim

Unit: mm (in)

Dial indicator deflection	Suitable shim thickness	Appropriate shim(s)
0.30 - 0.34 (0.0118 - 0.0134)	0.64 (0.0252)	0.64 (0.0252)
0.34 - 0.38 (0.0134 - 0.0150)	0.68 (0.0268)	0.68 (0.0268)
0.38 - 0.42 (0.0150 - 0.0165)	0.72 (0.0283)	0.72 (0.0283)
0.42 - 0.46 (0.0165 - 0.0181)	0.76 (0.0299)	0.76 (0.0299)
0.46 - 0.50 (0.0181 - 0.0197)	0.80 (0.0315)	0.80 (0.0315)
0.50 - 0.54 (0.0197 - 0.0213)	0.84 (0.0331)	0.84 (0.0331)
0.54 - 0.58 (0.0213 - 0.0228)	0.88 (0.0346)	0.88 (0.0346)
0.58 - 0.62 (0.0228 - 0.0244)	0.92 (0.0362)	0.44 (0.0173) + 0.48 (0.0189)
0.62 - 0.66 (0.0244 - 0.0260)	0.96 (0.0378)	0.48 (0.0189) + 0.48 (0.0189)
0.66 - 0.70 (0.0260 - 0.0276)	1.00 (0.0394)	0.44 (0.0173) + 0.56 (0.0220)
0.70 - 0.74 (0.0276 - 0.0291)	1.04 (0.0409)	0.44 (0.0173) + 0.60 (0.0236)
0.74 - 0.78 (0.0291 - 0.0307)	1.08 (0.0425)	0.44 (0.0173) + 0.64 (0.0252)
0.78 - 0.82 (0.0307 - 0.0323)	1.12 (0.0441)	0.44 (0.0173) + 0.68 (0.0268)
0.82 - 0.86 (0.0323 - 0.0339)	1.16 (0.0457)	0.44 (0.0173) + 0.72 (0.0283)
0.86 - 0.90 (0.0339 - 0.0354)	1.20 (0.0472)	0.44 (0.0173) + 0.76 (0.0299)
0.90 - 0.94 (0.0354 - 0.0370)	1.24 (0.0488)	0.44 (0.0173) + 0.80 (0.0315)
0.94 - 0.98 (0.0370 - 0.0386)	1.28 (0.0504)	0.44 (0.0173) + 0.84 (0.0331)
0.98 - 1.02 (0.0386 - 0.0402)	1.32 (0.0520)	0.44 (0.0173) + 0.88 (0.0346)
1.02 - 1.06 (0.0402 - 0.0417)	1.36 (0.0535)	0.88 (0.0346) + 0.48 (0.0189)
1.06 - 1.10 (0.0417 - 0.0433)	1.40 (0.0551)	0.68 (0.0268) + 0.72 (0.0283)
1.10 - 1.14 (0.0433 - 0.0449)	1.44 (0.0567)	0.88 (0.0346) + 0.56 (0.0220)
1.14 - 1.18 (0.0449 - 0.0465)	1.48 (0.0583)	0.88 (0.0346) + 0.60 (0.0236)
1.18 - 1.22 (0.0465 - 0.0480)	1.52 (0.0598)	0.88 (0.0346) + 0.64 (0.0252)
1.22 - 1.26 (0.0480 - 0.0496)	1.56 (0.0614)	0.88 (0.0346) + 0.68 (0.0268)
1.26 - 1.30 (0.0496 - 0.0512)	1.60 (0.0630)	0.88 (0.0346) + 0.72 (0.0283)
1.30 - 1.34 (0.0512 - 0.0528)	1.64 (0.0646)	0.88 (0.0346) + 0.76 (0.0299)
1.34 - 1.38 (0.0528 - 0.0543)	1.68 (0.0661)	0.88 (0.0346) + 0.80 (0.0315)
1.38 - 1.42 (0.0543 - 0.0559)	1.72 (0.0677)	0.88 (0.0346) + 0.84 (0.0331)
1.42 - 1.46 (0.0559 - 0.0575)	1.76 (0.0693)	0.88 (0.0346) + 0.88 (0.0346)

Tightening Torque—RS5F31A

TRANSMISSION INSTALLATION

Unit	N·m	kg-m	ft-lb
Transmission securing bolt	Refer to Removal and Installation.		
Engine gusset to engine			
Front gusset	30 - 40	3.1 - 4.1	22 - 30
Rear gusset	30 - 40	3.1 - 4.1	22 - 30
Engine mounting bracket fixing bolt	Refer to section EM.		
Starter motor fixing bolt	Refer to section EM.		

Gear control

Unit	N·m	kg-m	ft-lb
Control rod to transaxle	17 - 22	1.7 - 2.2	12 - 16
Support rod to engine mount bracket	31 - 40	3.2 - 4.1	23 - 30
Holder bracket fixing bolt	8 - 11	0.8 - 1.1	5.8 - 8.0
Holder bracket to support rod	20 - 25	2.0 - 2.6	14 - 19
Control lever socket to support rod	8 - 11	0.8 - 1.1	5.8 - 8.0
Control lever to control rod	16 - 21	1.6 - 2.1	12 - 15

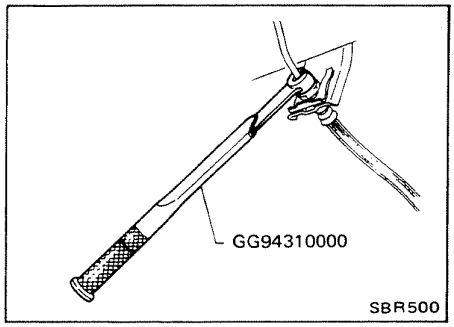
Gear assembly

Unit	N·m	kg-m	ft-lb
Clutch housing to transmission case	16 - 21	1.6 - 2.1	12 - 15
Case cover to transmission case	6.3 - 8.3	0.64 - 0.85	4.6 - 6.1
Bearing retainer to clutch housing	16 - 21	1.6 - 2.1	12 - 15
Control bracket to clutch housing	6.3 - 8.3	0.64 - 0.85	4.6 - 6.1
Reverse check plug	19 - 25	1.9 - 2.5	14 - 18
Check sleeve assembly to clutch housing	6.3 - 8.3	0.64 - 0.85	4.6 - 6.1
Final gear to differential case	74 - 88	7.5 - 9.0	54 - 65
Filler plug	25 - 34	2.5 - 3.5	18 - 25
Drain plug	25 - 34	2.5 - 3.5	18 - 25
Reverse lamp switch	20 - 29	2.0 - 3.0	14 - 22
Neutral switch	20 - 29	2.0 - 3.0	14 - 22
Switch plug	15 - 20	1.5 - 2.0	11 - 14

FRONT AXLE & FRONT SUSPENSION

SECTION FA

CONTENTS



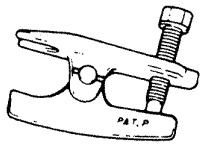
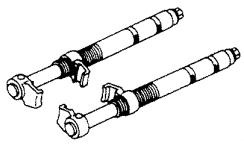
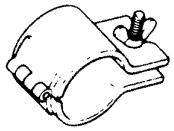
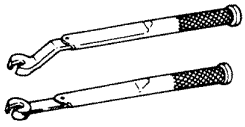
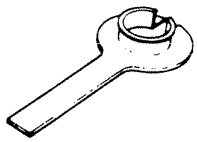
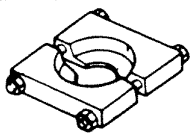
Precautions

(1) When installing each rubber part, final tightening must be carried out under unladen condition* with tires on ground.
*** Fuel, radiator coolant and engine oil full. Spare tire, jack, hand tools and mats in designated positions.**
(2) When removing each suspension part, check wheel alignment and adjust if necessary.
(3) Use Tool when removing or installing brake tubes.

Preparation

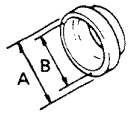
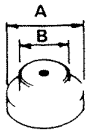
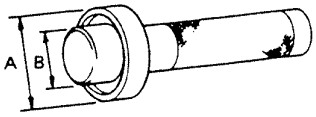
SPECIAL SERVICE TOOLS

*: Special tools or commercial equivalent

Tool number Tool name	Description	
HT72520000* Ball joint remover		Removing tie-rod outer end and lower ball joint
HT71780000* Spring compressor		Removing and installing coil spring
ST35652000* Strut attachment		Fixing strut assembly
GG94310000* Flare nut torque wrench		Removing and installing brake piping
KV38105500* Differential side oil seal protector		Installing drive shaft
ST30031000* Bearing puller		Removing inner race of wheel bearing

Preparation (Cont'd)

SPECIAL SERVICE TOOLS

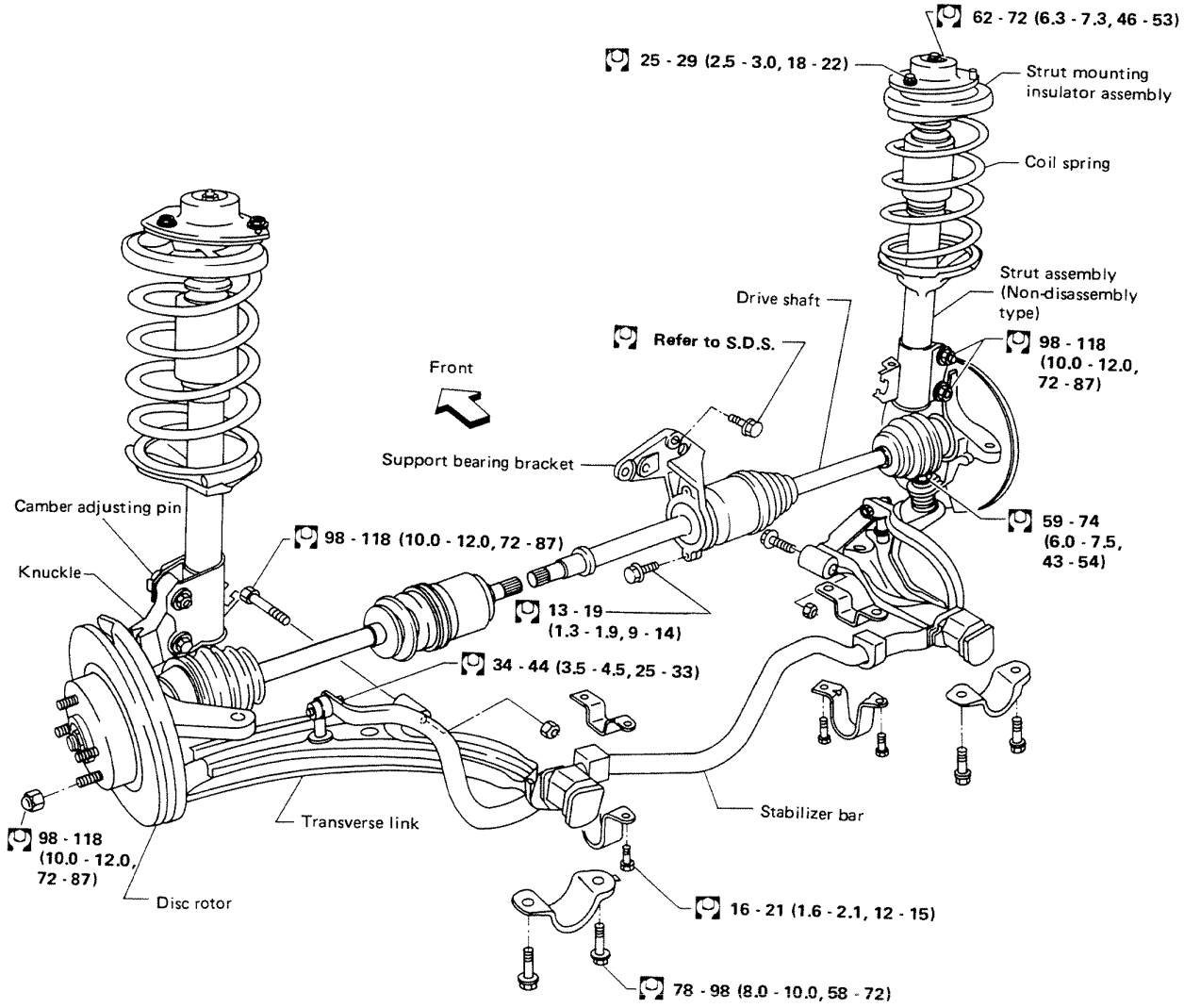
Tool number Tool name	Description
KV38102510* Drift	 Installing wheel bearing assembly A: 71 mm (2.80 in) dia. B: 65 mm (2.56 in) dia.
ST30621000* Drift	 Installing wheel bearing assembly and wheel hub A: 79 mm (3.11 in) dia. B: 59 mm (2.32 in) dia.
ST33220000* Drift	 Removing wheel hub A: 37 mm (1.46 in) dia. B: 22 mm (0.87 in) dia.

Wheel alignment

- **Caster and kingpin inclination cannot be adjusted.**
- **Camber and toe-in can be adjusted.**
  Camber: −1° 15′ to 0° 15′
  Toe-in: −1 to 1 mm (−0.04 to 0.04 in)

Wheel bearing

- **Tightening wheel bearing lock nut: 196 - 275 N·m (20 - 28 kg-m, 145 - 203 ft-lb)**
- **Axial end play: 0.05 mm (0.0020 in) or less**

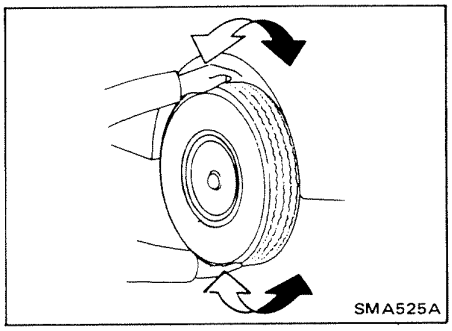


When installing each rubber part, final tightening must be carried out under unladen condition* with tires on ground.

*** Fuel, radiator coolant and engine oil full. Spare tire, jack, hand tools and mats in designated positions.**

: N·m (kg-m, ft-lb)

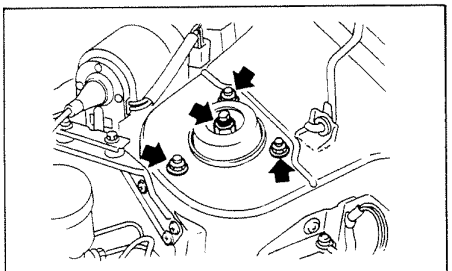
SFA200A

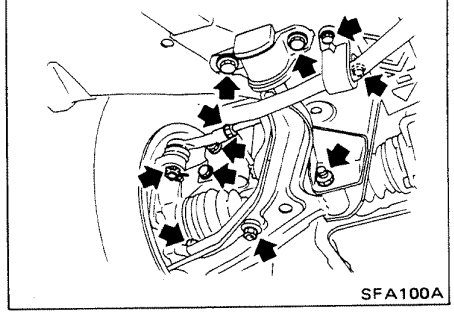

SMA525A

Front Axle and Front Suspension Parts

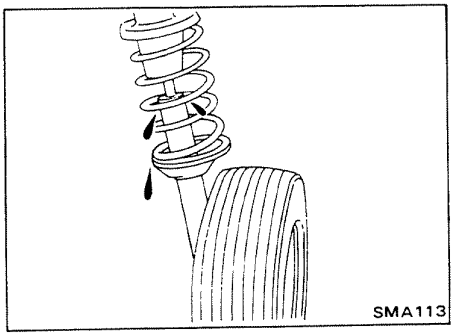
- Check front axle and front suspension parts for looseness, cracks, wear or other damage.

(1) Shake each front wheel.

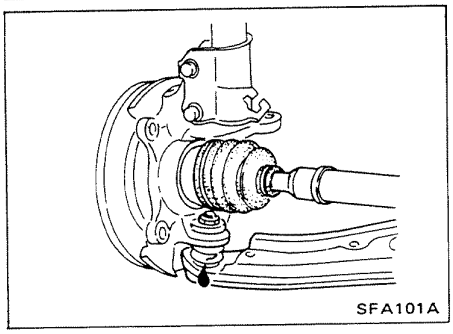

SFA099A


SFA100A

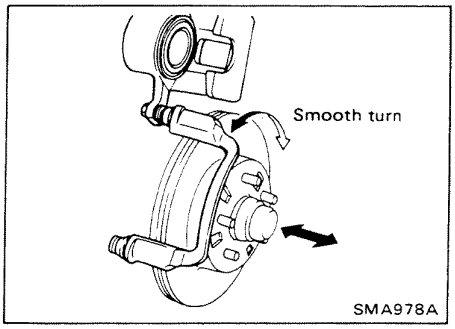
(2) Make sure that cotter pin is inserted.
(3) Retighten all nuts and bolts to the specified torque.
Tightening torque: Refer to S.D.S.


SMA113

- Check strut (Shock absorber) for oil leakage or other damage.


SFA101A

- Check suspension ball joint for grease leakage and ball joint dust cover for cracks or other damage.

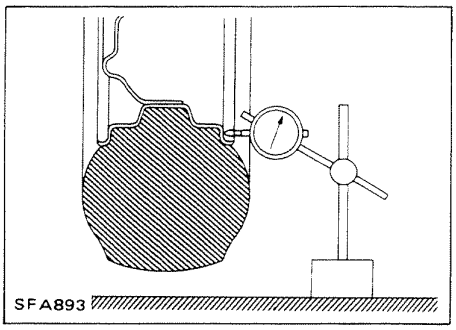


Front Wheel Bearing

- Check that wheel bearings operate smoothly.
- Check axial end play.

Axial end play: 0.05 mm (0.0020 in) or less

If axial end play is not within specification or wheel bearing does not turn smoothly, replace wheel bearing assembly.
Refer to FRONT AXLE — Wheel Hub and Knuckle.



Front Wheel Alignment

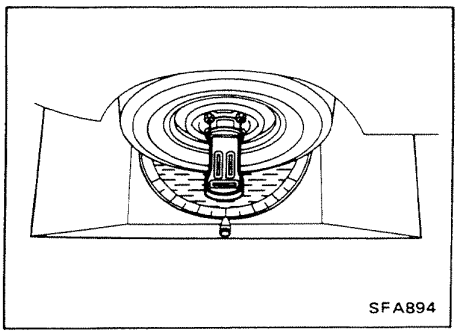
Before checking front wheel alignment, be sure to make a preliminary inspection.

PRELIMINARY INSPECTION

- Check tires for wear and proper inflation.
- Check wheel runout.

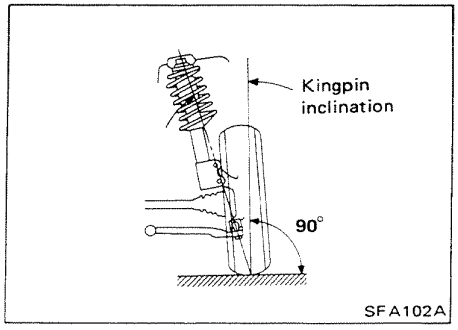
Lateral runout (Total indicator reading): 1.0 mm (0.039 in) or less

- Check front wheel bearings for looseness.
- Check front suspension for looseness.
- Check steering linkage for looseness.
- Check that front shock absorbers work properly.
- Check vehicle posture (Unladen):
  "Unladen"
  Fuel, radiator coolant and engine oil full. Spare tire, jack, hand tools and mats in designated positions.



CAMBER, CASTER AND KINGPIN INCLINATION

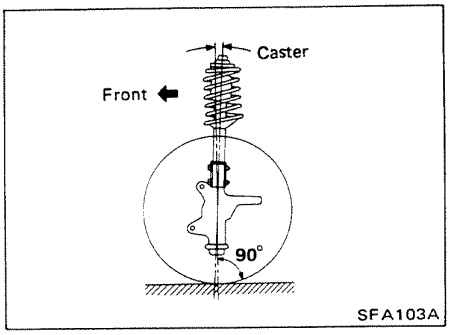
- **Caster and kingpin inclination are preset at factory and cannot be adjusted.**
  If the caster and kingpin inclination are not within specifications, inspect and replace any damaged or worn front suspension parts.
- **Measure camber, caster and kingpin inclination of both right and left wheels with a suitable alignment gauge and adjust in accordance with the following procedures.**



Kingpin inclination (Unladen)

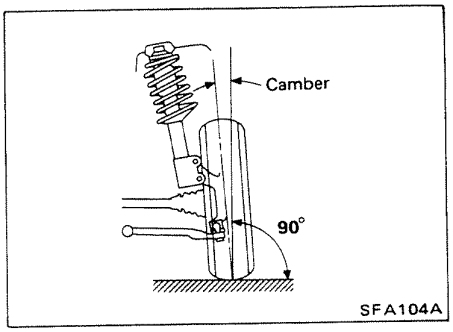
13°40' - 15°10'

Front Wheel Alignment (Cont'd)



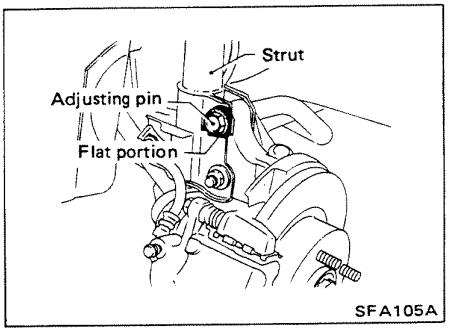
Caster (Unladen)

1°10' - 2°40'



Camber (Unladen)

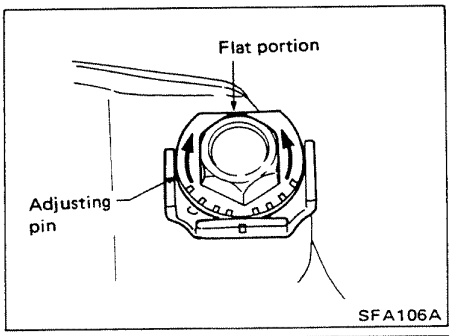
−1°15' to 0°15'



If camber is not within specification, adjust by turning the adjusting pin.

(1) Remove the adjusting pin.

Adjusting pin is factory-installed with the flat portion facing down.



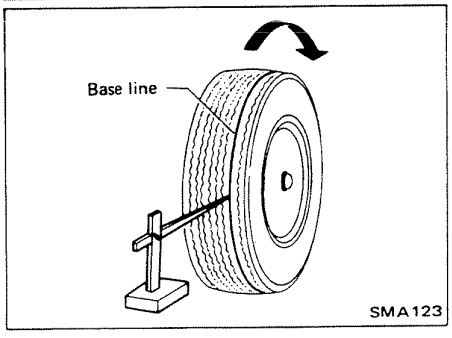
(2) Install adjusting pin with the flat portion facing up.

(3) Turn the adjusting pin to adjust.

Camber changes about 15' with each graduation of the adjusting pin.

(4) Tighten to the specified torque.

: 98 - 118 N·m (10.0 - 12.0 kg-m, 72 - 87 ft-lb)

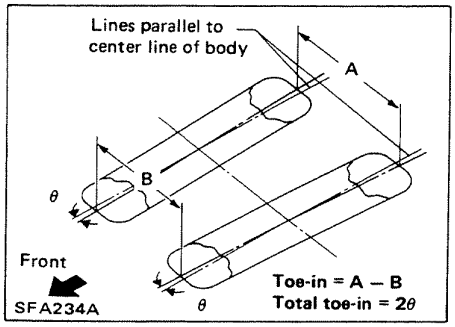


TOE-IN

1. Mark a base line across the tread.

Move it up and down to eliminate friction, and set steering wheel in straight-ahead position.

Front Wheel Alignment (Cont'd)



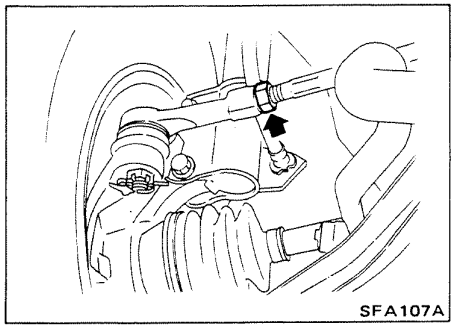
2. Measure toe-in.

Measure distance "A" and "B" at the same height as hub center.

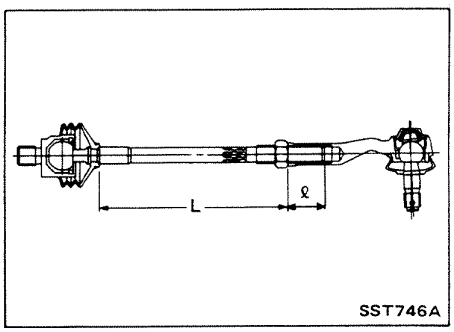
Toe-in (Unladen):

A – B: –1 to 1 mm (–0.04 to 0.04 in)

2θ (Total toe-in): –6' to 6'



3. Adjust toe-in by varying the length of steering tie-rods.



Length "ℓ" must be 25 mm (0.98 in) or more.

Make sure that the left and right tie-rods are the same length.

Tie-rod length "L"-reference data:

176 mm (6.93 in)

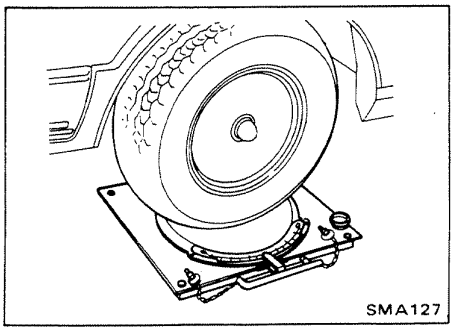
4. Tighten to the specified torque.

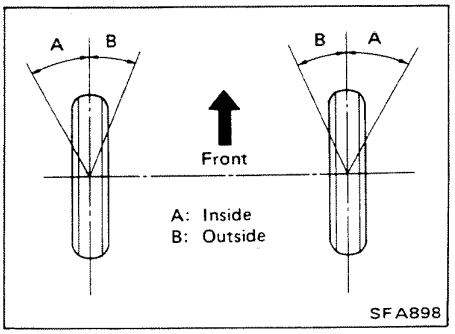
: Tie-rod lock nut

37 - 46 N·m (3.8 - 4.7 kg-m, 27 - 34 ft-lb)

FRONT WHEEL TURNING ANGLE

1. Set wheels in straight ahead position and then move vehicle forward until front wheels rest on turning radius gauge properly.

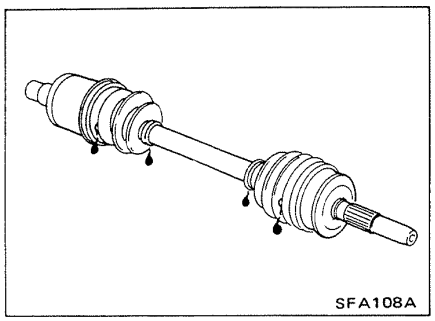




2. Rotate steering wheel all the way right and left; measure turning angle.

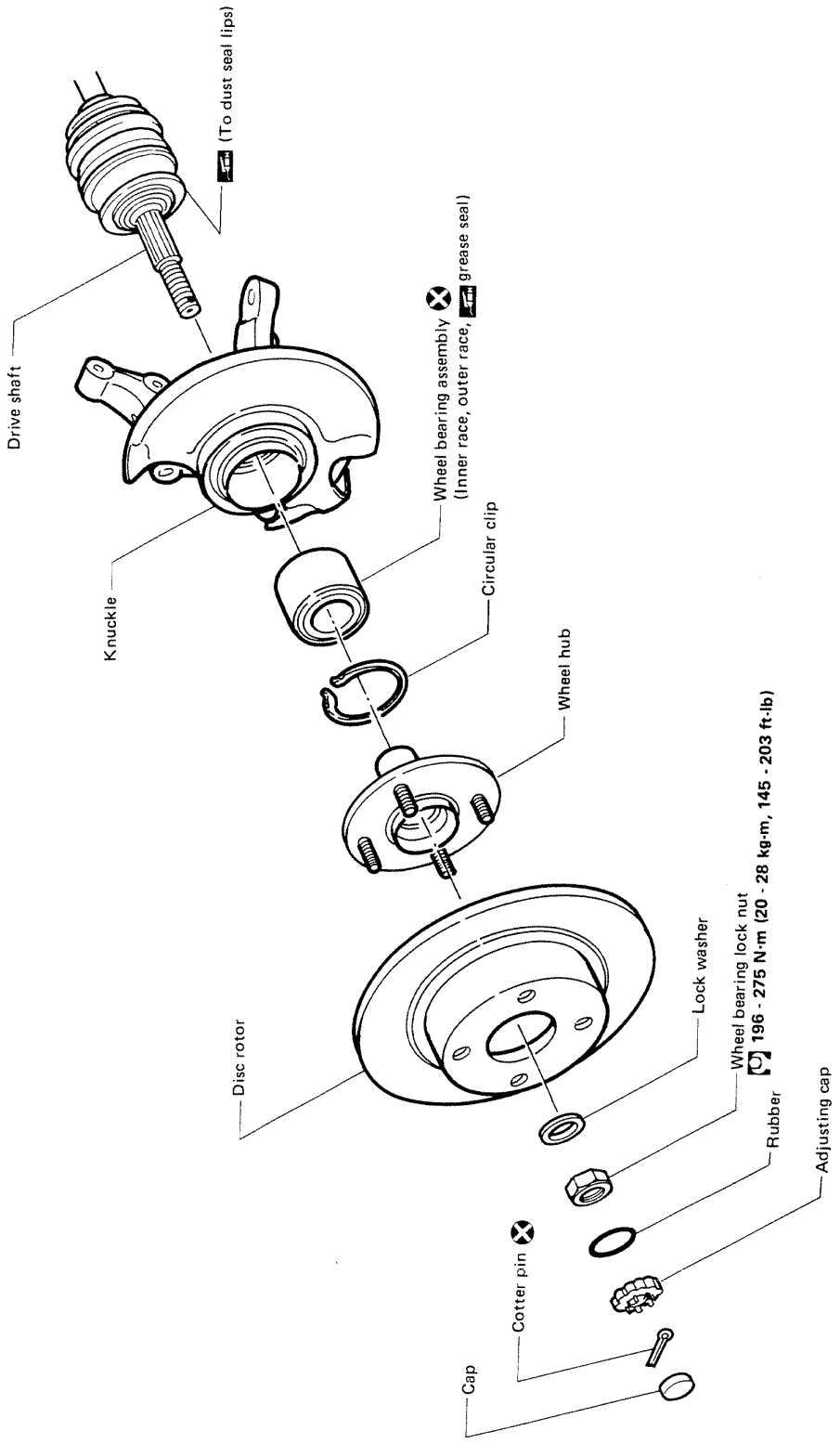
Wheel turning angle

Full turns	Inside wheel: A	36° - 39°
	Outside wheel: B	30°
Toe-out turn (at 20°)	Inside wheel: A	22°24'
	Outside wheel: B	20°



Drive Shaft

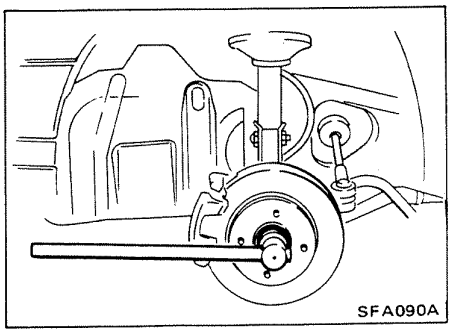
- Check for grease leakage or other damage.



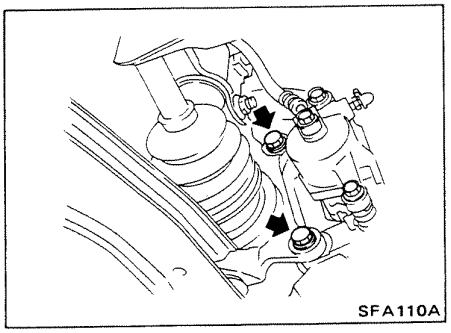
CAUTION:
- Tighten wheel bearing lock nut to the specified torque.
- Preload adjustment of wheel bearing not necessary.
- Axial end play: 0.05 mm (0.0020 in) or less
- Install lock washer with chamfer side facing wheel bearing lock nut.

SFA294A

Removal

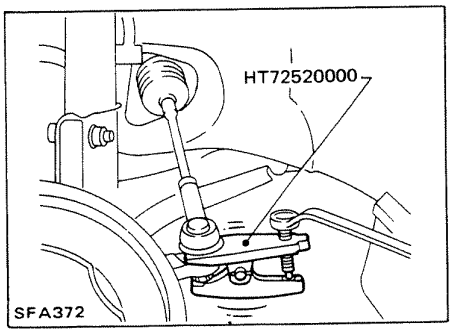


- Remove wheel bearing lock nut while depressing brake pedal.

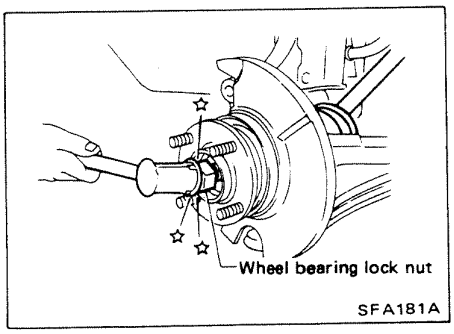


- Remove brake caliper assembly.

Brake hose does not need to be disconnected from brake caliper.
Be careful not to depress brake pedal, or piston will pop out.
Make sure brake hose is not twisted.

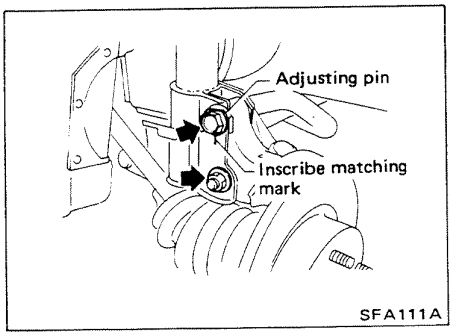


- Remove tie-rod ball joint with Tool.



- Separate drive shaft from knuckle by tapping it.

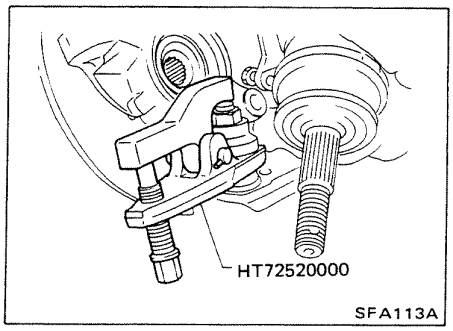
Cover boots with waste cloth so as not to damage them when removing drive shaft.



- Remove bolts and nuts as shown at left.

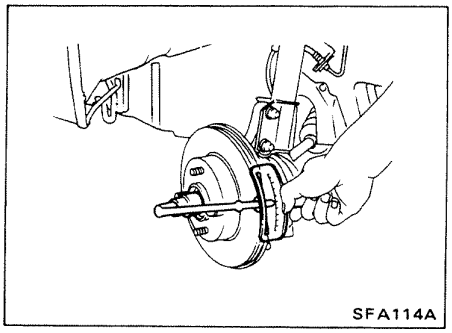
Make a matching mark before removing adjusting pin.

Removal (Cont'd)



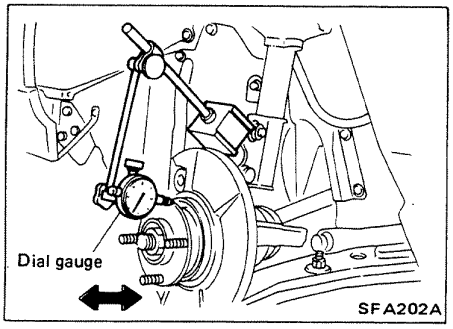
- Loosen lower ball joint tightening nut.
- Separate knuckle from lower ball joint stud with Tool.
- Remove knuckle from transverse link.

Installation



- Install knuckle with wheel hub.
- Tighten wheel bearing lock nut.

  ⓞ : **196 - 275 N·m**
  (20 - 28 kg-m, 145 - 203 ft-lb)



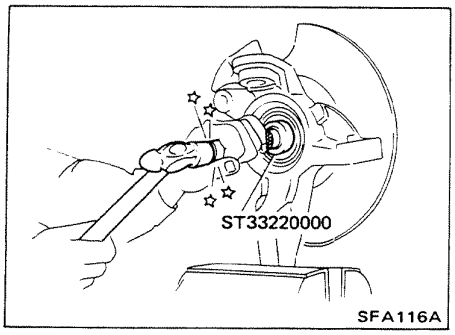
- Check wheel bearing axial end play.

  Axial end play: 0.05 mm (0.0020 in) or less

Disassembly

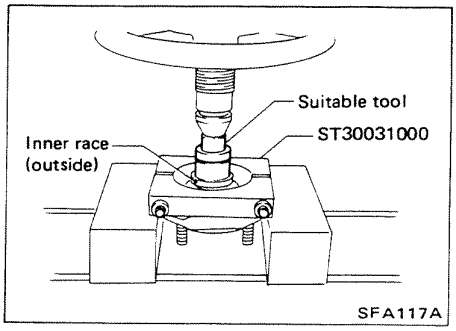
CAUTION:

When removing wheel hub from knuckle or wheel bearing from knuckle, replace wheel bearing assembly (outer race, inner race and grease seal) with a new one.



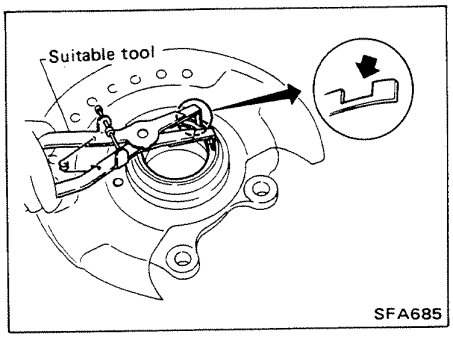
WHEEL HUB

- Drive out hub with inner race (outside) from knuckle with Tool.



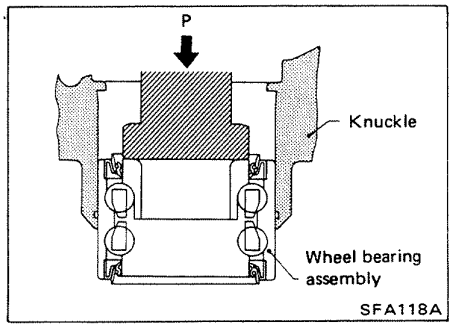
- Draw out inner race (outside) from wheel hub.
- Remove inner race (inside) from wheel bearing.

Disassembly (Cont'd)



WHEEL BEARING

- Remove circular clip with suitable tool.



- First install inner race (inside) of removed wheel bearing.
- Press out wheel bearing assembly from knuckle.

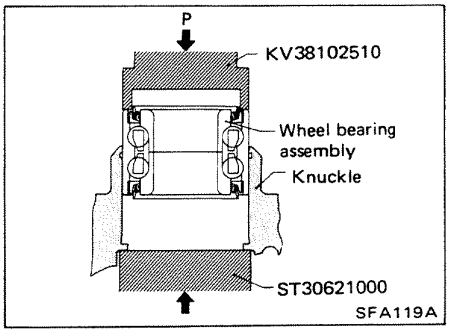
Inspection

WHEEL HUB AND KNUCKLE

- Check wheel hub and knuckle for cracks by using a magnetic exploration or dyeing test.

CIRCULAR CLIP

- Check circular clip for wear or cracks.
  Replace if necessary.



Assembly

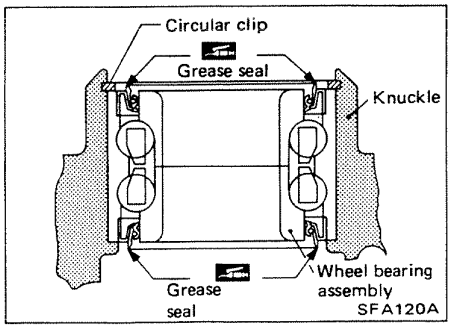
1. Press new wheel bearing assembly into knuckle from outside of knuckle.

CAUTION:

Do not press on inner race of wheel bearing assembly.

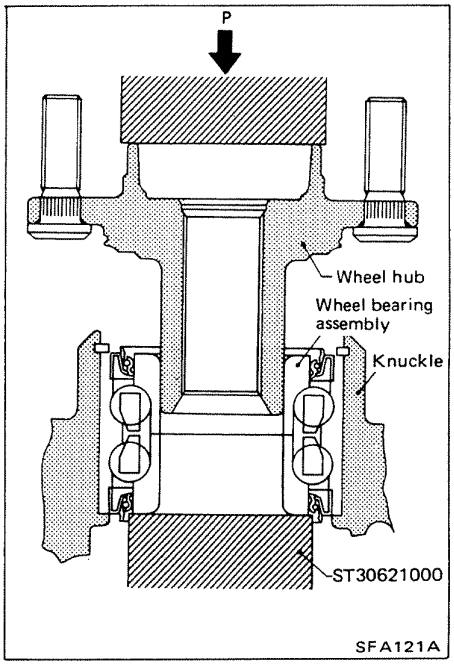
Do not apply oil or grease to mating surfaces of wheel bearing outer race and knuckle.

Be careful not to damage grease seals.



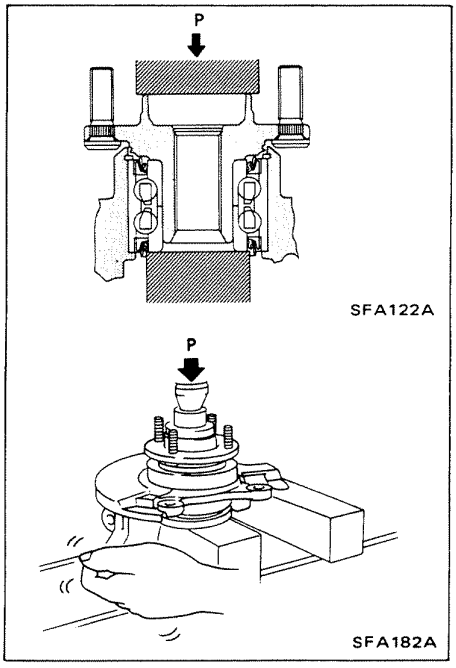
2. Install circular clip into groove of knuckle.
3. Apply multi-purpose grease to sealing lip.

Assembly (Cont'd)

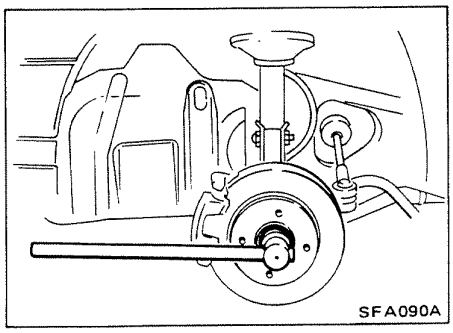


4. Press hub into knuckle.

Maximum load P:
29 kN (3 ton, 3.3 US ton, 3.0 Imp ton)



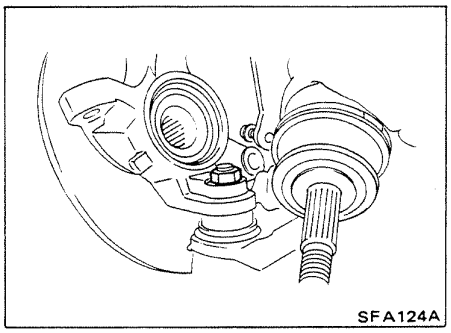
5. Check bearing preload.
(1) Add load P with a press.
P = 44.1 kN (4.5 ton, 5.0 US ton, 4.43 Imp ton)
(2) Spin knuckle several turns in both directions.
(3) Make sure that wheel bearings operate smoothly.


SFA090A

Removal

- Remove wheel bearing lock nut while depressing brake pedal.
- Remove brake caliper assembly.

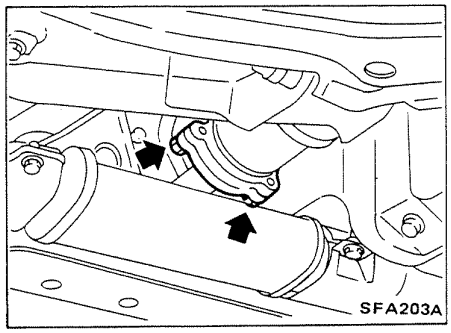
Brake hose does not need to be disconnected from brake caliper.
Be careful not to depress brake pedal, or piston will pop out.
Make sure brake hose is not twisted.


SFA124A

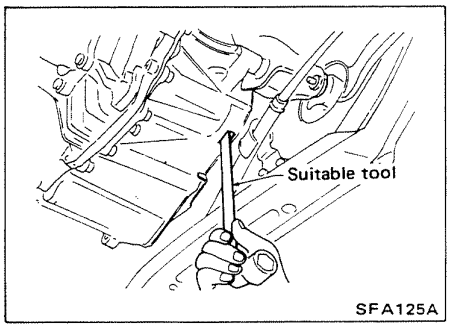
- Remove tie-rod ball joint.
- Separate drive shaft from knuckle by tapping it.

Cover boots with waste cloth so as not to damage them when removing drive shaft.

Refer to FRONT AXLE — Wheel Hub and Knuckle.

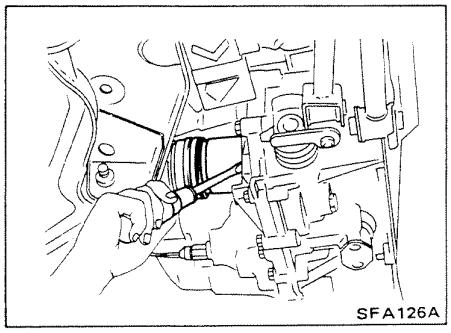

SFA203A

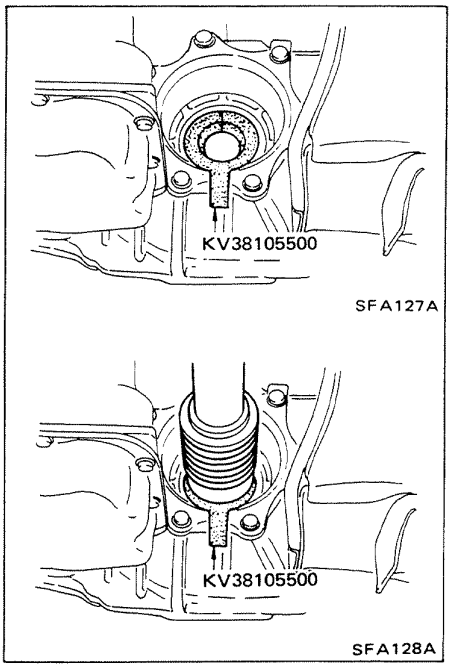
1. Remove right drive shaft from transaxle.
- Remove support bearing retainer bolts.



SFA125A

2. Remove left drive shaft from transaxle.


SFA126A



Installation

TRANSAXLE SIDE

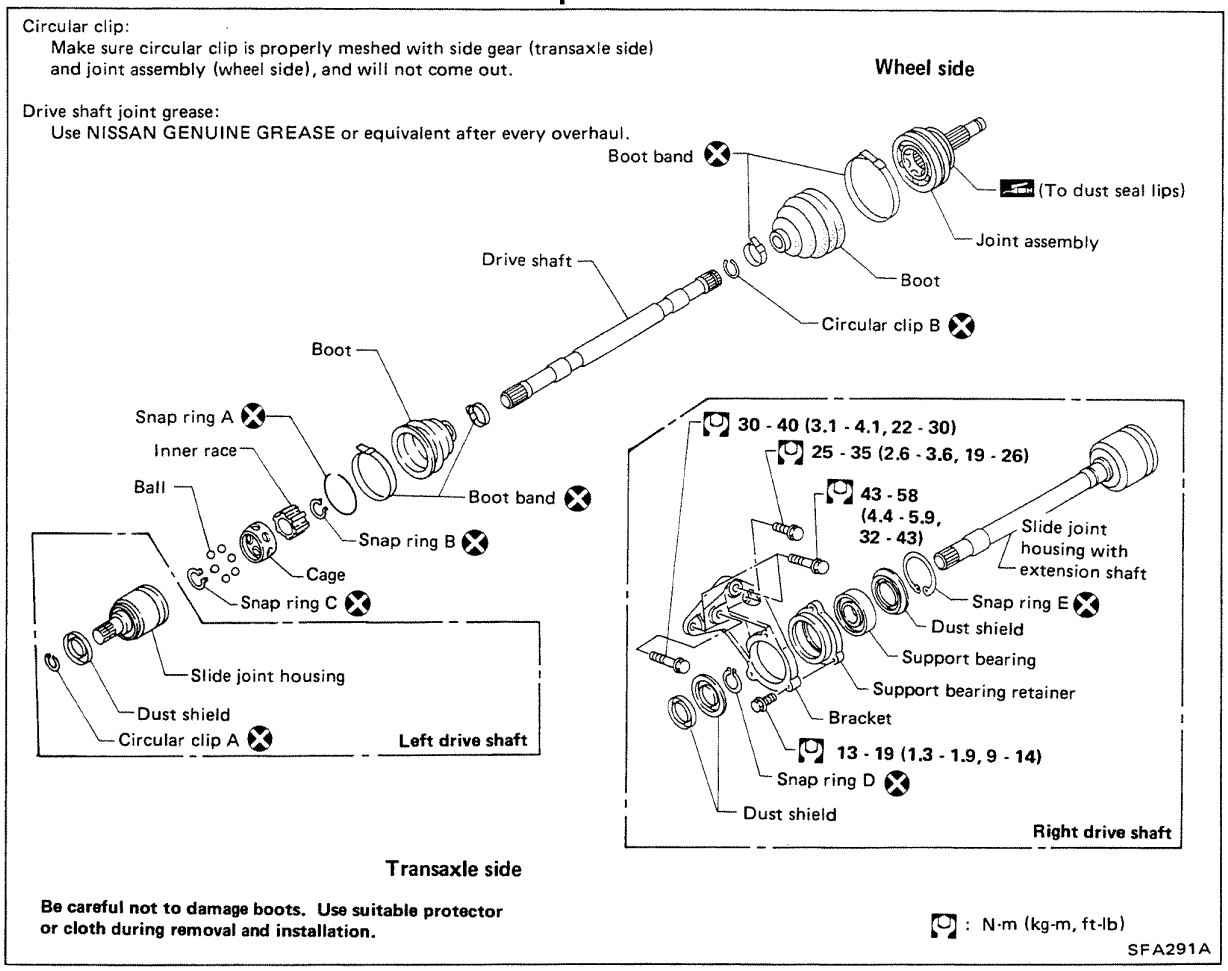
1. Drive a new oil seal to transaxle. Refer to section MT.
2. Set Tool along the inner circumference of oil seal (transaxle side).
3. Insert drive shaft into transaxle, be sure to properly align the serrations and then withdraw Tool.
4. Push drive shaft, then press-fit circular clip on the drive shaft into circular clip groove of side gear.

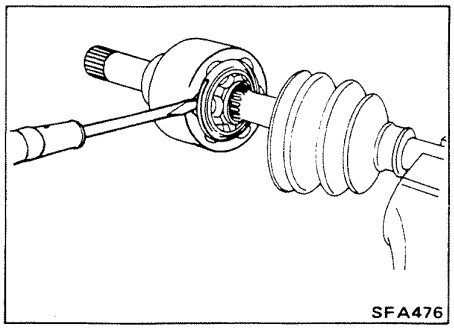
- **After it is inserted, try to pull flange out of slide joint by hand to make sure that circular clip is properly meshed with side gear and will not come out.**

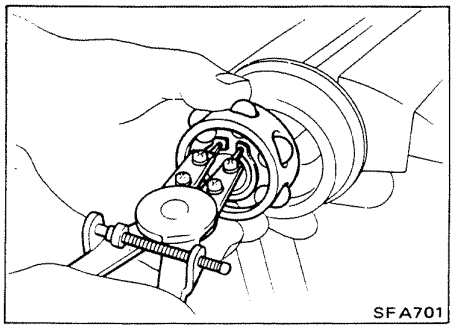
WHEEL SIDE

- Install knuckle to strut assembly.
- Tighten wheel bearing lock nut.

Components







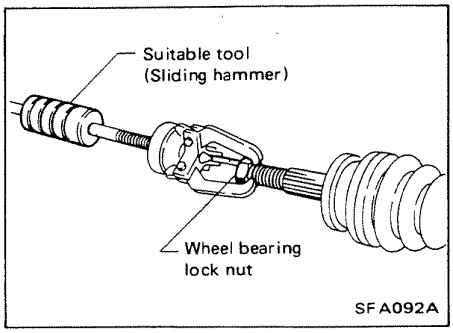
Disassembly

TRANSAXLE SIDE

1. Remove boot bands.
2. Put matching marks on slide joint housing and inner race, before separating joint assembly.
3. Pry off snap ring "A" with a screwdriver, and pull out slide joint housing.
4. Put matching marks on inner race and drive shaft.
5. Pry off snap ring "C", then remove ball cage, inner race and balls as a unit.
6. Pry off snap ring "B".
7. Draw out boot.

Cover drive shaft serration with tape so as not to damage the boot.

Disassembly (Cont'd)



WHEEL SIDE

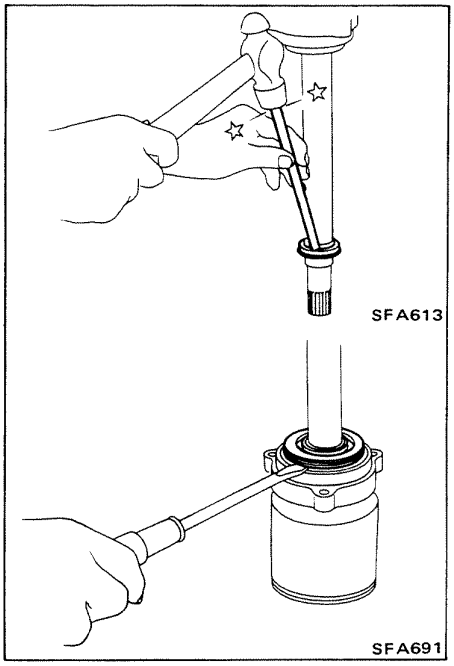
CAUTION:

The joint on the wheel side cannot be disassembled.

- Before separating joint assembly, put matching marks on drive shaft and joint assembly.
- Separate joint assembly with suitable tool.

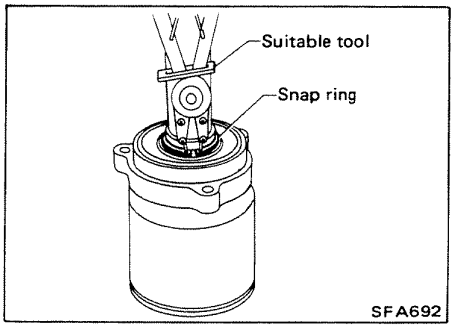
Be careful not to damage threads on drive shaft.

- Remove boot bands.

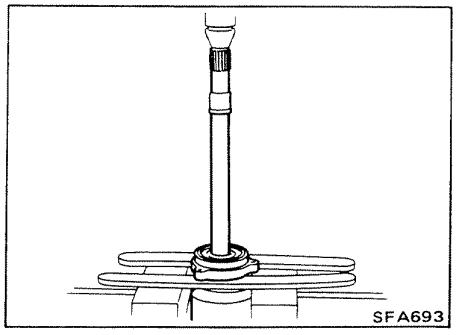


SUPPORT BEARING

- Remove dust shield.

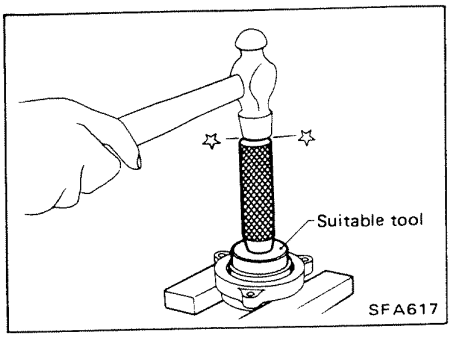


- Pry off snap ring.



- Press support bearing assembly out of drive shaft.

Disassembly (Cont'd)



- Press support bearing out of retainer.

Inspection

Thoroughly clean all parts in cleaning solvent, and dry with compressed air. Check parts for evidence of deformation or other damage.

DRIVE SHAFT

Replace drive shaft if it is twisted or cracked.

BOOT

Check boot for fatigue, cracks, or wear. Replace boot with new boot bands.

JOINT ASSEMBLY (Transaxle side)

- Replace any parts of double offset joint which show signs of scorching, rust, wear or excessive play.
- Check serration for deformation. Replace if necessary.
- Check slide joint housing for any damage. Replace if necessary.

JOINT ASSEMBLY (Wheel side)

Replace joint assembly if it is deformed or damaged.

SUPPORT BEARING

Make sure wheel bearing rolls freely and is free from noise, cracks, pitting or wear.

SUPPORT BEARING BRACKET

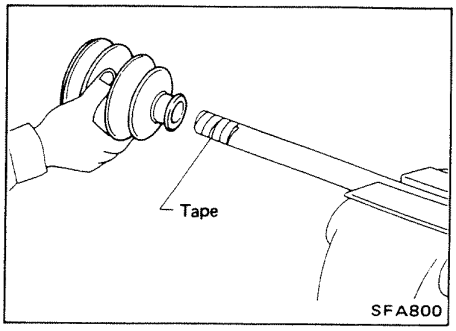
Check support bearing bracket for cracks with a magnetic exploration or dyeing test.

Assembly

- **After drive shaft has been assembled, ensure that it moves smoothly over its entire range without binding.**
- **Use NISSAN GENUINE GREASE or equivalent after every overhaul.**

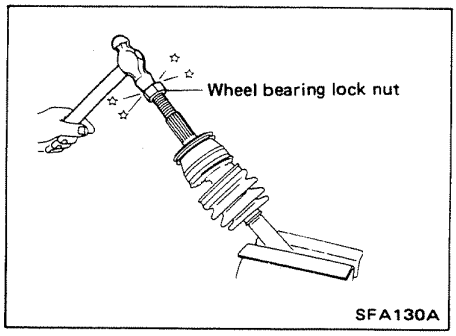
Assembly (Cont'd)

WHEEL SIDE

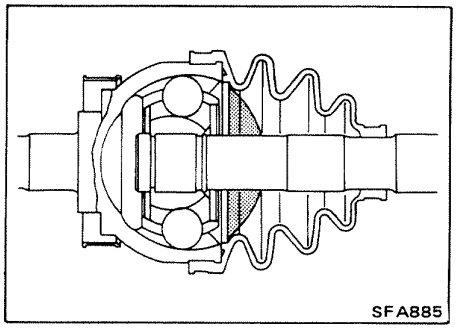


1. Install boot and new small boot band on drive shaft.

Cover drive shaft serration with tape so as not to damage boot during installation.

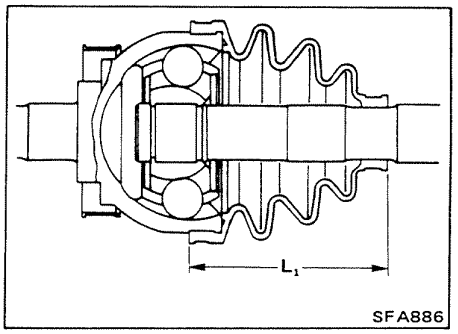


2. Set joint assembly onto drive shaft by lightly tapping it. Install joint assembly securely, ensuring marks which were made during disassembly are properly aligned.



3. Pack drive shaft with specified amount of grease.

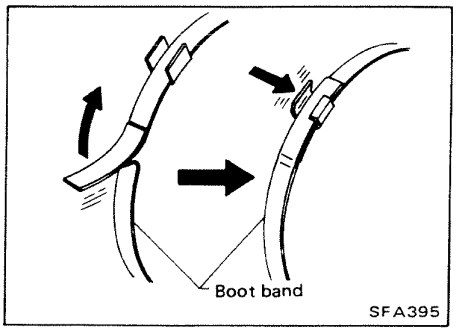
Specified amount of grease:
110 - 130 g (3.88 - 4.59 oz)



4. Set boot so that it does not swell and deform when its length is "L_1".

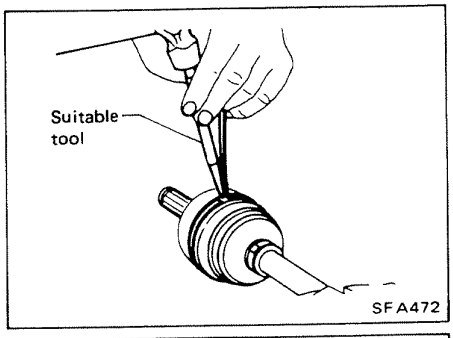
Length "L_1":
99.5 - 101.5 mm (3.917 - 3.996 in)

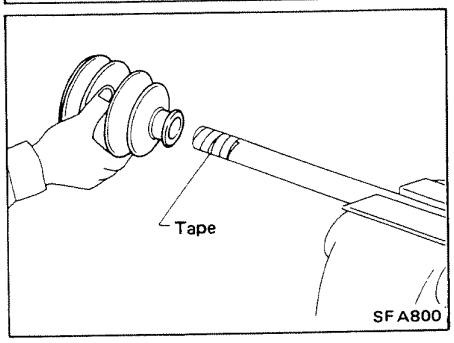
Make sure that boot is properly installed on the drive shaft groove.



5. Lock new larger and smaller boot bands securely with a suitable tool.

Assembly (Cont'd)

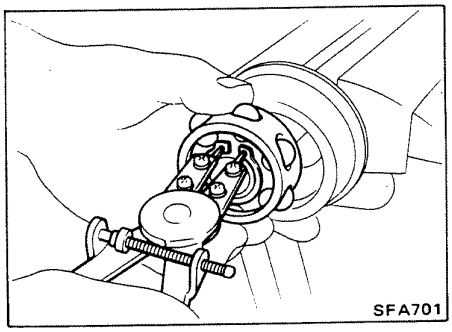




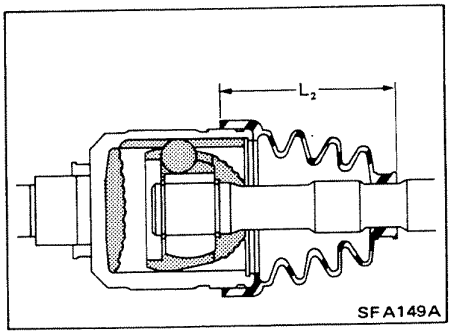
TRANSAXLE SIDE

1. Install boot and new small boot band on drive shaft.

Cover drive shaft serration with tape so as not to damage boot during installation.



2. Install new snap ring "B", then securely install ball cage, inner race and balls as a unit, making sure the marks which were made during disassembly are properly aligned.
3. Install new snap ring "C".



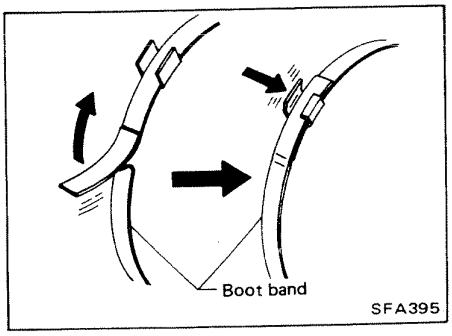
4. Pack drive shaft with specified amount of grease.

Specified amount of grease:
140 - 160 g (4.94 - 5.64 oz)

5. Install slide joint housing, then install new snap ring "A".
6. Set boot so that it does not swell and deform when its length is "L_2".

Length "L_2":
97 - 99 mm (3.82 - 3.90 in)

Make sure that boot is properly installed on the drive shaft groove.

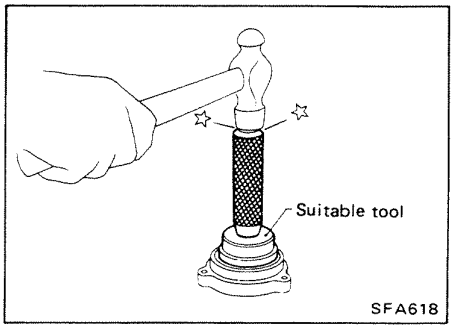


7. Lock new larger and smaller boot bands securely with a suitable tool.

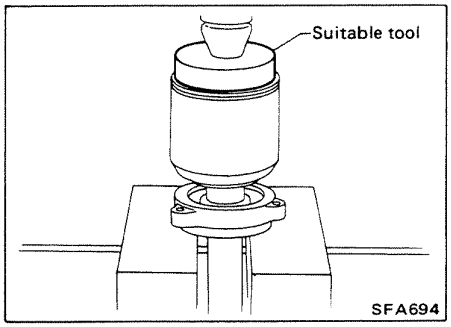
Assembly (Cont'd)

SUPPORT BEARING

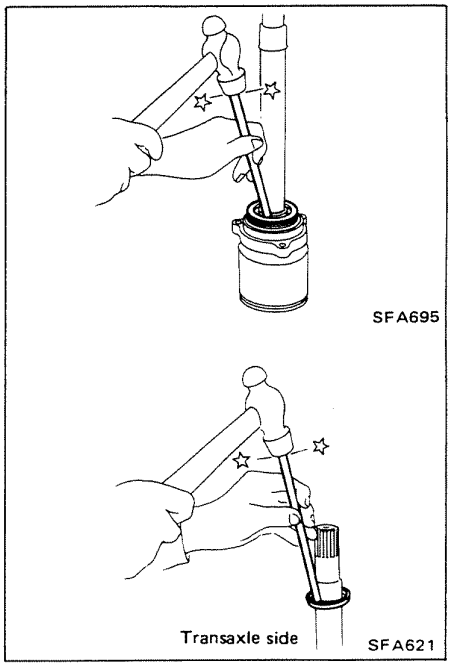
- Press bearing into retainer.



- Press drive shaft into bearing.

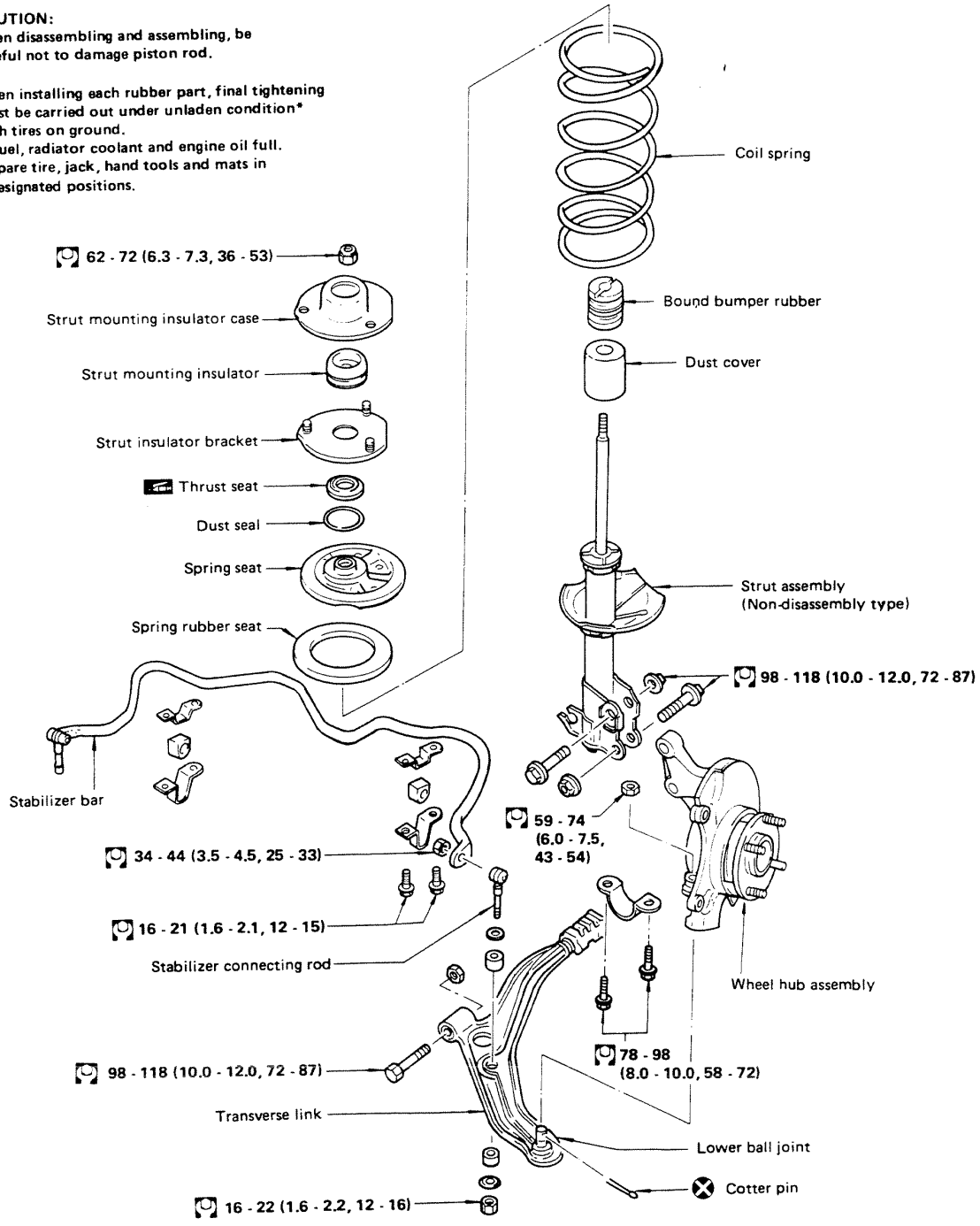


- Install snap ring.
- Install new dust shields.



CAUTION:
When disassembling and assembling, be careful not to damage piston rod.

When installing each rubber part, final tightening must be carried out under unladen condition* with tires on ground.
*** Fuel, radiator coolant and engine oil full. Spare tire, jack, hand tools and mats in designated positions.**



: N·m (kg-m, ft-lb)

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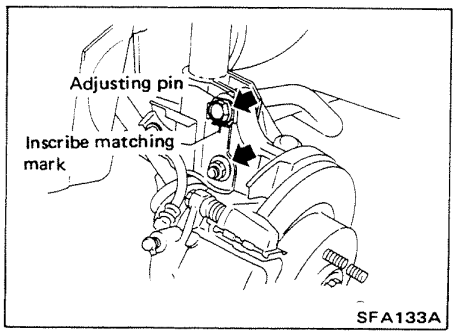
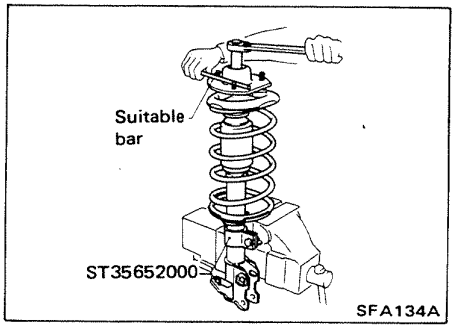


Removal and Installation

- Remove strut assembly fixing bolts and nuts (to hoodledge).

Do not remove piston rod lock nut on vehicle.

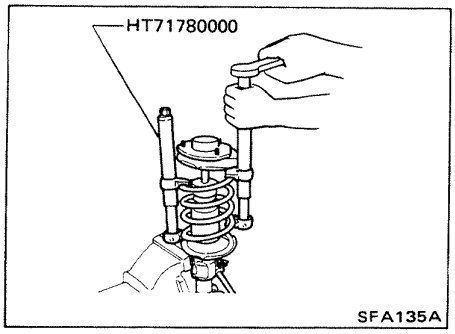
Put matching marks on strut lower bracket and camber adjusting pin.



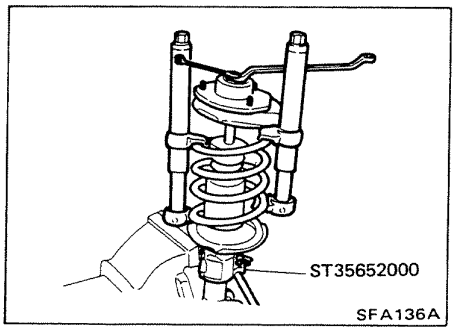
Disassembly

1. Set strut assembly on vise with Tool, then loosen piston rod lock nut.

- **Do not remove piston rod lock nut.**



2. Compress spring with Tool so as to permit turning of strut mounting insulator by hand.



3. Remove piston rod lock nut.

Inspection

STRUT ASSEMBLY

- If oil leakage occurs on welded or gland packing portion, replace strut assembly.
- Inspect piston rod for cracks, deformation or other damage. Replace strut assembly if necessary.
- Inspect threads for cracks or other damage. Replace strut assembly if necessary.

Inspection (Cont'd)

STRUT MOUNTING INSULATOR

Check cemented rubber-to-metal portion for melting or cracks. Check rubber parts for deterioration.

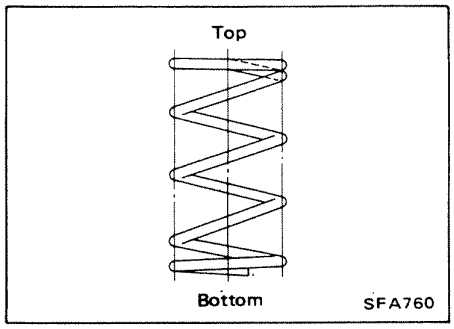
THRUST SEAT

Check for cracks, deformation or other damage. Replace if necessary.

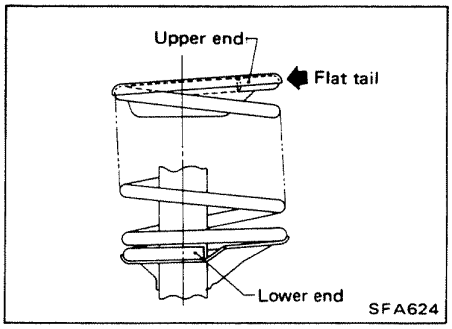
COIL SPRING

Check for cracks, deformation or other damage. Replace if necessary.

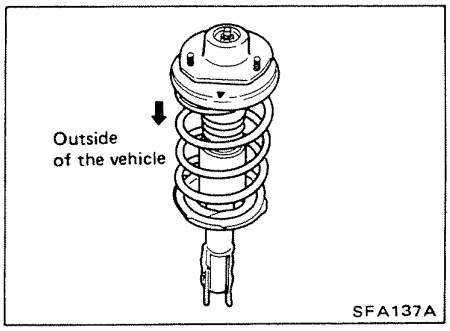
Assembly



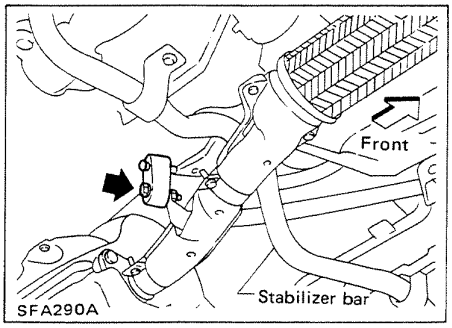
- When installing coil spring, be careful not to reverse top and bottom direction (top end is flat).



- When installing coil spring on strut, it must be positioned as shown.

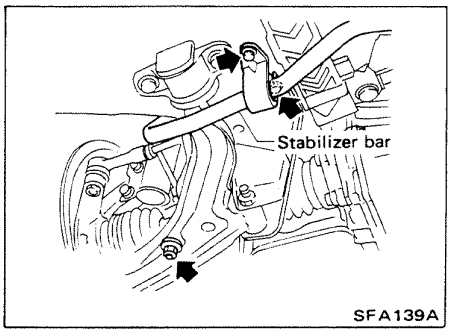


- When installing spring seat, make sure that it is positioned as shown.

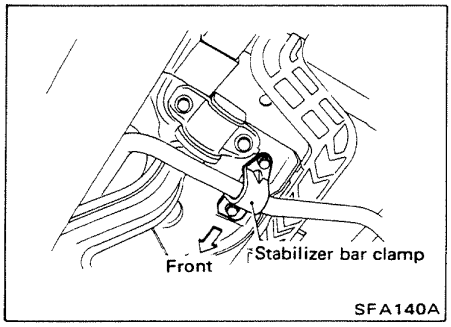


Removal and Installation

- Remove exhaust tube fixing bolts (as shown at left).

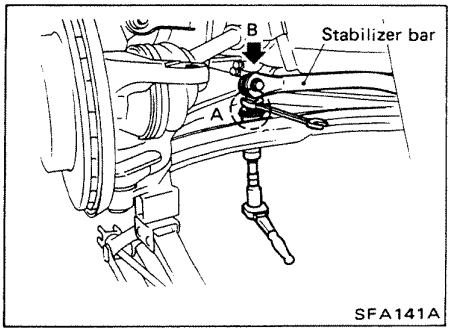


- Remove stabilizer attaching bolts and nuts, then pull out stabilizer pushing down exhaust tube.

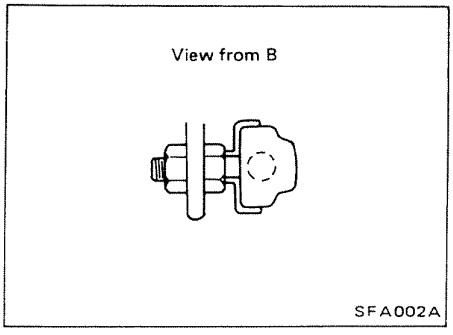


- Install stabilizer rear side bushings, then install front side bushings.

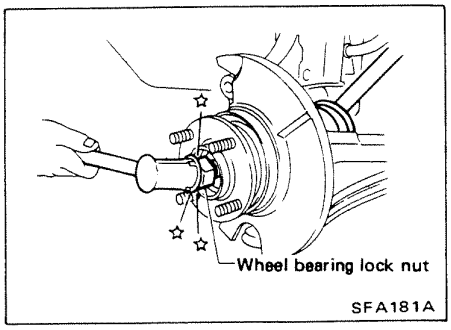
When installing stabilizer bar clamp, make sure direction is correct (as shown at left).



- When removing and installing stabilizer bar, fix portion A.



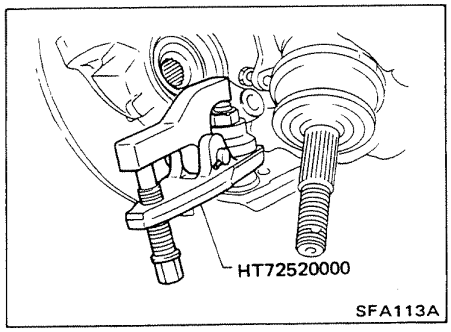
- Install stabilizer bar with ball joint socket properly placed.



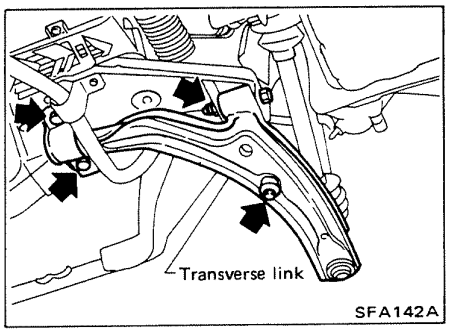
Removal and Installation

1. Remove wheel bearing lock nut.
2. Remove tie-rod ball joint.
3. Remove strut lower bracket fixing bolts and nuts.
4. Separate drive shaft from knuckle by tapping drive shaft end.

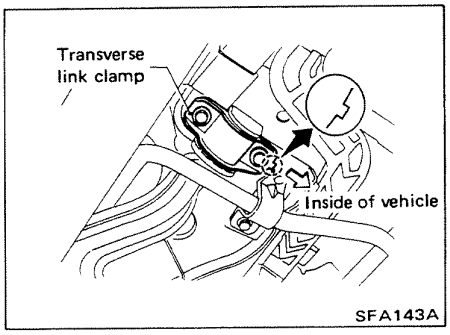
Cover boots with waste cloth so as not to damage them when removing drive shaft.



5. Separate lower ball joint stud from knuckle with Tool.
   Refer to FRONT AXLE – Wheel Hub and Knuckle.



6. Remove bolts and nuts as shown at left.



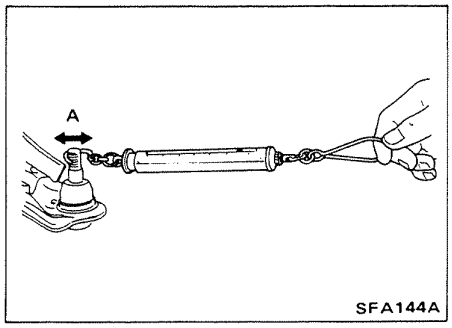
- When installing transverse link clamp, make sure direction is correct.

- When installing, final tightening must be carried out at curb weight with tires on ground.
- After installing, check wheel alignment.
  Refer to CHECK AND ADJUSTMENT – On-vehicle.

Inspection

TRANSVERSE LINK

- Check transverse link for damage, cracks and deformation; replace transverse link if necessary.
- Check rubber bushing for damage, cracks and deformation; replace transverse link if necessary.

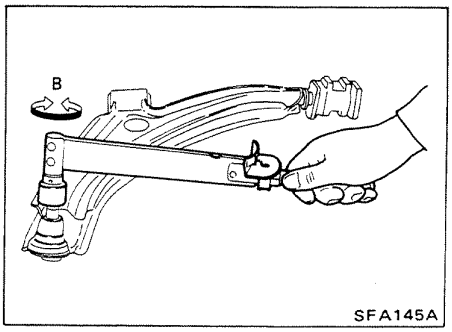


LOWER BALL JOINT

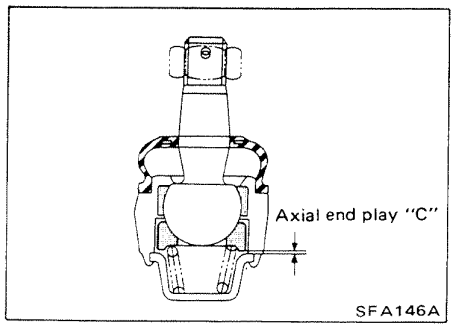
- Check ball joint for play. If ball stud is worn, play in axial direction is excessive or joint is hard to swing, replace transverse link.

Before checking, turn ball joint at least 10 revolutions so that ball joint is properly broken in.

Swing force "A":
(measure point: cotter pin hole of ball stud)
New parts
15.7 - 79.4 N (1.6 - 8.1 kg, 3.5 - 17.9 lb)
Used parts
4.9 - 79.4 N (0.5 - 8.1 kg, 1.1 - 17.9 lb)



Turning torque "B":
New parts
1.0 - 4.9 N·m (10 - 50 kg-cm, 8.7 - 43.4 in-lb)
Used parts
0.3 - 4.9 N·m (3 - 50 kg-cm, 2.6 - 43.4 in-lb)



Axial play "C" under force of approximately
981 N (100 kg, 221 lb)
0.7 mm (0.028 in) or less

General Specifications

COIL SPRING

Wire diameter mm (in) [Left/right]	11.9 (0.469)/12.0 (0.472)
Coil diameter mm (in)	130 (5.12)
Free length [Left/right] mm (in)	328.0 (12.91)/335.0 (13.19)
Spring constant N/mm (kg/mm, lb/in)	21.6 (2.2, 123)
Identification color [Left/right]	Purple x 1/Yellow x 1 Orange x 1/Orange x 1

STRUT

Piston rod diameter mm (in)	18 (0.71)
Stroke mm (in)	161 (6.34)
Damping force N (kg, lb) [at 0.3 m (1.0 ft)/sec.]	
Expansion	922 - 1,236 (94 - 126, 207 - 278)
Compression	255 - 392 (26 - 40, 57 - 88)

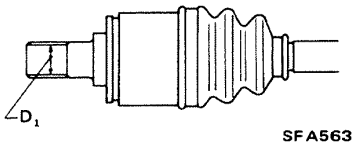
FRONT STABILIZER BAR

Stabilizer diameter mm (in)	28.6 (1.126)

DRIVE SHAFT

Joint type	
Transaxle side	DS86
Wheel side	BF86
Diameter mm (in)	
Transaxle side D_1	26 (1.02)
Wheel side D_2	26 (1.02)
Grease name	
Transaxle side	Nissan genuine grease or equivalent
Wheel side	Nissan genuine grease or equivalent
Capacity g (oz)	
Transaxle side	140 - 160 (4.94 - 5.64)
Wheel side	110 - 130 (3.88 - 4.59)

Transaxle side



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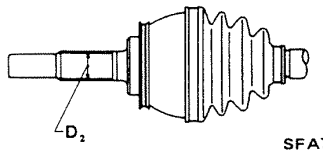
Wheel side



SFA726

Inspection and Adjustment

WHEEL ALIGNMENT (Unladen*)

Camber degree	−1°15′ to 0°15′
Caster degree	1°10′ - 2°40′
Toe-in mm (in)	−1 to 1 (−0.04 to 0.04)
(Total toe-in) degree	−6′ to 6′
Kingpin inclination degree	13°40′ - 15°15′
Front wheel turning angle	
Toe-out turn inside/outside degree	22°24′/20°
Full turn inside/outside degree	36° - 39°/30°

*: Tankful of fuel, radiator coolant and engine oil full. Spare tire, jack, hand tools, mats in designated positions.

WHEEL BEARING

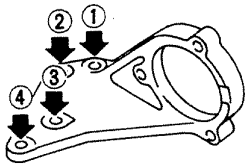
Wheel bearing axial end play mm (in)	0.05 (0.0020) or less
Wheel bearing lock nut Tightening torque N·m (kg-m, ft-lb)	196 - 275 (20 - 28, 145 - 203)

LOWER BALL JOINT

Axial end play [Under force of approximately 981 N (100 kg, 221 lb)] mm (in)	0.7 (0.028) or less
Swing force "A" (Measuring point: cotter pin hole of ball stud)	
New parts N (kg, lb)	15.7 - 79.4 (1.6 - 8.1, 3.5 - 17.9)
Used parts N (kg, lb)	4.9 - 79.4 (0.5 - 8.1, 1.1 - 17.9)
Turning torque "B" N·m (kg-cm, in-lb)	
New parts	1.0 - 4.9 (10 - 50, 8.7 - 43.4)
Used parts	0.3 - 4.9 (3 - 50, 2.6 - 43.4)

Tightening Torque

Item	N·m	kg-m	ft-lb
Strut assembly			
Piston rod self-locking nut	62 - 72	6.3 - 7.3	46 - 53
Strut to body	25 - 29	2.5 - 3.0	18 - 22
Strut to knuckle	98 - 118	10 - 12	72 - 87
Brake tube flare nut	15 - 18	1.5 - 1.8	11 - 13
Lower ball joint			
Stud nut	59 - 74	6.0 - 7.5	43 - 54
Tie rod			
Lock nut	37 - 46	3.8 - 4.7	27 - 34
Stud nut	29 - 39	3 - 4	22 - 29
Transverse link			
Securing bolt	78 - 98	8 - 10	58 - 72
Securing nut	98 - 118	10 - 12	72 - 87
Axle			
Wheel bearing lock nut	196 - 275	20 - 28	145 - 203
Caliper	54 - 64	5.5 - 6.5	40 - 47
Wheel nut	98 - 118	10 - 12	72 - 87
Stabilizer bar			
Stabilizer bar clamp to body	16 - 21	1.6 - 2.1	12 - 15
Connecting rod to transverse link	16 - 21	1.6 - 2.2	12 - 15
Stabilizer bar to ball joint	34 - 44	3.5 - 4.5	25 - 33
Front axle support bearing bracket			
To retainer	13 - 19	1.3 - 1.9	9 - 14
To engine			



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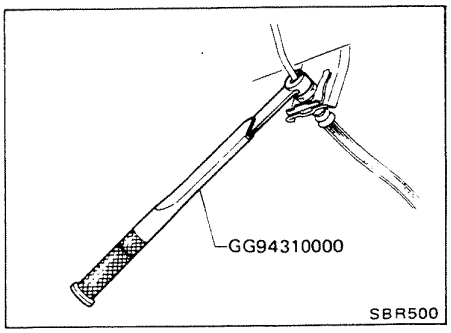
No. 1	25 - 35	2.6 - 3.6	19 - 26
No. 2, 4	43 - 58	4.4 - 5.9	32 - 43
No. 3	30 - 40	3.1 - 4.1	22 - 30

REAR AXLE & REAR SUSPENSION

SECTION **RA**

CONTENTS



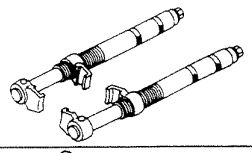
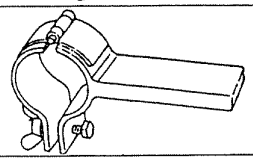
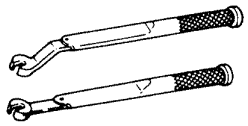
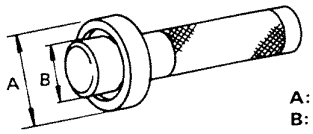
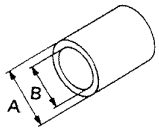
Precautions

(1) When installing each rubber part, final tightening must be carried out under unladen condition* with tires on ground.
  * Fuel, radiator coolant and engine oil full. Spare tire, jack, hand tools, and mats in designated positions.
(2) When removing each suspension part, check wheel alignment and adjust if necessary.
(3) Use Tool when removing or installing brake tubes.
(4) Do not jack up at the parallel links.

Preparation

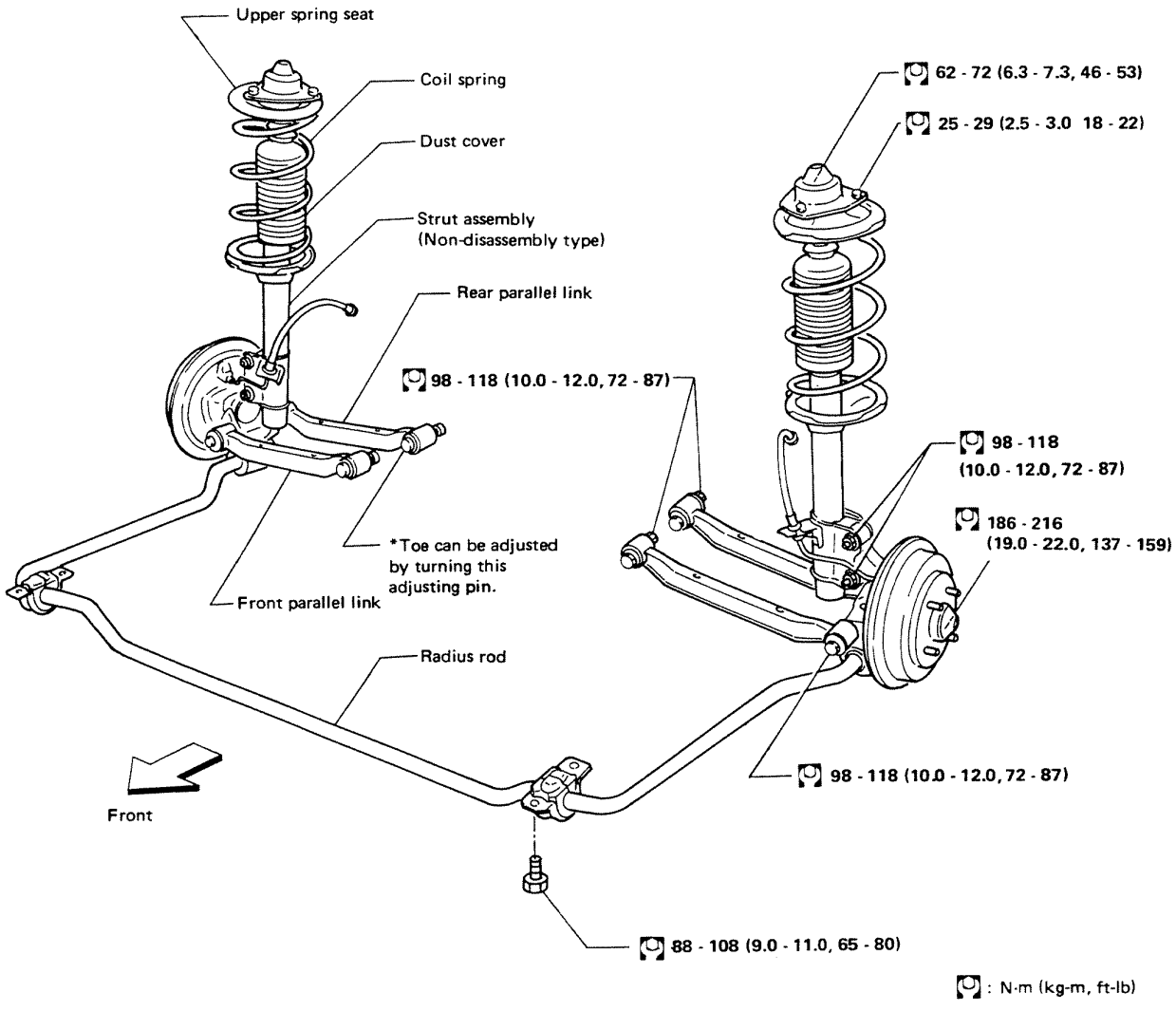
SPECIAL SERVICE TOOLS

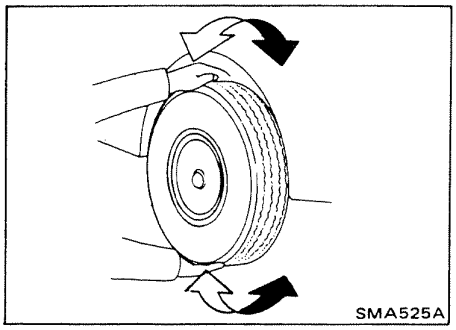
*: Special tools or commercial equivalent

Tool number Tool name	Description	
HT71780000* Spring compressor		Removing and installing coil spring
ST35652000* Strut attachment		Fixing strut assembly
GG94310000* Flare nut torque wrench		Removing and installing brake piping
ST33220000* Diff. side bearing drift	 A: 37 mm (1.46 in) dia. B: 22 mm (0.87 in) dia.	Removing wheel bearing
ST33200000* Diff. side bearing drift	 A: 60 mm (2.36 in) dia. B: 44.5 mm (1.752 in) dia.	Installing wheel bearing

CAUTION:
Do not jack up at the parallel links.
Wheel alignment
- **Camber cannot be adjusted.**
- **Vehicle requires only toe-in adjustment.**
  −1.5 to 2.5 mm (−0.059 to 0.098 in)
  −9' to 15' (Total toe-in)

Wheel bearing
- **Tightening torque: 186 - 216 N·m (19.0 - 22.0 kg-m, 137 - 159 ft-lb)**
- **Axial end play: 0.05 mm (0.0020 in) or less**

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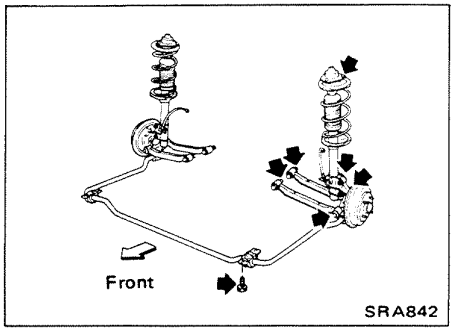
Rear Axle and Rear Suspension Parts

- Check axle and suspension parts for looseness, wear or damage.

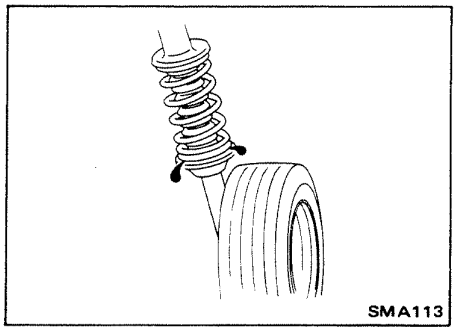
(1) Shake each rear wheel.



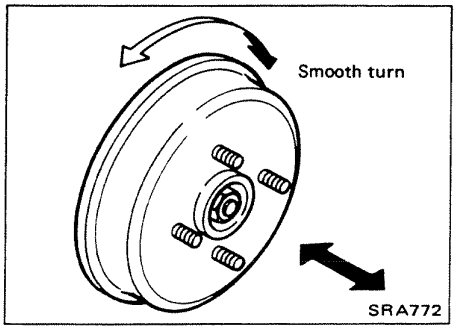
SRA842

(2) Retighten all nuts and bolts to the specified torque.

Tightening torque: Refer to S.D.S.


SMA113

(3) Check strut (shock absorber) for oil leakage or other damage.



SRA772

Rear Wheel Bearing

- Check tightening torque of wheel bearing lock nut.

  ⊡ : **186 - 216 N·m (19 - 22 kg-m, 137 - 159 ft-lb)**

- Check that wheel bearings operate smoothly.
- Check axial end play.

Axial end play:
0.05 mm (0.0020 in) or less

If there is any axial end play or wheel bearing does not turn smoothly, replace wheel bearing assembly.

Refer to REAR AXLE-Wheel Hub and Knuckle Spindle.

Rear Wheel Alignment

PRELIMINARY INSPECTION

Make following checks. Adjust, repair or replace if necessary.

- Check tires for wear and proper inflation.
- Check rear wheel bearings for looseness.
- Check wheel runout.

Lateral runout (Total indicator reading):
1.0 mm (0.039 in) or less

- Check if rear strut (shock absorber) works properly.
- Check rear axle and rear suspension parts for looseness.

Rear Wheel Alignment (Cont'd)

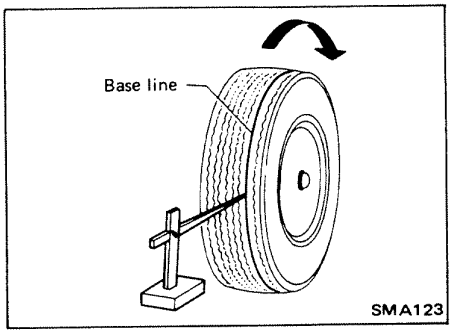
- Check vehicle posture (Unladen).
  "Unladen":
  Fuel tank, radiator and engine oil full. Spare tire, jack, hand tools and mats in designated positions.

CAMBER

Camber is preset at factory and cannot be adjusted.

Camber: −2°00′ to −0°30′

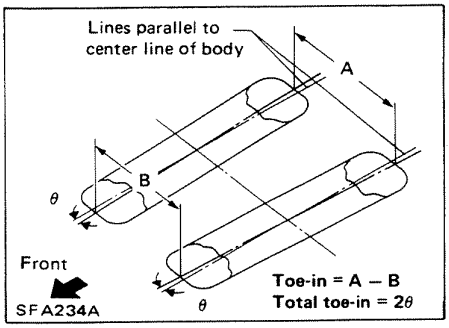
If the camber is not within specification, inspect and replace any damaged or worn rear suspension parts.



TOE-IN

1. Mark a base line across the tread.

After lowering rear of vehicle, move it up and down to eliminate friction.



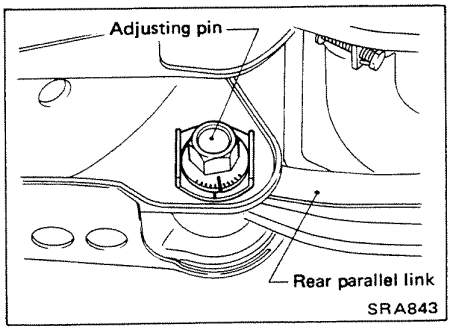
2. Measure toe-in.

Measure distance "A" and "B" at the same height as hub center.

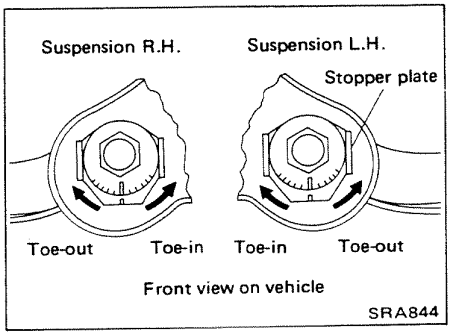
Toe-out:

A − B: −1.5 to 2.5 mm (−0.059 to 0.098 in)

2θ: −9′ to 15′



3. Adjust toe-in by turning adjusting pins.



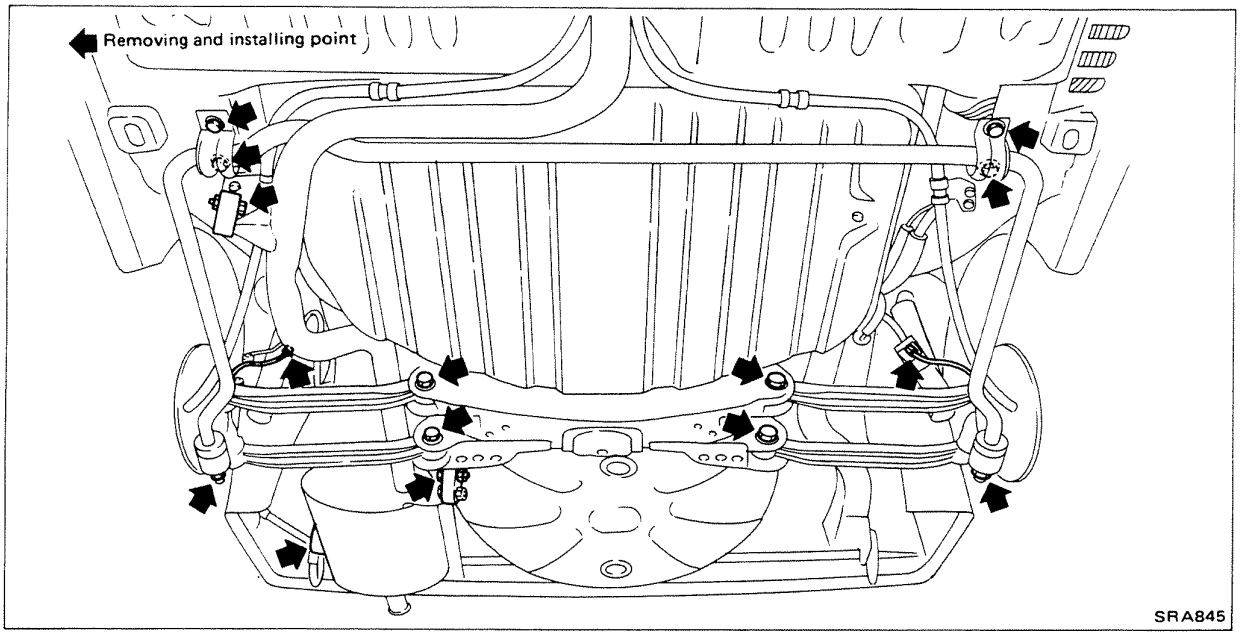
NOTE:

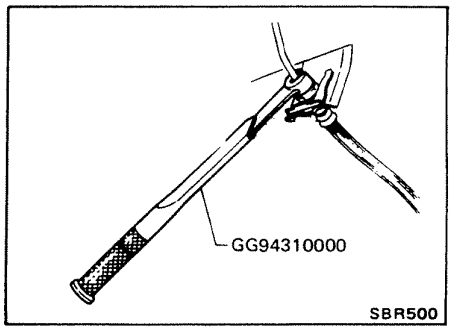
Toe changes about 2 mm (0.08 in) [One side] with each graduation of the pin.

4. Tighten to the specified torque.

: 98 - 118 N·m
(10.0 - 12.0 kg-m, 72 - 87 ft-lb)

Removal and Installation



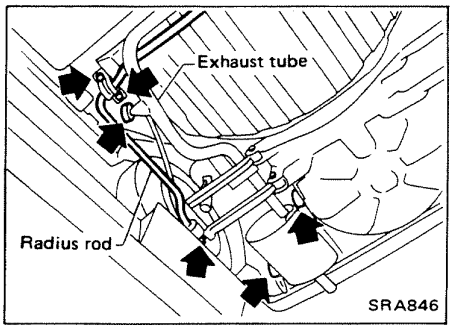


CAUTION:

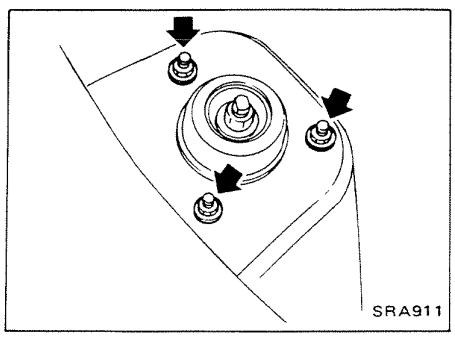
Do not jack up at the parallel links.

1. Disconnect brake hydraulic line and parking brake cable at equalizer.

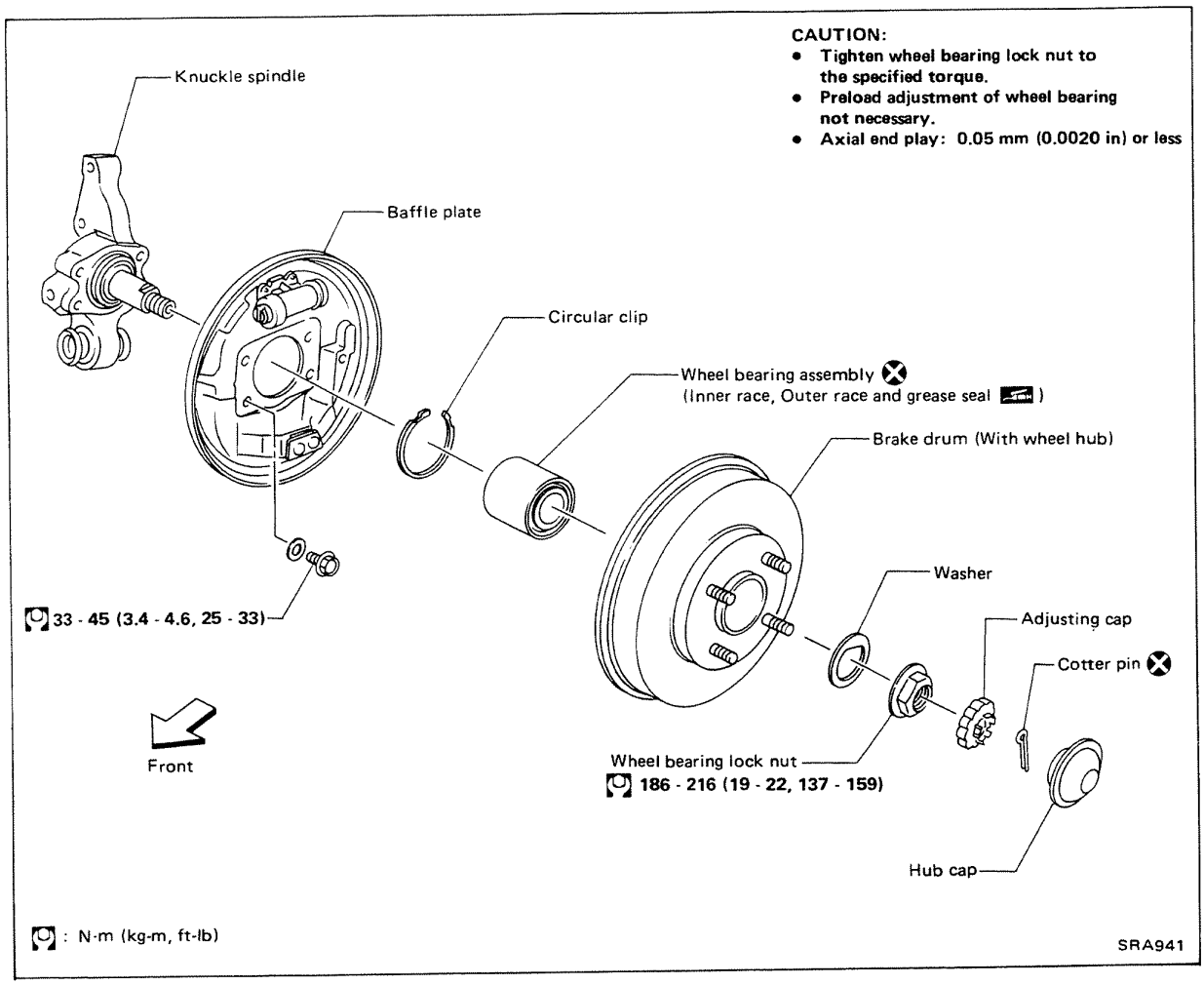
Use Tool when removing or installing brake tubes.

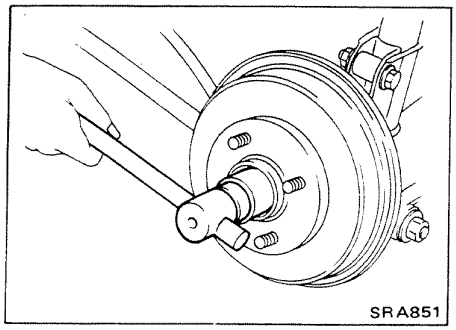


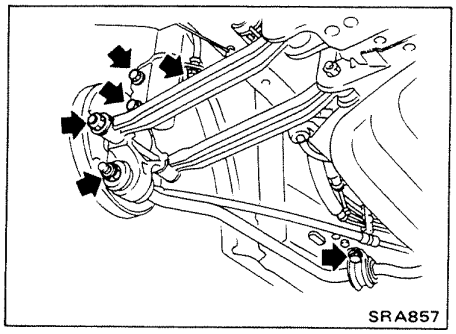
2. Remove exhaust tube fixing bolts.
3. Remove radius rod fixing bolts, then pull out radius rod pushing down exhaust tube.



- Remove upper end nut of shock absorber.


CAUTION:
• Tighten wheel bearing lock nut to the specified torque.
• Preload adjustment of wheel bearing not necessary.
• Axial end play: 0.05 mm (0.0020 in) or less
Knuckle spindle
Baffle plate
Circular clip
Wheel bearing assembly
(Inner race, Outer race and grease seal)
Brake drum (With wheel hub)
Washer
Adjusting cap
Cotter pin
Wheel bearing lock nut
186 - 216 (19 - 22, 137 - 159)
33 - 45 (3.4 - 4.6, 25 - 33)
Front
Hub cap
: N·m (kg-m, ft-lb)
SRA941


SRA851


SRA857

Removal and Installation

WHEEL HUB

- Remove wheel bearing lock nut.
- Remove brake drum (with wheel hub) with wheel bearing from knuckle spindle.

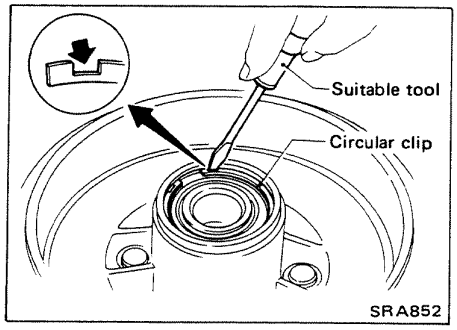
- After installing, check wheel bearing.
  Refer to Rear Wheel Bearing in CHECK AND ADJUSTMENT – On-vehicle.

KNUCKLE SPINDLE

- Disconnect brake hydraulic line and parking brake cable.

Use Tool (GG94310000) when removing or installing brake tubes.

- Remove bolts and nuts as shown.



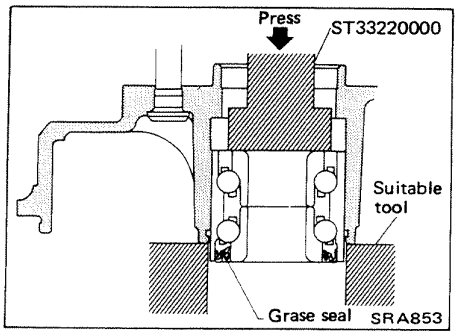
SRA852

Disassembly

CAUTION:

When removing wheel bearing from wheel hub, replace wheel bearing assembly (outer race, inner race and grease seal) with a new one.

- Remove circular clip with suitable tool.



SRA853

- Press out wheel bearing.

Inspection

WHEEL HUB

- Check wheel hub for any cracks by using a magnetic exploration or dyeing test.

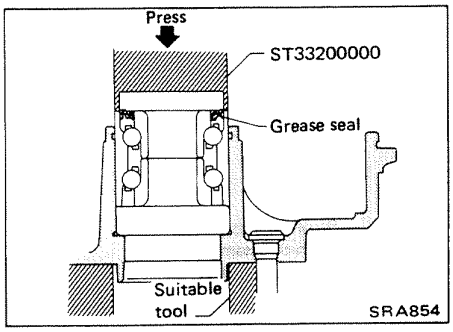
CIRCULAR CLIP

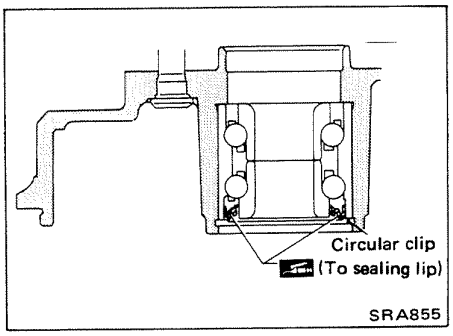
- Check circular clip for wear or cracks.
  Replace if necessary

Inspection (Cont'd)

KNUCKLE SPINDLE

- Check knuckle spindle for deformation, tapping mark or cracks (by magnetic or dyeing test) and replace if damaged.





Assembly

1. Press new wheel bearing assembly into wheel hub from inside of brake drum (with wheel hub).

   Maximum load P:

   29 kN (3 ton, 3.3 US ton, 3.0 Imp ton)

CAUTION:

Do not press inner race of wheel bearing assembly.

Do not apply oil or grease to mating surfaces of wheel bearing outer race and wheel hub.

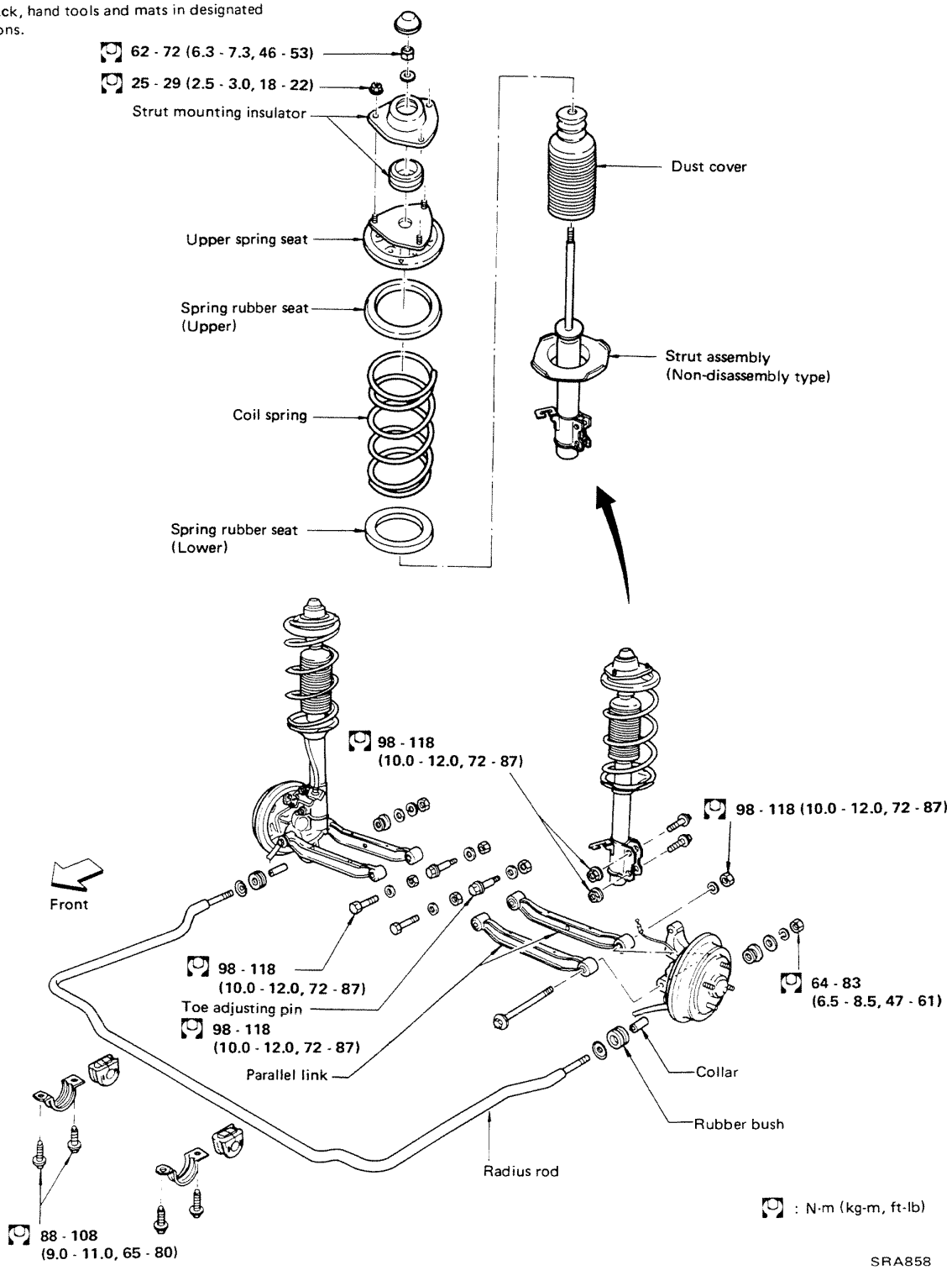
Be careful not to damage grease seal.

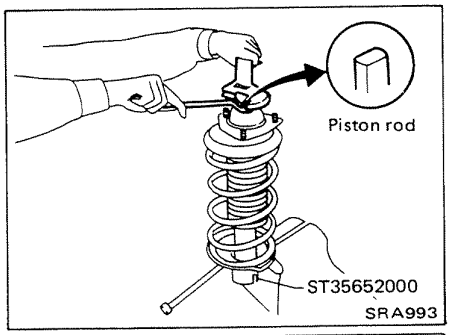
2. Install circular clip into groove of wheel hub.
3. Apply multi-purpose grease to sealing lip.

CAUTION:
Do not jack up at the parallel links.

When installing each rubber part, final tightening must be carried out under unladen condition* with tires on ground.

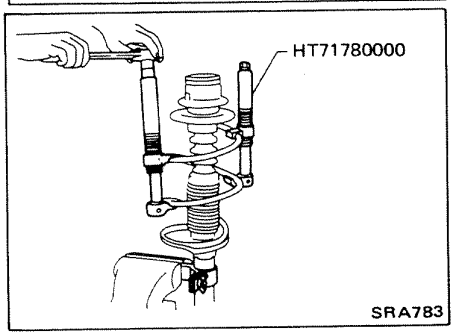
* Fuel, radiator coolant and engine oil full. Spare tire, jack, hand tools and mats in designated positions.



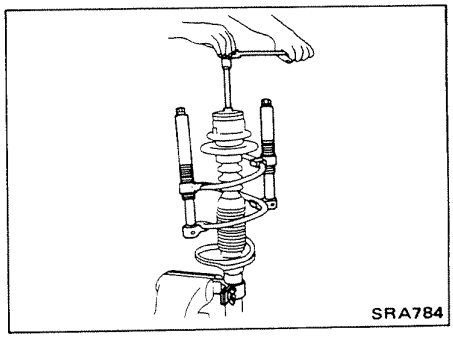


Disassembly

1. Set strut assembly on vice with attachment, then loosen piston rod lock nut.
- **Do not remove piston rod lock nut.**



2. Compress spring with suitable tool so that the strut mounting insulator can be turned by hand.



3. Remove piston rod lock nut.

Inspection

STRUT ASSEMBLY

- If oil leakage occurs on welded or gland packing portion, replace strut assembly.
- Inspect piston rod for cracks, deformation or other damage. Replace strut assembly if necessary.
- Inspect threads for cracks or other damage. Replace strut assembly if necessary.

STRUT MOUNTING INSULATOR

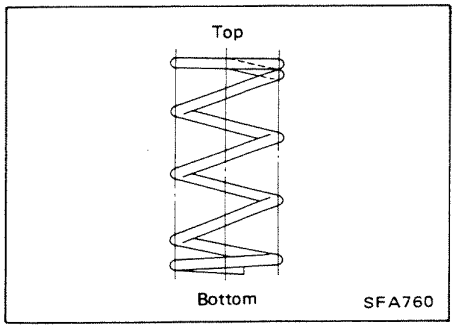
Check cemented rubber-to-metal portion for melting or cracks. Check rubber parts for deterioration.

SPRING SEAT

Check for cracks, deformation or other damage. Replace if necessary.

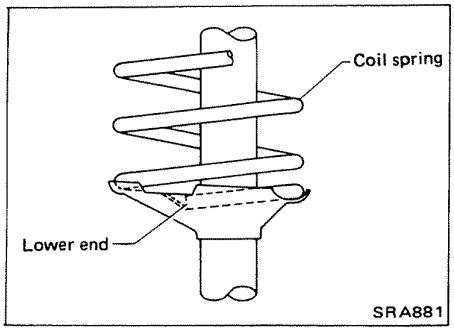
COIL SPRING

Check for cracks, deformation or other damage. Replace if necessary.

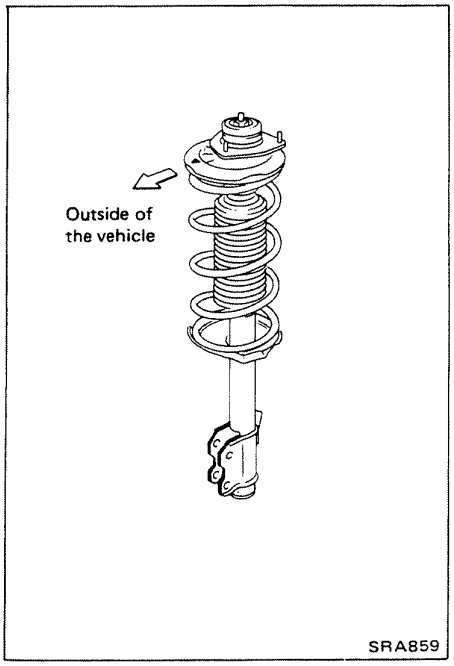


Assembly

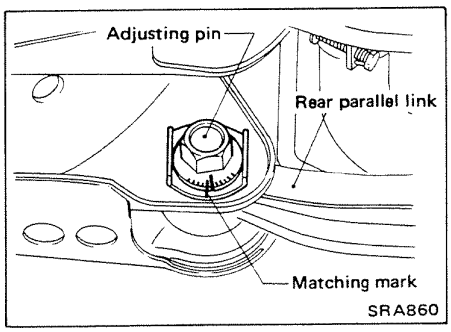
- When installing coil spring, be careful not to reverse top and bottom direction (top end is flat).

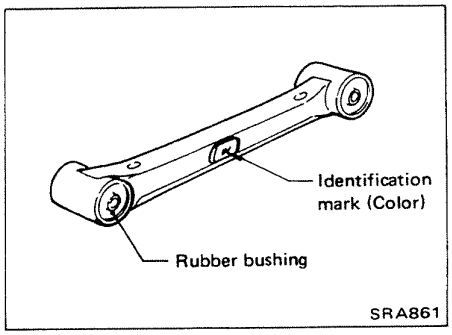


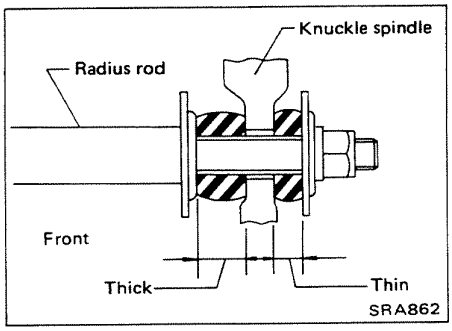
- When installing coil spring on strut, it must be positioned as shown.

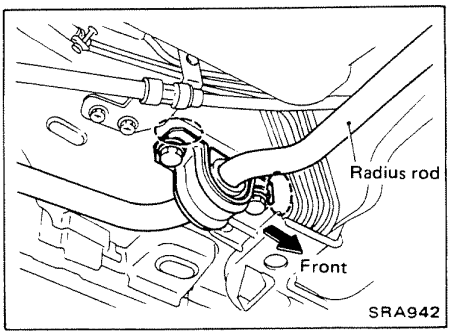


- When installing upper spring seat, make sure that it is positioned as shown.









Removal and Installation

- Refer to Removal and Installation in REAR AXLE AND REAR SUSPENSION ASSEMBLY.

PARALLEL LINK

Before removing parallel link fixing bolts, make a toe adjusting-pin matching mark.

- When installing, confirm identification mark (Color) on parallel link.

Parallel link	Identification mark (Color)	Parts number of rubber bushing
Front	Green	55157 50A00
Rear	Blue	55157 80M00

RADIUS ROD

- When installing each rubber bushing, pay attention to their positions.

- When installing radius rod clamps, pay attention to their direction.

Inspection

- Check parallel link and radius rod for cracks, distortion or other damage.
- Check rubber bushing for cracks, distortion or other damage.

General Specifications

COIL SPRING

Wire diameter	mm (in)	9.5 - 11.4 (0.374 - 0.449)
Coil diameter	mm (in)	130 (5.12)
Free length	mm (in)	311.5 (12.26)
Spring constant	N/mm (kg/mm, lb/in)	15.6 - 25.5 (1.59 - 2.60, 89.0 - 145.6)
Identification color		Yellow x 1 Pink x 1

STRUT

Piston rod diameter	mm (in)	18 (0.71)
Stroke	mm (in)	226.5 (8.92)
Damping force [at 0.3 m (1.0 ft)/sec.]	N (kg, lb)	
Expansion		490 - 686 (50 - 70, 110 - 154)
Compression		226 - 363 (23 - 37, 51 - 82)

Inspection and Adjustment

WHEEL ALIGNMENT (Unladen*1)

Item \ Model		All
Camber	degree	−2°00′ to −0°30′
Toe-in		
	mm (in)	−1.5 to 2.5 (−0.059 to 0.098)
	(Total) degree	−9′ to 15′

*1: Tankful of fuel, radiator coolant and engine oil full.
Spare tire, jack, hand tools, mats in designated positions.

WHEEL BEARING

Wheel bearing axial end play mm (in)	0.05 (0.0020) or less
Wheel bearing lock nut Tightening torque N·m (kg-m, ft-lb)	186 - 216 (19 - 22, 137 - 159)

Tightening Torque

	N·m	kg-m	ft-lb
Wheel nut	98 - 118	10 - 12	72 - 87
Brake tube flare nut	15 - 18	1.5 - 1.8	11 - 13
Wheel bearing lock nut	186 - 216	19 - 22	137 - 159
Strut assembly			
Piston rod self-locking nut	62 - 72	6.3 - 7.3	46 - 53
Strut to body	25 - 29	2.5 - 3.0	18 - 22
Strut to knuckle	98 - 118	10 - 12	72 - 87
Parallel link			
Parallel link to suspension member	98 - 118	10 - 12	72 - 87
Parallel link to knuckle	98 - 118	10 - 12	72 - 87
Radius rod			
Radius rod to knuckle	64 - 83	6.5 - 8.5	47 - 61
Radius rod bracket to body	88 - 108	9 - 11	65 - 80

BRAKE SYSTEM

SECTION BR

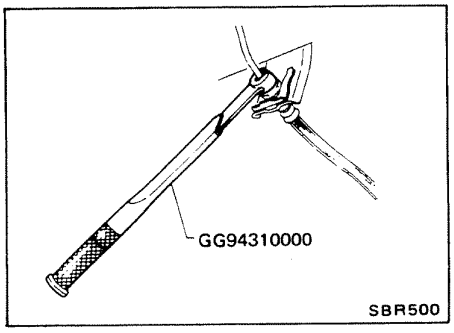
CONTENTS

Precautions

- Recommended fluid is brake fluid "DOT 3".
- Never reuse drained brake fluid.
- Be careful not to splash brake fluid on painted areas.
- To clean or wash all parts of master cylinder, disc brake caliper and wheel cylinder, use clean brake fluid.
- Never use mineral oils such as gasoline or kerosene. They will ruin the rubber parts of the hydraulic system.

WARNING:

- Clean pad and shoe dust using a dust collector after cleaning with waste cloth.

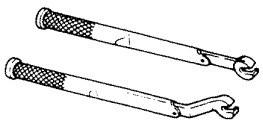


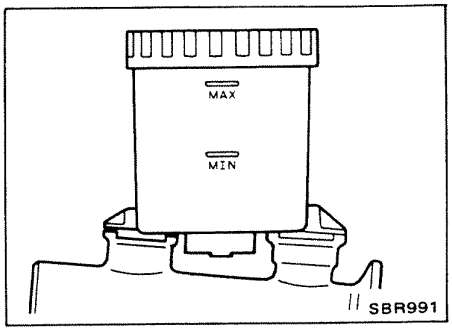
- Use Tool when removing and installing brake tube.

Preparation

SPECIAL SERVICE TOOL

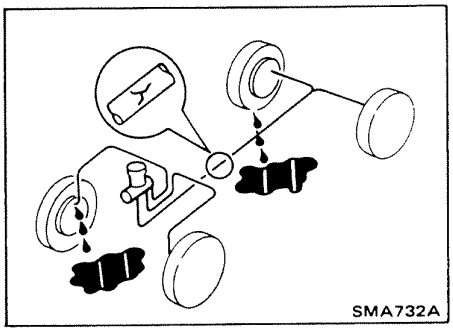
*: Special tool or a commercial equivalent

Tool number Tool name	Description	
GG94310000* Flare nut torque wrench		Removing and installing each brake piping



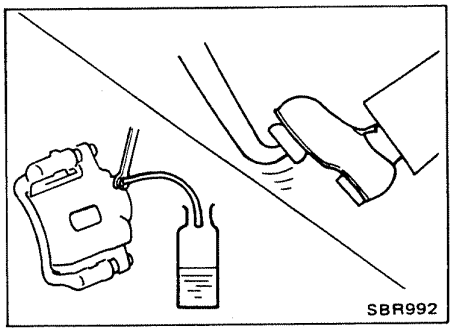
Checking Brake Fluid Level

- Check fluid level in reservoir tank. It should be between Max. and Min. lines on reservoir tank.
- If fluid level is extremely low, check brake system for leaks.



Checking Brake System

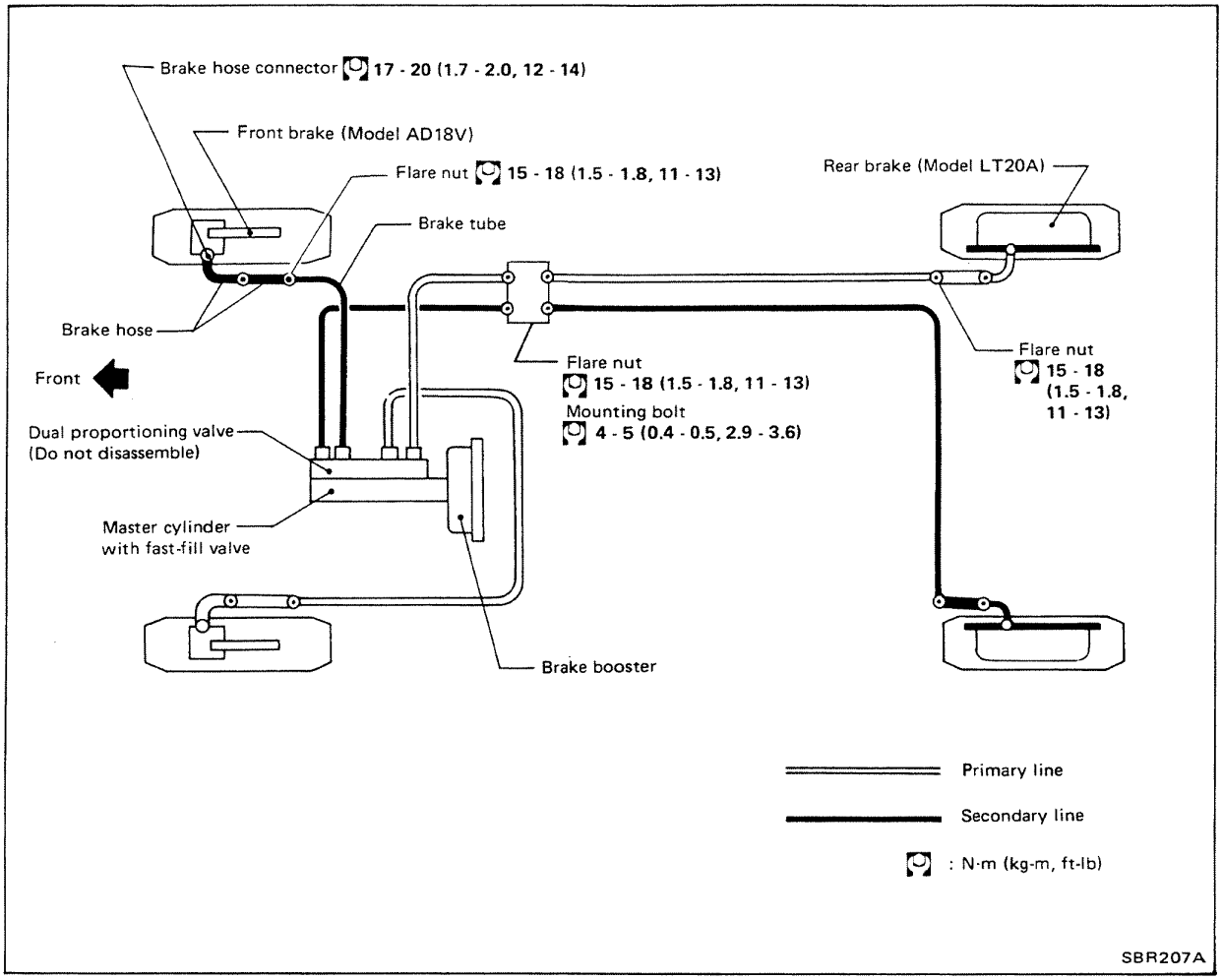
- Check brake lines (tubes and hoses) for evidence of cracks, deterioration or other damage. Replace any damaged parts.
  If leakage occurs around joints, retighten or, if necessary, replace damaged parts.
- Be sure to check for oil leakage by fully depressing brake pedal.

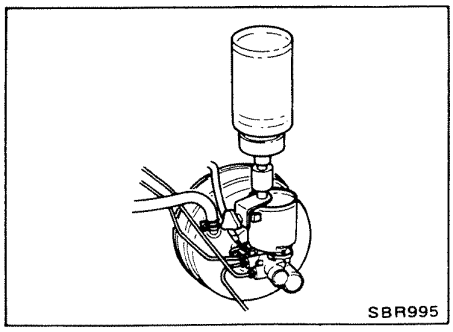


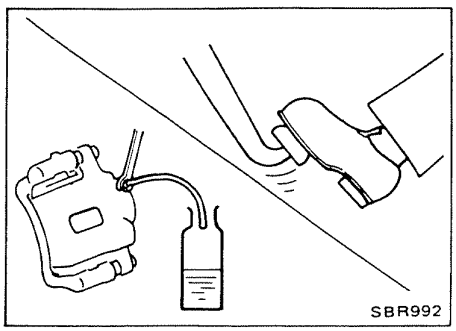
Changing Brake Fluid

1. Drain brake fluid using each air bleeder valve.
2. Refill until new brake fluid comes out of each air bleeder valve.
   Use same procedure as in bleeding hydraulic system to refill brake fluid.
   Refer to Bleeding Procedure.

- **Refill with recommended brake fluid "DOT 3".**
- **Never reuse drained brake fluid.**
- **Be careful not to splash brake fluid on painted areas.**







Bleeding Sequence

CAUTION:

- **Carefully monitor brake fluid level at master cylinder during bleeding operation.**
- **Fill reservoir with recommended brake fluid, and make sure it is kept full at all times while bleeding air out of system.**
- **Place a container beneath master cylinder to avoid spillage of brake fluid.**

- Bleed air according to the following procedure:
  Left rear wheel cylinder → Right front caliper → Right rear wheel cylinder → Left front caliper

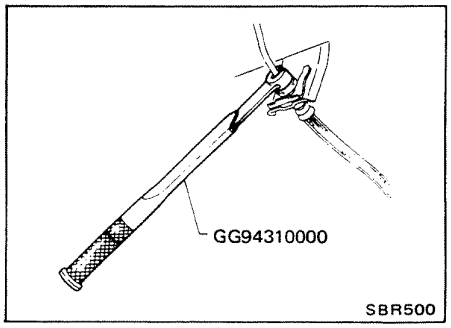
Bleeding Procedure

- **To bleed air out of master cylinder, use the following procedure.**

1) Connect a transparent vinyl tube to air bleeder valve.
2) Fully depress brake pedal several times.
3) With brake pedal depressed, open air bleeder valve to release air.
4) Close air bleeder valve.
5) Release brake pedal slowly.
6) **Wait 5 seconds.**
7) Repeat steps 2) through 6) until clear brake fluid comes out of air bleeder valve.

- **To bleed air out of lines, wheel cylinders and calipers, use the following procedure.**

1) Connect a transparent vinyl tube to air bleeder valve.
2) Fully depress brake pedal several times.
3) With brake pedal depressed, open air bleeder valve to release air.
4) Close air bleeder valve.
5) Release brake pedal slowly.
6) Repeat steps 2) through 5) until clear brake fluid comes out of air bleeder valve.



Removal and Installation

CAUTION:

a. **Use Tool when removing and installing brake tube.**

b. **Cover openings to prevent entrance of dirt whenever disconnecting hydraulic line.**

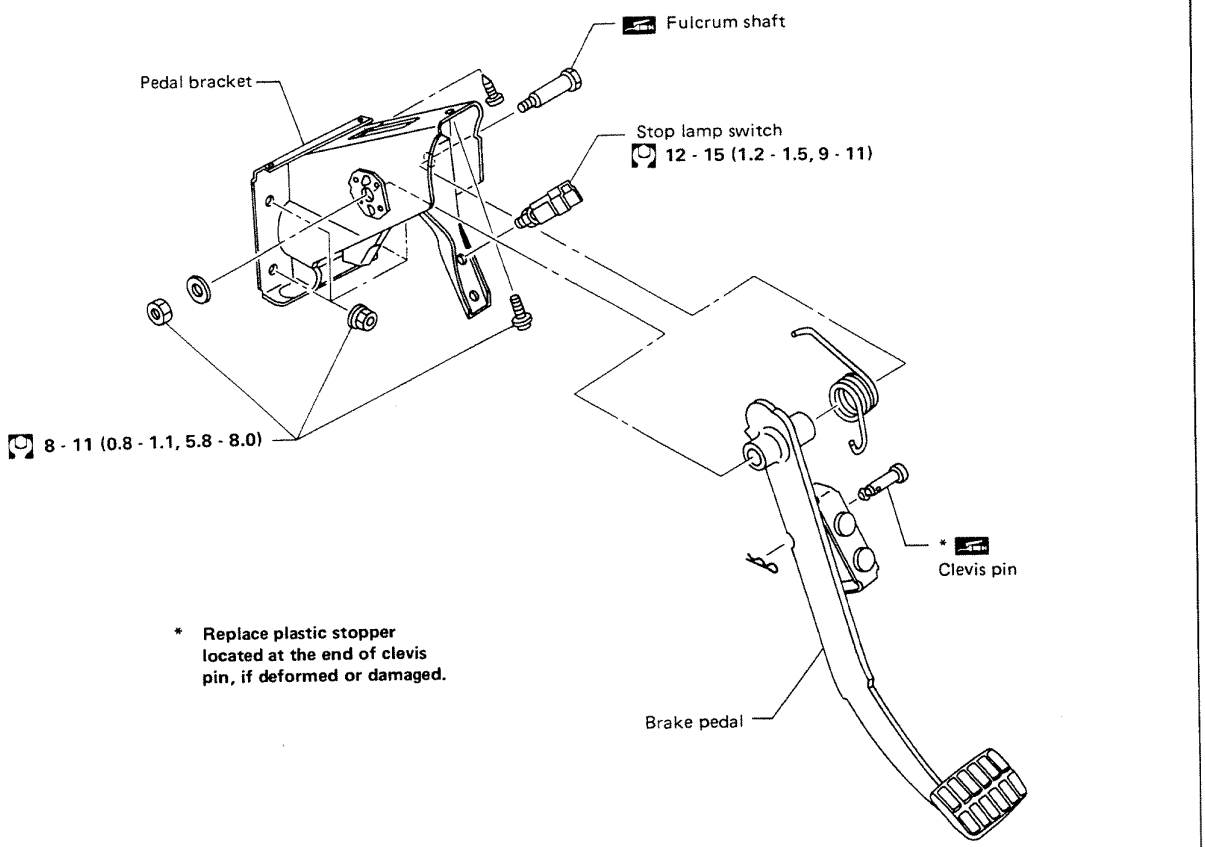
- To remove brake hose, first remove flare nut securing brake tube to hose, then withdraw lock spring. Next disconnect the other side.
- All hoses must be free from excessive bending, twisting and pulling.
- After installing brake lines, be sure to check for oil leakage by fully depressing brake pedal.

Inspection

Check brake lines (tubes and hoses) for evidence of cracks, deterioration or other damage. Replace any damaged parts.

If leakage occurs around joints, retighten or, if necessary, replace damaged parts.

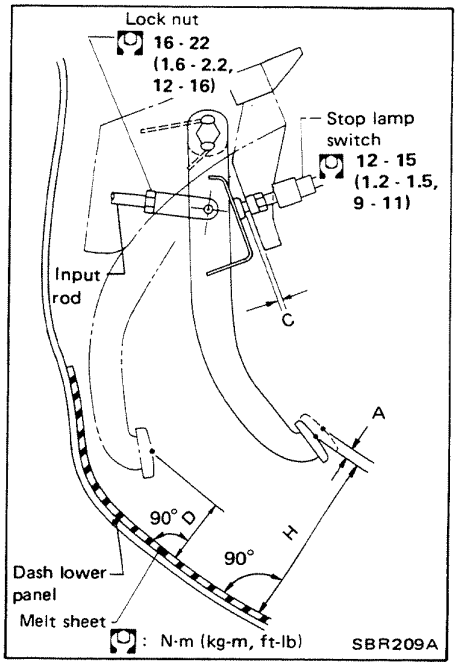
Removal and Installation



Inspection

Check brake pedal for the following items.

- Brake pedal bend
- Clevis pin deformation
- Cracks of any welded portion



Pedal Adjustment

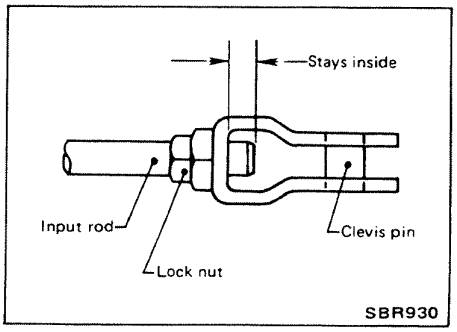
Check brake pedal free height from melt sheet. Adjust if necessary.

H: **Free height**
157 - 167 mm (6.18 - 6.57 in)

D: **Depressed height**
80 mm (3.15 in) or more
Under force of 490 N (50 kg, 110 lb) with engine running

C: **Clearance between pedal stopper and threaded end of stop lamp switch**
0.3 - 1.0 mm (0.012 - 0.039 in)

A: **Pedal free play**
1 - 3 mm (0.04 - 0.12 in)



1. Adjust pedal free height with brake booster input rod. Then tighten lock nut.

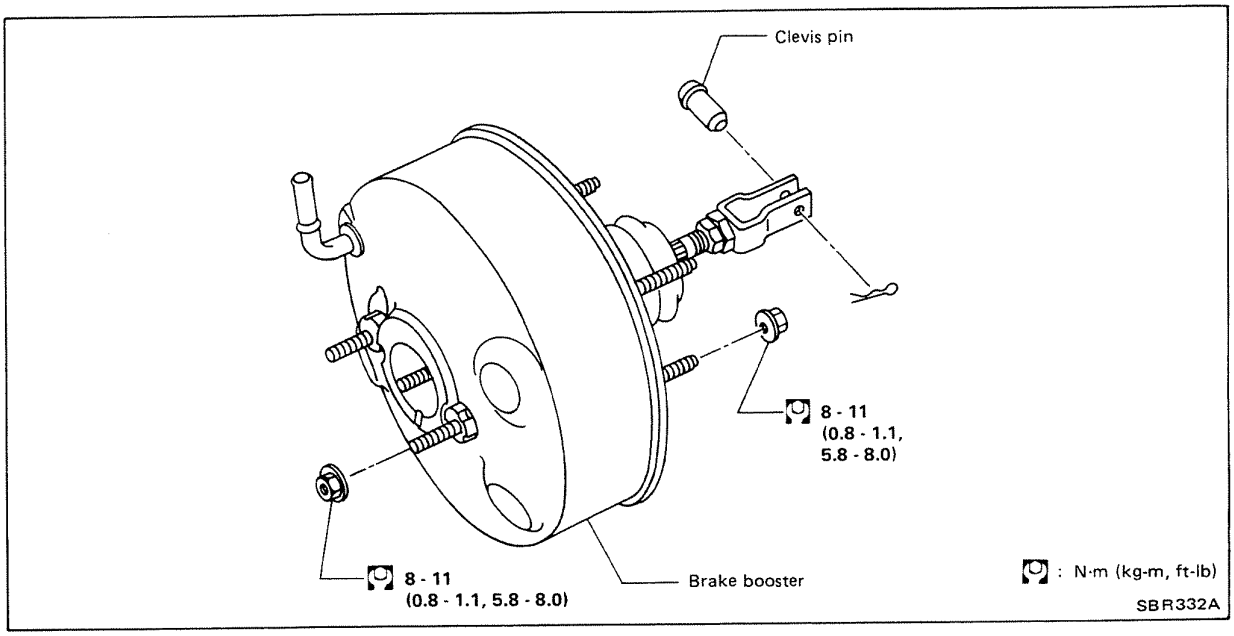
Make sure that the tip of input rod stays inside.

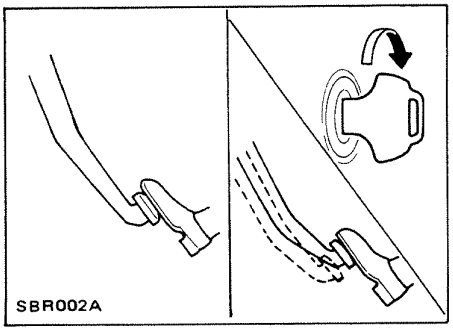
2. Adjust clearance "C" with stop lamp switch. Then tighten lock nuts.
3. Check pedal free play.

Make sure that stop lamp is off when pedal is released.

4. Check brake pedal depressed height with engine running.
   If depressed height is below the specified value, check brake system for leaks, accumulation of air or any damaged components such as master cylinder, wheel cylinder, etc. Make the necessary repairs, if necessary.

Removal and Installation





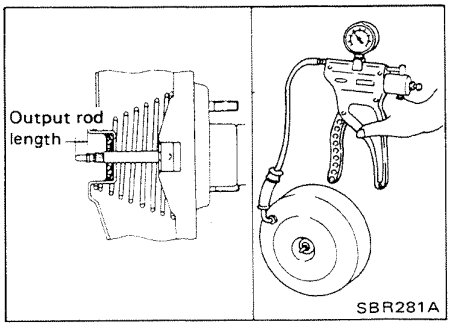
Inspection

OPERATING CHECK

- Depress brake pedal several times with engine off, then check that there is no change in pedal stroke.
- Depress brake pedal, then start engine. If pedal goes down slightly, operation is normal.

AIRTIGHT CHECK

- Start engine, then stop it in one or two minutes. Depress brake pedal several times slowly. If pedal goes further down the first time and gradually rises after second or third time, the booster is airtight.
- Depress brake pedal while engine is running, then stop engine with pedal depressed. If there is no change in pedal stroke for thirty seconds, brake booster is airtight.



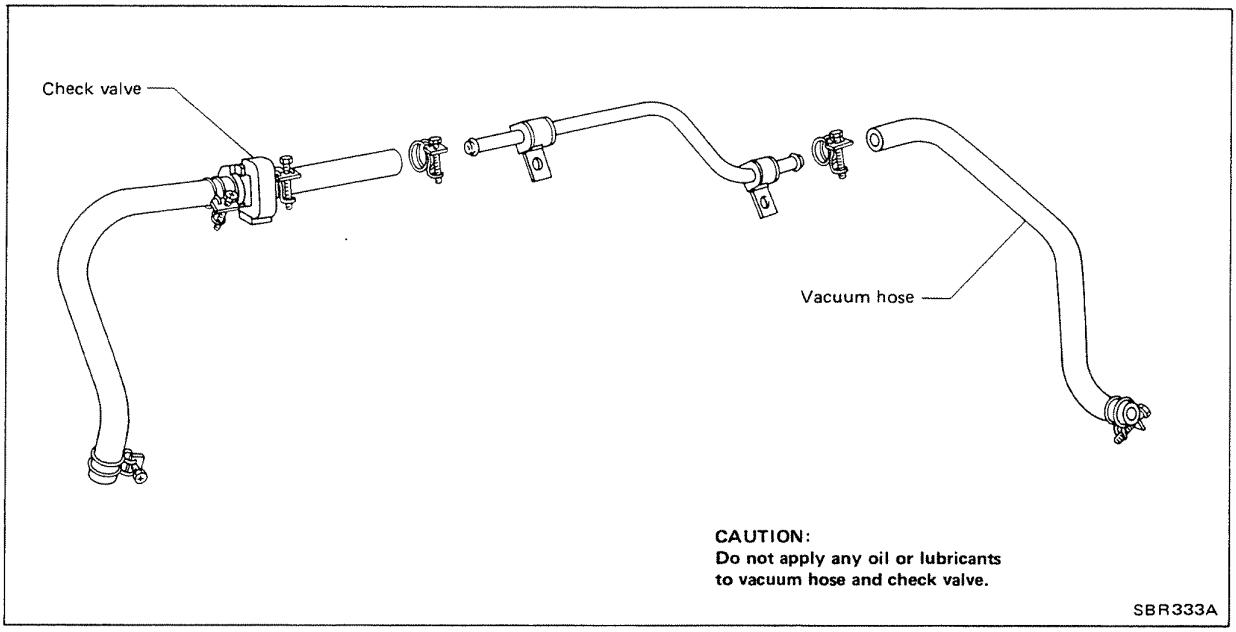
OUTPUT ROD LENGTH CHECK

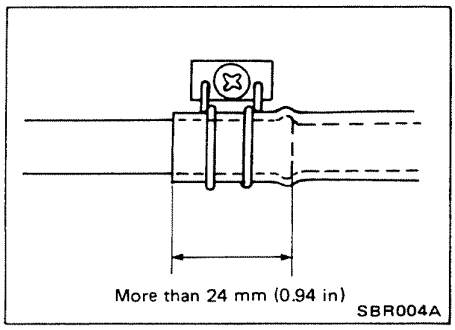
1. Supply brake booster with vacuum of −66.7 kPa (−500 mmHg, −19.69 inHg) using a handy vacuum pump.
2. Check output rod length.

   Specified length:

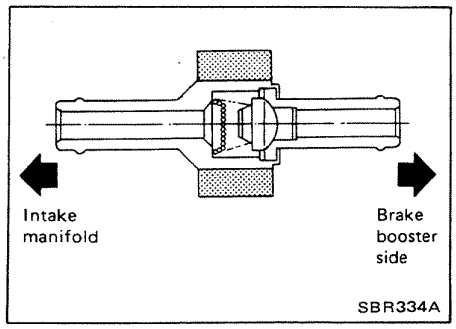
   10.275 - 10.525 mm (0.4045 - 0.4144 in)

Removal and Installation

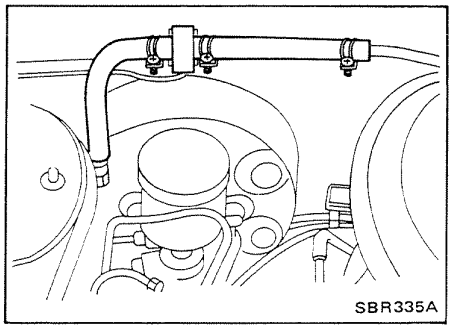




- Insert vacuum tube into vacuum hose more than 24 mm (0.94 in).



- Install check valve properly paying attention to its direction.



Inspection

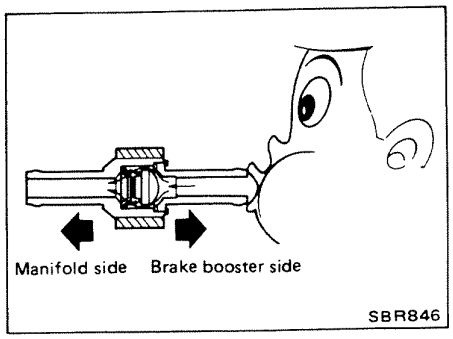
HOSES AND CONNECTORS

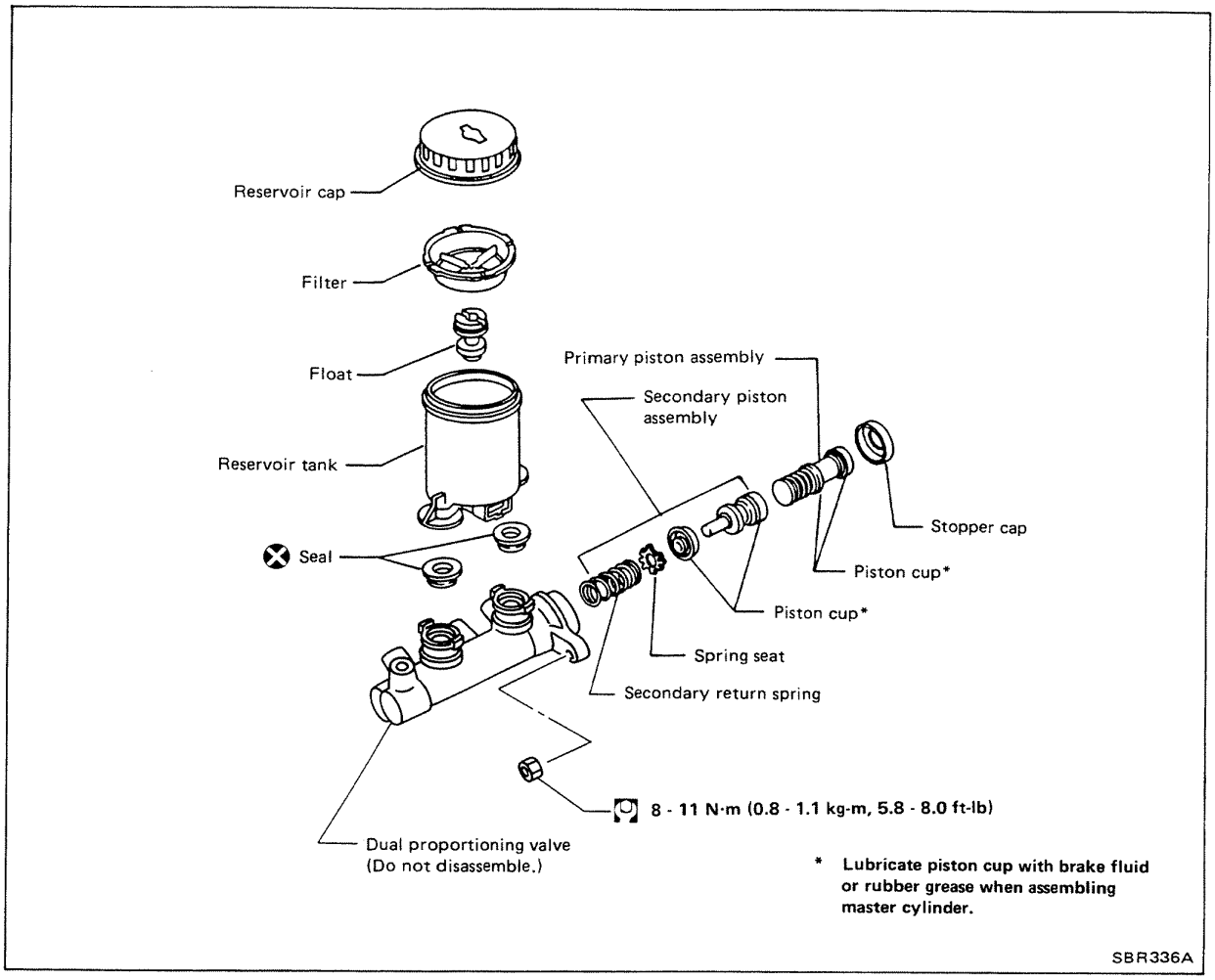
- Check condition of vacuum hoses and connectors.
- Check vacuum hoses for air tightness.

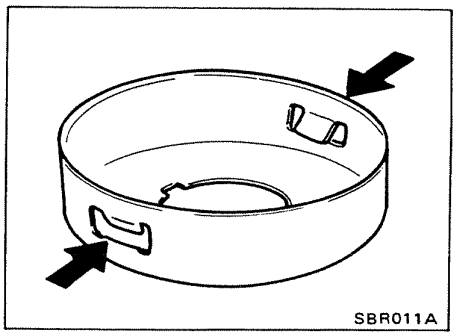
Inspection (Cont'd)

CHECK VALVE

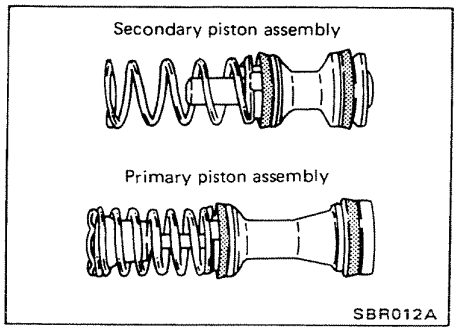
- If valve does not open when pressure is applied to the brake booster side of check valve, replace check valve with a new one.



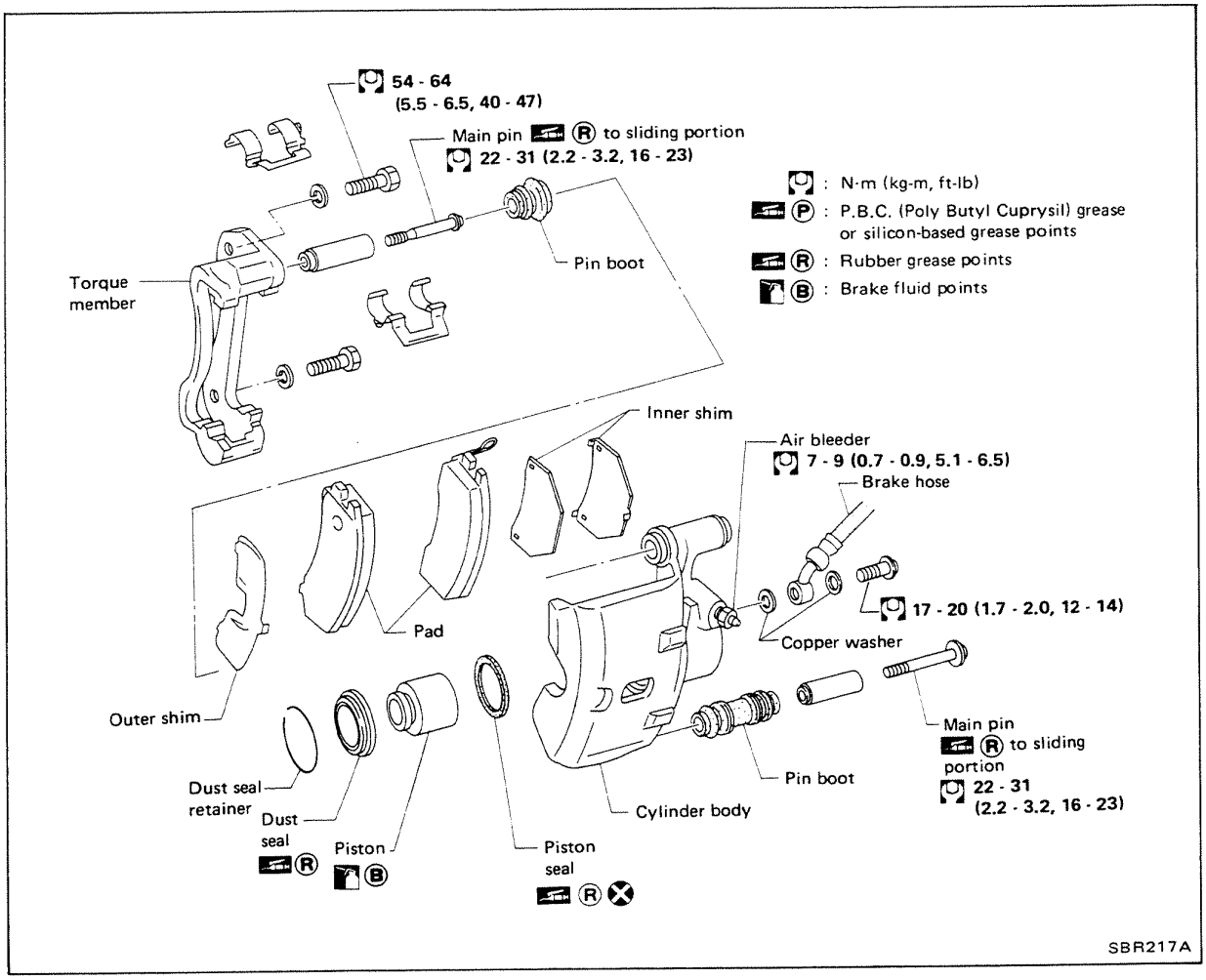


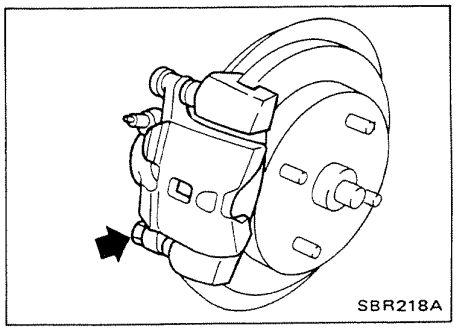


- Replace stopper cap if the claw is damaged or deformed.
- Bend claws inside when installing stopper cap.



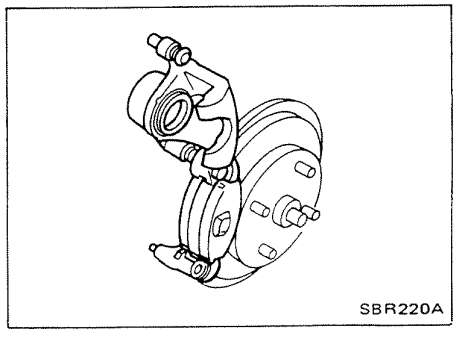
- Replace piston as an assembly when disassembled.
- Pay attention to the direction of piston cups in figure at left.
- Check parts for wear or damage. Replace if any of above conditions are observed.





Pad Replacement

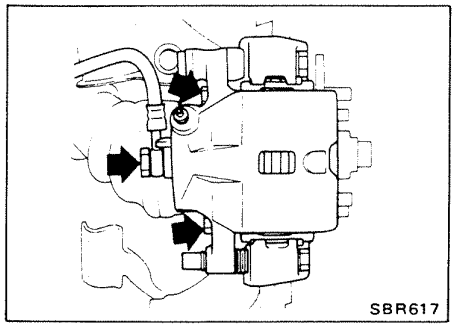
1. Remove guide pin.



2. Swing cylinder body upward. Then remove pad retainer, and inner and outer shims.

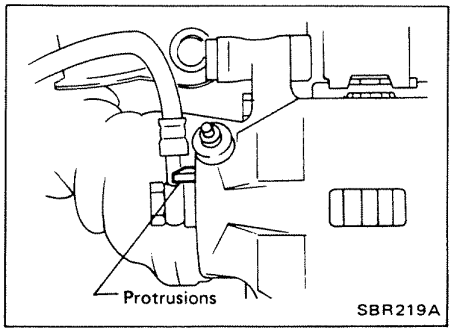
CAUTION:

- **When cylinder body is swung up, do not depress brake pedal because piston will pop out.**
- **Be careful not to damage dust seal or get oil on rotor. Always replace shims in replacing pads.**


SBR617

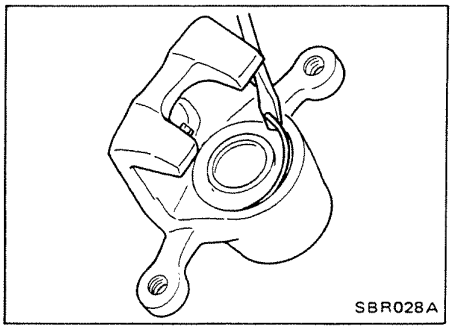
Removal and Installation

- Remove torque member fixing bolts and union bolt.



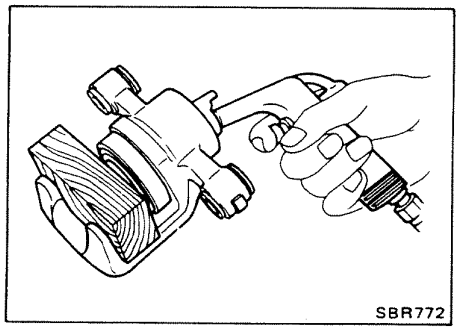
SBR219A

- Install brake hose to caliper securely.

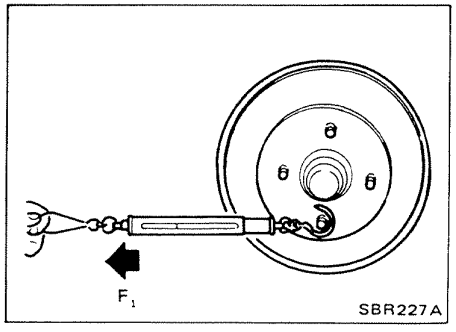

SBR028A

Disassembly

- Remove dust seal retainer with a screwdriver.


SBR772

Push out piston with dust seal with compressed air.

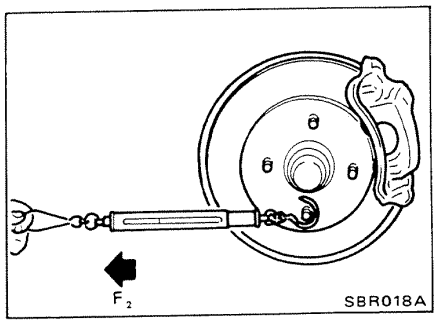


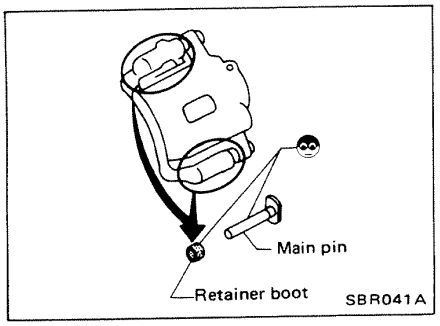
SBR227A

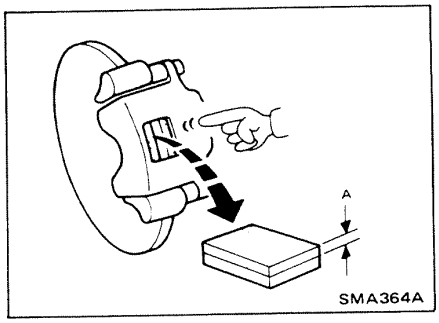
Inspection

INSPECTION OF BRAKE DRAG FORCE

(1) Swing cylinder body upward.
(2) Make sure that wheel bearing is adjusted properly. Refer to section FA.
(3) Measure rotating force (F_1).







Inspection (Cont'd)

(4) Install caliper with pads to the original position.
(5) Depress brake pedal for 5 seconds.
(6) Release brake pedal, rotate disc rotor 10 revolutions.
(7) Measure rotating force (F_2).
(8) Calculate brake drag force by subtracting F_1 from F_2.

Maximum brake drag force ($F_2 - F_1$):
103.0 N (10.5 kg, 23.2 lb)

If it is not within specification, check main pins and retainer boots in caliper.

- **Make sure that wheel bearing is adjusted properly.**
- **Disc pads and disc rotor must be dried.**

DISC PAD

Check disc pad for wear or damage.

Pad wear limit (A):
2.0 mm (0.079 in)

CYLINDER BODY

- Check inside surface of cylinder for score, rust, wear, damage or presence of foreign materials. If any of the above conditions are observed, replace cylinder body
- Minor damage from rust or foreign materials may be eliminated by polishing surface with a fine emery paper. Replace cylinder body if necessary.

CAUTION:
Use brake fluid to clean. Never use mineral oil.

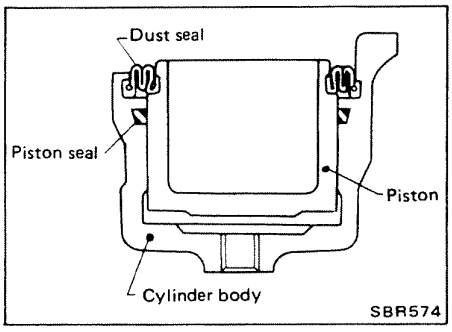
PISTON

Check piston for score, rust, wear, damage or presence of foreign materials. Replace if any of the above conditions are observed.

CAUTION:
Piston sliding surface is plated. Do not polish with emery paper even if rust or foreign materials are stuck to sliding surface.

MAIN PIN, PIN BOLT AND PIN BOOT

Check for wear, cracks or other damage. Replace if any of the above conditions are observed.



Assembly

- Insert piston seal into groove on cylinder body.
- With dust seal fitted to piston, install piston into cylinder body.

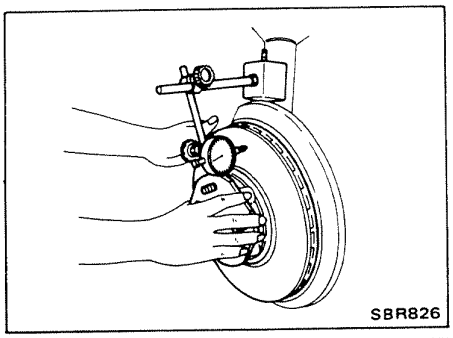
CAUTION

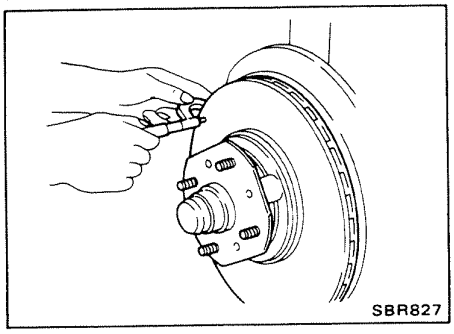
- **Secure dust seal properly.**
- **Pay attention to piston seal direction.**

Inspection

RUBBING SURFACE

Check rotor for roughness, cracks or chips.


SBR826


SBR827

RUNOUT

Make sure that axial end play is within the specifications before measuring. Refer to section FA.

Then check runout with a dial indicator.

Rotor repair limit

Maximum runout

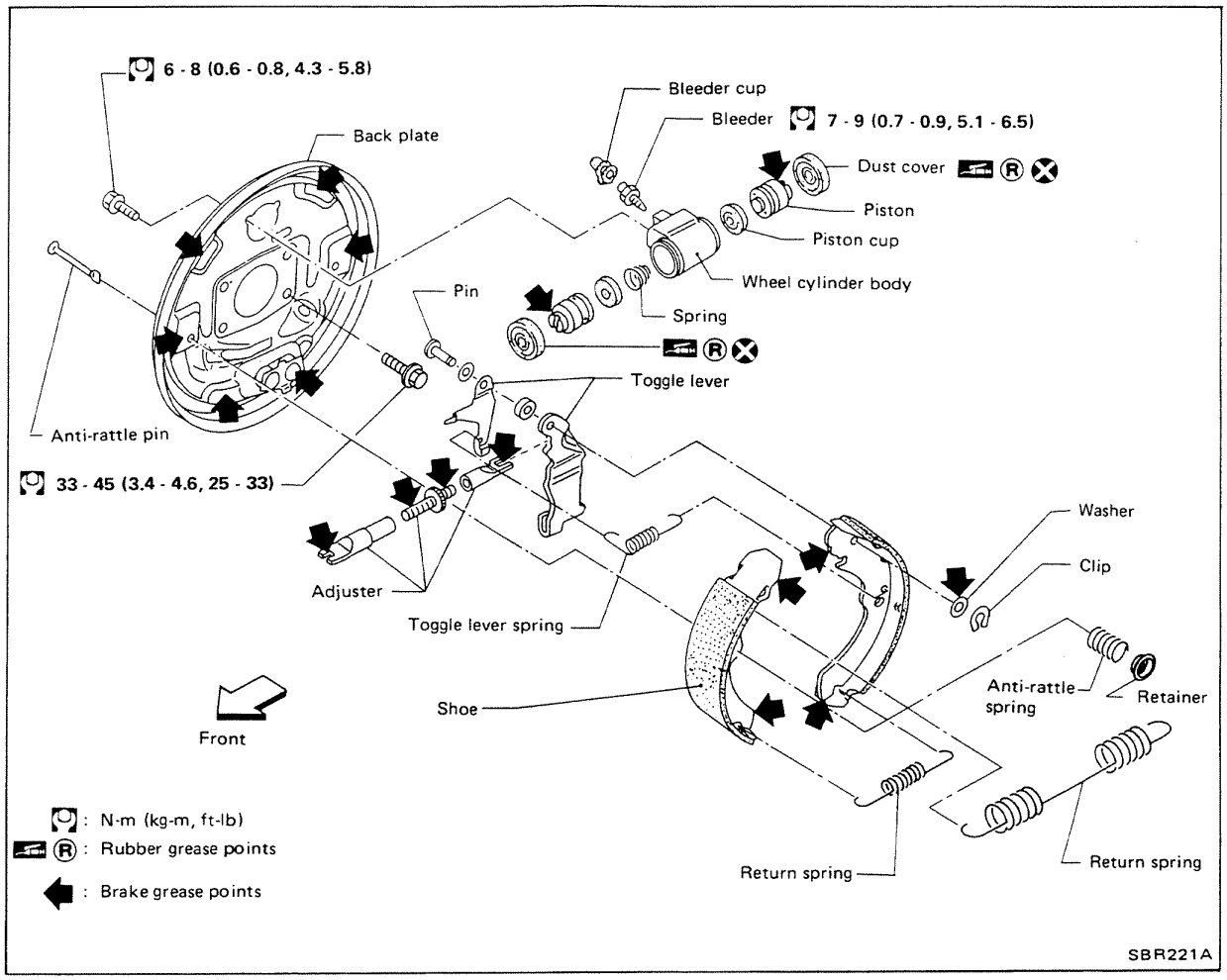
(Total indicator reading at center of rotor pad contact surface)

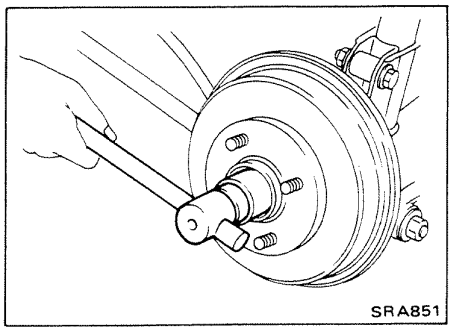
0.07 mm (0.0028 in)

THICKNESS

Rotor repair limit:

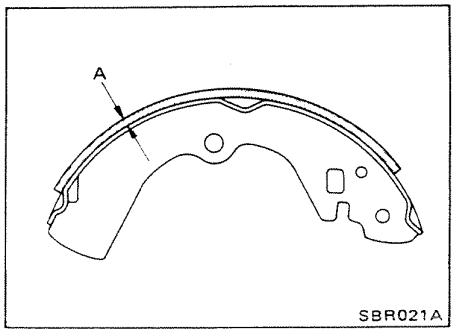
Minimum thickness **16.0 mm (0.630 in)**





Brake Drum Removal

- Release parking brake control lever fully.
- Remove hub cap and wheel bearing lock nut.
  Refer to section RA.



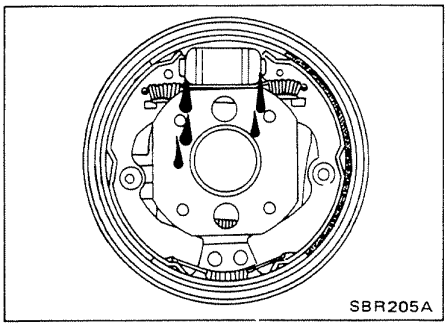
Shoe Replacement

- Measure lining thickness.

  Lining wear limit (A):
  1.5 mm (0.059 in)

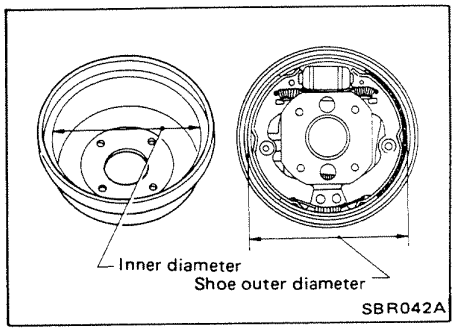
Before installing new shoes, rotate nut until adjuster rod is at its shortest point.

After installation is completed, adjust shoe-to-drum clearance. Refer to Removal and Installation.


SBR205A

Wheel Cylinder Inspection

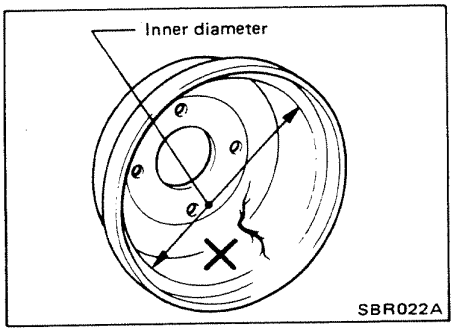
- Check wear, damage and loose conditions.
- Check wheel cylinder for leakage.
  Replace if any of the above conditions are observed.



SBR042A

Removal and Installation

When installing, measure inner diameter of the drum and adjust so that shoe outer diameter at its center is smaller than drum inner diameter by 0.35 to 0.55 mm (0.0138 to 0.0217 in) by rotating the adjuster. Then operate parking brake lever to adjust shoe clearance.



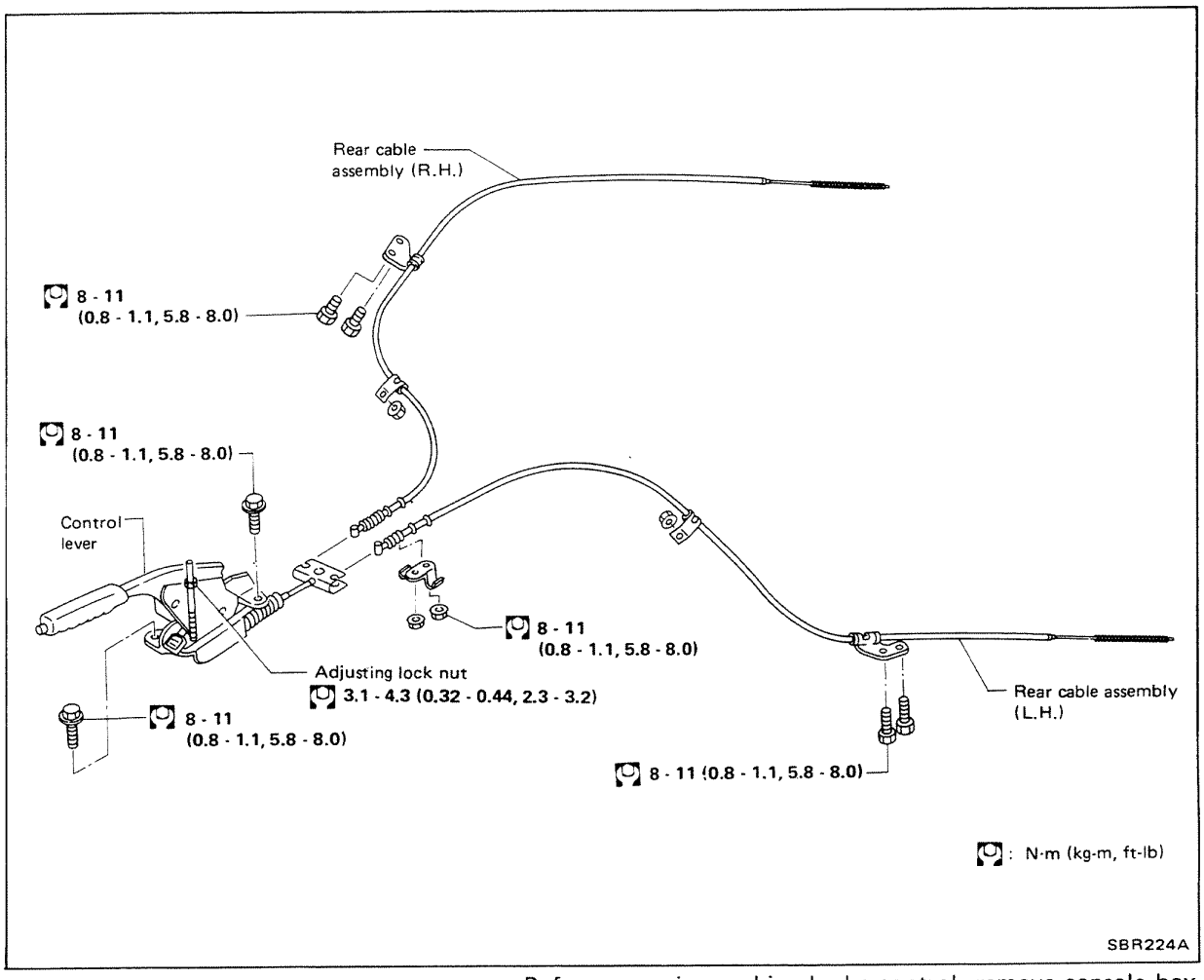
SBR022A

Drum Inspection

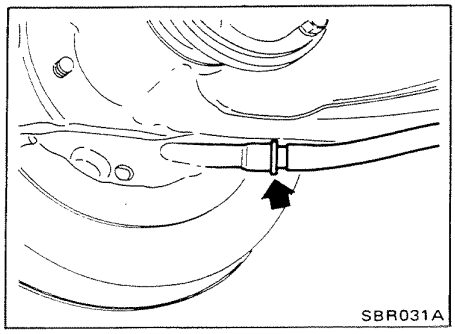
Standard inner diameter:
203.2 mm (8 in)
Maximum inner diameter:
204.5 mm (8.05 in)
Out-of-roundness (ellipticity):
0.03 mm (0.0012 in) or less
Radial runout (Total indicator reading):
0.05 mm (0.0020 in) or less

- Contact surface should be finefinished with No. 120 to 150 emery paper.
- Using a drum racer, lathe brake drum if it shows score marks, partial wear or stepped wear.
- After brake drum has been completely reconditioned or replaced, check drum and shoes for proper contact pattern.

Removal and Installation



- Before removing parking brake control, remove console box and heat insulator.



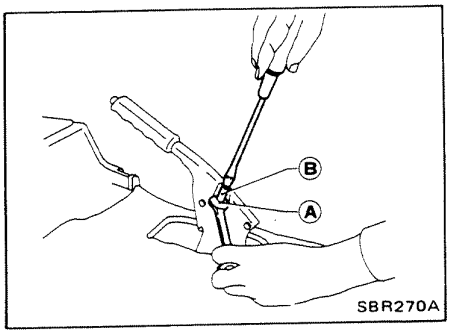
- Install rear cable by tapping the flanged section of cable cover with a hammer and punch.
  Be careful not to damage cable.
- Make sure there is no free play after installation.

Inspection

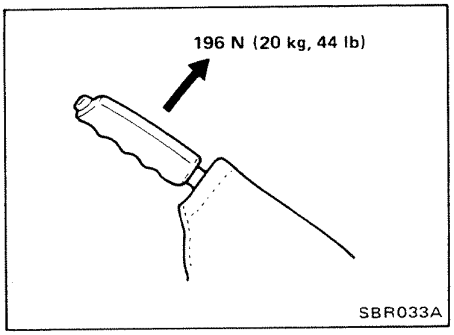
1. Check control lever for wear or other damage. Replace if necessary.
2. Check parking brake cables and switch for discontinuity or deterioration. Replace if necessary.
3. Check warning lamp and switch. Correct if necessary.
4. Check parts at each connecting portion and, if found deformed or damaged, replace.

Adjustment

Adjust control lever stroke as follows.



1. Loosen lock nut Ⓐ, rotate adjuster Ⓑ.
2. Tighten lock nut Ⓐ.



3. Pull control lever with specified amount of force. Check lever stroke and ensure smooth operation.
   Number of notches: 7 - 11

4. Bend parking brake warning lamp switch plate so that brake warning light comes on when ratchet at parking brake lever is pulled "A" notches and goes out when fully released.
   Number of notches "A": 1 - 2

General Specifications

Front brake Breke model	AD18V
Pad Width x thickness x length mm (in)	44.3 x 10.0 x 100.8 (1.744 x 0.394 x 3.968)
Rotor outer diameter mm (in)	240 (9.45)
Caliper inner diameter mm (in)	48.1 (1.894)
Rear brake Brake model	LT20A
Lining Width x thickness x length mm (in)	35 x 4.5 x 195 (1.38 x 0.177 x 7.68)
Drum inner diameter mm (in)	203.2 (8)
Wheel cylinder mm (in)	15.87 (5/8)
Master cylinder Inner diameter mm (in)	Large ... 25.4 (1) Small ... 20.64 (13/16)
Brake booster Model	G20, M20
Diaphragm diameter mm (in)	205 (8.07)
Control valve Type	Dual proportioning valve (within master cylinder)
Split point kPa (kg/cm^2, psi) x reducing ratio	2,452 (25,356) x 0.2
Recommended brake fluid	DOT 3

Inspection and Adjustment

BRAKE PEDAL

Free height "H" mm (in)	157 - 167 (6.18 - 6.57)
Depressed height "D" [Under force of 490 N (50 kg, 110 lb) with engine running] mm (in)	80 (3.15) or more
Clearance between pedal stopper and threaded end of stop lamp switch "C" mm (in)	0.3 - 1.0 (0.012 - 0.039)
Pedal free play "A" mm (in)	1 - 3 (0.04 - 0.12)

PARKING BRAKE

Type	Center lever type
Number of notches when warning lamp switch comes on	1 - 2
Number of notches [When pulled under force of 196 N (20 kg, 44 lb)]	7 - 11

Inspection and Adjustment (Cont'd)

DISC BRAKE

Brake model		AD18 V
Pad wear limit Minimum thickness	mm (in)	2.0 (0.079)
Rotor repair limit Maximum runout	mm (in)	0.07 (0.0028)
Minimum thickness	mm (in)	16.0 (0.630)

DRUM BRAKE

Brake model		LT20A
Lining wear limit Minimum thickness	mm (in)	1.5 (0.059)
Drum repair limit Inner diameter (Max.)	mm (in)	204.5 (8.05)
Out-of-round	mm (in)	0.03 (0.0012) or less
Runout	mm (in)	0.05 (0.0020) or less

Tightening Torque

Item	N·m	kg-m	ft-lb
Brake pedal			
Pedal bracket to body	8 - 11	0.8 - 1.1	5.8 - 8.0
Stop lamp switch lock nut	12 - 15	1.2 - 1.5	9 - 11
Brake booster			
Brake booster to body	8 - 11	0.8 - 1.1	5.8 - 8.0
Input rod lock nut	16 - 22	1.6 - 2.2	12 - 16
Brake booster to master cylinder	8 - 11	0.8 - 1.1	5.8 - 8.0
Brake tube connector			
Brake tube to connector	15 - 18	1.5 - 1.8	11 - 13
Brake tube connector mounting bolt	4 - 5	0.4 - 0.5	2.9 - 3.6
Brake tube flare nut	15 - 18	1.5 - 1.8	11 - 13
Wheel cylinder air bleeder	7 - 9	0.7 - 0.9	5.1 - 6.5
Front disc brake			
Union bolt	17 - 20	1.7 - 2.0	12 - 14
Torque member fixing bolt	54 - 64	5.5 - 6.5	40 - 47
Pin bolt	22 - 31	2.2 - 3.2	16 - 23
Rear drum brake			
Wheel cylinder to back plate	6 - 8	0.6 - 0.8	4.3 - 5.8
Back plate fixing bolt	33 - 45	3.4 - 4.6	25 - 33
Parking brake			
Control lever to body	8 - 11	0.8 - 1.1	5.8 - 8.0
Adjuster lock nut	3.1 - 4.3	0.32 - 0.44	2.3 - 3.2
Cable clamp to body	8 - 11	0.8 - 1.1	5.8 - 8.0

STEERING SYSTEM

SECTION ST

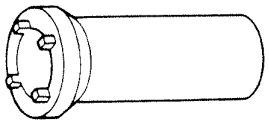
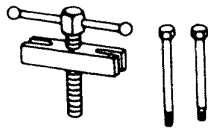
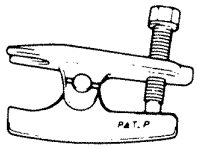
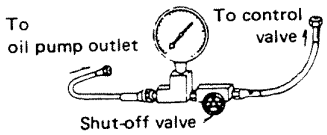
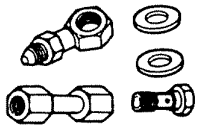
CONTENTS

- The power steering gear and oil pump should be disassembled only when repairing an "oil leak". They should not be disassembled to repair any other steering defect, steering noise, etc.
- Before disassembly, thoroughly clean the outside of the unit.
- Disassembly should be done in a clean work area. It is important to prevent the internal parts from becoming contaminated by dirt or other foreign matter.
- When disassembling parts, be sure to place them in order in parts rack so they can be put back in the unit in their proper positions.
- Use a nylon cloth or paper towel for wiping parts clean. Common shop rags can leave lint that might interfere with the operation.
- All parts should be carefully cleaned with a general purpose, non-flammable solvent before inspection or reassembly.
- Before assembly, apply a coat of recommended A.T.F.* to hydraulic parts. Vaseline may be applied to O-rings and seals. Do not use any grease.
- Gaskets, seals and O-rings should be replaced. Care should be taken to avoid damaging O-rings, seals and gaskets when assembling. It is also very important to perform functional tests whenever it is designated.

*: Automatic Transmission Fluid

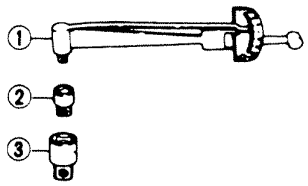
SPECIAL SERVICE TOOLS

*: Special tool or a commercial equivalent

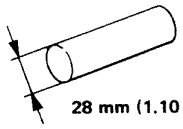
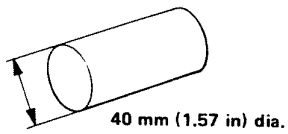
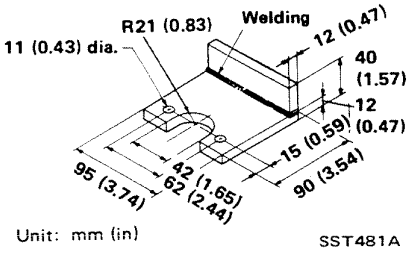
Tool number Tool name	Description	
KV48102000 End cover socket wrench		Removing and installing rear cover and end cover
KV48100700 Torque adapter		Measuring pinion rotating torque
ST27180001* Steering wheel puller		Removing steering wheel
HT72520000* Ball joint remover		Removing ball joint
ST27091000* Pressure gauge		Measuring oil pressure
KV48102500 Pressure gauge adapter		Measuring oil pressure

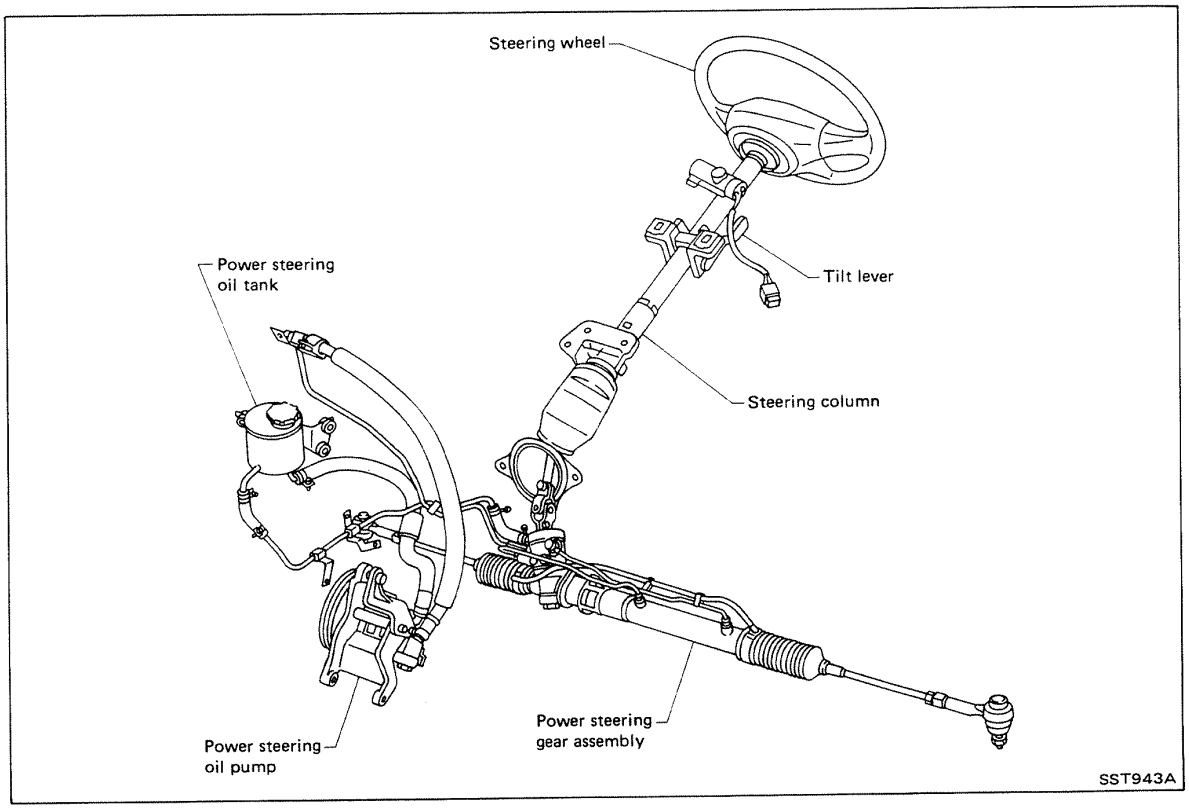
SPECIAL SERVICE TOOLS (Cont'd)

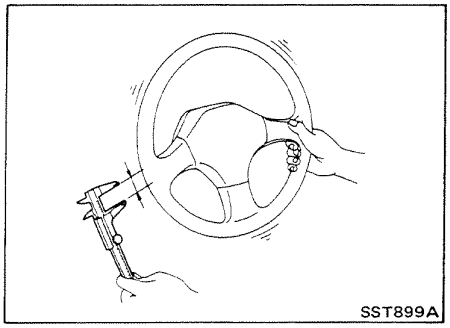
*: Special tool or a commercial equivalent

Tool number Tool name	Description	
ST3127S000* ① GG91030000 Torque wrench ② HT62940000 Socket adapter ③ HT62900000 Socket adapter		Measuring turning torque

COMMERCIAL SERVICE TOOLS

Tool name	Description	
Rear oil seal drift		Installing rear oil seal
Pinion oil seal drift		Installing pinion oil seal
Oil pump attachment		Disassembling and assembling oil pump


Steering wheel
Power steering oil tank
Tilt lever
Steering column
Power steering oil pump
Power steering gear assembly
SST943A


SST899A

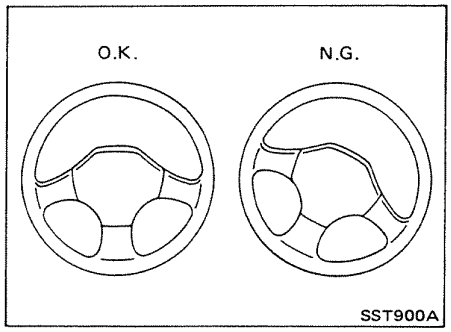
Checking Steering Wheel Play

- With wheels in a straight ahead position, check steering wheel play.

  Steering wheel play:

  35 mm (1.38 in) or less

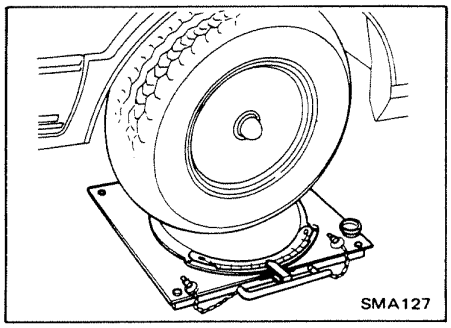
- If it is not within specification, check tie-rod outer and inner ball joints and/or pinion & rack assembly.



SST900A

Checking Neutral Position on Steering Wheel

- Check that the steering wheel is in the neutral position when driving straight ahead.
- If it is not in the neutral position, remove the steering wheel and re-install it correctly in the neutral position.
- If the neutral position is between two serrated teeth, loosen tie-rod lock nut and move tie-rod in the opposite direction by the same amount on both left and right sides to compensate for error in the neutral position.


SMA127

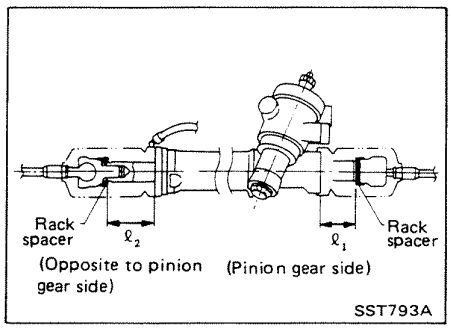
Checking Front Wheel Turning Angle

- Rotate steering wheel all the way right and left; measure turning angle.

  Turning angle:

  Full turns and toe-out turn

  Refer to section FA for S.D.S.

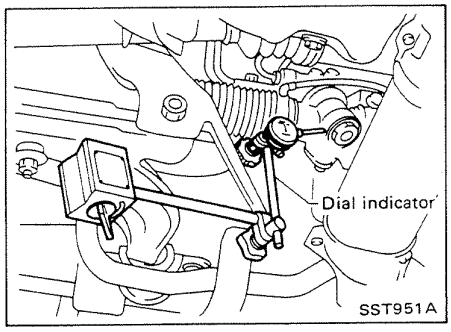


SST793A

- If it is not within specification, check rack stroke.

  Measure length "ℓ_1 & ℓ_2":

  Refer to S.D.S.



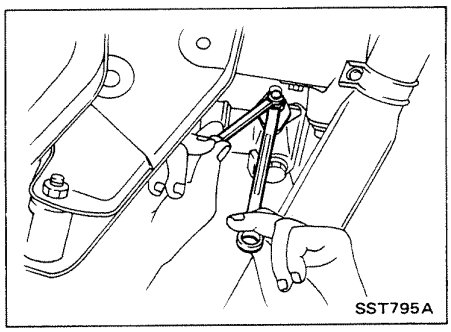
Checking Gear Housing Movement

- Check the movement of steering gear housing during stationary steering. The maximum allowable movement is as follows:

Movement of gear housing:
±2 mm (±0.08 in) (on dry paved surface) or less

When a force of 49 N (5 kg, 11 lb) is applied to steering wheel. On models equipped with power steering, turn off ignition key while checking.

- If movement exceeds the limit, replace mount insulator after confirming proper installation of gear housing clamps.



Adjusting Rack Retainer

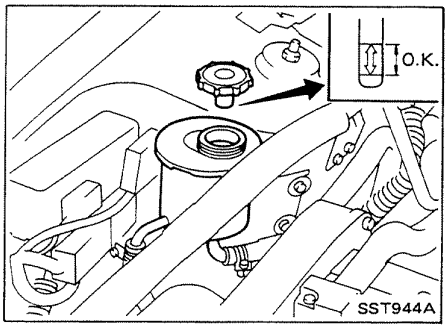
- Perform this driving test on a flat road.

1. Check whether vehicle moves in a straight line when steering wheel is released.
2. Check whether steering wheel returns to neutral position when steering wheel is released from a slightly turned (approx. 20°) position.

- If any abnormality is found, correct it by resetting adjusting screw.

Checking and Adjusting Drive Belts

Refer to section MA for Drive Belt Inspection.

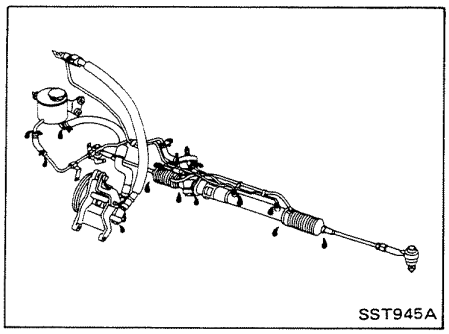


Checking Fluid Level

Check the fluid level when the fluid is cold.

CAUTION:

- **Do not overfill.**
- **Recommended fluid is Automatic Transmission Fluid "Dexron Type".**



Checking Fluid Leakage

Check lines for proper attachment, leaks, cracks, damage, loose connections, chafing and deterioration.

1. Run engine at idle speed or 1,000 rpm.
   Make sure temperature of fluid in oil tank rises to 60 to 80°C (140 to 176°F).
2. Turn steering wheel right-to-left several times.
3. Hold steering wheel at each "lock" position for five seconds and carefully check for fluid leakage.

CAUTION:

Do not hold steering wheel at lock position for more than fifteen seconds at a time.

4. If fluid leakage at connectors is noticed, loosen flare nut and then retighten.

Do not overtighten connector as this can damage O-ring, washer and connector.

Bleeding Hydraulic System

1. Raise front end of vehicle until wheels clear ground.
2. While adding fluid, quickly turn steering wheel fully to right and left and lightly touch steering stoppers.
   Repeat steering wheel operation until fluid level no longer decreases.
3. Start engine.
   Repeat step 2 above.

Bleeding Hydraulic System (Cont'd)

- Incomplete air bleeding will cause the following to occur. When this happens, bleed air again.

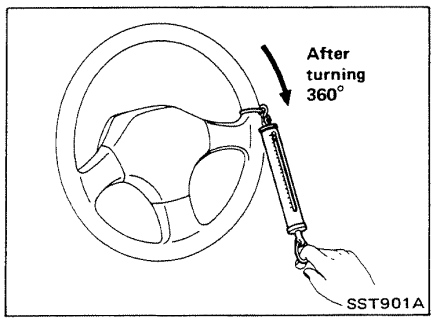
① Generation of air bubbles in reservoir tank
② Generation of clicking noise in oil pump
③ Excessive buzzing in oil pump

In steering while the vehicle is stationary, or when moving wheel slowly, fluid noise may occur in the valve or oil pump. This type of fluid noise is inherent in an integral power steering system, and it will not affect performance or durability of the system.

Checking Steering Wheel Turning Force

1. Park vehicle on a level, dry surface and set parking brake.
2. Bring power steering fluid up to adequate operating temperature. [Make sure temperature of fluid is approximately 60 to 80°C (140 to 176°F)].

Tires need to be inflated to normal pressure.



3. Check steering wheel turning force when steering wheel has been turned 360° from neutral position.

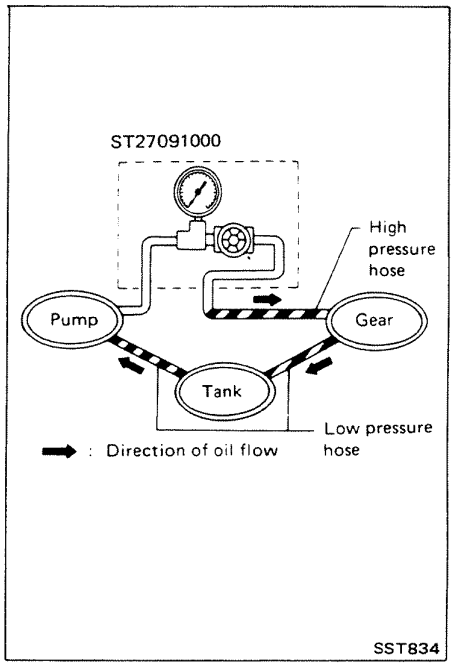
Steering wheel turning force:
39 N (4 kg, 9 lb) or less

Checking Hydraulic System

Before starting, check belt tension, driving pulley and tire pressure.

1. Set Tool. Open shut-off valve. Then bleed air. (See "Bleeding Hydraulic System".)
2. Run engine.
   Make sure temperature of fluid in tank rises to 60 to 80°C (140 to 176°F).

Checking Hydraulic System (Cont'd)



WARNING:

Warm up engine with shut-off valve fully opened. If engine is started with shut-off valve closed, oil pressure in oil pump will increase to relief pressure, resulting in an abnormal rise in oil temperature.

3. Check pressure with steering wheel fully turned to left and right positions.

CAUTION:

Do not hold steering wheel in lock position for more than fifteen seconds.

Oil pump maximum standard pressure:
6,375 kPa (65 kg/cm^2, 924 psi) at idling

4. If oil pressure is beyond the standard level, slowly close shut-off valve and check pressure.

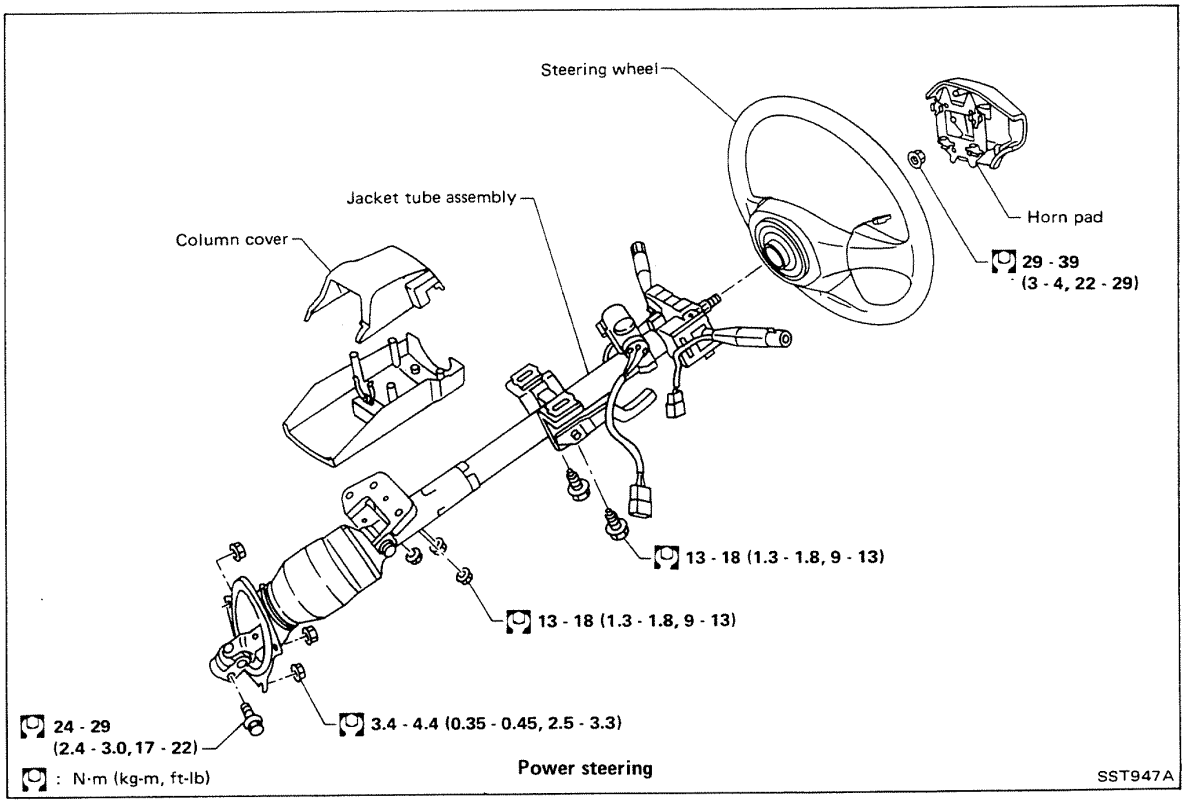
- When pressure reaches standard level, gear is damaged.
- When pressure remains beyond standard level, pump is damaged.

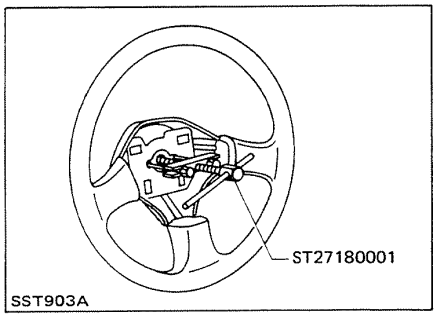
CAUTION:

Do not close shut-off valve for more than fifteen seconds.

5. After checking hydraulic system, remove Tool and add fluid as necessary, then completely bleed air out of system.

Removal and Installation

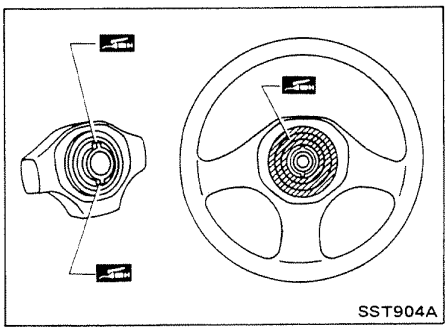




STEERING WHEEL

- Remove steering wheel with Tool.

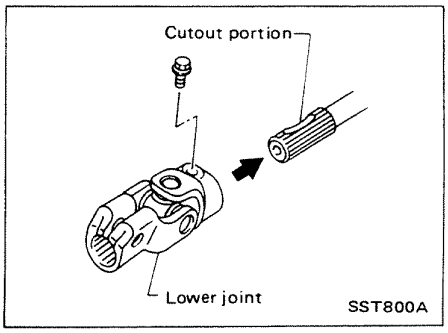
Removal and Installation (Cont'd)



- When installing steering wheel, apply multi-purpose grease to entire surface of turn signal cancel pin (both portions) and also to horn contact slip ring.

STEERING COLUMN

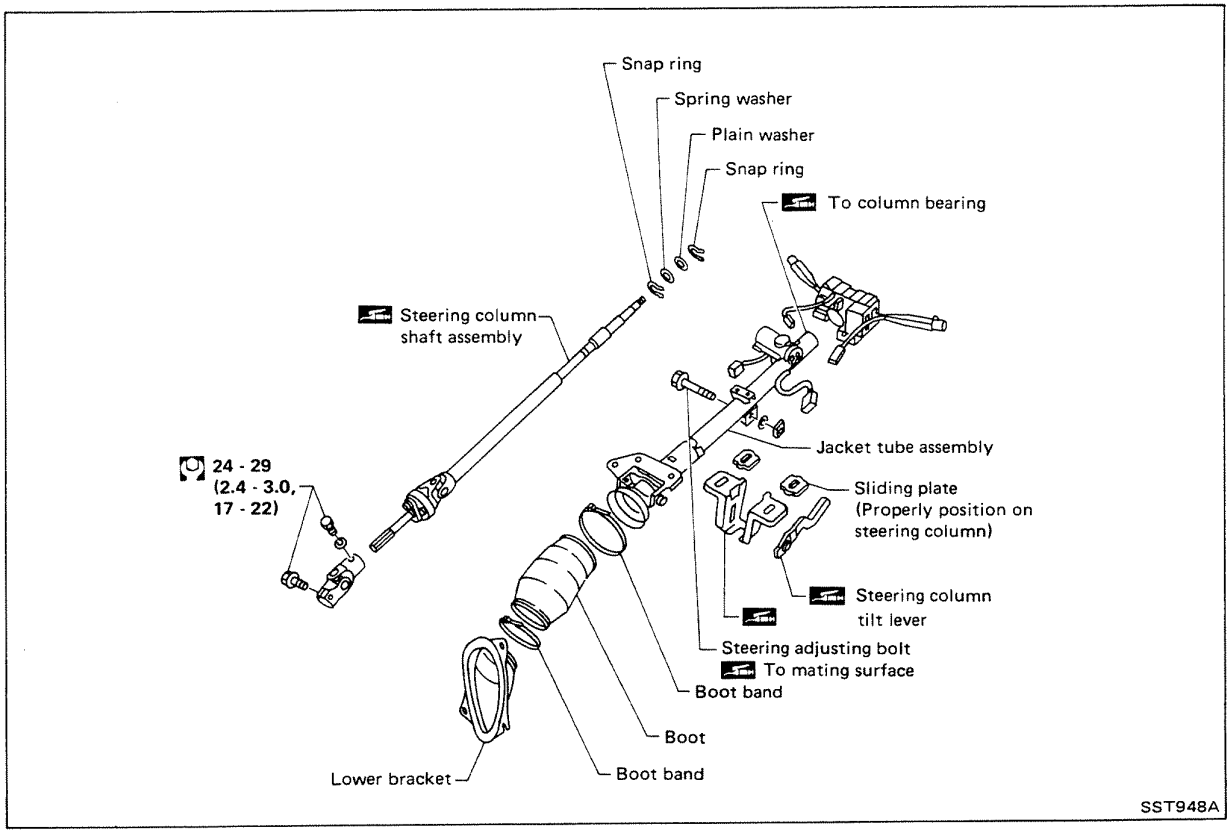
- When installing steering column, finger tighten all lower bracket and clamp retaining bolts; then retighten them securely. Make sure that undue stress is not applied to steering column.



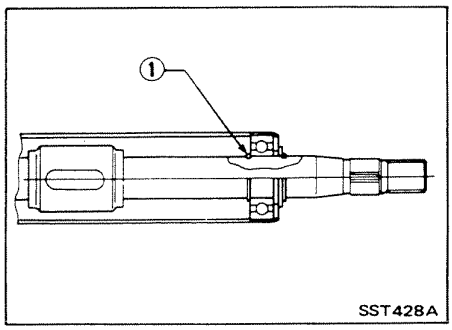
- When fitting steering lower joint, be sure tightening bolt faces cutout portion perfectly.

- After installing steering column, turn steering wheel to make sure it moves smoothly and that the number of turns from the straight forward position to left and right locks are equal.

Disassembly and Assembly

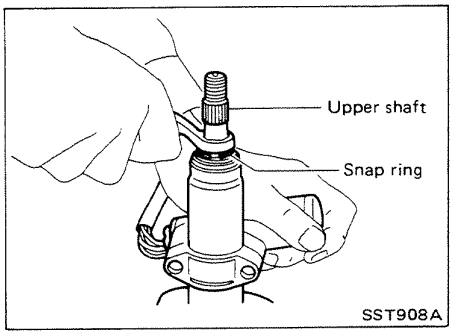


- Afrer installing, turn steering wheel to make sure it moves smoothly and that the number of turns from the straight forward position to left and right locks are equal.

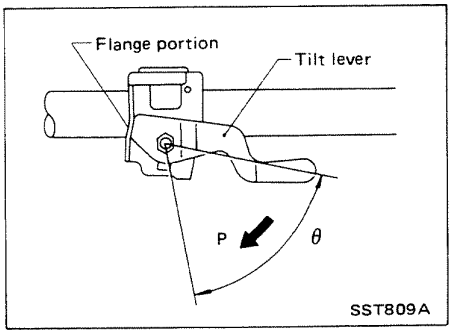


- When disassembling and assembling, unlock steering lock with key.
- Ensure that rounded surface of snap ring faces toward bearing when snap ring is installed.
- Install snap ring ① before inserting shaft into jacket tube.

Disassembly and Assembly (Cont'd)



- Install snap ring on upper shaft with box wrench.



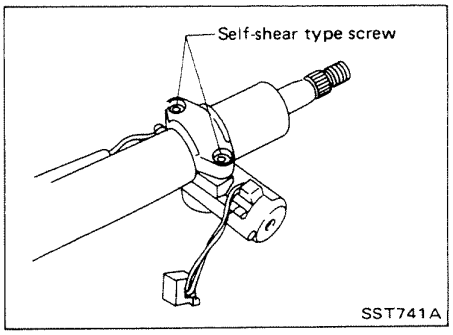
- Adjust tilt lever as follows.

(1) When tilt lever contacts flange portion, tighten adjusting bolt to specification.

: 8 - 11 N·m (0.8 - 1.1 kg-m, 5.8 - 8.0 ft-lb)

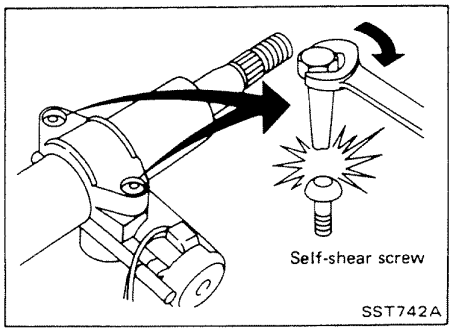
(2) Turn tilt lever by 70° (θ) in direction P to make sure steering column moves smoothly without binds.

(3) Return tilt lever to position θ. Make sure there is no free play (=0) of steering column when steering wheel is pushed down by force.

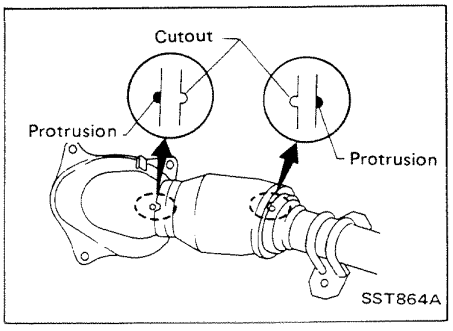


- **Steering lock**

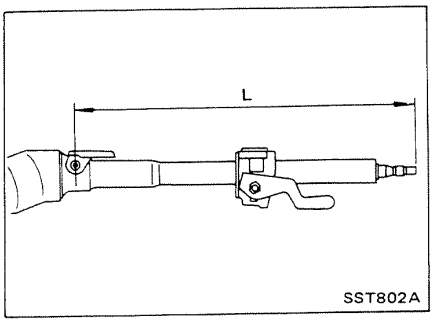
a) Break self-shear type screws with a drill or other appropriate tool.



b) Install self-shear type screws and then cut off self-shear type screw heads.



- When assembling, align cutout on joint cover with protrusions on hole cover.



Inspection

- When steering wheel can not be rotated smoothly, check the steering column for the following matters and replace damaged parts.

(1) Check column bearings for damage or unevenness. Lubricate with recommended multipurpose grease or replace steering column as an assembly, if necessary.

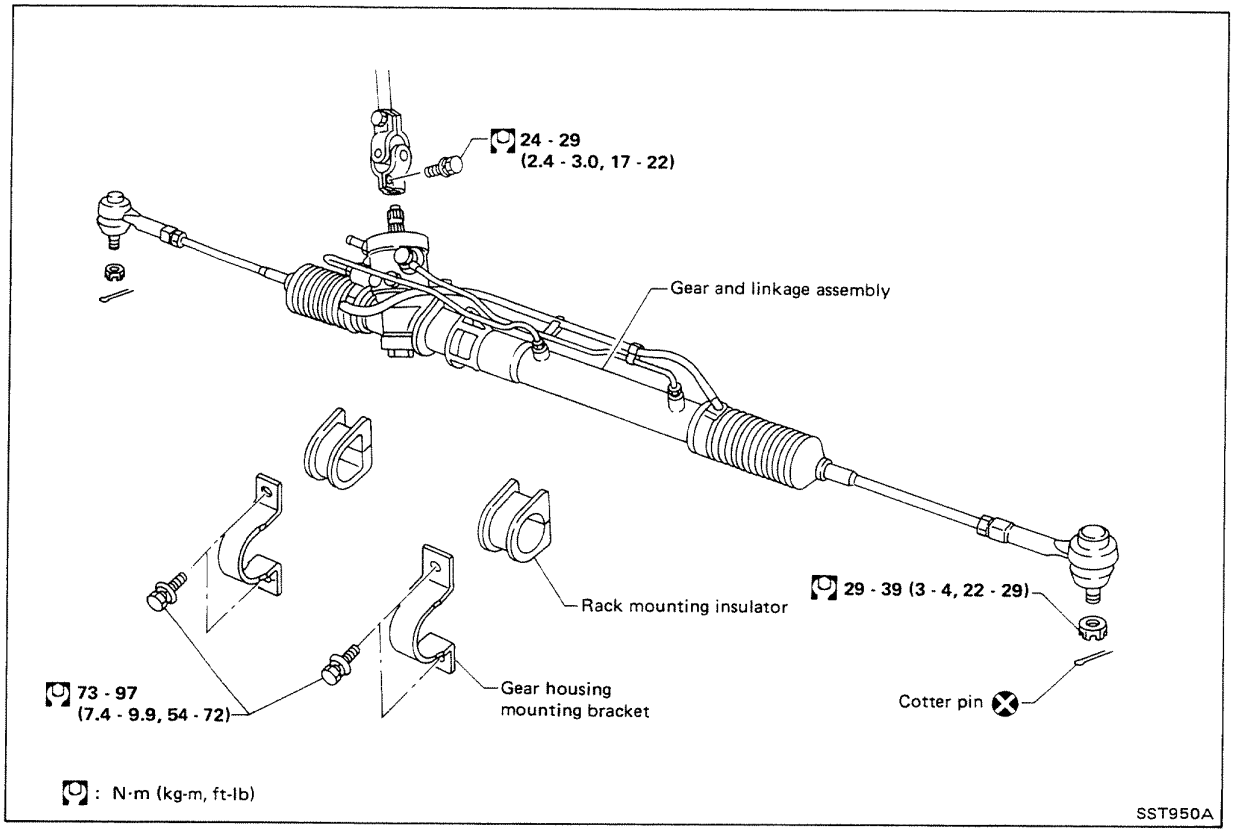
(2) Check jacket tube for deformation or breakage. Replace if necessary.

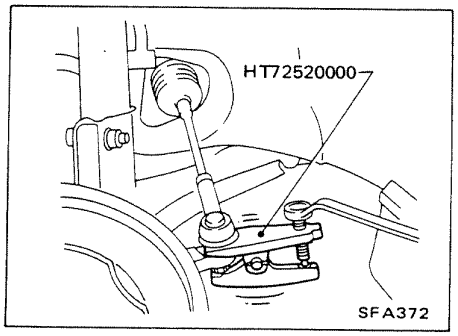
- When the vehicle is involved in a light collision, check column length "L". If it is not within specifications, replace steering column as an assembly.

Column length "L"

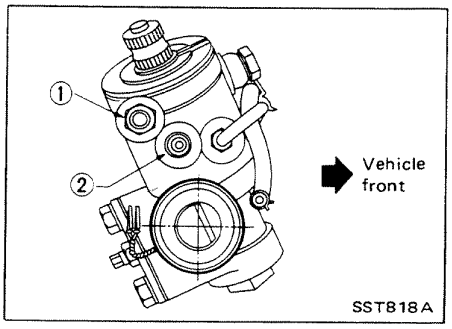
L = 534.7 - 537.3 mm (21.05 - 21.15 in)

Removal and Installation





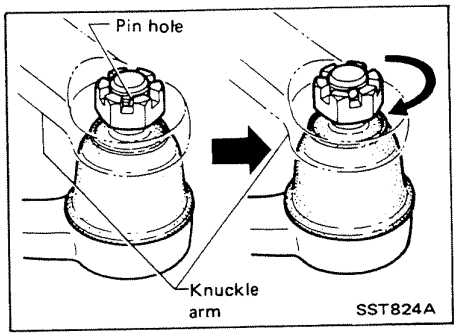
- Detach tie-rod outer sockets from knuckle arms with Tool.



- Install pipe connector as shown in Figure at left.
  - ① Low-pressure side
  - ② High-pressure side

Removal and Installation (Cont'd)

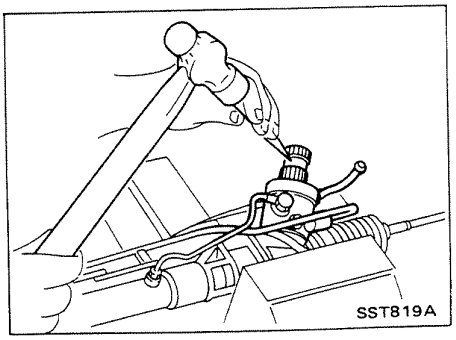
- Observe specified tightening torque when tightening high-pressure and low-pressure pipe connectors. Excessive tightening can damage threads or damaged connector O-ring.
- The O-ring in low-pressure pipe connector is larger than that in high-pressure connector. Take care to install the proper O-ring.



- Initially, tighten nut on tie-rod outer socket and knuckle arm to 29 to 39 N·m (3 to 4 kg-m, 22 to 29 ft-lb). Then tighten further to align nut groove with first pin hole so that cotter pin can be installed.

CAUTION:

Tightening torque must not exceed 49 N·m (5 kg-m, 36 ft-lb).

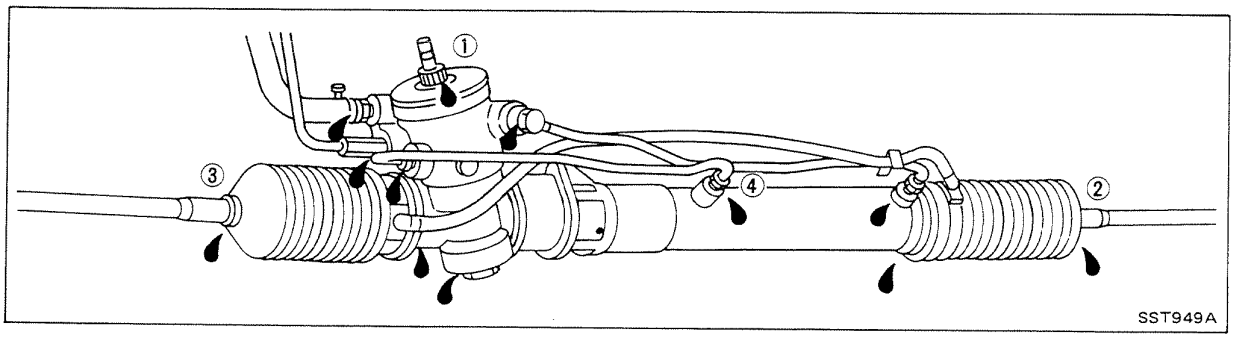


- Before removing lower joint from gear, set gear in neutral (wheels in straight ahead position). After removing lower joint, put matching mark on pinion shaft and pinion housing to record neutral position of gear.
- To install, set left and right dust boost to equal deflection, and attach lower joint by aligning match marks of pinion shaft and pinion housing.

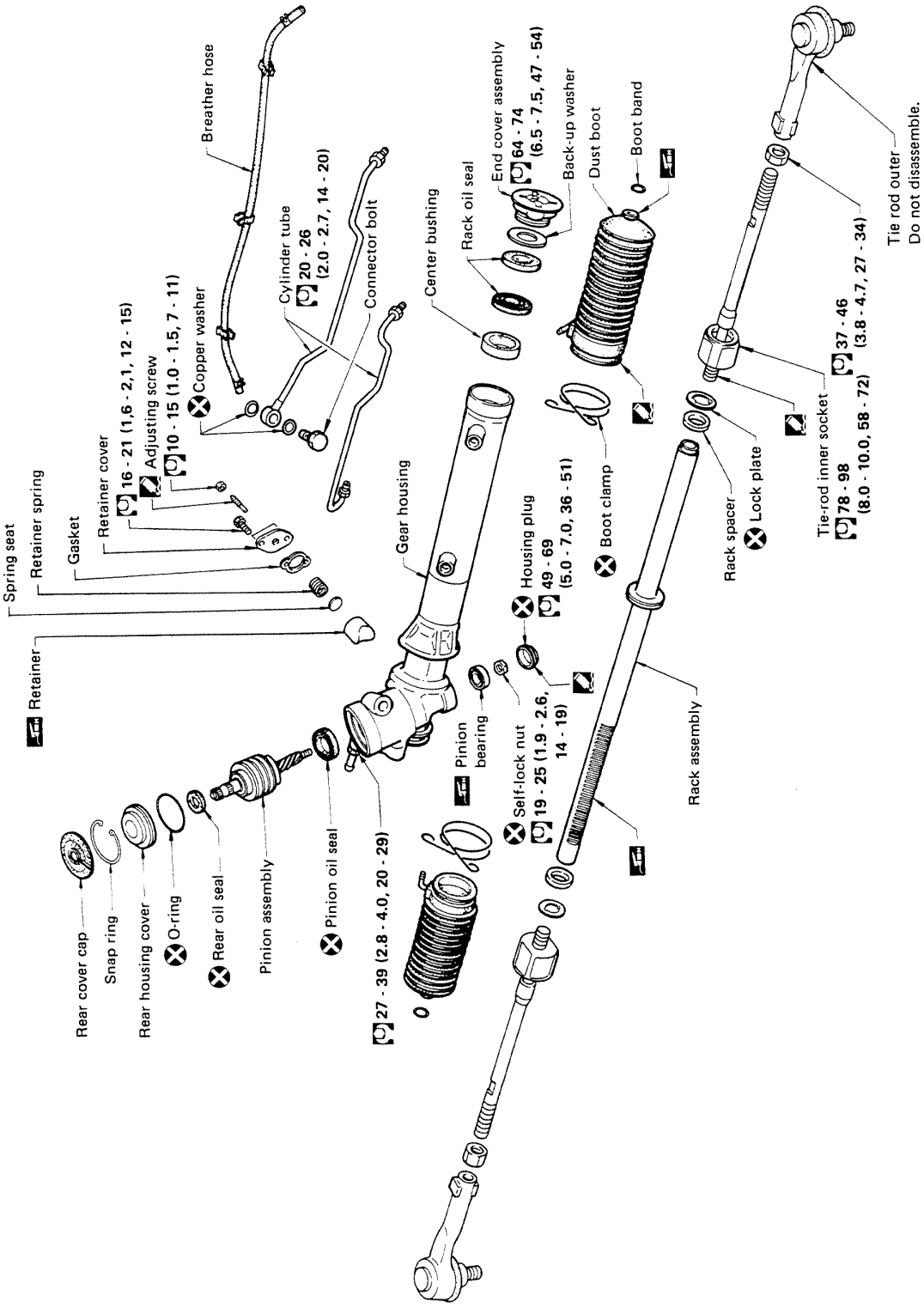
Disassembly and Assembly

The table below lists four ways to repair oil leaks in the steering gear, depending on the location of the leak. **See the following figure for oil leak locations.**

Item \ Position of oil leak	① Rear cover cap portion and rear housing	② Boot	③ Boot	④ Cylinder tube
Operation	■ Replacement • Rear oil seal • Pinion oil seal • O-ring • Snap ring	■ Replacement • Rack oil seal • Boot clamp	■ Replacement • Rack oil seals • Plastic ring • O-ring • Back-up collar • Boot clamp	■ Replacement • Cylinder tube • Copper washer
Procedure	Remove gear from vehicle. Measure rack starting force and pinion rotating torque. Replace parts described above. Replace rack oil seal. Replace parts described above. Replace cylinder tube. Measure pinion rotating torque. Adjust adjusting screw. Measure rack starting force and pinion rotating torque.			
Service parts to be prepared	• Pinion seal kit	• Gear housing seal kit	• Rack packing • Pinion seal kit	• Gear housing seal kit



Disassembly and Assembly (Cont'd)



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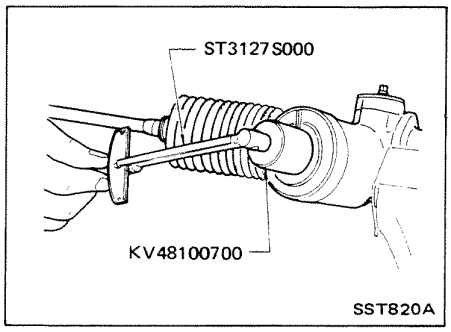
Disassembly and Assembly (Cont'd)

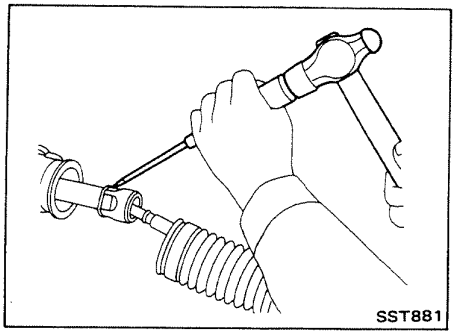


1. Prior to disassembling, measure pinion rotating torque and record the pinion rotating torque as a reference.

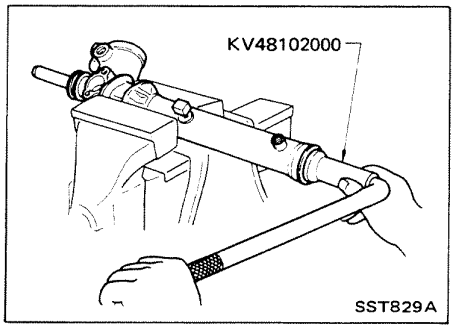
- **Before measuring, be sure to disconnect cylinder tube and drain fluid.**
- **Use soft jaws when holding steering gear housing. Handle it carefully as it is made of aluminum:**

Average rotating torque:
0.8 - 1.3 N·m (8 - 13 kg-cm, 6.9 - 11.3 in-lb)

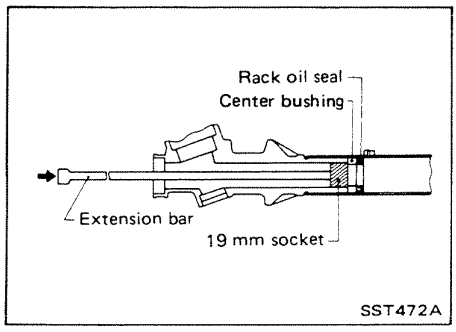
Max. rotating torque:
1.9 N·m (19 kg-cm, 16 in-lb) or less



2. Remove tie-rod outer sockets and boots.
3. Loosen tie-rod inner socket by prying up staked portion, and remove socket.
4. Remove retainer.
5. Remove pinion assembly.
6. Remove cylinder tubes.

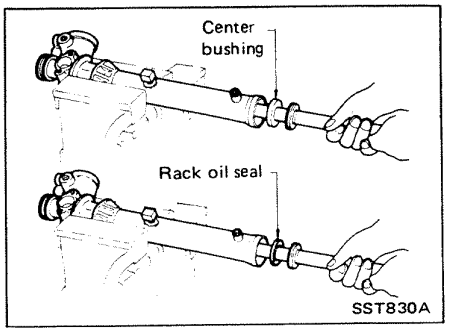


7. Remove cylinder end cover assembly with Tool.
8. Draw out rack assembly.



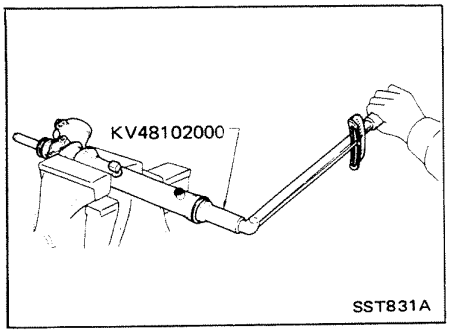
9. Remove center bushing and rack oil seal using 19 mm socket and extension bar.

Do not scratch inner surfaces of pinion housing.

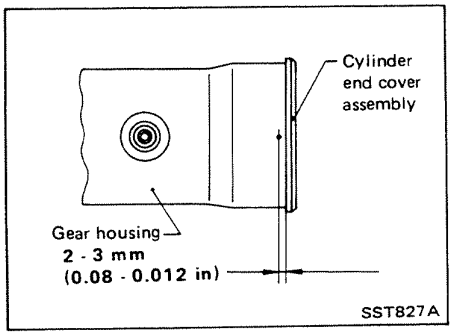


Assembly

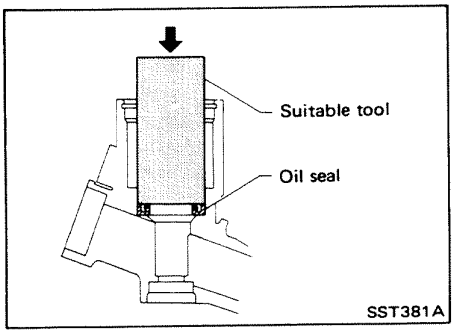
1. Install center bushing and rack oil seal with rack assembly.



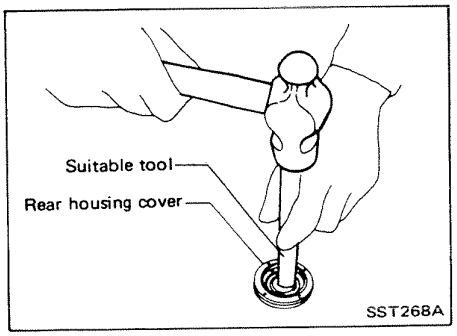
2. Tighten cylinder end cover assembly with Tool.



3. Fasten cylinder end cover assembly to gear housing by staking.

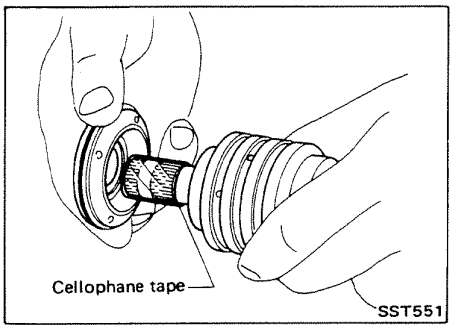


4. Coat seal lip of oil seal with multi-purpose grease and install new pinion oil seal to pinion housing with suitable tool.



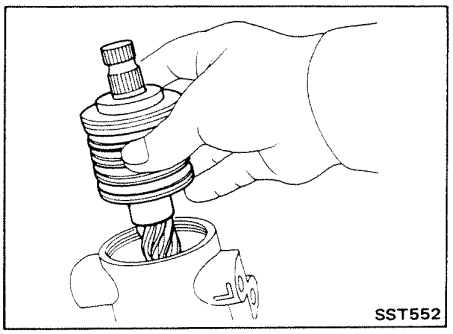
5. Install rear oil seal with suitable tool.

Assembly (Cont'd)



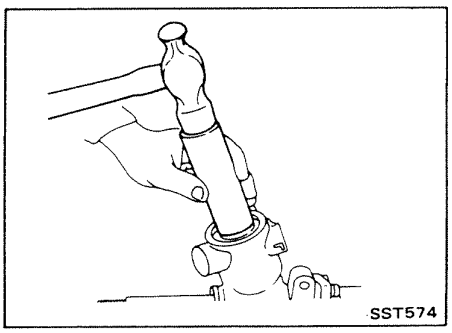
6. Install rear housing cover assembly to pinion.

Wrap cellophane tape around pinion serrations to prevent rear oil seal from being damaged.

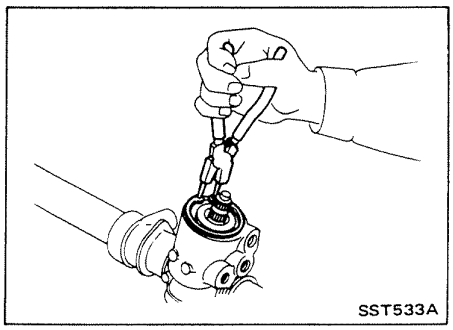


7. Install pinion assembly to pinion housing.

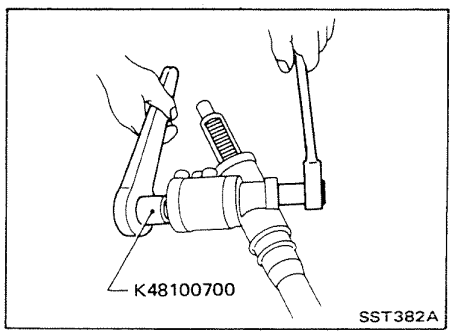
Be careful not to damage pinion oil seal.



8. When installing pinion assembly, use suitable tool.



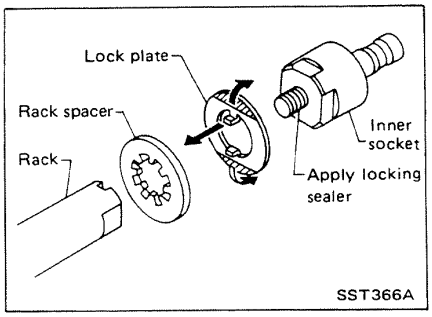
9. Install snap ring.



10. Tighten self-lock nut with Tool.

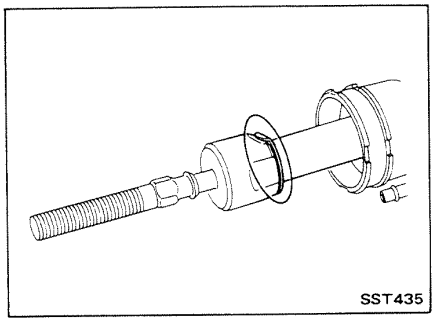
Assembly (Cont'd)

11. Install retainer, retainer spring, gasket and retainer cover.



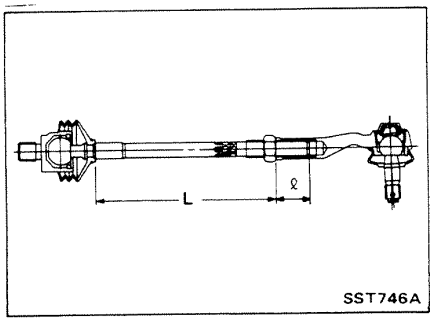
12. Apply locking sealer to threaded portion of inner socket and install inner socket to rack end together with new lock plate.

Be sure lock plate ratchet enters groove at end portion of rack so that rack and inner socket fit snugly.



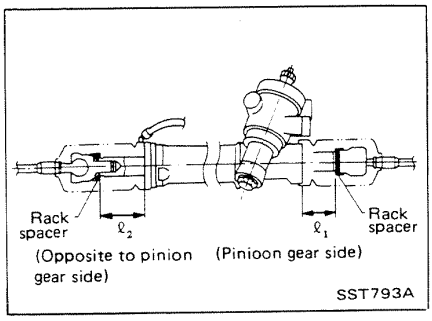
13. Tighten inner socket and securely bend lock plate at 2 cutout portions of inner socket.

To prevent damage to boot, remove burrs after bending lock plate.



14. Tighten outer socket lock nut.

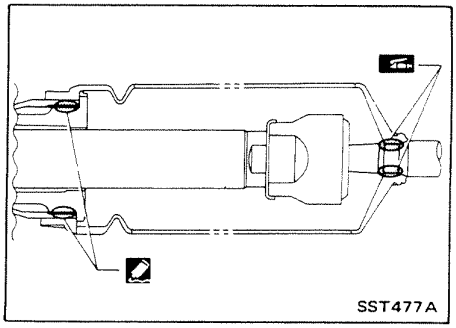
Tie-rod length "L":
176.4 mm (6.94 in)
Screwed length "ℓ":
25 mm (0.98 in) or more



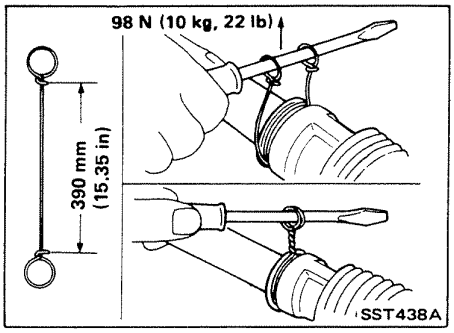
15. Measure rack stroke.

Measure length "ℓ_1 & ℓ_2":
ℓ_1: 52.5 mm (2.067 in)
ℓ_2: 65.5 mm (2.579 in)

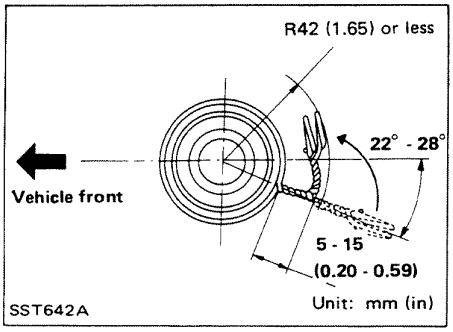
Assembly (Cont'd)



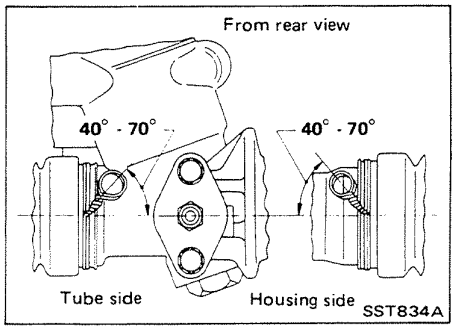
16. Apply a coat of sealant to contact surfaces between boot and cylinder before installing boot.



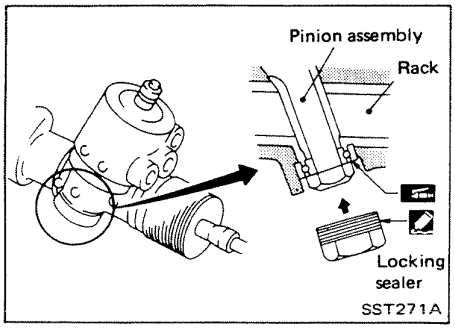
17. Install boot clamps.
- To install, wrap boot clamp around boot groove twice. Tighten clamp by twisting rings at both ends four or four and a half turns with screwdriver while pulling with a force of approx. 98 N (10 kg, 22 lb).



- Install boot clamp so that it is to the rear of the vehicle when gear housing is attached to the body. (This will avoid interference with other parts.)



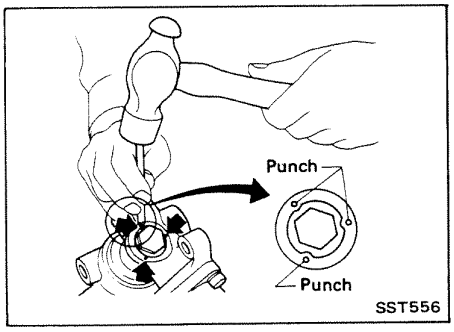
- After twisting boot clamp four or four and a half turns, bend twisted end diagonally so it does not contact boot.



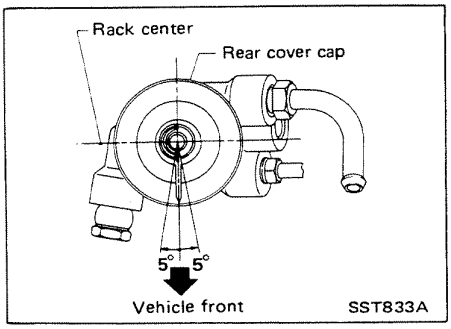
18. Apply grease to pinion bearing, coat threads of housing plug with locking sealer, and tighten plug.

Assembly (Cont'd)

19. Stake housing plug at three places with a punch.



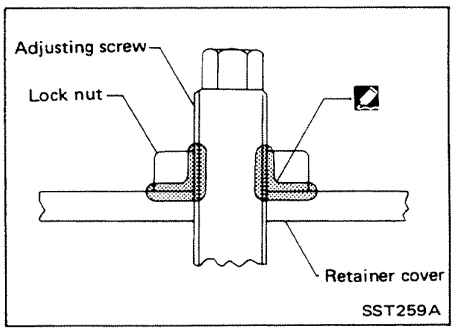
20. Set rear cover cap in neutral position.



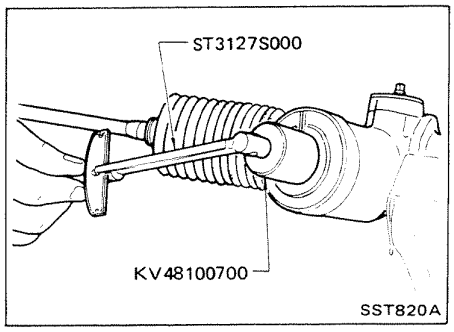
Adjustment

Adjust pinion rotating torque as follows.

1. Set gears to Neutral.
2. Tighten adjusting screw one or two times to a torque of 4.9 N·m (50 kg-cm, 43 in-lb).
3. Loosen adjusting screw, then retighten it to 0.05 to 0.20 N·m (0.5 to 2 kg-cm, 0.43 to 1.74 in-lb).



4. Apply a coat of locking sealer to adjusting screw and lock nut.
   - Shaded areas shown in the figure at left refer to portions that should be coated with sealer.
5. Prevent adjusting screw from turning, and tighten lock nut to specified torque.



Adjustment (Cont'd)

6. Move rack over its entire stroke several times.
7. Measure pinion rotating torque within the range of ±100° from neutral position.

   Average rotating torque:
   [(Max. value + Min. value) x 0.5]
   0.8 - 1.3 N·m
   (8 - 13 kg-cm, 6.9 - 11.3 in-lb)
   Max. rotating torque:
   1.9 N·m (19 kg-cm, 16 in-lb) or less
8. If pinion rotating torque is not within the specifications, readjust.

Inspection

Thoroughly clean all parts in cleaning solvent or automatic transmission fluid "Dexron Type", and blow dry with compressed air, if available.

BOOT

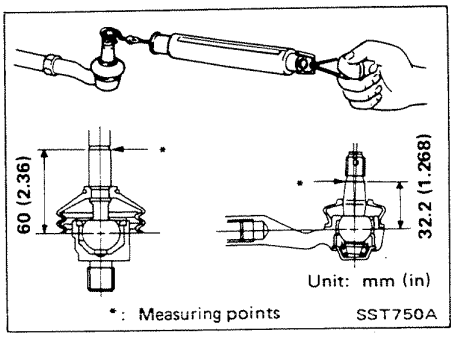
Check condition of boot. If it is cracked excessively, replace boot.

RACK

Thoroughly examine rack gear. If rack gear is damaged, cracked or worn, replace.

PINION ASSEMBLY

- Thoroughly examine pinion gear. If pinion gear is damaged, cracked or worn, replace.
- Inspect bearings to see that they roll freely and are free from cracked, pitted, or worn balls, rollers and races. Replace if necessary.

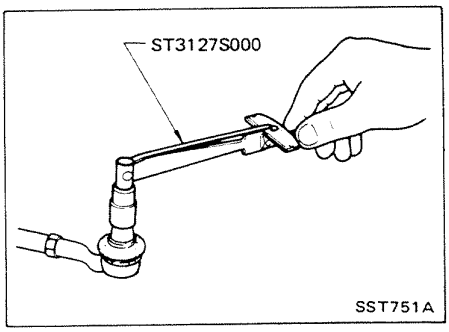


TIE-ROD OUTER AND INNER SOCKET

- Check ball joint for swinging force.

  Tie-rod outer ball joint:
  4.51 - 91.21 N
  (0.46 - 9.3 kg, 1.01 - 20.51 lb)
  Tie-rod inner ball joint:
  1.67 - 122.59 N
  (0.17 - 12.5 kg, 0.37 - 27.56 lb)

Inspection (Cont'd)

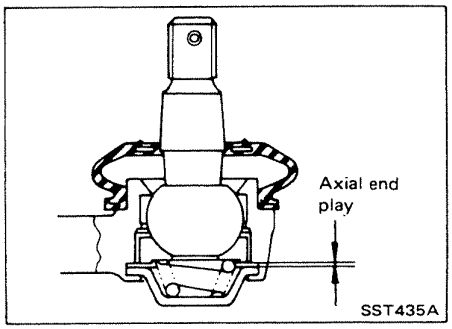


- Check ball joint for rotating torque.

  Tie-rod outer ball joint:

  0.15 - 2.94 N·m

  (1.5 - 30 kg-cm, 1.3 - 26.0 in-lb)



- Check ball joint for axial end play.

  Tie-rod outer ball joint:

  1.3 mm (0.051 in) or less

  Tie-rod inner ball joint:

  0 mm (0 in)

- Check condition of dust cover. If it is cracked excessively, replace it.

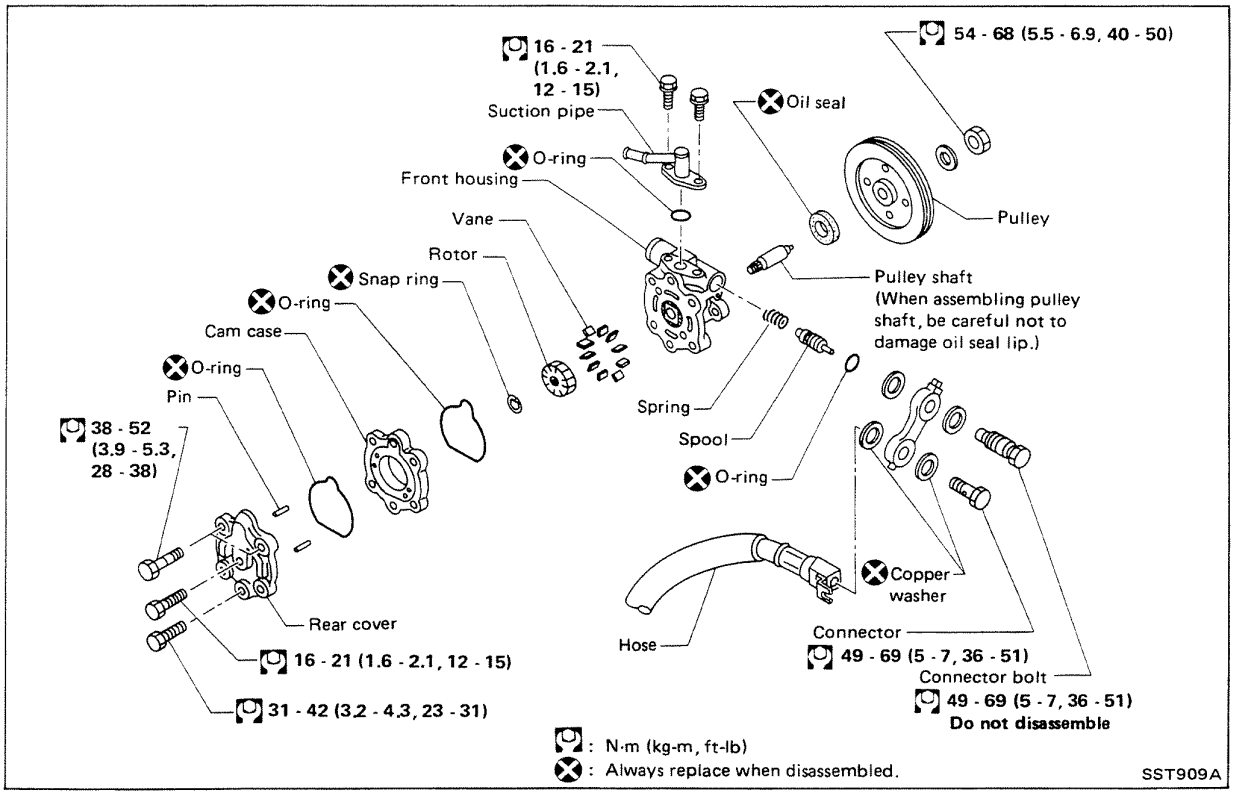
CYLINDER TUBES AND BREATHER HOSE

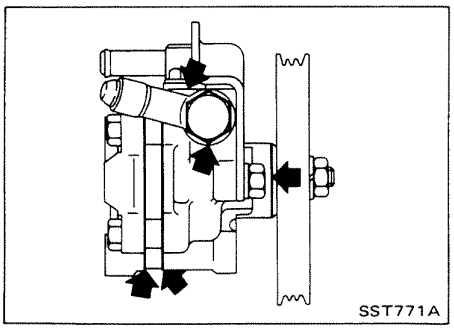
Check cylinder tubes and breather hose for scratches or other damage. Replace if necessary.

STEERING GEAR COMPONENT PARTS

Thoroughly examine steering gear component parts. If parts are damaged, cracked or worn, replace steering gear as an assembly.

Disassembly and Assembly





Pre-disassembly Inspection

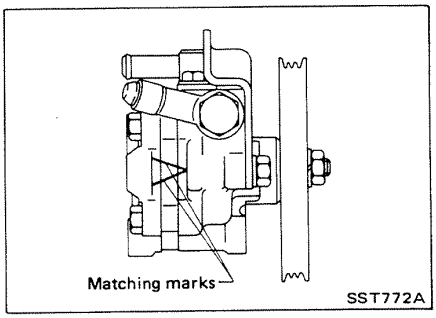
The power steering oil pump should be disassembled only if any of the following phenomena are noted.

- Oil leak as shown in figure.
- Deformed or damaged pulley

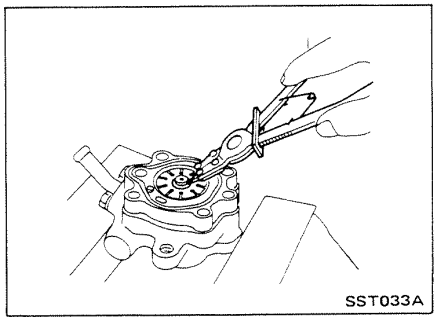
Disassembly

CAUTION:

- The parts which can be disassembled are strictly limited. Never disassemble parts other than the specified ones.
- Disassembly should be performed in a place as clean as possible.
- Hands should be cleaned before disassembly.
- Do not use a rag. Be sure to use nylon or paper cloth.
- Be sure to follow procedures and cautions indicated in the Service Manual.
- When disassembling and reassembling, do not allow any foreign matter to enter or contact any parts.

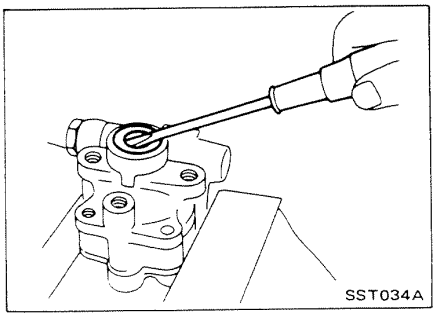


- Inscribe matching marks as shown in figure at left.



- Remove snap ring, then draw pulley shaft out.

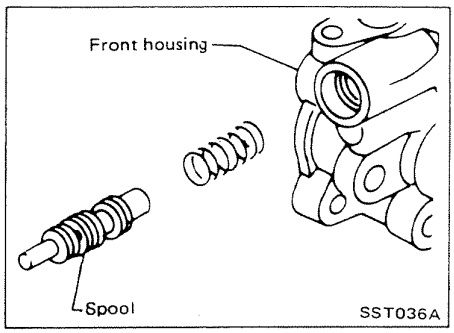
Be careful not to drop pulley shaft.



- Remove oil seal.

Be careful not to damage front housing.

Disassembly (Cont'd)



- Remove connector.

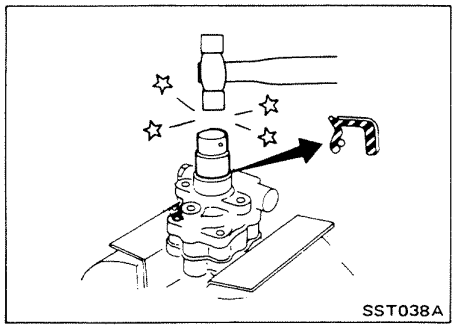
Be careful not to drop spool.

Inspection

Wash all disassembled parts in suitable cleaning solvent.

PULLEY AND PULLEY SHAFT

a. **If pulley is cracked or deformed, replace it.**
b. **If an oil leak is noticed around pulley shaft oil seal, replace it.**
c. **If serration of pulley or pulley shaft is deformed or worn,** replace.

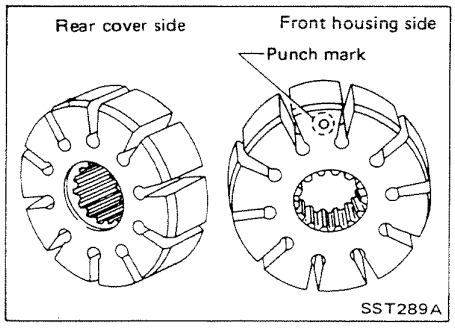


Assembly

Assemble oil pump in the reverse order of disassembly, noting the following instructions.

- Before installing O-rings and oil seal, apply a thin coat of A.T.F.* to them.
- Make certain that O-rings and oil seal are installed properly.
- When assembling vanes to rotor, rounded surfaces of vanes must be facing cam case side.
- Always install new O-rings and oil seal.
- Be careful of oil seal direction.

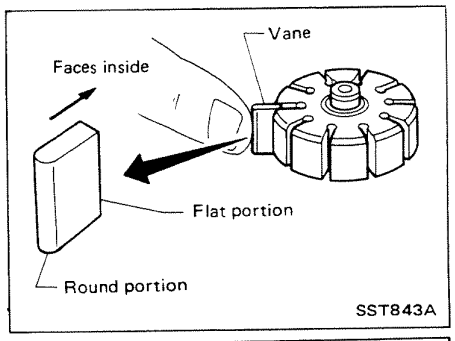
*: Automatic Transmission Fluid



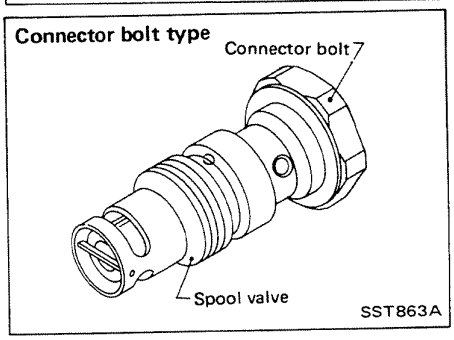
- Pay attention to the direction of rotor.

Assembly (Cont'd)

- Install vanes properly.



CAUTION:
Do not remove spool valve from connector.



General Specifications

Steering model	Power steering
Item	PR24SA
Steering column	Collapsible
Turns of steering wheel (Lock to lock)	2.7

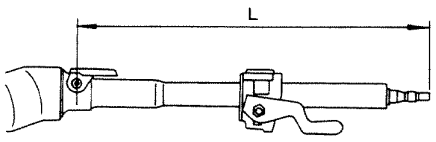
Inspection and Adjustment

GENERAL

Steering wheel axial play mm (in)	0 (0)
Steering wheel play mm (in)	35 (1.38) or less
Movement of gear housing mm (in)	±2 (±0.08) or less

STEERING COLUMN

Steering column length mm (in)	534.7 - 537.3 (21.05 - 21.15)



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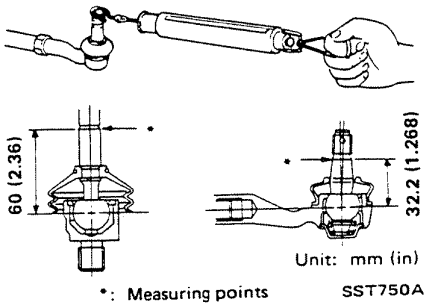
Inspection and Adjustment (Cont'd)

STEERING GEAR AND LINKAGE

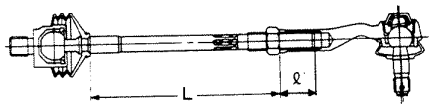
Tie-rod outer ball joint Swing force* N (kg, lb)	4.51 - 91.21 (0.46 - 9.3, 1.01 - 20.51)
Rotating torque N·m (kg-cm, in-lb)	0.15 - 2.94 (1.5 - 30, 1.3 - 26.0)
Axial end play mm (in)	1.3 (0.051) or less
Tie-rod inner ball joint Swinging force* N (kg, lb)	1.67 - 122.59 (0.17 - 12.5, 0.37 - 27.56)
Axial end play mm (in)	0 (0)



Unit: mm (in)

*: Measuring points SST750A

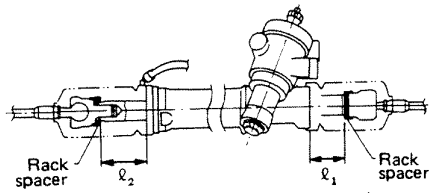
Tie-rod length "L" mm (in)	176.4 (6.94)



SST746A

	Average
Pinion rotating torque (Pinion gear and rack gear assembly) N·m (kg-cm, in-lb)	0.8 - 1.3 (8 - 13, 6.9 - 11.3)
Steering wheel turning force at 360° position from neutral N (kg, lb)	39 (4, 9) or less
Normal operating temperature of fluid °C (°F)	60 - 80 (140 - 176)
Fluid capacity ℓ (Imp qt)	Approximately 0.9 (3/4)
Oil pump maximum standard pressure kPa (kg/cm², psi)	6,375 (65, 924)

Measured length "ℓ_1 & ℓ_2" mm (in) Pinion gear side "ℓ_1"	52.5 (2.067)
Opposite pinion gear side "ℓ_2"	65.5 (2.579)



(Opposite to pinion gear side) (Pinioon gear side)

SST793A

SECTION BF

CONTENTS

BF

★ For seat belt, refer to MA section.
★ "Remarks" and Connections" in electrical diagram show the terminal meaning and actual electrical flow.
★ For connector Nos. in wiring diagrams in this section, refer to Harness Layout in EL section.

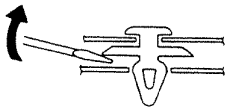
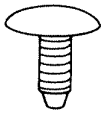
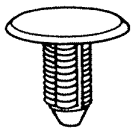
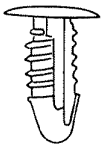
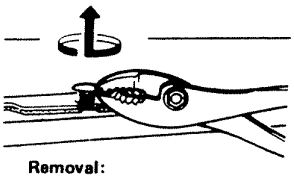
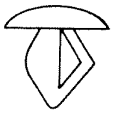
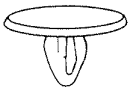
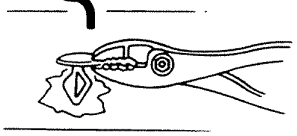
★ Method of reading electrical diagrams in BF section is basically the same as in the EL section.
So refer to "HOW TO READ WIRING DIAGRAM" in GI section.
★ For power supply routing, refer to "POWER SUPPLY" in EL section.

Precautions

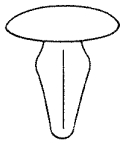
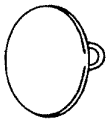
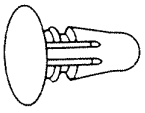
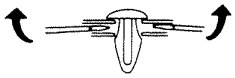
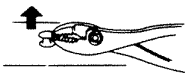
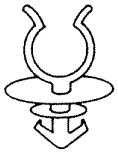
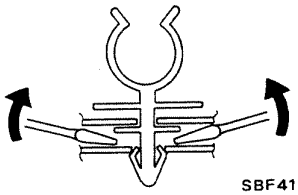
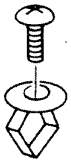
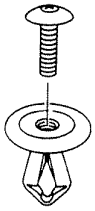
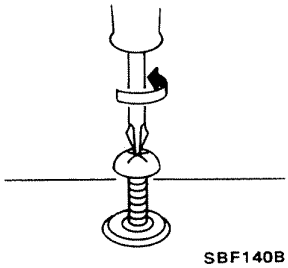
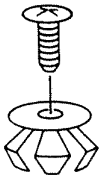
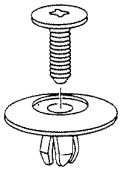
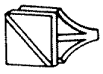
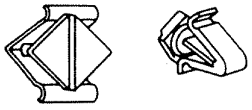
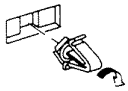
- When removing or installing various parts, place a cloth or padding onto the vehicle body to prevent scratches.
- Handle trim, molding, instruments, grille, etc. carefully during removing or installation. Be careful not to soil or damage them.
- Apply sealing compound where necessary when installing 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

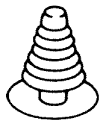
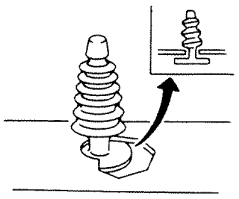
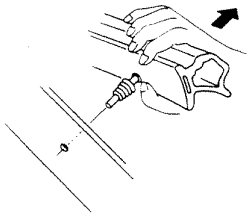
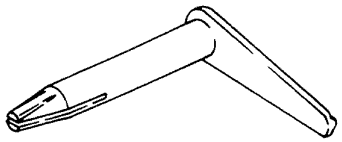
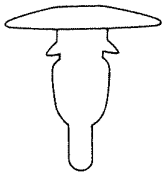
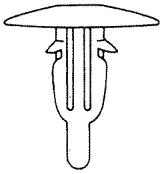
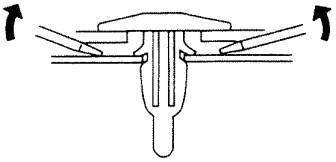
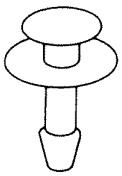
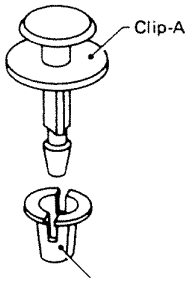
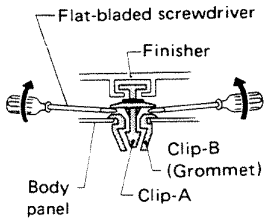
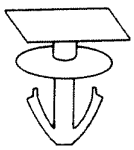
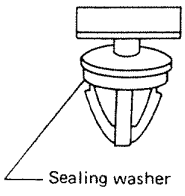
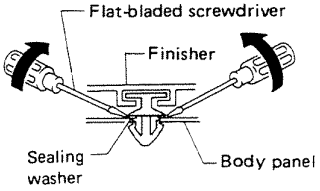
- Clips and fasteners in BF section correspond to the following numbers and symbols.
- Replace any clips and/or fasteners which are damaged during removal or installation.

No.	Symbol	Shape	Removal & Installation
C101	 SBF092B	 SBF109B	**Removal:** **Remove by bending up with a flat-bladed screwdriver.**  SBF094B
C102	 SBF113B	 SBF114B  SBF137B	 **Removal:** **Pull up by rotating** SBF115B
C105	 SBF141B	 SBF142B	**Removal:** **Tilt clip as indicated by arrow, then draw out.**  SBF143B

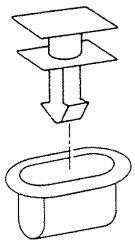
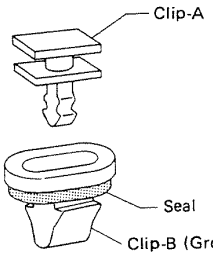
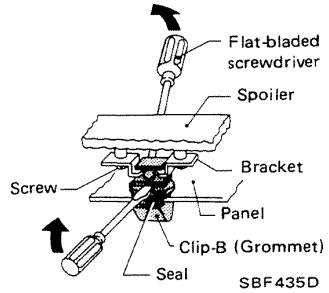
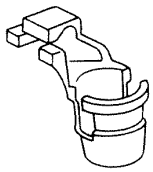
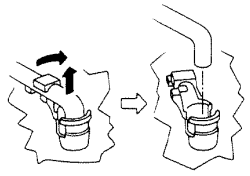
Clip and Fastener (Cont'd)

No.	Symbol	Shape	Removal & Installation
C106	 SBF089B	  SBF090B	**Removal:** **Remove with a flat-bladed screwdrivers or plier.**   SBF091B
C112	 SBF409D	 SBF410D	**Removal:** **Remove by bending up with flat-bladed screwdrivers.**  SBF411D
CS102	 SBF138B	 SBF139B	**Removal:** **Screw out with a Phillips screwdriver.**  SBF140B
CS103	 SBF363B	 SBF364B	
CG101	 SBF144B	 SBF145B	**Removal:**  **Rotate 45° to remove.**  **Removal:** **Installation:**  SBF085B

Clip and Fastener (Cont'd)

No.	Symbol	Shape	Removal & Installation
CE103	 SBF103B	 SBF104B	**Removal:**  SBF147B
CE114	 SBF353C		—
CE117	 SBF173D	 SBF174D	**Removal:** **Remove with a flat-bladed screwdriver or pliers.**  SBF175D
CF113	 SBF035C	 SBF036C	**Removal:**  SBF652B
CF119	 SBF419D	 SBF420D	 SBF421D

Clip and Fastener (Cont'd)

No.	Symbol	Shape	Removal & Installation
CF120	 SBF433D	 SBF434D	 SBF435D
CR103	 SBF768B		**Removal:** **Holder portion of clip must be spread out to remove rod.**  SBF770B

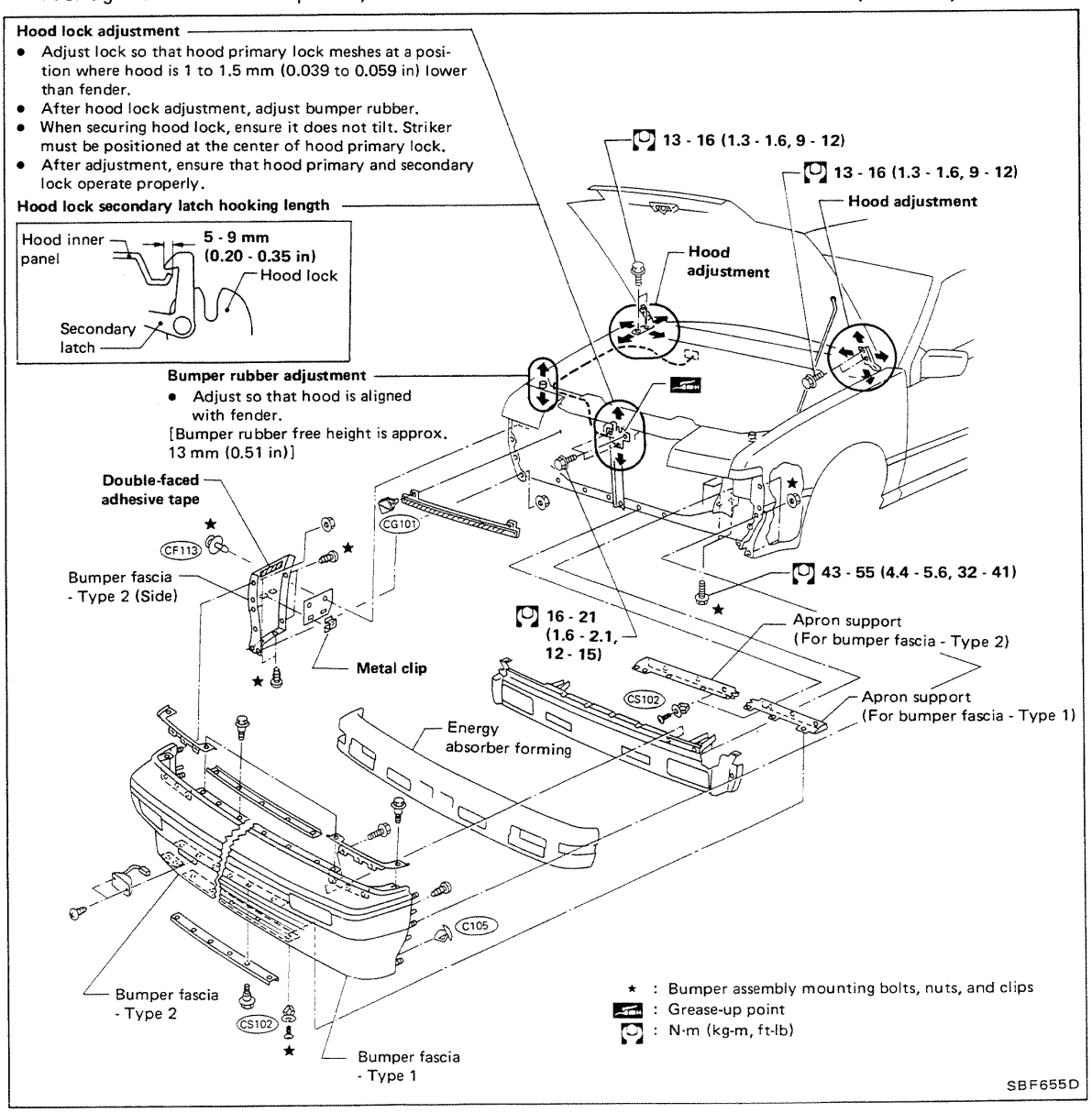
Clip and Fastener (Cont'd)

NOTE:

- When removing and installing hood or back door, place a cloth or other padding on hood 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.

Body 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 lock engaging mechanism.
- Hood lock control cable: 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.
- Front grille: It is made of plastic, so do not use excessive force and take care to keep oil away from it.



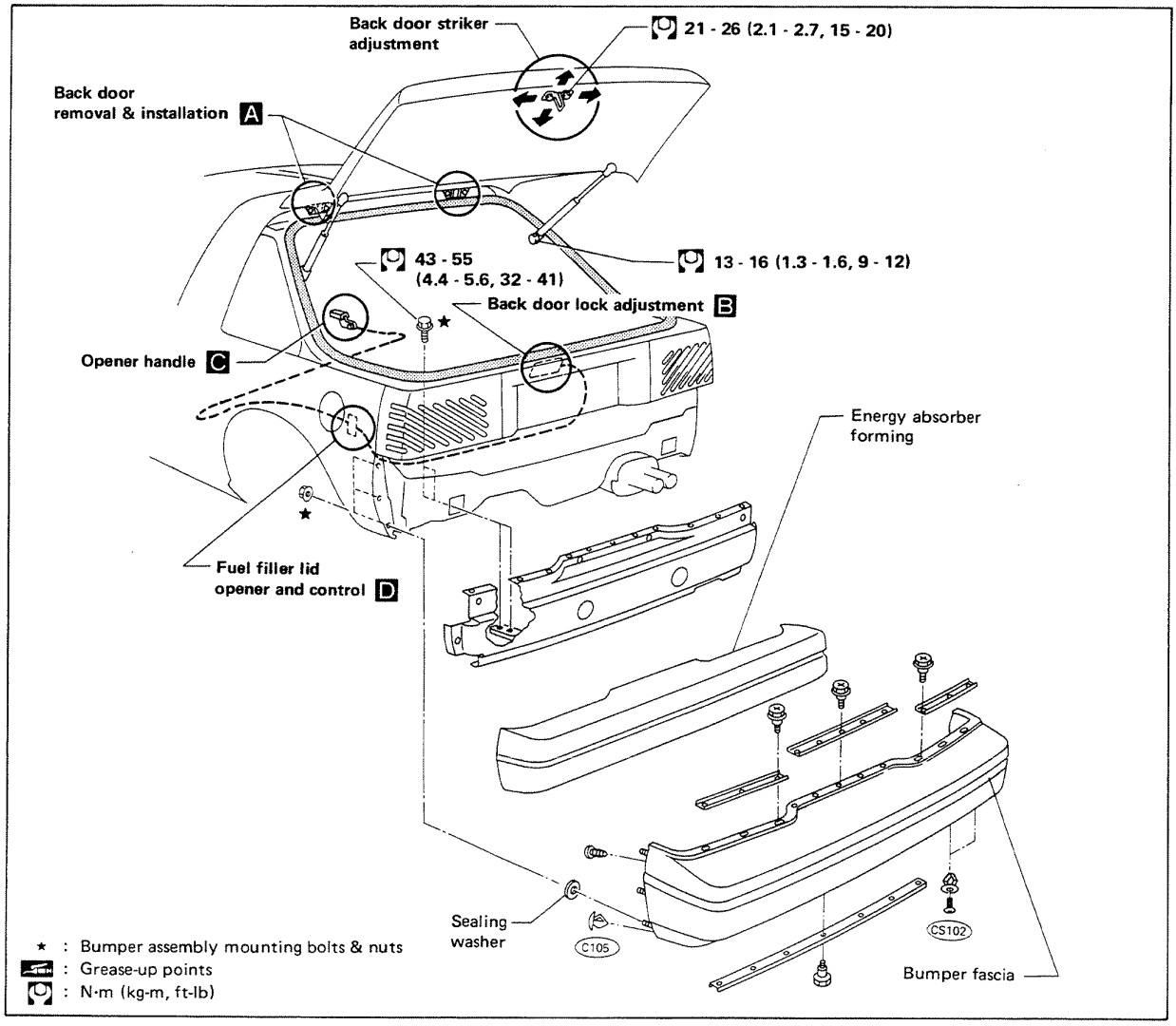
Body Rear End and Opener

- Back door lock system adjustment: Adjust lock & striker so that they are in the center. After adjustment, check back door lock operation.
- Bumper fascia: It is made of plastic, so do not use excessive force and take care to keep oil away from it.
- Opener cable: Do not attempt to bend cable using excessive force.
- After installing/adjusting opener, make sure that back door and fuel filler lid open smoothly.

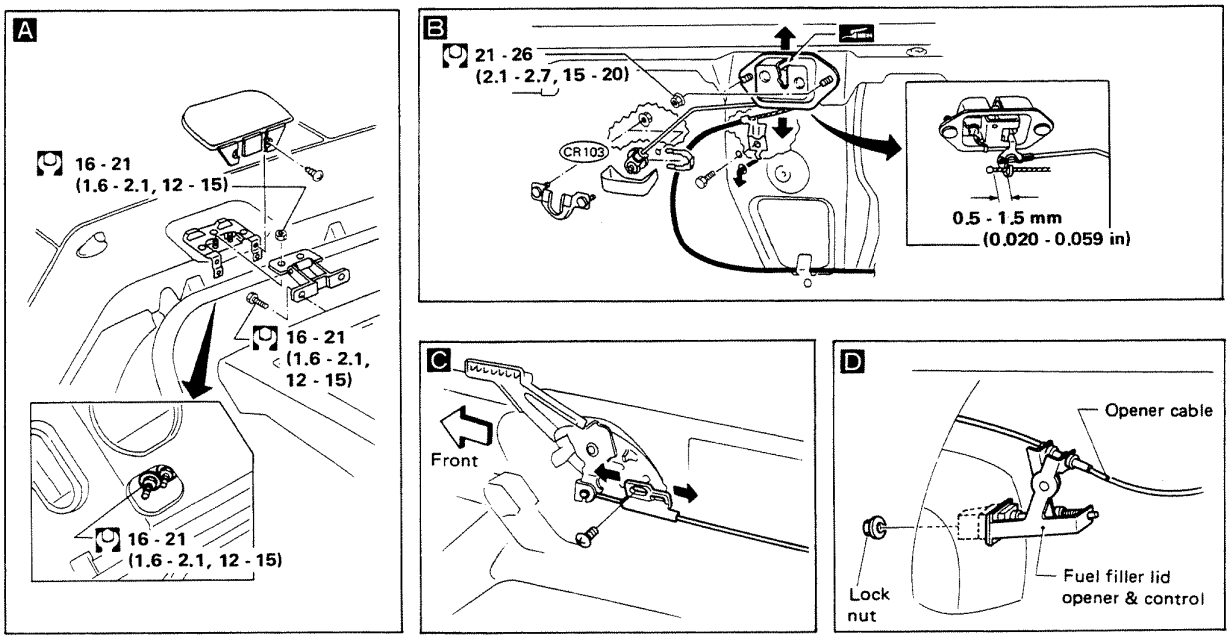
WARNING;

a. **Be careful not to scratch back door stay when installing back door. A scratched stay may cause gas leakage.**

b. **The contents of the back door stay are under pressure. Do not take apart, puncture, apply heat or allow fire near it.**



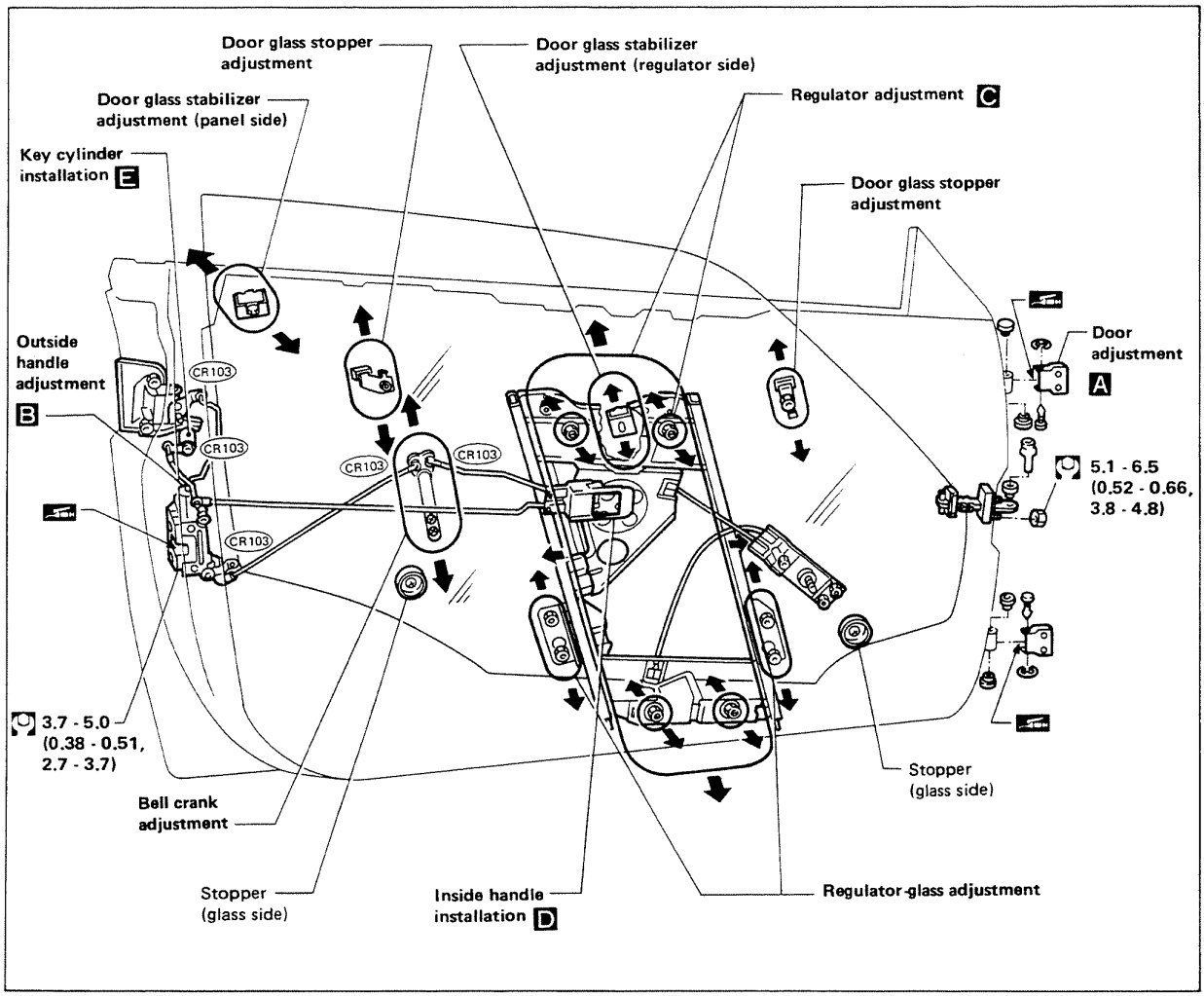
Body Rear End and Opener (Cont'd)

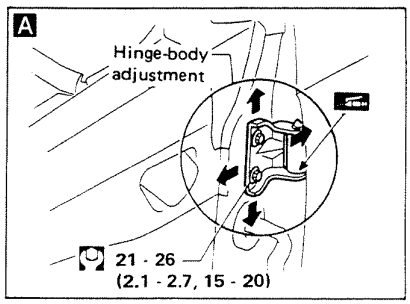


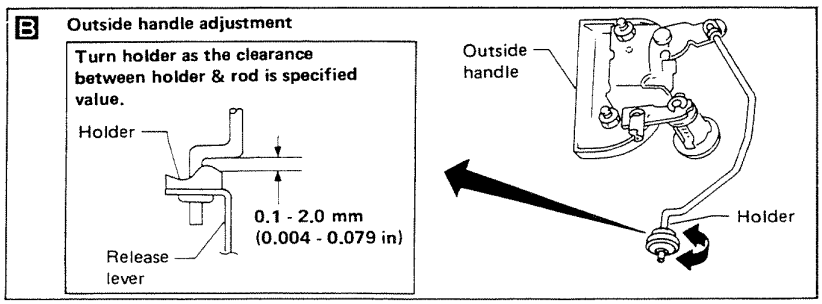
SBF656D

- When removing door, be sure not to scratch vehicle body.
- When removing clip or fastener, refer to CLIP & FASTENER.
- After adjusting door or door lock, check door lock operation.

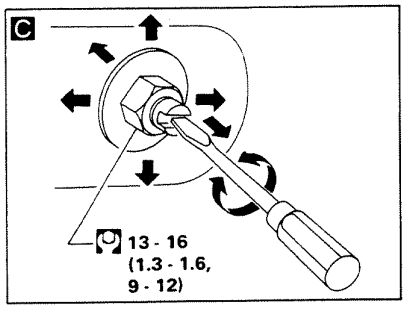
Front Door

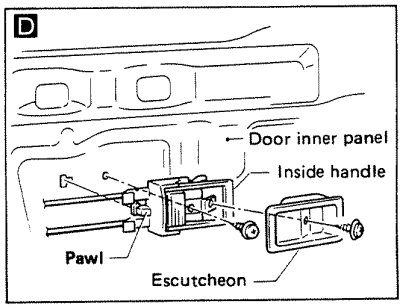


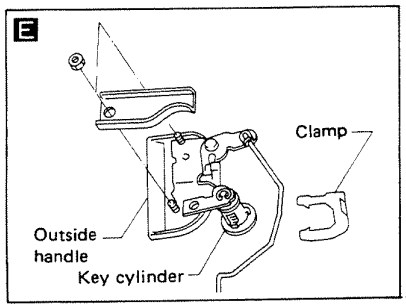


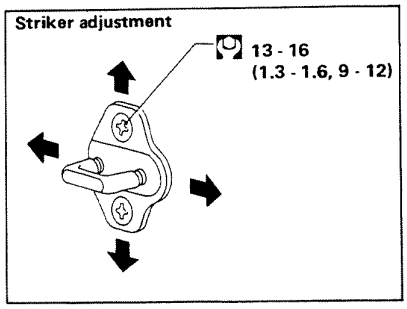


Front Door (Cont'd)





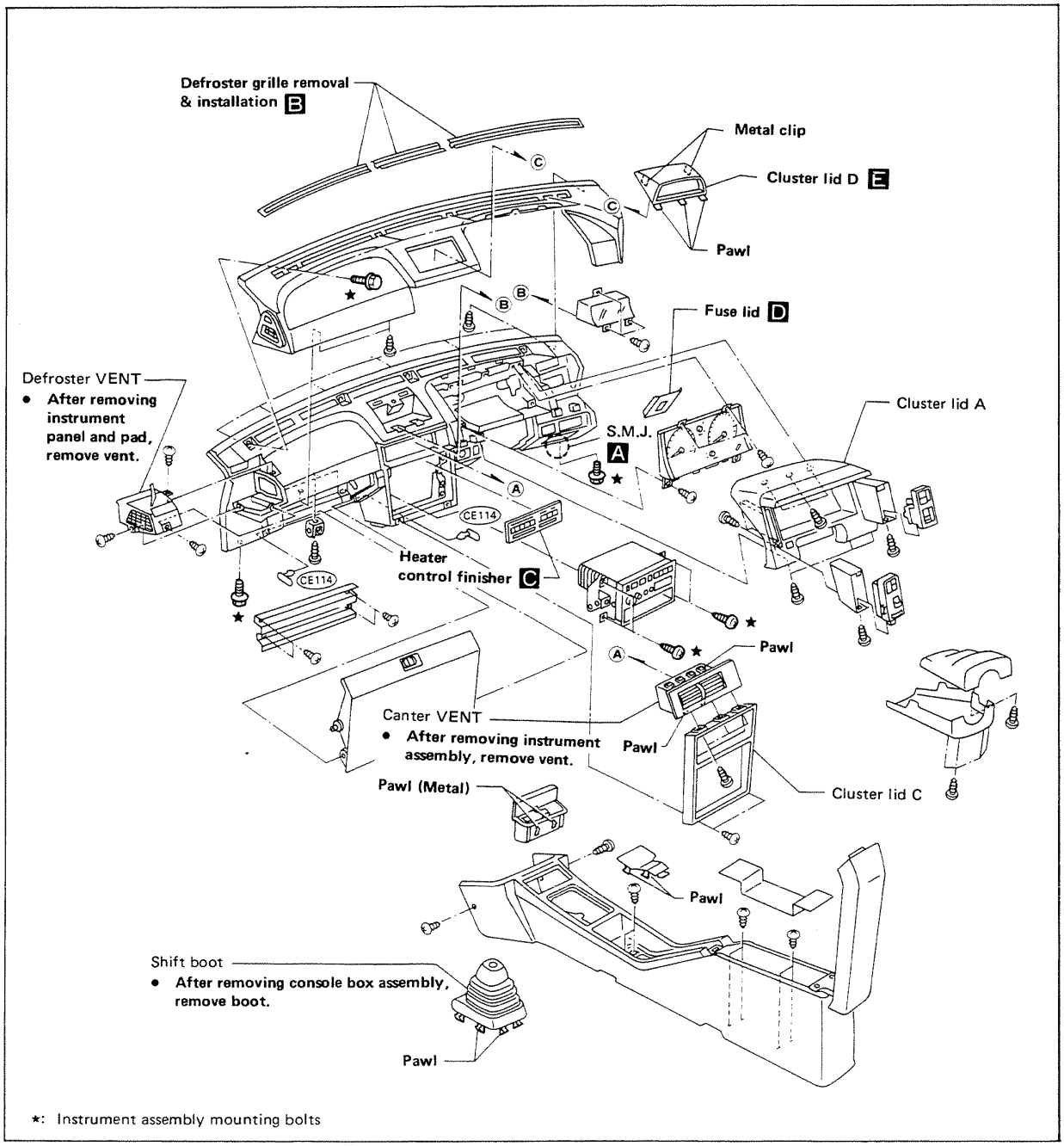




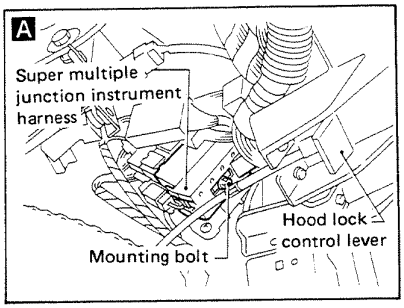
: Grease-up points
: N·m (kg-m, ft-lb)

SBF443D

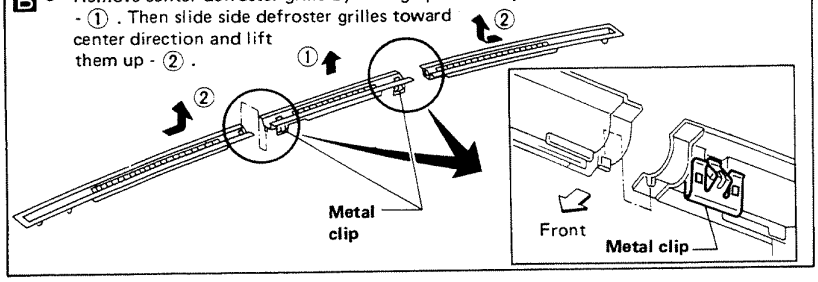
- These parts are made of plastic, so do not use excessive force and be careful not to damage them.
- When removing clip or fastener, refer to CLIP & FASTENER.
- When you remove instrument assembly, you should remove Front defroster grille, Cluster lid A, Combination meter, Cluster lid C, Heater control finisher, Heater control, Radio, S.M.J. and Hood lock control lever first.



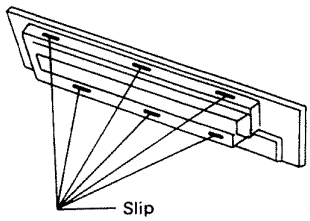
A



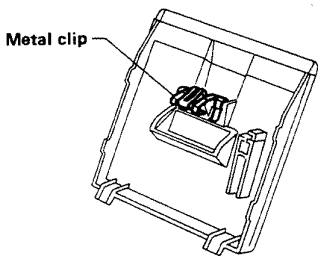
B • Remove center defroster grille by lifting up metal clips with flat-bladed screwdriver - ① . Then slide side defroster grilles toward center direction and lift them up - ② .



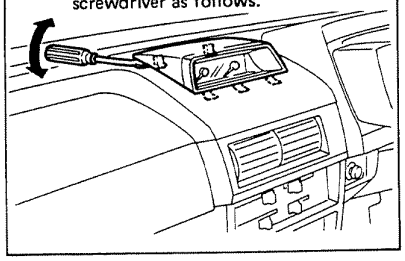
C



D



E • Remove cluster lid D with flat-bladed screwdriver as follows.

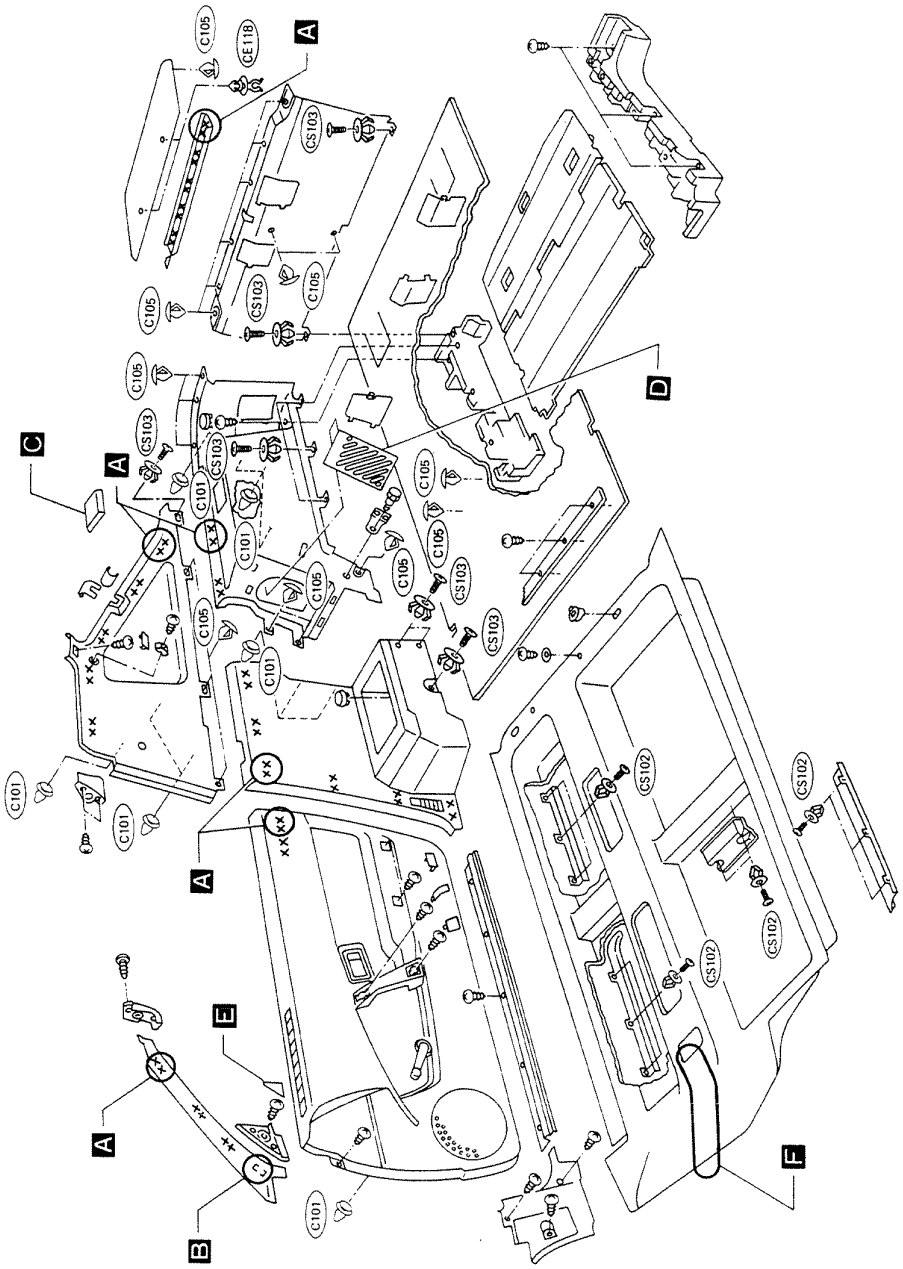


SBF658D

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

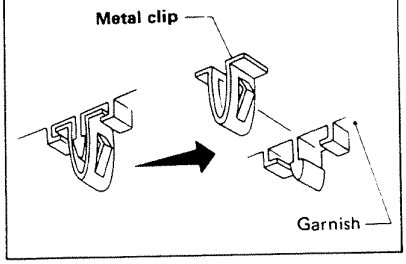
Interior

BODY SIDE, FLOOR AND LUGGAGE ROOM TRIM

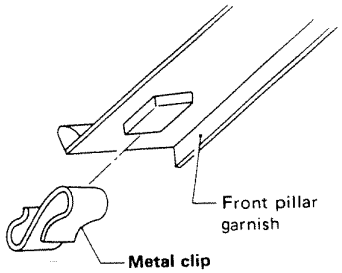


Interior (Cont'd)

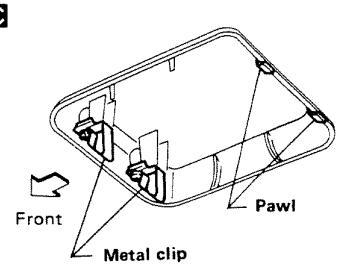
A



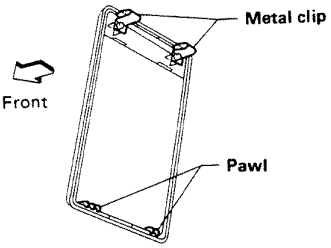
B



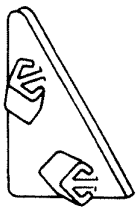
C



D

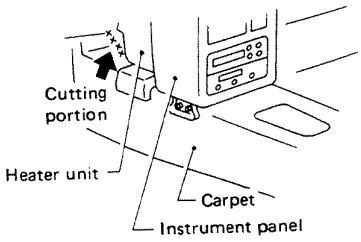


E



F

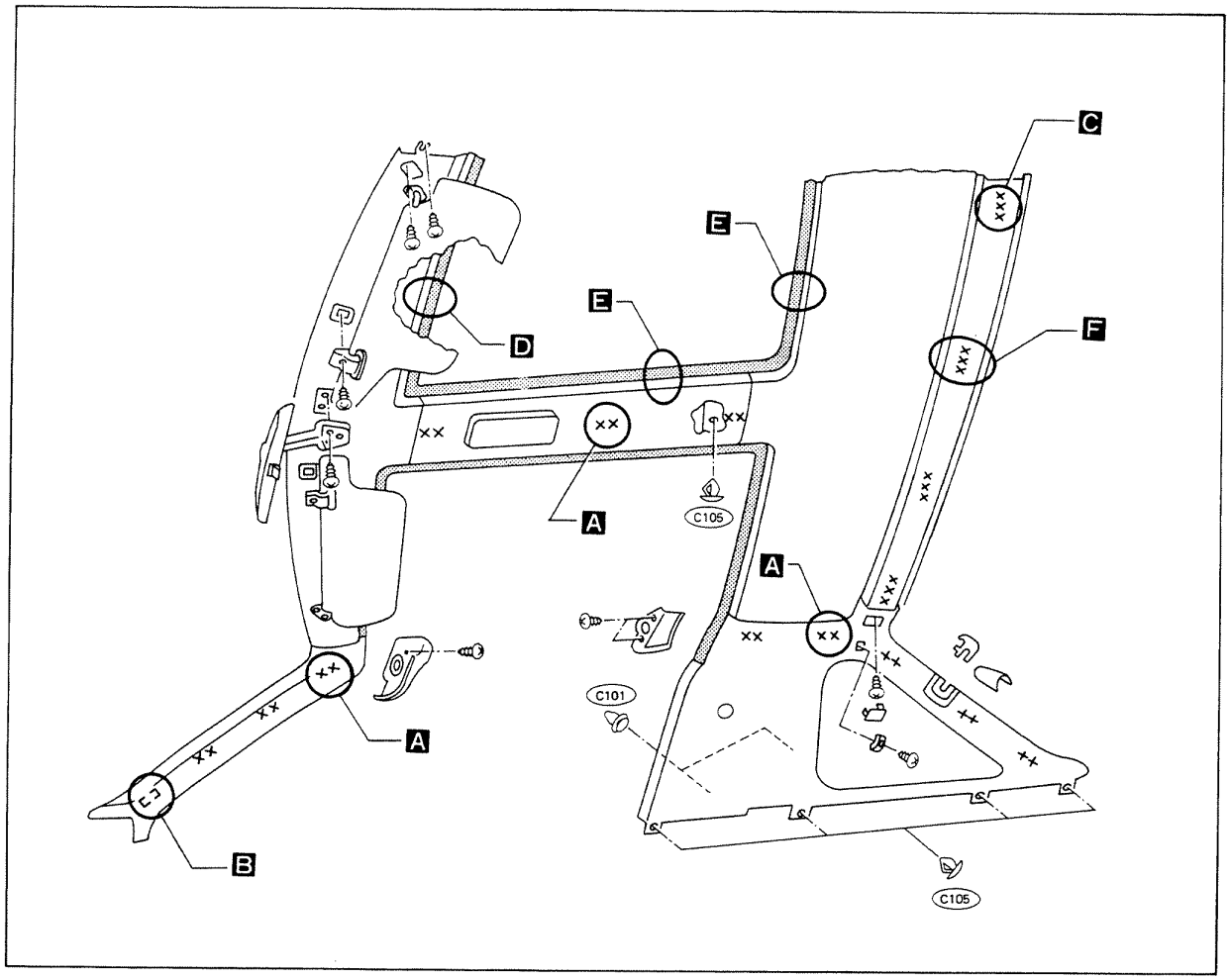
When removing or installing carpet, instrument panel has to be removed or carpet has to be cut at the portion shown by arrow, as carpet is a one-piece design.

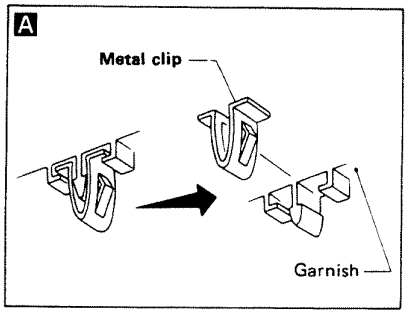


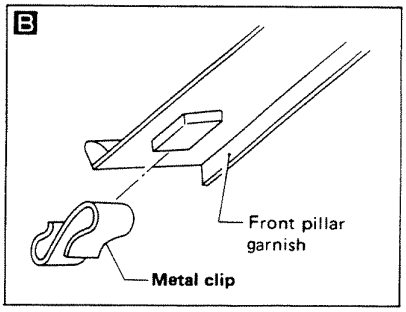
SBF659D

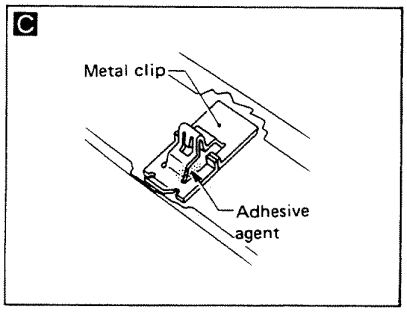
Interior (Cont'd)

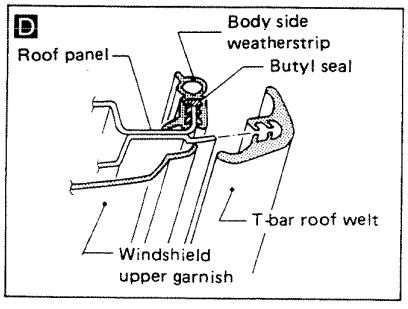
ROOF TRIM

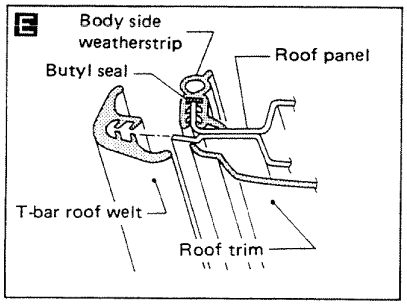


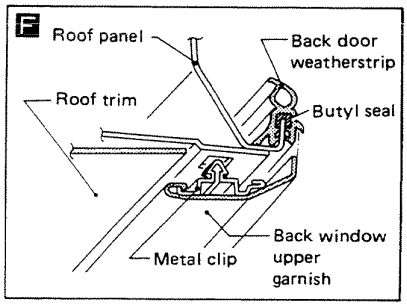








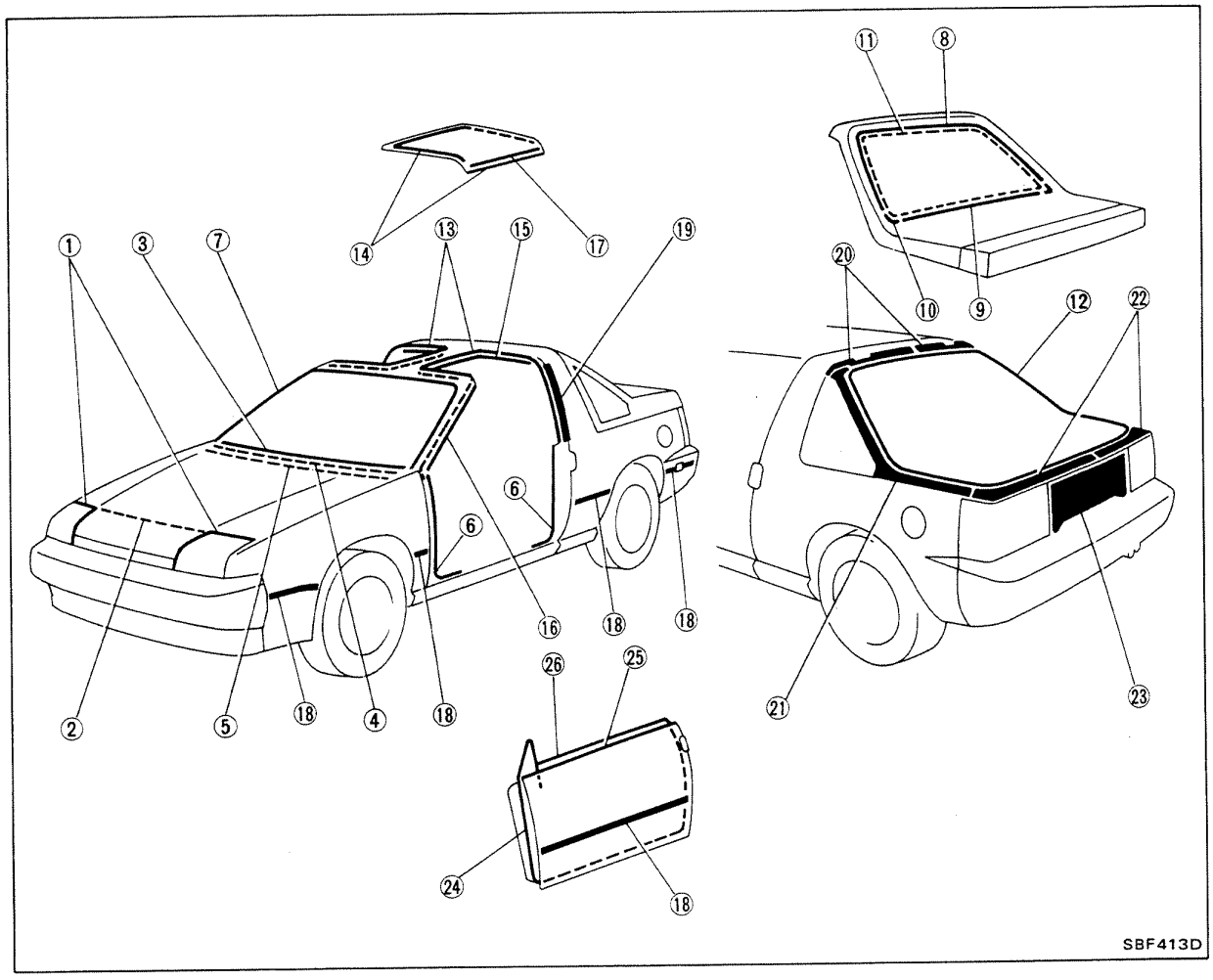




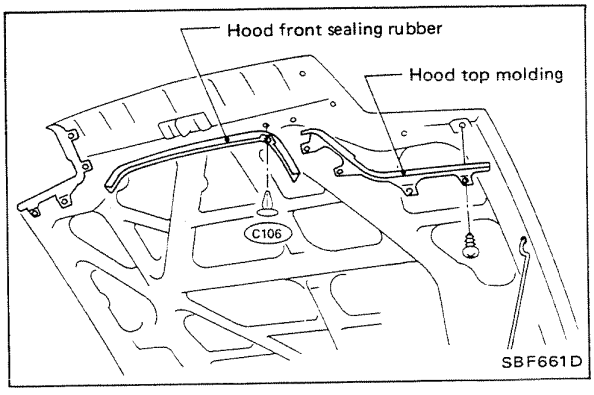
SBF660D

Exterior

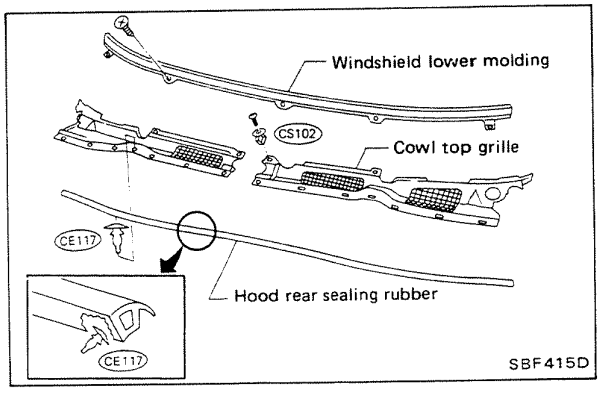
- Apply sealing compound where necessary while installing parts.
- When applying sealing compound, be careful that the sealing compound does not protrude from parts.
- When removing clip or fastener, refer to CLIP & FASTENER.



① ② **Hood top molding and Hood front sealing rubber**

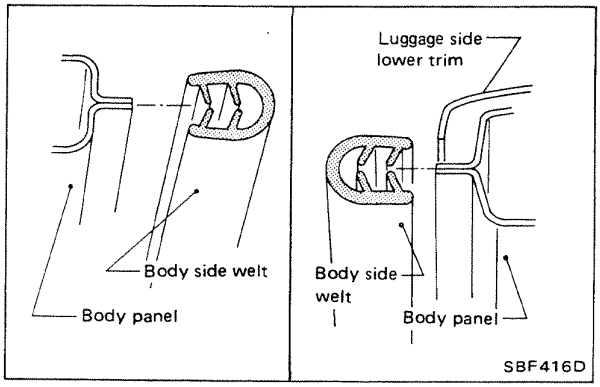


③ ④ ⑤ **Windshield lower molding, Cowl top grille and Hood rear sealing rubber**



Exterior (Cont'd)

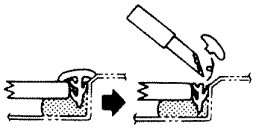
⑥ Body side welt



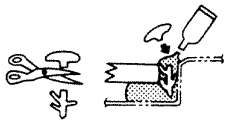
⑦ Windshield upper & side molding

Method 1

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



Apply sealant to top portion of molding.

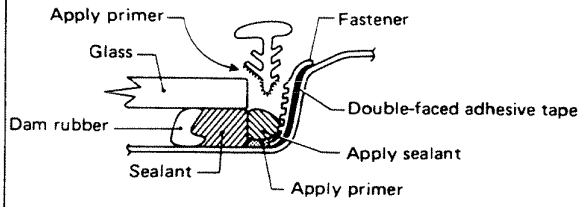


Cut off lower portion of new molding

Finish well to give it a good appearance.

Method 2

1. Cut off sealant at glass end.
2. Clean the side on which panel was mounted.
3. Set molding fastener and apply sealant & primer to body panel, and apply primer to molding.

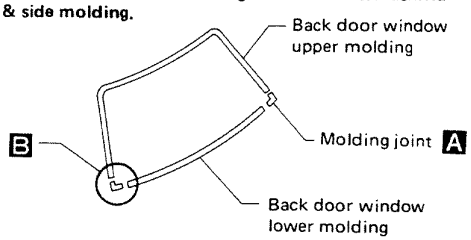


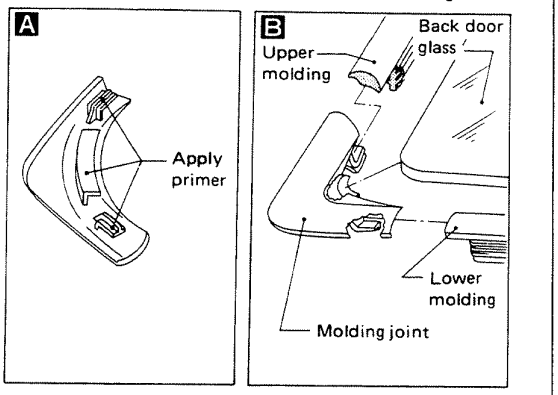
4. Install molding by aligning the molding mark located on center with vehicle center.
   Be sure to install tightly so that there is no gap around the corner.

SBF519B

⑧ ⑨ ⑩ Back door window upper molding, Back door window lower molding and Molding joint

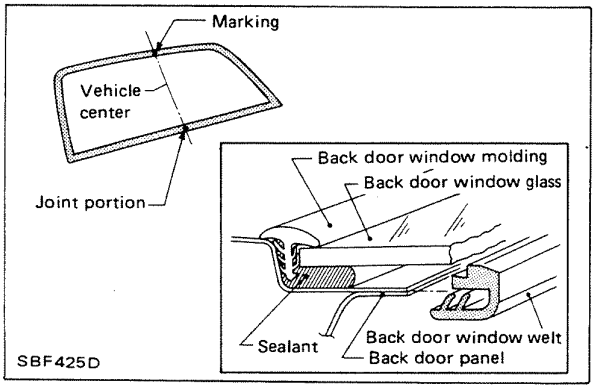
- As for upper and lower molding it is basically same as that of windshield upper & side molding. So refer to **windshield upper & side molding.**



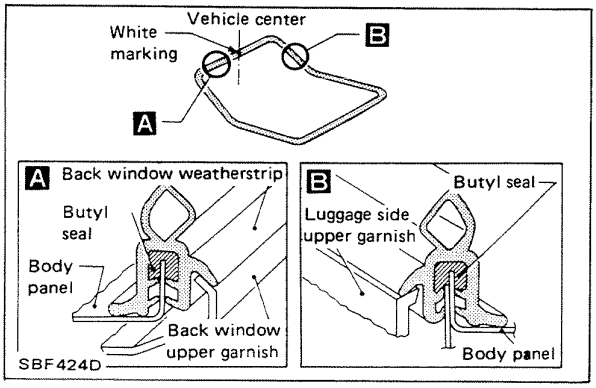


SBF426D

⑪ Back door window welt

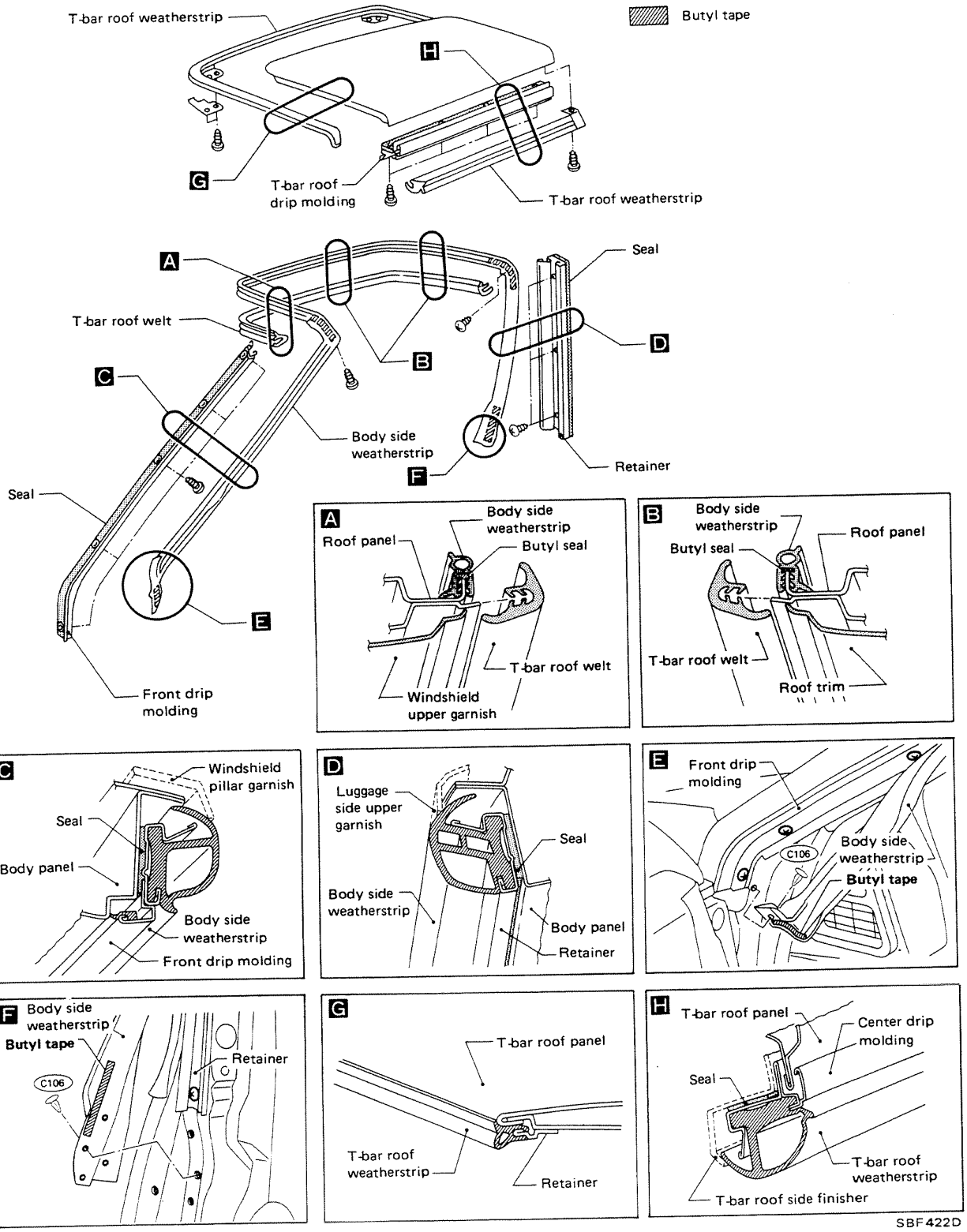


⑫ Back door weatherstrip



Exterior (Cont'd)

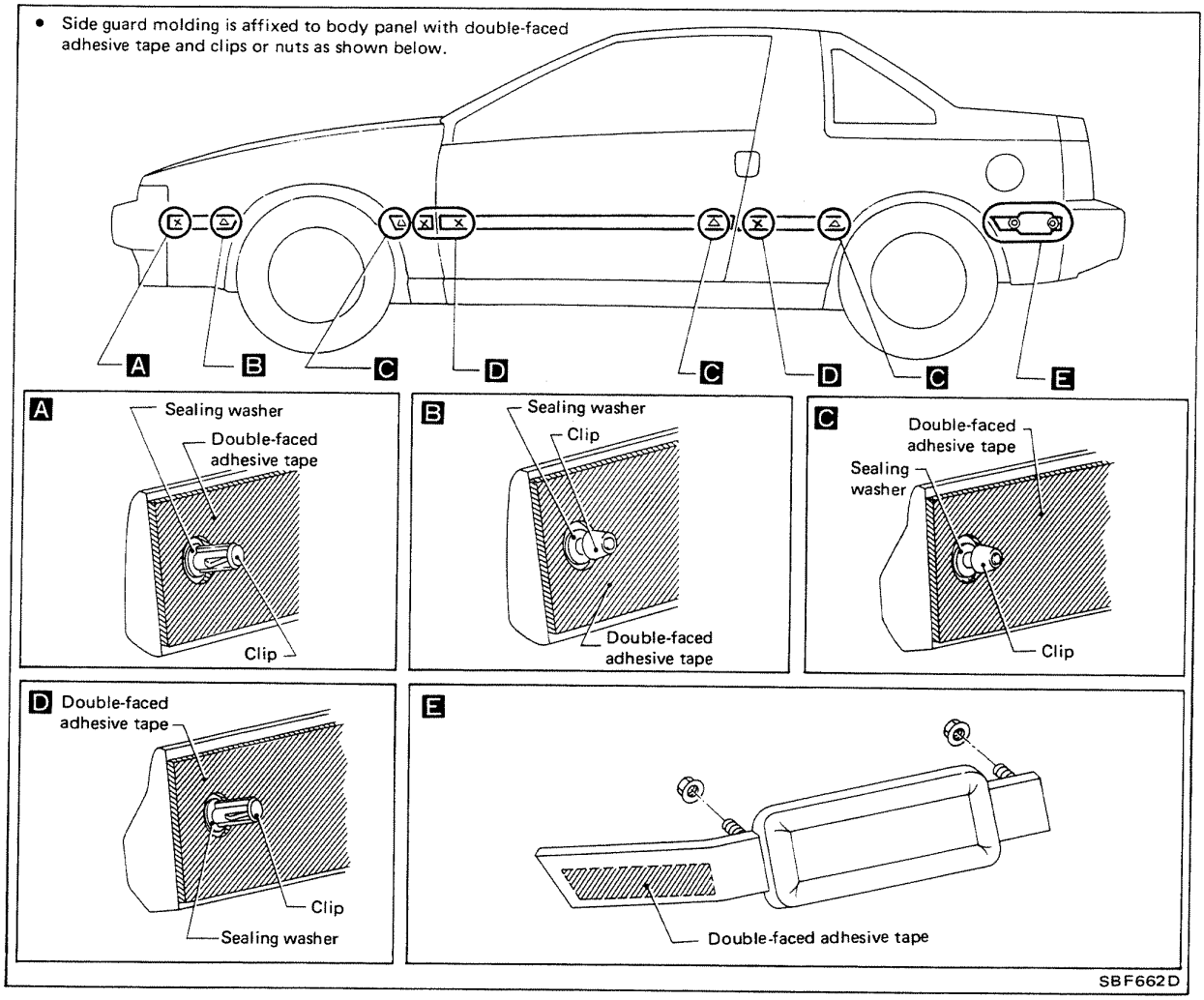
⑬ ⑭ ⑮ ⑯ ⑰ **Body side weatherstrip, T-bar roof weatherstrips, T-bar roof welt, Front drip molding and Center drip molding**



SBF422D

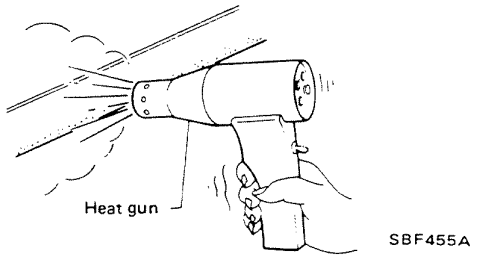
Exterior (Cont'd)

⑱ Side guard molding



- **Removal:**

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



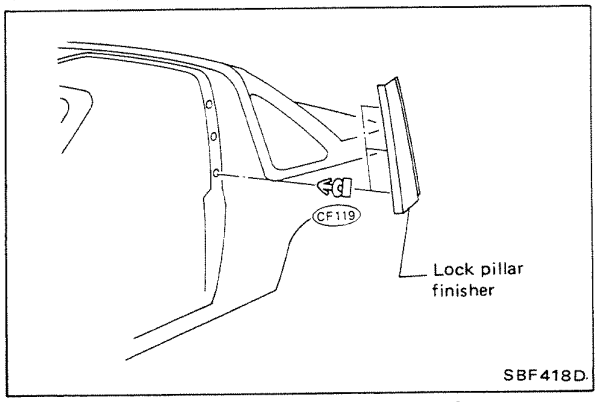
2. Raise end of molding and, while cutting off bonding agent, detach molding.

- **Installation.**

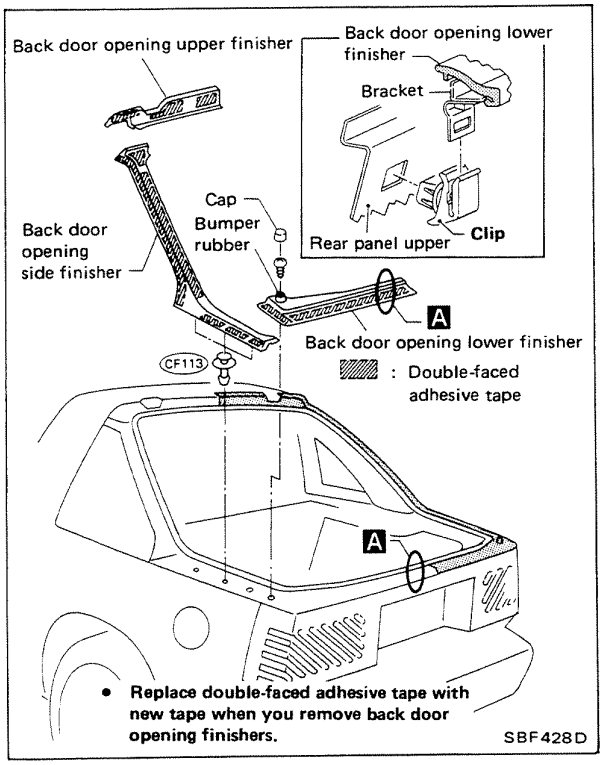
1. Remove all traces of bonding agent from body panel. Then clean contact face of body.
2. Heat body panel and molding to 30 to 40°C (86 to 104°F) with a heat gun. Then install molding.

Exterior (Cont'd)

⑲ Lock pillar finisher

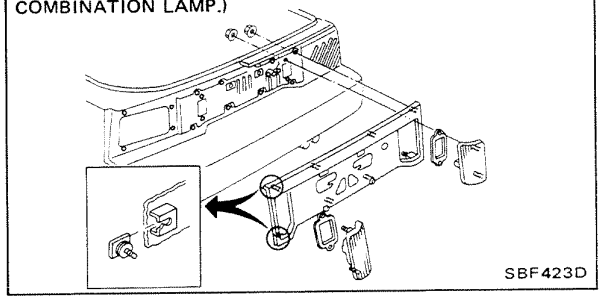


⑳ ㉑ ㉒ Back door opening upper, side and lower finisher

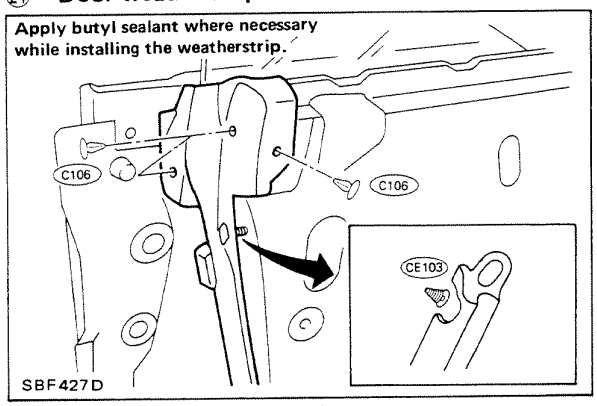


㉓ Rear finisher

Remove rear finisher after removing back door opening side, lower finisher and one side of rear combination lamp. (Refer to back door opening **upper, side and lower finisher** and REAR COMBINATION LAMP.)

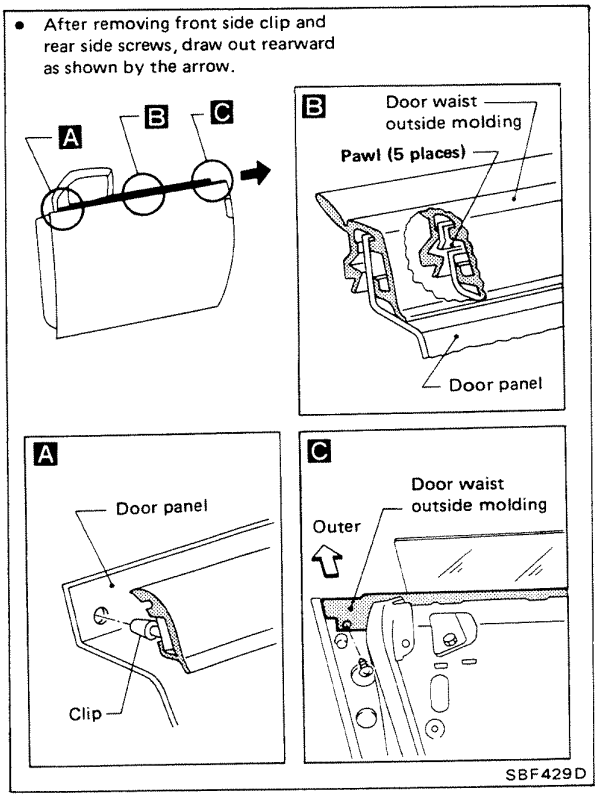


㉔ Door weatherstrip

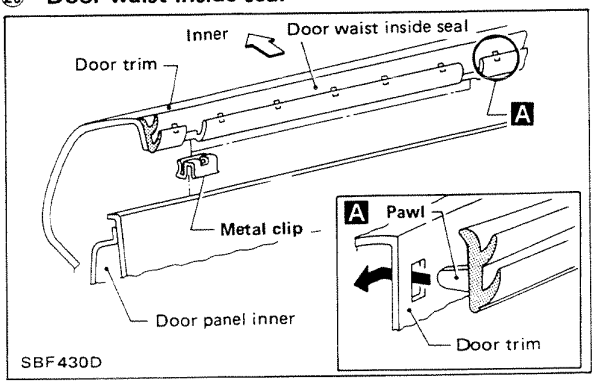


㉕ Door waist outside molding

• After removing front side clip and rear side screws, draw out rearward as shown by the arrow.

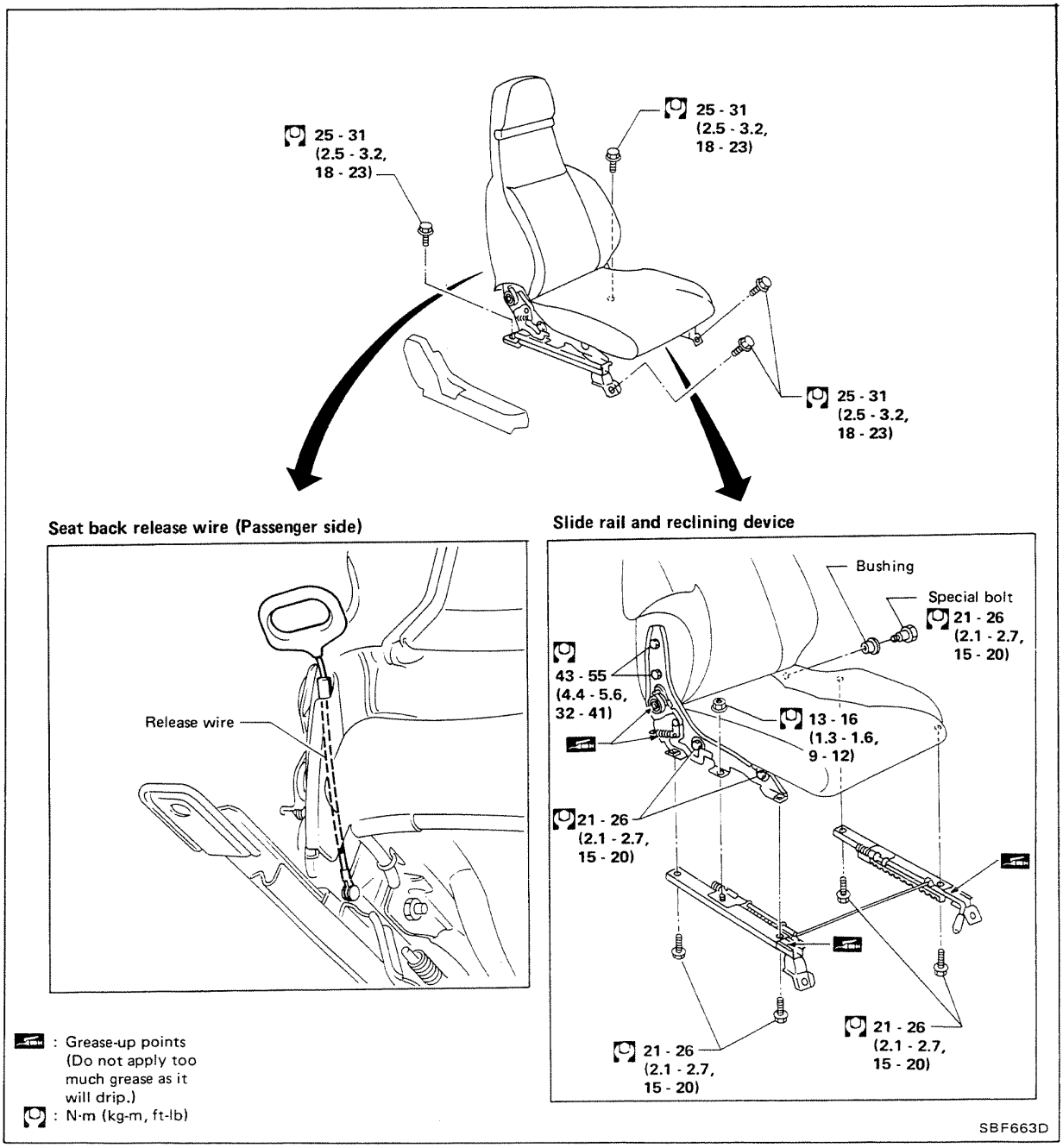


㉖ Door waist inside seal

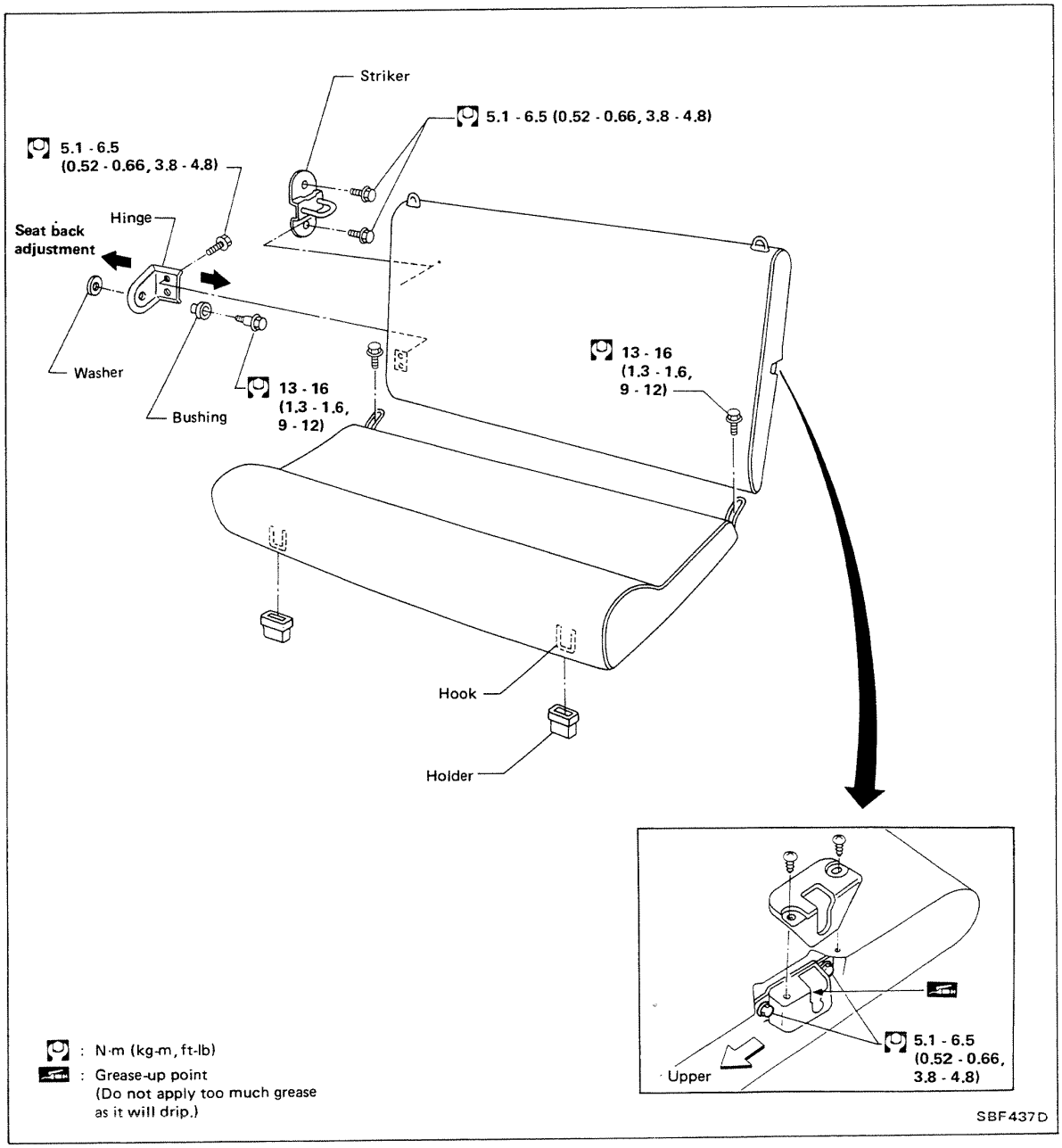


- When removing or installing the seat trim, carefully handle it to keep dirt out and avoid damage.

Front Seat



Rear Seat


Striker
5.1 - 6.5 (0.52 - 0.66, 3.8 - 4.8)
5.1 - 6.5
(0.52 - 0.66, 3.8 - 4.8)
Hinge
Seat back adjustment
Washer
Bushing
13 - 16
(1.3 - 1.6,
9 - 12)
13 - 16
(1.3 - 1.6,
9 - 12)
Hook
Holder
Upper
5.1 - 6.5
(0.52 - 0.66,
3.8 - 4.8)
: N·m (kg-m, ft-lb)
: Grease-up point
(Do not apply too much grease
as it will drip.)
SBF437D

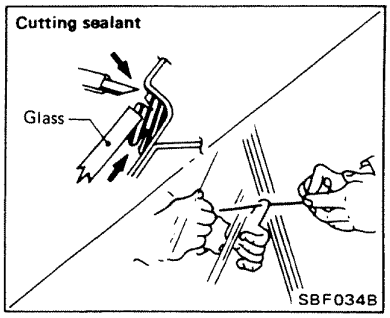
Windshield, Back Door Window and Side Window

Ⓦ : Windshield (Body side)
Ⓑ : Back door window (Body side)
Ⓢ : Side window (Body side)

(W) : Windshield (Glass side)
(B) : Back door window (Glass side)
(S) : Side window (Glass side)

REMOVAL

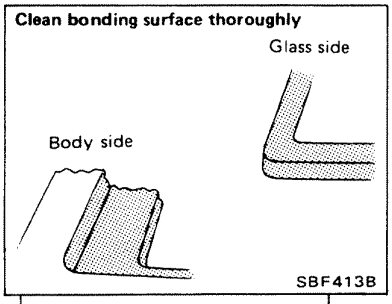
- As for windshield and back door window, after removing moldings, remove glass.



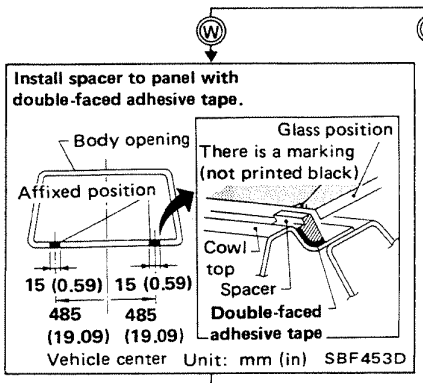
CAUTION:
Be careful not to scratch glass when removing.

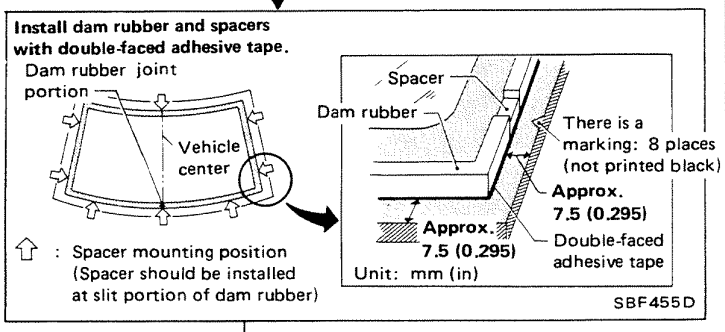
INSTALLATION

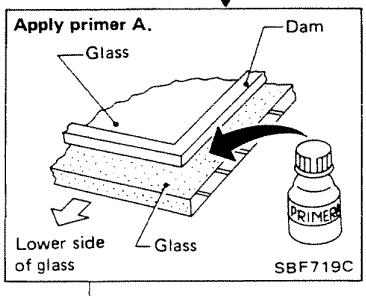
- **Use genuine Nissan Sealant kit or equivalent. Follow instructions furnished with it.**
- **After installation, the vehicle should remain stationary for about 24 hours.**
- **Do not use sealant which is more than 12 months past its production date.**
- **Do not leave cartridge unattended with its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

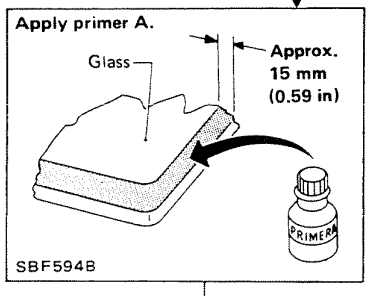


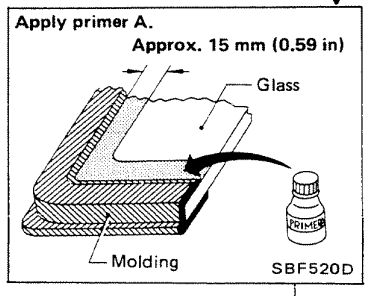
WARNING:
Keep heat or open flames away as primers are flammable.











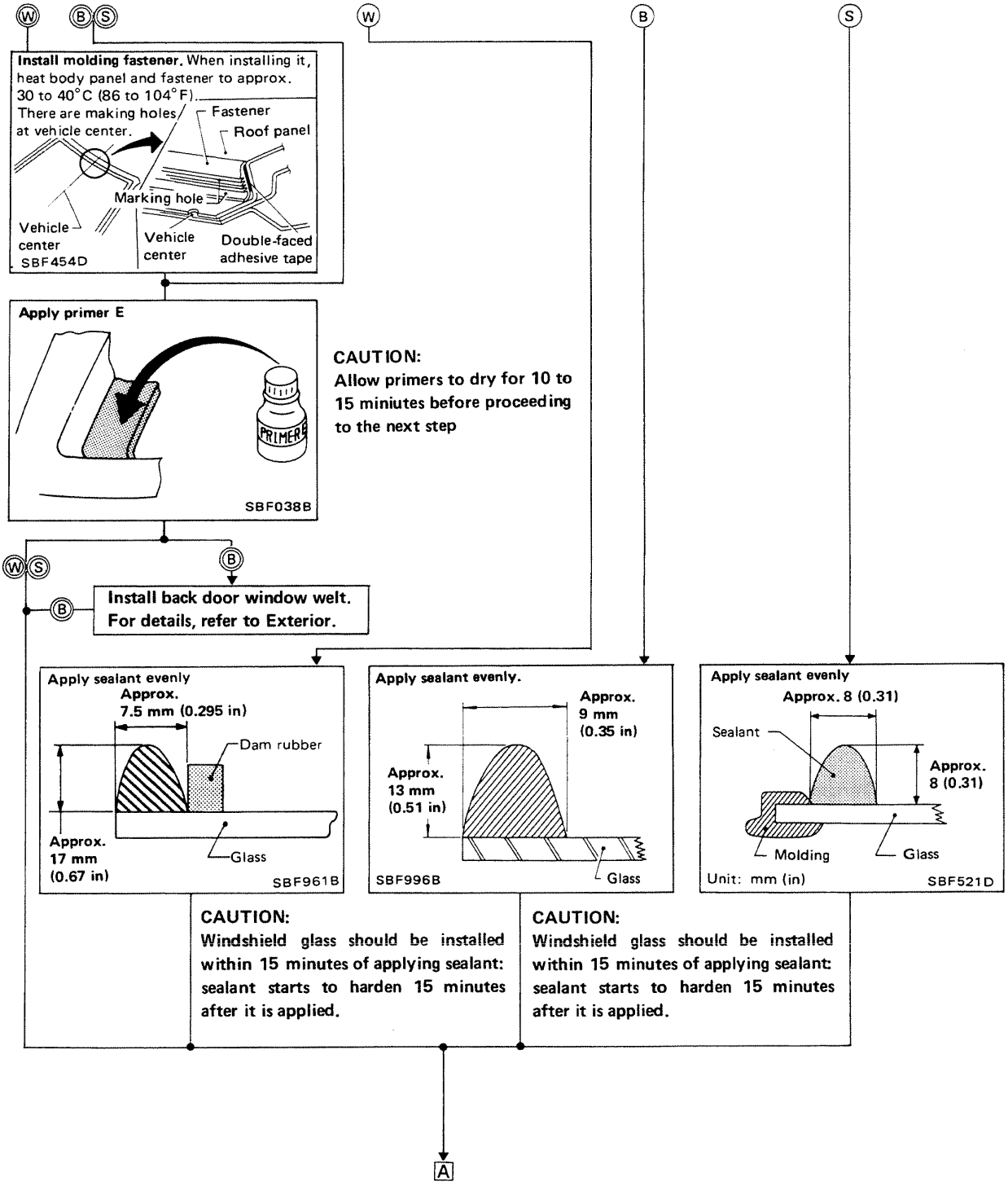
CAUTION:
Allow primers to dry for 10 to 15 minutes before processing to the next step.

CAUTION:
Allow primers to dry for 10 to 15 minutes before processing to the next step.

Windshield, Back Door Window and Side Window (Cont'd)

Ⓦ : Windshield (Body side)
Ⓑ : Back door window (Body side)
Ⓢ : Side window (Body side)

Ⓦ : Windshield (Glass side)
Ⓑ : Back door window (Glass side)
Ⓢ : Side window (Glass side)

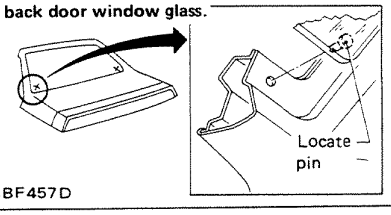


Windshield, Back Door Window and Side Window (Cont'd)

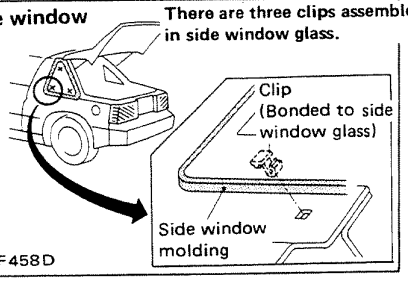
A

Set glass in position and press glass lightly and evenly.

Back door window
There are two locate pins assembled at lower corner of back door window glass.



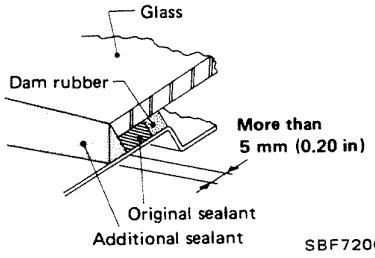
Side window There are three clips assembled in side window glass.



Windshield

Back door window and Side window

Apply additional sealant uniformly to the lower portion of glass, as shown below.



Check for water leakage.

CAUTION:
For sealant drying period, refer to DRYING PERIOD OF SEALANT.

Windshield

Apply sealant to upper & side molding fixing portion.

Set upper & side molding.

Install lower molding.

Back door window

Apply sealant to upper and lower molding fixing portion.

Set upper molding, lower molding and molding joint.

CAUTION:
Molding must be installed securely so that it is in position and leaves no gap.

For details of moldings, refer to EXTERIOR.

Drying Time of Sealant

- Chart below shows period requied for sealant to dry desired handness.

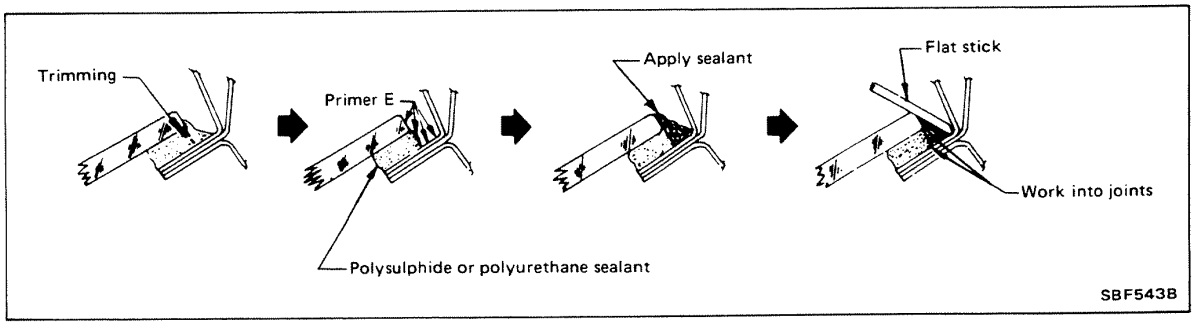
Unit: days

		Windshield			Back door window			Side window		
	Relative humidity %	90	50	25	90	50	25	90	50	25
Temperature °C (°F)	25 (77)	1.0	1.8	3.5	0.8	1.4	2.7	1.1	1.9	3.7
	5 (41)	2.2	6.0	9.6	1.7	4.6	7.4	2.3	6.3	10.0

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

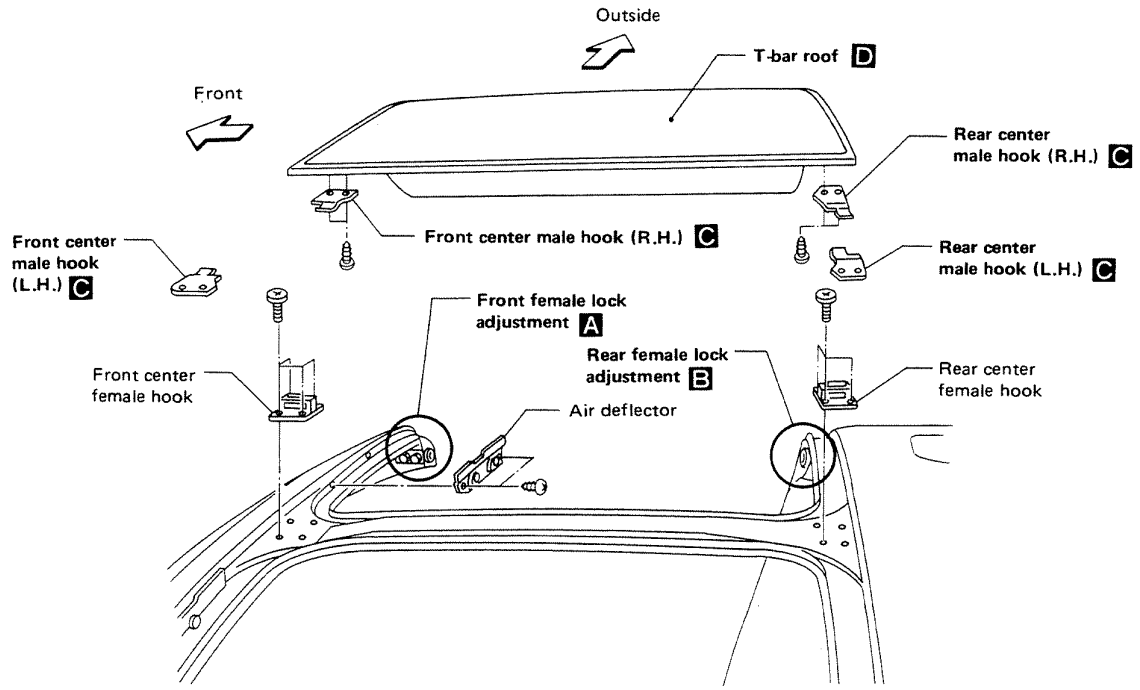
Repairing Water Leak

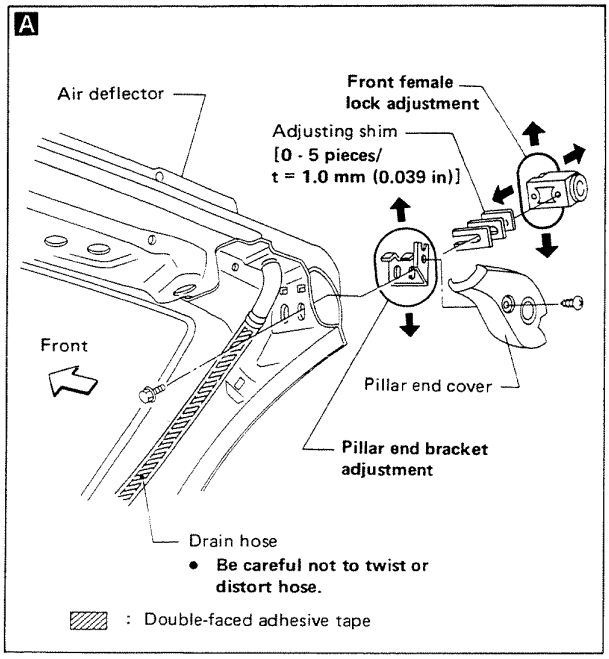
Leaks can be repaired without removing and reinstalling glass.
If water is leaking between caulking material and body or between glass and caulking material, determine the extent of the leak by applying water while pushing glass outward.
To stop the leak, apply primer and then sealant to the leak point.

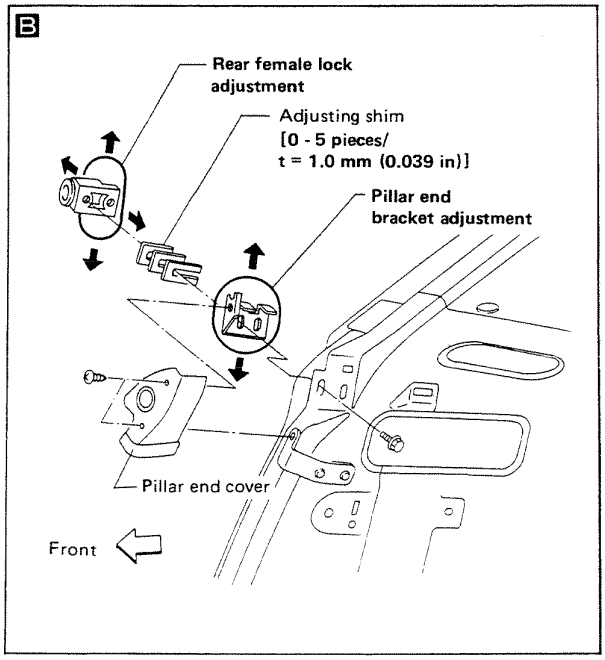


After this, install molding securely.

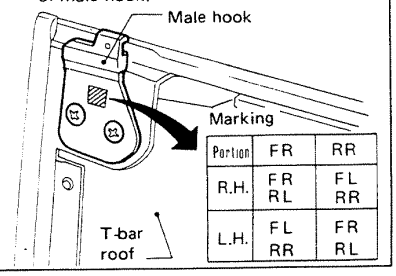
- Handle T-bar roof with care so as not to damage it.
- Apply sealant to portions susceptible to water leakage if necessary.
- As for T-bar roof drip molding, T-bar roof weatherstrip, T-bar roof welt and body side weatherstrip, refer to **Exterior.**







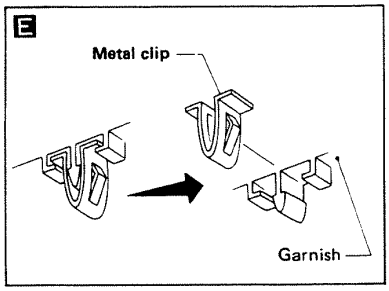
C
- There is a marking on the surface of male hook.

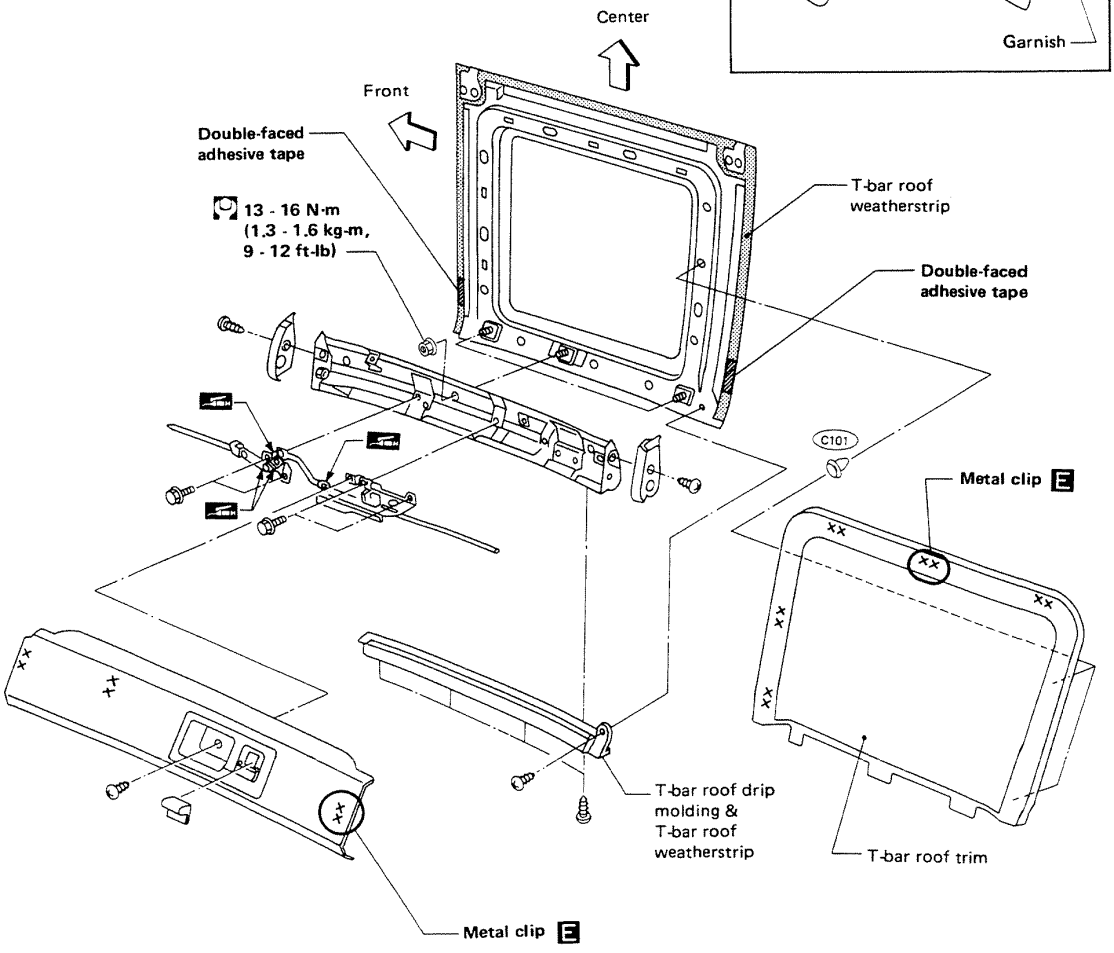


Portion	FR	RR
R.H.	FR RL	FL RR
L.H.	FL RR	FR RL

D

E

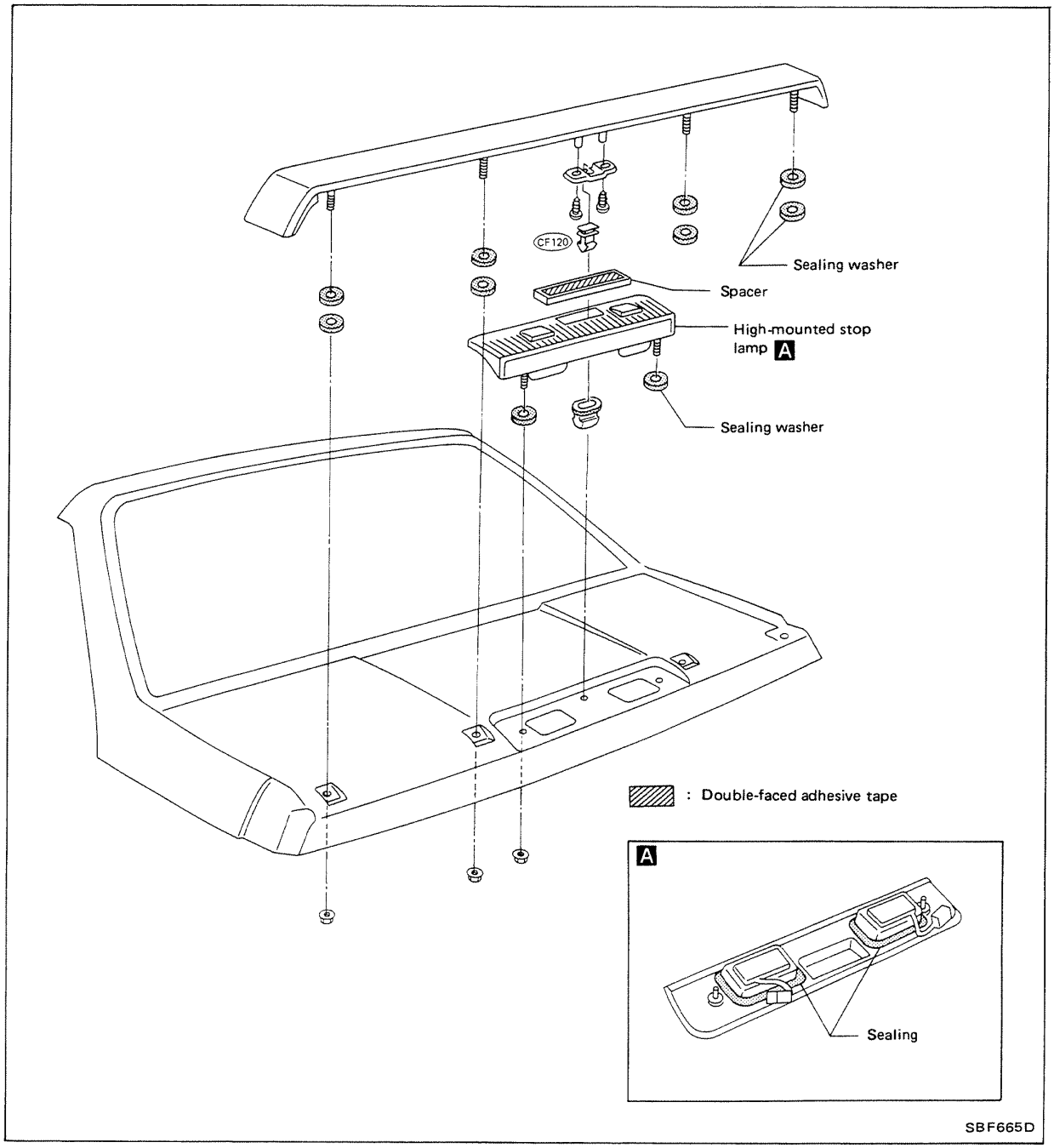




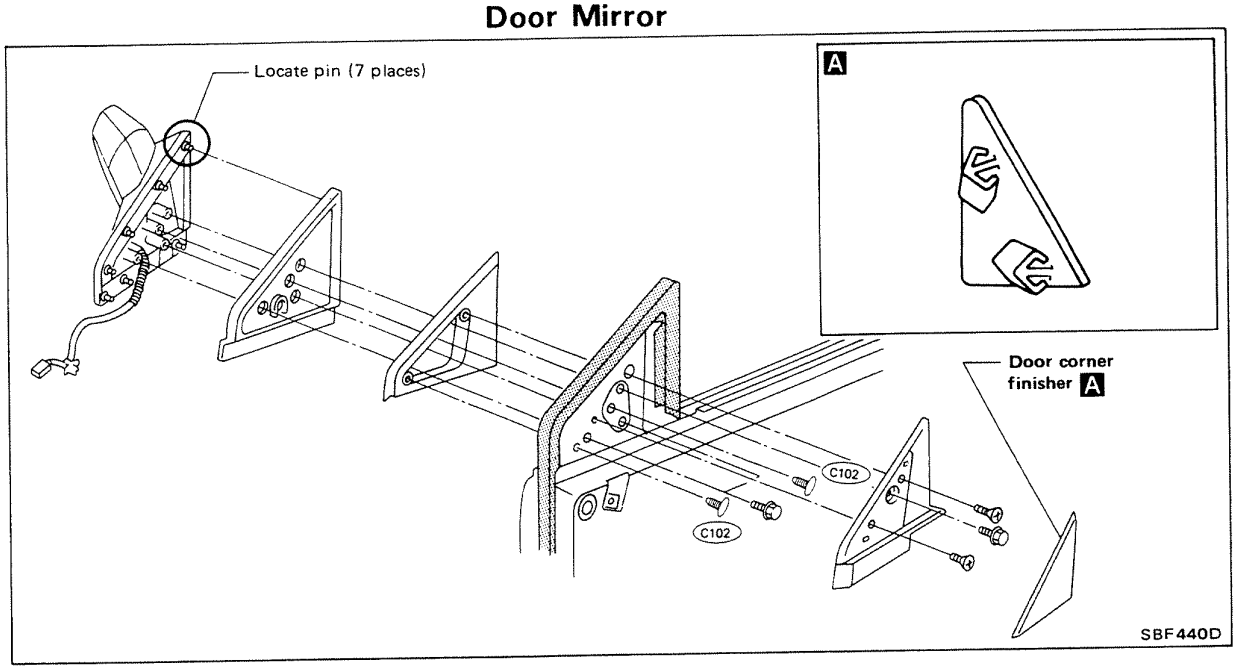
: Grease-up points

SBF664D

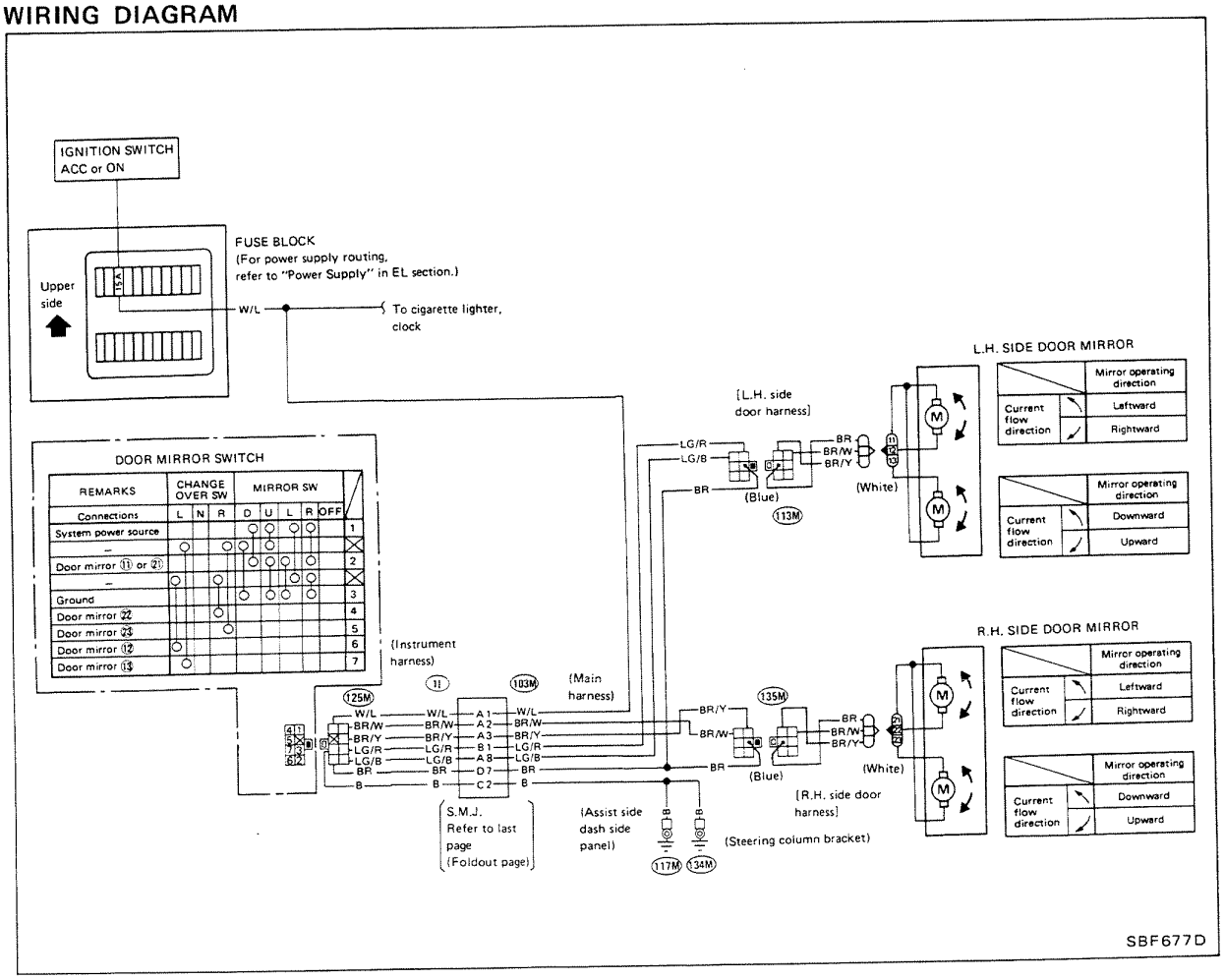
REAR AIR SPOILER AND HIGH-MOUNTED STOP LAMP



Door Mirror

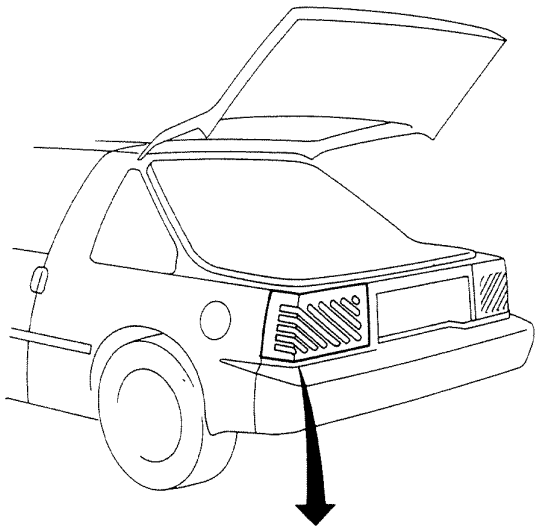


WIRING DIAGRAM

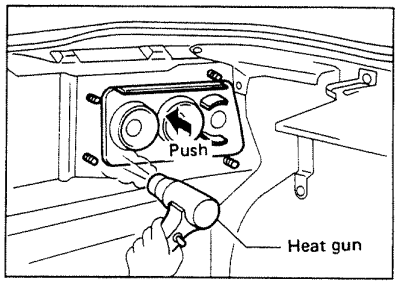


REAR COMBINATION LAMP

- Rear combination lamps are installed with nuts and butyl sealant.

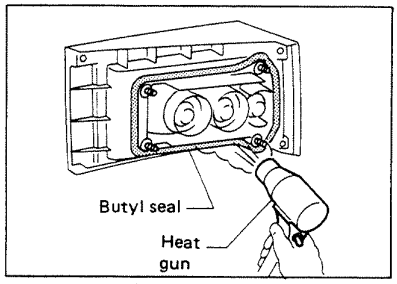


Removal



- Remove back door opening rear finisher before removing rear combination lamp. As for back door opening finisher, refer to **Exterior.**
- **Warm up lamp assembly area to a temperature of a little below 60°C (140°F).**

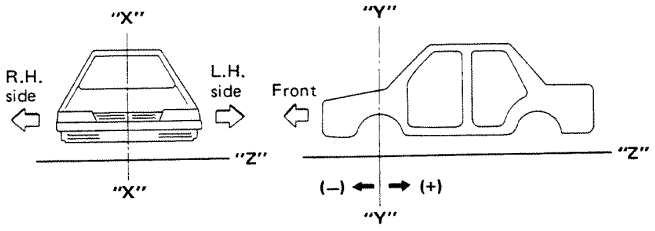
Installation



- **Apply butyl seal evenly as it tends to become thin in the corners.**
- **Warm up lamp assembly area to a temperature of a little below 60°C (140°F).**

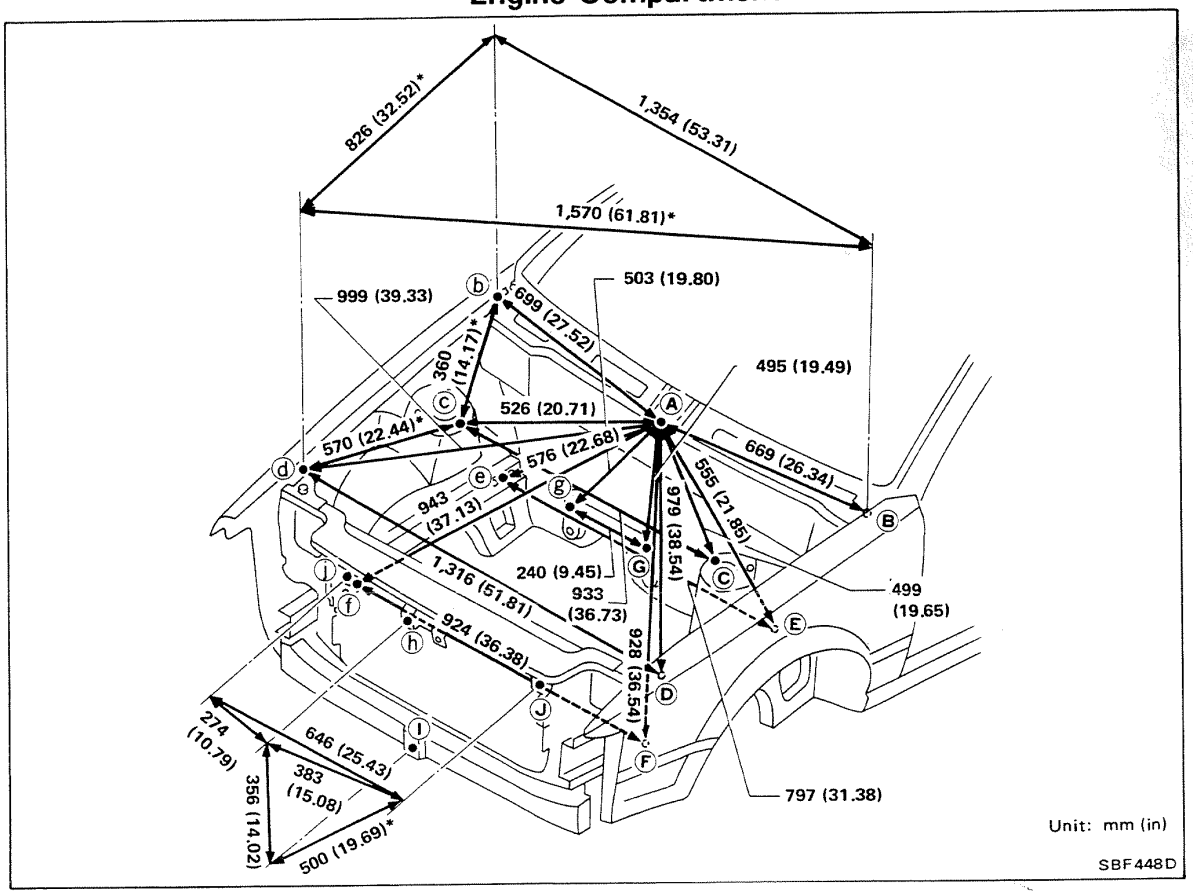
SBF438D

- 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.
- The coordinates of the measurement points are the distances measured from the standard line of "X", "Y" and "Z".



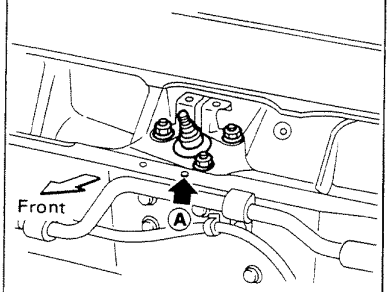
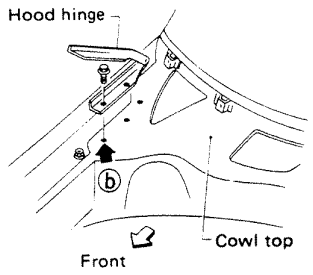
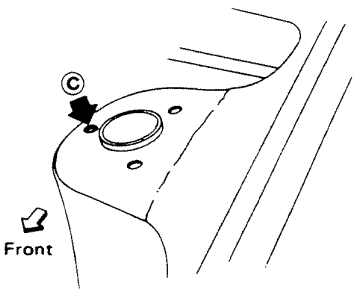
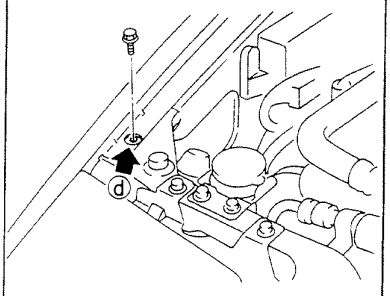
"X": Vehicle center
"Y": Center line of front axle
"Z": Imaginary base line
For reference: Standard imaginary base line (0Z) is specified as 200 mm (7.87 in) lower than that of Nissan's drawings.

Engine Compartment

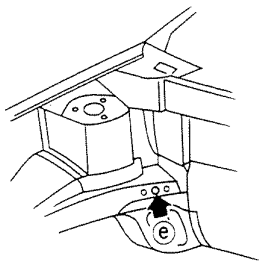
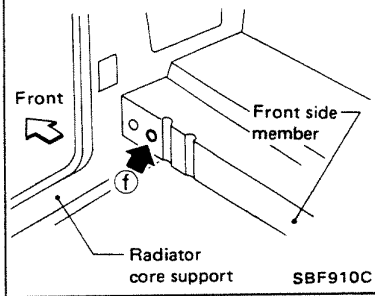
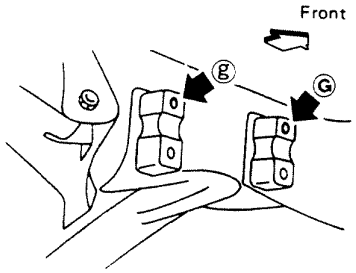
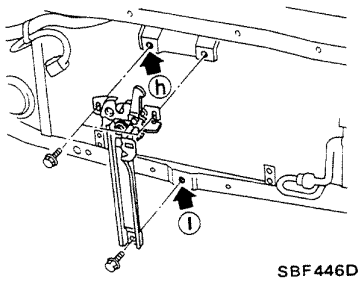
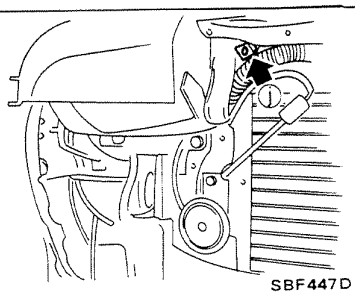


Engine Compartment (Cont'd)

MEASUREMENT POINTS

Points	Hole dia. mm (in)	Detailed points		Coordinates mm (in)		
				"x"	"y"	"z"
Ⓐ	5 (0.20)	 SBF195D	Hole for seal rubber fitting clip on cowl top front upper flange	15.0 (0.591)	207.0 (8.15)	833.0 (32.80)
Ⓑ ⓑ	13 (0.51)	 SBF673B	Hole for hood hinge mounting on cowl top (Front side portion)	677.0 (26.65)	300.0 (11.81)	812.6 (31.99)
Ⓒ Ⓒ	9 (0.35)	 SBF669B	Hole for front strut tower mounting	466.4 (18.36)	17.2 (0.677)	738.9 (29.09)
Ⓓ ⓓ	9 (0.35)	 SBF444D	Hole for front fender mounting on hoodledge (Behind front fender front portion)	658.0 (25.91)	−517.0 (−20.35)	691.0 (27.20)

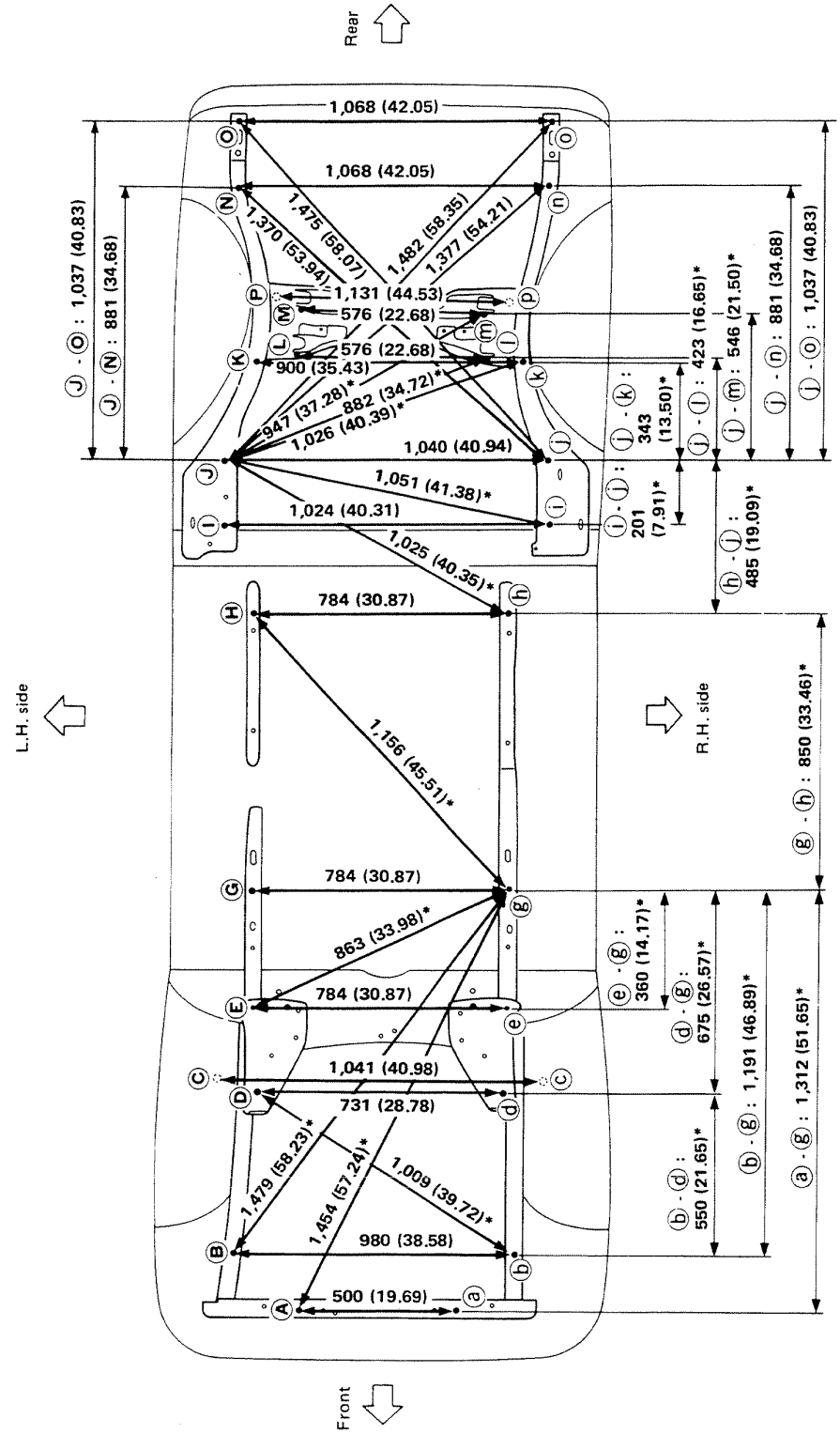
Engine Compartment (Cont'd)

Points	Hole dia. mm (in)	Detailed points		Coordinates mm (in)		
				"x"	"y"	"z"
Ⓔ ⓔ	16 (0.63)	 SBF445D	Hole for locating at rear portion of front side member (For canister hose)	398.6 (15.69)	150.8 (5.94)	436.0 (17.17)
Ⓕ ⓕ	16 (0.63)	 SBF910C	Hole for locating at front portion of front side member	462.0 (18.19)	−500.0 (−19.69)	430.0 (16.93)
Ⓖ ⓖ	15 (0.59)	 SBF233C	Hole for steering gear box mounting	120.0 (4.72)	184.4 (7.26)	349.4 (13.76)
ⓗ	11 (0.43)	 SBF446D	Hole for hood lock mounting (R.H. side hole)	R.H. side 55.5 (2.185)	−684.9 (−26.96)	601.0 (23.66)
ⓘ	11 (0.43)		Hole for hood lock stay mounting at front surface of radiator core lower support	0.0 (0.00)	−635.7 (−25.03)	252.9 (9.96)
Ⓙ ⓙ	9 (0.35)	 SBF447D	Hole for radiator mounting on radiator core side support	323.0 (12.72)	−633.0 (−24.92)	634.0 (24.96)

Underbody

MEASUREMENT

Unit: mm (in)

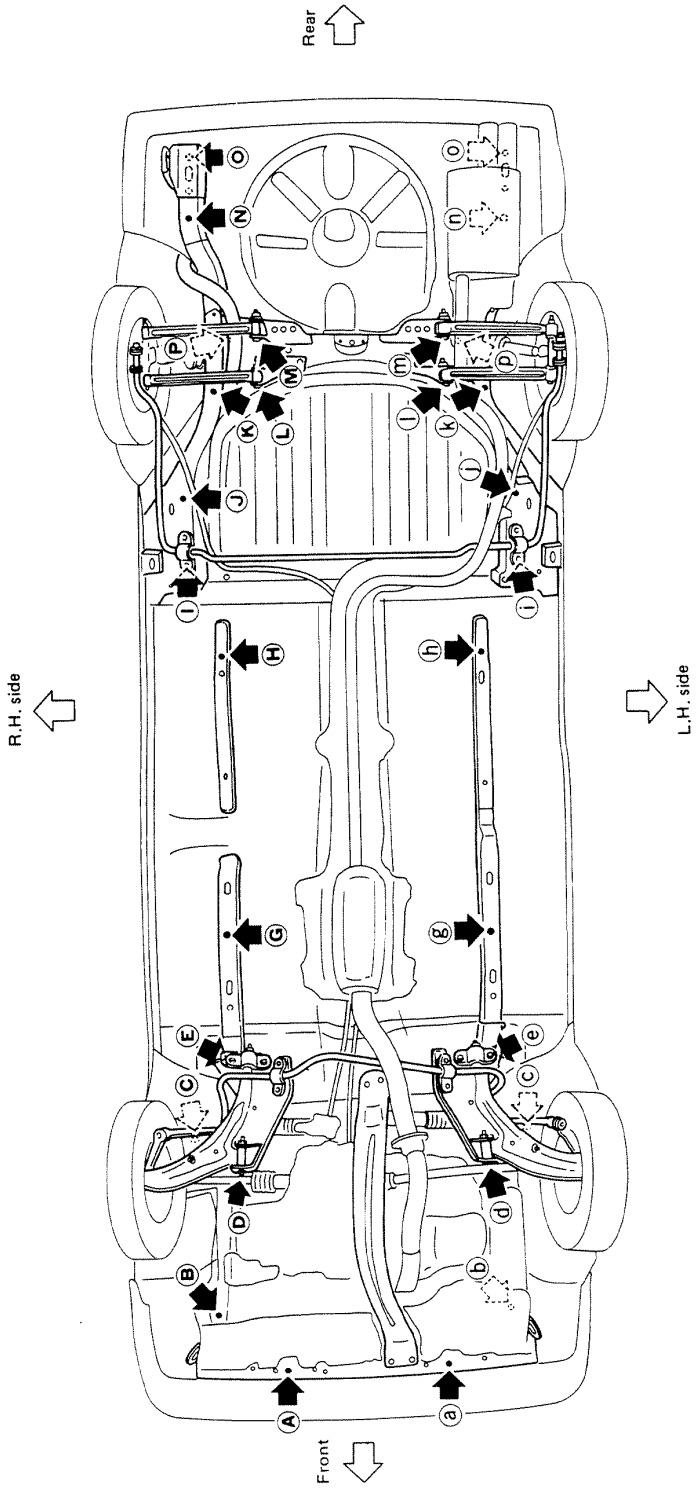


All dimensions indicated in these figures are actual ones.
(There are no projected dimensions.)

SBF449D

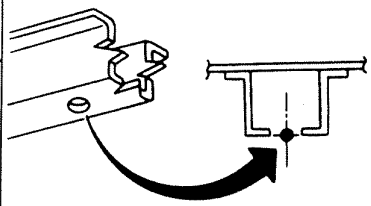
Underbody (Cont'd)

MEASUREMENT POINT

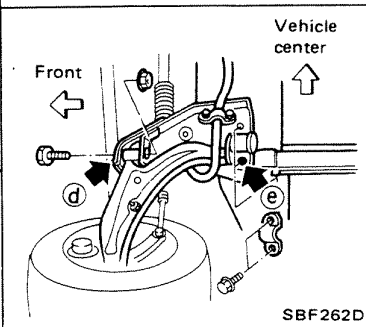
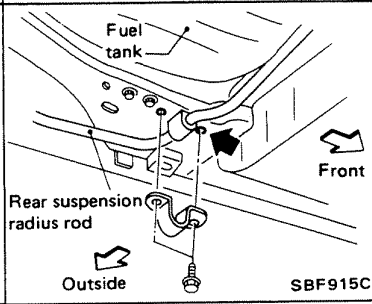
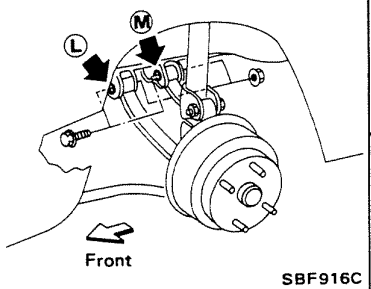
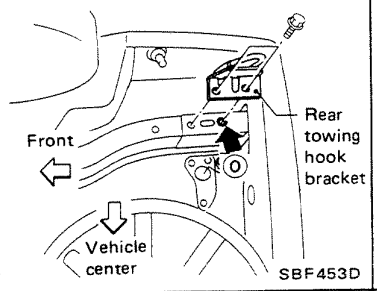
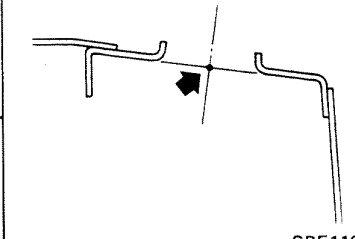


SBF450D

Underbody (Cont'd)

Points	Hole dia. mm (in)	Detailed points		Coordinates mm (in)		
				"x"	"y"	"z"
Ⓐ ⓐ	14 (0.55)	 SBF427B	Hole for locating at underside of radiator core lower support	250.0 (9.84)	−600.0 (−23.62)	234.1 (9.22)
Ⓑ ⓑ	16 (0.63)		Hole for locating at underside of front side member front portion	490.0 (19.29)	−460.0 (−18.11)	381.0 (15.00)
Ⓖ ⓖ	16 (0.63)		Hole for locating at underside of front side member front extension rear portion	392.0 (15.43)	700.0 (27.56)	127.4 (5.02)
Ⓗ ⓗ	16 (0.63)		Hole for locating at underside of front side member rear extension rear portion	392.0 (15.43)	1,550.0 (61.02)	128.3 (5.05)
Ⓙ ⓙ	14 (0.55)		Hole for locating at underside of rear side member front portion	520.0 (20.47)	2,005.2 (78.94)	236.8 (9.32)
Ⓚ ⓚ	20 (0.79)		Hole for locating & waxing at underside of rear side member center portion	450.0 (17.72)	2,325.0 (91.54)	338.6 (13.33)
Ⓝ ⓝ	16 (0.63)		Hole for locating at underside of rear side member rear portion	L.H. side 529.0 (20.83) R.H. side 539.0 (21.22)	2,880.0 (113.39)	338.6 (13.33)

Underbody (Cont'd)

Points	Hole dia. mm (in)	Detailed points		Coordinates mm (in)		
				"x"	"y"	"z"
Ⓓ ⓓ	14 (0.55)	 SBF262D	Hole for front suspension transverse link front mounting at underside of bracket (Rear side hole)	365.5 (14.39)	25.7 (1.012)	156 (6.14)
Ⓔ ⓔ	17 (0.67)		Hole for front suspension transverse link rear mounting at underside of mounting gusset (Outer side hole)	391.9 (15.43)	343.6 (13.53)	180.5 (7.11)
Ⓘ ⓘ	16 (0.63)	 SBF915C	Hole for rear suspension radius rod mounting (Front side hole)	512.0 (20.16)	1,806.8 (71.13)	208.2 (8.20)
Ⓛ Ⓘ	14.3 (0.563)	 SBF916C	Hole for rear suspension parallel link mounting at front bracket (Front side hole)	288.0 (11.34)	2,358.5 (92.85)	219.2 (8.63)
Ⓜ ⓜ	14.3 x 23 (0.563 x 0.906)		Hole for rear suspension parallel link mounting at rear bracket (Front side hole)	288.0 (11.34)	2,498.7 (98.37)	210.0 (8.27)
Ⓞ ⓞ	14 (0.55)	 SBF453D	Hole for rear towing hook bracket mounting at underside of rear side member extension	L.H. side 529.0 (20.83) R.H. side 539.0 (21.22)	3,037.0 (119.57)	340.0 (13.39)
Ⓒ ⓒ	73 (2.87)	 SBF119C	Hole for front strut upper mounting at underside of spring support	520.5 (20.49)	17.2 (0.677)	745.6 (29.35)
Ⓟ ⓟ	69.4 (2.732)		Hole for rear strut upper mounting at underside of spring support	565.4 (22.26)	2,495.8 (98.26)	776.2 (30.56)

HEATER & AIR CONDITIONER

SECTION HA

CONTENTS

When you read wiring diagrams:

- **Read GI section, "HOW TO READ WIRING DIAGRAMS".**
- **See EL section, "POWER SUPPLY ROUTING" for power distribution circuit.**

Tightening Torque

STEERING COLUMN

Unit	N·m	kg-m	ft-lb
Steering wheel nut	29 - 39	3.0 - 4.0	22 - 29
Lower joint to column	24 - 29	2.4 - 3.0	17 - 22
Lower joint to gear	24 - 29	2.4 - 3.0	17 - 22
Hole cover to dash panel	3.4 - 4.4	0.35 - 0.45	2.5 - 3.3
Lower bracket to pedal bracket	13 - 18	1.3 - 1.8	9 - 13
Steering column clamp to mounting bracket	13 - 18	1.3 - 1.8	9 - 13
Tilt lever fixing bolt	8 - 11	0.8 - 1.1	5.8 - 8.0

Model PR24SA

Unit	N·m	kg-m	ft-lb
Gear and linkage			
Tie-rod to knuckle	29 - 39	3 - 4	22 - 29
Tie-rod lock nut	37 - 46	3.8 - 4.7	27 - 34
Tie-rod to gear	78 - 98	8 - 10	58 - 72
Gear housing clamp bolt	73 - 97	7.4 - 9.9	54 - 72
Retainer cover fixing bolt	16 - 21	1.6 - 2.1	12 - 15
Adjusting screw lock nut	10 - 15	1.0 - 1.5	7 - 11
Self-lock nut	19 - 25	1.9 - 2.6	14 - 19
Housing plug	49 - 69	5 - 7	36 - 51
Cylinder tube flare nut	20 - 26	2.0 - 2.7	14 - 20
End cover	64 - 74	6.5 - 7.5	47 - 54
Low pressure connector at gear	27 - 39	2.8 - 4.0	20 - 29
Oil pump, tank and hoses			
Connector bolt	49 - 69	5 - 7	36 - 51
Connector	69 - 78	7 - 8	51 - 58
High pressure pipe to gear	15 - 25	1.5 - 2.5	11 - 18
Pulley lock nut	54 - 68	5.5 - 6.9	40 - 50
Suction pipe	16 - 21	1.6 - 2.1	12 - 15
Tank bracket securing bolt	3.1 - 4.3	0.32 - 0.44	2.3 - 3.2
Rear cover fixing bolt	38 - 52	3.9 - 5.3	28 - 38

HEATER & AIR CONDITIONER

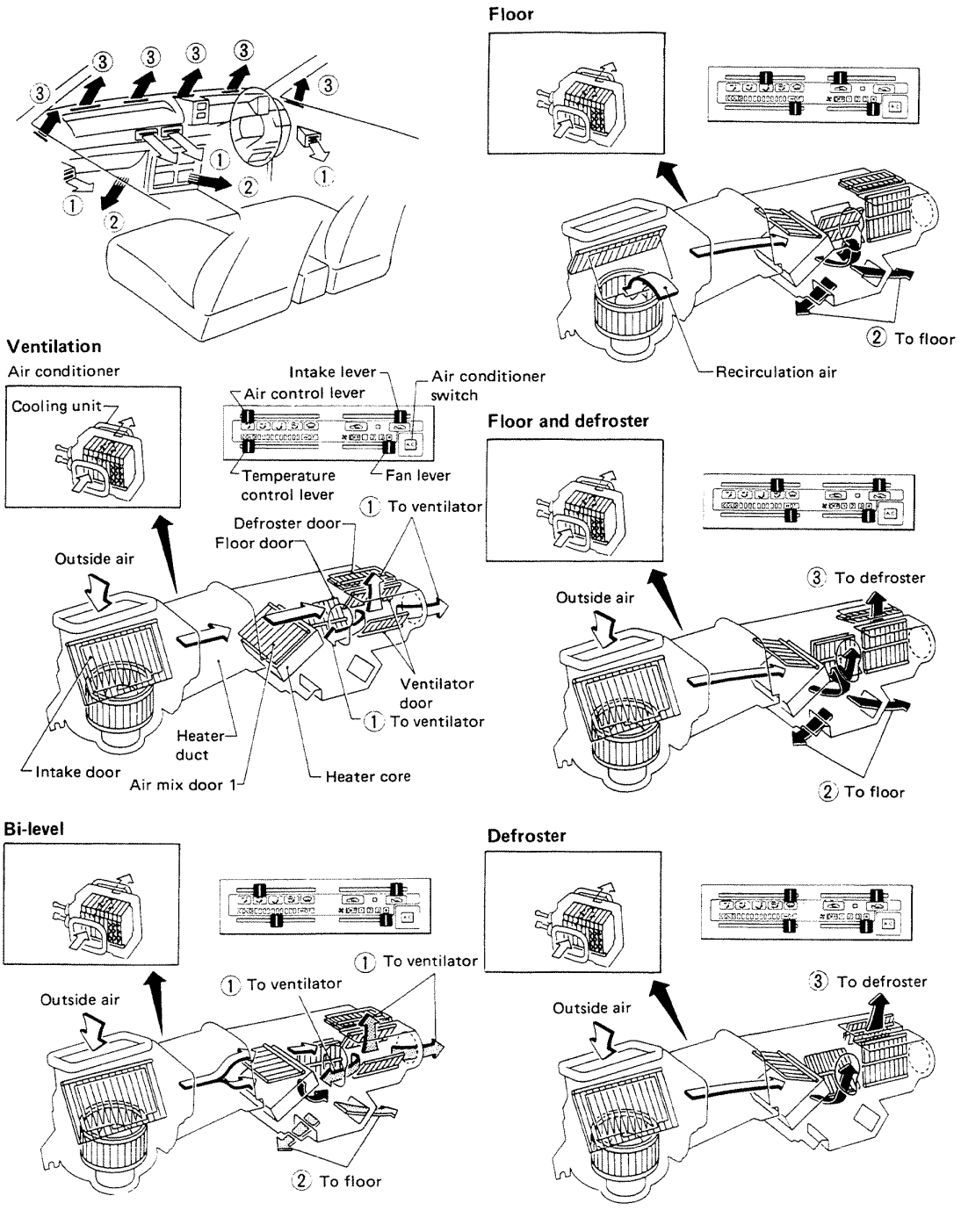
SECTION HA

CONTENTS

When you read wiring diagrams:

- **Read GI section, "HOW TO READ WIRING DIAGRAMS".**
- **See EL section, "POWER SUPPLY ROUTING" for power distribution circuit.**

Air Flow



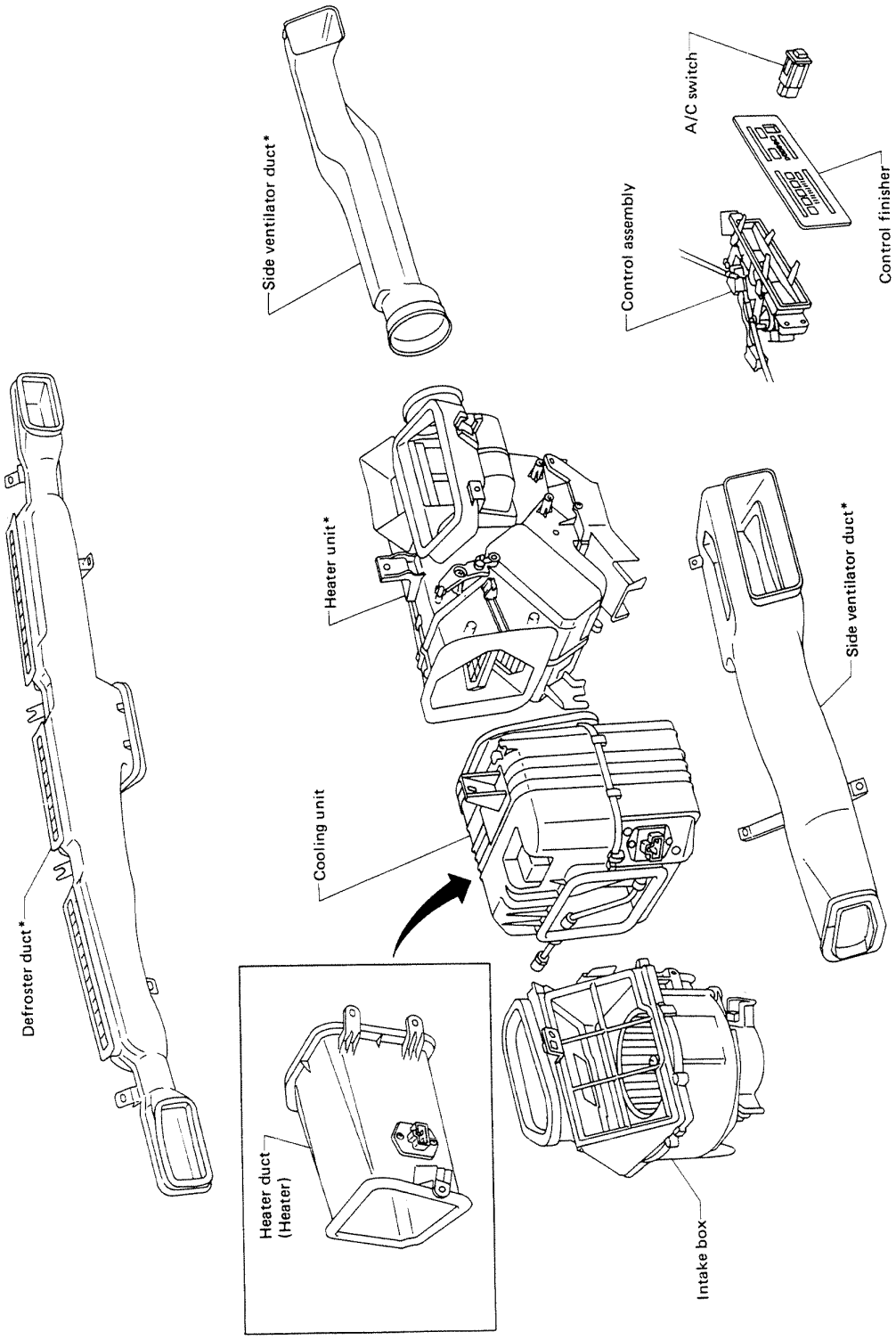
Air passed through heater core

Mixed air (+)

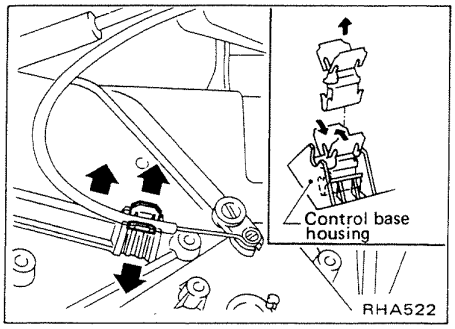
Air not passed through heater core

RHA792

Component Layout



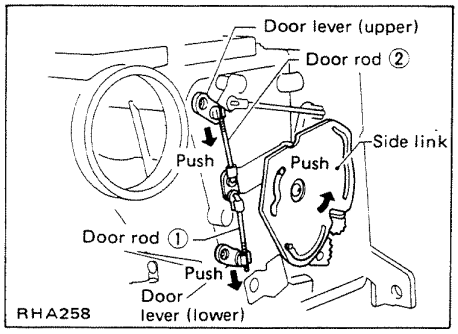
RHA793



Control Cable and Rod Adjustment

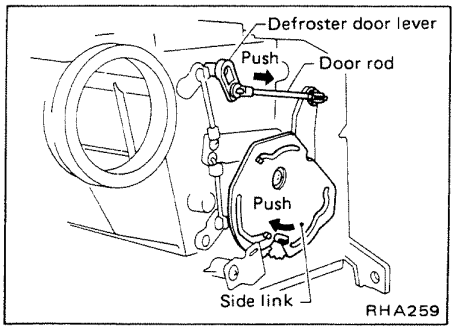
- **Expand control cable clip with both hands and then remove control cable from cable clip.**
- **Compress cable clip with both hands and then remove it from control base housing.**
- **Butt clip against the bottom of control base housing.**
- **When adjusting ventilator door rod and defroster door rod, disconnect air control cable from side link first, and then adjust door rod.**

  Reconnect air control cable and readjust it.



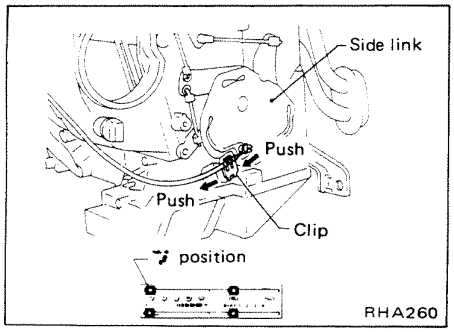
VENTILATOR DOOR CONTROL ROD

1. Move side link in direction of arrow.
2. With upper and lower ventilator door levers held in the direction of the arrow, connect rods ① and ② to their corresponding ventilator door levers in that order.



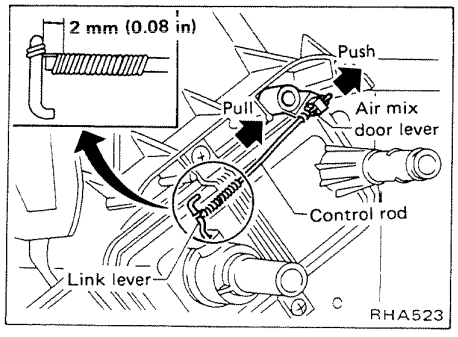
DEFROSTER DOOR CONTROL ROD

1. Move side link in direction of arrow.
2. Connect rod to side link while pushing defroster door lever in direction of arrow.



AIR CONTROL CABLE

- Clamp the cable while pushing cable outer and side link in direction of arrow.

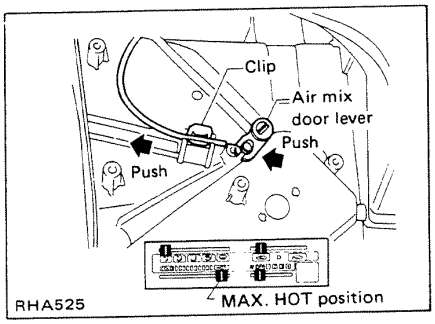


WATER COCK CONTROL ROD

- **When adjusting water cock control rod, first disconnect temperature control cable from air mix door lever and then adjust control rod. Reconnect temperature control cable and readjust it. (Refer to next item.)**

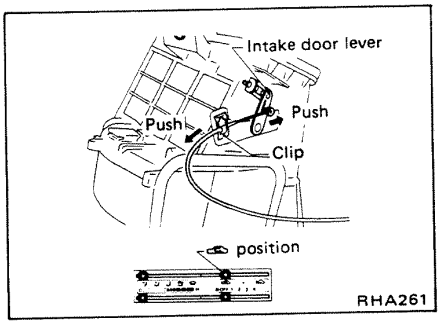
1. Push air mix door lever in direction of arrow.
2. Pull control rod of water cock in direction of arrow so as to make clearance of about 2 mm (0.08 in) between ends of rod and link lever and connect the rod to door lever.

Control Cable and Rod Adjustment (Cont'd)



TEMPERATURE CONTROL CABLE

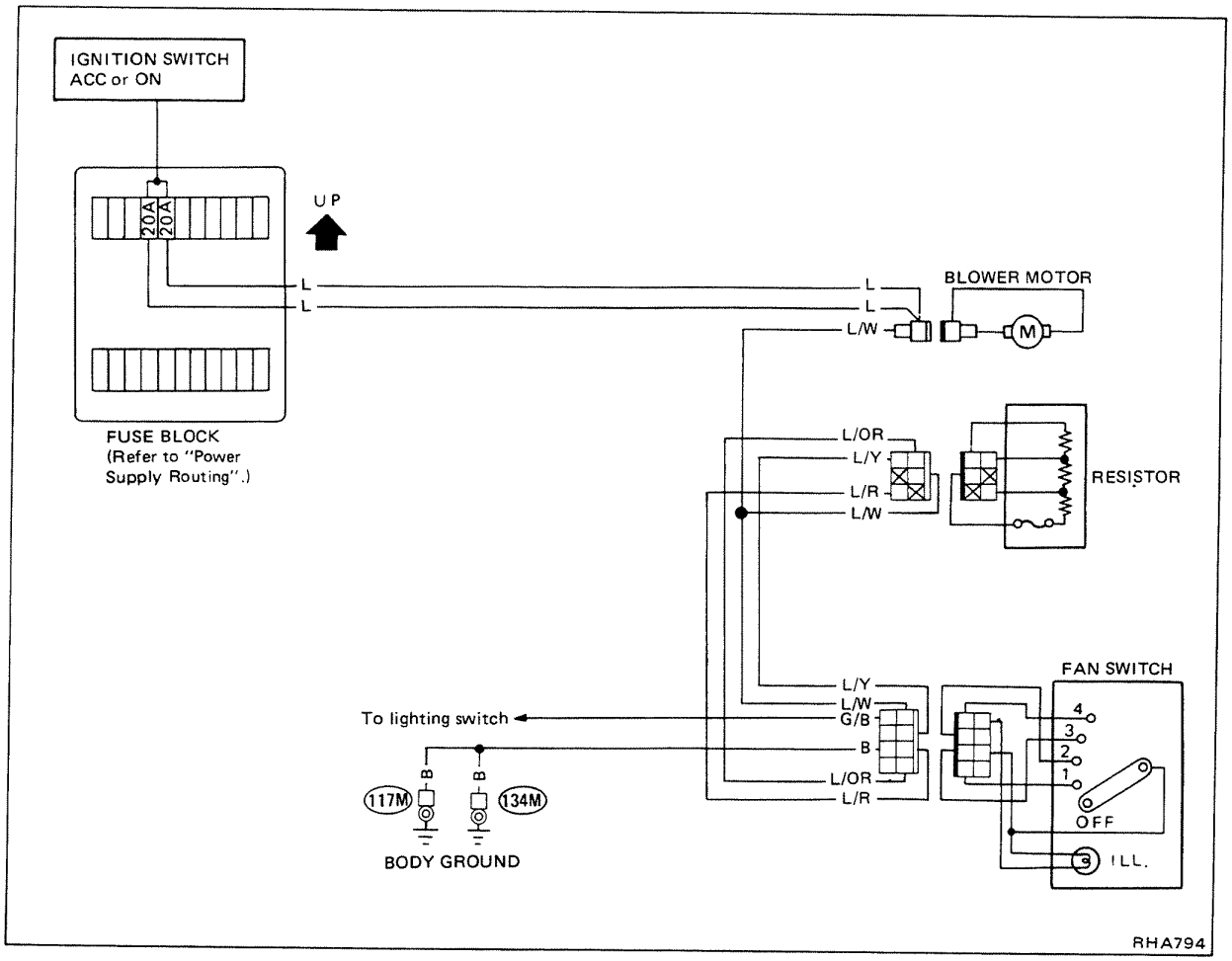
- Clamp the cable while pushing cable outer and air mix door lever in direction of arrow.



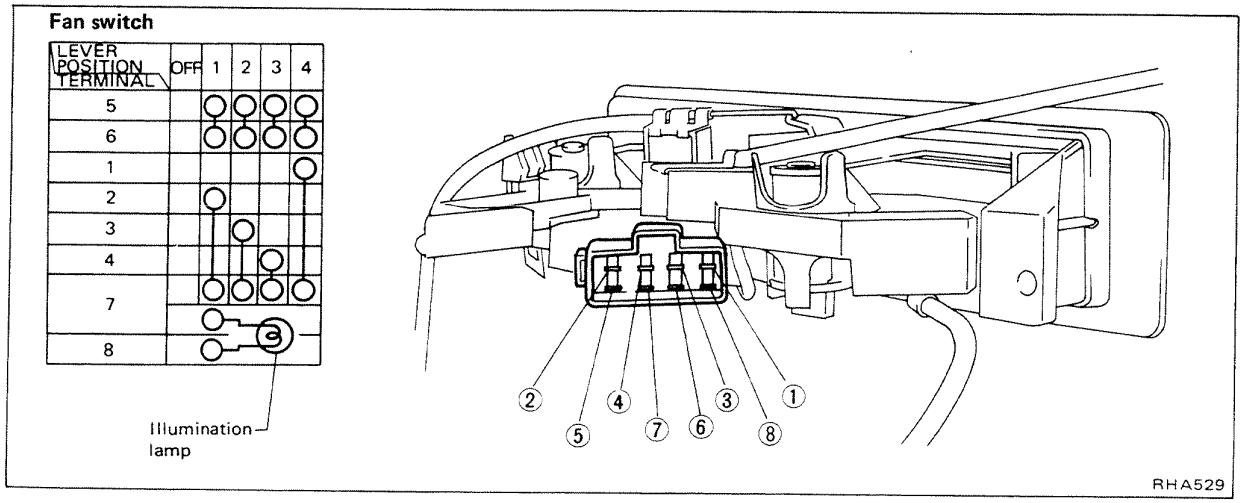
INTAKE DOOR CONTROL CABLE

- Clamp the cable while pushing cable outer case and intake door lever in direction of arrow.

Wiring Diagram

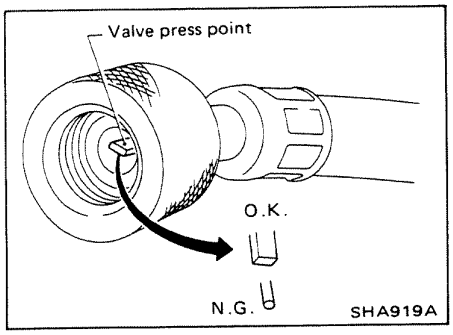


Fan Switch Check



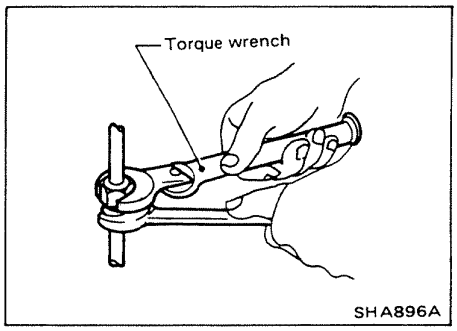
WARNING:

- Always be careful that refrigerant does not come in contact with your skin.
- Always wear eye protection when working around the system.
- Keep refrigerant containers stored below 50°C (122°F) and never drop from high places.
- Work in well-ventilated area because refrigerant gas evaporates quickly and breathing may become difficult due to the lack of oxygen.
- Keep refrigerant away from open flames because poisonous gas will be produced if it burns.
- Do not use steam to clean surface of condenser or evaporator. Be sure to use cold water or compressed air.
- Compressed air must never be used to clean a dirty line. Clean with refrigerant gas.



- Do not use manifold gauge whose press point shape is different than that shown. Otherwise, insufficient evacuating may occur.

- Do not over-tighten service valve cap.
- Do not allow refrigerant to rush out. Otherwise, compressor oil will be discharged along with refrigerant.

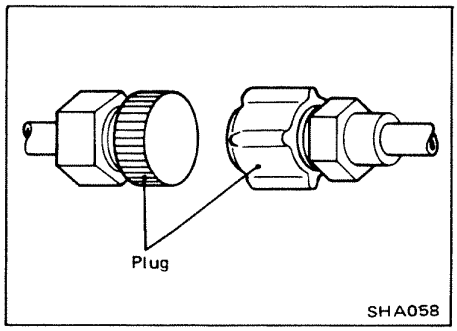


WARNING:

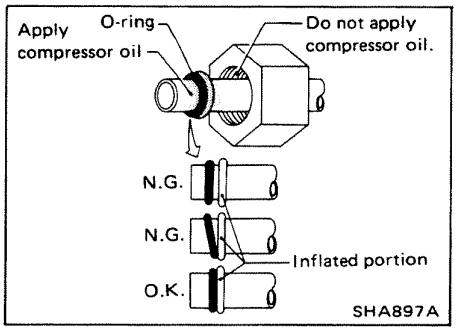
Gradually loosen discharge side hose fitting, and remove it after remaining pressure has been released.

When replacing or cleaning refrigerant cycle components, observe the following.

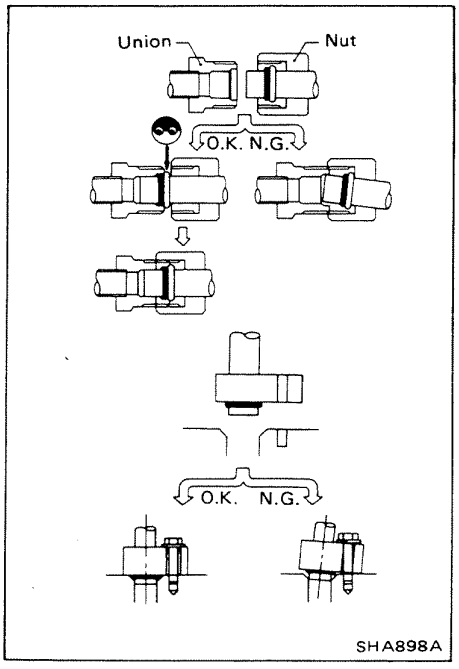
- Do not leave compressor on its side or upside down for more than 10 minutes, as compressor oil will enter low pressure chamber.
- When connecting tubes, always use a torque wrench.



- After disconnecting tubes, plug all openings immediately to prevent entrance of dirt and moisture.

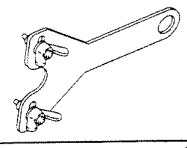
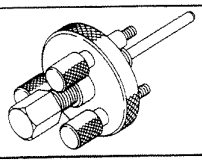
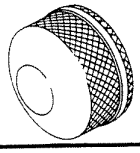


- Always replace used O-rings.
- When connecting tube, apply compressor oil to portions shown in illustration. Be careful not to apply oil to threaded portion.
- O-ring must be closely attached to inflated portion of tube.

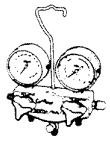
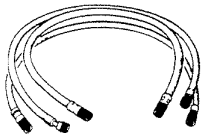
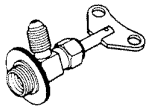
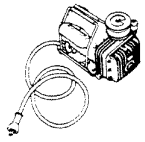


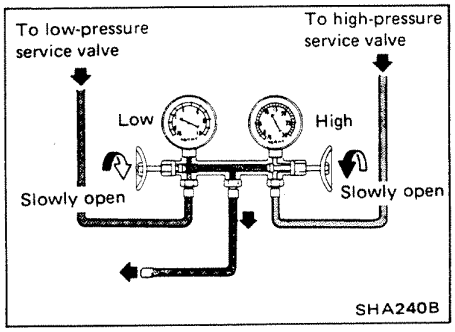
- After inserting tube into union until O-ring is no longer visible, tighten nut to specified torque.
- After connecting line, conduct leak test and make sure that there is no leakage from connections. When the gas leaking point is found, disconnect that line and replace the O-ring. Then tighten connections to the specified torque.

SPECIAL SERVICE TOOLS

Tool number Tool name	Description	
KV99231162 Clutch hub wrench		Removing shaft nut and clutch disc
KV99232340 Clutch hub puller		Removing clutch disc
KV99234330 Pulley installer		Installing pulley

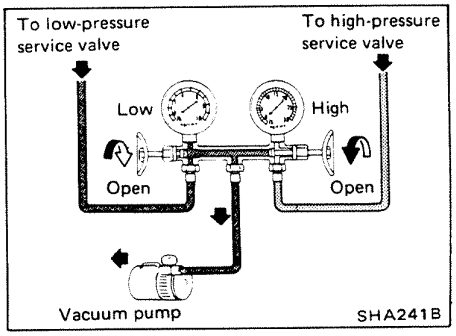
SERVICE TOOLS

Tool name	Description	
Manifold gauge		Discharging and charging refrigerant into system
Charging hose		Discharging and evacuating, charging refrigerant into system
Charge valve		Breaking seal of refrigerant can
Thermometer		Checking temperature
Vacuum pump		Evacuating refrigerant system
Electric leak-detector	**Nominal sensitivity:** **15 - 25 g (0.53 - 0.88 oz)/year** 	Detecting refrigerant leaks



Discharging

Slowly open the valves to regulate the flow of discharged refrigerant. If they are opened quickly, compressor oil will also be discharged.



Evacuating the System—Step one

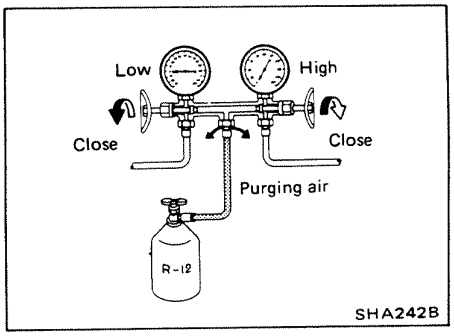
1. Start pump, then open both valves and run pump for about 5 minutes.
2. When low gauge has reached approx. 101.3 kPa (760 mmHg, 29.92 inHg), completely close both valves of gauge and stop vacuum pump. Let it stand for 5 to 10 minutes in this state and confirm that the reading does not rise.

a. **The low-pressure gauge reads lower by 3.3 kPa (25 mmHg, 0.98 inHg) per 300 m (1,000 ft) elevation. Perform evacuation according to the following table.**

b. **The rate of ascension of the low-pressure gauge should be less than 3.3 kPa (25 mmHg, 0.98 inHg) in five minutes.**

Elevation m (ft)	Vacuum of system* kPa (mmHg, inHg)
0 (0)	101.3 (760, 29.92)
300 (1,000)	98.0 (735, 28.94)
600 (2,000)	94.6 (710, 27.95)
900 (3,000)	91.3 (685, 26.97)

*: Values show reading of the low-pressure gauge.



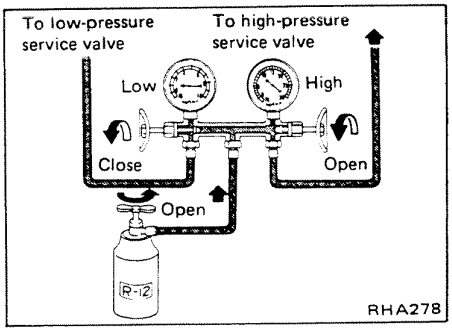
Charging—Step one

1. Evacuate refrigerant system.

Refer to "Evacuating the System — Step one".

2. Close manifold gauge valves securely and disconnect charging hose from vacuum pump.
3. Purge air from center charging hose.

1) Connect center charging hose to refrigerant can through charge valve.
2) Break seal of refrigerant can and purge air.



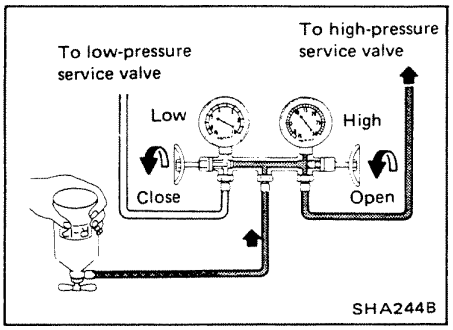
4. Charge refrigerant into system.

WARNING:

Ensure that engine is off.

1) Open high-pressure valve of manifold gauge and charge refrigerant into system.

Charging—Step one (Cont'd)

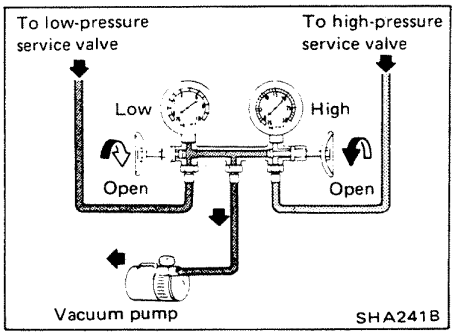


CAUTION:

If charging liquefied refrigerant into the system with the can turned upside down to reduce charging time, charge it only through high-pressure (discharge) service valve. After charging, the compressor should always be turned several times manually.

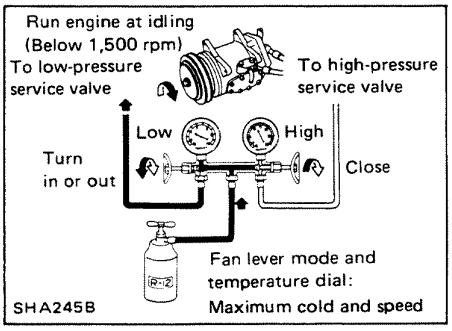
2) **When low-pressure gauge reading is 98 kPa (1.0 kg/cm², 14 psi), completely close high-pressure valve of manifold gauge and stop charging.**

Evacuating the System—Step two



1. Close manifold gauge valve securely and disconnect charging hose from refrigerant can.
2. Connect center charging hose to vacuum pump.
3. Start pump, then open both valves and run pump for about 20 minutes.

Charging—Step two



Refer to "Charging – Step one" of Nos. 2 through 4.

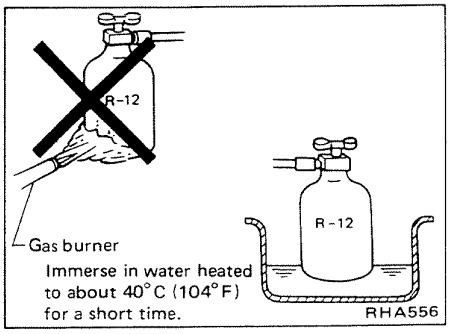
1. When refrigerant charging speed slows down, close high-pressure valve of manifold gauge and open low-pressure valve of manifold gauge and charge refrigerant while running the compressor for ease of charging.

WARNING:

Never charge refrigerant through high-pressure side (discharge side) of system since this will force refrigerant back into refrigerant can and can may explode.

2. Charge refrigerant while controlling low-pressure gauge reading at 275 kPa (2.8 kg/cm², 40 psi) or less by turning in or out low-pressure valve of manifold gauge.

- **Be sure to purge air from charging hose when replacing can with a new one.**



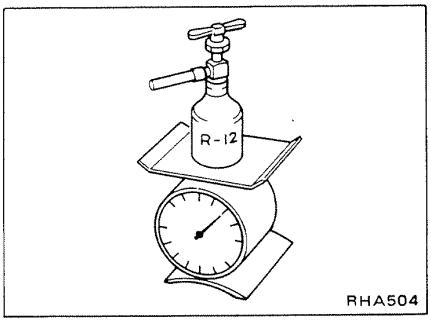
In low ambient conditions in order to reduce charging time, warming of the refrigerant can will increase internal pressure.

CAUTION:

Do not increase can temperature beyond 40°C (104°F).

WARNING:

Do not heat with an open flame. There is danger that can will explode.



Charging—Step two (Cont'd)

3. Charge the specified amount of refrigerant into system by weighing charged refrigerant with scale. Overcharging will cause discharge pressure to rise.

   Refrigerant amount:
   0.9 - 1.1 kg (2.0 - 2.4 lb)

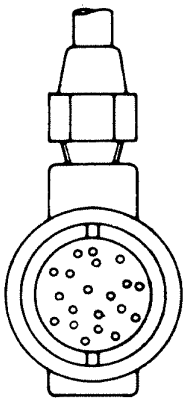
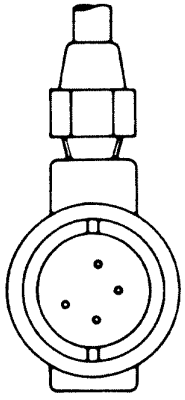
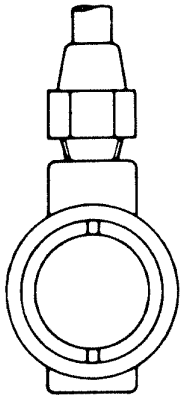
The state of the bubbles in sight glass should only be used for checking whether the amount of charged refrigerant is small or not. The amount of charged refrigerant can be correctly judged by means of discharge pressure.

4. After charging, be sure to install valve cap on service valve.
5. Confirm that there are no leaks in system by checking with a leak detector.

Checking Refrigerant Level

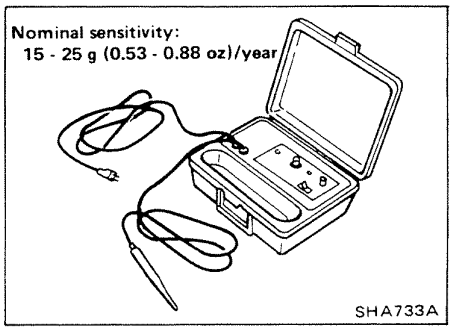
CONDITION

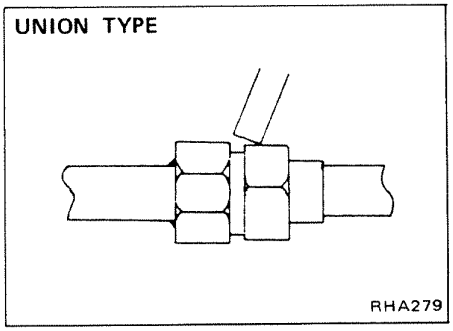
- Door window: Open
- A/C switch: ON
- TEMP. lever position: Max. COLD
- FAN lever position: Hi
- Check sight glass after a lapse of about five minutes.

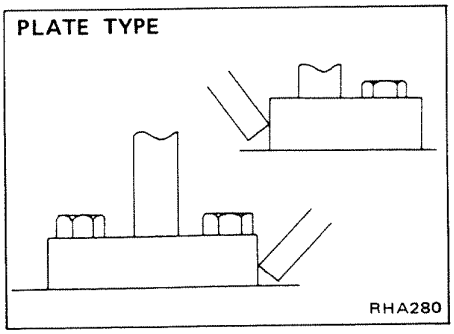
Amount of refrigerant / Check item	Almost no refrigerant	Insufficient	Suitable	Too much refrigerant
Temperature of high-pressure and low-pressure lines.	Almost no difference between high-pressure and low-pressure side temperature.	High-pressure side is warm and low-pressure side is fairly cold.	High-pressure side is hot and low-pressure side is cold.	High-pressure side is abnormally hot.
State in sight glass.	Bubbles flow continuously. Bubbles will disappear and something like mist will flow when refrigerant is nearly gone.  AC256	The bubbles are seen at intervals of 1 - 2 seconds.  AC257	Almost transparent. Bubbles may appear when engine speed is raised and lowered. No clear difference exists between these two conditions.  AC258	No bubbles can be seen.
Pressure of system.	High-pressure side is abnormally low.	Both pressures on high and low-pressure sides are slightly low.	Both pressures on high and low-pressure sides are normal.	Both pressures on high and low-pressure sides are abnormally high.
Repair.	Stop compressor immediately and conduct an overall check.	Check for gas leakage, repair as required, replenish and charge system.		Discharge refrigerant from service valve of low pressure side.

a. The bubbles seen through the sight glass are influenced by the ambient temperature. Since the bubbles are hard to show up in comparatively low temperatures below 20°C (68°F), it is possible that a slightly larger amount of refrigerant would be filled, if supplied according to the sight glass. Recheck the amount when it exceeds 20°C (68°F). In higher temperature the bubbles are easy to show up.

b. When the screen in the receiver drier is clogged, the bubbles will appear even if the amount or refrigerant is normal. In this case, the outlet side pipe of the receiver drier becomes considerably cold.







Checking Refrigerant Leaks

ELECTRIC LEAK DETECTOR

The leak detector is a delicate device that detects small amounts of halogen.

In order to use the device properly, read the manufacturer's manuals and perform the specified maintenance and inspections.

GENERAL PRECAUTIONS FOR HANDLING LEAK DETECTOR

Place the probe on connection fitting and wait for 5 seconds or more.

As to check cooling unit, wait for 10 seconds or more.

WARNING:

As detector meter is very sensitive, keep the probe as still as possible for one more minute.

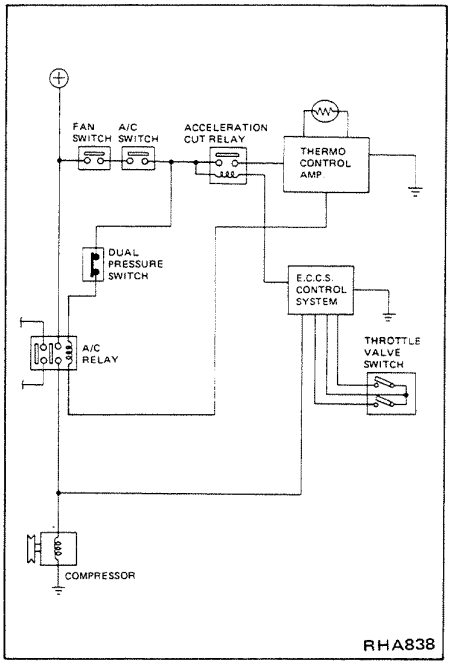
NOTICE:

When fixing single bolt flange, place the probe on opposite side of the fitting.

MEASUREMENT STANDARD

If any reaction is noted using a detector having a nominal sensitivity of 15 to 25 g (0.53 to 0.88 oz)/year, that portion found leaking must be repaired.

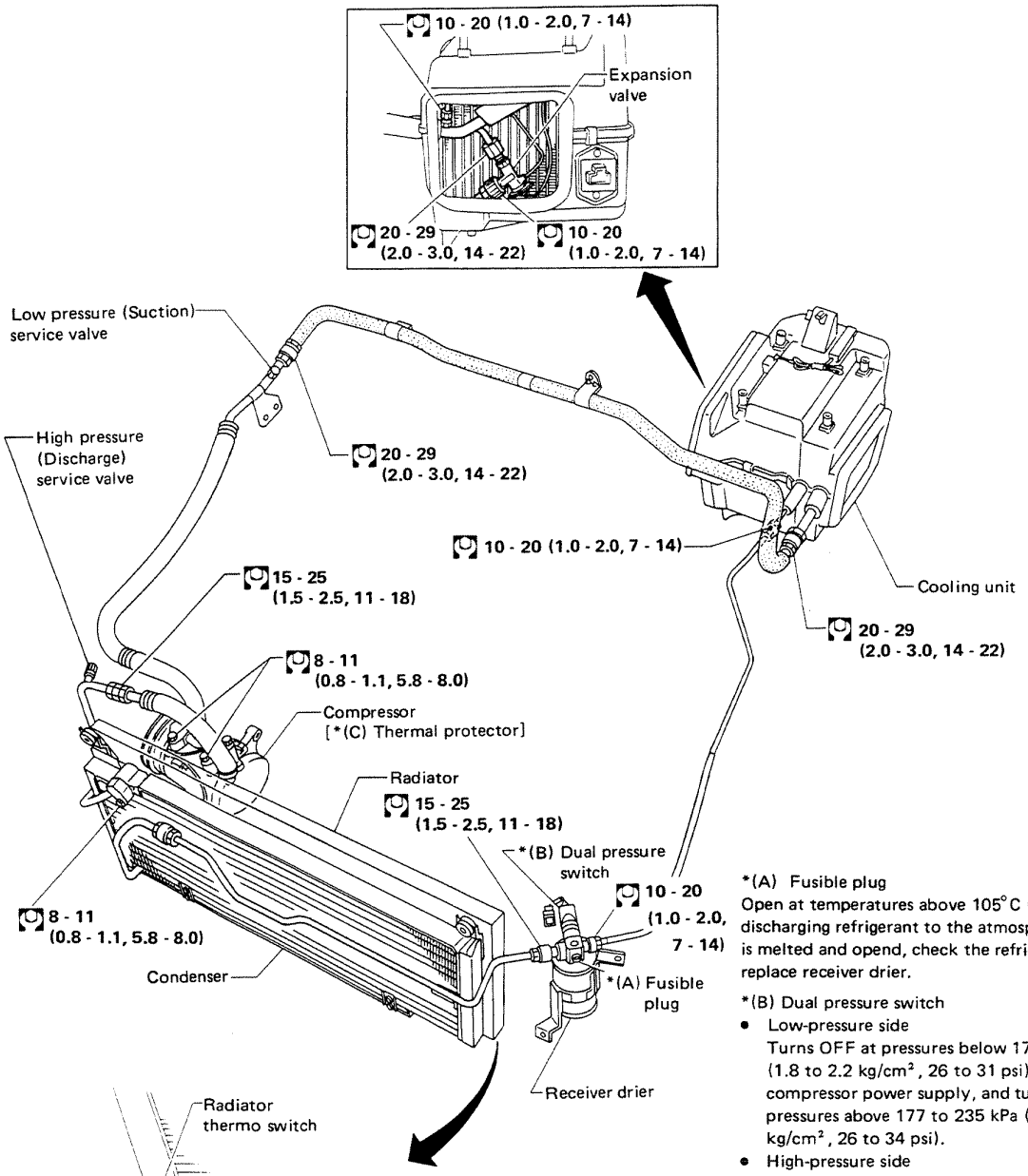
- The nominal sensitivity of the detector is determined under the assumption that all the leaking gas is collected by the detector. Accordingly, the quantity of gas actually leaking can amount to five to ten times the indicated value. Generally speaking, leakage of 150 to 200 g (5.29 to 7.05 oz) of refrigerant can cause insufficient cooling.
- Oil deposited during assembling must be wiped off before inspection. Refrigerant easily dissolves in oil, and the presence of oil can cause an error in measurement.
  This precaution is important when checking a used car for refrigerant leakage.
- If any trace of oil is noted at and around connection fittings, it is a sure indication that refrigerant is leaking.



Acceleration Cut System

This system is controlled by E.C.C.S. control unit. When the engine is heavily overloaded (throttle valve switch is turned to full throttle side), the compressor is turned off for 4 seconds to reduce the overloading.

Refrigerant Lines



Water temperature °C (°F)	Operation
Increasing to 90 (194)	ON
Decreasing to 83 (181)	OFF

*(A) Fusible plug
Open at temperatures above 105°C (221°F), thereby discharging refrigerant to the atmosphere. If this plug is melted and opend, check the refrigerant line and replace receiver drier.

*(B) Dual pressure switch

- Low-pressure side
  Turns OFF at pressures below 177 to 216 kPa (1.8 to 2.2 kg/cm², 26 to 31 psi), cutting compressor power supply, and turns ON at pressures above 177 to 235 kPa (1.8 to 2.4 kg/cm², 26 to 34 psi).
- High-pressure side
  Turns OFF at pressures above 2,354 to 2,844 kPa (24 to 29 kg/cm², 341 to 412 psi), cutting compressor power supply, and turns ON at pressures below 1,863 to 2,256 kPa (19 to 23 kg/cm², 270 to 327 psi).

*(C) Thermal protector

Temperature in compressor	°C (°F)	Operation
Increasing to approx.	145 - 155 (293 - 311)	Turns OFF
Decreasing to approx.	130 - 140 (266 - 284)	Turns ON

: N·m (kg-m, ft-lb)

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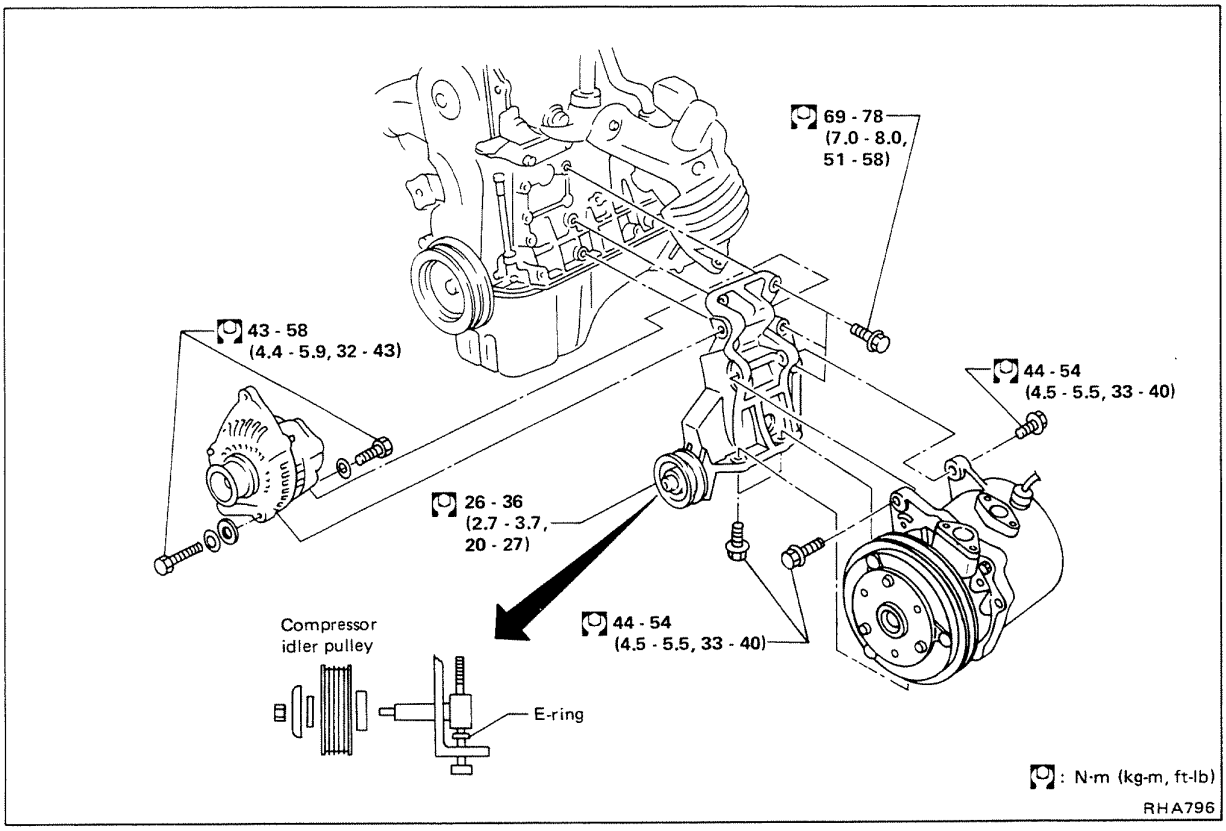
Compressor Mounting



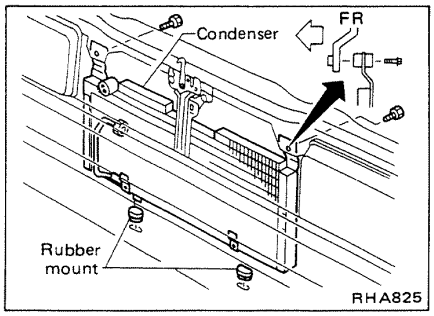
BELT TENSION

Refer to Checking Drive Belts (MA section).

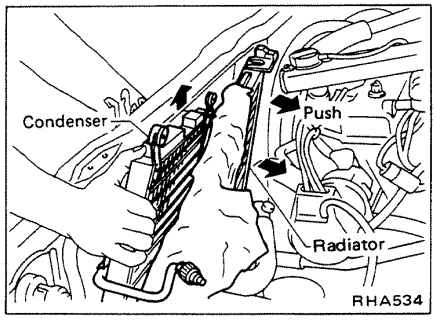
Condenser

REMOVAL AND INSTALLATION

1. Discharge refrigerant from system.
2. Remove radiator fan shroud assembly.
3. Remove radiator fixing bolts.
4. Disconnect high pressure tubes from condenser.



5. Remove condenser fixing bolts.



6. Remove condenser pushing radiator in the direction of engine side.
7. Installation is in the reverse order of removal.

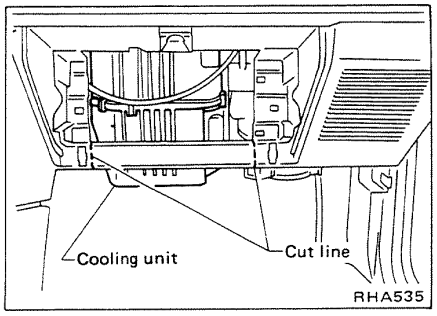
NOTICE:

Confirm that the condenser lower mounting rubber is securely set in the existing hole of the radiator core support.

Cooling unit

REMOVAL AND INSTALLATION

1. Discharge refrigerant from system.
2. Disconnect connectors from cooling unit.
3. For vehicles with factory installed air conditioner, cut instrument panel. (Cut and discard)
4. Remove cooling unit fixing bolts.
5. Remove cooling unit.
6. Installation is in the reverse order of removal.



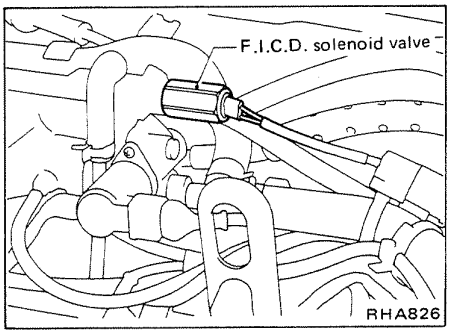
Idle Speed Adjusting

FAST IDLE CONTROL DEVICE (F.I.C.D.)

1. Warm up engine completely.
2. Make sure engine is at correct idling speed with air conditioner in OFF position.

   Idling speed (Air conditioner: OFF):

   Refer to S.D.S. (MA section).
3. When idling speed is different from specified value, refer to EF & EC section and adjust correctly.



4. Make sure that idle speed is at the specified value as shown below, when A/C is ON. (F.I.C.D. is actuated.)

Engine rpm

(Air conditioner: ON)

Unit: rpm

Transaxle	Engine model
	CA16DE
Manual	750 - 850

Performance Chart

TEST CONDITION

Testing must be performed as follows:

Vehicle location:	Indoors or in the shade (in a well ventilated place)
Doors:	Closed
Door window:	Open
Hood:	Open
TEMP. lever position:	Max. COLD
Air control lever position:	(Ventilation)
INTAKE lever position:	(Recirculation)
FAN lever position:	Hi
Engine speed:	1,500 rpm
Time required before starting testing after air conditioner starts operating:	More than 10 minutes

TEST READING

Recirculating-to-discharge air temperature table

Inside air (Recirculating air) at blower assembly inlet		Discharge air temperature at center ventilator °C (°F)
Relative humidity %	Air temperature °C (°F)	
40 - 60	20 (68)	4.8 - 7.0 (41 - 45)
	25 (77)	9.0 - 11.8 (48 - 53)
	30 (86)	13.6 - 16.8 (56 - 62)
	35 (95)	18.8 - 22.0 (66 - 72)
60 - 80	20 (68)	7.0 - 9.4 (45 - 49)
	25 (77)	11.8 - 14.4 (53 - 58)
	30 (86)	16.8 - 20.0 (62 - 68)
	35 (95)	22.0 - 26.0 (72 - 79)

Ambient air temperature-to-compressor pressure table

Ambient air		High-pressure (Discharge side) kPa (kg/cm^2, psi)	Low-pressure (Suction side) kPa (kg/cm^2, psi)
Relative humidity %	Air temperature °C (°F)		
40 - 80	25 (77)	1,079 - 1,295 (11.0 - 13.2, 156 - 188)	137 - 196 (1.4 - 2.0, 20 - 28)
	30 (86)	1,285 - 1,520 (13.1 - 15.5, 186 - 220)	186 - 245 (1.9 - 2.5, 27 - 36)
	35 (95)	1,510 - 1,775 (15.4 - 18.1, 219 - 257)	235 - 314 (2.4 - 3.2, 34 - 46)
	40 (104)	1,755 - 2,059 (17.9 - 21.0, 255 - 299)	304 - 392 (3.1 - 4.0, 44 - 57)

Checking and Adjusting

The oil used to lubricate the compressor is circulating with the refrigerant.
Whenever replacing any component of the system or a large amount of gas leakage occurs, add oil to maintain the original amount of oil.

OIL CAPACITY

Unit: mℓ (Imp fl oz)

Applied model	All model
Capacity	
Total in system	200 (7.0)
Amount of oil which can be drained	70 - 120 (2.5 - 4.2)*
Compressor (Service parts) charging amount	200 (7.0)

*: All oil cannot be drained from system.

OIL RETURN OPERATION

Before checking and adjusting oil level, operate compressor at engine idling speed, with controls set for maximum cooling and high blower speed, for 20 to 30 minutes in order to return oil to compressor.

CHECKING AND ADJUSTING FOR USED COMPRESSOR

1. After oil return operation, stop the engine and discharge refrigerant and then remove compressor from the vehicle.
2. Remove oil drain plug, drain compressor oil from compressor oil sump and measure the amount.

Oil is sometimes hard to extract when compressor is cooled. Remove oil while compressor is warm [maintained to 40 to 50°C (104 to 122°F)].

3. If the amount is less than 70 mℓ (2.5 Imp fl oz), some refrigerant may have leaked out. Conduct leak tests on connections of each system, and if necessary, repair or replace faulty parts.
4. Check the purity of the oil and then adjust oil level following the procedure below.
   (a) When oil is clean

Unit: mℓ (Imp fl oz)

Amount of oil drained	Adjusting procedure
Above 70 (2.5)*	Oil level is right. Pour in same amount of oil as was drained out.
Below 70 (2.5)	Oil level may be low. Pour in 70 mℓ (2.5 Imp fl oz) of oil.

*: If amount of oil drained is much greater than under normal circumstances, flush air conditioner system with refrigerant. Then pour in 200 mℓ (7.0 Imp fl oz) of oil into air conditioner system.

   (b) When oil contains chips or other foreign material. After air conditioner system has been flushed with refrigerant, replace receiver drier. Then pour in 200 mℓ (7.0 Imp fl oz) of oil into air conditioner system.

CHECKING AND ADJUSTING FOR COMPRESSOR REPLACEMENT

200 mℓ (7.0 Imp fl oz) of oil is charged in compressor (service parts). So it is necessary to drain the proper amount of oil from new compressor. Follow the procedure below.

1. After oil return operation, drain compressor oil from used compressor and measure the amount.
   (It is the same procedure as CHECKING AND ADJUSTING FOR USED COMPRESSOR.)

Checking and Adjusting (Cont'd)

2. Check the purity of the oil and then adjust oil level following the procedure below.

   (a) When oil is clean.

Unit: mℓ (Imp fl oz)

Amount of oil drained from used compressor	Draining amount of oil from new compressor
Above 70 (2.5)*	200 (7.0) – [Amount of oil drained + 20 (0.7)]
Below 70 (2.5)	110 (3.9)

*: If amount of oil drained is much greater than under normal circumstances, flush air conditioner system with refrigerant. Then install new compressor [200 mℓ (7.0 Imp fl oz) of oil is charged in compressor service parts.].

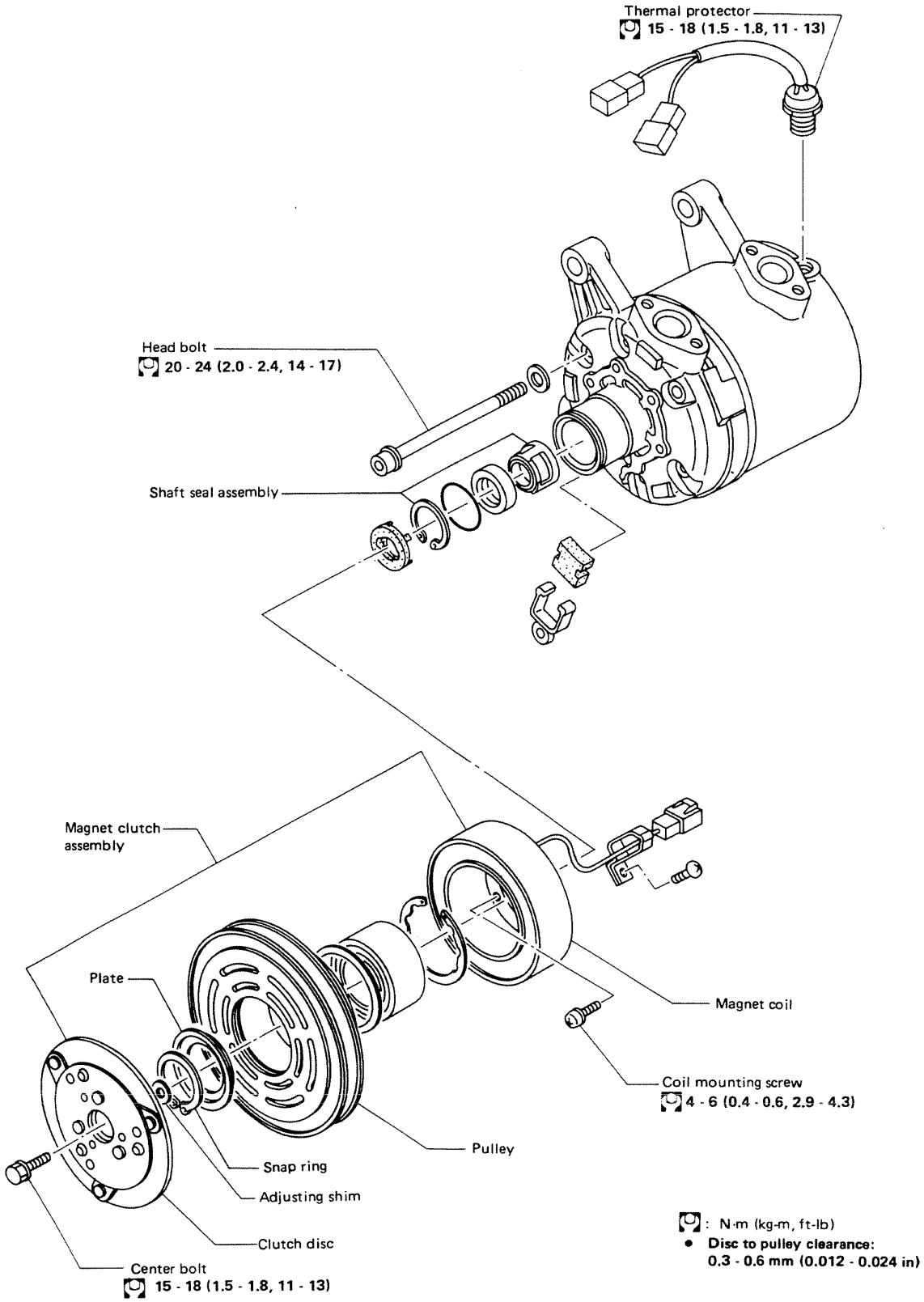
Example:

Unit: mℓ (Imp fl oz)

Amount of oil drained from used compressor	Draining amount of oil from new compressor
90 (3.2)	90 (3.2)
50 (1.8)	110 (3.9)

   (b) If oil contains chips or foreign material, after air conditioner system has been flushed with refrigerant, replace receiver drier. Then install new compressor [200 mℓ (7.0 Imp fl oz) of oil is charged in compressor service parts.].

COMPRESSOR—Model DKV-14C (DIESEL-KIKI make)



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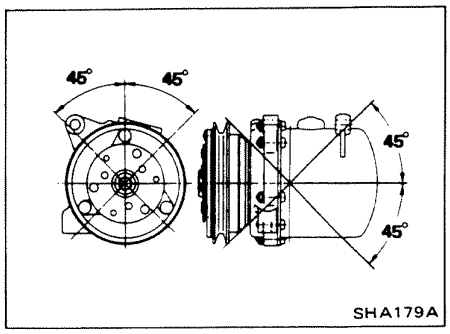


Precautions

1. Plug all openings in the compressor to prevent moisture and foreign matter from entering.
2. Do not tilt the compressor more than 45° in any direction for more than 10 minutes, as this will cause the lubricating oil to enter the cylinder. If under that condition, compressor should be operated suddenly, internal damage would result. To expel oil from cylinder, hand-crank compressor several times in its installed condition.
3. Before replacing with a new compressor, drain specified amount of compressor oil from new compressor. Refer to Compressor Oil Level Check.
4. When replacing parts, always replace O-ring with new ones.
5. When storing a compressor, be sure to fill it with refrigerant to prevent rusting. Add refrigerant at the low pressure side and purge air at the high pressure side, while rotating shaft by hand.

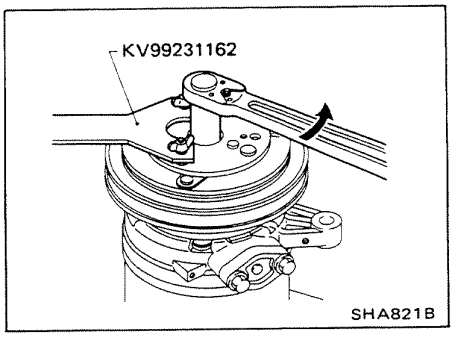
Compressor Clutch

The most likely source of problem is clutch slippage. Factors are listed here. Exercise ample care.

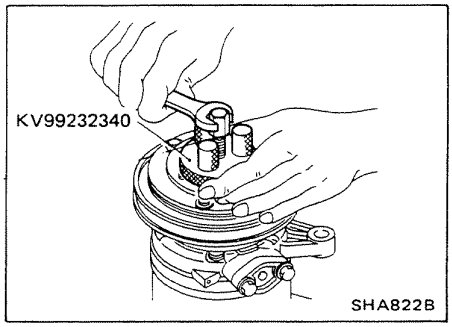
1. Clearance between clutch disc and pulley should be 0.3 to 0.6 mm (0.012 to 0.024 in) at all peripheral points.
2. Make sure that there is no oil or dirt on friction surfaces of clutch disc (clutch hub) and pulley. Remove any oil or dirt with a dry rag.
3. Make sure that terminal voltage at magnetic coil is above 10.5V.

REMOVAL

1. Using Tool, hold clutch plate. With suitable socket wrench, remove center bolt retaining clutch assembly to shaft.

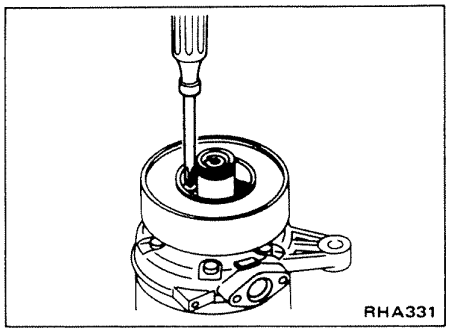


Compressor Clutch (Cont'd)



2. Thread tool into the bore of clutch hub, hold tool with wrench, and then thread in center bolt until clutch disc can be removed.
3. Remove clutch disc, collar and adjusting shims.
4. Expand snap ring with tool and remove snap ring and plate.
5. Remove pulley and bearing assembly. When the assembly can not be removed by hand, use a puller and suitable adapter.

- **Be careful not to scratch shaft or bend pulley.**



6. Using an impact tool, loosen three coil mounting screws. Use of the impact tool is advisable as screws have been calked.
7. Remove key.
8. Remove clutch coil.

INSPECTION

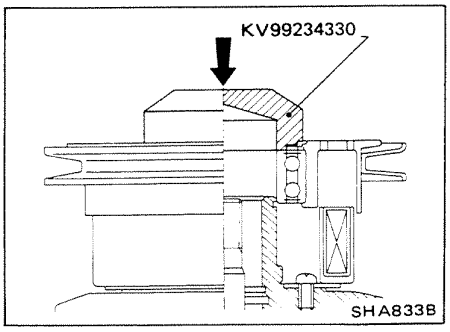
1. Check the friction surfaces of the clutch for damage due to excessive heat, or excessive grooving due to slippage. If necessary, replace coil, pulley and bearing assembly, and clutch disc as a set.
2. Oil or dirt on the friction surfaces should be cleaned with a suitable solvent and a dry rag.
3. Check coil for shorted or opened binding leads.

INSTALLATION

1. Install key.
2. Position coil assembly on compressor body. Be sure that the electrical terminals are reassembled in the original position. Install and tighten coil mounting screws evenly.

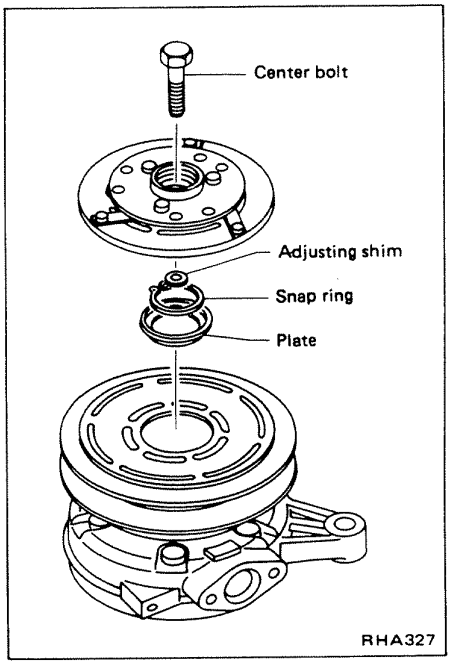
: Coil mounting screw
4 - 6 N·m
(0.4 - 0.6 kg-m, 2.9 - 4.3 ft-lb)

Compressor Clutch (Cont'd)



3. Press pulley assembly onto the neck of coil assembly using Tool.

- **Wipe oil thoroughly off the clutch surface.**



4. Select adjusting shim(s) which give(s) the correct clearance between pulley and clutch disc.
5. Using a plastic mallet, tape clutch disc in place on drive shaft.

- **Do not use excessive force with a plastic mallet or in a press, or internal damages may result.**

6. Place spring washer and center bolt onto drive shaft. Tighten center bolt to drive clutch wheel onto drive shaft.

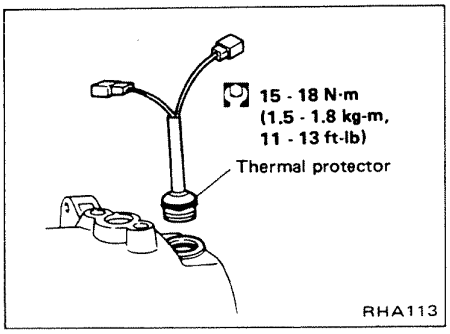
   Center bolt
   15 - 18 N·m
   (1.5 - 1.8 kg-m, 11 - 13 ft-lb)

   At this time, hold clutch wheel with Tool KV99231010.
7. Check clearance around the entire periphery of clutch disc.

   Disc-to-pulley clearance:
   0.3 - 0.6 mm (0.012 - 0.024 in)

   If the specified clearance is not obtained, replace adjusting spacer and readjust.

- **When replacing compressor clutch assembly, do not forget break-in operation, accomplished by engaging and disengaging the clutch some thirty times. Break-in operation raises the level of transmitted torque.**

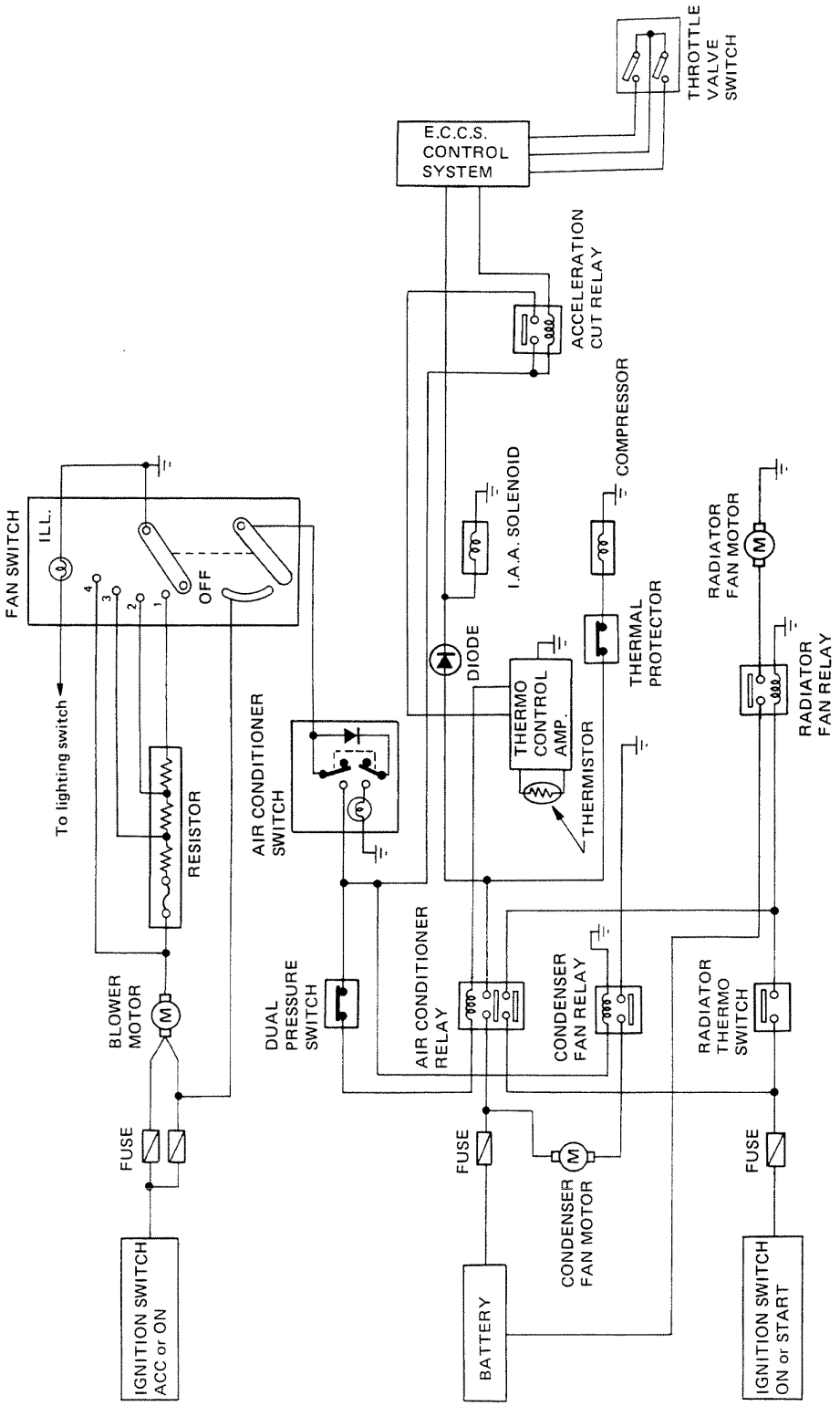


Thermal Protector

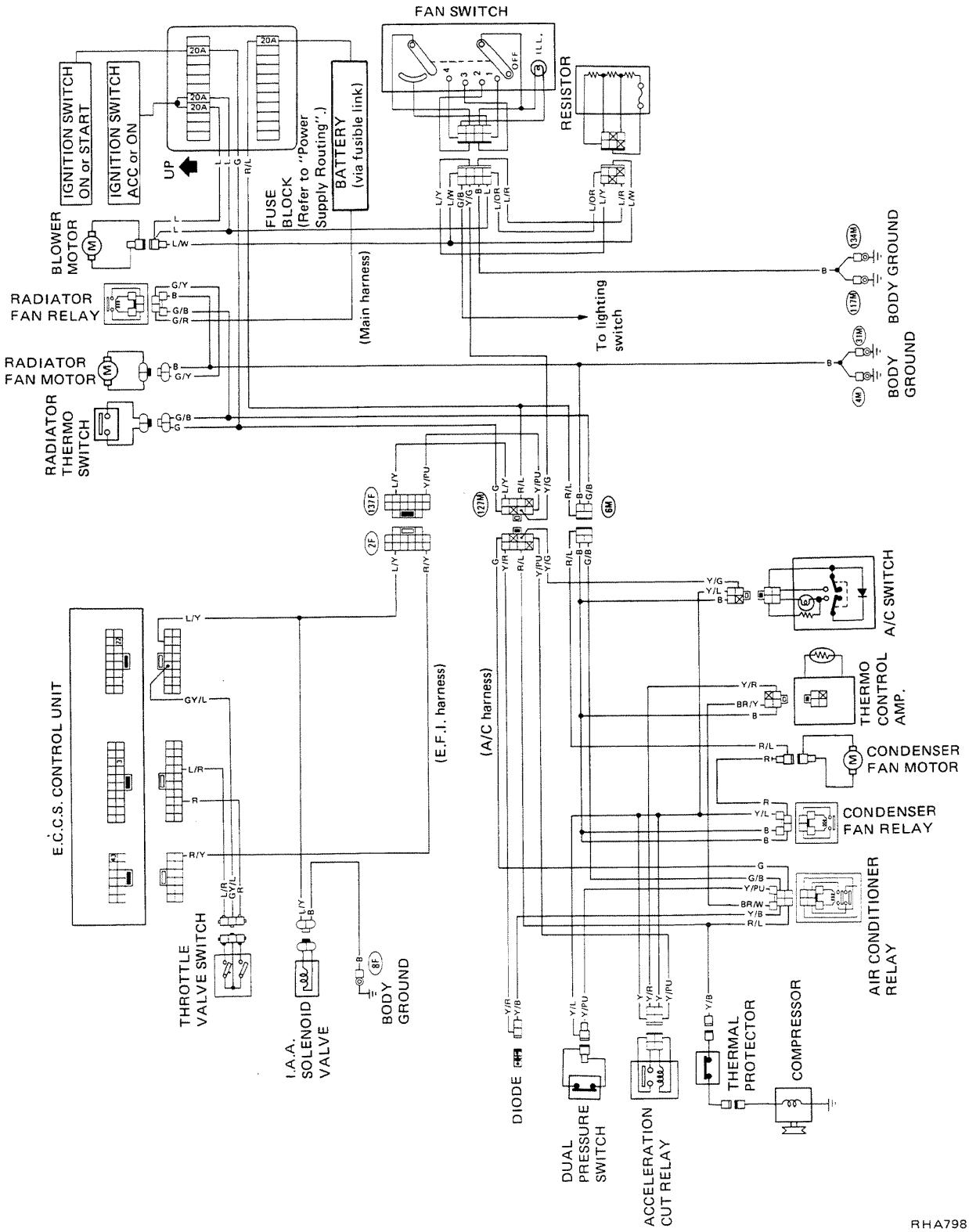
INSPECTION

- Check continuity between two terminals.

Schematic


THROTTLE VALVE SWITCH
E.C.C.S. CONTROL SYSTEM
ACCELERATION CUT RELAY
COMPRESSOR
I.A.A. SOLENOID
DIODE
THERMO CONTROL AMP.
THERMISTOR
THERMAL PROTECTOR
RADIATOR FAN MOTOR
RADIATOR FAN RELAY
FAN SWITCH
ILL.
OFF
To lighting switch
RESISTOR
AIR CONDITIONER SWITCH
BLOWER MOTOR
DUAL PRESSURE SWITCH
AIR CONDITIONER RELAY
CONDENSER FAN RELAY
RADIATOR THERMO SWITCH
FUSE
FUSE
FUSE
CONDENSER FAN MOTOR
IGNITION SWITCH ACC or ON
BATTERY
IGNITION SWITCH ON or START

Wiring Diagram



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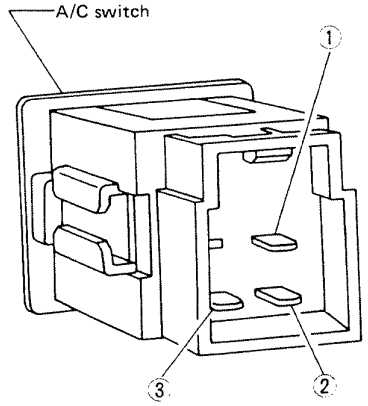
Inspection

FAN SWITCH

Refer to HA-6.

A/C SWITCH

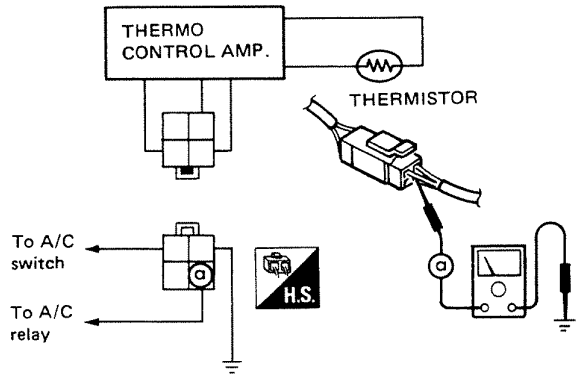


	ON	OFF
1	○ ○	
2	○	○
3	○	

A/C indicator lamp

RHA799

THERMO CONTROL AMP.



Evaporator outlet air temperatoure °C (°F)	Thermo amp. operation	Tester
Decreasing to 0.1 - 0.9 (32 - 34)	Turn OFF	Approx. 12V
Increasing to 2.5 - 3.5 (37 - 38)	Turn ON	Approx. 0V

RHA591

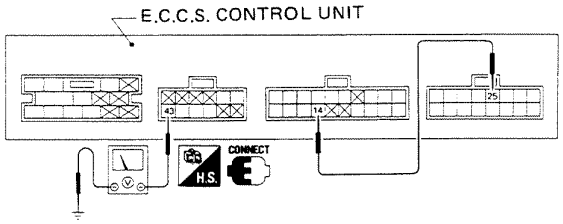
Inspection (Cont'd)

ACCELERATION CUT TIMER

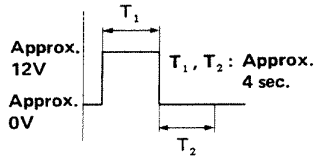
1. Turn ignition switch to "ON".
2. Connect voltmeter from harness side.
3. Measure voltage across terminal ㊸ and body ground when connecting terminals ⑭ and ㉕ with a jumper cable.

- Voltmeter indicates approx. 12V for approx. 4 seconds (T_1) after connecting terminal ⑭ and ㉕.

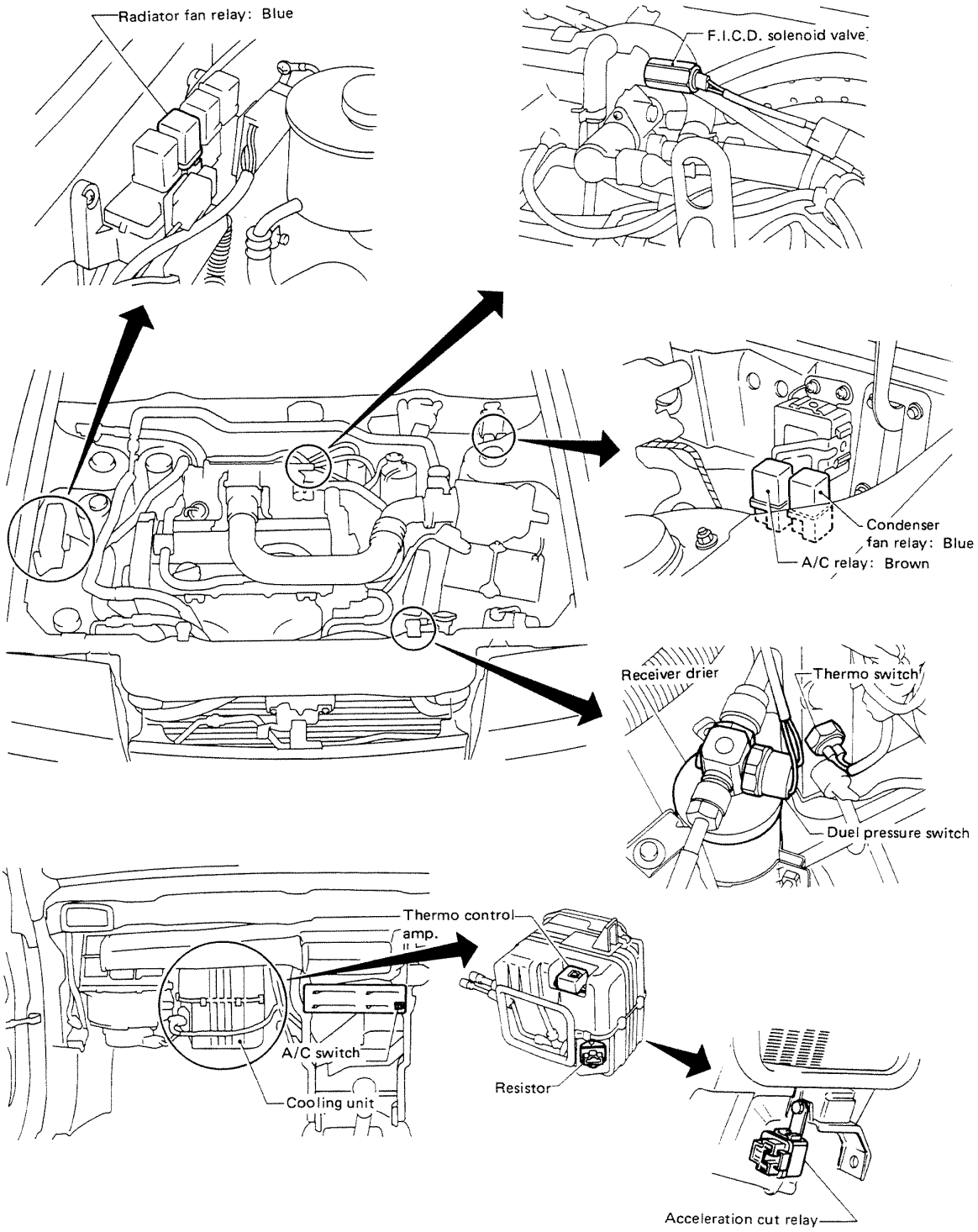
If terminals ⑭ and ㉕ are connected again for approx. 4 seconds (T_2), voltmeter will not indicate approx. 12V but indicates approx. 0V.



Specification of terminal ㊸



RHA772


Radiator fan relay: Blue
F.I.C.D. solenoid valve
Condenser fan relay: Blue
A/C relay: Brown
Receiver drier
Thermo switch
Duel pressure switch
Thermo control amp.
A/C switch
Cooling unit
Resistor
Acceleration cut relay

RHA800

General Specifications

COMPRESSOR

Model	DKV-14C
Type	Vane rotary
Displacement cm^3 (cu in)/Rev	140 (8.54)
Direction of rotation	Clockwise (Viewed from drive end)
Drive belt	Poly V

LUBRICATION OIL

Model	DIESEL-KIKI make DKV-14C
Type	SUNISO 5GS
Capacity mℓ (Imp fl oz) Total in system	200 (7.0)
Remaining oil in system after oil return operation and draining it	80 - 130 (2.8 - 4.6)
Compressor (Service parts) charging amount	200 (7.0)

REFRIGERANT

Type		R-12
Capacity	kg (lb)	0.9 - 1.1 (2.0 - 2.4)

Inspection and Adjustment

ENGINE IDLING SPEED

When A/C is ON (F.I.C.D. is actuated)

Unit: rpm

Transaxle \ Engine model	CA16DE
Manual	750 - 850

COMPRESSOR

Model		DKV-14C
Clutch disc-pulley clearance	mm (in)	0.3 - 0.6 (0.012 - 0.024)

BELT TENSION

Refer to Checking Drive Belts (MA section).

Tightening Torque

COMPRESSOR INSTALLATION

	CA engine model		
	N·m	kg-m	ft-lb
Compressor bracket to cylinder block	69 - 78	7.0 - 8.0	51 - 58
Compressor to compressor bracket	44 - 54	4.5 - 5.5	33 - 40
Idler pulley to compressor bracket	26 - 36	2.7 - 3.7	20 - 27

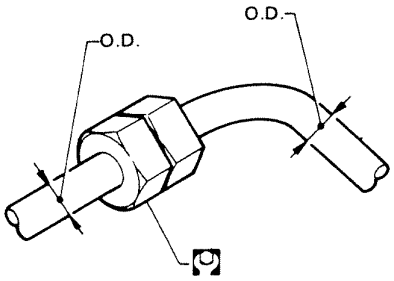
COMPRESSOR

Model	DKV-14C		
	N·m	kg-m	ft-lb
Center bolt	15 - 18	1.5 - 1.8	11 - 13
Thermal protector	15 - 18	1.5 - 1.8	11 - 13
Coil mounting screw	4 - 6	0.4 - 0.6	2.9 - 4.3
Head bolt	20 - 24	2.0 - 2.4	14 - 17

REFRIGERANT LINE

When connecting lines made of different material, basically use the lower tightening torque of the two.

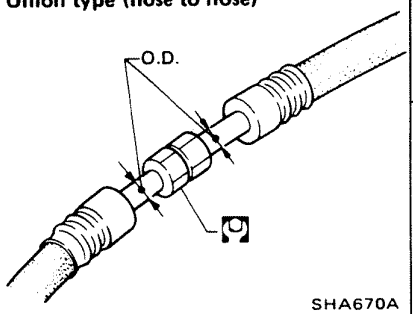
Union type (pipe to pipe)



SHA669A

Pipe O.D. mm (in)	Material					
	Steel or copper			Aluminum		
	N·m	kg-m	ft-lb	N·m	kg-m	ft-lb
6 (1/4)	10 - 20	1.0 - 2.0	7 - 14	–	–	–
8 (5/16)	15 - 25	1.5 - 2.5	11 - 18	10 - 20	1.0 - 2.0	7 - 14
10 (3/8)	15 - 25	1.5 - 2.5	11 - 18	10 - 20	1.0 - 2.0	7 - 14
12 (1/2)	20 - 29	2.0 - 3.0	14 - 22	15 - 25	1.5 - 2.5	11 - 18
16 (5/8)	25 - 34	2.5 - 3.5	18 - 25	20 - 29	2.0 - 3.0	14 - 22
19 (3/4)	25 - 34	2.5 - 3.5	18 - 25	20 - 29	2.0 - 3.0	14 - 22

Union type (hose to hose)

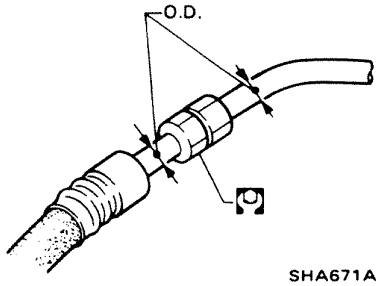


SHA670A

Pipe O.D. mm (in)	Material					
	Steel or copper			Aluminum		
	N·m	kg-m	ft-lb	N·m	kg-m	ft-lb
6 (1/4)	10 - 20	1.0 - 2.0	7 - 14	–	–	–
8 (5/16)	15 - 25	1.5 - 2.5	11 - 18	10 - 20	1.0 - 2.0	7 - 14
10 (3/8)	15 - 25	1.5 - 2.5	11 - 18	10 - 20	1.0 - 2.0	7 - 14
12 (1/2)	25 - 34	2.5- 3.5	18 - 25	20 - 29	2.0 - 3.0	14 - 22
16 (5/8)	25 - 34	2.5 - 3.5	18 - 25	20 - 29	2.0 - 3.0	14 - 22

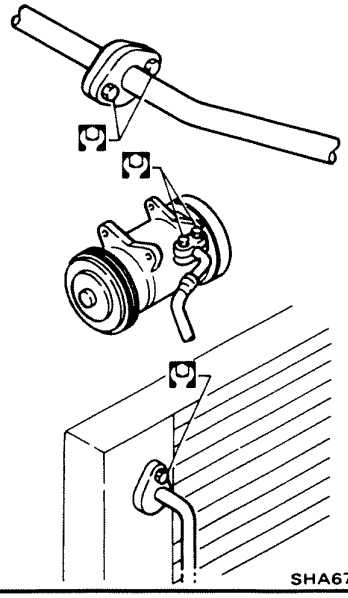
Tightening Torque (Cont'd)

Union type (hose to pipe)



- Use tightening torque for flexible hose.

Plate type



Bolt type				Tightening torque		
Grade	Nominal size	Bolt diameter mm	Pitch mm	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
	M10	10.0	1.5	16 - 22	1.6 - 2.2	12 - 16
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
	M10	10.0	1.5	25 - 35	2.6 - 3.6	19 - 26

ELECTRICAL SYSTEM

SECTION EL

When you read wiring diagrams:
- Read GI section, "HOW TO READ WIRING DIAGRAMS".

CONTENTS

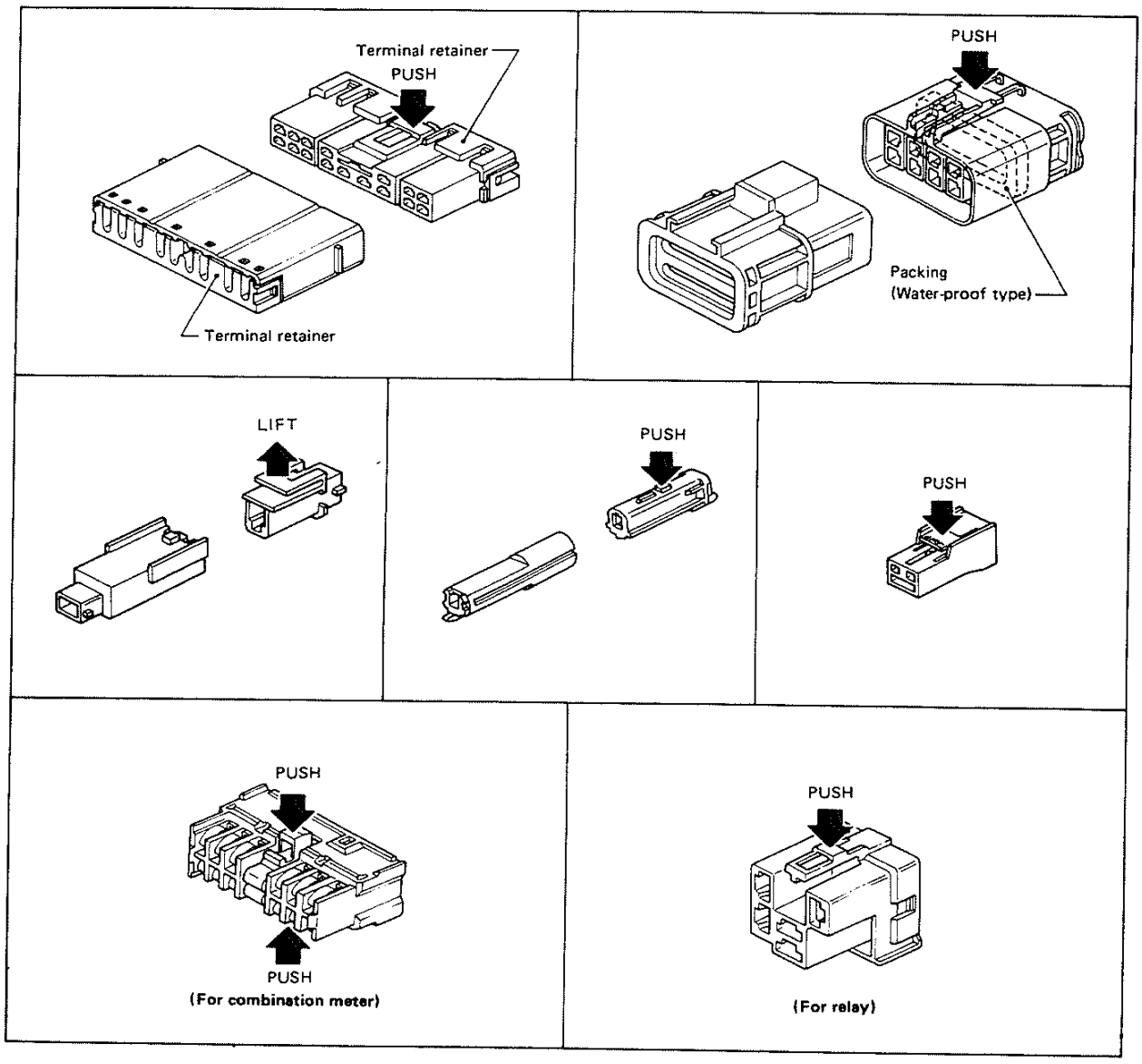
EL

WIRING DIAGRAM REFERENCE CHART

- All harness connectors prevent accidental looseness or disconnection.
- The connector can be disconnected by pushing or lifting the locking section.

CAUTION:
Do not pull the harness when disconnecting the connector.

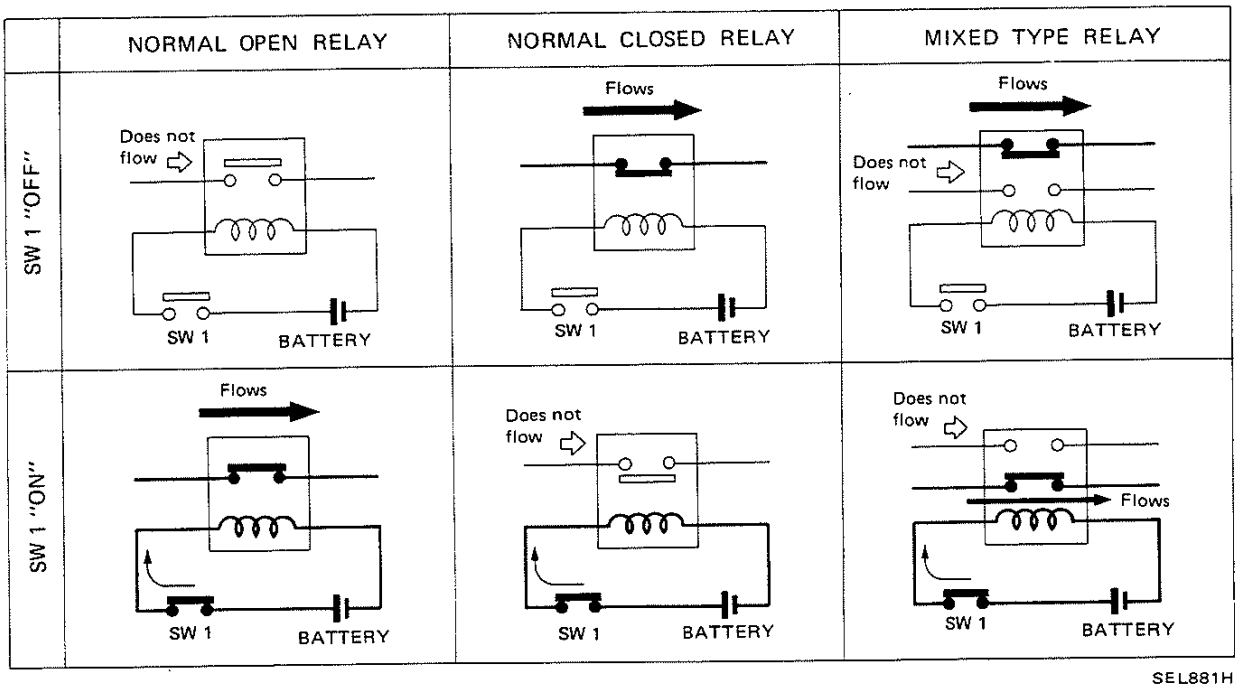
[Example]



SEL769D

Normal Open, Normal Closed and Mixed Type Relays

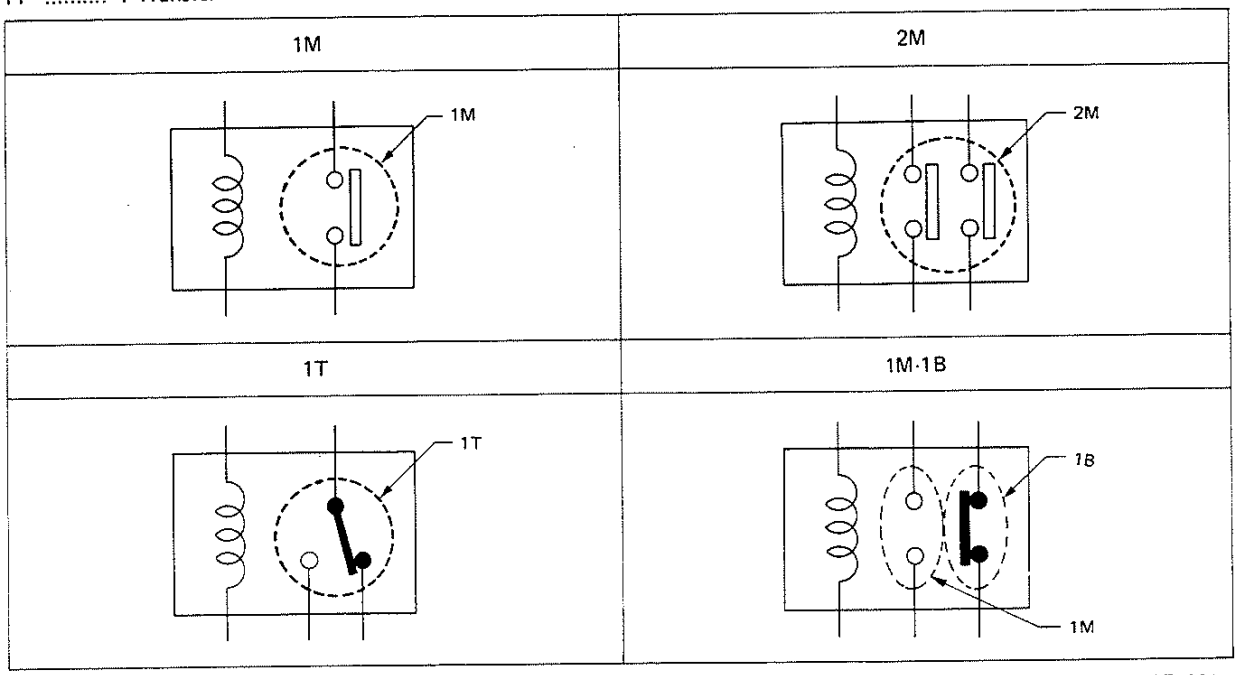
Relays can mainly be divided into three types: normal open, normal closed and mixed type relays.



SEL881H

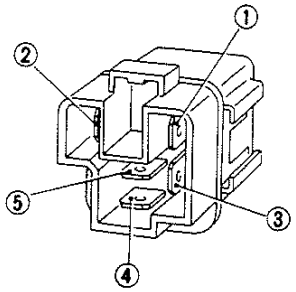
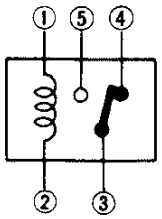
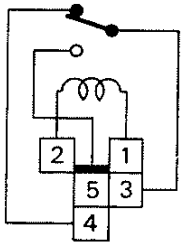
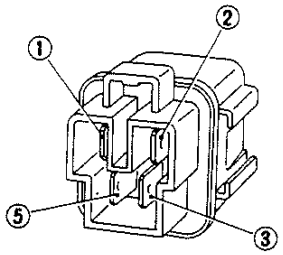
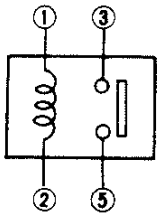
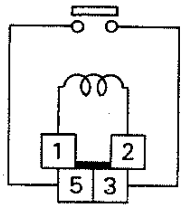
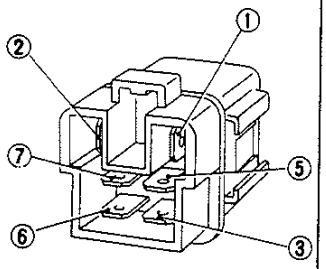
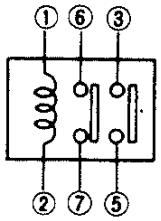
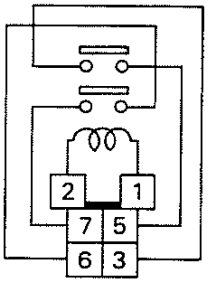
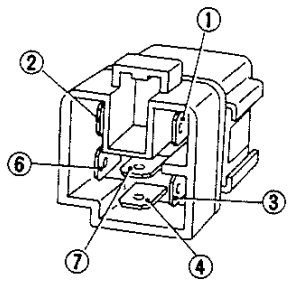
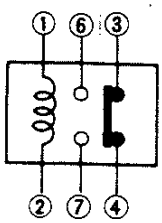
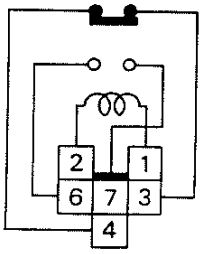
Type of Standardized Relays

1M ..... 1 Make
1T ..... 1 Transfer
2M ..... 2 Make
1M-1B ..... 1 Make 1 Break



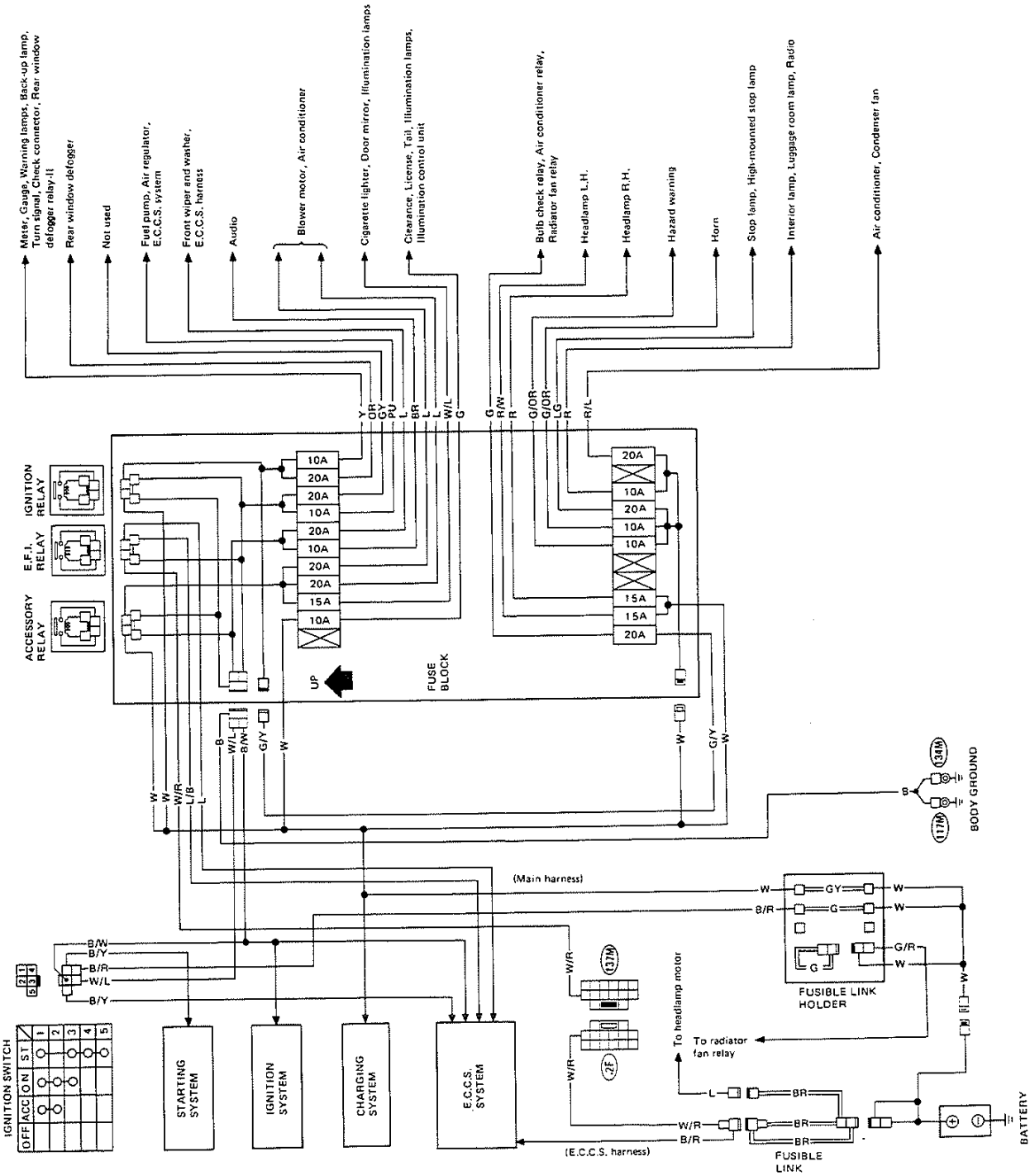
SEL882H

STANDARDIZED RELAY

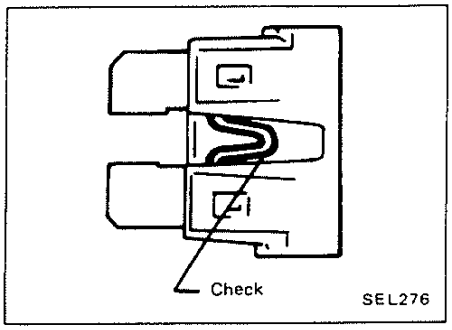
Type	Outer view	Circuit	Connector symbol and connection	Case color
1T				BLACK
1M				BLUE
2M				BROWN
1M-1B				GRAY

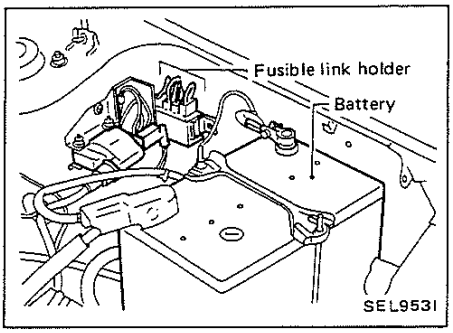
SEL883H

Wiring Diagram



SEL491J





Fuse

a. If fuse is blown, be sure to eliminate cause of problem before installing new fuse.
b. Use fuse of specified rating. Never use fuse of more than specified rating.
c. Do not install fuse in oblique direction; always insert it into fuse holder properly.
d. Remove fuse for clock if vehicle is not used for a long period of time.

Fusible Link

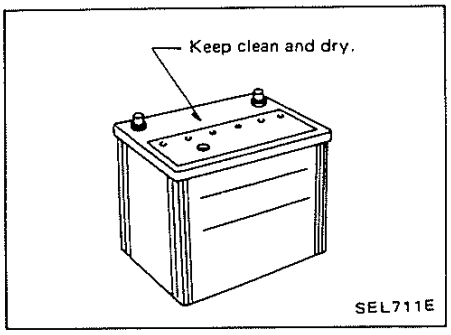
A melted fusible link can be detected either by visual inspection or by feeling with finger tip. If its condition is questionable, use circuit tester or test lamp.

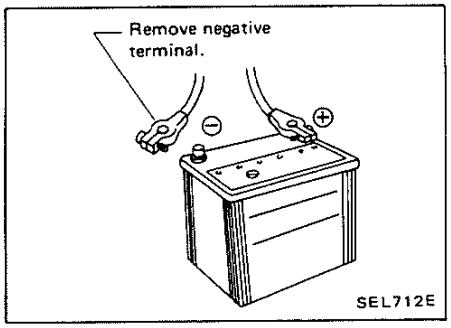
CAUTION:

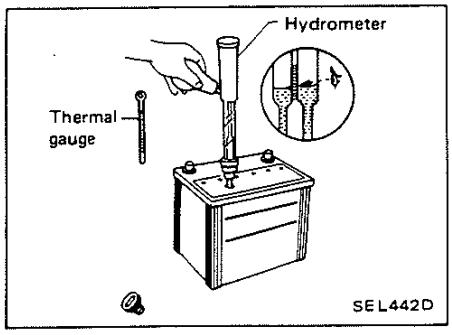
a. If fusible link should melt, it is possible that critical circuit (power supply or large current carrying circuit) is shorted. In such a case, carefully check and eliminate cause of problem.
b. Never wrap periphery of fusible link with vinyl tape. Extreme care should be taken with this link to ensure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

CAUTION:

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







How to Handle Battery

METHODS OF PREVENTING OVER-DISCHARGE

The following precautions must be taken to prevent over-discharging a battery.

- The battery surface (particularly its top) should always be kept clean and dry.
  If the top surface of a battery is wet with electrolyte or water, leakage current will cause the battery to discharge. Always keep the battery clean and dry.

- When the vehicle is not going to be used over a long period of time, disconnect the negative battery terminal. (If the vehicle has an extended storage switch, turn it off.)

- Check the charge condition of the battery.
  Periodically check the specific gravity of the electrolyte. Keep a close check on charge condition to prevent over-discharge.

How to Handle Battery (Cont'd)

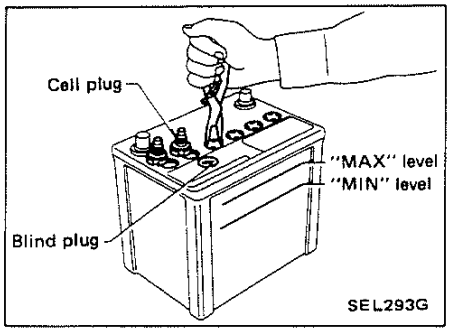
CHECKING ELECTROLYTE LEVEL

WARNING:

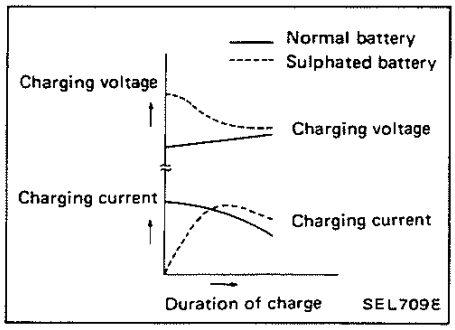
Do not allow battery fluid to come in contact with skin, eyes, fabrics, or painted surfaces. After touching a battery, do not touch or rub your eyes until you have thoroughly washed your hands. If the acid contacts the eyes, skin or clothing, immediately flush with water for 15 minutes and seek medical attention.

Normally the battery does not require additional water. However, when the battery is used under severe conditions, adding distilled water may be necessary during the battery life.

To maintain serviceability, a perforated line has been added to the battery caution label.



- If the electrolyte level is low, remove the cell plug using a suitable tool.
- Add distilled water up to the MAX level.



SULPHATION

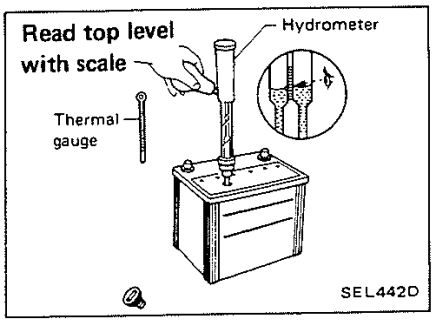
When a battery has been left unattended for a long period of time and has a specific gravity of less than 1.100, it will be completely discharged, resulting in sulphation on the cell plates.

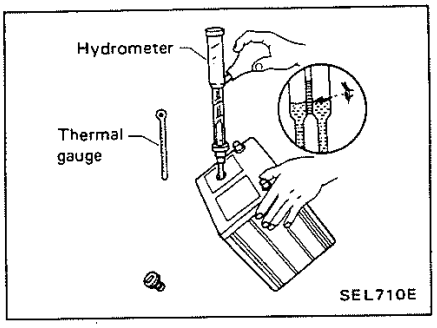
Compared with a battery discharged under normal conditions, the current flow in a "sulphated" battery is not as smooth although its voltage is high during the initial stage of charging, as shown in the figure at the left.

How to Handle Battery (Cont'd)

SPECIFIC GRAVITY CHECK

1. Read hydrometer and thermal gauge indications at eye level.



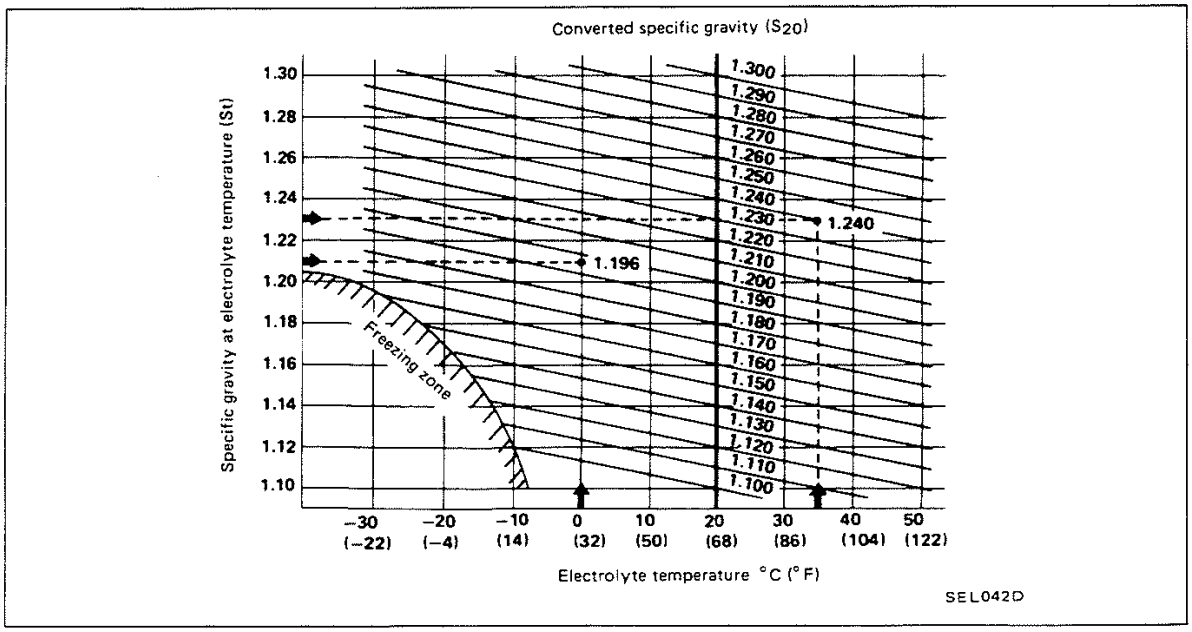


- When electrolyte level is too low, tilt battery case to raise it for easy measurement.

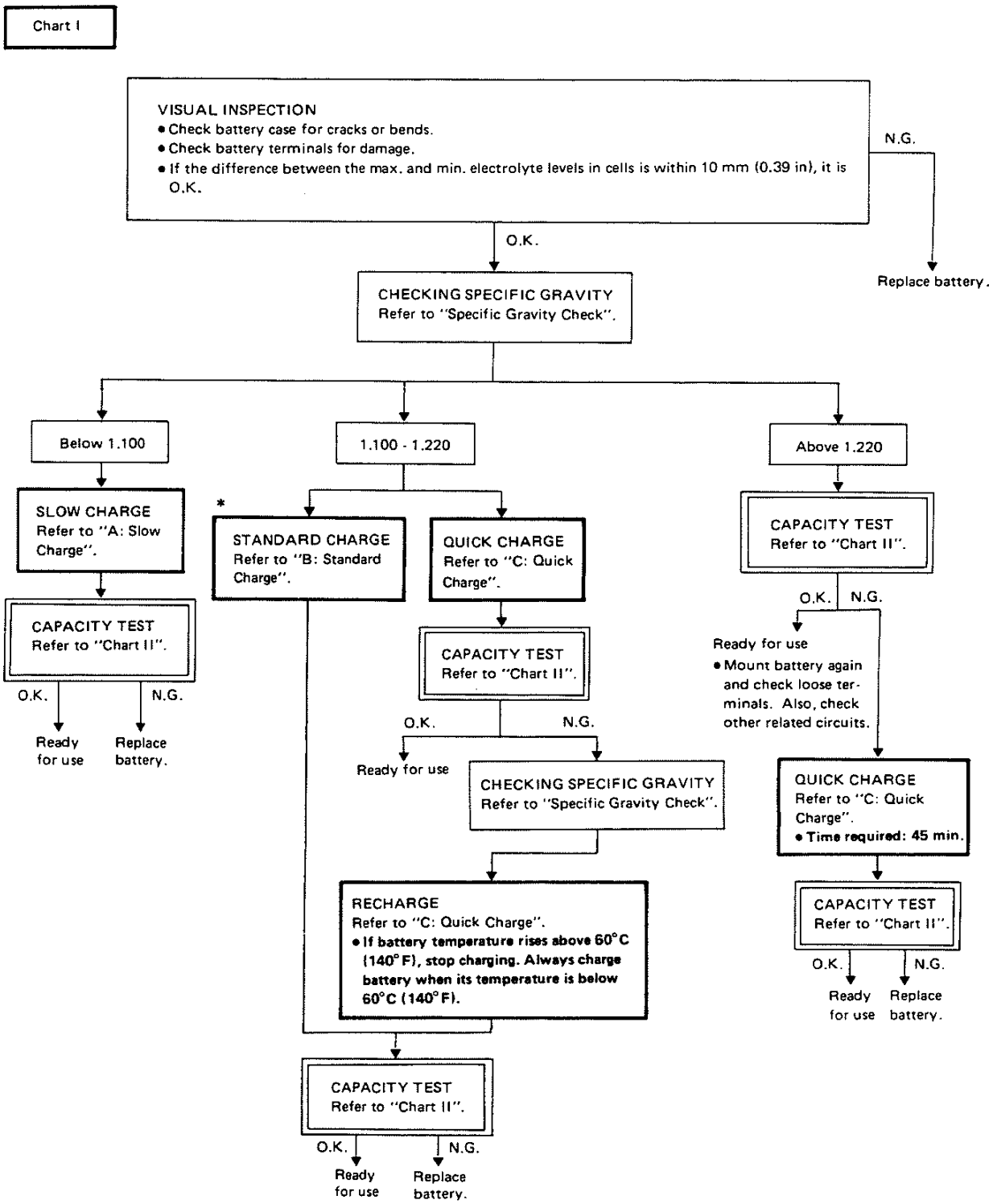
2. Convert into specific gravity at 20°C (68°F).

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.



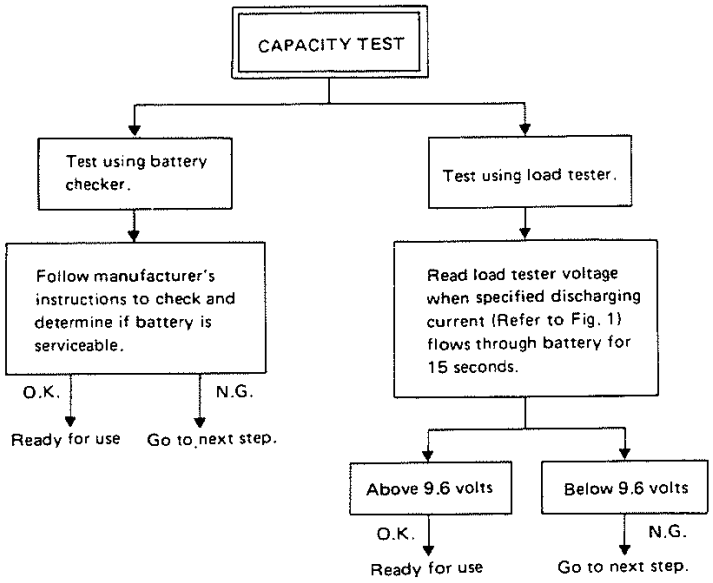
M.F. Battery Test and Charging Chart



* "STANDARD CHARGE" is recommended in case that the vehicle is in storage after charging.

M.F. Battery Test and Charging Chart (Cont'd)

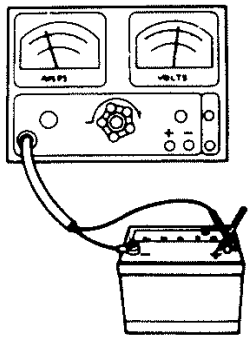
Chart II



- Check battery type and determine the specified current using the following table.

Fig. 1 DISCHARGING CURRENT (Load tester)

Type	Current (A)
28B19R(L)-MF	90
34B19R(L)-MF	99
46B24R(L)-MF	135
55B24R(L)-MF	135
50D23R(L)-MF	150
55D23R(L)-MF	180
65D26R(L)-MF	195
80D26R(L)-MF	195
75D31R(L)-MF	210
95D31R(L)-MF	240



SEL697B

M.F. Battery Test and Charging Chart (Cont'd)

A: SLOW CHARGE

Determine initial charging current from specific gravity referring to Fig. 2.

- Charge battery.
- Check charging voltage 30 minutes after starting the battery charge.

12 to 15 volts — O.K. → Continue to charge for 12 hours.

Below 12 volts or above 15 volts — N.G. → Replace battery.

CHECKING SPECIFIC GRAVITY
Refer to "Specific Gravity Check".

Conduct additional charge as per Fig 3, if necessary.

Go to "CAPACITY TEST".

Fig. 2 INITIAL CHARGING CURRENT SETTING (Slow charge)

BATTERY TYPE / CONVERTED SPECIFIC GRAVITY	28B19R(L)-MF 34B19R(L)-MF	46B24R(L)-MF 55B24R(L)-MF	50D23R(L)-MF 55D23R(L)-MF	65D26R(L)-MF 80D26R(L)-MF	75D31R(L)-MF	95D31R(L)-MF
Below 1.100	4.0 (A)	5.0 (A)	7.0 (A)	8.0 (A)	9.0 (A)	10.0 (A)

- Check battery type and determine the specified current using the table shown above.
- After starting charging, adjustment of charging current is not necessary.

Fig. 3 ADDITIONAL CHARGE (Slow charge)

Below 1.150	1.150 - 1.200	1.200 - 1.240	Above 1.240
Charge for 5 hours at initial charging current setting.	Charge for 4 hours at initial charging current setting.	Charge for 2 hours at initial charging current setting.	

Go to "CAPACITY TEST".

CAUTION:

a. Set charging current to value specified in Fig. 2. If charger is not capable of producing specified current value, set its charging current as close to that value as possible.
b. Keep battery away from open flame while it is being charged.
c. When connecting charger, connect leads first, then turn on charger. Do not turn on charger first, as this may cause a spark.
d. If battery temperature rises above 60°C (140°F), stop charging. Always charge battery when its temperature is below 60°C (140°F).

M.F. Battery Test and Charging Chart (Cont'd)

B: STANDARD CHARGE

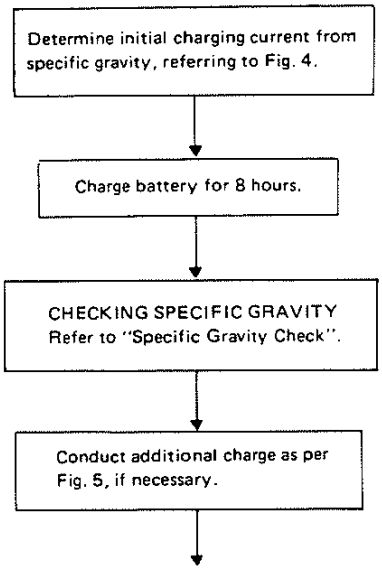
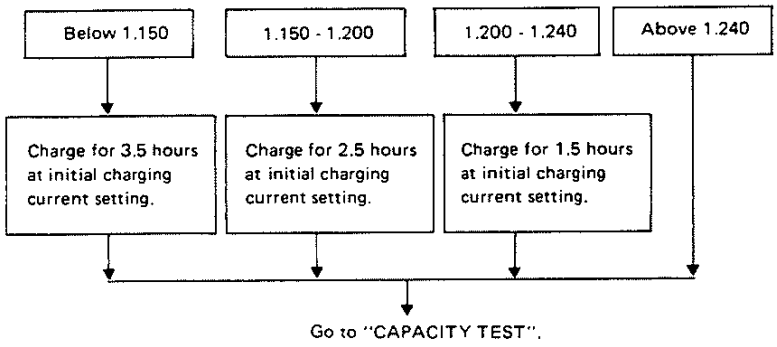


Fig. 4 INITIAL CHARGING CURRENT SETTING (Standard charge)

BATTERY TYPE / CONVERTED SPECIFIC GRAVITY	28B19R(L)-MF 34B19R(L)-MF	46B24R(L)-MF 55B24R(L)-MF	50D23R(L)-MF 55D23R(L)-MF	65D26R(L)-MF 80D26R(L)-MF	75D31R(L)-MF	95D31R(L)-MF
1.100 - 1.130	4.0 (A)	5.0 (A)	6.0 (A)	7.0 (A)	8.0 (A)	9.0 (A)
1.130 - 1.160	3.0 (A)	4.0 (A)	5.0 (A)	6.0 (A)	7.0 (A)	8.0 (A)
1.160 - 1.190	2.0 (A)	3.0 (A)	4.0 (A)	5.0 (A)	6.0 (A)	7.0 (A)
1.190 - 1.220	2.0 (A)	2.0 (A)	3.0 (A)	4.0 (A)	5.0 (A)	5.0 (A)

- Check battery type and determine the specified current using the table shown above.
- After starting charging, adjustment of charging current is not necessary.

Fig. 5 ADDITIONAL CHARGE (Standard charge)



CAUTION:

a. **Do not use standard charge method on a battery whose specific gravity is less than 1.100.**
b. **Set charging current to value specified in Fig. 4. If charger is not capable of producing specified current value, set its charging current as close to that value as possible.**
c. **Keep battery away from open flame while it is being charged.**
d. **When connecting charger, connect leads first, then turn on charger. Do not turn on charger first, as this may cause a spark.**
e. **If battery temperature rises above 60°C (140°F), stop charging. Always charge battery when its temperature is below 60°C (140°F).**

M.F. Battery Test and Charging Chart (Cont'd)

C: QUICK CHARGE

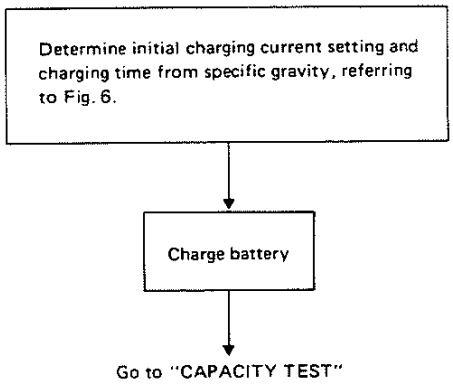


Fig. 6 INITIAL CHARGING CURRENT SETTING AND CHARGING TIME (Quick charge)

CONVERTED SPECIFIC GRAVITY \ BATTERY TYPE / CURRENT [A]	28B19R(L)-MF 34B19R(L)-MF	46B24R(L)-MF 55B24R(L)-MF 50D23R(L)-MF	55D23R(L)-MF 65D26R(L)-MF 80D26R(L)-MF	75D31R(L)-MF 95D31R(L)-MF
	10 (A)	15 (A)	20 (A)	30 (A)
1.100 - 1.130	2.5 hours			
1.130 - 1.160	2.0 hours			
1.160 - 1.190	1.5 hours			
1.190 - 1.220	1.0 hours			
Above 1.220	0.75 hours (45 min.)			

- Check battery type and determine the specified current using the table shown above.
- After starting charging, adjustment of charging current is not necessary.

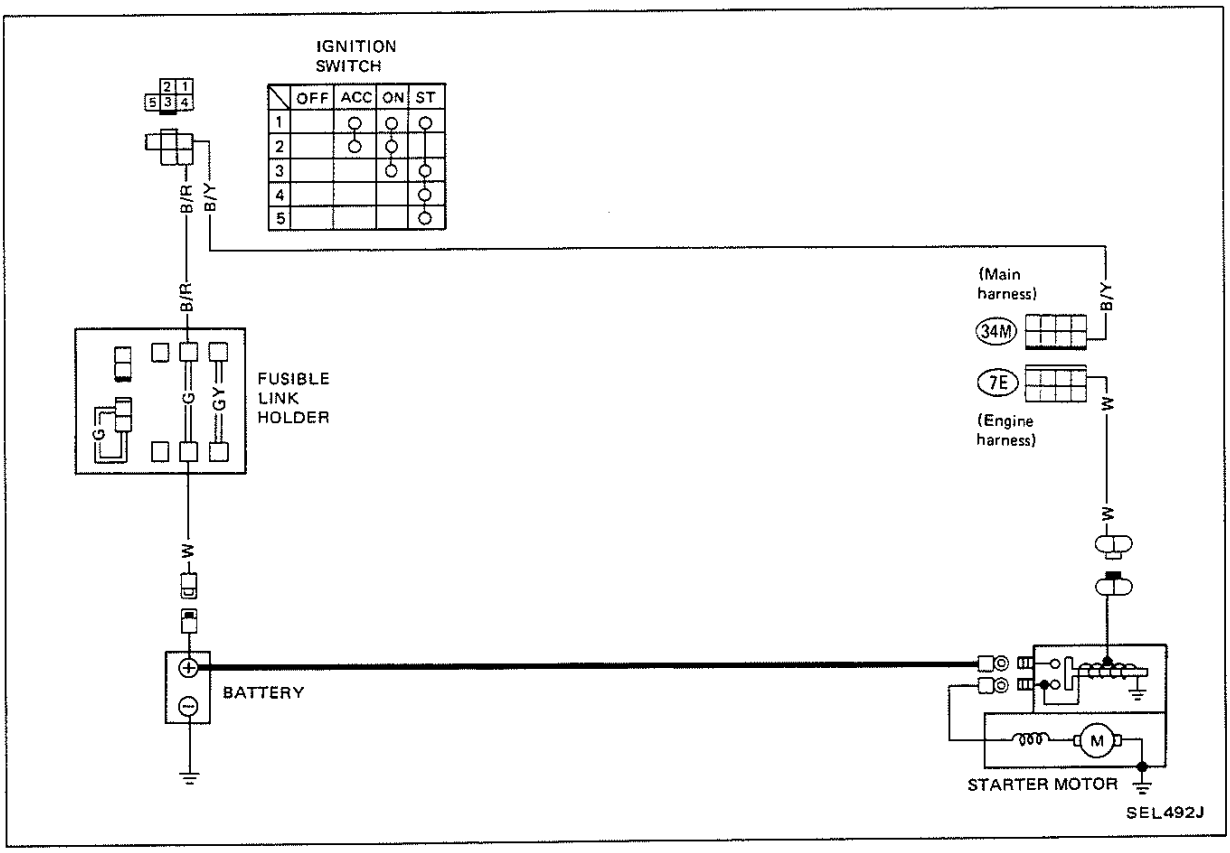
CAUTION:

a. **Do not use quick charge method on a battery whose specific gravity is less than 1.100.**
b. **Set initial charging current to value specified in Fig. 6. If charger is not capable of producing specified current value, set its charging current as close to that value as possible.**
c. **Keep battery away from open flame while it is being charged.**
d. **When connecting charger, connect leads first, then turn on charger. Do not turn on charger first, as this may cause a spark.**
e. **Be careful of a rise in battery temperature because a large current flow is required during quick-charge operation.**
   If battery temperature rises above 60°C (140°F), stop charging. Always charge battery when its temperature is below 60°C (140°F).
f. **Do not exceed the charging time specified in Fig. 6, because charging battery over the charging time can cause deterioration of the battery.**

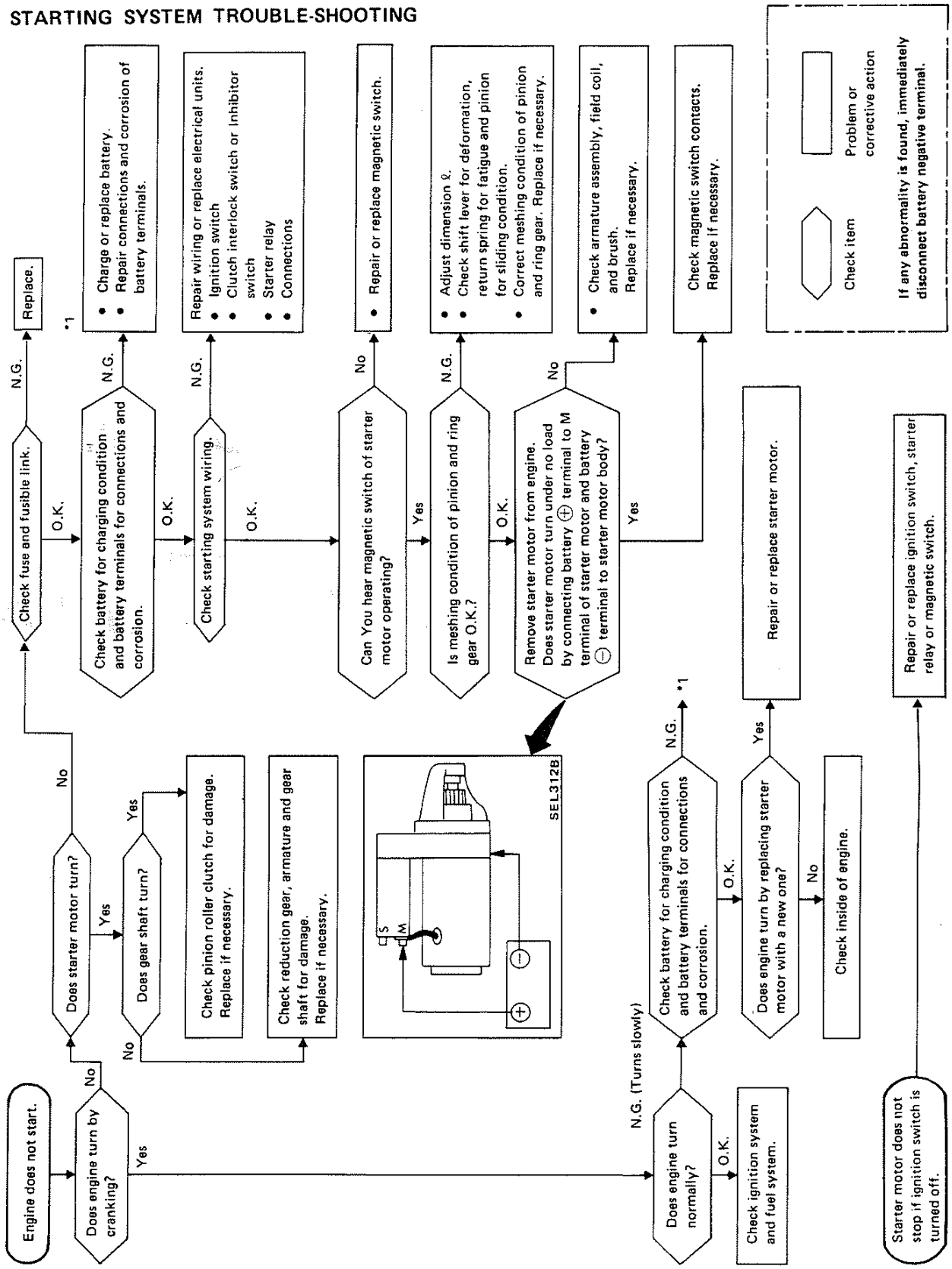
Service Data and Specifications (S.D.S.)

Applied area		Standard	Option
Type		55D23L-MF	65D26L-MF
		M.F. battery	
Capacity	V-AH	12-60	12-65

Wiring Diagram

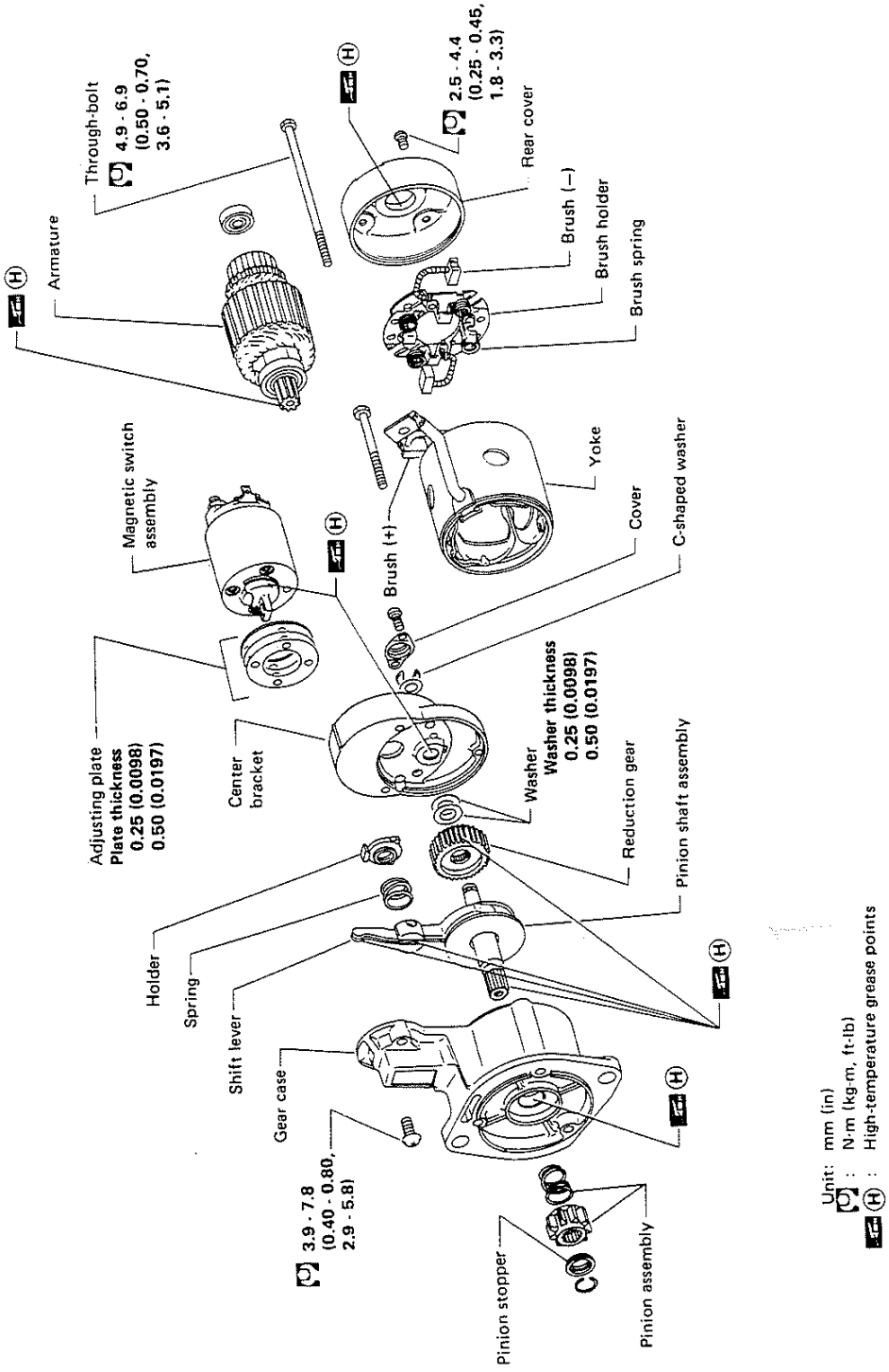


STARTING SYSTEM TROUBLE-SHOOTING



Construction

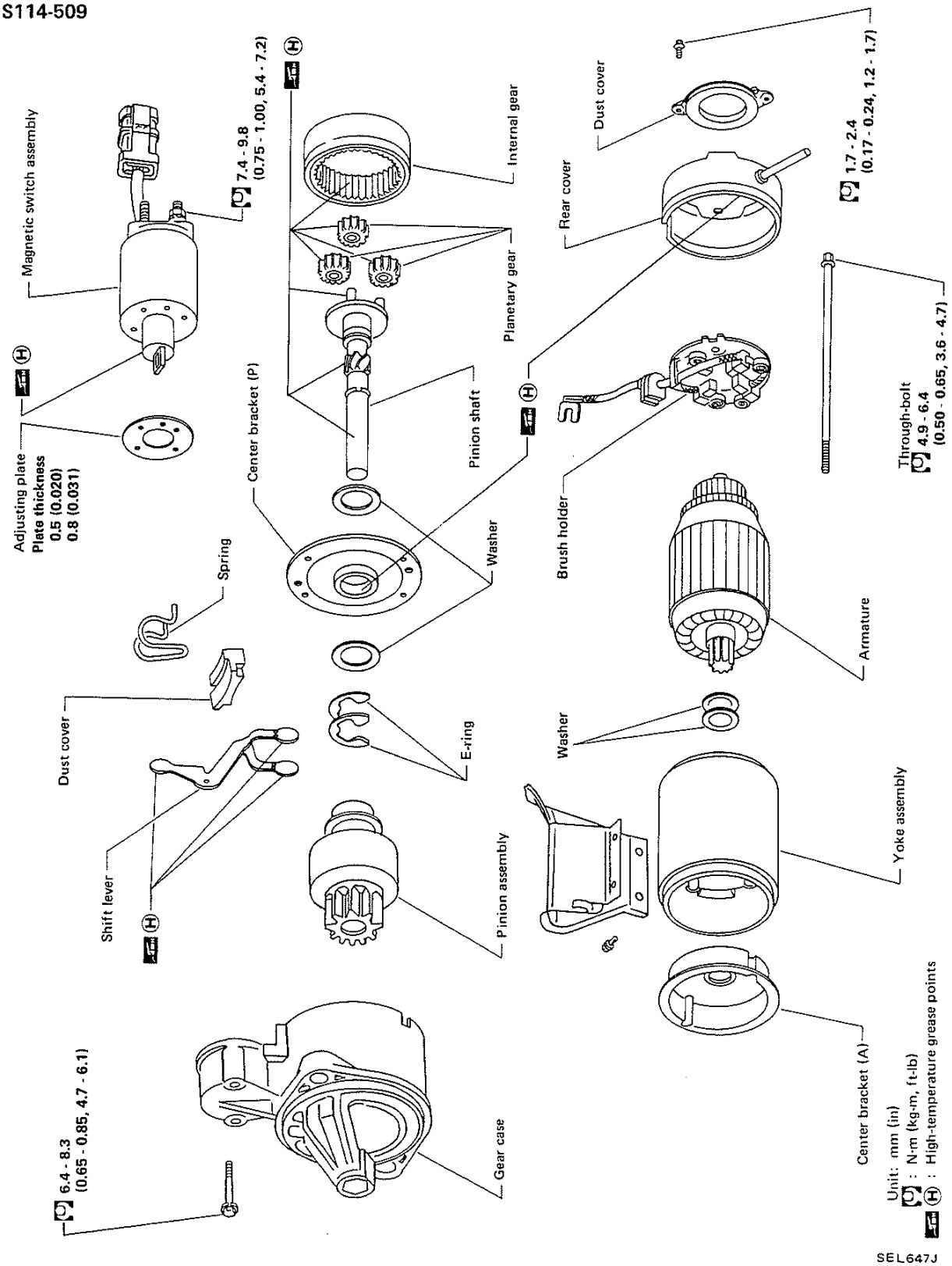
M2T53781



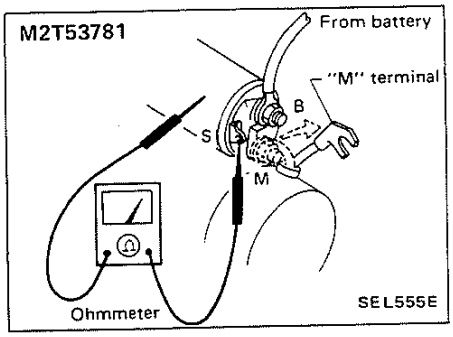
SEL554E

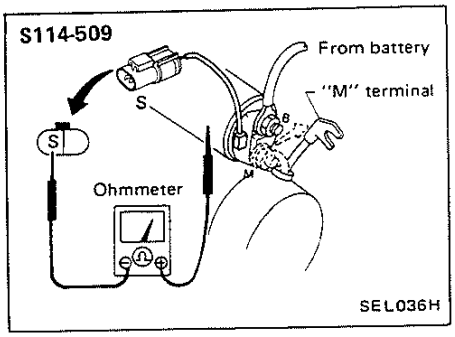
Construction (Cont'd)

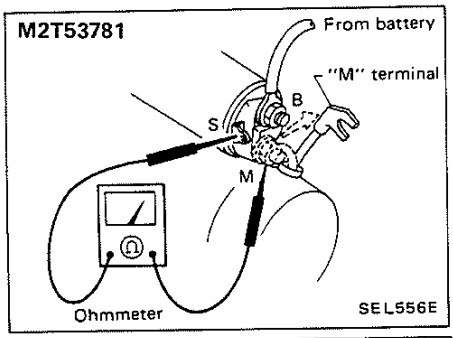
S114-509

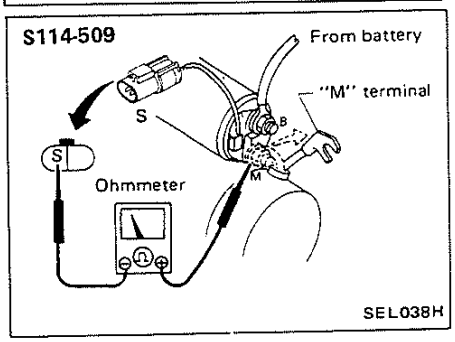


SEL647J









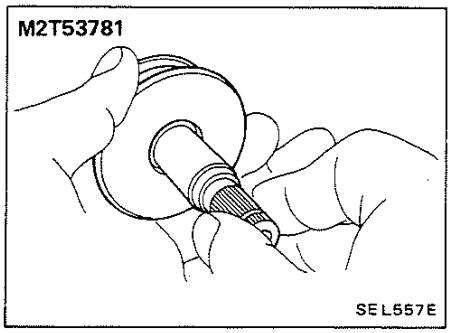
Magnetic Switch Check

Magnetic Switch Check

- Before starting to check, disconnect battery ground cable.
- Disconnect "M" terminal of starter motor.

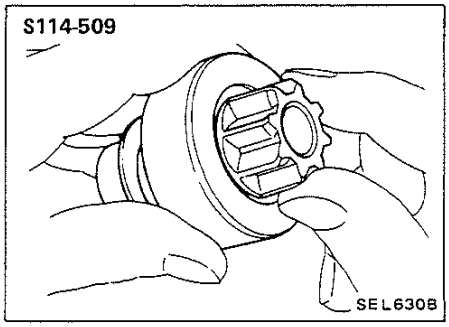
1. Continuity test (between "S" terminal and switch body).
   - No continuity ... Replace.

2. Insulation test (between each commutator and shaft).
   - Continuity exists ... Replace.

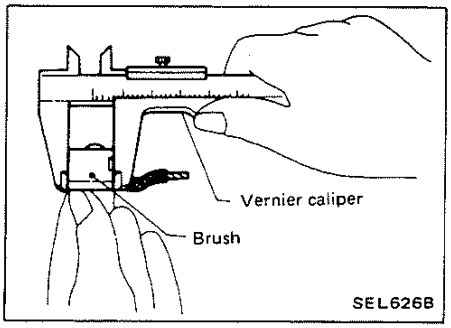


Pinion/Clutch Check

1. Check to see if pinion 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.



2. Inspect pinion teeth.
   - Replace pinion if teeth are worn or damaged. (Also check condition of ring gear teeth.)
3. Inspect reduction gear teeth.
   - Replace reduction gear if teeth are worn or damaged. (Also check condition of armature shaft gear teeth.)



Brush Check

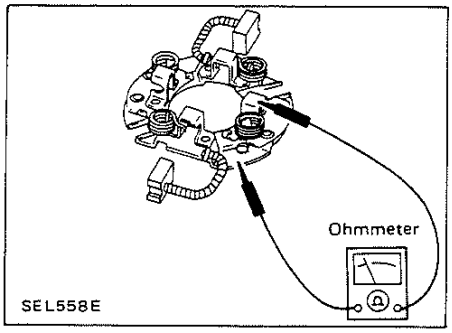
BRUSH

Check wear of brush.

Wear limit length:

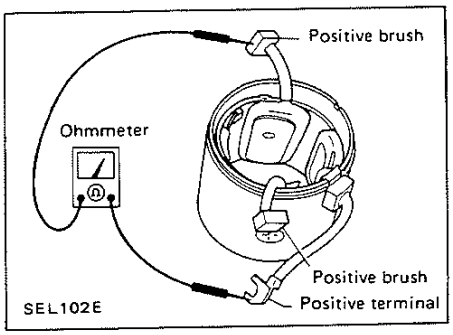
Refer to "Service Data and Specifications."

- Excessive wear ... Replace.



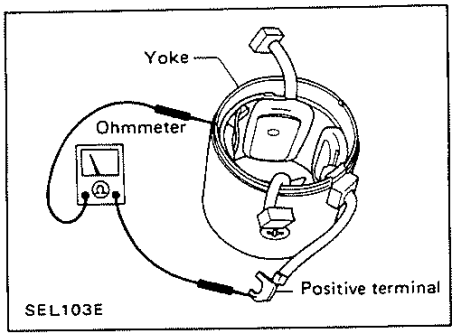
BRUSH HOLDER

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

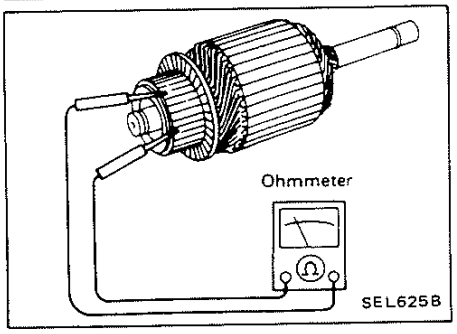
1. Continuity test (between field coil positive terminal and positive brushes).
   - No continuity ... Replace field coil.



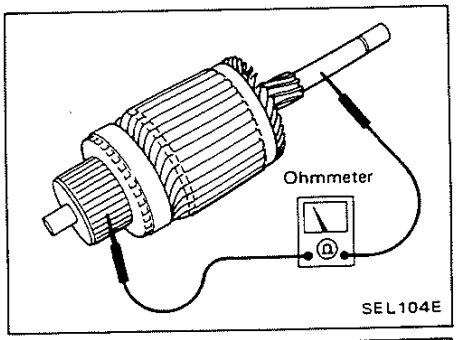
2. Insulation test (between field coil positive terminal and yoke).
   - Continuity exists ... Replace field coil.

Armature Check

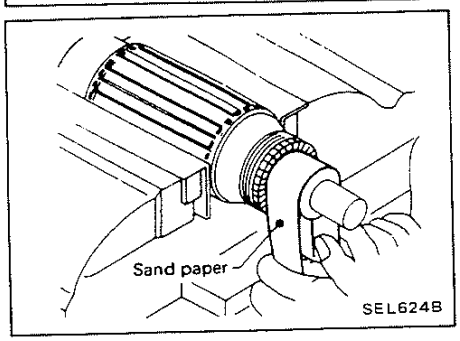
1. Continuity test (between two segments side by side).
   - No continuity ... Replace.



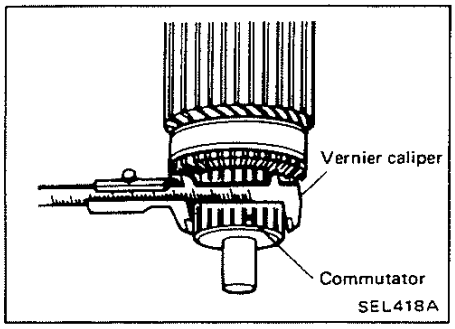
2. Insulation test (between each commutator and shaft).
   - Continuity exists ... Replace.



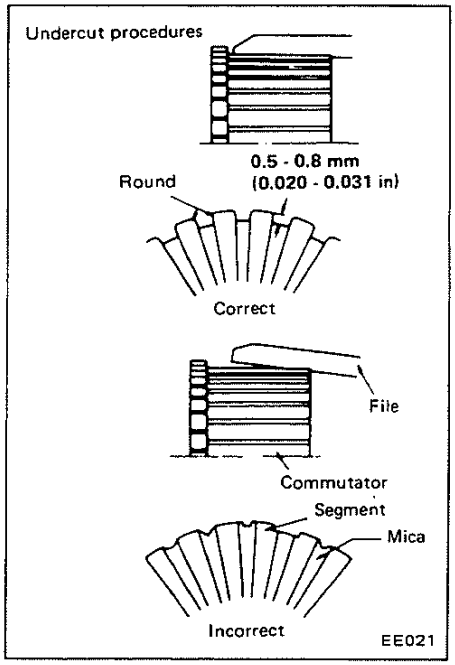
3. Check commutator surface.
   - Rough ... Sand lightly with No. 500 - 600 sandpaper.



Armature Check (Cont'd)



4. Check diameter of commutator.
   Commutator minimum diameter:
   Refer to "Service Data and Specifications."
   - 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)

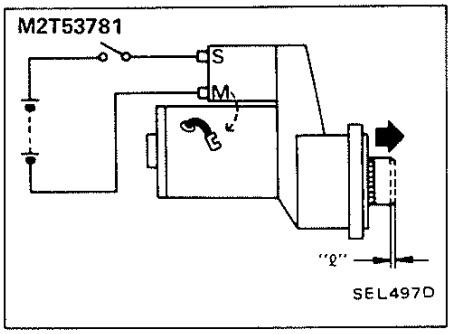
Assembly

Carefully observe the following instructions.

HIGH-TEMPERATURE GREASE POINT

- Rear cover metal
- Gear case metal
- Center bracket metal
- Frictional surface of pinion
- Moving portion of shift lever
- Plunger of magnetic switch
- Reduction gear

Assembly (Cont'd)



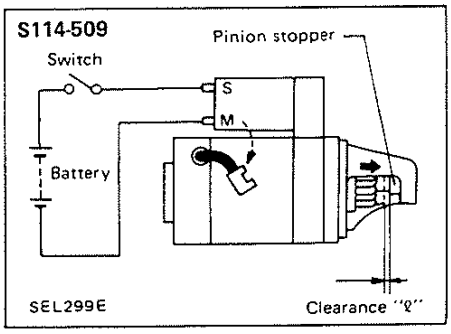
PINION PROTRUSION LENGTH ADJUSTMENT

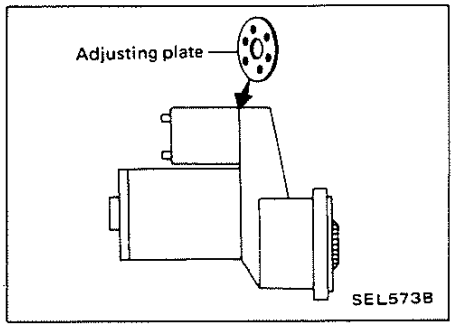
Reduction gear type

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

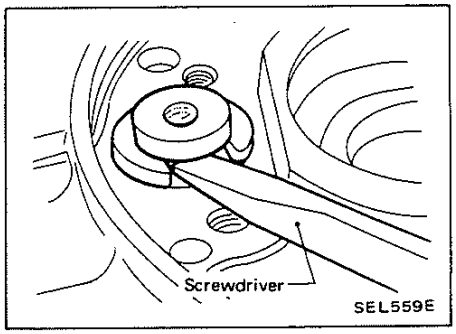
Movement "ℓ":

Refer to "Service Data and Specifications."





- Not in the specified value ... Adjust by adjusting plate.



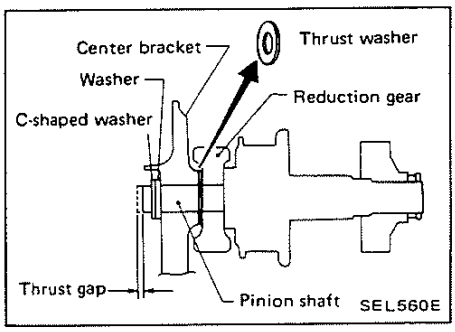
PINION SHAFT THRUST GAP ADJUSTMENT

Reduction gear type

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)



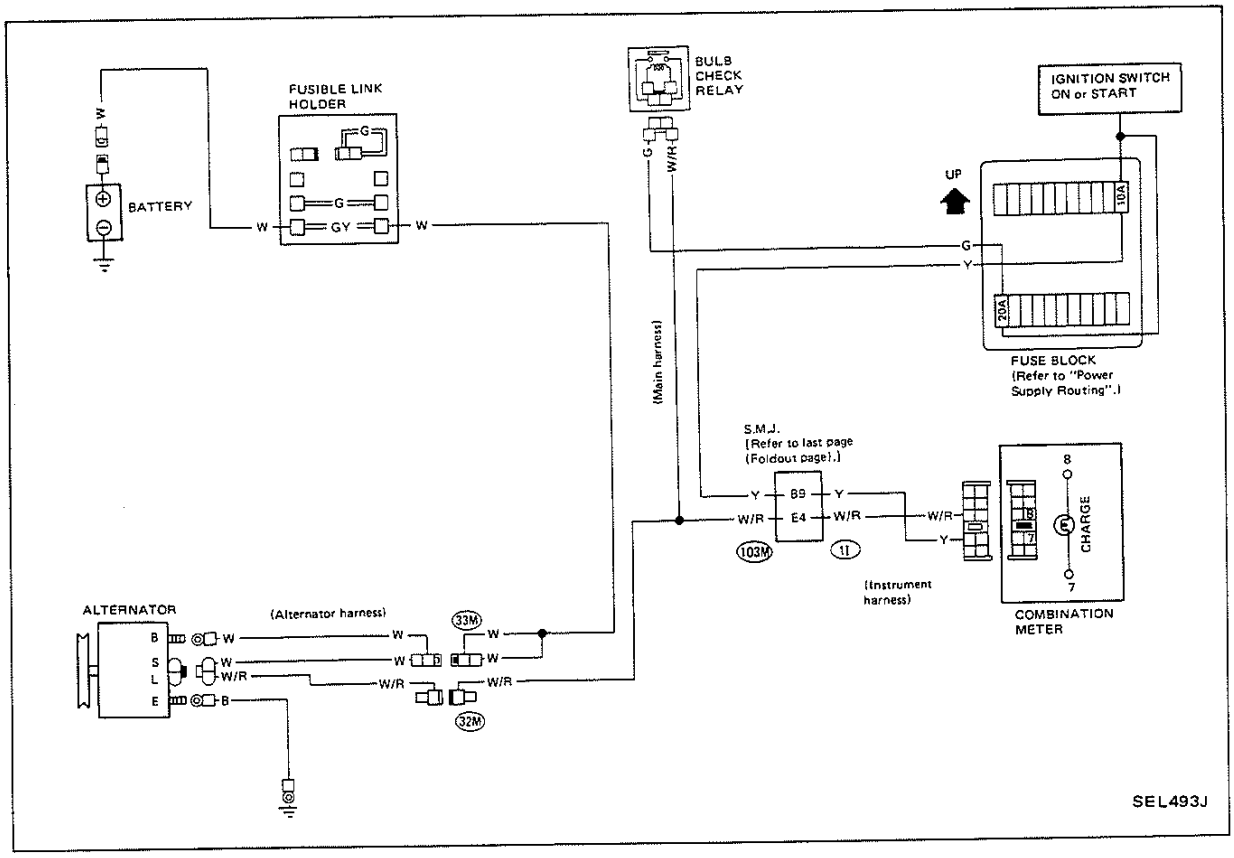
- If thrust gap is over the specified value, adjust it with thrust washer.

Service Data and Specifications (S.D.S.)

STARTER

Type		M2T53781	S114-509
		MITSUBISHI	HITACHI make
		Reduction gear type	
Applied model		All	
System voltage	V	12	
No-load			
Terminal voltage	V	11.5	11.0
Current	A	Less than 100	Less than 90
Revolution	rpm	More than 2,750	
Minimum diameter of commutator	mm (in)	More than 31.4 (1.236)	More than 32.0 (1.260)
Minimum length of brush	mm (in)	11.5 (0.453)	11.0 (0.433)
Brush spring tension	N (kg, lb)	16.7 - 21.6 (1.7 - 2.2, 3.7 - 4.9)	17.7 - 21.6 (1.8 - 2.2, 4.0 - 4.9)
Movement "ℓ" in height of pinion assembly	mm (in)	0.5 - 2.0 (0.020 - 0.079)	0.3 - 1.5 (0.012 - 0.059)
Clearance between bearing metal and armature shaft	mm (in)	Less than 0.2 (0.008)	–

Wiring Diagram

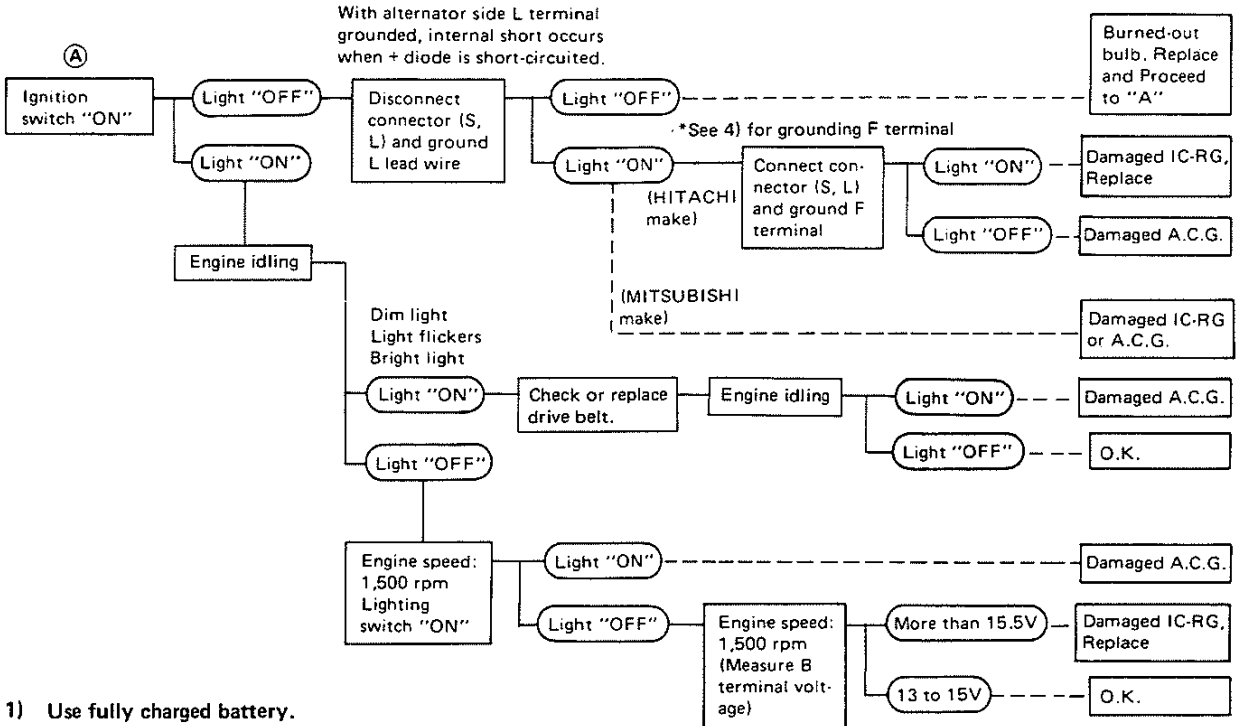


Trouble-shooting

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.

Before starting trouble-shooting, inspect the fusible link.

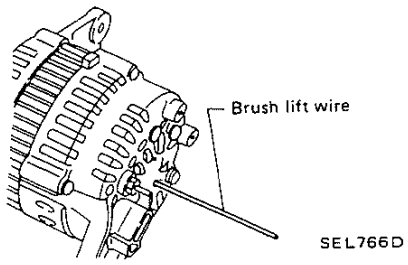
WITH IC REGULATOR



1) Use fully charged battery.
2) Light : Charge warning light
   A.C.G. : Alternator parts except IC regulator
   IC-RG : IC regulator
   O.K. : IC-alternator is in good condition.
3) When reaching "Damaged A.C.G.", remove alternator from vehicle and disassemble, inspect and correct or replace faulty parts.
4) *Method of grounding F terminal (HITACHI make only)

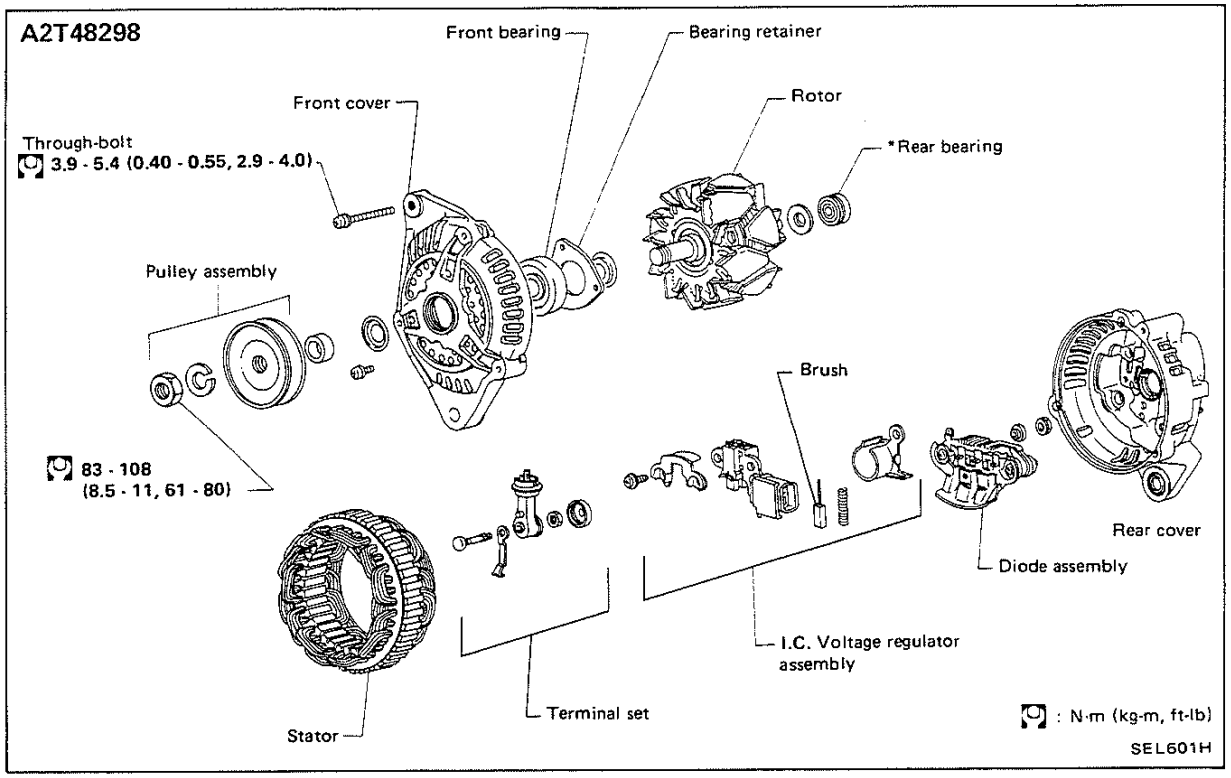
Gasoline engine model

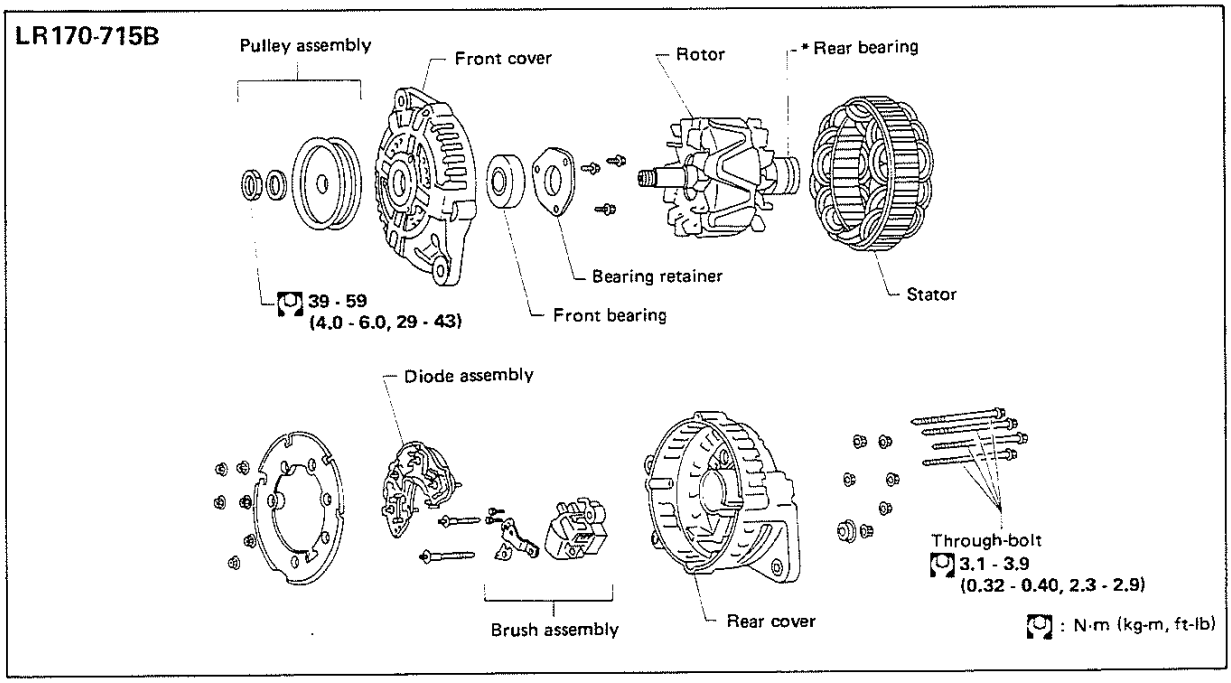
Contact tip of wire with brush and attach wire to alternator body.



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

Construction

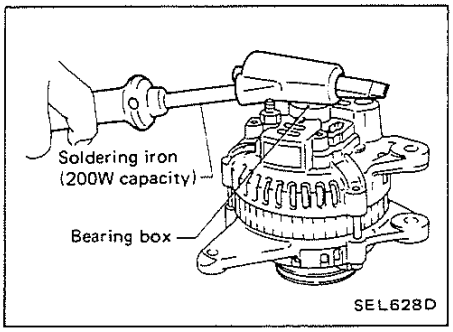




*Rear bearing

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.

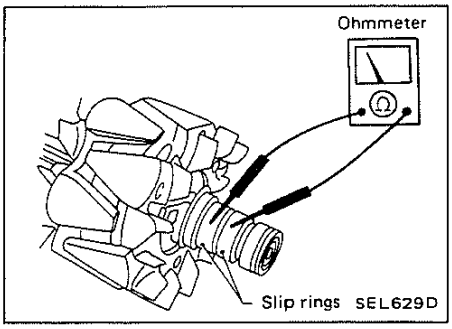


Disassembly

REAR COVER REMOVAL

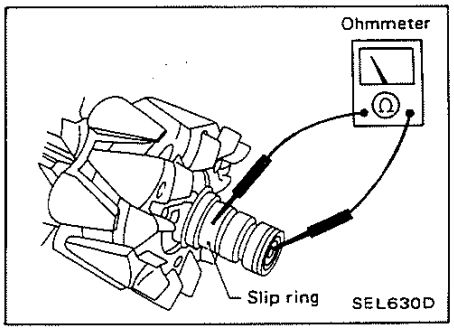
CAUTION:

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.



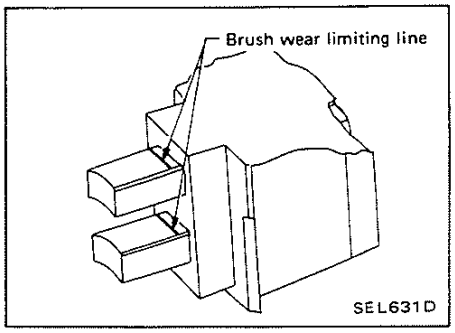
Rotor Slip Ring Check

1. Continuity test
   - No continuity ... Replace rotor.



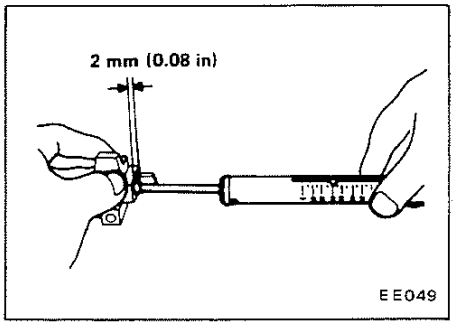
2. Insulator test
   - Continuity exists ... Replace rotor.
3. Check slip ring for wear.

   Slip ring minimum outer diameter:
   Refer to "Service Data and Specifications."



Brush Check

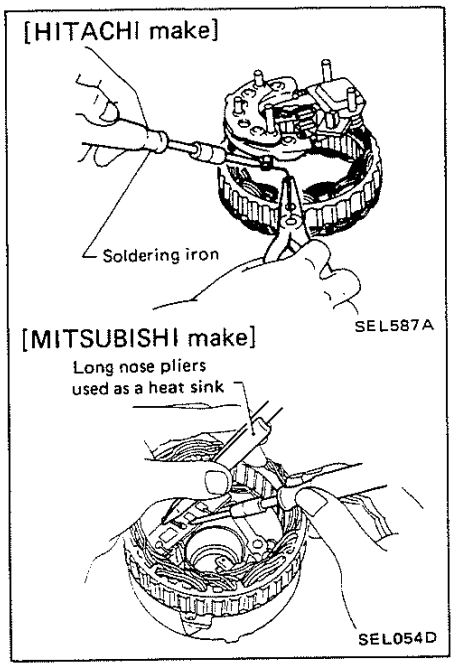
1. Check smooth movement of brush.
   - Not smooth ... Check brush holder and clean.
2. Check brush for wear.
   - Replace brush if it is worn down to the limit line.



3. Check brush lead wire 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:
   Refer to "Service Data and Specifications."
   - Not within the specified values ... Replace.

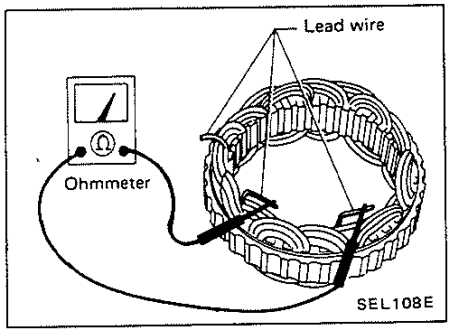


Stator Check

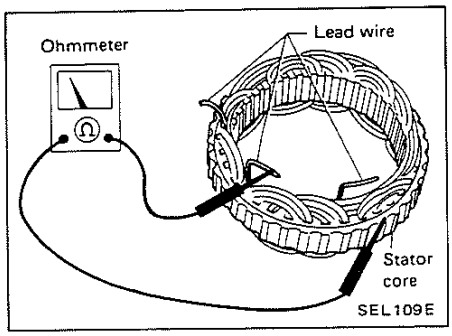
To test the stator or diode, you must separate them by unsoldering the connecting wires.

CAUTION:

Use only as much heat as required to melt solder. Otherwise, diodes will be damaged by excessive heat.



1. Continuity test
   - No continuity ... Replace stator.



2. Ground test
   - Continuity exists ... Replace stator.

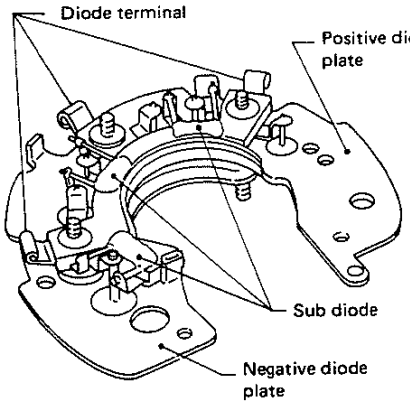
Diode Check

MAIN DIODES

- 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.

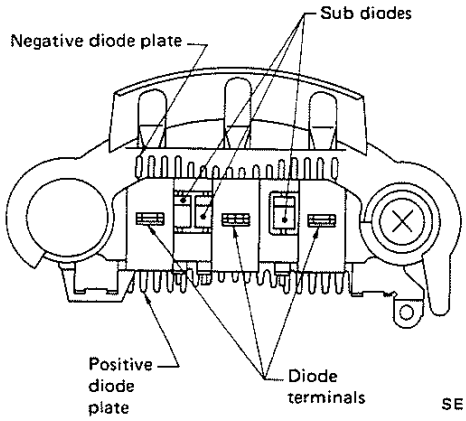
	Ohmmeter probes		Continuity
	Positive ⊕	Negative ⊖	
Diodes check (Positive side)	Positive diode plate	Diode terminals	Yes
	Diode terminals	Positive diode plate	No
Diodes check (Negative side)	Negative diode plate	Diode terminals	No
	Diode terminals	Negative diode plate	Yes

[HITACHI make]



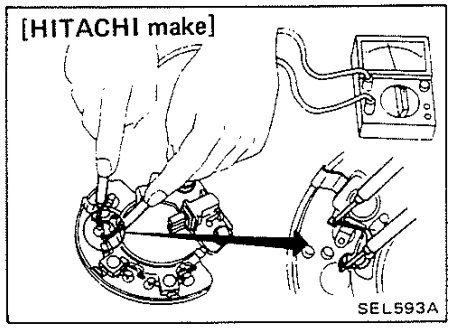
SEL768D

[MITSUBISHI make]



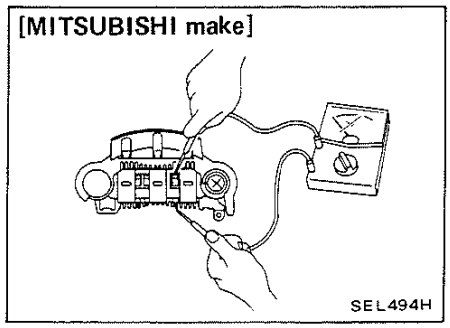
SEL493H

[HITACHI make]



SEL593A

[MITSUBISHI make]



SEL494H

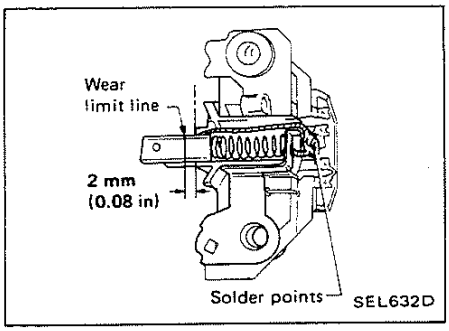
SUB-DIODES

- Attach ohmmeter's probe to each end of diode to check for continuity.
- Continuity is N.G. ... Replace diode assembly.

Assembly

Carefully observe the following instructions.

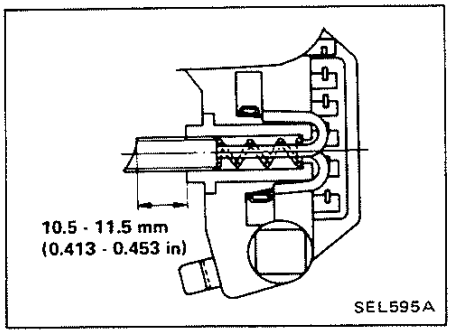
- When soldering each stator coil lead wire to diode assembly terminal, carry out the operation as fast as possible.



WHEN SOLDERING BRUSH LEAD WIRE

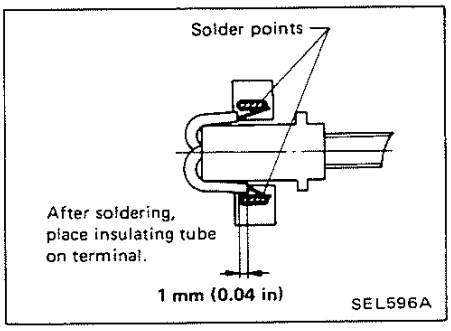
[MITSUBISHI make]

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



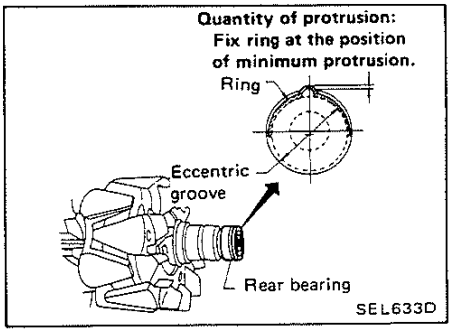
[HITACHI make]

(1) Position brush so that it extends 10.5 - 11.5 mm (0.413 - 0.453 in) from brush holder.



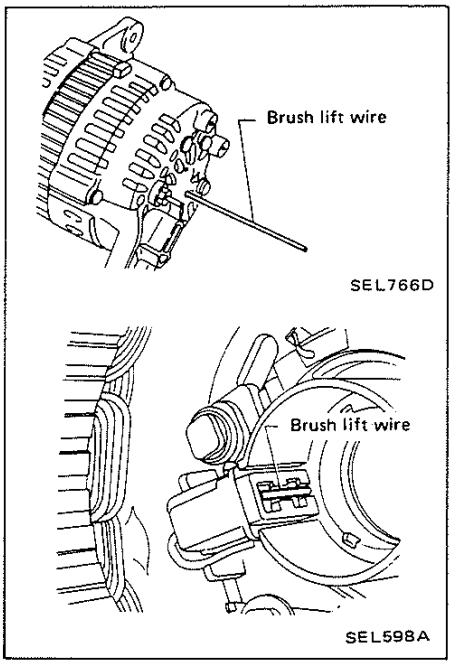
(2) Coil lead wire 1.5 times around terminal groove. Solder outside of terminal.

When soldering, be careful not to let solder adhere to insulating tube as it will weaken the tube and cause it to break.



RING FITTING IN REAR BEARING

- Fix ring into groove in rear bearing so that it is as close to the adjacent area as possible.



Assembly (Cont'd)

REAR COVER INSTALLATION

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

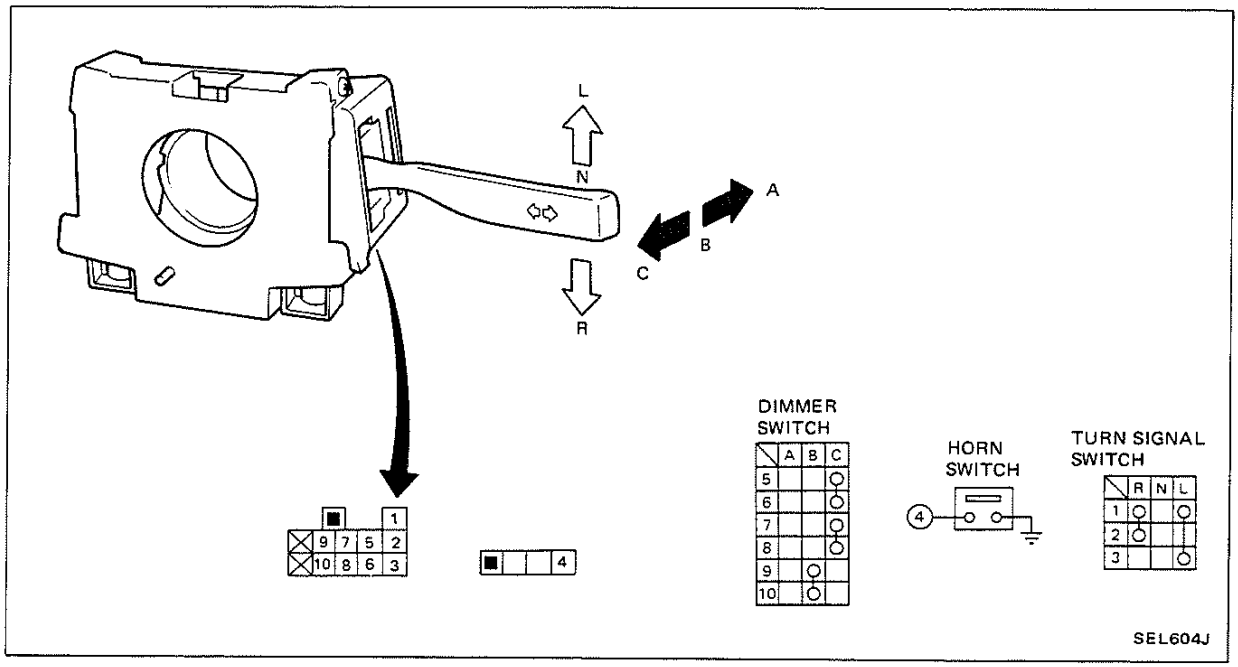
(2) After installing front and rear sides of alternator, pull out brush lift wire.

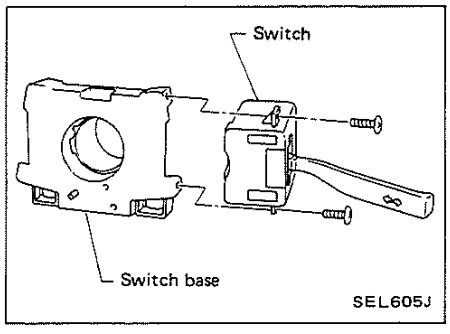
Service Data and Specifications (S.D.S.)

ALTERNATOR

Type		A2T48298 MITSUBISHI make	LR170-715B HITACHI make
Applied model		Standard	Model equipped with air conditioner in factory
Nominal rating	V-A	12-70	
Ground polarity		Negative	
Minimum revolution under no-load (when 14 volts is applied)	rpm	Less than 1,300	Less than 950 (when 13.5 volts is applied)
Hot output current	A/rpm	More than 50/2,500 More than 70/5,000	More than 50/2,500 More than 67/5,000
Regulated output voltage	V	14.1 - 14.7	
Minimum length of brush	mm (in)	More than 8 (0.31)	More than 7 (0.28)
Brush spring pressure	N (g, oz)	3.040 - 4.217 (310 - 430, 10.93 - 15.17)	2.746 - 3.923 (280 - 400, 9.88 - 14.11)
Slip ring minimum outer diameter	mm (in)	More than 22.4 (0.882)	More than 30.6 (1.205)

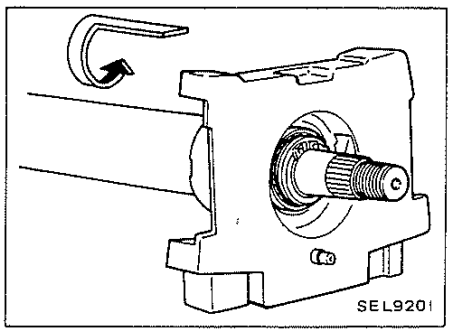
Check





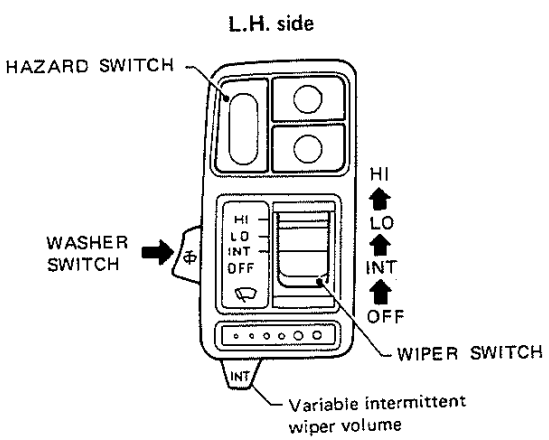
Replacement

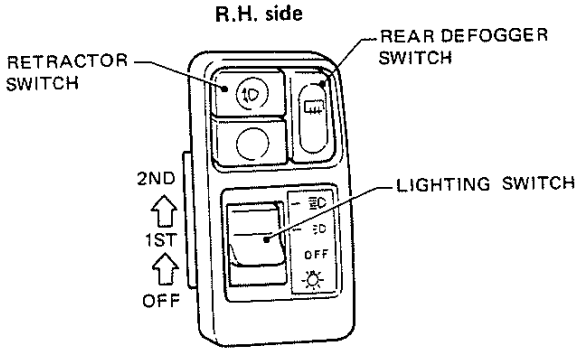
Dimmer switch & turn signal switch can be replaced without removing combination switch base.

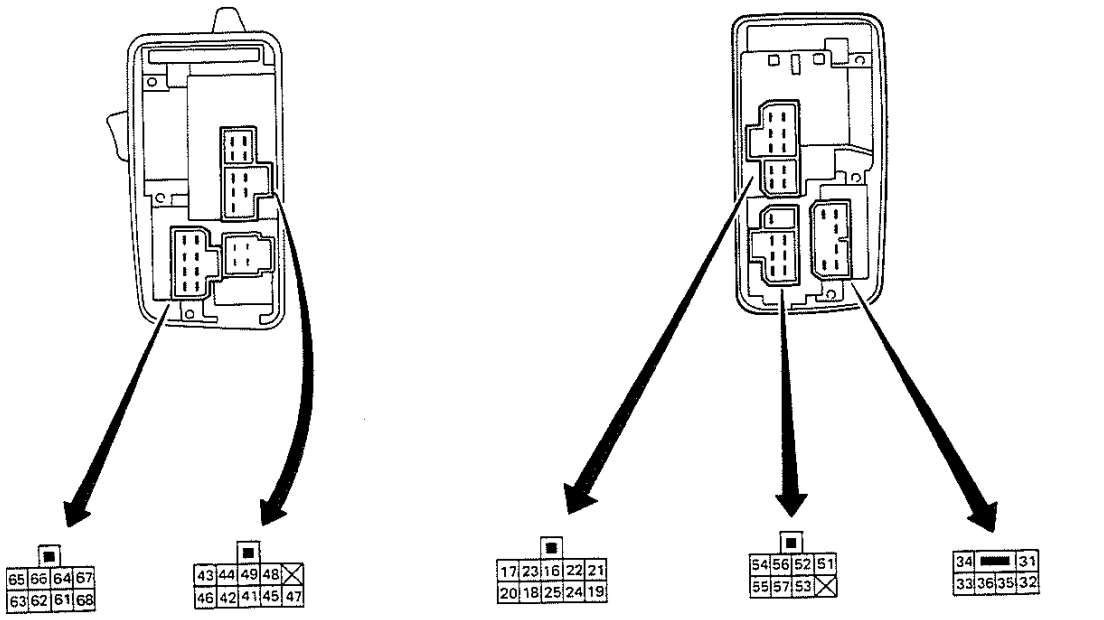


To remove combination switch base, loosen base attaching screw and turn after pushing on it.

Check







HAZARD SWITCH

	OFF	ON
61	○	○
62	○	
63		○
64		○
65		○
66		○
67	○	
	⊖	
68	○	

WIPER and WASHER SWITCH

	OFF	INT	LO	HI	WASH
41	○	○			
42	○	○	○		
43		○	○	○	
44					
45					○
46		○	○	○	
47	○				○
48		○			
		⊖			
49		○			

Resistance between 46 and 47:
80 - 1,000 [Ω]

LIGHTING SWITCH

	OFF	1ST	2ND
16			○
17			○
18			○
19			○
20	○		
	⊖		
21	○		
22	○	○	○
23			○
24	○	○	
25	○	○	

RETRACTOR SWITCH

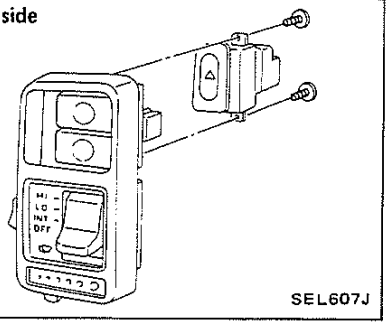
	DOWN	UP
51	○	
52	○	○
53		○
54		○
55		○
56	○	
	⊖	
57	○	

REAR DEFOGGER SWITCH

	OFF	ON
31		○
		⊖
32		○
33		○
34		○
35	○	
	⊖	
36	○	

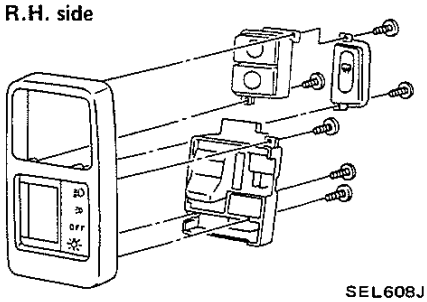
SEL606J

L.H. side



SEL607J

R.H. side

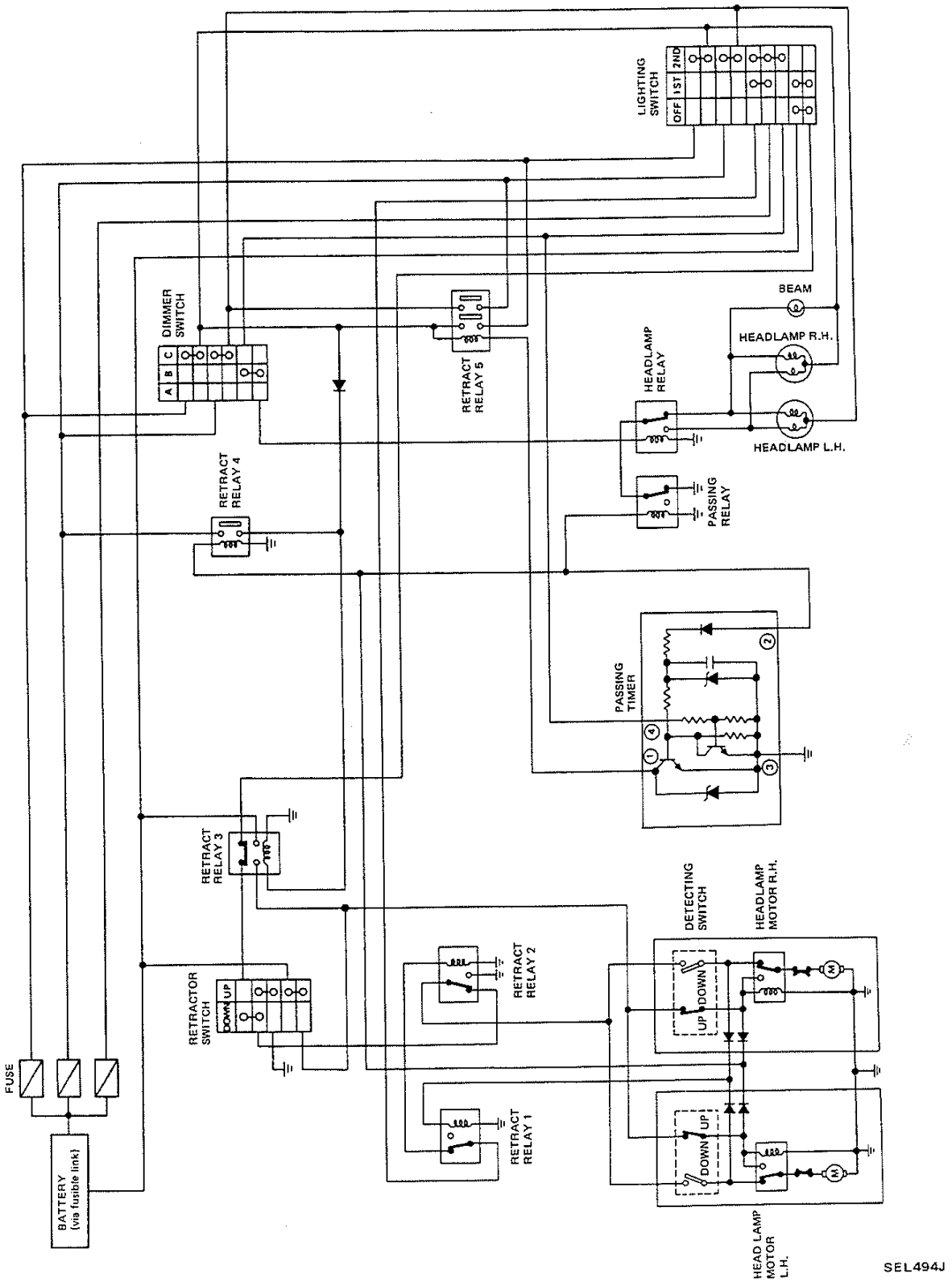


SEL608J

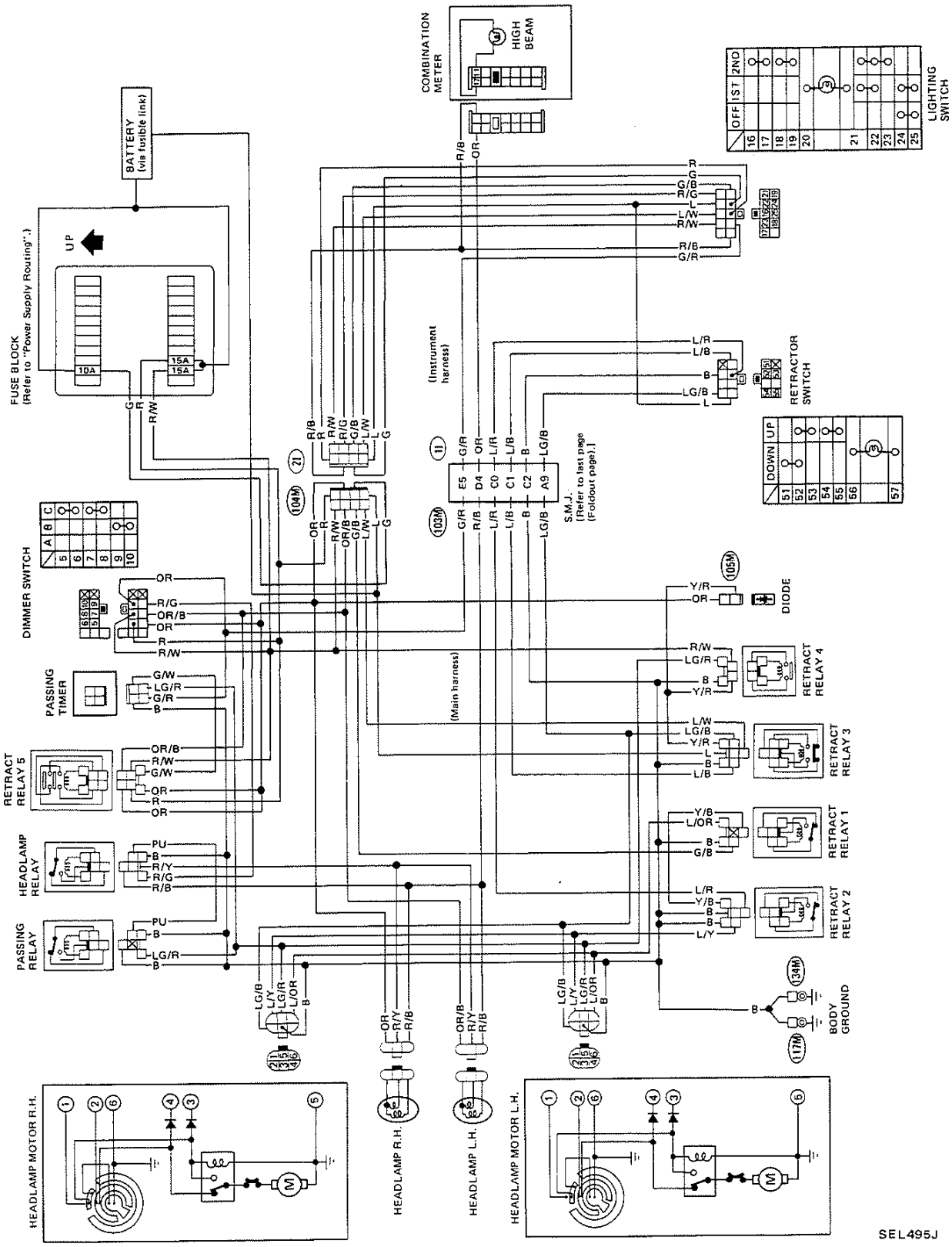
Replacement

Each switch can be replaced individually.

Schematic

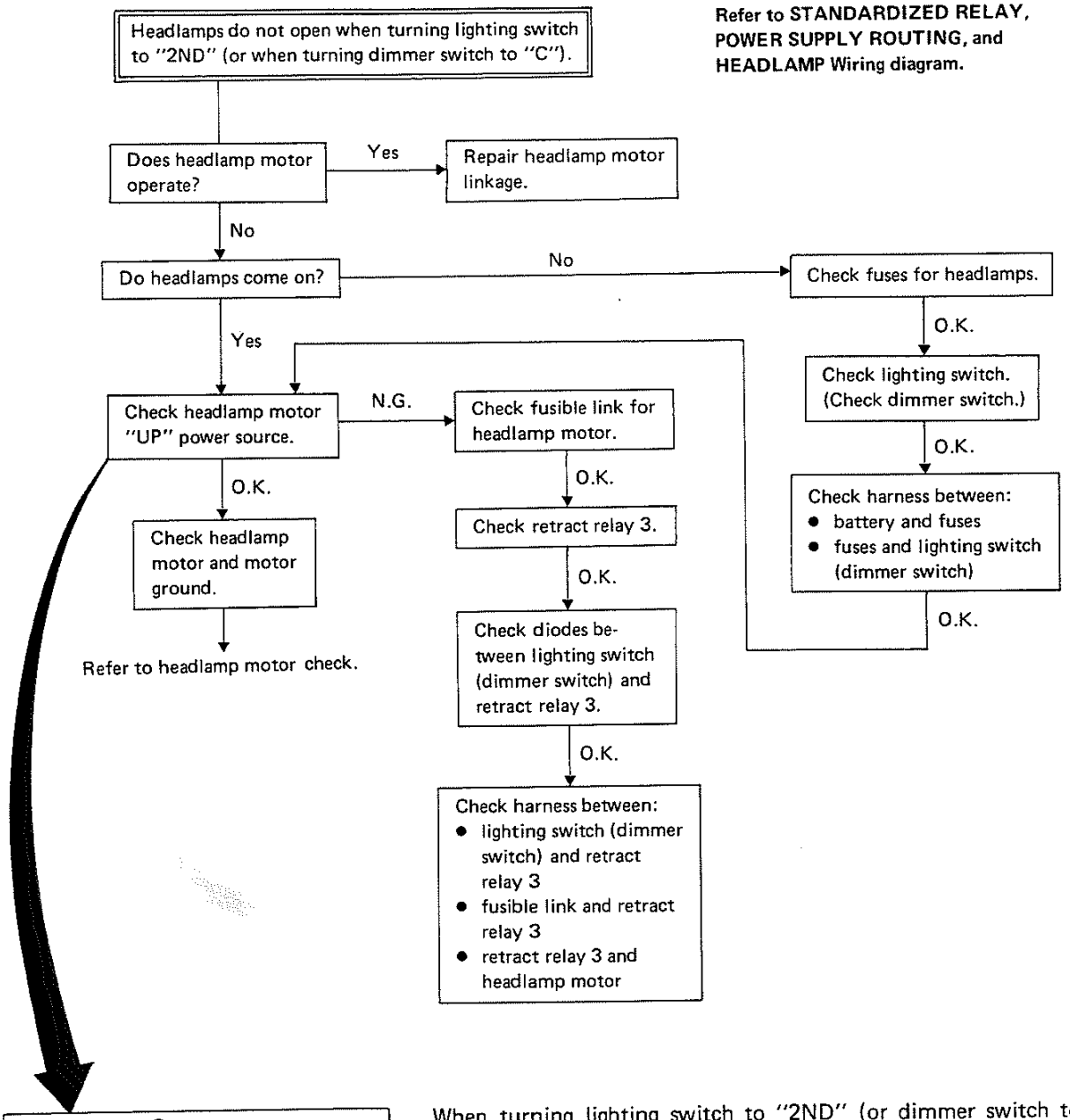

LIGHTING SWITCH
OFF
1ST
2ND
DIMMER SWITCH
A
B
C
RETRACT RELAY 5
BEAM
HEADLAMP R.H.
HEADLAMP L.H.
HEADLAMP RELAY
PASSING RELAY
RETRACT RELAY 4
PASSING TIMER
RETRACT RELAY 3
RETRACTOR SWITCH
UP
DOWN
RETRACT RELAY 2
RETRACT RELAY 1
DETECTING SWITCH
HEADLAMP MOTOR R.H.
HEAD LAMP MOTOR L.H.
FUSE
BATTERY (via fusible link)
SEL494J

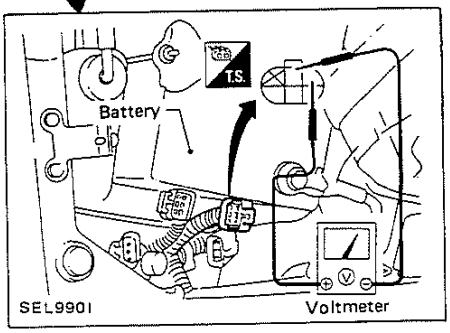
Wiring Diagram



Trouble-shooting

Refer to **STANDARDIZED RELAY, POWER SUPPLY ROUTING, and HEADLAMP Wiring diagram.**





When turning lighting switch to "2ND" (or dimmer switch to "C") and headlamps reach the "up" position.
Battery voltage should exist. ... O.K.

Trouble-shooting (Cont'd)

Headlamps do not open
when turning retractor switch to "UP", and when headlamps open by operating lighting switch (dimmer switch).

O.K.

Check retractor switch.

O.K.

Check harness between:
- fusible link and retractor switch
- retractor switch and headlamp motor

Headlamps do not close.

Check retract switch and lighting switch.

O.K.

Check retract relay 3 and retract relay 2.

O.K.

Check harness between:
- lighting switch and retract relay 3
- retract relay 3 and retract switch
- retract switch and retract relay 2
- retract relay 2 and headlamp motor

Headlamps do not come on when dimmer switch is in "PASSING" mode.

Check dimmer switch.

O.K.

Check retract relay 5.

O.K.

Check harness between:
- dimmer switch and headlamps.
- dimmer switch and retract relay 5.
- retract relay 5 and passing timer
- passing timer and headlamp motor

O.K.

Check passing timer. → N.G. → Replace

Description

BASIC OPERATION

Condition		Operation		
Lighting switch	Retractor switch	C/O*	Headlamp motor	Headlamps
OFF → 1ST	OFF		No operation	OFF
1ST → 2ND	OFF	[A]	Open	ON after headlamp motor reaches fully open position.
2ND → 1ST	OFF		Held to open position	OFF
1ST → OFF	OFF	[B]	Closed	OFF
Momentarily turned to PASSING	OFF	[C]	Opened and closed after headlamps go off.	Momentarily ON after headlamp motor reaches fully open position, and go off.
OFF	ON	[D]	Open	OFF

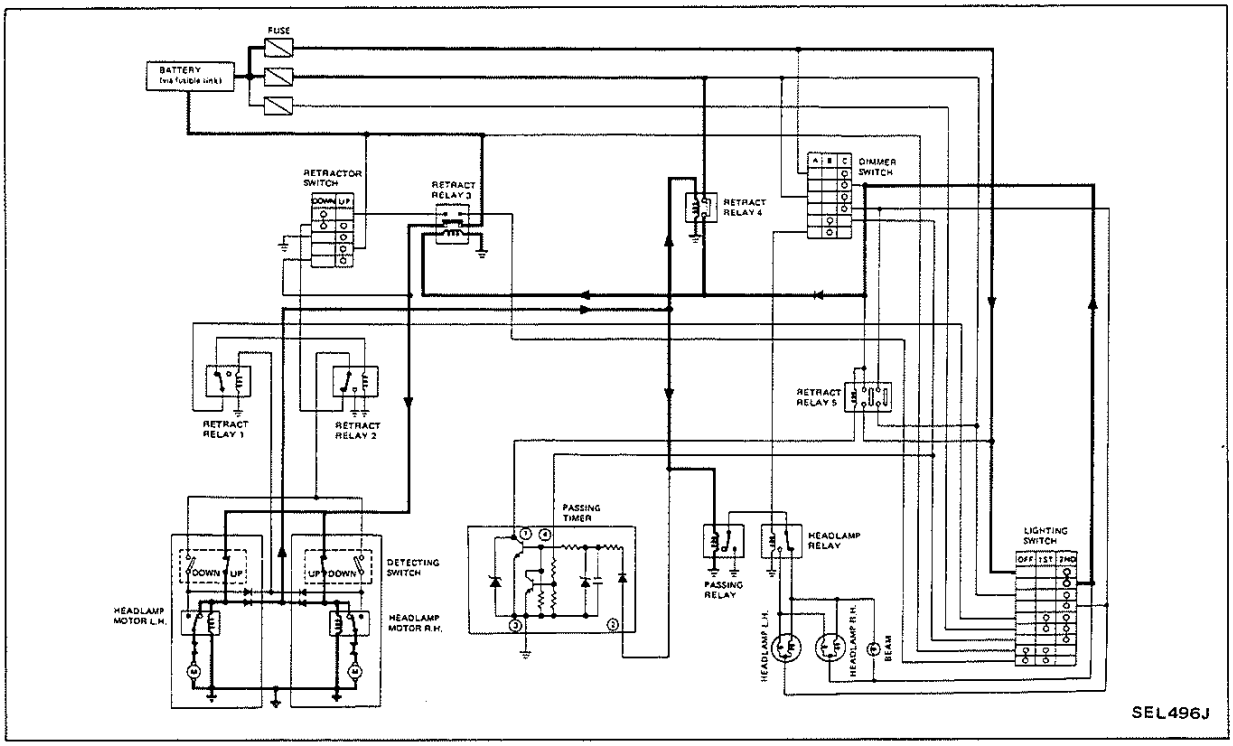
*: Refer to CIRCUIT OPERATION.

Description (Cont'd)

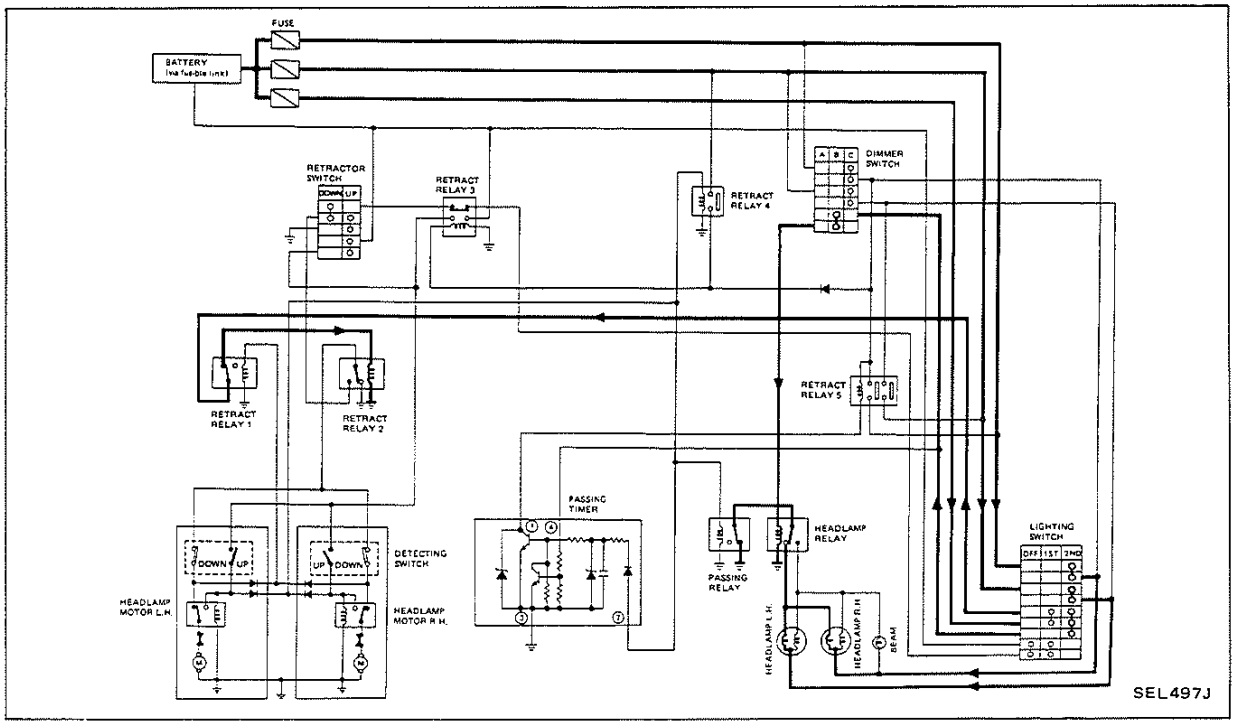
CIRCUIT OPERATION

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

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

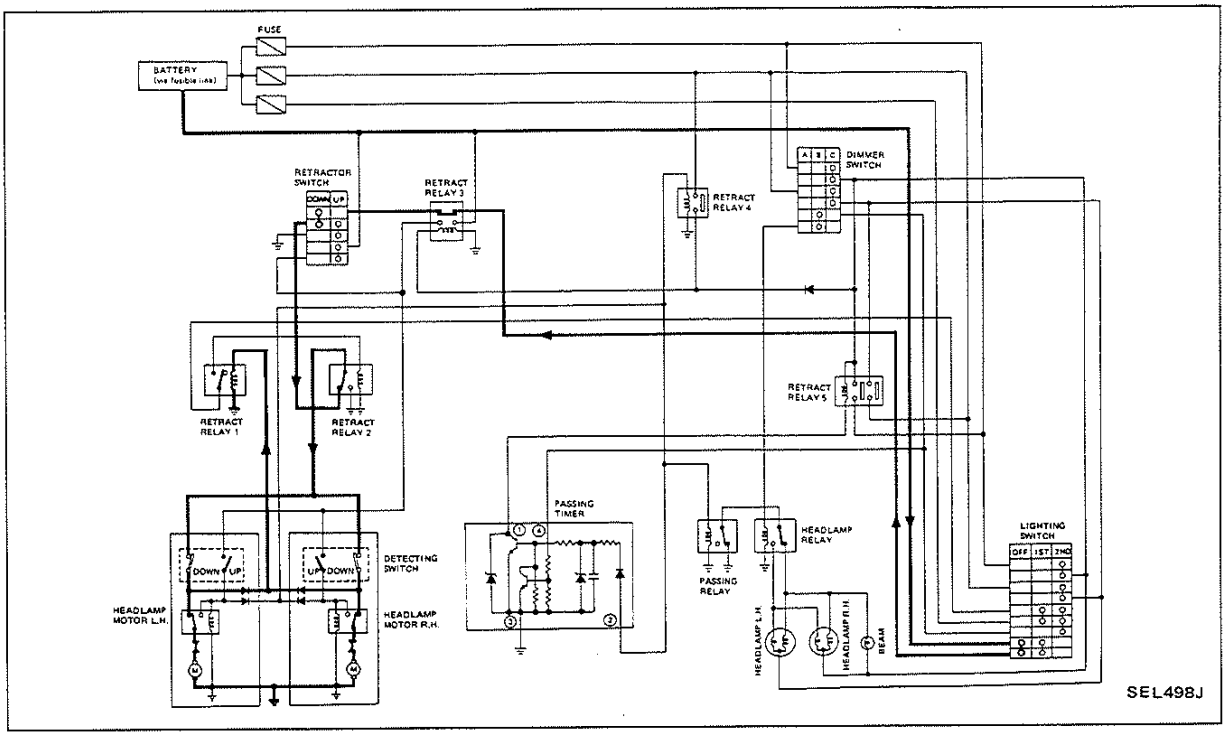


A-2: After the headlamp motor reaches fully open position

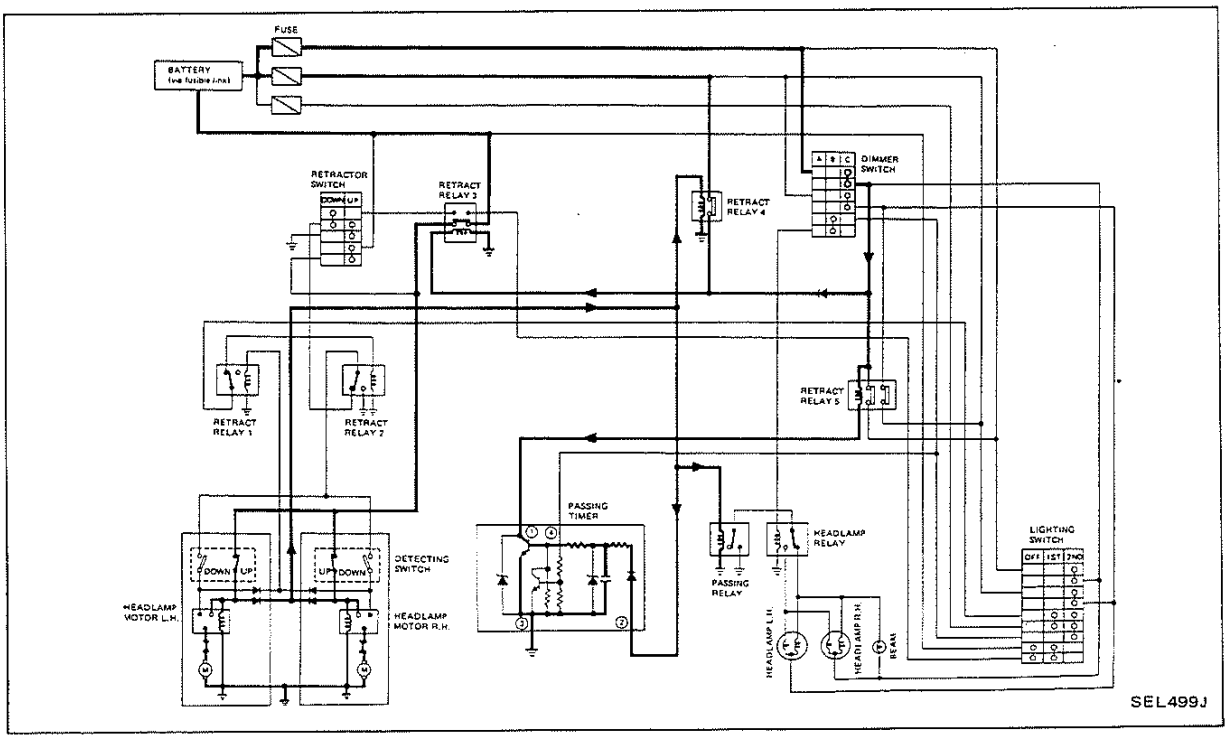


Description (Cont'd)

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

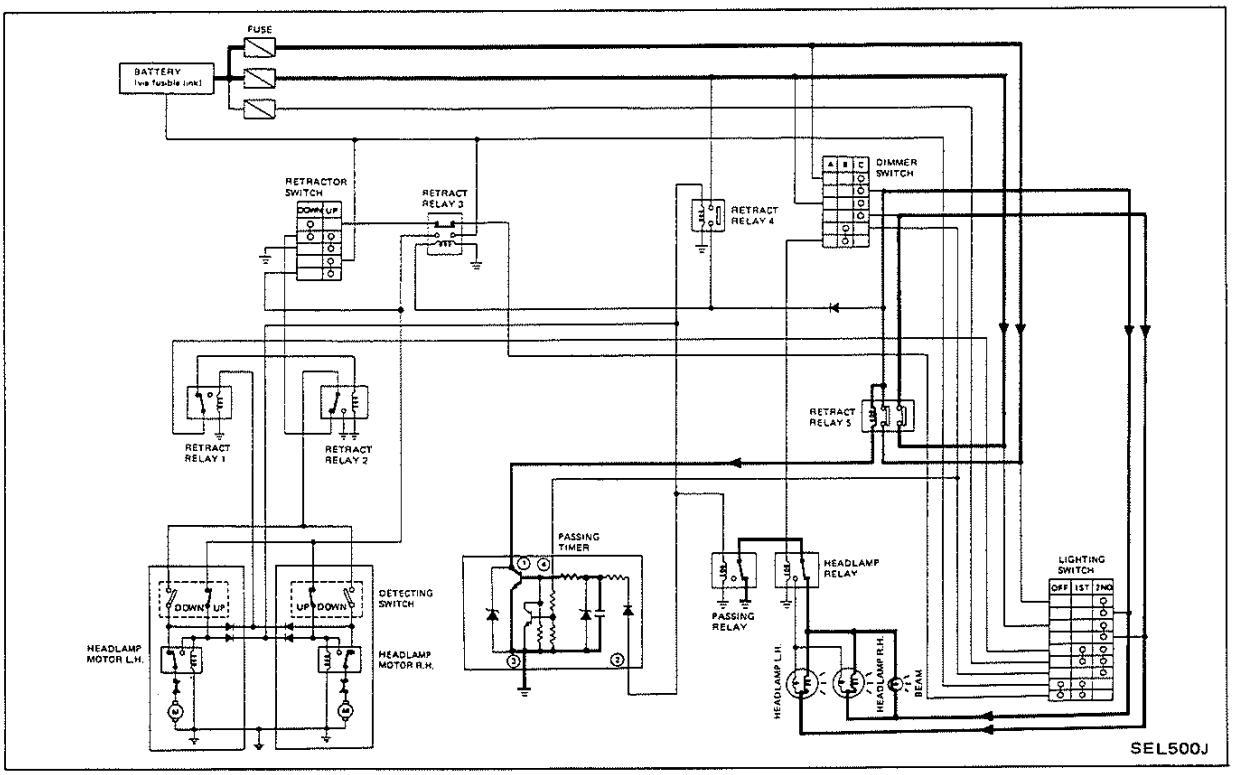


[C] When lighting switch is switched to "PASSING"
C-1: While operating the headlamp motor to open position

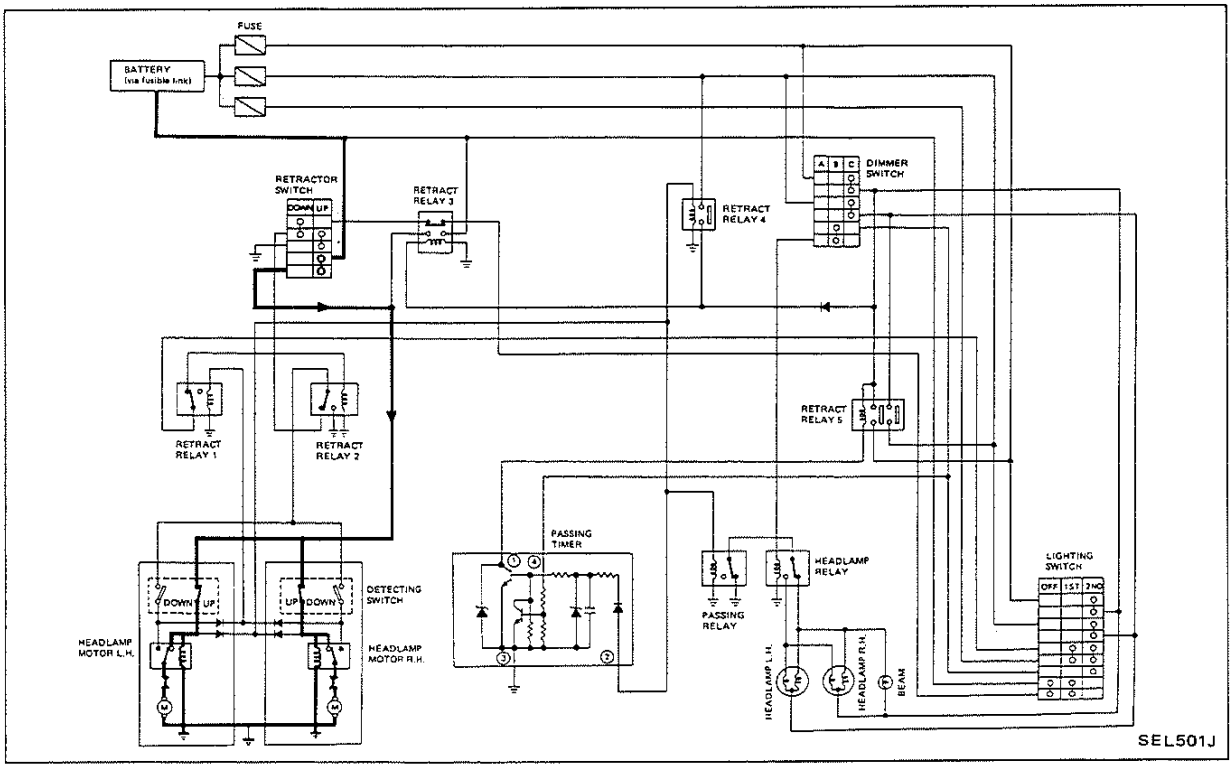


Description (Cont'd)

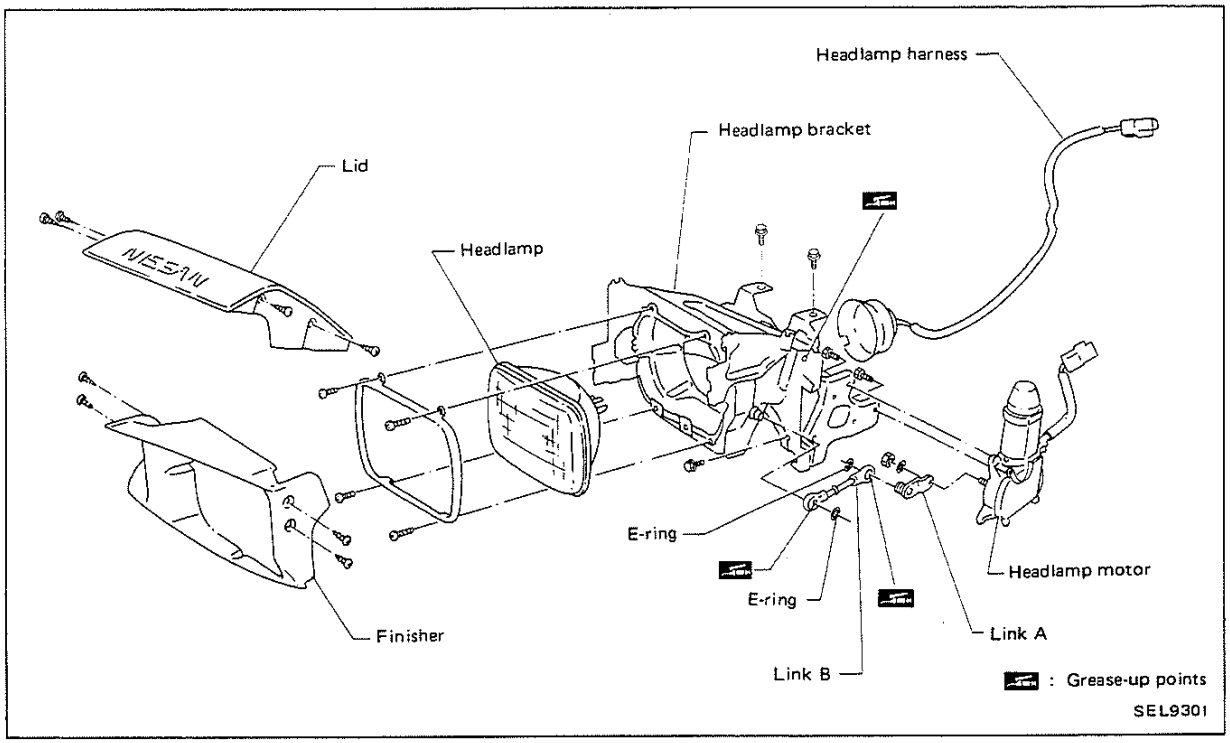
C-2: After the headlamp reaches fully open position



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

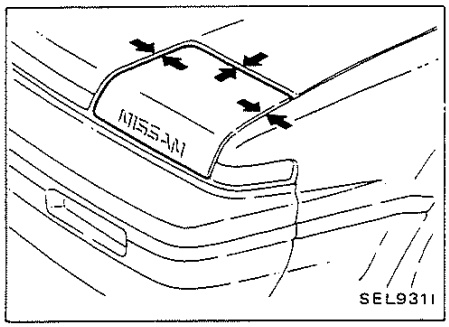


Constructions



Assembly

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.
4. Assemble link B to link A and the headlamp bracket.
5. Assemble headlamp, finisher and lid.



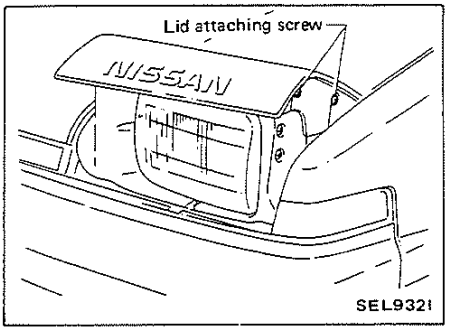
Installation and Adjustment

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

1. Install headlamp bracket to body temporarily.

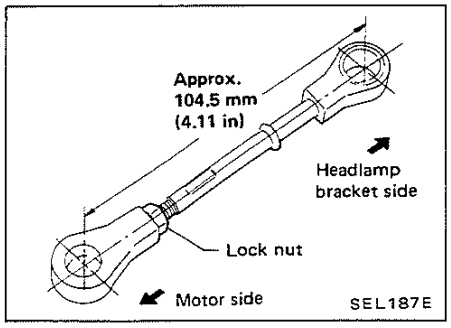
1) Determine headlamp bracket location on body so that alignment between lid, hood, and fender looks straight.

2) After adjusting alignment, tighten headlamp bracket securely to body.



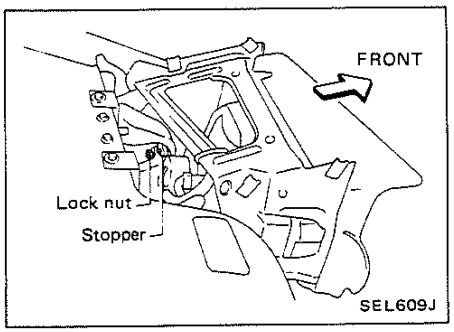
2. Adjust lid alignment.

- 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 taht lid is not interfering with hood.

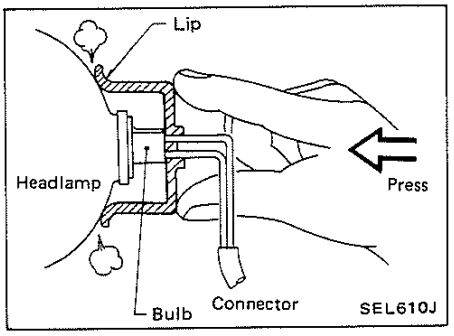


3. When the link B is changed, confirm that link B is the length shown left, then tighten lock nut firmly.

Installation and Adjustment (Cont'd)



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



INSTALLING HEADLAMP RUBBER CAP

Press the rubber cap firmly so the lip makes contact with the headlamp body.

Aiming Adjustment

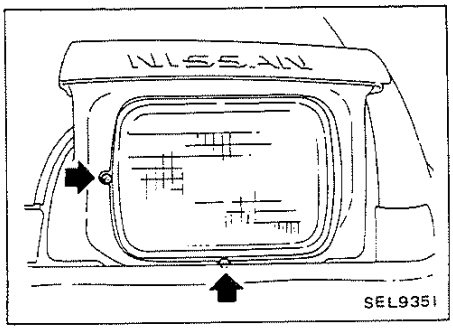
When performing headlamp aiming adjustment, use an aiming machine, aiming wall screen or headlamp tester. For operating instructions of any aimer, it should be in good repair, calibrated and used according to respective operation manuals supplied with the unit.

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

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

CAUTION:

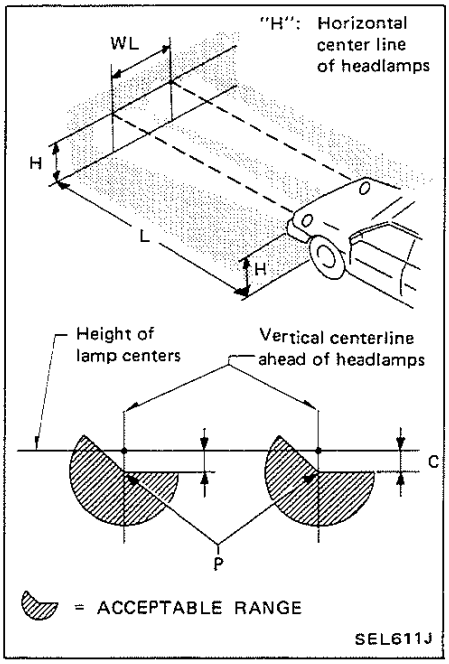
a. **Keep all tires inflated to correct pressures.**
b. **Place vehicle and tester on one and same flat surface.**
c. **See that there is no load in vehicle (coolant, engine oil filled up to correct level and full fuel tank) other than the driver (or equivalent weight placed in driver's position).**



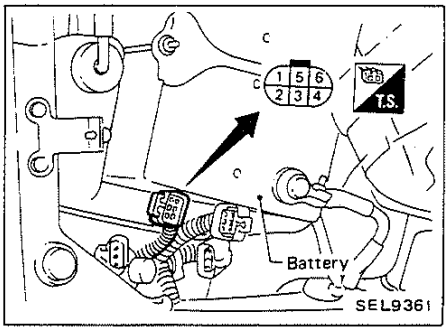
1. Turn headlamp low beam on.
2. Use adjusting screws to perform aiming adjustment.

- **First tighten the adjust screw all the way and then make adjustment by loosening the screw.**

Aiming Adjustment (Cont'd)



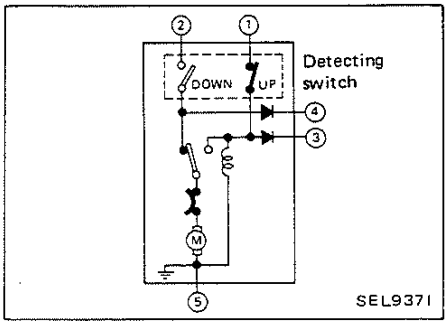
- Adjust headlamps so that main axis of light is parallel to center line of body and is aligned with point P shown in illustration.
- Dotted lines in illustration show center of headlamp.
  - L: 5,000 mm (196.85 in)
  - H: Horizontal center line of headlamps
  - WL: Distance between each headlamp center
  - C: 50 mm (1.97 in)



Headlamp Motor Check

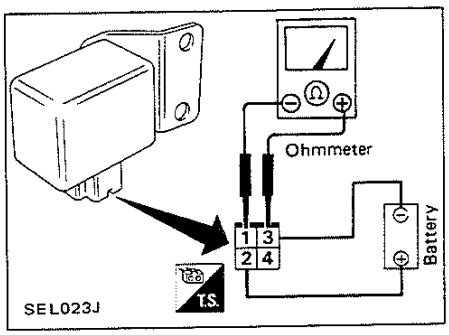
1. Disconnect battery ground cable.
2. Disconnect the headlamp motor connector.
3. Use an ohmmeter to check for continuity in headlamp motor circuit while rotating motor with manual knob.

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



- Detecting switch position:

Headlamp position	UP switch	DOWN switch
"OPEN"	OFF	ON
"CLOSED"	ON	OFF
Between "OPEN" and "CLOSED"	ON	ON



Passing Timer Check

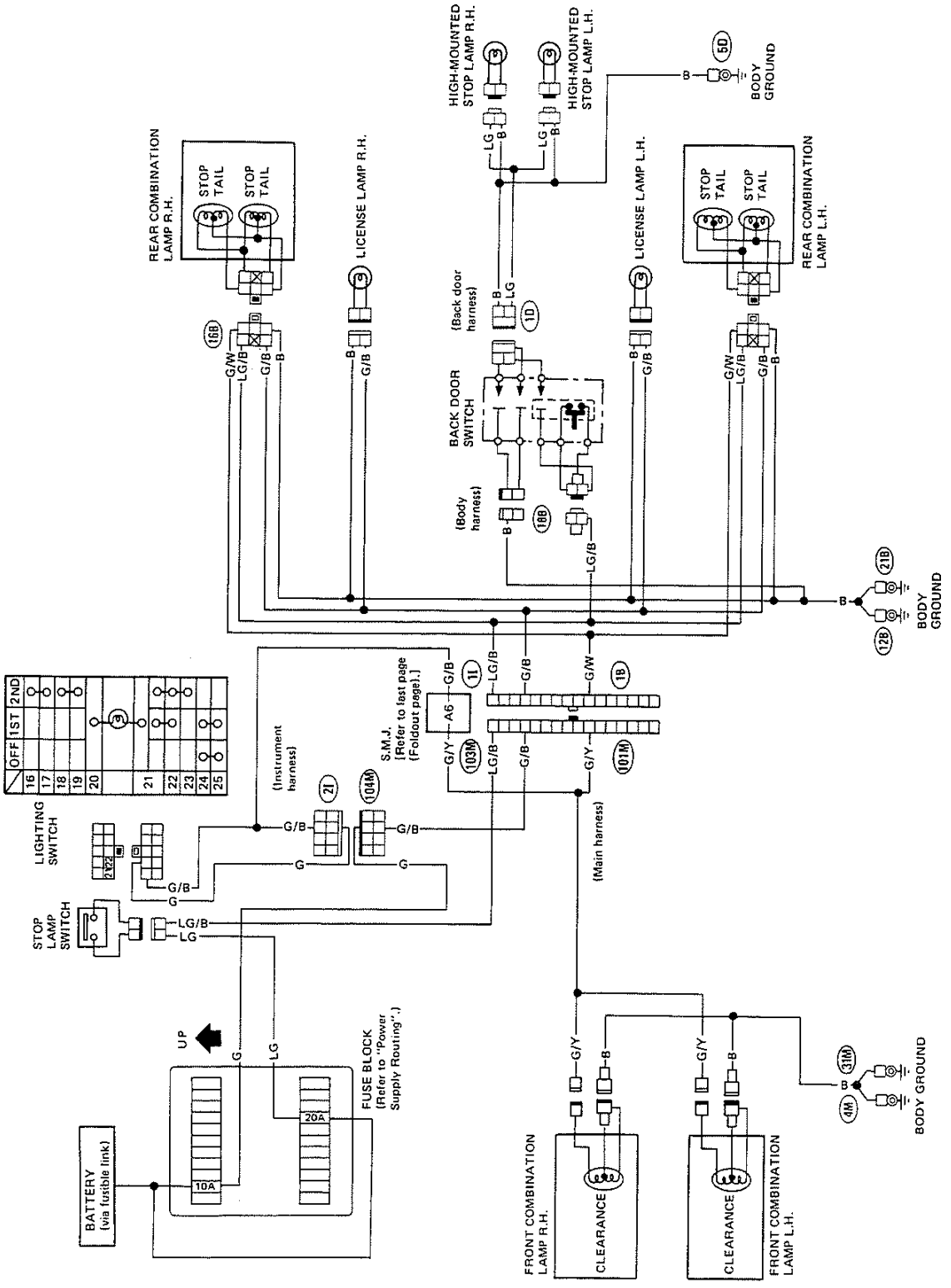
1. Disconnect harness connector from Passing Timer and connect battery and ohmmeter as shown.

Continuity exists.

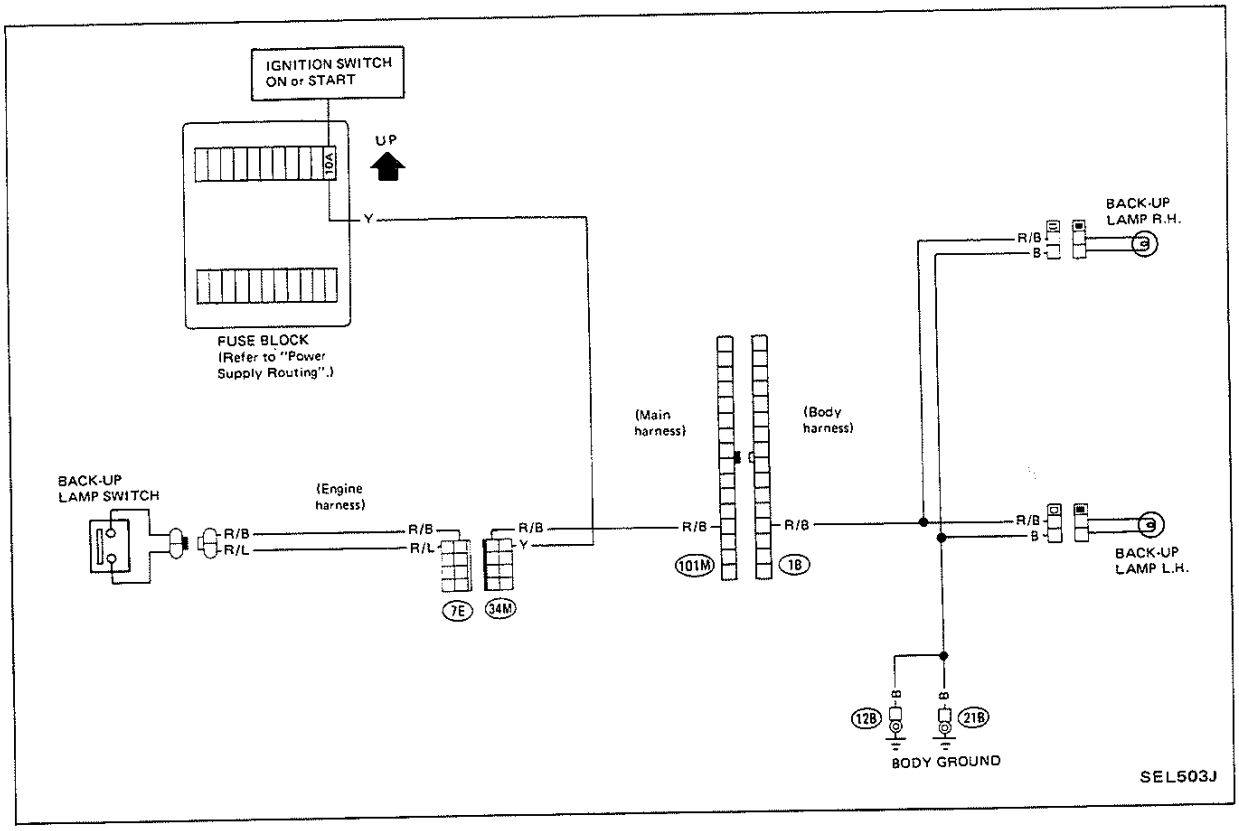
2. Disconnect battery.

There is a little time-lag (Approx. 0.2 [sec.]) of no continuity. ... O.K.

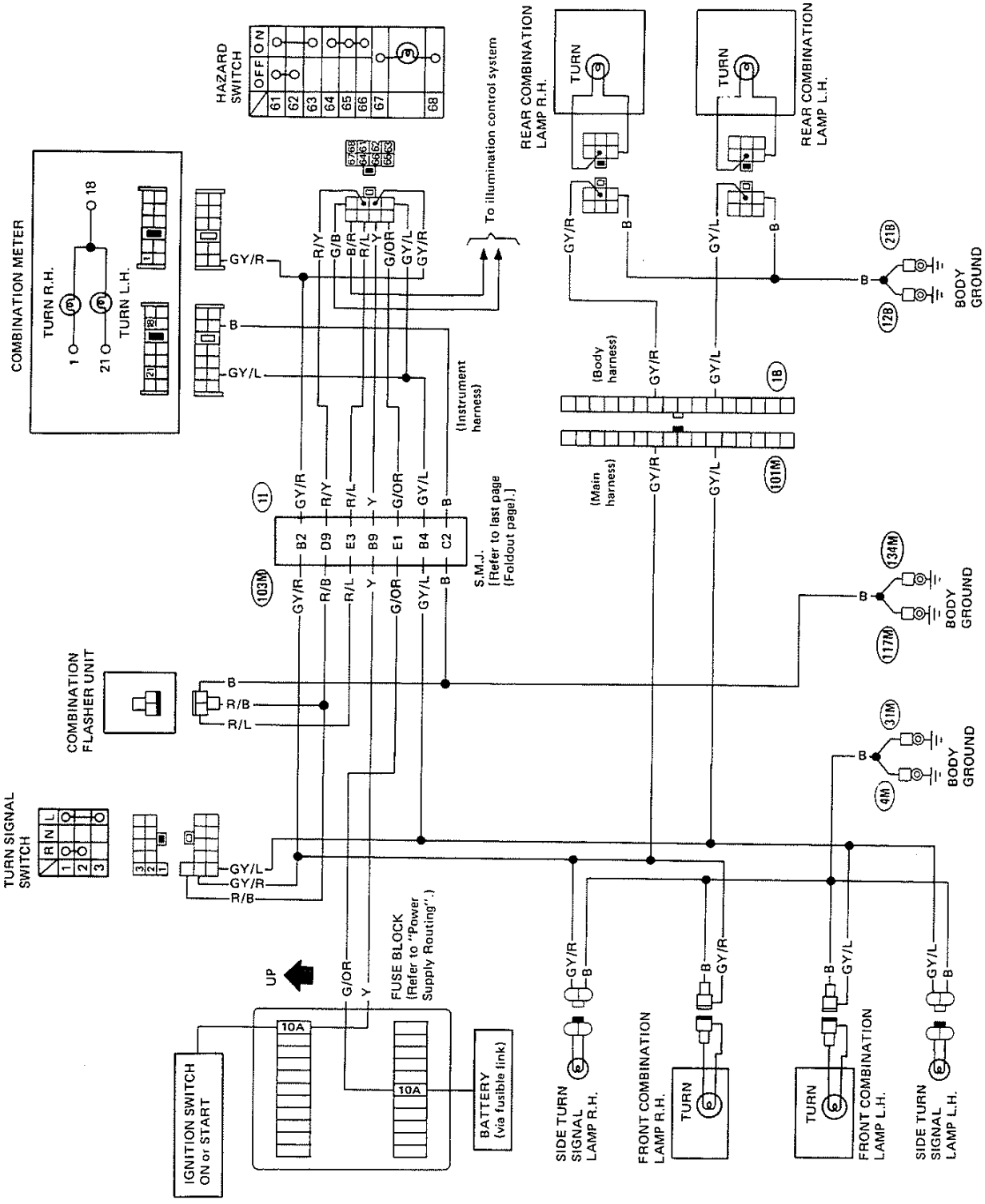
Clearance, License, Tail and Stop Lamps/Wiring Diagram

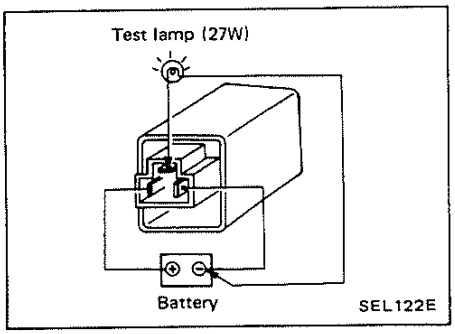


Back-up Lamp/Wiring Diagram



Turn Signal and Hazard Warning Lamps/Wiring Diagram





Combination Flasher Unit Check

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

Bulb Specifications

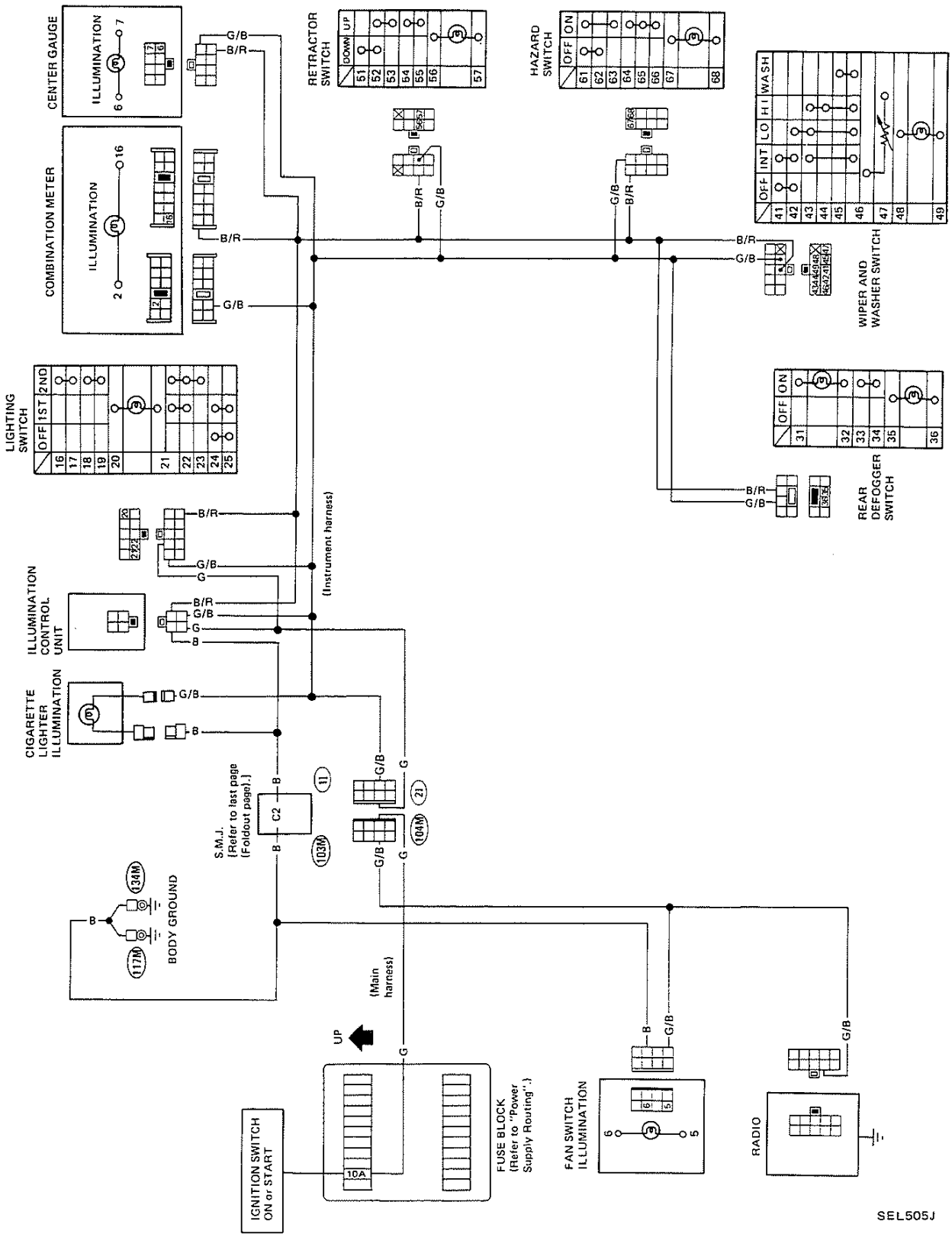
HEADLAMPS

Item	Wattage (W)
Sealed beam (halogen)	60/55

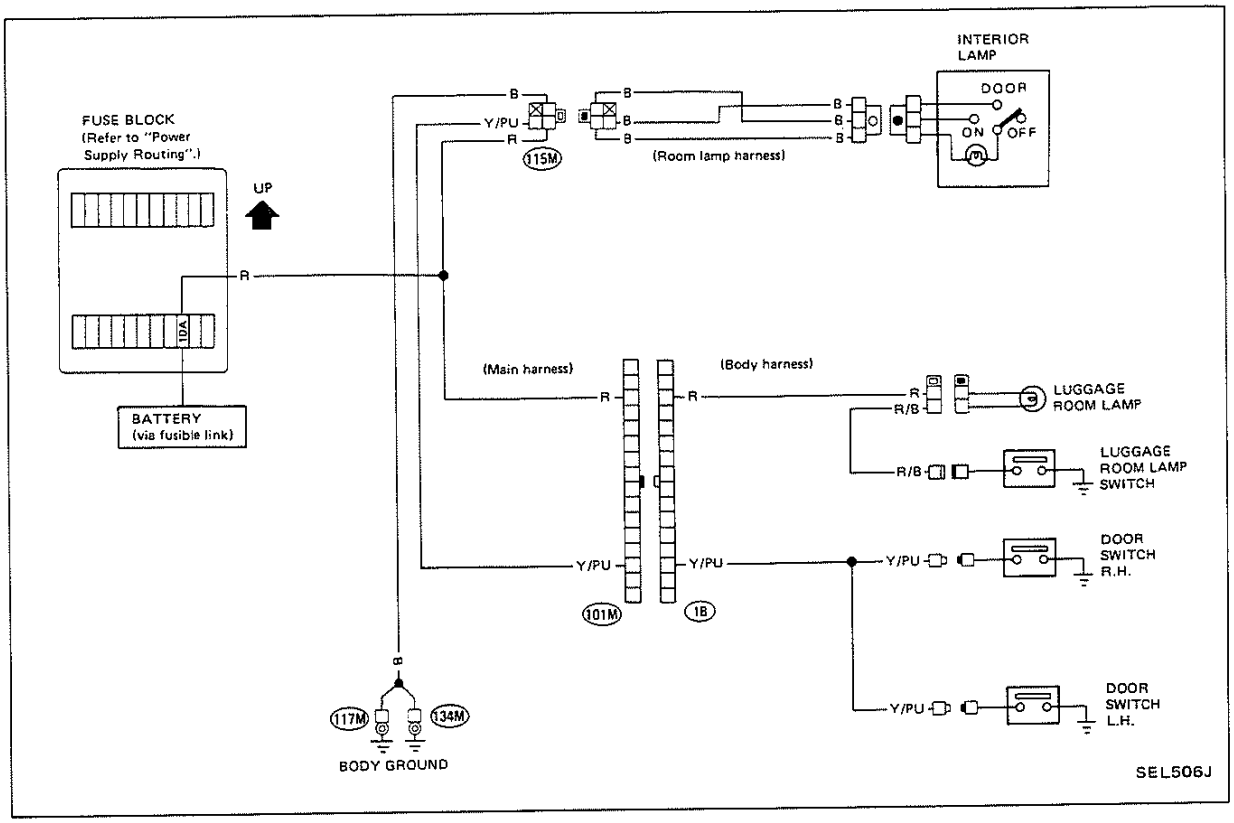
OTHER LAMPS

Item	Wattage (W)
Front side marker	3.8
Front turn signal lamp/Clearance	21/5
License plate lamp	10
Rear combination lamp	
Tail & Stop	21/5
Turn signal	21
Back-up	21
High-mounted stop lamp (Rear hatch)	21
Rear side marker lamp	3.8
Interior lamp	10
Luggage compartment lamp	5

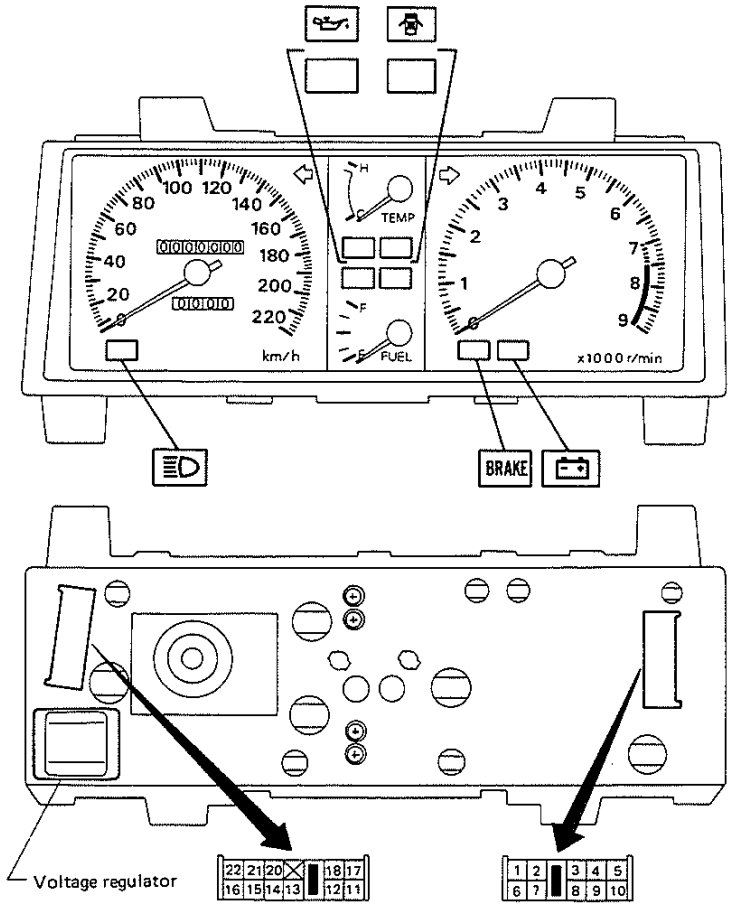
Illumination/Wiring Diagram

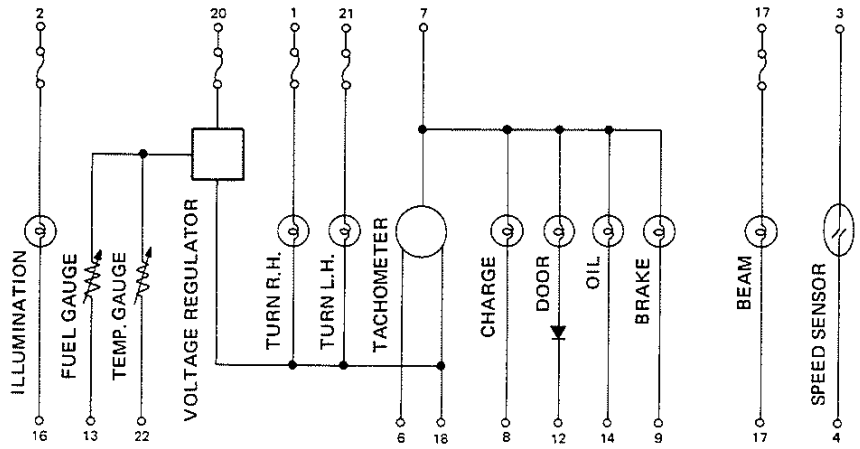


Interior and Luggage Room Lamps/Wiring Diagram



Combination Meter





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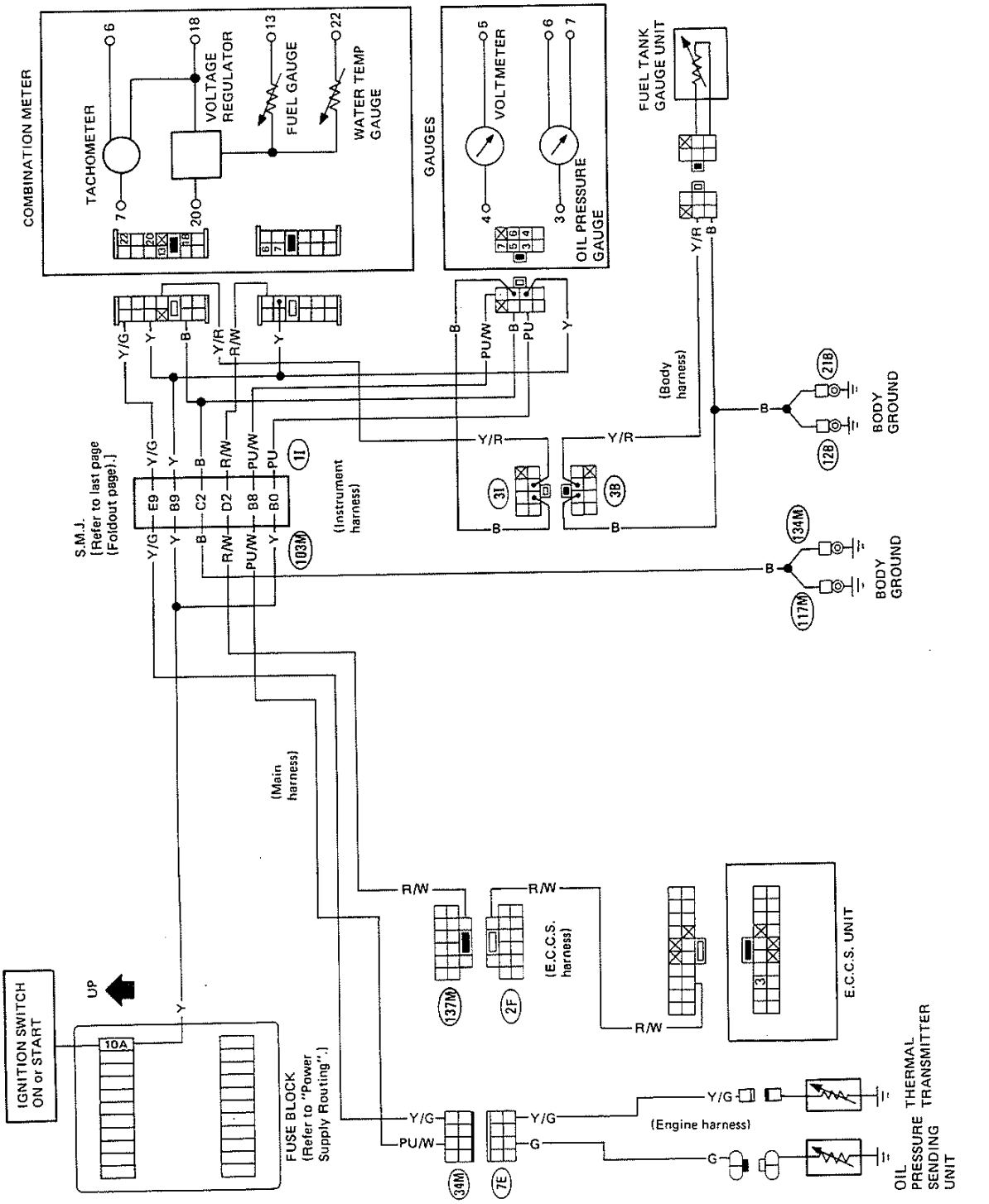
Combination Meter/Wiring Diagram



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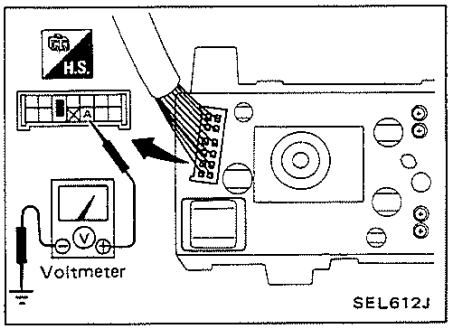
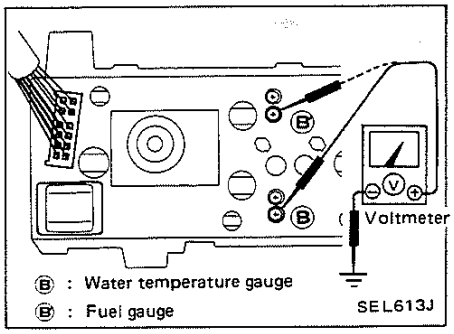
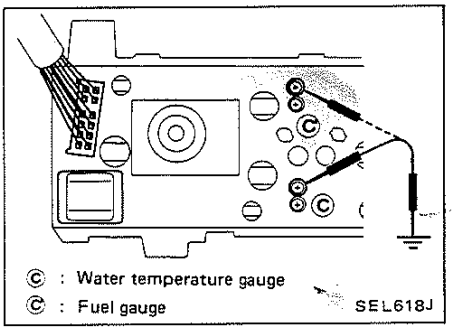
Inspection/Fuel Gauge and Water Temperature Gauge







INSPECTION START

O.K.

CHECK POWER SOURCE
1) Turn ignition switch "ON".
2) Check voltage between terminal Ⓐ and ground.
Battery voltage should exist.

N.G. → Check the following items.
1) Harness continuity between Battery terminal and combination meter
2) Ignition relay
3) Fusible link and fuse
4) Ignition switch

O.K.

CHECK OUTPUT VOLTAGE
1) Turn ignition switch "ON".
2) Check voltage between terminal Ⓑ and ground.
Approx. 8 volts should exist.

N.G. → Check the following items.
1) Printed circuit of combination meter
2) Voltage regulator

O.K.

CHECK GAUGE OPERATION
1) Turn ignition switch "ON".
2) Connect terminal Ⓒ and ground with wire for **less than 10 seconds.**
3) Check operation of gauge.
Gauge should move smoothly to full scale.

N.G. → Repair or Replace gauge.

O.K.

Check harness continuity between component and combination meter.

N.G. → Repair or Replace.

O.K.

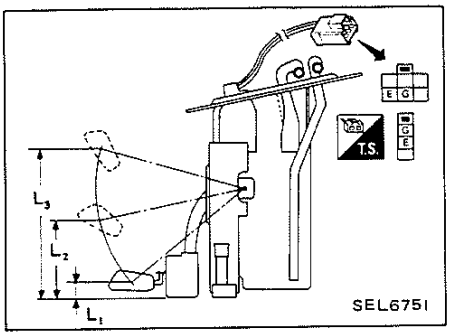
CHECK COMPONENT.
Check gauge units and harness.
Refer to "Fuel Tank Gauge Unit Check" or "Thermal Transmitter Check".

N.G. → Repair or Replace.
Refer to FE section. (Fuel gauge)

O.K.

Reinstall any part removed.

INSPECTION END

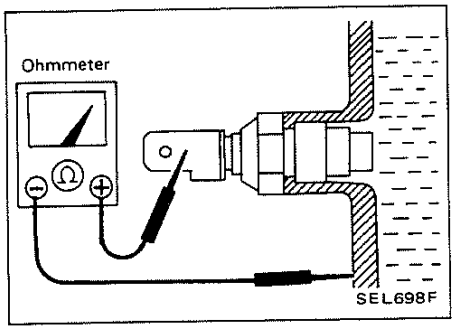


Fuel Tank Gauge Unit Check

- For removal, refer to FE section.

Check the resistance between terminals (G) and (E).

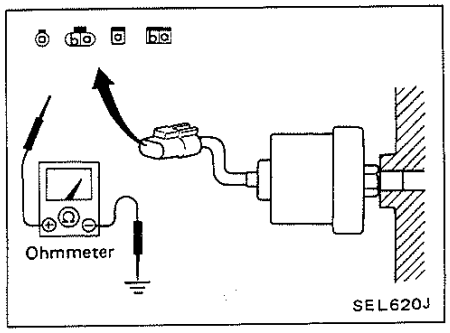
Ohmmeter		Float position L mm (in)	Resistance value (Ω)
(+)	(−)		
G	E	Full L_3 = Approx. 129 (5.08)	Approx. 9
		1/2 L_2 = Approx. 70 (2.76)	Approx. 30
		Empty L_1 = Approx. 19 (0.75)	Approx. 89



Thermal Transmitter Check

Check the resistance between the terminals of thermal transmitter and body ground.

Water temperature	Resistance
60°C (140°F)	Approx. 70 - 90Ω
100°C (212°F)	Approx. 21 - 24Ω



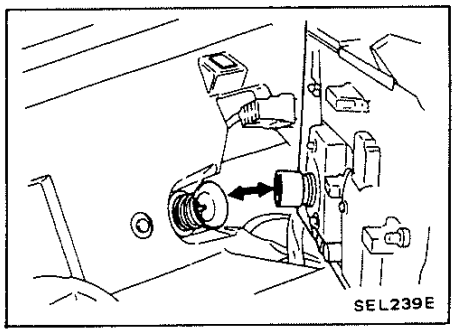
Oil Pressure Sending Unit Check

Check the resistance between the terminal ⓐ of oil pressure sending unit and body ground.

Oil pressure kPa (kg/cm², psi)	Resistance value
0 (0, 0) (Engine is stopped)	More than 74Ω
392 (4, 57) (Engine is running)	Approx. 25 - 31Ω
588 (6, 85) (Engine is running)	Approx. 13 - 20Ω

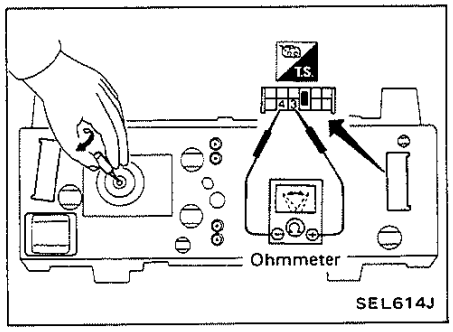
Check the continuity between the terminal ⓑ of oil pressure switch and body ground.

Engine	Continuity
Engine is running	NO
Engine is stopped	YES



Speedometer Cable Removal and Installation

Combination meter and speedometer cable can be joined together simply by inserting combination meter.



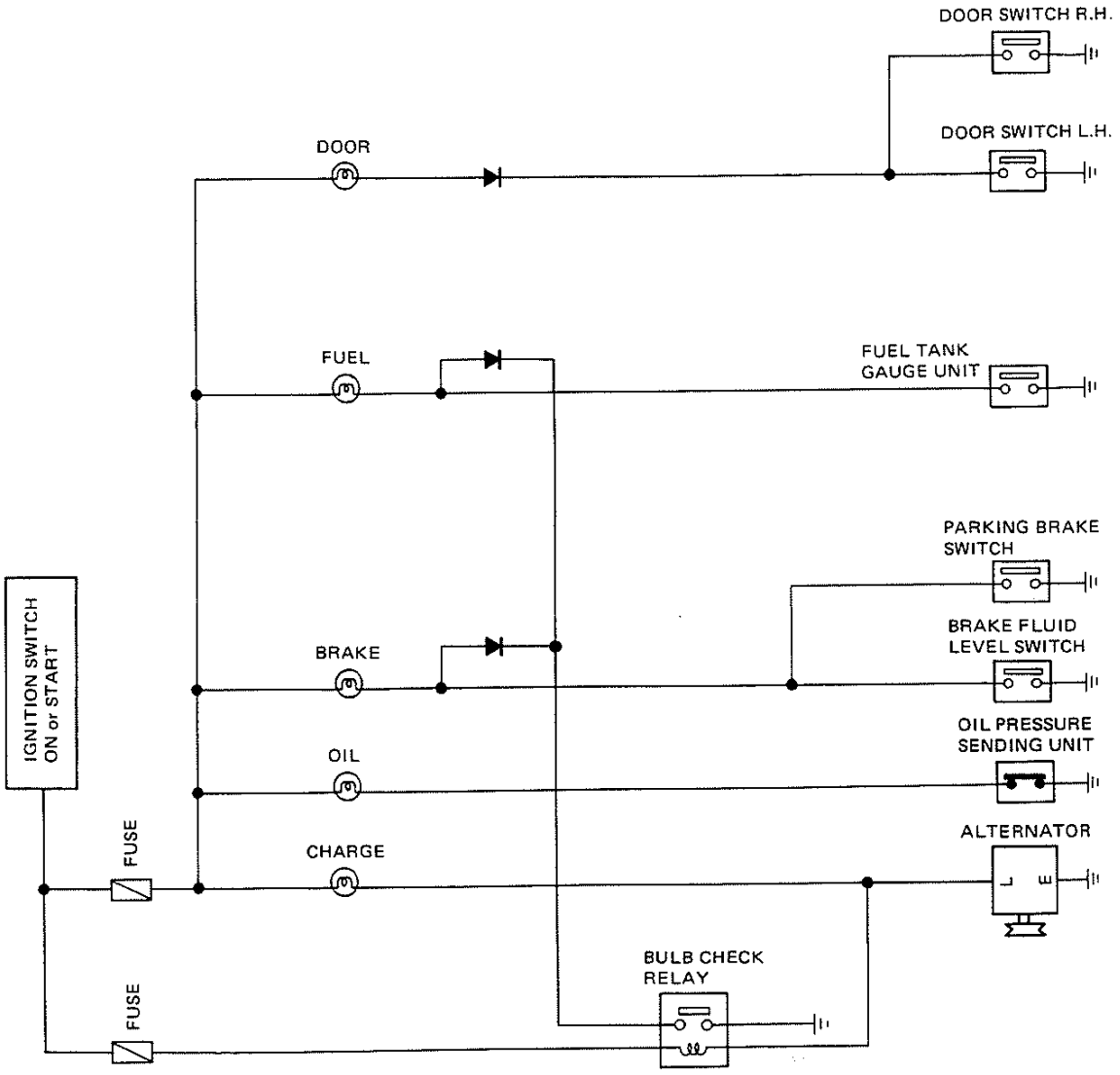
Speed Sensor Signal Check

- A speed sensor is built into the speedometer.

1. Turn speedometer slowly using a small screwdriver.
2. Check continuity of speed sensor circuit.

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

Warning Lamps/Schematic



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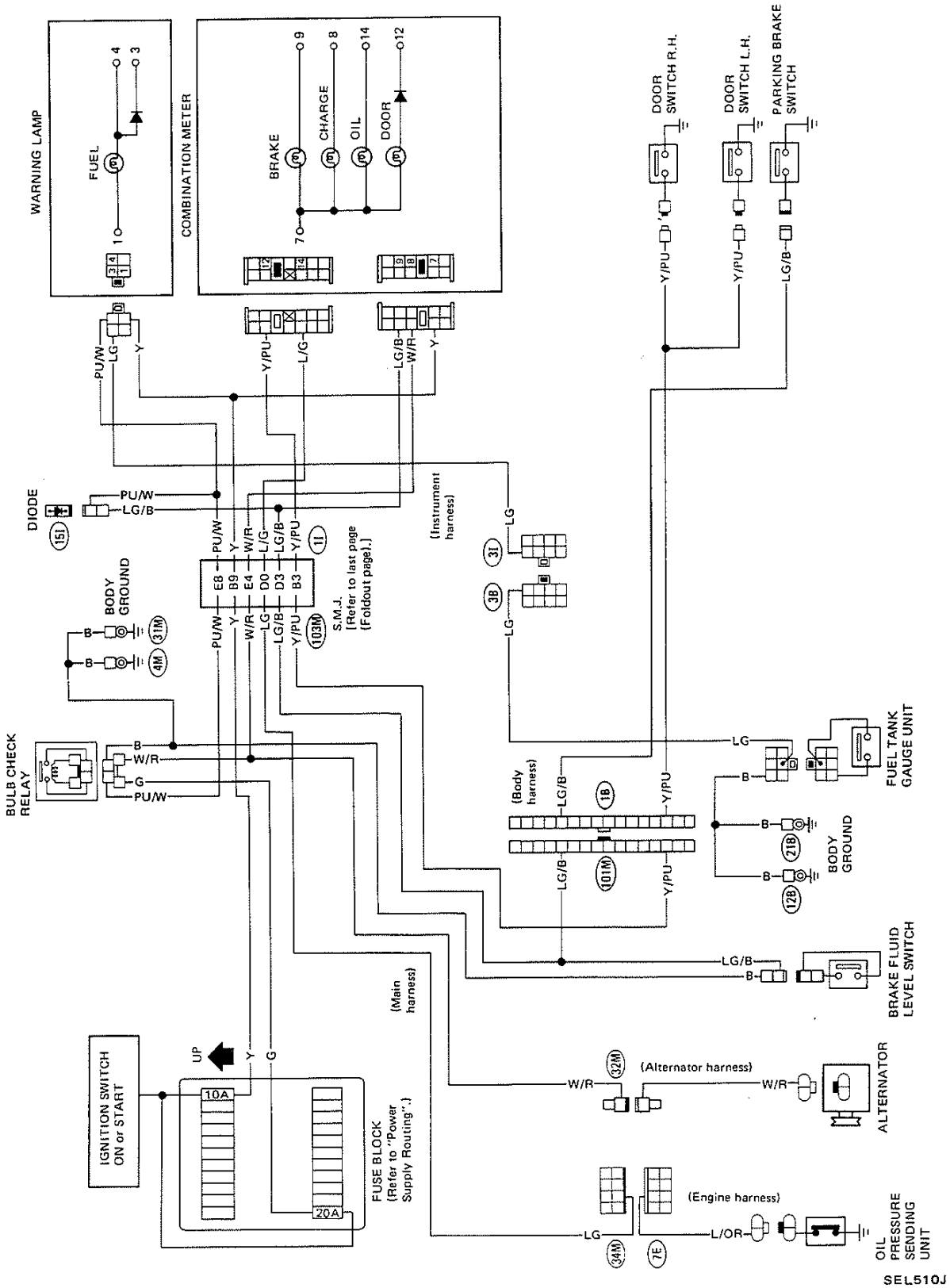
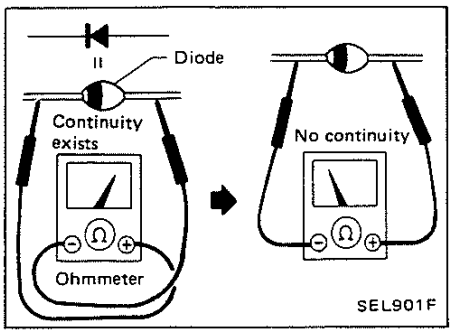
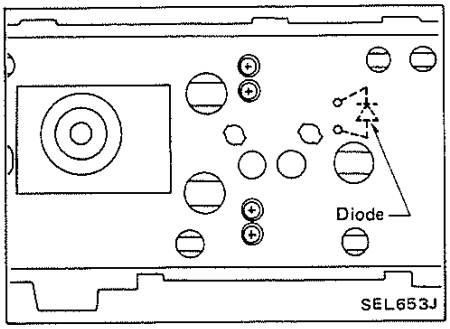
Warning Lamps/Wiring Diagram





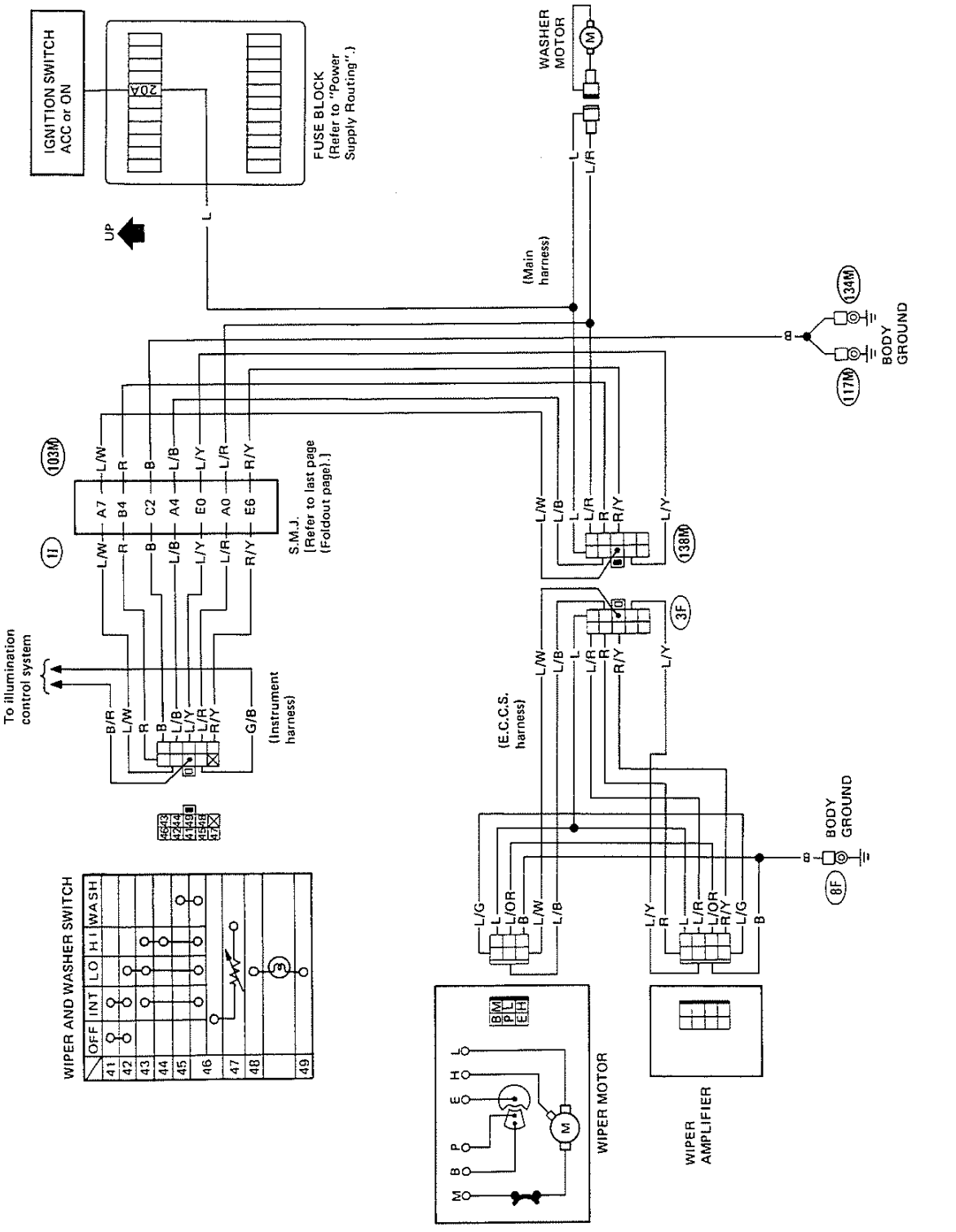
Diode Check

- Check continuity using an ohmmeter.
- Diode is functioning properly if test results are as shown in the figure on the left.

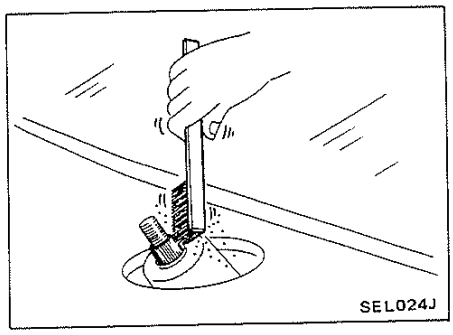


- Diodes for warning lamps are built into the combination meter printed circuit.

Wiring Diagram



Windshield Wiper Removal and Installation

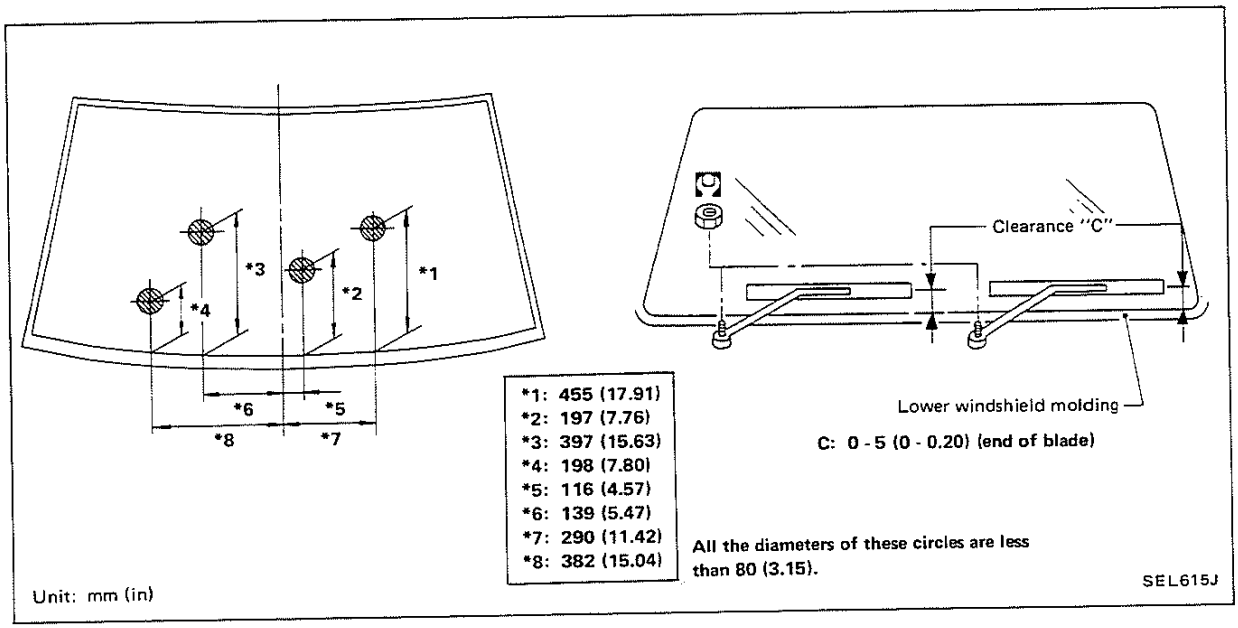


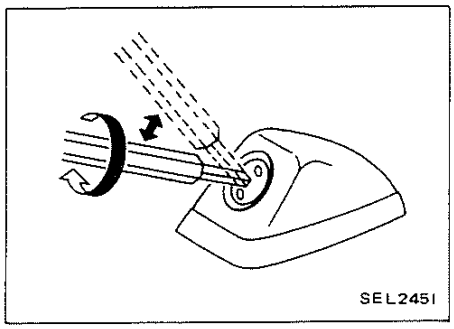
Before reinstalling wiper arm, clean up the pivot area as illustrated. This will reduce possibility of wiper arm looseness.

1. Prior to wiper arm installation, turn on wiper switch to operate wiper motor and then turn it "OFF" (Auto Stop).
2. Lift the blade up and then set it down onto glass surface to set the blade end to clearance "C" immediately before tightening nut.
3. Eject washer fluid. Turn on wiper switch to operate wiper motor and then turn it "OFF".
4. Ensure that wiper blades stop within clearance "C".

- Tighten windshield wiper arm nuts to specified torque.

13 - 18 N·m (1.3 - 1.8 kg-m, 9 - 13 ft-lb)

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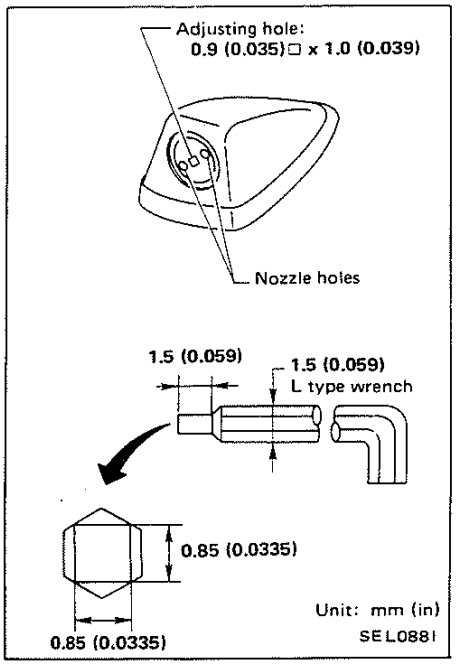
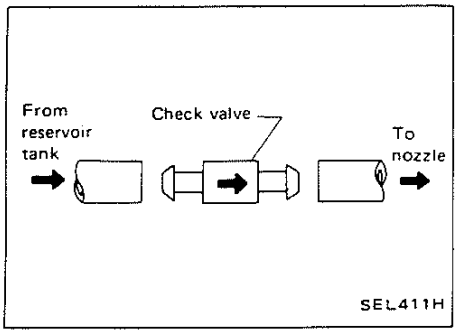
Washer Nozzle Adjustment

- Adjust washer nozzle with suitable tool as in the figure to the left.
  Details of tool are shown below.



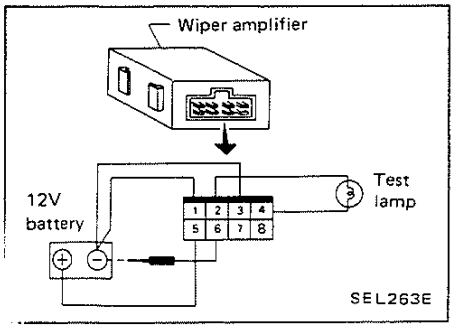
Check Valve

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

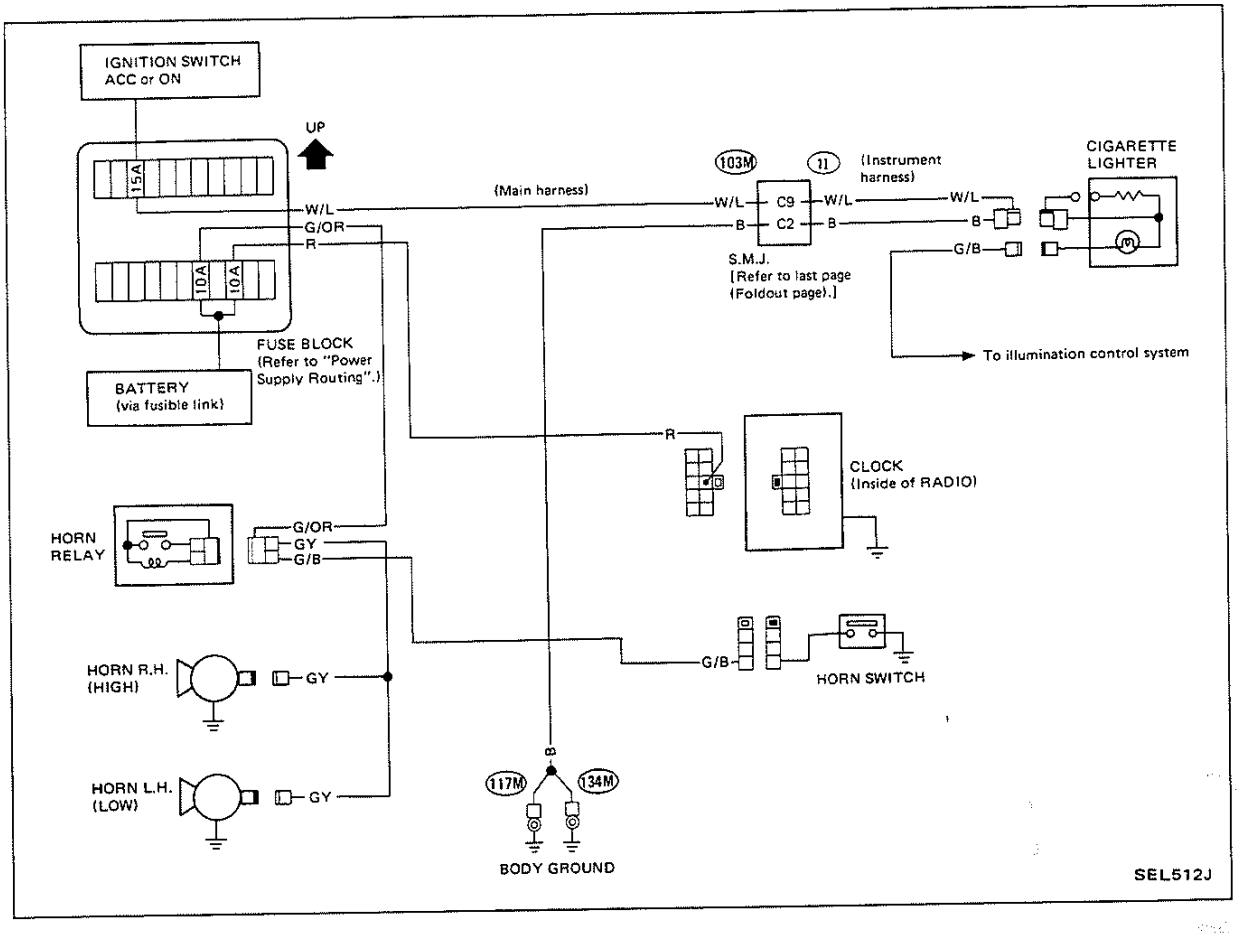


Wiper Amplifier Check

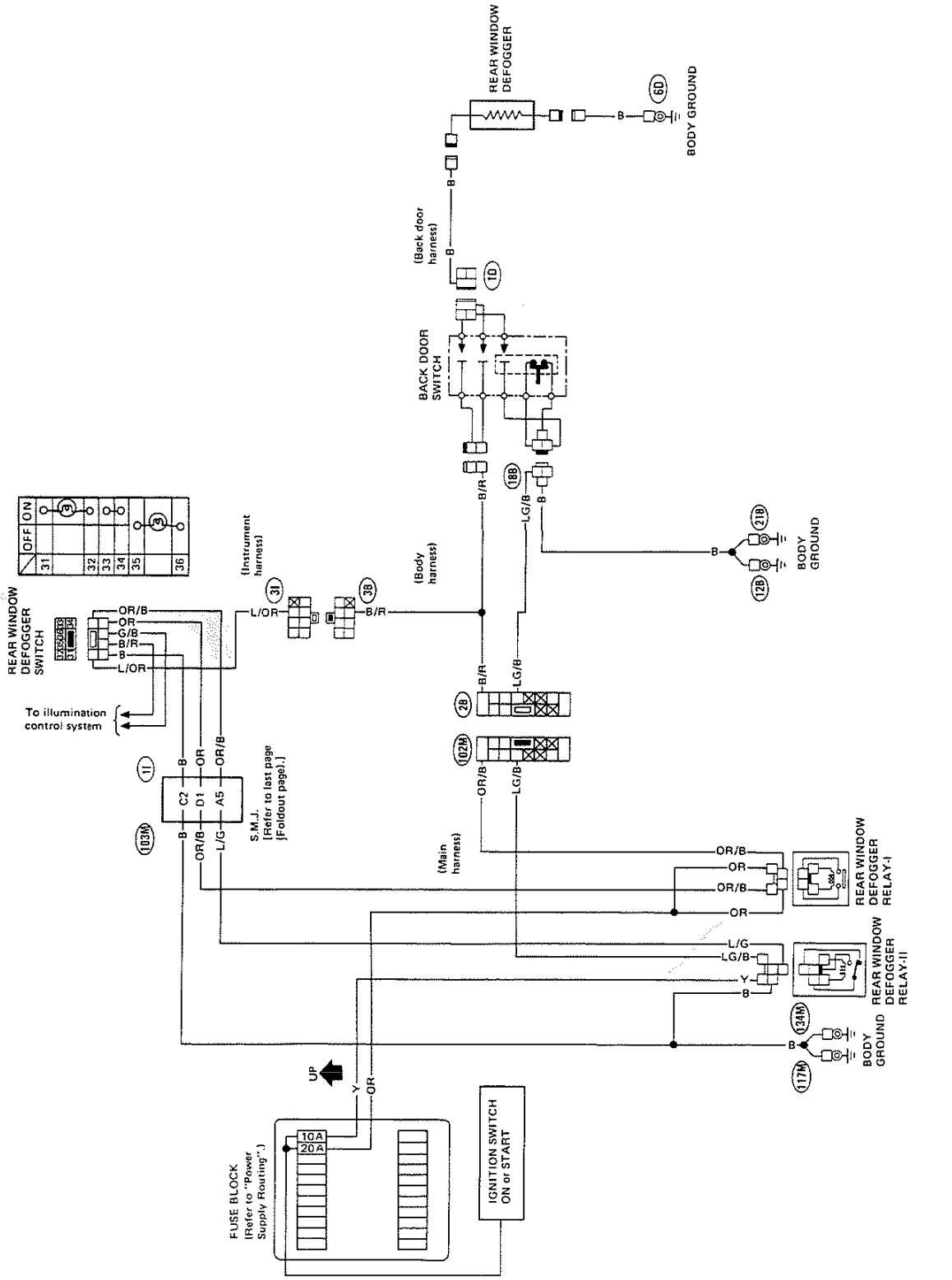
1. Connect as shown in the figure to the left.
2. If test lamp comes on when connected to terminal ⑥ and battery ground, wiper amplifier is normal.



Wiring Diagram



Wiring Diagram



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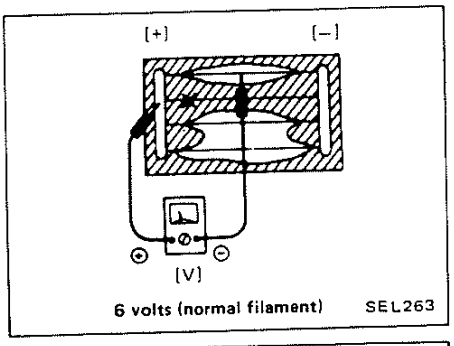
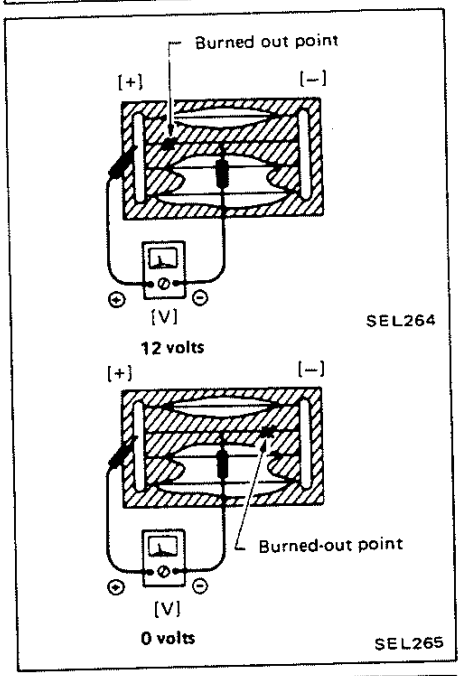


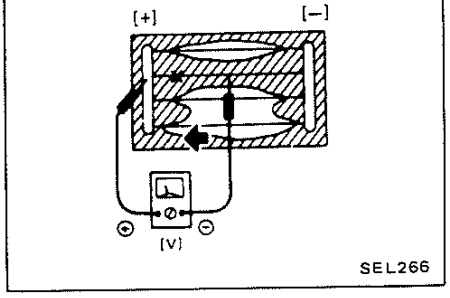
6 volts (normal filament) SEL263

Filament Check

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



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

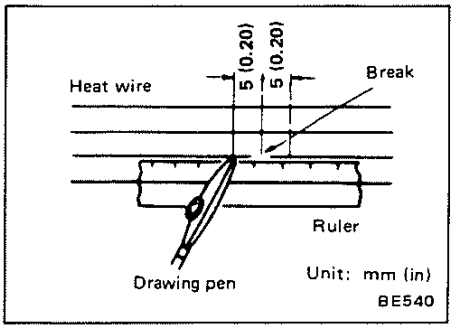


3. To locate burned out point, move probe to left and right along filament to determine point where tester needle swings abruptly.

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

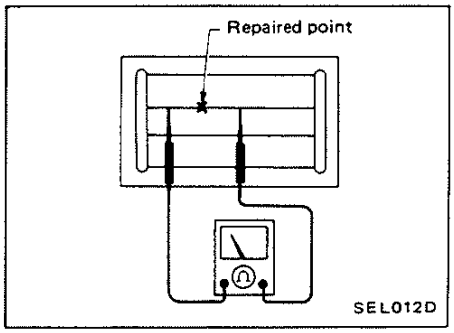


REPAIRING PROCEDURE

1. Wiper 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.

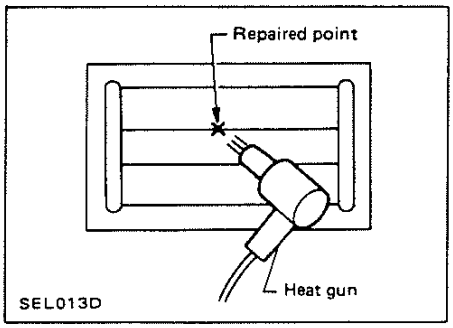
Shake silver composition container before use.

3. 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.



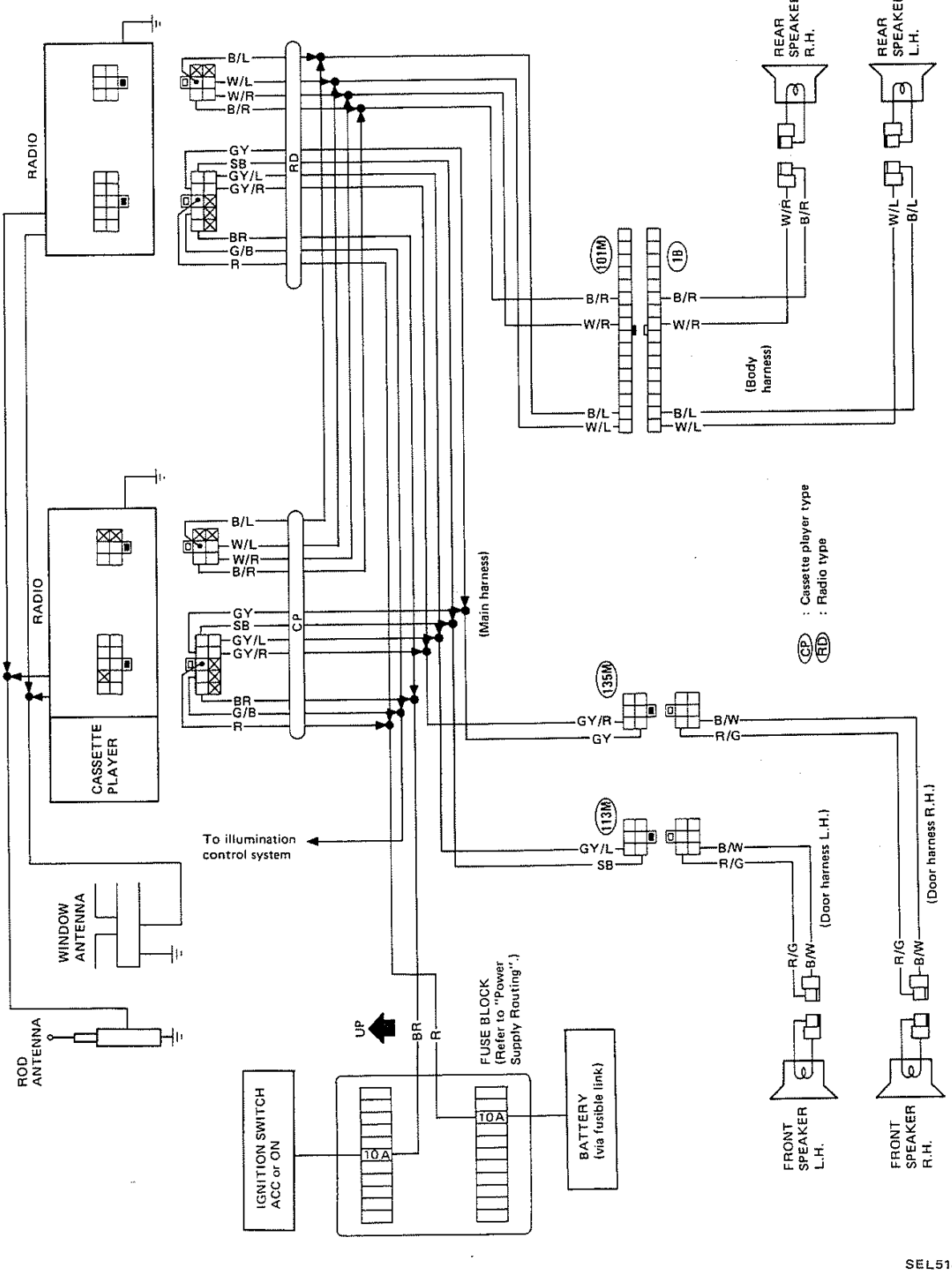
4. After repair has been completed, check repaired wire for ontinuity. This check should be conducted 10 minutes after silver compositon is deposited.

Do not touch repaired area while test is being conducted.



5. 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.

Wiring Diagram



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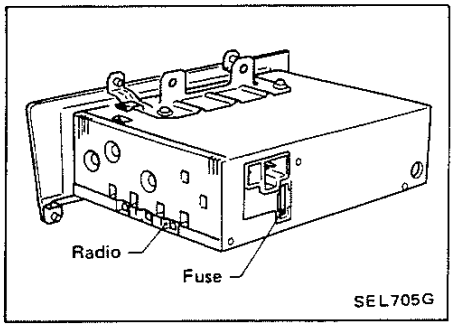
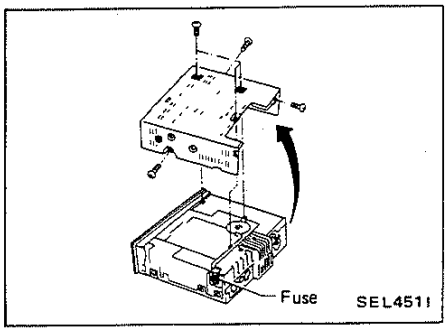
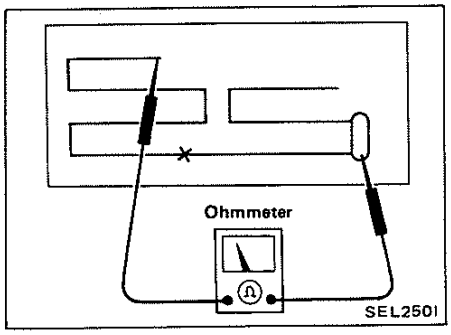


Radio Fuse Check



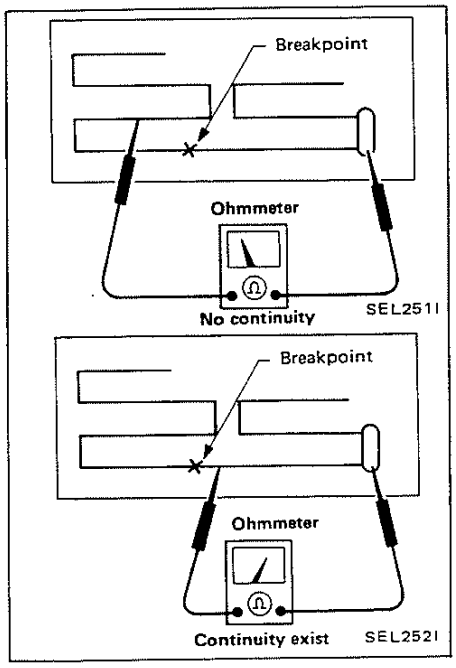
Radio with Cassette Fuse Check



Window Antenna Repair

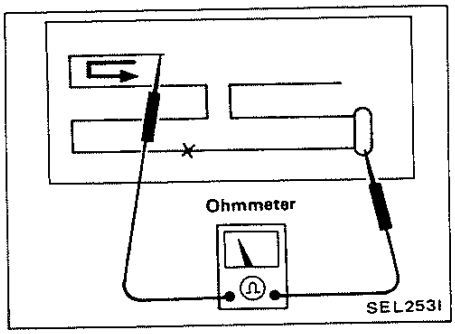
ELEMENT CHECK

1. Attach probe circuit tester (in ohm range) to antenna terminal on each side.



2. If an element is broken, no continuity will exist.

Window Antenna Repair (Cont'd)

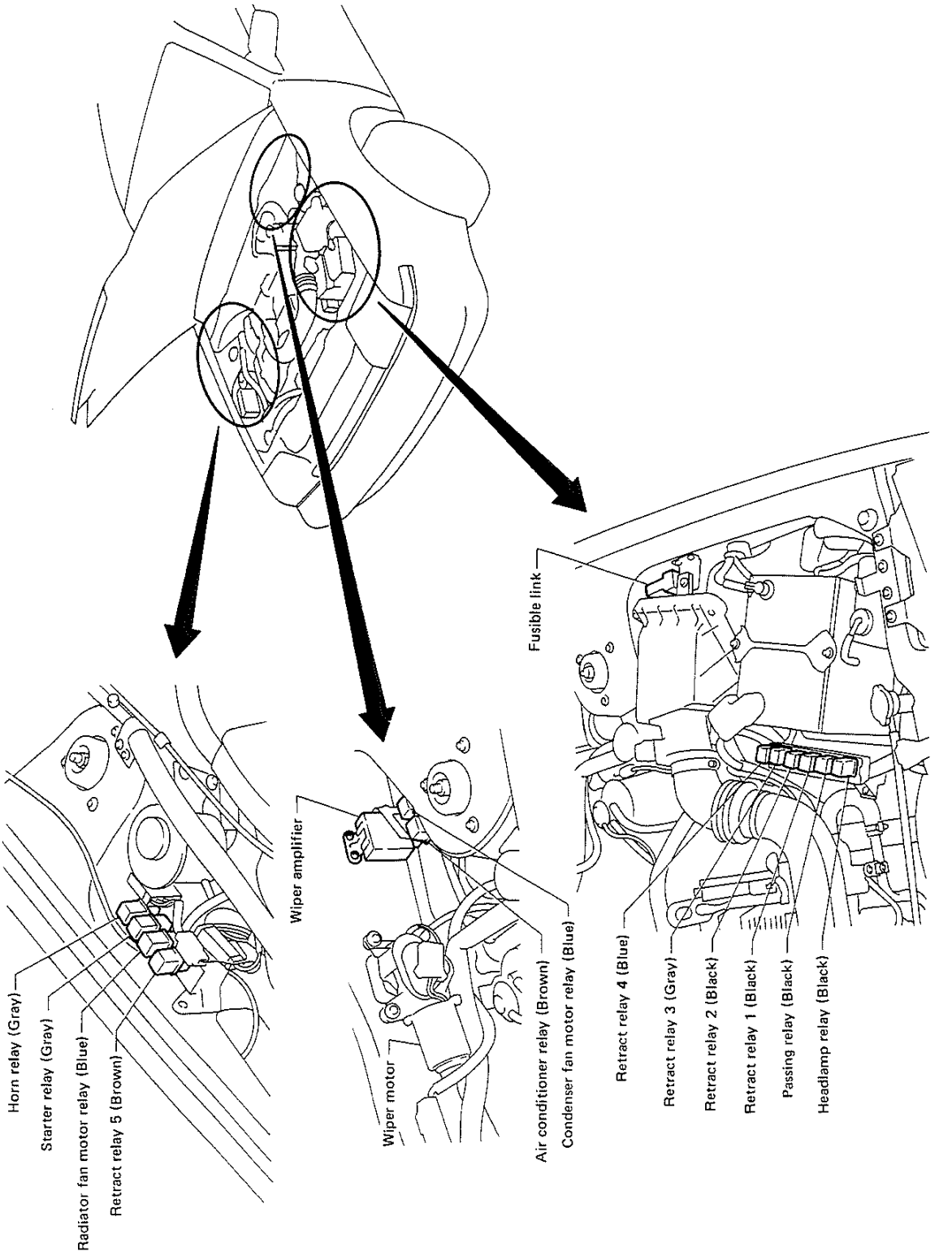


3. To locate broken point, move probe to left and right along element to determine point where tester needle swings abruptly.

ELEMENT REPAIR

Refer to REAR WINDOW DEFOGGER "Filament Repair".

Engine Compartment



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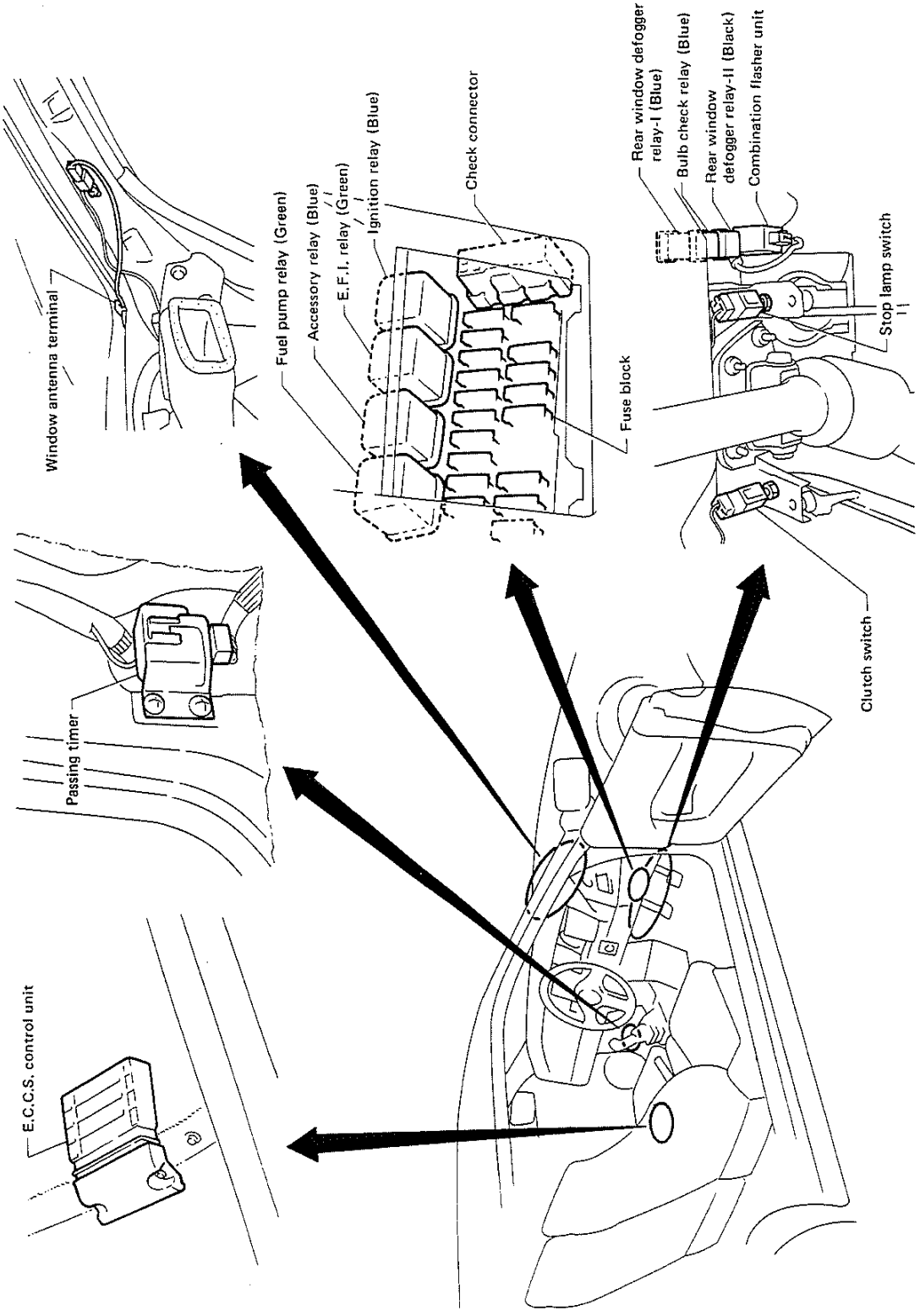
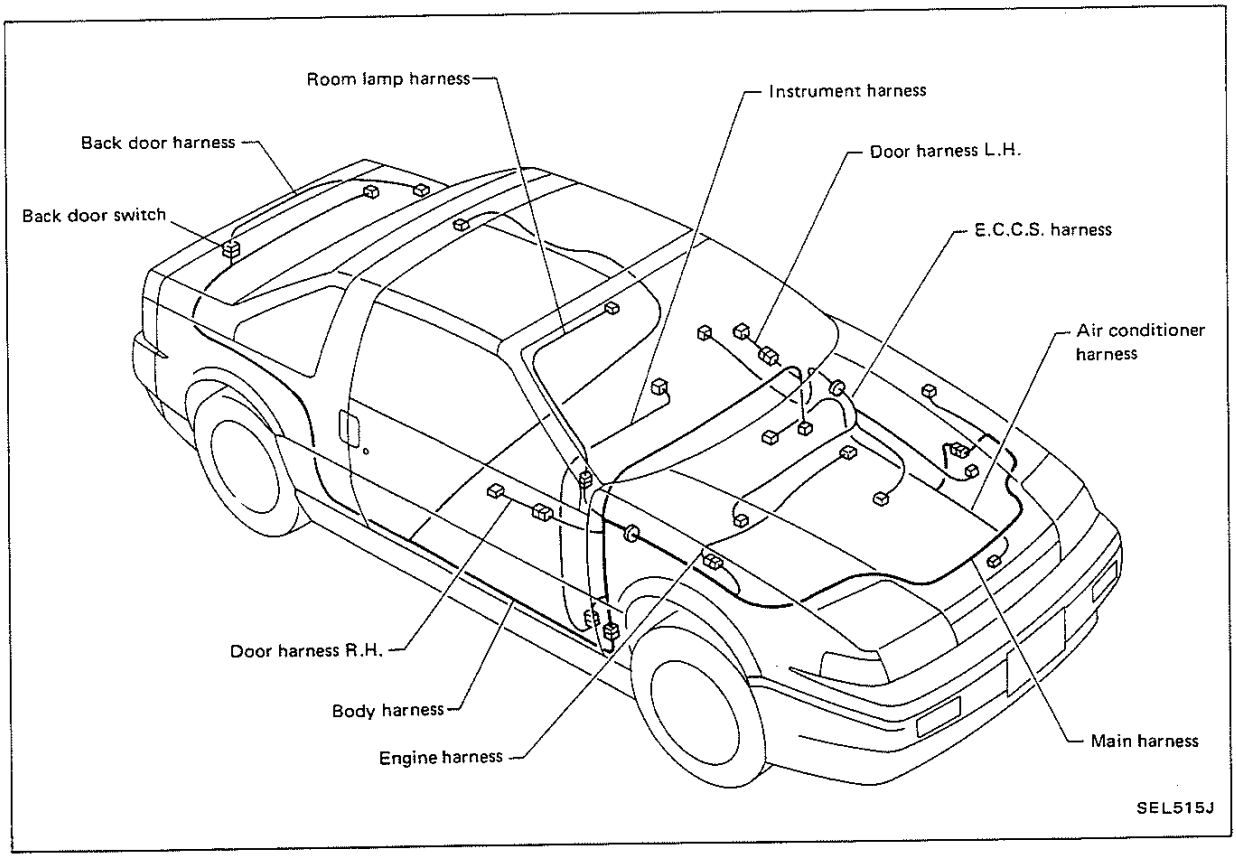
Passenger Compartment



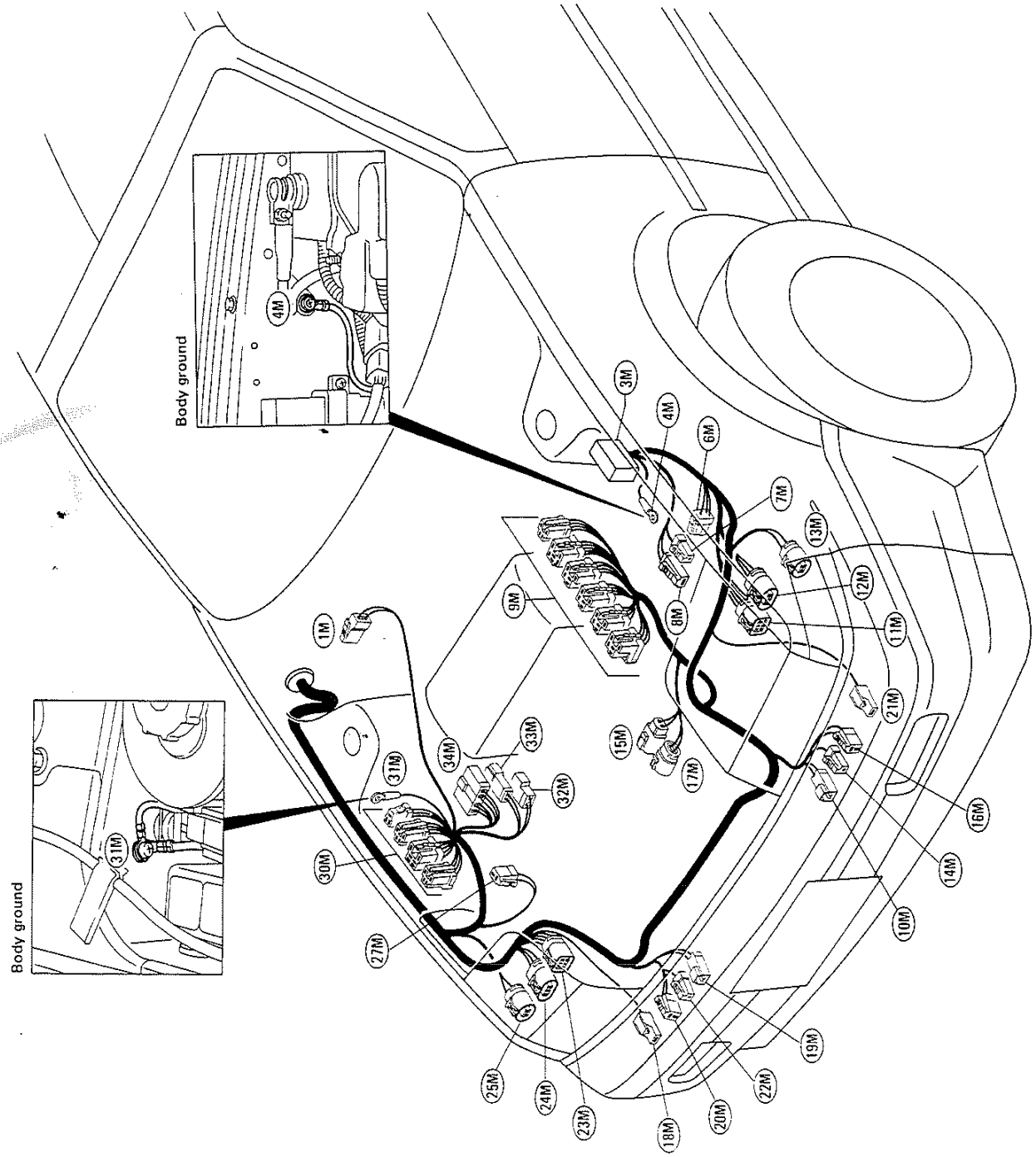
Note:

Outline


Room lamp harness
Instrument harness
Back door harness
Door harness L.H.
Back door switch
E.C.C.S. harness
Air conditioner harness
Door harness R.H.
Body harness
Engine harness
Main harness
SEL515J

Main Harness

ENGINE COMPARTMENT



Main Harness (Cont'd)

(1M) : Brake fluid level switch
(3M) : Fusible link holder
(4M) : Body ground
(6M) : To air conditioner harness
(7M) : Fusible link
(8M) : Battery
(9M) : Relays on bracket (Refer to LOCATION OF ELECTRICAL UNITS.)
(10M) : Not used
(11M) : Headlamp motor L.H.
(12M) : Headlamp L.H.
(13M) : Front side turn signal lamp L.H.
(14M) : Front combination lamp L.H.
(15M) : Radiator fan motor
(16M) : Front combination lamp L.H.
(17M) : Thermo switch
(18M) : Horn R.H.
(19M) : Not used
(20M) : Front combination lamp R.H.
(21M) : Horn L.H.
(22M) : Front combination lamp R.H.
(23M) : Headlamp motor R.H.
(24M) : Headlamp R.H.
(25M) : Front side turn signal lamp R.H.
(27M) : Washer motor
(30M) : Relays on bracket (Refer to LOCATION OF ELECTRICAL UNITS.)
(31M) : Body ground
(32M) : To alternator harness
(33M) : To alternator harness
(34M) : To (7E)

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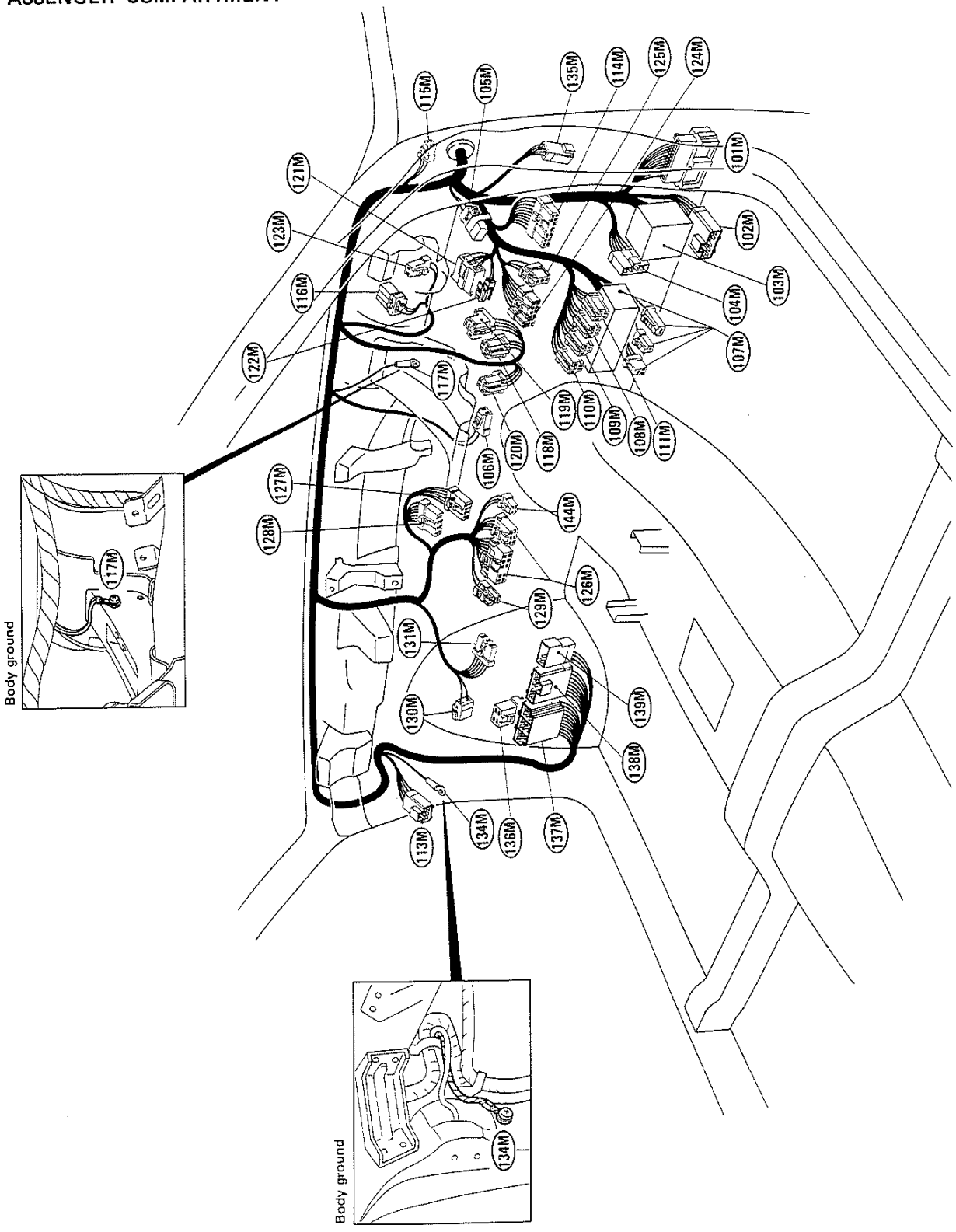
Main Harness (Cont'd)

PASSENGER COMPARTMENT



Main Harness (Cont'd)

(101M) : To (1B)
(102M) : To (2B)
(103M) : To (1I)
(104M) : To (2I)
(105M) : Diode
(106M) : Clutch switch
(107M) : Fuse block
(108M) : E.F.I. relay
(109M) : Accessory relay
(110M) : Fuel pump relay
(111M) : Ignition relay
(112M) : To door harness L.H.
(114M) : Check connector
(115M) : To room lamp harness
(116M) : Combination flasher unit
(117M) : Body ground
(118M) : Bulb check relay
(119M) : Rear window defogger relay-II
(120M) : Rear window defogger relay-I
(121M) : Ignition switch
(122M) : Not used
(123M) : Stop lamp switch
(124M) : Lighting switch
(125M) : Horn switch
(126M) : Radio
(127M) : To air conditioner harness
(128M) : Fan switch
(129M) : Not used
(130M) : Blower motor
(131M) : Heater resistor
(134M) : Body ground
(135M) : To door harness R.H.
(136M) : Passing timer
(137M) : To (2F)
(138M) : To (3F)
(139M) : To (4F)
(144M) : Not used

Diode (105M)

Lighting switch ——▲—— Retract relay-3

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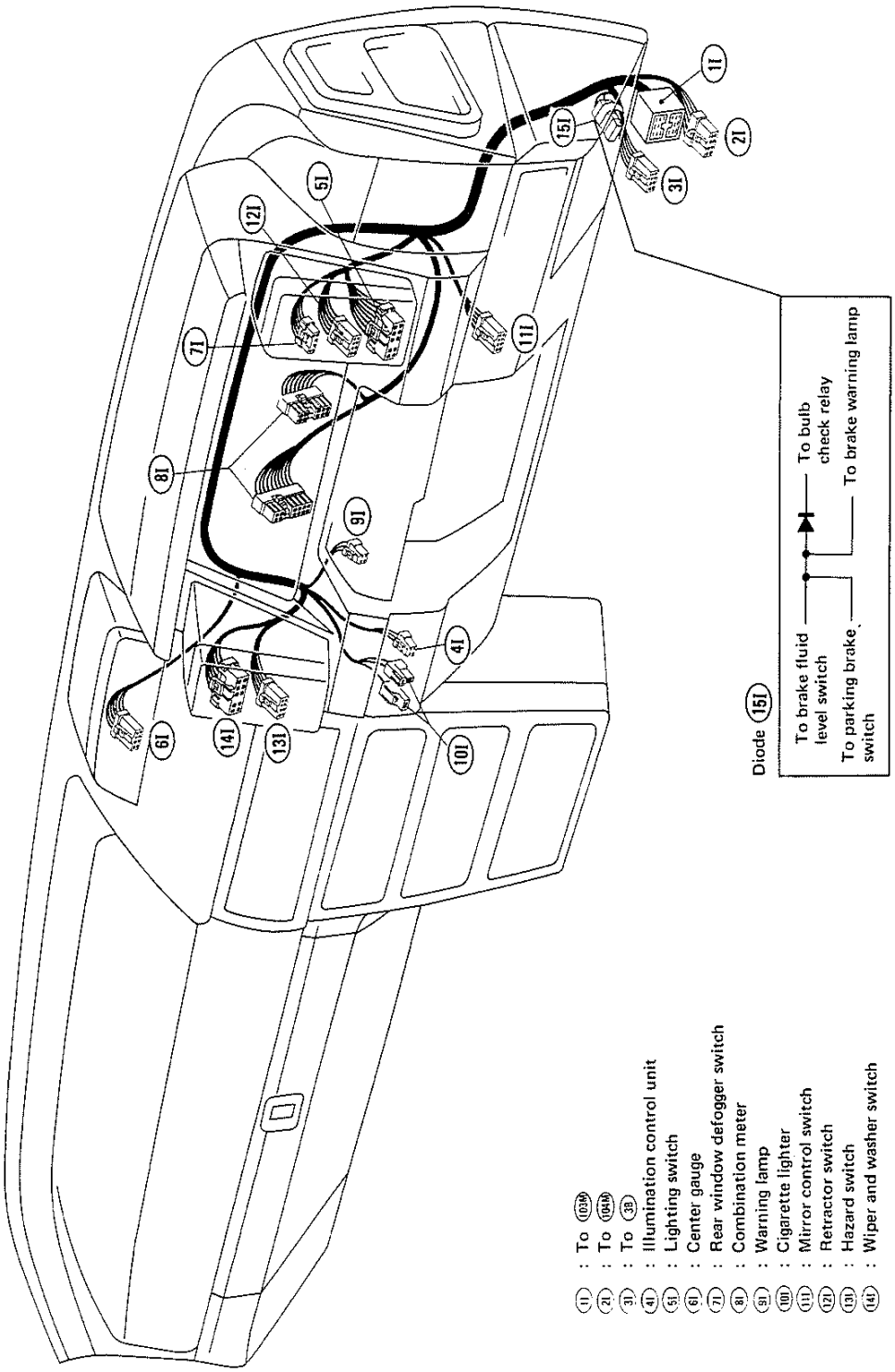
Instrument Harness



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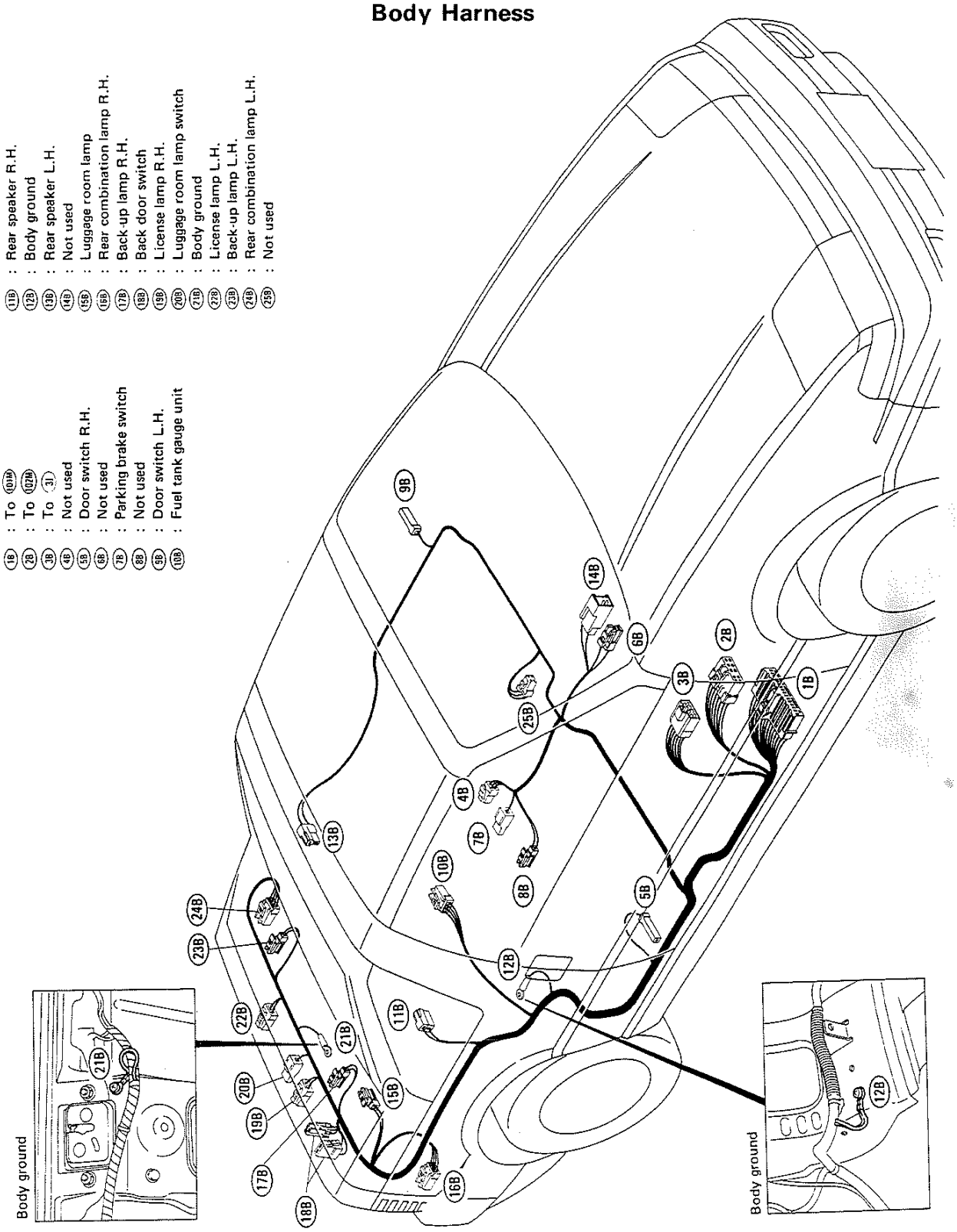
Body Harness

(1B) : To (101B)
(2B) : To (102B)
(3B) : To (3)
(4B) : Not used
(5B) : Door switch R.H.
(6B) : Not used
(7B) : Parking brake switch
(8B) : Not used
(9B) : Door switch L.H.
(10B) : Fuel tank gauge unit

(11B) : Rear speaker R.H.
(12B) : Body ground
(13B) : Rear speaker L.H.
(14B) : Not used
(15B) : Luggage room lamp
(16B) : Rear combination lamp R.H.
(17B) : Back-up lamp R.H.
(18B) : Back door switch
(19B) : License lamp R.H.
(20B) : Luggage room lamp switch
(21B) : Body ground
(22B) : License lamp L.H.
(23B) : Back-up lamp L.H.
(24B) : Rear combination lamp L.H.
(25B) : Not used



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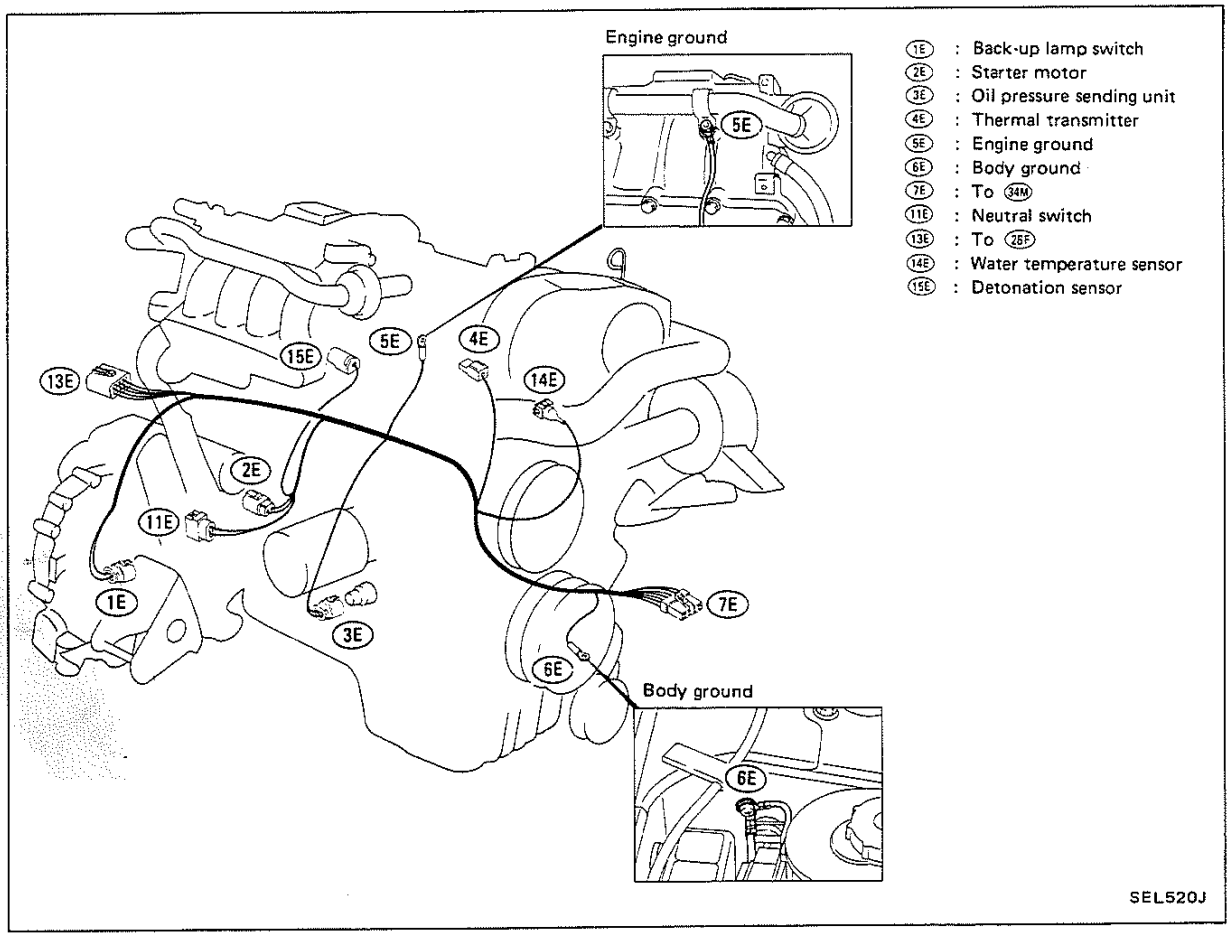
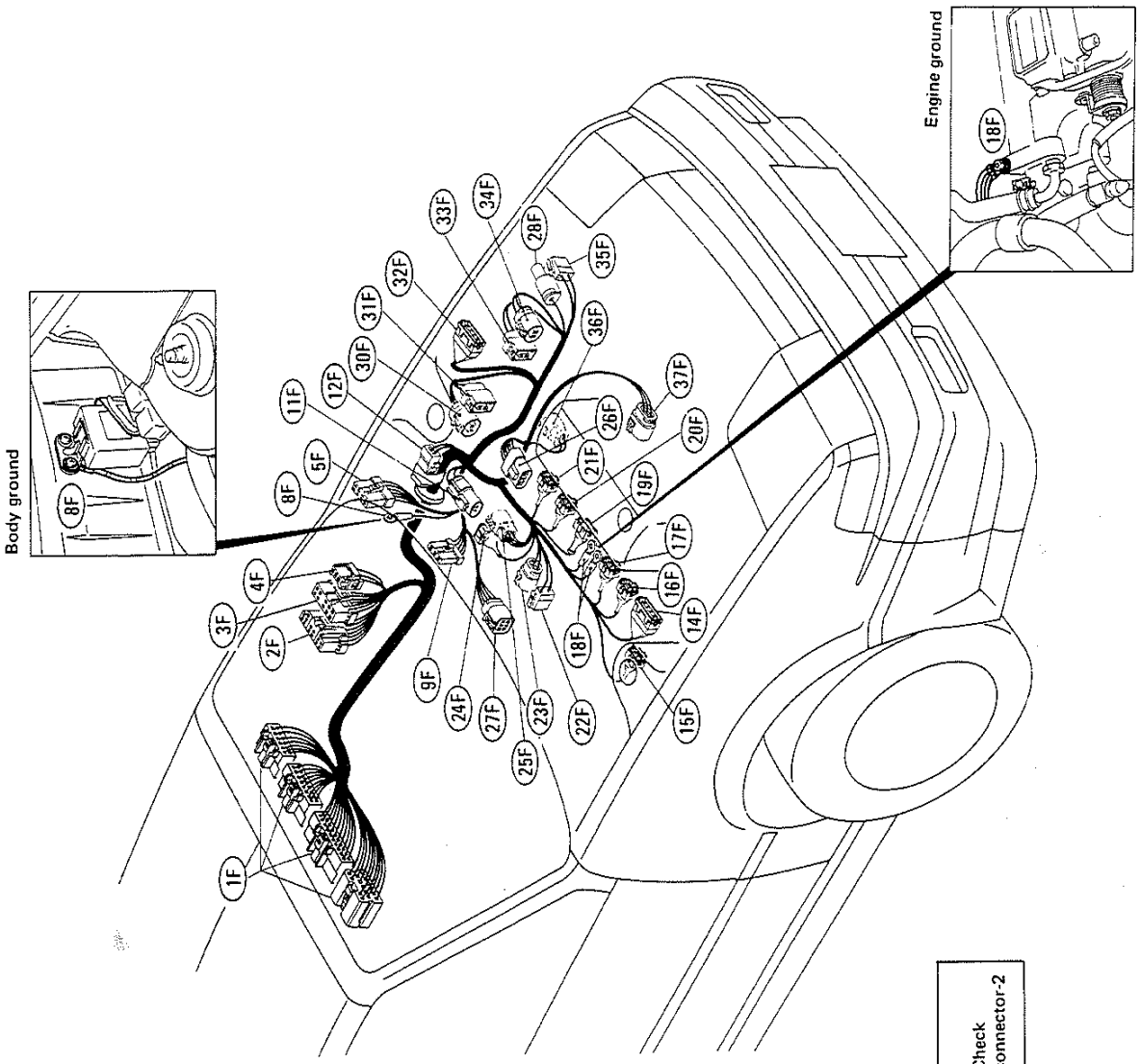
Engine Harness



E.C.C.S. Harness



(1F) : E.C.C.S. control unit
(2F) : To (131b)
(3F) : To (138b)
(4F) : To (139b)
(5F) : Wiper amplifier
(8F) : Body ground
(9F) : Wiper motor
(11F) : Check connector-2
(12F) : Resistor
(14F) : Crank angle sensor
(15F) : Air regulator
(16F) : Injector 1
(17F) : Injector 2
(18F) : Engine ground
(19F) : Throttle valve switch
(20F) : Injector 3
(21F) : Injector 4
(22F) : Condenser
(23F) : F.I.C.D. solenoid valve
(24F) : A.A.C. solenoid valve
(25F) : Power transistor unit
(26F) : To (13E)
(27F) : Dropping resistor
(28F) : Check connector
(30F) : A.I.V. control solenoid valve
(31F) : Power valve control solenoid valve
(32F) : Air flow meter
(33F) : E.G.R. control solenoid valve
(34F) : P.R. control solenoid valve
(35F) : Fusible link
(36F) : To E.C.C.S. sub harness
(37F) : Exhaust gas sensor

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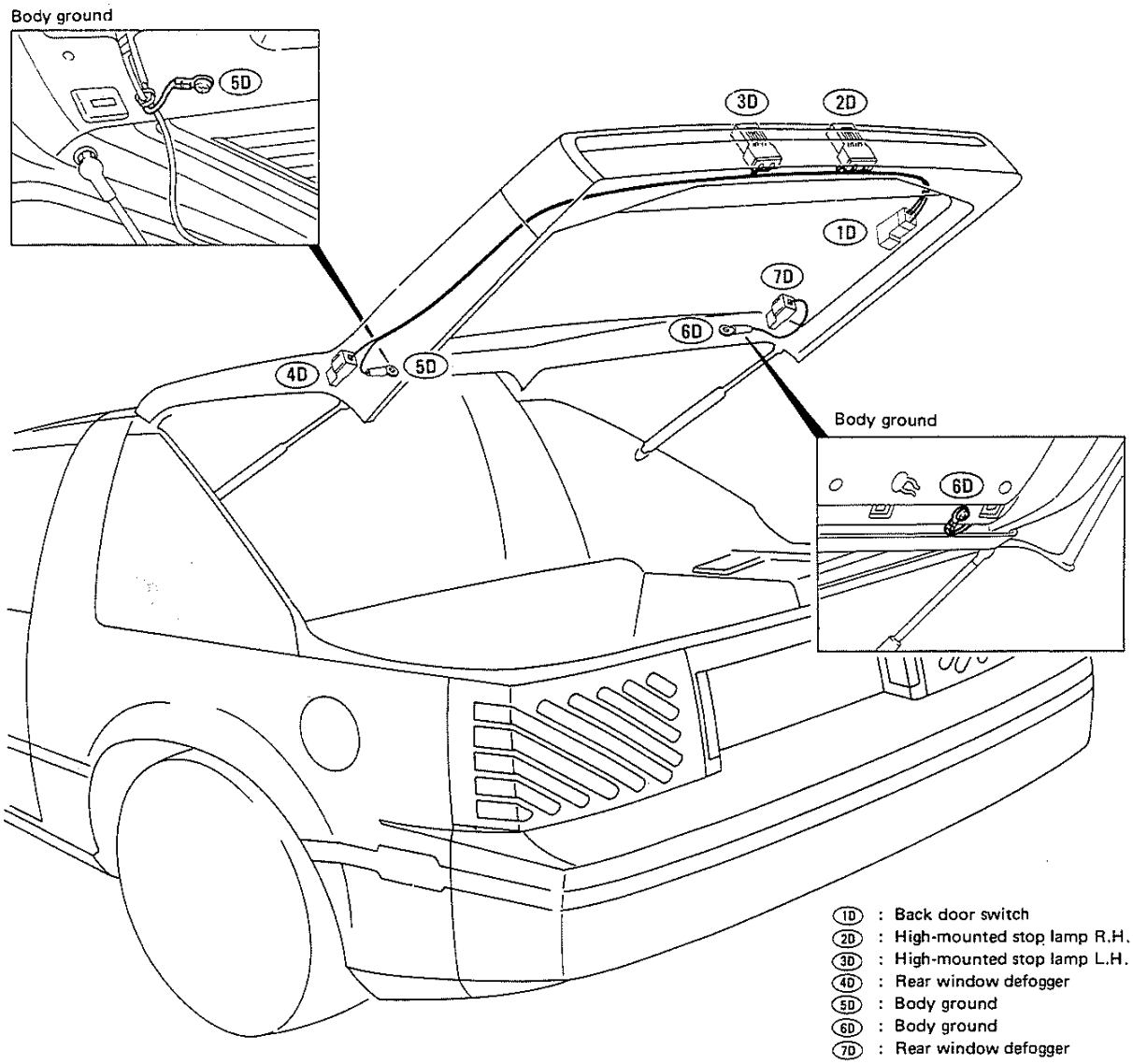
Back Door Harness



1D : Back door switch
2D : High-mounted stop lamp R.H.
3D : High-mounted stop lamp L.H.
4D : Rear window defogger
5D : Body ground
6D : Body ground
7D : Rear window defogger

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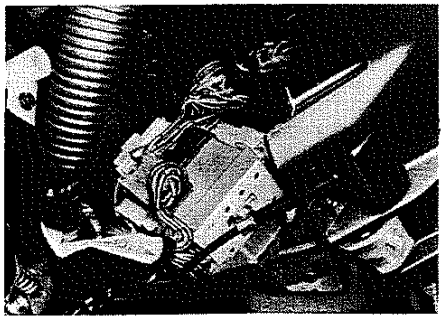

INSTALLATION

To install S.M.J., tighten bolts until orange "fulltight" mark appears and then retighten to specified torque as required.

: 3 - 5 N·m (0.3 - 0.5 kg-m, 2.2 - 3.6 ft-lb)

CAUTION:

Do not overtighten bolts, otherwise, they may be damaged.