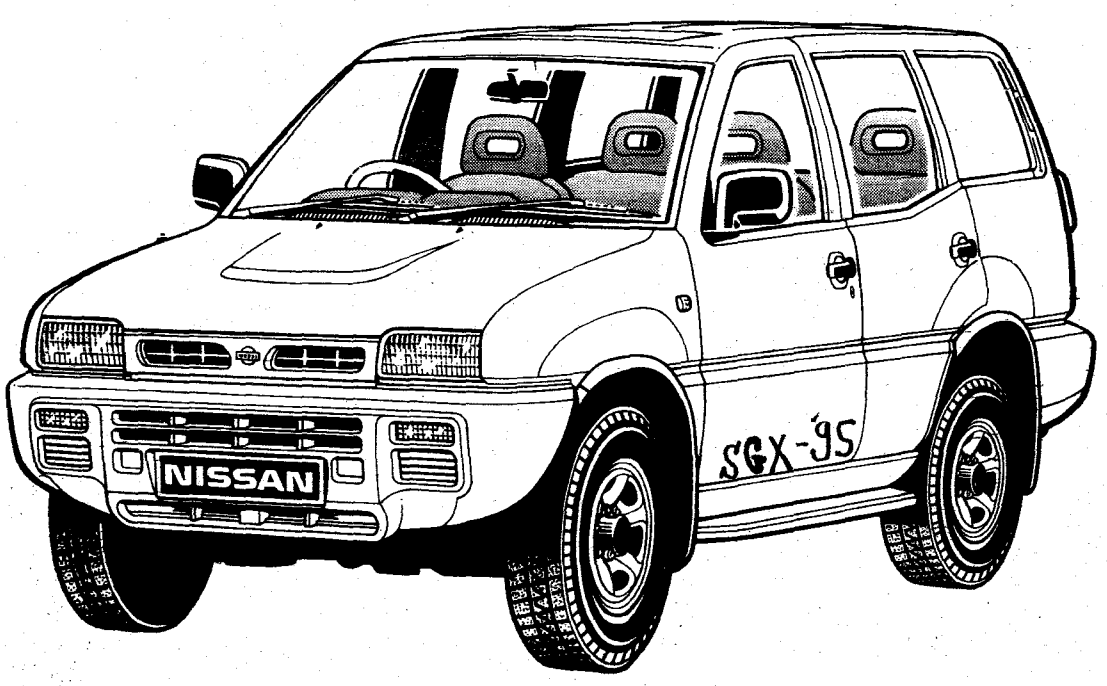
NISSAN TERRANO II

MODEL R20 SERIES

Volume 2

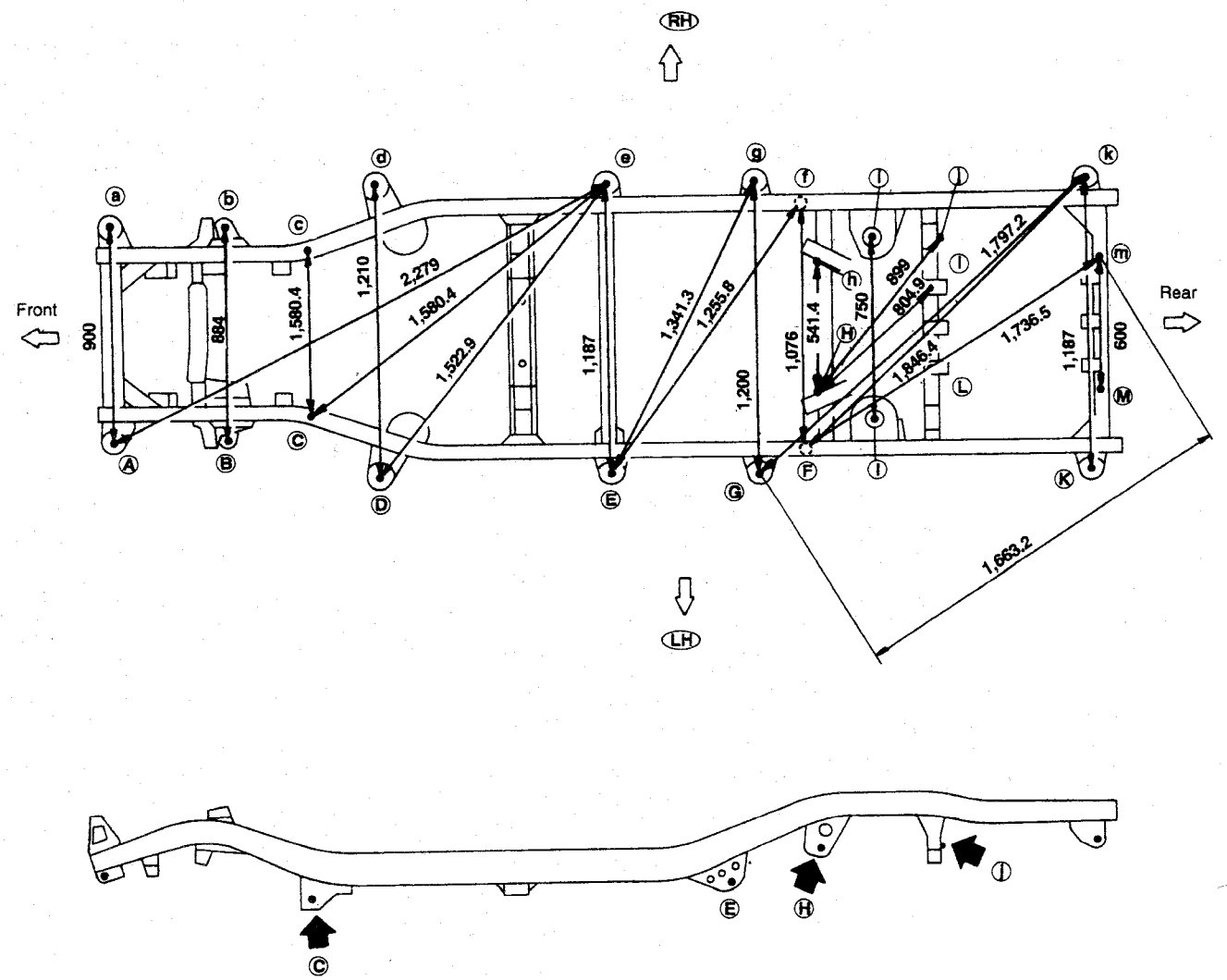


SERVICE MANUAL

Underbody (Cont'd)

MEASUREMENT POINTS

Wagon model



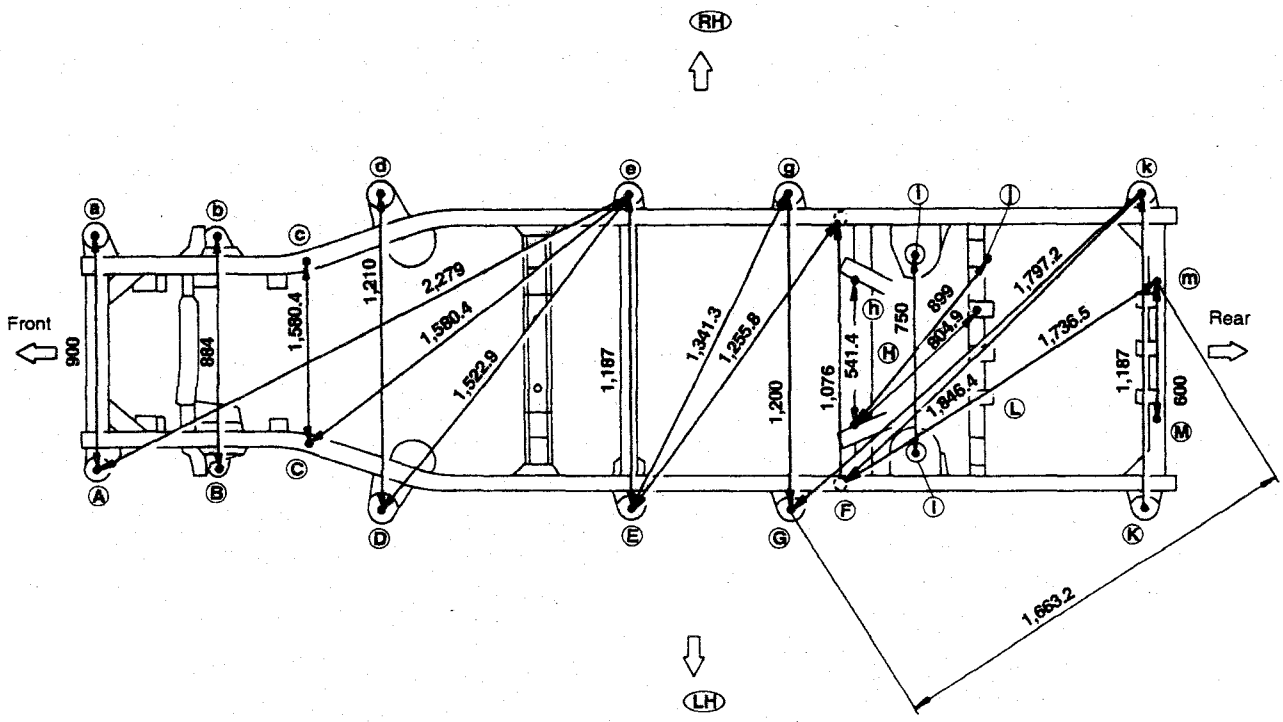
Unit: mm

NBF030

Underbody (Cont'd)

MEASUREMENT

Wagon model

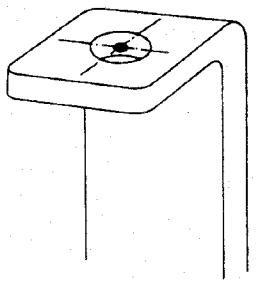
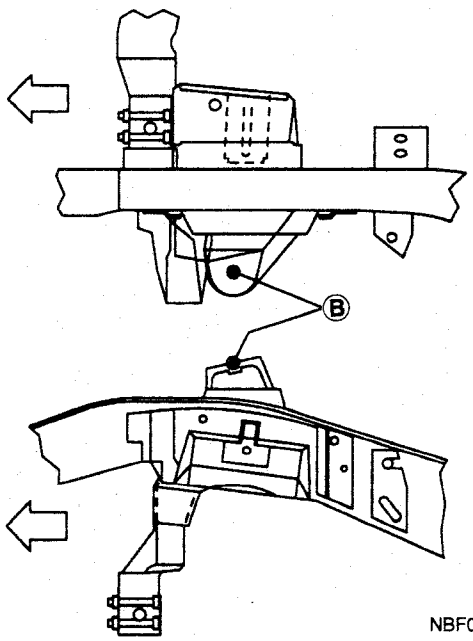
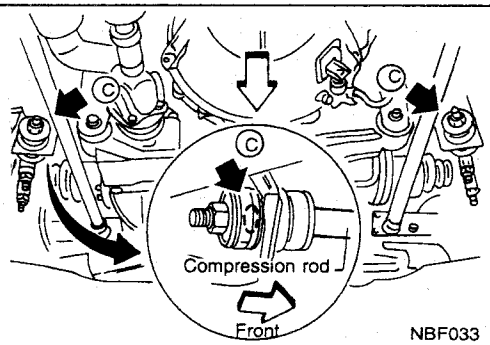


Unit: mm

NBF031

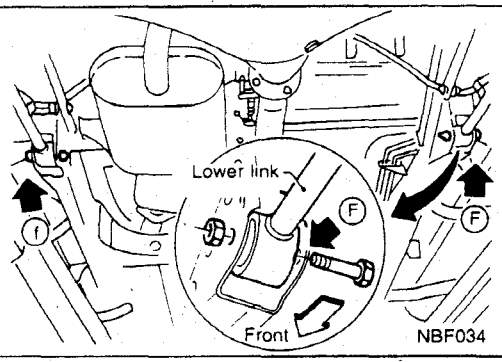
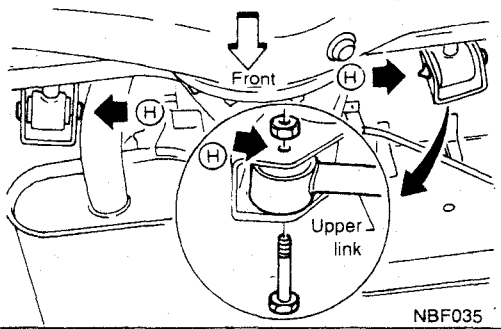
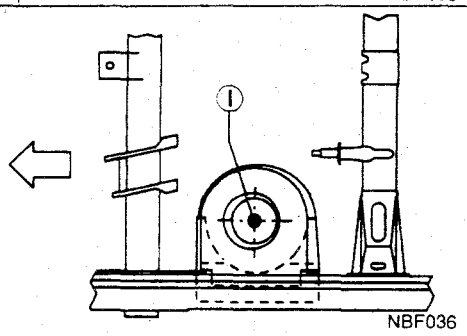
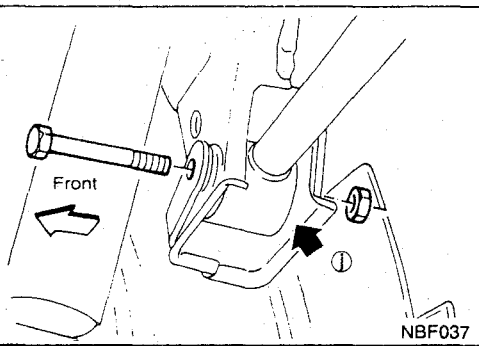
Underbody (Cont'd)

DETAILED MEASUREMENT POINTS

Points	Detailed points		Coordinates mm (in) "X"①	"Y"	"Z"
Ⓐ ⓐ	 SBF274B	Body mounting bracket hole	450.0 (17.72)	−488.5 (−19.23)	58.0 (2.28)
Ⓓ ⓓ			605.0 (23.82)	597.5 (23.52)	4.7 (0.18)
Ⓔ ⓔ			593.5 (23.37)	1,537.0 (60.51)	10.0 (0.39)
Ⓖ ⓖ			[W]: 600.0 (23.62)	[W]: 2,135.0 (84.06)	[W]: 140.2 (5.52)
Ⓚ ⓚ			593.5 (23.37)	[W]: 3,477.5 (136.91) [H]: 2,997.5 (118.01)	195.5 (7.70)
Ⓑ ⓑ	 NBF032	Front shock absorber bracket mounting hole	442.0 (17.40)	−16.0 (−0.63)	196.5 (7.74)
Ⓒ ⓒ	 NBF033	Compression rod mounting hole	362.6 (14.28)	290.0 (11.42)	−158.9 (−6.26)

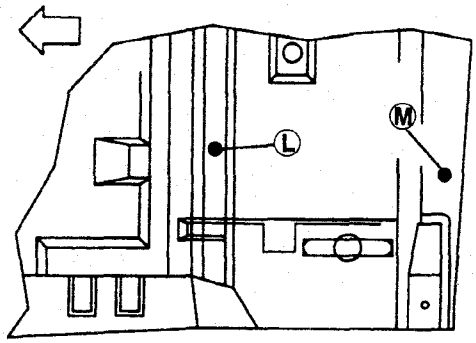
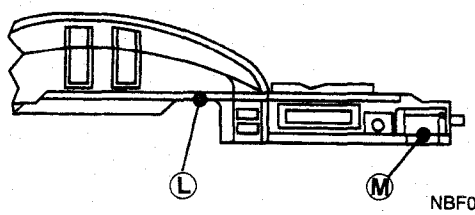
① :Coordinate indicated is (LH). (RH) coordinate is - (LH) coordinate.
E.g. if (LH) coordinate is: 698.5, (RH) coordinate is: -698.5.

Underbody (Cont'd)

Points	Detailed points		Coordinates mm (in)		
			"X"①	"Y"	"Z"
Ⓕ ⓕ	 NBF034	Lower link mounting bracket hole	538.0 (21.18)	W: 2,059.0 (81.06) H: 1,859.0 (73.19)	−146.0 (−5.75)
Ⓗ ⓗ	 NBF035	Upper link mounting bracket hole	270.7 (10.66)	W: 2382.3 (93.79) H: 2182.3 (85.92)	5.0 (0.20)
Ⓘ ⓘ	 NBF036	Rear spring mounting bracket hole	375.0 (14.76)	W: 2,610.0 (102.76) H: 2,410.0 (94.88)	210.0 (8.27)
ⓙ	 NBF037	Rear panhard rod mounting bracket hole	(RH) only −495.8 (−19.52)	W: 2,843.7 (111.96) H: 2,643.7 (104.08)	−55.0 (−2.16)

① :Coordinate indicated is (LH) . (RH) coordinate is - (LH) coordinate.
E.g. if (LH) coordinate is: 698.5, (RH) coordinate is: -698.5.

Underbody (Cont'd)

Points	Detailed points		Coordinates mm (in)		
			"X"①	"Y"	"Z"
Ⓛ Ⓘ		5th cross-member location hole	225.0 (8.86)	Ⓦ: 2,961.0 (116.58) Ⓗ: 2,637.0 (103.82)	Ⓦ: 264.4 (10.41) Ⓗ: 284.4 (11.20)
Ⓜ ⓜ	 NBF038	6th cross-member location hole	300.0 (11.81)	Ⓦ: 3,530.0 (138.98) Ⓗ: 3,050.0 (120.08)	240.6 (9.47)

① :Coordinate indicated is (LH). (RH) coordinate is - (LH) coordinate.
E.g. if (LH) coordinate is: 698.5, (RH) coordinate is: -698.5.

HEATER & AIR CONDITIONER

SECTION HA

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.**

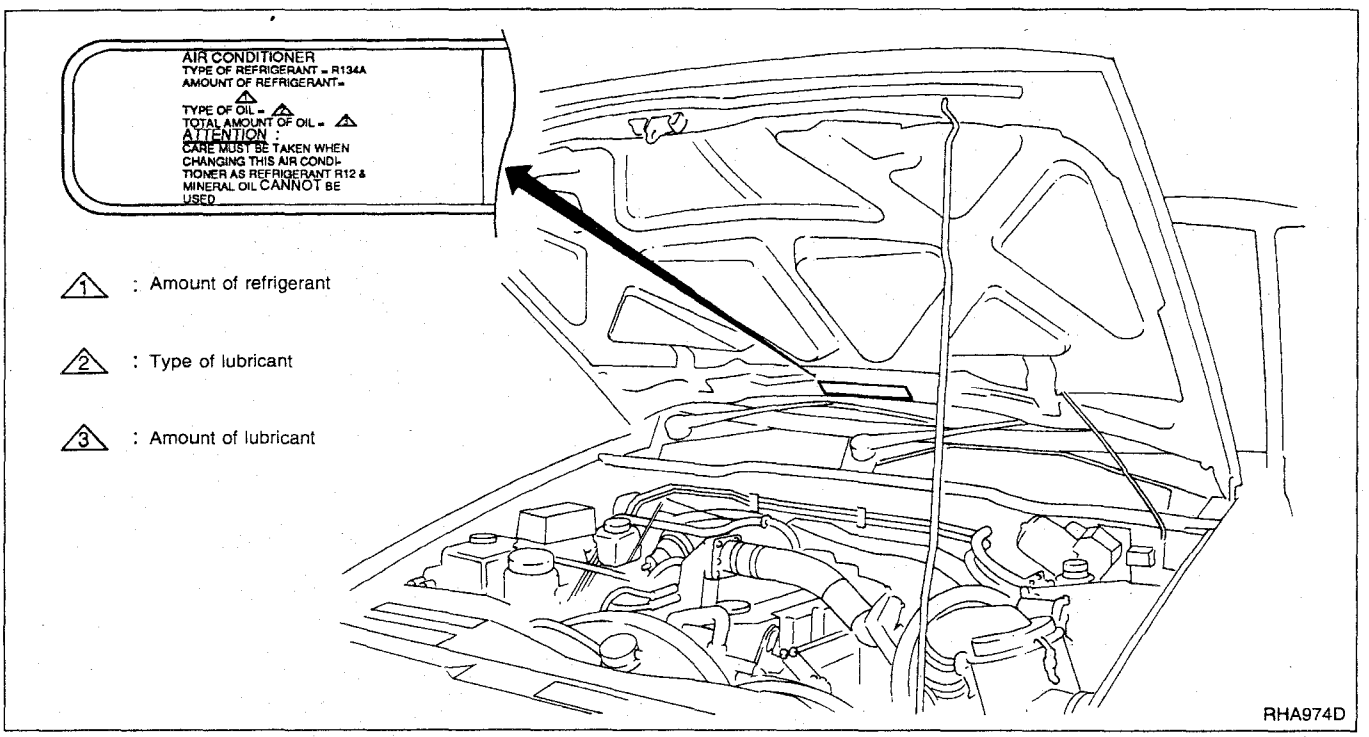
When you perform trouble diagnoses, read GI section, "HOW TO FOLLOW FLOW CHART IN TROUBLE DIAGNOSES".

Introduction

To prevent the ozone layer from being destroyed, the HFC-134a (R-134a) refrigerant has replaced the previously used CFC-12 (R-12).
The new and previous service tools, refrigerant, lubricant, etc. are not interchangeable due to differences in their physical properties and characteristics.
Always service the HFC-134a (R-134a) air conditioning system using the specified tools, lubricant and refrigerant, observing the following precautions:

Identification

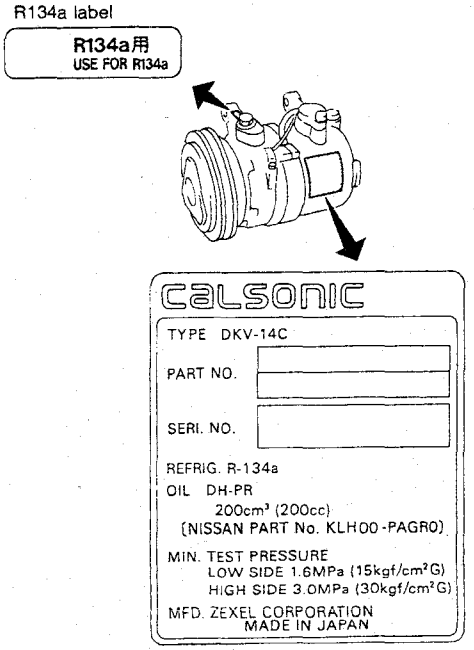
IDENTIFICATION LABEL FOR VEHICLE



PARTS IDENTIFICATION

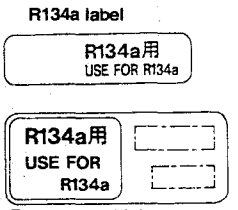
1. Compressor label

R134a label



2. Other component parts label

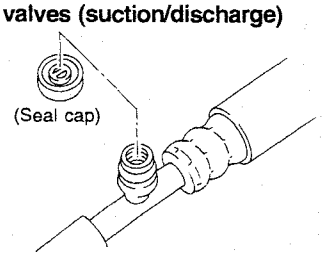
R134a label



Base color: Light blue

Part name	Identification
1. Compressor	R134a label or Compressor label
2. Cooling unit	R134a label
3. Expansion valve	Stamp
4. Condenser	R134a label
5. Liquid tank	R134a label
6. Hose or pipe	R134a label

3. Service valves (suction/discharge)



The service valves are specially designed for the HFC-134a (R-134a) system. Those for the CFC-12 (R-12) system are different in size and configuration. Refer to "PREPARATION".

RHA254D

Precautions for Working with HFC-134a (R-134a)

WARNING:

- CFC-12 (R-12) refrigerant and HFC-134a (R-134a) refrigerant must never be mixed, even in the smallest amounts, as they are incompatible with each other. If the refrigerants are mixed, compressor failure is likely to occur.
- Use only specified lubrication oil for the HFC-134a (R-134a) A/C system and HFC-134a (R-134a) components. If lubrication oil other than that specified is used, compressor failure is likely to occur.
- The specified HFC-134a (R-134a) lubrication oil absorbs moisture from the atmosphere at a rapid rate, therefore the following handling precautions must be observed:
  a: When removing refrigerant components from a vehicle, immediately cap (seal) the component to minimize the entry of moisture from the atmosphere.
  b: When installing refrigerant components to a vehicle, do not remove the caps (unseal) until just before connecting the components. Also, complete the connection of all refrigerant loop components as quickly as possible to minimize the entry of moisture into the system.
  c: Use the specified lubrication oil from a sealed container only. Containers must be re-sealed immediately after dispensing the lubrication oil. Lubrication oil in containers which are not properly sealed will become moisture saturated, and such lubrication oil is no longer suitable for use and should be properly disposed of.
  d: Avoid breathing A/C refrigerant and lubricant vapor or mist. Exposure may irritate eyes, nose and throat. Use only approved recovery/recycling equipment to discharge HFC-134a (R-134a) system. If accidental system discharge occurs, ventilate work area before resuming service. Additional health and safety information may be obtained from refrigerant and lubricant manufacturers.
  e: Do not allow lubrication oil (Nissan A/C System Oil Type S) to come in contact with styrofoam parts. Damage may result.

General Refrigerant Precautions

WARNING:

- Do not release refrigerant into the air. Use approved recovery/recycling equipment to capture the refrigerant every time an air conditioning system is discharged.
- Always wear eye and hand protection (goggles and gloves) when working with any refrigerant or air conditioning system.
- Do not store or heat refrigerant containers above 52°C (125°F).
- Do not heat a refrigerant container with an open flame; if container warming is required, place the bottom of the container in a warm pail of water.
- Do not drop, puncture, or incinerate refrigerant containers.
- Keep refrigerant away from open flames: poisonous gas will be produced if refrigerant burns.
- Refrigerant will displace oxygen, therefore be certain to work in well ventilated areas to prevent suffocation.
- Do not introduce compressed air to any refrigerant container or refrigerant component.

Precautions for Refrigerant Connection

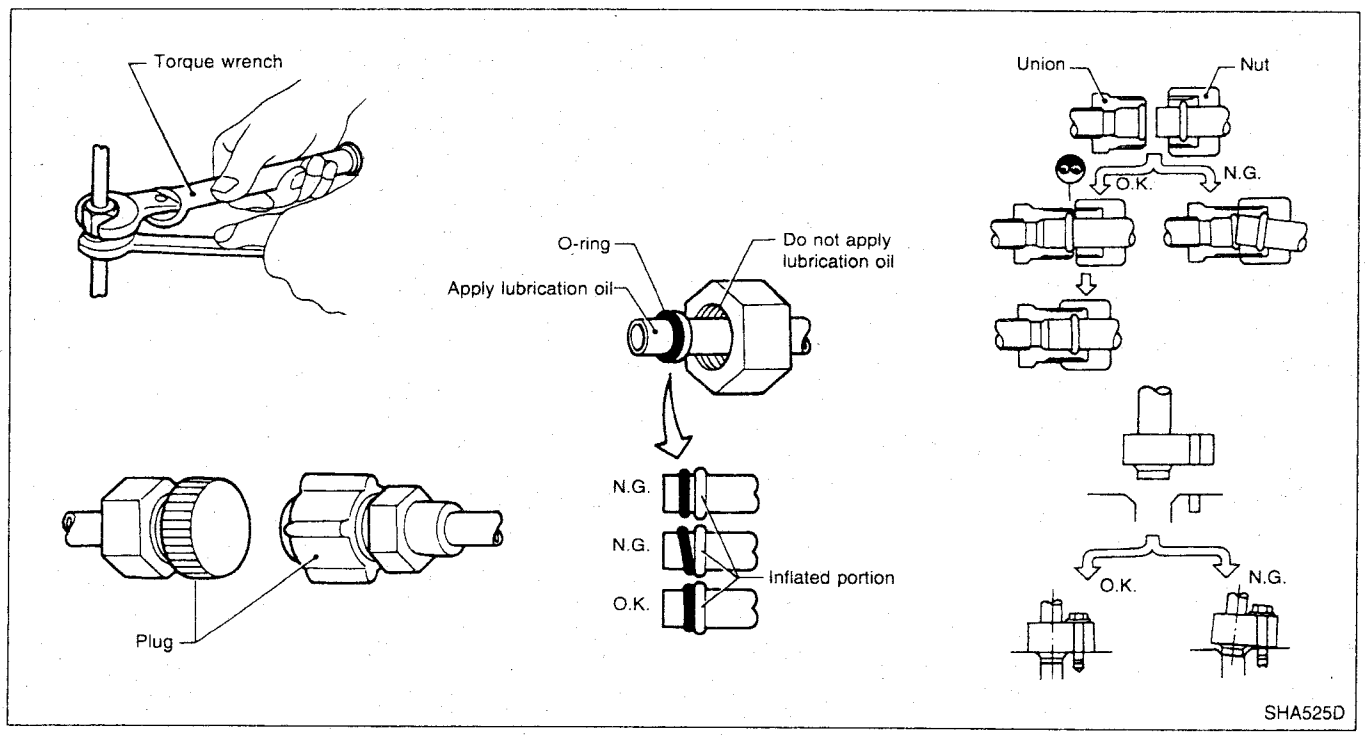
WARNING:

Make sure all refrigerant is discharged into the recycling equipment and the pressure in the system is less than atmospheric. Then gradually loosen the discharge side hose fitting and remove it.

CAUTION:

When replacing or cleaning refrigerant cycle components, observe the following.

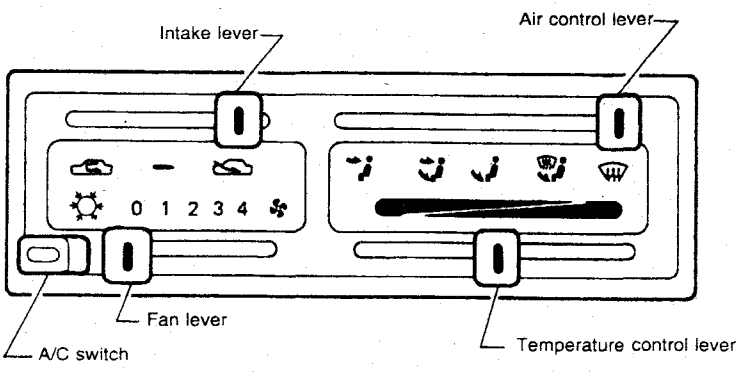
- **Do not leave compressor on its side or upside down for more than 10 minutes, as compressor oil will enter low pressure chamber.**
- **When connecting tubes, always use a torque wrench and a back-up wrench.**
- **After disconnecting tubes, plug all openings immediately to prevent entrance of dirt and moisture.**
- **When installing an air conditioner in the vehicle, the pipes must be connected as the final stage of the operation. The seal caps of the pipes and other components must not be removed until their removal is required for connection.**
- **To prevent the condensation of moisture inside A/C components, components stored in cool areas should be allowed to warm to the working area temperature before removing the seal caps.**
- **Thoroughly remove moisture from the refrigeration system before charging the refrigerant.**
- **Always replace used O-rings.**
- **When connecting tube, apply lubrication oil to portions shown in illustration. Be careful not to apply oil to threaded portion.**
  Lubrication oil name: NISSAN A/C System Oil Type R
  Part number: KLH00-PAGR0
- **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 of seal seat to the specified torque.**



Precautions for Servicing Compressor

- Attach a blind plug to the suction port (low pressure) and discharge port (high pressure) of the compressor to prevent oil from leaking out and dust from getting inside.
- When the compressor is removed, store it under the same condition as it is when mounted on the car.
- When replacing or repairing compressor, be sure to remove oil from the compressor and check the oil quantity extracted.
- When replacing with a new compressor, be sure to remove oil from the new compressor so that the quantity of oil remaining in the new compressor is equal to the quantity collected from the removed compressor. See the section "LUBRICATION OIL".
- Pay attention so as not to allow dirt and oil to attach on the friction surfaces between clutch and pulley. If the surface is contaminated, with oil, wipe it off by using a clean waste cloth moistened with thinner.
- After completing the compressor service operation, be sure to rotate the compressor shaft more than five turns in both directions by hand to equalize oil distribution inside the compressor, then run the compressor for about one hour by idling the engine.
- When the compressor magnet clutch has been replaced, be sure to check the magnet clutch for normal operation by applying voltage to the clutch.

Control Operation



RHA975D

FAN LEVER
This LEVER turns the fan ON and OFF, and controls fan speed.

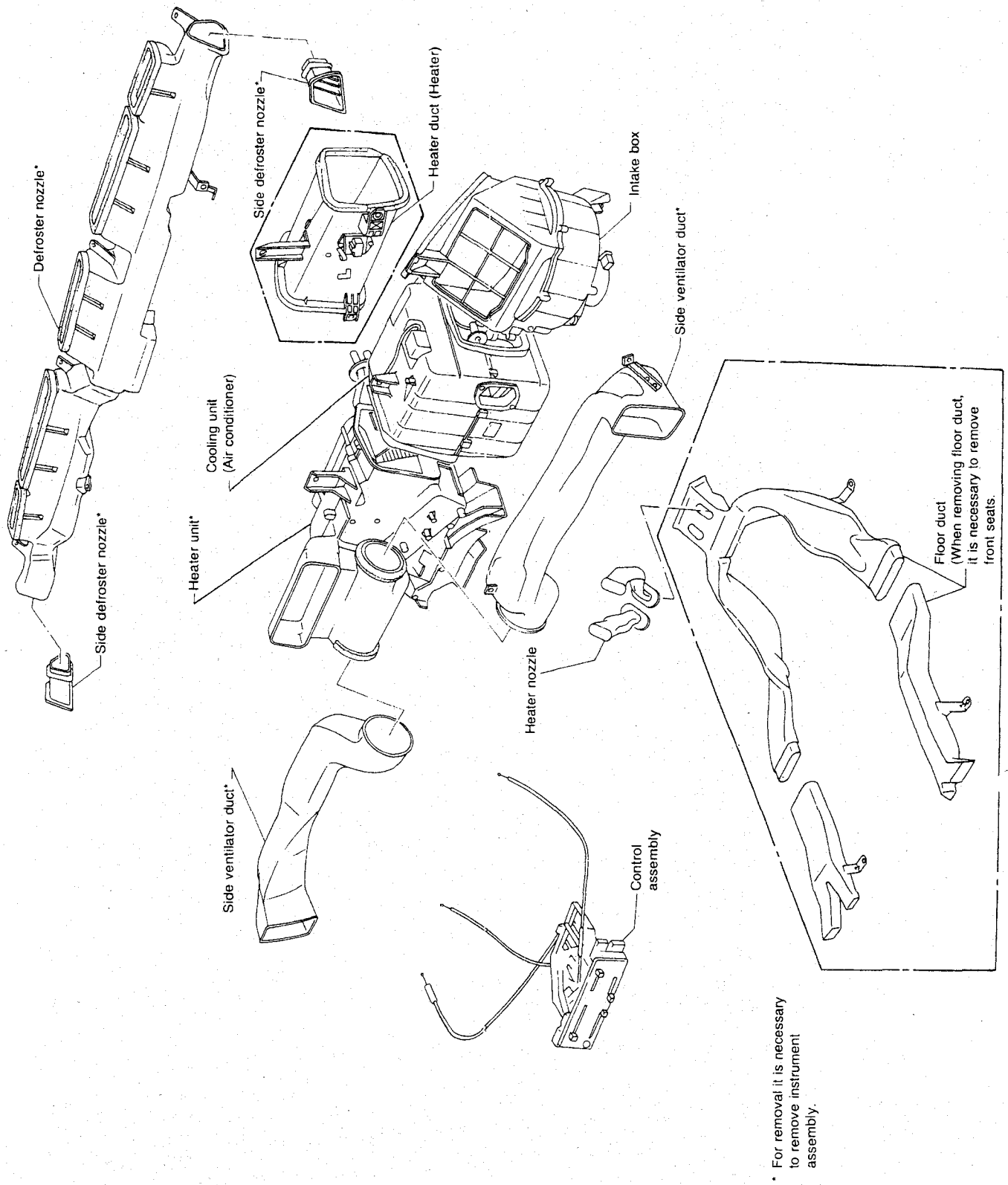
AIR CONTROL LEVER
This lever allows outlet air to flow.

TEMPERATURE CONTROL LEVER
This lever allows the temperature of the outlet air to be adjusted.

INTAKE LEVER
Slide to :
Outside air is drawn into the passenger compartment.
Slide to :
Interior air is recirculated inside the vehicle.

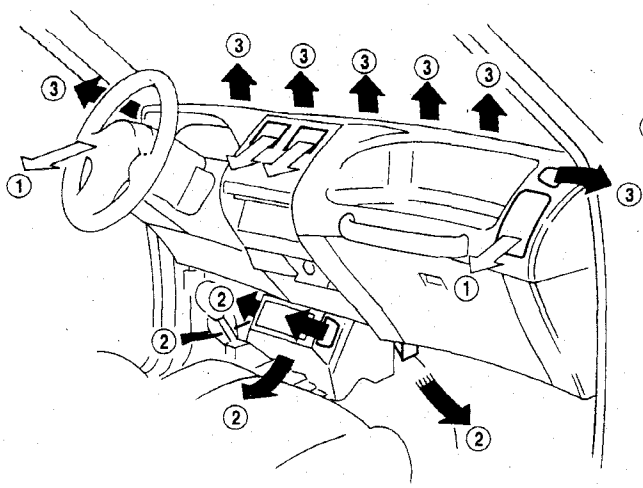
AIR CONDITIONER SWITCH
Start the engine, slide the fan switch to the desired (1 to 4) position and press the air conditioner switch to turn ON the air conditioner. The indicator light will come on when the air conditioner is ON. To stop the air conditioner, push the switch again to return it to the original position.
The air conditioner cooling function operates only when the engine is running.

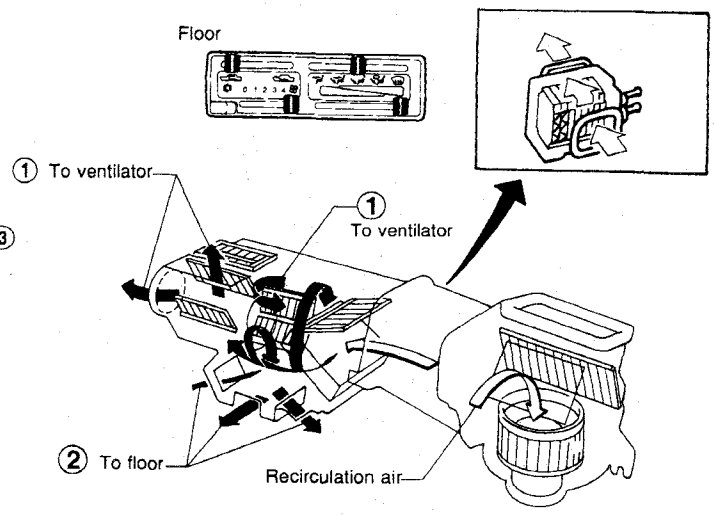
Component Layout

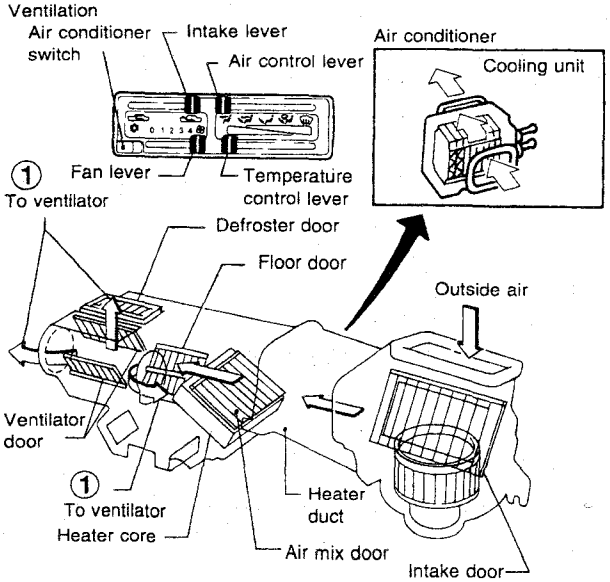


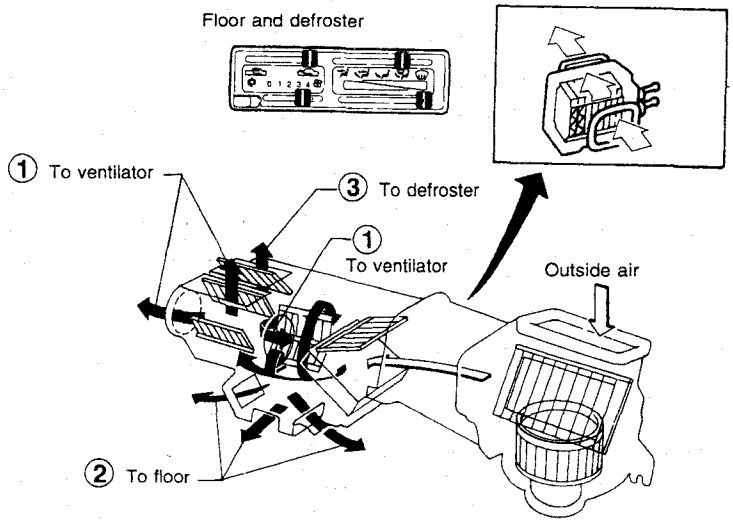
RHA976D

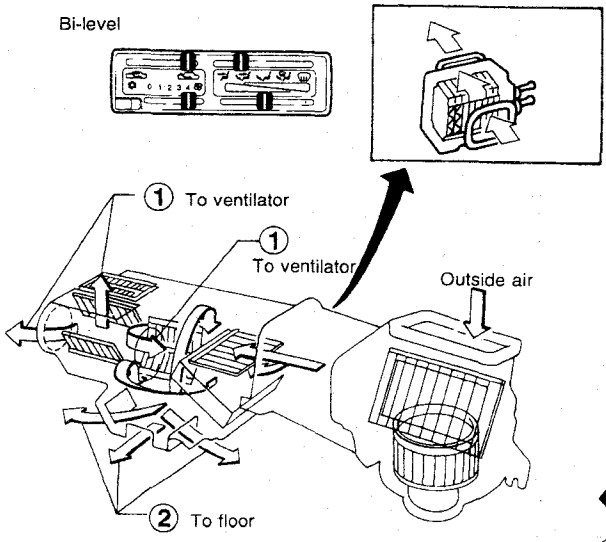
Air Flow

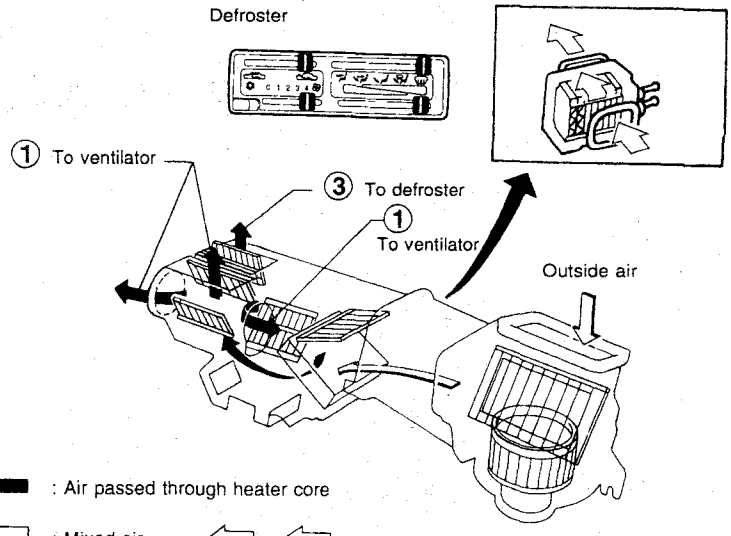












: Air passed through heater core

: Mixed air

: Air not passed through heater core

RHA977D

Refrigeration Cycle

REFRIGERANT FLOW

The refrigerant flows in the standard pattern, that is, through the compressor, the condenser, the liquid tank, through the evaporator, and back to the compressor.
The refrigerant evaporation through the evaporator coil is controlled by an externally equalized expansion valve, located inside the evaporator case.

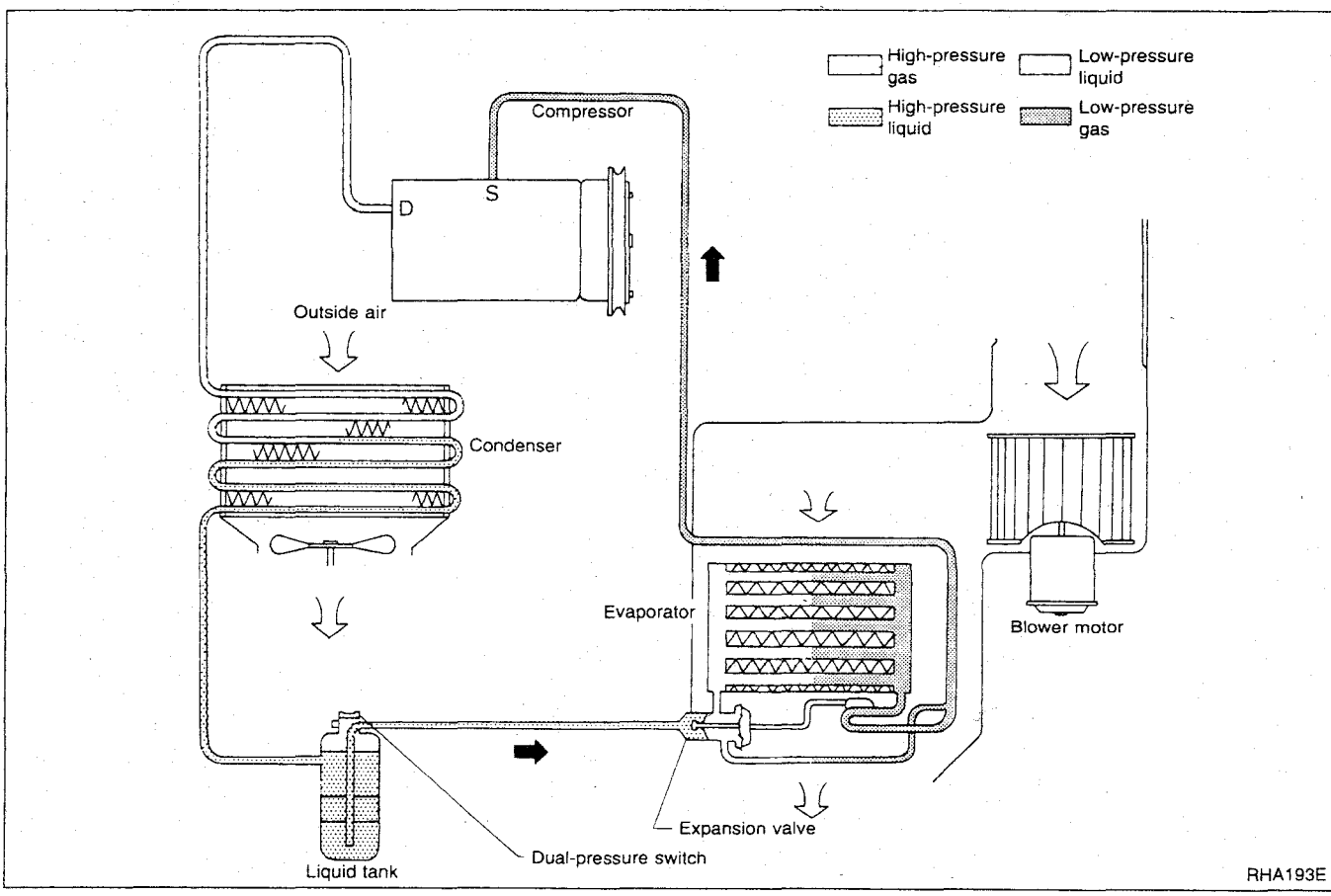
FREEZE PROTECTION

The compressor cycles on and off to maintain the evaporator temperature within a specified range. When the evaporator coil temperature falls below a specified point, the thermo control amplifier interrupts the compressor operation. When the evaporator coil temperature rises above the specification, the thermo control amplifier allows compressor operation.

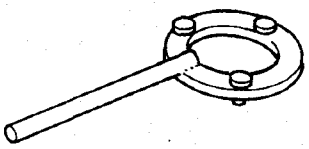
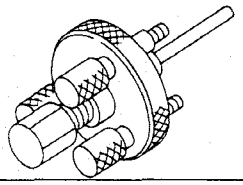
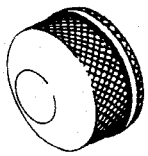
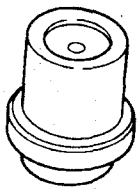
REFRIGERANT SYSTEM PROTECTION

Dual-pressure switch

The refrigerant system is protected against excessively high or low pressures by the dual-pressure switch, located on the liquid tank. If the system pressure rises above, or falls below the specifications, the dual-pressure switch opens to interrupt the compressor operation.

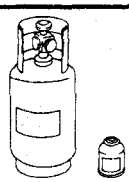
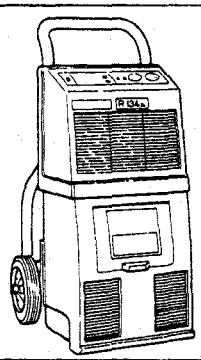
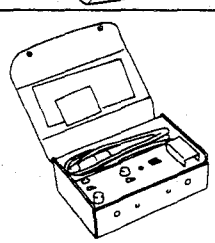


Special Service Tools

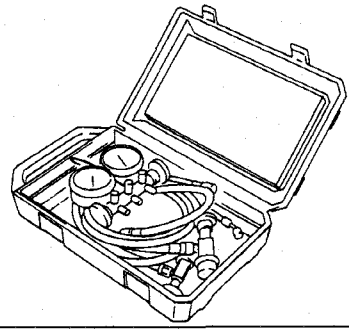
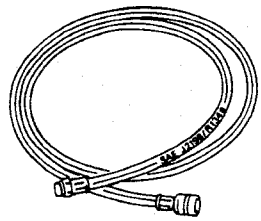
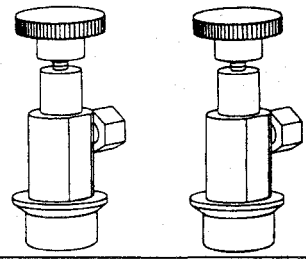
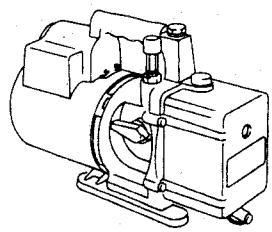
Tool number Tool name	Description	
KV99231260 Clutch disc wrench		Removing shaft nut and clutch disc
KV99232340 Clutch disc puller		Removing clutch disc
KV99234330 Pulley installer		Installing pulley
KV99233130 Pulley puller		Removing pulley

HFC-134a (R-134a) Service Tools and Equipment

It is important to understand that HFC-134a (R-134a) refrigerant, and the specified lubricant which must be used with HFC-134a (R-134a), must never be mixed with CFC-12 (R-12) refrigerant and/or the CFC-12 (R-12) lubricant.
This means that separate and non-interchangeable service equipment must be used for handling each type of refrigerant/lubricant.
To prevent the mixing of refrigerants/lubricants, refrigerant container fittings, service hose fittings, and service equipment fittings (equipment which handles refrigerant and/or lubricant) are different between CFC-12 (R-12) and HFC-134a (R-134a).
Adaptors to convert from one size of fitting to another must never be used: refrigerant/lubricant contamination will occur and compressor failure will result.

Tool number (Kent-Moore No.) Tool name	Description	Note
HFC-134a (R-134a) refrigerant		Container color: Light blue Container marking: HFC-134a (R-134a) Fitting size: Thread size • large container 1/2"-16 ACME
KLH00-PAGR0 (—) Nissan A/C System Oil Type R		Type: Poly alkyline glycol oil (PAG), type R Application: HFC-134a (R-134a) vane rotary compressors (Nissan only) Lubricity: 40 mℓ (1.4 Imp fl oz)
(J-39500-NI) (115V) (J-39635)(220V) Recovery/Recycling/ Recharging equipment (ACR4)		Function: Refrigerant Recovery and Recycling and Recharging
(J-39400) Electrical leak detector		Power supply: • DC 12 V (Cigarette lighter)

HFC-134a (R-134a) Service Tools and Equipment (Cont'd)

Tool number (Kent-Moore No.) Tool name	Description	Note
(J-39183) Manifold gauge set (with hoses and couplers)		Identification: • The gauge face indicates R-134a. Fitting size: Thread size • 1/2"-16 ACME
Service hoses • High side hose (J-39501-72) • Low side hose (J-39502-72) • Utility hose (J-39476-72)		Hose color: • Low hose: Blue with black stripe • High hose: Red with black stripe • Utility hose: Yellow with black stripe or green with black stripe Hose fitting to gauge: • 1/2"-16 ACME
Service couplers • High side coupler (J-39500-20) • Low side coupler (J-39500-24)		Hose fitting to service hose: • M14 x 1.5 fitting (optional) or permanently attached
(J-39650) (115V) (J-39656)(220V) Refrigerant weight scale		For measuring of refrigerant Fitting size: Thread size • 1/2"-16 ACME
(J-39649) (115V) (J-39655)(220V) Vacuum pump (Including the isolator valve)		Capacity: • Air displacement: 4 CFM • Micron rating: 20 microns • Oil capacity: 482 g (17 oz) Fitting size: Thread size • 1/2"-16 ACME

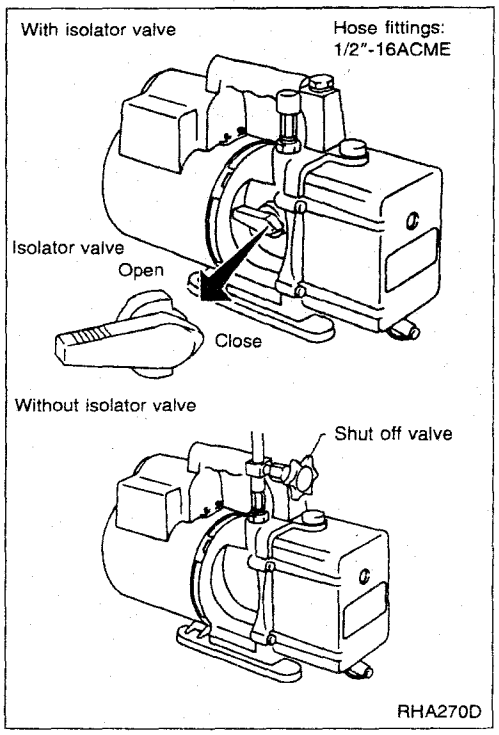
Precautions for Service Equipment

RECOVERY/RECYCLING/RECHARGING EQUIPMENT

Be certain to follow the manufacturers instructions for machine operation and machine maintenance. Never introduce any refrigerant other than that specified into the machine.

ELECTRONIC LEAK DETECTOR

Be certain to follow the manufactures instructions for tester operation and tester maintenance.



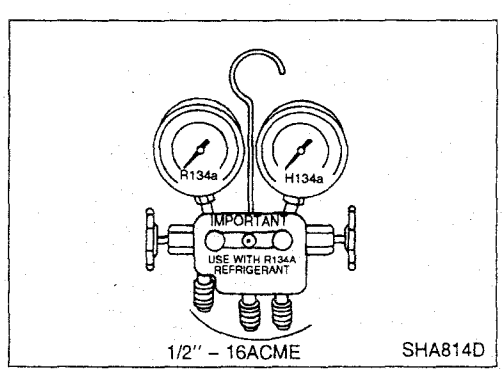
VACUUM PUMP

The lubricant contained inside the vacuum pump is not compatible with the specified lubricant for HFC-134a (R-134a) A/C systems. Since the vent side of the vacuum pump is exposed to atmospheric pressure, it is possible for the vacuum pump lubricant to migrate out of the pump into the service hose if the pump is switched off after evacuation (vacuuming) and the service hose is not isolated from the vacuum pump.

To prevent the migration of vacuum pump lubricant into service hoses, it is necessary to use a valve (which can be manually opened or closed) near the connection of the service hose to the pump.

- On a vacuum pump which is equipped with an isolator valve (usually part of the vacuum pump), closing this valve will isolate the service hose from the pump.
- For pumps without an isolator valve, be certain that the service hose is equipped with a manual shut off valve near the pump end of the hose.
- Hoses which contain an automatic shut off valve at the end of the service hose must be disconnected from the vacuum pump to prevent the migration of lubricant: as long as the hose is connected, the valve is open and lubricant may migrate.

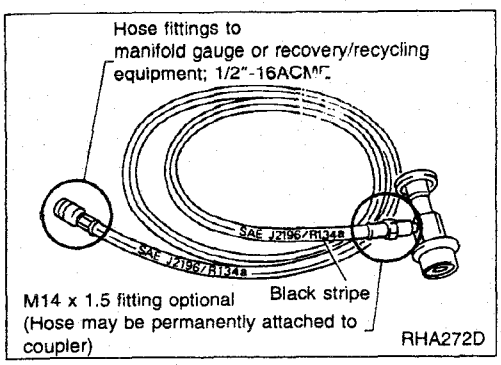
One-way valves which open when vacuum is applied and close under a no vacuum condition are not recommended, because this valve may restrict the pump's ability to pull a deep vacuum.



MANIFOLD GAUGE SET

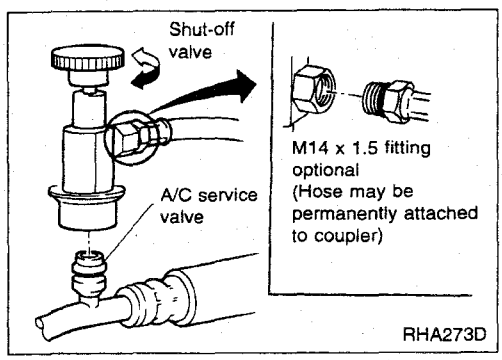
Be certain that the gauge face indicates R-134a or 134a. Be certain that the manifold gauge set has the 1/2"-16 ACME threaded connections for service hoses, and that no refrigerants other than HFC-134a (R-134a) (along with only specified lubricants) have been used with the manifold gauge set.

Precautions for Service Equipment (Cont'd)



SERVICE HOSES

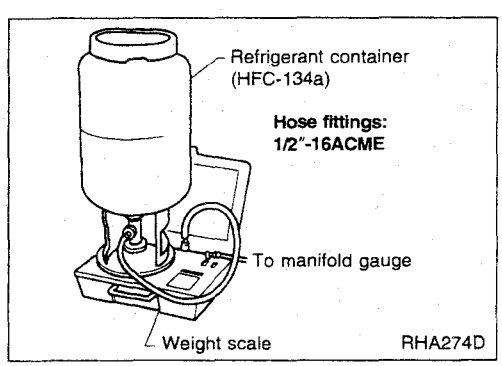
Be certain that the service hoses display the markings described (colored hose with black stripe). Be certain that all hoses include positive shut off devices (either manual or automatic) near the end of the hoses opposite the manifold gauge.



SERVICE COUPLERS

Never attempt to connect HFC-134a (R-134a) service couplers to an CFC-12 (R-12) A/C system. Although the HFC-134a (R-134a) couplers will not secure on to the CFC-12 (R-12) system, CFC-12 (R-12) refrigerant and lubricant will be discharged into the HFC-134a (R-134a) coupler, causing contamination.

Shut off valve rotation	A/C service valve
Clockwise	Open
Counterclockwise	Close



REFRIGERANT WEIGHT SCALE

If the scale allows electronic control of the flow of refrigerant through the scale, be certain that the hose fitting size is 1/2"-16 ACME, and that no refrigerant other than HFC-134a (R-134a) (along with only specified lubricant) has been used with the scale.

CHARGING CYLINDER

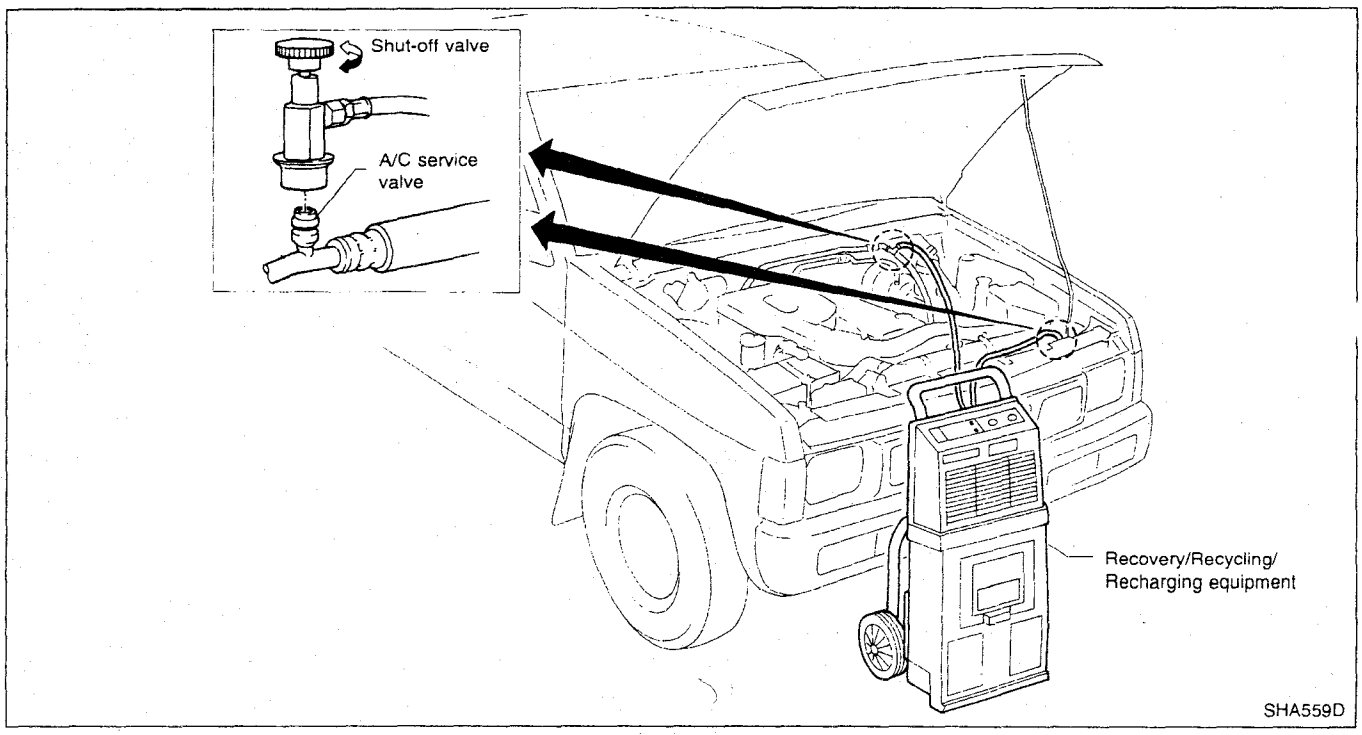
The charging cylinder is not recommended because refrigerant may be vented into the air from the top valve of the cylinder when filling the cylinder with refrigerant. Additionally, the accuracy of the cylinder is generally less than that of an electronic scale or of quality recycle/recharge equipment.

HFC-134a (R-134a) Service Procedure

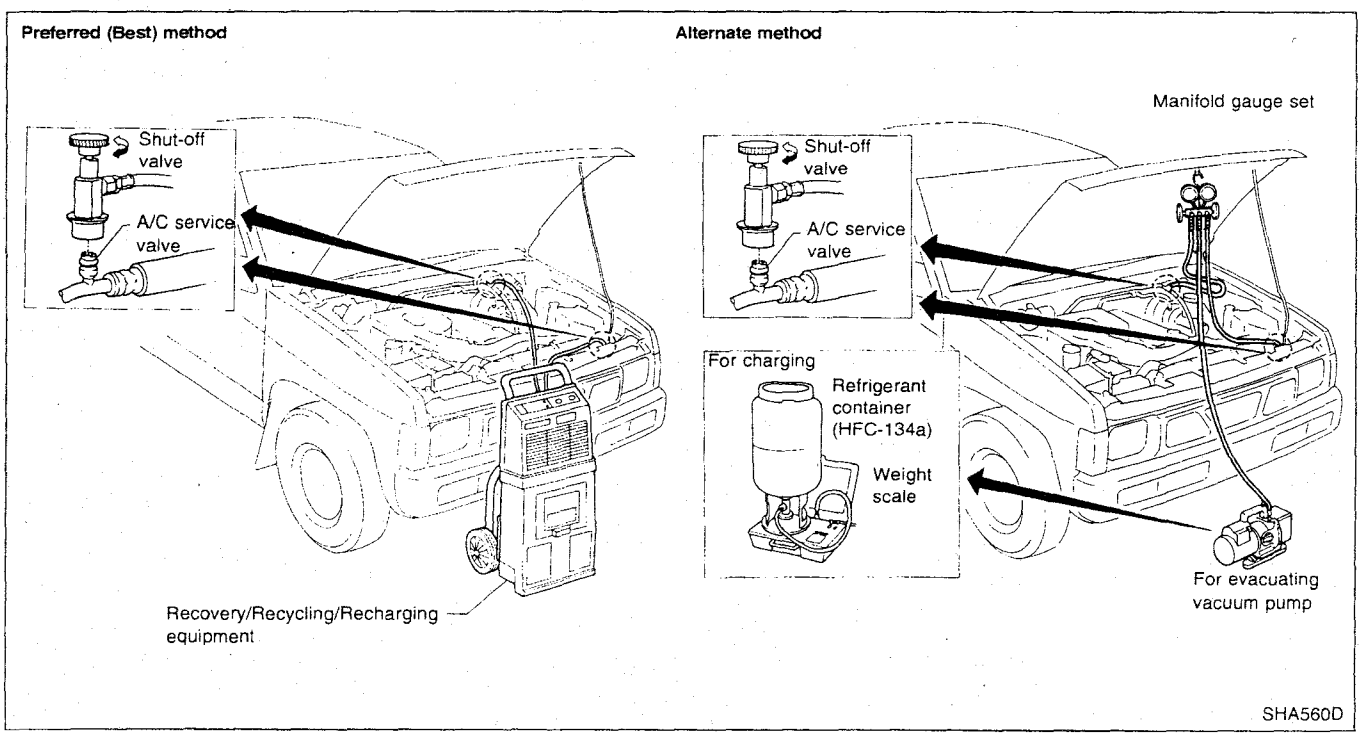
DISCHARGING REFRIGERANT

WARNING:

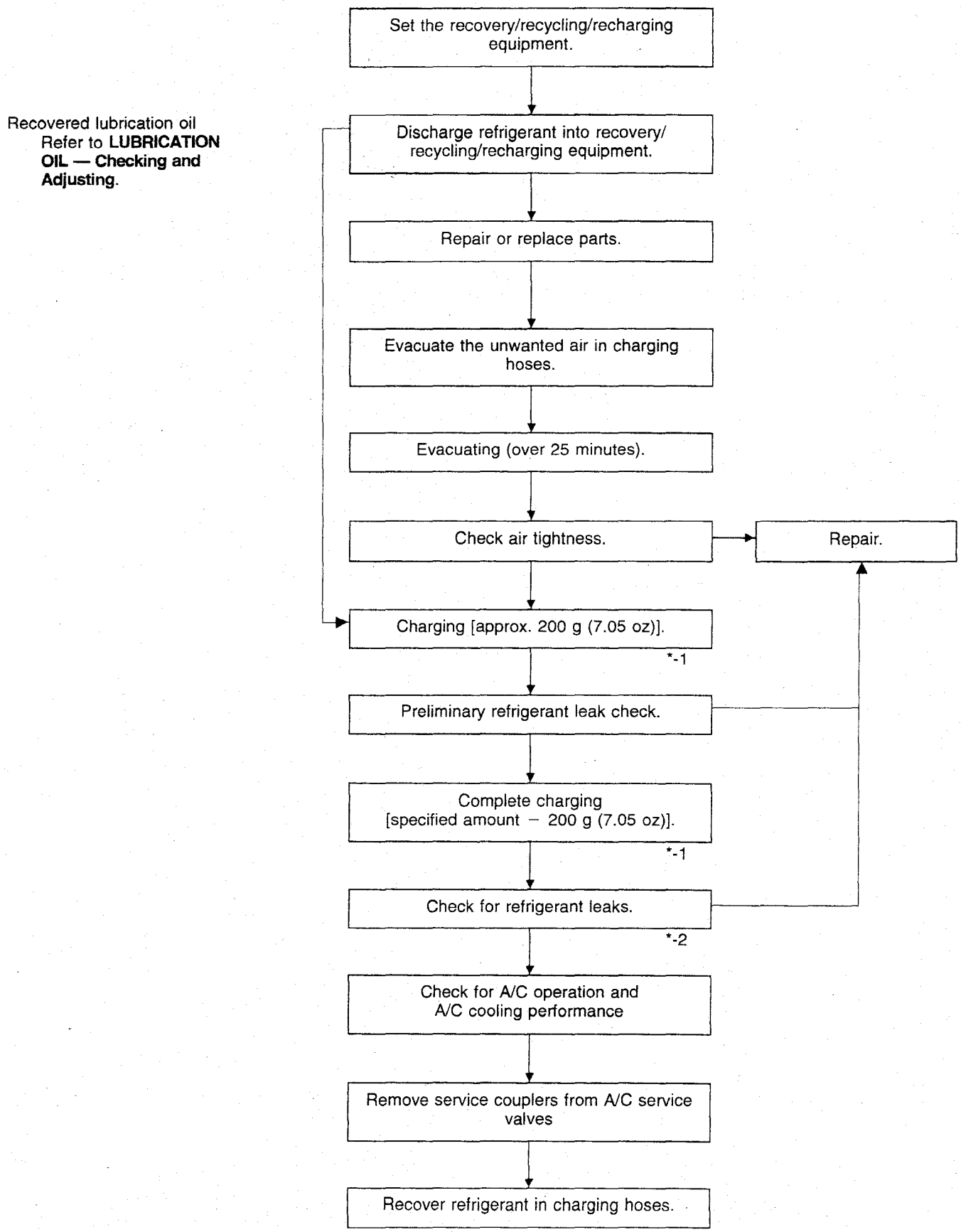
Avoid breathing A/C refrigerant and lubricant vapor or mist. Exposure may irritate eyes, nose and throat. To remove R-134a from the A/C system, use service equipment certified to meet the requirements of R-134a recycling equipment or R-134a recovery equipment. If accidental system discharge occurs, ventilate work area before resuming service. Additional health and safety information may be obtained from refrigerant and lubricant manufacturers.



EVACUATING SYSTEM AND CHARGING REFRIGERANT



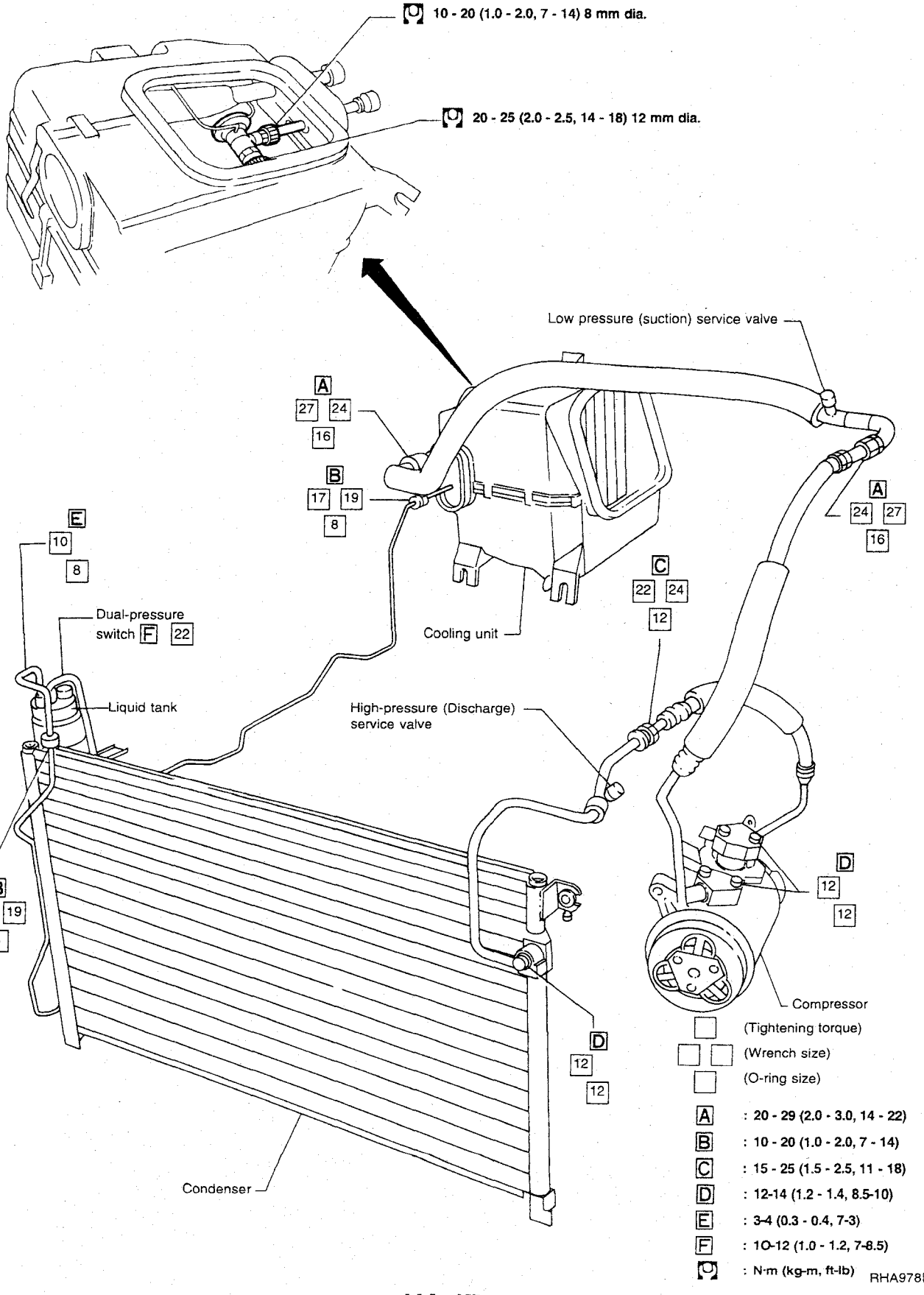
HFC-134a (R-134a) Service Procedure (Cont'd)



Note: *-1 Before charging refrigerant, ensure engine is off.
*-2 Before checking for leaks, start engine to activate air conditioning system then turn it off. Service valve caps must be attached to valves (to prevent leak).

Refrigerant Lines

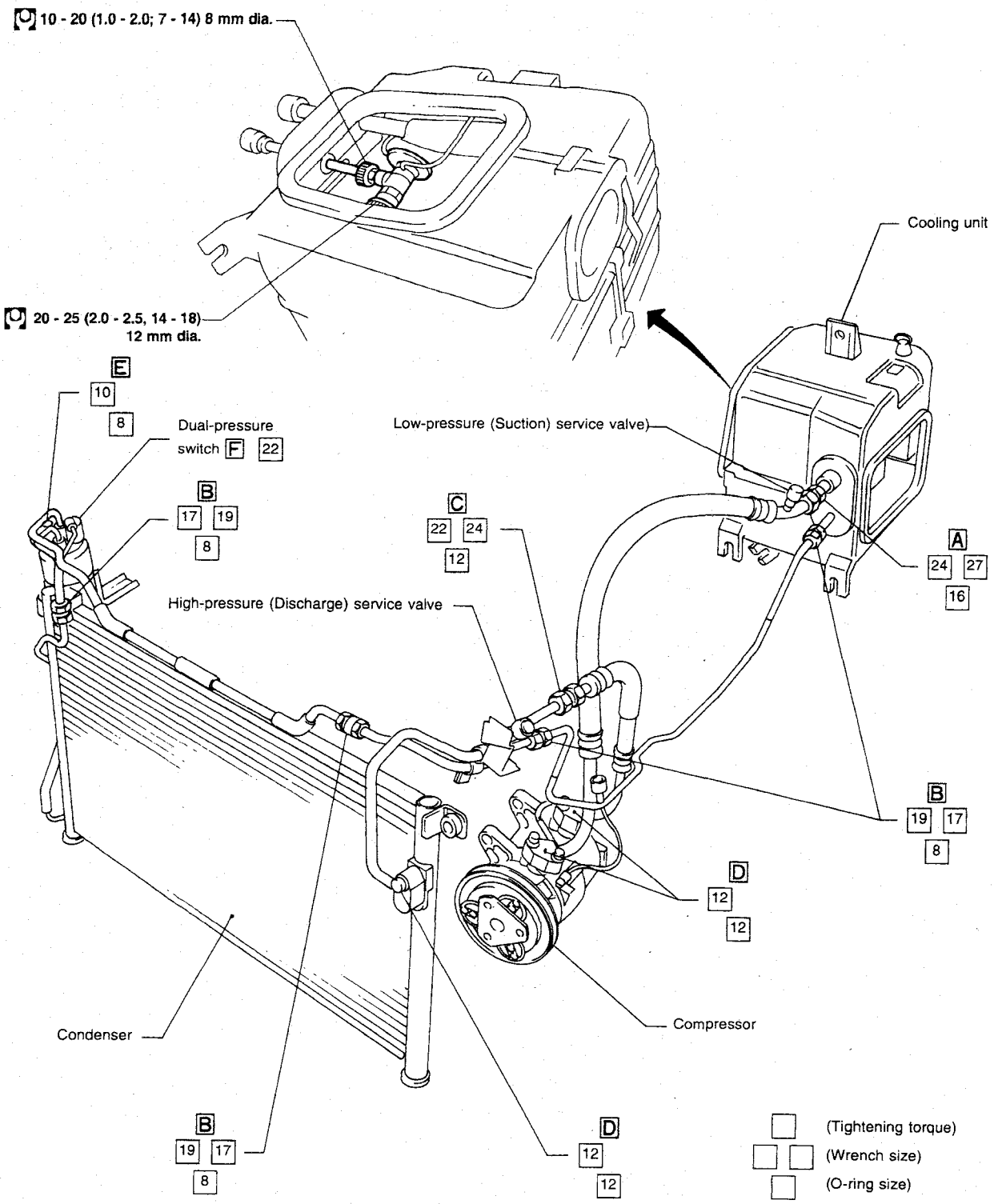
L.H. DRIVE MODEL



RHA978D

Refrigerant Lines (Cont'd)

R.H. DRIVE MODEL



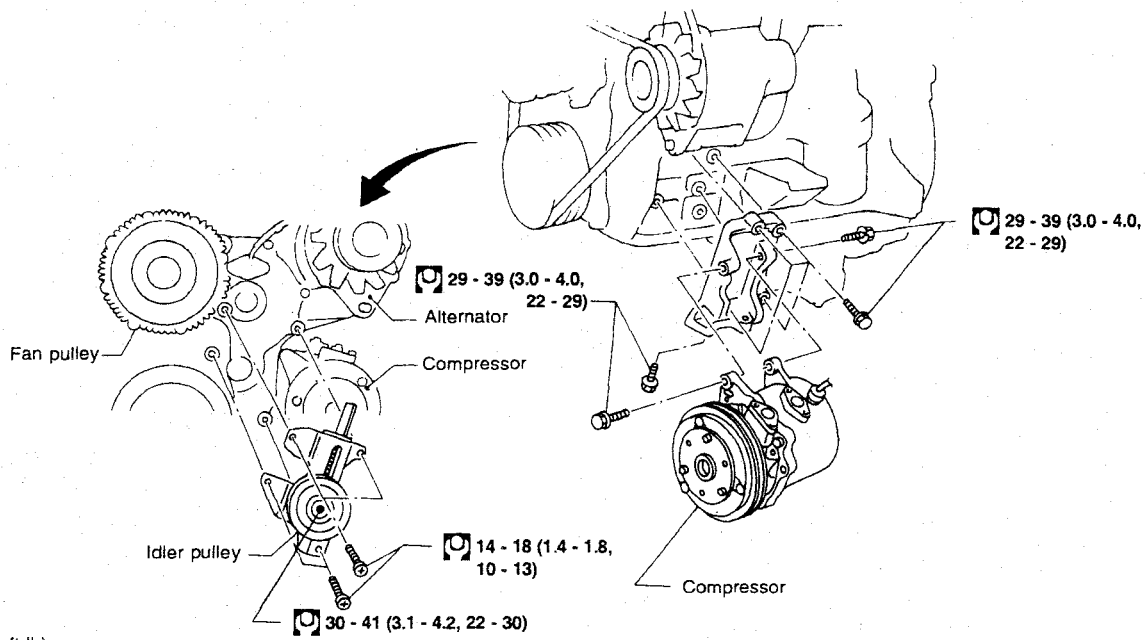
(Tightening torque)
(Wrench size)
(O-ring size)

A : 20 - 29 (2.0 - 3.0, 14 - 22)
B : 10 - 20 (1.0 - 2.0, 7 - 14)
C : 15 - 25 (1.5 - 2.5, 11 - 18)
D : 12 - 14 (1.2 - 1.4, 8.5 - 10)
E : 3 - 4 (0.3 - 0.4, 2 - 3)
F : 10 - 12 (1.0 - 1.2, 7 - 8.5)
: N·m (kg-m, ft-lb)

RHA979D

Compressor Mounting

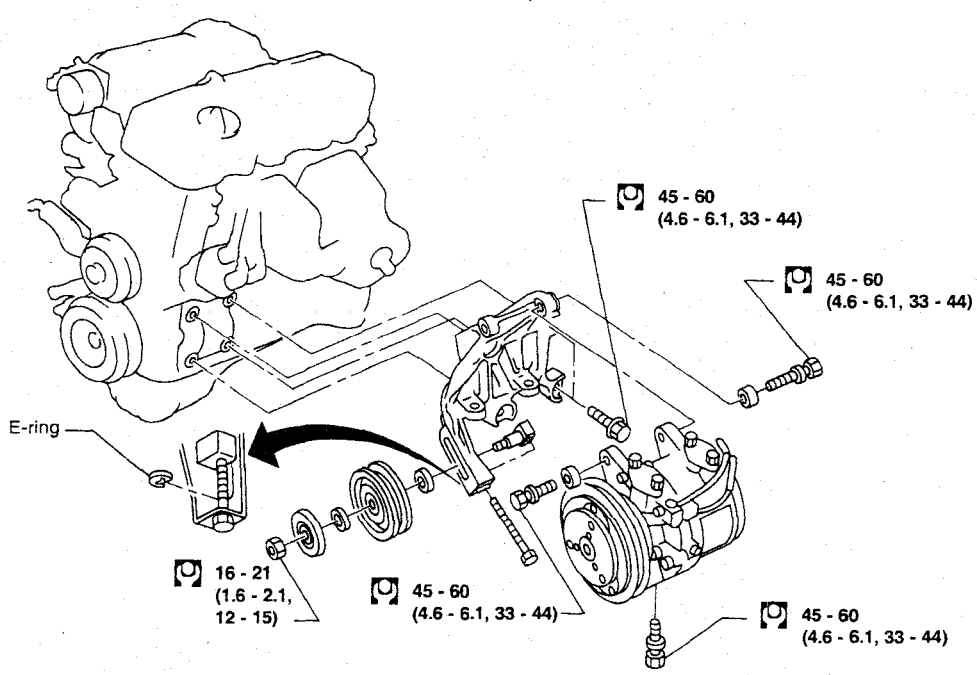
TD engine model



: N·m (kg-m, ft-lb)

RHA980D

KA engine model



: N·m (kg-m, ft-lb)

RHA981D

Belt Tension

- Refer to MA section.

Fast Idle Control Device (F.I.C.D.)

- Refer to EF & EC section.

Lubrication Oil

Name: Nissan A/C System Oil Type R
Part number: KLH00-PAGR0

Maintenance of Oil Quantity in Compressor

The oil used to lubricate the compressor circulates through the system with the refrigerant. Whenever any component of the system is replaced or a large amount of gas leakage occurs, add oil to the compressor to maintain the specified amount.
If oil quantity is not maintained properly, the following malfunctions may result:

- Lack of oil: May lead to a seized compressor
- Excessive oil: Inadequate cooling (thermal exchange impeded)

Checking and Adjusting

Adjust the oil quantity according to the flowchart shown below.

START

Can oil return operation be performed?
- A/C system works properly.
- There is no evidence of a large amount of oil leakage.

Yes → Perform oil return operation, proceeding as follows:

1. Start engine, and set the following conditions:
   - **Test condition**
     Engine speed: Idling to 1,200 rpm
     A/C or AUTO switch: ON
     Blower speed: Max. position
     Temp. control: Optional [Set so that intake air temperature is 25 to 30°C (77 to 86°F).]
2. Perform oil return operating for about 10 minutes.
3. Stop engine

CAUTION:
If excessive oil leakage is noted, do not perform the oil return operation.

No

Should the compressor be replaced?

No

Yes → Ⓐ (Go to next page.)

Is there any part to be replaced? (Evaporator, condenser, liquid tank or in case there is evidence of a large amount of oil leakage.)

Yes → After replacing any of the following major components of the system, be sure to add the correct amount of oil to the system.

Amount of oil to be added

Part replaced	Oil to be added to system	Remarks
	Amount of oil mℓ (Imp fl oz)	
Evaporator	75 (2.6)	—
Condenser	75 (2.6)	—
Liquid tank	5 (0.2)	Add if compressor is not replaced. *1
In case of refrigerant leak	30 (1.1)	Large leak
	—	Small leak *2

*1: If compressor is replaced, addition of oil is included in the flow chart.
*2: If refrigerant leak is small, no addition of oil is needed. "Ratio" in this table indicates the ratio of added oil to the overall amount of oil needed in the system.

No

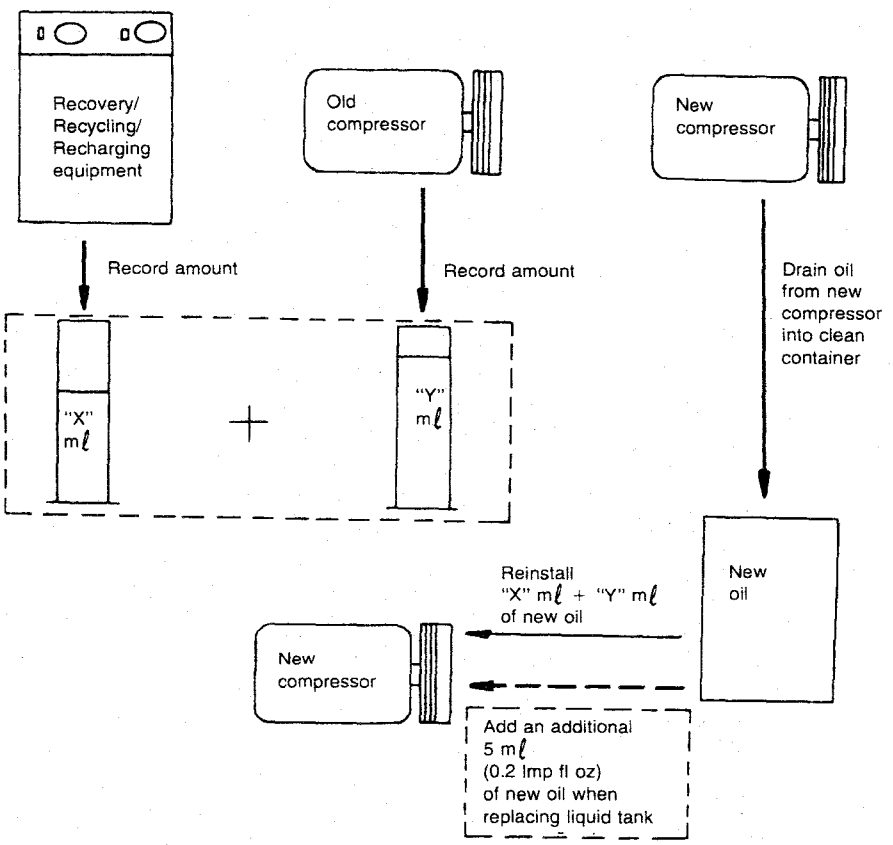
Carry out the A/C performance test.

Checking and Adjusting (Cont'd)

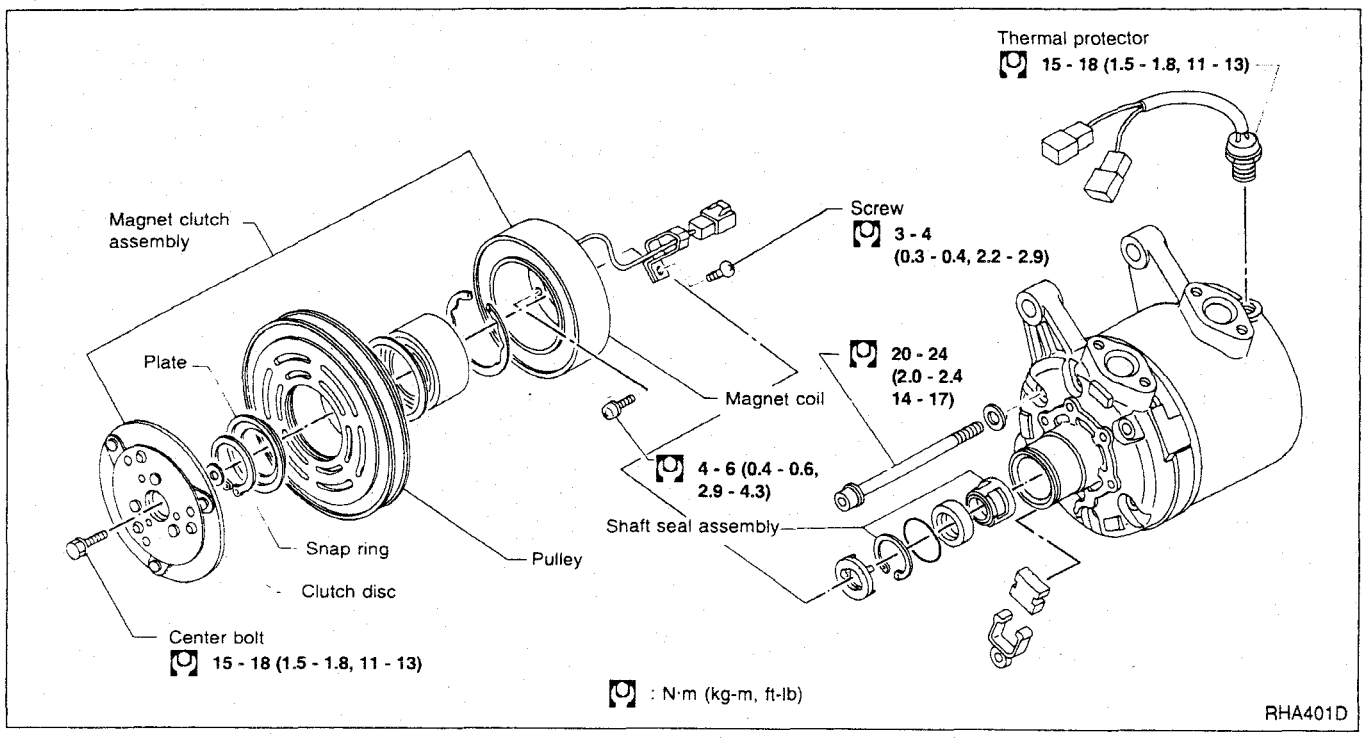
Ⓐ

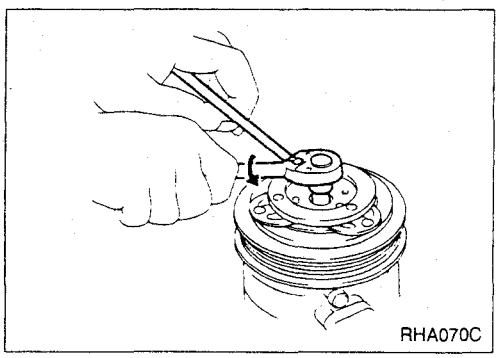
1. Discharge refrigerant into the refrigerant recovery/recycling equipment. Measure oil discharged into the recovery/ recycling equipment.
2. Drain the oil from the "old" (removed) compressor into a graduated container, and record the amount of oil drained.
3. Drain the oil from the "new" compressor into a separate, clean container.
4. Measure an amount of the new oil equivalent to that drained from the "old" compressor, and add this oil to the "new" compressor through the drain plug or suction port opening.
5. Measure an amount of the "new" oil equivalent to that recovered during discharging, and add this oil to the "new" compressor through the drain plug or suction port opening.
6. If the liquid tank also needs to be replaced, add an additional 5 mℓ (0.2 US fl oz, 0.2 Imp fl oz) of oil at this time.
   Do not add this 5 mℓ (0.2 Imp fl oz, 0.2 Imp fl oz) of oil if only replacing the compressor.

Oil adjusting procedure for compressor replacement



SHA563D

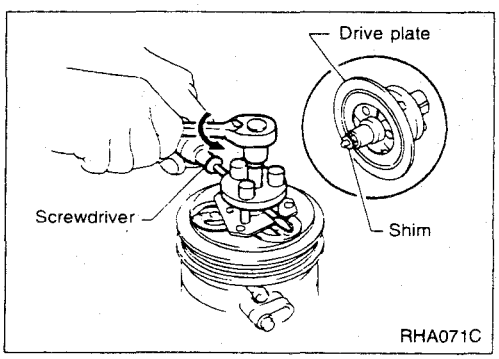




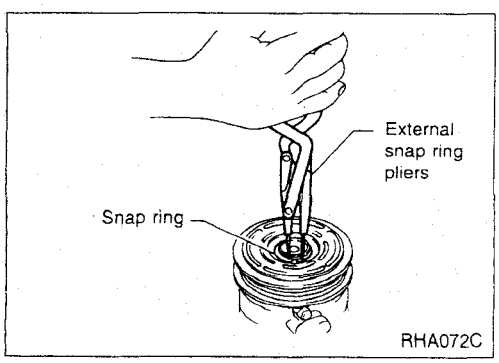
Compressor Clutch

REMOVAL

- When removing center bolt, hold clutch disc with clutch disc wrench.

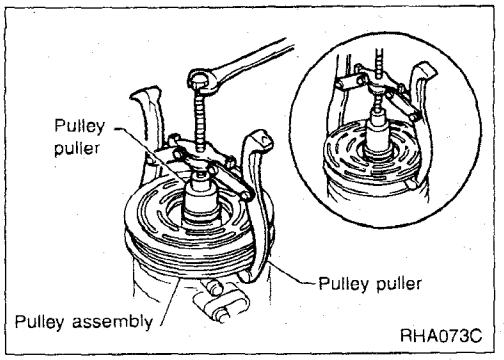


- Remove the drive plate using the drive plate puller.
  Insert the holder's three pins into the holes in the drive plate, and rotate the holder clockwise to hook it onto the plate. Then, tighten the center bolt to remove the drive plate.
  When tightening the center bolt, insert a round bar (screwdriver, etc.) between two of the pins (as shown in the left-hand figure) to prevent drive plate rotation. After removing the drive plate, remove the shims from either the drive shaft or the drive plate.

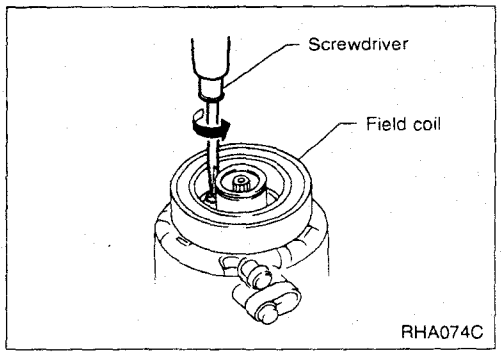


- Remove the snap ring using external snap ring pliers.

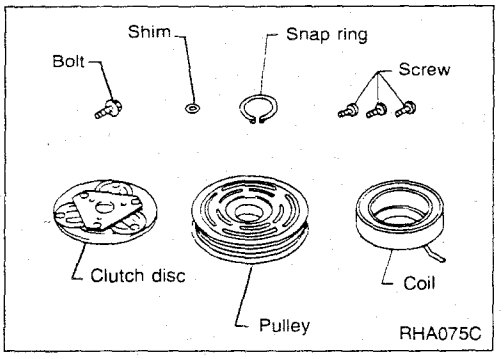
Compressor Clutch (Cont'd)



- Pulley removal
  Position the center pulley puller on the end of the drive shaft, and remove the pulley assembly using any commercially available pulley puller.
  For pressed pulleys:
  To prevent deformation of the pulley groove, the puller claws should be hooked into (not under) the pulley groove.
  For machine latched pulleys:
  Align the pulley puller groove with the pulley groove, and then remove the pulley assembly.



- Remove the field coil harness clip using a screwdriver.
- Remove the three field coil fixing screws and remove the field coil.

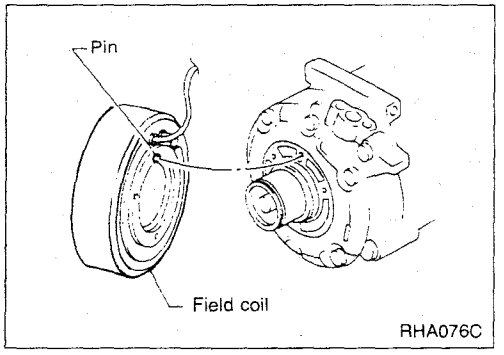


INSPECTION

Clutch disc : If the contact surface shows signs of damage due to excessive heat, the clutch disc and pulley should be replaced.

Pulley : Check the appearance of the pulley assembly. If the contact surface of the pulley shows signs of excessive grooving due to slippage, both the pulley and clutch disc should be replaced. The contact surfaces of the pulley assembly should be cleaned with a suitable solvent before reinstallation.

Coil : Check coil for loose connection or cracked insulation.

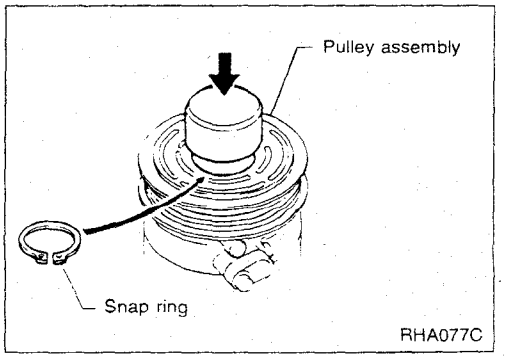


INSTALLATION

- Install the field coil.

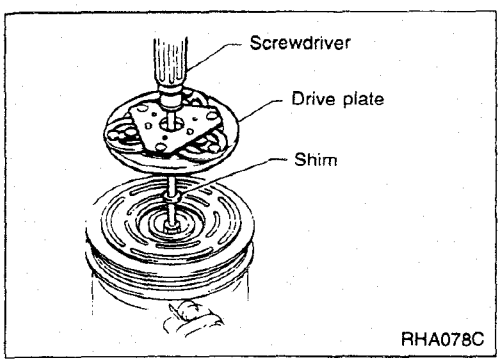
Be sure to align the coil's pin with the hole in the compressor's front head.

- Install the field coil harness clip using a screwdriver.

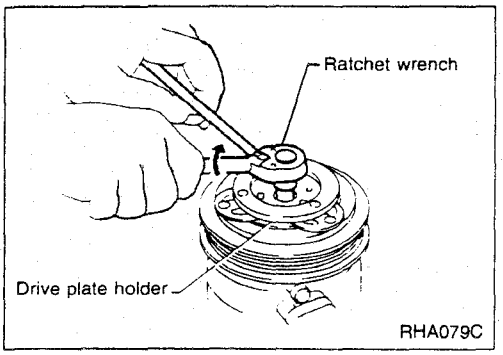


- Install the pulley assembly using the installer and a hand press, and then install the snap ring using snap ring pliers.

Compressor Clutch (Cont'd)

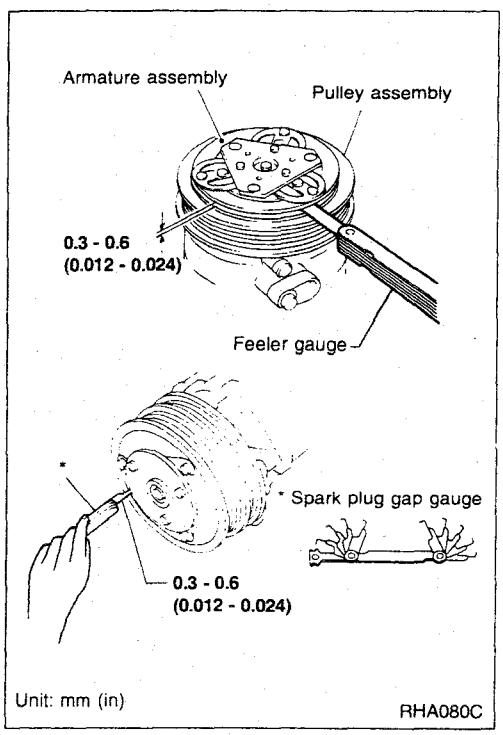


- Install the drive plate on the drive shaft, together with the original shim(s). Press the drive plate down by hand.



- Using the holder to prevent drive plate rotation, tighten the bolt to 12 to 15 N·m (1.2 to 1.5 kg-m, 9 to 11 ft-lb) torque.

After tightening the bolt, check that the pulley rotates smoothly.



- Check clearance around the entire periphery of clutch disc.

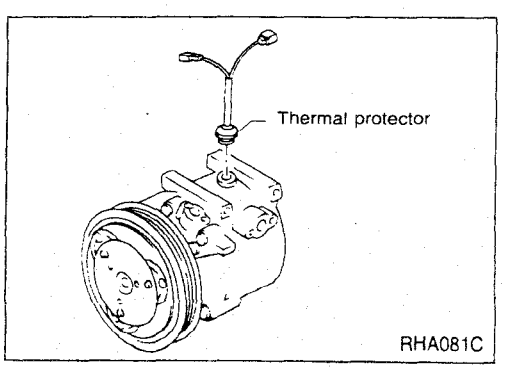
  Disc-to-pulley clearance:

  0.3 - 0.6 mm (0.012 - 0.024 in)

  If the specified clearance is not obtained, replace adjusting spacer and readjust.

BREAK-IN OPERATION

When replacing compressor clutch assembly, do not forget break-in operation, accomplished by engaging and disengaging the clutch about thirty times. Break-in operation raises the level of transmitted torque.



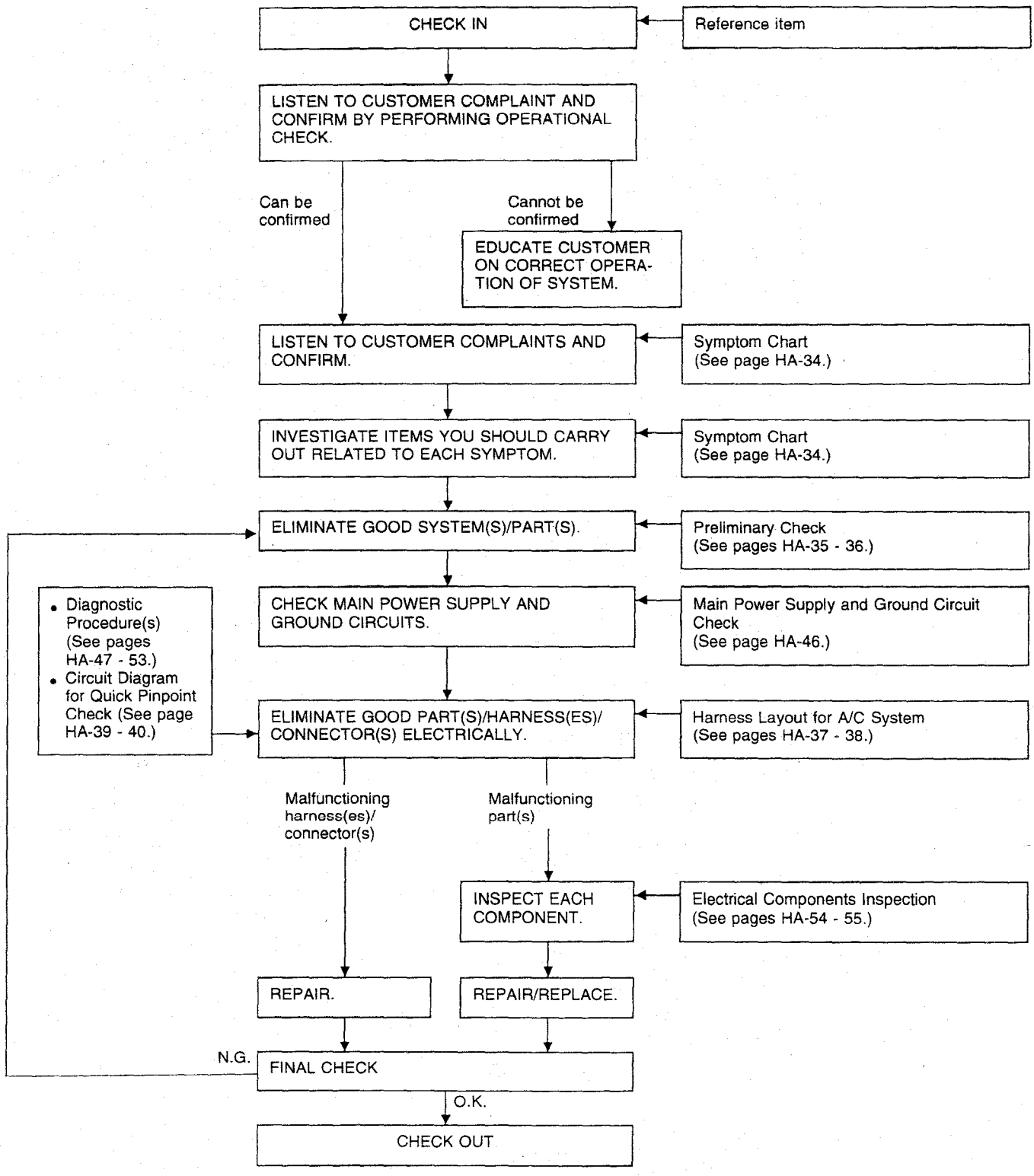
Thermal Protector

INSPECTION

- When servicing, do not allow foreign matter to get into compressor.
- Check continuity between two terminals.

How to Perform Trouble Diagnoses for Quick and Accurate Repair

WORK FLOW

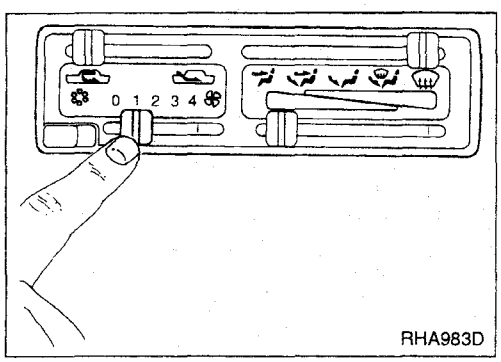


Operation Check

The purpose of the operational check is to confirm that the system is as it should be. The systems which will be checked are the blower, mode (discharge air), intake air, temperature decrease, temperature increase and A/C switch system.

CONDITIONS:

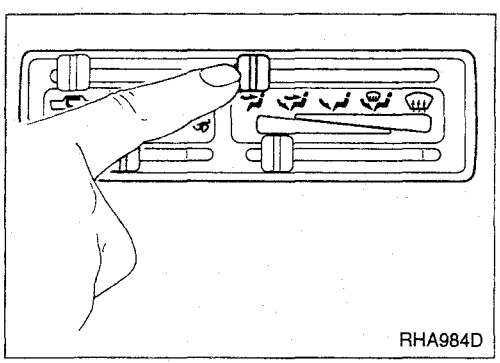
Engine running and at normal operating temperature.



PROCEDURE:

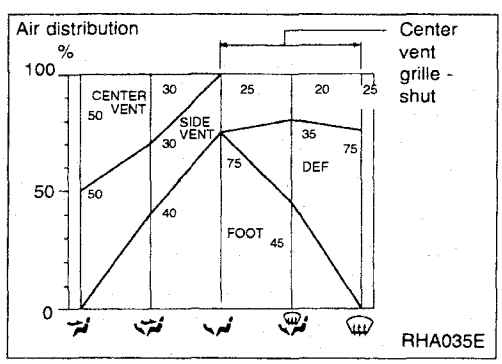
1. Check blower

1) Slide FAN lever to 1.
   Blower should operate at speed 1.
2) Then slide lever to speed 2.
3) Continue checking blower speed until all speeds are checked.
4) Leave blower on speed 4.

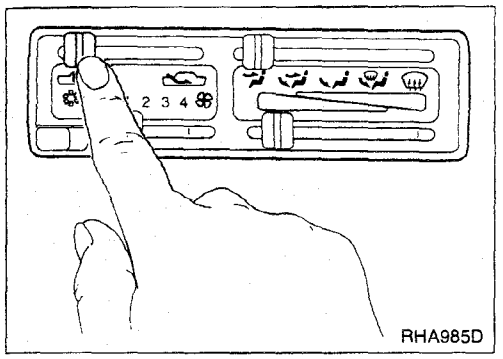


2. Check discharge air

1) Slide mode lever to position.
2) Confirm that all discharge air comes out of face vents.
3) Slide mode lever to position.
4) Confirm that discharge air comes out of face vents and foot vents.
5) Slide mode lever to position.
6) Confirm that discharge air comes out of foot vents, with some air from face vents.
7) Slide mode lever to position.
8) Confirm that discharge air comes out of foot vents with some air from defroster vents.
9) Slide mode lever to position.
10) Confirm that all discharge air comes out of defroster vents, with some air from face vents.

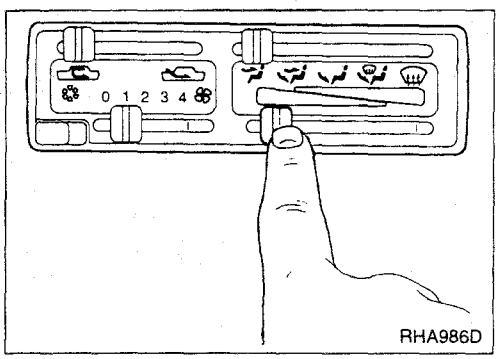


Operation Check (Cont'd)



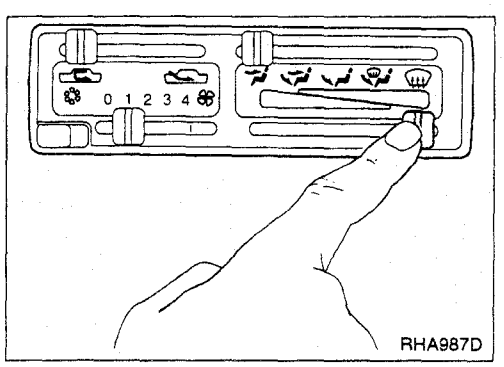
3. Check recirc

1) Slide intake lever to position.
2) Listen for intake door position change (you should hear sound change slightly).



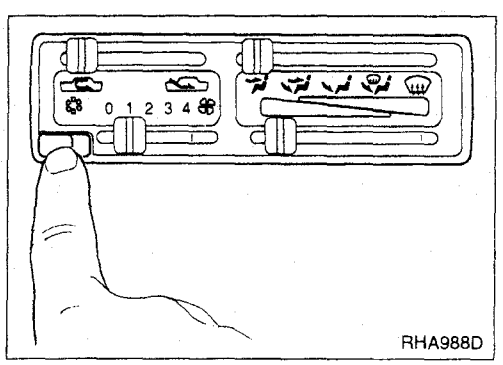
4. Check temperature decrease

1) Slide temperature lever to full cold.
2) Check for cold air at discharge air outlets.



5. Check temperature increase

1) Slide temperature lever to full hot.
2) Check for hot air at discharge air outlets.



6. Check A/C switch

Move fan control lever to the desired position (1 to 4) and press air conditioner button to turn ON air conditioner.
Indicator light will come on when air conditioner is ON.

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 (Front driver side only)
Hood:	Open
TEMP. control lever position:	Max. COLD
AIR control lever position:	(Ventilation)
INTAKE lever position:	(Recirculation)
FAN lever:	4
Engine speed:	1,500 rpm
Time required before starting testing after air conditioner starts operating:	More than 10 minutes

TEST READING

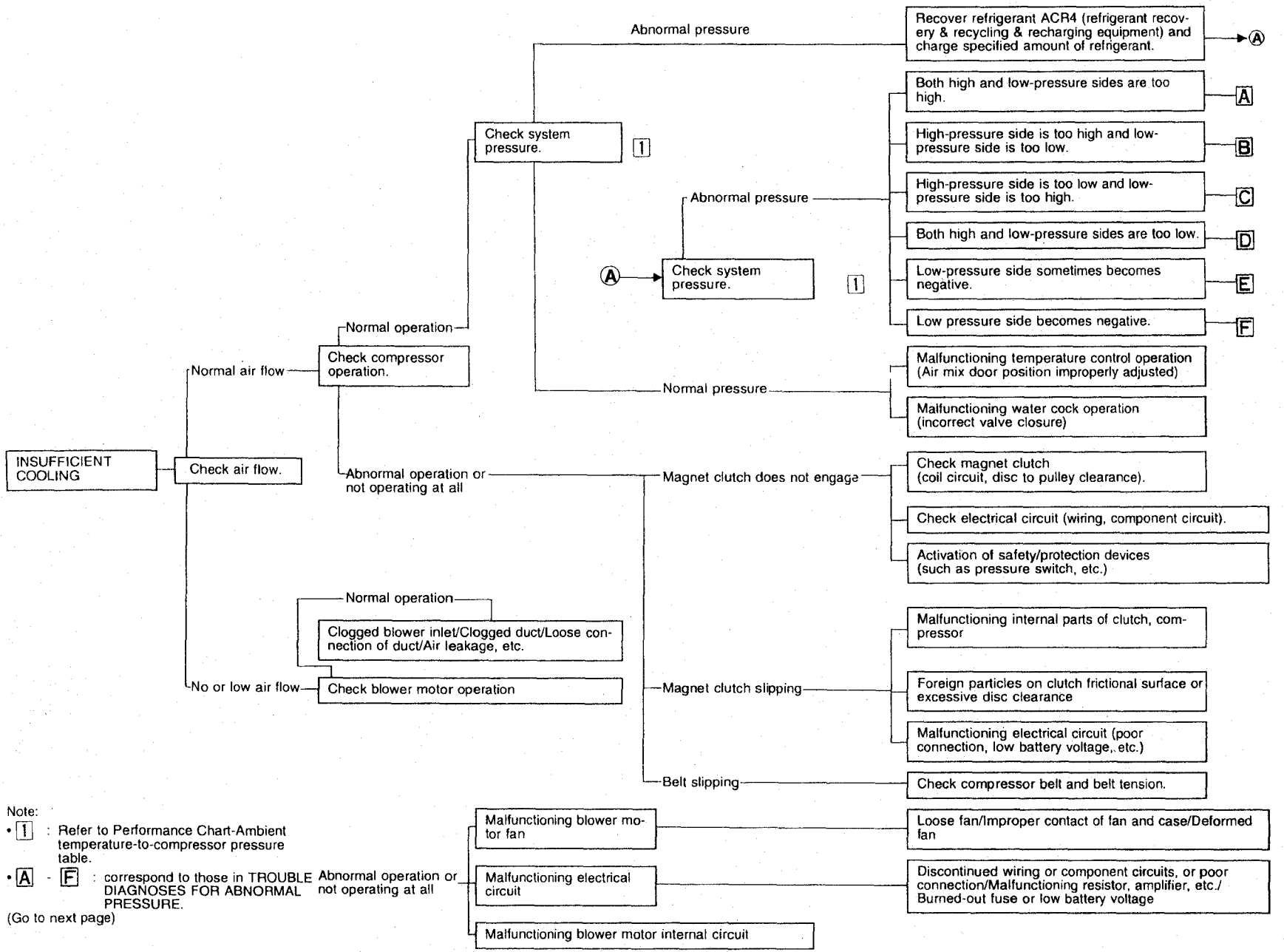
Recirculating-to-discharge air temperature table

Inside air (Recirculating air) at blower assembly inlet		Discharge air temperature at center ventilator °C (°F)
Relative humidity %	Air temperature °C (°F)	
40 - 60	25 (77)	9.8 - 11.5 (50 - 53)
	30 (86)	13.8 - 15.9 (57 - 61)
	35 (95)	17.9 - 20.3 (64 - 68)
60 - 80	25 (77)	11.5 - 13.3 (53 - 56)
	30 (86)	15.9 - 18.0 (61 - 64)
	35 (95)	20.3 - 22.7 (64 - 73)

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)	1451 - 1608 (14.8 - 16.4, 210 - 233)	157 - 186 (1.6 - 1.9, 23 - 27)
	30 (86)	1569 - 1804 (16.0 - 18.4, 228 - 262)	176 - 235 (1.8 - 2.4, 26 - 34)
	35 (95)	1834 - 2138 (18.7 - 21.8, 266 - 310)	226 - 304 (2.3 - 3.1, 33 - 44)

INSUFFICIENT COOLING



Note:

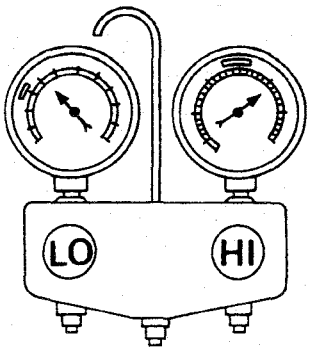
- 1 : Refer to Performance Chart-Ambient temperature-to-compressor pressure table.
- A - F : correspond to those in TROUBLE DIAGNOSES FOR ABNORMAL PRESSURE.

(Go to next page)

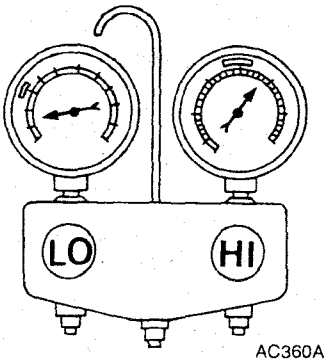
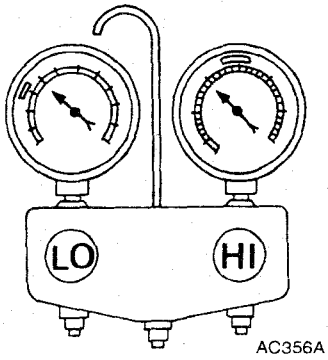
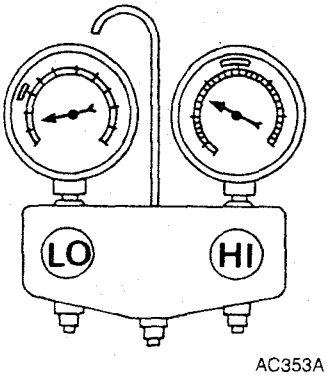
Performance Test Diagnoses (Cont'd)

TROUBLE DIAGNOSES FOR ABNORMAL PRESSURE

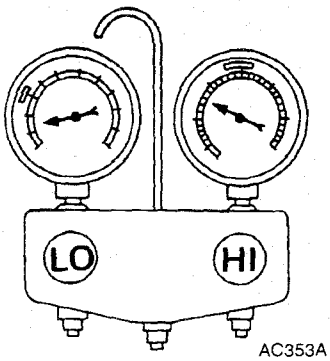
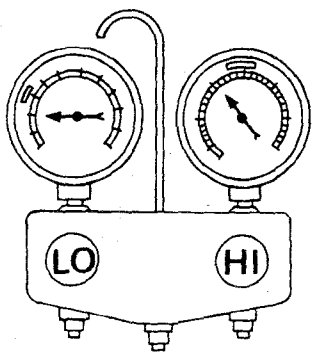
Whenever abnormal pressure of high and/or low sides of the system is noted, diagnosis must be conducted by using a manifold gauge. The large-line zone on the gauge scale (see illustrations.) shown in the following table refers to the standard (normal) pressure range for the corresponding pressure side (high or low). Since the standard (normal) pressure, however, differs from vehicle to vehicle, refer to the "Ambient air temperature-to-compressor pressure table".

Gauge indication	Refrigerant cycle	Probable cause	Corrective action
Both high and low-pressure sides are too high. A  AC359A	• Pressure is reduced soon after water is splashed on condenser.	Excessive refrigerant charge in refrigeration cycle	Reduce refrigerant until specified pressure is obtained.
	Air suction by radiator or condenser fan is insufficient.	Insufficient condenser cooling performance ↓ ① Condenser fins are clogged. ② Improper rotation of radiator fan or condenser fan	• Clean condenser. • Check and repair radiator or condenser fan as necessary.
	• Low-pressure pipe is not cold. • When compressor is stopped high-pressure value quickly drops by approximately 196 kPa (2 kg/cm^2, 28 psi). It then decreases gradually thereafter.	Poor heat exchange in condenser (After compressor operation stops, high pressure decreases too slowly.) ↓ Air in refrigeration cycle	Evacuate repeatedly and recharge system.
	Engine tends to overheat.	Engine cooling systems malfunction.	Check and repair each engine cooling system.
	• Areas near low-pressure pipe connection and service valves are considerably cold compared with areas near expansion valve outlet or evaporator. • Plates are sometimes covered with frost.	• Excessive liquid refrigerant on low-pressure side • Excessive refrigerant discharge flow • Expansion valve is open a little compared with the specification. ↓ ① Improper thermal valve installation ② Improper expansion valve adjustment	Replace expansion valve.

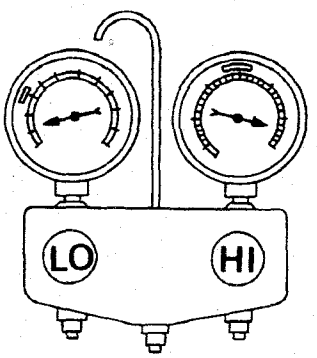
Performance Test Diagnoses (Cont'd)

Gauge indication	Refrigerant cycle	Probable cause	Corrective action
High-pressure side is too high and low-pressure side is too low. B  AC360A	Upper side of condenser and high-pressure side are hot, however, liquid tank is not so hot.	High-pressure tube or parts located between compressor and condenser are clogged or crushed.	• Check and repair or replace malfunctioning parts. • Check compressor oil for contamination.
High-pressure side is too low and low-pressure side is too high. C  AC356A	High and low-pressure sides become equal soon after compressor operation stops.	Compressor pressure operation is improper. ↓ Damages inside compressor packings	Replace compressor.
	No temperature difference between high and low-pressure sides	Compressor discharge capacity does not change. (Compressor stroke is set at maximum.)	Replace compressor.
Both high-and low-pressure sides are too low. D  AC353A	• There is a big temperature difference between liquid tank outlet and inlet. Outlet temperature is extremely low. • Liquid tank inlet and expansion valve are frosted.	Liquid tank inside is clogged a little.	• Replace liquid tank • Check compressor oil for contamination.
	• Temperature of expansion valve inlet is extremely low as compared with areas near liquid tank. • Expansion valve inlet may be frosted. • Temperature difference occurs somewhere in high-pressure side	High-pressure pipe located between liquid tank and expansion valve is clogged.	• Check and repair malfunctioning parts. • Check compressor oil for contamination.

Performance Test Diagnoses (Cont'd)

Gauge indication	Refrigerant cycle	Probable cause	Corrective action
Both high and low-pressure sides are too low. D  AC353A	There is a big temperature difference between expansion valve inlet and outlet while the valve itself is frosted.	Expansion valve closes a little compared with the specification. ↓ ① Improper expansion valve adjustment ② Malfunctioning thermal valve ③ Outlet and inlet may be clogged.	• Remove foreign particles by using compressed air. • Check compressor oil for contamination.
	Areas near low-pressure pipe connection and service valve are extremely cold as compared with areas near expansion valve outlet and evaporator.	Low-pressure pipe is clogged or crushed.	• Check and repair malfunctioning parts. • Check compressor oil for contamination.
	Air flow volume is not enough or is too low.	Evaporator is frozen. ↓ Compressor discharge capacity does not change. (Compressor stroke is set at maximum length.)	Replace compressor.
Low-pressure side sometimes becomes negative. E  AC354A	• Air conditioning system does not function and does not cyclically cool the compartment air. • The system constantly functions for a certain period of time after compressor is stopped and restarted.	Refrigerant does not discharge cyclically. ↓ Moisture is frozen at expansion valve outlet and inlet. ↓ Water is mixed with refrigerant.	• Drain water from refrigerant or replace refrigerant. • Replace liquid tank.

Performance Test Diagnoses (Cont'd)

Gauge indication	Refrigerant cycle	Probable cause	Corrective action
Low-pressure side becomes negative. F  AC362A	Liquid tank or front/rear side of expansion valve's pipe is frosted or dewed.	High-pressure side is closed and refrigerant does not flow. ↓ Expansion valve or liquid tank is frosted.	After the system is left at rest, start it again in order to confirm whether or not problem is caused by water or foreign particles. • If the problem is due to water, drain water from refrigerant or replace refrigerant. • If it is due to foreign particles, remove expansion valve and remove them with dry and compressed air. • If either of the above methods cannot correct the problem, replace expansion valve. • Replace liquid tank. • Check compressor oil for contamination.

Contents

Symptom Chart

DIAGNOSTIC TABLE

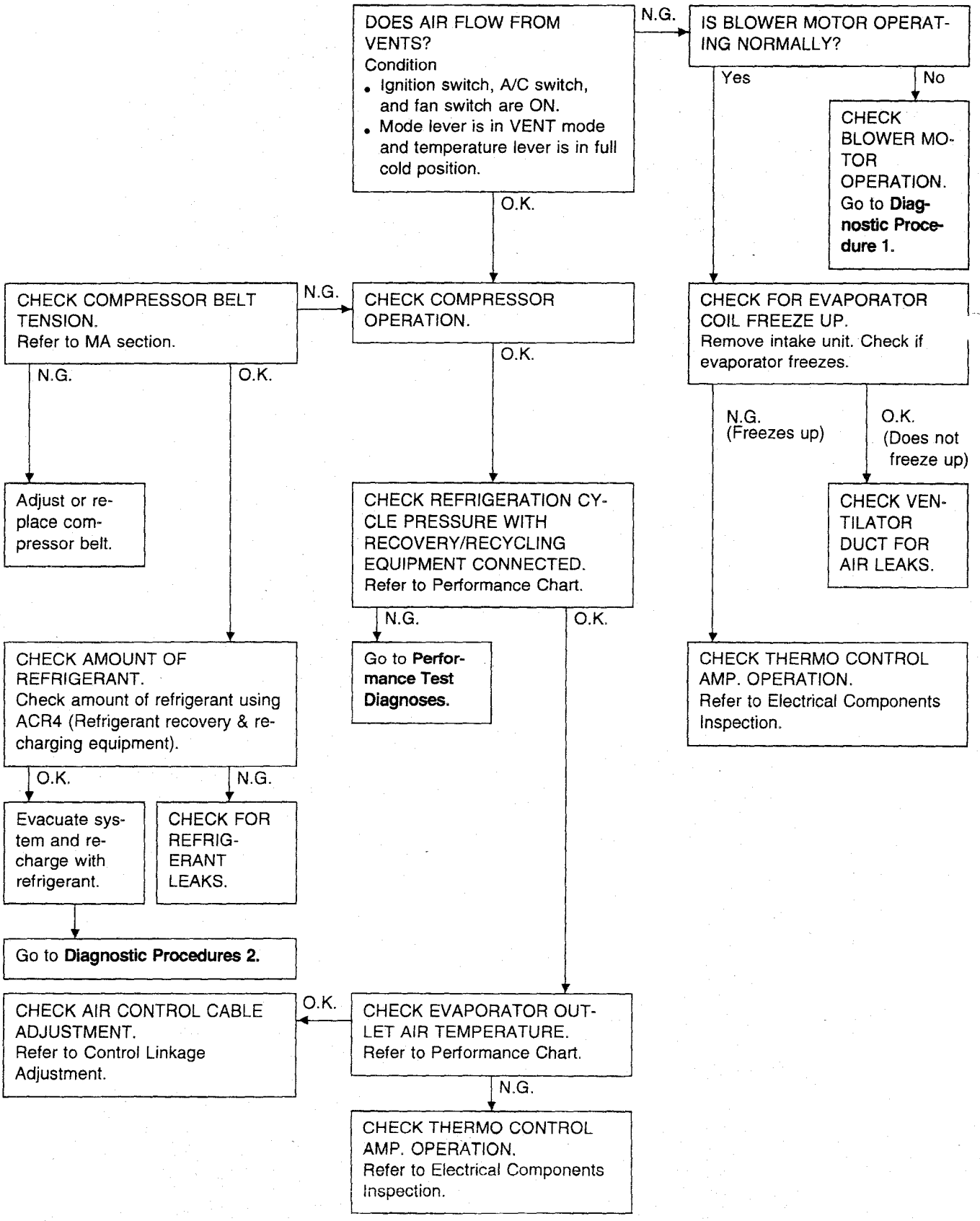
PROCEDURE	Prelimi-nary Check		Diag-nostic Proce-dure		Main Power Supply and Ground Circuit Check			Electrical Components Inspection									
SYMPTOM	Preliminary check 1	Preliminary check 2	Diagnostic procedure 1	Diagnostic procedure 2	15A Fuses	10A Fuse	15A Fuse	Blower motor	Resistor	A/C switch	Fan switch	A/C CUT relay	A/C relay	Dual-pressure switch	Compressor: Magnet clutch	Compressor: Thermal protector	Harness
A/C does not blow cold air.	❶		○		○	○	○	○	○	○	○	○	○	○	○	○	○
Blower motor does not rotate.	❶		❷		○		○	○	○		○						○
Magnet clutch does not engage when A/C switch and fan switch are ON.	❶			❷		○	○			○	○	○	○	○	○	○	○
Noise		❶															

❶, ❷: The number indicates checking order.
○: Refer to each flow chart for checking order. (It depends on malfunctioning portion.)

Preliminary Check

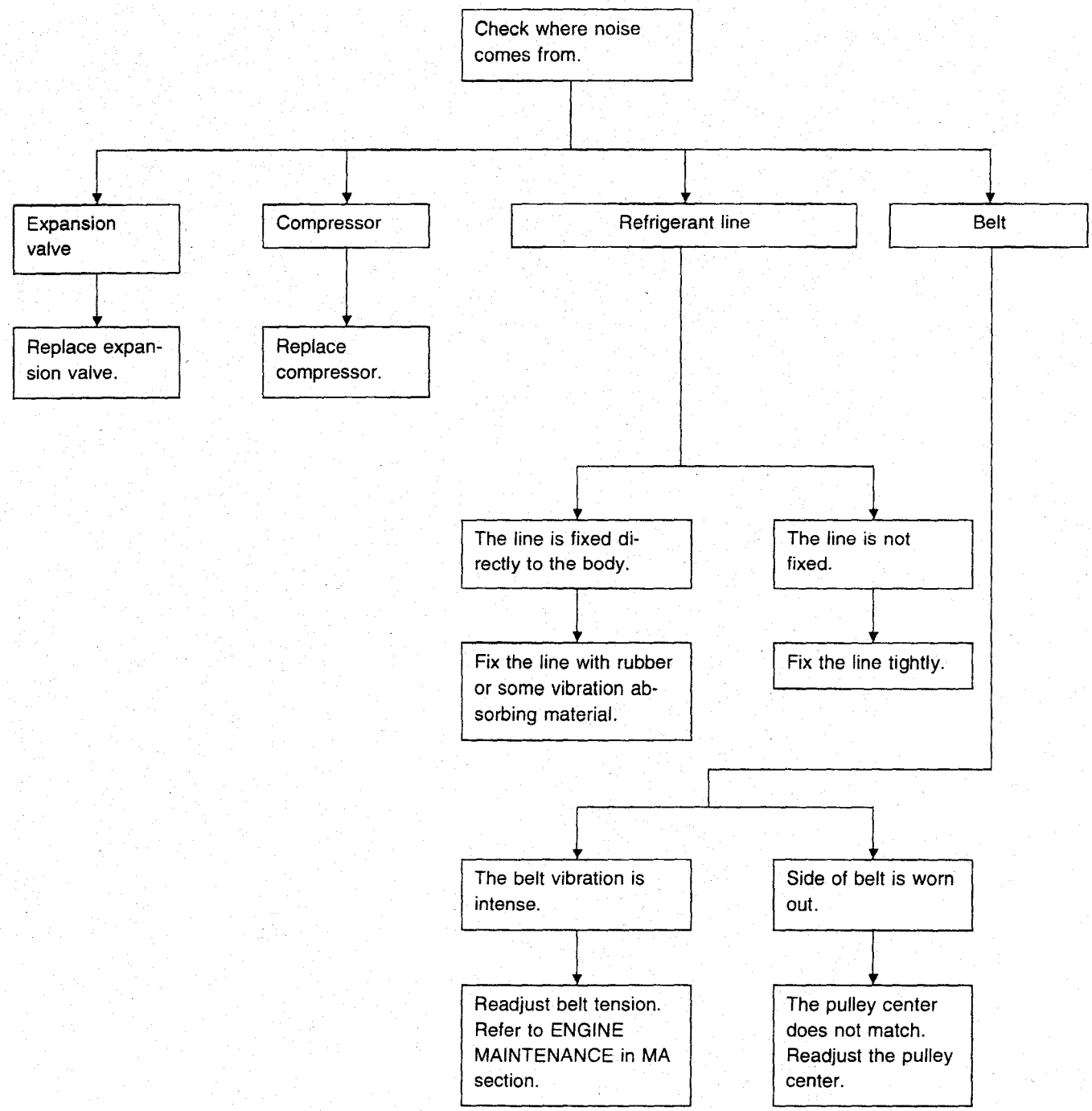
PRELIMINARY CHECK 1

A/C does not blow cold air.



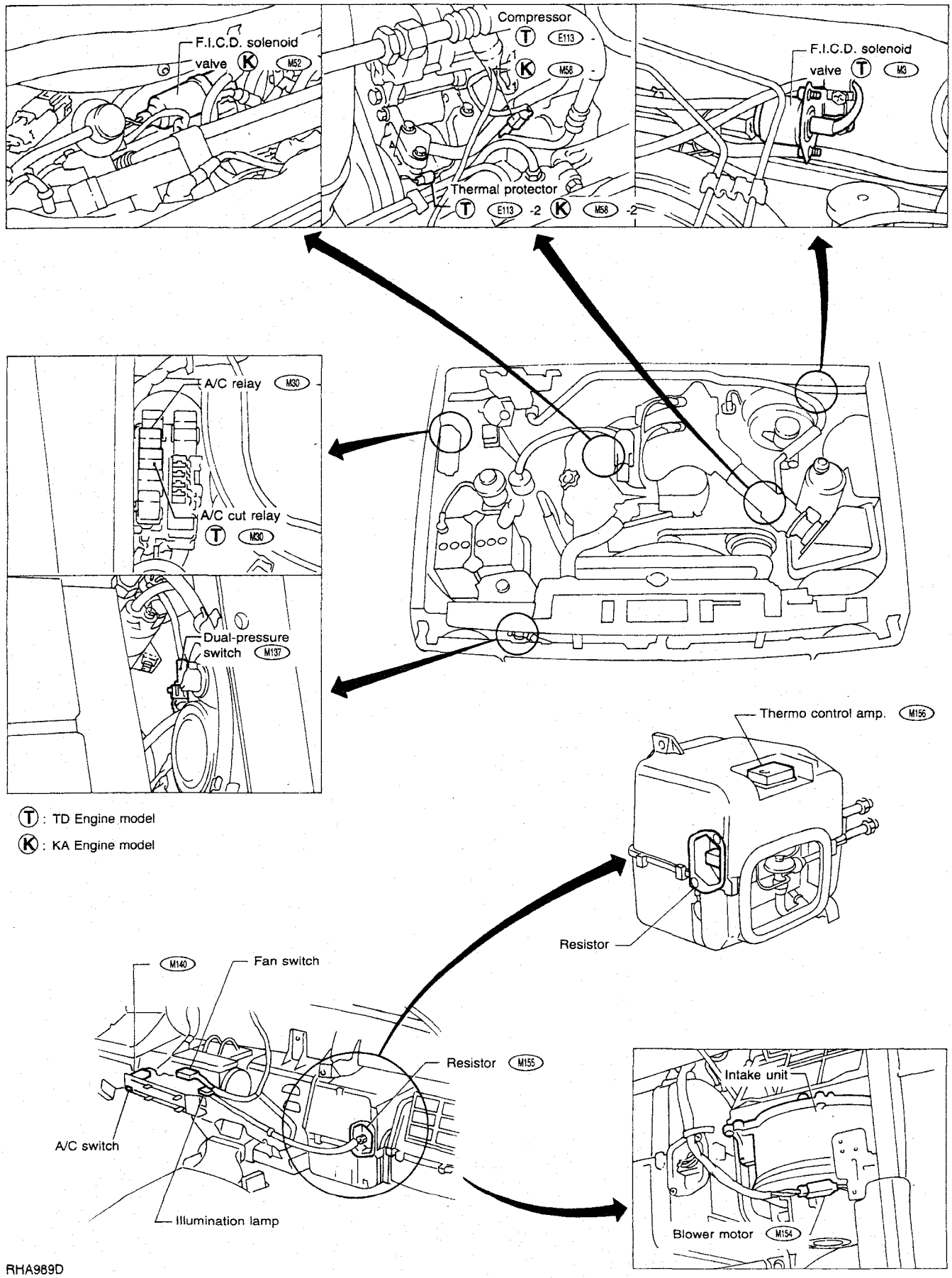
PRELIMINARY CHECK 2

Noise



L.H. DRIVE MODEL

Harness Layout for A/C System



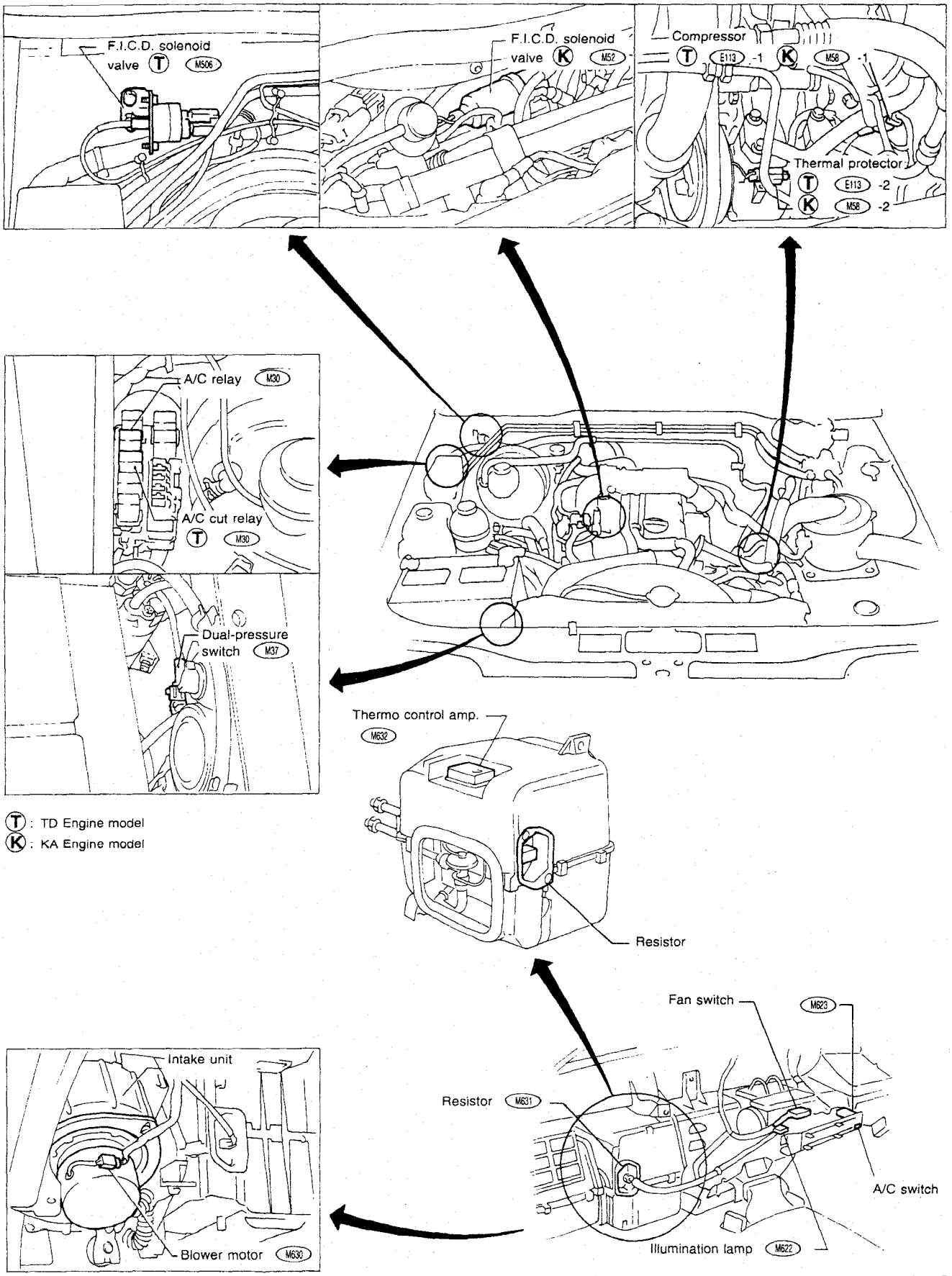
(T) : TD Engine model

(K) : KA Engine model

RHA989D

Harness Layout for A/C System (Cont'd)

R.H. DRIVE MODEL

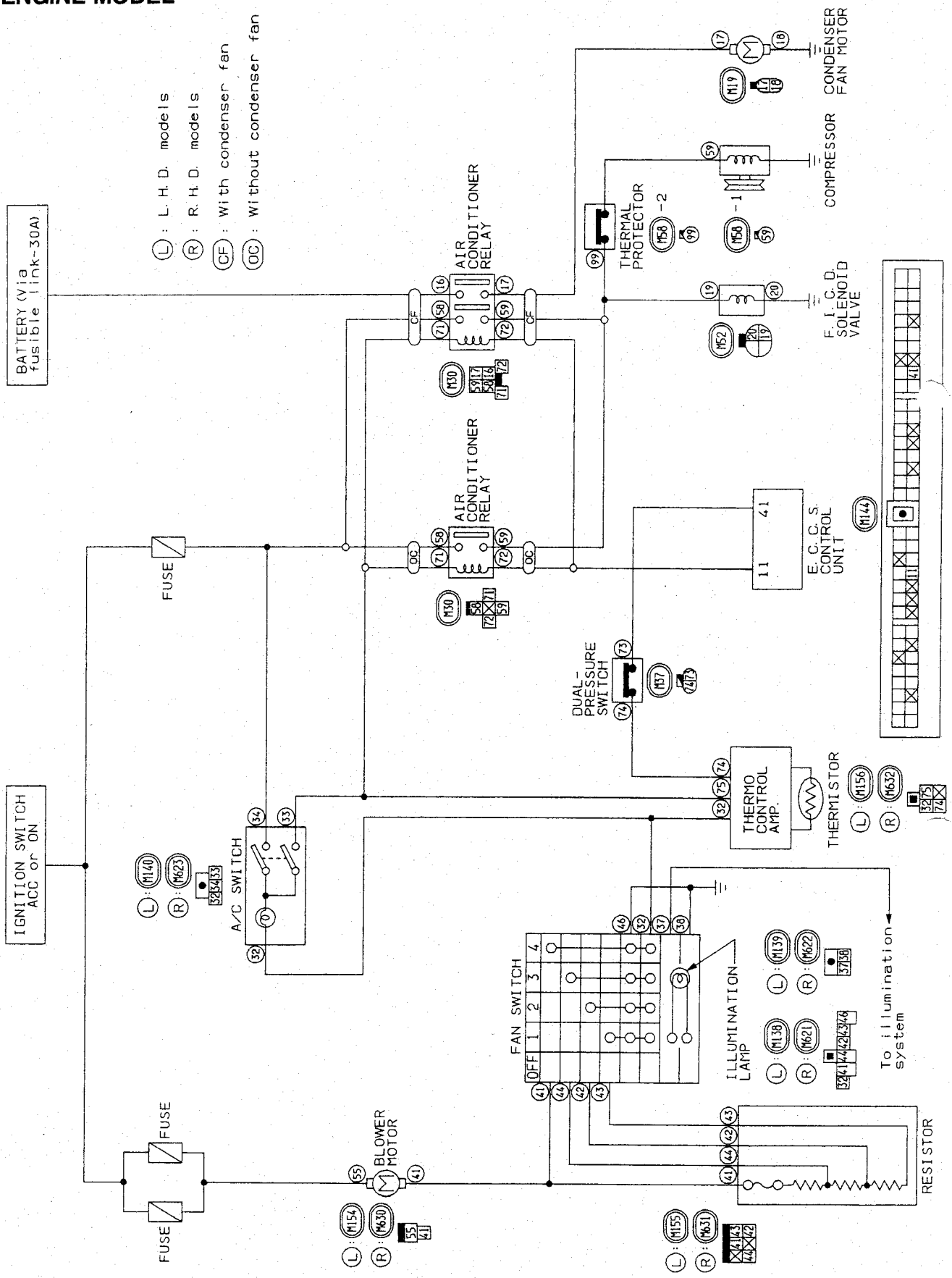


(T): TD Engine model
(K): KA Engine model

RHA990D

Circuit Diagram for Pinpoint Check

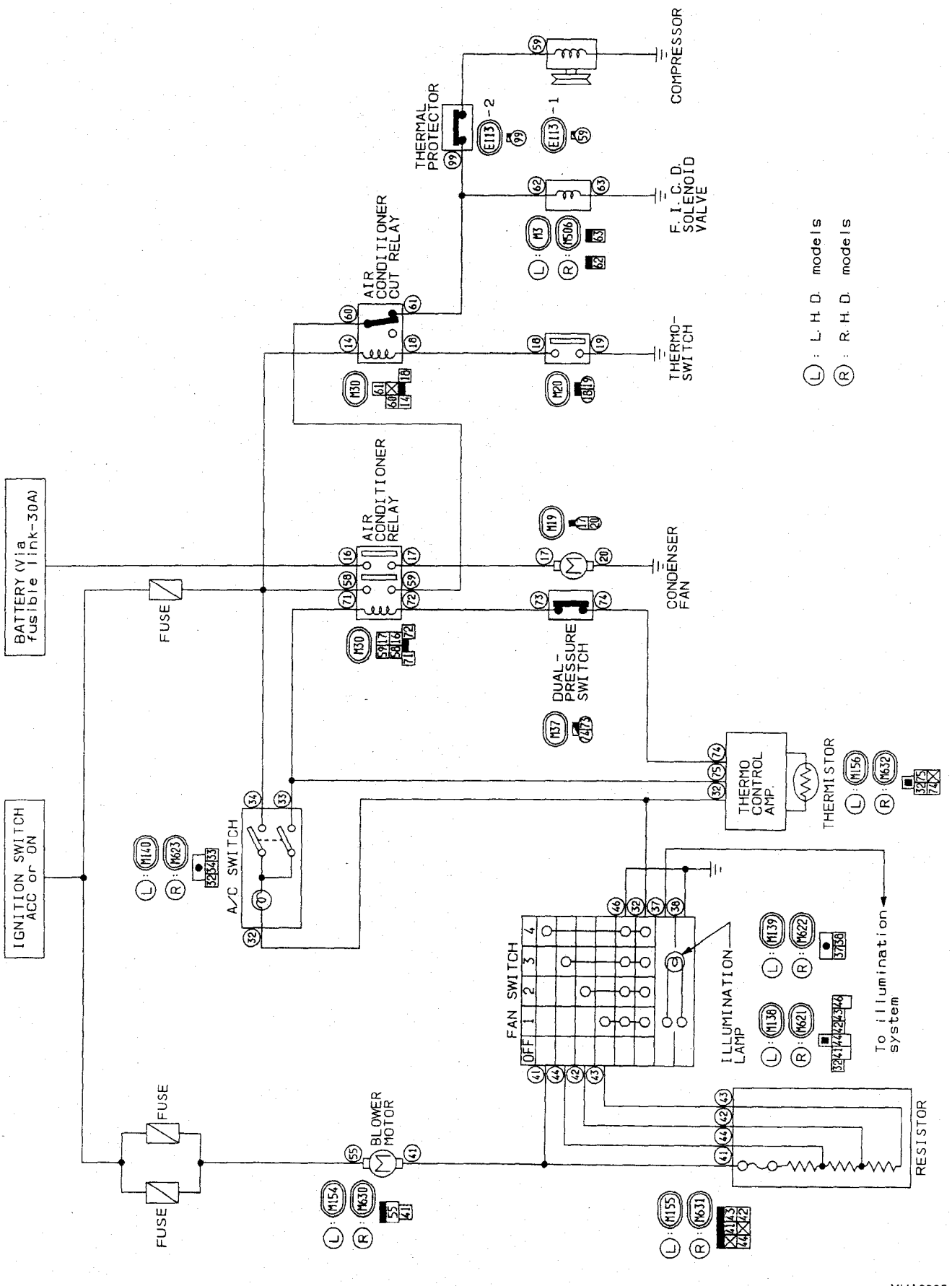
KA ENGINE MODEL



YHA003

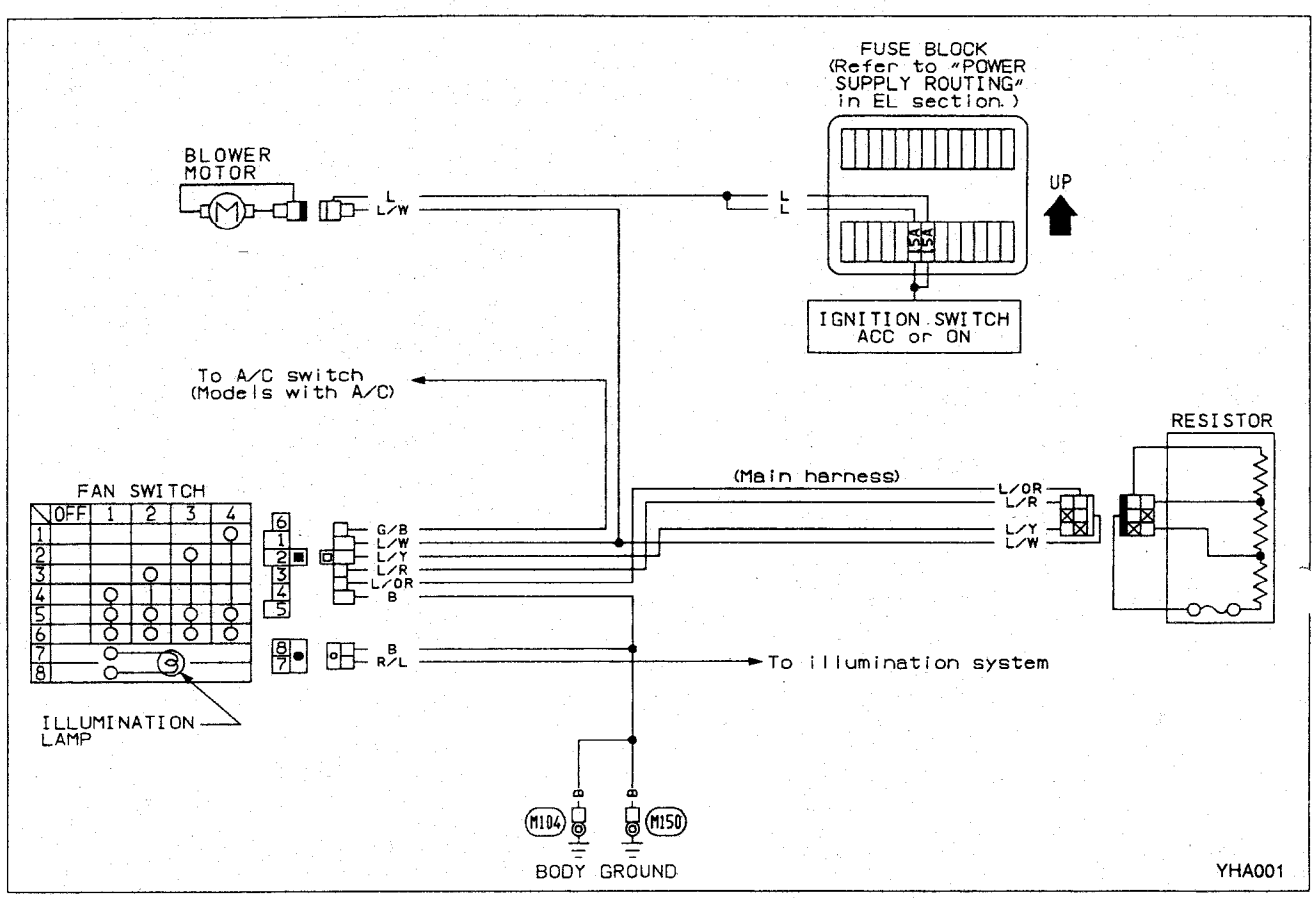
Circuit Diagram for Pinpoint Check (Cont'd)

TD ENGINE MODEL



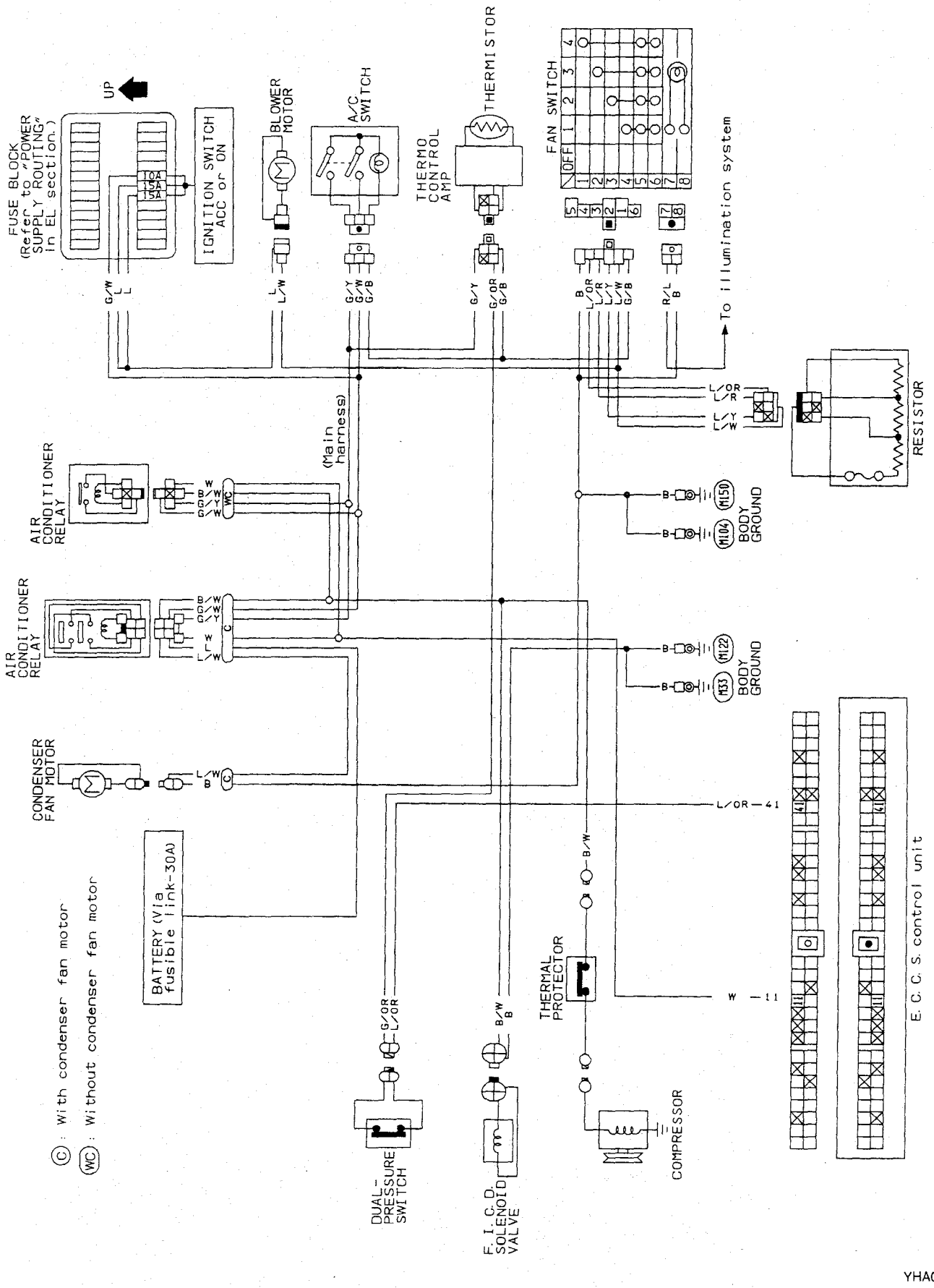
YHA0005

Wiring Diagram — Heater



Wiring Diagram

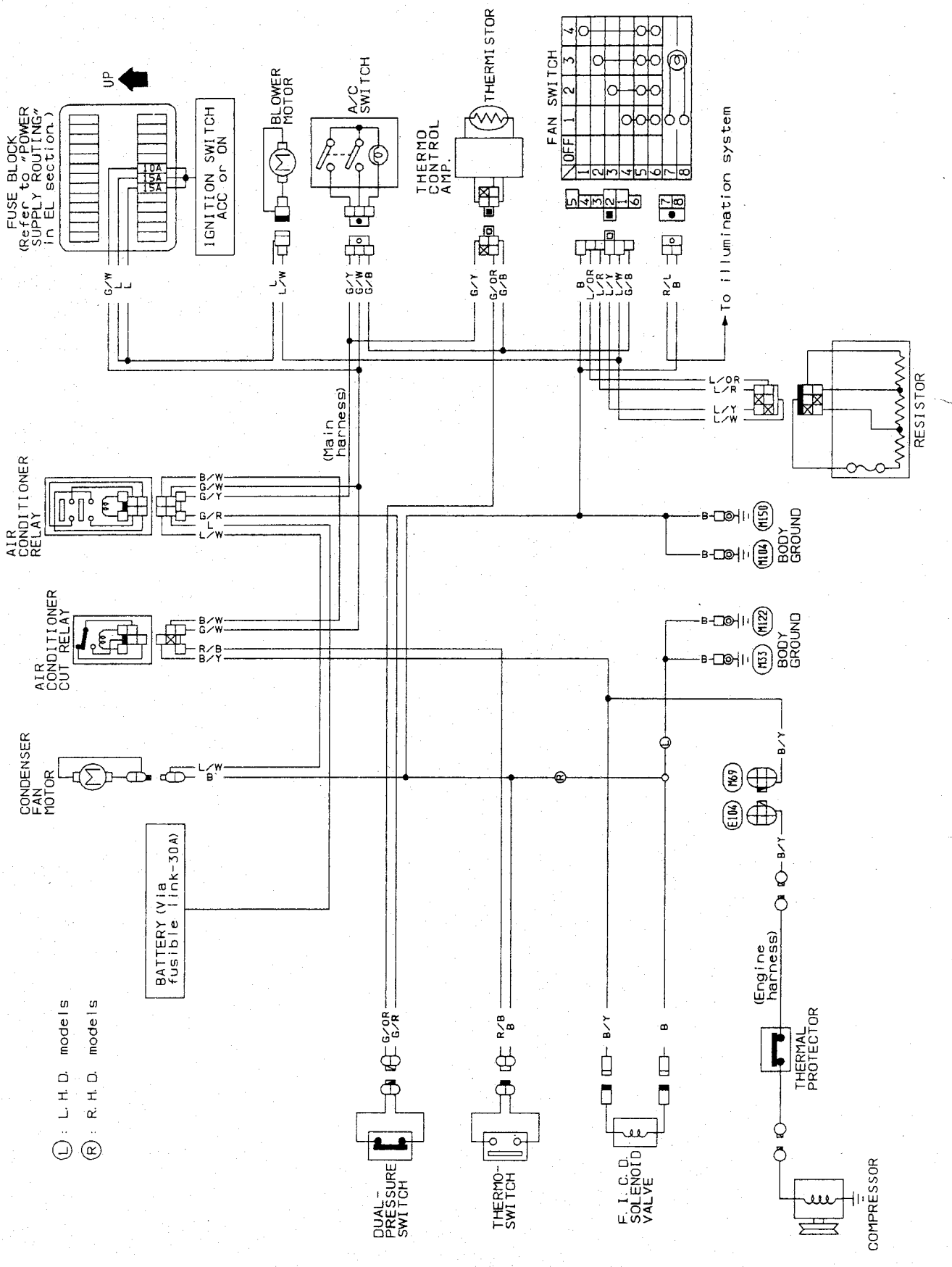
KA ENGINE MODEL



YHA002

Wiring Diagram (Cont'd)

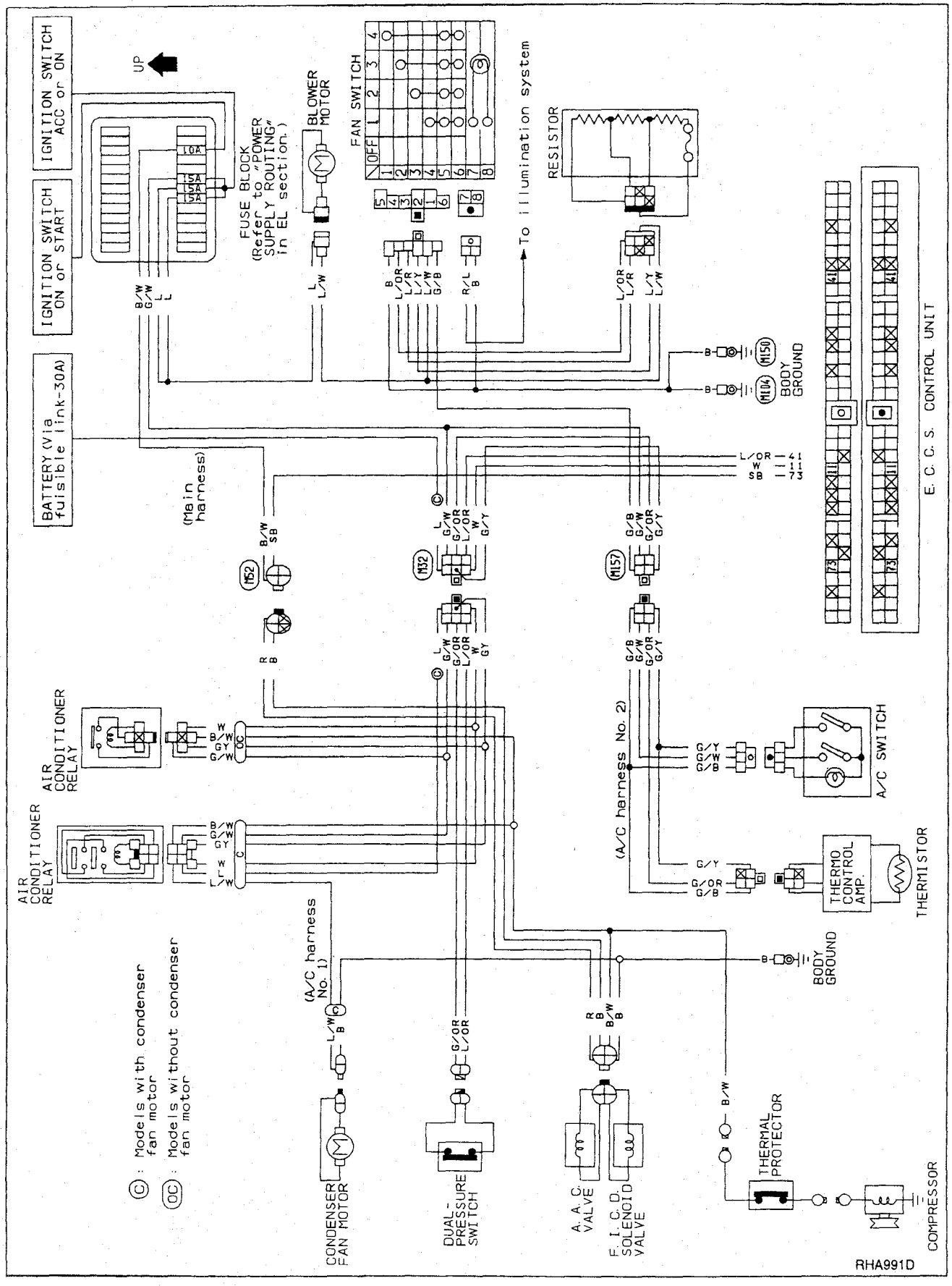
TD ENGINE MODEL



YHA004

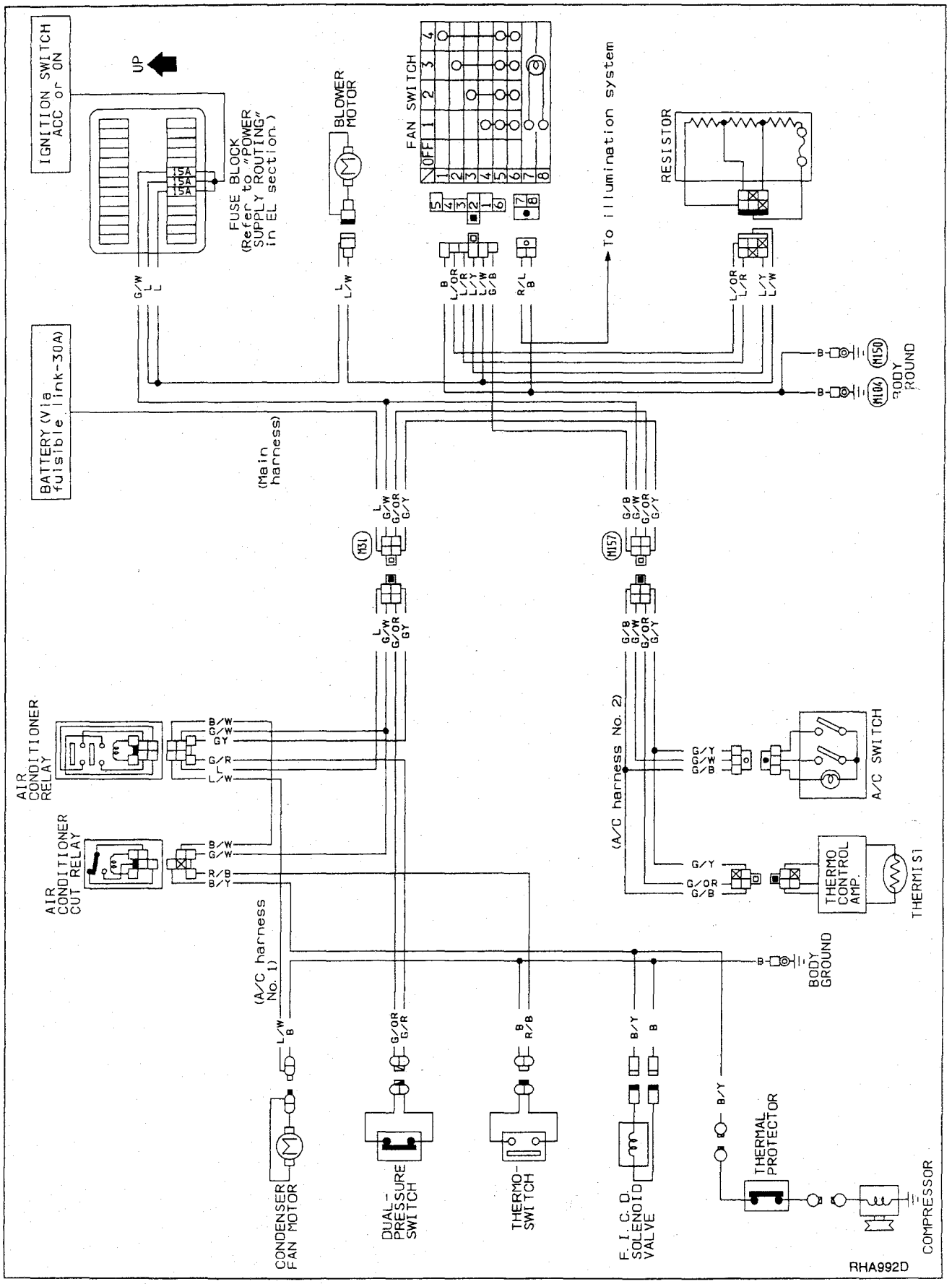
Wiring Diagram (Cont'd)

KA ENGINE MODEL (A/C Kit)



Wiring Diagram (Cont'd)

TD ENGINE MODEL (A/C Kit)

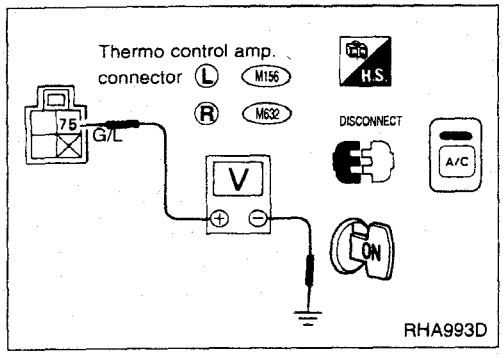


Main Power Supply and Ground Circuit Check

POWER SUPPLY CIRCUIT CHECK FOR A/C SYSTEM

Check power supply circuit for air conditioning system.

Refer to "POWER SUPPLY ROUTING" in EL section and "Wiring Diagram".

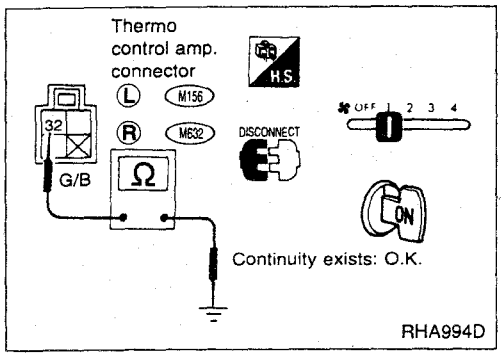


THERMO CONTROL AMP. CHECK

Check power supply circuit for thermo control amp. with ignition switch ON.

1. Disconnect thermo control amp. harness connector.
2. Connect voltmeter from harness side.
3. Measure voltage across terminal No. ⑮ and body ground.

Voltmeter terminal		Voltage
⊕	⊖	
⑮	Body ground	Approx. 12V



Check body ground circuit for thermo control amp. with ignition switch ON and fan switch ON.

1. Disconnect thermo control amp. harness connector.
2. Connect ohmmeter from harness side.
3. Check for continuity between terminal No. ⑫ and body ground.

Ohmmeter terminal		Continuity
⊕	⊖	
⑫	Body ground	Yes

	INCIDENT	Flow chart No.
1	Fan fails to rotate.	1
2	Fan does not rotate at 1-speed.	2
3	Fan does not rotate at 2-speed.	3
4	Fan does not rotate at 3-speed.	4
5	Fan does not rotate at 4-speed.	5

Diagnostic Procedure 1

SYMPTOM: Blower motor does not rotate.

- **Perform PRELIMINARY CHECK 2 before referring to the following flow chart.**

Check if blower motor rotates properly at each fan speed.
Conduct check as per flow chart at left.

2 3 4 → Ⓑ

5 → Ⓒ

(Go to next page.)

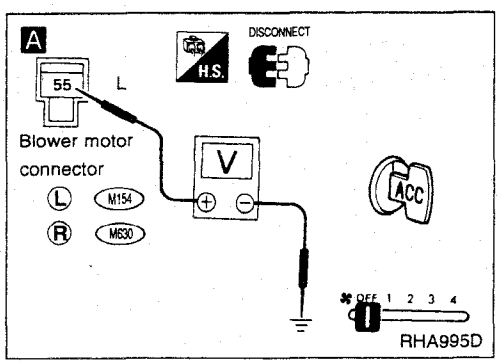
A

1

CHECK POWER SUPPLY FOR BLOWER MOTOR.
Disconnect blower motor harness connector.
Do approx. 12 volts exist between blower motor harness terminal No. 55 and body ground?

N.G. → Check 15A fuses at fuse block. (Refer to "POWER SUPPLY ROUTING" in EL section and "Wiring Diagram".)

O.K.



B

Check circuit continuity between blower motor harness terminal No. 41 and body ground.

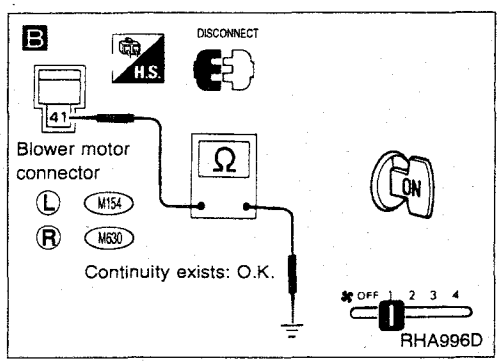
N.G. → Reconnect blower motor harness connector.

O.K.

CHECK BLOWER MOTOR.
(Refer to Electrical Components Inspection.)

N.G.

Replace blower motor.

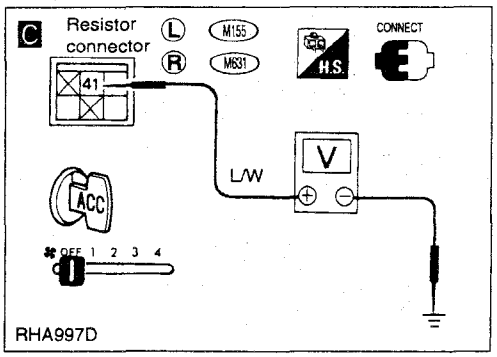


C

CHECK BLOWER MOTOR CIRCUIT BETWEEN BLOWER MOTOR AND RESISTOR.
Do approx. 12 volts exist between resistor harness terminal No. 41 and body ground?

N.G. → Disconnect blower motor and resistor harness connectors.

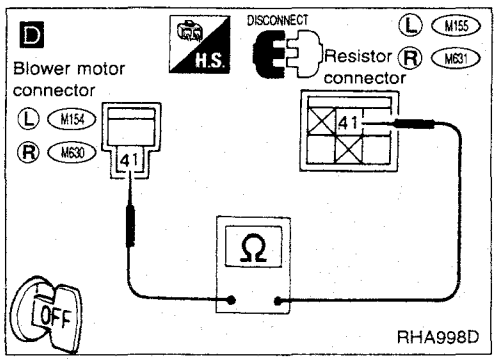
O.K.



D

Check circuit continuity between blower motor harness terminal No. 41 and resistor harness terminal No. 41.

Note

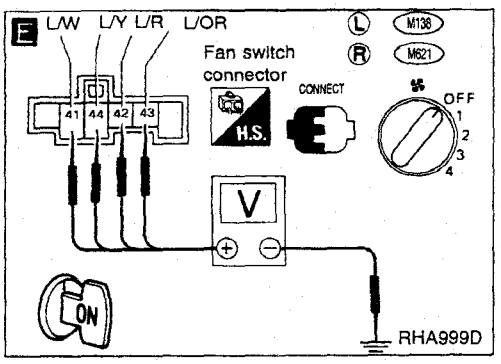


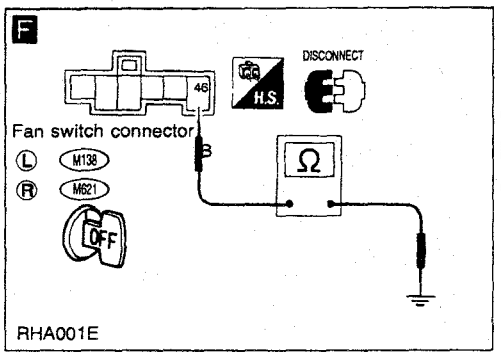
Ⓐ

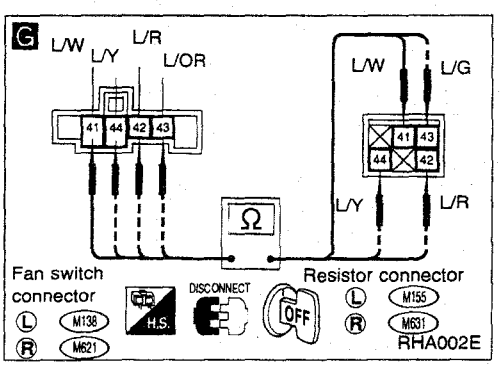
(Go to next page.)

Note:
If the result is N.G. after checking circuit continuity, repair harness or connector.

Diagnostic Procedure 1 (Cont'd)







Ⓐ Ⓑ Ⓒ

1 2 3 4 5

CHECK RESISTOR AFTER DISCONNECTING IT.
(Refer to Electrical Components Inspection.)

O.K. / N.G.

N.G. → Replace resistor.

Reconnect resistor harness connector.

1 2 3 4

E

CHECK FAN SWITCH CIRCUIT.
Do approx. 12 volts exist between each fan switch harness terminal and body ground?

Flow chart No.	Terminal No. ⊕	Terminal No. ⊖	Voltage
2	43	Body ground	Approx. 12V
3	42		
4	44		
5	41		

O.K. / N.G.

N.G. → **G** Note: Check circuit continuity between fan switch and resistor.

2 3 4 5

CHECK FAN SWITCH AFTER DISCONNECTING IT.
(Refer to Electrical Components Inspection.)

N.G. → Replace fan switch.

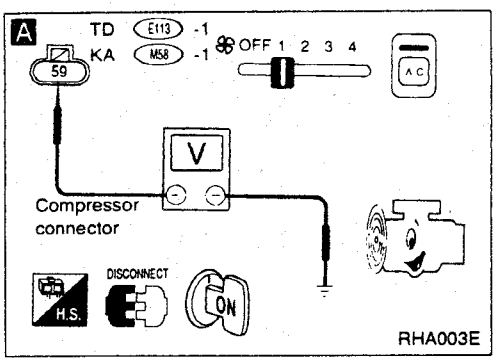
O.K.

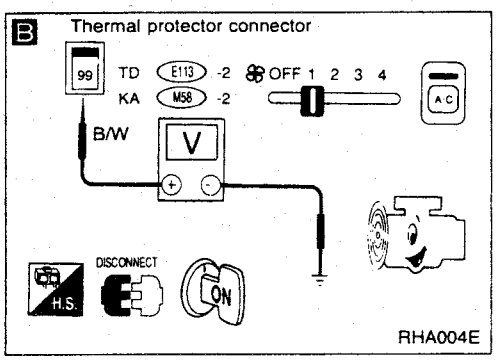
F Note: Check circuit continuity between fan switch harness terminal No. 46 and body ground.

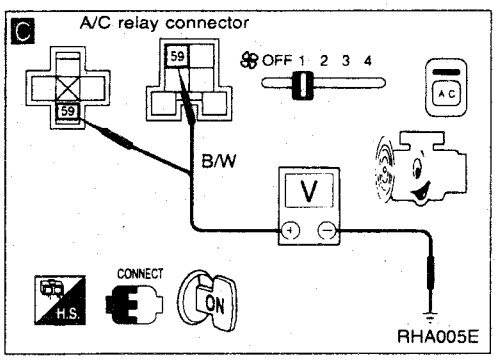
O.K.

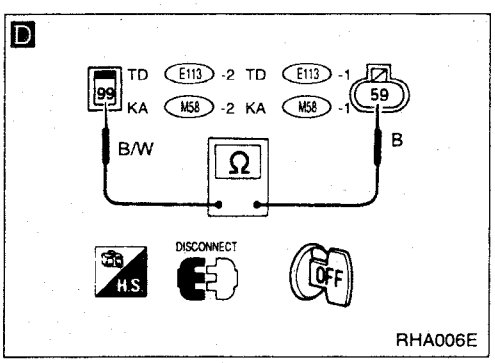
Replace blower motor.

Note:
If the result is N.G. after checking circuit continuity, repair harness or connector.









Diagnostic Procedure 2

SYMPTOM: Magnet clutch does not engage when A/C switch and fan switch are ON.

- **Perform PRELIMINARY CHECK 1 before referring to the following flow chart.**

A

CHECK POWER SUPPLY FOR COMPRESSOR.
Disconnect compressor harness connector.
Do approx. 12 volts exist between compressor harness terminal No. ⑤⑨ and body ground?

N.G. → **B**

CHECK POWER SUPPLY FOR THERMAL PROTECTOR.
Disconnect thermal protector harness connector.
Do approx. 12V exist between thermal protector harness terminal No. ⑨⑨ and body ground?

N.G (TD) → Ⓕ
N.G. (KA) → Ⓖ

O.K. → Check magnet clutch coil.

O.K. → Replace magnet clutch.
Refer to COMPRESSOR — Model DKV-14C (ZEXEL make).

O.K. → **C**

CHECK A/C RELAY OPERATION.
Do approx. 12 volts exist between A/C relay harness terminal No. ⑤⑨ and body ground.

O.K. → Ⓐ
N.G. → Ⓑ

O.K. → **D**

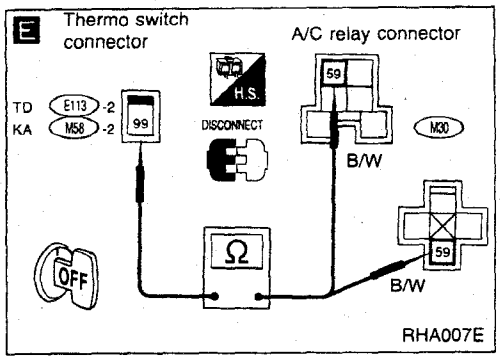
Note

CHECK THERMAL PROTECTOR.
Check circuit continuity between thermal protector harness terminal No. ⑨⑨ and compressor harness terminal No. ⑤⑨.

N.G. → Replace thermal protector.

Note:
If the result is N.G. after checking circuit continuity, repair harness or connector.

Diagnostic Procedure 2 (Cont'd)



Ⓐ

Disconnect A/C relay harness connector.

E

Note

Check circuit continuity between A/C relay harness terminal No. ⑲ and thermal protector harness terminal No. ⑨⑨.

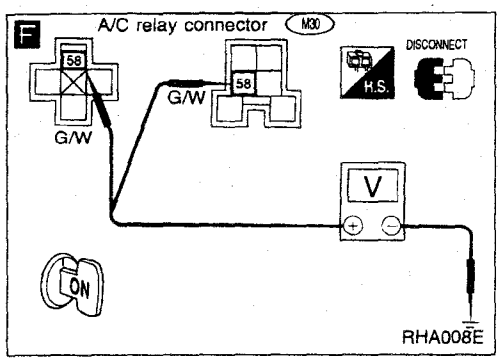
Ⓑ

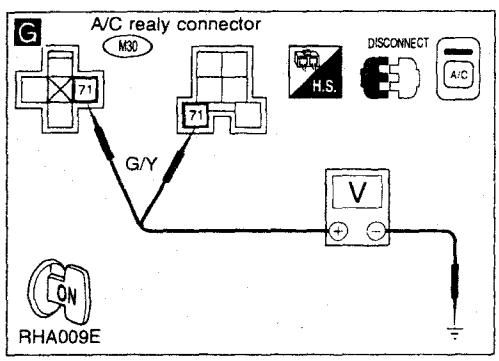
F

CHECK POWER SUPPLY FOR A/C RELAY.
Disconnect A/C relay.
Do approx. 12 volts exist between A/C relay harness terminal No. ⑤⑧ and body ground?

O.K. — N.G.

CHECK POWER SUPPLY CIRCUIT AND 10A FUSE AT FUSE BLOCK.
(Refer to "POWER SUPPLY ROUTING" in EL section and Wiring Diagram.)





G

CHECK POWER SUPPLY FOR A/C RELAY.
Do approx. 12 volts exist between A/C relay harness terminal No. ⑦① and body ground?

N.G. → H

O.K.

Ⓒ

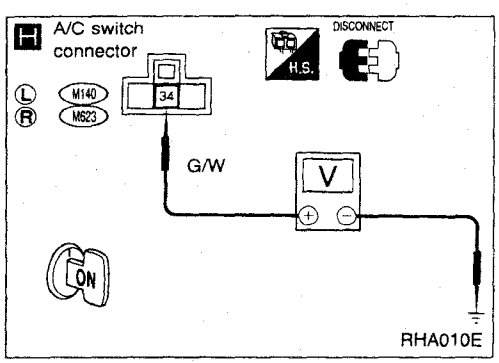
(Go to next page.)

H

CHECK POWER SUPPLY FOR A/C SWITCH.
Disconnect A/C switch harness connector.
Do approx. 12 volts exist between A/C relay harness terminal No. ③④ and body ground?

O.K. — N.G.

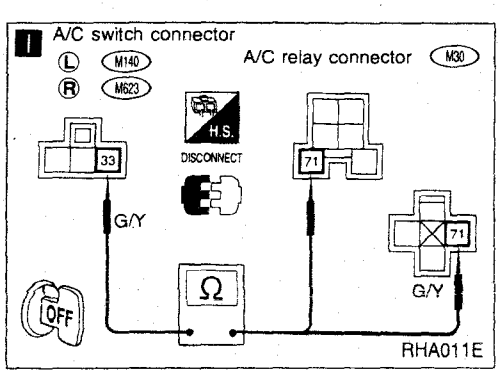
CHECK POWER SUPPLY CIRCUIT AND 10A FUSE AT FUSE BLOCK.
(Refer to "POWER SUPPLY ROUTING" in EL section and Wiring Diagram.)



CHECK A/C SWITCH.
(Refer to Electrical Components Inspection.)

O.K. — N.G.

Replace A/C switch.



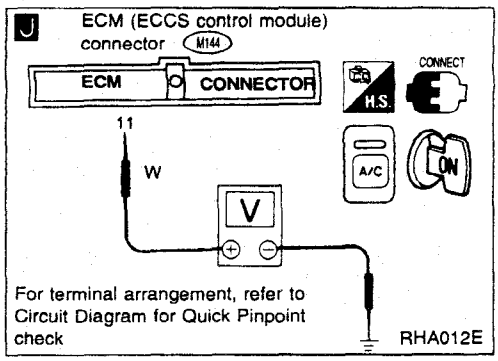
I

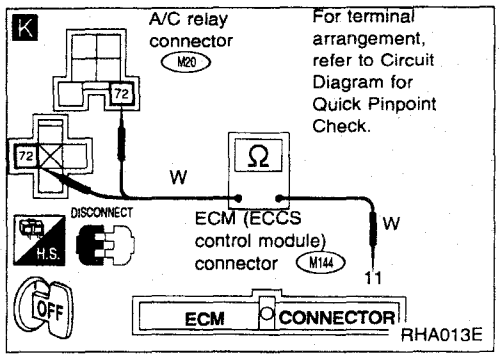
Note

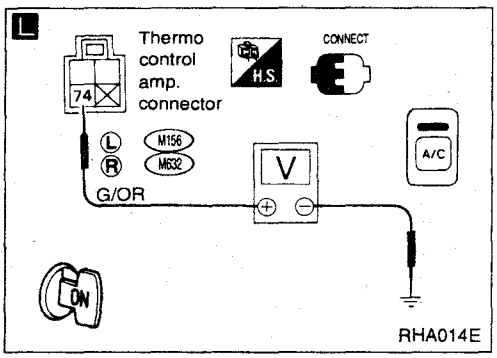
Check circuit continuity between A/C switch harness terminal No. ③③ and A/C relay harness terminal No. ⑦①.

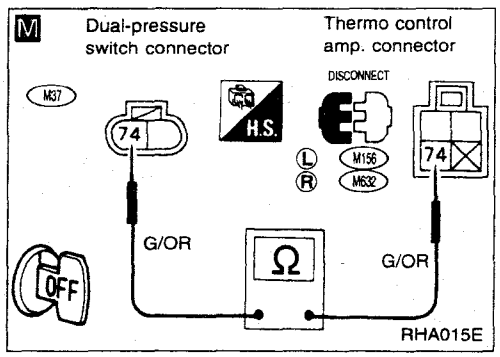
Note:
If the result is N.G. after checking circuit continuity, repair harness or connector.

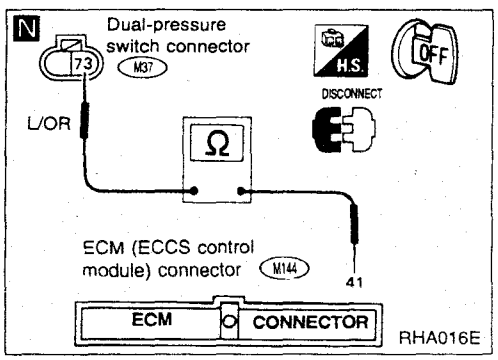
Diagnostic Procedure 2 (Cont'd)











Ⓒ

CHECK A/C RELAY AFTER DISCONNECTING IT.
(Refer to Electrical Components Inspection.)

N.G. → Replace A/C relay.

O.K. ↓

Reconnect A/C relay. TD → Ⓔ

KA ↓

J

CHECK COIL SIDE CIRCUIT OF A/C RELAY.
Do approx. 12 volts exist between ECM (ECCS control module) harness terminal No. ⑪ and body ground?

N.G. → **K** Note: Check circuit continuity between A/C relay harness terminal No. ⑫ and ECM (ECCS control module) harness terminal No. ⑪.

O.K. ↓

Ⓔ ↓

L

CHECK VOLTAGE FOR THERMO CONTROL AMP.
Do more than 8 volts exist between thermo control amp. harness terminal No. ⑭ and body ground?

N.G. → **M** Check circuit continuity between thermo control amp. harness terminal No. and dual-pressuret switch terminal No. ⑭.

O.K. ↓

Ⓓ (Go to next page.)

O.K. (TD) ← CHECK DUAL-PRESSURE SWITCH.
(Refer to Electrical Components Inspection.)

O.K. (KA) ↓

N.G. → Replace dual-pressure switch.

N

Check circuit continuity between ECM (ECCS control module) harness terminal No. ㊶ and dual-pressure switch harness terminal No. ⑬. Note

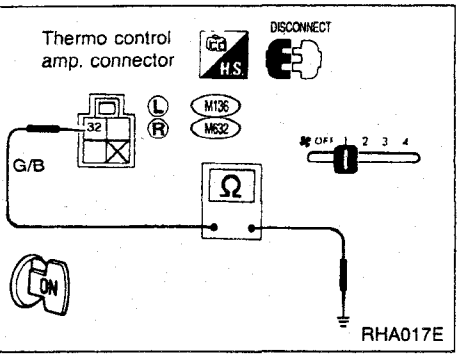
O.K. ↓

CHECK ECM (ECCS CONTROL MODULE).
(Refer to EF & EC section.)

Note:
If the result is N.G. after checking circuit continuity, repair harness or connector.

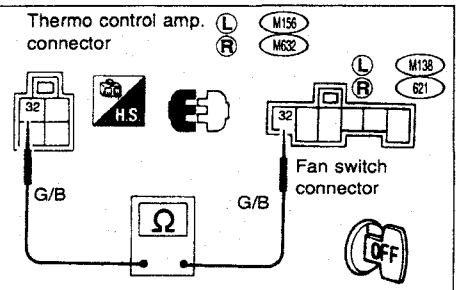
Diagnostic Procedure 2 (Cont'd)

O



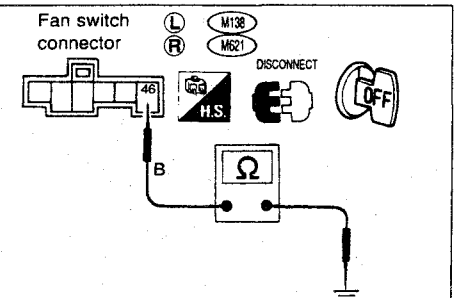
RHA017E

P



RHA018E

Q



RHA019E

Ⓓ

CHECK POWER SUPPLY FOR THERMO CONTROL AMP.
Go to Main Power Supply and Ground Circuit Check.

O.K.

O

CHECK BODY GROUND CIRCUIT FOR THERMO CONTROL AMP.
Disconnect thermo control amp. harness connector.
Does continuity exist between thermo control amp. harness terminal No. ㉜ and body ground?

N.G. → Disconnect fan switch harness connector.

P Note

Check circuit continuity between thermo control amp. harness terminal No. ㉜ and fan switch harness terminal No. ㉜.

O.K.

O.K.

Replace thermo control amp.

Q Note

CHECK BODY GROUND CIRCUIT FOR FAN SWITCH.
Does continuity exist between fan switch harness terminal No. ㊻ and body ground?

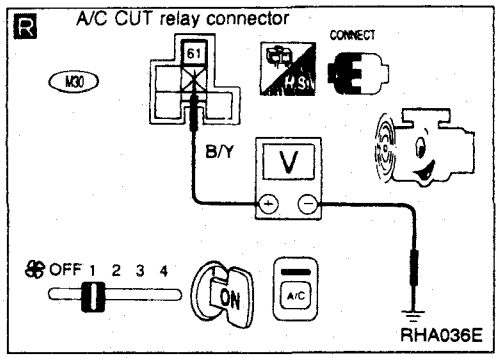
O.K.

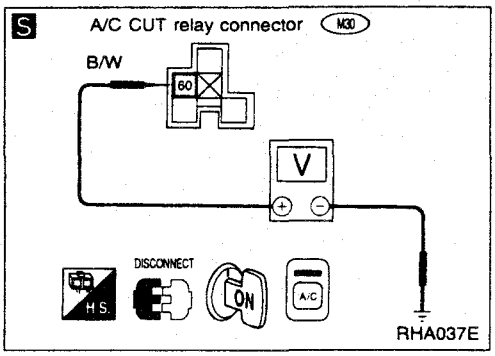
CHECK FAN SWITCH.
(Refer to Electrical Components Inspection.)

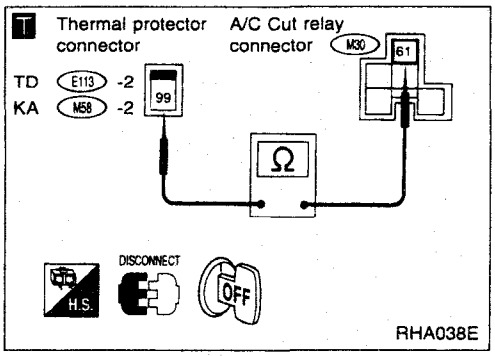
Replace fan switch.

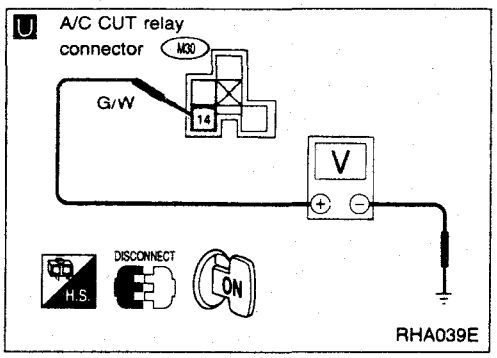
Note:
If the result is N.G. after checking circuit continuity, repair harness or connector.

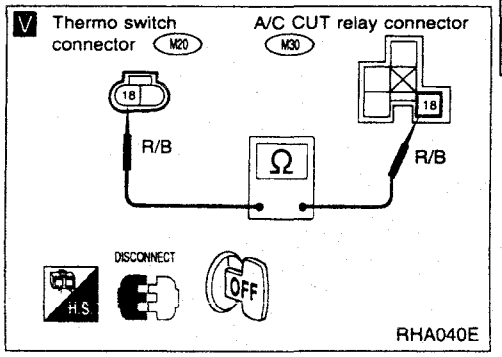
Diagnostic Procedure 2 (Cont'd)











Ⓕ

R

CHECK A/C CUT RELAY OPERATION
Do approx. 12 volts exist between A/C CUT relay harness terminal No. and body ground?

N.G. → S

S

CHECK POWER SUPPLY FOR A/C CUT RELAY.
Disconnect A/C CUT relay.
Do approx. 12 volts exist between A/C CUT relay harness terminal No. ⑥⓪ and body ground?

N.G. → Ⓖ

O.K. → CHECK THERMO SWITCH OPERATION. (Refer to LC section)

N.G. → Replace thermo switch.

O.K.

Disconnect A/C CUT relay harness connector.

T

Note

Check circuit continuity between A/C CUT relay terminal No. and thermal protector harness terminal No. ⑨⑨.

O.K.

U

CHECK POWER SUPPLY FOR A/C CUT RELAY.
Do approx. 12 volts exist between A/C CUT relay harness terminal No. ⑭ and body ground?

N.G. → CHECK POWER SUPPLY CIRCUIT AND 10A FUSE AT FUSE BLOCK (Refer to "POWER SUPPLY ROUTING" in EL section and Wiring Diagram.)

O.K.

CHECK A/C CUT RELAY AFTER DISCONNECTING IT. (Refer to Electrical Components Inspection.)

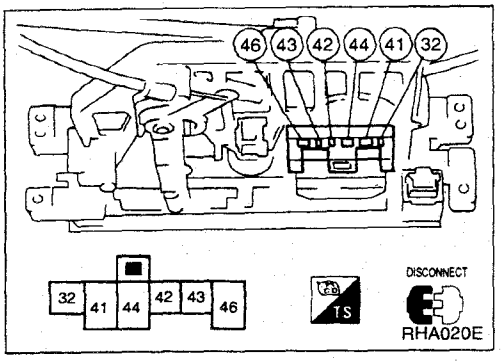
N.G. → Replace A/C CUT relay.

V

Note

Check circuit continuity between A/C CUT relay harness terminal No. ⑱ and thermo switch harness terminal No. ⑱.

Note:
If the result is N.G. after checking circuit continuity, repair harness or connector.

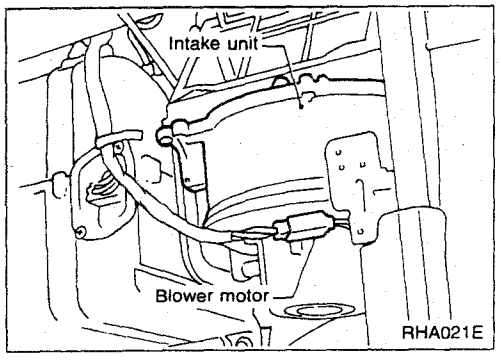


Electrical Components Inspection

FAN SWITCH

Check continuity between terminals at each switch position.

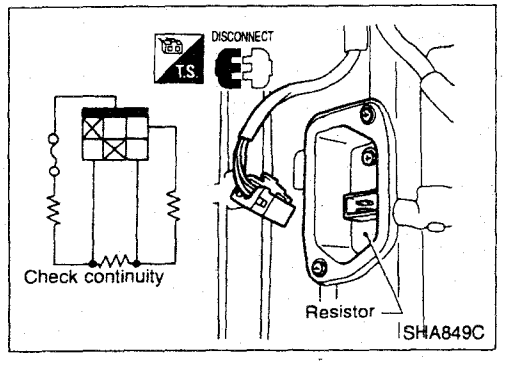
TERMINAL \ LEVER POSITION	OFF	1	2	3	4
41					○
43		○			○
42		○	○		
44				○	
46		○	○	○	○
32		○	○	○	○



BLOWER MOTOR

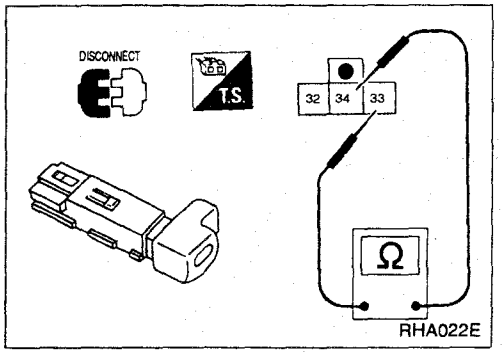
Confirm smooth rotation of the blower motor.

- Ensure that there are no foreign particles inside the intake unit.



BLOWER RESISTOR

Check continuity between terminals.

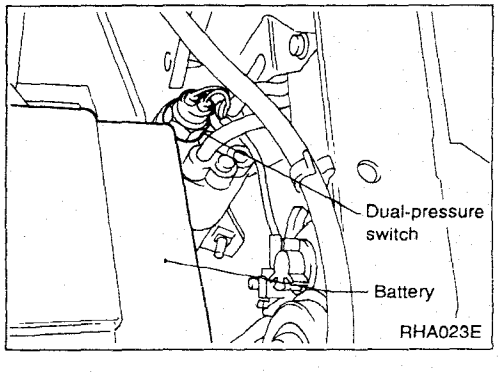


A/C SWITCH

Check continuity between terminals at each switch position.

	ON	OFF
32	○	
33	○	
34	○	

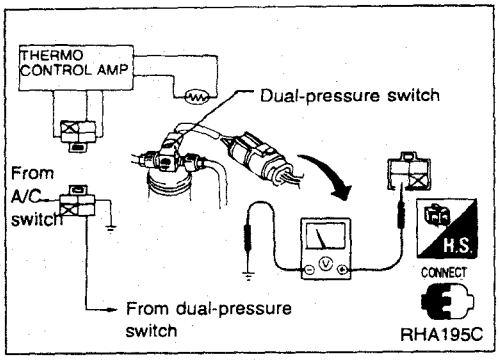
A/C indicator lamp



DUAL-PRESSURE SWITCH

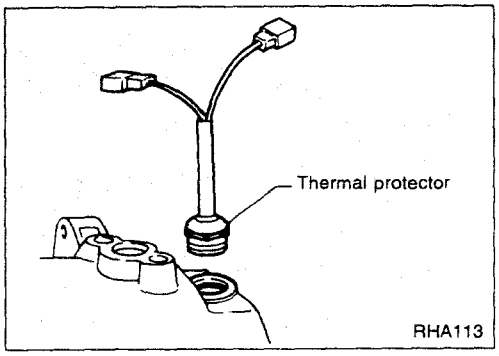
High-pressure side line pressure kPa (kg/cm², psi)	Operation	Continuity
Decreasing to 157 - 216 (1.6 - 2.2, 23 - 31) Increasing to 2,452 - 2,844 (25 - 29, 356 - 412)	Turn OFF	Does not exist
Increasing to 157 - 235 (1.6 - 2.4, 23 - 34) Decreasing to 1,863 - 2,256 (19 - 23, 270 - 327)	Turn ON	Exists

Electrical Components Inspection (Cont'd)



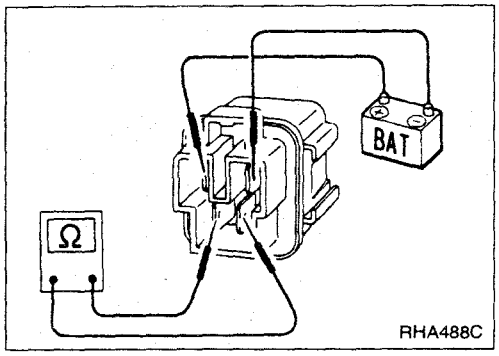
THERMO CONTROL AMP.

Evaporator outlet air temperature °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



THERMAL PROTECTOR

Temperature of compressor °C (°F)	Operation
Increasing to approx. 145 - 155 (293 - 311)	Turn OFF
Decreasing to approx. 130 - 140 (266 - 284)	Turn ON



A/C RELAY A/C CUT RELAY

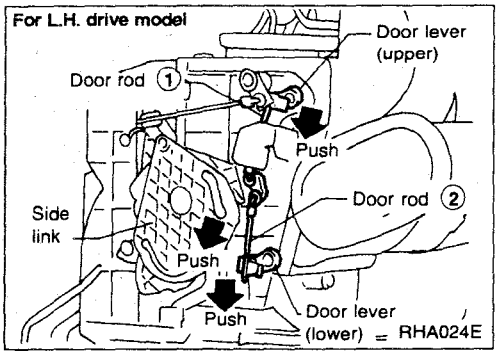
Check circuit continuity between terminals by supplying 12 volts to coil side terminal of relay.

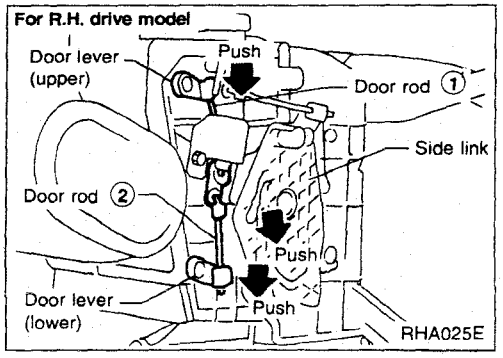
Refer to EL section for Description.

Control Linkage Adjustment

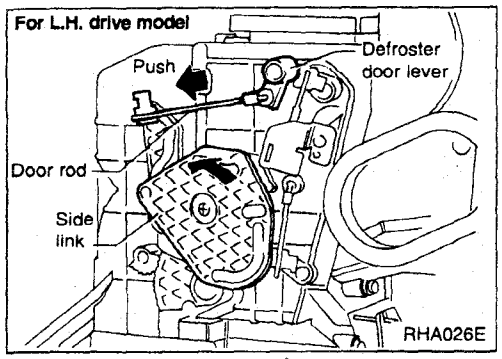
VENTILATOR DOOR CONTROL ROD

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.



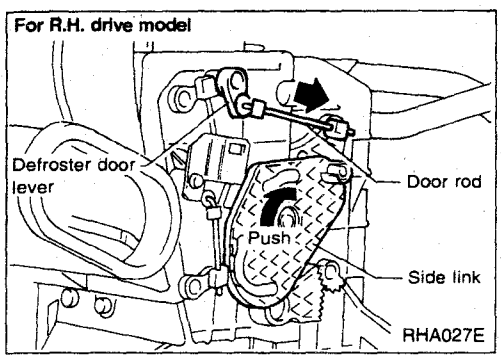


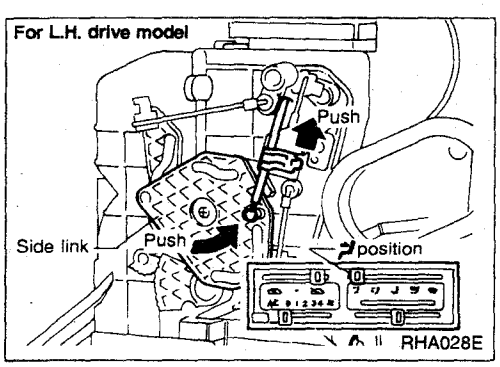
Control Linkage Adjustment (Cont'd)



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.

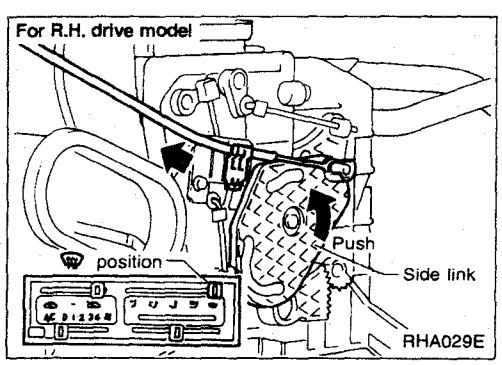




AIR CONTROL CABLE

For L.H. drive model

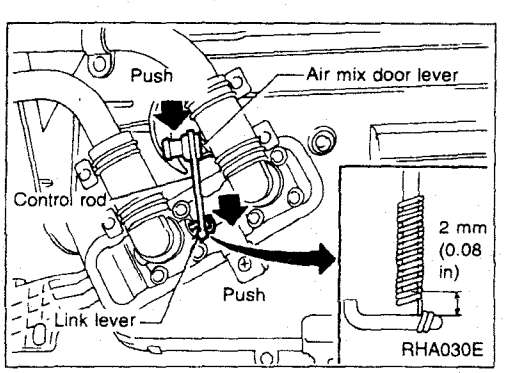
- Move air control lever to position.
  Set side link in VENT mode.
  Pull outer cable in direction of arrow and then clamp it.



For R.H. drive model

- Move air control lever to position.
  Set side link in DEF mode.
  Pull outer cable in direction of arrow and then clamp it.

After positioning control cable, check that it operates properly.



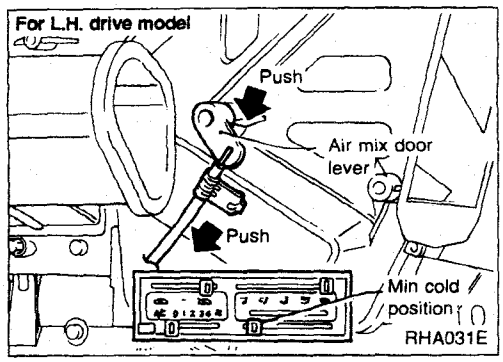
WATER COCK CONTROL ROD

- **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.

After connecting control rod, check that it operates properly.

Control Linkage Adjustment (Cont'd)

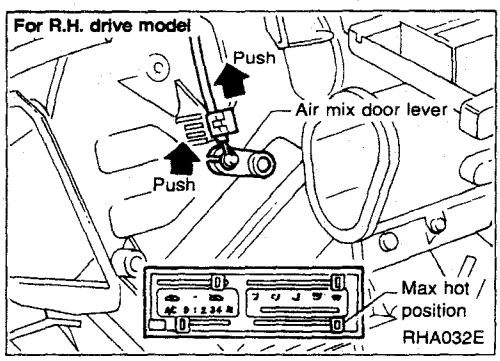


TEMPERATURE CONTROL CABLE

- **When adjusting ventilator door rod and defroster door rod, first disconnect air control cable from side link. Reconnect and readjust air control cable.**

For L.H. drive model

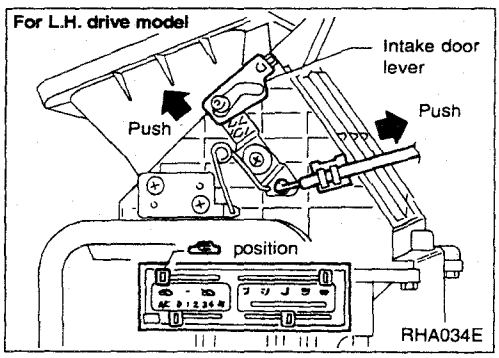
- Move temperature control lever to max. COLD position. Set air mix door lever in full cold mode. Pull outer cable in direction of arrow and then clamp it.



For R.H. drive model

- Move temperature control lever to max. HOT position. Set air mix door lever in full hot mode. Pull outer cable in direction of arrow and then clamp it.

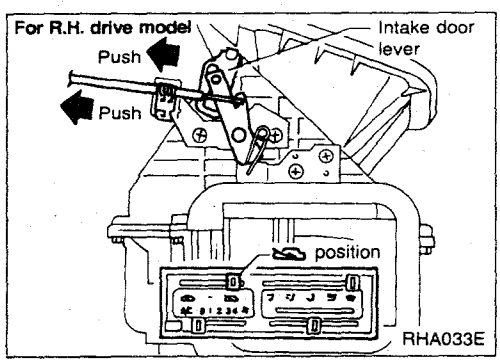
After positioning control cable, check it operates properly.



For L.H. drive model

- Move intake door lever to position.
  Set intake door lever in REC mode.
  Pull outer cable in direction of arrow and then clamp it.

After positioning control cable, check it operates properly.



INTAKE DOOR CONTROL CABLE

For R.H. drive model

- Move intake door lever to position.
  Set intake door lever in FRESH mode.
  Pull outer cable in direction of arrow and then clamp it.

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	A type

LUBRICATION OIL

Model	ZEXEL make DKV-14C
Name	Nissan A/C System Oil Type R
Part number	KLH00-PAGR0
Capacity mℓ (US fl oz, Imp fl oz)	
Total in system	200 (6.8, 7.0)
Compressor (Service parts) charging amount	200 (6.8, 7.0)

REFRIGERANT

Type		R134a
Capacity	kg (lb)	0.70 - 0.80 (1.54 - 1.76)

Inspection and Adjustment

ENGINE IDLING SPEED

When A/C is ON (F.I.C.D. is actuated)
Refer to EF & EC section.

BELT TENSION

Refer to Checking Drive Belts (MA section).

COMPRESSOR

Model	DKV-14C
Clutch disc-to-pulley clearance mm (in)	0.3 - 0.6 (0.012 - 0.024)

ELECTRICAL SYSTEM

SECTION EL

ELECTRICAL SYSTEM

SECTION EL

When you read wiring diagrams:
- **Read GI section, "HOW TO READ WIRING DIAGRAMS".**

CONTENTS

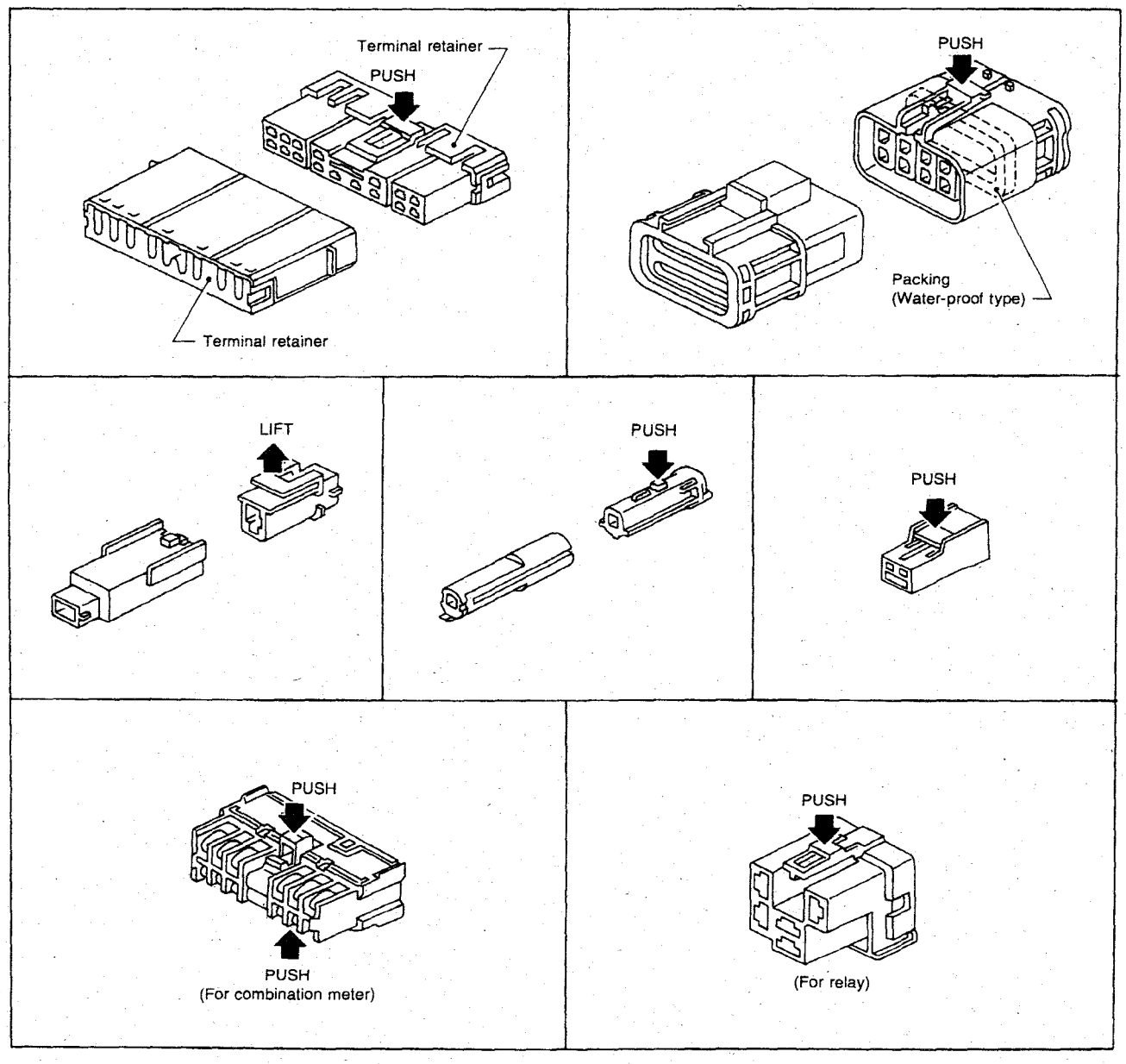
WIRING DIAGRAM REFERENCE CHART

Description

HARNESS CONNECTOR

- All harness connectors have been modified to prevent accidental looseness or disconnection.
- The connectors can be disconnected by pushing or lifting the locking section.

CAUTION:
Do not pull the harness when disconnecting the connector.
[Example]

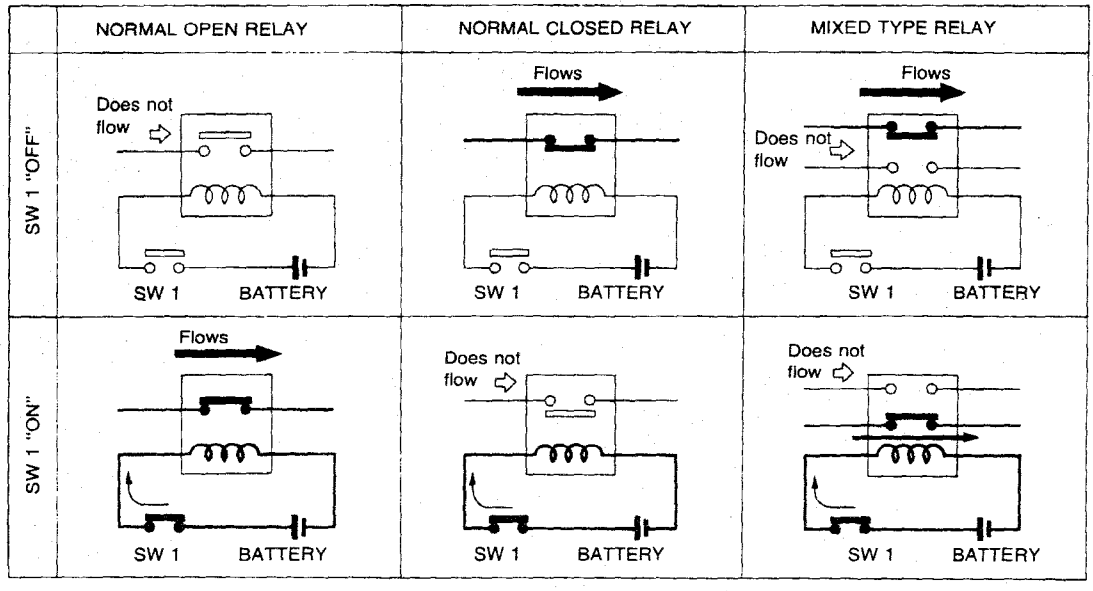


SEL769D

Description

NORMAL OPEN, NORMAL CLOSED AND MIXED TYPE RELAYS

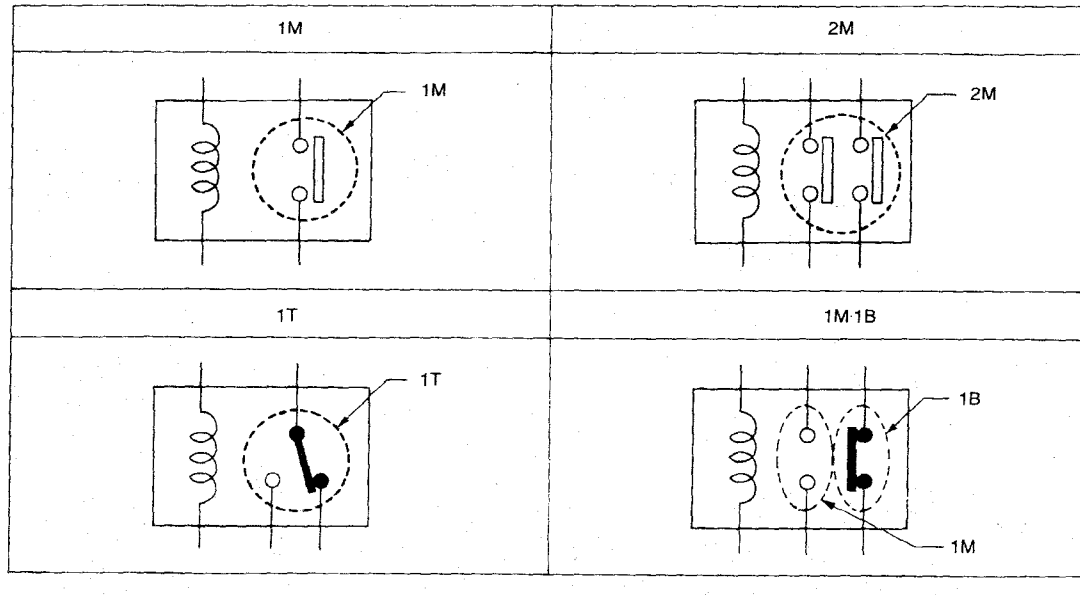
Relays can mainly be divided into three types: normal open, normal closed and mixed type relays.



SEL881H

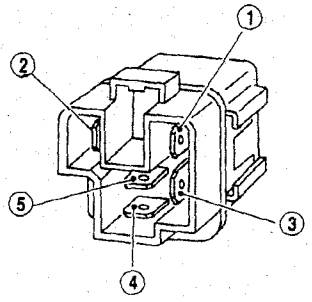
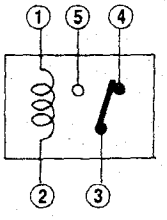
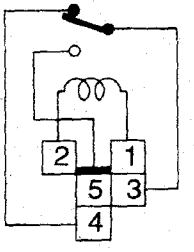
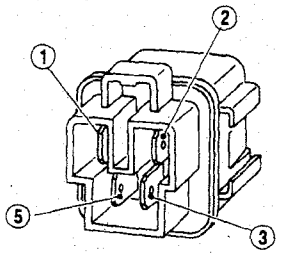
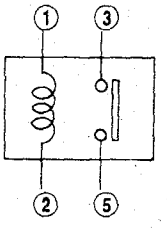
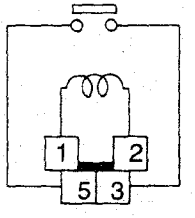
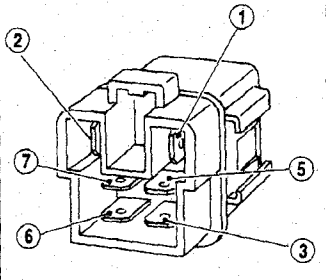
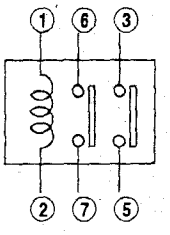
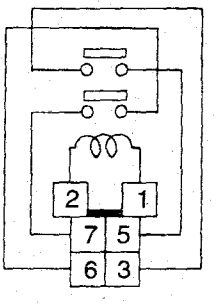
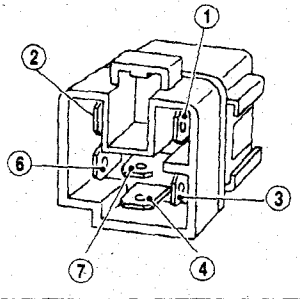
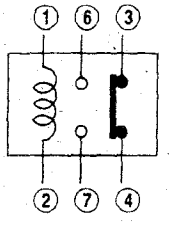
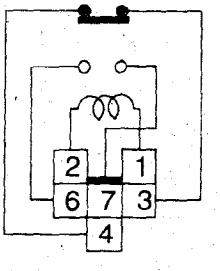
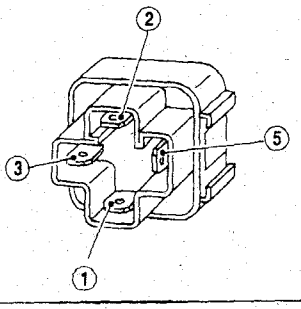
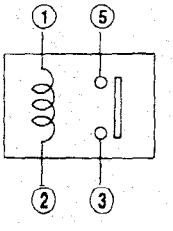
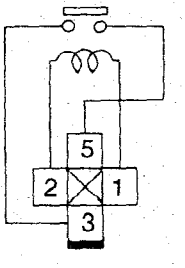
TYPES OF STANDARDIZED RELAYS

1M	.....	1 Make	2M	.....	2 Make
1T	.....	1 Transfer	1M ± 1B	.....	1 Make 1 Break



SEL882H

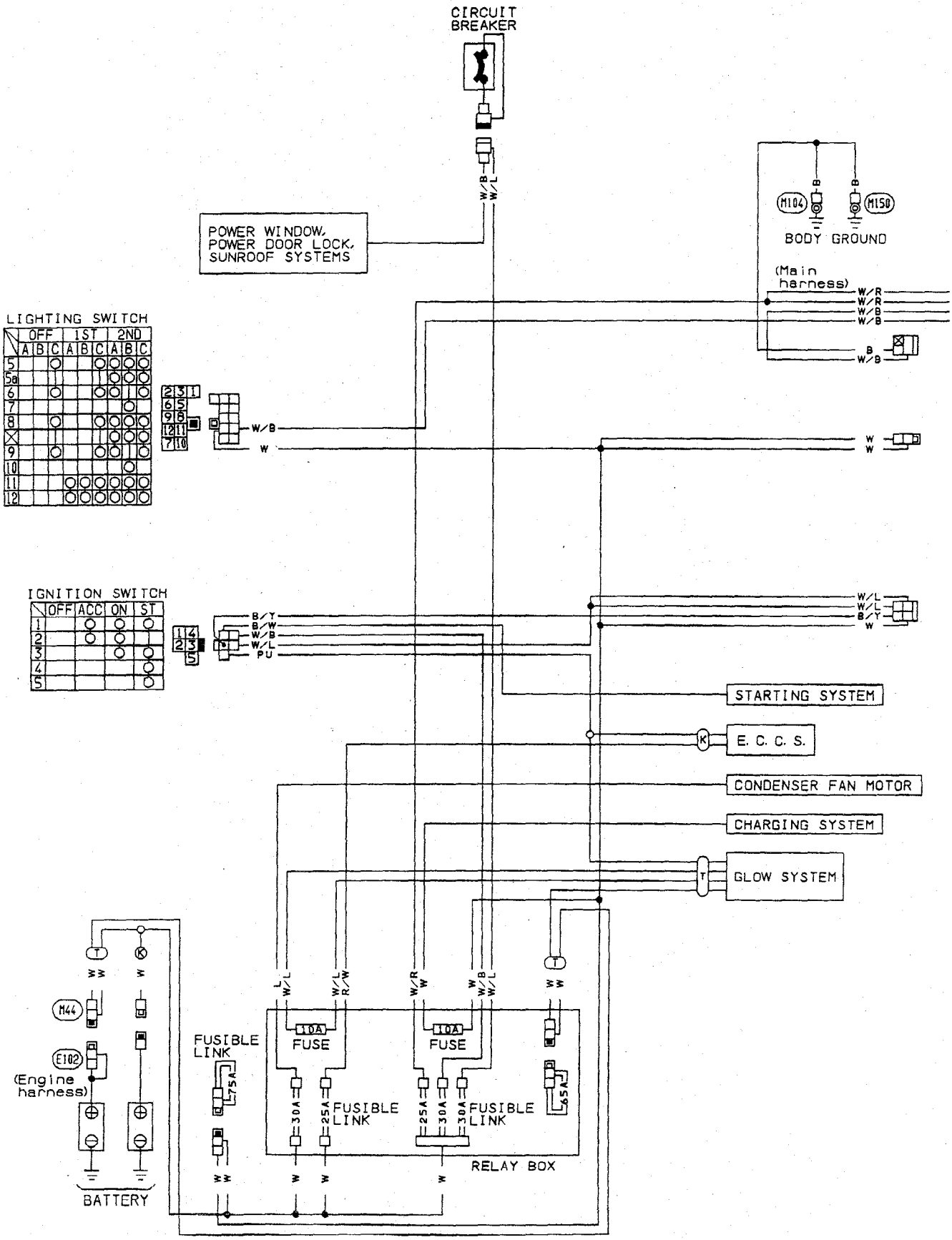
Description (Cont'd)

Type	Outer view	Circuit	Connector symbol and connection	Case color
1T				BLACK
1M				BLUE or GREEN
2M				BROWN
1M·1B				GRAY
1M				BLACK

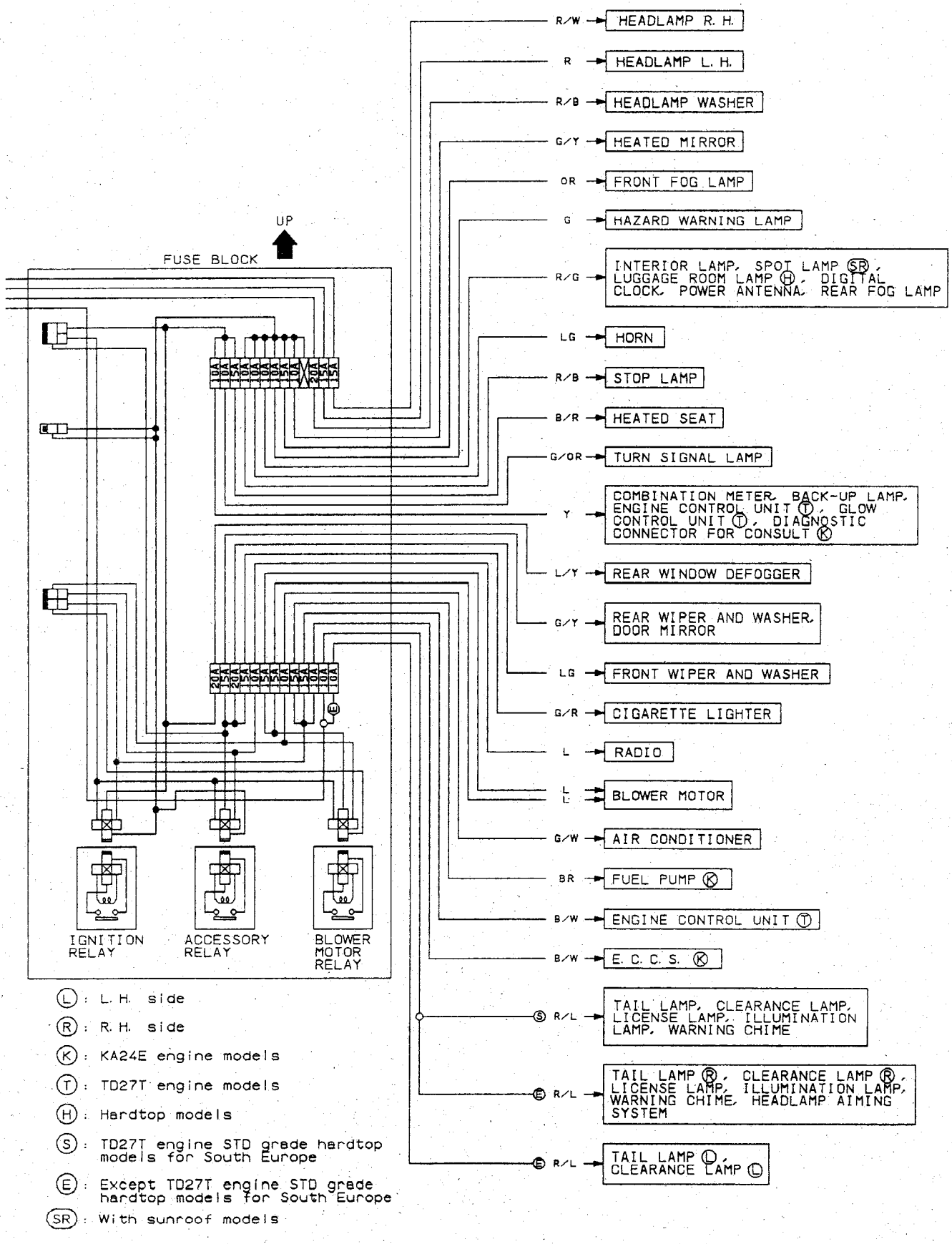
MEL202B

Wiring Diagram

L.H.D. MODELS (WITHOUT DAYTIME LIGHT SYSTEM)



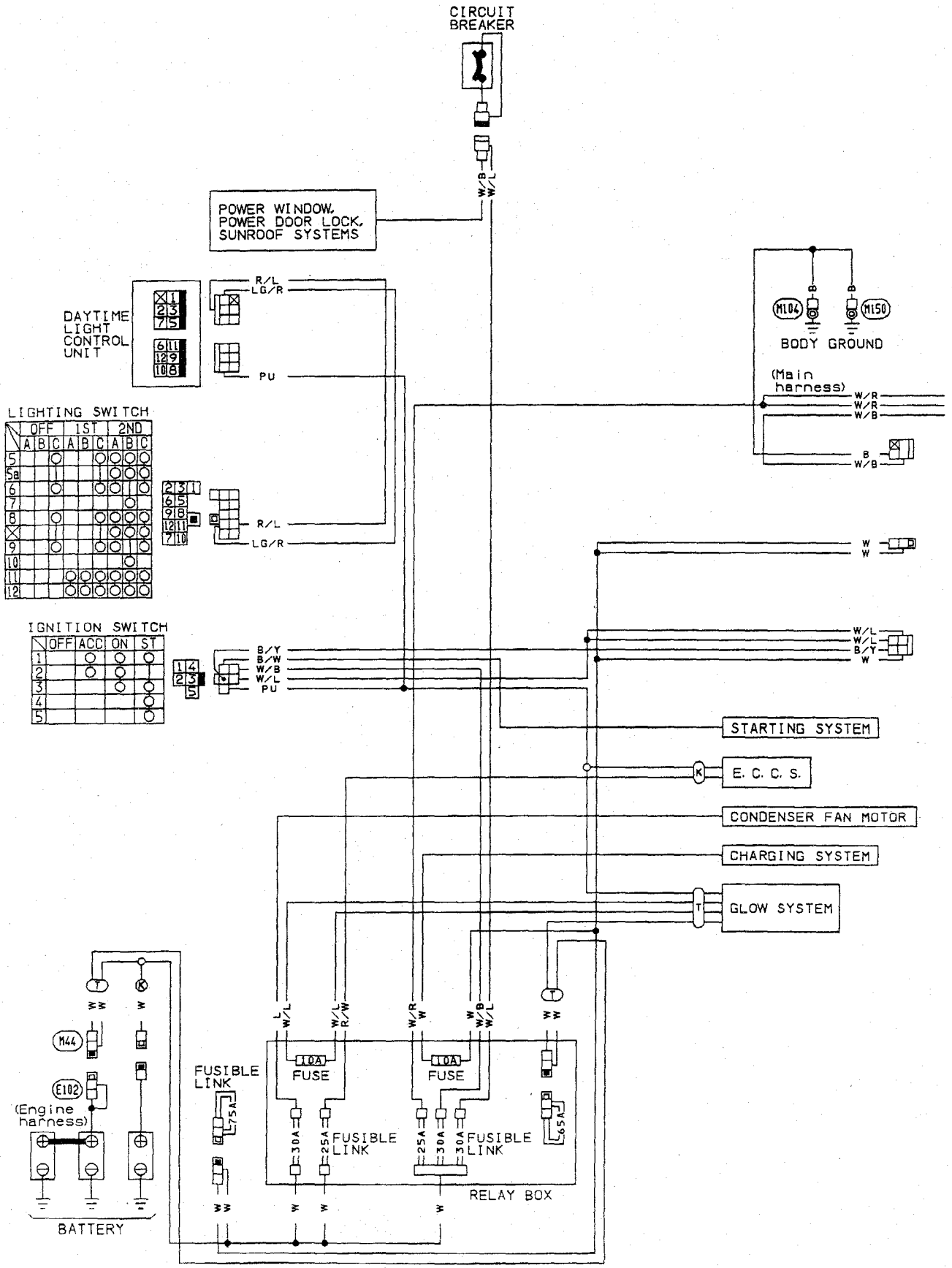
Wiring Diagram (Cont'd)



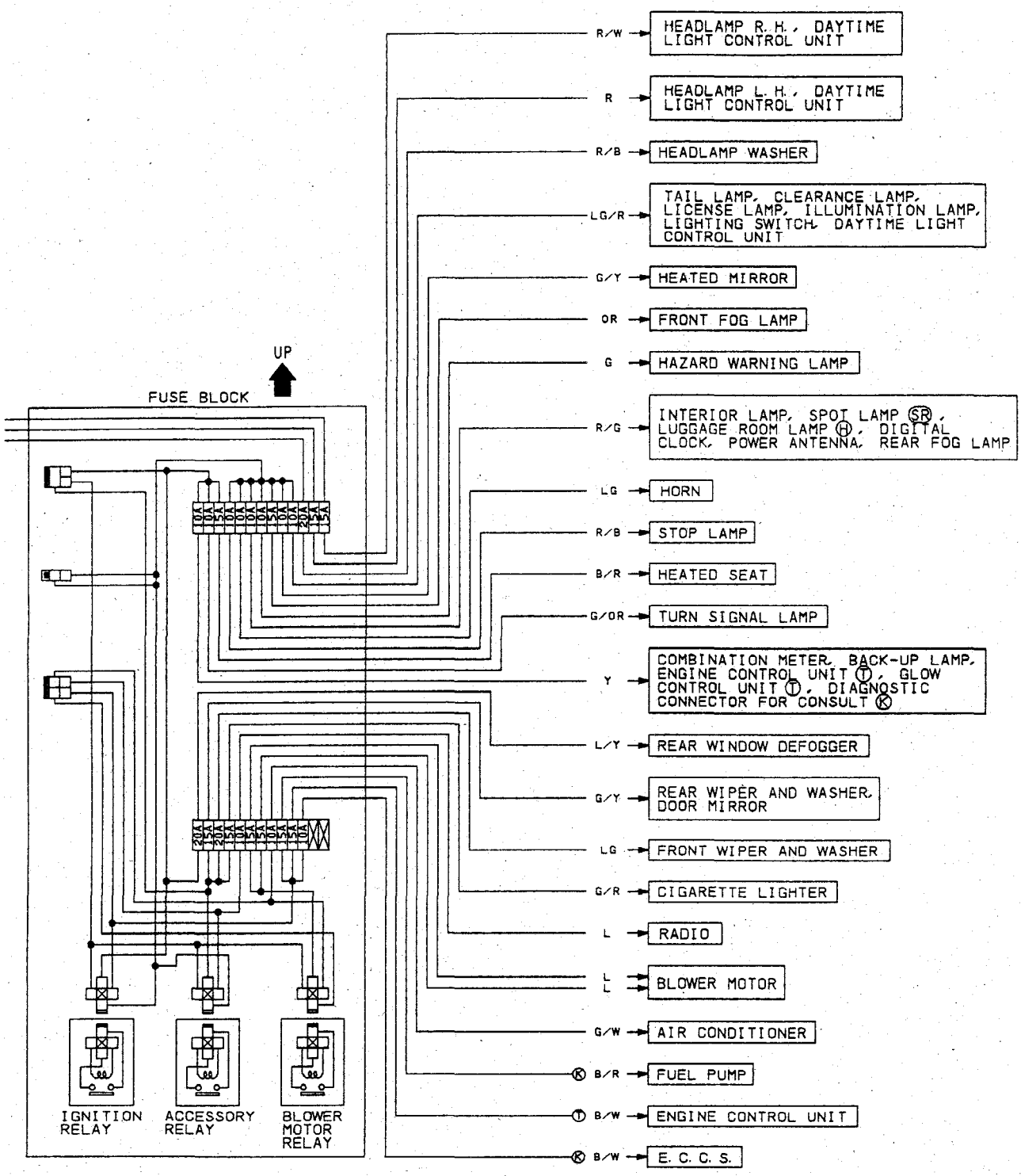
YEL016

Wiring Diagram (Cont'd)

L.H.D. MODELS (WITH DAYTIME LIGHT SYSTEM)



Wiring Diagram (Cont'd)



(K) : KA24E engine models

(T) : TD27T engine models

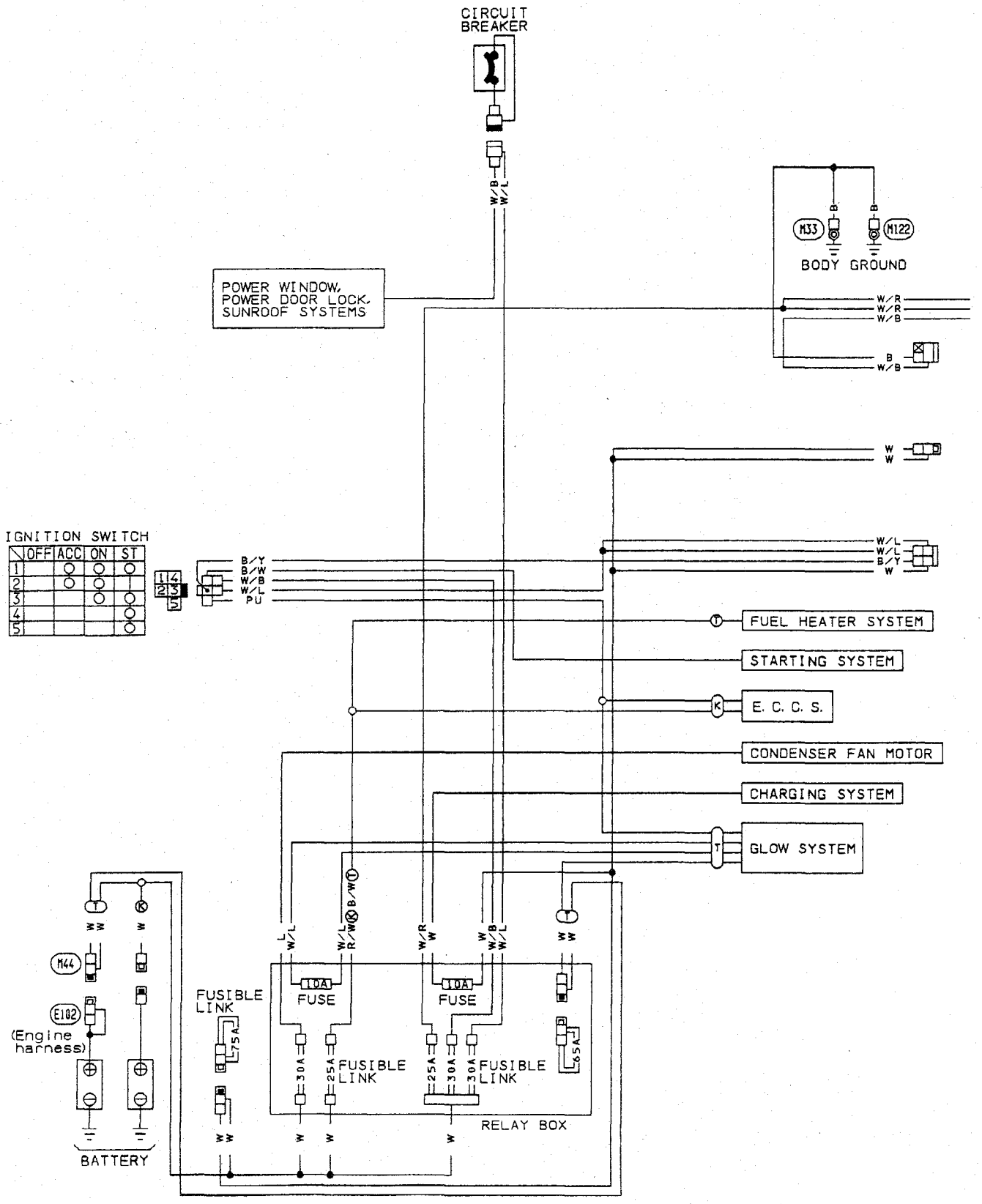
(SR) : With sunroof models

(H) : Hardtop models

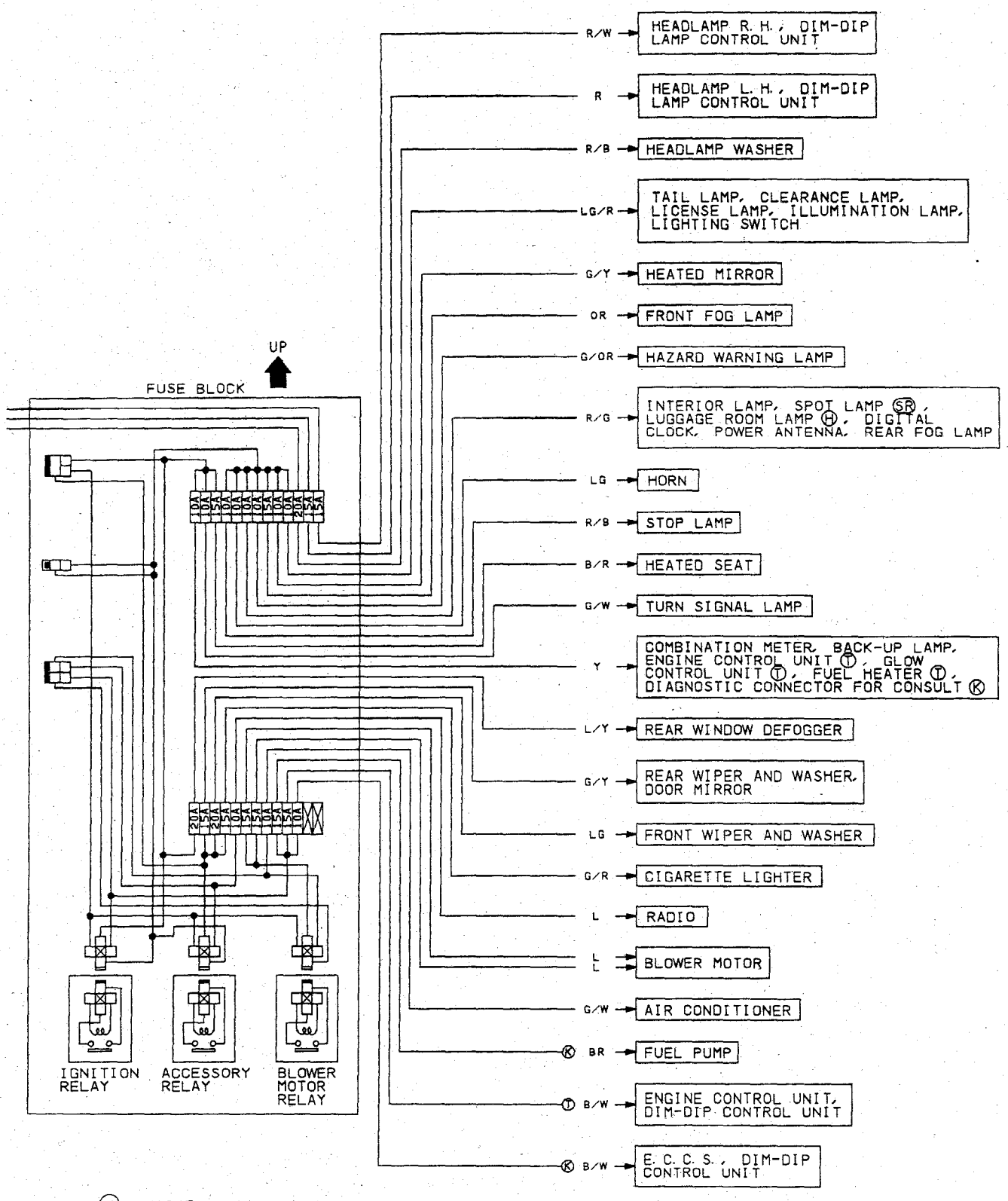
YEL017

Wiring Diagram (Cont'd)

R.H.D. MODELS

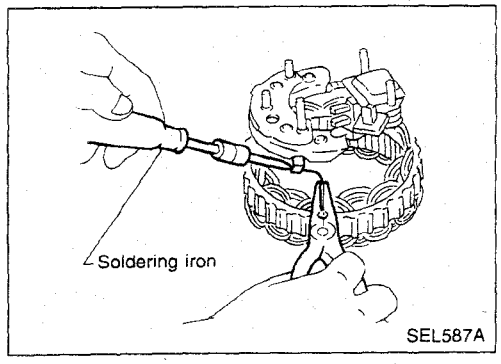


Wiring Diagram (Cont'd)



(K) : KA24E engine models
(T) : TD27T engine models
(SR) : With sunroof models
(H) : Hardtop models

YEL018

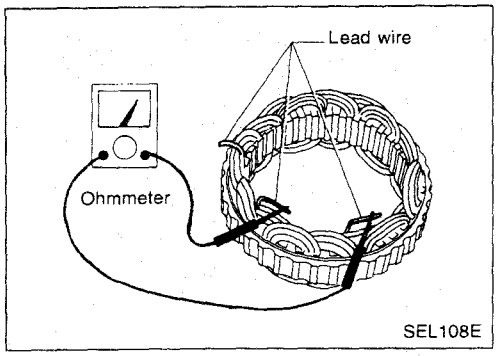


Stator Check

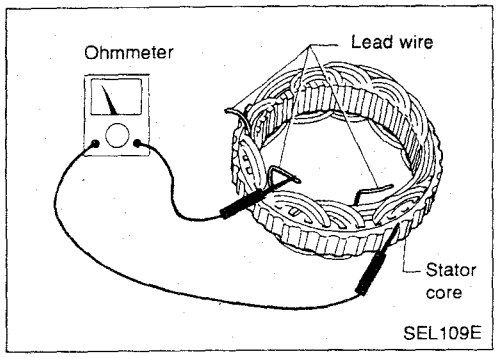
To test the stator or diode, separate them by unsoldering the connecting wires.

CAUTION:

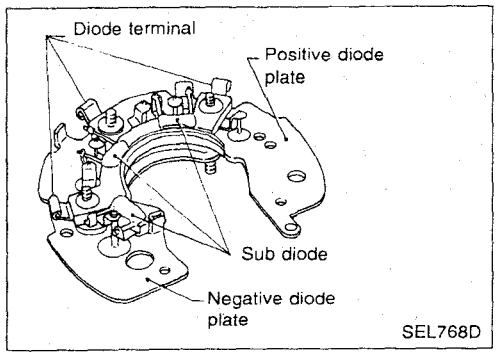
Use only as much heat as required to melt solder. Otherwise, diodes will be damaged by excessive heat.



1. Continuity test
   - No continuity ... Replace stator.



2. Ground test
   - Continuity exists ... Replace stator.

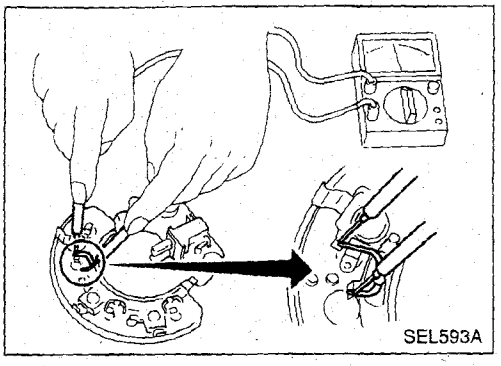


MAIN DIODES

- 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 ⊖**	
Positive diode plate	Diode terminals	Yes
Diode terminals	Positive diode plate	No
Negative diode plate	Diode terminals	No
Diode terminals	Negative diode plate	Yes

Stator Check (Cont'd)


SEL593A

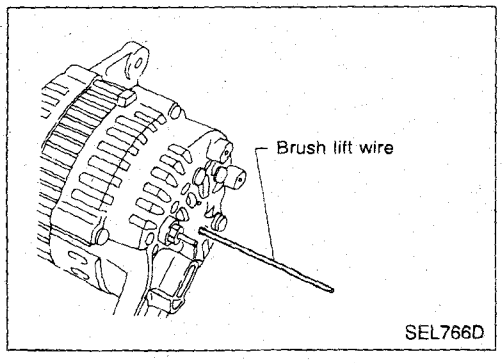
SUB-DIODES

- 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.

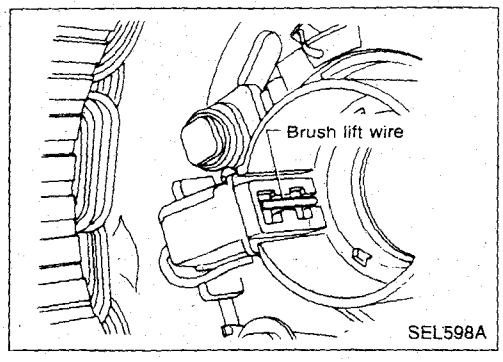
- When soldering each stator coil lead wire to diode assembly terminal, carry out the operation as fast as possible.



SEL766D

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.



SEL598A

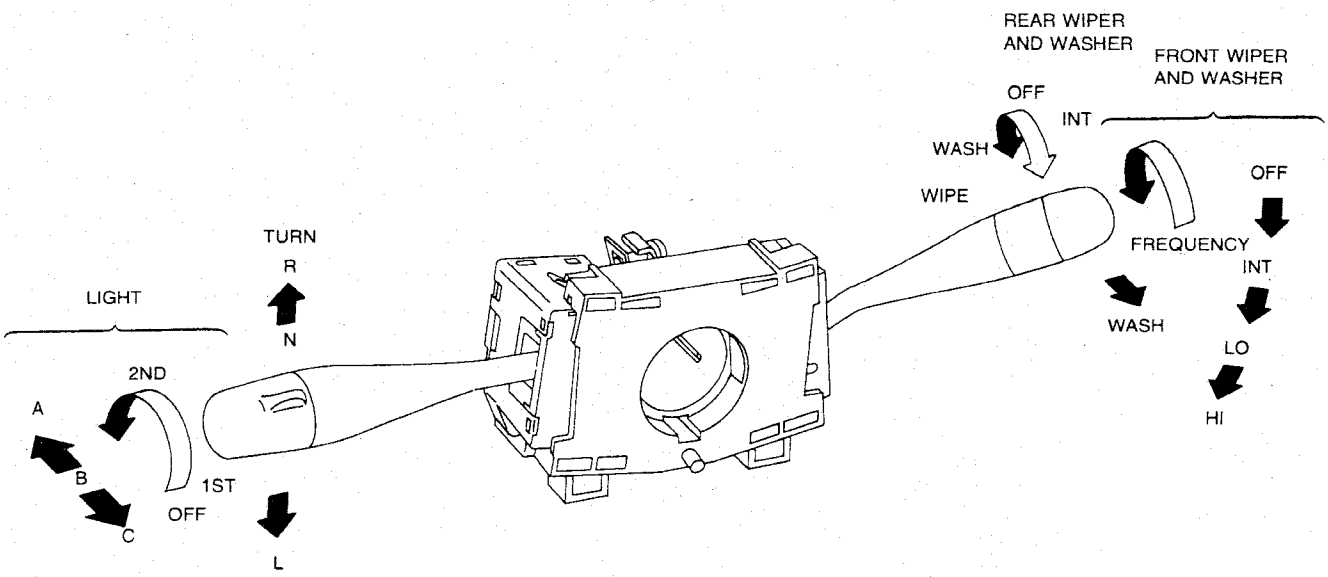
Service Data and Specifications (S.D.S.)

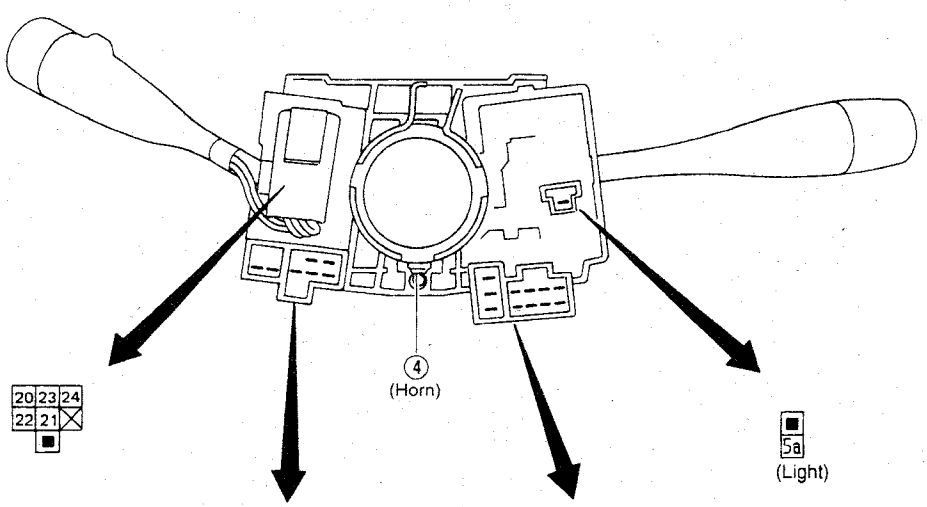
ALTERNATOR

Type		LR170-407T	9.120.334.632	0.123.115.008
		HITACHI	BOSCH	
Engine		TD27T		KA24E
		North Europe	Rest of Europe	
Nominal rating	V-A	12-70	12-60	12-65
Ground polarity		Negative		
Minimum revolution under no-load (When 13.5 volts is applied)	rpm	1,000	1,050	
Hot output current	A/rpm	23/1,300	17.5/1,300	24/1,500
		63/2,500	48.5/2,500	54/2,500
		87/5,000	60.5/5,000	65/5,000
Regulated output voltage	V	14.1 - 14.7		

NOTE

Check





(Intermittent wiper frequency, rear wiper and washer)

20	23	24
22	21	

(Front wiper and washer)

					19	18
13	14	15	16	17		

(Light and turn)

		1				
3	5	8	11	10		
2	6	9	12	7		

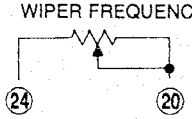
LIGHTING SWITCH

	OFF			1ST			2ND		
	A	B	C	A	B	C	A	B	C
5			○			○	○	○	○
5a			|			|	○	○	○
6			○			○	○	○	○
7								○	
8			○			○	○	○	○
⊠			|			|	○	○	○
9			○			○	○	○	○
10								○	
11				○	○	○	○	○	○
12				⊠	○	○	○	○	⊠

FRONT WIPER AND WASHER SWITCH

	OFF	INT	LO	HI	WASH
13	○	○			
14	○	○	○		
15		○	|		
16		|	|	○	
17		○	○	○	
18					○
19					○

INTERMITTENT WIPER FREQUENCY



REAR WIPER AND WASHER SWITCH
(WITH INTERMITTENT REAR WIPER)

	WIPE WASH	OFF	INT	WIPE
21			○	
22			|	○
23	○		|	|
24	○		○	○

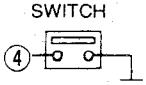
(Without intermittent rear wiper)

	WIPE WASH	OFF	WIPE	WASH
21	○		○	
23	○		|	○
24	○		○	○

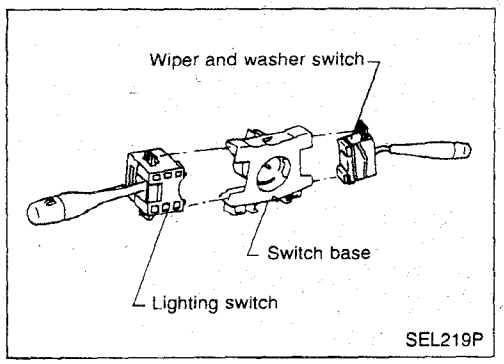
TURN SIGNAL SWITCH

	L	N	R
1	○		○
2	|		○
3	○		

HORN SWITCH

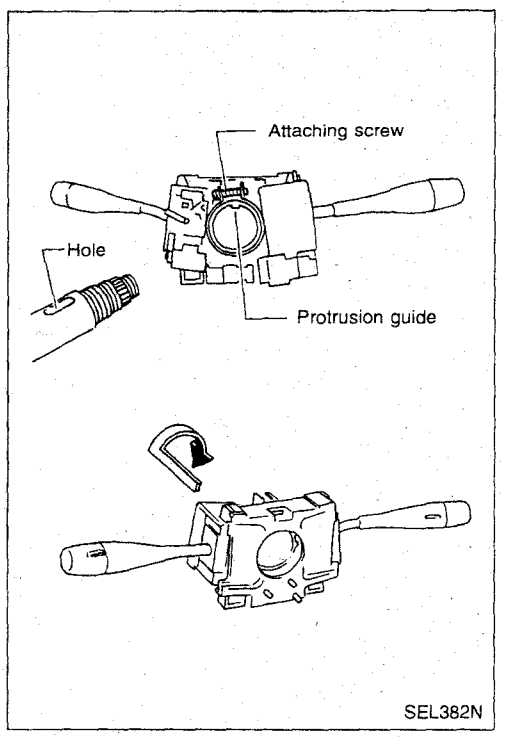


YEL065



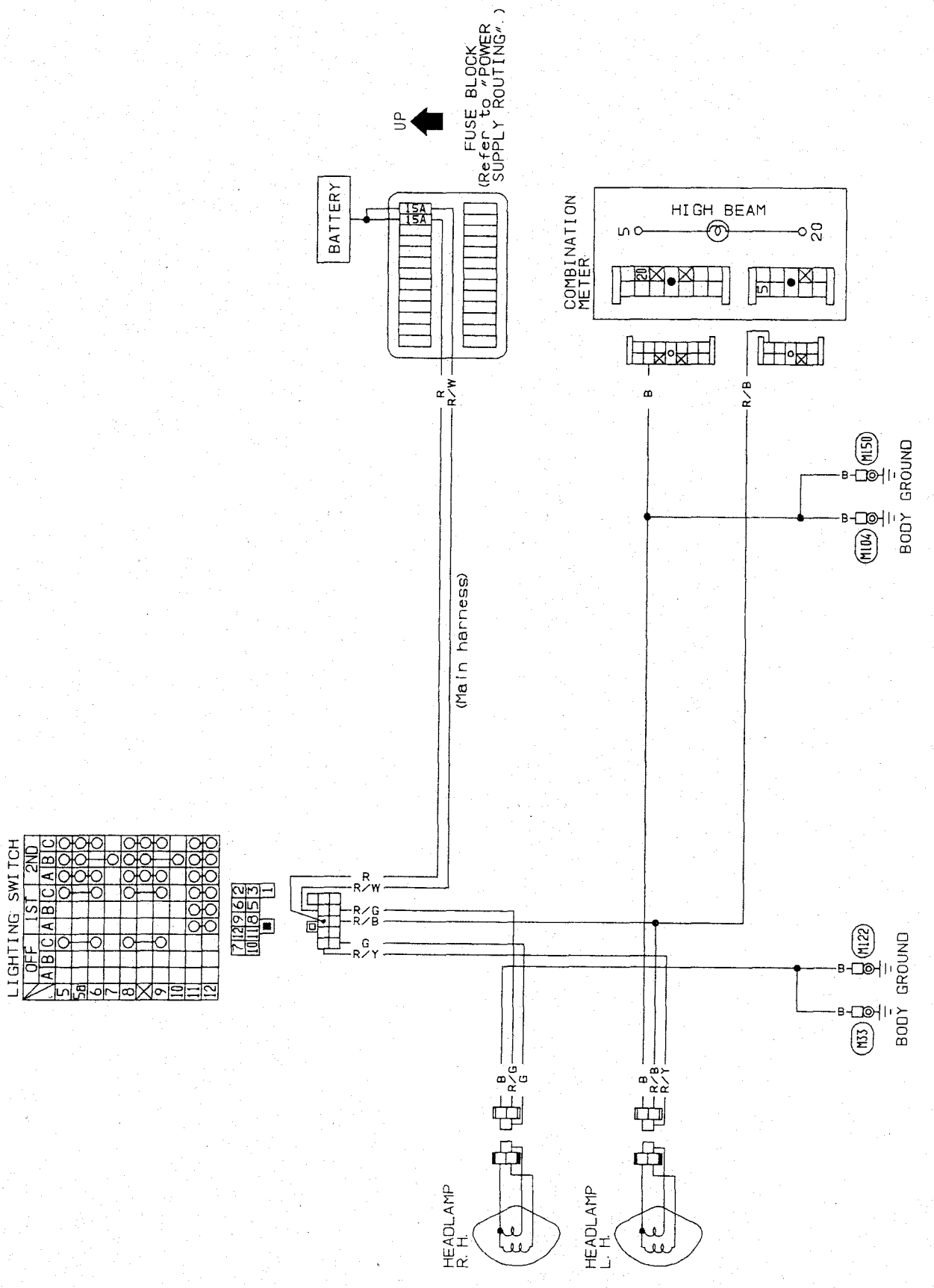
Replacement

- Each switch can be replaced without removing combination switch base.



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

Wiring Diagram



YEL023

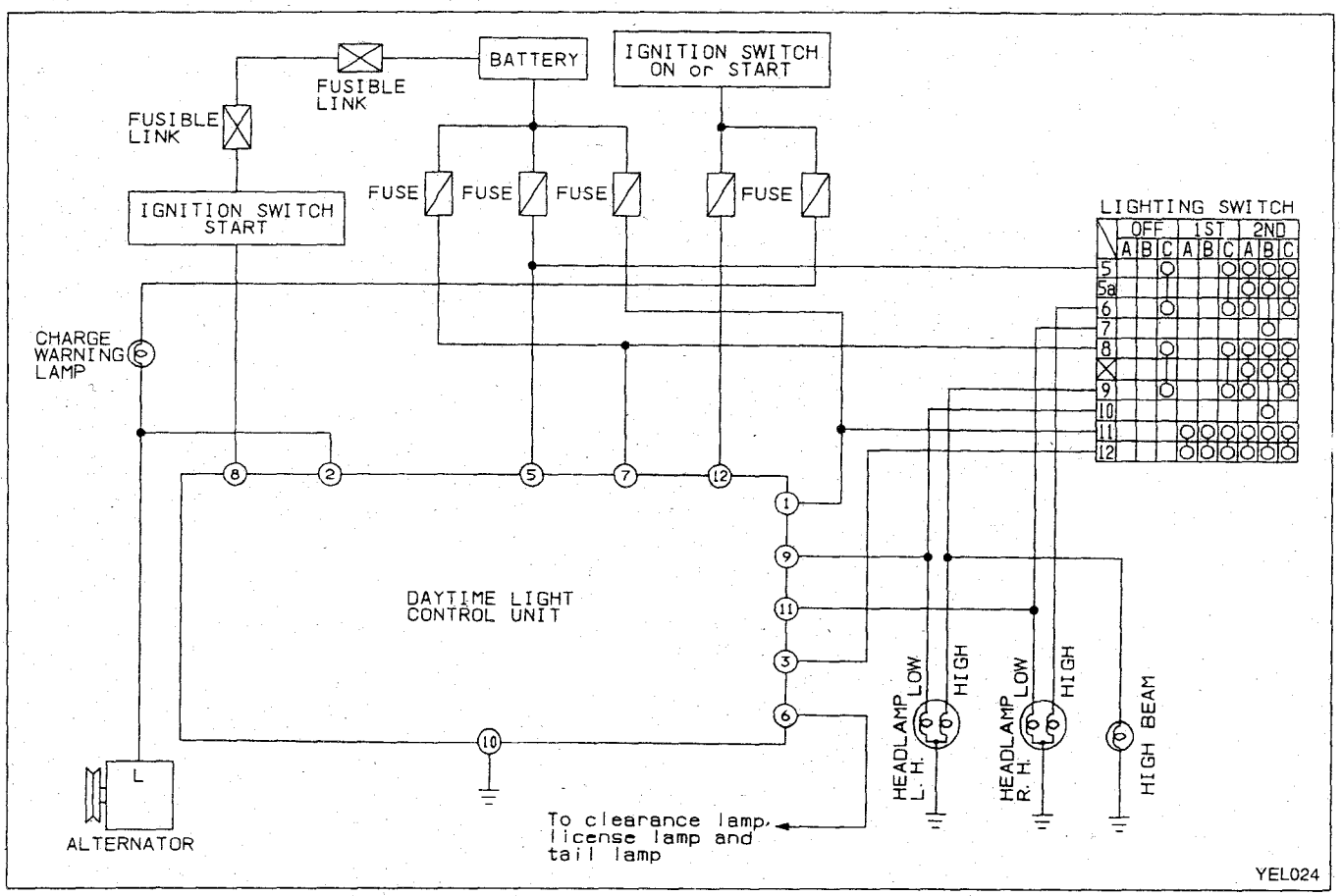
Operation

After starting the engine with the lighting switch in the "OFF" position, the headlamp low beam and clearance, tail, license and instrument illumination lamps automatically turn on. Lighting switch operations other than the above are the same as conventional light systems.

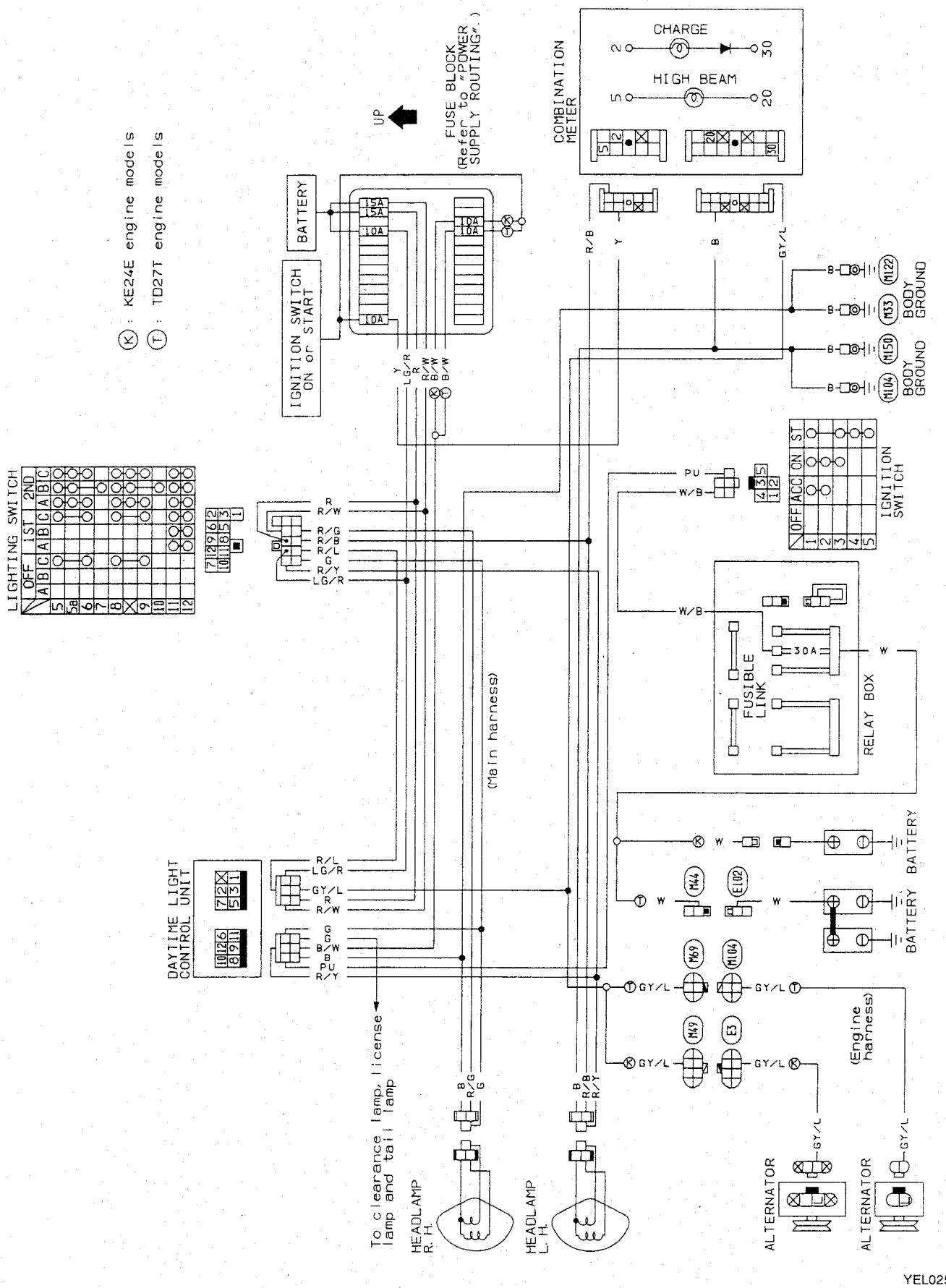
Engine		With engine stopped									With engine running								
Lighting switch		OFF			1ST			2ND			OFF			1ST			2ND		
		A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C
Headlamp	High beam	X	X	O	X	X	O	O	X	O	X	X	O	X	X	O	O	X	O
	Low beam	X	X	X	X	X	X	X	O	X	O	O	O	X	X	X	X	O	X
Clearance and tail lamp		X	X	X	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
License and instrument illumination lamp		X	X	X	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O

O: Lamp "ON"
X: Lamp "OFF"
□: Added functions

Schematic



Wiring Diagram



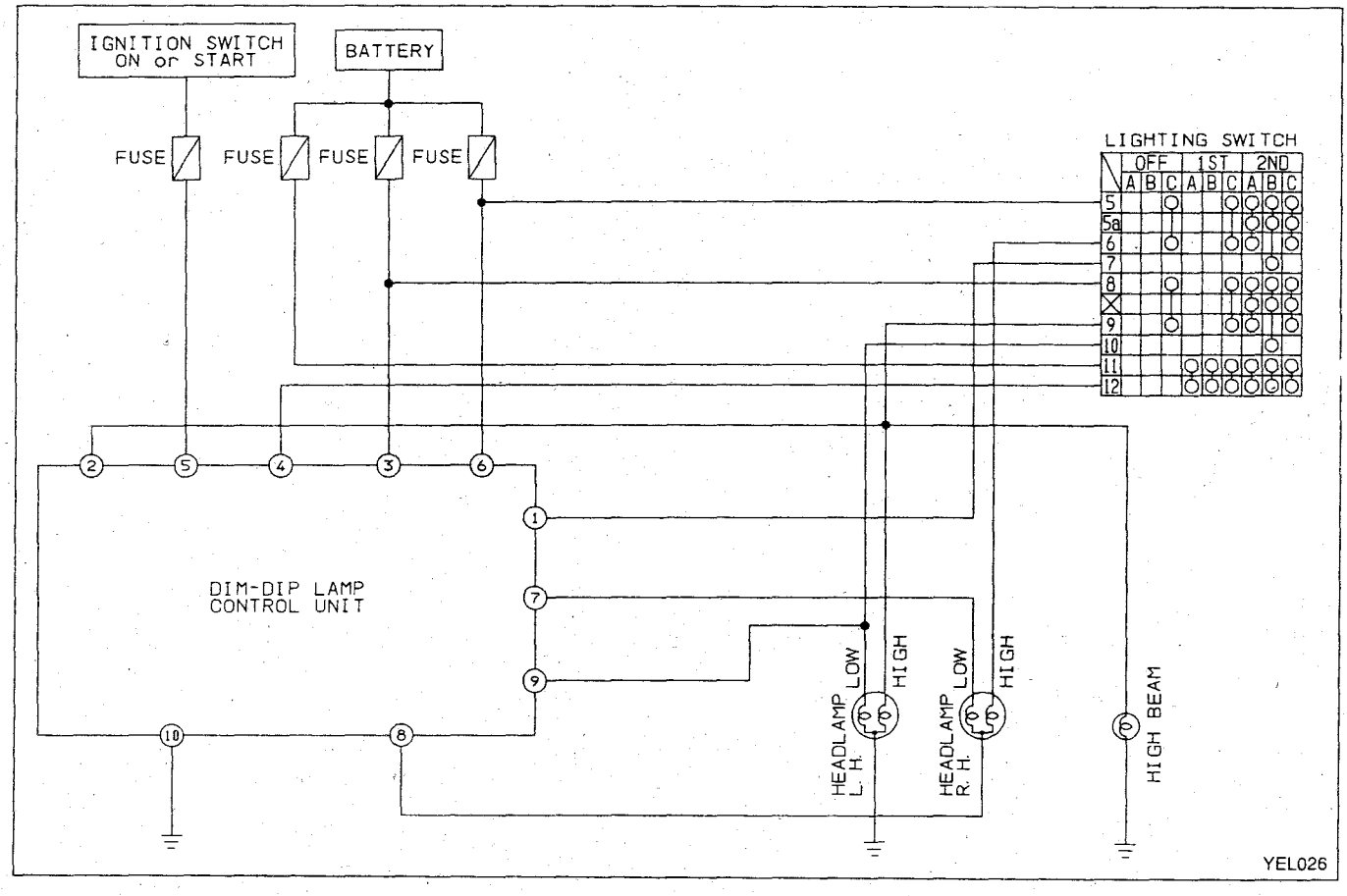
Operation

When ignition switch is in the "ON" position with the lighting switch in the "1ST" position, the headlamp low beam comes on dimly to function as a clearance lamp. Lighting switch operations other than the above are the same as conventional light systems.

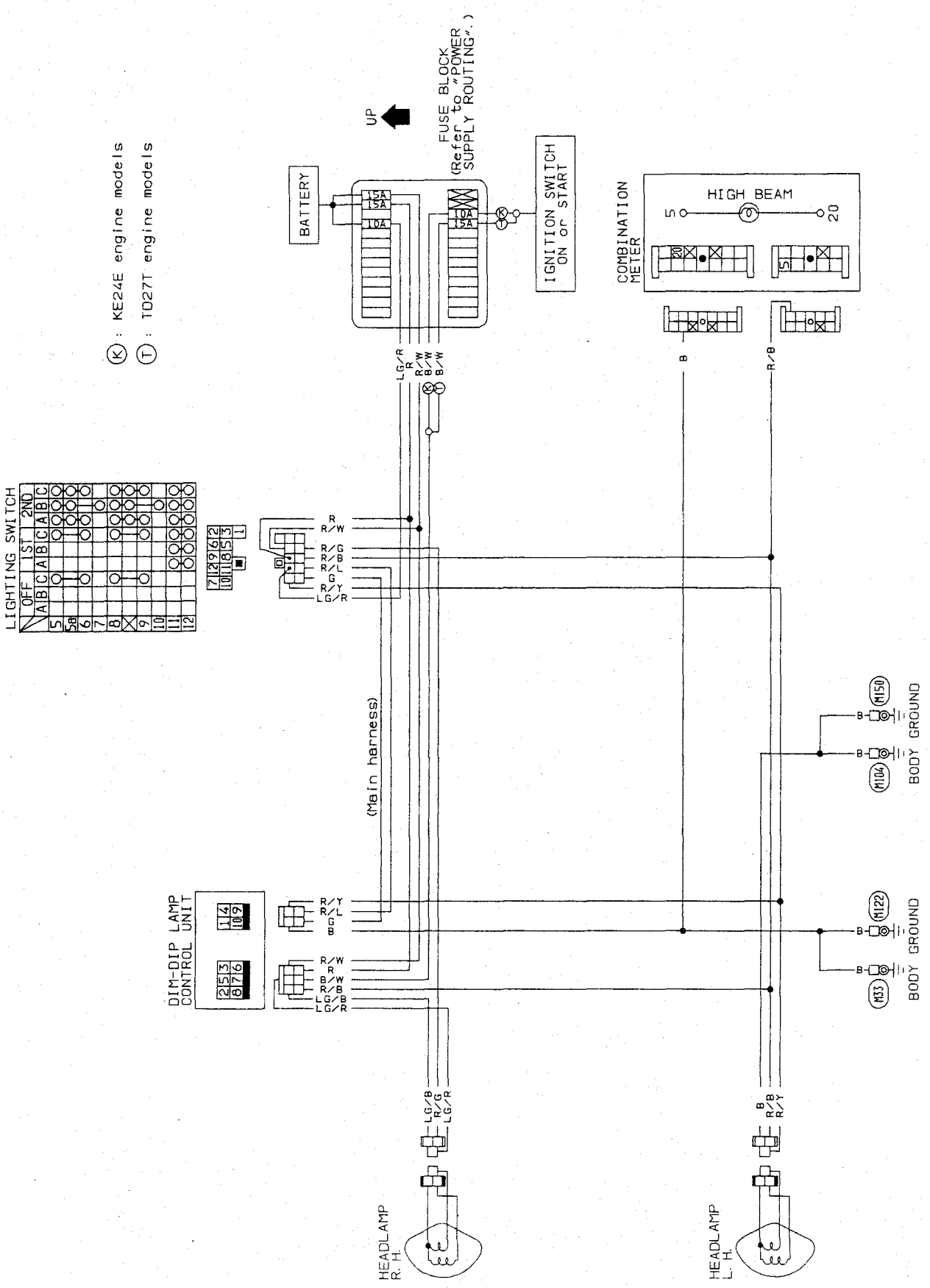
Ignition switch		OFF or ACC									ON								
Lighting switch		OFF			1ST			2ND			OFF			1ST			2ND		
		A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C
Headlamp	High beam	X	X	O	X	X	O	O	X	O	X	X	O	X	X	O	O	X	O
	Low beam	X	X	X	X	X	X	X	O	X	X	X	X	X	X	X	X	O	X
	Dim-dip (Low beam)	X	X	X	X	X	X	X	X	X	X	X	X	O	O	X	X	X	X
Clearance and tail lamp		X	X	X	O	O	O	O	O	O	X	X	X	O	O	O	O	O	O
License and instrument illumination lamp		X	X	X	O	O	O	O	O	O	X	X	X	O	O	O	O	O	O

O: Lamp "ON"
X: Lamp "OFF"
□: Added functions

Schematic



Wiring Diagram

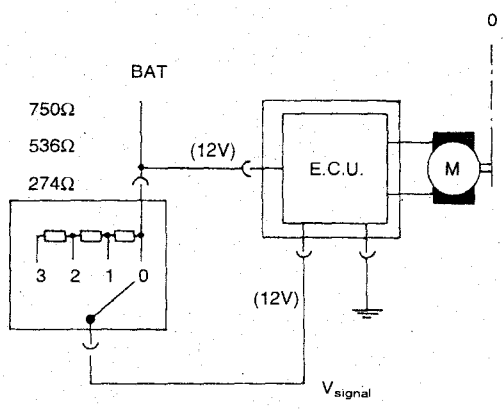


YEL027

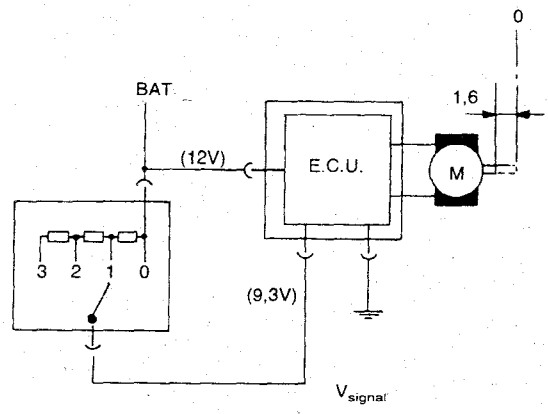
Description

- The vertical direction of the headlamp projection can be adjusted from inside the vehicle to prevent the headlamp beam axis from facing upward due to a change in the number of occupants and load conditions in the vehicle.
- A little Electronic Control Unit (E.C.U.) is incorporated in each actuator (one for each headlamp), which compares a signal voltage (V_{signal}), coming from the headlamp aiming switch, with battery voltage (12V). The signal voltage varies with the position of the switch.
  Related to the difference in voltage the actuator rod will move more or less and adjust the headlamp beam angle accordingly.

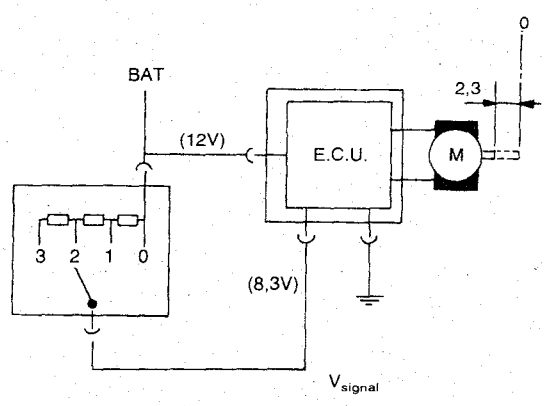
Position "0"



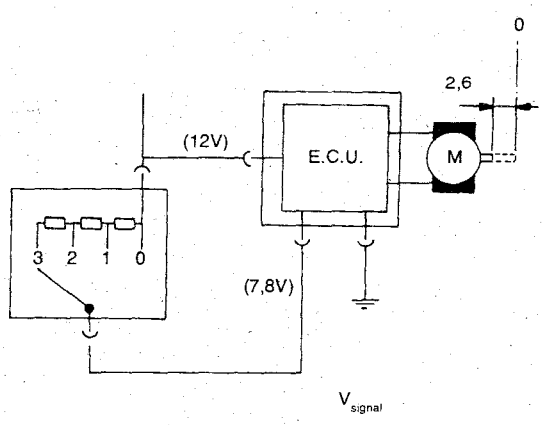
Position "1"



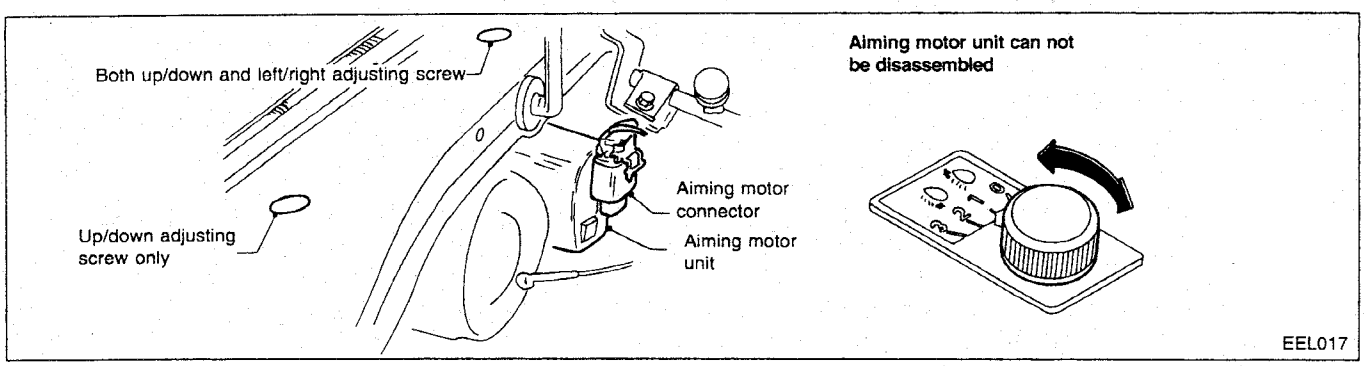
Position "2"

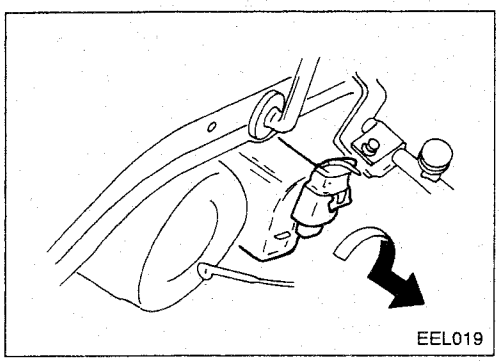


Position "3"



EEL018



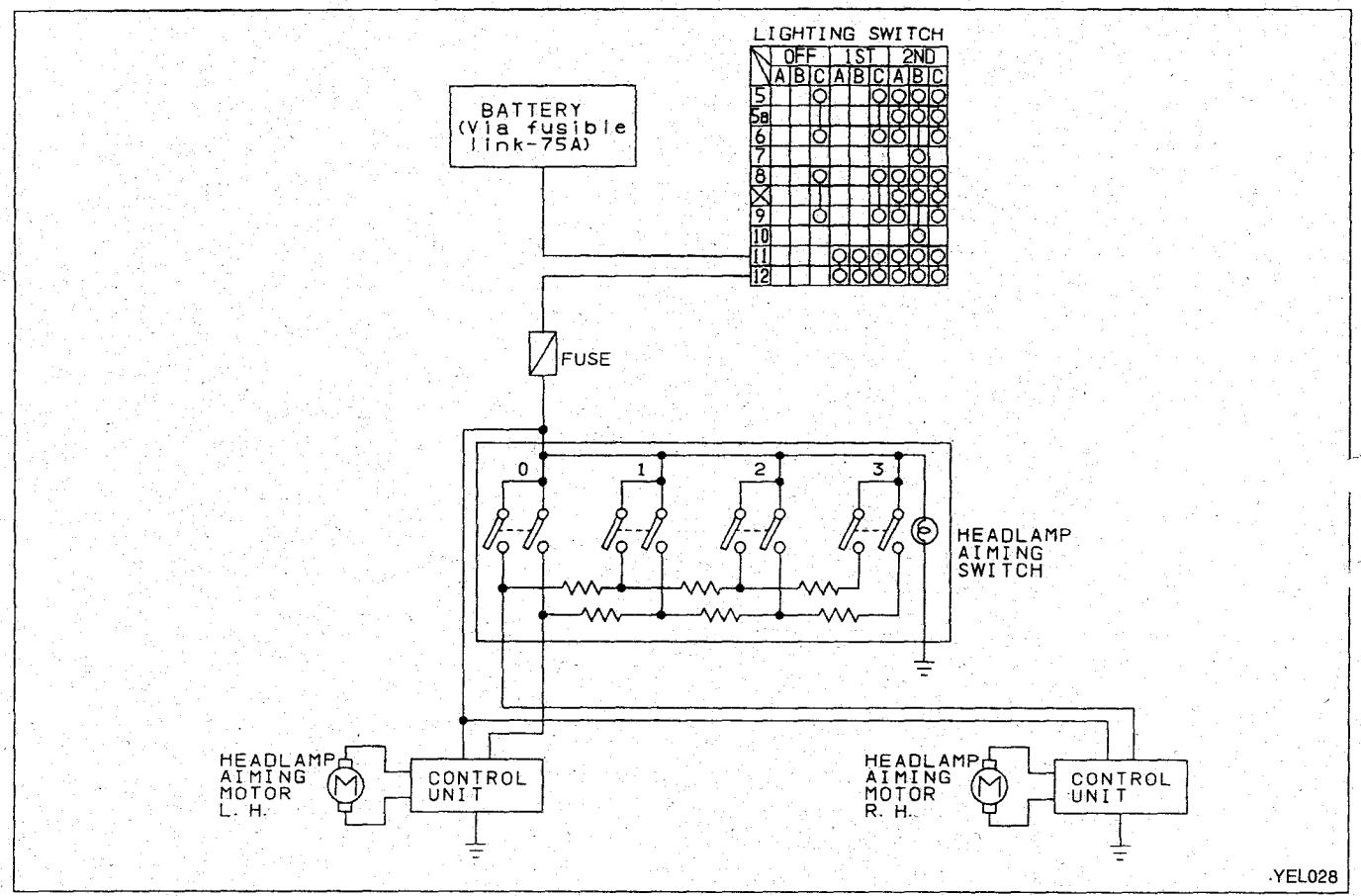


Replacing Headlamp Aiming Actuator

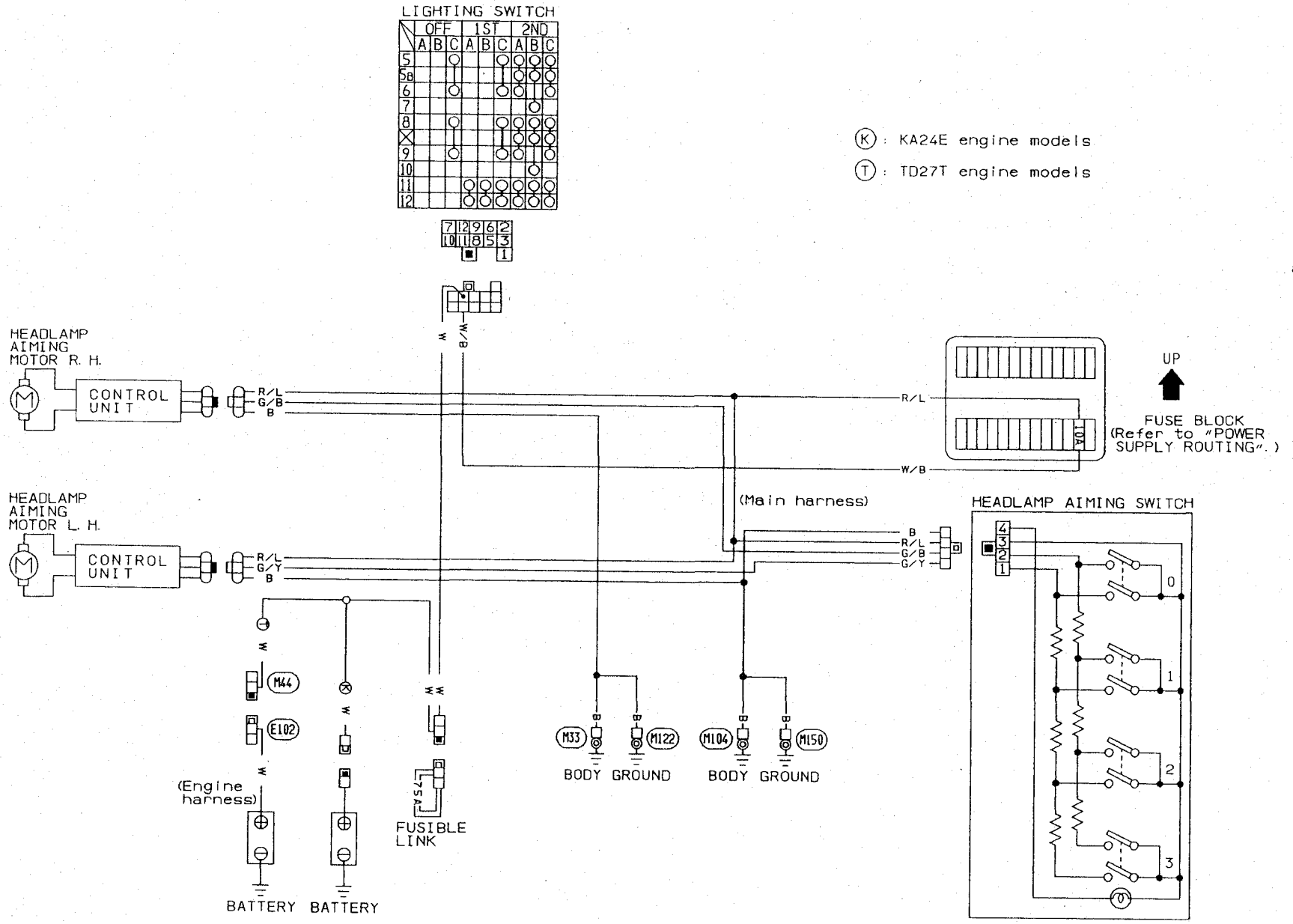
Headlamp aiming actuator can not be disassembled.

To remove aiming actuator, turn it 90° to the center of the vehicle (left and right symetrical) and pull outward.

Schematic

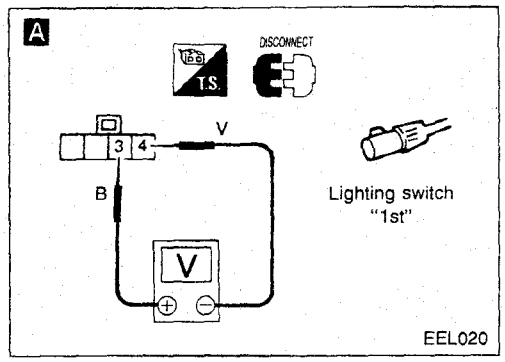

LIGHTING SWITCH
OFF
1ST
2ND
A B C A B C A B C
5
5a
6
7
8
9
10
11
12
BATTERY
(Via fusible
link-75A)
FUSE
0
1
2
3
HEADLAMP
AIMING
SWITCH
HEADLAMP
AIMING
MOTOR
L. H.
CONTROL
UNIT
HEADLAMP
AIMING
MOTOR
R. H.
CONTROL
UNIT
YEL028

Wiring Diagram



Trouble-diagnosis

SYMPTOM: Headlamp aiming does not operate.



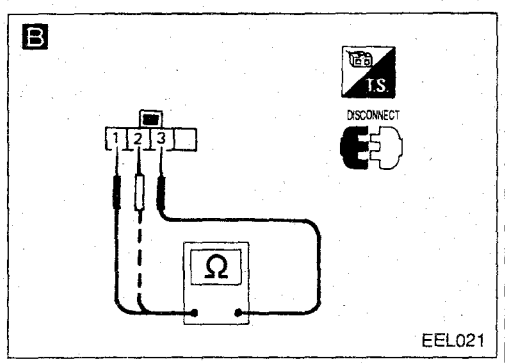
A

POWER SUPPLY CIRCUIT CHECK
(For aiming switch)
Check if 12 volts exist between terminals ③ and ④.

Voltmeter terminals		Voltage [V]
(+)	(—)	
③	④	Approx. 12

N.G. → Check 10A fuse at fuse block. (Refer to "POWER SUPPLY ROUTING.")

O.K. ↓



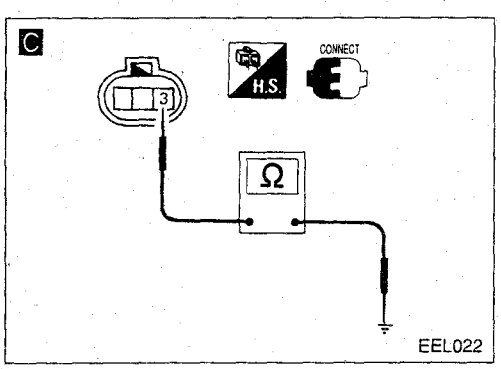
B

AIMING SWITCH CHECK
Check resistance between terminal ①/② and ③ at each switch position.

Switch position	Ohmmeter terminals	
	1 / 2	3
0	0Ω	
1	750Ω	
2	1,286Ω	
3	1,560Ω	

N.G. → Replace aiming switch.

O.K. ↓

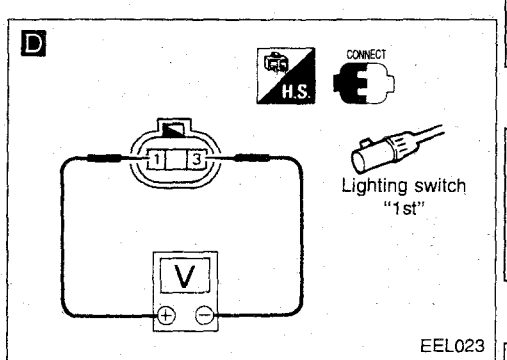


C

GROUND CIRCUIT CHECK FOR AIMING MOTOR
Check continuity between terminals ③ and body ground.
Continuity exists ... O.K.

N.G. → Repair harness between aiming motor and body ground.

O.K. ↓



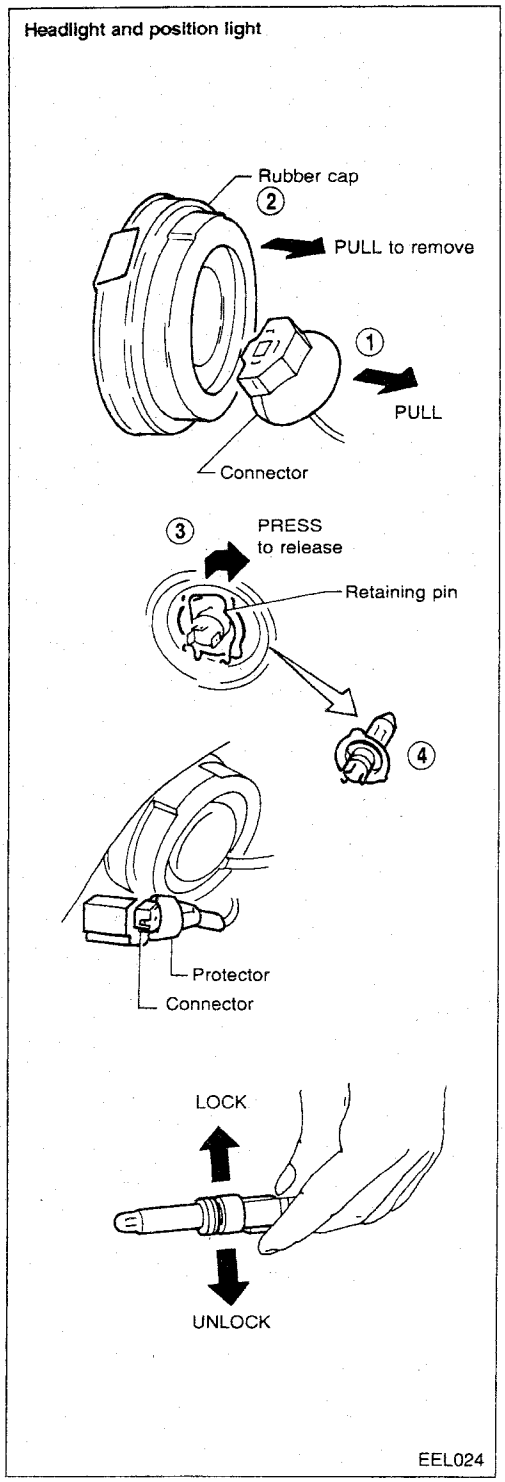
D

POWER SUPPLY CIRCUIT CHECK
(For aiming motor unit)
Check if 12 volts exist between terminals ① and ③.

N.G. → Check harness between aiming switch and aiming motor unit.

O.K. ↓

Replace aiming motor unit.



Bulb Replacement

The headlamp is a semi-sealed beam type which uses a replaceable halogen bulb. The bulb can be replaced from the engine compartment side without removing the headlamp body.

- **Grasp only the plastic base when handling the bulb. Never touch the glass envelope.**

1. Disconnect the battery cable.
2. Disconnect the harness connector from the back side of the bulb.
3. Pull off the rubber cap.
4. Remove the headlamp bulb carefully. Do not shake or rotate the bulb when removing it.
5. Install in the reverse order of removal.

CAUTION:

- **Do not leave the bulb out of the headlamp reflector for a long period of time as dust, moisture, smoke, etc. may enter the headlamp body and affect the performance of the headlamp. Thus, the headlamp bulb should not be removed from the headlamp reflector until just before a replacement bulb is to be installed.**

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.

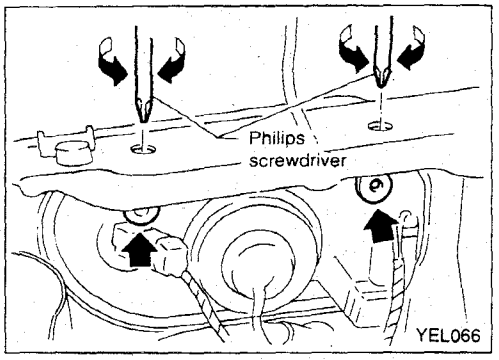
CAUTION:

a. **Keep all tires inflated to correct pressures.**
b. **Place vehicle and tester on one and same flat surface.**
c. **See that there is noload in vehicle other than coolant, engine oil filled up to correct level, full fuel tank and the driver (or equivalent weight placed in driver's position).**

CAUTION:

Be sure aiming switch is set to "0" when performing aiming adjustment on vehicles equipped with headlamp aiming control.

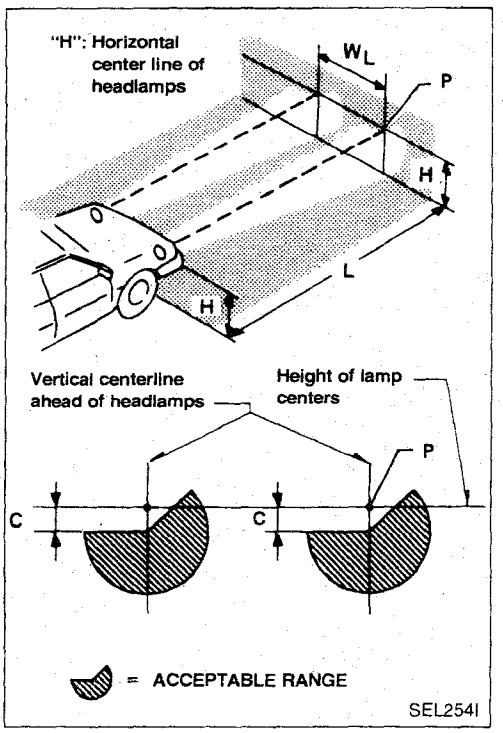
Aiming Adjustment (Cont'd)



LOW BEAM

1. Turn headlamp low beam on.
2. Use adjusting screws to perform aiming adjustment.

- **First tighten the adjusting screw all the way and then make adjustment by loosening the screw.**

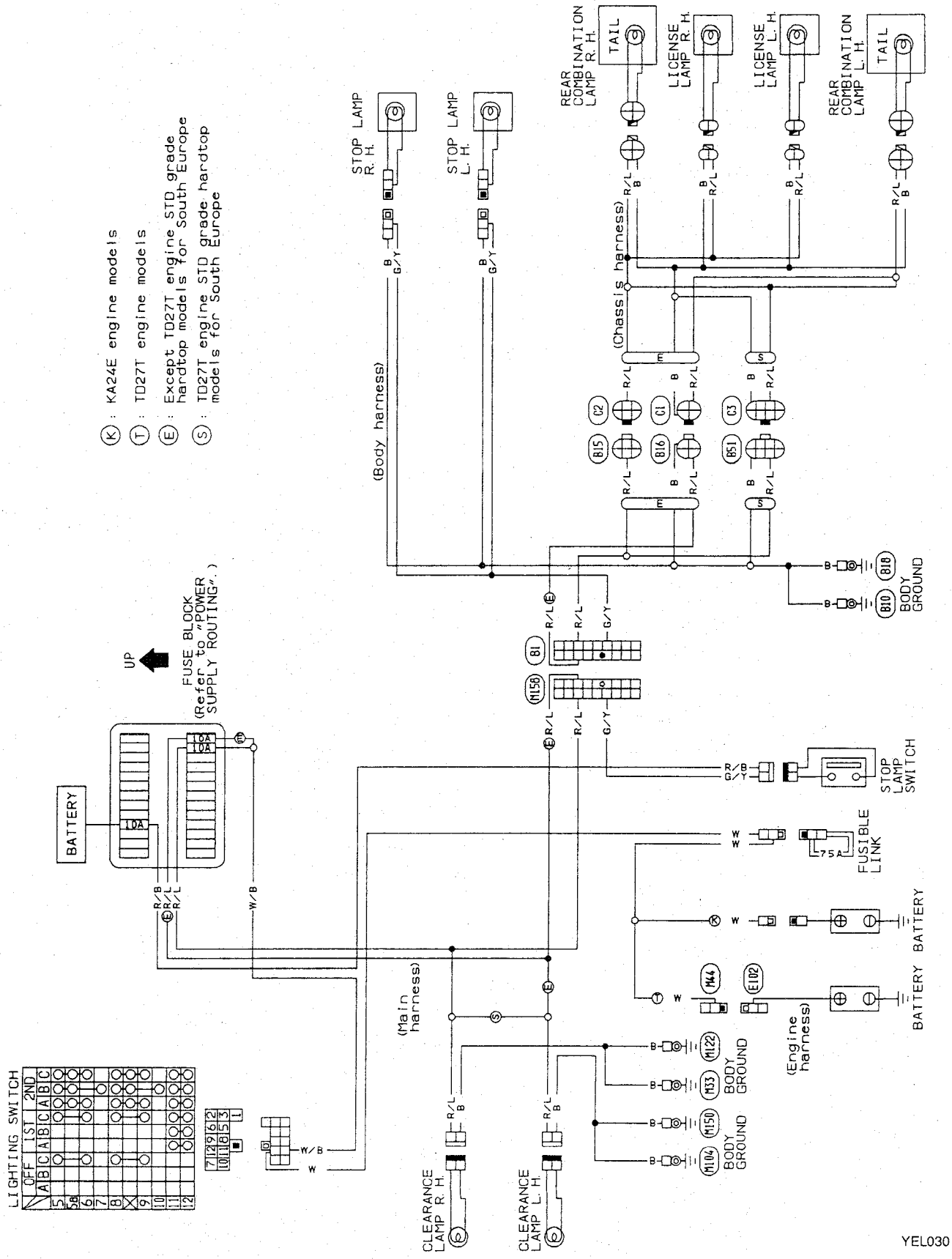


a. **Adjust headlamps so that main axis of light is parallel to center line of body and is aligned with point P shown in illustration.**
b. **Figure to the left shows headlamp aiming pattern for driving on right side of road; for driving on left side of roa aiming pattern is reversed.**
c. **Dotted lines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

"H": Horizontal center line of headlamps
"W_L": Distance between each headlamp center
"L": 5,000 mm (196.85 in)
"C": 65 mm (2.56 in)

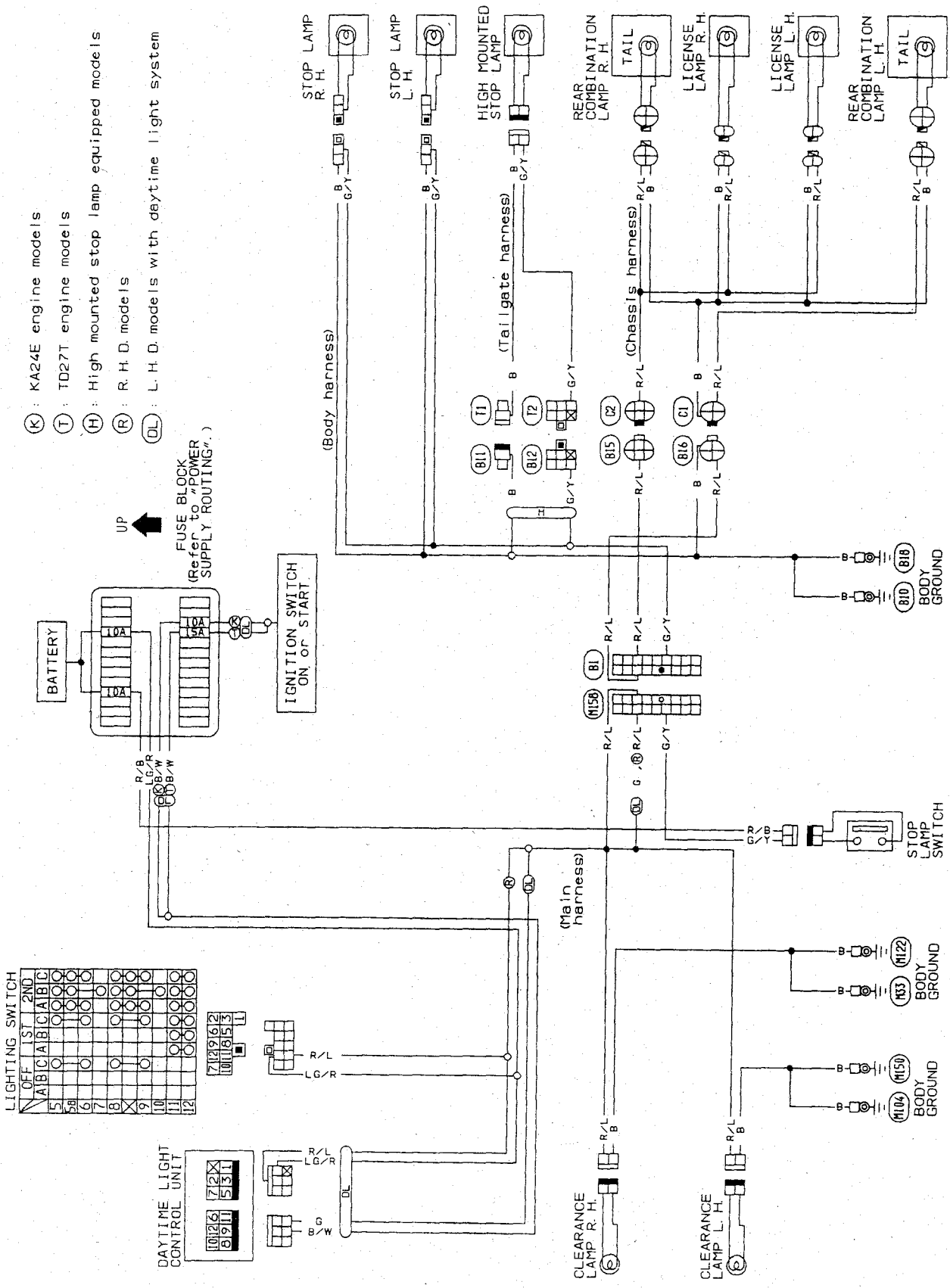
Clearance, License, Tail and Stop Lamps/Wiring Diagram

L.H.D. MODELS WITHOUT DAYTIME LIGHT SYSTEM



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

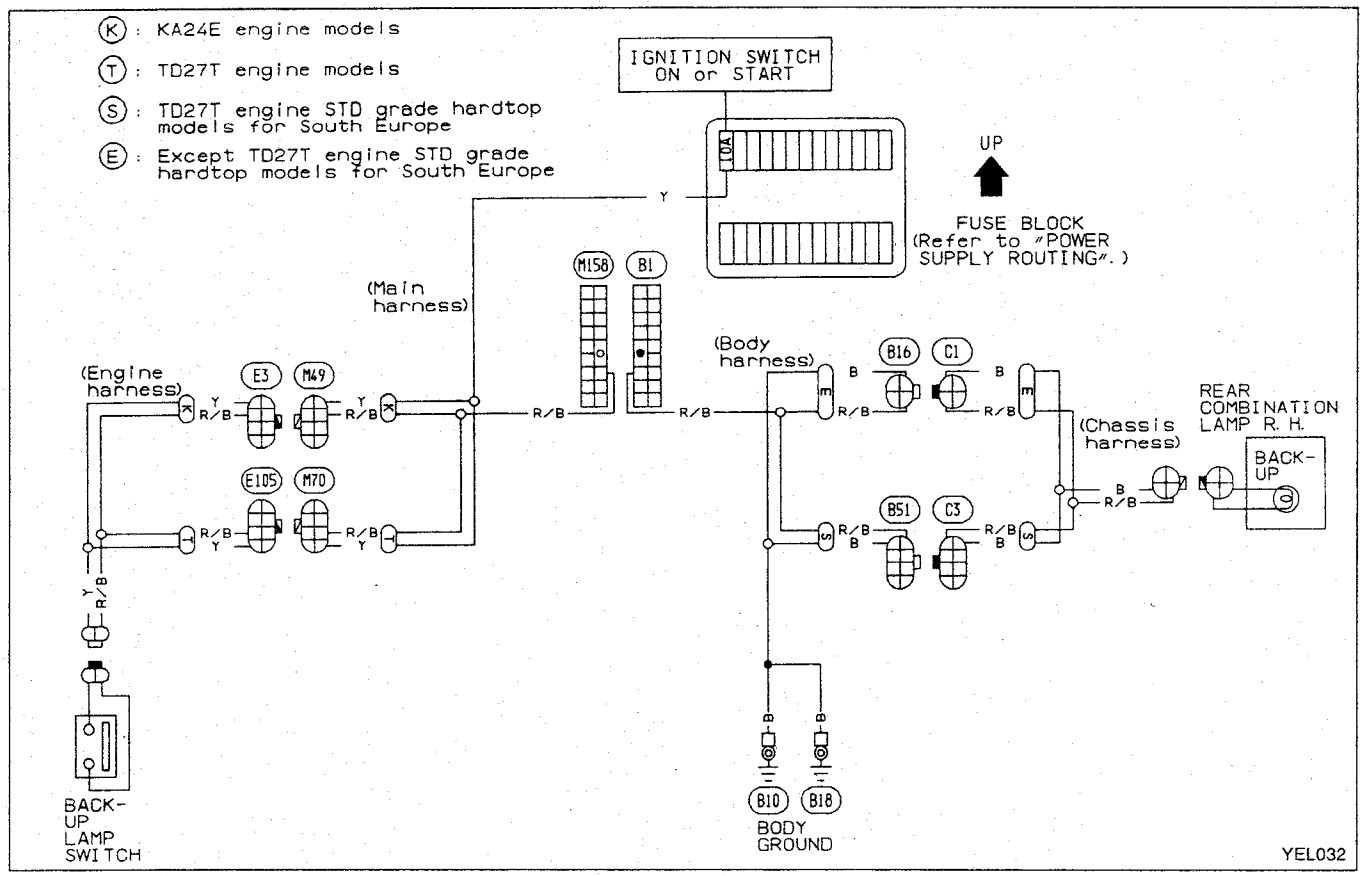
MODELS WITH DAYTIME LIGHT SYSTEM



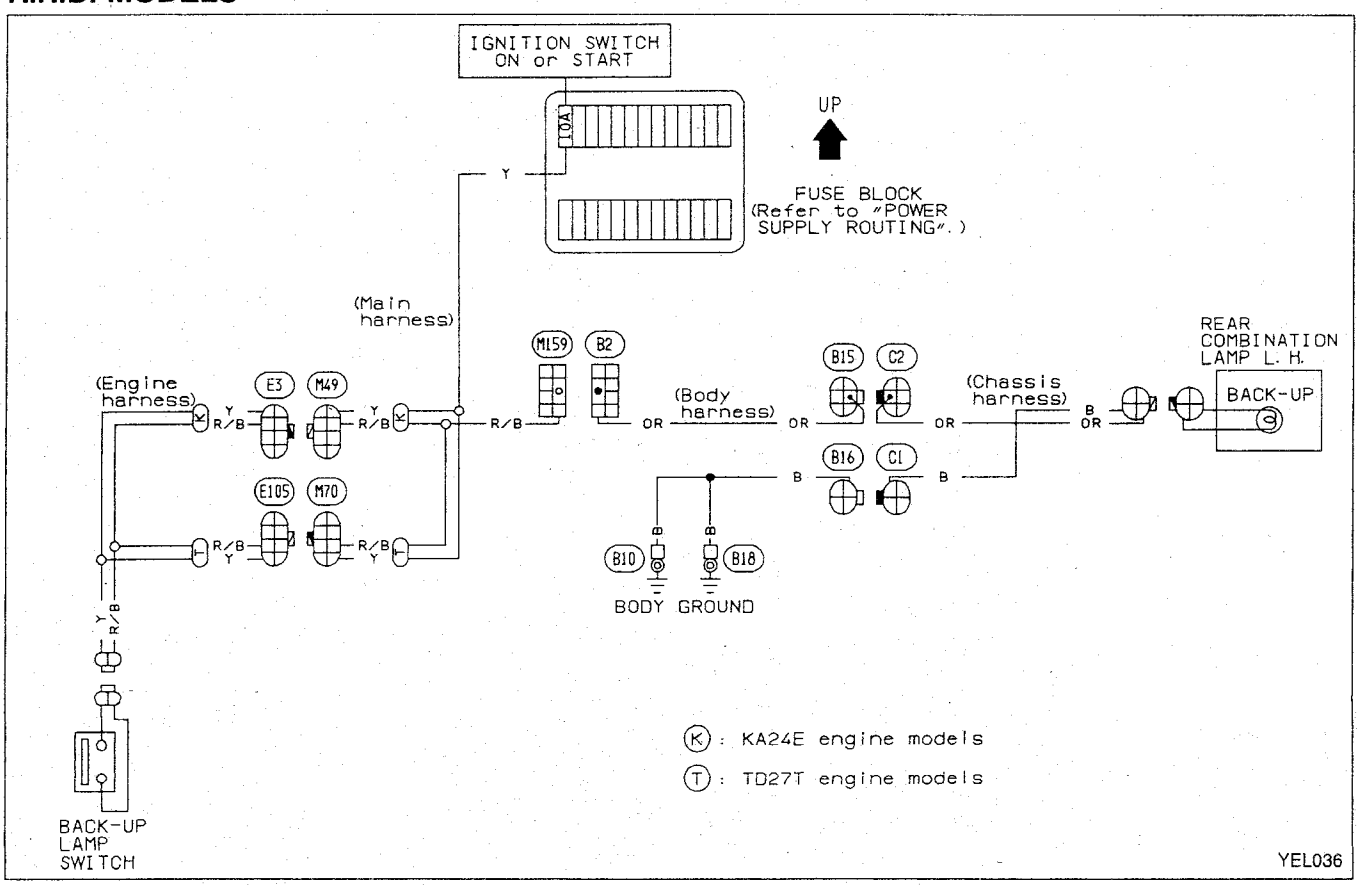
YEL031

Back-up Lamp/Wiring Diagram

L.H.D. MODELS

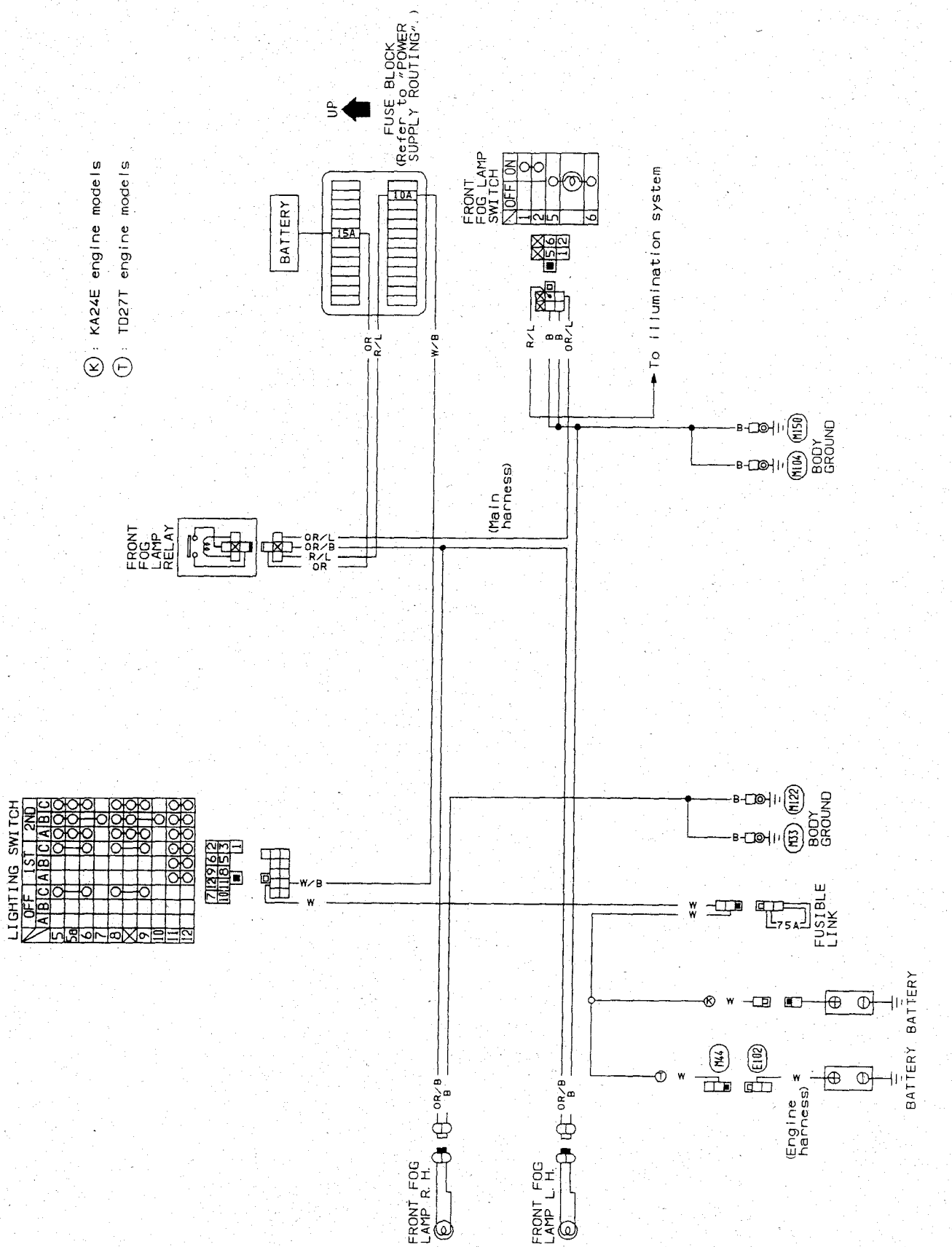


R.H.D. MODELS



Front Fog Lamp/Wiring Diagram

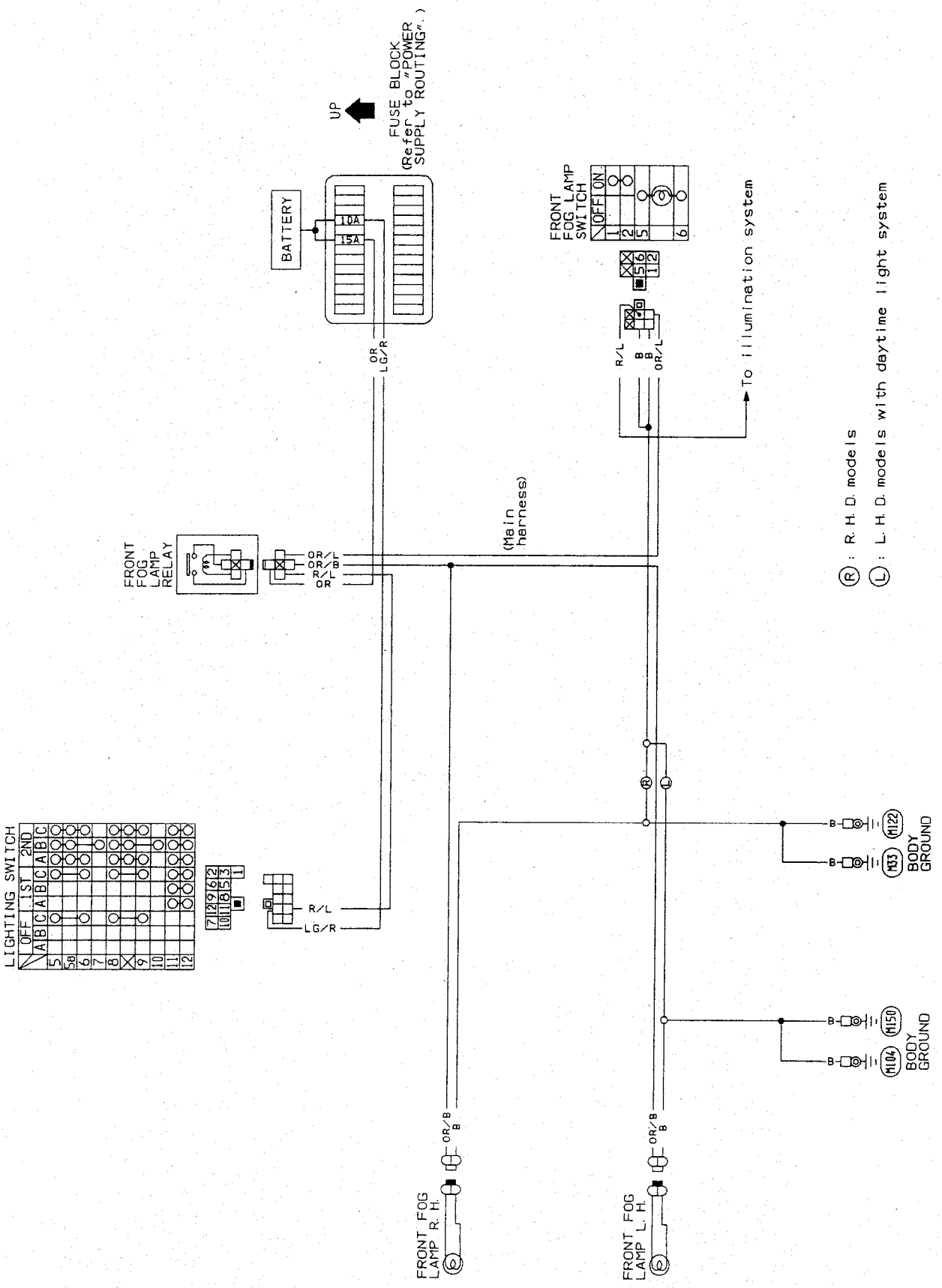
L.H.D. MODELS WITHOUT DAYTIME LIGHT SYSTEM



YEL033

Front Fog Lamp/Wiring Diagram (Cont'd)

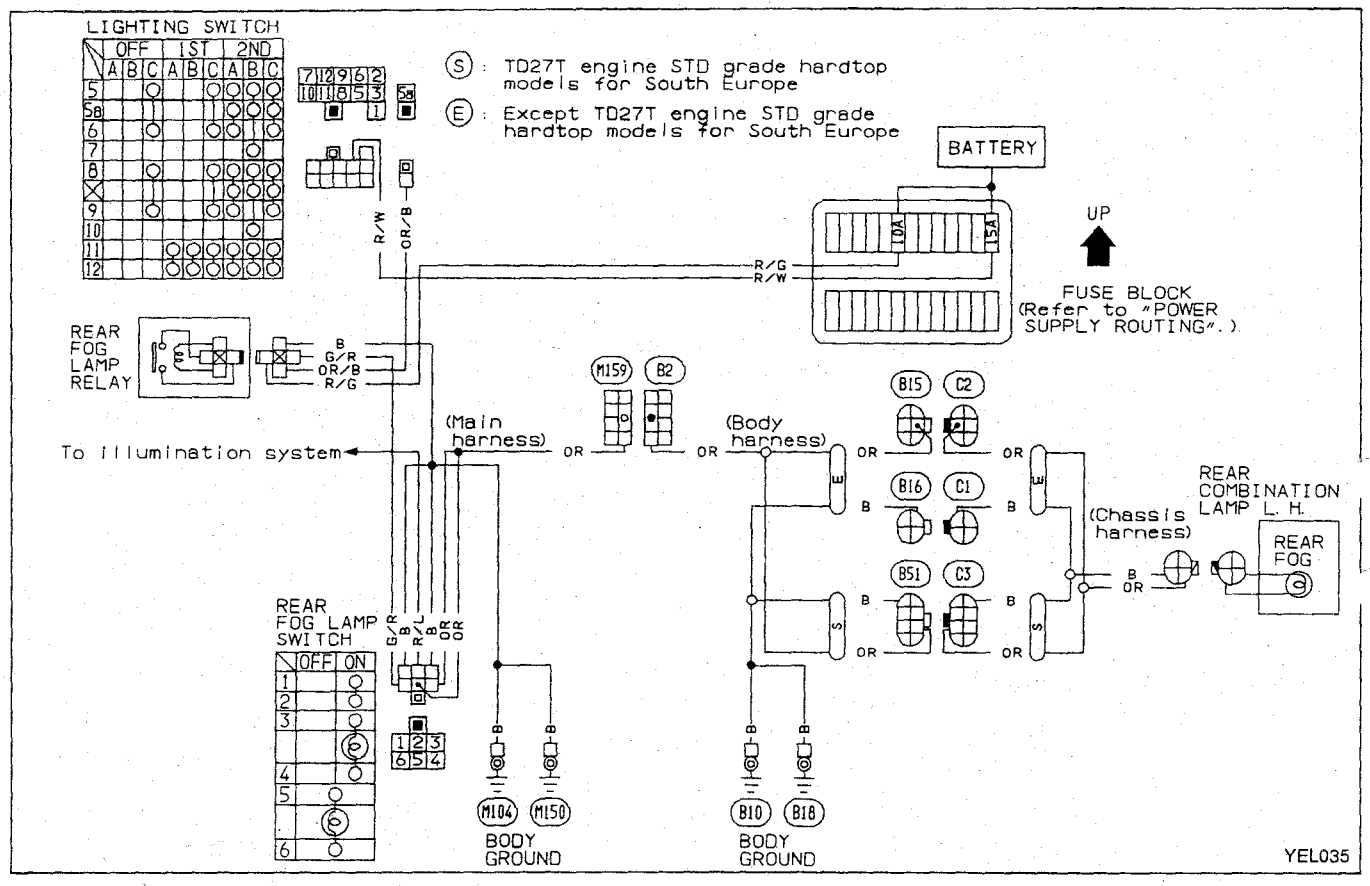
MODELS WITH DAYTIME LIGHT SYSTEM



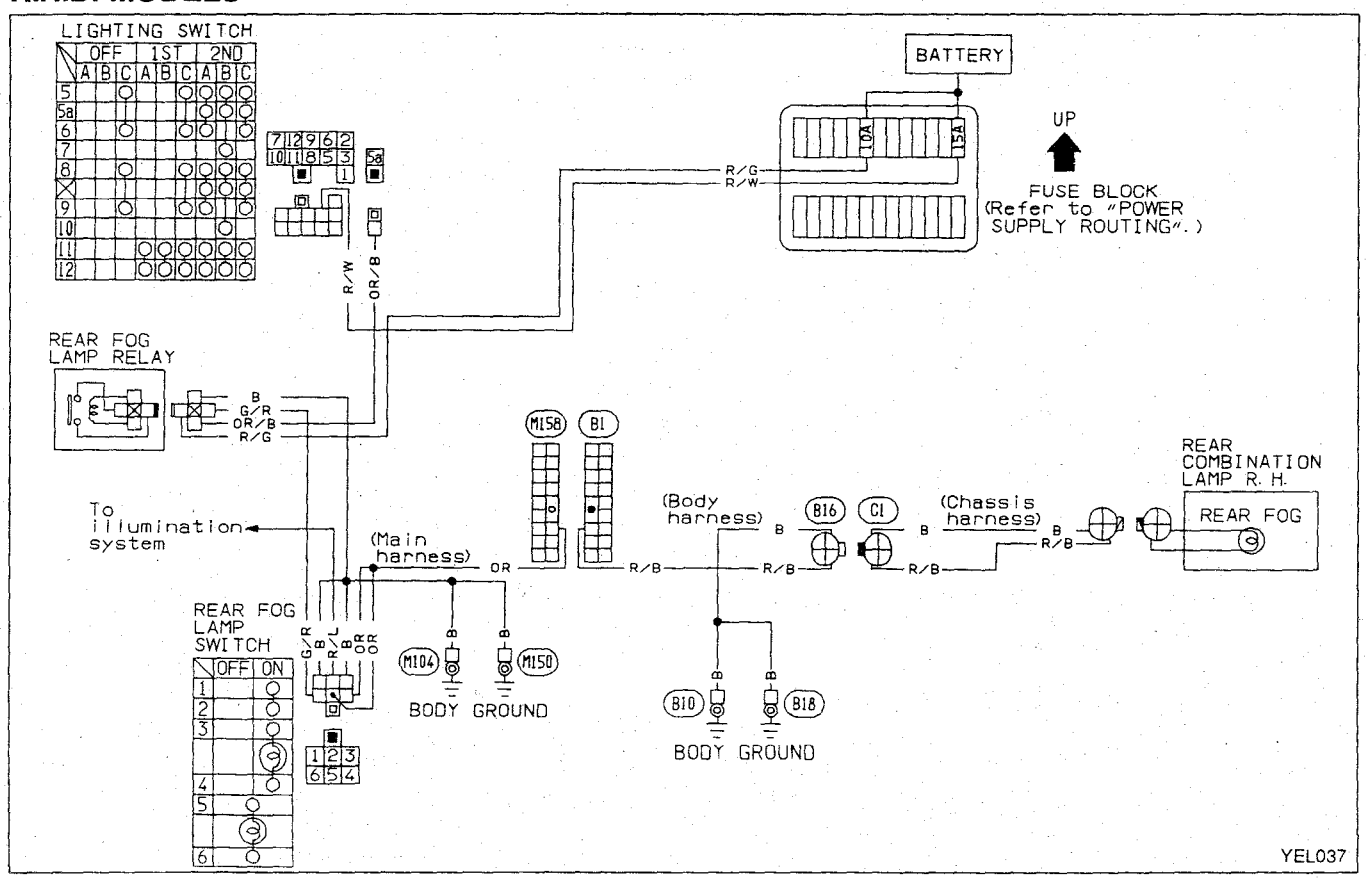
YEL034

Rear Fog Lamp/Wiring Diagram

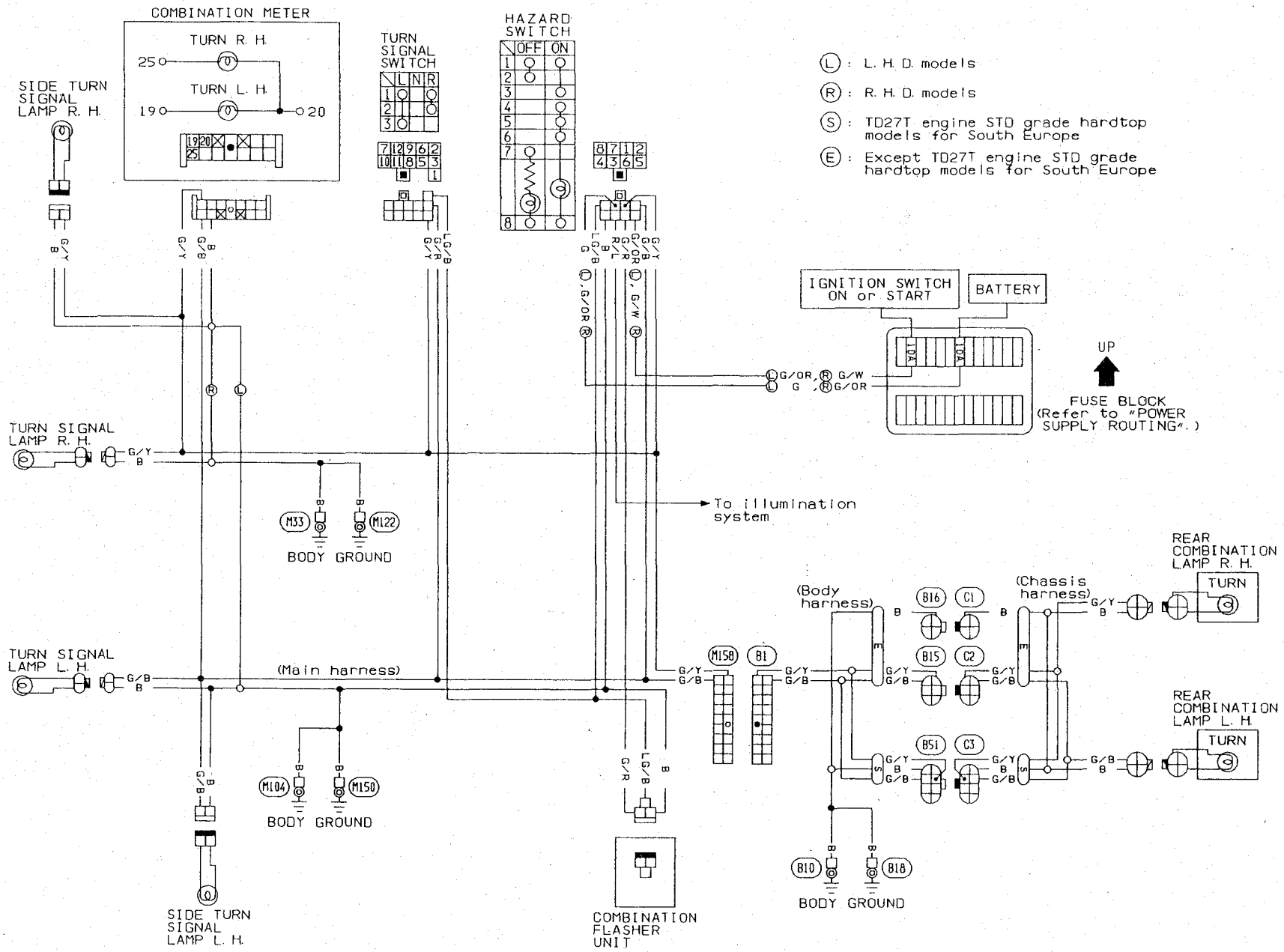
L.H.D. MODELS



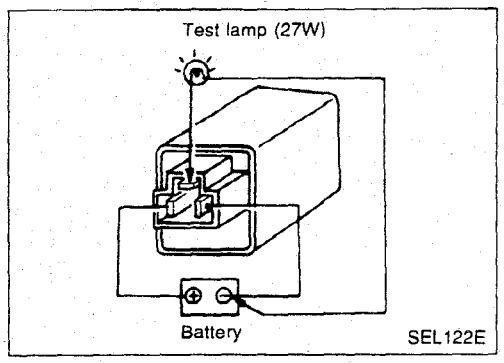
R.H.D. MODELS



Turn Signal and Hazard Warning Lamps/Wiring Diagram



YEL038



Combination Flasher Unit Check

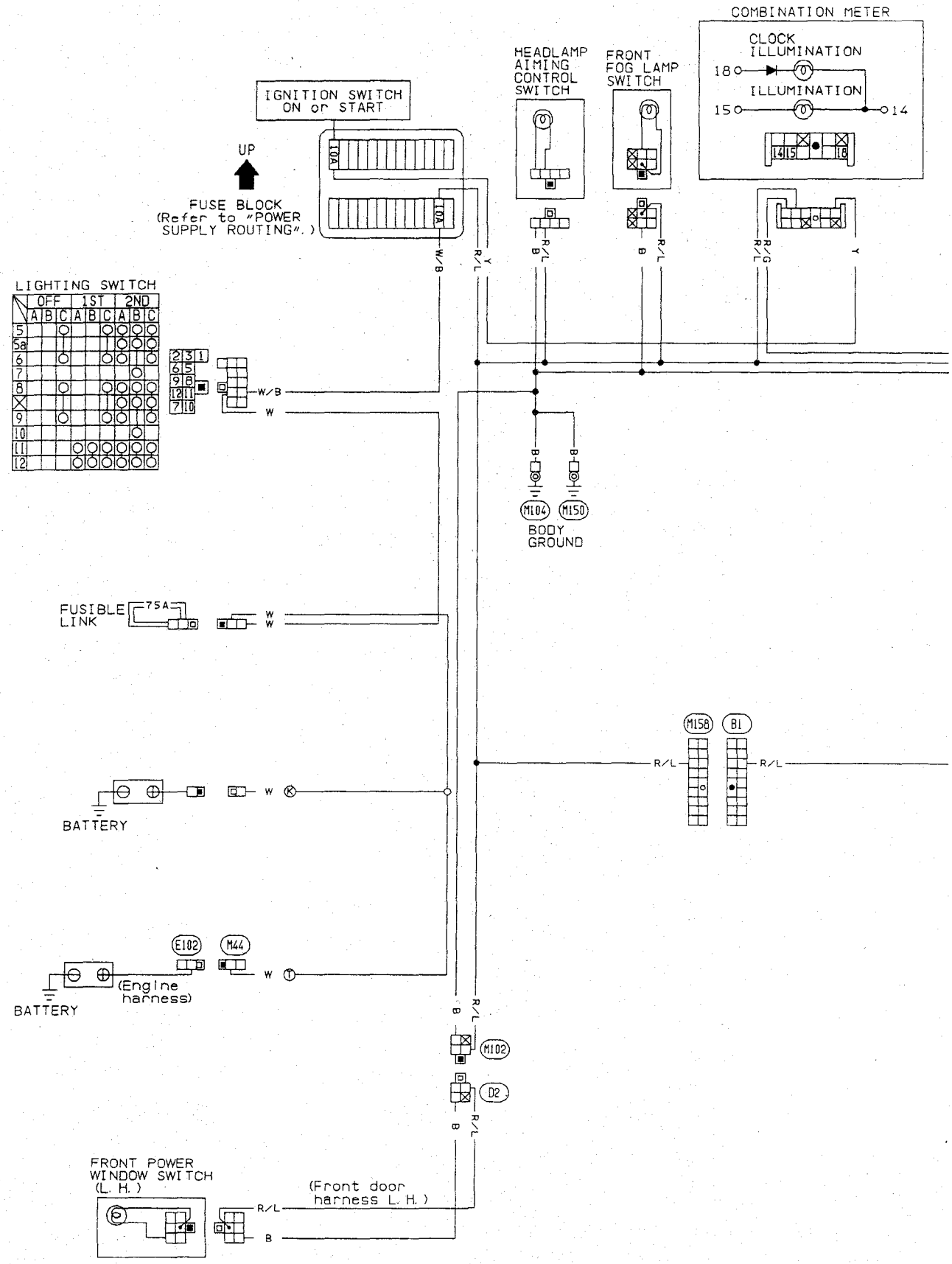
- Before checking, ensure that bulbs meet specifications.
- Connect a battery and test lamp to the combination flasher unit, as shown. Combination flasher unit is properly functioning if it blinks when power is supplied to the circuit.

Bulb Specifications

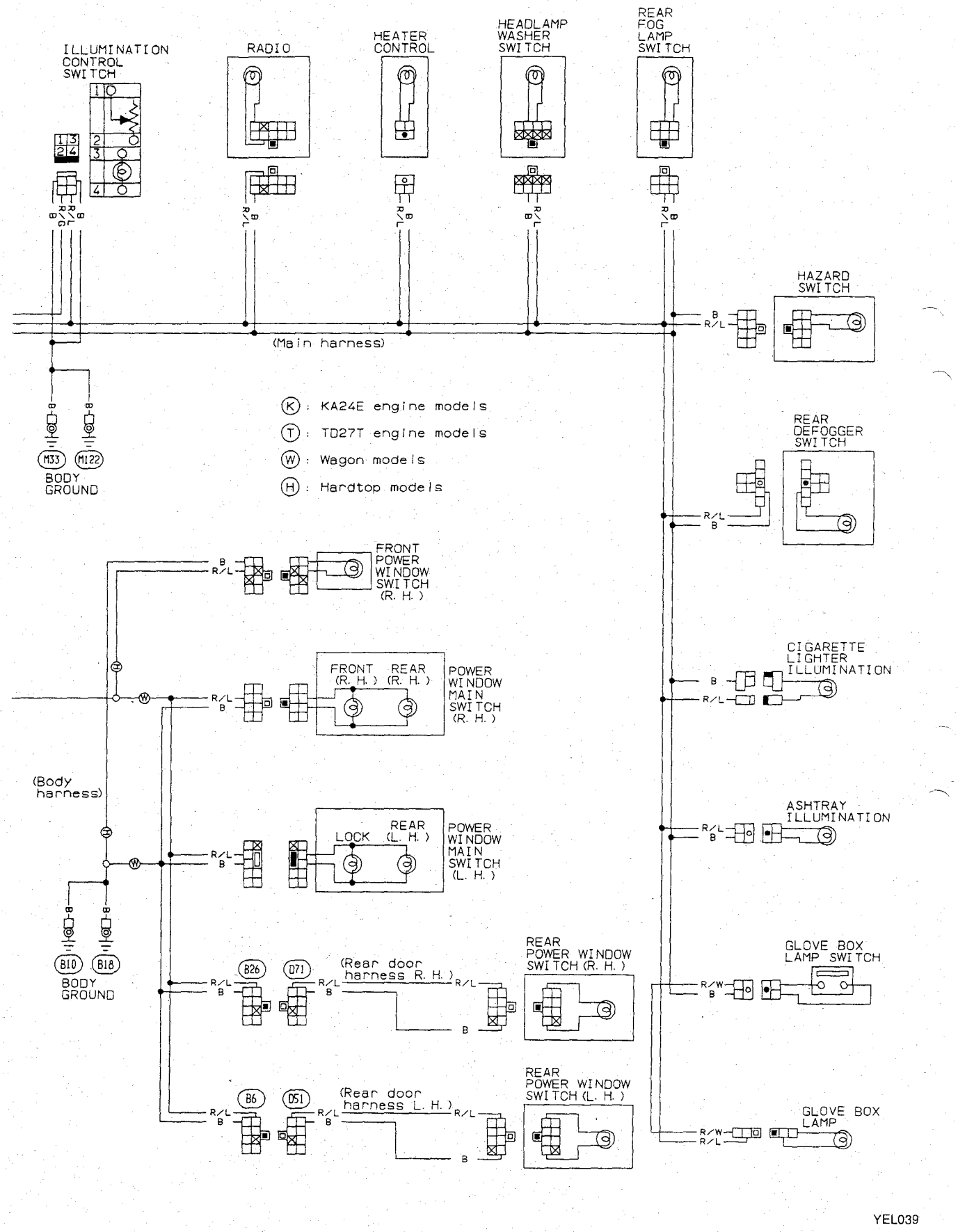
	Wattage (12 volt)
Headlamp (Semi-sealed beam)	
High/Low	60/55
Front fog lamp	55
Front turn signal lamp	21
Front clearance lamp	5
Side turn signal lamp	5
Rear combination lamp	
Turn signal	21
Stop/tail lamp	21/5
Back-up	21
Rear fog	21
License plate lamp	5
Interior lamp	10
Map lamp (With sunroof models)	5
Luggage room lamp (Hardtop models)	5

Illumination/Wiring Diagram

L.H.D. MODELS WITHOUT DAYTIME LIGHT SYSTEM



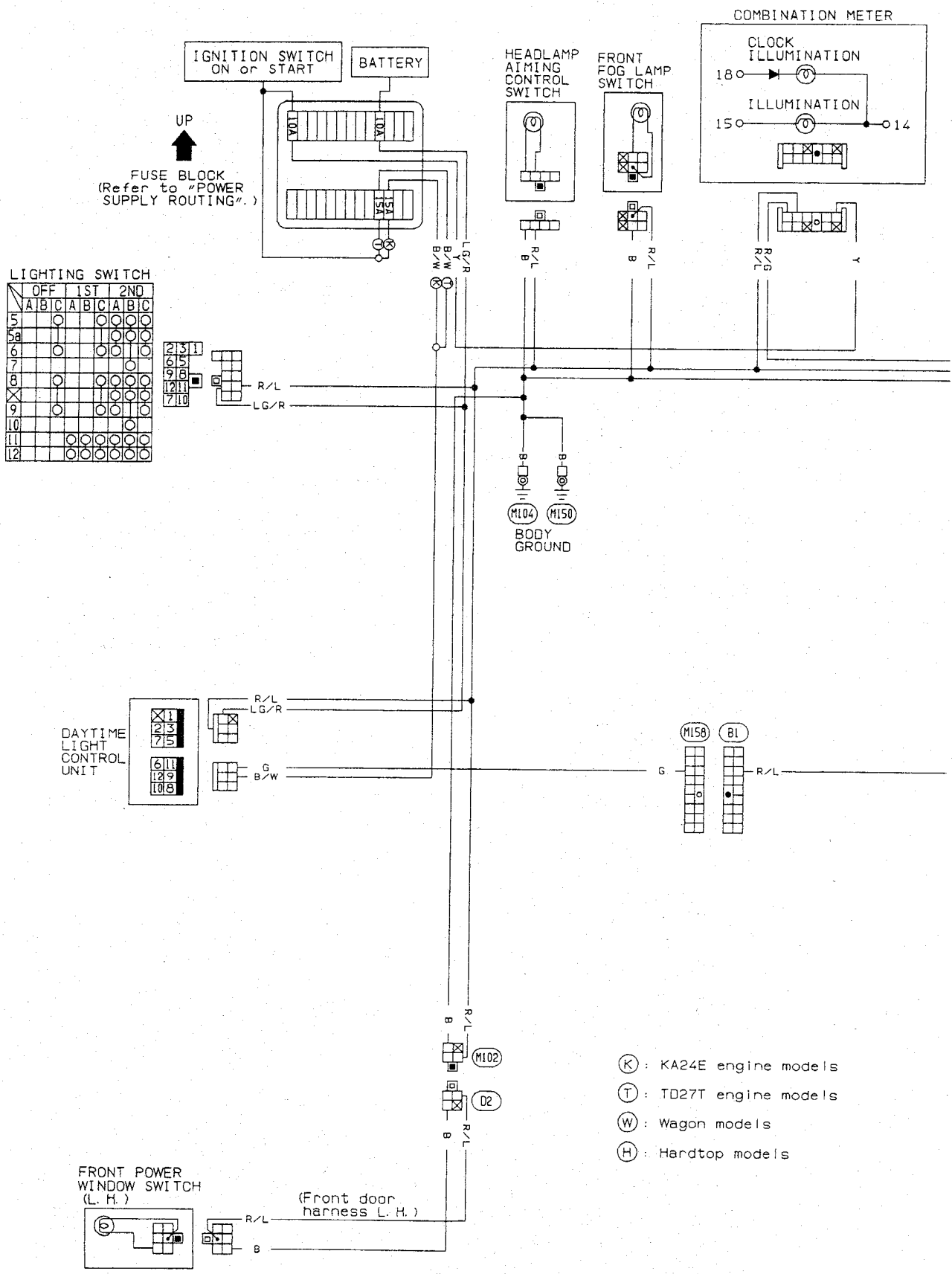
Illumination/Wiring Diagram (Cont'd)



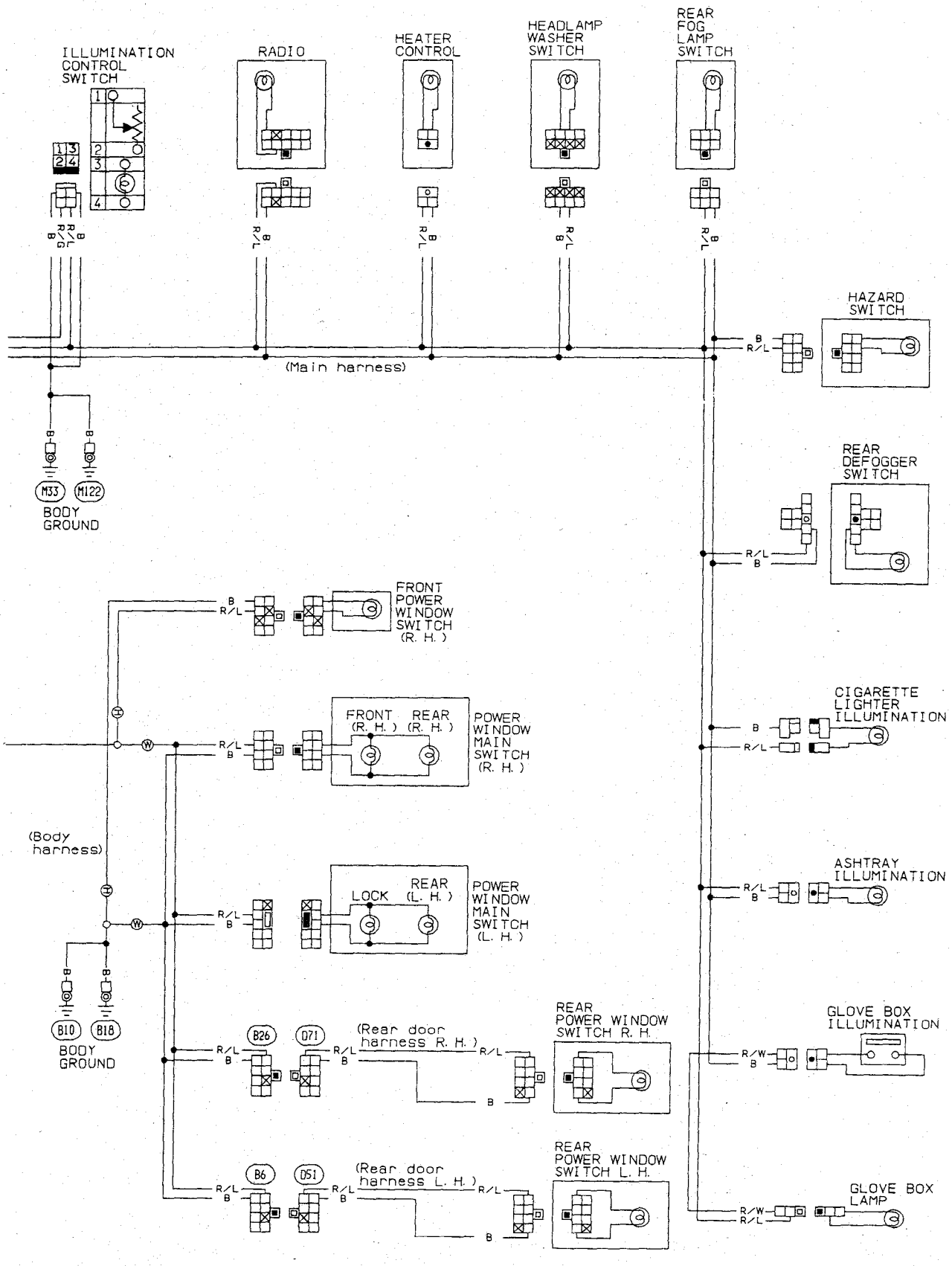
YEL039

Illumination/Wiring Diagram (Cont'd)

L.H.D. MODELS WITH DAYTIME LIGHT SYSTEM



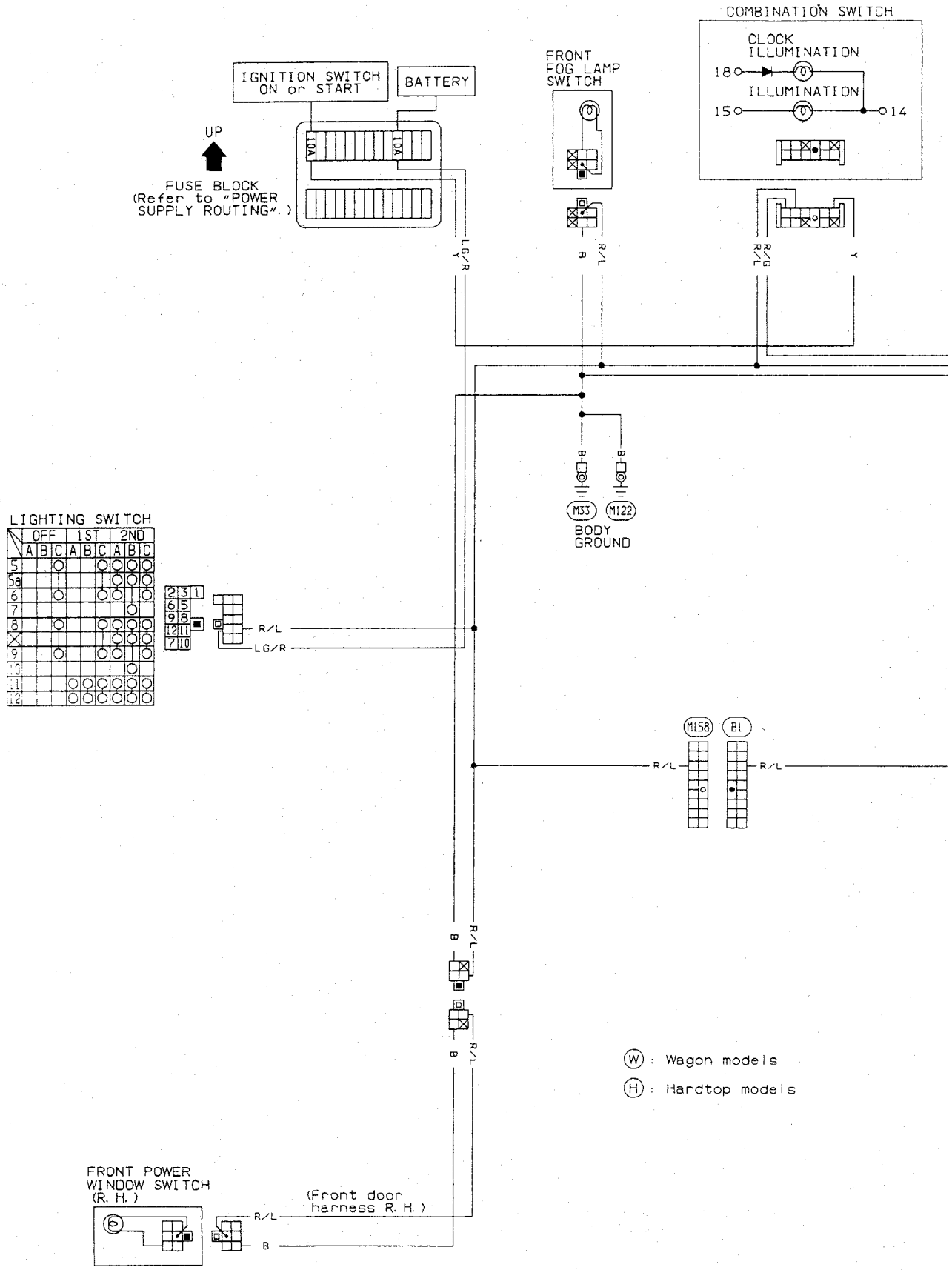
Illumination/Wiring Diagram (Cont'd)



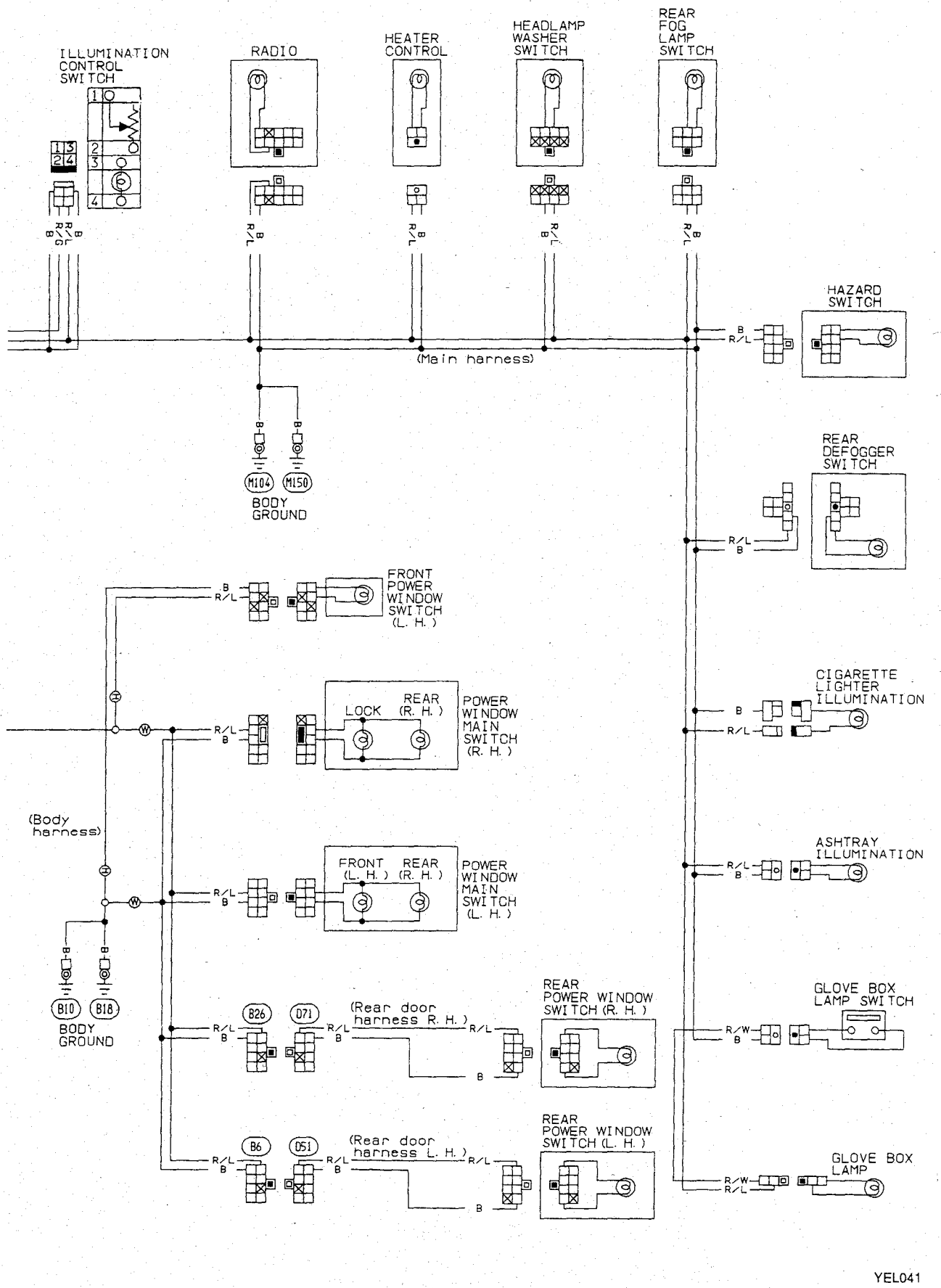
YEL040

Illumination/Wiring Diagram (Cont'd)

R.H.D. MODELS



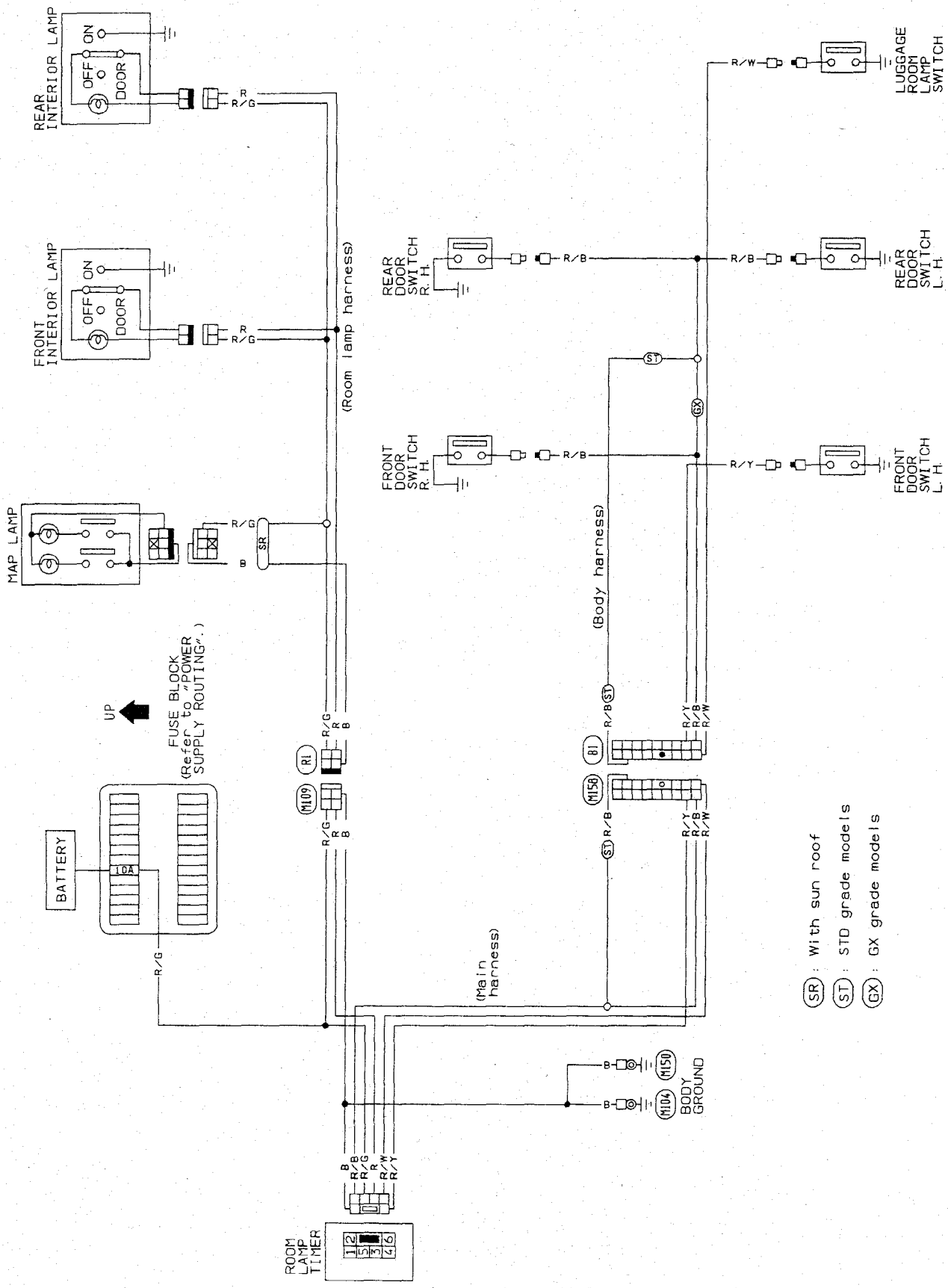
Illumination/Wiring Diagram (Cont'd)



YEL041

Interior, Spot and Luggage Room Lamps/Wiring Diagram

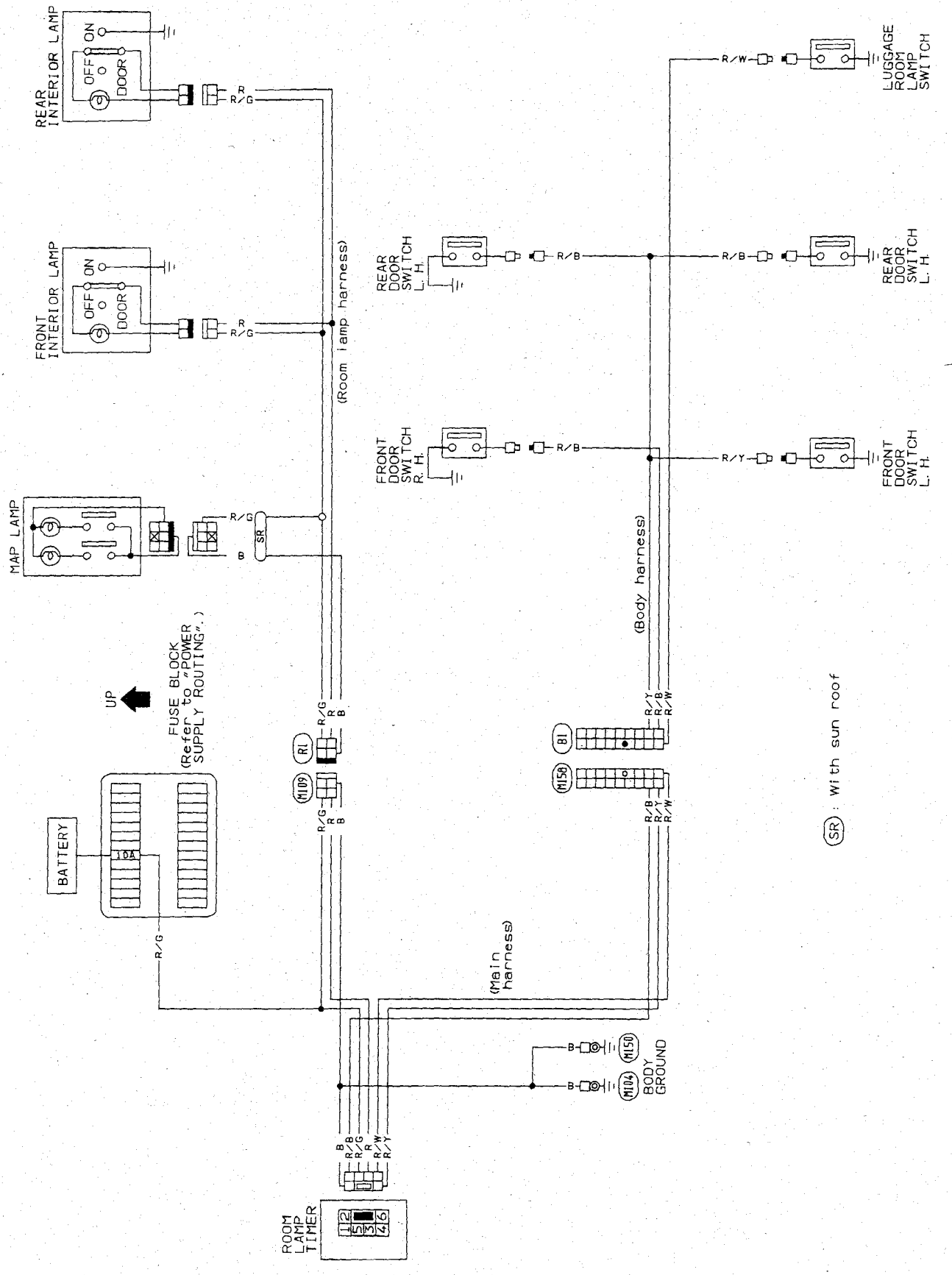
L.H.D. WAGON MODELS



YEL042

Interior, Spot and Luggage Room Lamps/ Wiring Diagram (Cont'd)

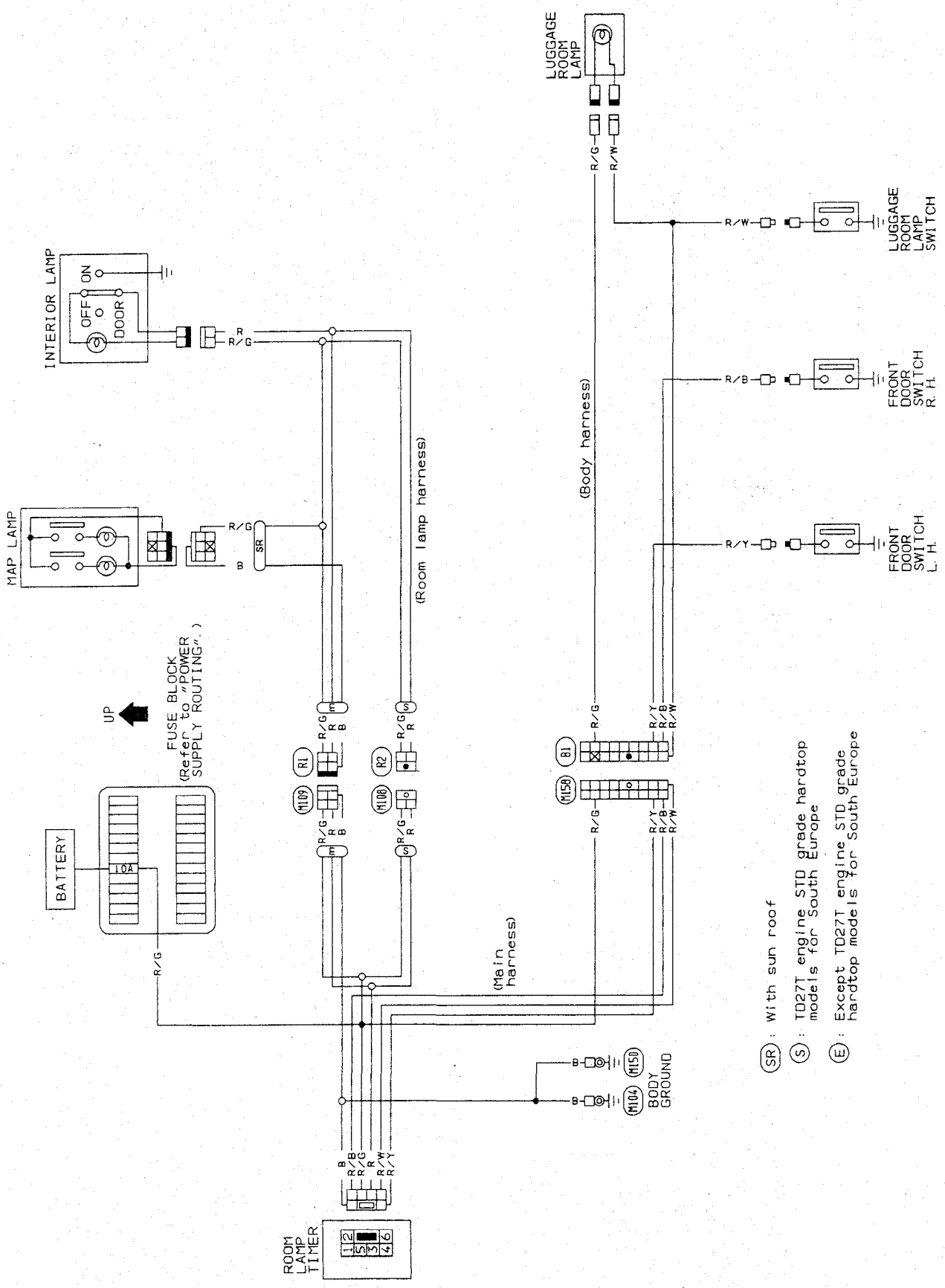
R.H.D. WAGON MODELS



YEL043

Interior, Spot and Luggage Room Lamps/ Wiring Diagram (Cont'd)

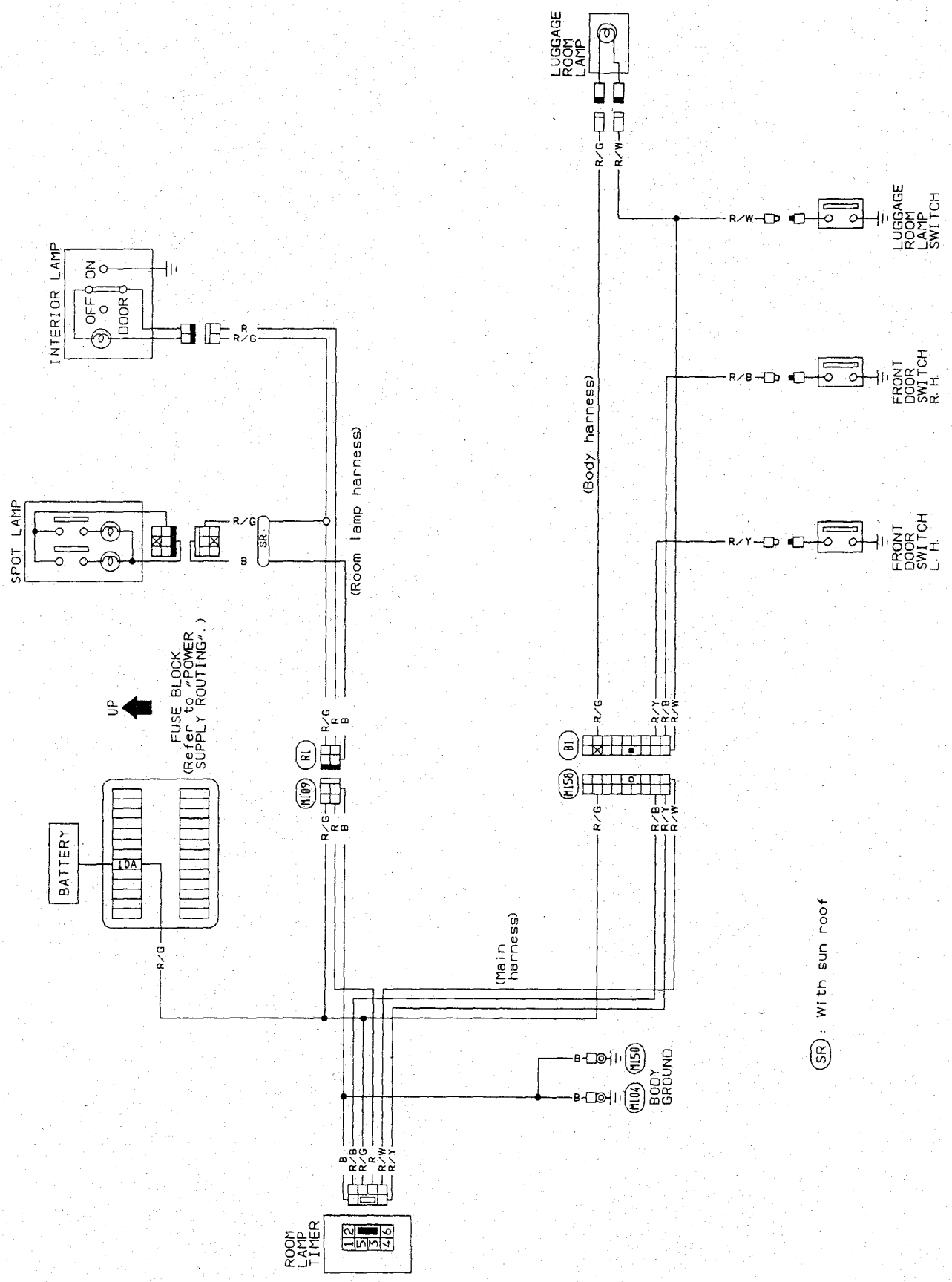
L.H.D. HARDTOP MODELS



YEL044

Interior, Spot and Luggage Room Lamps/ Wiring Diagram (Cont'd)

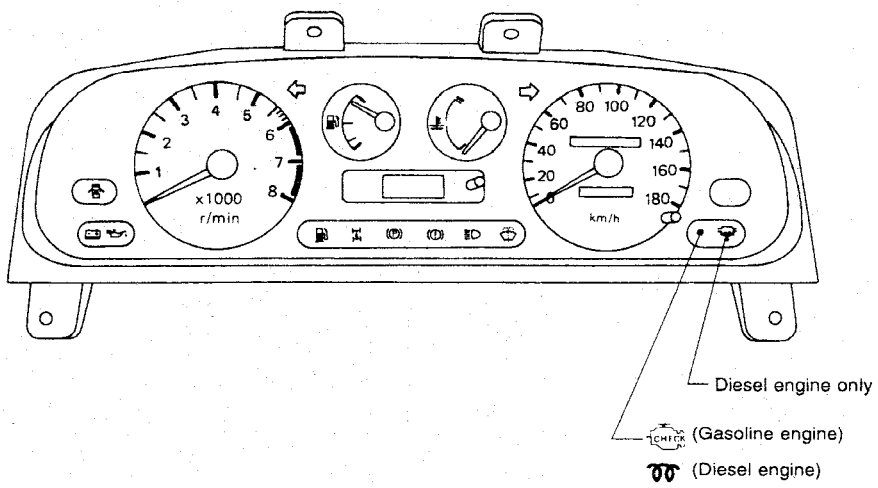
R.H.D. HARDTOP MODELS

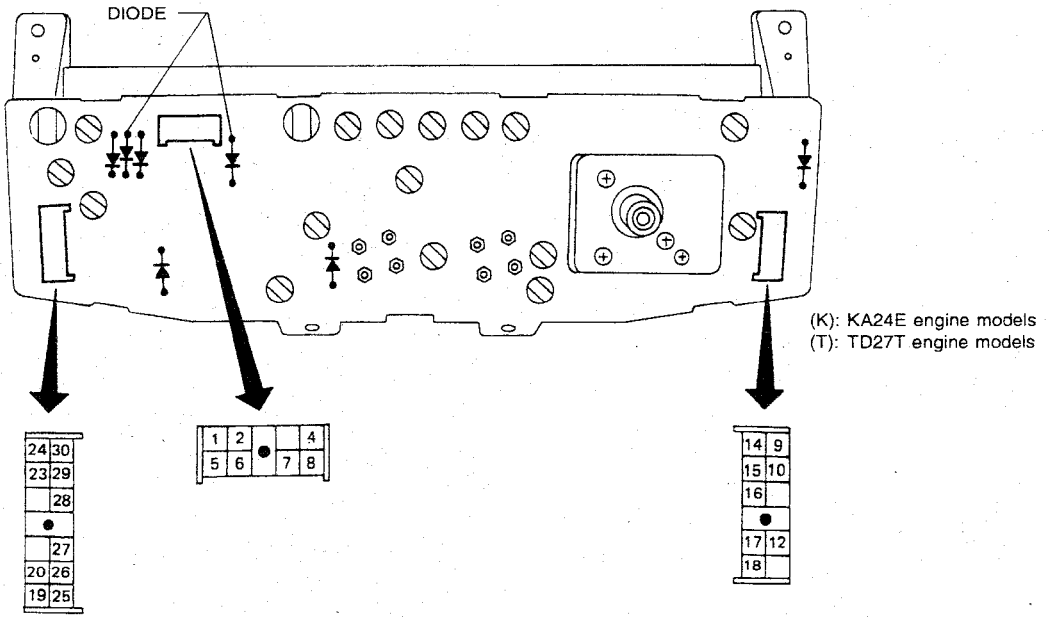


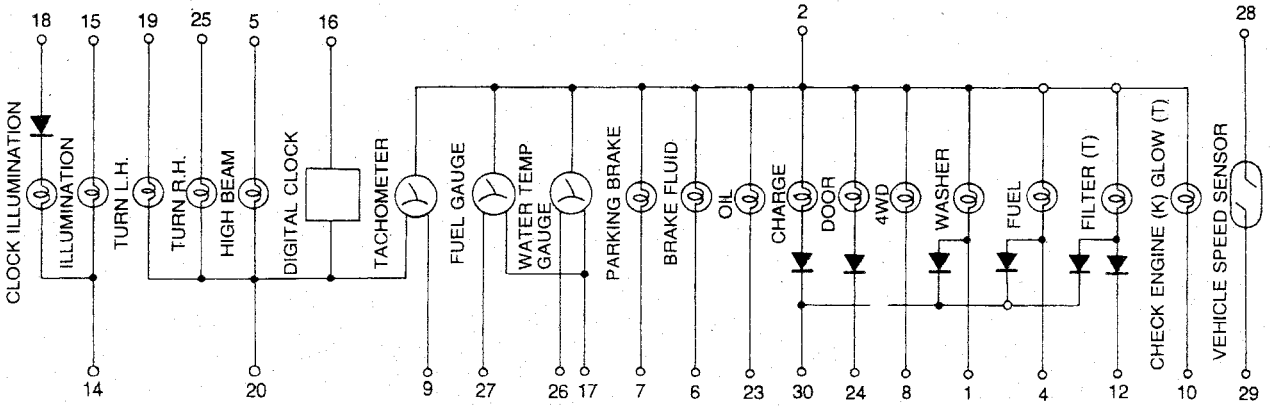
YEL045

Combination Meter

L.H.D. MODELS



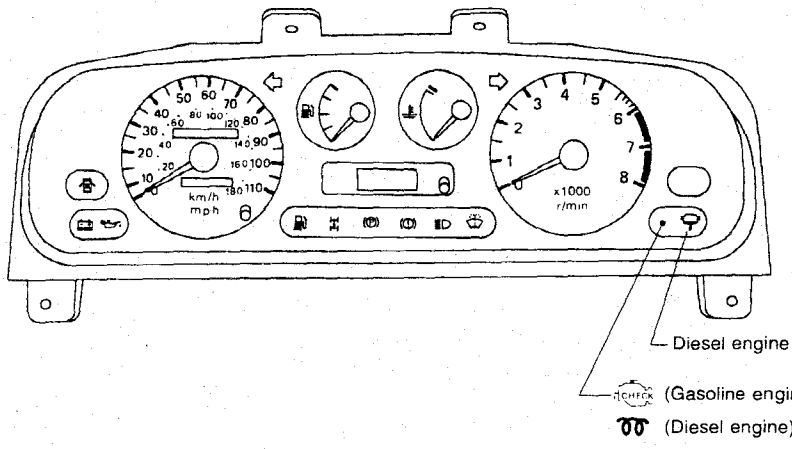


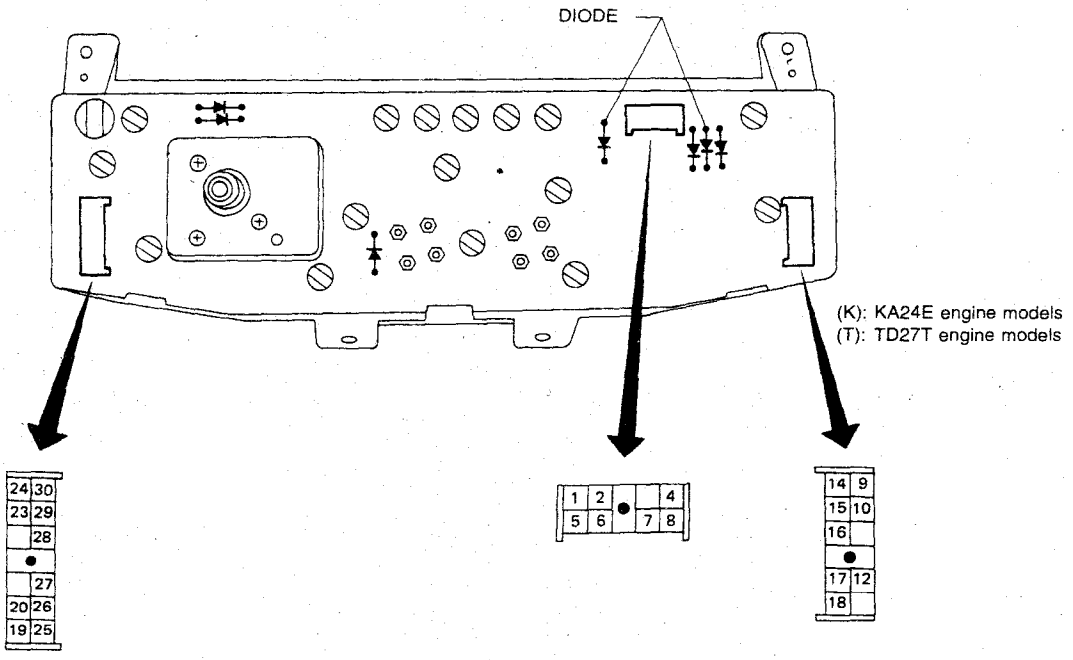


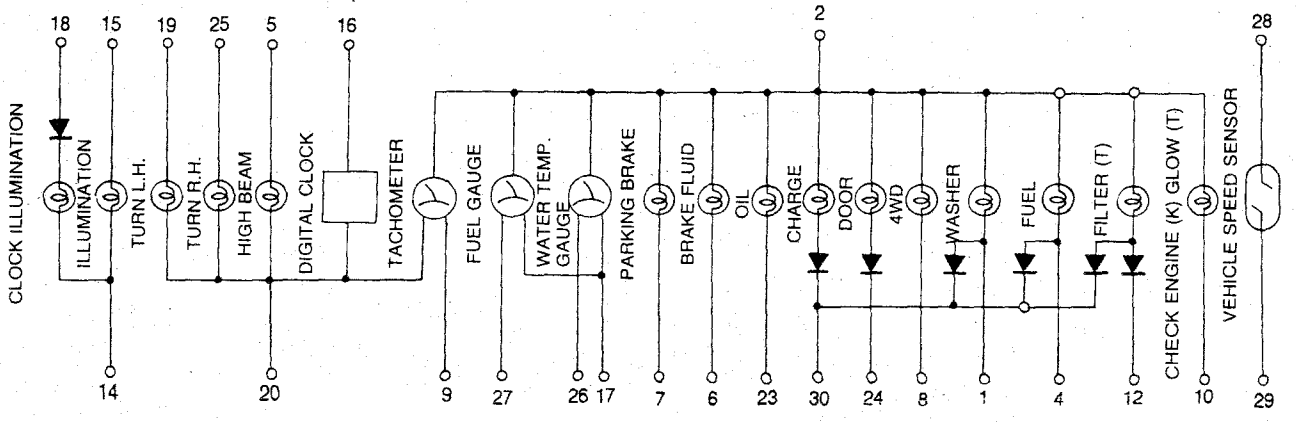
YEL067

Combination Meter (Cont'd)

R.H.D. MODELS



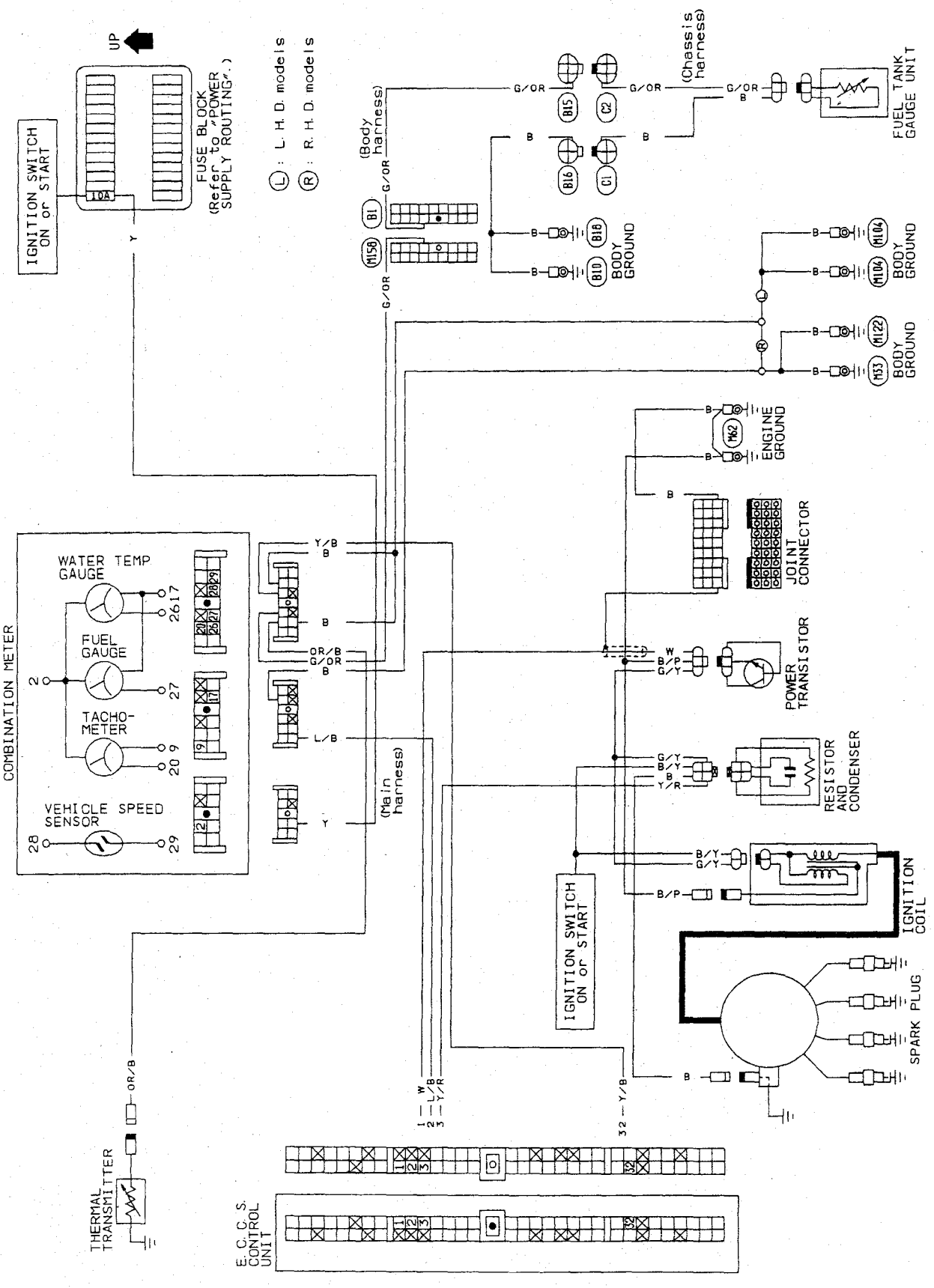




YEL068

Tachometer, Temp. and Fuel Gauges/Wiring Diagram

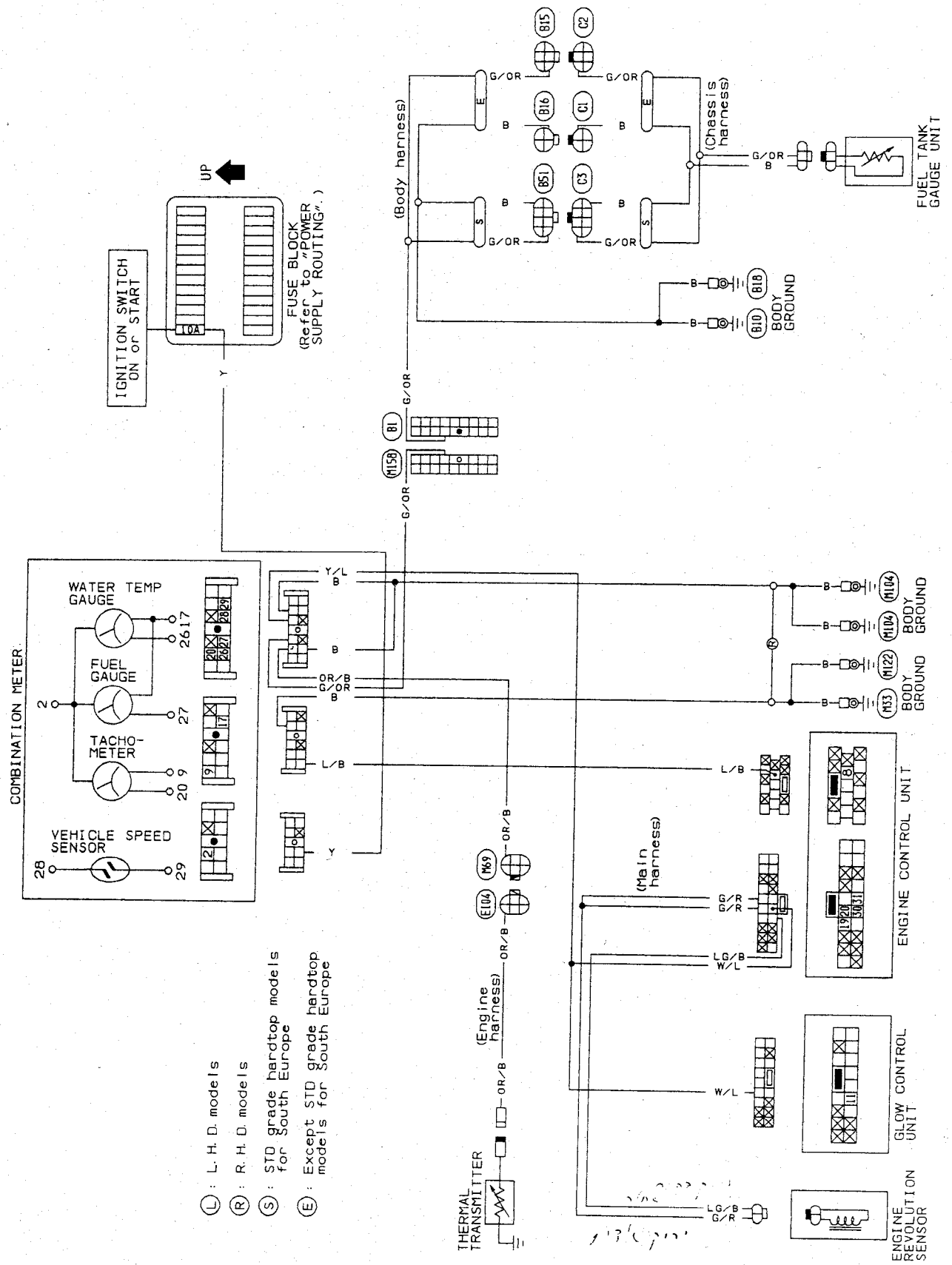
KA24E ENGINE MODELS



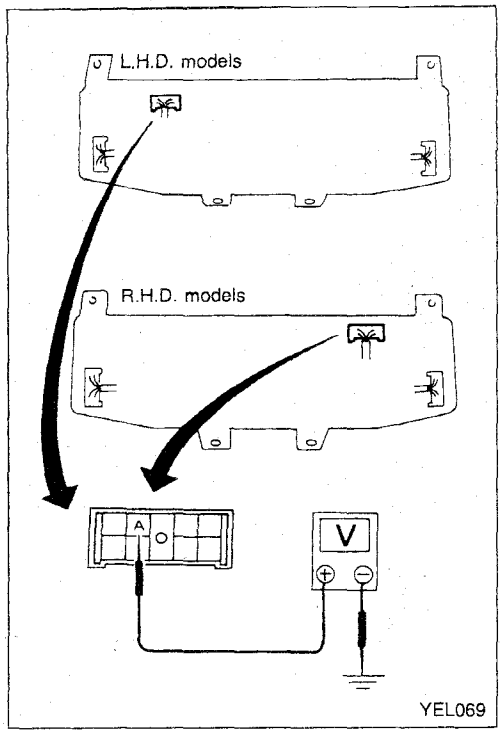
YEL046

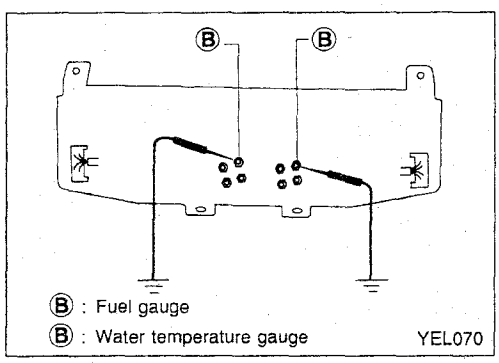
Tachometer, Temp. and Fuel Gauges/Wiring Diagram (Cont'd)

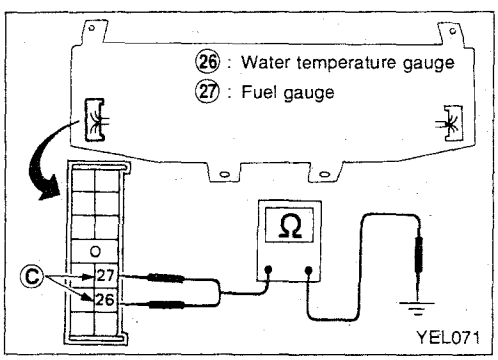
TD27T ENGINE MODELS



YEL047







Inspection/Fuel Gauge and Water Temperature Gauge

INSPECTION START

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 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.

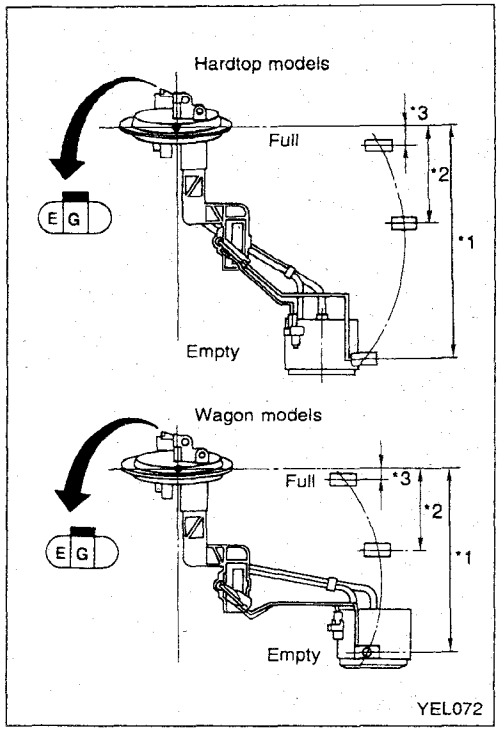
CHECK COMPONENT.
Check gauge units and harness.
Refer to "Fuel Tank Gauge Unit Check" and "Thermal Transmitter Check".

N.G. → Repair or replace.
Refer to FE section. (Fuel tank gauge unit)

O.K.

Reinstall any part removed.

INSPECTION END



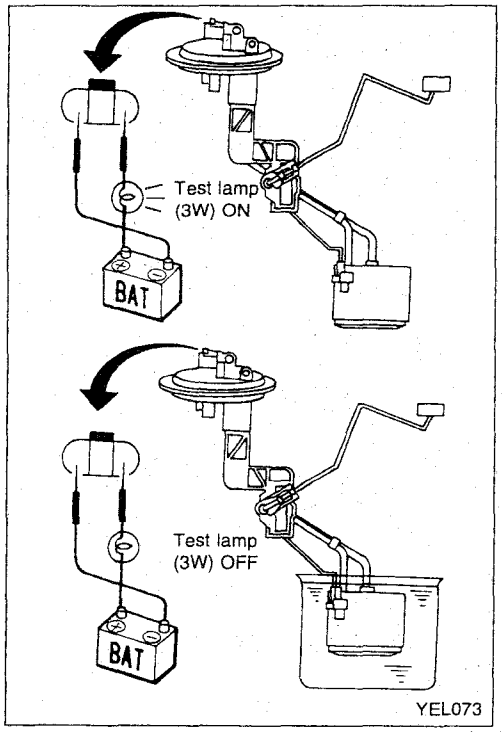
Fuel Tank Gauge Unit Check

- For removal, refer to FE section.

Check the resistance between terminals (G) and (E).

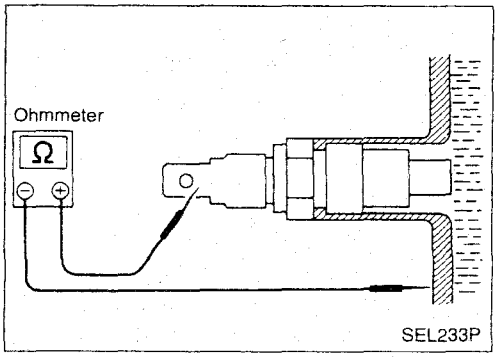
Ohmmeter		Float position mm (in)				Resistance value (Ω)
(+)	(−)			Hardtop models	Wagon models	
G	E	*3	Full	28 (1.10)	18 (0.71)	Approx. 0 - 7
		*2	1/2	168 (6.61)	126 (4.96)	92 - 112
		*1	Empty	274 (10.79)	210 (8.27)	240 - 320

Values *1 and *3: with the dipstick float at its lower or upper limit.



Fuel Warning Lamp Sensor Check

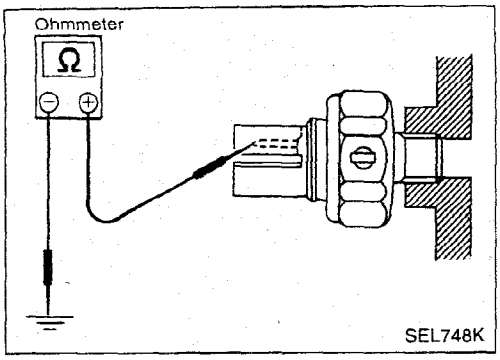
- It will take a short time for the bulb to light.



Thermal Transmitter Check

Check the resistance between the terminals of thermal transmitter and body ground.

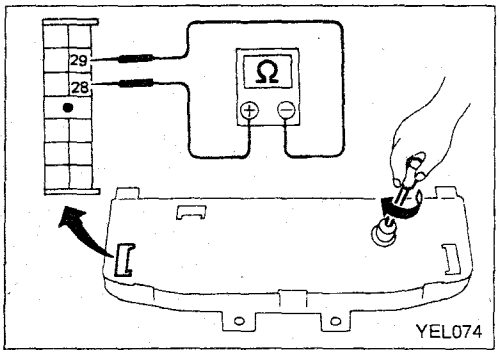
Water temperature	Resistance
65°C (149°F)	Approx. 482 - 496Ω
91°C (196°F)	Approx. 179 - 191Ω



Oil Pressure Switch Check

Check the continuity between the terminals of oil pressure switch and body ground.

	Oil pressure kPa (bar, kg/cm^2, psi)	Continuity
Engine start	More than 10 - 20 (0.10 - 0.20, 0.1 - 0.2,1.4 - 2.8)	NO
Engine stop	Less than 10 - 20 (0.10 - 0.20, 0.1 - 0.2,1.4 - 2.8)	YES



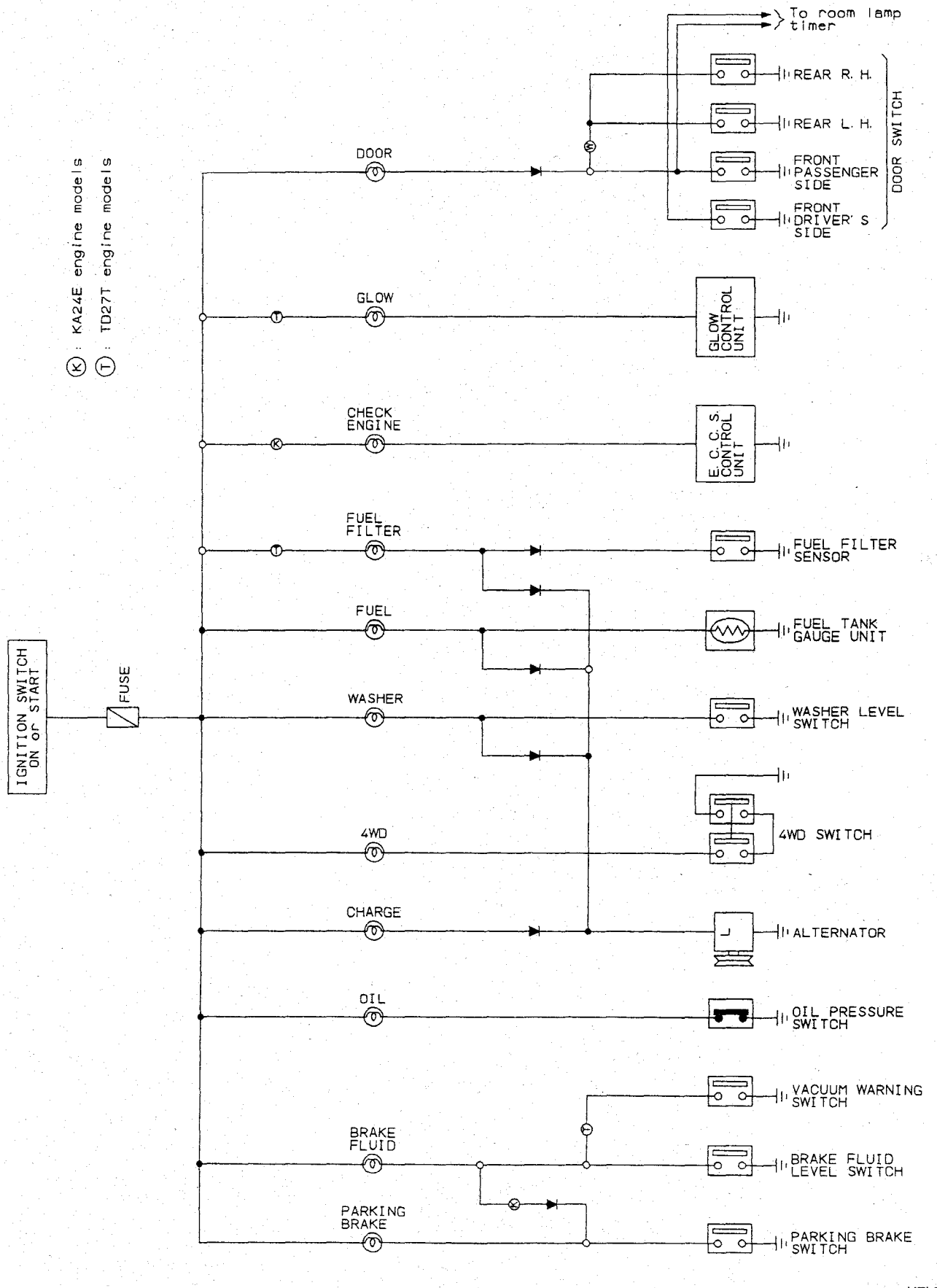
Speed Sensor Signal Check

- 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.

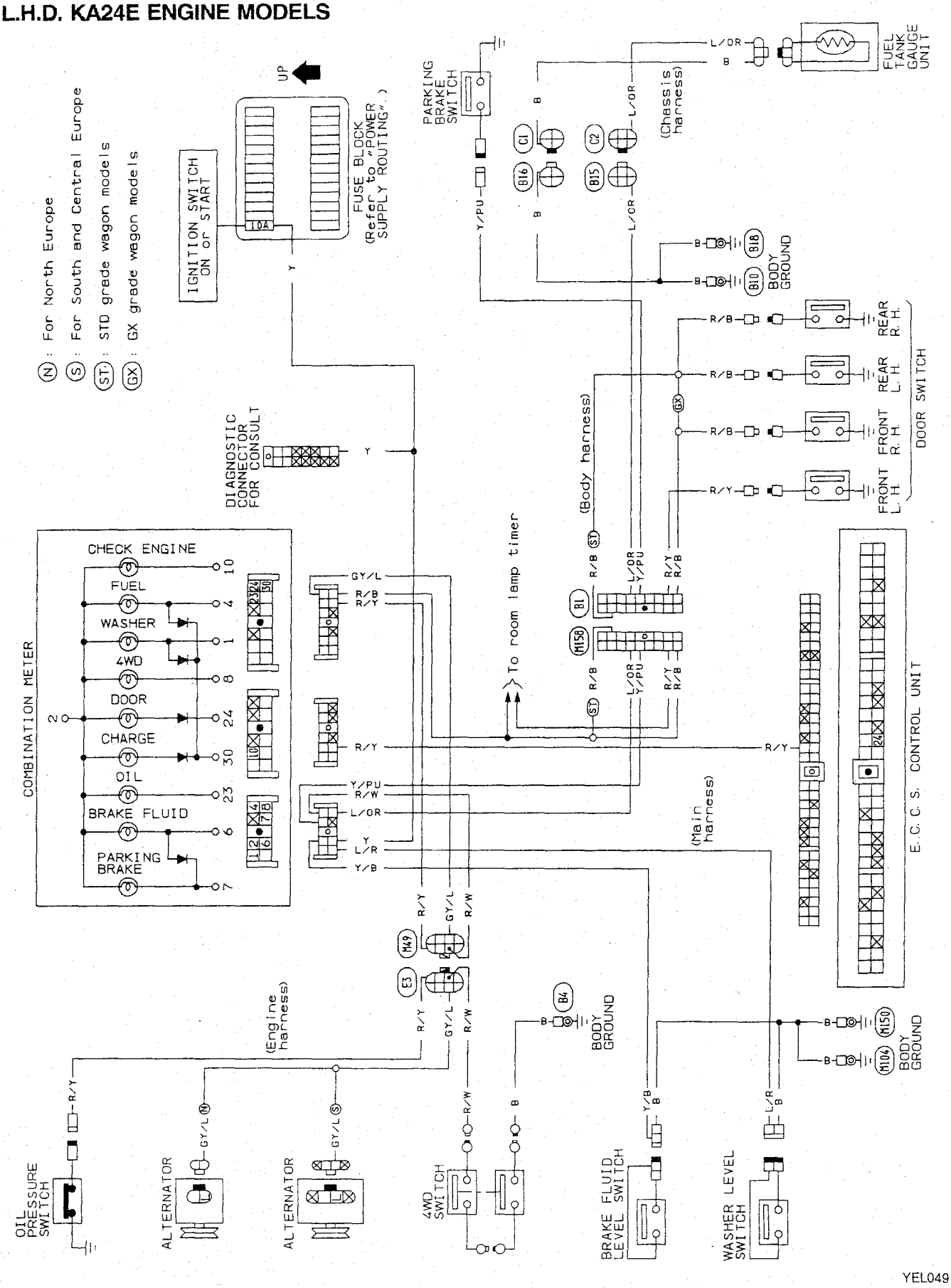
Warning Lamps/Schematic



YEL048

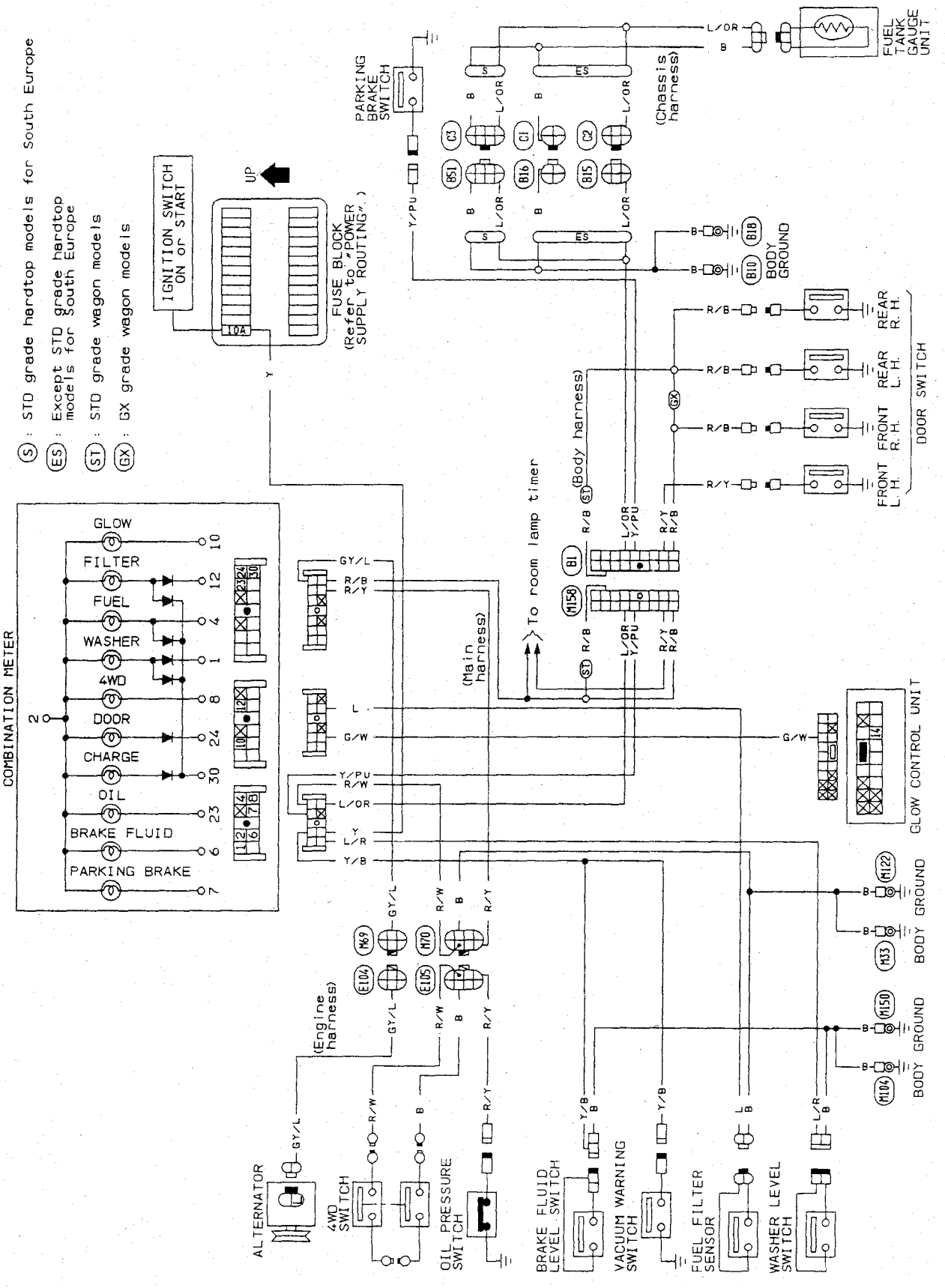
Warning Lamps/Wiring Diagram

L.H.D. KA24E ENGINE MODELS



Warning Lamps/Wiring Diagram (Cont'd)

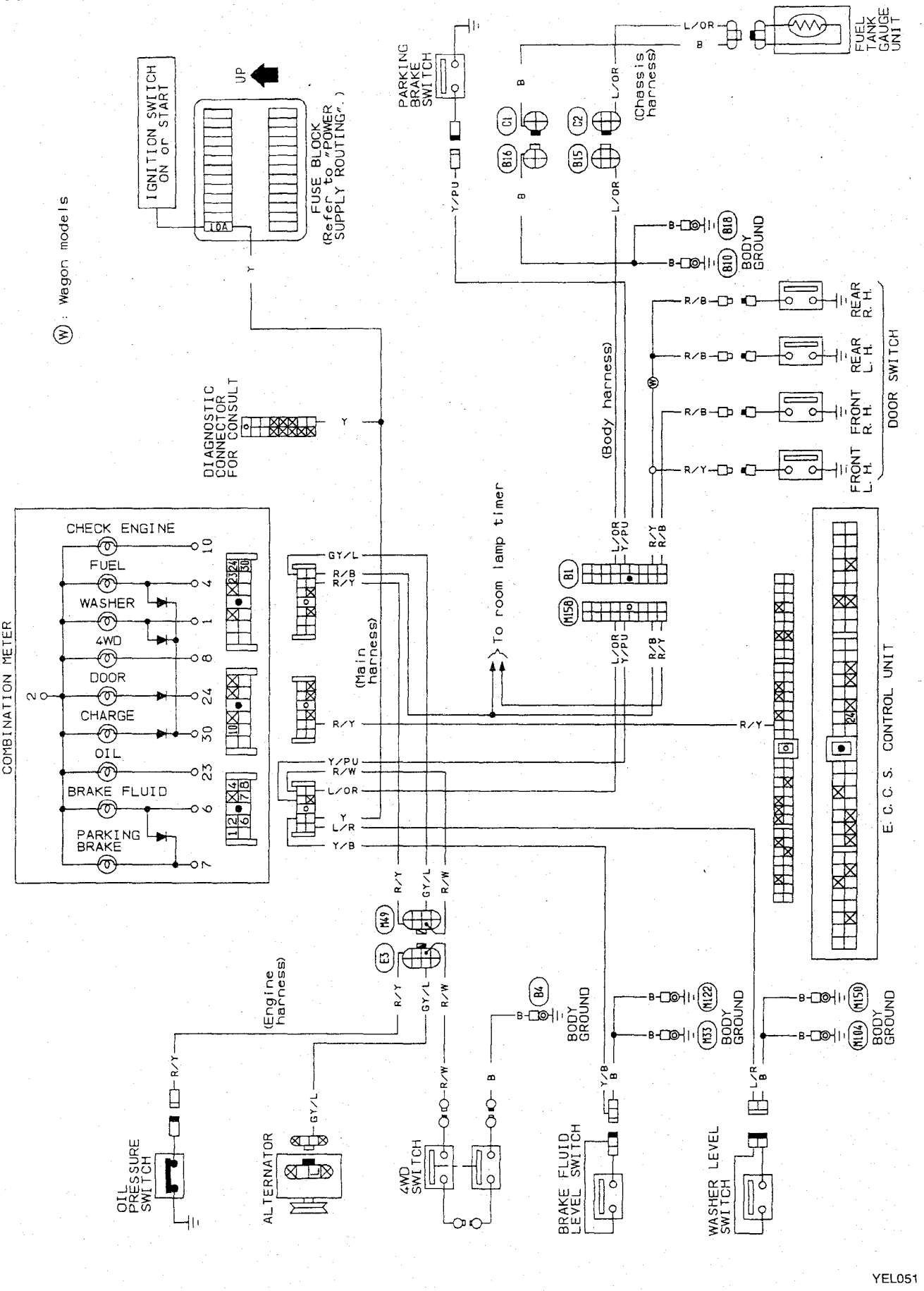
L.H.D. TD27T ENGINE MODELS



YEL050

Warning Lamps/Wiring Diagram (Cont'd)

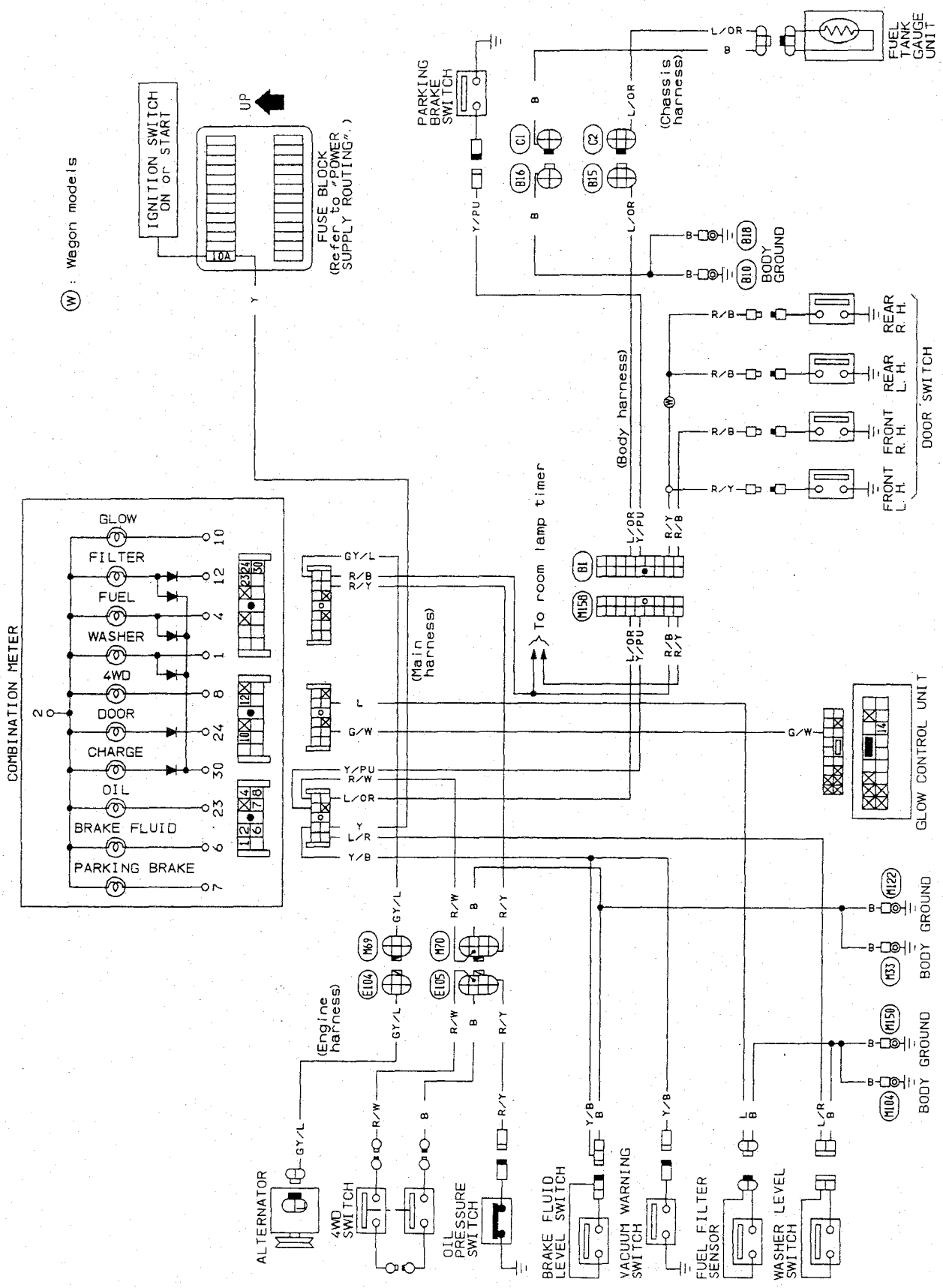
R.H.D. KA24E ENGINE MODELS



YEL051

Warning Lamps/Wiring Diagram (Cont'd)

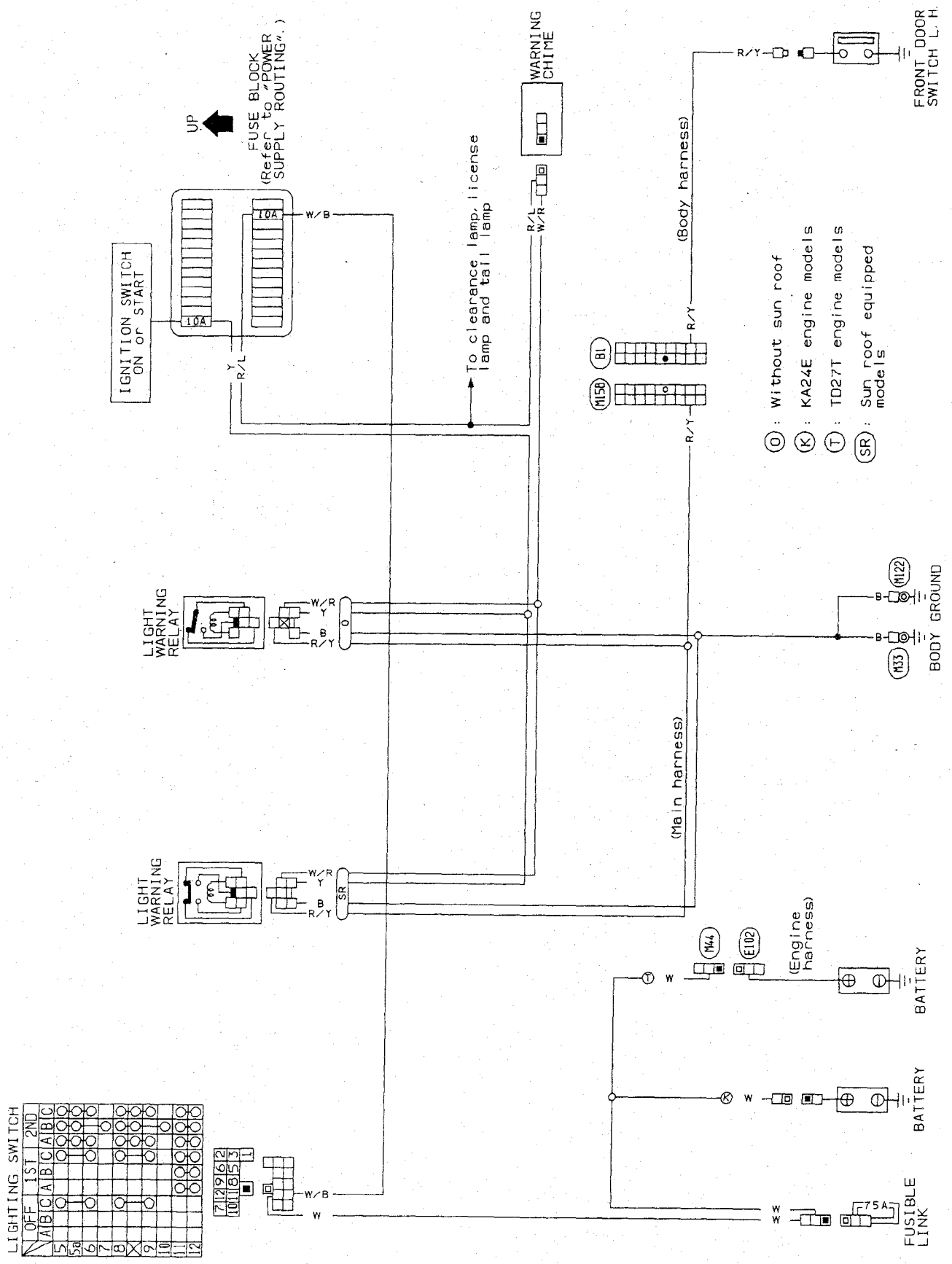
R.H.D. TD27T ENGINE MODELS



YEL052

Warning Chime/Wiring Diagram

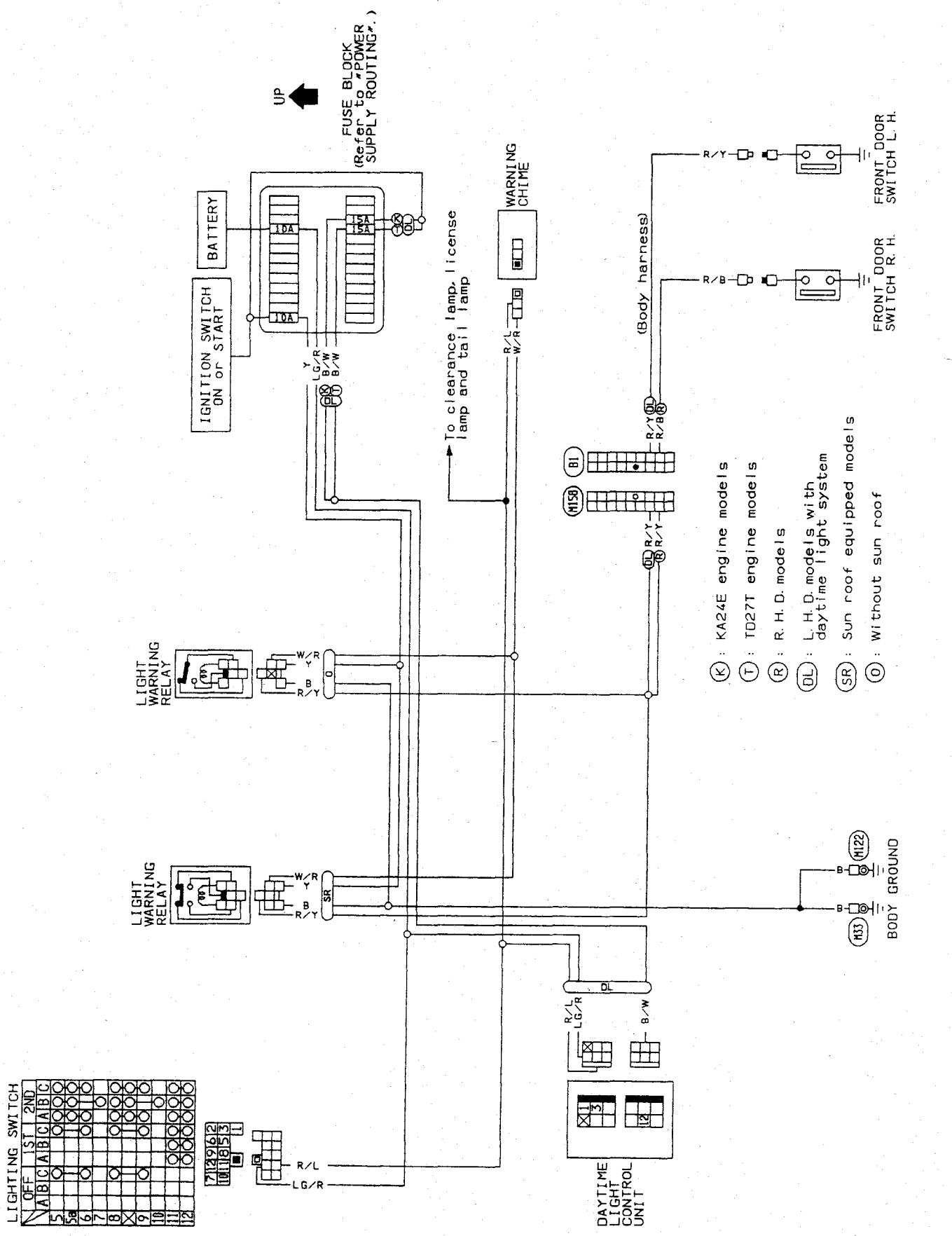
L.H.D. MODELS WITHOUT DAYTIME LIGHT SYSTEM



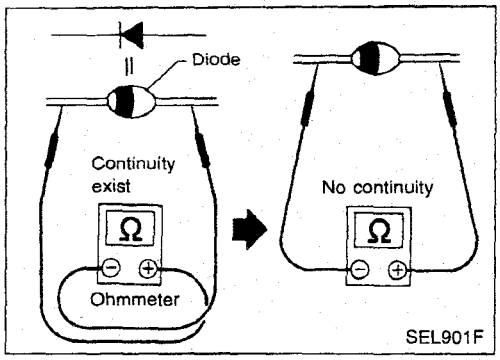
YEL054

Warning Chime/Wiring Diagram (Cont'd)

R.H.D MODELS AND L.H.D. MODELS WITH DAYTIME LIGHT SYSTEM

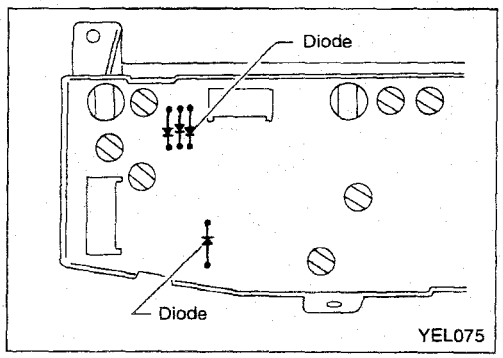


YEL053



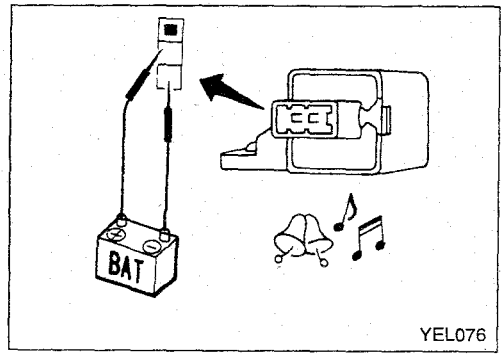
Diode Check

- Check continuity using an ohmmeter.
- Diode is functioning properly if test results are as shown in the figure at left.



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

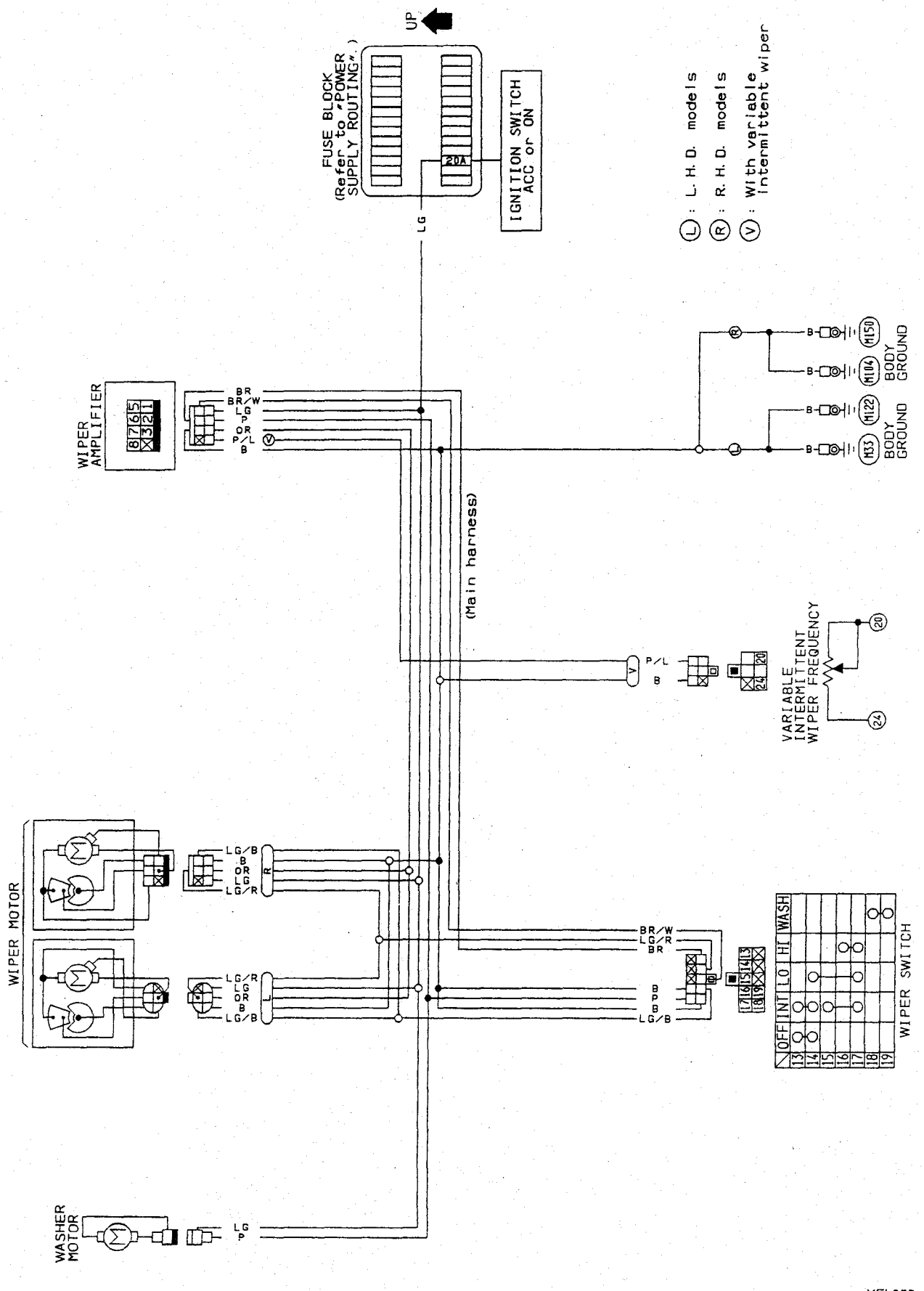
Refer to "Combination Meter".



Warning Chime Check

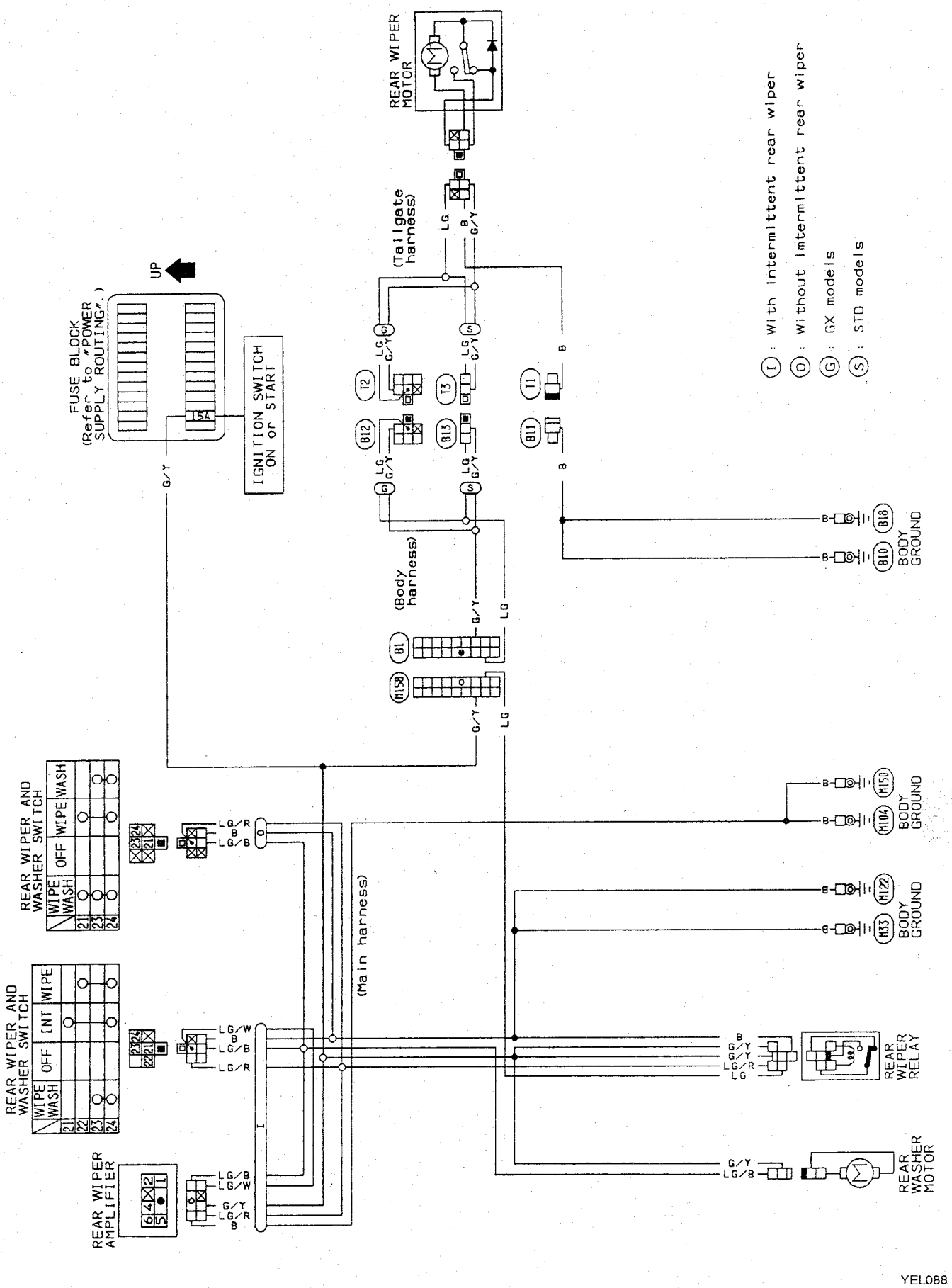
- Chime should sound when it is connected as shown in the figure.

Front Wiper and Washer/Wiring Diagram



YEL055

Rear Wiper and Washer/Wiring Diagram



YEL088

Installation

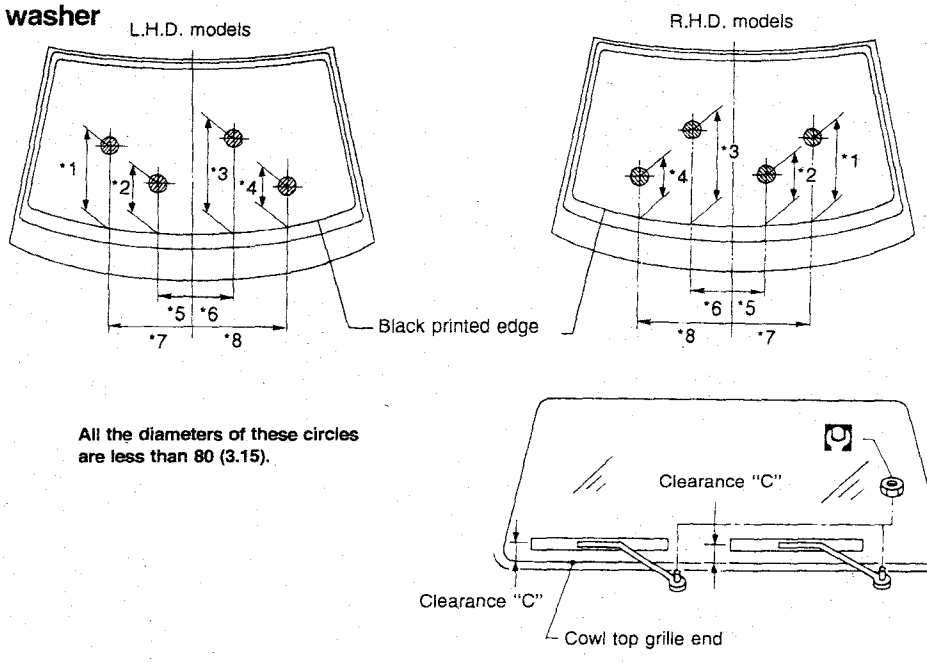
1. Prior to wiper arm installation, turn on wiper switch to operate wiper motor and then turn it "OFF" (Auto Stop).
2. Lift the blade up and then set it down onto glass surface to set the blade center to clearance "C" or "D" immediately before tightening nut.
3. Eject washer fluid. Turn on wiper switch to operate wiper motor and then turn it "OFF".
4. Ensure that wiper blades stop within clearance "C" or "D".

   Clearance "C": 20 - 30 mm (0.79 - 1.18 in)
   Clearance "D": 10 - 20 mm (0.39 - 0.79 in)

- Tighten windshield wiper arm nuts to specified torque.

  Front wiper:
  : 17 - 23 N·m(1.7 - 2.3 kg-m, 12 - 17 ft-lb)
  Rear wiper:
  : 13 - 18 N·m (1.3 - 1.8 kg-m, 9 - 13 ft-lb)

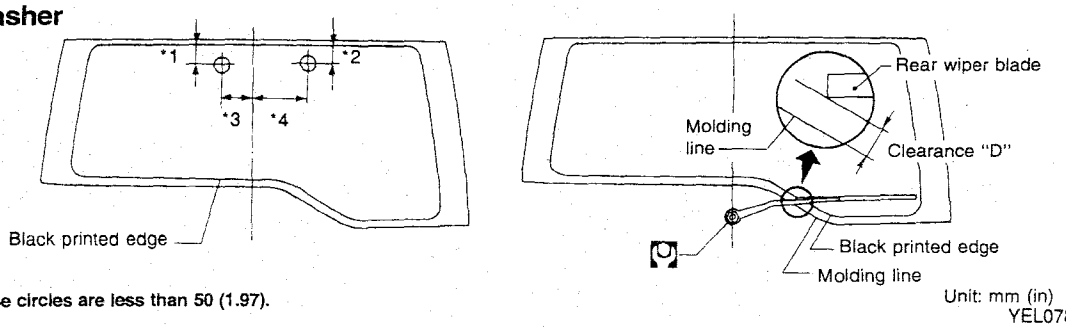
Front wiper and washer



*1: 344 (13.54)
*2: 210 (8.27)
*3: 401 (15.79)
*4: 166 (6.54)
*5: 117 (4.61)
*6: 200 (7.87)
*7: 317 (12.48)
*8: 426 (16.77)

All the diameters of these circles are less than 80 (3.15).

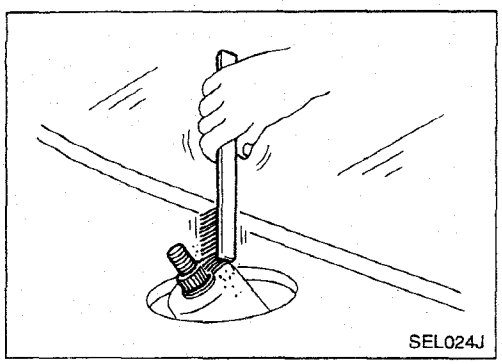
Rear wiper and washer



*1: 40 (1.57)
*2: 35 (1.38)
*3: 90 (3.54)
*4: 170 (6.69)

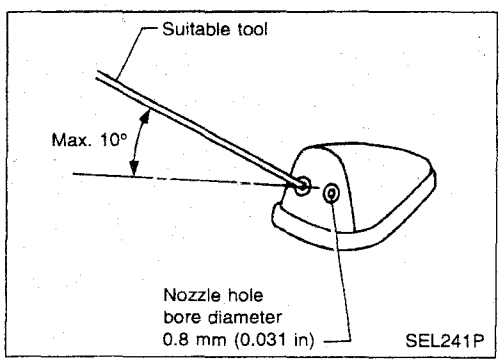
All the diameters of these circles are less than 50 (1.97).

Installation (Cont'd)


SEL024J

- **Before reinstalling wiper arm, clean up the pivot area as illustrated. This will reduce possibility of wiper arm looseness.**

Washer Nozzle Adjustment

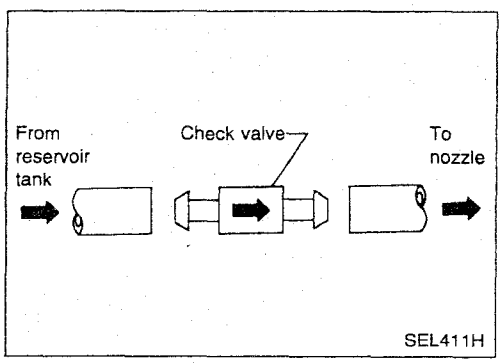


SEL241P

- Adjust washer nozzle with suitable tool as shown in the figure at left.

  Adjustable range: ±10°

Check Valve

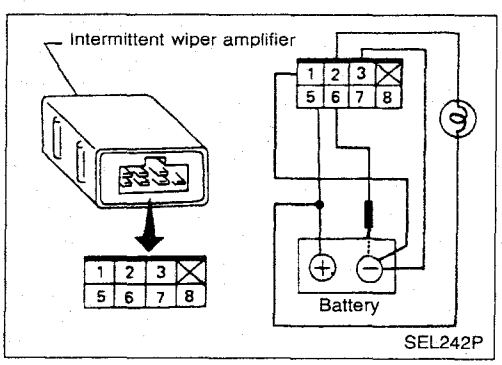


SEL411H

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

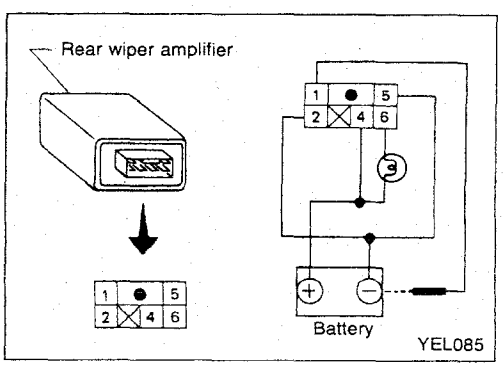
Wiper Amplifier Check

FRONT WIPER AMPLIFIER



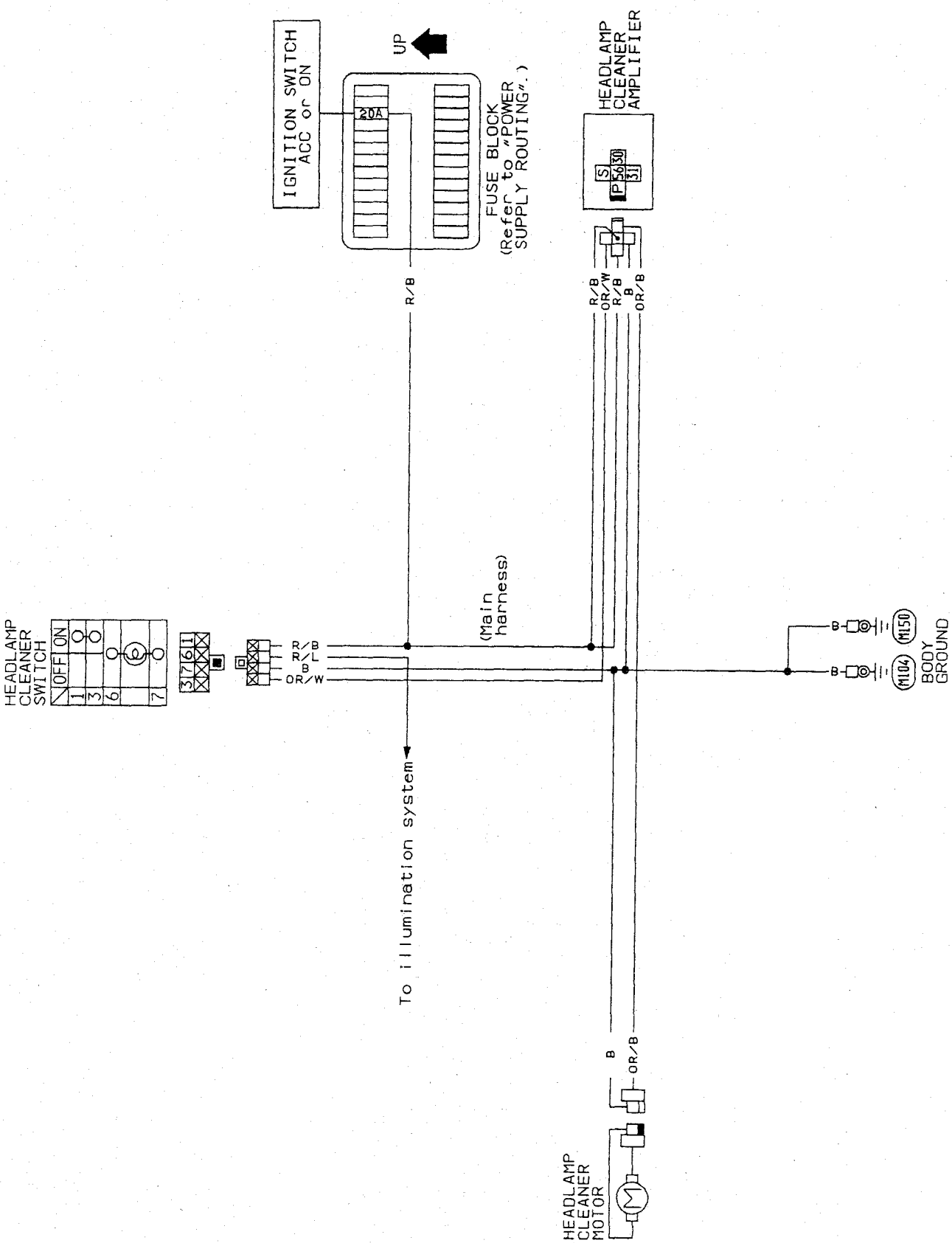
SEL242P

1. Connect as shown in the figure at left.
2. If test lamp comes on when connected to terminal ⑥ and battery ground, wiper amplifier is normal.

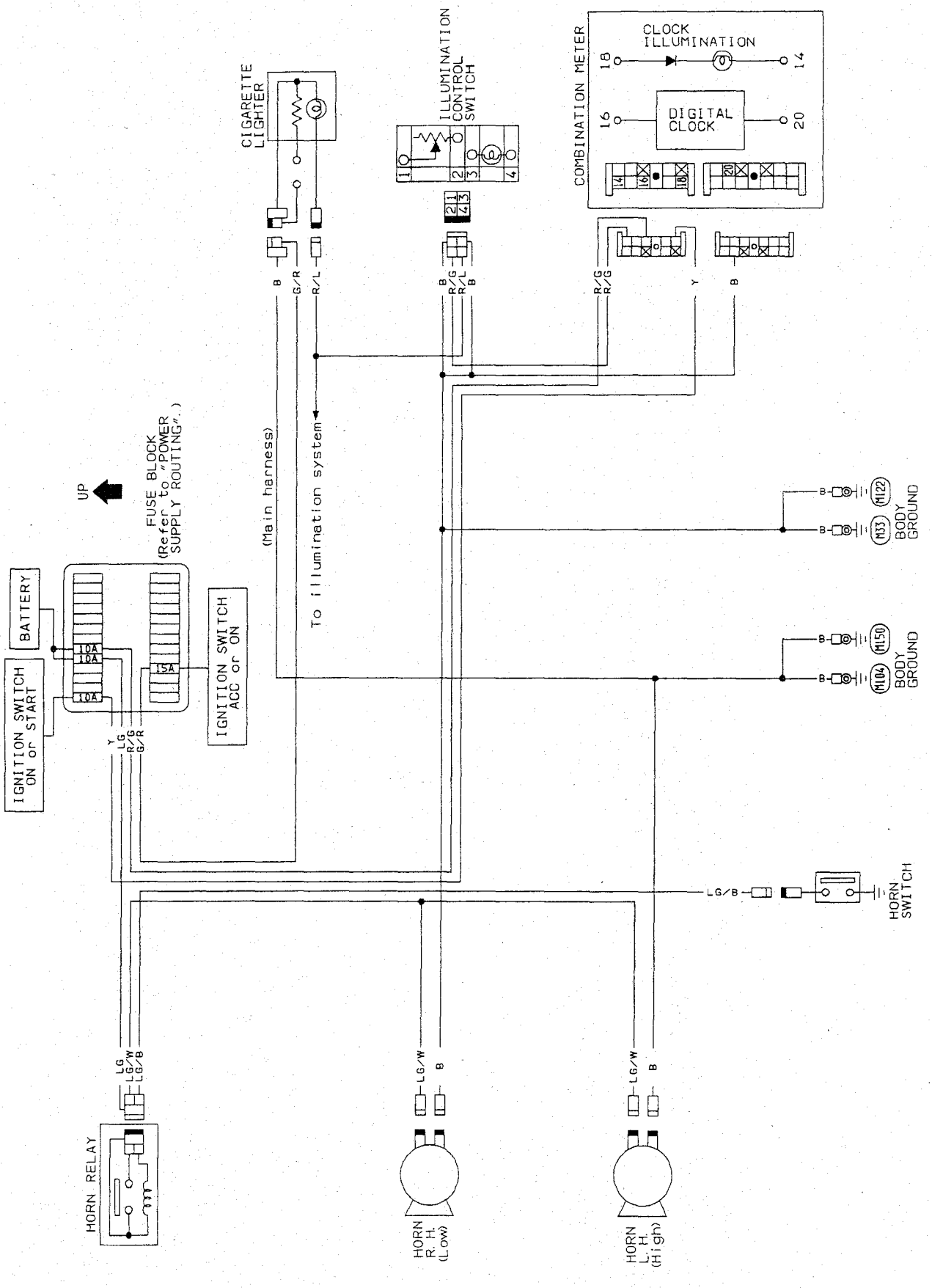


YEL085

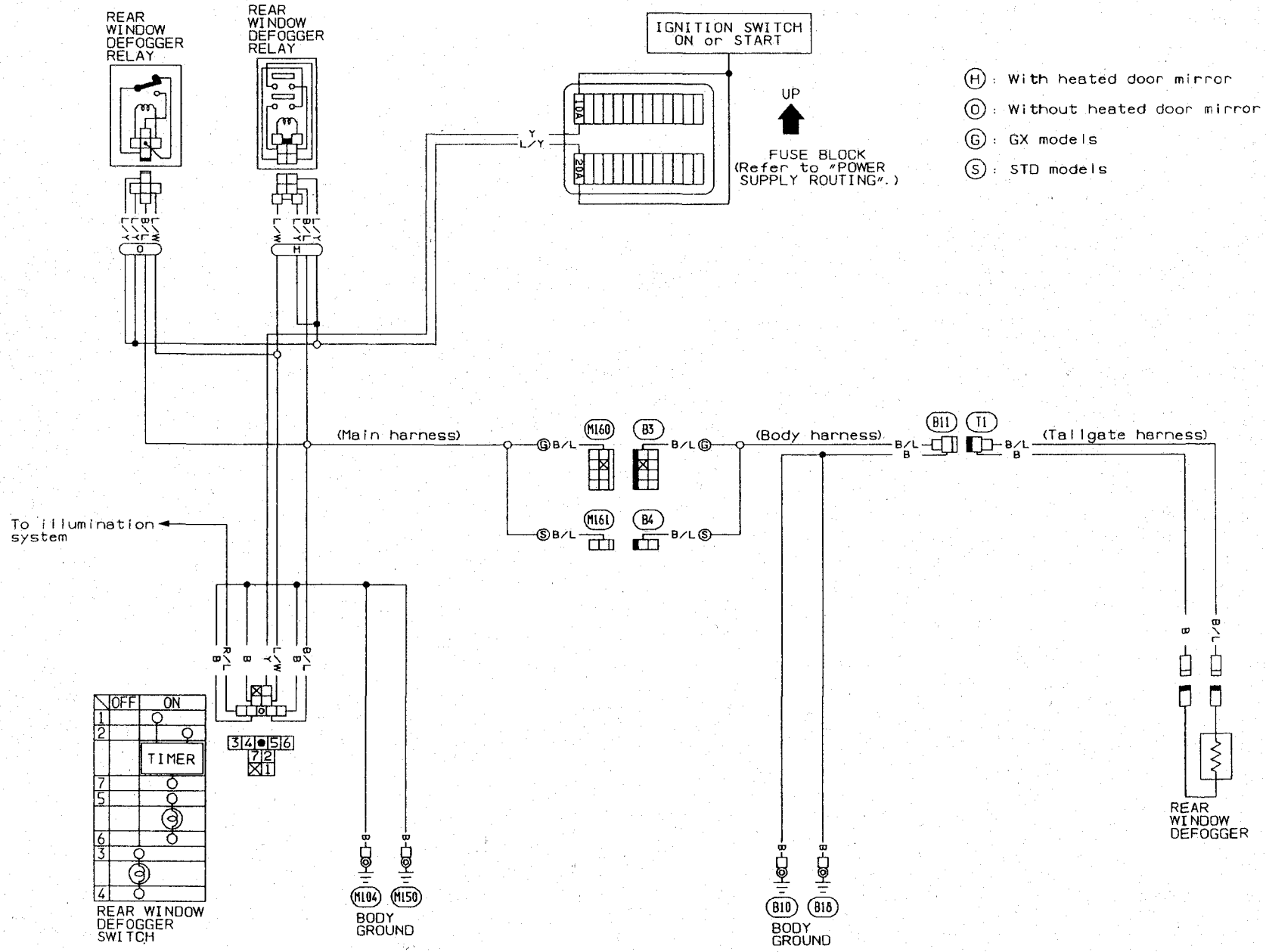
Headlamp Washer/Wiring Diagram

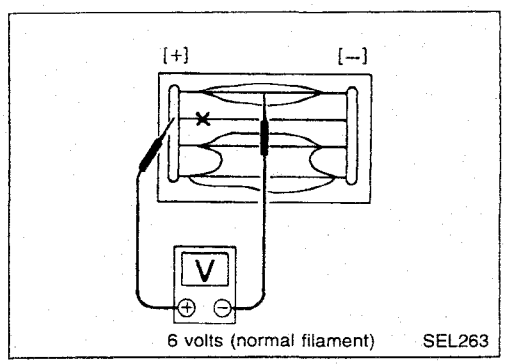


Wiring Diagram



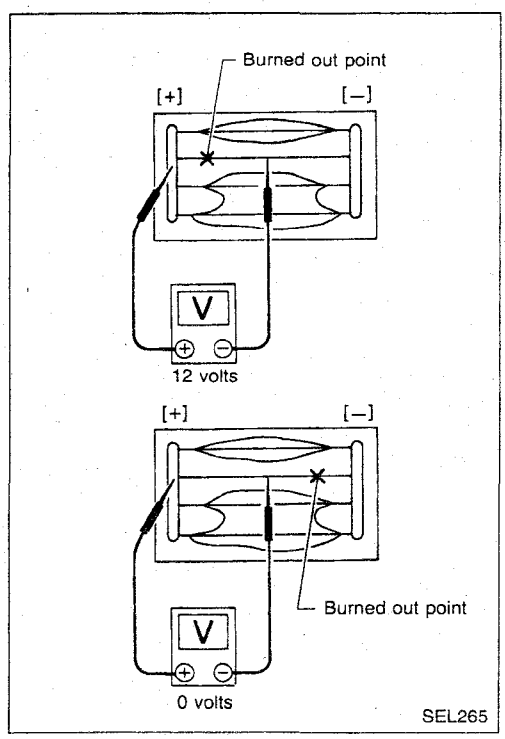
Wiring Diagram



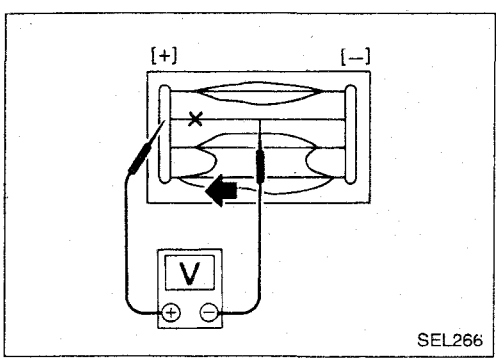


Filament Check

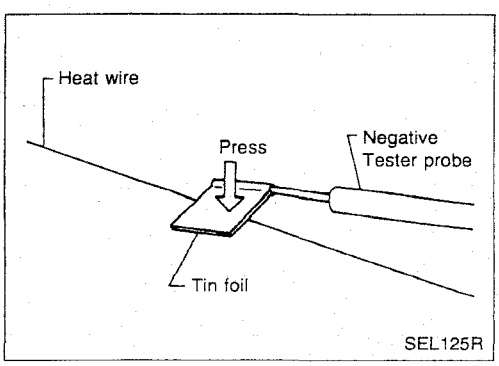
1. Attach probe circuit tester (in volt range) to middle portion of each filament.
   6 volts = Normal filament



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.

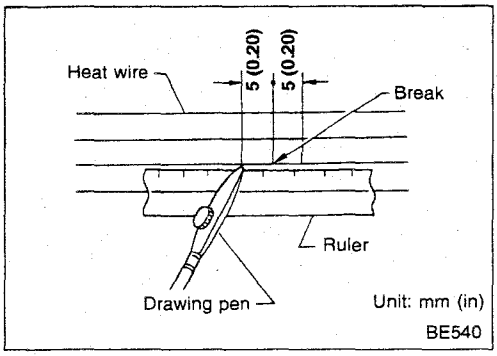


- **When measuring voltage, wind a piece of tin foil around the top of the negative probe and press the foil against the wire with your finger.**

Filament Repair

REPAIR EQUIPMENT

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

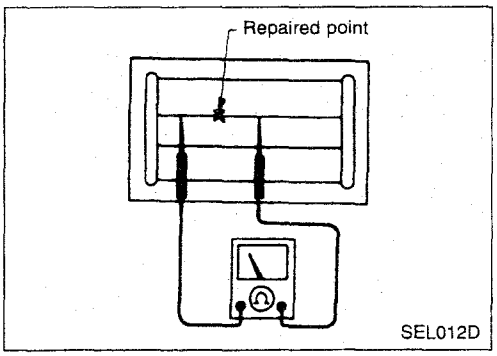


REPAIRING PROCEDURE

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

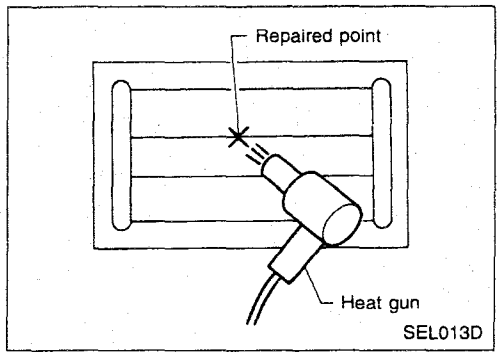
Shake silver composition container before use.

3. Place ruler on glass along broken line. Deposit conductiv silver composition on break with drawing pen. Slightly overlap existing heat wire on both sides [preferably 5 mm (0.2 in)] of the break.

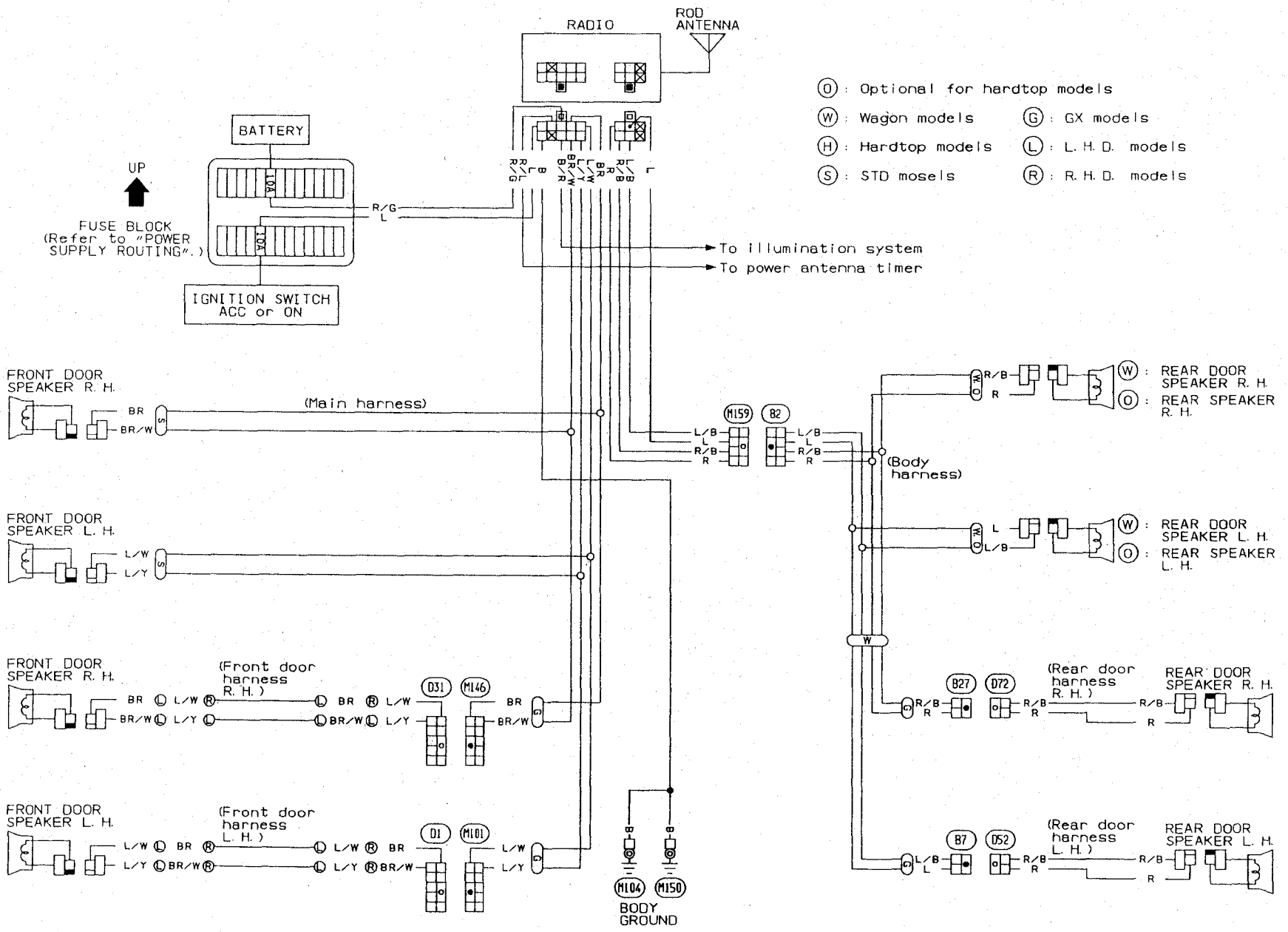


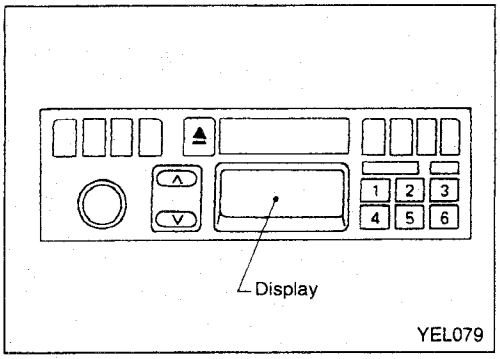
4. After repair has been completed, check repaired wire for continuity. This check should be conducted 10 minutes after silver composition is deposited.

Do not touch repaired area while test is being conducted.



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.


RADIO
ROD ANTENNA
BATTERY
UP
FUSE BLOCK
(Refer to "POWER SUPPLY ROUTING".)
10A
10A
IGNITION SWITCH
ACC or ON
R/G
L
To illumination system
To power antenna timer
Ⓞ : Optional for hardtop models
Ⓦ : Wagon models
Ⓖ : GX models
Ⓗ : Hardtop models
Ⓛ : L. H. D. models
Ⓢ : STD mosels
Ⓡ : R. H. D. models
FRONT DOOR SPEAKER R. H.
(Main harness)
BR
BR/W
FRONT DOOR SPEAKER L. H.
L/W
L/Y
FRONT DOOR SPEAKER R. H.
(Front door harness R. H.)
FRONT DOOR SPEAKER L. H.
(Front door harness L. H.)
M159
B2
(Body harness)
D31
M146
D1
M101
M104
M150
BODY GROUND
Ⓦ : REAR DOOR SPEAKER R. H.
Ⓞ : REAR SPEAKER R. H.
Ⓦ : REAR DOOR SPEAKER L. H.
Ⓞ : REAR SPEAKER L. H.
B27
D72
(Rear door harness R. H.)
REAR DOOR SPEAKER R. H.
B7
D52
(Rear door harness L. H.)
REAR DOOR SPEAKER L. H.

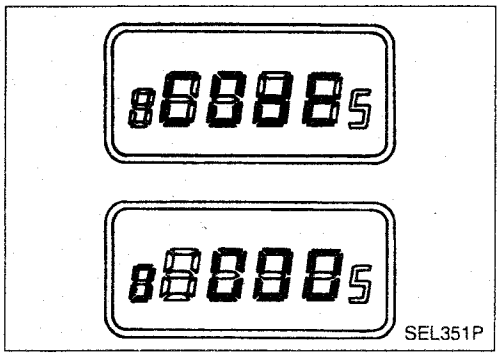


Radio

ANTI-THEFT SYSTEM

By using a personal 4-digit code known only to the vehicle owner, the possibility of the audio unit being stolen is effectively reduced, because without the code the unit can not be activated. When in normal use, the unit is unlocked and accessible in the usual way.

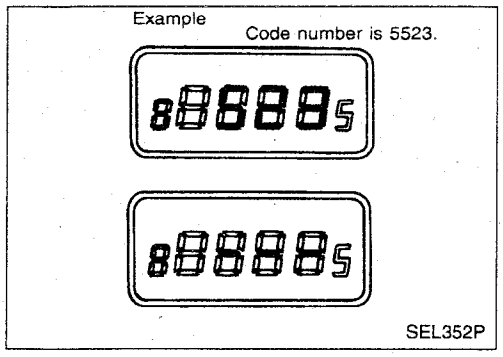
If however, someone attempts to remove the unit or the ground cable is disconnected from the battery, the Anti-theft system activates and the unit "locks". The only way it can be unlocked is by entering a personal code number known only by the owner.



UNLOCKING THE UNIT (How to enter a personal code number)

Use the following procedures to enter a personal code number into the radio.

1. Turn ignition switch to "ACC" or "ON".
2. Turn SW. VOL knob to "ON" and "CODE" will appear on the display.
3. Press any button (except "eject") and "xxxx" will appear on the display.

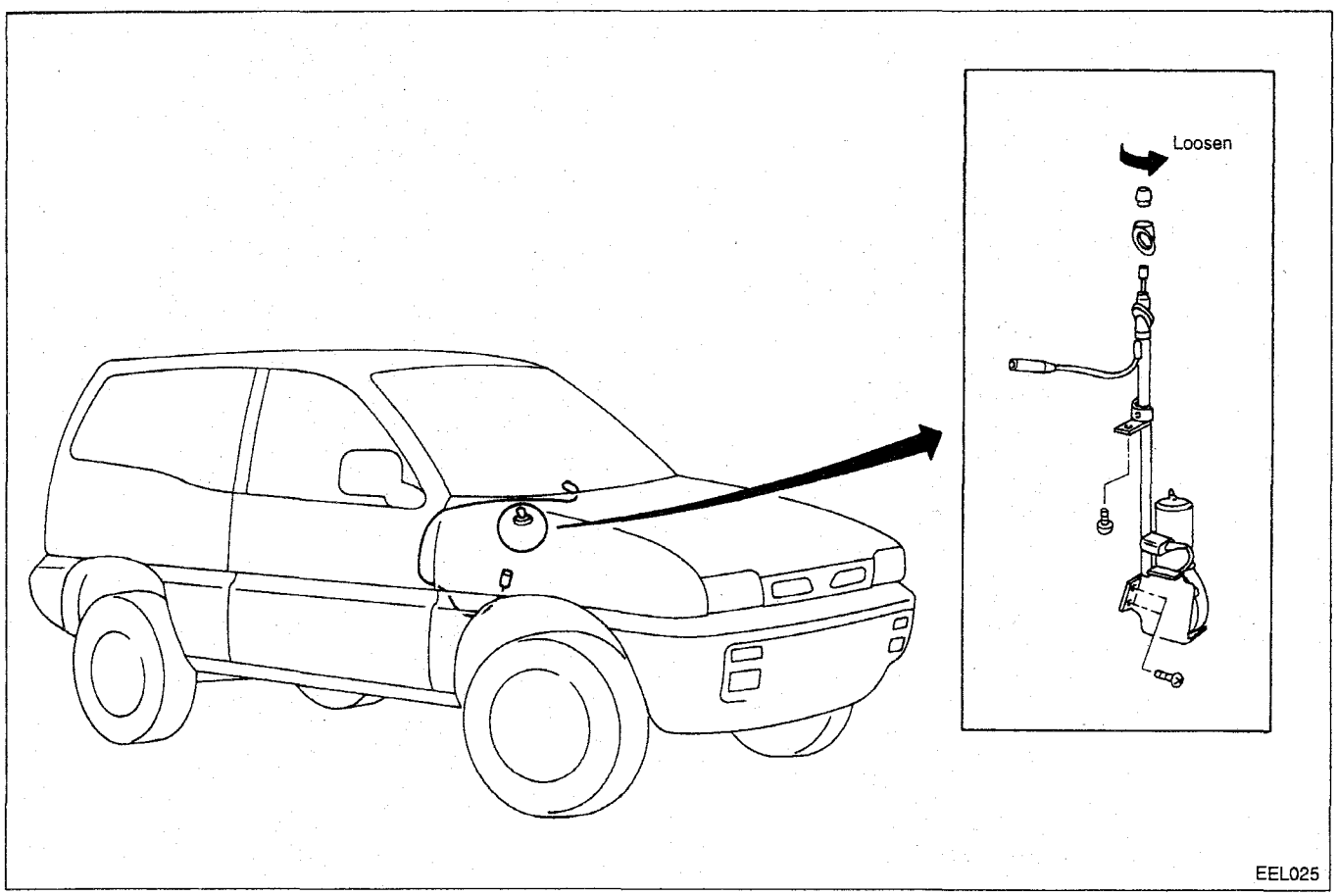


4. Enter a personal code number by pressing station select buttons 1, 2, 3,4 the required number of times to displa the code.
5. Press xxxx to enter the code.
   Unit is unlocked and the radio/cassette will operate.
   If the wrong code number is entered, the display shows "- - - -". Wait ten seconds then enter the correct code.

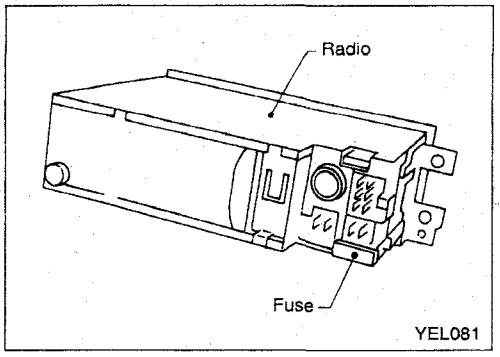
CAUTION:

There is a theft prevention mechanism restricting the number of times a wrong code number can be entered into the radio unit. If a wrong code number is entered 1 to 2 times, you will have to wait for 10 seconds before the radio will receive further input. If a wrong code number is entered 3 to 20 times, you will have to wait a duration of 15 minutes. The radio unit will lock permanently if any further attempts are made.

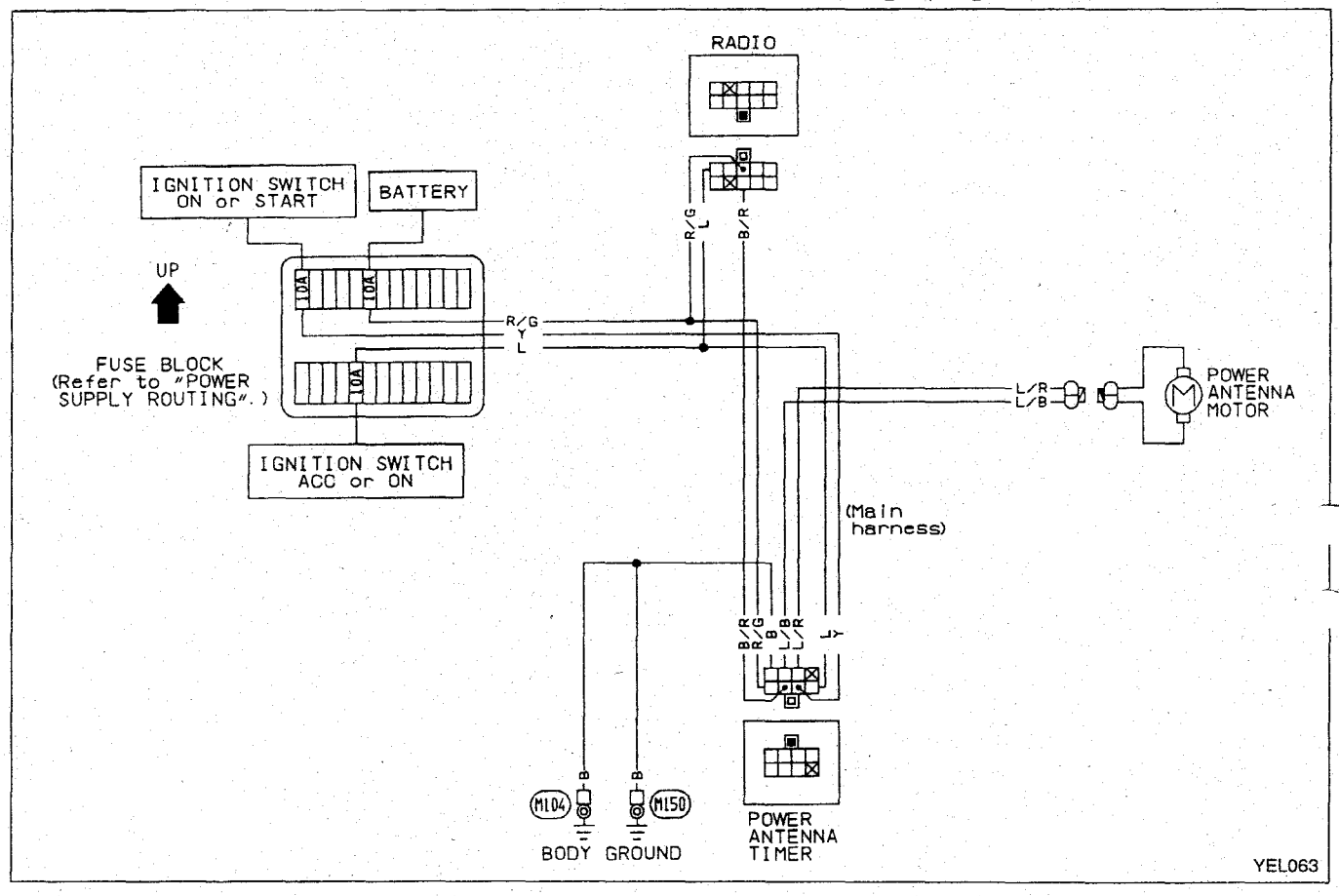
Location of Antenna

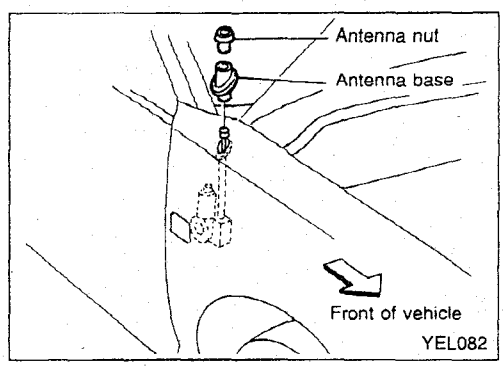


Radio Fuse Check



Power Antenna/Wiring Diagram

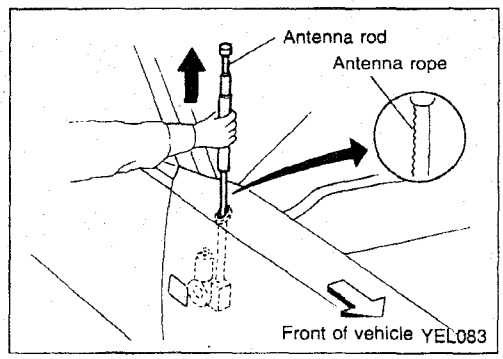




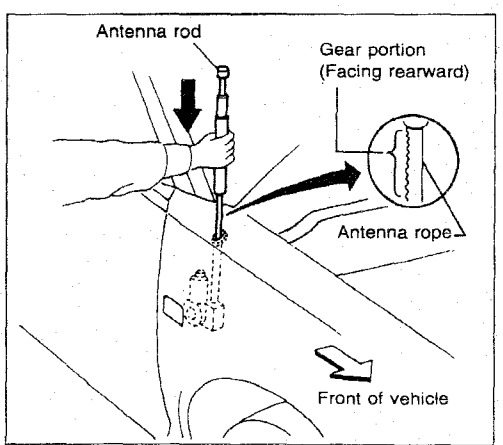
Antenna Rod Replacement

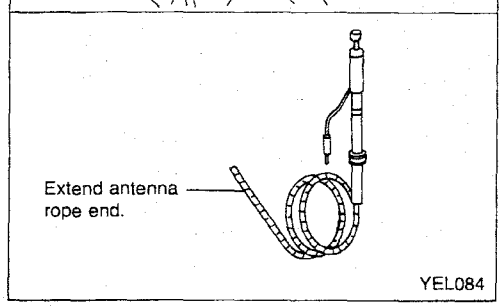
REMOVAL

1. Remove antenna nut and antenna base.



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

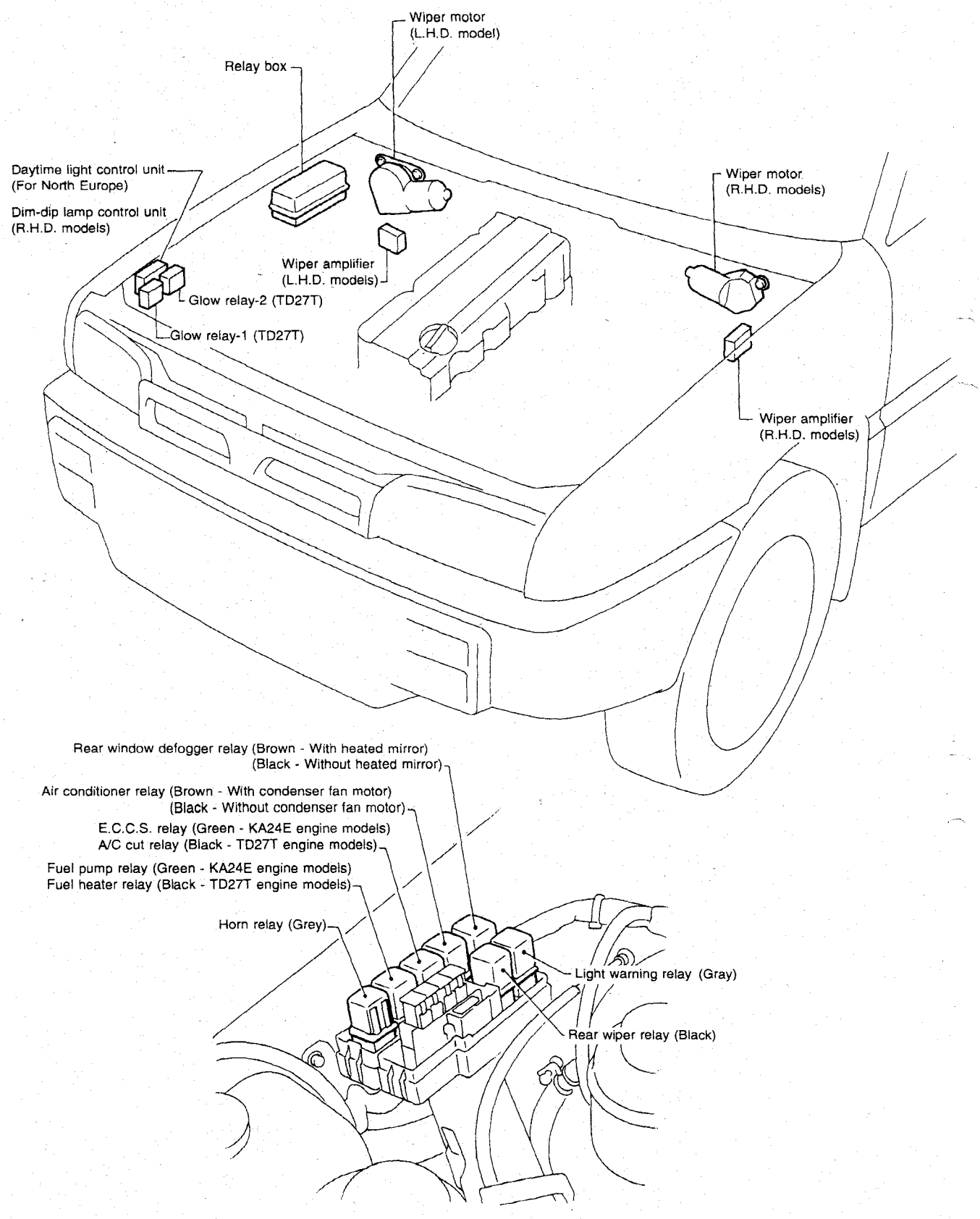




INSTALLATION

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

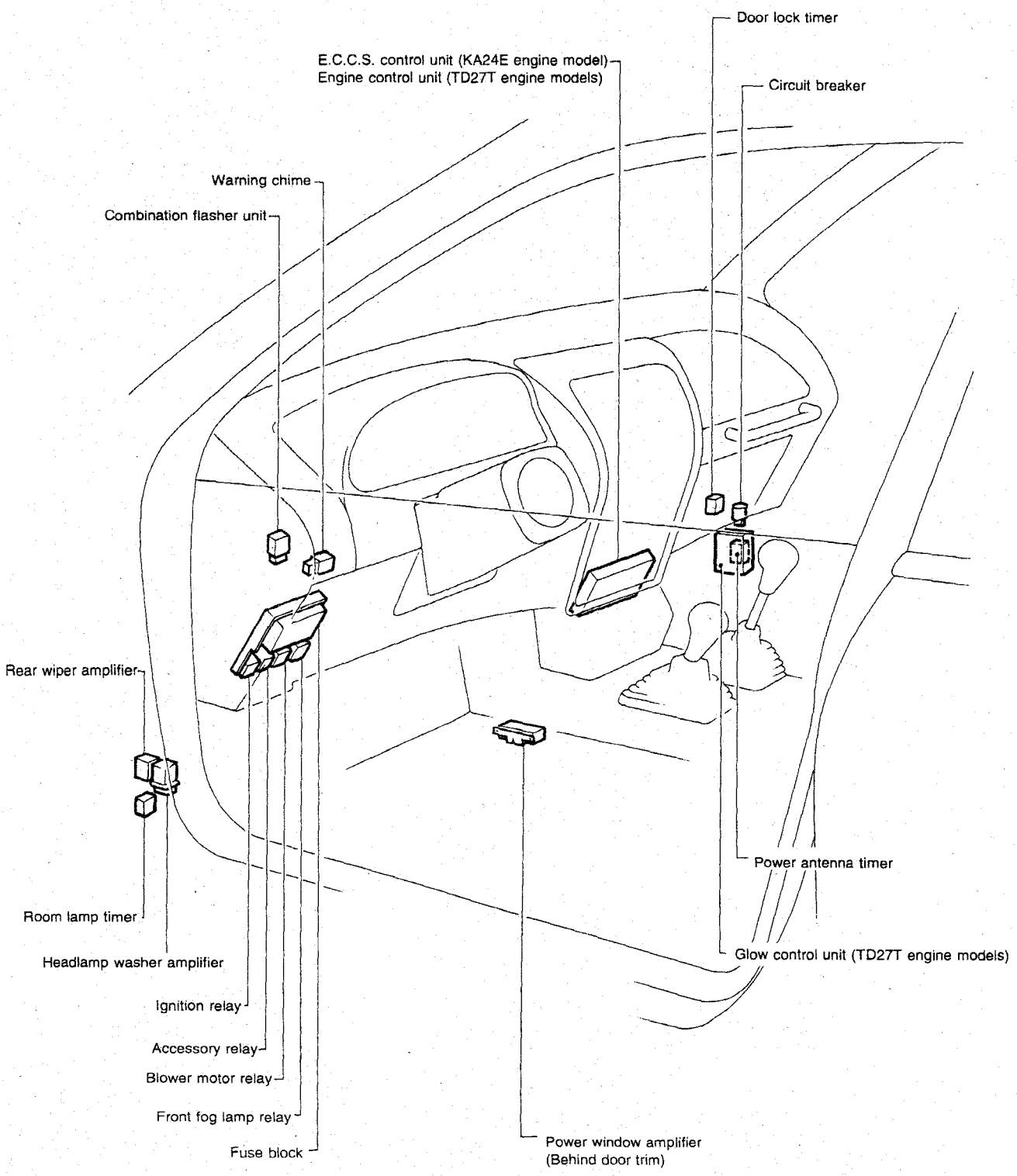
Engine Compartment



YEL056

Passenger Compartment

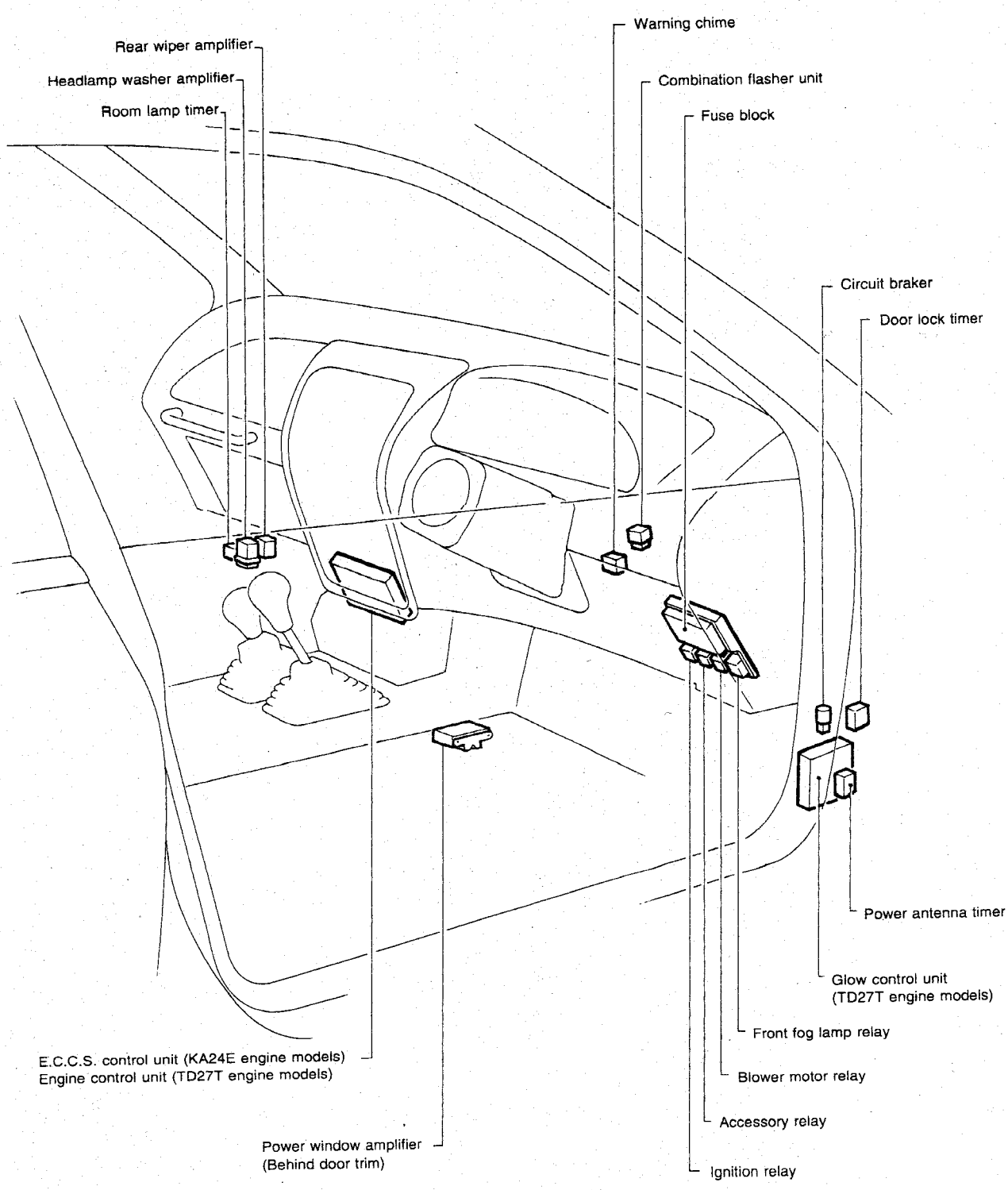
L.H.D. MODELS



YEL057

Passenger Compartment (Cont'd)

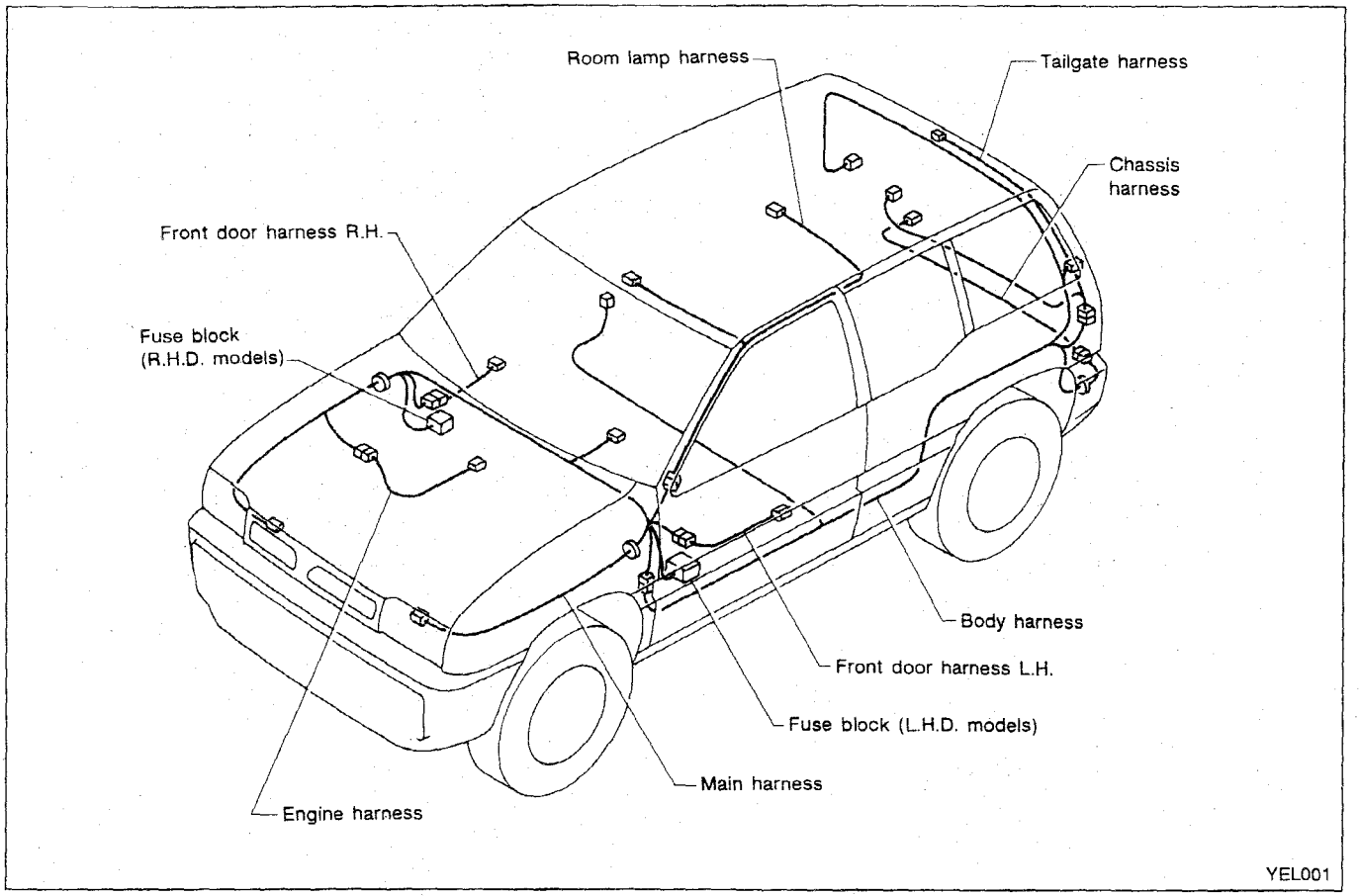
R.H.D. MODELS



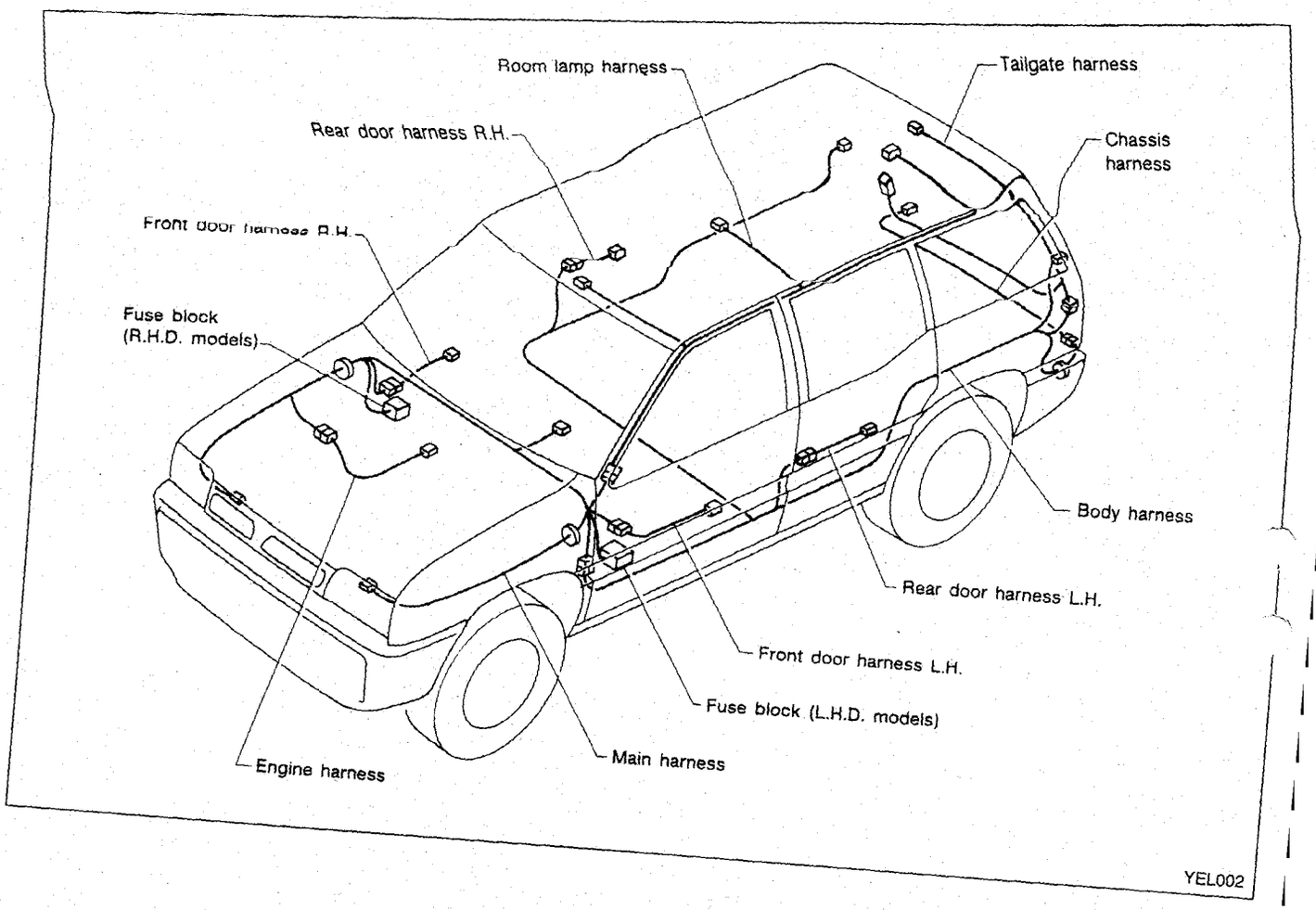
YEL058

Outline

HARDTOP MODELS

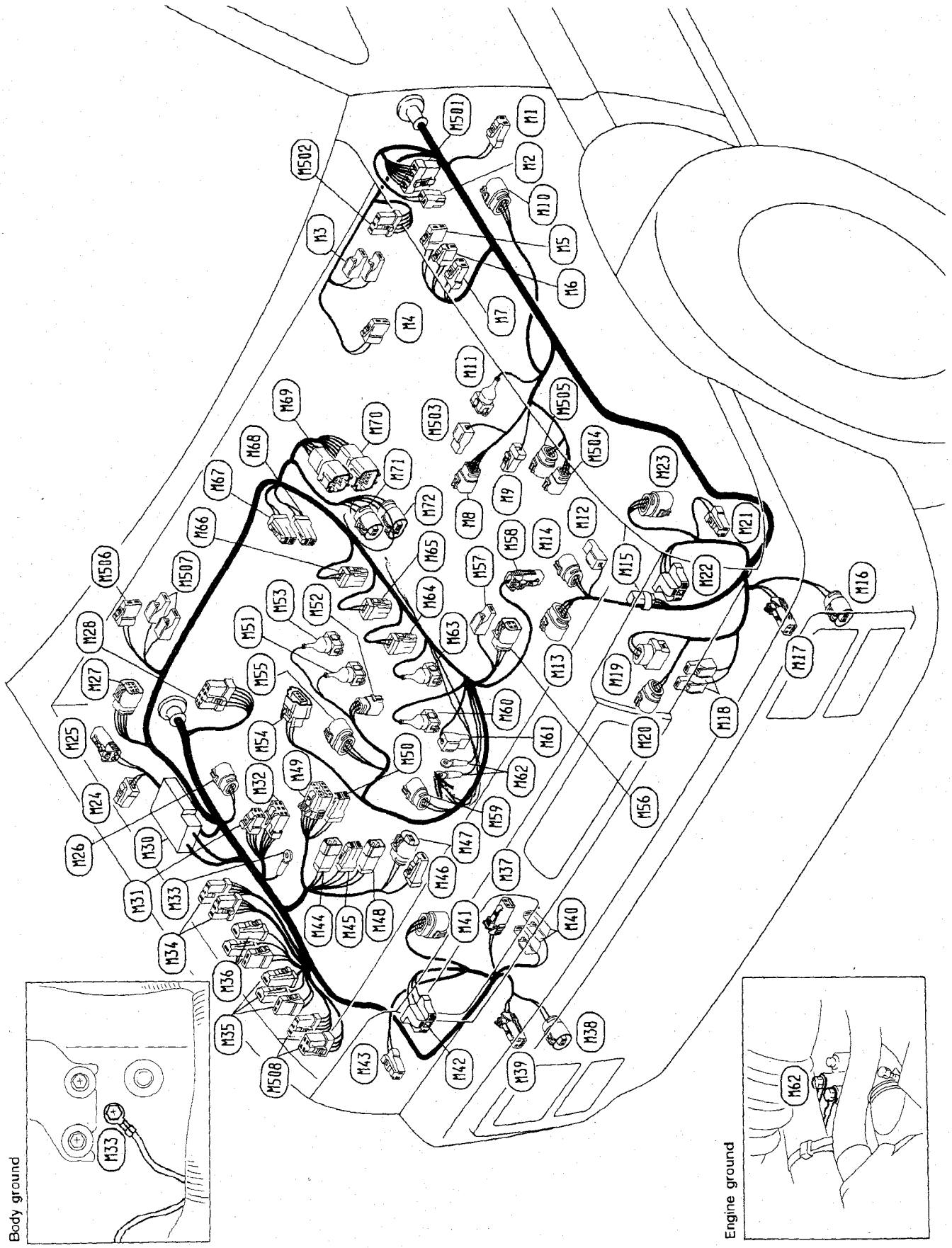


WAGON MODELS



Main Harness

ENGINE COMPARTMENT

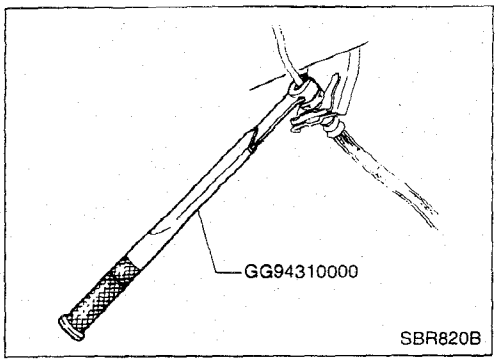


CLUTCH

SECTION CL

SECTION CL

CONTENTS



Precautions

- **Recommended fluid is brake fluid "DOT 4".**
- **Do not reuse drained brake fluid.**
- **Be careful not to splash brake fluid on painted areas.**
- **When removing and installing clutch piping, use Tool.**
- **To clean or wash all parts of master cylinder, operating cylinder and clutch damper, use clean brake fluid.**
- **Never use mineral oils such as gasoline or kerosene. It will ruin the rubber parts of the hydraulic system.**

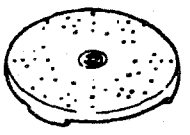
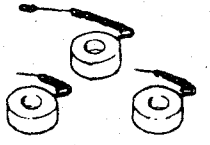
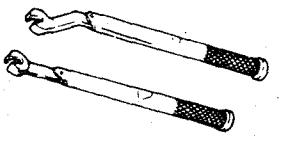
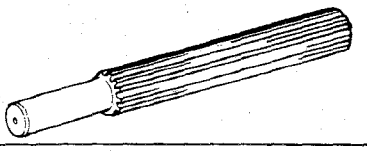
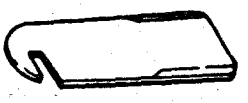
WARNING:

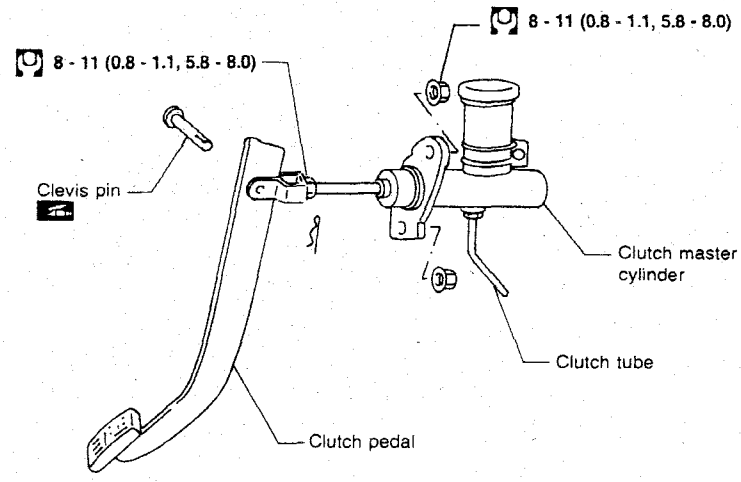
Remove all dust from clutch disc with a dust collector after cleaning with waste cloth.

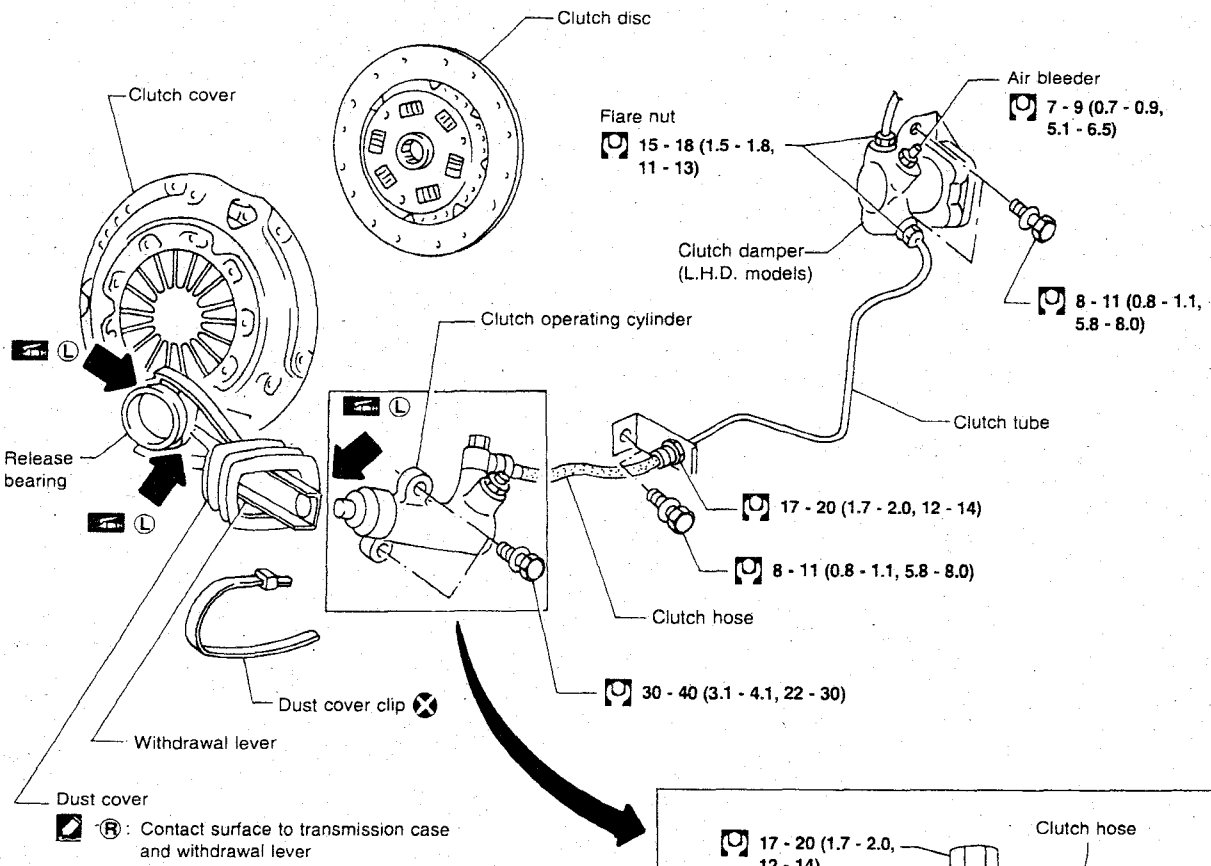
Preparation

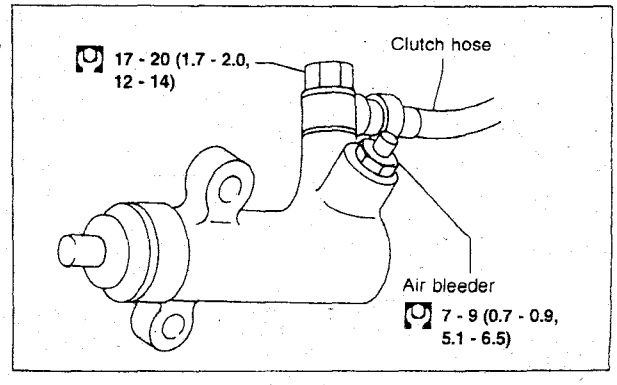
SPECIAL SERVICE TOOLS

*: Special tool or commercial equivalent

Tool number Tool name	Description	
ST20050010 Base plate		Inspecting diaphragm spring of clutch cover
ST20050100 Distance piece		Inspecting diaphragm spring of clutch cover
GG94310000 Flare nut torque wrench		Removing and installing each clutch piping
KV30100100* Clutch aligning bar		Installing clutch cover and clutch disc
ST20050240* Diaphragm spring adjusting wrench		Adjusting unevenness of diaphragm spring of clutch cover



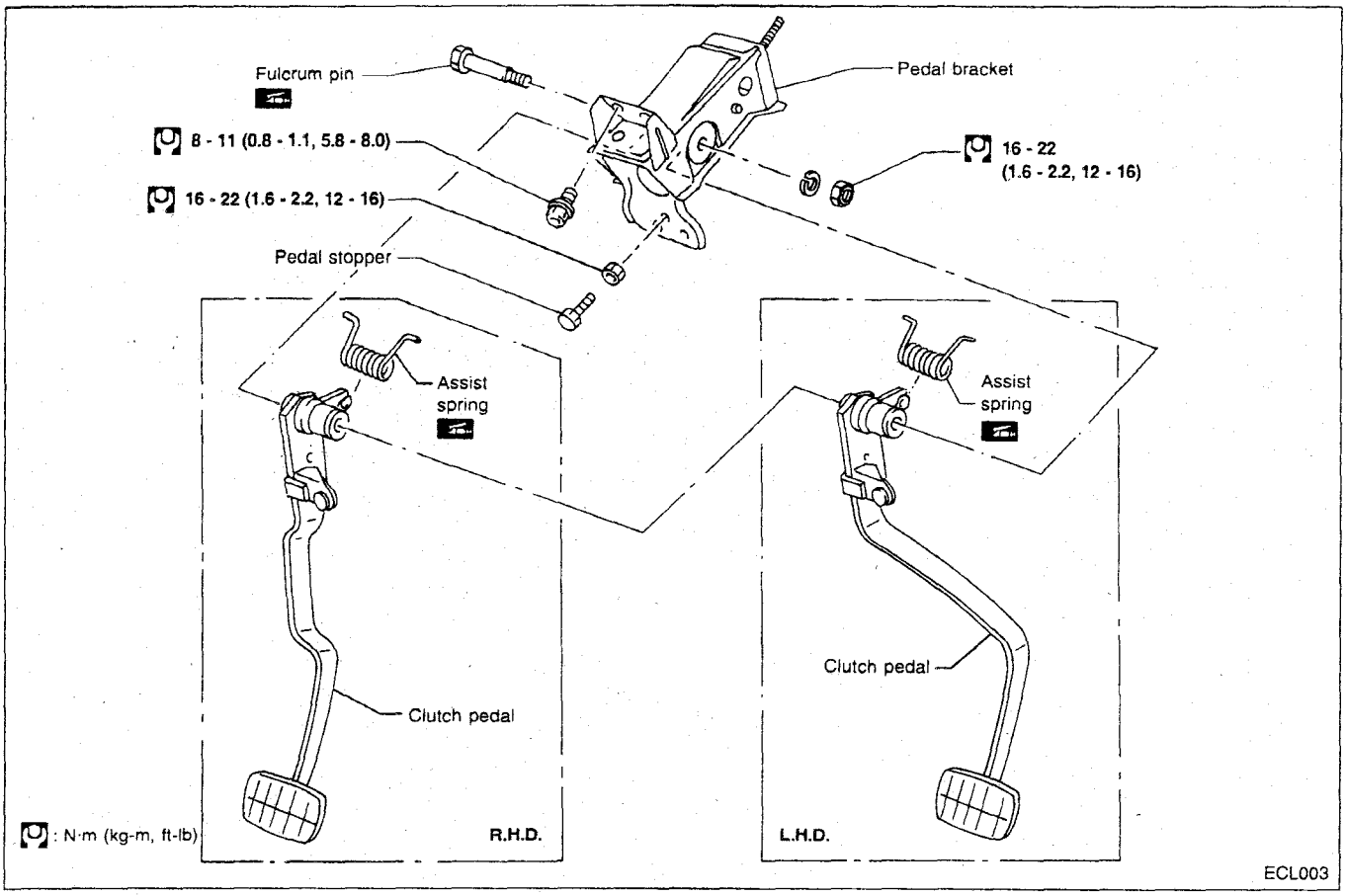




Ⓡ : Apply recommended sealant (Nissan genuine part: KP115-00100) or equivalent.
Ⓛ : Apply lithium-based grease including molybdenum disulphide.
: N·m (kg-m, ft-lb)

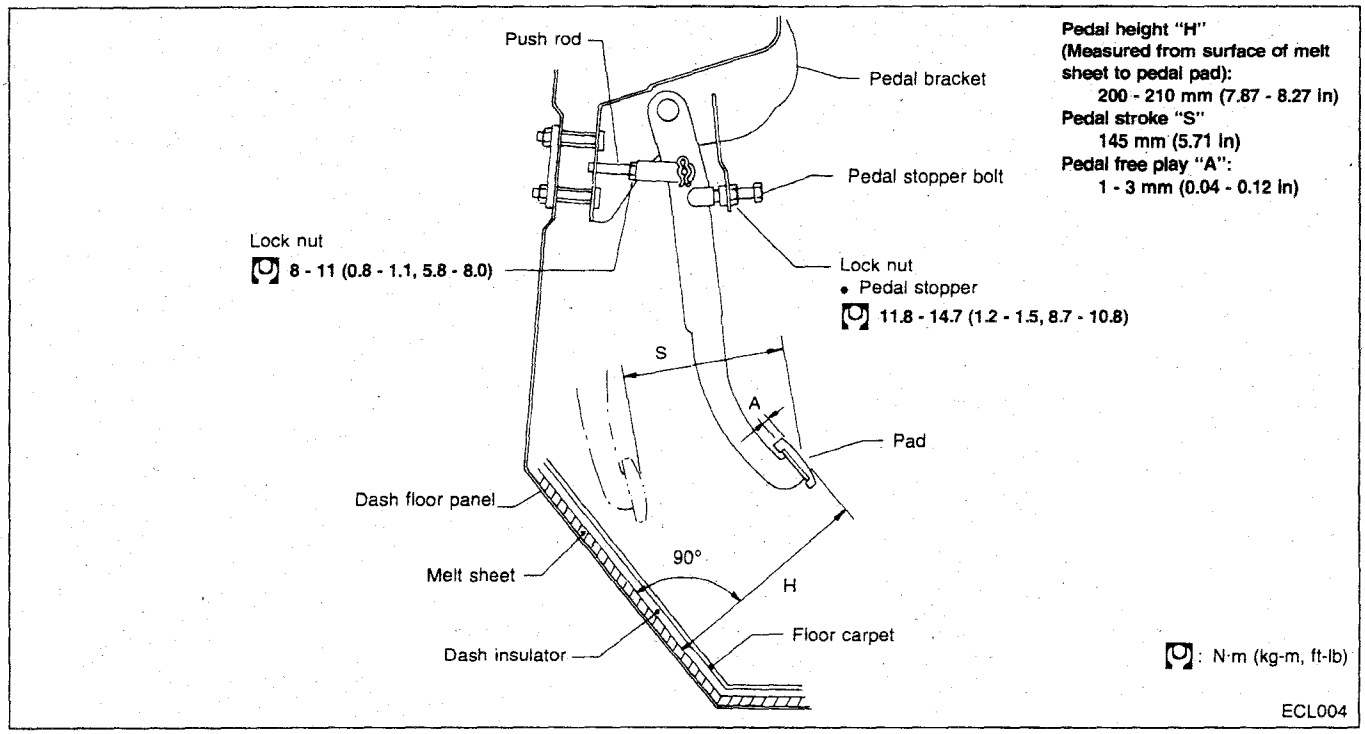
ECL002

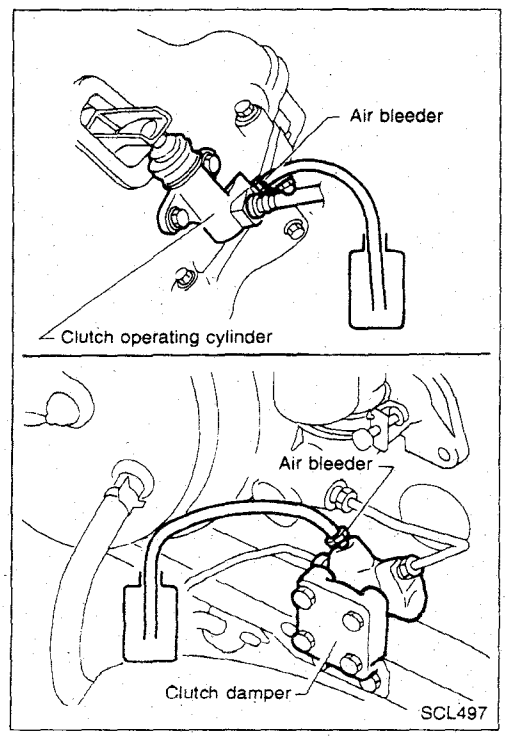
Clutch Pedal



Adjusting Clutch Pedal

1. Adjust pedal height with pedal stopper.
   Pedal height "H":
   217 - 227 mm (8.54 - 8.94 in)
2. Adjust pedal free play with master cylinder push rod. Then tighten lock nut.
   Pedal free play "A":
   1.0 - 3.0 mm (0.039 - 0.118 in)





Bleeding Procedure

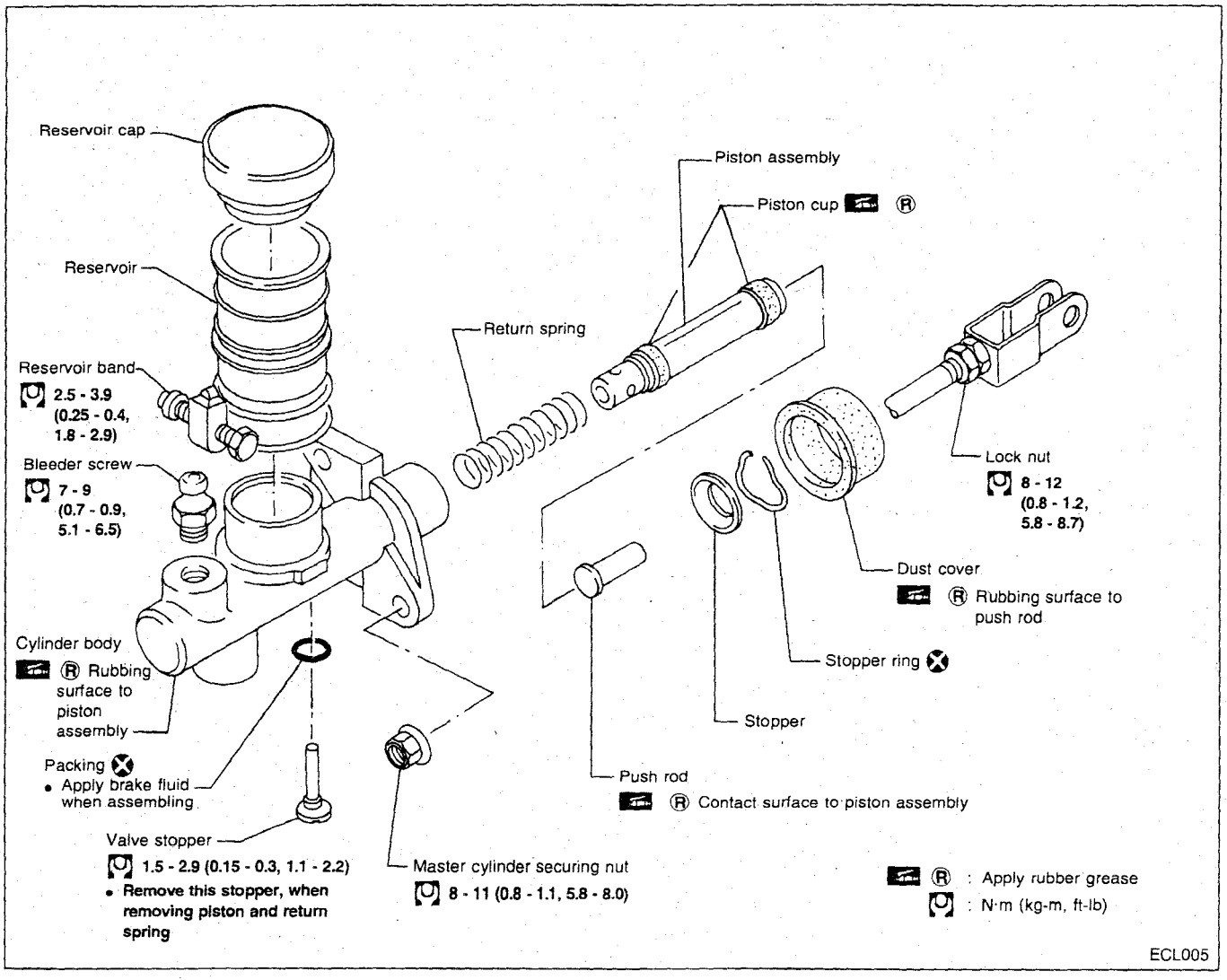
1. Bleed air from clutch operating cylinder according to the following procedure.

Carefully monitor fluid level at master cylinder during bleeding operation.

a. Top up reservoir with recommended brake fluid.
b. Connect a transparent vinyl tube to air bleeder valve of clutch operating cylinder.
c. Fully depress clutch pedal several times.
d. With clutch pedal depressed, open bleeder valve to release air.
e. Close bleeder valve.
f. Repeat steps (c) through (e) above until brake fluid flows from air bleeder valve without air bubbles.

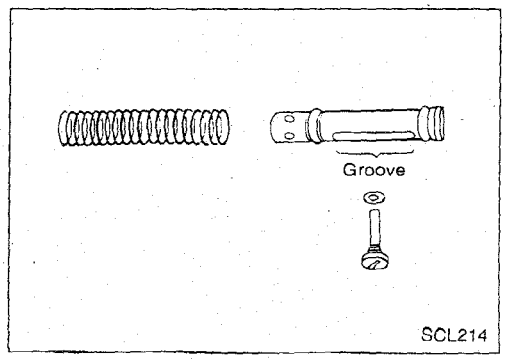
2. Bleed air from clutch damper according to the above procedure.
3. Repeat the above bleeding procedures 1 and 2 several times.

Clutch Master Cylinder



DISASSEMBLY AND ASSEMBLY

- Push piston into cylinder body with screwdriver when removing and installing valve stopper.



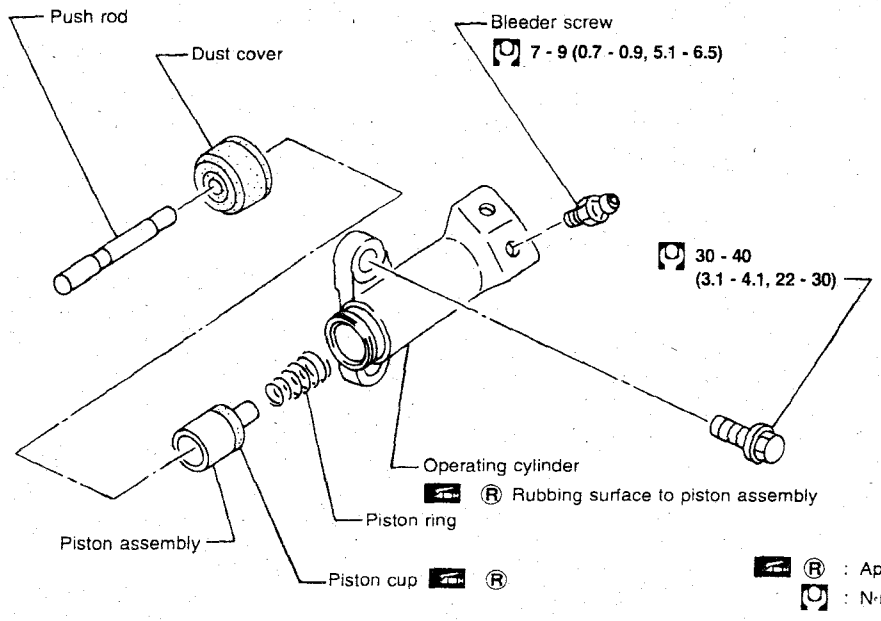
- Align groove of piston assembly and valve stopper when installing valve stopper.
- Check direction of piston cups.

Clutch Master Cylinder (Cont'd)

INSPECTION

- Check cylinder and piston rubbing surface for uneven wear, rust or damage. Replace if necessary.
- Check piston and piston cup for wear or damage. Replace if necessary.
- Check return spring for wear or damage. Replace if necessary.
- Check reservoir for deformation or damage. Replace if necessary.
- Check dust cover for cracks, deformation or damage. Replace if necessary.

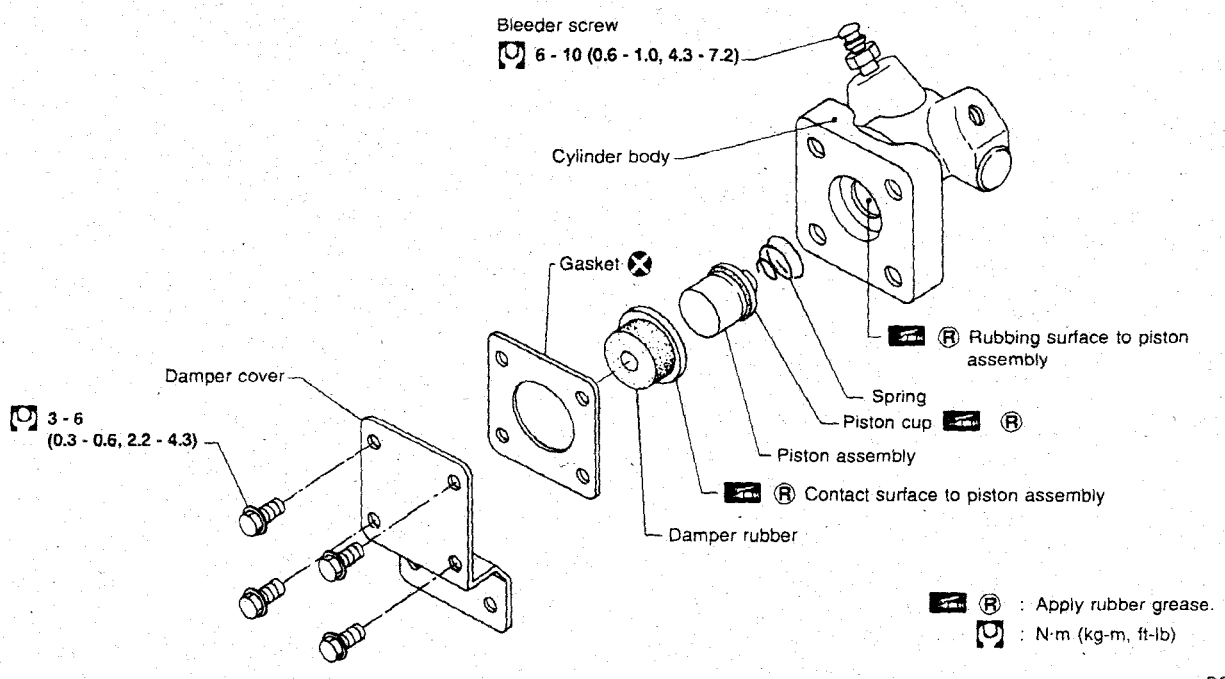
Clutch Operating Cylinder



INSPECTION

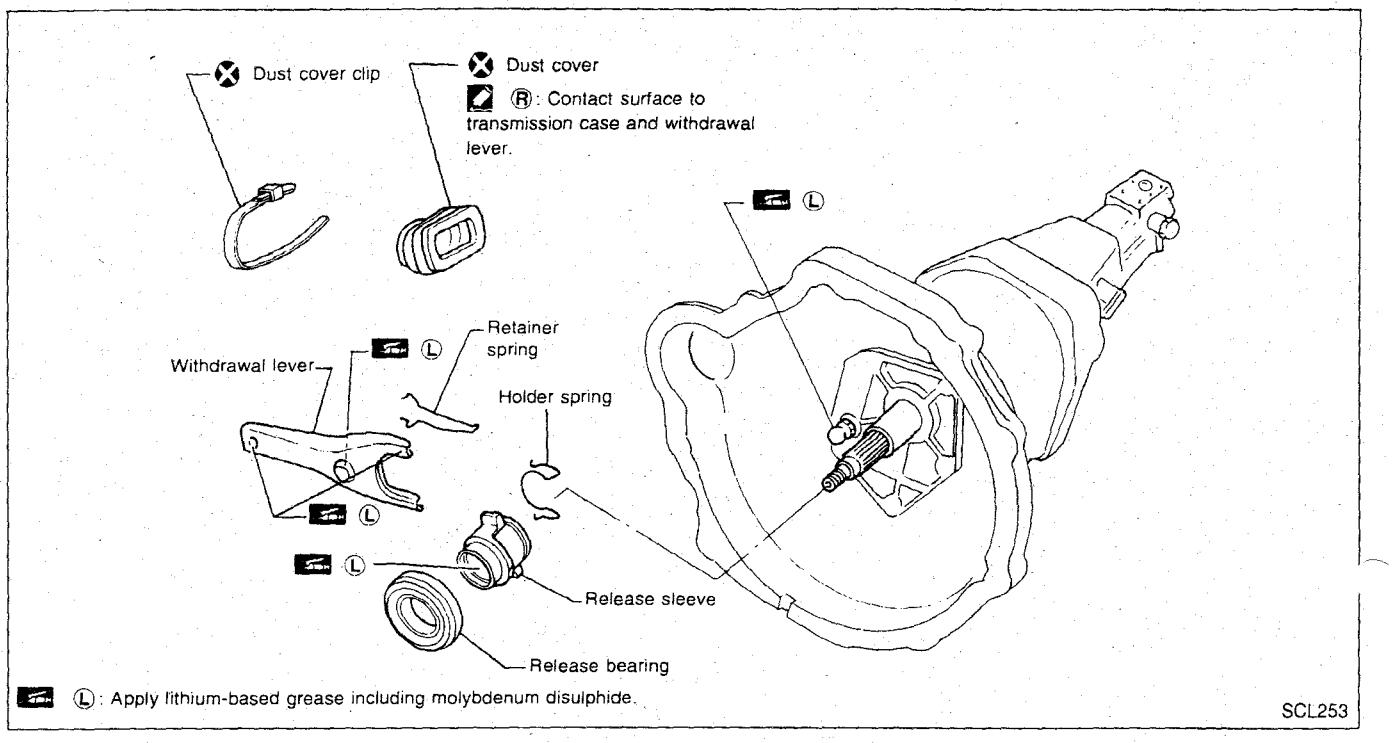
- Check rubbing surface of cylinder for wear, rust or damage. Replace if necessary.
- Check piston and piston cup for wear or damage. Replace if necessary.
- Check piston spring for wear or damage. Replace if necessary.
- Check dust cover for cracks, deformation or damage. Replace if necessary.

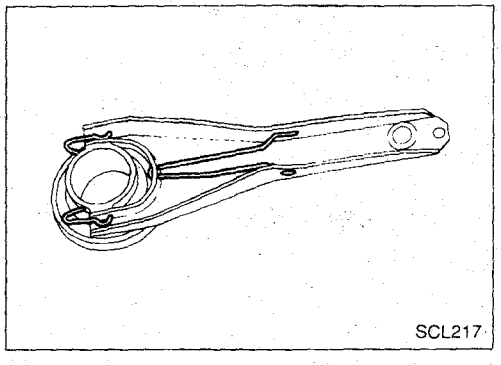
Clutch Damper (L.H.D. models)



INSPECTION

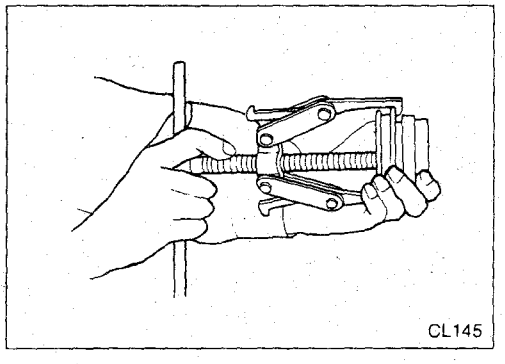
- Check cylinder and piston rubbing surface for uneven wear, rust or damage. Replace if necessary.
- Check damper rubber and piston cup for cracks, deformation or damage. Replace if necessary.



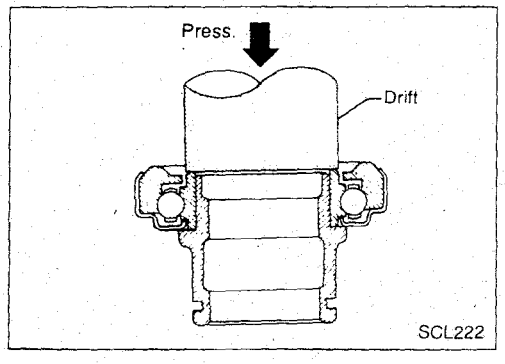


REMOVAL AND INSTALLATION

- Install retainer spring and holder spring.



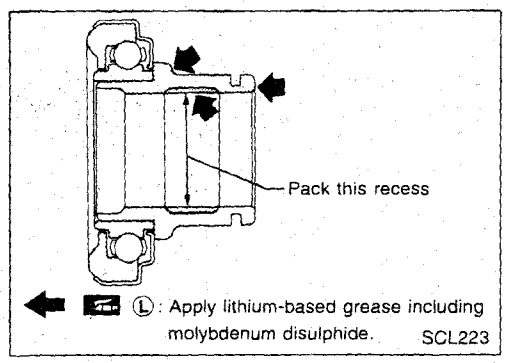
- Remove release bearing.



- Install release bearing with suitable drift.

INSPECTION

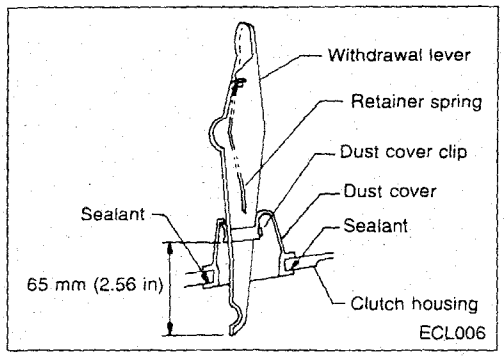
- Check release bearing to see that it rolls freely and is free from noise, cracks, pitting or wear. Replace if necessary.
- Check release sleeve and withdrawal lever rubbing surface for wear, rust or damage. Replace if necessary.



LUBRICATION

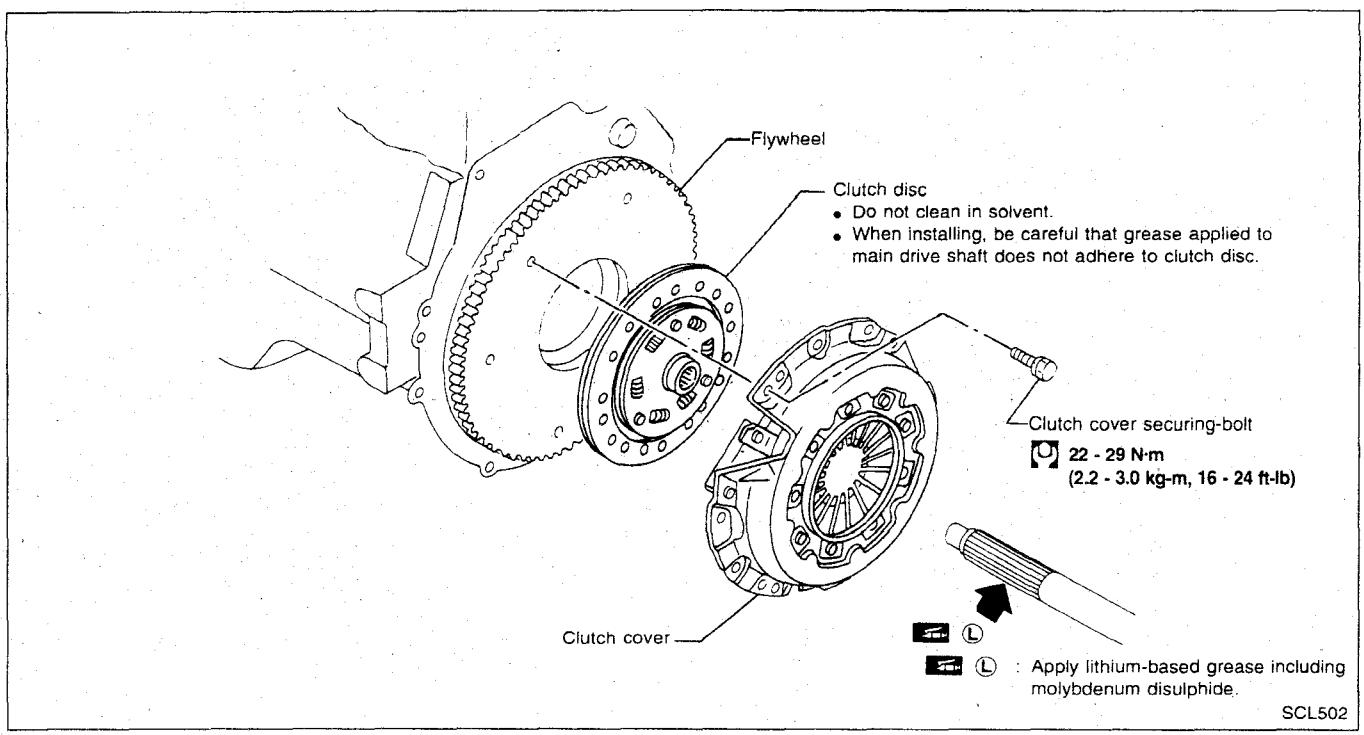
- Apply recommended grease to contact surface and rubbing surface.

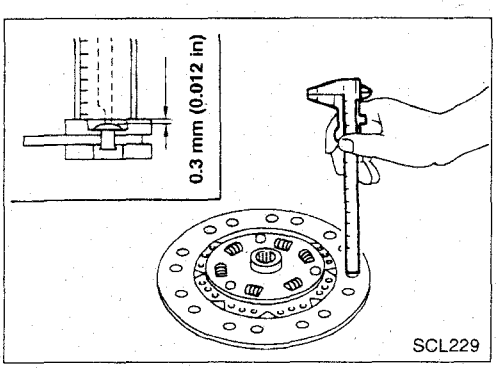
Too much lubricant might cause clutch disc facing damage.



DUST COVER SEALING

- Apply recommended sealant to contact surface of dust cover to transmission case and withdrawal lever and then install dust cover clip.

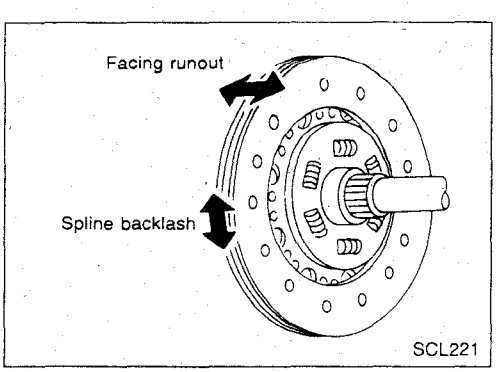




Clutch Disc

INSPECTION

- Check clutch disc for wear of facing.
  Wear limit of facing surface to rivet head:
  0.3 mm (0.012 in)

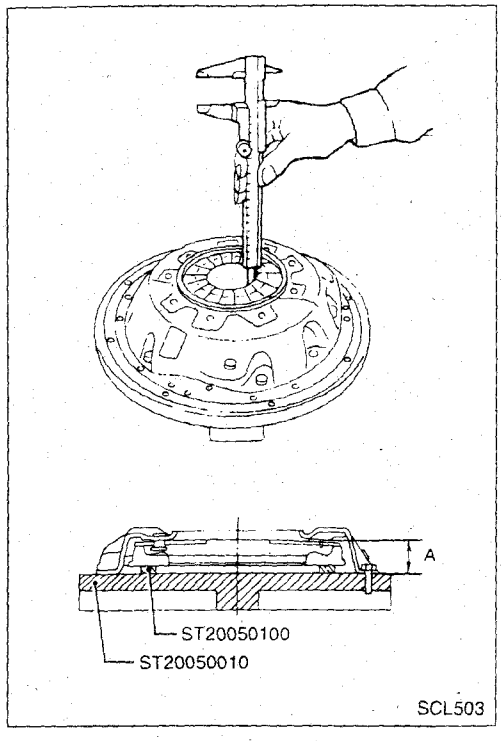


- Check clutch disc for spline backlash and facing runout.
  Maximum spline backlash (at outer edge of disc):
  1.0 mm (0.039 in)
  Runout limit:
  0.9 mm (0.035 in)
  Distance of runout check point (from hub center):
  115 mm (4.53 in)
- Check clutch disc for burns, discoloration or oil or grease leakage. Replace if necessary.

INSTALLATION

- Apply recommended grease to contact surface of splines to clutch disc hub.

Too much lubricant might damage clutch disc facing.

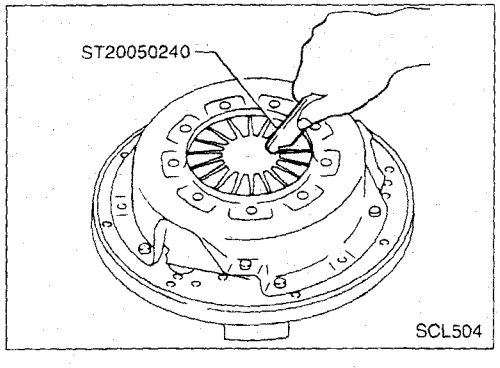


Clutch Cover and Flywheel

INSPECTION AND ADJUSTMENT

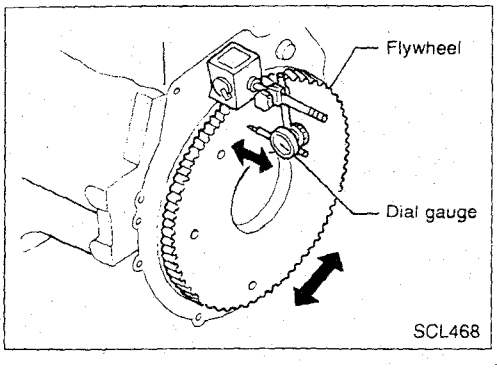
- Set Tools and check height and unevenness of diaphragm spring.

  Diaphragm spring height "A":
  37 - 40 mm (1.46 - 1.58 in)
- Check thrust rings for wear or damage by shaking cover assembly and listening for chattering noise, or lightly hammering on rivets for a slight cracking noise. Replace clutch cover assembly if necessary.
- Check pressure plate and clutch disc contact surface for slight burns or discoloration. Repair pressure plate with emery paper.
- Check pressure plate and clutch disc contact surface for deformation or damage. Replace if necessary.



- Adjust unevenness of diaphragm spring with Tool.

  Uneven limit:
  0.7 mm (0.028 in)

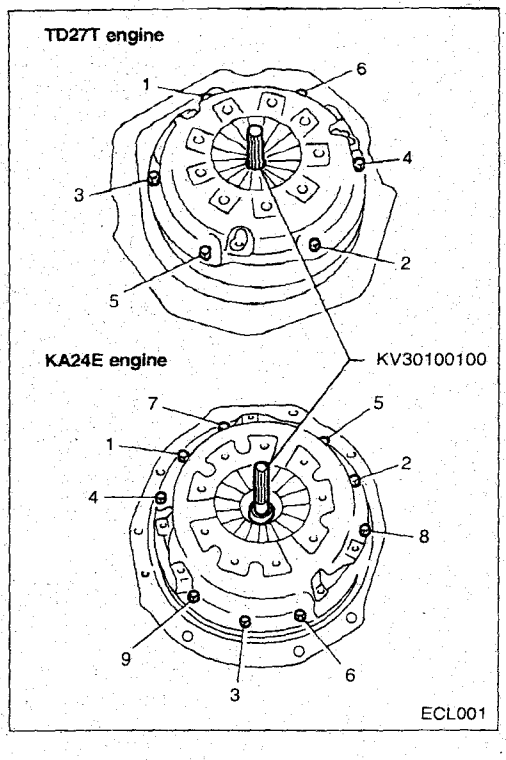


FLYWHEEL INSPECTION

- Check contact surface of flywheel for slight burns or discoloration. Repair flywheel with emery paper.
- Check flywheel runout.

  Runout (Total indicator reading):
  Refer to EM section. (Inspection — CYLINDER BLOCK)

Clutch Cover and Flywheel (Cont'd)



INSTALLATION

- Insert Tool into clutch disc hub when installing clutch cover and disc.
- Tighten bolts in numerical order.
- **Be careful not to allow grease to contaminate clutch facing.**

General Specifications

CLUTCH CONTROL SYSTEM

Type of clutch control	Hydraulic

CLUTCH MASTER CYLINDER

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

CLUTCH OPERATING CYLINDER

Inner diameter	mm (in)	
L.H.D.		17.46 (11/16)
R.H.D.		19.05 (3/4)

CLUTCH DAMPER

Inner diameter	mm (in)	19.05 (3/4)

CLUTCH DISC

Unit: mm (in)

Engine	KA24E	TD27T *
Model	242	
Facing size (Outer dia. x inner dia. x thickness)	242 x 162 x 3.5 (9.53 x 6.38 x 0.0138)	
Thickness of disc assembly under load	7.6 - 8.2 Under a load of 4750 N (484.3 kg, 1068 lb)	

* TD27T models are equipped with a clutch disc with pre-damper system.

CLUTCH COVER

Engine	KA24E	TD27T
Model	242	
Full load N (kg, lb)	4750 (484.3, 1068)	

Inspection and Adjustment

CLUTCH PEDAL

Unit: mm (in)

Applied model	All
Pedal height*	217 - 227 (8.54 - 8.94)
Pedal stroke	145 (5.71)
Pedal free play	1.0 - 3.0 (0.039 - 0.118)

*: Measured from surface of melt sheet to surface of pedal pad

CLUTCH DISC

Unit: mm (in)

Disc model	242
Wear limit of facing surface to rivet head	0.3 (0.012)
Runout limit of facing	0.9 (0.035)
Distance of runout check point (from the hub center)	115 (4.53)
Maximum of spline backlash of spline (at outer edge of disc)	1.0 (0.039)

CLUTCH COVER

Unit: mm (in)

Cover model	All
Engine	242
Diaphragm spring height	37 - 40 (1.46 - 1.58)
Uneven limit of diaphragm spring toe height "A"	0.7 (0.028)

MANUAL TRANSMISSION

SECTION MT

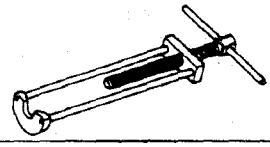
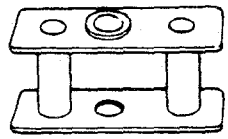
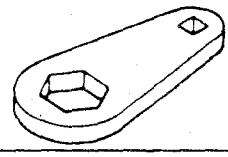
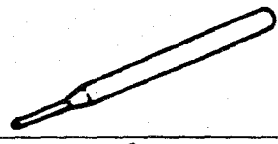
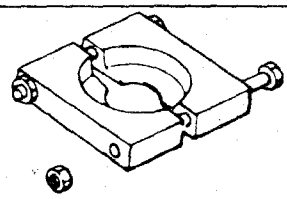
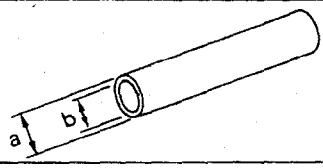
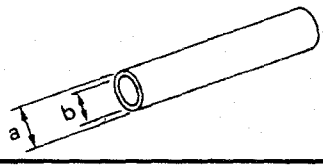
MANUAL TRANSMISSION

SECTION MT

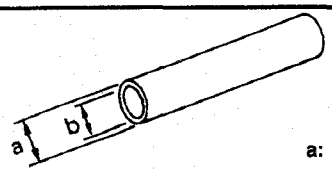
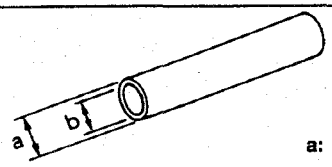
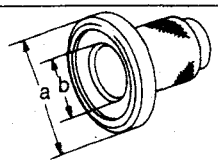
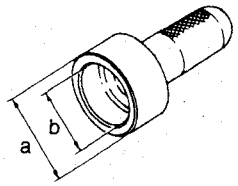
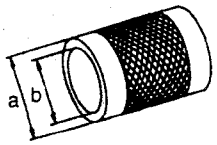
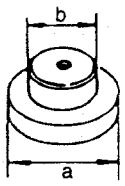
CONTENTS

SPECIAL SERVICE TOOLS

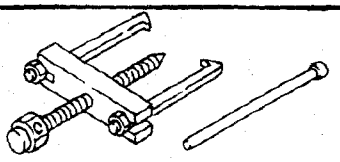
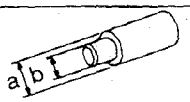
*: Special tool or commercial equivalent

Tool number Tool name	Description	
ST23810001 Adapter setting plate		Fixing adapter plate with gear assembly
KV32101330 Puller		Removing overdrive mainshaft bearing
KV31100401 Transmission press stand		Pressing counter gear and mainshaft
ST22520000 Wrench		Tightening mainshaft lock nut
ST23540000* Pin punch		Removing and installing fork rod retaining pin
ST30031000* Puller		Removing main drive gear bearing
ST23860000* Drift	 **a: 38 mm (1.50 in) dia.** **b: 33 mm (1.30 in) dia.**	Installing counter drive gear
ST22360002* Drift	 **a: 29 mm (1.14 in) dia.** **b: 23 mm (0.91 in) dia.**	Installing counter gear front and rear end bearings

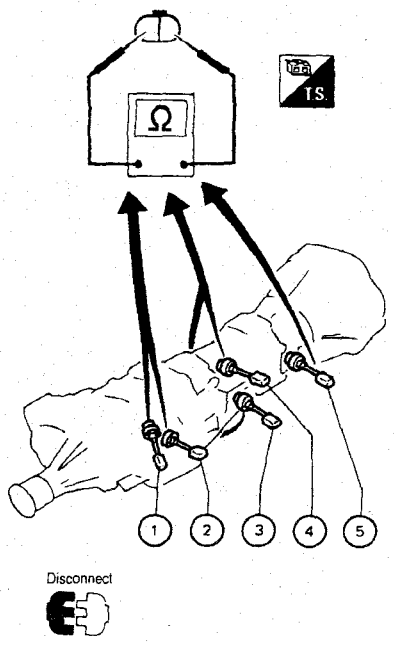
*: Special tool or commercial equivalent

Tool number Tool name	Description	
ST22350000* Drift	 a: 34 mm (1.34 in) dia. b: 28 mm (1.10 in) dia.	Installing O.D. gear bushing
ST23800000* Drift	 a: 44 mm (1.73 in) dia. b: 31 mm (1.22 in) dia.	Installing front cover oil seal
ST33400001* Drift	 a: 60 mm (2.36 in) dia. b: 47 mm (1.85 in) dia.	Installing rear oil seal
ST33290001* Puller		Removing rear oil seal
ST30720000* Drift	 a: 77 mm (3.03 in) dia. b: 55.5 mm (2.185 in) dia.	Installing mainshaft ball bearing
ST33200000* Drift	 a: 60 mm (2.36 in) dia. b: 44.5 mm (1.752 in) dia.	Installing counter rear bearing
ST30613000* Drift	 a: 71.5 mm (2.815 in) dia. b: 47.5 mm (1.870 in) dia.	Installing main drive gear bearing

COMMERCIAL SERVICE TOOLS

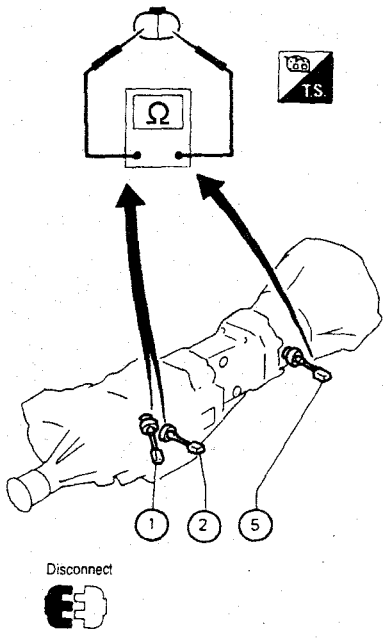
Tool name	Description	
Puller		Removing counter bearings, counter drive and O.D. gears
Drift	 **a: 40 mm (1.57 in) dia.** **b: 30 mm (1.18 in) dia.**	Installing counter shaft rear end bearing

KA24E Engine



EMT008

TD27T



EMT009

Check of Position Switches

Switch			Gear position	Continuity
①	4WD	Transfer case	4WD	Yes
			Except 4WD	No
②	Neutral (Transfer)		Neutral	Yes
			Except Neutral	No
③	5th	Overdrive gear case	5th	Yes
			Except 5th	No
④	Neutral (Transmission)		Neutral	Yes
			Except neutral	No
⑤	Reverse	Transmission case	Reverse	Yes
			Except rerverse	No

Removal

Transmission has to be removed as a unit together with transfer box.

Remove transmission assembly as follows:

- Disconnect negative battery terminal.
- Remove shift levers of transmission and transfer.
- Remove front and rear propeller shafts. — Refer to PD section.
- **Insert plug into rear oil seal after removing propeller shaft.**

CAUTION:

Be careful not to damage spline, sleeve yoke and rear oil seal, when removing propeller shaft.

- Remove torsion bar spring. — Refer to FA section.
- Remove third crossmember (the one supporting front differential).
- Remove fifth crossmember (the one situated at the rear of transfer).
- Support transmission and transfer with a suitable transmission jack.

WARNING:

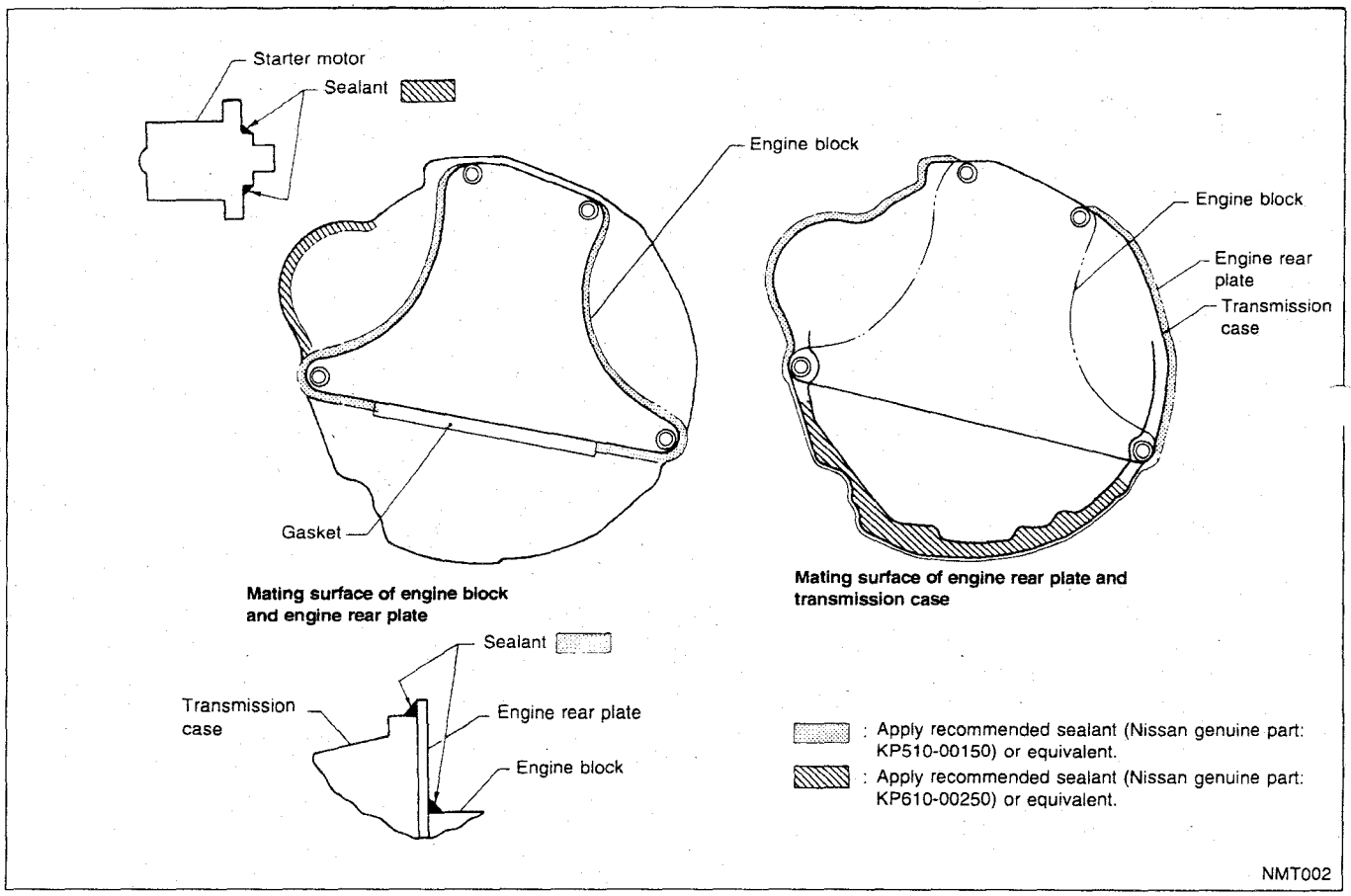
Support transmission and transfer with suitable jacks, while removing them.

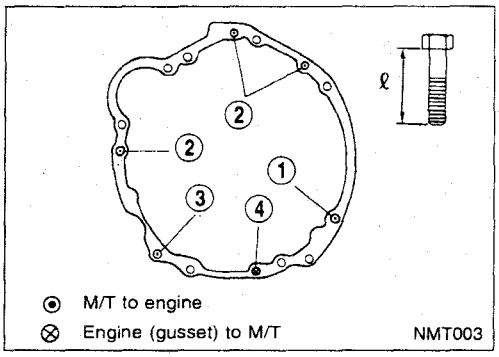
- Remove fourth crossmember (the one supporting transmission).
- Remove clutch operating cylinder.
- Remove starter motor.
- Remove exhaust tube from transmission.
- Disconnect electrical connectors.
- Remove transmission from engine.

Installation

Transmission has to be installed as a unit together with transfer box.
Install transmission assembly as follows:

- Apply sealant as below:

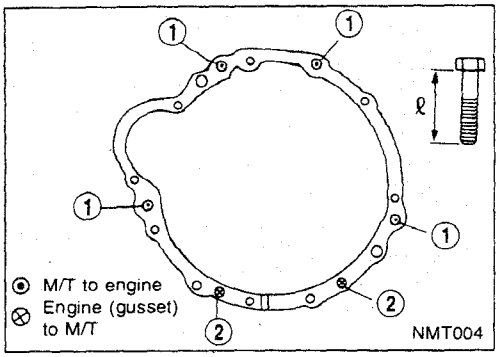




- Tighten bolts securing transmission.
- **KA24E engine model**

Bolt No.	Tightening torque N·m (kg-m, ft-lb)	ℓ mm (in)
1	39 - 49 (4.0 - 5.0, 29 - 36)	65 (2.56)
2	39 - 49 (4.0 - 5.0, 29 - 36)	60 (2.36)
3	19 - 25 (1.9 - 2.5, 14 - 18)	25 (0.98)
4	19 - 25 (1.9 - 2.5, 14 - 18)	16 (0.63)

Installation (Cont'd)

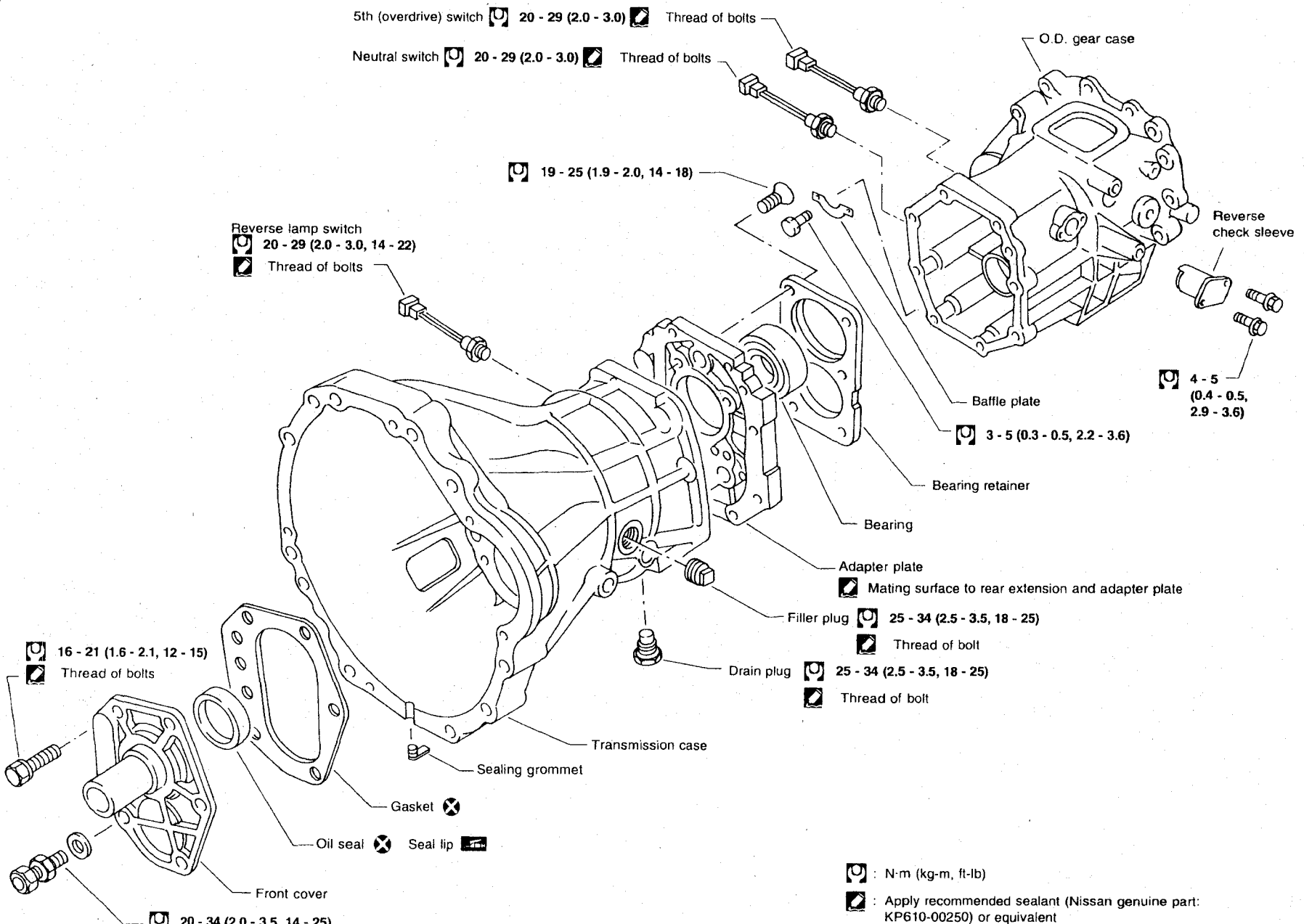


- **TD27T engine model**

Bolt No.	Tightening torque N·m (kg-m, ft-lb)	ℓ mm (in)
1	39 - 49 (4.0 - 5.0, 29 - 36)	60 (2.36)
2	18 - 22 (1.8 - 2.2, 13 - 16)	16 (0.63)

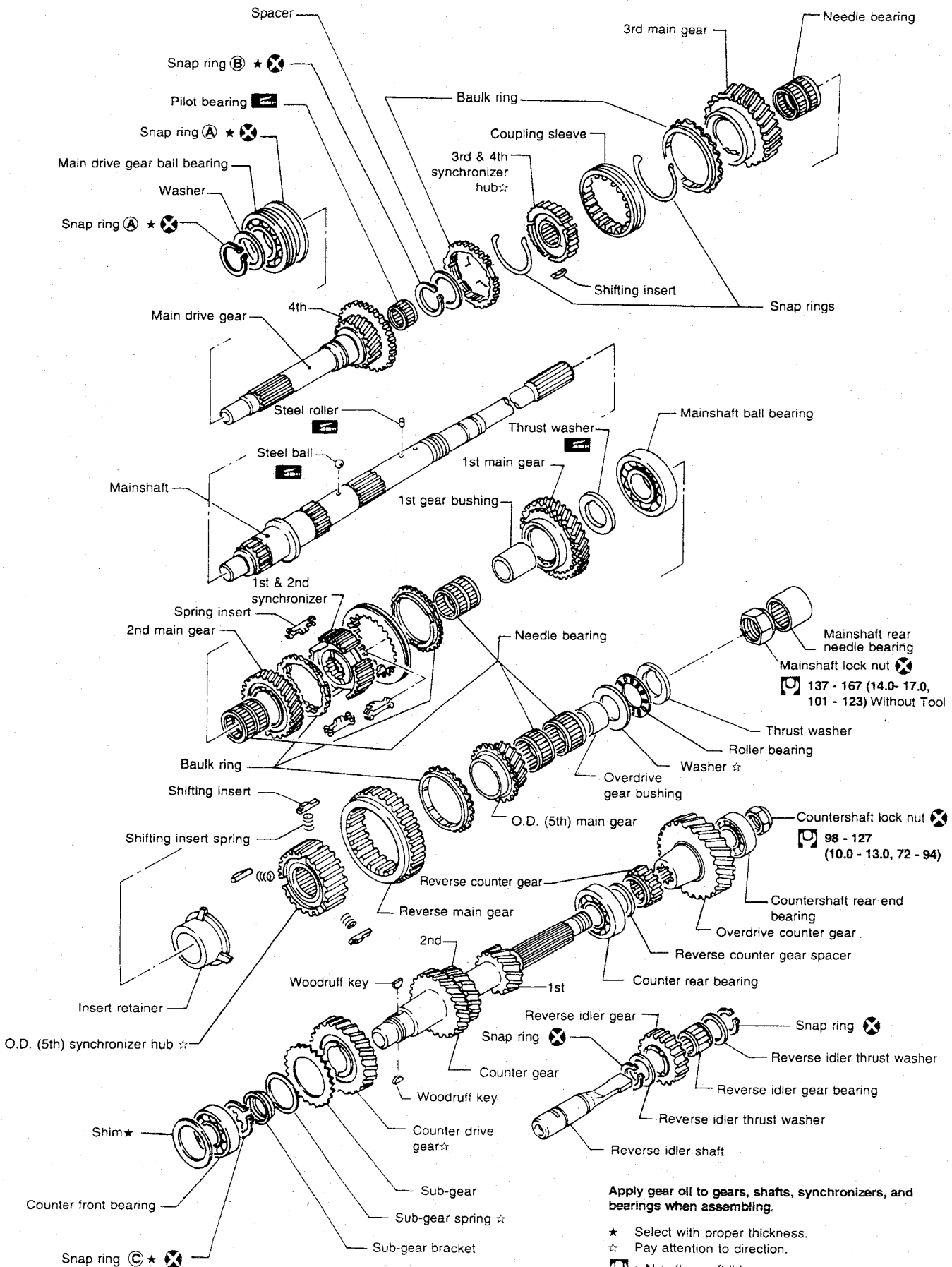
- Disconnect negative battery terminal.
- Raise the unit with a hoist.
- Position the transmission assembly on a portable jack and secure it with a suitable tool.
  Lift the assembly until the gearbox input shaft faces its housing.
  Move the assembly towards the engine. The assembly must be rotated slightly so that the starter motor housing clears the projection on the companion floor. Insert input shaft into its housing (slightly raising the rear of the transfer box may facilitate the introduction of the shaft into its housing).
- Tighten the screws securing the gearbox to the engine.
  [O]: 39 - 49 N·m (4.0 - 5.0 kg-m, 29 - 36 ft-lb)
- Connect the electrical wiring. Secure with the respective clips.
- Fit the exhaust pipe support bracket to the transfer box.
  [O]: 13 - 16 N·m (1.3 - 1.6 kg-m, 9 - 12 ft-lb)
- Fit the starter motor. Secure the earth wire to the starter motor lower screw (KA24E).
  [O]: 31 - 41 N·m (3.2 - 4.2 kg-m, 23 - 30 ft-lb)
- Fit the clutch slave cylinder.
  [O]: 30 - 40 N·m (3.1 - 4.1 kg-m, 22 - 30 ft-lb)
- Install fourth crossmember (Note the "front" mark).
  Crossmember fixing bolts to chassis:
  [O]: 41 - 52 N·m (4.2 - 5.3 kg-m, 30 - 38 ft-lb)
  Crossmember fixing bolts to transmission:
  [O]: 68 - 87 N·m (6.9 - 8.9 kg-m, 50 - 64 ft-lb)
- Take away the portable jack holding boxes assembly.
- Install fifth crossmember.
  [O]: 59 - 78 N·m (6.0 - 8.0 kg-m, 43 - 58 ft-lb)
- Install third crossmember.
  [O]: Screws: 41 - 52 N·m (4.2 - 5.3 kg-m, 30 - 38 ft-lb)
  Nuts: 68 - 87 N·m (6.9 - 8.9 kg-m, 50 - 64 ft-lb)
- Install torsion bar springs. — Refer to FA section.
- Install front and rear propeller shafts. — Refer to PD section.
- Install shift levers of transmission and transfer.
  [O]: 14 - 18 N·m (1.4 - 1.8 kg-m, 10 - 13 ft-lb)
- Connect negative battery terminal.

Case Components — FS5W71C



EMT010

Gear Components — FS5W71C

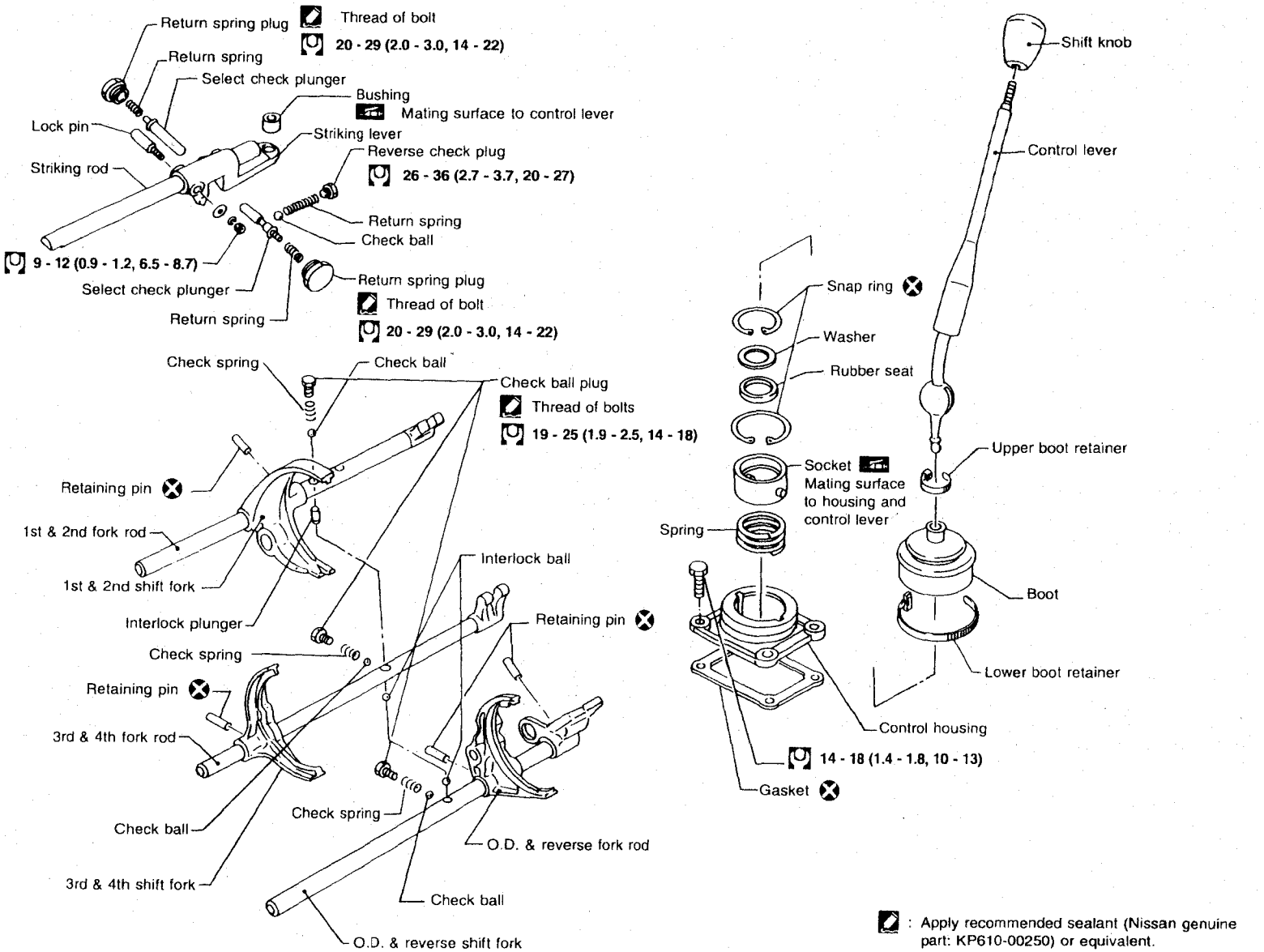


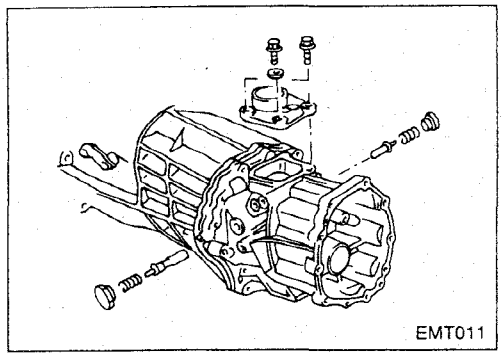
Apply gear oil to gears, shafts, synchronizers, and bearings when assembling.

★ Select with proper thickness.
☆ Pay attention to direction.
: N·m (kg-m, ft-lb)

EMT013

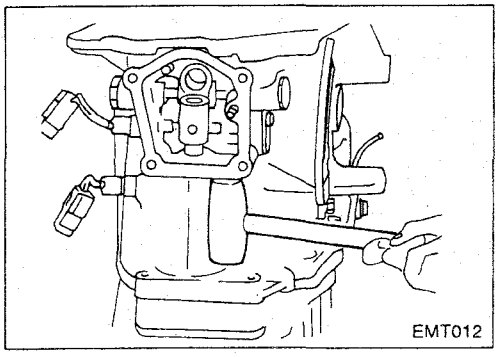
Shift Control Components — FS5W71C



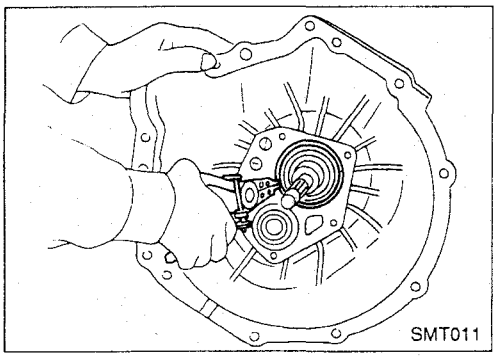

EMT011

Case Components

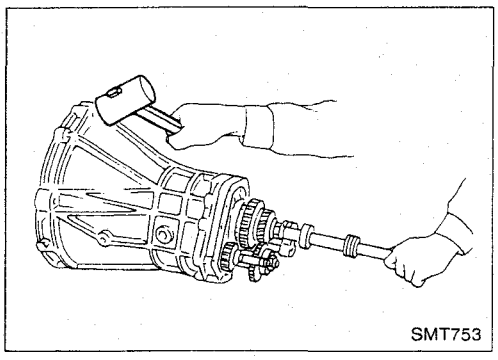
1. Remove rear extension.
a. Remove control housing, check ball, return spring plug, select check plunger and return springs.


EMT012

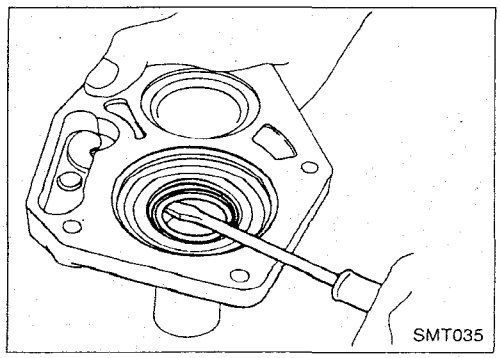
b. Remove O.D. gear case by lightly tapping it.


SMT011

2. Remove front cover, gasket, countershaft front bearing shim, and main drive bearing snap ring.

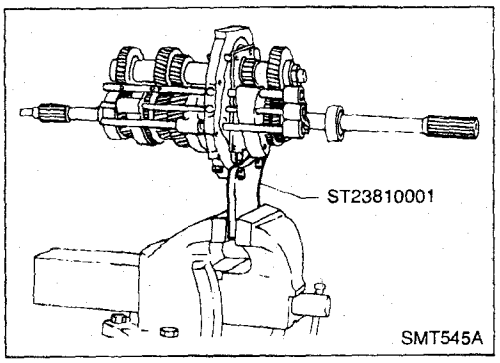

SMT753

3. Separate transmission case from adapter plate.


SMT035

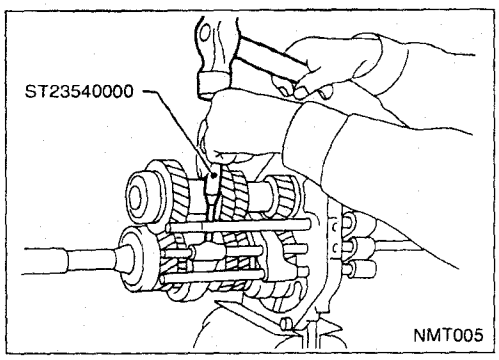
4. Remove front cover oil seal.

Be careful not to damage mating surface of front cover.

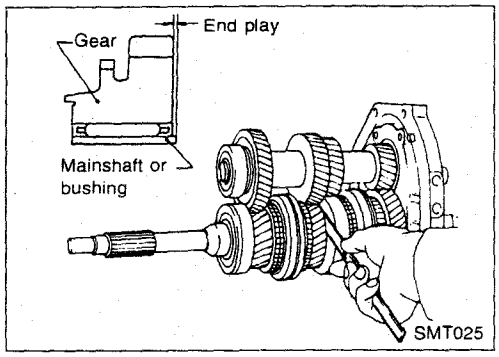


Shift Control Components

1. Set up Tool on adapter plate.
2. Remove check ball plugs, check springs, and check balls.



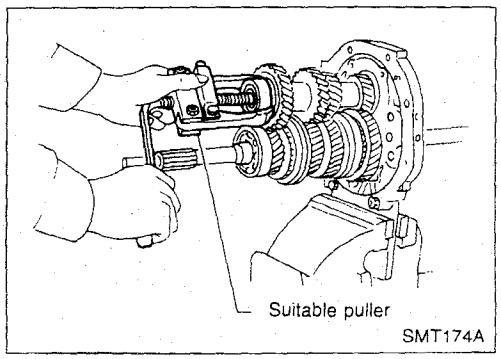
3. Drive out retaining pins. Then drive out fork rods and remove interlock balls.



Gear Components

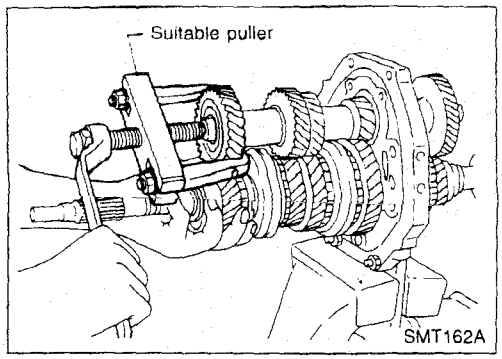
1. Before disassembly, measure each gear end play.
- If end play is not within the specified limit, disassemble and check the parts.
- Replace any part which is worn or damaged.

Gear	End play mm (in)
1st	0.31 - 0.41 (0.0122 - 0.0161)
2nd	0.11 - 0.21 (0.0043 - 0.0083)
3rd	0.11 - 0.21 (0.0043 - 0.0083)
O.D. 5th	0.32 - 0.39 (0.0126 - 0.0154)



2. Mesh 2nd and reverse gear, then draw out counter front bearing with suitable puller.
3. Remove snap ring and remove sub-gear bracket, sub-gear spring and sub-gear.

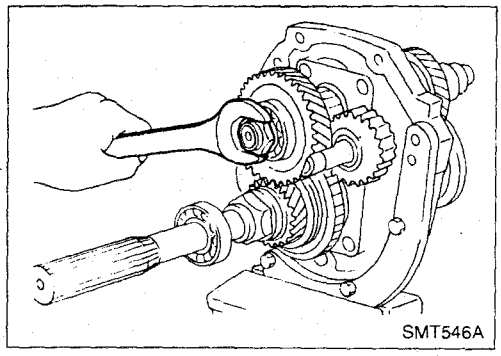
Gear Components (Cont'd)



4. Draw out counter drive gear with main drive gear assembly with suitable puller.

When drawing out main drive gear assembly, be careful not to drop pilot bearing and baulk ring.

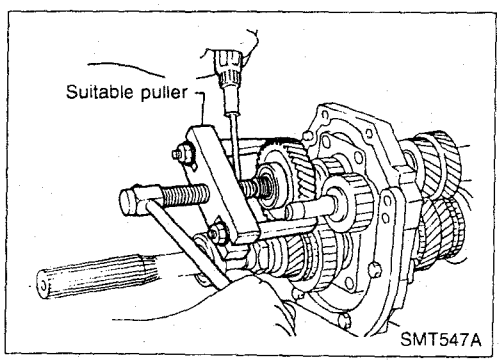
5. Remove snap ring and draw out 3rd & 4th synchronizer and 3rd gear.



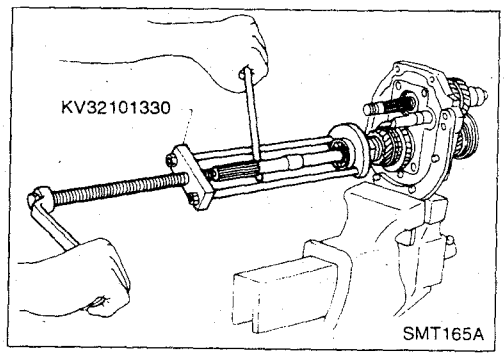
6. Disassemble parts at rear of adapter plate as follows:

a. Release staking on countershaft nut and mainshaft nut and loosen these nuts.

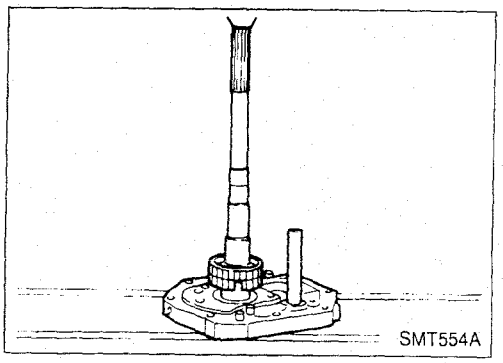
Mainshaft nut: Left-hand thread



b. Pull out O.D. counter gear with bearing with suitable puller.
c. Draw out reverse counter gear and spacer.
d. Remove snap rings from reverse idler shaft, and draw out reverse idler gear, thrust washers and needle bearing.

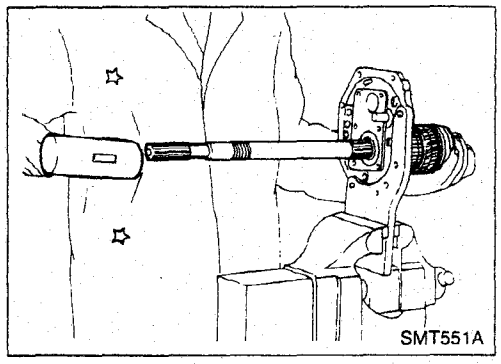


e. Remove thrust washer, steel roller, roller bearing and washer.
f. Remove O.D. main gear, needle bearing and baulk ring (O.D.).
g. Remove O.D. coupling sleeve, shifting inserts and shifting insert springs.
h. Remove counter gear by tapping rear end of counter gear.



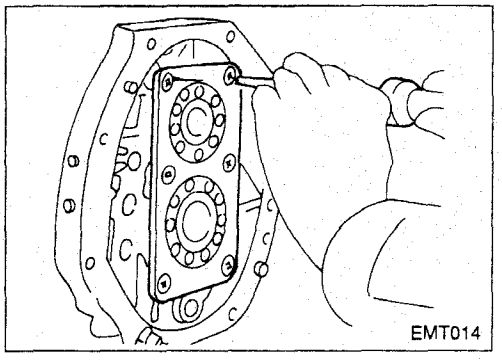
i. Press out O.D. gear bushing, insert retainer and O.D. synchronizer hub.

Gear Components (Cont'd)

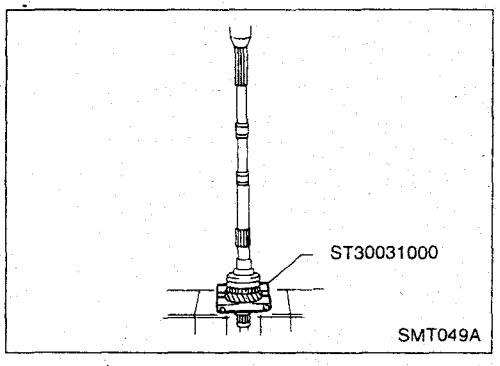


7. Draw out mainshaft assembly by tapping rear end of mainshaft.
8. Remove thrust washer, steel ball, 1st main gear and needle bearing.

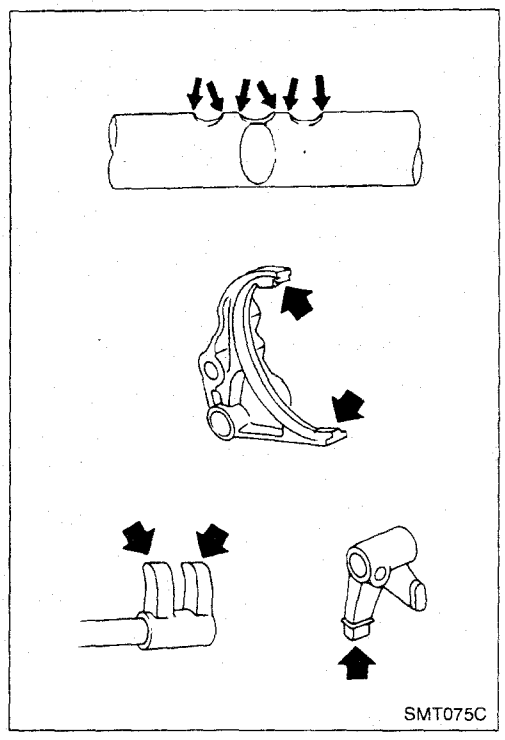
Be careful not to lose steel ball.



9. Remove bearing retainer.
   Remove reverse idler shaft.
   Remove ball bearings.

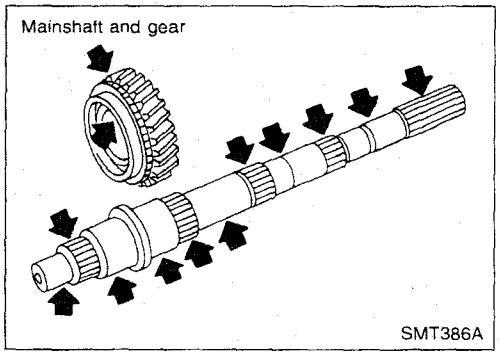


10. Press out 1st gear mainshaft bushing together with 2nd main gear with Tool.
    Then remove 2nd gear needle bearing.


SMT075C

Shift Control Components

- Check contact surface and sliding surface of fork rods for wear, scratches, projections or other damage.

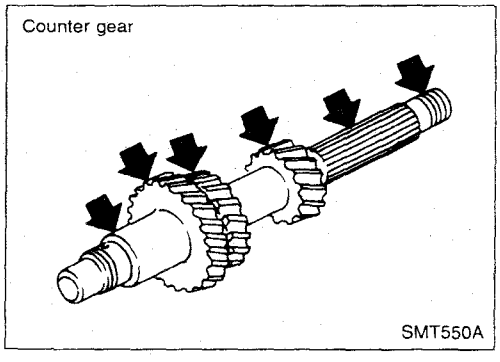


SMT386A

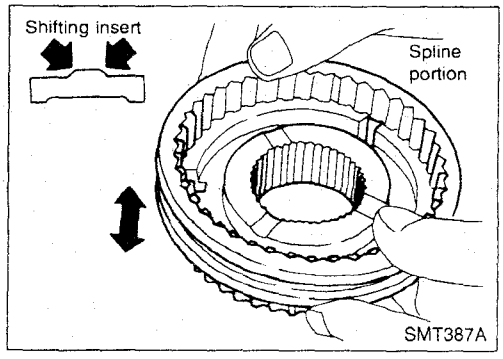
Gear Components

GEARS AND SHAFTS

- Check shafts for cracks, wear or bending.
- Check gears for excessive wear, chips or cracks.



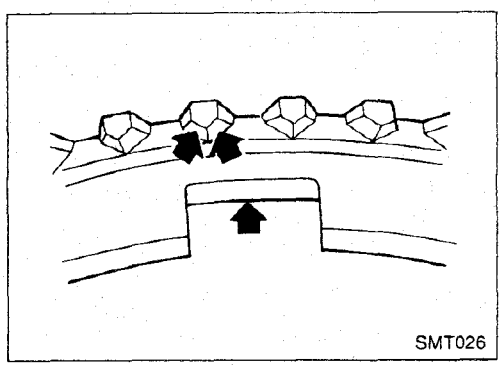
SMT550A

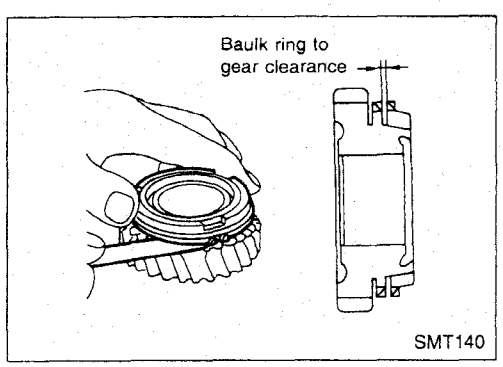


SMT387A

SYNCHRONIZERS

- 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.
- Check insert springs for deformation.


SMT026



SMT140

- Measure wear of baulk rings.

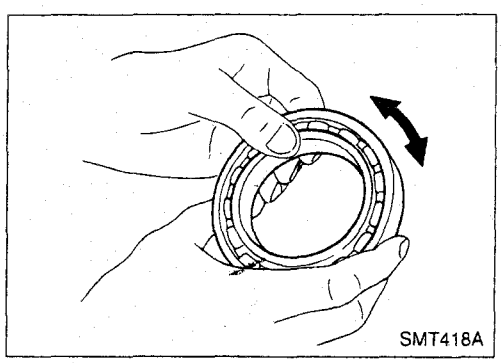
a. Measure clearance between baulk ring and gear.

Clearance between baulk ring and gear:

Unit: mm (in)

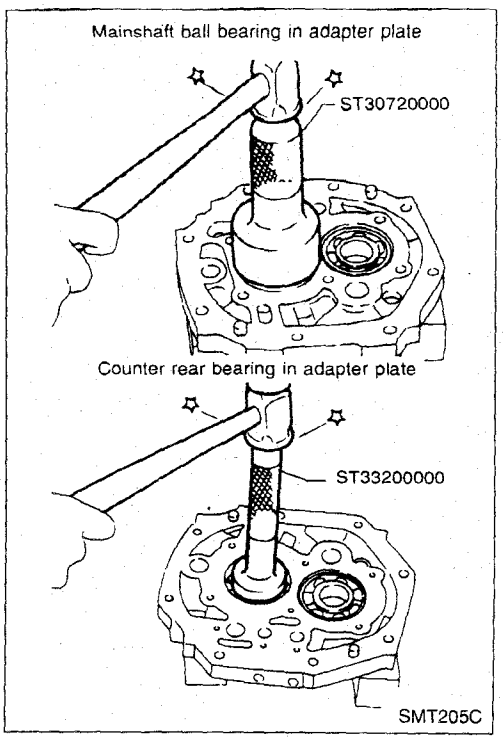
Dimension	Standard	Wear limit
1st and 2nd	1.2 - 1.6 (0.047 - 0.063)	0.8 (0.031)
3rd and main drive		
O.D. 5th	1.0 - 1.4 (0.039 - 0.055)	0.5 (0.02)

If the clearance is smaller than the wear limit, replace baulk ring.


SMT418A

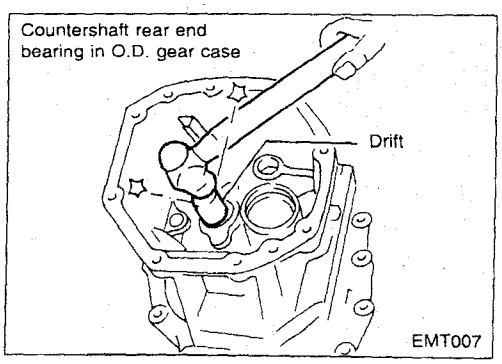
BEARINGS

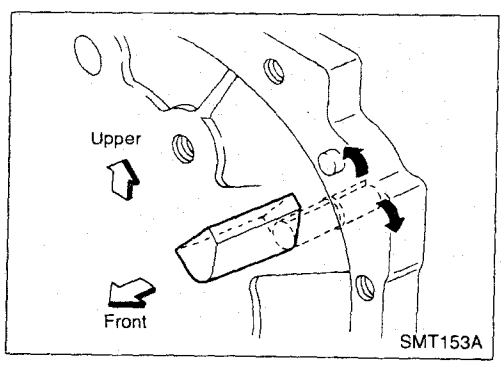
- Make sure bearings roll freely and are free from noise, crack, pitting or wear.



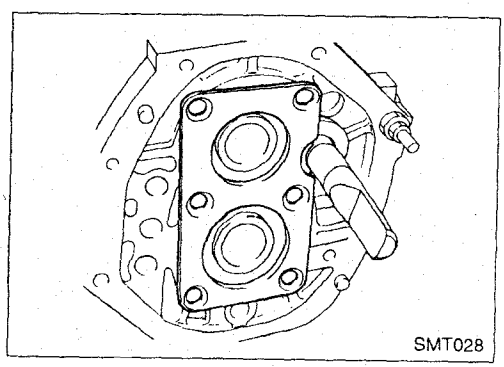
Gear Components

1. Install bearings into case components.





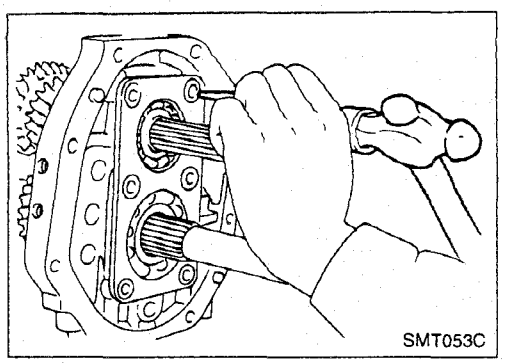
2. Assemble adapter plate parts.
- Install oil gutter on adapter plate and expand on rear side



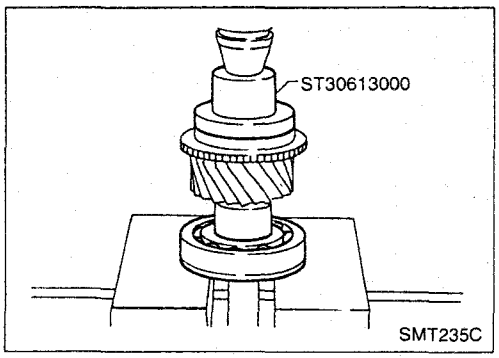
- Install bearing retainer.

a. Insert reverse shaft, then install bearing retainer.

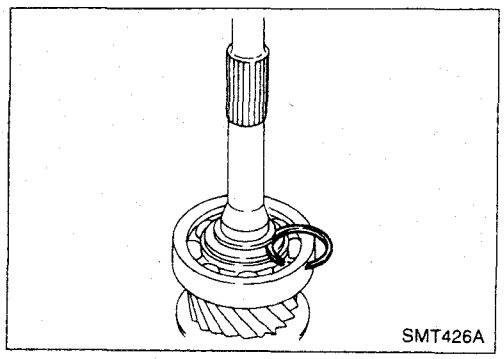
Gear Components (Cont'd)



b. Tighten each screw to 16 - 23 N·m (1.6 - 2.3 kg-m, 12 - 17 ft-lb), then stake each at two points.

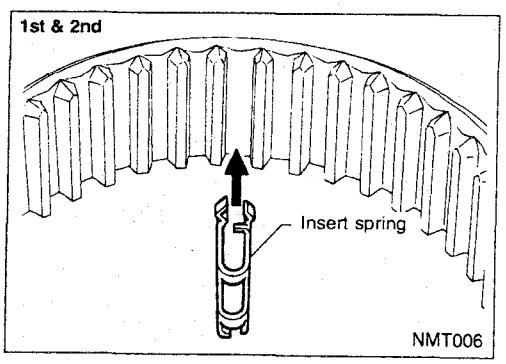


3. Install main drive gear bearing.
a. Press main drive gear bearing.
b. Install main drive gear spacer.

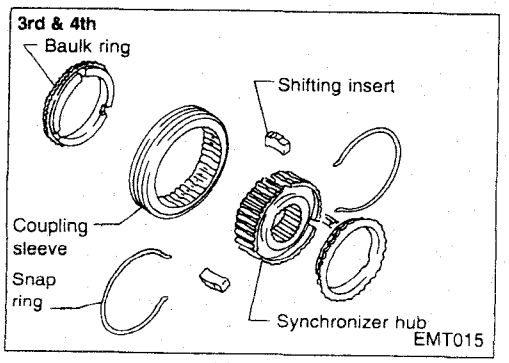


c. Select proper main drive gear snap ring Ⓐ to minimize clearance of groove and install it.

Allowable clearance of groove:
0 - 0.13 mm (0 - 0.0051 in)
Main drive gear snap ring:
Refer to S.D.S.

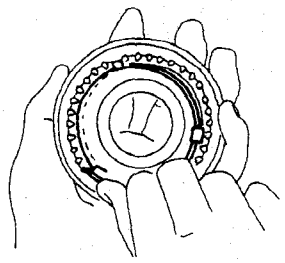


4. Assemble synchronizers.



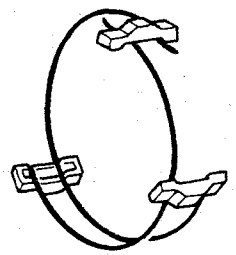
Gear Components (Cont'd)

3rd and 4th



EMT016

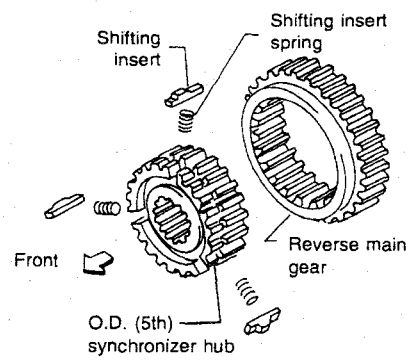
Place the two spread rings so that their open parts do not coincide. See figure.



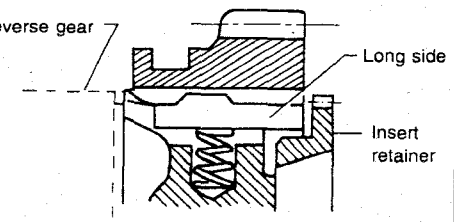
EMT017

Make sure that one end of the spread ring is mounted to the inside of the shifting insert whereas the other end is mounted to the outside of the shifting insert.

5th

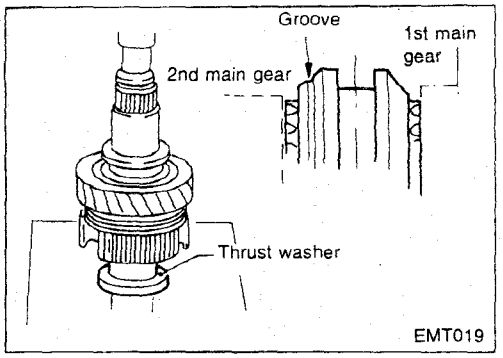


Shifting insert assembly

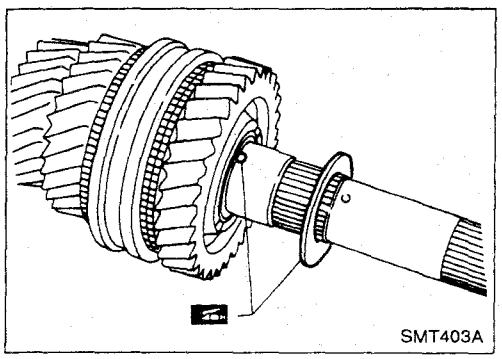


EMT018

Gear Components (Cont'd)

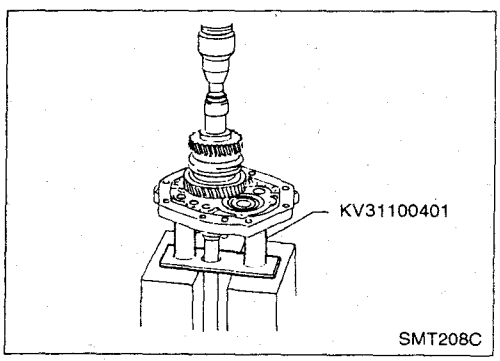


5. Install front side components on mainshaft.
a. Assemble 2nd main gear, needle bearing and 1st & 2nd synchronizer assembly, then press 1st gear bushing on mainshaft.
b. Install 1st main gear.

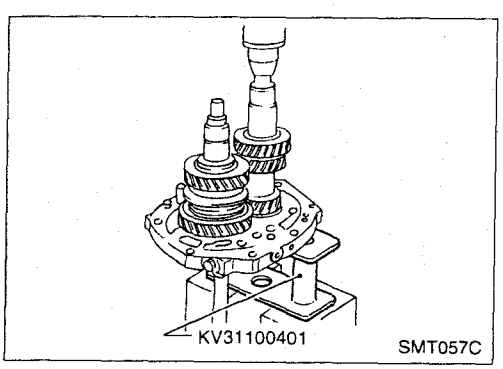


c. Install steel ball and 1st gear washer.

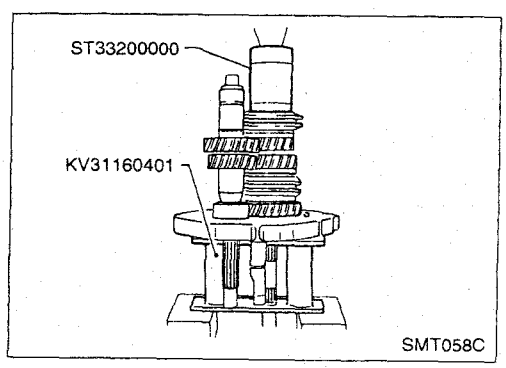
Apply multi-purpose grease to steel ball and 1st gear washer before installing.



6. Install mainshaft and counter gear on adapter plate and main drive gear on mainshaft as follows:
a. Press mainshaft assembly to adapter plate with Tool.

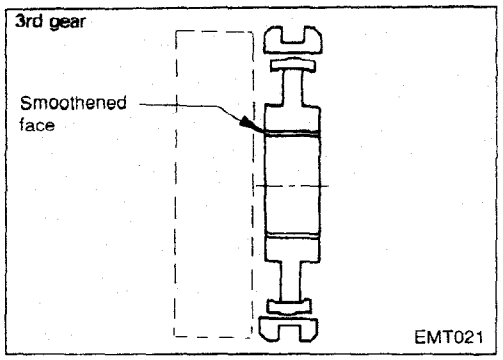


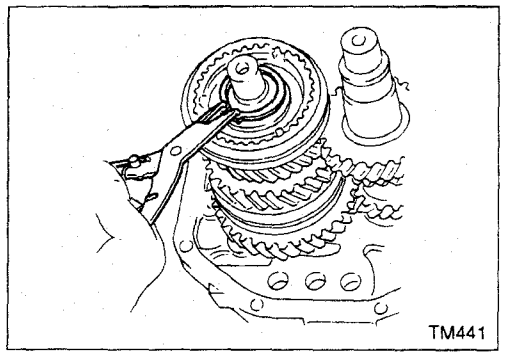
b. Press counter gear into adapter plate with Tool.



c. Install 3rd main gear and then press 3rd & 4th synchronizer assembly.

Pay attention to direction of 3rd & 4th synchronizer.



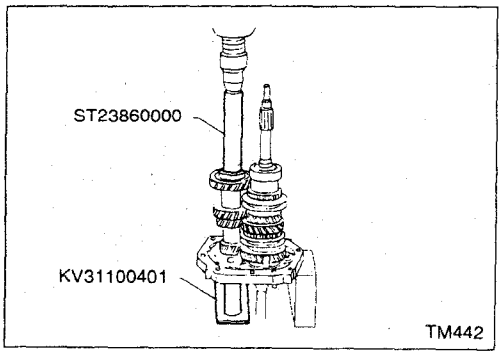


7. Install thrust washer on mainshaft and secure it with mainshaft front snap ring Ⓑ.

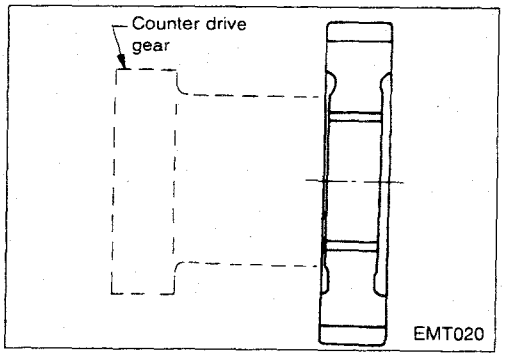
Select proper snap ring Ⓑ that will minimize clearance of groove in mainshaft.

Allowable clearance of groove:
0 - 0.18 mm (0 - 0.0071 in)
Mainshaft front snap ring Ⓑ:
Refer to S.D.S.

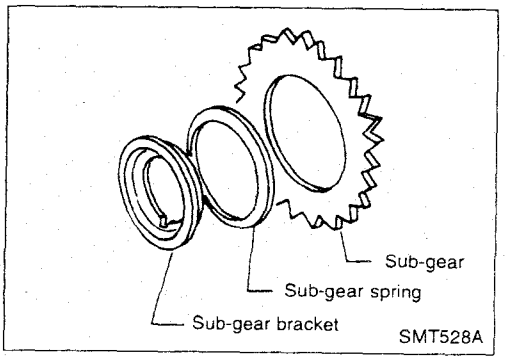
8. Apply gear oil to mainshaft pilot bearing and install it on mainshaft.



9. Press counter drive gear together with main drive gear with Tool.



Pay attention to direction of counter drive gear.



10. Install sub-gear components.

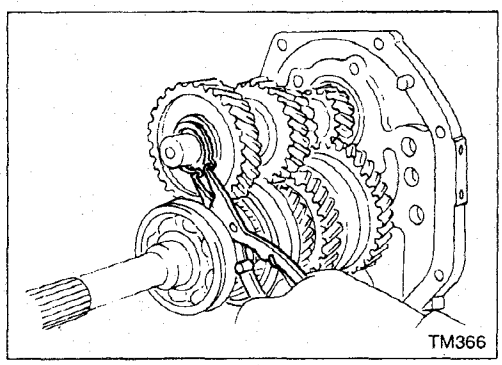
a. Install sub-gear, sub-gear spring and sub-gear bracket or counter drive gear and then select proper snap ring Ⓒ to minimize clearance of groove in counter gear.

Allowable clearance of groove:
0 - 0.18 mm (0 - 0.0071 in)
Counter drive gear snap ring Ⓒ:
Refer to S.D.S.

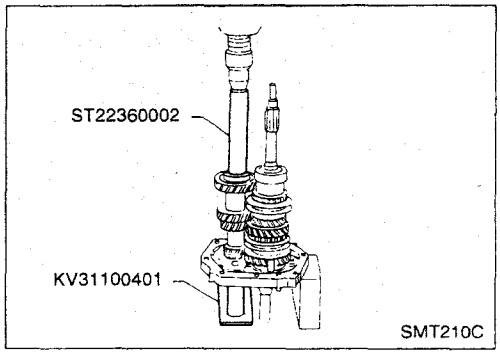
b. Remove snap ring Ⓒ, sub-gear bracket and sub-gea from counter gear.

c. Reinstall sub-gear, sub-gear spring and sub-gear bracket.

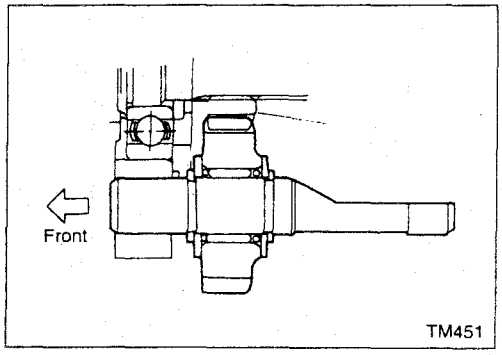
Gear Components (Cont'd)



11. Install selected counter drive gear snap ring Ⓒ.

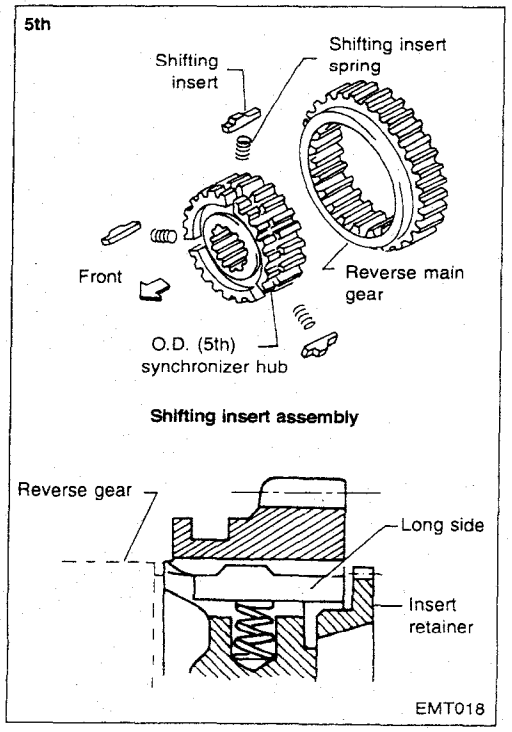


12. Press counter gear front bearing onto counter gear.



13. Install rear side components on mainshaft and counter gear as follows:

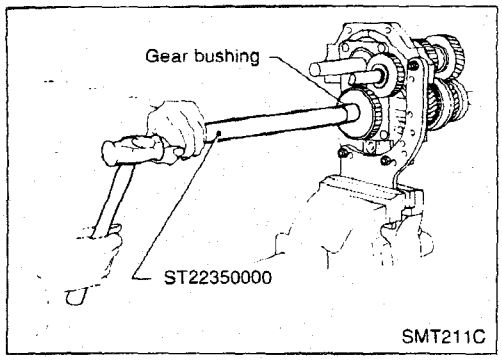
a. Install reverse idler gear to reverse idler shaft with spacers, snap rings and needle bearing.



b. Install bush, reverse main gear, needle bearing, baulk ring (reverse) and O.D. & reverse synchronizer hub to mainshaft.

Pay attention to direction of hub.

Gear Components (Cont'd)

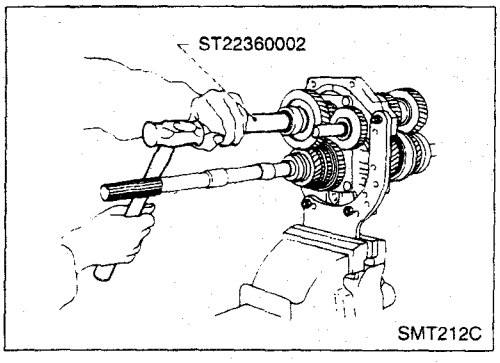


c. Install O.D. gear bushing with Tool.
d. Install baulk ring (O.D.), main gear and needle bearing.
e. Install spacer, reverse counter gear and O.D. counter gear.

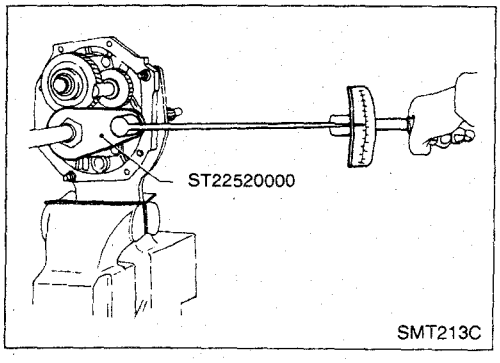
O.D. main gear and O.D. counter gear should be handled as a matched set.

f. Install thrust washer to mainshaft.
g. Tighten mainshaft lock nut temporarily.

Always use new lock nut.
Mainshaft nut: left-hand thread



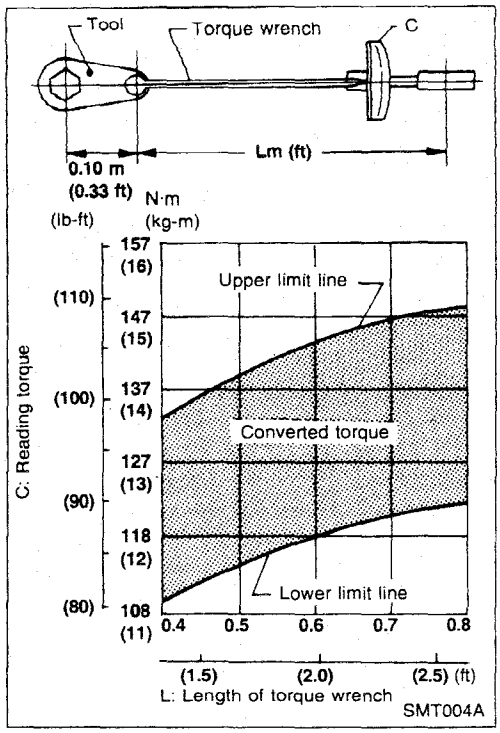
h. Install countershaft rear end bearing with Tool.



14. Mesh 2nd and reverse gears, then tighten mainshaft lock nut with Tool.

Mainshaft nut:
[O]: 137 - 167 N·m (14.0 - 17.0 kg-m, 101 - 123 ft-lb)

Gear Components (Cont'd)



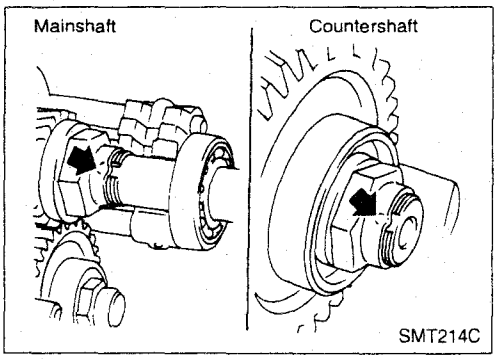
- Use the chart at left when deciding the reading torque. (Length of torque wrench vs. setting or reading torque)

15. Tighten countershaft lock nut.

Always use new lock nut.

Mainshaft lock nut:

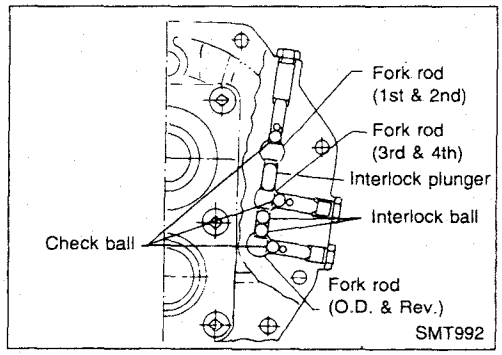
: 137 - 167 N·m (14.0 - 17.0 kg-m, 101 - 123 ft-lb)



16. Stake mainshaft lock nut and countershaft lock nut with a punch.
17. Measure gear end play. For the instructions, refer to DISASSEMBLY for Gear Components.
18. Install main shaft, rear end bearing and snap ring.

Countershaft lock nut:

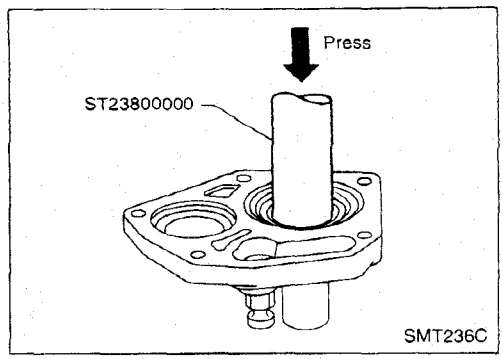
: 98 - 127 N·m (10.0 - 13.0 kg-m, 72 - 94 ft-lb)



Shift Control Components

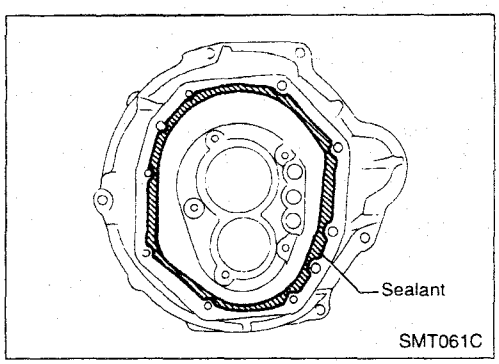
1. Install shift rods, interlock plunger, interlock balls and check balls.
   Fit the respective forks into their housings.

a. Install the 5th/reverse fork rod. Fit the retain pins securing the rod to the fork.
   Install the two interlock balls at the 5th/reverse and 3rd/4th rods.
b. Install the 3rd/4th fork rod. Fit the retaining pins securing the rod to the fork.
   Insert the interlock plunger between the 3rd/4th fork rod and the 1st/2nd fork rod.
c. Install the 1st/2nd fork rod.
d. Install check balls, check springs and check ball plugs to their respective position .

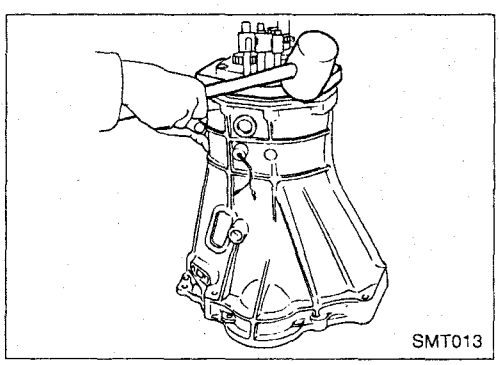


Case Components

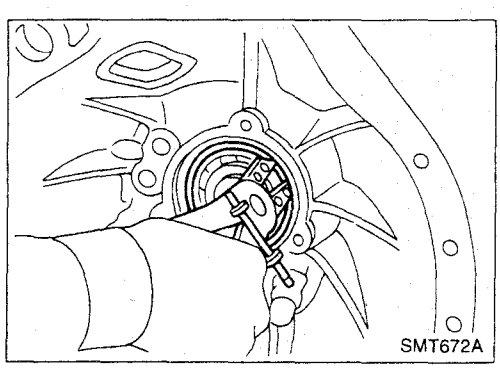
1. Install front cover oil seal.
- **Apply multi-purpose grease to seal lip.**



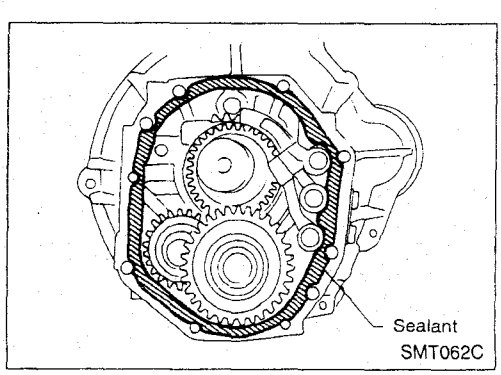
2. Apply sealant to mating surface of transmission case.



3. Slide gear assembly with adapter plate into transmission case by slightly tapping on adapter plate with a soft hammer.

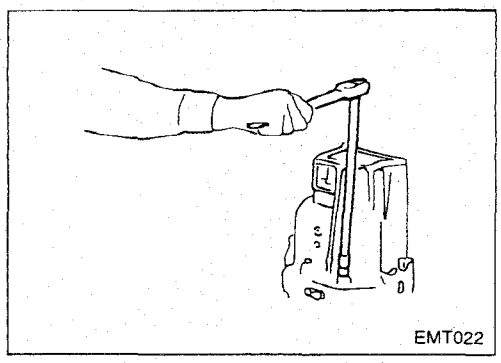


4. Install main drive bearing snap ring.

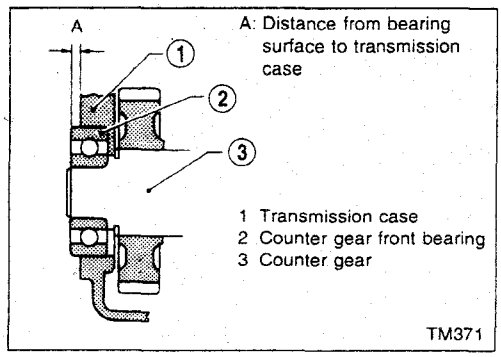


5. Apply sealant to mating surface of adapter plate.

Case Components (Cont'd)

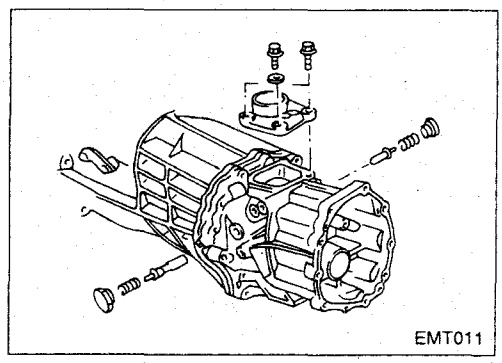

EMT022

6. Install rear extension.
7. Fit main drive bearing snap ring.



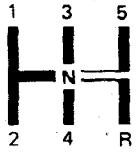
TM371

8. Select counter front bearing shim.
   Refer to S.D.S.
9. Install gasket and front cover.


EMT011

10. Install return spring plugs, check ball, return springs and select check plunger.
11. Install control housing and gasket.

General Specifications

Applied model		KA24E	TD27T
Transmission model		FS5W71C	
Number of speeds		5	
Shift pattern			
Synchromesh type		Warner	
Gear ratio	1st	3.592	
	2nd	2.246	
	3rd	1.415	
	4th	1.000	
	O.D.	0.821	
	Reverse	3.657	
Number of teeth			
Mainshaft	Drive	21	
	1st	33	
	2nd	28	
	3rd	26	
	O.D.	21	
	Reverse	36	
Countershaft	Drive	32	
	1st	14	
	2nd	19	
	3rd	28	
	O.D.	39	
	Reverse	15	
Reverse idler gear		21	
Oil capacity	ℓ (Imp pt)	3.5 (6-1/8)	

Inspection and Adjustment

GEAR END PLAY

Gear	End play mm (in)
1st gear	0.31 - 0.41 (0.0122 - 0.0161)
2nd gear	0.11 - 0.21 (0.0043 - 0.0083)
3rd gear	0.11 - 0.21 (0.0043 - 0.0083)
O.D. gear	0.32 -0.39 (0.0126 - 0.0154)

CLEARANCE BETWEEN BAULK RING AND GEAR

1st, 3rd, main drive and O.D. baulk ring

Unit: mm (in)

	Standard	Wear limit
1st & 2nd 3rd and main drive	1.2 - 1.6 (0.047 - 0.063)	0.8 (0.031)
O.D.	1.0 - 1.4 (0.039 - 0.055)	0.5 (0.02)

AVAILABLE SNAP RING

Main drive gear bearing (Snap Ring Ⓐ)

Allowable clearance	0 - 0.13 mm (0 - 0.0051 in)
Thickness mm (in)	Part number
1.73 (0.0681)	32204-78005
1.80 (0.0709)	32204-78000
1.87 (0.0736)	32204-78001
1.94 (0.0764)	32204-78002
2.01 (0.0791)	32204-78003
2.08 (0.0819)	32204-78004

Mainshaft 3rd & 4th synchronizer hub (Snap Ring Ⓑ)

Allowable clearance	0 - 0.18 mm (0 - 0.0071 in)
Thickness mm (in)	Part number
2.4 (0.094)	32263-V5200
2.5 (0.098)	32263-V5201
2.6 (0.102)	32263-V5202

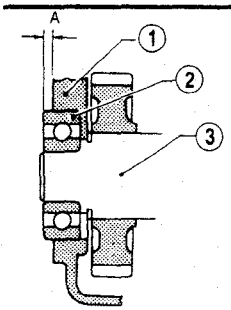
Counter drive gear (Snap Ring Ⓒ)

Allowable clearance	0 - 0.18 mm (0 - 0.0071 in)
Thickness mm (in)	Part number
1.4 (0.055)	32215-E9000
1.5 (0.059)	32215-E9001
1.6 (0.063)	32215-E9002

AVAILABLE SHIMS

Counter front bearing

Unit: mm (in)



A: Distance from bearing surface to transmission case

1 Transmission
2 Counter gear front bearing
3 Counter gear

SMT371

"A"	Thickness of shim	Part number
4.52 - 4.71 (0.1780 - 0.1854)	Not necessary	
4.42 - 4.51 (0.1740 - 0.1776)	0.1 (0.004)	32218-V5000
4.32 - 4.41 (0.1701 - 0.1736)	0.2 (0.008)	32218-V5001
4.22 - 4.31 (0.1661 - 0.1697)	0.3 (0.012)	32218-V5002
4.12 - 4.21 (0.1622 - 0.1657)	0.4 (0.016)	32218-V5003
4.02 - 4.11 (0.1583 - 0.1618)	0.5 (0.020)	32218-V5004
3.92 - 4.01 (0.1543 - 0.1579)	0.6 (0.024)	32218-V5005

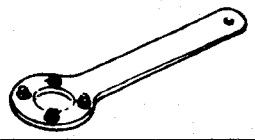
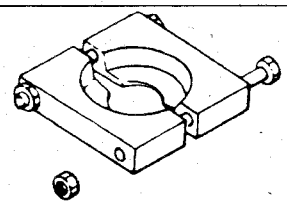
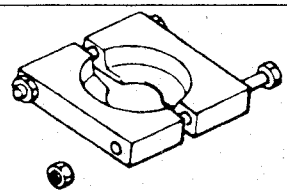
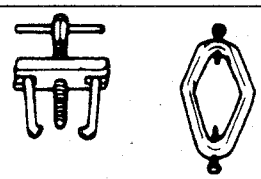
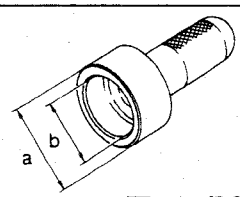
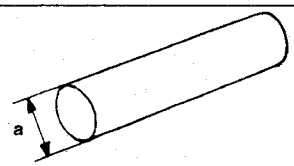
SECTION TF

SECTION TF

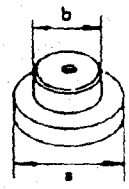
CONTENTS

SPECIAL SERVICE TOOLS

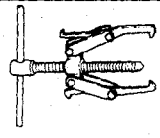
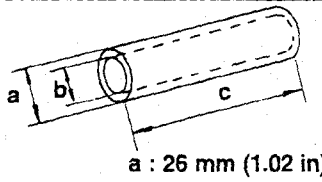
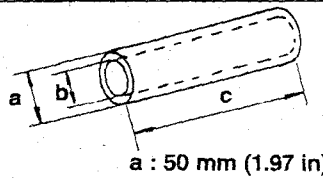
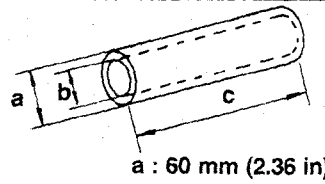
*: Special tool or commercial equivalent

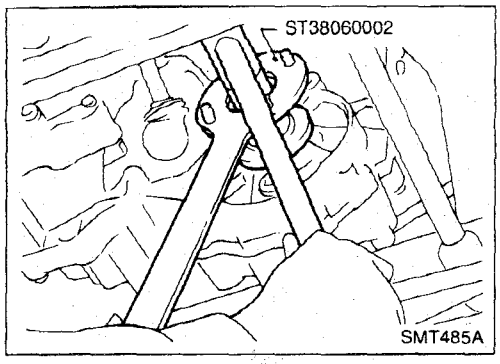
Tool number Tool name	Description	
ST38060002* Flange wrench		Removing companion flange nut Installing companion flange nut
ST30021000* Puller		Removing counter gear front bearing (Use with ST36710010)
ST30031000* Puller		Removing counter gear rear bearing (Use with ST36710010)
ST33290001* Puller		Removing center case oil seal Removing rear oil seal
ST33051001* Puller		Removing companion flange
ST30720000* Drift	 **a : 77 mm (3.03 in) dia.** **b : 55.5 mm (2.185 in) dia.**	Installing center case oil seal Installing rear oil seal
ST36710010* Drift	 **a : 34.5 mm (1.358 in) dia.**	Removing counter gear front bearing (Use with ST30021000) Removing counter gear rear bearing (Use with ST30031000)
ST33061000* Drift	 **a: 28.5 mm (1.22 in) dia.** **b: 38 mm (1.50 in) dia.**	Removing main gear bearing

*: Special tool or commercial equivalent

Tool number Tool name	Description	
ST30613000* Drift		Installing main gear bearing Installing cover oil seal **a: 72 mm (2.83 in) dia.** **b: 48 mm (1.89 in) dia.**

COMMERCIAL SERVICE TOOLS

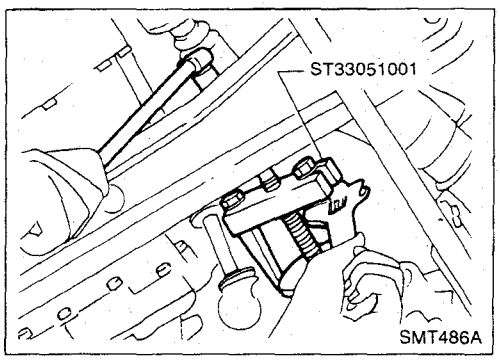
Tool name	Description	
Puller		Removing front drive shaft front bearing Removing front drive shaft rear bearing Removing main gear bearing
Drift	 **a : 26 mm (1.02 in) dia.** **b : 20 mm (0.79 in) dia.** **c : 150 mm (5.91 in)**	Installing shift shaft oil seal
Drift	 **a : 50 mm (1.97 in) dia.** **b : 42 mm (1.65 in) dia.** **c : 180 mm (7.09 in)**	Installing mainshaft rear bearing
Drift	 **a : 60 mm (2.36 in) dia.** **b : 50 mm (1.97 in) dia.** **c : 60 mm (2.36 in)**	Installing L & H hub



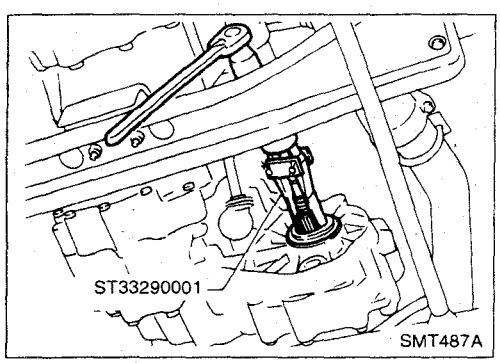
Replacing Oil Seal

CENTER CASE OIL SEAL

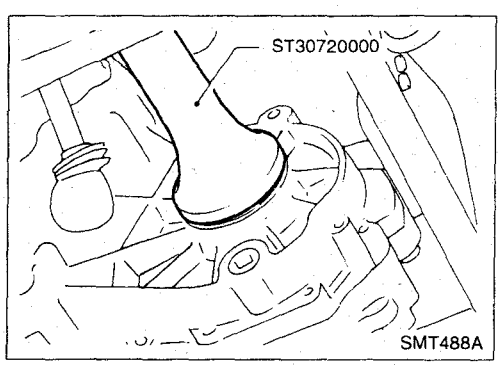
1. Remove front propeller shaft — Refer to PD section.
2. Remove companion flange nut.



3. Remove companion flange.



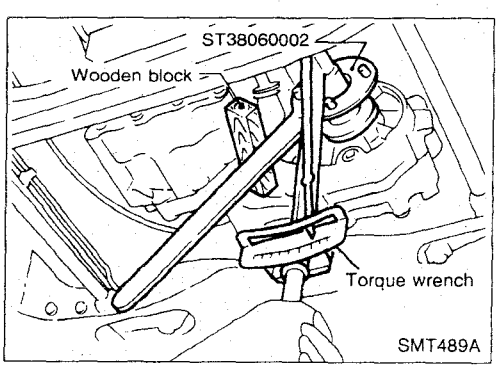
4. Remove center case oil seal.



5. Install center case oil seal.

Before installing, apply multi-purpose grease to seal lip.

6. Install companion flange.

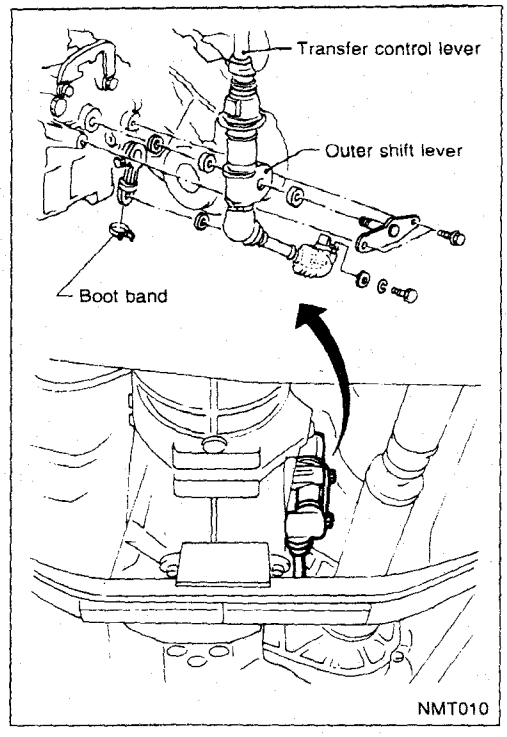


7. Tighten nut to the specified torque.

   : 226 - 324 N·m (23 - 33 kg-m, 166 - 239 ft-lb)

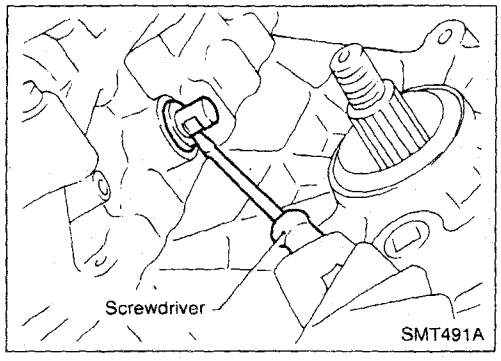
8. Install front propeller shaft.

Replacing Oil Seal (Cont'd)



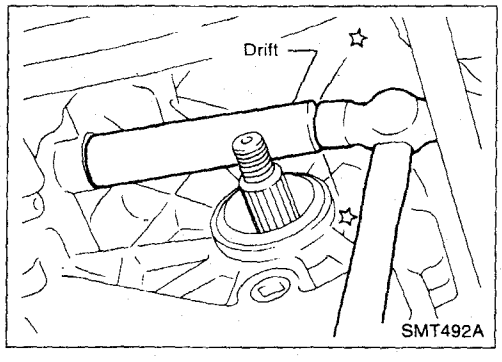
SHIFT SHAFT OIL SEAL

1. Remove front propeller shaft — Refer to PD section.
2. Remove companion flange — Refer to center case oil seal service on previous page.
3. Remove transfer control lever from transfer outer shift lever. Then remove outer shift lever.



4. Remove shift shaft oil seal.

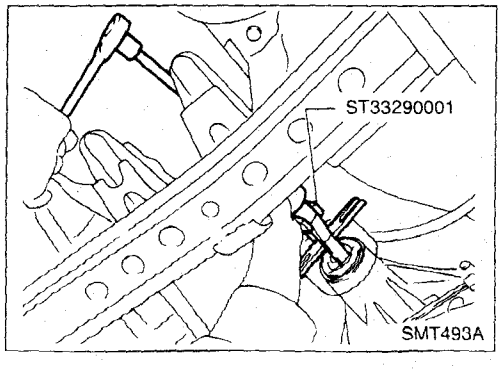
Be careful not do damage cross shaft.



5. Install shift shaft oil seal.

Before installing, apply multi-purpose grease to seal lip.

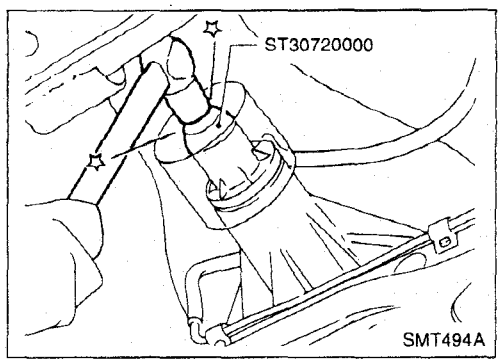
6. Install transfer control linkage.
7. Install companion flange — Refer to center case oil seal service on previous page.
8. Install front propeller shaft.



REAR OIL SEAL

1. Remove rear propeller shaft — Refer to PD section.
2. Remove rear oil seal.

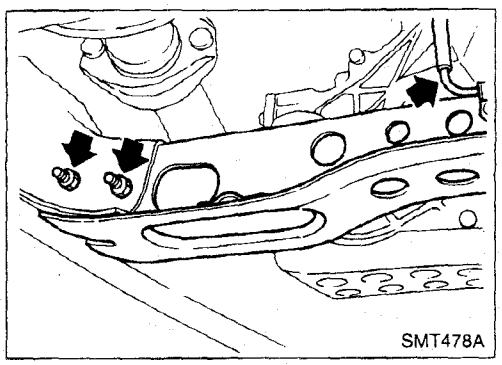
Replacing Oil Seal (Cont'd)



3. Install rear oil seal.

Before installing apply multi-purpose grease to seal lip.

4. Install rear propeller shaft.


SMT478A

Removal

- Drain oil from transfer and transmission.
- Remove front and rear propeller shafts — Refer to PD section.
- Insert plug into oil seal after removing propeller shaft.

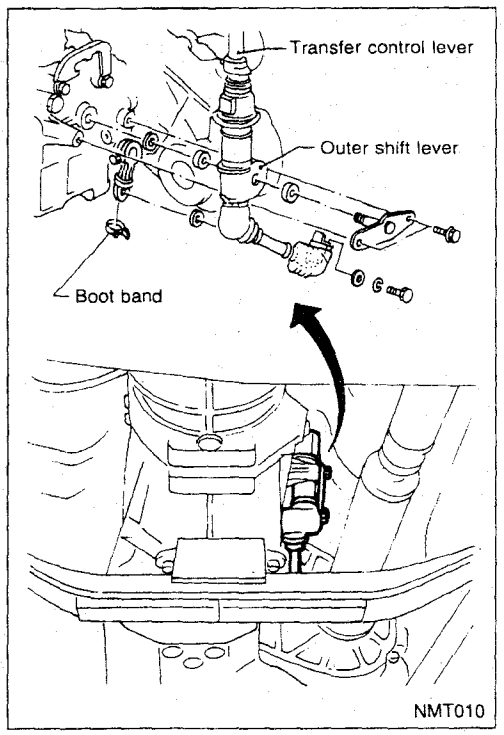
CAUTION:

Be careful not to damage spline, sleeve yoke and rear oil seal, when removing propeller shaft.

- Remove torsion bar spring — Refer to removal and installation of lower link in FA section. Then remove fifth crossmember.
- Remove transfer control lever from transfer outer shift lever.
- Remove transfer from transmission.

WARNING:

Support transfer while removing it.

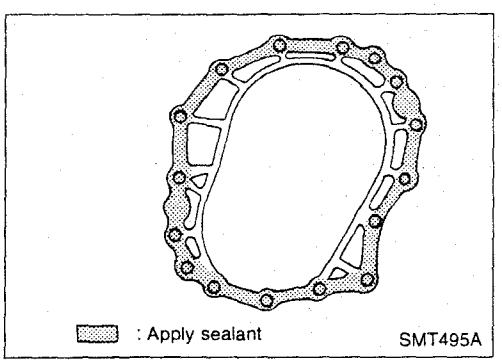


NMT010

Installation

- Apply recommended sealant to mating surface to transmission.

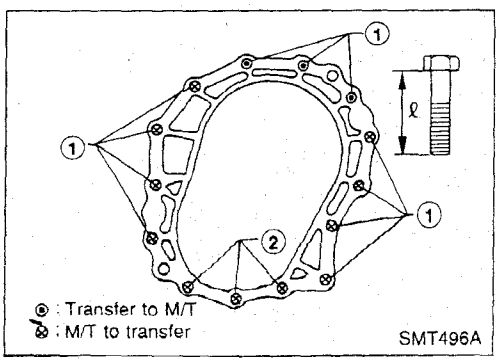
Recommended sealant:
Nissan genuine part (KP610-00250) or equivalent



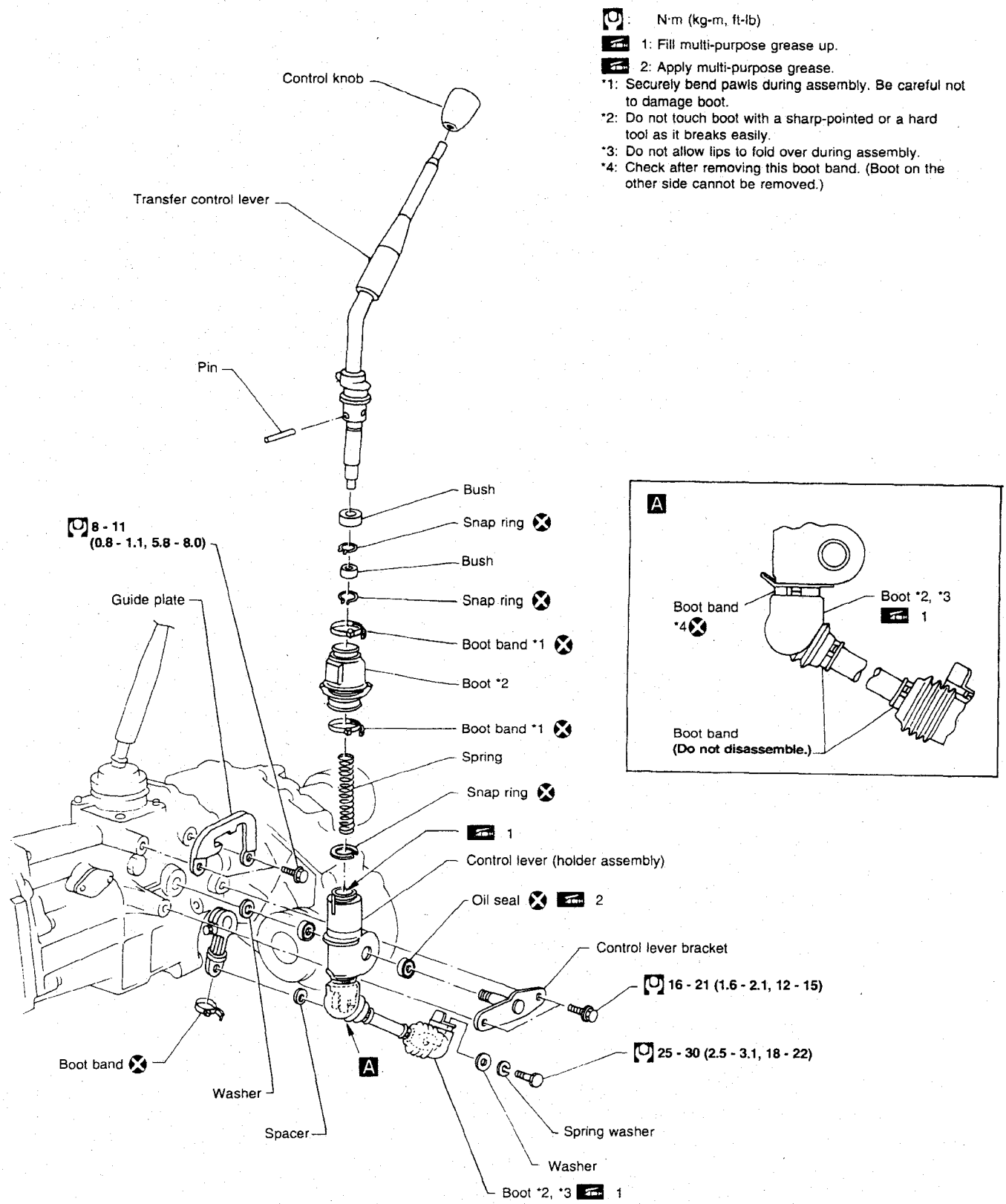
SMT495A

- Tighten bolts securing transfer.

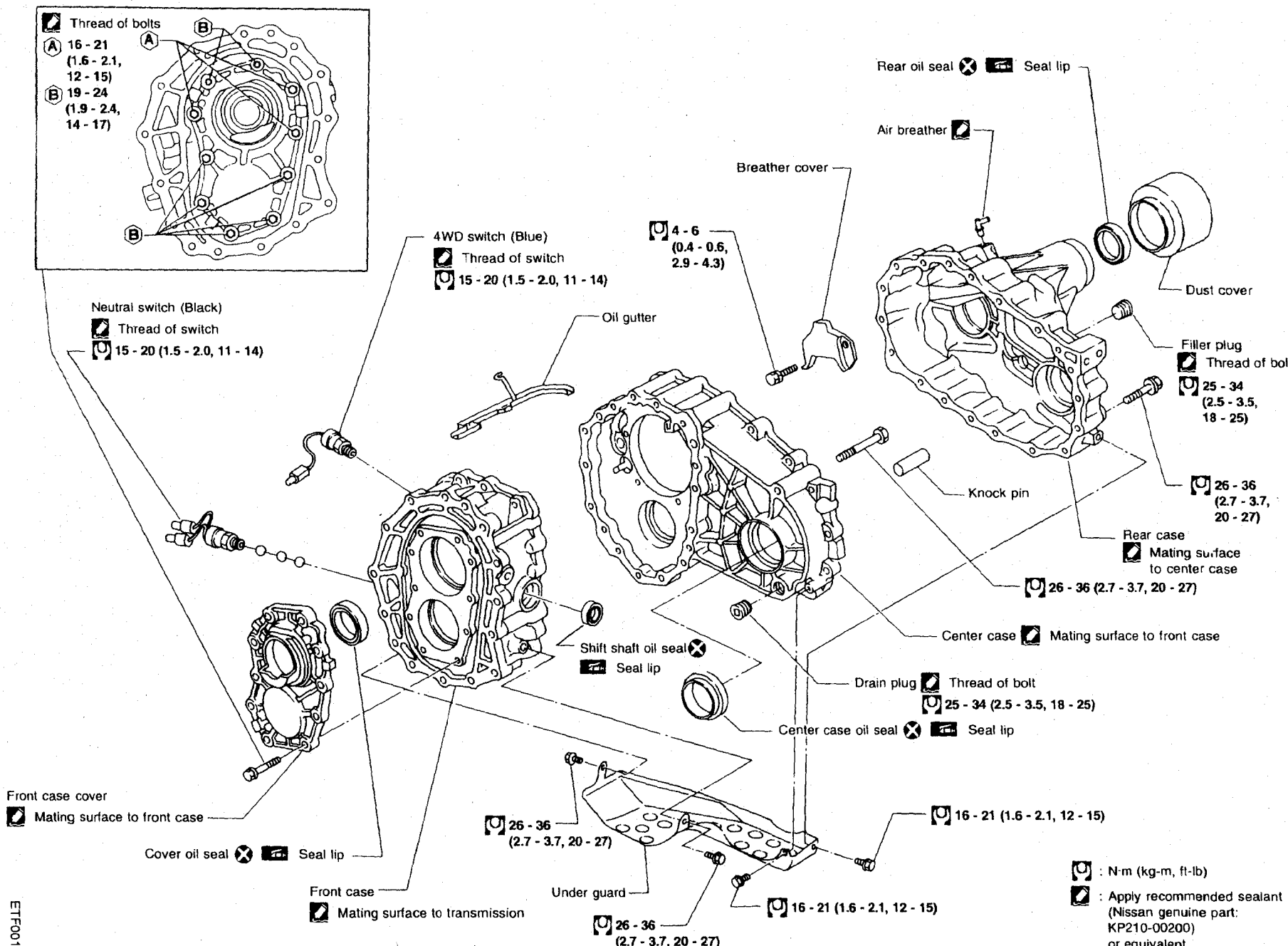
Bolt No.	Tightening torque N·m (kg-m, ft-lb)	ℓ mm (in)
①	31 - 41 (3.2 - 4.2, 23 - 30)	45 (1.77)
②	31 - 41 (3.2 - 4.2, 23 - 30)	60 (2.36)



SMT496A

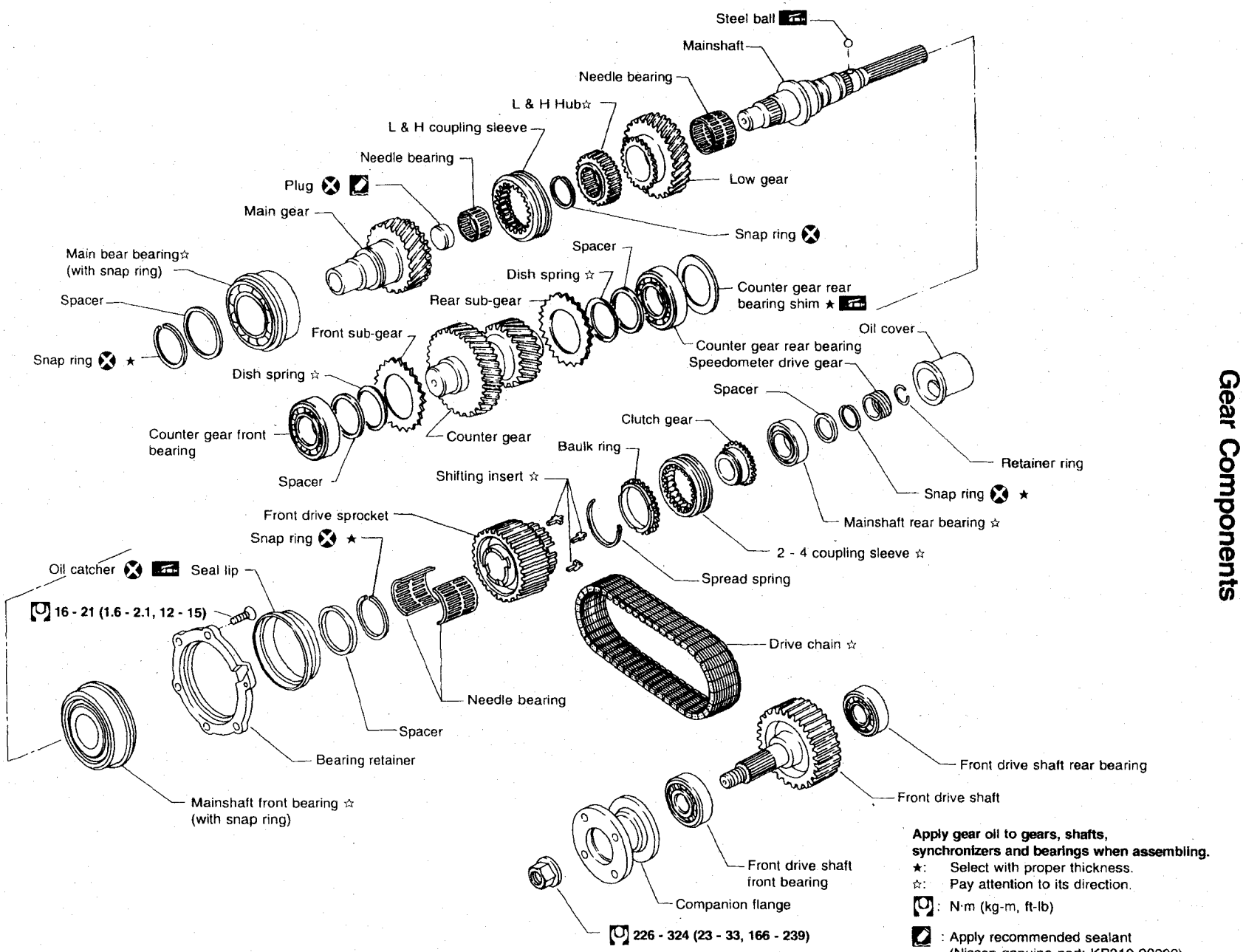

: N·m (kg-m, ft-lb)
1: Fill multi-purpose grease up.
2: Apply multi-purpose grease.
*1: Securely bend pawls during assembly. Be careful not to damage boot.
*2: Do not touch boot with a sharp-pointed or a hard tool as it breaks easily.
*3: Do not allow lips to fold over during assembly.
*4: Check after removing this boot band. (Boot on the other side cannot be removed.)
Control knob
Transfer control lever
Pin
Bush
Snap ring
Bush
Snap ring
Boot band *1
Boot *2
Boot band *1
Spring
Snap ring
1
Control lever (holder assembly)
Oil seal 2
Control lever bracket
16 - 21 (1.6 - 2.1, 12 - 15)
25 - 30 (2.5 - 3.1, 18 - 22)
Spring washer
Washer
Boot *2, *3 1
8 - 11 (0.8 - 1.1, 5.8 - 8.0)
Guide plate
Boot band
Washer
Spacer
A
Boot band *4
Boot *2, *3 1
Boot band (Do not disassemble.)

SMT635B


Thread of bolts
A 16 - 21 (1.6 - 2.1, 12 - 15)
B 19 - 24 (1.9 - 2.4, 14 - 17)
Rear oil seal
Seal lip
Air breather
Breather cover
4 - 6 (0.4 - 0.6, 2.9 - 4.3)
4WD switch (Blue)
Thread of switch
15 - 20 (1.5 - 2.0, 11 - 14)
Dust cover
Neutral switch (Black)
Thread of switch
15 - 20 (1.5 - 2.0, 11 - 14)
Oil gutter
Filler plug
Thread of bolt
25 - 34 (2.5 - 3.5, 18 - 25)
26 - 36 (2.7 - 3.7, 20 - 27)
Knock pin
Rear case
Mating surface to center case
26 - 36 (2.7 - 3.7, 20 - 27)
Center case
Mating surface to front case
Shift shaft oil seal
Seal lip
Drain plug
Thread of bolt
25 - 34 (2.5 - 3.5, 18 - 25)
Center case oil seal
Seal lip
Front case cover
Mating surface to front case
26 - 36 (2.7 - 3.7, 20 - 27)
16 - 21 (1.6 - 2.1, 12 - 15)
Cover oil seal
Seal lip
Front case
Mating surface to transmission
Under guard
16 - 21 (1.6 - 2.1, 12 - 15)
26 - 36 (2.7 - 3.7, 20 - 27)
: N·m (kg-m, ft-lb)
: Apply recommended sealant (Nissan genuine part: KP210-00200) or equivalent.

ETF001

Gear Components



Apply gear oil to gears, shafts, synchronizers and bearings when assembling.

★: Select with proper thickness.

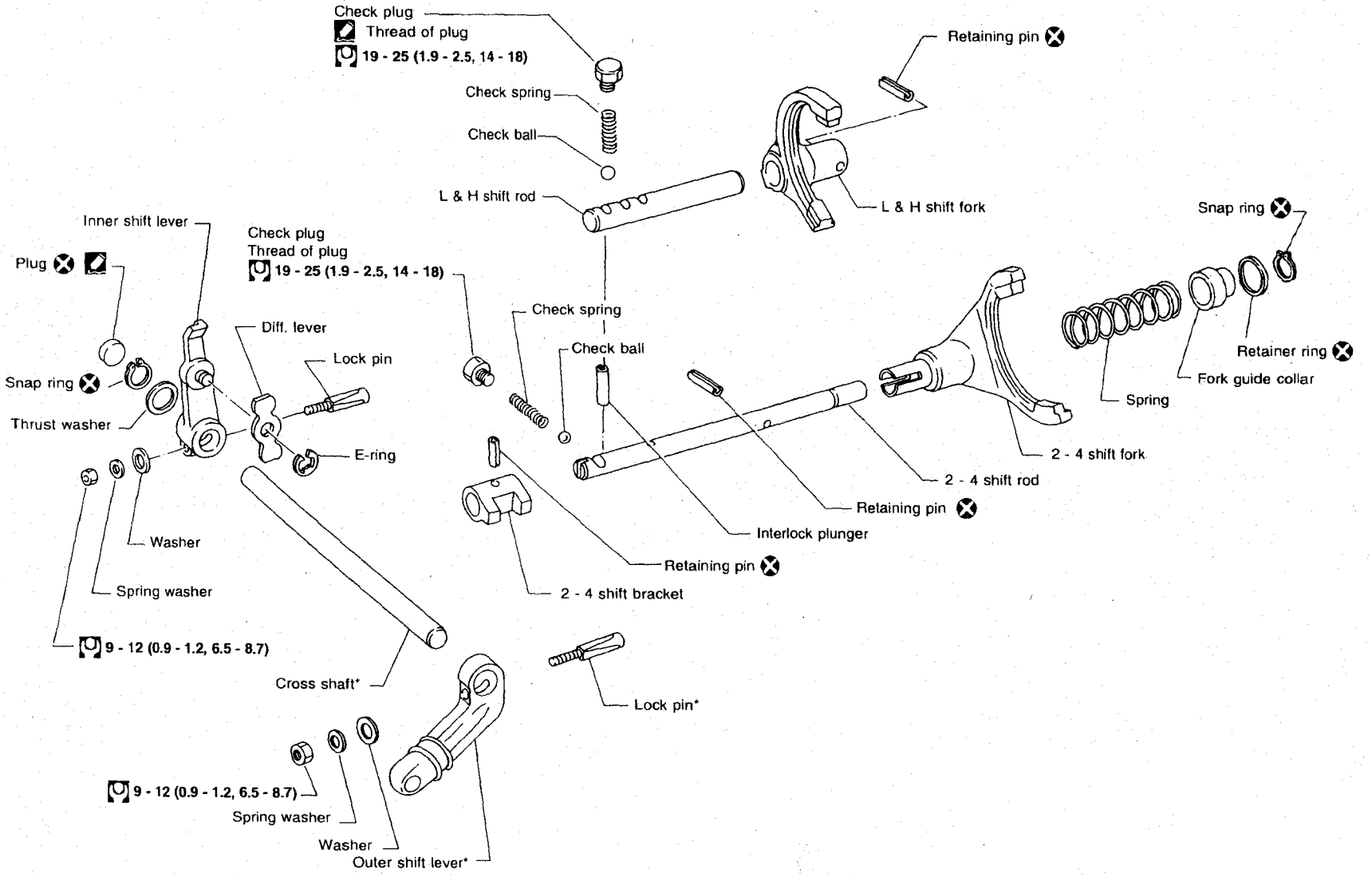
☆: Pay attention to its direction.

: N·m (kg-m, ft-lb)

: Apply recommended sealant (Nissan genuine part: KP210-00200) or equivalent.

SMT212B

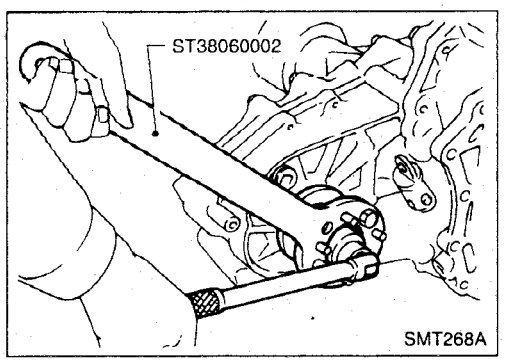
Shift Control Components



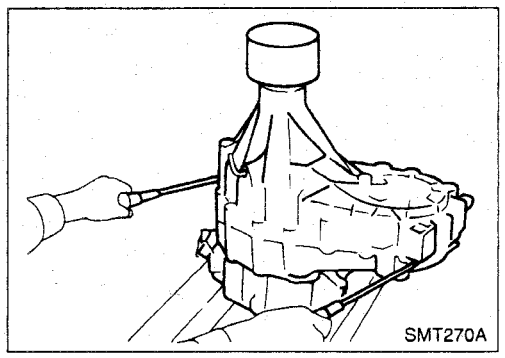
* : If these parts need to be replaced, replace them as a set.

: N·m (kg-m, ft-lb)

: Apply recommended sealant (Nissan genuine part: KP210-00200) or equivalent.

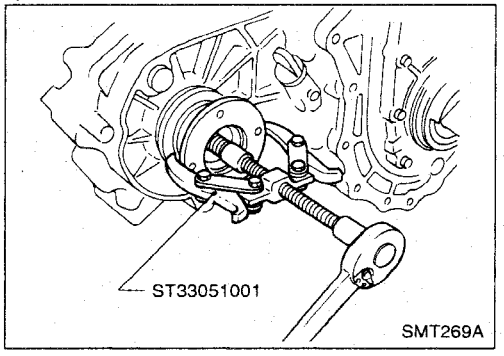


1. Remove nut of companion flange.

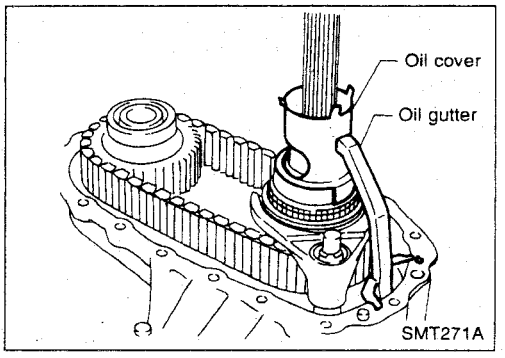


2. Remove rear case.

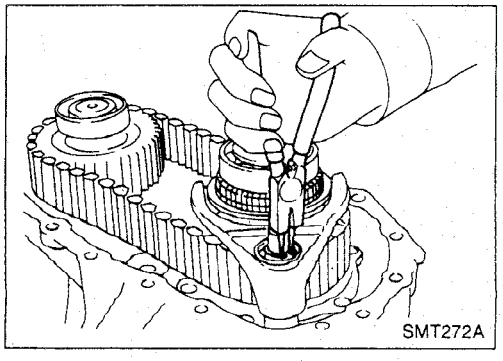
Be careful not to damage the mating surface.



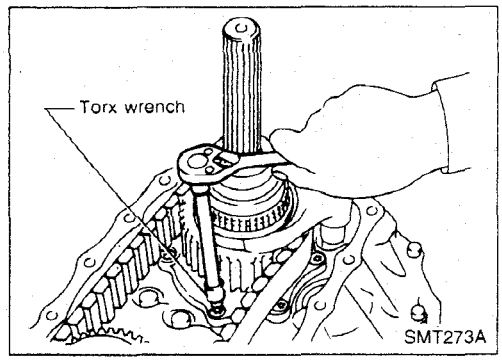
3. Remove companion flange.



4. Remove oil cover and oil gutter.

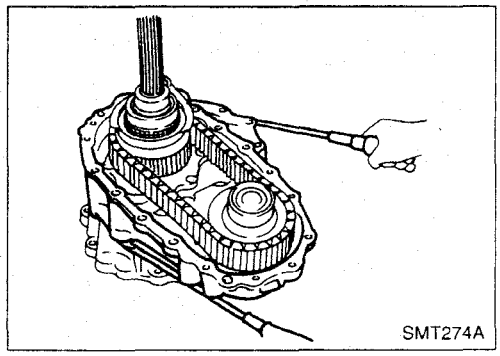


5. Remove snap ring from 2-4 shift rod.

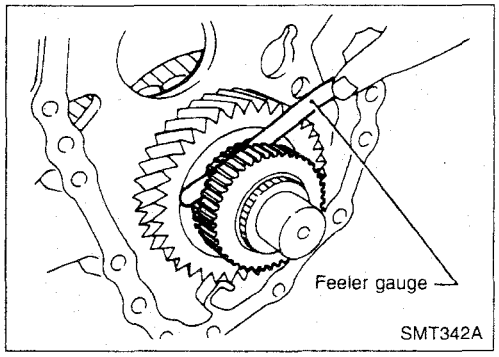


6. Remove bolts securing bearing retainer.

This step is necessary to remove mainshaft from center case.



7. Remove bolts securing center case to front case and then separate center case and front case.

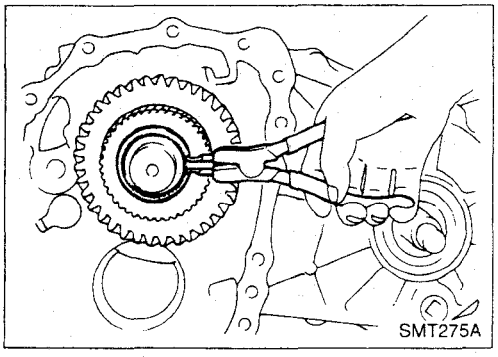


8. Measure end play of low gear.

Standard:

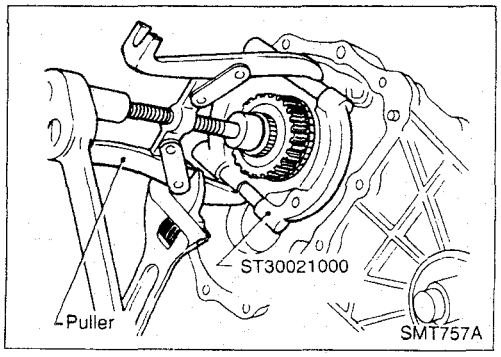
0.2 - 0.35 mm (0.0079 - 0.0138 in)

If end play is beyond the maximum value, check low gear and L & H hub for wear.

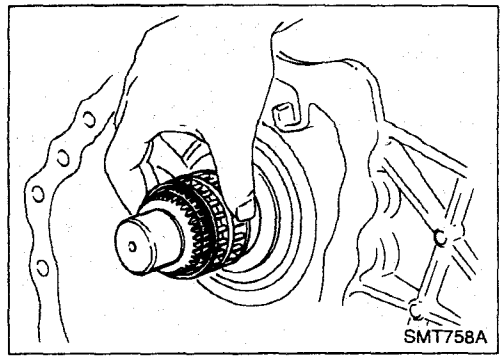


9. Disassemble center case assembly.

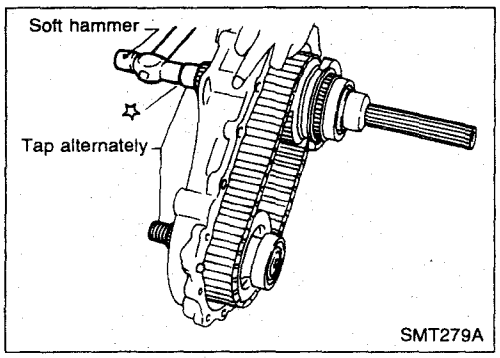
a. Remove snap ring from mainshaft.



b. Pull out low gear with L & H hub.

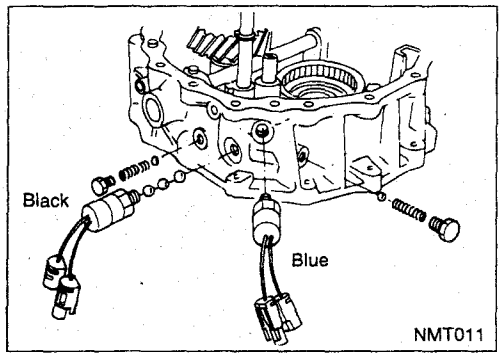


c. Remove needle bearing of low gear.

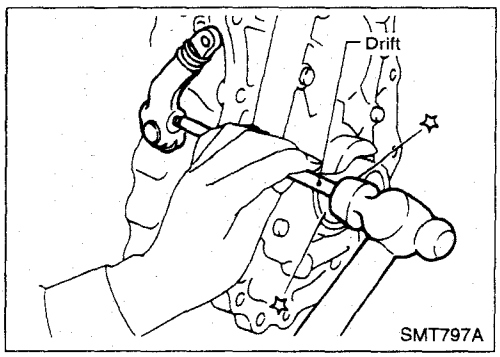


d. Remove mainshaft, front drive and drive chain as a set by tapping front end of mainshaft and front drive shaft alternately.

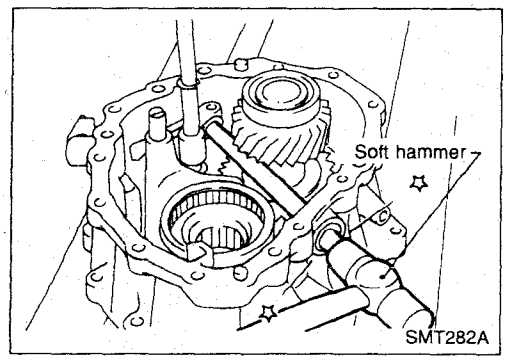
Be careful not to bend drive chain.



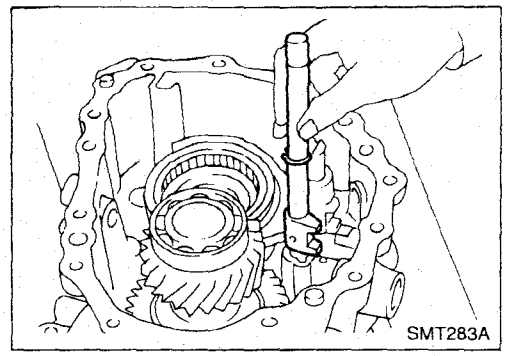
10. Disassemble front case assembly.
a. Remove switches, check plugs, check springs and check balls.



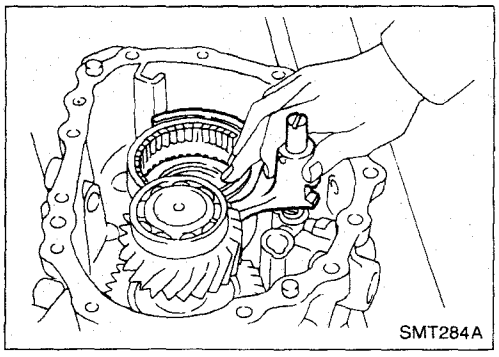
b. Remove outer shift lever.



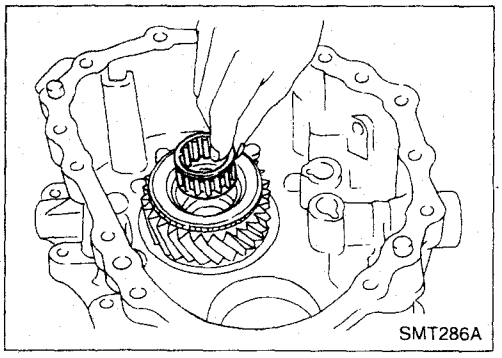
c. Remove lock pin of inner shift lever and drive out cross shaft with plug.



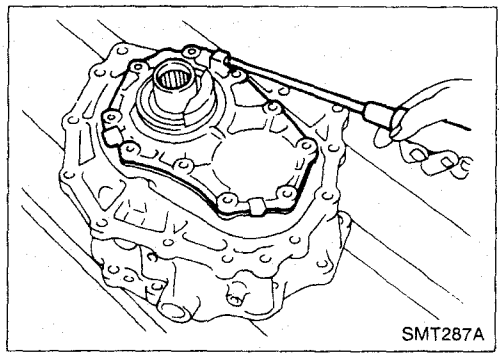
d. Remove 2-4 shift rod.



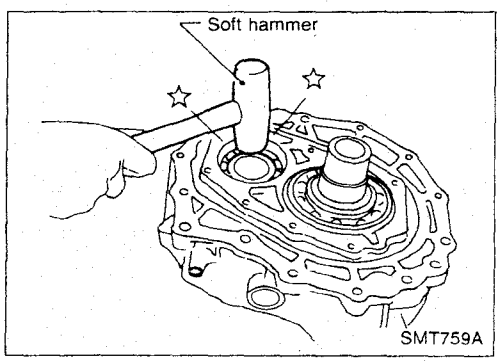
e. Remove L & H shift rod and fork assembly with coupling sleeve.



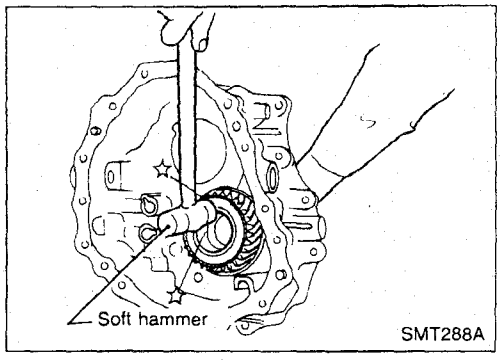
f. Remove needle bearing from main gear.



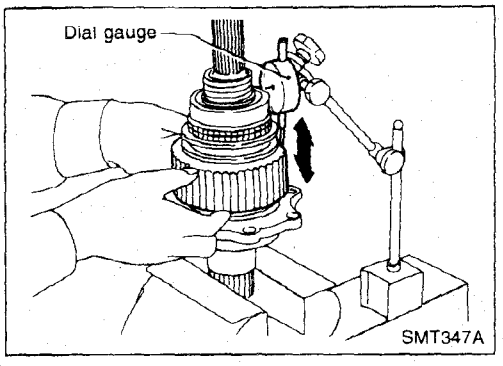
g. Remove bolts securing front case cover and then remove case.



h. Remove counter gear by tapping lightly.



i. Remove main gear by tapping lightly.



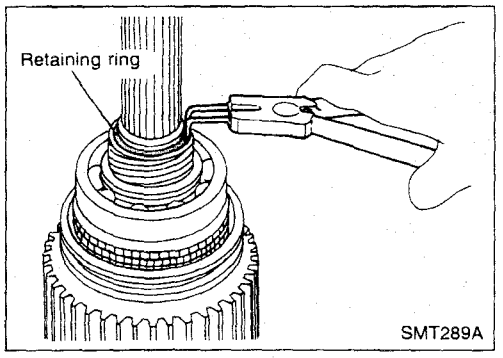
Mainshaft

DISASSEMBLY

1. Check end play of front drive sprocket.

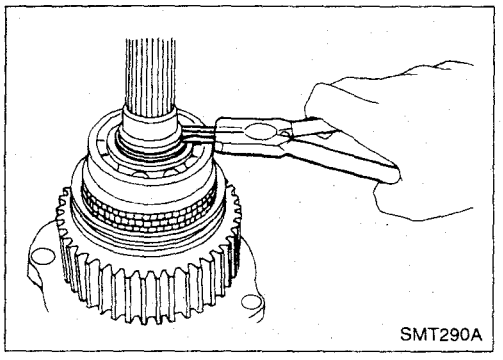
Standard:
0.2 - 0.35 mm (0.0079 - 0.0138 in)

If end play is beyond the maximum value, check front drive sprocket and clutch gear for wear.

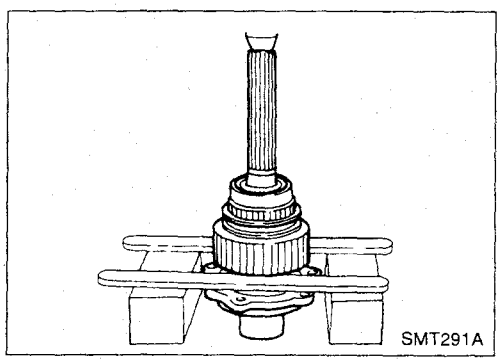


2. Remove retaining ring, speedometer drive gear and steel ball.

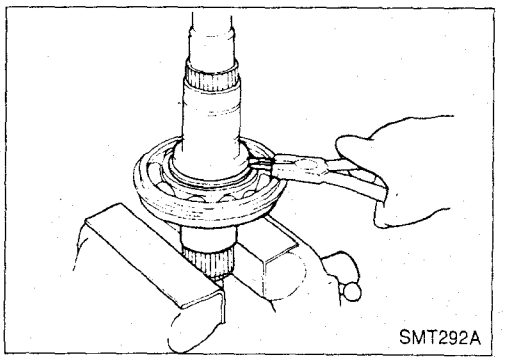
Be careful not to lose the steel ball.



3. Remove snap ring and spacer.

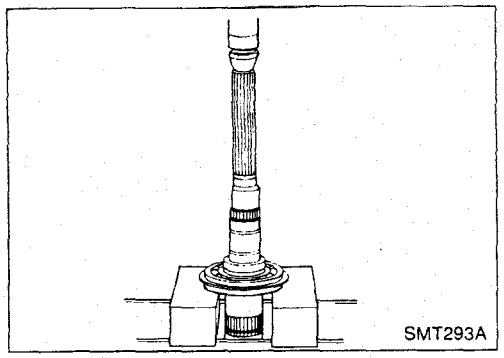


4. Press out front drive sprocket with mainshaft rear bearing and clutch gear together.
5. Remove needle bearing.

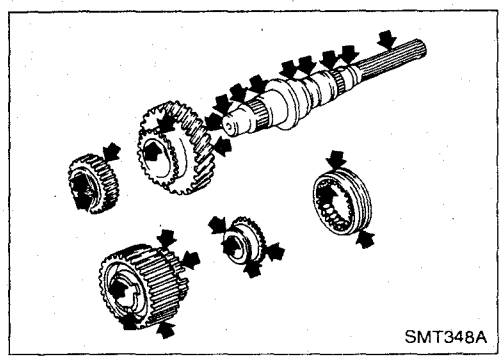


6. Remove bearing retainer and then remove snap ring and spacer.

Mainshaft (Cont'd)


SMT293A

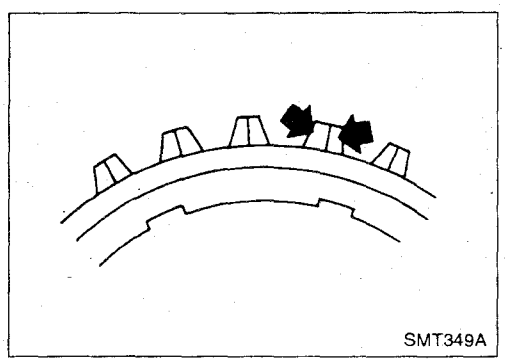
7. Press out mainshaft front bearing from mainshaft.


SMT348A

INSPECTION

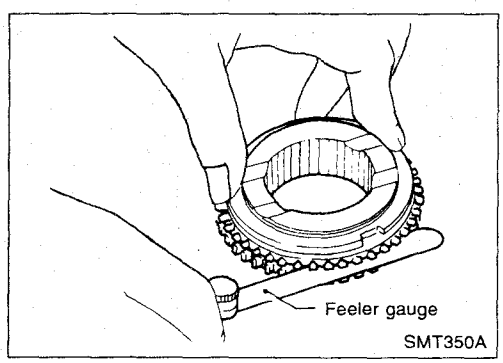
Gear and shaft

- Check gears for excessive wear, chips or cracks.
- Check shaft for cracks, wear of bending.
- Check coupling sleeve for wear or damage.


SMT349A

Baulk ring

- Check baulk ring for cracks or deformation.



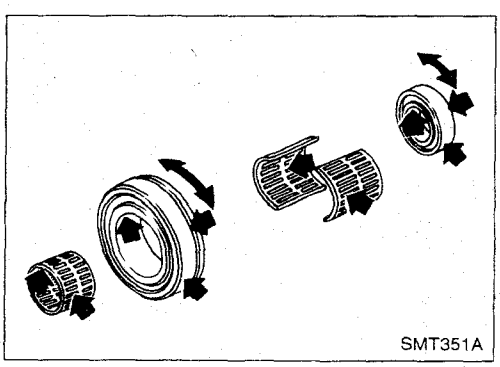
SMT350A

- Measure clearance between baulk ring and gear.

Baulk ring to gear clearance:

Unit: mm (in)

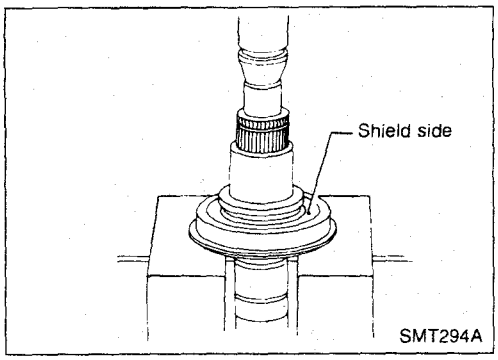
Standard	Wear limit
1.0 - 1.5 (0.039 - 0.059)	0.5 (0.020)


SMT351A

Bearing

- Make sure bearings roll freely and are free from noise, cracks, pitting or wear.

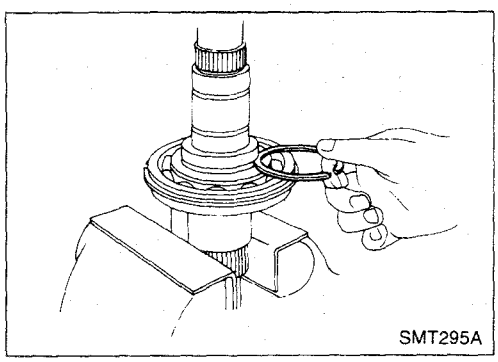
Mainshaft (Cont'd)



ASSEMBLY

1. Press mainshaft front bearing onto mainshaft.

Pay special attention to its direction.



2. Install spacer.
3. Select snap ring with proper thickness and install it.

Allowable clearance between snap ring and groove:
0 - 0.15 mm (0 - 0.0059 in)

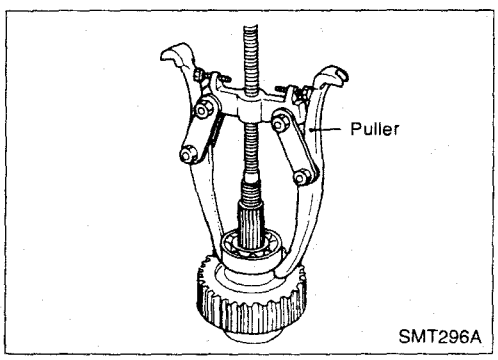
Available snap ring

Thickness mm (in)	Part number
3.1 (0.122)	33138-33G10
3.2 (0.126)	33138-33G11
3.3 (0.130)	33138-33G12
3.4 (0.134)	33138-33G13

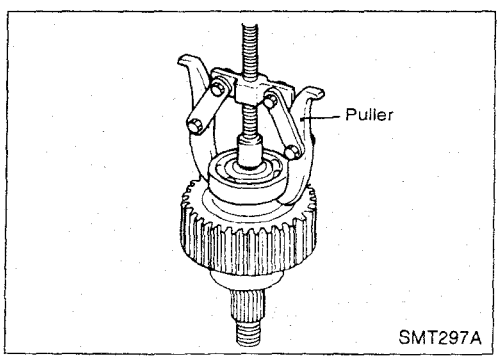
4. Regarding further procedures, refer to "ASSEMBLY"

Front Drive Shaft

DISASSEMBLY

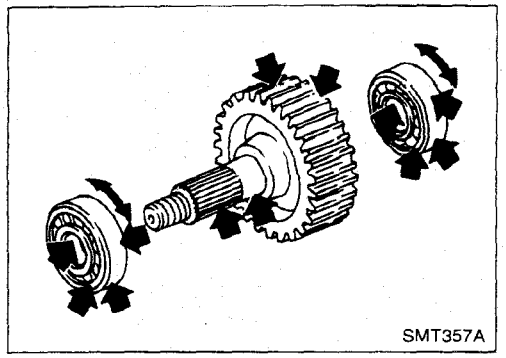


- Front drive shaft front bearing



- Front drive shaft rear bearing

Front Drive Shaft (Cont'd)



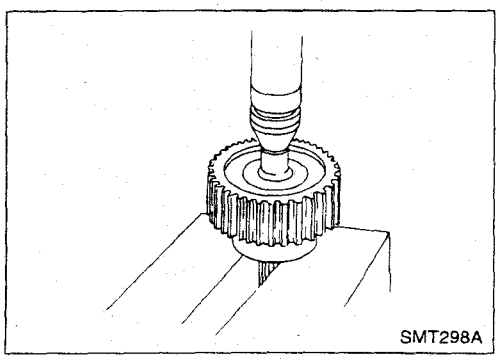
INSPECTION

Sprocket and shaft

- Check sprocket for excessive wear, chips or cracks.
- Check shaft for cracks or wear.

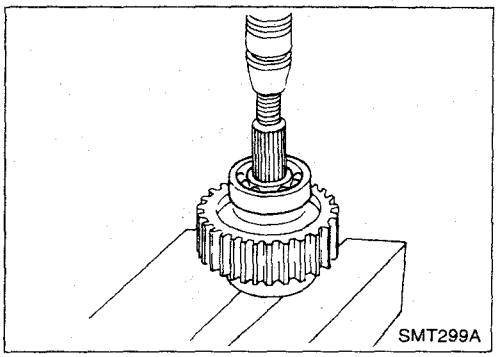
Bearing

- Make sure bearings roll freely and are free from noise, cracks, pitting or wear.



ASSEMBLY

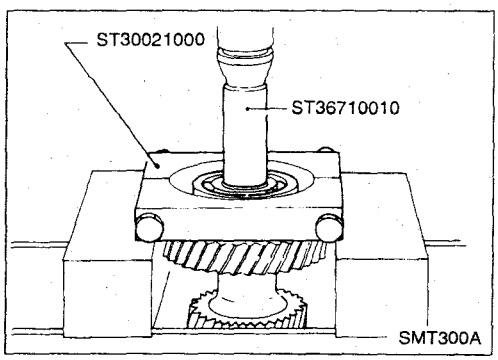
- Front drive shaft front bearing



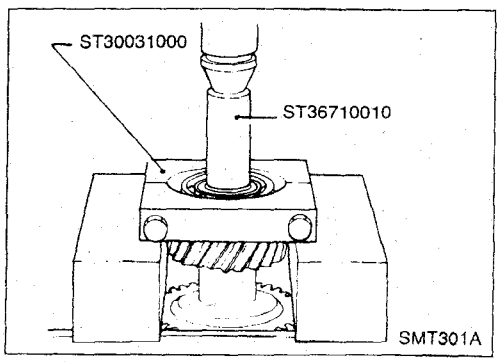
- Rear drive shaft rear bearing

Counter Gear

DISASSEMBLY

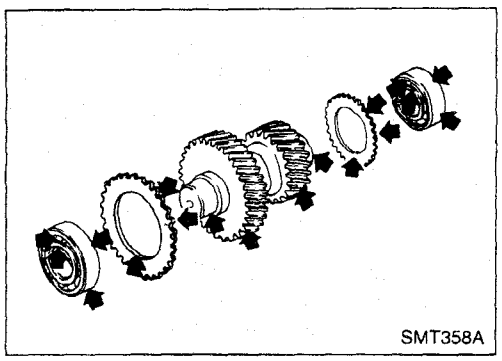


1. Press out counter gear front bearing and then remove front sub-gear, spacer and dish spring.



2. Press out counter gear rear bearing and then remove rear sub-gear, spacer and dish spring.

Counter Gear (Cont'd)


SMT358A

INSPECTION

Gear and shaft

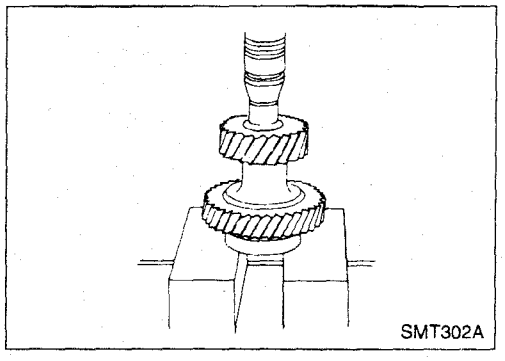
- Check gears for excessive wear, chips or cracks.
- Check shaft for cracks or wear.

Bearing

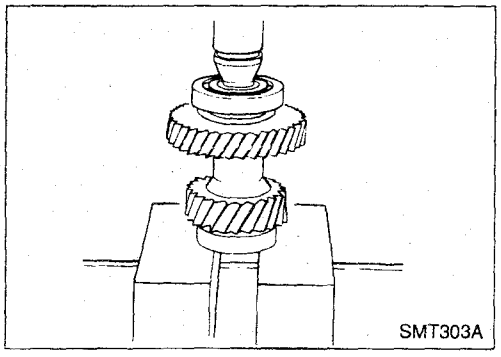
- Make sure bearings roll freely and are free from noise, cracks, pitting or wear.

ASSEMBLY

1. Install front sub-gear, dish spring and spacer, and then press on counter gear front bearing.


SMT302A

2. Install rear sub-gear, dish spring and spacer, and then press on counter gear rear bearing.

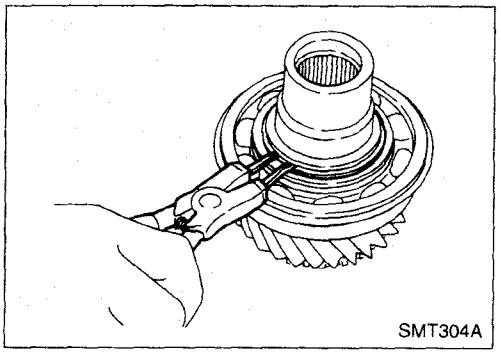

SMT303A

Main Gear

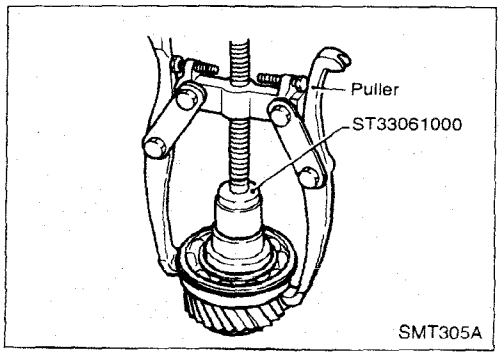
DISASSEMBLY

Main gear bearing

1. Remove snap ring and spacer.

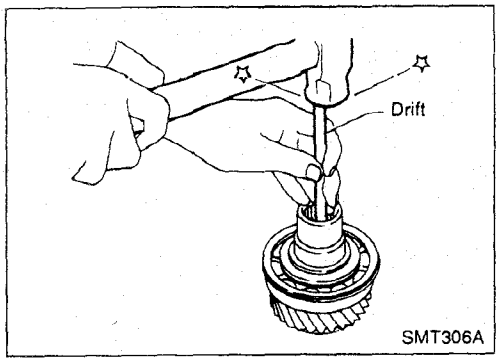

SMT304A

2. Pull out main gear bearing.



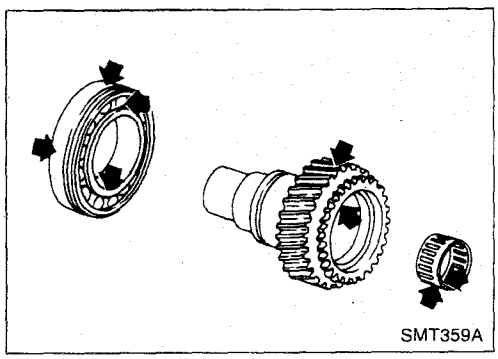
SMT305A

Main Gear (Cont'd)



Plug

Always replace it with new one whenever it is removed.



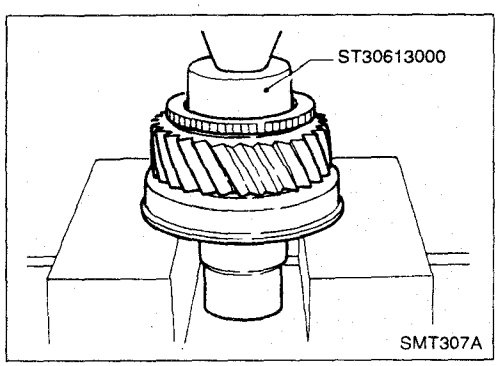
INSPECTION

Gear and shaft

- Check gears for excessive wear, chips or cracks.
- Check shaft for cracks or wear.

Bearing

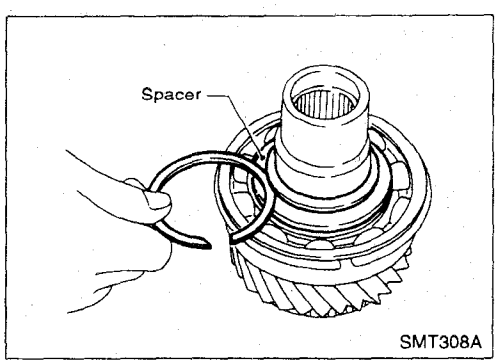
- Make sure bearings roll freely and are free from noise, cracks, pitting or wear.



ASSEMBLY

Main gear bearing

1. Press on main gear bearing.
2. Install spacer.

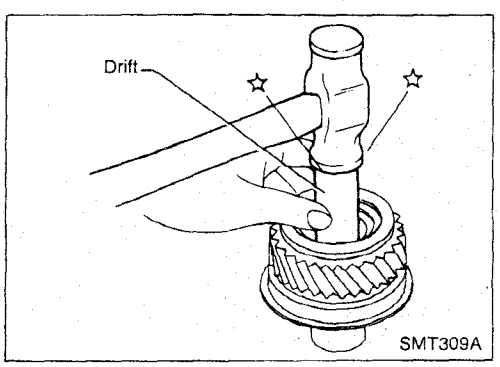


3. Select snap ring with proper thickness and install it.

Allowable clearance between snap ring and groove:
0 - 0.15 mm (0 - 0.0059 in)

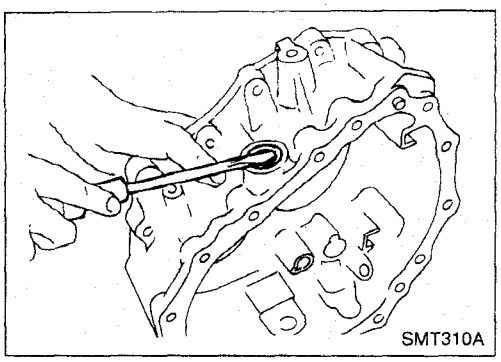
Available snap ring

Thickness mm (in)	Part number
2.6 (0.102)	33114-33G00
2.7 (0.106)	33114-33G01
2.8 (0.110)	33114-33G02
2.9 (0.114)	33114-33G03



Plug

Apply sealant to plug and install it.

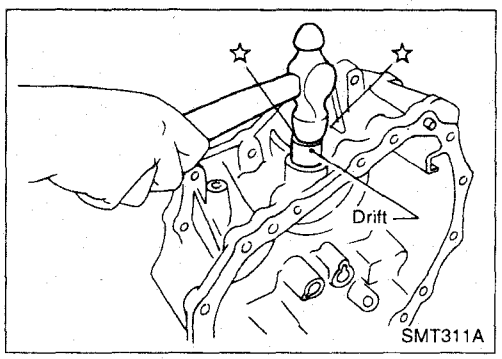


Front Case

SHIFT SHAFT OIL SEAL

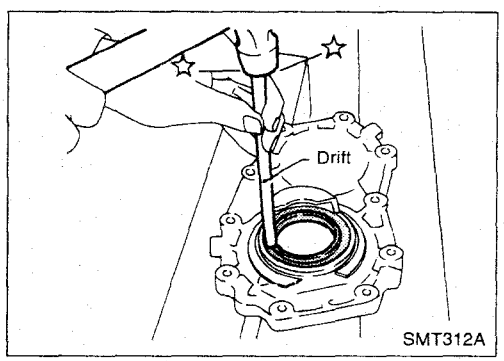
Removal

Remove the oil seal. Be careful not to damage its housing.
Always replace after every disassembly.



Installation

Install a new oil seal, using a suitable tool.

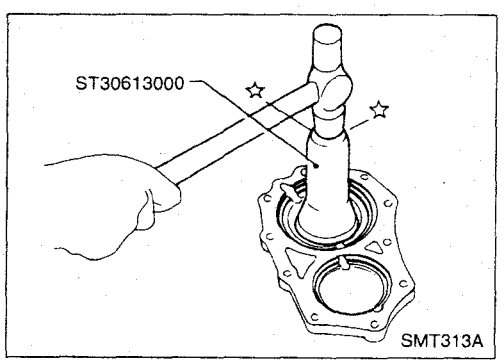


Front Case Cover

COVER OIL SEAL

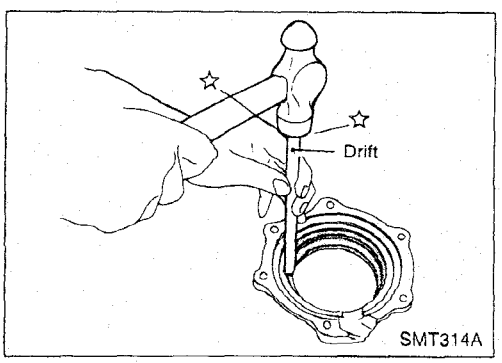
Removal

Remove the oil seal. Be careful not to damage its housing.
Always replace after every disassembly.



Installation

Install a new oil seal, using the Special Tool.



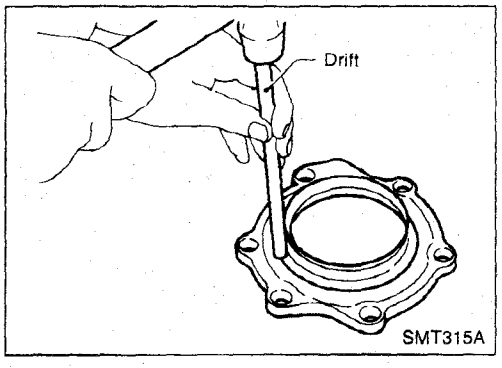
Bearing Retainer

OIL CATCHER

Removal

Remove the oil seal. Be careful not to damage its housing.
Always replace after every disassembly.

Bearing Retainer (Cont'd)



Installation

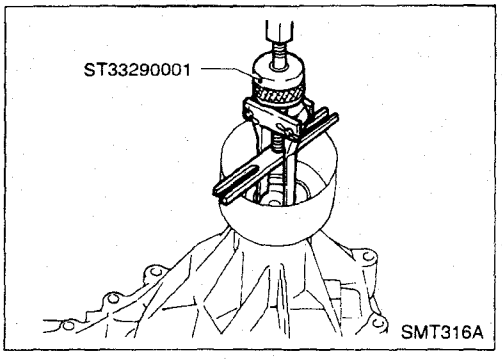
Install a new oil seal, using a suitable tool.

Rear Case

REAR OIL SEAL

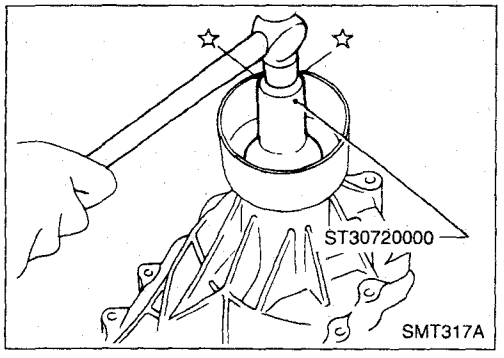
Removal

Remove the oil seal. Be careful not to damage its housing. Always replace after every disassembly.



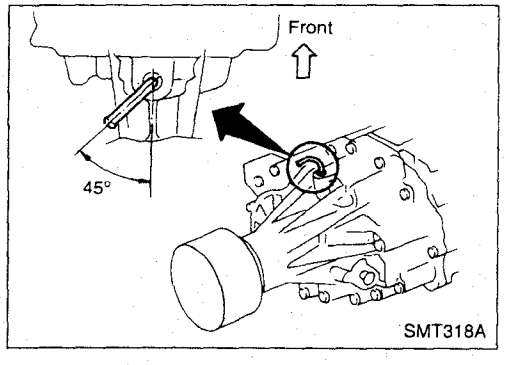
Installation

Install a new oil seal, using the Special Tool.



AIR BREATHER

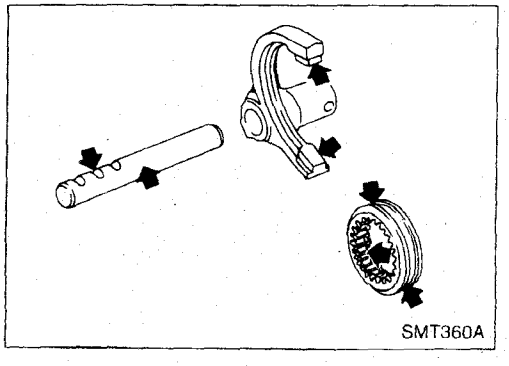
Install as shown in the illustration.



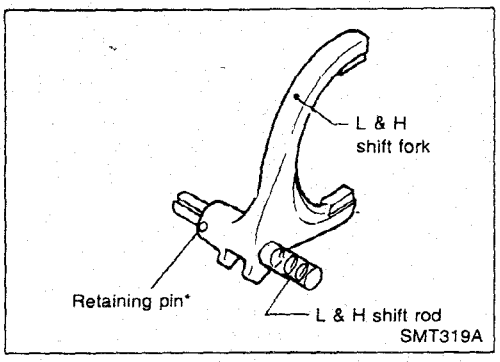
Shift Control Components

INSPECTION

- Check contact surface and sliding surface for wear, scratches, projections or other faulty conditions.



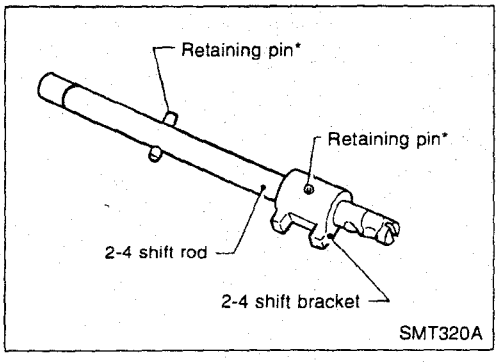
Shift Control Components (Cont'd)



L & H SHIFT ROD & FORK

Assemble as shown in the illustration.

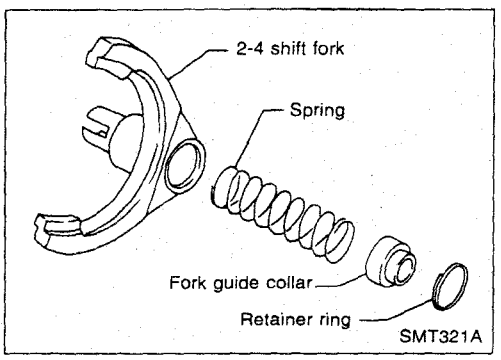
* This pin is the same size as the one for 2-4 shift rod.



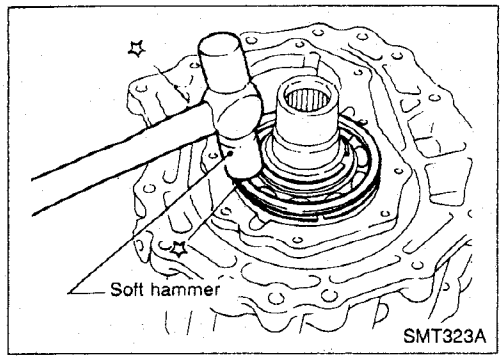
2-4 SHIFT ROD & FORK

Assemble as shown in the illustration.

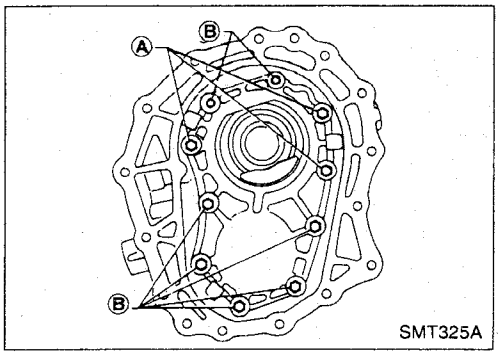
* These pins are the same size.



Pay special attention to the direction of fork guide collar.



1. Assemble front case.
a. Install main gear assembly by tapping lightly.



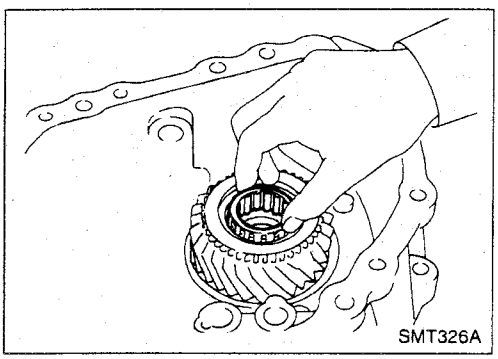
b. Apply sealant to the mating surface and bolts of front case cover and install it on front case.

- **These ten bolts should be coated with sealant.**

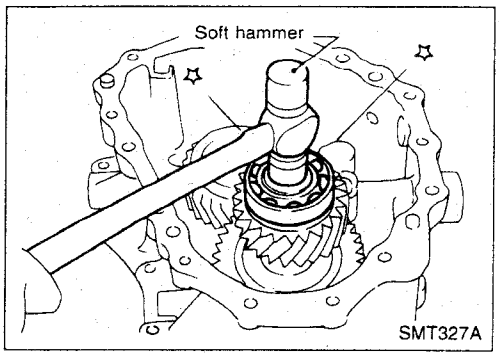
Tightening torque

Ⓐ: 16 - 21 N·m (1.6 - 2.1 kg-m, 12 - 15 ft-lb)

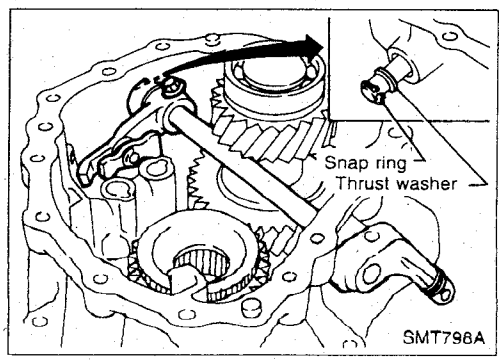
Ⓑ: 19 - 24 N·m (1.9 - 2.4 kg-m, 14 - 17 ft-lb)



c. Apply gear oil to needle bearing and install it into main gear.

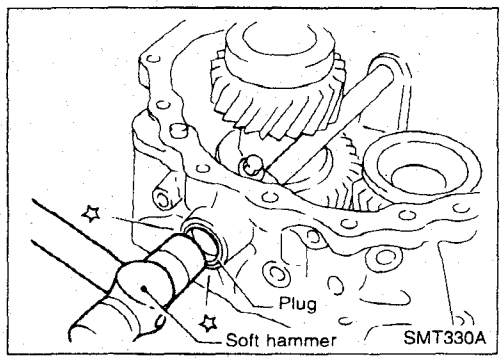


d. Install counter gear assembly by tapping lightly.

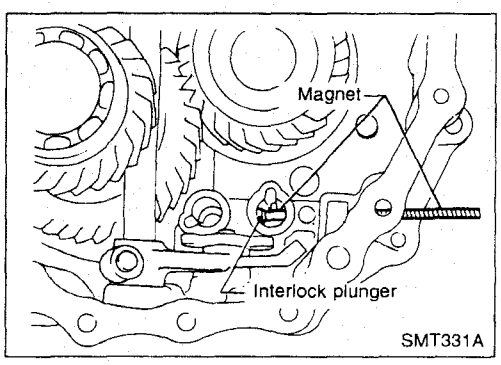


e. Install cross shaft and inner shift lever.

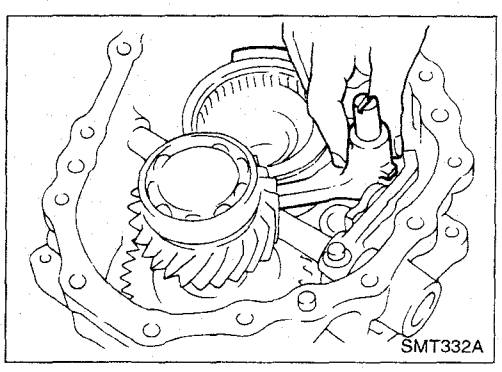
When replacing cross shaft, outer shift lever of lock pin of outer shift lever, replace them as a set.



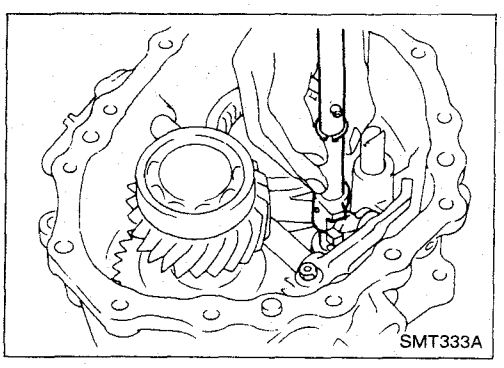
f. Apply sealant to plug and install it into front case.



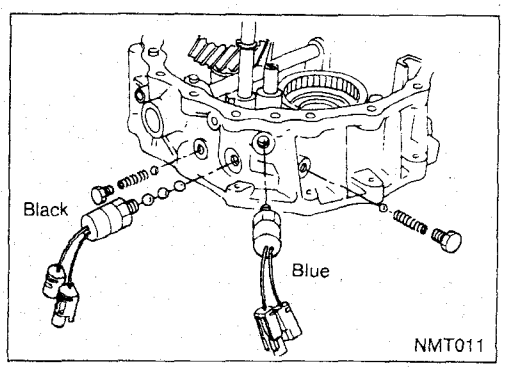
g. Insert interlock plunger into front case.



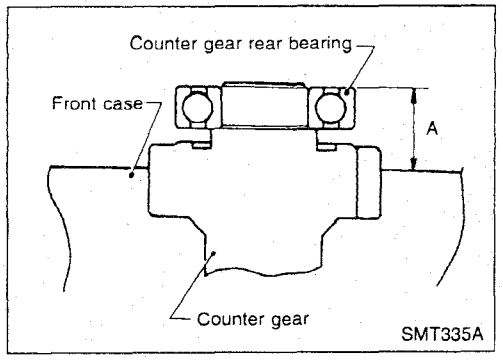
h. Install L & H shift rod and fork assembly with coupling sleeve.



i. Install 2-4 shift rod.



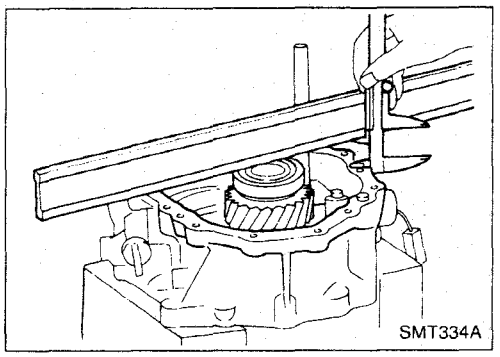
j. Install switches, check balls, check springs and plugs.
Apply sealant to switches and plugs.



2. Select counter gear rear bearing shim.

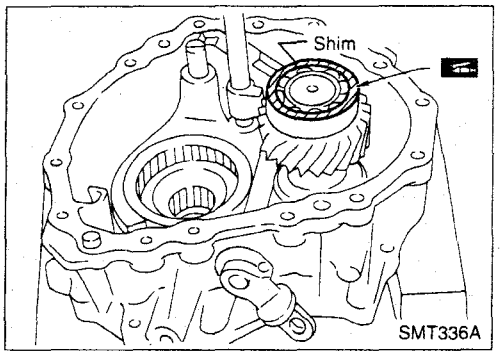
Counter gear end play:
0 - 0.2 mm (0 - 0.008 in)

a. Measure distance "A" between upper surface of counter gear rear bearing and mating surface of front case.

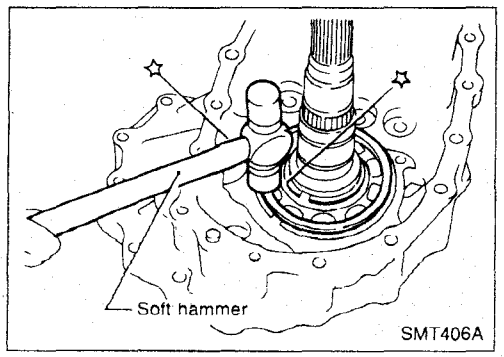


b. Select suitable shim using chart below.

Distance "A" mm (in)	Suitable shim	
	Thickness mm (in)	Part number
32.65 - 32.55 (1.2854 - 1.2815)	Not necessary	
32.55 - 32.45 (1.2815 - 1.2776)	0.1 (0.004)	33112-C6900
32.45 - 32.35 (1.2776 - 1.2736)	0.2 (0.008)	33112-C6901
32.35 - 32.25 (1.2736 - 1.2697)	0.3 (0.012)	33112-C6902
32.25 - 32.15 (1.2697 - 1.2657)	0.4 (0.016)	33112-C6903
32.15 - 32.05 (1.2657 - 1.2618)	0.5 (0.020)	33112-33G00
32.05 - 31.95 (1.2618 - 1.2579)	0.6 (0.024)	33112-33G01

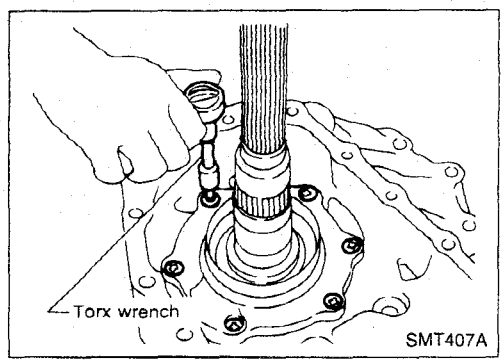


3. Place suitable shim on counter gear rear bearing with grease.
4. Apply gear oil to each part in front case.

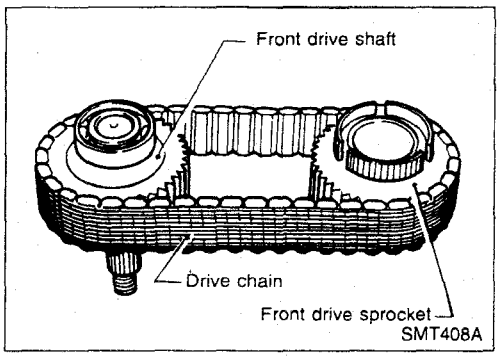


5. Assemble center case assembly.
a. Install mainshaft on center case by tapping lightly.

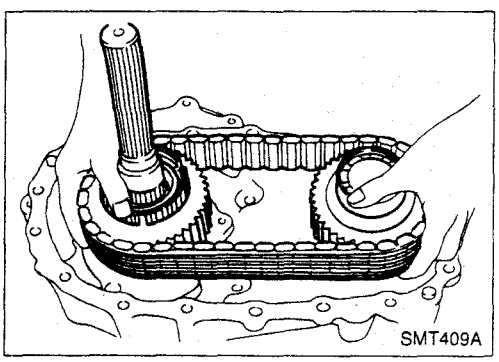
Apply gear oil to mainshaft front bearing.

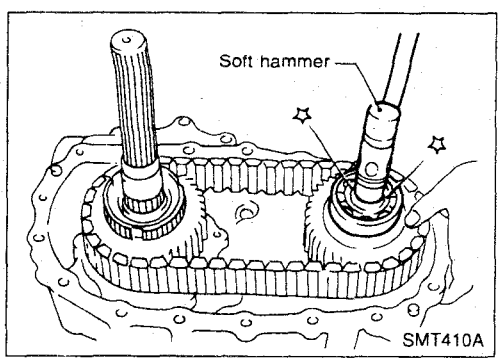


b. Install bearing retainer.

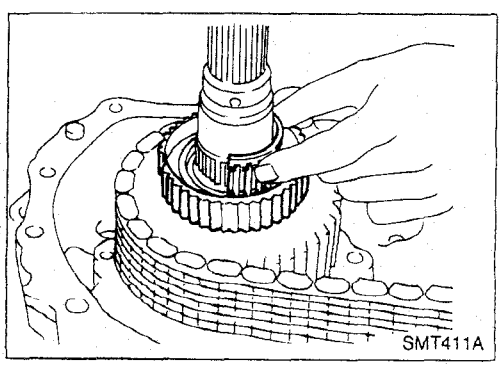


c. Put drive chain onto the front drive sprocket and front drive shaft, and then put them in center case.



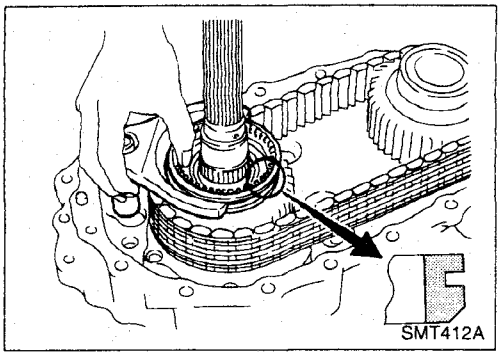


d. Install front drive shaft by tapping lightly.

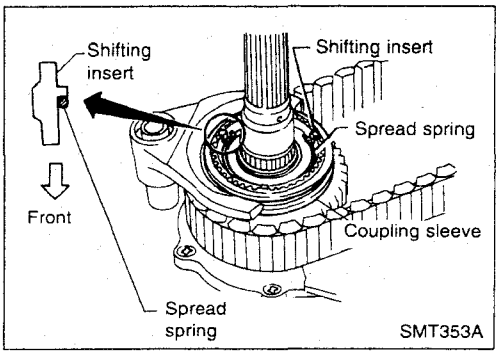


e. Apply gear oil to needle bearings and install them into front drive sprocket.

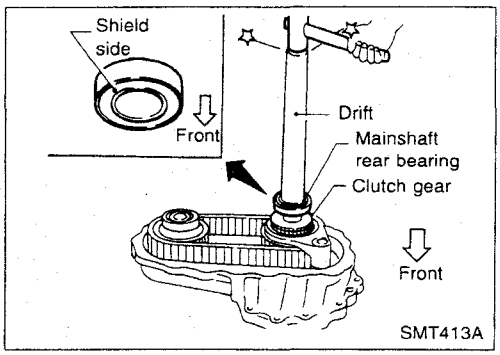
These needle bearings will be installed more easily if front drive sprocket is rotated while installing them.



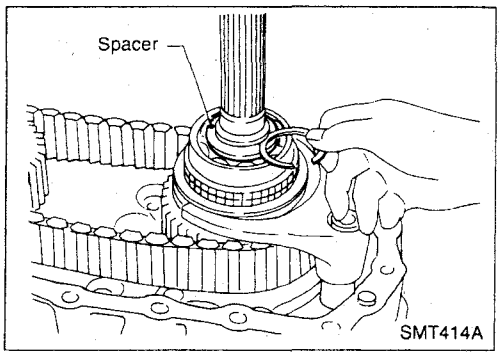
f. Install 2-4 coupling sleeve with 2-4 shift fork.
Pay special attention to direction of coupling sleeve.



g. Install shifting inserts and spread spring.
Pay special attention to direction of shifting inserts.



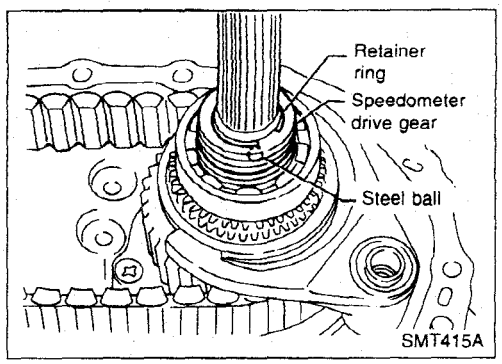
h. Install baulk ring and then install clutch gear and mainshaft rear bearing.
Place wooden block under mainshaft in order to protect mainshaft front bearing.



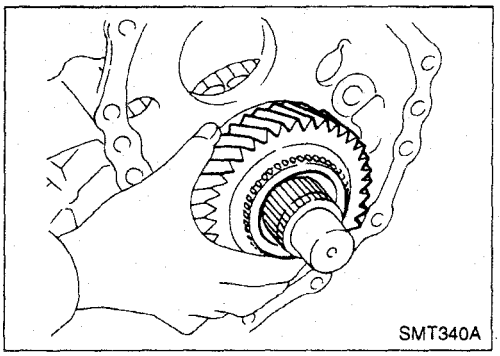
i. Install spacer.
j. Select snap ring with proper thickness and install it.
Allowable clearance between snap ring and groove:
0 - 0.15 mm (0 - 0.0059 in)

Available snap ring

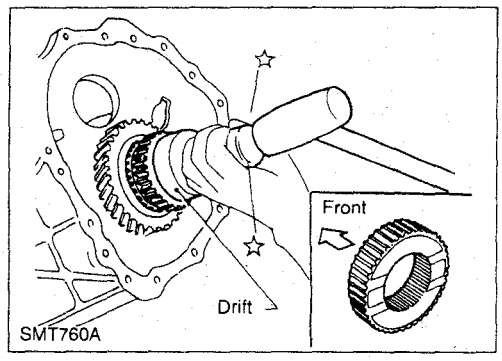
Thickness mm (in)	Part number
1.8 (0.071)	33138-33G20
1.9 (0.075)	33138-33G21
2.0 (0.079)	33138-33G22
2.1 (0.083)	33138-33G23
2.2 (0.087)	33138-33G24



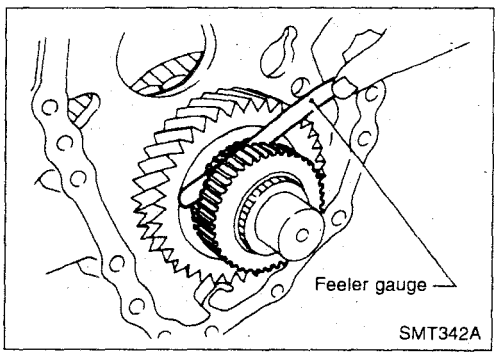
k. Install steel ball, speedometer drive gear and retainer ring.
Steel ball is the smallest of check balls for this unit.



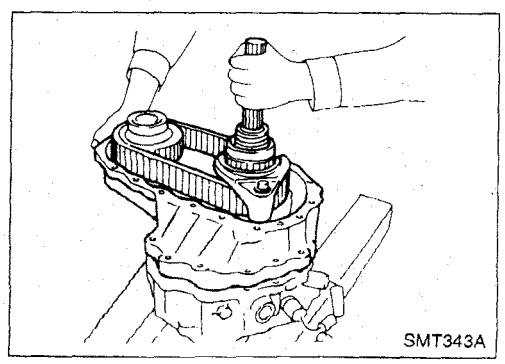
l. Install low gear and its bearing to mainshaft.
Apply gear oil to needle bearing.



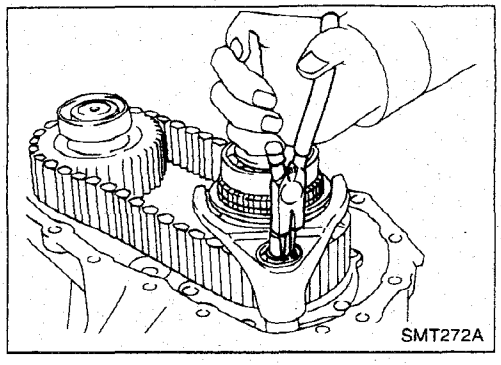
m. Install L & H hub and snap ring to mainshaft.
Pay special attention to direction of L & H hub.



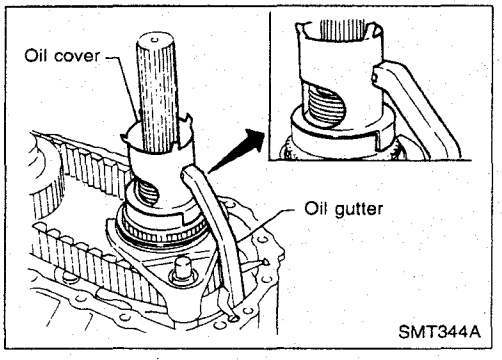
n. Measure end play of low gear.
Standard:
0.2 - 0.35 mm (0.0079 - 0.0138 in)



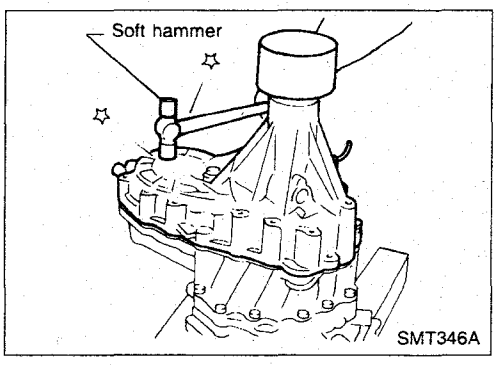
6. Apply sealant to mating surface and put center case assembly onto front case and tighten bolts.



7. Install snap ring to 2-4 shift rod.



8. Install oil gutter and oil cover.
9. Apply gear oil to each part in center case.



10. Apply sealant to mating surface and install rear case on center case.

General Specifications

Transfer model			TX10A
Gear ratio	High		1.000
	Low		2.020
Number of teeth	Main gear		29
	Low gear		37
	Counter gear	High	38
		Low	24
	Front drive sprocket		41
	Front drive shaft		41
Oil capacity		ℓ (Imp qt)	2.3 (2)

Inspection and Adjustment

GEAR END PLAY

Unit: mm (in)

Front drive sprocket	0.2 - 0.35 (0.0079 - 0.0138)
Low gear	0.2 - 0.35 (0.0079 - 0.0138)
Counter gear	0 - 0.2 (0 - 0.008)

CLEARANCE BETWEEN BAULK RING AND CLUTCH GEAR

Unit: mm (in)

Standard	Wear limit
1.0 - 1.5 (0.039 - 0.059)	0.5 (0.020)

AVAILABLE SNAP RING

Mainshaft front bearing

Allowable clearance	0 - 0.15 mm (0 - 0.0059 in)
Thickness mm (in)	Part number
3.1 (0.122)	33138-33G10
3.2 (0.126)	33138-33G11
3.3 (0.130)	33138-33G12
3.4 (0.134)	33138-33G13

Mainshaft rear bearing

Allowable clearance	0 - 0.15 mm (0 - 0.0059 in)
Thickness mm (in)	Part number
1.8 (0.071)	33138-33G20
1.9 (0.075)	33138-33G21
2.0 (0.079)	33138-33G22
2.1 (0.083)	33138-33G23
2.2 (0.087)	33138-33G24

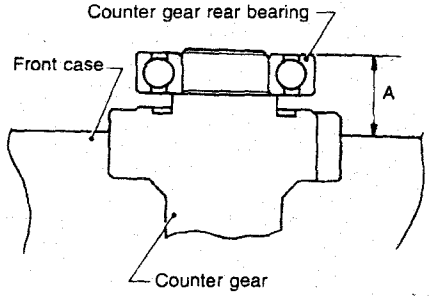
Main gear bearing

Allowable clearance	0 - 0.15 mm (0.0059 in)
Thickness mm (in)	Part number
2.6 (0.102)	33114-33G00
2.7 (0.106)	33114-33G01
2.8 (0.110)	33114-33G02
2.9 (0.114)	33114-33G03

AVAILABLE SHIM

Counter gear rear bearing

Distance "A" mm (in)	Shim(s)	
	Thickness mm (in)	Part number
32.65 - 32.55 (1.2854 - 1.2815)	Not necessary	
32.55 - 32.45 (1.2815 - 1.2776)	0.1 (0.004)	33112-C6900
32.45 - 32.35 (1.2776 - 1.2736)	0.2 (0.008)	33112-C6901
32.35 - 32.25 (1.2736 - 1.2697)	0.3 (0.012)	33112-C6902
32.25 - 32.15 (1.2697 - 1.2657)	0.4 (0.016)	33112-C6903
32.15 - 32.05 (1.2657 - 1.2618)	0.5 (0.020)	33112-33G00
32.05 - 31.95 (1.2618 - 1.2579)	0.6 (0.024)	33112-33G01



SMT335A

PROPELLER SHAFT & DIFFERENTIAL CARRIER

SECTION PD

PROPELLER SHAFT & DIFFERENTIAL CARRIER

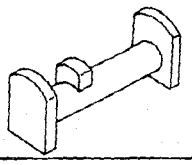
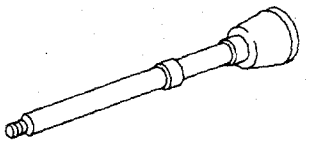
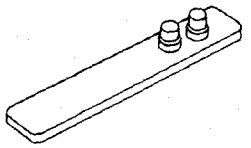
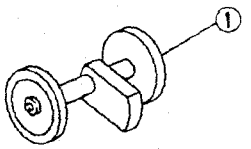
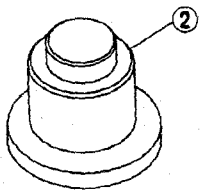
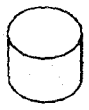
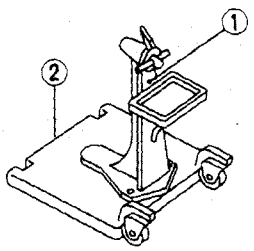
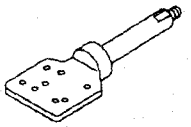
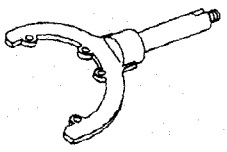
SECTION PD

CONTENTS

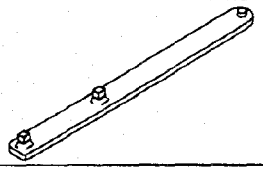
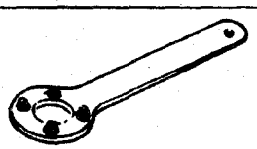
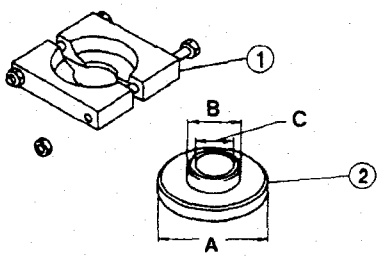
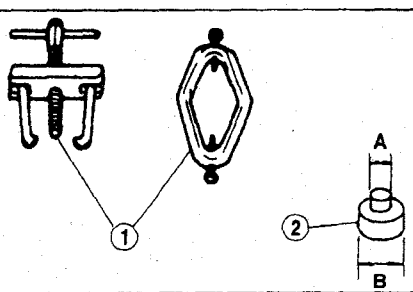
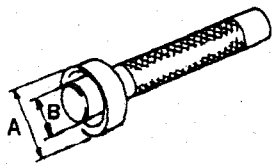
PD

SPECIAL SERVICE TOOLS

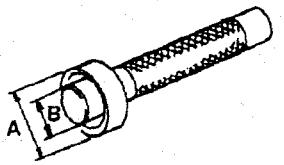
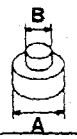
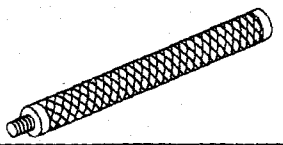
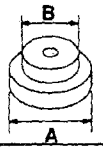
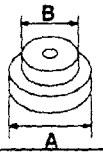
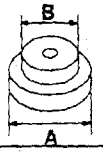
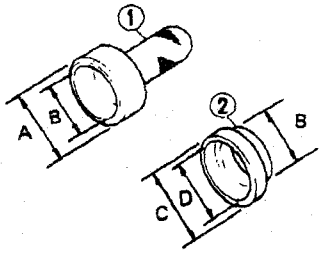
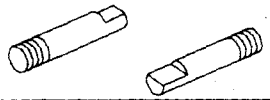
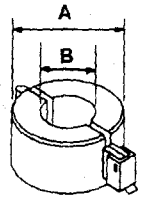
*: Special tool or commercial equivalent

Tool number Tool name	Description	Unit application	
		R180A	H233B
ST31211000 Height gauge	 Selecting pinion height adjusting washer	X	—
ST31212000 Dummy shaft	 Selecting pinion height adjusting washer	X	—
ST31852000 Stopper	 Selecting pinion height adjusting washer	X	—
ST3125S000 Drive pinion height setting gauge set ① ST31251000 Drive pinion height gauge ② ST31181001 Dummy shaft	 Selecting pinion height adjusting washer 	—	X
ST32501000 Weight block	 Selecting side bearing adjusting shim	X	—
KV38101900 Master gauge [20.0 mm (0.787 in)]	 Selecting side bearing adjusting shim	X	—
ST0501S000 Engine stand ① ST05011000 Engine stand ② ST05012000 Base	 Mounting differential attachment	X	X
KV38100800 Differential attachment	 Mounting final drive	X	—
ST06340000 Differential attachment	 Mounting final drive	—	X

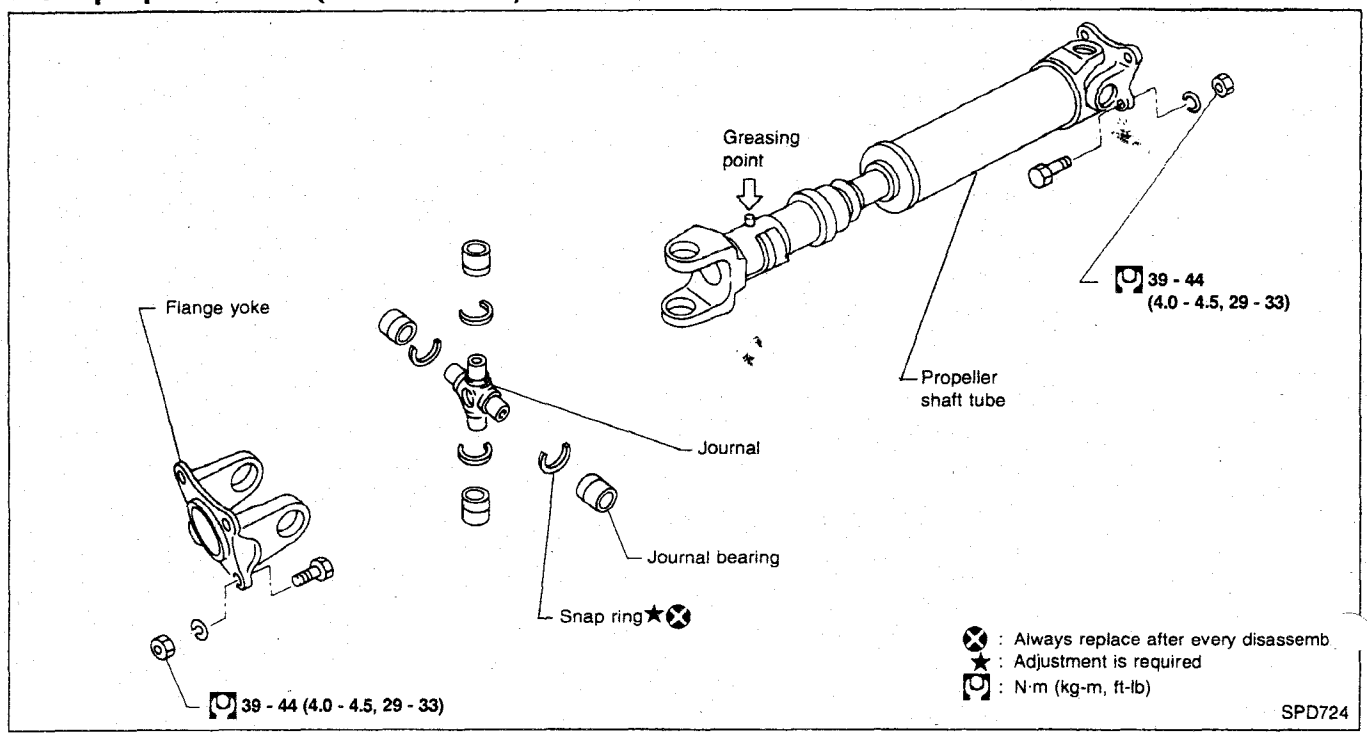
*: Special tool or commercial equivalent

Tool number Tool name	Description		Unit application	
			R180A	H233B
ST32580000 Diff. side bearing adjusting nut wrench		Adjusting side bearing preload and backlash (ring geardrive pinion)	—	X
KV381052S0 Rear axle shaft dummy ① KV38105210 Torque wrench side ② KV38105220 Vice side		Checking differential torque on limited slip differential	—	X
ST33290001* Side bearing outer race puller		Removing side bearing outer race and side oil seal	X	—
ST38060002* Drive pinion flange wrench		Removing and installing propeller shaft lock nut, and drive pinion lock nut	X	—
KV38104700* Drive pinion flange wrench		Removing and installing propeller shaft lock nut, and drive pinion lock nut	—	X
ST3090S000* Drive pinion rear inner race puller set ① ST30031000 Puller ② ST30901000* Base		Removing and installing drive pinion rear inner cone **A: 79 mm (3.11 in) dia.** **B: 45 mm (1.77 in) dia.** **C: 35 mm (1.38 in) dia.**	X	X
ST3306S001 Diff. side bearing puller set ① ST33051001* Body ② ST33061000* Adapter		Removing and installing differential side bearing inner cone **A: 28.5 mm (1.122 in) dia.** **B: 38 mm (1.50 in) dia.**	X	X
ST33230000* Diff. side bearing drift		Installing side bearing inner cone **A: 51 mm (2.01 in) dia.** **B: 28.5 mm (1.122 in) dia.**	X	—

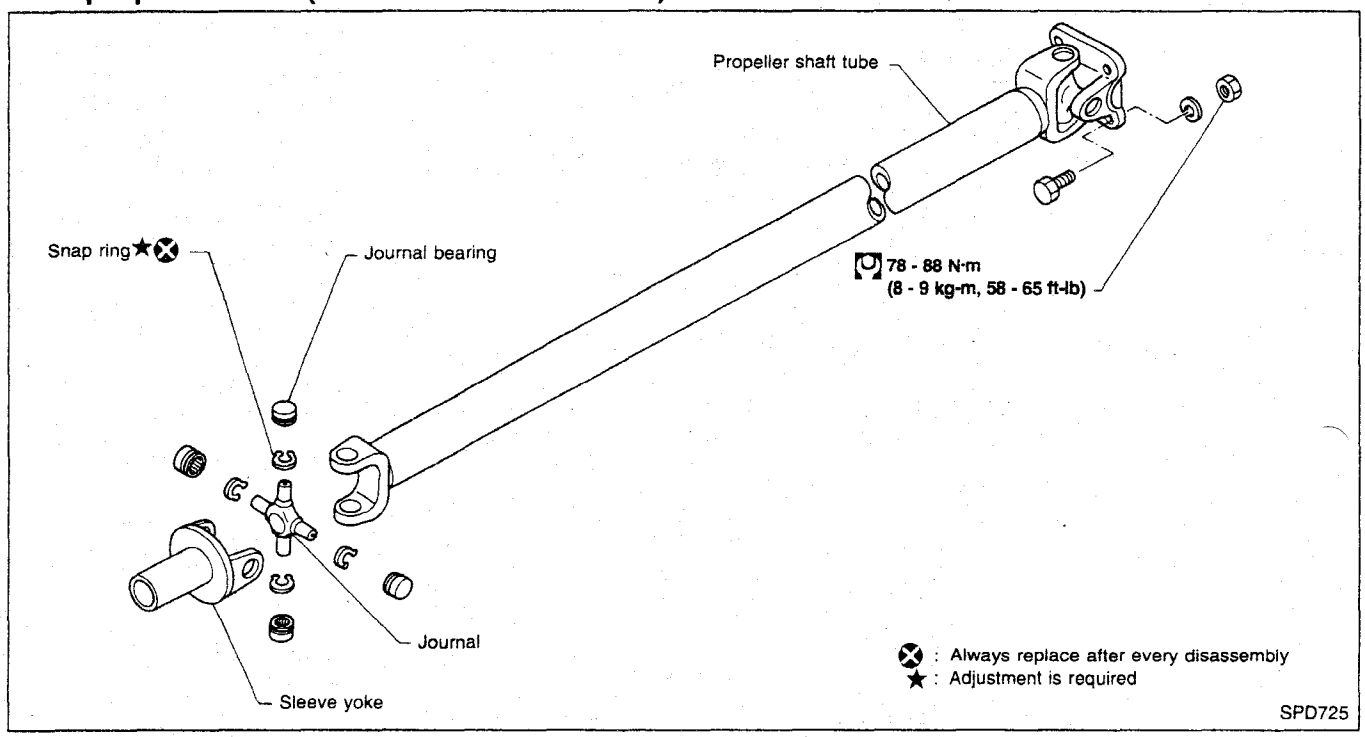
*: Special tool or commercial equivalent

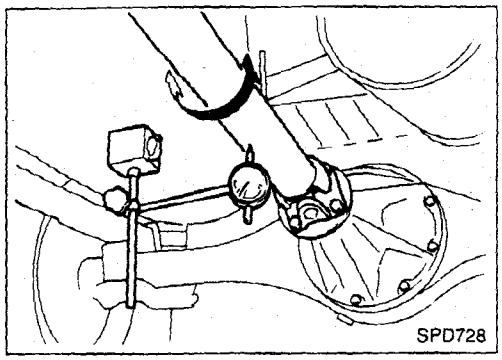
Tool number Tool name	Description		Unit application	
			R180A	H233B
ST33190000* Diff. side bearing drift		Installing side bearing inner cone **A: 52 mm (2.05 in) dia.** **B. 34 mm (1.34 in) dia.**	—	X
ST33081000* Side bearing puller adapter		Installing side bearing inner cone **A: 43 mm (1.69 in) dia.** **B: 33.5 mm (1.319 in) dia.**	—	X
ST30611000* Drift		Installing pinion rear bearing outer race	X	X
ST30621000* Drift		Installing pinion rear bearing outer race **A: 79 mm (3.11 in) dia.** **B: 59 mm (2.32 in) dia.**	X	X
ST30701000* Drift		Installing pinion front bearing outer race **A: 61.5 mm (2.421 in) dia.** **B: 41 mm (1.61 in) dia.**	X	—
ST30613000* Drift		Installing pinion front bearing outer race **A: 71.5 mm (2.815 in) dia.** **B: 47.5 mm (1.870 in) dia.**	—	X
KV381025S0* Oil seal fitting tool ① ST30720000 Drift bar ② KV38102510 Drift		Installing front oil seal **A: 77 mm (3.03 in) dia.** **B: 55 mm (2.17 in) dia.** **C: 71 mm (2.80 in) dia.** **D: 65 mm (2.56 in) dia.**	X	X
ST33720000 Diff. side retainer guide		Installing side retainer	X	—
ST33270000 Side oil seal drift		Installing side oil seal **A: 62 mm (2.44 in) dia.** **B: 28 mm (1.10 in) dia.**	X	—

Front propeller shaft (Model 2F71H)



Rear propeller shaft (Models 2S71H & 2S80B)



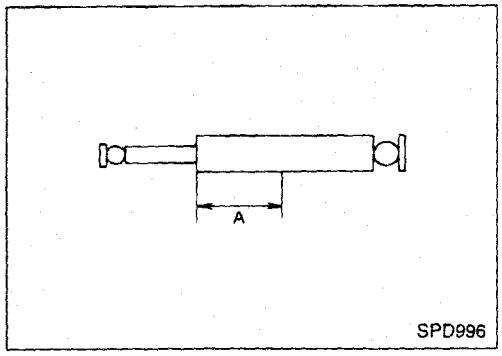

SPD728

On-Vehicle Service

PROPELLER SHAFT VIBRATION

If vibration is present at high speed, inspect propeller shaft runout first.

1. Raise rear wheels.
2. Measure propeller shaft runout at points indicated below by rotating final drive companion flange by hand.

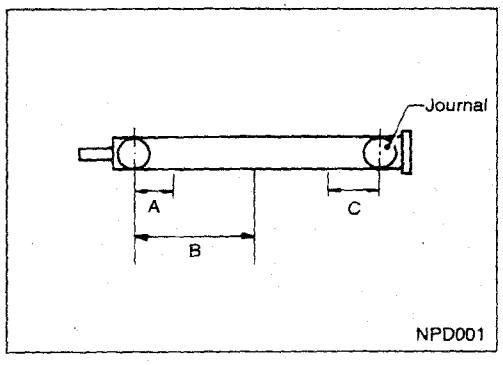


SPD996

Front propeller shaft

Unit: mm (in)

Propeller shaft model	2F71H
Measuring point A	126 (4.96)

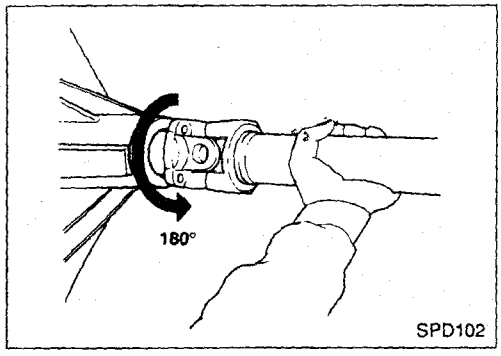


NPD001

Rear propeller shaft

Unit: mm (in)

Propeller shaft model	2S71H	2S80B
	H233B	
Measuring point		
A	300	280 (11.02)
B	473	475 (18.70)
C	300	280 (11.02)

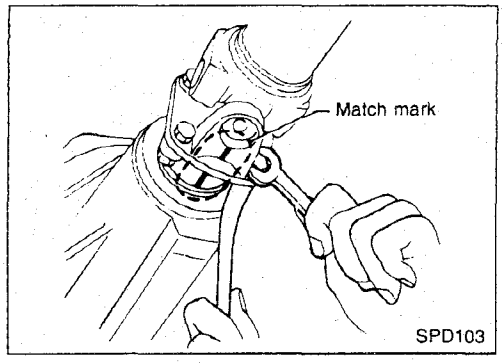


SPD102

3. If runout exceeds specifications, disconnect propeller shaft at final drive companion flange; then rotate companion flange 180 degrees and reconnect propeller shaft.
   Runout limit: 0.6 mm (0.024 in)
4. Check runout again. If runout still exceeds specifications, replace propeller shaft assembly.
5. Perform road test.

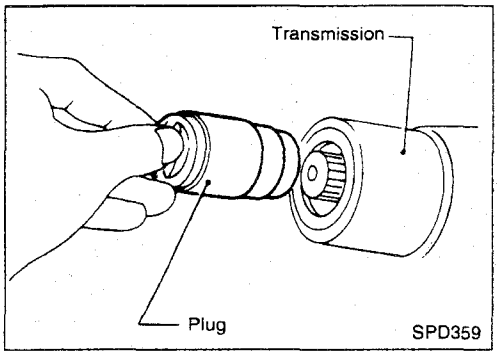
APPEARANCE CHECKING

- Inspect propeller shaft tube surface for dents or cracks. If damaged, replace shaft assembly.
- If center is noisy or damaged, replace center bearing.

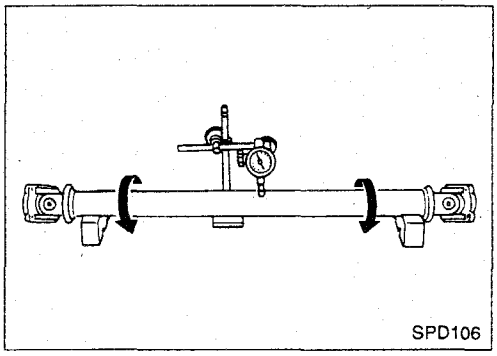


Removal and Installation

- Put match marks on flanges and separate propeller shaft from final drive.



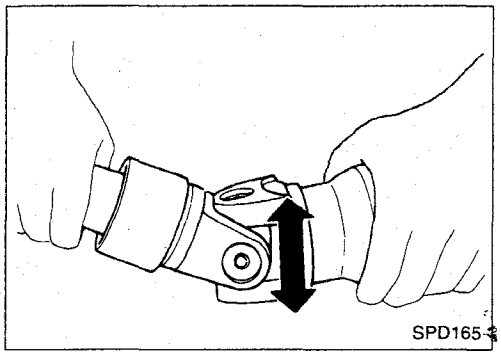
- Draw out propeller shaft from transmission and plug up rear end of transmission rear extension housing.



Inspection

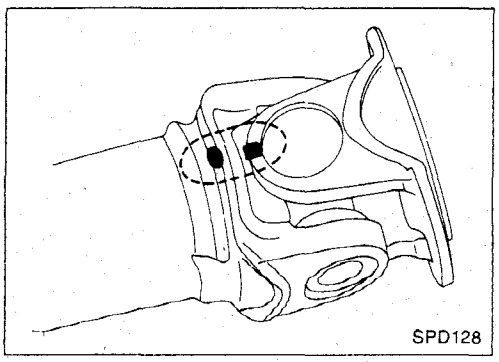
- Inspect propeller shaft runout. If runout exceeds specifications, replace propeller shaft assembly.

  Runout limit:
  0.6 mm (0.024 in)



- Inspect journal axial play. If the play exceeds specifications, replace propeller shaft assembly.

  Journal axial play:
  0.2 mm (0.008 in) or less

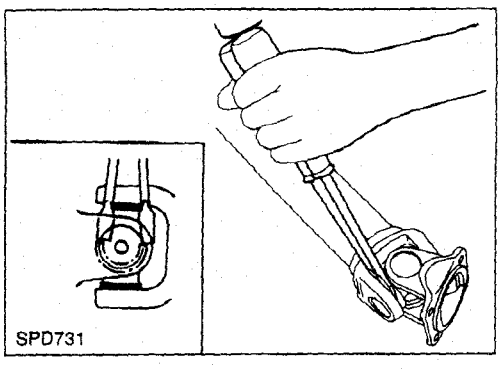


Disassembly

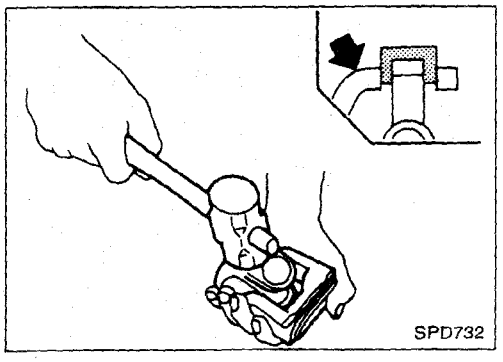
JOURNAL

1. Put match marks on shaft and flange or yoke.

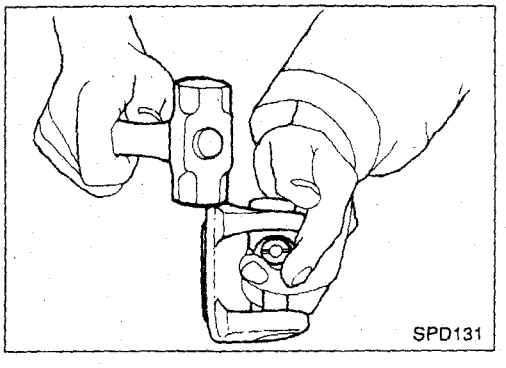
Disassembly (Cont'd)


SPD731

2. Remove snap ring.

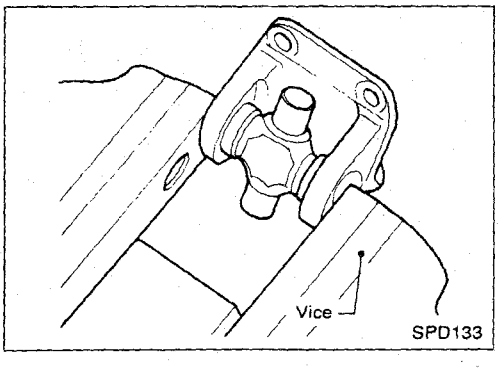

SPD732

3. Remove pushed out journal bearing by lightly tapping yoke with a hammer, taking care not to damage journal and yoke hole.


SPD131

4. Remove bearing at opposite side in above operation.

Put marks on disassembled parts so that they can be reinstalled in their original positions from which they were removed.



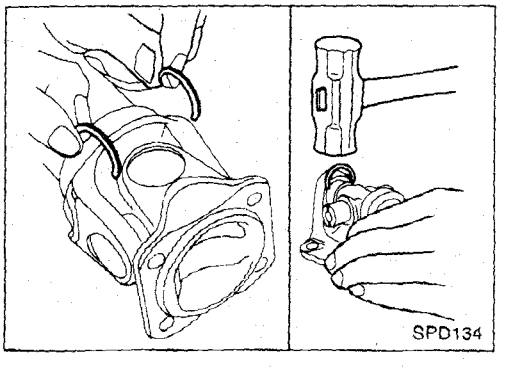
SPD133

Assembly

JOURNAL

1. Assemble journal bearing. Apply recommended multi-purpose grease on bearing inner surface.

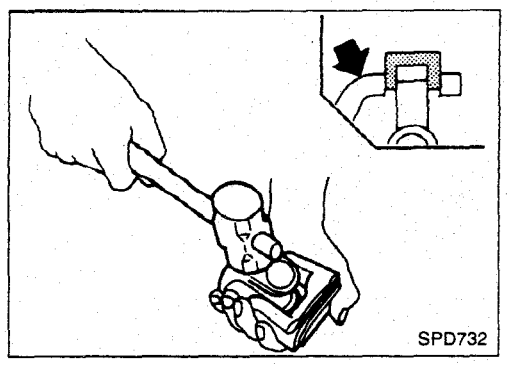
When assembling, be careful that needle bearing does not fall down.


SPD134

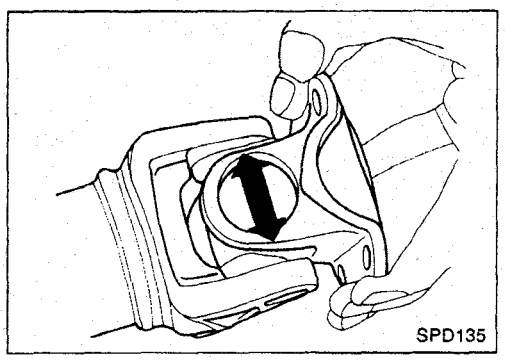
2. Select snap rings that will provide specified play in axial direction of journal, and install them (Refer to S.D.S.).

Select snap rings with a difference in thickness at both sides within 0.06 mm (0.0024 in).

Assembly (Cont'd)

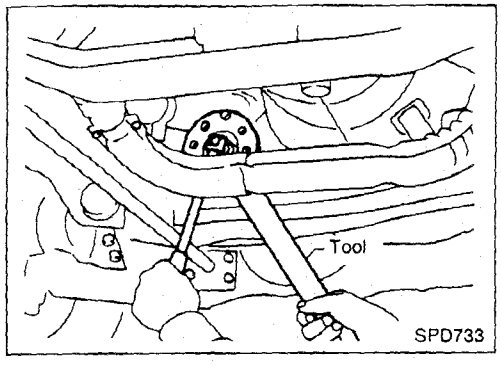


3. Adjust thrust clearance between bearing and snap ring to zero by tapping yoke.



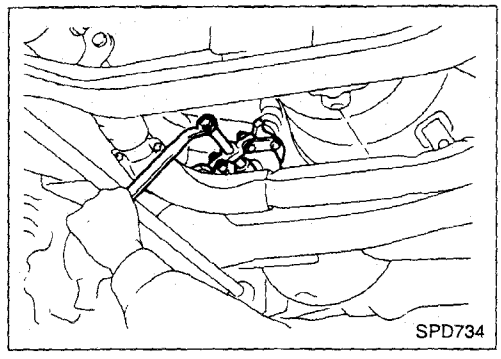
4. Check to see that journal moves smoothly and check for axial play.

   Axial play: Less than 0.02 mm (0.0008 in)

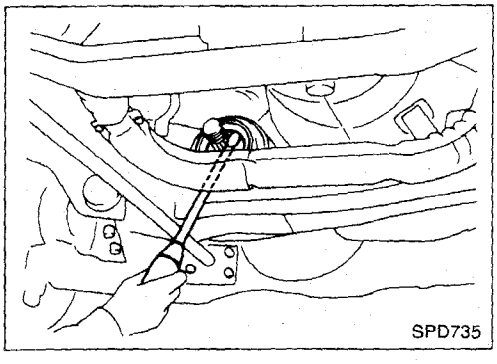


Front Oil Seal Replacement (Front final drive: R180A)

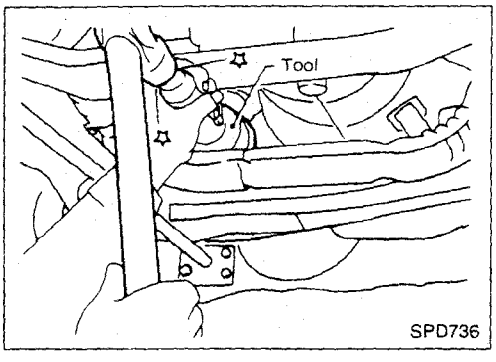
1. Remove front propeller shaft.
2. Loosen drive pinion nut.
   Tool number: ST38060002



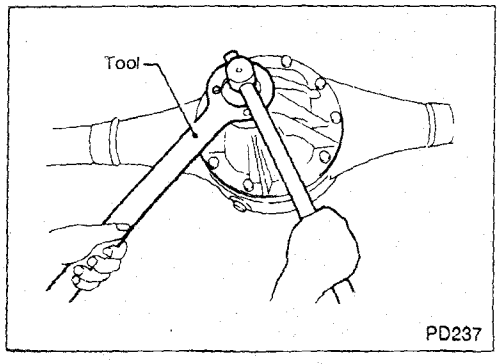
3. Remove companion flange.



4. Remove front oil seal.



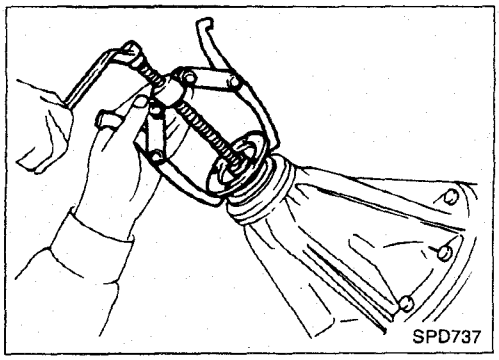
5. Apply multi-purpose grease to cavity at sealing lips of oil seal. Press front oil seal into carrier.
6. Install companion flange and drive pinion nut.
7. Install propeller shaft.
   Tool number: ST30720000



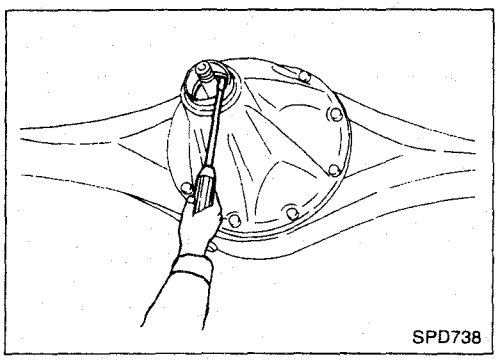
Front Oil Seal Replacement (Rear final drive: H233B)

1. Remove rear propeller shaft.
2. Loosen drive pinion nut.
   Tool number: KV38104700

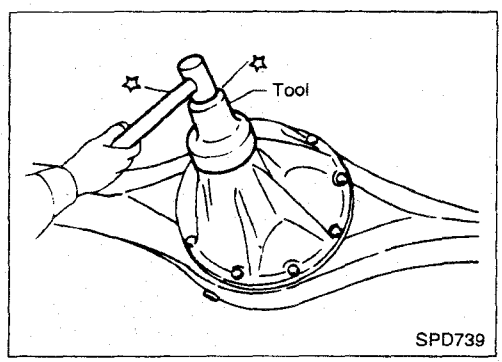
Front Oil Seal Replacement (Cont'd)


SPD737

3. Remove companion flange.


SPD738

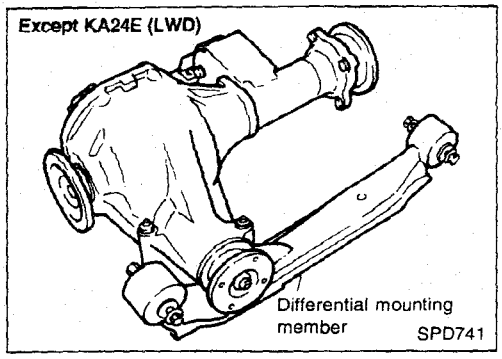
4. Remove front oil seal.

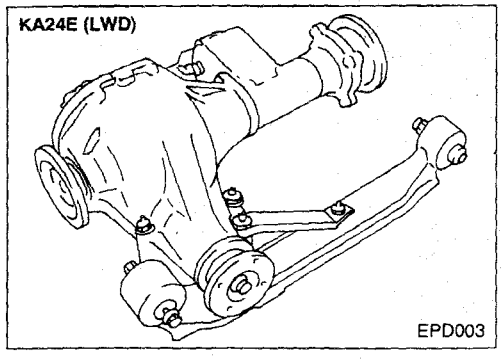


SPD739

5. Apply multi-purpose grease to cavity at sealing lips of oil seal. Press front oil seal into carrier.
6. Install companion flange and drive pinion nut in.
7. Install rear propeller shaft.

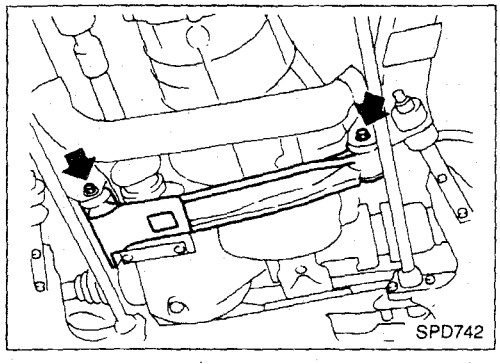
Tool number:
KV381025S0





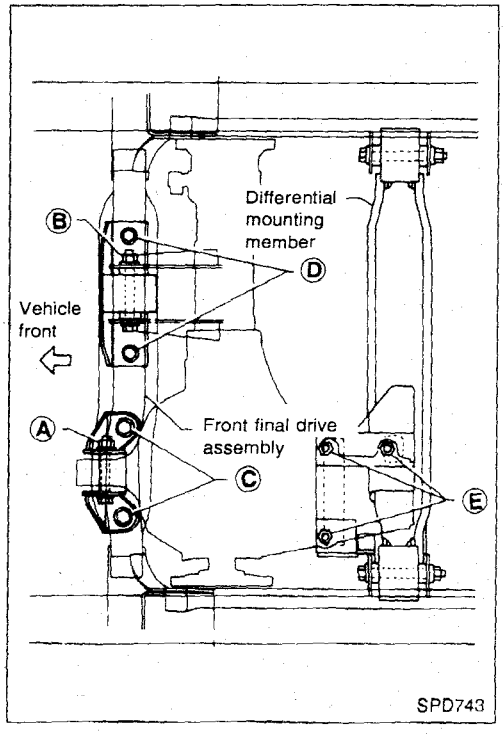
Removal

1. Remove front propeller shaft.
2. Remove drive shaft. Refer to FA section.
3. Remove engine mounting bolts and raise up engine.
4. Remove front final drive together with differential mounting member.



Installation

1. Install front final drive assembly together with differential mounting member.



2. Tighten the front final drive securing bolts and nuts following the procedures below to prevent drive train vibration.
(1) Temporarily tighten nut Ⓐ.
(2) Temporarily tighten nut Ⓑ.
(3) Tighten bolts Ⓒ to the torque of 68 to 87 N·m (6.9 to 8.9 kg-m, 50 to 64 ft-lb).
(4) Tighten bolts Ⓓ to the torque of 68 to 87 N·m (6.9 to 8.9 kg-m, 50 to 64 ft-lb).
(5) Tighten nut Ⓐ to the torque of 68 to 87 N·m (6.9 to 8.9 kg-m, 50 to 64 ft-lb).
(6) Tighten nut Ⓑ to the torque of 68 to 87 N·m (6.9 to 8.9 kg-m, 50 to 64 ft-lb).
(7) Tighten nuts Ⓔ to the torque of 68 to 87 N·m (6.9 to 8.9 kg-m, 50 to 64 ft-lb).

3. Install drive shaft. Refer to FA section.
4. Install front propeller shaft.

Removal

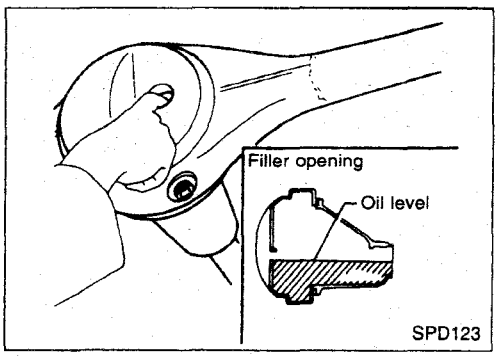
- Remove propeller shaft.

Insert plug into transfer or transmission after removing propeller shaft.

- Remove axle shaft. Refer to RA section.

CAUTION:

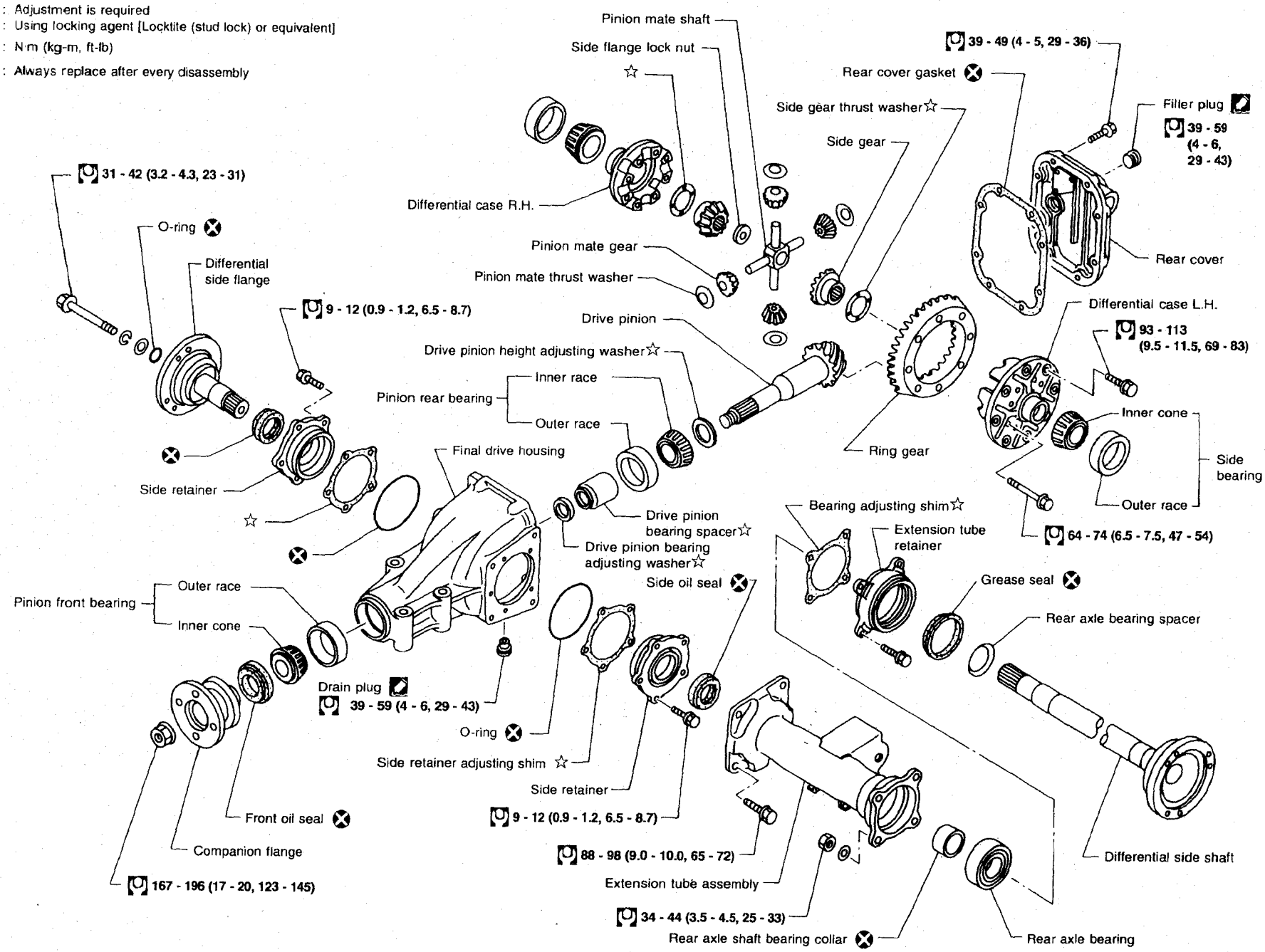
- **Be careful not to damage spline, sleeve yoke and front oil seal when removing propeller shaft.**



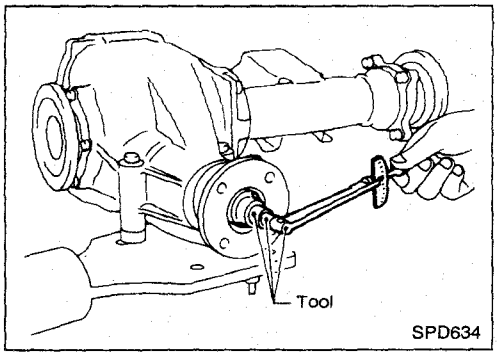
Installation

- Fill final drive with recommended gear oil.

☆ : Adjustment is required
* : Using locking agent [Locktite (stud lock) or equivalent]
: N·m (kg-m, ft-lb)
: Always replace after every disassembly



NPD002



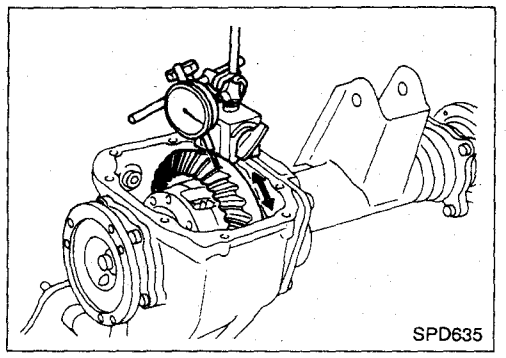
Pre-inspection

Before disassembling final drive, perform the following inspection.

- Total preload
- Remove the extension tube and the side flange. This measurement must be performed with the extension tube and the differential flange removed.

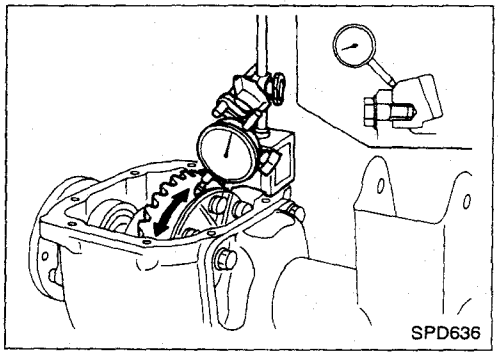
1) Turn drive pinion in both directions several times to set bearing rollers.
2) Check total preload with Tool.

Tool number:
ST3127S000
Total preload:
1.2 - 2.3 N·m (12 - 23 kg-cm, 8.7 - 20.0 in-lb)



- Ring gear to drive pinion backlash
  Check backlash of ring gear with a dial indicator at several points.

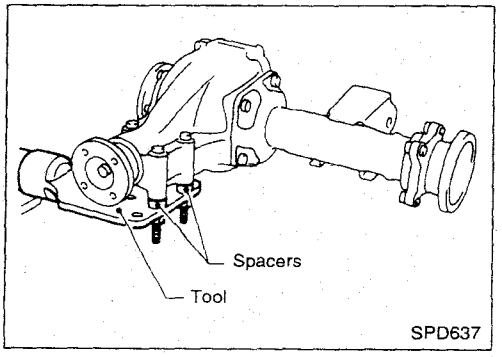
Ring gear-to-drive pinion backlash:
0.13 - 0.18 mm (0.0051 - 0.0071 in)



- Ring gear runout
  Check runout of ring gear with a dial indicator.

Runout limit:
0.05 mm (0.0020 in)

- Tooth contact
  Check tooth contact (Refer to Adjustment).

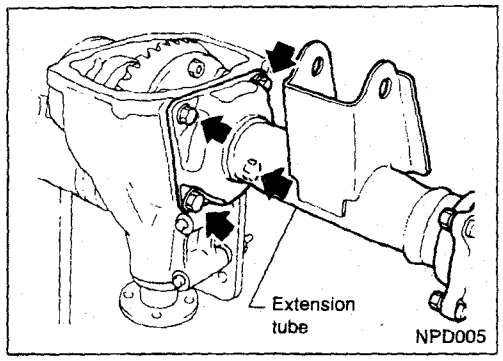


Final Drive Housing

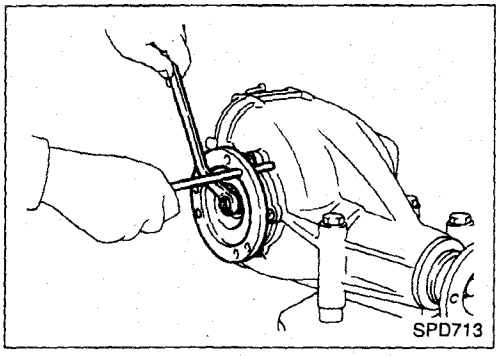
1. Using three spacers [20 mm (0.79 in)], mount final drive assembly on Tool.

Tool number:
KV38100800

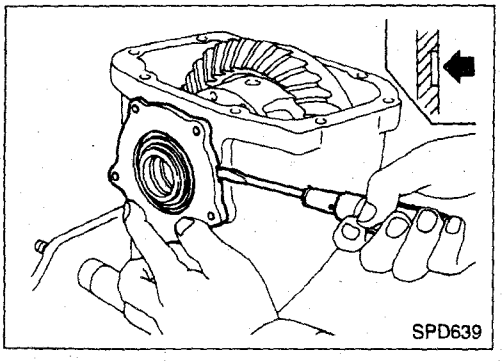
Final Drive Housing (Cont'd)



2. Remove extension tube and differential side shaft assembly.

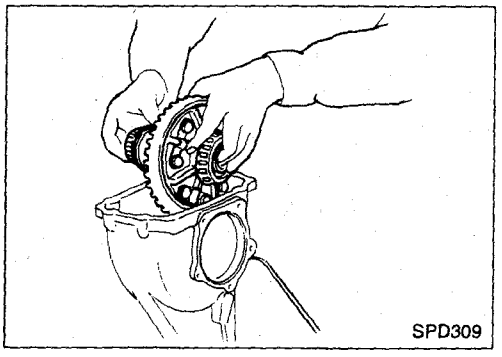


3. Remove differential side flange.

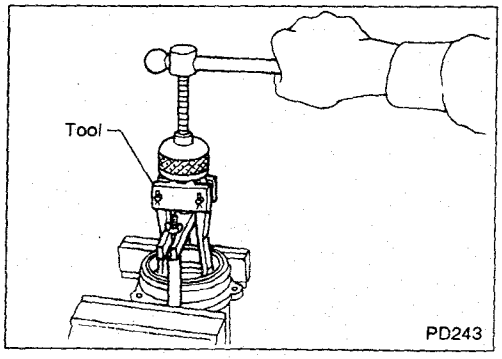


4. Mark side retainers for identification. Remove side retainers.

Be careful not to confuse right and left side retainers and shims.



5. Extract differential case from final drive housing.



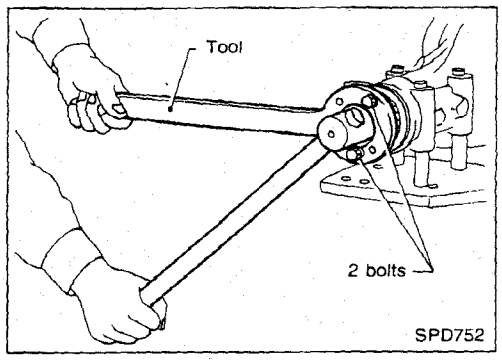
6. Remove side outer races.

Tool number:
ST33290001

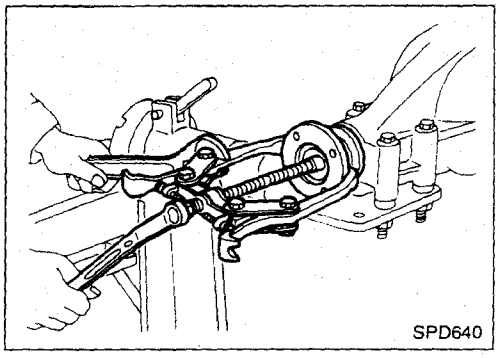
Be careful to keep the side bearing outer races together with their respective inner cones — do not mix them up.

7. Remove side oil seal.

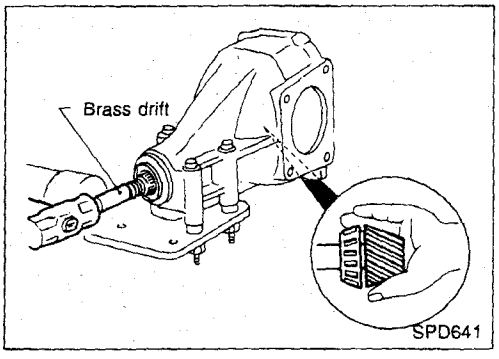
Final Drive Housing (Cont'd)



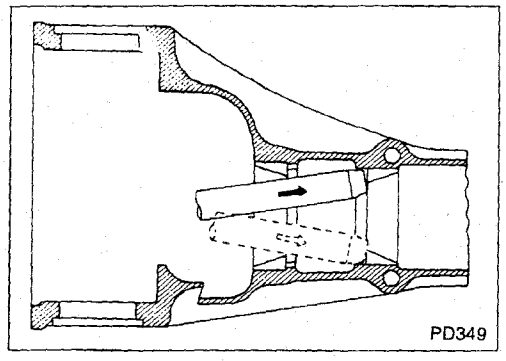
8. Loosen drive pinion nut.
   Tool number:
   ST38060002



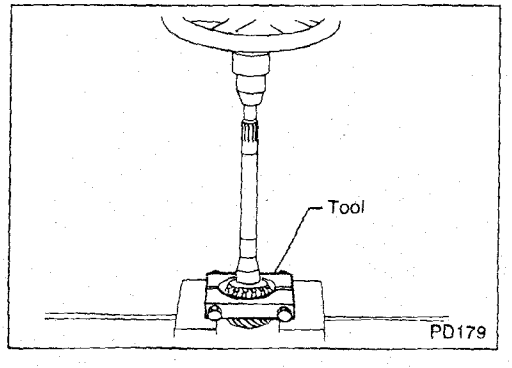
9. Remove companion flange with puller.



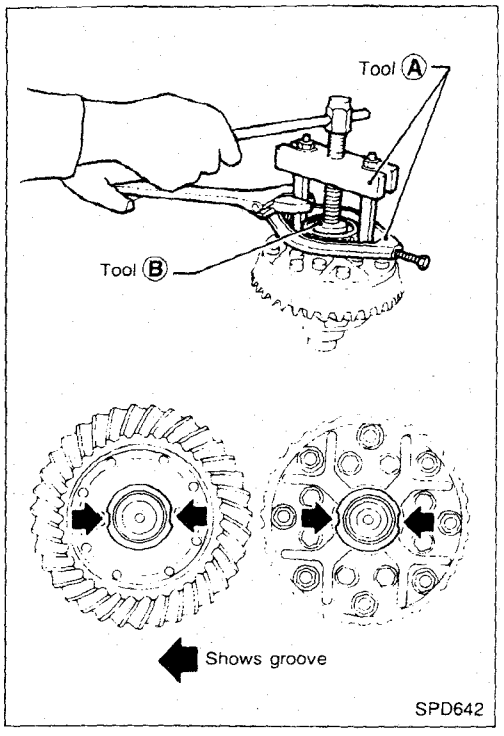
10. Take out drive pinion together with pinion rear bearing inner cone, drive pinion bearing spacer and pinion bearing adjusting washer.
11. Remove front oil seal and pinion front bearing inner cone.



12. Remove pinion front and rear bearing outer races with brass drift.



13. Remove pinion rear bearing inner cone and drive pinion adjusting washer.
    Assembly:
    ST30905000
    Tool number:
    ST30031000

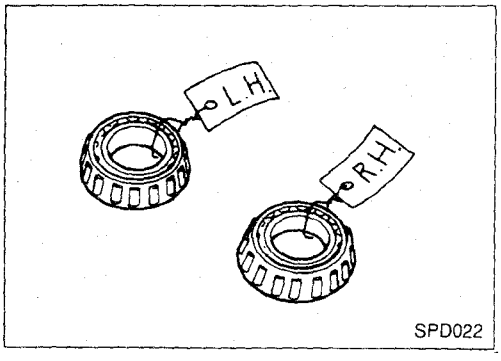


Differential Case

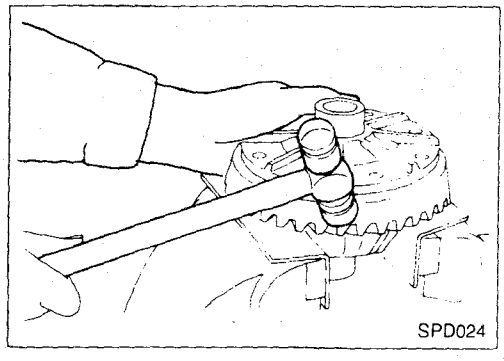
1. Remove side bearing inner cones.

To prevent damage to bearing, engage puller jaws in grooves.

Assembly:
ST33065001
Tool number:
Ⓐ ST33051001
Ⓑ ST33061000

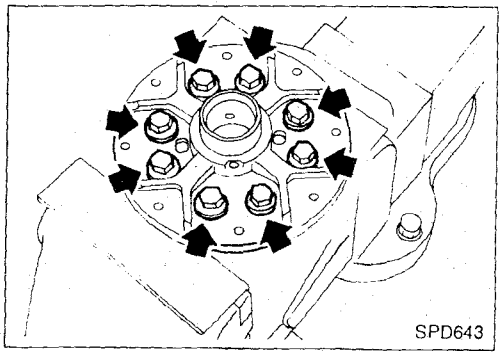


Be careful not to confuse the right and left hand parts.



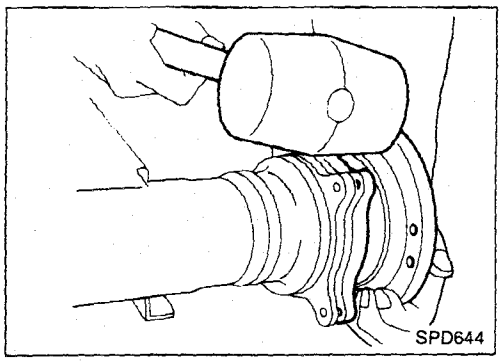
2. Loosen ring gear bolts in a criss-cross fashion.
3. Tap ring gear off differential case with a soft hammer.

Tap evenly all around to keep ring gear from binding.



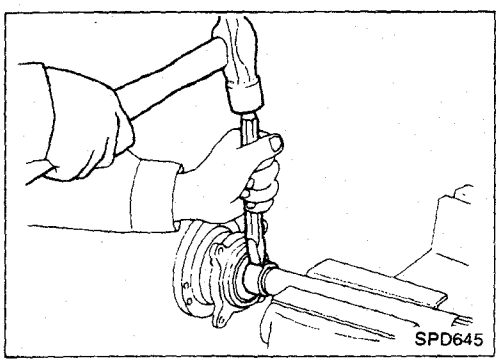
4. Separate L.H. and R.H. differential cases.

Put match marks on both L.H. and R.H. differential cases.

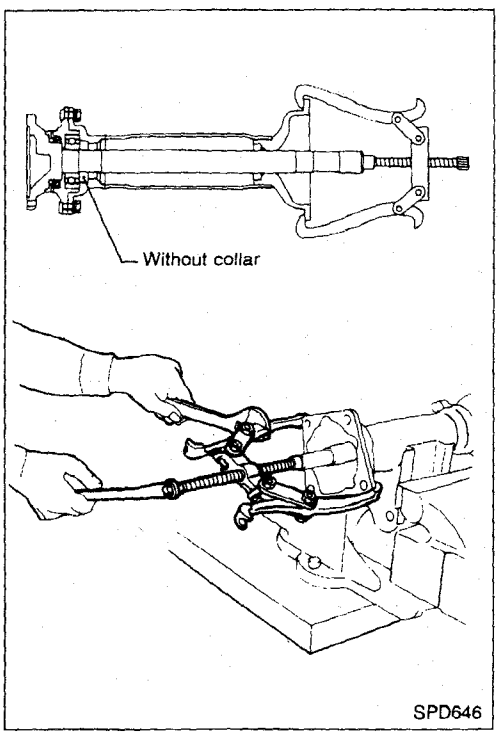


Extension Tube and Differential Side Shaft

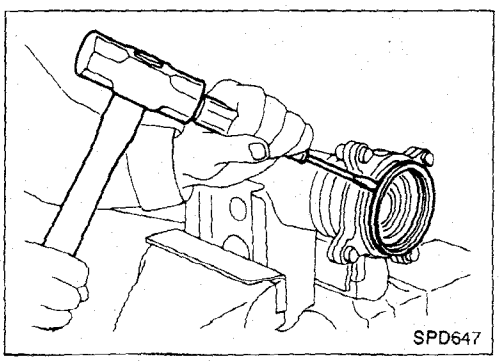
1. Remove differential side shaft assembly from extension tube.



2. Cut rear axle bearing collar with cold chisel. Be careful not to damage differential side shaft.



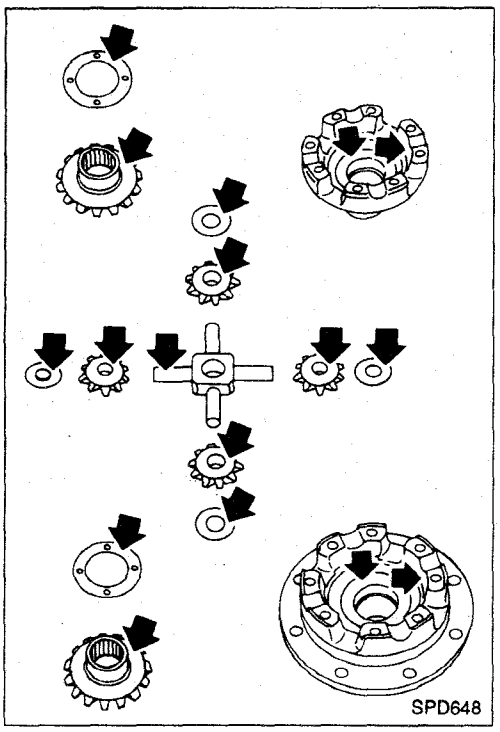
3. Install differential side shaft into extension tube and secure with bolts. Remove extension tube retainer from differential side shaft.



4. Remove grease seal.

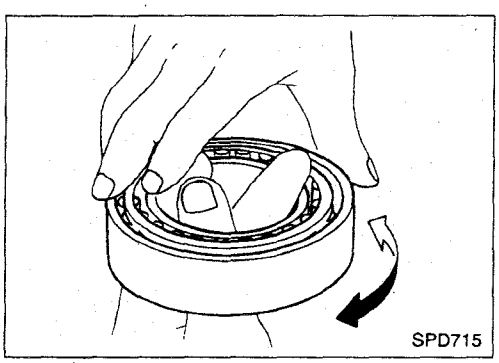
Ring Gear and Drive Pinion

Check gear teeth for scoring, cracking or chipping.
If any damaged part is evident, replace ring gear and drive pinion as a set (hypoid gear set).


SPD648

Differential Case Assembly

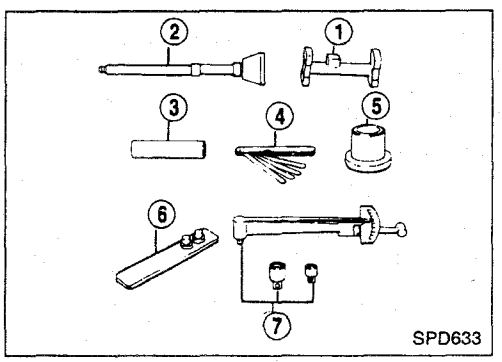
Check mating surfaces of differential case, side gears, pinion mate gears, pinion mate shaft and thrust washers.


SPD715

Bearing

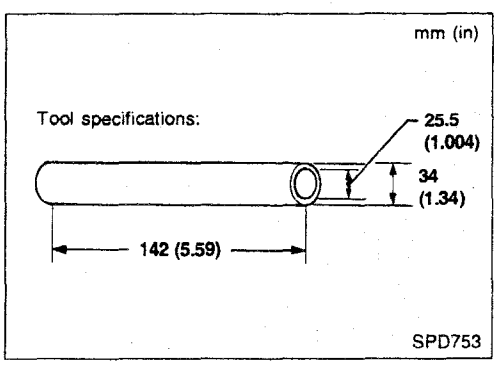
1. Thoroughly clean bearing.
2. Check bearings for wear, scratches, pitting or flaking.
   Check tapered roller bearing for smooth rotation. If damaged, replace outer race and inner cone as a set.

To avoid confusion while calculating bearing shims, it is absolutely necessary to stay with the metric system. If you measure anything in inches, the results MUST be converted to the metric system.



Drive Pinion Height

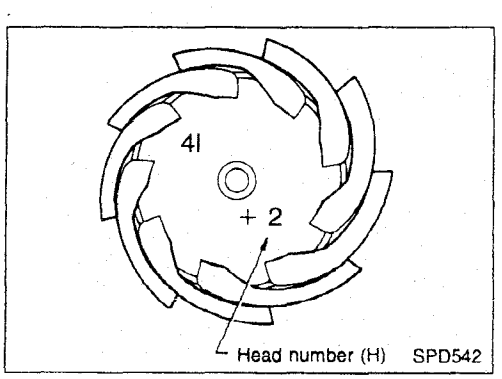
1. First prepare Tools for pinion height adjustment.
   ① Height gauge (ST31211000)
   ② Dummy shaft (ST31212000)
   ③ Collar
   ④ Feeler gauge
   ⑤ Dummy shaft spacer (ST31851000)
   ⑥ Stopper (ST31852000)
   ⑦ Preload gauge (ST3127S000)



- Use a collar which has the specifications shown at left.

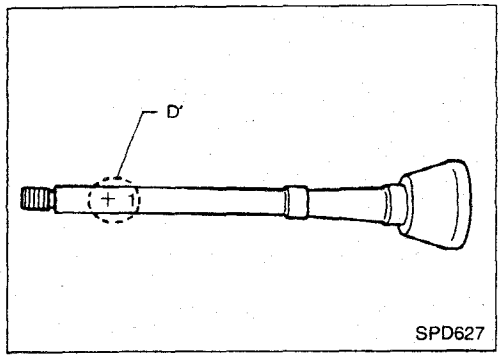
2. To simplify the job, make a chart, like the one below, to organize your calculations.

LETTERS	HUNDREDTHS OF A MILLIMETER
H: Head number	
D': Figure marked on dummy shaft	
S: Figure marked on height gauge	
N: Measuring clearance	

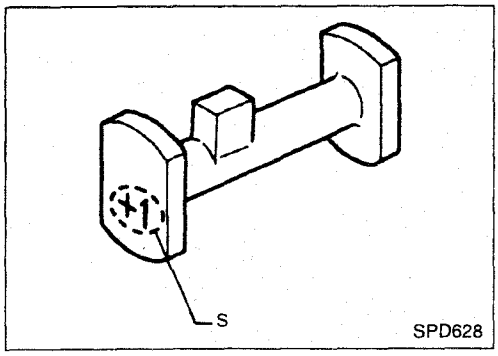


3. Write the following numbers down in the chart.
   H: Head number

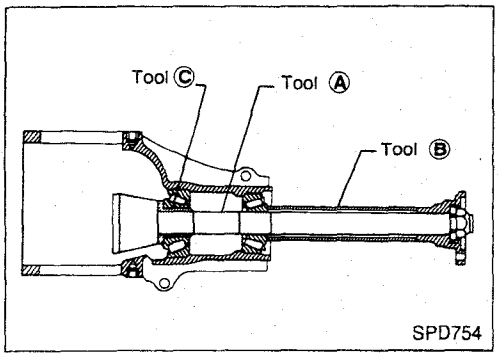
Drive Pinion Height (Cont'd)



D': Figure marked on dummy shaft.



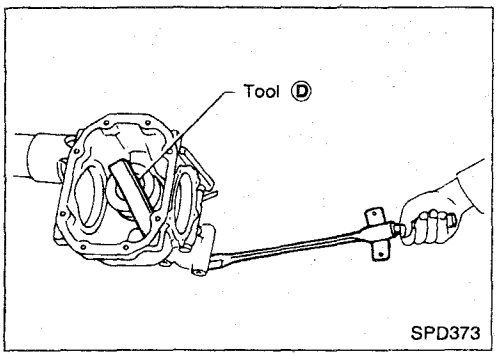
S: Figure marked on height gauge.
W: Thickness of drive pinion height adjusting washer which is 3.09 mm (0.1217 in).

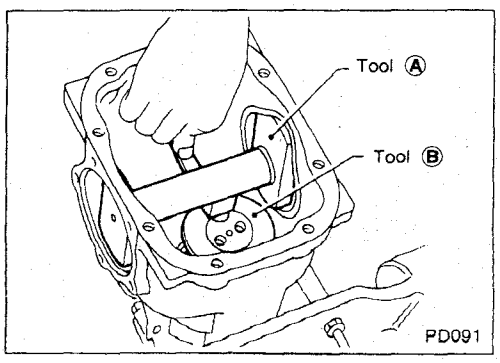


4. Set Tool (dummy shaft) as shown at left and tighten drive pinion nut carefully to correct preload of 1.0 to 1.3 N·m (10 to 13 kg-cm, 8.7 to 11.3 in-lb).

Tool number:

Ⓐ Dummy shaft (ST31212000)
Ⓑ Collar
Ⓒ Dummy shaft spacer (ST31851000)
Ⓓ Stopper (ST31852000)





5. Attach Tool (height gauge) to gear carrier, and measure the clearance between the height gauge and the dummy shaft face.

Tool number

Ⓐ Height gauge (ST31211000)
Ⓑ Dummy shaft (ST31212000)

Drive Pinion Height (Cont'd)

6. Substitute these values into the equation to calculate the thickness of the washer.

If values signifying H, D′ and S are not given, regard them as zero and calculate.

T (Thickness of washer)
= W + N – [(H – D′ – S) x 0.01] – 0.20

Example:

W = 3.09
N = 0.33
H = +2
D′ = –1
S = 0

T = W + N – [(H – D′ – S) x 0.01] – 0.20

(1)	H	2
	–D′	–(–1)
		+3
(2)	–S	– 0
		+3
(3)		+3
		x0.01
		+0.03
(4)	W	3.09
	+N	+0.33
		3.42
(5)		–[+0.03]
		3.39
(6)		–0.20
		3.19

7. Select the proper washer (Refer to S.D.S.)

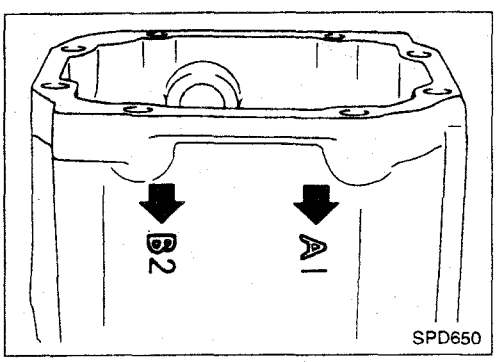
If you cannot find the desired thickness of washer, use washer with thickness closest to the calculated value.

Example:
Calculated value ... T = 3.19 mm
Used washer ... T = 3.18 mm

Side Bearing Preload

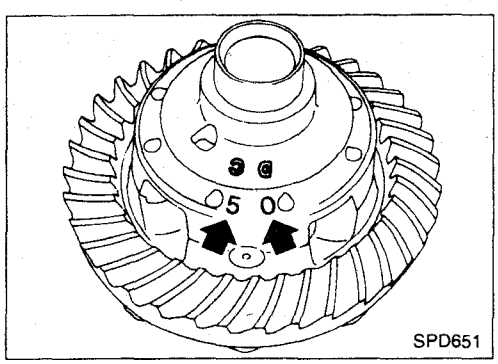
1. To simplify the job, make a chart like the one below to organize your calculations.

LETTERS	HUNDREDTHS OF A MILLIMETER
A – Left housing	
B – Right housing	
C – Differential case	
D – Differential case	
E – Left side bearing	
F – Right side bearing	
G_1 – Left side retainer	
G_2 – Right side retainer	



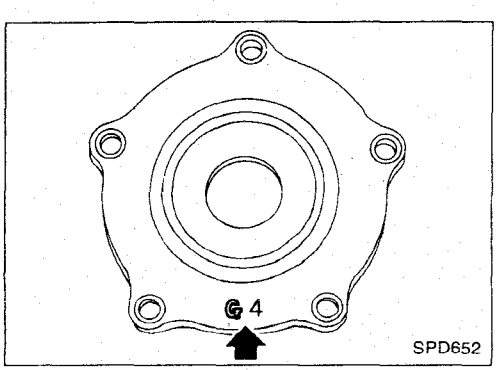
SPD650

2. Write the following numbers down in the chart.
A & B: Figures marked on final drive housing.



SPD651

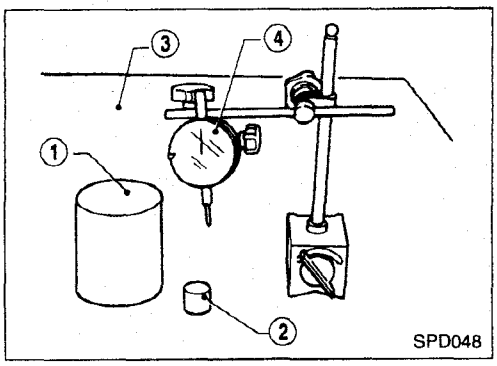
C & D: Figures marked on differential case.



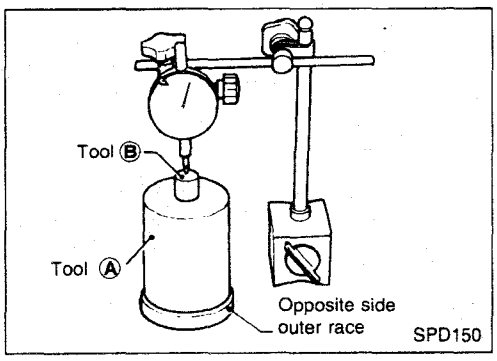
SPD652

G_1 & G_2: Figures marked on side retainer.

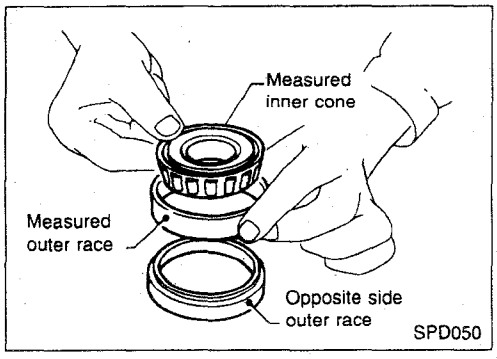
Side Bearing Preload (Cont'd)



3. Measure how far under the standard thickness [20 mm (0.79 in)] the side bearings are.
   It will require tools shown below.
   ① Weight Block (ST32501000)
   ② Master Gauge (KV38101900)
   ③ Base Plate
   ④ Dial Indicator

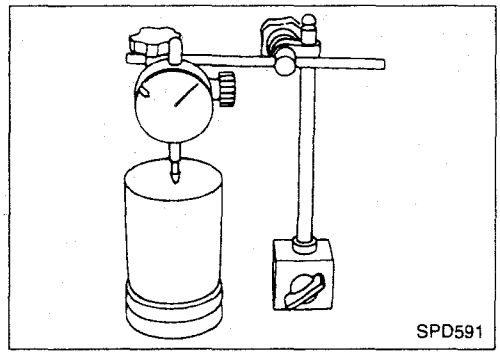


4. Place the outer race of the opposite side bearing to the measured.
5. Place a weight block on the outer race, and a master gauge on the block.
   Tool number:
   Ⓐ ST32501000
   Ⓑ KV38101900

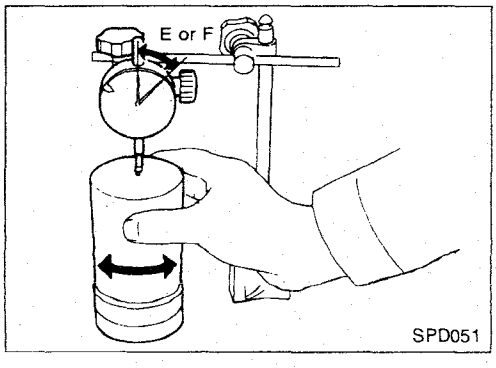


6. Adjust dial indicator scale to zero.
7. Carefully slide master gauge and weight block out from under dial indicator.
8. Lubricate side bearing and place the bearing outer race and inner cone to be measured on the opposite side outer race.

If the bearing assembly is placed on the base plate, the bearing width cannot be accurately determined due to its cage being in contact with the base plate.



9. Place weight block (ST32501000) on side bearing.
10. Slide dial indicator on weight block.



11. Turn weight block a few times to ensure that bearing is properly seated.
12. Read dial indicator.

- Normal indication:
  0.10 - 0.30 mm (0.0039 - 0.0118 in)
- If the needle fluctuates erratically then bearing is either dirty or defective and should be cleaned or replaced.

Side Bearing Preload (Cont'd)

13. Measure both bearing in the same way and write the left side bearing measurement next to "E" and the right side bearing measurement next to "F".
14. Substitute these values into the equation to calculate the thickness of the shim.

If values signifying A, B, C, D, G_1 and G_2 are not given, regard them as zero and calculate.

Left side:

$$T_1 = (A + C + G_1 - D) \times 0.01 + 0.76 - E$$

Right side:

$$T_2 = (B + D + G_2) \times 0.01 + 0.76 - F$$

Example

A = 5	E = 0.11
B = 5	F = 0.15
C = 3	G_1 = 4
D = 3	G_2 = 1

Left side:

$T_1 = (A + C + G_1 - D) \times 0.01 + 0.76 - E$
$= (5 + 3 + 4 - 3) \times 0.01 + 0.76 - 0.11$

(1)	A	5
	+C	+3
		8
	$+G_1$	+4
		12
	− D	−3
		9
(2)		9
		x0.01
		0.09
(3)		0.09
		+0.76
		0.85
(4)		0.85
	−E	−0.11
		0.74

$\therefore T_1 = 0.74$ mm

Right side:

$T_2 = (B + D + G_2) \times 0.01 + 0.76 - F$
$= (5 + 3 + 1) \times 0.01 + 0.76 - 0.15$

(1)	B	5
	+D	+3
		8
	$+G_2$	+1
		9
(2)		9
		x0.01
		0.09
(3)		0.09
		+0.76
		0.85
(4)		0.85
		−0.15
		0.70

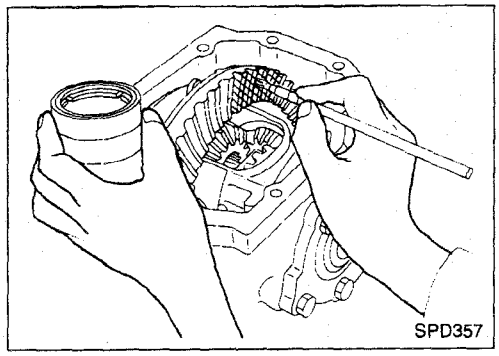
$\therefore T_2 = 0.70$ mm

15. Select the proper shims (Refer to S.D.S.).

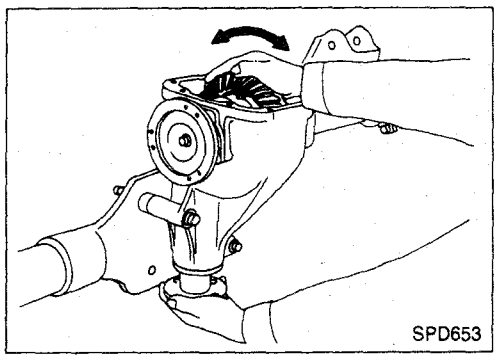
If you cannot find the desired thickness of shims, use shims with the total thickness closest to the calculated value.

Tooth Contact

Gear tooth contact pattern check is necessary to verify correct relationship between ring gear and drive pinion.
Hypoid gear sets which are not positioned properly in relation to one another may be noisy, or have short life span or both. With a pattern check, the most desirable contact for low noise level and long life can be assured.

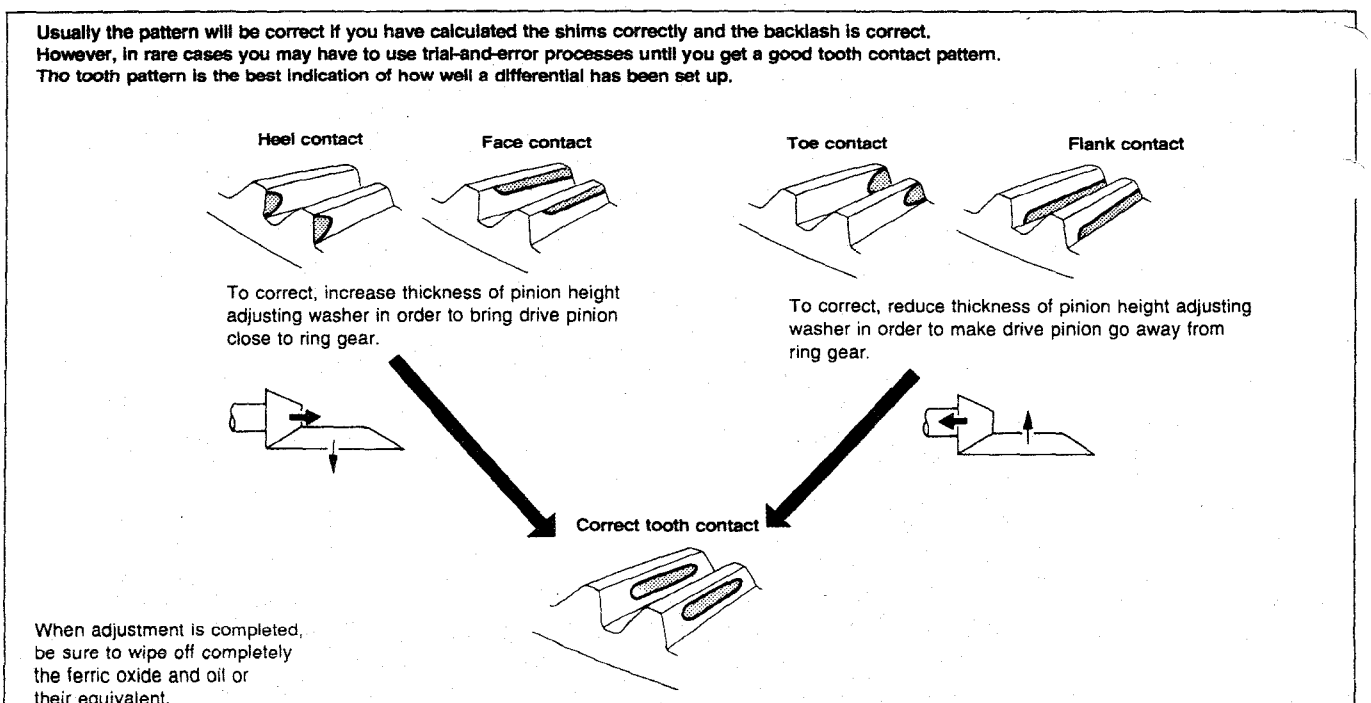

SPD357

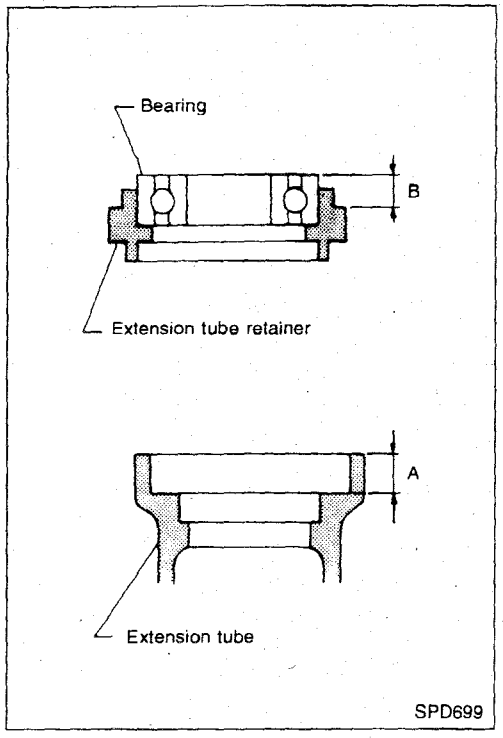
1. Thoroughly clean ring gear and drive pinion teeth.
2. Sparingly apply a mixture of powdered ferric oxide and oil or equivalent to 3 or 4 teeth of ring gear drive side.


SPD653

3. Hold companion flange steady by hand and rotate the ring gear in both directions.

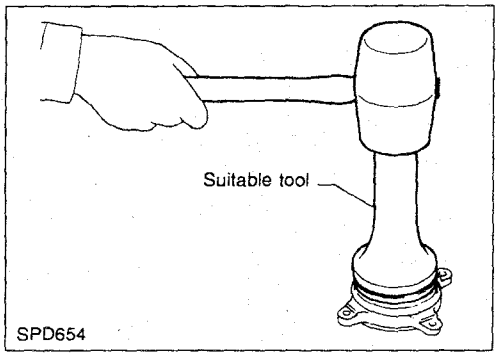
Usually the pattern will be correct if you have calculated the shims correctly and the backlash is correct.
However, in rare cases you may have to use trial-and-error processes until you get a good tooth contact pattern.
The tooth pattern is the best indication of how well a differential has been set up.



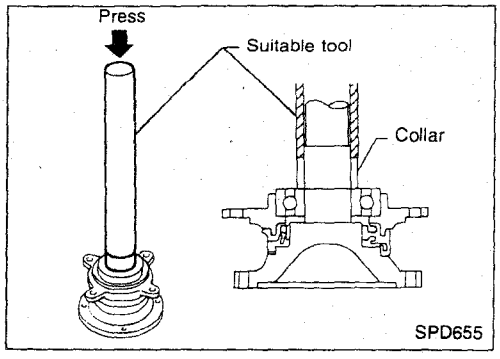


Extension Tube and Differential Side Shaft

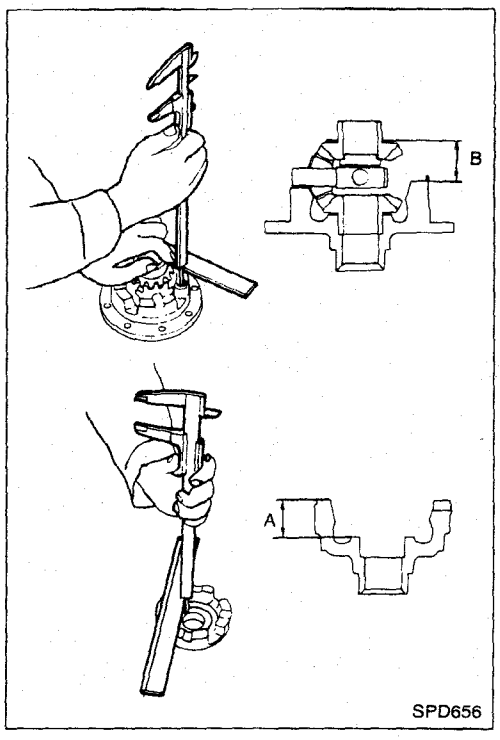
1. Measure rear axle bearing end play.
   Rear axle bearing end play (A–B):
   0.1 mm (0.0039 in) or less
   The end play can be adjusted with bearing adjusting shim (Refer to S.D.S.)



2. Install oil seal.



3. Install the spacer, grease seal, extension tube retainer, adjusting shim, shim and shim collar onto the differential side shaft.
4. Install differential side shaft assembly into extension tube.

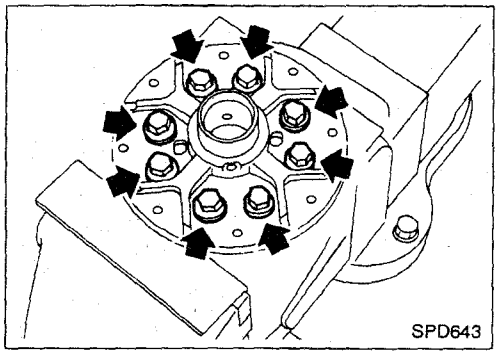


Differential Case

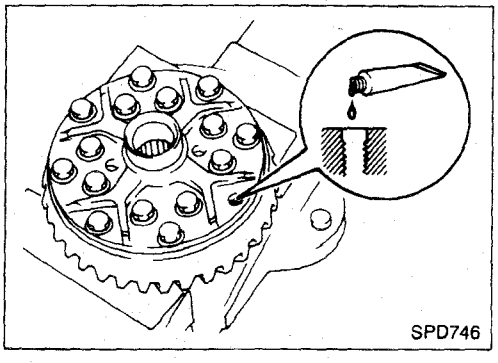
1. Measure clearance between side gear thrust washer and differential case.

   Clearance between side gear thrust washer and differential case (A – B):
   0.10 - 0.20 mm (0.0039 - 0.0079 in)

   The clearance can be adjusted with side gear thrust washer (Refer to S.D.S.).
2. Apply gear oil to gear tooth surfaces and thrust surfaces and check to see the turn properly.

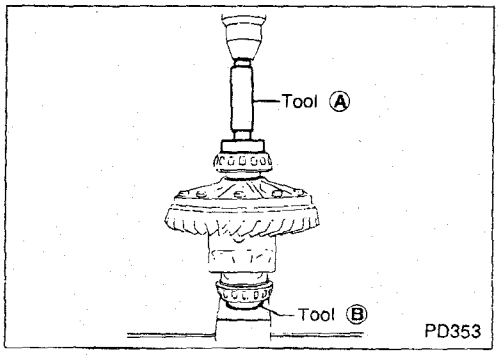


3. Install L.H. and R.H. differential cases.



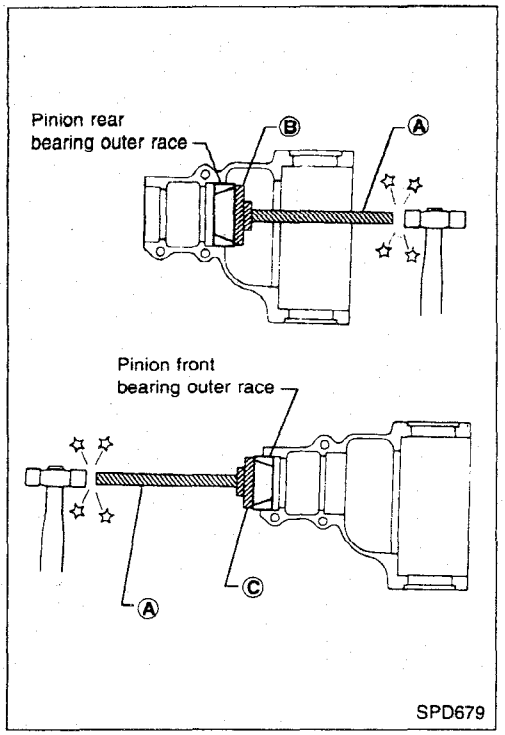
4. Place differential case on ring gear.
5. Apply locking agent [Locktite (stud lock) or equivalent] to ring gear bolts, and install them.

Tighten bolts in a criss-cross fashion, lightly tapping bolt head with a hammer.



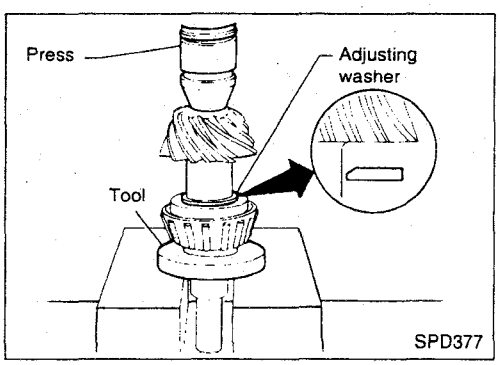
6. Press-fit side bearing inner cones on differential case with Tool.

   Tool number:
   Ⓐ ST33230000
   Ⓑ ST33061000

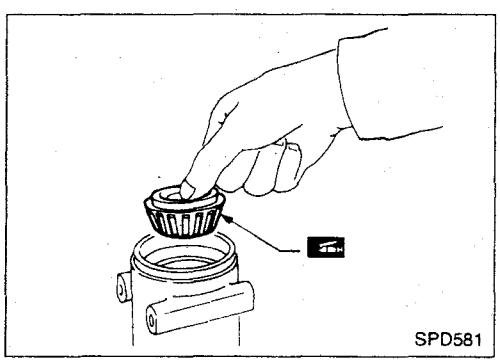


Final Drive Housing

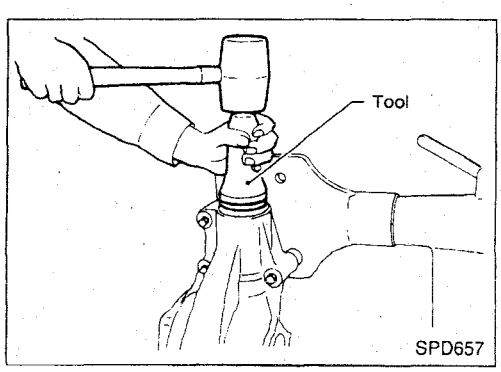
1. Press-fit front and rear bearing outer races with Tools.
   Tool number:
   Ⓐ ST30611000
   Ⓑ ST30621000
   Ⓒ ST30701000
2. Select pinion bearing adjusting washer and drive pinion bearing spacer, referring to Adjustment.



3. Install drive pinion height adjusting washer in drive pinion, and press-fit rear bearing inner cone in it, using press and Tool.
   Assembly:
   ST30905000
   Tool number:
   ST30901000

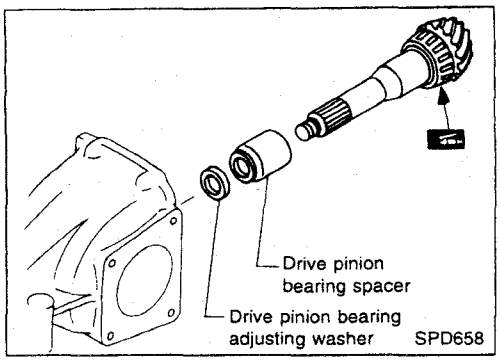


4. Place pinion front bearing inner cone in final drive housing.

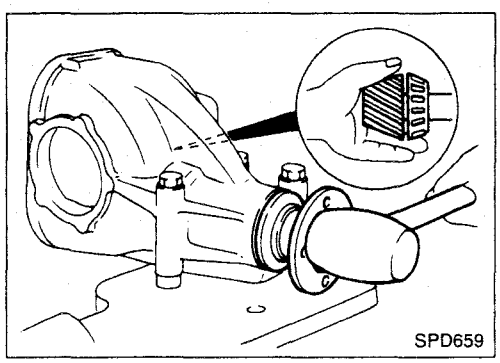


5. Apply multi-purpose grease to cavity at sealing lips of oil seal. Install front oil seal.
   Tool number:
   ST30720000

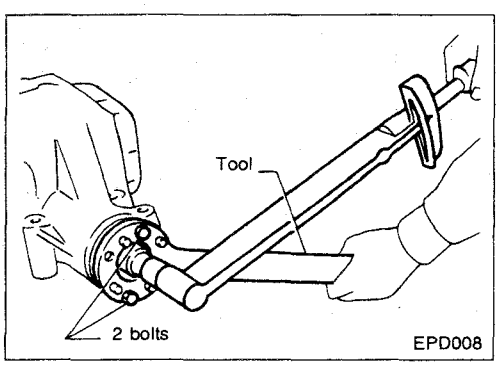
Final Drive Housing (Cont'd)



6. Place drive pinion bearing spacer, pinion bearing adjusting washer and drive in final drive housing.



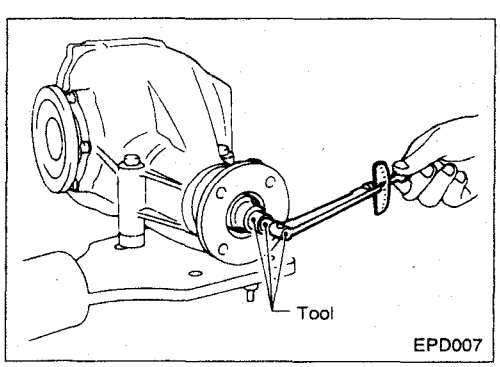
7. Insert companion flange into drive pinion by tapping the companion flange with a soft hammer.



8. Tighten pinion nut to the specified torque.

The threaded portion of drive pinion and pinion nut should be free from oil or grease.

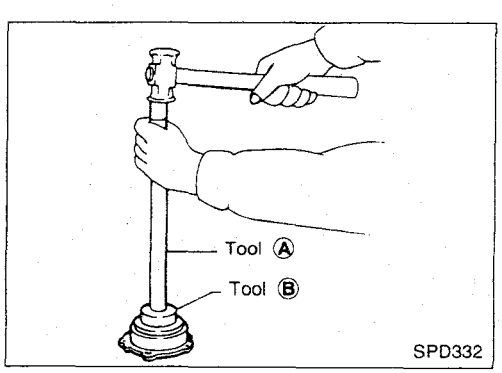
Tool number:
ST38060002



9. Turn drive pinion in both directions several revolutions, and measure pinion bearing preload.

Tool number:
ST3127S000
Pinion bearing preload:
1.1 - 1.7 N·m
(11 - 17 kg-cm, 9.5 - 14.8 in-lb)

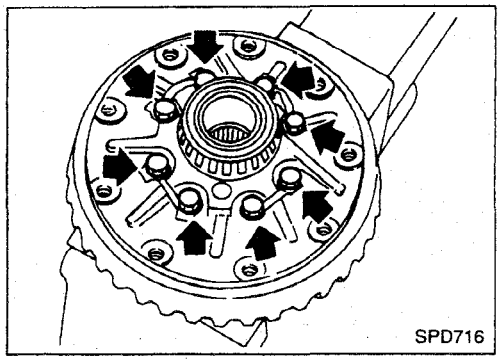
When pinion bearing preload is outside the specifications, replace pinion bearing adjusting washer and spacer with a different thickness.



10. Select side retainer adjusting washer.
    Refer to Adjustment.
11. Press-fit side bearing outer race into side retainer.

Tool number:
Ⓐ ST30611000
Ⓑ ST30621000

Differential Case (Cont'd)

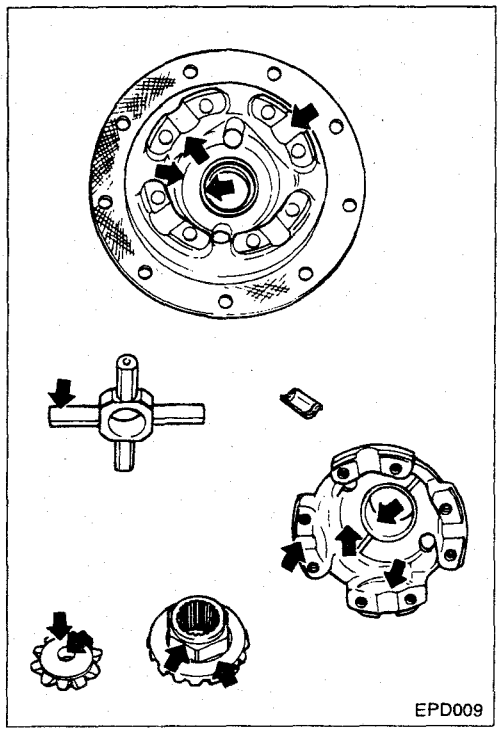


4. Separate differential case.

Put match marks on both L.H. and R.H. differential cases.

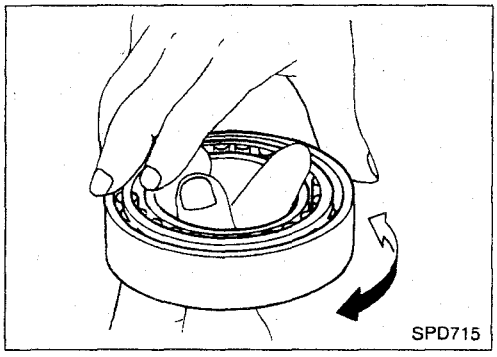
Ring Gear and Drive Pinion

Check gear teeth for scoring, cracking or chipping.
If any damaged part is evident, replace ring gear and drive pinion as a set (hypoid gear set).


EPD009

Differential Case Assembly

Check mating surfaces of differential case, side gears, pinion mate gears, pinion mate shaft, and thrust washers.

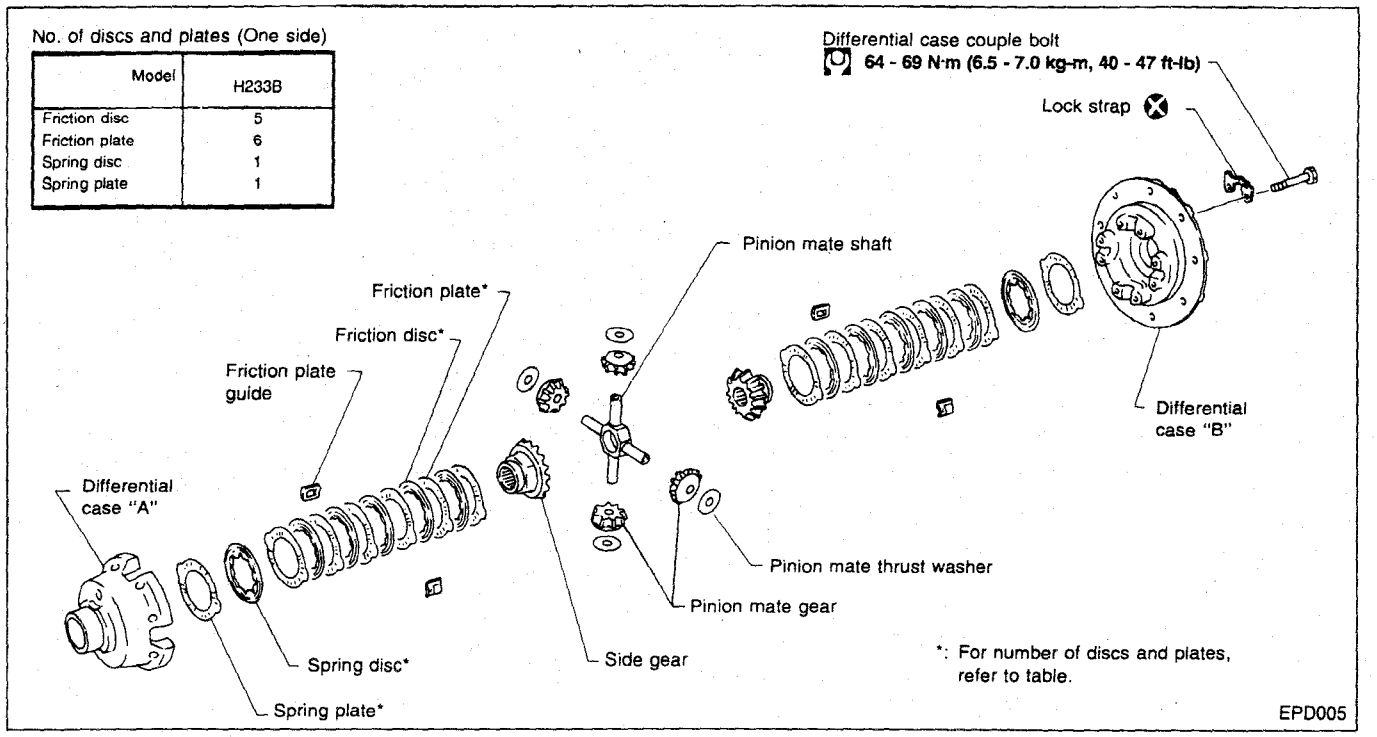

SPD715

Bearing

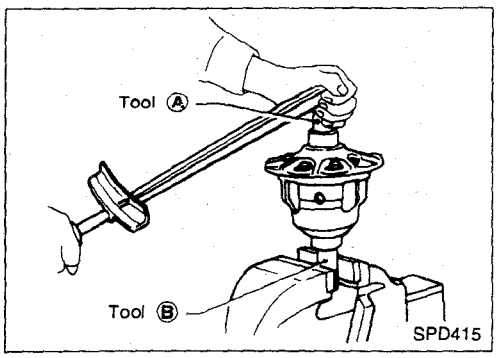
1. Thoroughly clean bearing.
2. Check bearings for wear, scratches, pitting or flaking. Check tapered roller bearing for smooth rotation. If damaged, replace outer race and inner cone as a set.

No. of discs and plates (One side)

Model	H233B
Friction disc	5
Friction plate	6
Spring disc	1
Spring plate	1



CAUTION:
Do not run engine when one rear wheel is off the ground.

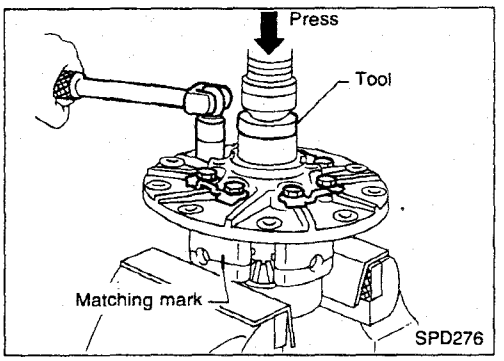


Preparation for Disassembly

CHECKING DIFFERENTIAL TORQUE

Measure differential torque with Tool.
If it is not within the specifications, inspect components of limited slip differential.

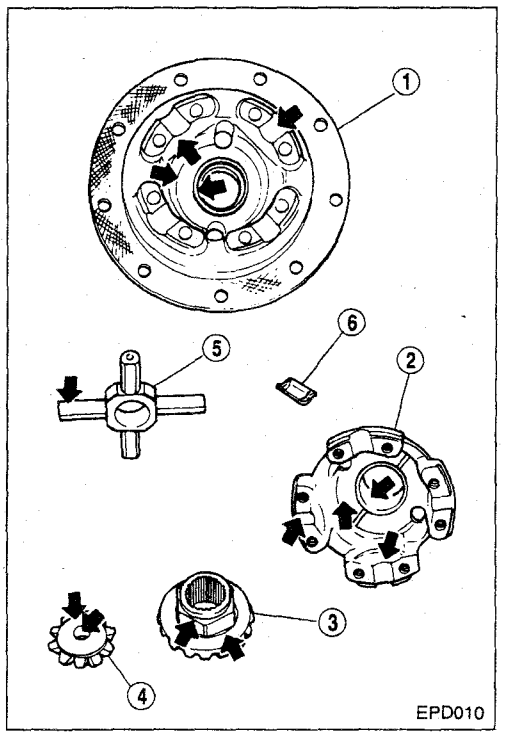
Differential torque:
353 - 392 N·m
(36 - 40 kg-m, 260 - 289 ft-lb)
Assembly:
KV38105250
Tool number:
Ⓐ KV38105210
Ⓑ KV38105220



Disassembly

1. Spread out lock straps.
2. Remove couple bolts using a press.
   Tool number: ST33081000
3. Separate differential case A and B.
   Draw out component parts (discs and plates, etc.)

Put marks on gears and pressure rings so that they can be re-installed in their original positions from which they were removed.



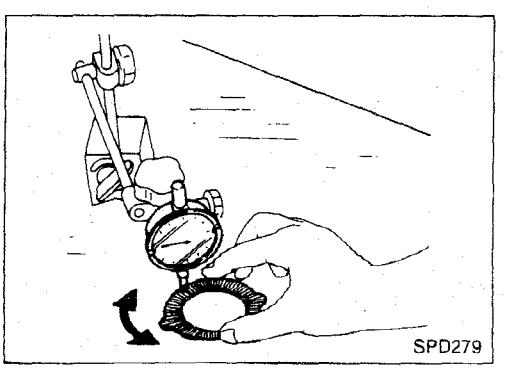
Inspection

CONTACT SURFACES

1. Clean the disassembled parts in suitable solvent and blow dry with compressed air.
2. If following surfaces are found with burrs or scratches, smooth with oil stone.
   ① Differential case B
   ② Differential case A
   ③ Side gear
   ④ Pinion mate gear
   ⑤ Pinion mate shaft
   ⑥ Friction plate guide

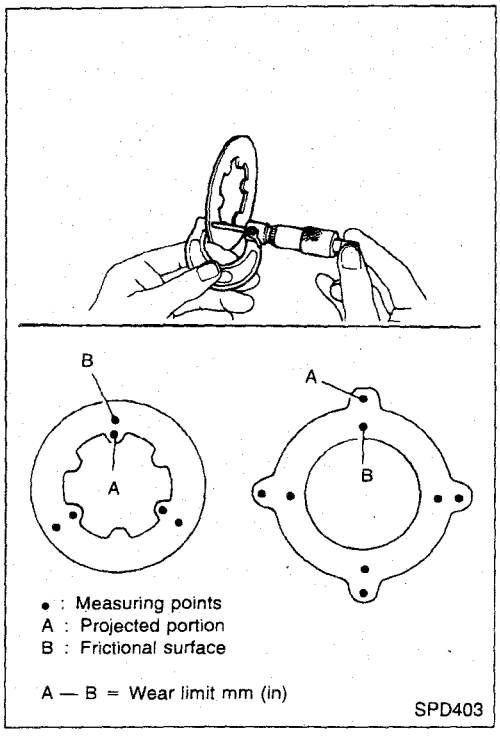
DISC AND PLATE

1. Clean the discs and plates in suitable solvent and blow dry with compressed air.
2. Inspect discs and plates for wear, nicks and burrs.



3. To make sure that friction disc or plate is not distorted, place it on a surface plate and rotate it by hand with indicating finger of dial gauge resting against disc or plate surface.
   Check the warpage.
   Allowable warpage:
   0.05 - 0.15 mm (0.0020 - 0.0059 in)
   If it exceeds limit, replace with a new plate to eliminate possibility of clutch slippage or sticking.

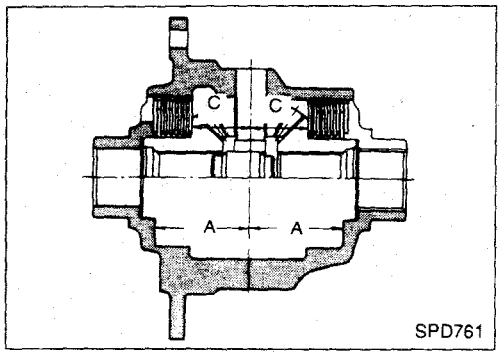
Inspection (Cont'd)



4. Measure frictional surfaces and projected portions of friction disc, friction plate and spring plate.

If any part has worn beyond the wear limit, replace it with a new one that is the same thickness as the projected portion.

Wear limit:
0.1 mm (0.004 in) or less



Adjustment

FRICTION DISC AND FRICTION PLATE END PLAY

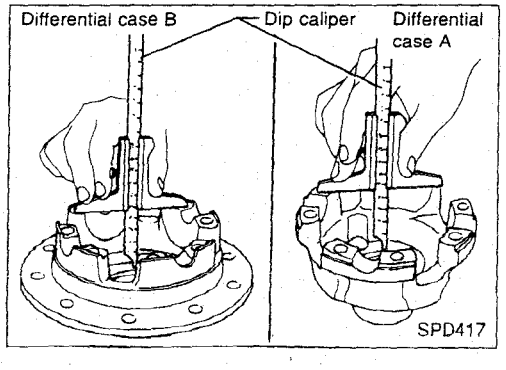
End play of friction disc and friction plate can be calculated by using the following equation and should be adjusted within the following range.

Adjustment can be made by selecting friction disc having two different thicknesses.

End play E:
0.05 - 0.15 mm (0.0020 - 0.0059 in)

$$E = A - (B + C)$$

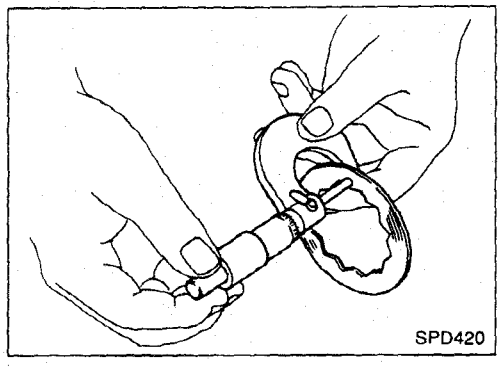
A: Length of differential case contact surface to differential case inner bottom.
B: Total thickness of friction discs, friction plates, spring disc and spring plate in differential case on one side.
C: Length of differential case contact surface to back side of side gear.



1. Measure values of "A".

Standard length A:
49.50 - 49.55 mm (1.9488 - 1.9508 in)

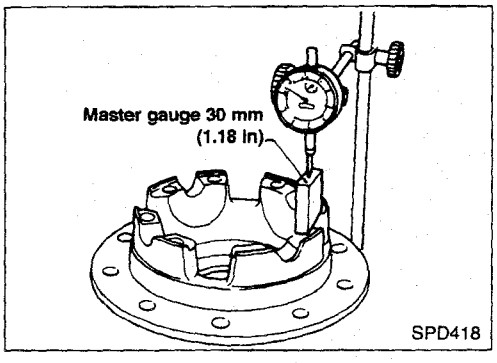
Adjustment (Cont'd)


SPD420

2. Measure thickness of each disc and plate.

Total thickness "B":
19.24 - 20.26 mm (0.7575 - 0.7976 in)
No. of discs and plates (One side):

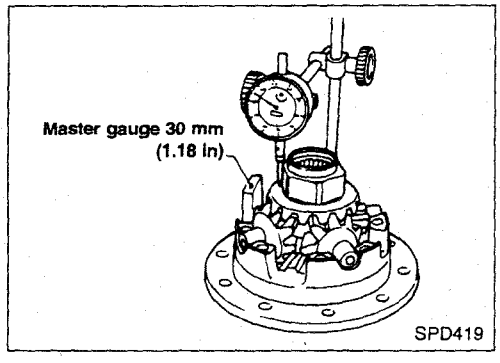
Friction disc	**5**
Friction plate	**6**
Spring disc	**1**
Spring plate	**1**



SPD418

3. Measure values of "C".
(1) Attach a dial indicator to the base plate.
(2) Place differential case B on the base plate, and install a master gauge on case B.

Then adjust the dial indicator scale to zero with its tip on the master gauge.



SPD419

(3) Install pinion mate gears, side gears and pinion mate shaft in differential case B.
(4) Set dial indicator's tip on the side gear, and read the indication.

Example:

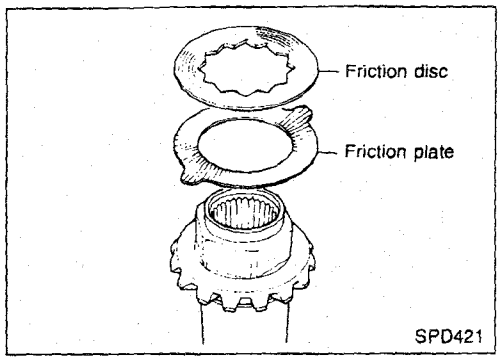
E = A–D
= A–(B + C)
= 0.05 to 0.15 mm → Specified range
A = 49.52 mm
B = 19.45 mm
C = 29.7 mm
D = B + C

B...19.45
+C...29.7
49.15

E = A–D

A...49.52
–D...49.15
0.37

From the above equation, end play of 0.37 mm exceeds the specified range of 0.05 to 0.15 mm.
Select suitable discs and plates to adjust correctly. (Refer to S.D.S.)

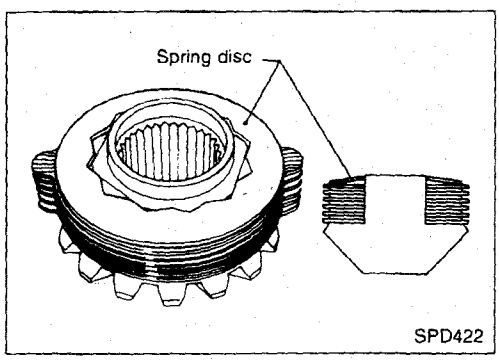


Assembly

Prior to assembling discs and plates, properly lubricate them by dipping them in limited slip differential oil.

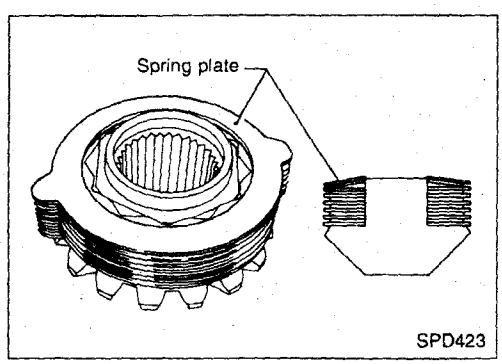
1. Alternately position specified number of friction plates and friction discs on rear of side gear.

Always position a friction plate first on rear of side gear.

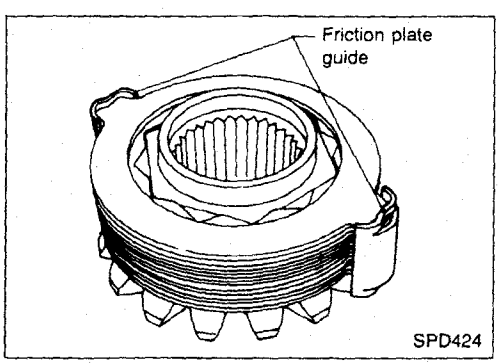


2. Install spring disc.

Align the twelve angular holes in spring disc with the hexagonal area of the side gear.

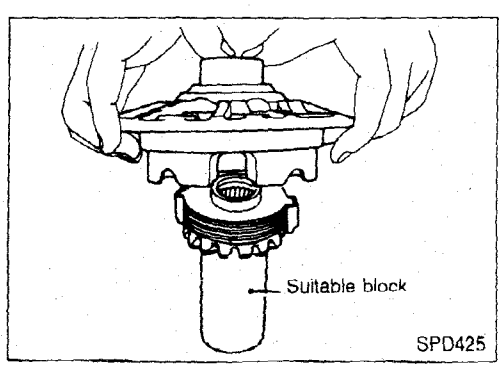


3. Install spring plate.



4. Install friction plate guides.

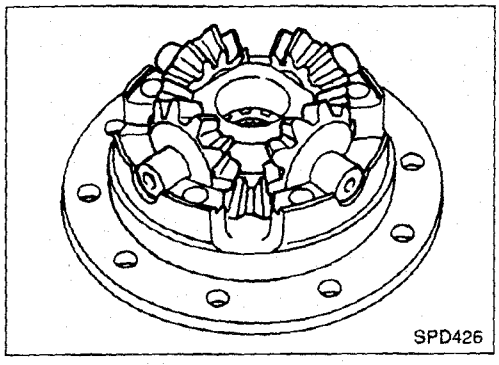
Correctly align the raised portions of friction plates, and apply grease to inner surfaces of friction plate guides to prevent them from falling.



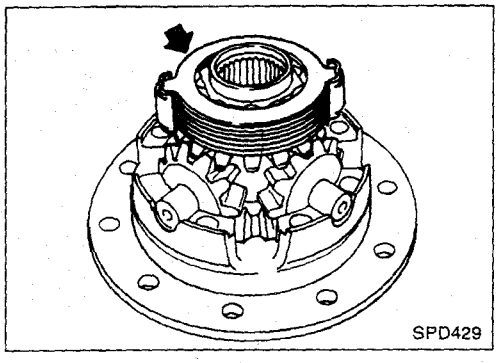
5. Install differential case B over side gear, discs, plates and friction plate guide assembly.

- **Install differential case B while supporting friction plate guides with your middle finger inserted through oil hole in differential case.**
- **Be careful not to detach spring disc from the hexagonal part of the side gear.**

Assembly (Cont'd)

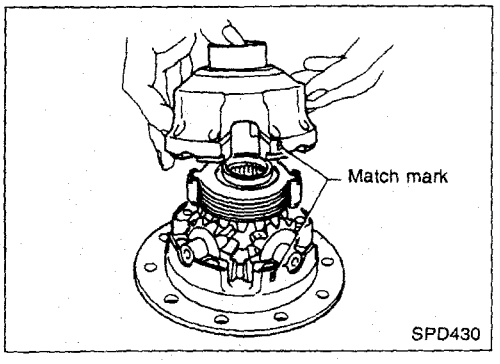

SPD426

6. Install pinion mate gears and pinion shaft to differential case B.


SPD429

7. Install side gear to pinion mate gears.
8. Install each disc and plate.

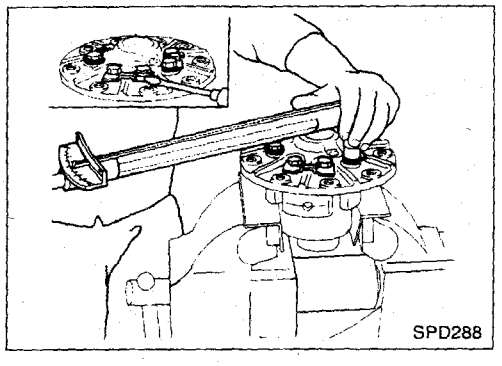
Use same procedures as outlined in steps 1. through 4. above.



SPD430

9. Install differential case A.

Position differential cases A and B by correctly aligning marks stamped on cases.


SPD288

10. Tighten differential case bolts.

[O]: 64 - 69 N·m (6.5 - 7.0 kg-m, 47 - 51 ft-lb)

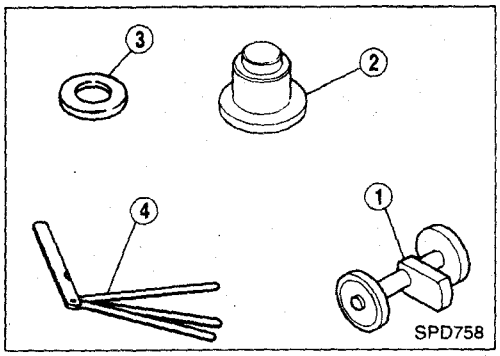
11. Place ring gear on differential case and install new lock straps and bolts.

Tighten bolts in a criss-cross fashion, lightly tapping bolt head with a hammer.

Then bend up lock straps to lock the bolts in place.

12. Install side bearing inner cone.
13. Check differential torque.

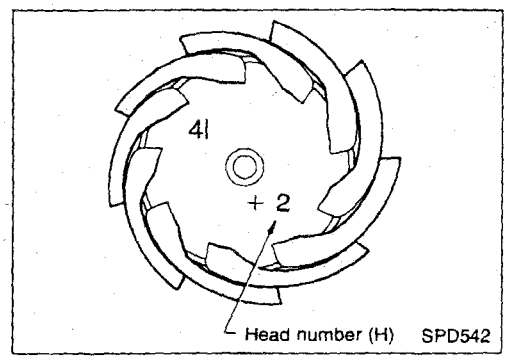
To avoid confusion while calculating bearing shims, it is absolutely necessary to stay with the metric system. If you measure anything in inches, the results MUST be converted to the metric system.



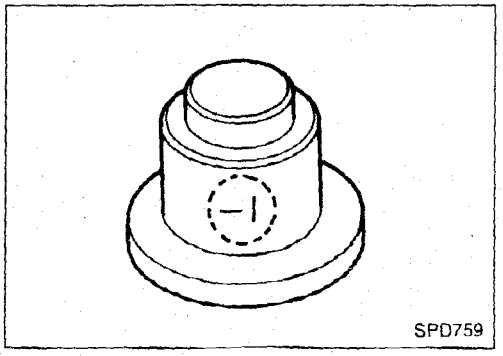
Drive Pinion Height

1. First prepare Tools for pinion height adjustment.
   Assembly ① ②:
   ST3125500
   ① Height Gauge (ST31251000)
   ② Dummy Shaft (ST31181001)
   ③ Spacer [thickness: 2.50 mm (0.0984 in)]
   ④ Feeler Gauge
2. To simplify the job, make a chart, like the one below, to organize your calculations.

LETTERS	HUNDREDTHS OF A MILLIMETER
H: Head number	
D': Figure marked on dummy shaft	
S: Figure marked on height gauge	
N: Measuring clearance	

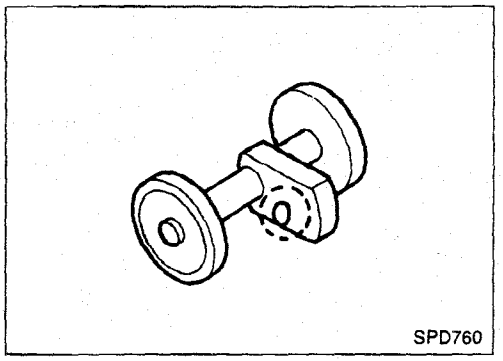


3. Write the following numbers down in the chart.
   H: Head number

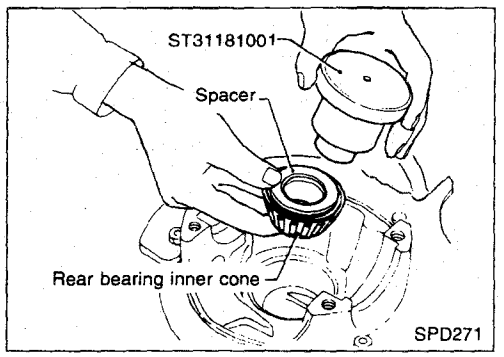


D': Figure marked on dummy shaft

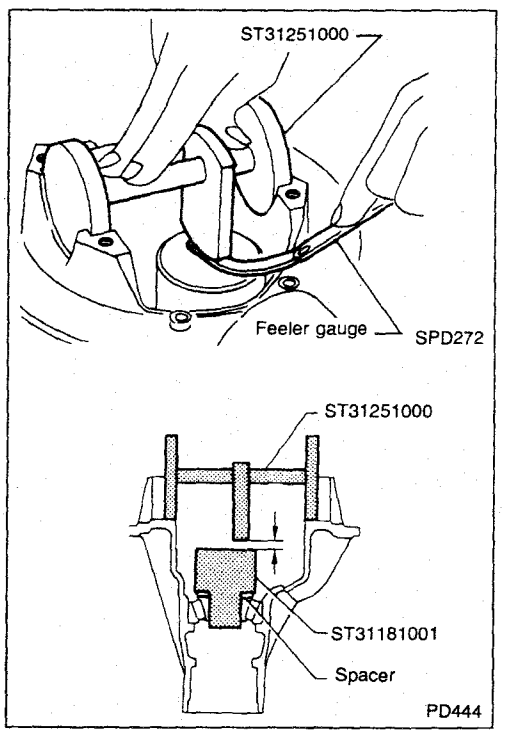
Drive Pinion Height (Cont'd)



S: Figure marked on height gauge



4. Place pinion rear bearing inner race and Tools on gear carrier.



5. Attach Tool (Height gauge) to gear carrier, and measure the clearance between the height gauge tip and the dummy shaft face.

Drive Pinion Height (Cont'd)

6. Substitute these values into the equation to calculate the thickness of the washer.

If values signifying H, D′ and S are not given, regard them as zero and calculate.

T (Thickness of washer) = N–[(H–D′–S) x 0.01] + 3.05

Example:

N = 0.30
H = 2
D′ = –1
S = 0

T = N – [(H – D′ – S) x 0.01] + 3.05
= 0.30 – [{2 – (– 1) – 0} x 0.01] + 3.05

(1) H 2
–D′ ..... –(–1)
3
–S ..... –0
3

(2) 3
x 0.01
0.03

(3) N 0.30
–0.03
0.27

(4) 0.27
+3.05
3.32
∴T = 3.32

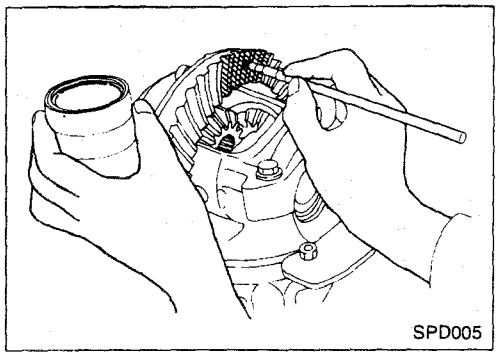
7. Select the proper washer (Refer to S.D.S.).

If you cannot find the desired thickness of washer, use washer with thickness closest to the calculated value.

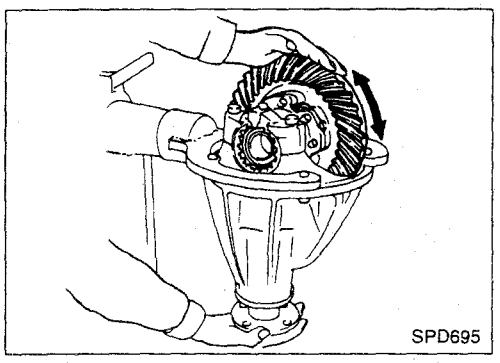
Example:
Calculated value ... T = 3.32 mm
Used washer ... T = 3.33 mm

Tooth Contact

Gear tooth contact pattern check is necessary to verify correct relationship between ring gear and drive pinion.
Hypoid gear sets which are not positioned properly in relation to one another may be noisy, or have short life span or both. With a pattern check, the most desirable contact for low noise level and long life can be assured.

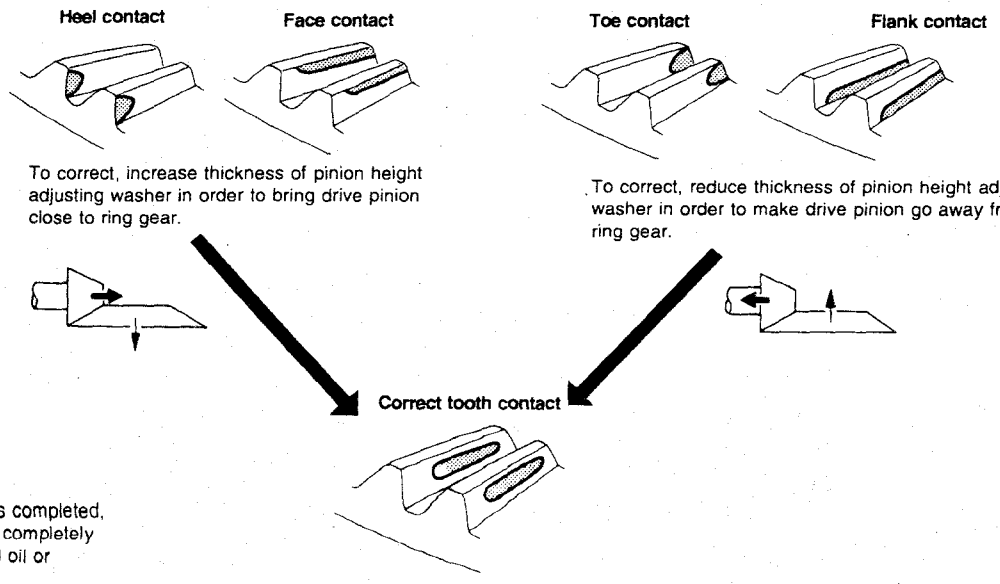

SPD005

1. Thoroughly clear ring gear and dive pinion teeth.
2. Sparingly apply a mixture of powdered ferric oxide and oil or equivalent to 3 or 4 teeth of ring gear drive side.


SPD695

3. Hold companion flange steady by hand and rotate the ring gear in both directions.

Usually the pattern will be correct if you have calculated the shims correctly and the backlash is correct.
However, in rare cases you may have to use trial-and-error processes until you get a good tooth contact pattern.
Tho tooth pattern is the best indication of how well a differential has been set up.



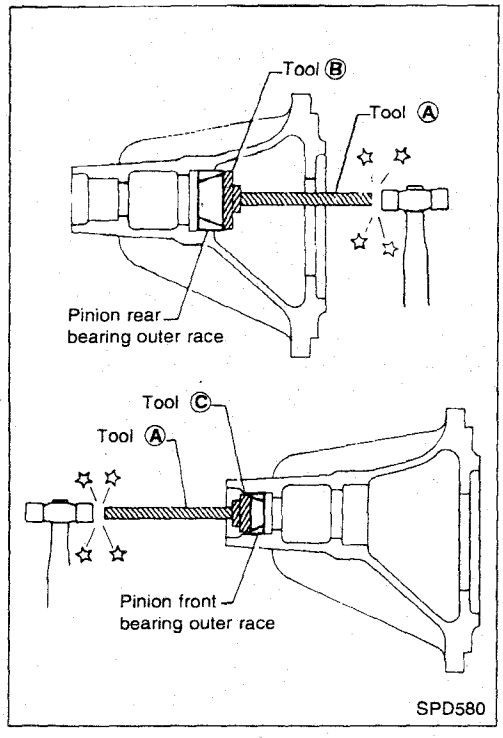
When adjustment is completed, be sure to wipe off completely the ferric oxide and oil or their equivalent.

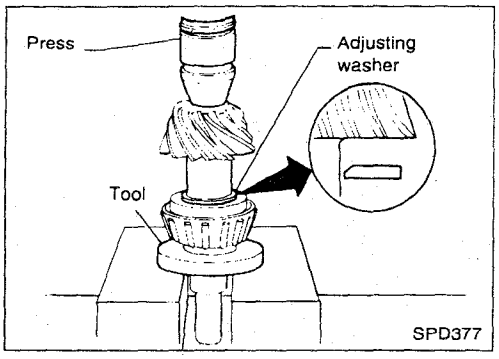
NPD003

Differential Carrier

1. Press-fit front and rear bearing outer races with Tools.

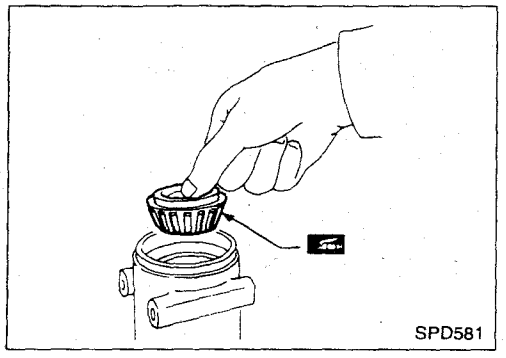
Tool number:
Ⓐ ST30611000
Ⓑ ST30621000
Ⓒ ST30613000



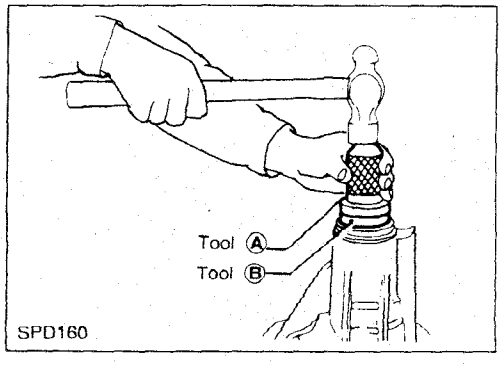


2. Select drive pinion height adjusting washer, referring to Adjustment.
3. Install drive pinion adjusting washer in drive pinion, and press-fit pinion rear bearing inner cone in it with press and Tool.

Tool number:
ST30901000



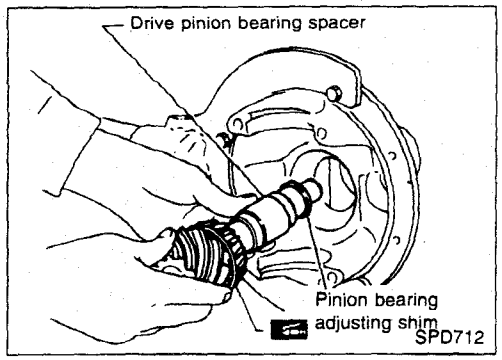
4. Place pinion front bearing inner cone in gear carrier.



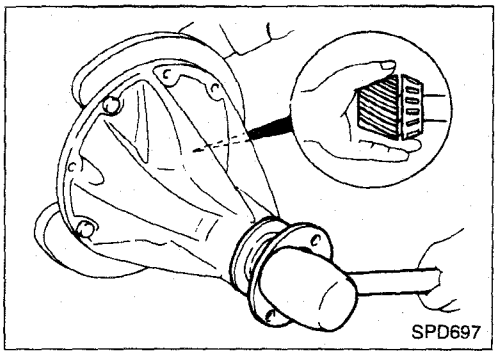
5. Apply multi-purpose grease to cavity at sealing lips of oil seal. Install front oil seal.

Tool number:
Ⓐ ST30720000
Ⓑ KV38102510

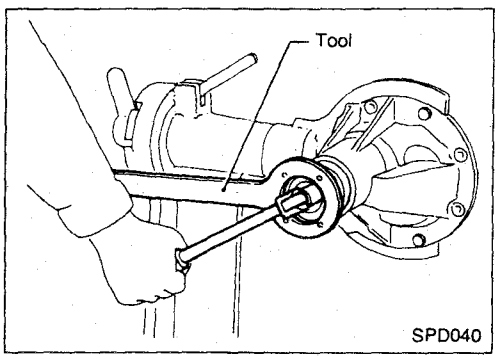
Differential Carrier (Cont'd)



6. Install drive pinion bearing spacer, pinion bearing adjusting shim and drive pinion in gear carrier.



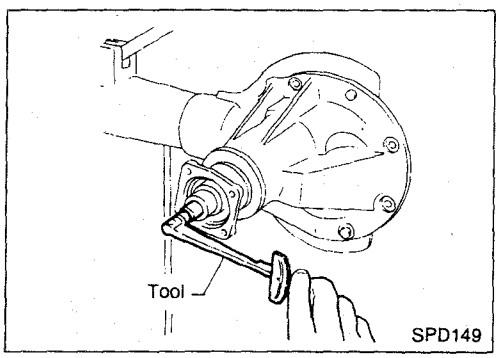
7. Insert companion flange into drive pinion by tapping the companion flange with a soft hammer.



8. Tighten pinion nut to specified torque.

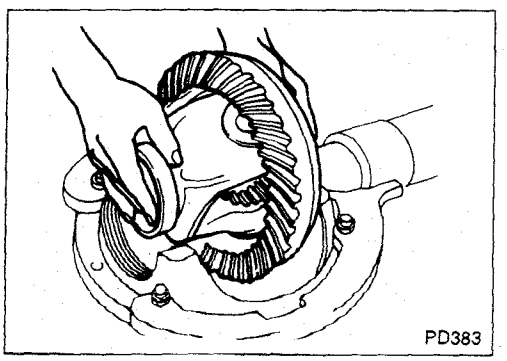
The threaded portion of drive pinion and pinion nut should be free from oil or grease.

Tool number:
KV38104700



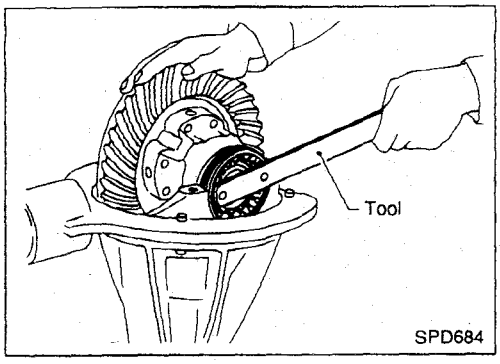
9. Turn drive pinion in both directions several times, and measure pinion bearing preload.

Tool number:
ST3127S000
Pinion bearing preload:
167 - 255 N·m
(17 - 26 kg-cm, 15 - 23 in-lb)



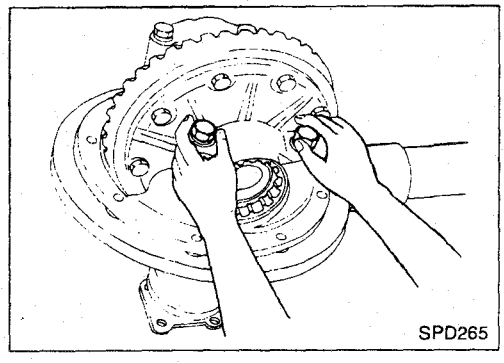
10. Install differential case assembly with side bearing outer races into gear carrier.

Differential Carrier (Cont'd)

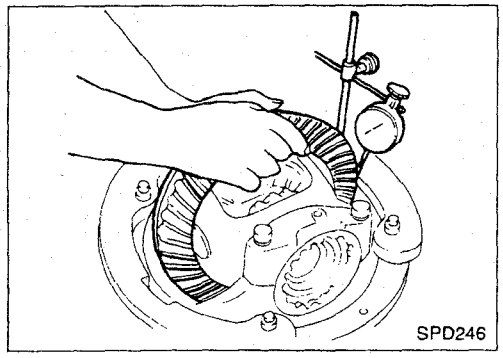


11. Position side bearing on gear carrier with threads properly engaged; screw in adjusters lightly at this stage of assembly.

Tool number:
ST32580000

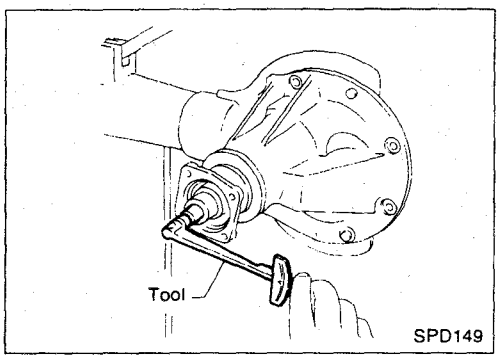


12. Align mark on bearing cap with that on gear carrier and install bearing cap on gear carrier.
- Do not tighten at this point to allow further tightening of side bearing adjusters.



13. Tighten both right and left side bearing adjusters alternately and measure ring gear backlash and total preload at the same time. Adjust right and left side bearing adjusters by tightening them alternately so that proper ring gear backlash and total preload can be obtained.

Ring gear-to-drive pinion backlash:
0.15 - 0.20 mm (0.0059 - 0.0079 in)



- **When checking preload, turn drive pinion in both directions several times to set bearing rollers.**

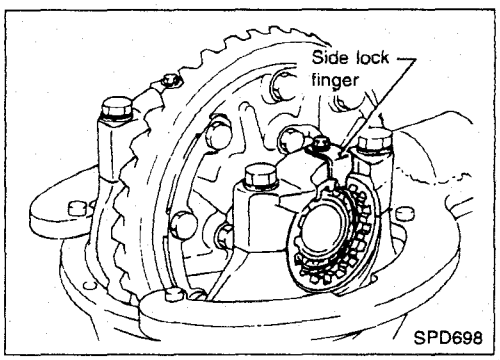
Tool number:
ST3127S000

The total pinion bearing preload value with the differential case assembly should be in accordance with the same value measured without the differential case assembly. (See point 9).
The relationship between both is:

Pinion bearing preload

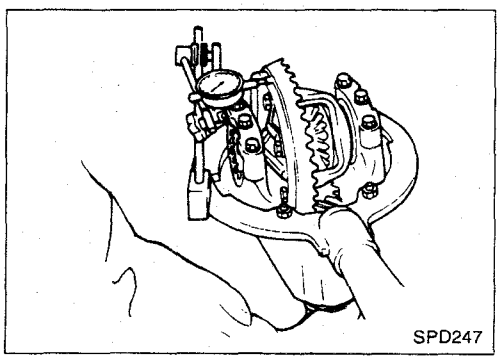
With differential case assembly		Without differential case assembly	
kg-cm	N·m	kg-cm	N·m
14	1.4	17 – 23	1.7 – 2.3
15	1.5	18 – 24	1.8 – 2.4
16	1.6	19 – 25	1.9 – 2.5
17	1.7	20 – 26	2.0 – 2.6

Differential Carrier (Cont'd)



14. Tighten side bearing cap bolts.
    : 83 - 103 N·m (8.5 - 10.5 kg-m, 62 - 76 ft-lb)

15. Install side lock finger in place to prevent rotation during operation.



16. Check runout of ring gear with a dial indicator.
    Runout limit:
    0.08 mm (0.0031 in)
- If backlash varies excessively in different places, the variance may have resulted from foreign matter caught between the ring gear and the differential case.
- If the backlash varies greatly when the runout of the ring gear is within a specified range, the hypoid gear set or differential case should be replaced.

17. Check tooth contact (Refer to Adjustment).

Propeller Shaft

GENERAL SPECIFICATIONS

Unit: mm (in)

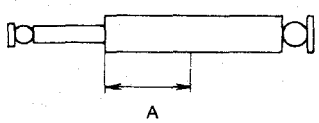
Portion	Front	Rear	
Propeller shaft model	2F71H	2S71H	2S80B
Number of joints	2		
Coupling method with transmission	Flange type	Sleeve type	
Types of journal bearings	Solid type (disassembly type)		
Shaft length (Spider to spider) mm (in)	542 (21.34)	965	950 (37.40)
Shaft outer diameter mm (in)	65 (2.56)	75	65 (2.56)

INSPECTION AND ADJUSTMENT

Front propeller shaft

Unit: mm (in)

Propeller shaft model	2F71H
Journal axial play limit	0.02 (0.0008)
Propeller shaft runout limit	0.6 (0.024)
Measuring point A	126 (4.96)

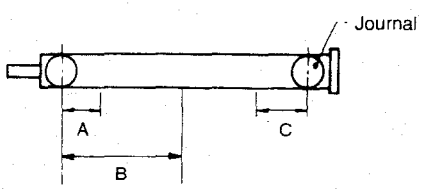


SPD996

Rear propeller shaft

Unit: mm (in)

Propeller shaft model	2S71H	2S80B
Journal axial play limit	0.02 (0.0008)	
Propeller shaft runout limit	0.6 (0.024)	
Measuring point		
A	300	280 (11.02)
B	473	475 (18.70)
C	300	280 (11.02)



NPD004

Available snap rings

2F71H models

Unit: mm (in)

Thickness mm (in)	ID color	Part number
1.99 (0.0783)	White	37146-01G00
2.02 (0.0795)	Yellow	37147-01G00
2.05 (0.0807)	Red	37148-01G00
2.08 (0.0819)	Green	37149-01G00
2.11 (0.0831)	Blue	37150-01G00
2.14 (0.0843)	Light brown	37151-01G00
2.17 (0.0854)	Pink	37152-01G00
2.20 (0.0866)	No paint	37153-01G00

2S71H/2S80B models

Thickness mm (in)	ID color	Part number
1.99 (0.0783)	White	37146-C9400
2.02 (0.0795)	Yellow	37147-C9400
2.05 (0.0807)	Red	37148-C9400
2.08 (0.0819)	Green	37149-C9400
2.11 (0.0831)	Blue	37150-C9400
2.14 (0.0843)	Light Brown	37151-C9400
2.17 (0.0854)	Pink	37152-C9400
2.20 (0.0866)	No paint	37153-C9400

Final Drive

GENERAL SPECIFICATIONS

Front final drive	R180A
	4-pinion
Oil capacity (Approx.) ℓ (Imp pt)	1.3 (2-1/4)
Rear final drive	H233B
	L.S.D.*
Oil capacity (Approx.) ℓ (Imp pt)	2.8 (4-7/8)
Gear ratio	4.625
Number of teeth	
Ring gear	37
Drive pinion	8

* Limited Slip Differential

INSPECTION AND ADJUSTMENT (R180A)

Ring gear runout

Ring gear runout limit mm (in)	0.05 (0.0020)

Axle bearing adjustment

Axle bearing end play mm (in)	0 - 0.1 (0 - 0.004)

Available axle bearing adjusting shims

Thickness mm (in)	Part number
0.10 (0.0039)	38233-01G11
0.20 (0.0079)	38233-01G12
0.30 (0.0118)	38233-01G13
0.40 (0.0157)	38233-01G14

Side gear adjustment

Side gear backlash (Clearance between side gear to differential case) mm (in)	0.10 - 0.20 (0.0039 - 0.0079)

Available side gear thrust washers

Thickness mm (in)	Part number
0.75 (0.0295)	38424-W2010
0.78 (0.0307)	38424-W2011
0.81 (0.0319)	38424-W2012
0.84 (0.0331)	38424-W2013
0.87 (0.0343)	38424-W2014
0.90 (0.0354)	38424-W2015
0.93 (0.0366)	38424-W2016
0.96 (0.0378)	38424-W2017

Drive pinion height adjustment

Available pinion height adjusting washers

Thickness mm (in)	Part number
3.09 (0.1217)	38154-P6017
3.12 (0.1228)	38154-P6018
3.15 (0.1240)	38154-P6019
3.18 (0.1252)	38154-P6020
3.21 (0.1264)	38154-P6021
3.24 (0.1276)	38154-P6022
3.27 (0.1287)	38154-P6023
3.30 (0.1299)	38154-P6024
3.33 (0.1311)	38154-P6025
3.36 (0.1323)	38154-P6026
3.39 (0.1335)	38154-P6027
3.42 (0.1346)	38154-P6028
3.45 (0.1358)	38154-P6029
3.48 (0.1370)	38154-P6030
3.51 (0.1382)	38154-P6031
3.54 (0.1394)	38154-P6032
3.57 (0.1406)	38154-P6033
3.60 (0.1417)	38154-P6034
3.63 (0.1429)	38154-P6035
3.66 (0.1441)	38154-P6036

Drive pinion preload adjustment

Drive pinion bearing preload adjusting method	Adjusting washer and spacer
Drive pinion preload N·m (kg-cm, in-lb)	
With front oil seal	1.1 - 1.7 (11 - 17, 9.5 - 14.8)

Available drive pinion preload adjusting washers

Thickness mm (in)	Part number
6.59 (0.2594)	38127-01G00
6.57 (0.2587)	38127-01G01
6.55 (0.2579)	38127-01G02
6.53 (0.2571)	38127-01G03
6.51 (0.2563)	38127-01G04
6.49 (0.2555)	38127-01G05
6.47 (0.2547)	38127-01G06
6.45 (0.2539)	38127-01G07
6.43 (0.2531)	38127-01G08
6.41 (0.2524)	38127-01G09
6.39 (0.2516)	38127-01G10
6.37 (0.2508)	38127-01G11
6.35 (0.2500)	38127-01G12
6.33 (0.2492)	38127-01G13
6.31 (0.2484)	38127-01G14

Available drive pinion preload adjusting spacers

Length mm (in)	Part number
52.20 (2.0551)	38130-G2300
52.40 (2.0630)	38131-G2301
52.60 (2.0709)	38132-G2302
52.80 (2.0787)	38133-G2303
53.00 (2.0866)	38134-G2304
53.20 (2.0945)	38135-G2305

Side bearing adjustment

Differential carrier assembly turning resistance N (kg, lb)	34.3 - 39.2 (3.5 - 4.0, 7.7 - 8.8)
Side bearing adjusting method	Adjusting shim

Available side retainer adjusting shims

Thickness mm (in)	Part number
0.20 (0.0079)	38453-01G00
0.25 (0.0098)	38453-01G01
0.30 (0.0118)	38453-01G02
0.40 (0.0157)	38453-01G03
0.50 (0.0197)	38453-01G04

Total preload adjustment

Total preload N·m (kg-cm, in-lb)	1.2 - 2.3 (12 - 23, 8.7 - 20.0)
Ring gear backlash mm (in)	0.13 - 0.18 (0.0051 - 0.0071)

INSPECTION AND ADJUSTMENT (H233B)

Ring gear runout

Ring gear runout limit mm (in)	0.08 (0.0031)

Differential torque adjustment

Differential torque N·m (kg-m, ft-lb)	353 - 392 (36 - 40, 260 - 289)
Number of discs and plates	
Friction disc	5
Friction plate	6
Spring disc	1
Spring plate	1
Wear limit of plate and disc mm (in)	0.1 (0.004)
Allowable warpage of friction disc and plate mm (in)	0.05 - 0.15 (0.0020 - 0.0059)

Available discs and plates

Part name	Thickness mm (in)	Part number
Friction disc	1.48 - 1.52 (0.0583 - 0.0598)	38433-C6000
	1.58 - 1.62 (0.0622 - 0.0638)	38433-C6001
Friction plate	1.48 - 1.52 (0.0583 - 0.0598)	38432-C6000
Spring disc	1.48 - 1.52 (0.0583 - 0.0598)	38436-C6000
Spring plate	1.48 - 1.52 (0.0583 - 0.0598)	38435-C6010

Drive pinion height adjustment

Available pinion height adjusting washers

Thickness mm (in)	Part number
2.58 (0.1016)	38151-01J00
2.61 (0.1028)	38151-01J01
2.64 (0.1039)	38151-01J02
2.67 (0.1051)	38151-01J03
2.70 (0.1063)	38151-01J04
2.73 (0.1075)	38151-01J05
2.76 (0.1087)	38151-01J06
2.79 (0.1098)	38151-01J07
2.82 (0.1110)	38151-01J08
2.85 (0.1122)	38151-01J09
2.88 (0.1134)	38151-01J10
2.91 (0.1146)	38151-01J11
2.94 (0.1157)	38151-01J12
2.97 (0.1169)	38151-01J13
3.00 (0.1181)	38151-01J14
3.03 (0.1193)	38151-01J15
3.06 (0.1205)	38151-01J16
3.09 (0.1217)	38151-01J17
3.12 (0.1228)	38151-01J18
3.15 (0.1240)	38151-01J19
3.18 (0.1252)	38151-01J60
3.21 (0.1264)	38151-01J61
3.24 (0.1276)	38151-01J62
3.27 (0.1287)	38151-01J63
3.30 (0.1299)	38151-01J64
3.33 (0.1311)	38151-01J65
3.36 (0.1323)	38151-01J66
3.39 (0.1335)	38151-01J67
3.42 (0.1346)	38151-01J68
3.45 (0.1358)	38151-01J69
3.48 (0.1370)	38151-01J70
3.51 (0.1382)	38151-01J71
3.54 (0.1394)	38151-01J72
3.57 (0.1406)	38151-01J73
3.60 (0.1417)	38151-01J74
3.63 (0.1429)	38151-01J75
3.66 (0.1441)	38151-01J76

Drive pinion preload adjustment

Drive pinion bearing preload adjusting method	Adjusting shim and spacer
Drive pinion preload N·m (kg-cm, in-lb)	1.4 - 1.7 (14 - 17, 12 - 15)
Without front oil seal	1.2 - 1.5 (12 - 15, 10 - 13)

Available drive pinion preload adjusting shims

Thickness mm (in)	Part number
2.31 (0.0909)	38125-82100
2.33 (0.0917)	38126-82100
2.35 (0.0925)	38127-82100
2.37 (0.0933)	38128-82100
2.39 (0.0941)	38129-82100
2.41 (0.0949)	38130-82100
2.43 (0.0957)	38131-82100
2.45 (0.0965)	38132-82100
2.47 (0.0972)	38133-82100
2.49 (0.0980)	38134-82100
2.51 (0.0988)	38135-82100
2.53 (0.0996)	38136-82100
2.55 (0.1004)	38137-82100
2.57 (0.1012)	38138-82100
2.59 (0.1020)	38139-82100

Available drive pinion preload adjusting spacers

Length mm (in)	Part number
4.50 (0.1772)	38165-76000
4.75 (0.1870)	38166-76000
5.00 (0.1969)	38.167-76000
5.25 (0.2067)	38166-01J00
5.50 (0.2165)	38166-01J10

Total preload adjustment

Total preload N·m (kg-cm, in-lb)	1.7 - 2.5 (17 - 25, 15 - 22)
Ring gear backlash mm (in)	0.15 - 0.20 (0.0059 - 0.0079)
Side bearing adjusting method	Side adjuster

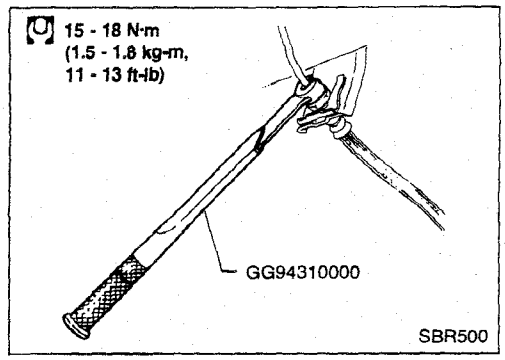
FRONT AXLE & FRONT SUSPENSION

SECTION FA

FRONT AXLE & FRONT SUSPENSION

SECTION FA

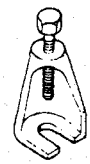
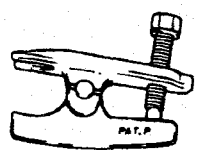
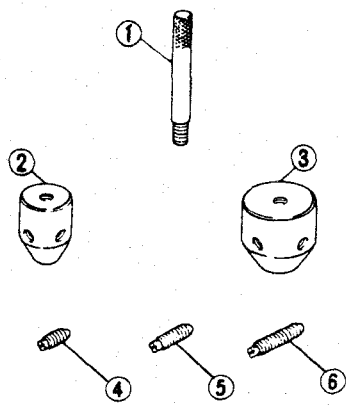
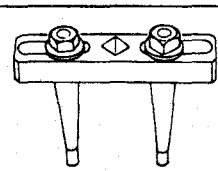
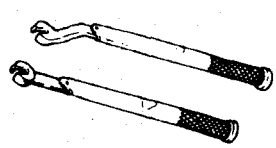
CONTENTS



(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.

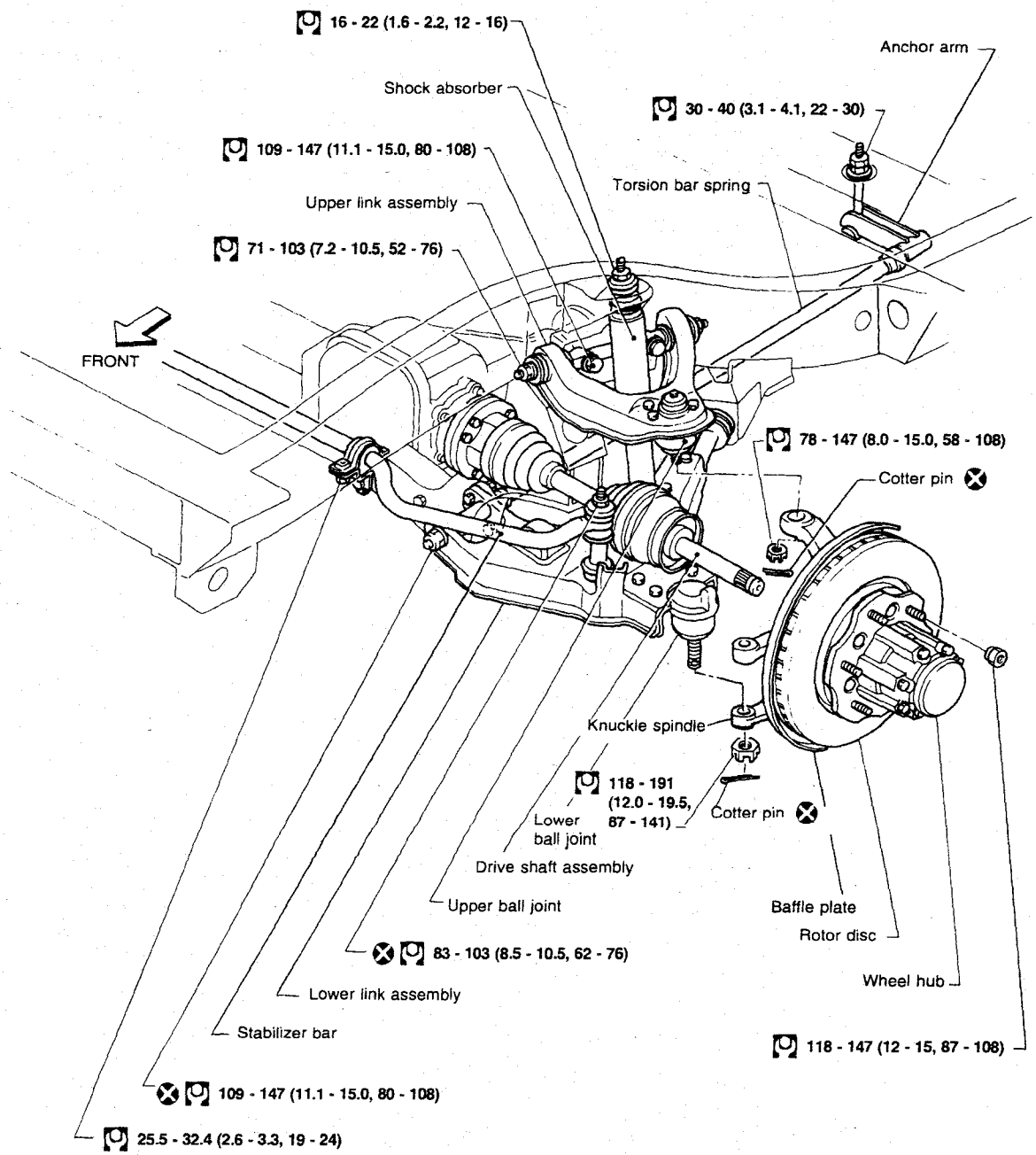
SPECIAL SERVICE TOOLS

*:Special tool or commercial equivalent

Tool number Tool name	Description	
ST29020001* Gear arm puller		Removing ball joint for knuckle spindle
ST27850000 Ball joint remover		Removing tie-rod outer end
KV401021S0* Bearing outer race drift ① ST35325000* Drift bar ② KV40102110* Drift (A) ③ KV40102120* Drift (B) ④ KV40102130* Screw (A) ⑤ KV40102140* Screw (B) ⑥ KV40102150* Screw (C)		Installing wheel bearing outer race
KV40105400 Wheel bearing lock nut wrench		Removing or installing wheel bearing lock nut
GG94310000* Flare nut torque wrench		Removing and installing brake piping

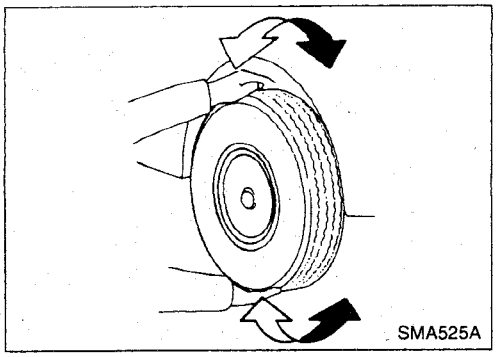
When installing each rubber part, final tightening must be carried out under unladen condition* with tires on ground.

* Fuel, radiator coolant and engine oil full. Spare tire, jack, hand tools and mats in designated positions.



: N·m (kg-m, ft-lb)

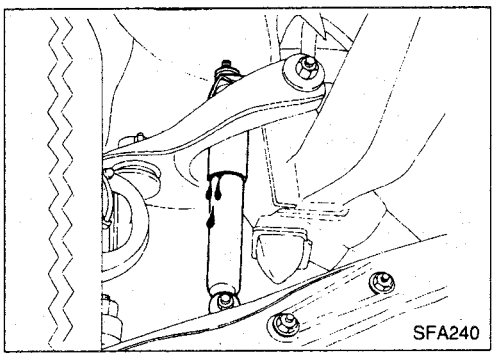
EFA014


SMA525A

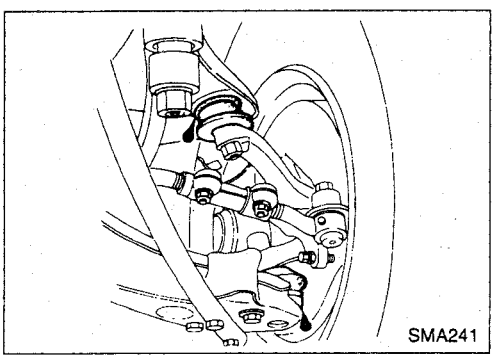
Front Axle and Front Suspension Parts

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

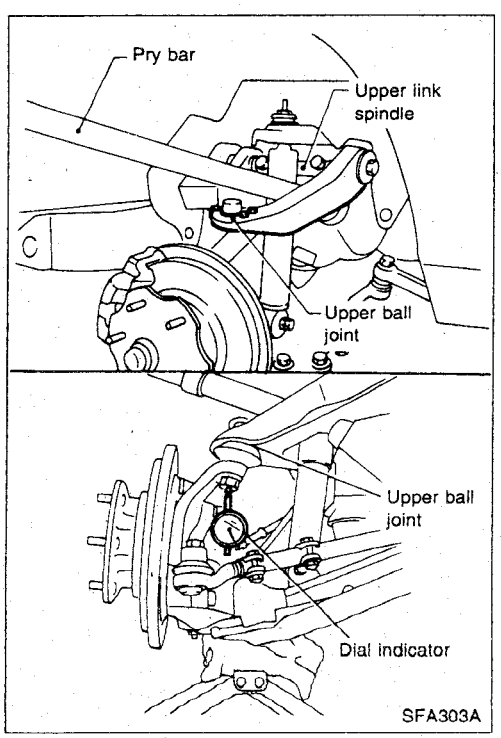
(1) Shake each front wheel.
(2) Make sure that cotter pin is inserted.
(3) Retighten all nuts and bolts to the specified torque.
[O]: Refer to "FRONT SUSPENSION"
(4) Check front axle and front suspension parts for wear, cracks or other damage.


SFA240

- Check shock absorber for oil leakage or other damage.


SMA241

- Check suspension ball joints for grease leakage and dust covers for cracks or other damage.



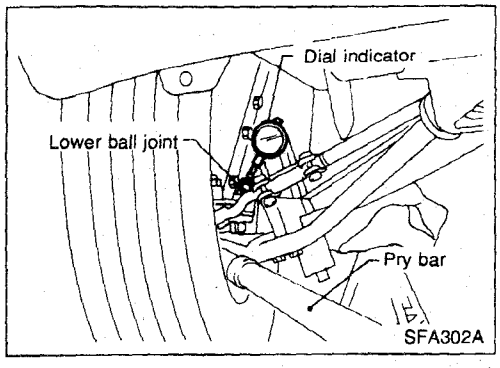
SFA303A

- Check ball joint for vertical end play.

Upper ball joint:
1.6 mm (0.063 in) or less

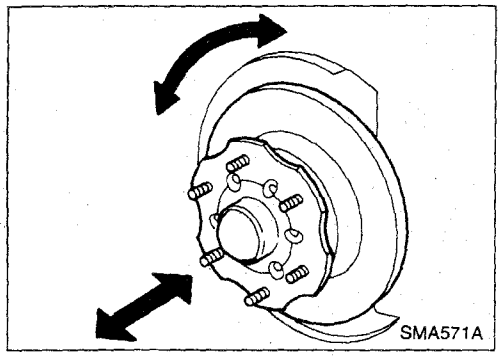
(1) Jack up front of vehicle and set the stands.
(2) Clamp dial indicator onto transverse link and place indicator tip on lower edge of brake caliper.
(3) Make sure front wheels are straight and brake pedal is depressed.
(4) Place a pry bar between transverse link and inner rim of road wheel.
(5) While pushing and releasing pry bar, observe maximum dial indicator value.
(6) If ball joint movement is beyond specifications, remove and recheck it.

Front Axle and Front Suspension Parts (Cont'd)



Lower ball joint:
0.5 mm (0.020 in) or less

(1) Jack up front of vehicle and set the stands.
(2) Remove road wheel.
(3) Clamp dial indicator onto upper link and place indicator tip on knuckle near ball joint.
(4) Jack up lower link [Approx. 20 mm (0.79 in)].
(5) Place a pry bar between upper link and upper link spindle.
(6) While pushing and releasing pry bar observe maximum dial indicator value.
(7) If ball joint movement is beyond specifications, remove and recheck it.



Front Wheel Bearing

- Check that wheel bearings operate smoothly.
- Check axial end play.

Axial end play: 0 mm (0 in)

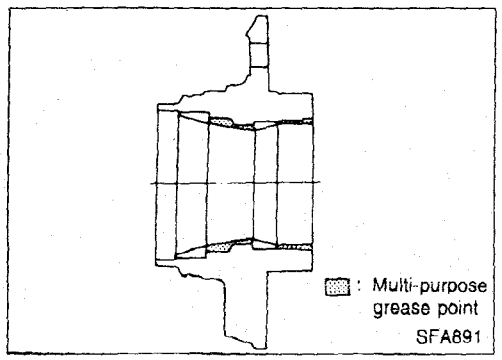
- Adjust wheel bearing preload if there is any axial end play or wheel bearing does not turn smoothly.

PRELOAD ADJUSTMENT

Adjust wheel bearing preload after wheel bearing has been replaced or front axle has been reassembled.

Adjust wheel bearing preload as follows:

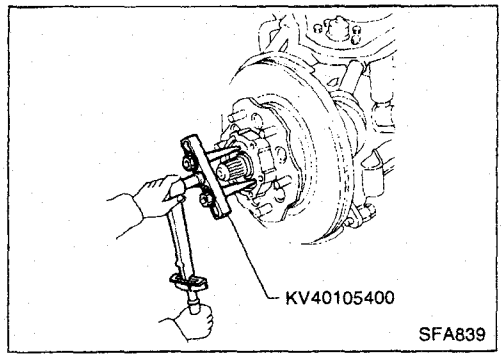
1. Before adjustment, thoroughly clean all parts to prevent dirt entry.



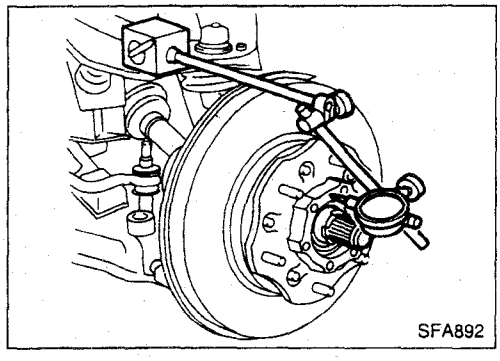
2. Apply multi-purpose grease sparingly to the following parts:

- Threaded portion of spindle
- Contact surface between wheel bearing washer and outer wheel bearing
- Grease seal lip
- Wheel hub (as shown at left)

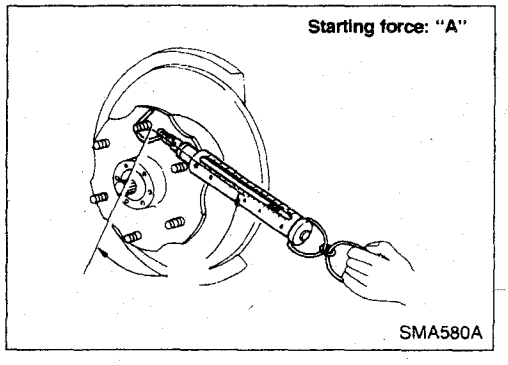
Front Wheel Bearing (Cont'd)



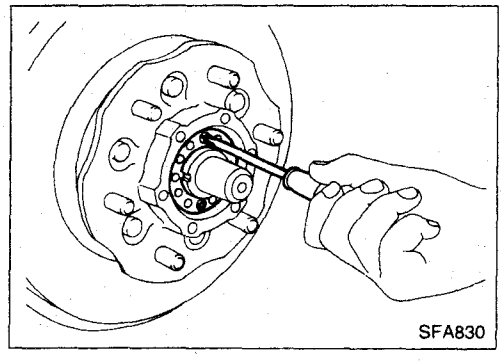
3. Tighten wheel bearing lock nut with Tool.
   :78 - 98 N·m
   (8 - 10 kg-m, 58 - 72 ft-lb)
4. Turn wheel hub several times in both directions.
5. Loosen wheel bearing lock nut so that torque becomes 0 N·m (0 kg-m, 0 ft-lb).
6. Retighten wheel bearing lock nut with Tool.
   :0.5 - 1.5 N·m
   (0.05 - 0.15 kg-m, 0.4 - 1.1 ft-lb)



7. Turn wheel hub several times in both directions.
8. Retighten wheel bearing lock nut with Tool.
   :0.5 - 1.5 N·m
   (0.05 - 0.15 kg-m, 0.4 - 1.1 ft-lb)
9. Measure wheel bearing axial end play.
   Axial end play:
   0 mm (0 in)



10. Measure starting force "A" at wheel hub bolt when moving the hub by 90° as shown.



11. Install lock washer by tightening the lock nut within 15 to 30 degrees.
12. Turn wheel hub several times in both directions to seat wheel bearing correctly.
13. Measure starting force "B" at wheel hub bolt. Refer to procedure 10.
14. Wheel bearing preload "C" can be calculated as shown below.

    C = B − A

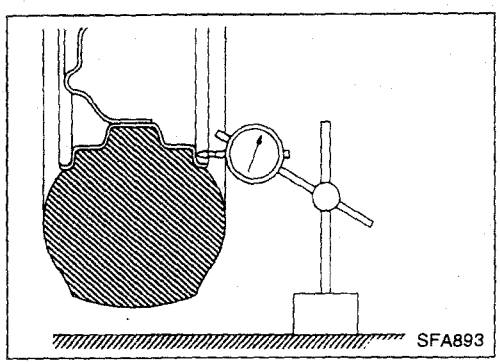
    Wheel bearing preload "C":
    7.06 - 20.99 N
    (0.72 - 2.14 kg, 1.59 - 4.72 lb)
15. Repeat above procedures until correct axial end play and wheel bearing preload are obtained.
16. Install free-running hub and brake pads.

Front Wheel Alignment

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

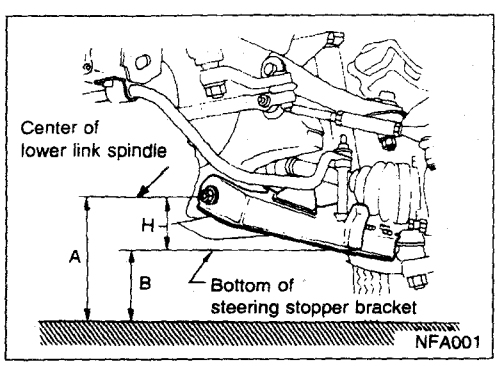
PRELIMINARY INSPECTION

1. Check the tires for wear and proper inflation.



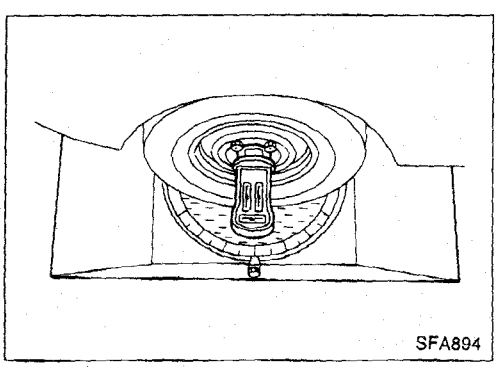
2. Check the wheel runout.
   Wheel runout:
   Refer to S.D.S
3. Check the front wheel bearings for looseness.
4. Check the front suspension for looseness.
5. Check the steering linkage for looseness.
6. Check that the front shock absorbers work properly by using the standard bounce test.
7. Measure vehicle height (Unladen): H = A – B mm (in)
   Refer to S.D.S.

(1) Exercise the front suspension by bouncing the front of the vehicle 4 or 5 times to ensure that vehicle is in a neutral height attitude.
(2) Measure wheel alignment.
   Refer to S.D.S.
(3) Measure vehicle posture ... Dimension "H".
   Refer to S.D.S.



If "H" dimension is not within the specified value, readjust vehicle posture using anchor arm adjusting nut.
Refer to "INSTALLATION AND ADJUSTMENT" in "Torsion Bar Spring", section of "FRONT SUSPENSION". Adjust wheel alignment if necessary.

(4) If wheel alignment is not as specified, but dimension "H" is correct, adjust wheel alignment.

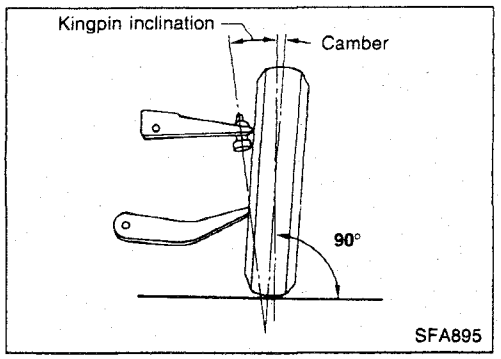


CAMBER, CASTER AND KINGPIN INCLINATION

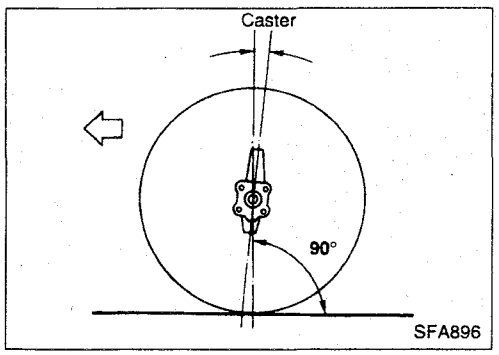
Before checking camber, caster or kingpin inclination, move vehicle up and down on turning radius gauge to minimize friction. Ensure that vehicle is in correct posture (unladen vehicle).

- **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.**

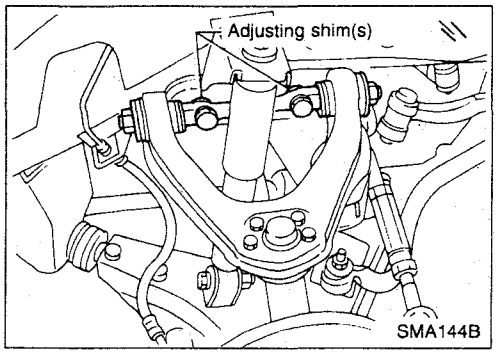
Front Wheel Alignment (Cont'd)



Camber (Unladen):
Refer to S.D.S.
Kingpin inclination (Unladen):
Refer to S.D.S.

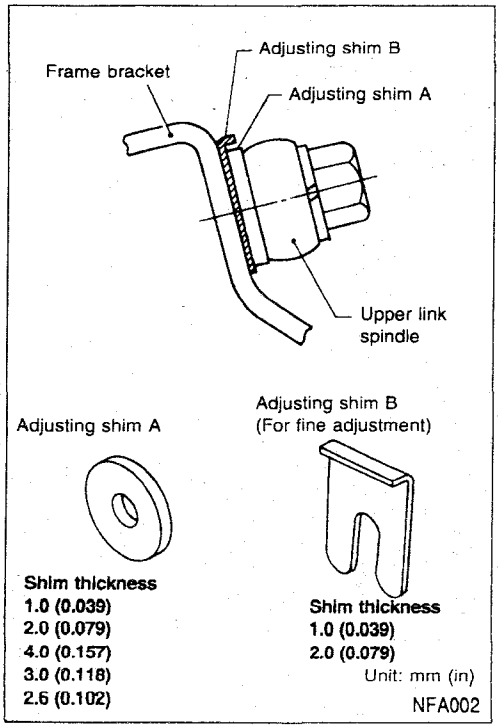


Caster (Unladen):
Refer to S.D.S.



ADJUSTMENT

Both camber and caster angles are adjusted by increasing or decreasing the number of adjusting shims inserted between upper link spindle and frame.



Before removing or installing adjusting shim(s), be sure to place a jack under lower link.

Adjusting shim standard thickness:
4.0 mm (0.157 in)

- **Do not use three or more shims at one place.**
- **When installing shim B, always face the pawl towards spindle and insert them from bracket side. Use only one shim in a place.**
- **Total thickness of shims must be within 8.0 mm (0.315 in).**
- **Difference of total thickness of the front and rear must be within 3.0 mm (0.118 in). The caster angle between the opposite sides of the vehicle may not exceed 0°45′.**
- **Determine thickness and number of shims necessary for adjusting camber and caster, in accordance with the following graph.**

Front Wheel Alignment (Cont'd)

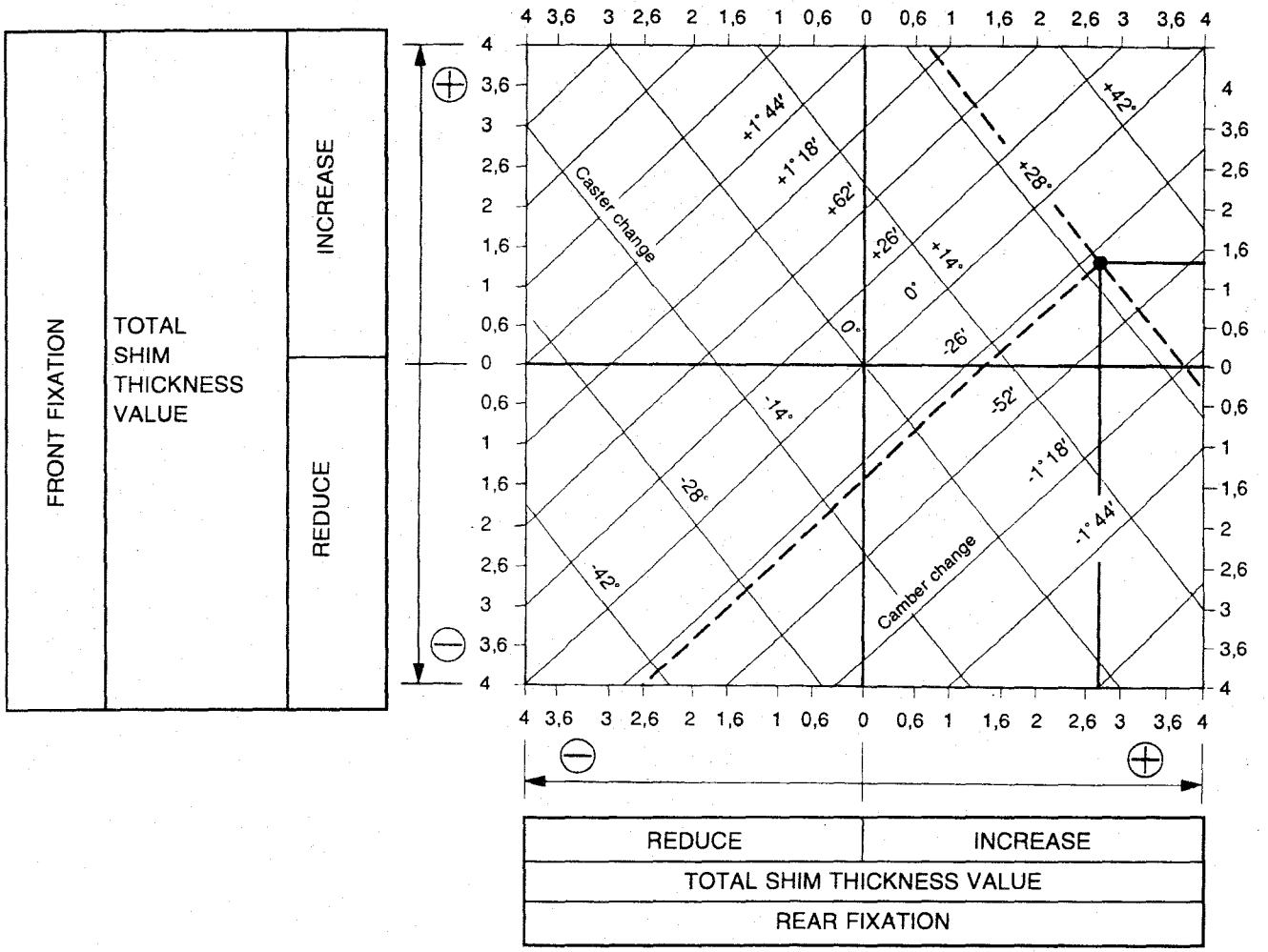
[Example]
(Measures taken at one side):

(1)

	Angle		
	Specified value	Measured	Change
Camber angle	0°35′	0°5′	+0°30′
Caster angle	1°40′	2°10′	–0°30′

The above values reflect to the below graph as follows:

Shim thickness selection graph



EFA015

(2) Obtain intersection point of lines in accordance with the graph.

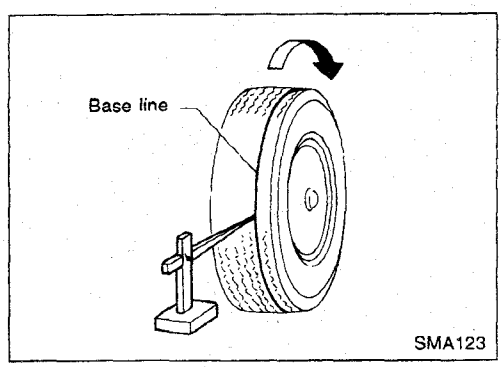
Front: 1.5 mm
Rear: 2.7 mm

(3) Choose shims which are nearest to the values found in the graph:

Front: 1.6 mm
Rear: 2.6 mm

(4) If shim thicknesses as calculated appear not to be available, combinations of different shims should be used to meet the desired total thickness of the shims.

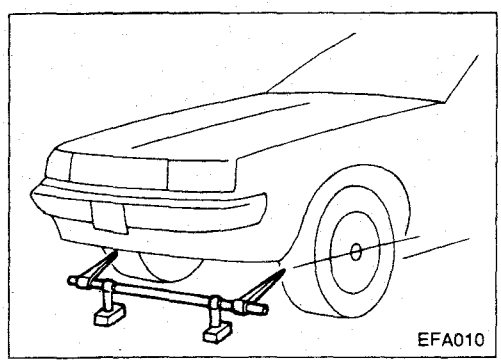
Front Wheel Alignment (Cont'd)



TOE-IN

1. Mark a base line across the tread.

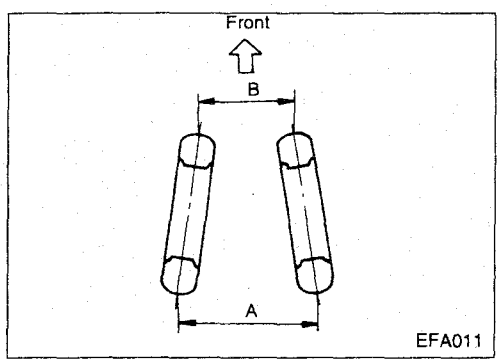
After lowering front of vehicle, move it up and down to eliminate friction, and set steering wheel in straight ahead position.

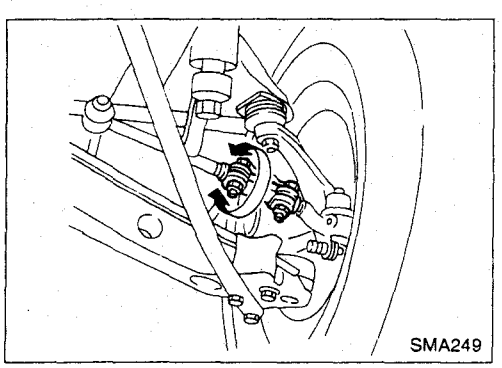


2. Measure toe-in.

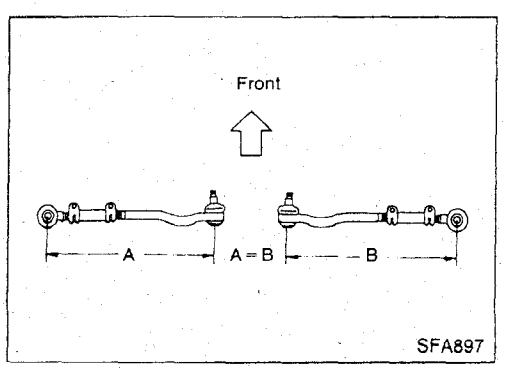
Measure distance "A" and "B" at the same height as hub center.

Toe-in (Unladen):
Refer to S.D.S.
Toe-in = A — B





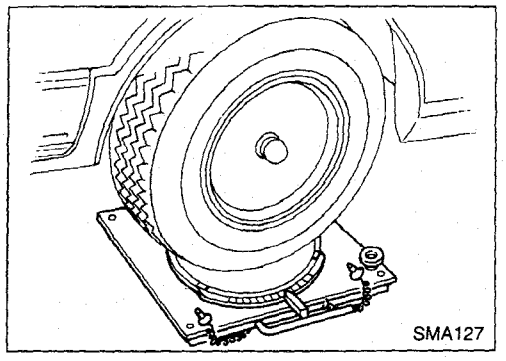
3. Adjust toe-in by varying the length of steering tie-rods.
(1) Loosen clamp bolts or lock nuts.
(2) Adjust toe-in by turning the left and right tie-rod tubes an equal amount.



Make sure that the tie-rod bars are screwed into the tie-rod tube more than 35 mm (1.38 in).
Make sure that the tie-rods are the same length.
Standard length (A = B):
281 mm (11.06 in)

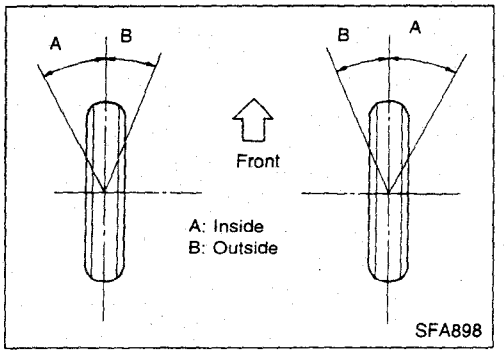
(3) Tighten clamp bolts or lock nuts, to the specified torque.

Front Wheel Alignment (Cont'd)


SMA127

FRONT WHEEL TURNING ANGLE

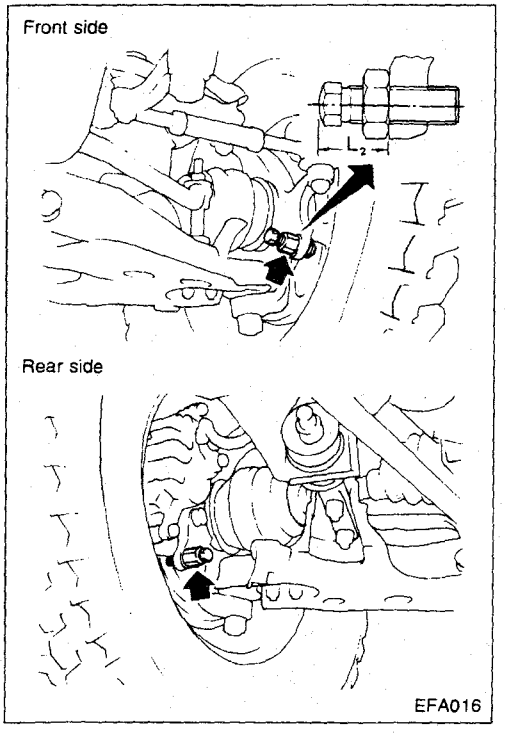
1. Set wheels in straight ahead position and then move vehicle forward until front wheels rest on turning radius gauge properly.



SFA898

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

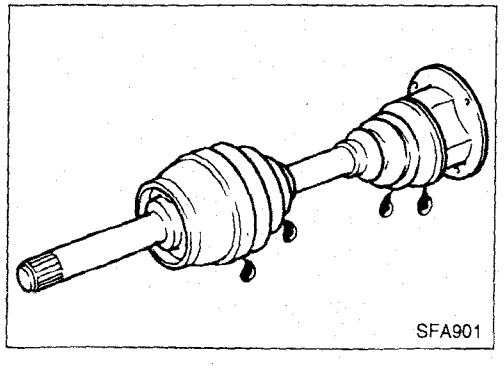
Wheel turning angle:
Refer to S.D.S.



EFA016

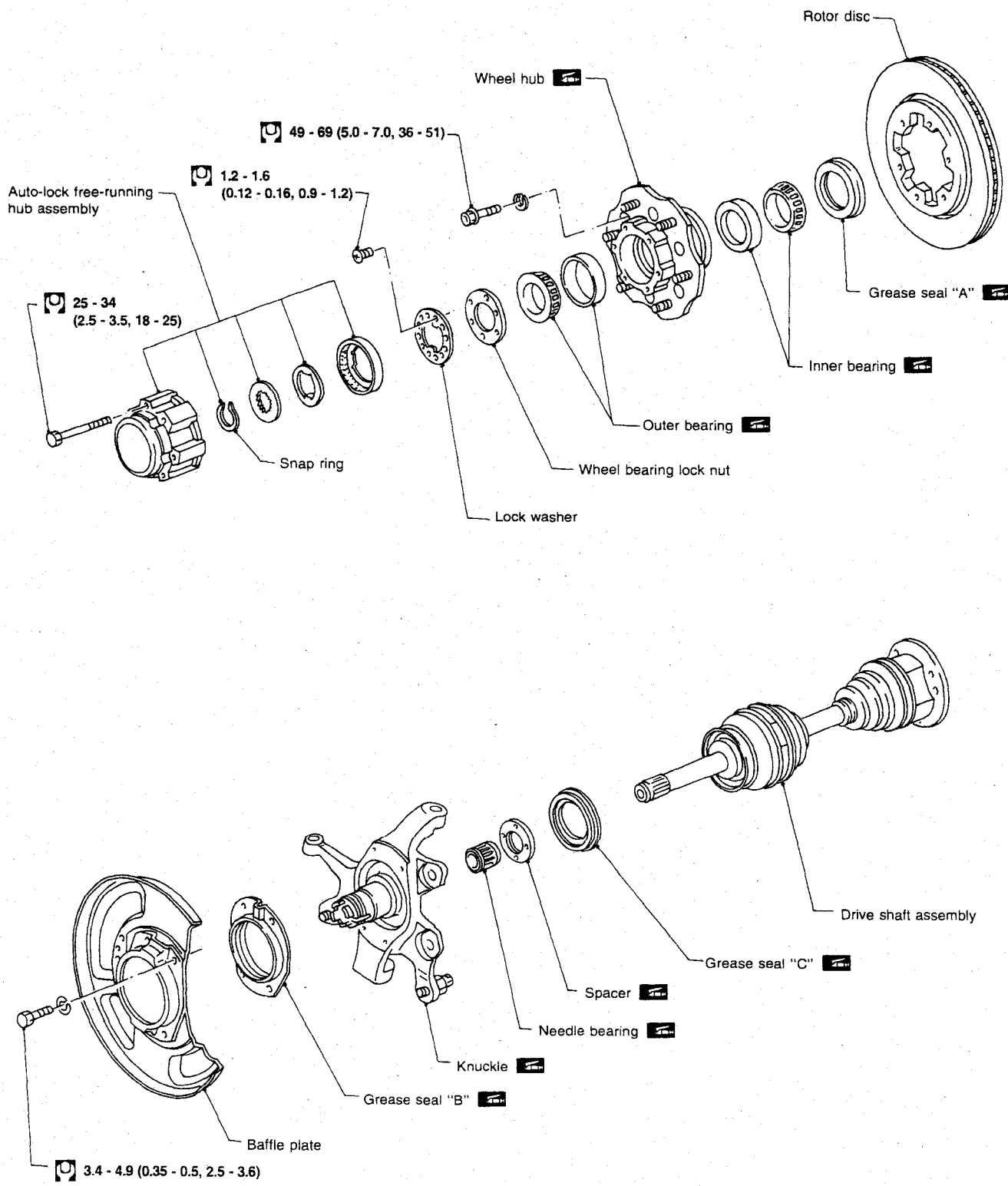
3. Adjust by stopper bolt if necessary.

Standard length "L_2":
26.5 mm (1.043 in)


SFA901

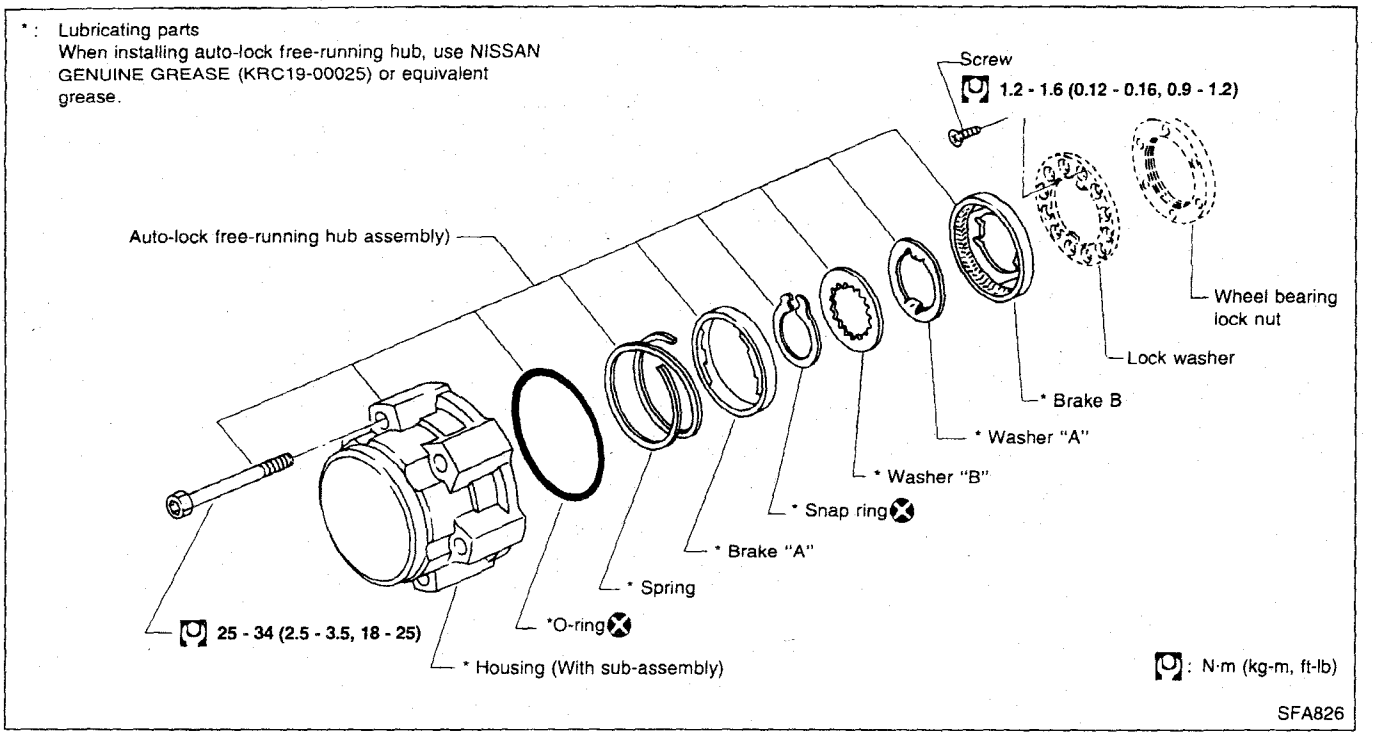
Drive Shaft

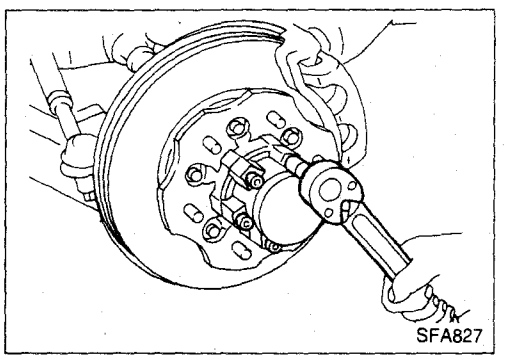
- Check for grease leakage or other damage.



: N·m (kg-m, ft-lb)

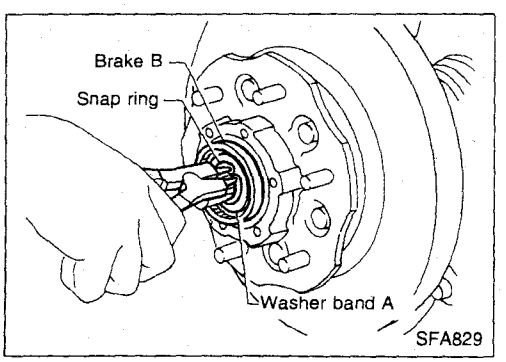
EFA006





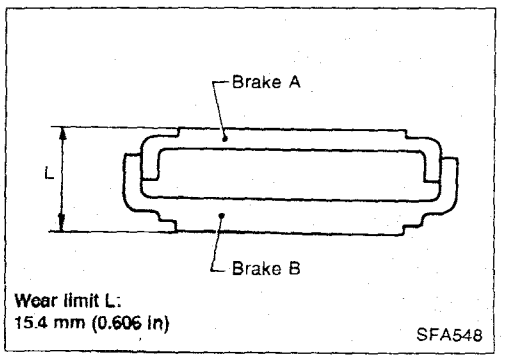
Removal and Installation

- Set the auto-lock free-running hub at the condition "Free".
- Remove auto-lock free-running hub with brake pedal depressed.



- Remove snap ring.
- Remove washer B, washer A and brake B.
- After installing auto-lock free-running hub, check operation.

When installing it, apply recommended grease to drive shaft end.



Inspection

Thoroughly clean parts and dry with compressed air.

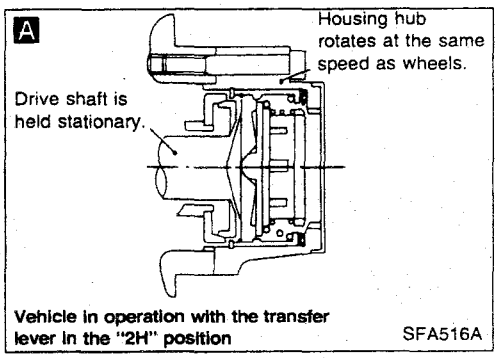
Brake "A" and "B"

Measure the thickness "L" of brake "A" and "B".
If thickness is less than the specified limit, replace brake "A" and "B" as a set.

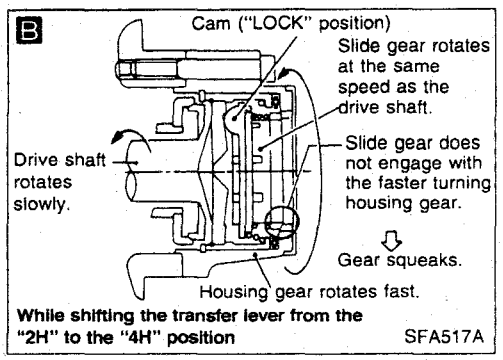
Wear limit "L" = 15.4 mm (0.606 in)

Trouble-shooting

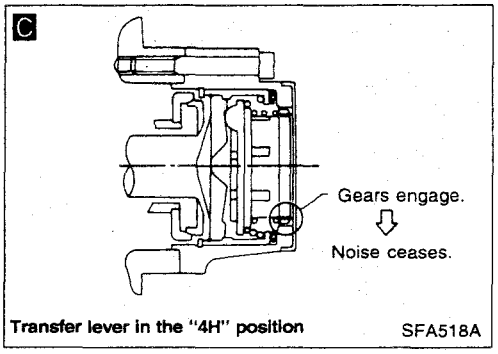
Noise occurring in the auto hub under any of the conditions described is not indicative of a problem. Noise can be eliminated by properly operating the transfer lever of the vehicle.



Vehicle in operation with the transfer lever in the "2H" position SFA516A



While shifting the transfer lever from the "2H" to the "4H" position SFA517A



Transfer lever in the "4H" position SFA518A

Noise

Was the transfer lever shifted from the "2H" to the "4H" position while the vehicle was operated at a speed greater than 40 km/h (25 MPH)?

Yes → Shifting the transfer lever from the "2H" to the "4H" position in high-speed operation (Fig. A → Fig. B), is sometimes difficult. At this point, a clattering occurs in the auto hub. If shifting is stopped halfway, the drive shaft no longer rotates and the cam is held in the "LOCK" position (Fig. B). In this case, the noise will continue until the vehicle is stopped. When this occurs, decrease vehicle speed to less than 40 km/h (25 MPH), return the transfer lever to the "2H" position once and then reshift to the "4H" position.
Gears will then be engaged and the noise will cease (Fig. C).

No

Was the transfer lever shifted from the "2H" to the "4H" position while the vehicle was operated at a speed less than 40 km/h (25 MPH)?

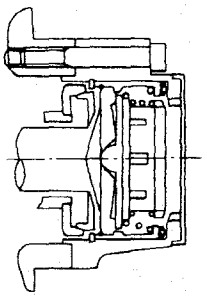
Yes → When noise occurs in the auto hub while shifting from the "2H" to the "4H" position (Fig. A → Fig. B), do not stop shifting halfway. When shifted to the "4H" position, the "4WD" pilot lamp will come on to indicate that the gears are engaged properly and that the vehicle is set in the 4WD mode. Noise will then cease (Fig. C). If shifting is stopped halfway, noise will continue.
In such a case, return the transfer lever to the "2H" position once and re-shift it to the "4H" position. Gears will then be engaged and the noise will cease (Fig. C). (If the lever is left in the "2H" position, the noise will continue until the vehicle is stopped.)

No

Ⓐ

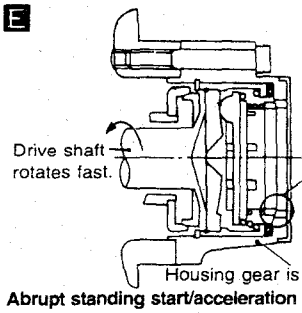
Trouble-shooting (Cont'd)

D



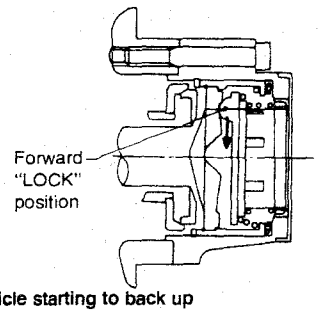
Vehicle stoppage SFA519A

E



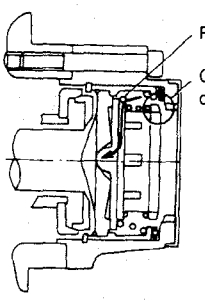
Abrupt standing start/acceleration while rear wheels are slipping SFA520A

F



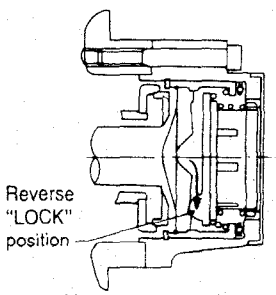
Vehicle starting to back up SFA521A

G



Gears in "unlocked" condition SFA522A

H



Gears engaged in reverse SFA523A

Ⓐ

Was the vehicle started after the transfer lever was shifted from the "2H" to the "4H" or "4L" position?

Yes → A clicking noise can sometimes occur in the auto hub when the gears are engaged. This is not a problem.
Noise can be encountered during rapid acceleration while rear wheels are slipping on snowy roads, muddy roads, slopes, etc. (Fig. D → Fig. E).
In such a case, release the accelerator pedal to reduce engine speed. Gears will then be engaged and the noise will cease (Fig. C).

No

Was the vehicle backed up when the transfer lever was in the "4H" or the "4L" position, or was the vehicle backed up while on a downgrade when the transfer lever was in the "4H" or the "4L" position?

Yes → When backing up the vehicle with the transfer in the "4H" or the "4L" position, auto-hub gears sometimes disengage but soon reengage (Fig. F → Fig. G → Fig. H) with a clicking noise. This is not a problem.
Noise will also occur if the vehicle is accelerated rapidly while the gears are disengaged. In such a case, release the accelerator pedal once to decrease engine speed. Gears will then be engaged and the noise will cease (Fig. C).

No

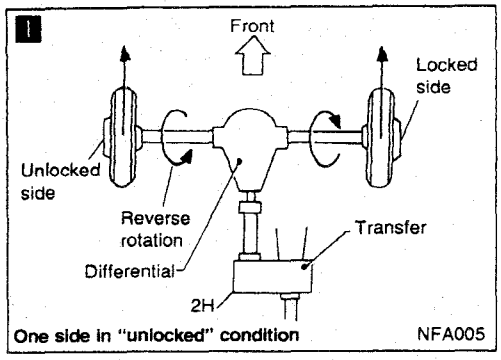
Was the vehicle turned on a dry pavement, when the transfer lever was in the "4H" or the "4L" position?

Yes → Under these conditions, noise occurs in tires (creaking) or in the power train (rattling) — not in the auto hub.
Avoid driving in the conditions described above as it may lead to tire wear.

No

Ⓑ

Trouble-shooting (Cont'd)



One side in "unlocked" condition NFA005

Ⓑ

Was the vehicle moved in one direction after the vehicle was driven in another direction when the transfer lever was in the "4H" or the "4L" position and then returned to the "2H" position?

Yes → Auto-hub gears will disengage with a resultant noise (clicking). If the distance the vehicle is moved in the opposite direction is short [less than 1 m (3 ft)] or if the rotation angle of the left and right wheels is not the same (as in rounding a corner), gears on one side will disengage (Fig. I). Under this condition, a noise (crushing, etc.) might occur while driving in the "2H" position. If only gears on one side are unlocked, the locked drive shaft rotates at the same speed as wheels; however, the unlocked drive shaft is made to rotate in the reverse direction by the differential. This forces by auto hub's slide gear to lock in the reverse direction. As a result, noise occurs.
If this happens, slowly move the vehicle straight back approximately 2 to 3 m (7 to 10 ft) with the transfer lever in the "2H" position to disengage the gears on the other side.

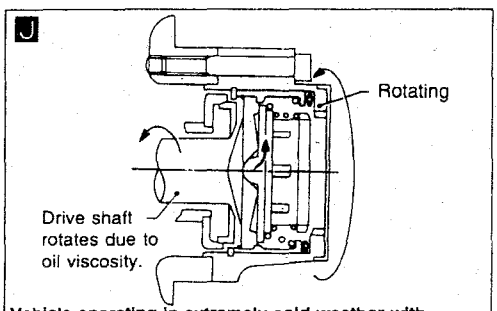
No ↓

Was the vehicle driven with the transfer lever in the "2H" position in extremely cold weather?

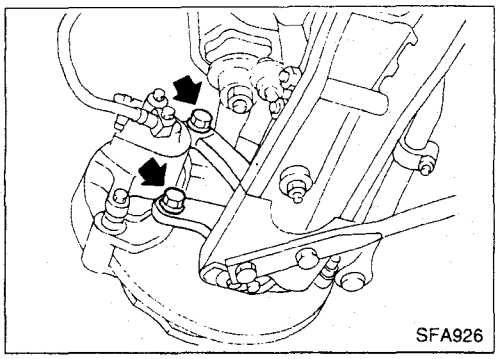
Yes → In extremely cold weather (areas), the viscosity of differential oil is greater than in moderate weather. When the auto hubs are unlocked with the transfer lever set to the "2H" position, one auto hub can sometimes remain locked. This causes noise during operation. Noise can also occur in the auto hub when the front propeller shaft is rotated due to the viscosity resistance of the transfer fluid (Fig. J).
In such a case, drive in the "4H" position for approximately 10 minutes until the vehicle warms up, and return the transfer lever to the "2H" position to eliminate the noise.

No ↓

Disassemble and check the auto hub.
(Refer to "Removal and Installation" earlier in this section.)



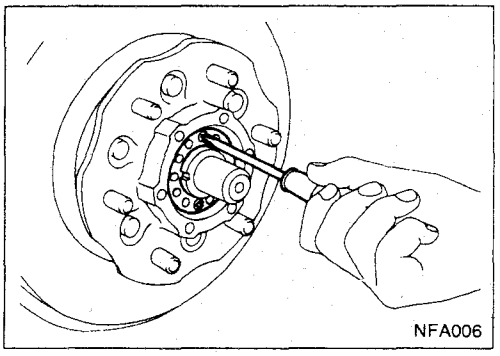
Vehicle operating in extremely cold weather with transfer lever in the "2H" position SFA525A



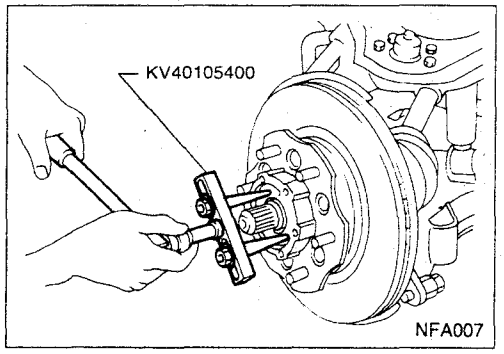
Removal and Installation

- Remove free-running hub assembly.
  Refer to "FRONT AXLE — Auto-Lock Free-running Hub".
- Remove brake caliper assembly.

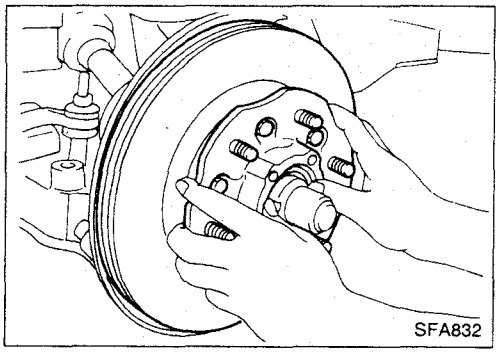
Brake hose does not need to be disconnected from brake caliper.
Be careful not to depress brake pedal, or piston will pop out.
Make sure brake hose is not twisted.



- Remove lock washer.



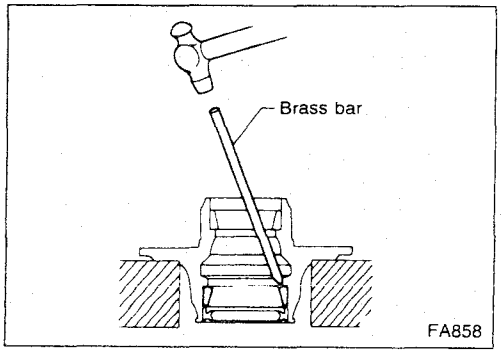
- Remove wheel bearing lock nut with Tool.
  Tool: KV40105400



- Remove wheel hub and wheel bearing.

Be careful not to drop outer bearing.

- After installing wheel hub and wheel bearing, adjust wheel bearing preload.
  Refer to "PRELOAD ADJUSTMENT" in "Front Wheel Bearing" section of "CHECK AND ADJUSTMENT".



Disassembly

- Drive bearing outer races with suitable brass bar.

Inspection

Thoroughly clean wheel bearing and wheel hub.

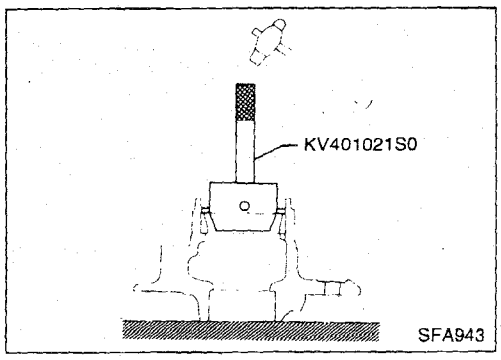
WHEEL BEARING

- Make sure wheel bearing rolls freely and is free from noise, crack, pitting or wear.

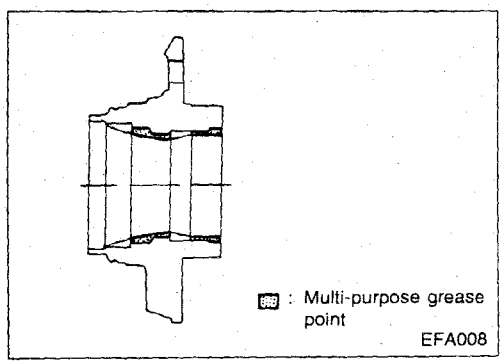
WHEEL HUB

- Check wheel hub for cracks by using a magnetic exploration or dyeing test.

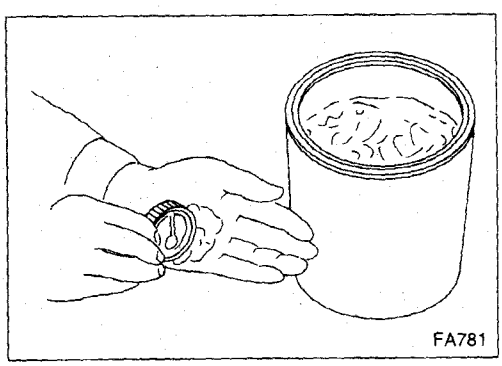
Assembly



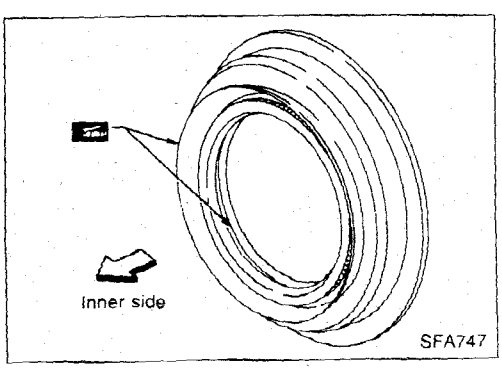
- Install bearing outer race with Tool until it seats in hub.



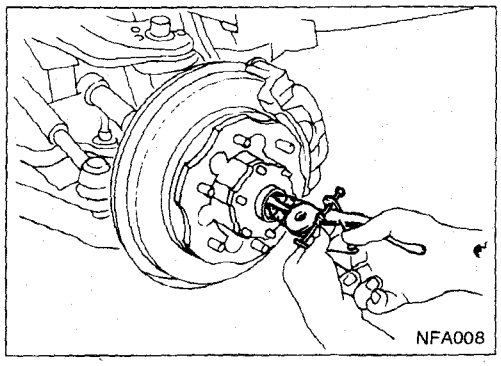
- Pack multi-purpose grease to hub and hub cap.



- Apply multi-purpose grease to each bearing cone.

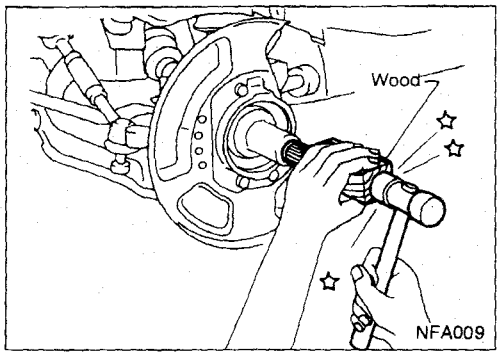


- Pack grease seal lip with multi-purpose grease, then install it into wheel hub with suitable drift.

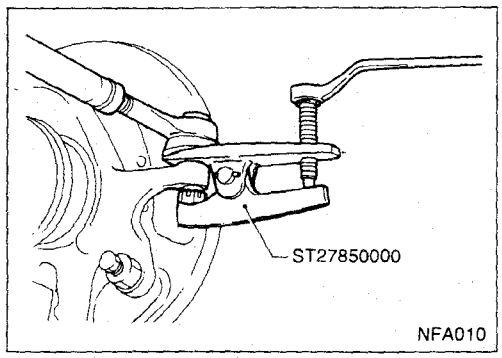


Removal

- Remove free-running hub assembly.
  Refer to "FRONT AXLE — Auto-lock Free-running Hub".

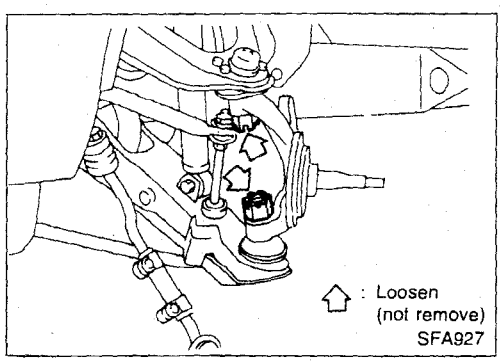


- Separate drive shaft from knuckle spindle by slightly tapping drive shaft end.



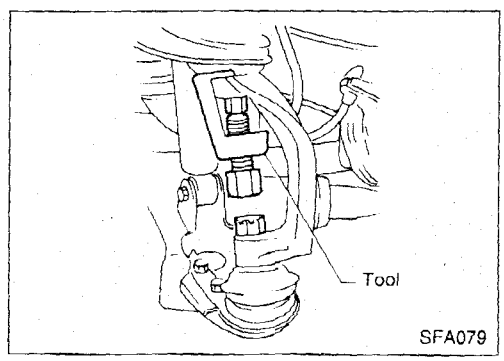
- Separate tie-rod from knuckle spindle with Tool.

Install stud nut conversely on stud bolt so as not to damage stud bolt.



- Separate knuckle spindle from ball joints.

(1) Loosen (not remove) upper and lower ball joint tightening nuts.

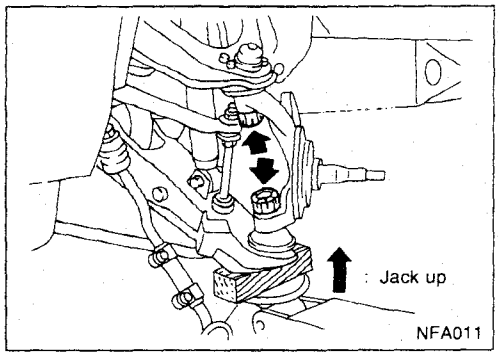


(2) Separate upper and lower ball joints to knuckle spindle with Tool.

During above operation, never remove ball joint nuts which are loosened in step (1) above.

Tool: HT72520000

Removal (Cont'd)



(3) Remove ball joint tightening nuts.
Support lower link with jack.
(4) Separate knuckle spindle from upper and lower links.

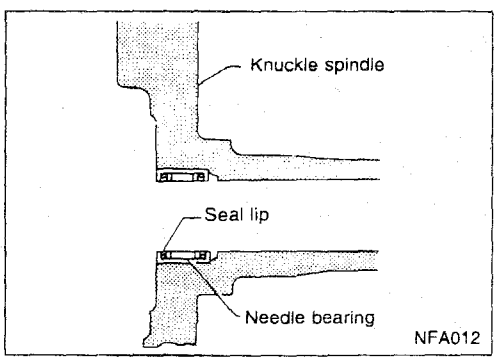
Inspection

KNUCKLE SPINDLE

- Check knuckle spindle for deformation, cracks or other damage by using a magnetic exploration or dyeing test.

NEEDLE BEARING

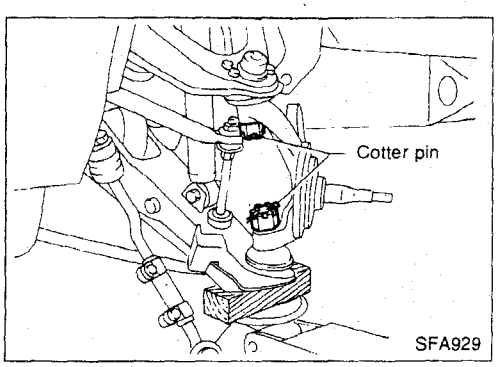
- Check needle bearing for wear, scratches, pitting, flaki and burn marks.



Installation

- Install needle bearing into knuckle spindle.

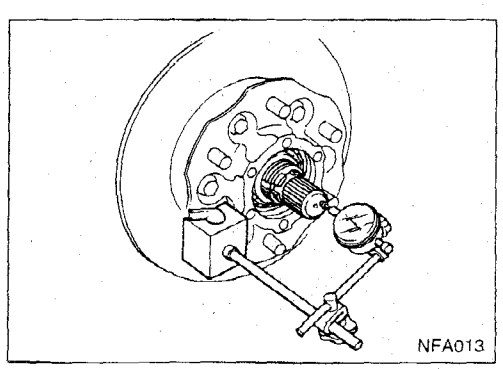
Make sure that needle bearing is facing in proper direction.
Apply multi-purpose grease.



- Install knuckle spindle to upper and lower ball joints with lower link jacked up.

CAUTION:

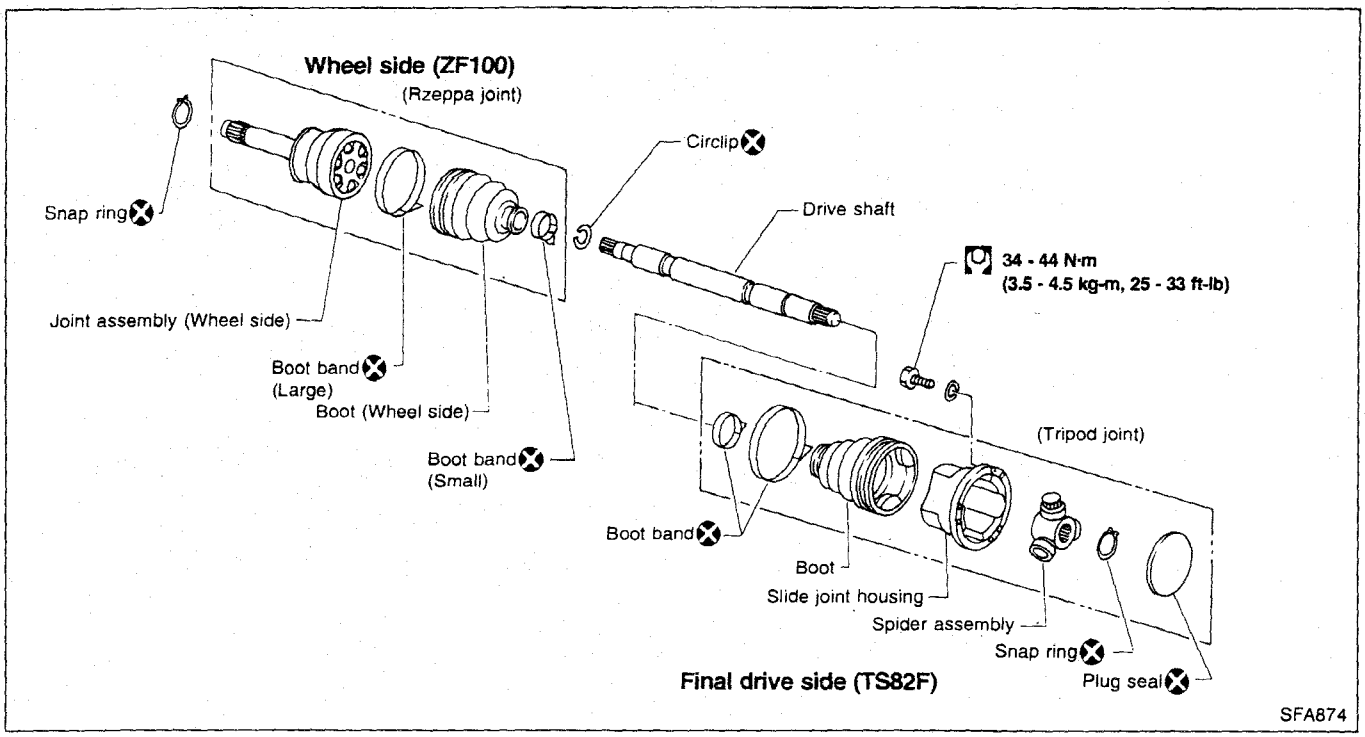
Make sure that oil or grease does not come into contact with tapered areas of ball joint and knuckle spindle and threads of ball joint.

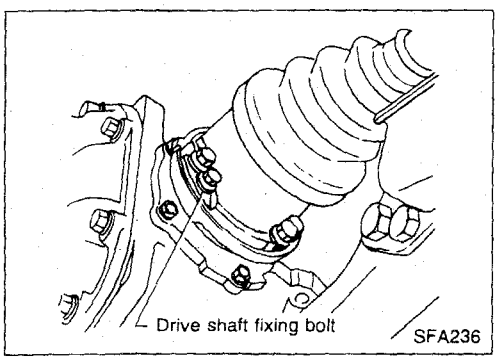


- After installing knuckle spindle, adjust wheel bearing preload.
  Refer to "PRELOAD ADJUSTMENT" in "Front Wheel Bearing" section of "CHECK AND ADJUSTMENT".
- After installing drive shaft, check drive shaft axial end play.

Do not reuse snap ring once it has been removed.
Temporarily install snap ring at same thickness as it was installed before removal.
Refer to "FRONT AXLE — Drive Shaft".

Removal and Installation





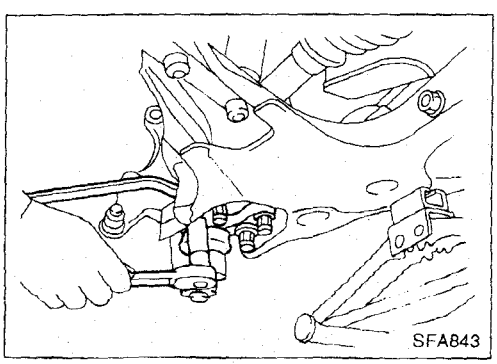
Removal

1. Remove bolts fixing drive shaft to final drive.

2. Remove free-running hub assembly with brake pedal depressed. Refer to "FRONT AXLE — Auto-lock Free-running Hub".
- Remove brake caliper assembly without disconnecting brake hydraulic line.

Make sure that brake hose is not twisted.

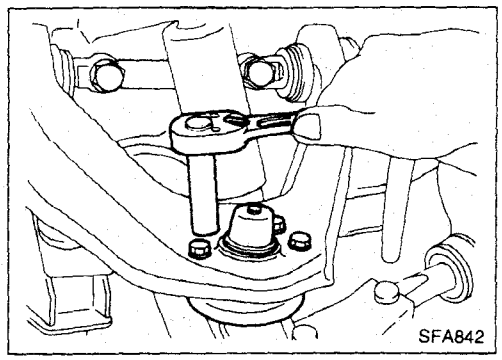
- Remove tie-rod ball joint. Refer to "FRONT AXLE — Knuckle Spindle".



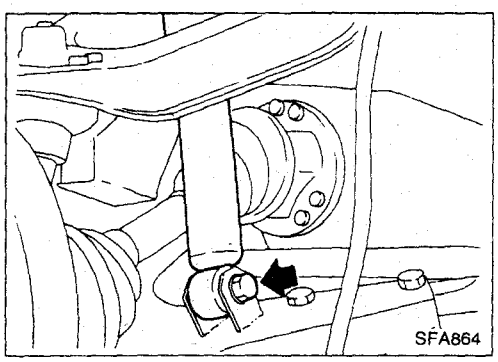
3. Remove nuts fixing lower ball joint on lower link.

Support lower link with jack.

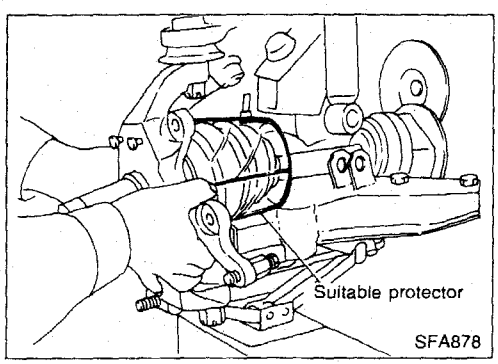
Removal (Cont'd)



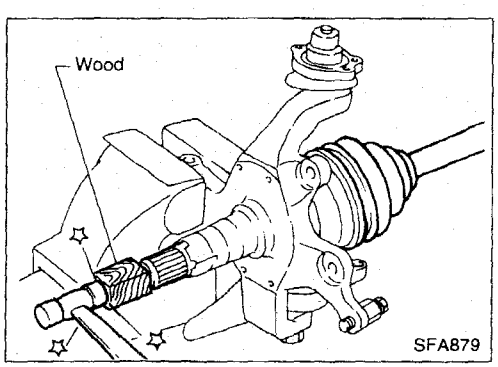
4. Remove upper ball joint fixing bolt.



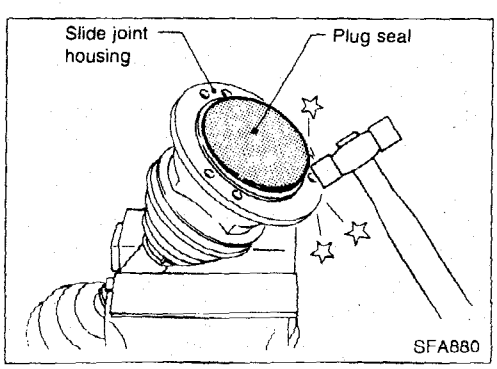
5. Remove shock absorber lower bolt.



6. Remove drive shaft with knuckle.
Cover drive shaft boot with a suitable protector.



7. Separate drive shaft from knuckle by slightly tapping it.



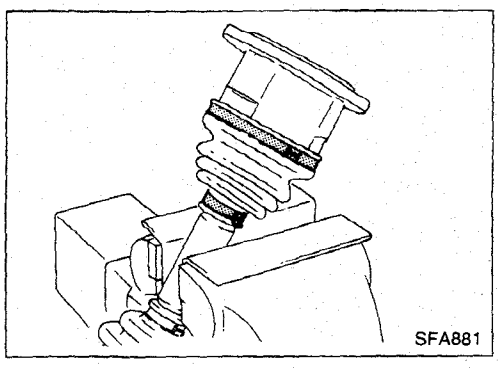
Disassembly

FINAL DRIVE SIDE

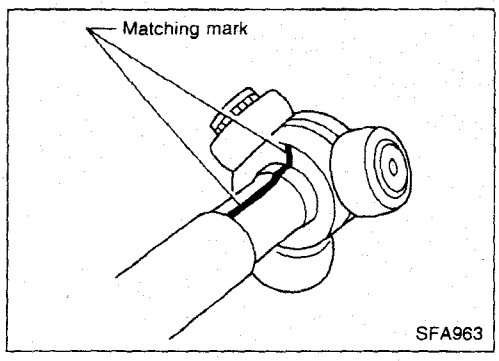
— TS82F type —

1. Remove plug seal from slide joint housing by lightly tapping around slide joint housing.

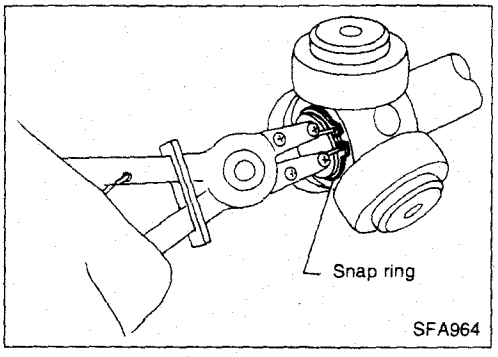
Disassembly (Cont'd)



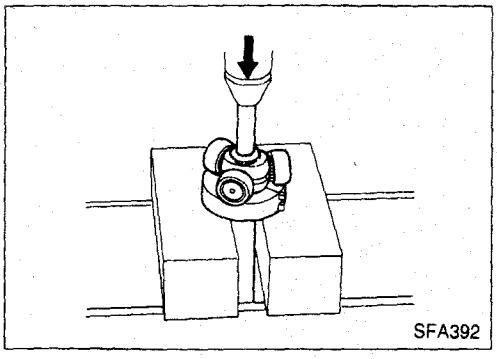
2. Remove boot bands.



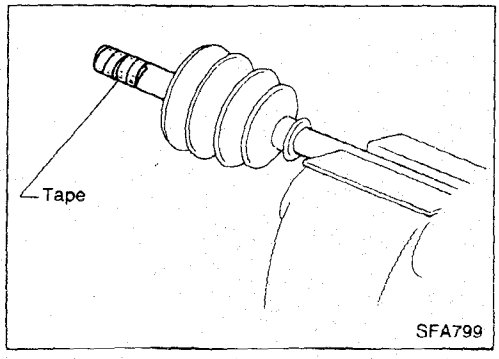
3. Move boot and slide joint housing toward wheel side, and put matching marks.



4. Pry off snap ring.



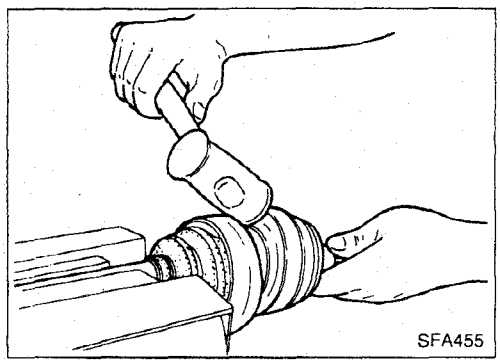
5. Detach spider assembly with press.



6. Draw out boot.

Cover drive shaft serration with tape so as not to damage the boot.

Disassembly (Cont'd)



WHEEL SIDE (ZF100)

CAUTION:

This type of 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.

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 (TS82F) (FINAL DRIVE SIDE)

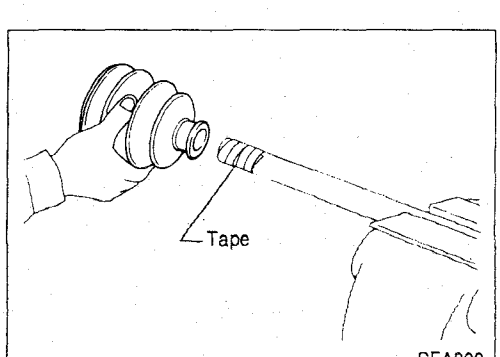
- Replace any parts of double offset joint which show signs of scorching, rust, wear or excessive play.
- Check serration for deformation. Replace if necessary.
- Check slide joint housing for any damage. Replace if necessary.

JOINT ASSEMBLY (ZF100) (WHEEL SIDE)

Replace joint assembly if it is deformed or damaged.

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.**



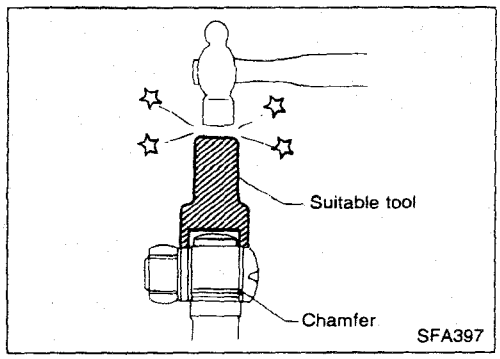
FINAL DRIVE SIDE

— TS82F type —

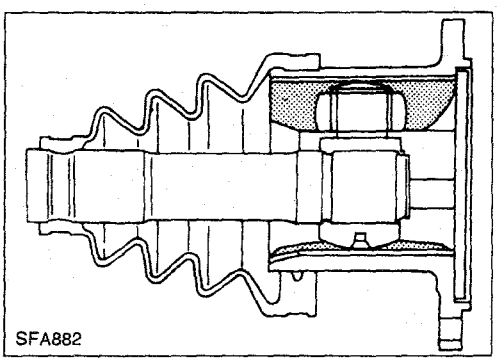
1. Install new small boot band, boot and side joint housing to drive shaft.

Cover drive shaft serration with tape so as not to damage boot during installation.

Assembly (Cont'd)

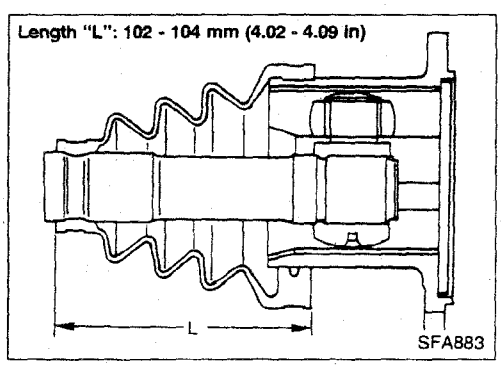


2. Install spider assembly securely, ensuring marks are properly aligned.
- **Press-fit with spider assembly serration chamfer facing shaft.**
3. Install new snap ring.



4. Pack with grease.

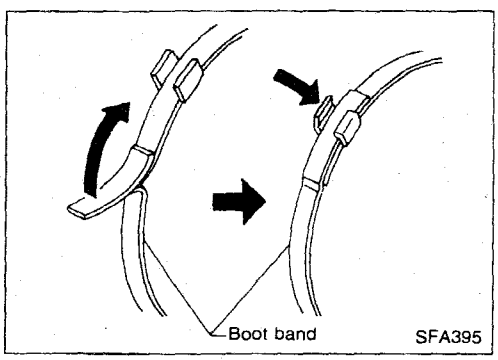
Specified amount of grease:
190 - 210 g (6.70 - 7.41 oz)



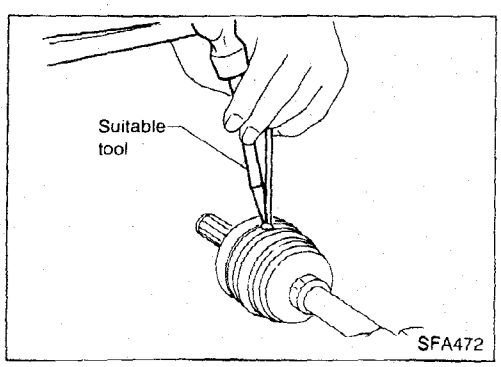
5. Set boot so that it does not swell and deform when its length is "L".

Length "L" = 102 - 104 mm (4.02 - 4.09 in)

Make sure that boot is properly installed on the drive shaft groove.



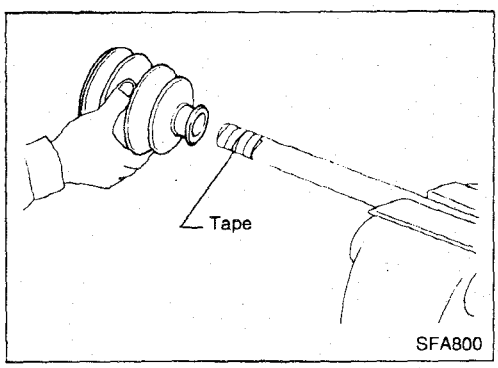
6. The rubber cover comes with clamps on both ends. Firmly clinch the clamp to the end which is wider in diameter and repeat the procedure at the narrower end. Use the appropriate tool.



7. Install new plug seal to slide joint housing by lightly tapping it.

Apply sealant to mating surface of plug seal.

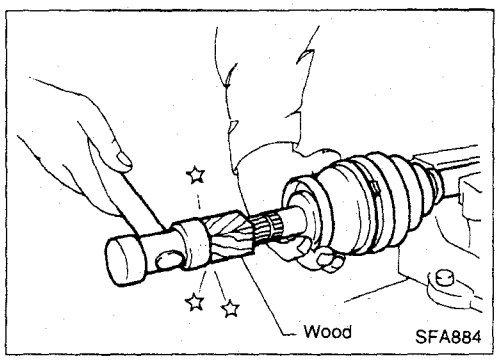
Assembly (Cont'd)



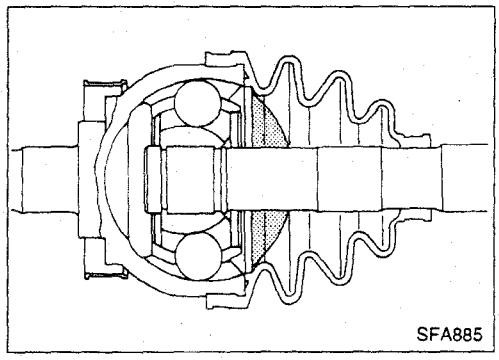
WHEEL SIDE (ZF100)

1. Install new small boot band and boot on drive shaft.

Cover drive shaft serration with tape so as not to damage boot during installation.

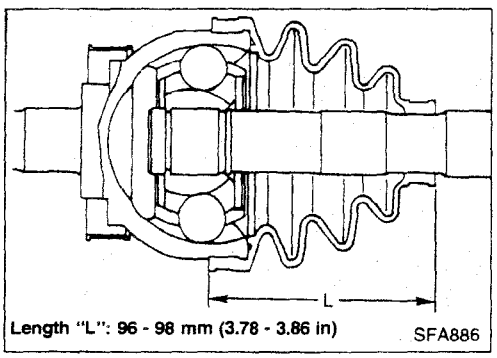


2. Set joint assembly onto drive shaft by lightly tapping it. Install joint assembly securely, ensuring marks which were made during disassembly are properly aligned.



3. Pack drive shaft with specified amount of grease.

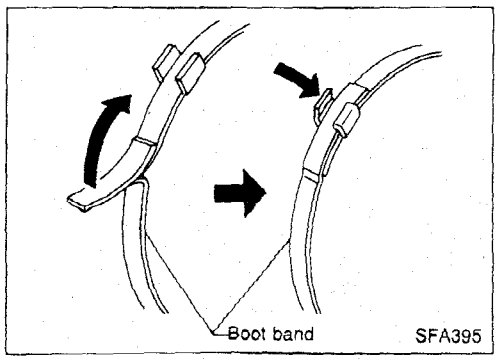
Specified amount of grease:
100 - 120 g (3.53 - 4.23 oz)



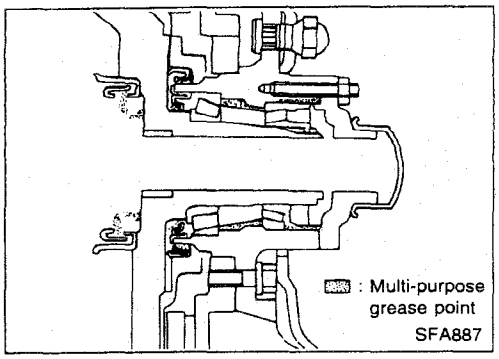
4. Set boot so that is does not swell and deform when its length is "L".

Length "L" = 96 - 98 mm (3.78 - 3.86 in)

Make sure that boot is properly installed on the drive shaft groove.

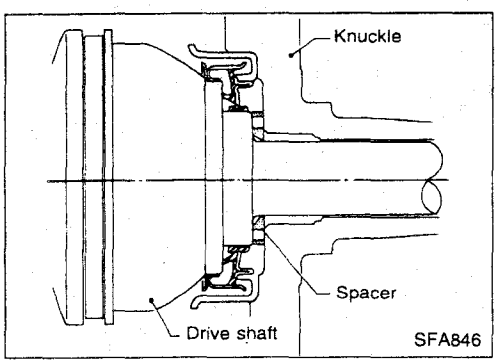


5. Lock new larger boot band securely with a suitable tool.



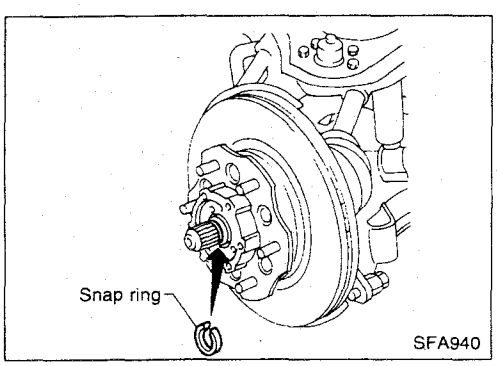
Installation

- Apply multi-purpose grease.



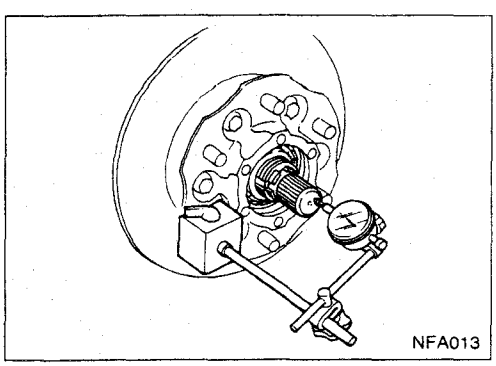
- Install bearing spacer onto drive shaft.

Make sure that bearing spacer is facing in proper direction.



- When installing drive shaft, adjust drive shaft axial end play by selecting a suitable snap ring.

(1) Temporarily install new snap ring on drive shaft in the same thickness as it was installed before removal.

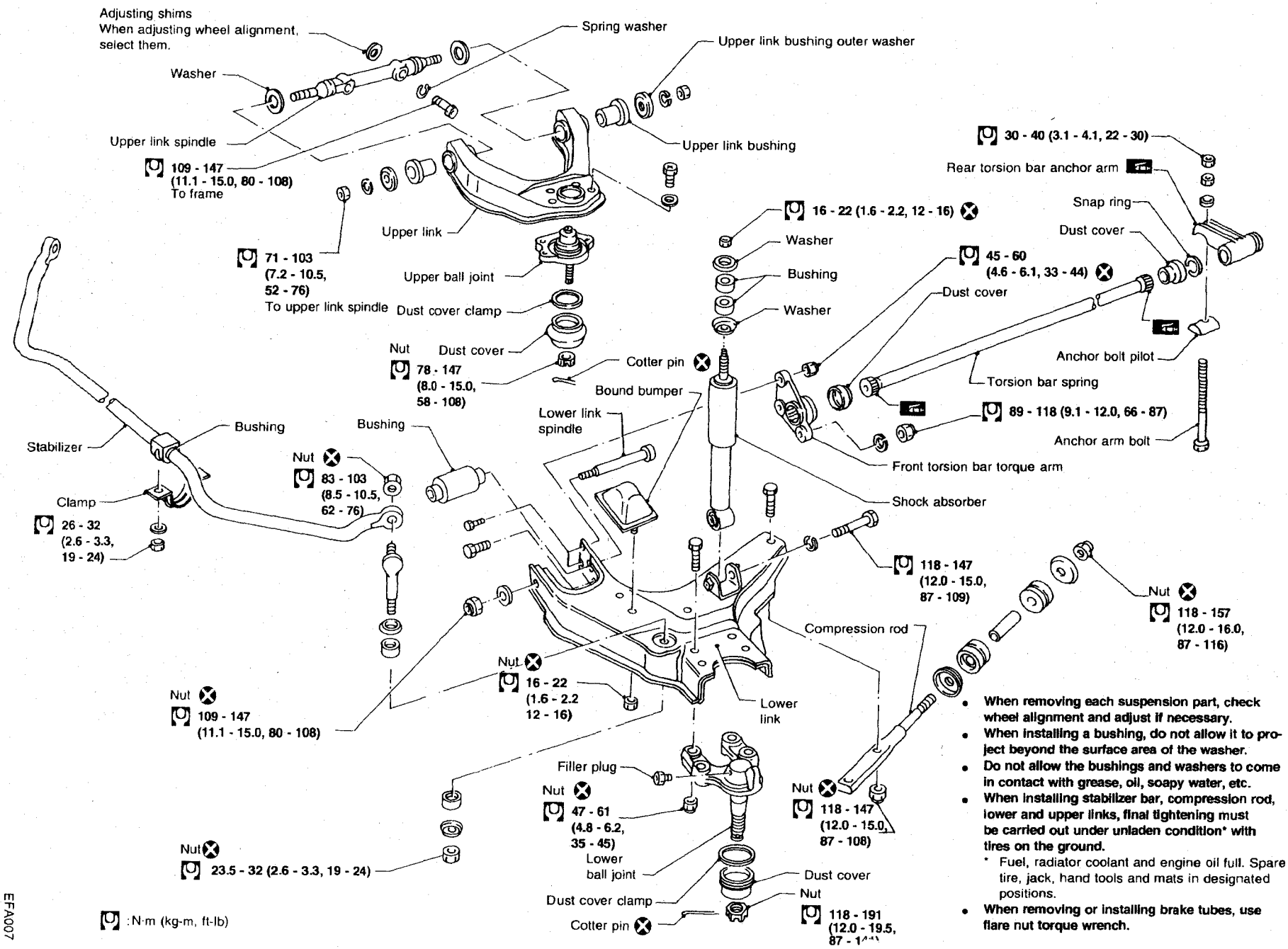


(2) Set dial gauge on drive shaft end.
(3) Measure axial end play of drive shaft.

Axial end play: 0.1 - 0.3 mm (0.004 - 0.012 in)

(4) If axial end play is not within the specified limit, select another snap ring.

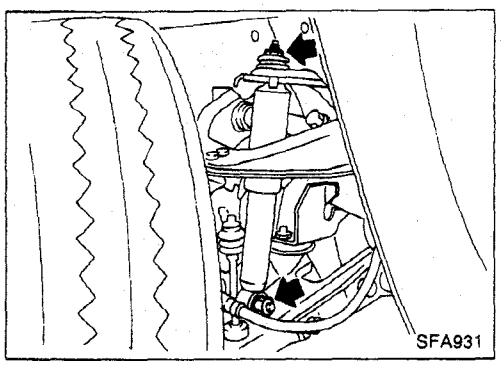
1.1 mm (0.043 in)	**1.3 mm (0.051 in)**
1.5 mm (0.059 in)	**1.7 mm (0.067 in)**
1.9 mm (0.075 in)	**2.1 mm (0.083 in)**
2.3 mm (0.091 in)	



- **When removing each suspension part, check wheel alignment and adjust if necessary.**
- **When installing a bushing, do not allow it to project beyond the surface area of the washer.**
- **Do not allow the bushings and washers to come in contact with grease, oil, soapy water, etc.**
- **When installing stabilizer bar, compression rod, lower and upper links, final tightening must be carried out under unladen condition* with tires on the ground.**
  * Fuel, radiator coolant and engine oil full. Spare tire, jack, hand tools and mats in designated positions.
- **When removing or installing brake tubes, use flare nut torque wrench.**

: N·m (kg-m, ft-lb)

EFA007



Shock Absorber

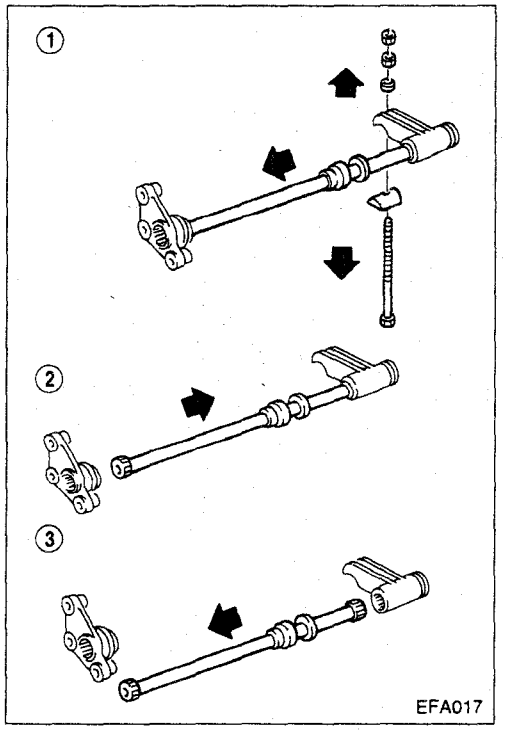
REMOVAL AND INSTALLATION

When removing and installing shock absorber, do not allow oil or grease to come into contact with rubber parts.

INSPECTION

Wash all parts, except for nonmetallic parts, with suitable solvent and dry with compressed air.
Blow dirt and dust off of nonmetallic parts with compressed air.

- Check for oil leakage and cracks. Replace if necessary.
- Check piston rod for smooth operation. Replace if necessary.
- Check rubber parts for wear, cracks, damage or deformation. Replace if necessary.



Torsion Bar

REMOVAL

- Remove torsion bar as follows:

(1) Remove anchor arm bolt nuts and remove anchor arm bolt and pilot.
Remove snap ring and dust cover from rear torsion bar anchor arm.
(2) Withdraw torsion bar and remove torsion bar and torsion bar rear anchor arm as an assembly from front torsion bar torque arm.
(3) Remove torsion bar from rear torsion bar anchor arm.

INSPECTION

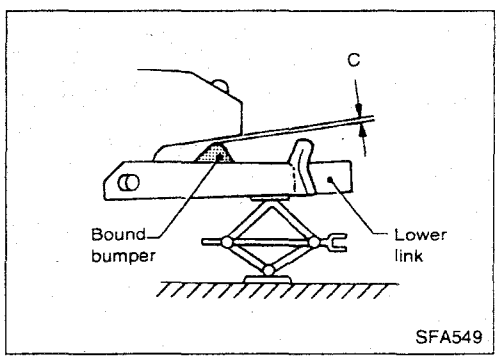
- Check torsion bar for wear, twist, bend and other damage.
- Check serrations of each part for cracks, wear, twist and other damage.
- Check dust cover for cracks.

Torsion Bar (Cont'd)

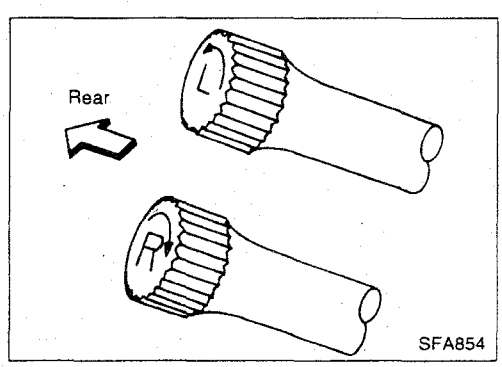
INSTALLATION AND ADJUSTMENT

Adjustment of anchor arm adjusting nut is in tightening direction only.
Do not adjust by loosening anchor arm adjusting nut.

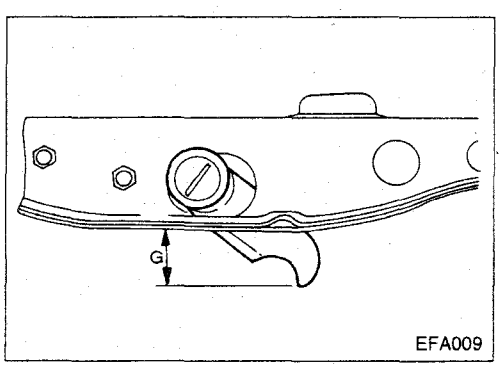
1. Coat multi-purpose grease on the serration of torsion bar spring.



2. Place lower link in the position where bound buffer clearance "C" is 0.
   Clearance "C": 0 mm (0 in)



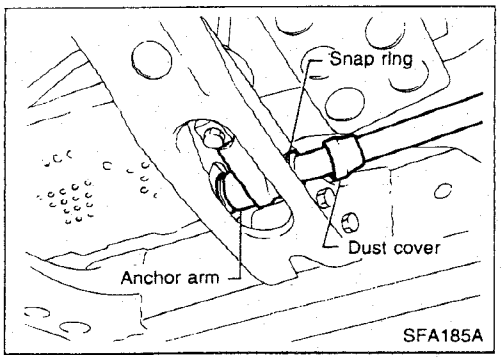
3. Install torsion bar spring with torque arm.
Be sure to install right and left torsion bar springs correctly.



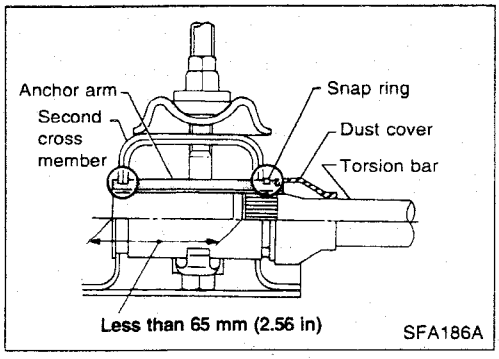
4. Set anchor arm.
   Standard length "G"
   KA24E engine:
   28 - 41 mm (1.10 - 1.61 in)
   TD27T engine:
   32 - 45 mm (1.26 - 1.77 in)

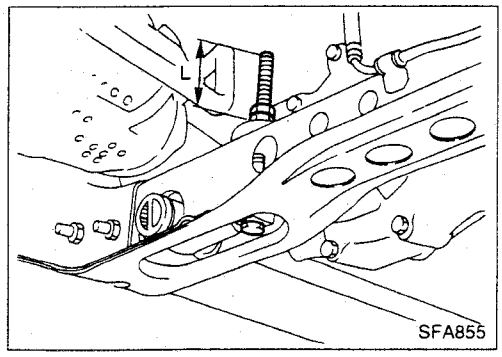
5. Install snap ring to anchor arm and dust cover.

Torsion Bar (Cont'd)

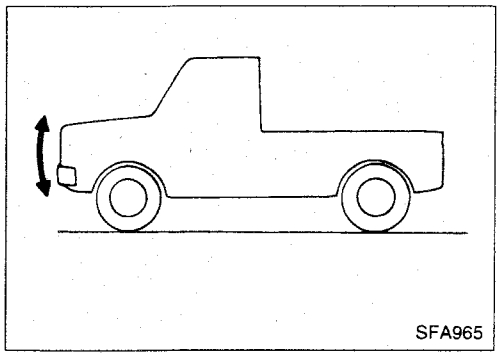


Make sure that snap ring and anchor arm are properly installed.

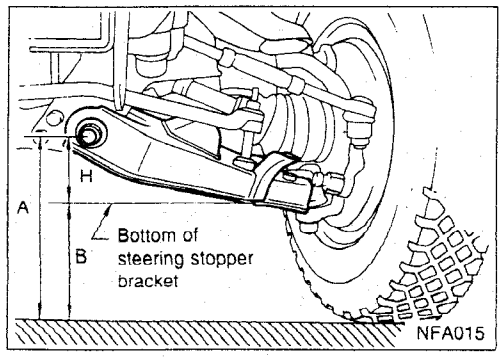




6. Tighten anchor arm adjusting nut to get L dimension.
   Standard length "L":
   77 mm (3.03 in)



7. Bounce vehicle with tires on ground (Unladen) to eliminate friction of suspension.



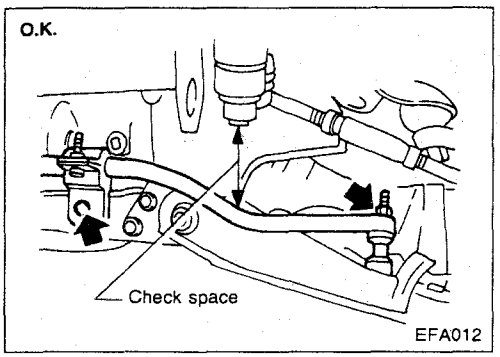
8. Measure vehicle posture "H".
   H = A – B mm (in) "Unladen"
   Refer to S.D.S.
   (1) Exercise the front suspension by bouncing the front of the vehicle 4 or 5 times to ensure that the vehicle is in a neutral height attitude.
   (2) Measure vehicle posture ... Dimension "H".
   (Refer to S.D.S.)

Torsion Bar (Cont'd)

(3) If height of the vehicle is not as specified, adjust vehicle posture.
(Refer to S.D.S.)

(4) Check wheel alignment if necessary.
(Refer to S.D.S.)

9. If "H" dimension is not within the specified value, readjust vehicle posture using anchor arm adjusting nut.



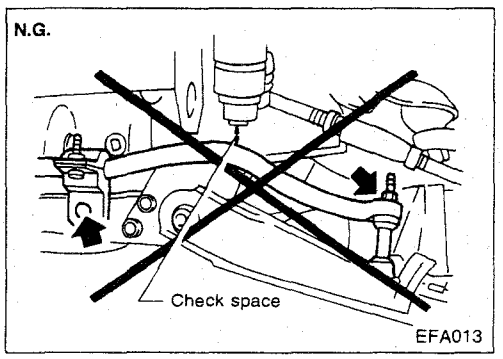
Stabilizer Bar

REMOVAL

- Remove stabilizer bar ball joint nuts and clamp bolts.

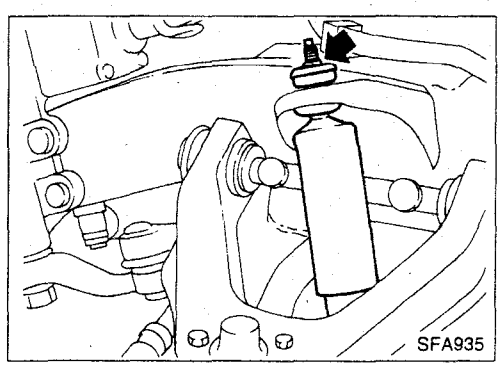
INSPECTION

- Check stabilizer bar for twist and deformation. Replace if necessary.
- Check rubber bushing for cracks, wear or deterioration. Replace if necessary.



INSTALLATION

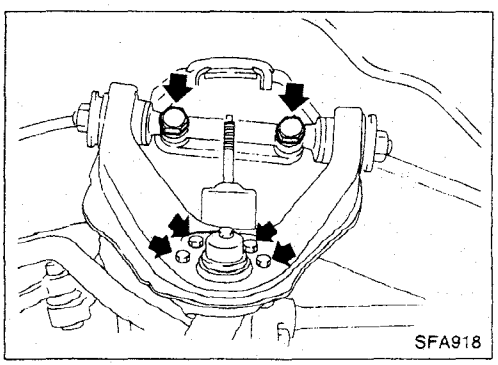
- Install bushing outside white mark painted on stabilizer facing the ground.
- Make sure stabilizer bar is properly installed. See figures.



Upper Link

REMOVAL

- Remove shock absorber upper fixing nut.

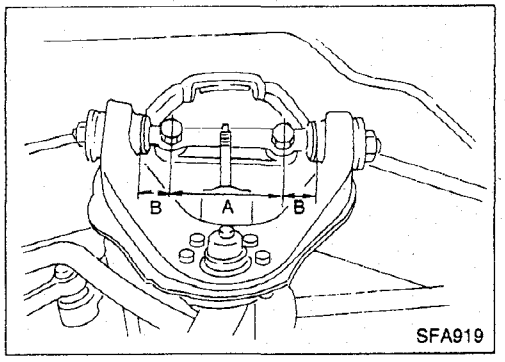


- Remove bolts fixing upper ball joint on upper link.

Support lower link with jack.

- Remove upper link spindle fixing bolts.

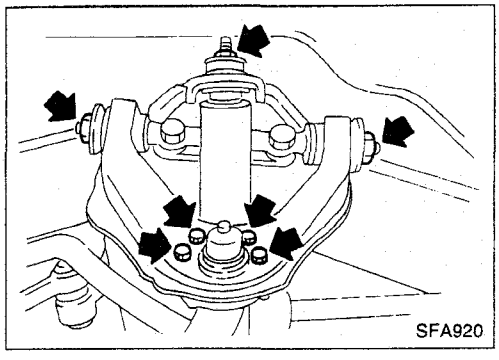
Upper Link (Cont'd)



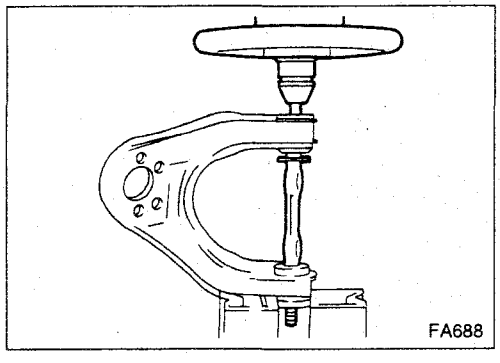
INSTALLATION

- Tighten upper link spindle with camber adjusting shims.
- After fitting, check dimensions "A" and "B".

  A: 110 mm (4.33 in)
  B: 31.8 mm (1.25 in)



- Install upper ball joint upper link.
- Install shock absorber upper fixing nut.
- Tighten upper link spindle lock nuts under unladen condition with tires on ground.
- After installing, check wheel alignment. Adjust if necessary. Refer to "Front Wheel Alignment" in "CHECK AND ADJUSTMENT".

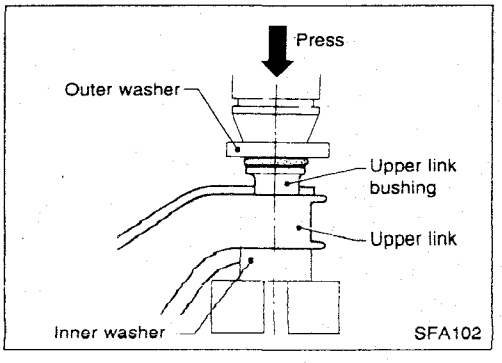


DISASSEMBLY

- Press out upper link spindle with bushings.

INSPECTION

- Check upper spindle and rubber bushings for damage. Replace if necessary.
- Check upper link for deformation or cracks. Replace if necessary.

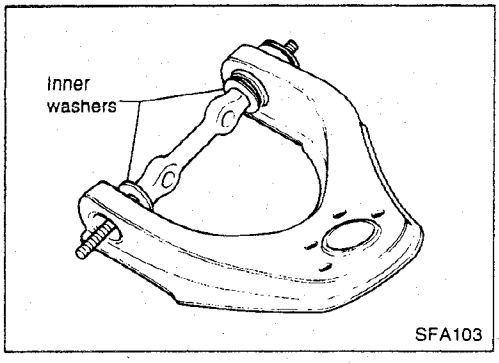


ASSEMBLY

- Apply soapsuds to rubber bushing.
- Press upper link bushing.

Press bushing so that flange of bushing securely contacts end surface of upper link collar.

Upper Link (Cont'd)

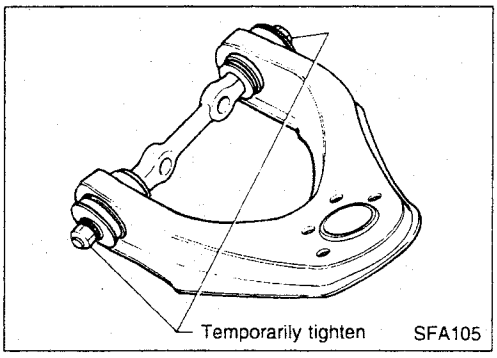


- Insert upper link spindle and inner washers.

Install inner washers with rounded edges facing inward.

- Press another bushing.

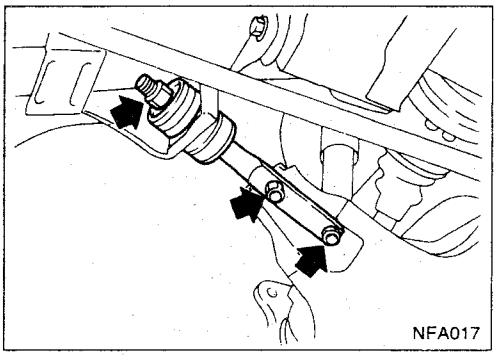
Press bushing so that flange of bushing securely contacts end surface of upper link collar.



- Temporarily tighten nuts.

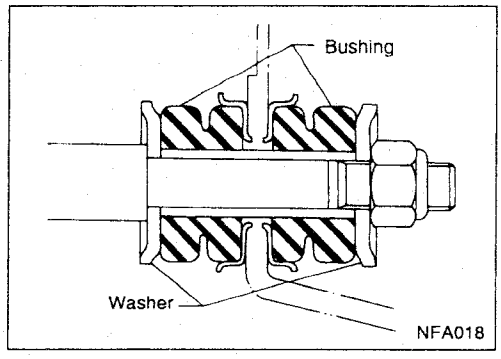
Compression Rod

REMOVAL AND INSTALLATION



- Remove fixing nuts on lower link and frame

Support lower link with jack.

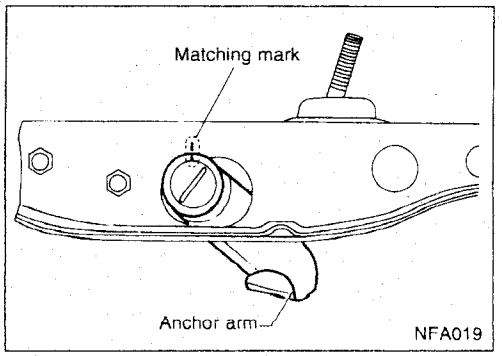


- Install compression rod.

Make sure that bushings and washers are installed properly.

Lower Link

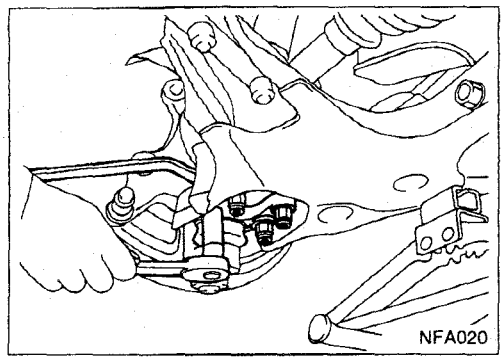
REMOVAL AND INSTALLATION



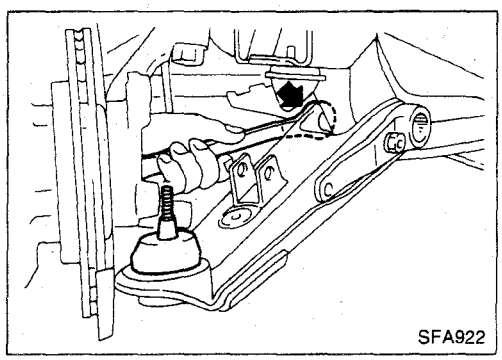
- Remove torsion bar. Refer to "REMOVAL" in "Torsion Bar".

Make matching mark on anchor arm and crossmember when loosening adjusting nut until there is no tension on torsion bar.

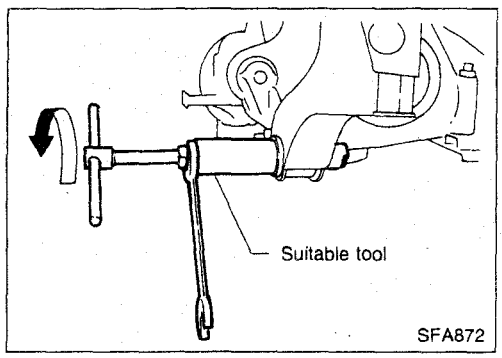
Lower Link (Cont'd)



- Separate lower ball joint from lower link.



- Remove front lower link fixing nut.



- Remove bushing of lower link spindle from frame with suitable tool.
- When installing bushing, apply grease on bushing and remove excess after installation.
- After installing lower link, adjust wheel alignment and vehicle height. Refer to "Front Wheel Alignment" in "CHECK AND ADJUSTMENT".

INSPECTION

Lower link and lower link spindle

- Check lower link and lower link spindle for deformation or cracks. Replace if necessary.

Lower link bushing

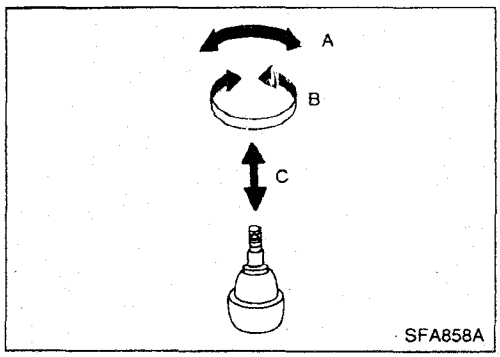
- Check bushing for distortion or other damage. Replace if necessary.

Upper Ball Joint and Lower Ball Joint

REMOVAL AND INSTALLATION

- Separate knuckle spindle from upper and lower link. Refer to "FRONT AXLE — Knuckle Spindle".

Upper Ball Joint and Lower Ball Joint (Cont'd)



INSPECTION

- Check ball joint for turning torque "A".
  Upper ball joint:
  31.87 - 199.38 N
  (3.25 - 20.33 kg, 7.17 - 44.38 lb)
  Lower ball joint:
  0 - 67.7 N
  (0 - 6.9 kg, 0 - 15.2 lb)
  If turning torque A is not within above specifications, replace ball joint assembly.

- Check ball joint for turning torque "B".
  Upper ball joint:
  1.0 - 4.9 N·m
  (10 - 50 kg-cm, 8.7 - 43.4 in-lb)
  Lower ball joint:
  0 - 4.9 N·m
  (0 - 50 kg-cm, 0 - 43 in-lb)
  If turning torque B is not within above specifications, replace ball joint assembly.

- Check ball joint for vertical end play "C".
  Upper ball joint:
  1.6 mm (0.063 in) or less
  Lower ball joint:
  0.5 mm (0.020 in) or less
  Replace ball joint if movement is beyond specifications.

- Check dust cover for damage.
  Replace dust cover and dust cover clamp if necessary.

General Specifications

TORSION BAR SPRING

Applied model	Hardtop	Wagon
Spring diameter x length mm (in)	26.0 x 1,230 (1.024 x 48.43)	
Spring constant N/mm (kg/mm, lb/in)	25.3 (2.58, 144.5)	

SHOCK ABSORBER

Applied model	Hardtop	Wagon
Shock absorber type	Non-adjustable (hydraulic)	
Damping force N (kg, lb) [at 0.3 m (1.0 ft)/sec.]		
Expansion	2265 ± 314 (230 ± 32, 507 ± 71)	2323 ± 324 (236.7 ± 33, 522 ± 73)
Compression	653 ± 124 (66.6 ± 12.6, 147 ± 28)	929 ± 157 (94.6 ± 16, 209 ± 35)

STABILIZER BAR

Applied model	Hardtop	Wagon
Stabilizer bar diameter mm (in)	28	26

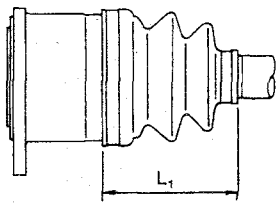
COMPRESSION ROD

Applied model	Hardtop	Wagon
Rod diameter mm (in)	23.5 (0.925)	

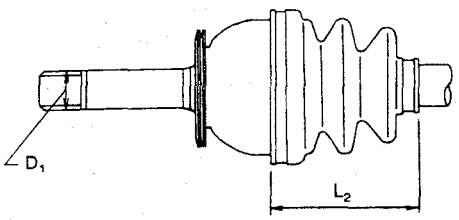
DRIVE SHAFT

Applied model	All
Drive shaft joint type	
Final drive side	TS82F
Wheel side	ZF100
Fixed joint axial end play limit mm(in)	1.0 (0.039)
Wheel side	
Pitch circle diameter serration mm (in)	27.0 (1.063)
Major diameter (D1) mm (in)	28.0 (1.10)
Grease	
Quality	Nissan genuine grease or equivalent
Capacity g (oz)	
Final drive side	190 - 210 (6.70 - 7.41)
Wheel side	100 - 120 (3.53 - 4.23)
Boot length mm (in)	
Final drive side (L_1)	97 - 99 (3.82 - 3.90)
Wheel side (L_2)	96 - 98 (3.78 - 3.86)

Final drive side



Wheel side

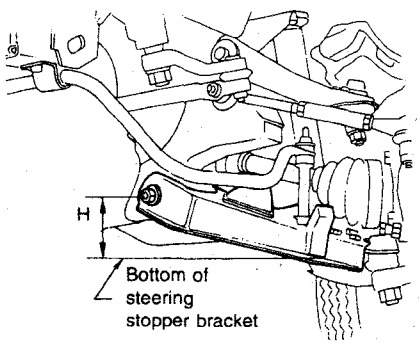


SFA877A

Inspection and Adjustment

WHEEL ALIGNMENT (Unladen *1)

Applied model		Hardtop	Wagon
Camber	degree	0°35′ ± 30′	
Caster	degree	1°40′ ± 30′	
Kingpin inclination	degree	7°36′ to 8°36′	
Total toe-in Radial tire	mm (in)	3 to 5 (0.12 x 0.20)	
Front wheel turning angle Full turn Inside		35^{+0}_{-2}	
Outside		33^{+0}_{-2}	
Vehicle posture Lower arm pivot height (H)	mm (in)	36	34



NFA021

*1: Fuel, radiator coolant and engine oil full. Spare tire, jack, hand tools and mats in designated positions.

WHEEL BEARING

Axial end play limit	mm (in)	0 (0)
Lock nut Tightening torque	N·m (kg-m, ft-lb)	78 - 98 (8 - 10, 58 - 72)
Retightening torque	N·m (kg-m, ft-lb)	0.5 - 1.5 (0.05 - 0.15, 0.4 - 1.1)
Turning resistance at wheel hub bolt		A
Tightening angle	degree	15° - 30°
Turning resistance at wheel hub bolt		B
Preload C = B–A	N (kg, lb)	7.06 - 20.99 (0.72 - 2.14, 1.59 - 4.72)

DRIVE SHAFT INSTALLATION

Axial end play mm (in) At wheel hub	0.1 - 0.3 (0.004 - 0.012)	
Available drive shaft end snap rings		
Thickness mm (in)	Part number	
1.1 (0.043)	39253-31G10	39253-88G10
1.3 (0.051)	39253-31G11	39253-88G11
1.5 (0.059)	39253-31G12	39253-88G12
1.7 (0.067)	39253-31G13	39253-88G13
1.9 (0.075)	39253-31G14	39253-88G14
2.1 (0.083)	39253-31G15	39253-88G15
2.3 (0.091)	39253-31G16	39253-88G16

UPPER BALL JOINT

Swinging force at cotter pin hole N (kg,lb)	31.87 - 199.38 (3.25 - 20.33, 7.17 - 44.83)
Rotating torque N·m (kg-cm, in-lb)	1.0 - 4.9 (10 - 50, 8.7 - 43.4)
Axial end play limit mm (in)	1.6 (0.063)

LOWER BALL JOINT

Swinging force at cotter pin hole N (kg,lb)	0 - 67.7 (0 - 6.9, 0 - 15.2)
Rotating torque N·m (kg-cm, in-lb)	0 - 4.9 (0 - 50, 0 - 43)
Axial end play limit mm (in)	0.5 (0.020)

WHEEL RUNOUT

Wheel type	Steel
	(15″)
Radial runout limit mm (in)	0.5 (0.02)
Lateral runout limit mm (in)	0.8 (0.031)

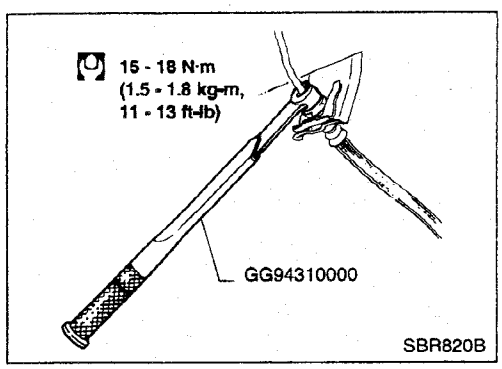
REAR AXLE & REAR SUSPENSION

SECTION RA

REAR AXLE & REAR SUSPENSION

SECTION RA

CONTENTS



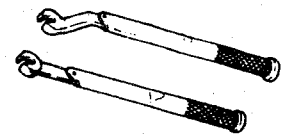
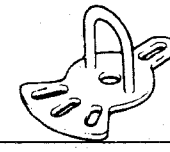
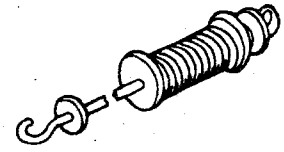
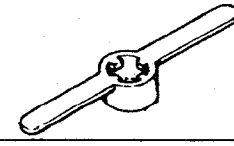
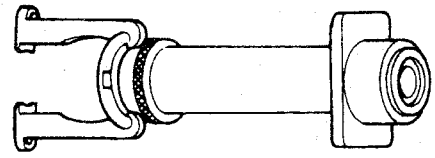
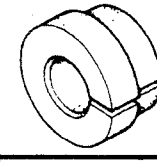
Precautions

- 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.
- Use Tool when removing or installing brake tubes.
- If suspension or suspension parts are dismounted, check wheel alignment and adjust if necessary.
- Do not jack up vehicle at lower link.

Preparation

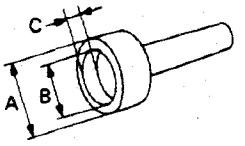
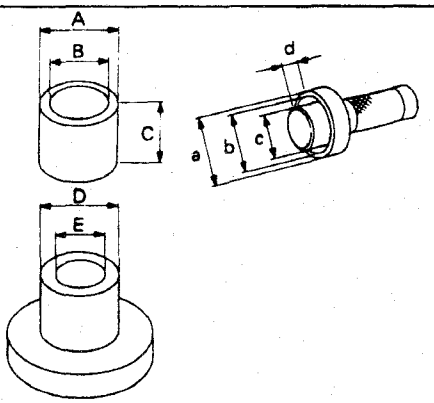
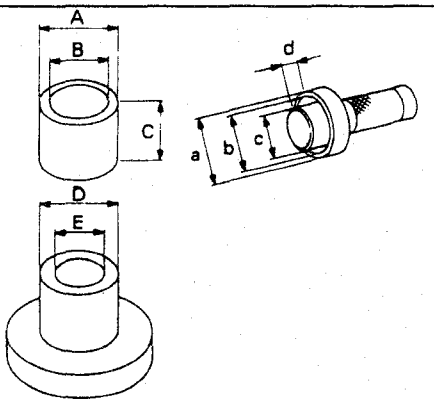
SPECIAL SERVICE TOOLS

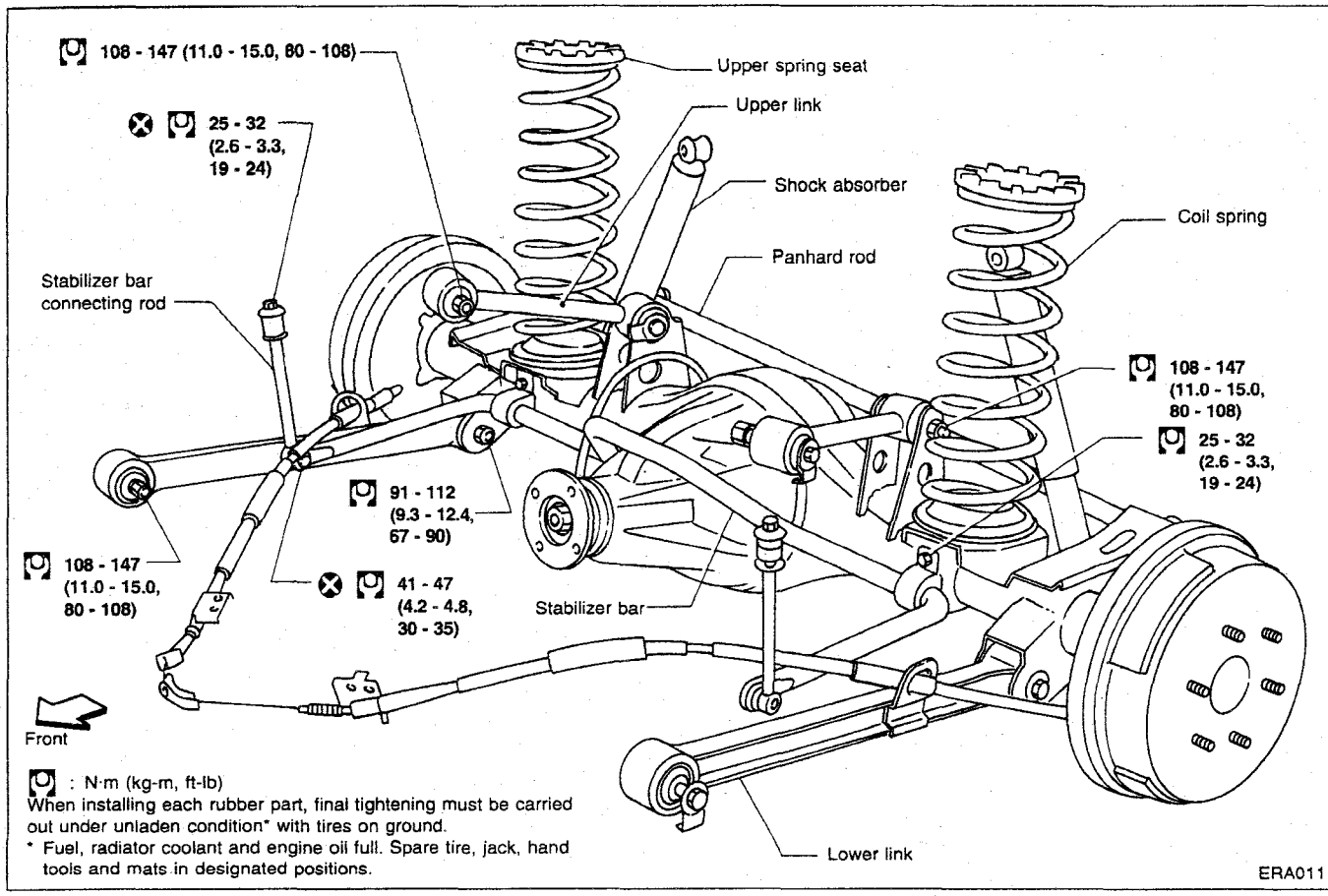
*: Special tool or commercial equivalent

Tool number Tool name	Description	
GG94310000* Flare nut torque wrench		Removing or installing brake piping
KV40101000* Axle stand		Removing rear axle shaft
ST36230000* Sliding hammer		Removing rear axle shaft
ST38020000 Bearing lock nut wrench		Removing wheel bearing lock nut
HT72480000 Rear axle shaft bearing puller		Removing wheel bearing
ST37840000 Rear axle shaft guide		Installing rear axle shaft

Preparation (Cont'd)

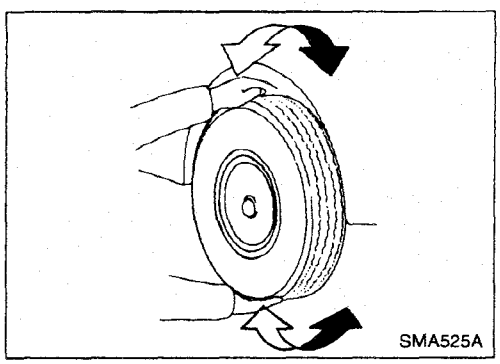
COMMERCIAL SERVICE TOOLS

Tool name	Description	
Rear axle oil seal drift		Installing oil seal **A: 74 mm (2.91 in) dia.** **B: 68 mm (2.68 in) dia.** **C: 10 mm (0.39 in)**
Drift-lower and upper links bushing		Removing or installing lower and upper link bushings **A: 64 (2.52) dia.** **B: 52 (2.05) dia.** **C: 65 (2.65)** **D: 64 (2.52) dia.** **E: 46 (1.81) dia.** **a: 50 (1.97) dia.** **b: 44 (1.73) dia.** **c: 13 (0.51) dia.** **d: 7 (0.28)** Unit: mm (in)
Drift-panhard rod bushing		Removing or installing panhard rod bushing **A: 54 (2.13) dia.** **B: 42 (1.65) dia.** **C: 65 (2.65)** **D: 54 (2.13) dia.** **E: 36 (1.42) dia.** **a: 40 (1.57) dia.** **b: 36 (1.42) dia.** **c: 13 (0.51) dia.** **d: 6 (0.24)** Unit: mm (in)



: N·m (kg-m, ft-lb)
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.

ERA011

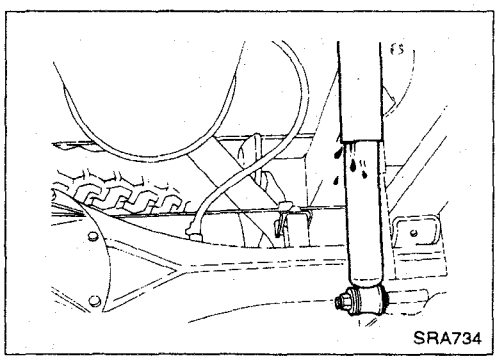

SMA525A

Rear Axle and Rear Suspension Parts

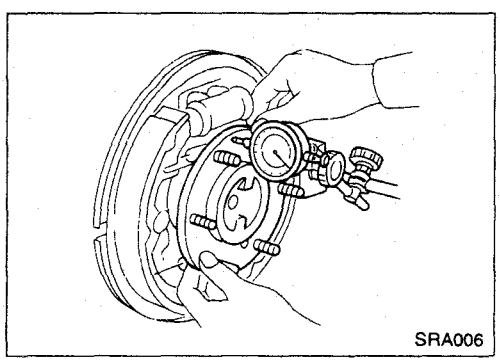
Check rear axle and rear suspension parts for looseness, wear or damage.

- Shake each rear wheel to check for excessive play.

- Retighten all nuts and bolts to the specified torque.
  Tightening torque: refer to REAR AXLE AND REAR SUSPENSION.


SRA734

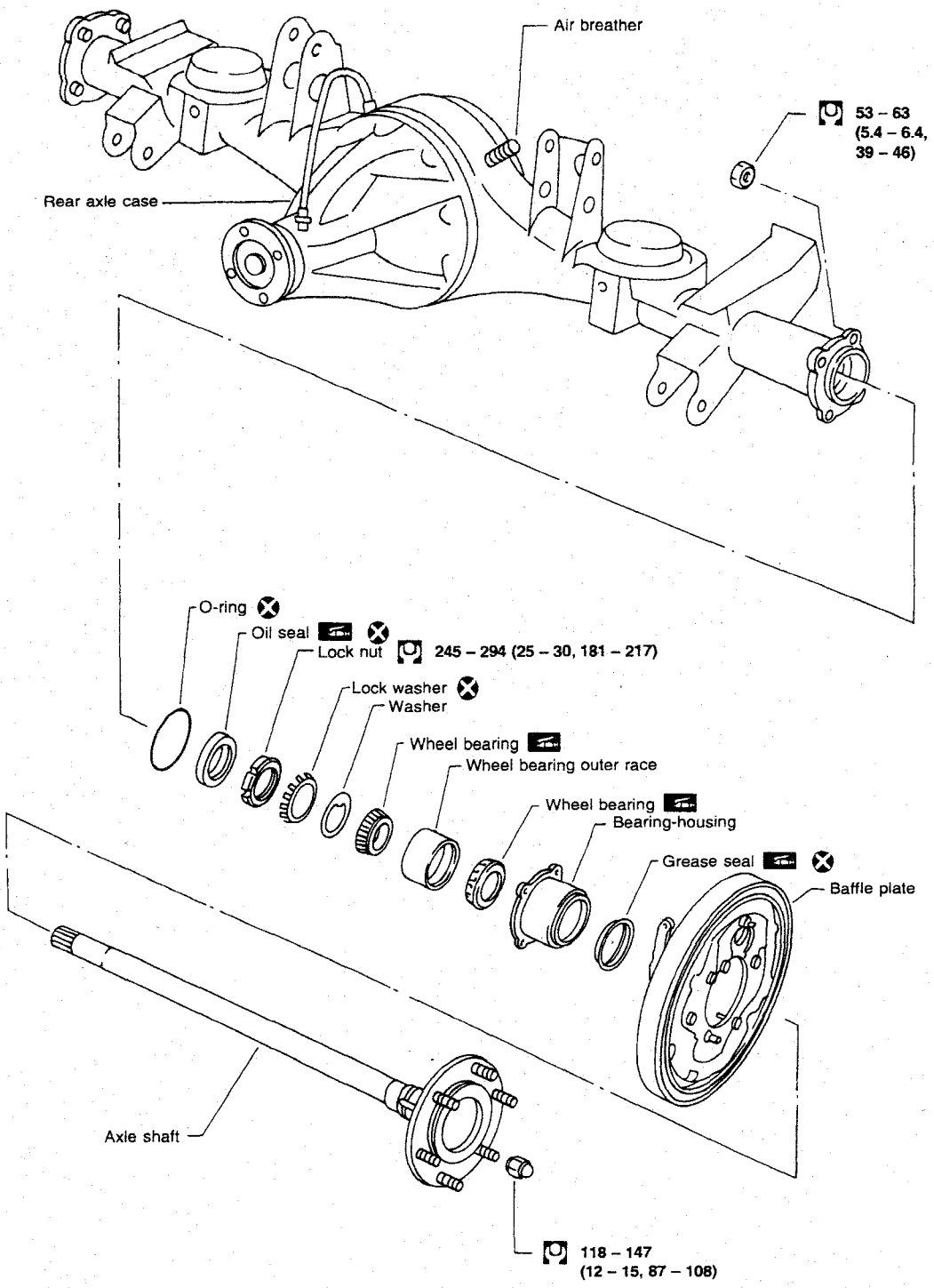
- Check shock absorber for oil leakage or other damage.


SRA006

Rear Wheel Bearing

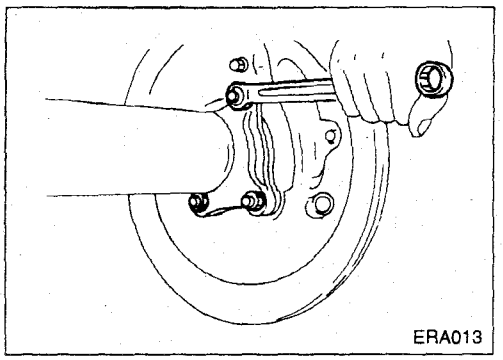
- Check that wheel bearings operate smoothly.
- Check axial end play.
  Axial end play:
  Refer to S.D.S.

Components



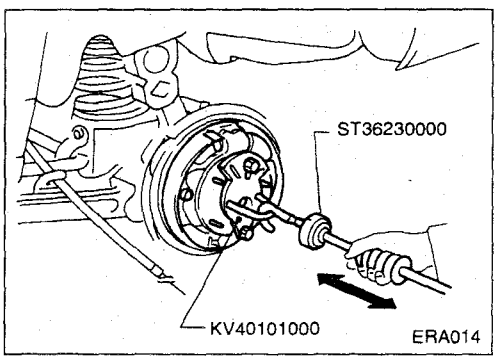
: N·m (kg-m, ft-lb)

ERA012



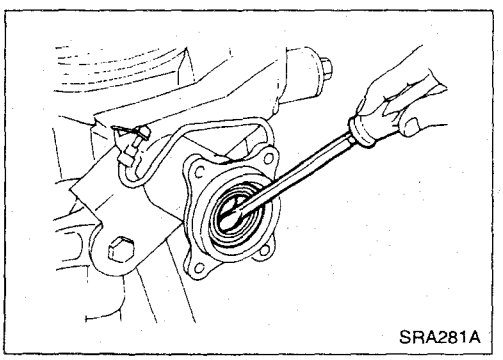
Removal

- Disconnect parking brake cable and brake tube.
- Remove nuts securing wheel bearing cage with baffle plate.



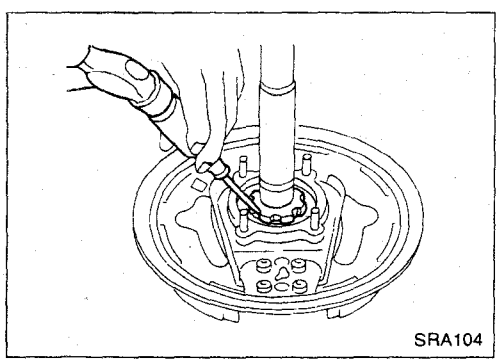
- Draw out axle shaft with Tool.

When drawing out axle shaft, be careful not to damage oil seal.



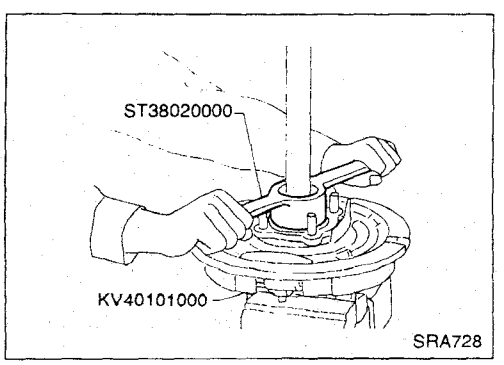
- Remove oil seal.

Do not reuse oil seal once it is removed.
Always install new one.



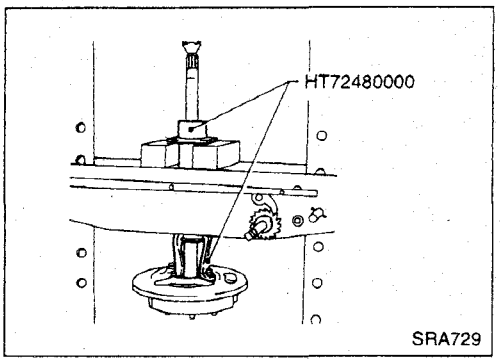
- Unbend lock washer with a screwdriver.

Do not reuse lock washer once it is removed.
Always install new one.

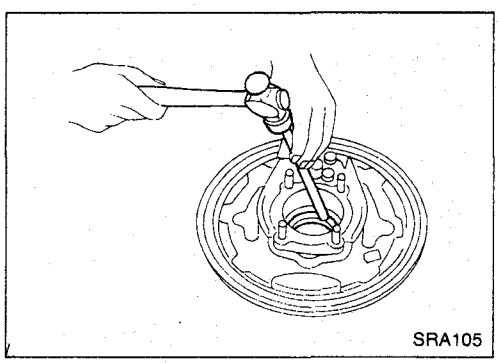


- Remove bearing lock nut with Tool.

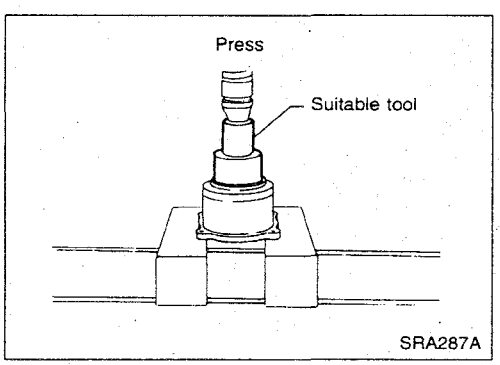
Removal (Cont'd)



- Remove the outer ring of ball bearings from the holder.



- Remove grease seal in bearing cage with suitable bar.



- Remove wheel bearing outer race with a suitable tool.

Inspection

AXLE SHAFT

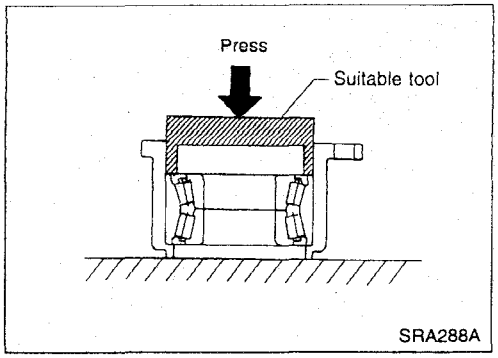
- Check axle shaft for straightness, cracks, damage, wear or distortion. Replace if necessary.

BEARING HOUSING

- Check bearing housing for deformation or cracks. Replace if necessary.

REAR AXLE HOUSING

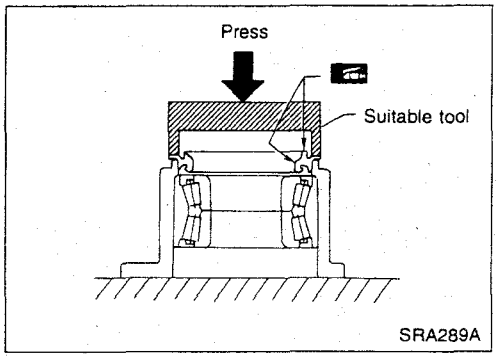
- Check rear axle housing for yield, deformation or cracks. Replace if necessary.



Installation

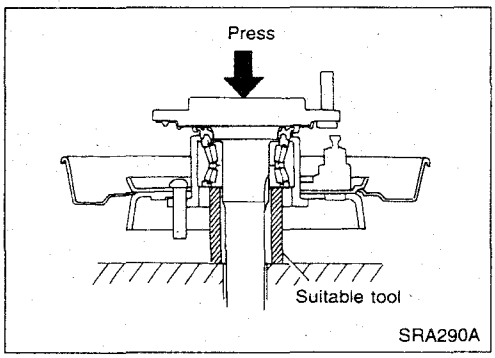
- Press new wheel bearing until it touches the bottom of the bearing housing.

Always press outer race of wheel bearing during installation.



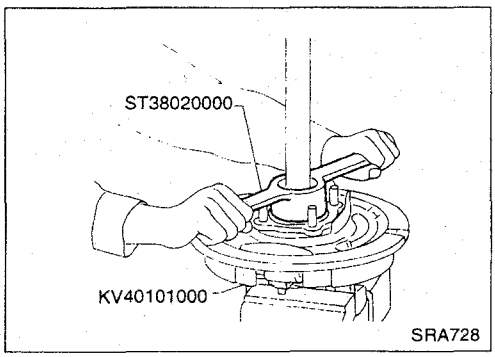
- Press new grease seal until it bottoms end face of bearing housing.

After installing new grease seal, coat sealing lip with multipurpose grease.



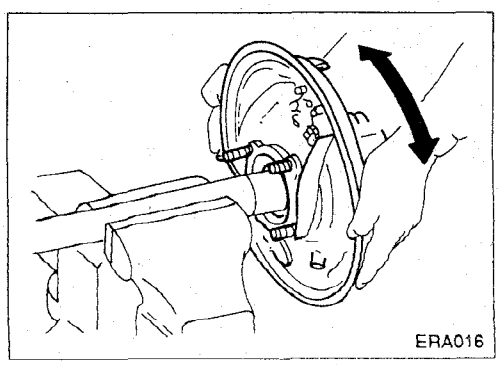
- Install baffle plate over bearing housing and press axle shaft into inner race of wheel bearing.

Be careful not to damage or deform grease seal.



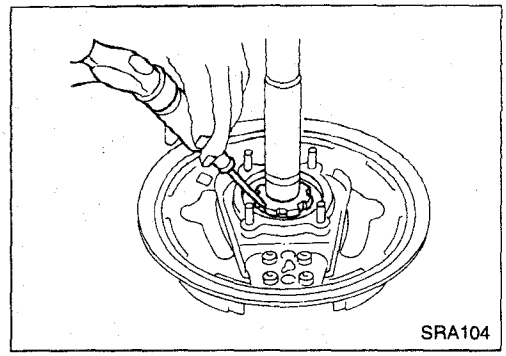
- Install washer and lock washer.
- Before installing lock nut, apply a coat of wheel bearing grease to its seat. Tighten lock nut to specified torque.

: 245 - 294 N·m
(25 - 30 kg-m, 181 - 217 ft-lb)

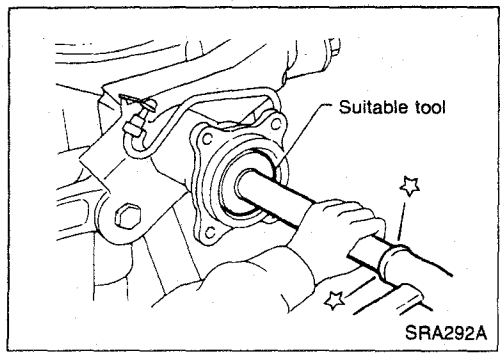


- Turn bearing housing (with respect to axle shaft) two or three times. It must turn smoothly.

Installation (Cont'd)


SRA104

- Secure lock nut by bending one portion of lock washer.



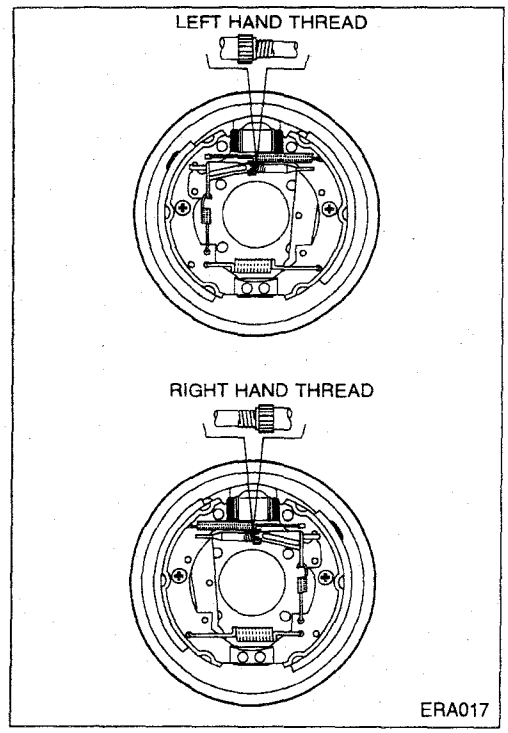
SRA292A

- Install new oil seal to rear axle housing using a suitable tool.

After installing new oil seal, coat sealing lip with multi-purpose grease.

- Position axle shafts in rear axle housing.

Be careful not to damage oil seal.

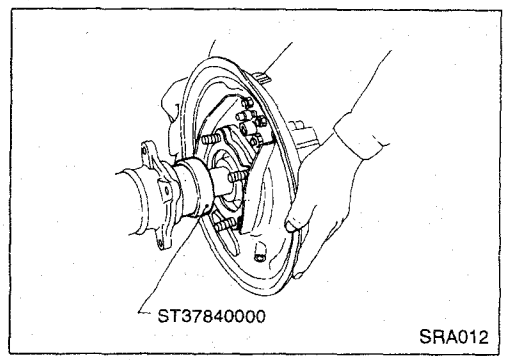


ERA017

- When the ball-bearing holder and the brake are installed in the base of the axle, they need to be correctly positioned.

A quick way to determine on which side the holder should be located, is to look at the brake adjustment screw.

Left-hand thread:
Install the holder on the left side.
Right-hand thread (Normal)
Install the holder on the right side.

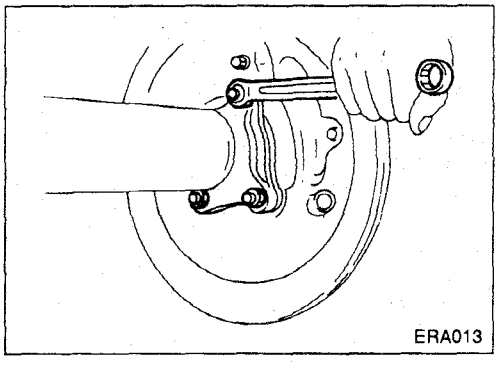


SRA012

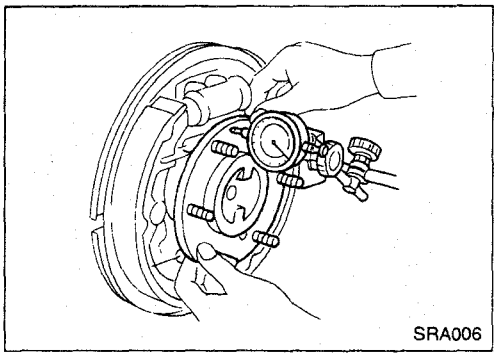
- Insert axle shaft with Tool as a guide.

When inserting axle shaft, be careful not to damage oil seal.

Installation (Cont'd)

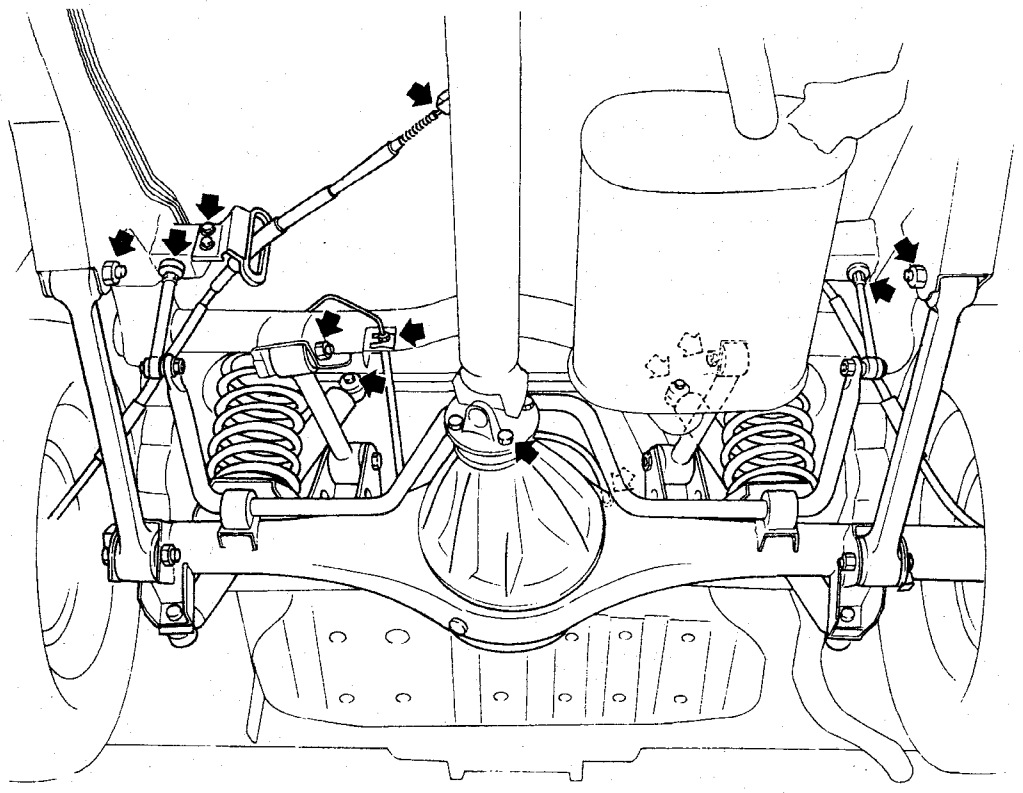

ERA013

- Tighten nuts to the specified torque.
  : 53 - 63 N·m (5.4 - 6.4, 39 - 46)

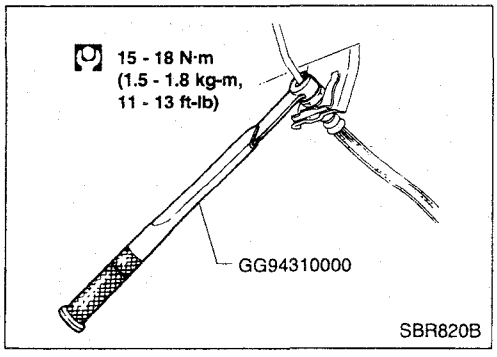

SRA006

- Measure end play of axle shaft.
  Axial end play:
  Refer to S.D.S.

Removal and Installation



SRA906



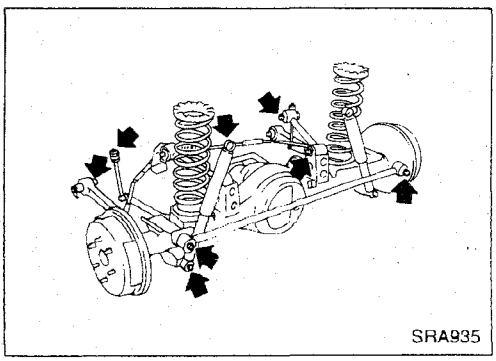
SBR820B

- Disconnect brake hydraulic line and parking brake cable.

CAUTION:

Use Tool when removing or installing brake tubes.

- Remove stabilizer bar from body
- Remove upper links and lower links from body.
- Remove panhard rod from body.
- Disconnect propeller shaft.
- Remove upper end nuts of shock absorber.

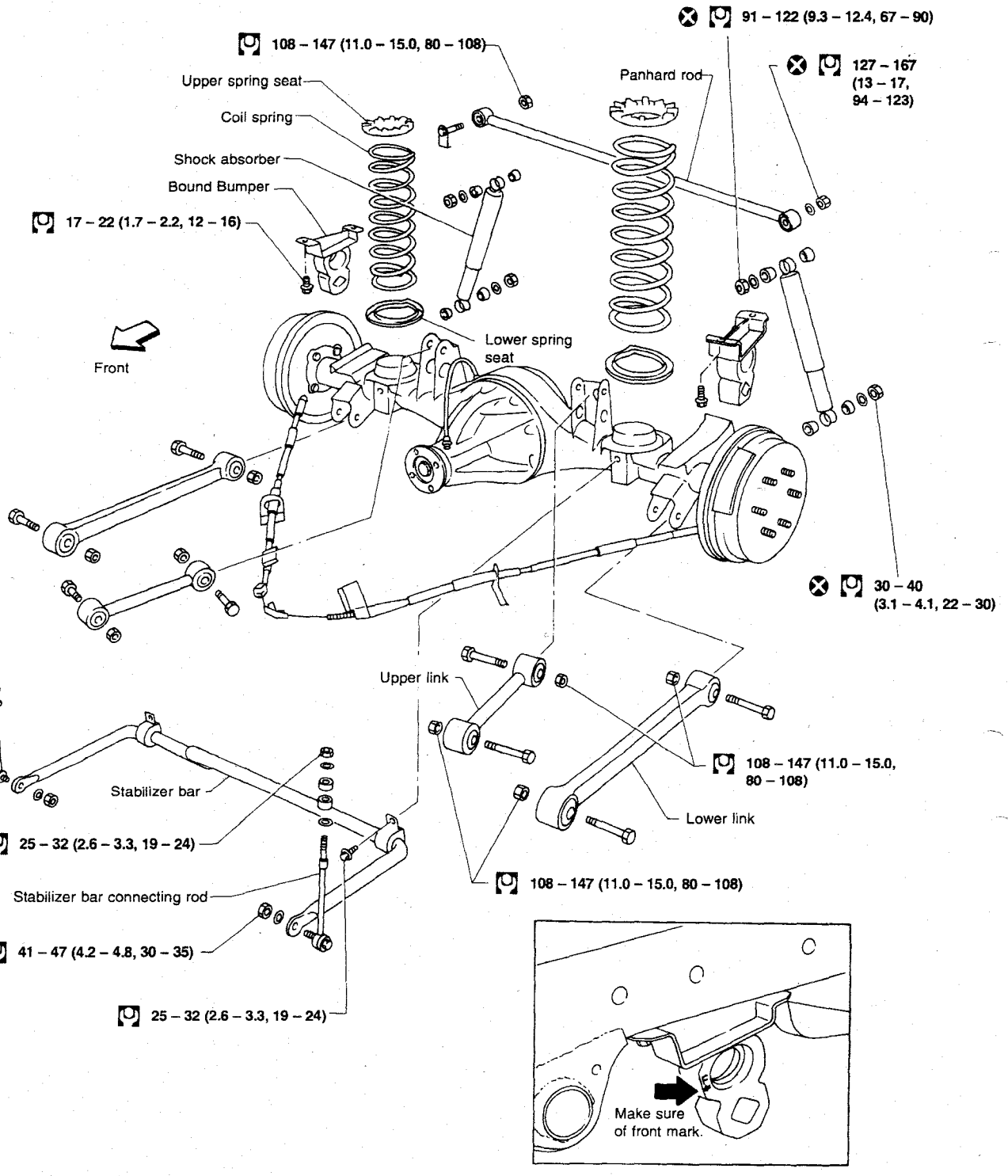


SRA935

Final tightening for rubber parts requires to be carried out under unladen condition with tires on ground.

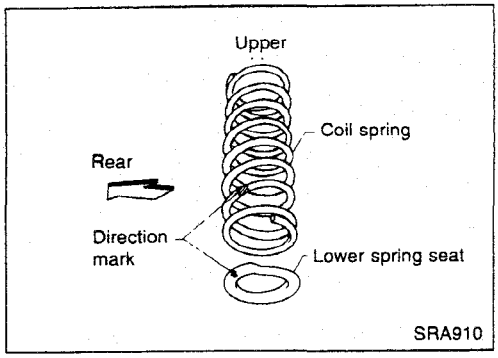
Components

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)

SRA297A



Coil Spring and Shock Absorber

REMOVAL AND INSTALLATION

- Refer to Removal and Installation of REAR AXLE AND REAR SUSPENSION

When installing coil spring and lower spring seat, pay attention to its direction.
Be sure spring rubber seat is not twisted and has not slipped off when installing coil spring.

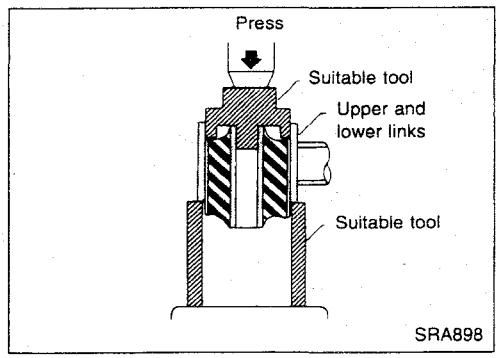
INSPECTION

- Check coil spring for yield, deformation or cracks.
- Check coil spring specifications. Refer to S.D.S.
- Check shock absorber for oil leakage, cracks or deformation.
- Check shock absorber specifications. Refer to S.D.S.
- Check all rubber parts for wear, cracks or deformation. Replace if necessary.

Upper Link, Lower Link and Panhard Rod

INSPECTION

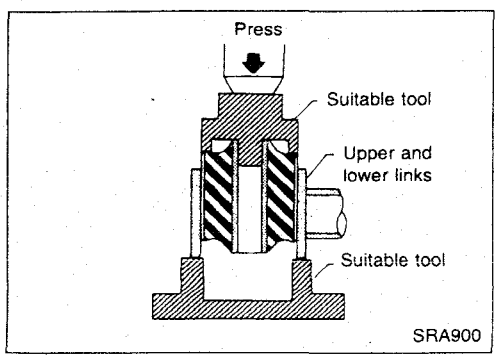
Check for cracks, distortion or other damage. Replace if necessary.



BUSHING REPLACEMENT

Check for cracks or other damage. Replace with suitable tool if necessary.

- Remove bushing with suitable tool.

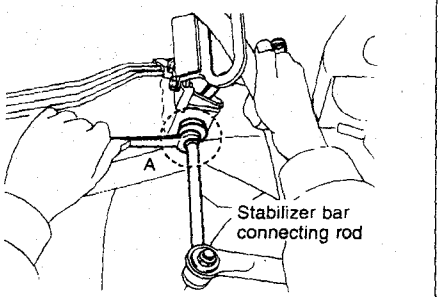


When installing bushing, apply a coating of 1% soap water to outer wall of bushing.
Always install new bushing.
Do not tap end face of bushing directly with a hammer.

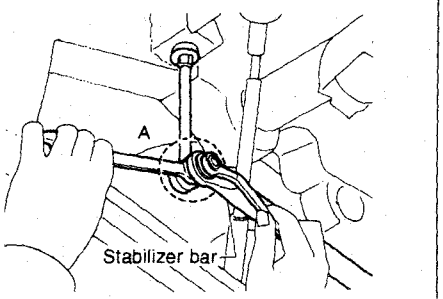
Upper Link, Lower Link and Panhard Rod (Cont'd)

INSTALLATION

When installing each link, pay attention to direction of bolts and nuts. Refer to REAR SUSPENSION - Components.
When installing each rubber part, final tightening must be carried out under unladen condition with tires on ground.



SRA908



SRA909

Stabilizer Bar

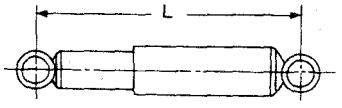
REMOVAL AND INSTALLATION

- When removing and installing stabilizer bar, fix portion A.

General Specifications

COIL SPRING AND SHOCK ABSORBER

Model	Hardtop	Wagon
Coil spring		
Wire diameter mm (in)	12.9 (0.508)	13.5 (0.532)
Free length mm (in)	390 (15.35)	389.5 (15.335)
Spring constant N·mm (kg-mm, lb-in)	26 (2.6, 146)	29 (3.0, 168)
Shock absorber		
Shock absorber type	Non-adjustable (hydraulic)	
Maximum length mm (in)	588 (23.15)	
Minimum length mm (in)	351 (13.82)	
Damping force [at 0.3 m (1.0 ft)/sec.] N (kg, lb)		
Expansion	993.3 - 1348.7 (101.3 - 137.5, 223.4 - 303.2)	1651.5 - 2280.5 (168.40 - 232.54, 371.3 - 512.7)
Compression	489.4 - 722.6 (49.9 - 73.7 , 110 - 162)	961.5 - 1374.5 (98.0 - 140.16 , 216 - 309)



RA260

STABILIZER BAR

Model	Hardtop	Wagon
Diameter mm (in)	23 (0.91)	26 (1.02)
Spring constant N·mm (kg-mm, lb-in)	24.5 (2.5, 140)	38 (3.87, 217)

Inspection and Adjustment

WHEEL BEARING

Total end play mm (in)	0 (0)

BRAKE SYSTEM

SECTION BR

SECTION BR

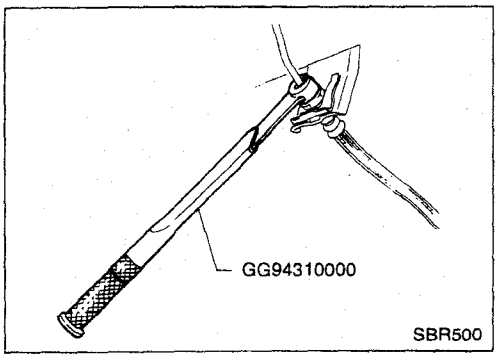
CONTENTS

Precautions

- **Use brake fluid "DOT 4".**
- **Never reuse drained brake fluid.**
- **Be careful not to splash brake fluid on painted areas; it may cause paint damage. If brake fluid is splashed on painted areas, wash it away with water immediately. DO NOT RUB IT OFF.**
- **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 damage rubber parts of hydraulic system.**
- **Use Tool when removing and installing brake tube.**

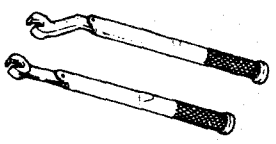
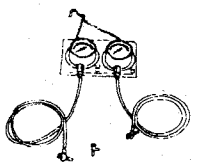
WARNING:

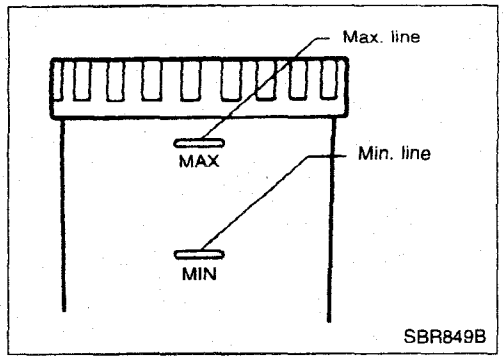
- **Clean brake pads and shoes with a vacuum dust collector.**



Preparation

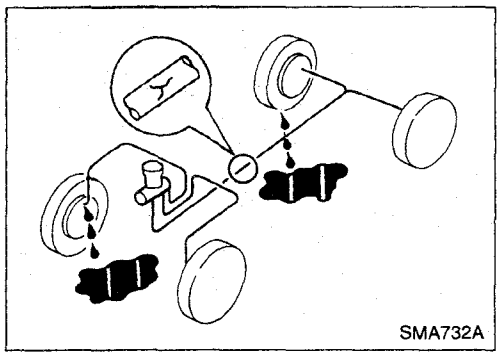
SPECIAL SERVICE TOOLS

Tool number Tool name	Description	
GG94310000 Flare nut torque wrench		Removing and installing each brake piping
KV991V0010 Brake fluid pressure gauge		Measuring brake fluid pressure



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.
- When brake warning lamp comes on even when parking brake lever is released, check brake system for leaks.

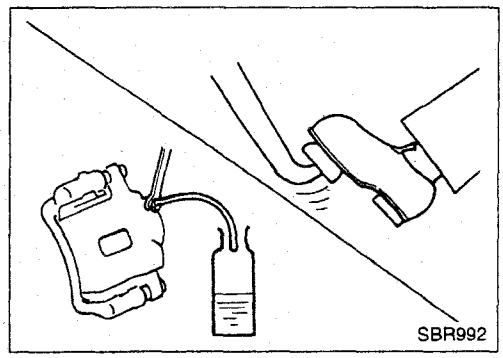


Checking Brake Line

CAUTION:

If leakage occurs around joints, retighten or, if necessary, replace damaged parts.

1. Check brake lines (tubes and hoses) for cracks, deterioration or other damage. Replace any damaged parts.
2. Check for oil leakage by fully depressing brake pedal while engine is running.



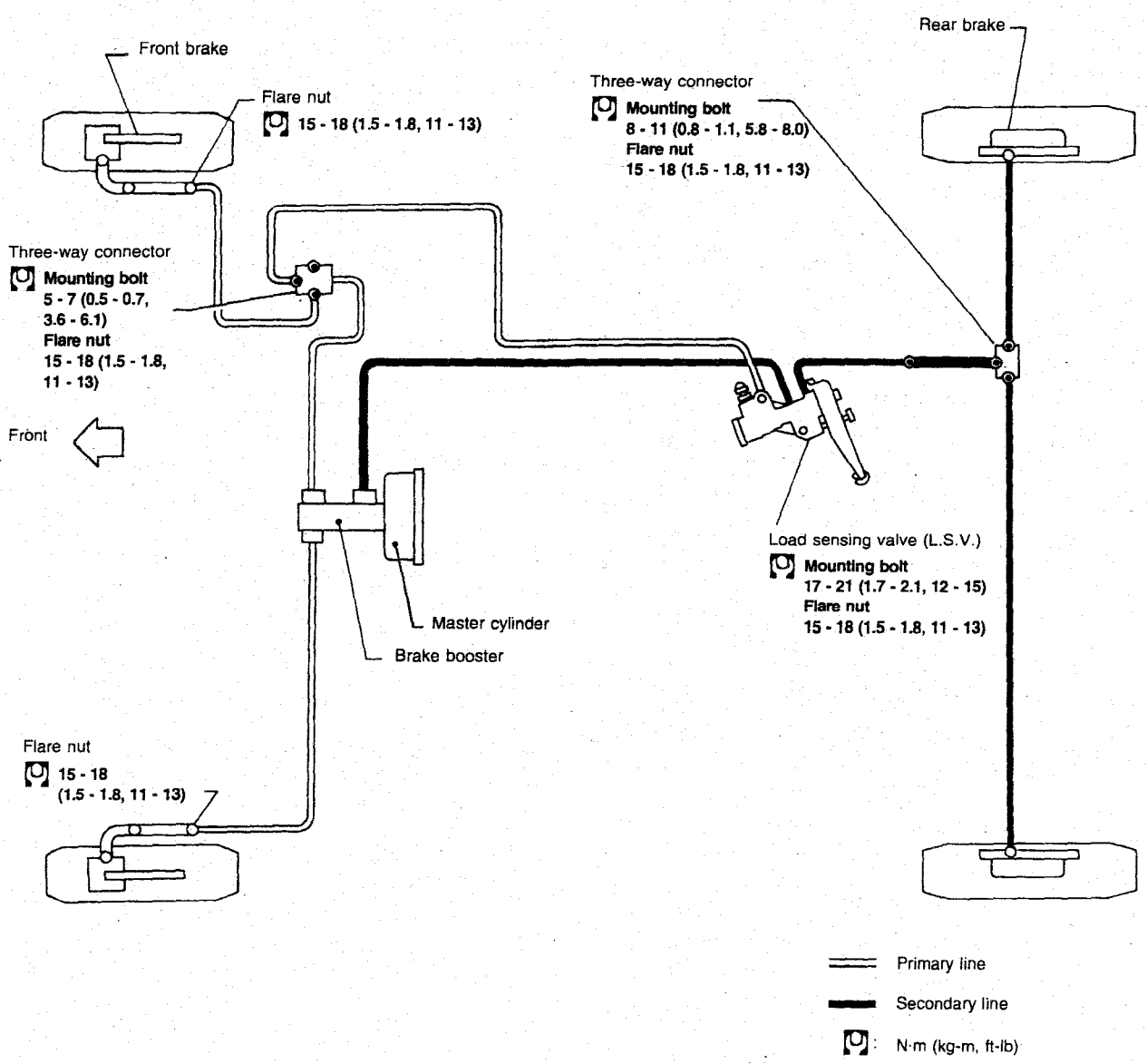
Changing Brake Fluid

CAUTION:

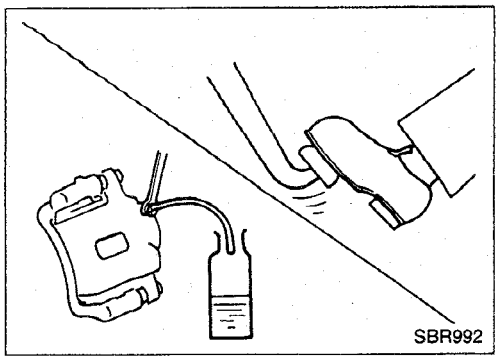
- **Refill with new brake fluid "DOT 4".**
- **Never reuse drained brake fluid.**
- **Be careful not to splash brake fluid on painted areas; it may cause paint damage. If brake fluid is splashed on painted areas, wash it away with water immediately. DO NOT RUB IT OFF.**

1. Connect a vinyl tube to each air bleeder valve.
2. Drain brake fluid from each air bleeder valve by depressing brake pedal.
3. 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" in "BRAKE HYDRAULIC LINE".

BRAKE HYDRAULIC LINE



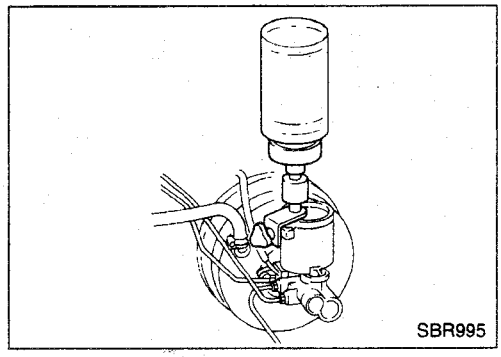
EBR093



Bleeding Procedure

CAUTION:

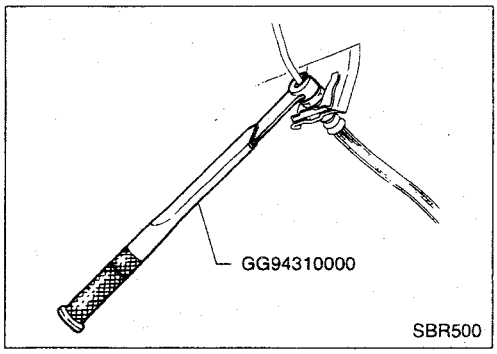
- **Carefully monitor brake fluid level at master cylinder during bleeding operation.**
- **Fill reservoir with recammended brake fluid "DOT 4". Make sure it is full at all times while bleeding air out of system.**
- **Be careful not to splash brake fluid on painted areas; it may cause paint damage. If brake fluid is splashed on painted areas, wash it away with water immediately. DO NOT RUB IT OFF.**



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.

- Bleed air in the following order.

Load Sensing Valve
↓
Left rear brake
↓
Right rear brake
↓
Left front brake
↓
Right front brake



Removal

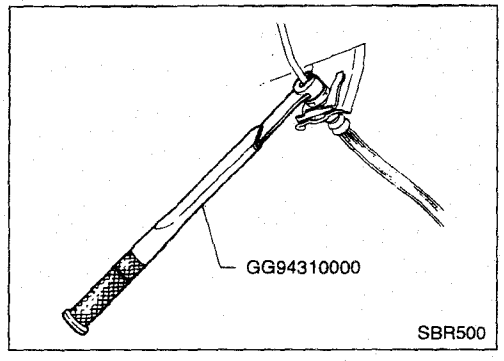
CAUTION:

- **Use suitable tool for assembly and disassembly of brake lines and hoses.**
- **Be careful not to splash brake fluid on painted areas; it may cause paint damage. If brake fluid is splashed on painted areas, wash it away with water immediately. DO NOT RUB IT OFF.**
- **All hoses must be free from excessive bending, twisting and pulling.**

1. Connect a vinyl tube to air bleeder valve.
2. Drain brake fluid from each air bleeder valve by depressing brake pedal.
3. Remove flare nut securing brake tube to hose, then withdraw lock spring.
4. Cover openings to prevent entrance of dirt whenever disconnecting hydraulic line.

Inspection

Check brake lines (tubes and hoses) for cracks, deterioration or other damage. Replace any damaged parts.



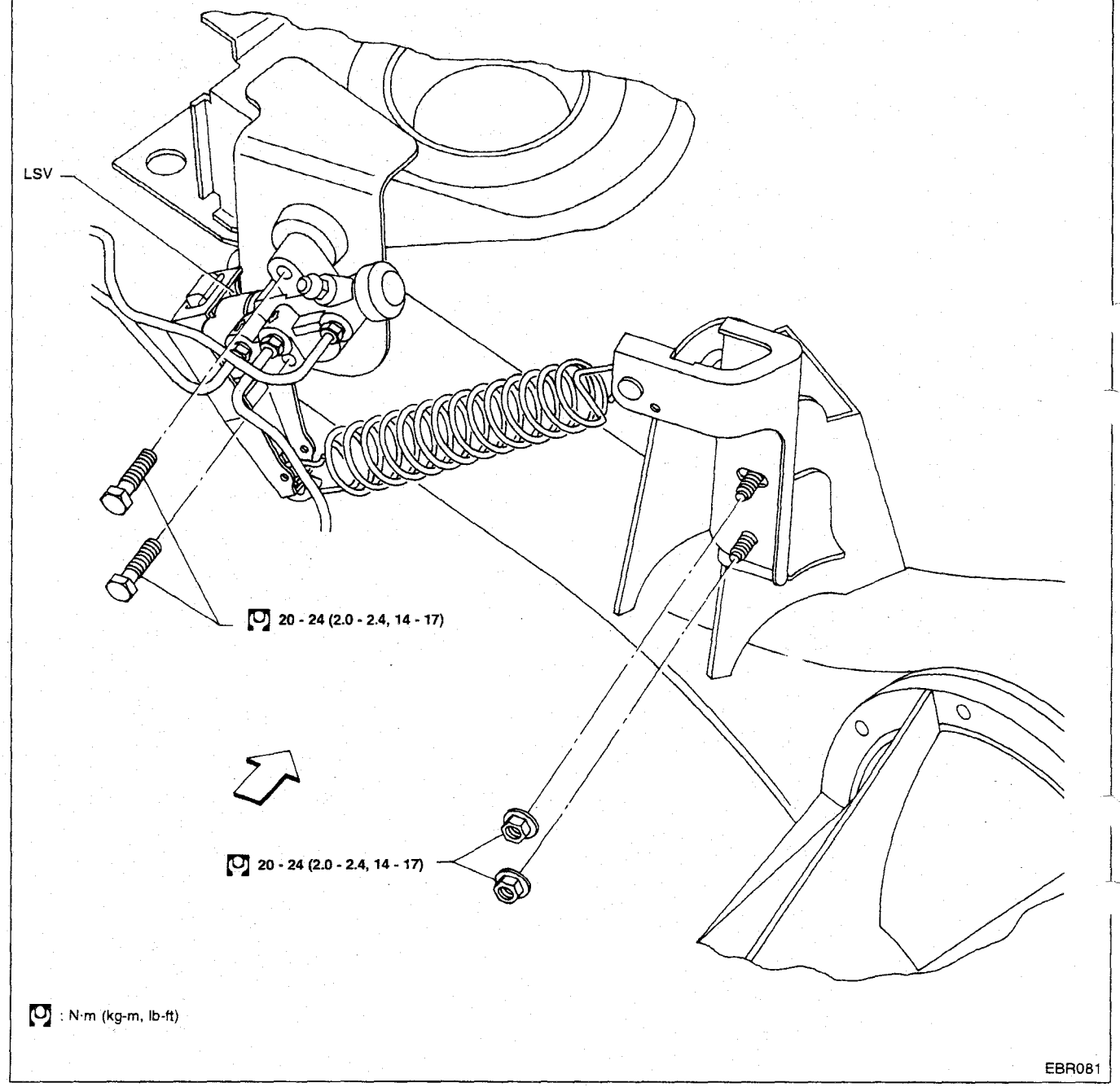
Installation

CAUTION:

- **Refill with new brake fluid "DOT 4".**
- **Never reuse drained brake fluid.**

1. Tighten all flare nuts and connecting bolts.
   Flare nut:
   : 9 - 11 N·m (0.9 - 1.1 kg-m, 6.5 - 8.0 ft-lb)
   Connecting bolt:
   : 17 - 20 N·m (1.7 - 2.0 kg-m, 12 - 14 ft-lb)
2. Refill until new brake fluid comes out of each air bleeder valve.
3. Bleed air. Refer to "Bleeding Procedure".

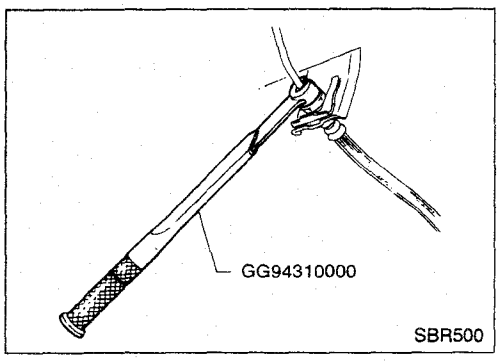
Removal and Installation



Removal

CAUTION

- **Be careful not to splash brake fluid on painted areas; it may cause paint damage. If brake fluid is splashed on painted areas wash it away with water immediately. DO NOT RUB IT OFF.**
- Remove flare nuts and LSV bolts.



Installation

CAUTION:

- **Refill with new brake fluid "DOT 4".**
- **Never reuse drained brake fluid.**
- **Check level in brake fluid reservoir.**

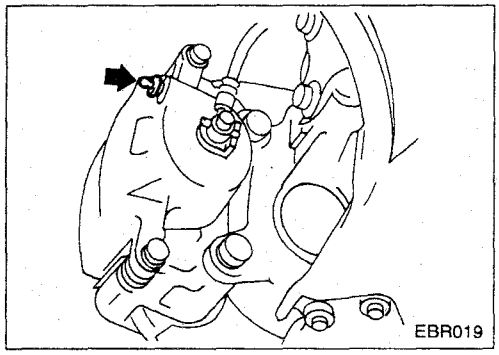
1. Tighten provisionaly flare nuts.
2. Tighten LSV bolts.
   : 20 - 24 N·m (2.0 - 2.4 kg-m, 14 - 17 ft-lb)
3. Tighten flare nuts.
   : 15 - 18 N·m (1.5 - 1.8 kg-m, 11 - 13 ft-lb)
4. Bleed air. Refer to "Bleeding Procedure" in "BRAKE HYDRAULIC LINE".
5. Adjust load sensing valve (LSV). Refer to "Inspection and Adjustment" in "LOAD SENSING VALVE".

Inspection and Adjustment

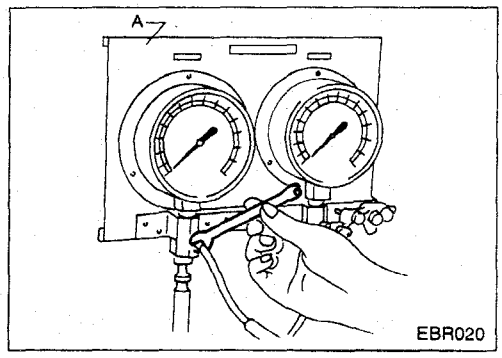
CAUTION:

- **Check level in brake fluid reservoir.**
- **Refill with recommended brake fluid "DOT 4".**
- **Never reuse drained brake fluid.**
- **Be careful not to splash brake fluid on painted areas; it may cause paint damage. If brake fluid is splashed on painted areas wash it away with water immediately. DO NOT RUB IT OFF.**

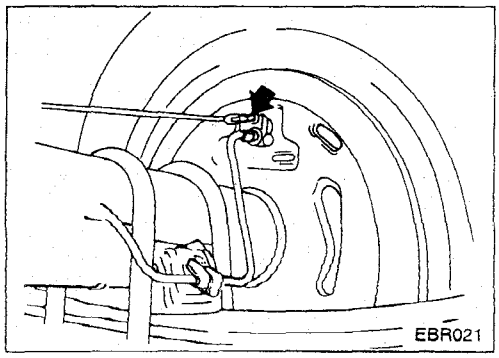
1. Before adjusting load sensing valve spring length, check for proper installation and abnormal wear of brake pads and shoes.



2. Remove the air bleeder from the wheel caliper, and install a pressure gauge (A) to the bleed valve hole.

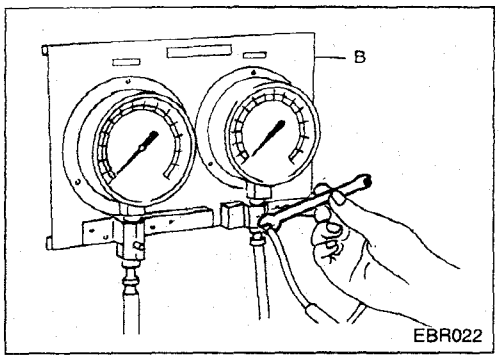


3. Bleed the air from the front brake piping.

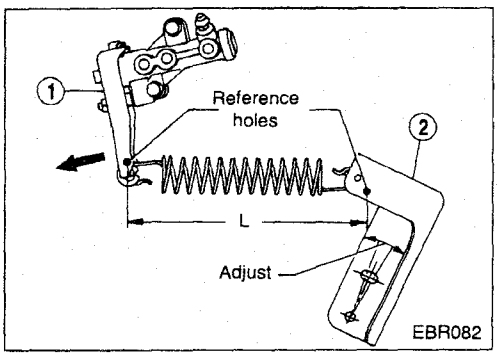


4. Remove the air bleed valve from the rear wheel cylinder, and install a pressure gauge (B) to the bleed valve hole.

Inspection and Adjustment (Cont'd)



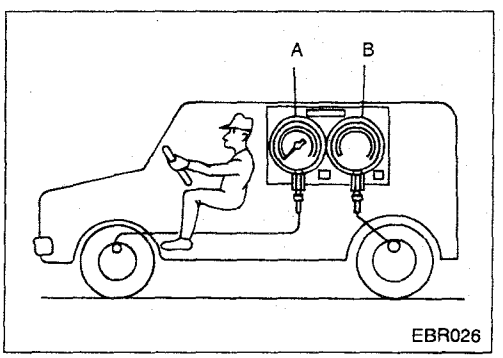
5. Bleed the air from the rear brake piping.



6. To adjust the LSV correctly, proceed as follows:
a. With unladen vehicle (Fuel, radiator coolant and engine oil full. Spare tire, jack, hand tools and mats in designated positions) check the length of LSV spring "L".
b. If the spring length is different from that specified, move the regulation lever (2) until the specified value is obtained. Move the LSV lever (1) until it contacts the stopper bolt and recheck the spring length.

Sensor spring length "L":
Hardtop: 211.5 mm (8.327 in)
Wagon: 213.3 mm (8.398 in)

NOTE: Do not disturb stopper bolt.



c. Start the engine and run it at idling speed.
d. Slowly depress the brake pedal until an input pressure of 5,000 kPa (50 bar, 49 kg/cm^2, 725 psi) is obtained (at the front axle pressure gauge) and an output pressure of 1,736 - 2,501 kPa (18 - 26 bar, 17.7 - 25.5 kg/cm^2, 252 - 363 psi) is obtained (at the rear axle pressure gauge).

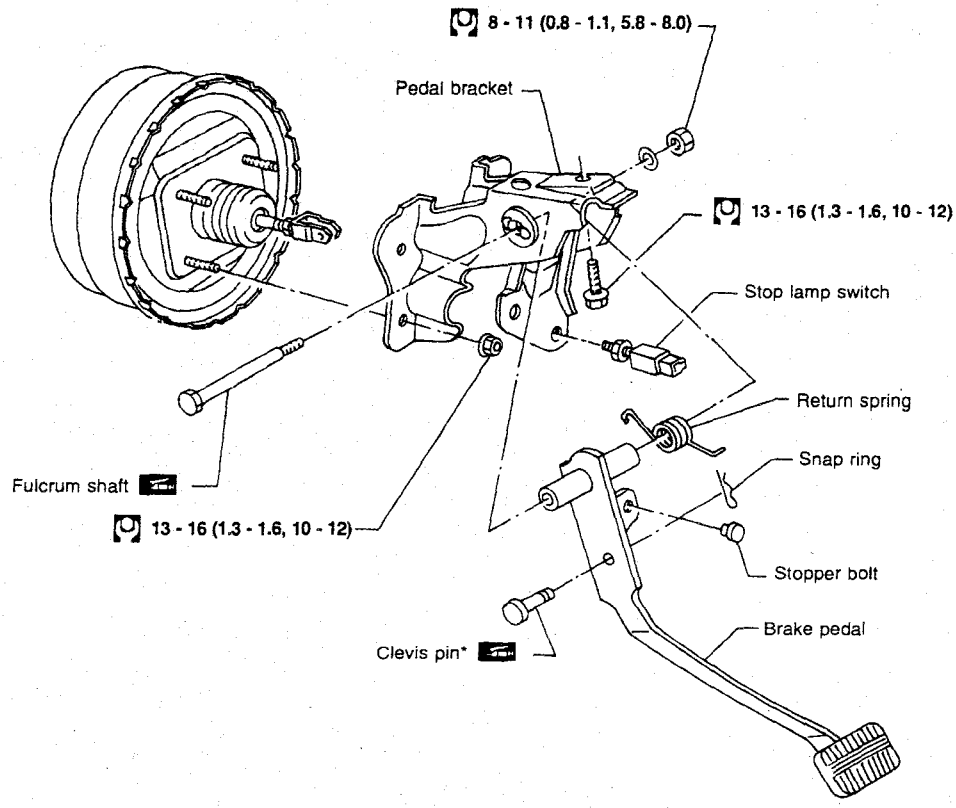
If the output pressure at the rear axle pressure gauge is not within the specified values, adjust LSV spring length as described under b) until the output pressure measured is within the specified range.

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

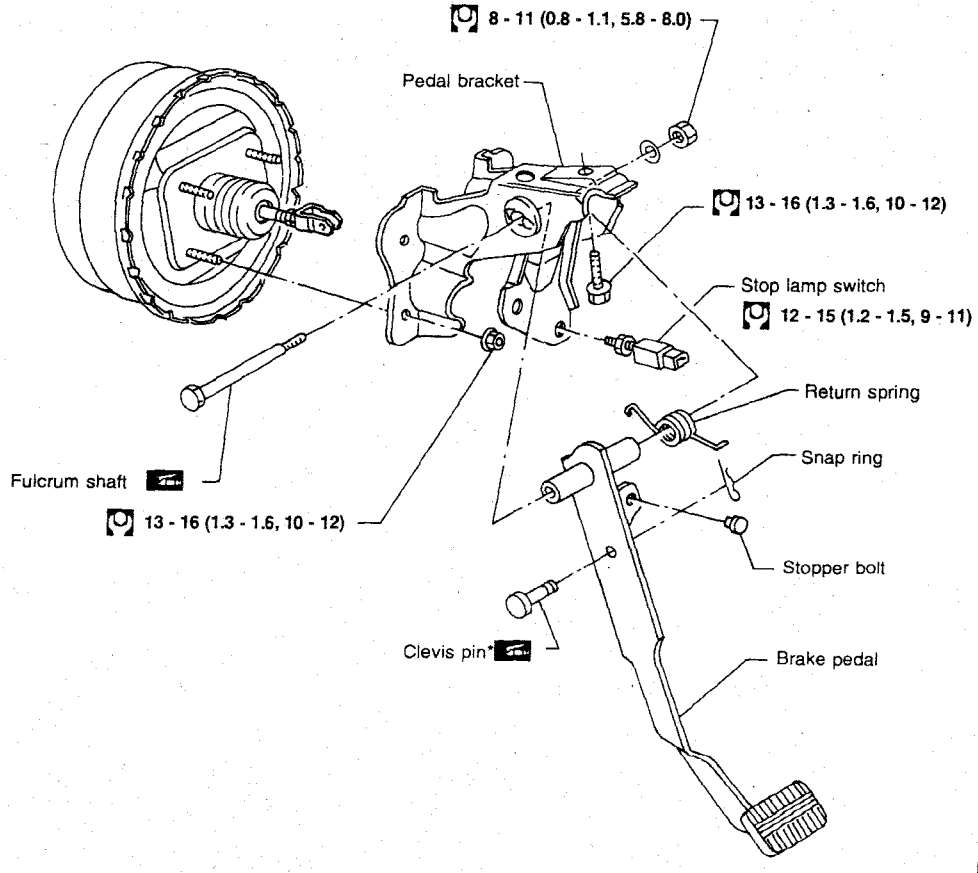
Front axle *	5,000 (50.0, 49.0, 725)
Rear axle *	1,736 - 2,501 (18 - 26, 17.7 - 25.5, 252 - 363)

* Load conditions as indicated under 6.a, driver seat occupied.

Removal and Installation



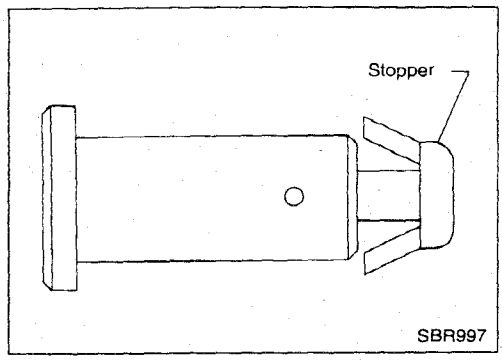
L.H.D.



R.H.D.

: N·m (kg-m, ft-lb)

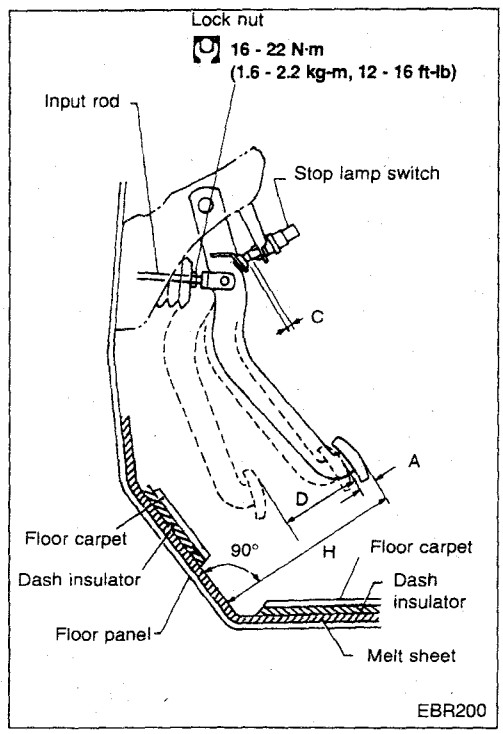
NBR003



Inspection

Check brake pedal for following items:

- Brake pedal bend
- Clevis pin deformation
- Crack of any welded portion
- Crack or deformation of clevis pin stopper



Adjustment

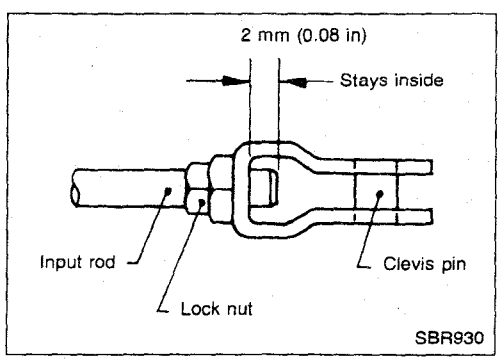
Check brake pedal free height from dash reinforcement panel.

H: Free height
Refer to S.D.S.

D: Full stroke
Refer to S.D.S.

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
1.0 - 3.0 mm (0.039 - 0.118 in)



If necessary, adjust brake pedal free height.

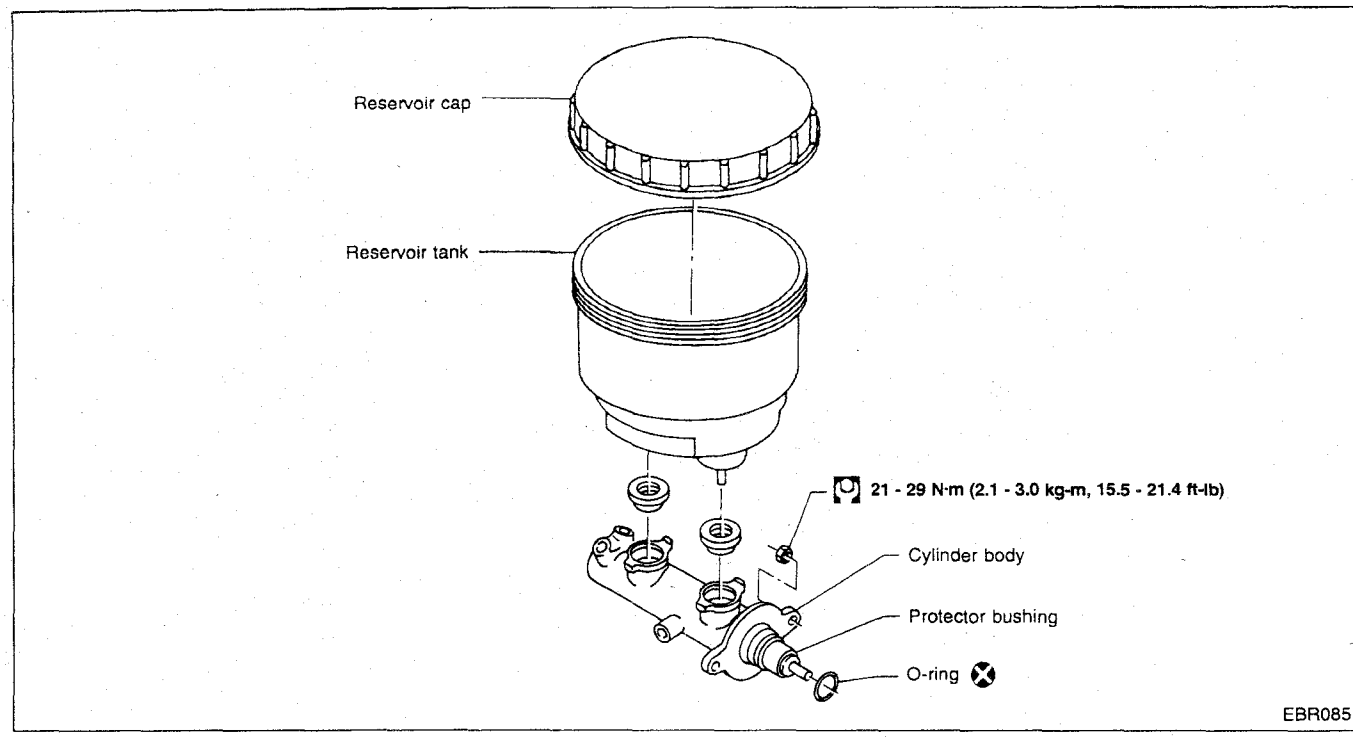
1. Loosen lock nut and adjust pedal free height by turning brake booster input rod. Then tighten lock nut.

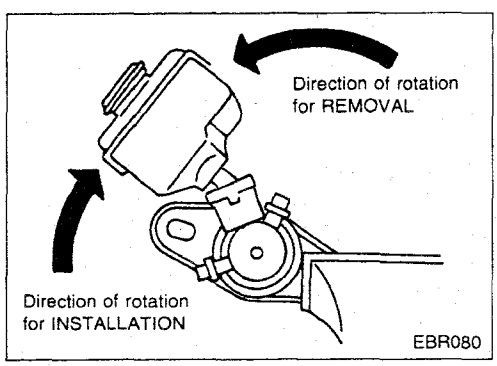
Make sure that tip of input rod stays inside of clevis as shown.

2. Loosen lock nut and adjust clearance "C" with stop lamp switch. Then tighten lock nuts.
3. Check pedal free play.

Make sure that stop lamps go off when pedal is released.

4. Check brake system for leaks, accumulation of air or any damage to components (master cylinder, etc.); then make necessary repairs.





Removal

CAUTION:

Be careful not to splash brake fluid on painted areas; it may cause paint damage. If brake fluid is splashed on painted areas, wash it away with water immediately. DO NOT RUB.

1. Connect a vinyl tube to air bleeder valve.
2. Drain brake fluid from each air bleeder valve, depressing brake pedal to empty fluid from master cylinder.
3. Remove brake pipe flare nuts.
4. Remove master cylinder mounting nuts.
5. Remove protector of master cylinder, and avoid scratching the surface of master cylinder during removal.

CAUTION:

Do not disassemble master cylinder.

NOTE:

If it is necessary to change the brake fluid reservoir, remove as shown in the illustration on the left, while holding the seals with one hand.

It is not necessary to replace the seals if they are in a good condition.

Installation

CAUTION:

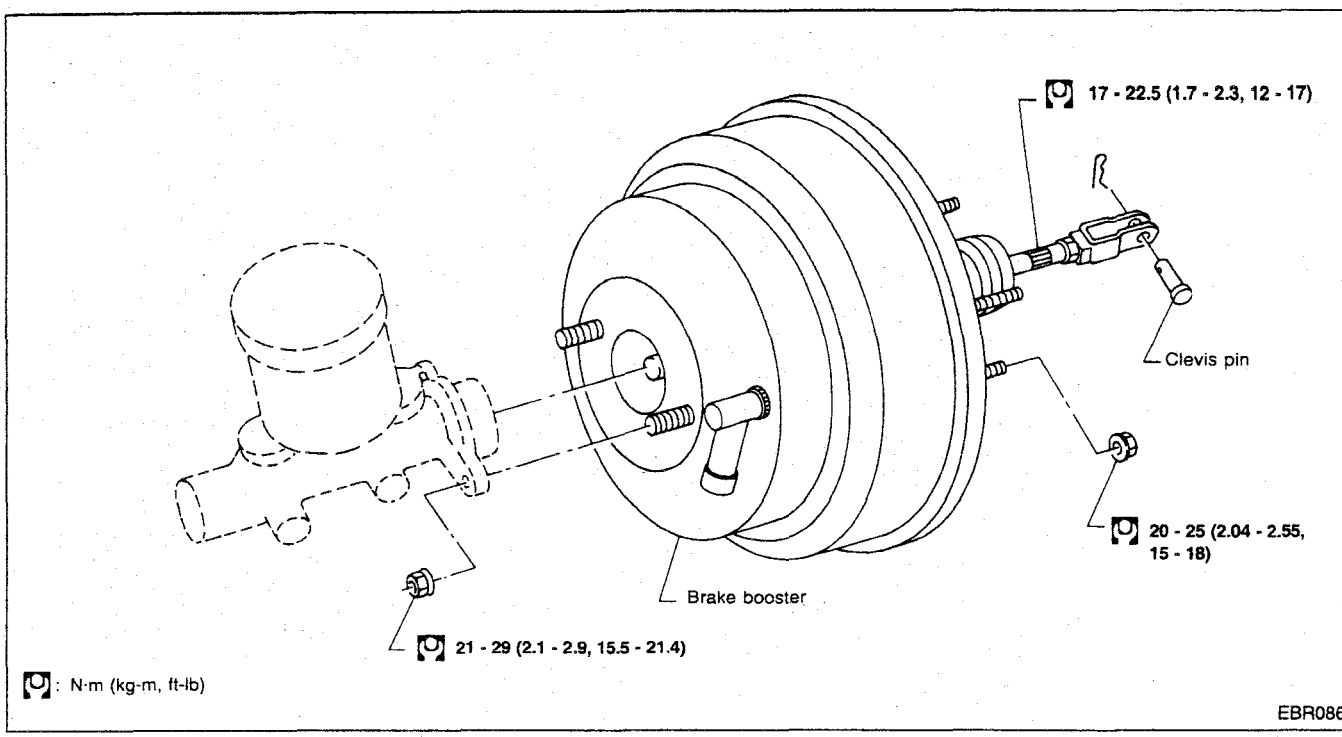
- **Refill with new brake fluid "DOT 4".**
- **Never reuse drained brake fluid.**

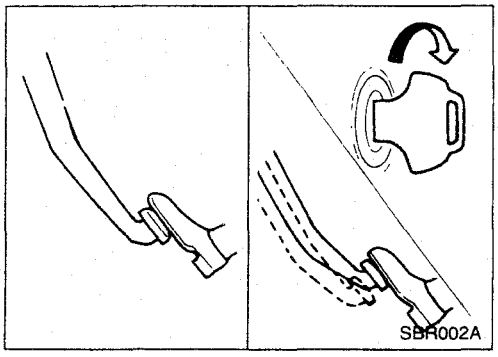
1. Place master cylinder onto brake booster and secure mounting nuts lightly.
2. Fit flare nuts to master cylinder.
3. Tighten mounting nuts.

   : 21 - 29 N·m (2.1 - 3.0 kg-m, 15.5 - 21.4 ft-lb)
4. Tighten flare nuts.

   : 15 - 18 N·m (1.5 - 1.8 kg-m, 11 - 13 ft-lb)
5. Bleed air. Refer to "Bleeding Procedure" in "BRAKE HYDRAULIC LINE".

Removal and Installation

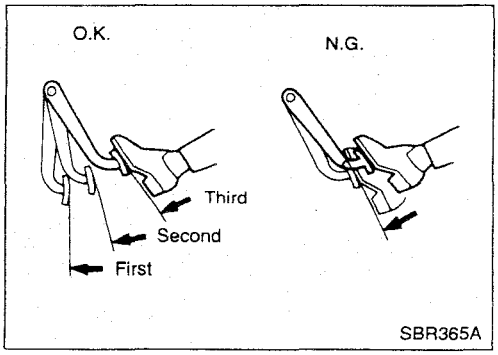




Inspection

OPERATING CHECK

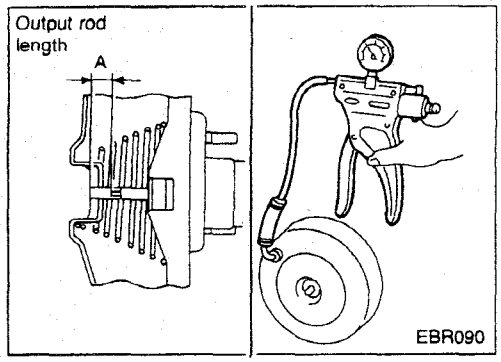
- Depress brake pedal several times with engine off, and check that there is no change in pedal stroke.
- Depress brake pedal, then start engine. If pedal goes down slightly, operation is normal.



AIRTIGHT CHECK

- Start engine, and stop it after 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, booster is airtight.
- Depress brake pedal while engine is running, and stop engine with pedal depressed. If there is no change in pedal stroke after holding pedal down **30 seconds**, brake booster is airtight.

Inspection (Cont'd)

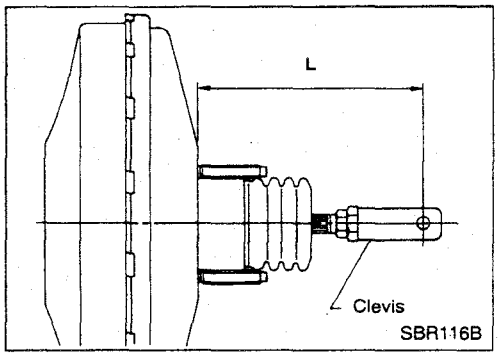


OUTPUT ROD LENGTH CHECK

1. Apply vacuum of − 66.7 kPa (− 667 mbar, − 500 mmHg, − 19.69 inHg) to brake booster with a manual vacuum pump and check output rod length "A".

   Specified length "A":
   22.15 - 22.45 mm (0.872 - 0.884 in)

   (The length "A" in this case is the distance from end of output rod to outside of brake booster, when the specified vacuum is applied.)



2. Check output rod length "L" when brake booster doesn't work.

   Specified length "L":
   129.2 - 130.2 mm (5.087 - 5.126 in)

Installation

CAUTION:

- **Be careful not to deform or bend brake pipes, during installation of booster.**
- **Replace clevis pin if damaged.**
- **Refill with new brake fluid "DOT 4".**
- **Never reuse drained brake fluid.**
- **Take care not to damage brake booster mounting bolt thread when installing. Due to the acute angle of installation, the threads can be damaged on the metal surrounding the dash panel holes.**

1. Before fitting booster, temporarily adjust clevis to dimension shown.
2. Fit booster, then secure mounting nuts (brake pedal bracket to brake booster) lightly. (Join brake booster and brake pedal bracket to the front end of the vehicle interior)
3. Connect brake pedal and booster input rod with clevis pin.
4. Secure mounting nuts.

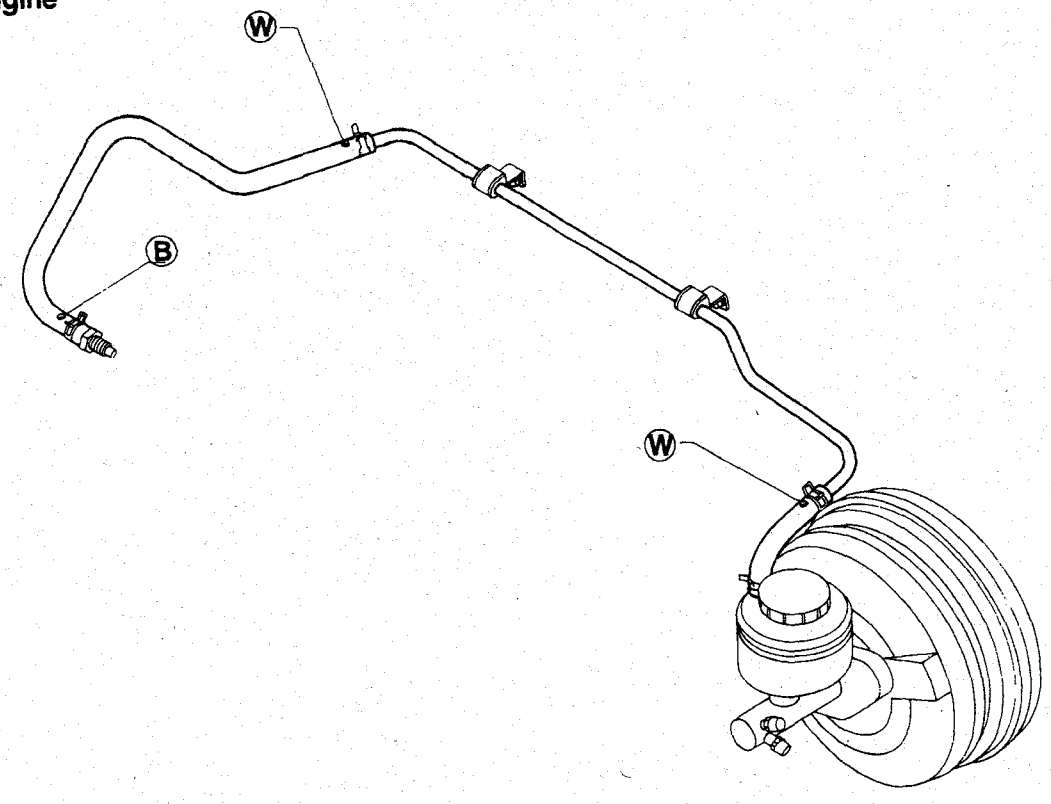
   : 21 - 29 N·m (2.1 - 3.0 kg-m, 15.5 - 21.4 ft-lb)

5. Install master cylinder. Refer to "Installation" in "MASTER CYLINDER".
6. Bleed air. Refer to "Bleeding Procedure" in "BRAKE HYDRAULIC LINE".

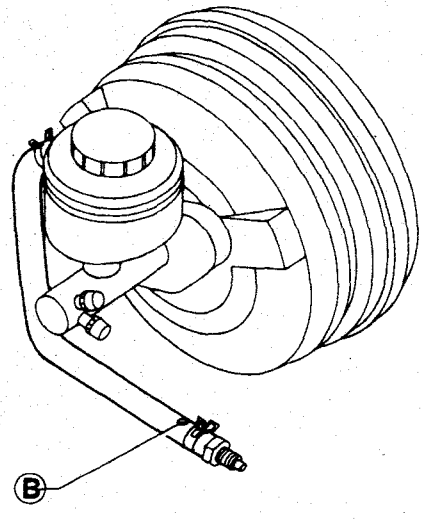
Removal and Installation

KA24E Engine

L.H.D.



R.H.D.



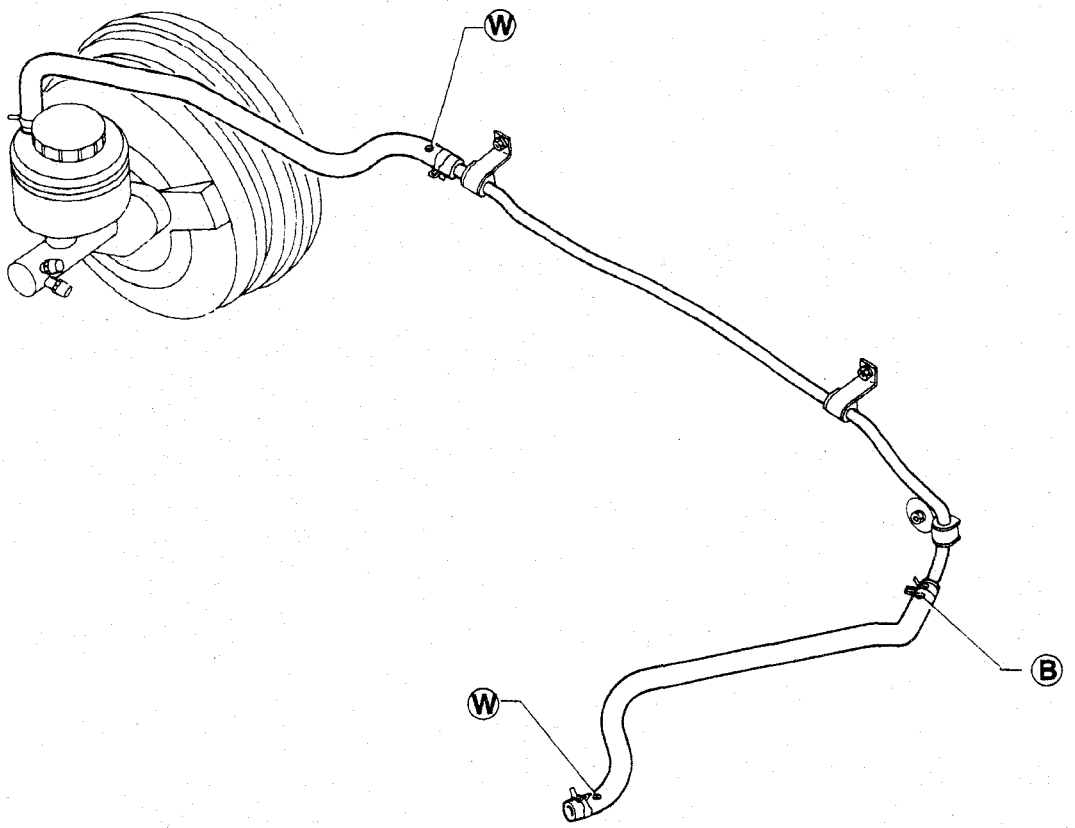
B – Blue color mark

W – White color mark

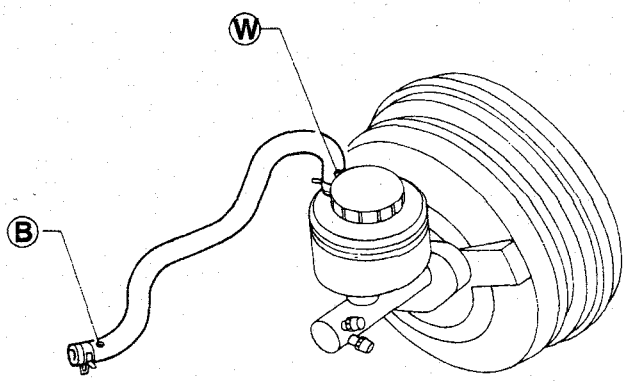
EBR087

TD27T Engine

R.H.D.

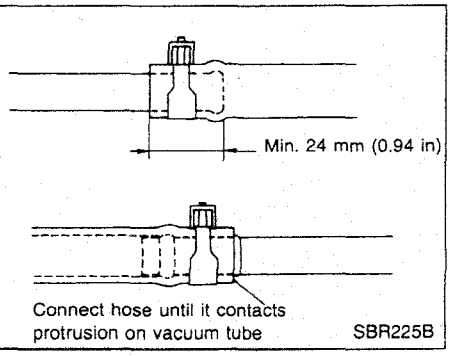


L.H.D.



B — Blue color mark
W — White color mark

EBR091

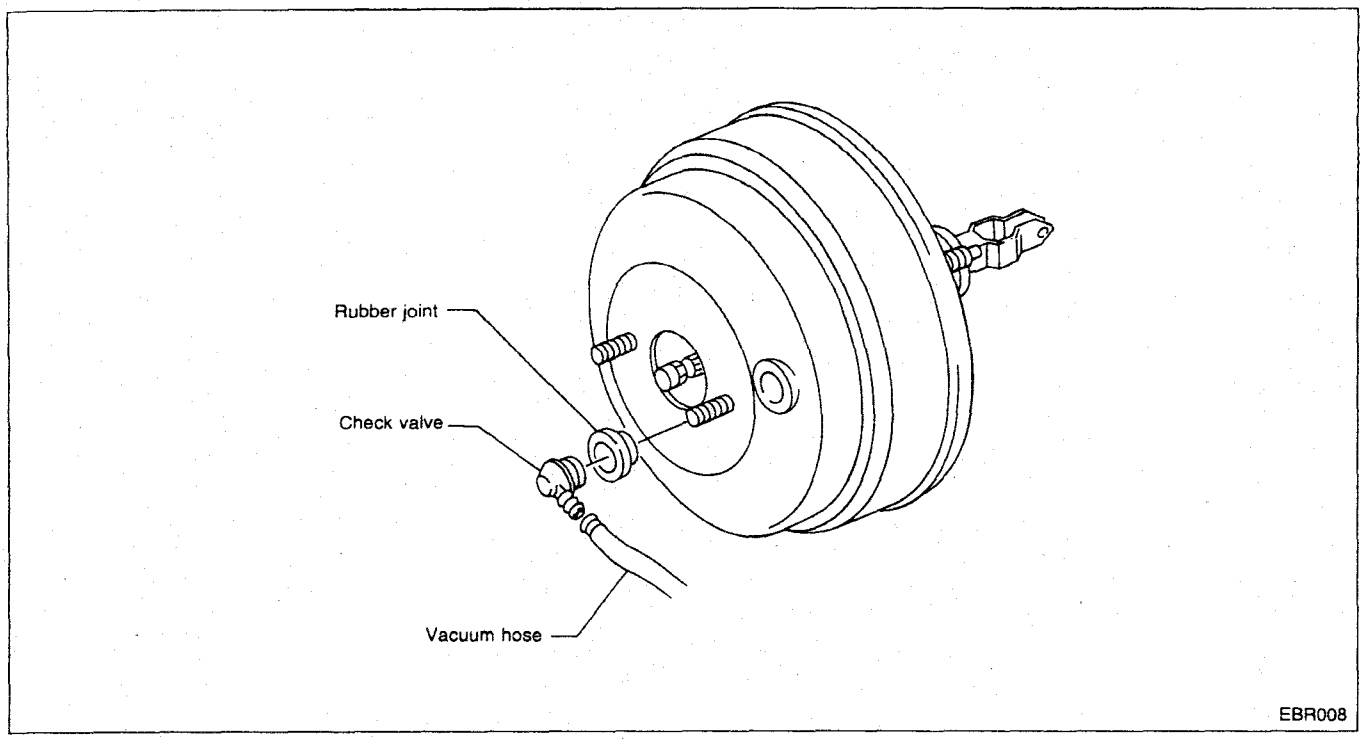


CAUTION:

When installing vacuum hoses, pay attention to the following points.

- **Do not apply any oil or lubricants to vacuum hose and check valve.**
- **Insert vacuum tube into vacuum hose over a length of min. 24 mm (0.94 in) as shown.**

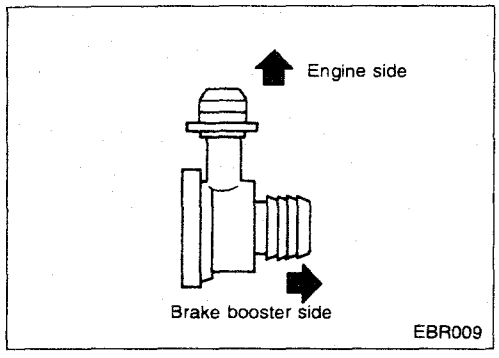
Take care to maint vacuum hoses in their original direction and position.



Inspection

HOSES AND CONNECTORS

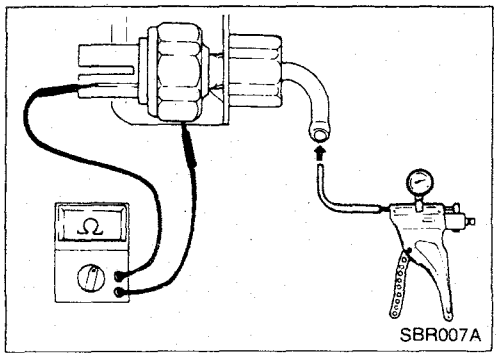
- Check condition of vacuum hoses and connectors.
- Check vacuum hoses and check valve for air tightness.



CHECK VALVE

- Check vacuum with a manual vacuum pump.

Connect to booster side	Vacuum should exist.
Connect to engine side	Vacuum should not exist.



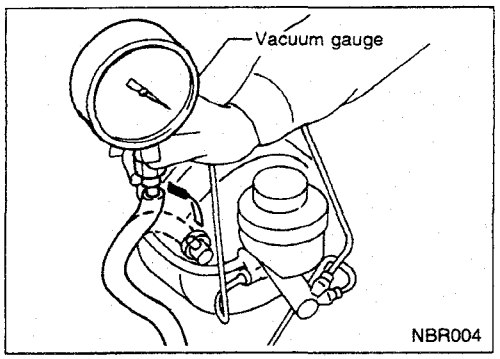
VACUUM WARNING SWITCH*

Test continuity though vacuum warning switch with an ohmmeter and vacuum pump.

Vacuum	Less than 26.7 kPa (267 mbar, 200 mmHg, 7.87 inHg)	0Ω
	33.3 kPa (333 mbar, 250 mmHg, 9.84 inHg) or more	∞ Ω

* TD27T Engine models.

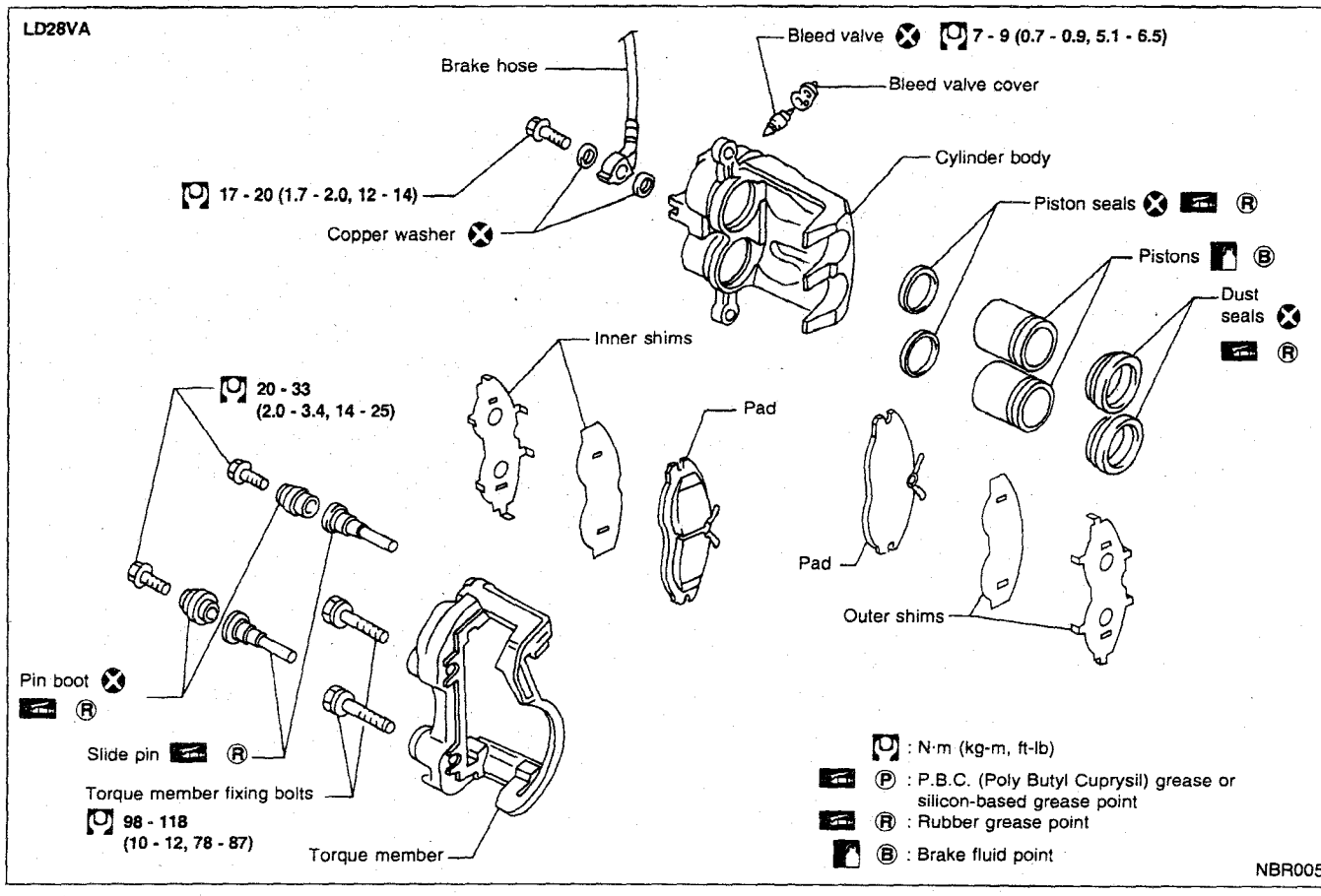
Inspection (Cont'd)



VACUUM POMP

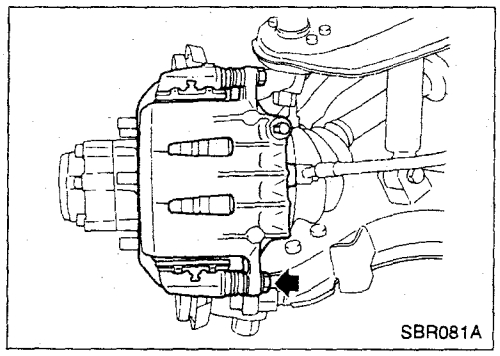
1. Install vacuum gauge.
2. Run engine at 1,000 rpm or more.
3. Check vacuum.

Specified vacuum:
93.3 kPa
(933 mbar, 700 mmHg, 27.56 inHg) or more



PRECAUTION:

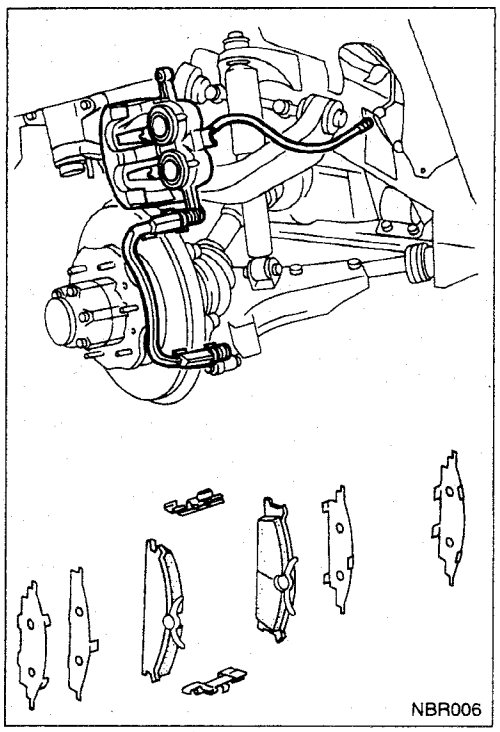
Clean all brake assembly parts with a vacuum dust collector to prevent particles from spreading through work area.



Pad Replacement

1. Loosen brake fluid reservoir cap.
2. Remove lower pin bolt.

Pad Replacement (Cont'd)

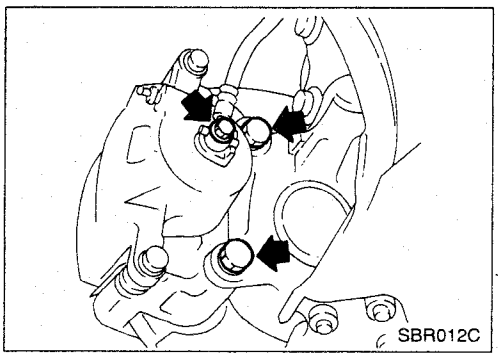


3. Swing cylinder body upward. Then remove pad retainers, and inner and outer shims.

CAUTION:

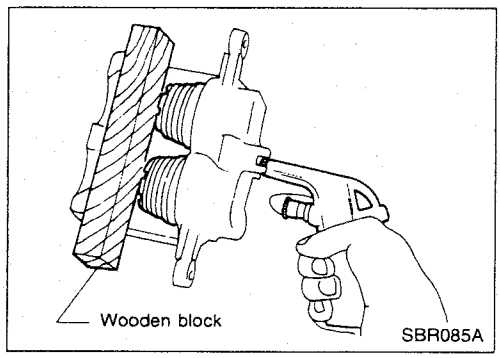
- **When cylinder body is swung up, do not depress brake pedal because piston will pop out.**
- **Be careful not to damage dust cover or soil rotor with brake fluid.**
- **Be careful not to twist brake hoses.**

  Brake pad thickness (new):
  10 mm (0.39 in)
  Wear limit (min. thickness):
  2 mm (0.08 in)
- **After installing new brake pads, check brake fluid level at brake fluid reservoir.**



Removal

- Remove torque member fixing bolts and union bolt.

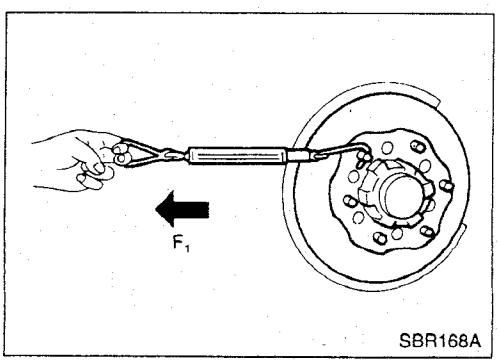


Disassembly

Push out piston with dust cover with compressed air.
Use a wooden block so that the 2 pistons come out evenly.

CAUTION:

- **Wear protecting clothes and safety goggles.**
- **Do not hold your fingers in front of the pistons.**
- **Be careful not to scratch piston and/or cylinder faces.**



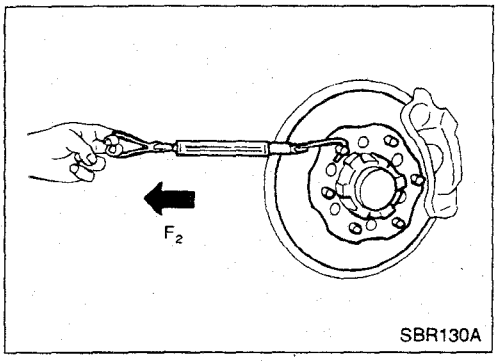
Inspection

INSPECTION OF BRAKE DRAG FORCE

"Residual pair" describes the friction pressure of the disc brake shoes against the disk when the brake pedal is not applied.

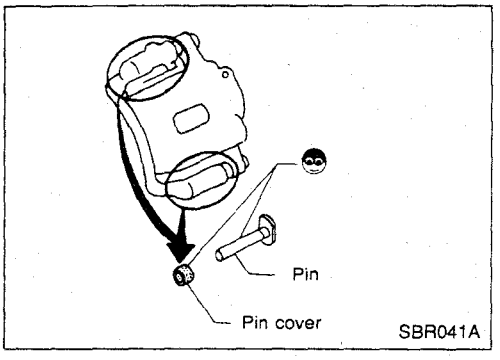
1. Swing cylinder body upward.
2. Make sure that wheel bearing is adjusted properly. Refer to section FA.
3. Measure rotating force (F_1).

Inspection (Cont'd)



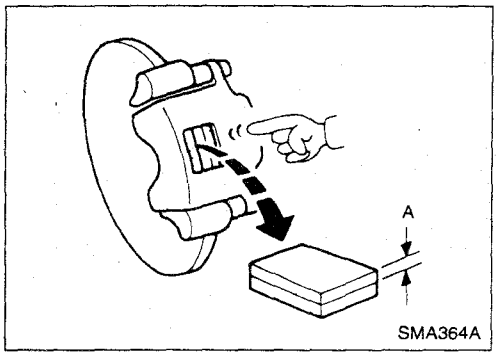
4. Install caliper with pads to the original position.
5. Depress brake pedal for 5 seconds.
6. Release brake pedal, rotate disc rotor 10 revolutions.
7. Measure rotating force (F_2).
8. Calculate brake drag force by subtracting F_1 from F_2.

Maximum brake drag force (F_2 — F_1):
103.0 N (10.5 kg, 23.2 lb)



If it is not within specification, check pins and pin boots in caliper.

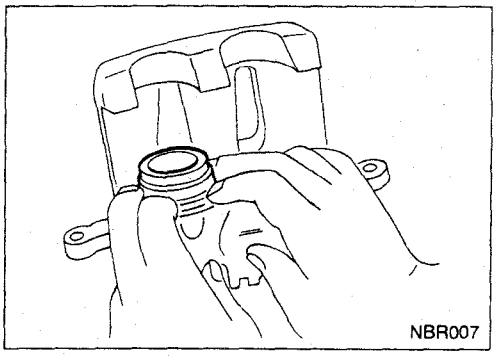
- **Make sure that wheel bearing is adjusted properly.**
- **Disc pads and disc rotor must be dry.**



DISC PAD

Check disc pad for wear or damage.

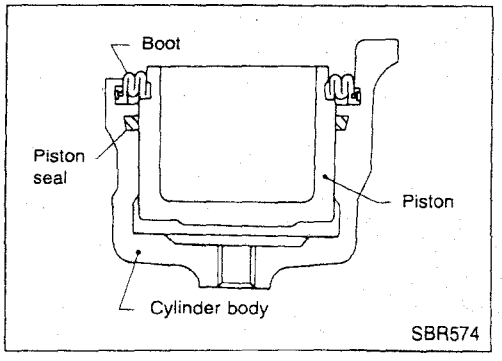
Pad wear limit (A):
2.0 mm (0.079 in)



Assembly

Fit new piston seals.
Lightly appley clean brake fluid "DOT 4" to piston outer face

1. Insert piston seal into groove on cylinder body.
2. Install piston into cylinder body.
3. Install piston boot and secure properly.



Inspection

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 the surface with a fine emery paper. Replace cylinder body if necessary.

CAUTION:
Use brake fluid to clean. Never use mineral oil.

Inspection (Cont'd)

PISTON

Check outside surface of 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.

PIN, PIN BOLT AND PIN BOOT

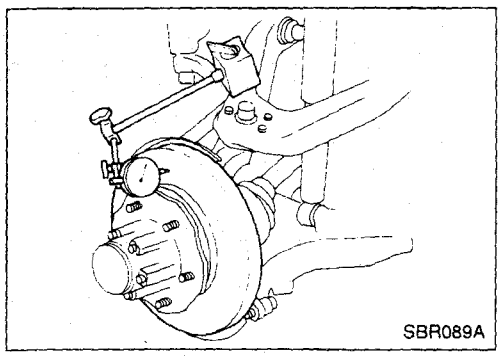
Check for wear, cracks or other damage. Replace if any of the above conditions are observed.

Inspection (Cont'd)

ROTOR

Rubbing surface

Check rotor for roughness, cracks or chips.


SBR089A

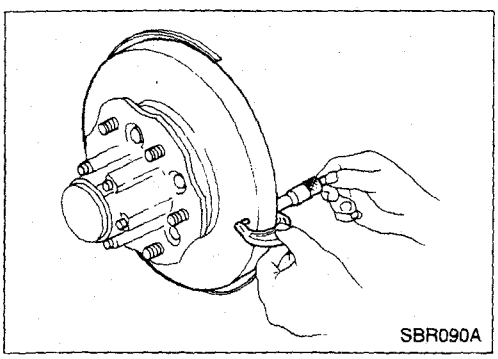
Runout

1. Secure rotor to wheel hub with at least two nuts.
2. Check runout using a dial indicator.

Make sure that wheel bearing axial end play is within the specifications before measuring. Refer to section FA.

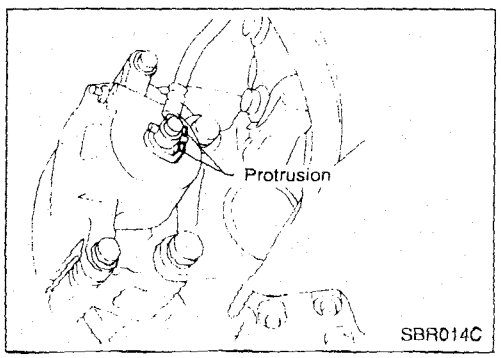
Maximum runout:
0.07 mm (0.0027 in)

3. If the runout is out of specification, find minimum runout position as follows:
   a. Remove nuts and rotor from wheel hub.
   b. Shift the rotor one hole and secure rotor to wheel hub with nuts.
   c. Measure runout.
   d. Repeat steps a. to c. so that minimum runout position can be found.
4. If the runout is still out of specification, turn rotor with on-car brake lathe.


SBR090A

Thickness

Standard thickness:
26.0 mm (1.02 in)
Minimum thickness:
24.0 mm (0.94 in)



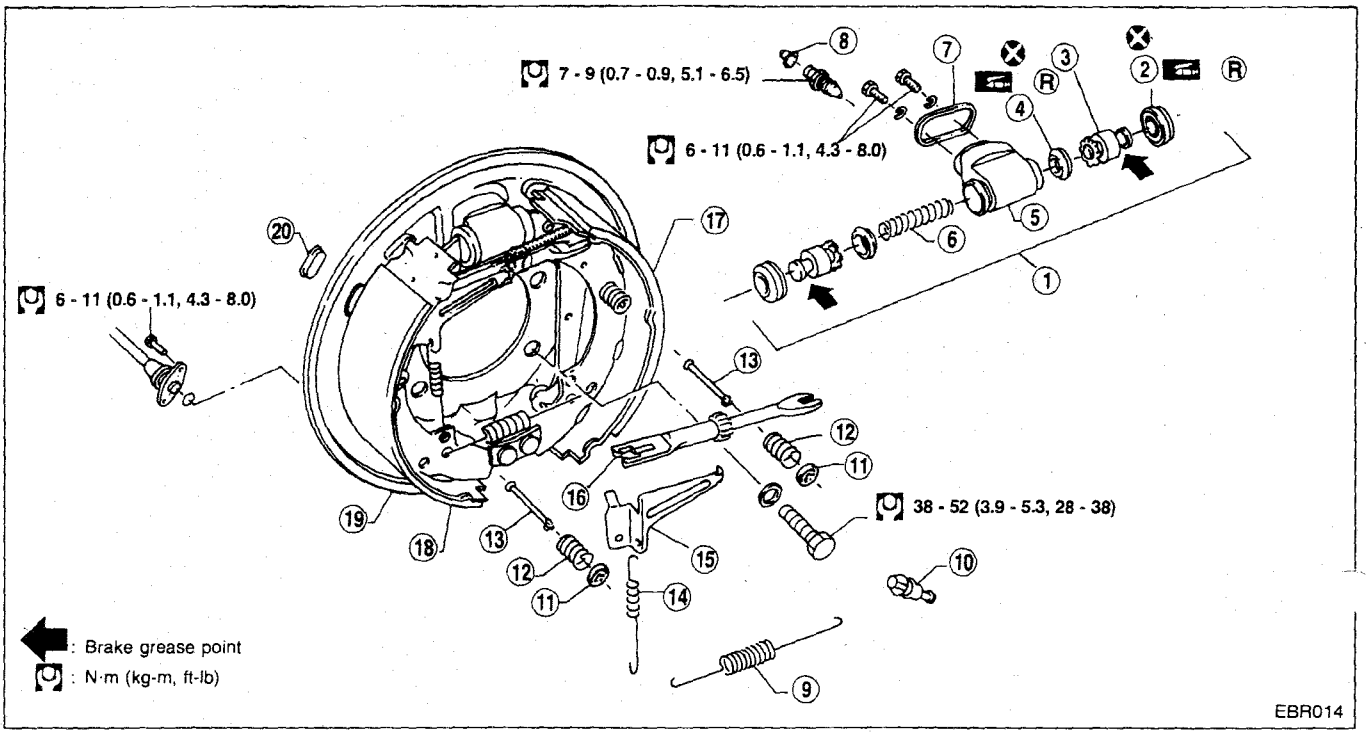
SBR014C

Installation

CAUTION:

- **Refill with new brake fluid "DOT 4".**
- **Never reuse drained brake fluid.**

1. Install caliper assembly.
2. Install brake hose to caliper securely taking care that brake hose is not trapped between any suspension part and that hoses are not twisted.
3. Bleed air. Refer to "Bleeding Procedure" in "BRAKE HYDRAULIC LINE".



① Wheel cylinder assembly
② Boot
③ Piston
④ Piston cup
⑤ Cylinder body
⑥ Spring
⑦ Gasket
⑧ Dust cap
⑨ Return spring
⑩ Handbrake lever stop
⑪ Retainer
⑫ Shoe hold-down spring
⑬ Shoe hold-down pin
⑭ Pawl return spring
⑮ Pawl
⑯ Adjuster assembly
⑰ Trailing shoe
⑱ Leading shoe
⑲ Backplate
⑳ Plug

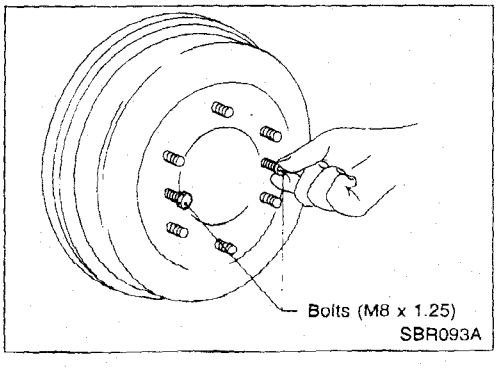
Removal

WARNING:

Clean brake lining with a vacuum dust collector.

CAUTION:

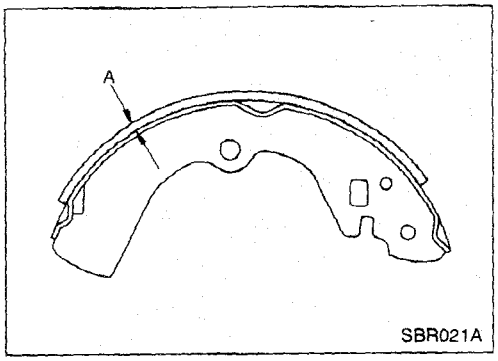
Make sure parking brake lever is released completely.



1. Release parking brake lever fully, then remove drum.

If drum is hard to remove, screw two bolts in the provided holes of the drum and tighten them gradually.

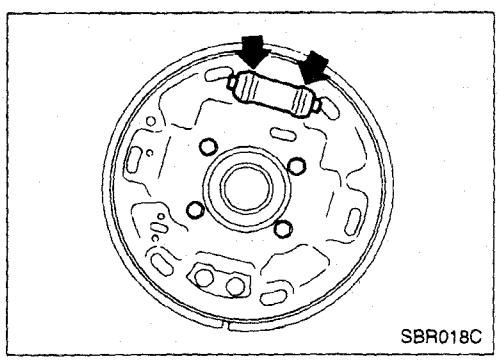
If the drum cannot be removed after carrying out this operation, refer to "Inspection" in "PARKING BRAKE CONTROL".



Shoe Replacement

When installing new shoes, springs should be changed as well. Check lining thickness.

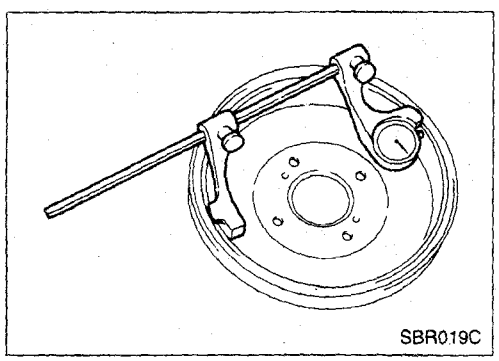
Standard lining thickness:
Trailing: 5.8 mm (0.228 in)
Leading: 4.3 mm (0.169 in)
Lining wear limit (A):
1.52 mm (0.060 in)



Inspection

WHEEL CYLINDER

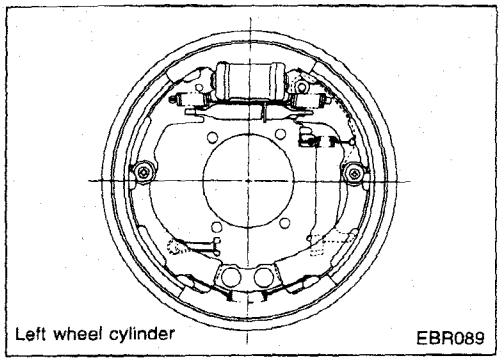
- Check wheel cylinder for leakage.
- Check for wear, damage and loose conditions. Replace if any such condition exists.



DRUM

Maximum inner diameter:
255.5 mm (10.05 in)
Out-of-roundness:
0.05 mm (0.0019 in) or less

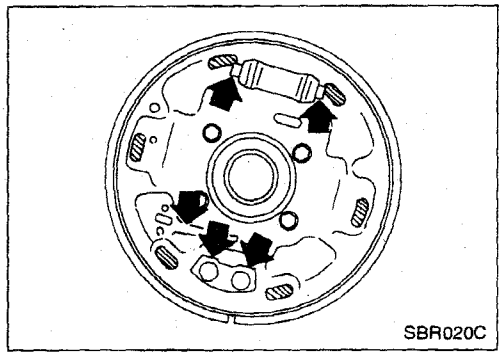
- Contact surface should be fine finished with No. 120 to 150 emery paper.
- If any scratches or wear are detected, adjust the alignment of the drum.
- After brake drum has been completely reconditioned or replaced, check drum and shoes for proper contact pattern.



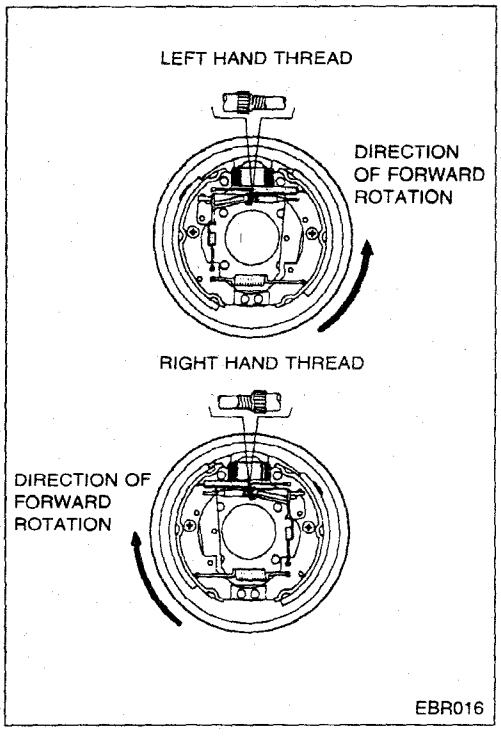
Installation

Always perform shoe clearance adjustment. Refer to "Adjustment" in "PARKING BRAKE CONTROL".

1. Fit adjuster assembly.

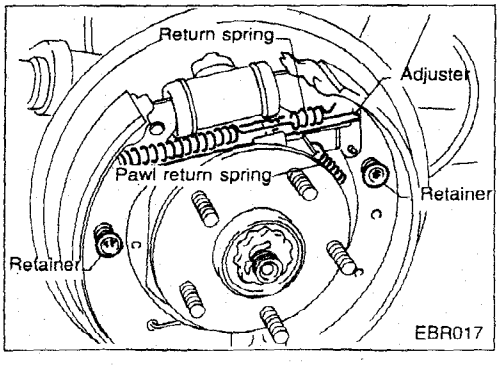


2. Apply brake grease to the contact areas shown at left.



3. Shorten adjuster by rotating it, so that shoe outer diameter is 253 - 253.5 mm (9.96 - 9.98 in)

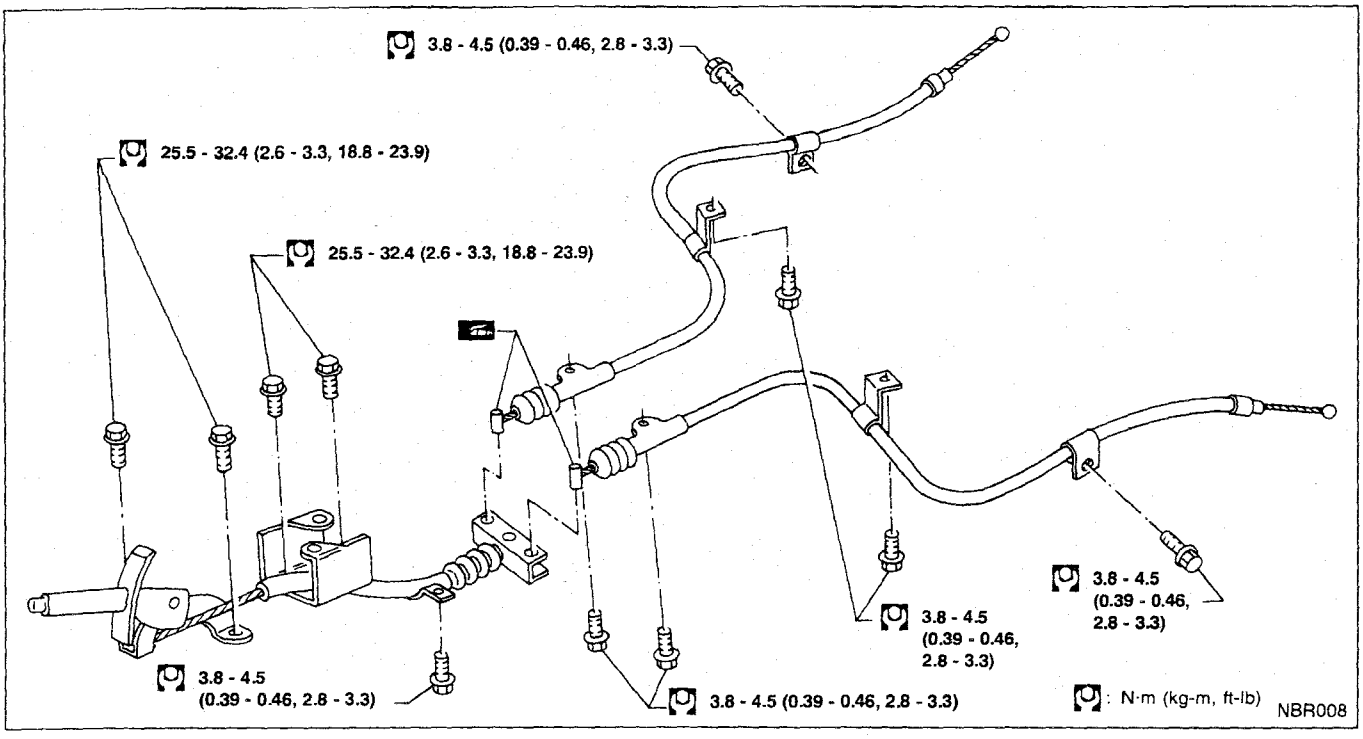
- **Pay attention to direction of adjuster.**

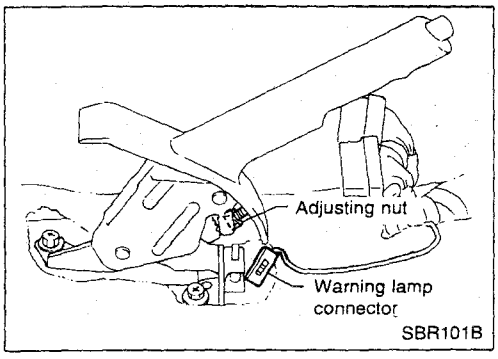


4. Connect parking brake cable to toggle lever.
5. Install all parts.
6. Check all parts are installed properly.

Pay attention to direction of adjuster.

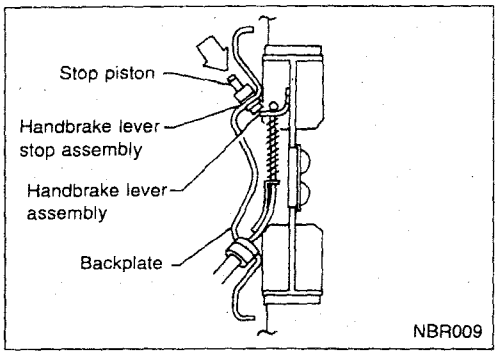
7. Install brake drum.
8. When installing new wheel cylinder or overhauling wheel cylinder, bleed air. Refer to "Bleeding procedure" in "BRAKE HYDRAULIC LINE".





Removal and Installation

1. To remove parking brake cable, first remove center console.
2. Disconnect warning lamp connector.
3. Remove bolts, slacken off and remove adjusting nut.



Inspection

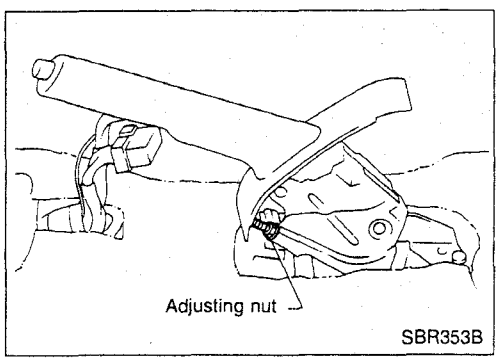
1. Check control lever for wear or other damage. Replace if necessary.
2. Check wires for discontinuity or deterioration. Replace if necessary.
3. Check warning lamp and switch. Replace if necessary.
4. Check parts at each connecting portion and, if deformed or damaged, replace.
5. Without the parking brake being applied, check that the parking brake lever stop is not moved fowards the interior of the back plate.

NOTE:

When the brake drum has been worn excessively, it can be hard to remove it. In this case break the parking brake lever stop by forcing it inside the brake drum, so the brake shoes will move to the center at minimum stroke. After the drum has been removed install new parking brake lever stop.

Adjustment

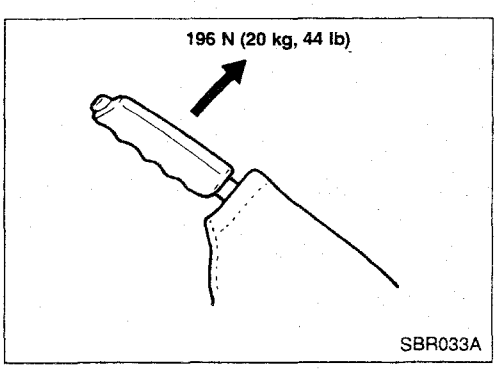
1. Adjust clearance between shoe and drum as follows:
a. Release parking brake lever and loosen adjusting nut.
b. Depress brake pedal fully at least 10 times with engine running.



2. Apply the handbrake, allowing the handbrake grip to move six notches. You can adjust the handbrake travel by using the adjustment spanner. To complete this adjustment, you will need a dynamometer to check the amount of pressure required to move from 6 to 8 notches. If the pressure exceeds 20 kg, the cable will have to be loosened with the help of the adjustment spanner.

   Number of notches:
   6 – 8

   If the pressure is less then 20 kg, the cable should be tightened.



3. Apply the handbrake, using the specified pressure. Check the travel to see that the handbrake is working smoothly.

4. Bend parking brake warning lamp switchplate so that brake warning lamp comes on when parking brake lever is pulled "A" notches.

   Number of "A" notches: 1 or less

General Specifications

Unit: mm (in)

Front brake	
Brake model	LD28VA
Cylinder bore diameter	43 x 2 (1.69 x 2)
Pad Length x width x thickness	144.85 x 48.5 x 15.5 (5.7027 x 1.90 x 0.61)
Rotor Outer diameter x thickness	277 x 26 (10.91 x 1.02)
Rear brake	
Brake model	LT25LD – H/T LT25LE – WAGON
Cylinder bore diameter	23.8 (0.93)
Lining Length x width x thickness	
Leading	244 x 55 x 5.8 (9.61 x 2.16 x 0.228)
Trailing	244 x 55 x 4.3 (9.61 x 2.16 x 0.169)
Drum inner diameter	254 (10.00)

Unit: mm (in)

Master cylinder	
Cylinder bore diameter	23.81 (0.93)
Control valve	
Valve model	Load Sensing Valve
Split point kPa (bar, kg/cm^2, psi) x reducing ratio	Variable
Brake booster	
Booster model	LUCAS LSC 115 (8 " + 9 ")
Diaphragm diameter	
Primary	203.2 (8)
Secondary	228.6 (9)
Recommended brake fluid	DOT 4

Inspection and Adjustment

DISC BRAKE

Unit: mm (in)

Brake model	LD28VA
Pad wear limit	
Minimum thickness	2.0 (0.079)
Rotor repair limit	
Minimum thickness	24.0 (0.94)

DRUM BRAKE

Unit: mm (in)

Lining wear limit	
Minimum thickness	1.52 (0.0598)
Drum repair limit	
Maximum inner diameter	255.5 (10.05)
Out-of-roundness	0.05 (0.0019) or less

BRAKE PEDAL

Unit: mm (in)

	RHD	LHD
Free pedal height (H)	196 $^{+10}_{-0}$	210 $^{+10}_{-0}$
Full stroke (D)	137.7	142.5
Clearance between pedal stopper and threaded end of stop lamp switch (C)	0.3 - 1.0 (0.012 - 0.039)	
Pedal free play at clevis (A)	1 - 3 (0.039 - 0.118)	

PARKING BRAKE

Item \ Control type	Center lever
Number of notches [under force of 196 N (20 kg, 44 lb)]	6 - 8
Number of notches (when warning switch comes on)	1

STEERING SYSTEM

SECTION ST

SECTION ST

CONTENTS

Precautions

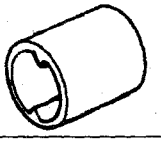
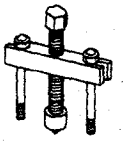
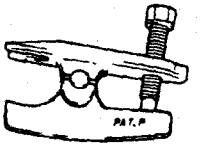
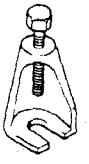
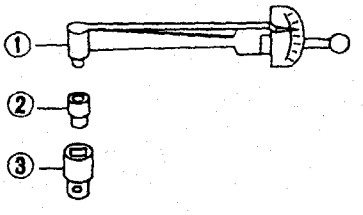
- Before disassembly, thoroughly clean the outside of the unit.
- Disassembly should be done in a clean work area. It is important to prevent the internal parts from becoming contaminated by dirt or other foreign matter.
- When disassembling parts, be sure to place them in order on a part rack so they can be reinstalled in their proper positions.
- Use nylon cloths or paper towels to clean the parts; common shop rags can leave lint that might interfere with their operation.
- Before inspection or reassembly, carefully clean all parts with a general purpose, non-flammable solvent.
- 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.
- Replace all gaskets, seals and O-rings. Avoid damaging O-rings, seals and gaskets during installation. Perform functional tests whenever designated.

  *: Automatic transmission fluid

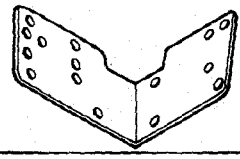
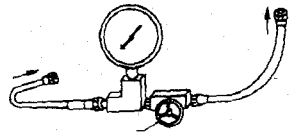
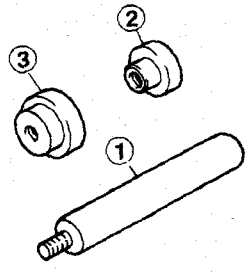
Preparation

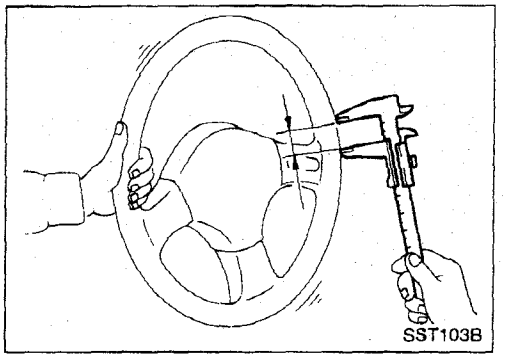
SPECIAL SERVICE TOOLS

*: Special tool or commercial equivalent

Tool number Tool name	Description	
KV48100700 Torque adapter		Measuring pinion rotating torque
ST27180001* Steering wheel puller		Removing and installing steering wheel
ST27850000 Ball joint remover		Removing ball joint
ST29020001* Steering gear arm puller		Removing and installing pitman arm
ST3127S000* ① GG91030000 Torque wrench ② HT62940000 Socket adapter ③ HT62900000 Socket adapter		Measuring turning torque

Preparation (Cont'd)

Tool number Tool name	Description	
KV48100301* Strut & steering gearbox attachment		Steering gear is installed
ST27091000* Pressure gauge		Measuring oil pressure
KV481009S0 Oil seal drift set ① KV48100910 Drift ② KV48100920 Adapter ③ KV48100930 Adapter		Installing oil seal

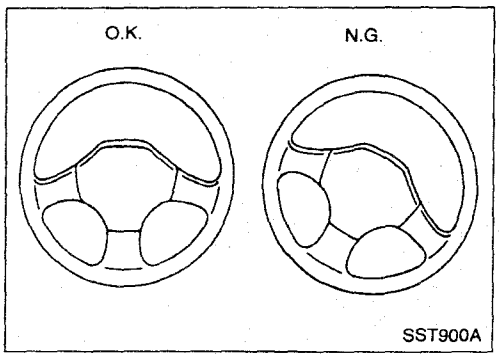


Checking Steering Wheel Play

1. With wheels in a straight-ahead position, check steering wheel play.

   Steering wheel play:
   35 mm (1.38 in) or less

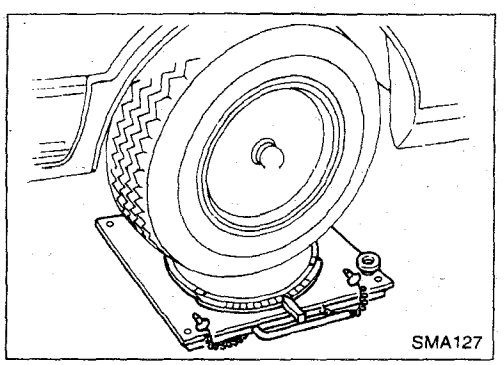
2. If it is not within specification, check steering gear assembly when front suspension and axle, steering gear assembly and steering column are mounted correctly.



Checking Neutral Position on Steering Wheel

CHECKING

1. Check that the steering wheel is in the neutral position when driving straight ahead.
2. If it is not in the neutral position, remove the steering wheel and reinstall it correctly.
3. 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.



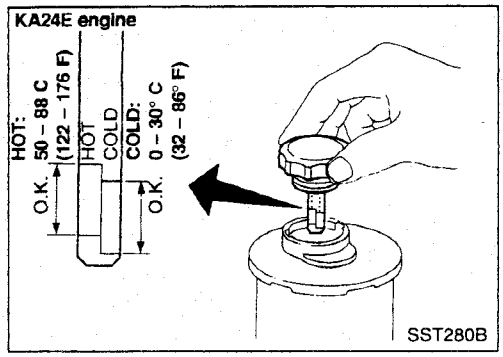
Front Wheel Turning Angle

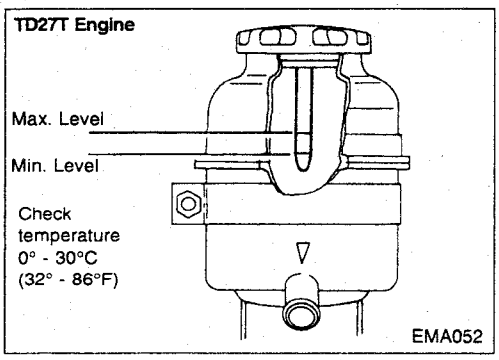
Rotate steering wheel all the way right and left; measure turning angle.

Turning angle of full turns:
Refer to section FA for S.D.S.

Checking and Adjusting Drive Belts

Refer to section MA for Drive Belt Inspection.





Checking Fluid Level

- **KA24E Engine**

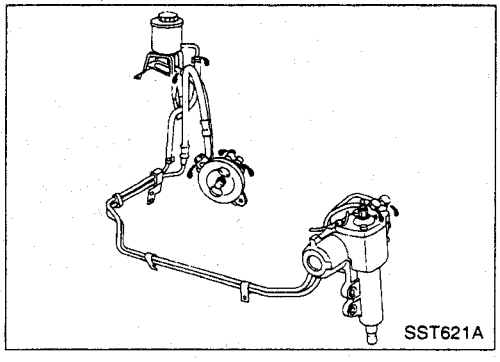
Check fluid level.
Fluid level should be checked using "HOT" range on dipstick at fluid temperatures of 50 to 80°C (122 to 176°F) or using "COLD" range on dipstick at fluid temperatures of 0 to 30°C (32 to 86°F).

- **TD27T Engine**

Fluid level should be checked when fluid temperature is between 0°C and 30°C (32°F and 86°F) and should be between "MAX" and "MIN" marks on the dipstick.

CAUTION:

- **Do not overfill.**
- **Recommended fluid is Automatic Transmission Fluid.**



Checking Fluid Leakage

Check the lines for improper attachment and for leaks, cracks, damage, loose connections, chafing or deterioration.

1. Run engine between idle speed and 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 the steering wheel in a locked position for more than 15 seconds.

4. If fluid leakage at connectors is noticed, loosen flare nu and then retighten.

Do not overtighten connector as this can damage O-ring, washer and connector.

Bleeding Hydraulic System

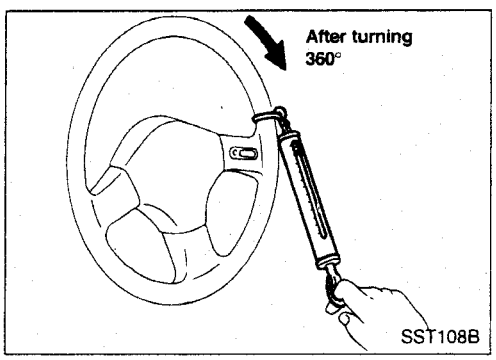
1. Raise front end of vehicle until wheels are clear of the ground.
2. Add fluid into oil tank to specified level. Meanwhile quickly turn steering wheel fully to right and left and lightly touch steering stoppers.
   Repeat steering wheel operation until fluid level no longer decreases.
3. Start engine.
   Repeat step 2 above.

Bleeding Hydraulic System (Cont'd)

- Incomplete air bleeding will cause the following to occur. When this happens, bleed air again.

a. Generation of air bubbles in reservoir tank
b. Generation of clicking noise in oil pump
c. Excessive buzzing in oil pump

While the vehicle is stationary or while moving the steering wheel slowly, fluid noise may occur in the valve or oil pump. This noise is inherent in this 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. Start engine.
3. Bring power steering fluid up to adequate operating temperature.

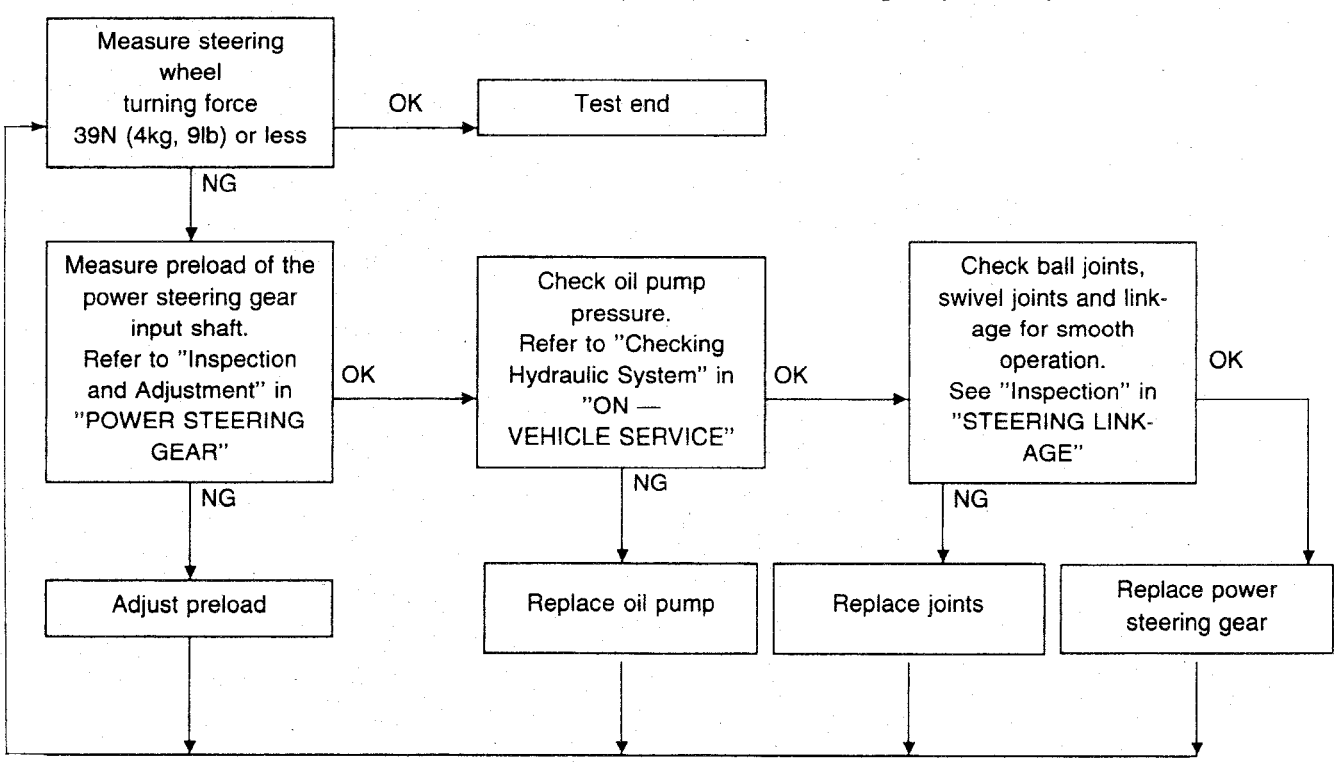
Temperature:
60° - 80°C (140 to 176°F)

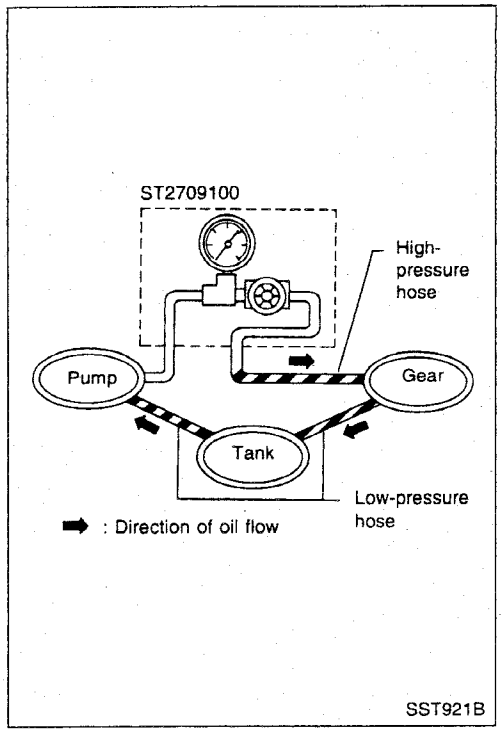
Tires need to be inflated to normal pressure.

4. 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

- If steering wheel turning force is not within specification, perform the following inspection procedure:





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).

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 with engine idling at 1,000 rpm.

CAUTION:

Do not hold the steering wheel in a locked position for more than 15 seconds.

Oil pump maximum pressure:

KA24E engine

8,042 – 8,630 kPa (80 – 86 bar, 82 – 88 kg/cm^2, 1,166 – 1,251 psi)

TD27 engine

8,434 – 9,022 kPa (84 – 90 bar, 86 – 92 kg/cm^2, 1,223 – 1,308 psi)

4. If oil pressure is below the maximum pressure, slowly close shut-off valve and check pressure.

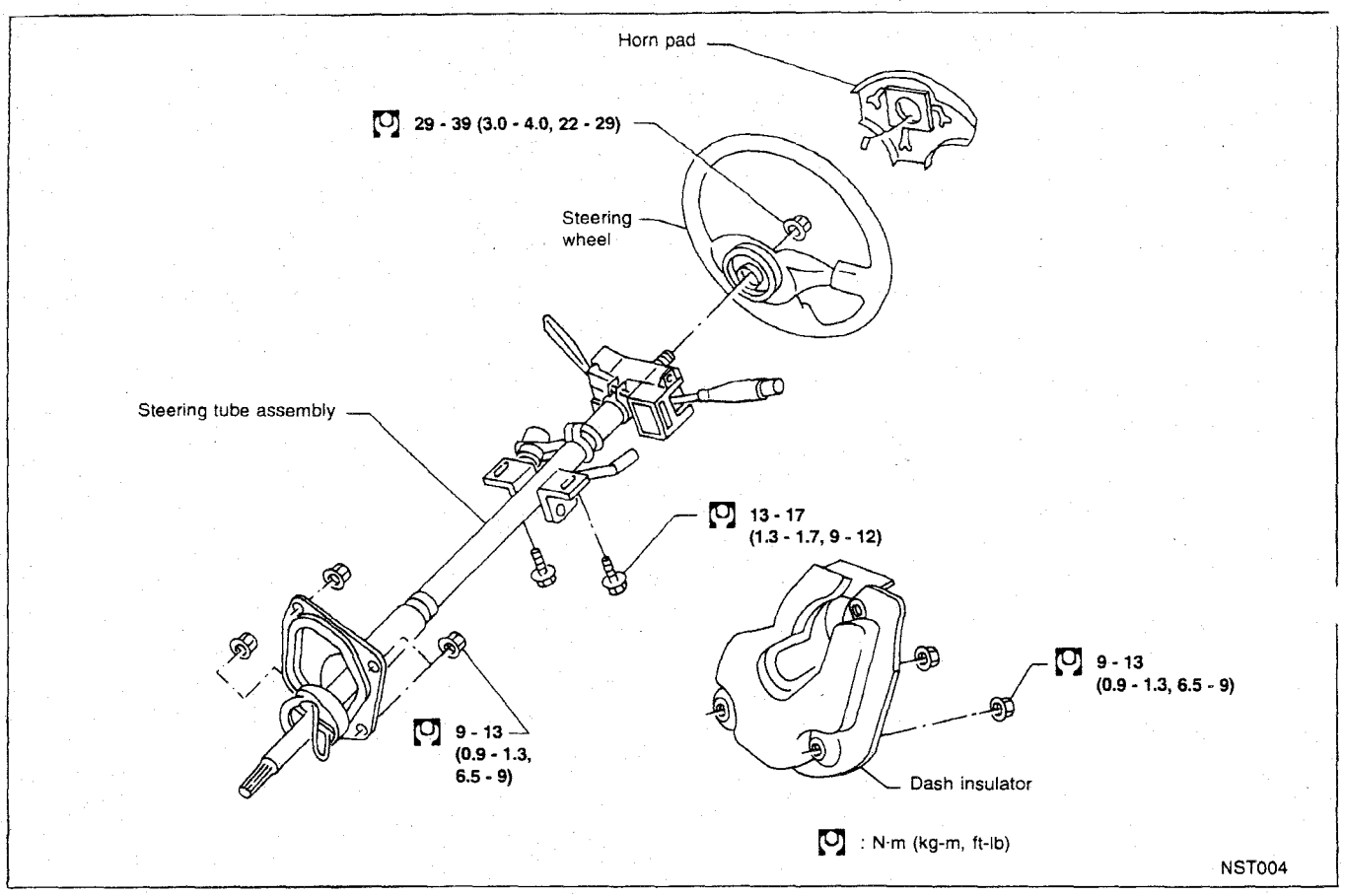
- When pressure reaches maximum pressure, gear is damaged.
- When pressure remains below maximum pressure, pump is damaged.

CAUTION:

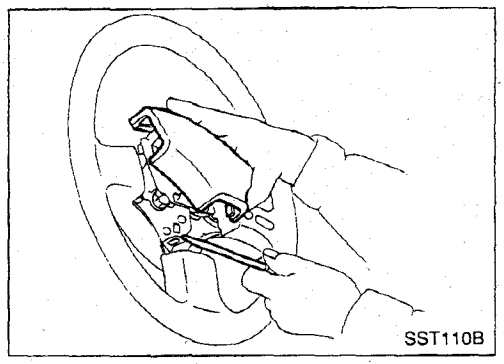
Do not close shut-off valve for more than 15 seconds.

5. If oil pressure is higher than maximum pressure, check oil pump flow control valve.
6. After checking hydraulic system, remove Tool and add fluid if necessary, then completely bleed air out of system.

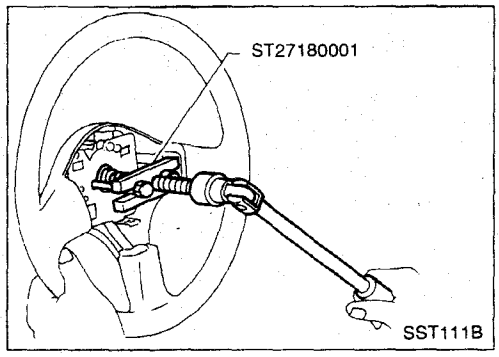
Removal


Horn pad
29 - 39 (3.0 - 4.0, 22 - 29)
Steering wheel
Steering tube assembly
13 - 17 (1.3 - 1.7, 9 - 12)
9 - 13 (0.9 - 1.3, 6.5 - 9)
9 - 13 (0.9 - 1.3, 6.5 - 9)
Dash insulator
: N·m (kg-m, ft-lb)
NST004

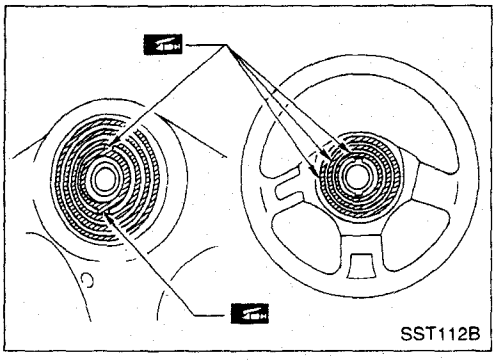
Removal (Cont'd)



1. Remove horn pad



2. Remove steering wheel with Tool.

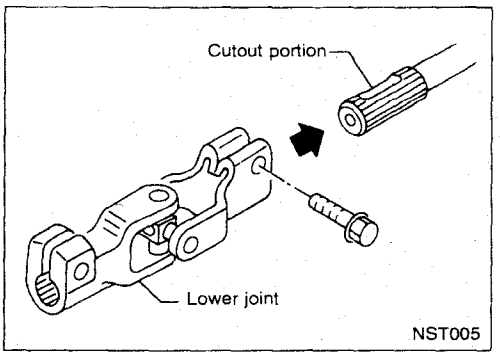


Installation

STEERING WHEEL

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.

- Fit steering wheel to steering column in neutral position so that reference marks on steering wheel spline and steering column spline coincide.



STEERING COLUMN

- When installing steering column, fingertighten upper support bracket bolts and lower support bracket nuts; then tighten them to the specified torque. Do not apply undue stress to steering column.
- When attaching coupling joint, be sure tightening bolt faces cutout portion.
- When inserting coupling joint onto steering gear axle, make sure that it is positioned correctly.

CAUTION:

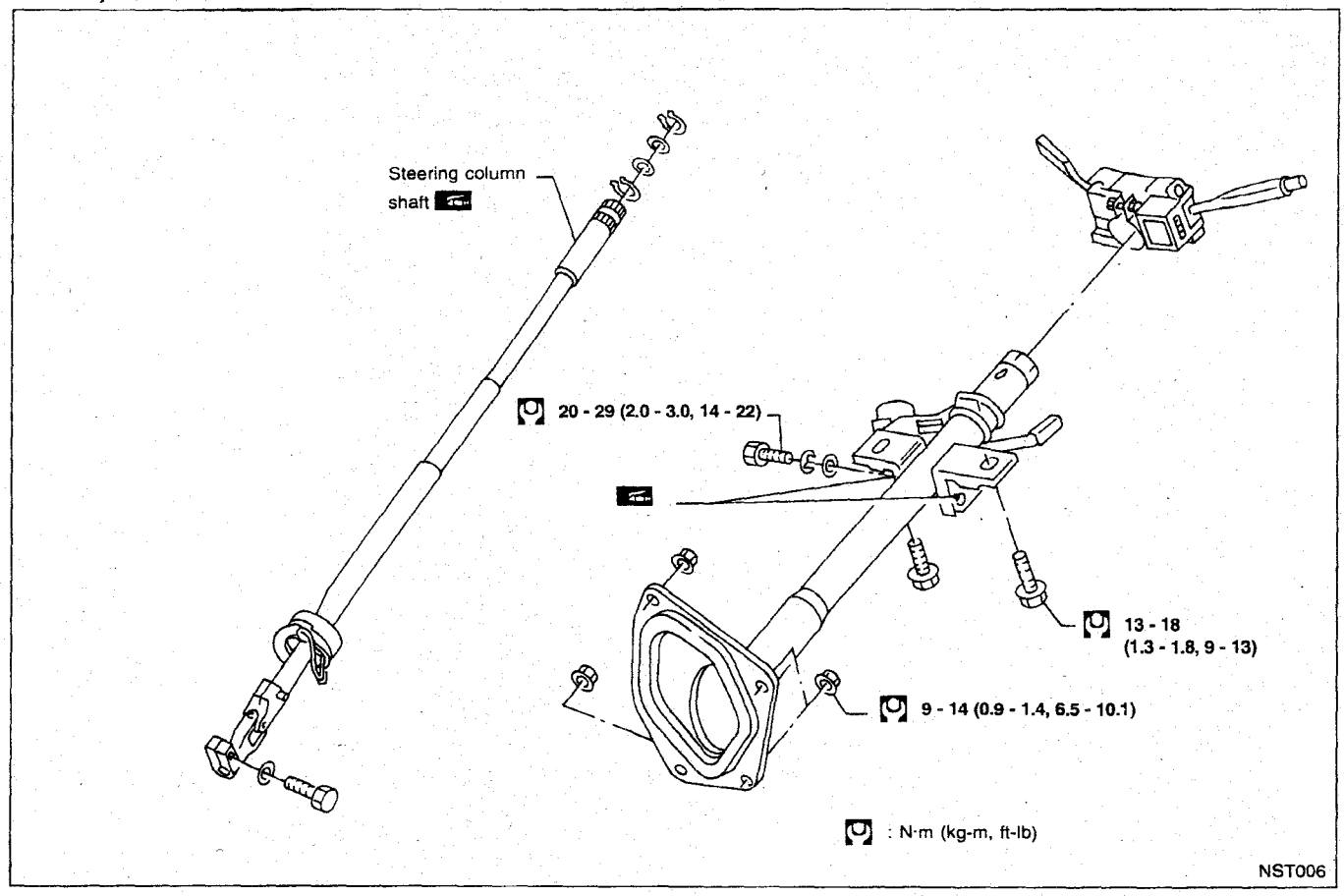
After installing steering column, turn steering wheel to make sure it moves smoothly and that the number of turns from the straight-ahead forward position to left and right locks are equal. Be sure that the steering wheel is in a neutral position when driving straight ahead.

Number of steering wheel turns from straight-ahead position:

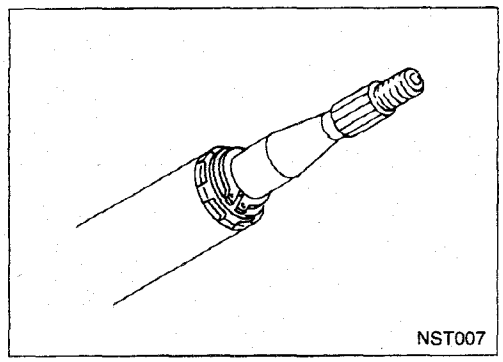
Right 1.93
Left 1.93

Disassembly and Assembly

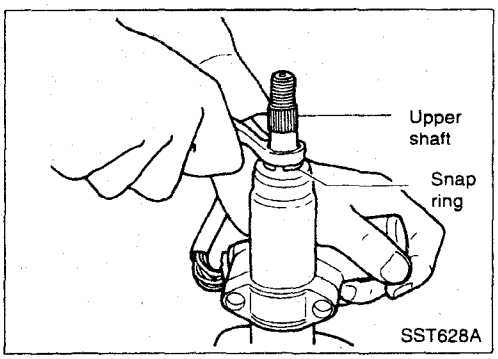
L.H.D., R.H.D.



Disassembly and Assembly (Cont'd)

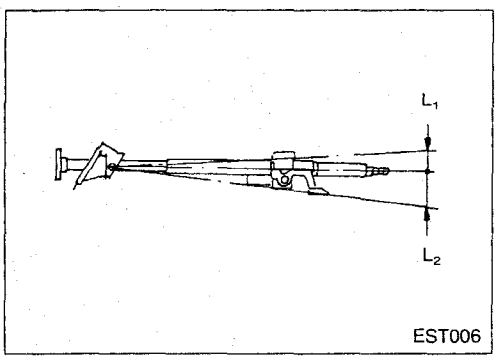

NST007

- When disassembling and assembling, unlock steering lock with key.



SST628A

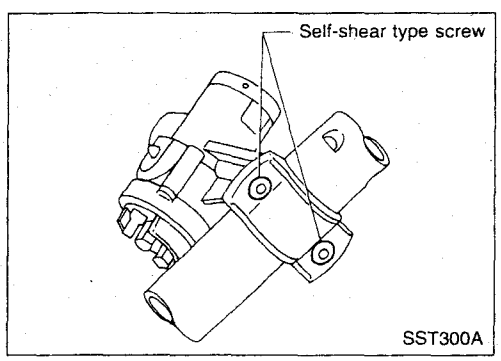
- Install snap ring on upper shaft with box wrench.



EST006

- After installing steering column, check tilt mechanism operation.

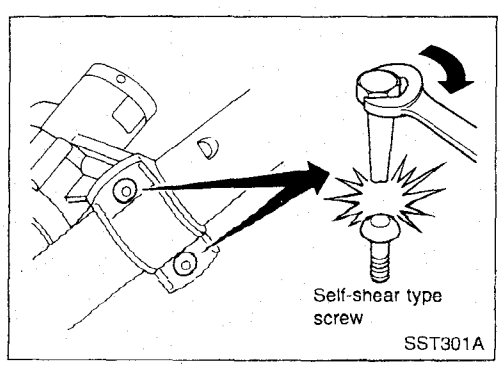
  L_1: 8 – 12 mm (0.32 – 0.47 in)
  L_2: 18 – 22 mm (0.71 – 0.87 in)



SST300A

- Steering lock

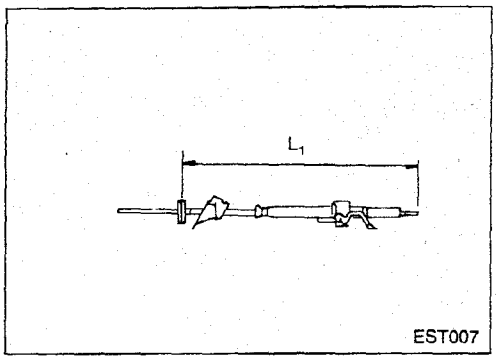
a. Break self-shear type screws with a drill or other appropriate tool.



SST301A

b. Install self-shear type screws until self-shear type screw heads are cut off.

- When disassembling and assembling, unlock steering lock with key.
- Ensure that rounded surface of snap ring faces towards bearing when snap ring is installed.



Inspection

- When steering wheel can not be rotated smoothly, check the steering column for the following matters and replace damaged parts:

a. Check column bearings for damage or unevenness. Lubricate with recommended multi-purpose grease or replace steering column as an assembly, if necessary.

b. 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 assembly "L_1".

Column length:

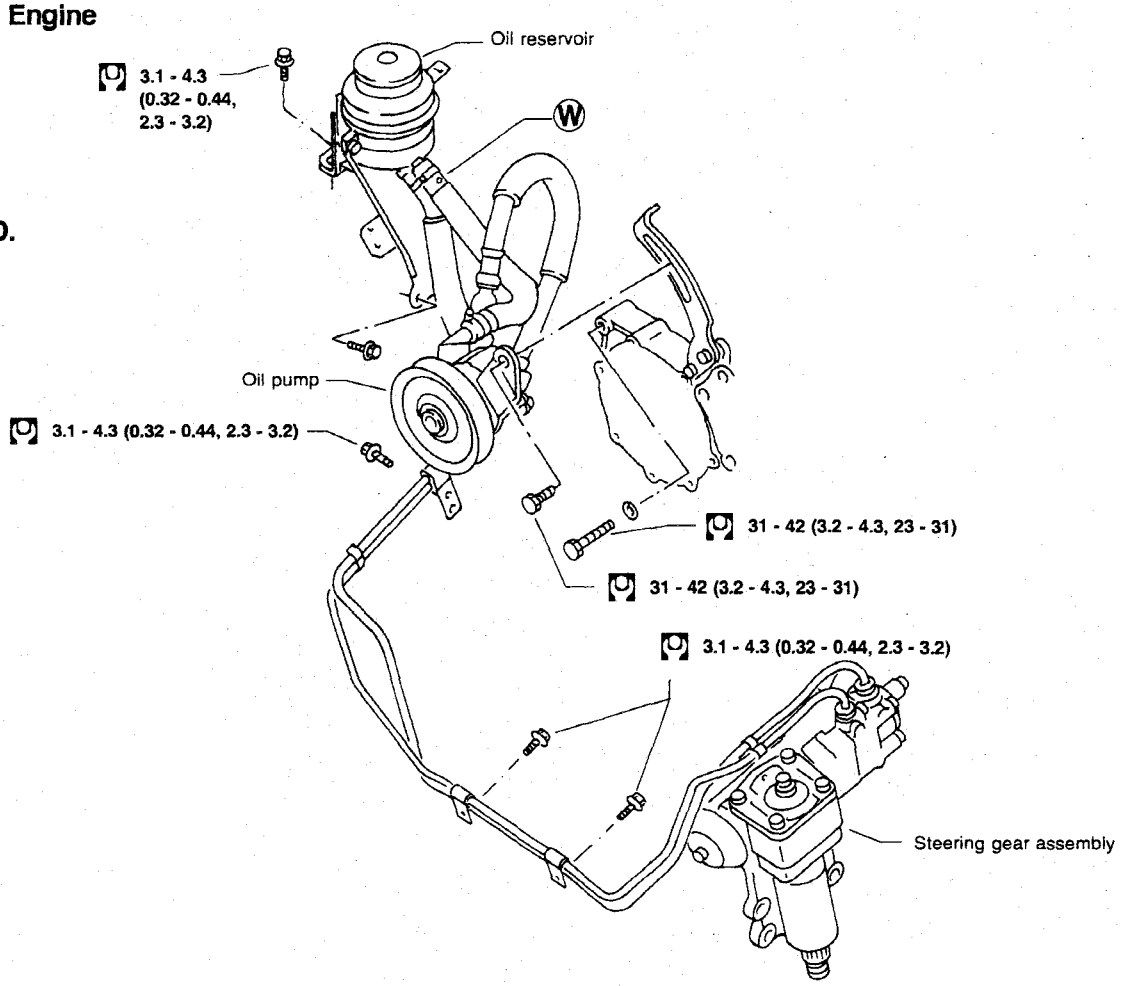
"L_1" : 835.5 – 837.7 mm (32.894 – 32.980 in)

Description

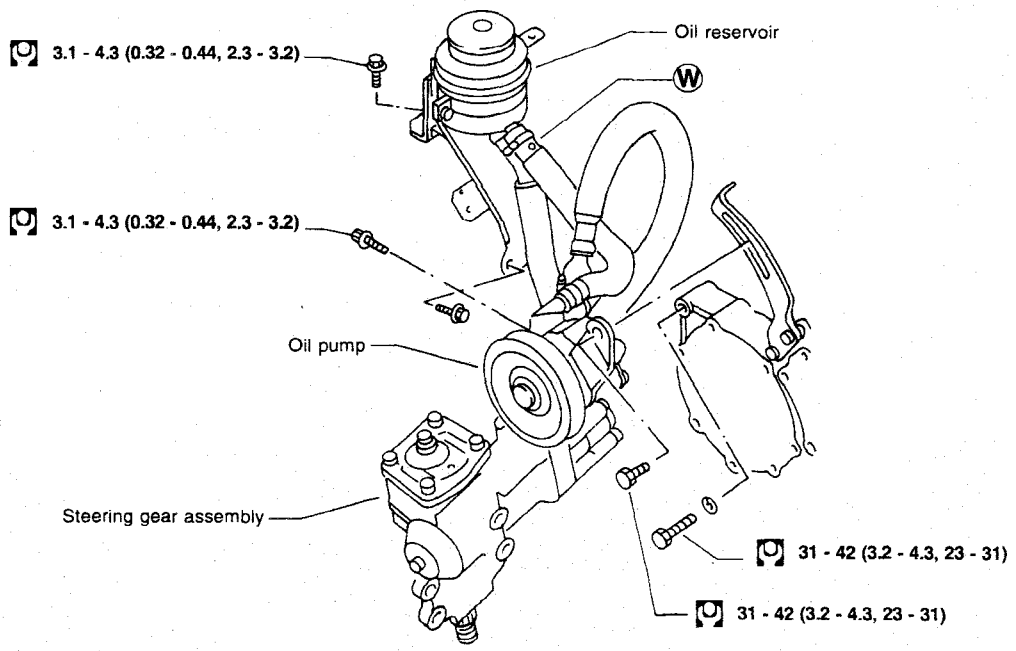
- **The steering gear assembly should not be disassembled.**

TD27T Engine

L.H.D.



R.H.D.



W – Marked in white

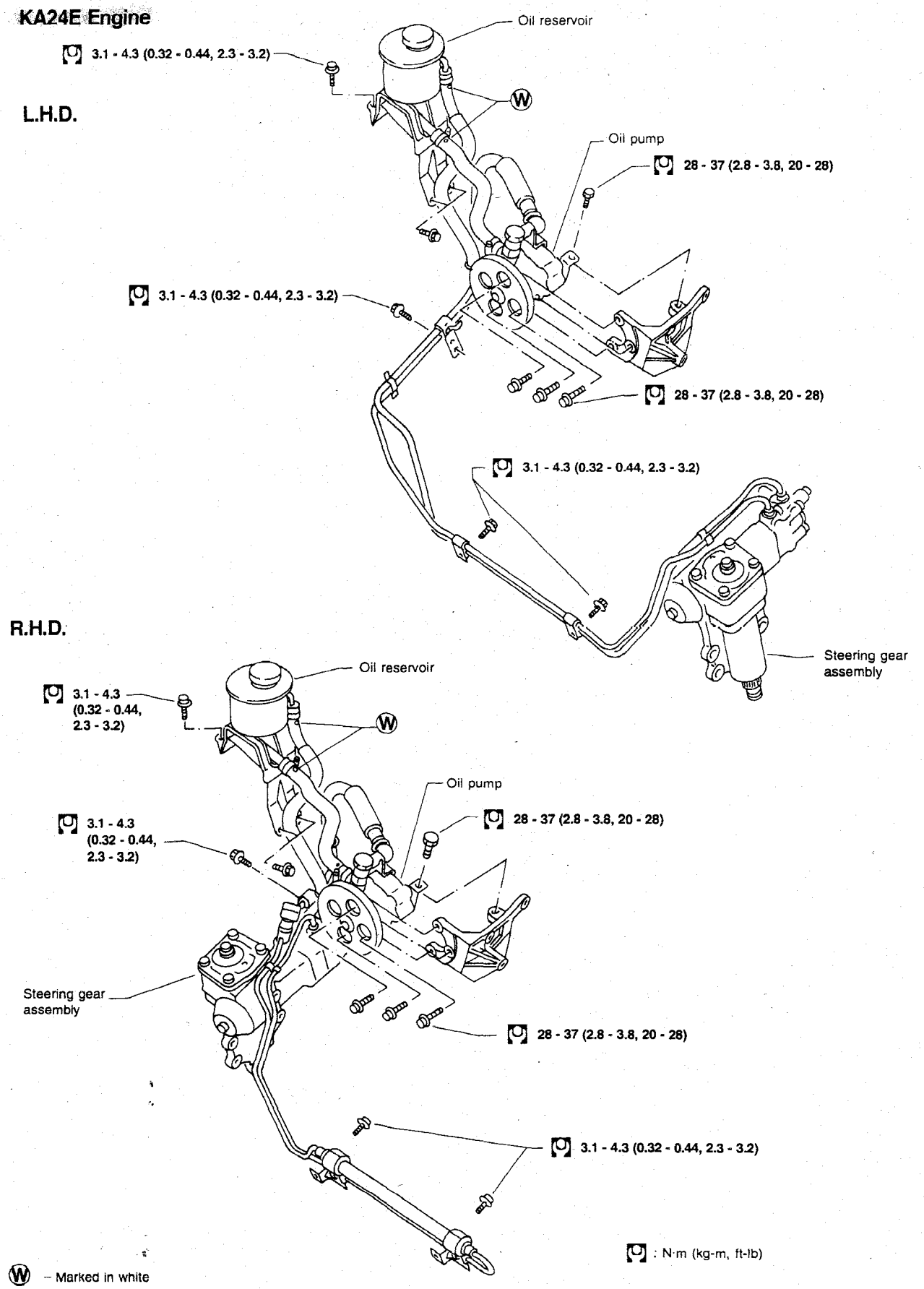
: N·m (kg-m, ft-lb)

EST008

Description (Cont'd)

- **The steering gear assembly should not be disassembled.**

KA24E Engine

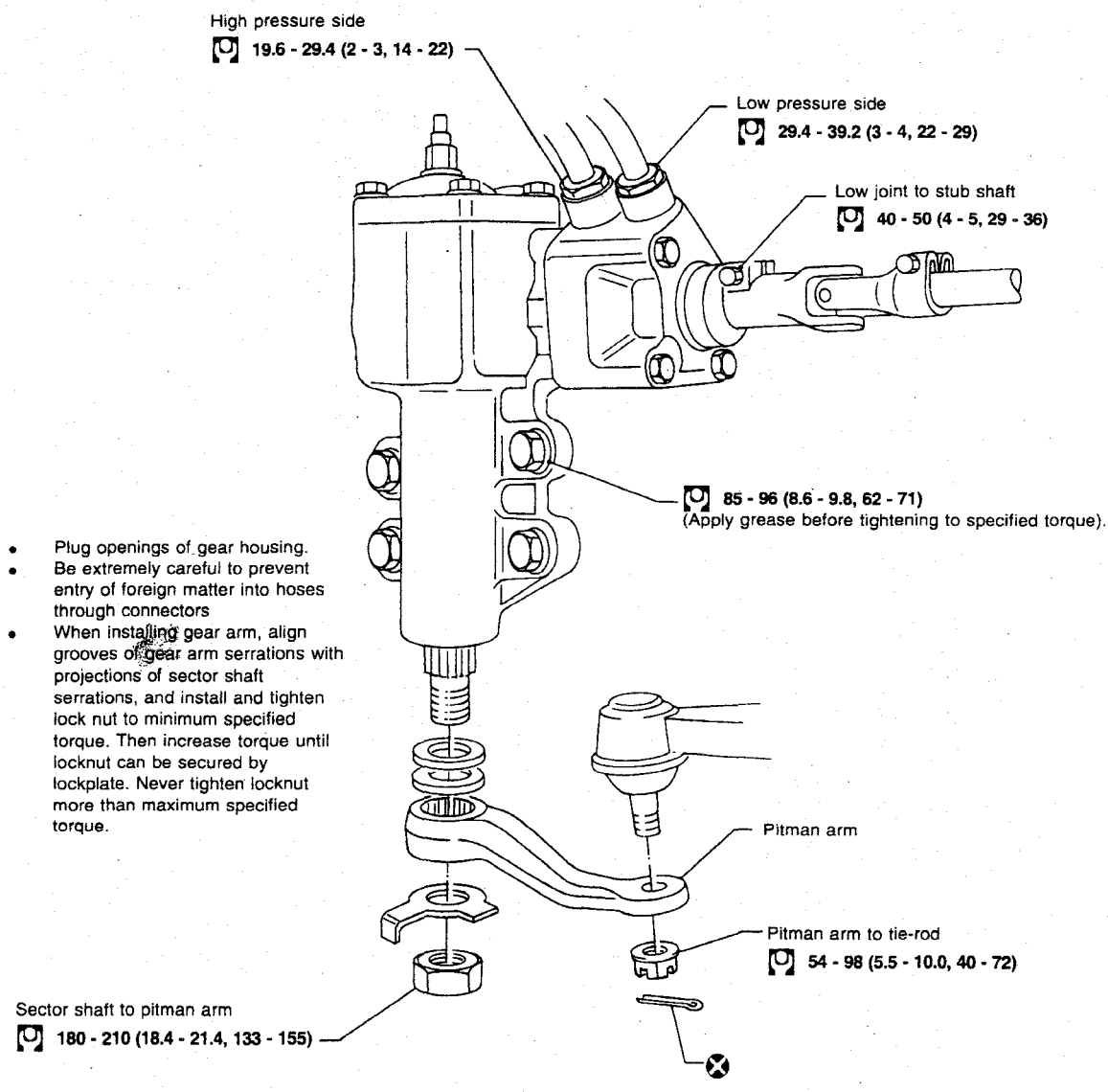


EST009

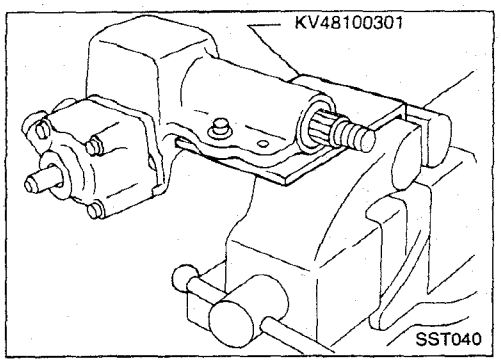
Removal and Installation

Before removing, clean exteriors of gear housing and oil pump with steam and dry with compressed air.

STEERING GEAR



- The steering gear must not be disassembled. Replace as an assembly.
- Remove only the parts shown in the illustration.

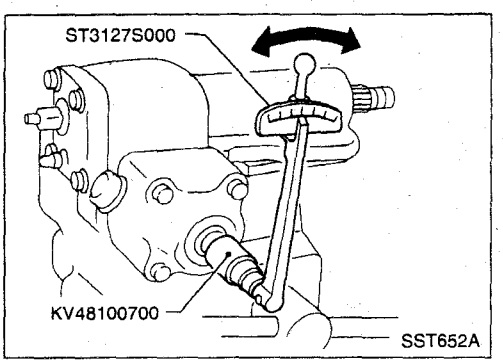


Inspection and Adjustment

STEERING GEAR PRELOAD

Measure preload in worm gear.

1. Mount steering gear to Tool (KV48100301) and place it in a vise, as shown in the illustration.
2. Turn worm gear several times by hand completely to the left and right (full lock to lock).



3. Measure preload at ±360° from straight-ahead position.

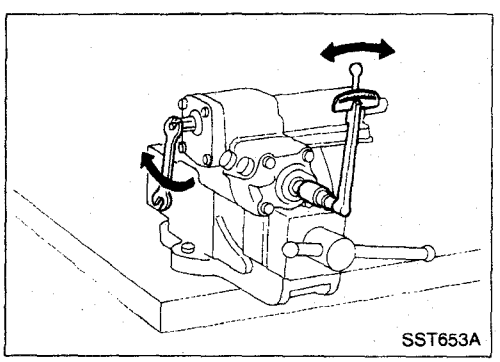
a. Turn worm gear counterclockwise until full lock position. Then turn clockwise more than two turns until the straight-ahead position.

Straight-ahead position is the position where the two mating marks are in line (approx. 765° from full lock position).

b. Turn worm gear one full turn (360°) clockwise and measure total preload at this position.

c. Turn worm gear two full turns (720°) counterclockwise and measure total preload.

Total preload at ±360° from straight-ahead position:
[O]: 0.4 – 1.2 N·m (0.04 – 0.12 kg-m, 0.3 – 0.9 ft-lb)

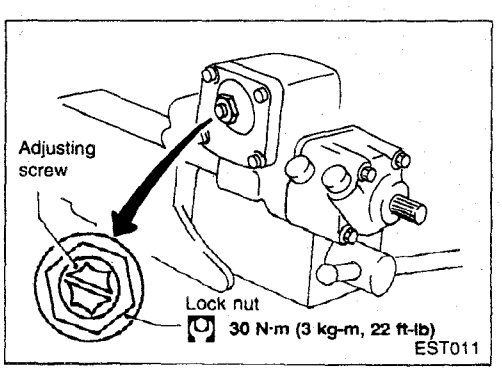


4. Measure total preload at straight-ahead position.

a. Place worm gear in straight-ahead position. See step 3.a.

b. Measure total preload in straight-ahead position.

Total preload at straight-ahead position:
[O]: 0.6 – 1.6 N·m (0.06 – 0.16 kg-m, 0.4 – 1.2 ft-lb)



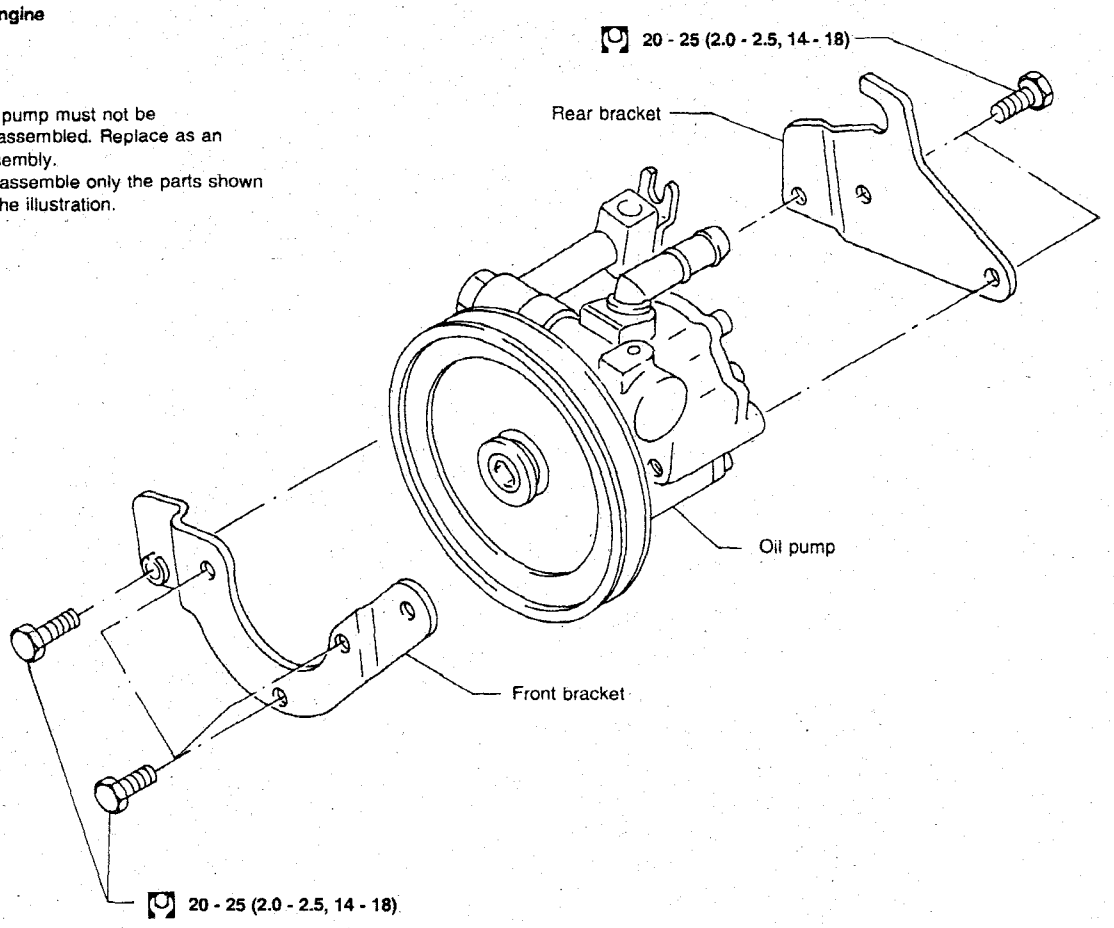
5. If either one of the above measured values are not within specifications, adjust total preload by turning sector shaft adjusting screw. Tighten adjusting screw lock nut with tools.

Lock nut:
[O]: 30 N·m (3 kg-m, 22 ft-lb)

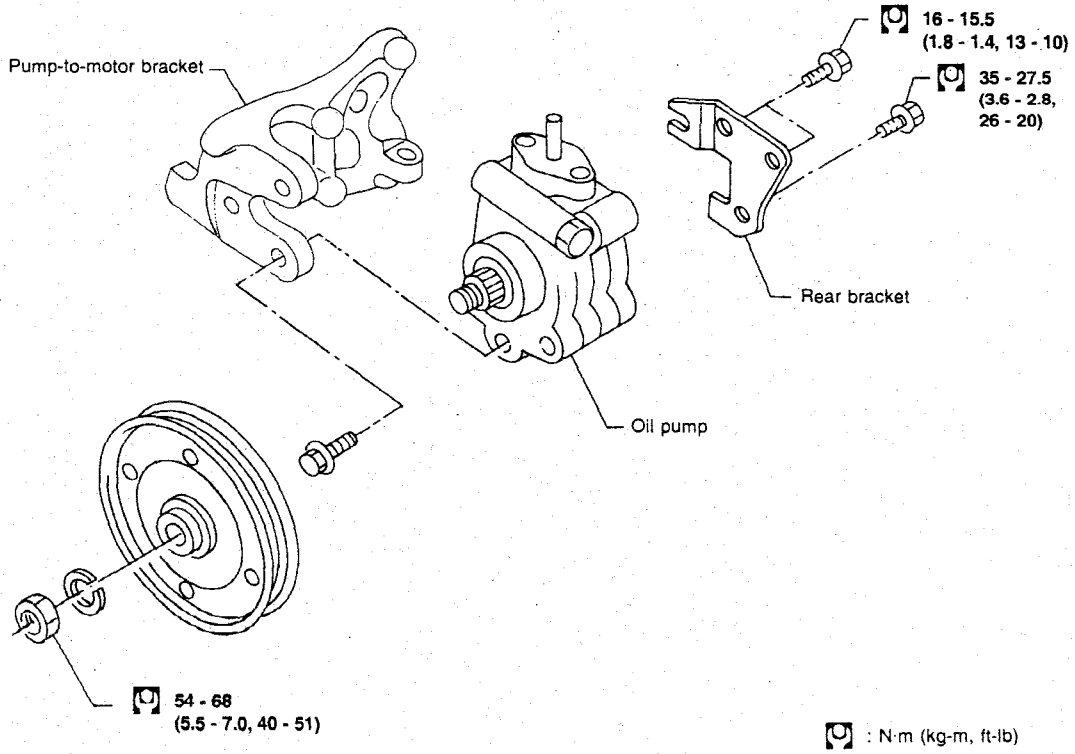
Removal and Installation

TD27T Engine

- Oil pump must not be disassembled. Replace as an assembly.
- Disassemble only the parts shown in the illustration.



KA24E Engine

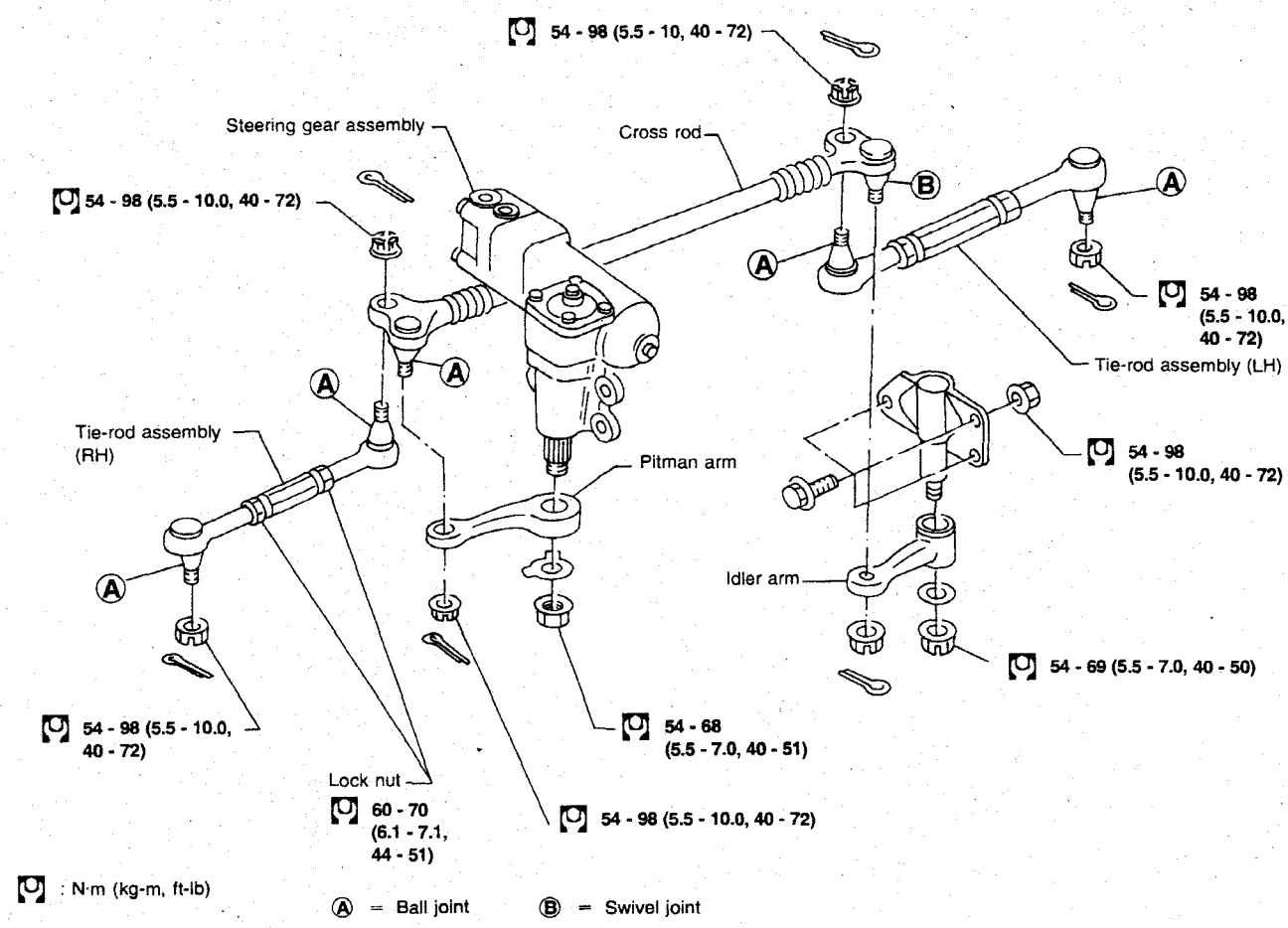


: N·m (kg-m, ft-lb)

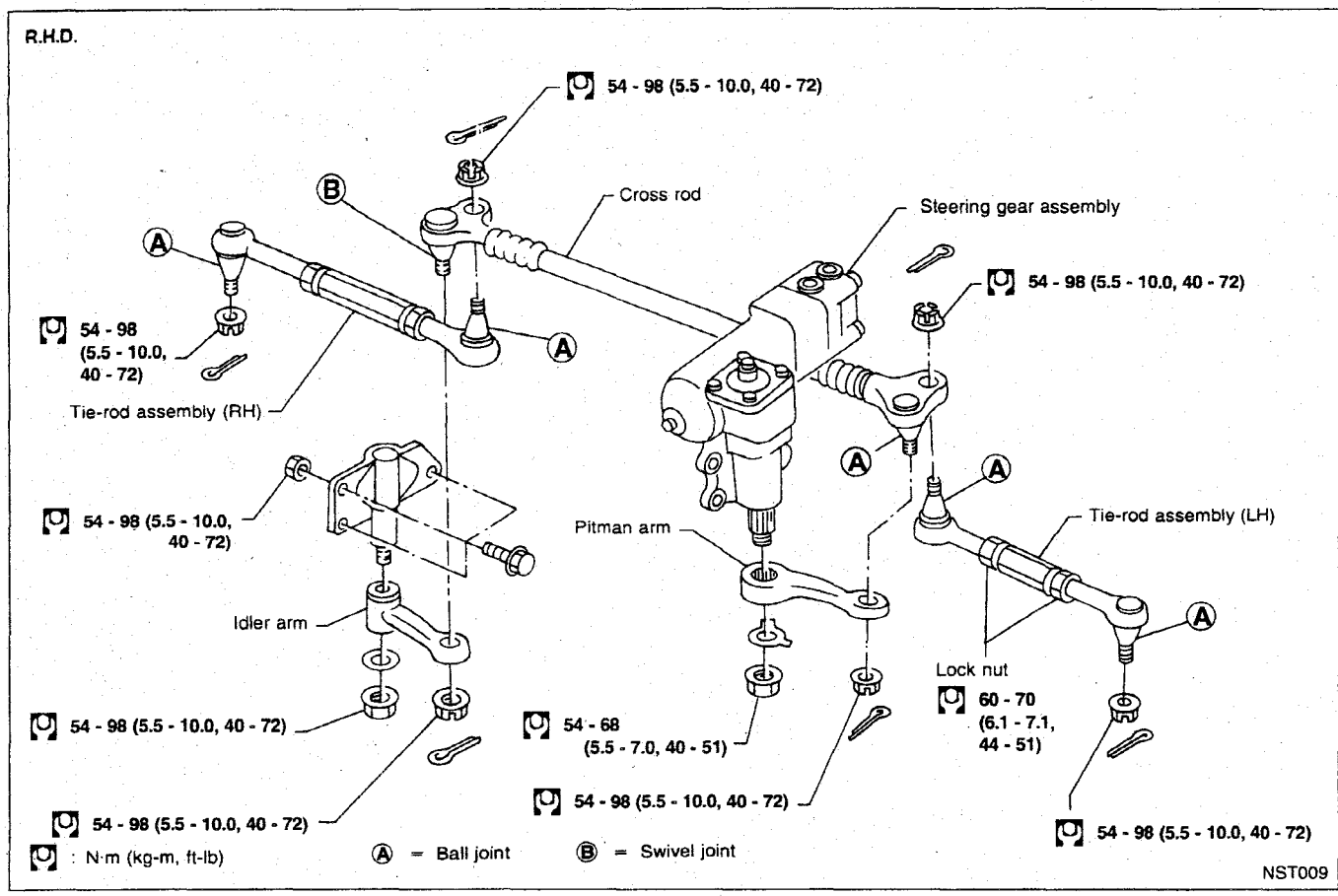
EST012

Removal and Installation

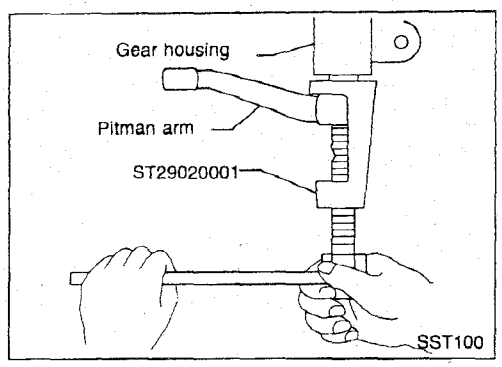
L.H.D.



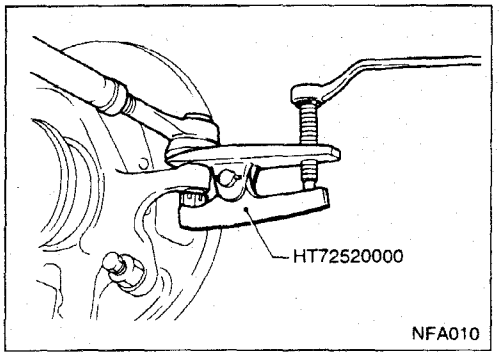
Removal and Installation (Cont'd)



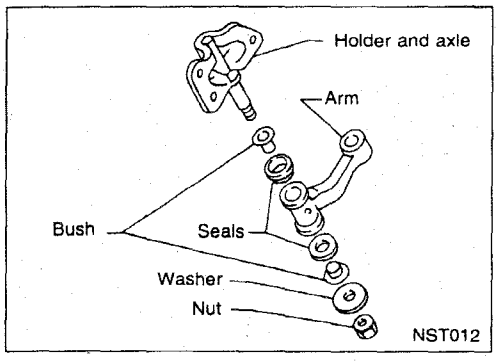
Removal and Installation (Cont'd)



Remove gear arm with Tool.



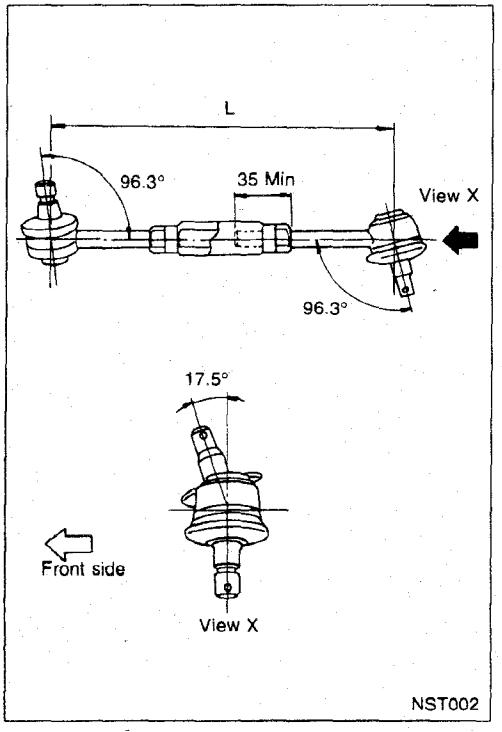
Remove tie-rod from knuckle arm with Tool.



Disassembly and Assembly

IDLER ARM ASSEMBLY

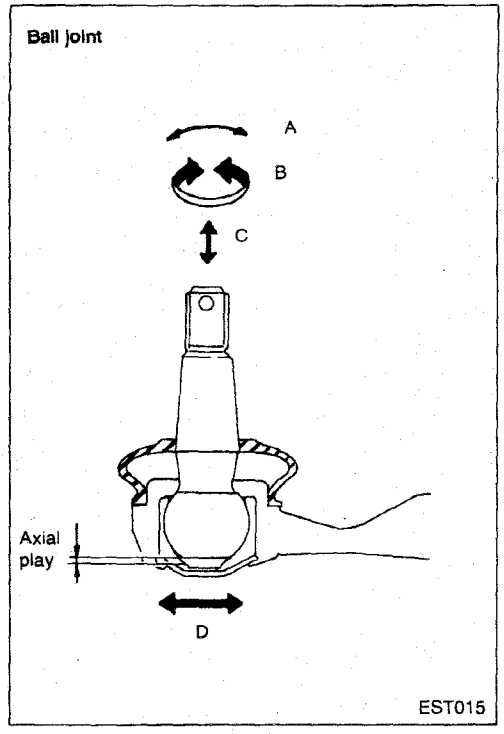
- Apply coat of multi-purpose grease to bushing.
- Press bushing into idler body, and insert shaft of idler bracket carefully until bushing protrudes.
  Tighten nut to the specified torque.
  [O] : 54-68 N·m (5.5 – 7.0 kg-m, 40 – 51 ft-lb)



CROSS ROD AND TIE-ROD

1. When tie-rod ball joints and tie-rod bar are separated, adjust tie-rod length correctly.
   Adjustment should be done between ball stud centers.
   L: Standard
   281 mm (11,06 in)
2. Lock tie-rod clamp nuts so that ball joint on outer ball stud is as follows with respect to that on inner ball stud.

CAUTION:
Make sure that tie-rod bars are screwed into tie-rod tube more than 35 mm (1.38 in). Refer to illustration.



Inspection

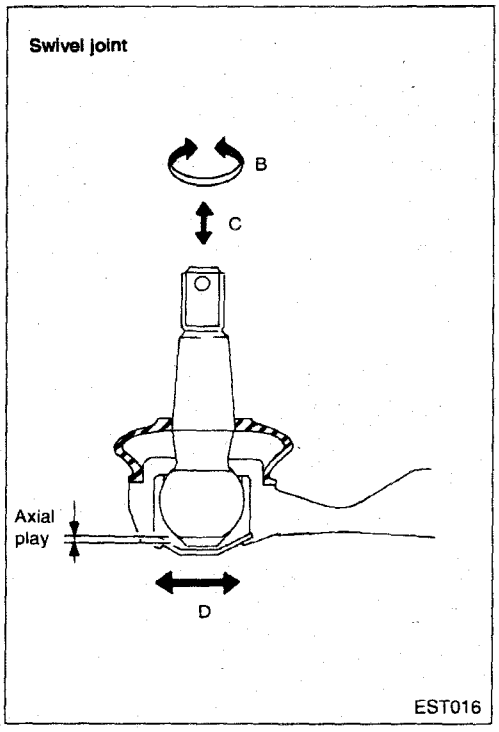
BALL JOINT AND SWIVEL JOINT

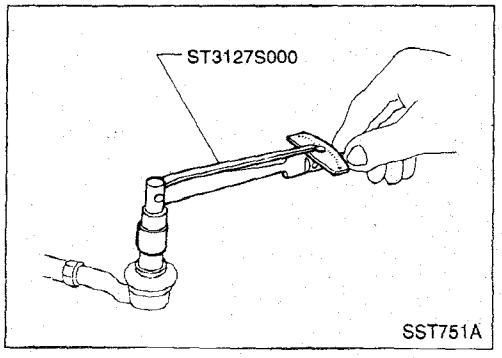
1. Check joints for play. If ball or swivel stud is worn and play in axial direction is excessive or joint is hard to swing or does not meet the specified values, replace as a complete unit.

   Swinging force (Measuring point: Cotter pin hole) "A":
   The ball joint must rotate smoothly in all directions.

   Rotating torque "B": (both)
   0.5 – 5 N·m (0.05 – 0.51 kg-m, 0.36 – 3.69 ft-lb)
   Axial end play "C": (both)
   0 – 0.2 mm (0 – 0.008 in)
   Radial play "D" (both)
   0 mm (0 in)

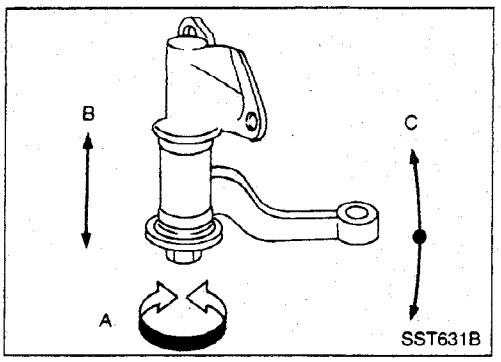
2. Check condition of dust cover. If it is cracked excessively, replace ball joint or swivel joint as an assembly.





- Check rotating torque "B".

Inspection (Cont'd)



IDLER ARM ASSEMBLY

- Check idler arm assembly for breakage, wear or play, and if necessary replace.

Rotating force "A":
1 – 6 N·m (0.1 – 0.6 kg-m, 0.7 – 4.3 ft-lb)
Axial end play "B":
0 mm (0 in)
Deflection "C" (when load is applied to the end of arm):

Load	N (kg, lb)	1,569 (160, 353)	3,923 (400, 882)
Deflection	mm (in)		
Max.		3 (0.12)	5.5 (0.216)
Min.		0.7 (0.028)	1.0 (0.039)

- Lubricate idler arm assembly with recommended multipurpose grease
  When lubricating, refer to section MA.

CROSS ROD AND TIE-ROD

Check tie-rod and cross rod for breakage, bend or cracks, and replace with a new one if necessary.

FIXING LOCATION

- Check fixing location (nuts and cotter pins) for looseness, play or breakage.
- When looseness or play is found, check for wear on tapered portion of joints, gear arm and idler arm.

General Specifications

Models	All
Steering gear type	ZF 8054
Turns of steering wheel (Lock to lock)	3.86
Overall gear ratio	17.1 : 1
Steering column type	Collapsible, adjustable height

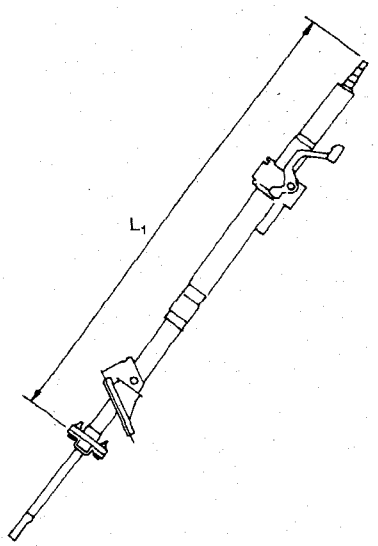
Inspection and Adjustment

GENERAL

Steering wheel axial play mm (in)	0 (0)
Steering wheel play mm (in)	35 (1.38) or less

STEERING COLUMN

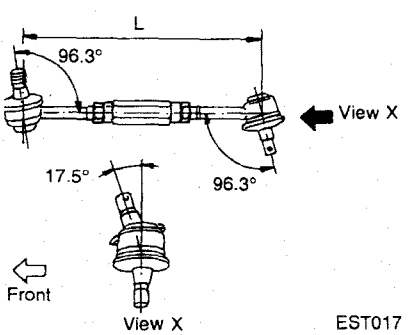
Steering column length mm (in) L_1	835.5 – 837 (32.894 – 32.95)



EST018

STEERING GEAR AND LINKAGE

Balljoint and swivel joint Rotating torque "B" N·m (kg-m, ft-lb)		0.5 – 5 (0.05 – 0.51, 0.36 – 3.69)
Axial end play "C"	mm (in)	0-0.2 (0 – 0.008)
Radial play "D"	mm (in)	0 (0)
Length "L"	mm (in)	281 (11.06)



EST017

OIL PUMP

Unit: kPa (bar, kg/cm², psi)

Engine	[redacted]	TD27T
Make	UNISIA	ZF
Max. pressure	8,042 – 8,630 (80 – 86, 82 – 88, 1,166 – 1,251)	8,434 – 9,022 (84 – 90, 86 – 92, 1,223 – 1,308)

SECTION BF

SECTION BF

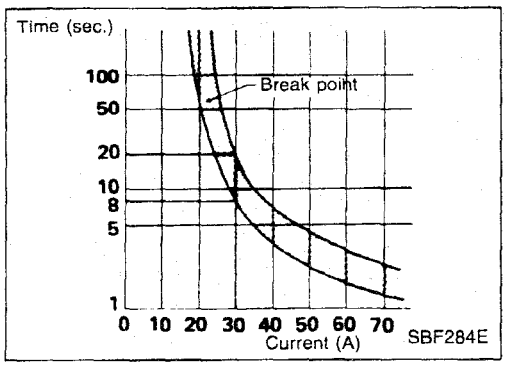
CONTENTS

When you read wiring diagrams:
- **Read GI section, "HOW TO READ WIRING DIAGRAMS".**
- **See EL section, "POWER SUPPLY ROUTING" for power distribution circuit.**

★ For seat belt, refer to MA 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 while installing parts.
- When applying sealing compound, be careful that the sealing compound does not protrude from between parts.
- When replacing any metal parts (for example body outer panel, members, etc.), be sure to take rust prevention measures.



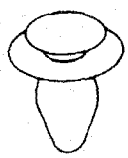
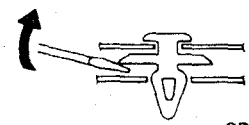
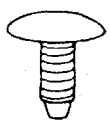
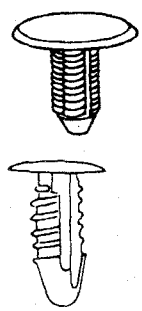
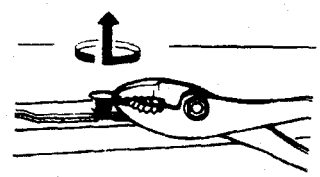
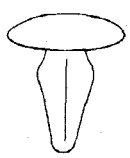
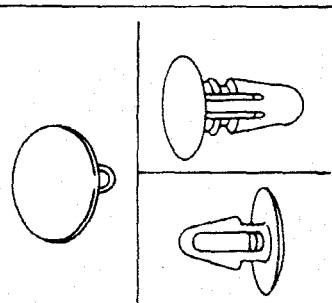
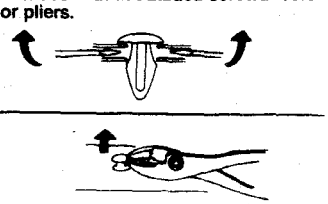
Circuit Breaker Inspection

For example, when current is 30A, the circuit is broken within 8 to 20 seconds.
Circuit breakers are used in the following systems:

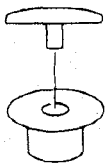
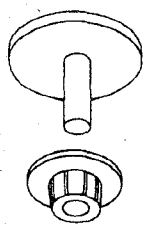
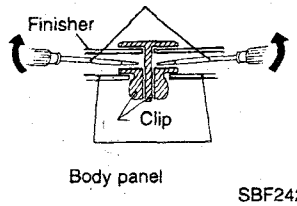
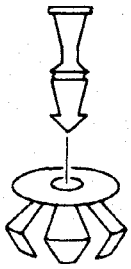
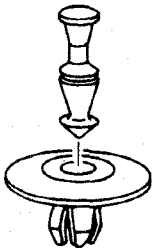
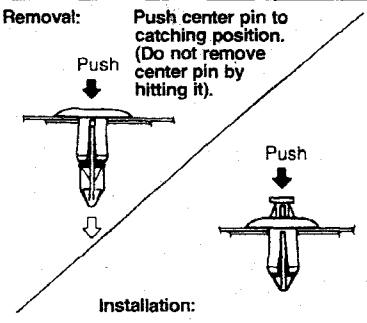
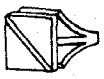
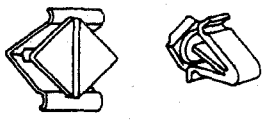
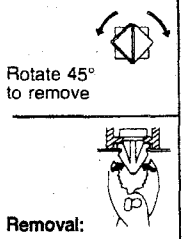
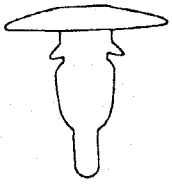
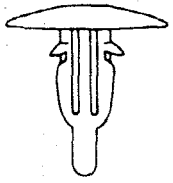
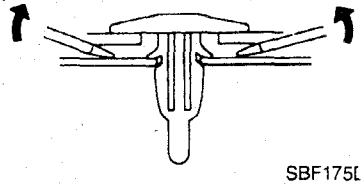
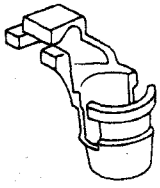
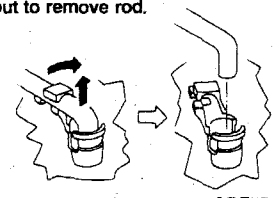
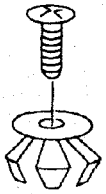
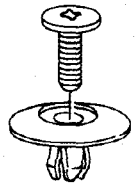
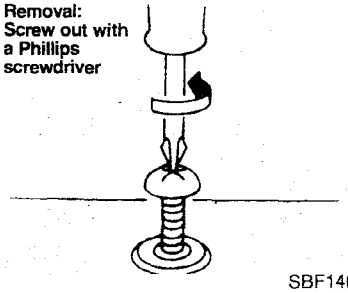
- Power window & power door lock
- Power sun roof

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			**Removal:** **Remove by bending up with a flat-bladed screwdriver.**  SBFR094B
C102			 **Removal:** **Pull up by rotating** SBF115B
C106			**Removal:** **Remove with flat-bladed screwdrivers or pliers.**  SBF091B

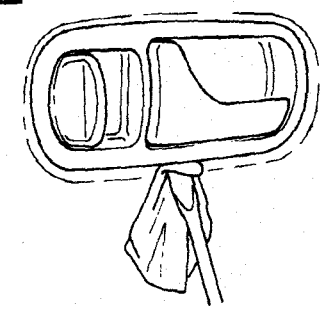
Clip and Fastener (Cont'd)

C201			**Removal:** **Flat-bladed screwdrivers**  SBF242B
C203			**Removal:** **Push center pin to catching position. (Do not remove center pin by hitting it).**  **Installation:** SBF708E
CG101			**Removal:**  **Removal:** **Installation:** SBF085B
CE117			**Removal:** **Remove with a flat-bladed screwdriver or pliers.**  SBF175L
CR103			**Removal:** **Holder portion of clip must be spread out to remove rod.**  SBF770B
CS103			**Removal:** **Screw out with a Phillips screwdriver**  SBF140B

Front Door (Cont'd)

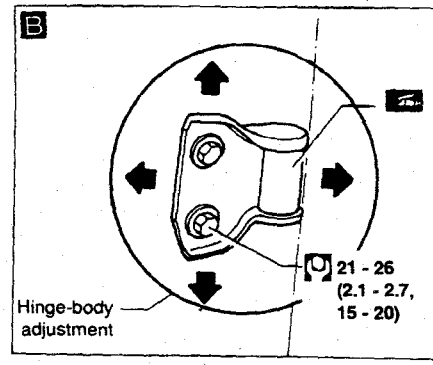
Inside handle installation

A

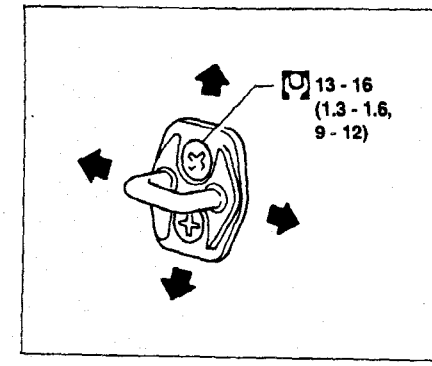


Door adjustment

B

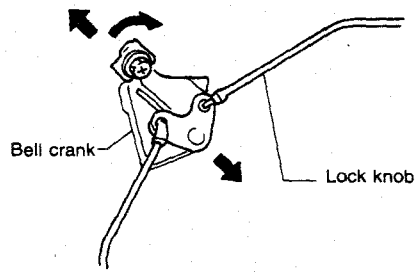


Striker adjustment



Bell crank adjustment

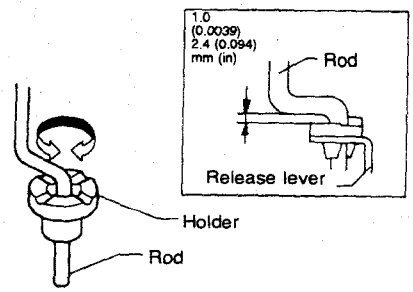
C



Bell crank adjustment:
Lock door after setting door lock assembly and inside handle in position.
Move bell crank in direction of arrow (shown in figure at left) to take up knob free play, and secure with bolts.

Outside handle adjustment

D



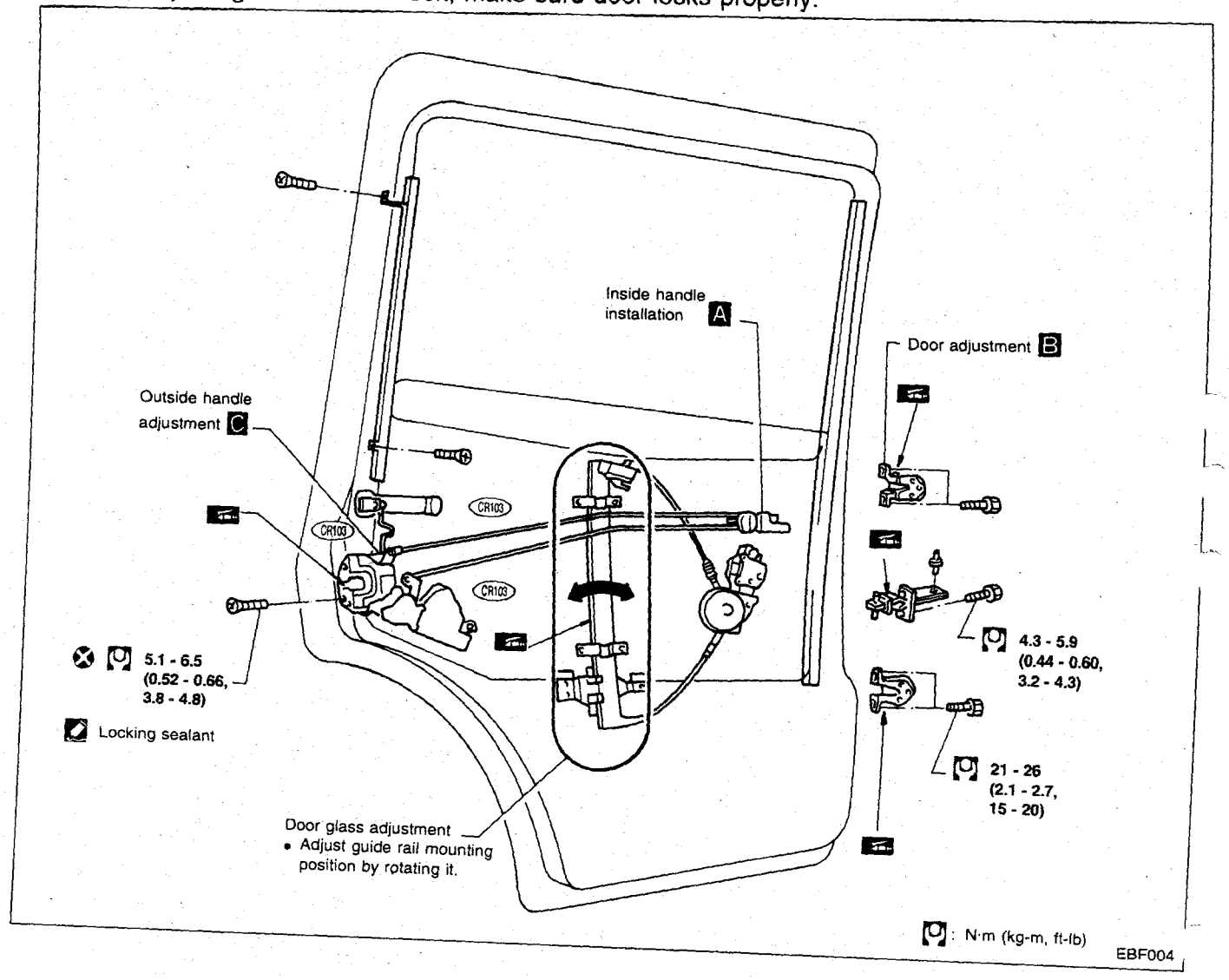
: N·m (kg-m, ft-lb)

EBF003

Rear Door

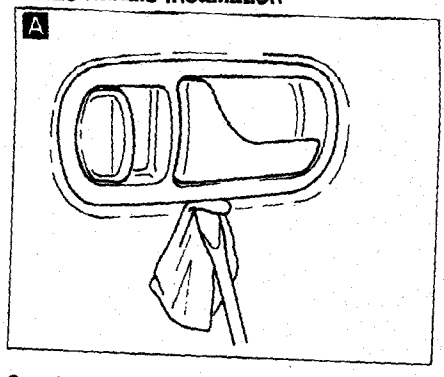
WAGON

- After adjusting door or door lock, make sure door locks properly.

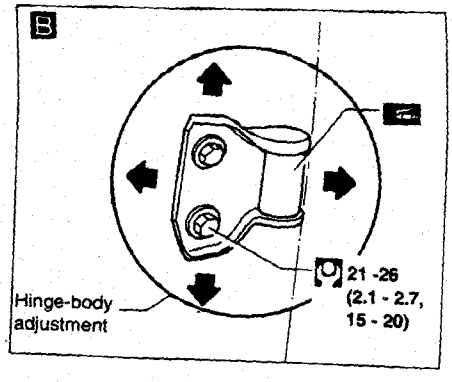


Rear Door (Cont'd)

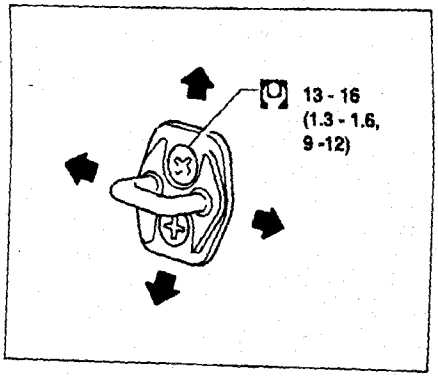
Inside handle installation



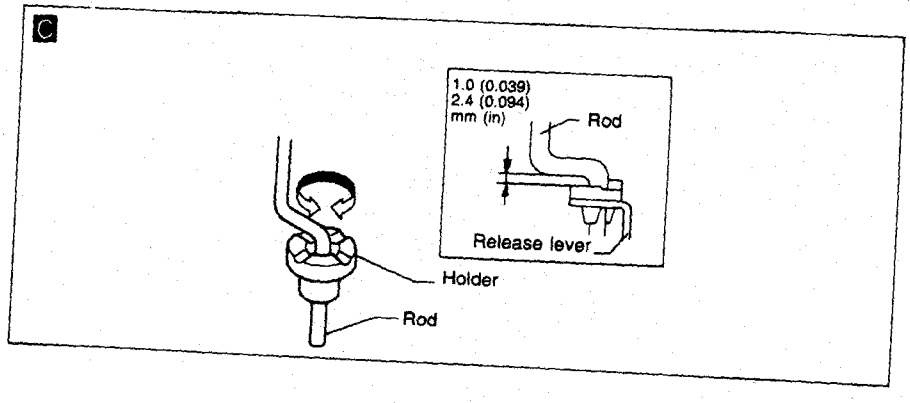
Door adjustment



Striker adjustment



Outside handle adjustment

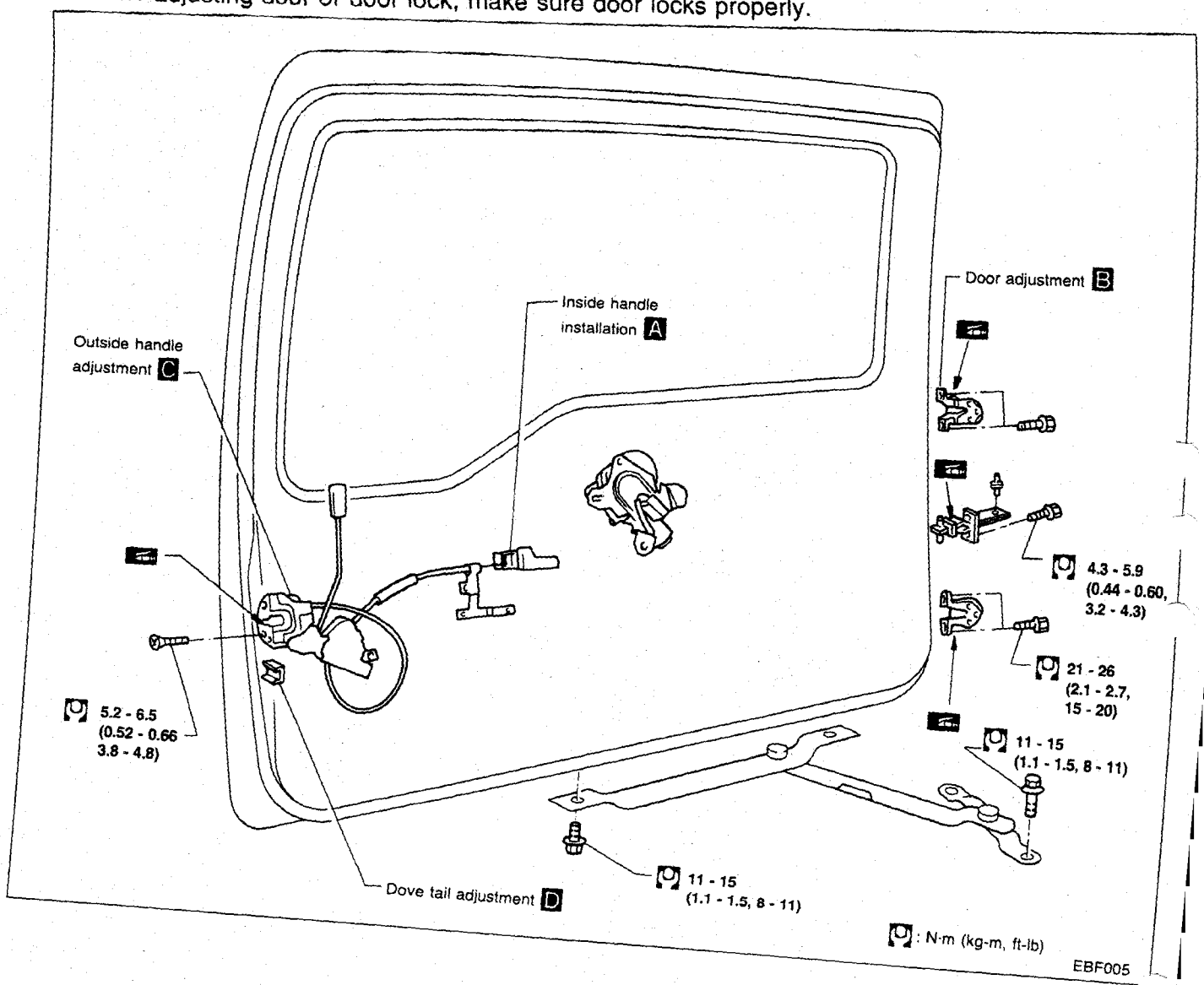


: N·m (kg-m, ft-lb)

EBF004

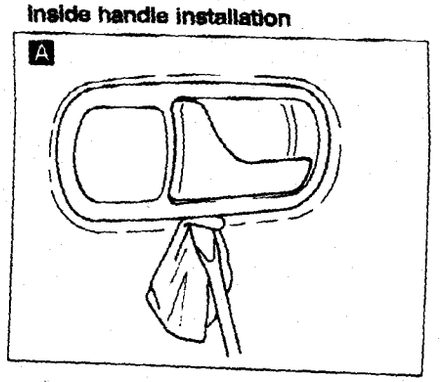
Back Door

- After adjusting door or door lock, make sure door locks properly.

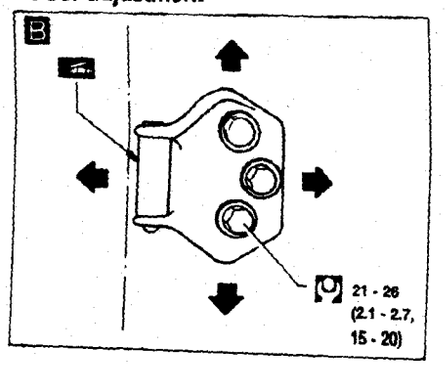


Back Door (Cont'd)

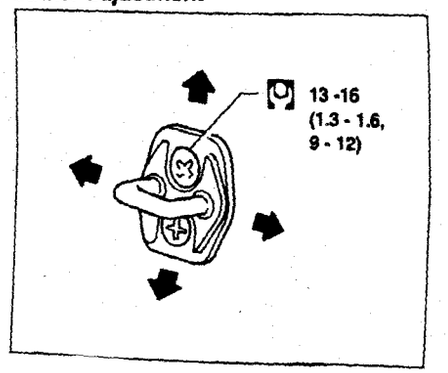
Inside handle installation



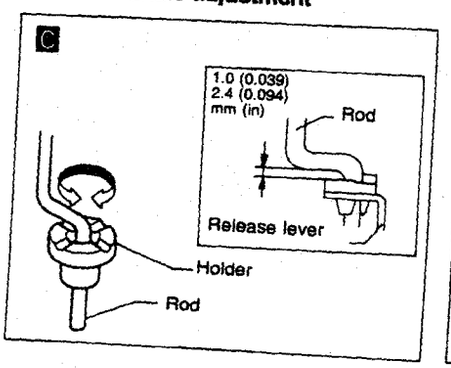
Door adjustment



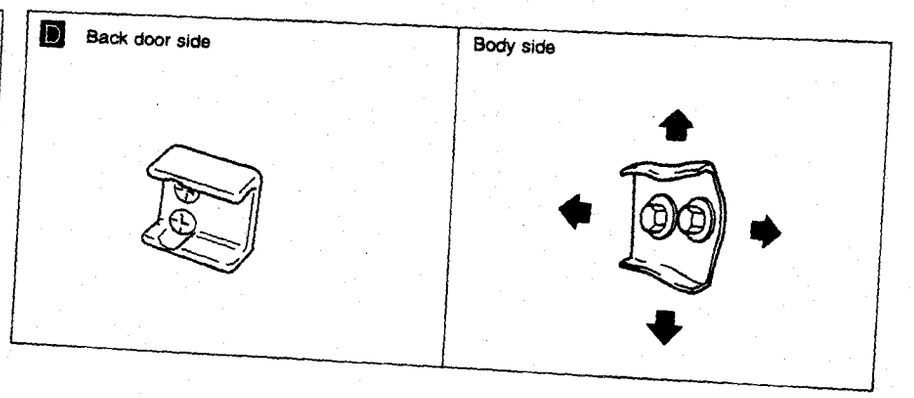
Striker adjustment



Outside handle adjustment



Dove tail adjustment



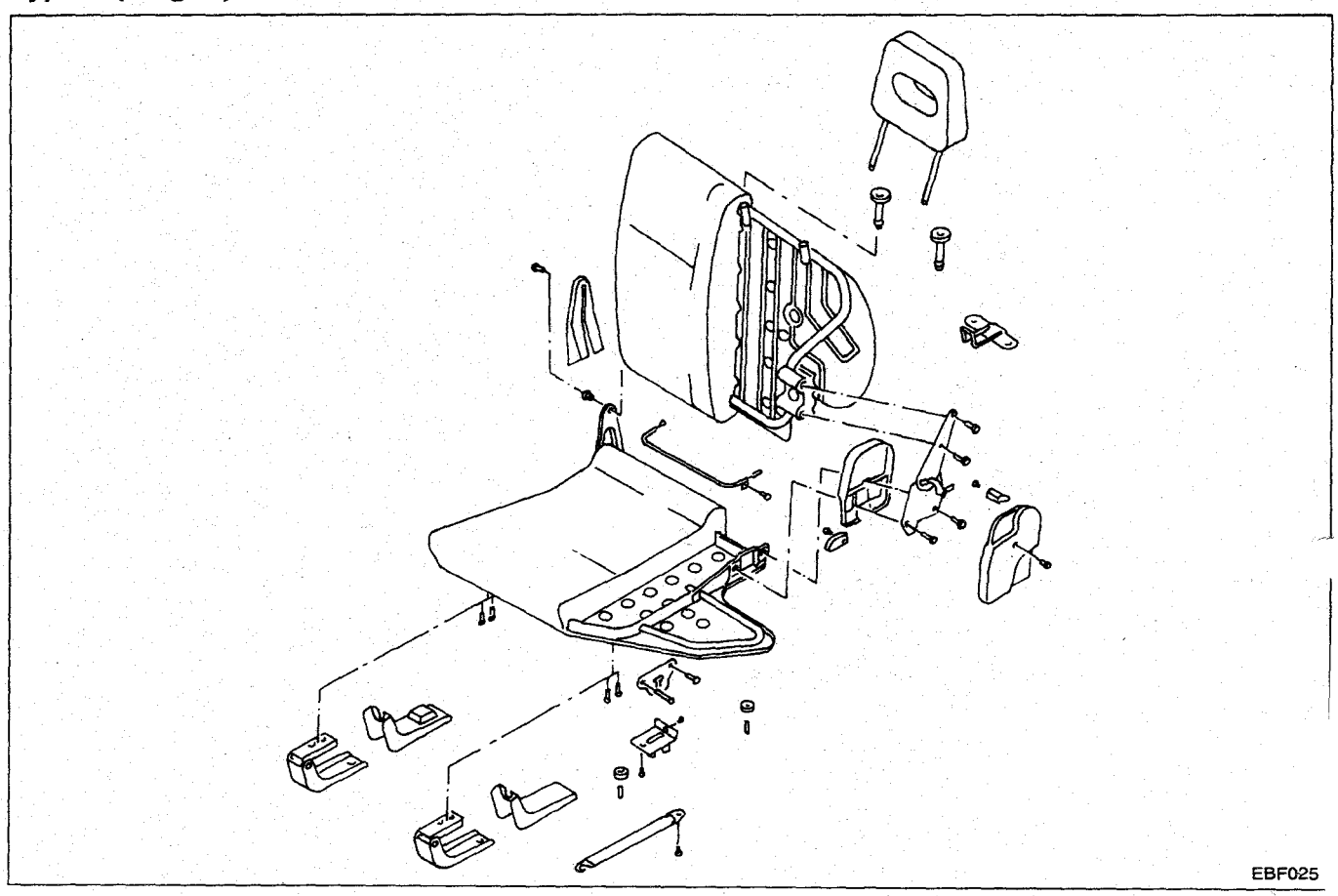
: N·m (kg-m, ft-lb)

EBF005

NOTE:

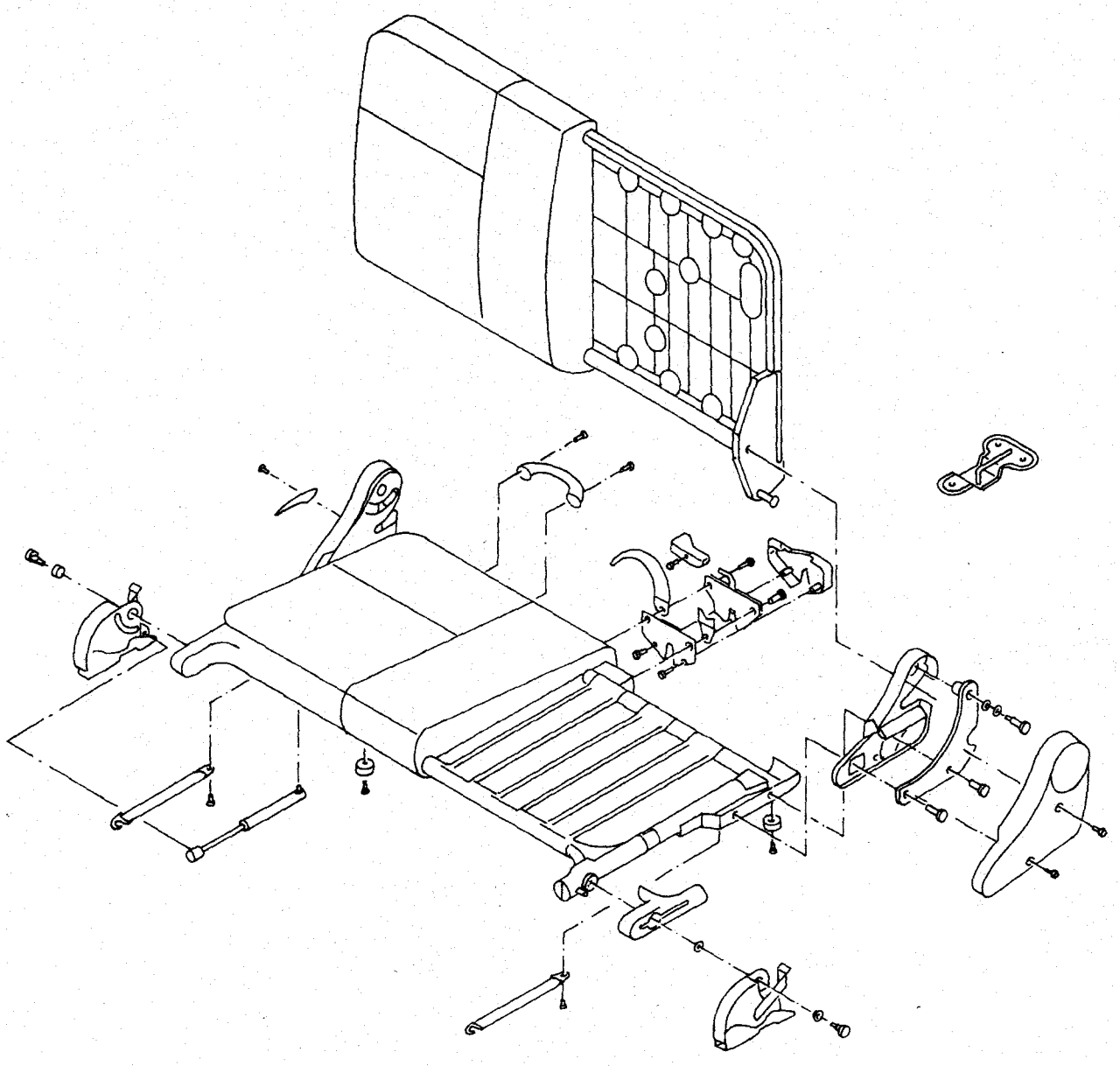
Second Seat (Cont'd)

Type 2 (Wagon)



EBF025

Third Seat



EBF026

- After any adjustment, check sun roof operation and lid alignment.
- Handle finisher plate and glass lid with care so as not to damage it.
- It is desirable for easy installation to mark each point before removal.

CAUTION:

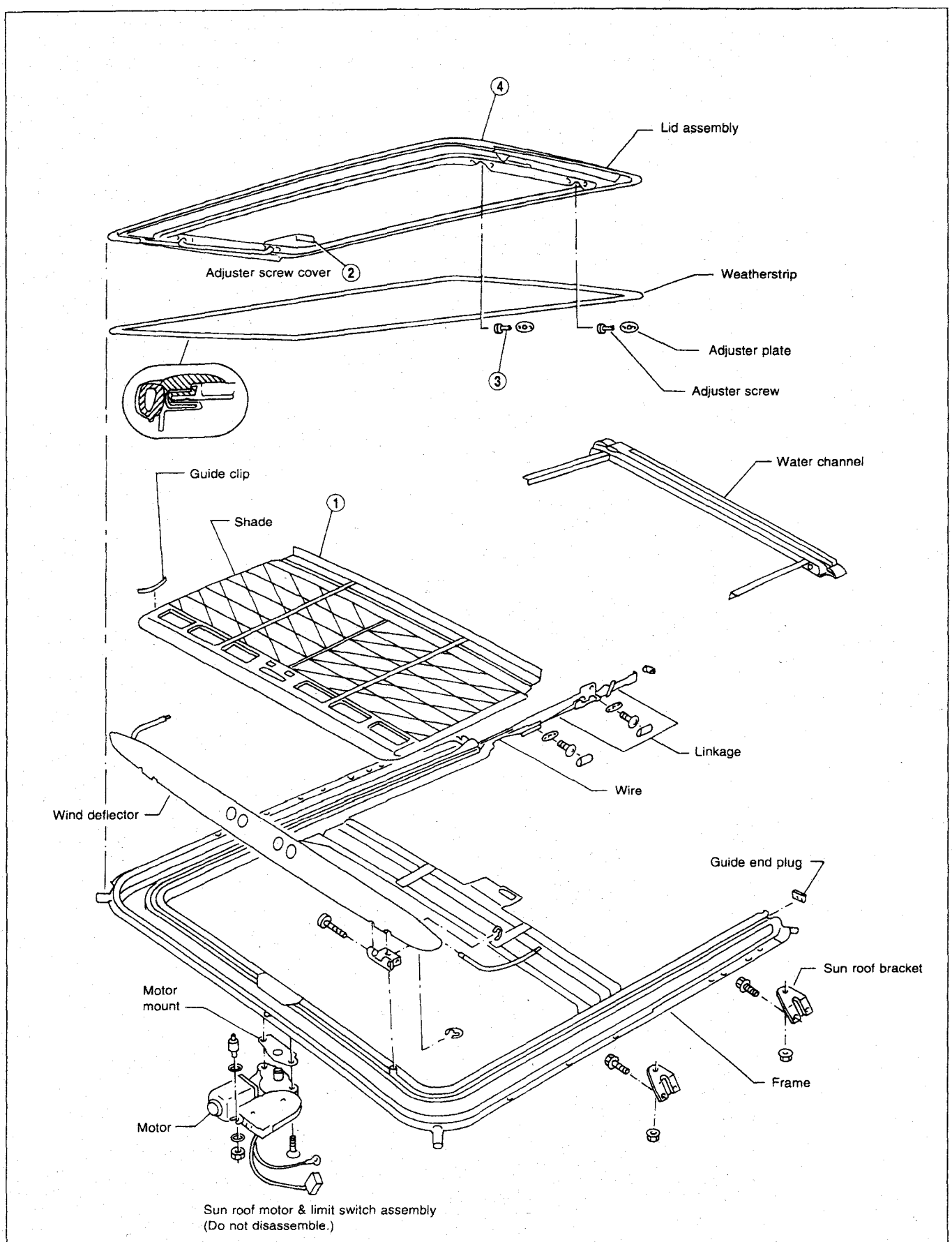
a. Always work with a helper.
b. Remove sun roof frame from rear door opening.

REMOVAL – Sun roof lid assembly

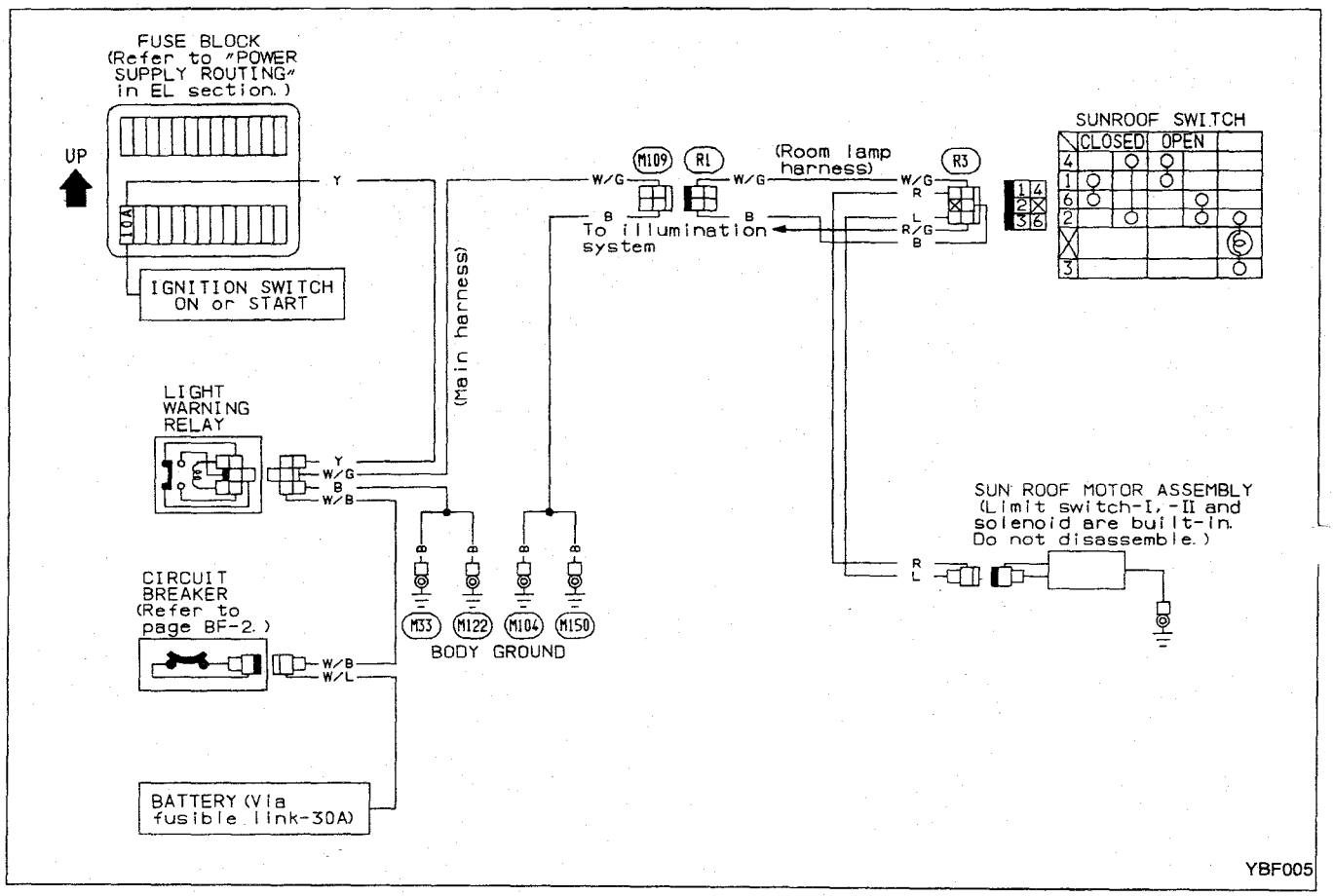
① Open sun roof shade.
② Close sun roof lid, and remove adjustment screw covers.
③ Remove the four adjuster screws.
④ Remove sun roof lid assembly

REMOVAL – Sun roof assembly

1. Remove headlining. For details, refer to "ROOF TRIM" in "Interior".
2. Disconnect interior lamp harness.
3. Disconnect front and rear drain hoses.
4. Remove nuts and bolts securing sun roof frame and motor to roof.
5. Remove sun roof assembly.


4
Lid assembly
Adjuster screw cover
2
Weatherstrip
Adjuster plate
3
Adjuster screw
Water channel
Guide clip
Shade
1
Linkage
Wire
Wind deflector
Guide end plug
Sun roof bracket
Motor mount
Frame
Motor
Sun roof motor & limit switch assembly
(Do not disassemble.)
EBF032

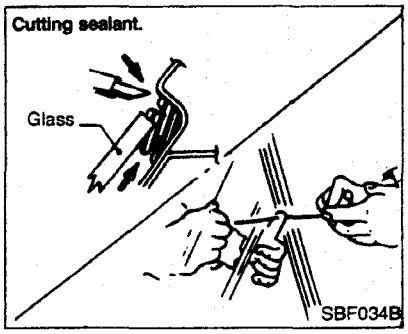
Wiring Diagram



Windshield, Rear Window and Back Door Window

REMOVAL

After removing moldings, remove glass.

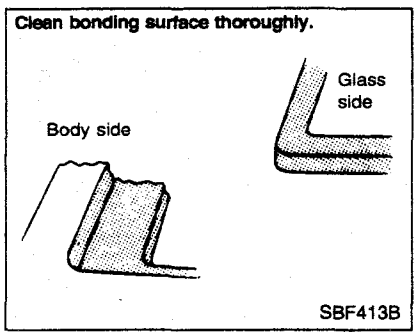


CAUTION:

Be careful not to scratch glass when removing.

INSTALLATION

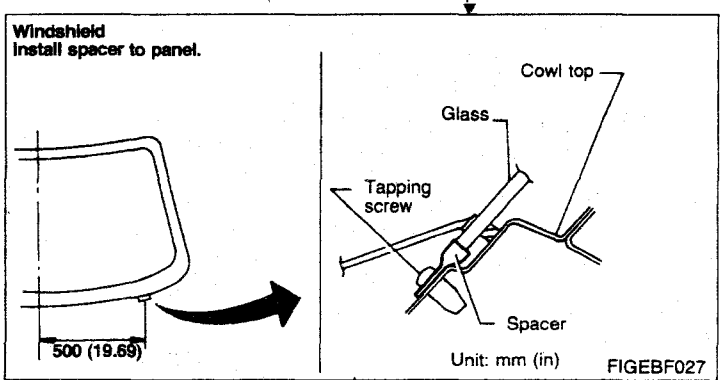
- **Use genuine Nissan Sealant kit or equivalent. Follow instructions furnished with it.**
- **After installation, the vehicle should remain stationary for about 24 hours.**
- **Do not use sealant which is more than 12 months past its production date.**
- **Do not leave cartridge unattended with its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



WARNING:

Keep heat or open flames away as primers are flammable.

Body side | Glass side



Ⓐ Ⓑ

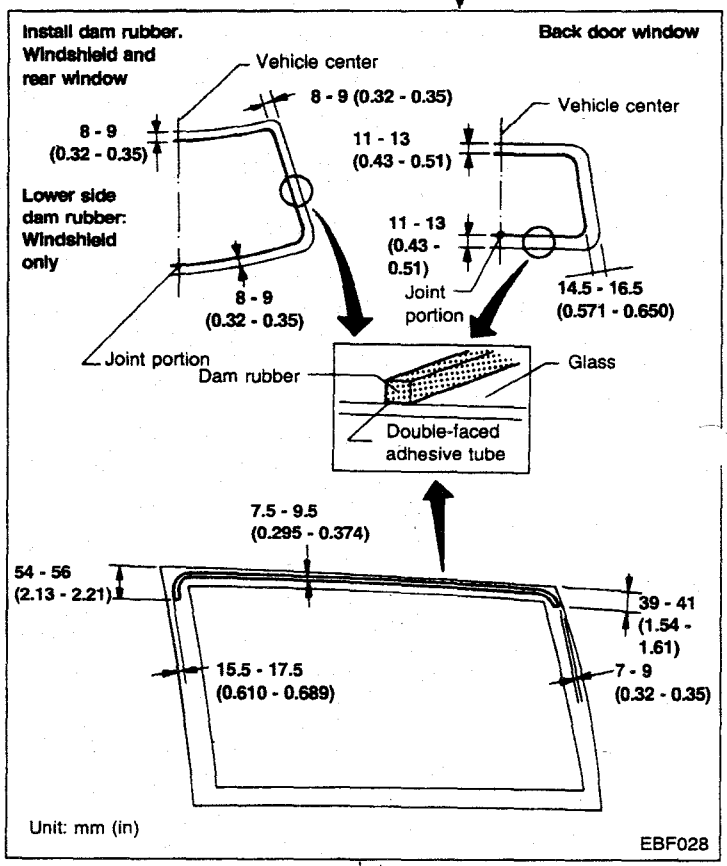
Windshield, Rear Window and Back Door Window (Cont'd)

Ⓐ

Ⓑ

Install dam rubber.
Windshield and rear window

Back door window



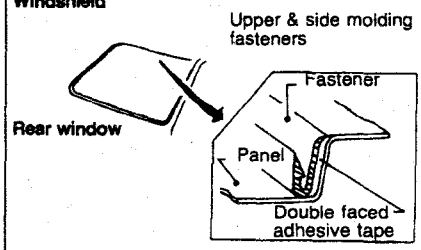
Unit: mm (in)

EBF028

Install molding fastener.

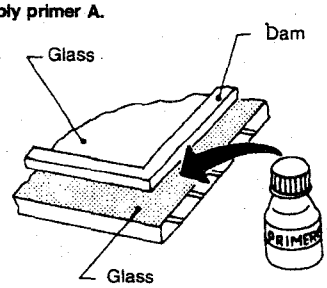
When installing it, heat body panel and fastener to approx. 30 to 40°C (86 to 104°F).

Windshield



EBF029

Apply primer A.

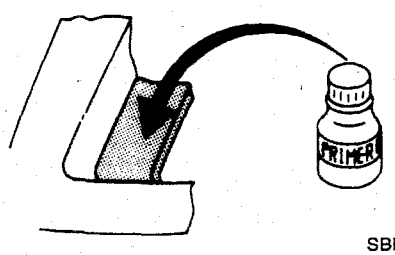


SBF208F

CAUTION:

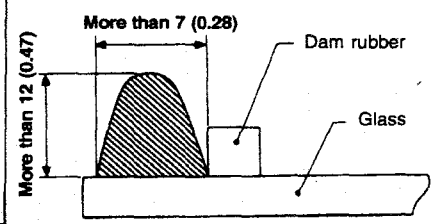
Allow primers to dry for 10 to 15 minutes before proceeding to the next step.

Apply primer E.



SBF038B

Apply sealant evenly.



Unit: mm (in)

SBF018A

Ⓒ

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

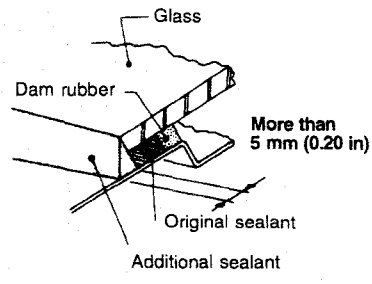
Ⓒ

CAUTION:
Allow primers to dry for 10 to 15 minutes before proceeding to the next step.

Set glass in position and press glass lightly and evenly.

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

Apply additional sealant uniformly to the lower portion of glass, as shown below:



SBF720C

Check for water leakage.

CAUTION:
For sealant drying period, refer to "Drying Time for Sealant".

Apply sealant to upper & side molding fixing portion.

Set upper and side moldings.

CAUTION:
Molding must be installed securely so that it is in position and leaves no gap.

For details of moldings, refer to "Exterior".

Install lower molding.

Drying Time for Sealant

- Reference: Time required for sealant to dry to desired hardness.

Unit: days

Relative humidity % / Temperature °C (°F)	Windshield and Rear window			Back door window		
	90	50	25	90	50	25
40 (104)	1.5	2.5	5.0	1.5	2.5	5.5
25 (77)	2.5	4.0	7.5	2.5	4.5	8.5
5 (41)	5.0	13.0	20.5	5.5	14.0	22.0

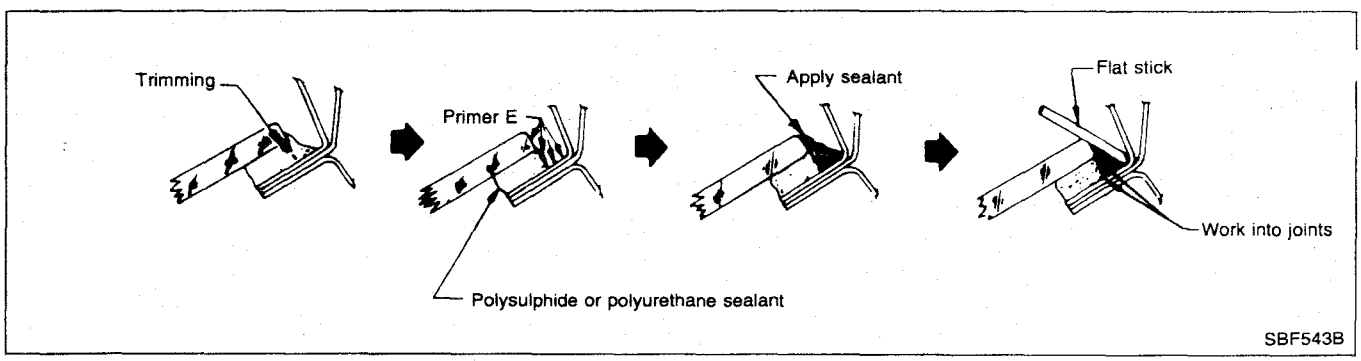
CAUTION:
Advise the user of the fact that vehicle should not be driven on rough roads or surfaces until sealant has properly vulcanized.

Repair Water Leaks for Windshield, Rear Window and Back Door Window

Leaks can be repaired without removing glass.

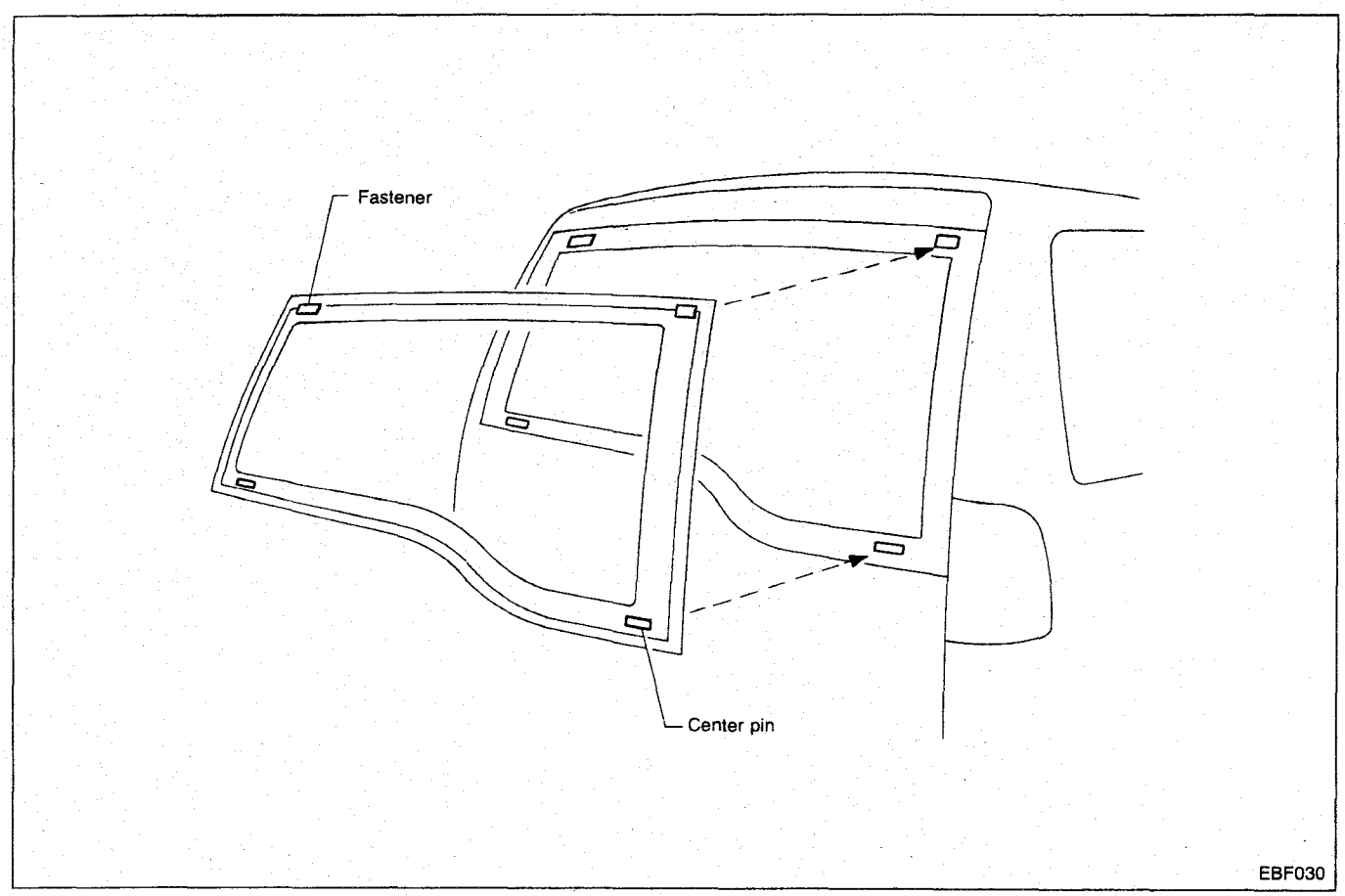
If water is leaking between caulking material and body or between glass and caulking material, determine the extent of the leak by applying water while pushing glass outward.

To stop the leak, apply primer and then sealant to the leak point.



Afterwards, install molding securely.

Back Door Window



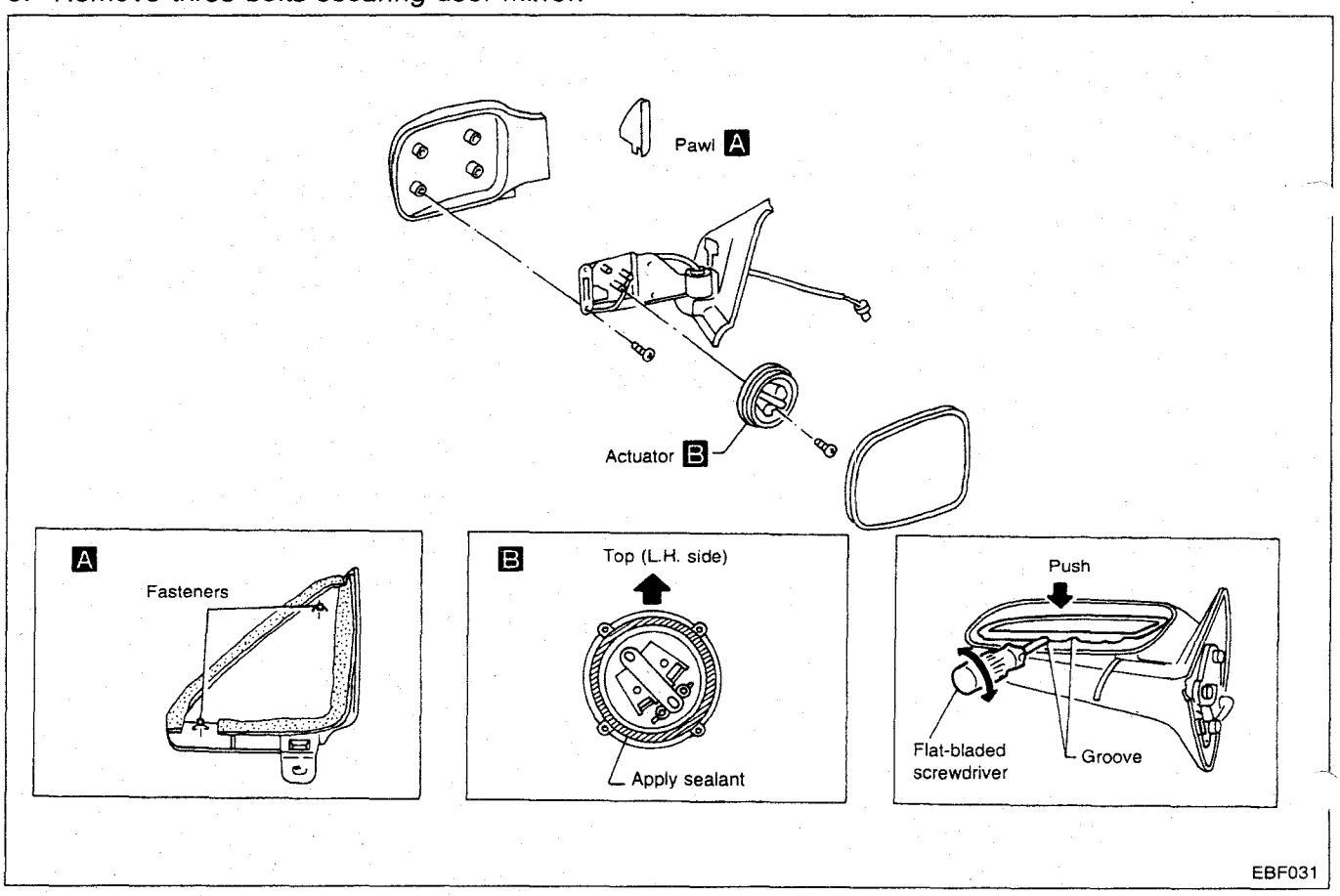
- Window glass is held in place by weatherstripping. For details regarding weatherstrip, refer to "EXTERIOR".
- Apply sealer to clearances between vehicle body panel and weatherstrip as necessary.

Door Mirror

CAUTION:
Be careful not to scratch door rearview mirror body.
When removing the outside mirror's cover, situated at the inside of the door, pull the cover straight out so as to prevent the fasteners from breaking.

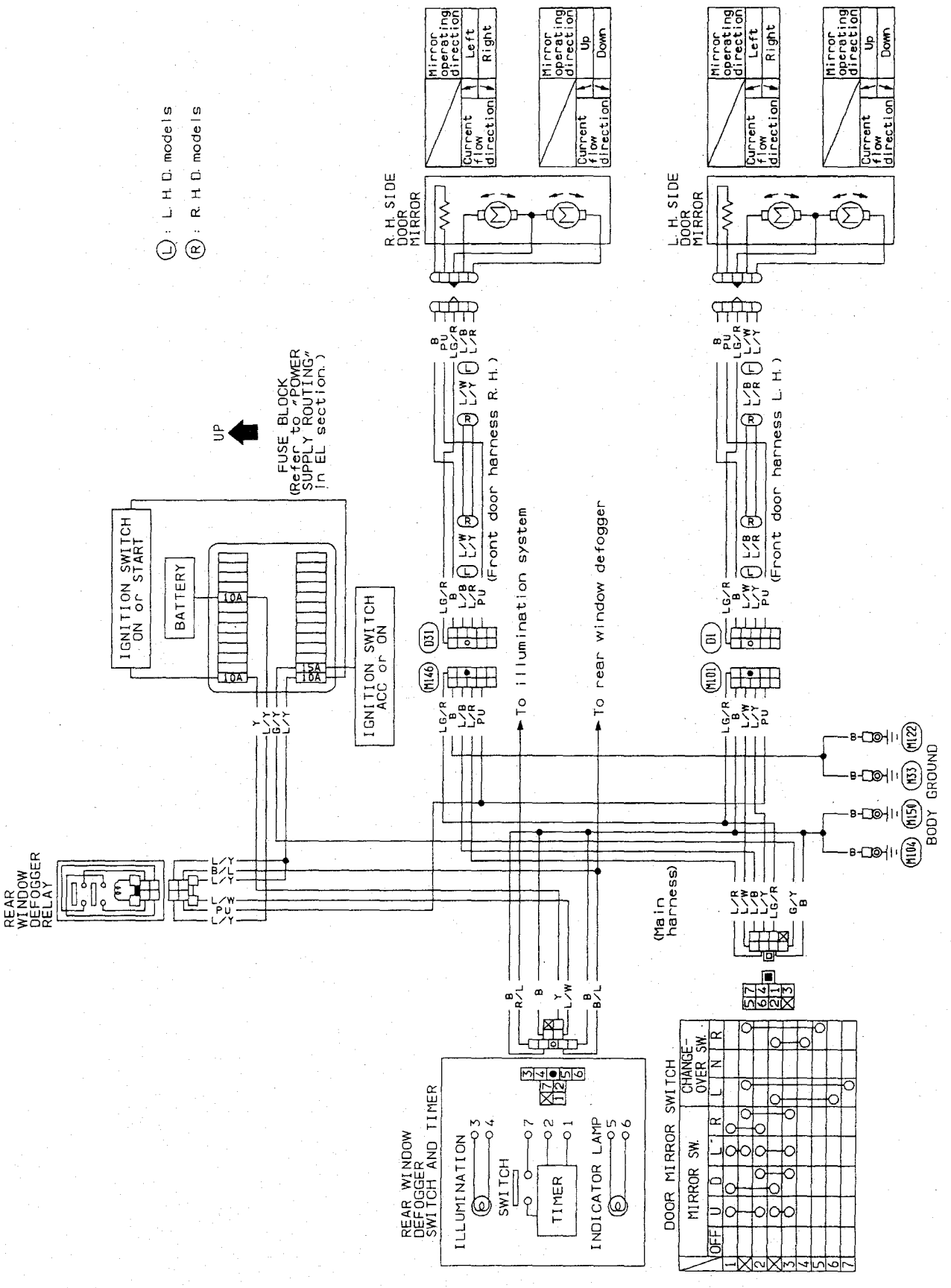
REMOVAL – Door mirror

1. Remove door trim. Refer to "Removal – Door trim" in "Interior" for details.
2. Remove inner cover front corner of door.
3. Disconnect door mirror harness connector.
4. Remove harness clips.
5. Remove three bolts securing door mirror.



Door Mirror (Cont'd)

ELECTRICAL REMOTE CONTROL DOOR MIRROR WIRING DIAGRAM



YBF006

Body

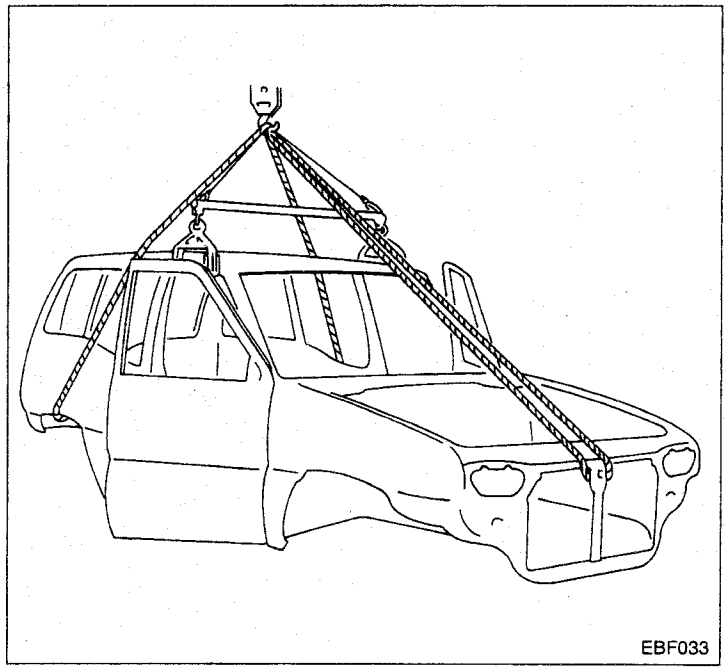
- Remove at least the following parts in engine compartment.

(1) Main harness and other wiring harnesses.

- Disconnect brake and clutch line in engine compartment.
- Remove at least the following parts under the body.

(1) Transmission and transfer control levers
(2) Hand brake control lever and cable
(3) Main harness and other wiring harnesses

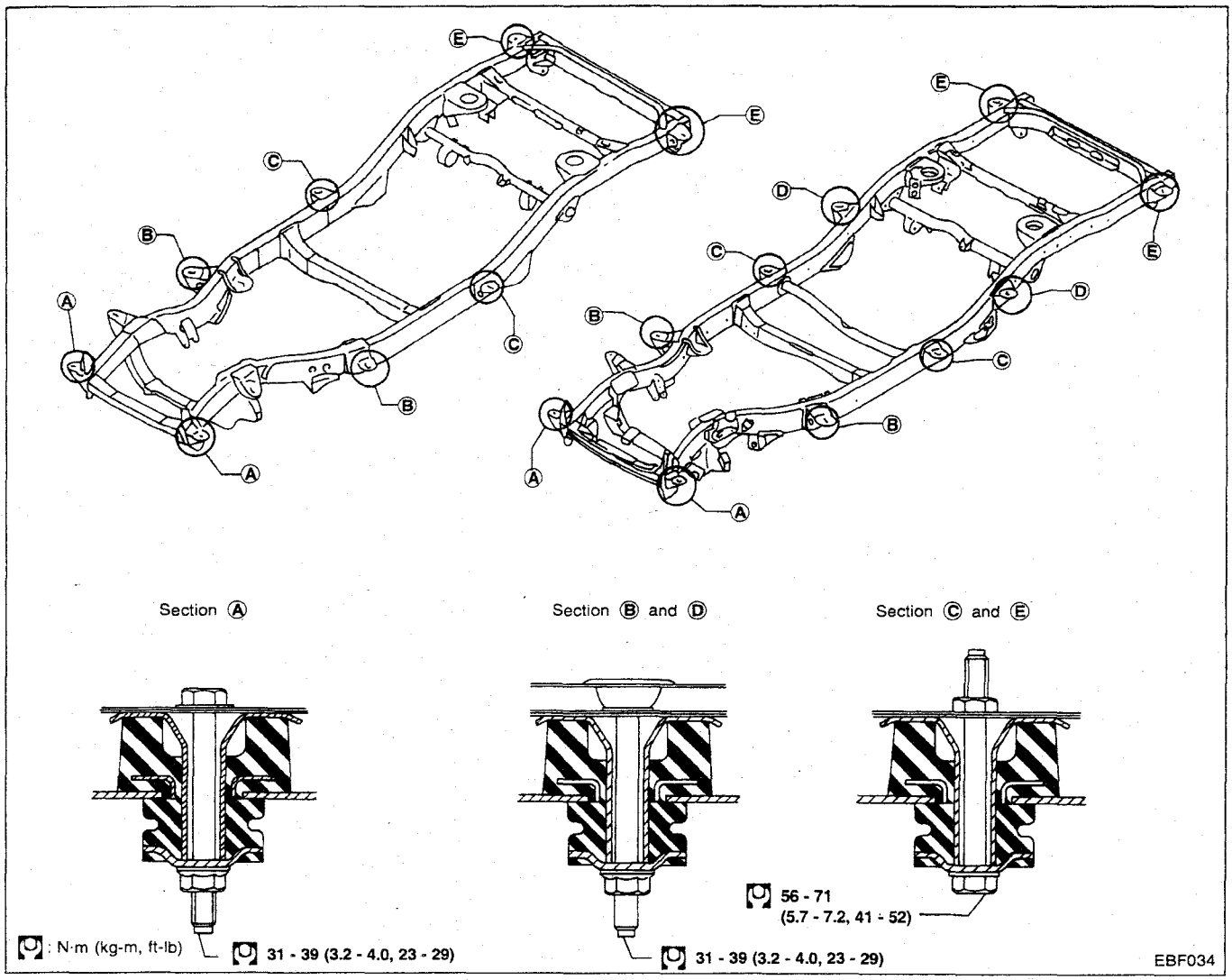
- Remove seat belt anchor bolt.



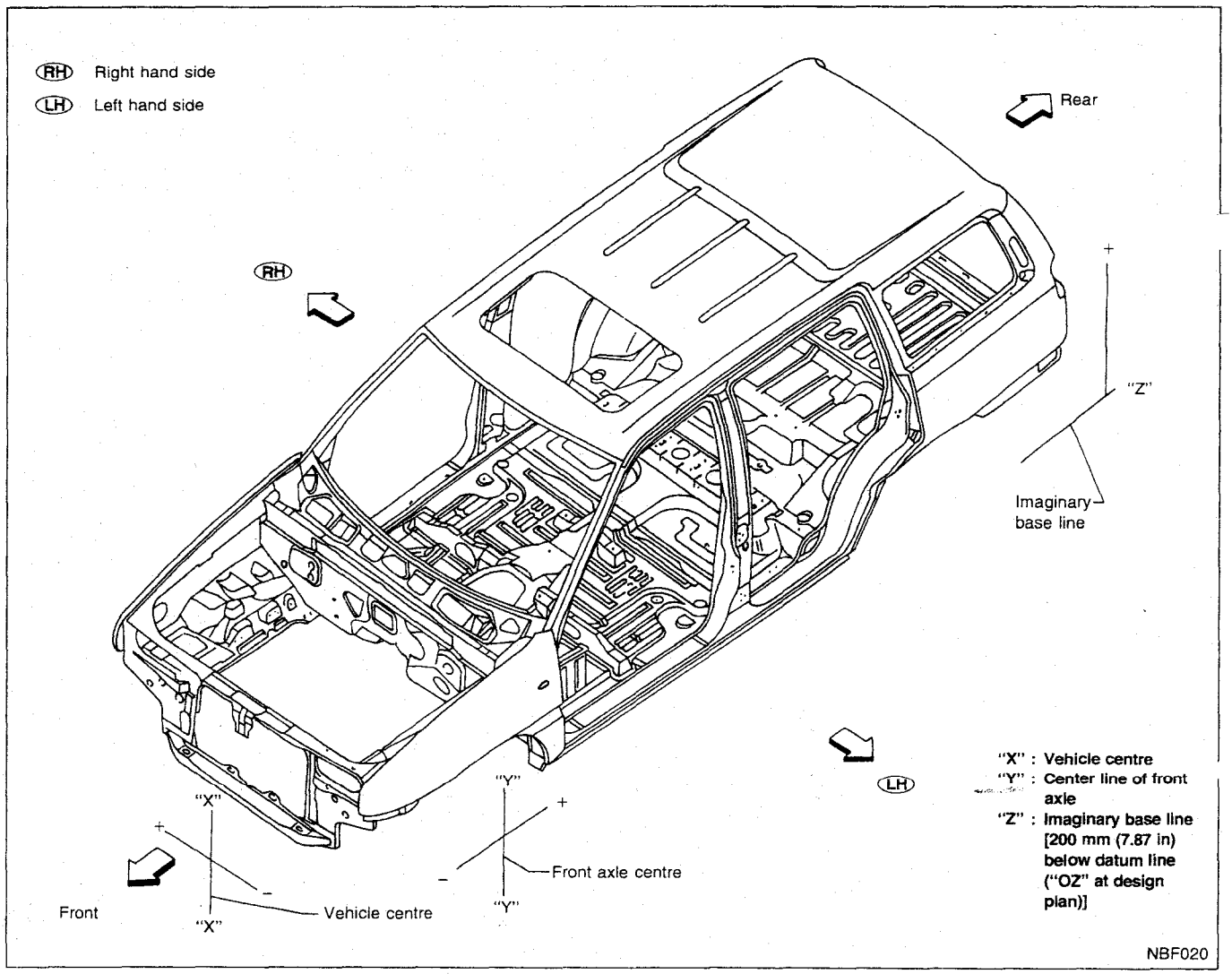
PRECAUTION:
The sling support at the front of the vehicle body serves only to stabilize the body during hoisting. The support will be damaged if too much pressure is exerted upon it.

Body Mounting

When removing, be sure to replace bolts and nuts (sealant applied bolts or self-lock nuts are used for all mountings).



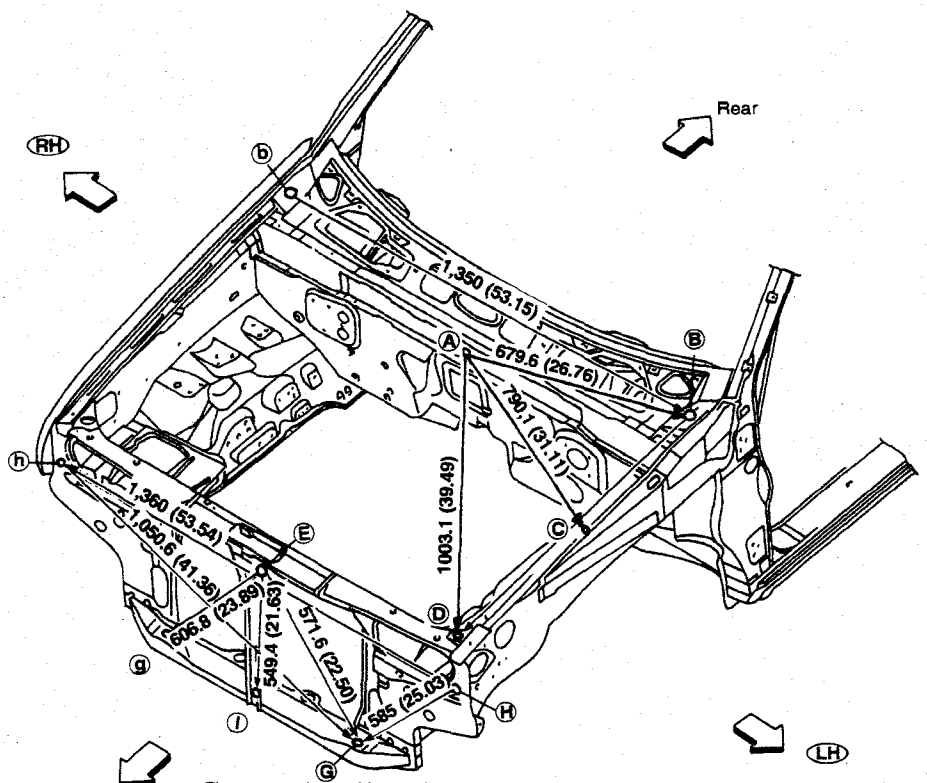
- All dimensions indicated in figures are actual ones.
- When a tram tracking gauge is used, adjust both pointers to equal length and check the pointers and gauge itself to make sure there is no free play.
- When a measuring tape is used, check to be sure there is no elongation, twisting or bending.
- Measurements should be taken at the center of the mounting holes.
- All measurements and mounting hole diameters are expressed in millimeters (mm).
- 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".



Engine Compartment

MEASUREMENT

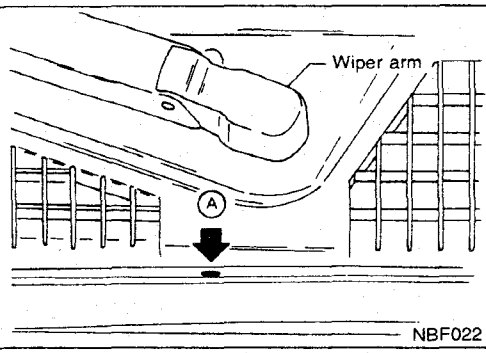
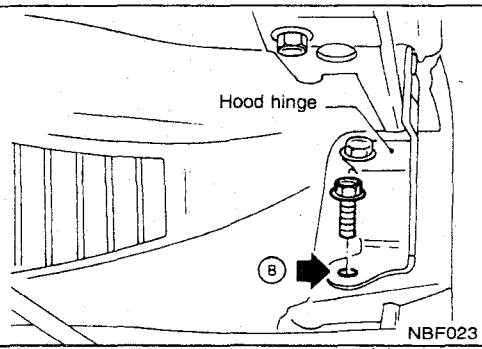
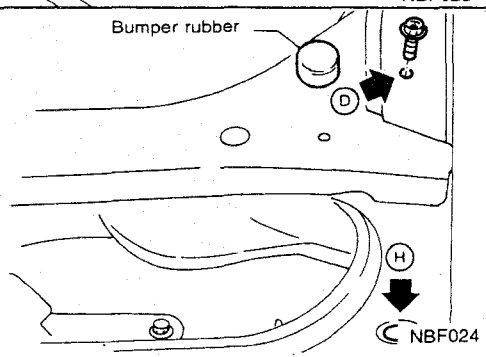
Unit: mm (in)



Figures marked with a * show symmetrically identical dimensions on both right and left hand sides of the vehicle.

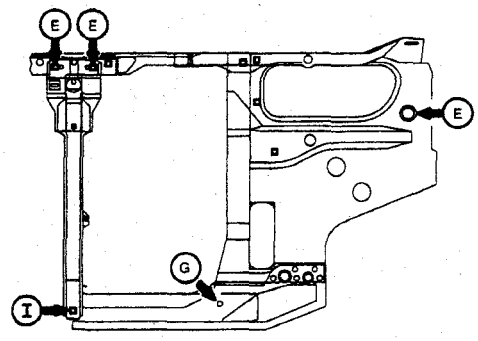
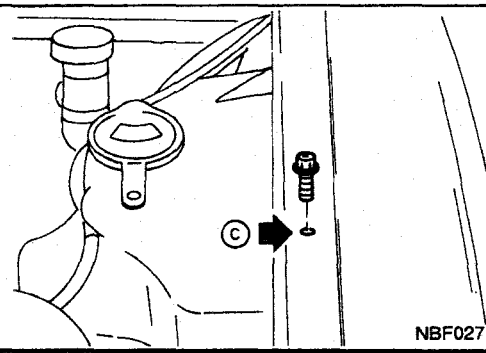
NBF021

DETAILED MEASUREMENT POINTS

Points	Hole dia. mm (in)	Detailed points		Coordinates mm (in) "X"	"Y"	"Z"
Ⓐ	8 (0.32)		Cowl top hole at vehicle center	0.0 (0.00)	250.0 (9.84)	760.9 (29.96)
Ⓑ ⓑ	11 (0.43)		Cowl top side hole	698.5 (27.50)	-110.1 (-4.34)	624.7 (24.59)
Ⓓ ⓓ	8 (0.32)		Upper radiator core support location hole	691.0 (27.20)	-459.5 (-18.09)	548.0 (21.58)
Ⓗ ⓗ	16 (0.63)		Side radiator core support location hole	680.0 (26.77)	-551.7 (-21.72)	400.0 (15.75)

① :Coordinate indicated is (LH) . (RH) coordinate is - (LH) coordinate.
E.g. if (LH) coordinate is: 698.5, (RH) coordinate is: -698.5.

Engine Compartment (Cont'd)

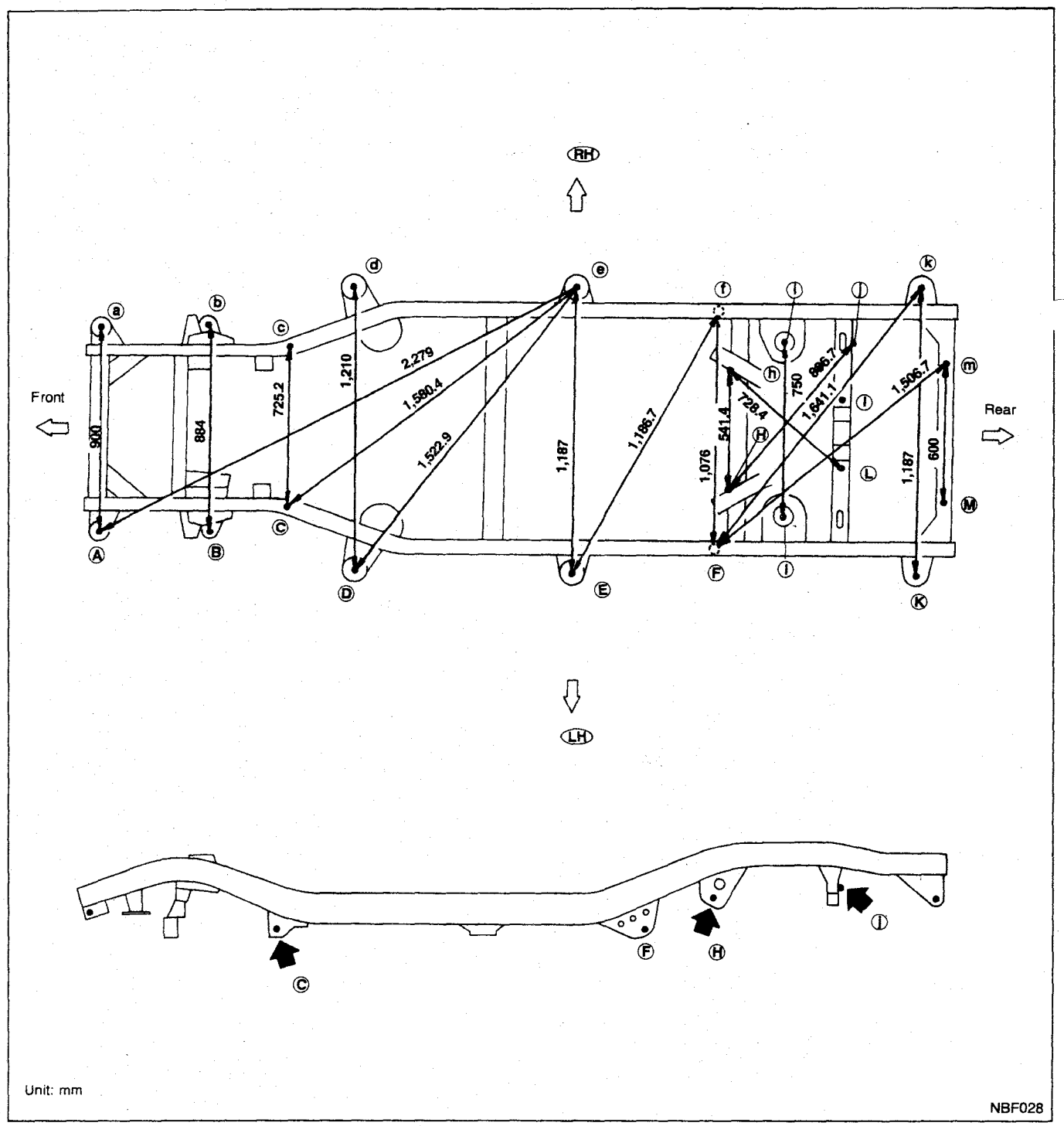
Points	Hole dia. mm (in)	Detailed points		Coordinates mm (in)		
				"X"①	"Y"	"Z"
Ⓔ	9 (0.35)	 NBF025	Hood lock stay mounting hole on upper radiator core support	37.0 (1.46)	-589.0 (-23.19)	494.0 (19.45)
Ⓘ			Lower radiator core support mounting hole	0.0 (0.00)	-581.1 (-22.88)	-54.1 (-2.13)
Ⓖ ⓖ	12 (0.47)		Lower radiator core support location hole	280.0 (11.02)	-608.9 (-23.97)	-23.0 (-0.91)
Ⓒ ⓒ	7.2 (0.28)	 NBF027	Front fender mounting hole on hood-ledge	698.5 (27.50)	-110.1 (-4.34)	624.7 (24.59)

① :Coordinate indicated is (LH). (RH) coordinate is - (LH) coordinate.
E.g. if (LH) coordinate is: 698.5, (RH) coordinate is: -698.5.

Underbody

MEASUREMENT POINTS

Hardtop model



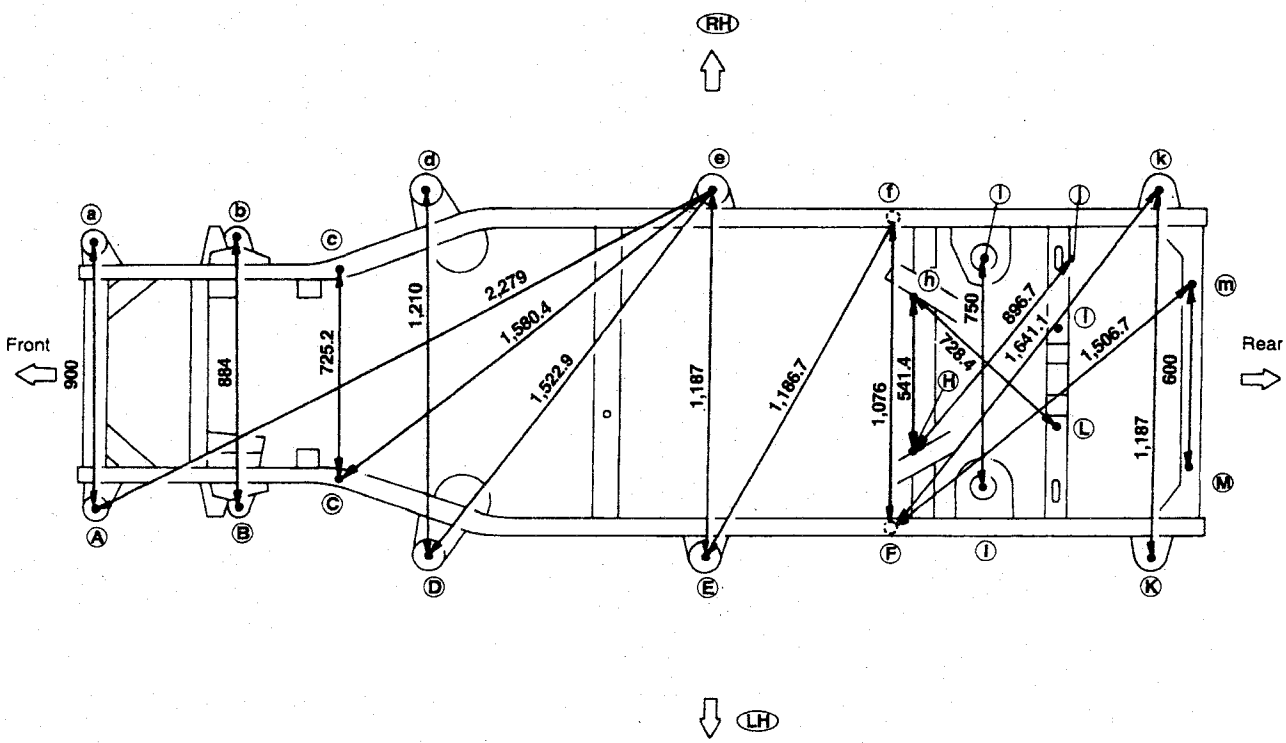
Unit: mm

NBF028

Underbody (Cont'd)

MEASUREMENT

Hardtop model



Unit: mm

NBF029