SECTION CL

CONTENTS

Refer to Section MA (Clutch) for:

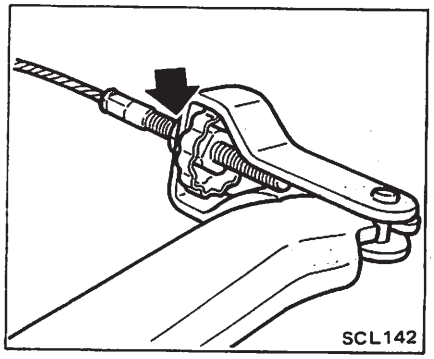
- CHECKING CLUTCH PEDAL HEIGHT AND FREE TRAVEL

MECHANICAL CLUTCH CONTROL

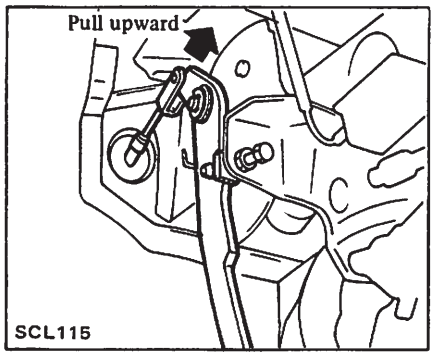
CLUTCH PEDAL AND CONTROL CABLE

REMOVAL

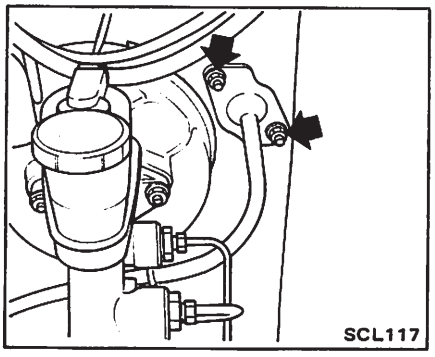
1. Remove instrument lower cover.
2. Loosen double nuts and disconnect control cable from withdrawal lever.



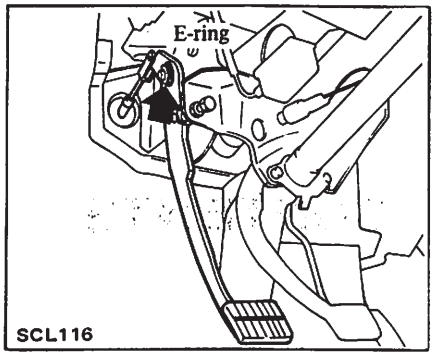
3. Disconnect other end of control cable from clutch pedal.



4. Remove control cable.



5. Remove E-ring retaining fulcrum pin.



6. Take out clutch pedal and return spring.

INSPECTION

Check pedal parts for the following, correcting as necessary.

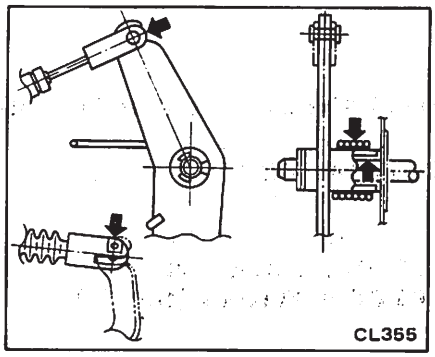
1. Bent pedal.
2. Weakened return spring.
3. Worn or deformed fulcrum bushings.
4. Cracks at welded parts.
5. Worn or damaged control cable ends.
6. Cracked outer case.

CAUTION:
If clutch pedal drags or does not operate smoothly, replace control cable.

INSTALLATION

To install clutch pedal and control cable, reverse the order of removal. Observe the following:

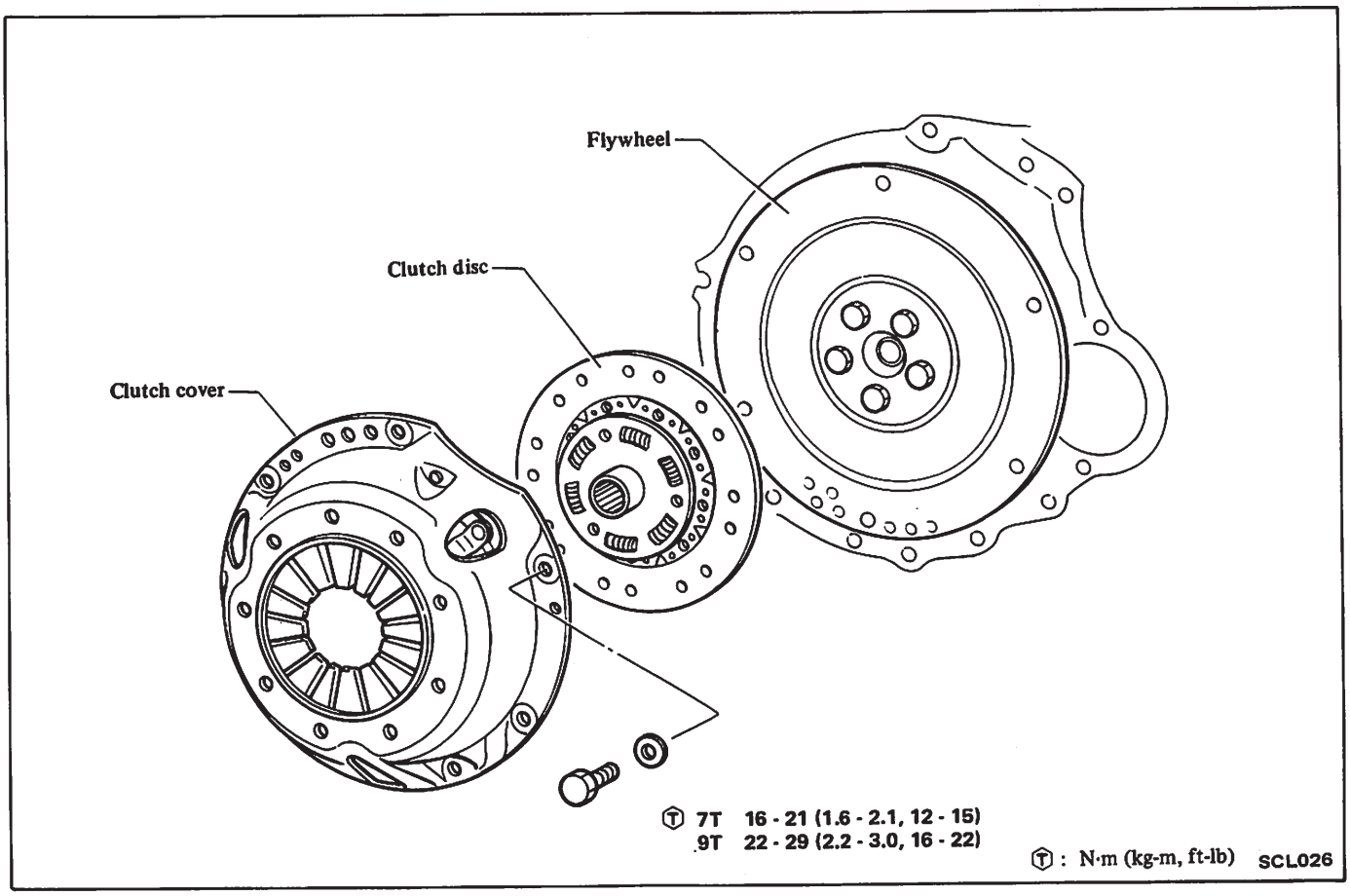
1. Apply coating of recommended multi-purpose grease to sliding portions and return spring.



2. Check the clutch pedal height. Adjust if necessary. Refer to Section MA for Checking Clutch Pedal Height.
3. Adjust the clutch pedal free travel. Refer to Section MA for Clutch Pedal Height and Free Travel.

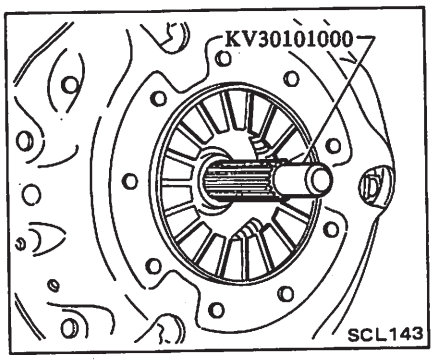
CLUTCH UNIT

CLUTCH DISC AND COVER

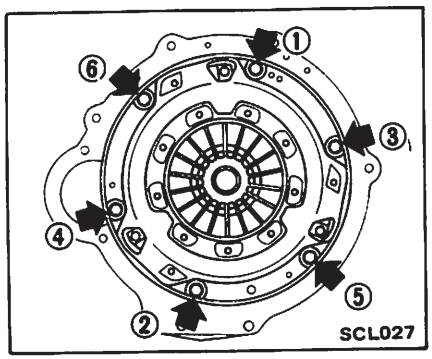


REMOVAL

1. Remove transaxle from engine. Refer to Removal (Section MT).
2. Insert Tool into clutch disc hub.



3. Loosen bolts attaching clutch cover to flywheel, one turn each at a time, until spring pressure is released. Be sure to turn them out in a crisscross fashion.



4. Remove clutch disc and cover assembly.

INSPECTION

Wash all disassembled parts except disc assembly in suitable cleaning solvent to remove dirt and grease before making inspection and adjustment.

Flywheel and pressure plate

Check friction surface of flywheel and pressure plate for scoring or roughness. Slight roughness may be smoothed by using fine emery cloth. If surface is deeply scored or grooved, the part should be replaced.

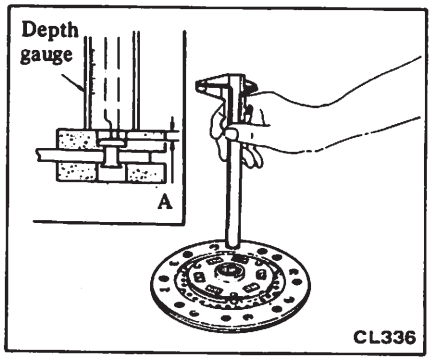
Clutch disc assembly

Inspect clutch disc for worn or oily facings, loose rivets and broken or loose torsional springs.

1. If facings are oily, disc should be replaced. In this case, inspect transaxle input shaft oil seal, engine rear oil seals and other points for oil leakage.

2. The disc should also be replaced when facings are worn locally or worn down to the specified limit.

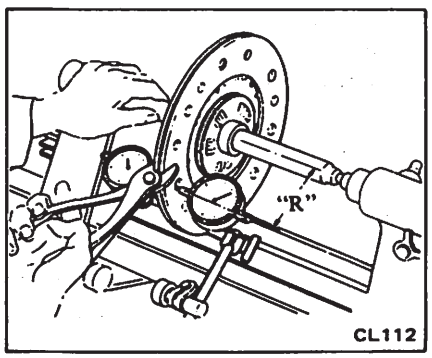
Wear limit of facing "A":
Less than 0.3 mm (0.012 in)



3. Check disc plate for runout whenever the old disc or a new one is installed.
4. If runout exceeds the specified value at outer circumference of facing, replace or repair disc.

Runout limit:
(total indicator reading)
Less than 0.5 mm (0.020 in)
"R" (from hub center):
85 mm (3.35 in)

CAUTION:
When repairing disc plate, never hold it forcibly with pliers or bend it excessively; otherwise facing will be damaged.



5. Check fit of disc hub on transaxle input shaft splines for smooth sliding.

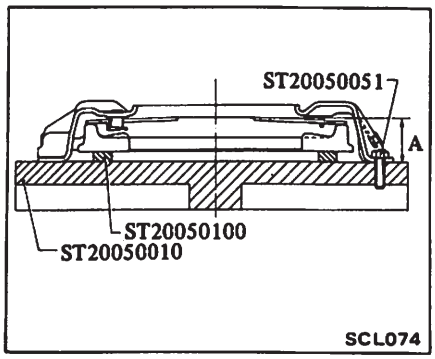
If splines are worn, clutch disc or input shaft should be replaced; that is, backlash exceeds the specified value at outer edge of clutch disc.

Backlash:
Less than 0.4 mm (0.016 in)

Clutch cover assembly

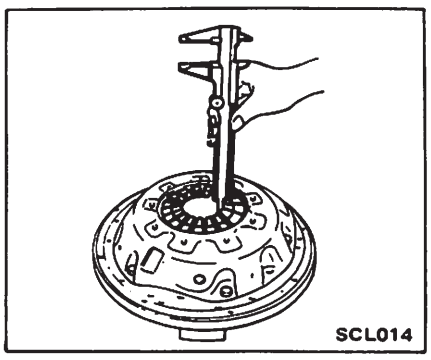
1. Check end surface of diaphragm spring for wear. If excessive wear is found, replace clutch cover assembly.
2. Measure height of diaphragm springs as outlined below:

(1) Place Tool ST20050100 on Tool ST20050010 and then tighten clutch cover assembly on base plate by using Tool ST20050051.

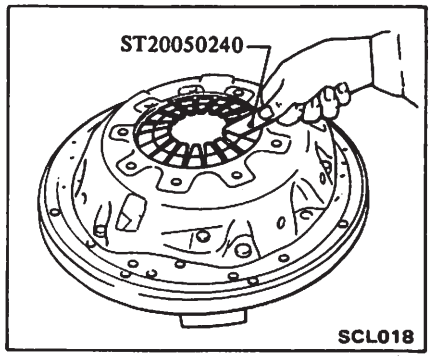


(2) Measure height "A" at several points with a vernier caliper depth gauge.

Diaphragm spring height "A":
29.0 - 31.0 mm
(1.142 - 1.220 in)



If height "A" of spring end is beyond specified value, adjust spring height with Tool ST20050240. If necessary, replace clutch cover assembly.



Also, unevenness of diaphragm spring toe height should be within the specified limit.

Unevenness of diaphragm spring toe height:
Less than 0:5 mm (0.020 in)

If unevenness of diaphragm spring toe height is beyond specified value, adjust spring height with Tool ST20050240.

3. Inspect thrust rings for wear or damage. As these parts are invisible from outside, shake cover assembly up and down to listen for chattering noise, or lightly hammer on rivets for a slightly cracked noise. Any of these noises indicates need of replacement as a complete assembly.

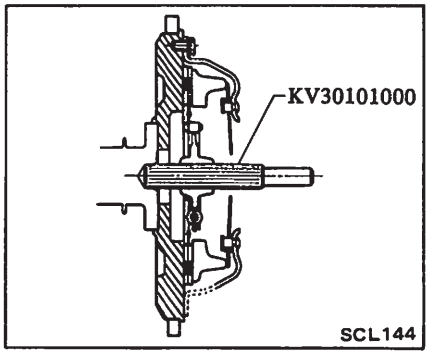
INSTALLATION

1. Apply a light coat of lithium-based grease (including molybdenum disulphide) to transaxle input shaft gear splines. Slide clutch disc on input shaft several times. Remove clutch disc and wipe off excess lubricant pushed off by disc hub.

Take special care to prevent grease or oil from getting on clutch facing.

2. Reinstall clutch disc and clutch cover assembly. Support clutch disc and cover assemblies with Tool KV30101000.

Be sure to keep disc facings, flywheel and pressure plate clean and dry.



3. Install clutch cover assembly. Each bolt should be tightened one turn at a time in a crisscross fashion.

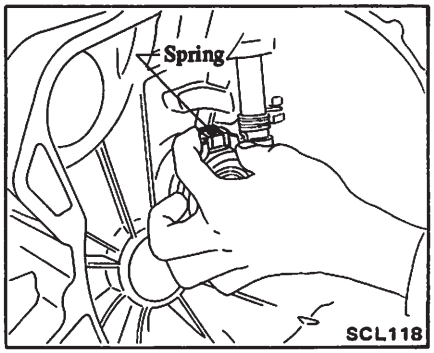
Ⓣ : **Clutch cover bolt**
16 - 21 N·m
(1.6 - 2.1 kg-m,
12 - 15 ft-lb)

4. Remove clutch aligning bar.
5. Reinstall transaxle. Refer to Installation (Section MT).

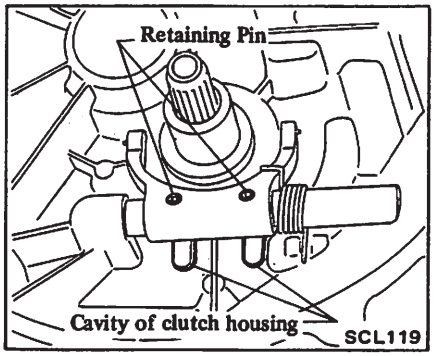
RELEASE BEARING

REMOVAL

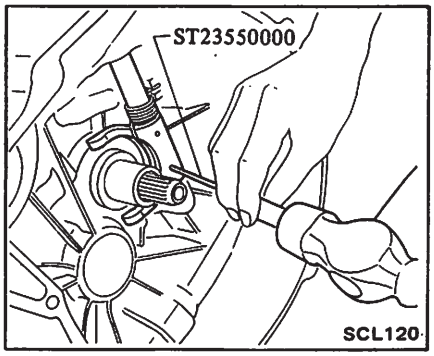
1. Remove transaxle from engine. Refer to Removal (Section MT).
2. Disconnect spring from release bearing.



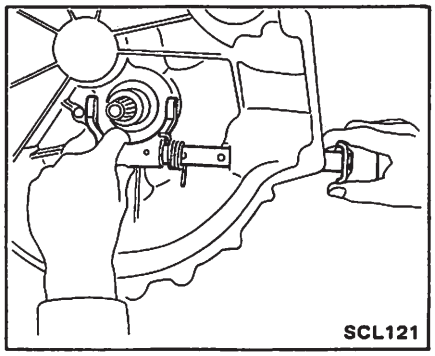
3. Remove release bearing from clutch housing front cover.
4. Align retaining pin with cavity of clutch housing.



5. Drive out retaining pin.



6. Pull out clutch control shaft. Then withdrawal lever and spring can be taken out.



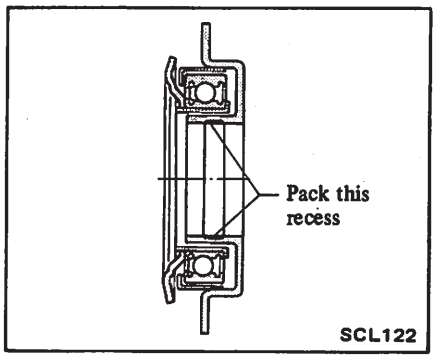
INSPECTION

Check for abnormal wear on contact surface of withdrawal lever, release bearing spring and release bearing.

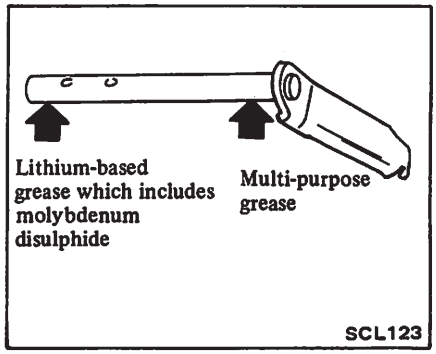
Hold bearing inner race and rotate outer race while applying pressure to it. If the bearing rotation is rough or noisy, replace bearing.

INSTALLATION

1. Lubricate the following points with a light coat of lithium-based grease which includes molybdenum desulphide.
(1) Inner groove of release bearing sleeve.

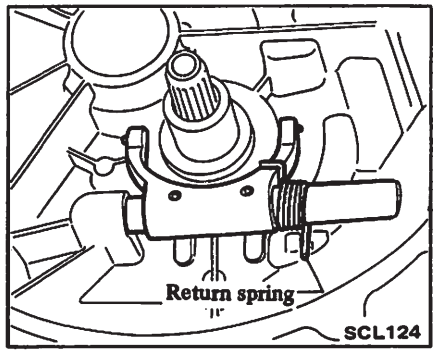


(2) Contact surfaces of withdrawal lever, and release bearing.
2. Apply recommended grease to clutch control shaft.

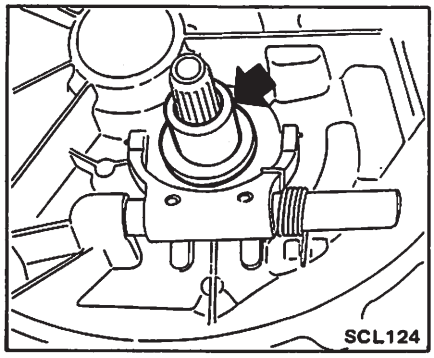


3. Install withdrawal lever, return spring and clutch control shaft on clutch housing.

Be sure to hook return spring as shown below.



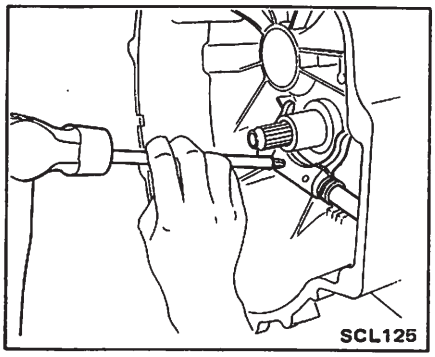
4. Lubricate the following points with lithium-based grease which includes molybdenum disulphide.
(1) Release bearing sliding surface of clutch housing front cover.



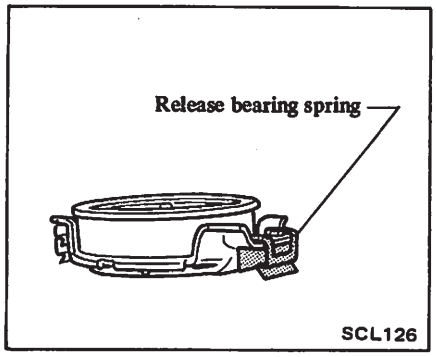
(2) Transaxle splines.

A small amount of grease should be coated to the above points. If too much lubricant is applied, it will run out on the friction plates when hot, resulting in damaged clutch disc facings.

5. Install withdrawal lever retaining pin.



6. Install release bearing springs to release bearing.



7. Install release bearing by pushing release bearing spring and clutch control lever by hand.

Be sure "click" is heard when pushing.

SERVICE DATA AND SPECIFICATIONS (S.D.S.)

GENERAL SPECIFICATIONS

CLUTCH CONTROL SYSTEM

Type of clutch control	Mechanical

CLUTCH DISC

Type	180CBL
Facing size Outer dia. x Inner dia. x Thickness mm (in)	180 x 125 x 3.5 (7.09 x 4.92 x 0.138)
Thickness of disc assembly Free mm (in)	8.85 - 9.55 (0.3484 - 0.3760)
At load 3,923 N mm (in) (400 kg, 882 lb)	8.0 - 8.4 (0.315 - 0.331)
Number of torsion springs	6

CLUTCH COVER

Model	C180S
Full load N (kg, lb)	
E15, E16	3,531 (360, 794)
CD17	2,746 (280, 617)

INSPECTION AND ADJUSTMENT

CLUTCH DISC

Unit: mm (in)

Model	180CBL
Wear limit of facing surface to rivet head	0.3 (0.012)
Runout limit	0.5 (0.020)
Distance of runout checking point (from the hub center)	85 (3.35)
Maximum backlash of spline (at outer edge of disc)	0.4 (0.016)

CLUTCH COVER

Unit: mm (in)

Model	C180S
Diaphragm spring height	29.0 - 31.0 (1.142 - 1.220)
Unevenness of diaphragm spring toe height	Less than 0.5 (0.020)

TIGHTENING TORQUE

Unit	N·m	kg-m	ft-lb
Pedal stopper bolt lock nut	12 - 15	1.2 - 1.5	9 - 11
Clutch cable lock nut (E15, E16)	3 - 4	0.3 - 0.4	2.2 - 2.9
Clutch cable double nut (CD17)	19 - 25	1.9 - 2.6	14 - 19
Clutch cable bracket securing bolt	8 - 11	0.8 - 1.1	5.8 - 8.0
Clutch cover securing bolt			
7T	16 - 21	1.6 - 2.1	12 - 15
9T	22 - 29	2.2 - 3.0	16 - 22

TROUBLE DIAGNOSES AND CORRECTIONS

CLUTCH SLIP

Slipping of clutch may be noticeable when any of the following symptoms is encountered during operation.
(1) Car will not respond to engine speed during acceleration.
(2) Insufficient car speed.
(3) Lack of power during uphill driving.
(4) Increasing of fuel consumption.

Some of the above conditions may also be attributable to engine problem. First determine whether engine or clutch is causing the problem.

If slipping clutch is left unheeded, wear and/or overheating will occur on clutch facing to such an extent that it is no longer serviceable.

TO TEST FOR SLIPPING CLUTCH, proceed as follows:

Inspection

Insure that parking brake is engaged. Disengage clutch and shift transaxle gears into 4th. Gradually increase engine speed while simultaneously engaging clutch. If engine stops while clutch is being engaged, clutch is functioning properly. If car does not move and the engine does not stop, clutch is slipping.

Probable cause	Corrective action
• Clutch facing hardened or wet with oil	Repair or replace
• Clutch facing excessively worn	Replace (Replace if engine/transaxle oil seal is faulty)
• Diaphragm spring weak or damaged	Replace
• Flywheel or pressure plate warped	Repair or replace

CLUTCH DRAGS

Dragging clutch is particularly noticeable when shifting gears, especially into low gear.
TO TEST FOR DRAGGING CLUTCH, proceed to inspection.

Inspection

The clutch will not disengage properly if the clutch pedal height is not correct. Before inspecting, be sure to correct the clutch pedal height, pedal stroke and extra allowance for disengagement. [There should be sufficient clearance below the pedal stroke (extra allowance for disengagement).]
(1) Clutch pedal height from the floor is outside the specifications. It indicates that the stopper bolt location is not correct.
(2) The adjustment of control cable (withdrawal lever play) is outside the specifications.
(3) Extra disengagement allowance is insufficient because of the interference of floor mats, etc.

Disengage clutch and shift gears into Reverse. Shift gears into Neutral, gradually increasing engine speed. After a short intermission, shift gears into Reverse. If noise is heard while gears are being shifted, clutch is dragging.

Probable cause	Corrective action
• Clutch disc hub splines worn or rusted	Replace (or remove rust) and coat with grease
• Insufficient pedal stroke	Adjust
• Clutch disc runout or warped	Replace
• Diaphragm spring fatigued	Replace
• Clutch facing wet with oil	Replace (Replace if engine/ transaxle oil seal is faulty)

CLUTCH CHATTERS

Clutch chattering is usually noticeable when car is just rolled off with clutch partially engaged.

Probable cause	Corrective action
• Oil on clutch facing	Replace
• Diaphragm spring fatigued	Replace
• Clutch facing hardened	Replace
• Clutch facing warped	Repair or replace
• Pressure plate worn or warped	Replace
• Engine mounting loose or rubber deteriorated	Tighten or replace
• Clutch facing rivets loose	Replace

NOISY CLUTCH

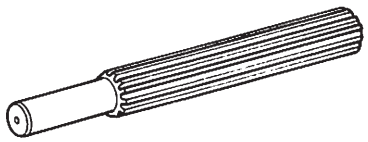
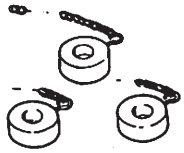
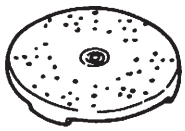
Probable cause	Corrective action
• Release bearing/sleeve damaged or improperly lubricated	Replace
• Pilot bushing worn, jammed or damaged	Replace
• Clutch facing rivets loose	Replace
• Disc plate cracked	Replace
• Clutch disc torsion springs fatigued	Replace

RABBIT-HOPPING CLUTCH

When "rabbit-hopping" of clutch occurs, car will not roll off smoothly from a standing start or clutch will be engaged before clutch pedal is fully depressed.

Probable cause	Corrective action
• Oil on clutch facing	Replace
• Clutch facing worn or rivets loose	Replace
• Flywheel/pressure plate warped or worn	Replace
• Mounting bolts on engine or power train loose	Tighten
• Diaphragm spring fatigued	Replace

SPECIAL SERVICE TOOLS

Tool number (Kent-Moore No.)	Tool name
KV30101000 (–)	Clutch aligning bar 
ST20050100 (–)	Distance piece 
ST20050010 (–)	Base plate 
ST20050051 (–)	Set bolt 
ST20050240 (–)	Diaphragm spring adjusting wrench 

MANUAL TRANSAXLE

SECTION MT

CONTENTS

REMOVAL AND INSTALLATION

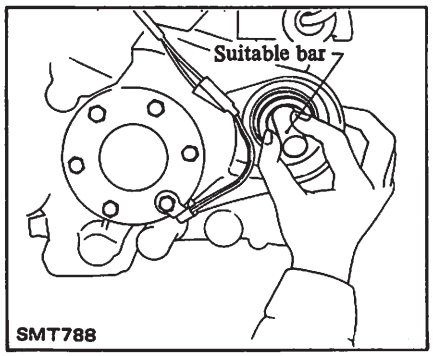
MANUAL TRANSAXLE

REMOVAL

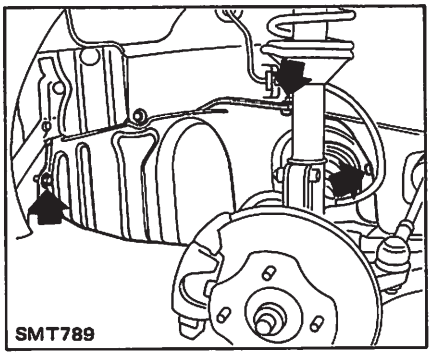
1. Remove battery and battery holding plate.
2. Remove radiator reservoir tank.
3. Drain gear oil.
4. Draw out drive shafts from transaxle.

Refer to Drive Shaft (Section FA) for removal.

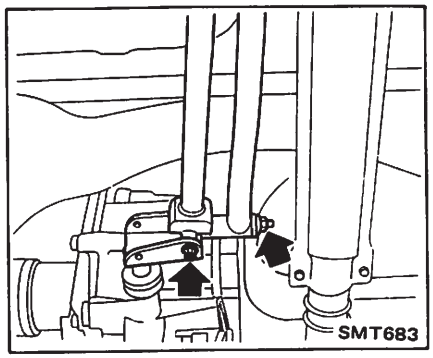
a. When drawing out drive shafts, use care not to damage lip of oil seal.
b. After drawing out drive shafts, insert suitable bar to prevent side gears from rotating and falling into differential case.



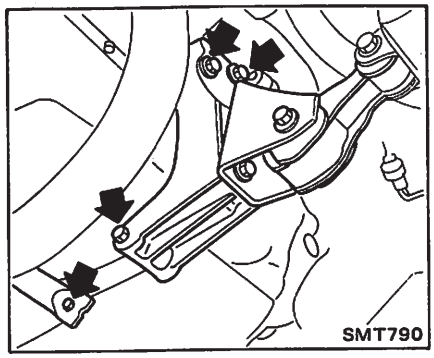
5. Remove wheel house protector.



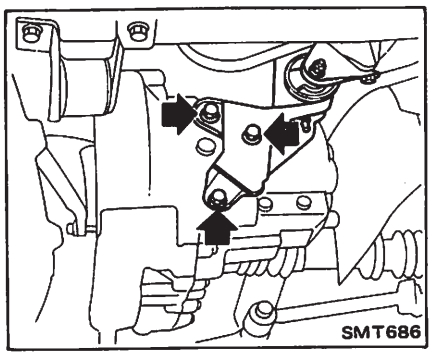
6. Separate control rod and support rod from transaxle.



7. Remove engine gusset securing bolt and engine mounting.

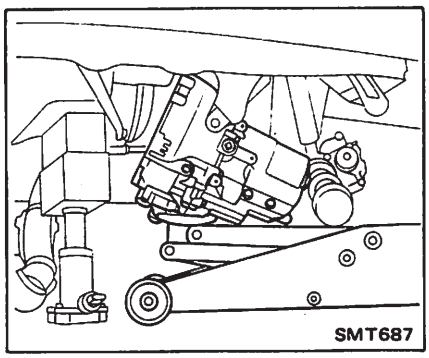


8. Remove clutch control cable from withdrawal lever.
9. Disconnect speedometer cable.
10. Disconnect wires from reverse (back-up) and neutral switches.
11. Support engine by placing a jack under oil pan with a wooden block used between oil pan and jack.
12. Support transaxle with a jack.
13. Remove engine mounting securing bolts.



14. Remove bolts securing transaxle to engine.

Then support engine and transaxle with jacks, and slide transaxle away from engine and remove it from vehicle.



CAUTION:
Take care not to strike any adjacent parts or input shaft when dismounting transaxle.

INSTALLATION

Install transaxle in the reverse order of removal, paying attention to the following points.

1. Before installing, clean mating surfaces of engine rear plate and clutch housing.
2. Before installing, apply a light coat of lithium-based grease which includes molybdenum disulphide to spline parts of clutch disc and input shaft.
3. Remove filler plug and fill transaxle with recommended gear oil up to the level of the plug hole.

Oil capacity:
RN4F30A
2.3 liters (4-7/8 US pt, 4 Imp pt)
FS5F30A
2.7 liters (5-3/4 US pt, 4-3/4 Imp pt)

4. Apply sealant to threads of filler plug, and install filler plug to transmission case.

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

5. Tighten bolts securing transaxle to engine.

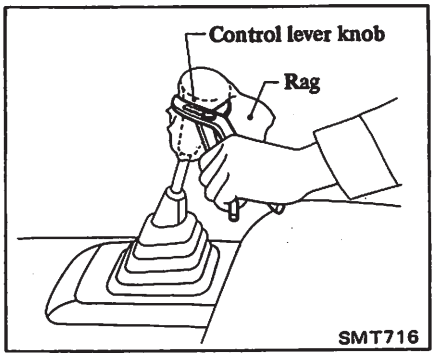
Ⓣ: **16 - 21 N·m**
(1.6 - 2.1 kg-m,
12 - 15 ft-lb)

For tightening torques of other related parts, refer to sections ER, FA, BR and CL.

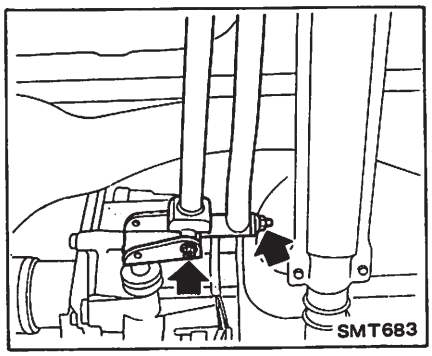
TRANSMISSION GEAR CONTROL

REMOVAL

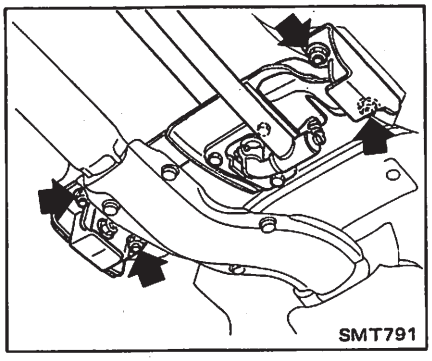
1. Remove control lever knob.



2. Separate control rod and support rod from transaxle.



3. Remove control bracket securing bolts, then remove transmission gear control assembly.



INSTALLATION

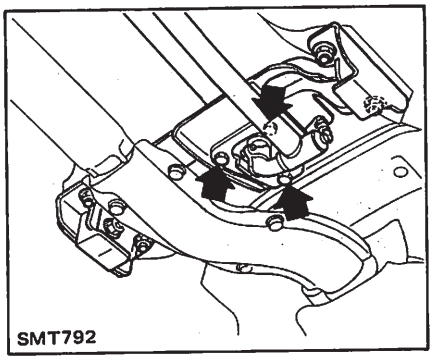
Install transmission gear control in the reverse order of removal.

Apply locking sealer to control lever knob.

Ⓣ : **Rubber holder to body**
8 - 12 N·m
(0.8 - 1.2 kg-m,
5.8 - 8.7 ft-lb)
Control rod to transaxle
6.3 - 8.3 N·m
(0.64 - 0.85 kg-m,
4.6 - 6.1 ft-lb)
Support rod to transaxle
8 - 12 N·m
(0.8 - 1.2 kg-m,
5.8 - 8.7 ft-lb)

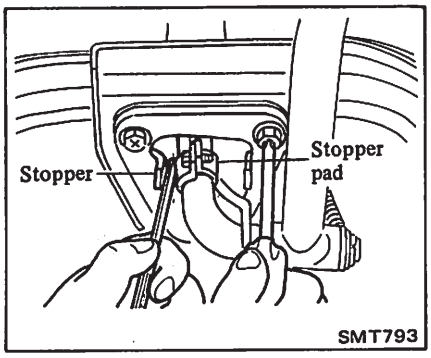
After installing transmission gear control, adjustment for select stopper should be perfomed.

1. Loosen select stopper securing bolts.



2. Shift to 1st gear.
3. Adjust the clearance between control lever and select stopper by sliding the select stopper so that the clearance is the specified value.

Clearance: 1.0 mm (0.039 in)



4. Tighten select stopper securing bolts.

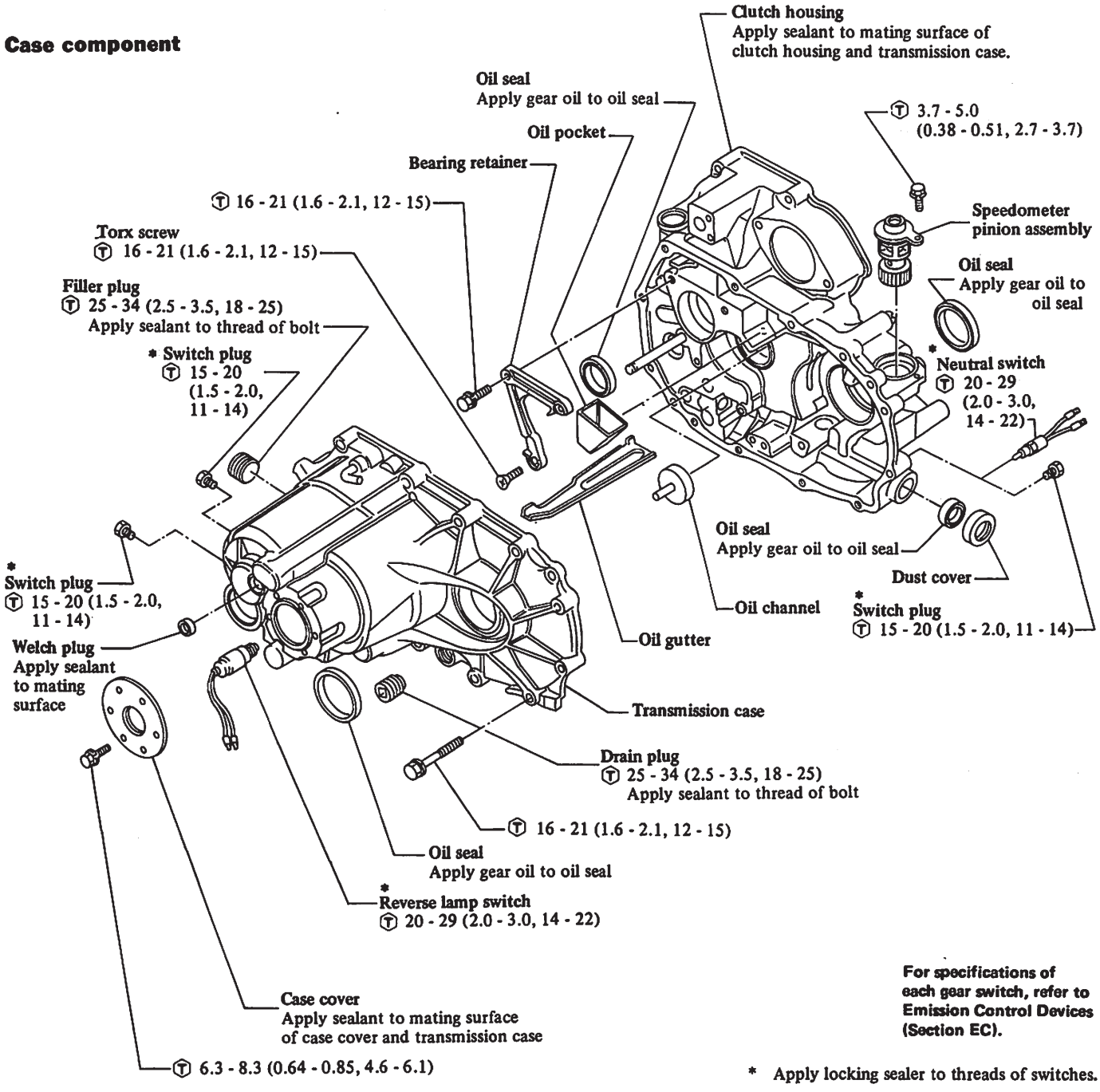
Ⓣ : **Select stopper bolt**
3.1 - 5.0 N·m
(0.32 - 0.51 kg-m,
2.3 - 3.7 ft-lb)

5. After adjustment, be sure to check that control lever can be shifted to all positions without binding or dragging.

MANUAL TRANSAXLES [Models: RS5F30A (5-speed) and RN4F30A (4-speed)]

Service procedures for 4-speed transaxle model RN4F30A are essentially the same as those for 5-speed transaxle model RS5F30A, except for 5th input gear, 5th main gear and synchronized mechanism. Consequently, 4-speed and 5-speed model transaxles are collectively treated in this manual, with major emphasis on the latter.

Case component



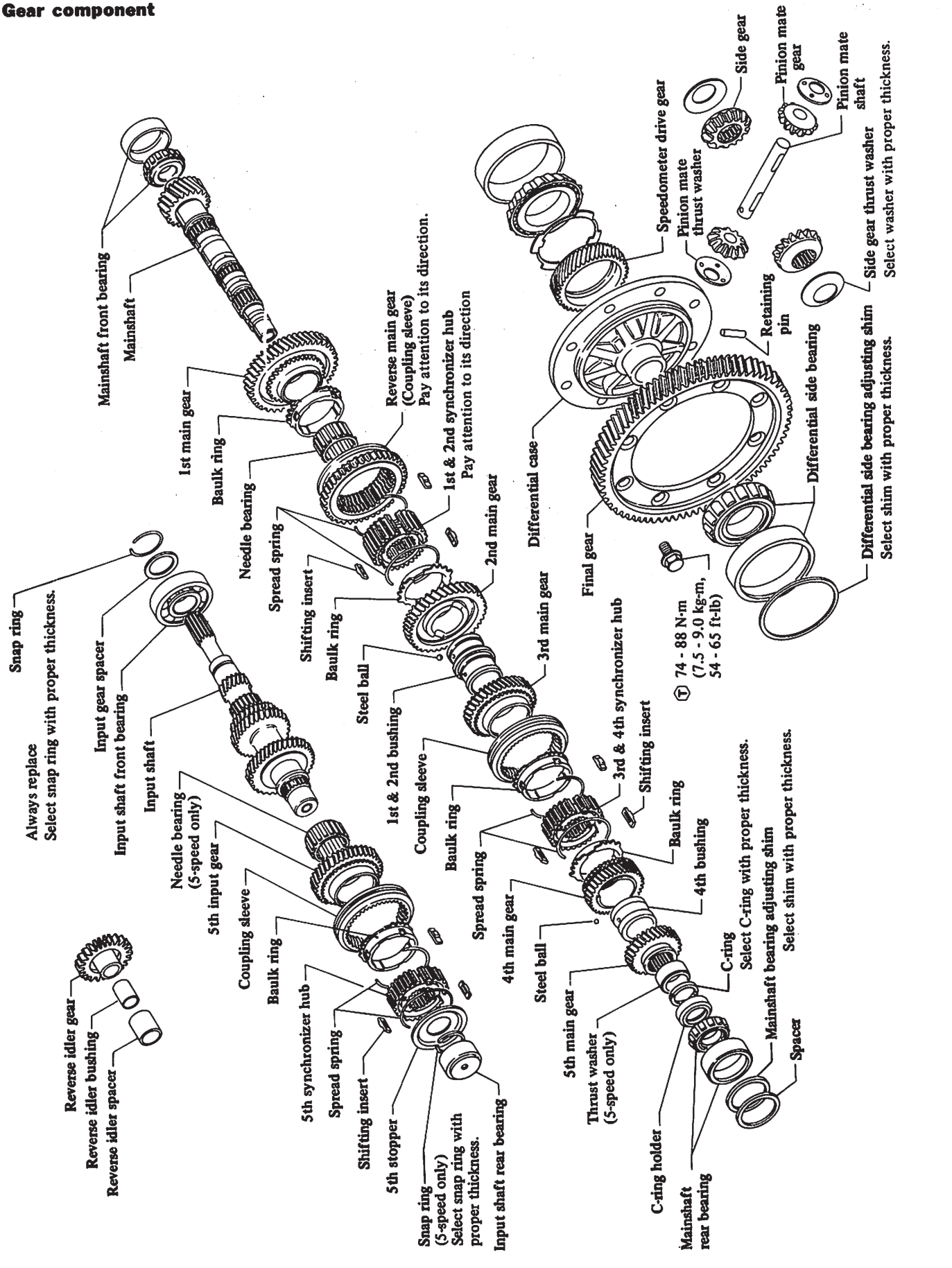
For specifications of each gear switch, refer to Emission Control Devices (Section EC).

* Apply locking sealer to threads of switches.

Ⓣ: N·m (kg-m, ft-lb)

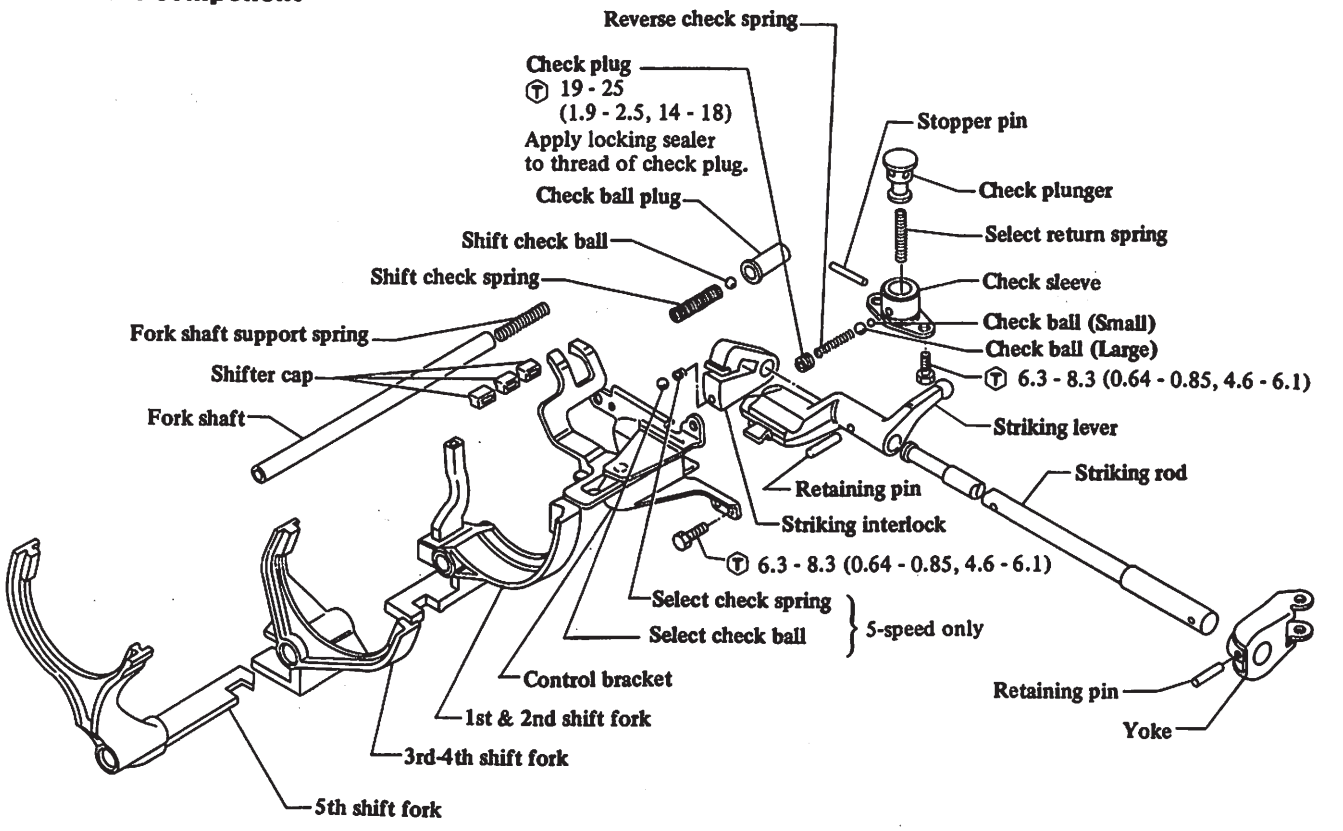
SMT734

Gear component



SMT834

Shift control component



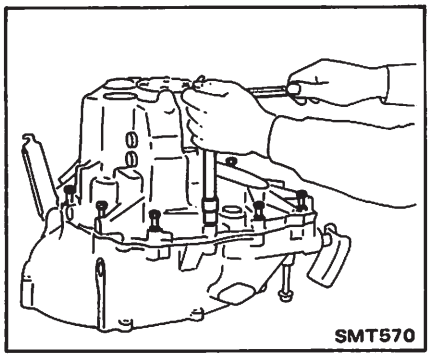
Ⓣ: N·m (kg-m, ft-lb)

SMT803

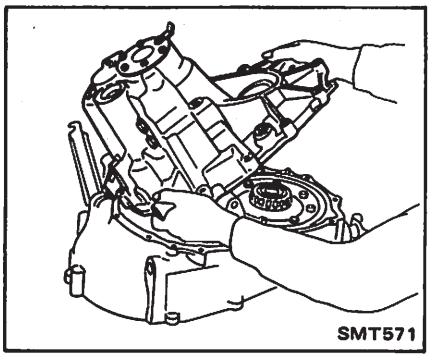
TRANSMISSION CASE

DISASSEMBLY

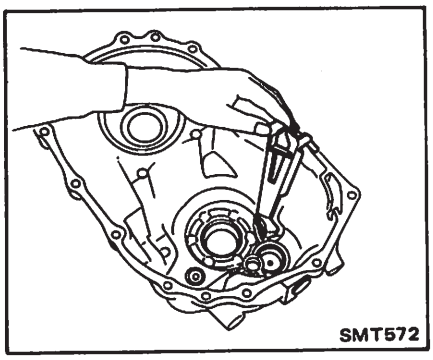
1. Wipe off dirt and grease.
2. Drain oil from transmission case.
3. Remove transmission case fixing bolts.



4. With a plastic hammer, tap the case, then carefully lift transmission case while slightly tilting it (5-speed only) to prevent 5th shift fork from interfering with the case.

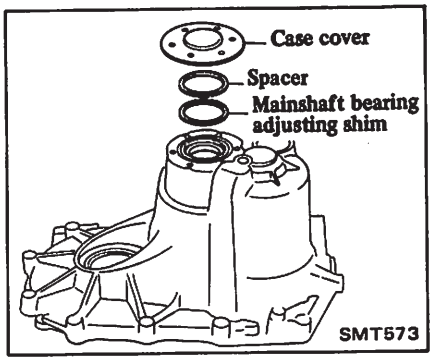


5. Remove reverse lamp (back-up) switch.
6. Remove oil gutter.



7. Remove input shaft rear bearing.
Refer to "Replacement of Bearings".

8. Remove case cover and mainshaft bearing adjusting shim and spacer.



9. Remove mainshaft rear bearing outer race and differential side bearing outer race.
Refer to "Replacement of Bearings".

INSPECTION

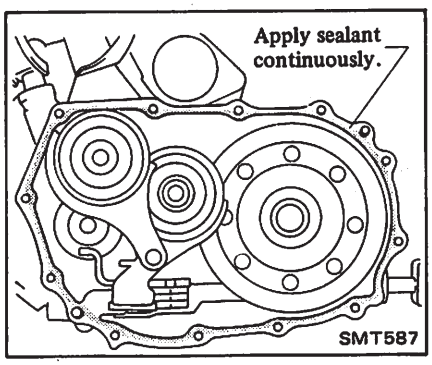
1. Clean with solvent and check for cracks or cavities by means of dyeing test.
2. Check mating surface of transmission case for small nicks, projections or sealant.

ASSEMBLY

1. Press fit differential side bearing outer race and mainshaft bearing outer race.
Refer to "Replacement of Bearings".
2. Install input shaft needle bearing and **apply sealant to welch plug,** then install it on transmission case.
Refer to "Replacement of Bearings".
3. Install oil gutter and apply locking sealer to reverse lamp (back-up) switch, then install them.
4. If transmission case is replaced, adjust differential side bearing and mainshaft rotary frictional force by selecting suitable shims.

Before installing a new transmission case, determine appropriate thickness of differential side bearing adjusting shim with both main and input shafts withdrawn from the case.
For removal of input shaft and mainshaft and for adjustment of bearing rotary frictional force, refer to instructions under "Disassembly of Clutch Housing" and "Adjustment of Gears and Shafts (except final drive)", respectively.
5. Clean mating surface of transmission case and clutch housing, and apply sealant to clutch housing.

Apply an even coat of sealant to mating surfaces of transmission case and clutch housing continuously. Uneven coating could lead to oil leakage.



6. Assemble transmission case on clutch housing.

12 bolts are used to secure transmission case and clutch housing. Only one of these bolts is longer than the others.

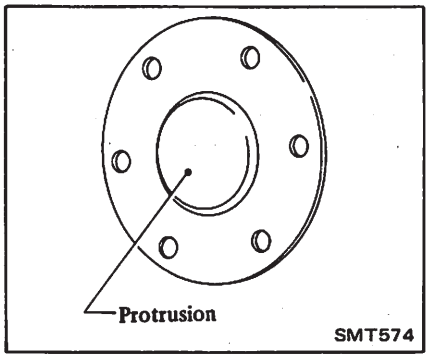
Ⓣ: 16 - 21 N·m (1.6 - 2.1 kg-m, 12 - 15 ft-lb)

7. After properly adjusting mainshaft bearing, remove transmission case cover.
Clean mating surface of transmission case and case cover, then apply sealant to transmission case.

Ensure that mating surfaces are evenly coated with sealant.

8. Install case cover.

Ensure that convex side of transmission case cover faces outward when installed.

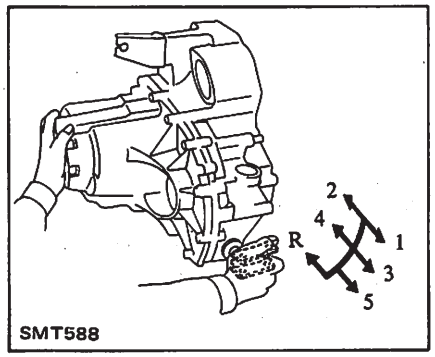


Ⓣ: 6.3 - 8.3 N·m (0.64 - 0.85 kg-m, 4.6 - 6.1 ft-lb)

9. Measure gear rotary frictional force and ensure that gear moves smoothly without binding.

Refer to "Gears and Shafts (Except final drive)" for adjustment.

10. Make sure that gears operate smoothly.



11. **Apply sealant to thread of drain plug,** then install it to transmission case.

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

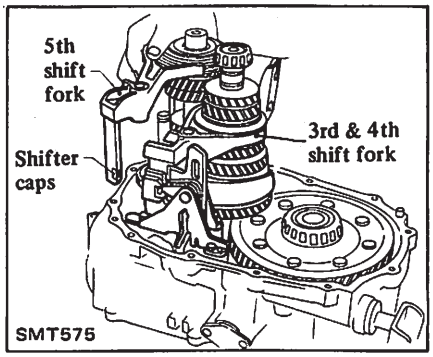
CLUTCH HOUSING

DISASSEMBLY

1. Wipe off dirt and grease.
2. Drain oil.
3. Remove transmission case.

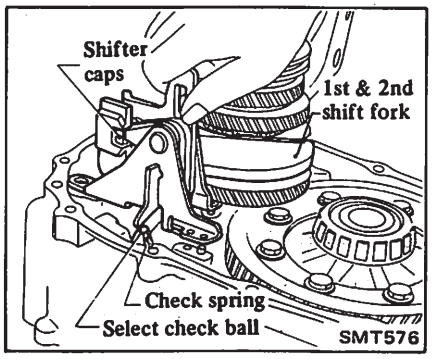
Refer to "Transmission Case" for disassembly.

4. Draw out reverse idler spacer and fork shaft, then remove 5th, 3rd & 4th shift fork. **Be careful not to lose shifter caps.**



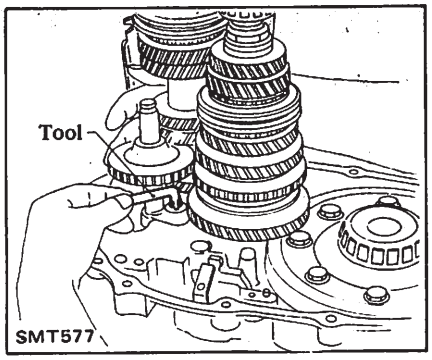
5. Remove control bracket with 1st & 2nd shift fork.

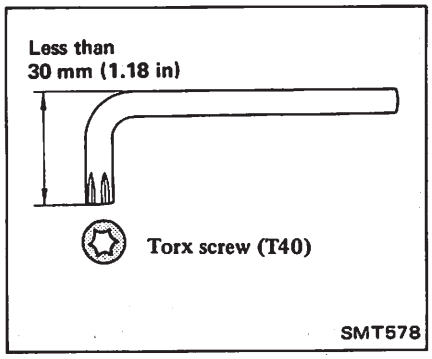
Be careful not to lose select check ball (5-speed only), check spring (5-speed only) and shifter caps.



6. Remove three screws and detach bearing retainer.

One of these three screws is a torx type and should be removed with a special-purpose tool, as shown in figures below; otherwise screw will be difficult to remove because of small clearance between screw and reverse idler gear.

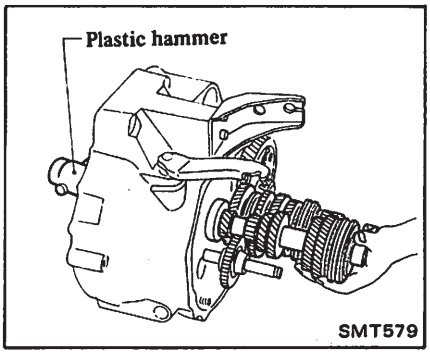




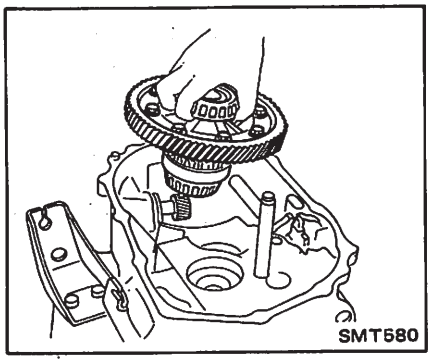
Do not draw out reverse idler shaft from clutch housing because these fittings will be loose.

7. Turn clutch housing so its side faces down. Lightly tap input shaft end (on engine side) with a plastic hammer, then remove input shaft together with mainshaft.

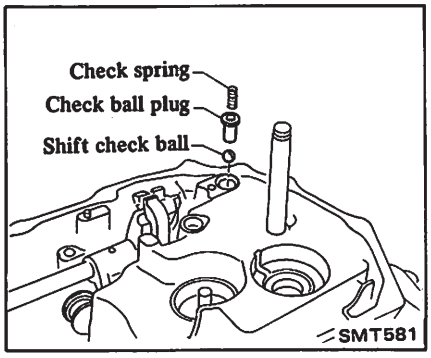
a. **Always withdraw mainshaft straight out. Failure to do so can damage resin oil channel on clutch housing side.**
b. **When removing input shaft, be careful not to scratch oil seal lip with shaft spline.**
c. **While tapping input shaft end, use care not to allow final gear assembly to fall out.**



8. Remove reverse idler gear and final drive assembly.

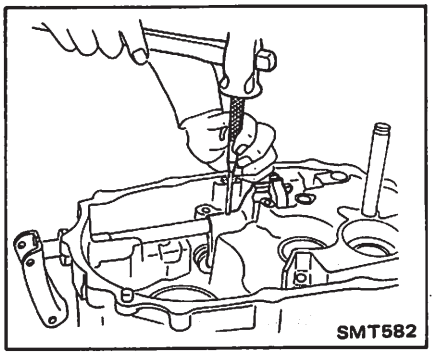


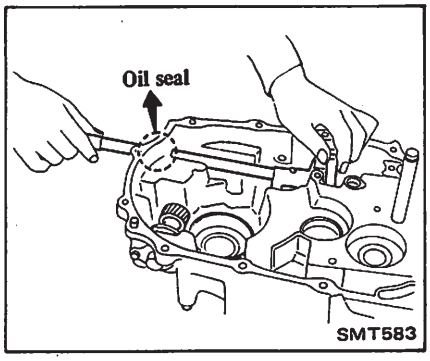
9. Remove oil pocket, shift check ball, check springs and check ball plug.



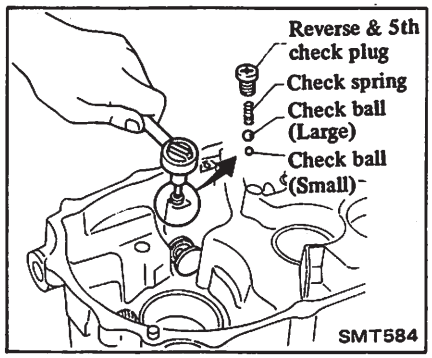
10. Drive retaining pin out of striking lever, then remove striking rod, striking lever and striking interlock.

a. Select a position where retaining pin does not interfere with clutch housing when removing the former.
b. When removing striking rod, use care not to damage oil seal's lip. If necessary, tape edges of striking rod when removing the rod.

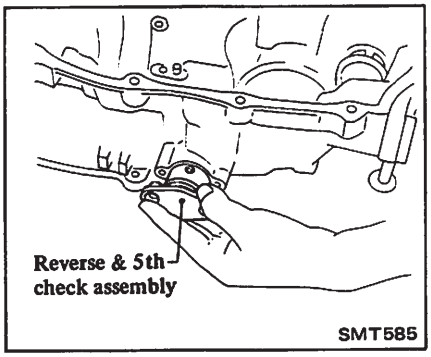




11. Remove reverse & 5th check plug, then detach check spring and check balls.



12. Remove reverse & 5th check assembly.



13. Remove clutch control shaft, clutch release bearing and clutch lever.

Refer to "Release Bearing (Section CL)" for removal.

14. Remove mainshaft bearing outer race and differential side bearing outer race.

Refer to "Replacement of Bearings".

15. Remove oil channel.

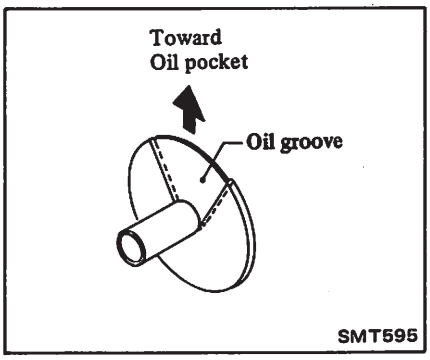
INSPECTION

1. Clean with solvent and check for cracks or cavities by means of dyeing test.
2. Check mating surface of clutch housing for small nicks, projections or sealant.

ASSEMBLY

1. Install a new oil channel.

Ensure that oil groove in oil channel always faces toward oil pocket when installing it on clutch housing.



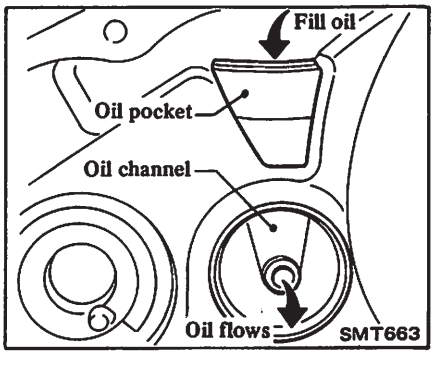
2. Install mainshaft bearing outer race and differential side bearing outer race.

Refer to "Replacement of Bearings".

3. Install clutch control shaft, clutch release bearing and clutch lever.

Refer to "Release Bearing (Section CL)" for installation.

4. Install oil pocket, then **make sure oil flows from oil pocket to oil channel.**

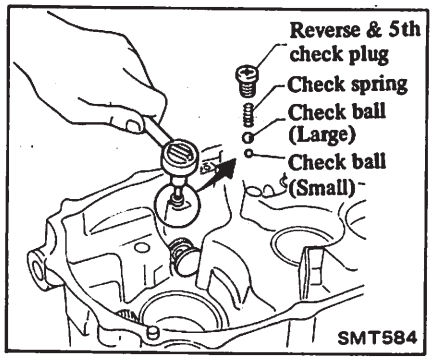


5. Install following parts in reverse order of disassembly.
- Reverse & 5th check assembly
- Reverse & 5th check plug (check spring, check balls)

a. Install smaller check ball first, then larger one.

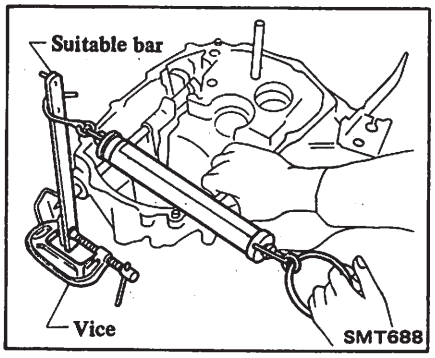
b. When replacing clutch housing, reverse & 5th check assembly, check spring and check plug, it is necessary to adjust reverse check force.

1) First, install used check plug or standard check plug and tighten it to the specified torque.



Ⓣ: **Reverse & 5th check plug**
19 - 25 N·m
(1.9 - 2.5 kg-m,
14 - 18 ft-lb)

2) Check reverse check force.

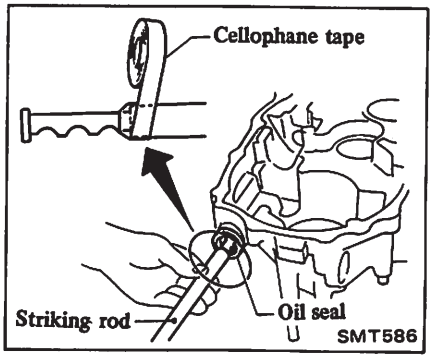


Reverse check force:
4-speed
15.7 - 22.6 N·m
(160 - 230 kg-cm,
139 - 200 in-lb)
5-speed
22.1 - 27.0 N·m
(225 - 275 kg-cm,
195 - 239 in-lb)

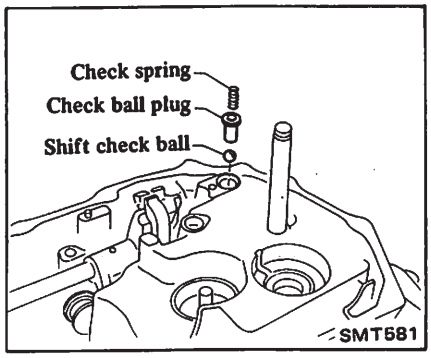
3) If reverse check force is not within the above range, select another check plug having a different length and reinstall it.
Reverse check plug:
Refer to S.D.S.

c. Apply locking sealer to thread of check plug.
- Striking lever
- Striking interlock
- Boot (for shift control oil seal)
- Striking rod

CAUTION:
When inserting striking rod into clutch housing, tape edges of striking rod to avoid damaging oil seal's lip if it hits against oil seal.



- Shift check related parts (check ball plug, shift check ball, check spring)



- Oil pocket
- Differential case assembly
  If clutch housing is replaced with a new one, adjust differential side bearing rotary frictional force by selecting shim. Refer to Transmission Case for assembly and adjustment.
- Reverse idler gear
- Mainshaft

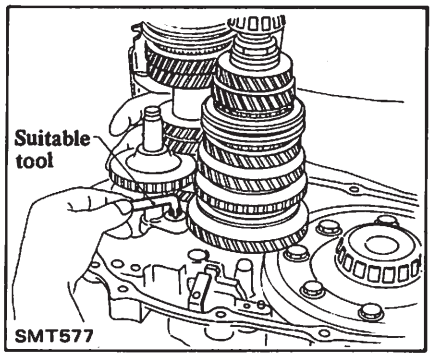
A resin oil channel is used at end of mainshaft on clutch housing side. Use care not to damage oil channel when inserting mainshaft into clutch housing.

- Input shaft

Use care not to damage oil seal's lip by splines of input shaft while shaft is being inserted into clutch housing.

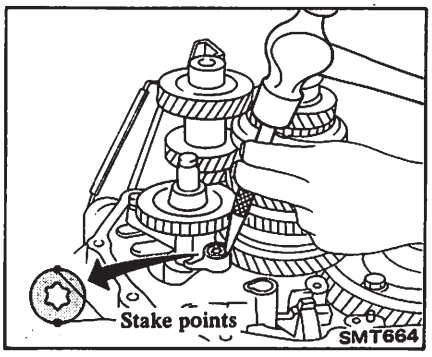
- Bearing retainer
  One of three screws is a torx design and should be installed with a special-purpose tool referred to in "Disassembly". A conventional tool will not do, as clearance between reverse idler gear and screw location is not wide enough for screw to be inserted.

a. Apply locking sealer to thread of torx screw.

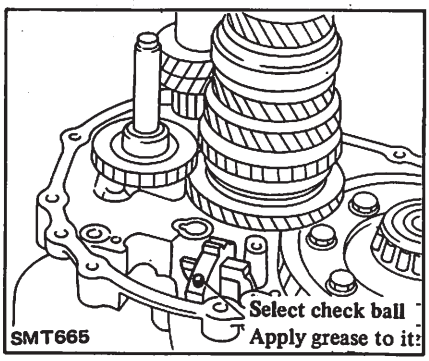


Ⓣ: **Torx screw**
16 - 21 N·m
(1.6 - 2.1 kg-m,
12 - 15 ft-lb)
Bearing retainer bolt
16 - 21 N·m
(1.6 - 2.1 kg-m,
12 - 15 ft-lb)

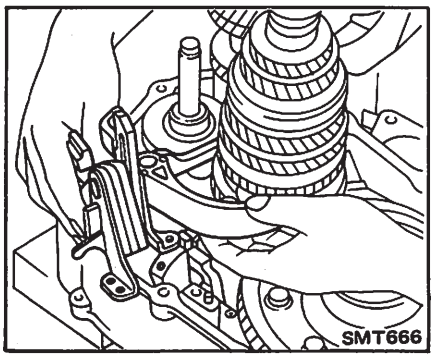
b. After installing torx screw, stake it at two points.



6. Apply grease to select check ball, then install it and check spring into striking interlock hole (5-speed only).



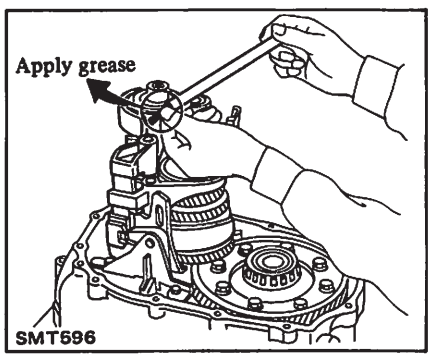
7. Apply grease to shifter caps, then install it to control bracket. Install control bracket with 1st & 2nd shift fork.



Ⓣ: **Control bracket bolt**
6.3 - 8.3 N·m
(0.64 - 0.85 kg-m, 4.6 - 6.1 ft-lb)

8. Install 3rd & 4th and 5th shift fork.
9. Insert fork shaft.

Apply grease to support spring before installing, in order to prevent spring from falling into hole for fork shaft on clutch housing.



10. Install reverse idler spacer.
11. Install transmission case.
Refer to "Transmission Case" for assembly.
12. Measure gear rotary frictional force and ensure that gear moves smoothly without binding. Refer to "Transmission Case" for assembly.
13. **Apply sealant to thread of drain plug,** then install it to transmission case.

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

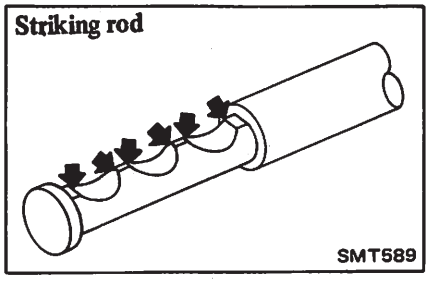
SHIFT CONTROL MECHANISM (Inside transaxle)

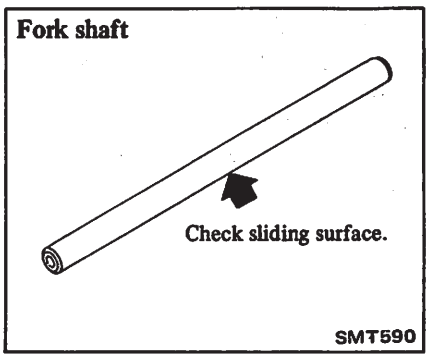
DISASSEMBLY

Disassemble shift control mechanism, following steps 1 through 12 described under "Disassembly of Clutch Housing".

INSPECTION

Clean with solvent and check for wear, scratches, projections, damage or other faulty conditions. Replace any part which is worn or damaged.





ASSEMBLY

Assemble shift control mechanism, following steps 5 through 13 described under "Assembly of Clutch Housing".

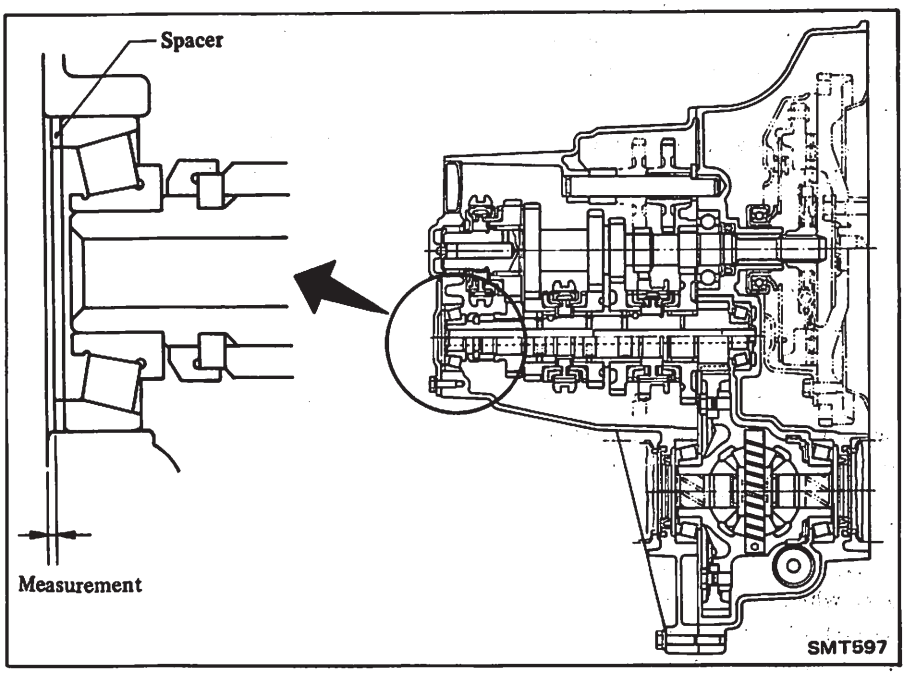
GEARS AND SHAFTS (Except final drive)

ADJUSTMENT

If any of following parts is replaced, mainshaft bearing rotary frictional force should be adjusted.

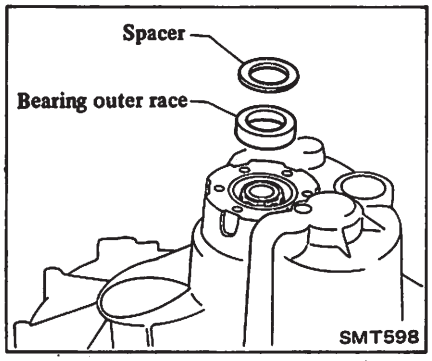
- Mainshaft
- Mainshaft bearings (front and rear)
- Clutch housing
- Transmission case

To properly adjust mainshaft bearing rotary frictional force, measure distance from rear of transmission case to spacer, then select proper thickness of shim equivalent to measured distance plus 0.2 mm (0.008 in).

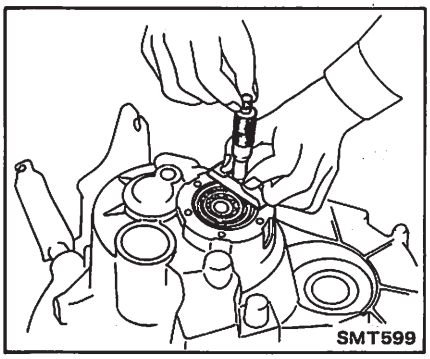


To properly adjust mainshaft bearing rotary frictional force, proceed as follows:

1. Apply gear oil to mainshaft rear bearing outer race, then install bearing outer race and spacer.



2. Measure distance from transmission case to spacer.



3. Select proper thickness of shim so that total thickness of shim is closest to measured distance plus 0.2 mm (0.008 in). Then **position this shim in place between bearing outer race and spacer.**

Main shaft adjusting shim:
Refer to S.D.S.

4. Install case cover.

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

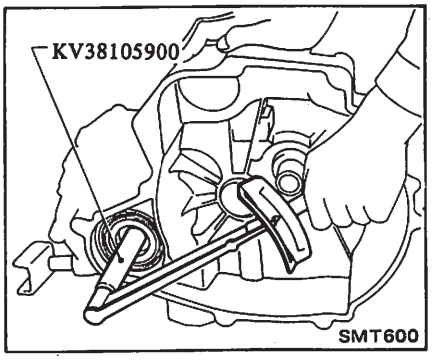
5. Ensure that differential side bearing rotary frictional force is within specified range. Then, check all gear rotary frictional force to see if it is within specified range without binding.

This check should be performed only when using a new bearing. When reusing a bearing, check to see if final drive assembly revolves smoothly.

To do this proceed as follows:

(1) Shift to 4th gear, then turn input shaft at least ten times until bearing is properly seated and gears are properly broken in.

(2) Insert special tool KV38105900 into final drive assembly at drive shaft location. With tool held in position, measure gear's rotary frictional force to ensure that it is within specified range.



Rotary frictional force:
7.4 - 10.8 N·m
(75 - 110 kg-cm, 65 - 95 in-lb)

Changes in rotary frictional force of final drive per revolution should be within 1.0 N·m (10 kg-cm, 8.7 in-lb) without binding.

(3) If any abnormality is noted while checking rotary frictional force, disassemble final drive assembly and readjust it.

(4) After properly adjusting mainshaft bearing rotary frictional force, remove case cover and apply sealant to it, then install it to transmission case.

Ⓣ : **Case cover bolt**
6.3 - 8.3 N·m
(0.64 - 0.85 kg-m, 4.6 - 6.1 ft-lb)

DISASSEMBLY

Input gears and input shaft

1. Remove transmission case, fork rod, shift forks, control bracket and bearing retainer.

Refer to "Clutch Housing" for disassembly.

2. Remove input shaft assembly.

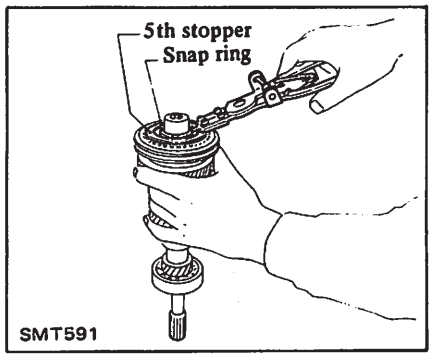
Refer to "Clutch Housing" for disassembly.

3. Remove input shaft front bearing.

Refer to "Replacement of Bearings".

4. Measure 5th input gear end play. Refer to "Gears and Shafts" for inspection.

5. Remove snap ring and 5th stopper.



6. Draw out 5th synchronizer and 5th gear.

Main gears and mainshaft

1. Remove transmission case, fork rod, shift forks, control bracket and bearing retainer.

Refer to "Clutch Housing" for disassembly.

2. Remove main gears and shaft assembly.

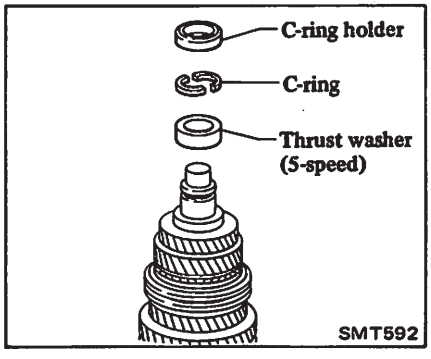
Refer to "Clutch Housing " for disassembly.

3. Measure gear end play. Refer to "Gears and Shafts" for inspection.

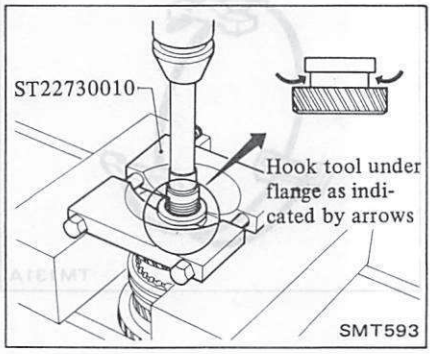
4. Remove mainshaft front and rear bearing inner race.

Refer to "Replacement of Bearing".

5. Remove C-rings, C-ring holder and thrust washer (5-speed only).

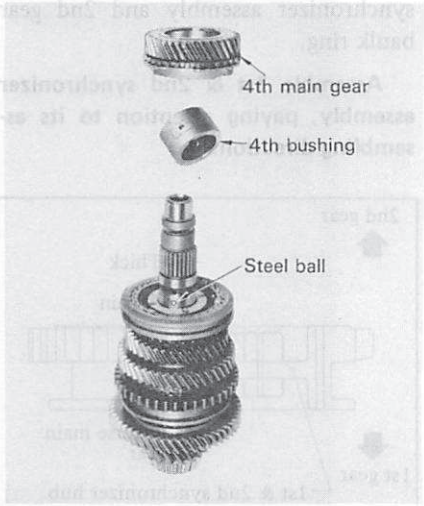


6. Remove 5th main gear.



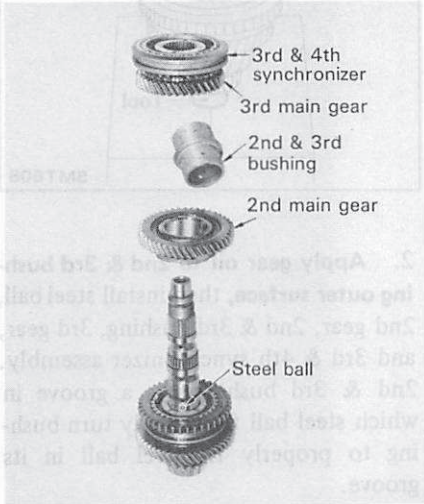
7. Remove 4th main gear, 4th bushing and steel ball.

Be careful not to lose steel ball.

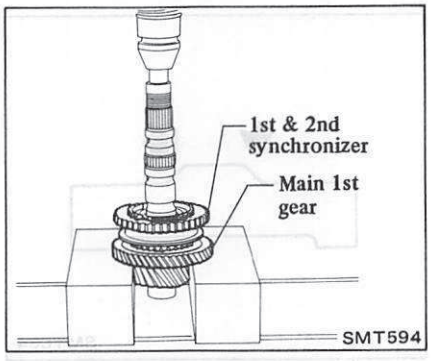


8. Draw out 3rd & 4th synchronizer, main 3rd gear, 2nd & 3rd bushing, steel ball and main 2nd gear.

Be careful not to lose steel ball.



9. Remove 1st & 2nd synchronizer and main 1st gear **as an assembly,** then remove 1st needle bearing.

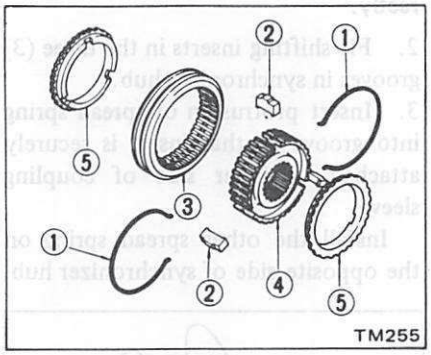


Reverse idler gear

Follow steps 1 throuth 8 described under "Disassembly of Clutch Housing" to disassemble reverse idler gear.

Synchronizer (1st & 2nd, 3rd & 4th and 5th)

1. Remove spread springs ①, and take out shifting inserts ②.
2. Separate coupling sleeve ③ from synchro-hub ④.



1 Spread spring
2 Shifting insert
3 Coupling sleeve
4 Synchro hub
5 Baulk ring

INSPECTION

Bearings

Thoroughly clean bearings and dry with compressed air.

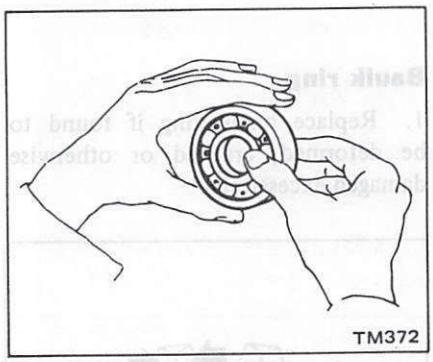
Tapered roller bearings

Check bearings for wear, scratches, pitching or flaking.

Ball bearing

When race and ball surfaces are worn or rough, or when balls are out-of-round or rough, replace bearing with a new one.

CAUTION:
Do not allow the bearings to spin when using compressed air because it will damage the race and balls. Turn them slowly by hand.



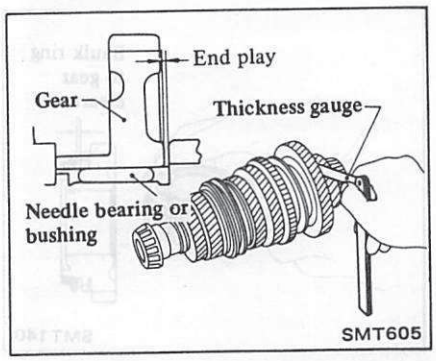
Needle bearing

Replace needle bearing if worn or damaged.

Gears and shafts

1. Check all gears for excessive wear, chips or cracks; replace as required.
2. Check shaft for bending, crack, wear or worn spline; if necessary, replace.
3. **Measure gear end play:**

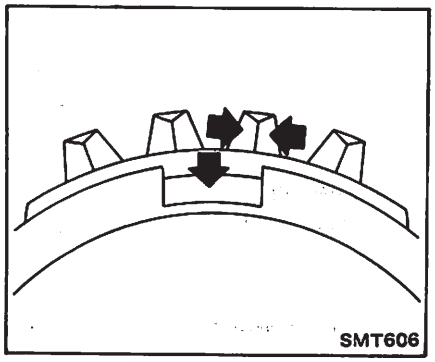
- It is necessary to measure end play before disassembling shafts and after reassembling shafts.
- Measure end play to insure that it is within the specified limit.
- If end play is not within the specified limit, disassemble and check the parts.
- Replace any part which is worn or damaged.



Standard end play:
Main 1st gear
0.18 - 0.31 mm
(0.0071 - 0.0122 in)
Main 2nd, 3rd, 4th gear
0.20 - 0.40 mm
(0.0079 - 0.0157 in)
Input 5th gear
0.18 - 0.41 mm
(0.0071 - 0.0161 in)

Baulk ring

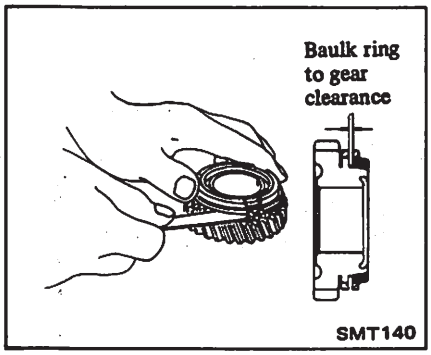
1. Replace baulk ring if found to be deformed, cracked or otherwise damaged excessively.


SMT606

2. Place baulk ring in position on gauge cone. While holding baulk ring against gear as far as it will go, measure gap between baulk ring and outer gear.

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

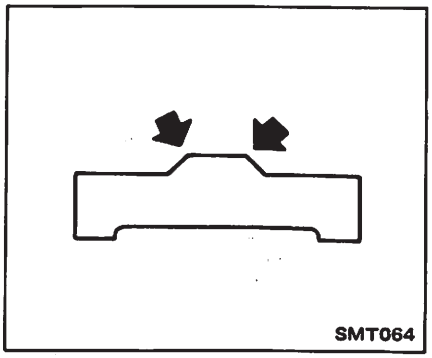
Baulk ring to gear clearance:
Standard
1.0 - 1.35 mm
(0.039 - 0.0531 in)
Wear limit
Less than 0.7 mm
(0.028 in)



SMT140

Shifting insert

Replace, if worn excessively or unevenly, deformed, or damaged.


SMT064

ASSEMBLY

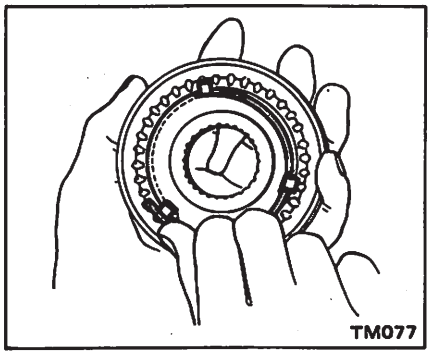
Synchronizer

1. Place synchronizer hub into coupling sleeve.

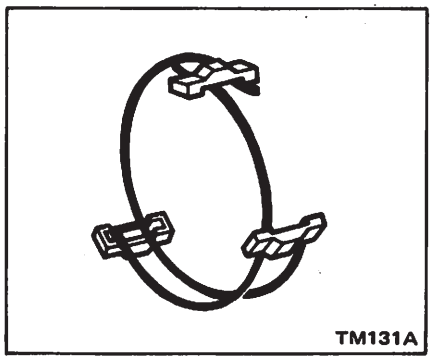
Turn hub and sleeve by hand to be sure they operate smoothly and correctly.

2. Fit shifting inserts in the three (3) grooves in synchronizer hub.
3. Insert protrusion of spread spring into groove so that insert is securely attached to inner side of coupling sleeve.

Install the other spread spring on the opposite side of synchronizer hub.


TM077

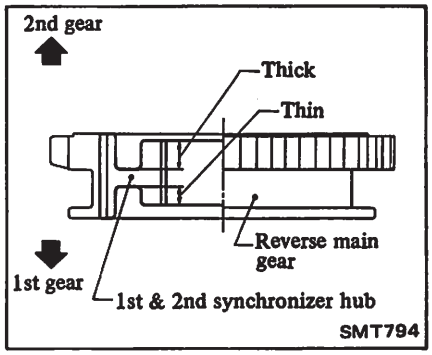
Be careful not to hook front and rear ends of spread spring to the same insert.


TM131A

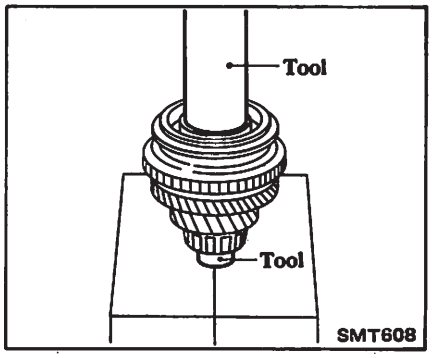
Main gears and mainshaft

1. **Apply gear oil to 1st needle bearing,** then assemble needle bearing, 1st gear, 1st gear baulk ring, 1st & 2nd synchronizer assembly and 2nd gear baulk ring.

Assemble 1st & 2nd synchronizer assembly, paying attention to its assembling direction.



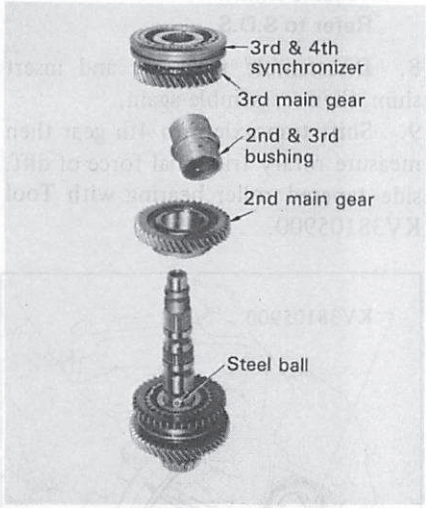
SMT794

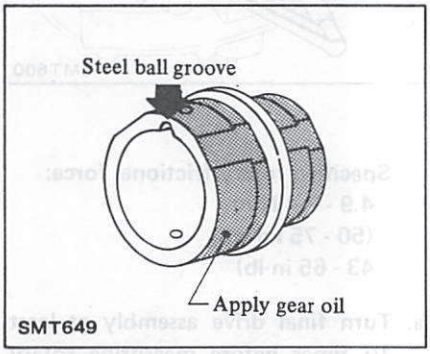


SMT608

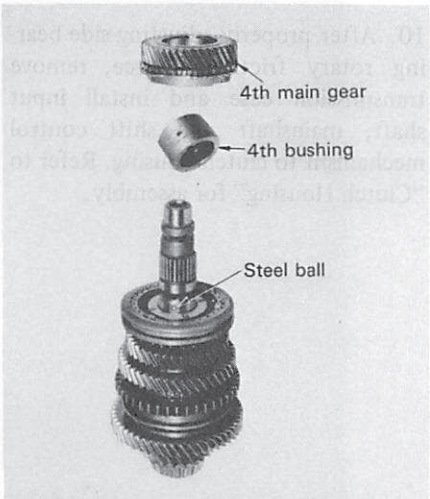
2. **Apply gear oil to 2nd & 3rd bushing outer surface,** then install steel ball, 2nd gear, 2nd & 3rd bushing, 3rd gear, and 3rd & 4th synchronizer assembly. 2nd & 3rd bushing has a groove in which steel ball fits. Slowly turn bushing to properly fit steel ball in its groove.

Before installing steel ball, apply grease to it.

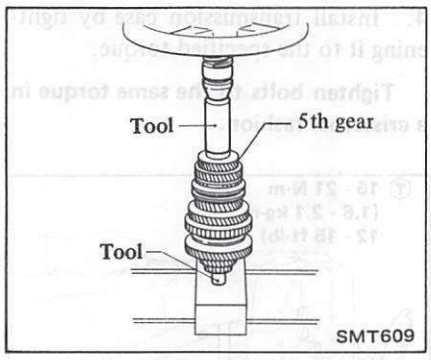




3. Apply grease to steel ball, then install it to mainshaft. **Apply gear oil to 4th bushing outer surface.** 4th bushing also has a groove in which steel ball fits. Ensure that steel ball fits properly in its groove when installing 4th bushing.

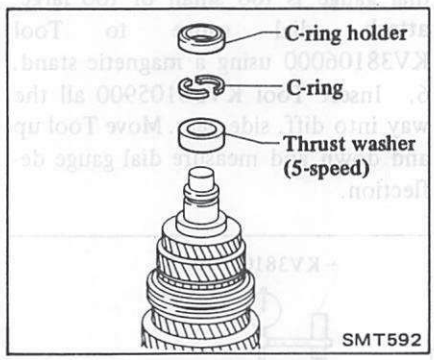


4. Install 5th gear.



5. Install thrust washer (5-speed only). Select C-ring that will minimize clearance of groove in mainshaft, then install C-ring and C-ring holder.

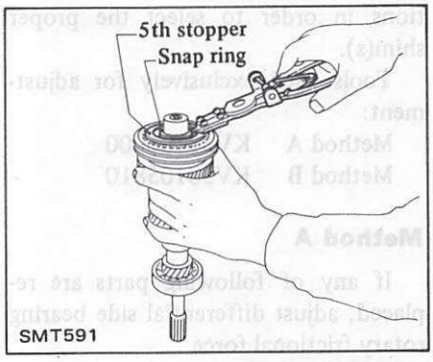
Allowable clearance of groove:
0 - 0.1 mm
(0 - 0.004 in)
C-ring:
Refer to S.D.S.



6. Install mainshaft front and rear bearing inner race. Refer to "Replacement of Bearings".
7. **Measure gear end play.** Refer to "Gears and Shafts" for inspection.
8. Install mainshaft assembly, input shaft assembly, bearing retainer, control bracket, shift forks, fork rod and transmission case. Refer to "Clutch Housing" for assembly.

Input gears and input shaft

1. Install 5th gear and 5th synchronizer.
2. Install 5th stopper on 5th synchronizer and secure it with snap ring of proper thickness that will minimize clearance of groove in input shaft.



Allowable clearance of groove:
0 - 0.1 mm
(0 - 0.004 in)
Input shaft gear snap ring:
Refer to S.D.S.

3. Measure 5th input gear end play. Refer to "Gears and Shafts" for inspection.
4. Install input shaft front bearing. Refer to "Replacement of Bearings".
5. Install input shaft assembly, mainshaft assembly, bearing retainer, control bracket, shift forks, fork rod and transmission case. Refer to "Clutch Housing" for assembly.

Reverse idler gear

Follow steps 5 through 13 described under "Assembly of Clutch Housing" to assemble reverse idler gear.

FINAL DRIVE

ADJUSTMENT

The two adjusting procedures are as follows.

Compared with the method B, the method A takes longer, but it is not necessary to make calculations in order to select the proper shim(s).

Tools used exclusively for adjustment:

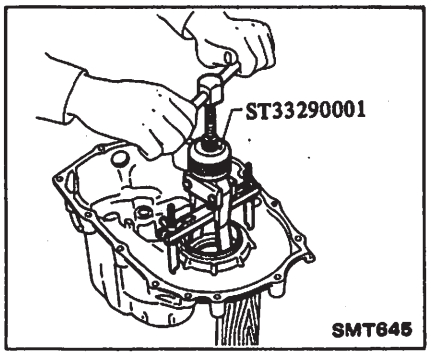
Method A KV38106000
Method B KV38105810

Method A

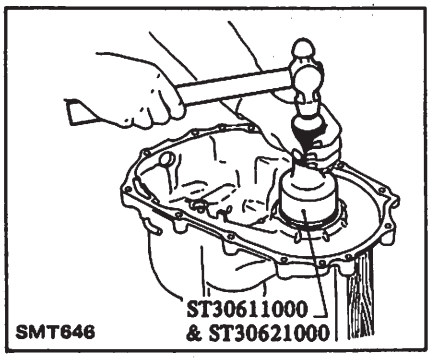
If any of following parts are replaced, adjust differential side bearing rotary frictional force.

- Differential case
- Differential side bearing
- Clutch housing
- Transmission case

1. Remove bearing outer race on shim side only and take out shim.

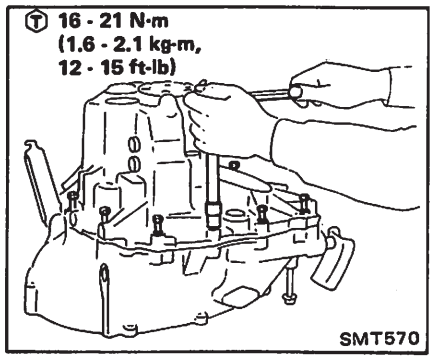


2. Press fit bearing outer race into place **without shim.**

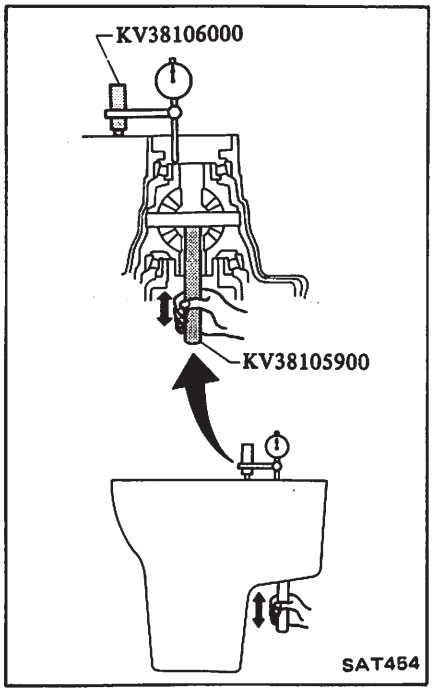


3. Install final drive assembly on clutch housing.
4. Install transmission case by tightening it to the specified torque.

Tighten bolts to the same torque in a crisscross fashion.



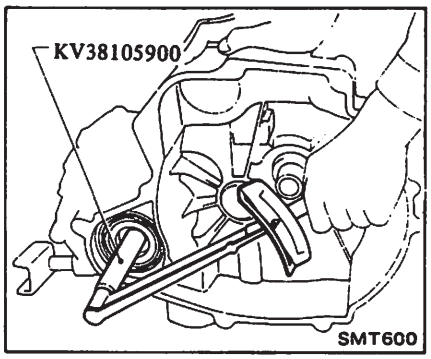
5. Attach dial gauge, using Tool KV38106000. If clamp diameter of dial gauge is too small or too large, attach dial gauge to Tool KV38106000 using a magnetic stand.
6. Insert Tool KV38105900 all the way into diff. side gear. Move Tool up and down and measure dial gauge deflection.



7. Select shim with appropriate thickness, using S.D.S. as a guide.

Available shims:
Refer to S.D.S.

8. Disassemble transaxle and insert shim, then reassemble again.
9. Shift transaxle into 4th gear then measure rotary frictional force of diff. side tapered roller bearing with Tool KV38105900.



Specified rotary frictional force:
4.9 - 7.4 N·m
(50 - 75 kg-cm,
43 - 65 in-lb)

a. Turn final drive assembly at least 10 times before measuring rotary frictional force.
b. Changes in rotary frictional force of final drive assembly per revolution should be within 1.0 N·m (10 kg-cm, 8.7 in-lb) without binding.
c. If any abnormalities are noted in b. above, or rotary frictional force is outside the specified range, disassemble and reassemble again.

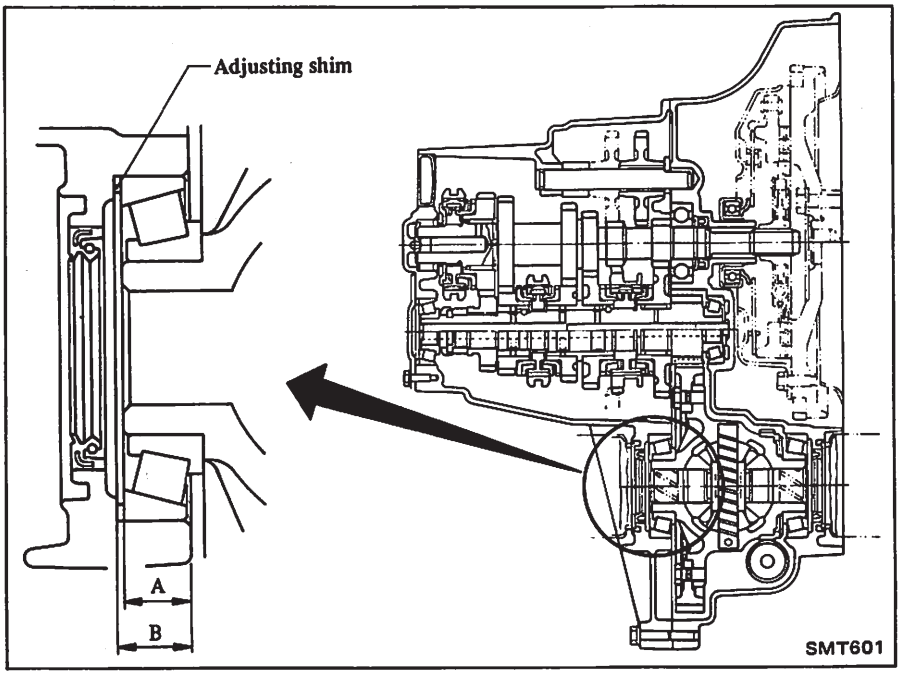
10. After properly adjusting side bearing rotary frictional force, remove transmission case and install input shaft, mainshaft and shift control mechanism to clutch housing. Refer to "Clutch Housing" for assembly.

Method B

If any of following parts are replaced, adjust differential side bearing rotary frictional force.

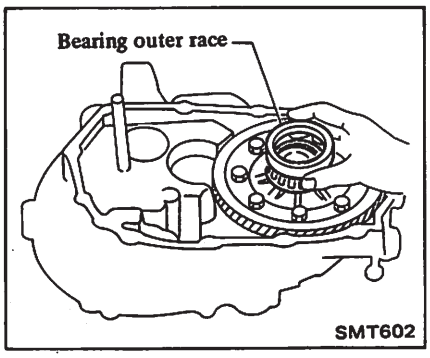
- Differential case
- Differential side bearing
- Clutch housing
- Transmission case

To properly adjust side bearing rotary frictional force, measure distances A and B from mating surfaces of clutch housing and transmission case, determine difference between the two distances, and add shim with a thickness equal to the difference plus 0.3 mm (0.012 in).

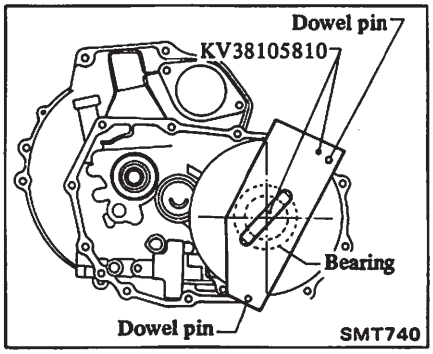


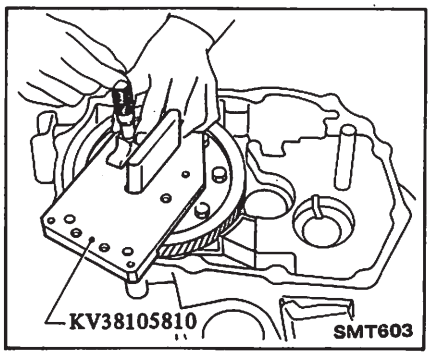
Adjustment procedures are described below.

1. Clean mating surfaces of clutch housing and transmission case with solvent.
2. Install final drive assembly and side bearing outer race on clutch housing. Turn final drive assembly while holding bearing outer race so that bearing outer race is properly broken in.



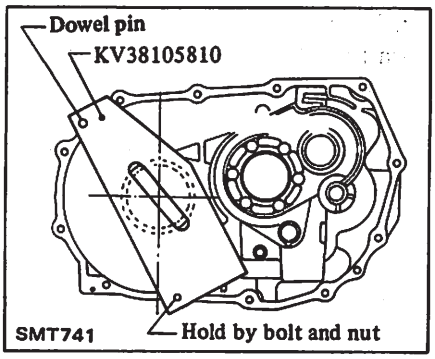
3. Properly attach Tool KV38105810 to clutch housing and bearing outer race, and measure the distance from upper surface of side bearing outer race to surface of the tool using a depth micrometer.

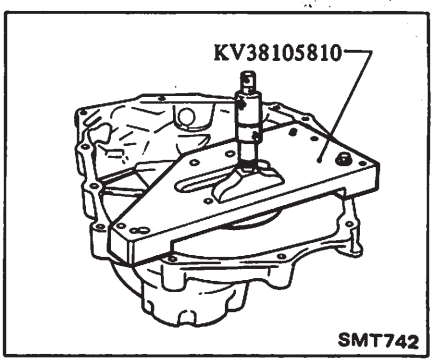




Dimension A =
Thickness of Tool [approx. 24 mm (0.9449 in)] – Measured distance

4. Properly attach Tool KV38105810 to transmission case and, using a depth micrometer, measure the distance from upper surface of Tool to portion with which side bearing adjusting shim is to be mated.





Dimension B =
Measured distance – Thickness of Tool

5. Determine thickness of shim to be used by the following equation.

Shim thickness =
(B – A) + 0.3 mm (0.012 in)

Select a shim whose thickness is nearest to the value determined by above equation.

Side bearing adjusting shim:
Refer to S.D.S.

6. Check preload to determine if final drive assembly turns smoothly without binding.

To do this, proceed as follows:

(1) Install final drive assembly and side bearing outer race on clutch housing.

(2) Assemble transmission case on clutch housing.

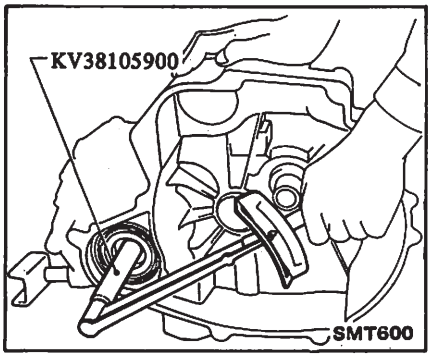
A total of twelve bolts are used to secure transmission case and clutch housing. Note that only one is longer than the remaining eleven bolts.

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

(3) Insert Tool KV38105900 into final drive at drive shaft location, and turn final drive at least 10 revolutions so that final drive is properly broken in.

Measure the turning torque of final drive assembly to determine if it is within specified range.

This check should be performed only when using a new bearing. When reusing a bearing, the turning torque will decrease depending on distance driven.



Rotary frictional force:
4.9 - 7.4 N·m (50 - 75 kg-cm, 43 - 65 in-lb)

Changes in turning torque of final drive assembly per revolution should be within 1.0 N·m (10 kg-cm, 8.7 in-lb) without binding.

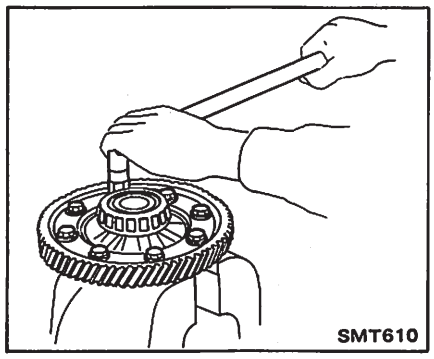
(4) If any abnormality is noted while checking rotary frictional force, disassemble final drive assembly and re-adjust it.

(5) After properly adjusting side bearing rotary frictional force, remove transmission case and install input shaft, mainshaft and shift control mechanism to clutch housing. Refer to "Clutch Housing" for assembly.

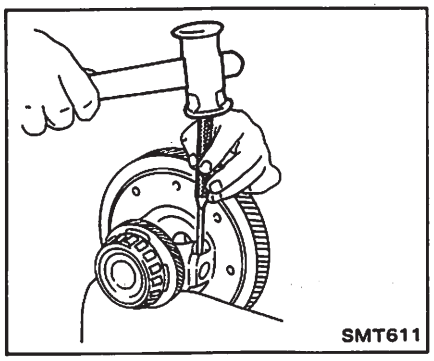
DISASSEMBLY

To remove final drive assembly from transaxle, follow steps 1 through 8 under "Disassembly of Clutch Housing".

1. Remove final gear.



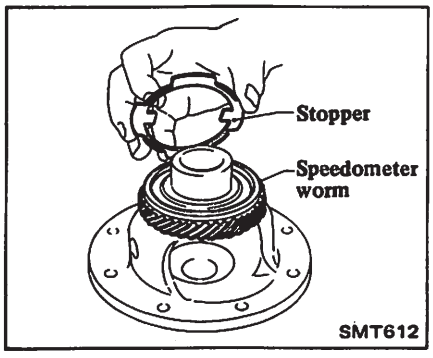
2. Drive out pinion mate shaft lock pin and draw out pinion mate shaft.



3. Remove pinion mate gears and side gears.
4. Drive out differential side bearing inner races. Refer to "Replacement of Bearings".

Be careful not to confuse the right- and left-hand bearings.

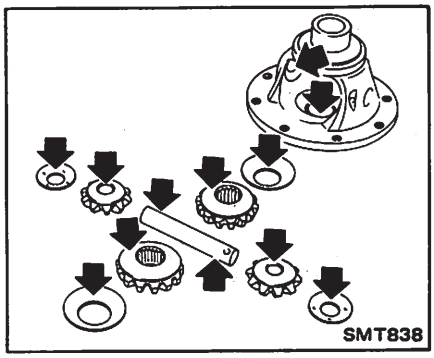
5. Remove speedometer worm and stopper.



INSPECTION

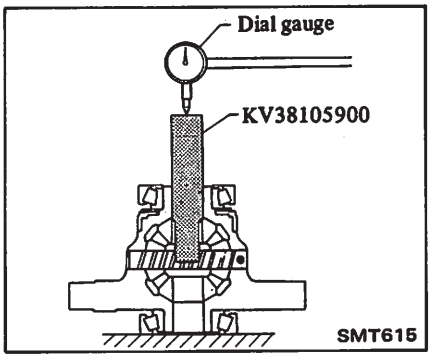
1. Thoroughly clean all disassembled parts, and check mating surfaces of differential case, side gears and pinion mate gears.

Replace as required.

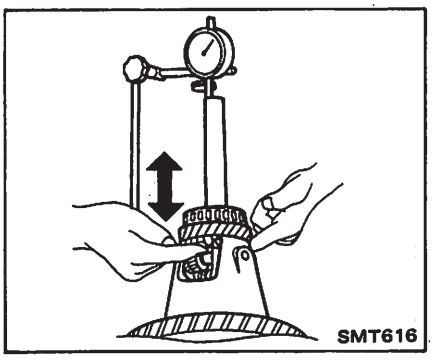


2. Check clearance between side gear and pinion mate gear following the procedure below.

(1) Set Tool and dial gauge on side gear.



(2) Move side gear up and down to measure dial gauge deflection. Always measure gauge deflection on both side gears.



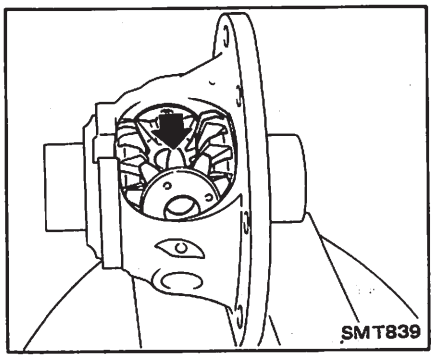
Side gear to pinion mate clearance:
0 - 0.3 mm (0 - 0.012 in)

(3) If clearance exceeds the specified value, check for wear and replace necessary parts.

3. Check tapered roller bearings for wear, scratches, pitching or flaking.

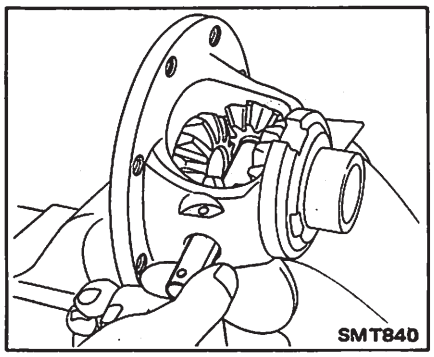
ASSEMBLY

1. Fit side gear thrust washers and side gears, then install pinion mate washers and pinion mate gears in place.



2. Insert pinion mate shaft.

When inserting, be careful not to damage pinion mate washers.



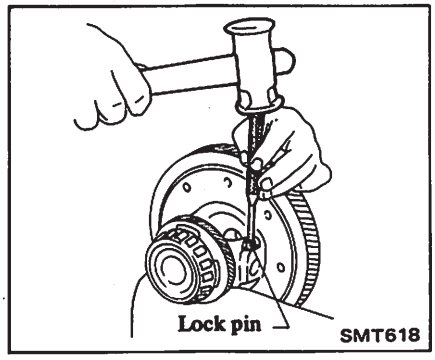
3. Measure clearance between side gear and pinion mate gear, referring to "Inspection". If necessary, adjust.

Side gear to pinion mate clearance:
0 - 0.3 mm
(0 - 0.012 in)

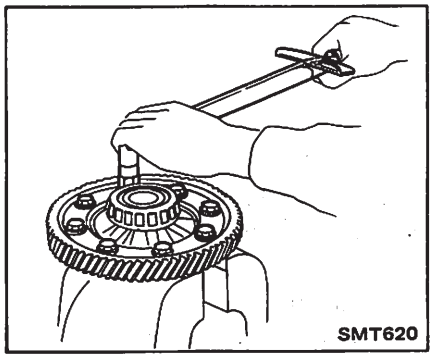
Side gear thrust washer:
Refer to S.D.S.

4. Install pinion mate shaft lock pin using a punch.

Make sure that lock pin is flush with case.



5. Install speedometer worm and stopper.
6. Press on differential side bearing inner races. Refer to "Replacement of Bearings".
7. Apply locking sealer to final gear bolts, then install final gear.



Ⓣ: 74 - 88 N·m
(7.5 - 9.0 kg-m,
54 - 65 ft-lb)

8. Assemble transaxle. Follow steps 5 through 13 under "Assembly of Clutch Housing".

REPLACEMENT OF OIL SEALS

DIFFERENTIAL SIDE OIL SEAL

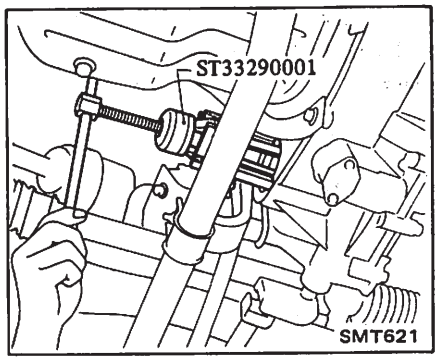
Differential side oil seals can be replaced without removing transaxle unit.

Replace oil seal as follows:

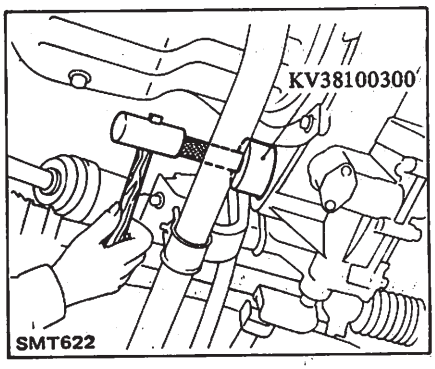
1. Drain oil.
2. Remove drive shaft.

Refer to "Drive Shaft (Section FA)" for removal.

3. Pull out oil seal.



4. Apply coat of gear oil to oil seal surface, then drive new oil seal into place.



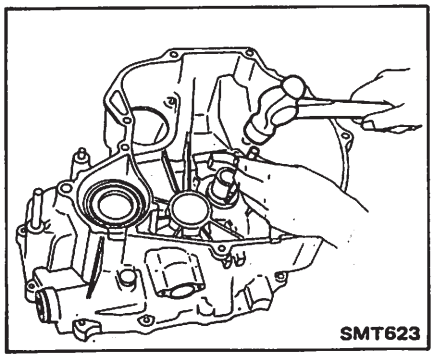
5. Lubricate seal lip and drive shafts with gear oil, then install drive shafts. Refer to "Drive Shaft (Section FA)" for installation.
6. Refill oil.

INPUT SHAFT OIL SEAL

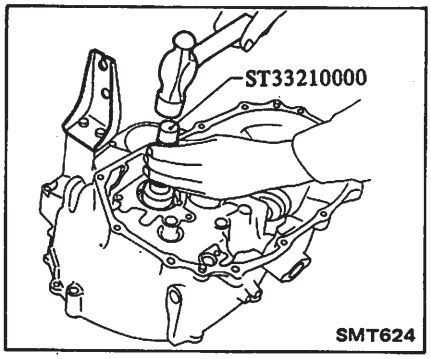
It is necessary to remove transaxle unit from vehicle.

Replace oil seal as follows:

1. Remove transaxle. Refer to "Removal".
2. Remove input shaft assembly from transaxle. Follow steps 1 through 7 under "Disassembly of Clutch Housing" for removal of required parts prior to removal of input shaft.
3. Remove oil seal.



4. Apply coat of gear oil to oil seal surface, then drive new oil seal into place.



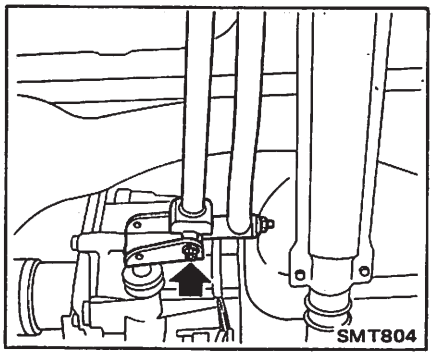
5. Lubricate seal lip and input shaft with gear oil.
6. Assemble transaxle. Follow steps 5 through 13 under "Assembly of Clutch Housing".

SHIFT CONTROL OIL SEAL

It can be replaced without removing transaxle unit.

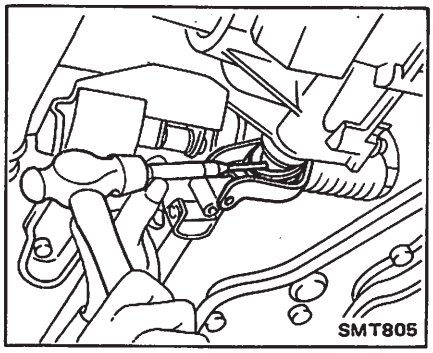
Replace oil seal as follows.

1. Separate control rod from transaxle.

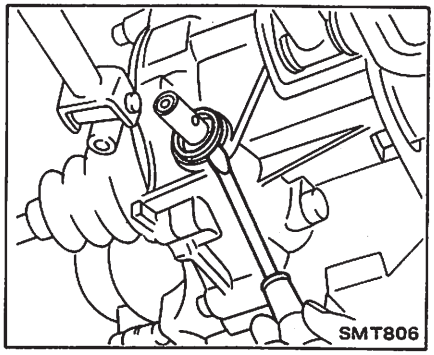


2. Remove yoke.

Be careful not to damage boot.



3. Remove oil seal.



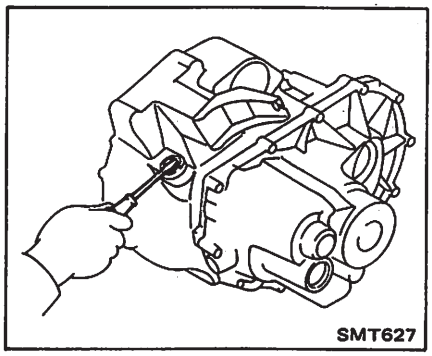
4. Apply coat of gear oil to oil seal surface, then drive new oil seal into place using suitable tool.
5. Install yoke.
6. Connect control rod to transaxle.

CLUTCH CONTROL SHAFT OIL SEAL

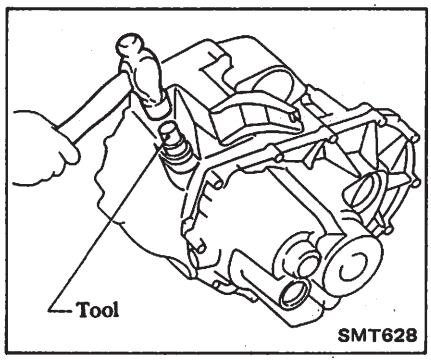
It is necessary to remove transaxle unit from vehicle.

Replace oil seal as follows:

1. Remove transaxle. Refer to "Removal".
2. Draw out clutch control shaft. Refer to "Release Bearing (Section CL)" for disassembly.
3. Remove oil seal.



4. Apply coat of gear oil to oil seal surface, then drive new oil seal into place.



5. Lubricate seal lip and clutch control shaft with gear oil.
6. Install clutch control shaft.

Refer to "Release Bearing (Section CL)" for assembly.

7. Install transaxle. Refer to "Installation".

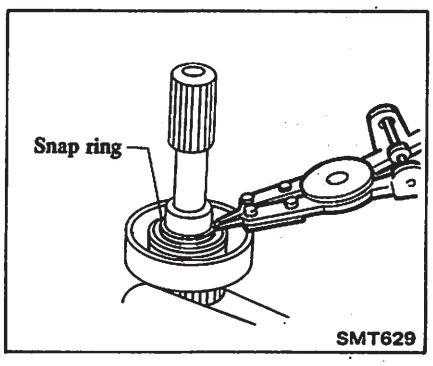
REPLACEMENT OF BEARINGS

CAUTION:
When replacing tapered roller bearing, replace inner and outer bearings at the same time to prevent mixed use of bearings of different brands.

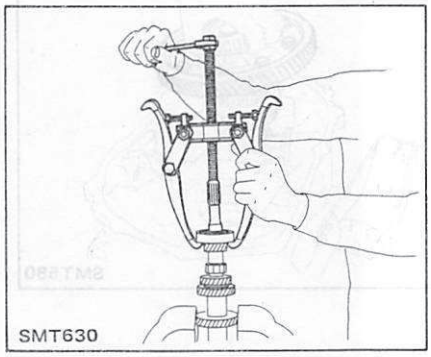
INPUT SHAFT FRONT BEARING

1. Remove input shaft assembly from transaxle. Before removing it, follow steps 1 through 7 under "Disassembly of Clutch Housing" so that input shaft can then be removed.
2. Remove snap ring from front bearing, and withdraw input gear spacer.

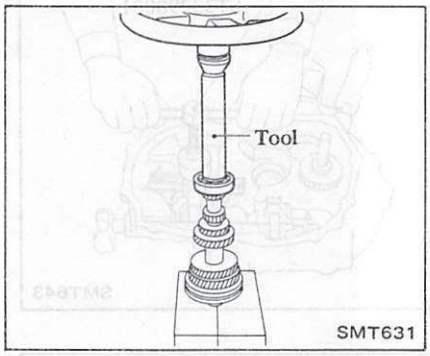
Snap ring must not be reused.



3. Pull out input shaft front bearing.



4. Press fit new ball bearing.



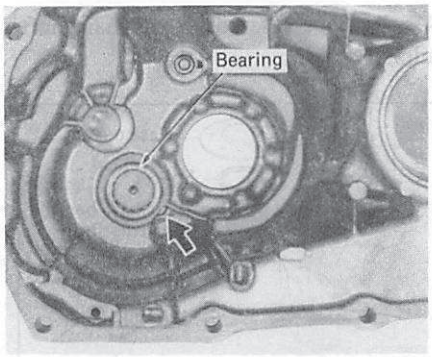
5. Install input gear spacer on front bearing and secure it with snap ring of proper thickness that will minimize clearance of groove in input shaft.

Allowable clearance of groove:
0 - 0.1 mm
(0 - 0.004 in)
Input shaft front snap ring:
Refer to S.D.S.

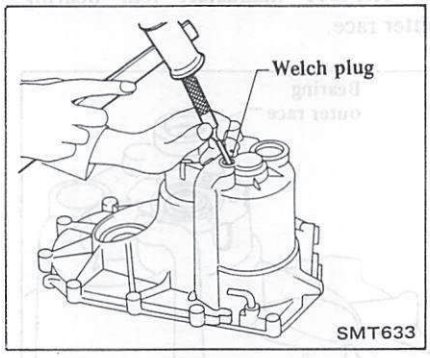
6. Assemble transaxle. Follow steps 5 through 13 under "Assembly of Clutch Housing".

INPUT SHAFT REAR BEARING

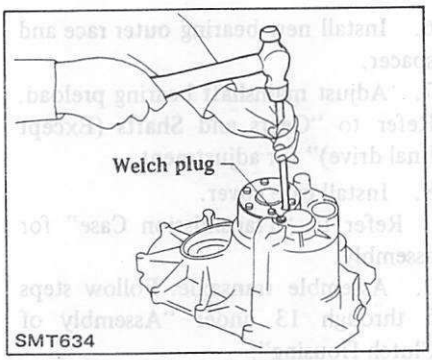
1. Remove transmission case.
Refer to "Transmission Case" for disassembly.
2. Remove welch plug from transmission case using a punch.



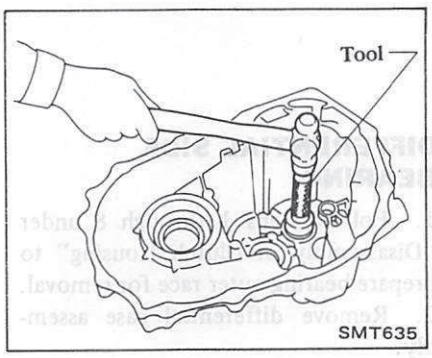
3. Using a punch, drive rear bearing of input shaft out of hole from which welch plug was removed.



4. **Apply sealant to welch plug** and punch it on transmission case.



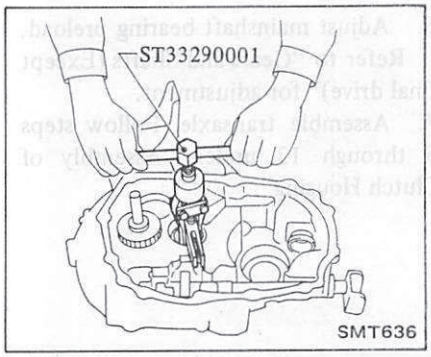
5. Press fit new bearing.



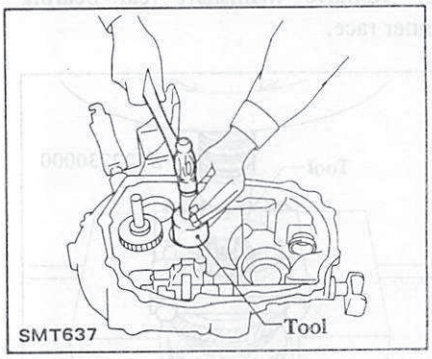
6. Install transmission case.
Refer to "Transmission Case" for assembly.

MAINSHAFT FRONT BEARING

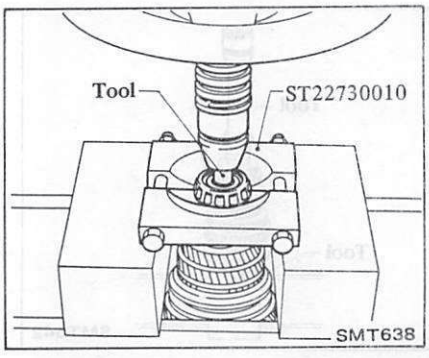
1. Follow steps 1 through 8 under "Disassembly of Clutch Housing" to prepare mainshaft front bearing outer race for removal.
2. Pull out mainshaft front bearing outer race.



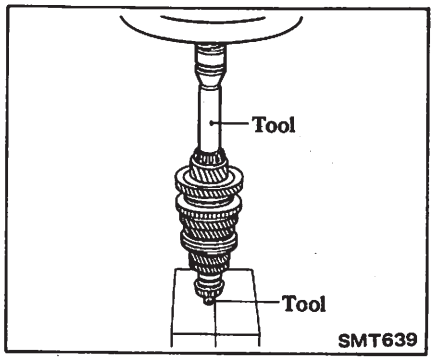
3. Press fit new bearing outer race.



4. Remove mainshaft front bearing inner race.



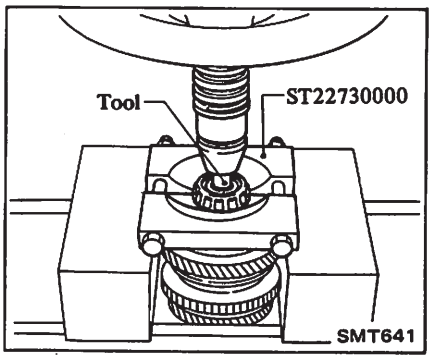
5. Install new bearing inner race.



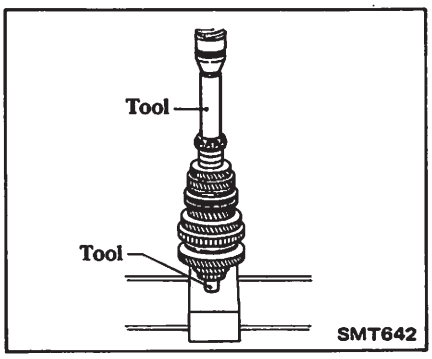
6. Adjust mainshaft bearing preload.
   Refer to "Gears and Shafts (Except final drive)" for adjustment.
7. Assemble transaxle. Follow steps 5 through 13 under "Assembly of Clutch Housing".

MAINSHAFT REAR BEARING

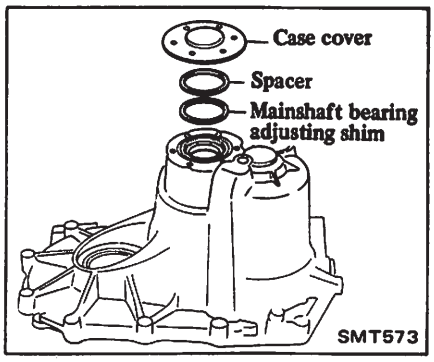
1. Remove mainshaft from transaxle. Follow steps 1 through 5 under "Disassembly of Clutch Housing".
2. Remove mainshaft rear bearing inner race.



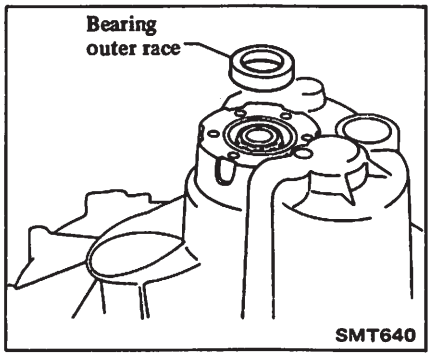
3. Install new bearing inner race.



4. Remove case cover and mainshaft adjusting shim.



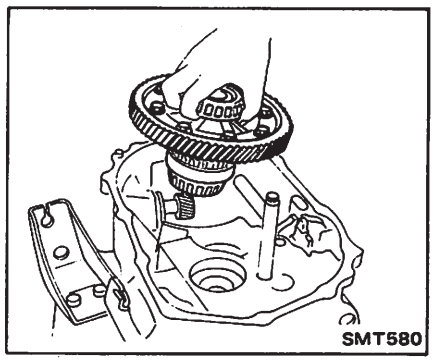
5. Remove mainshaft rear bearing outer race.



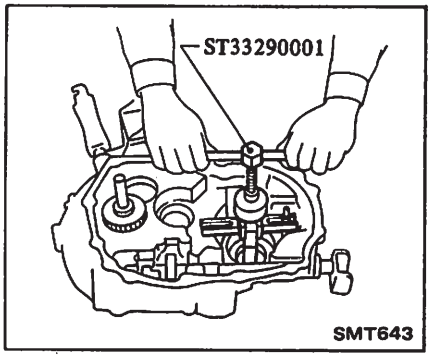
6. Install new bearing outer race and spacer.
7. Adjust mainshaft bearing preload. Refer to "Gears and Shafts (Except final drive)" for adjustment.
8. Install case cover.
   Refer to "Transmission Case" for assembly.
9. Assemble transaxle. Follow steps 5 through 13 under "Assembly of Clutch Housing".

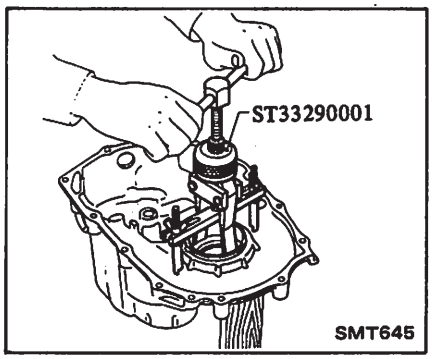
DIFFERENTIAL SIDE BEARING

1. Follow steps 1 through 8 under "Disassembly of Clutch Housing" to prepare bearing outer race for removal.
2. Remove differential case assembly.

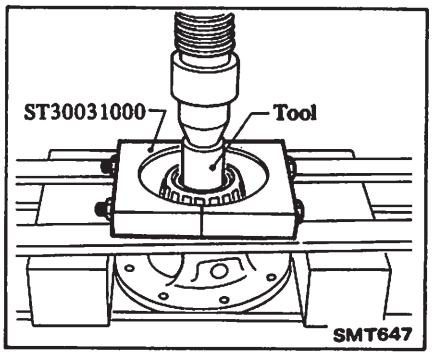


3. Pull out differential side bearing outer race.

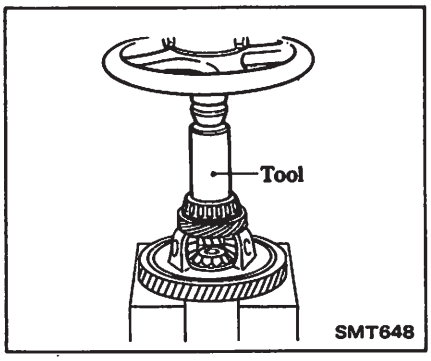




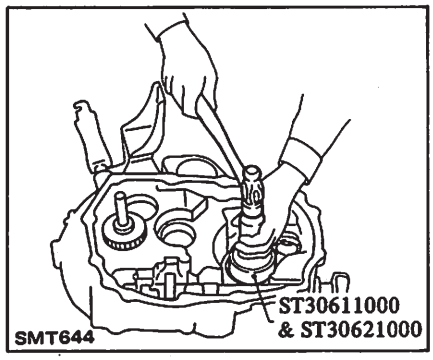
4. Remove differential side bearing inner race.

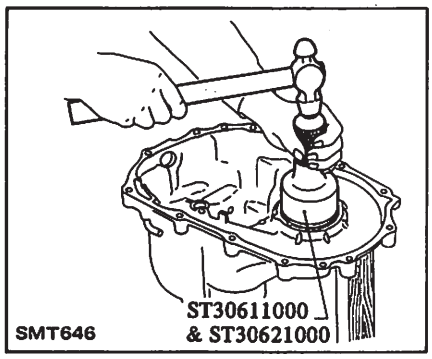


5. Install **new** bearing inner race.



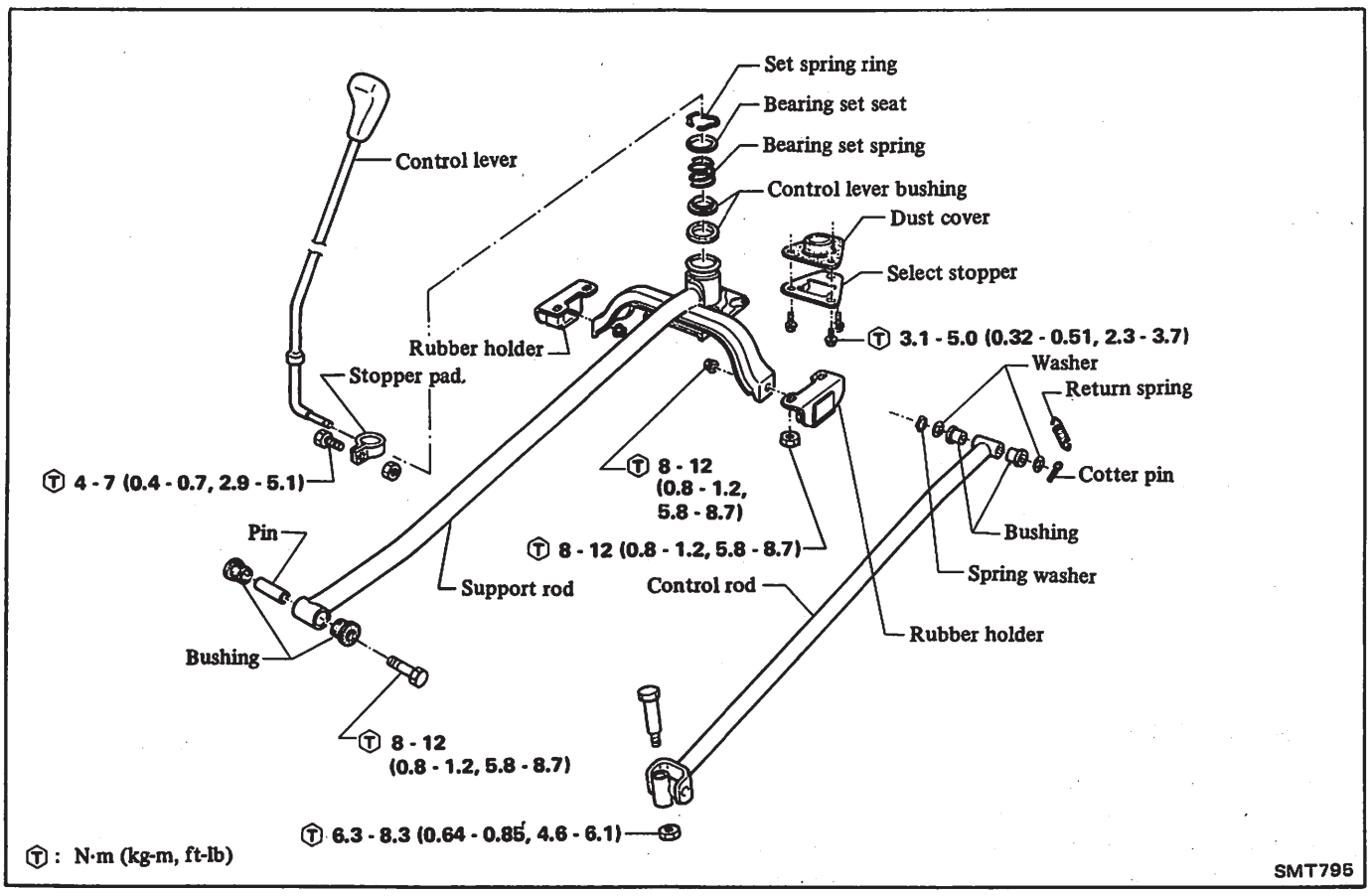
6. Press fit **new** bearing outer race.





7. Install differential case assembly.
8. Adjust differential side bearing preload.
   Refer to "Final Drive" for adjustment.
9. Install transmission case.
   Refer to "Transmission Case" for assembly.

TRANSMISSION GEAR CONTROL

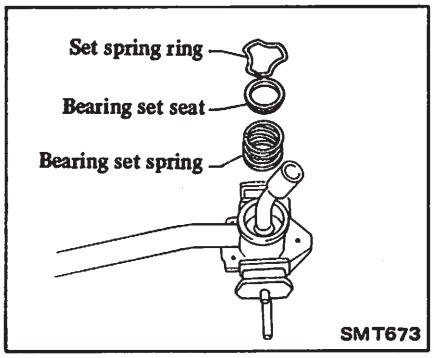


DISASSEMBLY

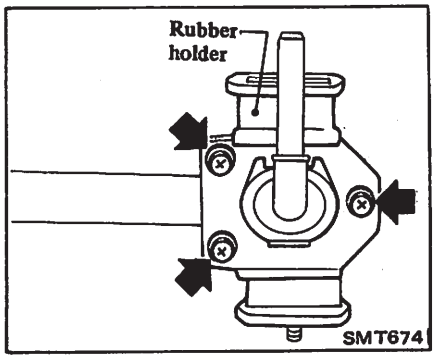
1. Remove control rod.

Cotter pin must not be reused.

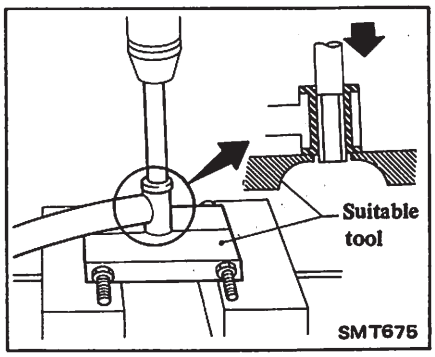
2. Remove control lever bracket, set spring ring, bearing set seat and bearing set spring.



3. Remove rubber holder, dust cover and control lever bearing.



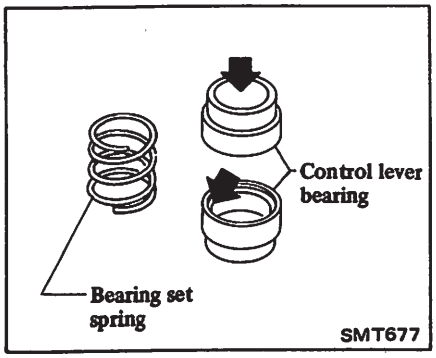
4. Draw out rubber bushing from control rod and support rod if necessary.



INSPECTION

Check for wear, cracks or other damage on sliding contact surfaces of parts. If any of the above conditions is apparent, replace faulty part.

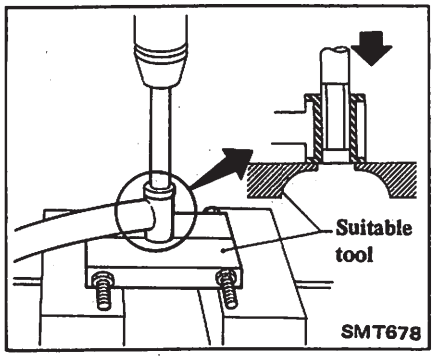
- Check bushings and rubbers for deformation or cracks, and replace with a new one if necessary.
- Check bearing set spring, set spring ring and control lever bearing for deformation, cracks, wear or other damage, and replace with a new one if necessary.



ASSEMBLY

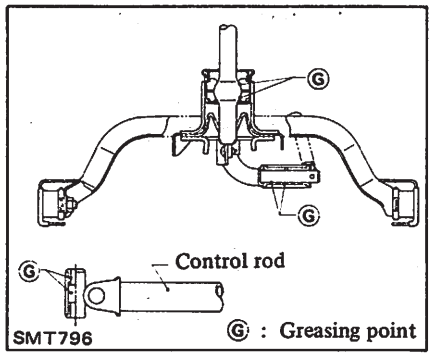
Assemble transmission gear control in the reverse order of disassembly, noting the following points.

- When installing rubber bushing to control rod and support rod, be sure to install in its proper place.

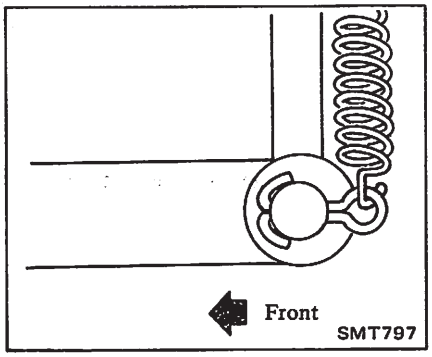


Ⓣ : **Rubber holder nut**
8 - 12 N·m
(0.8 - 1.2 kg-m,
5.8 - 8.7 ft-lb)

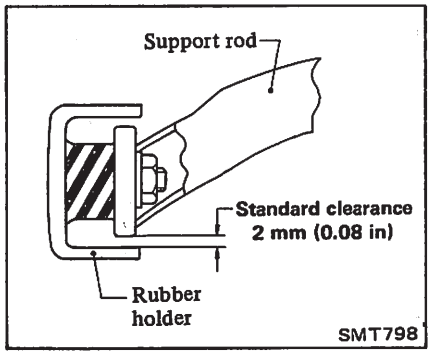
- **When assembling transaxle gear control, apply grease to the following positions.**



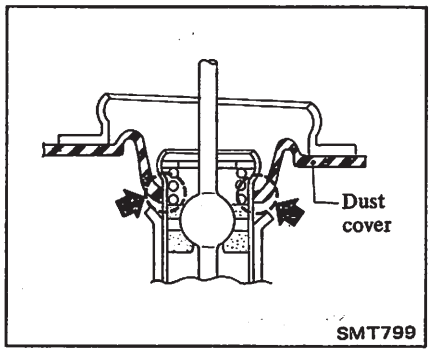
- **When installing cotter pin, pay attention to its direction and bend it securely.**



- **Adjust standard clearance with support rod exerting no weight.**



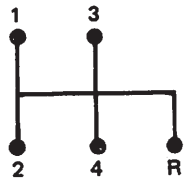
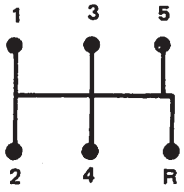
- **Install dust cover securely.**



SERVICE DATA AND SPECIFICATIONS (S.D.S.)

GENERAL SPECIFICATIONS

TRANSAXLE

Engine		E15	E16	CD17	E15	E16, CD17
Transaxle model		RN4F30A			RS5F30A	
No. of speeds		4			5	
Synchromesh type		Warner				
Shift pattern						
Gear ratio	1st	3.063	3.333	3.333	3.063	3.333
	2nd	1.708	1.955	1.708	1.708	1.955
	3rd	1.133	1.286	1.027	1.133	1.286
	4th	0.814	0.902	0.733	0.814	0.902
	5th	–	–	–	0.681	0.733
	Rev.	3.417	3.417	3.417	3.417	3.417
Number of teeth						
Input gear	1st	16	15	15	16	15
	2nd	24	22	24	24	22
	3rd	30	28	37	30	28
	4th	43	41	45	43	41
	5th	–	–	–	47	45
	Rev.	12	12	12	12	12
Main gear	1st	49	50	50	49	50
	2nd	41	43	41	41	43
	3rd	34	36	38	34	36
	4th	35	37	33	35	37
	5th	–	–	–	32	33
	Rev.	41	41	41	41	41
Reverse idler gear		30				
Speedometer gear ratio (Worm/pinion)		41/36				
Oil capacity liters (US pt, Imp pt)		2.3 (4-7/8, 4)			2.7 (5-3/4, 4-3/4)	

FINAL GEAR

Engine	E15, E16	CD17
Final gear ratio	3.550	3.789
Number of teeth Final gear/Pinion gear	71/20	72/19
Side gear/Pinion mate gear	14/10	

INSPECTION AND ADJUSTMENT

GEAR END PLAY

Unit: mm (in)

Position \ Model	RN4F30A	RS5F30A
Main 1st gear	0.18 - 0.31 (0.0071 - 0.0122)	
Main 2nd ~ 4th gear	0.20 - 0.40 (0.0079 - 0.0157)	
Input 5th gear	–	0.18 - 0.41 (0.0071 - 0.0161)

CLEARANCE BETWEEN BAULK RING AND GEAR

Unit: mm (in)

	All models
Standard Wear limit	1.0 - 1.35 (0.039 - 0.0531) 0.7 (0.028)

MAINSHAFT C-RING

Model RN4F30A

Unit: mm (in)

Part No.	Thickness	Part No.	Thickness
32348-M8000	3.63 (0.1429)	32348-M8006	4.05 (0.1594)
M8001	3.70 (0.1457)	M8007	4.12 (0.1622)
M8002	3.77 (0.1484)	M8008	4.19 (0.1650)
M8003	3.84 (0.1512)	M8009	4.26 (0.1677)
M8004	3.91 (0.1539)	M8010	4.33 (0.1705)
M8005	3.98 (0.1567)	M8011	4.40 (0.1732)

Model RS5F30A

Unit: mm (in)

Part No.	Thickness	Part No.	Thickness
32348-M8800	3.67 (0.1445)	32348-M8807	4.16 (0.1638)
M8801	3.74 (0.1472)	M8808	4.23 (0.1665)
M8802	3.81 (0.1500)	M8809	4.30 (0.1693)
M8803	3.88 (0.1528)	M8810	4.37 (0.1720)
M8804	3.95 (0.1555)	M8811	4.44 (0.1748)
M8805	4.02 (0.1583)	M8812	4.51 (0.1776)
M8806	4.09 (0.1610)		

AVAILABLE SNAP RING

Input shaft front bearing snap ring

Unit: mm (in)

Part No.	Thickness
32204-M8004	1.27 (0.0500)
M8005	1.33 (0.0524)
M8006	1.39 (0.0547)
M8007	1.45 (0.0571)

Input shaft 5th synchronizer snap ring

Unit: mm (in)

Part No.	Thickness
32311-M8812	2.00 (0.0787)
M8813	2.05 (0.0807)
M8814	2.10 (0.0827)
M8815	2.15 (0.0846)
M8816	2.20 (0.0866)
M8817	2.25 (0.0886)
M8818	2.30 (0.0906)

REVERSE CHECK TURNING TORQUE (At striking rod)

Unit: N·m (kg-cm, in-lb)

RN4F30A	RS5F30A
15.7 - 22.6 (160 - 230, 139 - 200)	22.1 - 27.0 (225 - 275, 195 - 239)

REVERSE CHECK PLUG

Unit: mm (in)

Part No.	Thickness
32188-M8001*	8.3 (0.327)
32188-M8002	7.1 (0.280)
32188-M8003	7.7 (0.303)
32188-M8004	8.9 (0.350)

*Standard check plug

CLEARANCE BETWEEN SIDE GEAR AND PINION MATE GEAR

0 - 0.3 mm (0 - 0.012 in)

Side gear thrust washer

Unit: mm (in)

Part number	Thickness
38424 01M00	0.76 - 0.81 (0.0299 - 0.0319)
01M01	0.81 - 0.86 (0.0319 - 0.0339)
01M02	0.86 - 0.91 (0.0339 - 0.0358)
01M03	0.91 - 0.96 (0.0358 - 0.0378)

ROTARY FRICTIONAL FORCE

Unit: N·m (kg-cm, in-lb)

Final drive only	4.9 - 7.4 (50 - 75, 43 - 65)
Total	7.4 - 10.8 (75 - 110, 65 - 95)

AVAILABLE SHIM

Mainshaft bearing adjusting shim

Unit: mm (in)

Part No.	Thickness	Part No.	Thickness
32137-M8000	0.10 (0.0039)	32137-M8010	0.60 (0.0236)
M8001	0.15 (0.0059)	M8011	0.65 (0.0256)
M8002	0.20 (0.0079)	M8012	0.70 (0.0276)
M8003	0.25 (0.0098)	M8013	0.75 (0.0295)
M8004	0.30 (0.0118)	M8014	0.80 (0.0315)
M8005	0.35 (0.0138)	M8015	0.85 (0.0335)
M8006	0.40 (0.0157)	M8016	0.90 (0.0354)
M8007	0.45 (0.0177)	M8017	0.95 (0.0374)
M8008	0.50 (0.0197)	M8018	1.00 (0.0394)
M8009	0.55 (0.0217)		

Differential side bearing adjusting shim

Unit: mm (in)

Part No.	Thickness	Part No.	Thickness
38454-M8000	0.44 (0.0173)	38454-M8008	0.76 (0.0299)
M8001	0.48 (0.0189)	M8009	0.80 (0.0315)
M8003	0.56 (0.0220)	M8010	0.84 (0.0331)
M8004	0.60 (0.0236)	M8011	0.88 (0.0346)
M8005	0.64 (0.0252)		
M8006	0.68 (0.0268)		
M8007	0.72 (0.0283)		

Table for method A

Unit: mm (in)

Dial gauge deflection	Suitable shim thickness	Appropriate shim(s)
0.30 - 0.34 (0.0118 - 0.0134)	0.60 (0.0236)	0.60 (0.0236)
0.34 - 0.38 (0.0134 - 0.0150)	0.64 (0.0252)	0.64 (0.0252)
0.38 - 0.42 (0.0150 - 0.0165)	0.68 (0.0268)	0.68 (0.0268)
0.42 - 0.46 (0.0165 - 0.0181)	0.72 (0.0283)	0.72 (0.0283)
0.46 - 0.50 (0.0181 - 0.0197)	0.76 (0.0299)	0.76 (0.0299)
0.50 - 0.54 (0.0197 - 0.0213)	0.80 (0.0315)	0.80 (0.0315)
0.54 - 0.58 (0.0213 - 0.0228)	0.84 (0.0331)	0.84 (0.0331)
0.58 - 0.62 (0.0228 - 0.0244)	0.88 (0.0346)	0.88 (0.0346)
0.62 - 0.66 (0.0244 - 0.0260)	0.92 (0.0362)	0.44 (0.0173) + 0.48 (0.0189)
0.66 - 0.70 (0.0260 - 0.0276)	0.96 (0.0378)	0.48 (0.0189) + 0.48 (0.0189)
0.70 - 0.74 (0.0276 - 0.0291)	1.00 (0.0394)	0.44 (0.0173) + 0.56 (0.0220)
0.74 - 0.78 (0.0291 - 0.0307)	1.04 (0.0409)	0.44 (0.0173) + 0.60 (0.0236)
0.78 - 0.82 (0.0307 - 0.0323)	1.08 (0.0425)	0.44 (0.0173) + 0.64 (0.0252)
0.82 - 0.86 (0.0323 - 0.0339)	1.12 (0.0441)	0.44 (0.0173) + 0.68 (0.0268)
0.86 - 0.90 (0.0339 - 0.0354)	1.16 (0.0457)	0.44 (0.0173) + 0.72 (0.0283)
0.90 - 0.94 (0.0354 - 0.0370)	1.20 (0.0472)	0.44 (0.0173) + 0.76 (0.0299)
0.94 - 0.98 (0.0370 - 0.0386)	1.24 (0.0488)	0.44 (0.0173) + 0.80 (0.0315)
0.98 - 1.02 (0.0386 - 0.0402)	1.28 (0.0504)	0.44 (0.0173) + 0.84 (0.0331)
1.02 - 1.06 (0.0402 - 0.0417)	1.32 (0.0520)	0.44 (0.0173) + 0.88 (0.0346)
1.06 - 1.10 (0.0417 - 0.0433)	1.36 (0.0535)	0.88 (0.0346) + 0.48 (0.0189)
1.10 - 1.14 (0.0433 - 0.0449)	1.40 (0.0551)	0.68 (0.0268) + 0.72 (0.0283)
1.14 - 1.18 (0.0449 - 0.0465)	1.44 (0.0567)	0.88 (0.0346) + 0.56 (0.0220)
1.18 - 1.22 (0.0465 - 0.0480)	1.48 (0.0583)	0.88 (0.0346) + 0.60 (0.0236)
1.22 - 1.26 (0.0480 - 0.0496)	1.52 (0.0598)	0.88 (0.0346) + 0.64 (0.0252)
1.26 - 1.30 (0.0496 - 0.0512)	1.56 (0.0614)	0.88 (0.0346) + 0.68 (0.0268)
1.30 - 1.34 (0.0512 - 0.0528)	1.60 (0.0630)	0.88 (0.0346) + 0.72 (0.0283)
1.34 - 1.38 (0.0528 - 0.0543)	1.64 (0.0646)	0.88 (0.0346) + 0.76 (0.0299)
1.38 - 1.42 (0.0543 - 0.0559)	1.68 (0.0661)	0.88 (0.0346) + 0.80 (0.0315)
1.42 - 1.46 (0.0559 - 0.0575)	1.72 (0.0677)	0.88 (0.0346) + 0.84 (0.0331)
1.46 - 1.50 (0.0575 - 0.0591)	1.76 (0.0693)	0.88 (0.0346) + 0.88 (0.0346)

Table for method B

Suitable shim thickness can be achieved by selecting one or two shims among the above eleven types.

For example:

Unit: mm (in)

Suitable shim thickness	Appropriate shim(s)	Suitable shim thickness	Appropriate shim(s)
0.56 (0.0220)	0.56 (0.0220)	1.16 (0.0457)	0.44 (0.0173) + 0.72 (0.0283)
0.60 (0.0236)	0.60 (0.0236)	1.20 (0.0472)	0.44 (0.0173) + 0.76 (0.0299)
0.64 (0.0252)	0.64 (0.0252)	1.24 (0.0488)	0.44 (0.0173) + 0.80 (0.0315)
0.68 (0.0268)	0.68 (0.0268)	1.28 (0.0504)	0.44 (0.0173) + 0.84 (0.0331)
0.72 (0.0283)	0.72 (0.0283)	1.32 (0.0520)	0.44 (0.0173) + 0.88 (0.0346)
0.76 (0.0299)	0.76 (0.0299)	1.36 (0.0535)	0.88 (0.0346) + 0.48 (0.0189)
0.80 (0.0315)	0.80 (0.0315)	1.40 (0.0551)	0.68 (0.0268) + 0.72 (0.0283)
0.84 (0.0331)	0.84 (0.0331)	1.44 (0.0567)	0.88 (0.0346) + 0.56 (0.0220)
0.88 (0.0346)	0.88 (0.0346)	1.48 (0.0583)	0.88 (0.0346) + 0.60 (0.0236)
0.92 (0.0362)	0.44 (0.0173) + 0.48 (0.0189)	1.52 (0.0598)	0.88 (0.0346) + 0.64 (0.0252)
0.96 (0.0378)	0.48 (0.0189) + 0.48 (0.0189)	1.56 (0.0614)	0.88 (0.0346) + 0.68 (0.0268)
1.00 (0.0394)	0.44 (0.0173) + 0.56 (0.0220)	1.60 (0.0630)	0.88 (0.0346) + 0.72 (0.0283)
1.04 (0.0409)	0.44 (0.0173) + 0.60 (0.0236)	1.64 (0.0646)	0.88 (0.0346) + 0.76 (0.0299)
1.08 (0.0425)	0.44 (0.0173) + 0.64 (0.0252)	1.68 (0.0661)	0.88 (0.0346) + 0.80 (0.0315)
1.12 (0.0441)	0.44 (0.0173) + 0.68 (0.0268)	1.72 (0.0677)	0.88 (0.0346) + 0.84 (0.0331)

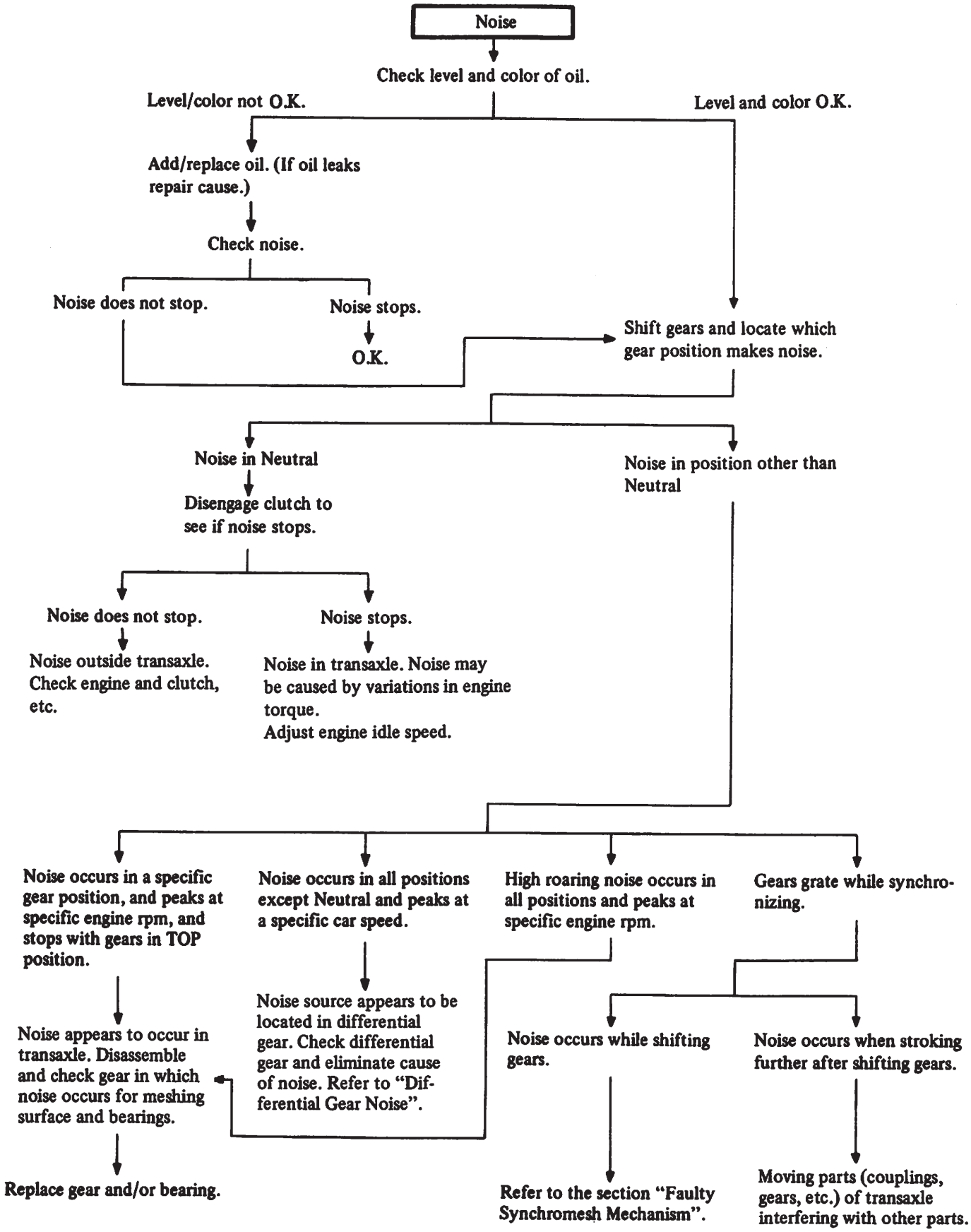
TIGHTENING TORQUE

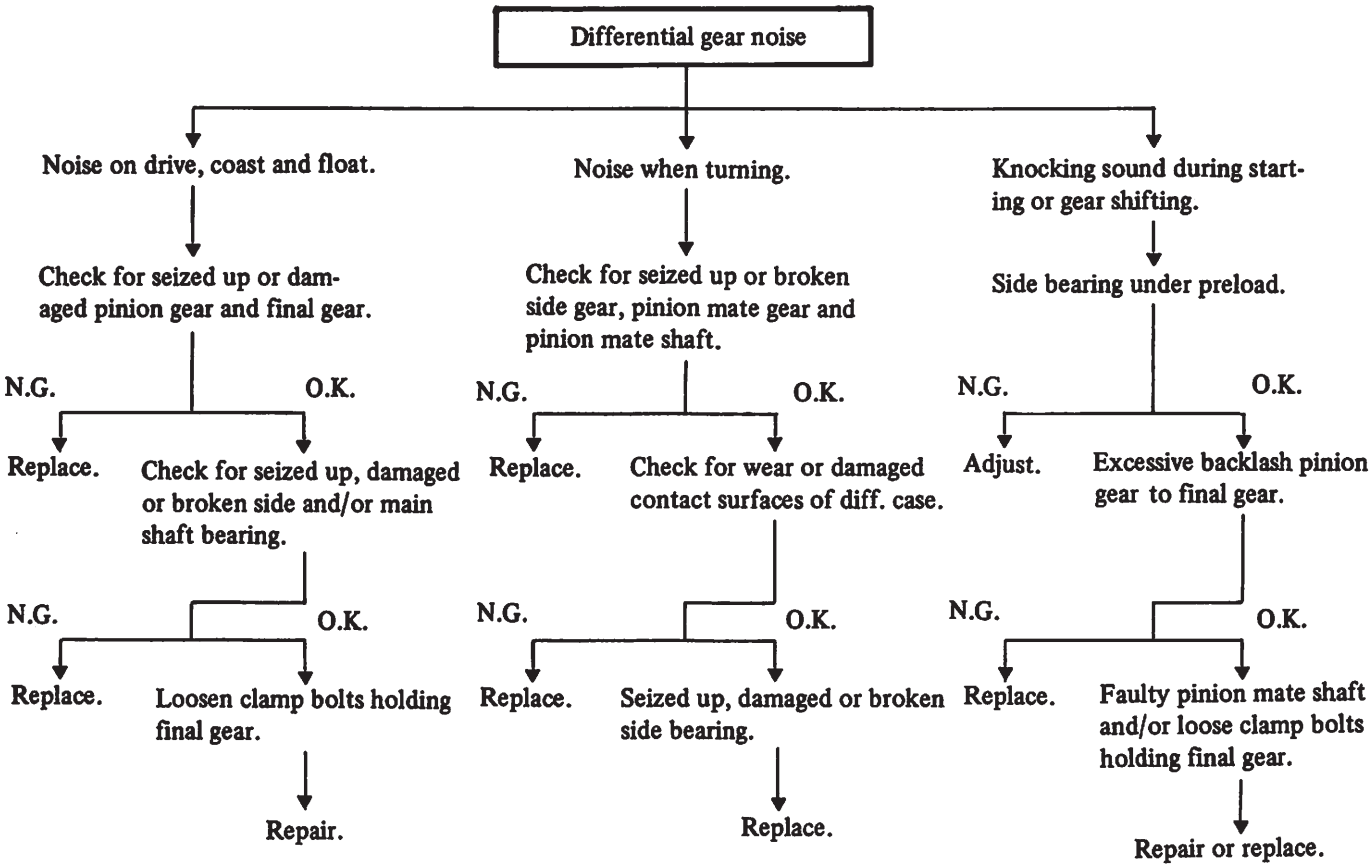
Item \ Unit	N·m	kg-m	ft-lb
Transaxle installation			
Clutch control cable lock nut	3 - 4	0.3 - 0.4	2.2 - 2.9
Front buffer rod bracket To engine	29 - 39	3 - 4	22 - 29
To transaxle	16 - 21	1.6 - 2.1	12 - 15
Left engine mounting to transaxle	29 - 39	3 - 4	22 - 29
Rear engine mounting To body	29 - 39	3 - 4	22 - 29
To transaxle *	16 - 21 29 - 39 34 - 39	1.6 - 2.1 3 - 4 3.5 - 4.0	12 - 15 22 - 29 25 - 29
Buffer rod	39 - 49	4 - 5	29 - 36
Speedometer pinion gear	3.7 - 5.0	0.38 - 0.51	2.7 - 3.7
Transmission gear control installation			
Control rod to transaxle	6.3 - 8.3	0.64 - 0.85	4.6 - 6.1
Support rod to transaxle	8 - 12	0.8 - 1.2	5.8 - 8.7
Select stopper bolt	3.1 - 5.0	0.32 - 0.51	2.3 - 3.7
Rubber holder to body	8 - 12	0.8 - 1.2	5.8 - 8.7

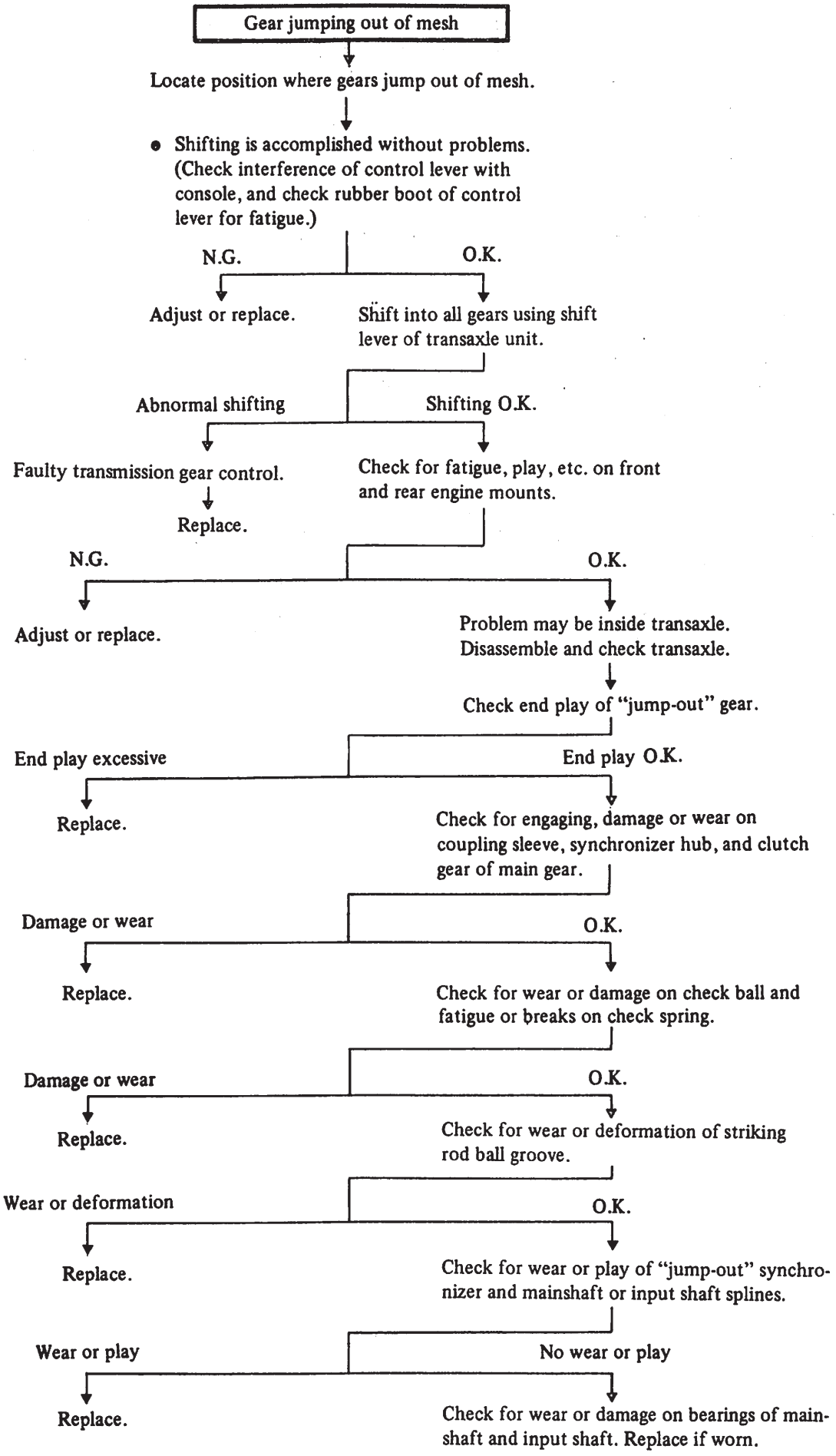
Item \ Unit	N·m	kg-m	ft-lb
Gear assembly			
Clutch housing to transmission case	16 - 21	1.6 - 2.1	12 - 15
Case cover to transmission case	6.3 - 8.3	0.64 - 0.85	4.6 - 6.1
Bearing retainer to clutch housing	16 - 21	1.6 - 2.1	12 - 15
Control bracket to clutch housing	6.3 - 8.3	0.64 - 0.85	4.6 - 6.1
5th & Rev. check plug	19 - 25	1.9 - 2.5	14 - 18
5th & Rev. check assembly to clutch housing	6.3 - 8.3	0.64 - 0.85	4.6 - 6.1
Final gear to differential case	74 - 88	7.5 - 9.0	54 - 65
Filler plug	25 - 34	2.5 - 3.5	18 - 25
Drain plug	25 - 34	2.5 - 3.5	18 - 25
Back-up switch	20 - 29	2.0 - 3.0	14 - 22
Neutral switch	20 - 29	2.0 - 3.0	14 - 22
Switch plug	15 - 20	1.5 - 2.0	11 - 14
Transmission gear control			
Stopper pad bolt	4 - 7	0.4 - 0.7	2.9 - 5.1
Rubber holder nut	8 - 12	0.8 - 1.2	5.8 - 8.7

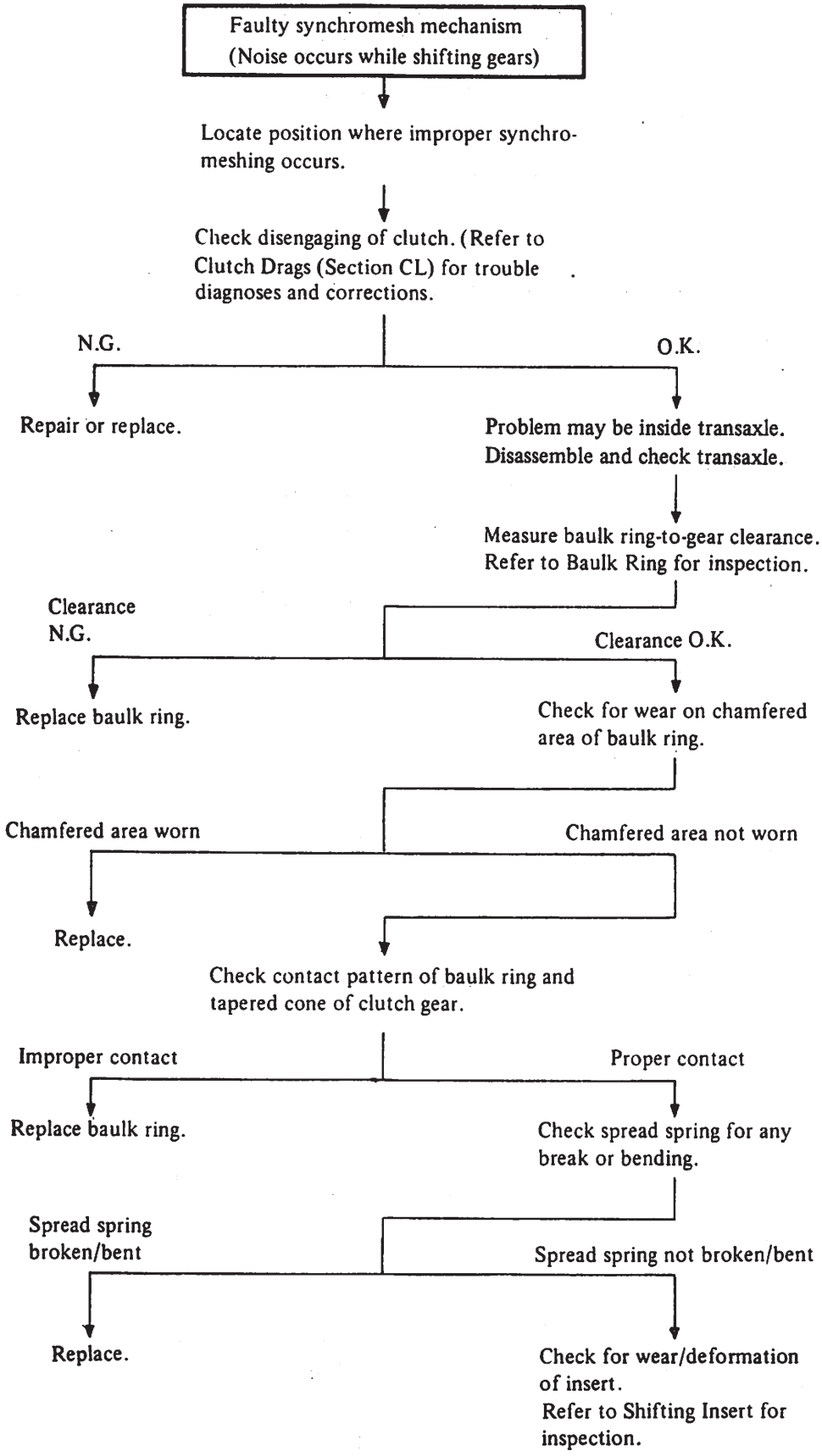
*For details, refer to ER section.

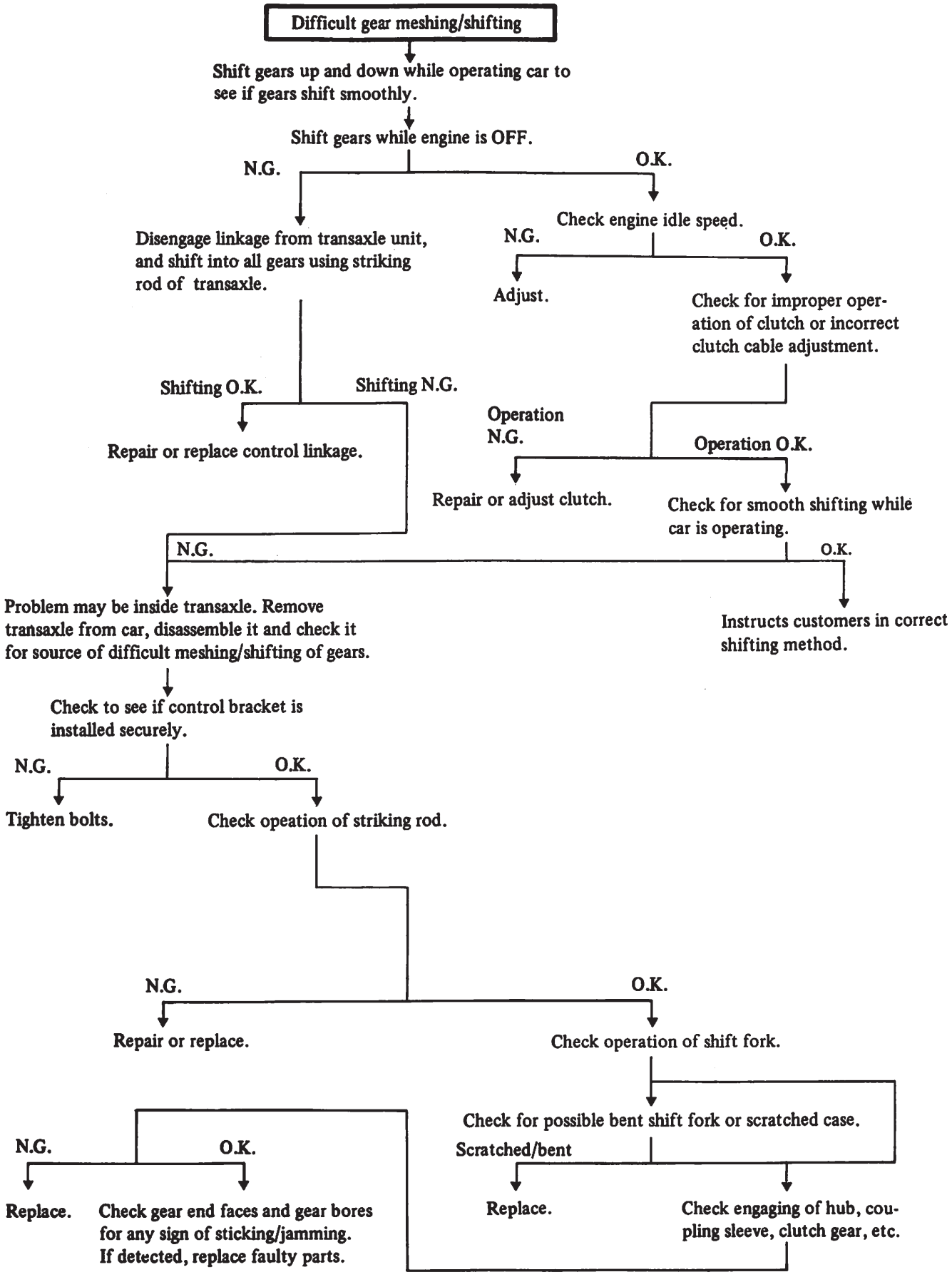
TROUBLE DIAGNOSES AND CORRECTIONS



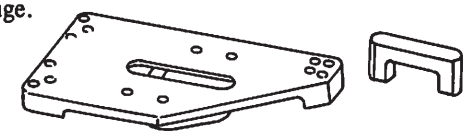
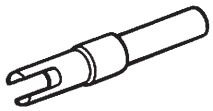
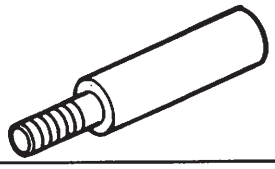
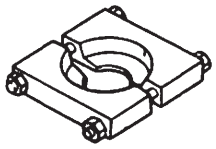
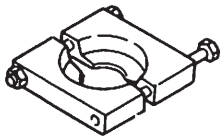
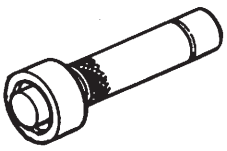
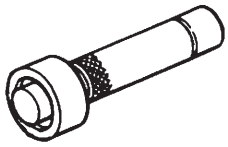

Differential gear noise
Noise on drive, coast and float.
Check for seized up or damaged pinion gear and final gear.
N.G.
O.K.
Replace.
Check for seized up, damaged or broken side and/or main shaft bearing.
N.G.
O.K.
Replace.
Loosen clamp bolts holding final gear.
Repair.
Noise when turning.
Check for seized up or broken side gear, pinion mate gear and pinion mate shaft.
N.G.
O.K.
Replace.
Check for wear or damaged contact surfaces of diff. case.
N.G.
O.K.
Replace.
Seized up, damaged or broken side bearing.
Replace.
Knocking sound during starting or gear shifting.
Side bearing under preload.
N.G.
O.K.
Adjust.
Excessive backlash pinion gear to final gear.
N.G.
O.K.
Replace.
Faulty pinion mate shaft and/or loose clamp bolts holding final gear.
Repair or replace.


Gear jumping out of mesh
Locate position where gears jump out of mesh.
• Shifting is accomplished without problems. (Check interference of control lever with console, and check rubber boot of control lever for fatigue.)
N.G.
O.K.
Adjust or replace.
Shift into all gears using shift lever of transaxle unit.
Abnormal shifting
Shifting O.K.
Faulty transmission gear control.
Replace.
Check for fatigue, play, etc. on front and rear engine mounts.
N.G.
O.K.
Adjust or replace.
Problem may be inside transaxle. Disassemble and check transaxle.
Check end play of "jump-out" gear.
End play excessive
End play O.K.
Replace.
Check for engaging, damage or wear on coupling sleeve, synchronizer hub, and clutch gear of main gear.
Damage or wear
O.K.
Replace.
Check for wear or damage on check ball and fatigue or breaks on check spring.
Damage or wear
O.K.
Replace.
Check for wear or deformation of striking rod ball groove.
Wear or deformation
O.K.
Replace.
Check for wear or play of "jump-out" synchronizer and mainshaft or input shaft splines.
Wear or play
No wear or play
Replace.
Check for wear or damage on bearings of mainshaft and input shaft. Replace if worn.


Faulty synchromesh mechanism
(Noise occurs while shifting gears)
Locate position where improper synchro-meshing occurs.
Check disengaging of clutch. (Refer to Clutch Drags (Section CL) for trouble diagnoses and corrections.
N.G.
O.K.
Repair or replace.
Problem may be inside transaxle. Disassemble and check transaxle.
Measure baulk ring-to-gear clearance. Refer to Baulk Ring for inspection.
Clearance N.G.
Clearance O.K.
Replace baulk ring.
Check for wear on chamfered area of baulk ring.
Chamfered area worn
Chamfered area not worn
Replace.
Check contact pattern of baulk ring and tapered cone of clutch gear.
Improper contact
Proper contact
Replace baulk ring.
Check spread spring for any break or bending.
Spread spring broken/bent
Spread spring not broken/bent
Replace.
Check for wear/deformation of insert.
Refer to Shifting Insert for inspection.


Difficult gear meshing/shifting
Shift gears up and down while operating car to see if gears shift smoothly.
Shift gears while engine is OFF.
N.G.
O.K.
Disengage linkage from transaxle unit, and shift into all gears using striking rod of transaxle.
Check engine idle speed.
N.G.
O.K.
Adjust.
Check for improper operation of clutch or incorrect clutch cable adjustment.
Shifting O.K.
Shifting N.G.
Repair or replace control linkage.
Operation N.G.
Operation O.K.
Repair or adjust clutch.
Check for smooth shifting while car is operating.
N.G.
O.K.
Problem may be inside transaxle. Remove transaxle from car, disassemble it and check it for source of difficult meshing/shifting of gears.
Instructs customers in correct shifting method.
Check to see if control bracket is installed securely.
N.G.
O.K.
Tighten bolts.
Check opeation of striking rod.
N.G.
O.K.
Repair or replace.
Check operation of shift fork.
Check for possible bent shift fork or scratched case.
N.G.
O.K.
Scratched/bent
Replace.
Check gear end faces and gear bores for any sign of sticking/jamming. If detected, replace faulty parts.
Replace.
Check engaging of hub, coupling sleeve, clutch gear, etc.

SPECIAL SERVICE TOOLS

Tool number (Kent-Moore No.)	Tool name
KV38105810 (–)	Differential side bearing height gauge. 
KV38105900 (–)	Preload adapter 
KV38106000 (–)	Height gauge adapter (diff. side bearing) 
ST30031000 (J25733-1)	Bearing puller 
ST22730000 (–)	Bearing puller 
ST33290001 (J25810)	Side bearing outer race puller 
KV38100300 (–)	Drift 
ST33210000 (J25803)	Drift 
ST30611000 (J25742-1)	Drift bar 
ST30621000 (–)	Drift 

AUTOMATIC TRANSAXLE

SECTION AT

CONTENTS

This section describes both RN3F01A (without lock-up) and RL3F01A (with lock-up) transaxles but it mainly describes RL3F01A. Portions different from RN3F01A are noted with (L/U) marks.

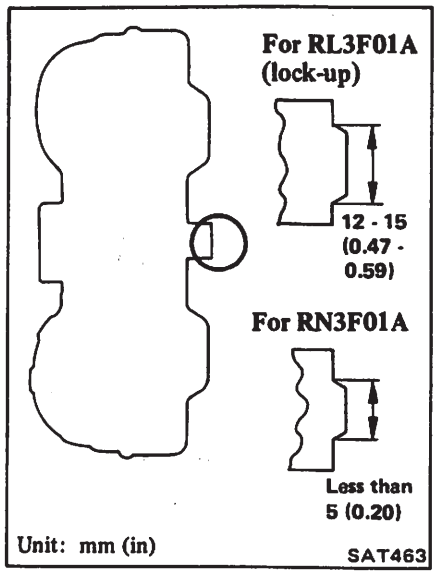
DESCRIPTION

The RL3F01A transaxle is a fully automatic unit consisting primary of a 3 element hydraulic lock-up torque converter (L/U) , two planetary gear sets and final gear. Two multiple-disc clutches, a multiple-disc brake, brake band, and one-way clutch provide the friction elements necessary to obtain the desired function of the two planetary gear-sets.
A hydraulic control system is used to operate the friction elements and automatic shift controls.

TORQUE CONVERTER

The lock-up torque converter (L/U) is attached to the crankshaft through a flexible drive plate and serves to directly couple the turbine runner and pump impeller through the lock-up piston (L/U) which is controlled by the speed cut valve and lock-up control valve (L/U) . Heat generated in the torque converter is dissipated by circulating the transaxle fluid through an oil-to-water type cooler in the radiator lower tank.
The welded construction of the torque converter prohibits disassembly or service unless highly specialized equipment is available.

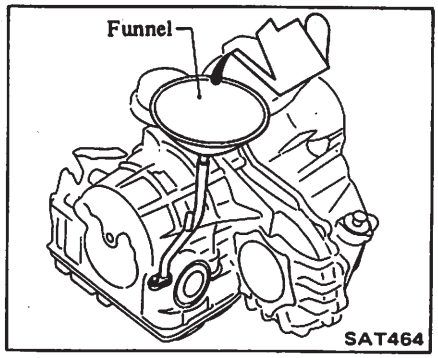
Discrimination



FLUID RECOMMENDATION

Use "DEXRON" type automatic transaxle fluid only.

FLUID REFILLING POSITION



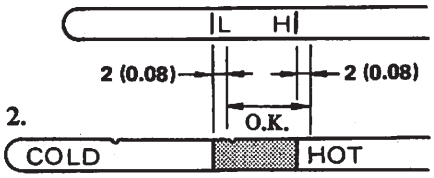
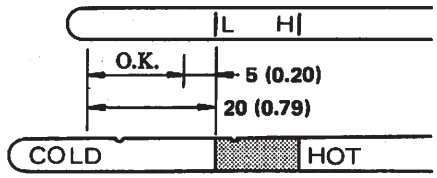
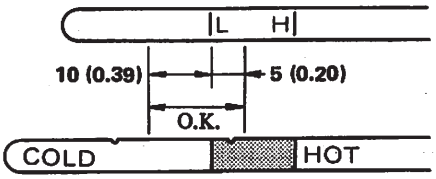
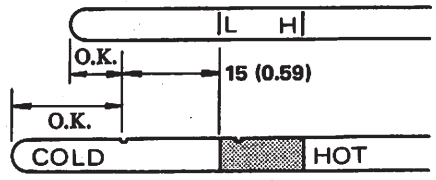
FLUID LEVEL

The transaxle has the proper amount of fluid if, 10 minutes after engine start and with the engine idling, the level is within the values described in the following table.
Proceed with fluid level check as follows:
1. Park the vehicle on a level surface and set the parking brake.
2. Start the engine and idle it for about 10 minutes and then move the selector lever through each gear range, ending in "P".
3. Check the fluid level with the engine idling.
4. Remove the dipstick and clean it with lint-free paper. Reinsert it into the charging pipe as far as it will go.
5. Remove the dipstick and note the reading.

Keep the fluid at the proper level.

- **Overfilling may blow off the fluid during high speed driving.**
- **Underfilling may cause the clutches to slip, and finally break them.**

Unit: mm (in)

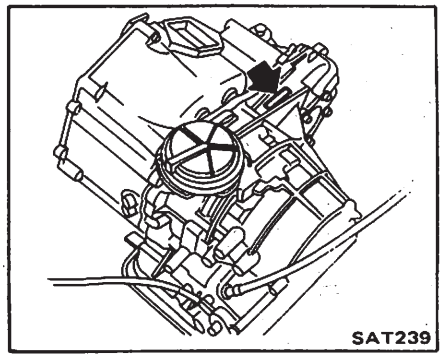
Ambient temperature	Fluid level	Ambient temperature	Fluid level
30 - 50°C (86 - 122°F)	Type 1. Type 2. 	–10 - 10°C (14 - 50°F)	
10 - 30°C (50 - 86°F)		–30 - –10°C (–22 - 14°F)	

SAT611

IDENTIFICATION NUMBER LABEL

Location

The label is pasted on right upper face of transmission case.

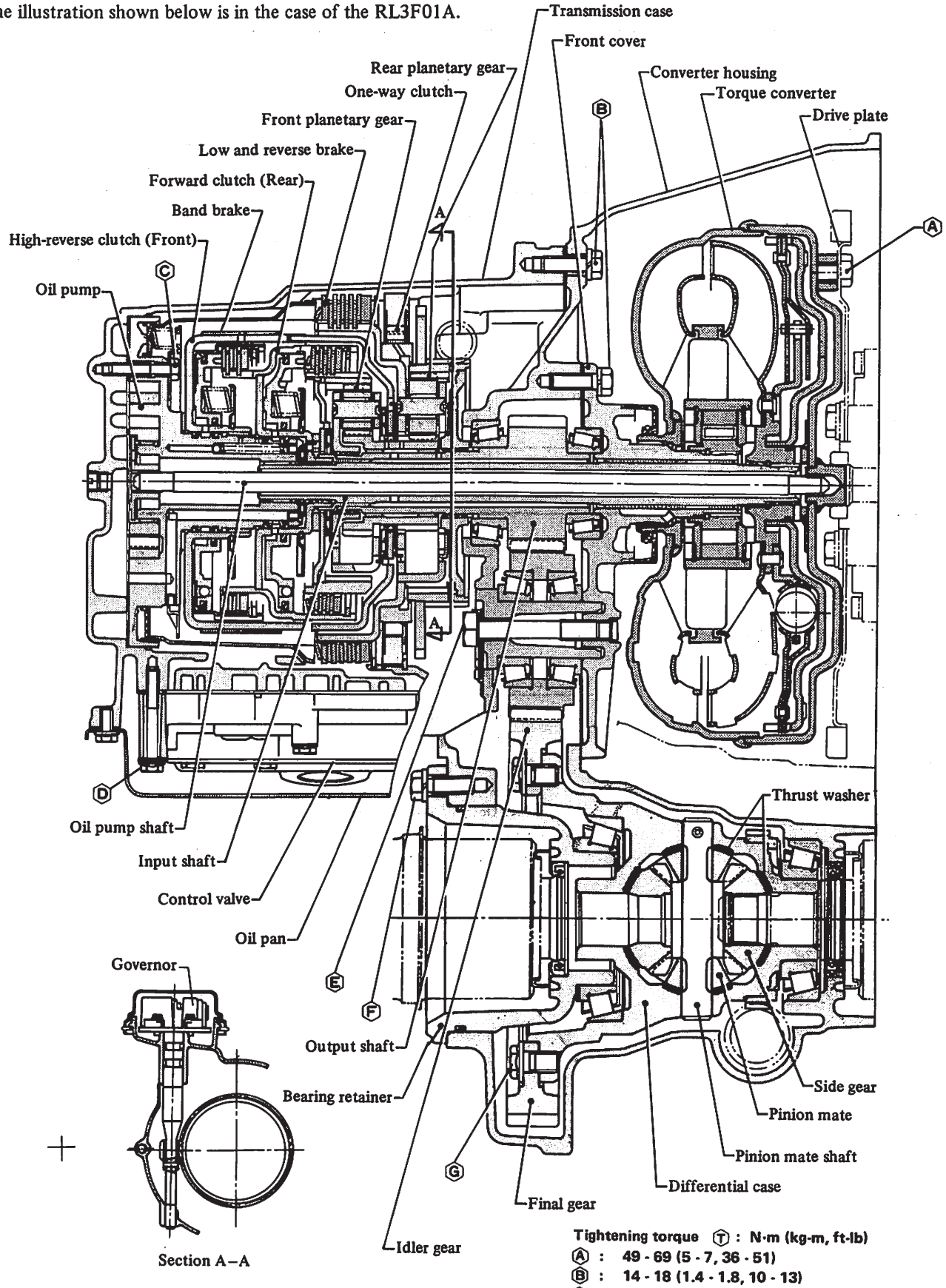


Number designation

0 6 0 1 2 3 4

- Serial production number for the month
- Month of production
  1: Jan., 2: Feb., ...
  X: Oct., Y: Nov., Z: Dec.
- This figure denoting the transaxle model
  0: Automatic transaxle
  1.2, and 9: Manual transaxle

The illustration shown below is in the case of the RL3F01A.



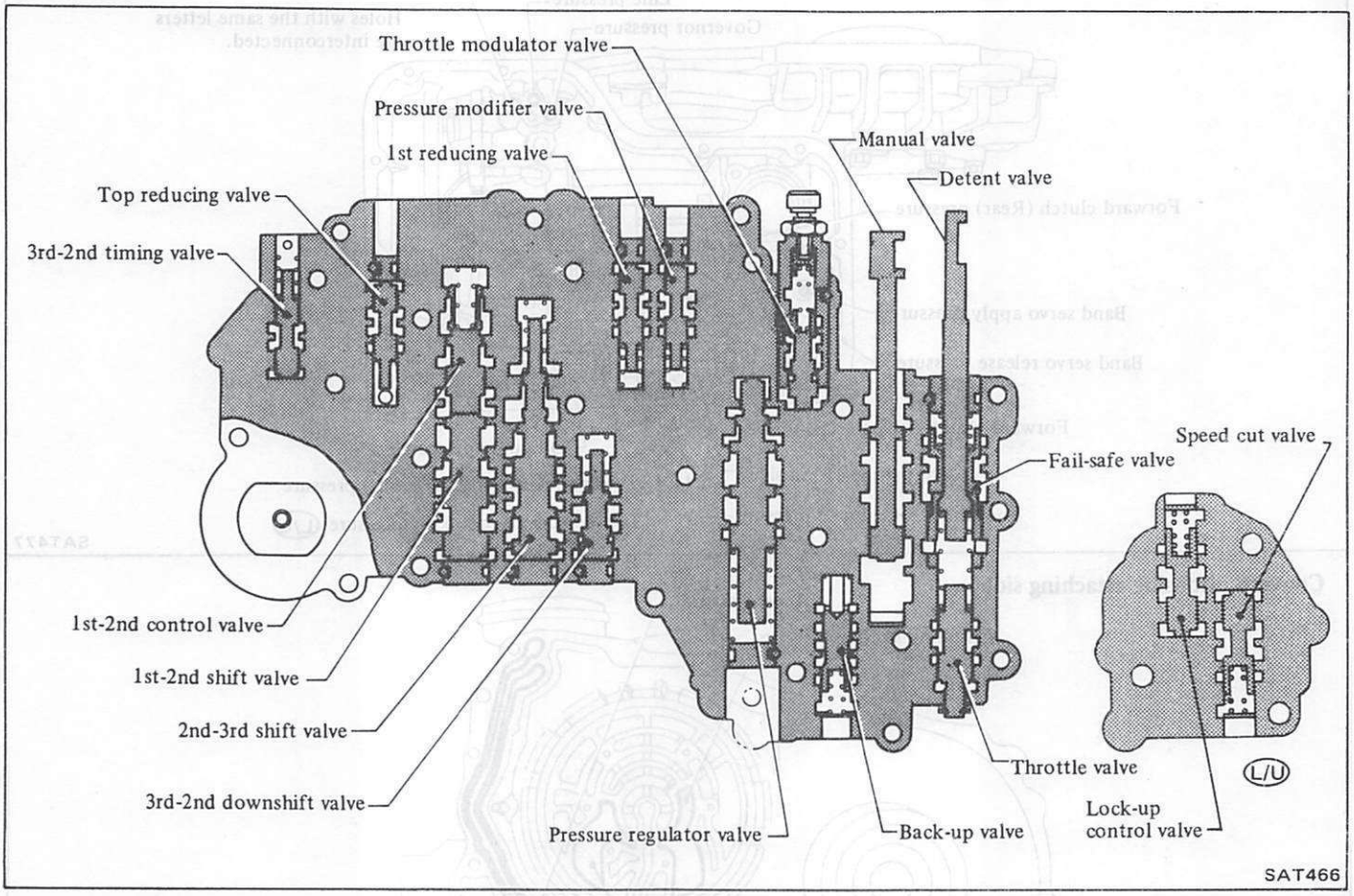
Tightening torque (T) : N·m (kg-m, ft-lb)

(A) : 49 - 69 (5 - 7, 36 - 51)
(B) : 14 - 18 (1.4 - 1.8, 10 - 13)
(C) : 7 - 9 (0.7 - 0.9, 5.1 - 6.5)
(D) : 7 - 9 (0.7 - 0.9, 5.1 - 6.5)
(E) : 3 - 4 (0.3 - 0.4, 2.2 - 2.9)
(F) : 19 - 25 (1.9 - 2.5, 14 - 18)
(G) : 69 - 78 (7.0 - 8.0, 51 - 58)

SAT612

HYDRAULIC CONTROL UNIT AND VALVES

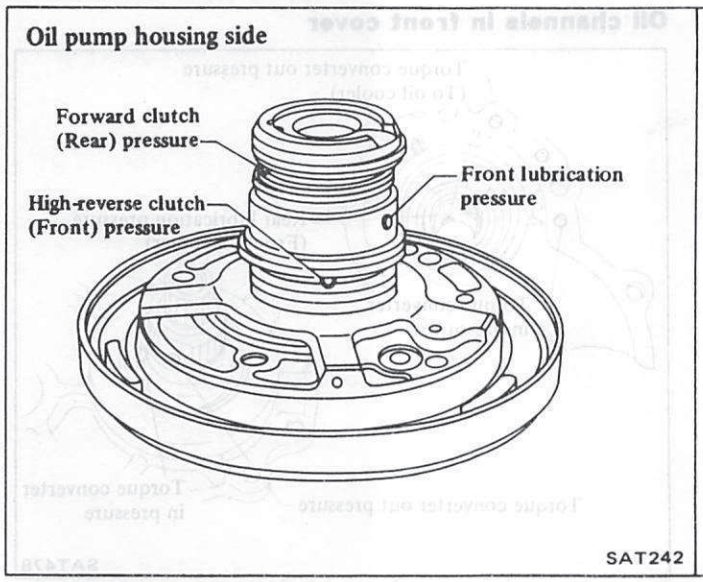
Control valve

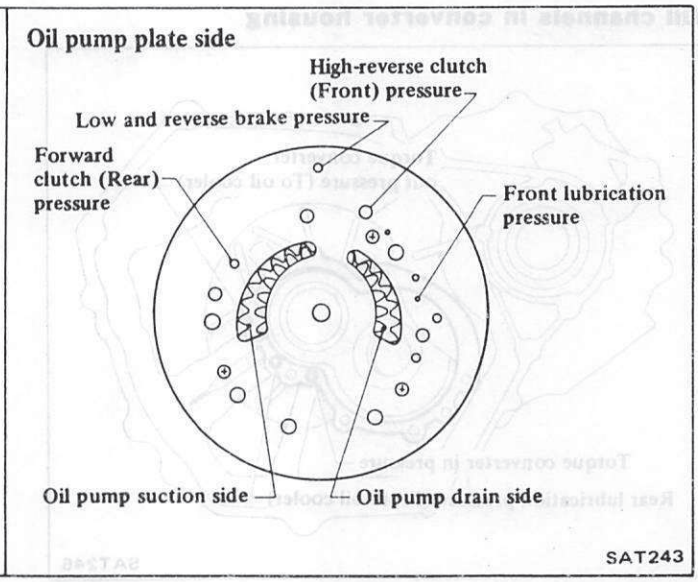


OIL CHANNEL

Oil channels which connect components are located in areas shown below.

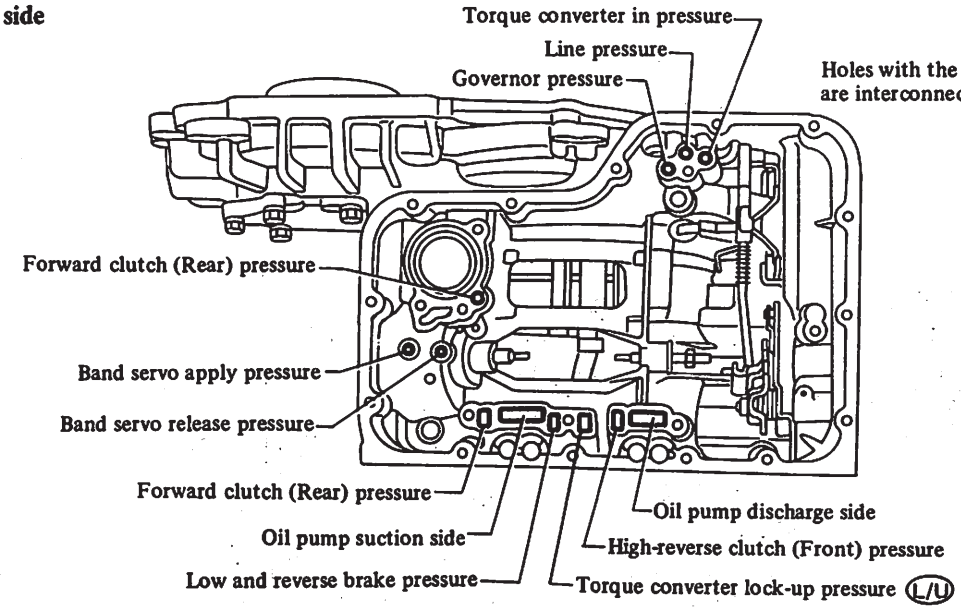
Oil channels in oil pump housing





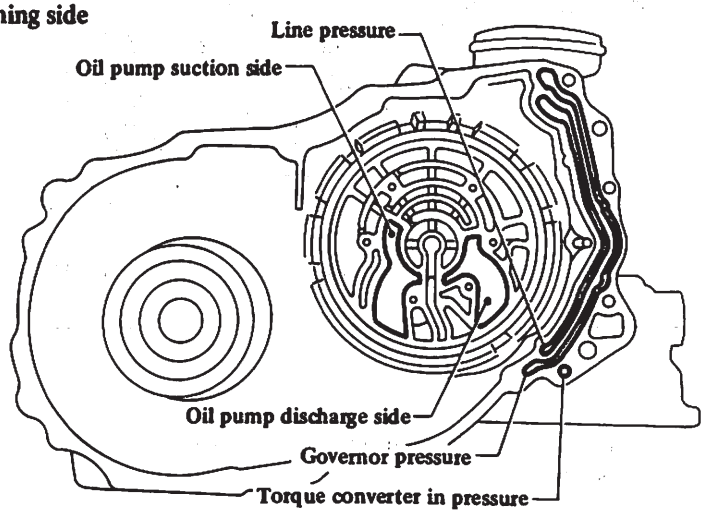
Oil channels in transmission case

Lower face side



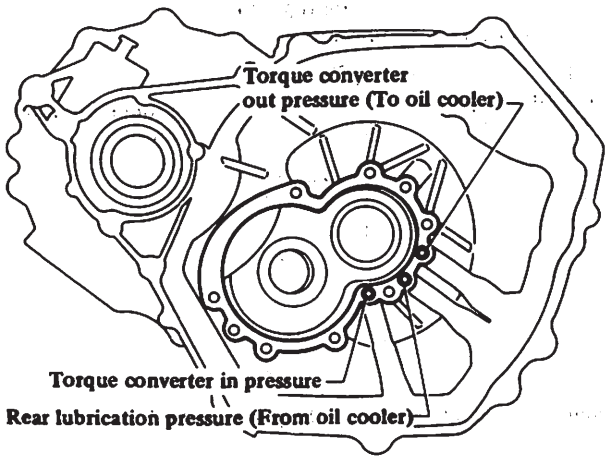
SAT477

Converter housing attaching side



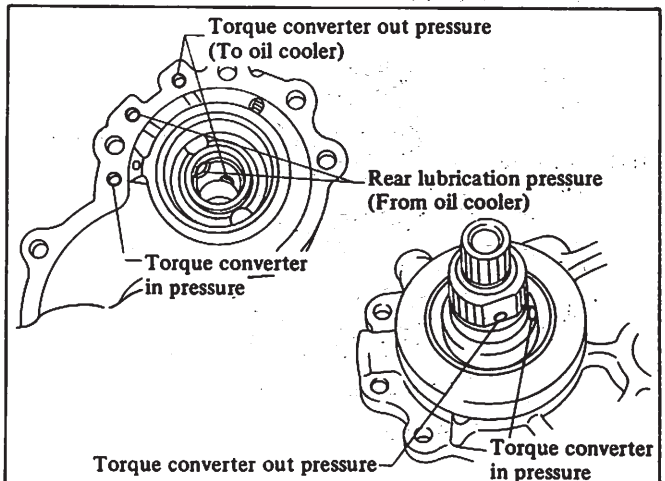
SAT245

Oil channels in converter housing



SAT246

Oil channels in front cover



SAT478

MECHANICAL OPERATION

In the RL3F01A automatic transaxle, each part operates as shown in the following table at each gear select position.

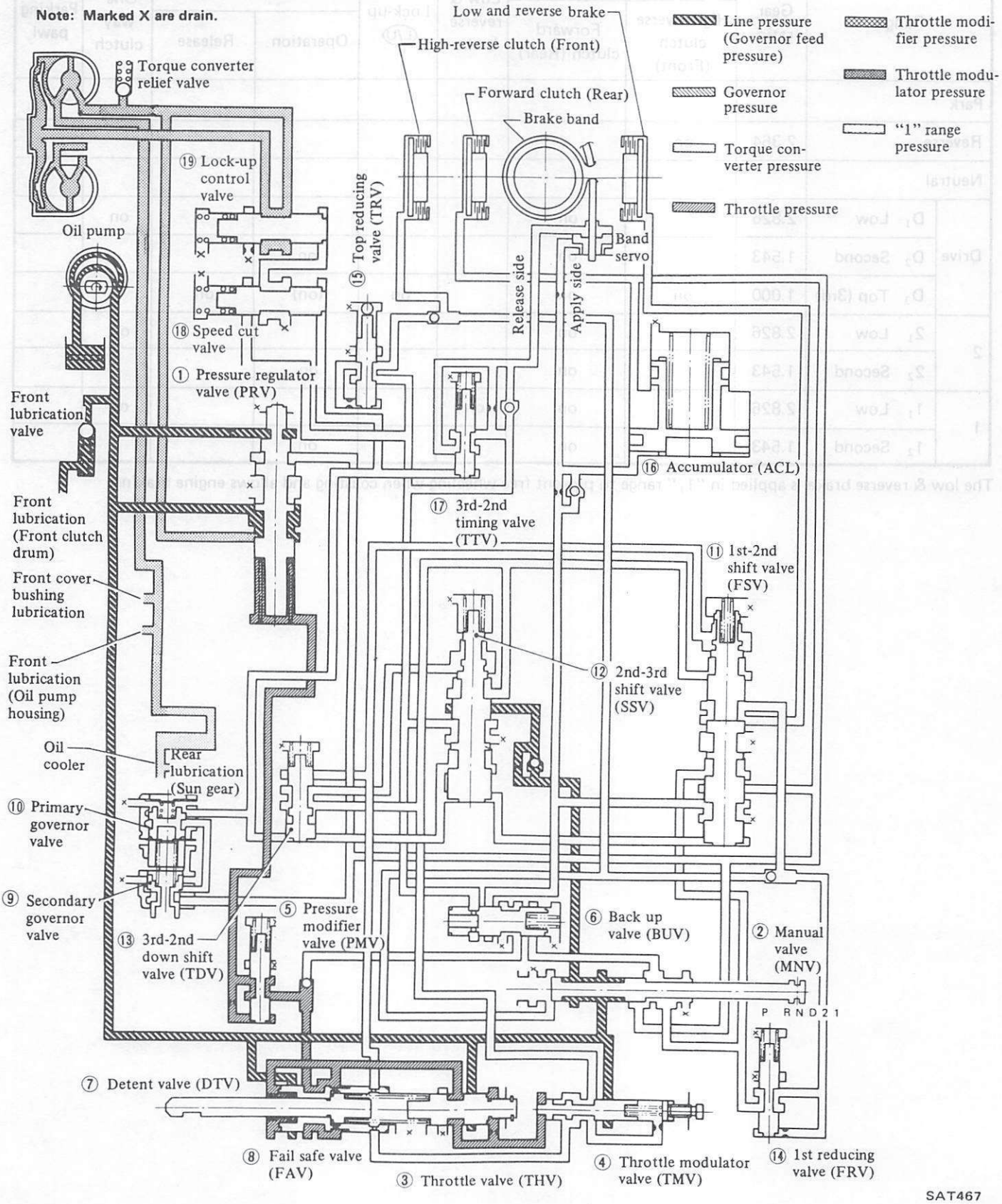
Range		Gear ratio	Clutch		Low & reverse brake	Lock-up (L/U)	Band servo		One-way clutch	Parking pawl
			High-reverse clutch (Front)	Forward clutch (Rear)			Operation	Release		
Park										on
Reverse		2.364	on		on					
Neutral										
Drive	D_1 Low	2.826		on					on	
	D_2 Second	1.543		on			on			
	D_3 Top (3rd)	1.000	on	on		on	(on)	on		
2	2_1 Low	2.826		on					on	
	2_2 Second	1.543		on			on			
1	1_1 Low	2.826		on	on				on	
	1_2 Second	1.543		on			on			

The low & reverse brake is applied in "1_1" range to prevent free wheeling when coasting and allows engine braking.

HYDRAULIC CONTROL CIRCUITS

The illustration shown below is in the case of the RL3F01A.

Oil Pressure Circuit Diagram - "N" range (Neutral)



SAT467

ON-VEHICLE SERVICE

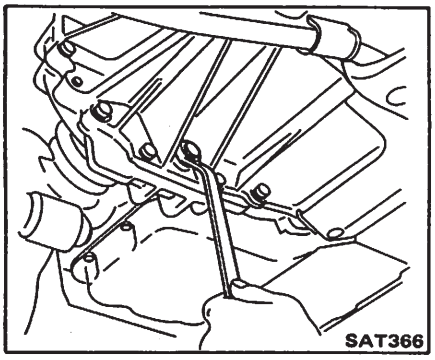
The following parts can be serviced with the transaxle on the vehicle.

1. Control valve assembly
2. Throttle wire
3. Governor shaft assembly
4. Inhibitor switch
5. Bearing retainer oil seal
6. Converter housing oil seal

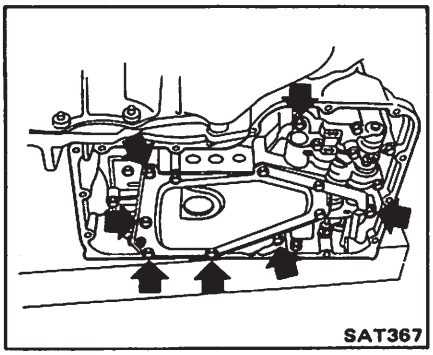
Check and/or replace faulty parts as follows:

CONTROL VALVE ASSEMBLY

1. Remove hexagon plug and drain oil completely.



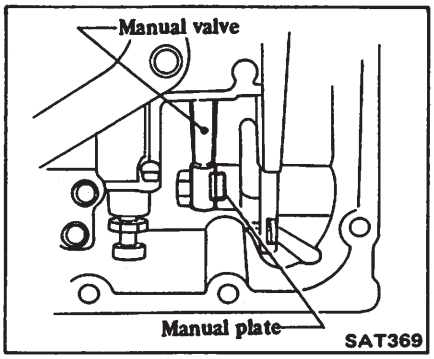
2. Remove oil pan guard, oil pan and gasket.
3. Remove control valve assembly.



4. Disassemble, inspect and assemble control valve assembly. Refer to page AT-24 for Control Valve Body.
5. Install control valve assembly.

Ⓣ : **7 - 9 N·m**
(0.7 - 0.9 kg-m,
5.1 - 6.5 ft-lb)

a. Set manual shaft at Neutral, then align manual plate with groove in manual valve of control valve assembly.



b. Install detent valve with its groove facing forward.
c. After installing control valve to transmission case, make sure that control lever can be moved to all positions.

6. Install gasket, oil pan and oil pan guard.

Ⓣ : **5 - 7 N·m**
(0.5 - 0.7 kg-m,
3.6 - 5.1 ft-lb)

7. Apply sealant to threads of hexagon plug, and install it in place.

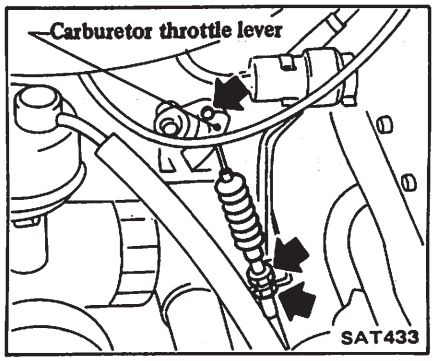
Ⓣ : **7 - 13 N·m**
(0.7 - 1.3 kg-m,
5.1 - 9.4 ft-lb)

8. Refill automatic transaxle fluid.

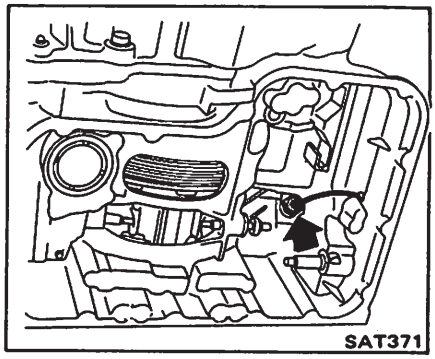
Oil capacity:
Refer to S.D.S.

THROTTLE WIRE

1. Remove control valve assembly. Refer to Control Valve Assembly.
2. Disconnect throttle wire from carburetor throttle valve.



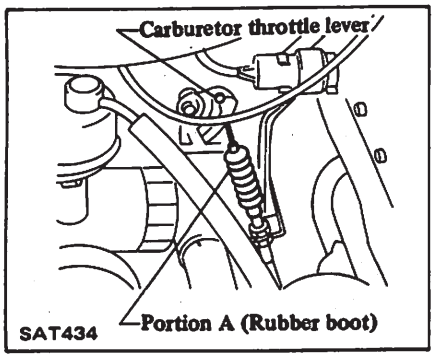
3. Disconnect the other end of throttle wire from throttle lever.
4. Remove throttle wire from transmission case.



5. Install throttle wire in the reverse order of removal. After tightening nut, bend the lock plate securely.

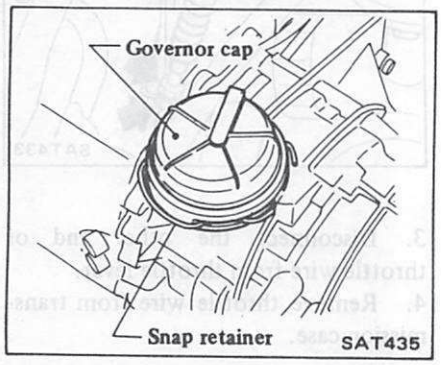
Ⓣ : **Throttle wire securing nut**
2 - 3 N·m
(0.2 - 0.3 kg-m,
1.4 - 2.2 ft-lb)

6. Adjust throttle wire. Refer to Minor Adjustments.
7. After properly adjusting throttle wire, turn portion (A) to correct any twisting of rubber boot. Ensure the parting line is as straight as possible.

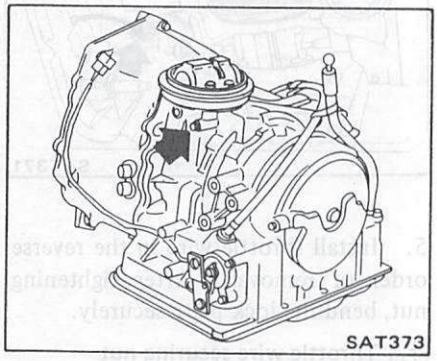


GOVERNOR SHAFT ASSEMBLY

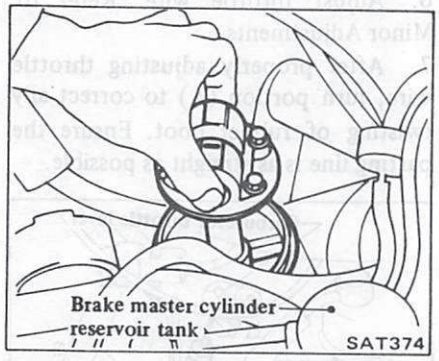
1. Disconnect battery terminal.
2. Remove radiator reservoir tank.
3. Remove battery.
4. Remove battery support bracket.
5. Remove snap retainer, governor cap with breather hose, and seal ring.



6. Remove governor shaft securing bolt.



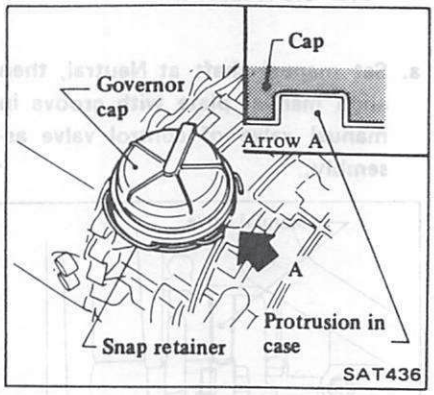
7. Remove governor shaft assembly.



8. Disassemble, check and reassemble governor shaft assembly. Refer to page AT-33 for Governor.

9. Install governor shaft assembly.
10. Install O-ring, governor cap with breather hose, then secure it with snap retainer.

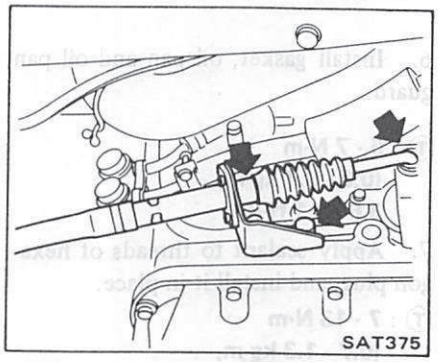
When installing governor cap, pay attention to its direction.



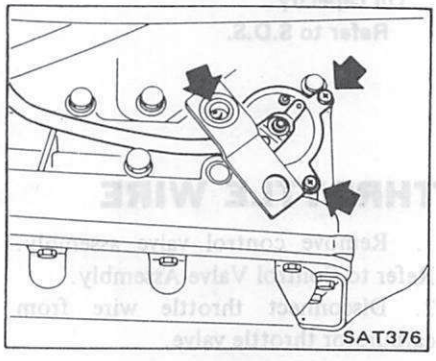
11. Install battery support bracket, battery and radiator reservoir tank.
12. Connect battery terminal.

INHIBITOR SWITCH

1. Remove undercover.
2. Remove control cable end from unit.



3. Disconnect harness at connector, then remove inhibitor switch.



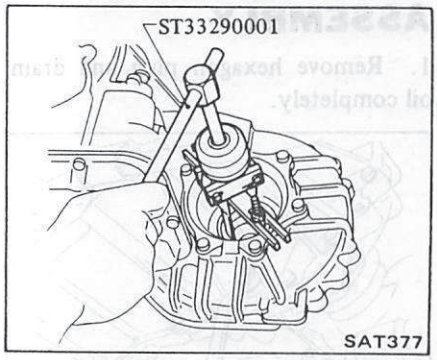
4. Install inhibitor switch in the reverse order of removal.

Ⓣ : **2.0 - 2.5 N·m (0.20 - 0.25 kg-m, 1.4 - 1.8 ft-lb)**

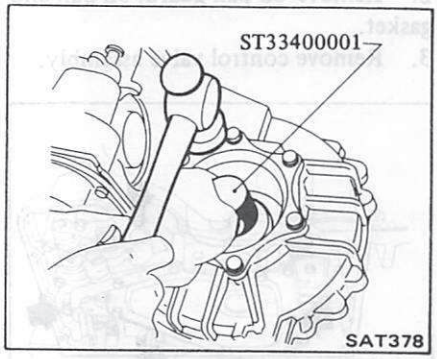
5. Adjust inhibitor switch. Refer to Minor Adjustments.

BEARING RETAINER OIL SEAL

1. Remove left drive shaft assembly. Refer to Drive Shaft for removal.
2. Remove oil seal.



3. Apply coat of automatic transaxle fluid to oil seal surface, then drive new seal into place.

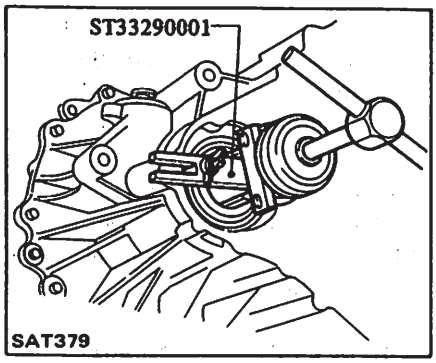


4. Install left drive shaft assembly. Refer to Drive Shaft for installation.

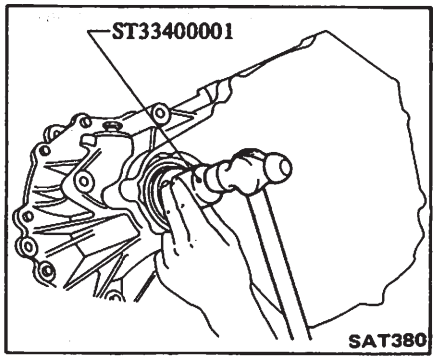
Be extremely careful not to scratch oil seal when inserting drive shaft.

CONVERTER HOUSING OIL SEAL

1. Remove right drive shaft assembly. Refer to Drive Shaft for removal.
2. Remove oil seal.



3. Apply coat of automatic transaxle fluid to oil seal surface, then drive new seal into place.



4. Install right drive shaft assembly. Refer to Drive Shaft for installation.

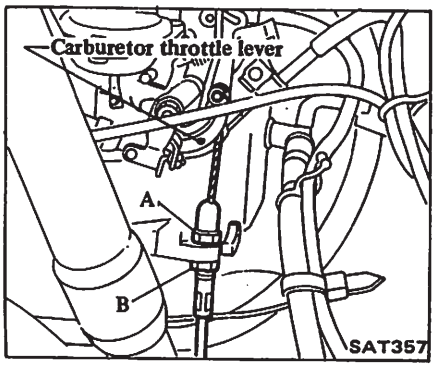
Be extremely careful not to scratch oil seal when inserting drive shaft.

MINOR ADJUSTMENTS

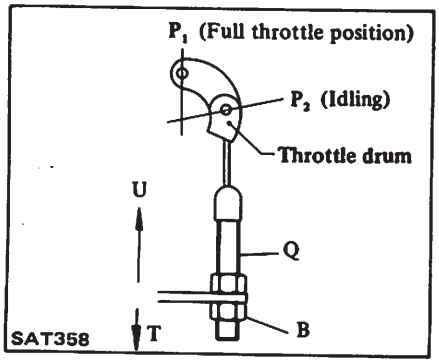
THROTTLE WIRE ADJUSTMENT

Throttle wire is adjusted by means of double nuts on carburetor side.

1. Loosen throttle wire double nuts A and B on carburetor side.



2. With throttle drum set at "P_1" (fully-open), move fitting Q fully in direction T and tighten nut B in direction U.

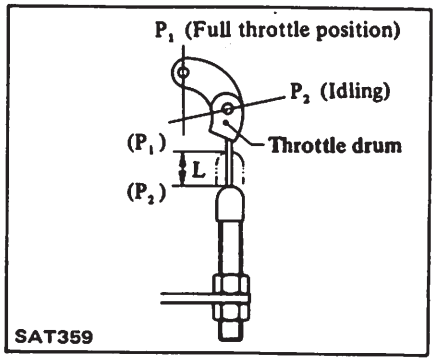


3. Reverse nut B 1.0 to 1.5 revolutions in direction T, then tighten nut A securely. Throttle drum should be held at "P_1".

Ⓣ : **Double nuts**
8 - 10 N-m
(0.8 - 1.0 kg-m,
5.8 - 7.2 ft-lb)

4. Ensure that throttle wire stroke L is within specified range between full throttle and idle.

Throttle wire stroke:
27.4 - 31.4 mm
(1.079 - 1.236 in)



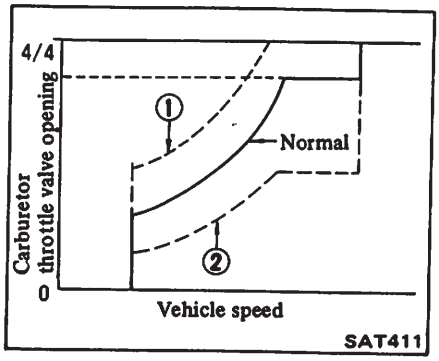
a. Adjust throttle wire stroke when throttle wire/accelerator wire is installed or after carburetor has been adjusted.

b. Put marks on throttle wire to facilitate measuring wire stroke.

Problems arising from improper adjustment of throttle wire

If throttle wire stroke is improperly adjusted, the following problems may arise.

- When full-open position "P_1" of throttle drum is closer to direction T, shift schedule will be as shown by ② in figure below, and kick-down range will greatly increase.



- When full-open position "P_1" of throttle drum is closer to direction U, shift schedule will be as shown by ① in figure above, and kick-down range will not occur.

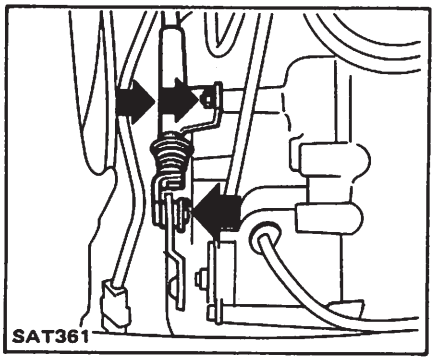
CONTROL CABLE ADJUSTMENT

Adjustment of the control cable is an important adjustment of the automatic transaxle. Move the shift lever from the "P" range to "1" range. You should be able to feel the detents in each range.

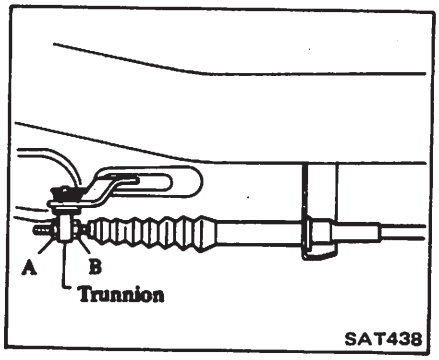
If the detents cannot be felt or the pointer indicating the range is improperly aligned, the control cable needs adjustment.

Control cable adjustment

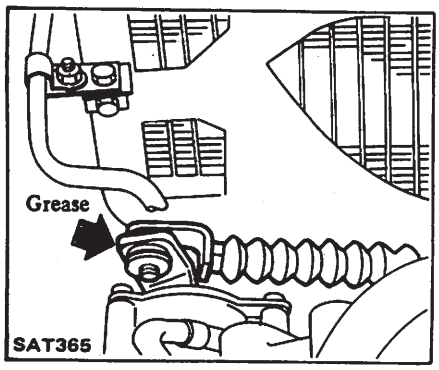
1. Place control lever at "P" range.
2. Connect control cable end to manual lever in transaxle unit, and tighten control cable securing bolts.



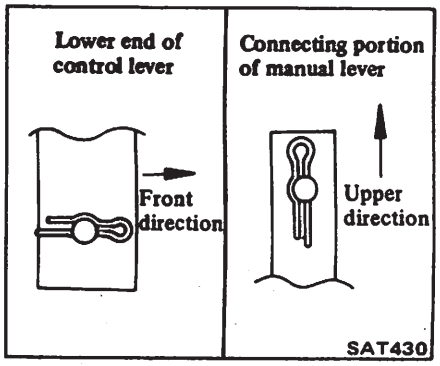
3. Move control lever from "P" range to "1" range. Make sure that control lever can move smoothly and without any sliding noise.
4. Place control lever at "P" range again.
5. Make sure that control lever locks at "P" range.
6. Remove control cable adjusting nut A and loosen nut B, then connect control cable to trunnion. Install nut A and B, then tighten them.



7. Move control lever from "P" range to "1" range again. Make sure that control lever can move smoothly and without any sliding noise.
8. Apply grease to spring washer.



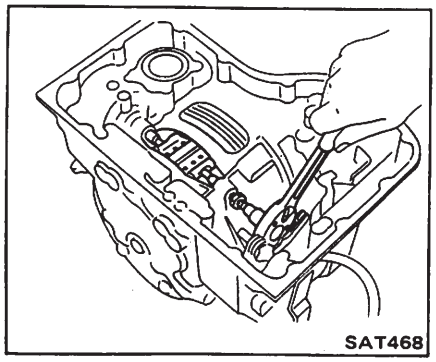
9. After properly adjusting control cable, check spring pin to see if it is assembled as shown in figure below. If not, adjust spring pin.



BRAKE BAND ADJUSTMENT

Proper brake band adjustment results in smooth shifting between 1st & 2nd and 2nd & 3rd. Although the adjustment is very simple, it is important to use an accurate torque wrench.

1. Loosen locknut.



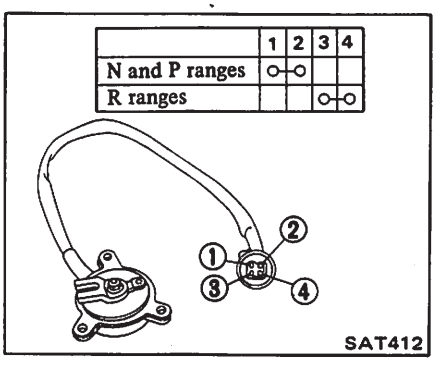
2. Torque anchor end pin lock nut to 4 to 6 N·m (0.4 to 0.6 kg-m, 2.9 to 4.3 ft-lb).
3. Back off anchor end pin lock nut 2.5 complete turns.
4. Tighten locknut to 16 to 22 N·m (1.6 to 2.2 kg-m, 12 to 16 ft-lb) while holding anchor end pin lock nut stationary.

INHIBITOR SWITCH ADJUSTMENT

The inhibitor switch has two major functions. It allows the back-up lights to illuminate when the shift lever is placed in the reverse range. It also acts as a neutral safety switch allowing current to pass from the starter only when the lever is placed in the "P" or "N" range.

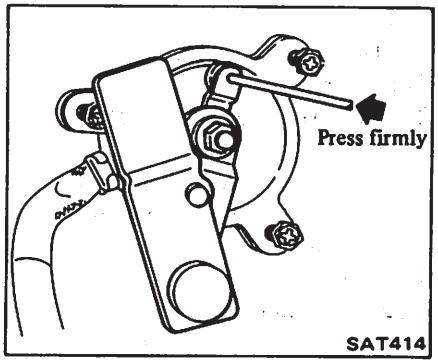
A continuity tester may be used to check the inhibitor switch for proper operation.

- Check continuity at "N", "P" and "R" ranges.



- With control lever held in Neutral, turn manual lever an equal amount in both directions to see if current flow ranges are nearly the same. (Current normally begins to flow before manual lever reaches a angle of 1.5° in either direction.)
  If current flows outside normal range, or if normal flow range is out of specifications, properly adjust inhibitor switch.

Adjust inhibitor switch as follows:
This adjustment can be done on the vehicle.
1. Loosen attaching screws.
2. Set select lever (manual shaft) at "N" position.
3. Insert a 2.5 mm (0.098 in) dia. pin into adjustment holes in both inhibitor switch and switch lever as near vertical as possible.



4. Tighten screws.

Ⓣ : **2.0 - 2.5 N·m (0.20 - 0.26 kg-m, 1.4 - 1.9 ft-lb)**

5. Recheck for continuity. If faulty, replace the switch.

REMOVAL AND INSTALLATION

TRANSAXLE ASSEMBLY

When dismounting the automatic transaxle from a vehicle, pay attention to the following points:

1. Before dismounting the transaxle, rigidly inspect it by using the "Trouble-shooting Chart", and dismount it only when it is necessary.
2. Dismount the transaxle with utmost care; and when mounting, observing the tightening torque indicated on another table, do not exert excessive force.

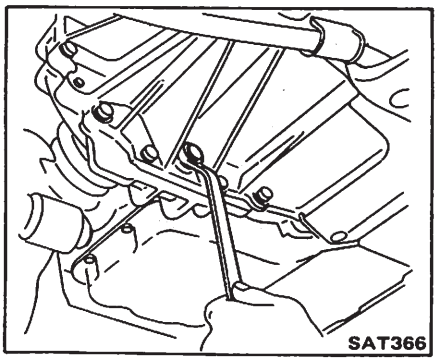
REMOVAL

In dismounting the automatic transaxle from a vehicle, proceed as follows:

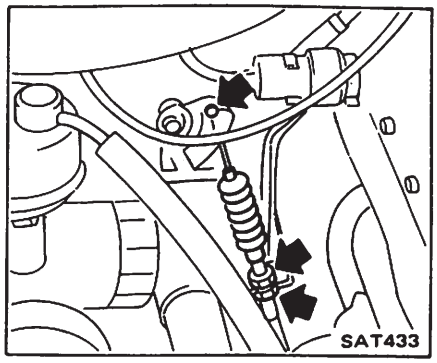
1. Disconnect battery ground cable from terminal.
2. Remove air cleaner (CD17 engine model).
3. Jack up vehicle and support it on safety stands. We recommend a hydraulic hoist or open pit be utilized, if available.

Observe all safety regulations.

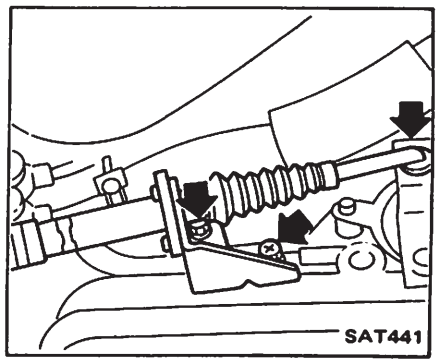
4. Remove front L.H. tire.
5. Drain oil.



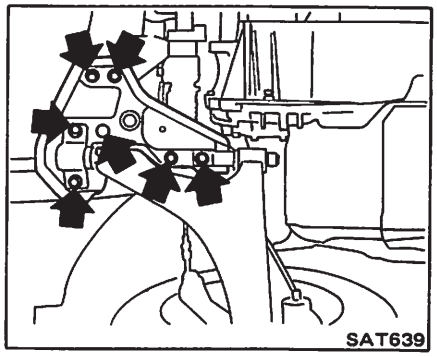
6. Remove left side fender protector.
7. Disconnect drive shafts. Refer to Drive shaft (Section FA) for removal.
8. Disconnect speedometer cable.
9. Disconnect throttle wire from throttle lever.



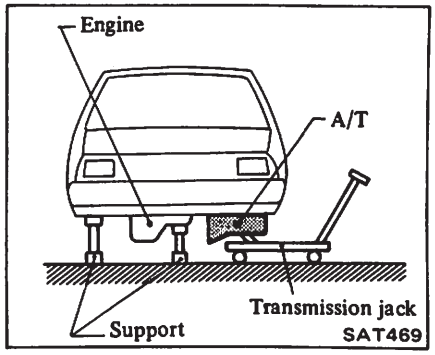
10. Remove control cable rear end from unit.



11. Remove oil level gauge tube.
12. Remove left-hand transverse link and gusset (CD17 engine model).

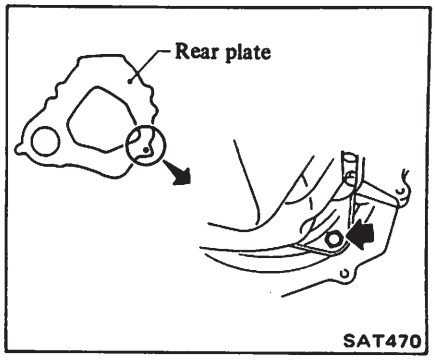


13. Place jack under transaxle and engine.



CAUTION:
Do not place the jack under the oil pan drain plug.

14. Disconnect oil cooler hoses from tubes.
15. Remove engine gusset (CD17 engine model).
16. Remove bolts securing torque converter to drive plate.



a. Remove those bolts turning crank shaft.
b. Before removing torque converter, inscribe chalk marks on two parts so that they may be replaced in their original positions during assembly.

17. Remove engine mount securing bolts.
18. Remove starter motor.
19. Remove bolts securing transaxle to engine. After removing these bolts, move the jack gradually until transaxle can be removed and take out transaxle from left side wheel house.

Plug up openings such as oil charging pipe, oil cooler tubes, etc.

CAUTION:
Take care when dismounting transaxle not to strike any adjacent parts.

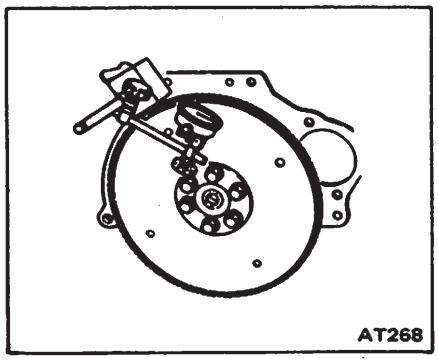
INSTALLATION

Installation of automatic transaxle on vehicle is in reverse order of removal. However, observe the following installation notes.

1. Drive plate runout

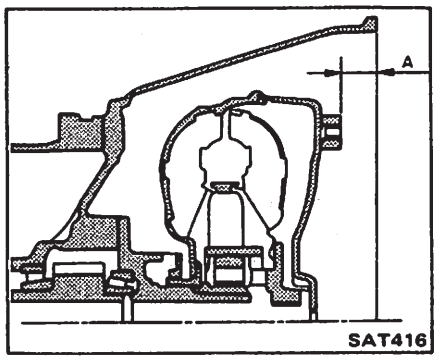
Turn crankshaft one full turn and measure drive plate runout with indicating finger of a dial gauge rested against plate.

Maximum allowable runout:
0.5 mm (0.020 in)



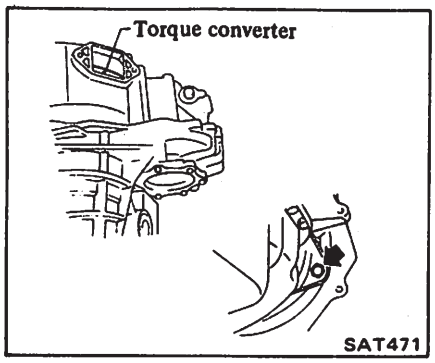
2. When connecting torque converter to transaxle, measure distance "A" to be certain that they are correctly assembled.

Distance "A":
More than 21.1 mm (0.831 in)



3. Bolt converter to drive plate.

When installing the first bolt, turn torque converter by reaching for it through hole in starter motor mounting portion on converter housing. Then align hole in drive plate with that in torque converter.



a. Align chalk marks painted across both parts during disassembly.
b. Before installing torque converter securing bolts, apply locking sealer to threads of bolts.

4. After converter is installed, rotate crankshaft several turns and check to be sure that transaxle rotates freely without binding.
5. Pour recommended automatic transaxle fluid up to correct level through oil charge pipe.
6. Connect control cable to manual shaft. Adjust control cable. Refer to Minor Adjustments.
7. Connect inhibitor switch wires.

a. Refer to page AT-13 for Inhibitor Switch Adjustment.
b. Inspect and adjust switch as above whenever it has to be removed for service.

8. Check inhibitor switch for operation:

Starter should be brought into operation only when selector lever is in "P" and "N" positions (it should not be started when lever is in "D", "2", "1" and "R" positions).

Back-up lamp should also light when selector lever is placed in "R" position.

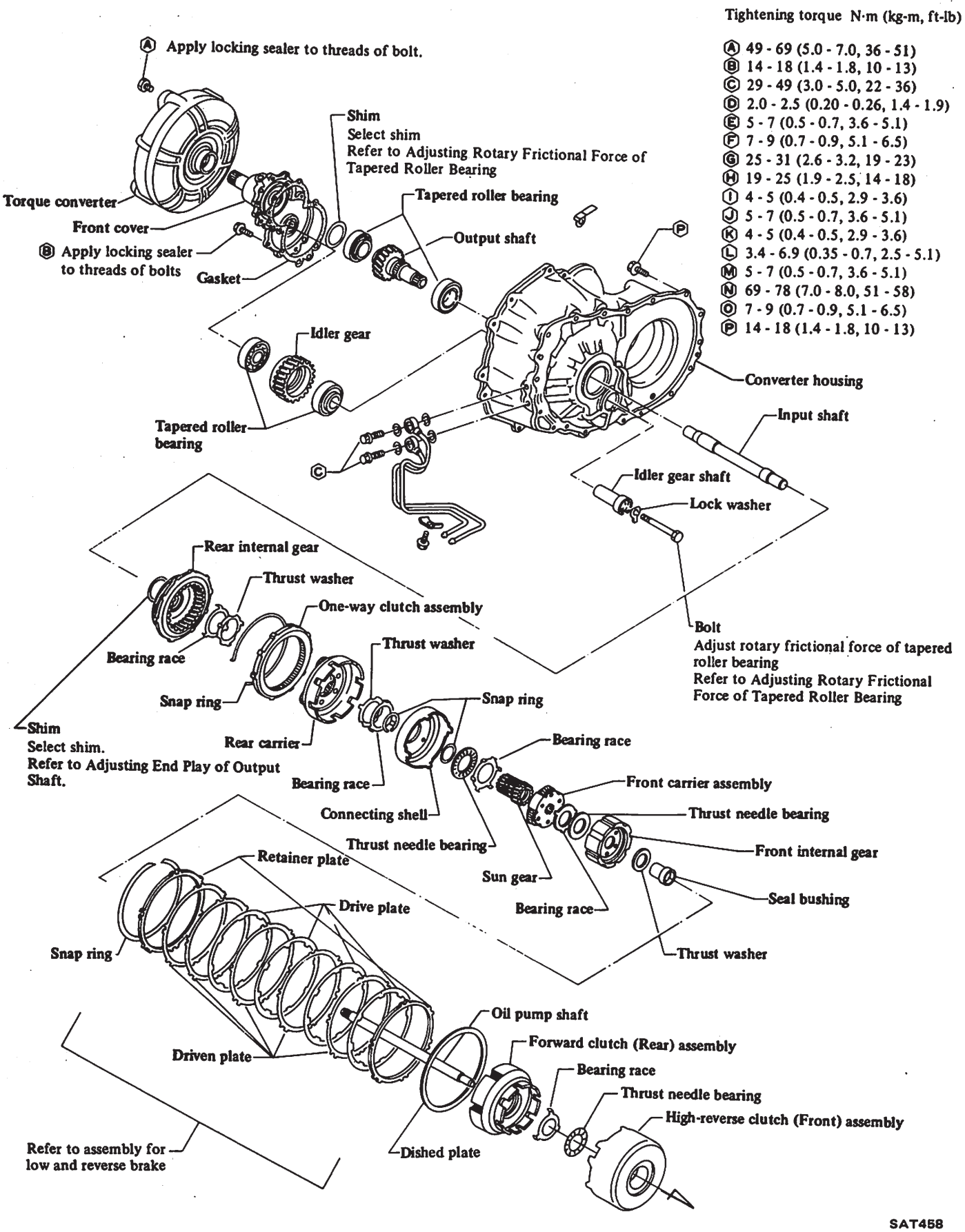
9. Check fluid level in transaxle. For detailed procedure, see page AT-2.
10. Move hand lever through all positions to be sure that transaxle operates correctly.

With hand brake applied, rotate engine at idling. Without disturbing the above setting, move selector lever through "N" to "D", to "2", to "1" and to "R". A slight shock should be felt by hand gripping hand lever each time transaxle is shifted.

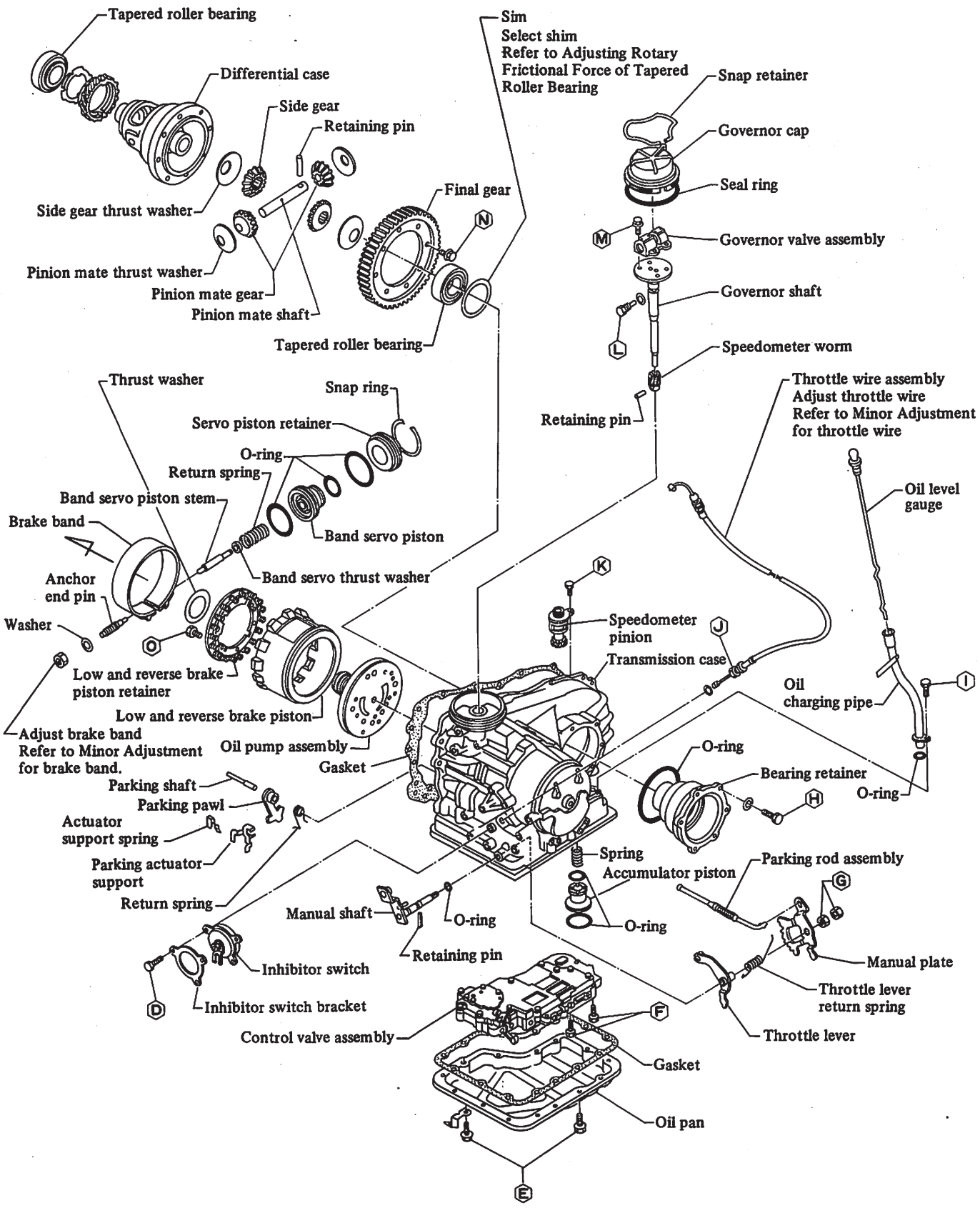
Refer to MA section.

11. Check to be sure that line pressure is correct. To do this, refer to page AT-46 for Line Pressure Test.
12. Perform stall test as described on Page AT-47.

MAJOR OVERHAUL OPERATIONS



SAT458


Tapered roller bearing
Differential case
Side gear
Retaining pin
Side gear thrust washer
Pinion mate thrust washer
Pinion mate gear
Pinion mate shaft
Final gear
N
Tapered roller bearing
Sim
Select shim
Refer to Adjusting Rotary Frictional Force of Tapered Roller Bearing
Snap retainer
Governor cap
Seal ring
M
Governor valve assembly
Governor shaft
L
Speedometer worm
Retaining pin
Throttle wire assembly
Adjust throttle wire
Refer to Minor Adjustment for throttle wire
Oil level gauge
Thrust washer
Snap ring
Servo piston retainer
O-ring
Return spring
Band servo piston stem
Brake band
Band servo piston
Band servo thrust washer
Anchor end pin
Washer
O
Low and reverse brake piston retainer
Low and reverse brake piston
Adjust brake band
Refer to Minor Adjustment for brake band.
Oil pump assembly
Gasket
K
Speedometer pinion
J
Transmission case
Oil charging pipe
I
O-ring
Bearing retainer
H
O-ring
Parking shaft
Parking pawl
Actuator support spring
Parking actuator support
Return spring
Spring
Accumulator piston
O-ring
Parking rod assembly
G
Manual shaft
O-ring
Retaining pin
Manual plate
Throttle lever return spring
Throttle lever
Inhibitor switch
D
Inhibitor switch bracket
Control valve assembly
F
Gasket
Oil pan
E

SAT613

SERVICE NOTES FOR DISASSEMBLY

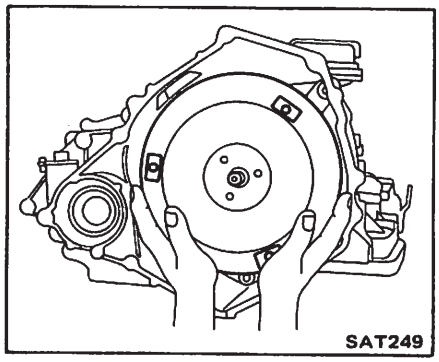
Before proceeding with disassembly, thoroughly clean the outside of the transaxle. It is important to prevent the internal parts of the transaxle from becoming contaminated by dirt or other foreign matter.

Disassembly should be done in a clean work area.

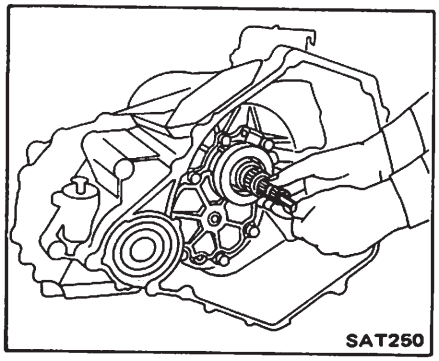
Use a nylon cloth or paper towel for wiping parts clean. Common shop rags can leave lint that might interfere with the transaxle's operation.

DISASSEMBLY

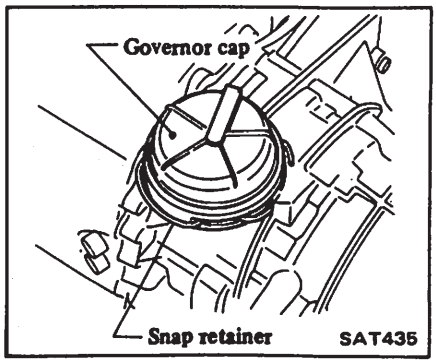
1. Remove hexagon plug, then drain transaxle fluid from plug hole.
2. Remove torque converter.



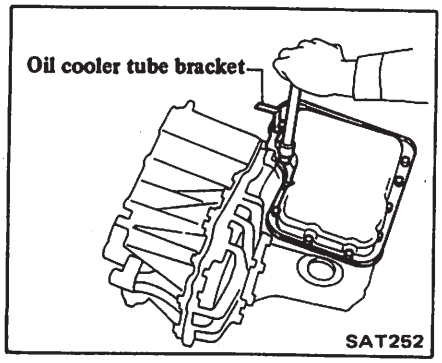
3. Remove oil pump shaft and input shaft.



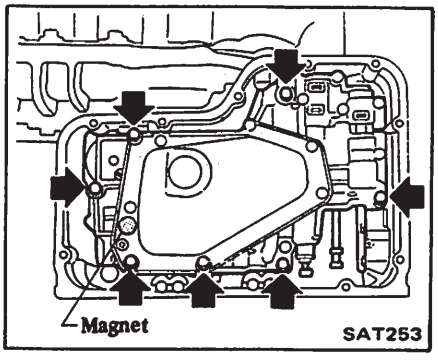
4. Remove snap retainer, governor cap with breather hose and O-ring.



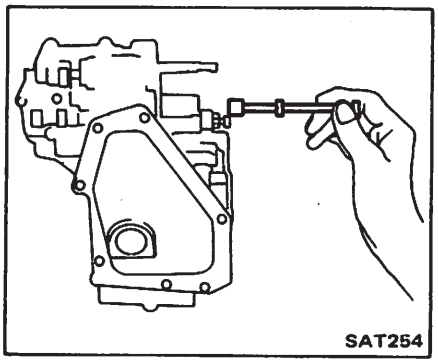
5. Remove oil pan guard and oil pan and inspect its contents. An analysis of any foreign matter can indicate the types of problems to look for. If the fluid is very dark, smells burned, or contains foreign particles, the frictional material (clutches, band.) may need replacement. A tacky film that will not wipe clean indicates varnish build up which can cause valves, servo, and clutches to stick and may inhibit pump pressure.



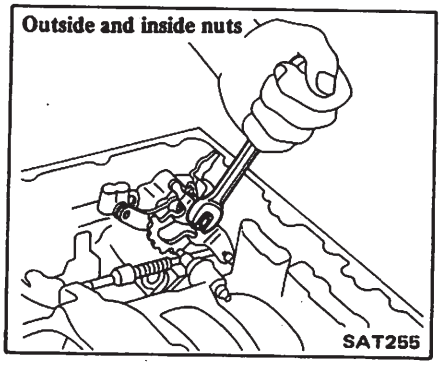
6. Remove control valve body and magnet.



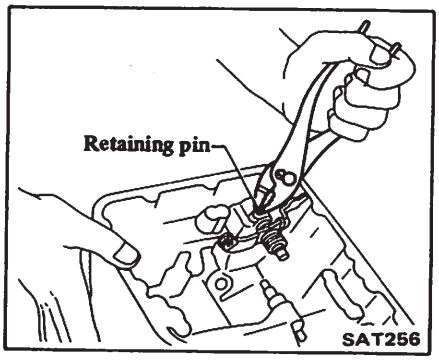
Remove manual valve from valve body as a precaution, to prevent valve from dropping out accidentally.



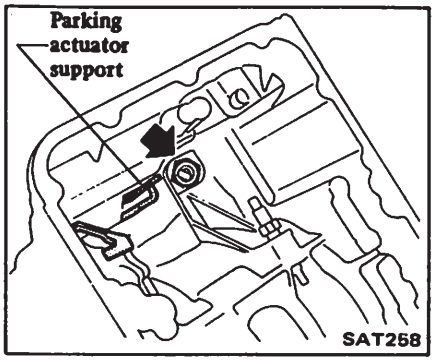
7. Remove manual shaft securing nuts.



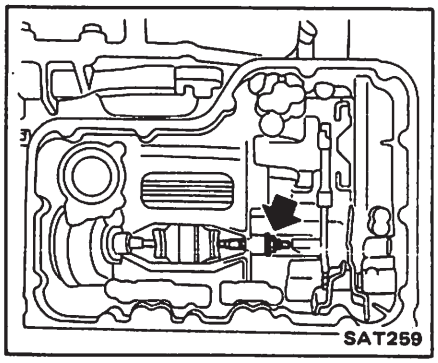
8. Pull out retaining pin, then remove throttle lever, manual plate, manual shaft, selector range lever and parking rod assembly.



9. Disconnect throttle wire from throttle lever, then remove throttle wire. Remove parking actuator support from transmission case.

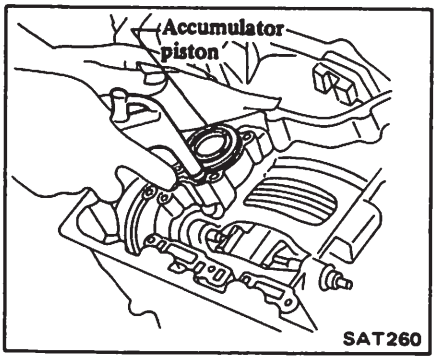


10. Loosen band brake piston stem lock nut, then back off piston stem.

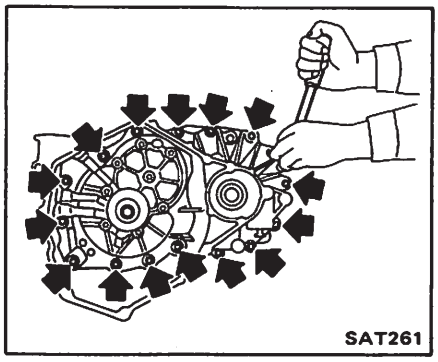


11. Remove accumlator piston with compressed air.

Be careful that accumulator piston does not jump out.

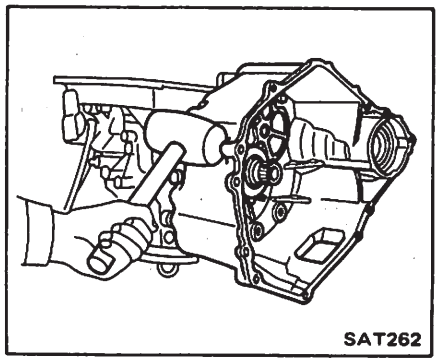


12. Remove converter housing securing bolts.

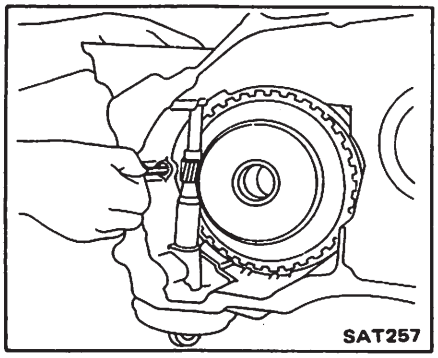


13. Separate converter housing from transmission case by tapping it.

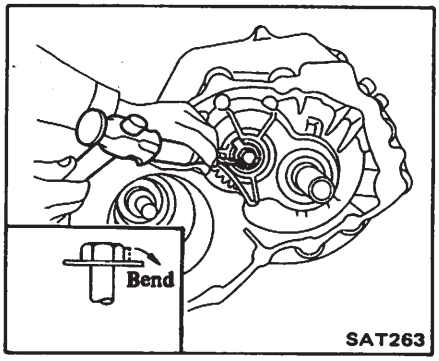
Be careful not to drop final drive assembly.



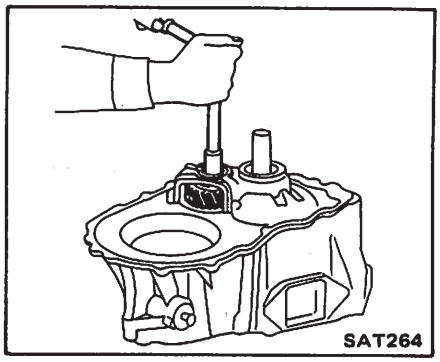
14. Remove final drive assembly.
15. Pull out parking pawl shaft, then remove parking pawl and return spring.



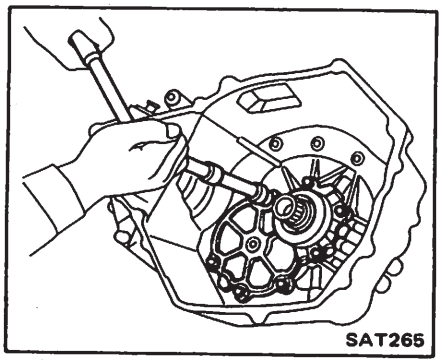
16. Straighten lock washer.



17. Remove idler gear bolt and lock washer.

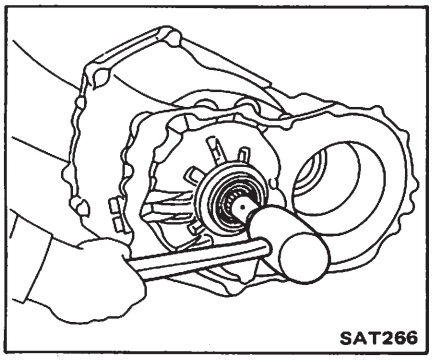


18. Remove front cover retaining bolts.

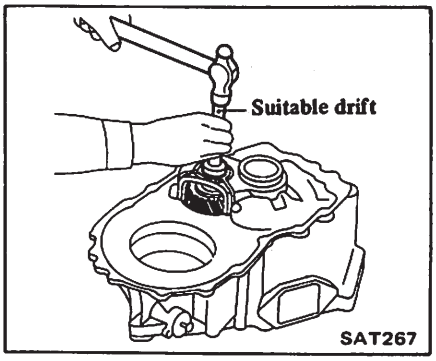


19. Tap output shaft, then remove it together with front cover.

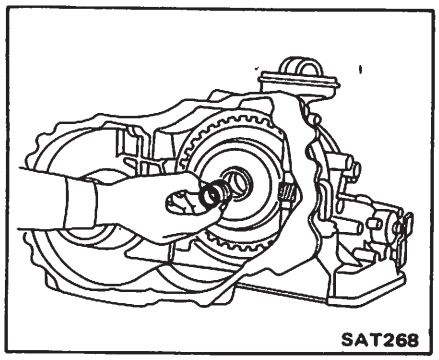
a. When tapping output shaft, be sure to hold front cover so that it does not fall.
b. Adjusting shim is attached to rear internal gear side of output shaft so be careful not to lose it.



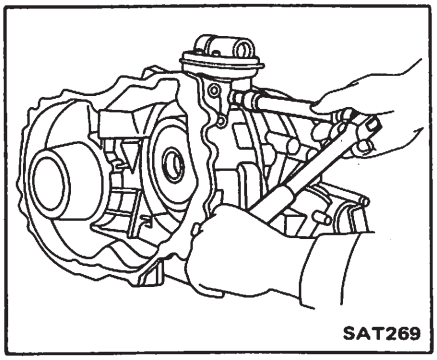
20. Remove front cover gasket.
21. Remove idler gear, idler gear shaft and taper roller bearings by tapping idler gear shaft.



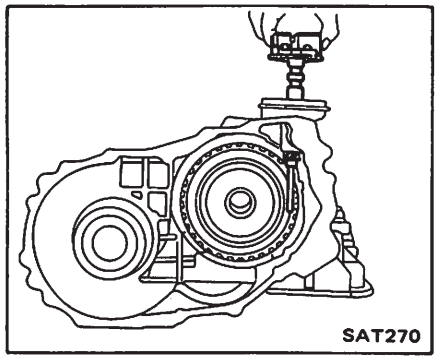
22. Remove seal bushing.



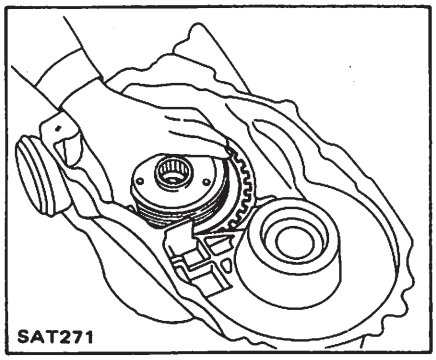
23. Remove governor shaft retaining bolt.



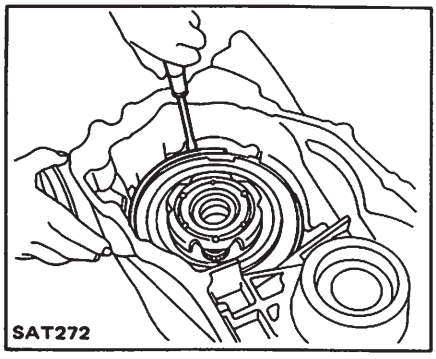
24. Pull out governor shaft.



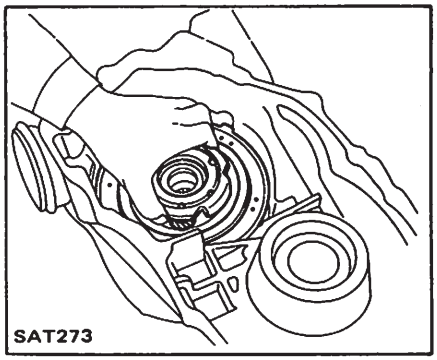
25. Remove rear internal gear, bearing race and thrust washer.



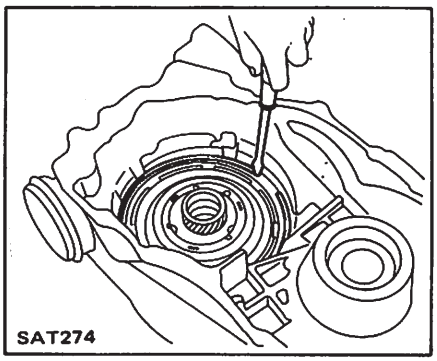
26. Remove one-way clutch snap ring.



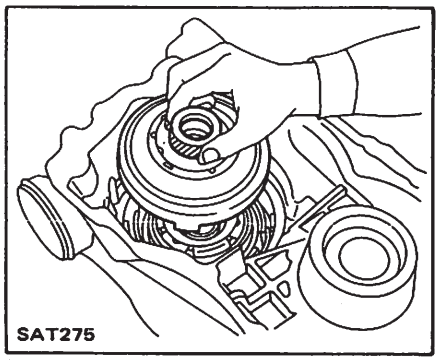
27. Remove one-way clutch assembly together with rear carrier assembly.



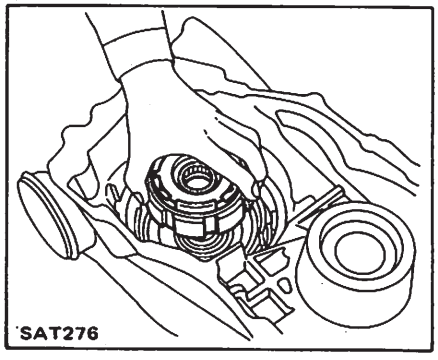
28. Remove bearing race and thrust washer.
29. Remove low and reverse brake snap ring.



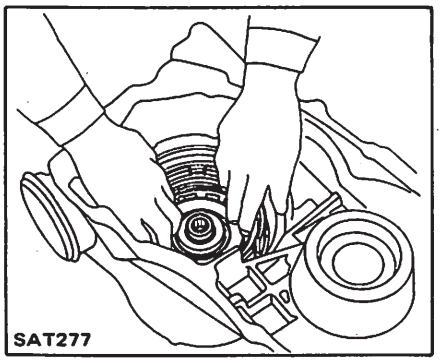
30. Remove shell & sun gear assembly, thrust needle bearing and bearing race.



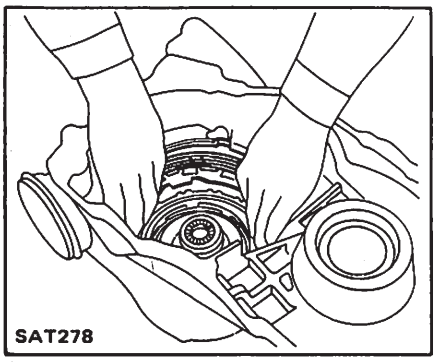
31. Remove front carrier assembly together with front internal gear.



32. Remove forward clutch (Rear) assembly and plastic thrust washer.

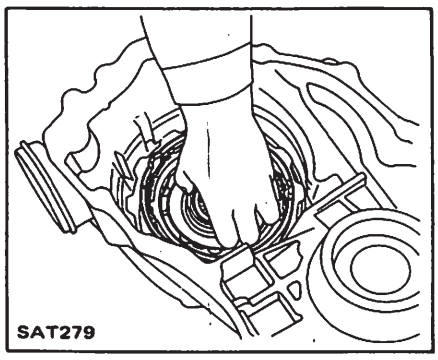


33. Remove low and reverse brake retaining plate, driven plates and drive plates at the same time.

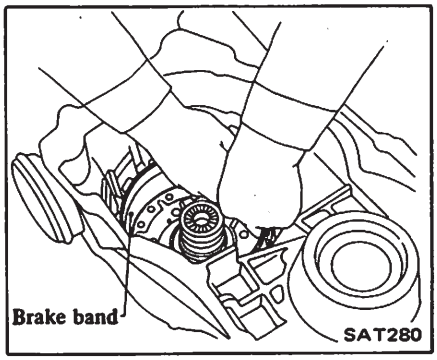


34. Remove high-reverse clutch (Front) assembly by turning it.

Check seal rings to ensure that they have not expanded. If they have, high-reverse clutch (Front) assembly will be hard to remove. If it is forcibly removed, seal rings may be damaged.

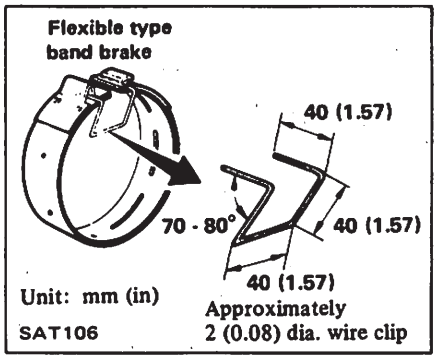


35. Remove brake band.

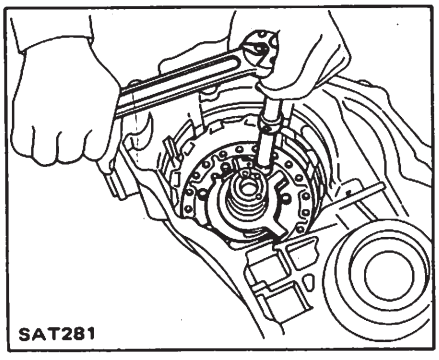


To prevent brake linings from cracking or peeling, do not stretch the flexible band unnecessarily. Before removing the brake band, always secure it with a clip as shown in the figure below.

Leave the clip in position after removing the brake band.

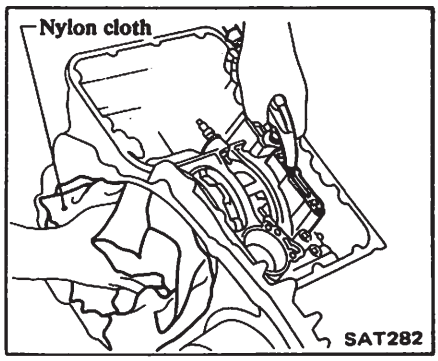


36. Remove low and reverse brake retainer.

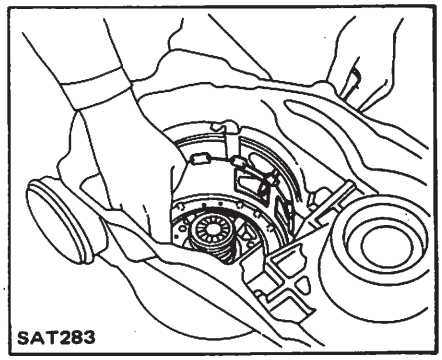


37. Remove low and reverse brake piston with compressed air.

Be sure to hold low and reverse brake piston with nylon cloth so that they do not jump out.

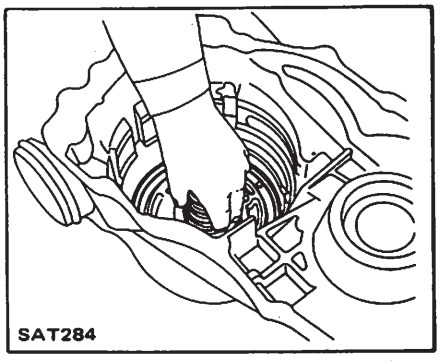


If compressed air is not available, remove it with a screwdriver.

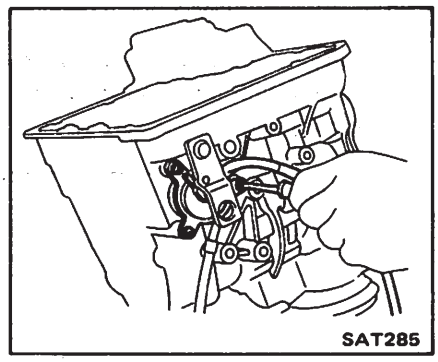


38. Remove oil pump assembly, thrust washer and thrust needle bearing.

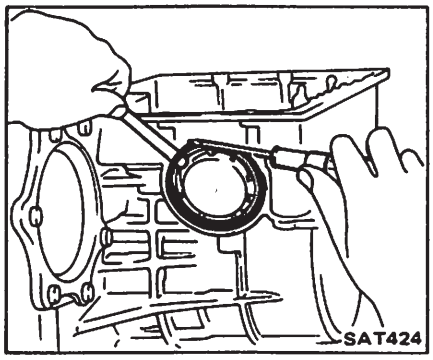
The oil pump and transmission case fit loosely, but the clearance is very small. So always lift it straight out of transmission case.



39. Remove inhibitor switch.



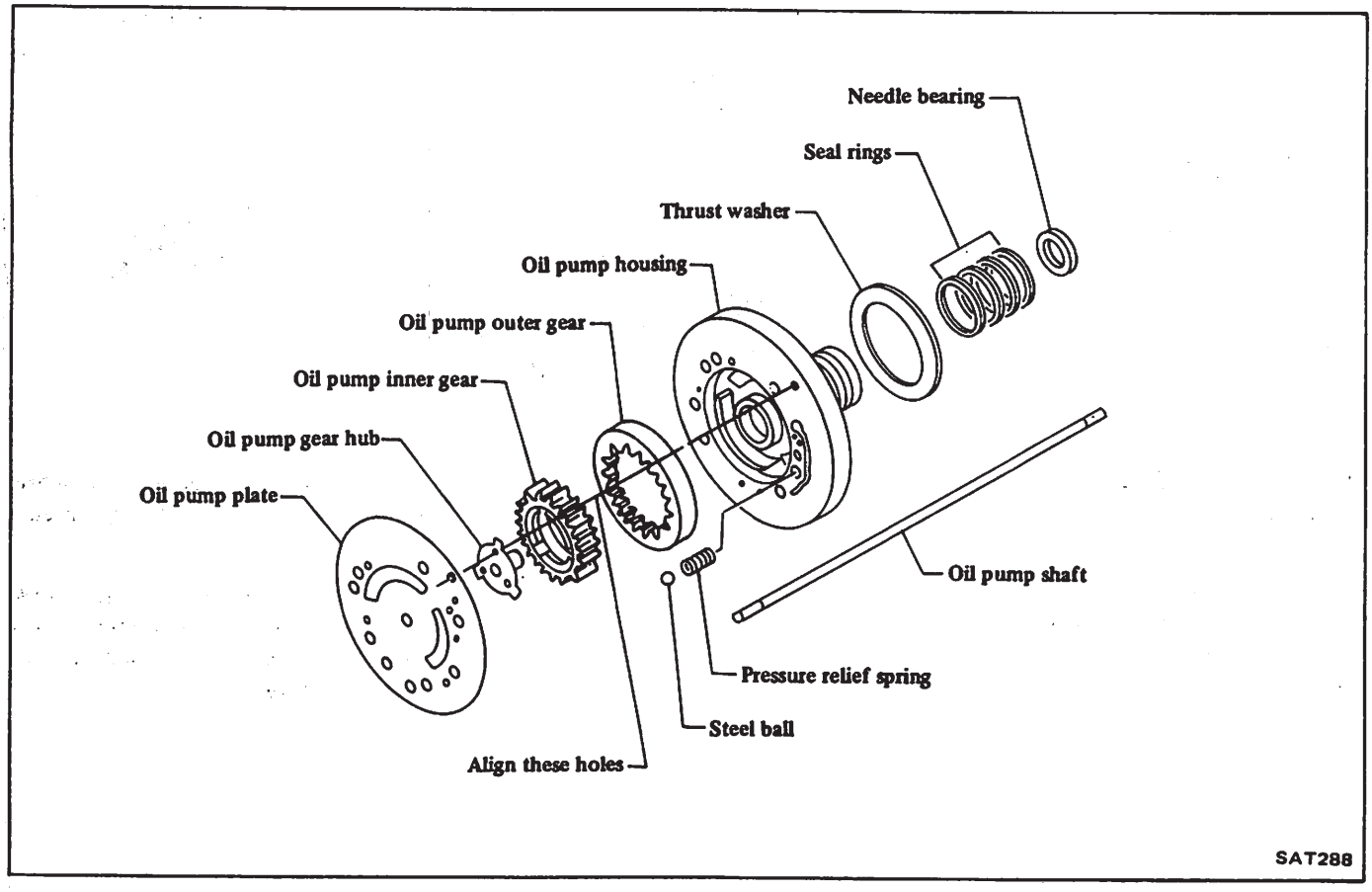
40. Remove band servo piston and return spring. Then, transmission case can be removed.



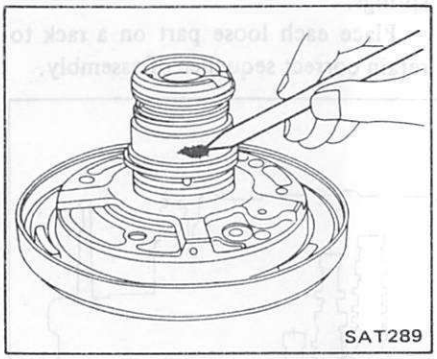
COMPONENT PARTS

The transaxle consists of many small parts that are quite alike in construction yet machined to very close tolerances. When disassembling parts, be sure to place them in order in parts rack so they can be put back in the unit in their proper positions. All parts should be carefully cleaned with a general purpose, non-flammable solvent before inspeciton or reassembly. Gaskets, seals, and similar parts should be replaced. It is also very important to perform functional tests whenever it is designated.

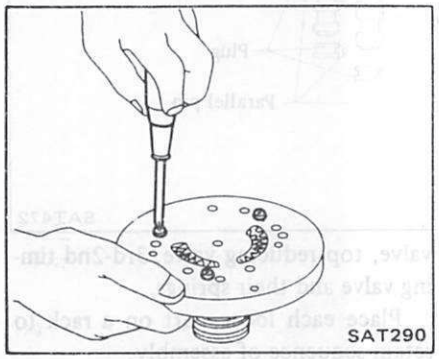
OIL PUMP



1. Inspect oil pump body, oil pump shaft and ring groove areas for wear.



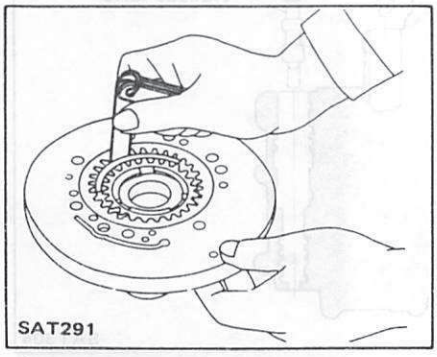
2. Remove oil pump plate.



3. Inspect gears and all internal surfaces for faults and visible wear.
4. Measure clearance between outer gear and crescent.

Standard clearance:
0.20 - 0.30 mm
(0.0079 - 0.0118 in)

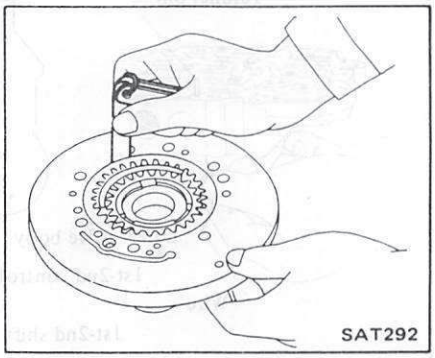
Repalce if the clearance exceeds **0.35 mm (0.0138 in).**



5. Measure clearance between outer gear and pump housing.

Standard clearance:
0.20 - 0.30 mm
(0.0079 - 0.0118 in)

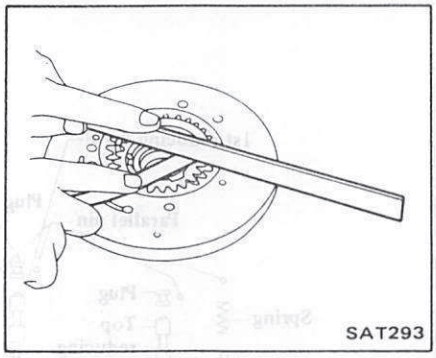
Replace if the clearance exceeds **0.35 mm (0.0138 in).**



6. Using a feeler gauge and straight edge, measure clearance between gears and pump plate.

Standard clearance:
0.02 - 0.04 mm
(0.0008 - 0.0016 in)

Replace if the clearance exceeds **0.08 mm (0.0031 in).**

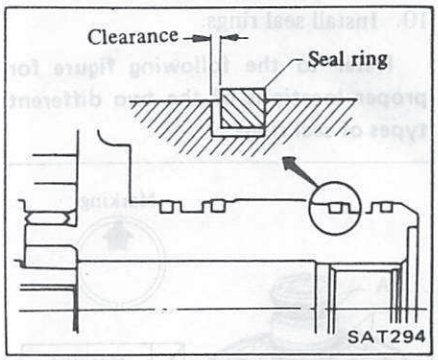


7. Measure clearance between seal ring and ring groove.

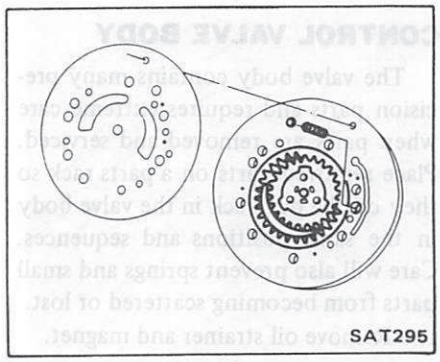
Standard clearance:
0.10 - 0.25 mm
(0.0039 - 0.0098 in)

Replace if the clearance exceeds **0.25 mm (0.0098 in).**

Of course, it is good practice to replace all seal rings during an overhaul.

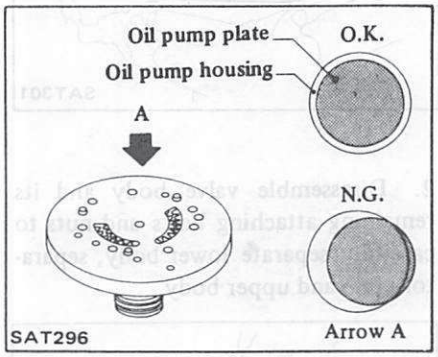


8. Install oil pump gear hub, pressure relief spring and steel ball onto oil pump housing.



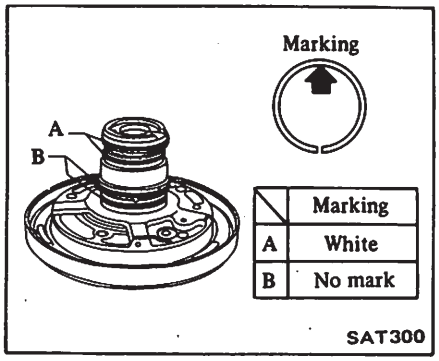
9. Install oil pump plate.

Do not allow periphery of oil pump plate to protrude beyond periphery of oil pump housing.



10. Install seal rings.

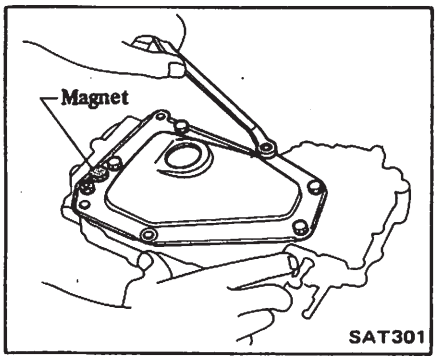
Refer to the following figure for proper locations of the two different types of seal rings.



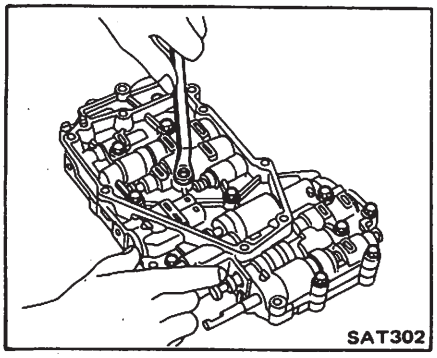
CONTROL VALVE BODY

The valve body contains many precision parts and requires extreme care when parts are removed and serviced. Place removed parts on a parts rack so they can be put back in the valve body in the same positions and sequences. Care will also prevent springs and small parts from becoming scattered or lost.

1. Remove oil strainer and magnet.

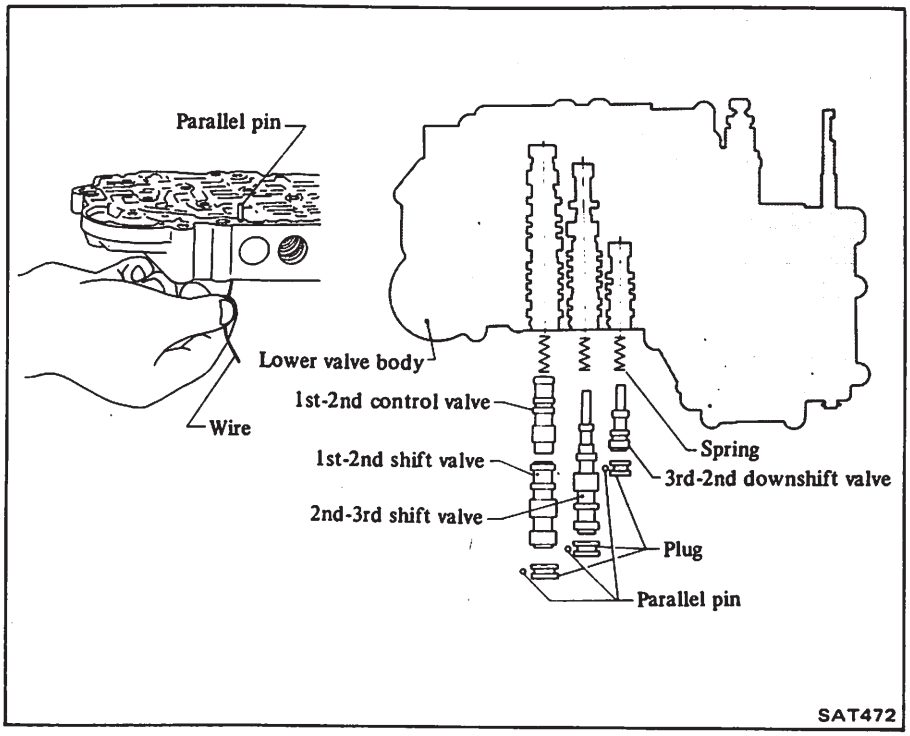


2. Disassemble valve body and its remaining attaching bolts and nuts to carefully separate lower body, separator plate and upper body.



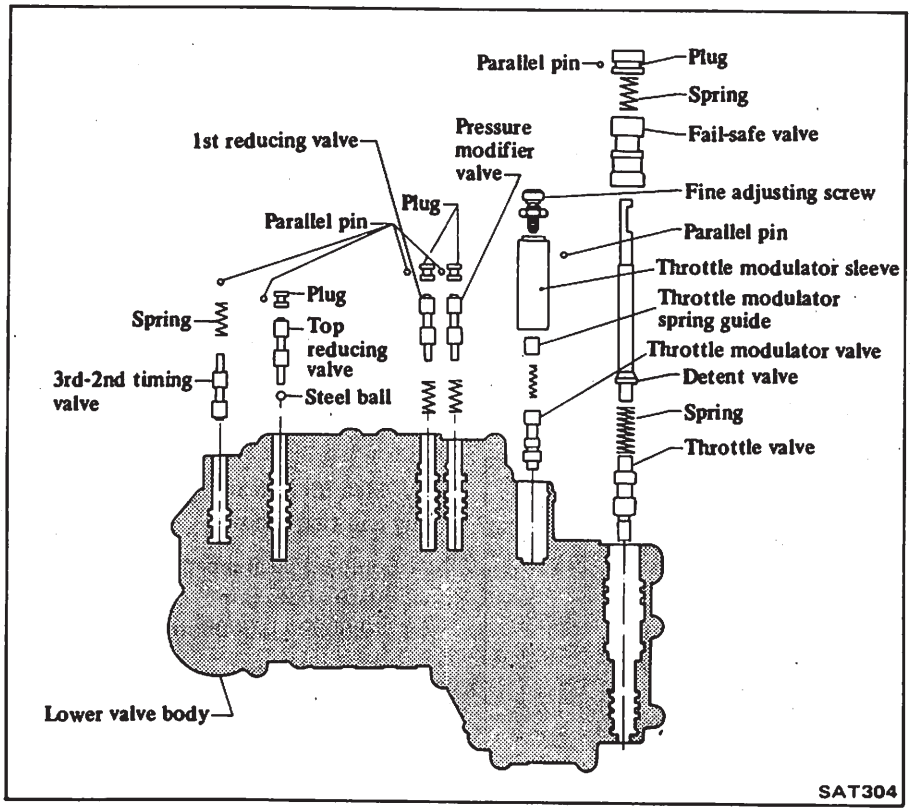
3. During valve body separation, do not lose the 6 steel balls on valve upper body.
4. Remove parallel pins with wire, then remove plugs, 3rd-2nd downshift valve, 2nd-3rd shift valve, 1st-2nd shift valve, 1st-2nd control valve and their springs.

Place each loose part on a rack to retain correct sequence of assembly.



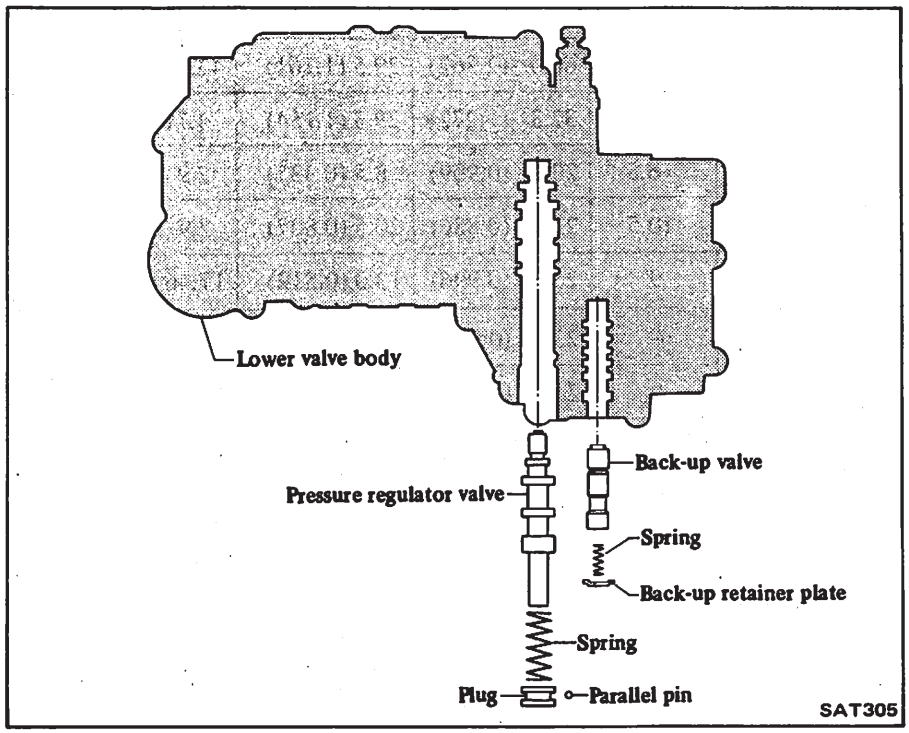
5. Remove parallel pins with wire, then remove plugs, fail-safe valve, throttle valve, detent valve, throttle modulator valve with spring guide, pressure modifier valve, 1st reducing valve, top reducing valve, 3rd-2nd timing valve and their springs.

Place each loose part on a rack to retain sequence of assembly.



6. Remove back up valve retaining plate by pressing its spring with small screwdriver. Remove parallel pin, then remove plug, pressure regulator valve and its spring.

Place each loose part on a rack to retain sequence of assembly.



Manual valve was removed when valve body was removed from transaxle. Include valve in subsequent inspection and service sequence.

Precaution for inspection

A newly manufactured valve body represents precision manufactured valves assembled with close tolerances into precision bores of the valve body. If inspection reveals excessive clearances, 0.03 mm (0.0012 in) or more, between the valves and the valve body bores, replace the entire valve body rather than attempt rework.

If one or more valves are sticking from varnish deposits or burns resulting from deteriorated oil or overheating, you may be able to clean the valves and valve bodies. **Always use crocus cloth**, which is a very fine type of cutting material. **Never use emery cloth**, as it is too coarse and can scratch the valves or valve bores. Scratches can lead to future deposits of varnish or foreign matter.

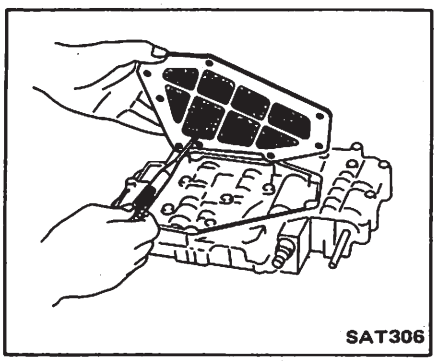
During cleaning, do not remove the sharp edges of the valve. When edges are rounded or scratched, entry is provided for dirt or foreign matter to work into the sides of the valves and hinder valve movement.

The valves may be cleaned using alcohol or lacquer thinner. The valve bodies can be dip cleaned with a good carburetor cleaner or lacquer thinner. **Do not leave valve bodies submerged in carburetor cleaner longer than five minutes. Rinse parts thoroughly and dry.**

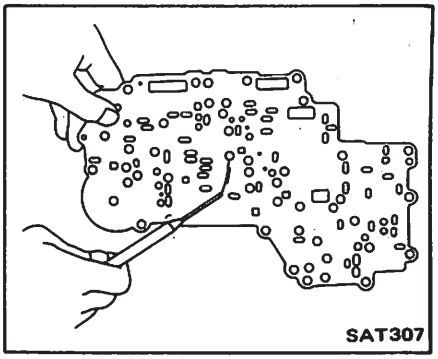
Lubricate all parts in clean automatic transaxle fluid before reassembly.

7. Check valves for signs of burning. Replace if beyond clean-up.

8. Check oil strainer for general condition. Replace if necessary.



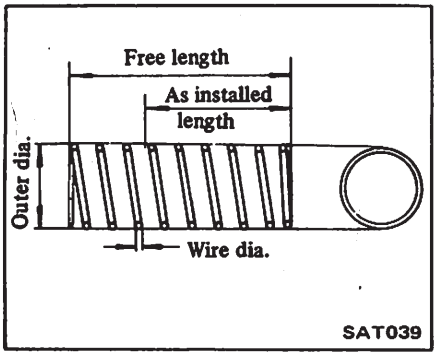
9. Check separator plate for scratches or damage. Replace if necessary. Scratches or score marks can cause oil to bypass correct oil passages and result in system malfunction.



10. Check oil passages in upper and lower valve bodies for varnish deposits, scratches or other damage that would impair valve movement. Check threaded holes and related bolts and screws for stripped threads; replace as needed.

11. Test valve springs for weakened load condition. Refer to Valve Body Spring Chart for spring specifications.

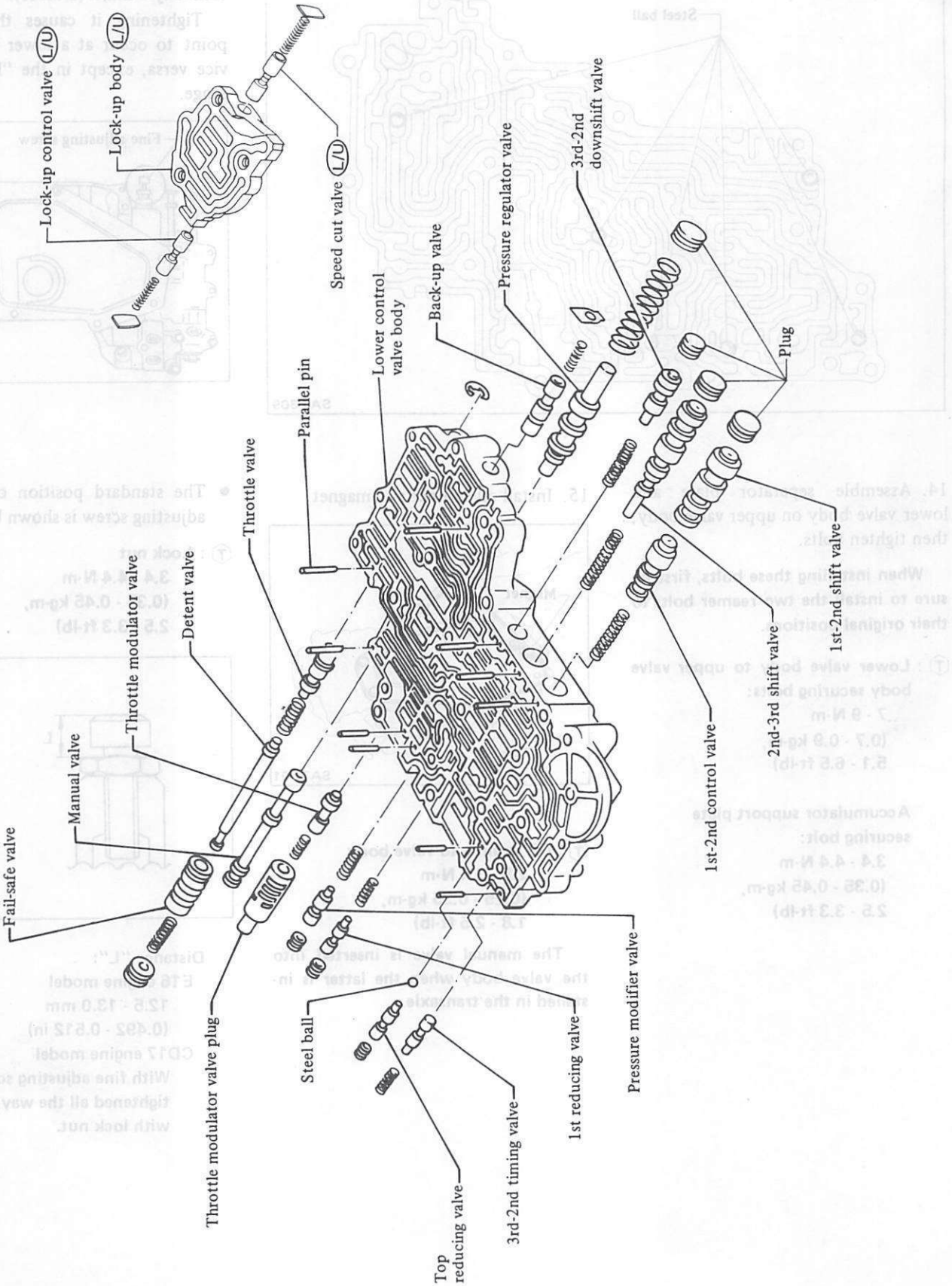
Valve body spring chart



Valve spring	Wire dia. mm (in)	Outer coil dia. mm (in)	No. of active coils	Free length mm (in)	Installed	
					Length mm (in)	Load N (kg, lb)
Manual detent	1.2 (0.047)	7.2 (0.283)	16	31.9 (1.256)	25 (0.98)	37.76 (3.85, 8.49)
Pressure regulator valve	1.4 (0.055)	15.4 (0.606)	10	60.0 (2.362)	29.5 (1.161)	43.35 (4.42, 9.75)
Throttle valve	1.0 (0.039)	10.0 (0.394)	9.4	32.3 (1.272)	29.3 (1.154)	4.71 (0.48, 1.06)
Fail-safe valve	0.6 (0.024)	10.6 (0.417)	6.5	23.1 (0.909)	8.5 (0.335)	2.9 (0.3, 0.7)
Throttle modulator valve	0.6 (0.024)	5.1 (0.201)	10.5	22.5 (0.886)	20.5 (0.807)	2.9 (0.3, 0.7)
Pressure modifier valve*	0.8 (0.031)	7.8 (0.307)	9	25.3 (0.996)	13.0 (0.512)	17.46 (1.78, 3.92)
	0.8 (0.031)	7.8 (0.307)	9	23.6 (0.929)	13.0 (0.512)	15.00 (1.53, 3.37)
	0.8 (0.031)	7.8 (0.307)	9	21.8 (0.858)	13.0 (0.512)	12.55 (1.28, 2.82)
1st reducing valve	0.75 (0.0295)	6.75 (0.2657)	9	21.4 (0.843)	13.0 (0.512)	14.81 (1.51, 3.33)
3rd-2nd timing valve	0.75 (0.0295)	6.75 (0.2657)	9	20.6 (0.811)	13.0 (0.512)	12.36 (1.26, 2.78)
Back up valve	0.5 (0.020)	5.5 (0.217)	7	18.8 (0.740)	12.0 (0.472)	4.9 (0.5, 1.1)
1st-2nd shift valve	0.65 (0.0256)	6.65 (0.2618)	16	37.3 (1.469)	18.0 (0.709)	10.8 (1.1, 2.4)
2nd-3rd shift valve	0.8 (0.031)	7.8 (0.307)	17	45.4 (1.787)	22.5 (0.886)	17.26 (1.76, 3.88)
3rd-2nd downshift valve	0.55 (0.0217)	7.55 (0.2972)	12	38.9 (1.531)	18.0 (0.709)	4.71 (0.48, 1.06)
Speed cut valve (L/U)	0.65 (0.0256)	5.65 (0.2224)	11	19.9 (0.783)	12.0 (0.472)	11.18 (1.14, 2.51)
Lock-up control valve (L/U)	0.6 (0.024)	5.6 (0.220)	11	21.6 (0.850)	12.0 (0.472)	9.12 (0.93, 2.05)

*** Ensure that the new pressure modifier valve spring is the same type as the one which was removed.**

12. Assemble all parts into lower valve body in the reverse order of disassembly.



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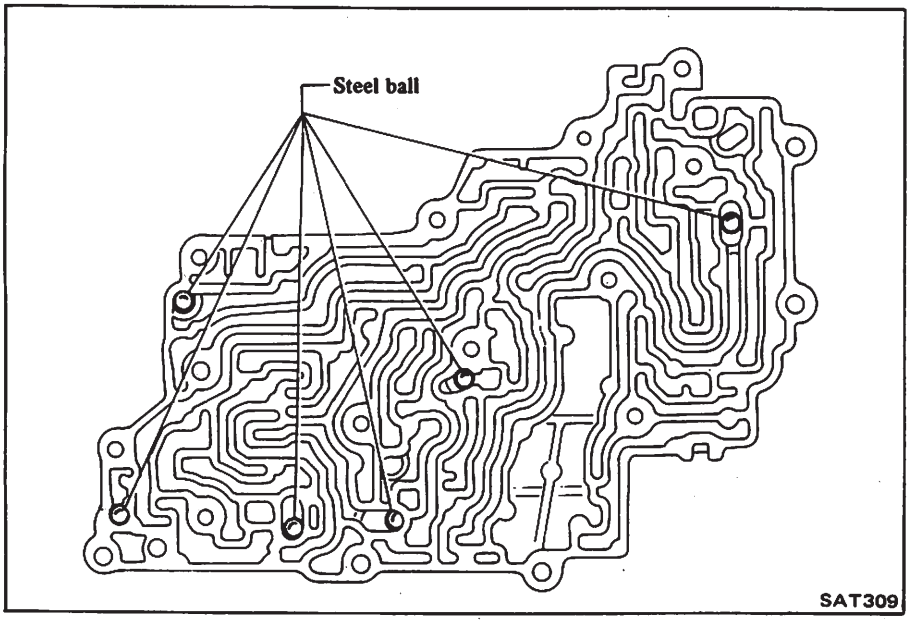
13. Reinstall the six steel balls in upper valve body.



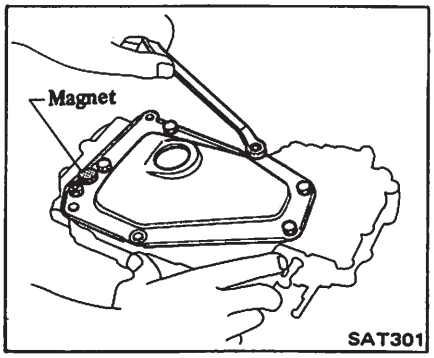
14. Assemble separator plate and lower valve body on upper valve body, then tighten bolts.

When installing these bolts, first be sure to install the two reamer bolts to their original positions.

Ⓣ : Lower valve body to upper valve body securing bolts:
7 - 9 N·m
(0.7 - 0.9 kg-m,
5.1 - 6.5 ft-lb)

Accumulator support plate securing bolt:
3.4 - 4.4 N·m
(0.35 - 0.45 kg-m,
2.5 - 3.3 ft-lb)

15. Install oil strainer and magnet.



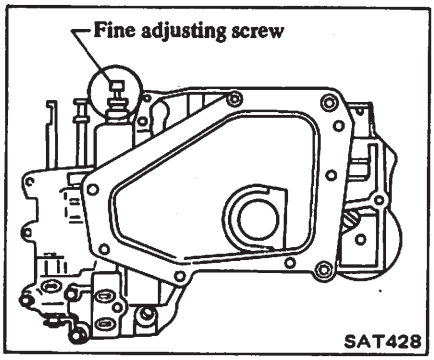
Ⓣ : Oil strainer to valve body
2.5 - 3.4 N·m
(0.25 - 0.35 kg-m,
1.8 - 2.5 ft-lb)

The manual valve is inserted into the valve body when the latter is installed in the transaxle.

Fine adjusting screw

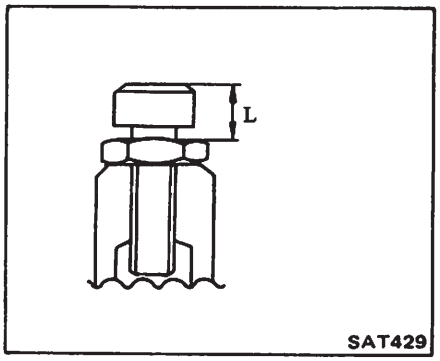
The fine adjusting screw provides a maximum fine adjustment of approximately 5 km/h (3 MPH).

Tightening it causes the shifting point to occur at a lower point, and vice versa, except in the "kickdown" range.



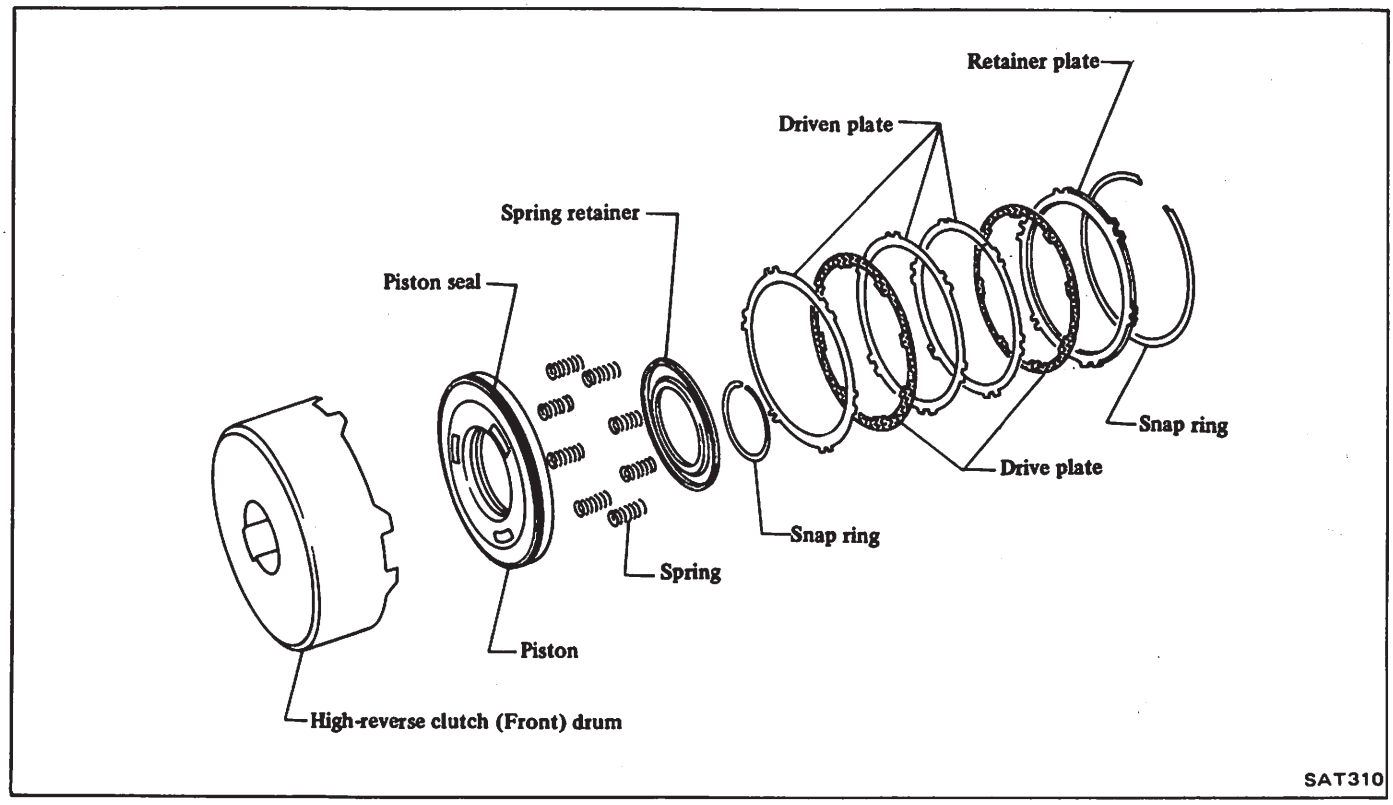
- The standard position of the fine adjusting screw is shown below.

Ⓣ : Lock nut
3.4 - 4.4 N·m
(0.35 - 0.45 kg-m,
2.5 - 3.3 ft-lb)

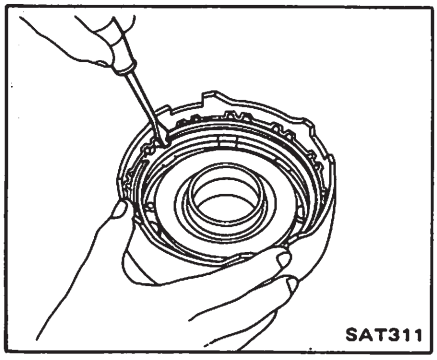


Distance "L":
E16 engine model
12.5 - 13.0 mm
(0.492 - 0.512 in)
CD17 engine model
With fine adjusting screw tightened all the way, secure with lock nut.

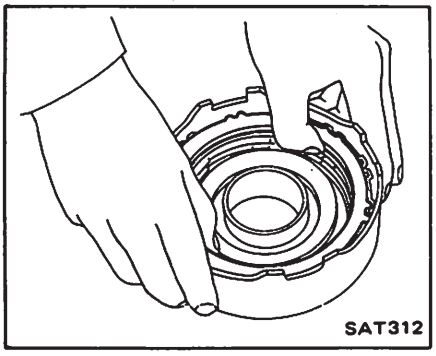
HIGH-REVERSE CLUTCH (Front)



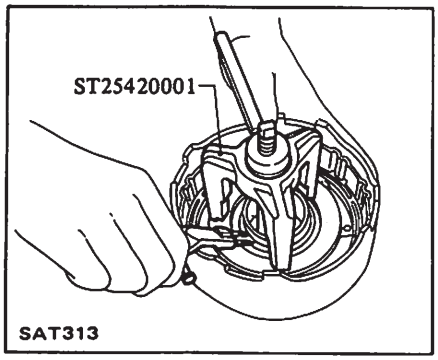
1. Using a screwdriver, remove large clutch retaining plate snap ring.



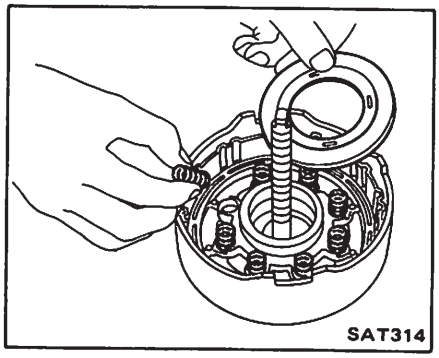
2. Remove clutch plates assembly.



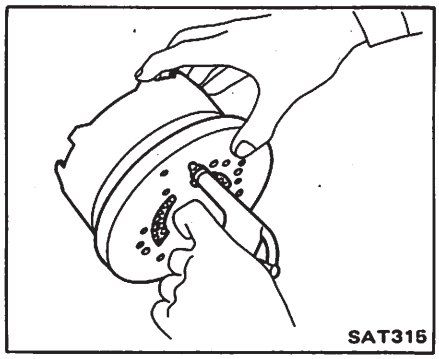
3. Compress clutch springs and remove snap ring from spring retainer.



4. Remove spring retainer and springs.



5. For easy removal of piston from drum, use an air gun with a tapered rubber tip to carefully apply air pressure to loosen piston from drum.



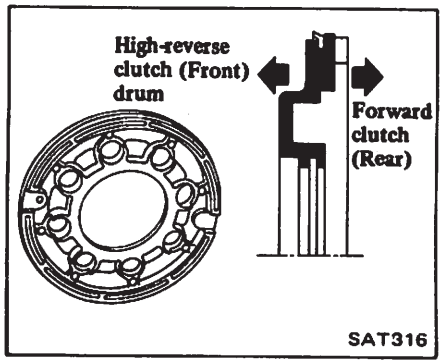
6. Check clutch drive plate facing for wear or damage. Drive plate thickness must not be less than **1.4 mm (0.055 in)**.

Standard drive plate thickness:
1.50 - 1.65 mm
(0.0591 - 0.0650 in)

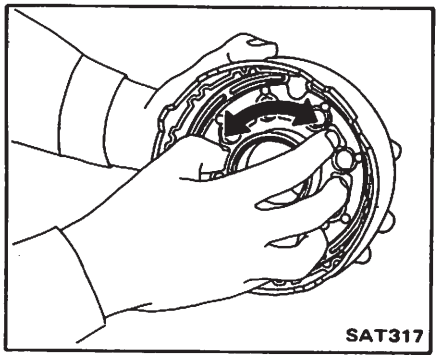
7. Check for wear on snap ring, weak or broken coil springs, and warped spring retainer.

8. Lubricate clutch drum bushing, and install inner seal and piston seal as illustrated. *Be careful not to stretch seals during installation.*

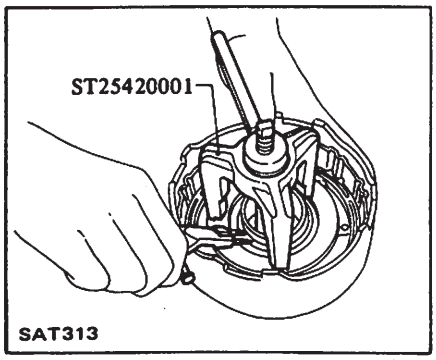
a. Never assemble clutch dry; always lubricate its components thoroughly.
b. Always install piston seal in direction shown in figure below.



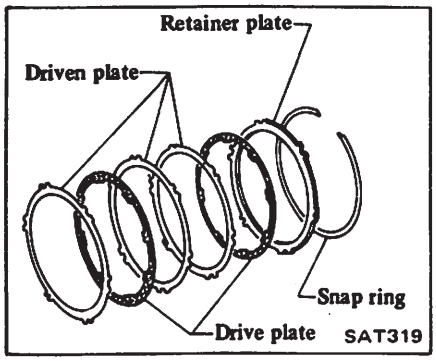
9. Assemble piston, being careful not to allow seal to kink or become damaged during installation. After installing, turn piston by hand to ensure that there is no binding.



10. Reassemble springs and retainer. Reinstall snap ring. Be sure snap ring is properly seated.



11. Now install driven plates (steel plate) and drive plates (friction plate) in the order shown below. Now install retainer plate and snap ring.



12. Measure clearance between retainer plate and snap ring.

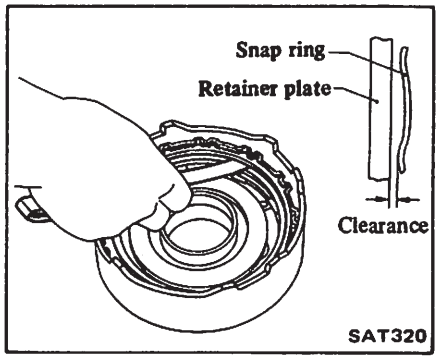
Always measure the existing minimum clearance, since snap ring is a wave type.

Specified clearance:
Standard
1.0 - 1.4 mm (0.039 - 0.055 in)
Allowable limit
2.2 mm (0.087 in)

If necessary, try other retaining plates having different thicknesses until correct clearance is obtained.

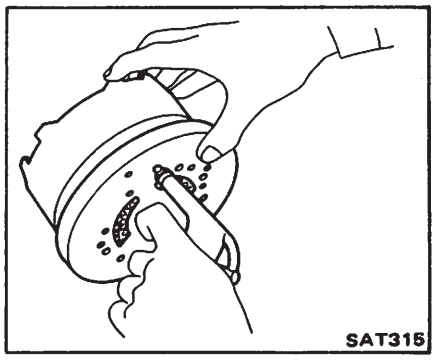
Available retainer plate

Thickness mm (in)	Part number
3.4 (0.134)	31537-01X05
3.6 (0.142)	31537-01X00
3.8 (0.150)	31537-01X01
4.0 (0.157)	31537-01X02
4.2 (0.165)	31537-01X03
4.4 (0.173)	31537-01X04

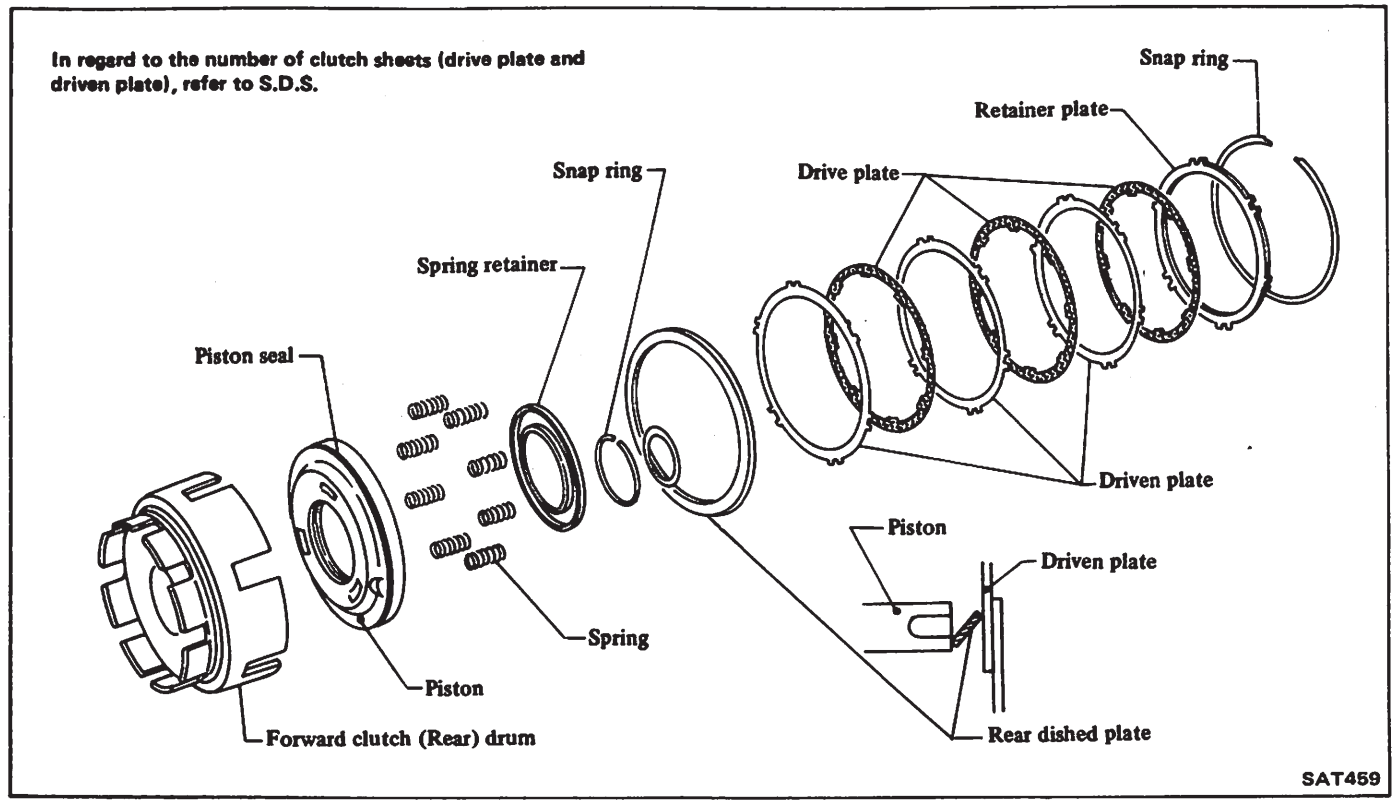


13. Testing high-reverse clutch (Front)

With high-reverse clutch (Front) assembled on oil pump housing, direct a jet of air into hole in clutch drum for definite clutch operation.

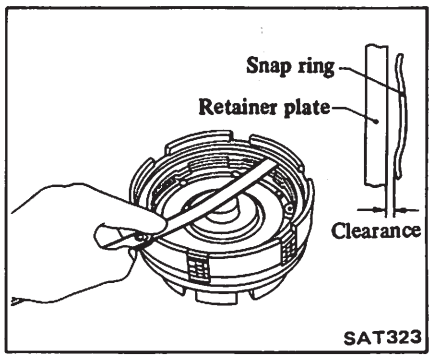


FORWARD CLUTCH (Rear)

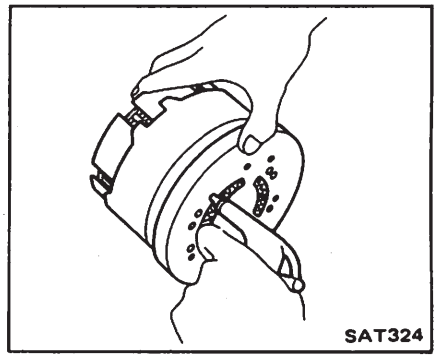


Service procedures for forward clutch (Rear) are essentially the same as those for high-reverse clutch (Front), with the following exception:

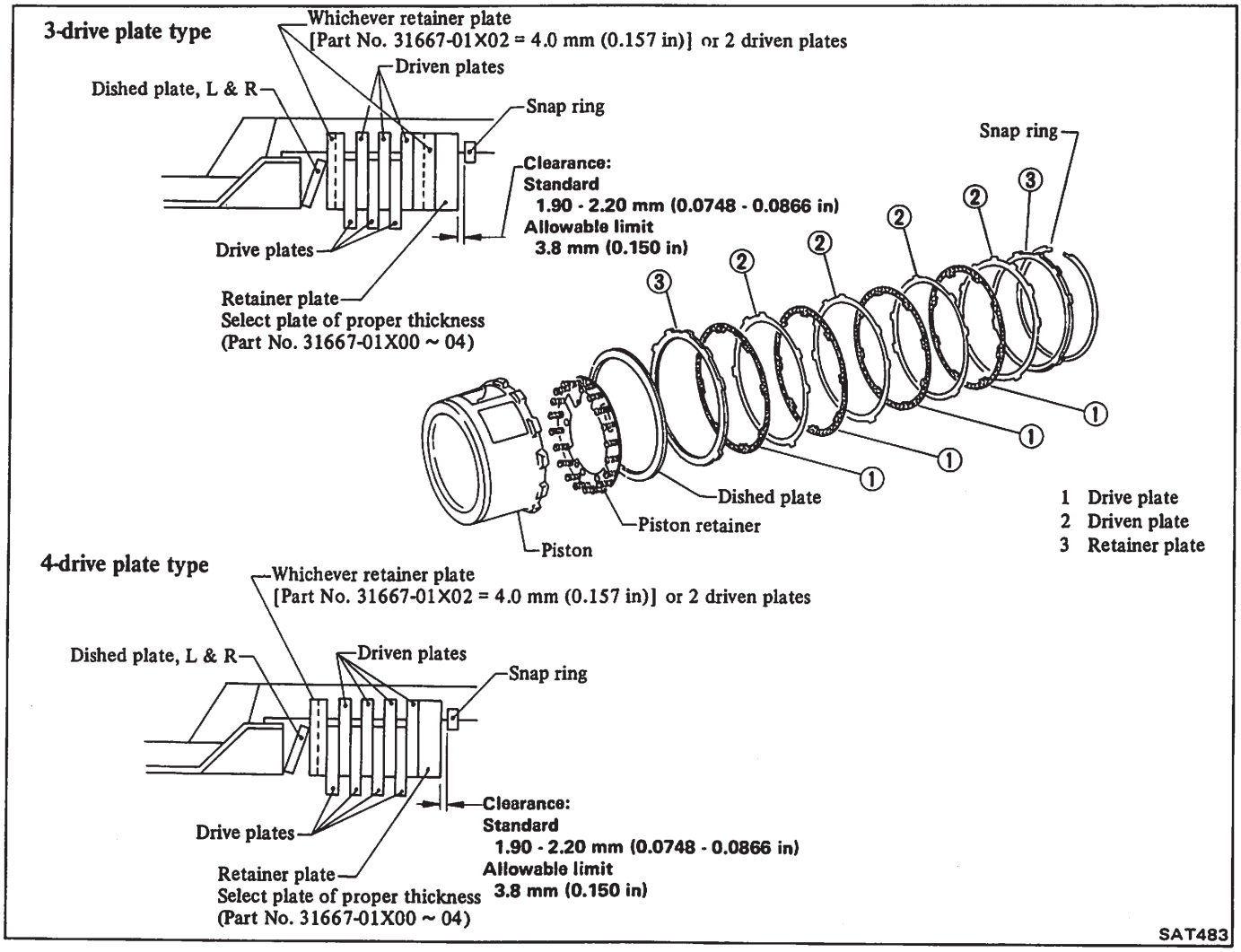
Specified clearance between retainer plate and snap ring:
Standard
0.8 - 1.2 mm
(0.031 - 0.047 in)
Allowable limit
2.8 mm (0.110 in)



Test forward clutch (Rear)



LOW & REVERSE BRAKE

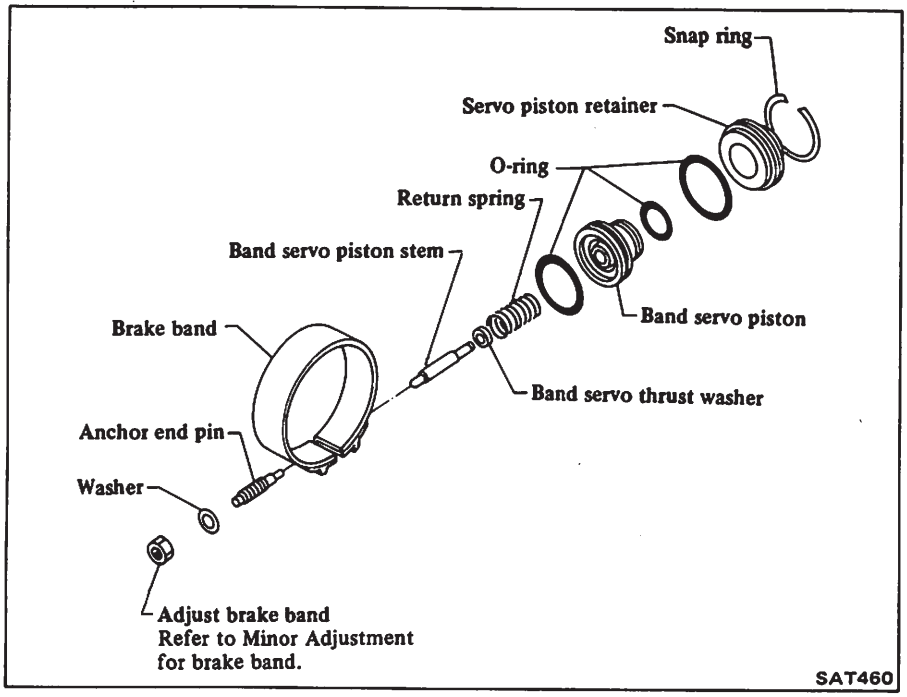


- Examine low and reverse brake for damaged clutch drive plate facing and worn snap ring.
- Check drive plate facing for wear or damage; if necessary, replace.

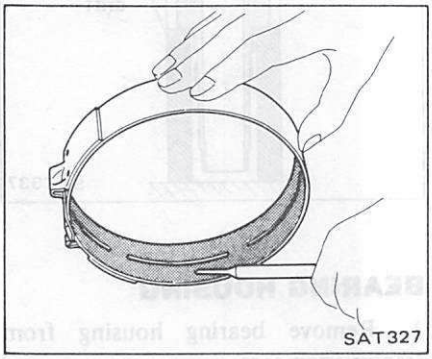
Drive plate thickness:
Standard
1.90 - 2.05 mm
(0.0748 - 0.0807 in)
Allowable limit
1.8 mm (0.071 in)

- Test piston return spring for weakness. Discard if it is too weak.

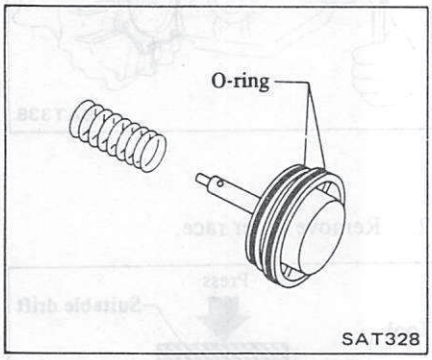
BRAKE BAND AND BAND SERVO



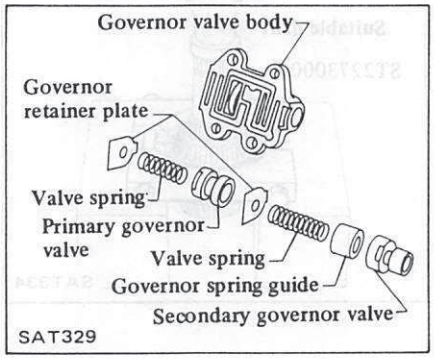
- Inspect band friction material for wear. If cracked, chipped or burnt spots are apparent, replace the band.



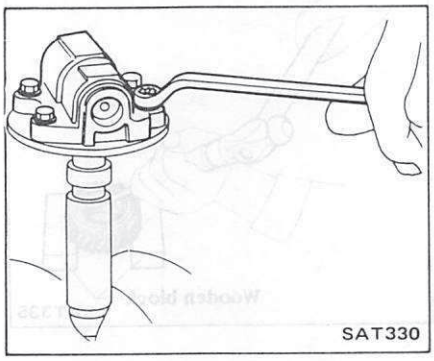
- Check band servo components for wear and scoring. Replace piston O-rings and all other components as necessary.



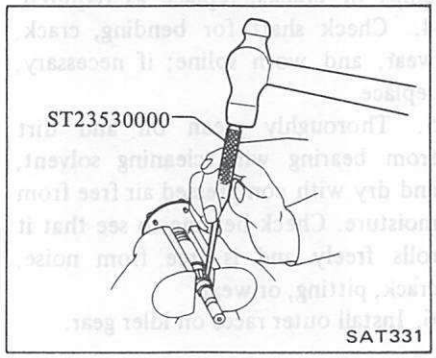
GOVERNOR



- Remove governor body from governor shaft.



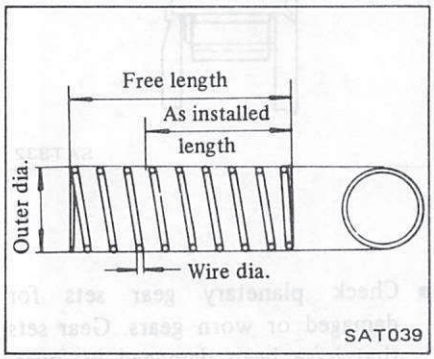
- Remove governor worm.



- Disassemble governor and check valves for indication of burning or scratches. Inspect springs for weakness or burning. Replace parts as necessary and reassemble.

Do not interchange components of primary and secondary governor valves.

Governor valve spring chart



- Assemble governor on governor shaft.

Ⓣ: **Governor valve body to governor shaft**
5 - 7 N·m (0.5 - 0.7 kg-m, 3.6 - 5.1 ft-lb)

Valve spring	Wire dia. mm (in)	Outer coil dia. mm (in)	No. of active coils	Free length mm (in)	Installed	
					Length mm (in)	Load N (kg, lb)
Primary governor	0.45 (0.0177)	10.45 (0.4114)	7	31.7 (1.248)	9.3 (0.366)	1.47 (0.15, 0.33)
Secondary governor	0.8 (0.031)	10.8 (0.425)	7	38.2 (1.504)	26.0 (1.024)	7.75 (0.79, 1.74)

PLANETARY CARRIER

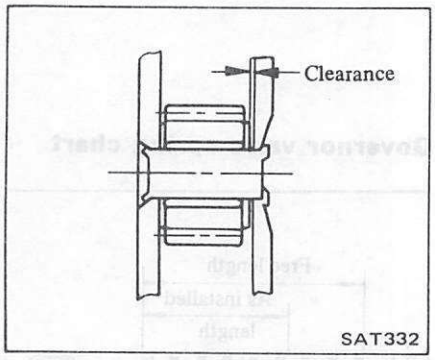
The planetary carrier cannot be divided into its individual components.

If any part of the component is faulty, replace the carrier as a unit.

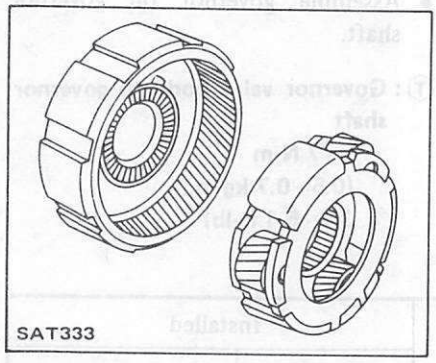
- Check clearance between pinion washer and planetary carrier with a feeler.

Standard clearance:
0.20 - 0.70 mm
(0.0079 - 0.0276 in)

Replace if the clearance exceeds **0.80 mm (0.0315 in).**

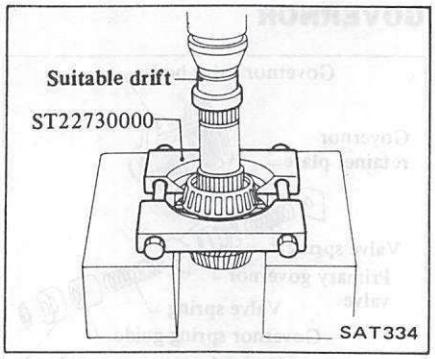


- Check planetary gear sets for damaged or worn gears. Gear sets that have been damaged by overheating will have a blue discoloration.

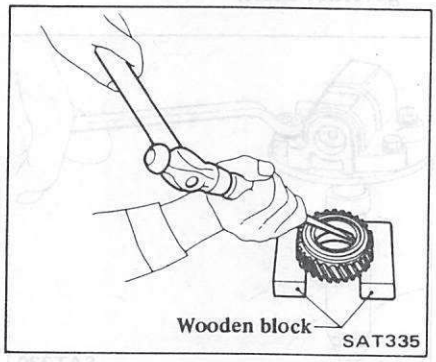


OUTPUT SHAFT AND IDLER SHAFT

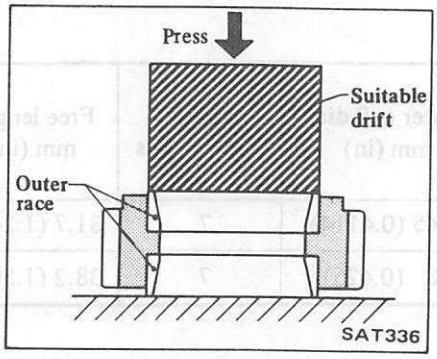
1. Remove inner races from output shaft.



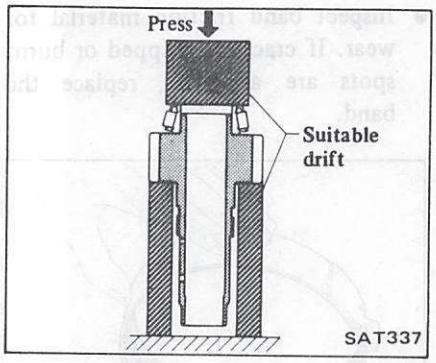
2. Remove outer races from ilder gear.



3. Check all gears for excessive wear, chips or cracks; replace as required.
4. Check shaft for bending, crack, wear, and worn spline; if necessary, replace.
5. Thoroughly clean oil and dirt from bearing with cleaning solvent, and dry with compressed air free from moisture. Check bearing to see that it rolls freely and is free from noise, crack, pitting, or wear.
6. Install outer races on idler gear.

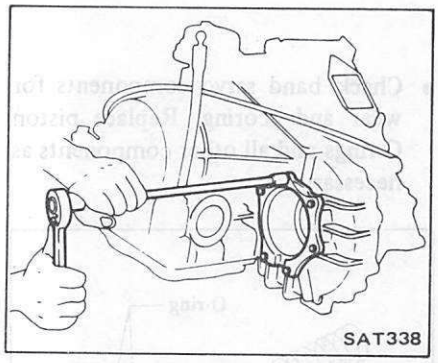


7. Install inner races on output shaft.

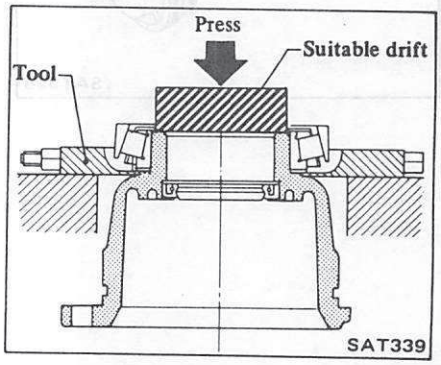


BEARING HOUSING

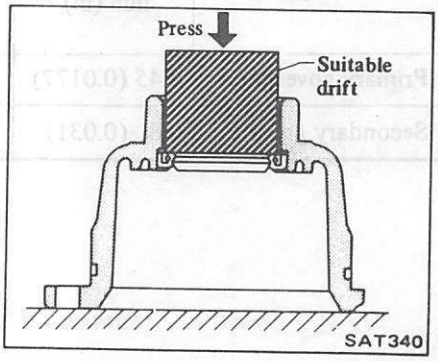
1. Remove bearing housing from transmission case.



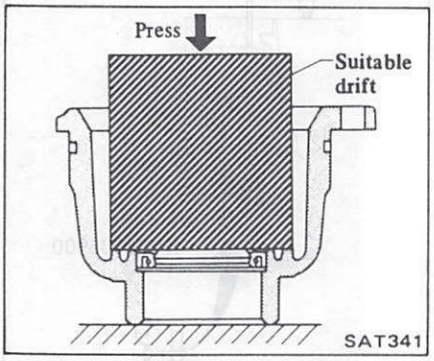
2. Remove inner race.



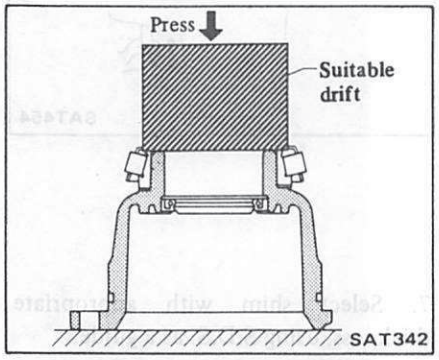
3. Remove oil seal and O-ring.



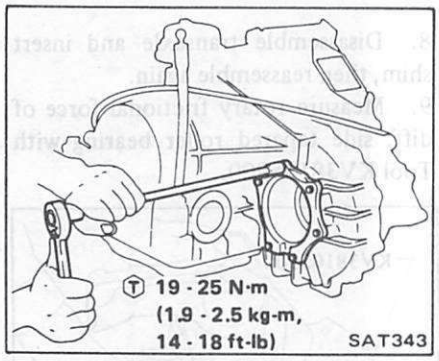
4. Apply coat of gear oil to seal surface and O-ring, then drive new seal and O-ring into place.



5. Install inner race.



6. Install bearing housing.



ADJUSTING ROTARY FRICTIONAL FORCE OF TAPERED ROLLER BEARING

Before assembling automatic transaxle, be sure to adjust rotary frictional force of each tapered roller bearing first.

FINAL DRIVE

If transmission case, bearing housing, tapered roller bearing, differential case or converter housing is replaced, final drive should be adjusted. Adjusting procedures are basically the same as those for final drive of manual transaxle. Rotary frictional force is adjusted by selecting shims of appropriate thickness.

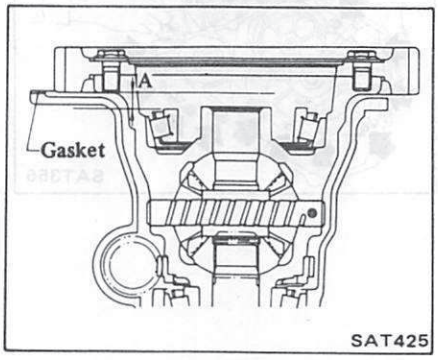
Adjusting procedures

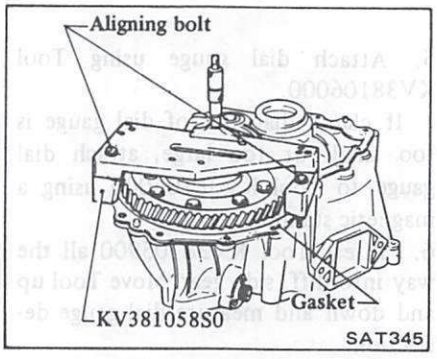
Two types of adjusting procedures have been established.

Type A

1. Press bearing outer race into bore in converter housing.
2. Install final drive assembly on converter housing.
3. Install tapered roller bearing on differential case.
4. Measure depth "A" with micrometer.

a. "A" is depth from upper surface of gasket to inner race upper surface.
b. Secure Tool to transmission case with aligning bolts and tighten it to the specified torque.
c. When measuring depth "A", be sure to use counterweight that is included in the Tool.
d. Before measuring depth "A", ensure that bearing is seated properly. To seat it, turn final gear.

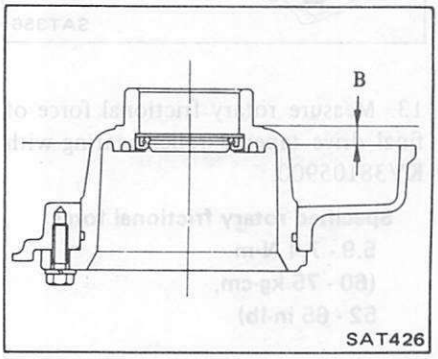


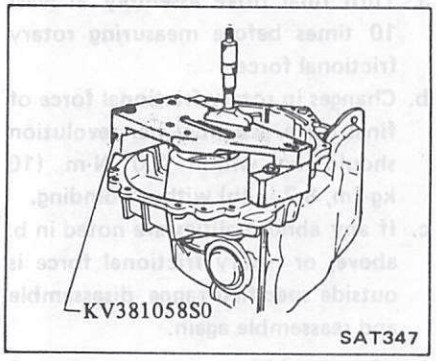


A = Measured value
– Thickness of special tool

5. Install bearing housing to transmission case.
6. Measure height "B" with micrometer.

Before measuring height "B", ensure that bearing is seated properly. To seat it, turn outer race while pushing it.





B = Thickness of special tool
– Measured value

7. Determine height "H" using following equation:

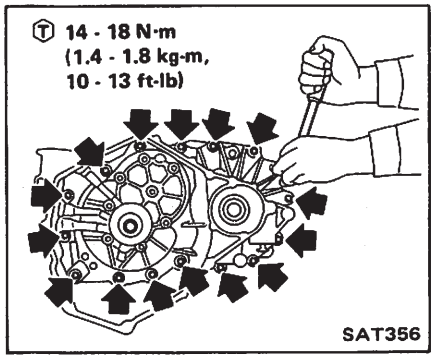
H = A – B

Select shim(s) of appropriate thickness, using S.D.S. as a guide.

Available shims
Refer to S.D.S.

8. Remove bearing retainer from transmission case.
9. Install shim selected in step 7 on bearing housing, and seat bearing inner race.
10. Apply vaseline to O-ring and install it on bearing housing.
11. Install bearing housing to transmission case.

12. Attach converter housing and gasket to transmission case.



13. Measure rotary frictional force of final drive tapered roller bearing with KV38105900.

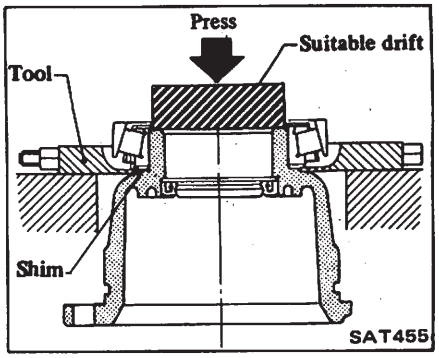
Specified rotary frictional force:
5.9 - 7.4 N·m
(60 - 75 kg-cm,
52 - 65 in-lb)

a. **Turn final drive assembly at least 10 times before measuring rotary frictional force.**
b. **Changes in rotary frictional force of final drive assembly per revolution should be within 1.0 N·m (10 kg-cm, 8.7 in-lb) without binding.**
c. **If any abnormalities are noted in b. above, or rotary frictional force is outside specified range, disassemble and reassemble again.**

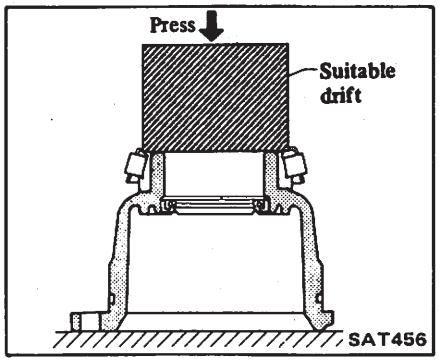
14. Disassemble transmission case and remove final drive assembly.

Type B

1. Remove bearing inner race on shim side only and take out shim.

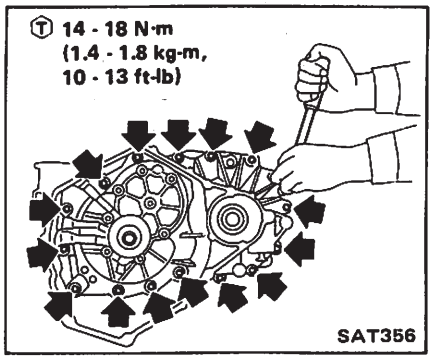


2. Press fit bearing inner race into place **without shim.**

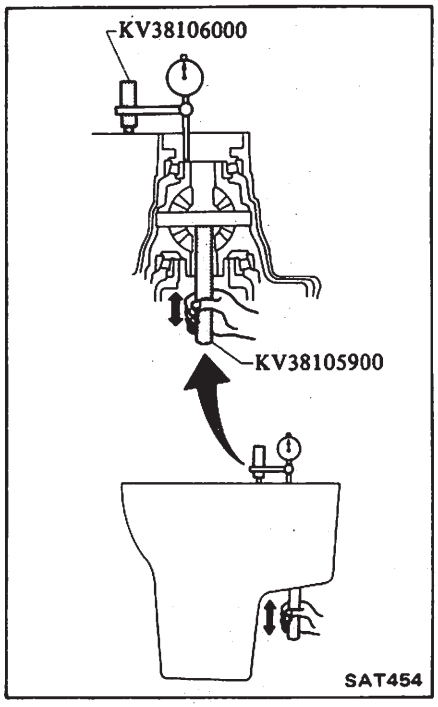


3. Install final drive assembly on transmission case.
4. Place gasket on transmission case, then install converter housing by tightening it to the specified torque.

Tighten bolts to the same torque in a crisscross fashion.



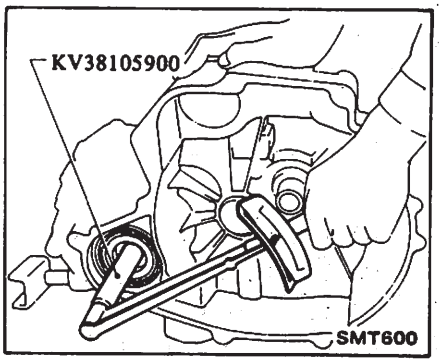
5. Attach dial gauge using Tool KV38106000.
If clamp diameter of dial gauge is too small or too large, attach dial gauge to Tool KV38106000 using a magnetic stand.
6. Insert Tool KV38105900 all the way into diff. side gear. Move Tool up and down and measure dial gauge deflection.



7. Select shim with appropriate thickness, using S.D.S. as a guide.

Available shims:
Refer to S.D.S.

8. Disassemble transaxle and insert shim, then reassemble again.
9. Measure rotary frictional force of diff. side tapered roller bearing with Tool KV38105900.



Specified rotary frictional force:
5.9 - 7.4 N·m
(60 - 75 kg-cm,
52 - 65 in-lb)

a. **Turn final drive assembly at least 10 times before measuring rotary frictional force.**

b. Changes in rotary frictional force of final drive assembly per revolution should be within 1.0 N·m (10 kg-cm, 8.7 in-lb) without binding.
c. If any abnormalities are noted in b. above, or rotary frictional force is outside the specified range, disassemble and reassemble again.

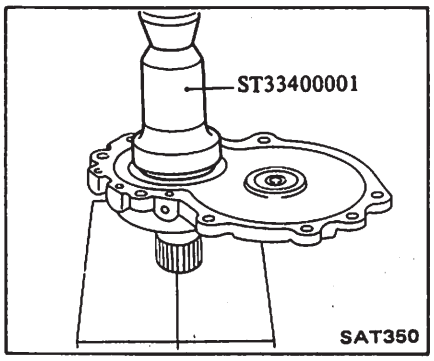
Disassembly and assembly procedures

Refer to Section MT.

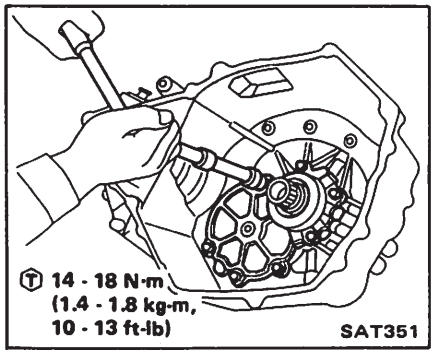
OUTPUT SHAFT

If transmission case, output shaft, tapered roller bearing or front cover is replaced, output shaft should be adjusted by means of shims.

1. Apply automatic transaxle fluid to bearing outer race.
2. Press bearing outer race into bore in transmission case.
3. Install two or three shims on front cover, and press bearing outer race into bore in front cover.



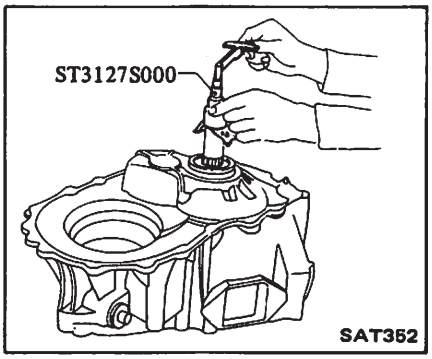
4. Install gasket and front cover on converter housing.



5. Measure rotary frictional force of output shaft.

Specified rotary frictional force:
0.35 - 0.47 N·m
(3.6 - 4.8 kg-cm,
3.1 - 4.2 in-lb)

a. Turn output shaft at least 10 times before measuring rotary frictional force.
b. Ensure that output shaft turns smoothly without binding.
c. If any abnormalities are noted in b. above, or rotary frictional force is outside specified range, disassemble and reassemble again.



Available shims:
Refer to S.D.S.

6. Remove front cover and withdraw output shaft.

IDLER GEAR

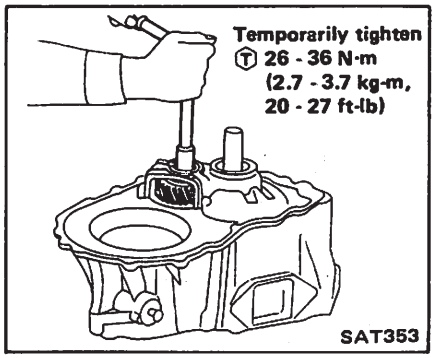
1. Press bearing outer races onto idler gear.
2. Assemble bearing inner races and idler shaft to idler gear.
3. Attach idler gear assembly and output shaft assembly to converter housing.
4. Install gasket and front cover on converter housing as follows:
(1) Clean threads of bolts and converter housing with solvent.
(2) Apply locking sealer to threads of bolts and install them into place.

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

5. Install lock washer and idler gear bolt, and tighten bolt to specified torque.

Be sure to align lock washer with groove on converter housing.

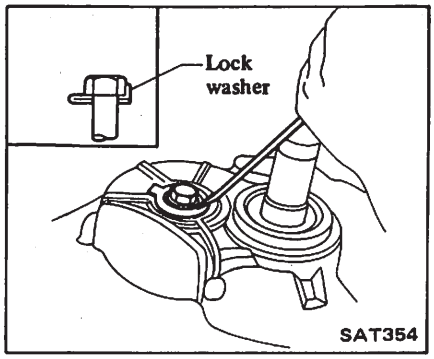
Ⓣ : 26 - 36 N·m
(2.7 - 3.7 kg-m,
20 - 27 ft-lb)



6. After tightening bolt, turn output shaft five complete rotations. Loosen idler gear bolt, then tighten it to specified torque.

Ⓣ : 3 - 4 N·m
(0.3 - 0.4 kg-m,
2.2 - 2.9 ft-lb)

7. Bend lock washer.

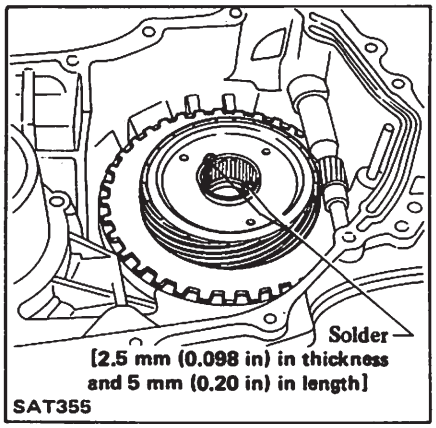


ADJUSTING END PLAY OF OUTPUT SHAFT

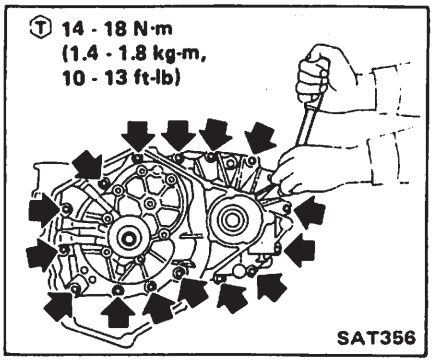
1. After adjusting rotary frictional force of tapered roller bearing used with output shaft, put solder on rear internal gear.

a. Be sure to use fuse of 2.5 mm (0.098 in) in diameter or soldering plate of 2.5 mm (0.098 in) in thickness and 5 mm (0.20 in) in length, as maximum gear clearance is 2.3 mm (0.091 in). [If diameter or thickness is smaller than 2.5 mm (0.098 in), also use shim(s).]

b. Always install two fuses or soldering plates symmetrically over the periphery of internal gear.



2. Install converter housing and output shaft assembly as a unit on transmission case.



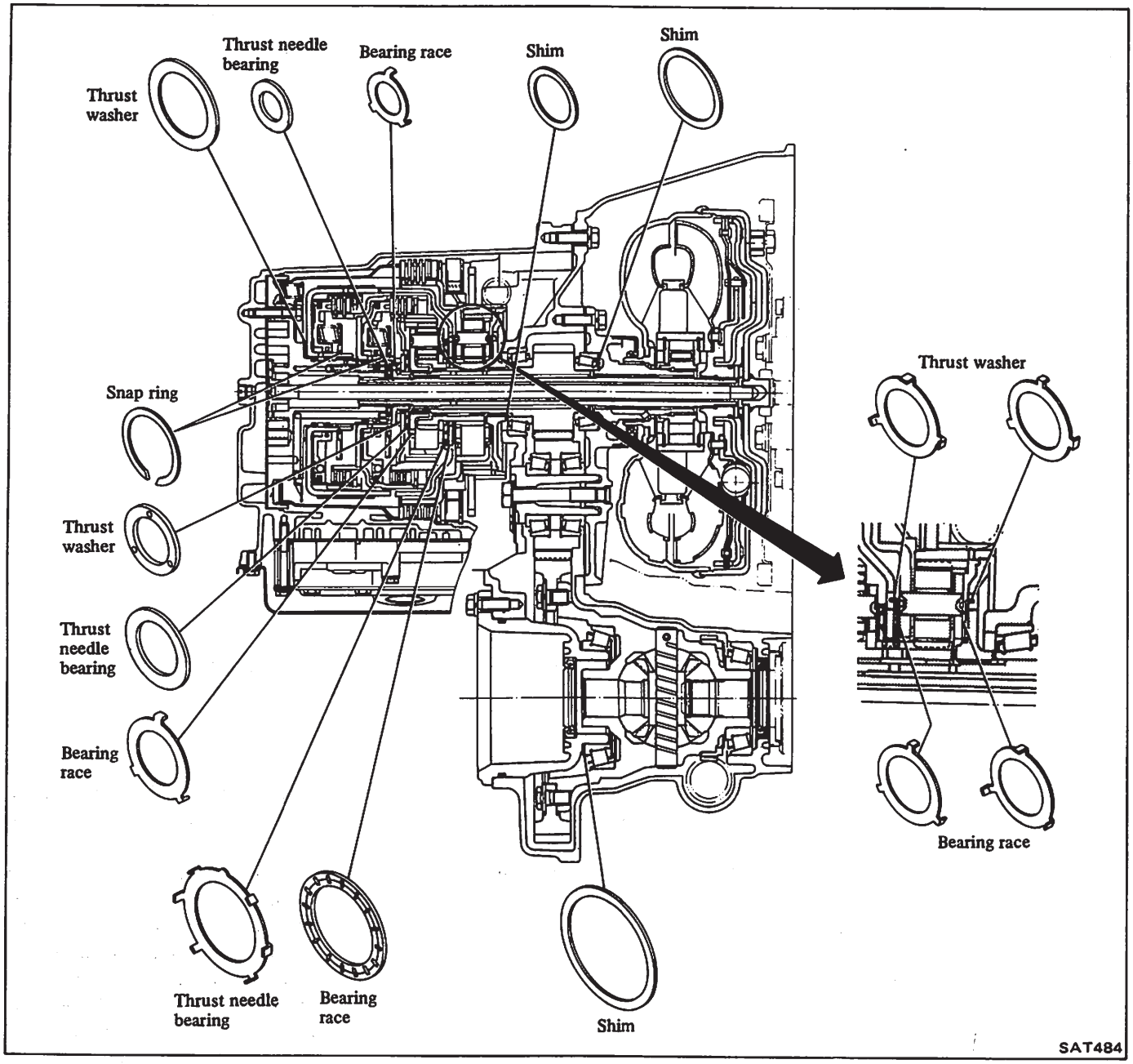
3. Disassemble output shaft assembly and remove soldering plate.

4. Measure thickness of soldering plate and, if necessary, select shim(s) of appropriate thickness so that end play of output shaft is within specified range.

End play:
0.25 - 0.55 mm
(0.0098 - 0.0217 in)
Available shims:
Refer to S.D.S.

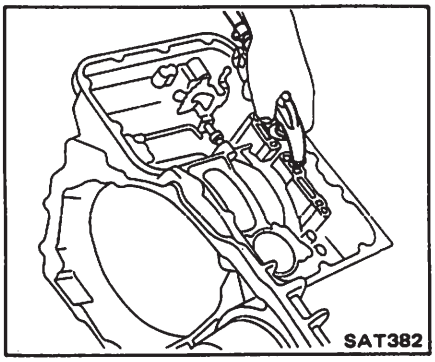
FINAL ASSEMBLY

When installing/assembling needle bearing, bearing race, snap ring and seal ring, use the following illustration as a guide to installation procedures and locations.



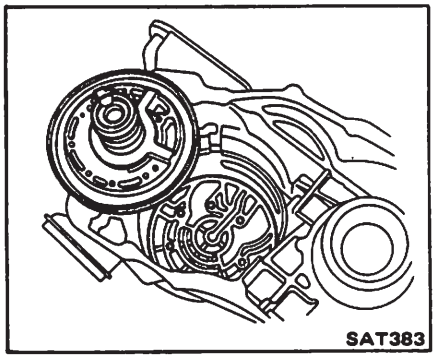
1. Before proceeding with the final assembly of all components, it is important to verify that the case, housing and parts are clean and free from dust, dirt and foreign matter (use air gun). Have a tray available with clean transaxle fluid for lubricating parts.

Petroleum jelly can be used to secure washers during installation. All new seals and rings should have been installed before beginning final assembly.

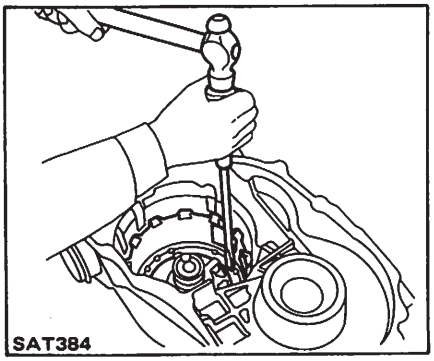


2. Apply automatic transaxle fluid or vaseline to outer diameter part of oil pump assembly. Install oil pump assembly, nylon washer and thrust bearing.

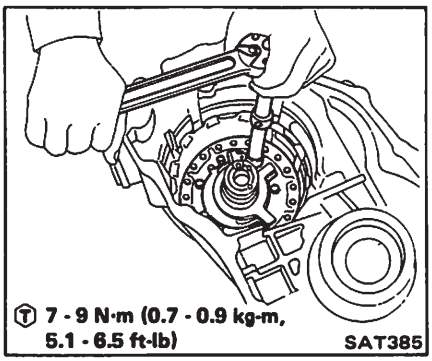
Align five bolt holes on oil pump assembly and transmission case and install oil pump.



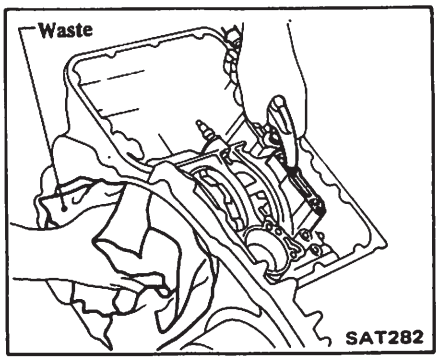
3. Apply automatic transaxle fluid or vaseline to low and reverse brake piston seal then install piston by tapping it evenly.



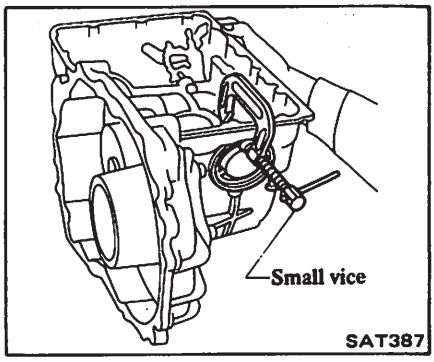
4. Install low and reverse brake piston retainer.



After installing piston retainer, make sure that its piston seal is not turned over by the application of air pressure to low and reverse brake circuit. The piston is installed properly if it move smoothly.



5. Install brake band. Apply automatic transaxle fluid or vaseline to band servo piston O-ring and install band servo piston, return spring and snap ring holding piston with a small vice.

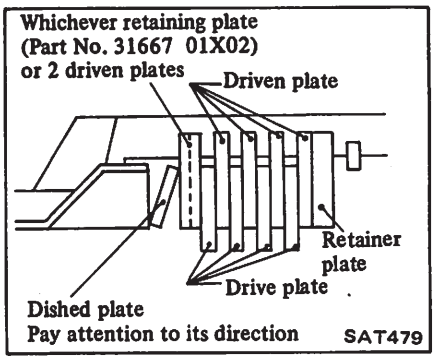


6. Apply automatic transaxle fluid or vaseline to seals in oil pump housing, then install high-reverse clutch (Front).

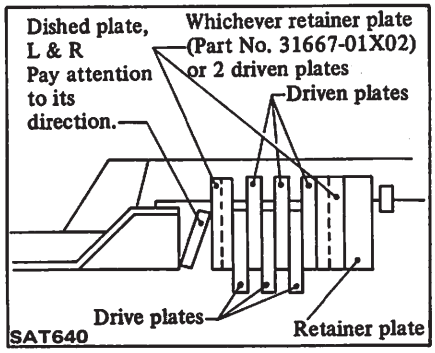
7. Install forward clutch (Rear), front internal gear, thrust bearing, bearing race, front carrier, bearing race, thrust bearing and sun gear assembly in the reverse order of removal. Prior to assembly, apply automatic transaxle fluid or grease to thrust bearings and bearing races.

8. Install low and reverse brake retainer plate, drive and driven plates, retainer plate and snap ring.

4-drive plate type

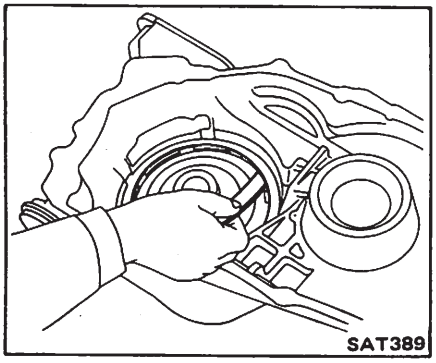


3-drive plate type



9. After low and reverse brake has been completely assembled, measure clearance between snap ring and retainer plate. If measurement exceeds specifications it can be adjusted by replacing retainer plate with one of a different thickness.

Low and reverse brake clearance:
Standard
1.90 - 2.20 mm
(0.0748 - 0.0866 in)
Allowable limit
3.8 mm (0.150 in)



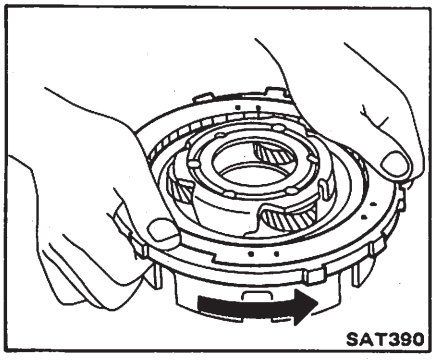
Available retainer plate (Piston side)

Thickness mm (in)	Part Number
3.6 (0.142)	31667-01X00
3.8 (0.150)	31667-01X01

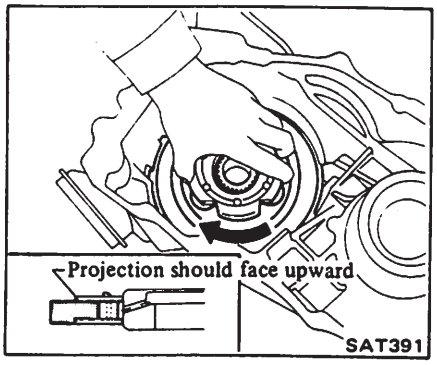
Available retainer plate (O.W.C. side)

Thickness mm (in)	Part Number
3.6 (0.142)	31667-01X00
3.8 (0.150)	31667-01X01
4.0 (0.157)	31667-01X02
4.2 (0.165)	31667-01X03
4.4 (0.173)	31667-01X04

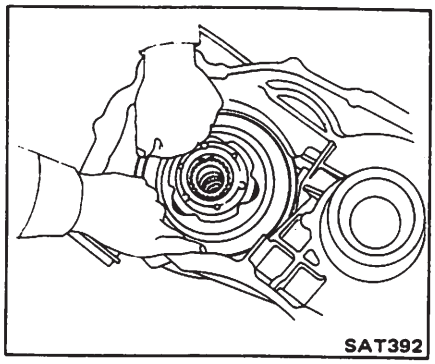
10. Install bearing race on connecting shell.
11. Apply vaseline to thrust washer, then attach it to rear carrier.
12. Install one-way clutch assembly to rear carrier by turning it counterclockwise.



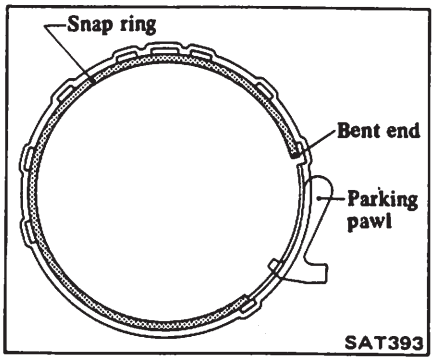
13. Apply vaseline to thrust washer and install it on rear carrier.
14. Install one-way clutch together with rear carrier by turning rear carrier clockwise.



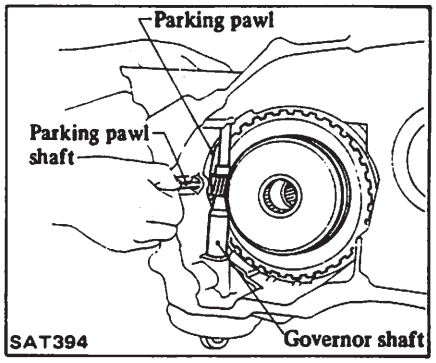
15. Install snap ring



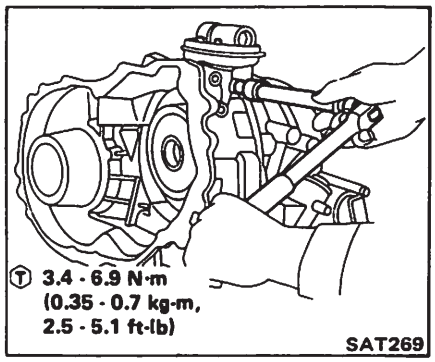
Install snap ring. Ensure that its bent end is positioned so that it does not interfere with parking pawl.



16. Apply vaseline to bearing race, then attach it to rear internal gear.
17. Install rear internal gear, then assemble governor shaft assembly, parking pawl, return spring and parking pawl shaft.

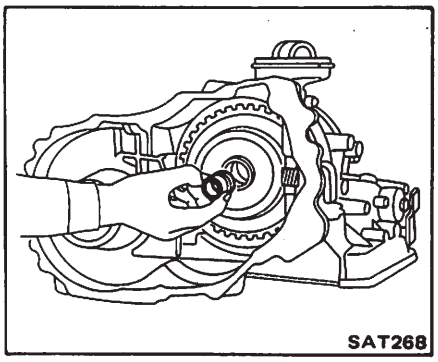


18. Install governor shaft retaining bolt.



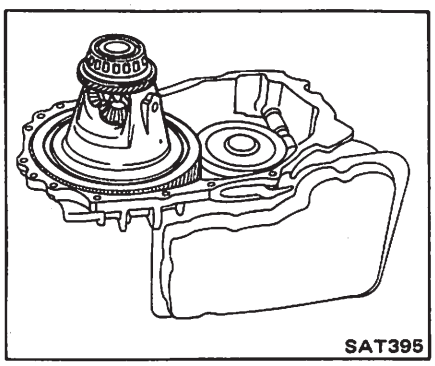
19. Install seal bushing.

CAUTION:
Always install seal bushing to prevent sun gear and output shaft from becoming jammed.

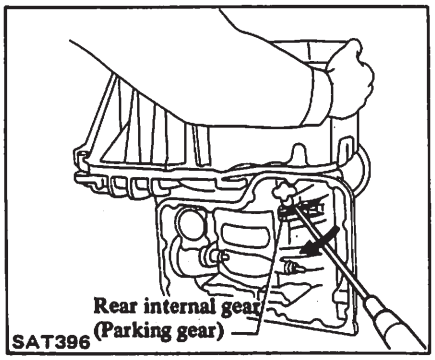


20. **Adjust end play of output shaft.** Refer to Adjusting End Play of Output Shaft.
21. **Adjust rotary frictional force of output shaft and idler gear tapered roller bearing.** Refer to Adjusting Rotary Frictional Force of Tapered Roller Bearing.

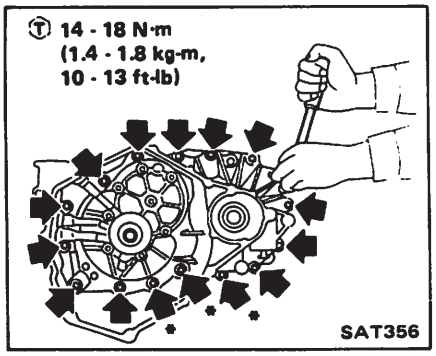
22. **Adjust rotary frictional force of final drive tapered roller bearing.** Refer to Adjusting Rotary Frictional Force of Tapered Roller Bearing.
23. Install final drive assembly on transmission case.



24. Apply vaseline to output shaft shim selected, then attach it to output shaft.
25. Put gasket on transmission case.
26. Install converter housing assembly on transmission case.
27. Turn parking gear (rear internal gear) clockwise with screwdriver while supporting converter housing assembly by hand, until output shaft splines, front carrier, and rear internal gear are engaged properly.

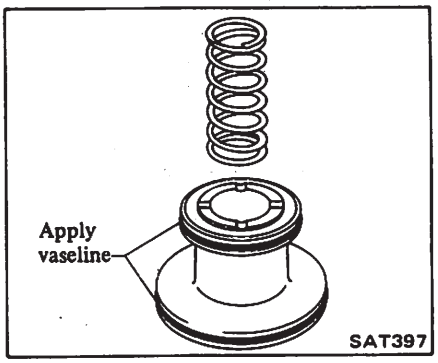


28. Tighten converter housing securing bolts to the specified torque.

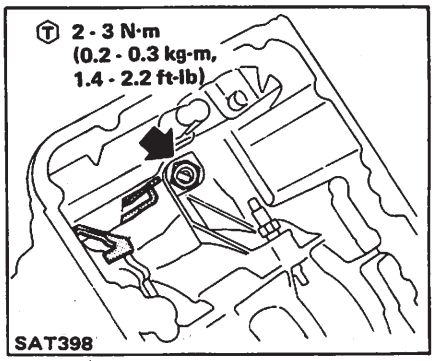


Before installing bolts marked "*" in figure below, ensure that bolt threads are clean and that locking sealer has been applied. Also ensure that the transmission case has been cleaned with solvent.

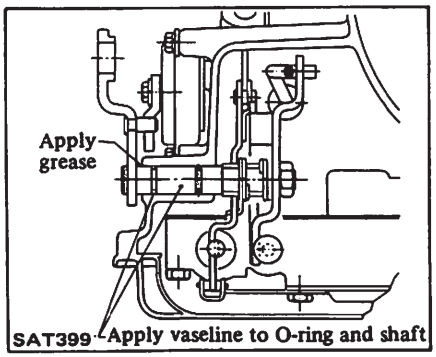
29. Apply vaseline to lathe cut ring, then install return spring and accumulator piston on transmission case.



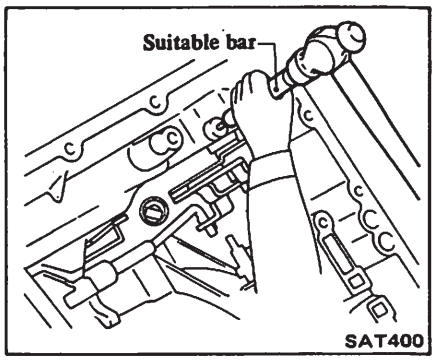
30. **Adjust brake band.** Refer to Brake Band Adjustment.
31. Assemble parking actuator support and throttle wire to transmission case. After tightening nut, bend the lock-plate securely.



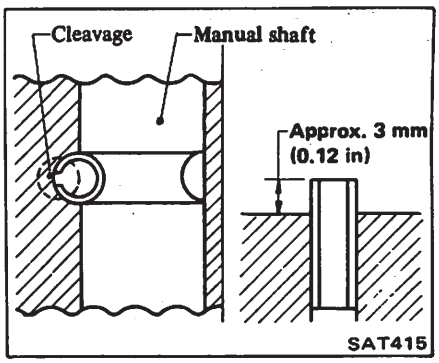
32. Apply grease and vaseline to manual shaft.



33. Install throttle lever, manual plate, manual shaft, selector range lever and parking rod assembly, then secure them with retaining pin.



Install retaining pin as shown in figures below.

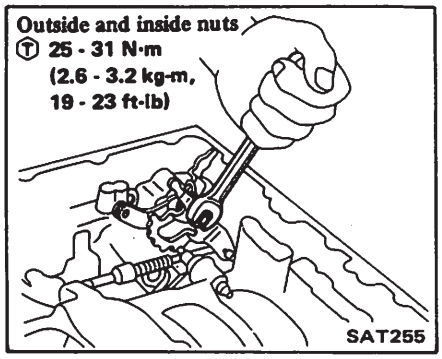


34. Tighten manual shaft securing nuts as follows:
(1) Tighten inside nut to the specified torque.

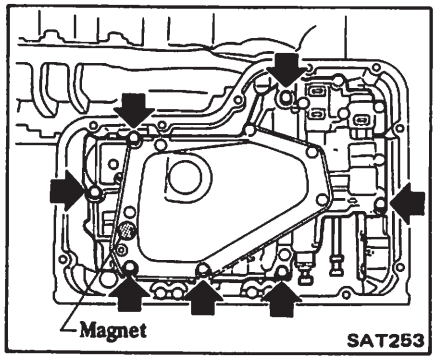
Ⓣ: **Inside nut**
25 - 31 N·m
(2.6 - 3.2 kg-m,
19 - 23 ft-lb)

(2) Tighten outside nut to the specified torque.

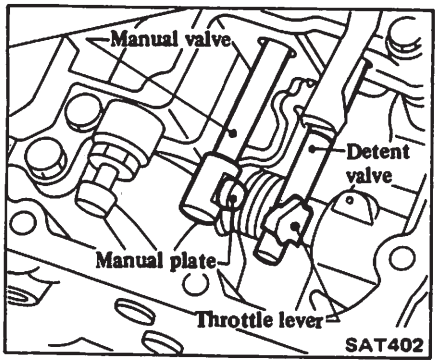
Ⓣ: **Outside nut**
25 - 31 N·m
(2.6 - 3.2 kg-m,
19 - 23 ft-lb)



35. Insert manual valve to control valve body, then assemble them to transmission case. Then install magnet in place.

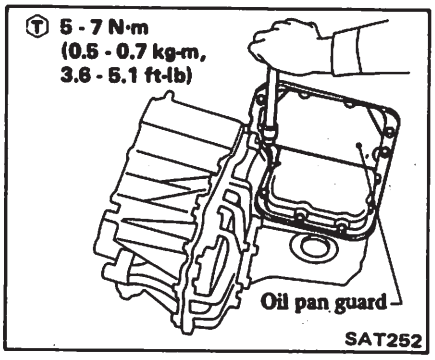


Install manual valve, manual plate, detent valve and throttle lever securely, as shown in figure below.



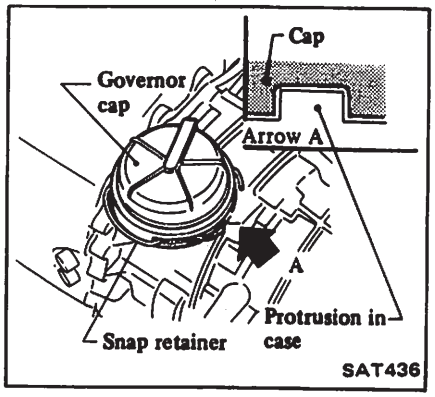
36. Before installing oil pan, check alignment and operation of manual lever and parking pawl engagement. Blow mechanism with air to clean. Make final check to be sure all bolts are installed in valve body.

37. Install oil pan with new gasket and oil pan guard.



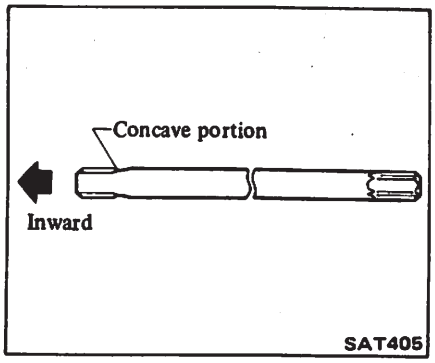
38. Install seal ring and governor cap, then secure it with snap retainer.

When installing snap retainer, pay attention to its direction.



39. Install oil pump shaft and input shaft.

Ensure that concave portion of oil pump shaft faces inward.



40. Carefully inspect torque converter for damage. Check converter hub for grooves caused by hardened seals. Also check bushing contact area.

41. Lubricate oil pump lip seal and converter neck before installing converter.

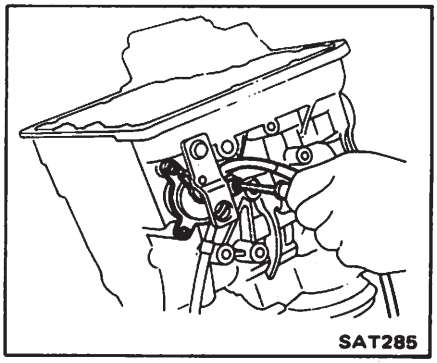
42. Install torque converter to converter housing.

Be careful not to scratch front cover oil seal.

43. Apply sealant to threads of hexagon plug and install it in place.

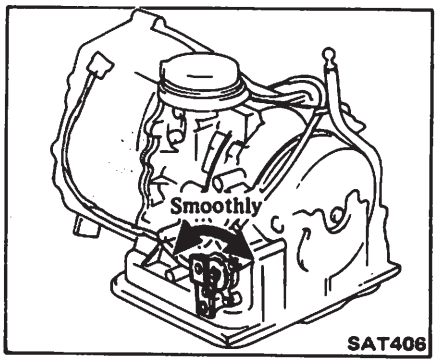
T : **Hexagon plug**
7 - 13 N·m
(0.7 - 1.3 kg-m,
5.1 - 9.4 ft-lb)

44. Install inhibitor switch to transaxle case.



45. Adjust inhibitor switch. Refer to Minor Adjustments.

46. Make sure that manual lever operates smoothly.



TROUBLE-SHOOTING AND DIAGNOSES

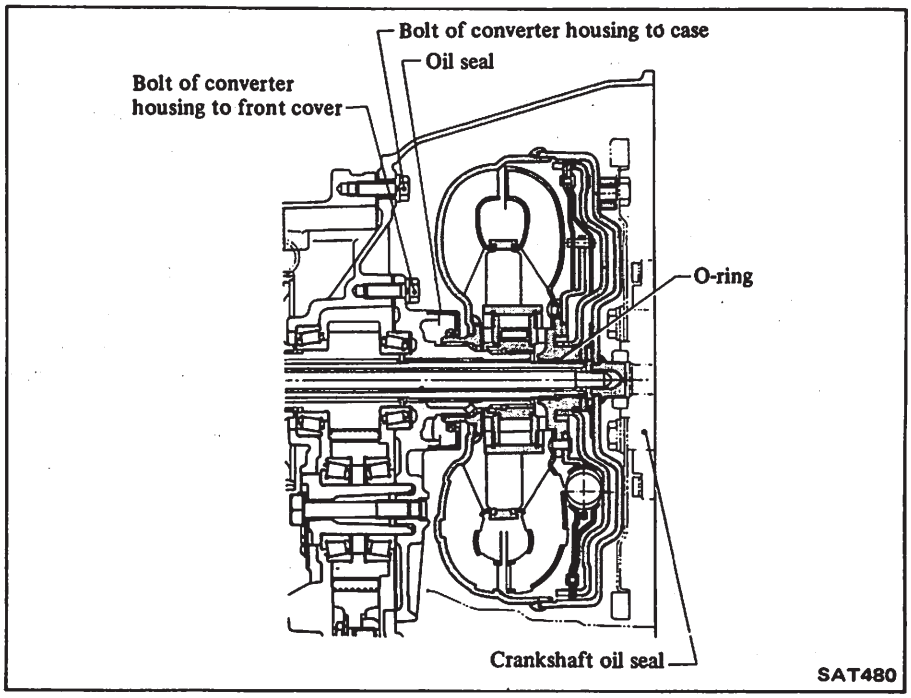
PRELIMINARY CHECKS (Prior to road testing)

Verify customer complaint

The customer should supply as much information as possible, including any unusual characteristics that accompany the complaint.

Fluid level

Refer to Description (on the first page).



Fluid leakage

To detect a fluid leak:

1) Raise vehicle.
2) Clean area suspected of leaking.
3) Start engine, apply foot brake, place control lever in drive, and wait a few minutes.
4) Stop engine.
5) Check for fresh leakage.

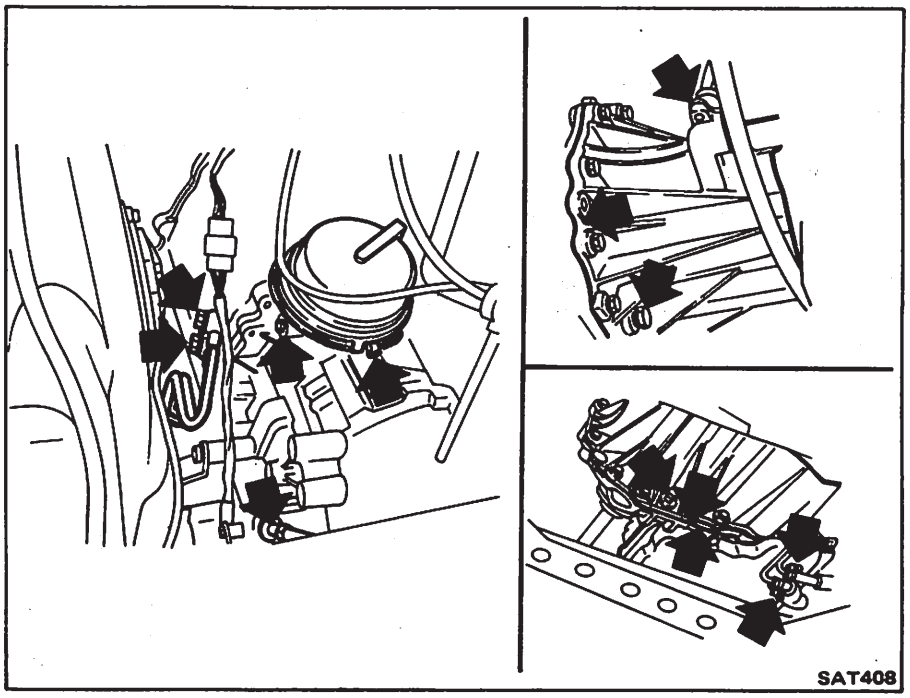
If the governor cap is suspected:

1) Open hood.
2) Remove snap retainer, governor cap and seal ring, then reinstall them. Refer to ON-VEHICLE SERVICE.
3) Clean the area around the governor cap.
4) Run the car at highway speeds.
5) Check the governor cap for fresh leakage.

To aid in locating leaks, use the following list of seals and gaskets.

1) Converter housing
- Front cover oil seal (transaxle front seal).
- Crankshaft oil seal.
- Bolts of converter housing to case and converter housing to front cover.
- Input shaft O-ring.

2) Transaxle and bearing housing.
- Junction of transmission case and converter housing.
- Junction of transmission case and bearing housing.
- Oil cooler inlet and outlet tube connectors.
- Oil pressure inspection ports.
- O-ring of manual shaft.
- O-ring of throttle wire.
- Speedometer pinion sleeve.
- Drive shaft oil seals.
- Governor cap seal ring.



Fluid condition

Transaxle fluid color and texture can aid greatly in transaxle trouble-shooting. When checking fluid level, examine the transaxle fluid and note its color, texture, and odor. Some common forms of contamination are listed below:

1) Dark of Black Fluid:
   With a burned odor
   – Worn friction material.
   Without an odor
   – Slight engine coolant leak (in radiator).
2) Milky Pink Fluid: Water Contamination
   – Coolant leak.
   – Road water entering through filler tube or breather.
3) Varnished Fluid, light to dark brown and tacky: Oxidation
   – Over or Underfilling.
   – Overheating.

Engine idle

Check and adjust idle to specifications.

Idling speed:

Refer to MA section.

Engine oil and coolant levels

Prior to road testing, check engine oil and coolant levels, and fill as necessary.

Control cable

Start in park position, depress detent button and slowly move the gear selector through all ranges. The detent "clicks" should correspond with the range indicator.

DIAGNOSTIC ROAD TEST

Prior to road testing, perform the preliminary inspections outlined earlier. If the car is not equipped with a tachometer, install a portable tachometer in the car. And also install a suitable pressure gauge. If the customer has a specific complaint, select road conditions similar to those described. (e.g. steep hills, freeways, etc.)

Follow the test sequence as outlined in this section and mark the results on the Symptom Chart on page AT-55. It may be necessary to repeat sections of the test under different throttle conditions. (e.g. light, medium of full throttle.) After completing the road test, compare the test results to the Trouble-shooting Chart on page AT-51.

ROAD TESTING

1. Park Range

Place the control lever in "P" range and start the engine. Stop the engine and repeat the procedure in all other ranges and neutral. In Park, the car should be locked in position, unable to roll or move. Make all results on the Symptom Chart.

2. Reverse

Manually shift the control lever from "P" to "R", and note shift quality. Drive the car in reverse long enough to detect slippage or other abnormalities. Note results.

3. Neutral

Manually shift the control lever from "P" to "N" and note quality. In neutral no clutches or bands are applied, and there should be no movement. Note results.

4. Drive Range

Manually shift the control lever to range "D", and note shift quality. Drive the car through all automatic shifts and in all gear ranges. Note shift quality and timing [km/h (MPH)], check for slippage, noise, or other abnormal conditions. If necessary, drive the test sequence under different throttle openings (e.g. light, medium or full throttle).

5. Range "2"

Manually shift the control lever to range "2". Check for slippage, hesitation or abnormal condition. When the lever is set at this position, the transaxle will be automatically shifted between 1st and 2nd gears in response to the depression of the accelerator pedal. However, the transaxle is not shifted to 3rd gear. When the car is slowing down, the transaxle will automatically down-shift.

6. Range "1"

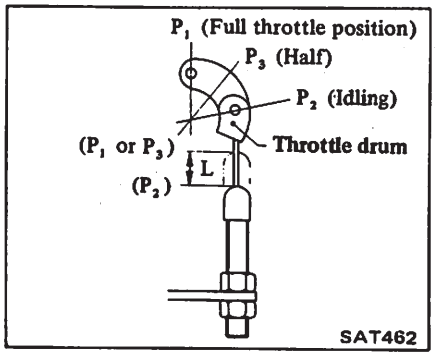
Manually shift the control lever to range "1". Note shift quality. It should, however, downshift immediately to 2nd gear and downshift again to 1st gear as road speed decreases. Accelerate and decelerate in 1st gear to determine engine braking Note results.

The transaxle should not sift into 1st gear from "D" range if the car road speed is above approximately 65 km/h (40 MPH).

7. Record line pressure and governor pressure at each range and at each throttle valve opening in accordance with the pressure testing described below.

CAR SPEED AND LINE PRESSURE WHEN SHIFTING GEARS

This check should be carried out when oil temperature is between 43 to 57°C (109 to 135°F). Throttle position is determined by wire length.



E16 engine model (11X03)

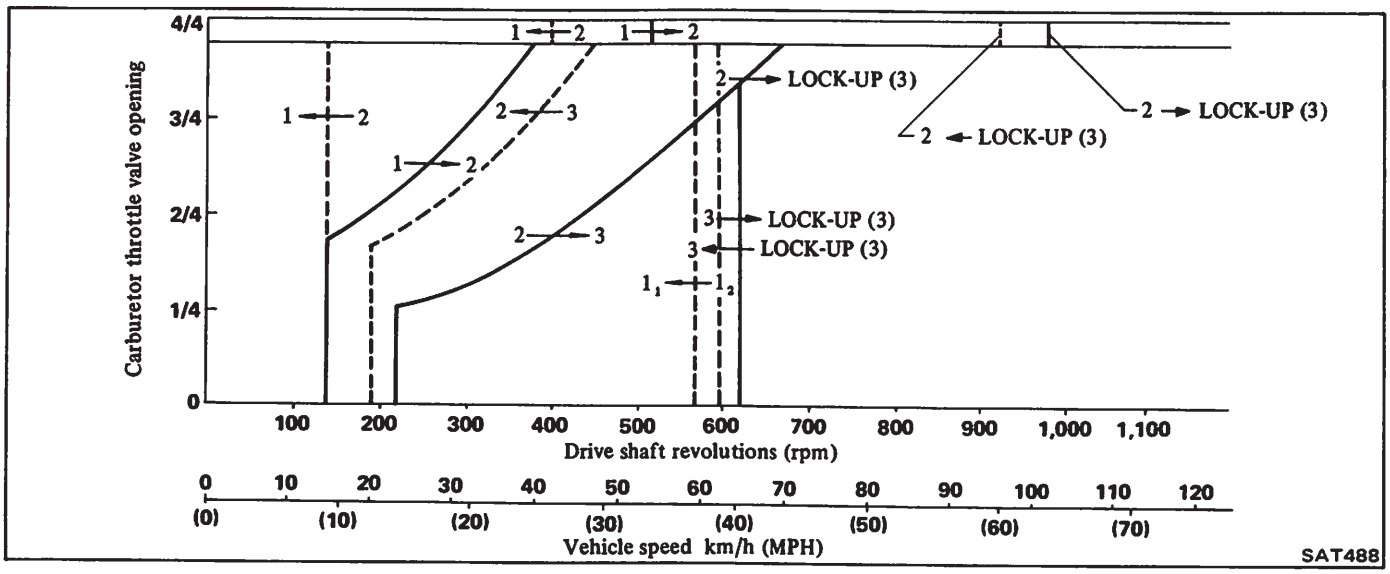
Throttle position	Throttle Wire length L mm (in)	Gear shift	Vehicle speed km/h (MPH)	Drive shaft revolutions rpm	Line pressure kPa (kg/cm², psi)
Full throttle	29.4 (1.157)	$D_1 \rightarrow D_2$ $(2_1 \rightarrow 2_2)$	48 - 56 (30 - 35)	467 - 540	549 - 696 (5.6 - 7.1, 80 - 101)
		$D_2 \rightarrow D_3$	95 - 104 (59 - 65)	915 - 992	
		$D_3 \rightarrow D_2$	93 - 99 (58 - 62)	889 - 947	
		$D_2 \rightarrow D_1$ $(2_2 \rightarrow 2_1)$	29 - 44 (18 - 27)	275 - 419	
		$D_3 \rightarrow 2_2$	–	–	
		$1_2 \rightarrow 1_1$	–	–	
Half throttle (4/8 open)	14.6 (0.575)	$D_1 \rightarrow D_2$ $(2_1 \rightarrow 2_2)$	18 - 27 (11 - 17)	175 - 261	500 - 647 (5.1 - 6.6, 73 - 94)
		$D_2 \rightarrow D_3$	46 - 55 (29 - 34)	447 - 534	
		$D_3 \rightarrow D_2$	25 - 32 (16 - 20)	238 - 310	
		$D_2 \rightarrow D_1$ $(2_2 \rightarrow 2_1)$	11 - 19 (7 - 12)	101 - 188	
		$D_3 \rightarrow 2_2$ $(D_3 \rightarrow 1_2)$	–	–	549 - 696 (5.6 - 7.1, 80 - 101)
		$1_2 \rightarrow 1_1$	50 - 66 (31 - 41)	487 - 632	500 - 647 (5.1 - 6.6, 73 - 94)
Light throttle (1/8 open)	3.7 (0.146)	$D_1 \rightarrow D_2$ $(2_1 \rightarrow 2_2)$	12 - 21 (7 - 13)	115 - 201	245 - 343 (2.5 - 3.5, 36 - 50)
		$D_2 \rightarrow D_3$	23 - 32 (14 - 20)	219 - 306	
		$D_3 \rightarrow D_2$	19 - 27 (12 - 17)	187 - 259	
		$D_2 \rightarrow D_1$ $(2_2 \rightarrow 2_1)$	11 - 19 (7 - 12)	101 - 188	
		$D_3 \rightarrow 2_2$ $(D_3 \rightarrow 1_2)$	–	–	549 - 696 (5.6 - 7.1, 80 - 101)
		$1_2 \rightarrow 1_1$	50 - 66 (31 - 41)	487 - 632	245 - 343 (2.5 - 3.5, 36 - 50)
Lock-up shift	0 - 22.5 (0 - 0.886)	$D_3 \rightarrow D_3$ L/U	61 - 72 (38 - 45)	586 - 688	–
		D_3 L/U $\rightarrow D_3$	58 - 69 (36 - 43)	558 - 660	–

CD17 engine model (03X17)

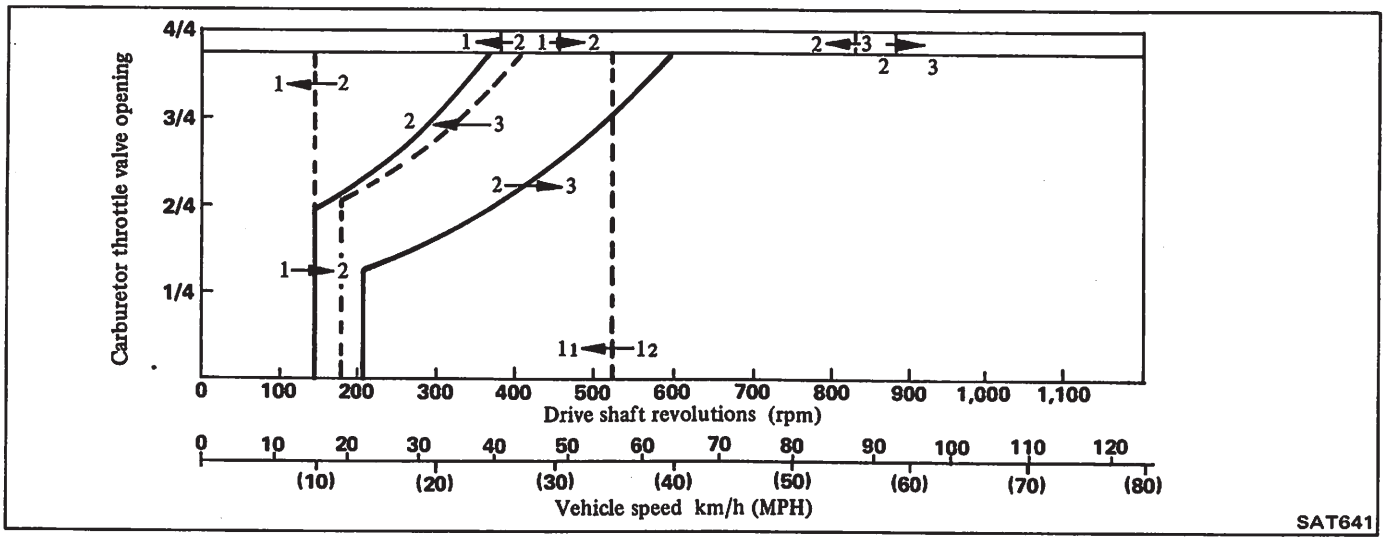
Throttle position	Throttle Wire length L mm (in)	Gear shift	Vehicle speed km/h (MPH)	Drive shaft revolutions rpm	Line pressure kPa (kg/cm², psi)
Full throttle	29.4 (1.157)	$D_1 \rightarrow D_2$ $(2_1 \rightarrow 2_2)$	44 - 52 (27 - 32)	421 - 496	549 - 696 (5.6 - 7.1, 80 - 101)
		$D_2 \rightarrow D_3$	87 - 96 (54 - 60)	829 - 909	
		$D_3 \rightarrow D_2$	85 - 92 (53 - 57)	810 - 871	
		$D_2 \rightarrow D_1$ $(2_2 \rightarrow 2_1)$	28 - 44 (17 - 27)	268 - 416	
		$D_3 \rightarrow 2_2$ $(D_3 \rightarrow 1_1)$	–	–	
		$1_2 \rightarrow 1_1$	–	–	
Half throttle (4/8 open)	14.6 (0.575)	$D_1 \rightarrow D_2$ $(2_1 \rightarrow 2_2)$	14 - 23 (9 - 14)	132 - 221	500 - 647 (5.1 - 6.6, 73 - 94)
		$D_2 \rightarrow D_3$	38 - 48 (24 - 30)	365 - 455	
		$D_3 \rightarrow D_2$	18 - 26 (11 - 16)	170 - 245	
		$D_2 \rightarrow D_1$ $(2_2 \rightarrow 2_1)$	11 - 20 (7 - 12)	104 - 194	
		$D_3 \rightarrow 2_2$ $(D_3 \rightarrow 1_2)$	–	–	549 - 696 (5.6 - 7.1, 80 - 101)
		$1_2 \rightarrow 1_1$	46 - 62 (29 - 39)	435 - 585	500 - 647 (5.1 - 6.6, 73 - 94)
Light throttle (1/8 open)	3.7 (0.146)	$D_1 \rightarrow D_2$ $(2_1 \rightarrow 2_2)$	13 - 22 (8 - 14)	119 - 208	245 - 343 (2.5 - 3.5, 36 - 50)
		$D_2 \rightarrow D_3$	21 - 30 (13 - 19)	198 - 288	
		$D_3 \rightarrow D_2$	18 - 26 (11 - 16)	170 - 245	
		$D_2 \rightarrow D_1$ $(2_2 \rightarrow 2_1)$	11 - 21 (7 - 13)	104 - 194	
		$D_3 \rightarrow 2_2$ $(D_3 \rightarrow 1_2)$	–	–	549 - 696 (5.6 - 7.1, 80 - 101)
		$1_2 \rightarrow 1_1$	46 - 62 (29 - 39)	435 - 585	245 - 343 (2.5 - 3.5, 36 - 50)

SHIFT SCHEDULE —— Upshift line ------ Downshift line

E16 engine model

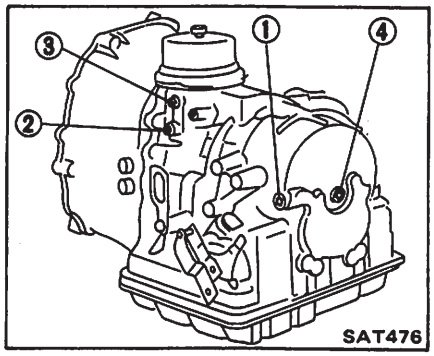


CD17 engine model (03X17)



PRESSURE TESTING

The RL3F01A transaxle is provided with three pressure test ports. All are useful for transaxle trouble-shooting, Line Pressure [To high-reverse clutch (Front)], Line Pressure [To forward clutch (Rear)] and Governor Pressure.



1 Line pressure [To high-reverse clutch (Front)]
2 Line pressure [To forward clutch (Rear)]
3 Governor pressure
4 Torque converter lock-up pressure

LINE PRESSURE

1. Install pressure gauge to line pressure port. (When shift lever is in "D", "2" or "1" range, install pressure gauge to port ② and when in "R" range, install pressure gauge to port ① shown above.) Locate the gauge so it can be seen by driver. Measure line pressure at idling and at stall test.
2. Road test car and note pressure under different throttle conditions.

At idling

E16 engine model

Range	Line pressure kPa (kg/cm², psi)
R	628 - 775 (6.4 - 7.9, 91 - 112)
D	245 - 343 (2.5 - 3.5, 36 - 50)
2	245 - 343 (2.5 - 3.5, 36 - 50)
1	245 - 343 (2.5 - 3.5, 36 - 50)

CD17 engine model

Range	Line pressure kPa (kg/cm², psi)
R	628 - 775 (6.4 - 7.9, 91 - 112)
D	245 - 343 (2.5 - 3.5, 36 - 50)
2	245 - 343 (2.5 - 3.5, 36 - 50)
1	245 - 343 (2.5 - 3.5, 36 - 50)

At stall test

E16 engine model

Range	Line pressure kPa (kg/cm², psi)
R	1,275 - 1,471 (13.0 - 15.0, 185 - 213)
D	549 - 696 (5.6 - 7.1, 80 - 101)
2	549 - 696 (5.6 - 7.1, 80 - 101)
1	549 - 696 (5.6 - 7.1, 80 - 101)

CD17 engine model

Range	Line pressure kPa (kg/cm², psi)
R	1,275 - 1,471 (13.0 - 15.0, 185 - 213)
D	549 - 696 (5.6 - 7.1, 80 - 101)
2	549 - 696 (5.6 - 7.1, 80 - 101)
1	549 - 696 (5.6 - 7.1, 80 - 101)

a. **Line pressure can be measured by gradually opening throttle, starting with engine idle.**
b. **Line pressure should be measured while fluid temperature is within the 43 to 57°C (109 to 135°F) range.**

Lock-up test

Install pressure gauge to port ④. Shift selector lever in "D" range.

Condition	Torque converter lock-up pressure kPa (kg/cm², psi)
Lock-up "ON"	Less than 49 (0.5, 7)
Lock-up "OFF"	More than 196 (2.0, 28)

Key points of pressure testing are:

a. **Pressure at idle: Look for a steady rise in pressure as car speed increases under light load.**
b. **Pressure drop between shift points should not exceed 98 kPa (1.0 kg/cm², 14 psi). Excessive pressure drop may indicate an internal leak at a servo or clutch seal.**

GOVERNOR PRESSURE

1. Install pressure gauge to governor pressure port. Locate the gauge so it can be seen by driver.
2. Road test car and note pressure at different road speeds. Governor pressure increases directly with road speed, and should always be less than line pressure.

STALL TESTING

The stall test is an effective method of testing clutch and band holding ability, torque converter one-way clutch operation, and engine performance. A stall test should only be performed as a last resort because of the high fluid temperature it generates and the excessive load it places on the engine and transaxle.

CAUTION:
a. **Transaxle and engine fluid levels should always be checked and fluid added as needed.**
b. **Run engine at 1,200 rpm to attain proper warm-up.**
c. **During test, never hold throttle wide-open for more than 5 seconds.**
d. **Do not test more than two gear ranges without driving car to cool off engine and transaxle.**

STALL TEST PROCEDURE

1. Install a tachometer where it can be seen by driver during test.
2. Set hand brake and block wheels.
3. Start engine and place shift lever in "D" range.
4. Apply foot brake and accelerate to wide-open throttle. Do **not** hold throttle open longer than five seconds.
5. Quickly note the engine stall speed and immediately release throttle.

Stall revolution:
E16 engine
1,800 - 2,100 rpm
CD17 engine
1,500 - 1,800 rpm

6. Place control lever in "R" range and repeat above test (same as in "D" range).

If stall test indicates proper stall revolution in "D" range, no further testing is necessary.

STALL TEST ANALYSIS

1. Satisfactory results in "D" range indicates forward clutch (Rear), one-way clutch of transaxle, and sprag clutch of torque converter, are functioning properly.
2. **Stall revolution in "D" range, 1st gear, is above the vehicle's specified revolution:**
The forward clutch (Rear) is faulty.
3. **Stall revolution in "R" range is above specified revolution (for "D" range):**
Low and Reverse Brakes are faulty.
4. **Stall revolution in "D" range, 1st gear is below specified revolution:**
Converter one-way clutch is faulty (slipping), or engine is not performing properly.

If converter one-way clutch is frozen, vehicle will have poor high speed performance. If converter one-way clutch is slipping, vehicle will be sluggish up to 50 or 60 km/h (30 or 40 MPH).

TROUBLE-SHOOTING CHART

Numbers are arranged in order of probability. Perform inspections starting with number one and working up. Circled numbers indicate that the transaxle must be removed from the vehicle.

	ON CAR										OFF CAR									
	Oil level	Control cable	Inhibitor switch and wiring	Throttle wire	Detent valve	Engine idling rpm	Line pressure	Manual valve	Governor	Band servo	Transaxle air check	Oil quality	Ignition switch and starter motor	Engine adjustment, brake inspection	Forward clutch (Rear)	High-reverse clutch (Front)	Band brake	Low and reverse brake	Oil pump	Oil passage leak	Transaxle on-way clutch	High-reverse clutch (Front) check ball	Park linkage
Engine does not start in "N", "P" ranges.		2	3										1										
Engine starts in range other than "N" and "P".		1	2																				
Transaxle noise in "P" and "N" ranges.	1						2												③				
Car moves when changing into "P" range or parking gear does not disengage when shifted out of "P" range		1																					②
Car runs in "N" range.		1						3				2			④								
Car will not run in "R" range (but runs in "D", "2" and "1" ranges.) Clutch slips. Very poor acceleration.	1	2					3	5			6	4			⑨	⑧		⑦		⑩		⑪	
Car braked when shifting into "R" range.										3	2	1			④		⑤						⑥
Sharp shock in shifting from "N" to "D" range.				2		1	3	4							⑤								
Car will not run in "D" range (but runs in "2", "1" and "R" ranges).		1					2	3													④		
Car will not run in "D", "1", "2" ranges (but runs in "R" range). Clutch slips. Very poor acceleration.	1	2					4	5			6	3		7	⑧	⑩			⑨				
Clutches or brakes slip somewhat in starting.	1	2		6			3	5			7	4						⑧	⑨				
Excessive creep.						1																	
No creep at all.	1	2				3		5				4			⑧	⑨			⑥	⑦			
Failure to change gear from "1st" to "2nd".		1		2	3			5	6	8	7	4					⑨			⑩			
Failure to change gear from "2nd" to "3rd".		1		2	3			5	6	8	7	4				⑨				⑩		⑪	
Too high a gear change point from "1st" to "2nd", from "2nd" to "3rd".				1	2		3	5	6			4								⑦			
Gear change directly from "1st" to "3rd" occurs.								2	4		3	1					⑤			⑥			
Engine stops when shifting lever into "D" range.													1										
	ON CAR										OFF CAR									

Numbers are arranged in order of probability. Perform inspections starting with number one and working up. Circled numbers indicate that the transaxle must be removed from the vehicle.

	ON CAR							OFF CAR				
	Oil level	Control cable	Throttle wire	Detent valve	Line pressure	Engine stall rpm	Manual valve	Governor	Band servo	Transaxle air check	Oil quality	Engine adjustment, brake inspection	Forward clutch (Rear)	High-reverse clutch (Front)	Band brake	Low and reverse brake	Oil pump	Oil passage leak	Transaxle one-way clutch	High-reverse clutch (Front) check ball
Too sharp a shock in change from "1st" to "2nd".			1			2	4		5		3			⑥						
Too sharp a shock in change from "2nd" to "3rd".			1		2		3		5	4				⑥						
Almost no shock or clutches slipping in change from "1st" to "2nd".	1	2	3		4		6		8	7	5			⑨			⑩			
Almost no shock or slipping in change from "2nd" to "3rd". Engine races extremely fast.	1	2	3		4		6		8	7	5			⑨			⑩			⑪
Car braked by gear change from "1st" to "2nd".							2				1			④		③			⑤	
Car braked by gear change from "2nd" to "3rd".							3		2		1			④						
Maximum speed not attained. Acceleration poor.	1	2			4	5	7		6		3	8	⑪	⑫	⑨	⑩	⑬			
Failure to change gear from "3rd" to "2nd".			1				3	4	6	5	2			⑦	⑧		⑨			
Failure to change gear from "2nd" to "1st" or from "3rd" to "1st".			1				3	4	6	5	2			⑦					⑧	
Gear change shock felt during deceleration by releasing accelerator pedal.		1	2	3	4		5	6									⑦			
Too high a change point from "3rd" to "2nd", from "2nd" to "1st".		1	2	3	4		5	6									⑦			
Kickdown does not operate when depressing pedal in "3rd" within kickdown car speed.			2	1			4	5		3				⑥			⑦			
Kickdown operates or engine overruns when depressing pedal in "3rd" beyond kickdown car speed limit.		1	2		3		5	6		7	4			⑧			⑨			
Races extremely fast or slips in changing from "3rd" to "2nd" when depressing pedal.			1		2		4		6	5	3			⑦	⑧		⑨			⑩
	ON CAR												OFF CAR							

Numbers are arranged in order of probability. Perform inspections starting with number one and working up. Circled numbers indicate that the transaxle must be removed from the vehicle.

	ON CAR									OFF CAR				
	Oil level Control cable Throttle wire	Engine idling rpm Line pressure Engine stall rpm	Lubrication Manual valve Governor	Band servo Transaxle air check Oil quality	Forward clutch (Rear) High-reverse clutch (Front) Band brake	Low and reverse brake Oil pump Oil passage leak	Torque converter, one-way clutch Transaxle one-way clutch Park linkage	Planetary gear
Car will not run in any range.	1 2 .	. 3 .	. 5 .	. 6 4	. . .	. ⑦ ⑧	. . ⑨	.
Transmission noise in "D", "2", "1" and "R" ranges.	1 . .	. 2 .	. . .	. . .	③ . .	. ④ .	. ⑤ .	⑥
Failure to change from "3rd" to "2nd" when changing lever into "2" range.	. 1 .	. 2 .	. 4 .	5 . 3	. . ⑥	. . ⑦	. . .	.
Gear change from "2nd" to "3rd" in "2" range.	. 1 .	. 2 .	. 3 .	. . .	. . .	. . .	. . .	.
No shock at change from "1" to "2" range or engine races extremely fast.	1 2 3	4 . 5	. 7 .	. 8 6	. . ⑨	. ⑩ .	. . .	.
Failure to change from "3rd" to "2nd" when shifting lever into "1" range.	. 1 .	. 2 .	. 4 5	7 6 3	. ⑧ ⑨	. . ⑩	. . .	.
Engine brake does not operate in "1" range.	. 1 .	. 2 .	. 4 .	. 5 3	. . .	⑥ . ⑦	. . .	.
Gear change from "1st" to "2nd" or from "2nd" to "3rd" in "1" range.	. 1 .	. . .	. 2 .	. . .	. . .	. . ③	. . .	.
Does not change from "2nd" to "1st" in "1" range.	1 2 .	. . .	. 4 5	6 7 3	. . .	⑧ . ⑨	. . .	.
Large shock changing from "2nd" to "1st" in "1" range.	. . 1	. . 2	. 4 .	. . 3	. . .	⑤ . .	. . .	.
Transaxle overheats.	1 . .	. 3 4	2 6 .	8 7 5	. ⑨ ⑩	⑪ ⑫ ⑬	⑭ . .	⑮
Oil shoots out during operation. White smoke emitted from exhaust pipe during operation.	1 . 3	. 5 6	2 7 .	. 8 4	. ⑨ ⑩	⑪ ⑫ ⑬	⑭ . .	⑮
Offensive smell at oil charging pipe.	1 . .	. . .	. . .	. . 2	③ ④ ⑤	⑥ ⑦ ⑧	⑨ . .	⑩
	ON CAR				OFF CAR			

Exclusively for RL3F01A (L/U)

Numbers are arranged in order of probability. Perform inspections starting with number one and working up. Circled numbers indicate that the transaxle must be removed from the vehicle.

	←ON CAR→		←OFF CAR→				
	Governor	*Line pressure*	*O-ring in input shaft*	*Torque converter*	*Speed cut valve*	*Lock-up control valve*	*Oil pump*
Torque converter is not locked up	1	2	③	⑦	⑤	⑥	④
Lock-up piston slip		1	②	④			③
Lock-up point is extremely high or low	1				②	③	
Engine is stopped at R.D. 2 and 1 ranges				②		①	
Transmission overheats		1	②	④			③

ROAD TEST SYMPTOM CHART

		SHIFT QUALITY				CAR WON'T MOVE	CRUISE SLIPPAGE	POOR POWER/ ACCELERATION	NOISY	OK	COMMENTS
		ROUGH	SHIFT TIMING [Mark km/h (MPH)]	NO SHIFT	SHIFT SLIPPAGE						
PARK RANGE	ENG. START										
	HOLDING										
"R" RANGE	Man. shift P-R										
	REVERSE										
"N" RANGE	Man. shift R-N										
	ENG. START										
	N										
"D" RANGE	Man. shift N-D										
	1st										
	Auto shift 1-2										
	2nd										
	Auto shift 2-3										
	3rd in lock-up "OFF"										
	Auto shift Lock-up "OFF" (3) → Lock-up "ON" (3) (L/U)										
	3rd in Lock-up "ON" (L/U)										
	Auto shift Lock-up "ON" (3) → Lock-up "OFF" (3) (L/U)										
	Decel. 3-2										
	Kickdown 3-2										
	Decel. 2-1										
	Kickdown 2-1										
"2" RANGE	Man. shift D-2										
	1st										
	Auto shift 1-2										
	2nd										
	Decel. 2-1										
	Kickdown 2-1										
"1" RANGE	Man. shift 2-1										
	Man. shift D-1										
	Acceleration										
	"1" Engine Braking										

TROUBLE-SHOOTING GUIDE

Order	Test item	Procedure
Checking	1. Oil level gauge	Check gauge for oil level and leakage before and after each test.
	2. Control cable	Check by shifting into "P", "R", "N", "D", "2" and "1" ranges with selector lever.
	3. Inhibitor switch	Check whether starter operates in "N" and "P" ranges only and whether reverse lamp operates in "R" range only.
	4. Engine idling rpm.	Check whether idling rpm meet standard.
	5. Throttle wire	Check whether the throttle wire is adjusted properly.
	6. Operation in each range.	Check whether transmission engages positively by shifting "N" → "D", "N" → "2", "N" → "1" and "N" → "R" range while idling with brake applied.
	7. Creep of car.	Check whether there is any creep in "D", "2", "1" and "R" ranges.
Stall test	1. Oil pressure before testing.	Measure line pressures in "D", "2", "1" and "R" range while idling.
	2. Stall test.	Measure engine rpm and line pressure in "D", "2", "1" and "R" ranges during full throttle operation. **Temperature of torque converter oil used in test should be from 60 to 100°C (140 to 212°F) i.e., sufficiently warmed up but not overheated.** **CAUTION:** **To cool oil between each stall test for "D", "2", "1" and "R" ranges, idle engine, i.e., rpm at about 1,200 rpm for more than 1 minute in "P" range. Measurement time must not be more than 5 seconds.**
	3. Oil pressure after testing	Same as item 1.
Road test	1. Slow acceleration, 1st → 2nd 2nd → 3rd	Check car speeds and engine rpm in shifting up 1st → 2nd range and 2nd → 3rd range while running with lever in "D" range and accelerator pedal half-way down.
	2. Quick acceleration, 1st → 2nd 2nd → 3rd	Same as item 1 above except with accelerator pedal more than 15/16 down (i.e., in the position just before kick-down).
	3. Lock-up operation, Lock-up "OFF" ⟷ "ON" (L/U)	Check whether the lock-up operates and measure the operating vehicle speeds.
	4. Kickdown operation, 3rd → 2nd or 2nd → 1st	Check whether the kickdown operates and measure the time delays while running at 30, 40, 50, 60, 70 km/h (19, 25, 31, 37, 43 MPH) in "D_3" range.
	5. Shift down, $D_3 \rightarrow D_2 \rightarrow D_1$	Check car speeds and engine rpm in shifting down from 3rd → 2nd → 1st (sequentially) while coasting with accelerator pedal released and in "D_3" range with accelerator pedal half-way down.

Order	Test item	Procedure
Road test	6. Shift down, $D_3 \rightarrow 1_2 \rightarrow 1_1$	Check for shifting down $D_3 \rightarrow 1_2$ and engine braking, and further for shifting down $1_2 \rightarrow 1_1$ and engine braking after shifting the lever into "1" range with the accelerator pedal released and while driving at about 60 km/h (37 MPH) in "D_3" range.
	7. Shift down, $D_3 \rightarrow 2$	Check for quick shifting down $D_3 \rightarrow 2$ and engine braking, after shifting the lever into "2" range while driving at about 50 km/h (31 MPH) in "D_3" range.
	8. Shift up and down $2_2 \rightarrow 2_1 \rightarrow 2_2$	Check for shifting up and down between 2_2 and 2_1 in response to car speed.
	9. Shift up, $1_1 \rightarrow 1_2$	Check for failure of the transaxle to shift up during acceleration, when starting in "1" range.
	10. Parking	Confirm that car will not move on grade when shifting to "P" range.
Others	Abnormal shock, oil leakage.	Enter into record conditions observed during these tests such as gear noise, abnormal clutch noise and acceleration performance.

SERVICE DATA AND SPECIFICATIONS (S.D.S.)

GENERAL SPECIFICATIONS

Vehicle model		E16 engine	CD17 engine
Automatic transaxle model		RL3F01A	RN3F01A
Stall torque ratio		1.9 : 1	1.9 : 1
Transaxle gear ratio	1st	2.826	
	2nd	1.543	
	Top	1.000	
	Reverse	2.364	
	Final drive	3.476	3.364
Number of teeth	Output shaft	21	22
	Idler gear	31	30
	Final gear	73	74
Oil		Automatic transmission fluid "Dexron" type	
Oil capacity		6.0 liters (6-3/8 US qt, 5-1/4 Imp qt)	

SPECIFICATIONS AND ADJUSTMENT

Vehicle model			E16 engine	CD17 engine
Automatic transaxle assembly Model code number			11X03	03X17
High-reverse clutch (Front)	Number of drive plates		2	2
	Number of driven plates		3	3
	Clearance mm (in)	Standard	1.0 - 1.4 (0.039 - 0.055)	
		Allowable limit	2.2 (0.087)	
	Drive plate thickness mm (in)	Standard	1.80 (0.0709)	
		Allowable limit	1.6 (0.063)	
	Thickness of retaining plate		Thickness mm (in)	Part number
			3.4 (0.134)	31537-01X05
			3.6 (0.142)	31537-01X00
			3.8 (0.150)	31537-01X01
			4.0 (0.157)	31537-01X02
			4.2 (0.165)	31537-01X03
			4.4 (0.173)	31537-01X04
For-ward clutch (Rear)	Number of drive plates		3	3
	Number of driven plates		3	3
	Clearance mm (in)	Standard	0.8 - 1.2 (0.031 - 0.047)	
		Allowable limit	2.8 (0.110)	
	Drive plate thickness mm (in)	Standard	1.80 (0.0709)	
		Allowable limit	1.6 (0.063)	
	Thickness of retaining plate		Thickness mm (in)	Part number
			3.4 (0.134)	31537-01X05
			3.6 (0.142)	31537-01X00
			3.8 (0.150)	31537-01X01
			4.0 (0.157)	31537-01X02
			4.2 (0.165)	31537-01X03
			4.4 (0.173)	31537-01X04
Low & reverse brake	Number of drive plates		4	3
	Number of driven plates		4 (6)*	3 (7)*
	Clearance mm (in)	Standard	1.90 - 2.20 (0.0748 - 0.0866)	
		Allowable limit	3.8 (0.150)	
	Drive plate thickness mm (in)	Standard	2.00 (0.0787)	
		Allowable limit	1.8 (0.071)	
	Thickness of retaining plate		Thickness mm (in)	Part number
			3.6 (0.142)	31667-01X00
			3.8 (0.150)	31667-01X01
			4.0 (0.157)	31667-01X02
			4.2 (0.165)	31667-01X03
			4.4 (0.173)	31667-01X04
Brake band Piston size mm (in)		Big dia.	68 (2.68)	
		Small dia.	40 (1.57)	
Identification mark on separator plate (Punch mark on separator plate)			W	R

*: In the case where two driven plates are used instead of the retaining plate (Part No. 31667-01X02).

Oil pump clearance mm (in)	Outer gear-pump housing	Standard	0.20 - 0.30 (0.0079 - 0.0118)
		Allowable limit	0.35 (0.0138)
	Outer gear-crescent	Standard	0.20 - 0.30 (0.0079 - 0.0118)
		Allowable limit	0.35 (0.0138)
	Gears-pump plate	Standard	0.02 - 0.04 (0.0008 - 0.0016)
		Allowable limit	0.08 (0.0031)
	Seal ring-ring groove	Standard	0.10 - 0.25 (0.0039 - 0.0098)
		Allowable limit	0.25 (0.0098)
Planetary carrier mm (in)	Clearance between pinion washer and planetary carrier	Standard	0.20 - 0.70 (0.0079 - 0.0276)
		Allowable limit	0.80 (0.0315)

ROTARY FRICTIONAL FORCE

Unit: N·m (kg-cm, in-lb)

Output shaft	0.35 - 0.47 (3.6 - 4.8, 3.1 - 4.2)
Final drive	5.9 - 7.4 (60 - 75, 52 - 65)

OUTPUT SHAFT END PLAY

0.25 - 0.55 mm (0.0098 - 0.0217 in)

AVAILABLE SHIMS

Output shaft tapered roller bearing

Thickness mm (in)	Part number
0.11 (0.0043)	31499-01X00
0.13 (0.0051)	31499-01X01
0.15 (0.0059)	31499-01X02
0.17 (0.0067)	31499-01X03
0.19 (0.0075)	31499-01X04
0.30 (0.0118)	31499-01X05
0.40 (0.0157)	31499-01X06
0.50 (0.0197)	31499-01X07
0.60 (0.0236)	31499-01X08
0.70 (0.0276)	31499-01X09
0.80 (0.0315)	31499-01X10
0.90 (0.0354)	31499-01X11
1.00 (0.0394)	31499-01X12

Output shaft end play

Thickness of soldering plate –0.05 mm (0.0020 in)* mm (in)	Thickness mm (in)	Part number
0.55 - 0.85 (0.0217 - 0.0335)	0.3 (0.012)	31484-01X00
0.75 - 1.05 (0.0295 - 0.0413)	0.5 (0.020)	31484-01X01
0.95 - 1.25 (0.0374 - 0.0492)	0.7 (0.028)	31484-01X02
1.15 - 1.45 (0.0453 - 0.0571)	0.9 (0.035)	31484-01X03
1.35 - 1.65 (0.0531 - 0.0650)	1.1 (0.043)	31484-01X04
1.55 - 1.85 (0.0610 - 0.0728)	1.3 (0.051)	31484-01X05
1.75 - 2.05 (0.0689 - 0.0807)	1.5 (0.059)	31484-01X06
1.95 - 2.25 (0.0768 - 0.0886)	1.7 (0.067)	31484-01X07

* 0.05 mm (0.0020 in) is the amount the soldering plate recovers due to its elasticity, and it must be subtracted from the thickness of soldering plate.

Final drive

H = A – B mm (in)	Thickness mm (in)	Part number
0 - 0.07 (0 - 0.0028)	0.38 (0.0150)	38453-01X00
0.07 - 0.15 (0.0028 - 0.0059)	0.46 (0.0181)	38453-01X01
0.15 - 0.23 (0.0059 - 0.0091)	0.54 (0.0213)	38453-01X02
0.23 - 0.31 (0.0091 - 0.0122)	0.62 (0.0244)	38453-01X03
0.31 - 0.39 (0.0122 - 0.0154)	0.70 (0.0276)	38453-01X04
0.39 - 0.47 (0.0154 - 0.0185)	0.78 (0.0307)	38453-01X05
0.47 - 0.55 (0.0185 - 0.0217)	0.86 (0.0339)	38453-01X06
0.55 - 0.63 (0.0217 - 0.0248)	0.94 (0.0370)	38453-01X07
0.63 - 0.71 (0.0248 - 0.0280)	1.02 (0.0402)	38453-01X08
0.71 - 0.79 (0.0280 - 0.0311)	1.10 (0.0433)	38453-01X09
0.79 - 0.87 (0.0311 - 0.0343)	1.18 (0.0465)	38453-01X10
0.87 - 0.95 (0.0343 - 0.0374)	1.26 (0.0496)	38453-01X11
0.95 - 1.03 (0.0374 - 0.0406)	1.34 (0.0528)	38453-01X12
1.03 - 1.11 (0.0406 - 0.0437)	1.42 (0.0559)	38453-01X13
1.11 - 1.19 (0.0437 - 0.0469)	1.50 (0.0591)	38453-01X14
1.19 - 1.27 (0.0469 - 0.0500)	1.58 (0.0622)	38453-01X15
1.27 - 1.35 (0.0500 - 0.0531)	1.66 (0.0654)	38453-01X16

STALL REVOLUTION

Stall revolution rpm	E16 engine	1,800 - 2,100
	CD17 engine	1,500 - 1,800

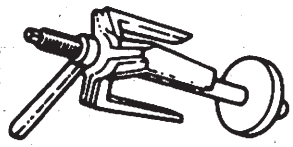
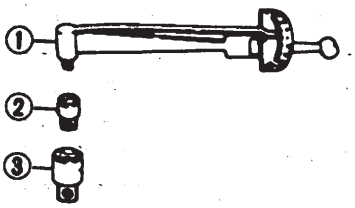
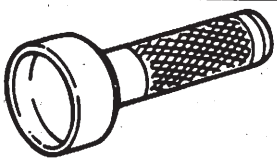
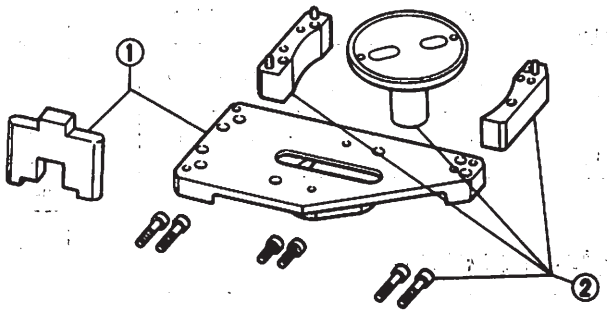
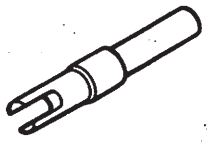
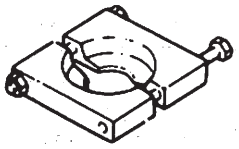
TIGHTENING TORQUE

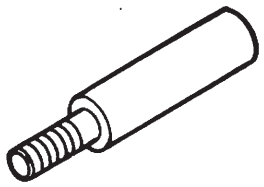
Unit		N·m	kg-m	ft-lb
Drive plate to torque converter		49 - 69	5.0 - 7.0	36 - 51
Converter housing to engine	M8	16 - 22	1.6 - 2.2	12 - 16
	M10	39 - 49	4.0 - 5.0	29 - 36
Engine gusset to cylinder block (CD17 engine model)		30 - 40	3.1 - 4.1	22 - 30

Unit	N·m	kg-m	ft-lb
Transaxle case to converter housing	14 - 18	1.4 - 1.8	10 - 13
Transaxle case to front cover	14 - 18	1.4 - 1.8	10 - 13
Oil pan to transaxle case	5 - 7	0.5 - 0.7	3.6 - 5.1
Bearing retainer to transaxle case	19 - 25	1.9 - 2.5	14 - 18
Piston stem (when adjusting band brake)	*4 - 5	*0.4 - 0.5	*2.9 - 3.6
Piston stem lock nut	16 - 22	1.6 - 2.2	12 - 16
Low and reverse brake piston retainer	7 - 9	0.7 - 0.9	5.1 - 6.5
Control valve body to transaxle case	7 - 9	0.7 - 0.9	5.1 - 6.5
Lower valve body to upper valve body	7 - 9	0.7 - 0.9	5.1 - 6.5
Final gear bolt	69 - 78	7.0 - 8.0	51 - 58
Oil strainer to lower valve body	5 - 7	0.5 - 0.7	3.6 - 5.1
Governor valve body to governor shaft	5 - 7	0.5 - 0.7	3.6 - 5.1
Governor shaft securing nut	3.4 - 6.9	0.35 - 0.7	2.5 - 5.1
Idler gear when adjusting turning frictional force)	26 - 36	2.7 - 3.7	20 - 27
Idler gear lock nut	**		
Throttle wire securing nut	5 - 7	0.5 - 0.7	3.6 - 5.1
Control cable securing nut	8 - 11	0.8 - 1.1	5.8 - 8.0
Inhibitor switch to transaxle case	2.0 - 2.5	0.20 - 0.26	1.4 - 1.9
Manual shaft lock nut	31 - 42	3.2 - 4.3	23 - 31
Oil cooler pipe to transaxle case	29 - 49	3.0 - 5.0	22 - 36
Test plug (oil pressure inspection hole	5 - 10	0.5 - 1.0	3.6 - 7.2
Support actuator (parking rod inserting position) to rear extension	8 - 11	0.8 - 1.1	5.8 - 8.0
Engine to gusset	30 - 40	3.1 - 4.1	22 - 30
Gusset to converter housing	16 - 21	1.6 - 2.1	12 - 15

* Turn back 2.5 turns after tightening.
** Refer to Adjusting Turning Frictional Force of Tapered Roller Bearing.

SPECIAL SERVICE TOOLS

Tool number (Kent-Moore No.)	Tool name	
ST25420001 (ST25420000) (J26063)	Clutch spring compressor	
ST33290001 (J25810)	Side bearing outer race puller	
ST3127S000 ① GG91030000 (J25765) ② HT62940000 (——) ③ HT62900000 (——)	Preload gauge Torque wrench Socket adapter Socket adapter	
ST33400001 (J26082)	Oil seal drift	
KV381058S0 (——) ① KV38105810 (——) ② KV38105820 (——)	Differential side bearing height gauge Differential side bearing height gauge Spacer and bolts	
KV38105900 (——)	Preload adapter	
ST22730000 (J25681)	Bearing puller	
ST2505S001 (——)	Oil pressure gauge set	

Tool number (Kent-Moore No.)	Tool name
KV38106000 (——)	Height gauge adapter (diff. side bearing) 

FRONT AXLE & FRONT SUSPENSION

SECTION FA

CONTENTS

Refer to section MA (Front Axle and Front Suspension) for:

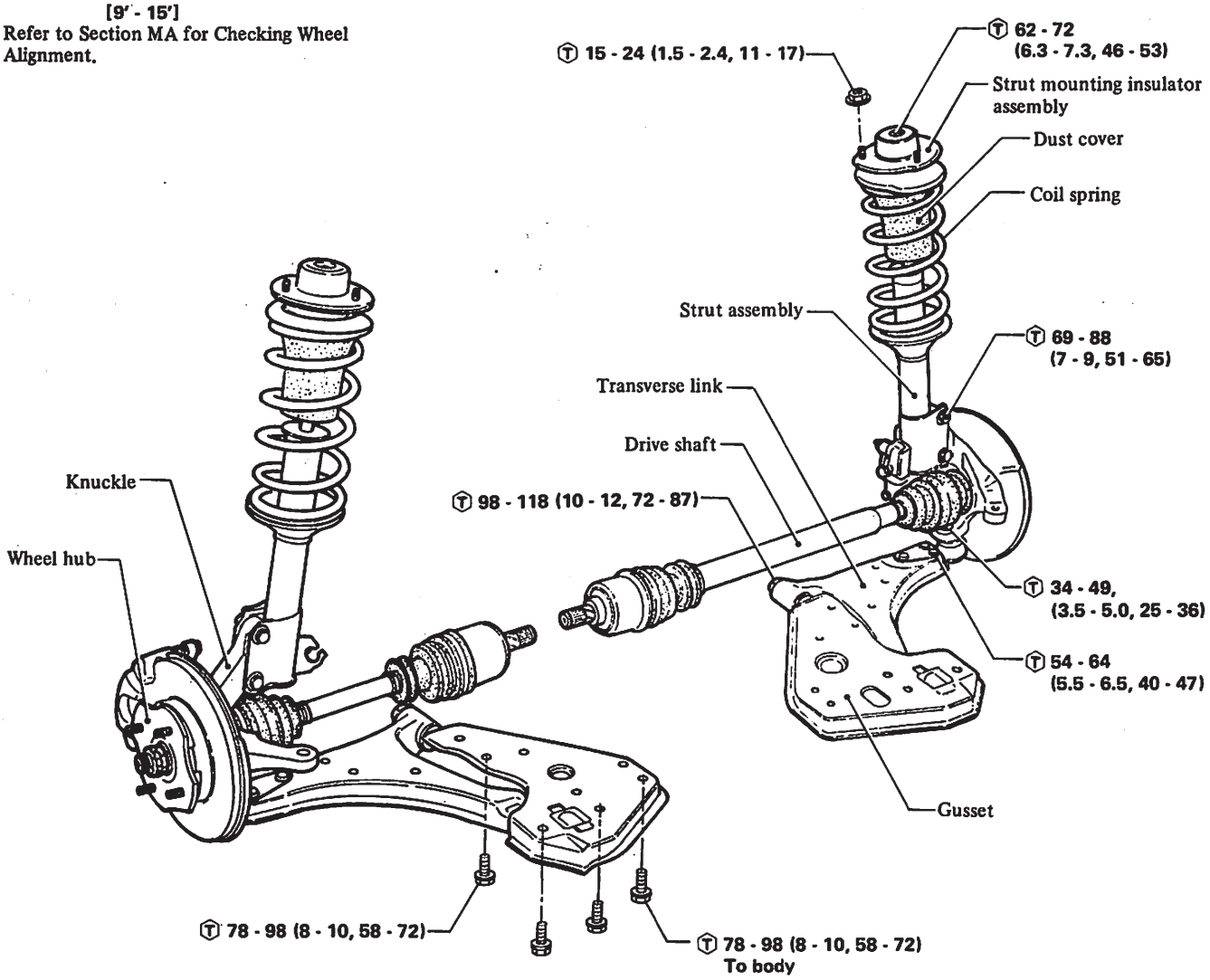
- CHECKING FRONT AXLE AND SUSPENSION PARTS
- CHECKING WHEEL ALIGNMENT

FRONT AXLE AND FRONT SUSPENSION

Wheel alignment
- Camber, caster and kingpin are preset at factory and cannot be adjusted.
- The vehicle requires only toe-in adjustments.

  Toe-in 3 - 5 mm (0.12 - 0.20 in)
  [9' - 15']

  Refer to Section MA for Checking Wheel Alignment.



Wheel bearing
- Do not overtighten wheel bearing nuts, as this can cause wheel bearing seizure.
- **Axial play: 0 mm (0 in)**
- **Ⓣ 118 - 196 N·m (12 - 20 kg-m, 87 - 145 ft-lb)**
- **Rotation starting torque (with grease seal)**
  0.8 - 2.7 N·m (8 - 28 kg-cm, 6.9 - 24.3 in-lb)
  As measured at wheel hub bolt
  13.7 - 48.1 N (1.4 - 4.9 kg, 3.1 - 10.8 lb)
- When measuring starting torque, do not include "dragging" resistance with brake pads.
- Adjust shim thickness. Refer to S.D.S.

Ⓣ: N·m (kg-m, ft-lb)

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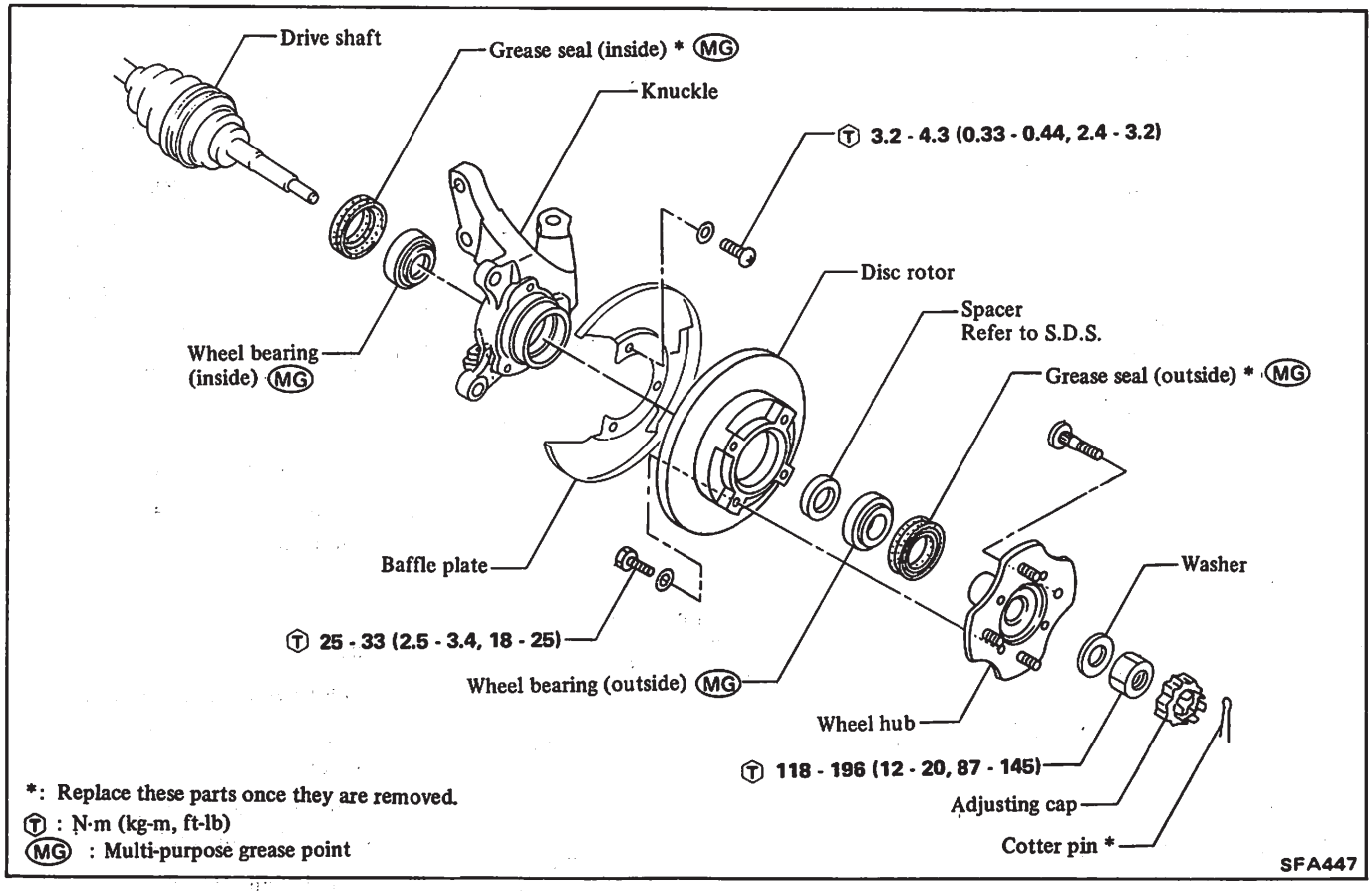
FRONT AXLE



WHEEL HUB AND KNUCKLE

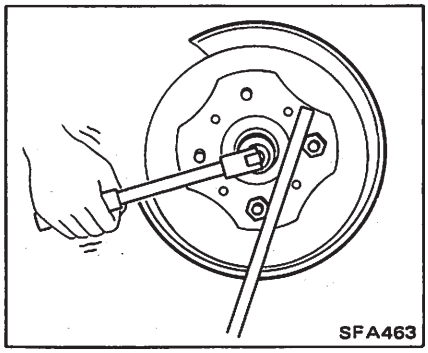
REMOVAL

1. Jack up vehicle and support it with safety stands.
2. Remove wheel and tire.
3. Remove caliper assembly.

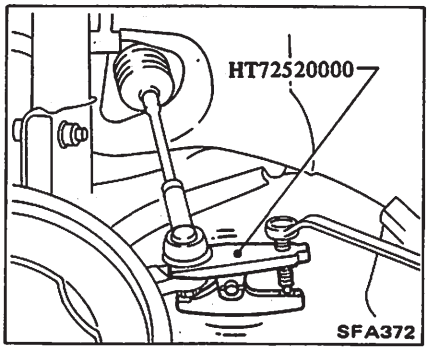
Refer to section BR.

4. Pry off cotter pin.
5. Loosen (not remove) wheel hub nut from drive shaft while holding wheel hub with suitable tool.

CAUTION:
Install wheel nuts so as not to damage wheel bolts during above operation.

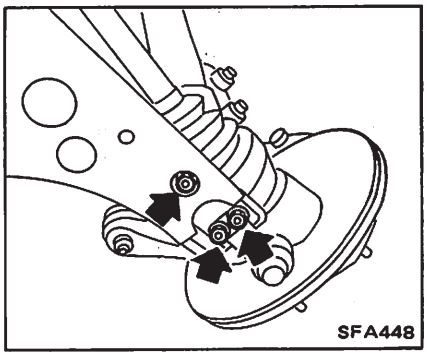


6. Remove tie-rod ball joint.



7. Remove lower ball joint.

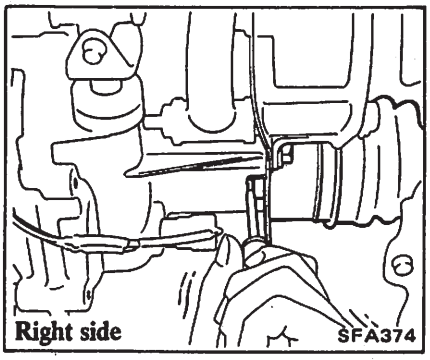
Do not reuse nut once it has been removed.

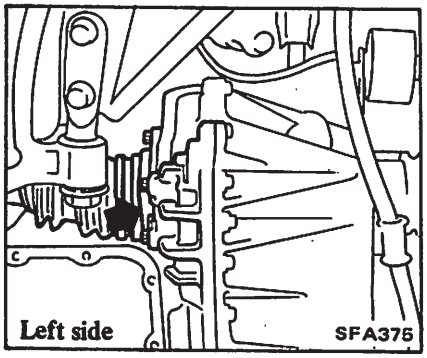


8. Drain gear oil.
9. Remove drive shaft.

Circlip that was installed on shaft should not be used again after drive shaft has been removed.

CAUTION:
To prevent possible damage, do not attempt to pull out drive shaft.

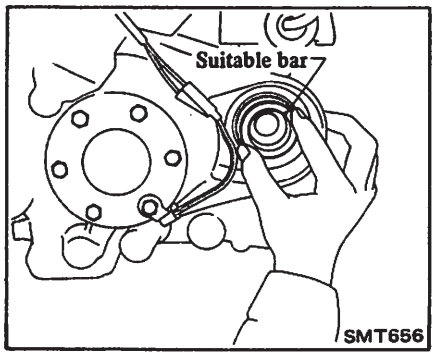




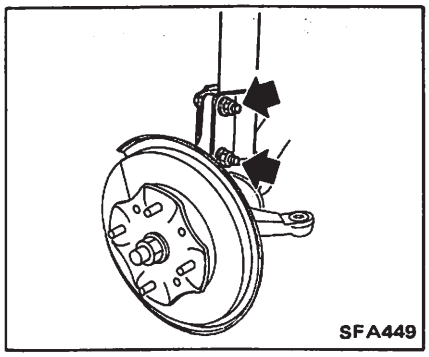
10. Remove oil seal on transaxle side. Refer to section MT or AT.

When removing drive shaft, replace oil seal.

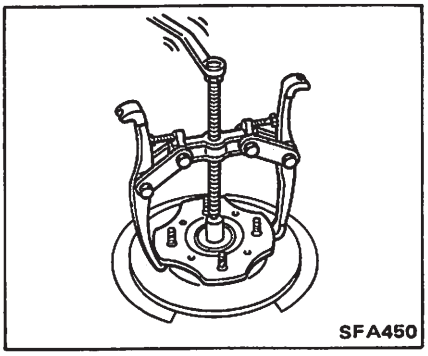
11. Insert a suitable bar or similar tool to prevent side gear from dropping.



12. Remove bolts, then remove wheel hub, knuckle, and drive shaft as a unit.



13. Remove hub nut and then separate drive shaft.

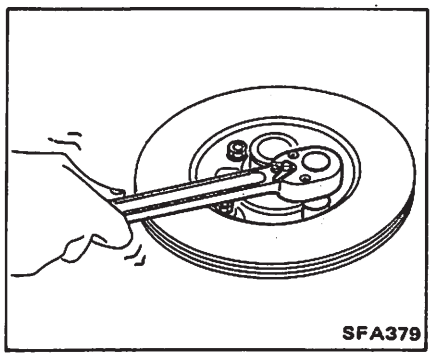


14. If necessary, separate lower ball joint from knuckle, using Ball Joint Remover HT72520000.

DISASSEMBLY

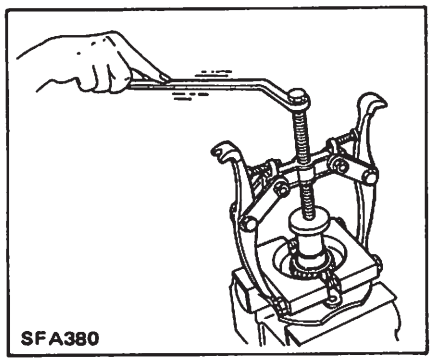
Wheel hub

1. Separate wheel hub and knuckle using tools KV40101000 and ST36230000.
2. Remove bolts securing wheel hub to disc rotor.



3. Remove outer wheel bearing with suitable bearing replacer.

When replacing wheel bearing, replace as a set of outer and inner wheel bearing assembly.



4. Remove grease seal (outside).

Do not reuse grease seal once it has been removed.

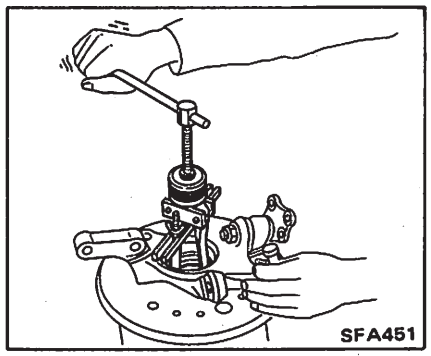
Knuckle

1. Remove grease seal (inside).

Do not reuse grease seal once it has been removed.

2. Remove wheel bearing outer race with suitable bearing puller.

When replacing wheel bearing, replace as a set of outer and inner wheel bearing assembly.



INSPECTION

Wheel bearing

Thoroughly clean grease and dirt from wheel bearing with cleaning solvent, and dry with compressed air free from moisture. Check wheel bearing to see that it rolls freely and is free from noise, crack, pitting, or wear.

Wheel hub and knuckle

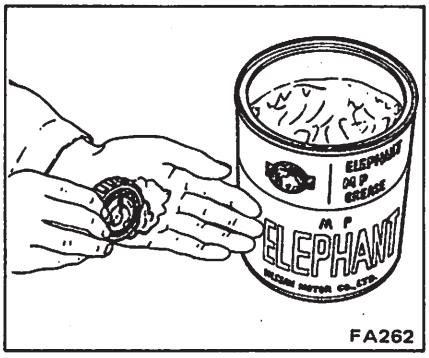
Check wheel hub for crack by means of a magnetic exploration or dyeing test, and replace if cracked.

Grease seal

If grease leakage is detected during removal, replace grease seal. Replace grease seal at every disassembly even if it appears good.

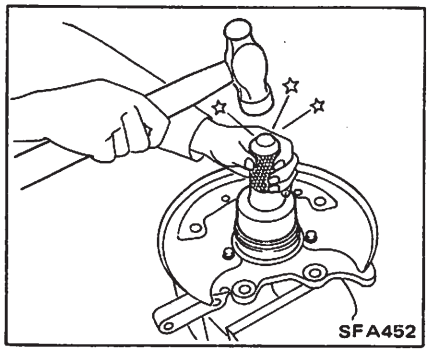
ASSEMBLY

1. Coat each bearing with recommended multi-purpose grease.



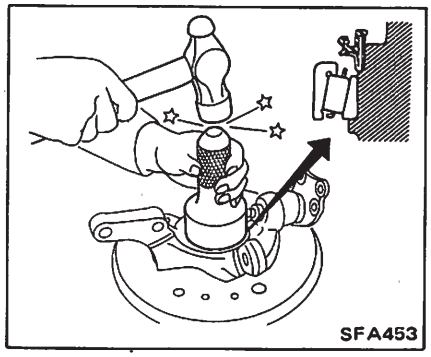
2. Install bearing outer race into each side of knuckle using suitable drift or brass bar.

CAUTION:
When replacing wheel bearing, replace inner and outer wheel bearings at the same time to prevent mix use of bearings of different brands.



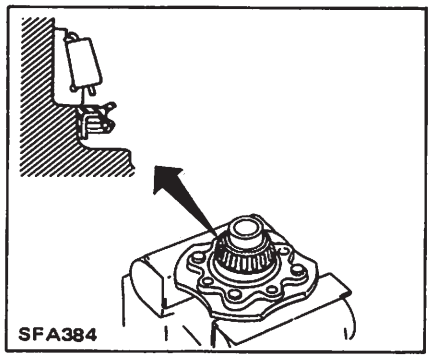
3. Install inside bearing inner race and grease seal using suitable drift.

a. Pack seal lip with recommended multi-purpose grease.
b. Be sure that grease seal is facing in proper direction.



4. Install outside grease seal and bearing into wheel hub with suitable drift.

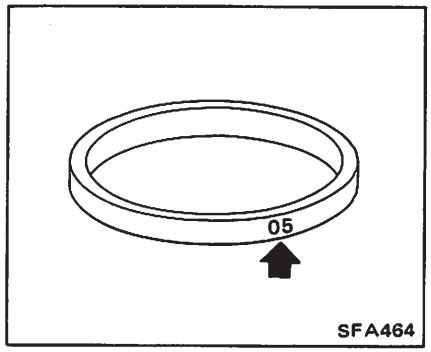
a. Pack seal lip with recommended multi-purpose grease.
b. Be sure that grease seal is facing in proper direction.
c. Press bearing inner race to install, never force to the roller or cage.



5. Install spacer.

Select suitable spacer as follows:

a. When grease seal, bearing, or spacer is replaced, select a spacer having same mark as old one. The old spacer can be used if it is still serviceable.

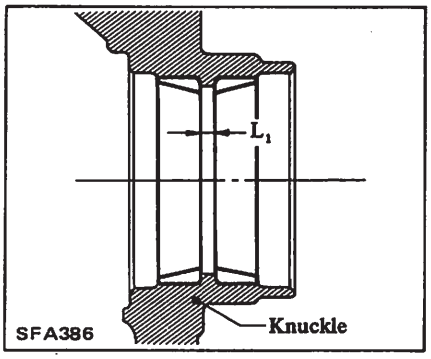


b. When knuckle is replaced, use a spacer determined by the following equation:

$L = L_1 - L_2$

L: Spacer thickness, mm (in)
L_1: Distance between outer races of bearing, mm (in)
L_2: 0.16 mm (0.0063 in)

For relationship between spacer's mark and its thickness, refer to S.D.S.



6. Tighten bolts securing hub to disc rotor.

Ⓣ: 25 - 33 N·m (2.5 - 3.4 kg-m, 18 - 25 ft-lb)

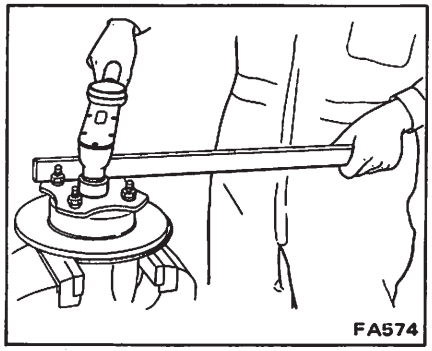
7. Put drive shaft into knuckle, and fit drive shaft serration to wheel hub.
(1) Clamp drive shaft in vise and install knuckle with bearings, spacer and hub nut.

CAUTION:
Do not tap drive shaft.

(2) Tighten hub nut.

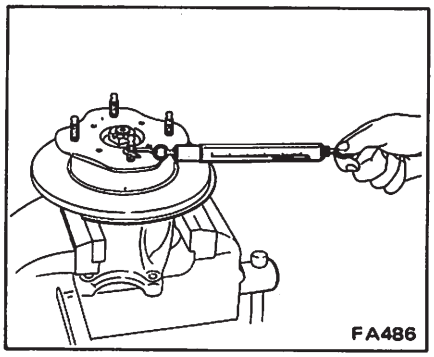
Ⓣ: 118 - 196 N·m (12 - 20 kg-m, 87 - 145 ft-lb)

CAUTION:
Install wheel nuts so as not to damage wheel bolts during above operation.



8. Spin wheel hub several turns in both directions.
9. Measure bearing preload.

Rotation starting torque of wheel bearing:
0.8 - 2.7 N·m
(8 - 28 kg-cm,
6.9 - 24.3 in-lb)
As measured at wheel hub bolt:
13.7 - 48.1 N
(1.4 - 4.9 kg,
3.1 - 10.8 lb)



If bearing preload does not accord with the specification, reselect spacer as follows:

a. **When any axial end-play is present in wheel bearing, or bearing preload is lower than the specification, replace spacer with a smaller one.**
b. **When bearing preload is greater than the specification, replace spacer with a larger one.**

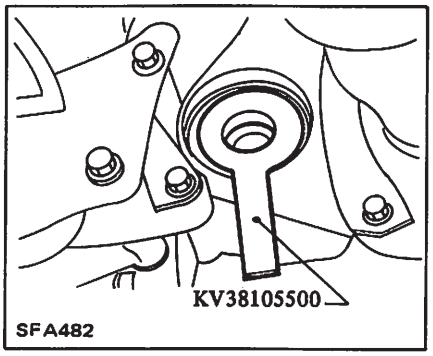
10. Repeat steps 7 and 9 until specified preload is obtained.
11. Insert a new cotter pin, and bend up.

INSTALLATION

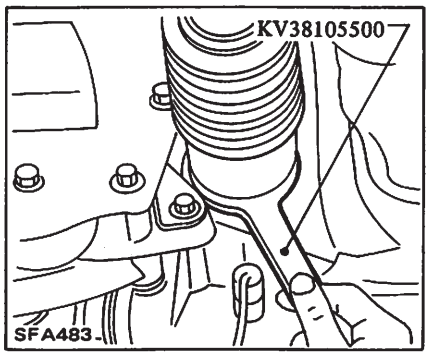
Install hub and knuckle in reverse order of removal, noting the following.

- When installing drive shaft in transaxle;

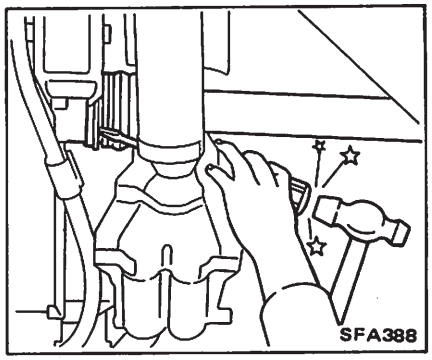
1. Install new oil seal on transaxle side.
2. Install new circlip to drive shaft. When removing drive shaft, replace the circlip.
3. Set Tool along the inner circumference of oil seal (transaxle side).



4. Insert drive shaft into transaxle, be sure to properly align the serrations and then withdraw Tool.



5. Push drive shaft or hammer the flange of slide joint cover, and then press-fit circlip on the drive shaft into circlip groove of side gear.

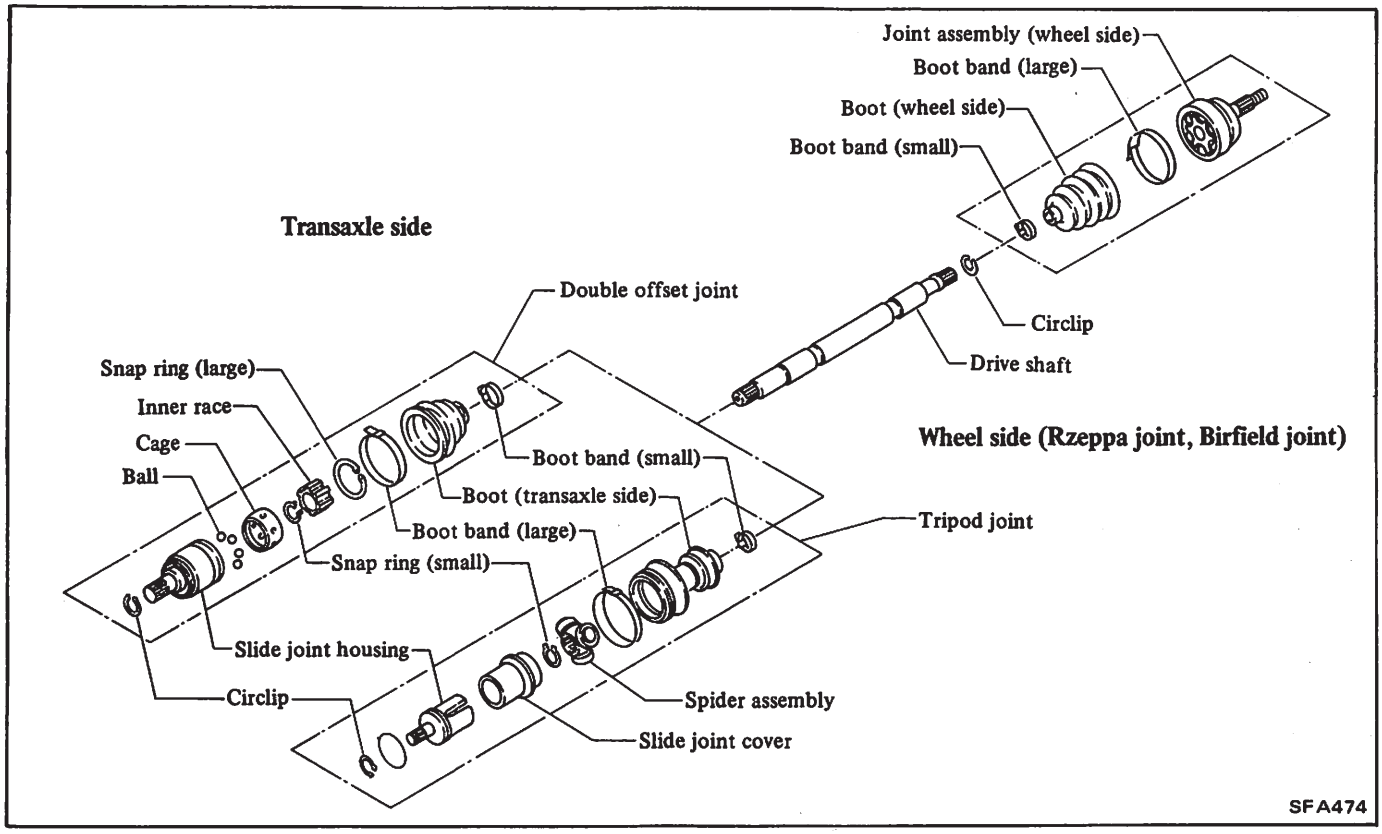


- **After it is inserted, try to pull flange out of slide joint by hand to make sure circlip is properly meshed with side gear and will not come out.**
- Always use new cotter pins and lower ball joint fixing nuts.
- After installation, pour gear oil into transaxle.

Refer to instllation (section MT or AT) of Transaxle in Removal and Installation.

Ⓣ : Strut to knuckle
69 - 88 N·m
(7 - 9 kg-m,
51 - 65 ft-lb)
Transverse link to ball joint
54 - 64 N·m
(5.5 - 6.5 kg-m,
40 - 47 ft-lb)
Lower ball joint stud nut
34 - 49 N·m
(3.5 - 5.0 kg-m,
25 - 36 ft-lb)
Tie-rod stud nut
29 - 49 N·m
(3.0 - 5.0 kg-m,
22 - 36 ft-lb)

DRIVE SHAFT



REMOVAL

Refer to Hub and Knuckle for removal.

DISASSEMBLY

CAUTION:

a. The joint on the wheel side employs a non-disassembling design. It should not be disassembled except as designated in this Service Manual.

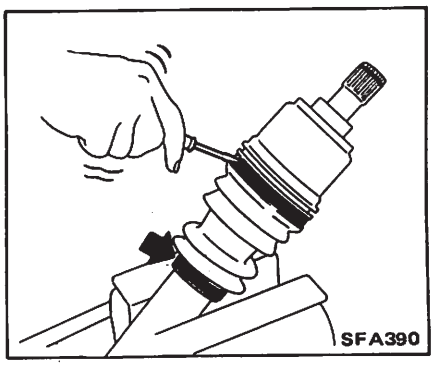
b. Tripod joint:
The spider assembly on the transaxle side is also a non-disassembling type, consisting of a tripod, rollers, needle bearing and washer.

Transaxle side

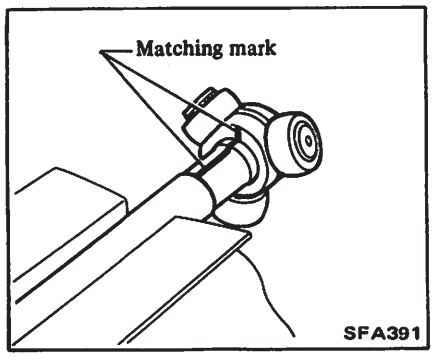
Tripod joint

1. Place "soft" jaws over steel jaws of bench vise, and place drive shaft securely in vise.
2. Remove boot bands.

Do not reuse boot bands once they have been removed.

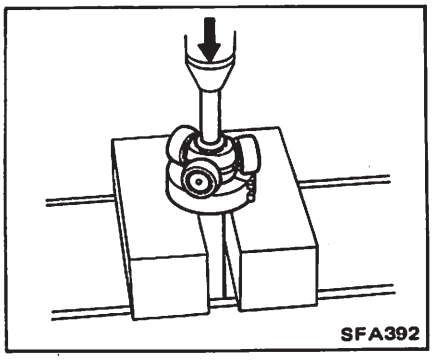


3. Separate slide joint housing (with slide joint cover) and drive shaft (with spider assembly).
4. Make matching mark.



5. Remove snap ring, then detach spider assembly, using press.

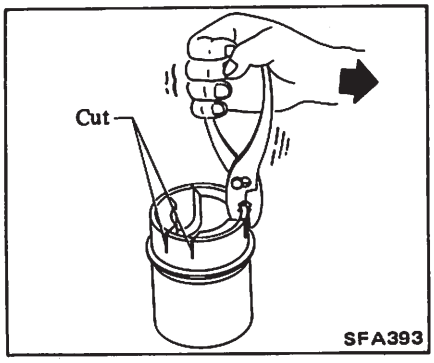
- **Do not reuse snap ring once it has been removed.**
- **To prevent drive shaft from dropping, always support drive shaft by hand when removing spider assembly.**



6. Remove boot.
7. Cut off the edge of slide joint cover with a saw blade; remove slide joint cover by bending it.

- **Do not reuse slide joint cover once it has been removed.**

- **Be careful not to damage slide joint housing.**



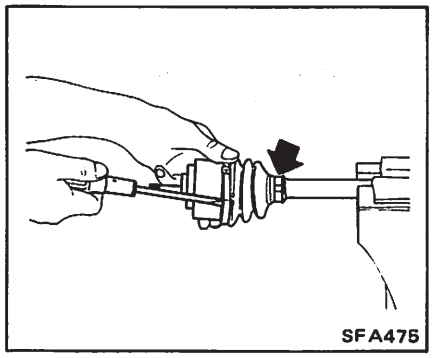
8. Remove O-ring.

Do not reuse O-ring once it has been removed.

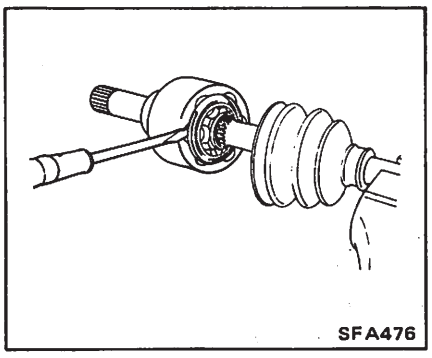
Double offset joint

1. Place "soft" jaws over steel jaws of bench vise, and place drive shaft securely in vise.
2. Remove boot bands.

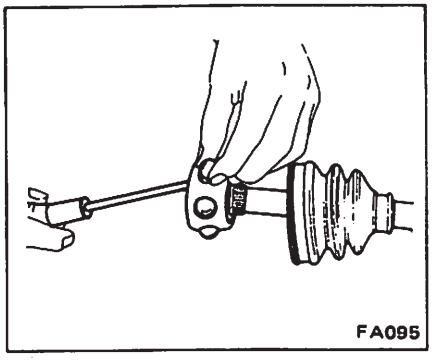
Do not reuse boot bands once they have been removed.



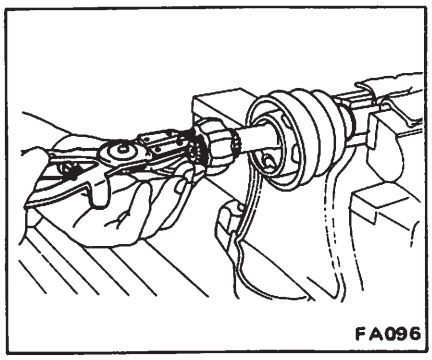
3. To disassemble double offset joint, pry off snap ring with a screwdriver, and pull out slide joint housing.



4. Wipe grease off ball cage, and drive out balls. Turn cage approximately a half turn, and detach from inner race.



5. Pry off snap ring, and withdraw inner race. This inner race is removed easily by lightly tapping on it with a mallet.



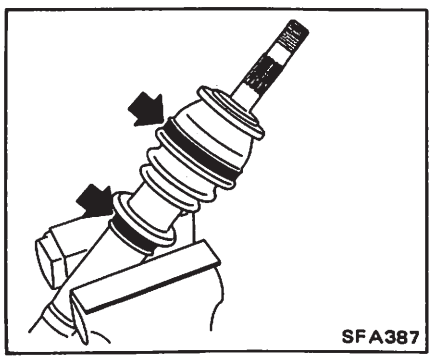
Do not reuse snap ring once it has been removed.

6. Draw out boot.

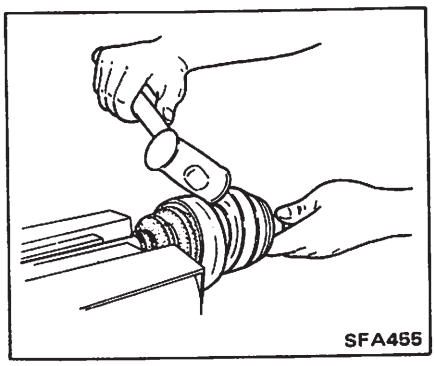
Wheel side

1. Remove boot bands.

Do not reuse boot bands once they have been removed.



2. Put matching marks on drive shaft and joint assembly.
3. Separate joint assembly by lightly tapping it.



Do not disassemble joint assembly.
Do not reuse circlip once it has been separated.

4. Draw out boot.

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.

Joint assembly (Wheel side)

Replace joint assembly if it is deformed or damaged.

Spider assembly (Transaxle side)

1. Replace spider assembly if needle bearing and washer are damaged.
2. Check to see if serrated portions are deformed; also check serrated portions on the drive shaft side. If necessary, replace.
3. Check to see if roller surfaces are scratched, worn or damaged; also check slide joint housing for abnormalities. If necessary, replace.

Double offset joint (Transaxle side)

Replace any parts of double offset joint which show sign of burn, rust, wear, or excessive play.
Check groove of slide joint housing for cracks, wear or deformation. Replace if necessary.

Boot

Replace fatigued, cracked, or worn boot.

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.**

Rzeppa joint - Tripod joint:

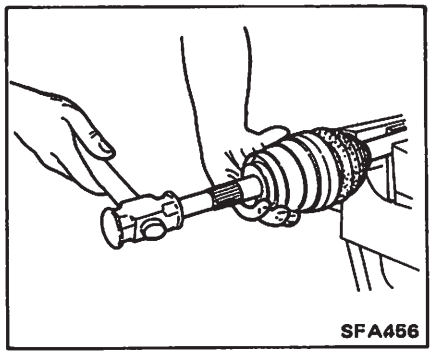
Be careful when applying grease to transaxle side and wheel side as different types are used for each.

Wheel side

1. Install boot and new small boot band to drive shaft.

- **Be careful not to damage boot on the edge of drive shaft.**

2. Set joint assembly onto drive shaft (with new circlip) by lightly tapping it.

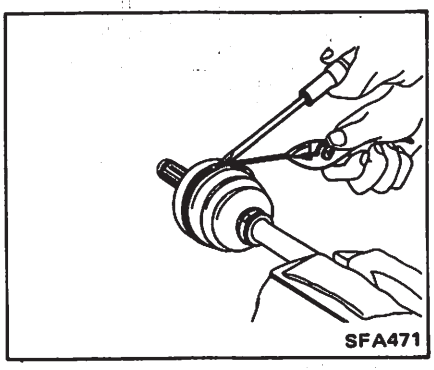

SFA466

- **Do not reuse circlip once it has been separated.**
- **Install joint assembly securely, ensuring marks are properly aligned.**
- **If there is not mark, position both spider assemblies (one on the wheel side and the other on the transaxle side) so that their phases are nearly zero.**

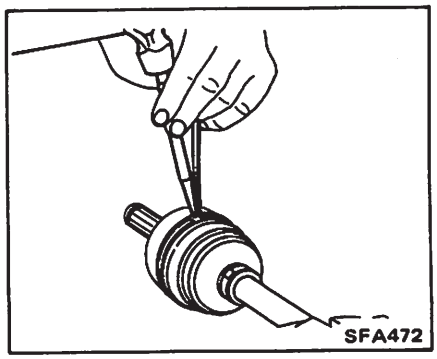
3. Pack drive shaft with specified amount of grease.

Specified amount:
Rzeppa joint
Approx. 110 g (3.88 oz)
Birfield joint
Approx. 100 g (3.53 oz)

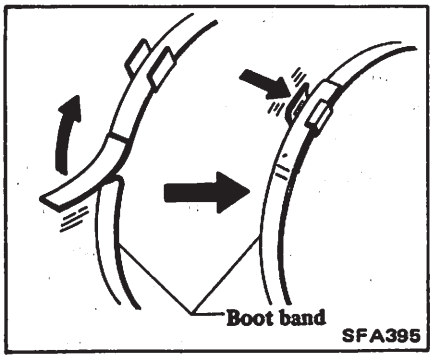
4. Install new larger diameter boot band.
(1) Tie band two turns around boot, tighten it with a screwdriver and pliers or suitable tool, and bend approximately 90 degrees.


SFA471

(2) Lock band securely with a punch, leaving the length the same as its width. Secure band by bending back over itself.

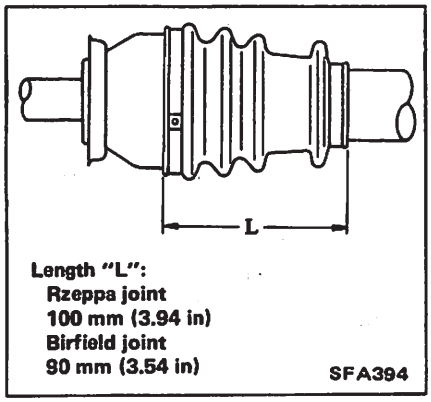

SFA472

In securing band, be careful not to scratch boot.



SFA395

5. Set boot so that it does not swell and deform when its length is "L".



Length "L":
Rzeppa joint
100 mm (3.94 in)
Birfield joint
90 mm (3.54 in)
SFA394

6. Install new smaller diameter boot band.

Transaxle side

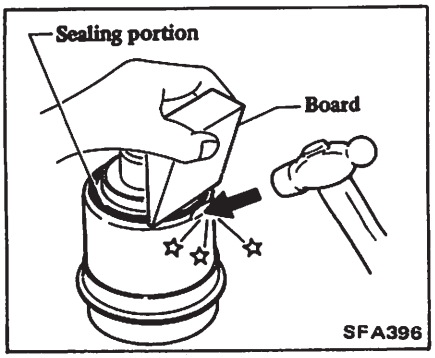
Tripod type

1. Install new O-ring.

Apply a coat of grease to O-ring.

2. Install new slide joint cover and bend the edge over on entire circumference.

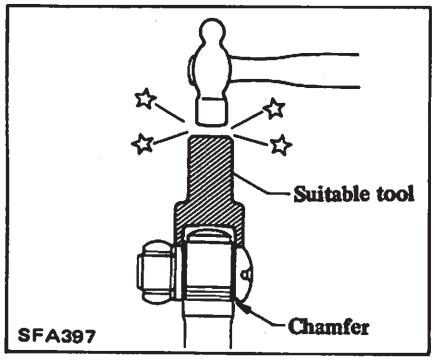
- **Bend the edge at two positions (180° apart) and ensure that housing cover does not rattle.**
- **Place a board on slide joint cover to prevent it from being scratched.**



SFA396

3. Apply sealant.
4. Install boot and new small boot band onto drive shaft.
5. Place drive shaft in a vise, using soft cushioning pads.
6. Install spider assembly securely, ensuring marks are properly aligned.

- **If there is not mark, position both spider assemblies (one on the wheel side and the other on the transaxle side) so that their phases are nearly zero.**
- **Press-fit with spider assembly serration chamfer facing shaft.**



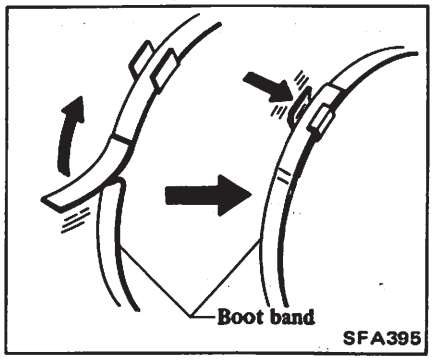
7. Install new snap ring.

Ensure that round surface faces toward spider assembly.

8. Pack with grease.

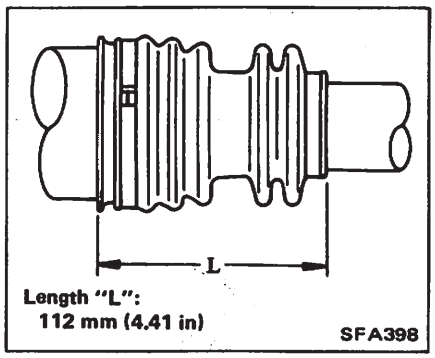
Specified amount of grease:
Approx. 180 g (6.35 oz)

9. Fasten new large diameter boot band.



In securing boot bands, be careful not to scratch boot.

10. Set boot so that it does not swell of deform when its length is "L".



11. Fasten new smaller diameter boot band.

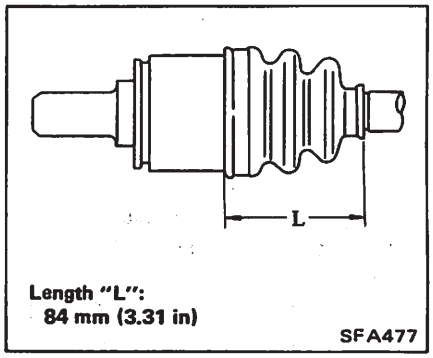
Double offset joint

To assemble drive shaft assembly, reverse the order of disassembly, noting the following.

- Pack with grease.

Specified amount of grease:
Approx. 100 g (3.53 oz)

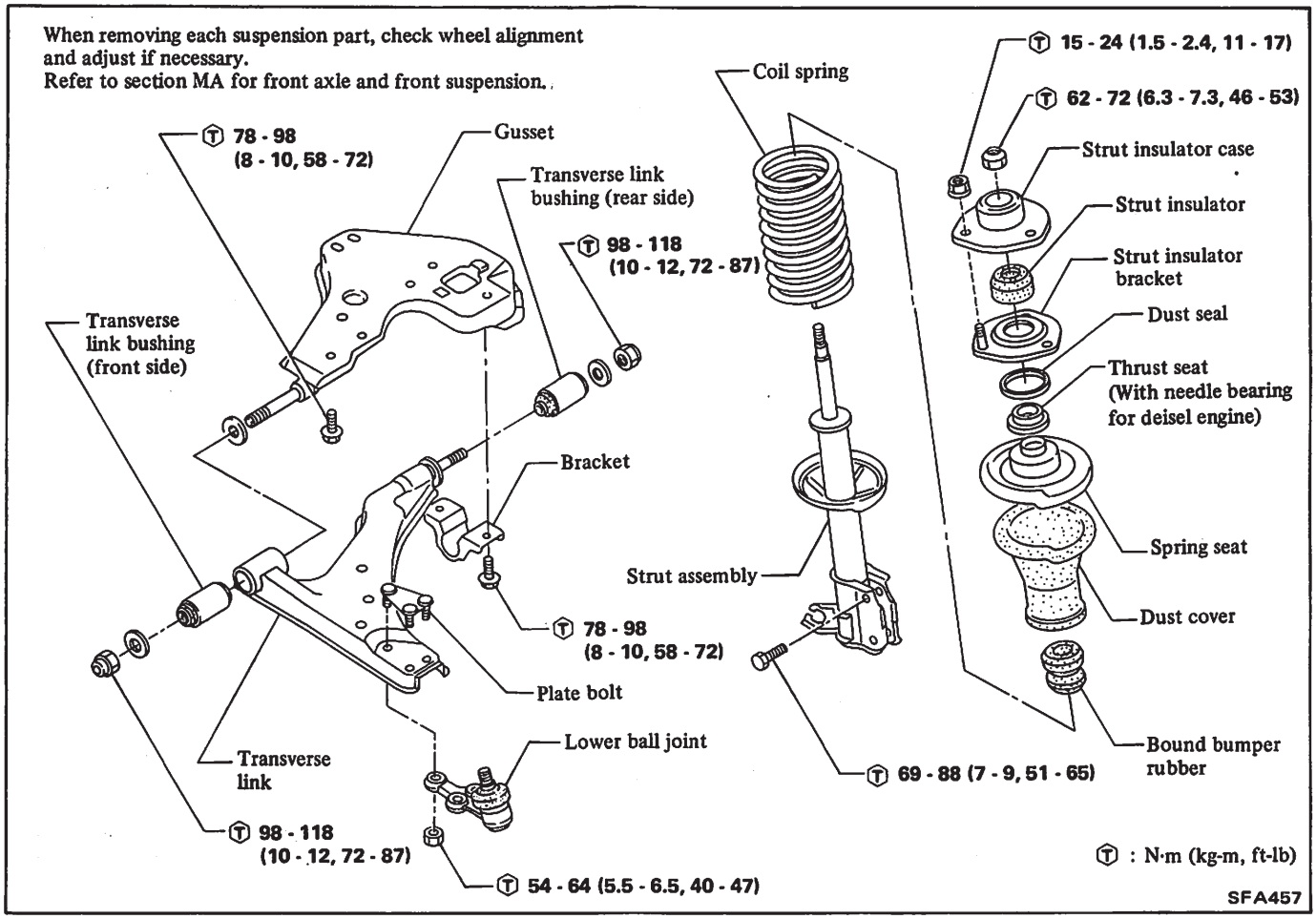
- Fasten boot bands.
  Refer to Tripod type.



INSTALLATION

Refer to Wheel Hub and Knuckle for installation.

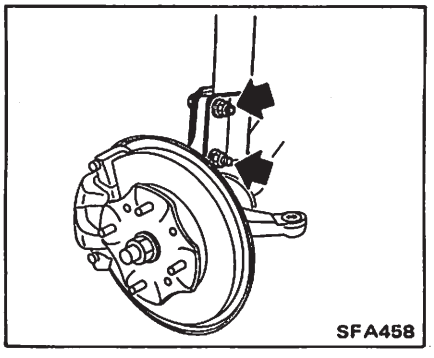
FRONT SUSPENSION



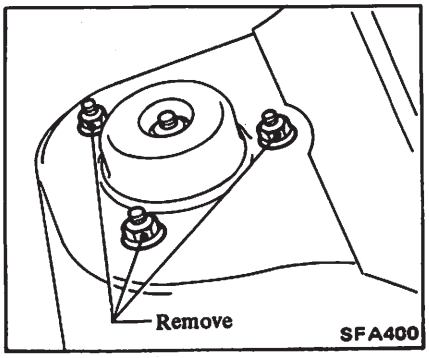
SPRING AND STRUT ASSEMBLY

REMOVAL AND INSTALLATION

1. Jack up vehicle and support it with safety stands.
2. Remove wheel and tire.
3. Detach brake tube from strut.
4. Support transverse link with safety stand.
5. Detach strut from knuckle.



6. Supporting strut assembly, remove strut attaching nut, and then withdraw strut assembly.



7. Install spring and strut assembly in reverse order of removal.

Ⓣ : Strut to body
15 - 24 N·m
(1.5 - 2.4 kg-m,
11 - 17 ft-lb)

Piston rod self-locking nut
62 - 72 N·m
(6.3 - 7.3 kg-m,
46 - 53 ft-lb)

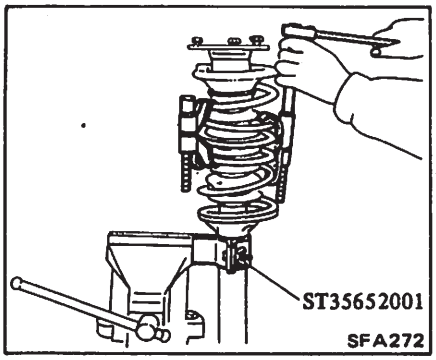
Strut to knuckle
69 - 88 N·m
(7 - 9 kg-m,
51 - 65 ft-lb)

DISASSEMBLY

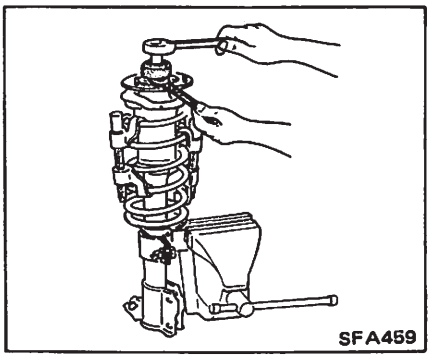
When disassembling strut assembly, extra caution should be exercised to prevent dirt and dust from entering strut.

1. Set up Tool on strut assembly.

Compress spring with coil spring compressor just for enough to permit turning of strut mounting insulator by hand.



2. Remove self-locking nut from top of piston rod.



Separate following parts:
- Strut mounting insulator
- Thrust seat
- Dust seal
- Spring upper seat
- Bound bumper rubber
- Coil spring
- Dust cover

CAUTION:
Pay attention not to damage piston rod.

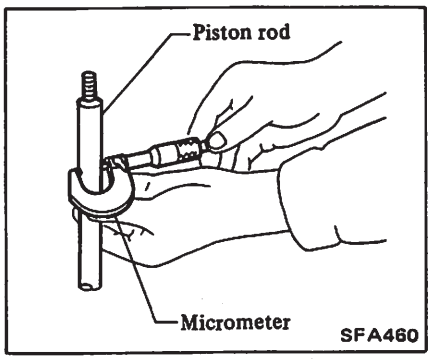
INSPECTION

- Wash all parts, except for nonmetallic parts, clean with suitable solvent and dry with compressed air.
- Blow dirt and dust off of nonmetallic parts using compressed air.
- **If oil leakage occurs on welded and gland packing portion of outer strut casing, replace strut assembly.**

Piston rod

- Inspect piston rod for cracks, deformation or other damage. Replace strut assembly.
- Inspect threads for cracks or other damage. Replace strut assembly.

Rod diameter:
17.940 - 17.975 mm
(0.7063 - 0.7077 in)
Maximum runout:
Less than 0.1 mm (0.004 in)



Strut mounting insulator

Inspect rubber bushing for damage, cracks and deformation. Replace part if necessary.

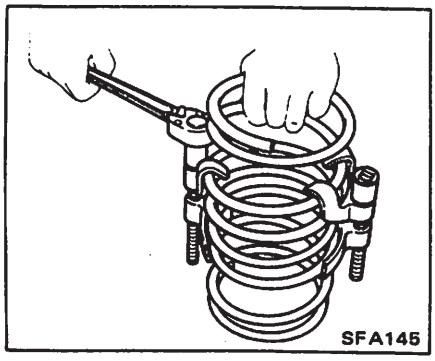
Thrust seat

Replace if inspection reveals abnormal noise or excessive rattle in axial direction.

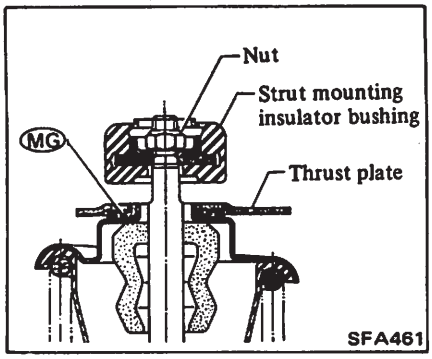
ASSEMBLY

Before assembly, clean away all dirt to prevent any possible entry of dirt into strut assembly.

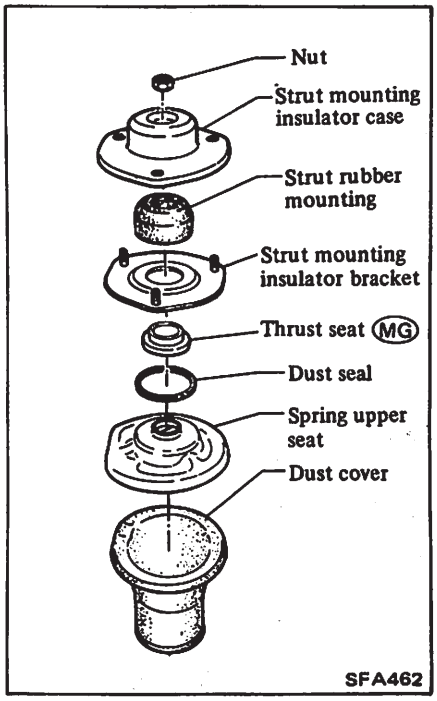
1. Install strut assembly on Tool ST35652001.
2. Compress coil spring using coil spring compressor.



3. Set up coil spring with coil spring compressor on spring lower seat of strut.
4. Lubricate parts indicated in figure.

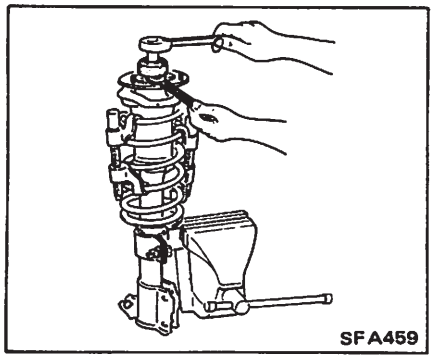


5. Mount following part as shown in figure.



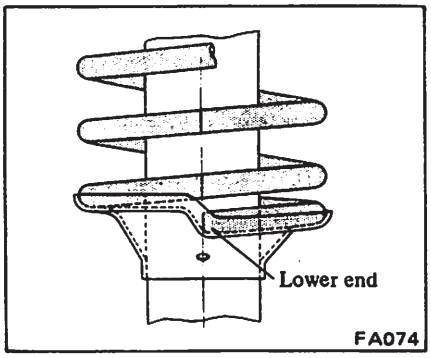
- Install bound bumper rubber in place to prevent piston rod from falling by its own weight.
- Install thrust seat so that it points in correct direction.

6. Tighten new piston rod self-locking nut.



7. Remove coil spring compressor on strut assembly.

After placing spring in position between upper and lower spring seats, release compressor gradually.

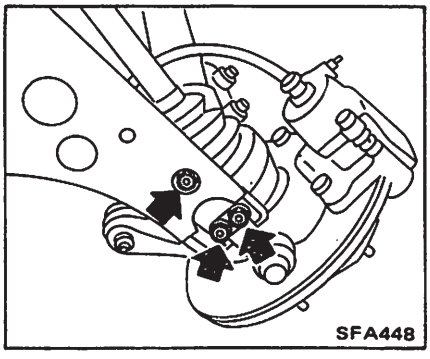


TRANSVERSE LINK

REMOVAL AND INSTALLATION

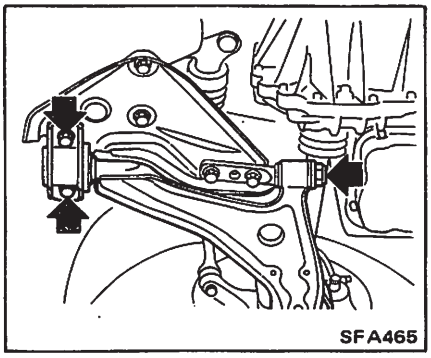
1. Jack up vehicle and support it with safety stands.
2. Remove wheel and tire.
3. Remove stabilizer bar.
4. Remove lower ball joint.

Do not reuse nuts once they have been removed.

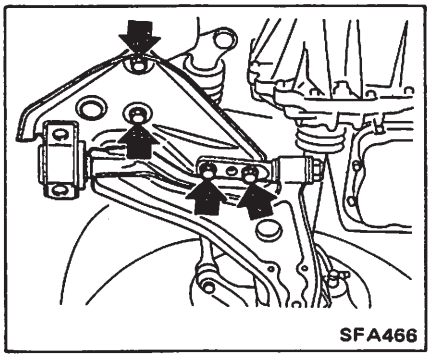


5. Remove transverse link.

Do not reuse nut once it has been removed.



6. Remove gusset.



7. Install transverse link in reverse order of removal, noting the following.

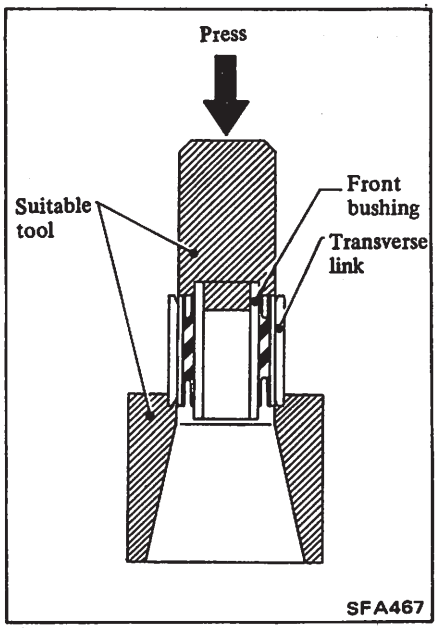
- **To install transverse link, tighten nut securing transverse link spindle which connects transverse link to gusset.**
- **Final tightening should be carried out at curb weight with tires on ground.**

Ⓣ: Gusset to body
78 - 98 N·m
(8 - 10 kg-m,
58 - 72 ft-lb)
Transverse link securing nut
98 - 118 N·m
(10 - 12 kg-m,
72 - 87 ft-lb)
Transverse link securing bolts
78 - 98 N·m
(8 - 10 kg-m,
58 - 72 ft-lb)
Lower ball joint fixing nuts
54 - 64 N·m
(5.5 - 6.5 kg-m,
40 - 47 ft-lb)

DISASSEMBLY

Front bushing

Press out front bushing with suitable bushing replacer.



ASSEMBLY

Front and rear bushing

- **Exercise care not to allow oil or grease to come into contact with it.**
- **Make sure that bushing is exposed evenly on the transverse link side.**

LOWER BALL JOINT

REMOVAL AND INSTALLATION

1. Remove drive shaft.
Refer to Hub and Knuckle for removal.
2. Remove lower ball joint using Ball Joint Remover HT72520000.
3. Install ball joint in reverse order of removal.

INSPECTION

Ball joint is assembled at factory and cannot be disassembled.

1. Check ball joint for play. If ball stud is worn and play in axial direction is excessive or joint is hard to swing, replace as a complete unit.

Turning torque:
New parts
2.9 - 9.8 N·m
(30 - 100 kg-cm,
26 - 87 in-lb)
Used parts
More than 1.0 N·m
(10 kg-cm, 8.7 in-lb)

2. Check condition of dust cover. If it is cracked excessively, replace ball joint.

SERVICE DATA AND SPECIFICATIONS (S.D.S.)

GENERAL SPECIFICATIONS

COIL SPRING

		A/T model		M/T model	
		R.H.	L.H.	R.H.	L.H.
Dimension					
Wire diameter	mm (in)	11.2 (0.441)	11.3 (0.445)	11.1 (0.437)	11.2 (0.441)
Coil diameter (inside)	mm (in)	110.0 (4.33)			
Free length	mm (in)	375 (14.76)	384 (15.12)	366 (14.41)	375 (14.76)
Spring constant N/mm (kg/mm, lb/in)		16.77 (1.71, 95.8)			

STRUT ASSEMBLY

Shock absorber type		Double acting hydraulic
Piston rod diameter	mm (in)	18 (0.71)
Piston diameter	mm (in)	25 (0.98)
Stroke	mm (in)	162 (6.38)
Damping force [at 0.3 m (1.0 ft)/sec.]		
Expansion	N (kg, lb)	392 - 588 (40 - 60, 88 - 132)
Compression	N (kg, lb)	127 - 226 (13 - 23, 29 - 51)

INSPECTION AND ADJUSTMENT

WHEEL ALIGNMENT

Refer to section MA.

LOWER BALL JOINT

Turning torque N·m (kg-cm, in-lb) New parts	2.9 - 9.8 (30 - 100, 26 - 87)
Used parts	More than 1.0 (10, 8.7)
Axial end play mm (in)	0.1 - 1.5 (0.004 - 0.059)

WHEEL BEARING ADJUSTMENT

Rotation starting torque N·m (kg-cm, in-lb)	0.8 - 2.7 (8 - 28, 6.9 - 24.3)
As measured at wheel hub bolt N (kg, lb)	13.7 - 48.1 (1.4 - 4.9, 3.1 - 10.8)

Spacer thichness

Mark	H mm (in)
05	7.381 - 7.440 (0.2906 - 0.2929)
06	7.441 - 7.500 (0.2930 - 0.2953)
07	7.501 - 7.560 (0.2953 - 0.2976)
08	7.561 - 7.620 (0.2977 - 0.3000)
09	7.621 - 7.680 (0.3000 - 0.3024)
10	7.681 - 7.740 (0.3024 - 0.3047)
11	7.741 - 7.800 (0.3048 - 0.3071)
12	7.801 - 7.860 (0.3071 - 0.3094)
13	7.861 - 7.920 (0.3095 - 0.3118)
14	7.921 - 7.980 (0.3118 - 0.3142)
15	7.981 - 8.040 (0.3142 - 0.3165)
16	8.041 - 8.100 (0.3166 - 0.3189)
17	8.101 - 8.160 (0.3189 - 0.3213)
18	8.161 - 8.220 (0.3213 - 0.3236)
19	8.221 - 8.280 (0.3237 - 0.3260)
20	8.281 - 8.340 (0.3260 - 0.3283)
21	8.341 - 8.400 (0.3284 - 0.3307)
22	8.401 - 8.460 (0.3307 - 0.3331)

TIGHTENING TORQUE

Unit	N·m	kg-m	ft-lb
Strut assembly Piston rod self-lock nut	62 - 72	6.3 - 7.3	46 - 53
Strut to body	15 - 24	1.5 - 2.4	11 - 17
Strut to knuckle	69 - 88	7 - 9	51 - 65
Lower ball joint Transverse link to ball joint	54 - 64	5.5 - 6.5	40 - 47
Stud nut	34 - 49	3.5 - 5.0	25 - 36
Tie-rod Lock nut	37 - 46	3.8 - 4.7	27 - 34
Stud nut	29 - 49	3.0 - 5.0	22 - 36
Transverse link Securing bolt	78 - 98	8 - 10	58 - 72
Securing nut	98 - 118	10 - 12	72 - 87
Gusset to body	78 - 98	8 - 10	58 - 72
Axle Drive shaft to hub	118 - 196	12 - 20	87 - 145
Hub to disc rotor	25 - 33	2.5 - 3.4	18 - 25
Baffle plate	3.2 - 4.3	0.33 - 0.44	2.4 - 3.2
Caliper	54 - 64	5.5 - 6.5	40 - 47

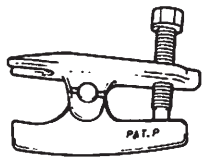
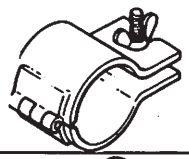
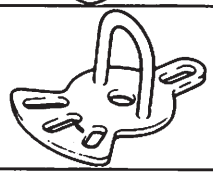
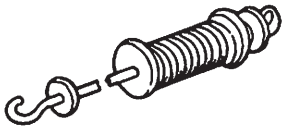
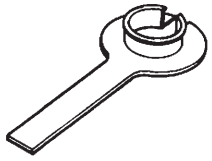
TROUBLE DIAGNOSES AND CORRECTIONS

Condition	Probable cause	Corrective action
Steering wheel shock, vibration or shimmying	• Steering wheel oscillation is often experienced when there is an excessive free play in steering linkage, improper backlash in steering gear, or oscillation of front wheels. • Steering shock or kickback is sharply felt on steering wheel when front wheels encounter obstructions on road. This condition may be due to improper backlash in steering gear or other associated units. • Shimmy is rapid oscillation of front suspension system and related parts and is often experienced when vehicle reaches a certain speed.	
	Improper tire air pressure.	Adjust.
	Wheel out of balance or deformed.	Correct or replace.
	Worn or loose tire.	Replace or retighten.
	Worn suspension ball joint or lack of preload.	Replace ball joint.
	Steering gear out of adjustment.	Readjust.
	Improper wheel alignment.	Readjust.
	Worn rubber bushing in transverse link.	Replace.
	Excessive free play in steering linkage.	Check and correct.
	Excessive play or wear on front wheel bearing.	Replace bearing.
	Loose steering gear box.	Retighten.
	Loose or inoperative shock absorber (in strut assembly).	Retighten or replace.
	Unbalanced vehicle posture.	Adjust.
Vehicle drifts.	This condition becomes evident when vehicle is running on a flat surface with your hands off steering wheel. **Also refer to Trouble diagnoses and corrections under the Rear suspension section.**	
	Improper tire air pressure, or loose wheel nuts.	Replace tires.
	Difference in height between right and left tire treads.	Replace.
	Worn front wheel bearing.	Replace.
	Fatigued front spring, or use of improper spring.	Replace.
	Improper wheel alignment.	Readjust.
	Brake drag.	Check and correct.
	Worn rubber bushing in transverse link.	Replace.
	Deformed steering linkage or suspension link.	Replace.
	Unbalanced vehicle posture.	Adjust.
	Worn radial tire.	Replace.
Vehicle wanders.	Improper tire air pressure.	Adjust.
	Improper wheel alignment.	Readjust.

Condition	Probable cause	Corrective action
	Excessive free play or wear on steering linkage or suspension link.	Replace.
	Steering gear out of adjustment.	Readjust.
	Wheel deformed or out of balance.	Check and correct.
	Worn bushing in transverse link.	Replace.
Stiff steering wheel	• Check and correct in the following manner: Jack up front of vehicle and support it with safety stands. Separate knuckle arm from tie rod and manipulate steering wheel. a) When steering wheel operation is light, check and locate cause of problem in steering linkage, suspension system, or front axle. b) When steering wheel operation is heavy, check and locate cause of problem in steering gear or steering column.	
	Improper tire air pressure.	Adjust.
	Improper lubrication in steering gear housing or dirt in oil.(b)	Lubricate, service, or replace.
	Improper lubrication in steering linkage, dirt in grease, or abnormal wear on steering linkage.(a)	Lubricate or replace.
	Seized or damaged suspension ball joint. Lack of lubrication in ball joint.(a)	Replace.
	Worn or seized wheel bearing.(a)	Replace.
	Steering gear out of adjustment.(b)	Readjust.
	Deformed steering linkage.(a)	Replace.
	Improper wheel alignment.(a)	Readjust.
	Damaged thrust seal on upper end of strut.(a)	Replace.
	Seized or damaged piston or piston rod in shock absorber (in strut).(a)	Replace.
Excessive play in steering wheel.	Steering gear out of adjustment.	Readjust.
	Worn steering linkage.	Replace.
	Loose steering gear box.	Retighten.
	Worn wheel bearing.	Replace.
	Worn bushing in transverse link.	Replace.
Noise	Improper tire air pressure.	Adjust.
	Damaged or worn suspension ball joint or steering linkage, or lack of lubrication.	Replace or lubricate.
	Loose steering gear linkage or suspension system.	Retighten.
	Faulty shock absorber (in strut).	Replace.
	Worn wheel bearing.	Replace.
	Worn steering linkage or steering gear.	Replace.
	Worn bushing in transverse link.	Replace.
	Broken or fatigued coil spring.	Replace.

Condition	Probable cause	Corrective action
	Loose mounting nut on strut mounting insulator.	Retighten.
	Improper tightening of strut and gland packing.	Retighten.
	Loose bolt on gusset.	Retighten.
	Deformed wheel.	Replace.
Tires squeal.	Improper tire air pressure.	Adjust.
	Improper wheel alignment.	Readjust.
	Deformed knuckle, spindle or suspension.	Replace.
	Rough driving.	Avoid rough driving.
Abnormal (or uneven) tire wear.	Improper tire air pressure.	Adjust.
	Improper wheel alignment.	Readjust.
	Worn wheel bearing.	Replace.
	Brake out of adjustment.	Readjust.
	Improper tire rotation.	Rotate tires properly.
	Rough or hard driving.	Avoid rough or hard driving.

SPECIAL SERVICE TOOLS

Tool number (Kent-Moore No.)	Tool name	
HT72520000 (J25730-A)	Ball joint remover	
ST35652001 (–)	Clamp	
KV40101000 (J25604-01)	Rear axle stand	
ST36230000 (J25840-A)	Sliding hammer	
KV38105500 (–)	Differential side oil seal protector	

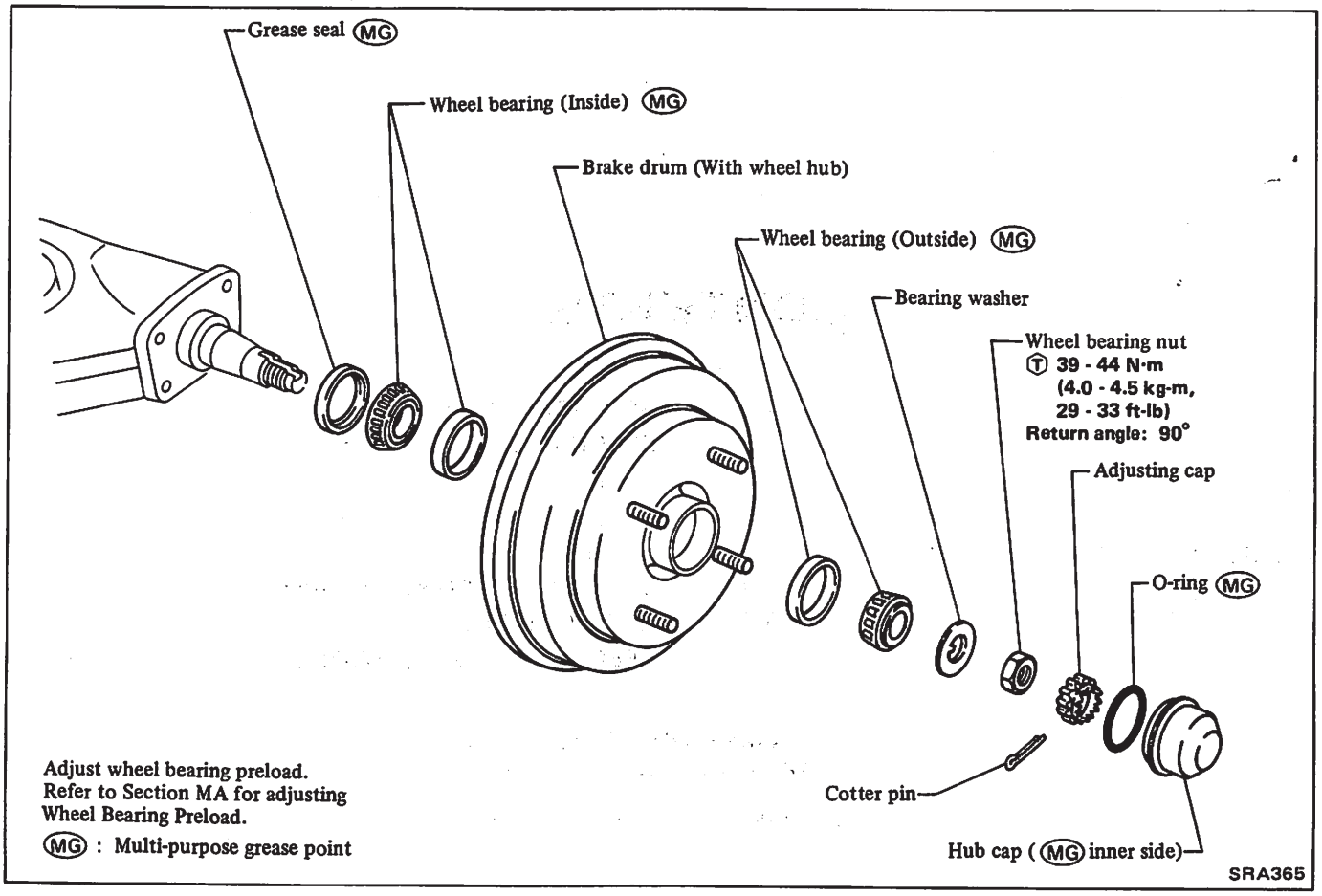
REAR AXLE & REAR SUSPENSION

SECTION RA

CONTENTS

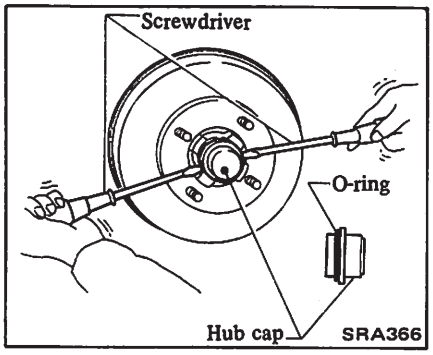
Refer to Section MA (Rear Axle & Rear Suspension) for:
- CHECKING REAR AXLE AND SUSPENSION PARTS
- ADJUSTING WHEEL BEARING PRELOAD

REAR AXLE



REMOVAL

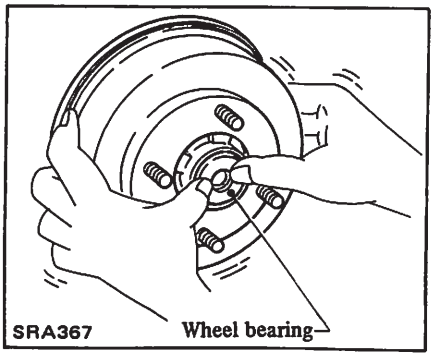
1. Block front wheels and raise rear of vehicle, and then support it with safety stands. Refer to Section GI for Lifting Points and Towing.
2. Remove rear wheel one side to be worked on.
3. Release parking brake.
4. Work off hub cap.



5. Pry off cotter pin; take out adjusting cap and wheel bearing nut.

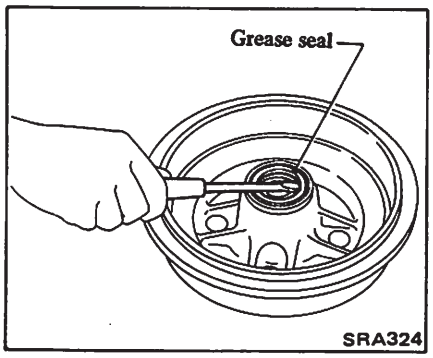
Cotter pin must not be reused.

6. Remove rear brake drum with outer bearing and washer.

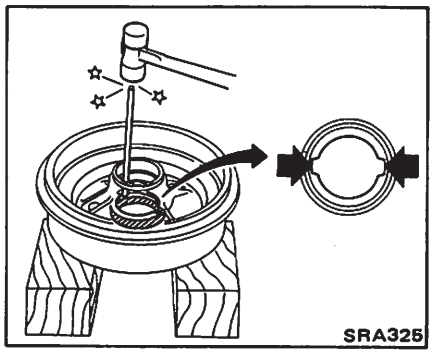


CAUTION:
Be careful not to drop wheel bearing.

7. Remove grease seal and inside wheel bearing inner race. Grease seal must not be reused.



8. Remove inside and outside wheel bearing outer races.



INSPECTION

Thoroughly clean bearing and each part, and dry with compressed air.

WHEEL BEARING

When race, cage or roller surfaces make a noise, or are cracked, pitted, worn, rough, or out-of-round, replace bearing assembly.

CAUTION:
When replacing wheel bearing, replace inner and outer wheel bearings at the same time to prevent mix use of bearings of different brands.

BRAKE DRUM

Check drum for cracks using magnetic exploration or dyeing test; replace if necessary. Refer to Section BR for inspection or sliding portion.

KNUCKLE SPINDLE

Also check brake drum; replace if cracked or damaged. When thread is damaged, replace rear arm.

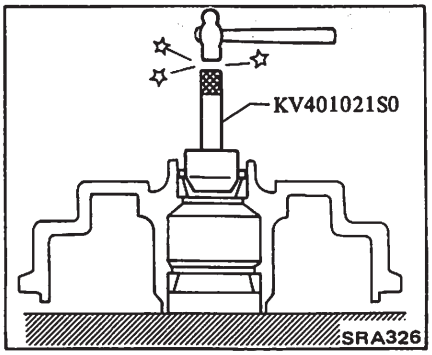
GREASE SEAL

If grease leakage is detected during removal, replace grease seal. Replace grease seal at every disassembly even if it appears good.

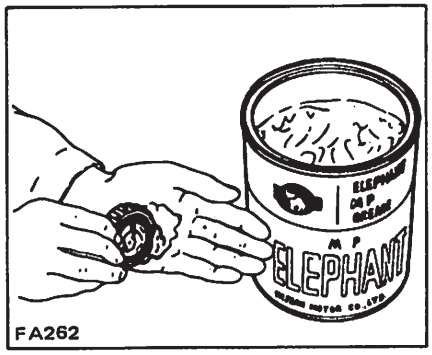
INSTALLATION

Install rear axle in the reverse order of removal as follows:

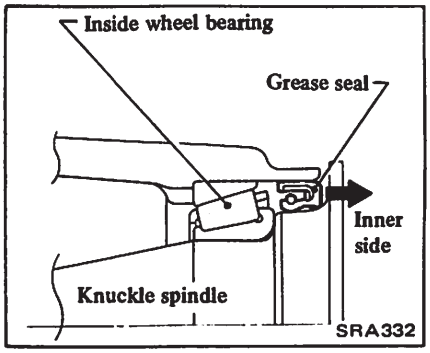
1. Install bearing outer race with Tool until it seats in hub.



2. Coat each bearing with recommended multi-purpose grease.

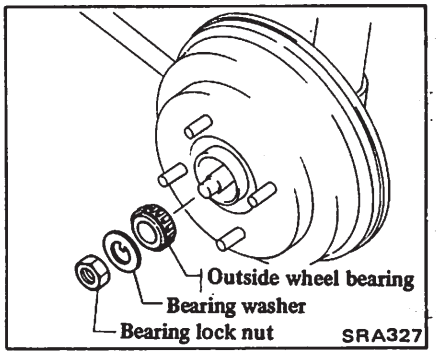


3. Place inside bearing in hub and install a new grease seal, coating sealing lips with recommended multi-purpose grease.

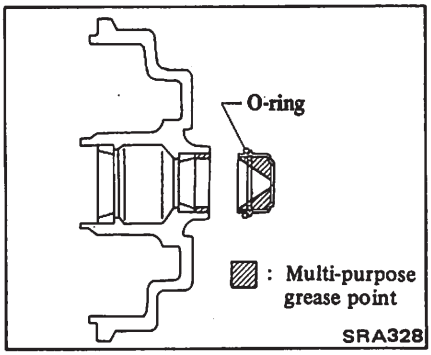


4. Apply recommended multi-purpose grease sparingly to each part.
- Threaded portion of spindle.
- Contacting surface of wheel bea nut.
- Contacting surface of bearing washer.

5. Put hub assembly on spindle, then install outside bearing, bearing washer and wheel bearing nut.



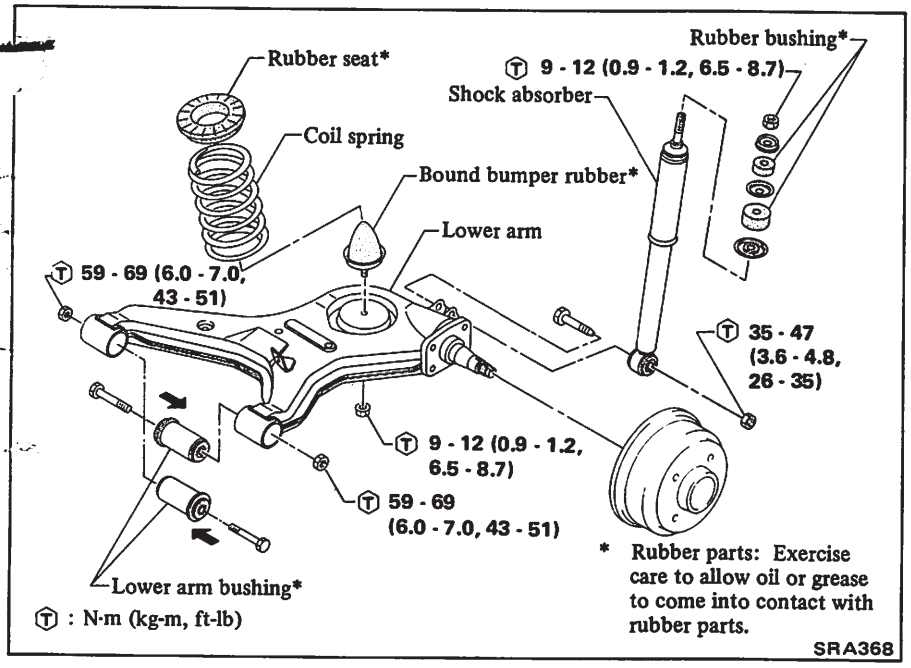
6. Adjust wheel bearing preload.
Refer to Section MA for adjustment.
7. Pack hub cap with recommended multi-purpose grease. Coat O-ring with recommended multi-purpose grease.



8. Install hub cap with O-ring on hub.
9. Install wheel.

Ⓣ : Wheel nut
78 - 98 N·m
(8.0 - 10.0 kg-m, 58 - 72 ft-lb)

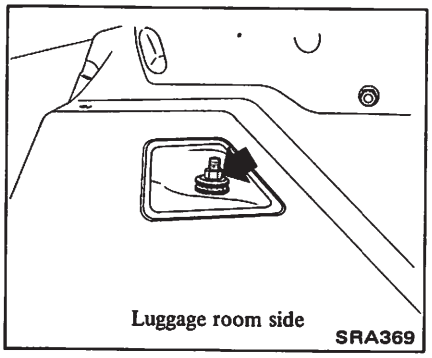
REAR SUSPENSION

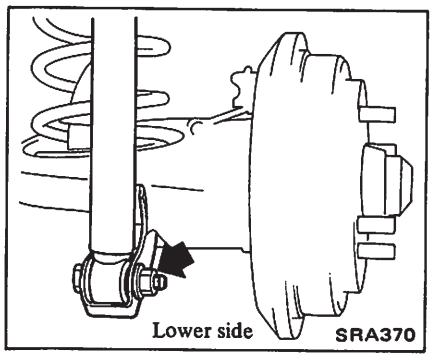


SHOCK ABSORBER

REMOVAL

1. Block front wheels and raise rear of vehicle, and then support it with safety stands. Refer to Section GI for Lifting Points and Towing.
2. Remove nut and bolts from shock absorber.





3. Lower jack slowly. Remove shock absorber.

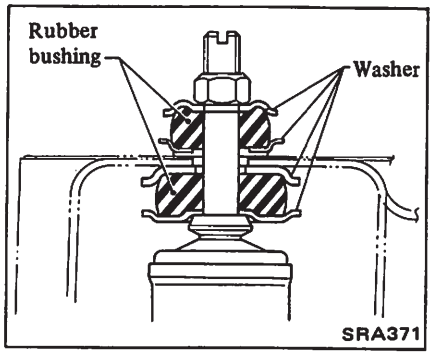
INSPECTION

1. Test shock absorber and compare with specification given in Service Data and Specifications. Replace if necessary.
2. Check for cracks.
3. Check all rubber parts for wear, cracks, damage or deformation. Replace if necessary.

INSTALLATION

Install shock absorber in reverse order of removal.

When installing upper end of shock absorber, bushing and washer must be located and oriented as shown below.



T : Shock absorber upper end nut
9 - 12 N·m
(0.9 - 1.2 kg-m,
6.5 - 8.7 ft-lb)

Shock absorber lower end bolt
35 - 47 N·m
(3.6 - 4.8 kg-m,
26 - 35 ft-lb)

CAUTION:
a. Be careful not to damage or bend piston rod during operation.
b. Do not open or heat gas filled type shock absorbers.

COIL SPRING

REMOVAL

1. Block front wheels with chocks.
2. Jack up vehicle and support it with safety stands.
3. Remove wheel and tire.
4. Securely support lower end of rear arm with jack.
5. Remove shock absorber lower end bolt. Refer to Shock Absorber.
6. Lower jack slowly. Remove coil spring.

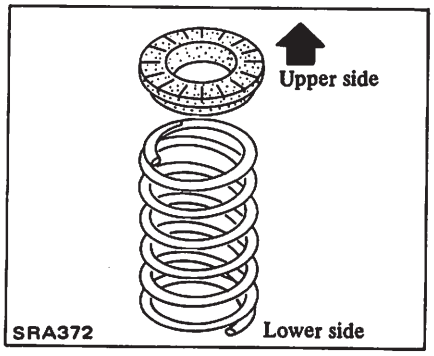
INSPECTION

1. Check coil spring for yield, deformation or cracks.
2. Test spring and compare with specifications given in S.D.S.
3. Check all rubber parts for wear, cracks, damage or deformation. Replace if necessary.

INSTALLATION

Install coil spring in reverse order of removal.

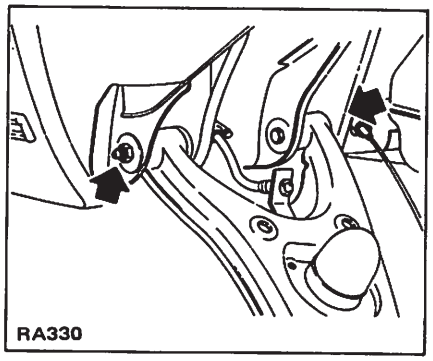
CAUTION:
Correctly fit flattened end of coil spring on spring seat.



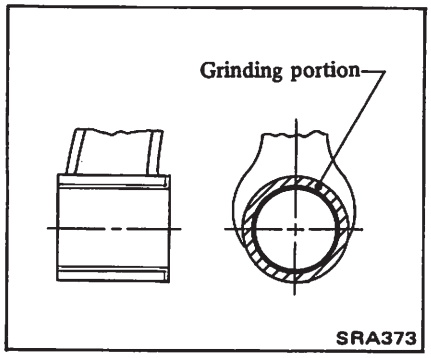
REAR ARM

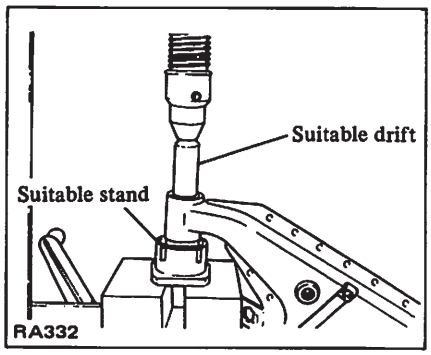
REMOVAL

1. Remove coil spring. Refer to Coil Spring.
2. Loosen flare nut connecting brake tube, and detach brake tube. Install brake line plug.
3. Detach hand brake wire.
4. Remove brake drum. Refer to Rear Axle.
5. Remove rear arm bolts.



6. Grind the flanged portion of rear arm bushing.
Set the grinding portion of rear arm on Tool, press bushing out using suitable Drift.





INSPECTION

Rear arm

1. Examine rear arms to ensure they are not deformed or cracked.
2. Check rubber bushings for wear, damage or separation. Replace if necessary.

Rear arm bushing

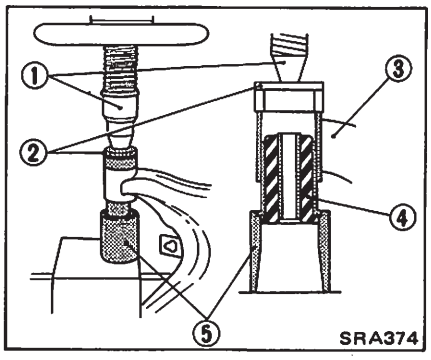
Check condition of bushing without removing it from rear suspension arm. If bushing shows indications of cracks, deformation, or other damage, replace it.

Bound bumper

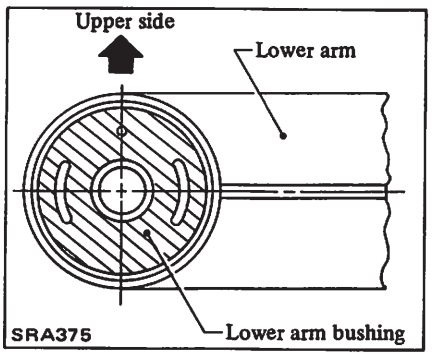
If bound bumper is deteriorated, cracked, or damaged to such an extent that it is no longer serviceable, replace it.

INSTALLATION

1. Press bushing into rear arm collar, using Tool.



1 Press
2 Suitable plate
3 Rear arm
4 Bushing
5 Suitable stand



2. Install rear arm in the reverse order of removal.

At first, tighten rear arm attaching bolts temporarily. Final tightening should be carried out with vehicle under normal load.

CAUTION:
When installing brake tubes, use Flare Nut Torque Wrench GG94310000.

Ⓣ : Rear arm attaching bolt
59 - 69 N·m
(6 - 7 kg-m,
43 - 51 ft-lb)
Shock absorber lower end bolt
35 - 47 N·m
(3.6 - 4.8 kg-m,
26 - 35 ft-lb)
Brake disc attaching bolt
25 - 33 N·m
(2.5 - 3.4 kg-m,
18 - 25 ft-lb)
Brake tube flare nut
15 - 18 N·m
(1.5 - 1.8 kg-m,
11 - 13 ft-lb)
Brake hose connector
17 - 20 N·m
(1.7 - 2.0 kg-m,
12 - 14 ft-lb)
Wheel nut
78 - 98 N·m
(8.0 - 10 kg-m,
58 - 72 ft-lb)

3. Bleed air out of brake system. Refer to section BR.

SERVICE DATA AND SPECIFICATIONS (S.D.S.)

GENERAL SPECIFICATIONS

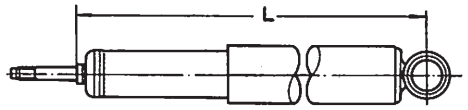
COIL SPRING

	Sedan	Hatchback	Wagon
Wire diameter mm (in)	11.0 (0.433)	10.8 (0.425)	11.0 (0.433)
Coil diameter mm (in)	100 (3.94)		
Free length mm (in)	299 (11.77)	304 (11.97)	314 (12.36)
Spring constant N/mm (kg/mm, lb/in)	23.05 (2.35, 131.6)		
Identification color	White 1 & Blue 2	Red 1 & Blue 2	Green 1 & White 2

SHOCK ABSORBER

	Other	Wagon
Maximum length "L" mm (in)	552 (21.73)	
Stroke mm (in)	227 (8.94)	
Damping force [at 0.3 m (1.0 ft)/Sec.]		
Expansion N (kg, lb)	441 (45, 99)	588 (60, 132)
Compression N (kg, lb)	196 (20, 44)	294 (30, 66)

*: Wagon model



SRA112

TIGHTENING TORQUE

Unit	N·m	kg-m	ft-lb
Wheel bearing lock nut	39 - 44	4.0 - 4.5	29 - 33
Shock absorber lock nut (upper end)	9 - 12	0.9 - 1.2	6.5 - 8.7
Shock absorber lock bolt (lower end)	59 - 69	6.0 - 7.0	43 - 51
Brake tube flare nut	15 - 18	1.5 - 1.8	11 - 13
Brake hose connector	17 - 20	1.7 - 2.0	12 - 14
Brake disc attaching bolt	25 - 33	2.5 - 3.4	18 - 25
Wheel nut	78 - 98	8.0 - 10.0	58 - 72
Lower arm to body	59 - 69	6.0 - 7.0	43 - 51
Bumper rubber to lower arm	9 - 12	0.9 - 1.2	6.5 - 8.7

INSPECTION AND ADJUSTMENT

WHEEL ALIGNMENT AND WHEEL BEARING

Refer to section MA.

TROUBLE DIAGNOSES AND CORRECTIONS

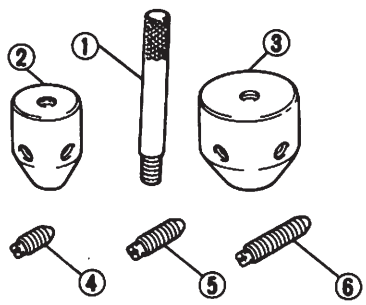
When rear axle and suspension are suspected of being noisy, it is advisable to make thorough test to determine whether the noise originates in the tires, road surface, exhaust, engine, transaxle, wheel bearings or suspension.

Noise which originates in other places cannot be corrected by adjustment or replacement of parts in the rear axle and rear suspension.

Condition	Probable cause	Corrective action
Noise (Unusual sound).	Loose wheel nuts.	Tighten to specified torque.
	One or more securing bolts loose.	Tighten to specified torque.
	Lack of lubricating grease.	Lubricate as required.
	Faulty shock absorber.	Replace.
	Damaged or worn wheel bearing.	Replace.
	Unbalance of wheel and tire.	Balance.
	Damage to the rubber parts such as lower arm bushing.	Replace damaged parts.
	Breakage of coil spring.	Replace.
Instability in driving This problem is also related to the front suspension. For trouble diagnoses, also refer to Section FA.	Loose wheel nuts.	Tighten to specified torque.
	Malfunctioning of shock absorber.	Repair or replace.
	Incorrect wheel alignment.	Adjust.
	Worn coil spring.	Replace.
	Damaged lower arm bushing or bound bumper.	Replace.
	Worn or damaged wheel bearing.	Replace.
	Loose or broken lower arm.	Retighten or replace.

SPECIAL SERVICE TOOLS

Tool number (Kent-Moore No.)	Tool name
KV401021S0 (–)	Bearing outer race drift set
① ST35325000 (–)	Drift bar
② KV40102110 (–)	Drift (A)
③ KV40102120 (–)	Drift (B)
④ KV40102130 (–)	Screw (A)
⑤ KV40102140 (–)	Screw (B)
⑥ KV40102150 (–)	Screw (C)



BRAKE SYSTEM

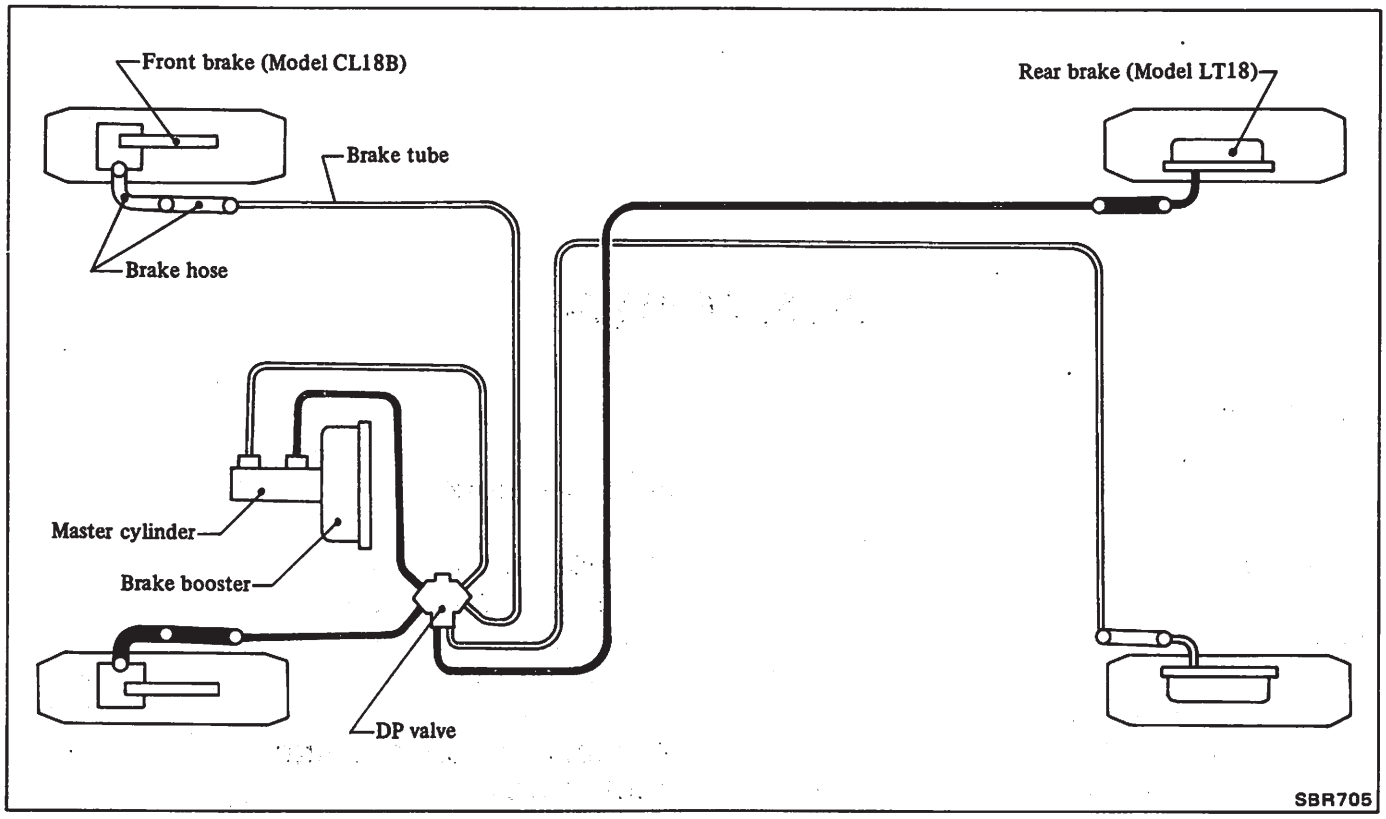
SECTION BR

CONTENTS

Refer to section MA (Brake System) for:

- CHECKING FOOT BRAKE
- CHECKING PARKING BRAKE

DESCRIPTION



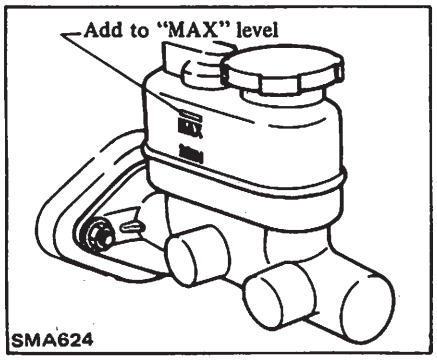
- The brake system is a hydraulically controlled, dual line type which operates independently on right front and left rear wheel, and left front and right rear wheel.
- The brake booster is a power assist device which utilizes engine intake manifold vacuum.
- The DP valve is a pressure control device for the rear brakes.
- The rear brake is equipped with a mechanically operated parking brake mechanism.
- The pad clearance and shoe clearance for both front disc and rear drum brakes are automatically adjusted.

SERVICE BRAKE

BLEEDING HYDRAULIC SYSTEM

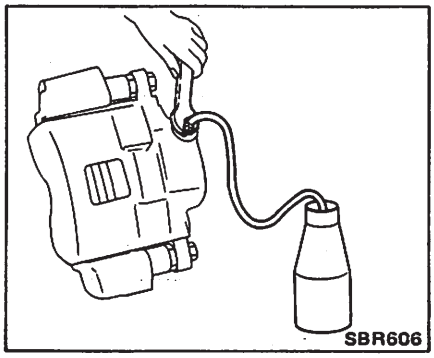
1. Top up reservoir with recommended brake fluid.

a. Do not mix two different brand brake fluids.
b. Carefully monitor brake fluid level at master cylinder during bleeding operation.
c. Do not reuse drained brake fluid.

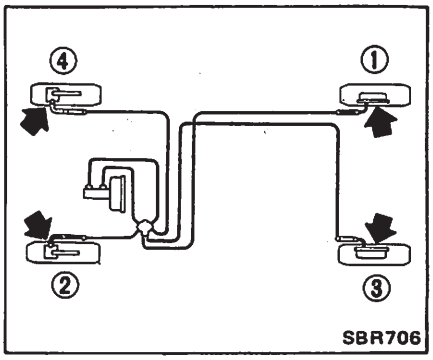


2. Install bleeder hose on bleeder valve. Push down on brake pedal slowly until it is fully depressed, then open bleeder valve to exhaust air. Then close bleeder valve and allow brake pedal to return. Repeat bleeding operation until no air bubbles show in hose.

a. Be careful not to splash brake fluid on painted areas.
b. Brake fluid containing air is white and contains air bubbles.
c. Brake fluid containing no air runs out of bleeder valve in a solid stream free of air bubbles.

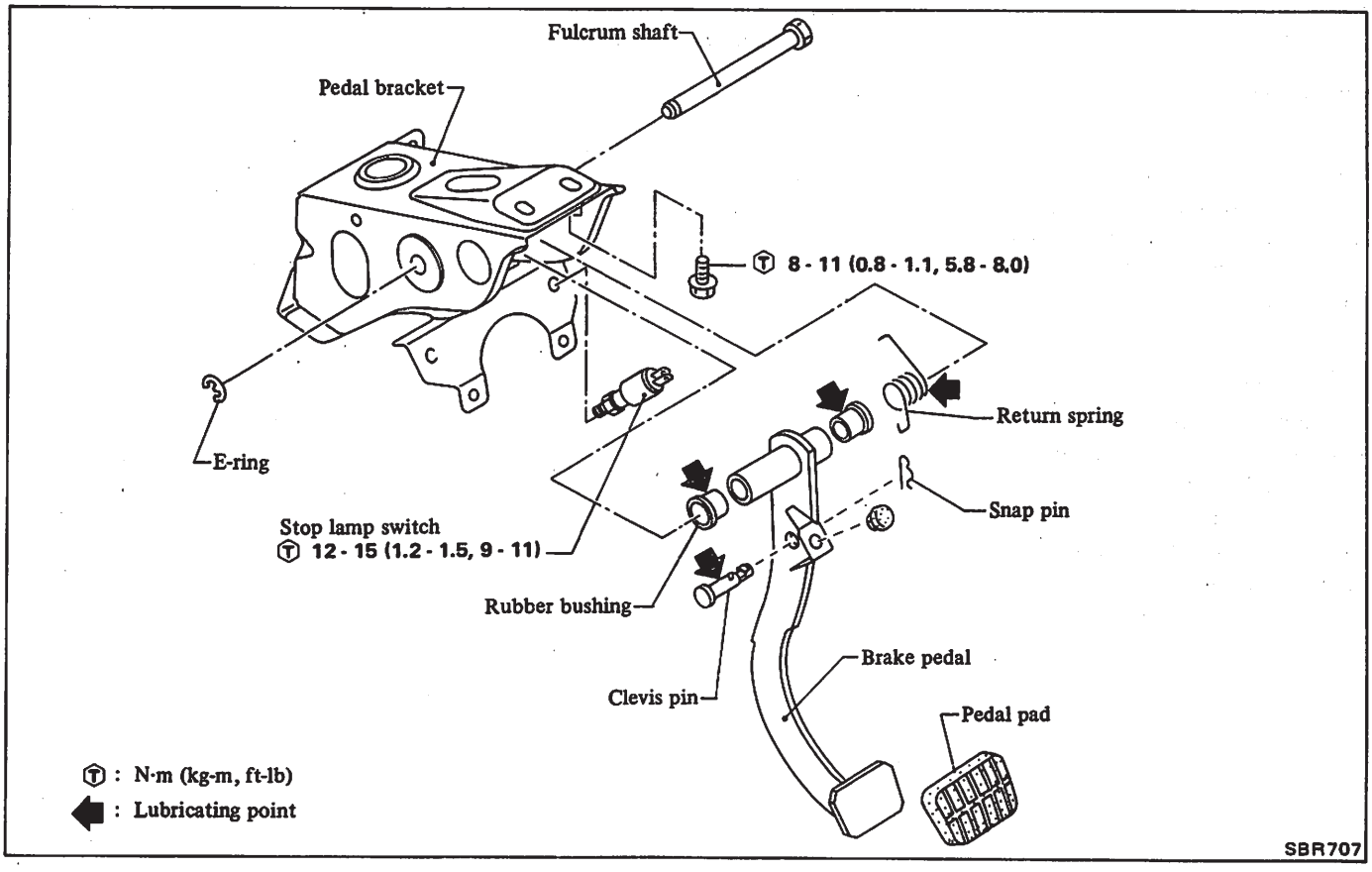


3. Bleed air in the following sequence.



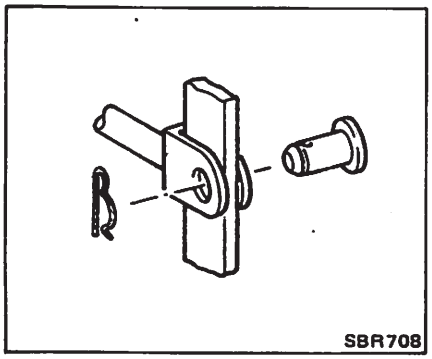
Ⓣ: Air bleeder
7 - 9 N·m
(0.7 - 0.9 kg-m, 5.1 - 6.5 ft-lb)

BRAKE PEDAL

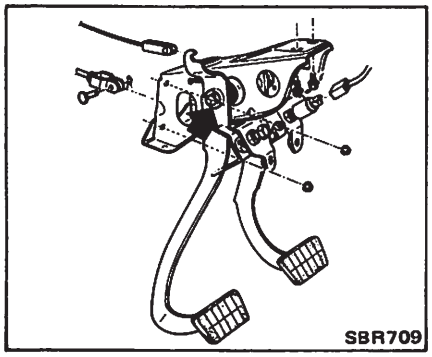


REMOVAL

1. Remove instrument lower cover and heater duct.
2. Remove snap pin and clevis pin.



3. Remove fulcrum shaft. Brake pedal can then be taken out.



INSPECTION

Check brake pedal for the following items, servicing as necessary.
1. Check brake pedal for bend.
2. Check return springs for fatigue.
3. Check clevis for deformation and crack at welded part.

INSTALLATION

1. Apply coating of recommended multi-purpose grease to sliding portion and return spring.
2. Adjust brake pedal after installation is completed. Refer to Section MA for adjustment.

Ⓣ : Input rod lock nut
16 - 22 N·m
(1.6 - 2.2 kg-m,
12 - 16 ft-lb)
Stop lamp switch lock nut
12 - 15 N·m
(1.2 - 1.5 kg-m,
9 - 11 ft-lb)

BRAKE HYDRAULIC LINE

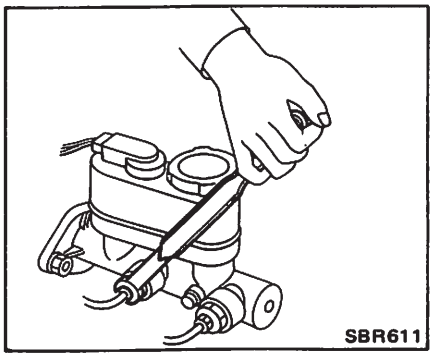
INSPECTION

Check brake lines (tubes and hoses) for evidence of cracks, deterioration or other damage. Replace any faulty parts.
If leakage occurs at end around joints, re-tighten or, if necessary, replace faulty parts.

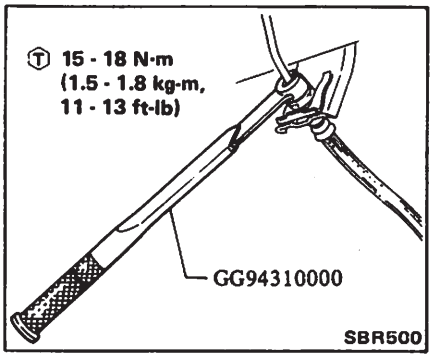
REMOVAL AND INSTALLATION

CAUTION:
a. When removing and installing brake tube, use Tool GG94310000.
b. Cover openings to prevent entrance of dirt whenever disconnecting hydraulic line.

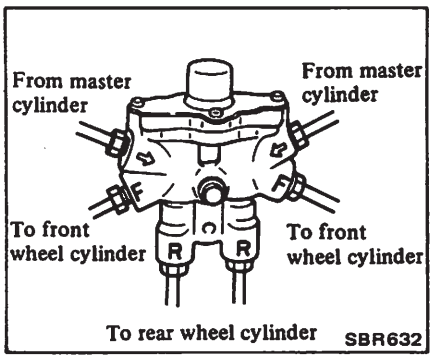
- To remove brake tube, disconnect flare nuts on both ends, and remove retainers and clips.



- To remove brake hose, first remove flare nut securing brake tube to hose, then withdraw lock spring. Next disconnect the other side.
Do not twist brake hose.



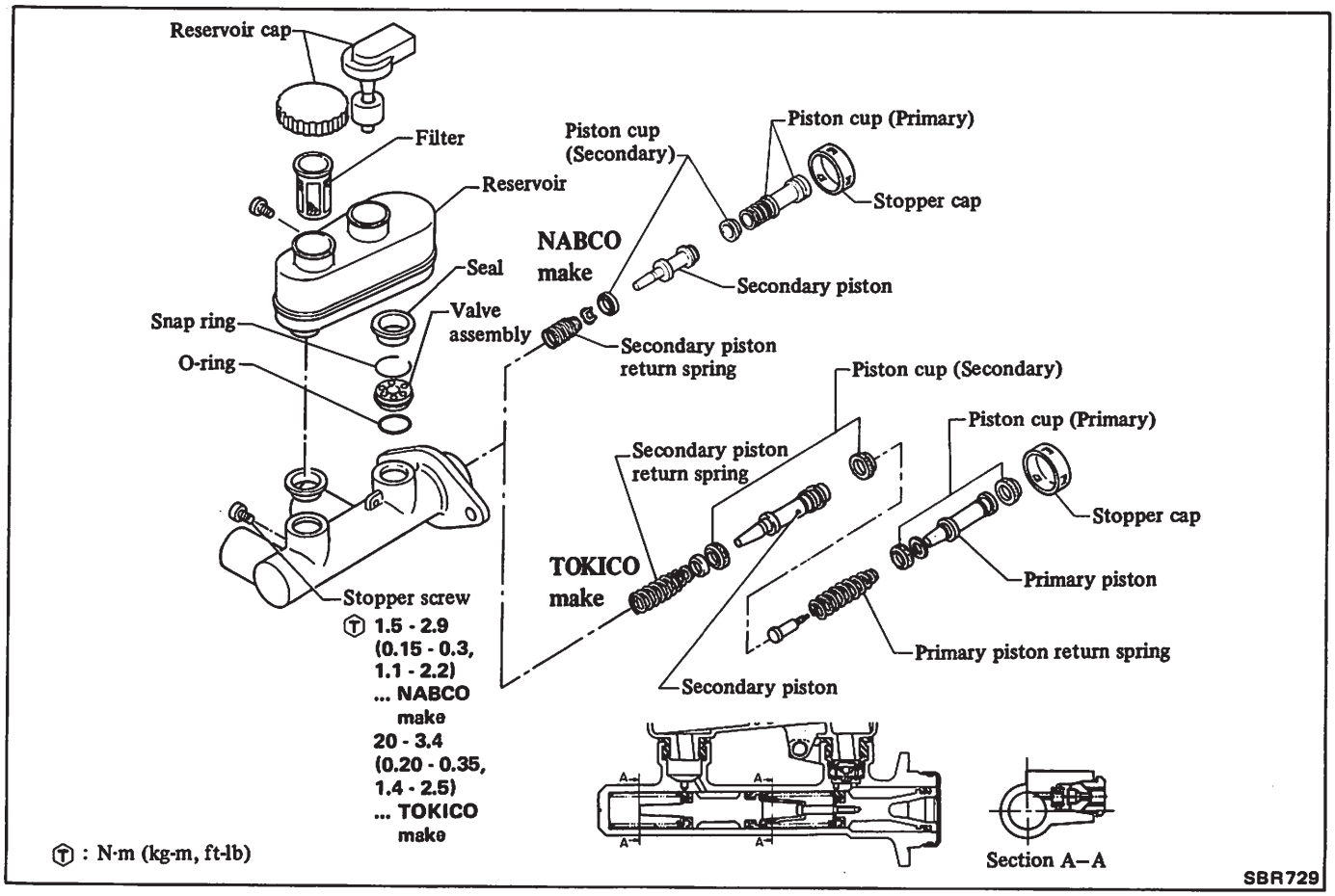
DP (Dual Proportioning) VALVE



Do not disassemble DP valve.

Ⓣ : Brake tube flare nut
15 - 18 N·m
(1.5 - 1.8 kg-m,
11 - 13 ft-lb)
DP valve to body
4 - 5 N·m
(0.4 - 0.5 kg-m,
2.9 - 3.6 ft-lb)

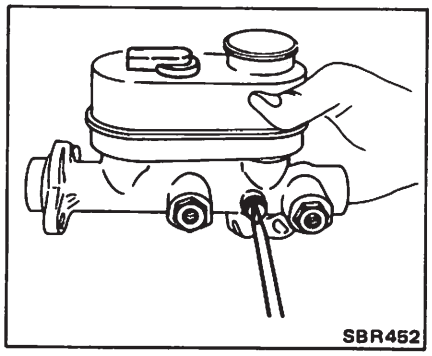
MASTER CYLINDER



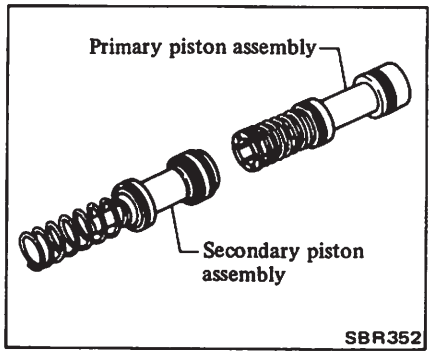
DISASSEMBLY

There is no interchangeability of repair kits or component parts between NABCO and TOKICO makes.
When replacing the repair kit or component parts, ascertain the brand of the brake master cylinder body. Be sure to use parts of the same make as the former ones.

1. Pry off stopper ring.
Primary piston assembly can then be taken out.
2. Remove stopper screw.
Secondary piston assembly can then be taken out.



3. Disassemble piston assembly. Do not disassemble primary piston assembly of NABCO make.



4. Remove piston cups and discard them.
5. Remove seal on valve assembly side.
6. Remove snap ring and then valve assembly.
7. Remove O-ring.

Do not use O-ring again.

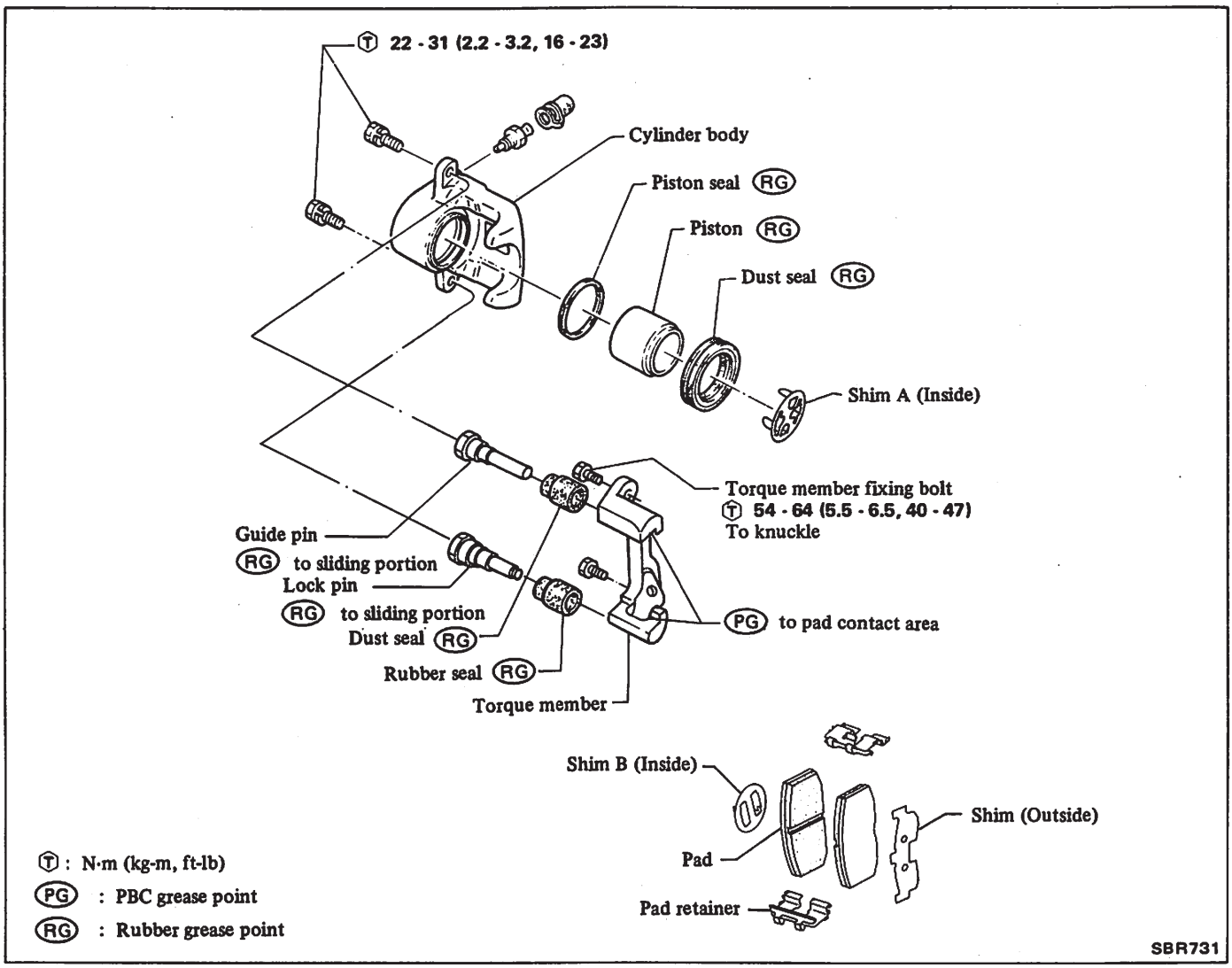
INSPECTION

1. Clean all parts in a brake fluid.
2. Check the parts for evidence of abnormal wear or damage.

ASSEMBLY

a. Replace piston cups and packing with new ones.
b. Apply brake fluid or rubber grease to sliding contact surface of parts to facilitate assembly of master cylinder.

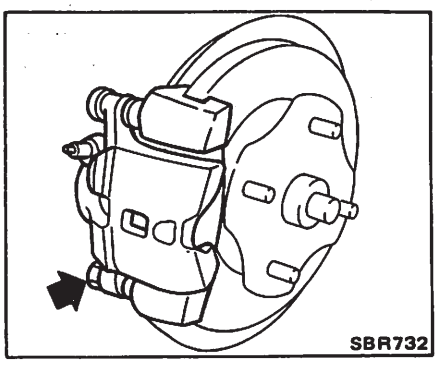
FRONT DISC BRAKE –CL18B–



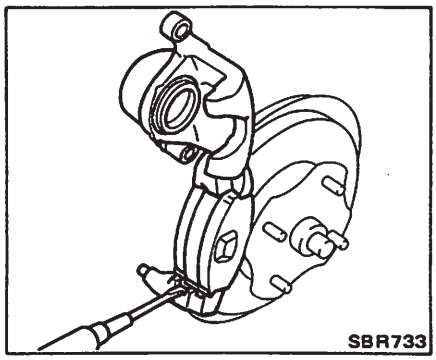
PAD REPLACEMENT

Removal

1. Jack up front of vehicle and support it on safety stands. Refer to section GI for lifting points and towing.
2. Remove lock pin.



3. Open cylinder body upward. Remove pad retainers and pads.



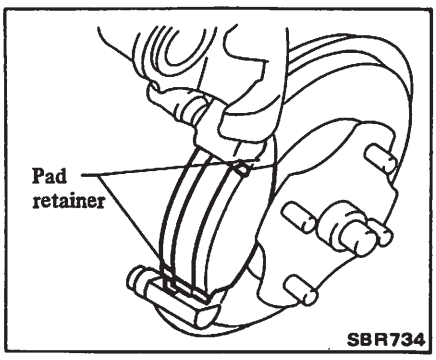
CAUTION:
When cylinder body is open, do not depress brake pedal, or piston will jump out.

Installation

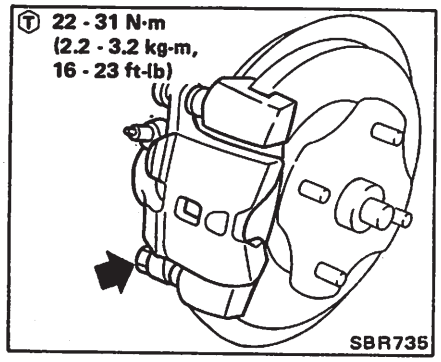
1. Clean piston end and surroundings of pin bolts.
2. Apply a coat of PBC grease to pad-to-torque member clearance.

Be careful not to get grease on pads or rotor.

3. Install inner pad. Pull cylinder body to outer side.
4. Install outer pad, then pad retainers.

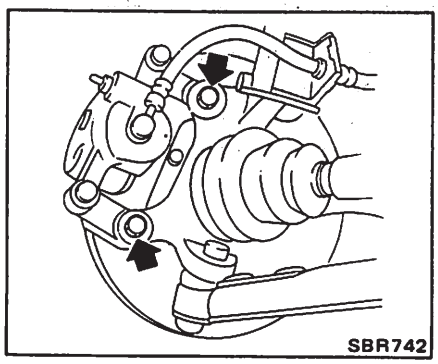


5. Tighten lock pin.



REMOVAL AND INSTALLATION

1. Disconnect brake line at brake tube and hose connection
2. Remove caliper mounting bolts.

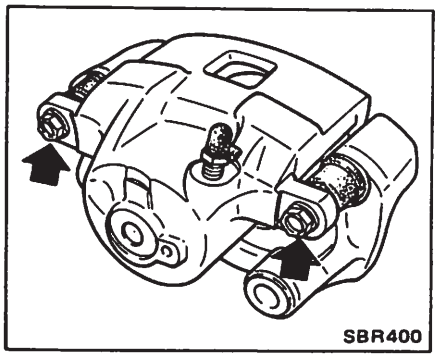


Install caliper assembly in the reverse order of removal.

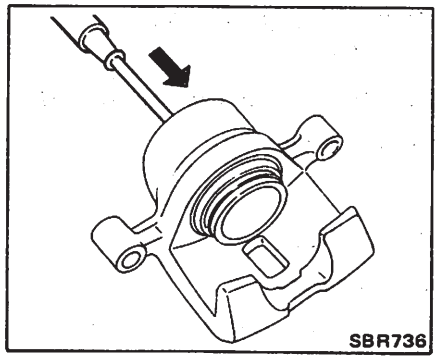
Ⓣ: Caliper fixing bolt
54 - 64 N·m
(5.5 - 6.5 kg-m,
40 - 47 ft-lb)

DISASSEMBLY

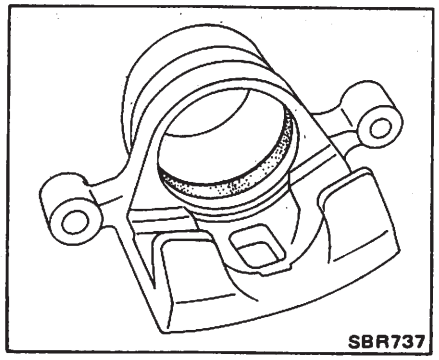
1. Separate cylinder body and torque member.



2. Remove brake hose. Press out piston with dust seal and retainer ring.



3. Remove piston seal.



4 Remove guide pin and lock pin from torque member.

INSPECTION

Clean all parts and check as follows.

CAUTION:
Use brake fluid to clean. Never use mineral oil.

Cylinder body

1. Check inside surface of cylinder for score, rust, wear, damage or presence of foreign substances. If any surface fault is detected, replace cylinder body.
2. Minor damage from rust of foreign substances may be eliminated by polishing surface with a fine emery paper. If damage is major, cylinder assembly must be replaced.

Torque member

Check for wear, cracks or other damage. Replace if any fault is detected.

Piston

Check piston for score, rust, wear, damage or presence of foreign substances. Replace if any fault is detected.

CAUTION:
Piston sliding surface is plated. Do not polish with emery paper even if rust or foreign matter is stuck to sliding surface.

Piston seal and dust seal

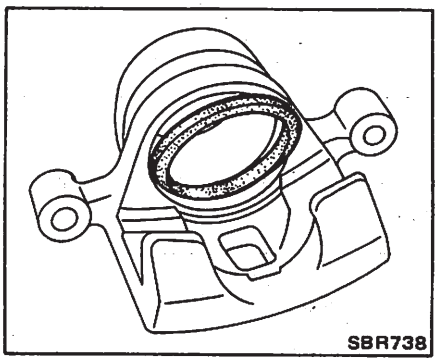
Replace piston seal and dust seal at each disassembly.

Guide pin, lock pin and boots

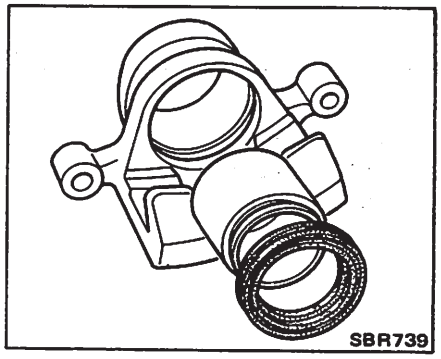
Check for wear, cracks or other damage. Replace if any fault is detected.

ASSEMBLY

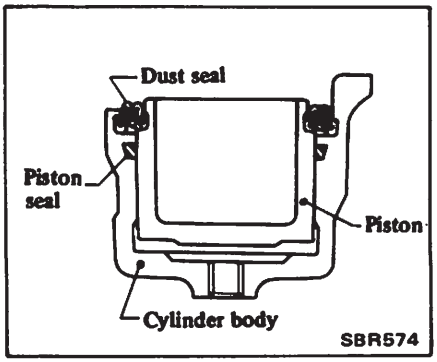
1. Install piston seal applying rubber grease or brake fluid to seal groove and seal.



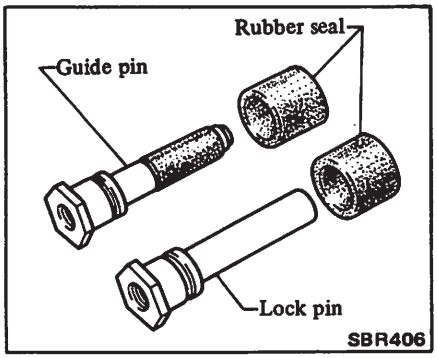
2. Apply rubber grease or brake fluid to sliding portions and inside of dust seal.



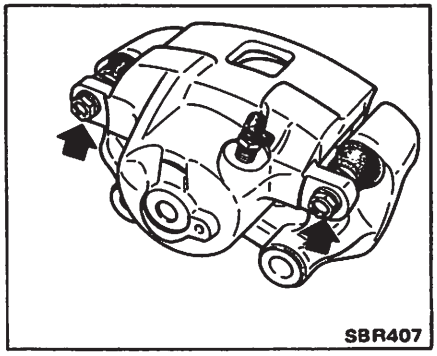
3. With dust seal fitted to piston, insert dust seal into groove on cylinder body and install piston.
4. Properly secure dust seal.



5. Apply a coat of rubber grease to guide pin and lock pin sliding portion. Install lock pin boot, guide pin boot, lock pin and guide pin.



6. Attach torque member to cylinder body.



Ⓣ : 22 - 31 N·m
(2.2 - 3.2 kg-m,
16 - 23 ft-lb)

FRONT DISC ROTOR
–CL18B–

REMOVAL AND INSTALLATION

Refer to section FA.

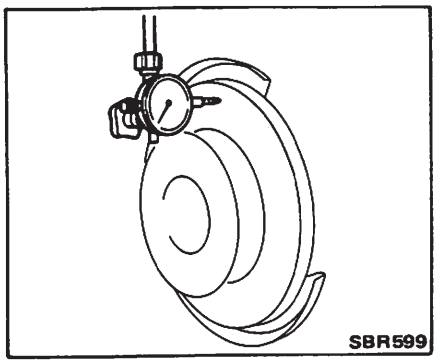
INSPECTION

Sliding surface

If there are cracks or considerable chips, repair or replace.

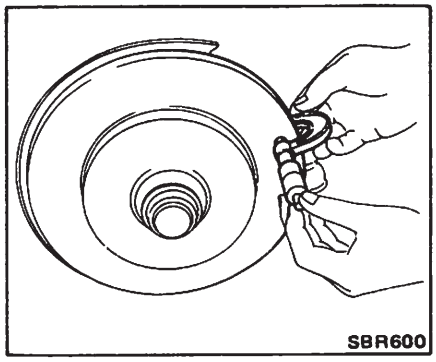
Runout

Adjust wheel bearing correctly. Measure runout.



Rotor repair limit:
Maximum runout
(Total indicator reading at center of rotor pad contact surface)
Less than 0.07 mm (0.0028 in)

Thickness

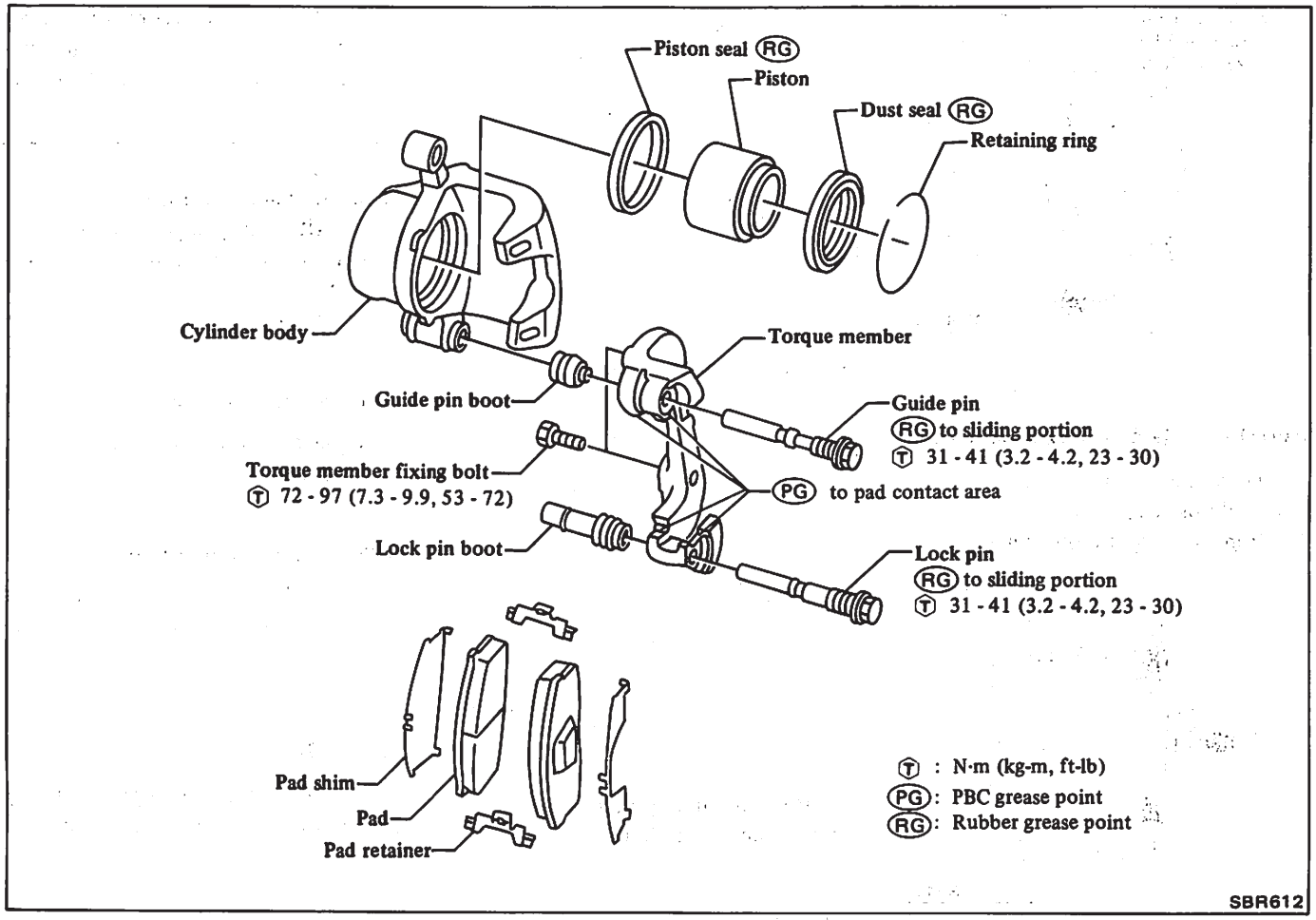


Rotor repair limit:
Minimum thickness
More than 10 mm (0.39 in)

Parallelism (Thickness variation)

Rotor repair limit:
Maximum parallelism
(Circumferential direction)
0.03 mm (0.0012 in)

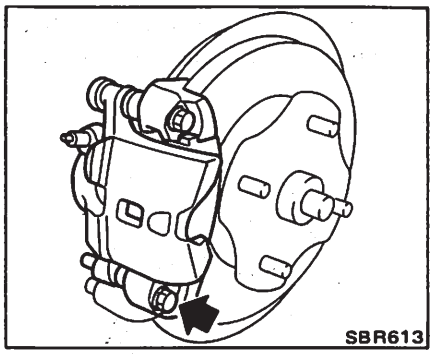
FRONT DISC BRAKE –AD20V–



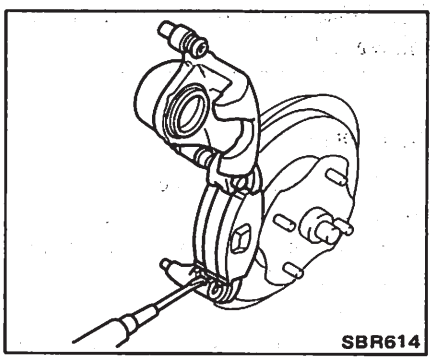
PAD REPLACEMENT

Removal

1. Jack up front of vehicle and support it on safety stands. Refer to Section GI for lifting points and towing.
2. Remove guide pin.



3. Open cylinder body upward. Remove pad retainers and pads.



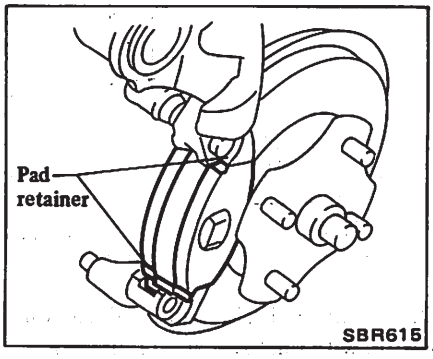
CAUTION:
When cylinder body is open, do not depress brake pedal, or piston will jump out.

Installation

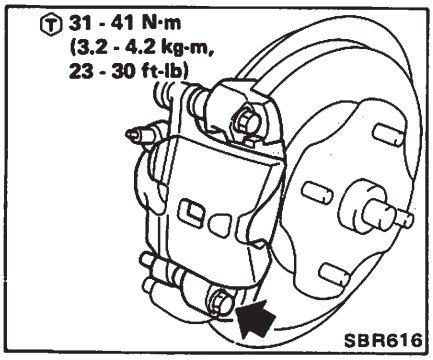
1. Clean piston end and surroundings of pin bolts.
2. Apply a coat of PBC grease to pad-to-torque member clearance.

Be careful not to get grease on pads or rotor.

3. Install inner pad. Pull cylinder body to outer side.
4. Install outer pad, then pad retainers.

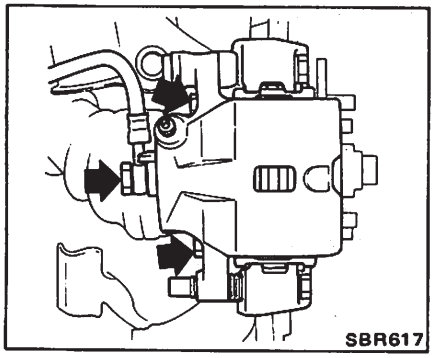


5. Tighten guide pin.



REMOVAL AND INSTALLATION

1. Disconnect brake line at brake tube and hose connection
2. Remove caliper mounting bolts.

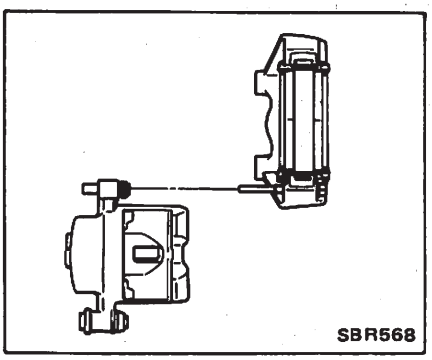


Install caliper assembly in the reverse order of removal.

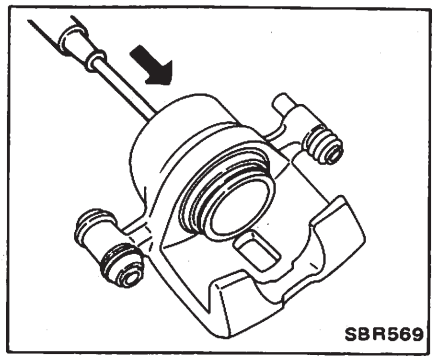
Ⓣ: Caliper fixing bolt
72 - 97 N·m
(7.3 - 9.9 kg-m,
53 - 72 ft-lb)

DISASSEMBLY

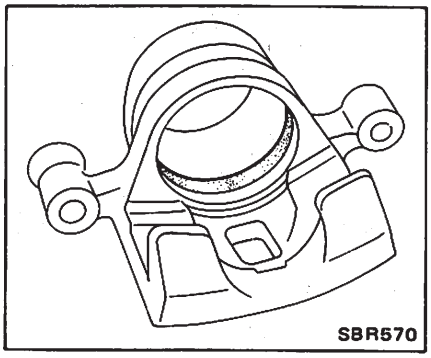
1. Separate cylinder body and torque member.



2. Remove brake hose. Press out piston with dust seal and retainer ring.



3. Remove piston seal.



4. Remove guide pin, lock pin, guide pin boot and lock pin boot.

INSPECTION

Clean all parts and check as follows:

CAUTION:
Use brake fluid to clean. Never use mineral oil.

Cylinder body

1. Check inside surface of cylinder for score, rust, wear, damage or presence of foreign substances. If any surface fault is detected, replace cylinder body.
2. Minor damage from rust of foreign substances may be eliminated by polishing surface with a fine emery cloth. If damage is major, cylinder assembly must be raplaced.

Torque member

Check for wear, cracks or other damage. Replace if any fault is detected.

Piston

Check piston for score, rust, wear, damage or presence of foreign substances. Replace if any fault is detected.

CAUTION:
Piston sliding surface is plated. Do not polish with emery paper even if rust or foreign matter is stuck to sliding surface.

Piston seal and dust seal

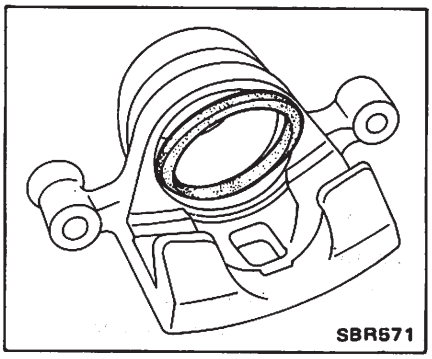
Replace piston seal and dust seal at each disassembly.

Guide pin, lock pin and boots

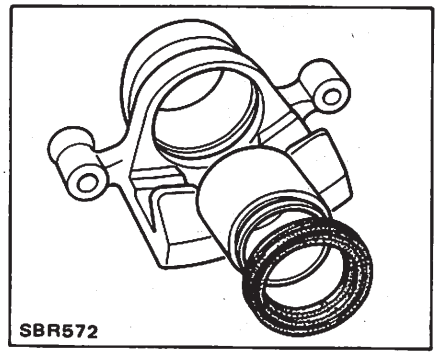
Check for wear, cracks or other damage. Replace if any fault is detected.

ASSEMBLY

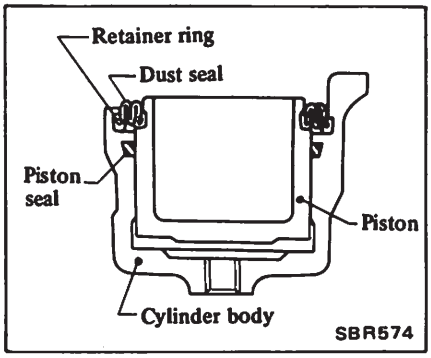
1. Install piston seal applying rubber grease or brake fluid to seal groove and seal.



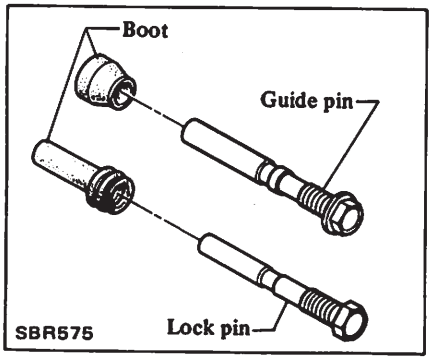
2. Apply rubber grease or brake fluid to sliding portions and inside of dust seal.



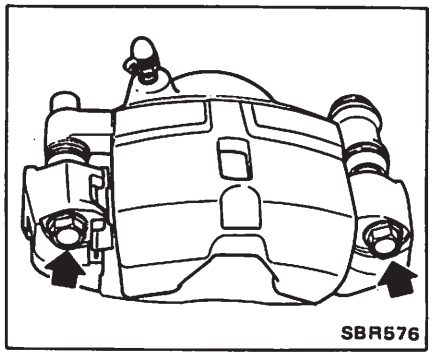
3. With dust seal fitted to piston, insert dust seal into groove on cylinder body and install piston.
4. Install retainer ring and properly secure dust seal.



5. Apply a coat of rubber grease to guide pin and lock pin sliding portion. Install lock pin boot, guide pin boot, lock pin and guide pin.



6. Attach torque member to cylinder body.



Ⓣ: **31 - 41 N·m (3.2 - 4.2 kg-m, 23 - 30 ft-lb)**

FRONT DISC ROTOR —AD20V—

REMOVAL AND INSTALLATION

Refer to section FA.

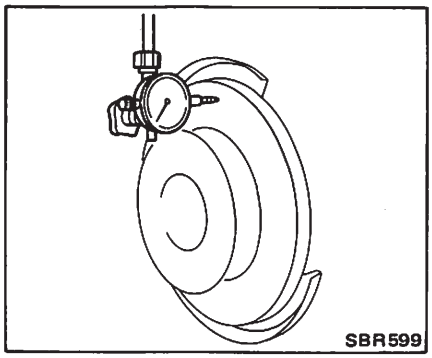
INSPECTION

Sliding surface

If there are cracks or considerable chips, repair or replace.

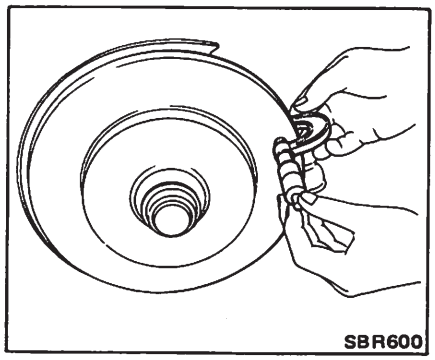
Runout

Adjust wheel bearing correctly. Measure runout.



Rotor repair limit:
Maximum runout (Total indicator reading at center of rotor pad contact surface)
0.07 mm (0.0028 in)

Thickness

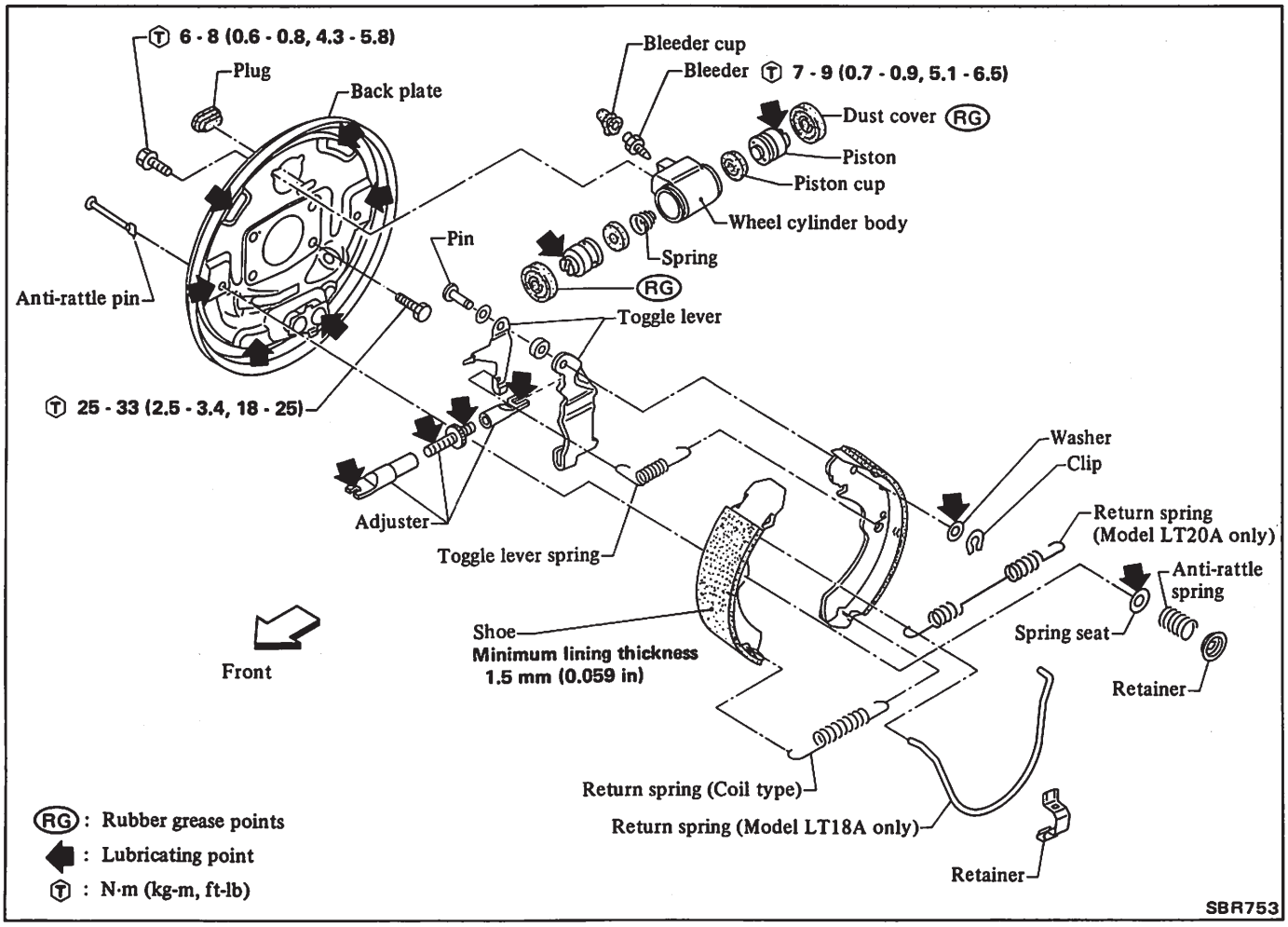


Standard thickness:
18 mm (0.71 in)
Rotor repair limit:
Minimum thickness
16 mm (0.63 in)

Parallelism (Thickness variation)

Rotor repair limit:
Maximum parallelism (Circumferential direction)
0.03 mm (0.0012 in)

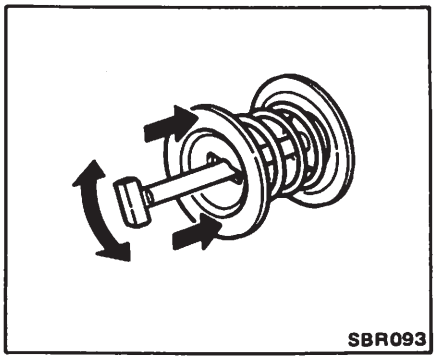
REAR DRUM BRAKE –LT18A and LT20A–



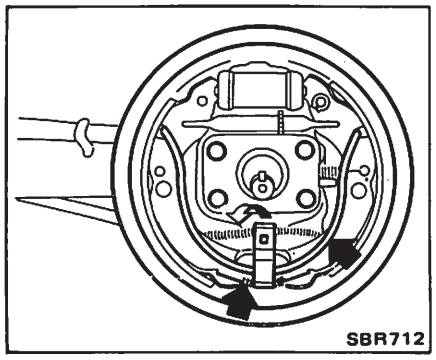
SHOE REPLACEMENT

Removal

1. Remove wheel and brake drum. Refer to Section RA for removal.
2. Remove parking brake rear cable.
3. Remove anti-rattle spring and pin.



4. Remove retainer and then return spring and brake shoe.

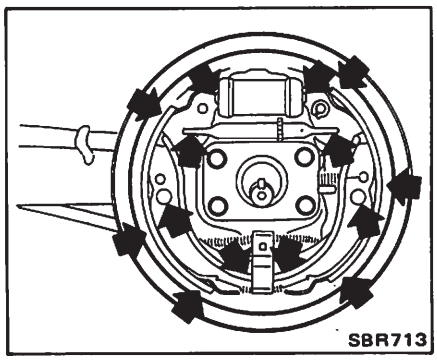


5. Remove toggle lever. Refer to Adjuster.

Installation

Apply brake grease to the following contact areas:

- Shoe to wheel cylinder and anchor
- Shoe to back plate
- Shoe to adjuster
- Spring seat to shoe



Before installing new shoes, set shoe-to-drum clearance [0.23 to 0.32 mm (0.0091 to 0.0126 in)] with the adjuster.

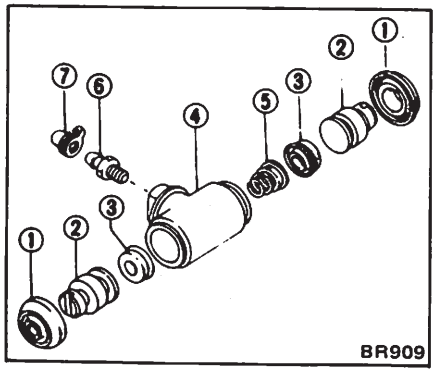
After installation is completed, adjust shoe-to-drum clearance by operating parking brake several times.

WHEEL CYLINDER

Removal

1. Remove brake shoe.
2. Disconnect brake tube.
3. Then remove wheel cylinder.

Disassembly



1 Dust cover
2 Piston
3 Piston cup
4 Wheel cylinder body
5 Spring
6 Bleeder
7 Bleeder cap

Inspection

1. Replace any cylinder or piston which is scratched, scored or worn on its sliding contact surface.
2. Replace worn parts if piston-to-cylinder clearance is beyond limit.
3. Replace any piston cup which is worn or otherwise damaged.
4. Replace if contacting face of cylinder and shoe is worn locally or in step.
5. Replace any damaged dust cover, fatigued piston spring or faulty threaded parts.
6. Replace any tube connector which is worn on its threaded portion.

Assembly

a. Apply a coating of rubber grease or brake fluid to piston cup at assembly.

b. Charge with rubber grease or equivalent before installing dust cover.

c. The brake wheel cylinder is available in both NABCO make and TOKICO make. There is no interchangeability of repair kits or component parts between NABCO and TOKICO makes.
When replacing the repair kit or component parts, ascertain the brand of the brake wheel cylinder body. Be sure to use parts of the same make as the former ones.

Installation

Ⓣ : Wheel cylinder fixing bolt
6 - 8 N·m
(0.6 - 0.8 kg-m,
4.3 - 5.8 ft-lb)

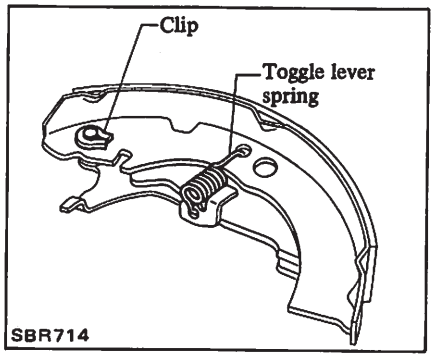
ADJUSTER

Removal

1. Separate equalizer and rear cable.
2. Remove brake shoe.

Refer to Shoe Replacement.

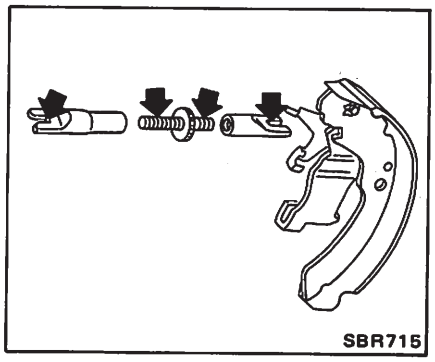
3. Remove adjuster assembly.
4. Remove toggle lever spring and clip, and then separate toggle lever and shoe.



Installation

Lubricating points:

- Adjuster nut and rod threads
- Mating surfaces between adjuster and toggle lever.



Right side brake:
Right thread adjuster
Left side brake:
Left thread adjuster

After installation is completed, adjust shoe-to-drum clearance by operating parking brake several times.
Then adjust parking brake system.

Refer to section MA for adjustment.

BRAKE DRUM

Inspection

1. Check inner diameter of brake drum to make sure it is properly round and tapered. If it is not, repair or replace brake drum.

Standard inner diameter:
180.0 mm (7.09 in)
Maximum inner diameter:
181.0 mm (7.13 in)
Out-of-roundness (ellipticity):
Less than
0.03 mm (0.0012 in)
Radial run-out
(Total indicator reading):
Less than
0.05 mm (0.0020 in)

2. Contact surface with which linings come into contact should be fine-finished with No. 120 to 150 emery paper.
3. Using a drum racer, finish brake drum by machining if it shows any sign of score marks, partial wear or stepped wear on its contact surface.

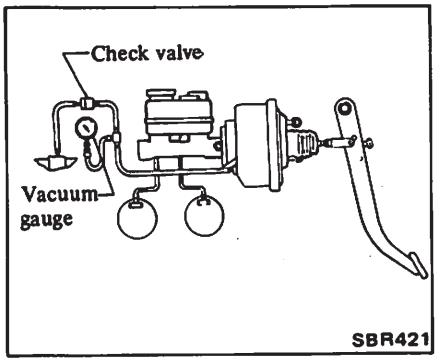
After brake drum has been completely re-conditioned or replaced, check drum and shoes for proper contact pattern.

BRAKE BOOSTER

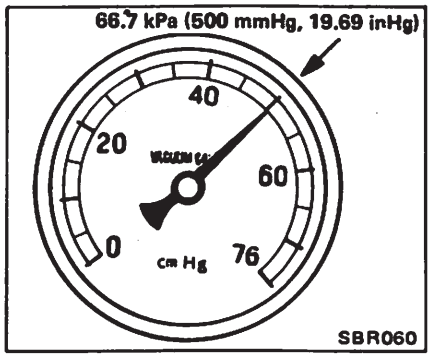
INSPECTION

Airtight test (No load)

1. Connect a vacuum gauge between check valve and brake booster.



2. Start engine and increase engine speed. Stop engine when vacuum is 66.7 kPa (500 mmHg, 19.69 inHg).



3. If vacuum pressure drops more than the specified value, correct the cause in accordance with the following chart.

Maximum vacuum leakage (15 seconds after engine is stopped):
3.3 kPa (25 mmHg, 0.98 inHg)

Probable cause	Corrective action
Air leakage at check valve.	Inspect check valve.
Air leakage at output rod seat.	Replace brake booster as an assembly.
Air leakage between valve body and seal.	
Air leakage at valve plunger seat.	
Damaged piping or connectors	Repair or replace.

Airtight test (Under load)

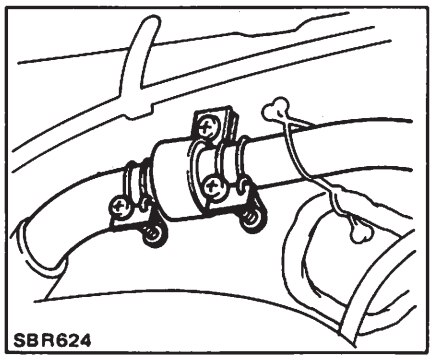
Keep brake pedal fully depressed. Following procedures are same as for no-load conditions.

Maximum vacuum leakage (15 seconds after engine is stopped)
3.3 kPa (25 mmHg, 0.98 inHg)

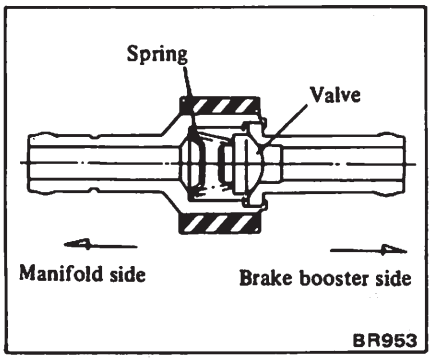
Probable cause	Corrective action
Air leakage at check valve.	Inspect check valve.
Damaged diaphragm.	Replace brake booster as an assembly.
Air leakage at poppet assembly seat and valve body.	

Check valve

1. Remove check valve.



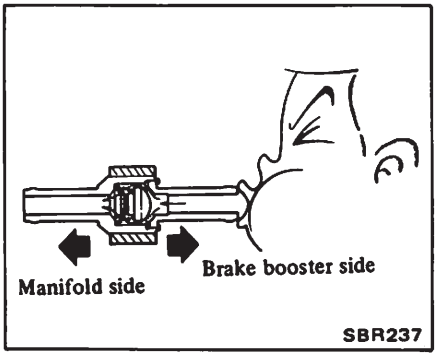
2. Apply a vacuum pressure of 66.7 kPa (500 mmHg, 19.69 inHg) to the port of check valve on the brake booster side.



3. If vacuum pressure drops more than the specified value in 15 seconds, replace check valve with a new one.

Maximum vacuum leakage of check valve:
1.3 kPa (10 mmHg, 0.39 inHg)

4. When pressure is applied to the brake booster side of check valve and valve does not open, replace check valve with a new one.



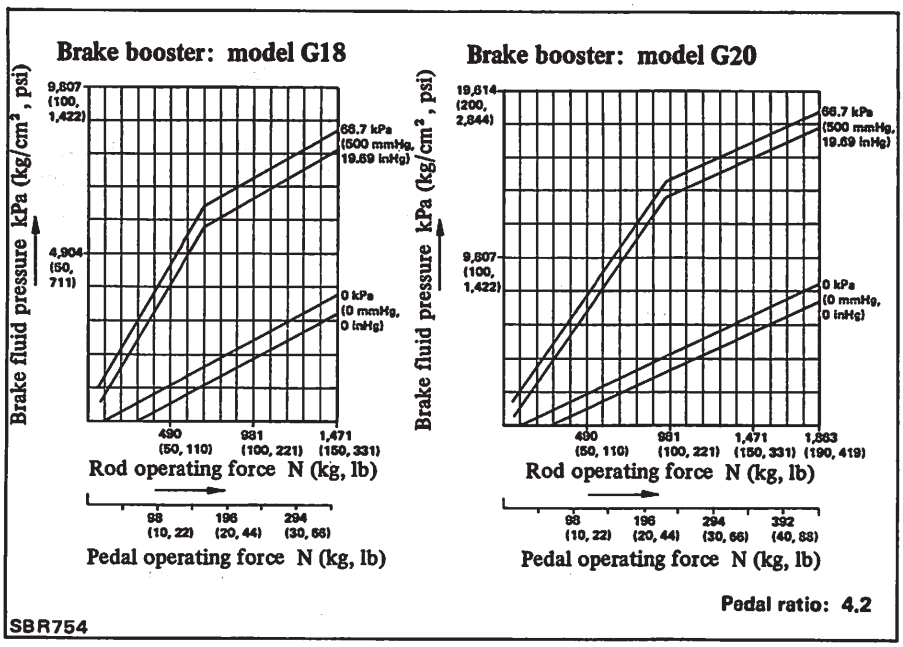
Operating test

1. Connect an oil pressure gauge to brake line, at connection on master cylinder.
2. Install a pedal force gauge on brake pedal.
3. Start engine, and increase engine speed until a vacuum pressure of 66.7 kPa (500 mmHg, 19.69 inHg) is registered on vacuum pressure gauge. With a steady vacuum pressure of 66.7 kPa (500 mmHg, 19.69 inHg), measure oil pressure with respect to each pedal operating force.

Relationship between oil pressure and pedal operating force is illustrated in the following figures. If test results are not as specified, check brake booster for condition in manner described under "Inspection" before removal of this unit.

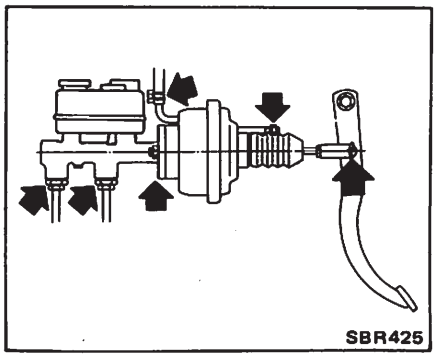
Also check brake line for evidence of fluid leakage.

Determine whether source of problem is in brake booster or check valve. Before you reach a final conclusion, always inspect check valve first.



REMOVAL

To remove brake booster, detach the following points.



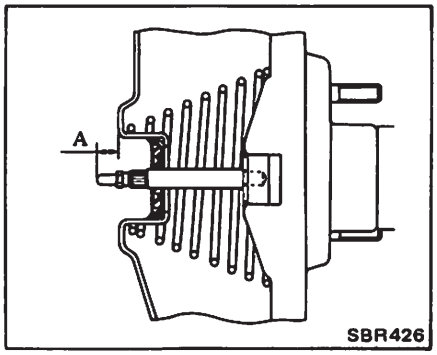
ADJUSTMENT

Output rod length

PV servo cannot be adjusted as output rod thread portion is secured by adhesion.

1. Check length.

Length "A":
10.275 - 10.525 mm
(0.4045 - 0.4144 in)

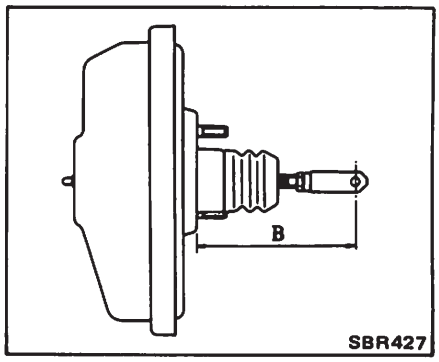


2. If length is not within specifications, replace brake booster assembly.

Input rod length

Adjust length by turning clevis.

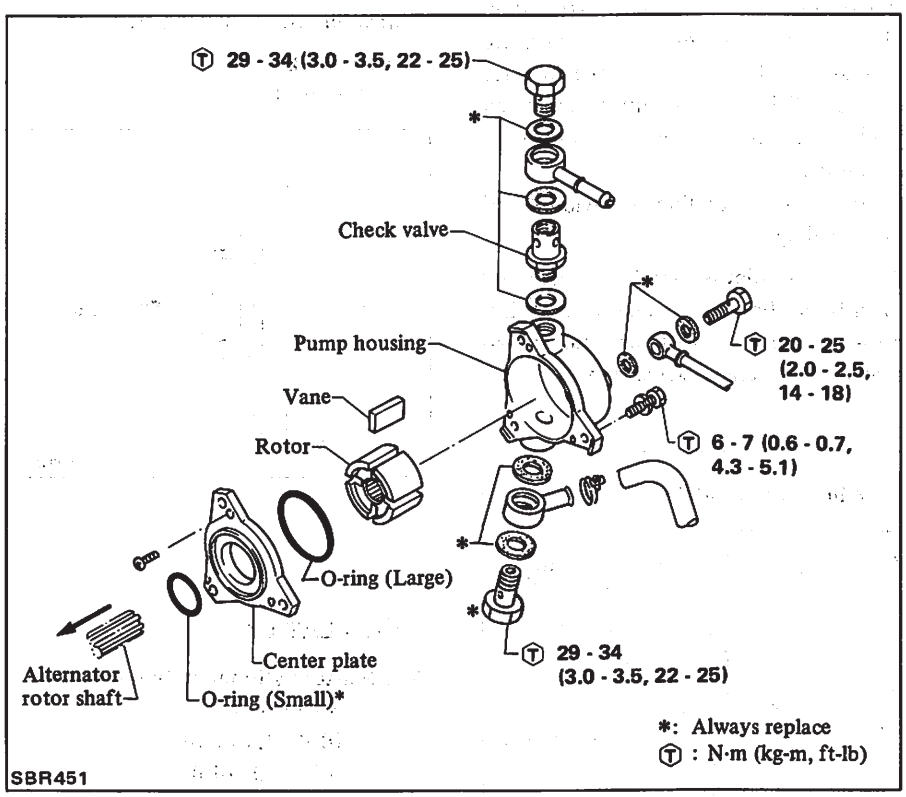
Length "B":
150 mm (5.91 in)



INSTALLATION

Ⓣ : Master cylinder to brake booster
8 - 11 N·m
(0.8 - 1.1 kg-m,
5.8 - 8.0 ft-lb)
Brake booster to pedal bracket
8 - 11 N·m
(0.8 - 1.1 kg-m,
5.8 - 8.0 ft-lb)
Input rod lock nut
16 - 22 N·m
(1.6 - 2.2 kg-m,
12 - 16 ft-lb)

VACUUM PUMP (Diesel engine model)

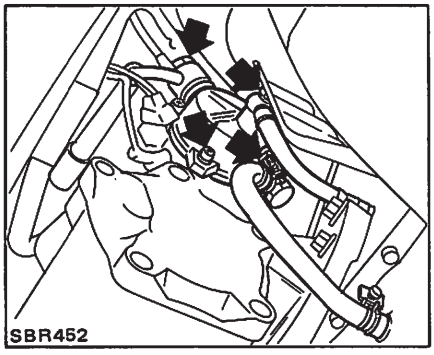


REMOVAL AND INSTALLATION

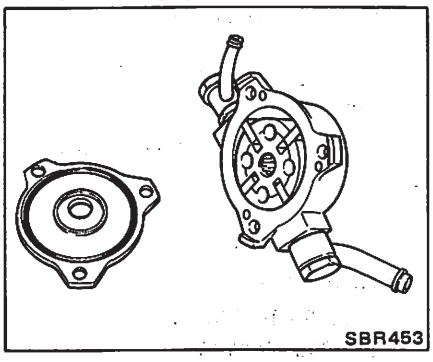
1. Drain oil from vacuum pump

Manually rotate fan belt clockwise to discharge any oil which may have accumulated in vacuum pump.

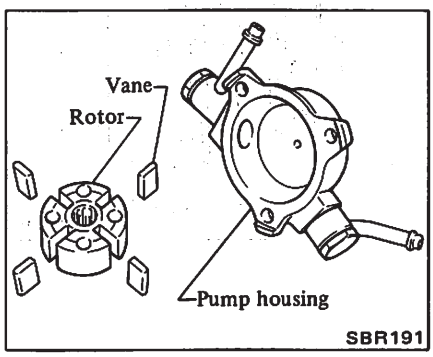
2. Remove vacuum pump assembly from alternator.



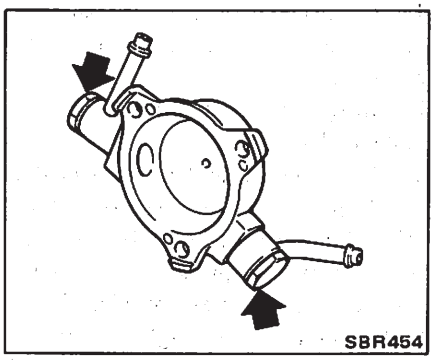
3. Separate center plate and vacuum pump housing.



4. Disassemble rotor, vane and vacuum pump housing.



5. Disconnect valve assembly.



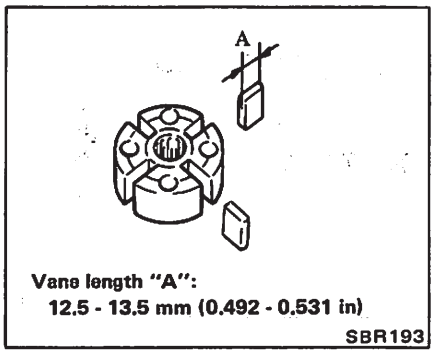
6. Install vacuum pump in the reverse order of removal.

After installing vacuum pump, fill vacuum pump with engine oil [approximately 5 mℓ (0.2 US fl oz, 0.2 Imp fl oz)] and then check that alternator rotates smoothly by turning it manually.

INSPECTION

Clean all parts and check them as follows:

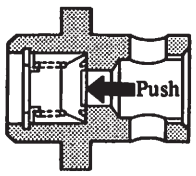
- Check for wear or scratches on mating surfaces of rotor and vacuum pump housing and of rotor and center plate. If any wear or scratches are noted, replace those parts.
- Check for wear or scratches on vanes. If necessary, replace.



- Check inner wall of vacuum pump housing for wear. If necessary, replace.

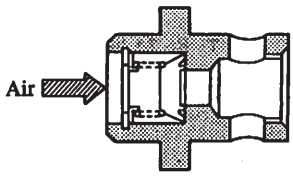
  Vacuum pump housing inner diameter:
  57.0 - 57.1 mm (2.244 - 2.248 in)

- Check rotor shaft opening and serrated end of rotor shaft for wear. If necessary, replace.
- Check valve locations and copper washers for bending or deformity. If necessary, replace.
- Check operation of valves. If necessary, replace.



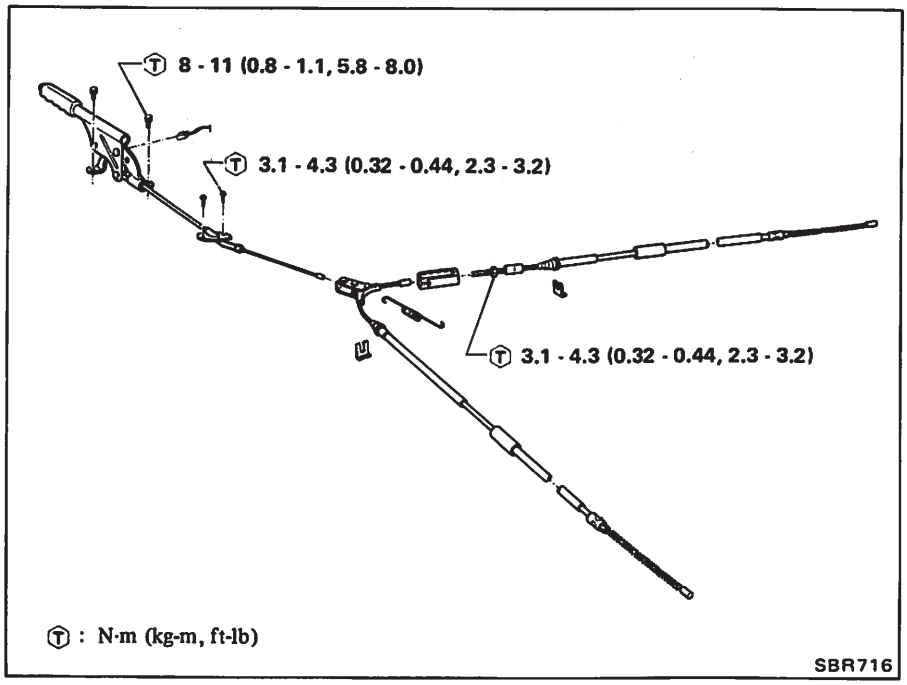
Checking operation of valve SBR194

Air pressure:
98 - 490 kPa (1 - 5 kg/cm², 14 - 71 psi)



Checking air leakage of valve SBR195

PARKING BRAKE

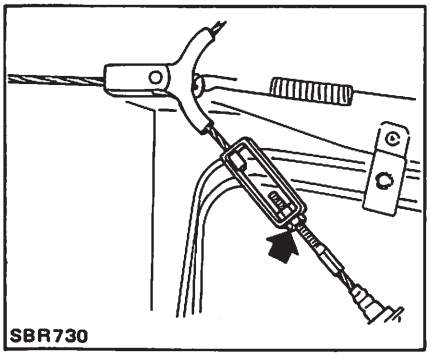


PARKING BRAKE CONTROL

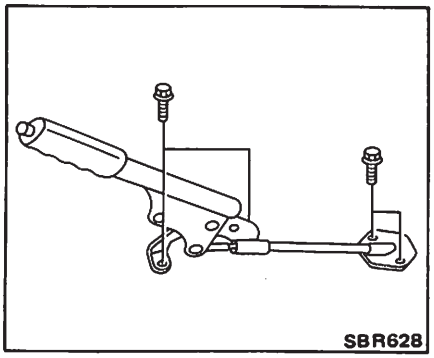
REMOVAL

Control lever and front cable

1. Separate equalizer and rear cable.

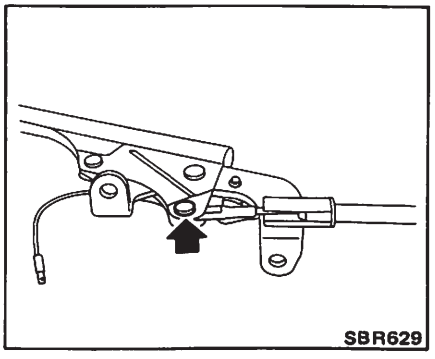


2. Remove center console.
3. Disconnect parking brake lamp switch harness connector.
4. Remove seat belt anchor bolts.
5. Remove control lever attaching bolts and front cable bracket attaching screws.



6. Remove front cable out through driver's compartment.
7. If necessary separate front cable from parking brake lever by breaking pin.

Front cable, clevis pin and cotter pin are available as service parts.



Rear cable

Refer to Adjuster (Rear drum brake –LT18–).

INSPECTION

1. Check control lever for wear or other damage. Replace if necessary.
2. Check wires for discontinuity or deterioration. Replace if necessary.
3. Replace malfunctioning warning lamp and switch.
4. Check parts at each connection and, if found deformed or damaged, replace.

INSTALLATION

Install parking brake control assembly following the reverse procedure of removal. Closely observe the following items:

When installing, apply a coat of grease to sliding contact surfaces.

T: Control lever to floor panel
8 - 11 N·m
(0.8 - 1.1 kg-m,
5.8 - 8.0 ft-lb)
Front cable to floor panel
3.1 - 4.3 N·m
(0.32 - 0.44 kg-m,
2.3 - 3.2 ft-lb)
Rear cable adjusting nut lock nut
3.1 - 4.3 N·m
(0.32 - 0.44 kg-m,
2.3 - 3.2 ft-lb)
Rear seat belt anchor bolt
24 - 31 N·m
(2.4 - 3.2 kg-m,
17 - 23 ft-lb)

SERVICE DATA AND SPECIFICATIONS (S.D.S.)

GENERAL SPECIFICATIONS

	Type	CL18B	AD20V
Front brake	Cylinder dia. mm (in)	48.1 (1.894)	51.1 (2.012)
	Pad width x thickness x length mm (in)	37.0 x 10.0 x 94.0 (1.457 x 0.394 x 3.701)	43 x 10 x 105 (1.69 x 0.39 x 4.13)
	Rotor outer dia. mm (in)	240 (9.45)	232 (9.13)
Rear brake	Type	LT18A	LT20A
	Cylinder dia. mm (in)	17.46 (11/16)	
	Lining width x thickness x length mm (in)	35.0 x 4.0 x 172.8 (1.378 x 0.157 x 6.803)	35 x 4.8 x 195 (1.38 x 0.189 x 7.68)
	Drum inner dia. mm (in)	180 (7.09)	203.2 (8)
Master cylinder inner dia. mm (in)		19.05 (3/4) Small 23.81 (15/16) Large	20.64 (13/16) Small 25.40 (1) Large
Brake booster type		G18	G20
Dual proportioning valve Split point kPa (kg/cm², psi) x reducing ratio		3,432 (35, 498) x 0.4	2,452 (25, 356) x 0.4

INSPECTION AND ADJUSTMENT

BRAKE PEDAL AND PARKING BRAKE

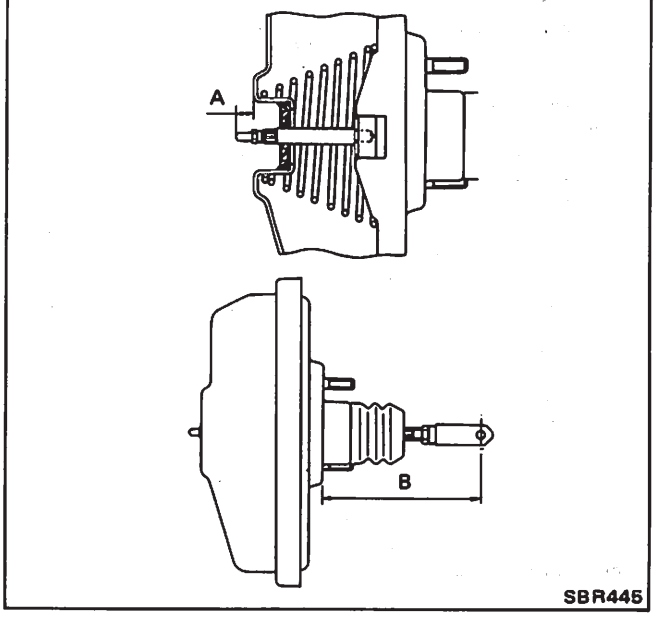
Refer to section MA.

CHECK VALVE

Maximum vacuum leakage [15 seconds after 66.7 kPa (500 mmHg, 19.69 inHg) pressure is applied] kPa (mmHg, inHg)	1.3 (10, 0.39)

BRAKE BOOSTER

Maximum vacuum leakage (15 seconds after engine is stopped) kPa (mmHg, inHg)	3.3 (25, 0.98)
Output rod length "A" mm (in)	10.275 - 10.525 (0.4045 - 0.4144)
Input rod length "B" mm (in)	150 (5.91)



FRONT DISC BRAKE

Unit: mm (in)

		CL18B	AD20V
Pad wear limit	Minimum thickness	2.0 (0.079)	
Rotor wear limit	Maximum runout	Less than 0.07 (0.0028)	
	Maximum parallelism	Less than 0.03 (0.0012)	
	Minimum thickness	More than 10.0 (0.394)	More than 16 (0.63)

REAR BRAKE

Unit: mm (in)

		CL18B	AD20V
Lining wear limit	Minimum thickness	1.5 (0.059)	
Drum wear limit	Maximum inner diameter	181.0 (7.13)	204.5 (8.05)
	Out-of-roundness	Less than 0.03 (0.0012)	
	Radial runout	Less than 0.05 (0.0020)	
	Taper [Measured at a point 45 mm (1.77 in) from inlet]	Less than 0.04 (0.0016)	

TIGHTENING TORQUE

Unit	N·m	kg-m	ft-lb
Pedal bracket to body	8 - 11	0.8 - 1.1	5.8 - 8.0
Brake booster to pedal bracket	8 - 11	0.8 - 1.1	5.8 - 8.0
Master cylinder to brake booster	8 - 11	0.8 - 1.1	5.8 - 8.0
Brake booster input rod lock nut	16 - 22	1.6 - 2.2	12 - 16
Stop lamp switch lock nut	12 - 15	1.2 - 1.5	9 - 11
Secondary piston stopper bolt			
TOKICO make	2.0 - 3.4	0.2 - 0.35	1.4 - 2.5
NABCO make	1.5 - 2.9	0.15 - 0.30	1.1 - 2.2
DP valve mounting bolt	4 - 5	0.4 - 0.5	2.9 - 3.6
Air bleeder	7 - 9	0.7 - 0.9	5.1 - 6.5
Brake tube flare nut	15 - 18	1.5 - 1.8	11 - 13
Brake hose connector	17 - 20	1.7 - 2.0	12 - 14
Disc brake baffle plate			
CL18B	3.2 - 4.3	0.33 - 0.44	2.4 - 3.2
AD20V	8 - 11	0.8 - 1.1	5.8 - 8.0
Torque member fixing bolt			
CL18B	54 - 64	5.5 - 6.5	40 - 47
AD20V	72 - 97	7.3 - 9.9	53 - 72
Cylinder body to torque member			
CL18B	22 - 31	2.2 - 3.2	16 - 23
AD20V	31 - 41	3.2 - 4.2	23 - 30
Disc rotor to wheel hub	25 - 33	2.5 - 3.4	18 - 25
Drum brake back plate			
LT18A	25 - 33	2.5 - 3.4	18 - 25
LT20A	22 - 26	2.2 - 2.7	16 - 20
Wheel cylinder to back plate	6 - 8	0.6 - 0.8	4.3 - 5.8

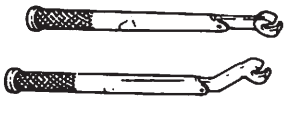
TROUBLE DIAGNOSES AND CORRECTIONS

Condition	Probable cause	Corrective action
Excessive pedal travel	Low brake fluid level or empty master cylinder reservoir.	Fill and bleed as necessary. Test for source of leakage by examining all lines, connections and wheel cylinder.
	Leakage in master cylinder.	Overhaul master cylinder.
	Deteriorated check valve.	Replace check valve and bleed system.
	Air in system.	Bleed system.
	Faulty brake adjustment.	Adjust shoe-to-drum clearance.
	Excessive lateral play on disc caused by loose or worn wheel bearings or steering parts.	Replace or adjust faulty parts.
Spongy pedal	Low fluid level in master cylinder.	Top with fluid and inspect for leakage.
	Air in system.	Correct as necessary.
	Faulty brake adjustment.	Adjust shoe-to-drum clearance.
	Reservoir filler cap vent hole clogged.	Clean and bleed system.
	Swollen hose due to deterioration or use of poor quality hose.	Replace hose and bleed system.
	Distorted brake shoes, or excessively worn or cracked brake drum.	Replace faulty parts.
	Soft or swollen caliper seals.	Drain hydraulic system, flush with alcohol and replace all seals.
	Use of a brake fluid with too low boiling point.	Replace with specified brake fluid and bleed system.
Poor braking effect	Fluid leakage in brake lines.	Check master cylinder, piping and wheel cylinder for leaks, and repair.
	Low brake fluid level or empty master cylinder reservoir.	Fill and bleed as necessary.
	Air in brake lines.	Bleed system.
	Excessive shoe-to-drum clearance.	Adjust.
	Grease, oil, mud or water on linings or pads.	Clean brake mechanism and check for cause of problem. Replace linings or pads.
	Deterioration of linings or pads.	Replace.
	Local fit of linings or pads.	Shave or replace.
	Linings or pads excessively worn.	Replace.
	Master cylinder or wheel cylinders in poor condition.	Repair or replace.
	Frozen or seized caliper pistons on disc brakes.	Disassemble caliper and free up as required.
	Binding mechanical linkage at brake pedal and shoes.	Free up as required.

Condition	Probable cause	Corrective action
Unbalanced brakes	Improper tire inflation.	Inflate to correct pressure.
	Improper adjustment of shoe-to-drum clearance.	Readjust.
	Grease, oil, mud or water on linings or pads.	Clean brake mechanism and check for cause of problem. Replace linings or pads.
	Mud in brake drum.	Clean.
	Deterioration of linings or pads.	Replace.
	Excessive wear of linings or pads.	Replace.
	Wheel cylinder in poor condition.	Repair or replace.
	Poor sliding condition of brake shoe.	Adjust.
	Looseness of cylinder body or back plate securing bolts/nuts.	Fasten or replace.
	Scored or out-of-round drums.	Recondition or replace brake drum as required. Check for improper lining contact with drum and grind lining if necessary.
	Sticking wheel cylinder cups.	Recondition or replace cylinder.
	Deformation of back plate.	Replace.
	Incorrect adjustment of wheel bearings.	Adjust.
	Incorrect adjustment of wheel alignment.	Adjust.
Brakes fade	Brake fluid has too low boiling point.	Drain and fill system with approved fluid.
	Use of improper linings or brake linings are contaminated.	Replace linings.
	Brake drums are out-of-round.	Repair or replace as necessary.
	Hydraulic connections, master cylinder and wheel cylinders are corroded or damaged.	Repair as necessary.
	Bleed screw is open.	Close screw and bleed system.
Brake chatters	Groove or out-of-round brake drum or rotor.	Grind or replace as required.
	Loose or bent support plate.	Tighten support plate bolts to specified torque, or replace plate.
	Distorted brake shoes or pads.	Replace as necessary.
	Grease or brake fluid on linings.	Replace linings.
Brake squeals	Dirty or scored brake drums.	Blow out assembly with compressed air or refinish drum.
	Distorted brake shoes or bent support plate.	Replace faulty unit.
	Weak or broken brake shoe retaining spring or return spring.	Replace if faulty.
	Glazed or contaminated brake lining.	Cam ground lining to eliminate glaze. If it does not, replace linings.
Brakes drag	Pedal linkage is binding or output rod adjustment is too long.	Lubricate linkage, check pedal return spring for condition and adjust output rod as necessary.

Condition	Probable cause	Corrective action
(Brakes drag)	Master cylinder compensator part is obstructed.	Blow out foreign matter with compressed air.
	Seized master cylinder piston.	Disassemble master cylinder and replace piston. Bleed system.
	Poor shoe condition.	Clean and repair.
	Poor wheel cylinder condition.	Repair or replace.
	Deformation of piston cups.	Replace.
	Poor condition of caliper because of faulty piston seals.	Replace piston seals.
	Excessive runout of rotor.	Turn rotor on lathe or replace.
	Parking brake will not return.	Check and repair.
	Clogged master cylinder return port.	Clean.
	Clogged brake lines.	Check and clean.
	Incorrect adjustment of wheel bearings.	Adjust.
	Improper shoe-to-drum clearance.	Inspect auto-adjuster operation.
	Weak shoe return springs.	Replace.
	No free travel in brake shoe return.	Adjust pedal height.
Pedal pulsates	Out-of-round or off-center drum.	Turn drum or replace as necessary.
	On disc brakes, lateral runout of brake rotor is excessive.	Check with dial indicator, turning disc by hand. If runout exceeds specifications, repair or replace disc.
	Excessive variation in thickness of brake rotor surfaces.	Measure around disc face with micrometer. Replace disc as required.
Rear lock (Under light brake pedal force)	Improper tire pressures.	Check and adjust.
	Excessive wear of tires.	Check and replace.
	Faulty DP valve.	Replace.
Rear lock (Under heavy brake pedal force)	Improper tire pressures.	Check and adjust.
	Excessive wear of tires.	Check and replace.
	Poor front braking effect.	
	• Grease, oil, mud or water on linings or pads.	Clean or replace.
	• Excessive wear of linings or pads.	Replace.
	• Local fit of linings or pads.	Shave or replace.
	• Master cylinder or wheel cylinder in poor condition.	Repair or replace.

SPECIAL SERVICE TOOL

Tool number (Kent-Moore No.)	Tool name
GG94310000 (–)	Flare nut torque wrench 

STEERING SYSTEM

SECTION ST

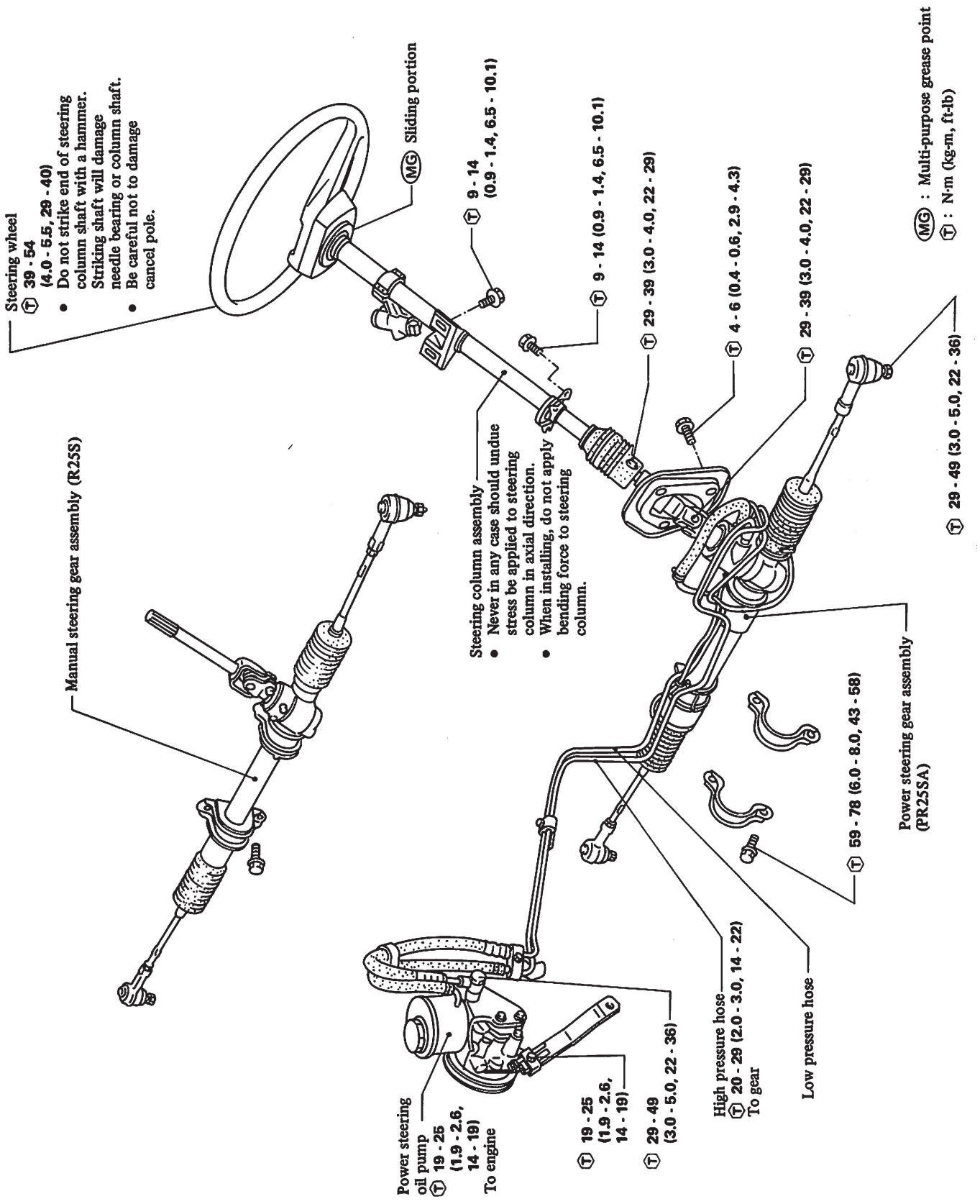
CONTENTS

Refer to section MA (Front Axle and Front Suspension) for:

CHECKING WHEEL ALIGNMENT

- Toe-in
- Front wheel turning angle

STEERING SYSTEM



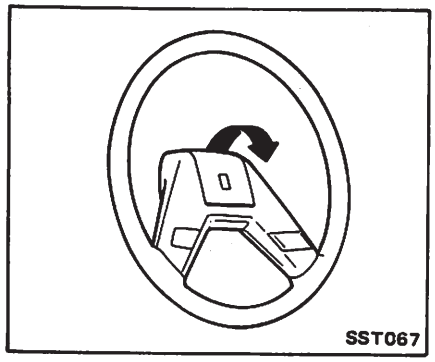
SST984

STEERING WHEEL AND COLUMN

STEERING WHEEL

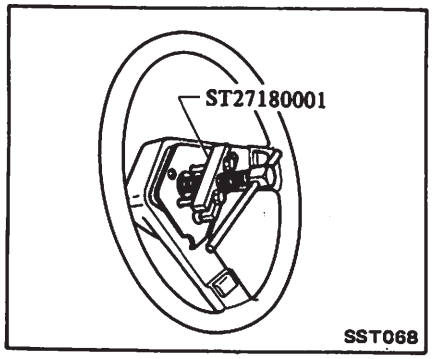
REMOVAL

1. Disconnect battery ground cable.
2. Remove horn pad and steering wheel nut.



3. Remove steering wheel using **Tool.**

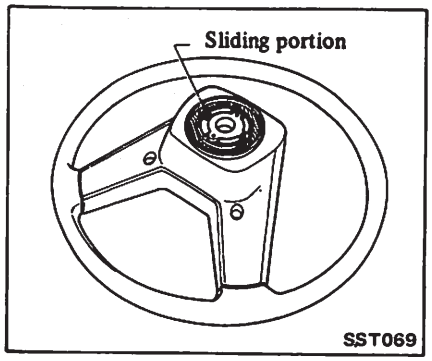
CAUTION:
Do not strike end of steering column shaft with a hammer. Striking shaft will damage bearing or column shaft.



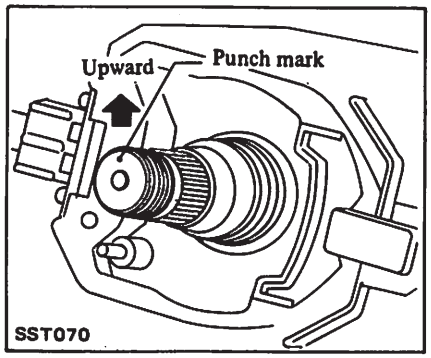
INSTALLATION

Install steering wheel in the reverse order of removal. Observe the following instructions.

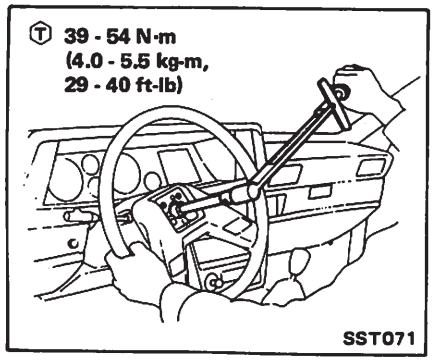
1. Apply grease to sliding portions.



2. Install steering wheel **on column shaft in a straight-ahead position.**



3. Tighten steering wheel nut.

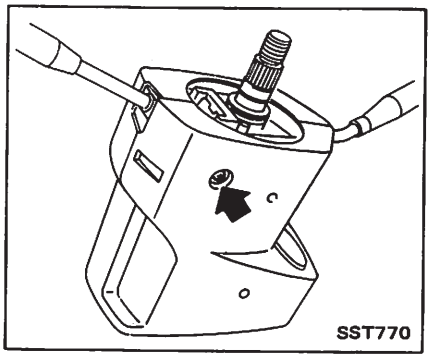


4. After installing steering wheel, **turn it clockwise and counterclockwise, checking for catch or drag. Also check horn operation.**

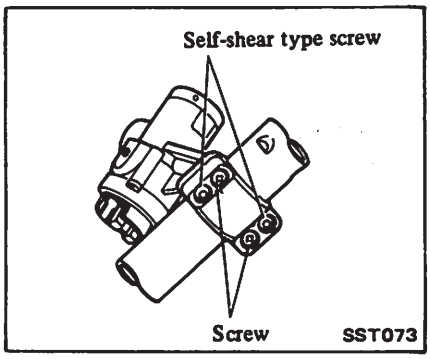
STEERING LOCK

REMOVAL

1. Remove steering wheel. Refer to Steering Wheel for removal.
2. Remove steering column shell cover.

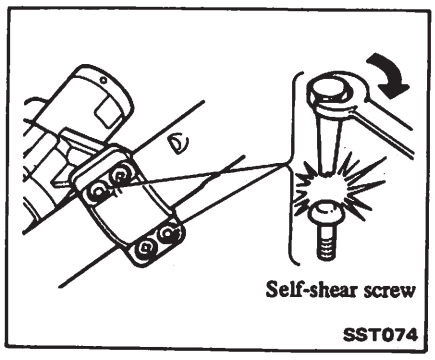


3. Break self-shear type screws **with a drill or other appropriate tool.**
4. Remove screws and disconnect steering lock.



INSTALLATION

1. Align steering lock hole in steering column tube with mating portion of steering lock.
2. Install screws and self-shear type screws and then cut off self-shear type screw heads.

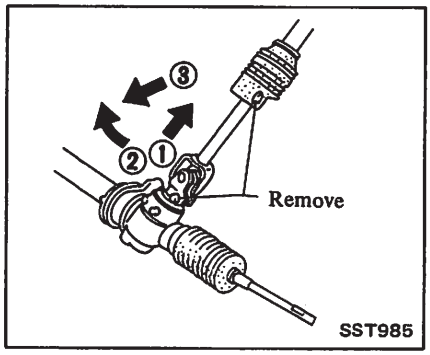


STEERING LOWER JOINT

REMOVAL

Remove steering lower joint.

If necessary, remove hole cover.

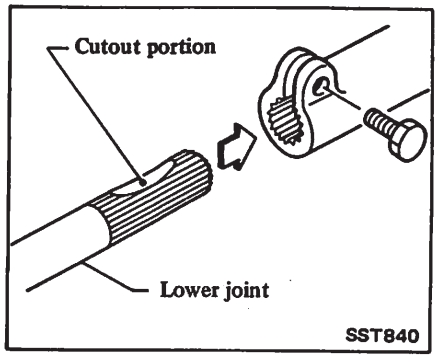


INSTALLATION

1. Set wheels in the straight ahead position.

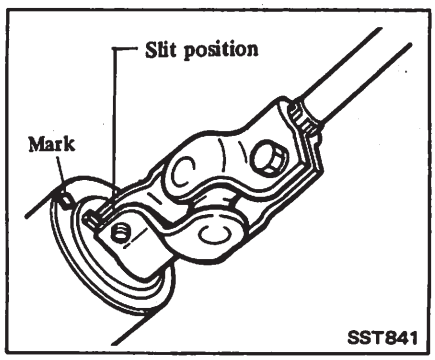
2. Fit steering lower joint into steering column.

- **Apply grease to portion where lower joint and hole cover make contact.**
- **When fitting, be sure tightening bolt faces cutout portion perfectly.**



3. Fit steering lower joint into steering gear.

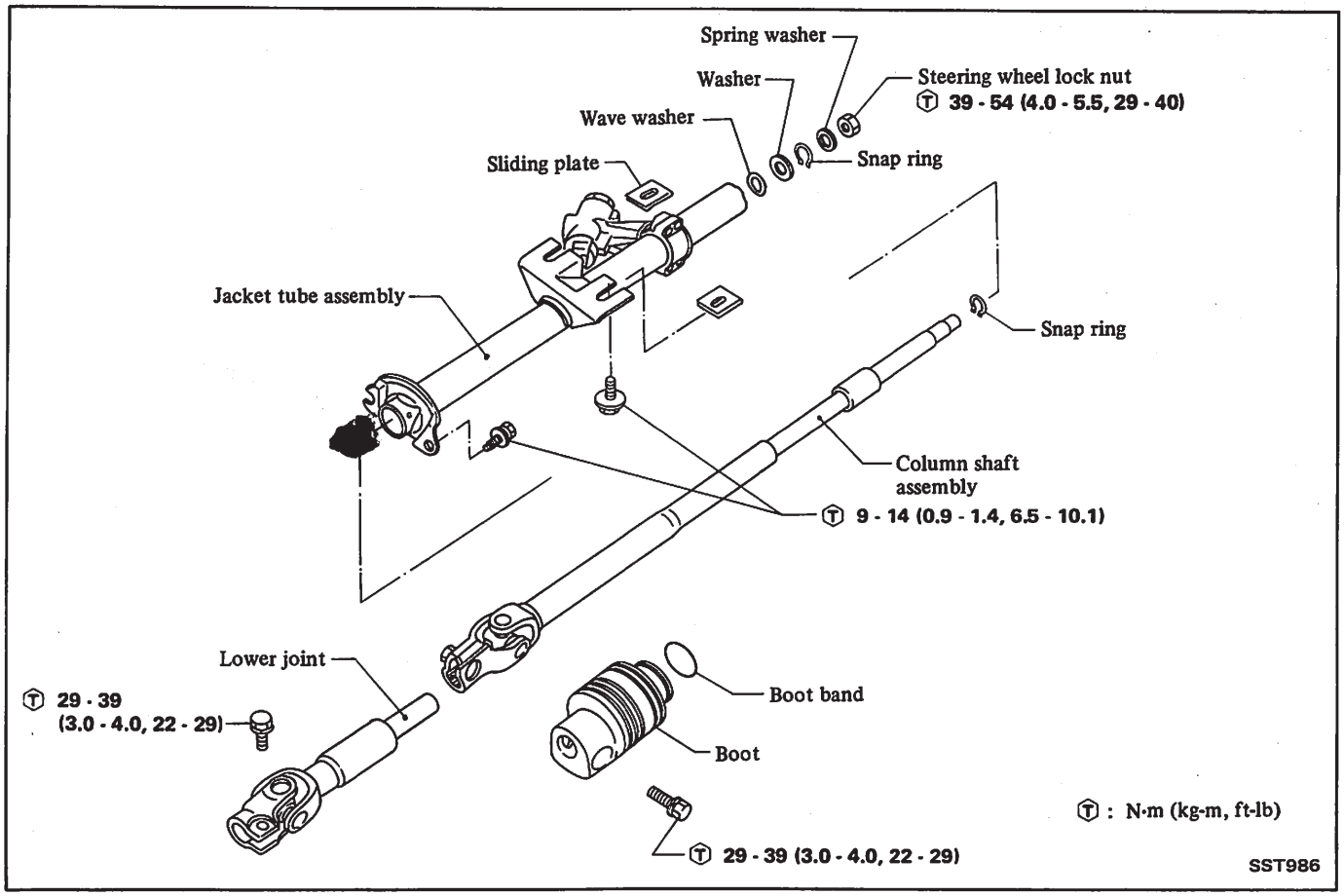
Ensure that slit position of steering lower joint is aligned with steering gear cap or spacer mark.



4. Install steering lower joint bolts.

Ⓣ : Lower joint to column
29 - 39 N·m
(3.0 - 4.0 kg-m,
22 - 29 ft-lb)
Lower joint to gear
29 - 39 N·m
(3.0 - 4.0 kg-m,
22 - 29 ft-lb)

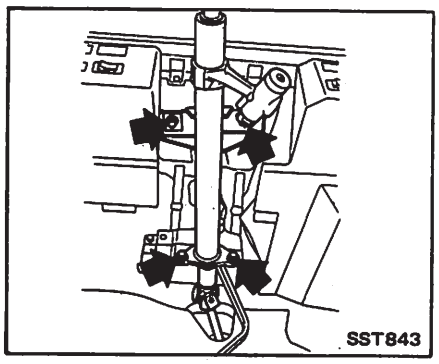
STEERING COLUMN



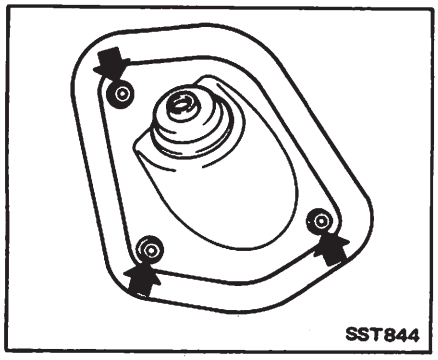
REMOVAL

1. Remove steering wheel. Refer to Steering Wheel for removal.
2. Remove steering lower joint. Refer to Steering Lower Joint for removal.
3. Remove steering column shell cover.
4. Remove combination switch assembly.
5. Remove heater ducts.
6. Draw out steering column assembly.

Be careful not to lose sliding plate.



7. Remove hole cover.



INSTALLATION

Install in the reverse order of removal.

- **Properly position sliding plate on steering column.**
- **Loosely tighten all lower bracket and clamp retaining bolts; then retighten them securely.**
- **After installing, turn steering wheel to make sure it moves smoothly and that the number of turns from the straight-forward position to left and right locks are equal.**

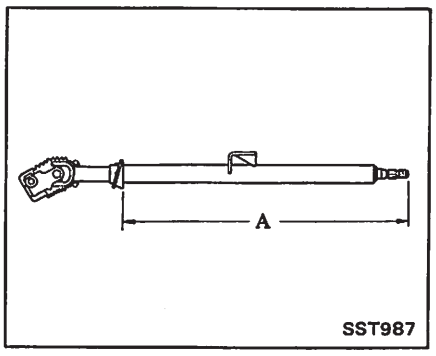
CAUTION
Make sure that undue stress is not applied to steering column.

Ⓣ : Lower bracket to pedal bracket
9 - 14 N·m
(0.9 - 1.4 kg-m,
6.5 - 10.1 ft-lb)
Steering column clamp
9 - 14 N·m
(0.9 - 1.4 kg-m,
6.5 - 10.1 ft-lb)

INSPECTION

1. When steering wheel can not be rotated smoothly, check the steering column for the following matters and replace faulty parts.
(1) Check column bearings for damage or unevenness. If so, lubricate with recommended multi-purpose grease or replace with a new one as steering column assembly
(2) Check jacket tube for deformation or breakage, and replace if necessary.
2. When the vehicle comes into light collision, check dimension "A". If they are not within specifications, replace steering column as an assembly.

Column length "A":
481.3 - 484.3 mm
(18.95 - 19.07 in)

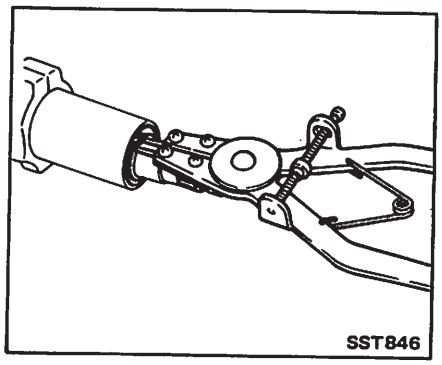


DISASSEMBLY AND ASSEMBLY

While disassembling and assembling, unlock steering lock with a key.

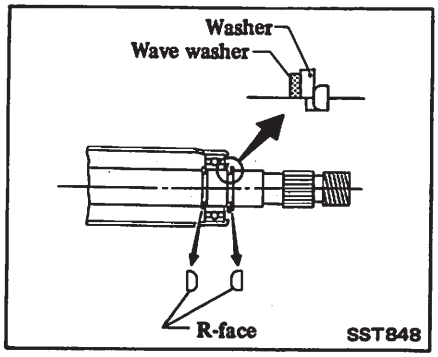
1. Remove snap ring, and then separate each part.

Do not reuse snap ring once it has been removed.

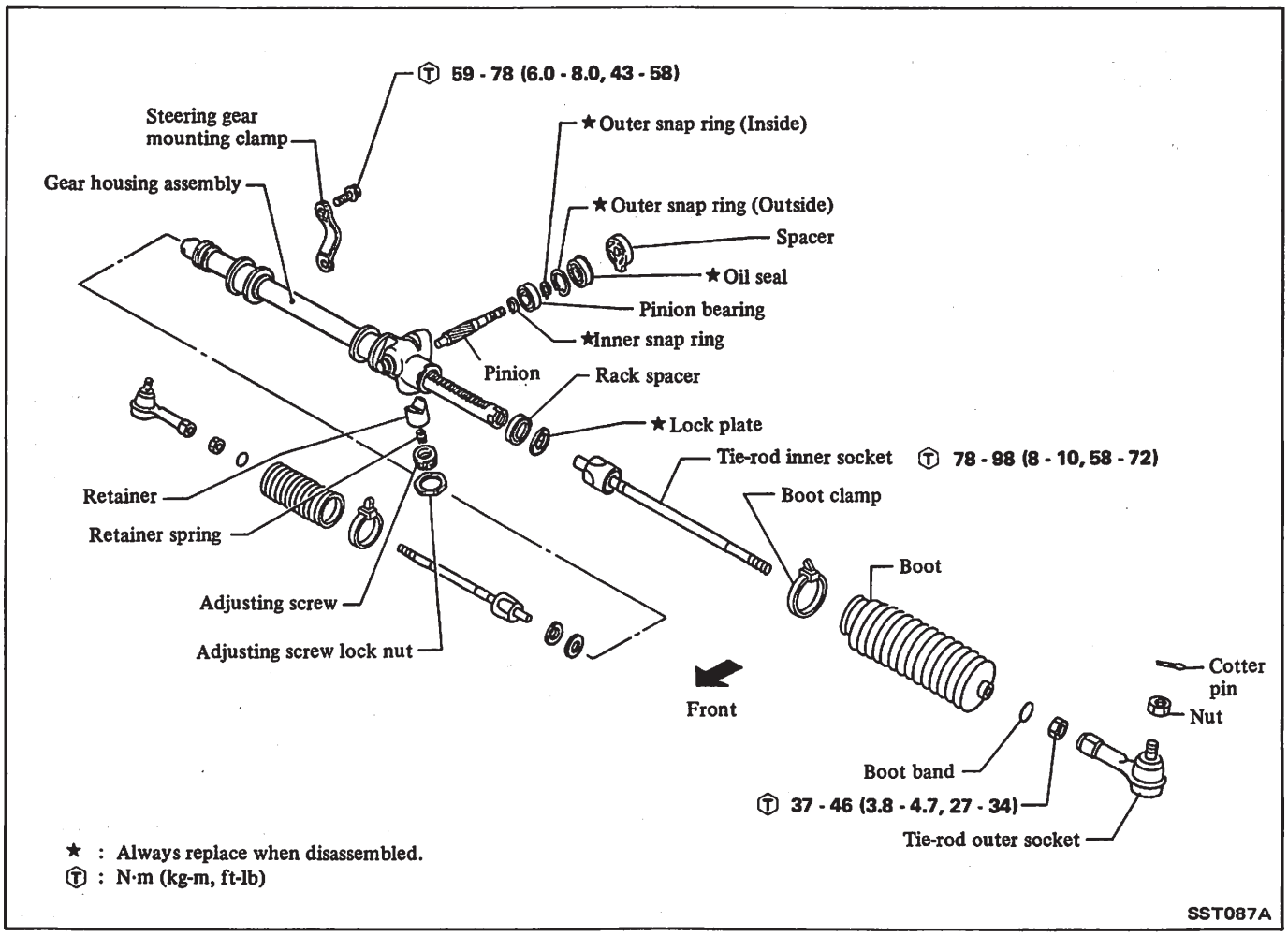


2. Assemble steering column, observing the following instructions.

a. **Apply grease to portion between steering column joint and joint cover.**
b. **Apply a coat of grease to column bearing and lower bushing.**
c. **Make sure that undue stress is not applied to column shaft in axial direction.**
d. **Ensure that rounded surface of snap ring faces toward bearing when snap ring is installed.**

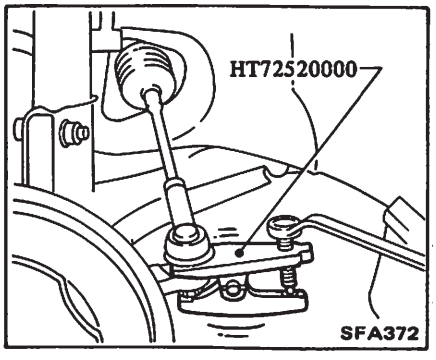


MANUAL STEERING GEAR (Model: R25S) AND LINKAGE

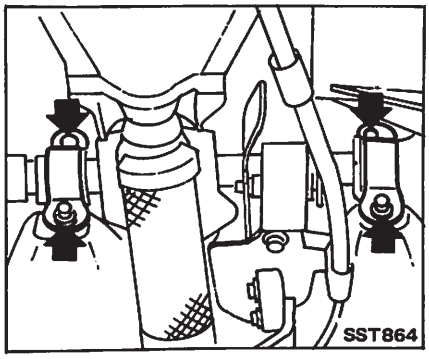


REMOVAL

1. Jack up front of vehicle and support it with safety stand.
2. Remove tie-rod from steering knuckle using Tool.



3. Loosen steering gear mounting bolts in advance to facilitate removal of lower joint.



4. Remove lower joint.

Refer to Steering Lower Joint for removal.

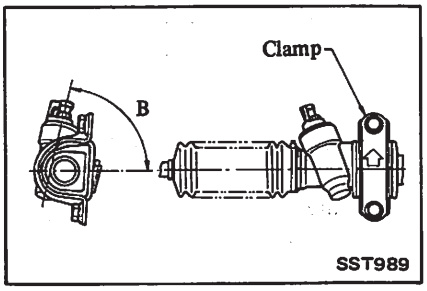
5. Remove bolts securing steering gear housing to body. Then remove steering gear and linkage assembly from vehicle.

INSTALLATION

Install steering gear and linkage in reverse order of removal.

- **Install both mounting rubber and clamp with arrow marks pointing upward.**

"B" angle: 76.5°

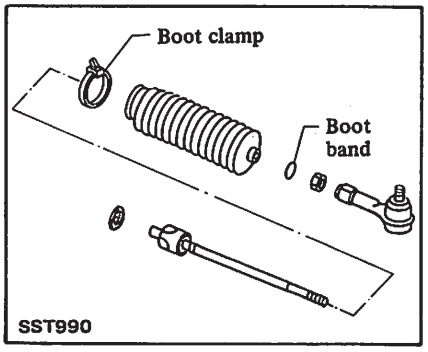


Ⓣ : Tie-rod to steering knuckle
29 - 49 N·m
(3.0 - 5.0 kg-m,
22 - 36 ft-lb)
Gear housing clamp bolt
59 - 78 N·m
(6.0 - 8.0 kg-m,
43 - 58 ft-lb)
Lower joint to pinion gear
29 - 39 N·m
(3.0 - 4.0 kg-m,
22 - 29 ft-lb)
Lower joint to steering column
29 - 39 N·m
(3.0 - 4.0 kg-m,
22 - 29 ft-lb)

Check wheel alignment, and if necessary adjust.
Refer to Section MA.

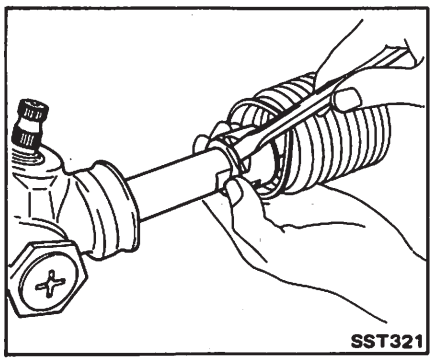
DISASSEMBLY

1. Clamp steering gear and linkage assembly in a vise using patches on steering gear housing to prevent scarring.
2. Remove boot clamps. (Both left and right)



3. Flatten lock plates.

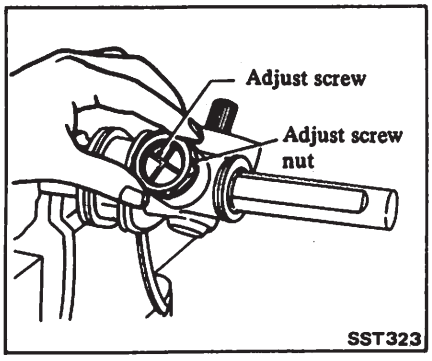
Always replace lock plate when disassembled.



4. Disconnect tie-rod inner socket. And remove tie rod assembly from rack.

CAUTION:
Do not disassemble inner socket assembly and outer socket assembly.

5. Loosen adjust screw lock nut and remove adjust screw.
Then take retainer spring and retainer out.



6. Remove oil seal from gear housing and **discard seal.**
7. Pry off snap ring from gear housing.

Discard snap ring once it has been removed.

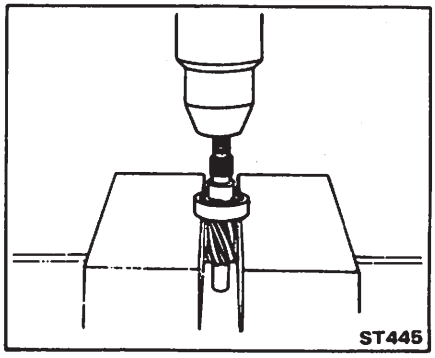
8. Draw pinion assembly out.
9. Draw rack out from gear housing.

Pinion gear

1. Pry off snap rings securing pinion bearing from the side of bearing.

Discard snap rings once they have been removed.

2. Press out bearing from pinion shaft.



INSPECTION

Thoroughly clean all parts in cleaning solvent, and blow dry with compressed air, if available.

Rack

Thoroughly examine rack gear. If rack gear is damaged, cracked or worn, replace.

Pinion

Thoroughly examine pinion gear. If pinion gear is damaged, cracked or worn, replace.

Tie-rod outer ball joint

Ball joint is assembled at factory and cannot be disassembled.
1. Check ball joint for play. If ball stud is worn and play in axial direction is excessive or joint is hard to swing, replace as a complete unit.

Tie-rod outer ball joint:
Swinging torque
0.3 - 2.9 N·m
(3 - 30 kg-cm,
2.6 - 26.0 in-lb)

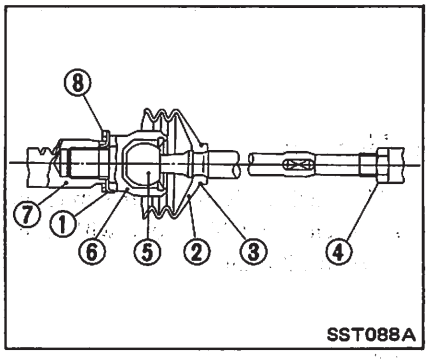
2. Check condition of dust cover. If it is cracked excessively, replace ball joint.

Tie-rod inner ball joint

Ball joint is assembled at factory and cannot be disassembled.

1. Check ball joint for play. If ball stud is worn and play in axial direction is excessive or joint is hard to swing, replace as a complete unit.

Tie rod inner ball joint:
Swinging torque
0.5 - 7.4 N·m
(5 - 75 kg-cm,
4.3 - 65.1 in-lb)
Axial play
0 mm (0 in)



1 Lock plate
2 Boot
3 Boot band
4 Lock nut
5 Inner ball joint
6 Inner socket
7 Rack
8 Rack spacer

2. Check condition of boot. If it is cracked excessively, replace boot.

Pinion bearing

Inspect bearings to see that they roll freely and are free from cracked, pitted, or worn balls, rollers and races. Replace if necessary.

Oil seal

Always replace oil seal at each disassembly.

ASSEMBLY AND ADJUSTMENT

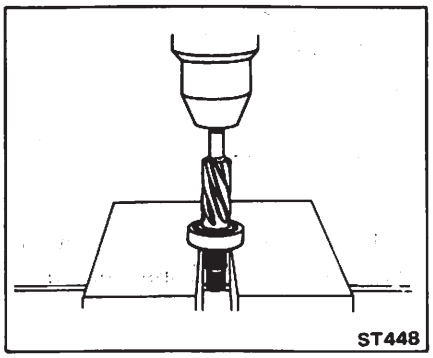
Assemble steering gear in reverse order of disassembly. Observe following instructions.

Rack and pinion

1. Install inside snap ring Ⓐ onto pinion gear.

Inside snap ring thickness:
1.19 - 1.24 mm
(0.0469 - 0.0488 in)

2. Press bearing onto pinion gear.

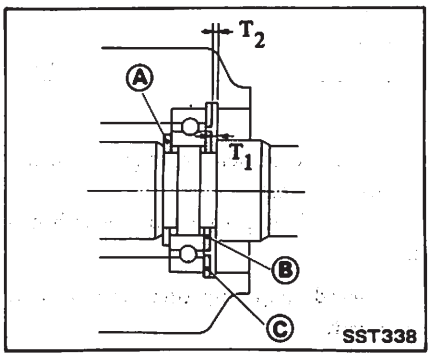


3. Install snap ring Ⓑ onto pinion gear.

Snap rings Ⓑ and Ⓒ should be of such thickness that axial play T_1 and T_2 is less than 0.1 mm (0.004 in).

To ensure proper axial play, select snap ring of proper thickness.

- **Pinion bearing outside snap ring: Refer to S.D.S.**
- **Snap rings should be fitted to grooves correctly.**

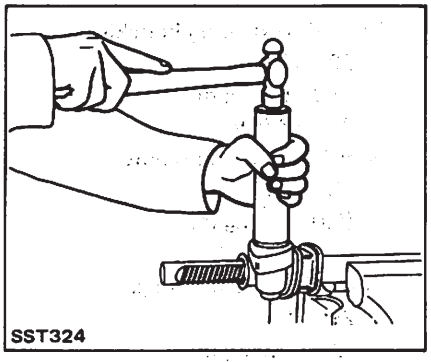


4. Clamp steering gear housing in a vise.

5. Sparingly apply recommended multi-purpose grease to toothed faces and friction surfaces of rack.
6. Insert rack gear from gear housing side.

- **Pay attention to direction of rack teeth.**

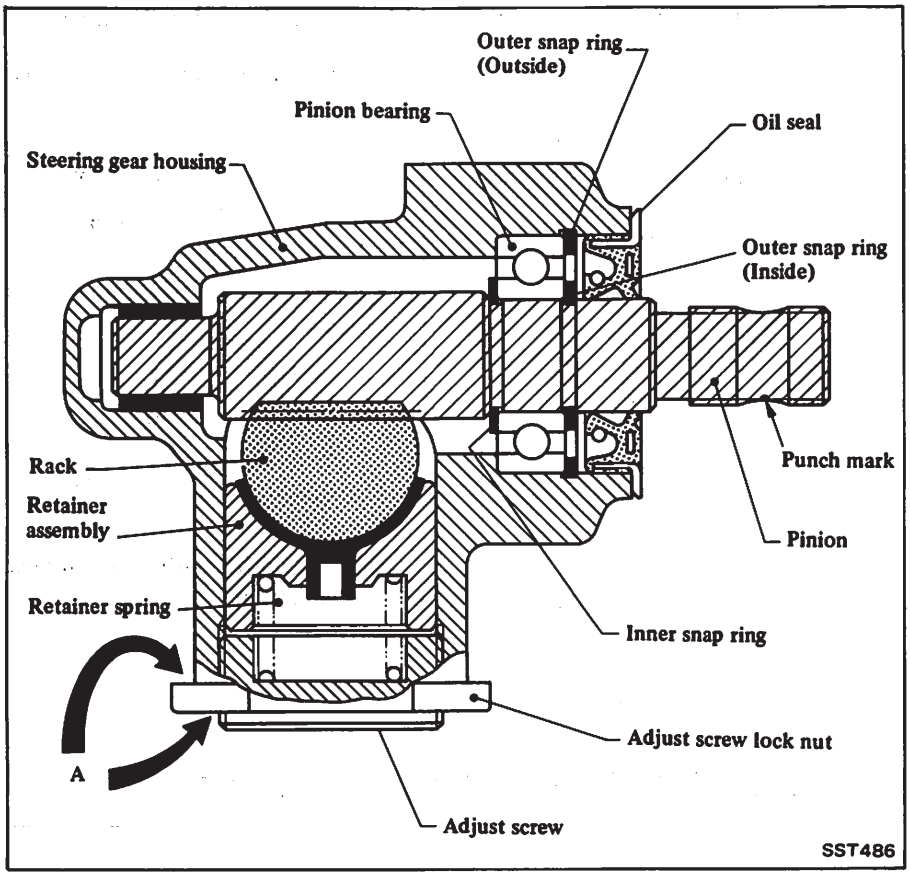
7. Properly mesh pinion with rack and insert pinion assembly into groove.
8. Make sure that rack protrudes by the same amount from both ends of housing.
9. Secure pinion bearing to gear housing with snap ring.
10. Fit new oil seal.



Pack sealing lips with multi-purpose grease.

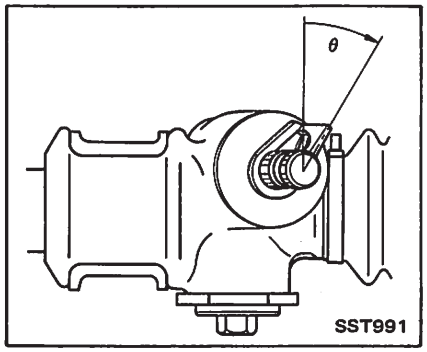
11. Make sure that pinion assembly rotates smoothly.
12. Apply an adequate amount of recommended multi-purpose grease to steering gear retainer.
13. Insert retainer and retainer spring into housing. Turn retainer adjust screw in, and install adjust screw lock nut.
14. Fully tighten adjust screw at 2.9 N·m (30 kg-cm, 26 in-lb) and then back it off 10° to 15° degrees.
15. Apply suitable liquid sealant around lock nut at "A" and tighten lock nut.

Ⓣ : 39 - 59 N·m
(4 - 6 kg-m,
29 - 43 ft-lb)



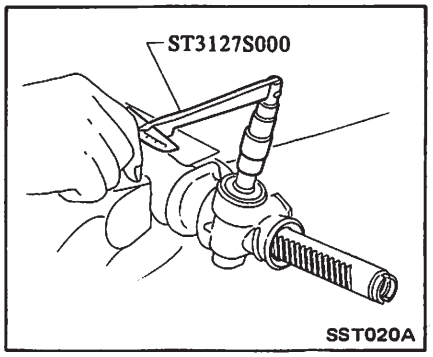
16. Set spacer at neutral position.

Spacer set angle "θ":
–38.3° - –25.3°

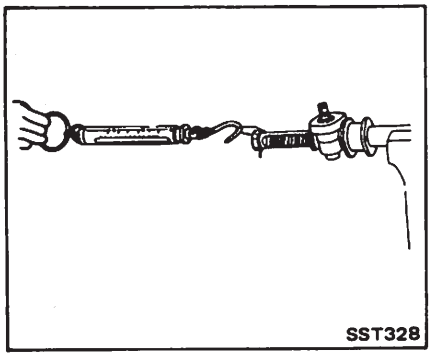


17. Upon completion of gear assembly, measure pinion rotating torque and rack starting force. Readjust retainer adjust screw as necessary.

Pinion rotating torque:
Less than 1.5 N·m
(15 kg-cm, 13 in-lb)



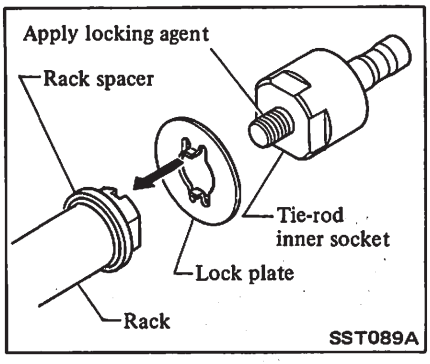
Rack starting force:
98 - 137 N
(10 - 14 kg, 22 - 31 lb)
in neutral position



Tie-rod and boot

1. Fit boot and boot band on tie rod inner socket.
2. Fit rack spacer to rack end (CD engine equipped model only).
3. Fit tie-rod inner socket to rack end together with new lock plate.

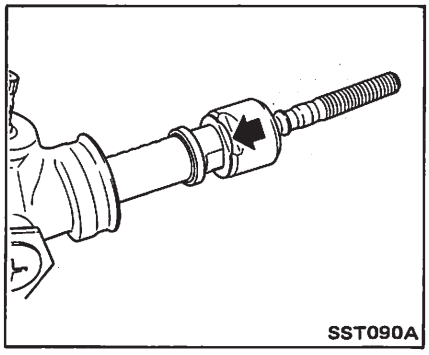
Be sure lock plate ratchet enters groove at end portion of rack.



4. After tightening tie-rod inner socket to specified torque, securely bend lock plate at 2 cutout portions of tie rod inner socket.

To prevent damage to boot, remove burrs after bending lock plate.

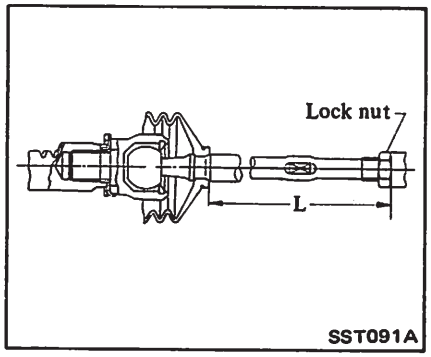
Ⓣ : 78 - 98 N·m
(8 - 10 kg-m,
58 - 72 ft-lb)



5. Fit lock nut and outer socket to inner socket, and tighten lock nut with tie rod length that has been set to the length specified.

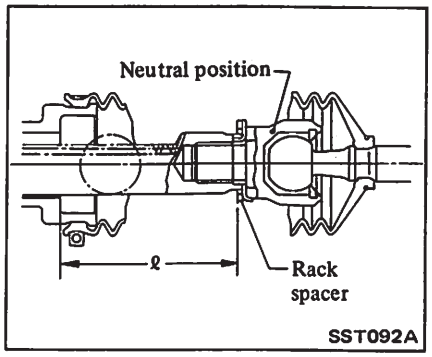
Ⓣ : 37 - 46 N·m
(3.8 - 4.7 kg-m,
27 - 34 ft-lb)

Tie-rod length "L":
175.9 mm (6.93 in)



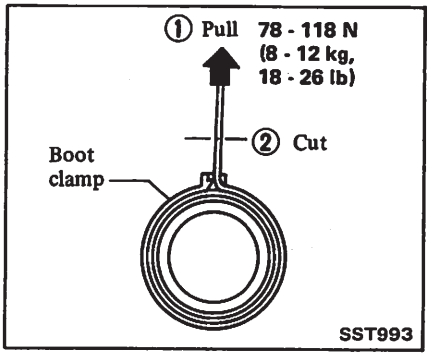
6. Measure rack stroke.

Rack stroke "ℓ" (both sides):
E engine equipped model (Without rack spacer)
73.5 mm (2.894 in)
CD engine and manual transaxle equipped model (With rack spacer)
70.0 mm (2.756 in)
CD engine and automatic transaxle equipped model (With rack spacer)
65.5 mm (2.579 in)



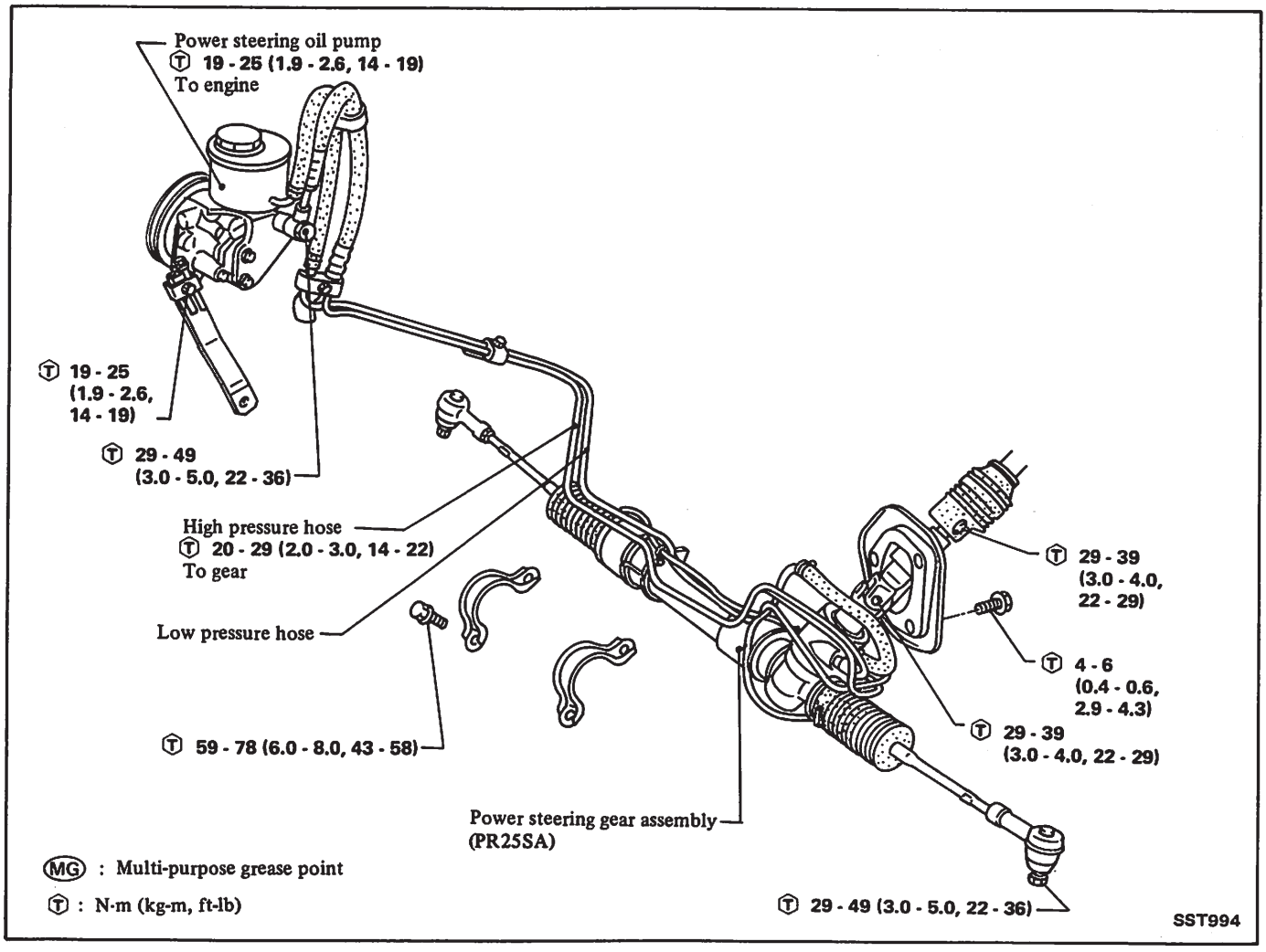
7. Install boot to gear housing, then tighten inside boot clamp securely.

Apply sealant between boot and gear housing.



Boot should be neither too inflated nor too elongated.

POWER STEERING SYSTEM (Model: PR25SA)



DESCRIPTION

POWER STEERING SYSTEM

The major components are as follows:

- Power steering pump
- Power steering gear and linkage
- Hydraulic piping

POWER STEERING GEAR AND OIL PUMP

The integral power steering gear and oil pump are an accurate hydraulic pressure mechanism.

Only the sealing parts can be replaced. The remaining parts must be replaced as an assembly.

CAUTION:

a. The parts which can be disassembled are strictly limited, and never disassemble other parts than the specified ones.
b. Disassembly should be performed in a place as clean as possible.
c. Hands should be cleaned before disassembly.
d. Do not use a rag. Be sure to use nylon or paper cloth.
e. Be sure to follow procedures and cautions indicated in the Service Manual.

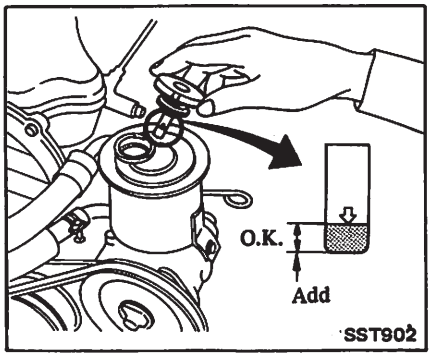
POWER STEERING SYSTEM

INSPECTION

Fluid level

1. Check the fluid level in reservoir by observing the dipstick when the fluid is cold. Add fluid as necessary to bring the level into the proper range on dipstick.

CAUTION:
Do not overfill.



2. Check fluid level and leakage.

Recommended fluid is Automatic Transmission Fluid "Dexron Type".
Refer to Section MA for "Recommended Lubricant".
Fluid capacity (With pump, each hose and steering gear assembly):
Approximately 0.9 ℓ
(1 US qt, 3/4 Imp qt)

Pump belt adjustment

Refer to Checking and Adjusting Drive Belts (Section MA) for drive belt tension.

Check fluid leakage

1. Run engine at idle speed or 1,000 rpm.
Make sure temperature of fluid in pump rises to 60 to 80°C (140 to 176°F).
2. Turn steering wheel to right-to-left several times.
3. Hold steering wheel at each "lock" position for five seconds and carefully check the following points for fluid leakage.

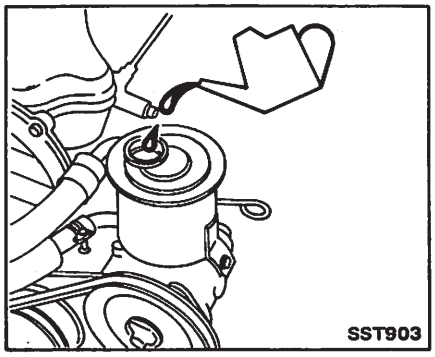
- Pinion housing
- Rear housing and rear cover
- Rack end (Both sides)
- Cylinder
- Pulley
- Suction pipe
- Connector
- Rear cover
- If fluid leakage at connectors is noticed, once loosen flare nut and then retighten.

CAUTION:
Do not hold steering wheel at lock position for more than fifteen seconds at a time.

Hydraulic system check

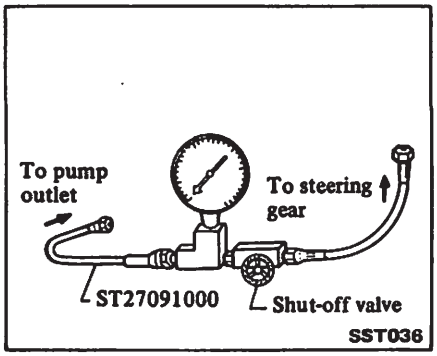
To determine whether problem is in steering gear or power steering pump, measure operating pressure.
Before conducting hydraulic system test, carefully check belt tension and condition of driving pulley.
Tires must be inflated to normal pressure.

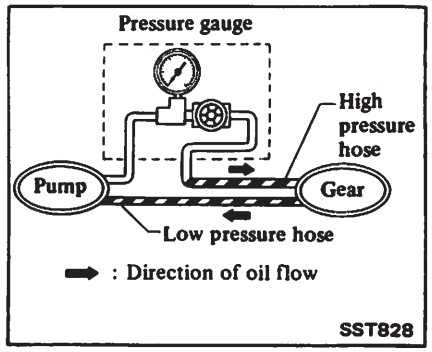
1. Check fluid level and fluid leakage, **adding fluid if necessary.**



2. Run engine.
Make sure temperature of fluid in pump rises to 60 to 80°C (140 to 176°F).
3. Stop engine.
4. Set **Tool.** And bleed air.

- **Gauge must be between shut-off valve and power steering pump.**
- **Use pressure Gauge Adapter KV48102500 when installing Pressure Gauge ST27091000.**





5. Open shut-off valve.
6. Check fluid level, **adding fluid if necessary.**
7. Run engine at idle **for 3 to 5 seconds.**
8. Stop engine and check fluid level, **adding fluid if necessary.**
9. Run engine and **check fluid level again, adding fluid if necessary.**
10. Turn steering wheel fully in left or right until fluid reaches operating temperature.

- **Be sure that all connections are tight.**
- **Expel any air from system.**

11. Check pressure **with steering wheel fully turned in left and right.**

CAUTION:
Do not hold steering wheel at lock position for more than fifteen seconds, as this would abnormally increase fluid temperature and cause undue gear and pump wear.

Pressure should be as follows:

Normal pressure:
5,198 - 5,786 kPa
(53 - 59 kg/cm^2, 754 - 839 psi) at idling

12. If oil pressure is abnormal, slowly close shut-off valve and check oil pressure to determine which part is faulty, as follows:

Pressure	Faulty part
Normal	Gear
Abnormal	Pump

CAUTION:
Do not close shut-off valve for more than fifteen seconds, as this would abnormally increase lubricant temperature and cause undue pump wear.

13. Replace any part that is faulty.

CAUTION:
The power steering system consists primarily of an accurate hydraulic pressure unit.
Any abnormality in one of this unit's parts will cause the other part(s) to malfunction, or the oil to deteriorate. Whenever faulty parts must be replaced, oil should be discarded and all other parts should be cleaned.

14. Open shut-off valve, pour fresh oil into and bleed air from power steering system, as outlined in the "Bleeding Hydraulic System" section.
15. **Repeat steps 10 through 14** above until oil pressure is normal.

After checking hydraulic system, remove Tool and add fluid as necessary, then completely bleed air out of system.

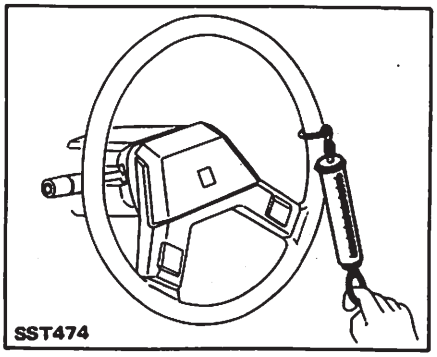
Steering wheel turning force check

1. Park vehicle on a level, dry surface and set parking brake firmly.
2. Bring power steering fluid up to adequate operating temperature. **[Approximately 60 to 80°C (140 to 176°F)].**

- **Fluid temperature can be warmed up more easily by idling engine and at the same time turning steering wheel from left to right for about two minutes. Alternatively, drive vehicle several miles.**
- **Tires must be inflated to normal pressure.**

3. Check steering wheel turning force when steering wheel has been turned 360° from straight-ahead position.

Steering wheel turning force:
19.6 - 29.4 N
(2.0 - 3.0 kg, 4.4 - 6.6 lb)



REMOVAL

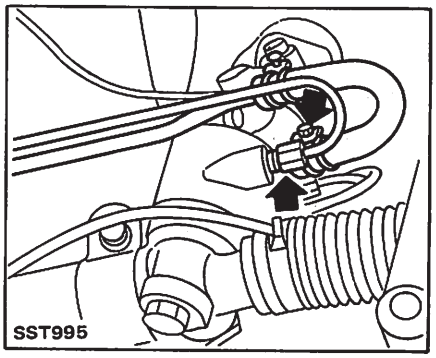
Power steering gear and linkage

CAUTION

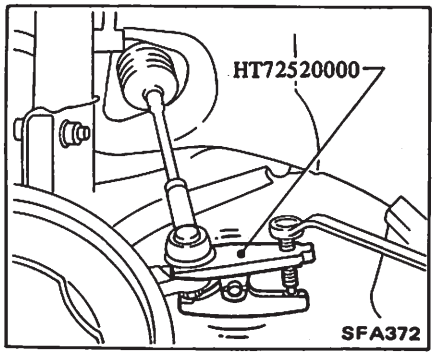
- **Whenever disconnecting hydraulic lines, cover openings to prevent foreign matter from entering.**
- **When installing or carrying power steering gear, be sure to hold gear, and not tube. When tube is held, it may be deformed or fluid will leak out from connector.**

1. Jack up front of vehicle and support it with safety stand.
2. Disconnect hose clamp.
3. Disconnect flare nut and hose at steering gear and drain fluid.

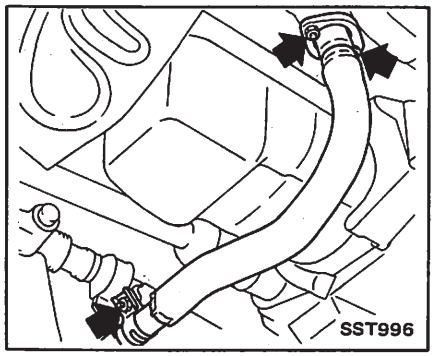
Be careful not to damage flare nut.



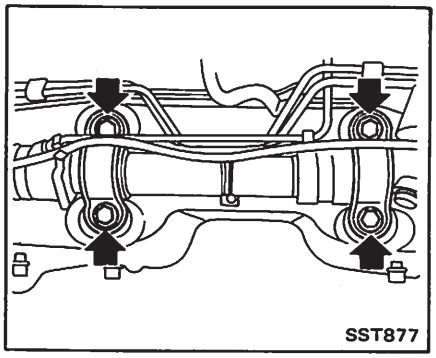
4. Remove cotter pins and nuts fastening tie-rod ball studs, and detach tie-rod ball studs from knuckle arms with Tool.



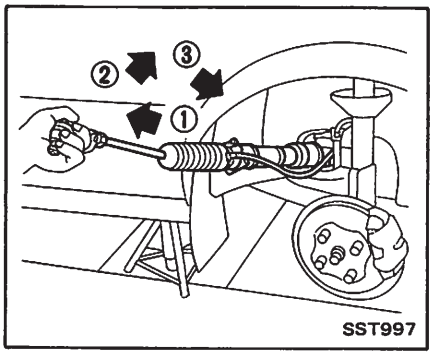
5. Support transaxle with a jack.
6. Remove exhaust tube.



7. Remove rear engine mounting.
8. Remove steering gear mounting bolts.



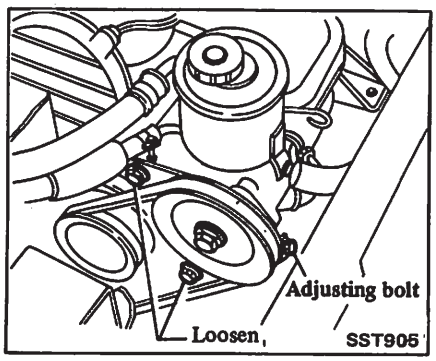
9. Remove steering lower joint.
Refer to Steering Lower Joint for removal.
10. Remove steering gear and linkage from vehicle.



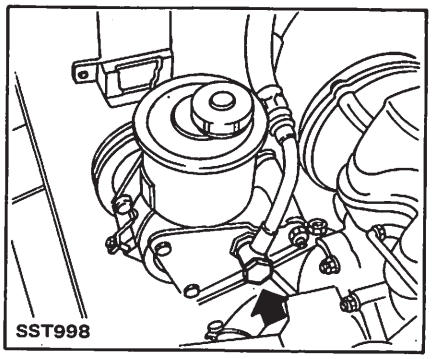
Oil pump and hoses

CAUTION:
Whenever disconnecting hydraulic lines, cover openings to prevent foreign matter from entering.

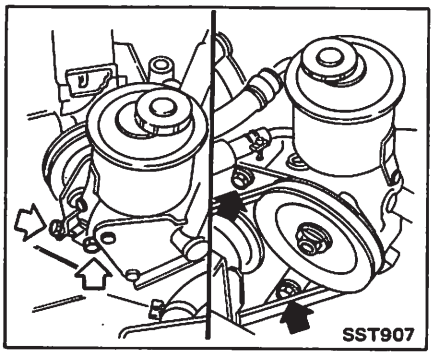
1. Loosen power steering pump adjusting bolt lock bolt.
2. Turn adjusting bolt counterclockwise to loosen pump belt.



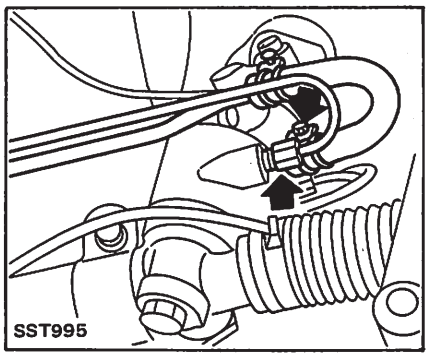
3. Remove power steering pump belt.
4. Disconnect pressure hose at power steering pump, and drain fluid. Then remove return hose clamp.



5. Remove power steering pump assembly.



6. Disconnect hoses on steering gear side.



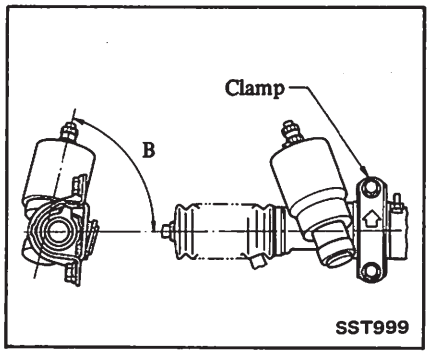
7. Disconnect hose clamp bolts and remove hoses from vehicle.

INSTALLATION AND ADJUSTMENT

Power steering gear and linkage

Install steering gear and linkage in the reverse order of removal.

- Install both mounting rubber and clamp with arrow marks pointing upward.



"B" angle: 70.7°

Ⓣ : Tie-rod to knuckle
29 - 49 N·m
(3.0 - 5.0 kg-m,
22 - 36 ft-lb)
Gear housing clamp bolt
59 - 78 N·m
(6.0 - 8.0 kg-m,
43 - 58 ft-lb)
High pressure hose to gear
20 - 29 N·m
(2.0 - 3.0 kg-m,
14 - 22 ft-lb)

Check wheel alignment, and if necessary adjust.

Refer to Section MA.

After installation is completed, fill fluid and bleed system.

Oil pump and hoses

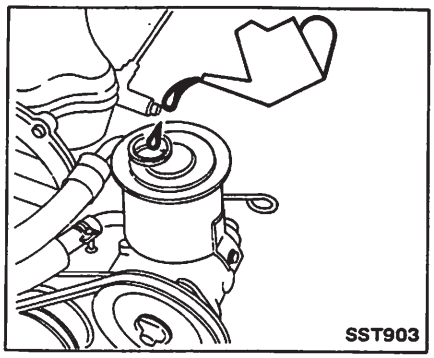
Install oil pump and hoses in the reverse order of removal.

Ⓣ : **High pressure hose to pump**
29 - 49 N·m
(3 - 5 kg-m,
22 - 36 ft-lb)
High pressure hose to gear
20 - 29 N·m
(2.0 - 3.0 kg-m,
14 - 22 ft-lb)
Pump mounting bolt
19 - 25 N·m
(1.9 - 2.6 kg-m,
14 - 19 ft-lb)

After installation is completed, fill fluid and bleed system.

Bleeding hydraulic system

1. Raise front end of car until wheels clear ground.
2. Quickly turn steering wheel **all the way to right and left ten times and lightly touch wheel stoppers.**
3. Check fluid level, **adding fluid if necessary.**
4. Run engine. **Make sure temperature of fluid in pump rises to 60 to 80°C (140 to 176°F) with a temperature indicator.**
5. Stop engine, **adding fluid if necessary.**



6. Run engine for 3 to 5 seconds.
7. Stop engine, **adding fluid if necessary.**
8. Quickly turn steering wheel **all the way to right and left ten times and lightly touch wheel stoppers.**
9. Check fluid level, **adding fluid if necessary.**
10. Start engine at idle.

Repeat steps 6 through 10 until air will be bled from pump.

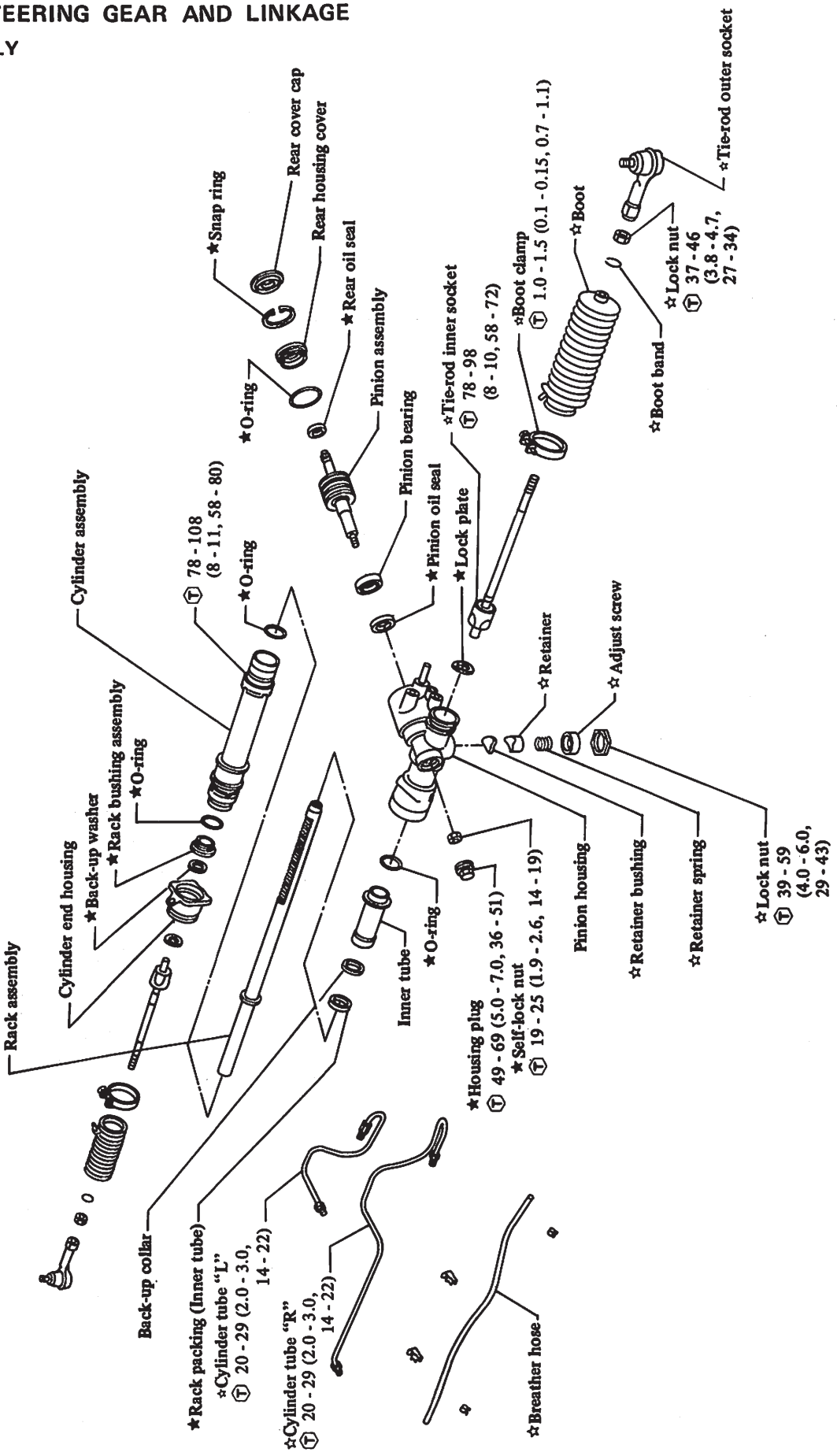
11. If air cannot be bled completely in steps 1 through 10, proceed as follows:

Turn steering wheel to right and left from lock to lock five to ten times. Carefully check fluid leakage with steering wheel held at each lock position for five seconds.

CAUTION:
Do not hold steering wheel at lock position for more than fifteen seconds at a time.

POWER STEERING GEAR AND LINKAGE

DISASSEMBLY



☆ or ★: are available for service replacement.
★: Always replace when disassembled.
Ⓣ: N·m (kg-m, ft-lb)

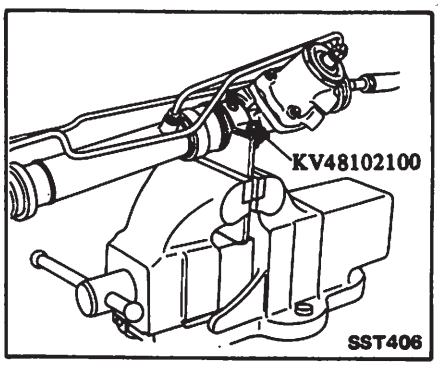
SST880

CAUTION:
When disassembling and reassembling, do not allow any foreign matter to enter or contact any parts of steering gear.

Measuring pinion rotating torque and rack starting force

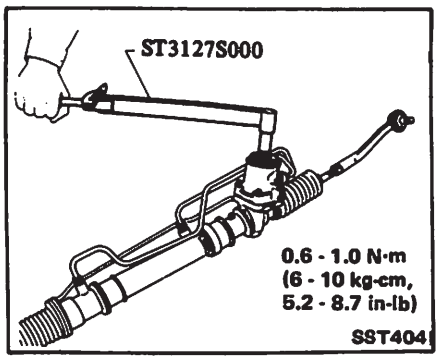
Prior to disassembling, measure pinion rotating torque and rack starting force. If they are not within specifications, adjust retainer adjust screw. **If adjustments cannot be made properly, replace steering gear assembly.**

Install steering gear on Tool KV48102100 in a vice.



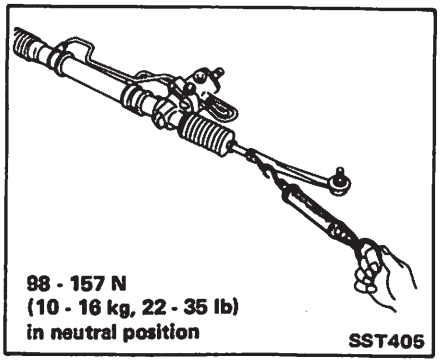
Before measuring, be sure to disconnect cylinder tube and drain fluid.

a. Pinion rotating torque



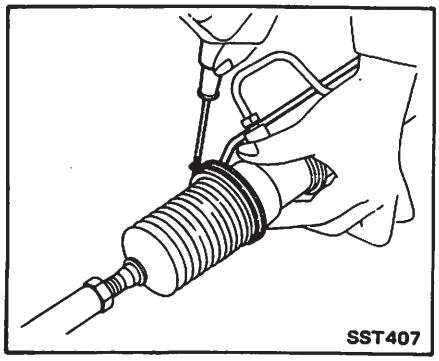
- **Pinion assembly can be turned by wrapping vinyl tape around serration area of stub shaft and fitting socket wrench.**

b. Rack starting force



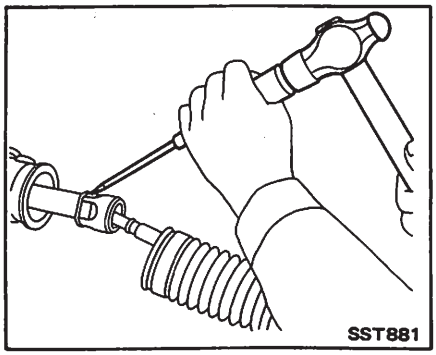
Tie-rod and breather hose

1. Install steering gear on Tool KV48102100 in a vice.
2. Remove boot clamp and then remove breather hose. (Both left and right)



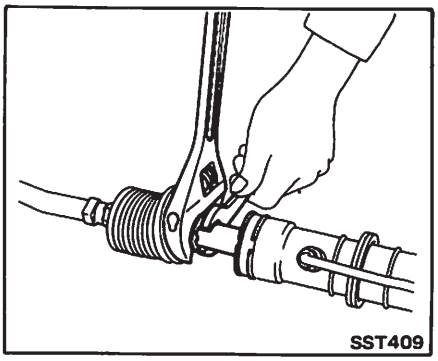
3. Flatten lock plate.

Always replace lock plate when disassembled.

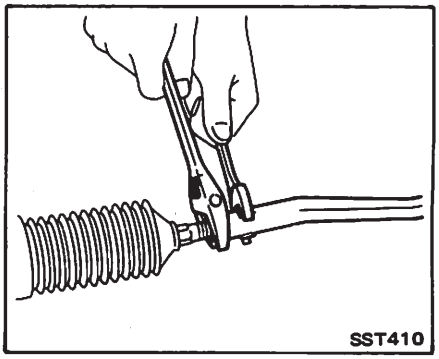


4. Disconnect tie-rod inner socket and remove tie-rod assembly from steering gear assembly.

Use a wrench of approximately 6 mm (0.24 in) in thickness which can be placed in the thickness across flats of rack.



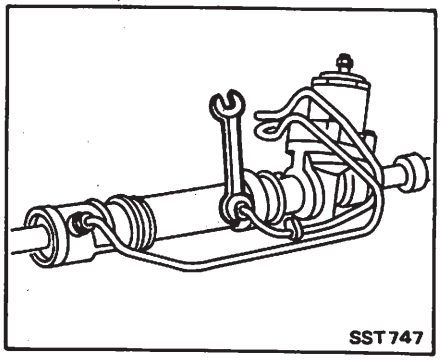
5. Remove tie-rod inner socket from tie-rod outer socket.



CAUTION:
Do not disassemble inner socket assembly and outer socket assembly.

Cylinder tubes

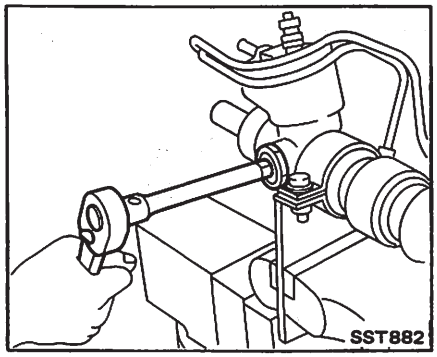
1. Install steering gear on Tool KV48102100 in a vice.
2. On cylinder tube "L", first disconnect flare nut at cylinder side and then the other one at pinion housing side.



3. Remove cylinder tube "R" in the same way.

Retainer

1. Install steering gear on Tool KV48102100 in a vice.
2. Loosen adjust screw lock nut and then remove retainer adjust screw. Take retainer out.

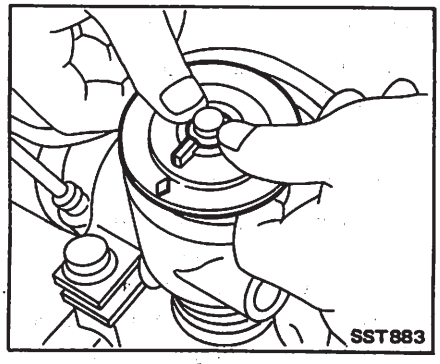


Rear cover oil seal and pinion oil seal

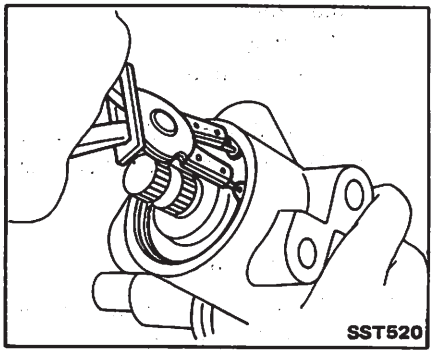
1. Install steering gear on Tool KV48102100 in a vice.
2. Remove retainer.

Refer to Retainer for disassembly.

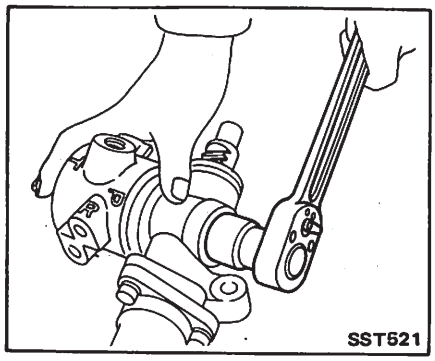
3. Remove rear cover cap.



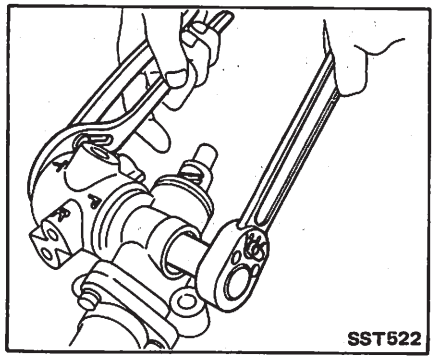
4. Remove snap ring and **discard.**



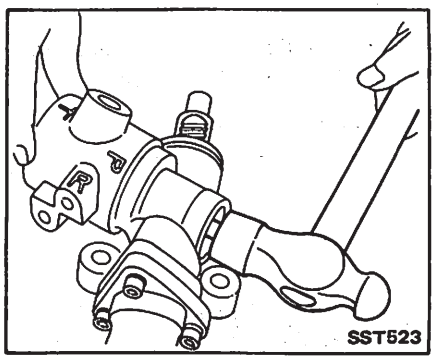
5. Remove housing plug and **discard.**



6. Remove self-locking nut and **discard.**

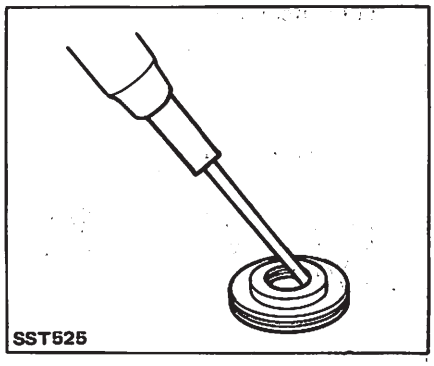


7. Draw pinion assembly out by **lightly** tapping it with a plastic hammer.

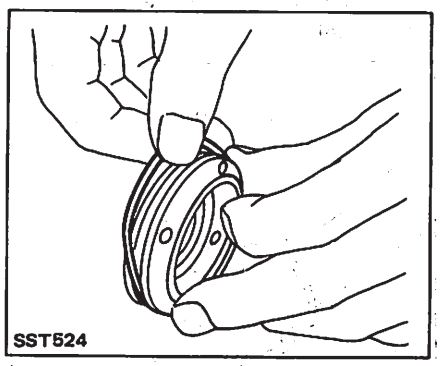


8. Separate rear housing cover from pinion and then remove rear oil seal using suitable tool.

Always replace oil seal when disassembled.

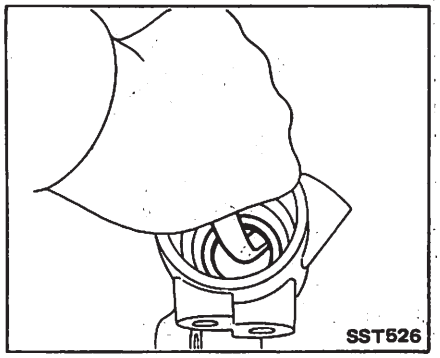


9. Remove O-ring and **discard.**



10. Remove pinion oil seal using suitable tool as necessary.

Always replace oil seal when disassembled.



Rack bush assembly
(Cylinder end housing)

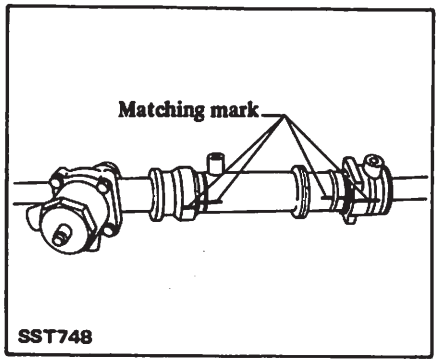
1. Install steering gear on Tool KV48102100 in a vice.
2. Remove tie-rod and breather hose.

Refer to Tie-Rod and Breather Hose for disassembly.

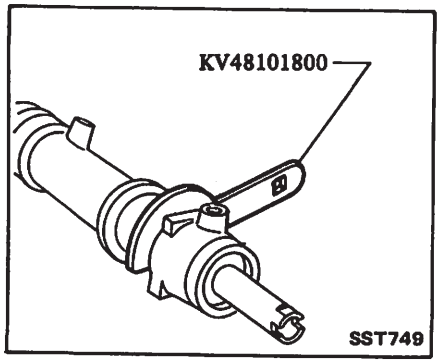
3. Remove cylinder tubes.

Refer to Cylinder Tubes for disassembly.

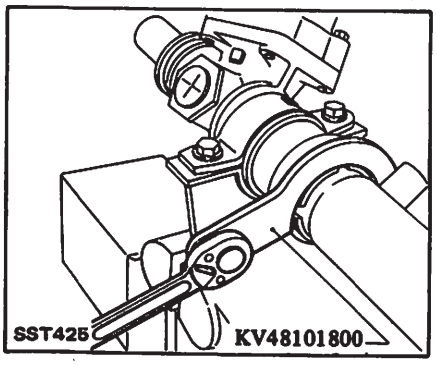
4. Put matching mark.



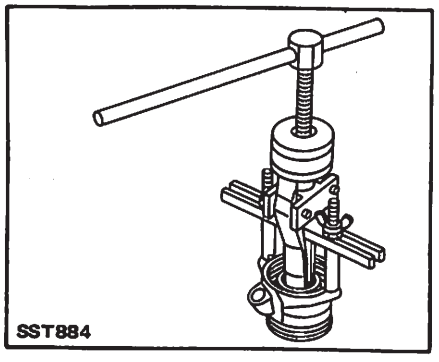
5. Remove cylinder end housing using Tool.



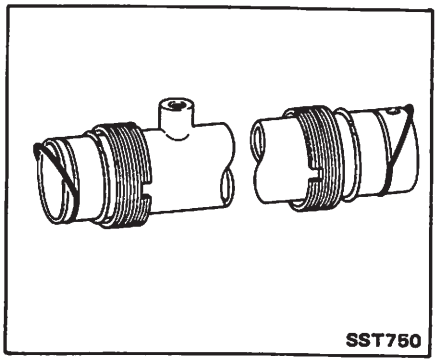
6. Disconnect cylinder lock nut using Tool and separate cylinder from pinion housing.



7. Remove rack bush assembly using suitable tool and **discard it.**



8. Remove cylinder O-rings and **discard.**



Rack packing (Inner tube)

1. Install steering gear on Tool KV48102100 in a vice.
2. Remove tie-rod and breather hose.

Refer to Tie-Rod and Breather Hose for disassembly.

3. Remove cylinder tubes.

Refer to Cylinder Tubes for disassembly.

4. Remove retainer.

Refer to Retainer for disassembly.

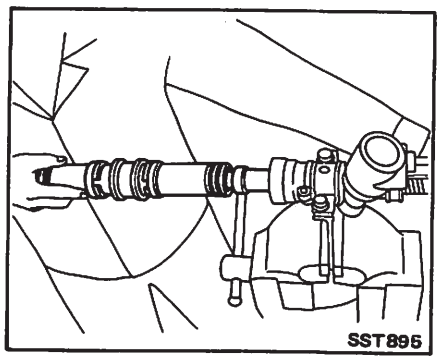
5. Remove cylinder end housing and cylinder assembly.

Refer to Rack Bush Assembly (Cylinder End Housing) for disassembly.

6. Remove pinion assembly.

Refer to Rear Cover Oil Seal and Pinion Oil Seal for disassembly.

7. Draw out rack assembly.

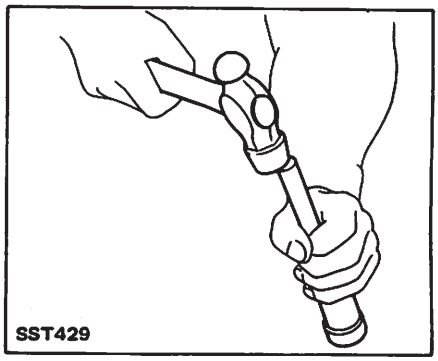


8. Remove inner tube assembly.
9. Remove O-ring from pinion housing.

Always replace O-ring when disassembled.

10. Remove rack packing and back-up collar using suitable tool.

Always replace rack packing when disassembled.



INSPECTION

Thoroughly clean all parts in cleaning solvent or automatic transmission fluid "Dexron Type", and blow dry with compressed air, if available.

Oil seals and O-rings

Always replace oil seals and O-rings when disassembled.

Snap rings

Always replace snap rings when disassembled.

Tie-rod outer ball joint

Ball joint is assembled at factory and cannot be disassembled.

1. Check ball joint for play. If ball stud is worn and play in axial direction is excessive or joint is hard to swing, replace as a complete unit.

Tie-rod outer ball joint:
Swinging torque
0.3 - 2.9 N·m
(3 - 30 kg-cm,
2.6 - 26.0 in-lb)

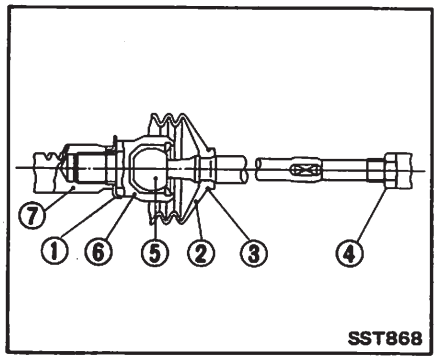
2. Check condition of dust cover. If it is cracked excessively, replace ball joint.

Tie-rod inner ball joint

Ball joint is assembled at factory and cannot be disassembled.

1. Check ball joint for play. If ball stud is worn and play in axial direction is excessive or joint is hard to swing, replace as a complete unit.

Tie-rod inner ball joint:
Swinging torque
0.5 - 7.4 N·m
(5 - 75 kg-cm,
4.3 - 65.1 in-lb)
Axial play
0 mm (0 in)



1 Lock plate
2 Boot
3 Boot band
4 Lock nut
5 Inner ball joint
6 Inner socket
7 Rack

2. Check condition of boot. If it is cracked excessively, replace boot.

Cylinder tubes and breather hose

Check cylinder tubes and breather hose for scratches or other damage. Replace if necessary.

Steering gear component parts

Thoroughly examine those component parts. If those parts are damaged, cracked or worn, replace as steering gear assembly.

ASSEMBLY AND ADJUSTMENT

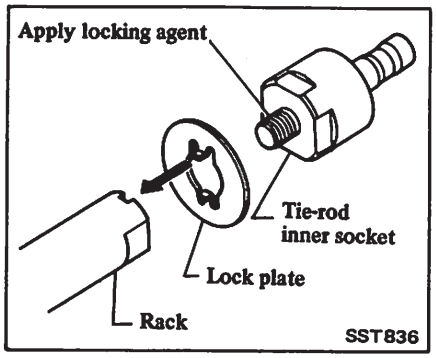
CAUTION:
a. When assembling power steering gear, apply a coat of automatic transmission fluid "Dexiron Type" as necessary.
b. Be careful not to damage or deform O-rings and oil seals when installing them.

Assemble power steering gear and linkage in reverse order of disassembly. Observe the following instructions.

Tie-rod and breather hose

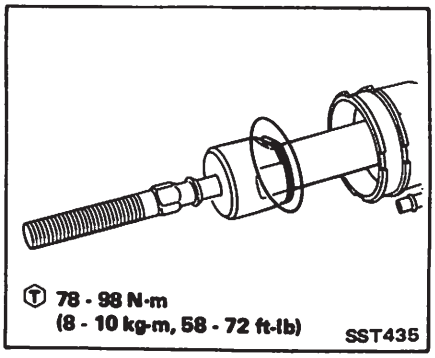
1. Apply locking agent to threaded portion of inner socket and fit inner socket to rack end together with new lock plate.

Be sure lock plate ratchet enters groove at end portion of rack so that rack and inner socket fit snugly.



2. Tighten inner socket and securely bend lock plate at 2 cut-out portions of inner socket.

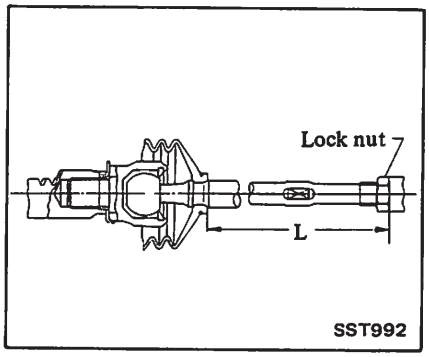
To prevent damage to boot, remove burrs after bending lock plate.



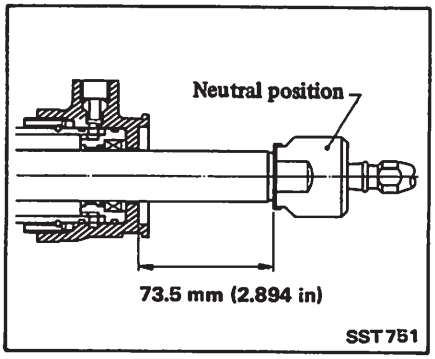
3. Fit lock nut and outer socket to inner socket, and tighten lock nut with the rod length that has been set to the length specified.

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

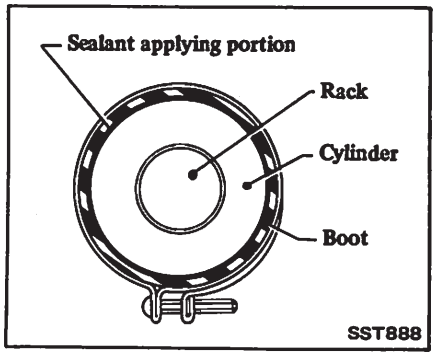
Tie-rod length "L":
175.9 mm (6.93 in)



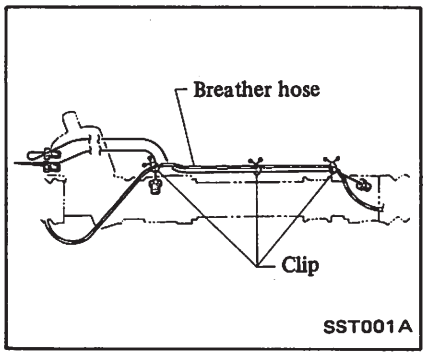
4. Measure rack stroke (both sides).

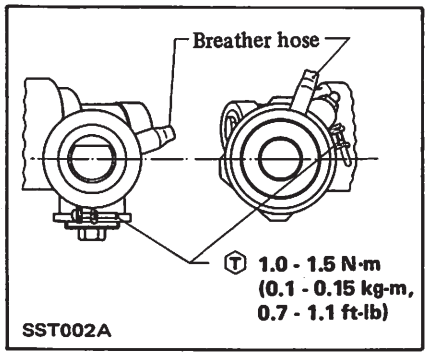


5. Apply a coat of sealant to contact surfaces between boot and cylinder before installing boot.



6. Set breather hose as shown below, and tighten boot clamp.



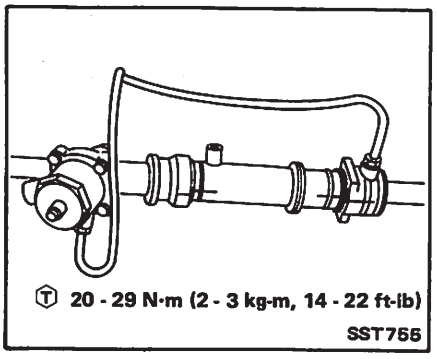


7. Upon completion of assembly, make sure that rack operates smoothly, that boot is not deformed, and that clamp is tightly in place.

Cylinder tubes

1. On cylinder tube "R", temporarily tighten flare nut at pinion housing side and then the other one at cylinder side. Finally tighten these nuts to specified torque.

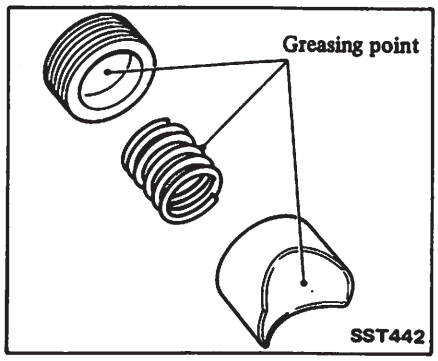
Be careful not to damage flare nut.



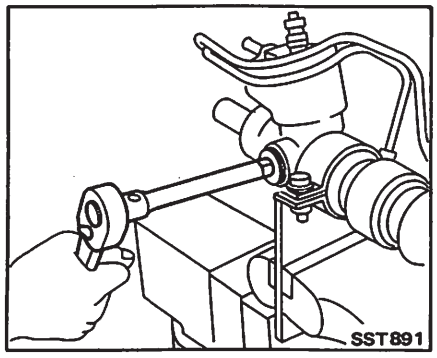
2. Install and tighten flare nuts for cylinder tube "L" in the same way.

Retainer

1. Apply a coat of grease to contact surfaces with rack, and install retainer to pinion housing.



2. Install retainer spring and fully tighten adjust screw at 2.9 N·m (30 kg-cm, 26 in-lb).

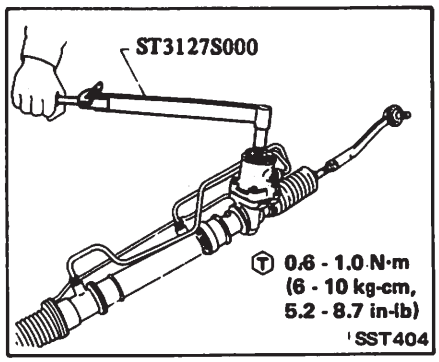


3. Turn back adjust screw 10 to 15° and tighten lock nut.

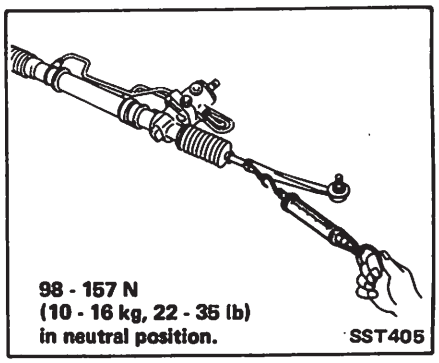
Ⓣ: **39 - 59 N·m**
(4 - 6 kg-m,
29 - 43 ft-lb)

4. Measure pinion rotating torque and rack starting force. If they are not within specifications, readjust.

a. Pinion rotating torque

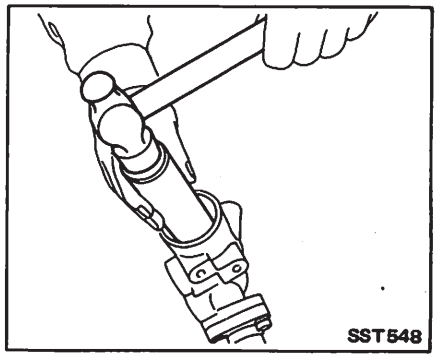


b. Rack starting force

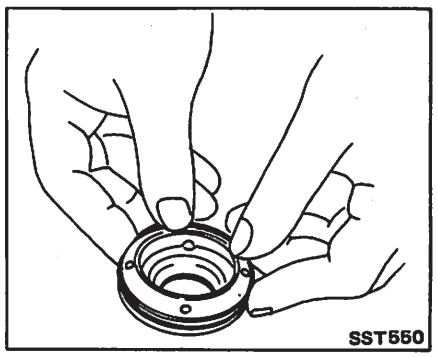


Rear cover oil seal and pinion oil seal

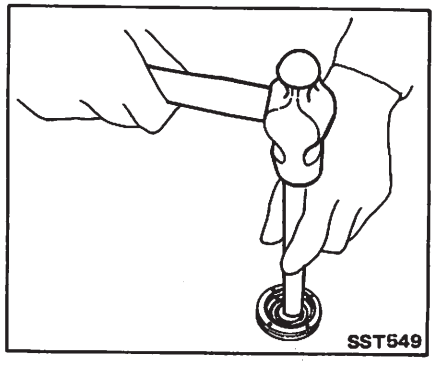
1. Install new pinion oil seal to pinion housing using suitable tool.



2. Apply a coat of automatic transmission fluid to new O-ring prior to installation.

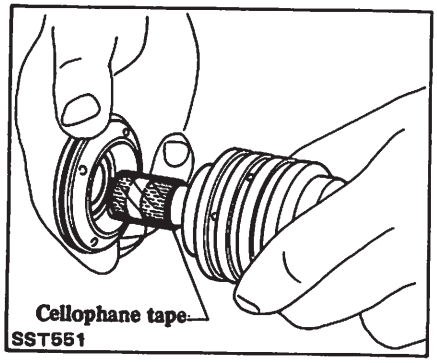


3. Apply a coat of automatic transmisstion fluid to new rear oil seal and install it to rear housing cover using suitable tool.



4. Install rear housing cover assembly to pinion.

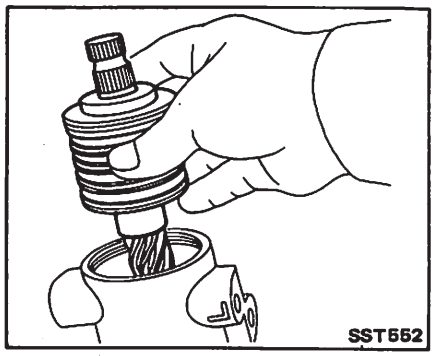
Wrap cellophane tape around pinion serrations to prevent oil seal from being damaged.



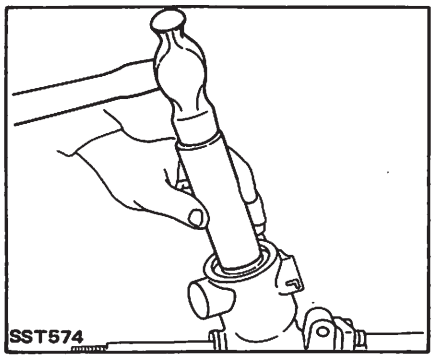
5. Install pinion assembly to pinion housing.

a. Apply a coat of grease to gear surfaces of pinion and rack.

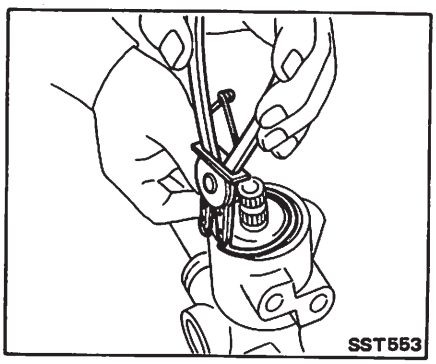
b. Be careful not to damage pinion teflon ring.



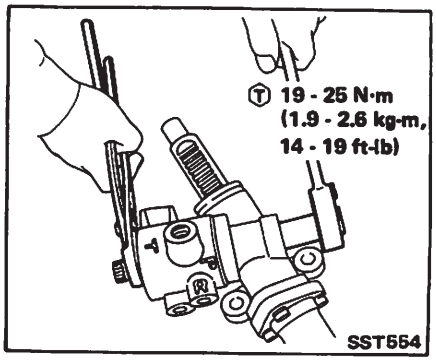
When installing pinion assembly, use suitable tool.



6. Install snap ring.



7. Tighten self-lock nut using suitable tool and wrapping pinion shaft serrations with a cloth to prevent pinion shaft from turning.

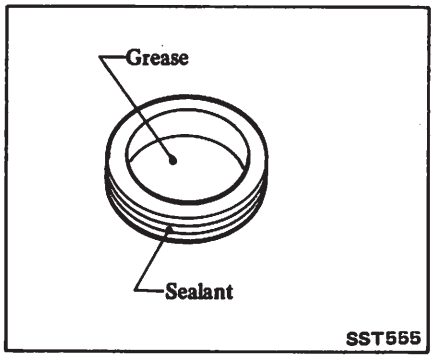


8. Install retainer and adjust pinion rotating torque.

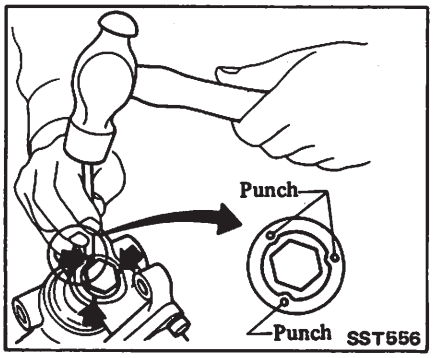
Refer to Retainer for assembly.

9. Apply grease to housing plug, coat its threads with sealant, and tighten plug.

T : 49 - 69 N·m
(5 - 7 kg-m,
36 - 51 ft-lb)

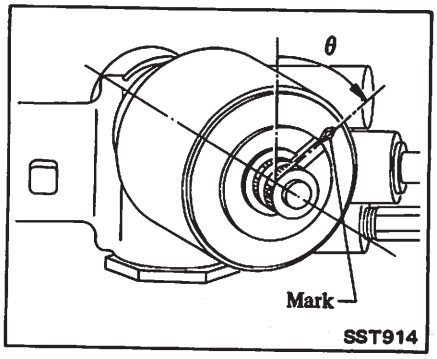


10. Stake housing plug at three places with a punch.



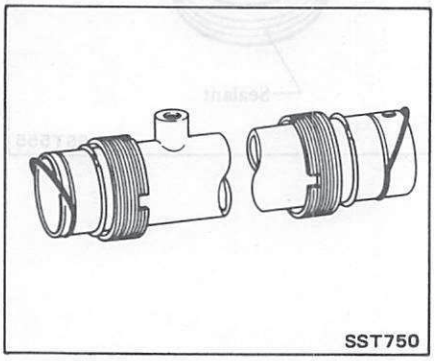
11. Set rear cover cap at neutral position.

Rear cover set angle "θ":
−39° - −29°



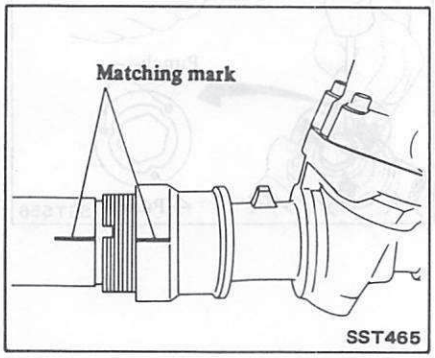
Rack bush assembly
(Cylinder end housing)

1. Apply a coat of automatic transmission fluid to new O-ring before installing it on cylinder.

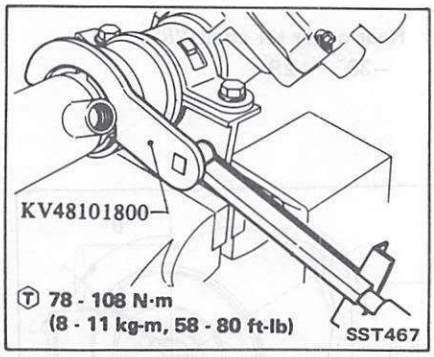


2. Position cylinder on pinion housing by aligning matching marks.

Be careful not to damage piston teflon ring.

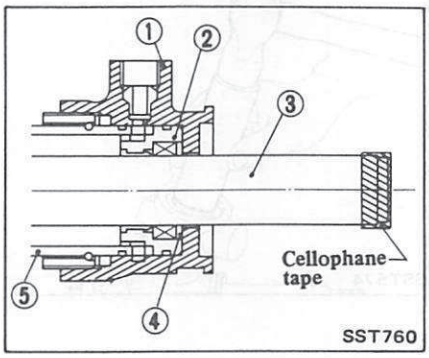


3. Tighten cylinder lock nut using Tool.



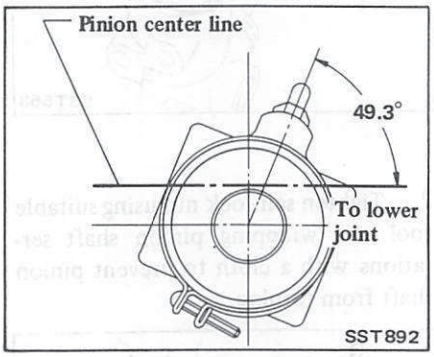
4. Wrap cellophane tape around rack end. Then place a new rack bush assembly and back-up washer onto rack end. Next align cylinder end housing at matching marks.

Apply a coat of grease to rack.

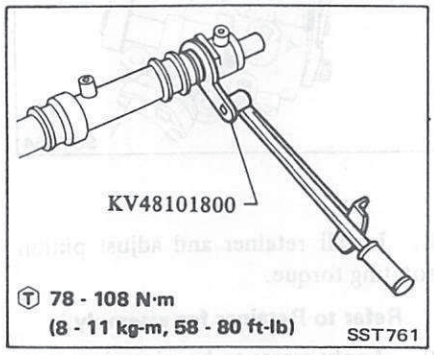


1 Cylinder end housing
2 Rack bush assembly
3 Rack
4 Back-up washer
5 Cylinder assembly

If matching marks are not present, position cylinder end housing as follows:



5. Tighten cylinder end housing using Tool.



6. Install cylinder tubes.

Refer to Cylinder Tubes for assembly.

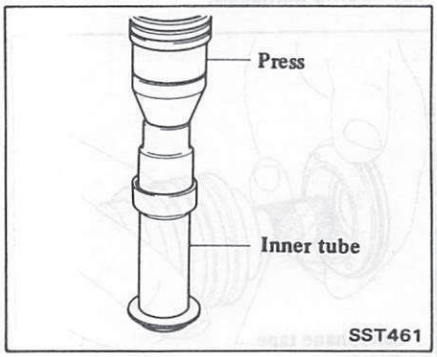
7. Install tie-rod and breather hose.

Refer to Tie Rod and Breather Hose for assembly.

Rack packing (Inner tube)

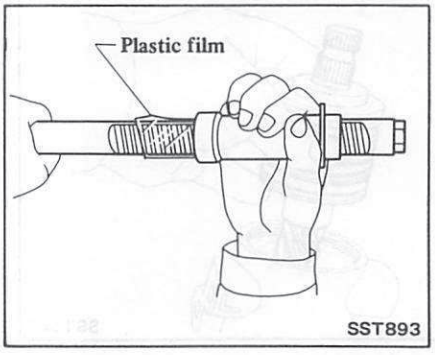
1. Apply a coat of automatic transmission fluid to new O-ring when installing it to pinion housing.
2. Attach back-up collar to inner tube and press new rack packing into place, using a suitable tool.

Pressing force:
Less than 5,884 N
(600 kg, 1,323 lb)

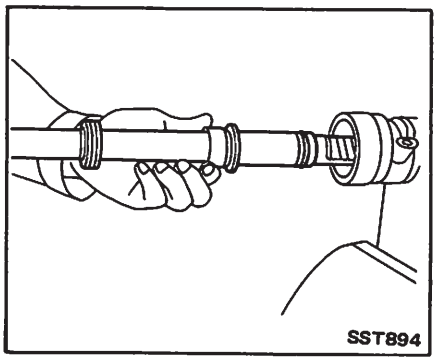


3. Insert inner tube assembly.

- **Place plastic film on inner side of rack packing to prevent damage by rack teeth.**
- **Always remove plastic film after rack packing is positioned properly.**



4. Insert rack assembly, and then set inner tube assembly to pinion housing.



5. Install pinion assembly.

Refer to Rear Cover Oil Seal and Pinion Oil Seal for assembly.

6. Install cylinder and rack bush assembly.

Refer to Rack Bush Assembly (Cylinder end housing) for assembly.

7. Install retainer and adjust pinion rotating torque.

Refer to Retainer for assembly.

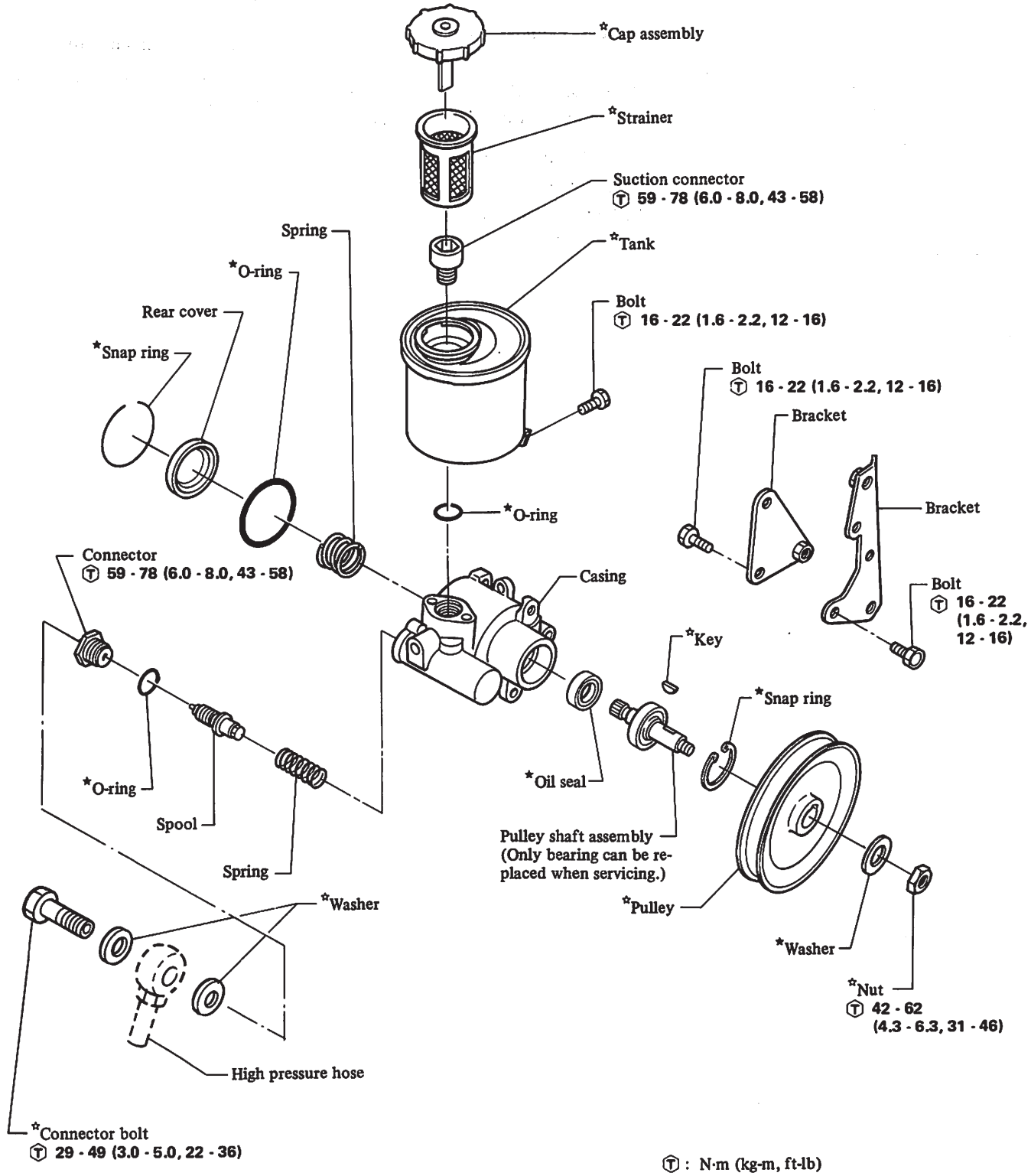
8. Install cylinder tubes.

Refer to cylinder Tubes for assembly.

9. Install tie-rod and breather hose.

Refer to Tie-Rod and Breather Hose for assembly.

POWER STEERING OIL PUMP

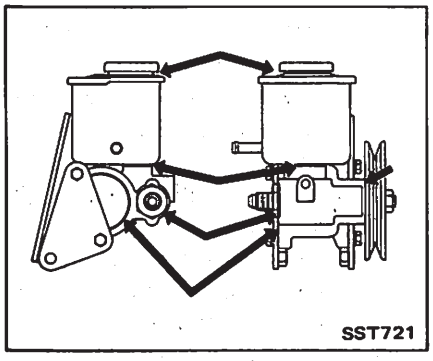


Ⓣ : N·m (kg-m, ft-lb)
★ or ☆: are available for service replacement.
★: always replace when disassembled.

SST003A

The power steering oil pump should be disassembled only if any of the following phenomena is noted.

- **Oil leak at the following points**



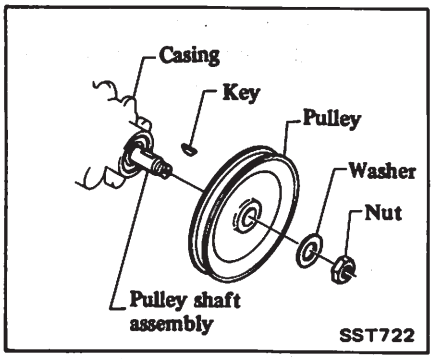
- **Deformed or damaged pulley**
- **Deformed or damaged cap assembly or strainer**

CAUTION:
This power steering oil pump is a precision hydraulic unit. Extreme care should be taken to prevent entry of dust, dirt, metal chips, etc. into oil pump during disassembly.

DISASSEMBLY

Pulley

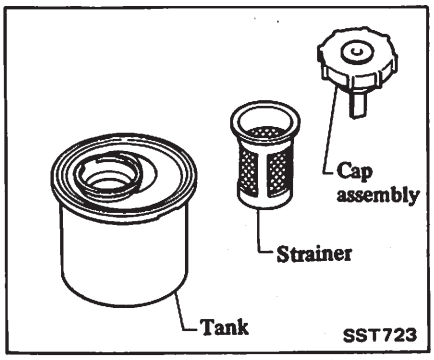
Remove pulley.



Do not reuse washer once it has been removed.

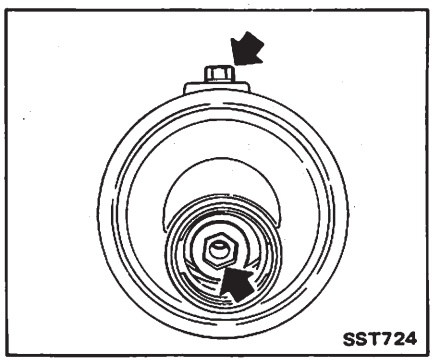
Cap assembly and strainer

Remove cap assembly.

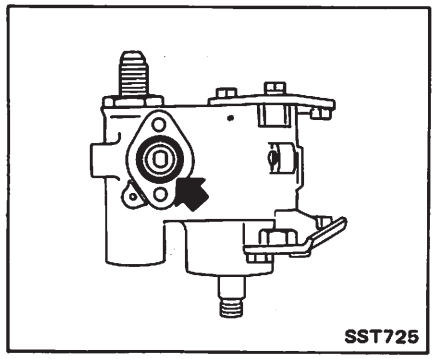


Tank O-ring

1. Remove tank.



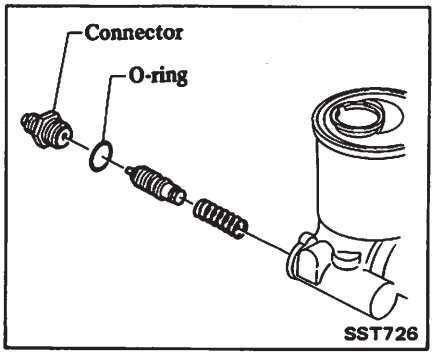
2. Remove O-ring.



Do not reuse O-ring once it has been removed.

Connector

Remove connector, then remove O-ring.



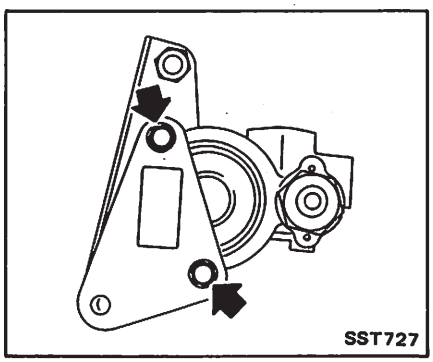
Do not reuse O-ring once it has been removed.

Rear cover O-ring

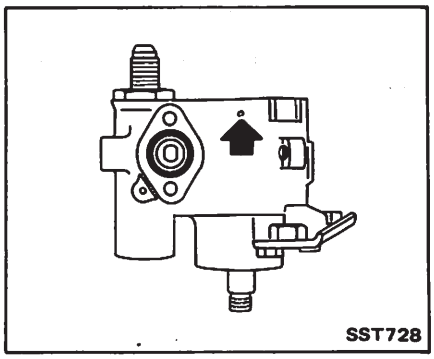
1. Remove tank.

Refer to "Tank O-ring" for disassembly.

2. Remove bracket.

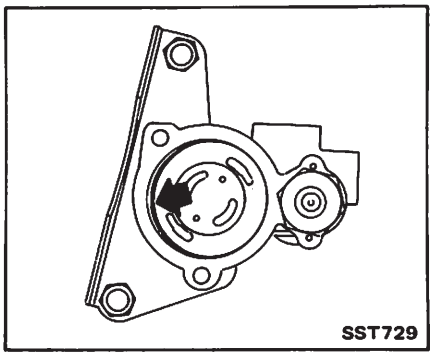


3. Remove snap ring.



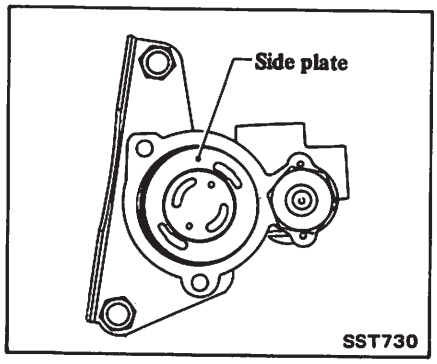
Do not reuse snap ring once it has been removed.

4. Remove rear cover and spring.
5. Remove O-ring.



Do not reuse O-ring once it has been removed.

CAUTION:
Do not face rear cover side of housing downwards, nor jar the housing; otherwise, the side plate, etc. may fall. If dropped, do not attempt to reassemble them; rather replace oil pump assembly.

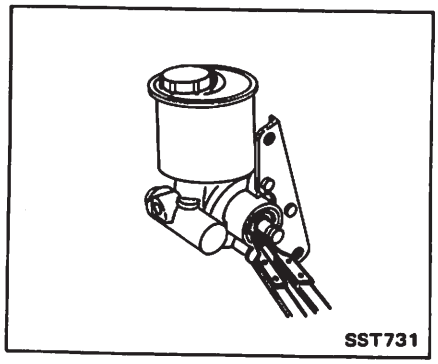


Pulley shaft oil seal

1. Remove pulley.

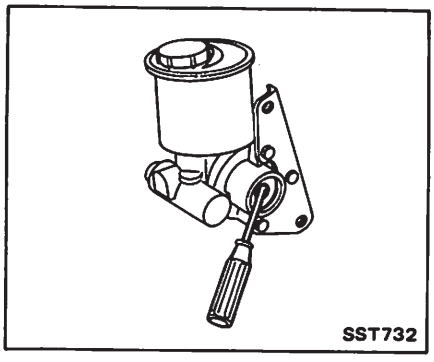
Refer to "Pulley" for disassembly.

2. Remove snap ring, then remove pulley shaft assembly.



Do not reuse snap ring once it has been removed.

3. Remove oil seal.



Do not reuse oil seal once it has been removed.

INSPECTION

Wash clean all disassembled parts in suitable cleaning solvent.

Discard any oil seals and O-rings which have once been removed.

Replace oil seal and O-ring if sealing surface is deformed or cracked.

Pulley and pulley shaft

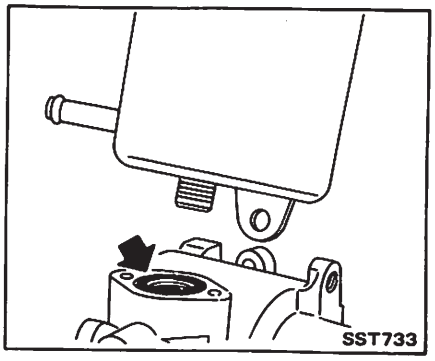
a. If pulley is cracked or deformed, replace it.
b. If an oil leak is noticed around pulley shaft oil seal, replace it.
c. If key or pulley's key groove is deformed or worn, replace oil pump assembly.

Cap assembly and strainer

a. If cap assembly is deformed, damaged, or cracked, replace it.
b. If an oil leak is noticed, replace cap assembly. If cap contacting portion of tank is damaged or deformed, replace tank.

Tank

a. If tank is deformed or cracked, replace it.
b. If an oil leak is noticed, replace O-ring.



Connector

a. If connector is deformed or cracked, replace oil pump assembly.
b. If an oil leak is noticed, replace O-ring.

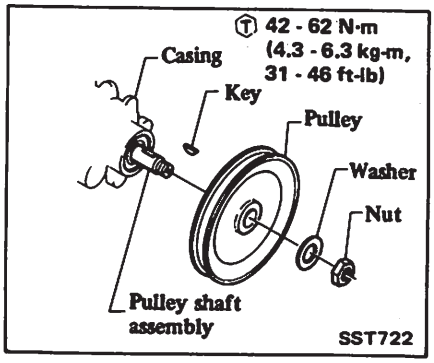
Rear cover

If an oil leak is noticed, replace O-ring.

CAUTION:
a. When disassembling, reassembling or inspecting, use utmost care not to damage housing and rear cover contacting portion. If damaged accidentally, do not attempt to reassemble them; rather replace oil pump assembly.
b. When rear cover is removed, do not face housing downwards; or the side plate, etc. may fall. If dropped, do not attempt to reassemble them; rather replace oil pump assembly.

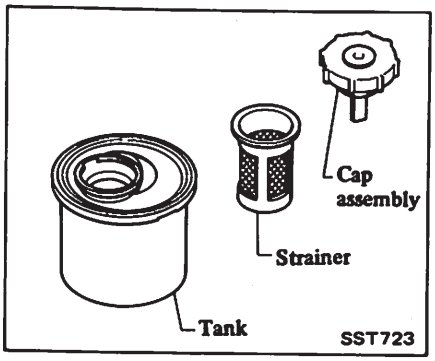
ASSEMBLY

Pulley



a. Always use new washer.
b. After tightening nuts securely, be sure to bend washer.

Cap assembly and strainer

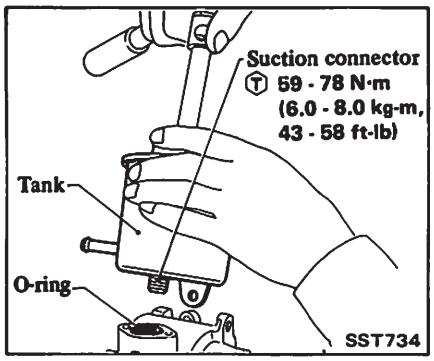


Tank O-ring

1. Install new O-ring.

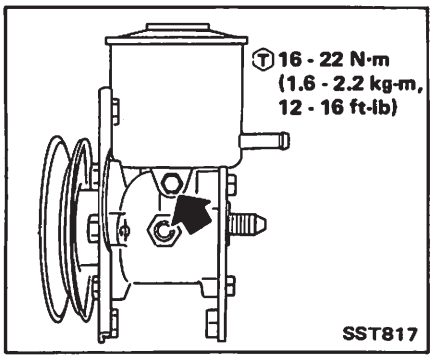
a. Before installing, apply a thin coat of vaseline to O-ring.
b. Make certain that O-ring is installed properly.

2. Install tank.



Use utmost care not to damage O-ring when installing suction connector.

3. Install bolt.

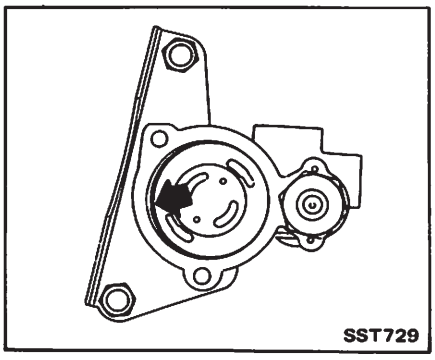


4. Install cap assembly.

Refer to "Cap assembly and strainer" for assembly.

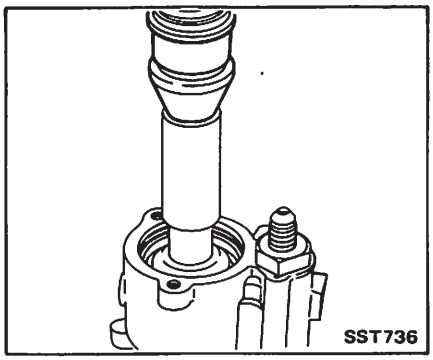
Rear cover O-ring

1. Install new O-ring.

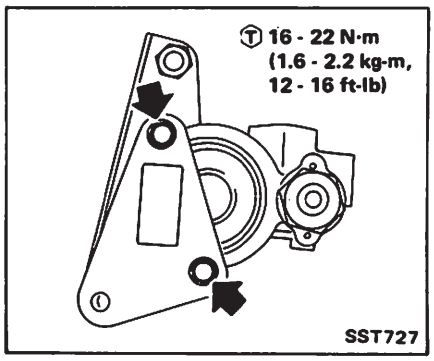


a. Before installing, apply a thin coat of vaseline to O-ring.
b. Make certain that O-ring is installed properly.

2. Install spring, and press rear cover with a hydraulic press so that snap ring can be installed.



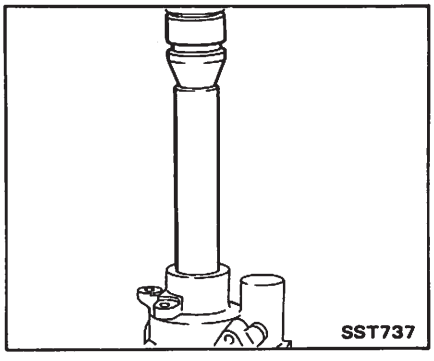
3. Install new snap ring.
4. Install bracket.



5. Assemble by referring to "Assembly of Tank O-ring".

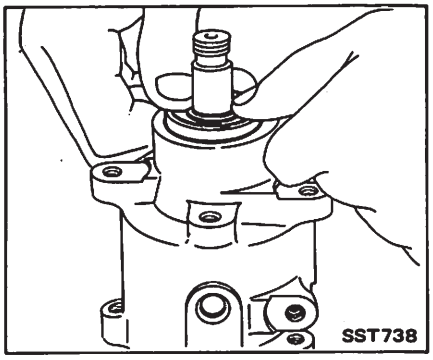
Pulley shaft oil seal

1. Using a suitable tool, install new oil seal.

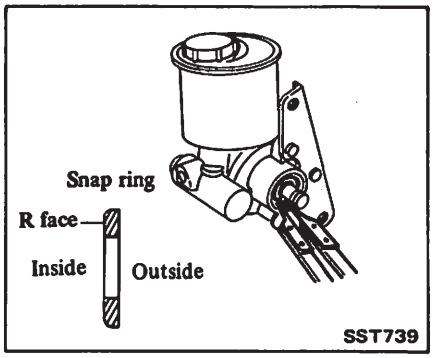


Before installing, apply a thin coat of vaseline to oil seal.

2. Securely install pulley shaft assembly by adjusting with screwdriver until rotor comes to the center position.



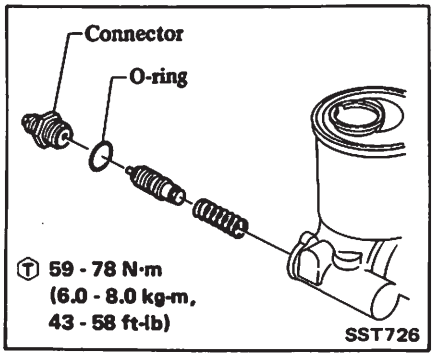
3. Install new snap ring.



4. Install pulley.

Refer to "Pulley" for assembly.

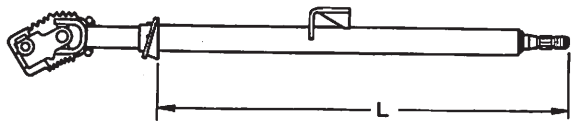
Connector



a. Before installing, apply a thin coat of vaseline to O-ring.
b. Make certain that O-ring is installed properly.

SERVICE DATA AND SPECIFICATIONS (S.D.S.)

GENERAL SPECIFICATIONS

Steering gear type		R25S* [Manual steering]	PR25SA* [Power steering]
Steering column		Collapsible column	
Steering column length "L"	mm (in)	481.3 - 484.3 (18.95 - 19.07)	
Non tilt type  SST987			
Turns of steering wheel (Lock to lock)	E15, E16	3.9	3.33
	CD17 M/T	3.7	
	CD17 A/T	3.5	
Steering overall gear ratio		21.55	18.45

* New model code.
R25S and PR25SA correspond to RP15L and IPRP15L respectively.

P R 25 S A
- Rack diameter [mm (in)]
- Rack and pinion type
- Power steering

INSPECTION AND ADJUSTMENT

GENERAL

Steering gear type		R25S	PR25SA
Steering wheel axial play	mm (in)	0 (0)	
Steering wheel play	mm (in)	Less than 35 (1.38)	

STEERING GEAR AND LINKAGE

	R25S	PR25SA
Tie-rod outer ball joint Swinging torque N·m (kg-cm, in-lb)	0.3 - 2.9 (3 - 30, 2.6 - 26.0)	0.3 - 2.9 (3 - 30, 2.6 - 26.0)
Tie-rod inner ball joint Swinging torque N·m (kg-cm, in-lb)	0.5 - 7.4 (5 - 75, 4.3 - 65.1)	0.5 - 7.4 (5 - 75, 4.3 - 65.1)
Tie-rod length mm (in)	175.9 (6.93)	175.9 (6.93)
Pinion gear rotating torque (Pinion gear and rack gear assembly) N·m (kg-cm, in-lb)	Less than 1.5 (15, 13)	0.6 - 1.0 (6 - 10, 5.2 - 8.7)
Rack force to pull (At neutral position) N (kg, lb)	98 - 137 (10 - 14, 22 - 31)	98 - 157 (10 - 16, 22 - 35)
Pinion bearing outer snap ring (Inside) mm (in) Thickness / Part No. 1.04 - 1.09 (0.0409 - 0.0429) / 48265-78500 1.09 - 1.14 (0.0429 - 0.0449) / 48266-78500 1.14 - 1.19 (0.0449 - 0.0469) / 48267-78500 1.19 - 1.24 (0.0469 - 0.0488) / 48268-78500 1.24 - 1.29 (0.0488 - 0.0508) / 48269-78500 1.29 - 1.34 (0.0508 - 0.0528) / 48270-78500		—
Pinion bearing outer snap ring (Outside) mm (in) Thickness / Part No. 1.55 - 1.60 (0.0610 - 0.0630) / 48271-78500 1.60 - 1.65 (0.0630 - 0.0650) / 48272-78500 1.65 - 1.70 (0.0650 - 0.0669) / 48273-78500 1.70 - 1.75 (0.0669 - 0.0689) / 48274-78500		—
Steering wheel turning force N (kg, lb)	—	19.6 - 29.4 (2.0 - 3.0, 4.4 - 6.6)
Normal operating temperature at fluid °C (°F)	—	60 - 80 (140 - 176)
Fluid capacity ℓ (US qt, Imp qt)	—	Approximately 0.9 (1, 3/4)

TIGHTENING TORQUE

STEERING COLUMN

Unit	N·m	kg-m	ft-lb
Steering wheel nut	39 - 54	4.0 - 5.5	29 - 40
Lower joint to column	29 - 39	3.0 - 4.0	22 - 29
Lower joint to gear	29 - 39	3.0 - 4.0	22 - 29
Hole cover to dash panel	4 - 6	0.4 - 0.6	2.9 - 4.3
Lower bracket to pedal bracket	9 - 14	0.9 - 1.4	6.5 - 10.1
Steering column clamp or mounting bracket	9 - 14	0.9 - 1.4	6.5 - 10.1

STEERING GEAR AND LINKAGE

Model R25S

Unit	N·m	kg-m	ft-lb
Tie-rod to knuckle	29 - 49	3.0 - 5.0	22 - 36
Tie-rod lock nut	37 - 46	3.8 - 4.7	27 - 34
Tie-rod to gear	78 - 98	8.0 - 10.0	58 - 72
Gear housing clamp bolt	59 - 78	6.0 - 8.0	43 - 58
Retainer lock nut	39 - 59	4.0 - 6.0	29 - 43

Model PR25SA

Unit	N·m	kg-m	ft-lb
Gear and linkage			
Tie-rod to knuckle	29 - 49	3.0 - 5.0	22 - 36
Tie-rod lock nut	37 - 46	3.8 - 4.7	27 - 34
Tire-rod to gear	78 - 98	8 - 10	58 - 72
Gear housing clamp bolt	59 - 78	6.0 - 8.0	43 - 58
Boot clamp securing bolt	1.0 - 1.5	0.1 - 0.15	0.7 - 1.1
Retainer lock nut	39 - 59	4.0 - 6.0	29 - 43
Housing plug	49 - 69	5.0 - 7.0	36 - 51
Self lock nut	19 - 25	1.9 - 2.6	14 - 19
Cylinder tube flare nut	20 - 29	2.0 - 3.0	14 - 22
Cylinder lock nut	78 - 108	8 - 11	58 - 80
Oil pump, tank and hoses			
High pressure hose to pump	29 - 49	3.0 - 5.0	22 - 36
High pressure to gear	20 - 29	2.0 - 3.0	14 - 22
Pump to bracket	19 - 25	1.9 - 2.6	14 - 19
Pump belt adjusting bracket fixing bolt	19 - 25	1.9 - 2.6	14 - 19
Pump bracket	16 - 22	1.6 - 2.2	12 - 16
Pulley lock nut	42 - 62	4.3 - 6.3	31 - 46
Connector	59 - 78	6.0 - 8.0	43 - 58
Suction connector	59 - 78	6.0 - 8.0	43 - 58

TROUBLE DIAGNOSES AND CORRECTIONS

Except for the following probable causes and corrective actions, refer to Trouble Diagnoses and Corrections in Front Axle and Front Suspension section.

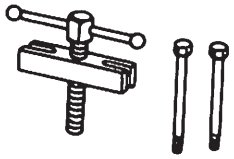
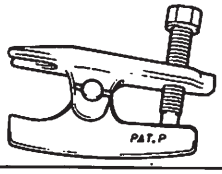
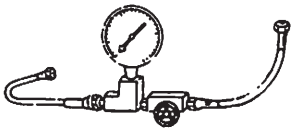
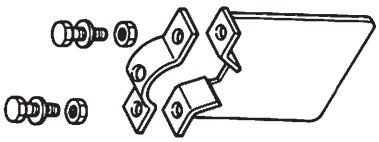
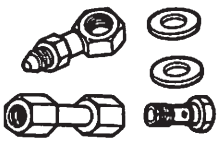
MANUAL STEERING

Condition	Probable cause	Corrective action
Excessive wheel play.	Insufficiently tightened or improperly installed steering gear housing.	Retighten.
	Damaged steering linkage or ball joint.	Replace faulty parts.
	Incorrect adjustment of steering gear.	Adjust.
Vibration, shock or shimmying of steering wheel.	Insufficiently tightened or improperly installed steering gear housing.	Retighten.
	Wear of steering linkage.	Replace faulty parts.
	Worn column bearing, weakened column bearing spring, or loose clamp.	Replace or retighten.
Car pulls to right or left.	Deformed steering linkage and/or suspension link.	Replace.
Stiff or heavy steering wheel.	Insufficient lubricants or mixing impurities in steering linkage or excessively worn steering linkage.	Replenish grease or replace the part.
	Worn or damaged steering gear and bearing.	Replace.
	Incorrectly adjusted steering gear.	Adjust.
	Deformed steering linkage.	Replace.
	Interference of steering column with turn signal switch.	Adjust.

POWER STEERING

Condition	Probable cause	Corrective action
Fluid pressure does not build up.	Pump drive belt slipping on pulley.	Readjust belt tension.
	Pump malfunctioning.	Replace.
	Fluid leaking through hose connectors.	Replace or retighten.
	Fluid leaking through power steering gear.	Replace or retighten.
	Fluid leaking through power steering oil pump.	Replace.
Steering wheel moves heavily.	Lack of fluid in power steering pump.*	Refill.
	Air present in fluid.	Bleed air.
	Fluid pressure too low.	See "Hydraulic system check".
	Wheel alignment out of specifications or air pressure in tires too low.*	Re-align or inflate tires to correct pressure.
	Steering column out of alignment.*	Repair or replace.
	Worn or damaged ball joint at suspension and steering linkage.*	Replace.
Steering wheel fails to return.	Refer to items marked "*" above.	
	Front wheel caster improperly adjusted.	Readjust.
	Internal gears dragged or gouged.	Replace gear assembly.
Steering effort is not the same in both directions.	Fluid leakage in steering gear.	Replace sealing parts.
	Stuffy fluid passage in steering gear.	Replace gear assembly.
Unstable running.	Wheel bearing not properly adjusted.	Readjust.
	Stuck or damaged control valve in steering gear.	Replace gear assembly.
	Front wheel alignment not properly.	Readjust.
	Excessive steering gear play.	Readjust backlash or replace gear assembly.
	Play at suspension and linkage ball joint.	Replace.
Noisy pump.	Lack of fluid in power steering pump.	Refill.
	Hoses or filter clogged.	Clean or, if necessary, replace.
	Loose pulley.	Repair.
	Belt noisy or slapping.	Readjust belt tension.
	Broken pump part.	Replace.

SPECIAL SERVICE TOOLS

Tool number (Kent-Moore No.)	Tool name	Unit application	
		R25S	PR25SA
ST27180001 (J25726)	Steering wheel puller 	X	X
HT72520000 (J25730-A)	Ball joint remover 	X	X
ST3127S000 (See J25765) ① GG91030000 (J25765) ② HT62900000 (–) ③ HT62940000 (–)	Preload gauge Torque wrench  Socket adapter (Useless)  Socket adapter (Useless) 	X	X
ST27091000 (J26357)	Pressure gauge 	–	X
KV48101800 (J28820)	Cylinder lock nut wrench 	–	X
KV48102100 (J28817)	Power steering stand 	–	X
KV48102500 (–)	Pressure gauge adapter 	–	X