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AUTOMATIC TRANSMISSION SERVICE GROUP

INTRODUCTION

NISSAN - RL3FO1A

The RL3FO1A is a three speed automatic transaxle front wheel drive with a converter clutch.

The teardown - assembly and trouble shooting are covered in detail.

We thank the Nissan Corporation for the illustrations and information that made this booklet possible.

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DESCRIPTION

The RL3F01A transaxle is a fully automatic unit consisting primarily of a 3 element hydraulic lock-up torque converter, 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.

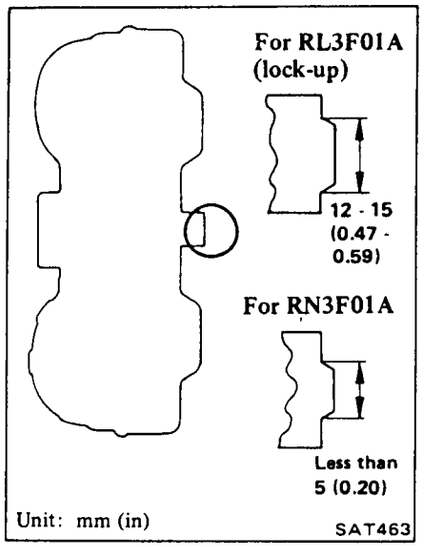
A hydraulic control system is used to operate the friction elements and automatic shift controls.

TORQUE CONVERTER

The lock-up torque converter 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 which is controlled by the speed cut valve and lock-up control valve. 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.

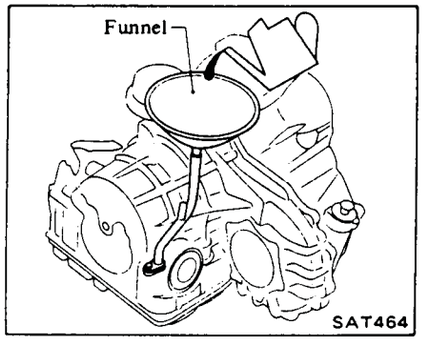
Discrimination



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.

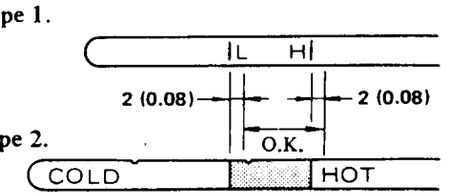
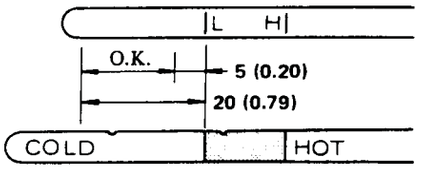
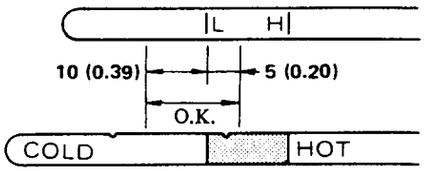
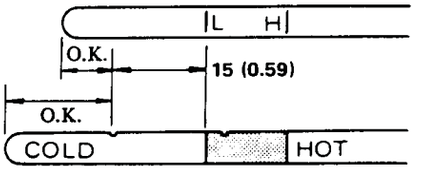
Proceed with fluid level check as follows:

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)	

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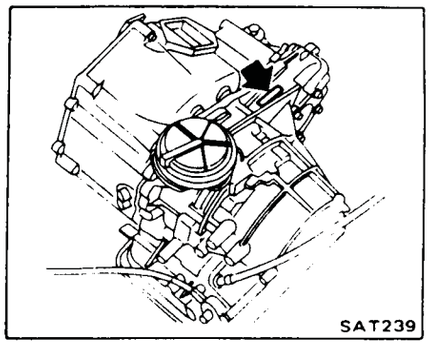
IDENTIFICATION NUMBER LABEL

Location

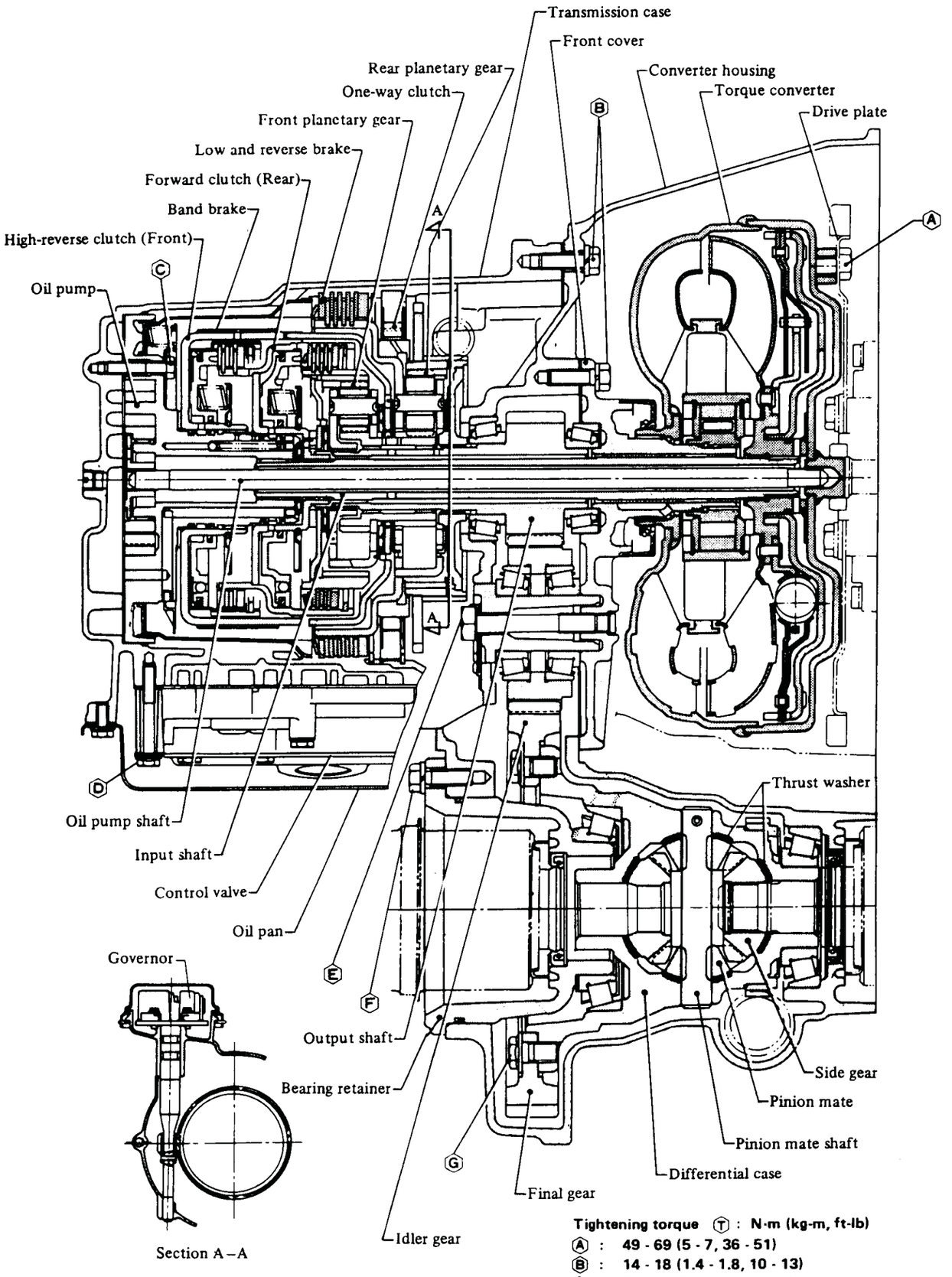
The label is pasted on right upper face of transmission case.



Number designation

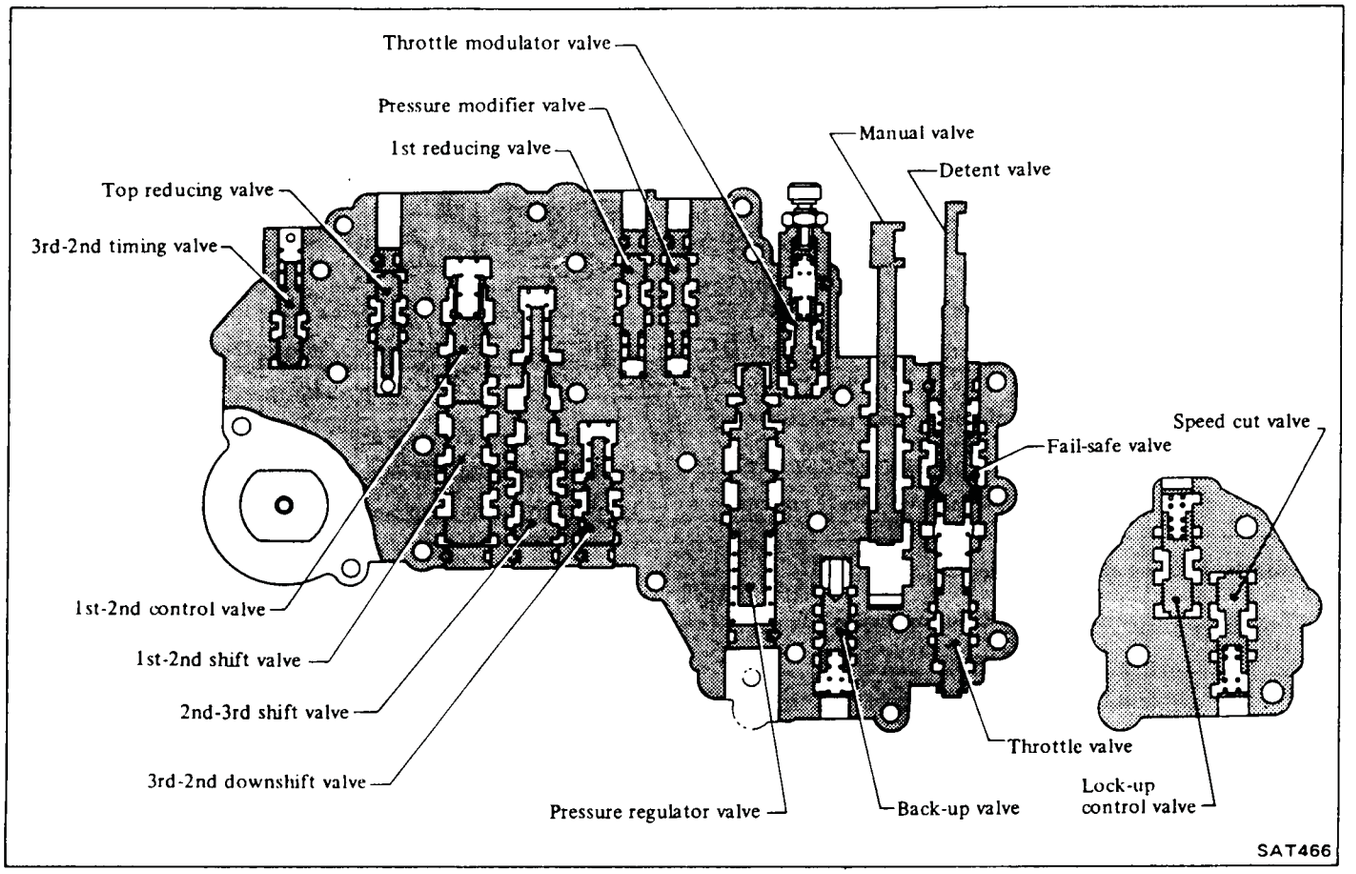
0 6 0 1 2 3 4

- 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



HYDRAULIC CONTROL UNIT AND VALVES

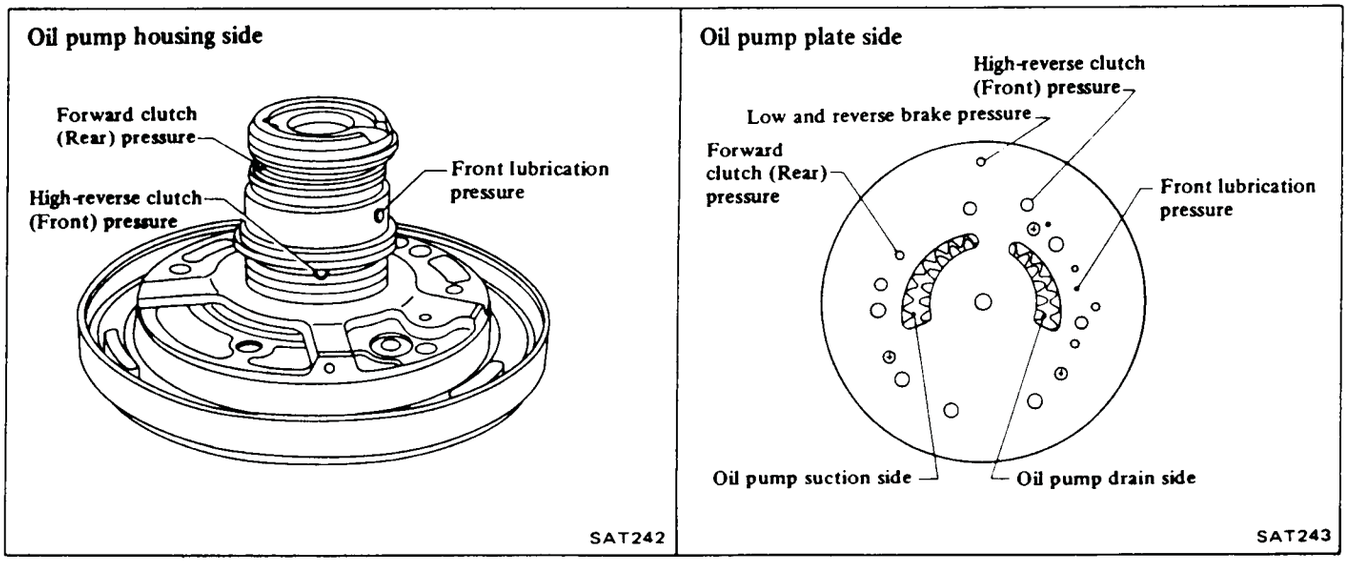
Control valve



OIL CHANNEL

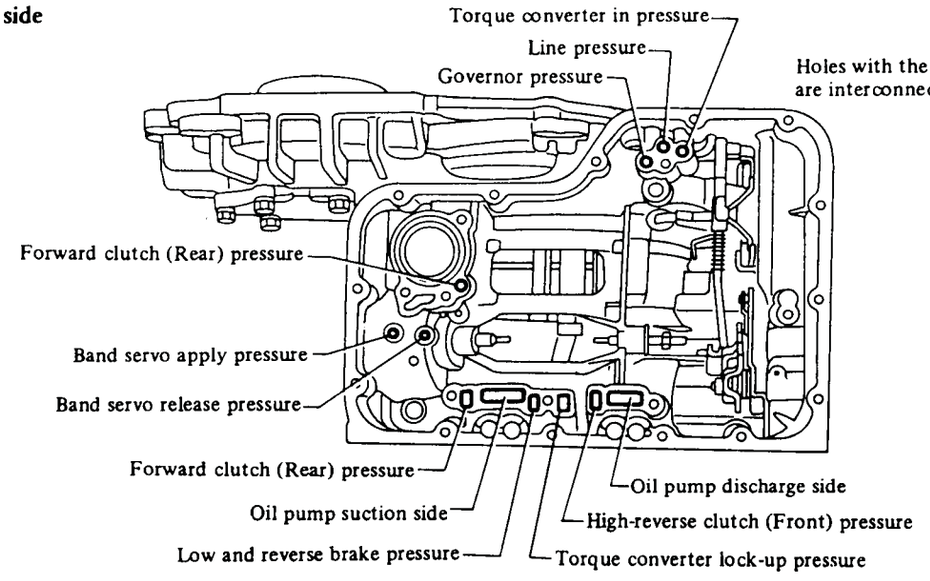
Oil channels which connect components are located in areas shown below.

Oil channels in oil pump housing



Oil channels in transmission case

Lower face side



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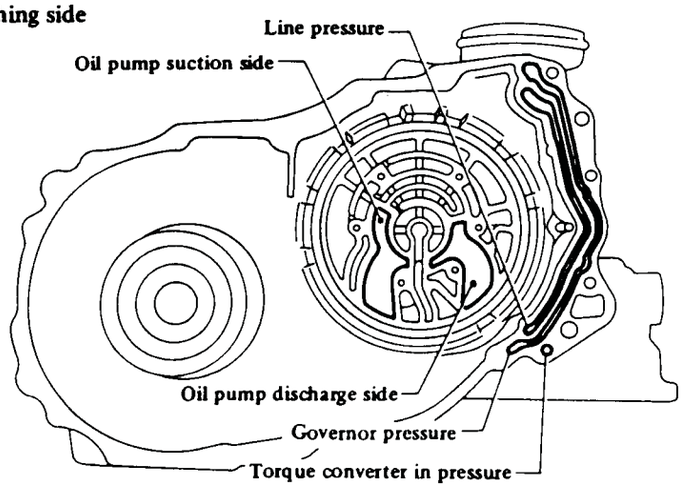
Converter housing attaching side



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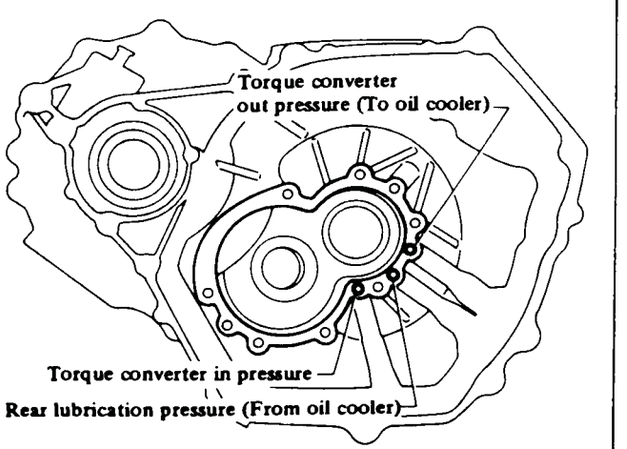
Oil channels in converter housing



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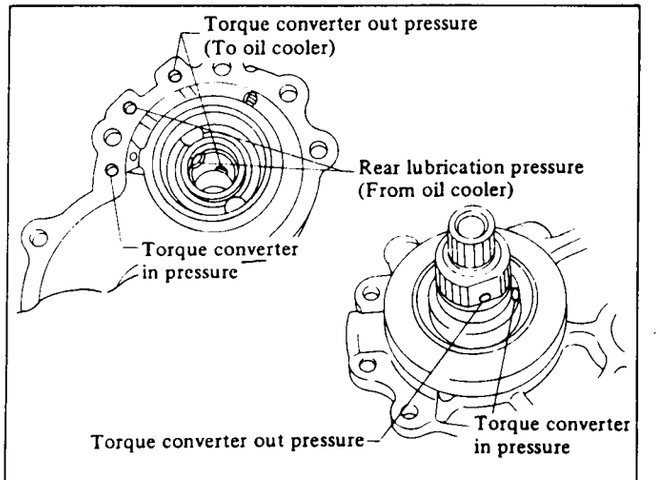
Oil channels in front cover



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MECHANICAL OPERATION

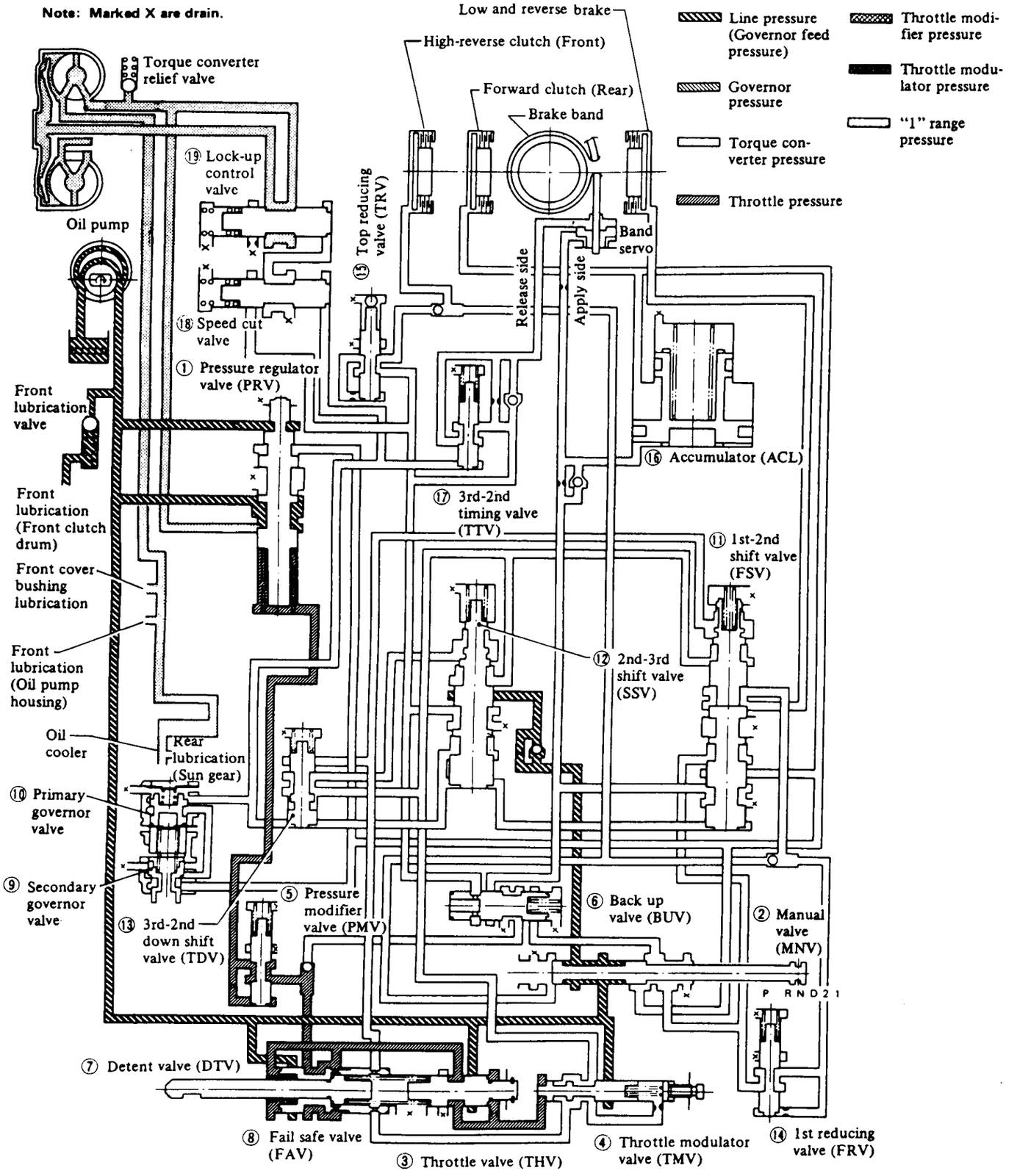
In the RL3F01A automatic transaxle, each part operates as shown in the following table at each gear select position.

Range		Gear ratio	Clutch		Low & reverse brake	Lock-up	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

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



SAT467

ON-VEHICLE SERVICE

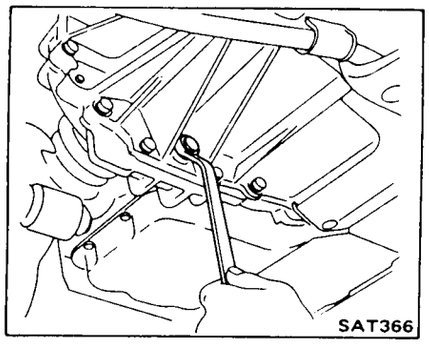
The following parts can be serviced with the transaxle on the vehicle.

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

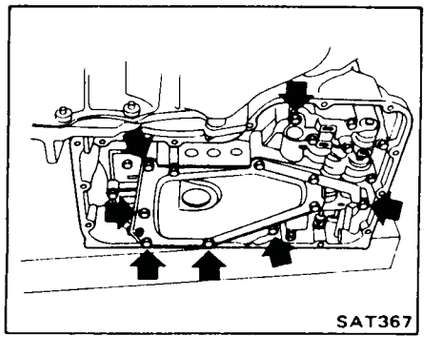
Check and/or replace faulty parts as follows:

CONTROL VALVE ASSEMBLY

1. Remove hexagon plug and drain oil completely.



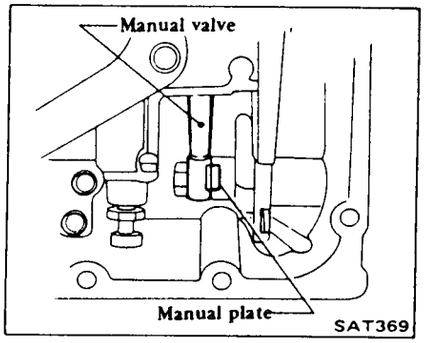
2. Remove oil pan guard, oil pan and gasket.
3. Remove control valve assembly.



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.

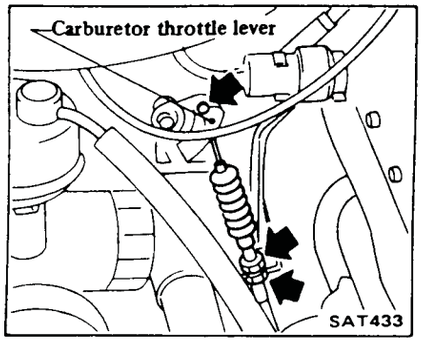
Ⓣ : **7 - 13 N·m**
(0.7 - 1.3 kg-m,
5.1 - 9.4 ft-lb)

8. Refill automatic transaxle fluid.

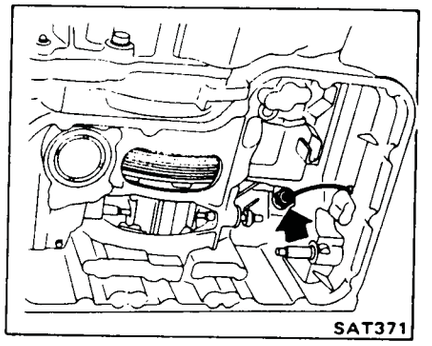
Oil capacity:
Refer to S.D.S.

THROTTLE WIRE

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



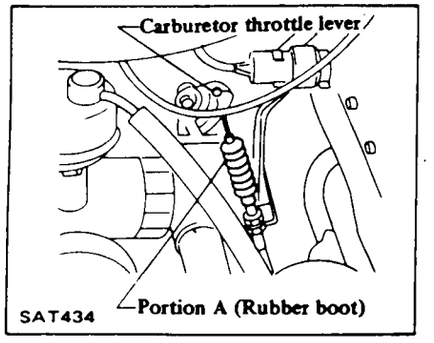
3. Disconnect the other end of throttle wire from throttle lever.
4. Remove throttle wire from transmission case.



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

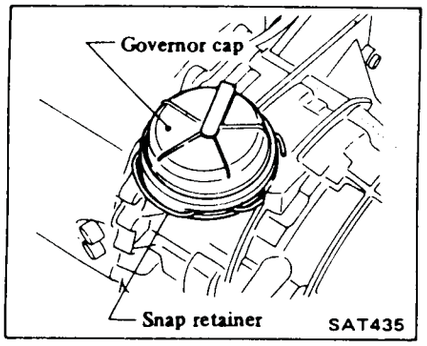
Ⓣ : **Throttle wire securing nut**
2 - 3 N·m
(0.2 - 0.3 kg-m,
1.4 - 2.2 ft-lb)

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.

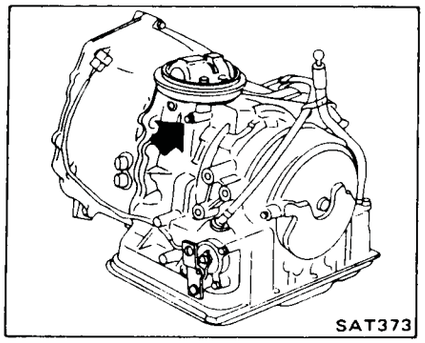


GOVERNOR SHAFT ASSEMBLY

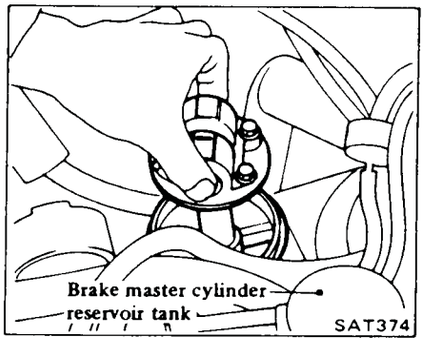
1. Disconnect battery terminal.
2. Remove radiator reservoir tank.
3. Remove battery.
4. Remove battery support bracket.
5. Remove snap retainer, governor cap with breather hose, and seal ring.



6. Remove governor shaft securing bolt.



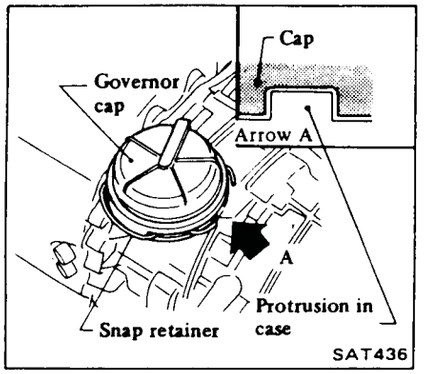
7. Remove governor shaft assembly.



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.

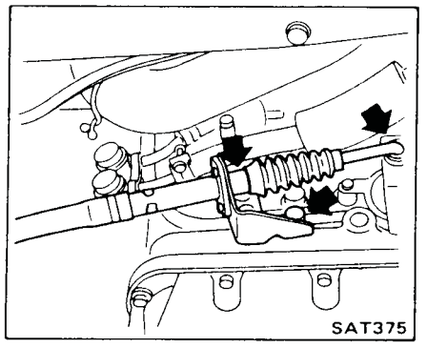
When installing governor cap, pay attention to its direction.



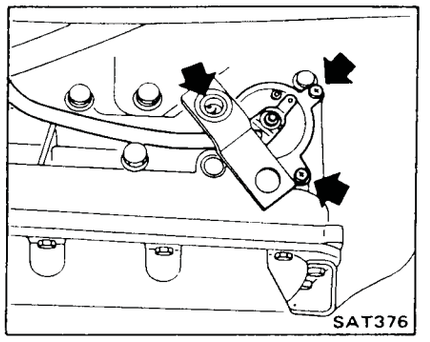
11. Install battery support bracket, battery and radiator reservoir tank.
12. Connect battery terminal.

INHIBITOR SWITCH

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



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



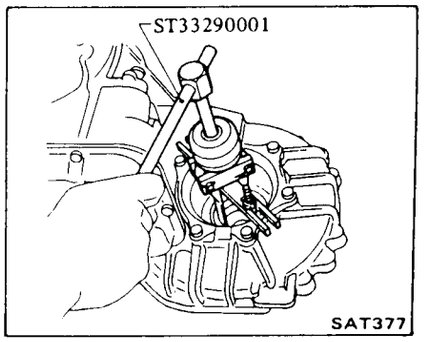
4. Install inhibitor switch in the reverse order of removal.

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

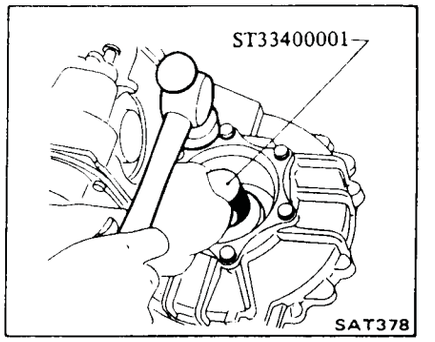
5. Adjust inhibitor switch. Refer to Minor Adjustments.

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.

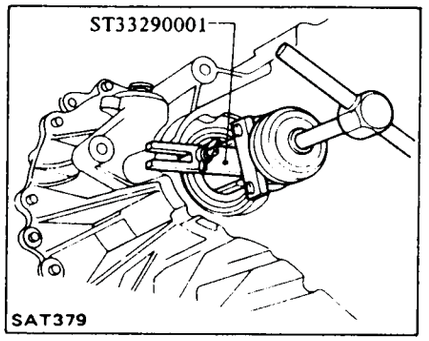


4. Install left drive shaft assembly. Refer to Drive Shaft for installation.

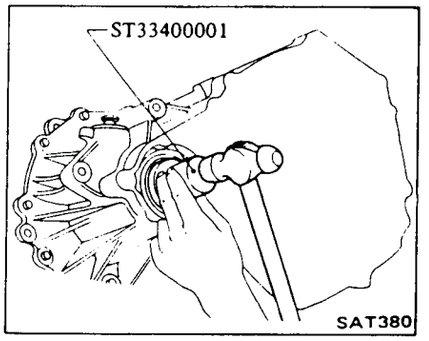
Be extremely careful not to scratch oil seal when inserting drive shaft.

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.

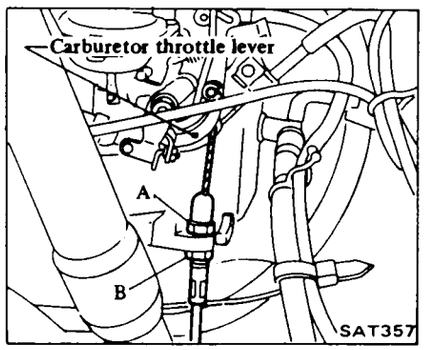
Be extremely careful not to scratch oil seal when inserting drive shaft.

MINOR ADJUSTMENTS

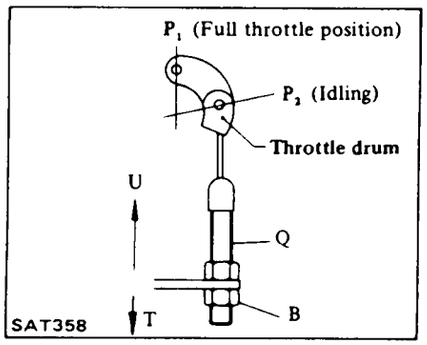
THROTTLE WIRE ADJUSTMENT

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.

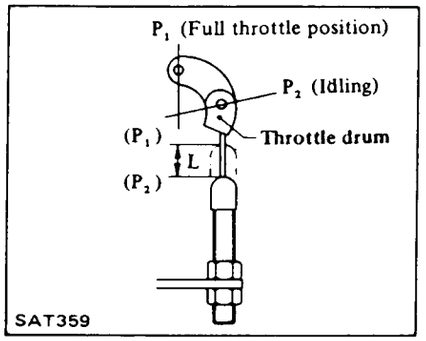


3. Reverse nut B 1.0 to 1.5 revolutions in direction T, then tighten nut A securely. Throttle drum should be held at "P_1".

Ⓣ : **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)

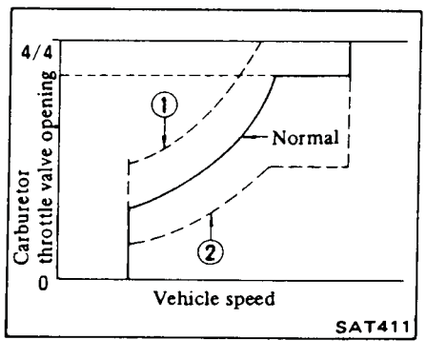


a. Adjust throttle wire stroke when throttle wire/accelerator wire is installed or after carburetor has been adjusted.
b. Put marks on throttle wire to facilitate measuring wire stroke.

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.

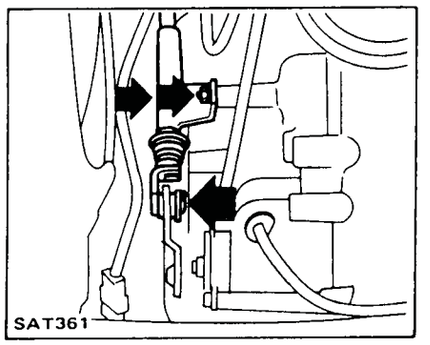
CONTROL CABLE ADJUSTMENT

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.

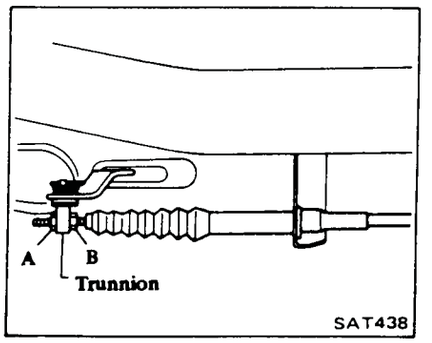
If the detents cannot be felt or the pointer indicating the range is improperly aligned, the control cable needs adjustment.

Control cable adjustment

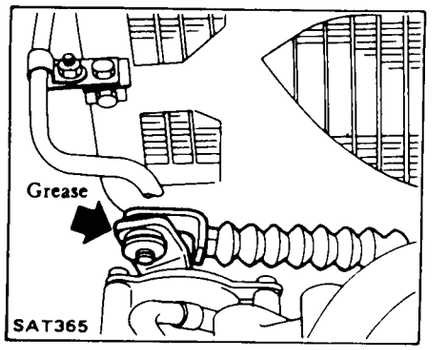
1. Place control lever at "P" range.
2. Connect control cable end to manual lever in transaxle unit, and tighten control cable securing bolts.



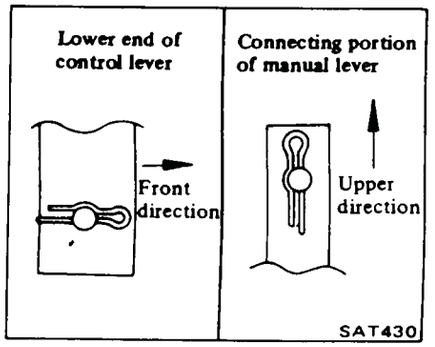
3. Move control lever from "P" range to "1" range. Make sure that control lever can move smoothly and without any sliding noise.
4. Place control lever at "P" range again.
5. Make sure that control lever locks at "P" range.
6. Remove control cable adjusting nut A and loosen nut B, then connect control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



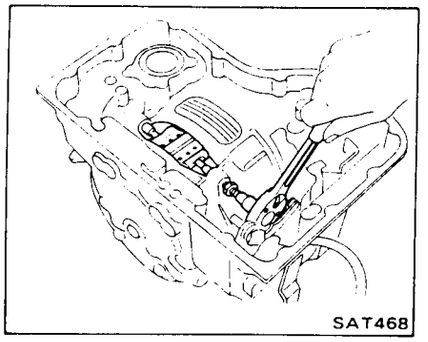
9. After properly adjusting control cable, check spring pin to see if it is assembled as shown in figure below. If not, adjust spring pin.



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.



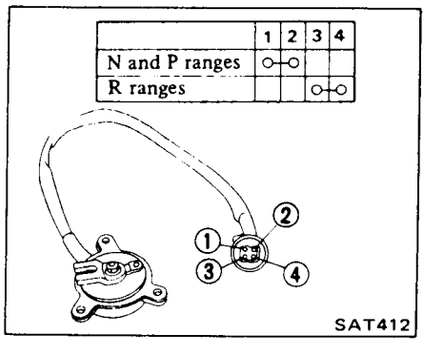
2. Torque anchor end pin lock nut to 4 to 6 N·m (0.4 to 0.6 kg-m, 2.9 to 4.3 ft-lb).
3. Back off anchor end pin lock nut 2.5 complete turns.
4. Tighten locknut to 16 to 22 N·m (1.6 to 2.2 kg-m, 12 to 16 ft-lb) while holding anchor end pin lock nut stationary.

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.

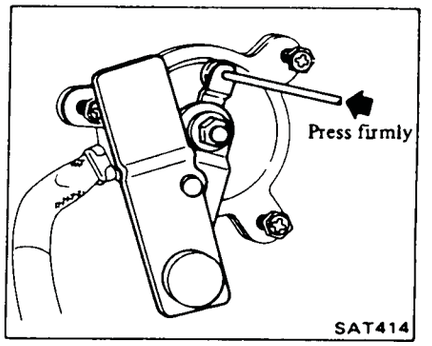
A continuity tester may be used to check the inhibitor switch for proper operation.

- 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.

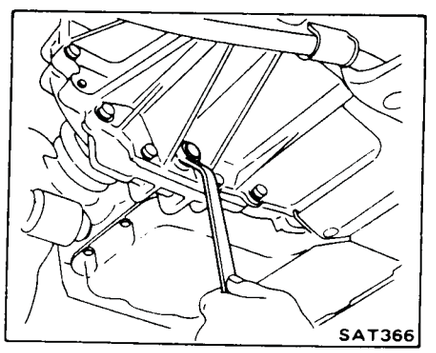
REMOVAL

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

1. Disconnect battery ground cable from terminal.
2. 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.

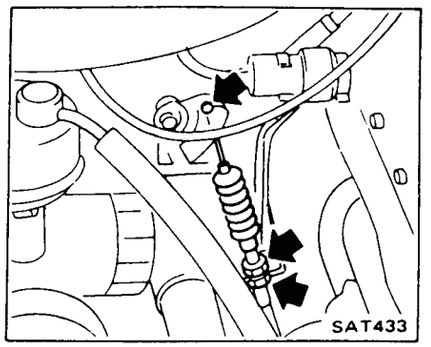
3. Remove front L.H. tire.
4. Drain oil.



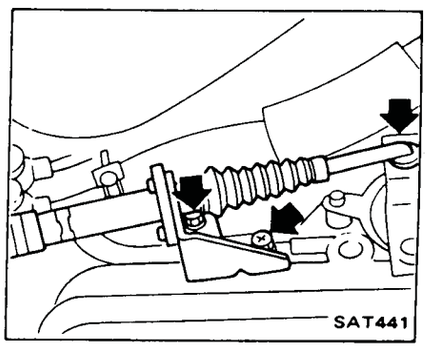
5. Remove left side fender protector.
6. Disconnect drive shafts.

Refer to Drive shaft (Section FA) for removal.

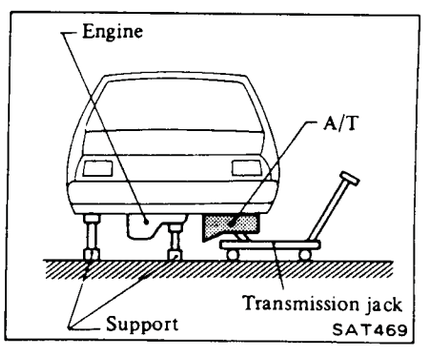
7. Disconnect speedometer cable.
8. Disconnect throttle wire from carburetor throttle lever.



9. Remove control cable rear end from unit.

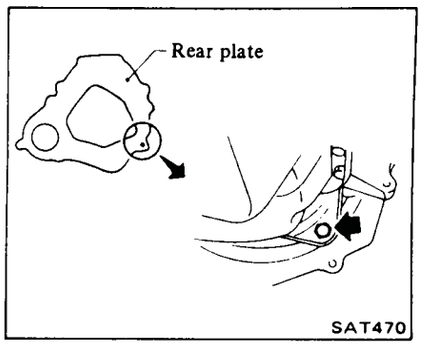


10. Remove oil level gauge tube.
11. Place jack under transaxle and engine.



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

12. Disconnect oil cooler hoses from tubes.
13. 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.

14. Remove engine mount securing bolts.
15. Remove starter motor.
16. 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.

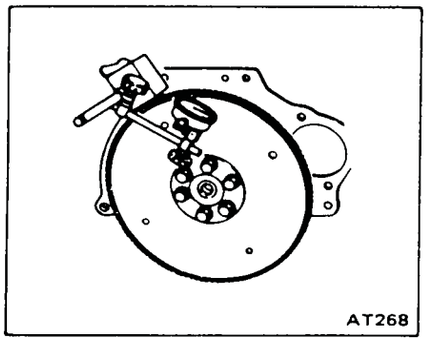
INSTALLATION

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

1. Drive plate runout

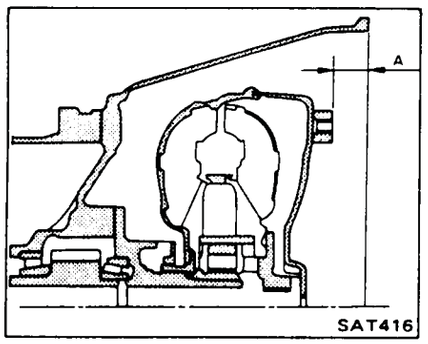
Turn crankshaft one full turn and measure drive plate runout with indicating finger of a dial gauge rested against plate.

Maximum allowable runout:
0.5 mm (0.020 in)



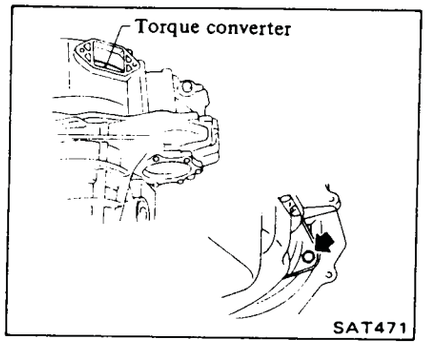
2. When connecting torque converter to transaxle, measure distance "A" to be certain that they are correctly assembled.

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.

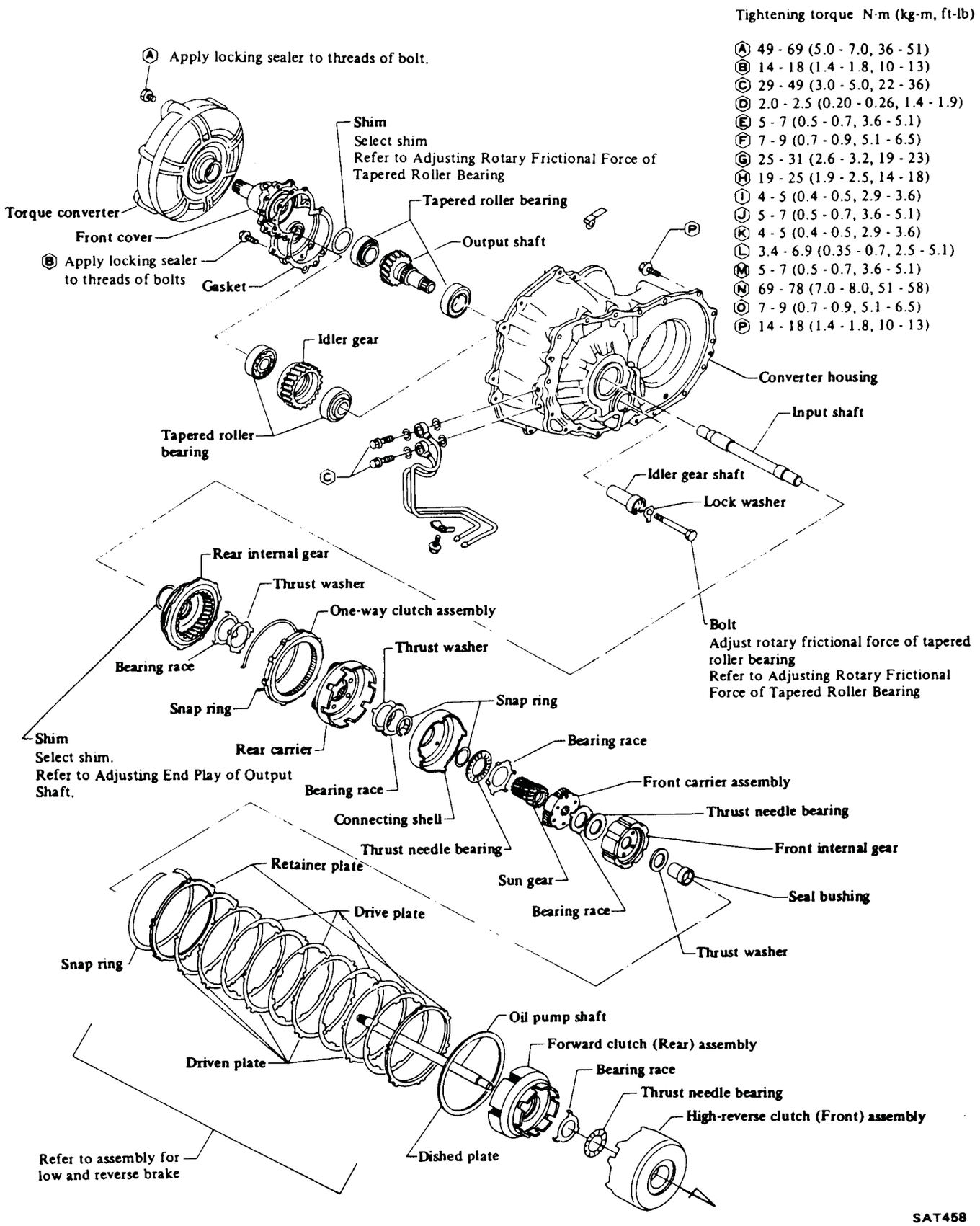
With hand brake applied, rotate engine at idling. Without disturbing the above setting, move selector lever through "N" to "D", to "2", to "1" and to "R". A slight shock should be felt by hand gripping hand lever each time transaxle is shifted.

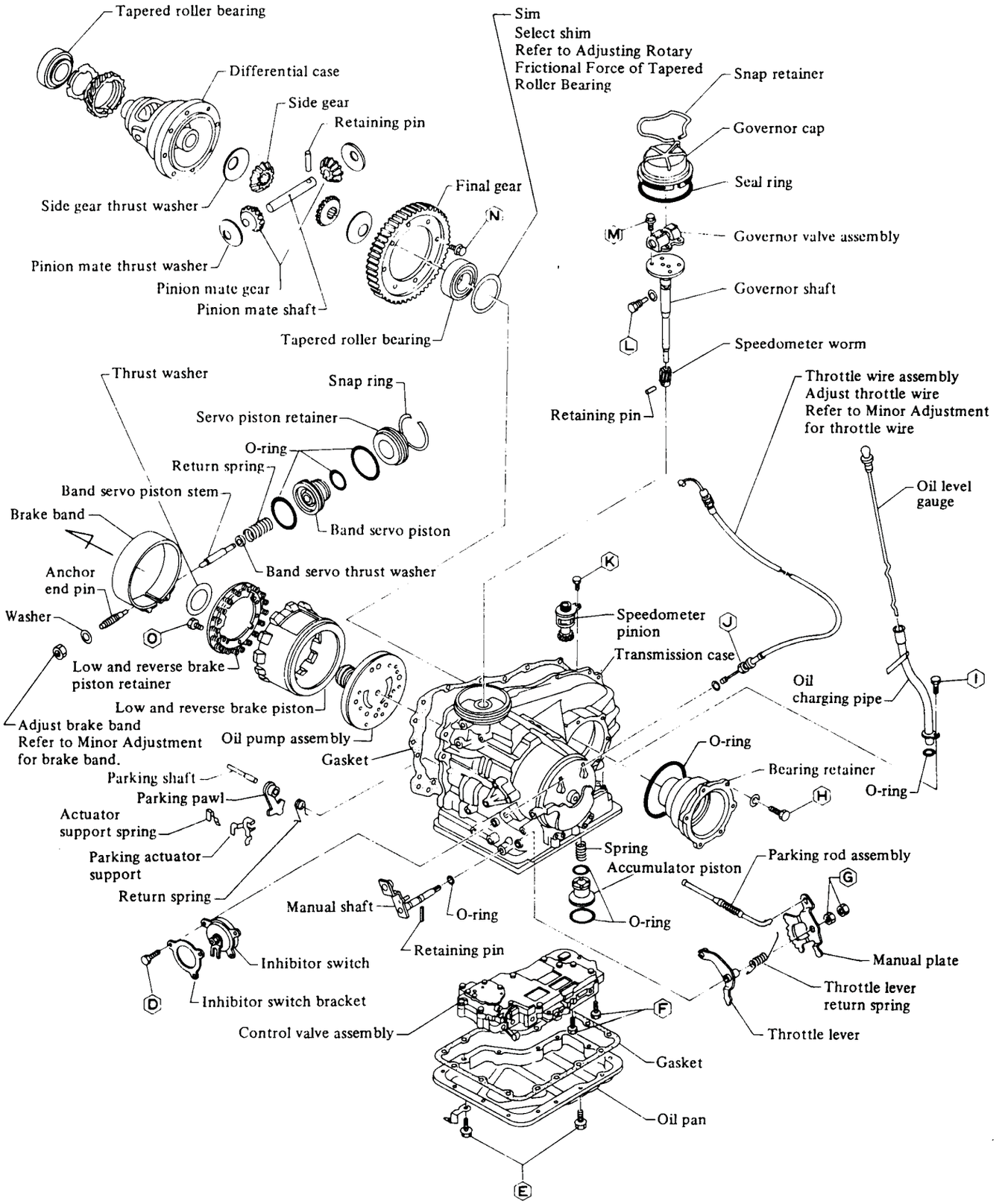
Refer to MA section.

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





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SERVICE NOTES FOR DISASSEMBLY

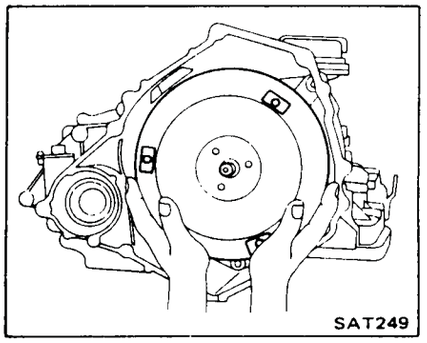
Before proceeding with disassembly, thoroughly clean the outside of the transaxle. It is important to prevent the internal parts of the transaxle from becoming contaminated by dirt or other foreign matter.

Disassembly should be done in a clean work area.

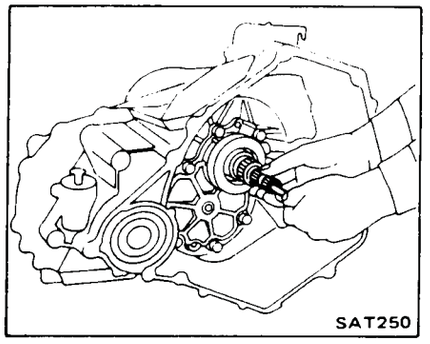
Use a nylon cloth or paper towel for wiping parts clean. Common shop rags can leave lint that might interfere with the transaxle's operation.

DISASSEMBLY

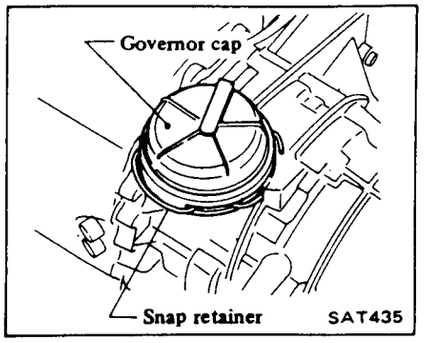
1. Remove hexagon plug, then drain transaxle fluid from plug hole.
2. Remove torque converter.



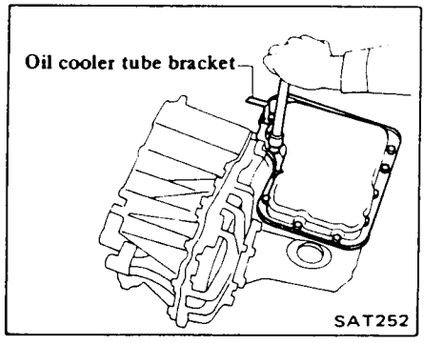
3. Remove oil pump shaft and input shaft.



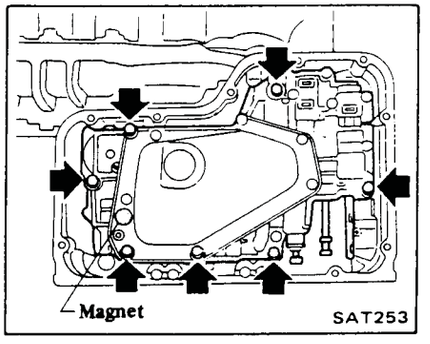
4. Remove snap retainer, governor cap with breather hose and O-ring.



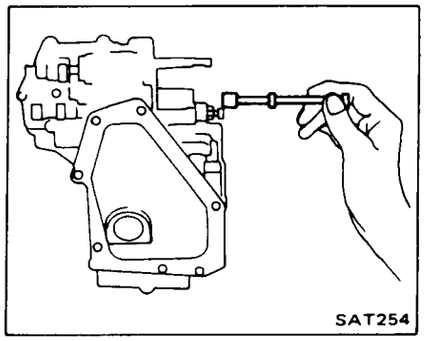
5. Remove oil pan guard and oil pan and inspect its contents. An analysis of any foreign matter can indicate the types of problems to look for. If the fluid is very dark, smells burned, or contains foreign particles, the frictional material (clutches, band.) may need replacement. A tacky film that will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



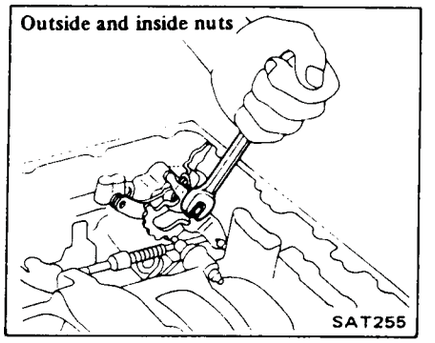
6. Remove control valve body and magnet.



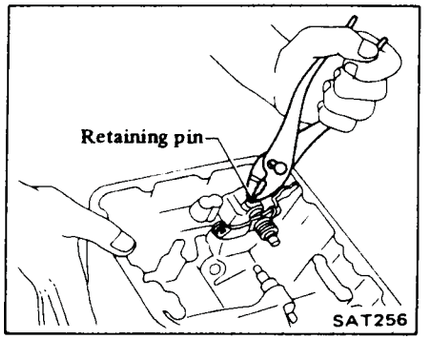
Remove manual valve from valve body as a precaution, to prevent valve from dropping out accidentally.



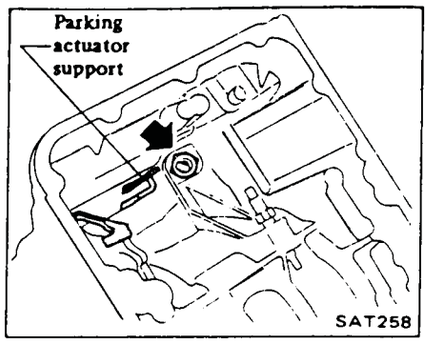
7. Remove manual shaft securing nuts.



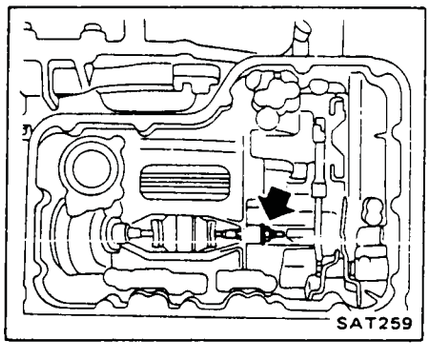
8. Pull out retaining pin, then remove throttle lever, manual plate, manual shaft, selector range lever and parking rod assembly.



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

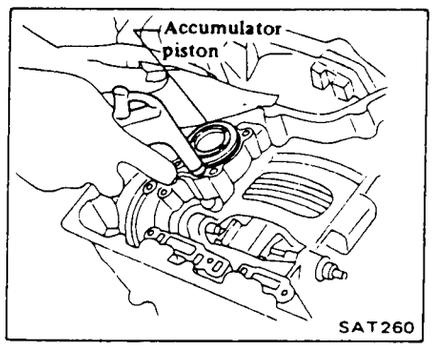


10. Loosen band brake piston stem lock nut, then back off piston stem.

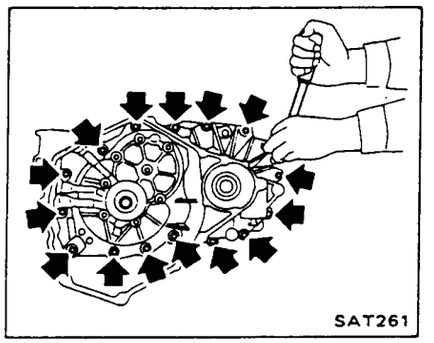


11. Remove accumulator piston with compressed air.

Be careful that accumulator piston does not jump out.

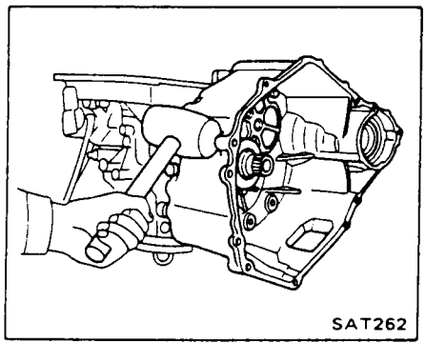


12. Remove converter housing securing bolts.

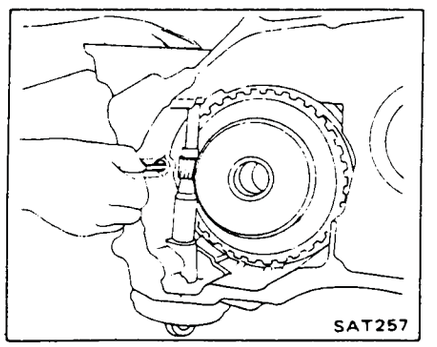


13. Separate converter housing from transmission case by tapping it.

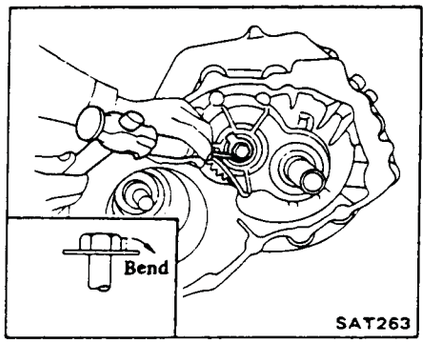
Be careful not to drop final drive assembly.



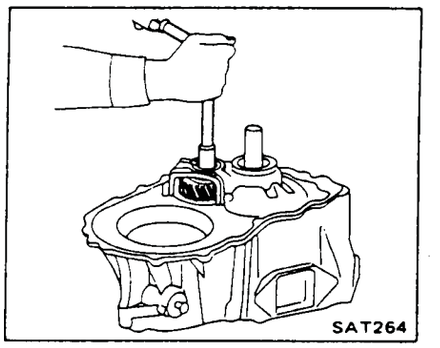
14. Remove final drive assembly.
15. Pull out parking pawl shaft, then remove parking pawl and return spring.



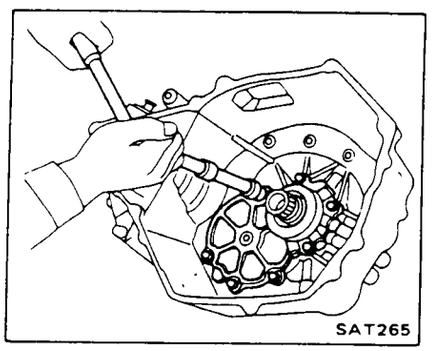
16. Straighten lock washer.



17. Remove idler gear bolt and lock washer.

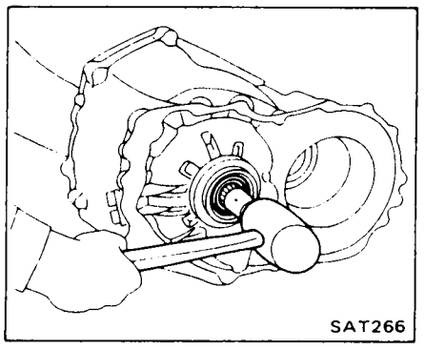


18. Remove front cover retaining bolts.

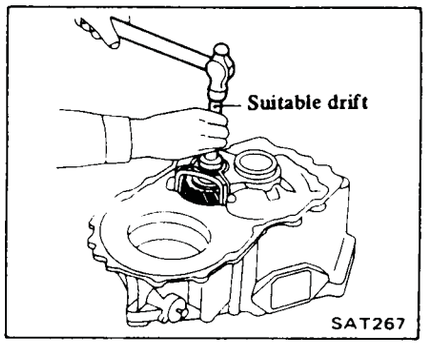


19. Tap output shaft, then remove it together with front cover.

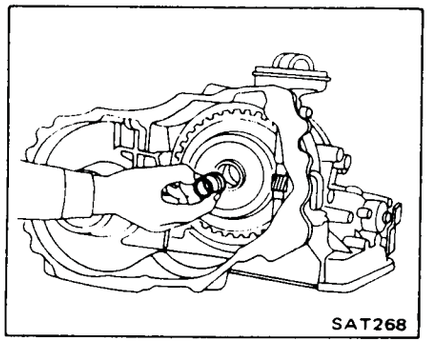
a. When tapping output shaft, be sure to hold front cover so that it does not fall.
b. Adjusting shim is attached to rear internal gear side of output shaft so be careful not to lose it.



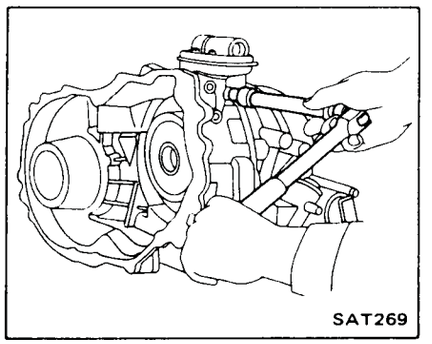
20. Remove front cover gasket.
21. Remove idler gear, idler gear shaft and taper roller bearings by tapping idler gear shaft.



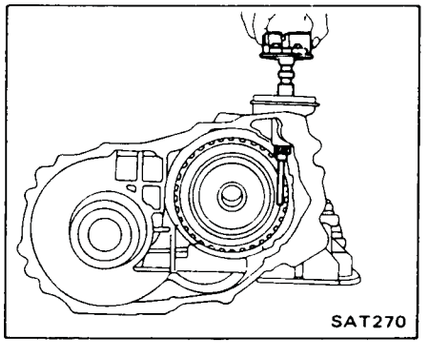
22. Remove seal bushing.



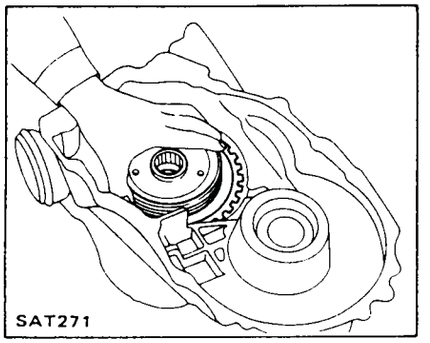
23. Remove governor shaft retaining bolt.



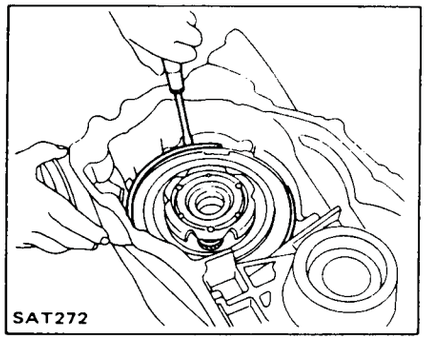
24. Pull out governor shaft.



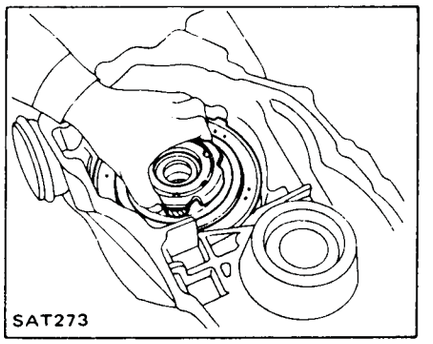
25. Remove rear internal gear, bearing race and thrust washer.



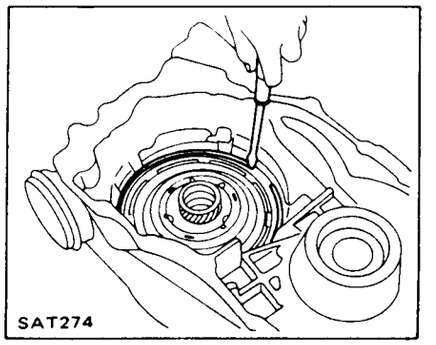
26. Remove one-way clutch snap ring.



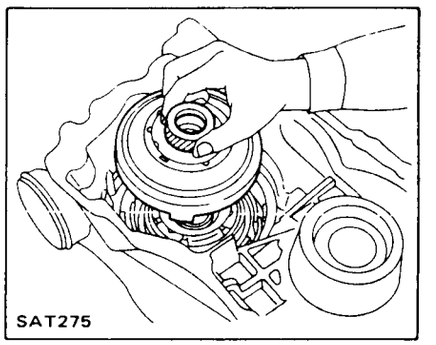
27. Remove one-way clutch assembly together with rear carrier assembly.



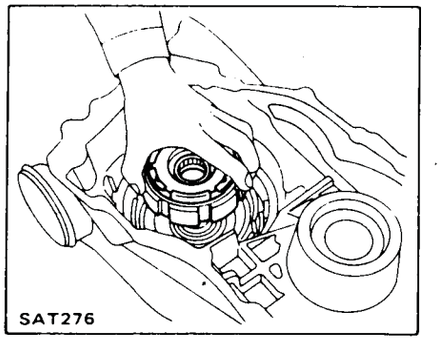
28. Remove bearing race and thrust washer.
29. Remove low and reverse brake snap ring.



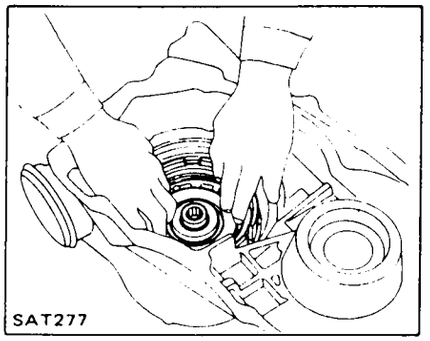
30. Remove shell & sun gear assembly, thrust needle bearing and bearing race.



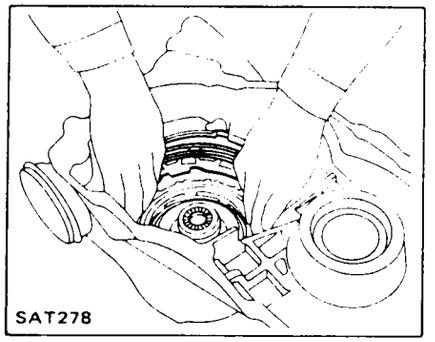
31. Remove front carrier assembly together with front internal gear.



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

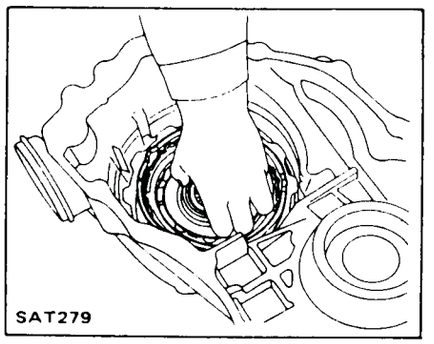


33. Remove low and reverse brake retaining plate, driven plates and drive plates at the same time.

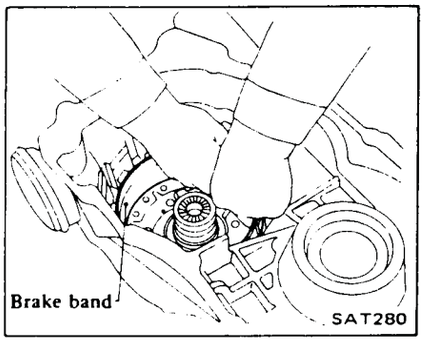


34. Remove high-reverse clutch (Front) assembly by turning it.

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.

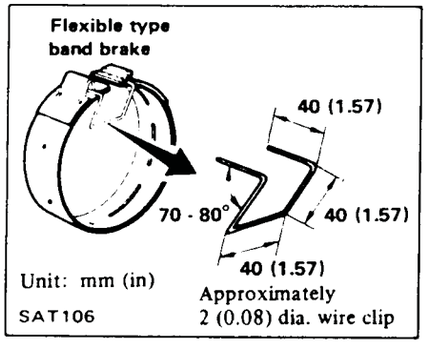


35. Remove brake band.

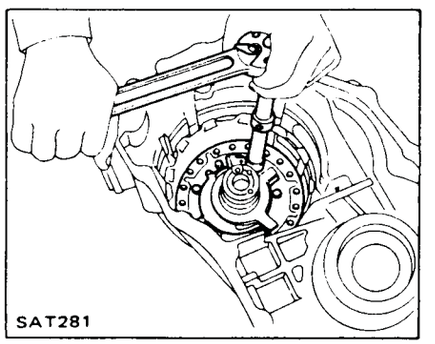


To prevent brake linings from cracking or peeling, do not stretch the flexible band unnecessarily. Before removing the brake band, always secure it with a clip as shown in the figure below.

Leave the clip in position after removing the brake band.

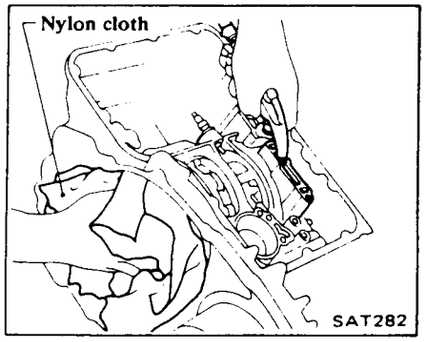


36. Remove low and reverse brake retainer.

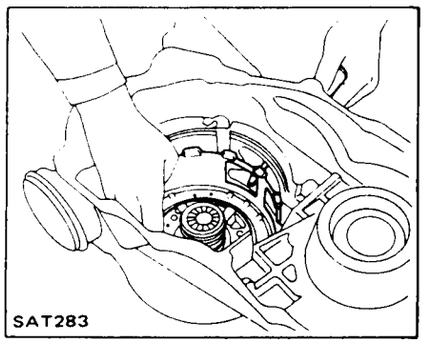


37. Remove low and reverse brake piston with compressed air.

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

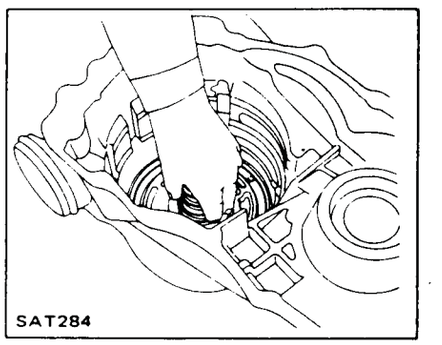


If compressed air is not available, remove it with a screwdriver.

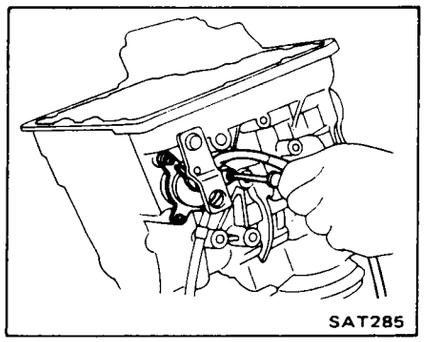


38. Remove oil pump assembly, thrust washer and thrust needle bearing.

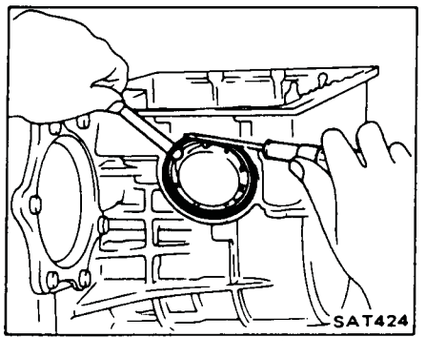
The oil pump and transmission case fit loosely, but the clearance is very small. So always lift it straight out of transmission case.



39. Remove inhibitor switch.



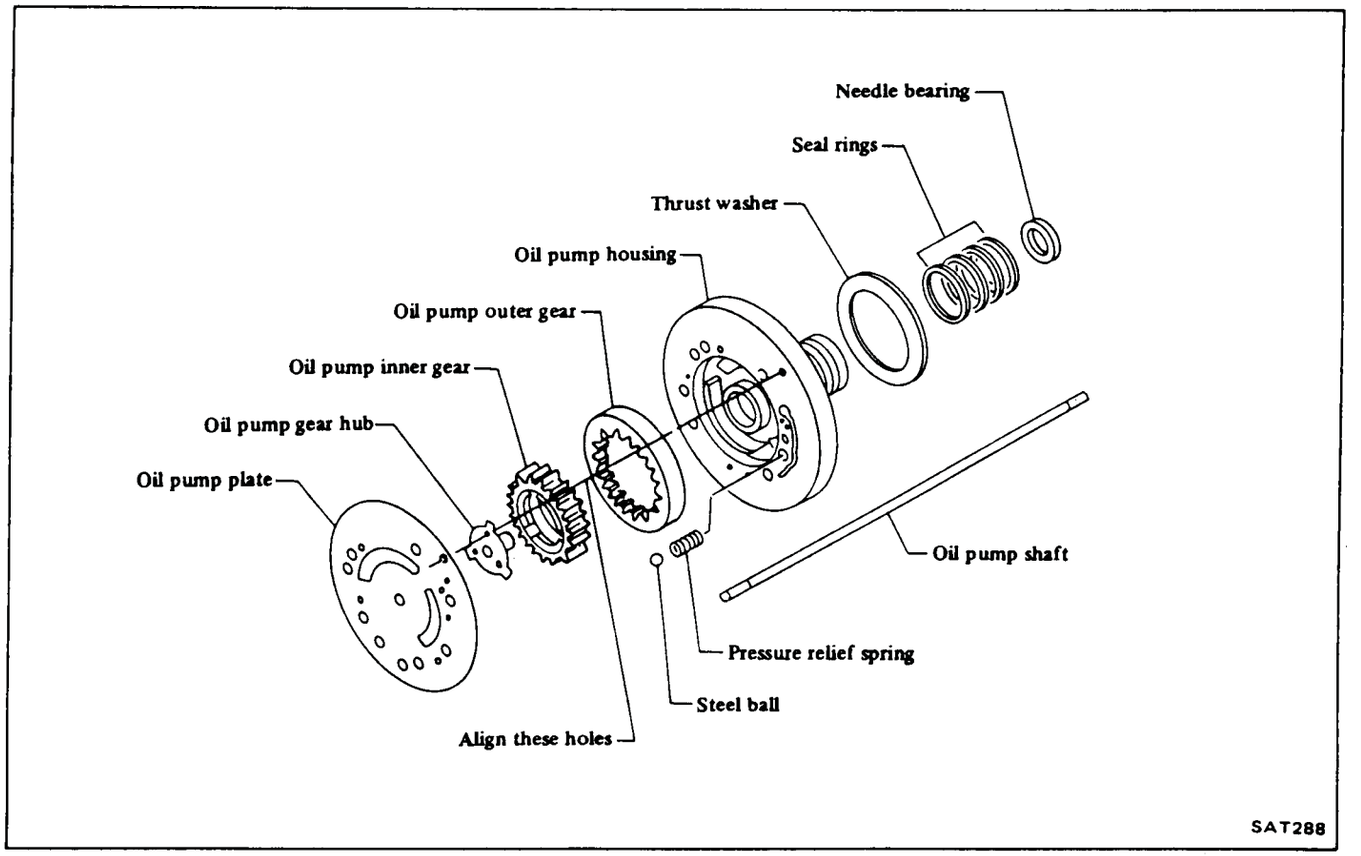
40. Remove band servo piston and return spring. Then, transmission case can be removed.



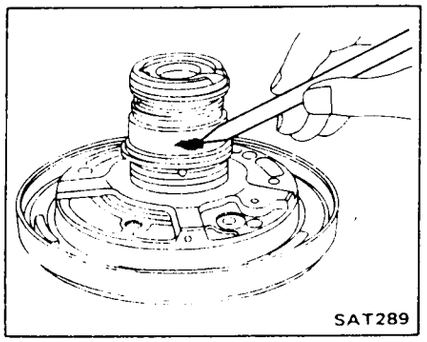
COMPONENT PARTS

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.

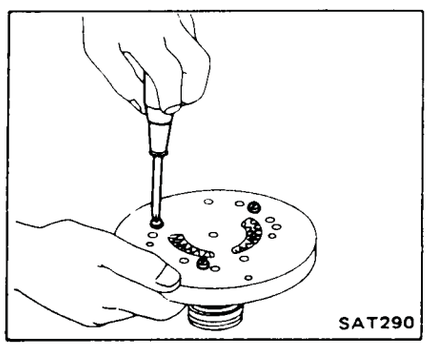
OIL PUMP



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



2. Remove oil pump plate.

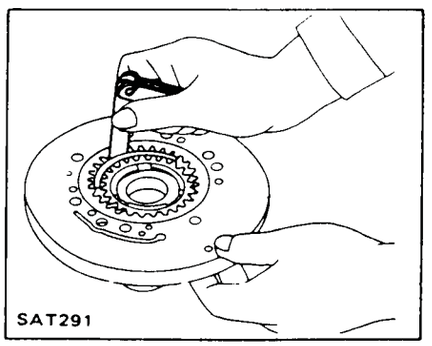


3. Inspect gears and all internal surfaces for faults and visible wear.

4. Measure clearance between outer gear and crescent.

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

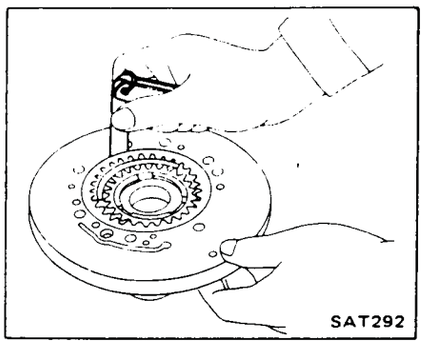
Repalce if the clearance exceeds **0.35 mm (0.0138 in).**



5. Measure clearance between outer gear and pump housing.

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

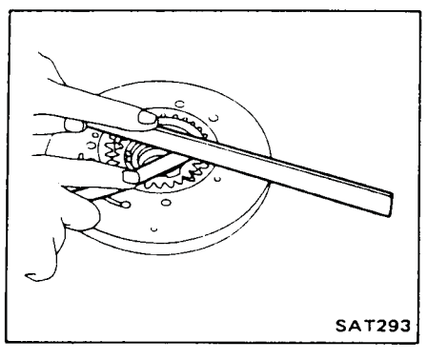
Replace if the clearance exceeds **0.35 mm (0.0138 in).**



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).**

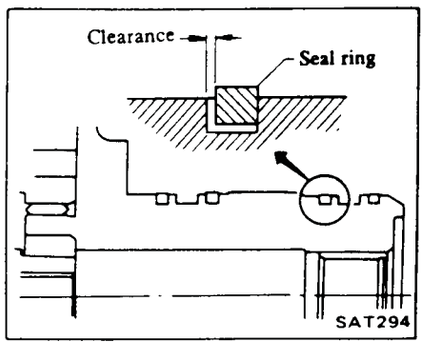


7. Measure clearance between seal ring and ring groove.

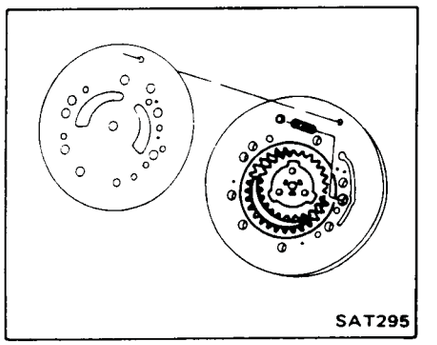
Standard clearance:
0.10 - 0.25 mm
(0.0039 - 0.0098 in)

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.

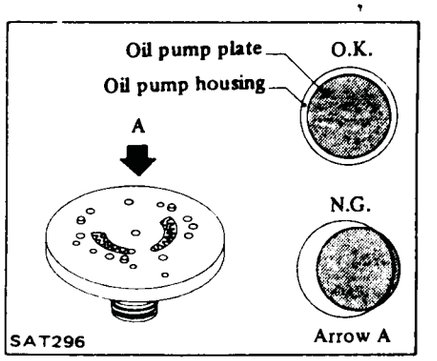


8. Install oil pump gear hub, pressure relief spring and steel ball onto oil pump housing.



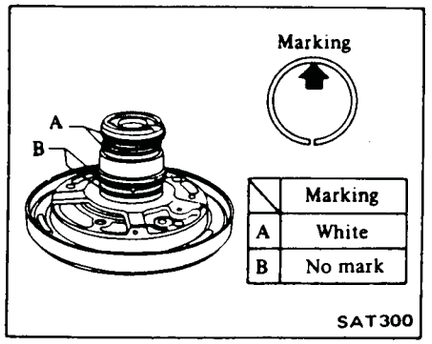
9. Install oil pump plate.

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



10. Install seal rings.

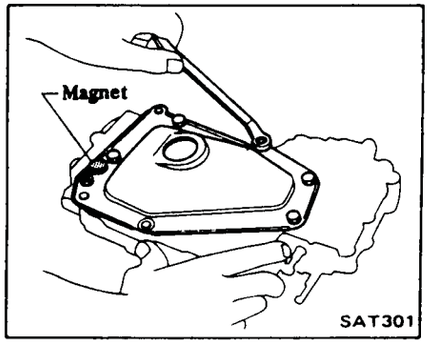
Refer to the following figure for proper locations of the two different types of seal rings.



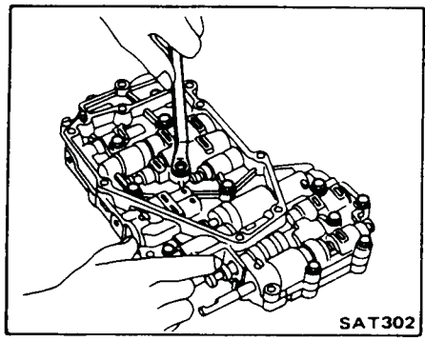
CONTROL VALVE BODY

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.

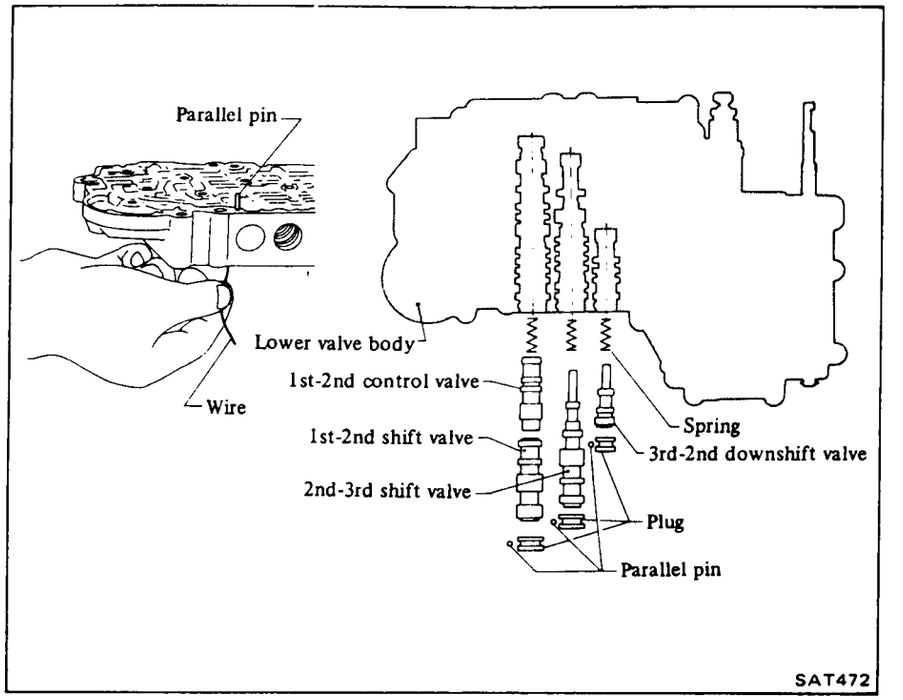


2. Disassemble valve body and its remaining attaching bolts and nuts to carefully separate lower body, separator plate and upper body.



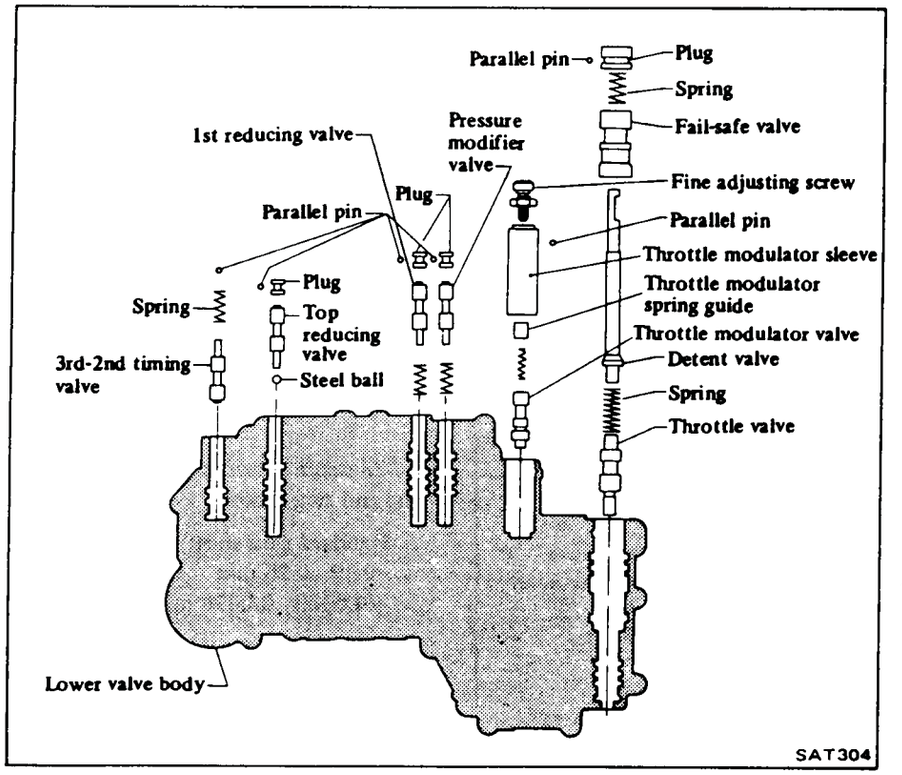
3. During valve body separation, do not lose the 6 steel balls on valve upper body.
4. Remove parallel pins with wire, then remove plugs, 3rd-2nd downshift valve, 2nd-3rd shift valve, 1st-2nd shift valve, 1st-2nd control valve and their springs.

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



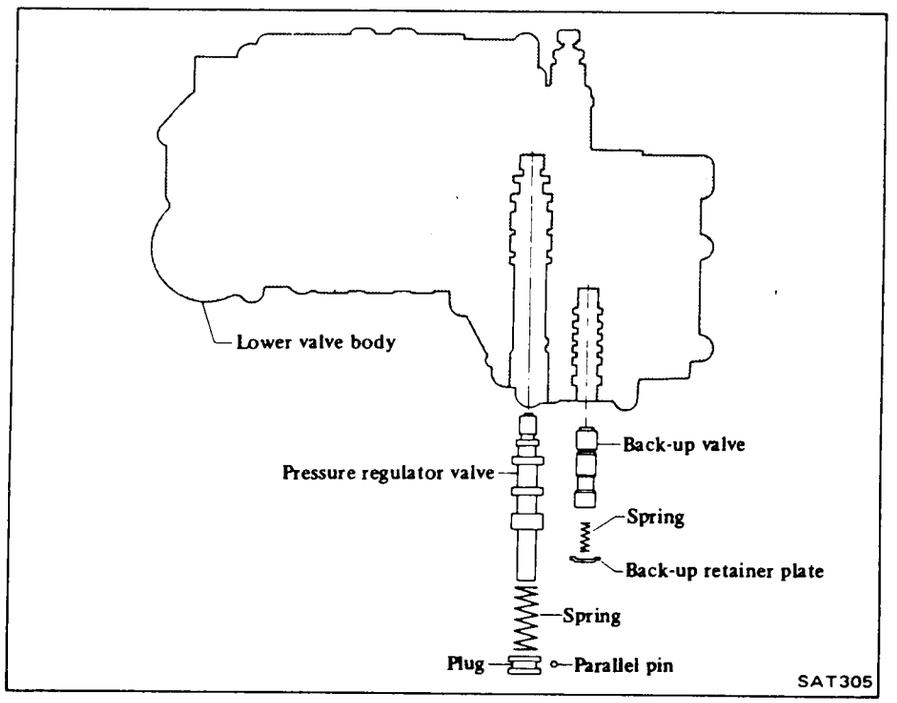
5. Remove parallel pins with wire, then remove plugs, fail-safe valve, throttle valve, detent valve, throttle modulator valve with spring guide, pressure modifier valve, 1st reducing valve, top reducing valve, 3rd-2nd timing valve and their springs.

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.

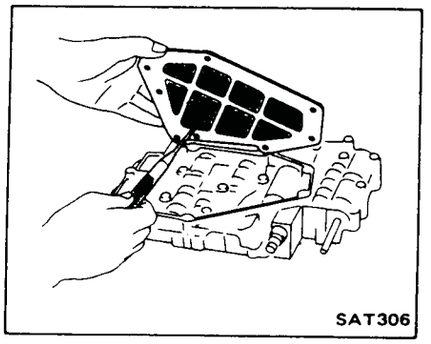
During cleaning, do not remove the sharp edges of the valve. When edges are rounded or scratched, entry is provided for dirt or foreign matter to work into the sides of the valves and hinder valve movement.

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.**

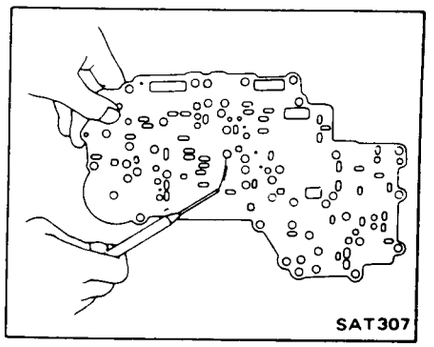
Lubricate all parts in clean automatic transaxle fluid before reassembly.

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

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



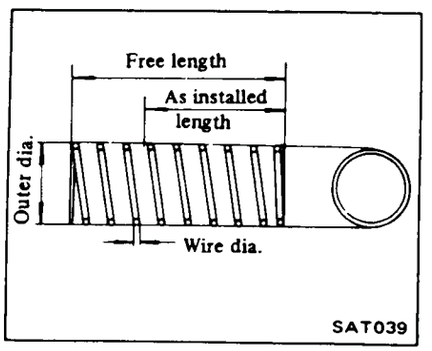
9. Check separator plate for scratches or damage. Replace if necessary. Scratches or score marks can cause oil to bypass correct oil passages and result in system malfunction.



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.

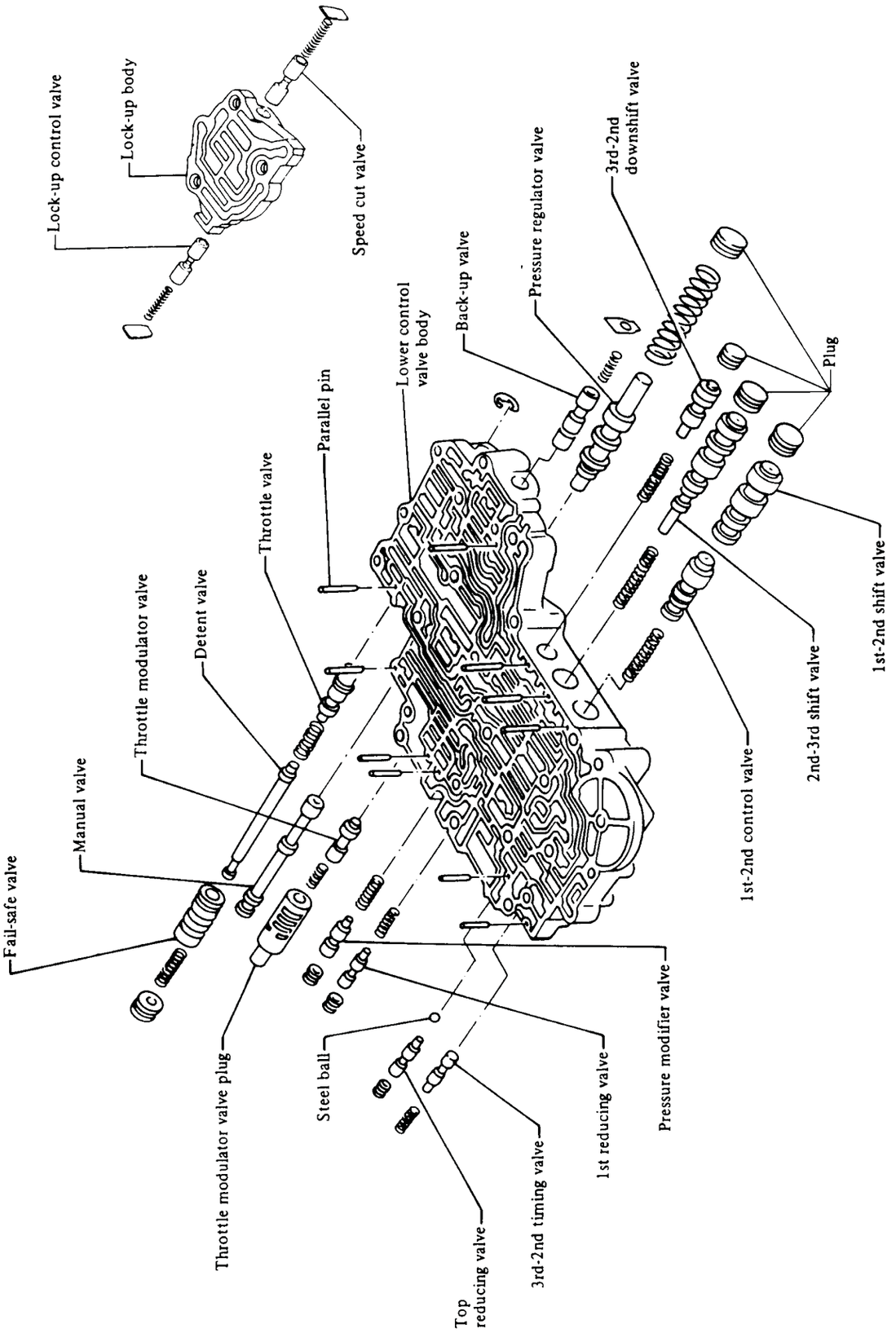
Valve body spring chart



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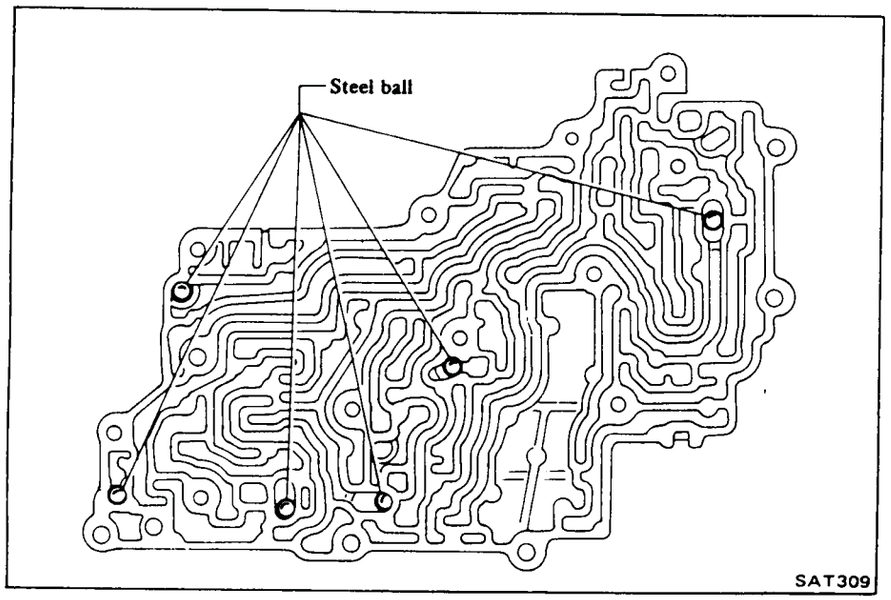
13. Reinstall the six steel balls in upper valve body.



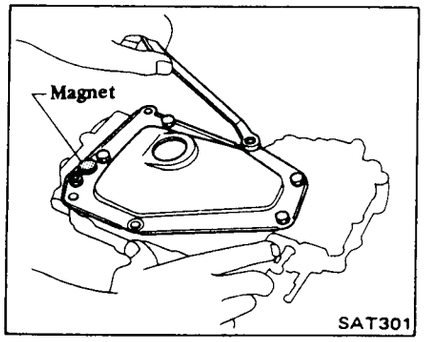
14. Assemble separator plate and lower valve body on upper valve body, then tighten bolts.

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.



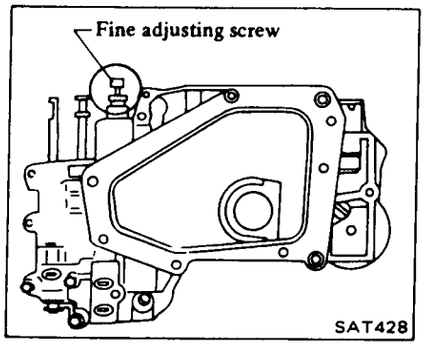
Ⓣ : Oil strainer to valve body
2.5 - 3.4 N·m
(0.25 - 0.35 kg-m,
1.8 - 2.5 ft-lb)

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

Fine adjusting screw

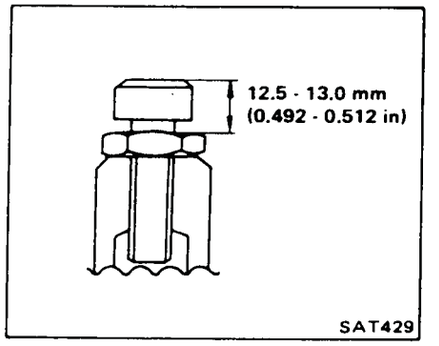
The fine adjusting screw provides a maximum fine adjustment of approximately 5 km/h (3 MPH).

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

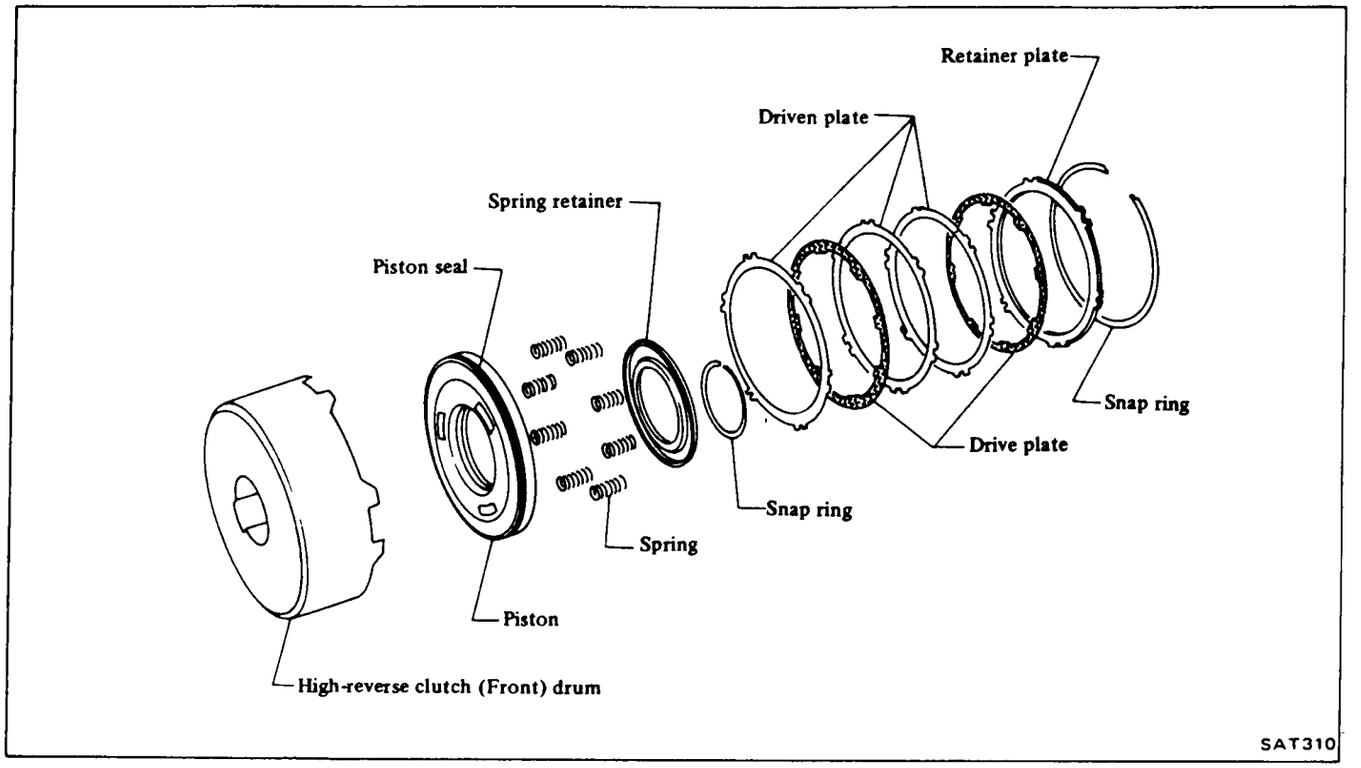


- The standard position of the fine adjusting screw is shown below.

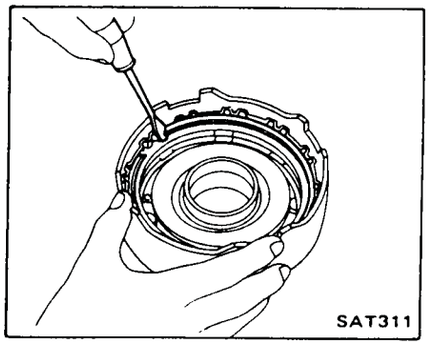
Ⓣ : Lock nut
3.4 - 4.4 N·m
(0.35 - 0.45 kg-m,
2.5 - 3.3 ft-lb)



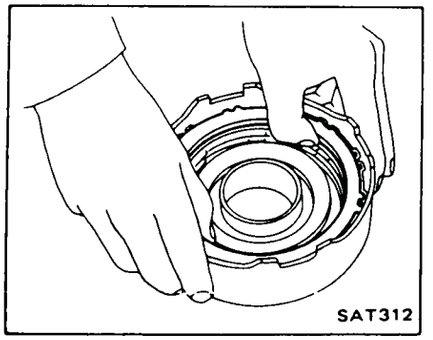
HIGH-REVERSE CLUTCH (Front)



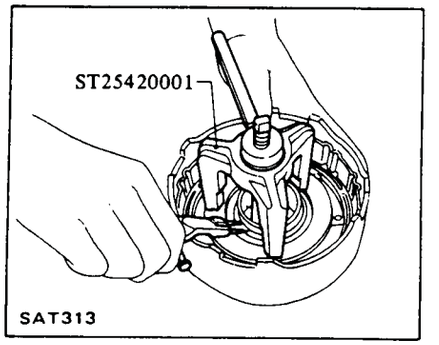
1. Using a screwdriver, remove large clutch retaining plate snap ring.



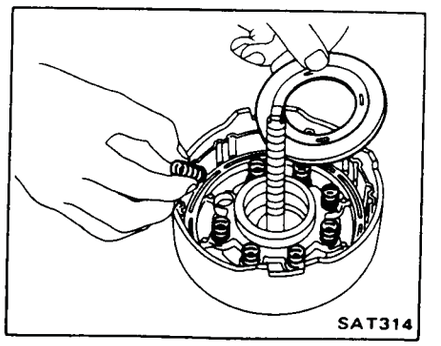
2. Remove clutch plates assembly.



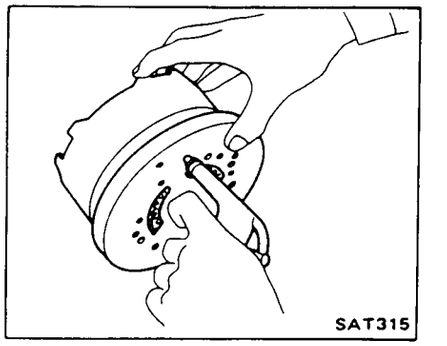
3. Compress clutch springs and remove snap ring from spring retainer.



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)**.

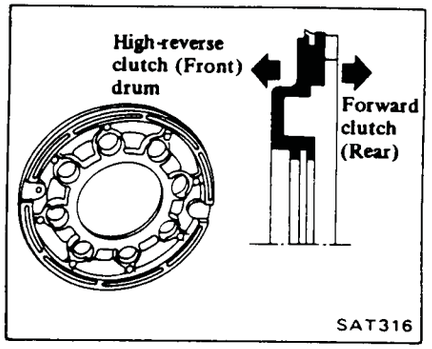
Standard drive plate thickness:
1.50 - 1.65 mm
(0.0591 - 0.0650 in)

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

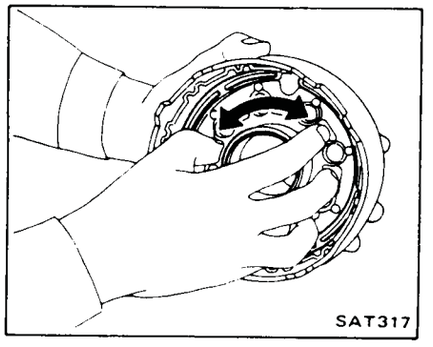
8. Lubricate clutch drum bushing, and install inner seal and piston seal as illustrated. *Be careful not to stretch seals during installation.*

a. Never assemble clutch dry; always lubricate its components thoroughly.

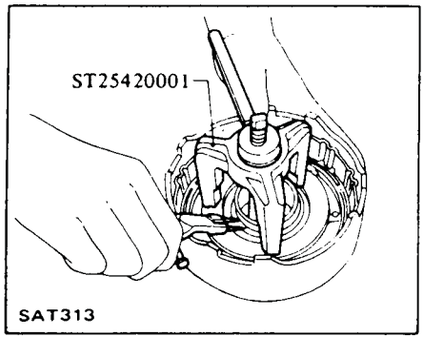
b. Always install piston seal in direction shown in figure below.



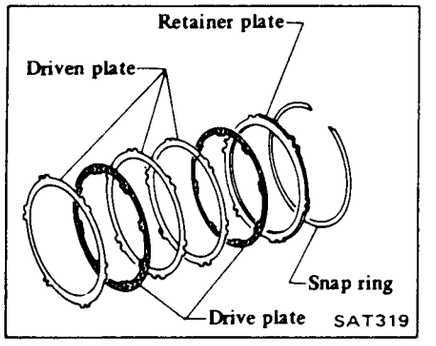
9. Assemble piston, being careful not to allow seal to kink or become damaged during installation. After installing, turn piston by hand to ensure that there is no binding.



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)

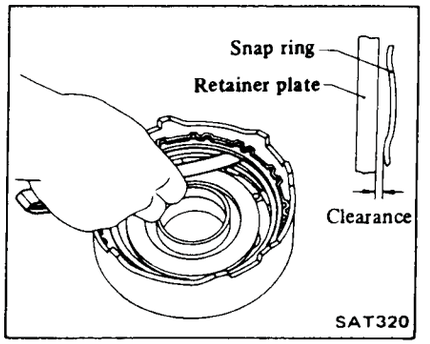
Allowable limit

2.2 mm (0.087 in)

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

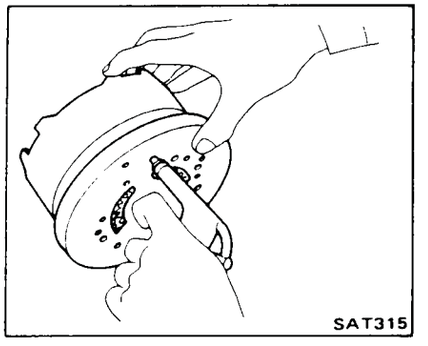
Available retainer plate

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

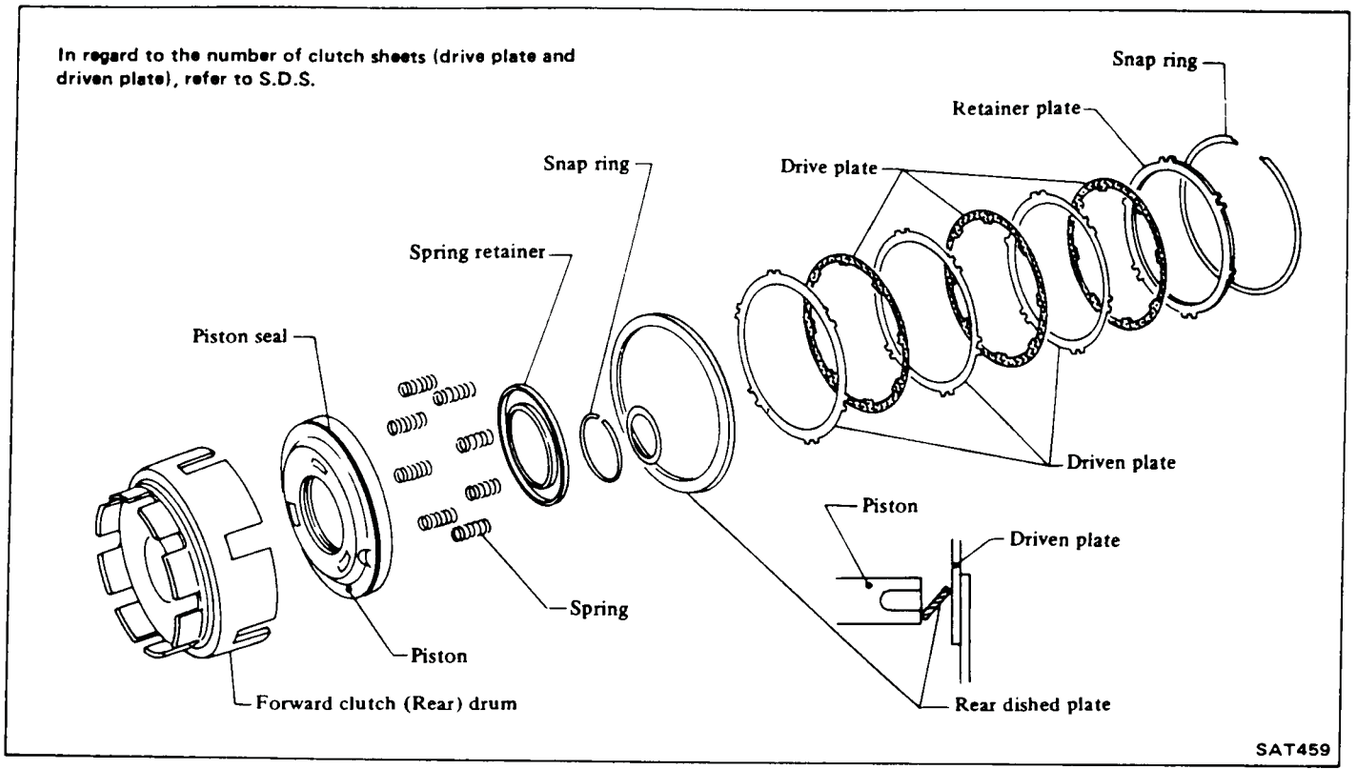


13. Testing high-reverse clutch (Front)

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:

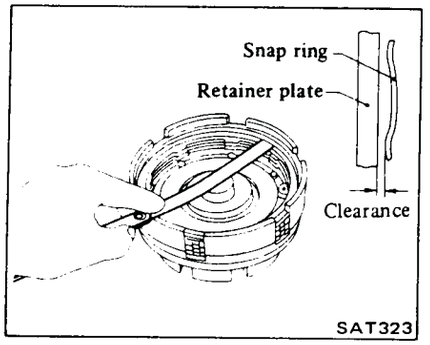
Specified clearance between retainer plate and snap ring:

Standard

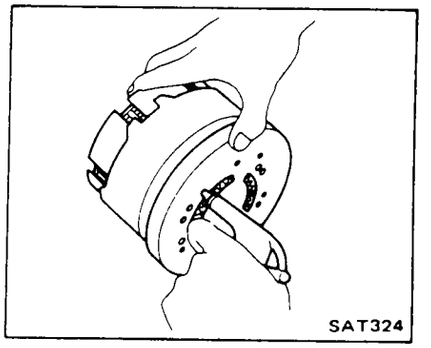
0.8 - 1.2 mm (0.031 - 0.047 in)

Allowable limit

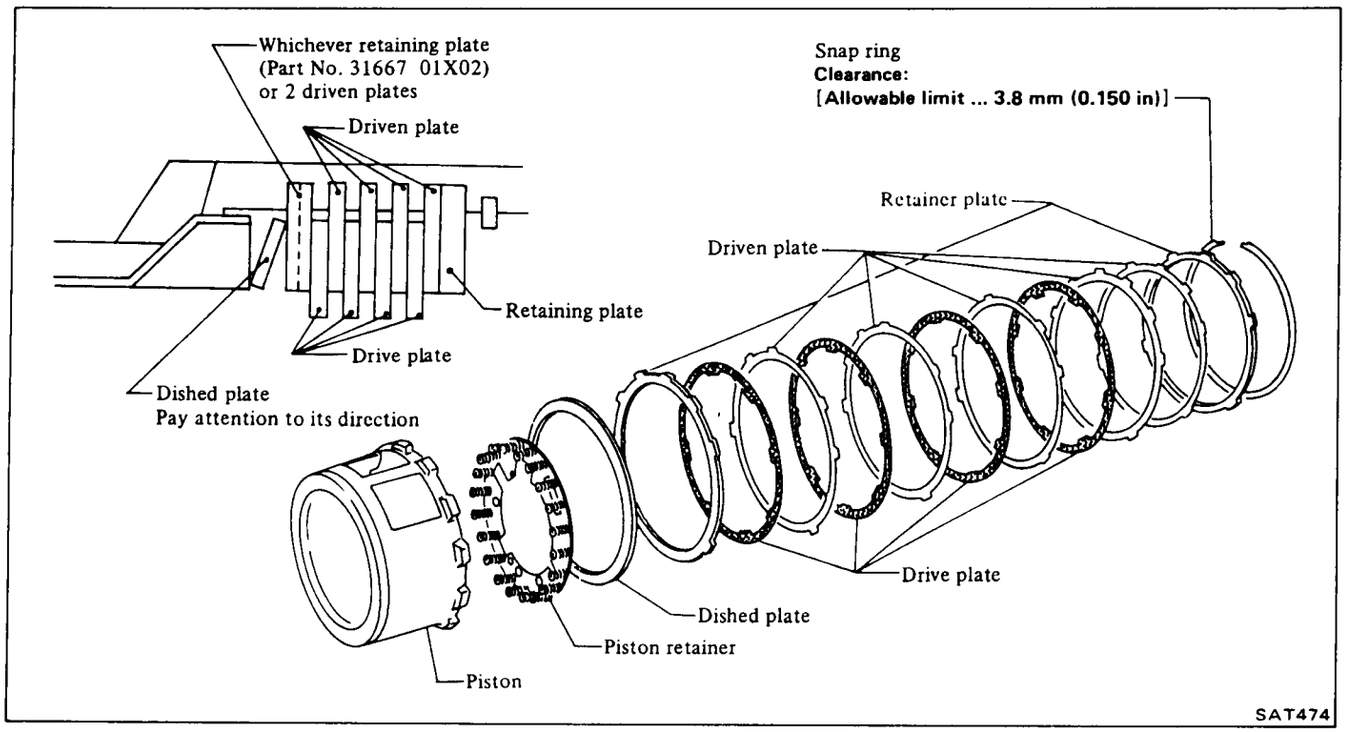
2.8 mm (0.110 in)



Test forward clutch (Rear)



LOW & REVERSE BRAKE

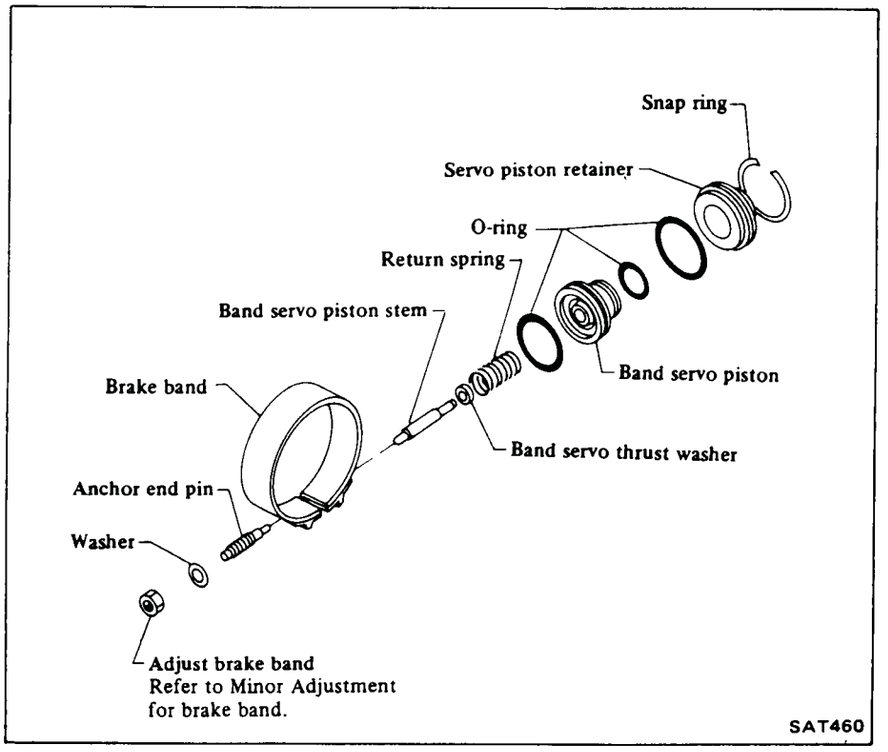


- Examine low and reverse brake for damaged clutch drive plate facing and worn snap ring.
- Check drive plate facing for wear or damage; if necessary, replace.

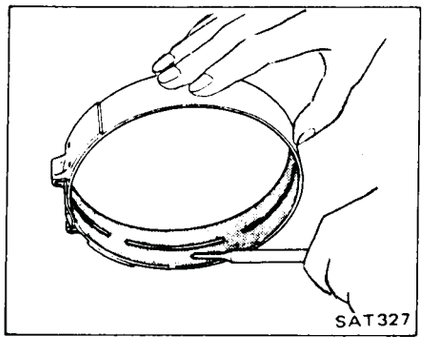
Drive plate thickness:
Standard
1.90 - 2.05 mm
(0.0748 - 0.0807 in)
Allowable limit
1.8 mm (0.071 in)

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

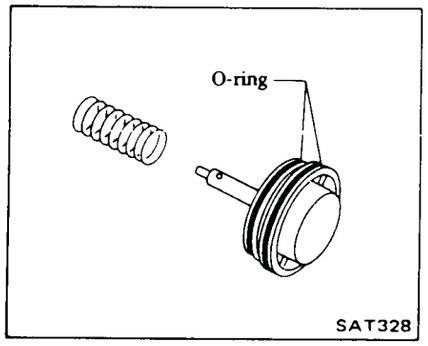
BRAKE BAND AND BAND SERVO



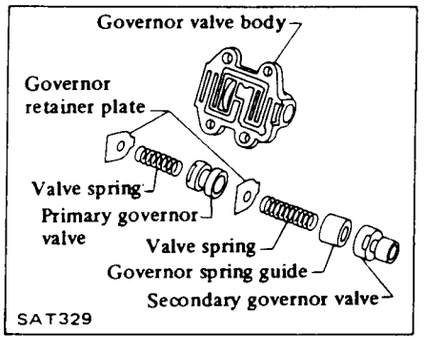
- Inspect band friction material for wear. If cracked, chipped or burnt spots are apparent, replace the band.



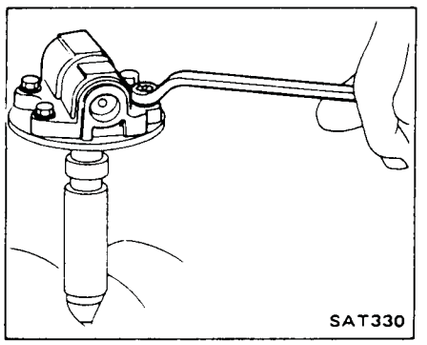
- Check band servo components for wear and scoring. Replace piston O-rings and all other components as necessary.



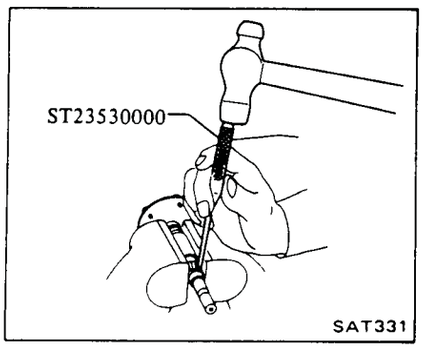
GOVERNOR



- Remove governor body from governor shaft.



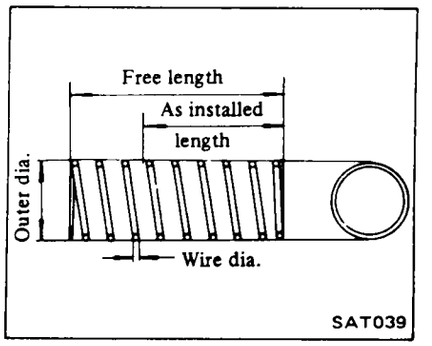
- Remove governor worm.



- 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

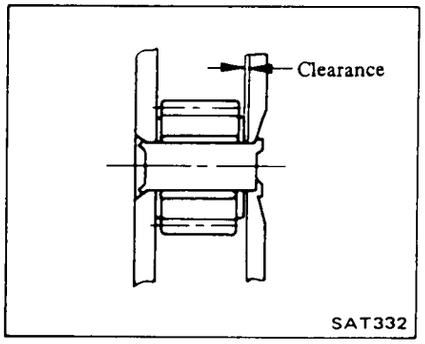
The planetary carrier cannot be divided into its individual components.

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

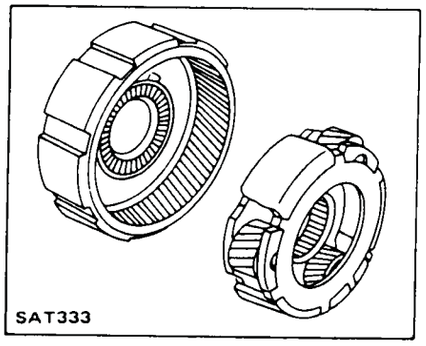
- Check clearance between pinion washer and planetary carrier with a feeler.

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

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

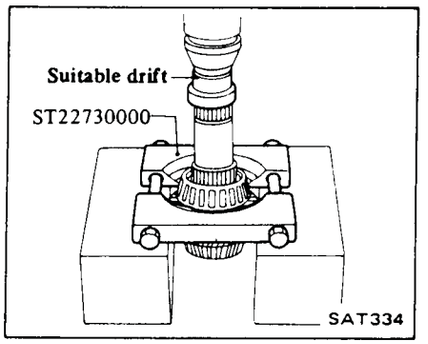


- Check planetary gear sets for damaged or worn gears. Gear sets that have been damaged by overheating will have a blue discoloration.

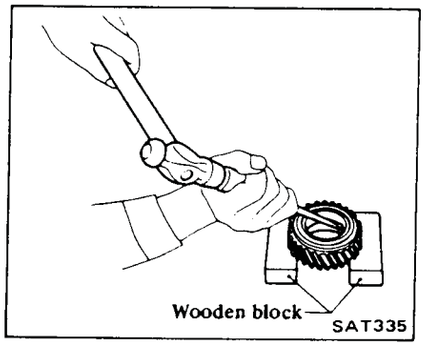


OUTPUT SHAFT AND IDLER SHAFT

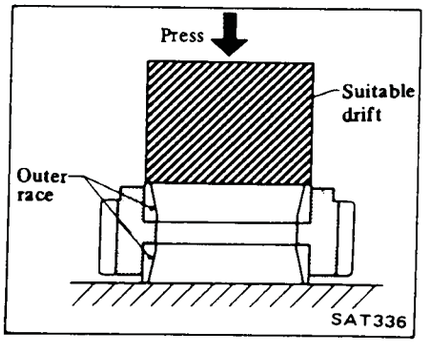
1. Remove inner races from output shaft.



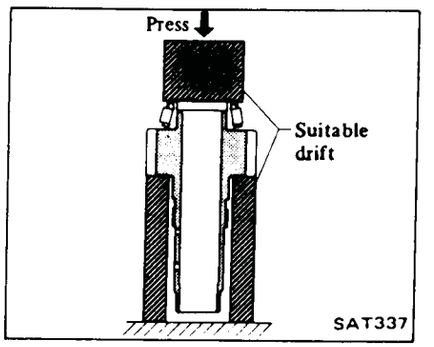
2. Remove outer races from ilder gear.



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.

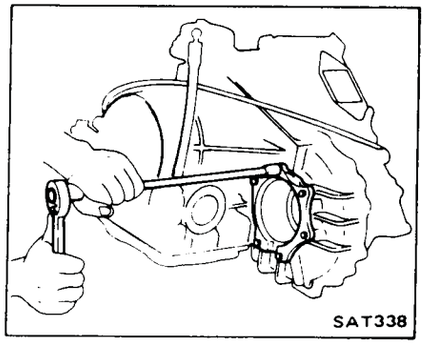


7. Install inner races on output shaft.

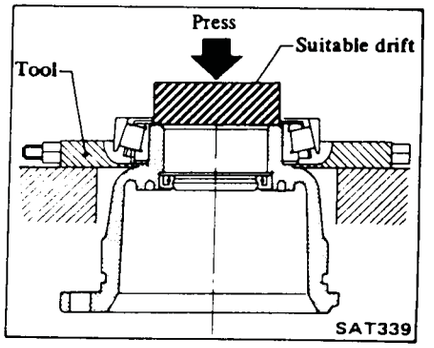


BEARING HOUSING

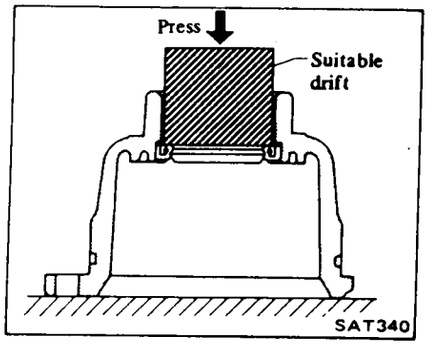
1. Remove bearing housing from transmission case.



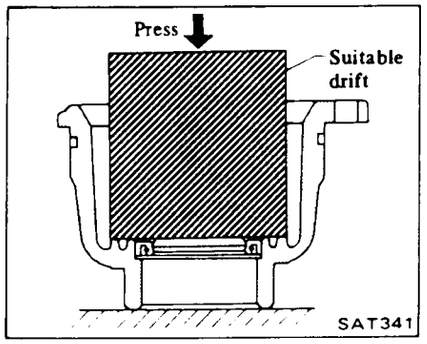
2. Remove inner race.



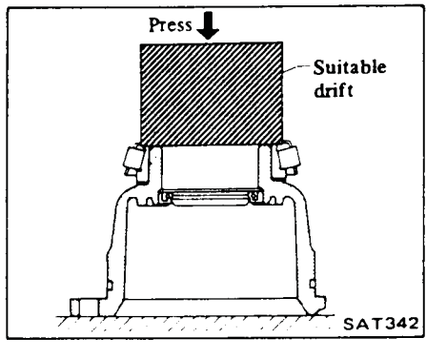
3. Remove oil seal and O-ring.



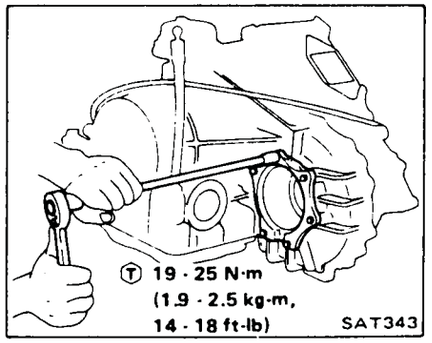
4. Apply coat of gear oil to seal surface and O-ring, then drive new seal and O-ring into place.



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.

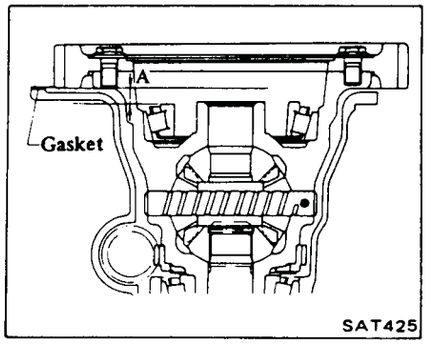
Adjusting procedures

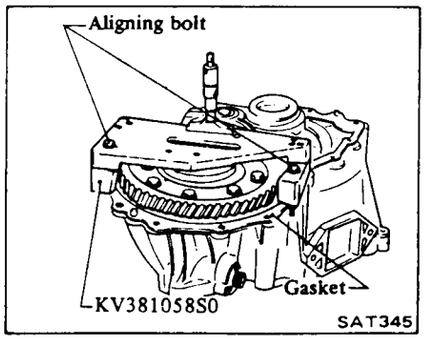
Two types of adjusting procedures have been established.

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.

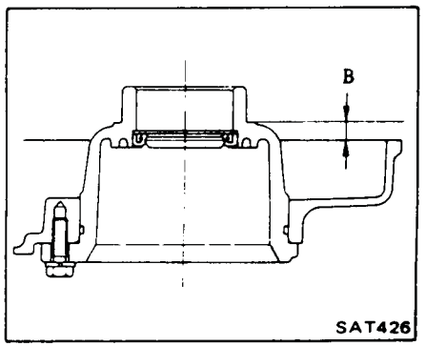


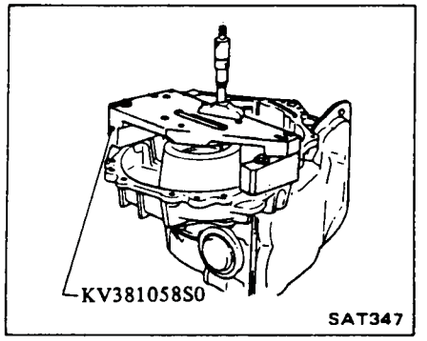


A = Measured value
– Thickness of special tool

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:

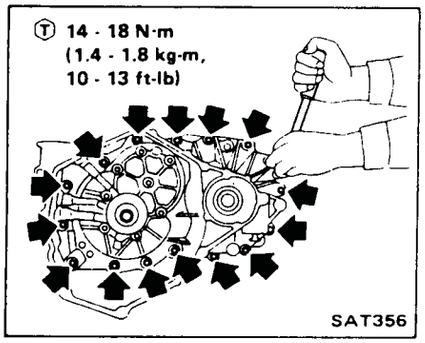
H = A – B

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.

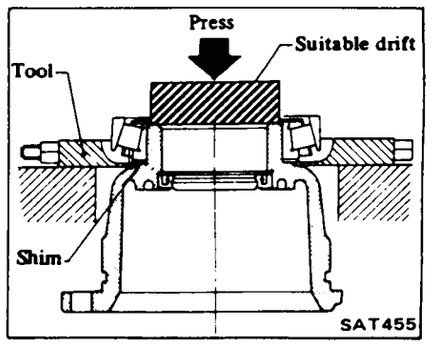
Specified rotary frictional force:
5.9 - 7.4 N·m
(60 - 75 kg-cm,
52 - 65 in-lb)

- **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.**

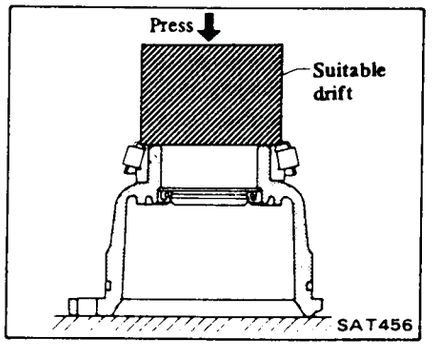
14. Disassemble transmission case and remove final drive assembly.

Type B

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

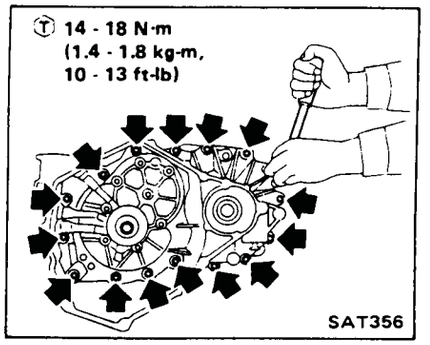


2. Press fit bearing inner race into place **without shim.**



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.

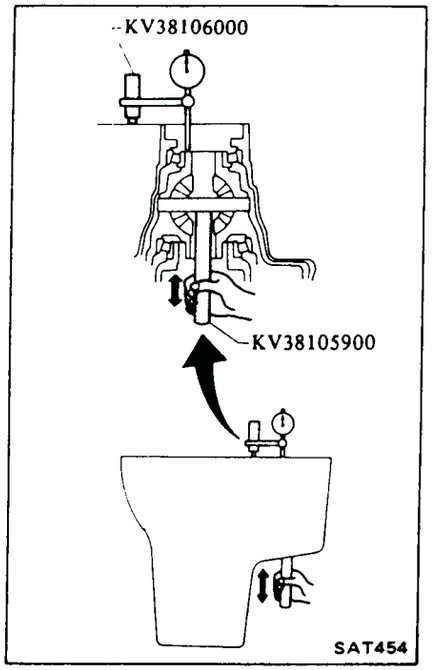
Tighten bolts to the same torque in a crisscross fashion.



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.

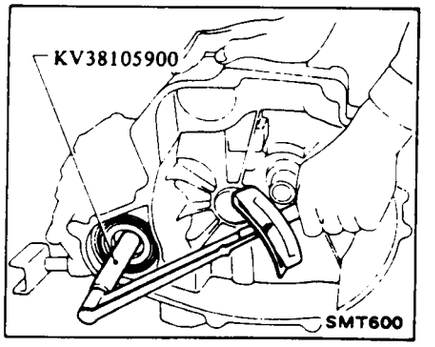
6. Insert Tool KV38105900 all the way into diff. side gear. Move Tool up and down and measure dial gauge deflection.



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.

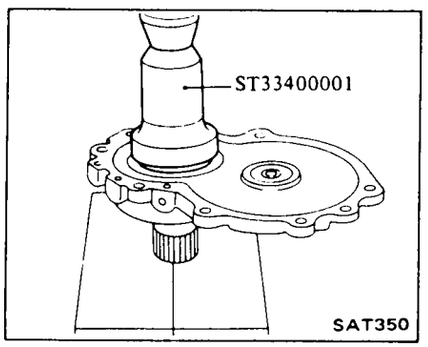
Disassembly and assembly procedures

Refer to Section MT.

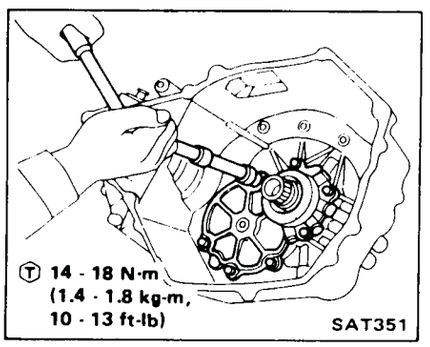
OUTPUT SHAFT

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.



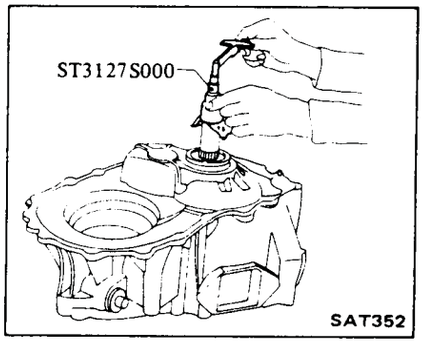
4. Install gasket and front cover on converter housing.



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

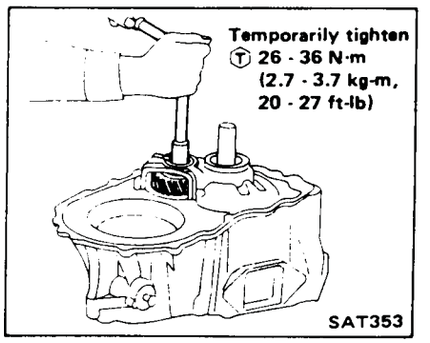
1. Press bearing outer races onto idler gear.
2. Assemble bearing inner races and idler shaft to idler gear.
3. Attach idler gear assembly and output shaft assembly to converter housing.
4. Install gasket and front cover on converter housing as follows:
(1) Clean threads of bolts and converter housing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

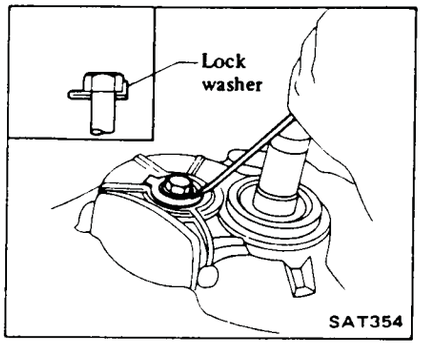
Ⓣ : 26 - 36 N·m
(2.7 - 3.7 kg-m,
20 - 27 ft-lb)



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.

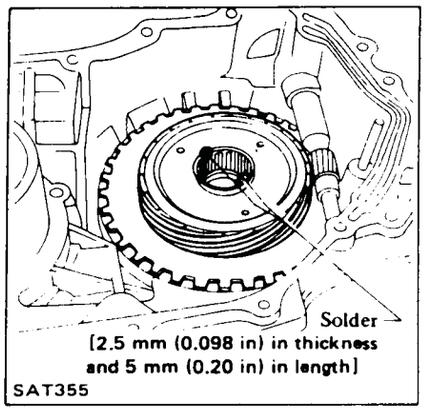


ADJUSTING END PLAY OF OUTPUT SHAFT

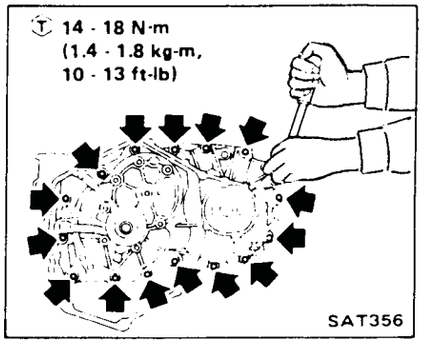
1. After adjusting rotary frictional force of tapered roller bearing used with output shaft, put solder on rear internal gear.

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.



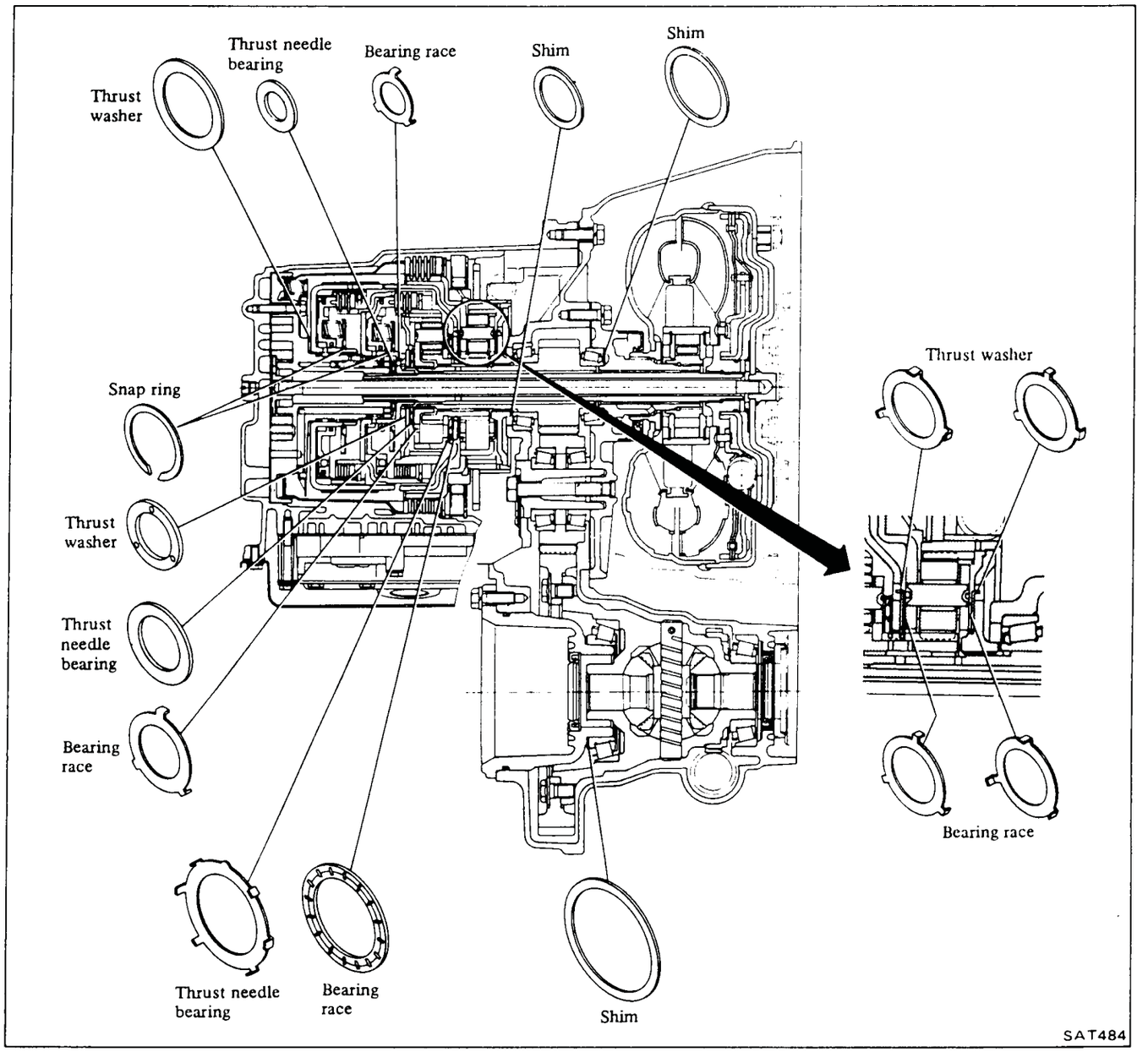
3. Disassemble output shaft assembly and remove soldering plate.

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.

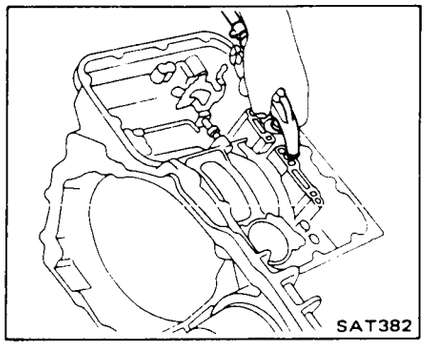
FINAL ASSEMBLY

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



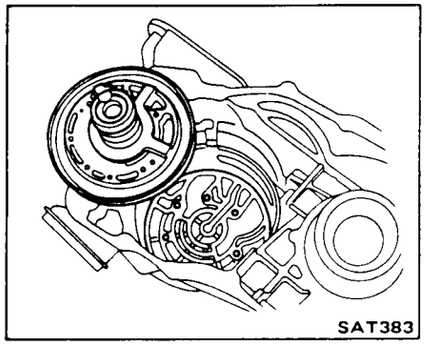
1. Before proceeding with the final assembly of all components, it is important to verify that the case, housing and parts are clean and free from dust, dirt and foreign matter (use air gun). Have a tray available with clean transaxle fluid for lubricating parts.

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

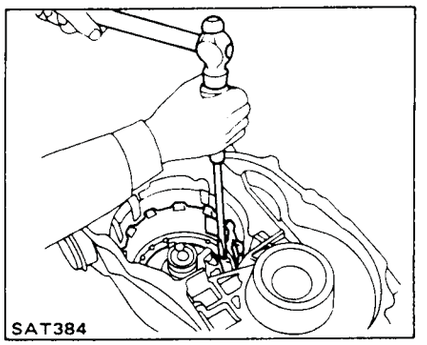


2. Apply automatic transaxle fluid or vaseline to outer diameter part of oil pump assembly. Install oil pump assembly, nylon washer and thrust bearing.

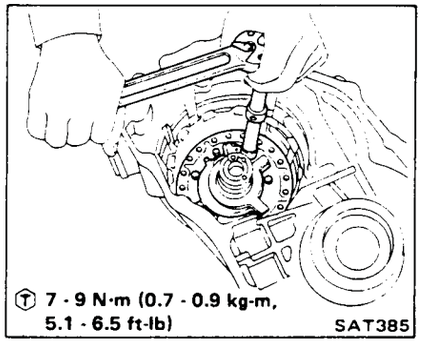
Align five bolt holes on oil pump assembly and transmission case and install oil pump.



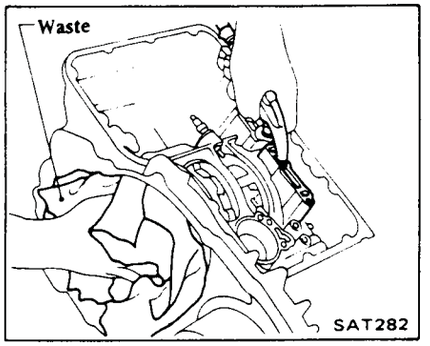
3. Apply automatic transaxle fluid or vaseline to low and reverse brake piston seal then install piston by tapping it evenly.



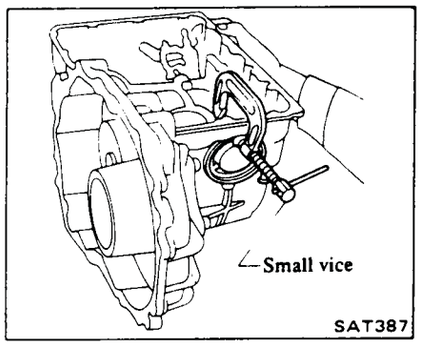
4. Install low and reverse brake piston retainer.



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.



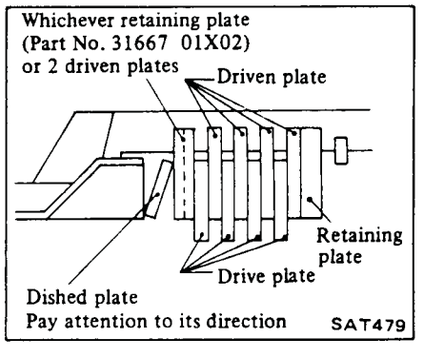
5. Install brake band. Apply automatic transaxle fluid or vaseline to band servo piston O-ring and install band servo piston, return spring and snap ring holding piston with a small vice.



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

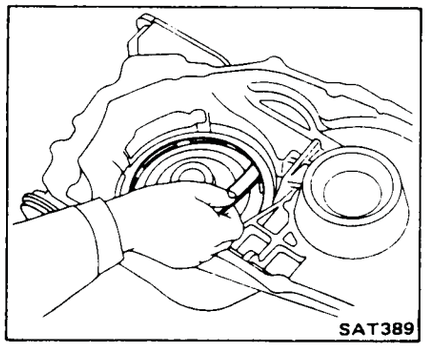
7. Install forward clutch (Rear), front internal gear, thrust bearing, bearing race, front carrier, bearing race, thrust bearing and sun gear assembly in the reverse order of removal. Prior to assembly, apply automatic transaxle fluid or grease to thrust bearings and bearing races.

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



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)



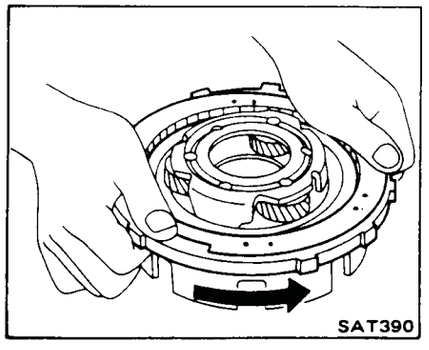
Available retainer plate (Piston side)

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

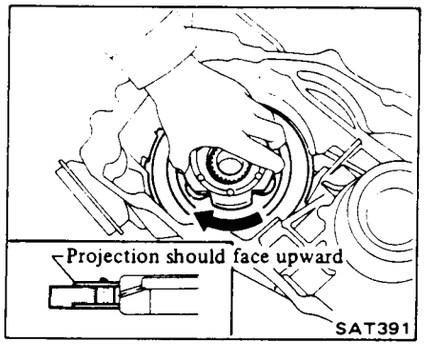
Available retainer plate (O.W.C. side)

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

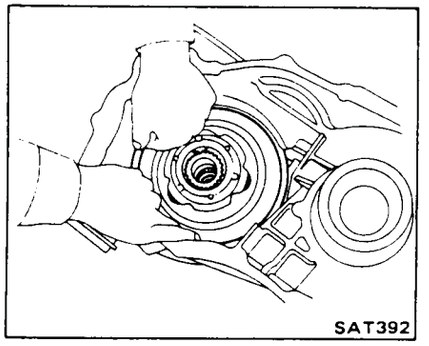
10. Install bearing race on connecting shell.
11. Apply vaseline to thrust washer, then attach it to rear carrier.
12. Install one-way clutch assembly to rear carrier by turning it counterclockwise.



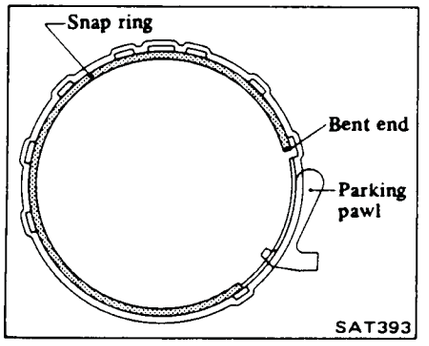
13. Apply vaseline to thrust washer and install it on rear carrier.
14. Install one-way clutch together with rear carrier by turning rear carrier clockwise.



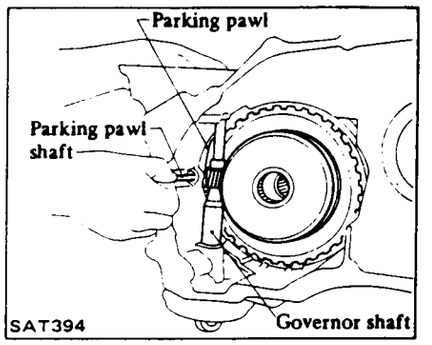
15. Install snap ring



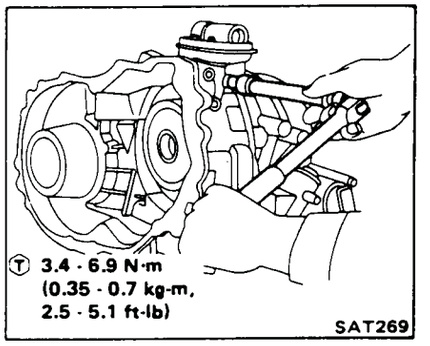
Install snap ring. Ensure that its bent end is positioned so that it does not interfere with parking pawl.



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.

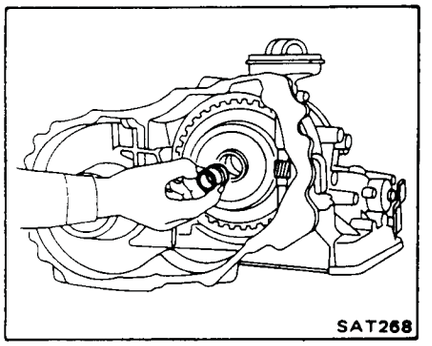


18. Install governor shaft retaining bolt.



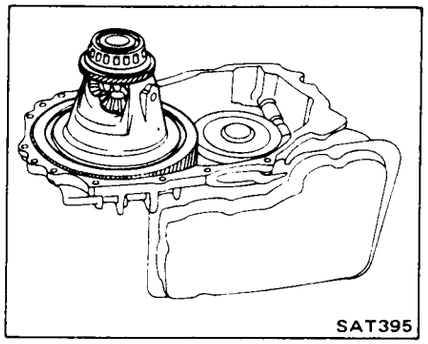
19. Install seal bushing.

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

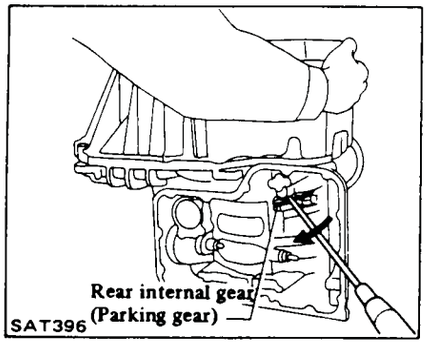


20. **Adjust end play of output shaft.** Refer to Adjusting End Play of Output Shaft.
21. **Adjust rotary frictional force of output shaft and idler gear tapered roller bearing.** Refer to Adjusting Rotary Frictional Force of Tapered Roller Bearing.

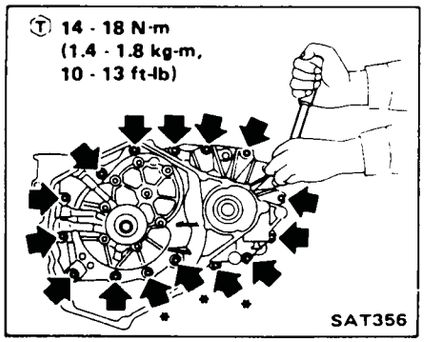
22. **Adjust rotary frictional force of final drive tapered roller bearing.** Refer to Adjusting Rotary Frictional Force of Tapered Roller Bearing.
23. Install final drive assembly on transmission case.



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.

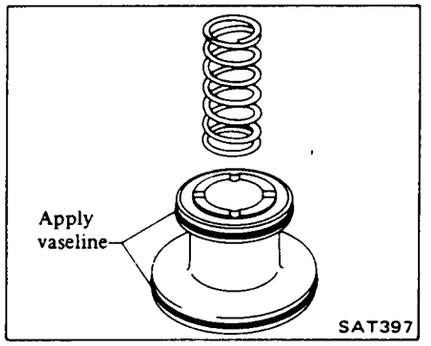


28. Tighten converter housing securing bolts to the specified torque.

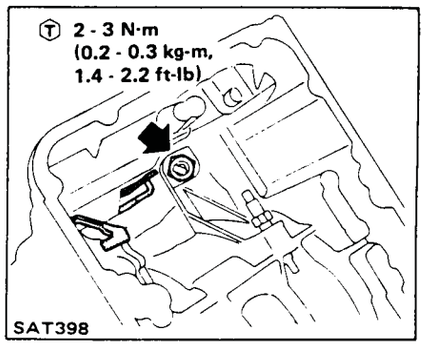


Before installing bolts marked "*" in figure below, ensure that bolt threads are clean and that locking sealer has been applied. Also ensure that the transmission case has been cleaned with solvent.

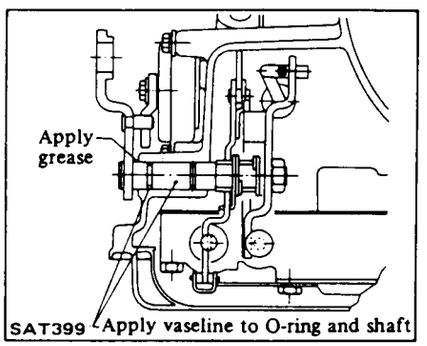
29. Apply vaseline to lathe cut ring, then install return spring and accumulator piston on transmission case.



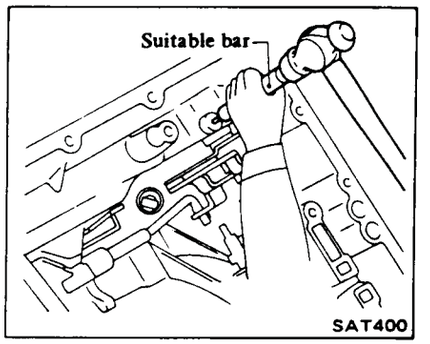
30. **Adjust brake band.** Refer to Brake Band Adjustment.
31. Assemble parking actuator support and throttle wire to transmission case. After tightening nut, bend the lock-plate securely.



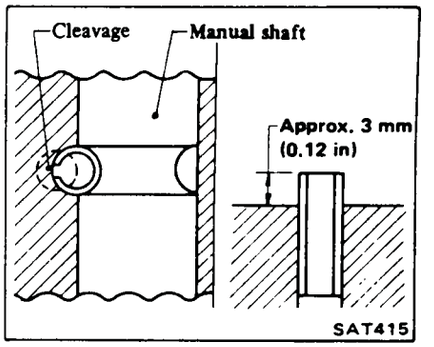
32. Apply grease and vaseline to manual shaft.



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.

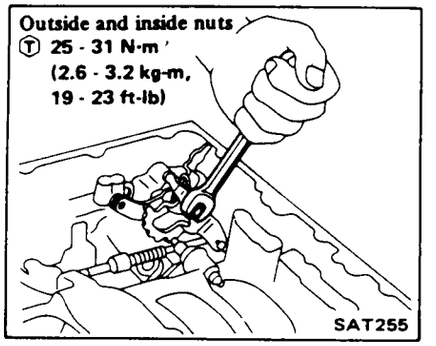


34. Tighten manual shaft securing nuts as follows:
(1) Tighten inside nut to the specified torque.

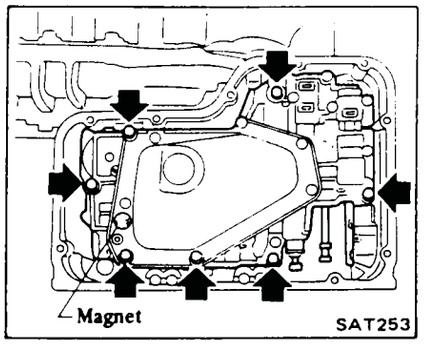
Ⓣ: **Inside nut**
25 - 31 N·m
(2.6 - 3.2 kg-m,
19 - 23 ft-lb)

(2) Tighten outside nut to the specified torque.

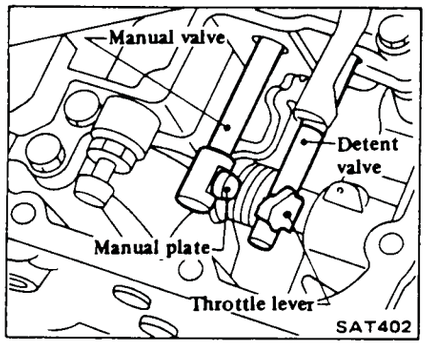
Ⓣ: **Outside nut**
25 - 31 N·m
(2.6 - 3.2 kg-m,
19 - 23 ft-lb)



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

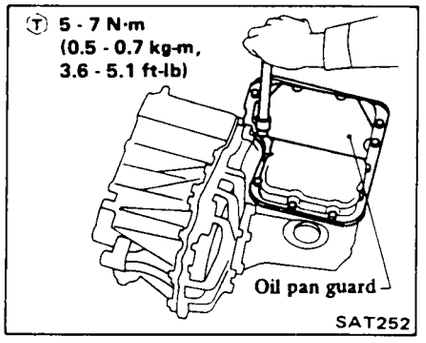


Install manual valve, manual plate, detent valve and throttle lever securely, as shown in figure below.



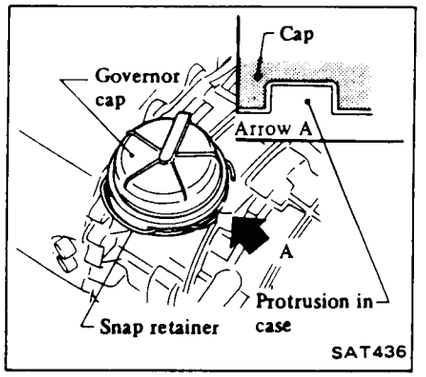
36. Before installing oil pan, check alignment and operation of manual lever and parking pawl engagement. Blow mechanism with air to clean. Make final check to be sure all bolts are installed in valve body.

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



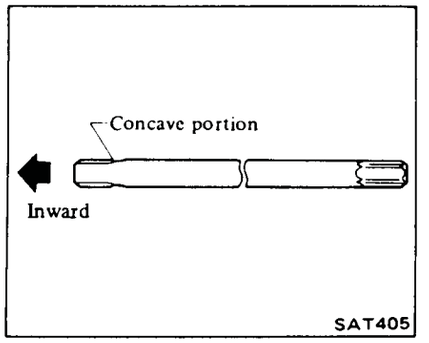
38. Install seal ring and governor cap, then secure it with snap retainer.

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.

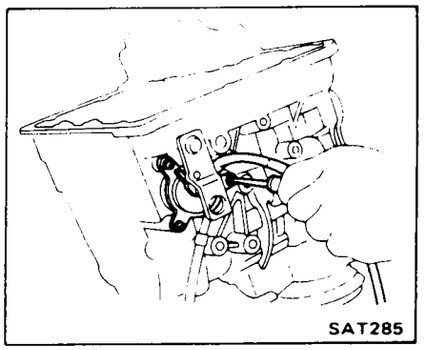
42. Install torque converter to converter housing.

Be careful not to scratch front cover oil seal.

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

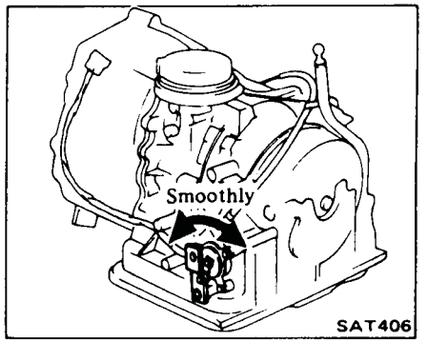
Ⓣ : **Hexagon plug**
7 - 13 N·m
(0.7 - 1.3 kg-m,
5.1 - 9.4 ft-lb)

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

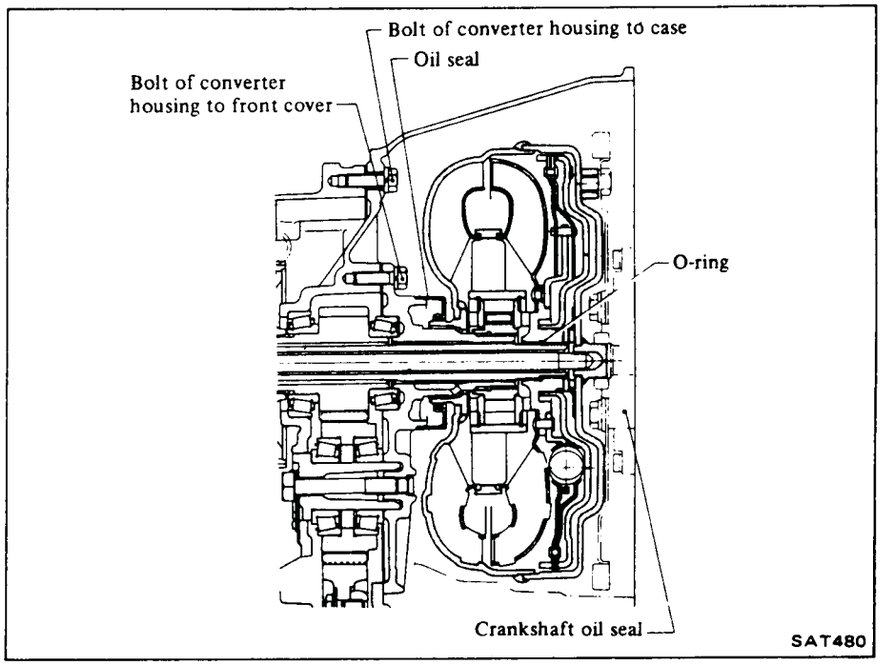
PRELIMINARY CHECKS (Prior to road testing)

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.

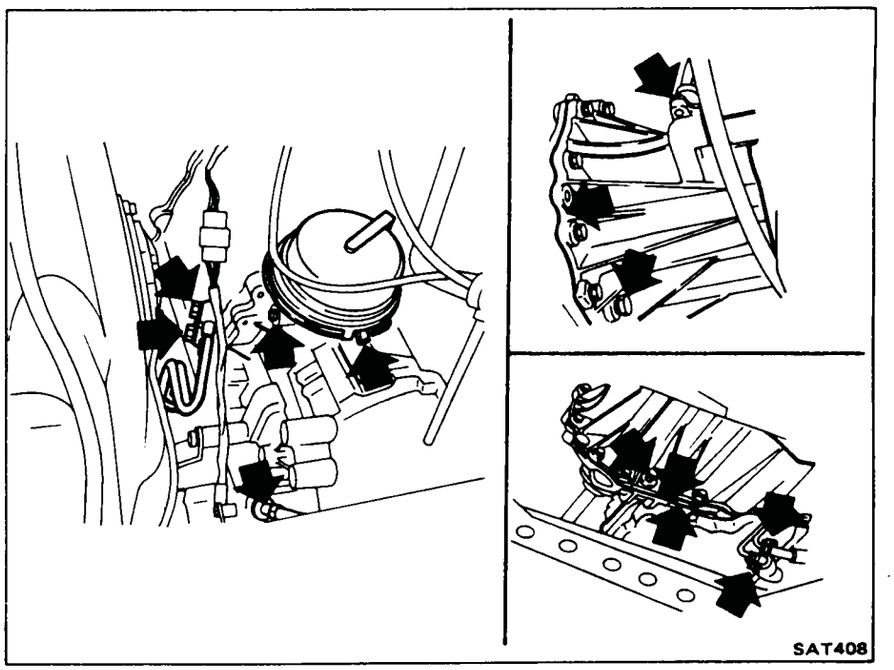
If the governor cap is suspected:

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"

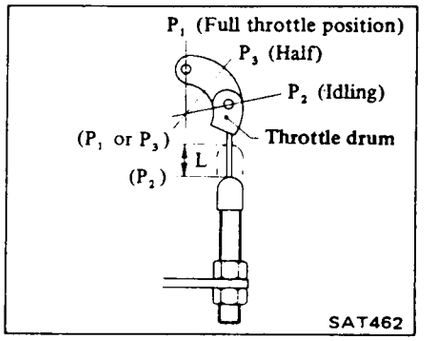
Manually shift the control lever to range "1". Note shift quality. It should, however, downshift immediately to 2nd gear and downshift again to 1st gear as road speed decreases. Accelerate and decelerate in 1st gear to determine engine braking Note results.

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.

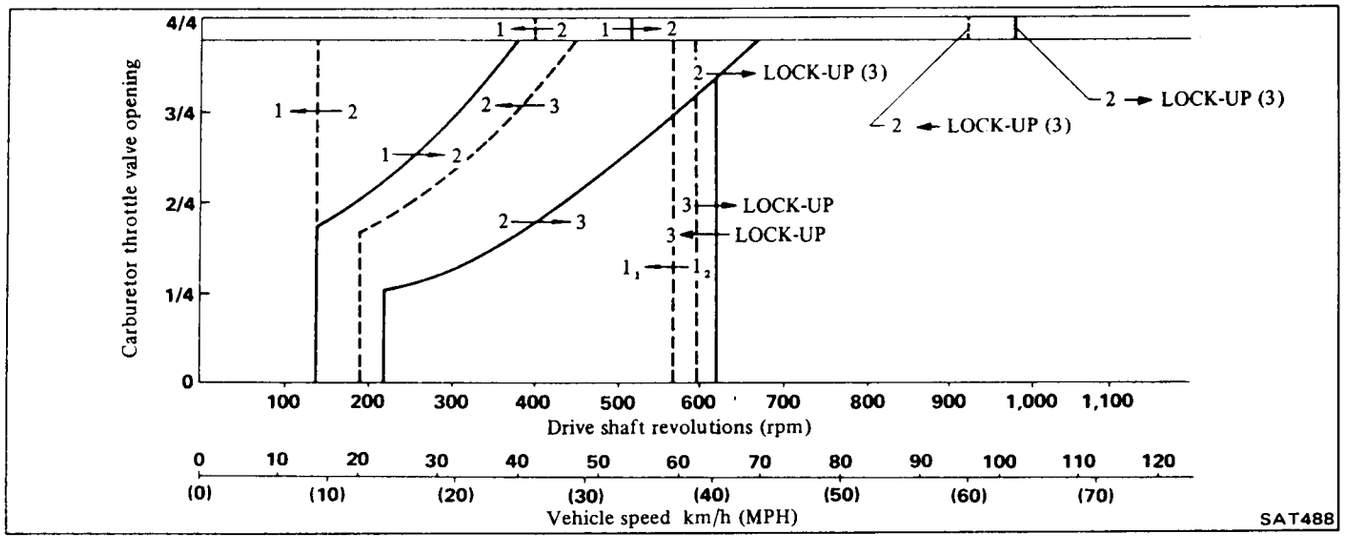
CAR SPEED AND LINE PRESSURE WHEN SHIFTING GEARS

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.



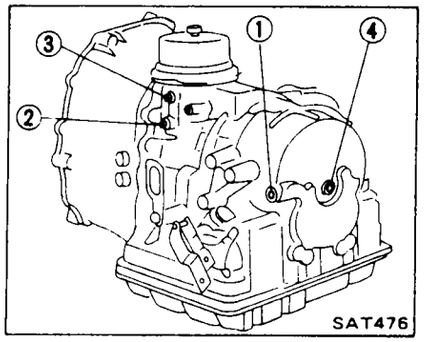
Throttle position	Throttle Wire length L mm (in)	Gear shift	Vehicle speed km/h (MPH)	Drive shaft revolutions rpm	Line pressure kPa (kg/cm², psi)
Full throttle	29.4 (1.157)	$D_1 \rightarrow D_2$ ($2_1 \rightarrow 2_2$)	48 - 56 (30 - 35)	467 - 540	549 - 696 (5.6 - 7.1, 80 - 101)
		$D_2 \rightarrow D_3$	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	–

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



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

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

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:
1,800 - 2,100 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

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									
		ROUGH	SHIFT TIMING [Mark km/h (MPH)]	NO SHIFT	SHIFT SLIPPAGE	CAR WON'T MOVE	CRUISE SLIPPAGE	POOR POWER/ ACCELERATION	NOISY	OK	COMMENTS
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)										
	3rd in Lock-up "ON"										
	Auto shift Lock-up "ON" (3) → Lock-up "OFF" (3)										
	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 FOR RL3F01A AUTOMATIC TRANSAXLE

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"	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

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

SPECIFICATIONS AND ADJUSTMENT

Automatic transaxle assembly Model code number			11X03	
High-reverse clutch (Front)	Number of drive plates		2	
	Number of driven plates		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
Forward clutch (Rear)	Number of drive plates		3	
	Number of driven plates		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	
	Number of driven plates		4 (6)*	
	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	

*: 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

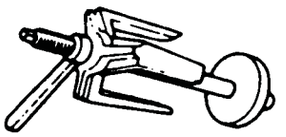
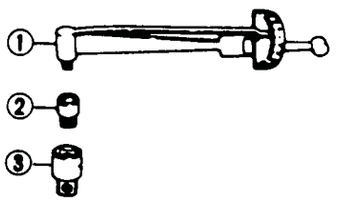
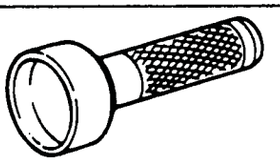
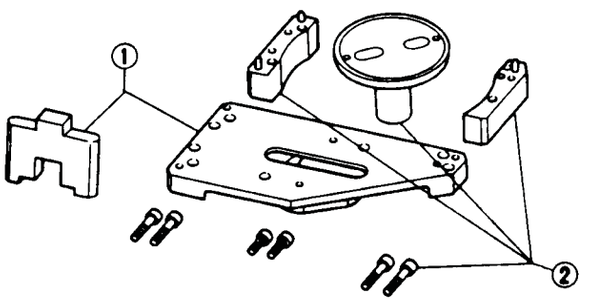
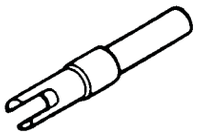
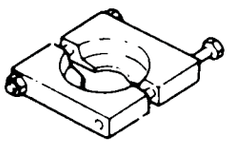
Stall revolution rpm	1,800 - 2,100

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	16 - 22	1.6 - 2.2	12 - 16
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)