

AUTOMATIC TRANSMISSION

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TROUBLESHOOTING

Problem	Possible cause	Remedy	Page
Fluid discolored or smells burnt	Fluid contaminated	Replace fluid	10-5
	Torque converter faulty	Replace torque converter	10-29
	Transmission faulty	Disassemble and inspect transmission	10-29
Vehicle does not move in either any forward range or reverse range	Manual linkage out of adjustment	Adjust linkage	10-6
	Valve body or primary regulator faulty	Inspect valve body	10-19
	Transmission faulty	Disassemble and inspect transmission	10-29
Vehicle does not move in any range	Park lock pawl faulty	Inspect park pawl	10-24
	Valve body or primary regulator faulty	Inspect valve body	10-19
	Torque converter faulty	Replace torque converter	10-29
	Converter drive plate broken	Replace torque converter	10-29
	Oil pump intake screen blocked	Clean screen	10-19
	Transmission faulty	Disassemble and inspect transmission	10-29
Shift lever position incorrect	Manual linkage out of adjustment	Adjust linkage	10-6
	Manual valve and lever faulty	Inspect valve body	10-19
	Transmission faulty	Disassemble and inspect transmission	10-29
Harsh engagement into any drive range	Throttle cable out of adjustment	Adjust throttle cable	10-6
	Valve body or primary regulator faulty	Inspect valve body	10-19
	Accumulator pistons faulty	Inspect accumulator pistons	10-19
	Transmission faulty	Disassemble and inspect transmission	10-29
Delayed 1-2, 2-3 or 3-4 up-shift, or down-shifts from 4-3 or 3-2 then shifts back to 4 or 3	Throttle cable out of adjustment	Adjust throttle cable	10-6
	Throttle cable and cam faulty	Inspect throttle cable and cam	10-22
	Governor faulty	Inspect governor	10-27
	Valve body faulty	Inspect valve body	10-19
Slip on 1-2, 2-3 or 3-4 up-shift, or slip or shudder on take-off	Manual linkage out of adjustment	Adjust linkage	10-6
	Throttle cable out of adjustment	Adjust throttle cable	10-6
	Valve body faulty	Inspect valve body	10-19
	Transmission faulty	Disassemble and inspect transmission	10-29
Drag, binding, or tie-up on 1-2, 2-3 or 3-4 up-shift	Manual linkage out of adjustment	Adjust linkage	10-6
	Valve body faulty	Inspect valve body	10-19
	Transmission faulty	Disassemble and inspect transmission	10-29
Harsh down-shift	Throttle cable out of adjustment	Adjust throttle cable	10-6
	Throttle cable and cam faulty	Inspect throttle cable and cam	10-22
	Accumulator pistons faulty	Inspect accumulator pistons	10-19
	Valve body faulty	Inspect valve body	10-19
	Transmission faulty	Disassemble and inspect transmission	10-29

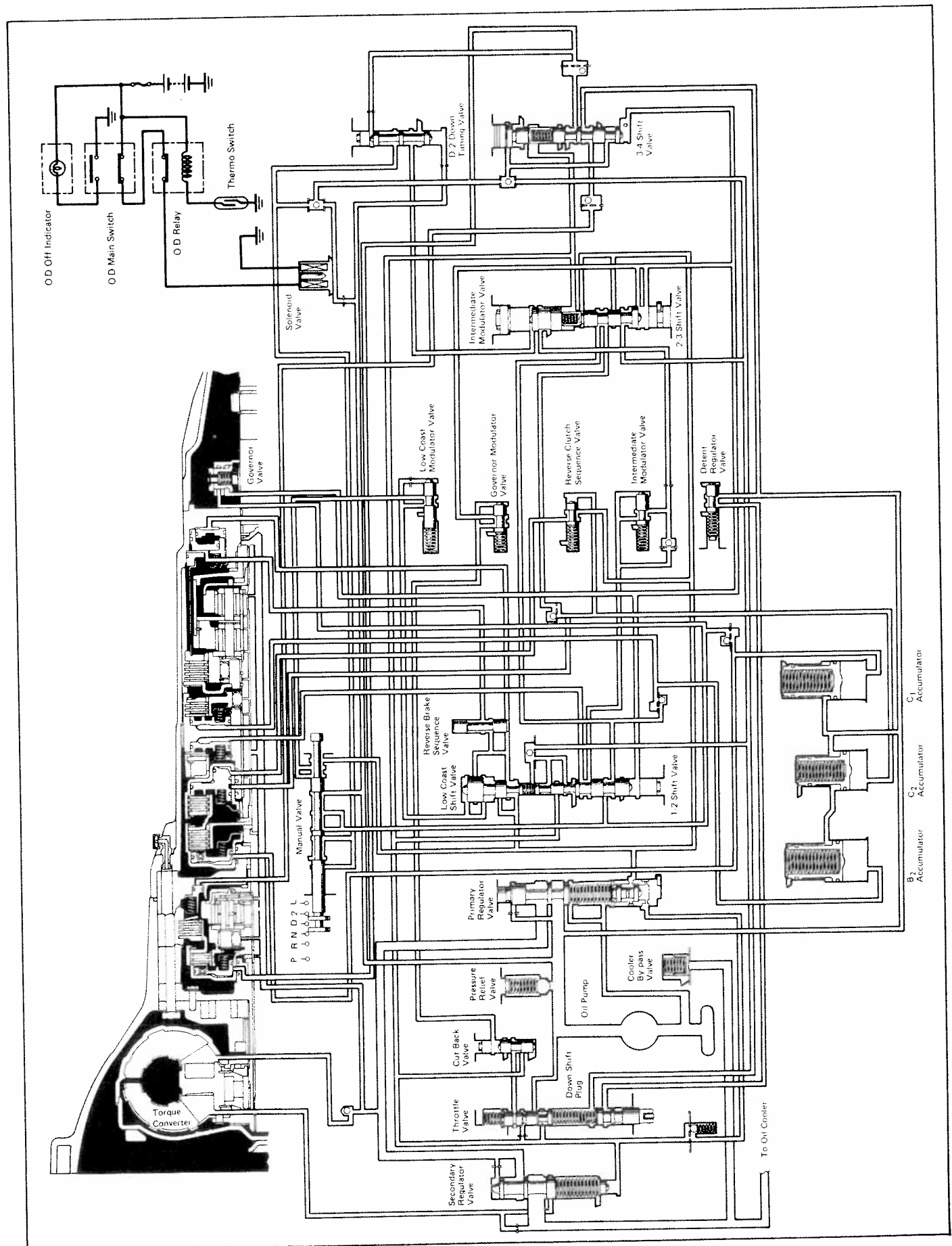
TROUBLESHOOTING (CONT'D)

Problem	Possible cause	Remedy	Page
No down-shift when coasting	Governor faulty	Inspect governor	10-28
	Valve body faulty	Inspect valve body	10-19
Down-shift occurs too fast or too late while coasting	Throttle cable out of adjustment	Adjust throttle cable	10-6
	Throttle cable faulty	Inspect throttle cable	10-22
	Governor faulty	Inspect governor	10-27
	Valve body faulty	Inspect valve body	10-19
	Transmission faulty	Disassemble and inspect transmission	10-29
No 4-3, 3-2 or 2-1 kick-down	Throttle cable out of adjustment	Adjust throttle cable	10-6
	Governor faulty	Inspect governor	10-27
	Valve body faulty	Inspect valve body	10-19
No engine braking in "2" range	Valve body faulty	Inspect valve body	10-19
	Transmission faulty	Disassemble and inspect transmission	10-29
Vehicle does not hold in "P"	Manual linkage out of adjustment	Adjust linkage	10-6
	Parking lock pawl cam and spring faulty	Inspect cam and spring	10-24

SPECIAL TOOLS AND TEST EQUIPMENT

Tool	SST No.	Use
Oil pressure gauge	09992-00092	To measure oil pressure
Oil seal puller	09308-10010 or Commercial	To remove front and rear oil seals (ON-VEHICLE REPAIR)
	09308-00010 or Commercial	To remove rear oil seal
Transmission oil plug	09325-20010 or Commercial	To install rear oil seal
Pitman arm puller	09610-20011	To remove front pump
Automatic transmission service set	09350-20013 or 00002-00223	To overhaul transmission
Oil seal replacer	09350-20013 or Commercial	To install front oil seal and manual shaft oil seal
Hook	09921-00010 or Commercial	To remove speedometer driven gear oil seal
Oil seal replacer	09201-60011 or Commercial	To install speedometer driven gear oil seal

HYDRAULIC CIRCUIT (A43D)

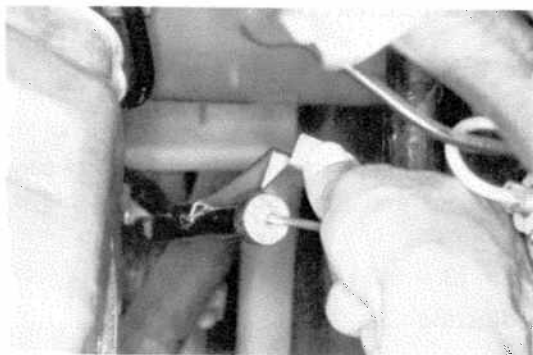


MAINTENANCE

1. PERFORM REQUIRED MAINTENANCE REGULARLY

The following maintenance is essential:

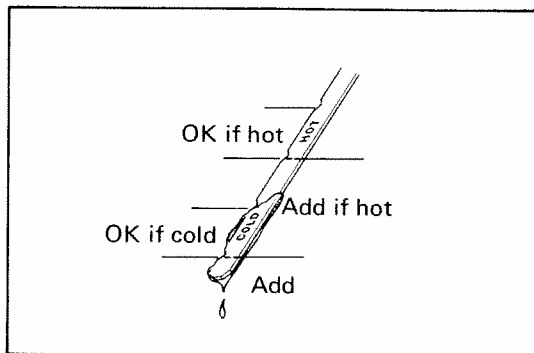
- (a) Regularly check the fluid level.
- (b) Regularly check the fluid condition.
- (c) Change the fluid every 30,000 miles.



2. CHECK FLUID LEVEL

NOTE: The vehicle must have been driven so that the engine and transmission are at normal operating temperature.

- (a) With the engine idling, shift the selector into each gear from PARK to LOW and return to PARK.
- (b) Pull out the transmission dipstick and wipe it clean.



- (c) Push it fully into the tube.
- (d) Pull it out and check that the fluid level is in the HOT range.

If low, add fluid.

CAUTION: Do not overfill.

3. CHECK FLUID CONDITION

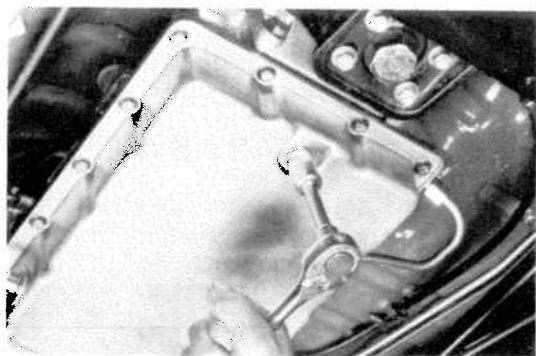
If the fluid smells burnt or is black, replace it.

4. REPLACE FLUID

- (a) Remove the drain plug and drain all fluid from the transmission.
- (b) Remove the pan and inspect for particles that would indicate excessive wear or damage. Clean and install the pan.
- (c) Clean and install the drain plug. (Use a new gasket if necessary.) Tighten the plug.

Torque: 150 — 200 kg-cm (11 — 14 ft-lb)

- (d) Add 2 quarts of ATF and check the fluid level. Add fluid, as necessary, to bring the level to proper range.



ADJUSTMENTS

ADJUSTMENT OF THROTTLE CABLE

1. REMOVE AIR CLEANER
2. PUSH ON ACCELERATOR CONNECTING ROD AND CHECK THAT THROTTLE VALVE OPENS FULLY

If the throttle valve does not open fully, adjust the accelerator link.

3. FULLY DEPRESS ACCELERATOR
4. LOOSEN ADJUSTMENT NUTS
5. ADJUST THROTTLE CABLE

- (a) Adjust the cable housing so that the distance between the end of the boot and the stopper on the cable is correct.

Distance: 0 – 1 mm (0 – 0.04 in.)

- (b) Tighten the adjusting nuts.
- (c) Recheck the adjustments.

6. INSTALL AIR CLEANER

ADJUSTMENT OF FLOOR SHIFT LINKAGE

1. LOOSEN NUT ON CONNECTING ROD
2. ADJUST SHIFT LINKAGE

- (a) Push the manual lever fully toward the front of the vehicle.
- (b) Return the lever three notches to the NEUTRAL position.
- (c) Set the shift selector to "N".
- (d) While holding the selector lightly toward the "R" range side, tighten the connecting rod nut.

ADJUSTMENT OF NEUTRAL START SWITCH

If the engine will start with the shift selector in any range other than "N" or "P" range, adjustment is required.

1. LOOSEN NEUTRAL START SWITCH BOLT
2. SET SHIFT SELECTOR TO "N"
3. ALIGN SWITCH SHAFT GROOVE WITH NEUTRAL BASIC LINE

Align the groove and line as shown. Hold in position and tighten the bolt.

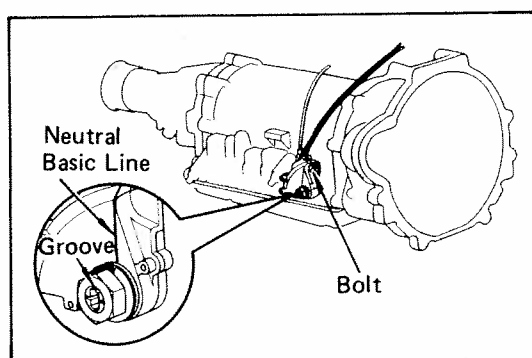
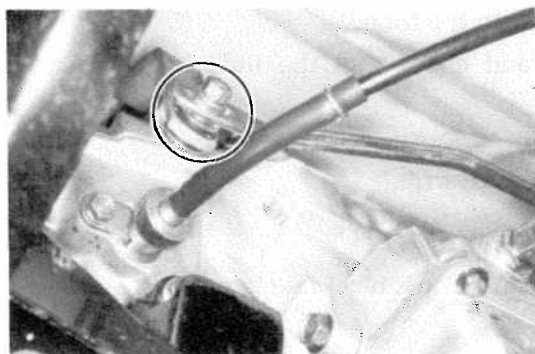
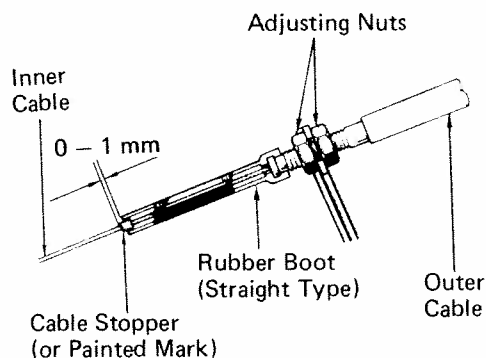
Torque: 40 – 70 kg-cm (35 – 60 in.-lb)

4. CHECK SWITCH TERMINALS FOR CONTINUITY

Using an ohmmeter, check for continuity between the terminals as shown.

If a problem is found, replace the switch.

WHEN THROTTLE VALVE
IS FULLY OPENED



	B	N	RB	RL
P	○ — ○			
R			○ — ○	
N	○ — ○			

RB (R)	RL (L)

TEST

STALL TEST

The object of this test is to check the overall performance of the transmission and engine by measuring the maximum engine speeds at the "D" and "R" ranges.

MEASURE STALL SPEED

- Chock the front wheels.
- Mount the engine tachometer.
- Fully apply the parking brake.
- Step down strongly on the brake pedal with your left foot.
- Start the engine.
- Shift into "D" range. Step all the way down on the accelerator pedal with your right foot. Quickly read the highest engine rpm at this time.

Stall speed: $1,850 \pm 150$ rpm

- Perform the same test on the "R" range.

CAUTION:

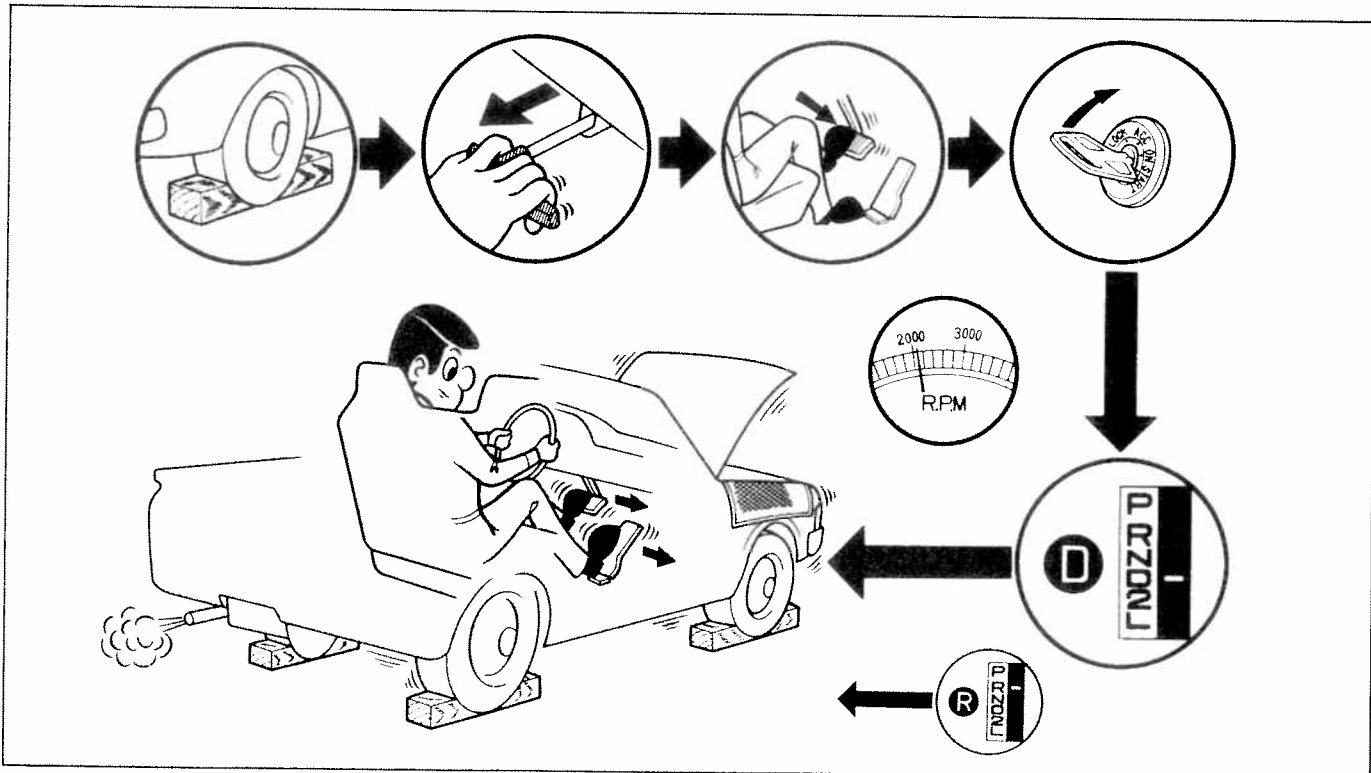
- Perform the test at normal operation fluid temperature ($50 - 80^{\circ}\text{C}$ or $122 - 176^{\circ}\text{F}$).
- Do not continuously run this test longer than 5 seconds.

EVALUATION

- If the engine speed is the same for both ranges but lower than specified value.
 - Engine output is insufficient.
 - Stator one-way clutch is not operating properly.

NOTE: If more than 600 rpm below the specified value, the torque converter could be at fault.

- If the stall speed at "L" range is higher than specified.
 - Front clutch slipping.
 - One-way clutch No. 2 not operating properly.
 - Line pressure too low.
 - OD clutch slipping
 - OD one-way clutch not operating properly
- If the stall speed at "R" range is higher than specified.
 - Rear clutch slipping.
 - Brake No. 3 slipping.
 - Line pressure too low.
 - OD clutch slipping
 - OD one-way clutch not operating properly



TIME LAG TEST

If the shift lever is shifted while the engine is idling, there will be a certain time elapse or time lag, before the shock can be felt. This is used for checking the condition of front clutch, rear clutch and brake No. 3.

MEASURE LAG TIME

- Have the parking brake fully applied.
- Start the engine.
- Place the hand on the shift lever and shift from "N" to "D" range. Using a stopwatch, measure the time it takes from shifting the lever until the shock is felt.

Lag time: Less than 1.2 seconds

- In same manner, measure the time lag for "N" → "R".

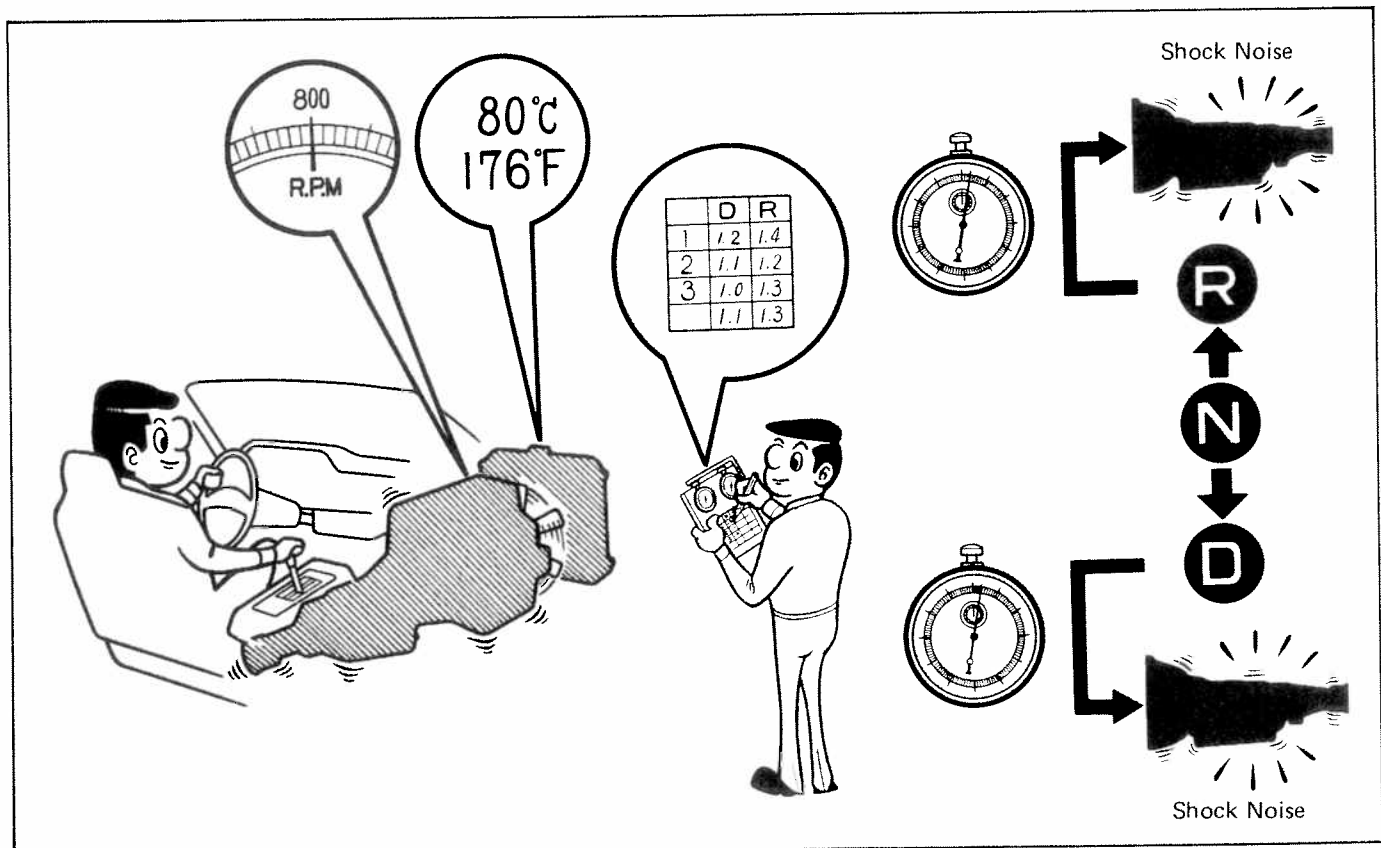
Lag time: Less than 1.5 seconds

CAUTION:

- Perform the test at normal operation fluid temperature (50 — 80°C or 122 — 176°F).
- Be sure to allow one minute interval between tests.
- Make three measurements and take the average value.

EVALUATION

- If "N" → "D" time lag is longer than specified.
 - Line pressure too low.
 - Front clutch worn.
- If "N" → "R" time lag is longer than specified.
 - Rear clutch worn.
 - Brake No. 3 worn.
 - Line pressure too low.



HYDRAULIC TEST

1. PREPARATION

- Warm-up the transmission fluid.
- Chock the front wheels.
- Jack up the vehicle and support it on stands.
- Remove the test plugs from the transmission case and mount the hydraulic pressure gauges*.

*SST: 09992-00092 Oil pressure gauge

2. MEASURE GOVERNOR PRESSURE

- Check the parking brake to see that it is not acting.
- Start the engine.
- Shift into "D" range and measure the governor pressures at the speeds specified in table.

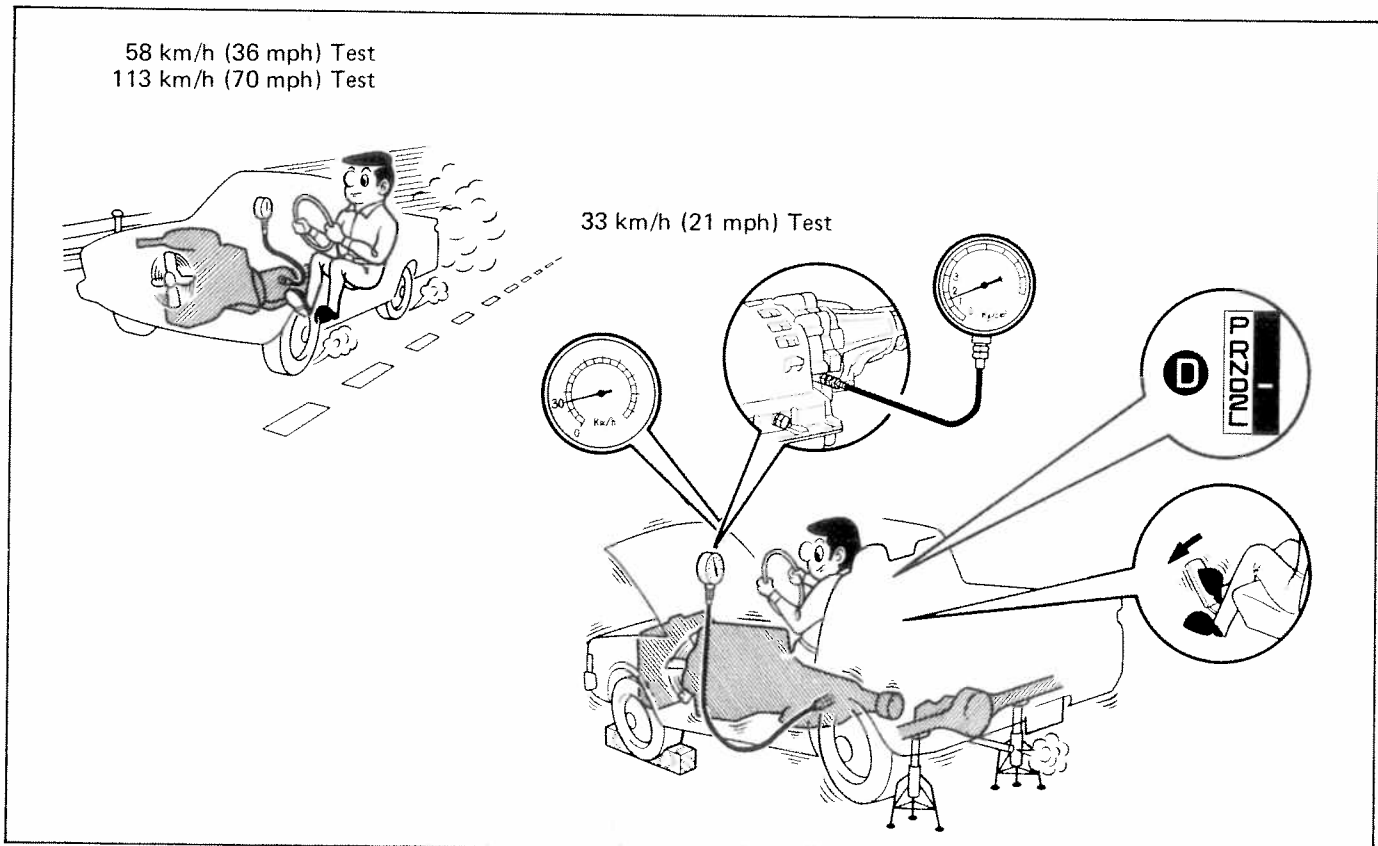
CAUTION: Decision can be reached with 1,000 rpm test (32 km/h test), but if tests are to be made at 1,800 and 3,500 rpm (57 and 111 km/h), it would be safer to test on road or chassis dynamometer as on-stand test could be hazardous.

EVALUATION

If governor pressure is defective.

- Line pressure defective.
- Fluid leakage in governor pressure circuit.
- Governor valve operation defective.

Output shaft rpm	Vehicle speed (Reference only)	Governor pressure kg/cm ² (psi)
1,000	32 km/h (20 mph)	0.9 – 1.5 (12 – 21)
1,800	57 km/h (35 mph)	1.6 – 2.2 (23 – 31)
3,500	111 km/h (69 mph)	4.1 – 5.3 (58 – 75)



3. MEASURE LINE PRESSURE

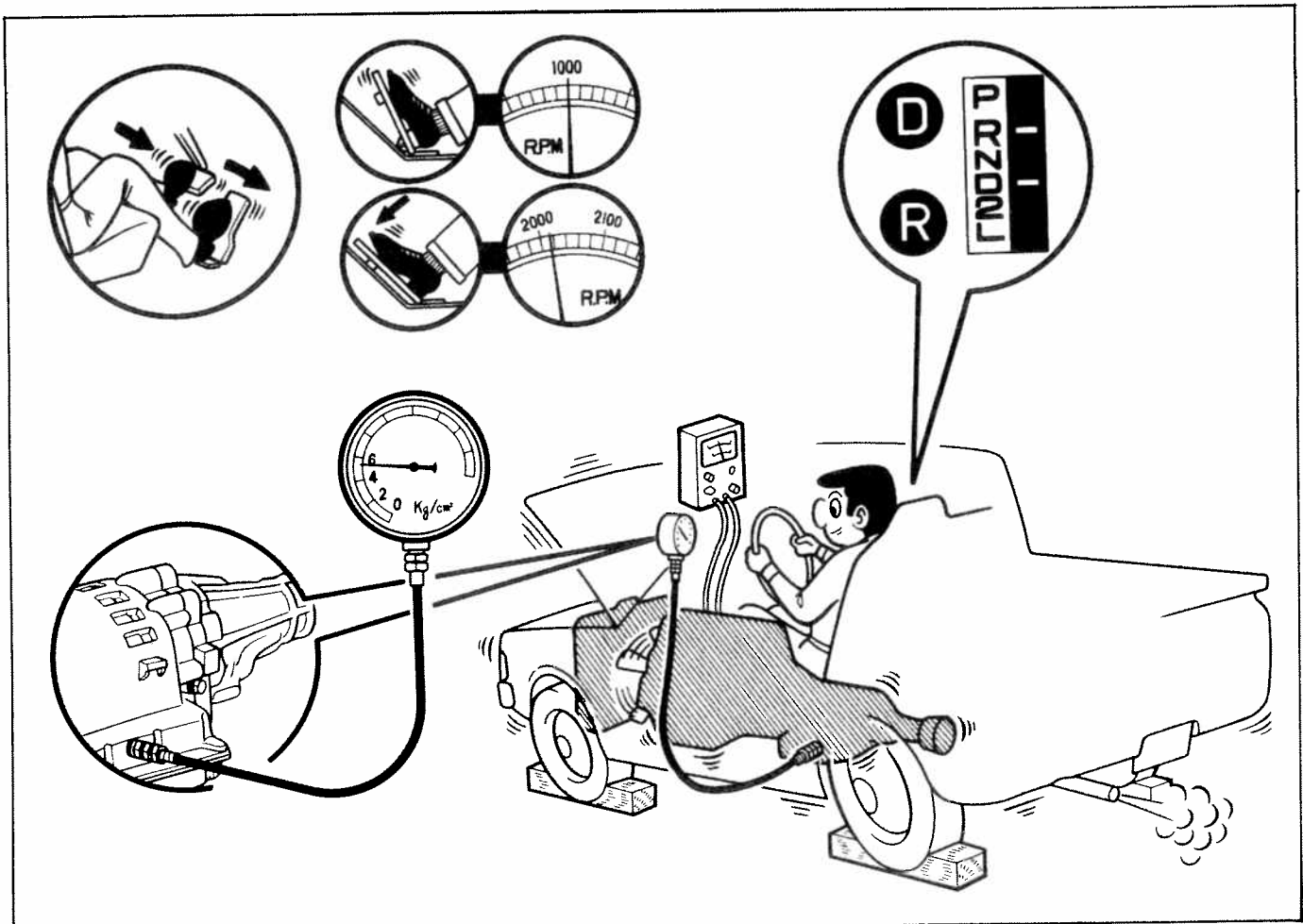
- Fully apply the parking brake and chock four wheels.
- Start the engine and shift into "D" range.
- Step down strongly on the brake pedal with your left foot and while manipulating the accelerator pedal with the right foot, measure the line pressures at the engine speeds specified in table.
- In the same manner, perform the test for "R" range.

Engine speed rpm	Line pressure	
	"D" range	"R" range
At idling	4.0 – 4.5 (57 – 64)	5.8 – 6.8 (82 – 97)
Stall	9.5 – 12.0 (135 – 171)	14.0 – 17.0 (199 – 242)

- If the measured pressures are not up to specified values, recheck the throttle cable adjustment and perform a retest.

EVALUATION

- If the measured values at all ranges are higher than specified.
 - Regulator valve defective
 - Throttle valve defective
 - Throttle cable out-of-adjustment
- If the measured values at all ranges are lower than specified.
 - Oil pump defective
 - Regulator valve defective
 - Throttle valve defective
 - Throttle cable out-of-adjustment
 - OD clutch defective
- If pressure is low in "D" range only.
 - Front clutch defective.
 - "D" range circuit fluid leakage
 - OD clutch defective
- If pressure is low in "R" range only.
 - Rear clutch defective.
 - Brake No. 3 defective.
 - "R" range circuit fluid leakage
 - OD clutch defective

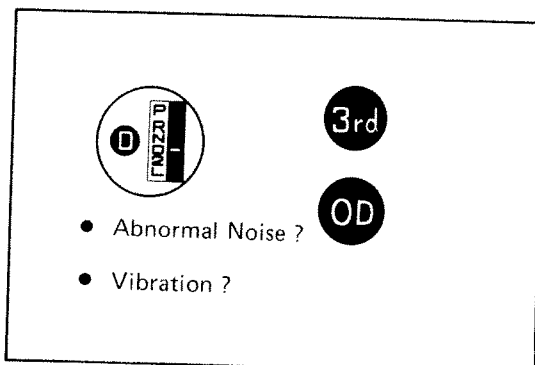
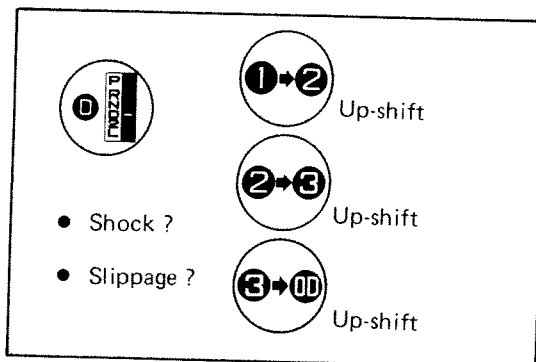
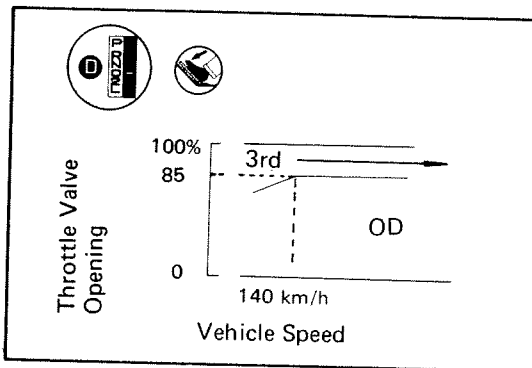
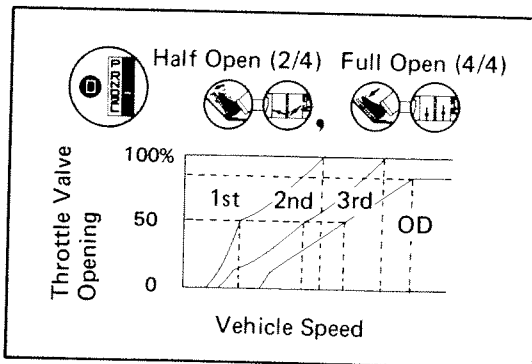


ROAD TEST

1. "D" RANGE TEST

Shift into "D" range and while driving with the accelerator pedal held constant at specified point (throttle valve opening 1/2 and 4/4), and check on the following points.

- (a) At each of the above throttle openings, check to see that 1 → 2, 2 → 3 and 3 → OD up-shifts take place and also that the shift points conform to those shown on the automatic shift diagram.



EVALUATION

- (1) If there is no 1 → 2 up-shift,
 - Governor valve is defective
 - 1-2 shift valve is stuck
- (2) If there is no 2 → 3 up-shift,
 - 2-3 shift valve is stuck
- (3) If there is no 3 → OD up-shift throttle valve opening 1/2),
 - 3-OD shift valve is stuck
- (4) If the shift point is defective,
 - Throttle cable is out-of-adjustment
 - Throttle valve, 1-2 shift valve, 2-3 shift valve, 3-OD shift valve etc., are defective.

NOTE: 3 → OD up-shift does not take place with a throttle valve opening of more than 85%.

- (b) In the same manner, check the shock and the slip at 1 → 2, 2 → 3 and 3 → OD up-shifts.

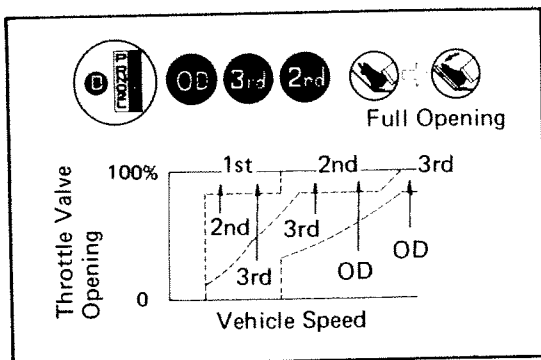
EVALUATION

If the shock is large,

- Line pressure is too high
- Accumulator is defective
- Check ball is defective

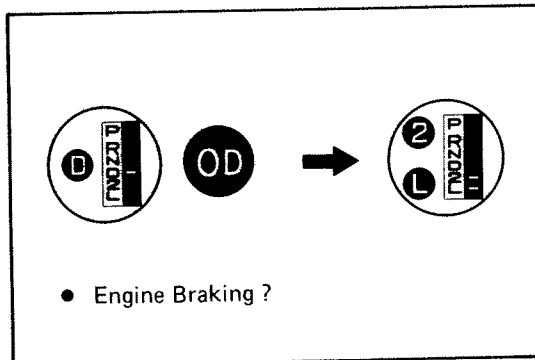
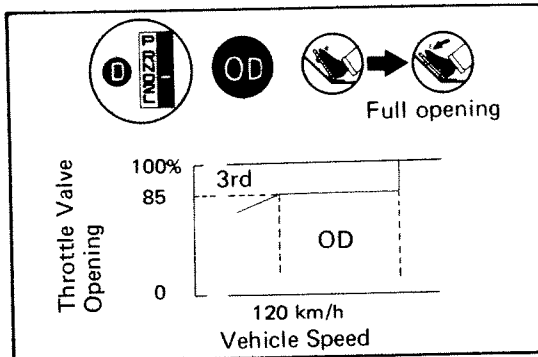
- (c) Run at "D" range third gear or OD gear and check for abnormal noise and vibration.

NOTE: Check for cause of abnormal noise and vibration must be made with extreme care as they could also be due to unbalance in propeller shaft, differential, tire, torque converter, etc. or bending rigidity, etc., in the power train.



- (d) While running in "D" range second, third and OD gears, check to see that the possible kick-down vehicle speed limits for 2 → 1, 3 → 2, OD → 3 and OD → 2 kick-downs conform to those indicated on the automatic shift diagram.

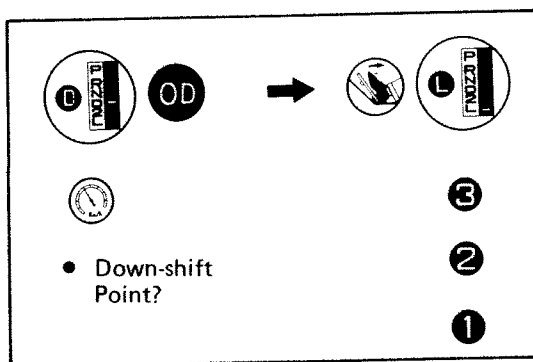
NOTE: OD → 3 kick-down is always possible with a throttle valve opening of less than 85% and vehicle speed above 120 km/h.



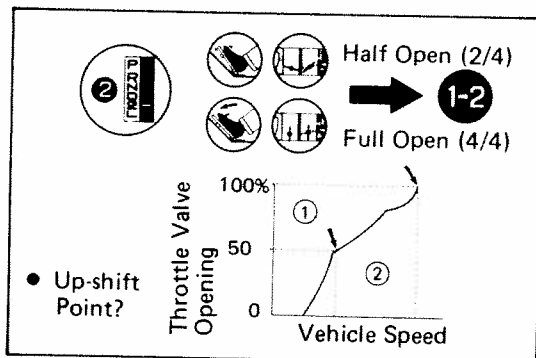
- (e) While running in "D" range third gear or OD gear, shift to "2" and "L" ranges and check the engine braking effect at each of these ranges.

EVALUATION

- (1) If there is no engine braking effect at "2" range
 - Brake No. 1 is defective
- (2) If there is no engine braking effect at "L" range
 - Brake No.3 is defective

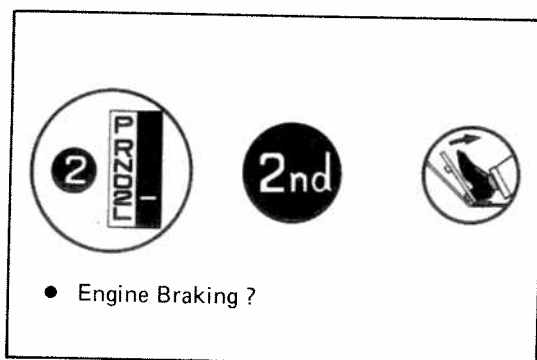


- (f) While running in "D" range, release the foot from the accelerator pedal and shift into "L" range. Then check to see if OD → 3, 3 → 2 and 2 → 1 down-shift points conform to those indicated on the automatic shift diagram.

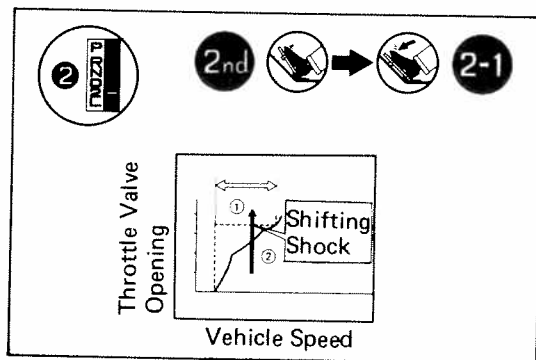


2. "2" RANGE TEST

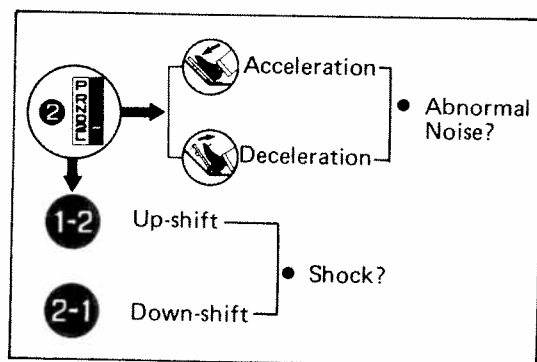
- (a) Shift to the "2" range and run with the throttle valve opening at 2/4 and 4/4 respectively. Then check the 1 → 2 up-shift points at each of the throttle valve openings to see that it conforms to those indicated on the automatic shift diagram.



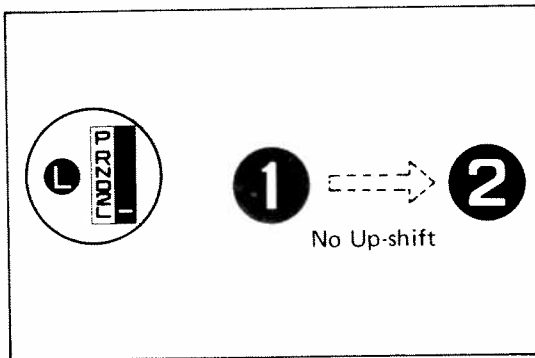
- (b) While running in "2" range second gear, release the accelerator pedal and check the engine braking effect.



- (c) Perform a kick-down from the "2" range and check the possible 2 → 1 kick-down vehicle speed limit to see if it conforms to that indicated on the automatic shift diagram.

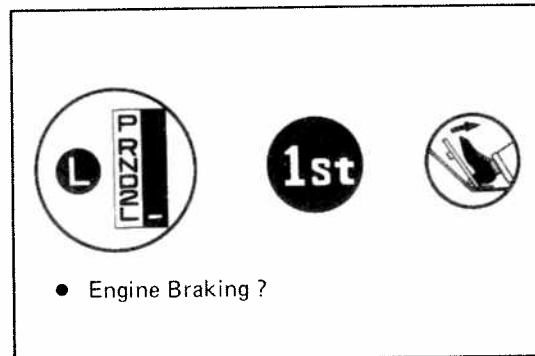


- (d) Check for abnormal noise at acceleration and deceleration, and for shock at up-shift and down-shift.

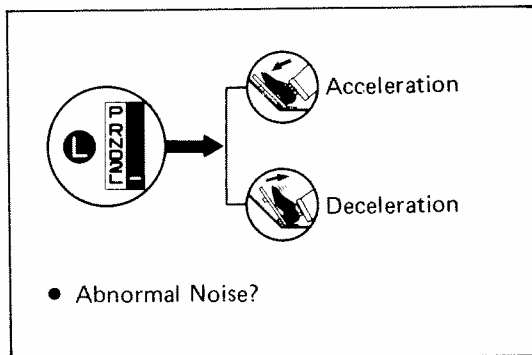


3. "L" RANGE TEST

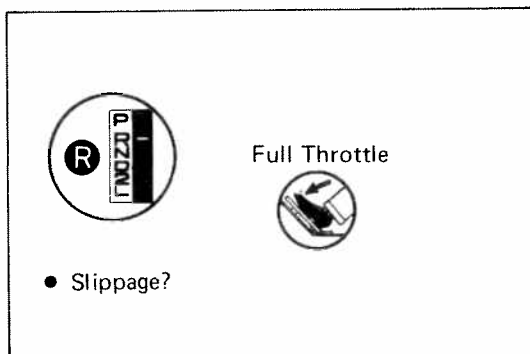
- (a) While running in the "L" range, check to see that there is no up-shift to second gear.



- (b) While running in "L" range, release the accelerator pedal and check the engine braking effect.

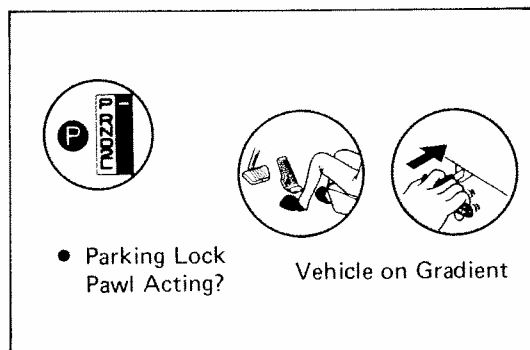


- (c) Check for abnormal noise at acceleration and deceleration.



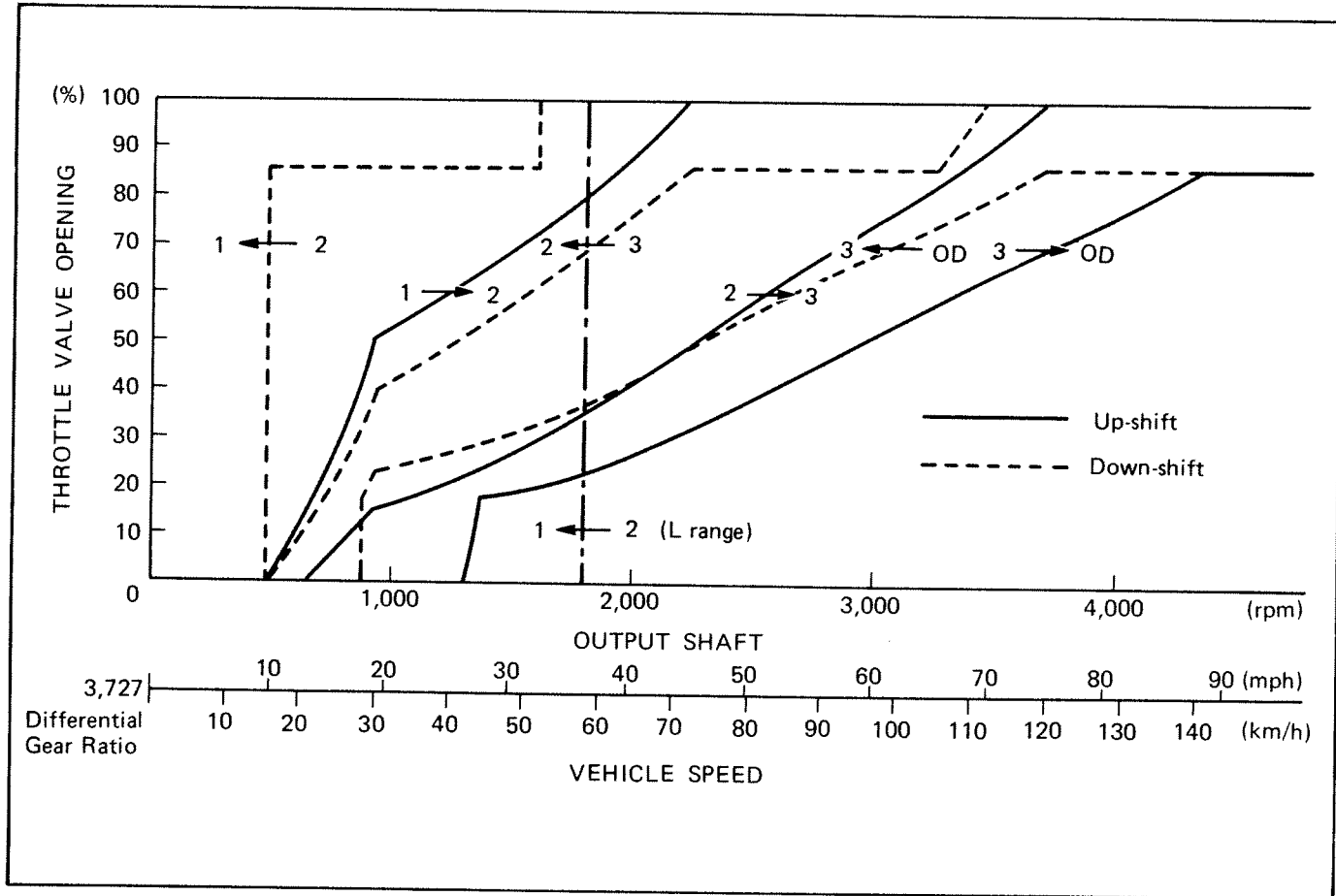
4. "R" RANGE TEST

- (a) Shift into "R" range and while running at full throttle, check for slipping.

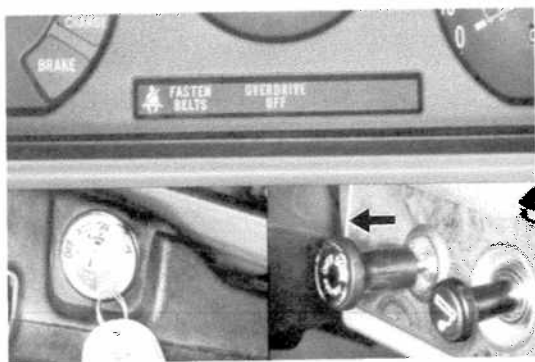
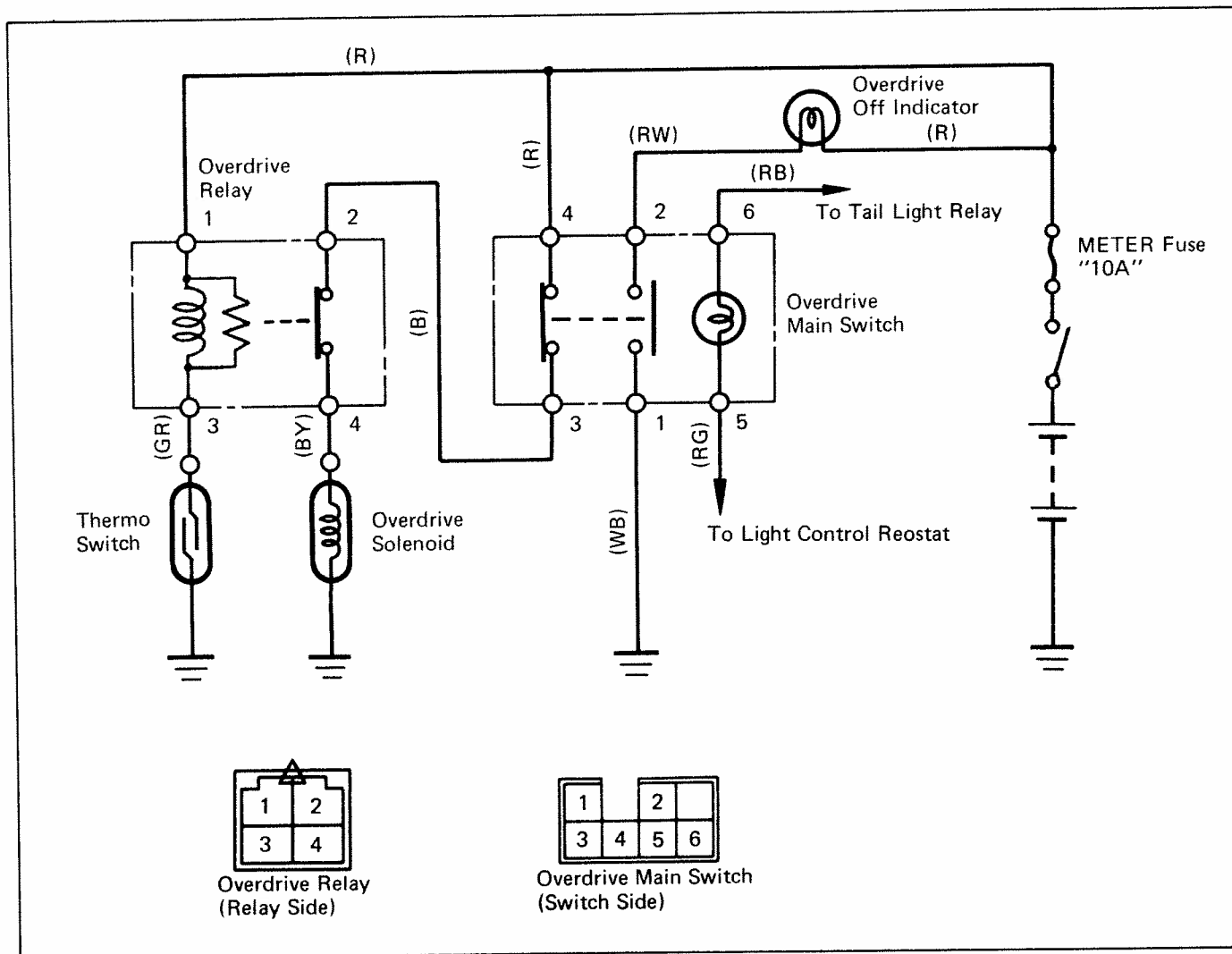


5. "P" RANGE TEST

Stop the vehicle on a gradient (more than 5°) and after shifting into "P" range, release the parking brake. Then check to see that the parking lock pawl is acting so that vehicle will not move.

AUTOMATIC SHIFT DIAGRAM

ELECTRIC CONTROL



1. INSPECT OVERDRIVE OFF INDICATOR LIGHT

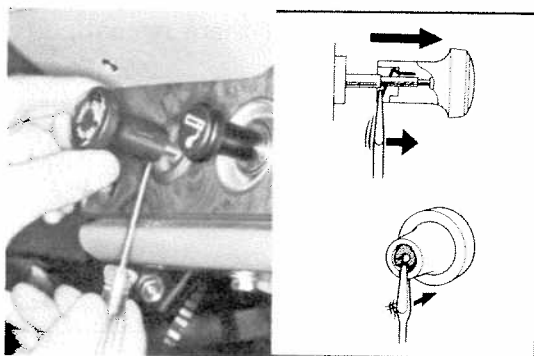
- Turn on the ignition switch.
- Pull the overdrive knob to the off position and confirm that the off indicator light is lit.

If the light is not lit, check the ignition switch, fuse and main switch.



2. INSPECT FUSE

- Check the fuse for continuity.
- Check that the fuse is connected correctly.



3. INSPECT OVERDRIVE MAIN SWITCH

- (a) Disconnect the overdrive main switch wire and remove the switch from the instrument panel.

- (b) Using an ohmmeter, check the continuity of the terminals for each switch positions.

Terminal	1	2	3	4	5	6
Switch position						
ON (Push)			○ — ○		○ — ○ — ○	○ — ○
OFF (Pull)	○ — ○				○ — ○ — ○	○ — ○

- (c) Using a screwdriver, remove the valve holder and check the valve.

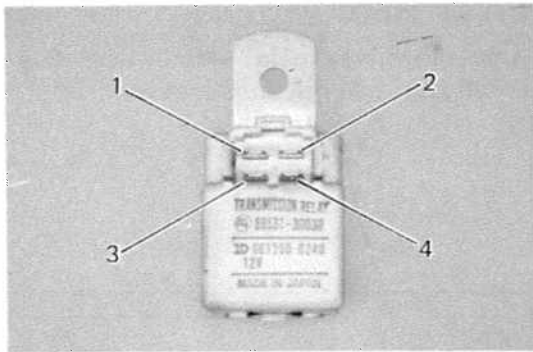
4. INSPECT OVERDRIVE RELAY [ON-VEHICLE INSPECTION]

- (a) Directly ground the thermo switch wire.
(b) Turn on the ignition switch.
(c) Repeatedly turn the main switch ON and OFF and confirm that operation sounds of the solenoid and relay can be heard.

If neither the solenoid or relay does not make a noise, check.

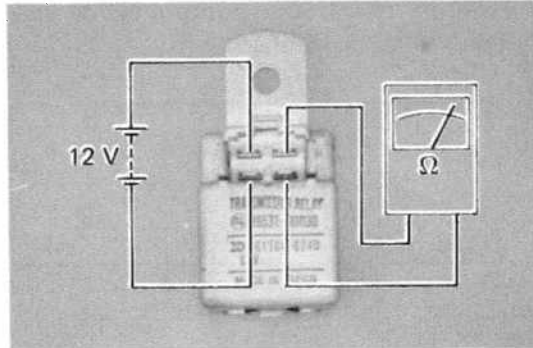
[COMPONENT INSPECTION]

- (a) Remove the overdrive relay from the pedal bracket.

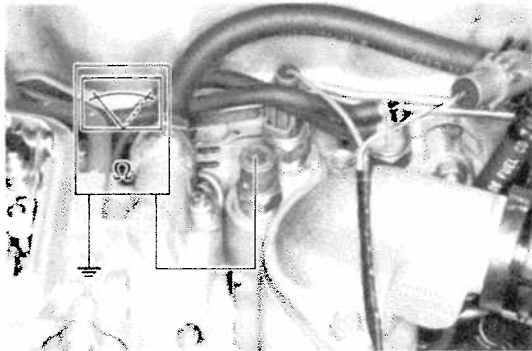


- (b) Using an ohmmeter, check that there is continuity between terminals 2 and 4.
- (c) Using an ohmmeter, measure the resistance between terminals 1 and 3.

Resistance: 8 ohms



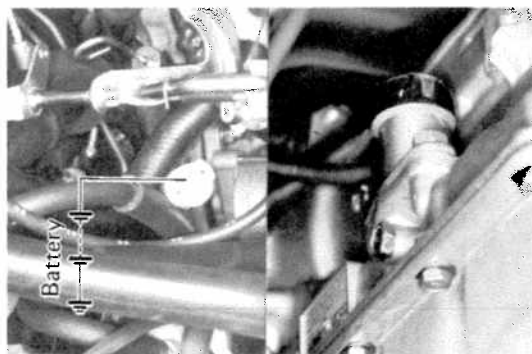
- (d) Apply 12 volts battery voltage across terminals 1 and 3. Using an ohmmeter, check that there is no continuity between terminals 2 and 4.



5. INSPECT THERMO SWITCH

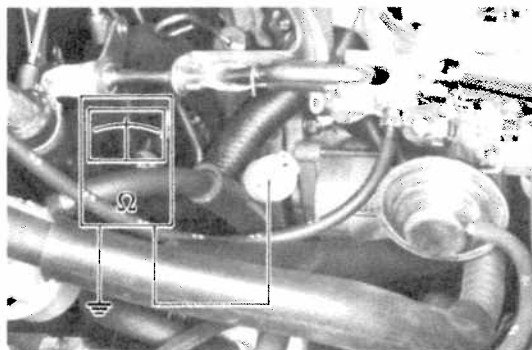
- (a) Disconnect the thermo switch wire.
- (b) Using an ohmmeter, measure the resistance between the terminal and ground

Coolant temperature	Resistance (Point)
Below 43°C (109°F)	0 ohms (Close)
Above 55°C (131°F)	∞ ohms (Open)



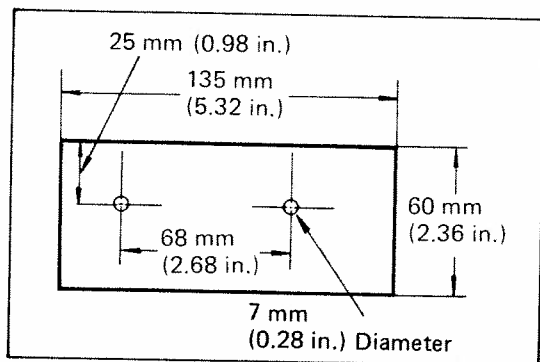
6. INSPECT OVERDRIVE SOLENOID

- (a) Disconnect the solenoid wire and apply 12 volts battery voltage to the solenoid. Confirm that the solenoid operation sound is heard.



- (b) Using an ohmmeter, measure the solenoid coil resistance.

Resistance: 13 ohms

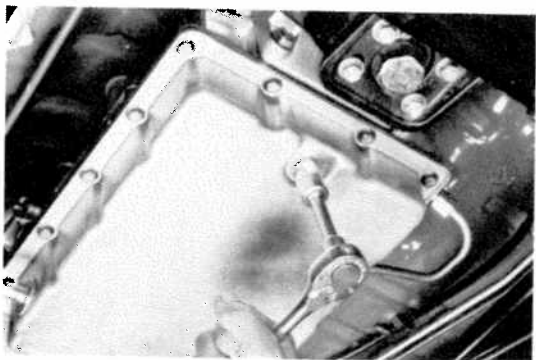


ON-VEHICLE REPAIR

REMOVAL OF VALVE BODY

1. MAKE PLATE TO RETAIN ACCUMULATOR PISTONS

A retainer is helpful for holding accumulator pistons in the case during removal and installation of the valve body. The plate may be made from aluminum or plastic.

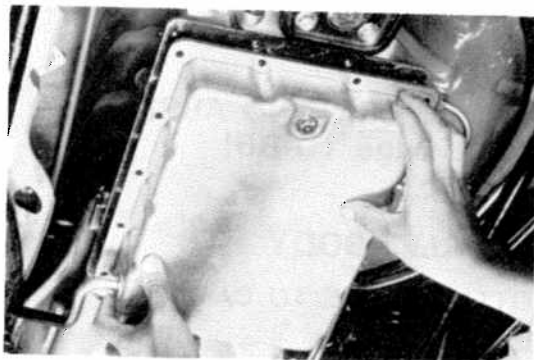


2. CLEAN TRANSMISSION EXTERIOR

To help prevent contamination, clean the exterior of the transmission.

3. DRAIN TRANSMISSION FLUID

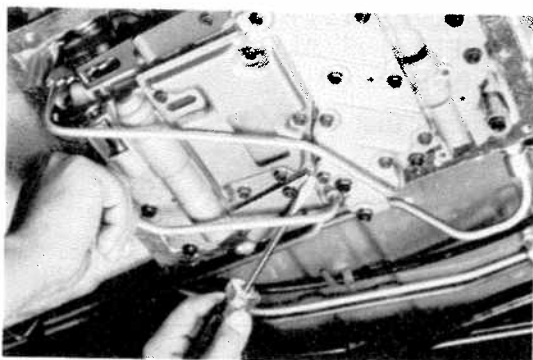
Remove the drain plug and drain fluid into a suitable container.



4. REMOVE OIL PAN, FILLER TUBE AND GASKET

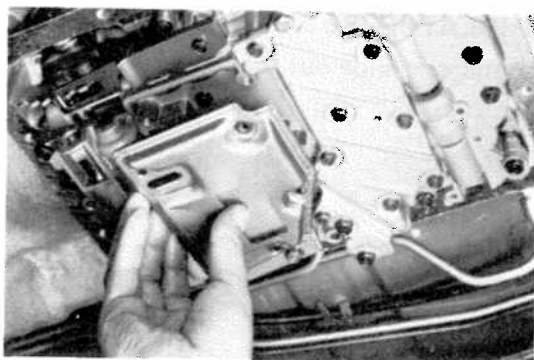
CAUTION: Some fluid will still be in the oil pan. Be careful not to damage the filler tube and O-ring.

Remove all pan bolts, and carefully remove the pan assembly. Discard the gasket.



5. REMOVE OIL TUBES

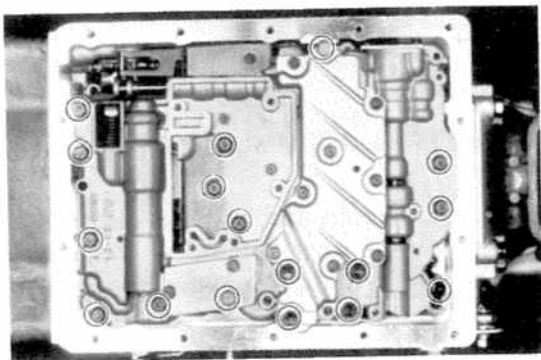
Using a screwdriver, pry up both tube ends and remove the tubes.



6. REMOVE OIL STRAINER

Remove five bolts, and the oil strainer.

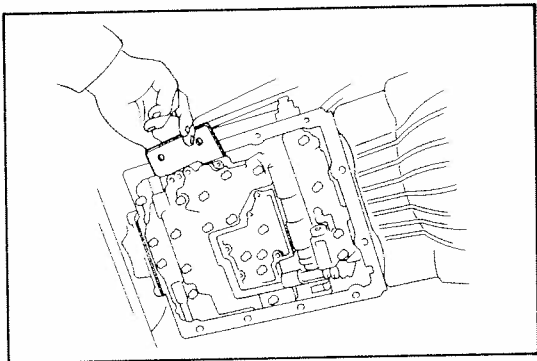
CAUTION: Be careful as some oil will come out with the filter.



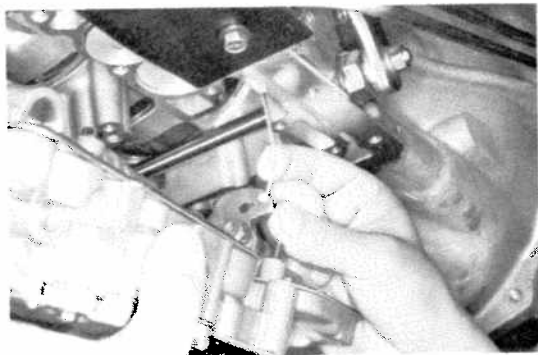
7. REMOVE VALVE BODY

- (a) Remove seventeen bolts.

NOTE: Bolt lengths will be shown for installation, so there is no need to mark them now.



- (b) Lower valve body slightly, and install the accumulator piston retaining plate. Hold in place with two pan bolts, finger tight.



- (c) Disconnect the throttle cable from the cam and remove the valve body.

DISASSEMBLY, INSPECTION AND ASSEMBLY OF VALVE BODY (See page 10-86)

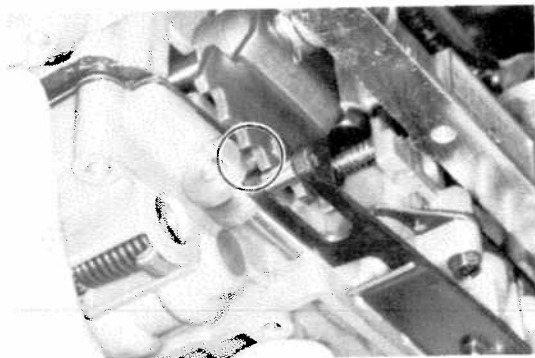
INSTALLATION OF VALVE BODY

1. CONNECT THROTTLE CABLE TO CAM

Push the cable fitting into the cam.

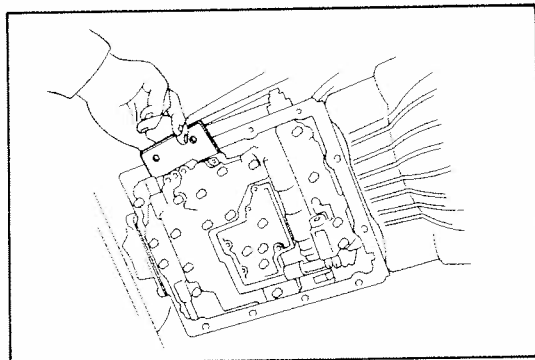
2. ALIGN MANUAL VALVE LEVER WITH MANUAL VALVE, AND LOOSELY INSTALL SEVERAL BOLTS IN VALVE BODY

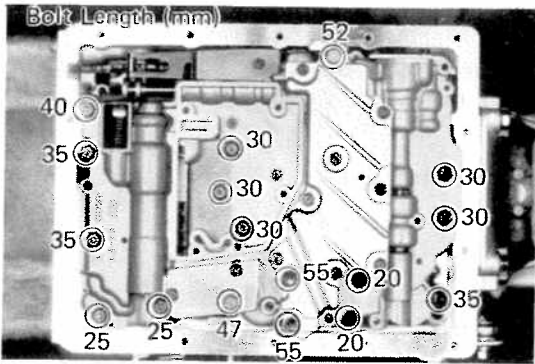
Leave the bolts loose so that the accumulator retaining plate can be removed.



3. REMOVE ACCUMULATOR RETAINING PLATE

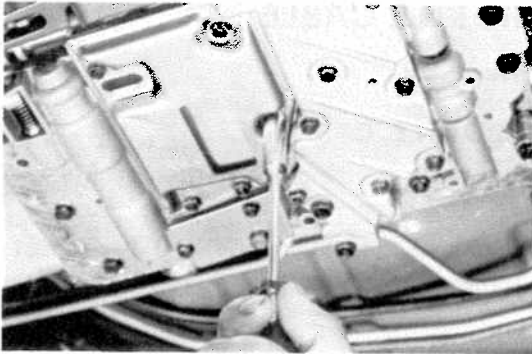
Remove two pan bolts, and slide out the plate.



**4. INSTALL VALVE BODY BOLTS**

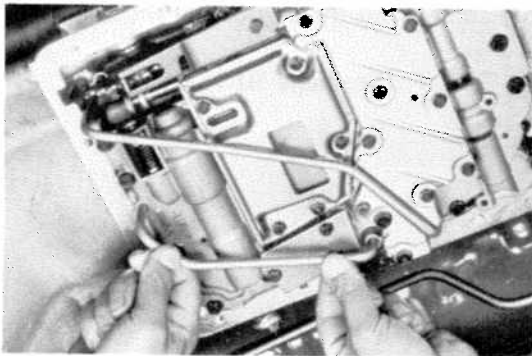
Install the bolts as shown. Tighten the bolts evenly.

Torque: 80 – 120 kg-cm (70 – 104 in.-lb)

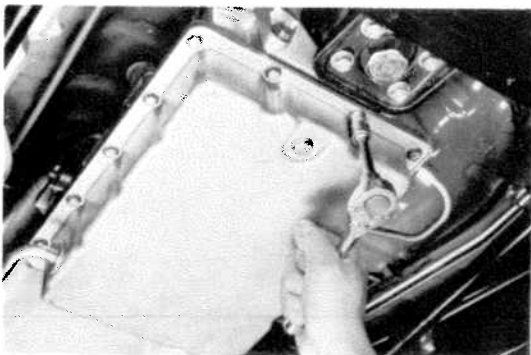
**5. INSTALL OIL SCREEN**

Be sure the screen is clean. Torque the bolts.

Torque: 50 – 60 kg-cm (44 – 52 in.-lb)

**6. INSTALL TWO OIL TUBES**

Press the tubes by hand into the positions indicated in the figure.

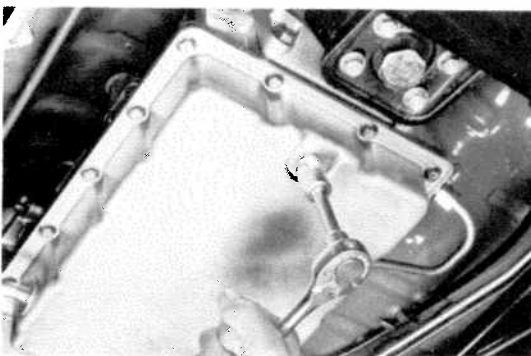
**7. INSTALL PAN WITH NEW GASKET**

Be sure the pan is clean and the magnet is in place.

CAUTION: Do not use gasket sealer.

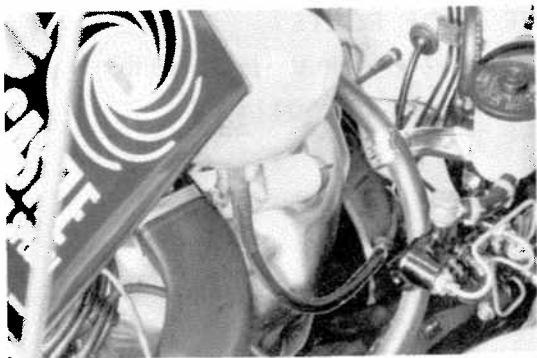
Tighten bolts evenly.

Torque: 40 – 50 kg-cm (35 – 43 in.-lb)

**8. INSTALL DRAIN PLUG**

Torque the drain plug.

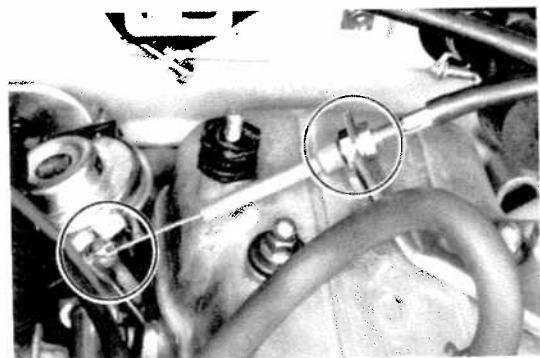
Torque: 180 – 230 kg-cm (13 – 16 ft-lb)



9. FILL TRANSMISSION WITH ATF

Add only about four quarts of ATF. Start the engine and shift through all the gears. Check the fluid level and add as necessary.

CAUTION: Do not overfill.



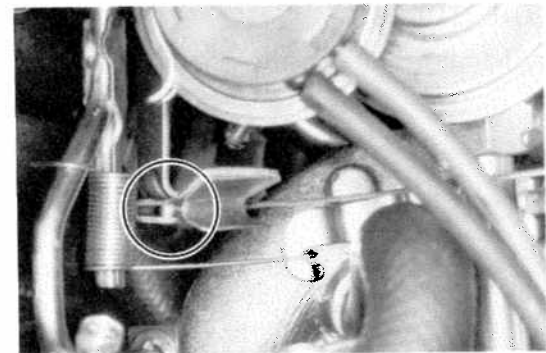
REMOVAL OF THROTTLE CABLE

1. REMOVE AIR CLEANER

2. DISCONNECT THROTTLE CABLE

- (a) Disconnect the cable housing from the bracket on the valve cover.
- (b) Remove the clip from the cable guide, and disconnect the guide grommet.

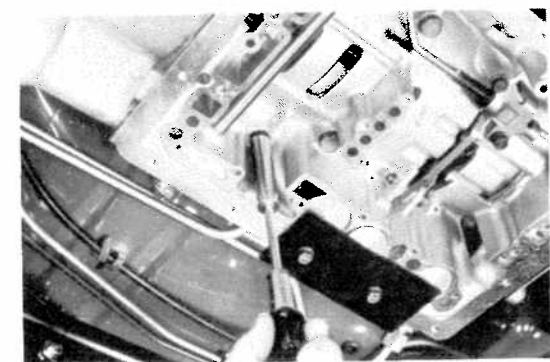
- (c) Disconnect the cable from the carburetor linkage.



3. REMOVE VALVE BODY (See page 10-18)

4. PUSH THROTTLE CABLE OUT OF TRANSMISSION CASE

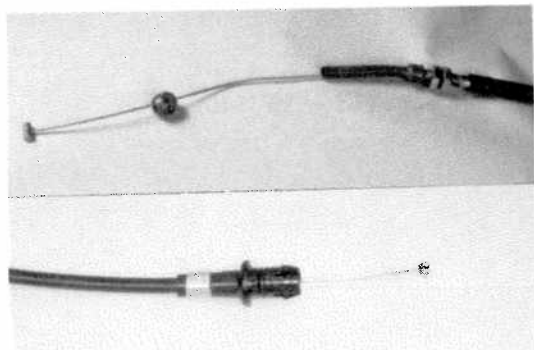
Using a 10 mm socket, push the throttle cable out.

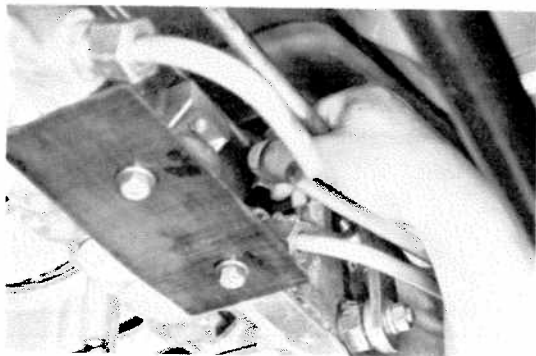


INSPECTION OF THROTTLE CABLE

CHECK PARTS FOR WEAR, DAMAGE, CRACKS OR SMOOTH OPERATION

Replace parts as necessary.



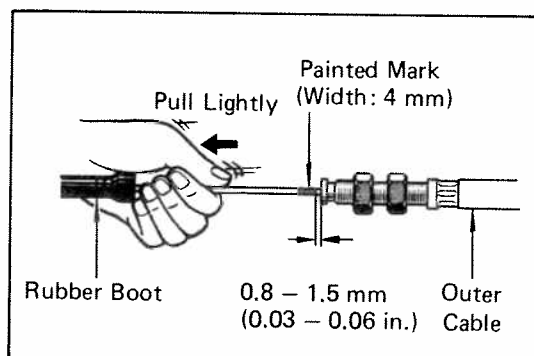


INSTALLATION OF THROTTLE CABLE

1. INSTALL CABLE IN TRANSMISSION CASE

Be sure to push it in all the way.

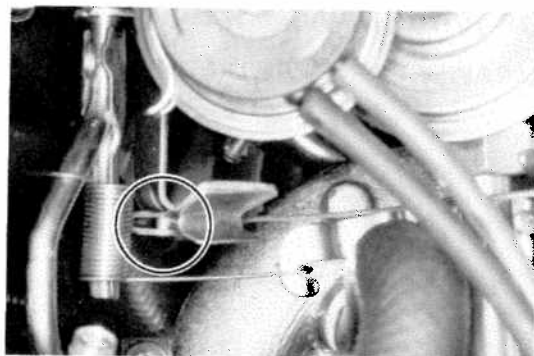
2. INSTALL VALVE BODY (See page 10-19)



3. IF THROTTLE CABLE IS NEW, PAINT MARK ON INNER CABLE

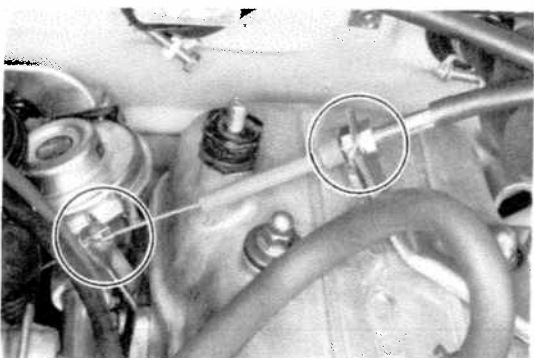
NOTE: New cables do not have a cable stopper installed. Therefore, to make adjustment possible, paint a mark as described below.

- (a) Pull the inner cable lightly until a slight resistance is felt, and hold it.
- (b) Paint a mark as shown, about 4 mm (0.16 in.) in width.



4. CONNECT THROTTLE CABLE

- (a) Connect the cable to the carburetor linkage.



- (b) Put the guide grommet into position, and install the clip.
- (c) Connect the cable housing to the bracket on the valve cover.

5. ADJUST THROTTLE CABLE (See page 10-5)

6. INSTALL AIR CLEANER

7. TEST DRIVE VEHICLE

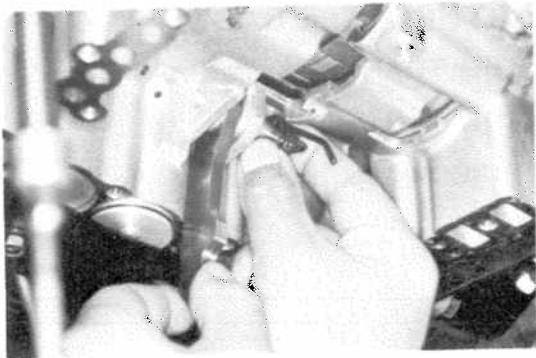
REMOVAL OF PARK PAWL

1. REMOVE VALVE BODY (See page 10-18)

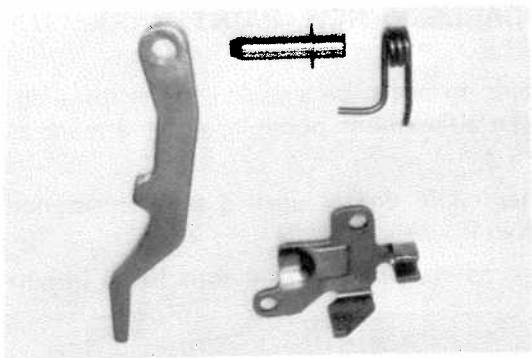
2. REMOVE PARK LOCK PAWL BRACKET

Remove two bolts and the bracket.

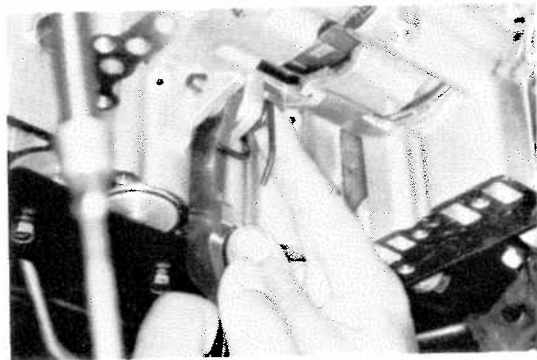




3. REMOVE SPRING, PARK PAWL PIVOT PIN AND PARK PAWL

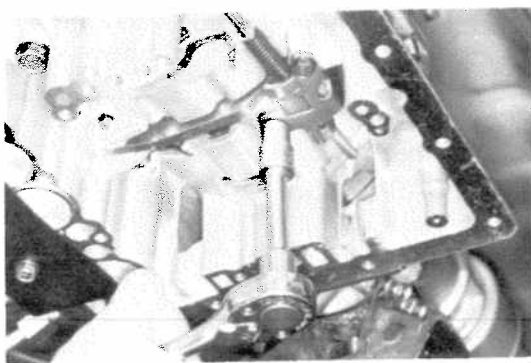


4. CLEAN AND INSPECT PARK PAWL SUBASSEMBLY
 - (a) Use only clean solvent, and dry parts with compressed air.
 - (b) Check spring, pivot pin, pawl, bracket and rod for wear or damage. Replace parts as necessary.



INSTALLATION OF PARK PAWL

1. INSTALL PARK PAWL, PARK PAWL PIVOT PIN AND SPRING



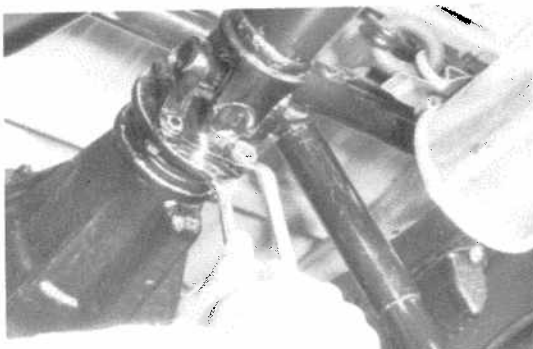
2. INSTALL PARK LOCK PAWL BRACKET
 - (a) Push lock rod fully forward.
 - (b) Install two bolts finger tight.
 - (c) Check that the pawl operates smoothly.
 - (d) Torque the bolts.

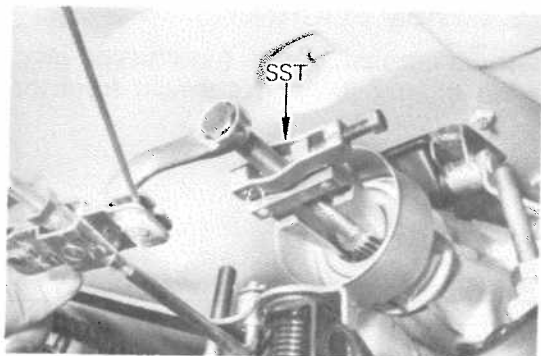
Torque: 60 – 90 kg-cm (53 – 78 in.-lb)

3. INSTALL VALVE BODY (See page 10-19)

REPLACEMENT OF REAR OIL SEAL

1. RAISE VEHICLE, AND POSITION PAN TO CATCH ANY FLUID THAT MAY DRIP
2. REMOVE PROPELLER SHAFT (See page 12-3)



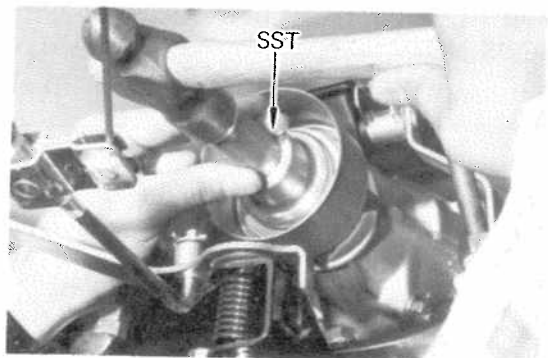


3. REMOVE REAR DUST SEAL AND OIL SEAL

CAUTION: Clean the rear extension housing before removing the seal.

Using a seal puller*, remove the two seals.

*SST 09308-10010 or Commercial puller



4. INSTALL NEW OIL SEAL AND DUST SEAL

Using a seal driver*, drive in the oil seal as far as it will go. Drive in the dust seal flush with the housing.

*SST 09325-20010 or Commercial driver

5. INSTALL PROPELLER SHAFT (See page 12-7)

6. LOWER VEHICLE AND CHECK FLUID LEVEL

Start the engine, shift the selector into each gear, then check the fluid level with the transmission in PARK. Add fluid as necessary.

CAUTION: Do not overfill.

REMOVAL OF EXTENSION HOUSING

1. RAISE VEHICLE AND POSITION PAN TO CATCH ANY FLUID THAT MAY DRIP

2. REMOVE PROPELLER SHAFT (See page 12-3)

3. DISCONNECT SPEEDOMETER CABLE

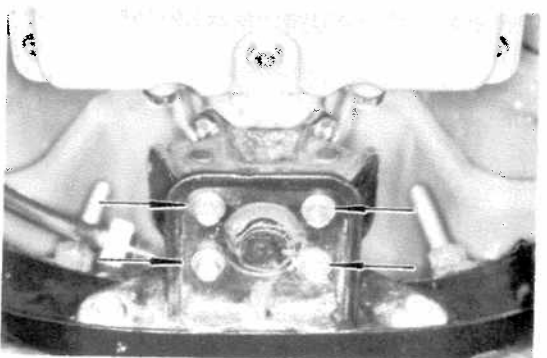
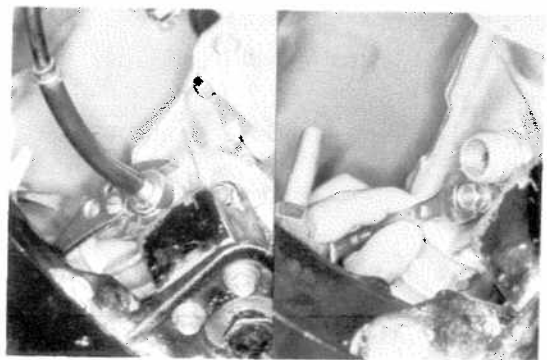
Loosen serrated collar with water pump pliers. Do not lose the felt dust protector and washer.

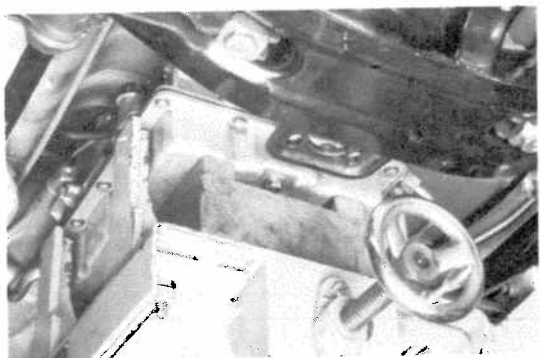
4. REMOVE SPEEDOMETER DRIVEN GEAR

Remove one bolt and locking tab. Pry out the speedometer gear with a screwdriver.

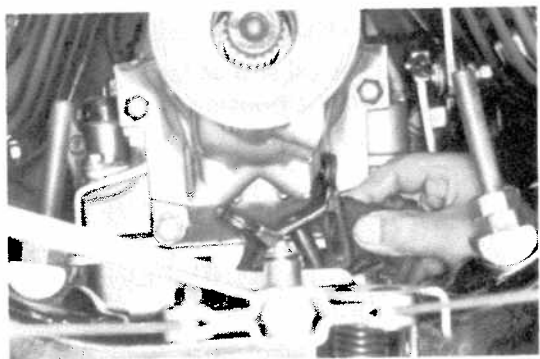
5. DISCONNECT ENGINE REAR MOUNTING FROM BRACKET

Remove four bolts from the bracket.

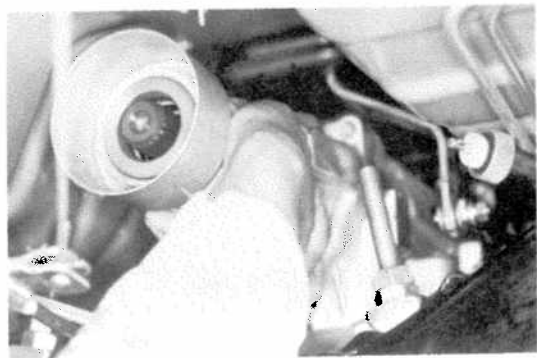


**6. JACK UP TRANSMISSION SLIGHTLY**

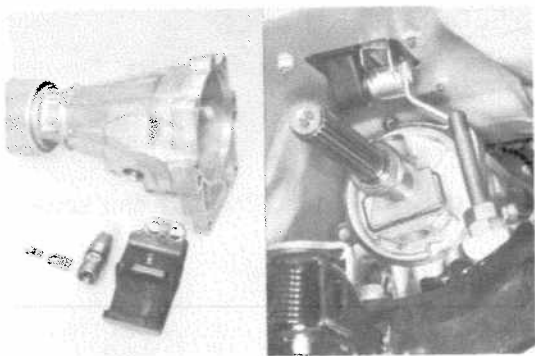
Securely support the transmission on a transmission jack. Lift the transmission slightly to remove weight from the rear support member.

**7. REMOVE ENGINE REAR MOUNTING FROM EXTENSION HOUSING**

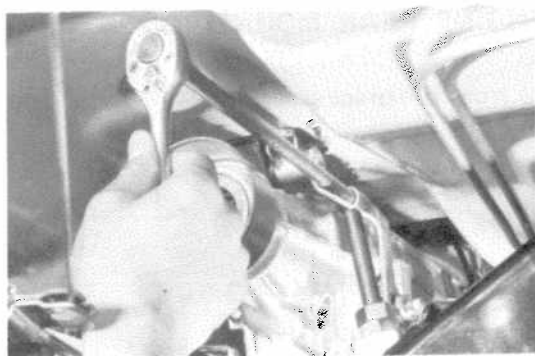
Remove four bolts and the engine rear mounting from the extension housing.

**8. REMOVE EXTENSION HOUSING AND GASKET**

Remove six bolts. If necessary, tap the extension housing with a plastic hammer to loosen it.

**9. CLEAN AND INSPECT COMPONENTS**

- (a) Wash components in clean solvent, and dry with compressed air.
- (b) Check the case, speedometer gear and output shaft for cracks, wear and damage.

**INSTALLATION OF EXTENSION HOUSING**

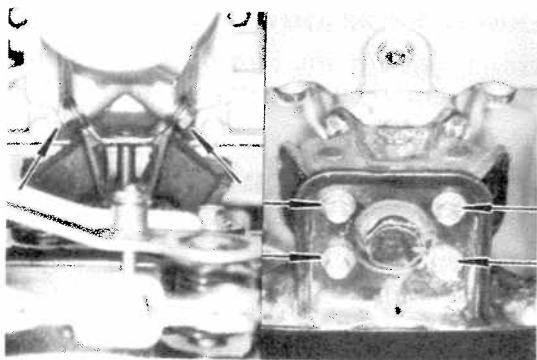
NOTE: If necessary, install a new oil seal before installation.
(See page 10-107)

1. INSTALL NEW GASKET AND EXTENSION HOUSING ON TRANSMISSION

Install six bolts finger tight, then torque the bolts.

Torque: 270 — 420 kg-cm (20 — 30 ft-lb)

NOTE: The two lower bolts are shorter.



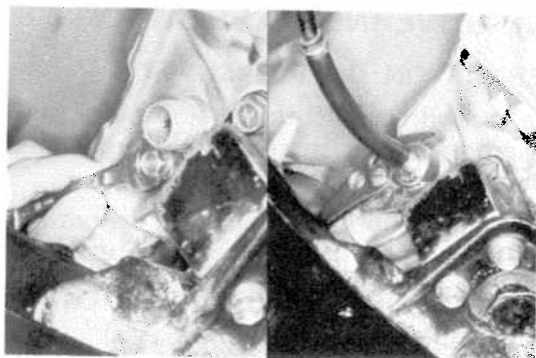
2. INSTALL ENGINE REAR MOUNTING

- (a) Install the engine rear mounting to the extension housing. Tighten the four bolts.

Torque: 190 – 310 kg-cm (14 – 22 ft-lb)

- (b) Lower and rest the transmission on the mounting bracket.
- (c) Connect the mounting to the bracket. Tighten the four bolts.

Torque: 100 – 160 kg-cm (8 – 11 ft-lb)

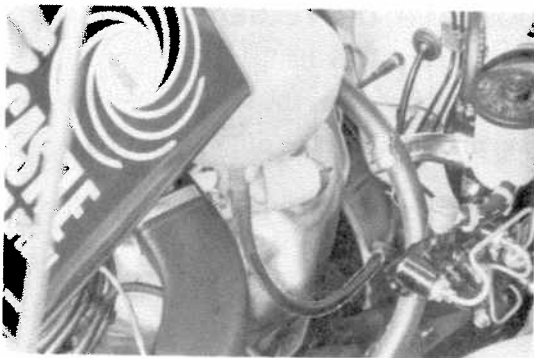


3. INSTALL SPEEDOMETER DRIVEN GEAR

- (a) Install a new O-ring on the shaft sleeve.
- (b) Install the lock plate with a bolt and washer.

4. CONNECT SPEEDOMETER CABLE

Place felt dust protector and washer on the end of the cable. Tighten the collar with pliers.



5. INSTALL PROPELLER SHAFT (See page 12-7)

6. LOWER VEHICLE AND CHECK FLUID LEVEL

Start the engine, shift the selector into each gear, then check the fluid level with the transmission in PARK. Add fluid as necessary.

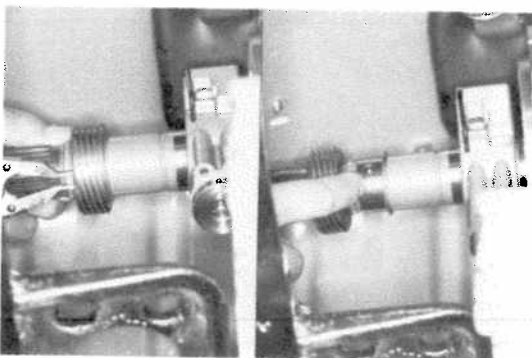
CAUTION: Do not overfill.

REMOVAL OF GOVERNOR ASSEMBLY

1. REMOVE EXTENSION HOUSING (See page 10-24)

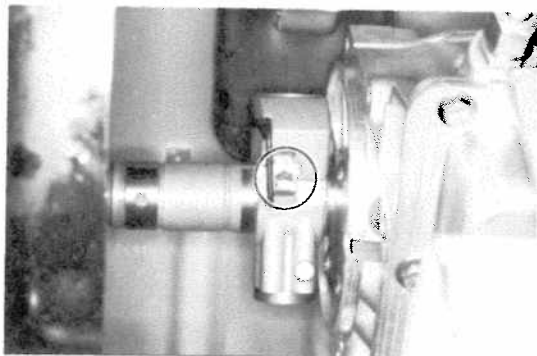
2. REMOVE SPEEDOMETER DRIVE GEAR

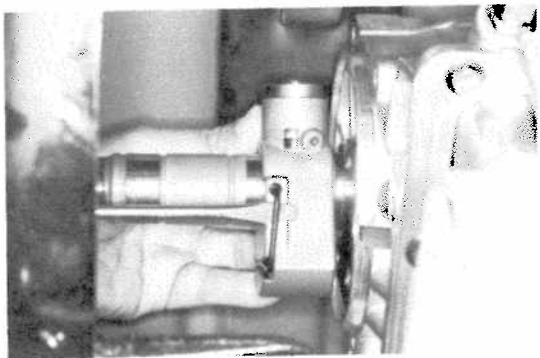
- (a) Using snap ring pliers, remove the snap ring.
- (b) Slide off the speedometer gear.
- (c) Remove the lock ball and the other snap ring.



3. REMOVE GOVERNOR LOCK PLATE AND BOLT

Release the lock plate and remove the lock bolt.



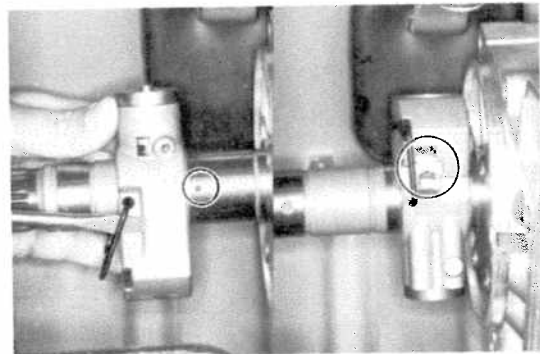


4. REMOVE GOVERNOR FROM OUTPUT SHAFT

Using a larger screwdriver, lift the retaining clip on the square side of the governor body and slide off of the shaft.

INSPECTION AND REPAIR OF GOVERNOR ASSEMBLY

(See page 10-105)



INSTALLATION OF GOVERNOR ASSEMBLY

1. INSTALL GOVERNOR ON OUTPUT SHAFT

- (a) Using a large screwdriver, lift the retaining clip, and slide the governor on the shaft with the retaining ring facing the end of the shaft.
- (b) Release the retaining clip into the hole in the output shaft. Check that the governor assembly is secure.

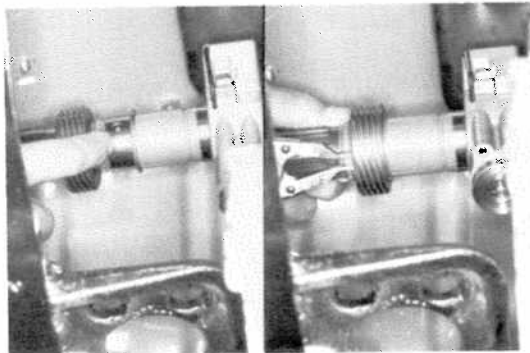
2. INSTALL GOVERNOR LOCK PLATE AND BOLT

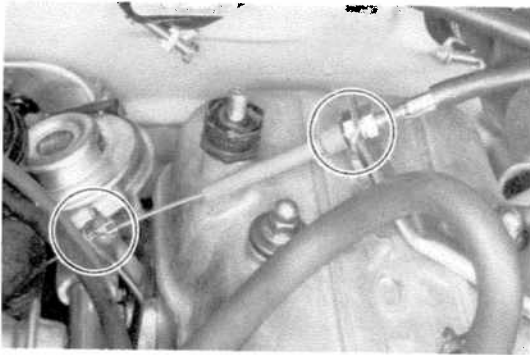
Tighten the lock bolt and secure with the lock plate.

3. INSTALL SPEEDOMETER DRIVE GEAR

- (a) Install the snap ring and lock ball.
- (b) Slide the speedometer gear on the shaft.
- (c) Using snap ring pliers, install the outer snap ring.

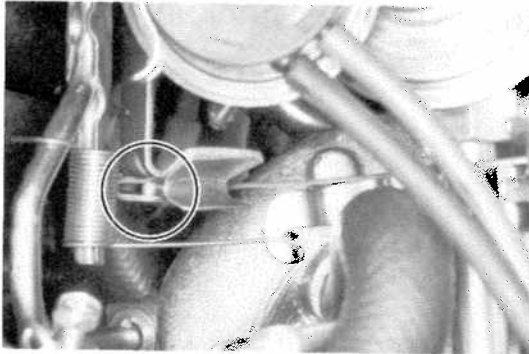
4. INSTALL EXTENSION HOUSING (See page 10-26)



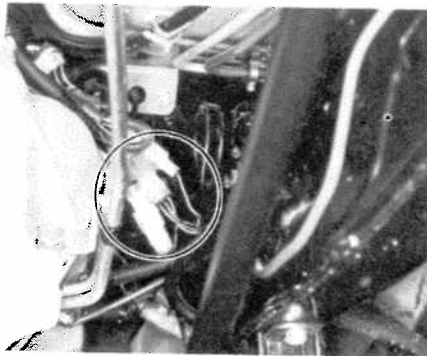


REMOVAL OF TRANSMISSION

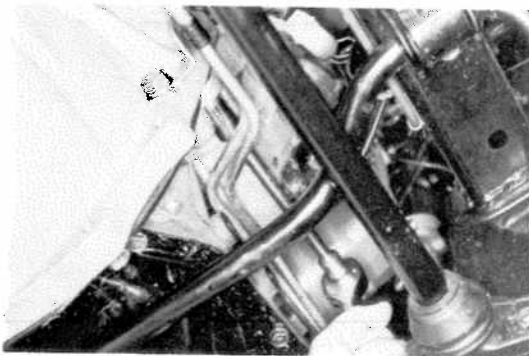
1. DISCONNECT BATTERY CABLE FROM NEGATIVE \ominus TERMINAL
2. REMOVE AIR CLEANER ASSEMBLY
3. DISCONNECT TRANSMISSION THROTTLE CABLE
 - (a) Loosen the adjusting nuts, and disconnect the cable housing from the bracket.
 - (b) Remove the clip from the cable guide, and disconnect the guide grommet.
 - (c) Disconnect the cable from the carburetor linkage.
4. REMOVE UPPER MOUNTING NUT ON STARTER
5. RAISE VEHICLE AND DRAIN TRANSMISSION
CAUTION: Be sure the vehicle is securely supported.



6. DISCONNECT WIRING CONNECTORS TO SOLENOID, NEUTRAL START AND BACK-UP LIGHT SWITCHES
Disconnect the connectors located near the starter.



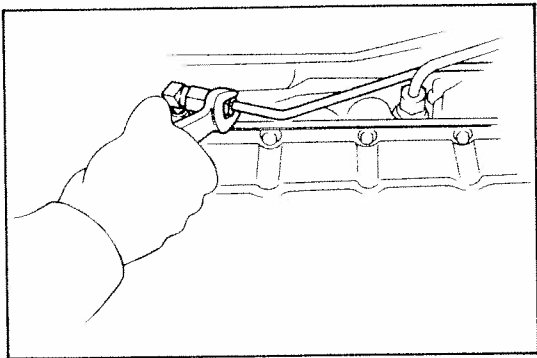
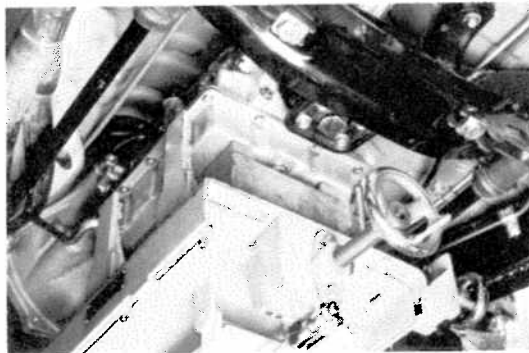
7. REMOVE STARTER
 - (a) Remove the lower mounting bolt, and pull the starter toward the front of the vehicle.
 - (b) Lay the starter alongside the engine.



8. REMOVE PROPELLER SHAFT (See page 12-3)

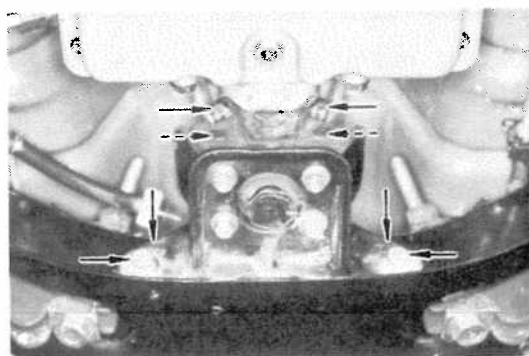
9. DISCONNECT SPEEDOMETER CABLE
10. DISCONNECT MANUAL SHIFT LINKAGE
Disconnect the shift linkage at the rear connection.



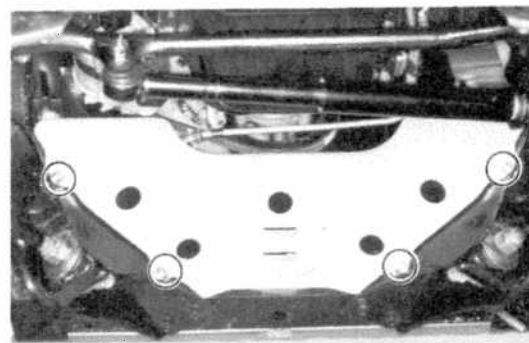
**11. DISCONNECT TWO OIL COOLER LINES****12. DISCONNECT EXHAUST PIPE CLAMP AND REMOVE OIL FILLER TUBE****13. JACK UP TRANSMISSION SLIGHTLY**

If a transmission jack is not available, be sure to put a wooden block between the jack and the transmission pan to prevent damage.

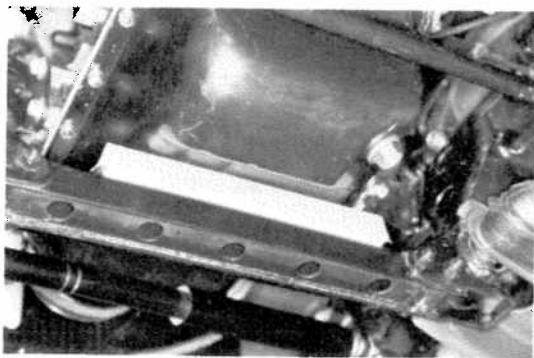
Raise the transmission enough to remove the weight from the engine rear mounting.

**14. REMOVE ENGINE REAR MOUNTING WITH BRACKET**

Remove eight bolts and the engine rear mounting with bracket.

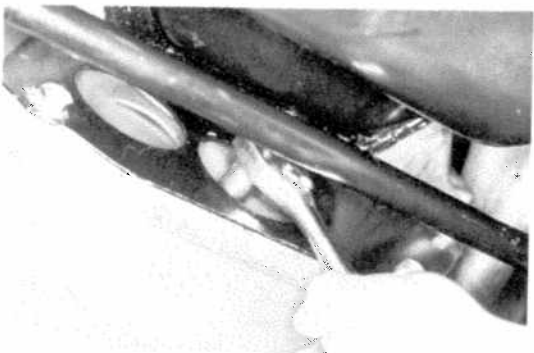
**15. REMOVE ENGINE UNDERCOVER**

For rotating the engine and torque converter, remove the engine undercover to gain access to the crankshaft pulley.



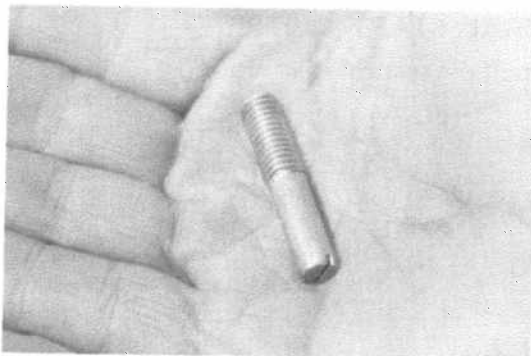
16. INSERT WOODEN PIECE BETWEEN ENGINE OIL PAN AND MEMBER

- (a) Insert wooden piece between the engine oil pan and member.
- (b) Lower the transmission and rest the engine on the member.



17. REMOVE SIX TORQUE CONVERTER MOUNTING BOLTS

- (a) Pry out the two rubber plugs from the service holes at the rear of the engine.
- (b) Turn the crankshaft to gain access to each bolt. Remove six bolts.



18. INSTALL GUIDE PIN IN TORQUE CONVERTER

Install the guide pin in one of the torque converter bolt holes.

If necessary, a guide pin can be made by cutting off the head of a bolt.

19. REMOVE TRANSMISSION HOUSING MOUNTING BOLTS



20. PRY ON END OF GUIDE PIN TO BEGIN MOVING TRANSMISSION WITH CONVERTER TOWARD REAR

The guide pin helps keep the converter with the transmission.

21. REMOVE TRANSMISSION ASSEMBLY

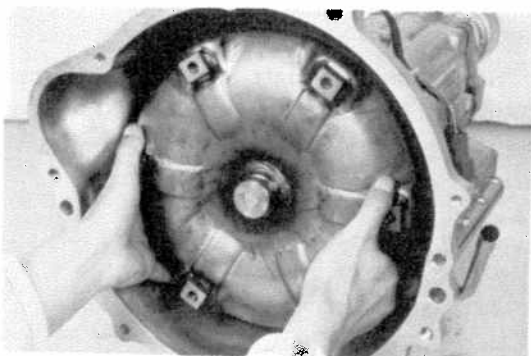
Draw out the transmission toward the rear.

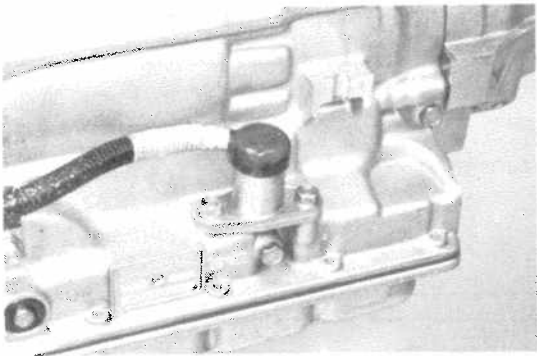
CAUTION: Do not let the throttle cable or neutral start switch cable catch on anything. Keep the oil pan positioned down.

Be careful not to let the torque converter slide out.

22. PLACE PAN UNDER CONVERTER HOUSING AND REMOVE CONVERTER

Pull the converter straight off, and allow fluid to drain into the pan.

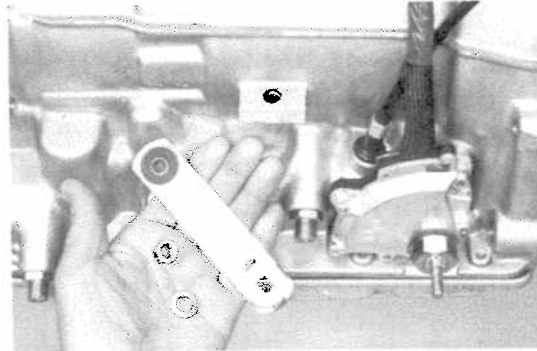




DISASSEMBLY OF TRANSMISSION SEPARATE BASIC SUBASSEMBLY

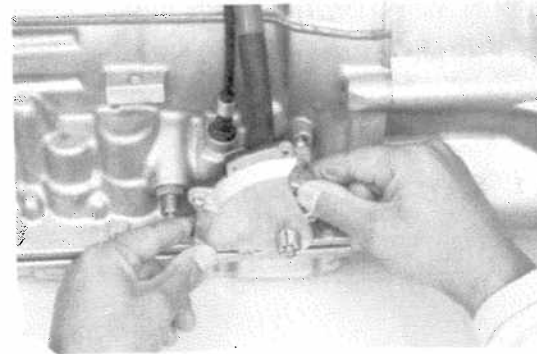
1. REMOVE SOLENOID

After removing two bolts, remove the solenoid.



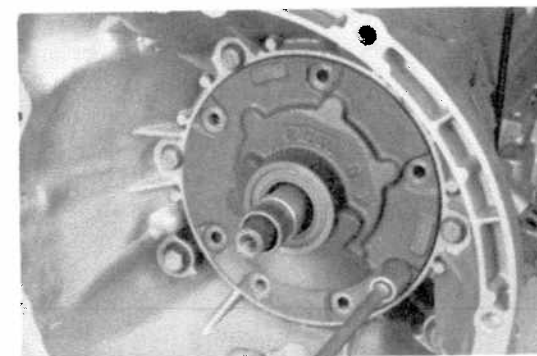
2. REMOVE SHIFT HANDLE

Remove nut on shaft and pull off handle.



3. REMOVE NEUTRAL START SWITCH

Remove nut and pull off neutral start switch.



4. REMOVE OIL PUMP AND BELL HOUSING

(a) Remove seven bolts of oil pump housing.



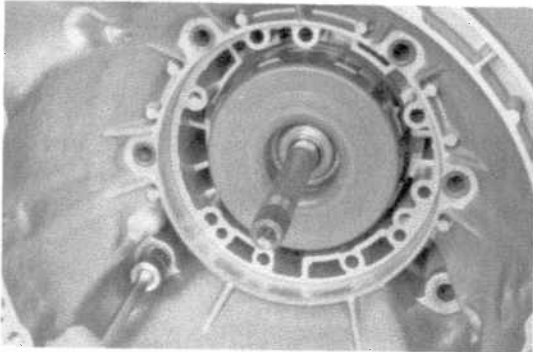
(b) Position puller* on shaft in back of the splines.

CAUTION: Do not damage shaft bushing surface. Turn end bolt of puller to free pump. Remove the puller.

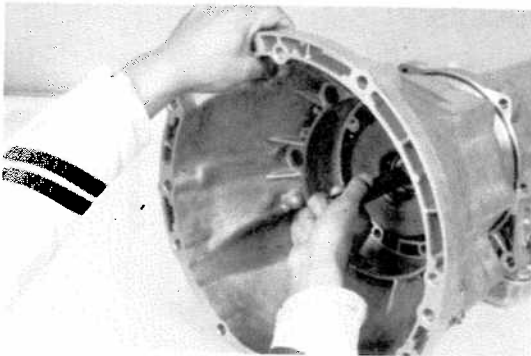
*SST 09610-20011



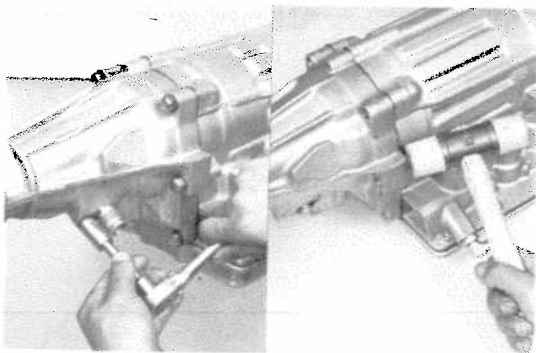
- (c) Grasp the pump stator shaft and pull pump from case.



- (d) Remove two short bolts and four long bolts of bell housing.



- (e) While holding the input shaft, remove the bell housing.

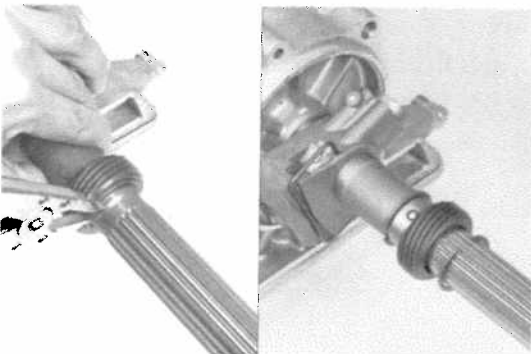


5. REMOVE SPEEDOMETER DRIVEN GEAR SLEEVE

Remove the locking tab and pry out the gear sleeve with a medium-sized screwdriver.

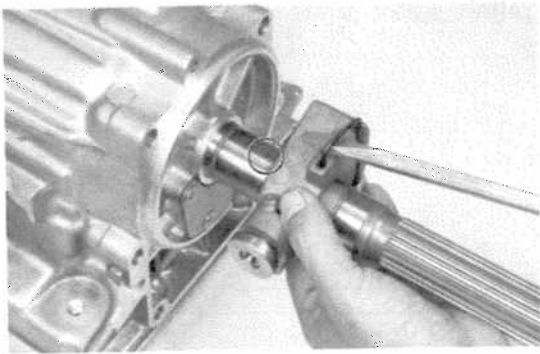
6. REMOVE EXTENSION HOUSING AND GASKET

Remove six bolts. To loosen the housing, tap it lightly with a soft-faced hammer or a block of wood.

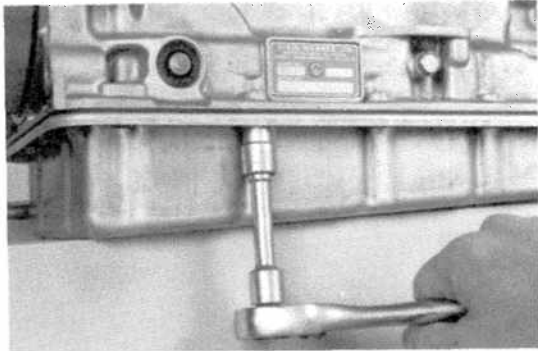


7. REMOVE SPEEDOMETER DRIVE GEAR

- (a) Using snap ring pliers, remove the snap ring.
(b) Remove the speedometer drive gear and lock ball from the output shaft.
(c) Remove the other snap ring.

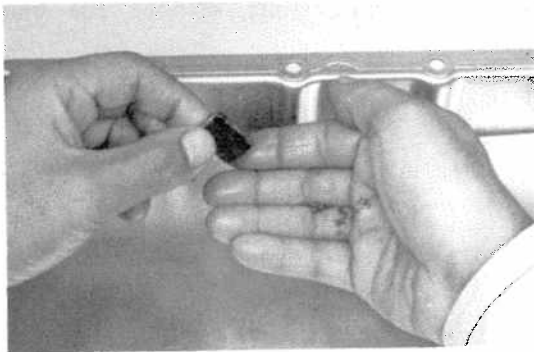
**8. REMOVE GOVERNOR FROM OUTPUT SHAFT**

- (a) Remove the governor valve lock bolt.
- (b) While lifting the retaining clip with a larger screwdriver, slide off the governor valve.

**9. REMOVE PAN AND GASKET**

- (a) Remove fourteen bolts.
- (b) Remove the pan by lifting the transmission case.

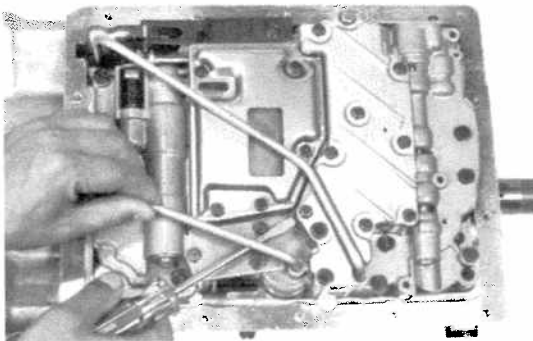
CAUTION: Do not turn the transmission over as this will contaminate the valve body with foreign materials in the bottom of the pan.

**10. EXAMINE PARTICLES IN PAN**

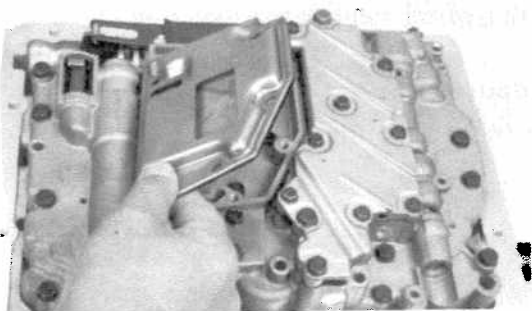
Remove magnet and use it to collect any steel chips. Look carefully at the chips and particles in the pan and on the magnet to anticipate what type of wear you will find in the transmission:

Steel (magnetic) = bearing, gear and clutch plate wear.

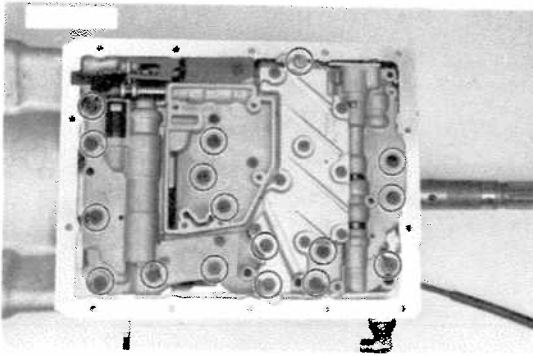
Brass (nonmagnetic) = bushing wear.

**11. TURN TRANSMISSION OVER AND REMOVE TUBES**

Pry up both ends of tubes with a larger screwdriver and remove the tubes.

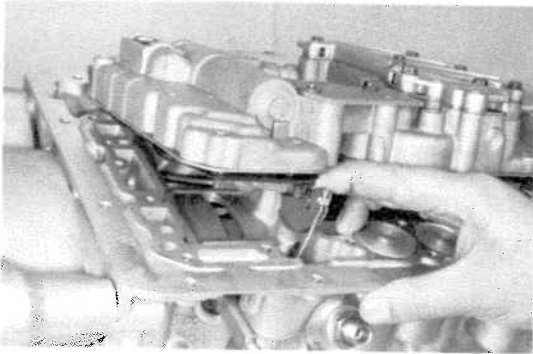
**12. REMOVE SCREEN**

Remove five bolts, and lift off screen.

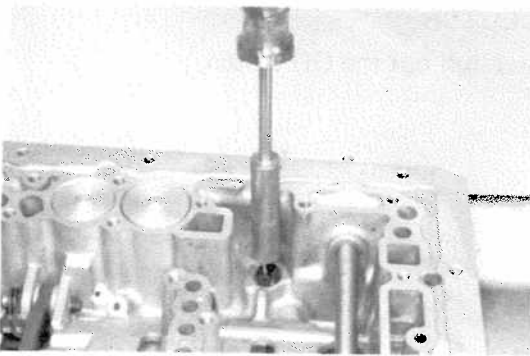


13. REMOVE VALVE BODY

(a) Remove seventeen bolts

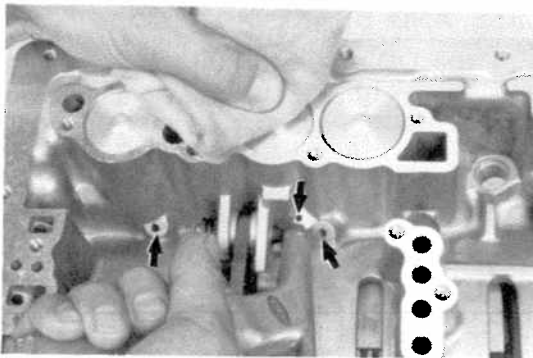


(b) Disconnect the throttle cable from the cam and remove the valve body.



14. REMOVE THROTTLE CABLE AND RETAINER

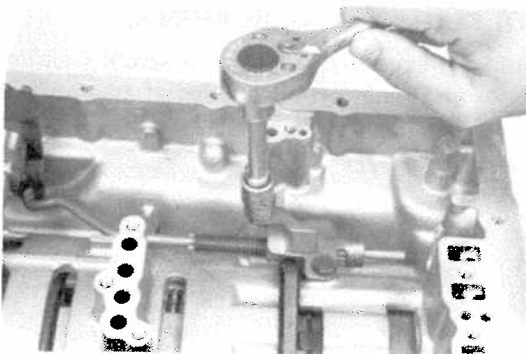
Using a 10 mm socket, push the plastic throttle cable retainer out of the transmission case.



15. REMOVE ACCUMULATOR PISTONS AND SPRINGS

WARNING: Keep face away to avoid injury. Do not use high-pressure air.

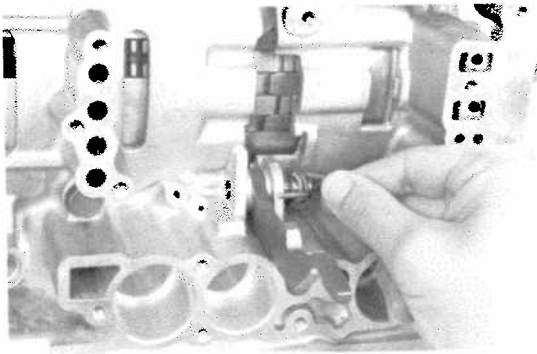
Position a rag to catch each piston. Using low-pressure compressed air (1 kg/cm² or 14 psi, max), pop each piston into the rag. Force air into holes shown, and remove pistons and springs.



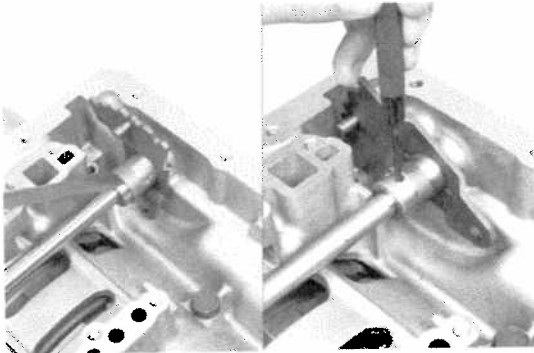
16. REMOVE PARKING LOCK ROD

(a) Remove two bolts and the parking lock pawl bracket.

(b) Remove the lock rod after aligning the lugs with the slots of manual valve lever.



- 17. REMOVE SPRING, PIVOT PIN AND PARKING LOCK PAWL**



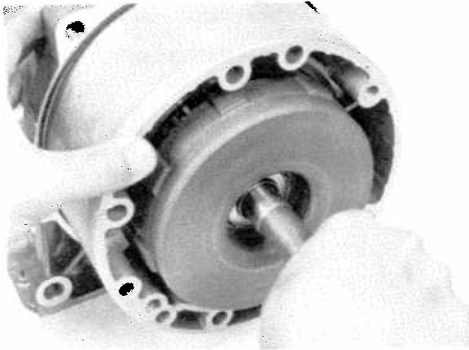
- 18. PRY AND SHIFT COLLAR**

Using a hammer and chisel, pry and shift the collar.

- 19. DRIVE OUT ROLL PIN AND REMOVE MANUAL VALVE LEVER SHAFT**

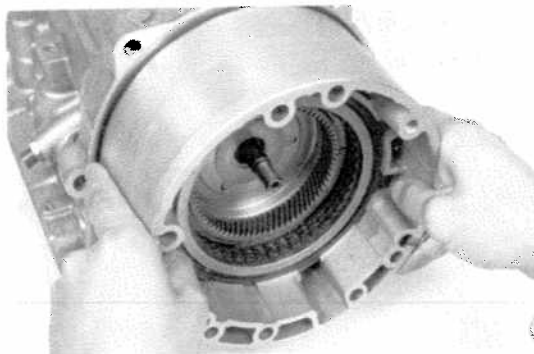
Using a hammer and punch, drive out pin.

Turn transmission assembly over.



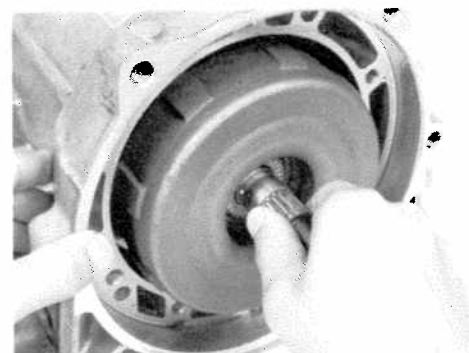
- 20. REMOVE OD CLUTCH**

Grasp the shaft and pull out the OD clutch.



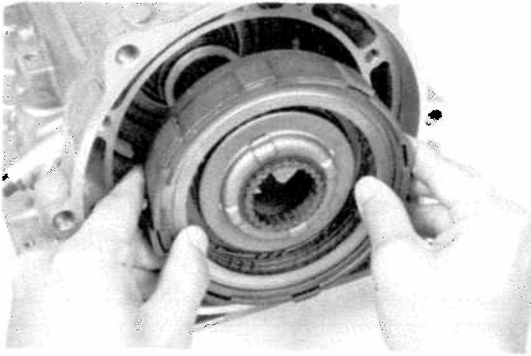
- 21. REMOVE OD CASE AND BRAKE**

Hold both sides of the OD case and pull out from the transmission case while watching for bearings and races on both sides of assembly.

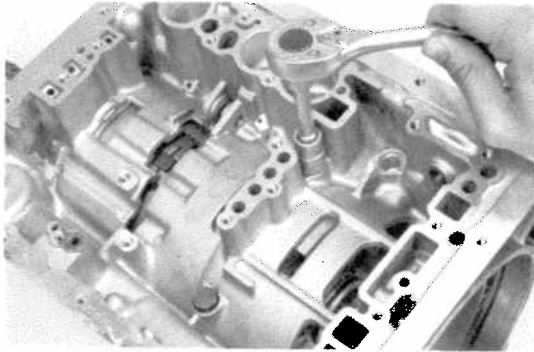


- 22. REMOVE FRONT CLUTCH AND BEARINGS**

Grasp the shaft and pull out front clutch assembly while watching for bearings and races on both sides of assembly.

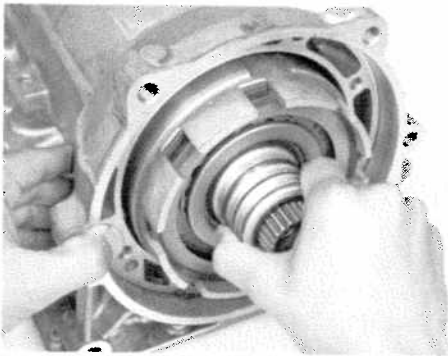
**23. REMOVE REAR CLUTCH**

Grasp the clutch hub and pull out from case.

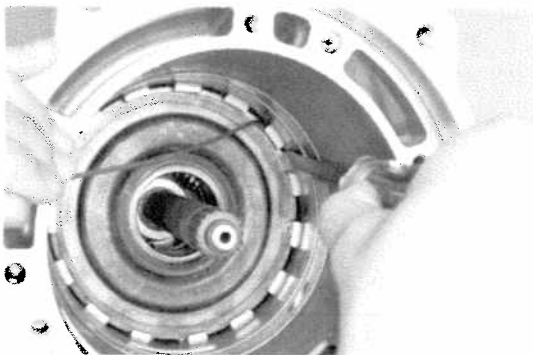
**24. REMOVE CENTER SUPPORT BOLTS**

Remove the two center support bolts.

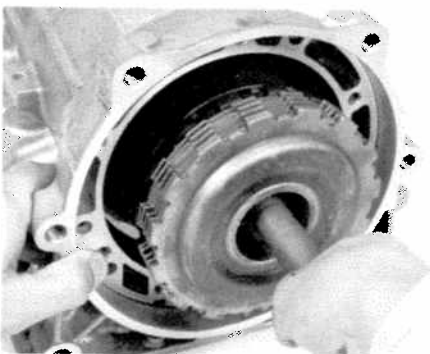
NOTE: After removing one bolt, the other one will be loose, but this is normal.

**25. REMOVE CENTER SUPPORT AND SUN GEAR ASSEMBLY**

From the case front opening, grasp the assembly and pull out.

**26. REMOVE REACTION PLATE RETAINING RING**

Using a long screwdriver, compress the snap ring and lift it above the groove with a wire hook.

**27. REMOVE REAR PARTS GROUP**

Grasp the intermediate shaft and pull out the rear parts group. If the brake apply tube and rear thrust bearing and races do not come out with the assembly, remove them from the case.

COMPONENT GROUP DISASSEMBLY, INSPECTION AND ASSEMBLY

IMPORTANT NOTE: The instructions here are organized so that you work on only one component at a time. This will help avoid confusion from similar-looking parts from different components being on your workbench at the same time.

The components are inspected and repaired from bell housing side.

GENERAL CLEANING NOTES:

1. All disassembled parts should be washed clean and the fluid passages and holes blown through with compressed air to make sure that they are not clogged.
3. When using compressed air to dry parts, keep face away to avoid spraying solvent in your face.

PARTS HOLDING NOTES:

1. The parts after cleaning should be arranged in proper order to allow performing the inspection, repairs, and reassembly with efficiency.
3. When disassembling valve body, be sure to keep each valve together with corresponding spring.

GENERAL ASSEMBLY NOTES:

1. All oil seal rings, clutch discs, clutch plates, rotating parts, and sliding surfaces should be coated with transmission fluid prior to reassembly.
3. All gaskets and rubber oil seals should be replaced if excessively damaged.
5. Make sure that the ends of snap ring are not in an open notch and are installed in groove correctly.

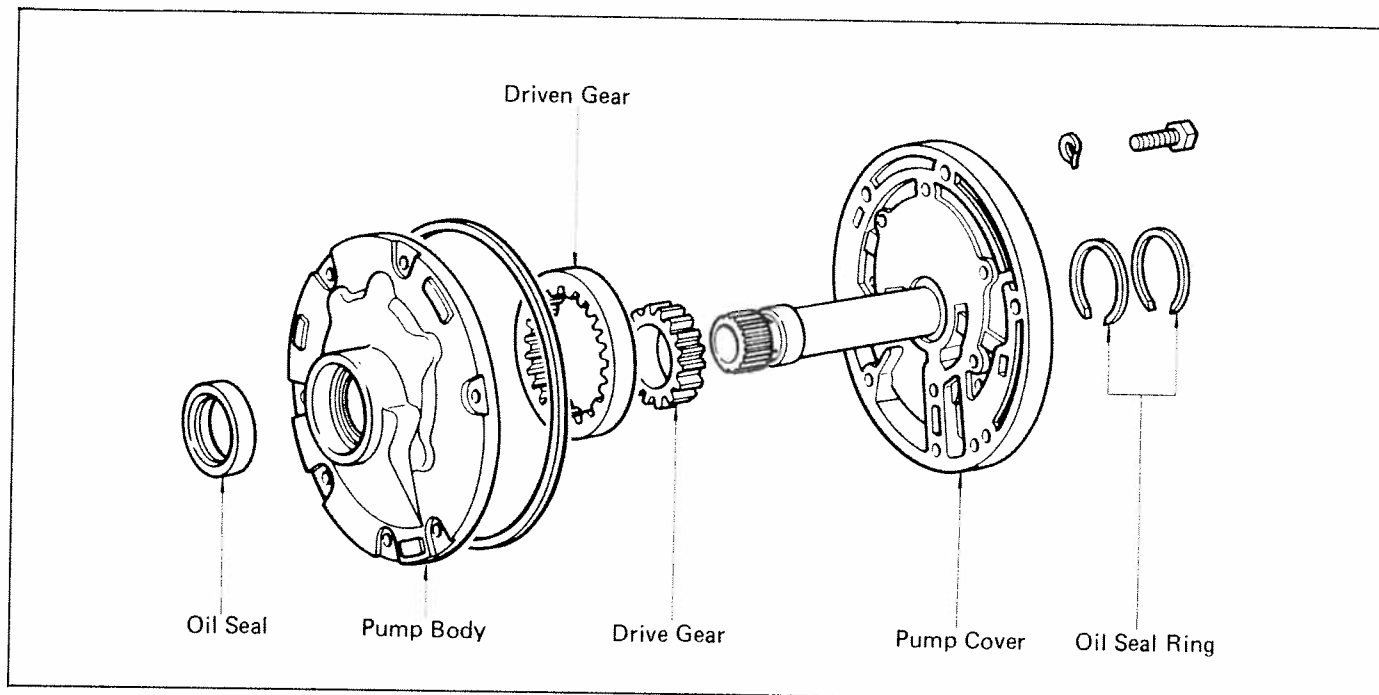
As much as possible, complete the inspection, repair, assembly before proceeding to the next component. If a component cannot be assembled because parts are being ordered, **BE SURE** to keep all parts of that group in a separate container while proceeding with disassembly, inspection, repair and assembly of other components.

2. Cleaning solvent used should be recommended automatic transmission fluid or kerosene.

2. New brakes and clutches that are to be used for replacement must be soaked in transmission fluid for at least two hours before assembly.

2. If a worn bushing is to be replaced, the replacement must be made with the sub-assembly containing that bushing.
4. Check thrust bearings and races for wear and damage. Replace if necessary.
6. Use petroleum jelly to keep parts in their places.

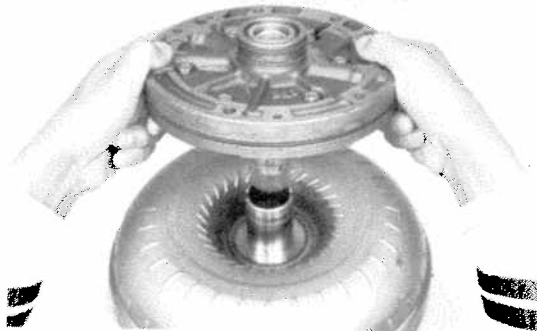
Oil Pump



DISASSEMBLY OF OIL PUMP

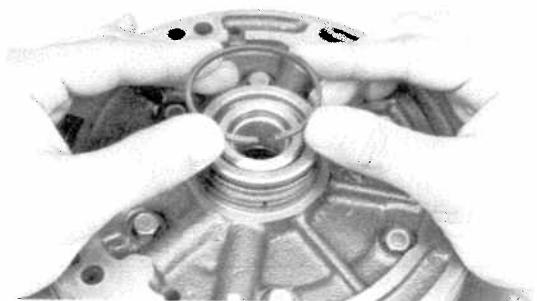
1. USE TORQUE CONVERTER AS A WORK STAND

Set oil pump on the torque converter.



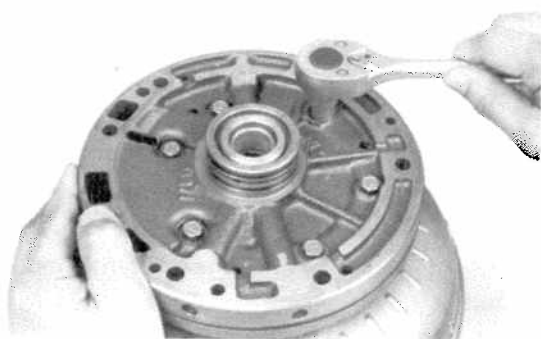
2. REMOVE TWO OIL SEAL RINGS FROM PUMP COVER

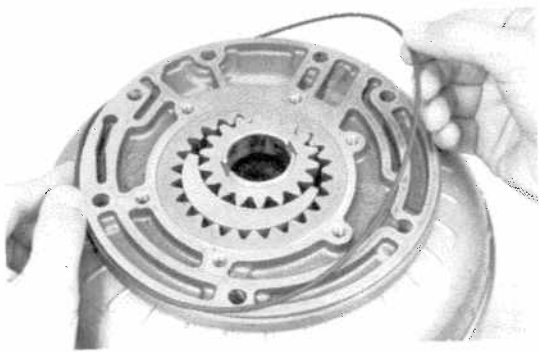
Unlock, spread and slide off by hand.



3. UNBOLT AND REMOVE PUMP COVER

Remove six bolts with washers from the oil pump cover. Lift off the cover.





4. REMOVE O-RING FROM PUMP

Pull off and discard.

5. LIFT PUMP OFF CONVERTER AND REMOVE OIL PUMP DRIVE GEAR AND DRIVEN GEAR

Lift out by hand. Identify the top and bottom and keep in assembly order.

INSPECTION OF OIL PUMP

1. THOROUGHLY WASH ALL PARTS IN SOLVENT

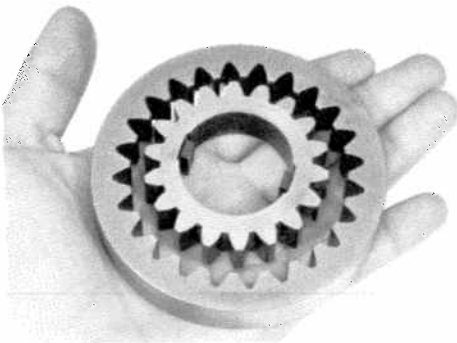
Use clean solvent. Be careful not to scratch mating surfaces of pump. Dry all parts with compressed air. Do not use towels or rags to dry parts.

CAUTION: To prevent deterioration, do not clean the oil seal with solvent.



2. INSPECT PUMP BODY AND COVER

- (a) Check interior surfaces where gears contact for wear or ridges.
- (b) Check overall for cracks, scores or damage.
- (c) Check bushing and oil seal grooves for wear or damage.
- (d) Check stator shaft surface and splines for wear or damage.

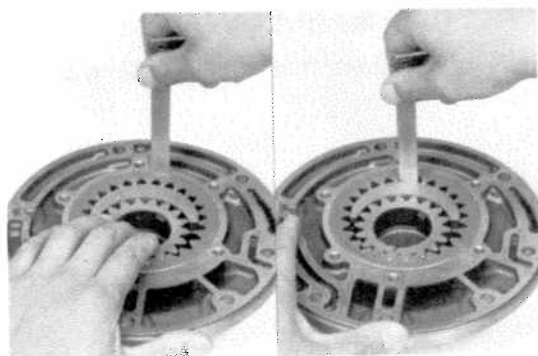


3. INSPECT DRIVE AND DRIVEN GEARS

Check teeth and all surfaces for wear, scores, ridges, cracks or other damage.

4. INSTALL DRIVEN GEAR AND DRIVE GEAR INTO PUMP BODY

Set into place for clearance measurements. Make sure top side of gears is facing up.



5. CHECK CLEARANCE BETWEEN BODY AND DRIVEN GEAR

Push driven gear to one side of body. Using a feeler gauge, check clearance.

Body clearance: 0.07 — 0.15 mm (0.0028 — 0.0059 in.)

6. CHECK TIP CLEARANCE OF BOTH GEARS

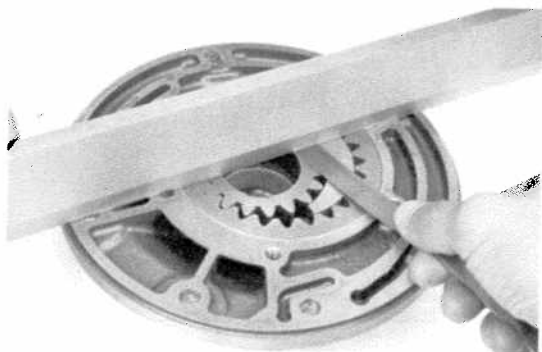
Measure between the gear teeth and the crescent-shaped part of the pump body.

Tip clearance: 0.11 — 0.14 mm (0.0043 — 0.0055 in.)

7. CHECK SIDE CLEARANCE OF BOTH GEARS

Using a steel straightedge and a feeler gauge, measure the side clearance of both gears.

Side clearance: 0.02 — 0.05 mm (0.0008 — 0.0020 in.)

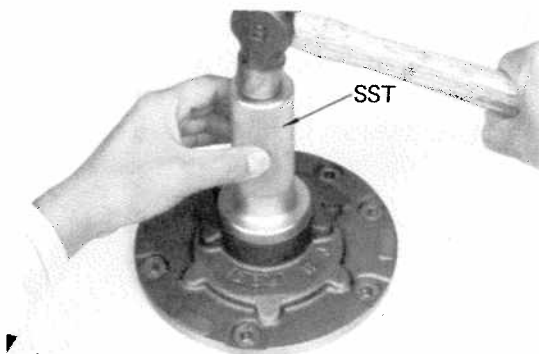
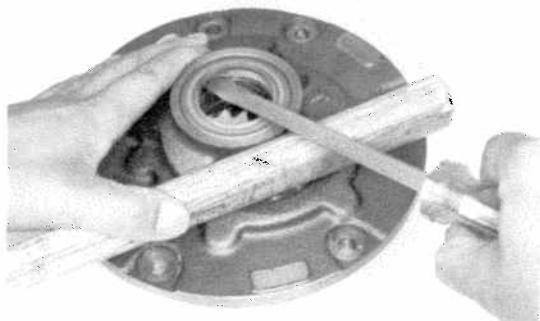
**8. INSPECT FRONT OIL SEAL**

Check for wear, damage and cracks. Replace the oil seal as follows, if necessary.

(a) Pry off the oil seal with a screwdriver.

(b) Using a driver* and hammer, install a new oil seal. The seal end should be flush with outer edge of pump body.

*SST 09350-20013 or Commercial driver



ASSEMBLY OF OIL PUMP

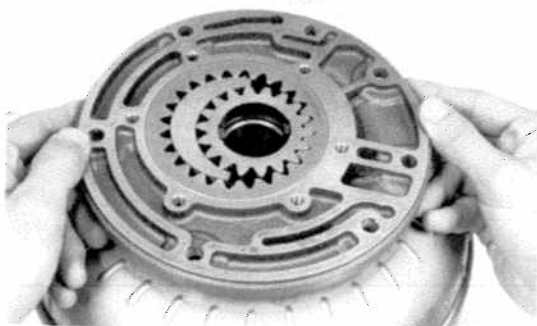
(See illustration on page 10-37)

GENERAL ASSEMBLY NOTE:

Coat all sliding and meshing surfaces with ATF during assembly.

1. INSTALL DRIVEN GEAR AND DRIVE GEAR AND SET PUMP BODY ON TORQUE CONVERTER

Make sure the top of the gears is facing up.

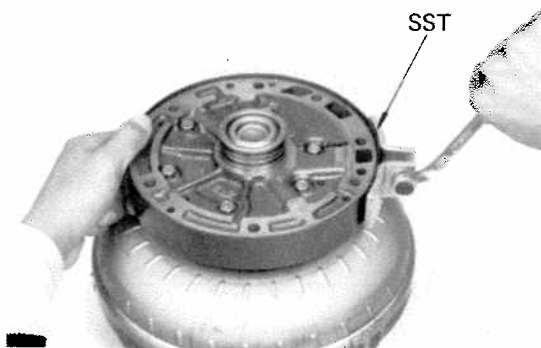
**2. LOOSELY INSTALL PUMP COVER**

Align bolt holes and drop pump cover into place. Install six bolts with wave washers finger tight.

3. ALIGN PUMP AND PUMP COVER

Install alignment band* around pump and cover. Tighten SST to align pump and cover.

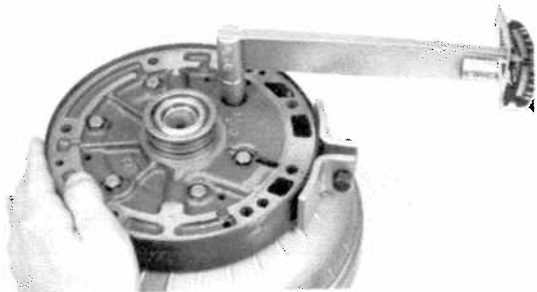
*SST 09350-20013



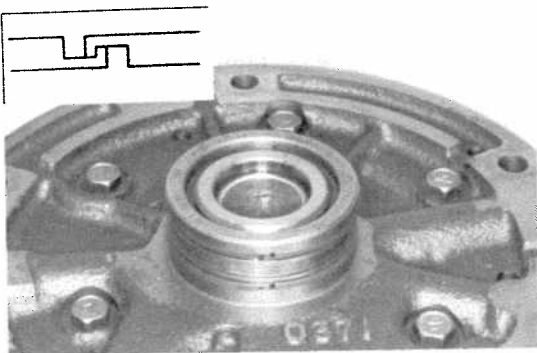
4. TIGHTEN SIX PUMP COVER BOLTS

Tighten pump cover bolts. Remove SST.

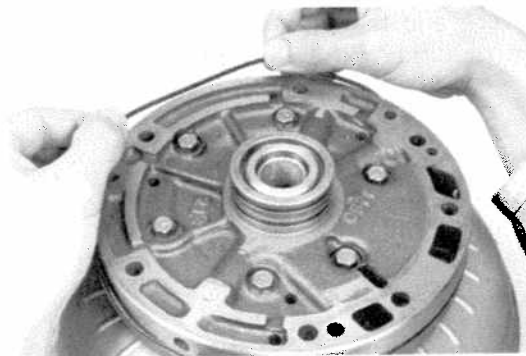
Torque: 60 – 90 kg-cm (53 – 78 in.-lb)

**5. INSTALL TWO NEW OIL SEAL RINGS ON PUMP COVER**

Spread and slip into grooves. Press rings into place, flush with outer surface of the grooves.

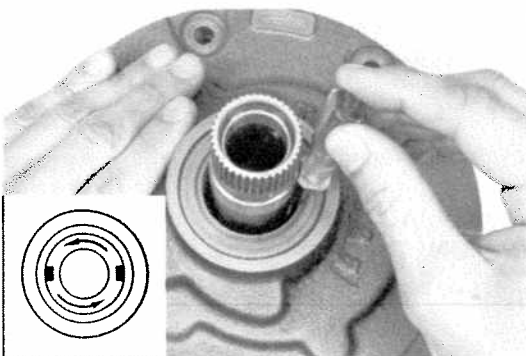
**6. INSTALL NEW O-RING ON PUMP**

Install in groove by hand. Lubricate with ATF. Make sure the O-ring is not twisted and is fully seated in the groove. Remove pump from the converter for the next step.

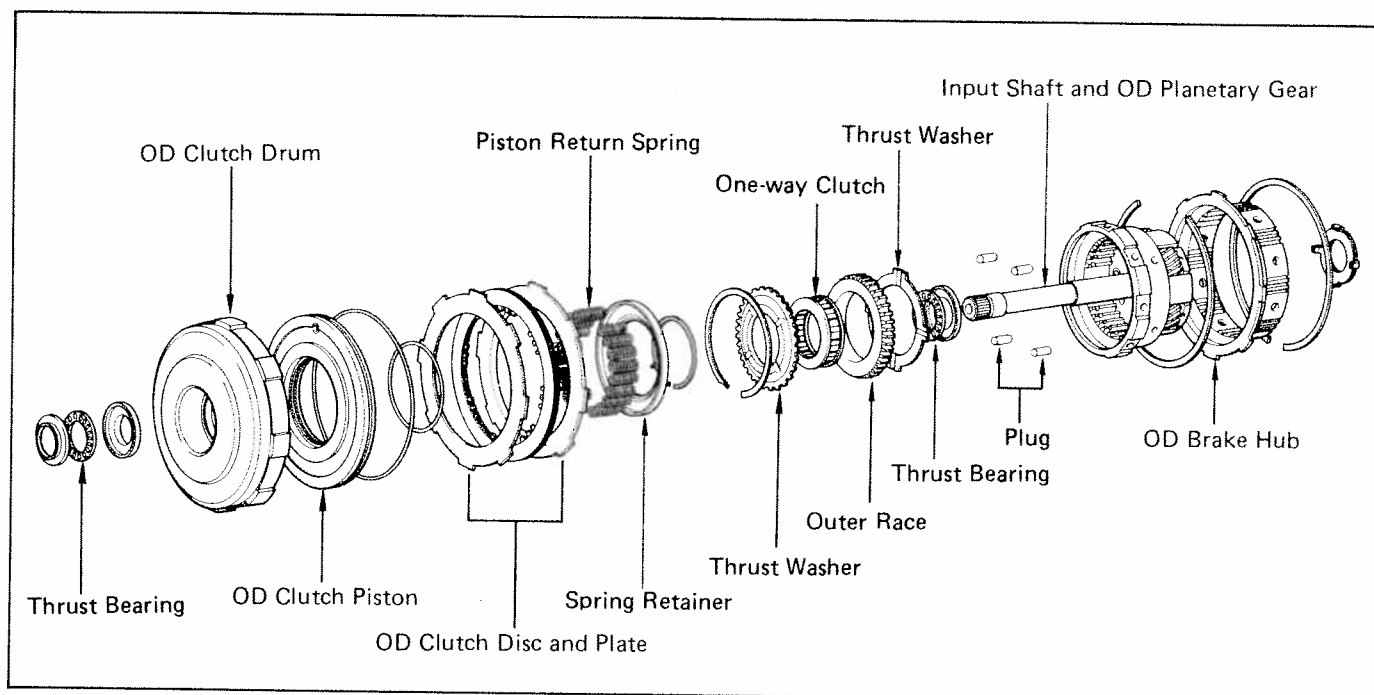
**7. CHECK DRIVE GEAR ROTATION**

Turn the drive gear with a screwdriver and make sure that it rotates smoothly.

NOTE: Do not damage the oil seal lip.



OD Input Shaft and Clutch



DISASSEMBLY OF OD INPUT SHAFT AND CLUTCH

1. REMOVE THRUST BEARING AND RACE FROM BOTH SIDES OF CLUTCH

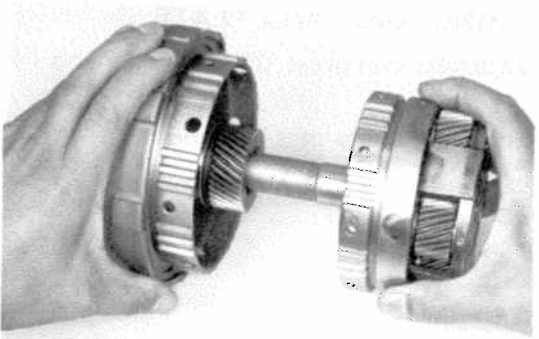
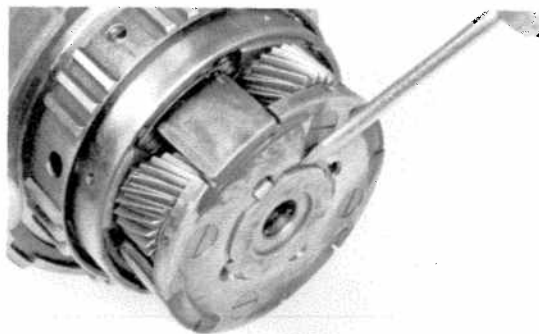
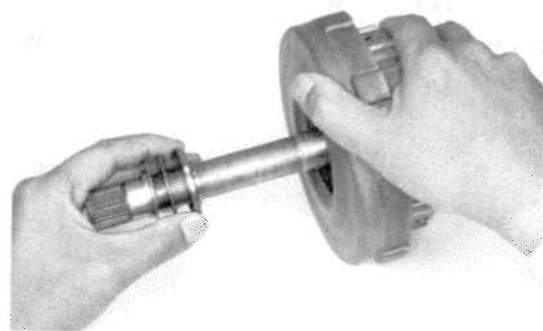
- (a) Slide off the thrust bearing and race from clutch side by hand. Note position of cup.

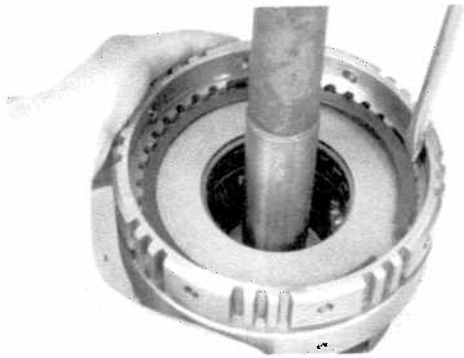
- (b) Pry off the thrust washer from planetary gear side using a screwdriver.

2. PULL OD CLUTCH ASSEMBLY FROM INPUT SHAFT

CAUTION: Be careful that the thrust bearing and race do not fall out.

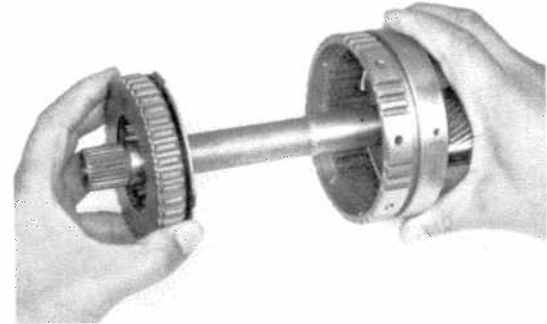
3. REMOVE THRUST BEARING AND RACE





4. REMOVE SNAP RING FROM OD PLANETARY GEAR ASSEMBLY

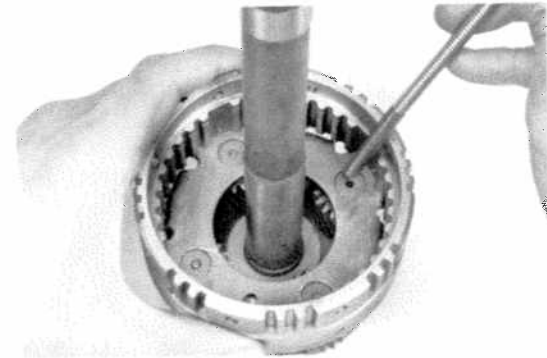
Using a medium screwdriver, compress the snap ring and lift out.



5. REMOVE THRUST WASHERS AND ONE-WAY CLUTCH FROM PLANETARY GEAR ASSEMBLY

Lift out by hand.

CAUTION: Be careful not to lose four plugs.



6. REMOVE FOUR PLUGS BY MAGNET HAND

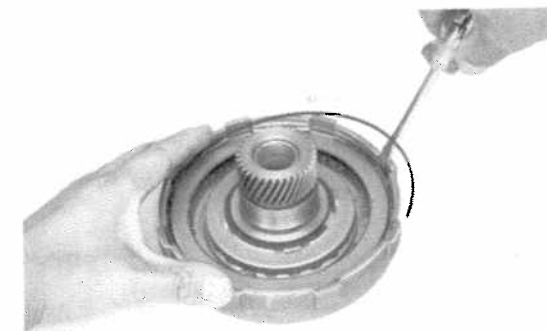
CAUTION: Keep the four plugs together to prevent losing them.



7. REMOVE SNAP RING AND HUB FROM OD CLUTCH ASSEMBLY

(a) Using a screwdriver, compress the snap ring and lift out.

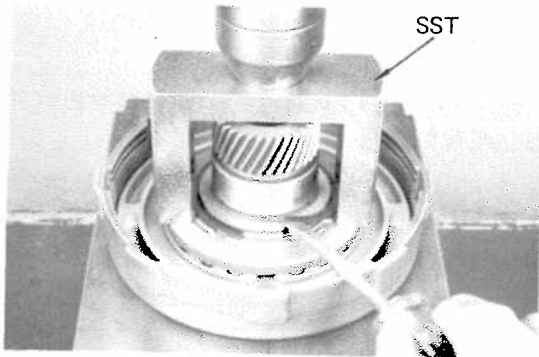
(b) Lift off hub by hand.



8. REMOVE SNAP RING, DISC AND PLATE

(a) Using a screwdriver, compress the snap ring and lift out.

(b) Lift out one disc and two plates by hand.



9. COMPRESS PISTON RETURN SPRINGS AND REMOVE SNAP RING

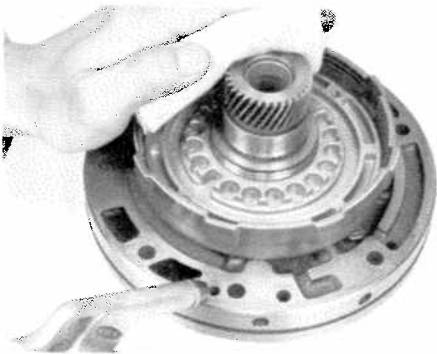
- (a) Place spring compressor* on spring retainer and compress springs with a shop press. Using a screwdriver, compress the snap ring and lift out.
- (b) Carefully remove SST.

*SST 09350-20013 or 00002-00223-04



10. REMOVE SNAP RING, SPRING RETAINER AND EIGHTEEN SPRINGS

Lift off by hand.



11. REMOVE CLUTCH PISTON

Install the clutch drum onto the oil pump body. Apply compressed air through the oil pump hole to remove the piston.

If piston does not come out completely, use pliers to remove it.



12. REMOVE CLUTCH PISTON O-RINGS

Remove both inner and outer rings by hand. Discard O-rings.



13. REMOVE ONE-WAY CLUTCH FROM OUTER RACE

Note direction of one-way clutch.

INSPECTION OF OD INPUT SHAFT AND CLUTCH

1. THOROUGHLY CLEAN ALL PARTS — EXCEPT DISCS — IN SOLVENT

Use only fresh, clean solvent. Maintain order of parts during cleaning. Dry all parts with compressed air.

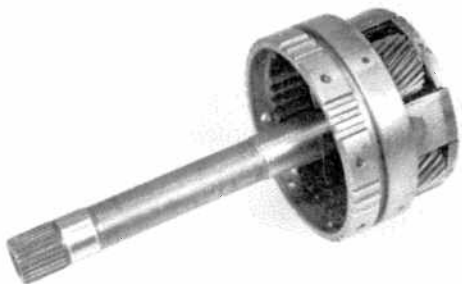
2. INSPECT ONE-WAY CLUTCH

Check sprags, ribon spring and end surfaces for wear or damage.



3. INSPECT OD PLANETARY GEAR

- (a) Check pinion gear for wear, damage or rotating condition.
- (b) Check lugs for wear or damage.
- (c) Check snap ring groove for wear or damage.
- (d) Check splines for wear or damage.



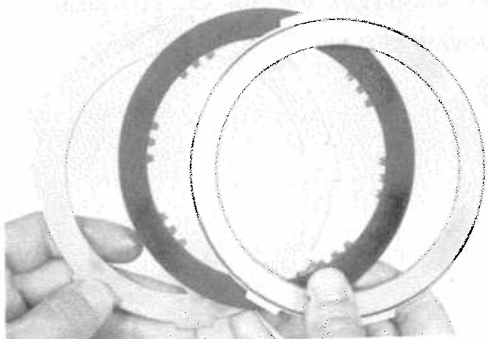
4. INSPECT CLUTCH DRUM

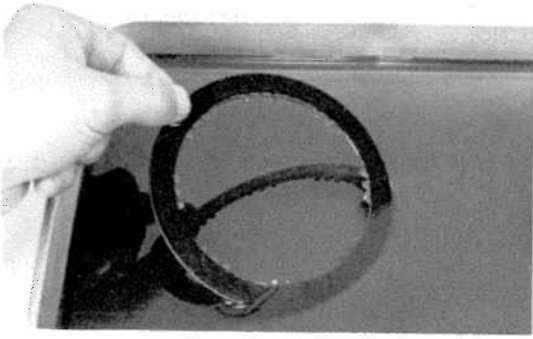
Check gear teeth, piston sliding surface, inner lug surface, thrust bearing surface, snap ring groove, bushing surface and oil seal ring sliding surface for wear or damage.



5. INSPECT FLANGE, DISC AND PLATE

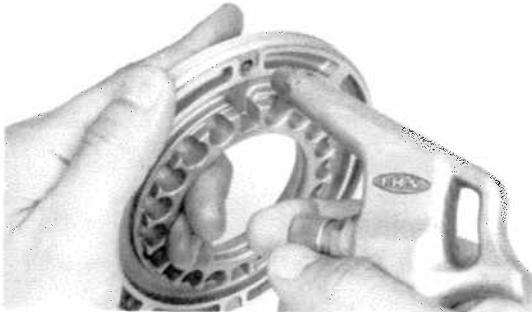
- (a) Check outer and inner lugs for wear.
- (b) Check surfaces for burning (black appearance).
- (c) Check disc friction surfaces for scoring, flaking and debonding.
- (d) Check for warpage.
- (e) Measure disc thickness. Minimum allowable thickness is 2.1 mm (0.083 in.).
- (f) Replace all worn or damaged parts.





6. DO NOT ALLOW DISC TO DRY OUT; SOAK NEW DISC IN ATF

Keep a disc being reused from drying out. If necessary, immerse in ATF. Prepare a new disc by soaking at least two hours in ATF.



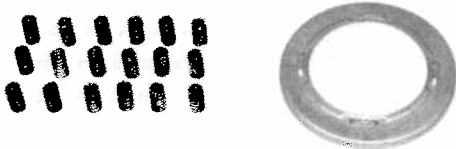
7. INSPECT CLUTCH PISTON

- (a) Check sliding surfaces and O-ring grooves for wear or damage.
- (b) Shake piston to make sure check ball is free, and check that valve does not leak by applying low-pressure air.

8. INSPECT RETURN SPRINGS AND RETAINER

Check for equal height and for broken springs.

Check retainer for wear or damage.



ASSEMBLY OF OD INPUT SHAFT AND CLUTCH

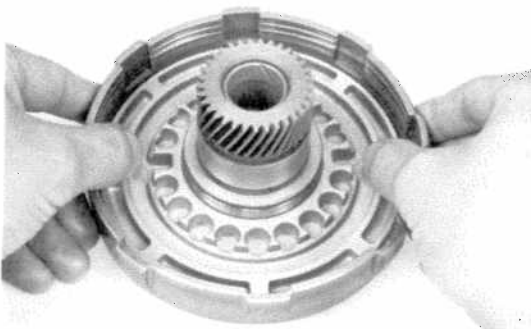
(See illustration on page 10-41)

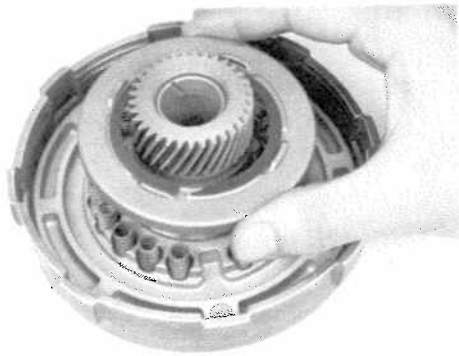
GENERAL ASSEMBLY NOTE:

Coat all friction surfaces, bearing races, sliding surfaces and O-rings with ATF during assembly.

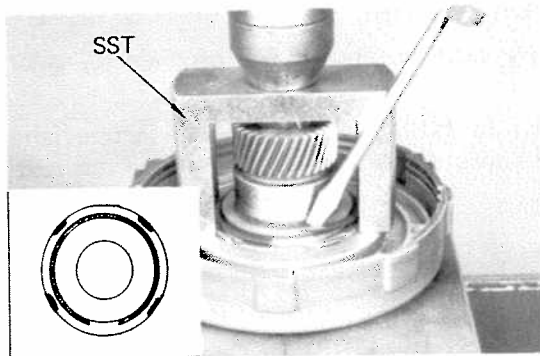
1. INSTALL CLUTCH PISTON IN OD CLUTCH DRUM

- (a) Install new O-ring on the piston. Coat O-ring with ATF.
- (b) Press piston into the drum with cup side up being careful not to damage O-ring.





2. **INSTALL EIGHTEEN PISTON RETURN SPRINGS AND SET RETAINER AND SNAP RING IN PLACE**



3. **COMPRESS RETURN SPRINGS AND INSTALL SNAP RING IN GROOVE**

(a) Place spring compressor* on top of the retainer, and compress springs on shop press.

*SST 09350-20013 or 00002-00223-04

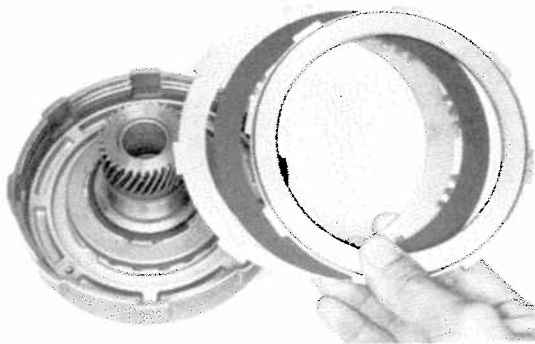
(b) Install snap ring with a screwdriver. Remove SST.

4. **INSTALL PLATE, DISC AND FLANGE**

Install a plate, a disc and a flange in following order.

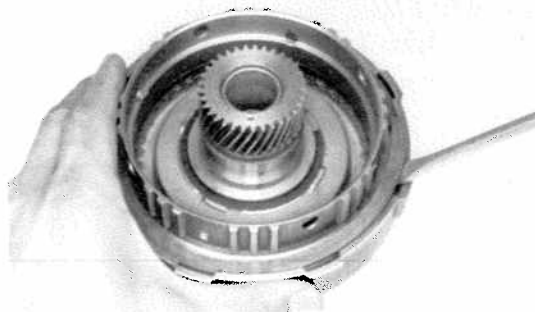
CAUTION: Do not install thinner snap ring.

Plate-disc-flange (no snap ring).



5. **INSTALL OD CLUTCH HUB AND OUTER SNAP RING**

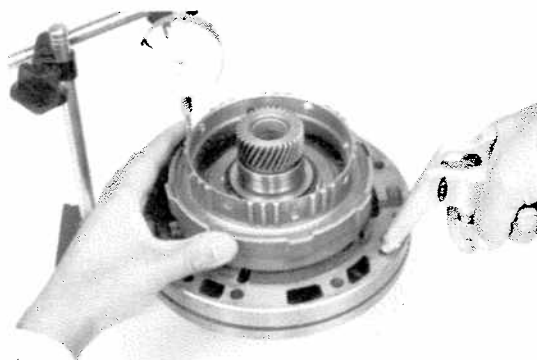
Check that the ends of the snap ring are not aligned with one of the cutouts.



6. **CHECK PISTON STROKE OF OD CLUTCH**

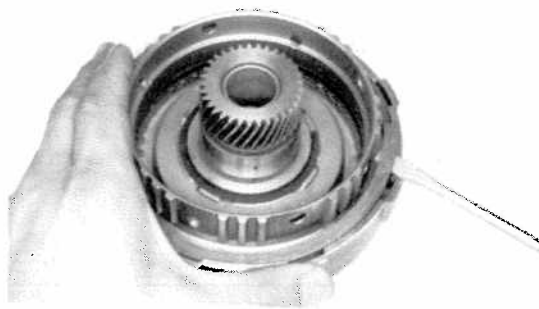
Install OD clutch drum onto the oil pump body. With a dial indicator, apply 4 – 8 kg/cm² (57 – 114 psi) of compressed air and measure the stroke as shown.

Stroke: 1.55 – 2.28 mm (0.0610 – 0.0898 in.)

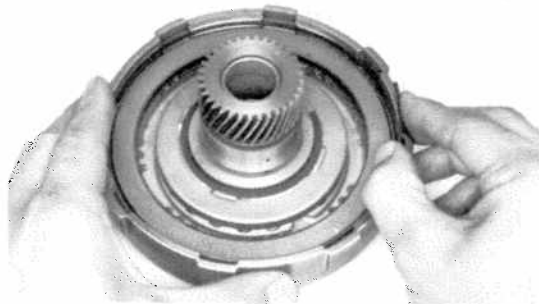


7. REMOVE SNAP RING AND HUB TO ALLOW INSTALLATION OF INNER SNAP RING

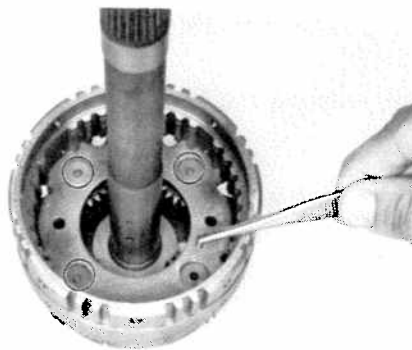
Compress outer snap ring with a screwdriver and lift out. Lift off hub.

**8. INSTALL THIN INNER SNAP RING IN CLUTCH DRUM**

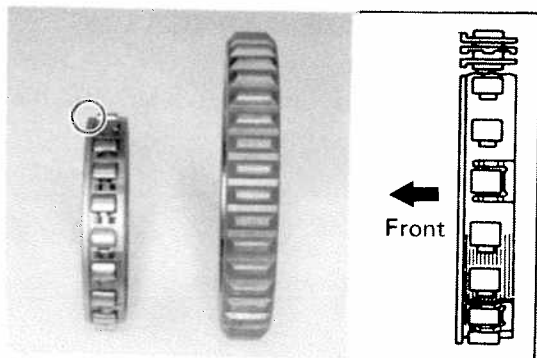
Compress and lower into groove by hand. Check that the ends of the snap ring are not aligned with one of the cutouts.

**9. INSTALL HUB AND OUTER SNAP RING**

Check that the ends of the snap ring are not aligned with one of the cutouts.

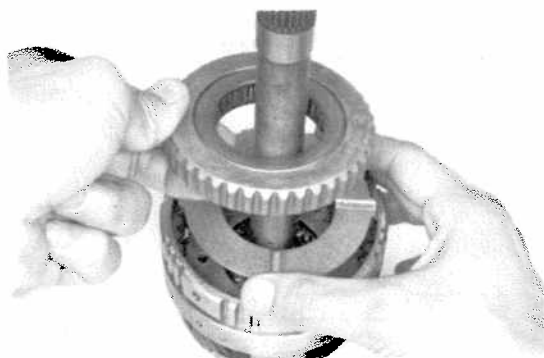
**10. INSTALL FOUR PLUGS****11. INSTALL THRUST WASHER AND BEARING**

- (a) Coat parts with petroleum jelly to keep them in place.
- (b) Slip bearing and then thrust washer facing lip outward.

**12. INSTALL ONE-WAY CLUTCH**

- (a) Install the one-way clutch into the outer race.
- (b) Install a retainer on both sides of the one-way clutch.

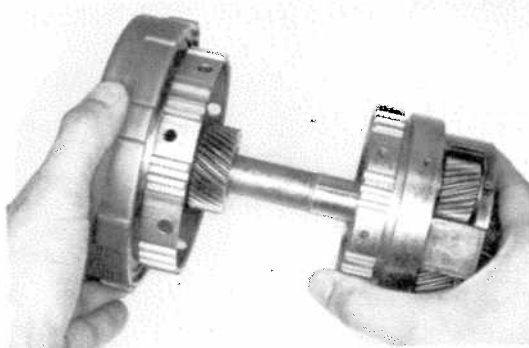
NOTE: Remember that the spring cage side of the one-way clutch faces toward the front of the transmission.

**13. INSTALL THRUST WASHER AND ONE-WAY CLUTCH**

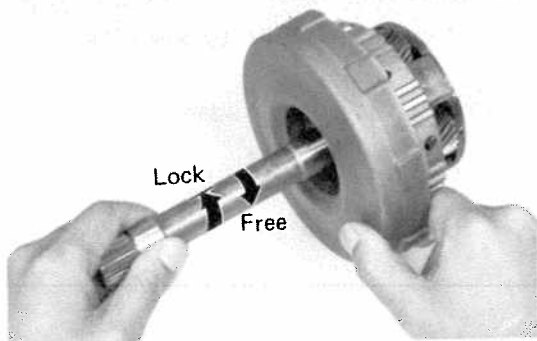
- (a) Install thrust washer, facing grooves upward.
- (b) Install one-way clutch in correct direction.

**14. INSTALL THRUST WASHER AND SNAP RING**

Check that the ends of the snap ring are not aligned with one of the cutouts.

**15. ASSEMBLE OD CLUTCH DRUM AND OD PLANETARY GEAR**

Mesh hub with disc, twisting and jiggling hub as required.

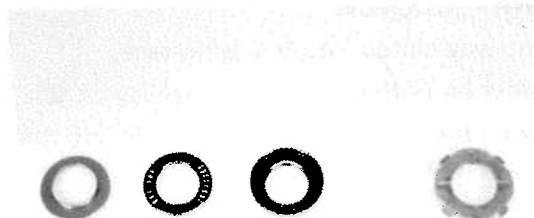
**16. CHECK OPERATION OF ONE-WAY CLUTCH**

Hold clutch drum and turn input shaft. The input shaft should turn freely clockwise and should lock counterclockwise.

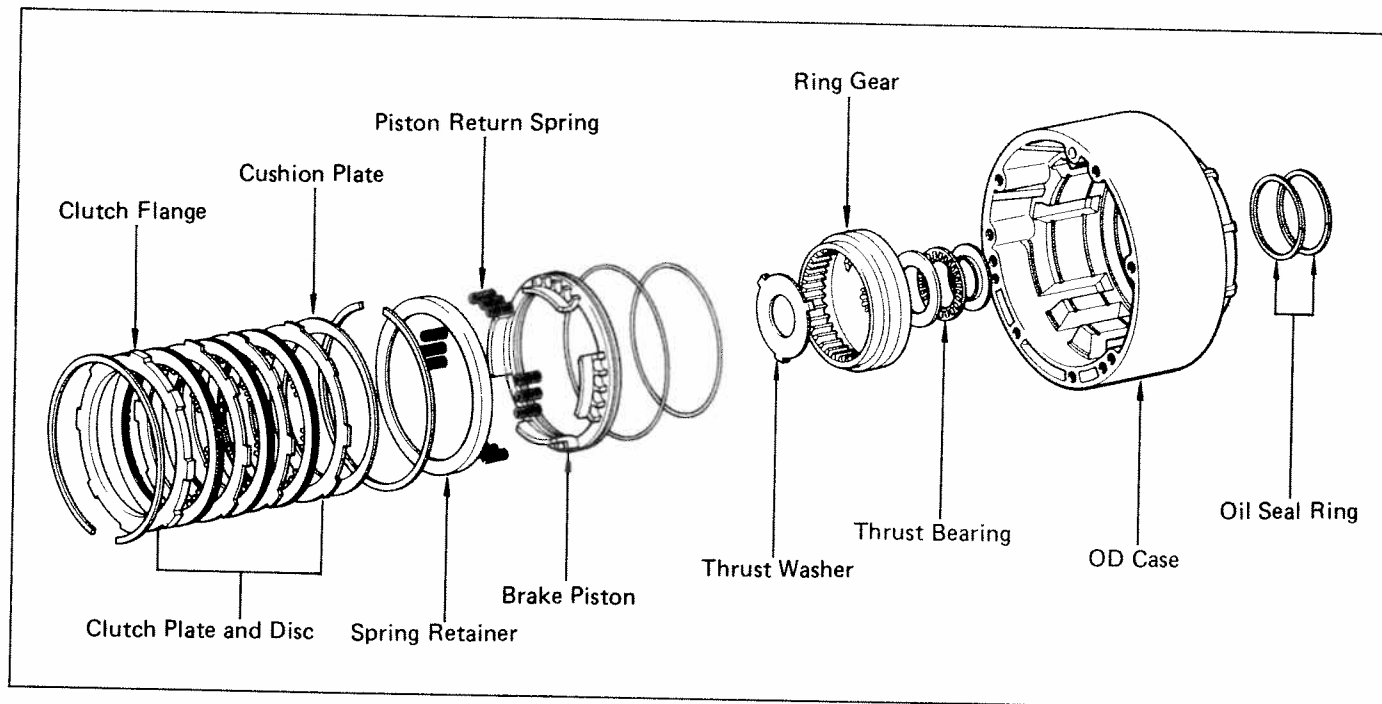
If the one-way clutch does not work properly, replace it.

17. KEEP THRUST WASHER, RACE AND BEARING TOGETHER FOR ASSEMBLY

The parts left over will be installed later, as the transmission is assembled.



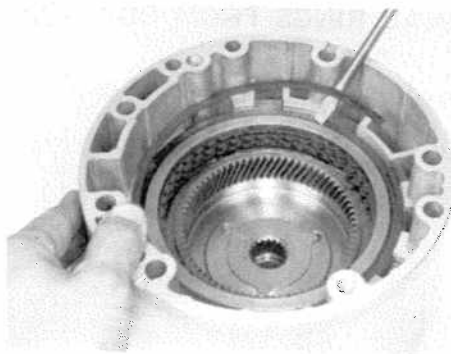
OD Case and Brake



DISASSEMBLY OF OD CASE AND BRAKE

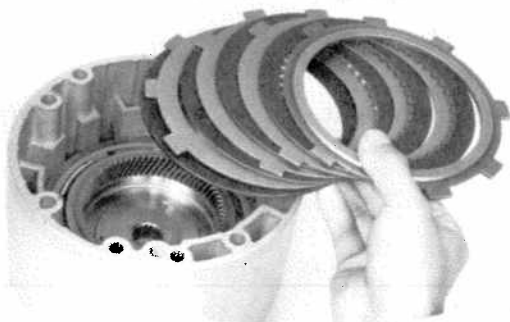
1. REMOVE OUTER SNAP RING FROM OD CASE

Using a screwdriver, compress snap ring and lift out.



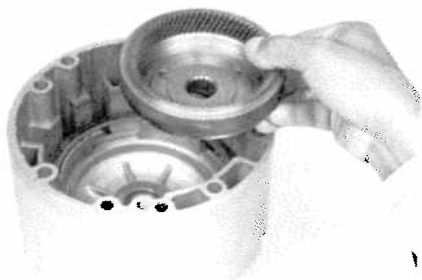
2. REMOVE CLUTCH FLANGE, DISCS, PLATES AND CUSHION PLATE

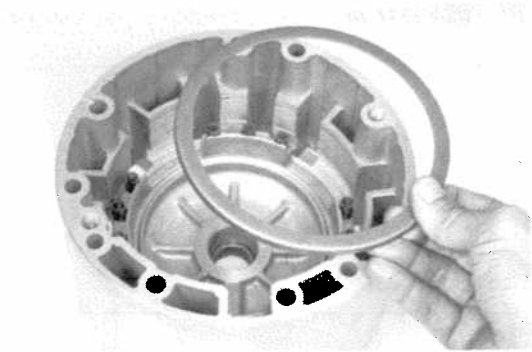
Keep in order.



3. REMOVE RING GEAR, THRUST BEARING AND RACES

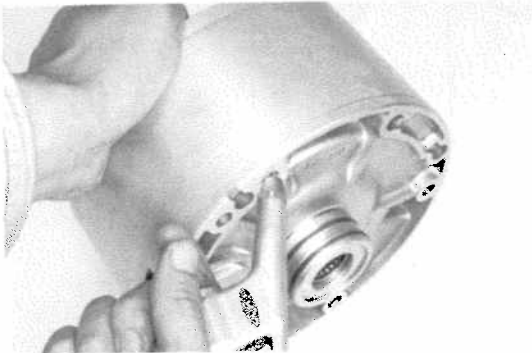
Pull out the ring gear and then remove bearing and races. Note position of races.





4. REMOVE SNAP RING, SPRING RETAINER AND TWELVE RETURN SPRINGS

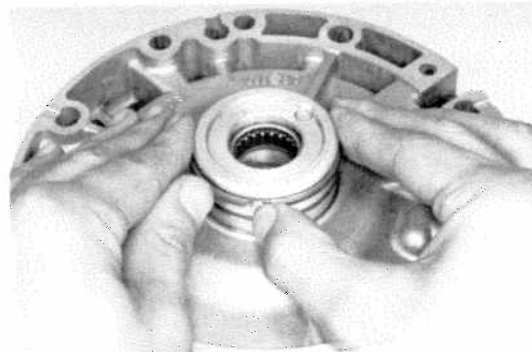
Using a screwdriver, compress snap ring and lift out. Remove retainer and springs.



5. REMOVE BRAKE PISTON

Blow compressed air through the case hole indicated in the figure to pop out the brake piston.

If piston does not pop out, lift it out with needle nose pliers.



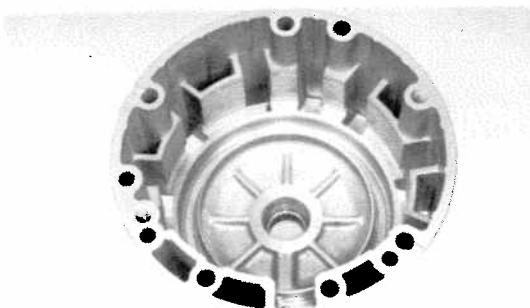
6. REMOVE TWO OIL SEAL RINGS FROM OD CASE

Unlock, spread and slide off by hand.

INSPECTION OF OD CASE AND BRAKE

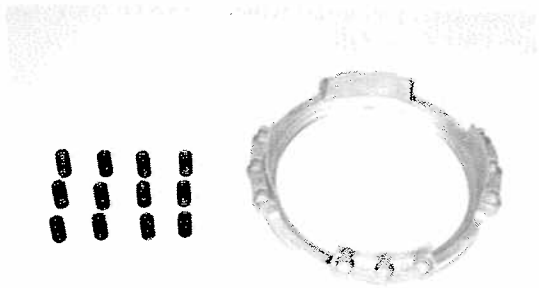
1. THOROUGHLY CLEAN ALL PARTS — EXCEPT DISCS — IN SOLVENT

Use only fresh, clean solvent. Maintain order of parts during cleaning. Dry all parts with compressed air.



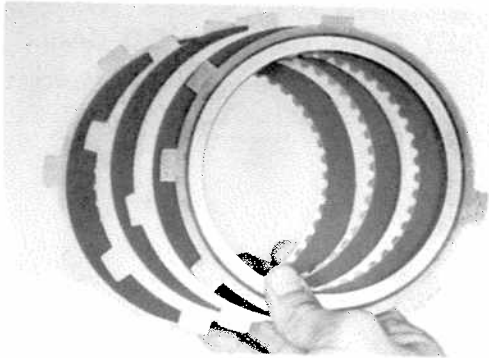
2. INSPECT OD CASE

Check piston sliding surface, snap ring grooves, oil seal rings and ring grooves for wear or damage.



3. INSPECT PISTON AND COMPRESSION SPRINGS

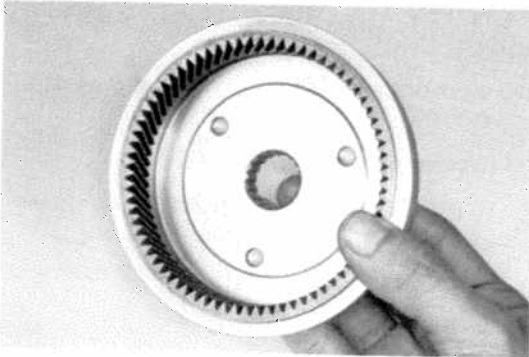
- (a) Check piston contacting surface with case for wear or damage.
- (b) Check compression springs for deterioration or damage.



4. INSPECT CUSHION PLATE, DISCS, PLATES AND FLANGE

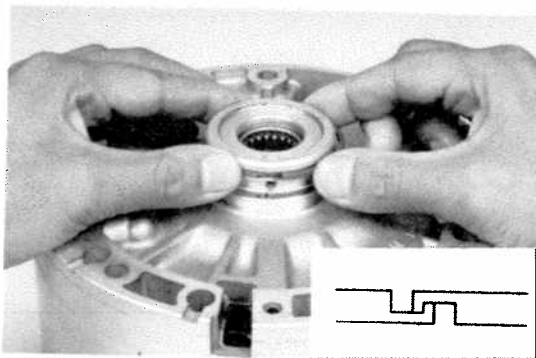
Check outer and inner lugs and sliding surfaces for wear or damage.

NOTE: Do not allow discs to dry out. Prepare new discs by soaking at least two hours in ATF.



5. INSPECT PLANETARY RING GEAR

Check gear teeth and splines for wear or damage.



ASSEMBLY OF OD CASE AND BRAKE (See illustration on page 10-49)

GENERAL ASSEMBLY NOTE:

Coat all friction surfaces, sliding surfaces, thrust washers and O-rings with ATF during assembly.

1. INSTALL TWO OIL SEAL RINGS ON OD CASE

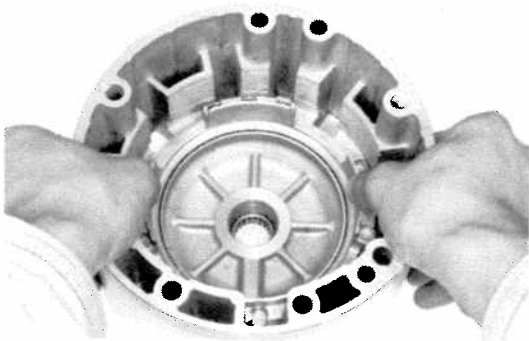
Spread apart and slip into groove. Lock into place.

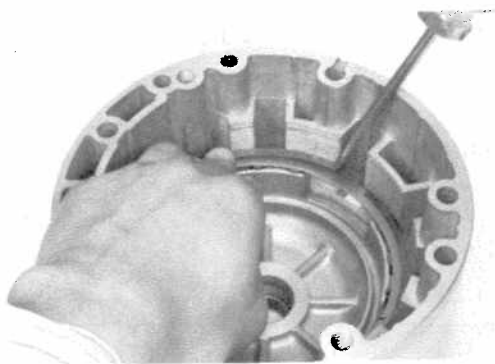
2. INSTALL NEW O-RINGS ON PISTON

Install by hand. Coat O-rings with ATF.

3. INSTALL BRAKE PISTON INTO OD CASE

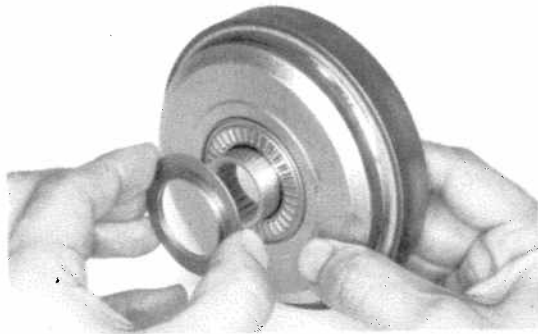
Install piston with cup side up being careful not to damage O-rings.





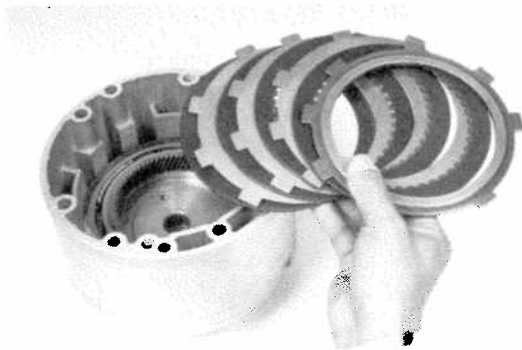
4. INSTALL TWELVE RETURN SPRINGS AND SET RETAINER AND SNAP RING IN PLACE

NOTE: Make sure that the snap ring is installed fully in groove.



5. INSTALL THRUST BEARING AND RACES TO RING GEAR AND SET RING GEAR IN OD CASE

NOTE: Make sure that the races are installed in correct direction.

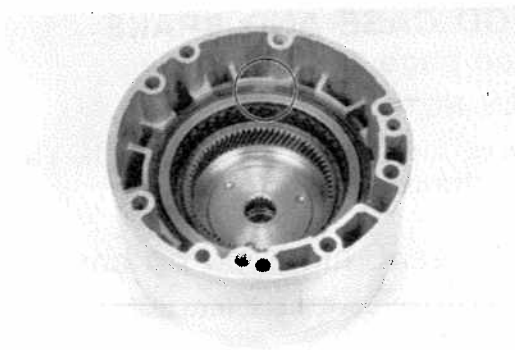


6. INSTALL CUSHION PLATE, DISCS, PLATES AND FLANGE

Using low-pressure compressed air, blow all excess ATF from discs.

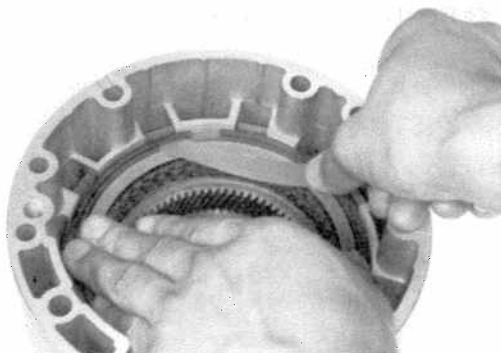
CAUTION: High-pressure air will damage discs.

Install in order: Cushion plate (rounded end down) -plate-disc-plate-disc-plate-disc-flange (flat end down)



7. INSTALL SNAP RING

Check that the ends of the snap ring are not aligned with one of the cutouts.



8. MEASURE BREAK CLEARANCE

Measure the distance between snap ring and flange.

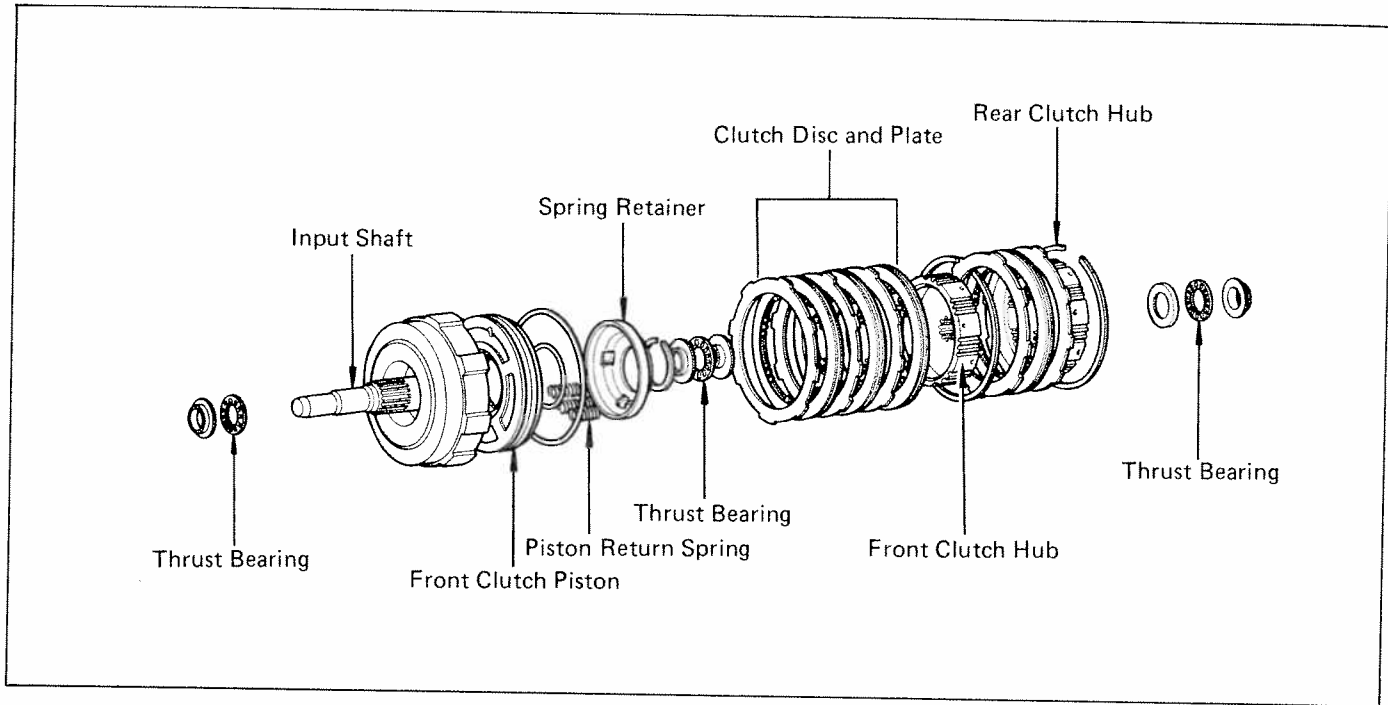
Standard clearance: 0.35 – 1.60 mm
(0.0138 – 0.0630 in.)

Maximum clearance: 2.1 mm (0.083 in.)

9. KEEP THRUST WASHER FOR ASSEMBLY

The thrust washer left over will be installed later, as the transmission is assembled.

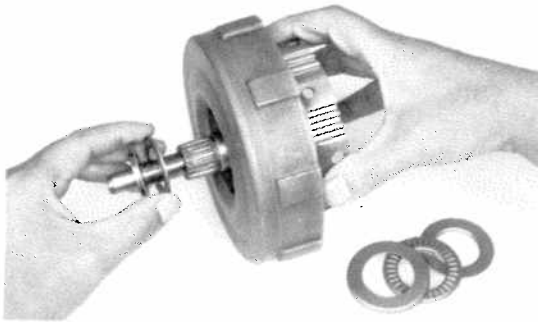
Front Clutch



DISASSEMBLY OF FRONT CLUTCH

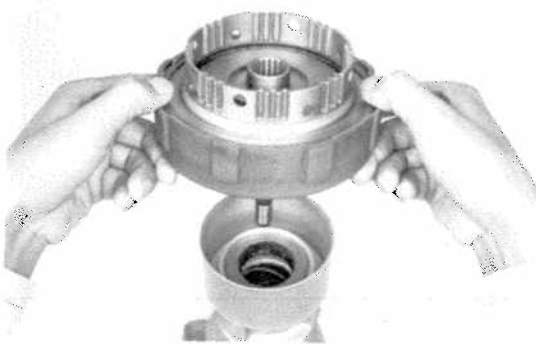
1. REMOVE THRUST BEARINGS AND RACES FROM BOTH SIDES OF CLUTCH

Note position of races.



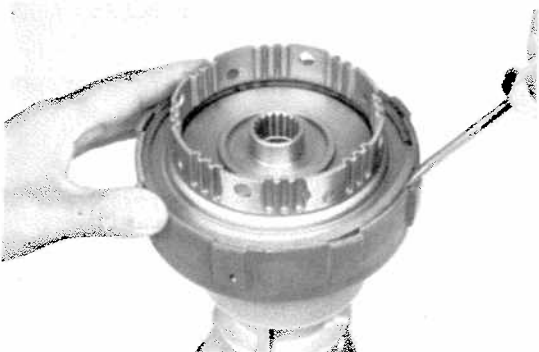
2. USE EXTENSION HOUSING AS A WORK STAND

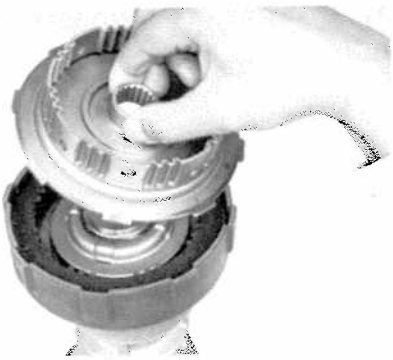
Insert the input shaft into the extension housing.



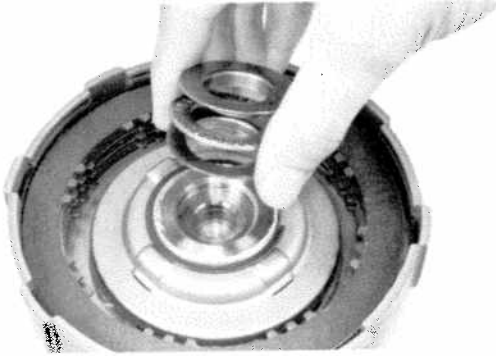
3. REMOVE SNAP RING FROM FRONT CLUTCH DRUM

Using a screwdriver, compress the snap ring and lift out.



**4. REMOVE FRONT CLUTCH HUB**

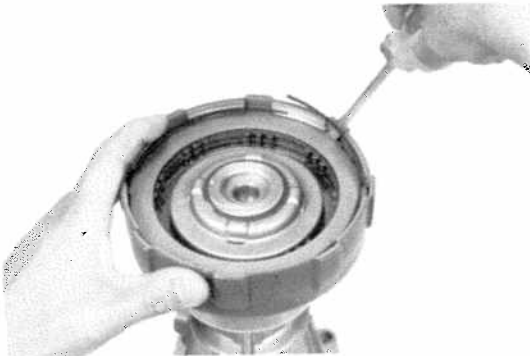
Lift out two clutch hubs together.

**5. REMOVE THRUST BEARINGS AND RACES**

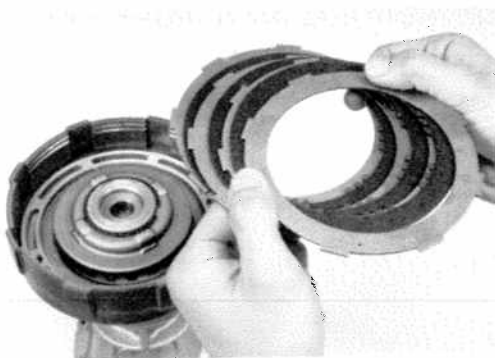
Note position of races for assembly.

6. REMOVE CLUTCH DISC

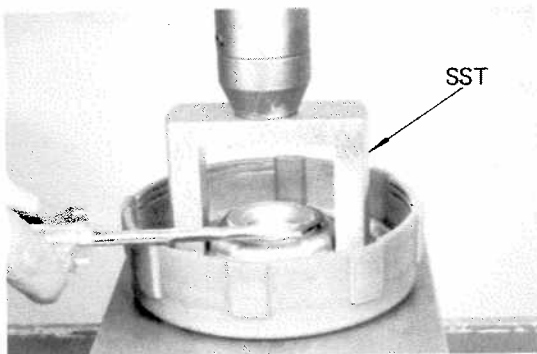
Lift out a disc.

**7. REMOVE THIN SNAP RING**

Compress with a screwdriver and lift up.

**8. REMOVE REMAINING CLUTCH PLATES AND DISCS**

Lift out four plates and three discs. Keep them in order.

**9. COMPRESS RETURN SPRINGS AND REMOVE SNAP RING**

- (a) Place spring compressor* on the spring retainer, and compress springs on the shop press.

*SST 09350-20013 or 00002-00223-04

- (b) Using snap ring pliers, spread snap ring and lift from front clutch. Carefully remove SST.