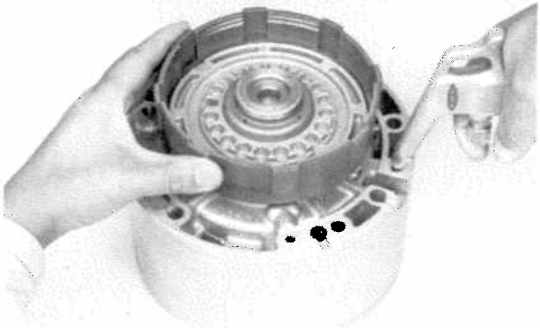


**10. REMOVE SPRING RETAINER AND SPRINGS****11. ASSEMBLE FRONT CLUTCH ON OD CASE AND BLOW OUT PISTON**

- (a) Slide front clutch onto OD case.
- (b) Apply compressed air to OD case to remove piston. If piston does not come out completely, use pliers to remove it.
- (c) Remove front clutch from OD case.

**INSPECTION OF FRONT CLUTCH****1. THOROUGHLY WASH ALL PARTS – EXCEPT DISCS – IN SOLVENT**

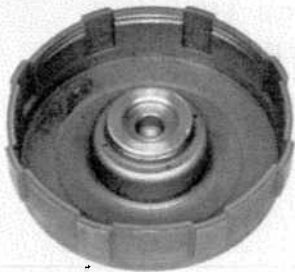
Use fresh, clean solvent. Maintain order of parts during cleaning. Dry all parts with compressed air.

**2. INSPECT INPUT SHAFT**

- (a) Check thrust bearing surface, bushing surface and seal surface for wear, burning or damage.
- (b) Check shaft and housing for cracks or damage.
- (c) Check splines for wear, groove or chipped teeth.

**3. INSPECT FRONT CLUTCH DRUM**

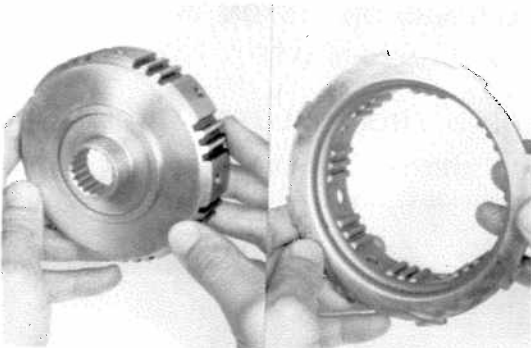
Check lug surfaces, piston sliding surface, thrust bearing surface and snap ring groove for wear, cracks, burning or other damage.

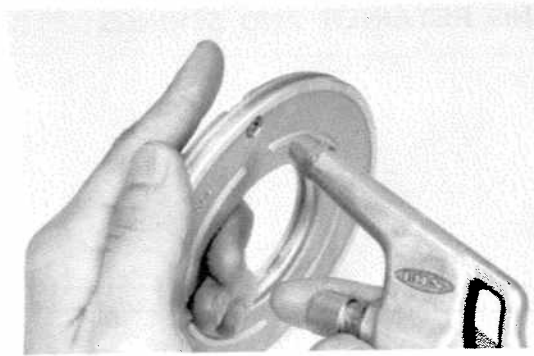
**4. INSPECT FRONT CLUTCH HUB**

Check splines, lug surfaces and hub thrust surface for wear, burning, cracks or damage.

**5. INSPECT REAR CLUTCH HUB**

Check lugs and mating surfaces for wear or damage.



**6. INSPECT 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.

**7. INSPECT PISTON RETURN SPRINGS AND RETAINER**

Check for equal height and for broken springs.

Check retainer for wear or damage.

**8. INSPECT DISCS AND PLATES**

- (a) Check outer and inner lugs for wear.
- (b) Check surfaces for burning, scoring and debonding.
- (c) Check for warpage (discs and plates should be flat).
- (d) Measure discs. Minimum allowable thickness is 2.1 mm (0.083 in.).
- (e) Replace all worn and damaged parts.

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

## **ASSEMBLY OF FRONT CLUTCH**

(See illustration on page 10-53)

**GENERAL ASSEMBLY NOTE:**

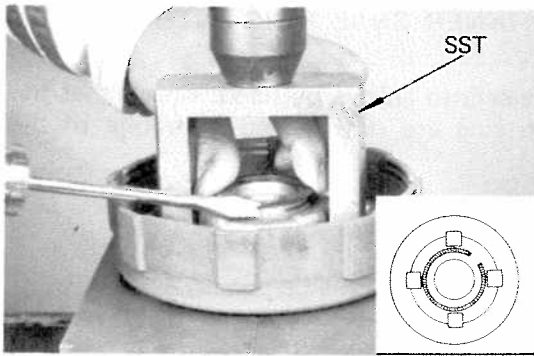
Coat all friction surfaces, sliding surfaces, thrust surfaces and O-rings with ATF during assembly.

**1. INSTALL NEW O-RINGS ON PISTON**

Install by hand. Coat O-rings with ATF.

**2. INSTALL PISTON IN FRONT CLUTCH DRUM**

Press into housing with cup side up (check ball down). Be careful not to damage O-rings.



**3. INSTALL RETURN SPRINGS, SPRING RETAINER AND SNAP RING IN PLACE**

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

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

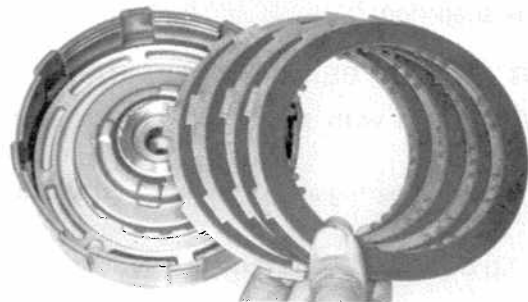
\*SST 09350-20013 or 00002-00223-04

- (b) Spread with snap ring pliers and install in groove. Remove SST.

**5. INSTALL DISCS AND PLATES**

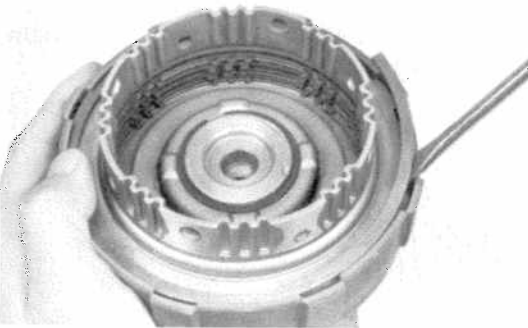
Using low-pressure compressed air, blow all excess ATF from discs. For measurement of the clutch pack, install all four plates and four discs (temporarily without small snap ring):

Install in order: Plate-disc-plate-disc-plate-disc-plate (no snap ring)-disc.



**6. INSTALL REAR CLUTCH HUB AND OUTER SNAP RING**

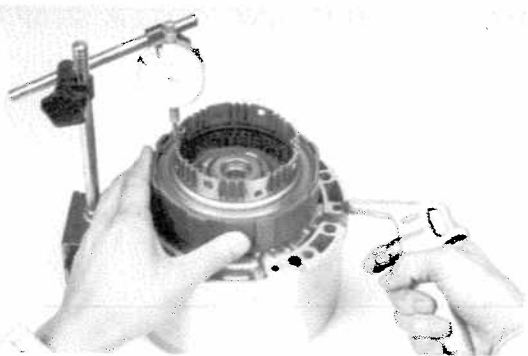
Check that the ends of snap ring are not aligned with one of the cutouts.



**7. CHECK PISTON STROKE OF FRONT CLUTCH**

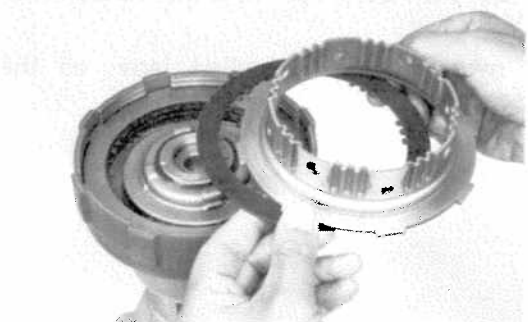
Install front clutch drum onto the oil pump body. With a dial indicator, apply 4 – 8 kg/cm<sup>2</sup> (57 – 114 psi) of compressed air and measure the stroke as shown.

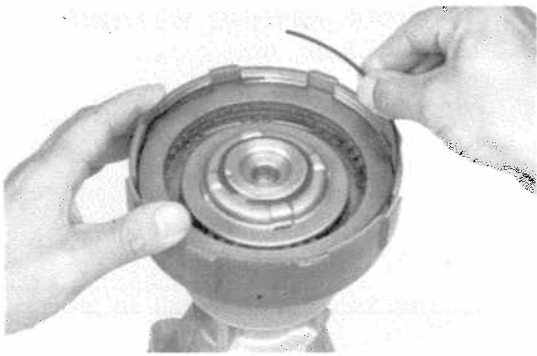
Stroke: 1.84 – 2.86 mm (0.0724 – 0.1126 in.)



**8. REMOVE SNAP RING, REAR CLUTCH HUB AND ONE DISC TO ALLOW INSTALLATION OF INNER SNAP RING**

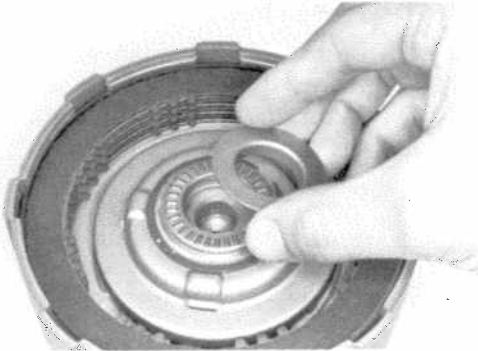
Compress outer snap ring with screwdriver. Lift off parts.





**9. INSTALL THIN INNER SNAP RING INTO 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.



**10. INSTALL DISC**

Install a disc on the snap ring.

**11. INSTALL INNER THRUST BEARING AND RACES**

**IMPORTANT:** Coat parts with petroleum jelly to keep them in place.

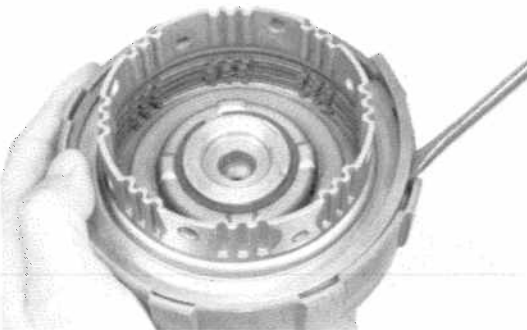
Install inner race, needle bearing and outer race. Press into place.

**NOTE:** Face the lip of race toward front clutch body.



**12. INSTALL FRONT CLUTCH HUB**

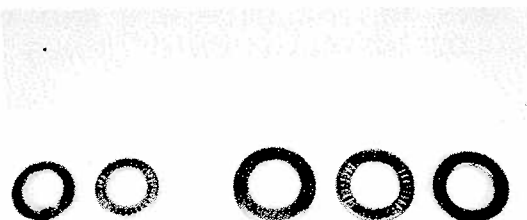
Align disc lugs with hub teeth. Make sure hub meshes with all discs and is fully inserted.



**13. INSTALL REAR CLUTCH HUB AND OUTER SNAP RING**

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

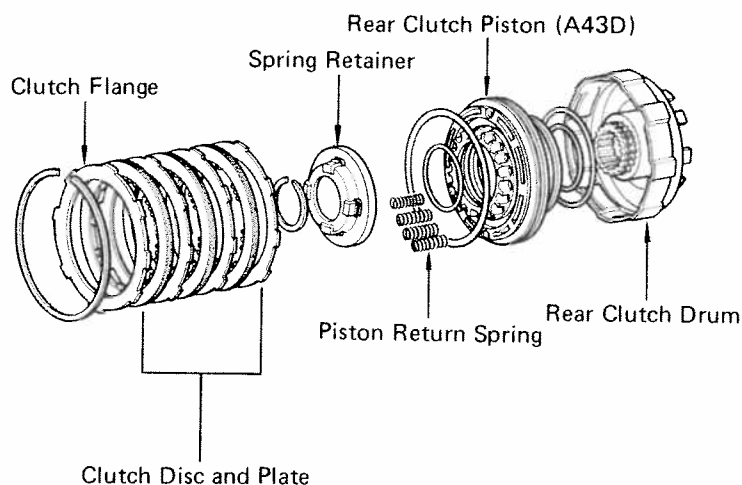
**NOTE:** Note position of thrust bearing and races and keep them together until assembly.



**14. KEEP THRUST BEARINGS AND RACES TOGETHER FOR ASSEMBLY**

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

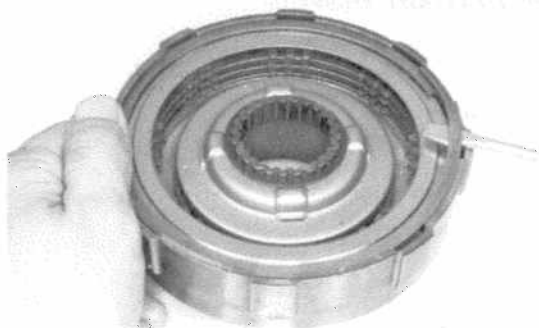
## Rear Clutch



### DISASSEMBLY OF REAR CLUTCH

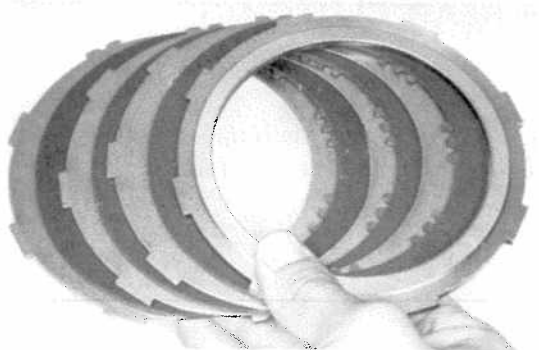
#### 1. REMOVE OUTER SNAP RING FROM DRUM

Using a screwdriver, compress snap ring and lift out.



#### 2. REMOVE CLUTCH FLANGE, DISCS AND PLATES

Keep in order.

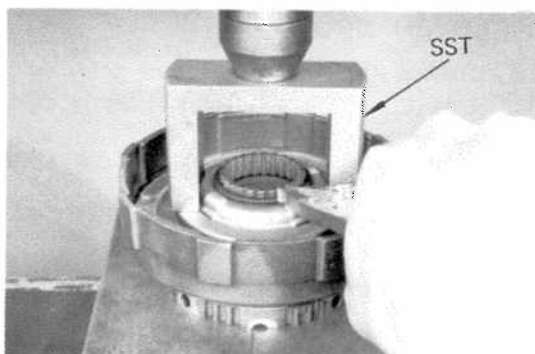


#### 3. COMPRESS RETURN SPRINGS AND REMOVE SNAP RING

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

\*SST 09350-20013 or 00002-00223-04

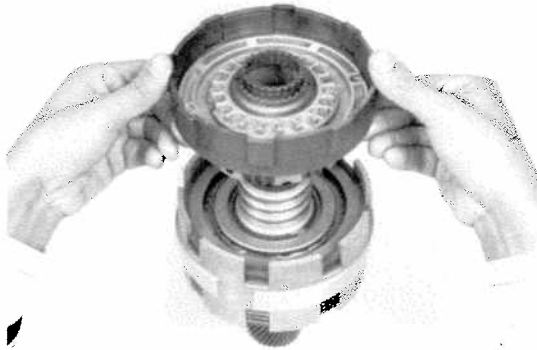
- (b) Using snap ring pliers, spread snap ring and lift from rear clutch. Remove SST.





4. **REMOVE SPRING RETAINER, SNAP RING AND EIGHTEEN RETURN SPRINGS**

Lift off by hand.



5. **SET REAR CLUTCH ON CENTER SUPPORT**



6. **REMOVE REAR CLUTCH PISTON**

Blow out piston with compressed air.

7. **REMOVE REAR CLUTCH HUB**

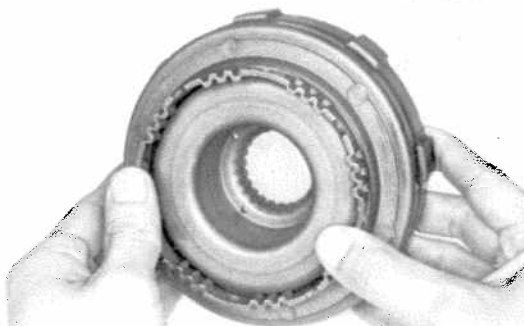
## **INSPECTION OF REAR CLUTCH**

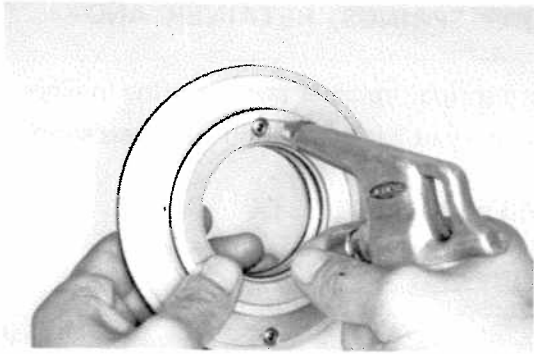
1. **THOROUGHLY WASH ALL PARTS — EXCEPT DISCS — IN SOLVENT**

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

2. **INSPECT REAR CLUTCH DRUM**

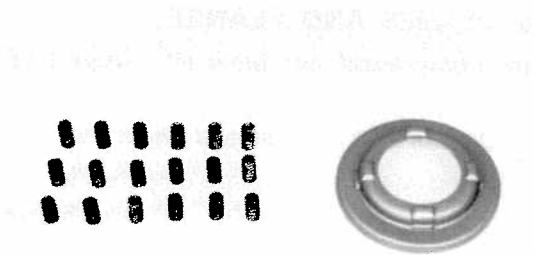
Check lug detents, piston sliding surfaces and snap ring grooves for wear or damage.





### 3. INSPECT REAR CLUTCH PISTON

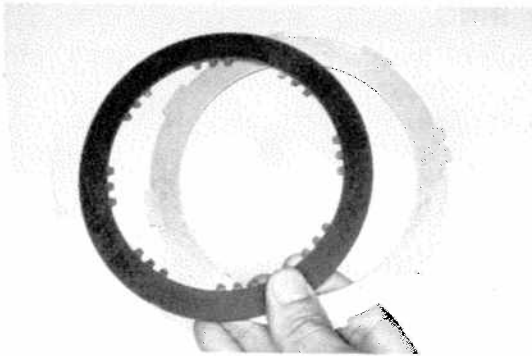
- (a) Check sliding surfaces and O-ring grooves for wear or damage.
- (b) Check that check ball is free by shaking each piston.
- (c) Check that valve does not leak by applying low-pressure compressed air.



### 4. INSPECT PISTON RETURN SPRINGS

Check for equal height and for broken springs.

Check retainer for wear or damage.



### 5. INSPECT DISCS, PLATES AND FLANGE

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

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

## ASSEMBLY OF REAR CLUTCH (See illustration on page 10-59)

### GENERAL ASSEMBLY NOTE:

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

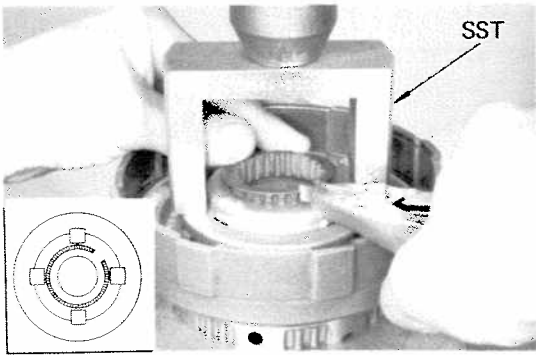
#### 1. INSTALL NEW O-RINGS ON PISTON

Coat with ATF.

#### 2. INSTALL REAR CLUTCH PISTON IN DRUM

Press rear clutch piston into drum with cup side up, being careful not to damage O-rings.





### 3. INSTALL RETURN SPRINGS, RETAINER AND SNAP RING

- (a) Put the return springs, retainer and snap ring in place.
- (b) Put spring compressor\* in place, and compress springs on shop press.

\*SST 09350-20013 or 00002-00223-04

- (c) Spread ring with snap ring pliers. Remove SST.

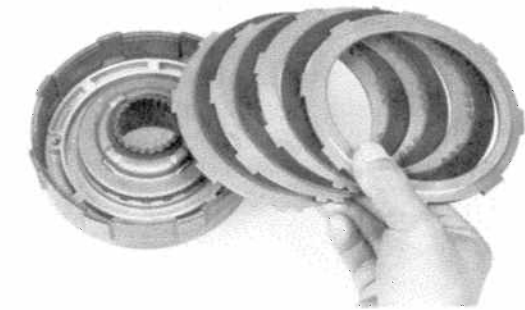
### 4. INSTALL DISCS, PLATES AND FLANGE

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

**CAUTION:** High-pressure air will damage discs.

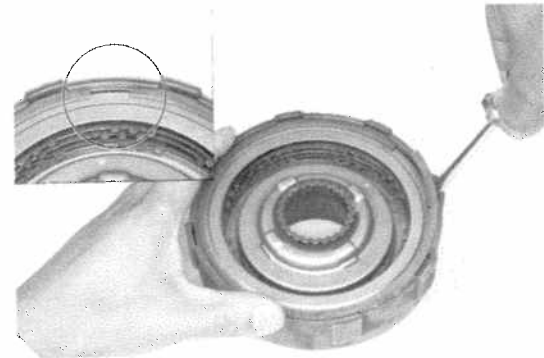
Install in order: Plate-disc-plate-disc-plate-disc-flange.

**NOTE:** Be sure to install the flange facing flat side toward disc.



### 5. INSTALL SNAP RING

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

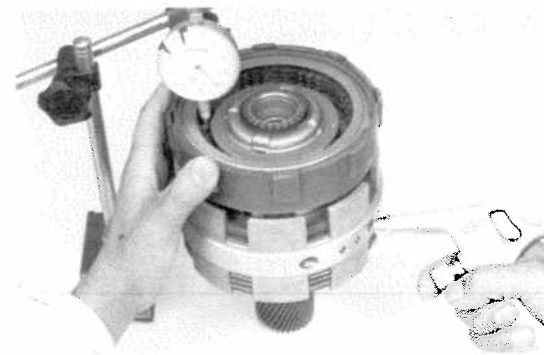


### 6. CHECK PISTON STROKE OF REAR CLUTCH

Install rear clutch onto the center support. With a dial indicator, apply 4 — 8 kg/cm<sup>2</sup> (57 — 114 psi) of compressed air and measure the stroke as shown.

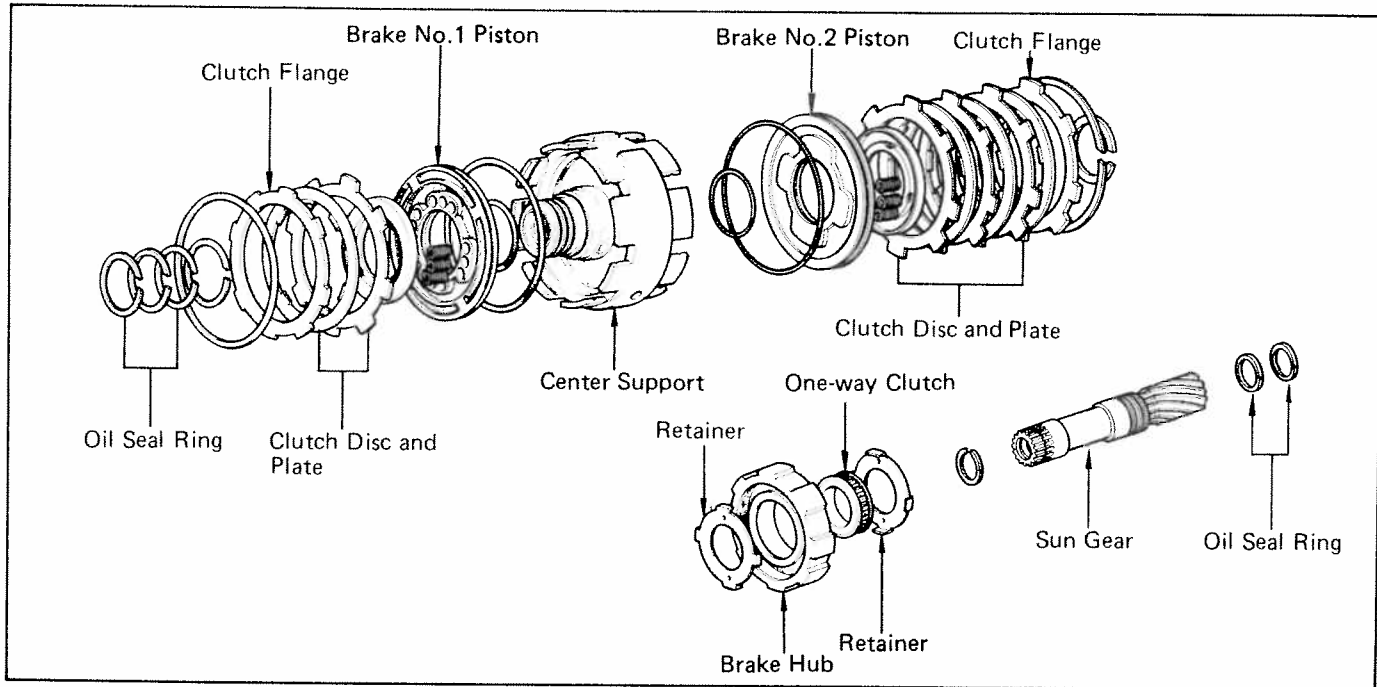
**Stroke:** 1.24 — 2.12 mm (0.0488 — 0.0835 in.)

**NOTE:** Keep thrust bearing and race together until assembly.



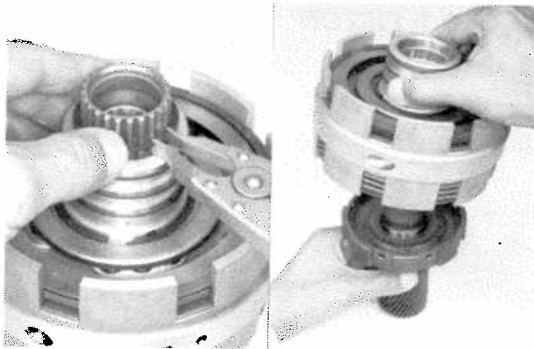


## Center Support Assembly

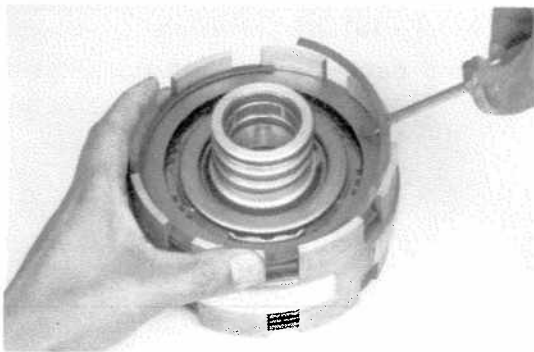


### DISASSEMBLY OF CENTER SUPPORT ASSEMBLY

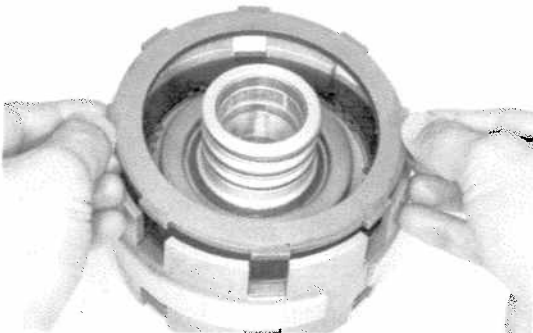
1. REMOVE SNAP RING FROM END OF SUN GEAR SHAFT  
Spread with snap ring pliers and lift off.
2. PULL CENTER SUPPORT ASSEMBLY FROM SHAFT

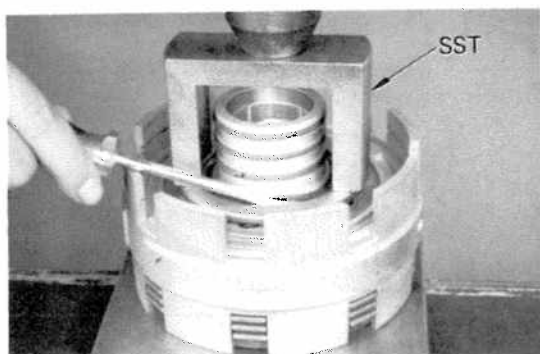


3. REMOVE SNAP RING FROM FRONT OF CENTER SUPPORT ASSEMBLY (BRAKE NO.1)  
Using a screwdriver, compress the snap ring and lift out.



4. REMOVE CLUTCH FLANGE, DISC AND PLATE (BRAKE NO.1)  
Lift out by hand.



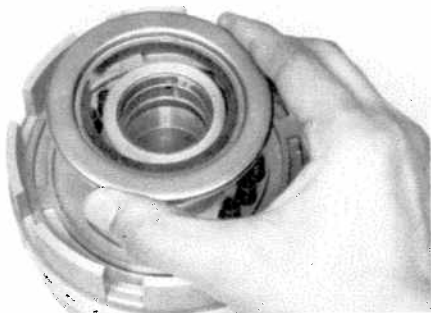


**5. COMPRESS PISTON RETURN SPRINGS AND REMOVE SNAP RING**

(a) Place spring compressor\* on spring retainer and compress springs with a standard shop press. Using a screwdriver, remove snap ring.

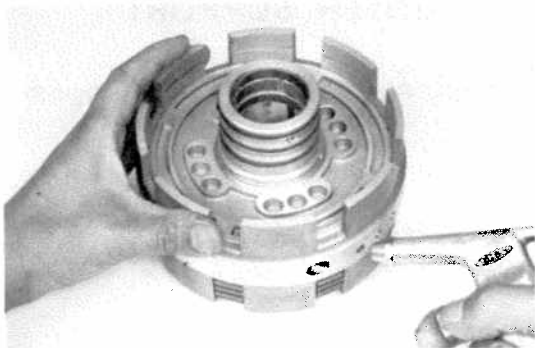
(b) Carefully remove SST.

\*SST 09350-20013 or 00002-00223-04



**6. REMOVE SNAP RING, SPRING RETAINER AND TWELVE SPRINGS**

Lift off by hand.



**7. REMOVE BRAKE NO.1 PISTON**

Blow compressed air through the center support oil hole to remove brake No. 1 piston.

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



**8. REMOVE BRAKE NO.1 PISTON O-RINGS**

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



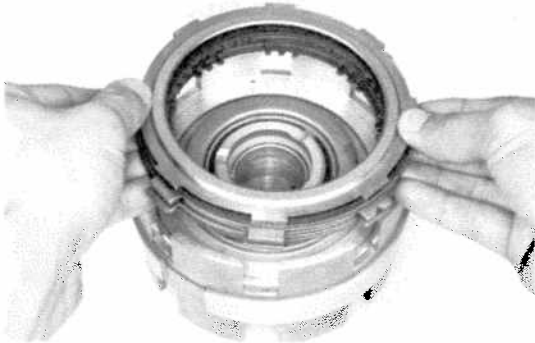
**9. REMOVE THREE OIL SEAL RINGS FROM CENTER SUPPORT**

Unlock, spread and slide off by hand.



- 10. TURN CENTER SUPPORT ASSEMBLY OVER AND REMOVE REAR SNAP RING (BRAKE NO.2)**

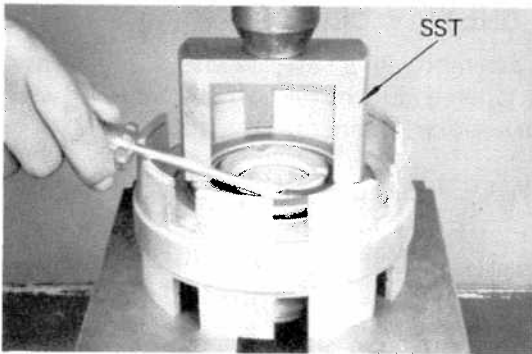
Using a screwdriver, compress the snap ring and lift out.



- 11. REMOVE CLUTCH FLANGE (BRAKE NO.2)**

- 12. REMOVE DISCS AND PLATES**

Keep in order.

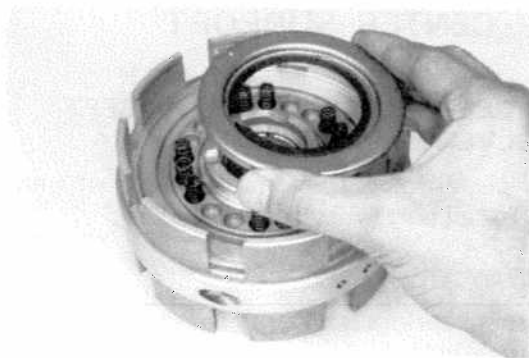


- 13. COMPRESS PISTON RETURN SPRINGS AND REMOVE SNAP RING**

(a) Place spring compressor\* on spring retainer and compress springs with a standard shop press. Using a screwdriver, remove snap ring.

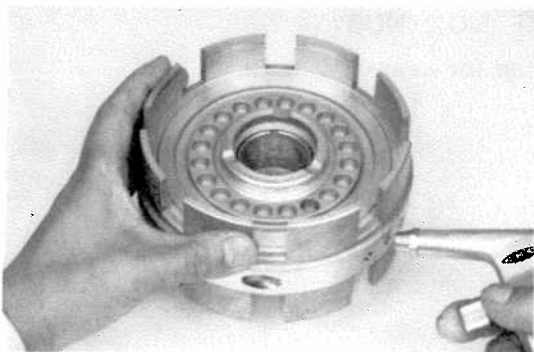
(b) Carefully remove SST.

\*SST 09350-20013 or 00002-00223-04



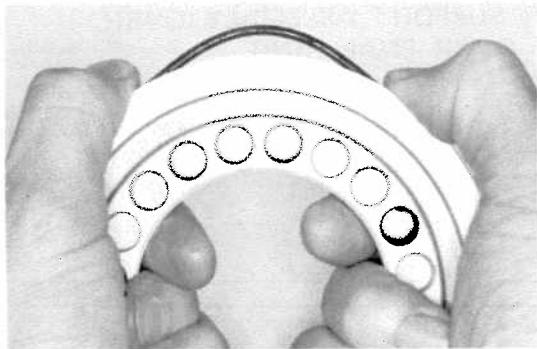
- 14. REMOVE SNAP RING, SPRING RETAINER AND TWELVE SPRINGS**

Lift off by hand.

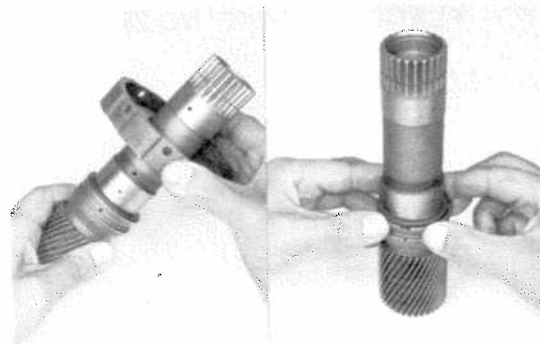
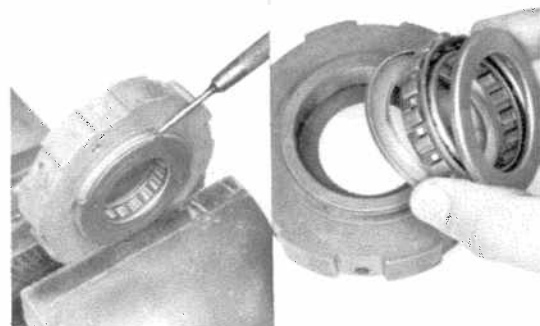


- 15. REMOVE BRAKE NO.2 PISTON**

Blow compressed air through the center support oil hole to remove brake No. 2 piston.

**16. REMOVE NO.2 PISTON O-RINGS**

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

**17. REMOVE ONE-WAY CLUTCH ASSEMBLY AND OIL SEAL RINGS FROM SUN GEAR****18. REMOVE ONE ONE-WAY CLUTCH RETAINER**

Hold the clutch assembly in a soft-jaw vise. Bend several tabs back with a tapered punch. Pry off the retainer with a screwdriver. Leave other retainer on the hub.

**19. REMOVE ONE-WAY CLUTCH AND RETAINERS**

Lift off one-way clutch and retainers from brake hub.

**INSPECTION OF CENTER SUPPORT ASSEMBLY****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 sprag, ribbon springs and end bearings for wear or damage.

**3. INSPECT BRAKE NO.2 HUB**

Check bore and lugs for wear or damage.

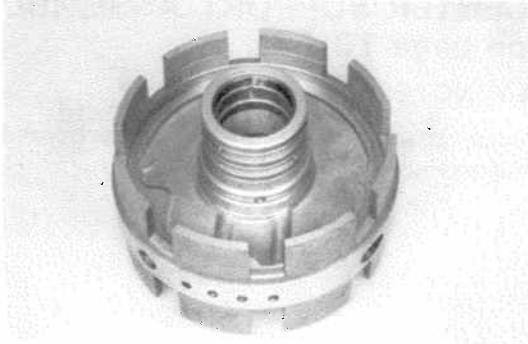


**4. INSPECT SUN GEAR AND OIL SEAL RINGS**

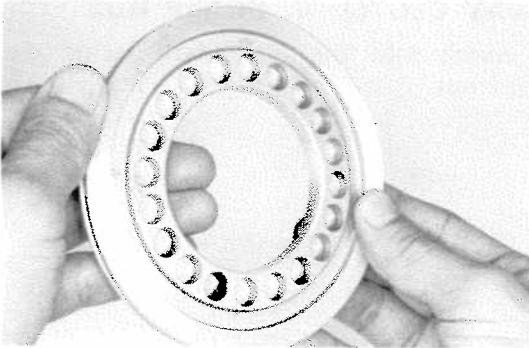
Check gear teeth, splines, one-way clutch inner race, oil seal grooves and oil seals for wear, chipping or damage.

**5. INSPECT CENTER SUPPORT**

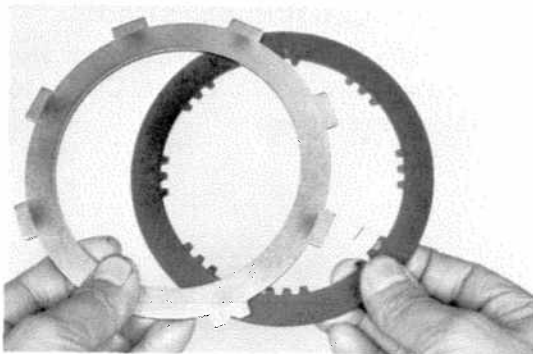
Check oil seal grooves, oil seals, bushing surface, clutch plate slots and snap ring grooves for wear, ridges or damage.

**6. INSPECT BRAKE PISTONS**

Check O-ring grooves and contacting surfaces for wear, ridges, cracks or damage.

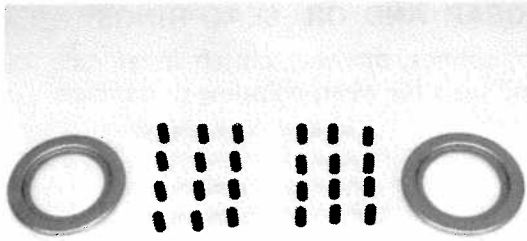
**7. INSPECT DISCS AND PLATES**

- (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 (discs and plates should be flat).
- (e) Measure thickness of each disc. Minimum allowable thickness is 2.1 mm (0.083 in.).
- (f) Replace any damaged or worn discs or plates.

**8. DO NOT ALLOW DISCS TO DRY OUT, SOAK NEW DISCS IN ATF**

Keep discs being reused from drying out; if necessary, immerse in ATF. Prepare new discs by soaking at least two hours in ATF.





### 9. INSPECT RETURN SPRINGS

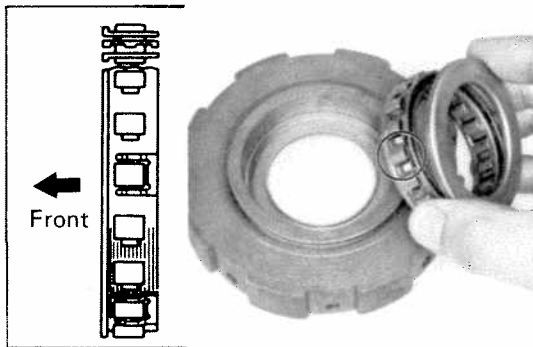
Check for equal height and for broken springs.

Check retainer for wear or damage.

## ASSEMBLY OF CENTER SUPPORT ASSEMBLY (See illustration on page 10-63)

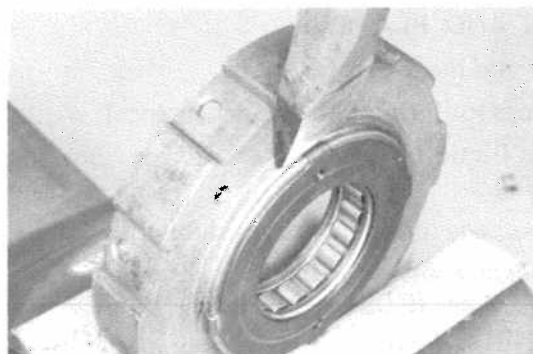
### GENERAL ASSEMBLY NOTE:

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



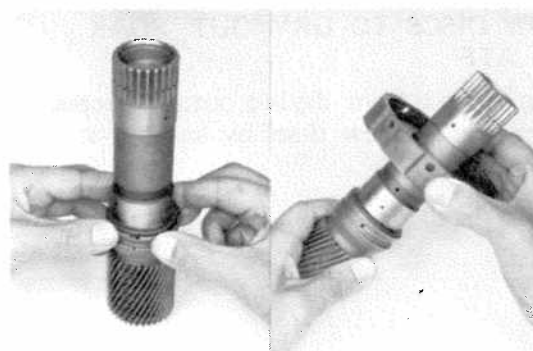
### 1. INSTALL ONE-WAY CLUTCH IN BRAKE HUB

Install one-way clutch into the brake hub facing the spring cage toward front.

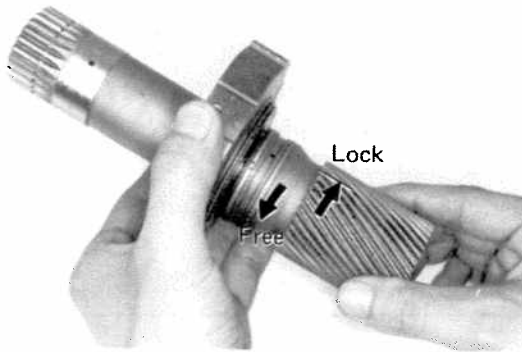


### 2. INSTALL NEW ONE-WAY CLUTCH RETAINER

Push retainer onto the brake hub. Hold brake hub in vise with soft jaws, and flatten ears with a chisel. Check to make sure that the retainer is centered.

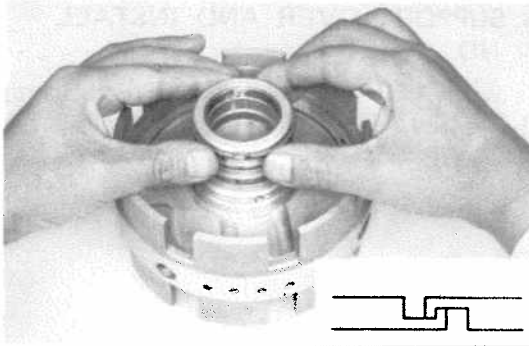


### 3. INSTALL TWO OIL SEAL RINGS AND ONE-WAY CLUTCH ASSEMBLY ON SUN GEAR

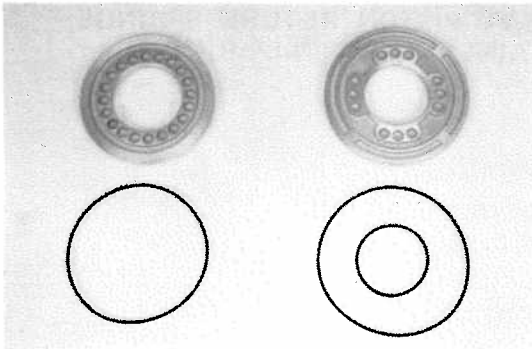
**4. CHECK OPERATION OF ONE-WAY CLUTCH**

Hold the brake No. 2 hub and turn the sun gear. The sun gear should turn freely counterclockwise and should lock clockwise.

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

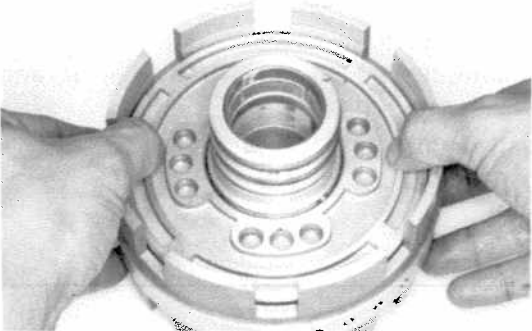
**5. INSTALL THREE OIL SEAL RINGS ON CENTER SUPPORT**

Spread apart and slip into groove. Hook both ends by hand.

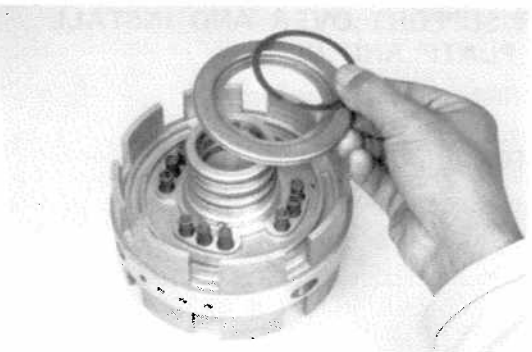
**6. INSTALL NEW O-RINGS ON PISTONS**

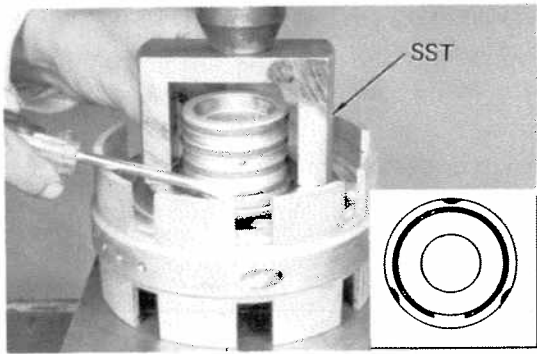
Install new inner and outer O-rings on two pistons.

NOTE: The inner O-ring is not installed on brake No. 2 piston.

**7. INSTALL PISTON NO.1 IN CENTER SUPPORT**

Lubricate O-rings with ATF and push No.1 piston into oil seal ring side of center support. Press from side to side to work into place.

**8. INSTALL TWELVE PISTON RETURN SPRINGS AND SET RETAINER WITH SNAP RING IN PLACE**

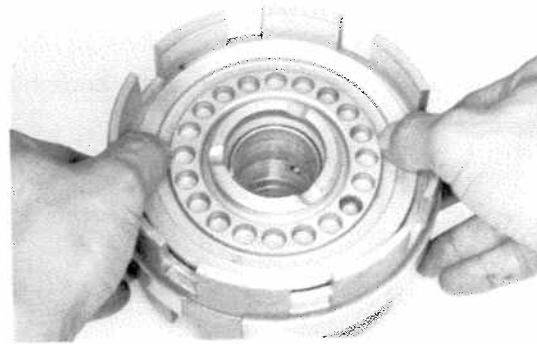


**9. COMPRESS RETURN SPRINGS AND INSTALL SNAP RING IN GROOVE**

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

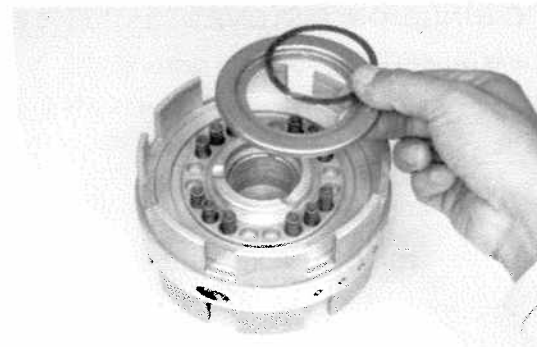
\*SST 09350-20013 or 00002-00223-04

- (b) Install snap ring using a screwdriver. Remove SST.

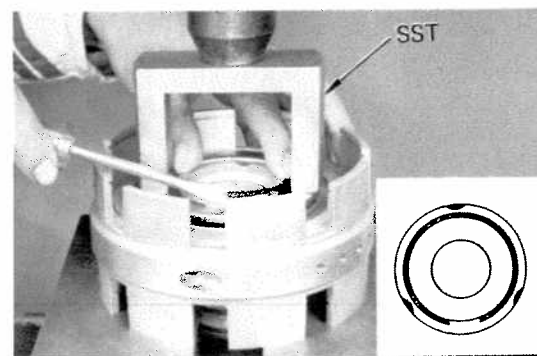


**10. TURN CENTER SUPPORT OVER AND INSTALL BRAKE PISTON NO. 2**

Lubricate O-rings with ATF and push No. 2 piston into place. When fully seated, the piston will be below the notch.



**11. INSTALL TWELVE PISTON RETURN SPRINGS AND SET RETAINER WITH SNAP RING IN PLACE**

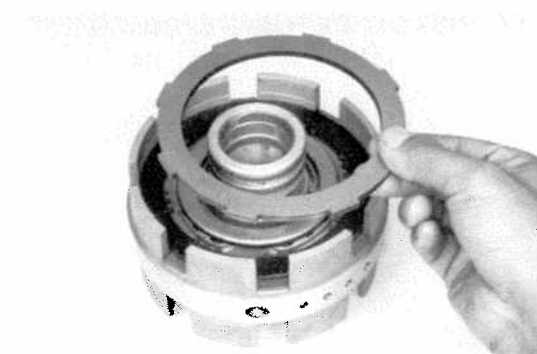


**12. COMPRESS RETURN SPRINGS AND INSTALL SNAP RING IN GROOVE**

- (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 using a screwdriver. Remove SST.



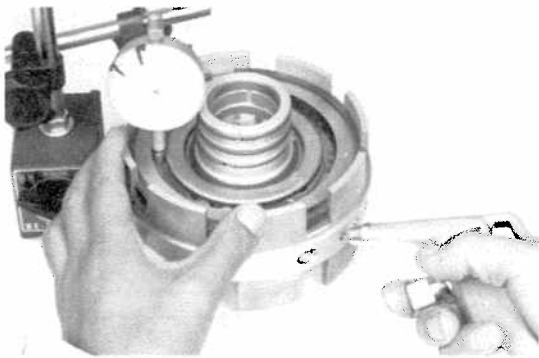
**13. TURN CENTER SUPPORT OVER AND INSTALL BRAKE NO. 1 PLATE AND DISC**

Install one plate first, and then one disc.

**14. INSTALL CLUTCH FLANGE**

Install with rounded edge toward disc.



**15. INSTALL SNAP RING IN CENTER SUPPORT**

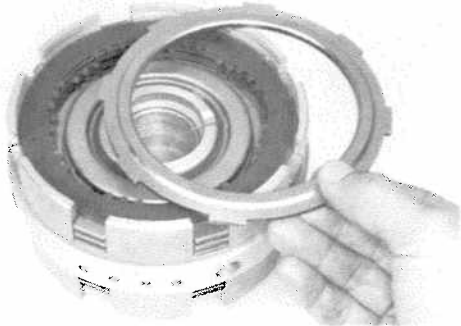
**CAUTION:** Make sure that the ends of the snap ring are not aligned with one of the cutouts.

Compress snap ring and push it into groove. Check that ring is completely seated in groove.

**16. CHECK PISTON STROKE OF BRAKE NO.1**

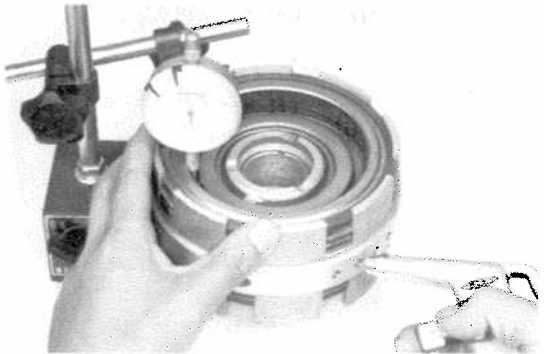
With a dial indicator, apply 4 – 8 kg/cm<sup>2</sup> (57 – 114 psi) of compressed air and measure the stroke as shown.

Stroke: 0.65 – 1.30 mm (0.0256 – 0.0512 in.)

**17. TURN CENTER SUPPORT OVER AND INSTALL BRAKE NO.2 DISCS, PLATES AND FLANGE**

Install in following order: Plate-disc-plate-disc-plate-disc-flange.

**CAUTION:** The clutch flange should be installed facing flat side toward disc.

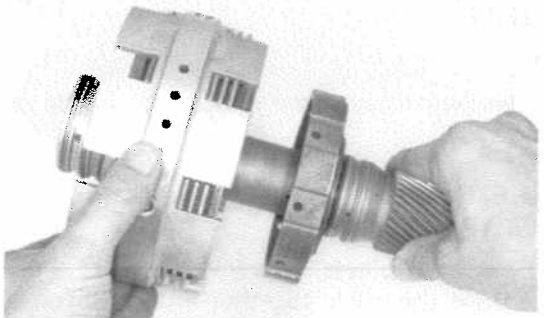
**18. INSTALL SNAP RING IN CENTER SUPPORT**

**CAUTION:** Make sure that the ends of the snap ring are not aligned with one of the cutouts.

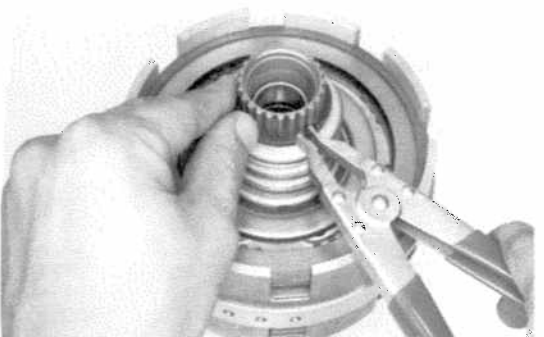
**19. CHECK PISTON STROKE OF BRAKE NO.2**

With a dial indicator, apply 4 – 8 kg/cm<sup>2</sup> (57 – 114 psi) of compressed air and measure the stroke as shown.

Stroke: 1.24 – 2.12 mm (0.0488 – 0.0835 in.)

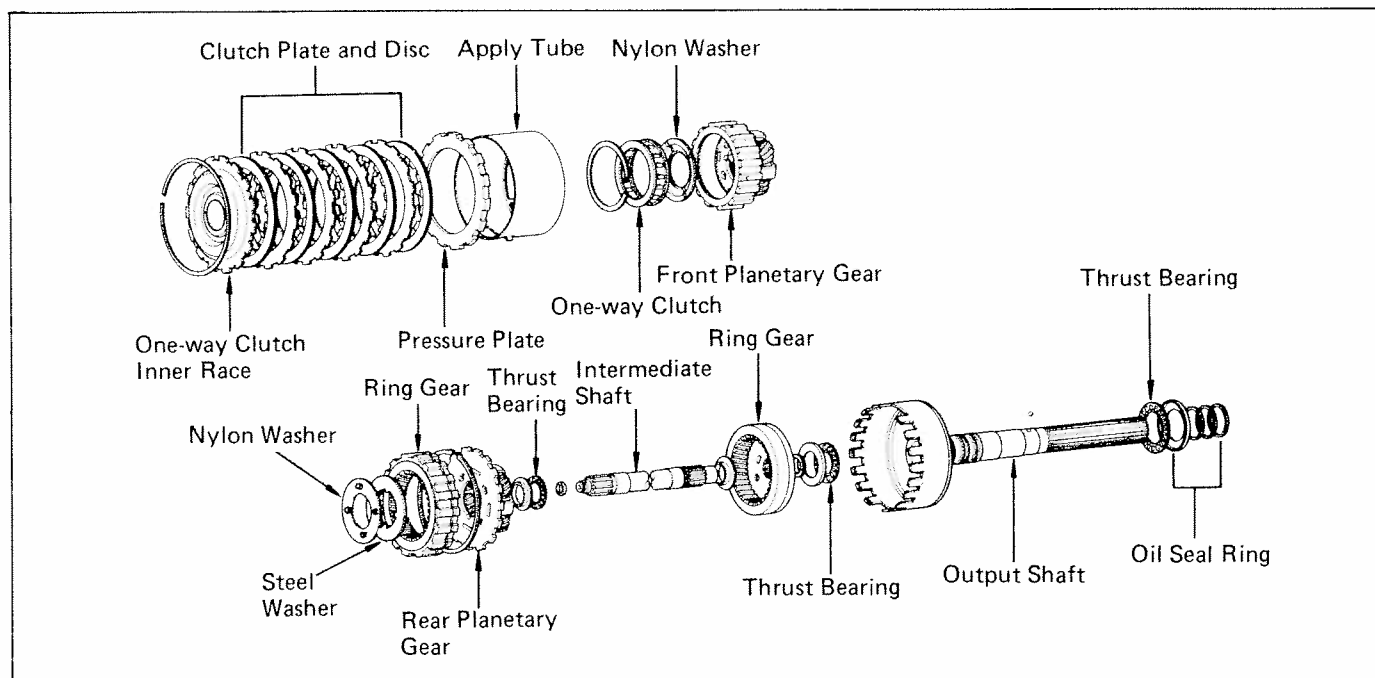
**20. ASSEMBLE CENTER SUPPORT AND SUN GEAR SHAFT**

- (a) Align brake No. 2 disc notches.
- (b) Start sun gear shaft into center support.
- (c) Mesh brake hub with discs, twisting and jiggling hub as required.
- (d) Push sun gear all the way into the center support.

**21. INSTALL SNAP RING ON END OF SUN GEAR SHAFT**

Spread with snap ring pliers and install in groove.

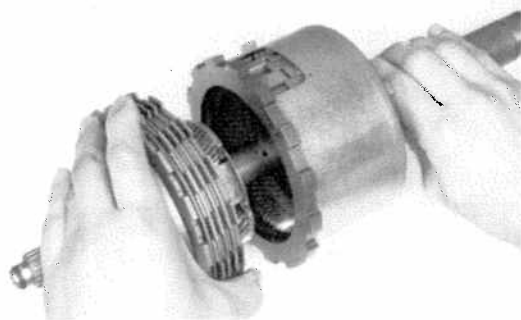
## Planetary Gear Output Shaft



### DISASSEMBLY OF PLANETARY GEAR OUTPUT SHAFT

1. REMOVE BRAKE NO.3 DISC/PLATE PACK AND FRONT PLANETARY GEAR

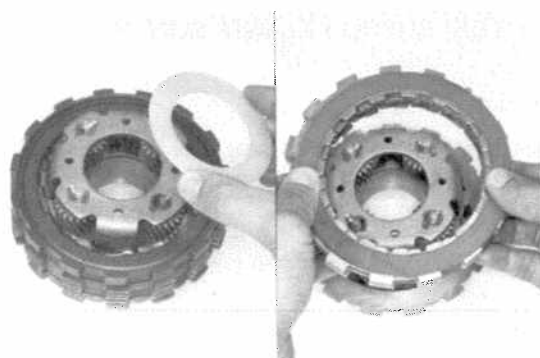
Grasp components and pull off front end of output shaft.



2. REMOVE NYLON WASHER FROM FRONT PLANETARY GEAR

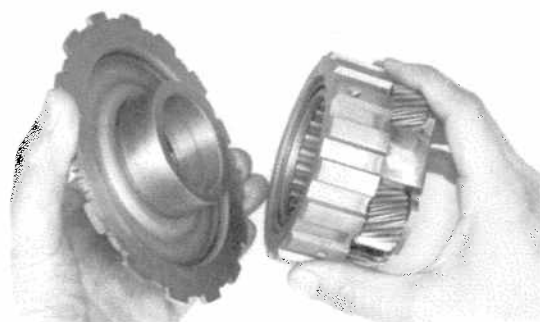
Lift off with hand.

NOTE: Nylon washer may have stuck to inside of planetary gear case.



3. REMOVE BRAKE DISCS AND PLATES FROM FRONT PLANETARY GEAR

Lift off the discs and plates, keeping them in exact assembly order. Hold the pack together with a piece of wire.



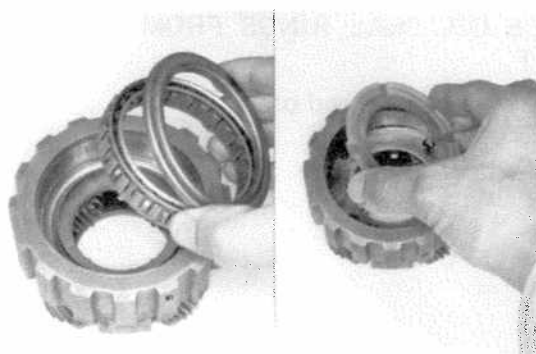
4. REMOVE ONE-WAY CLUTCH INNER RACE FROM FRONT PLANETARY GEAR

Pull apart by hand.



**5. REMOVE SNAP RING FROM FRONT PLANETARY GEAR**

Using a medium-sized screwdriver, pry out the snap ring.

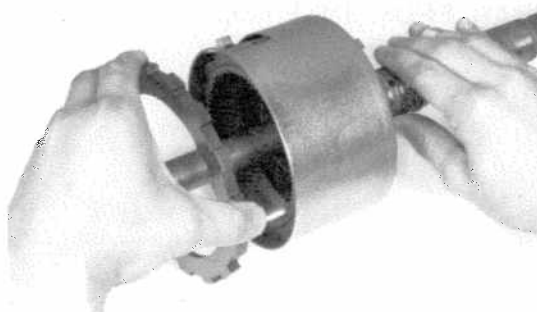


**6. REMOVE END BEARING, ONE-WAY CLUTCH AND OTHER END BEARING FROM FRONT PLANETARY GEAR**

Lift out by hand.

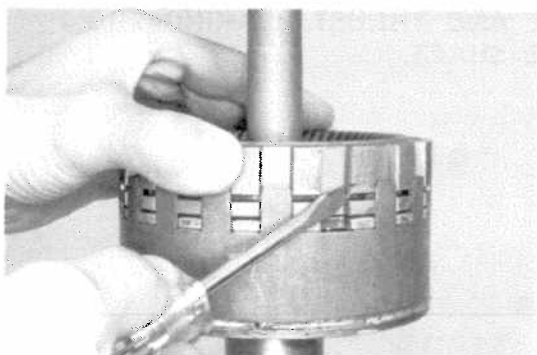
**7. REMOVE NYLON WASHER FROM FRONT PLANETARY GEAR**

Lift out by hand.



**8. REMOVE CLUTCH PRESSURE PLATE AND BRAKE APPLY TUBE**

Pull off by hand. Be careful to avoid dropping bearings on output shaft.



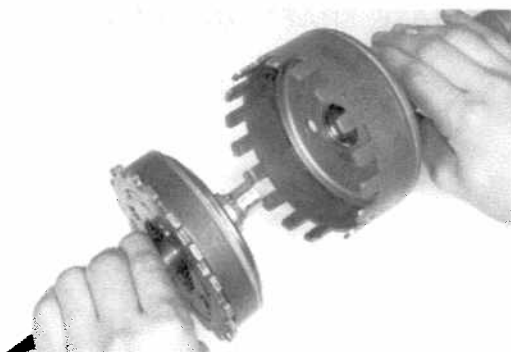
**9. COMPRESS SHAFT SNAP RING AND REMOVE FRONT PLANETARY RING GEAR**

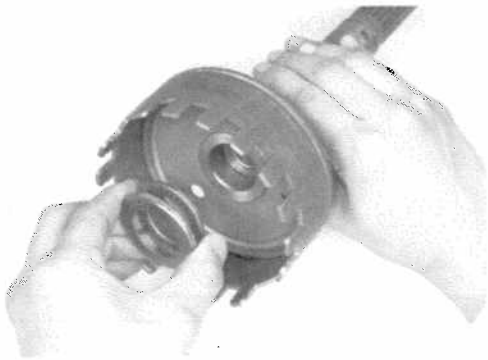
(a) While pulling up the ring gear, compress the snap ring and remove from the groove.

(b) Lift out the ring gear by hand.

**10. SEPARATE INTERMEDIATE SHAFT ASSEMBLY FROM OUTPUT SHAFT ASSEMBLY**

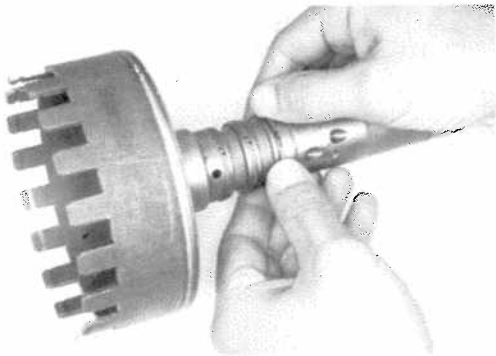
Pull apart the two assemblies.





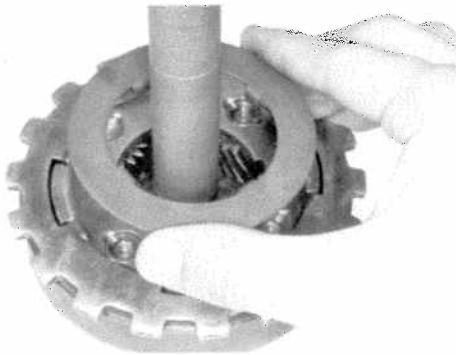
**11. REMOVE THRUST BEARING AND RACE FROM OUTPUT SHAFT ASSEMBLY**

Lift off by hand. Note position of races.



**12. REMOVE THREE OIL SEAL RINGS FROM OUTPUT SHAFT**

Unhook each ring and slide off end of the shaft.



**13. REMOVE STEEL THRUST WASHER AND REAR PLANETARY GEAR FROM INTERMEDIATE SHAFT ASSEMBLY**

Lift off by hand. Note position of lugs.



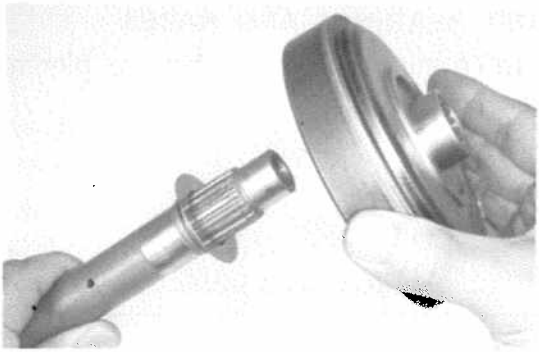
**14. REMOVE RACE AND THRUST BEARING FROM INTERMEDIATE SHAFT**

Lift off by hand.



**15. INVERT INTERMEDIATE SHAFT AND REMOVE SET RING**

Use a small screwdriver to open ring and remove by unwinding.



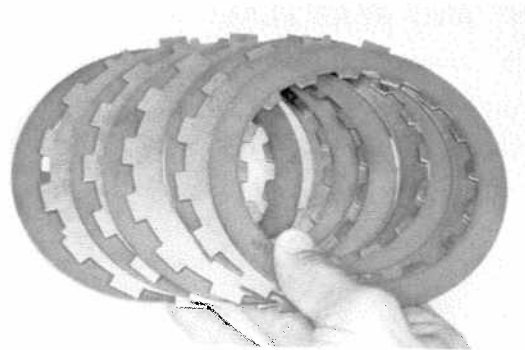
**16. REMOVE REAR PLANETARY RING GEAR AND BEARING RACE FROM INTERMEDIATE SHAFT**

Lift straight off.

**INSPECTION OF PLANETARY GEAR OUTPUT SHAFT**

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

Use only fresh, clean solvent. A bristle brush is recommended for cleaning gears. Be sure to maintain assembly order of discs and plates during cleaning. Dry parts with compressed air.

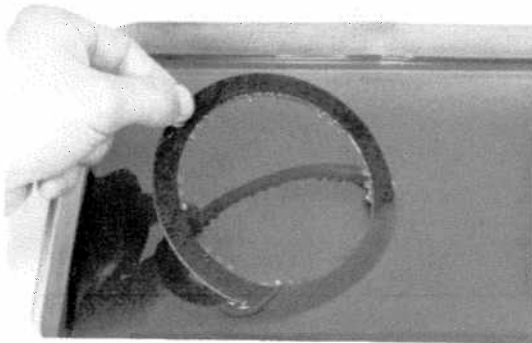


**2. INSPECT PLATES AND DISCS**

- (a) Check outer and inner lugs for wear.
- (b) Check disc and plate surfaces for burning (black appearance).
- (c) Check for scoring, flaking or debonding of disc friction surfaces.
- (d) Check for warpage (discs and plates should be flat).
- (e) Measure thickness of each disc. Minimum allowable thickness is 2.1 mm (0.083 in.).
- (f) Replace any damaged or worn discs or plates.

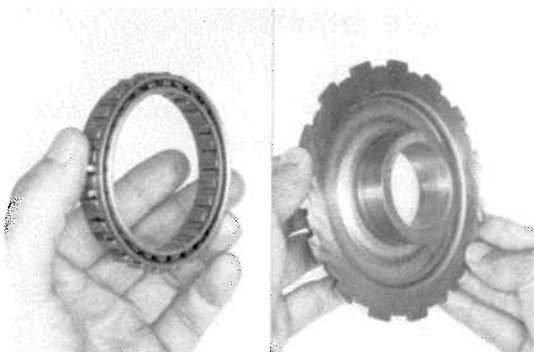
**3. DO NOT ALLOW DISCS TO DRY; PREPARE NEW DISCS**

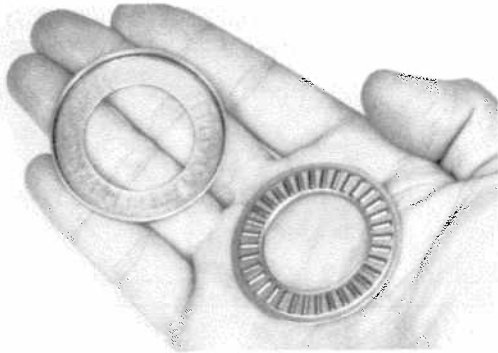
Discs being reused should not be allowed to dry out. If necessary, immerse disc/plate packs in ATF. Prepare new discs for installation by soaking at least two hours in ATF.



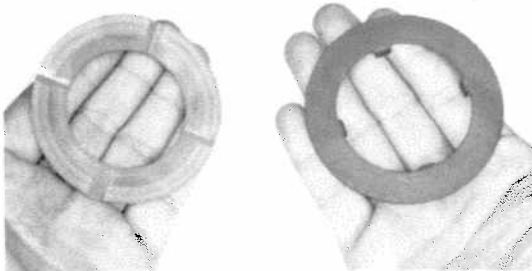
**4. INSPECT ONE-WAY CLUTCH AND INNER RACE**

- (a) Check sprags, ribbon spring and end surfaces for wear or damage.
- (b) Check lugs, disc sliding surface and bearing race for wear or damage.

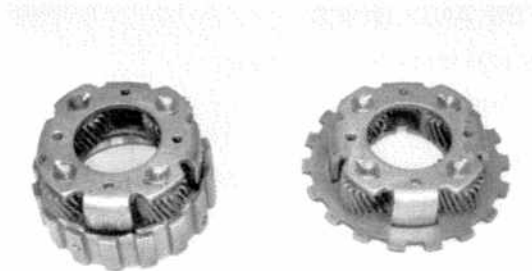


**5. INSPECT THRUST BEARINGS AND RACES**

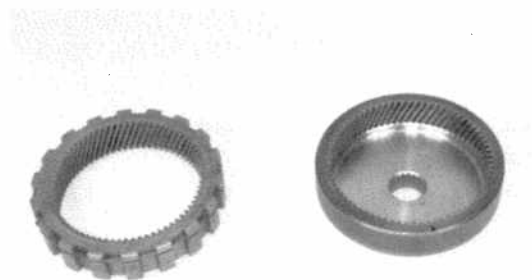
Check needle bearings and races for wear, burning, binding or damage.

**6. INSPECT NYLON AND STEEL THRUST WASHERS**

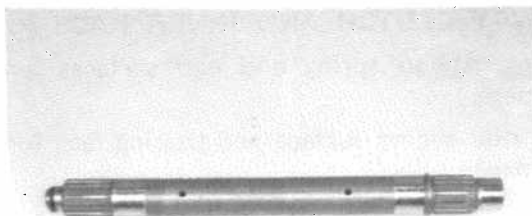
Check for wear, warping, burning or cracking.

**7. INSPECT FRONT AND REAR PLANETARY GEARS**

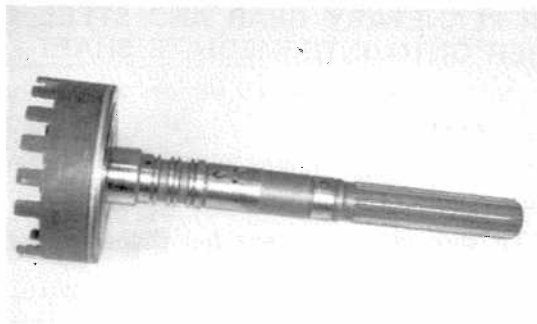
- (a) Check thrust surfaces for warping, wear or burning.
- (b) Check lugs for wear or damage.
- (c) Check for worn or chipped gear teeth.
- (d) Check inner (one-way clutch) surface of front planetary carrier for wear or damage.
- (e) Check pinion gear pins. No play is allowable.

**8. INSPECT FRONT AND REAR PLANETARY RING GEARS**

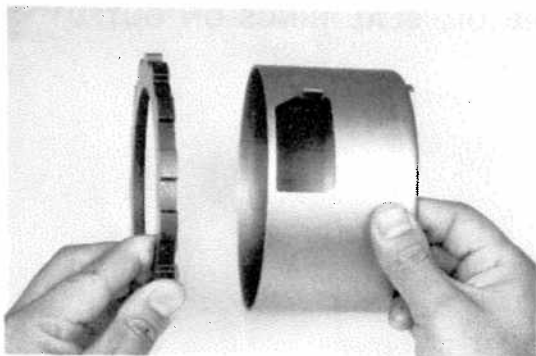
- (a) Check internal gear teeth for wear or damage.
- (b) Check parking pawl lugs on front gear for wear or damage.
- (c) Check internal splines of rear gear for wear or damage.

**9. INSPECT INTERMEDIATE SHAFT**

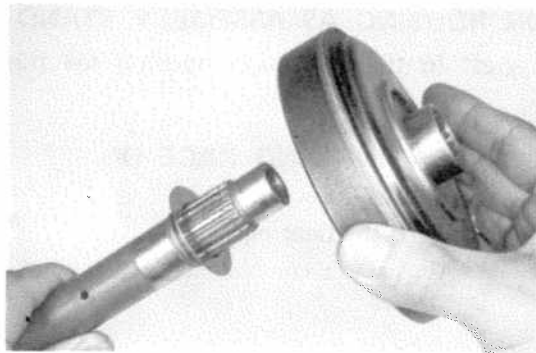
- (a) Check oil holes for clogging.
- (b) Check splines, bushing journal, ring groove and set ring for wear, deformation or damage.
- (c) Check oil seal ring for wear or damage.

**10. INSPECT OUTPUT SHAFT**

- (a) Check oil holes and governor oil passages for clogging.
- (b) Check thrust bearing, inner bushing and bushing journal surfaces for wear, burning or scoring.
- (c) Check rear splines for wear, twisting or damage.

**11. INSPECT APPLY TUBE AND PRESSURE PLATE**

Check for wear, deformation, cracks, burning or other damage.

**12. INSPECT ALL OTHER PARTS****ASSEMBLY OF PLANETARY GEAR OUTPUT SHAFT**

(See illustration on page 10-72)

**GENERAL ASSEMBLY NOTE:**

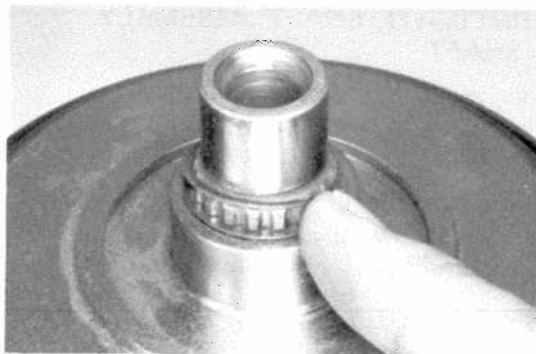
Be sure to coat all friction surfaces, bearing races, thrust faces and sliding surfaces with ATF during assembly.

**1. INSTALL THRUST BEARING RACE AND REAR PLANETARY RING GEAR ON INTERMEDIATE SHAFT**

Slip thrust bearing race and ring gear onto shaft with exterior splines up, as shown.

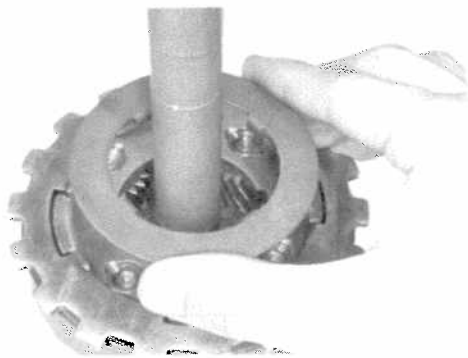
**2. INSTALL SET RING ON INTERMEDIATE SHAFT**

Push down and wind into place. Check to make sure it is secure.

**3. TURN INTERMEDIATE SHAFT OVER AND INSTALL THRUST BEARING AND RACE**

Make sure that flat side of race is against bearing.

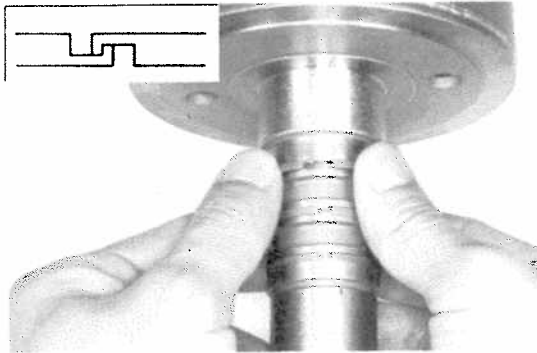




**4. INSTALL REAR PLANETARY GEAR AND STEEL THRUST WASHER ONTO INTERMEDIATE SHAFT**

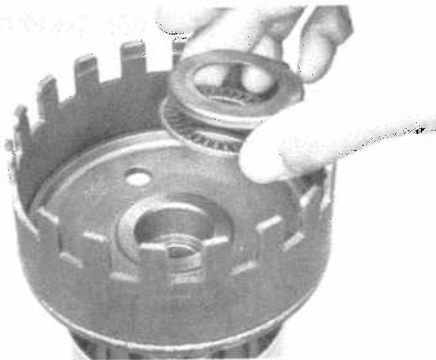
- (a) Rotate gear to make sure that all pinion gears fully mesh with ring gear.
- (b) Install washer with lugs down, fitting into rear planetary gear carrier.

**CAUTION:** Make sure that different lug shapes match openings on plate.



**5. INSTALL THREE OIL SEAL RINGS ON OUTPUT SHAFT**

Slide into place and hook both ends.

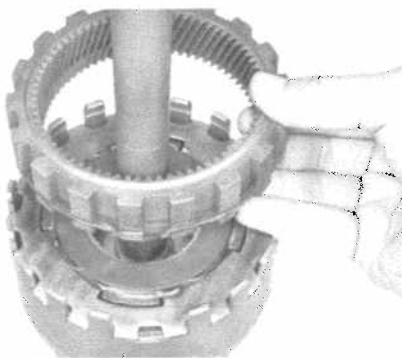


**6. USE EXTENSION HOUSING AS ASSEMBLY STAND**

Set the output shaft in the extension housing for the next four steps.

**7. INSTALL THRUST BEARING AND RACE ON OUTPUT SHAFT**

Hold cup of the race toward the bearing.

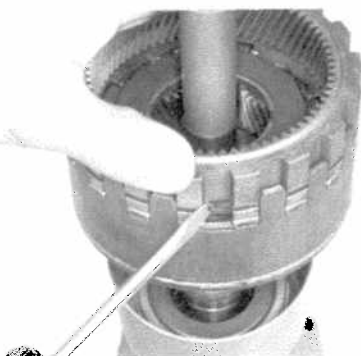


**8. INSTALL INTERMEDIATE SHAFT ASSEMBLY INTO OUTPUT SHAFT**

Slide into place, and make sure that lugs interlock.

**9. SET IN PLACE FRONT PLANETARY RING GEAR**

Slide snap ring downward, and align lugs with notches. Align ends of snap ring with wide gap between teeth.



**10. INSTALL FRONT PLANETARY RING GEAR WITH SNAP RING**

While pushing down ring gear, squeeze snap ring end with a screwdriver and install into the groove.

**NOTE:** When the snap ring is fully seated, the gap is the width of one lug.

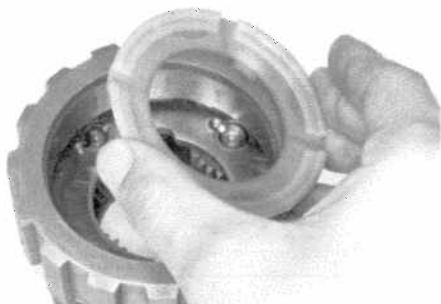
**11. LIFT ASSEMBLY OUT OF EXTENSION HOUSING**

The whole assembly should come out as a single unit.



**12. INSTALL NYLON THRUST WASHER INTO FRONT PLANETARY GEAR**

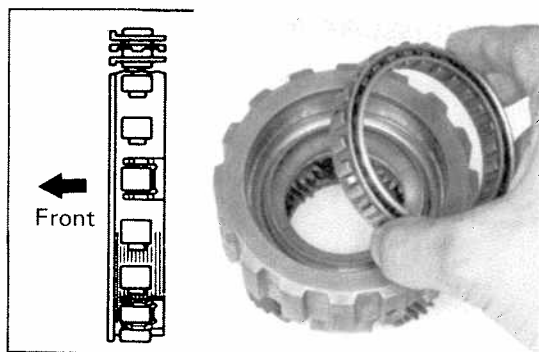
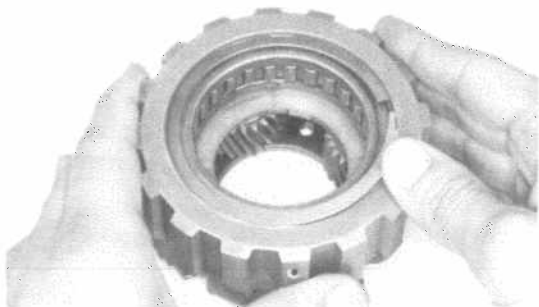
Face lugs downward and match them with slots in back of planetary gear.

**13. INSTALL END BEARING**

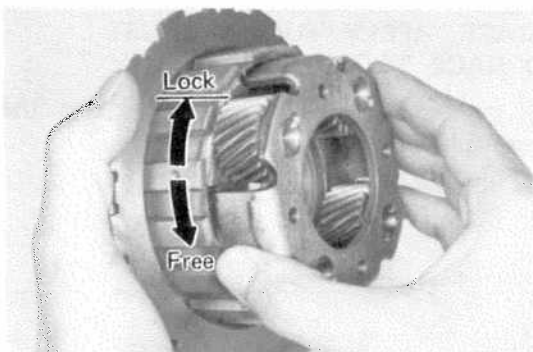
Push into place with cup side up.

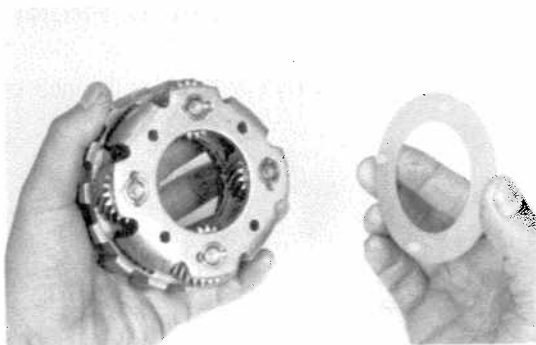
**14. INSTALL ONE-WAY CLUTCH**

Install one-way clutch into the outer race facing spring cage toward front.

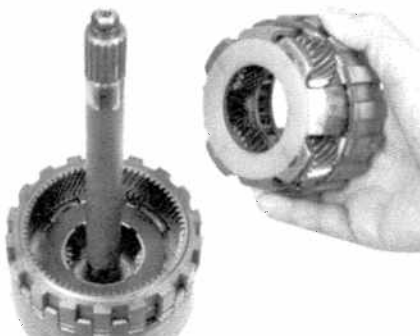
**15. INSTALL END BEARING AND SNAP RING****16. CHECK OPERATION OF ONE-WAY CLUTCH**

- Temporarily install the one-way clutch inner race into the front planetary gear.
- Hold the inner race and turn the front planetary gear. The front planetary gear should turn freely counter-clockwise and should lock clockwise.  
If the one-way clutch does not work properly, replace it.
- Remove the inner race.

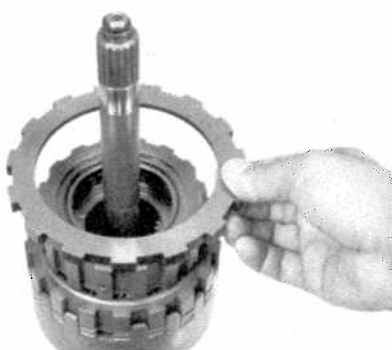


**17. INSTALL NYLON THRUST WASHER ON FRONT PLANETARY GEAR**

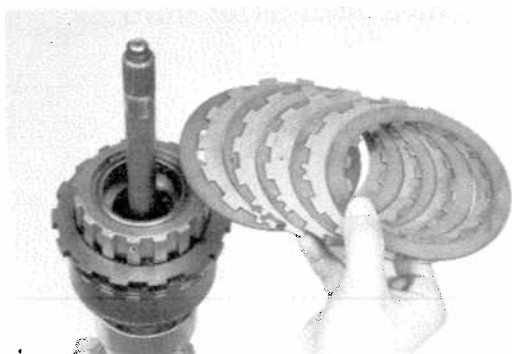
Apply petroleum jelly to washer to hold it in place during later assembly. Match lugs with planetary carrier while installing.

**18. INSTALL FRONT PLANETARY GEAR ASSEMBLY TO INTERMEDIATE SHAFT**

Slide over shaft and mesh pinion gears with ring gear.

**19. INSTALL CLUTCH PRESSURE PLATE**

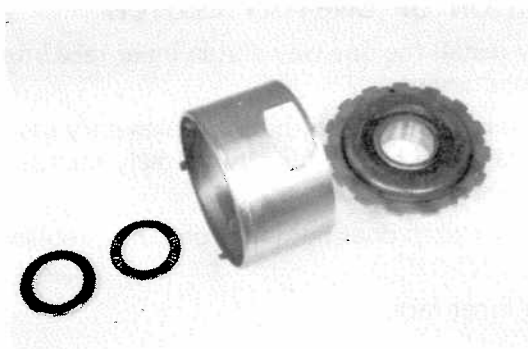
Install pressure plate facing flat surface toward intermediate shaft.

**20. INSTALL BRAKE NO. 3 CLUTCH PACK**

Do not install dry discs. Use low-pressure compressed air to blow off excess ATF or measurement of clutch pack height will be inaccurate.

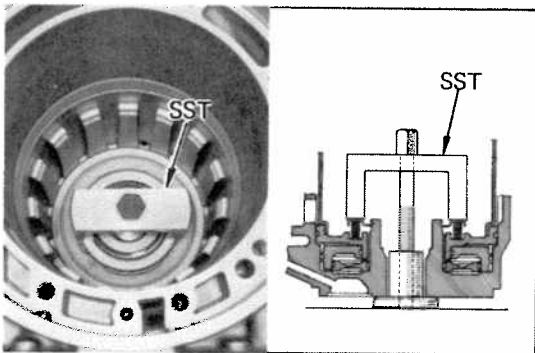
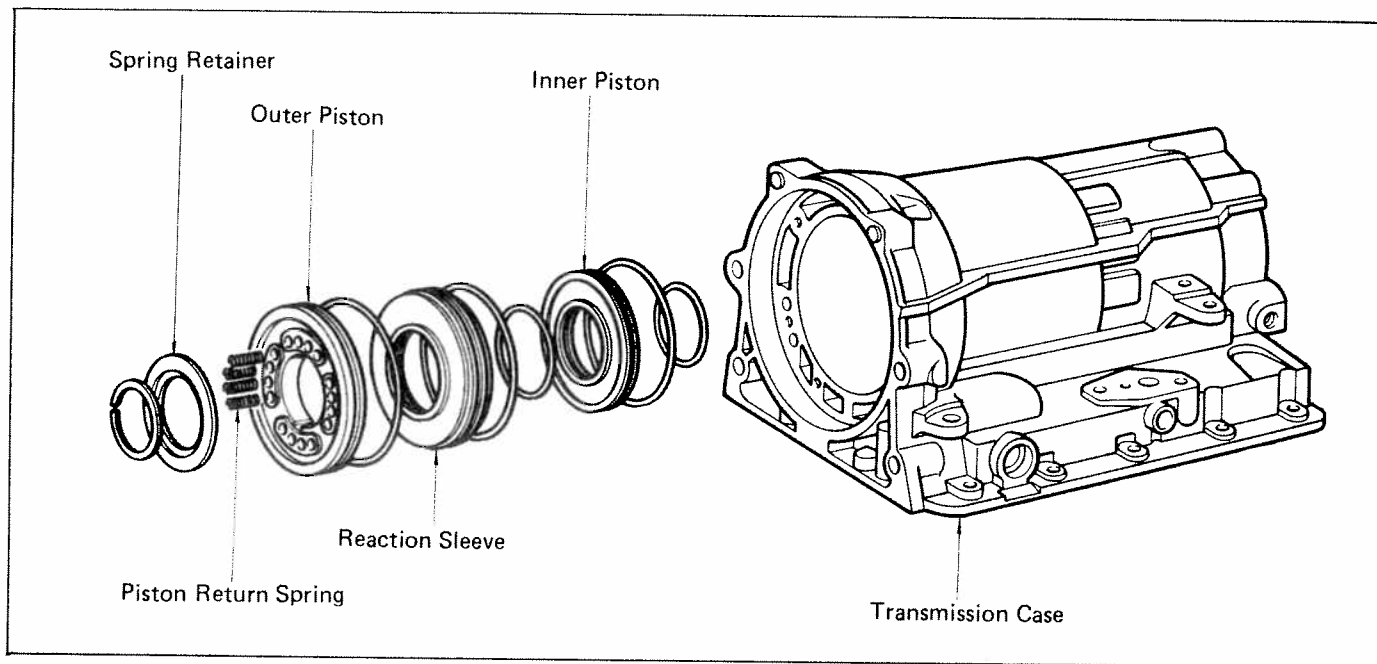
**CAUTION:** Do not use high-pressure air because discs may be damaged. If reusing original components, keep in order.

Install in: Disc-plate-disc-plate-disc-plate-disc-plate-disc.

**21. KEEP INNER RACE, APPLY TUBE, THRUST BEARING AND RACE TOGETHER**

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

## Transmission Case and Rear Brake Pistons



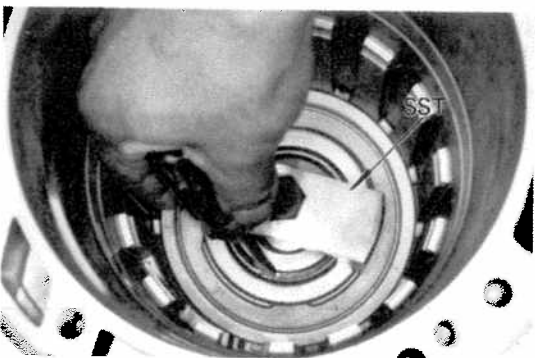
### DISASSEMBLY OF TRANSMISSION CASE AND REAR BRAKE PISTONS

#### 1. COMPRESS RETURN SPRINGS AND REMOVE SPRING RETAINER SNAP RING

- (a) Install spring compressor\*. Gradually and evenly tighten bolts to compress springs.

\*SST 09350-20013 or 00002-00223-03

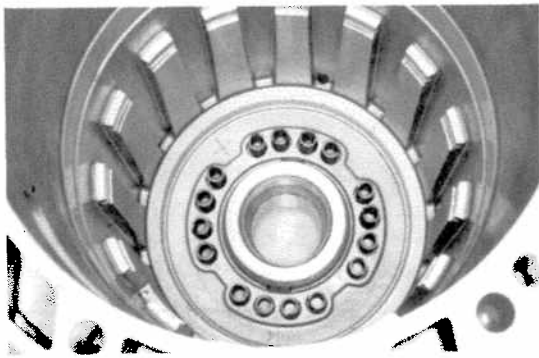
- (b) Using a screwdriver, remove snap ring.
- (c) Carefully remove SST.



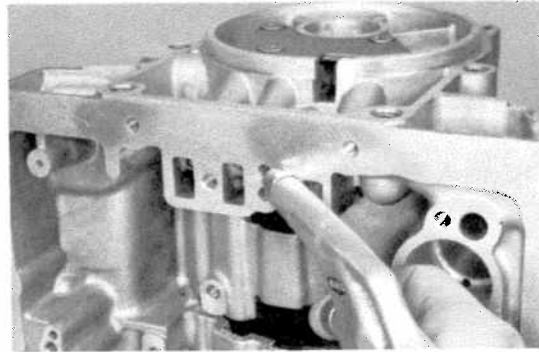
#### 2. REMOVE SPRING RETAINER

Lift out spring retainer.



**3. REMOVE PISTON RETURN SPRINGS**

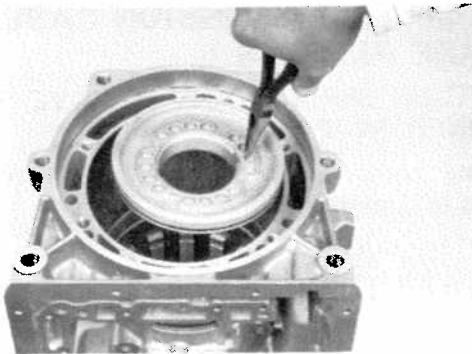
Lift out sixteen return springs. Keep together.

**4. REMOVE OUTER PISTON AND REACTION SLEEVE WITH COMPRESSED AIR**

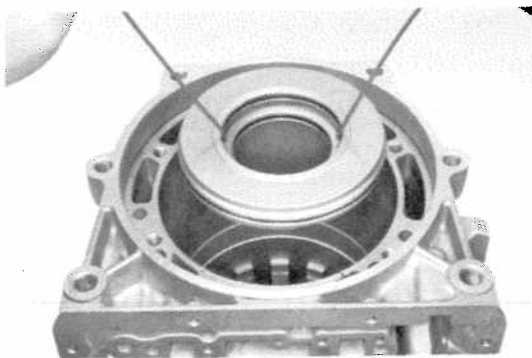
Turn the case over with face down on workbench. Place several clean shop rags under the case to catch the piston and sleeve. To pop out, apply compressed air to the outer and inner piston oil holes.

If piston and sleeve do not pop out with compressed air, remove them in accordance with following order.

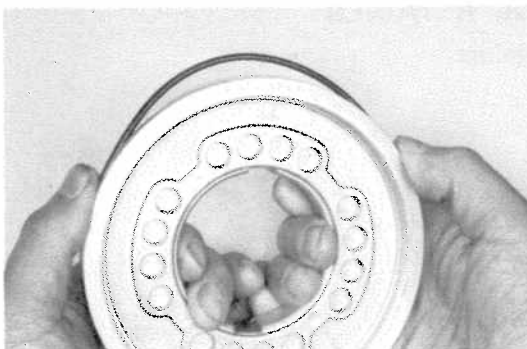
(a) Lift outer piston from case, using needle nose pliers.



(b) Apply compressed air to the inner piston oil holes, then insert two long hooks between inner piston and reaction sleeve and gradually lift them out of case.

**5. REMOVE O-RINGS FROM OUTER PISTON AND REACTION SLEEVE**

Pull off by hand and discard O-rings.



## INSPECTION OF CASE COMPONENT

### 1. CLEAN PARTS IN SOLVENT

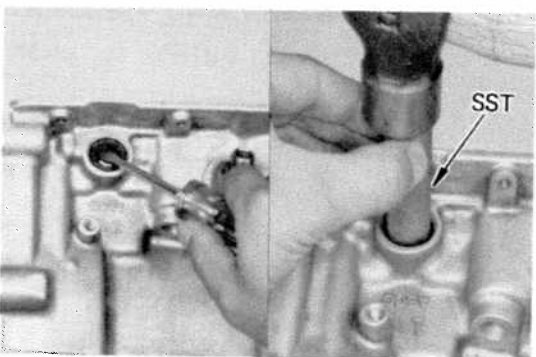
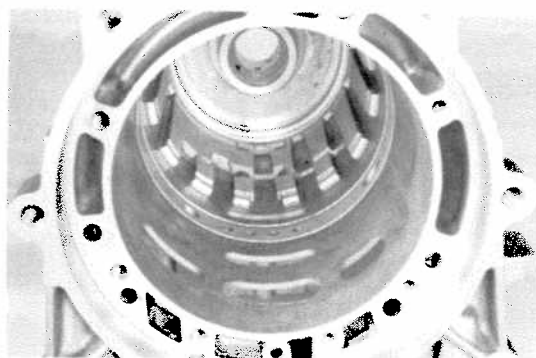
Use only clean solvent. Make sure that all gasket residue is removed, but do not scrape finished gasket surfaces with metal tools. A stiff bristle brush is OK.

### 2. DRY PARTS WITH COMPRESSED AIR

With compressed air, dry parts and blow all fluid passages to clear solvent.

### 3. INSPECT CASE

- Carefully inspect case for cracks or damage.
- Check gasket surfaces for warp or gouges.
- Check piston bores, O-ring sliding surfaces and output shaft bushing for gouges, wear or damage.
- Using compressed air, blow all fluid passages to make sure that they are unclogged.



### 4. INSPECT MANUAL SHAFT OIL SEALS

Check for wear, damage or cracks.

Replace the oil seals as follows, if necessary.

- Remove manual shaft oil seals with a screwdriver.

**CAUTION:** Be careful not to damage bore.

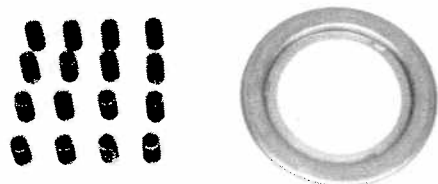
- Drive in new left and right oil seals with an oil seal replacer\*.

\*SST 09350-20013 or Commercial replacer

### 5. INSPECT PISTON RETURN SPRINGS AND RETAINER

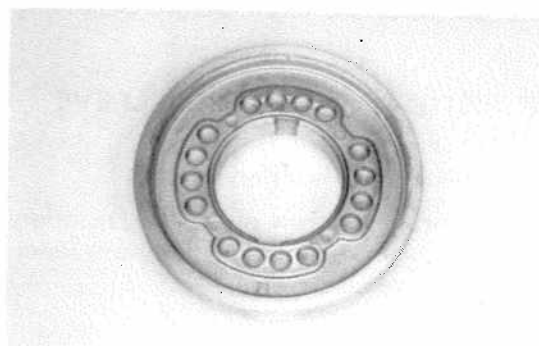
Check for equal height and for broken springs.

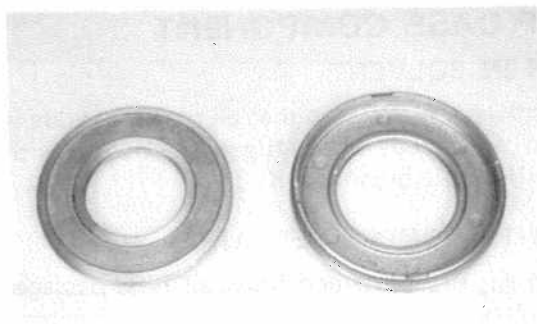
Check retainer for wear or damage.



### 6. INSPECT OUTER PISTON

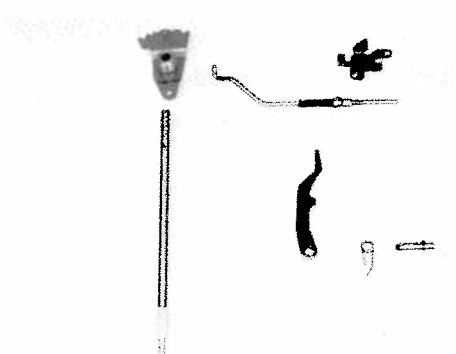
Check sliding surfaces, O-ring grooves and spring seats for wear or damage.





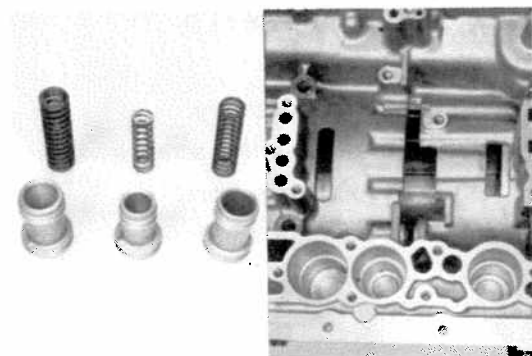
## 7. INSPECT INNER PISTON AND REACTION SLEEVE

Check sliding surfaces, O-ring grooves for wear or damage.



## 8. INSPECT MANUAL VALVE LEVER AND PARKING LOCK PAWL

Check for wear or damage.



## 9. INSPECT ACCUMULATOR SPRINGS AND PISTONS

- (a) Check piston grooves and sliding surfaces for wear, cracks or damage.
- (b) Check that springs are not broken or damaged.
- (c) Replace O-rings with new ones.

# ASSEMBLY OF TRANSMISSION CASE AND REAR BRAKE PISTONS

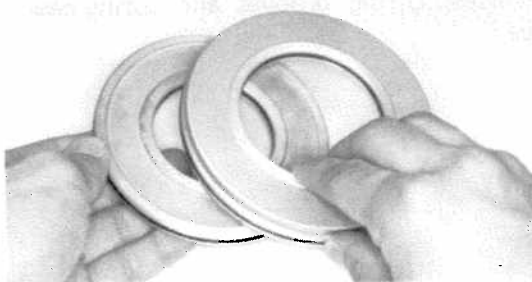
(See illustration on page 10-81)

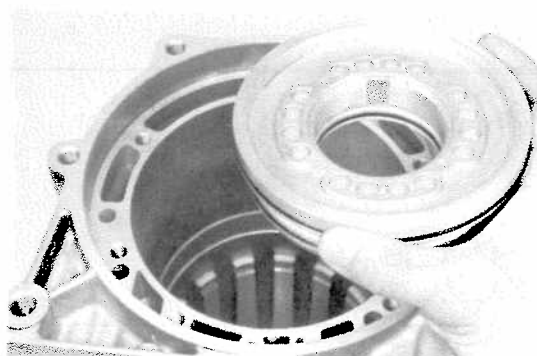
NOTE: Make sure all parts are clean before beginning assembly.

## 1. INSTALL INNER PISTON IN REACTION SLEEVE WITH NEW O-RINGS

Place O-rings on inner piston and reaction sleeve.

**CAUTION:** Thinner O-ring goes on outside of reaction sleeve. Lightly lubricate O-rings with ATF, and push inner piston into cupped side of reaction sleeve.





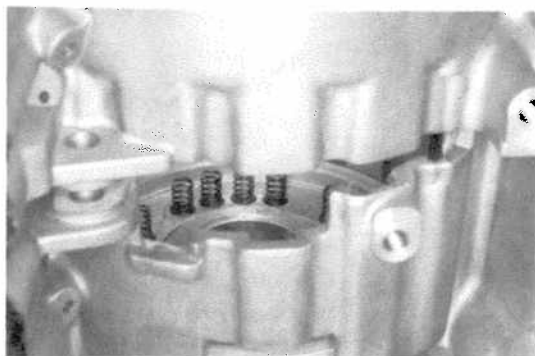
## 2. INSTALL OUTER PISTON IN REACTION SLEEVE

Lubricate the O-rings with ATF, and push the outer piston onto the other side of the reaction sleeve.

## 3. INSTALL PISTONS AND SLEEVE INTO CASE

**CAUTION:** Be careful not to damage the O-rings.

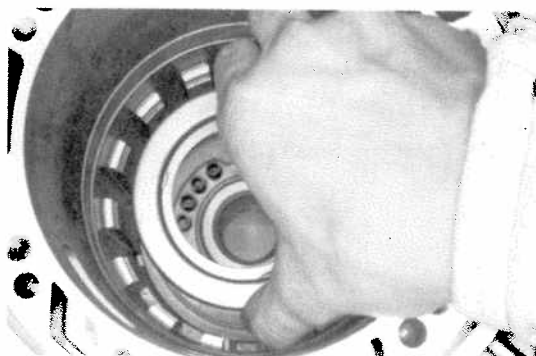
Hold the assembly with the outer piston up (spring seats visible), and push the assembly into its bore in the case.



## 4. INSTALL SIXTEEN PISTON RETURN SPRINGS

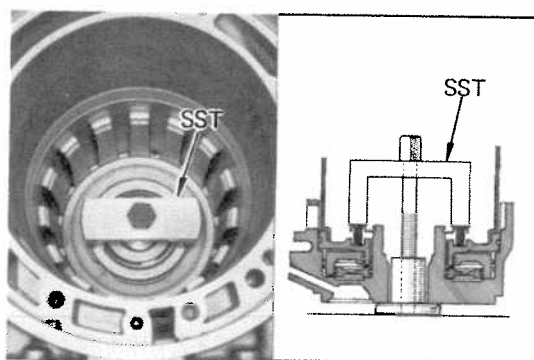
Apply petroleum jelly to the end of each spring to hold it in place. Install springs in seats on top of outer piston.

**NOTE:** Springs are visible through cutout in case, which helps position them more easily.



## 5. INSTALL SPRING RETAINER

Position the retainer on the springs, being careful not to knock over the springs.

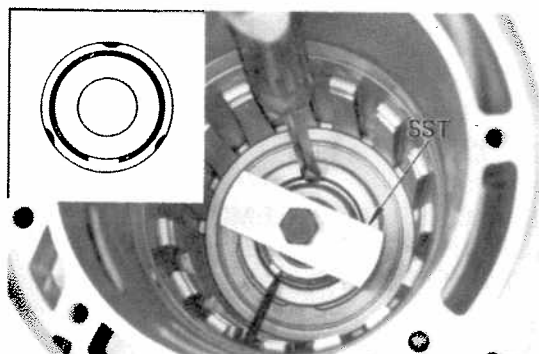


## 6. COMPRESS RETURN SPRINGS AND INSTALL SNAP RING IN GROOVE

**CAUTION:** Do not over-tighten the bolts as this will bend the spring retainer.

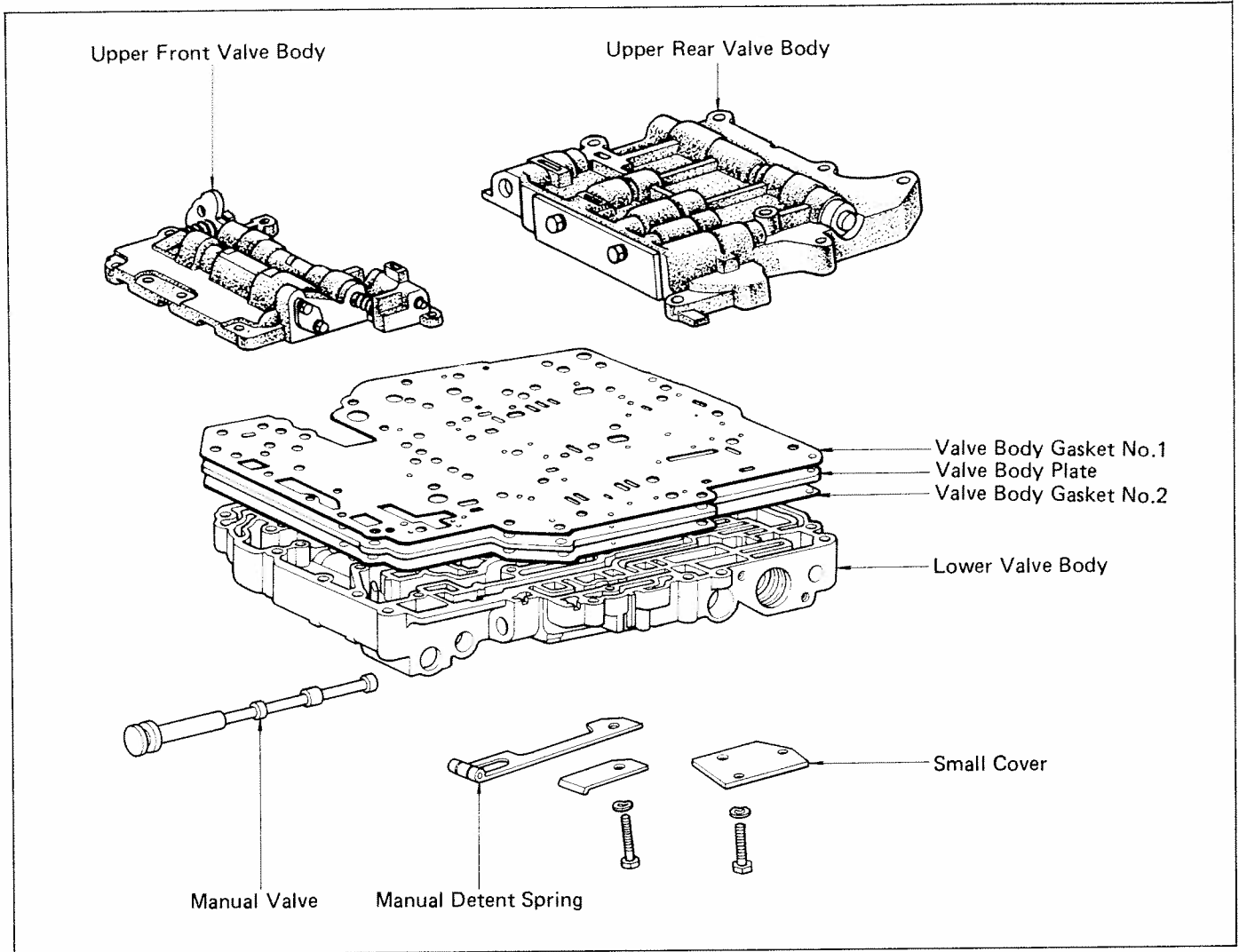
- Carefully position the spring compressor\* on the spring retainer.
- Gradually and evenly tighten the bolts to compress the springs and keep retainer centered.

\*SST 09350-20013 or 00002-00223-03



- Push the snap ring into place with two screwdrivers. Visually check to make sure that it is fully seated and centered by three lugs on spring retainer. Remove the SST.

## Valve Body



### DISASSEMBLY OF VALVE BODY

#### GENERAL DISASSEMBLY NOTES:

- To facilitate assembly, arrange parts in order.
- Do not scratch valve faces or raise burrs in valve bores. Never force a valve into or out of its bore; damage will result.
- Be careful not to lose check balls when separating valve bodies.
- Be careful not to mix up or lose springs; they are not interchangeable.

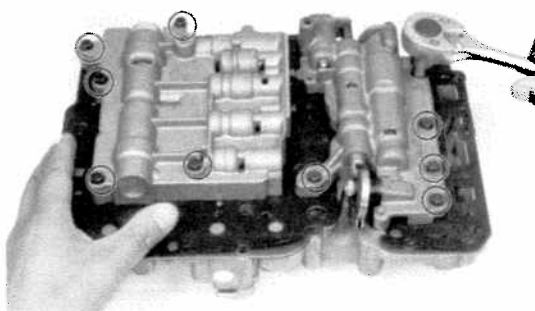
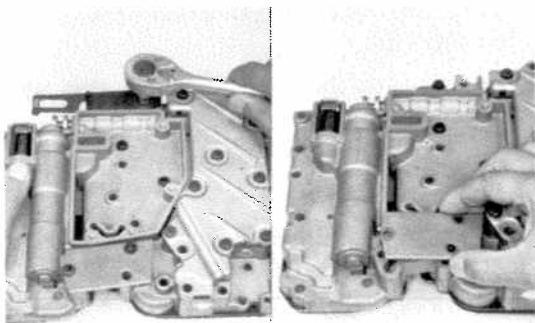
#### 1. UNBOLT AND REMOVE DETENT SPRING

#### 2. REMOVE MANUAL VALVE

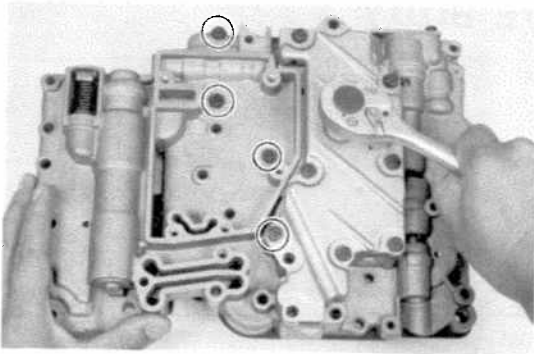
#### 3. REMOVE SMALL COVER

#### 4. TURN ASSEMBLY OVER AND REMOVE TEN BOLTS FROM UPPER FRONT VALVE BODY AND UPPER REAR VALVE BODY

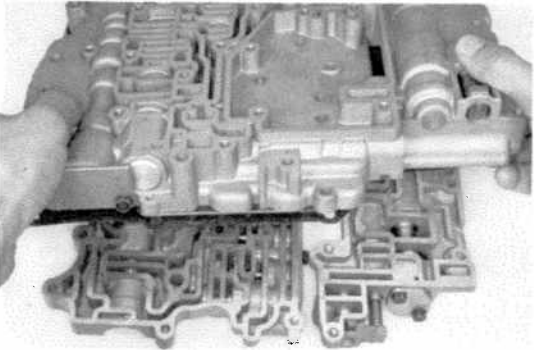
Remove ten bolts.







5. **TURN ASSEMBLY OVER AND REMOVE FIVE BOLTS FROM LOWER VALVE BODY**

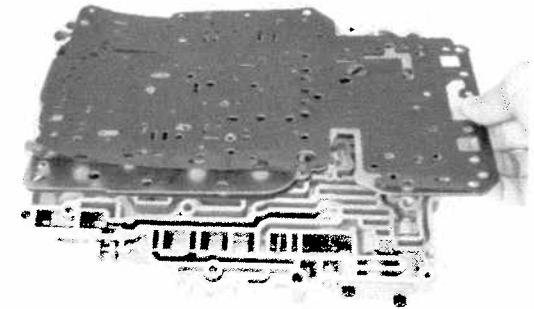


6. **LIFT OFF LOWER VALVE BODY AND PLATE AS SINGLE UNIT**

Hold the lower valve and plate together so that the check valve and ball do not fall out. Turn the lower valve body over and set on the workbench.

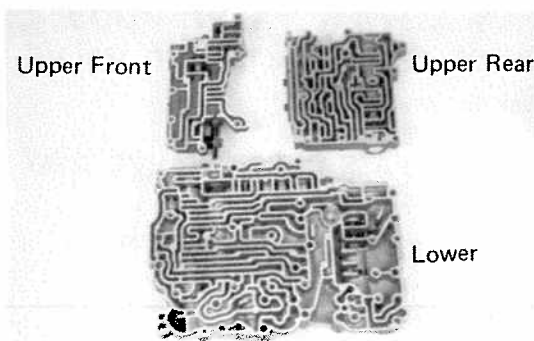
NOTE: Be sure that other two valve bodies do not stick to gasket – they should remain on workbench.

Carefully set aside other two valve bodies.



7. **REMOVE LOWER VALVE BODY PLATE AND GASKETS**

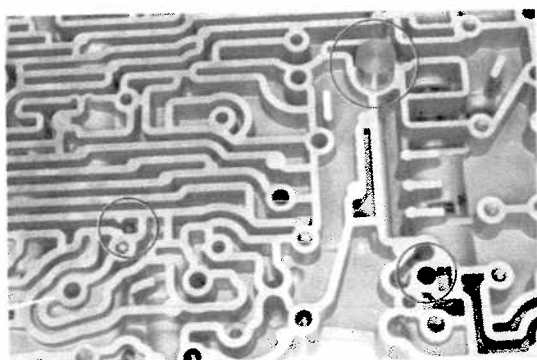
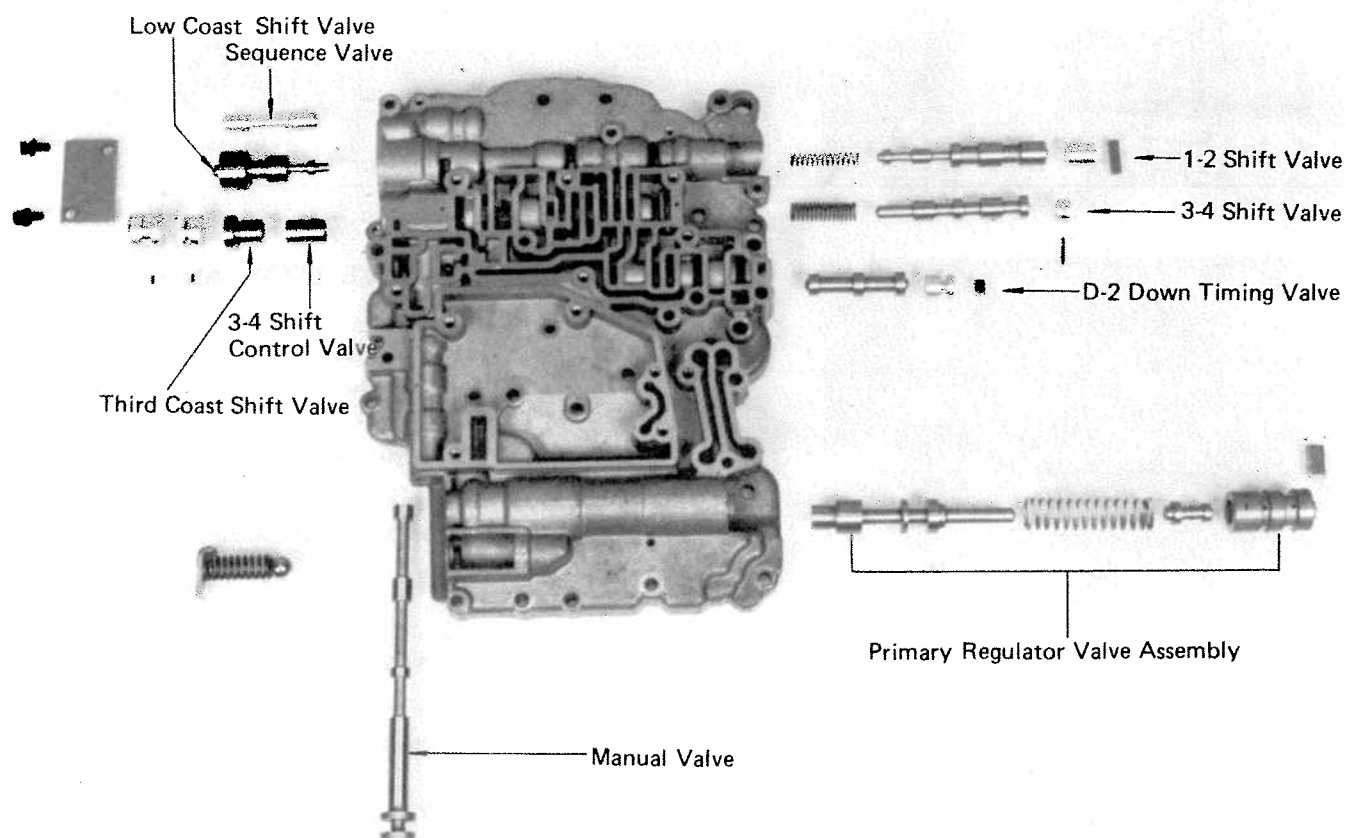
Lift off. Save gaskets for inspection.



Now valve body has been separated into three parts, namely, lower valve body, upper front valve body and upper rear valve body. Disassemble and inspect each of the three parts.

Lower valve body (A43D) ..... See page 10-90  
 Upper front valve body ..... See page 10-100  
 Upper rear valve body ..... See page 10-106

## LOWER VALVE BODY



### DISASSEMBLY OF LOWER VALVE BODY

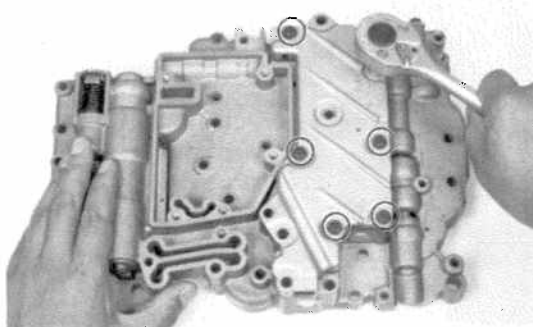
1. NOTE POSITION OF CHECK BALLS AND VALVE  
These are loose parts.

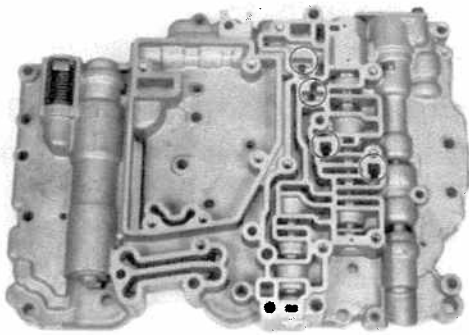
2. REMOVE COOLER BY-PASS CHECK VALVE AND SPRINGS

Lift out of valve body. Keep spring with check valve.

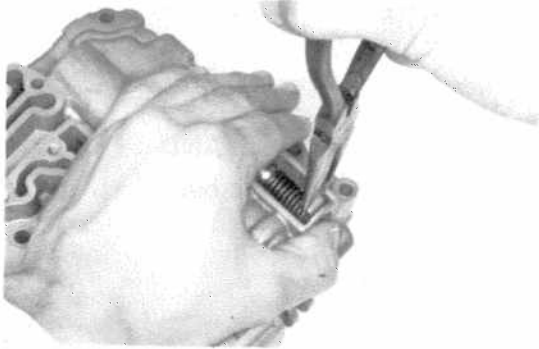
3. TURN ASSEMBLY OVER AND REMOVE SIX BOLTS AND REMOVE LOWER BODY COVER, PLATE AND GASKETS

Lift off cover and carefully remove plate and gaskets.



**4. REMOVE FOUR CHECK BALLS**

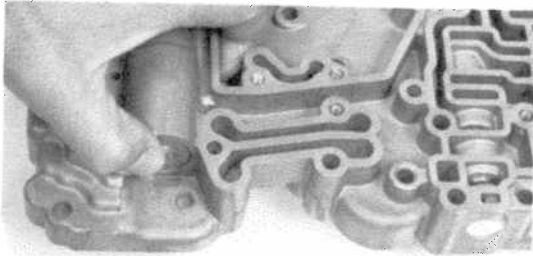
Remove four check balls being careful not to scratch grooves. Keep balls together to prevent losing them.

**5. REMOVE SPRING RETAINER FROM PRESSURE RELIEF ASSEMBLY**

**CAUTION:** Cover spring with hand. Then, with needle nose pliers, slowly pull out spring seat, being careful not to bend spring.

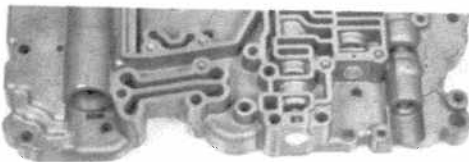
**6. REMOVE PRESSURE RELIEF SPRING AND BALL**

Lift out the spring. Tilt the body to remove the ball. Keep spring with ball.

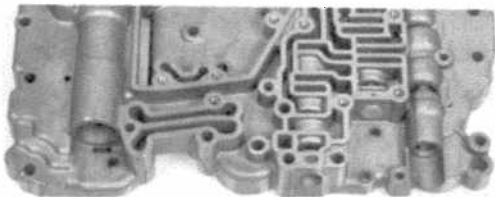
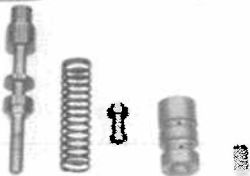
**7. REMOVE SPRING RETAINER FROM PRIMARY REGULATOR VALVE**

**WARNING:** Highly compressed spring inside — keep away from face.

To remove retainer, hold valve body face down, and press in on valve sleeve. Retainer will drop out. Slowly relieve spring compression.

**8. REMOVE SLEEVE, PLUNGER, SPRING AND PRIMARY REGULATOR VALVE**

Tilt the valve body and gently shake to slide out parts. Do not force valve. Keep the spring with the valve.

**9. REMOVE PLUG RETAINER FOR D-2 DOWN TIMING VALVE**

Lift out the retainer.

**10. REMOVE PLUG AND D-2 DOWN TIMING VALVE**

Tilt the valve body and allow to slide out.



**11. REMOVE LOCATING PIN FOR 3-4 SHIFT VALVE**

Be careful not to lose the pin.

**12. REMOVE PLUG, 3-4 SHIFT VALVE AND SPRING**

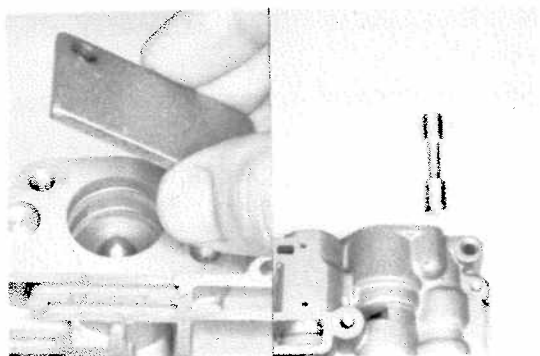
Tilt the valve body and allow to slide out. Keep spring with valve.

**13. REMOVE PLUG RETAINER FOR 1-2 SHIFT VALVE**

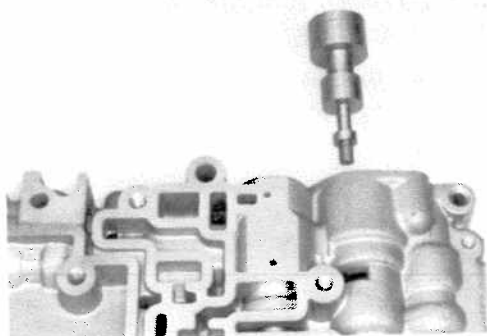
Push up from underneath with finger and lift out.

**14. REMOVE PLUG, 1-2 SHIFT VALVE AND SPRING**

Tilt the valve body and allow to slide out. Keep spring with valve.

**15. REMOVE COVER PLATE****16. REMOVE SEQUENCE VALVE**

Tilt the body to remove valve.

**17. REMOVE LOW-COAST SHIFT VALVE**

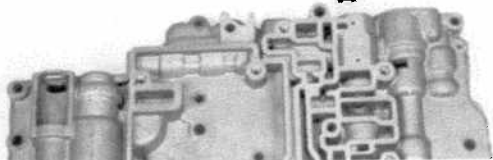
Tilt the body and gently shake out low-coast shift valve.

**18. REMOVE TWO LOCATING PINS FOR THIRD COAST SHIFT VALVE**

Be careful not to lose the pins.

**19. REMOVE PLUGS, THIRD COAST SHIFT VALVE AND 3-4 SHIFT CONTROL VALVE**

Tilt the valve body and allow to slide out.



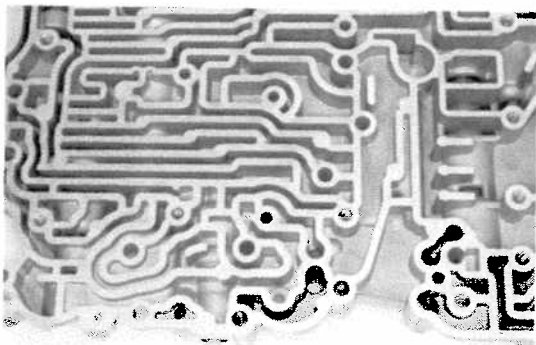
## INSPECTION OF LOWER VALVE BODY

### 1. THOROUGHLY WASH VALVES AND BODY IN CLEAN SOLVENT

Do not scrape surfaces. Do not use a hot tank or carburetor cleaner. Use only fresh, clean solvent. Dry parts with compressed air.

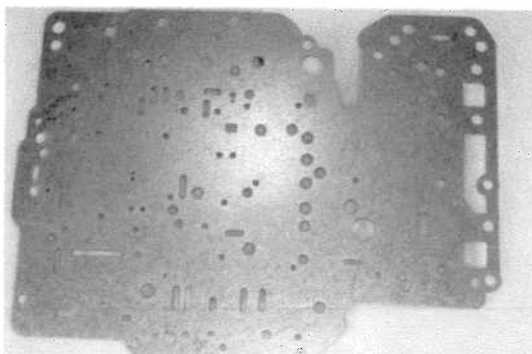
### 2. INSPECT VALVES AND VALVE BORES

Check for wear, rust, rough spots, cracks, nicks, deformation or other damage. Make sure that the valves slide freely in the bores.



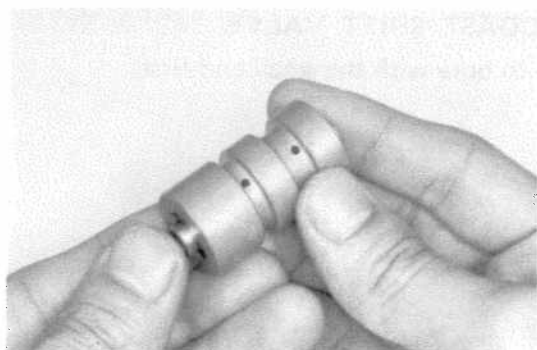
### 3. INSPECT FACES, OIL HOLES AND PASSAGES IN VALVE BODY

Check for clogging, obstruction or leakage between passages. (Also inspect old gasket for indications of leakage.)



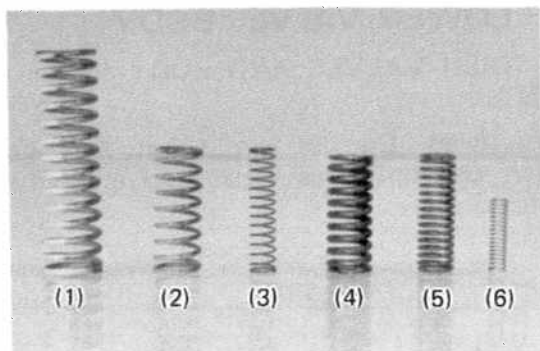
### 4. INSPECT SEPARATOR PLATE

Check for flatness or damage. Make sure that all small holes are open.



### 5. INSPECT REGULATOR VALVE

Make sure that the plunger moves smoothly.



## 6. INSPECT VALVE SPRINGS

Check the squareness and check for damage, rust and distorted coils. Measure spring height and replace if less than that shown below.

	Free length mm (in.)	Wire diameter mm (in.)
(1) Primary regulator valve	73.32 (2.8866)	1.59 (0.0626)
(2) 1-2 shift valve	34.62 (1.3630)	0.56 (0.0220)
(3) 3-4 shift valve	33.65 (1.3248)	1.10 (0.0433)
(4) Check valve (for oil cooler)	33.32 (1.3118)	1.32 (0.0520)
(5) Pressure relief valve ball	32.14 (1.2654)	2.03 (0.0799)
(6) Damping ball	20.00 (0.7874)	0.38 (0.0150)

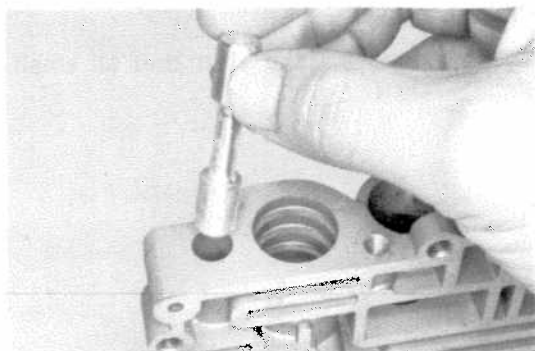
## 7. INSPECT CHECK AND PRESSURE RELIEF BALLS

Check for wear, damage and improper seating, indicated by a wear line.

## ASSEMBLY OF LOWER VALVE BODY (See illustration on page 10-90)

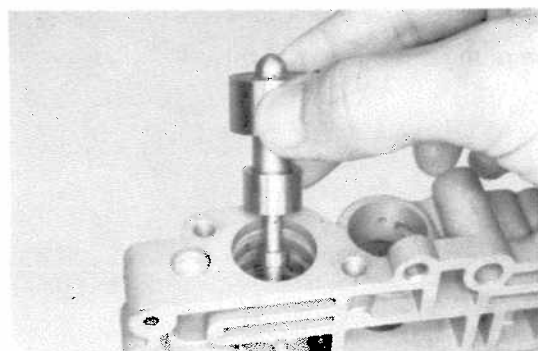
### GENERAL ASSEMBLY NOTES:

Make sure that all parts are perfectly clean and air dried before assembly. Lightly lubricate sliding surfaces on each valve with ATF just before inserting in the valve body. All other parts are assembled dry to prevent contamination with shop dust. Make sure workbench and hands are clean.



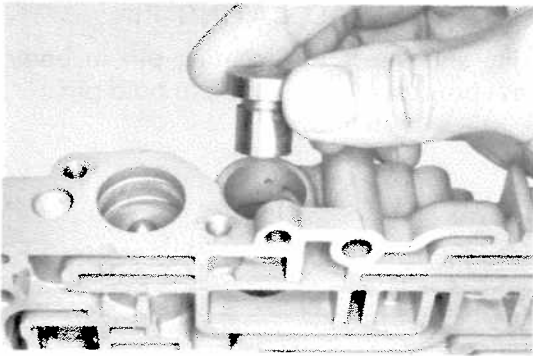
### 1. INSTALL SEQUENCE VALVE

Insert into bore with care.



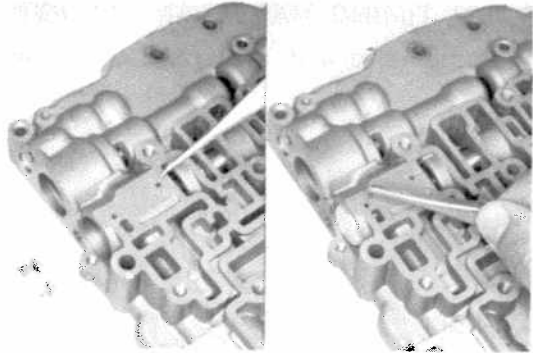
### 2. INSTALL LOW-COAST SHIFT VALVE

Carefully insert into bore with the small end first.



**3. INSTALL 3-4 SHIFT CONTROL VALVE AND THIRD COAST SHIFT VALVE**

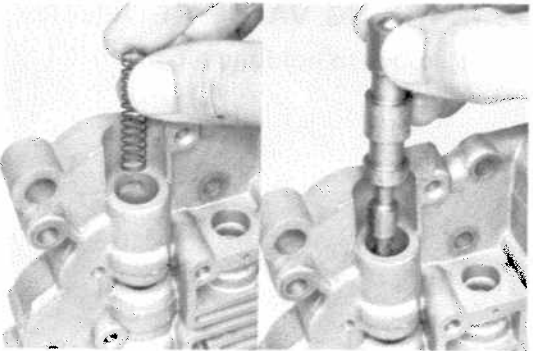
- (a) Insert 3-4 shift control valve with cup side first.
- (b) Insert third coast shift valve with small end first.



**4. INSTALL TWO PLUGS AND TWO LOCATING PINS**

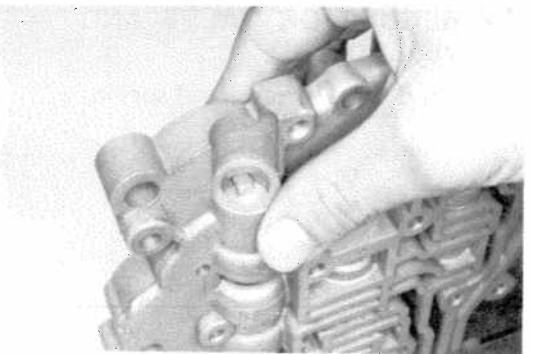
- (a) Insert straight plug and hold with pin.
- (b) Insert manual valve plug facing rounded end outward and hold with pin.

**5. INSTALL COVER PLATE**



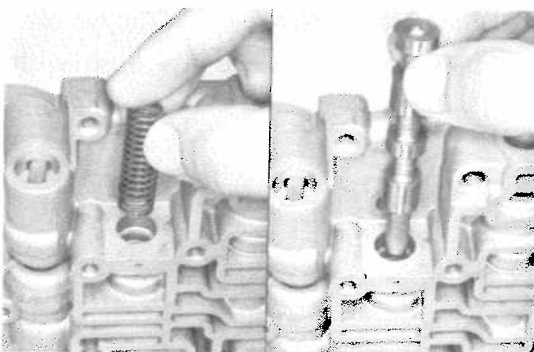
**6. INSERT SPRING, 1-2 SHIFT VALVE AND PLUG INTO VALVE BODY**

Set the valve body on edge and carefully insert the spring, 1-2 shift valve (small end first) and plug.



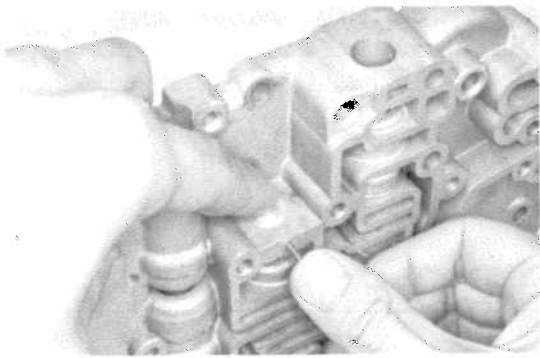
**7. INSTALL 1-2 SHIFT VALVE PLUG RETAINER**

Compress the spring and insert retainer in body behind plug. Release pressure on the spring to hold retainer.

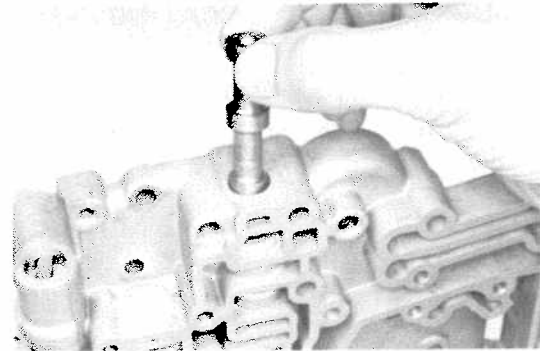


**8. INSERT SPRING, 3-4 SHIFT VALVE AND PLUG INTO VALVE BODY**

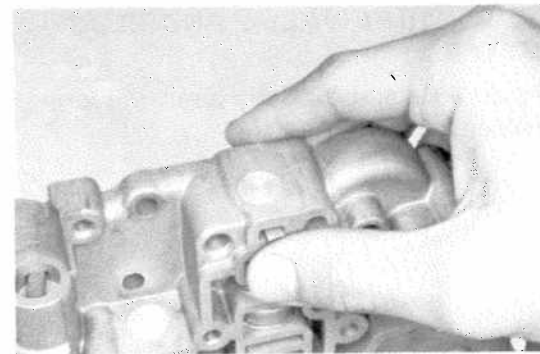
Set the valve body on edge and carefully insert the spring, 3-4 shift valve (small end first) and plug.

**9. INSTALL 3-4 SHIFT VALVE LOCATING PIN**

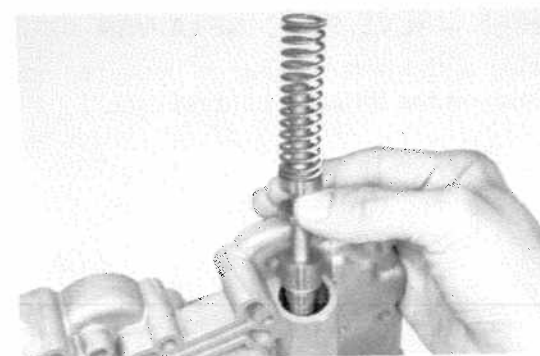
Compress the spring and insert the locating pin in body behind plug. Release pressure on the spring to hold pin.

**10. INSTALL D-2 DOWN TIMING VALVE AND PLUG**

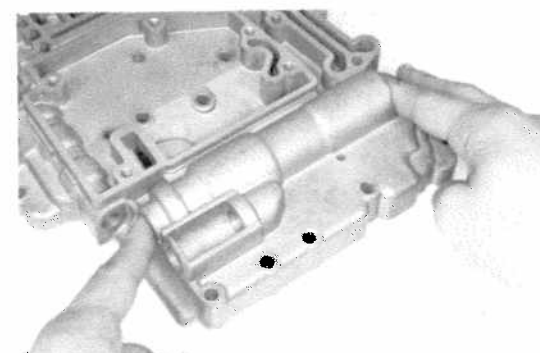
Insert D-2 down timing valve and then plug with large end first.

**11. INSTALL D-2 DOWN TIMING VALVE RETAINER**

Insert the retainer into groove to hold the plug.

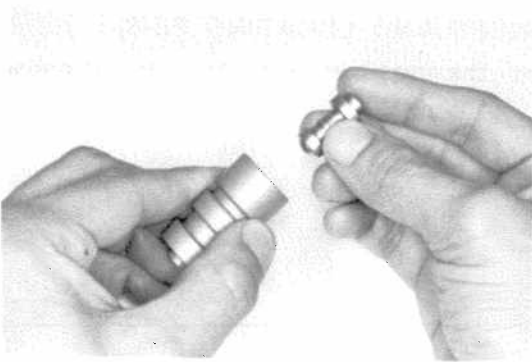
**12. INSERT PRIMARY REGULATOR VALVE AND SPRING INTO VALVE BODY**

Set valve body on edge and drop in valve and spring.

**13. CHECK VALVE POSITION**

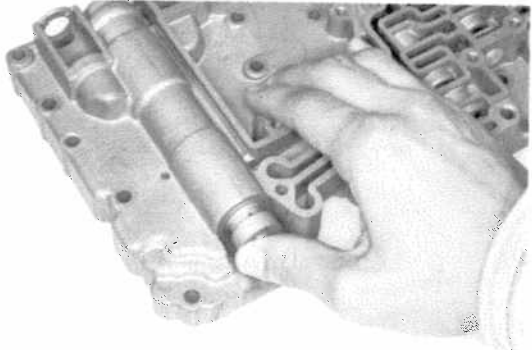
Make sure that primary regulator valve fits flush with the valve body.





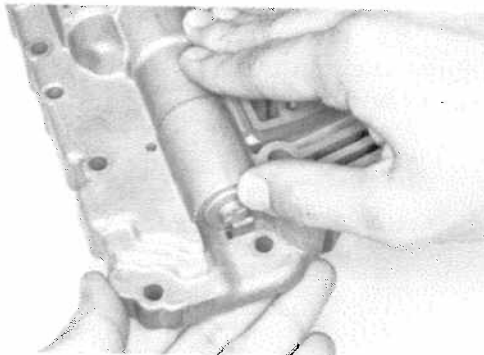
**14. INSERT REGULATOR VALVE PLUNGER INTO SLEEVE**

Insert with the rounded end first. Make sure that it is fully inserted: the plunger should be recessed inside the sleeve.



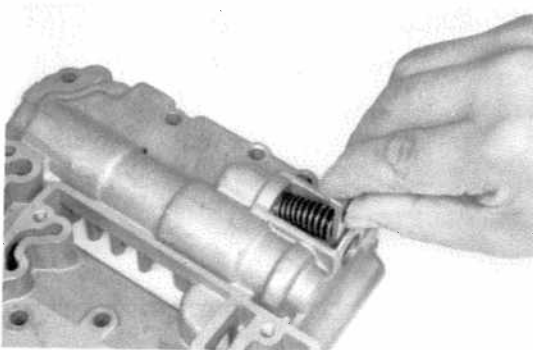
**15. INSERT SLEEVE WITH PLUNGER INTO VALVE BODY**

Hold valve body level to keep plunger from falling out of the sleeve. Push sleeve with plunger into the valve body.

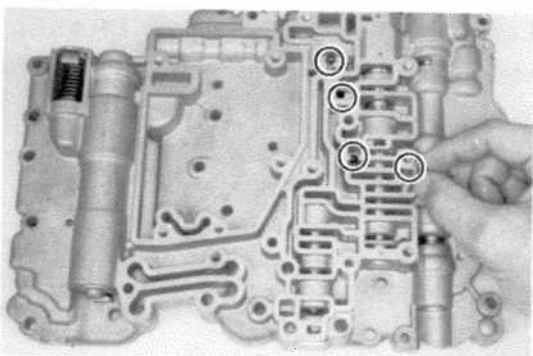


**16. INSTALL REGULATOR VALVE SPRING RETAINER**

Push in on the sleeve to compress spring until the seat can be installed over the end of the sleeve. Release the spring to hold the retainer.

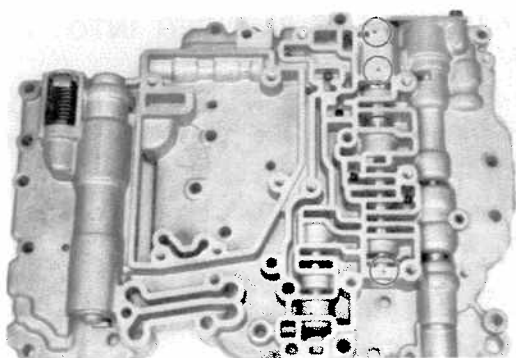


**17. INSTALL PRESSURE RELIEF BALL, SPRING AND SEAT IN VALVE BODY**

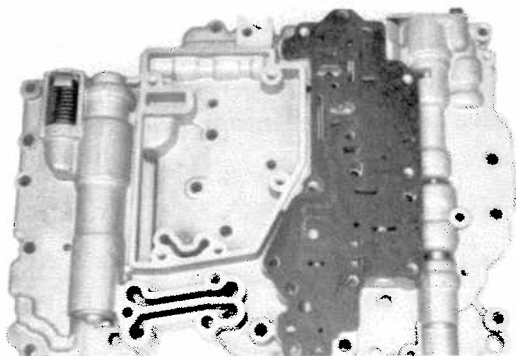


**18. INSTALL FOUR CHECK BALLS**

Drop into the places shown in the figure.

**19. CHECK RETAINERS AND LOCATING PINS**

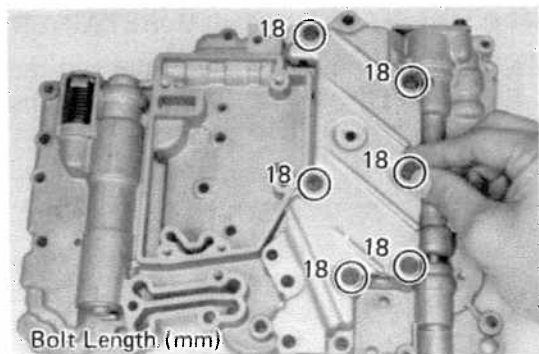
Make sure that the retainers and pins are installed correctly.

**20. INSTALL LOWER BODY COVER**

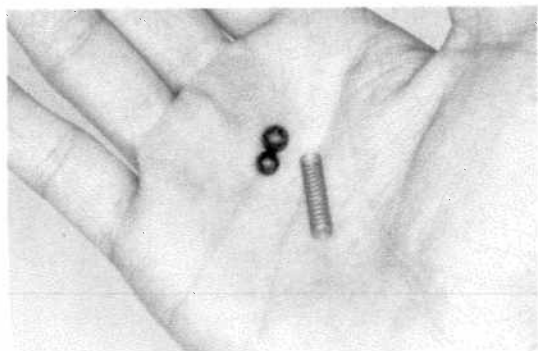
Install in accordance with following order.

Gasket-plate-gasket-cover.

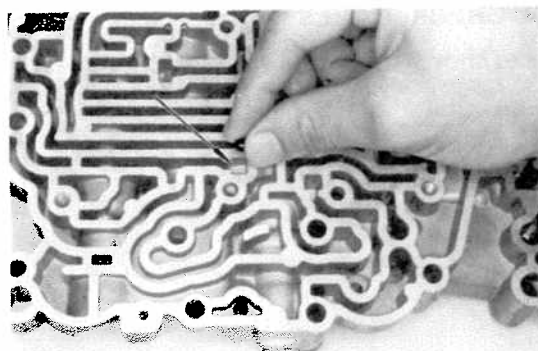
NOTE: Two gaskets are not interchangeable.

**21. INSTALL SIX BOLTS**

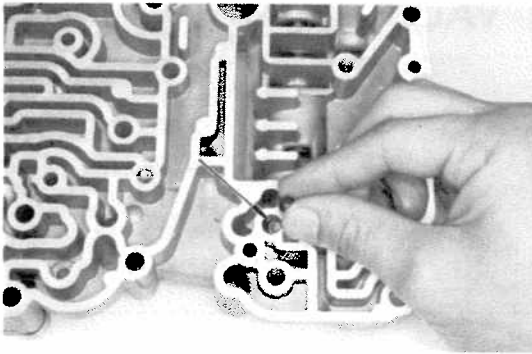
Align bolt holes. Finger tighten the six bolts of 18 mm in order to hold the lower body cover.

**22. IDENTIFY CHECK BALLS AND SPRING**

Note different size of two rubber check balls. The spring goes with larger ball.

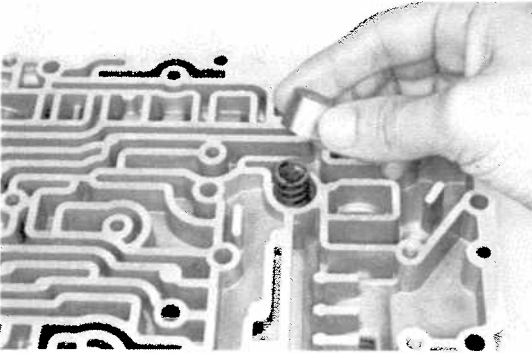
**23. INSTALL SMALLER CHECK BALL (NO. 2 BRAKE)**

Drop into the place shown in the figure.



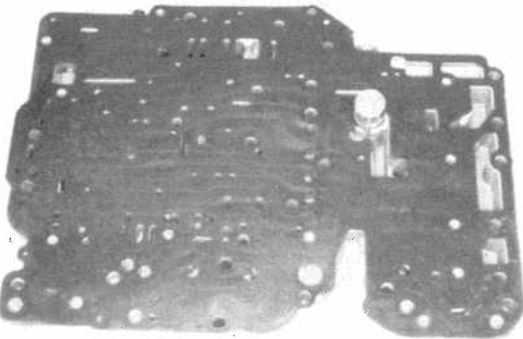
**24. INSTALL SPRING AND LARGER CHECK BALL (REGULATOR VALVE DAMPING)**

Drop the spring and then check ball into the place shown in the figure.



**25. INSTALL SPRING AND COOLER BY-PASS CHECK VALVE**

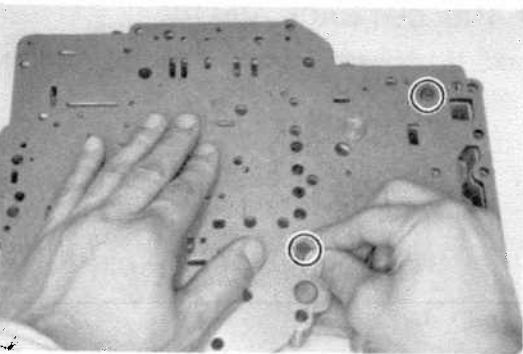
Drop the spring and then check valve into the place shown in the figure.



**26. INSTALL LOWER VALVE BODY GASKET**

Note that two gaskets are not interchangeable. Gasket must lay flat on the valve body.

**CAUTION:** Make sure that new gasket matches old gasket.



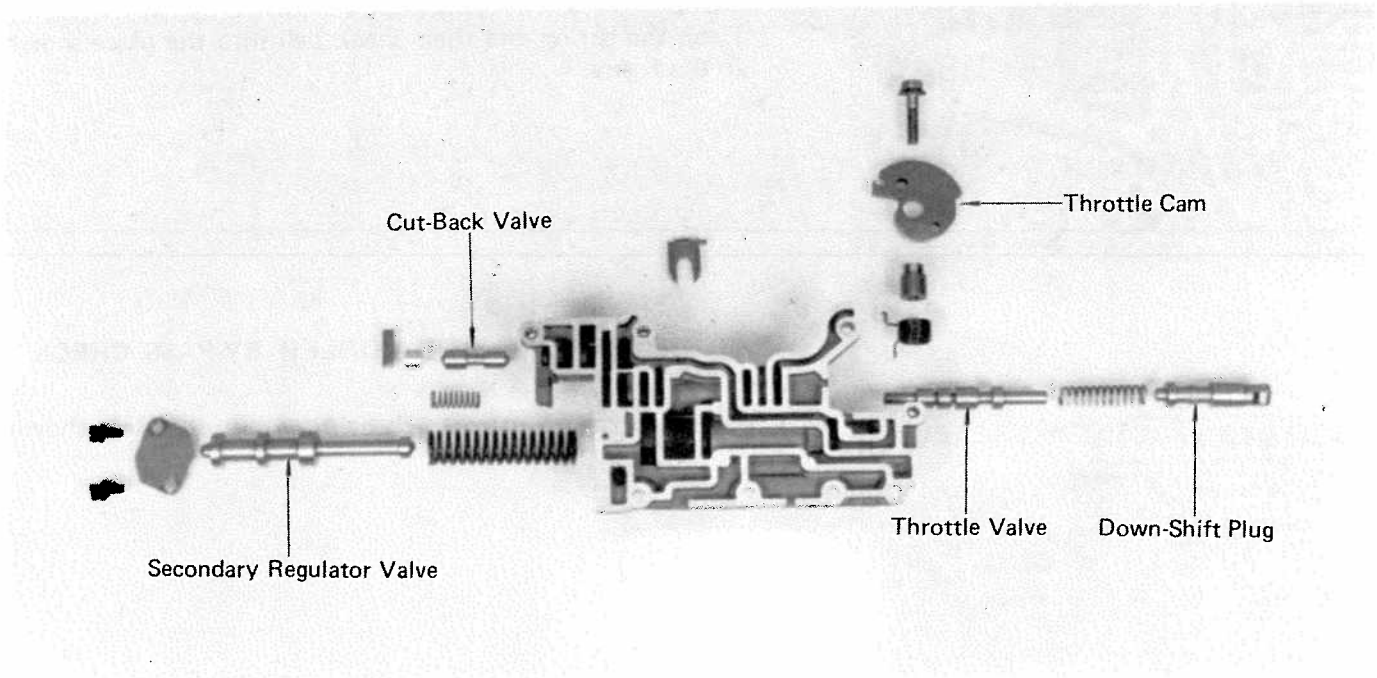
**27. INSTALL LOWER VALVE BODY PLATE**

Set plate into place. Temporarily install two short bolts finger tight to compress plate against spring-loaded check valve.

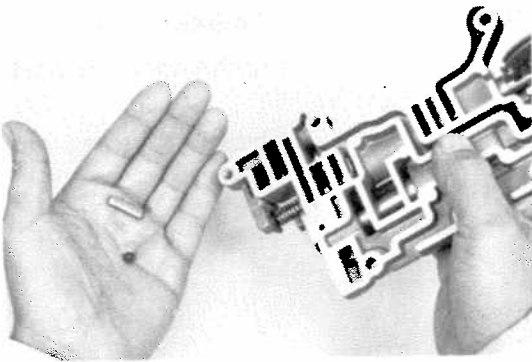
**NOTE:** Use the bolts for oil strainer.

As for assembly of valve body, see page 10-108.

## UPPER FRONT VALVE BODY



### DISASSEMBLY OF UPPER FRONT VALVE BODY



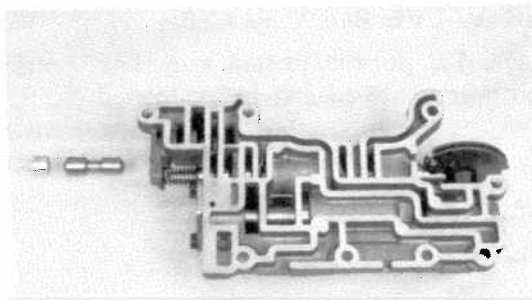
1. **HOLD THUMB ON THROTTLE VALVE RETAINER**  
Hold retainer so that it won't fall out during next step.

2. **REMOVE CHECK BALL AND CUT-BACK PLUG RETAINER**

Turn upper front valve body over and catch the ball in hand. If retainer does not fall out, shake the valve body.

3. **REMOVE PLUG AND CUT-BACK VALVE**

Tilt valve body and, if necessary, gently shake to remove plug and valve.



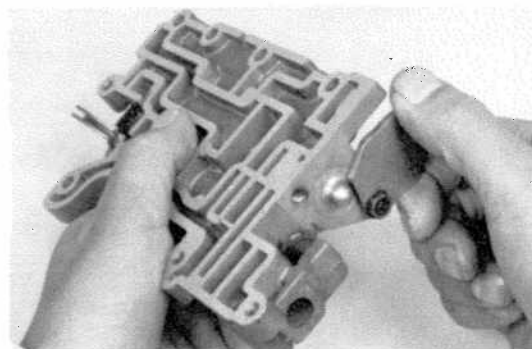
4. **REMOVE SECONDARY REGULATOR VALVE**

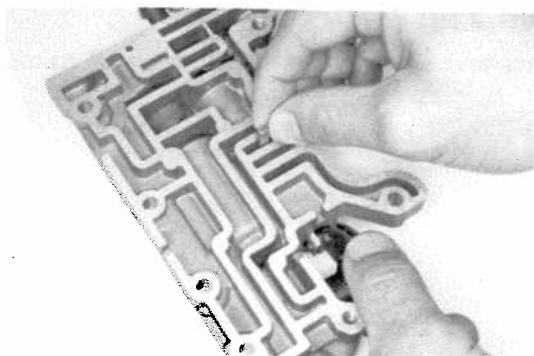
- (a) Remove one bolt from the plate over the valve and loosen the other one. Slowly rotate plate to uncover the valve.

**WARNING: Spring-loaded valve.**

- (b) Remove the valve and spring. Keep spring with the valve.

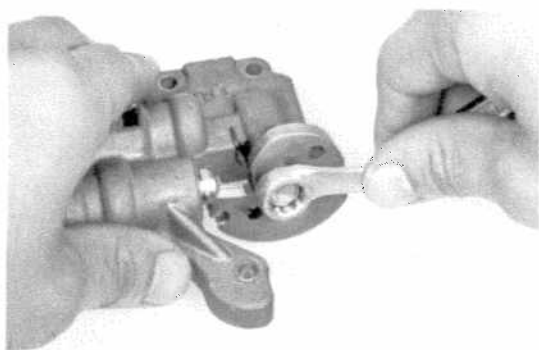
- (c) Remove the other bolt and remove cover plate.





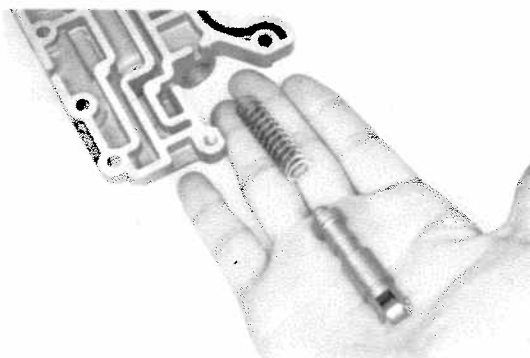
**5. PUSH DOWN-SHIFT PLUG INTO VALVE BODY AND TEMPORARILY HOLD**

Temporarily hold in position with cut-back valve plug retainer.



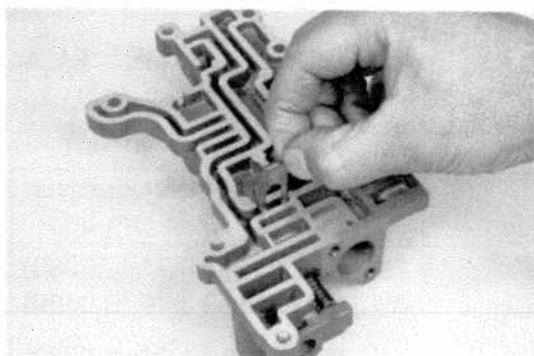
**6. REMOVE THROTTLE CAM**

Remove cam bolt. Remove washers, cam, sleeve and spring.



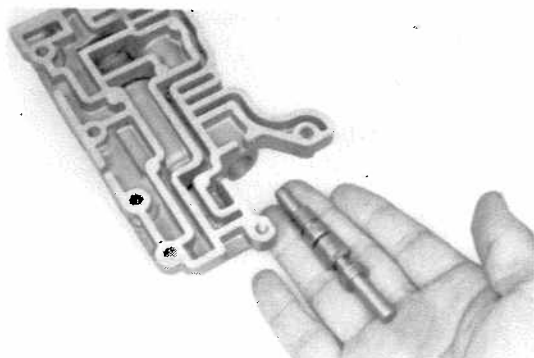
**7. REMOVE DOWN-SHIFT PLUG AND SPRING**

Press on down-shift plug so that temporary retainer will fall out. Tilt valve body to remove plug and spring. Keep spring with plug.



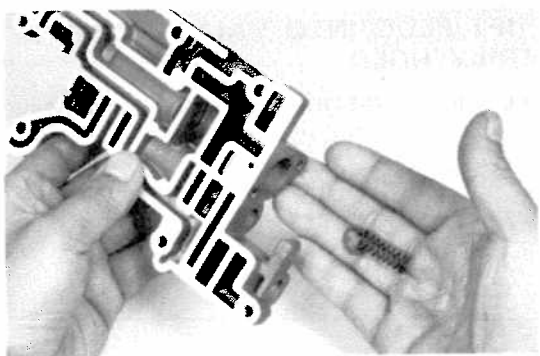
**8. PULL OUT THROTTLE VALVE RETAINER**

Use needle-nose pliers to lift out retainer.



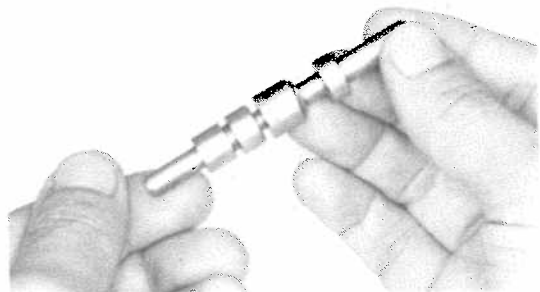
**9. REMOVE THROTTLE VALVE**

Tilt the valve body to remove the valve.



## 10. REMOVE SPRING AND E-RING SHIMS

Lift off the spring and shims. Note the number of shims installed.



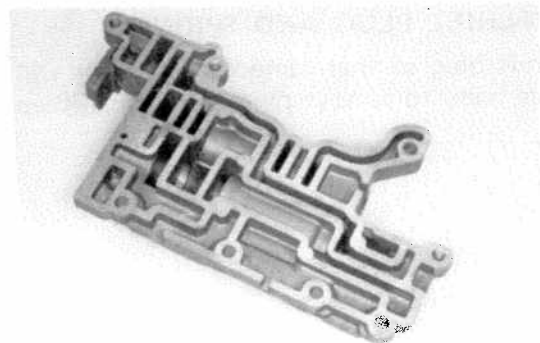
## INSPECTION OF UPPER FRONT VALVE BODY

### 1. THOROUGHLY WASH VALVES AND BODY IN NEW, CLEAN SOLVENT

Be careful not to scratch or nick parts. Dry parts with compressed air.

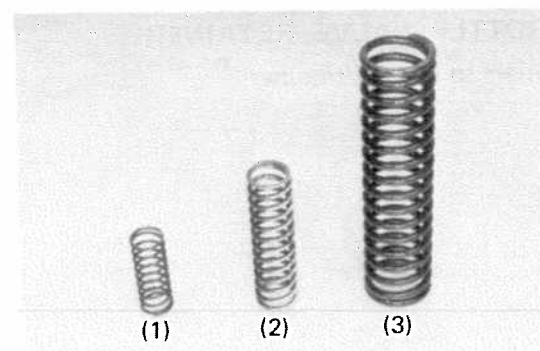
### 2. INSPECT VALVES AND VALVE BORES

Check for wear, rust, rough spots, cracks, nicks, deformation or other damage.



### 3. INSPECT FACES, OIL HOLES AND PASSAGES IN VALVE BODY

Check for scratches, clogging, obstruction or leakage between passages. (Also inspect old gasket for indications of leakage.)



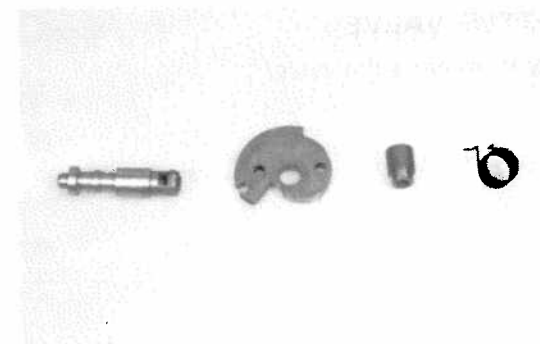
### 4. INSPECT VALVE SPRINGS

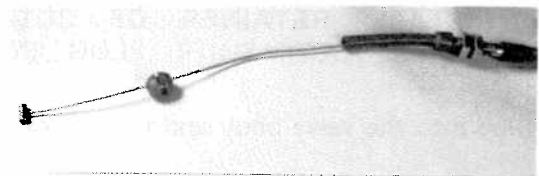
Check the squareness and check for damage, rust or collapsed coils. Measure free spring height and replace if less than that shown in specifications:

	Free length mm (in.)	Wire diameter mm (in.)
(1) Throttle valve	19.24 (0.7575)	0.71 (0.0280)
(2) Down shift plug	43.00 (1.6929)	1.19 (0.0469)
(3) Secondary regulator valve	71.27 (2.8059)	1.93 (0.0760)

### 5. INSPECT THROTTLE CAM

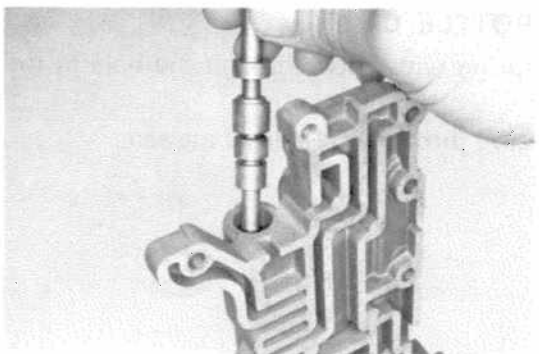
Check each part for wear or damage.





#### 6. INSPECT THROTTLE CABLE

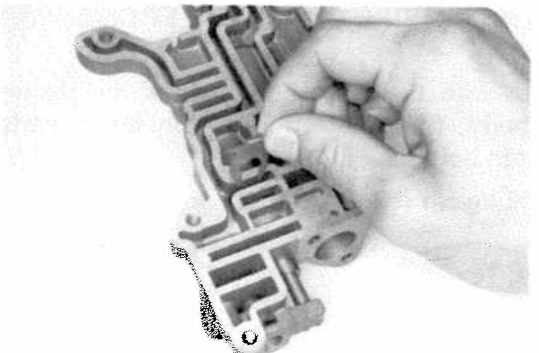
Check wire, rubber boots and end fittings for fraying, wear or damage.



### ASSEMBLY OF UPPER FRONT VALVE BODY ( See illustration on page 10-98)

#### GENERAL ASSEMBLY NOTES:

Make sure that all parts are perfectly clean and air dried before assembly. Lightly lubricate sliding surfaces on each valve with ATF just before inserting in the valve body. All other parts are assembled dry to prevent contamination with shop dust. Make sure that workbench and hands are clean.

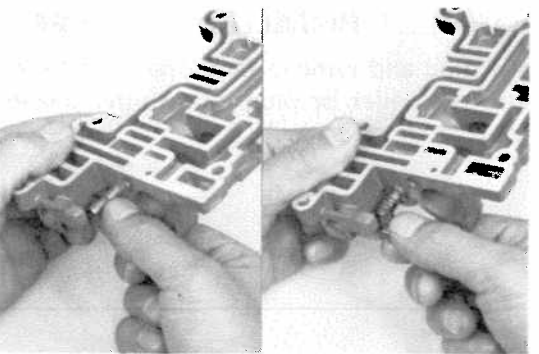


#### 1. INSERT THROTTLE VALVE IN BORE

Note direction indicated in the figure. Make sure that the valve is inserted fully into bore.

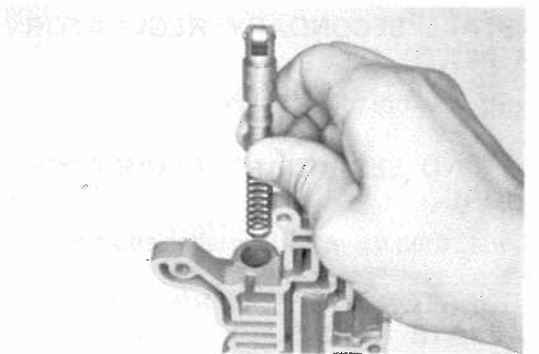
#### 2. INSTALL THROTTLE VALVE RETAINER

Coat clip with petroleum jelly to keep it in place. Note position of tabs in the figure. Slip retainer into place in the valve body.



#### 3. INSTALL E-RING SHIMS AND SMALL SPRING ON THROTTLE VALVE SHAFT

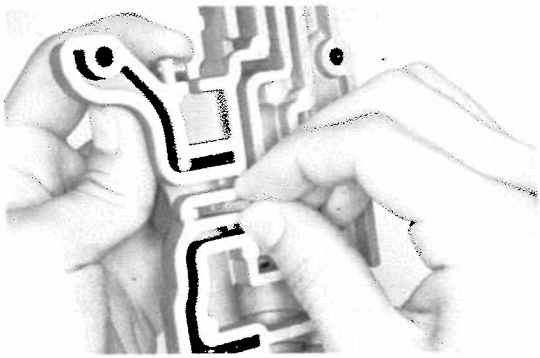
- (a) Install same number of shims as were removed during disassembly.
- (b) Slip spring over end of valve shaft. Compress and slide into place.



#### 4. INSERT SPRING AND DOWN-SHIFT PLUG INTO BORE

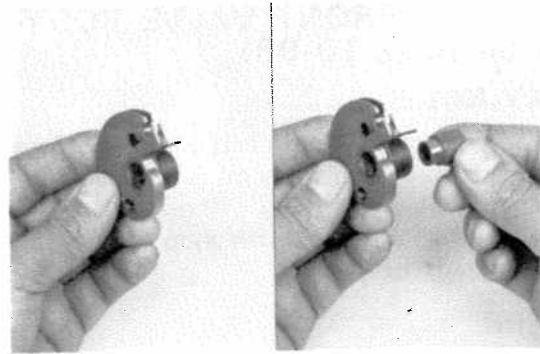
In other end of throttle valve bore, insert spring first, then down-shift plug.





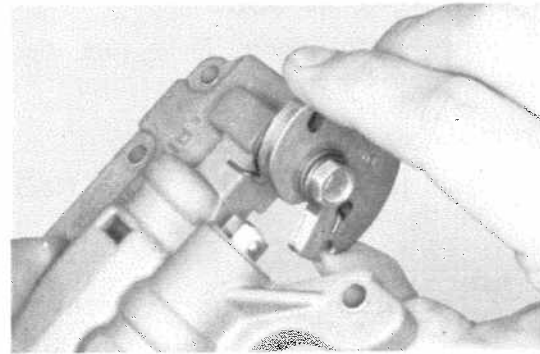
5. **TEMPORARILY INSTALL RETAINER OF CUT-BACK PLUG TO HOLD DOWN-SHIFT PLUG IN PLACE**

Push down-shift plug into the valve body and temporarily install retainer.



6. **ASSEMBLE THROTTLE CAM**

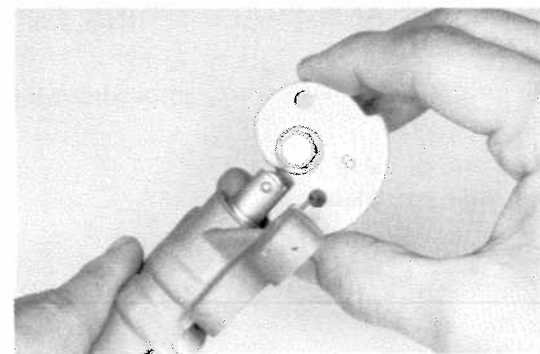
- (a) Install the spring with hook through the hole in the cam.
- (b) Insert the sleeve through one side of the cam.



7. **INSTALL CAM ASSEMBLY ON UPPER FRONT VALVE BODY**

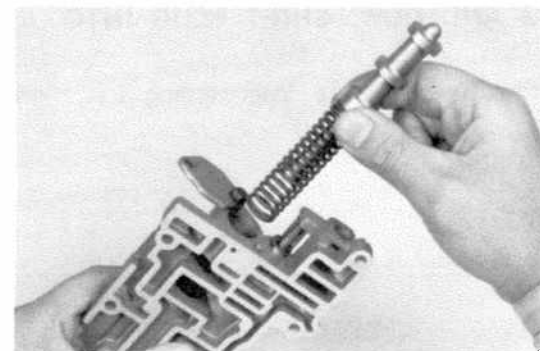
Start bolt threads into the valve body. Hook the spring onto the valve body. Check position of the spring ends with photo. Tighten bolt.

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



8. **REMOVE TEMPORARILY INSTALLED RETAINER**

Push in down-shift plug and remove temporarily installed retainer. Make sure the roller or plug follows the smaller portion of the cam (flat edge surface).



9. **PARTIALLY INSTALL SECONDARY REGULATOR VALVE COVER PLATE**

Install the plate with one bolt finger tight.

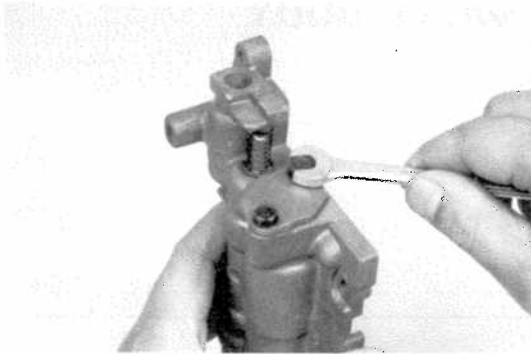
10. **INSERT SPRING AND SECONDARY REGULATOR VALVE INTO BORE**

Insert the spring first, then valve with smaller end first.

11. **COMPRESS REGULATOR VALVE SPRING AND SWING COVER PLATE INTO PLACE**

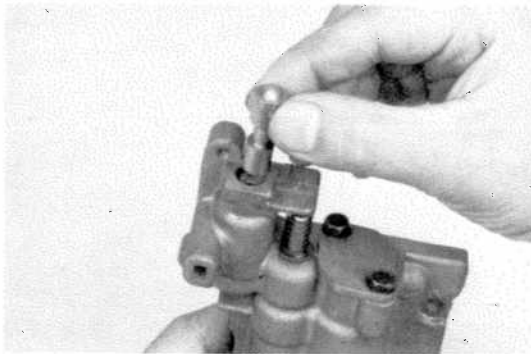
Cover plate will then hold valve in the body.



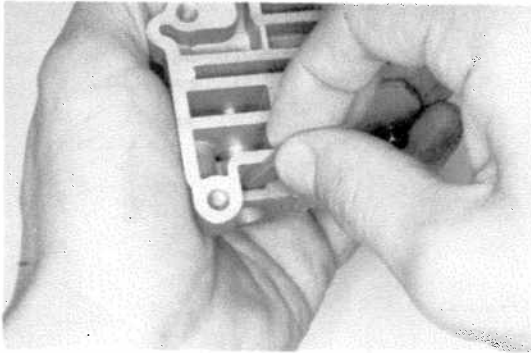
**12. INSTALL SECOND BOLT IN COVER PLATE AND TIGHTEN BOTH BOLTS**

Tighten bolts.

**Torque:** 60 – 70 kg-cm (53 – 60 in.-lb)

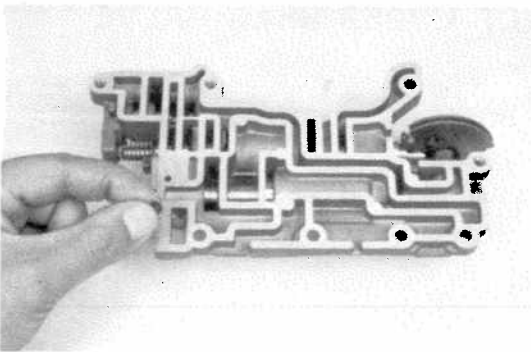
**13. INSERT CUT-BACK VALVE AND PLUG INTO BORE**

Install valve with smaller end first. Install the plug. Push fully into bore.

**14. INSTALL CUT-BACK VALVE RETAINER**

Coat with petroleum jelly to keep in place. Insert in place as shown.

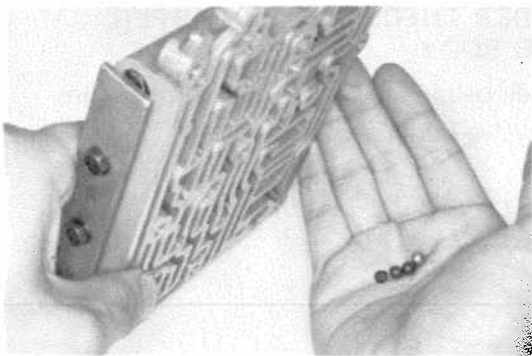
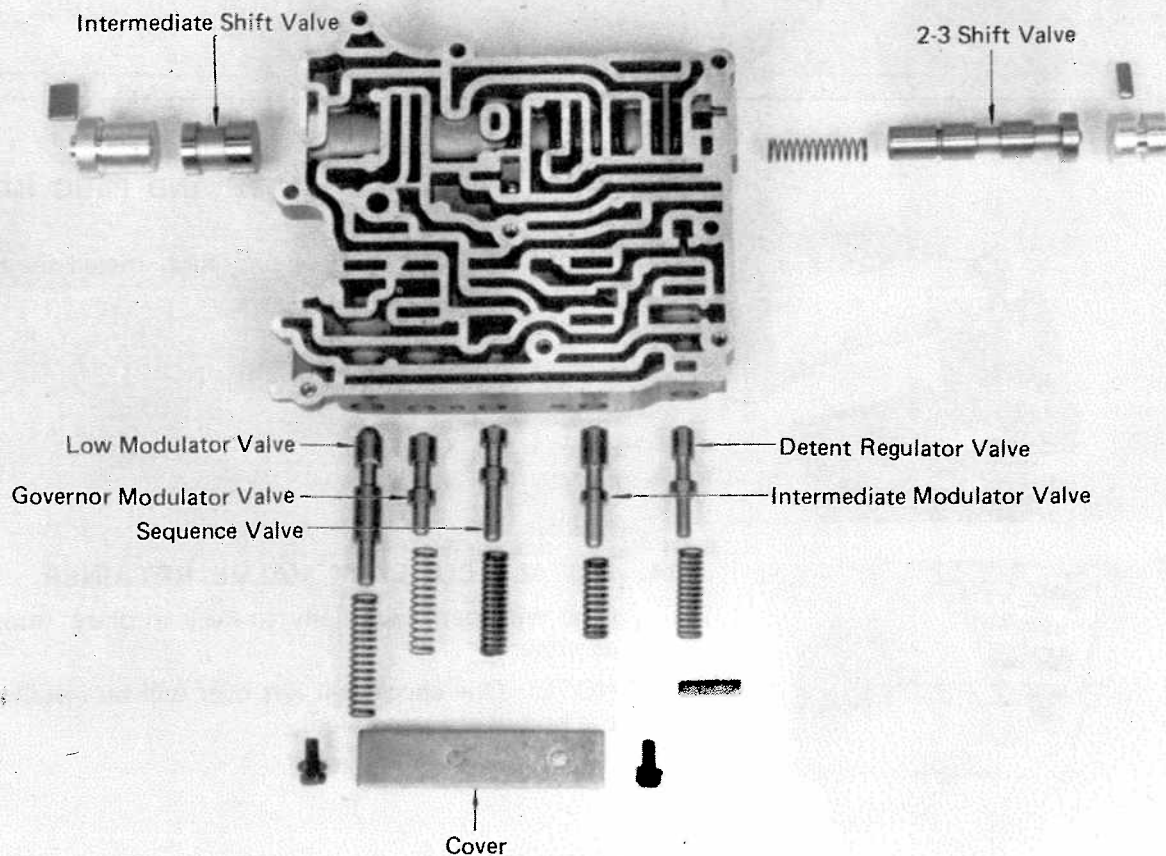
**NOTE:** One check ball left over will be installed later, as the bodies are assembled.

**15. INSTALL RUBBER CHECK BALL IN UPPER FRONT VALVE BODY**

Drop rubber check ball in location shown in the figure.

For assembly of valve body, see page 10-111.

## UPPER REAR VALVE BODY



### DISASSEMBLY OF UPPER REAR VALVE BODY

1. TURN VALVE BODY OVER AND CATCH CHECK BALLS

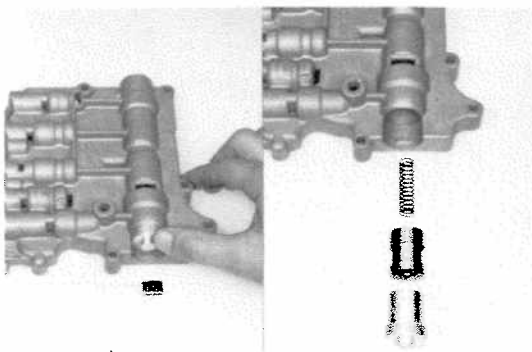
NOTE: Three rubber balls and one steel ball.

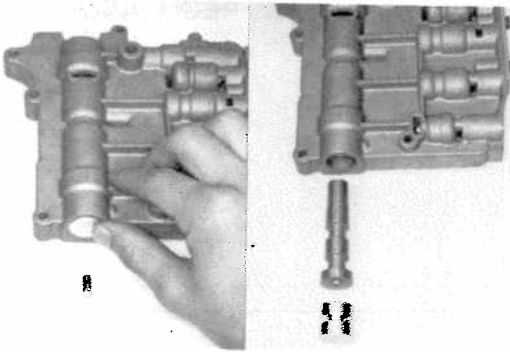
2. REMOVE INTERMEDIATE SHIFT VALVE RETAINER

With valve body still turned over, push in on the valve and the retainer will drop out.

3. REMOVE PLUG, INTERMEDIATE SHIFT VALVE AND SPRING

Tilt body and allow to slide out. Keep the spring with the valve.

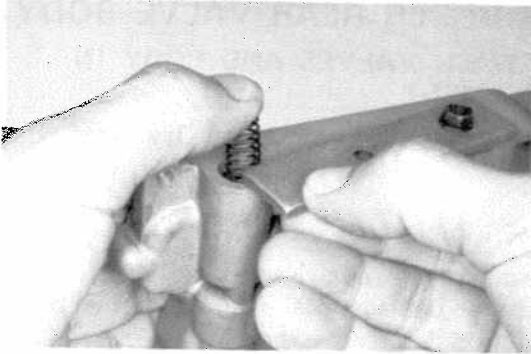


**4. REMOVE 2-3 SHIFT VALVE RETAINER**

Move plug back-and-forth and allow the retainer to fall out.

**5. REMOVE PLUG AND 2-3 SHIFT VALVE**

Tilt body and allow to slide out.

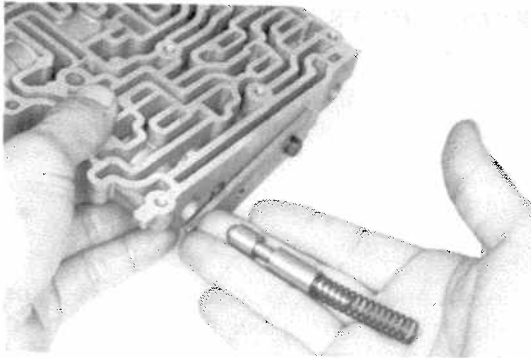
**6. REMOVE ONE BOLT FROM VALVE BODY SIDE COVER**

Remove the bolt closer to the middle of the cover and slightly loosen the other bolt.

**7. SLIGHTLY ROTATE COVER**

(a) Rotate the cover until the low modulator valve spring can be seen.

(b) Hold hand over the spring.

**8. REMOVE SPRING AND LOW MODULATOR VALVE**

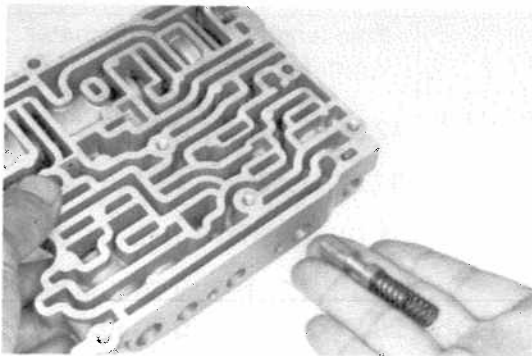
Lift out the spring and tilt body to remove the low modulator valve. Keep the spring with the valve.

**9. ROTATE COVER FURTHER AND REMOVE SPRING AND GOVERNOR MODULATOR VALVE**

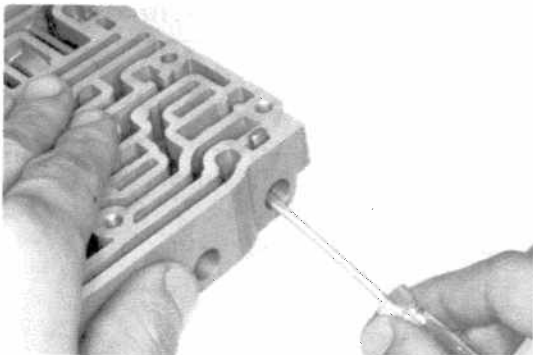
Keep the spring with the valve.

**10. ROTATE COVER FURTHER AND REMOVE SPRING AND REVERSE SEQUENCE VALVE**

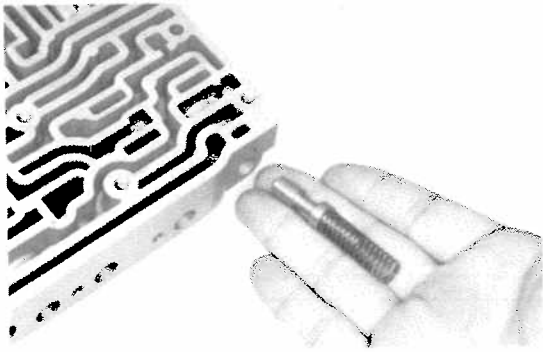
Keep the spring with the valve.

**11. REMOVE COVER PLATE, SPRING AND INTERMEDIATE MODULATOR VALVE**

Keep the spring with the valve.

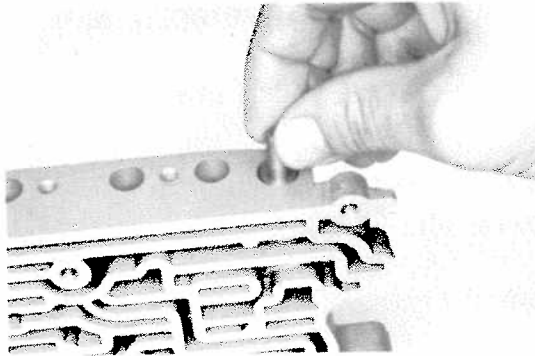
**12. REMOVE DETENT REGULATOR VALVE RETAINER**

Lift out with a screwdriver. Be careful not to damage the spring or valve body.



### 13. REMOVE SPRING AND DETENT REGULATOR VALVE

Keep the spring with the valve.



## INSPECTION OF UPPER REAR VALVE BODY

### 1. THOROUGHLY WASH VALVES AND BODY IN NEW, CLEAN SOLVENT

Be careful not to scratch or nick parts. Dry parts with compressed air.

### 2. INSPECT VALVES AND VALVE BORES

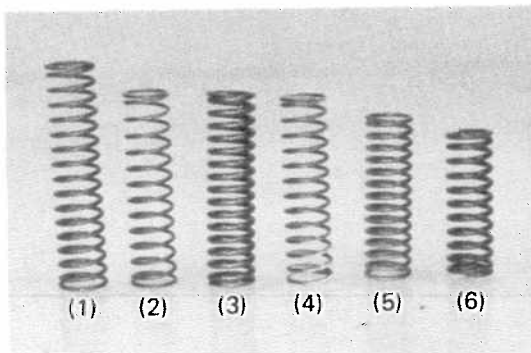
Check for wear, rust, rough spots, cracks, nicks, deformation or other damage. Make sure that the bleed hole in the end of modulator valve is clear.

### 3. INSPECT FACES, OIL HOLES AND PASSAGES IN VALVE BODY

Check for scratches, clogging, obstruction or leakage between passages. (Also inspect old gasket for indications of leakage).

### 4. INSPECT VALVE SPRINGS

Check the squareness and check for damage, rust or collapsed coils. Measure free spring height and replace if less than that shown in specifications.



	Free length mm (in.)	Wire diameter mm (in.)
(1) Low coast modulator valve	42.35 (1.6673)	0.84 (0.0331)
(2) Sequence valve	37.55 (1.4783)	1.17 (0.0461)
(3) Governor modulator valve	36.07 (1.4201)	0.71 (0.0280)
(4) 2-3 shift valve	35.10 (1.3819)	0.76 (0.0299)
(5) Detent regulator valve	29.93 (1.1783)	0.90 (0.0354)
(6) Intermediate modulator valve	27.26 (1.0732)	1.10 (0.0433)

### 5. INSPECT CHECK BALLS

Check rubber balls and one steel ball for wear, damage or improper seating, indicated by a wear line.

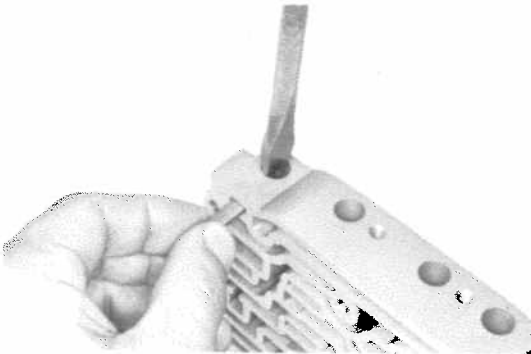
NOTE: Three rubber balls and one steel ball.



## ASSEMBLY OF UPPER REAR VALVE BODY (See illustration on page 10-106)

### GENERAL ASSEMBLY NOTES:

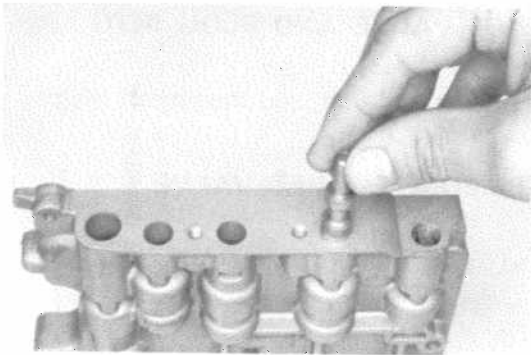
Make sure that all parts are perfectly clean and air dried before assembly. Lightly lubricate sliding surfaces on each valve with ATF just before inserting in the valve body. All other parts are assembled dry to prevent contamination with shop dust. Make sure that the workbench and hands are clean.



#### 1. INSTALL DETENT REGULATOR VALVE, SPRING AND RETAINER

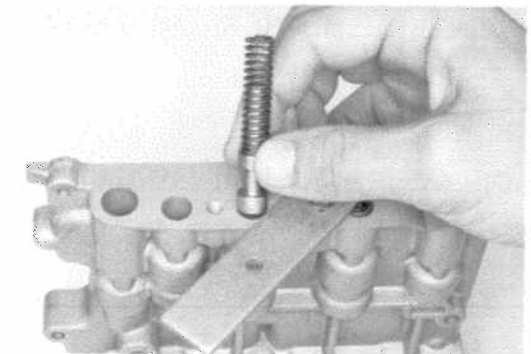
Insert the valve (round end first) and spring into bore. Compress spring with wide-bladed screwdriver and slip retainer over the edge of the spring. Then use needle-nose pliers to compress spring and allow the retainer to fall into place.

NOTE: Make sure that the retainer fully covers end of spring.



#### 2. INSERT INTERMEDIATE MODULATOR VALVE AND SPRING INTO BORE

Insert valve with round end first, and then insert the spring.



#### 3. INSTALL VALVE BODY SIDE COVER WITH ONE BOLT

Compress intermediate modulator spring and install end bolt finger tight.

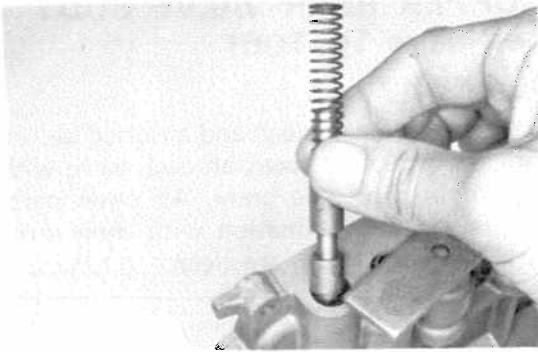
#### 4. INSERT REVERSE SEQUENCE VALVE AND SPRING INTO BORE

Swing side plate out of the way. Insert the valve with round end first, then insert the spring. Compress the spring and rotate the cover to hold it.



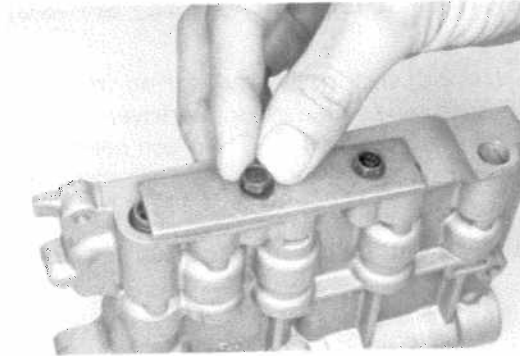
#### 5. INSERT GOVERNOR MODULATOR VALVE AND SPRING INTO BORE

Insert the valve with round end first, then insert the spring. Compress the spring and rotate the cover further to hold the spring.



**6. INSERT LOW MODULATOR VALVE AND SPRING INTO BORE**

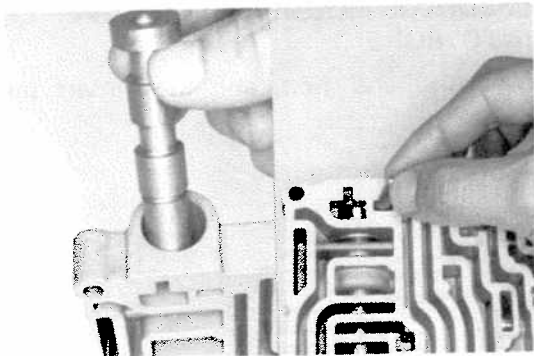
Insert the valve with round end first, then insert the spring. Compress the spring and swing cover over to hold it.



**7. POSITION COVER AND INSTALL SECOND BOLT**

Install second bolt, and tighten both bolts.

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

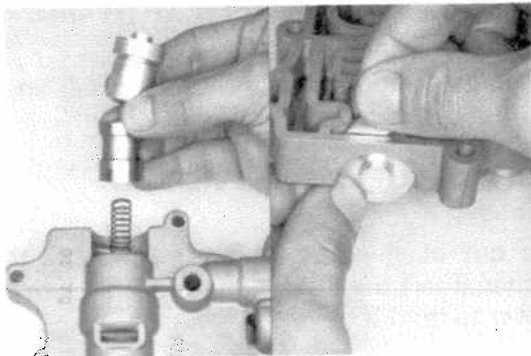


**8. INSERT 2-3 SHIFT VALVE AND PLUG INTO BORE**

Insert valve with smaller end first, and then insert plug.

**9. INSTALL INTERMEDIATE SHIFT VALVE RETAINER**

Compress plug and install retainer in the valve body.

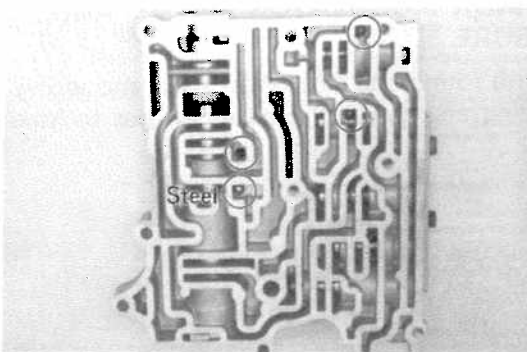


**10. INSERT SPRING, INTERMEDIATE SHIFT VALVE AND PLUG INTO BORE**

Install valve with rounded end up.

**11. INSTALL RETAINER OVER 2-3 SHIFT VALVE PLUG**

Insert the retainer through the valve body.



**12. INSTALL CHECK BALLS AS SHOWN**

Install the steel ball.

The rubber balls are identical and may be installed in any other of the positions.

As for assembly of valve body, see page 10-111.

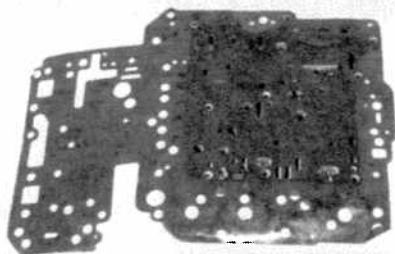


## ASSEMBLY OF VALVE BODY

(See illustration on page 10-88)

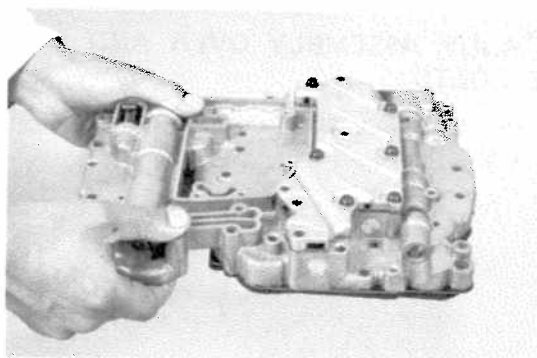
1. POSITION NEW GASKET ON UPPER REAR VALVE BODY

Make sure the new gasket matches the old gasket before installation. Align the gasket at lower left corner.



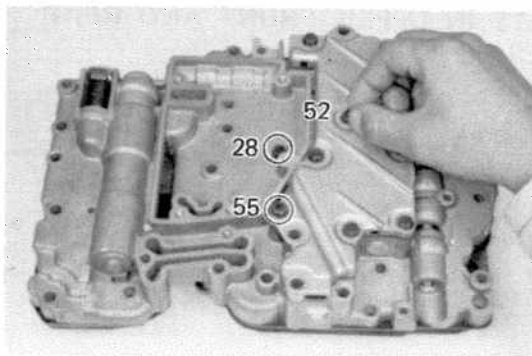
2. PLACE LOWER VALVE BODY WITH PLATE ON TOP OF UPPER REAR VALVE BODY

Align left edge.



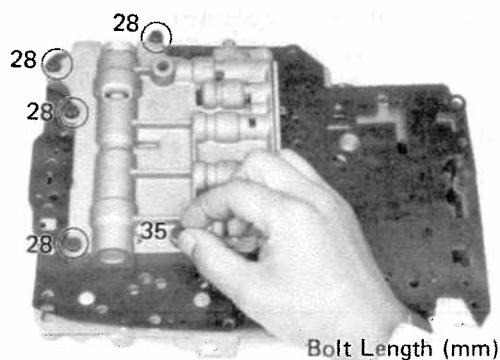
3. INSTALL THREE BOLTS IN LOWER VALVE BODY TO SECURE UPPER REAR VALVE BODY

Install three bolts indicated in figure. Tighten the bolts just barely finger tight.



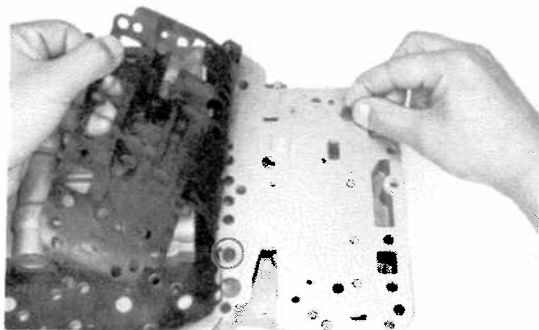
4. TURN VALVE BODY ASSEMBLY OVER, CHECK GASKET ALIGNMENT AND INSTALL FIVE BOLTS IN UPPER REAR VALVE

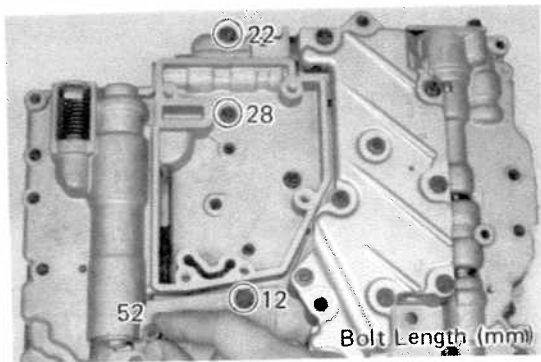
Make sure that the gasket is perfectly aligned. Install five bolts finger tight. Make sure that the gaskets are still aligned.



5. REMOVE TEMPORARILY INSTALLED BOLTS FROM PLATE

Carefully pull back gasket and remove two bolts.





- 6. PLACE LOWER AND UPPER REAR VALVE BODY ASSEMBLY ON TOP OF UPPER FRONT VALVE BODY**

Align bolt holes.

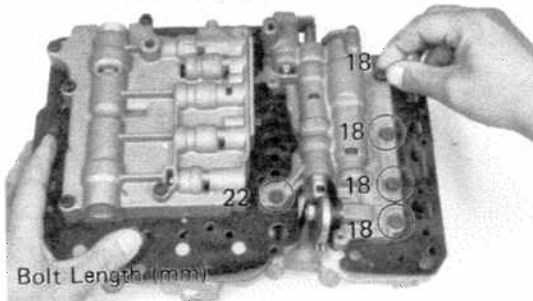
- 7. PLACE SMALL COVER AND INSTALL FOUR BOLTS FINGER TIGHT**

Finger tighten the bolts in accordance with the bolt length indicated in the figure.

**CAUTION:** Do not tighten these bolts until the installation of other bolts.

- 8. TURN VALVE BODY ASSEMBLY OVER AND INSTALL FIVE BOLTS**

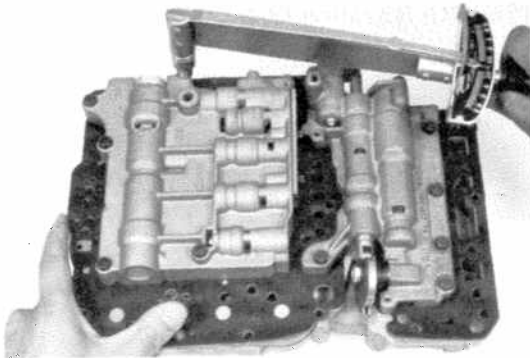
Finger tighten the bolts in accordance with the bolt length indicated in the figure.



- 9. TIGHTEN BOLTS IN UPPER FRONT AND REAR VALVE BODIES**

Recheck alignment of gaskets. Tighten bolts.

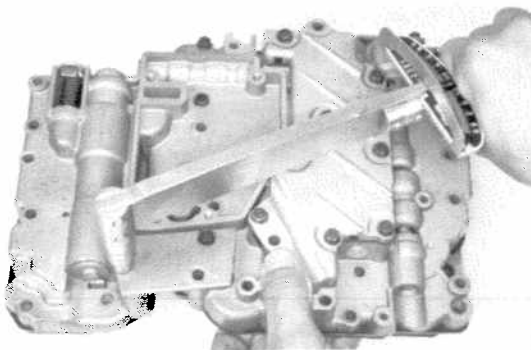
**Torque: 50 – 60 kg-cm (44 – 52 in.-lb)**



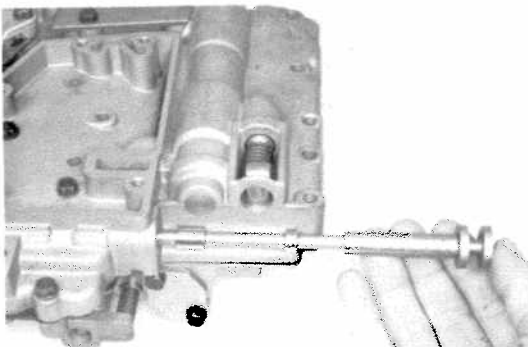
- 10. TURN OVER VALVE BODY ASSEMBLY AND TIGHTEN BOLTS IN LOWER VALVE BODY**

Tighten bolts.

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



- 11. INSERT MANUAL VALVE INTO BORE**

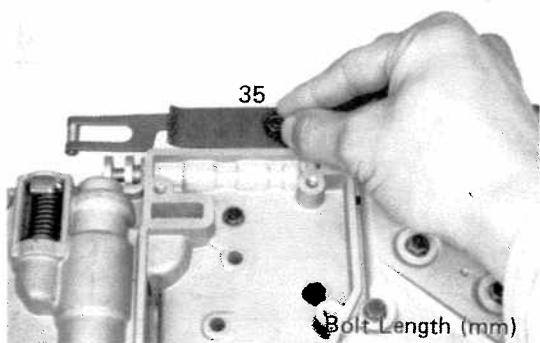




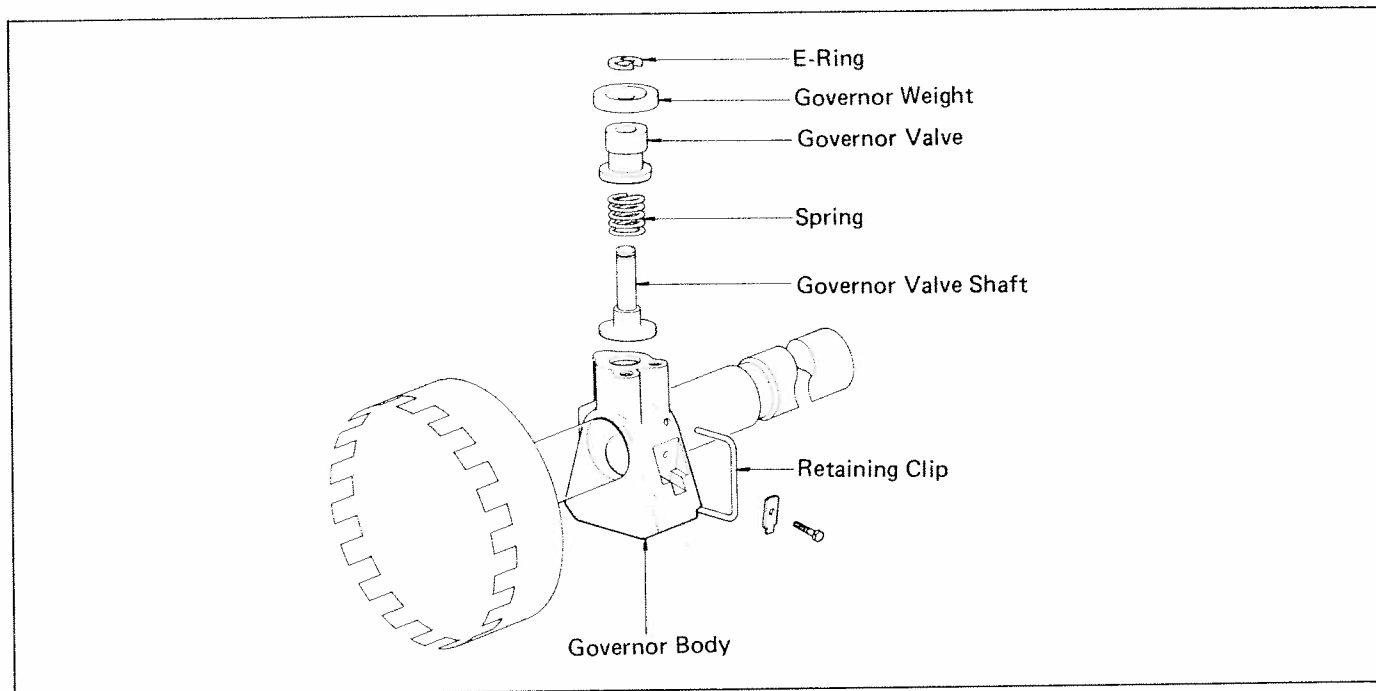
**12. INSTALL DETENT SPRING**

Tighten bolts.

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



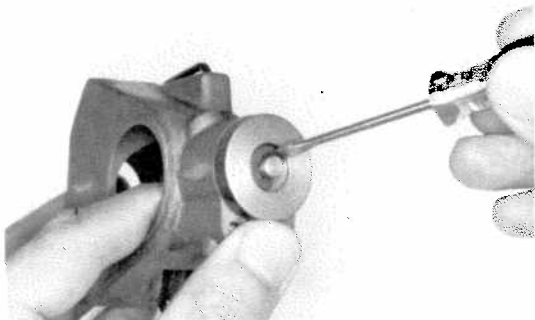
## Governor Body



### DISASSEMBLY OF GOVERNOR BODY

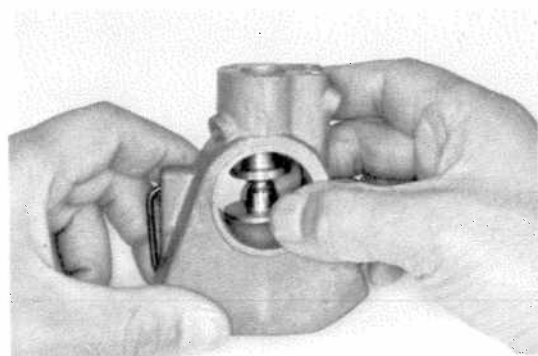
#### 1. REMOVE E-RING AND GOVERNOR WEIGHT

Compress the spring by pushing up on the shaft and down on the weight. Remove E-ring with a screwdriver. Lift off governor weight.



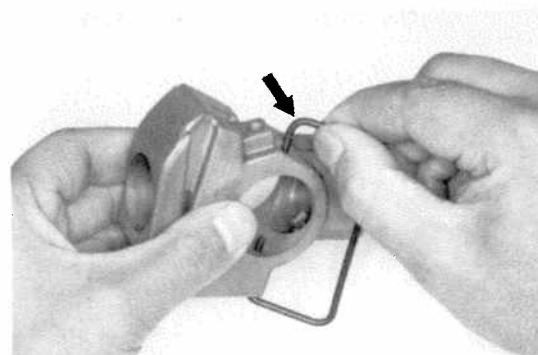
#### 2. REMOVE GOVERNOR VALVE

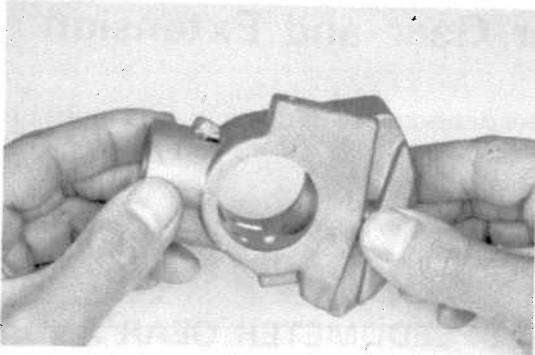
Slide down through the bore.



#### 3. REMOVE RETAINING CLIP

Remove the end indicated by arrow first being careful not to scratch the governor body.





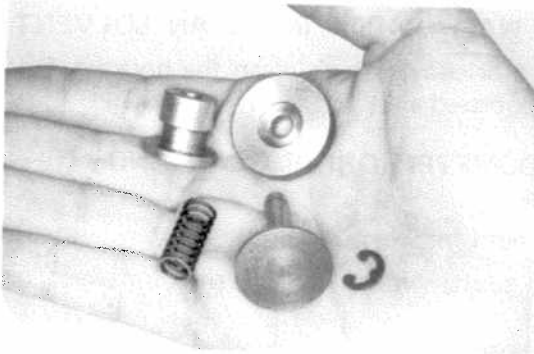
## INSPECTION OF GOVERNOR BODY

### 1. THOROUGHLY WASH ALL PARTS IN CLEAN SOLVENT

Use only clean solvent. Dry parts with compressed air.

### 2. INSPECT GOVERNOR BODY

- (a) Check valve bore and body for wear or cracks.
- (b) Check oil hole and passage for clogging.



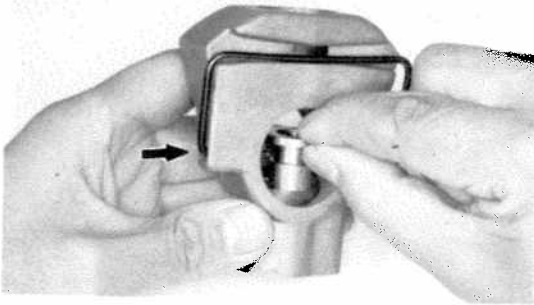
### 3. INSPECT GOVERNOR VALVE, SHAFT AND SPRING

- (a) Check for wear, rust or damage.
- (b) Insert valve in body and rotate to see that it slides smoothly.

## ASSEMBLY OF GOVERNOR BODY (See illustration on page 10-105)

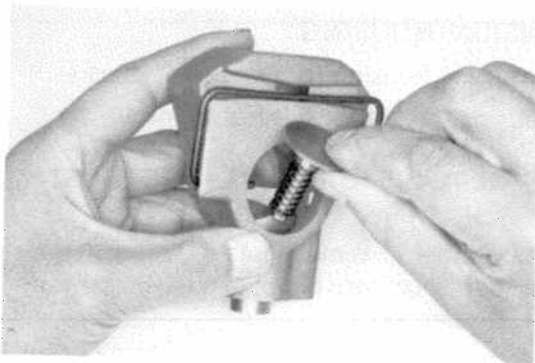
### 1. INSTALL RETAINING CLIP AND GOVERNOR VALVE

- (a) Install the clip end indicated by arrow being careful not to scratch the governor body.
- (b) Slide down the governor valve through the bore.



### 2. INSTALL SHAFT AND SPRING

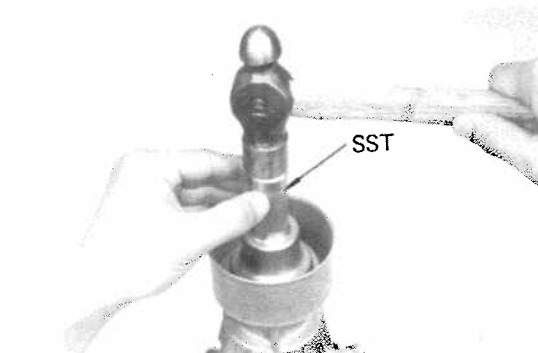
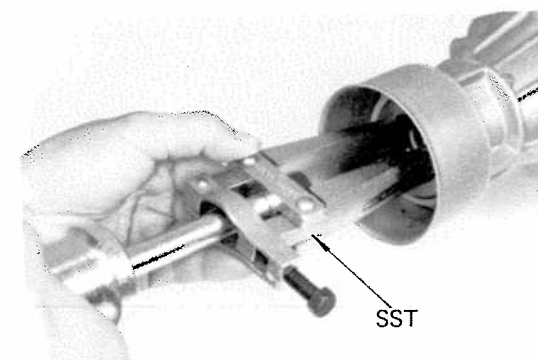
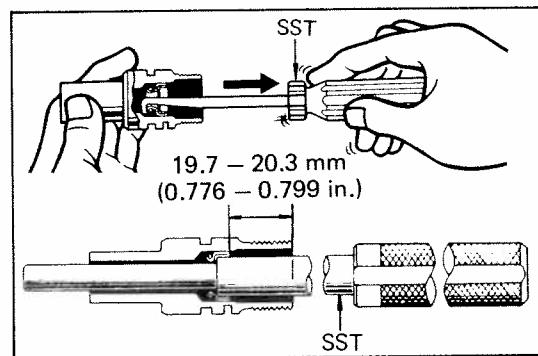
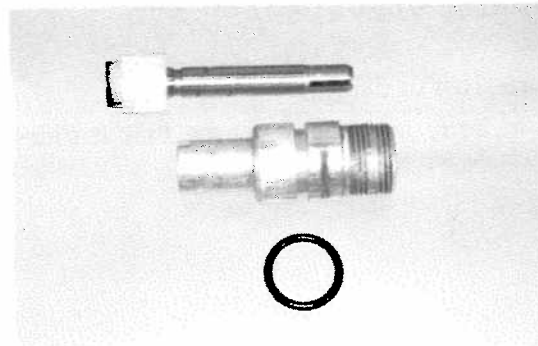
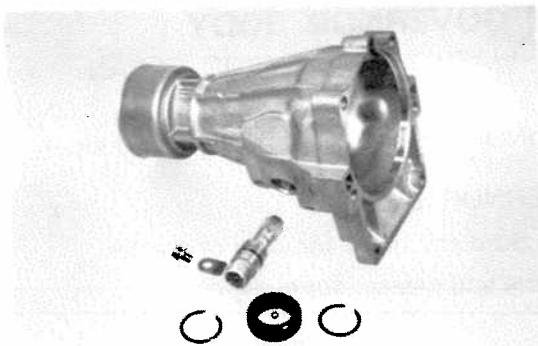
Slide down through the bore.



### 3. INSTALL GOVERNOR WEIGHT AND E-RING ON SHAFT

Compress spring, and install E-ring on the shaft with needle-nose pliers. Make sure that it is fully seated in the groove.





## Speedometer Gear and Extension Housing

NOTE: Parts were disassembled during initial transmission disassembly.

### INSPECTION OF SPEEDOMETER GEAR AND EXTENSION HOUSING

#### 1. THOROUGHLY WASH PARTS IN CLEAN SOLVENT

If necessary, use a bristle brush to clean the housing. Dry all parts with compressed air.

#### 2. INSPECT SPEEDOMETER DRIVE GEAR AND DRIVEN GEAR

- (a) Check gear teeth for wear or damage.
- (b) Check gear shaft, oil seal and O-ring for wear or damage.

If the oil seal is worn or damaged, replace it.

#### 3. IF NECESSARY REPLACE OIL SEAL

- (a) Using a hook\*, remove the seal.

\*SST 09921-00010 or Commercial tool

- (b) Using a driver\*, install the new seal.

\*SST 09201-60011 or Commercial driver

#### 4. INSPECT EXTENSION HOUSING

- (a) Check the extension housing for damage or cracks.
- (b) Check the housing oil seal for wear or damage.

#### 5. IF NECESSARY, REPLACE OIL SEAL AND DUST SEAL

- (a) Using oil seal puller\*, remove seals. If both seals do not come out together, remove the oil seal with a second pull. Discard seals.

\*SST 09308-00010 or Commercial puller, or SST 09308-10010 with extension housing installed

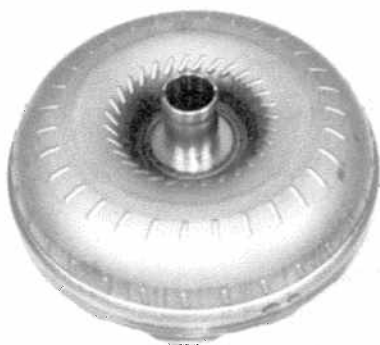
- (b) Before installation, coat new oil seal with MP grease and soak dust seal in ATF. Install a new oil seal with cup side down and then a dust seal using a hammer and seal installation tool\*.

\*SST 09325-20010 or Commercial driver

**CAUTION:** The dust seal end should be flush with the lip of extension housing.

## Torque Converter

**IMPORTANT NOTE:** If the transmission is contaminated, the torque converter and transmission cooler should be thoroughly flushed, using Toyota Transmission Cleaner.

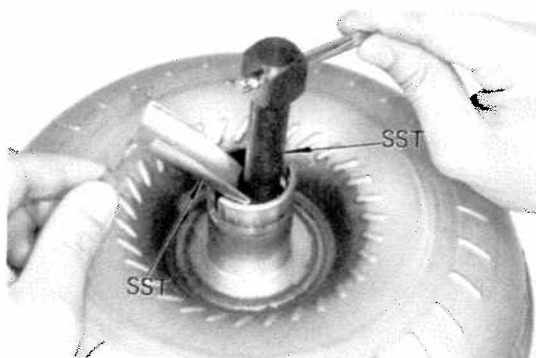


### INSPECTION OF TORQUE CONVERTER

#### 1. INSERT SST'S INTO END OF TORQUE CONVERTER

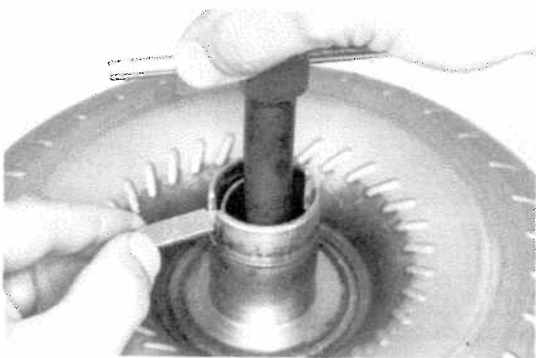
Insert turning tool in inner race of one-way clutch. Insert the stopper so that it fits in notch of the converter hub and other race of one-way clutch.

SST 09350-20010 or 00002-00223-01



#### 2. TEST ONE-WAY CLUTCH

Clutch should lock when turned counterclockwise, and should rotate freely and smoothly clockwise. Less than 25 kg-cm (22 in.-lb) of torque should be required to rotate the clutch clockwise. If necessary, clean converter and retest the clutch. Replace the converter if clutch still fails the test.



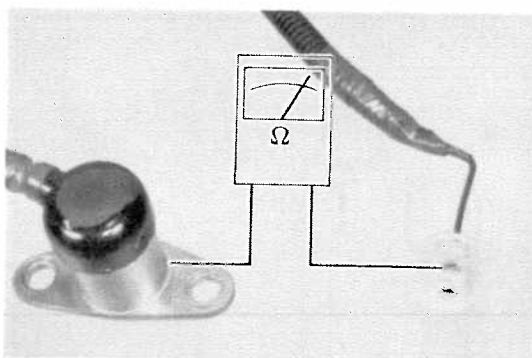
## OD Solenoid and Neutral Start Switch

**CAUTION:** Do not clean the electrical parts with solvent. If dirty, wipe off with shop rags.

#### 1. INSPECT OD SOLENOID

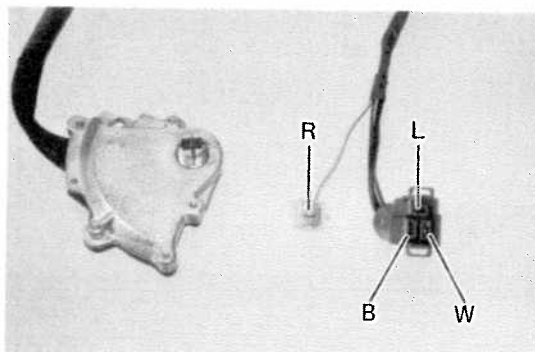
Check the resistance between terminals.

**Standard resistance : about 13 ohms**



#### 2. INSPECT NEUTRAL START SWITCH

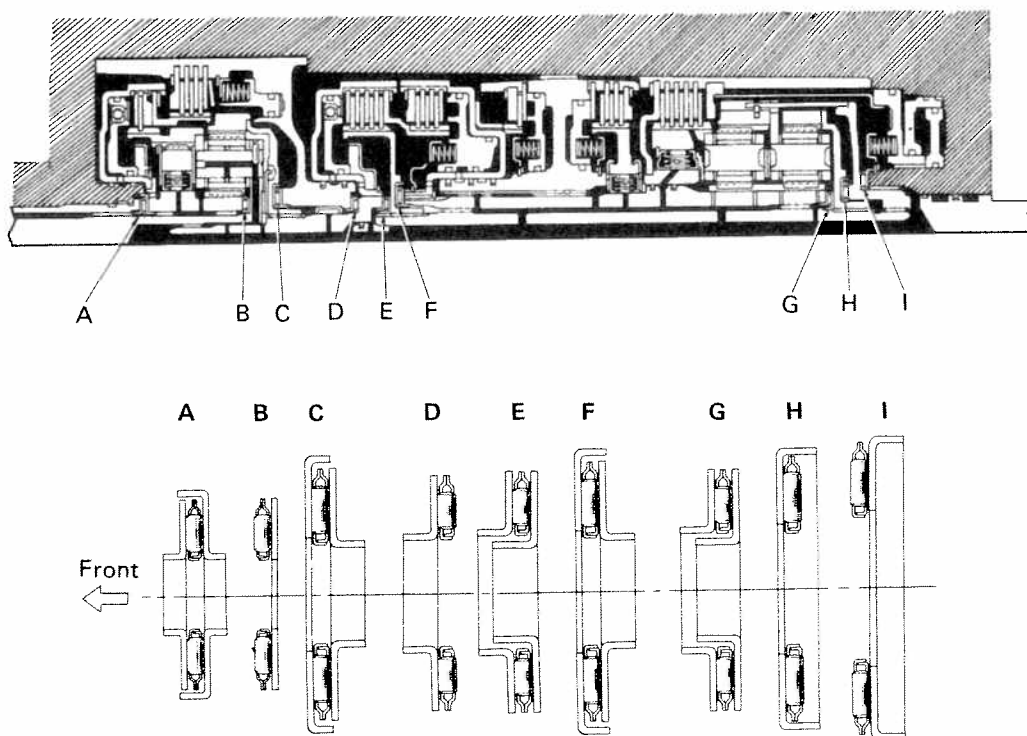
- Make sure that there is continuity between B and W terminals in P and N range.
- Make sure that there is continuity between L and R terminals in remaining ranges.

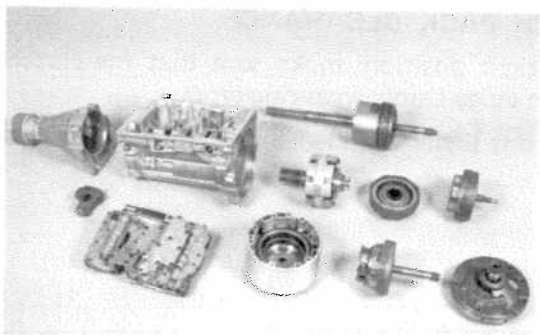


# ASSEMBLY OF TRANSMISSION

## GENERAL ASSEMBLY NOTE

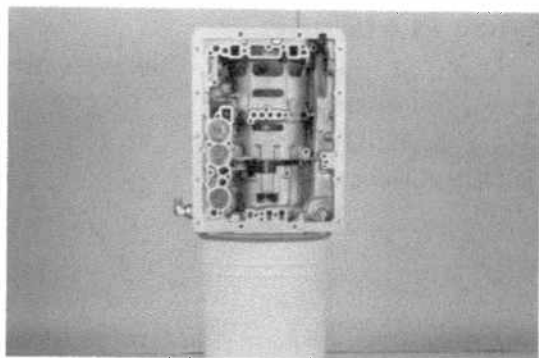
1. The automatic transmission is composed of highly precision-finished parts, necessitating careful inspection before assembling them because even a small nick could cause fluid leakage or affect performance.
2. Do not use adhesive cements on gaskets and similar parts.
3. Before assembling new clutch discs, soak them in automatic transmission fluid for at least two hours.
4. When assembling the transmission, be sure to use new gaskets and O-rings.
5. Apply automatic transmission fluid on sliding or rotating surfaces of the parts before assembly.
6. Dry all parts by blowing with compressed air. Never use shop rags.
7. Use petroleum jelly to keep small parts in their places.
8. Be sure to install thrust bearings and races in correct direction and position.





**1. CHECK EACH COMPONENT GROUP CONDITION**

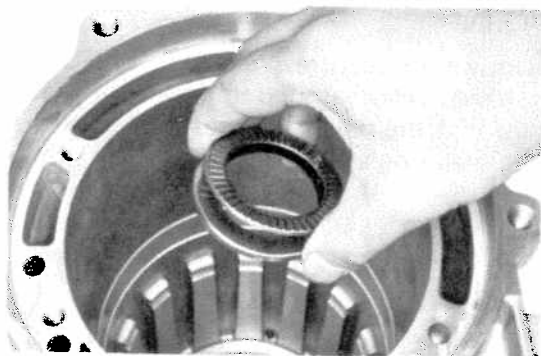
Before assembly, make sure again that all component groups are assembled correctly.



**2. PLACE TRANSMISSION CASE ON CYLINDER**

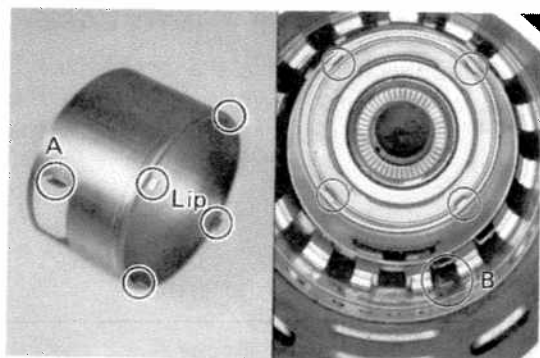
Place the transmission case on a stand in the shape of cylinder for efficient work.

**CAUTION:** Place shop rags between the case and stand to avoid spoiling case.



**3. INSTALL THRUST WASHER AND BEARING**

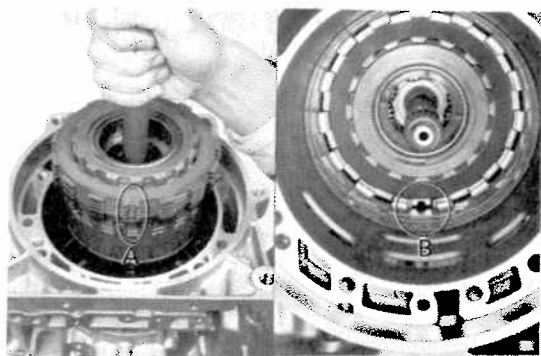
**NOTE:** Install thrust washer facing cup side downward.



**4. INSTALL APPLY TUBE IN CASE**

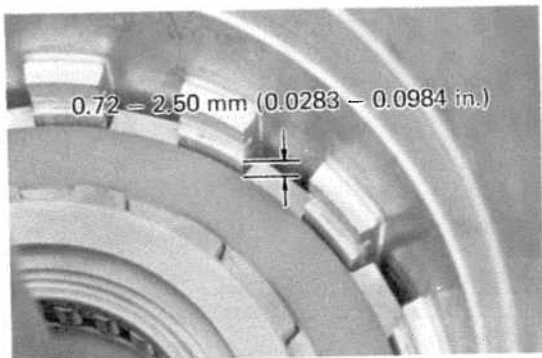
Install apply tube aligning its locking tab (part A) with part B of the case.

**NOTE:** Make sure that the lips of tube end are completely inserted into the case.



**5. PARTIALLY INSERT OUTPUT SHAFT ASSEMBLY INTO CASE**

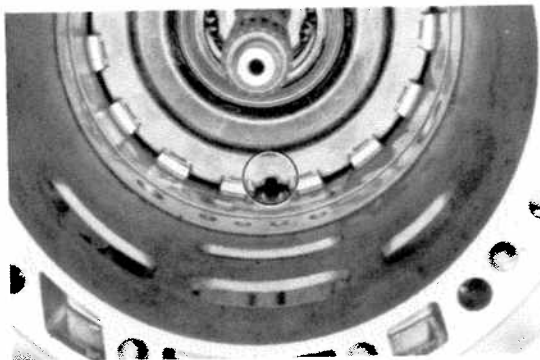
Align opening notch (part A) of clutch plates with the slot (part B) of case.



## 6. CHECK CLUTCH PACK CLEARANCE

With case in upright position, make sure that the clutch disc is lower than ledge below snap ring groove.

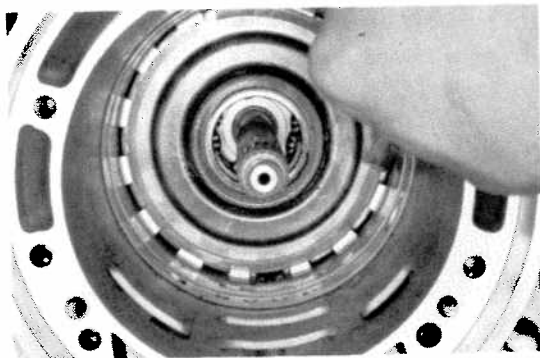
If clutch disc is not lower than ledge, components may be misassembled.



## 7. INSTALL REACTION PLATE

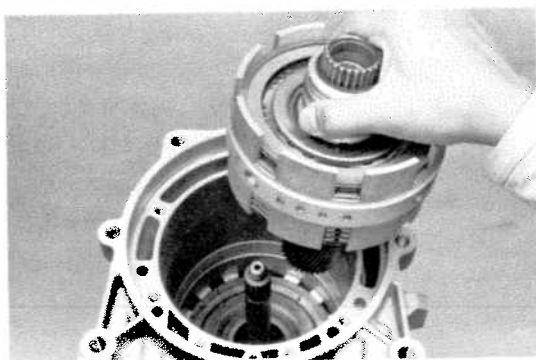
Position notched tooth of reaction plate toward valve body side of the case. Push into place.

NOTE: The reaction plate is correctly installed if the snap ring groove is fully visible.



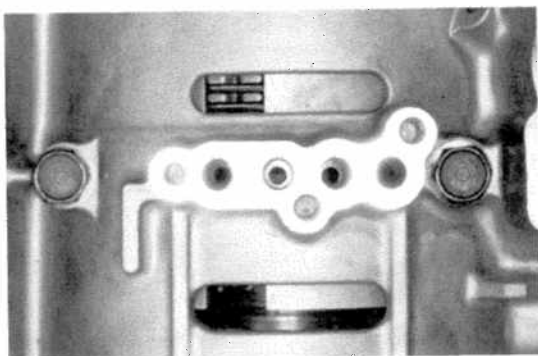
## 8. INSTALL SNAP RING

Use a large screwdriver to compress the snap ring. Push it into place by hand. Work around the case. Visually check to make sure that the ring is fully seated. Make sure that the ends of the snap ring are between lugs.



## 9. PUSH CENTER SUPPORT ASSEMBLY INTO CASE

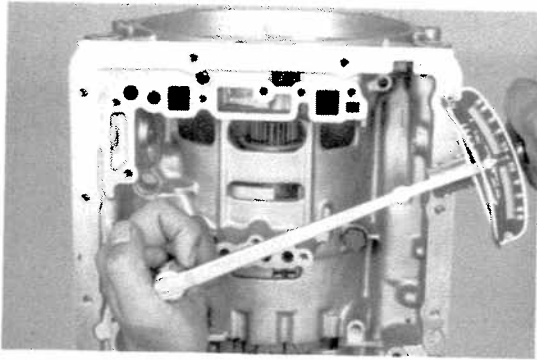
Before installation, double-check that the brake No. 2 hub is fully meshed with its discs. While pulling on the sun gear shaft, push the center support assembly into the case.



## 10. INSTALL TWO CENTER SUPPORT BOLTS WITH WAVE WASHERS

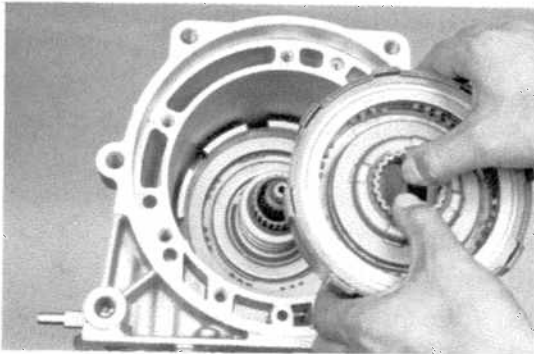
Align the center support with holes in case and install two bolts finger tight.



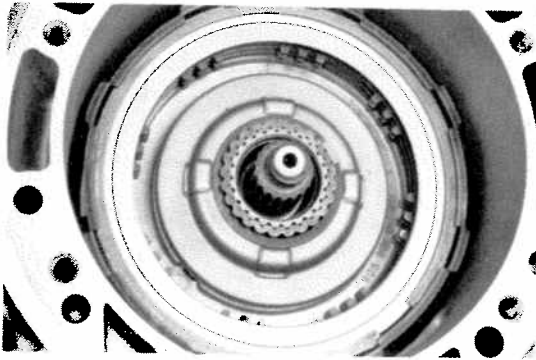
**11. TIGHTEN TWO CENTER SUPPORT BOLTS**

Tighten bolts alternately in 70 kg-cm (61 in.-lb) increments.

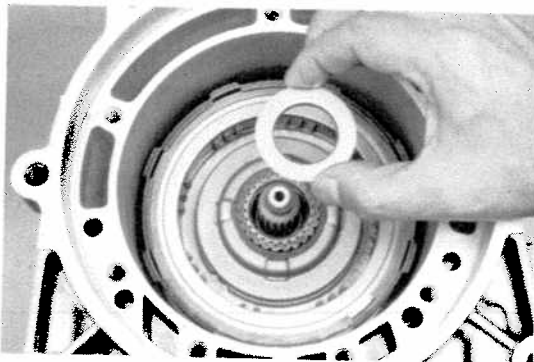
**Torque: 240 – 280 kg-cm (18 – 20 ft-lb)**

**12. INSTALL REAR CLUTCH INTO CASE**

Rotate clutch to mesh the hub with the center support.

**13. CHECK FOR CORRECT INSTALLATION OF REAR CLUTCH**

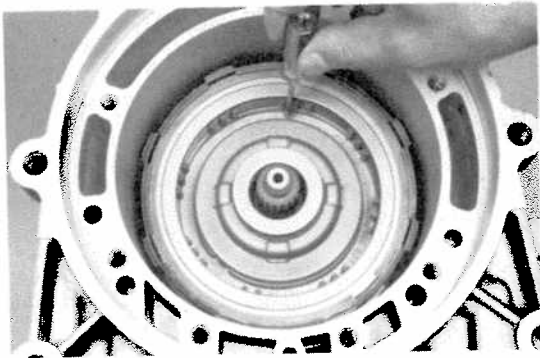
If rear clutch is fully meshed with the center support, the splined center of the clutch will be flush with the end of the sun gear shaft.

**14. INSTALL NEEDLE BEARING RACE OVER SPLINED END OF REAR CLUTCH IN CASE**

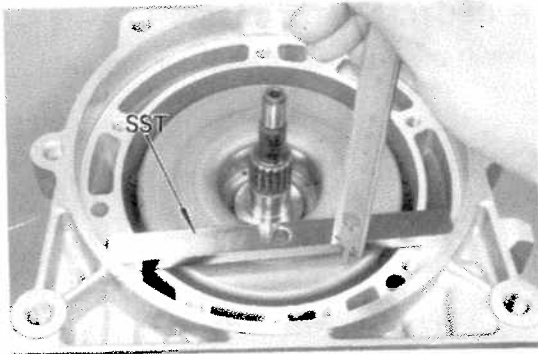
Coat parts with petroleum jelly to keep them in place. Put lip of race toward the rear clutch. Press into place.

**15. INSTALL THRUST BEARING AND RACE ON FRONT CLUTCH**

Coat parts with petroleum jelly to keep them in place. Put lip of race outward. Press into place.



- 16. INSTALL FRONT CLUTCH ASSEMBLY INTO CASE**  
Complete flukes of rear clutch discs and mesh them with front clutch hub. Push front clutch assembly into the case.  
**CAUTION:** Be careful the thrust bearing does not fall out.



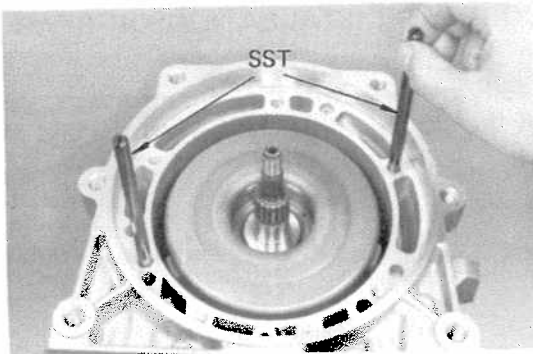
- 17. CHECK CORRECT INSTALLATION OF FRONT CLUTCH**

Set SST on transmission case as shown in the figure. Measure the distance between top surface of SST and front clutch assembly.

If the distance corresponds to the specification, front clutch will mesh completely with rear clutch.

SST 09350-20013

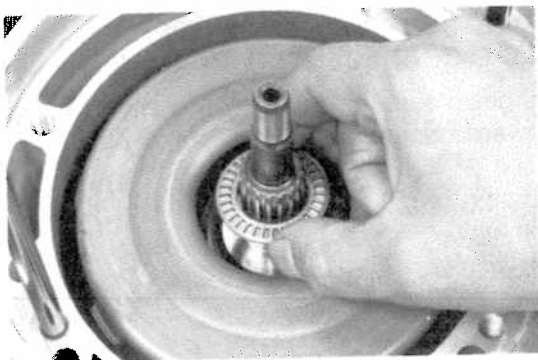
Height: Measured value minus SST width  
= Approx. 2 mm (0.08 in.)



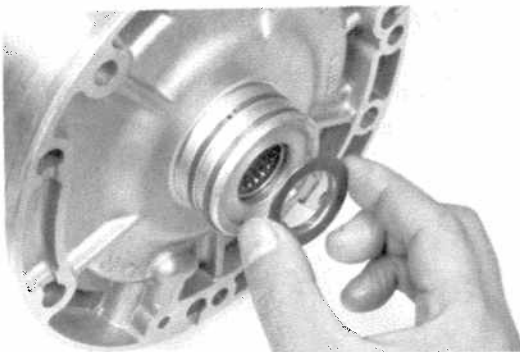
- 18. INSTALL SST ON CASE**

Finger tighten SST as guide pin on transmission case.

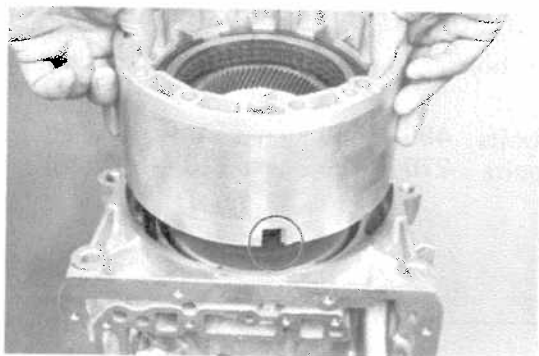
SST 09350-20013



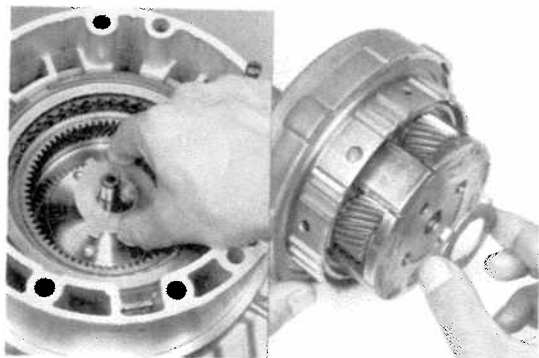
- 19. INSTALL THRUST BEARING ON FRONT CLUTCH**  
Coat thrust bearing with petroleum jelly and set into place.



- 20. INSTALL THRUST WASHER ON OD CASE END**  
Coat thrust washer with petroleum jelly and set into place facing lip side toward OD case.

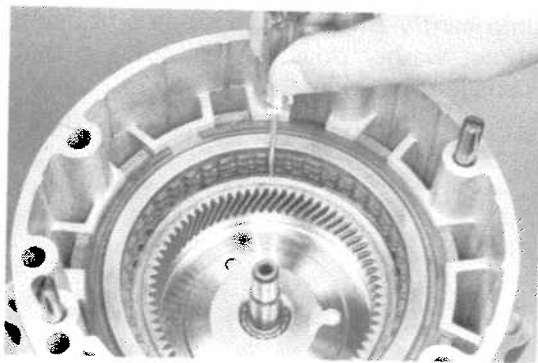
**21. INSERT OD CASE INTO TRANSMISSION CASE**

Set the opening notch of OD case in the position indicated in the figure and insert gently through two guide pins.

**22. INSTALL TWO THRUST WASHERS**

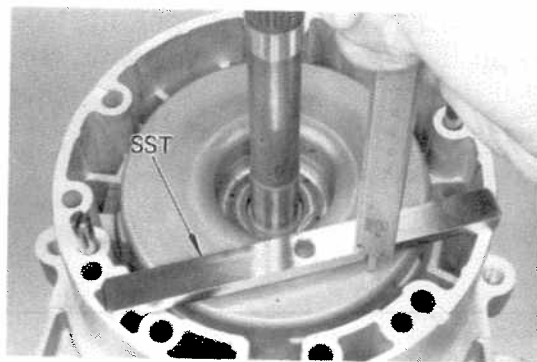
Coat thrust washers with petroleum jelly. Install one thrust washer on OD case and the other one on OD clutch.

NOTE: The lugs of washers should be inserted in holes.

**23. INSTALL OD CLUTCH IN CASE**

Complete flukes of discs in the OD case. Align the flukes with slots of OD clutch and press OD clutch into OD case.

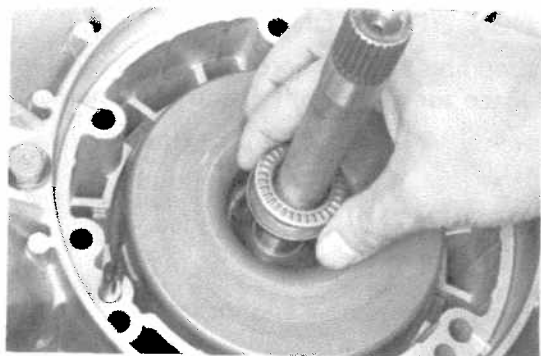
NOTE: Be careful the thrust washer of OD clutch does not fall out.

**24. CHECK CORRECT INSTALLATION OF OD CLUTCH**

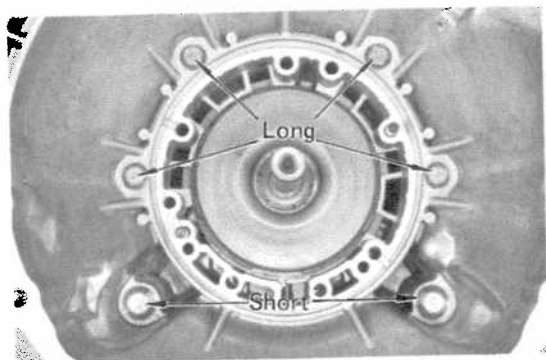
Set SST on OD case as shown in the figure. Measure the distance between top surface of SST and OD clutch. If the distance corresponds to the specification, OD clutch is installed correctly.

SST 09350-20013

Height: Measured value minus SST width  
= Approx. 2 mm (0.08 in.)

**25. INSTALL O-RING ON OD CASE****26. INSTALL THRUST WASHER AND BEARING ON OD CLUTCH**

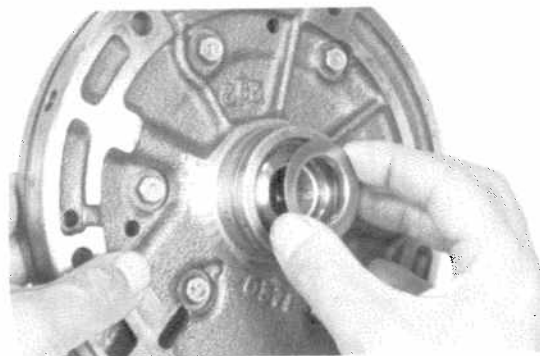
Coat thrust washer with petroleum jelly. Install thrust washer facing lip side outward together with the bearing.



## 27. INSTALL BELL HOUSING

Install two short bolts and four long bolts and tighten them.

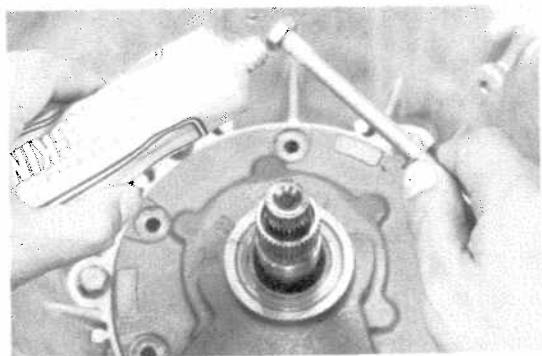
**Torque:** Short bolts 480 — 680 kg-cm (35 — 49 ft-lb)  
Long bolts 270 — 420 kg-cm (20 — 30 ft-lb)



## 28. INSTALL FRONT OIL PUMP

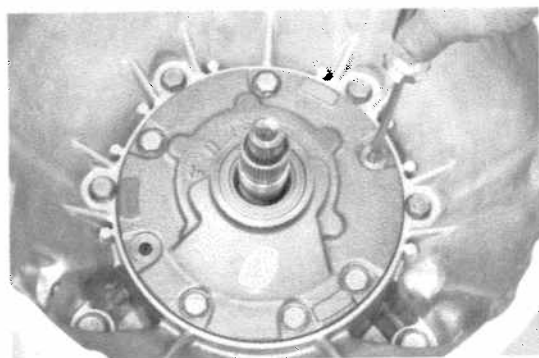
**NOTE:** In spite of presence of the bell housing, front oil pump can be installed in the common way.

(a) Coat thrust washer with petroleum jelly and install facing lip side toward pump body.



(b) Install oil pump gently through two guide pins being careful the thrust washer does not fall out and that you do not damage the O-ring.

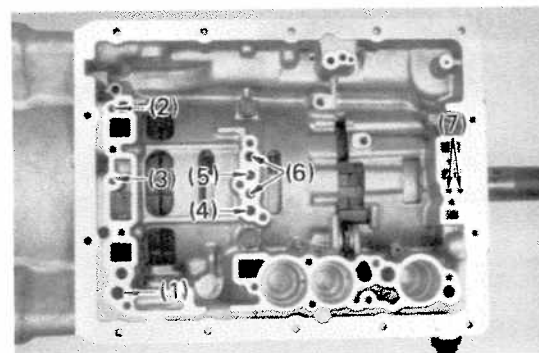
(c) Coat five set bolts with seal packing and finger tighten them.



(d) Using a screwdriver, remove two guide pins. In place of them, install two set bolts coated with seal packing.

(e) Tighten the set bolts gradually and evenly.

**Torque:** 180 — 250 kg-cm (14 — 18 ft-lb)

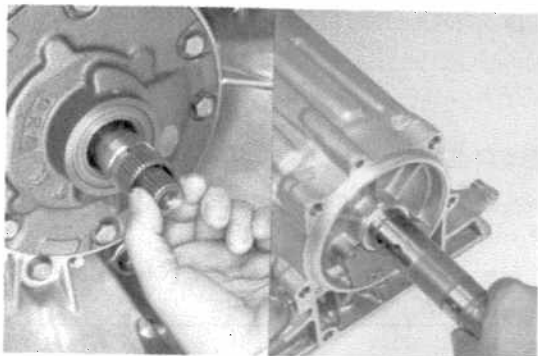


## 29. CHECK OPERATION OF PISTONS

Blow low-pressure compressed air into passages indicated on the photo and listen for noise from piston movement.

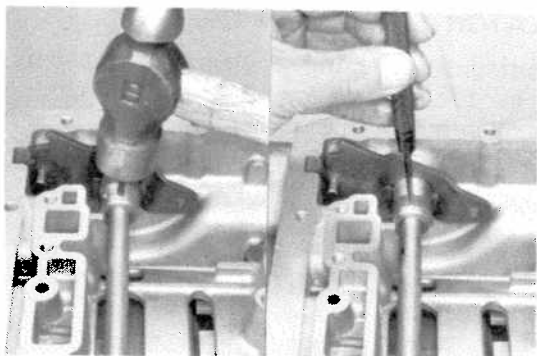
- |                      |                 |
|----------------------|-----------------|
| (1) Overdrive clutch | (5) Brake No. 2 |
| (2) Overdrive brake  | (6) Rear clutch |
| (3) Front Clutch     | (7) Brake No. 3 |
| (4) Brake No. 1      |                 |

If pistons do not move, disassemble and inspect.

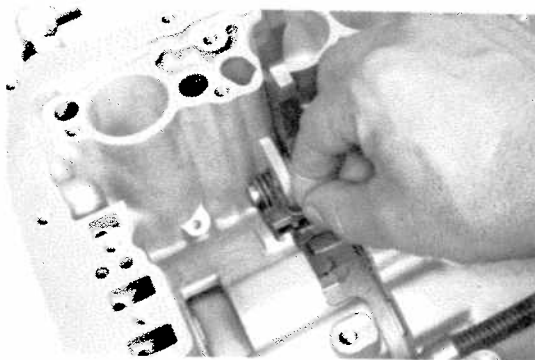
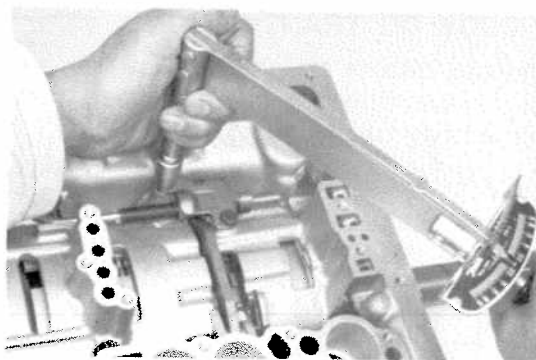
**30. CHECK INPUT SHAFT AND OUTPUT SHAFT**

- (a) Make sure that input shaft has play in axial direction and that it turns lightly.
- (b) Make sure that output shaft has thrust play in axial direction.

Thrust play: 0.3 — 0.9 mm (0.012 — 0.035 in.)

**31. INSTALL MANUAL VALVE LEVER SHAFT INTO CASE**

- (a) Assemble the new collar to the manual valve lever.  
NOTE: Always replace the collar and roll pin with a new one. Never reuse a pin after it has been removed.
- (b) Install the manual valve lever shaft to the transmission case through the manual valve lever.
- (c) Drive in a new roll with the slot at a right angle to the shaft.
- (d) Match the collar hole to the lever calking hollow and calk the collar to the lever.

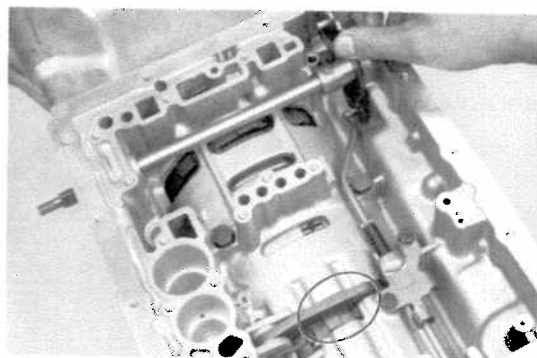
**32. INSTALL PARK PAWL, PIVOT PIN AND SPRING IN CASE****33. INSTALL PARK PAWL BRACKET ON CASE**

Make sure that the collar on the control rod is toward the front of the transmission.

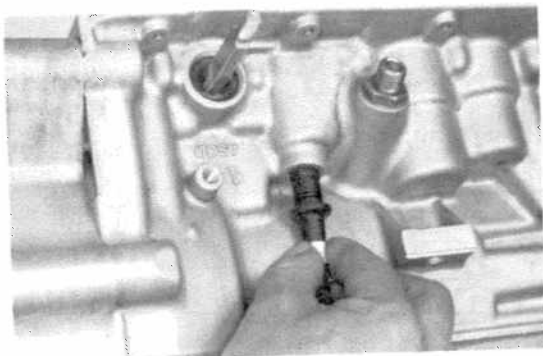
Tighten two bolts. Make sure that pawl moves freely.

NOTE: It is possible for bracket to be installed too far forward, where it will bind the pawl.

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

**34. CHECK OPERATION OF PARK LOCK PAWL**

Make sure that planetary gear output shaft is locked when the manual valve lever is shifted at P position.



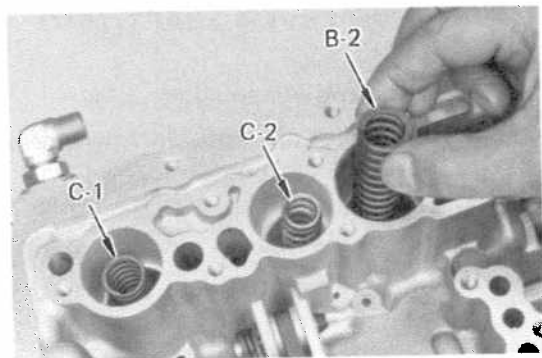
### 35. INSTALL NEW O-RING ON THROTTLE CABLE FITTING

Lubricate with ATF.

### 36. INSTALL THROTTLE CABLE IN CASE

Push through the case, being careful not to damage the O-ring. Check for full seating.

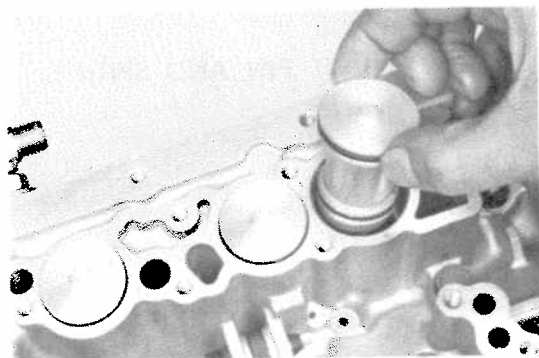
**CAUTION:** In subsequent work, do not roll case over the cable and break the cable fitting.



### 37. SET ACCUMULATOR SPRINGS IN CASE

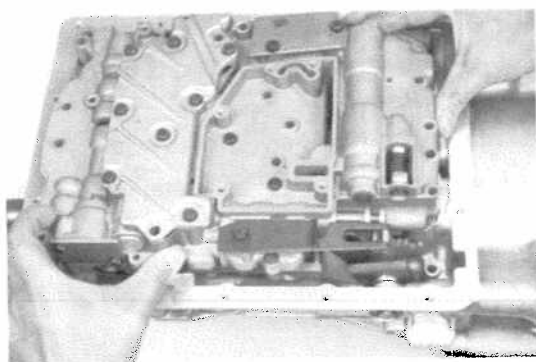
Place longest spring in opening at front of the case, shortest spring in the middle opening and remaining spring in the rear opening.

		Free length mm (in.)	Outer diameter mm (in.)
	B-2	66.50 (2.6181)	17.91 (0.7051)
	C-2	55.18 (2.1724)	15.87 (0.6248)
	C-1	68.56 (2.6992)	17.53 (0.6902)



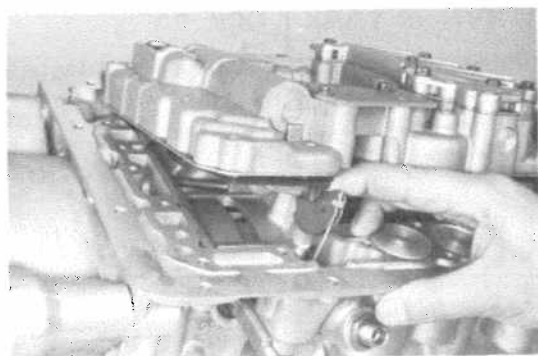
### 38. INSTALL ACCUMULATOR PISTONS

Place smallest piston in the middle. Place longest piston in the rear, and remaining piston in the front.



### 39. PLACE VALVE BODY ON TRANSMISSION

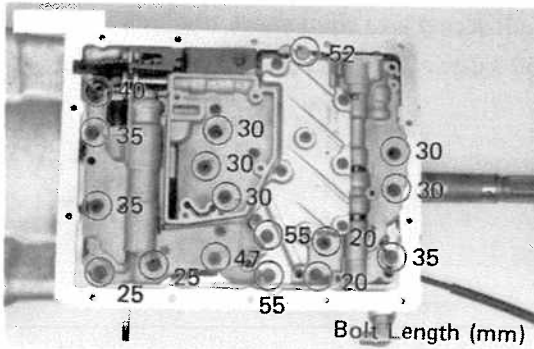
Make sure accumulator pistons are pressed fully into the bore. Align manual valve with pin on the manual shift lever, and lower valve body into place.



### 40. LIFT SIDE OF VALVE BODY AND ATTACH THROTTLE CABLE

While holding cam down with fingers, slip the cable end into the slot.

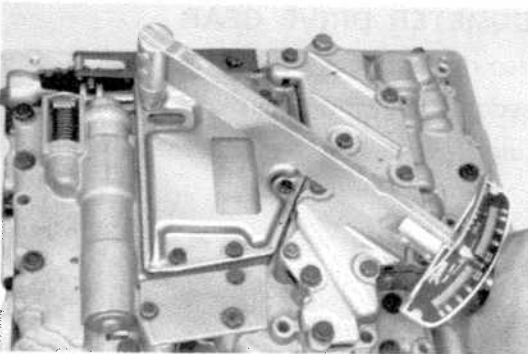


**41. INSTALL SEVENTEEN BOLTS IN VALVE BODY**

Install bolts as shown.

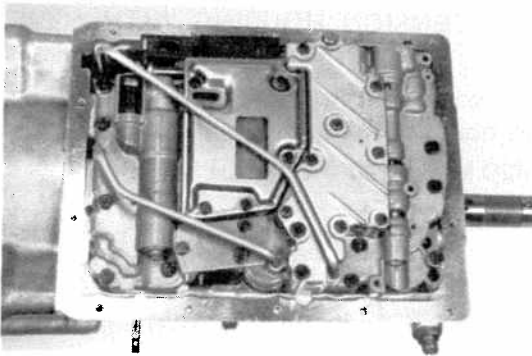
Tighten seventeen bolts.

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

**42. INSTALL OIL SCREEN AND BOLTS**

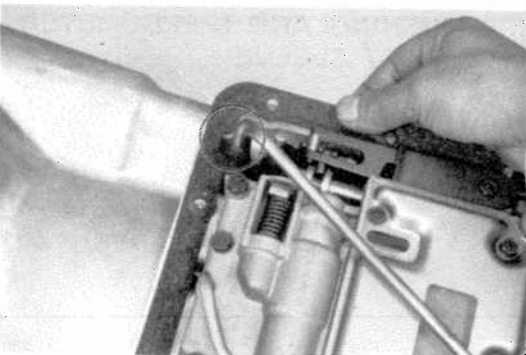
Install five bolts and tighten them.

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

**43. INSTALL TWO OIL TUBES**

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

**CAUTION:** Be careful not to bend or damage the tubes.

**44. INSTALL MAGNET IN PAN AND INSTALL OIL PAN WITH NEW GASKET**

Align the cut part of gasket and case.

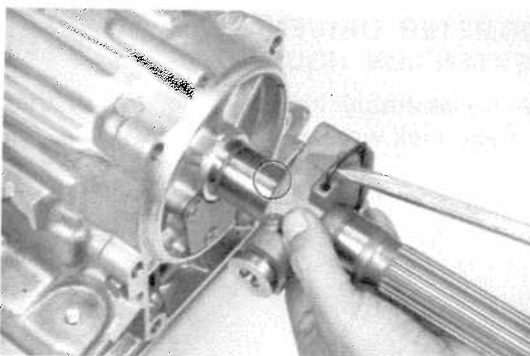
Tighten fourteen bolts.

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

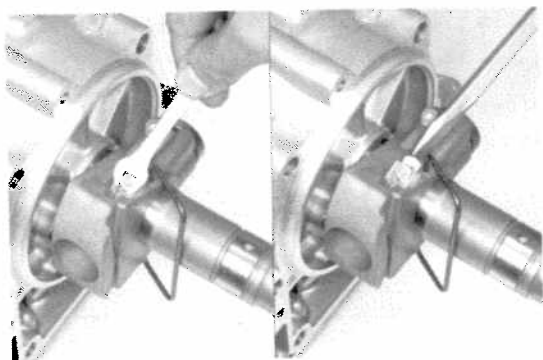
**45. INSTALL DRAIN PLUG WITH NEW GASKET**

Tighten drain plug.

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

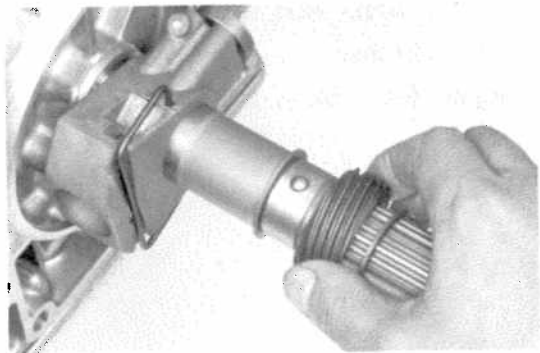
**46. INSTALL GOVERNOR BODY ON OUTPUT SHAFT**

- (a) While lifting the retaining clip with a large screwdriver, slide the governor body and insert retaining clip end into the hole on output shaft.



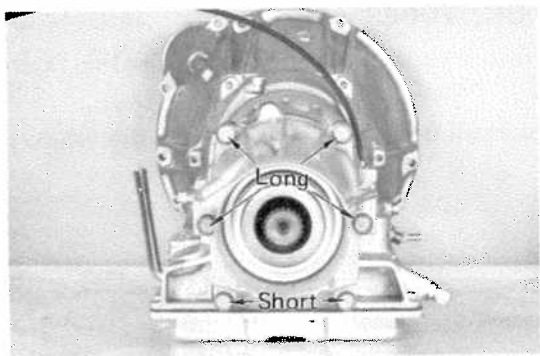
(b) Install the lock screw and then stake the lock plate.

**Torque: 30 – 50 kg-cm (27 – 43 in.-lb)**



#### 47. INSTALL SPEEDOMETER DRIVE GEAR

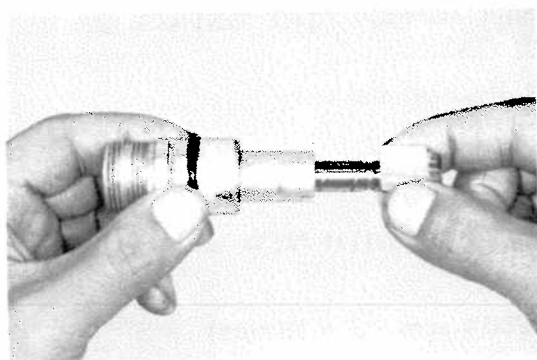
- (a) Install the snap ring and lock ball.
- (b) Slide the speedometer gear on the shaft.
- (c) Using snap ring pliers, install the outer snap ring.



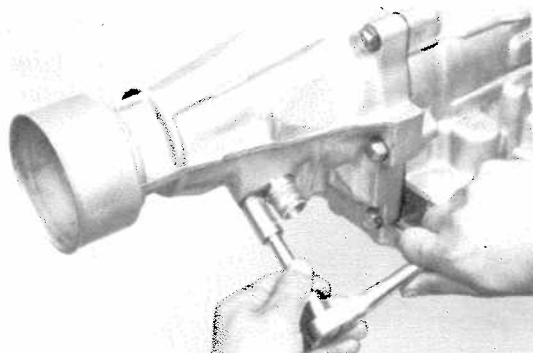
#### 48. INSTALL REAR EXTENSION HOUSING WITH NEW GASKET

Do not use gasket sealer. Install housing with four long bolts and two short bolts. Tighten bolts.

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



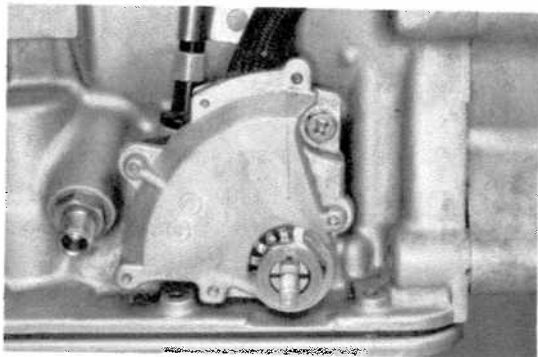
#### 49. INSTALL O-RINGS, BUSHING AND SPEEDOMETER DRIVEN GEAR TO SHAFT SLEEVE



#### 50. INSTALL SPEEDOMETER DRIVEN GEAR ASSEMBLY IN EXTENSION HOUSING

Insert the shaft sleeve assembly into housing. Install the lock plate with bolt and lock washer.



**51. INSTALL NEUTRAL SWITCH**

- (a) Slide the neutral switch onto the control shaft.
- (b) Install the grommet facing the groove toward switch body and then install washer and nut.
- (c) Move the switch so that the slit in switch and neutral base line match up. Tighten the bolt and nut.

**52. INSTALL SHIFT HANDLE****53. INSTALL SOLENOID**

Install the solenoid with two O-rings on the body being careful they do not fall out.

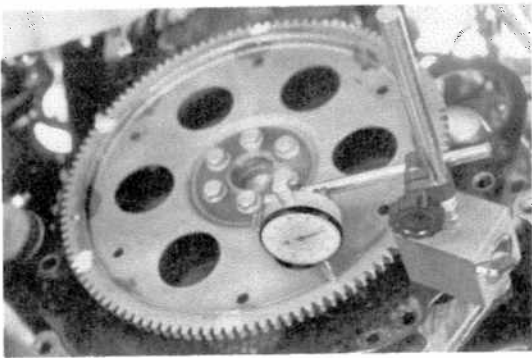
## INSTALLATION OF TRANSMISSION

### 1. MEASURE DRIVE PLATE RUNOUT AND INSPECT RING GEAR

Set up a dial indicator and measure drive plate runout.

If runout exceeds 0.20 mm (0.0079 in.) or if the ring gear is damaged, replace drive plate. If installing new drive plate, note the orientation of spacers and tighten the bolts.

Torque: 800 – 900 kg-cm (57 – 64 ft-lb)



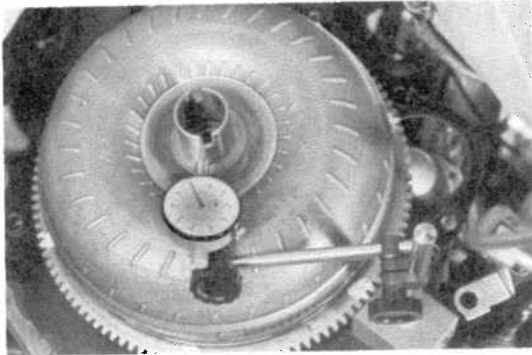
### 2. MEASURE TORQUE CONVERTER SLEEVE RUNOUT

(a) Temporarily mount the torque converter to the drive plate. Set up a dial indicator.

If runout exceeds 0.30 mm (0.0118 in.), try to correct by reorienting the installation of the converter. If excessive runout cannot be corrected, replace the torque converter.

NOTE: Mark the position of the converter to ensure correct installation.

(b) Remove the torque converter.



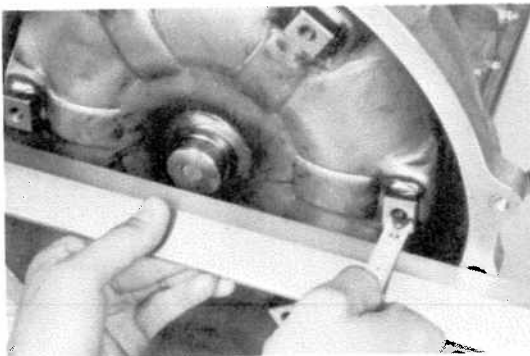
### 3. APPLY GREASE TO CENTER HUB OF TORQUE CONVERTER AND PILOT HOLE IN DRIVE PLATE



### 4. INSTALL TORQUE CONVERTER IN TRANSMISSION

If the torque converter has been drained and washed, refill with fresh ATF.

ATF capacity: 2.5 liters (2.6 US qts, 2.2 Imp.qts)

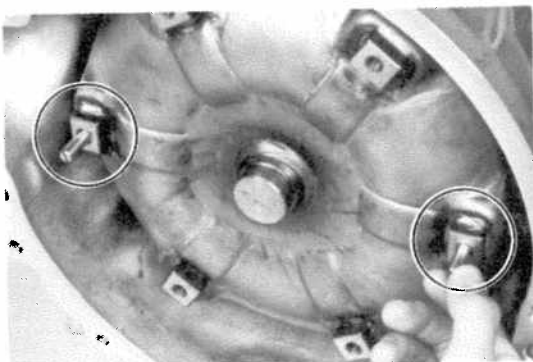


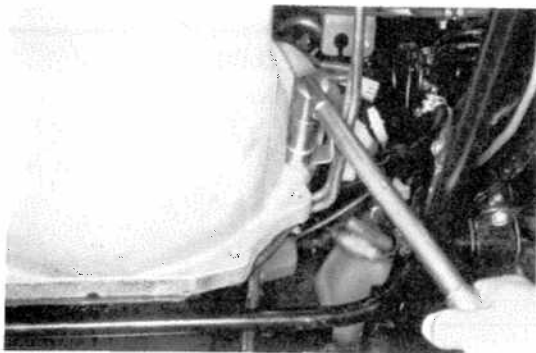
### 5. CHECK TORQUE CONVERTER INSTALLATION

Using calipers and a straight edge, measure from the center hub to the front surface of the transmission housing.

Correct distance: 20 mm (0.79 in.)

### 6. INSTALL GUIDE PIN IN TORQUE CONVERTER



**7. INSTALL TRANSMISSION ASSEMBLY**

**CAUTION:** Be careful not to let the Torque Converter Slide out.

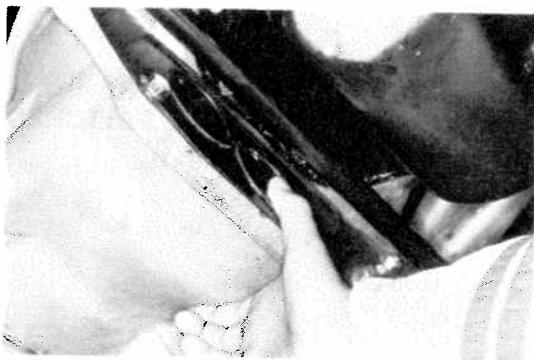
- (a) Align the guide pin with one of the drive plate holes.
- (b) Align the upper starter stud with the hole in the engine plate.
- (c) Align two sleeves on the block with the converter housing.
- (d) Tighten the transmission housing mounting bolts.

**Torque:** 50 – 80 kg-cm (37 – 57 ft-lb)

**8. INSTALL SIX TORQUE CONVERTER BOLTS**

- (a) Remove guide pin.
- (b) Install six bolts finger tight. Turn the crankshaft to gain access.
- (c) Tighten the bolts evenly.

**Torque:** 150 – 220 kg-cm (11 – 15 ft-lb)

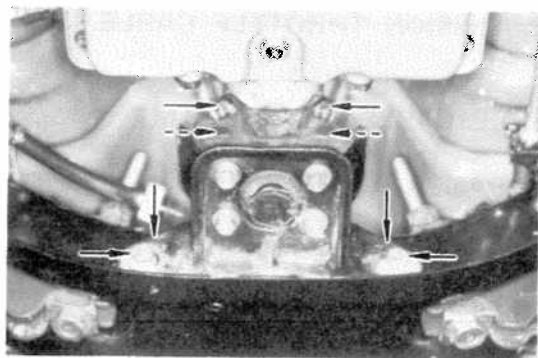
**9. INSTALL TWO RUBBER PLUGS IN SERVICE HOLES AT REAR OF ENGINE****10. INSTALL ENGINE UNDERCOVER****11. JACK UP TRANSMISSION SLIGHTLY AND REMOVE WOODEN PIECE BETWEEN ENGINE OIL PAN AND MEMBER****12. INSTALL ENGINE REAR MOUNTING WITH BRACKET**

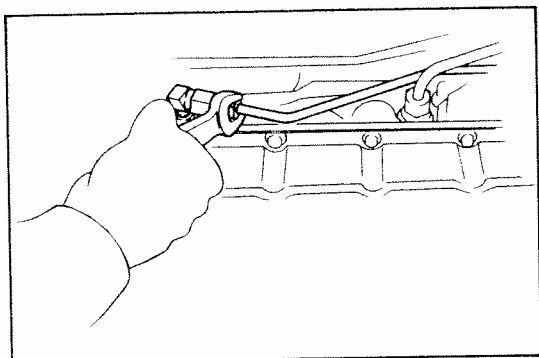
- (a) Install the engine rear mounting with bracket to the member.

**Torque:** 350 – 500 kg-cm (26 – 36 ft-lb)

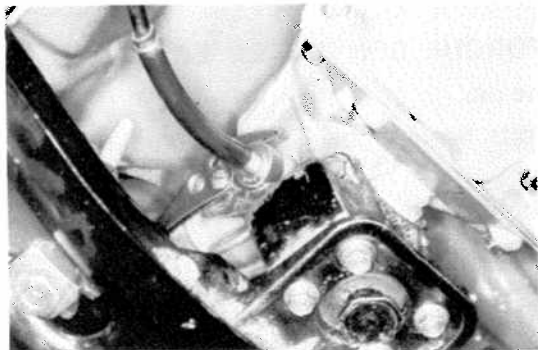
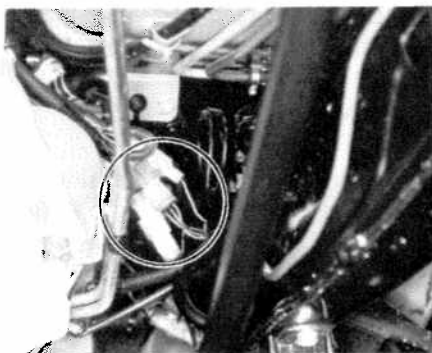
- (b) Lower the transmission and connect the mounting to the extension housing.

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

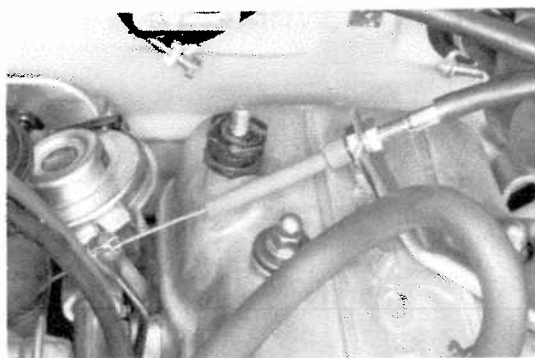
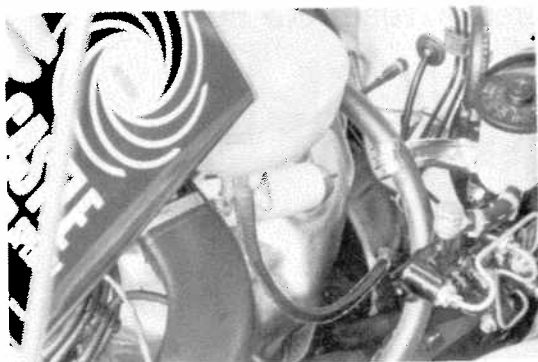
**13. INSTALL OIL FILLER TUBE AND CONNECT EXHAUST PIPE CLAMP**

**14. CONNECT OIL COOLER LINES**

Torque: 300 – 400 kg-cm (22 – 29 ft-lb)

**15. CONNECT MANUAL SHIFT LINKAGE****16. CONNECT SPEEDOMETER CABLE****17. INSTALL PROPELLER SHAFT (See page 12-8)****18. INSTALL STARTER****19. CONNECT WIRING CONNECTORS TO SOLENOID, NEUTRAL START AND BACK-UP LIGHT SWITCHES**

Connect the connectors located near the starter.

**20. CONNECT TRANSMISSION THROTTLE CABLE (See page 10-23)****21. ADJUST THROTTLE CABLE (See page 10-6)****22. INSTALL AIR CLEANER ASSEMBLY****23. CONNECT BATTERY CABLE TO NEGATIVE ⊖ TERMINAL****24. FILL TRANSMISSION WITH ATF**

- (a) Add about 4.0 liters (4.2 USqts, 3.5 Imp.qts) of ATF.
- (b) Start the engine, shift into each gear and put into PARK.
- (c) Check the fluid level and add ATF to the upper mark.

**Total Capacity:**

A43D 6.5 liters (6.9 US qts, 5.7 Imp.qts)

**25. PERFORM ROAD TEST (See page 10-10)**