
AUTOMATIC TRANSAXLE OVERHAUL <F4AC1>

CONTENTS

23319000016

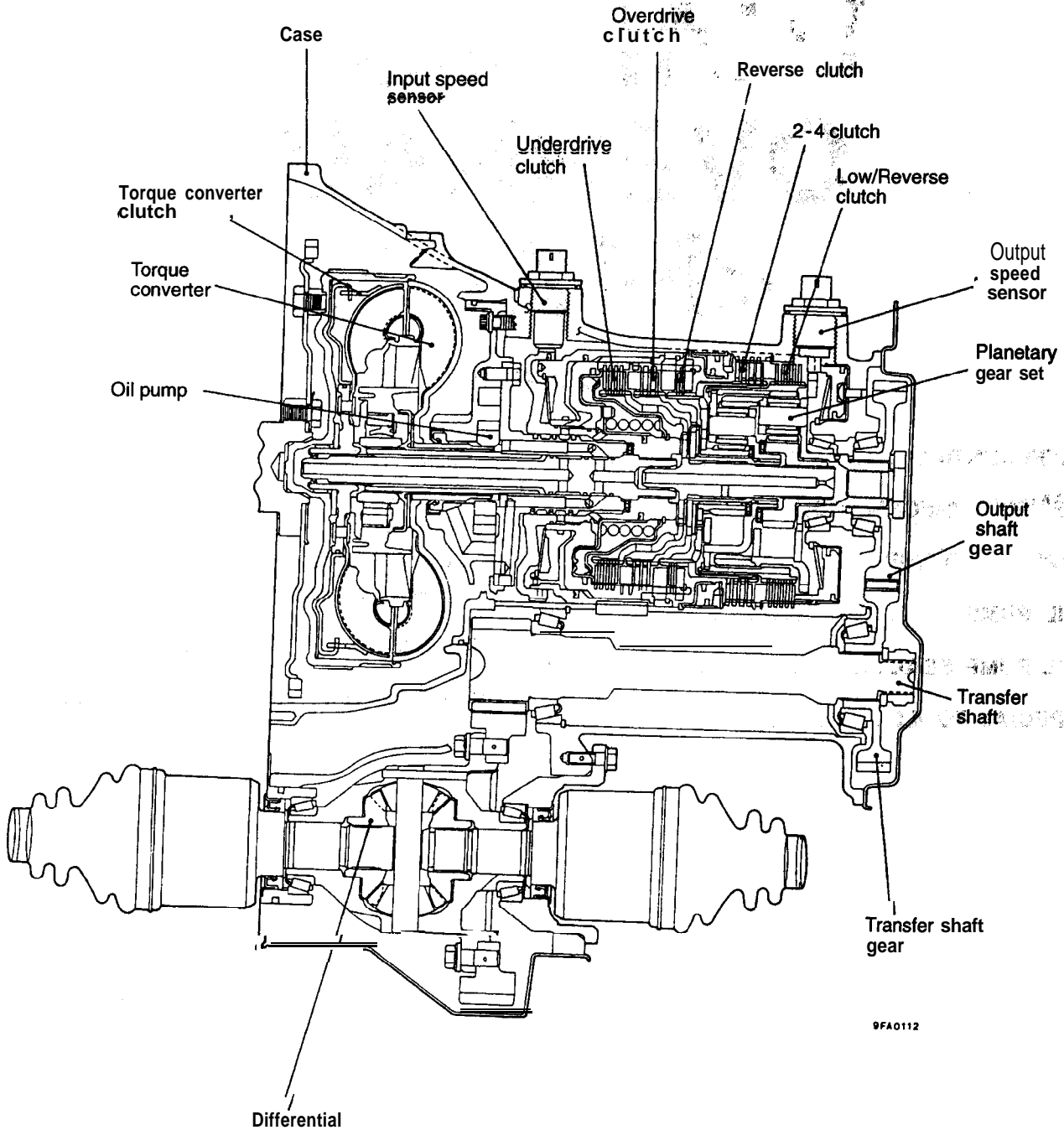
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GENERAL INFORMATION

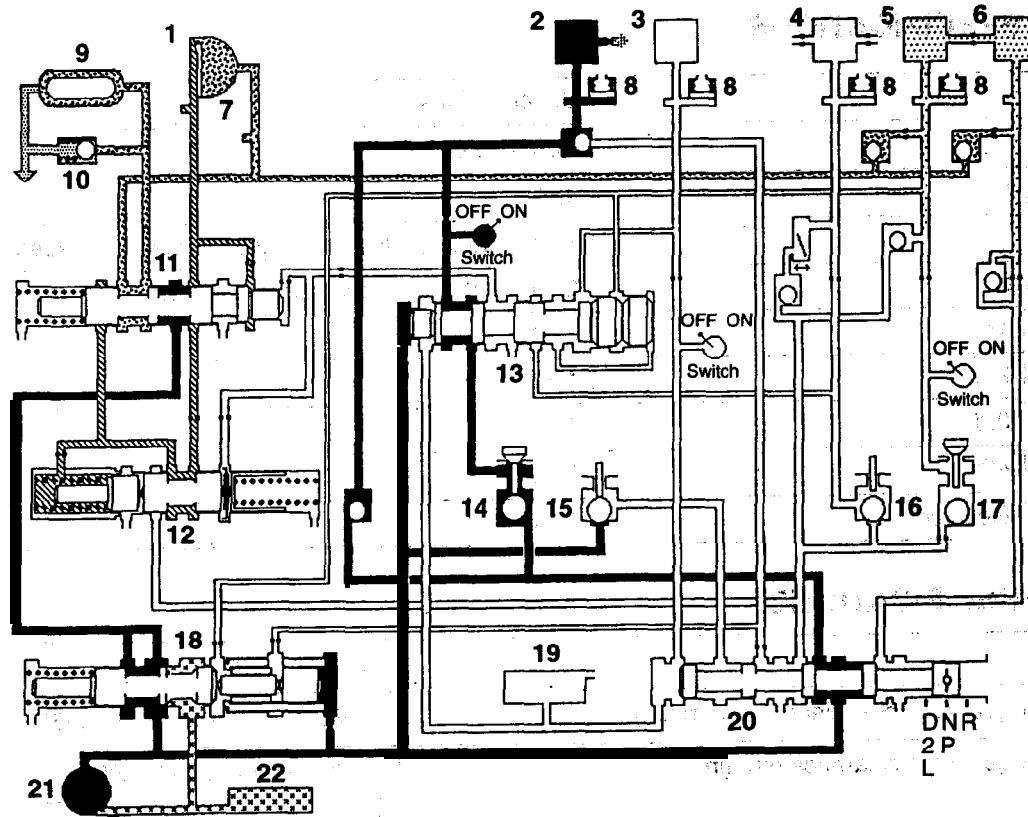
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The F4AC1 four-speed FWD transaxle uses fully-adaptive controls. Adaptive controls are those which perform their functions based on real-time feedback sensor information. The transaxle uses hydraulically applied clutches to shift a planetary gear train.

SECTIONAL VIEW



HYDRAULIC CONTROL SYSTEM



CAT0247

- 1. Torque converter clutch
- 2. Low reverse clutch
- 3. 2-4 clutch
- 4. Underdrive clutch
- 5. Overdrive clutch
- 6. Reverse clutch
- 7. Torque converter
- 8. Accumulator
- 9. Cooler
- 10. Bypass
- 11. Torque converter control
- 12. Torque converter clutch control

- 13. Switch valve
- 14. Low reverse, Reverse/Torque converter clutch solenoid
- 15. 2-4 clutch/low reverse solenoid
- 16. Underdrive solenoid
- 17. Overdrive solenoid
- 18. Regulator
- 19. Vent reservoir
- 20. Manual valve
- 21. Pump
- 22. Filter

SPECIFICATIONS

23310020011

GENERAL SPECIFICATIONS

| Items | | Specifications |
|-------------------|---------|---|
| Model | | F4AC1-3-QZAF |
| Applicable engine | | 420A |
| Type | | Fully-adaptive, electronically-controlled, four-speed automatic |
| Torque converter | | 3-element with torque converter clutch |
| Gear ratio | 1st | 2 . 8 4 |
| | 2nd | 1 . 5 7 |
| | 3rd | 1.00 |
| | 4th | 0 . 6 9 |
| | Reverse | 2.21 |

SERVICE SPECIFICATIONS

23310030014

| Items | Standard value |
|--|-----------------------------|
| Oil pump outer gear to pocket clearance mm (in.) | 0.045–0.141 (.00177–.00555) |
| Oil pump outer gear side clearance mm (in.) | 0.020–0.046 (.00079–.00181) |
| Oil pump inner gear side clearance mm (in.) | 0.020–0.046 (.00079–.00181) |
| Output gear bearing preload mm (in.) | 0.02–0.05 (.0008–.0020) |
| Output gear turning drive torque Nm (ft.lbs.) | 0.34–0.90 (0.25–0.65) |
| Input shaft end play mm (in.) | 0.13–0.64 (.0051–.0252) |
| Transfer shaft bearing end play mm (in.) | 0.05–0.10 (.0020–.0039) |
| Differential bearing preload mm (in.) | 0.15–0.29 (.0059–.0114) |
| Differential side gear end play mm (in.) | 0.025–0.330 (.00098–.01299) |
| Differential turning drive torque Nm (ft.lbs.) | 0.56–2.03 (0.41–1.47) |
| Underdrive clutch clearance mm (in.) | 0.91–1.47 (.0358–.0579) |
| Overdrive clutch clearance mm (in.) | 1.07–2.44 (.0421–.0961) |
| Reverse clutch clearance mm (in.) | 0.76–1.24 (.0299–.0488) |
| 2/4 clutch clearance mm (in.) | 0.76–2.64 (.0299–.1039) |
| Low/reverse clutch clearance mm (in.) | 1.04–1.65 (.0409–.0650) |

AUTOMATIC TRANSAXLE OVERHAUL – Specifications

TORQUE SPECIFICATIONS

23310040017

| Items | Nm | ft.lbs. |
|------------------------------|-----|------------|
| Differential cover bolts | 19 | 14 |
| Differential ring gear bolts | 95 | 70 |
| Differential retainer bolts | 28 | 20 |
| Extension housing bolts | 28 | 20 |
| Oil pan bolts | 19 | 14 |
| Output gear bolt | 271 | 200 |
| Pump bolts | 22 | 16 |
| Rear cover bolts | 19 | 14 |
| Transfer shaft gear nut | 271 | 200 |
| Valve body bolts | 5 | 3.6 |

SEALANTS

22210056010

| Items | Specified sealant | Quantity |
|-------------------------------------|-----------------------------|--------------------|
| Oil pan | Loctite 18718 or equivalent | As required |
| Rear cover | Loctite 18718 or equivalent | As required |
| Rear cover bolts | Loctite 18718 or equivalent | As required |
| Differential cover | Loctite 18718 or equivalent | As required |
| Differential bearing retainer | Loctite 18718 or equivalent | As required |
| Differential bearing retainer bolts | Loctite 18718 or equivalent | As required |
| Extension | Loctite 18718 or equivalent | As required |

THRUST PLATE, THRUST WASHER, REACTION PLATE, SNAP RING, SHIM FOR ADJUSTMENT

23310060013

Thrust washer (For adjustment of differential side gear end play)

| Thickness mm (in.) | Thickness mm (in.) | Thickness mm (in.) | Thickness mm (in.) |
|--------------------|--------------------|--------------------|---------------------|
| 0.81 (.0319) | 0.93 (.0366) | 1.07 (.0421) | 1.19 (.0469) |

Reaction plate (For adjustment of low/reverse clutch clearance)

| Thickness mm (in.) | Thickness mm (in.) | Thickness mm (in.) | Thickness mm (in.) |
|--------------------|--------------------|--------------------|--------------------|
| 5.36 (.2110) | 5.88 (.2315) | 6.40 (.2520) | 6.92 (.2724) |
| 5.62 (.2213) | 6.14 (.2417) | 6.66 (.2622) | |

Thrust plate (For adjustment of input shaft end play)

| Thickness mm (in.) | Thickness mm (in.) |
|-----------------------------|-----------------------------|
| 0.81 – 1.03 (.0319 – .0406) | 2.13 – 2.35 (0.839 – .0925) |
| 1.03 – 1.25 (.0406 – .0492) | 2.35 – 2.57 (.0925 – .1012) |
| 1.25 – 1.47 (.0492 – .0579) | 2.57 – 2.79 (.1012 – .1098) |
| 1.47 – 1.69 (.0579 – .0665) | 2.79 – 3.01 (.1098 – .1185) |
| 1.69 – 1.91 (.0665 – .0752) | 3.01 – 3.23 (.1185 – .1272) |
| 1.91 – 2.13 (.0752 – .0839) | 3.23 – 3.45 (.1272 – .1358) |

Reaction plate (For adjustment of underdrive clutch clearance)

| Thickness mm (in.) | Thickness mm (in.) | Thickness mm (in.) | Thickness mm (in.) |
|--------------------|---------------------|--------------------|--------------------|
| 5.52 (.2173) | 6.01 (.2366) | 6.50 (.2559) | 6.99 (.2752) |

Snap ring (For adjustment of reverse clutch clearance)

| Thickness mm (in.) | Thickness mm (in.) | Thickness mm (in.) | Thickness mm (in.) |
|--------------------|--------------------|--------------------|--------------------|
| 1.56 (.0614) | 1.80 (.0709) | 2.05 (.0807) | 2.30 (.0906) |

Shim (For adjustment of output gear bearing preload, transfer shaft bearing end play)

| Thickness mm (in.) | Thickness mm (in.) | Thickness mm (in.) | Thickness mm (in.) |
|--------------------|--------------------|--------------------|---------------------|
| 3.22 (.1268) | 3.46 (.1362) | 3.70 (.1457) | 3.94 (.1551) |
| 3.26 (.1283) | 3.50 (.1378) | 3.74 (.1472) | 3.98 (.1567) |
| 3.30 (.1299) | 3.54 (.1394) | 3.78 (.1488) | 4.02 (.1583) |
| 3.34 (.1315) | 3.58 (.1409) | 3.82 (.1504) | 4.06 (.1598) |
| 3.38 (.1331) | 3.62 (.1425) | 3.86 (.1520) | 4.10 (.1614) |
| 3.42 (.1346) | 3.66 (.1441) | 3.90 (.1535) | 4.14 (.1630) |

Shim (For adjustment of output gear bearing preload, transfer shaft bearing end play)

*1: Also used as "test" shim. (Output gear)

*2: Also used as "test" shim. (Transfer shaft)

| Thickness mm (in.) | Thickness mm (in.) | Thickness mm (in.) | Thickness mm (in.) |
|--------------------|--------------------|--------------------|--------------------|
| 4.18 (.1646) | 4.34 (.1709) | 4.50 (.1772)*1 | 4.66 (.1835)*2 |
| 4.22 (.1661) | 4.38 (.1724) | 4.54 (.1787) | |
| 4.26 (.1677) | 4.42 (.1740) | 4.58 (.1803) | |
| 4.30 (.1693) | 4.46 (.1756) | 4.62 (.1819) | |

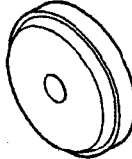

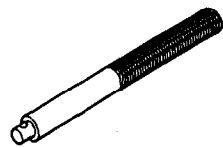
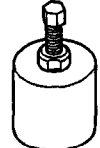
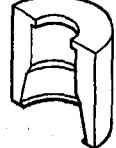
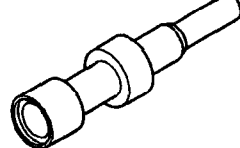
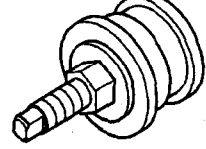
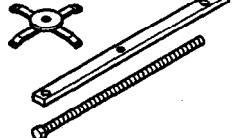
Shim (For adjustment of differential bearing preload)

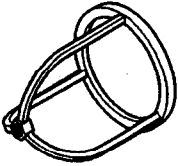
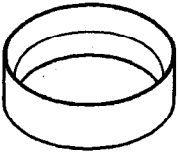
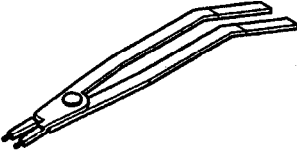
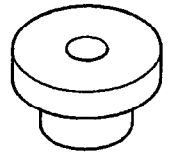
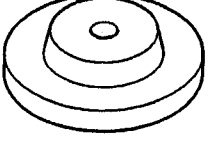
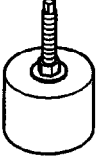
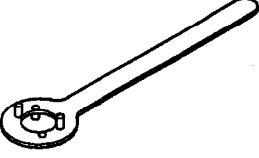
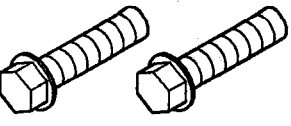
*3: Also used as "test" shim. (Differential bearing)

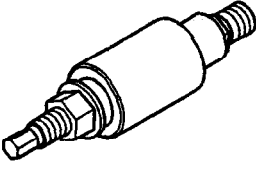

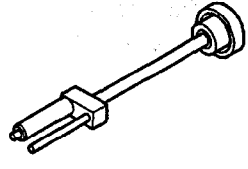
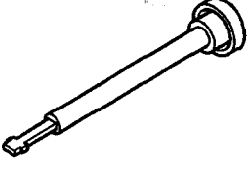
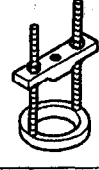
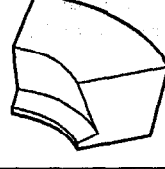
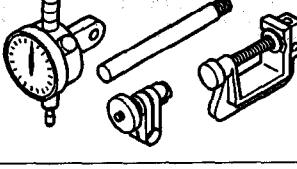
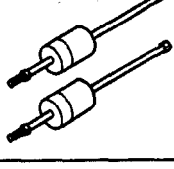
| Thickness mm (in.) | Thickness mm (in.) | Thickness mm (in.) | Thickness mm (in.) |
|---------------------|---------------------|---------------------|--------------------|
| 0.50 (.0197)*3 | 0.65 (.0256) | 0.80 (.0315) | 0.95 (.0374) |
| 0.55 (.0217) | 0.70 (.0276) | 0.85 (.0335) | 1.00 (.0394) |
| 0.60 (.0236) | 0.75 (.0295) | 0.90 (.0354) | 1.05 (.0413) |

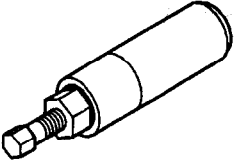

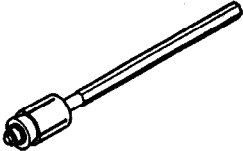

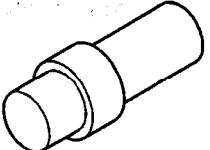
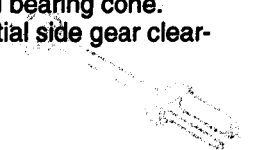
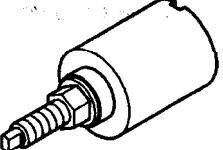



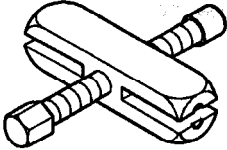
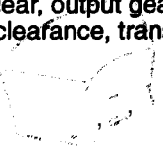
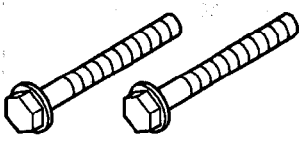

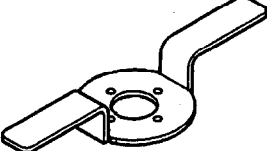

SPECIAL TOOLS

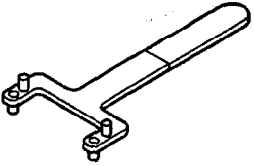
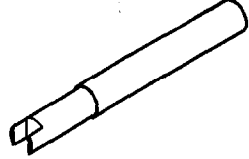
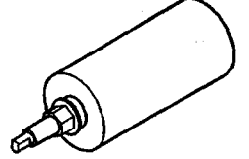
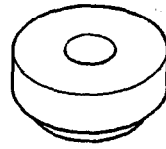
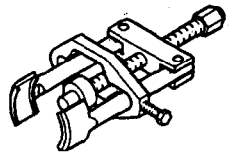
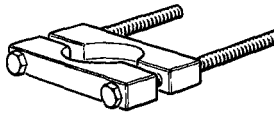
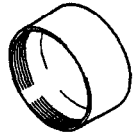
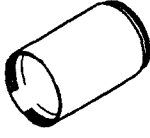
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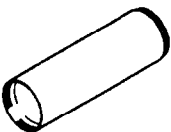
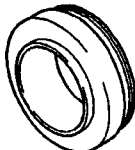
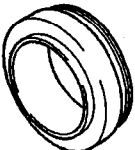


| Tool | Tool number and name | Supersession | Application |
|---|-----------------------------------|--------------|--|
|  | MB990933 Installer adapter | MB990933-01 | Installation of differential bearing retainer bearing cup. |
|  | MB990936 Installer adapter | MB990936-01 | Installation of transfer shaft gear bearing cup, output bearing cup. |
|  | MB990938 Installer bar | MB990938-01 | Use with MB990933, MB990936. |
|  | MB995001 Bearing puller | 5048 | Removal of transfer shaft gear bearing race, rear carrier cone. |
|  | MB995002 Bearing puller | 5048-3 | Removal of rear carrier cone. |
|  | MB995003 Installer remover | 5049-A | Installation and removal of transfer shaft. |
|  | MB995004 Bearing cap installer | 5050 | Installation of output bearing cup. |
|  | MB995005 Spring compressor | 5058 | Removal of 2/4 clutch retainer snap ring. Installation and removal of low-reverse clutch snap ring. |

| Tool | Tool number and name | Supersession | Application |
|---|---------------------------------|--------------|---|
|  | MB995006 Spring compressor | 5059 | Installation and removal of low-reverse clutch snap ring, underdrive clutch spring retainer snap ring. |
|  | MB995007 Seal installer | 5067 | Installation of underdrive clutch spring retainer snap ring. |
|  | MB995008 Snap ring plier | 6051 | Installation and removal of transfer shaft bearing snap ring. |
|  | MB995009 Thrust button | 6055 | Removal of output gear, rear carrier cone. |
|  | MB995010 Disc | 6057 | Installation and removal of low-reverse clutch snap ring, overdrive piston snap ring. |
|  | MB995011 Bearing cup remover | 6062 | Removal of transfer shaft gear bearing cup, output bearing cup. |
|  | MB995012 Holder | 6259 | Installation and removal of transfer shaft gear nut, output gear bolt. Adjustment of output gear, transfer shaft. |
|  | MB995013 Special bolts | 6260 | Adjustment of output gear clearance. |

| Tool | Tool number and name | Supersession | Application |
|---|-----------------------------------|----------------------|--|
|  | MB995014 Gear installer | General service tool | Installation of transfer shaft gear. |
|  | MB995015 Dial indicator tip | MB995015-01 | Adjustment of low-reverse clutch. |
|  | MB995016 Installer remover | General service tool | Installation and removal of T/C control valve, T/C clutch switch valve. |
|  | MB995017 Installer remover | MB995017-01 | Installation and removal of regulator valve. |
|  | MB995028 Puller | MD998348-01 | Removal of differential bearing cone. |
|  | MB995029 Adapter blocks | MD998348-01 | Removal of differential bearing cone. |
|  | MB995030 Dial indicator set | General service tool | Adjustment of underdrive clutch clearance, overdrive clutch. |
|  | MB995031 Puller set | MIT3752A-1 | Removal of oil pump. |

| Tool | Tool number and name | Supersession | Application |
|---|--|--------------|---|
|  | MB995032 Seal remover | C-3981 | Removal of oil pump oil seal.  |
|  | MB995038 Differential bearing torque tool | C-4995 | Adjustment of differential bearing.  |
|  | MB995039 Adapter | C-4996 | Removal of differential bearing cone. Adjustment of differential side gear clearance.  |
|  | MB995041 Bearing and gear remover | L-4406 | Removal of differential bearing cone.  |
|  | MB995042 Bearing and gear remover | L-4406-3 | Removal of differential bearing cone.  |
|  | MB995043 Gear puller | L-4407 | Removal of transfer shaft gear, output gear. Adjustment of output gear clearance, transfer shaft.  |
|  | MB995044 Bolts | L-4407-6 | Removal of transfer shaft gear, output gear. Adjustment of output gear clearance, transfer shaft.  |
|  | MB995045 Fixture | L-4432 | Adjustment of output gear clearance, transfer shaft.  |

| Tool | Tool number and name | Supersession | Application |
|---|-------------------------------------|----------------------|---|
|  | MB995046 Remover | L-4435 | Removal of differential bearing retainer. |
|  | MB995047 Checking tool | L-4436-A | Adjustment of differential clearance, differential turning drive torque. |
|  | MB995048 Cup remover | L-4518-1 | Removal of differential bearing retainer bearing cup. Adjustment of differential bearing. |
|  | MB995049 Button | L-4539-2 | Removal of transfer shaft gear bearing cone. |
|  | MD998348 Bearing and gear puller | MD998348-01 | Removal of transfer shaft gear bearing cone. |
|  | MD998801 Bearing remover | MD998348-01 | Removal of transfer shaft bearing cone. |
|  | MD998812 Installer cap | General service tool | Use with MD998813, MD998814, MD998821, MD998823, MD998825, MD998827. |
|  | MD998813 Installer-100 | General service tool | Use with MD998812, MD998821, MD998825. |

| Tool | Tool number and name | Supersession | Application |
|--|---------------------------------------|-------------------------|--|
|  | MD998814 Installer-200 | MIT304180 | Use with MD998812, MD998821. |
|  | MD998821 Installer adapter (44) | - | Installation of transfer shaft bearing cone, rear carrier cone. |
|  | MD998823 Installer adapter (48) | - | Installation of transfer shaft gear bearing cone, output bearing cone. |
|  | MD998825 Installer adapter (52) | General service tool | Installation of oil pump oil seal. |
|  | MD998827 Installer adapter (56) | MD998827 | Installation of differential oil seal, differential bearing retainer bearing cup. |

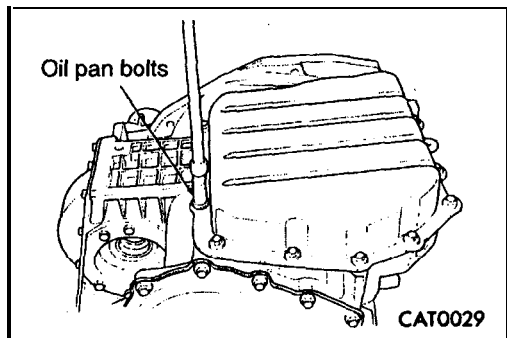
TRANSAXLE

23310090012

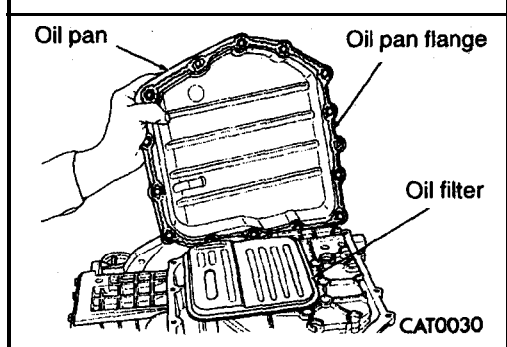
DISASSEMBLY

Caution

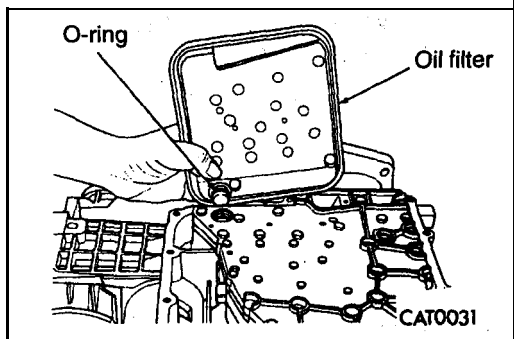
Do not intermix clutch discs or plates, or the unit might fall.



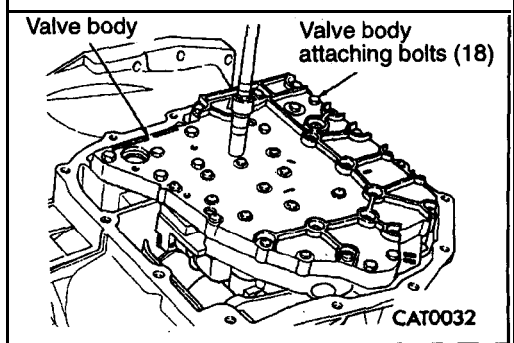
(1) Remove oil pan bolts.



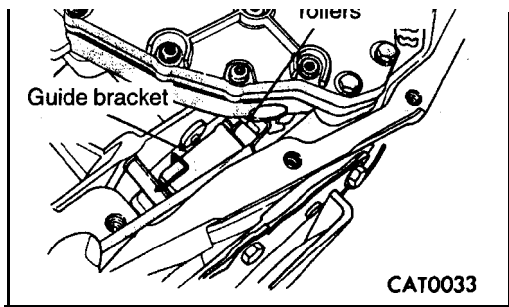
(2) Remove oil pan.



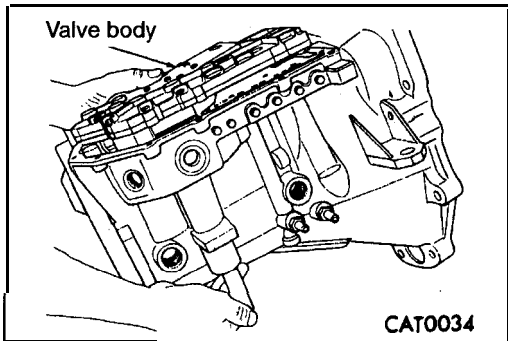
(3) Remove oil filter.



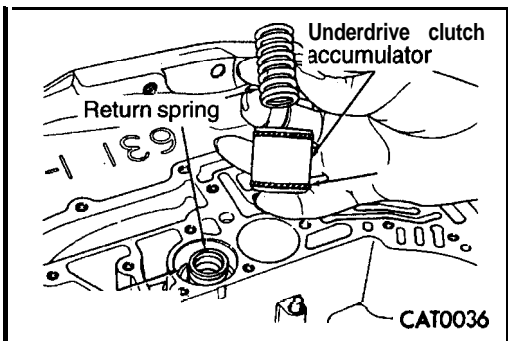
(4) Remove valve body attaching bolts (18).



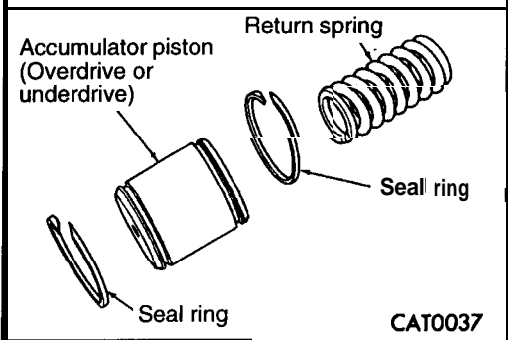
guide bracket.



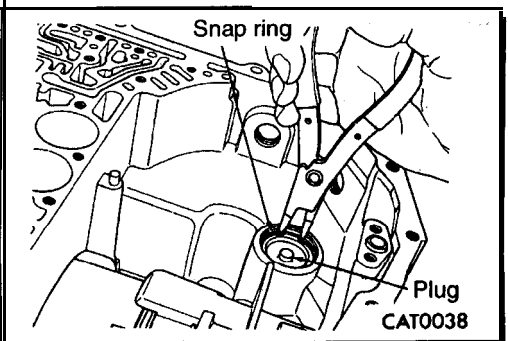
(6) Remove valve body.



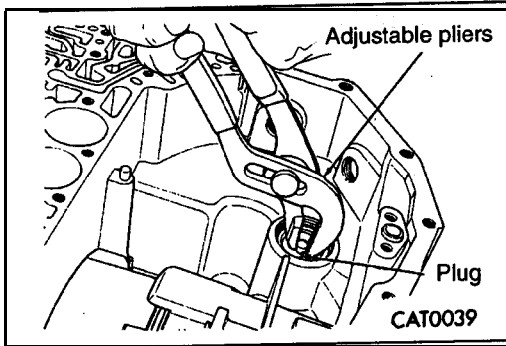
(7) Remove underdrive clutch accumulator and overdrive clutch accumulator with return springs and seal rings.



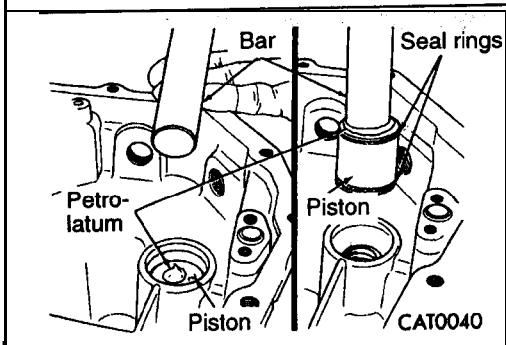
(8) Remove return spring and two seal rings from the overdrive and underdrive clutch accumulator pistons.



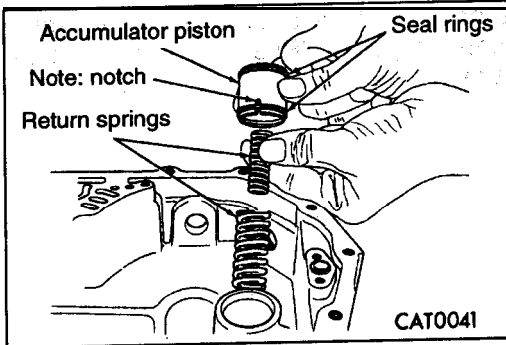
(9) Remove the snap ring holding the low/reverse accumulator plug (cover) in place.



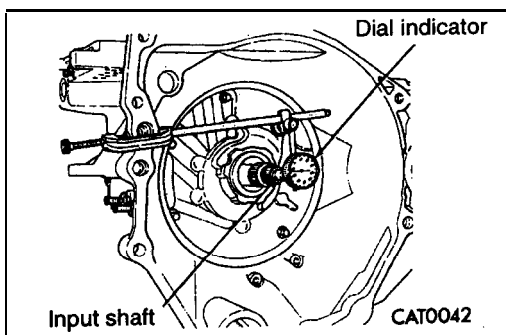
(10) Using adjustable pliers, pull out low/reverse accumulator plug.



(11) Put a dab of petrolatum on the top of low/reverse, accumulator piston. Using a **smooth-surface** bar or, equivalent, press the bar evenly against the **petrolatum** so it sticks to the piston. Pull out the piston.



(12) Remove two return springs.

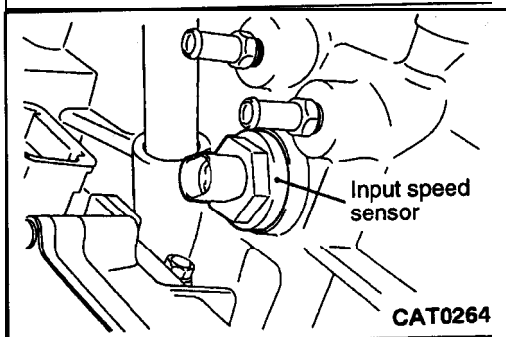


(13) **Measuring** input shaft end play before disassembly Will usually indicate when a No. 4 thrust plate **change** is required (except when major parts are **replaced**). The No. 4 thrust plate is **located behind** the overdrive **clutch** hub.

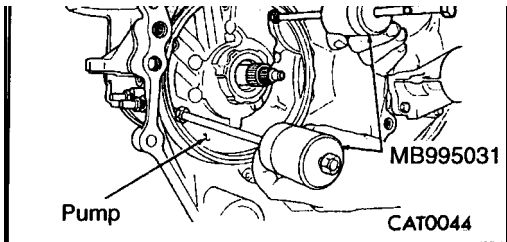
Attach a dial indicator to transaxle **bell-housing with** its plunger seated against end of input shaft.

Move input shaft in and out to obtain end **play** reading.

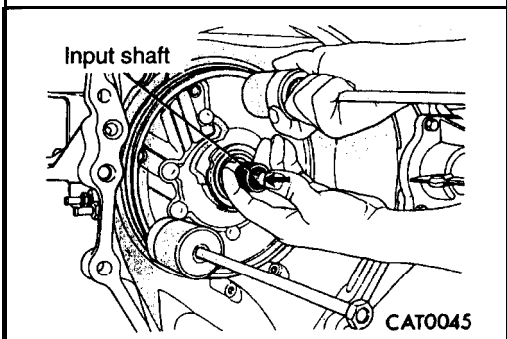
End play specifications are **0.13 to 0.64 mm (.005 to .025 inch.)**. Record indicator reading for reference **when** reassembling the. transaxle.



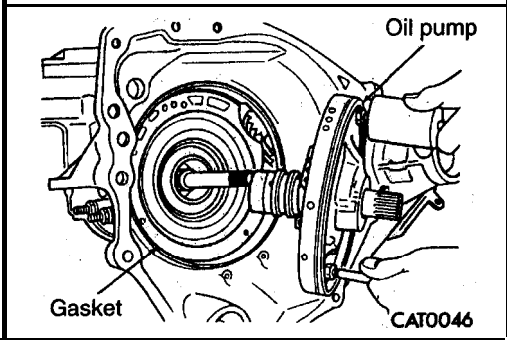
(14) Remove input speed sensor.



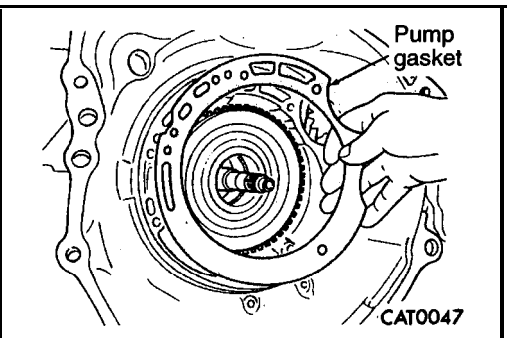
CAT0044



CAT0045



CAT0046

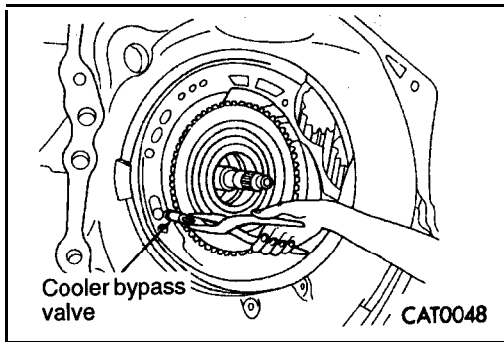


CAT0047

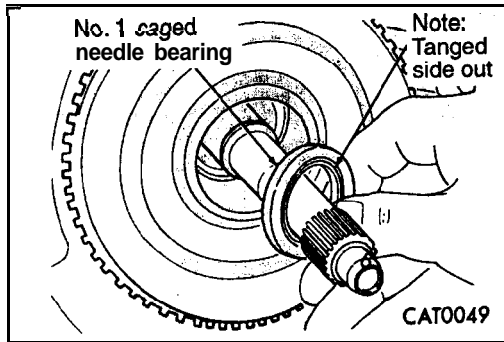
(17) Strike the weights of the pullers against the **bolt heads** of the tools to loosen the pump. **"Push in"** on input **shaft** while loosening pump.

(18) Remove oil pump.

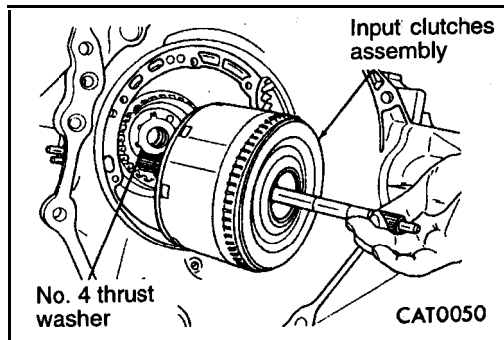
(19) Remove oil pump gasket.



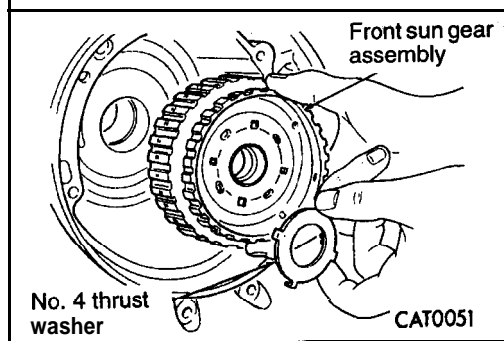
(20) Remove cooler bypass valve.



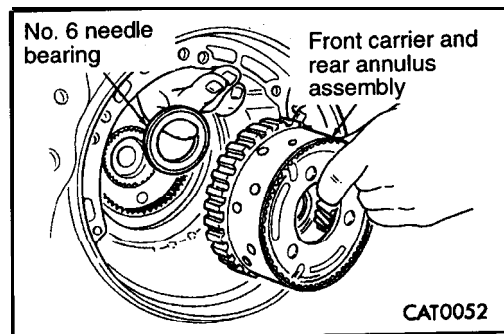
(21) Remove No. 1 caged needle bearing.



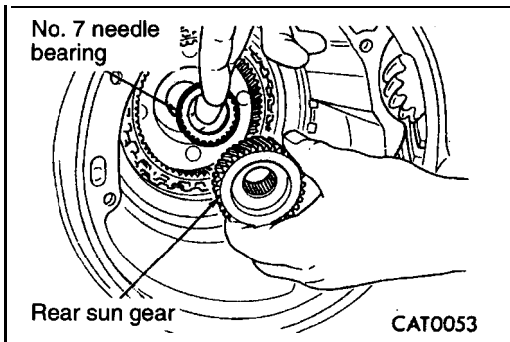
(22) Remove input clutches assembly.



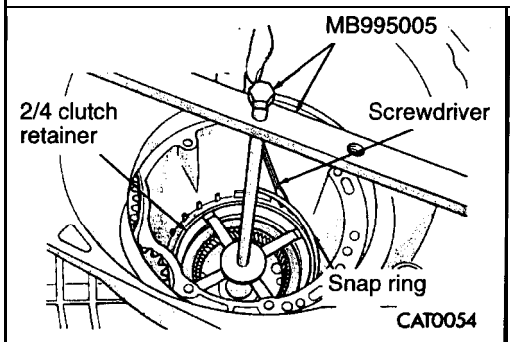
(23) Remove No. 4 thrust plate and front sun gear assembly.



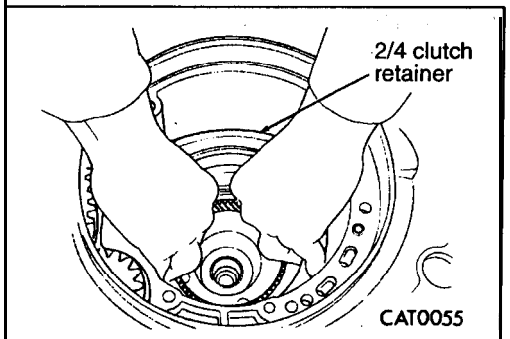
(24) Twist and pull to remove front carrier and rear annulus assembly.
Remove No. 6 needle bearing.



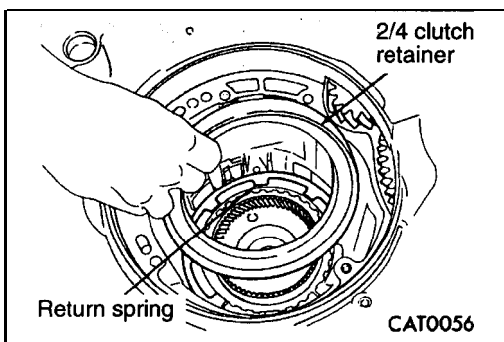
(25) Remove rear sun gear and No. 7 needle bearing.



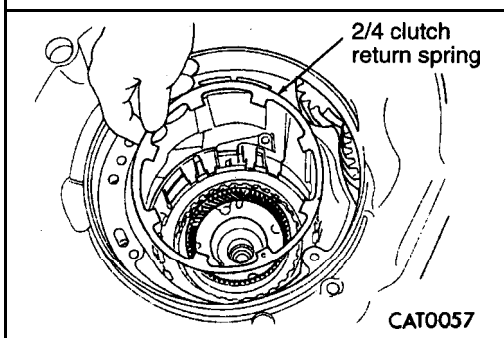
(26) Install spring compressor **MB995005**. Using the special tool, compress the $2/4$ clutch retainer just enough to remove the snap ring. Using a screwdriver, remove the $2/4$ clutch retainer snap ring.



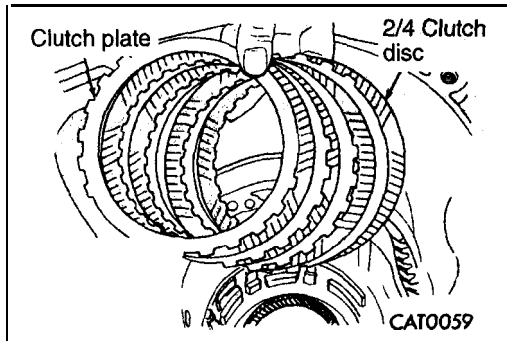
(27) Pull up $2/4$ clutch retainer by hand.



(28) Remove $2/4$ clutch retainer.



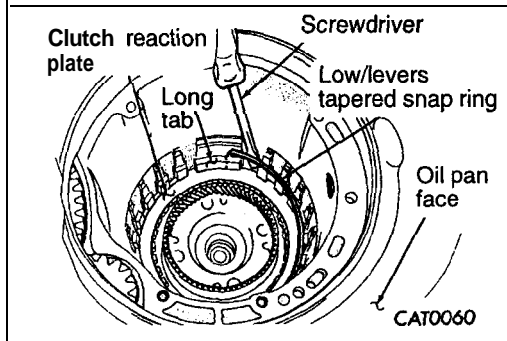
(29) Remove $2/4$ clutch return spring.



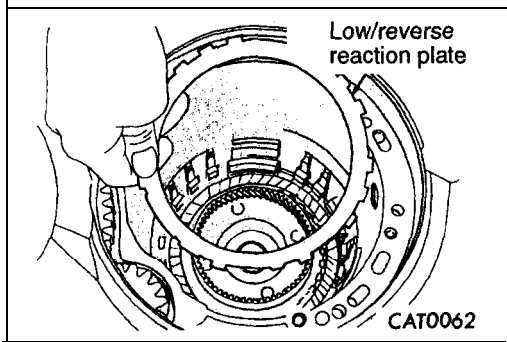
(30) Remove 2/4 clutch pack.

NOTE

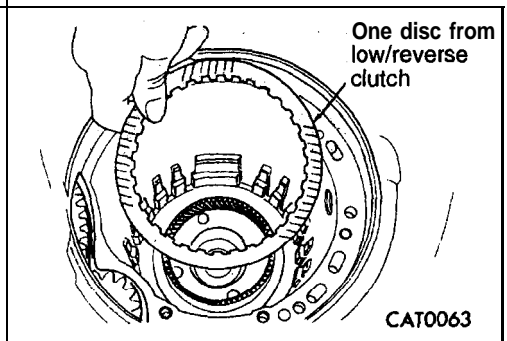
Tag 2/4 clutch pack for reassembly identification.



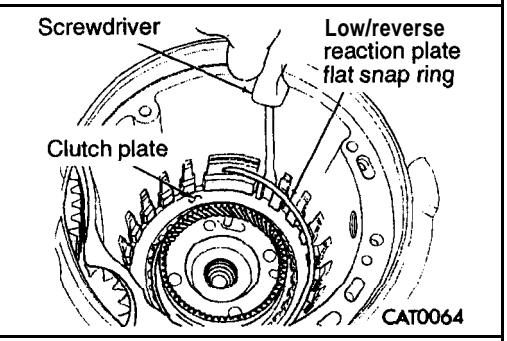
(31) Remove tapered snap ring by prying with a screwdriver as shown.



(32) Remove low/reverse reaction plate.



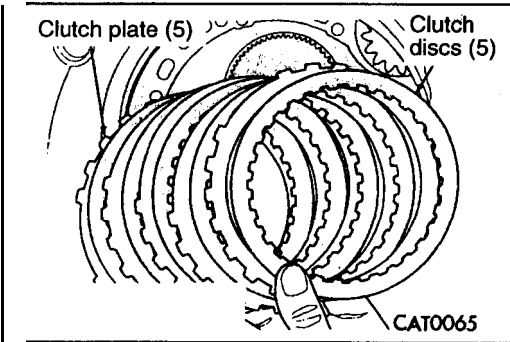
(33) Remove one disc from low/reverse clutch.



(34) Using a screwdriver, pry out the low/reverse reaction plate flat snap ring.

Caution

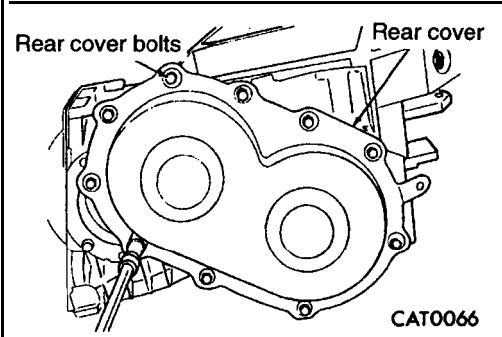
Use care not to scratch the clutch plate with screwdriver tip while prying out snap ring.



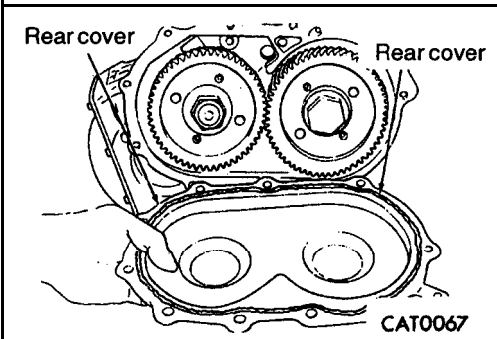
(35) Remove low/reverse clutch pack.

NOTE

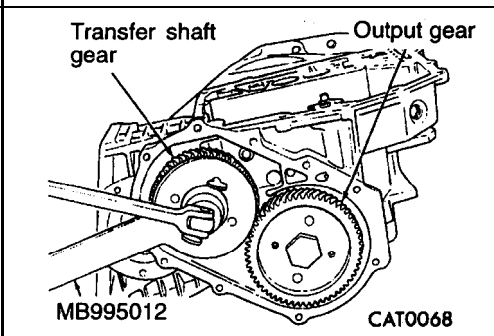
Tag low/reverse clutch pack for **reassembly** identification.



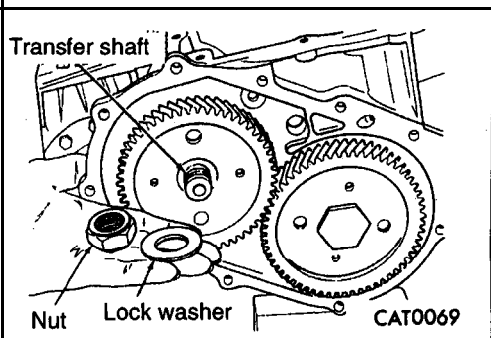
(36) Remove rear cover bolts.



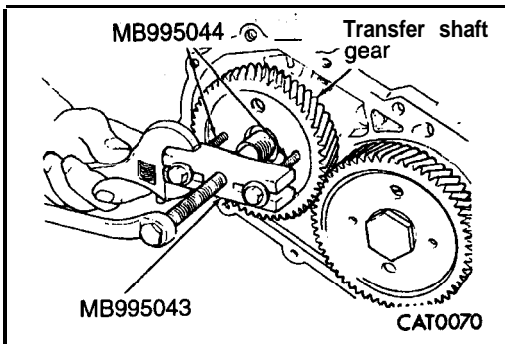
(37) Remove rear cover.



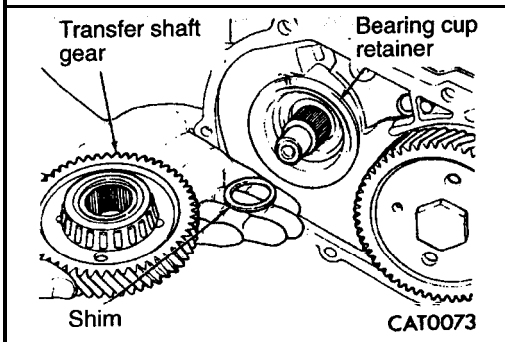
(38) While holding transfer shaft gear with Holder **MB995012**, loosen transfer shaft gear nut.



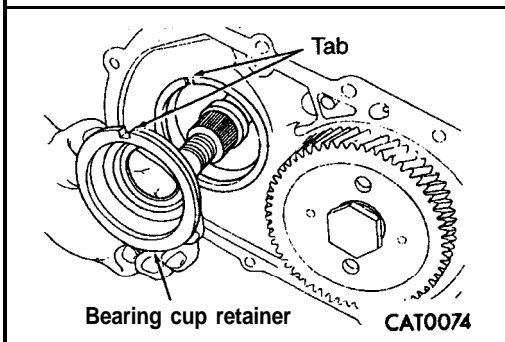
(39) Remove transfer shaft gear nut and lock washer.



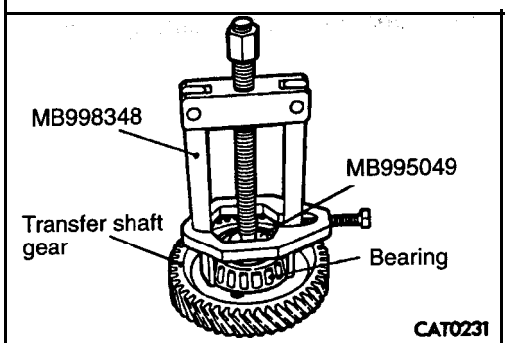
(40) Install Gear Puller **MB995043** and Bolts **MB995044** to transfer shaft gear. Using the appropriate wrench, turn, the center bolt clockwise to remove gear.



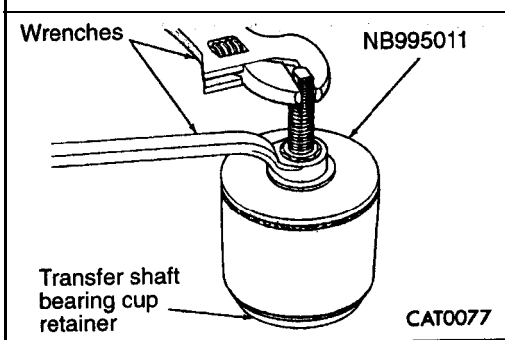
(41) Remove transfer shaft gear and shim.



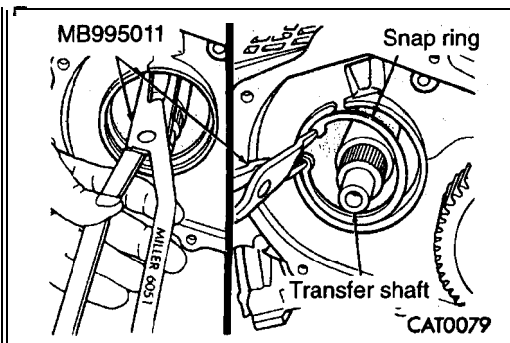
(42) Remove bearing cup retainer.



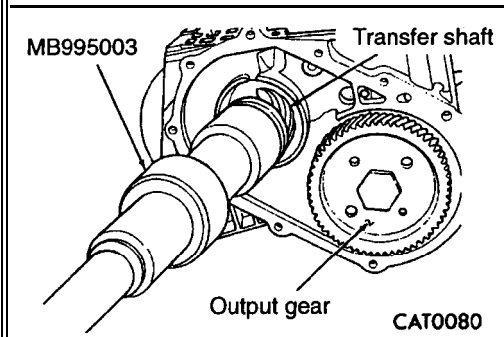
(43) Install Bearing Puller **MD998348** and Button **MB995049** on transfer shaft gear bearing to remove bearing.



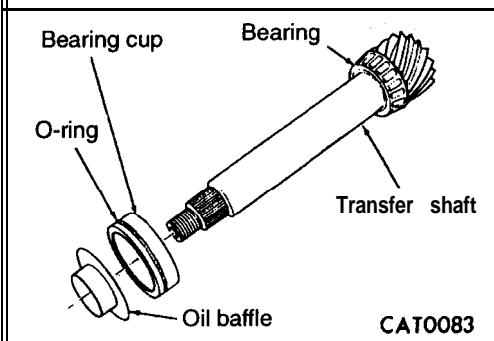
(44) Using Bearing Cup Remover- **NB995011**, remove transfer shaft gear bearing cup.



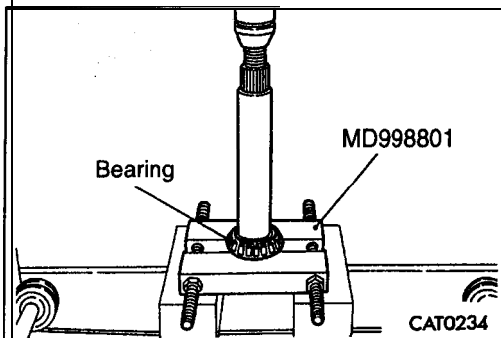
(45) Remove transfer shaft bearing snap ring with Snap Ring Pliers MB995008



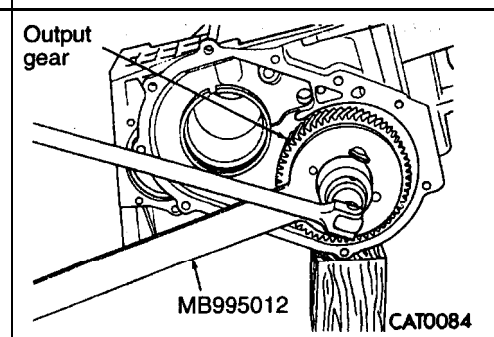
(46) Remove transfer shaft with Installer/Remover MB995003.



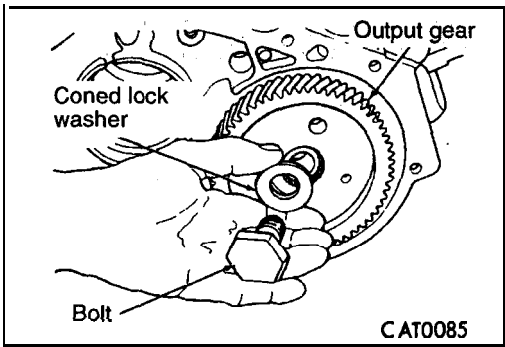
(47) Remove oil baffle and bearing cup from transfer shaft.



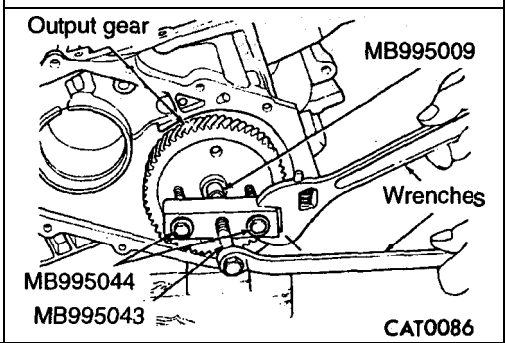
(48) Remove transfer shaft bearing with Bearing Splitter MD998801.



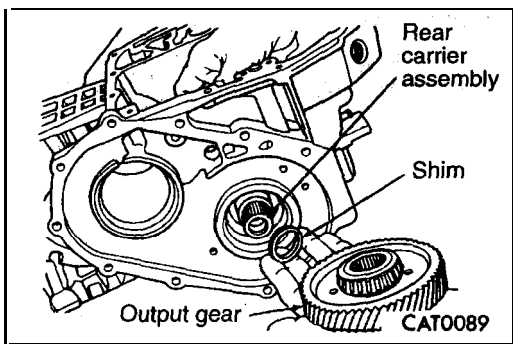
(49) While holding output gear with Holder MB995012, loosen output gear bolt.



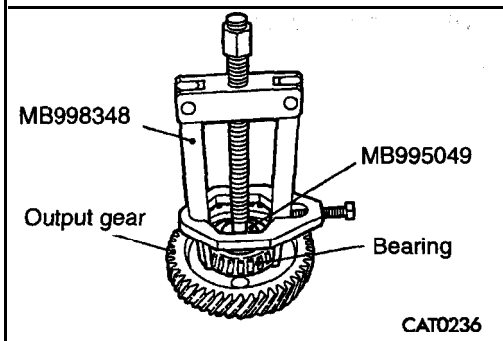
(50) Remove output gear bolt and coned lock washer.



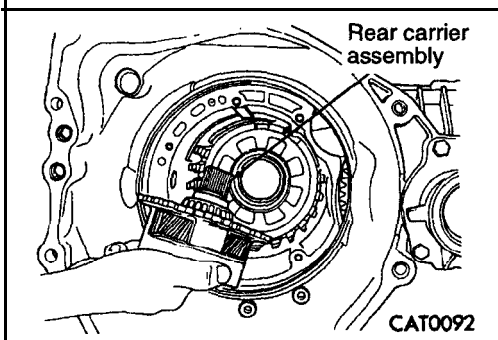
(51) Install Gear Puller **MB995043** with Bolts **MB995044** and Thrust Button **MB995009** to output gear. Turn puller center bolt clockwise to remove gear.



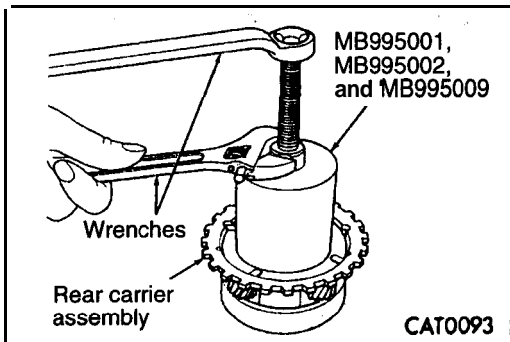
(52) Remove output gear and shim.



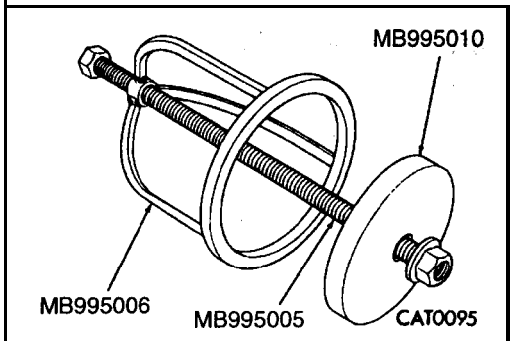
(53) Install Bearing and Gear Puller **MD998348** and Button **MB995049** on output gear bearing to remove bearing.



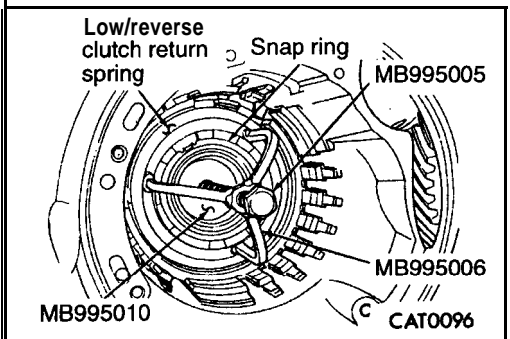
(54) Remove gear carrier assembly.



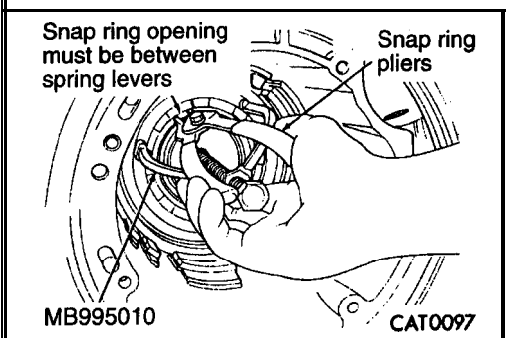
(55) Remove gear carrier bearing with-, Rearing Puller MB995001 and MB995002 and Thrust Button MB995009.



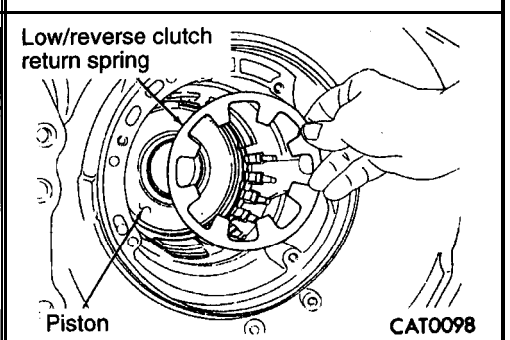
(56) Use center bolt of Spring Compressor MB995005, Spring Compressor MB995006 and Disc MB995010 to assemble low/reverse spring compressor tool.



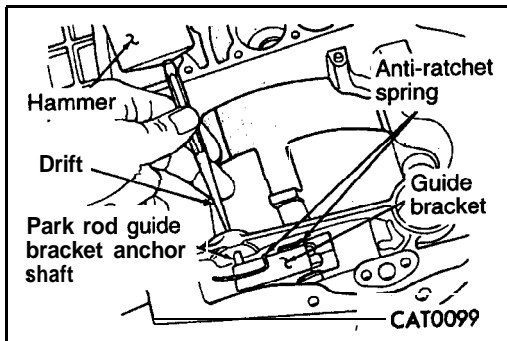
(57) Install compressor tool to transaxle as shown. Compress low/reverse piston assembly. Position Spring Compressor MB995005 to allow access to snap ring.



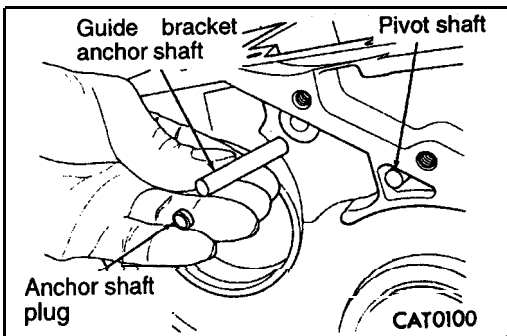
(58) Remove snap ring with snap ring pliers.



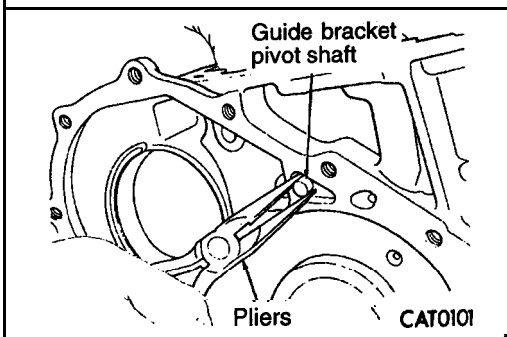
(59) Remove low/reverse. piston return spring.



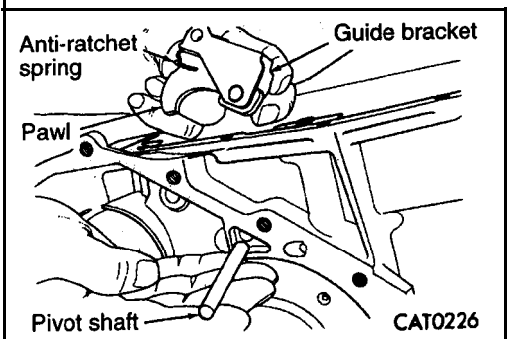
(60) Drive out park rod **guide** bracket anchor shaft with a hammer and drift.



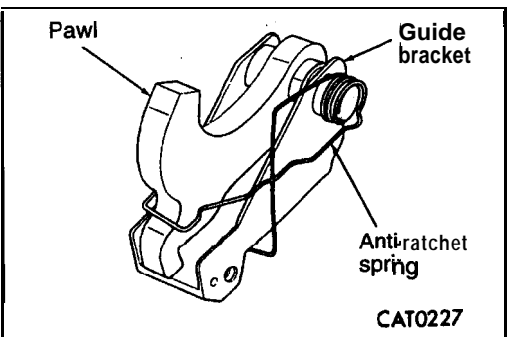
(61) Remove guide bracket anchor shaft and plug.



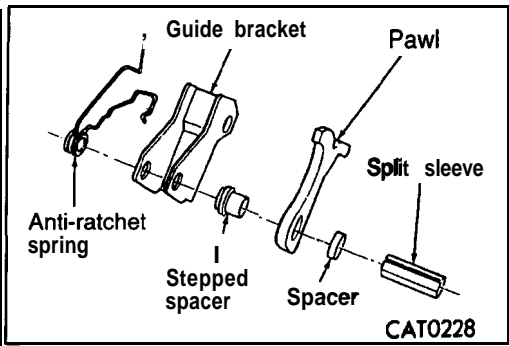
(62) Pull out guide bracket **pivot shaft** with pliers.



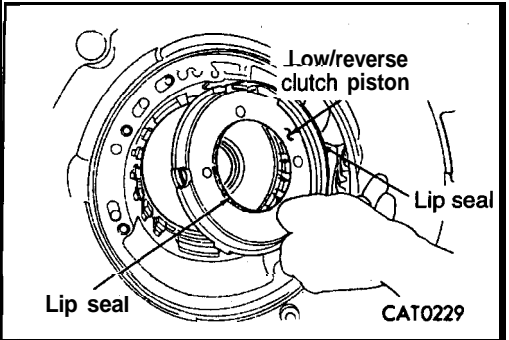
(63) Remove pivot shaft and **guide** bracket.



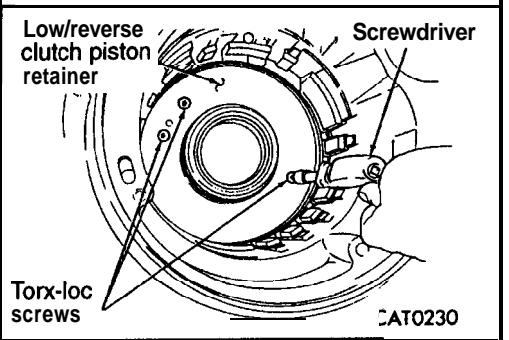
- Guide bracket' (assembled)



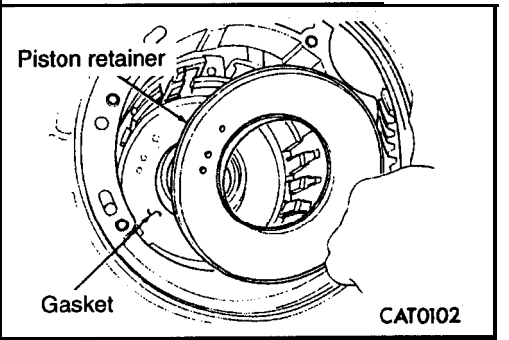
- Guide bracket (disassembled)



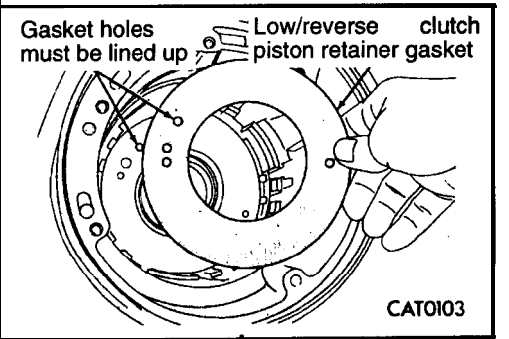
(64) Remove low/reverse clutch piston.



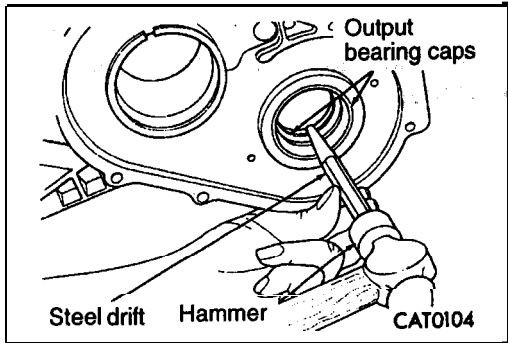
(65) Remove Torx-loc screws attaching low/reverse clutch piston retainer.



(66) Remove low/reverse clutch piston retainer.



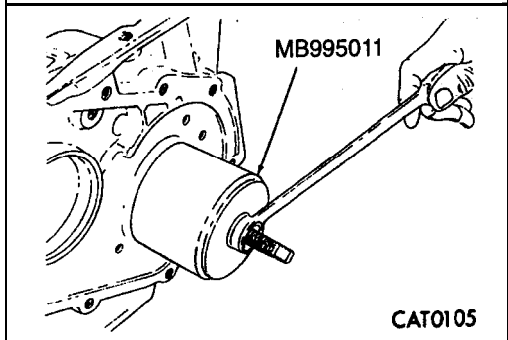
(67) Remove low/reverie clutch piston retainer gasket.



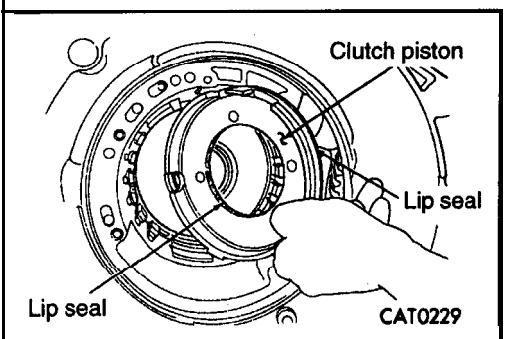
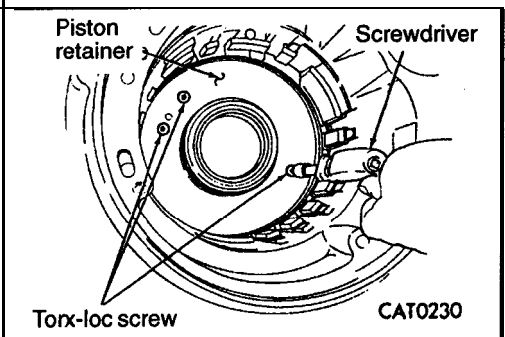
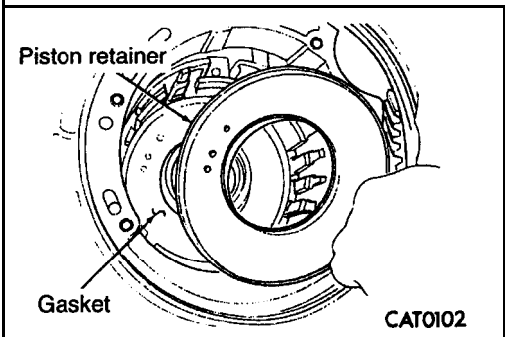
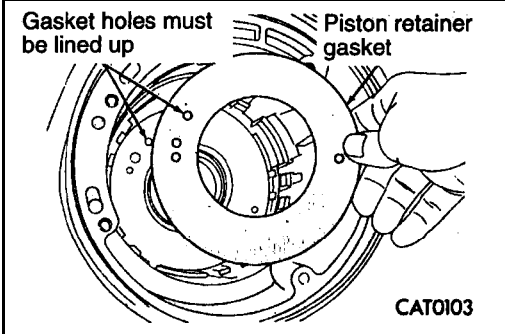
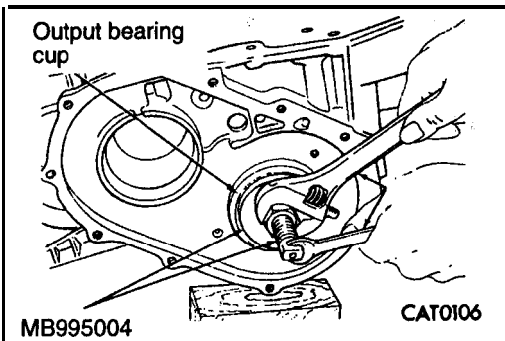
(68) Drive out "output bearing inner cup with a steel drift and hammer.

Caution

Drift bearing cup all the way, around.



(69) Remove output bearing outer cup with Bearing Cup Remover MB995011.



REASSEMBLY

23310100012

- (1) Install both output bearing cups using Bearing Installer MB995004 and wrenches.

- (2) Install low/reverse clutch retainer gasket.

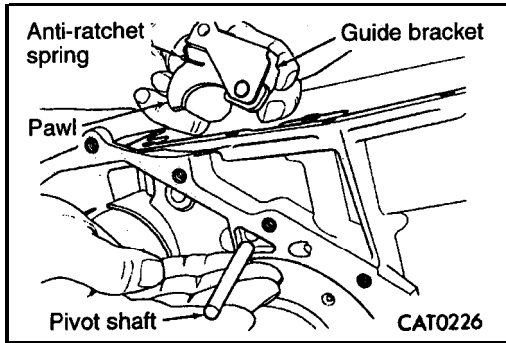
Caution

Be sure to align gasket holes.

- (3) Install low/reverse clutch piston retainer.

- (4) install Torx-loc screws attaching low/reverse clutch piston retainer.

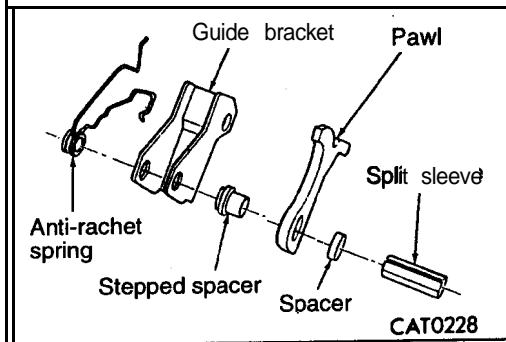
- (5) Install low/reverse clutch piston.



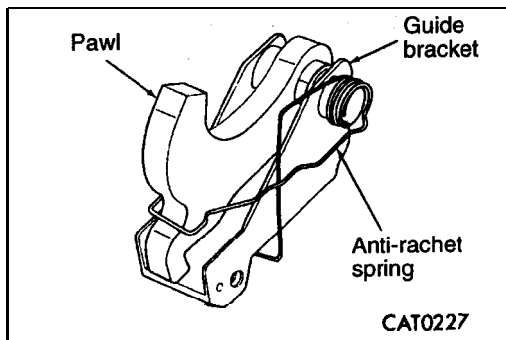
(6) Install pivot shaft and guide bracket.

Caution

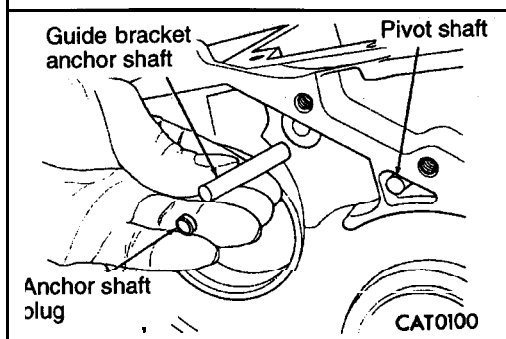
Be sure that guide bracket and split sleeve touch the rear of the case.



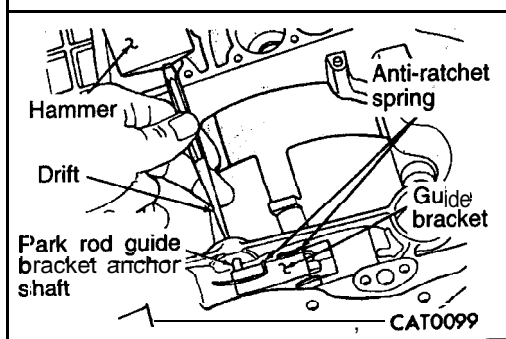
- Guide bracket (disassembled)



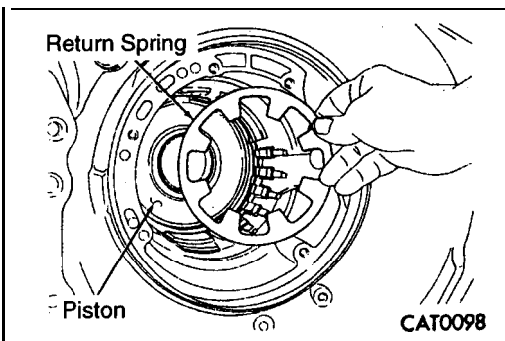
- Guide bracket (assembled)



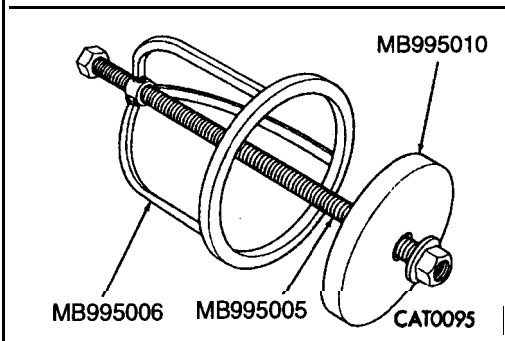
(7) Install guide bracket anchor shaft and **plug**.



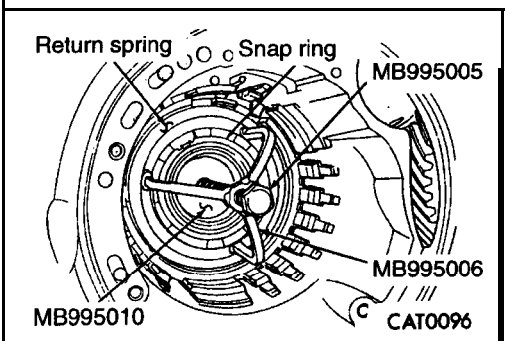
(8) Install park rod guide bracket anchor shaft with a **hammer** and drift.



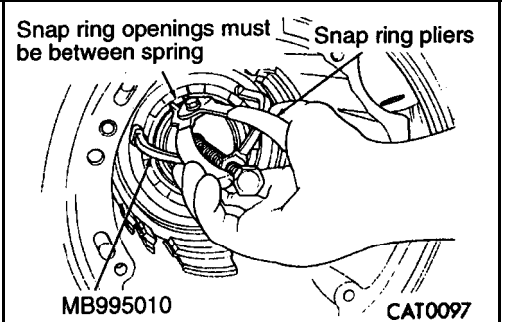
(9) Install low/reverse piston return spring.



(10) Use center bolt of Spring Compressor **MB995005**, Spring Compressor **MB995006** and Disc **MB995010** to assemble low/reverse spring compressor tool.



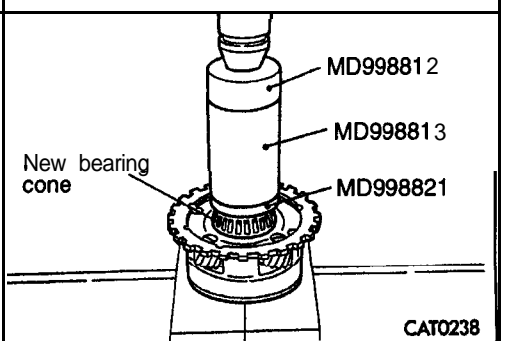
(11) Install compressor tool to transaxle as shown to compress low/reverse piston assembly.



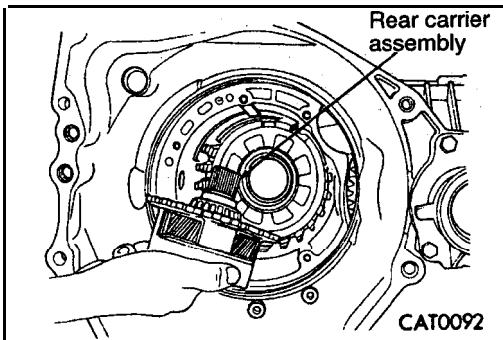
(12) Install snap ring with snap ring pliers.

NOTE

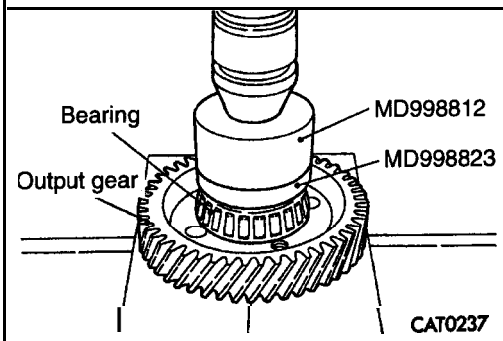
Be sure to place the opening between-spring covers.



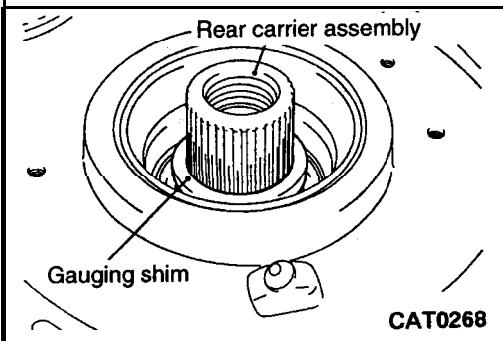
(13) Install rear carrier bearing cone, press onto rear carrier using Installer Cap, **MD998812**, Installer-100, **MD998813** and Installer Adapter (44), **MD998821**.



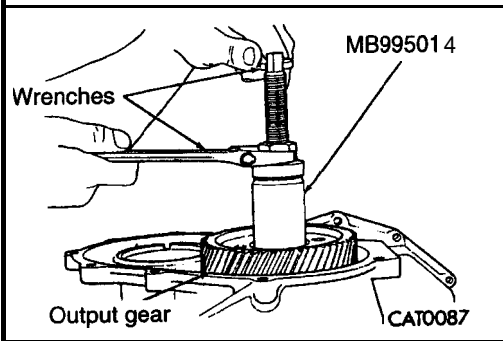
(14) Install rear carrier assembly.



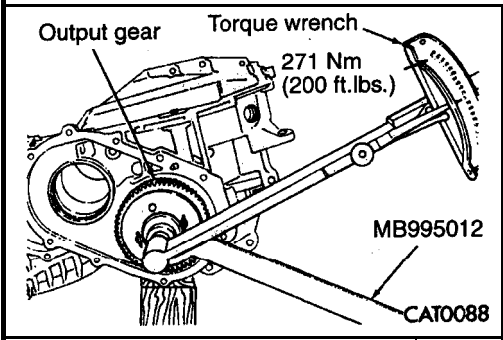
(15) Install bearing, press onto output gear using Installer Cap MD998812 and Installer Adapter (48) MD998823.



(16) Install a 4.50 mm (.1772 in.) “test” shim on the rear carrier assembly hub, using grease to hold the shim in place.



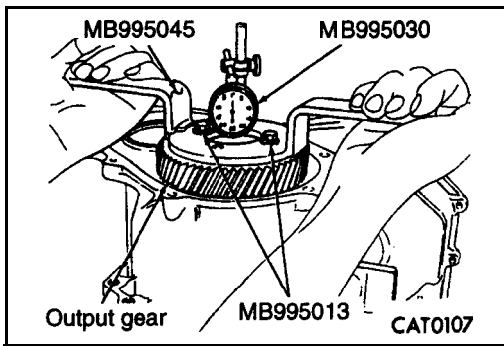
(17) Install output gear using Gear Installer MB995014 and two wrenches.



(18) Tighten output gear bolt to 271 Nm (200 ft.lbs.) while holding output gear with Holder MB995012.

Caution

Original retaining bolt must not be re-used. Always use a new retaining bolt when reassembling.



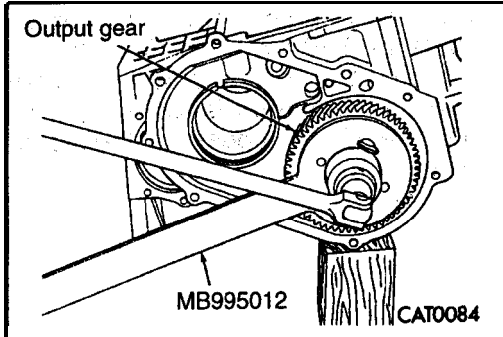
- (19) Install Dial Indicator Set MB995030 with Fixture MB995045 and Special Bolts MB995013.
- (20) Push and pull the gear while rotating back and forth to ensure seating of the bearing rollers.
- (21) Measure output gear end play.
- (22) Once bearing end play has been determined, refer to the Output Gear Bearing Shim, Chart for the required shim.

OUTPUT GEAR BEARING SHIM CHART

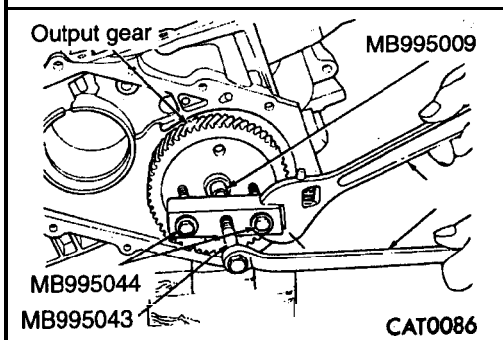
| End play with 4.50 mm (.1772 in.) "test" shim installed | | Required Shim | |
|---|-------|---------------|-------|
| mm | in. | mm | in. |
| 0.05 | .0020 | 4.42 | .1740 |
| 0.08 | .0031 | 4.38 | .1724 |
| 0.10 | .0039 | 4.38 | .1724 |
| 0.13 | .0051 | 4.34 | .1709 |
| 0.15 | .0059 | 4.30 | .1693 |
| 0.18 | .0071 | 4.30 | .1693 |
| 0.20 | .0079 | 4.26 | .1677 |
| 0.23 | .0091 | 4.22 | .1661 |
| 0.25 | .0098 | 4.22 | .1661 |
| 0.28 | .0110 | 4.18 | .1646 |
| 0.30 | .0118 | 4.14 | .1630 |
| 0.33 | .0130 | 4.14 | .1630 |
| 0.36 | .0142 | 4.10 | .1614 |
| 0.38 | .0150 | 4.10 | .1614 |

| End play with 4.50 mm (.1772 in.) "test" shim installed | | Required Shim | |
|---|-------|---------------|-------|
| mm | in. | mm | in. |
| 0.41 | .0161 | 4.06 | .1598 |
| 0.43 | .0169 | 4.02 | .1583 |
| 0.46 | .0181 | 4.02 | .1583 |
| 0.48 | .0189 | 3.98 | .1567 |
| 0.51 | .0201 | 3.94 | .1551 |
| 0.53 | .0209 | 3.94 | .1551 |
| 0.56 | .0220 | 3.90 | .1535 |
| 0.58 | .0228 | 3.90 | .1535 |
| 0.61 | .0240 | 3.86 | .1520 |
| 0.64 | .0252 | 3.82 | .1504 |
| 0.66 | .0260 | 3.82 | .1504 |
| 0.69 | .0272 | 3.78 | .1488 |
| 0.71 | .0280 | 3.74 | .1472 |
| 0.74 | .0291 | 3.74 | .1472 |
| 0.76 | .0299 | 3.70 | .1457 |
| 0.79 | .0311 | 3.66 | .1441 |

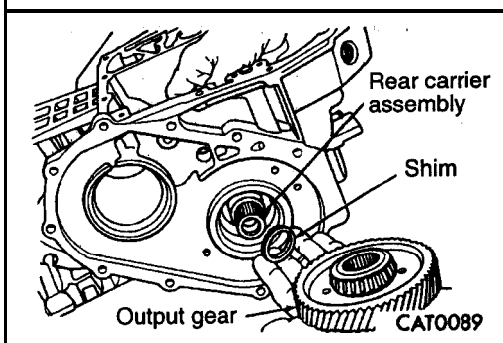
| mm | in. | mm | in. |
|------|-------|------|-------|
| 0.81 | .0319 | 3.66 | .1441 |
| 0.84 | .0331 | 3.62 | .1425 |
| 0.86 | .0339 | 3.62 | .1425 |
| 0.89 | .0350 | 3.58 | .1409 |
| 0.91 | .0358 | 3.54 | .1394 |
| 0.94 | .0370 | 3.54 | .1394 |
| 0.97 | .0382 | 3.50 | .1378 |



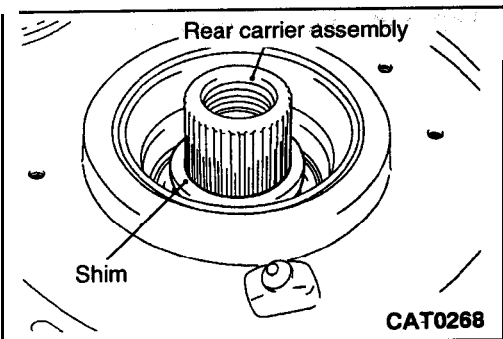
(23) While holding output gear with Holder MB995012, loosen output gear bolt and washer.



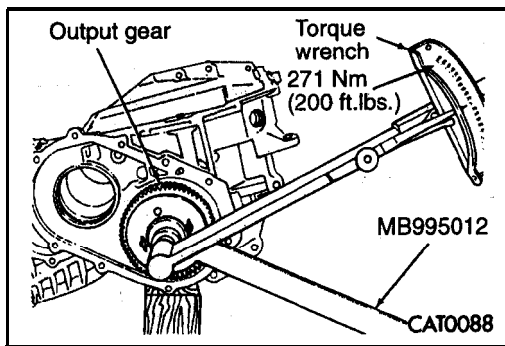
(24) Install Gear Puller MB995043 with Bolts MB995044 and Thrust Button MB995009 to output gear. Turn puller center bolt clockwise to remove gear.



(25) Remove the "test" shim and install the proper shim.



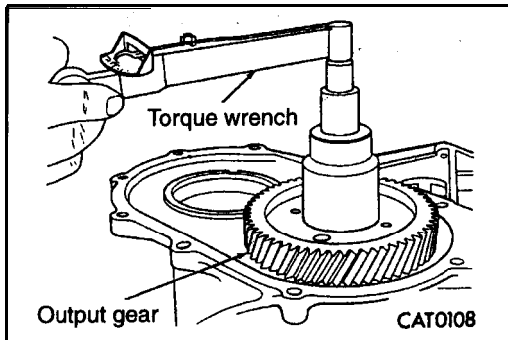
(26) Use grease to hold the shim in place. Install the output gear.



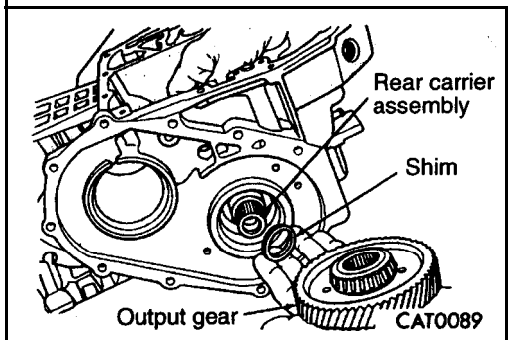
(27) Tighten output gear bolt to 271 Nm (200 ft.lbs.) while holding output gear with Holder MB995012.

Caution

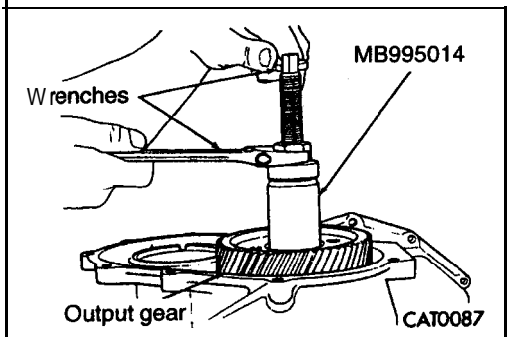
Original retaining bolt must not be re-used. Always use a new retaining bolt when reassembling.



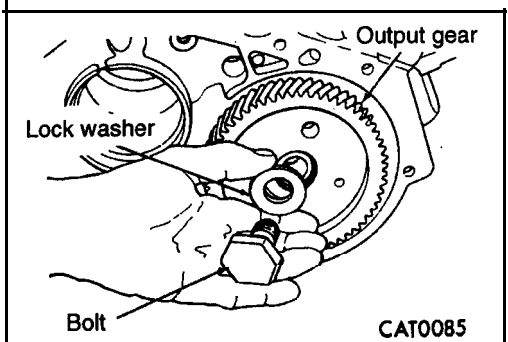
(28) Using torque wrench, check the turning torque. The torque should be between 0.34 to 0.90 Nm (3 to 8 in. lbs.). If the turning torque is too high, install a 0.04 mm (.0016 in.) thicker shim. If the turning torque is too low, install a 0.04 mm (.0016 in.) thinner shim. Repeat until the proper turning torque is obtained.



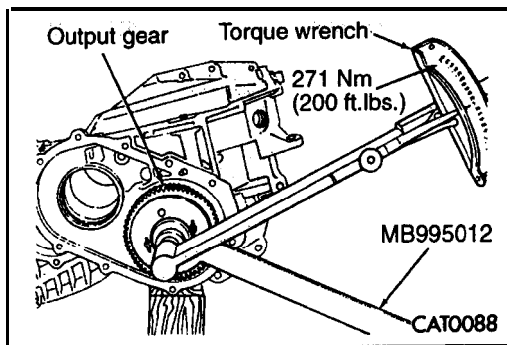
(29) Install output gear and proper shim.



(30) Install output gear, using Gear Installer MB995014 and two wrenches.



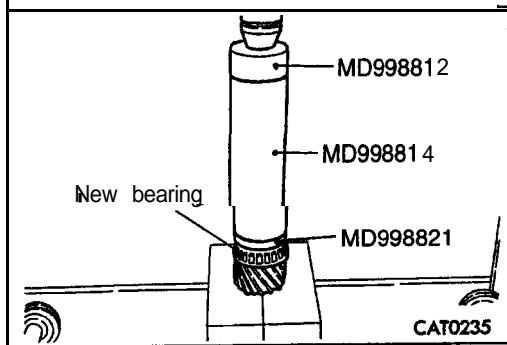
(31) Install output gear bolt and coned lock washer.



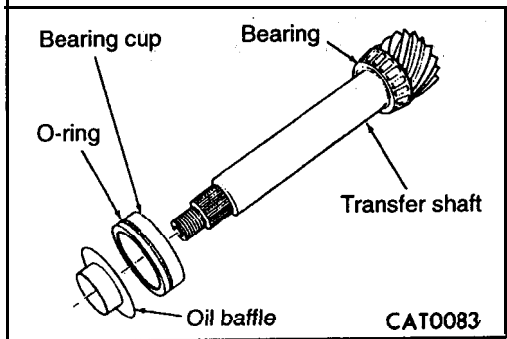
(32) Tighten output gear bolt to 271 Nm (200 ft.lbs.) while holding output gear with Holder MB995012.

Caution

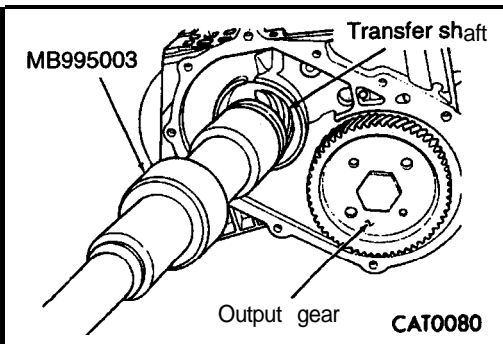
Always use new retaining bolt. Old retaining bolt must not be reused.



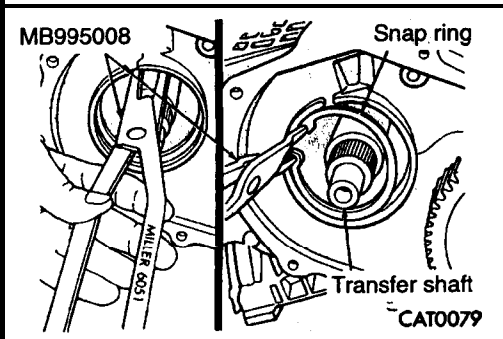
(33) Install transfer shaft bearing press onto transfer shaft using Installer Cap MD998812 Installer-200 MD998814 and Installer Adapter (44) MD998821.



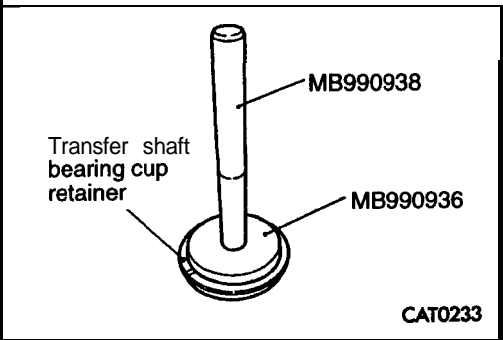
(34) Install oil baffle and bearing cup from transfer shaft.



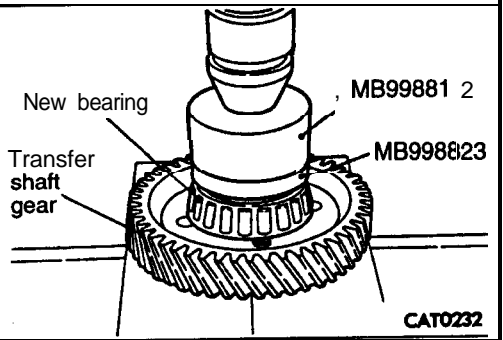
(35) Install transfer shaft with Installer/Remover MB995003.



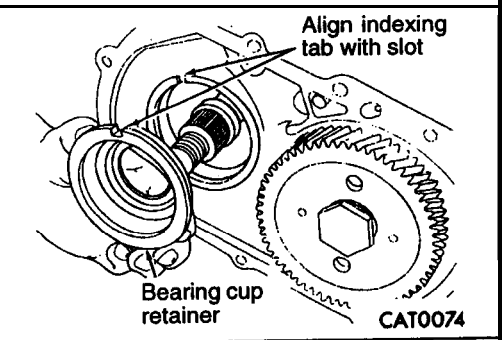
(36) Install transfer shaft bearing snap ring with Snap Ring Pliers MB995008.



(37) Install transfer shaft gear bearing cup, use Installer Adapter MB990936 and Installer Bar MB990938.

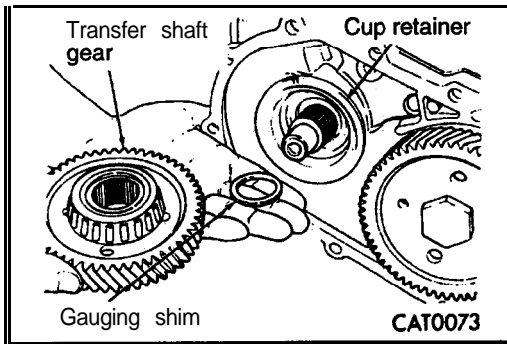


(38) Install bearing, press in using Installer Cap MD998812 and Installer Adapter (48) MD998823.

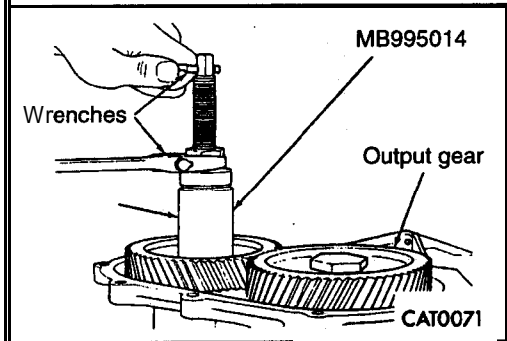


(39) Install bearing cup retainer.

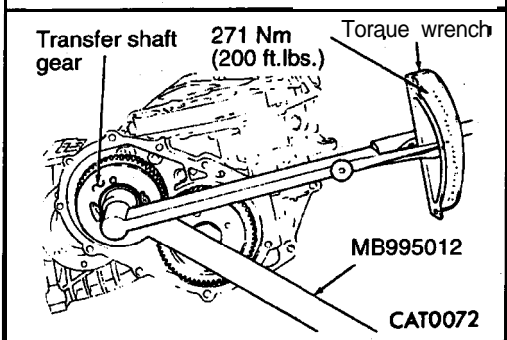
NOTE
Align indexing tab with slot.



(40) Install a 4.66 mm (.1835 in.) “test” shim on the transfer shaft.



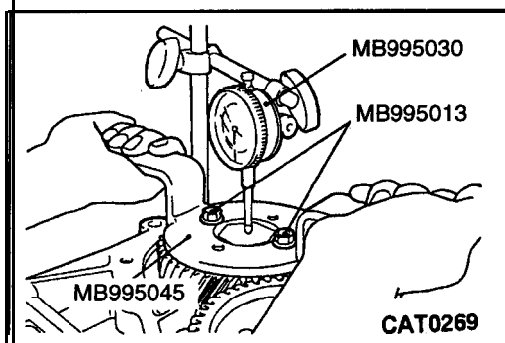
(41) Install transfer shaft gear, using Gear Installer MB995014 and two wrenches as shown.



(42) Tighten transfer shaft gear nut to 271 Nm (200 ft.lbs.) while holding transfer shaft gear with Holder MB995012.

Caution

Original retaining nut must not be re-used. Always use a new retaining nut when reassembling.



(43) Install Dial Indicator Set MB995030 with Fixture MB995045 and Special Bolts MB995013.

(44) Push and pull the gear while rotating back and forth to ensure seating of the bearing rollers.

(45) Measure transfer shaft gear end play.

(46) Once bearing end play has been determined, refer to the Transfer Bearing Shim Chart for the required shim.

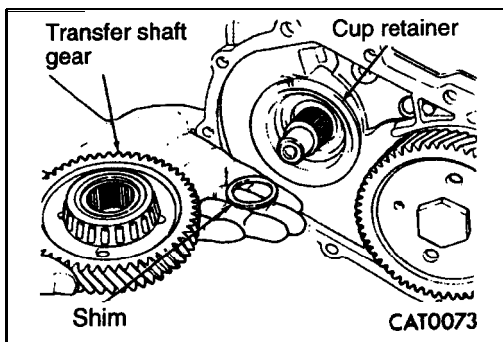
(47) End play should be between 0.05 to 0.10 mm (.0020 to .0039 in.).

If end play is too high, install a 0.04 mm (.0016 in.) thinner shim. If end play is too low, install a 0.04 mm (.0016 in.) thicker shim combination. Repeat until 0.05 to 0.10 mm (0.0020 to .0039 in.) end play is obtained.

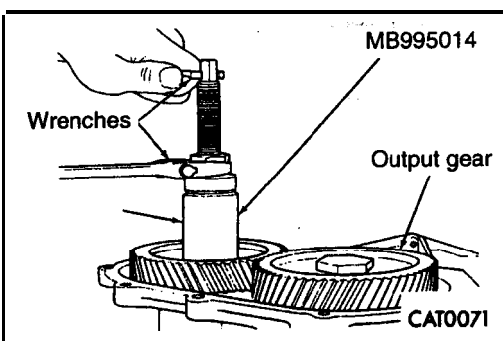
TRANSFER GEAR BEARING SHIM CHART

| End play with 4.66 mm (.1835 in.) "test" shim installed | | Required Shim | |
|---|-------|---------------|-------|
| mm | in. | mm | in. |
| 0.05 | .0020 | 4.66 | .1835 |
| 0.08 | .0031 | 4.62 | .1819 |
| 0.10 | .0039 | 4.58 | .1803 |
| 0.13 | .0051 | 4.58 | .1803 |
| 0.15 | .0059 | 4.54 | .1787 |
| 0.18 | .0071 | 4.50 | .1772 |
| 0.20 | .0079 | 4.50 | .1772 |
| 0.23 | .0091 | 4.46 | .1756 |
| 0.25 | .0098 | 4.46 | .1756 |
| 0.28 | .0110 | 4.42 | .1740 |
| 0.30 | .0118 | 4.38 | .1724 |
| 0.33 | .0130 | 4.38 | .1724 |
| 0.36 | .0142 | 4.34 | .1709 |
| 0.38 | .0150 | 4.30 | .1693 |
| 0.41 | .0161 | 4.30 | .1693 |
| 0.43 | .0169 | 4.26 | .1677 |
| 0.46 | .0181 | 4.22 | .1661 |
| 0.48 | .0189 | 4.22 | .1661 |
| 0.50 | .0197 | 4.18 | .1646 |
| 0.53 | .0209 | 4.18 | .1646 |
| 0.58 | .0220 | 4.14 | .1630 |
| 0.58 | .0228 | 4.10 | .1614 |
| 0.81 | .0240 | 4.10 | .1614 |
| 0.64 | .0252 | 4.06 | .1598 |
| 0.66 | .0260 | 4.02 | .1583 |
| 0.69 | .0272 | 4.02 | .1583 |
| 0.71 | .0280 | 3.98 | .1567 |
| 0.74 | .0291 | 3.94 | .1551 |
| 0.76 | .0299 | 3.94 | .1551 |
| 0.79 | .0311 | 3.90 | .1535 |
| 0.81 | .0319 | 3.90 | .1535 |
| 0.84 | .0331 | 3.86 | .1520 |
| 0.86 | .0339 | 3.82 | .1504 |
| 0.89 | .0350 | 3.82 | .1504 |
| 0.91 | .0358 | 3.78 | .1488 |
| 0.94 | .0370 | 3.74 | .1472 |
| 0.97 | .0382 | 3.74 | .1472 |
| 0.99 | .0390 | 3.70 | .1457 |
| 1.02 | .0402 | 3.66 | .1441 |
| 1.04 | .0409 | 3.66 | .1441 |
| 1.07 | .0421 | 3.62 | .1425 |
| 1.08 | .0425 | 3.62 | .1425 |
| 1.12 | .0441 | 3.58 | .1409 |

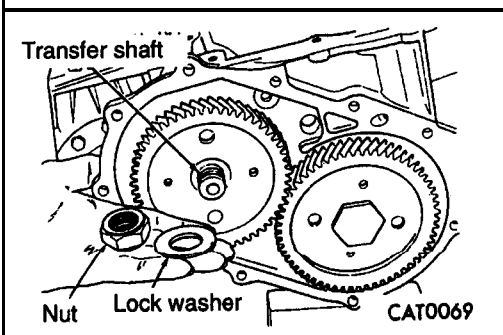
| End play with 4.66 mm (.1835 in.) "test" shim installed | | Required Shim | |
|---|-------|---------------|-------|
| mm | in. | mm | in. |
| 1.14 | .0449 | 3.54 | .1394 |
| 1.17 | .0461 | 3.54 | .1394 |
| 1.19 | .0469 | 3.50 | .1378 |
| 1.22 | .0480 | 3.46 | .1362 |
| 1.24 | .0488 | 3.46 | .1362 |
| 1.27 | .0500 | 3.42 | .1346 |
| 1.30 | .0512 | 3.38 | .1331 |
| 1.32 | .0520 | 3.38 | .1331 |
| 1.35 | .0531 | 3.34 | .1315 |
| 1.37 | .0539 | 3.34 | .1315 |
| 1.40 | .0551 | 3.30 | .1299 |
| 1.42 | .0559 | 3.26 | .1283 |
| 1.45 | .0571 | 3.26 | .1283 |
| 1.47 | .0579 | 3.22 | .1268 |



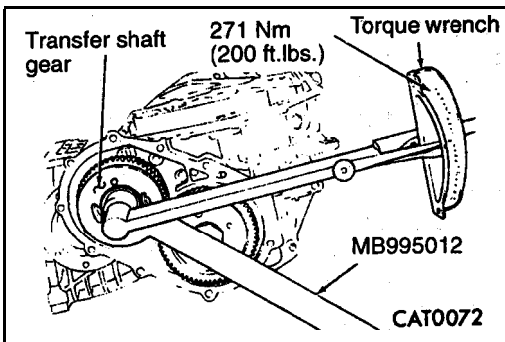
(48) Install transfer shaft gear and proper shim.



(49) Install transfer shaft gear, using Gear Installer MB995014 and two wrenches as shown.

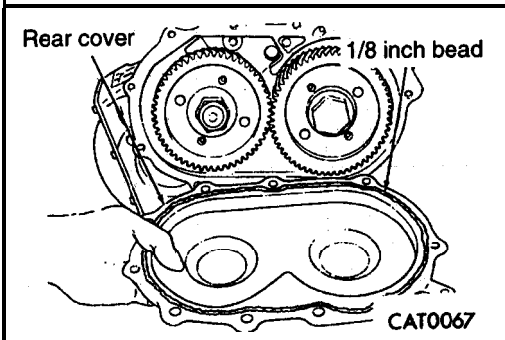


(50) Install transfer shaft gear nut and lock washer.



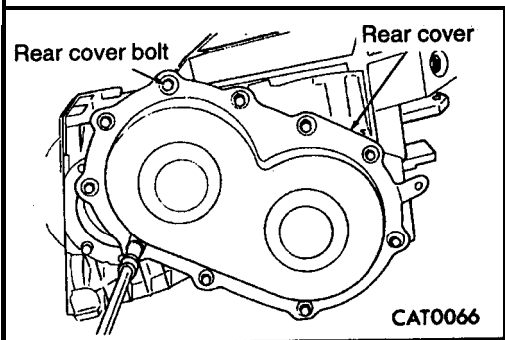
(51) Tighten transfer shaft gear nut to 271 Nm (200 ft.lbs.) while holding transfer shaft gear with Holder MB995012.

Caution
Always use new retaining nut. Never reuse old retaining nut.

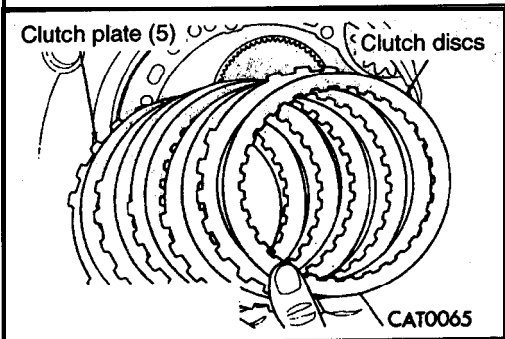


(52) Install rear cover.

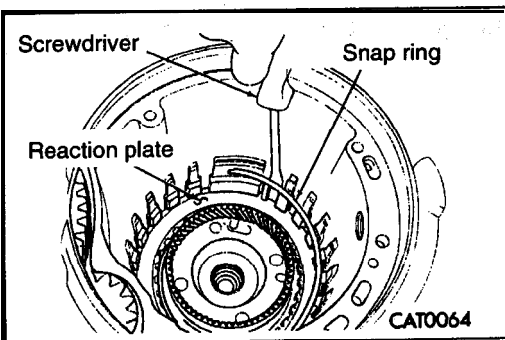
NOTE
Apply a, 1/8 inch wide bead of Loctite 18718 or equivalent as shown.



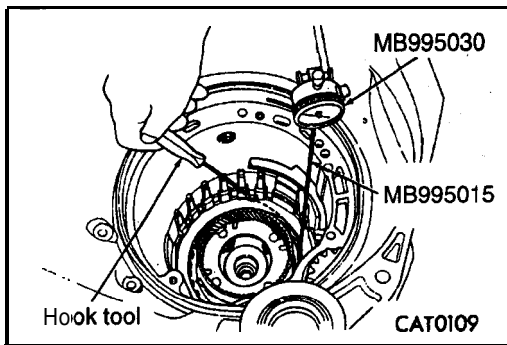
(53) Install rear cover bolts.



(54) Install low/reverse clutch pack.

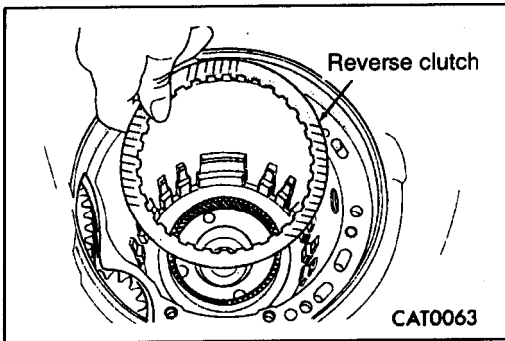


(55) Using a screwdriver, install low/reverse reaction plate flat snap ring.

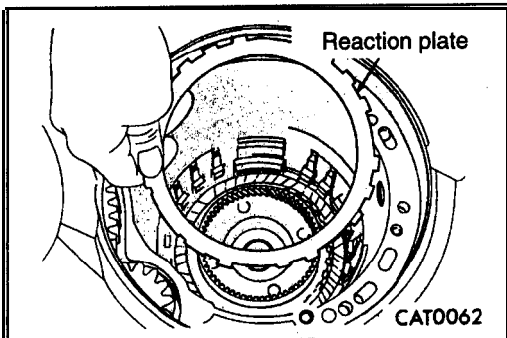


(56) Check clutch clearance. Set Dial Indicator set up MB995030 with Dial Indicator Tip MB995015 as shown. Press down on the clutch pack with finger and zero dial indicator. Raise one clutch disc with a hook tool. Read the dial indicator.

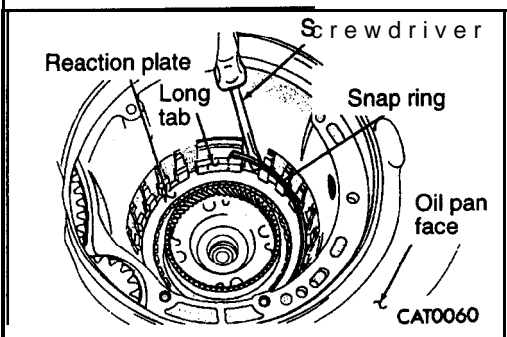
(57) Select the proper low/reverse reaction plate to achieve specification:
 Low/reverse clutch pack clearance is 1.04 to 1.65 mm (.0409 to .0650 inch).



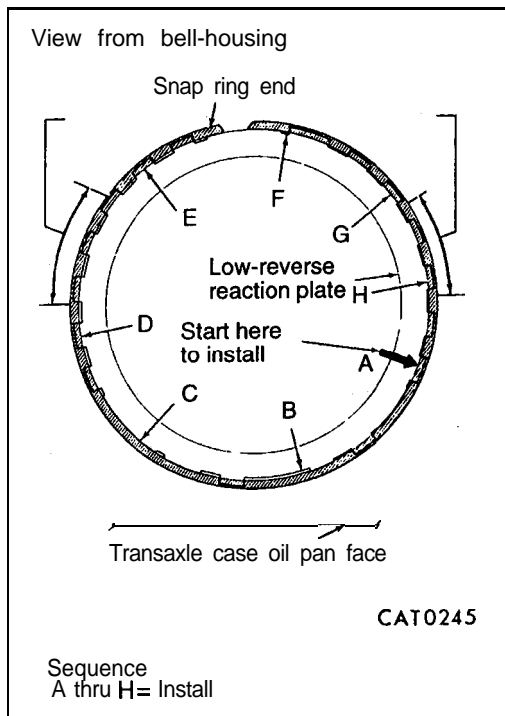
(58) Install last disc from low/reverse clutch.



(59) Install low/reverse reaction plate with its flat side facing up.

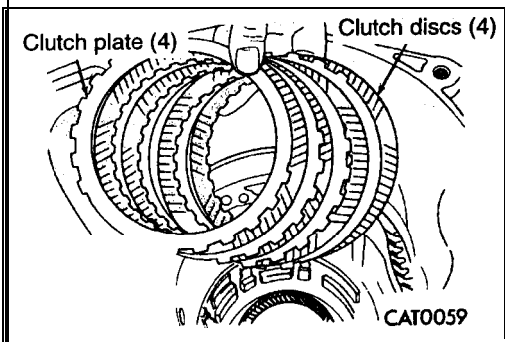


(60) Install new tapered snap ring with a screwdriver as shown with its tapered side facing up.

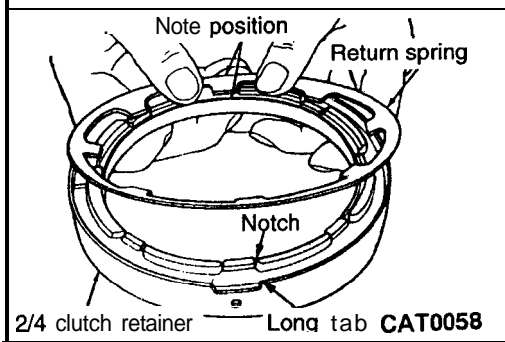


NOTE

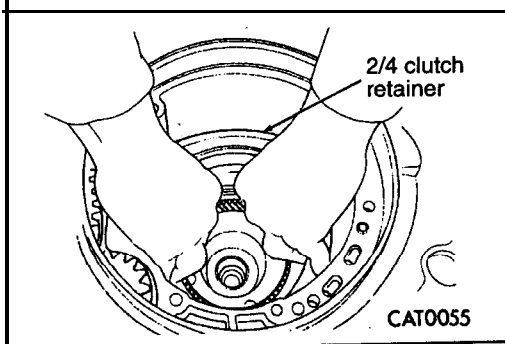
- Do not reuse the old snap. ring.
- When installing a new **snap ring**, position the snap ring ends as shown.
- Follow A – H sequence for best results.



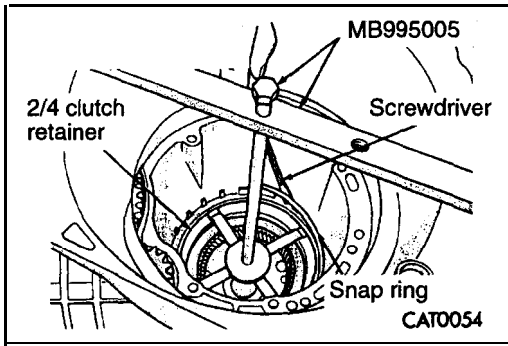
(61) Install 2/4 clutch pack.



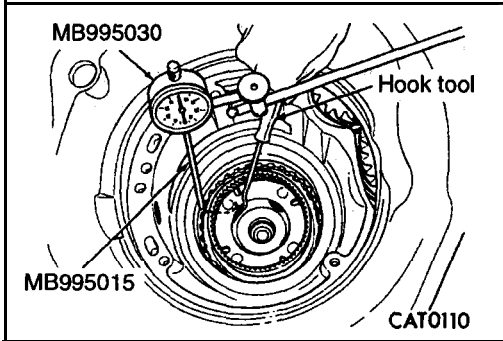
(62) **Note** correct position of clutch return **spring** in relation with clutch retainer.
Line up the **piston** spring cut-outs with the long tab and notch.



(63) Install 2/4 clutch retainer.

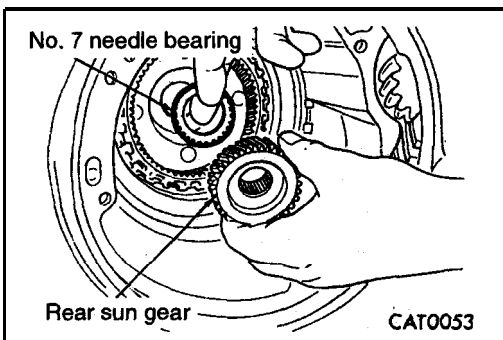


(64) Install Spring Compressor MB995005.
Using a screwdriver, install the **2/4 clutch** retainer snap ring.

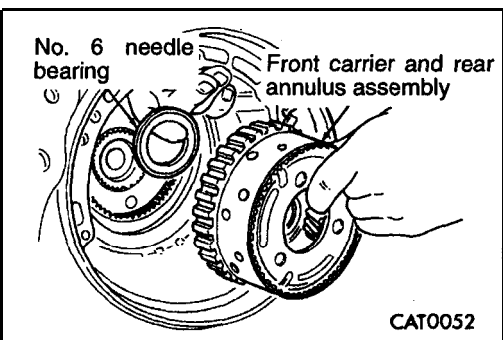


(65) Check clutch clearance. Set up Dial Indicator set **MB995030** with Dial Indicator Tip **MB995015** as shown. Press down on the clutch pack with finger and zero dial indicator. Raise one clutch disc with a hook tool. Read the dial indicator.

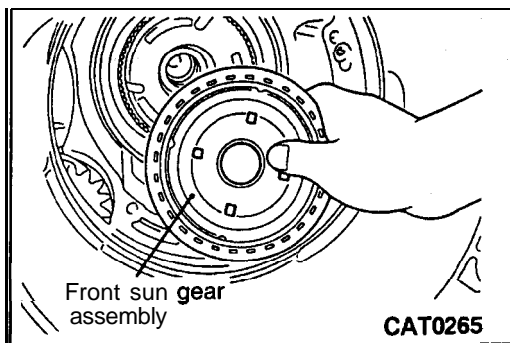
(66) The 2/4 clutch pack clearance is 0.76 to 2.64 mm (.0299 to .1039 inch). If not within specifications, the clutch is not assembled properly. There is no adjustment for the **2/4** clutch clearance.



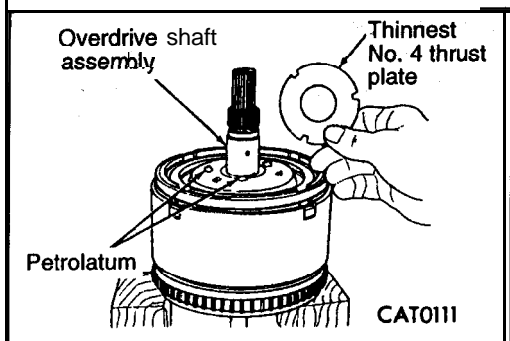
(67) Install rear sun gear and No. 7 needle bearing.



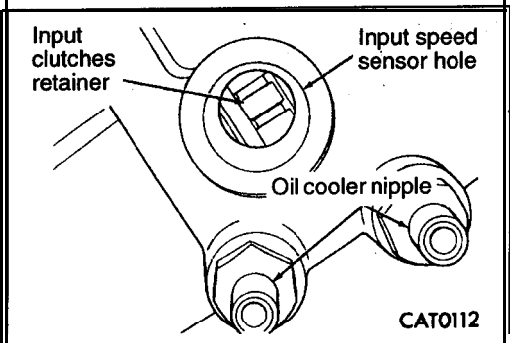
(68) Install front carrier and rear annulus assembly, push in and twist.



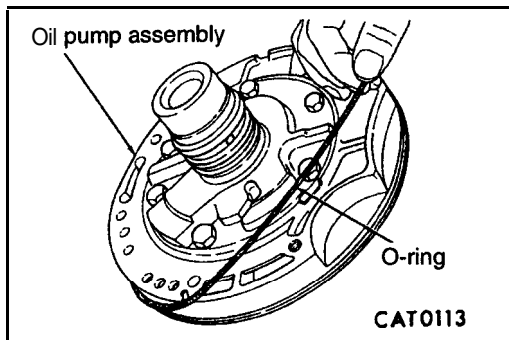
(69) Install front sun gear assembly.



(70) To determine the proper thickness of the No. 4 thrust plate, select the thinnest No. 4 "test" thrust plate; Using petrolatum to hold thrust plate in position,, install input clutches assembly. Be sure the 'input clutches assembly is completely seated.



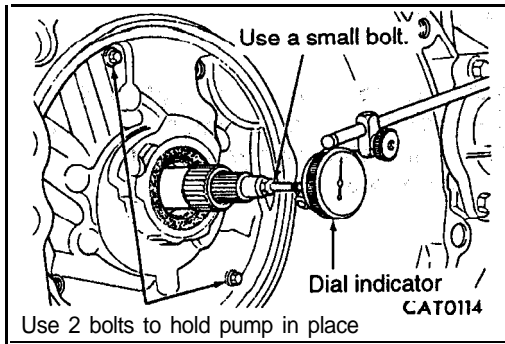
Caution
if view through input speed sensor hole is not as shown above, the input clutches assembly is not seated properly.



(71) Remove the oil pump O-ring. You can install and remove the oil pump and gasket very easily to select the proper No. 4 thrust plate.

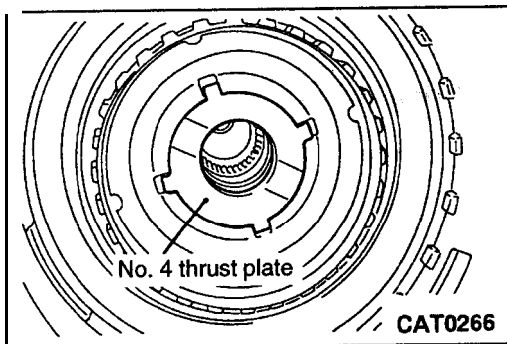
Caution

Be sure to install O-ring on oil pump after selecting the proper No. 4 thrust plate. Temporarily secure oil pump with 2 oil pump bolts. Insert a small bolt into end of input shaft. Measure input shaft end play. If end play readings are not within specifications, the transaxle assembly. will be damaged.

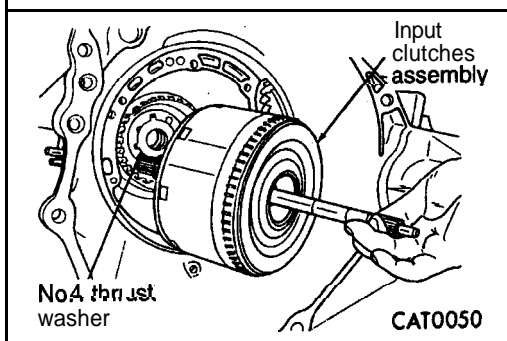


(72) Input shaft end play must be 0.13 to 0.64 mm (.0051 to .0252 inch). Subtract end play specifications from end play readings. Add the result to "test" shim to select proper shim.

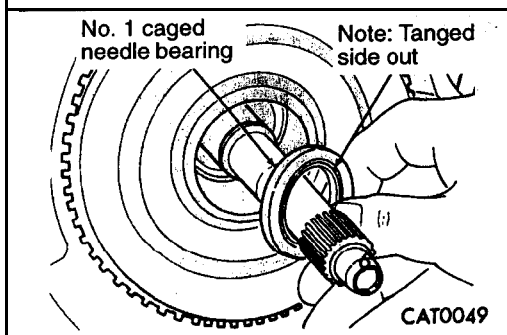
For example if end play reading is 1.40 mm (.0551 inch), subtract end play specifications. $1.40 \text{ mm (.0551 inch)} - [.13 \text{ mm (.0051 inch) to } 0.64 \text{ mm (.0252 inch)}] = 1.27 \text{ mm to } 0.76 \text{ mm (.0500 inch to .0299 inch)}$. Add "test" shim. $0.76 \text{ mm to } 1.27 \text{ mm (.0299 inch to .0500 inch)} + 0.81 \text{ mm (.0319 inch)} = 1.75 \text{ mm to } 2.08 \text{ mm (.0618 inch to .0819 inch)}$. Select shim closest to mid point or 1.69 mm to 1.91 mm (.0665 inch to .0752 inch).



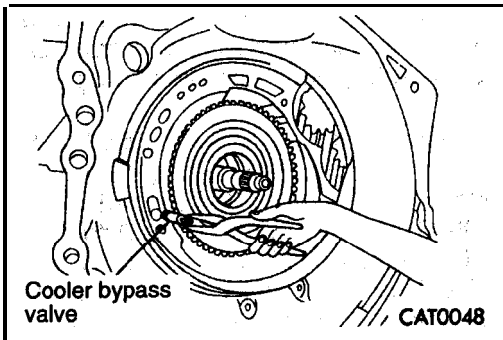
(73) Install No. 4 thrust plate.



(74) Install input clutches assembly.

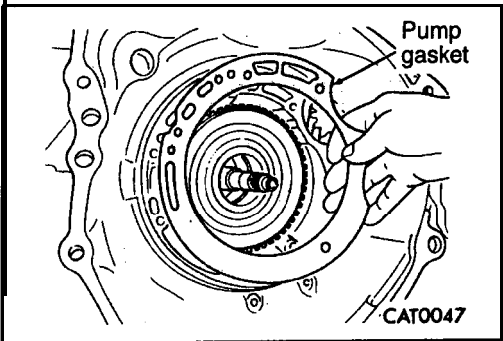


(75) Install No. 1 caged needle bearing with its tanged side facing out.

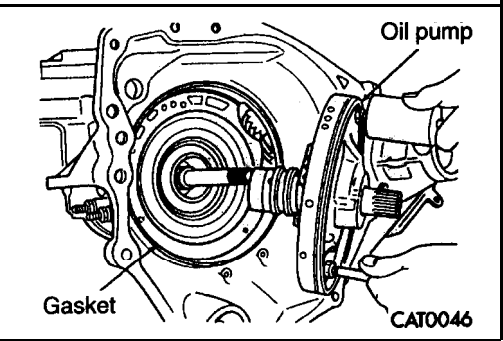


(76) Install cooler bypass valve.

Caution
 The cooler bypass valve must be replaced if a transaxle failure has occurred. Do not reuse or attempt to clean old valve. When installing bypass valve, insert with O-ring end toward rear of case.

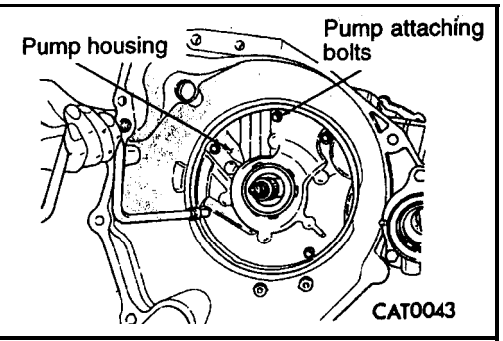


(77) Install oil pump gasket.

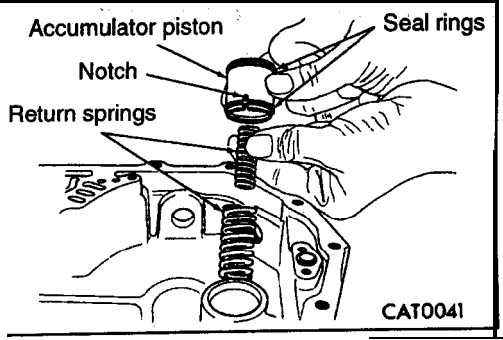


(78) Install oil pump.

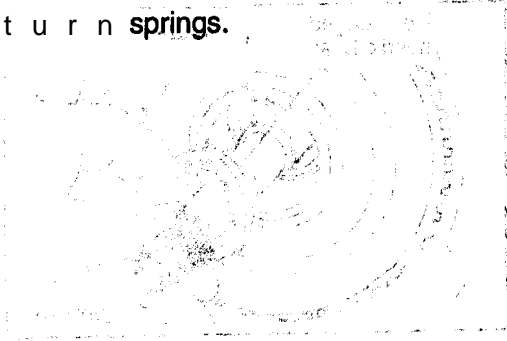
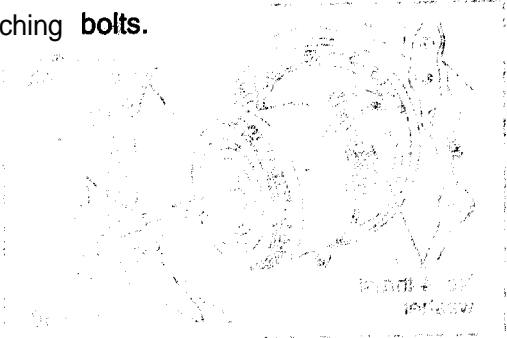
Caution
 Be sure oil pump O-ring is installed.

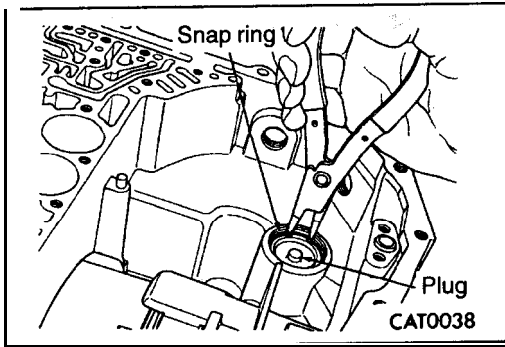


(79) Install pump attaching bolts.

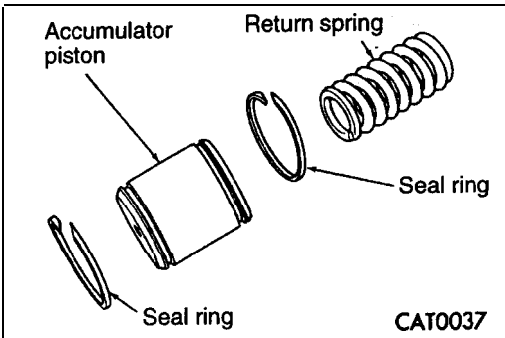


(80) Install two return springs.

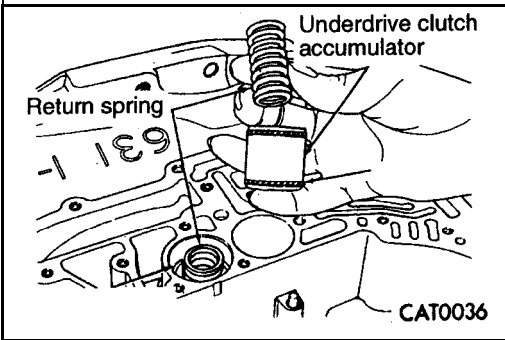




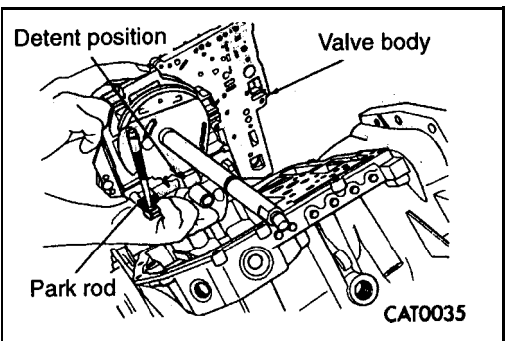
(81) Install the snap ring holding the low/reverse accumulator plug (cover) in place.



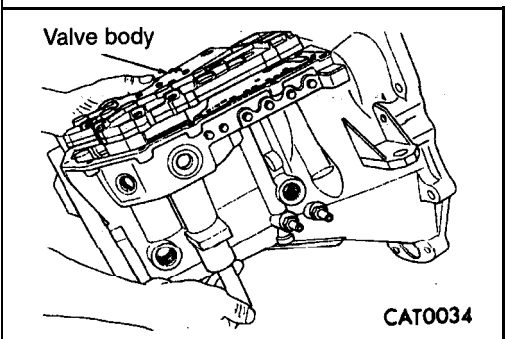
(82) Install return spring and two seal rings from the overdrive and underdrive clutch accumulator pistons.



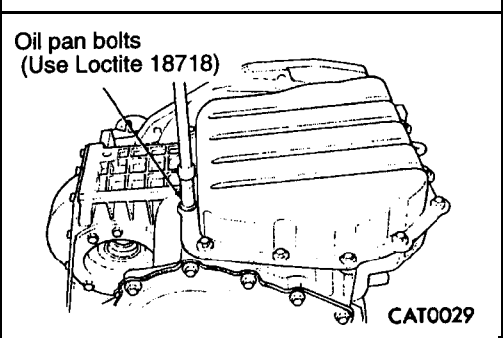
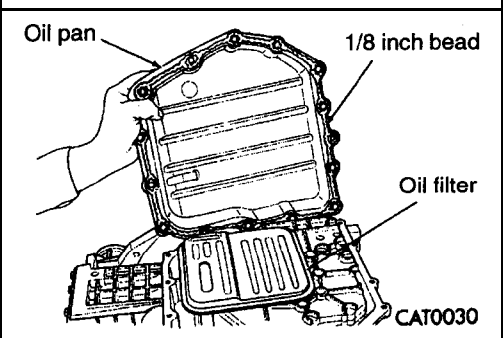
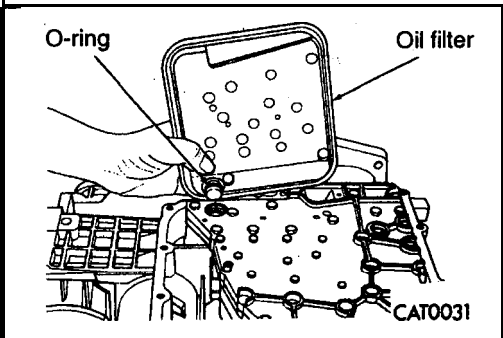
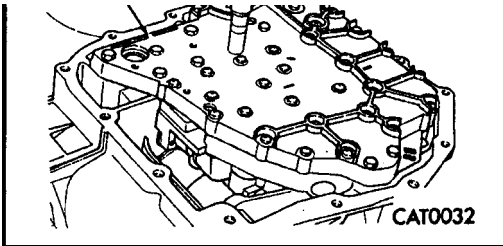
(83) Install underdrive clutch accumulator and overdrive clutch accumulator with return springs and Seal rings:



(84) Position detent as shown.



(85) Install valve body.



(88) Install oil filter.

(89) Install oil pan.

NOTE

Apply a 1/8 inch wide bead of Loctite 1 8718 or equivalent.

(90) Install oil pan bolts.

NOTE

Use Loctite 18718 or equivalent **under bolt beads.**

INPUT CLUTCHES

23310120018

DISASSEMBLY

Place input clutches assembly on wood blocks or equivalent, as shown to facilitate disassembly and reassembly.

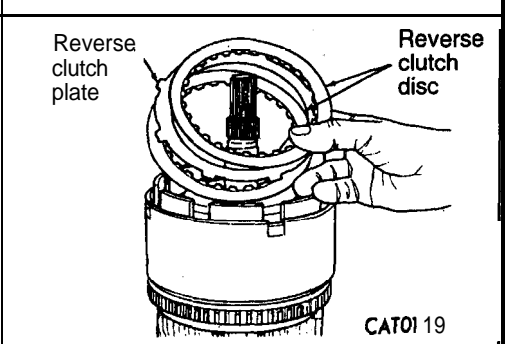
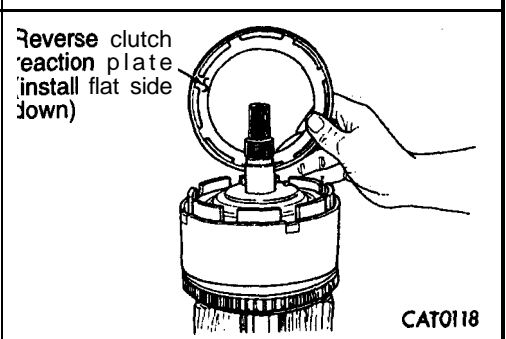
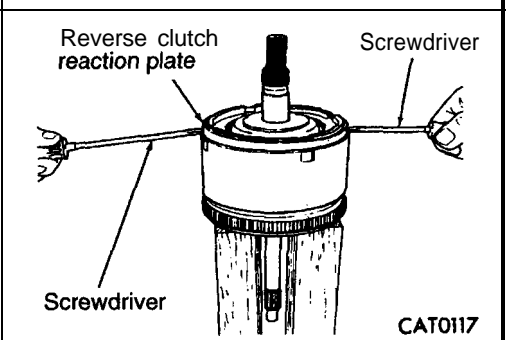
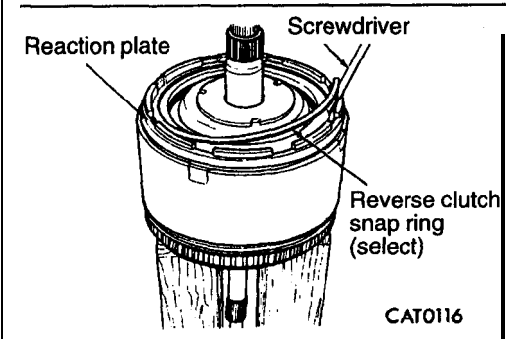
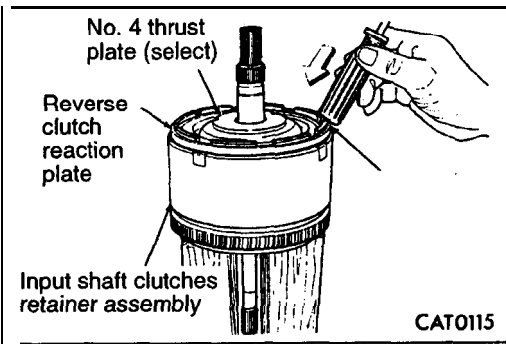
(1) Tap down reverse clutch reaction plate to **remove** (or install) snap ring.

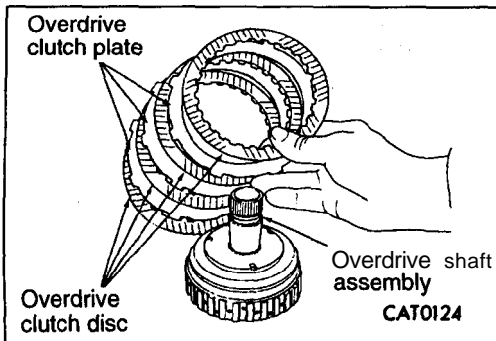
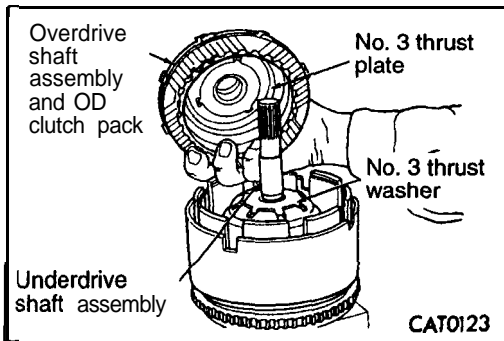
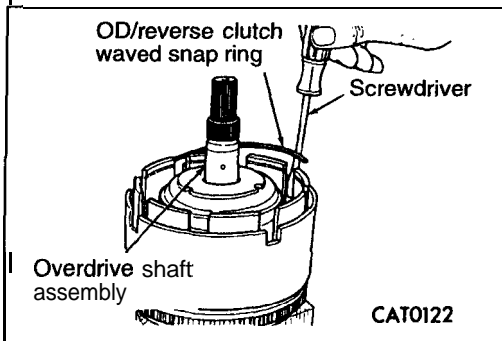
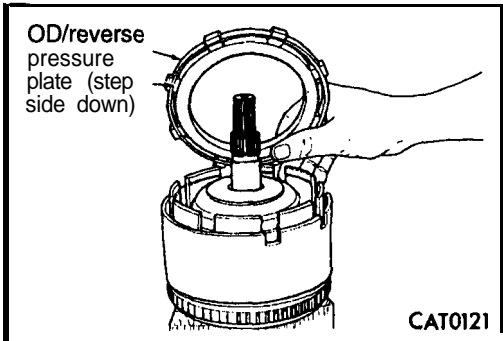
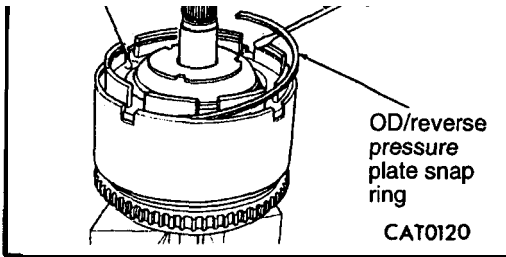
(2) Using a screwdriver, remove the reverse **clutch** snap ring.

(3) Loosen reverse clutch reaction plate by prying at **two** locations with screwdrivers as shown.

(4) Remove reverse clutch reaction plate.

(5) Remove clutch plates and discs.
Tie plates and discs together so they go back in the same location.





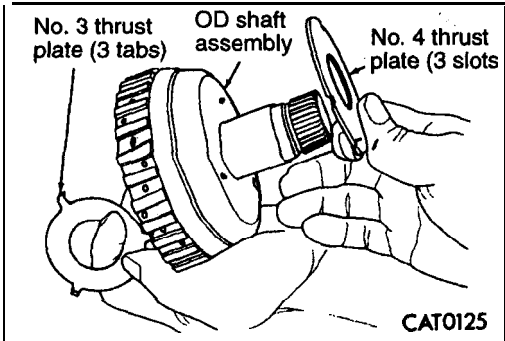
(7) Remove overdrive/reverse pressure plate.

(8) Remove overdrive/reverse clutch waved snap ring with a screwdriver.

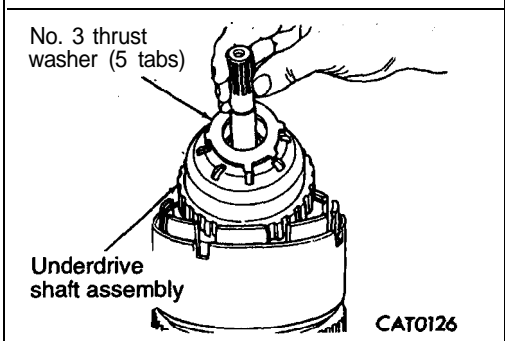
(9) Remove overdrive shaft assembly and overdrive clutch pack.

(10) Disassemble overdrive clutch pack.

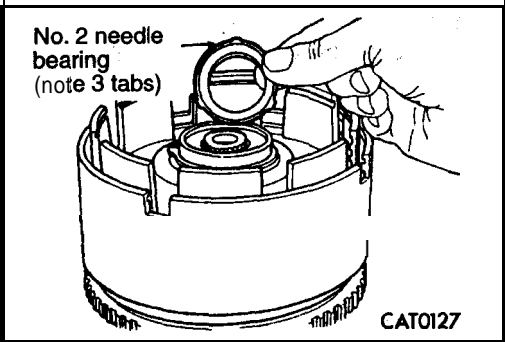
Tie plates and discs together so they go back in the same location.



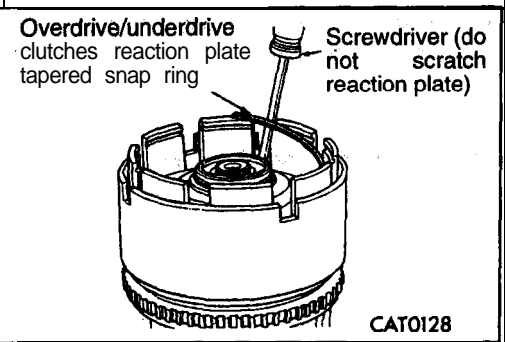
(11) Remove No. 3 and No. 4 thrust plates from overdrive shaft assembly.



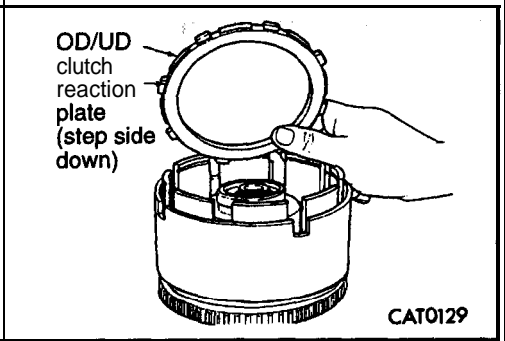
(12) Remove underdrive shaft assembly.



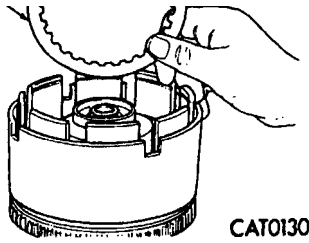
(13) Remove No. 2 needle bearing.



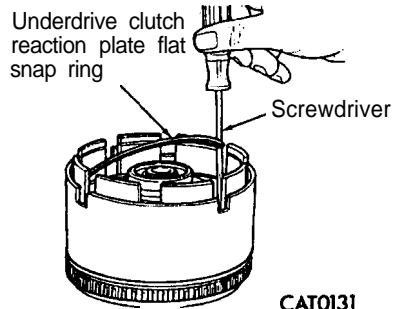
(14) Remove overdrive/underdrive clutches reaction plate tapered snap ring. Do not scratch reaction plate.



(15) Remove overdrive/underdrive clutch reaction plate.

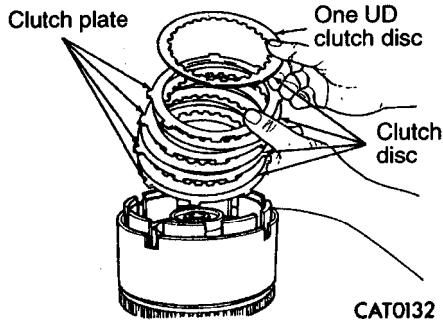


CAT0130



CAT0131

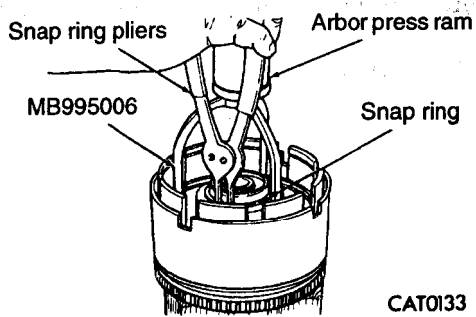
(17) Remove underdrive clutch reaction plate flat snap ring.



CAT0132

(18) Remove clutch plates and discs.

Tie together so plates and discs go back into the same location.

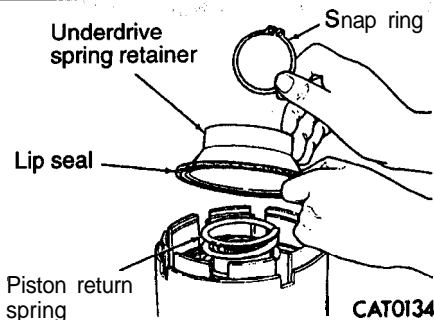


CAT0133

(19) Remove snap ring with snap ring pliers while compressing, return spring with Spring Compressor MB995006 and arbor press ram.

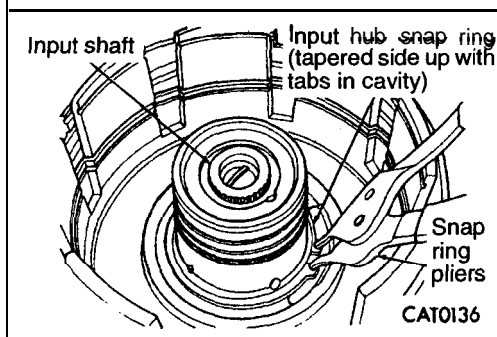
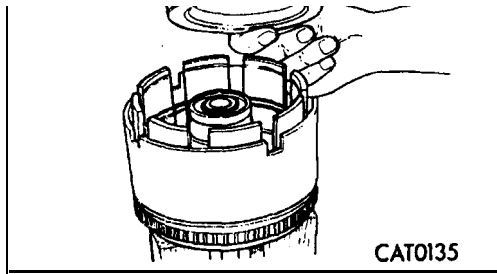
Caution

Compress return spring just enough to remove snap ring.

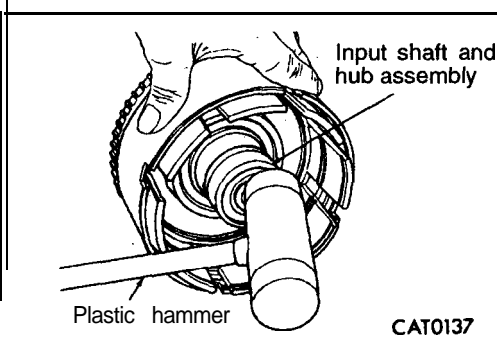


CAT0134

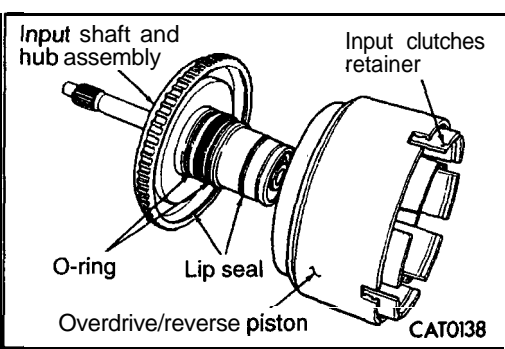
(20) Remove underdrive spring retainer and spring.



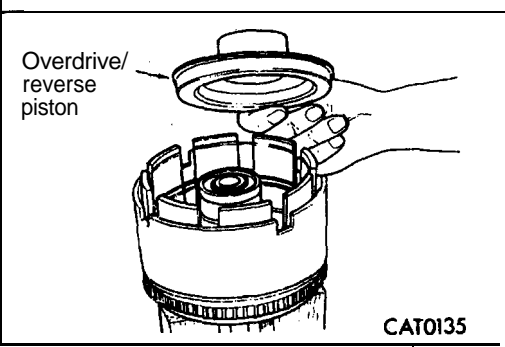
(22) Remove input hub snap ring with snap ring pliers.



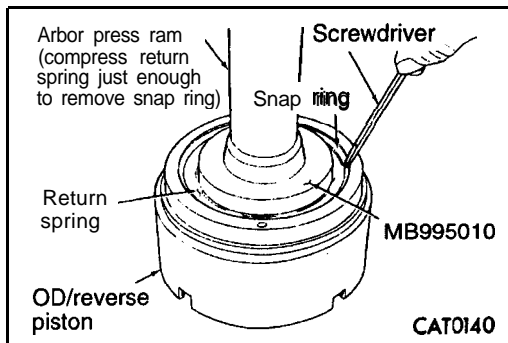
(23) Tap on input shaft and hub assembly with a plastic hammer.



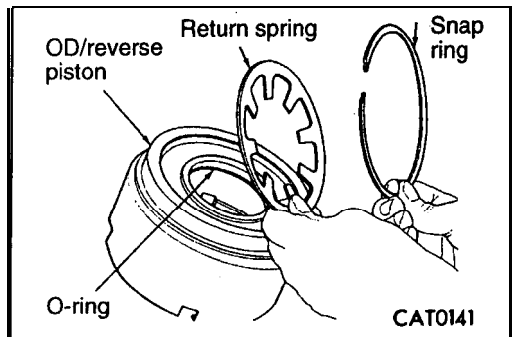
(24) Remove input shaft and hub assembly.



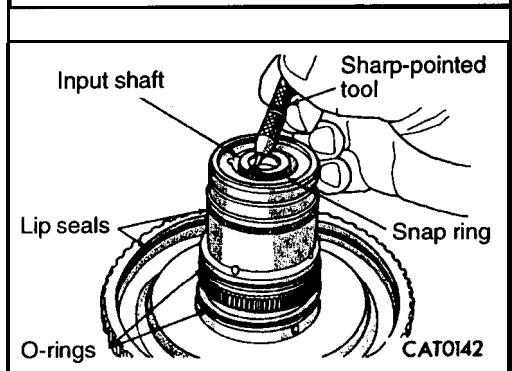
(25) Remove overdrive/reverse piston.



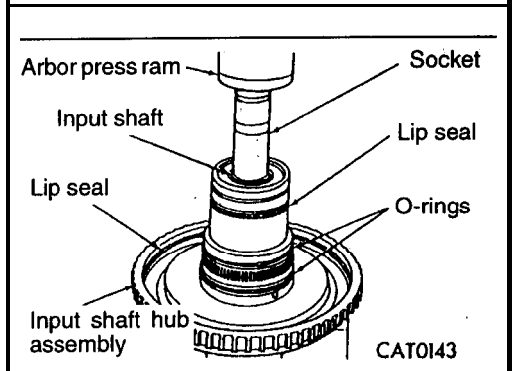
(26) Remove snap ring with a screwdriver while compressing return spring with Disc MB995010 and arbor press ram.



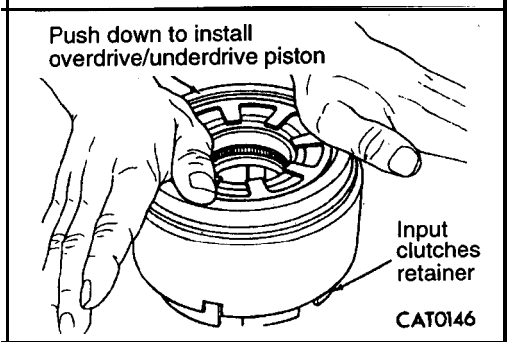
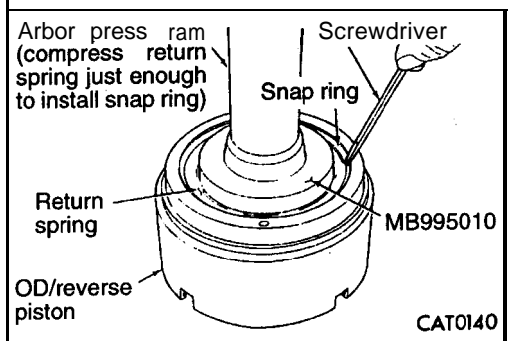
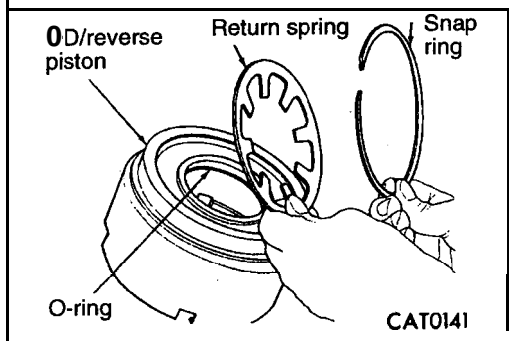
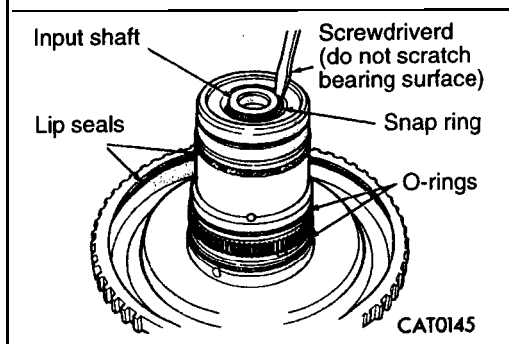
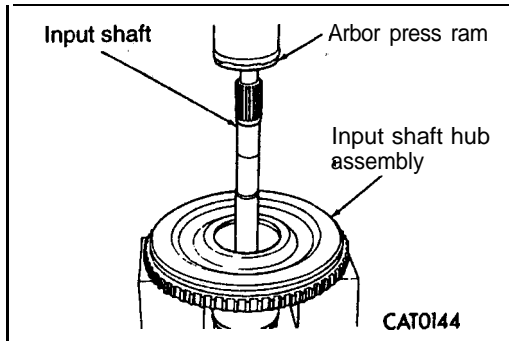
(27) Remove snap ring and return spring.



(28) Remove input shaft snap ring.



(29) Remove input shaft from hub.

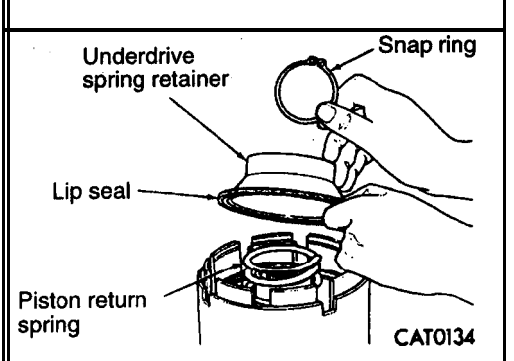
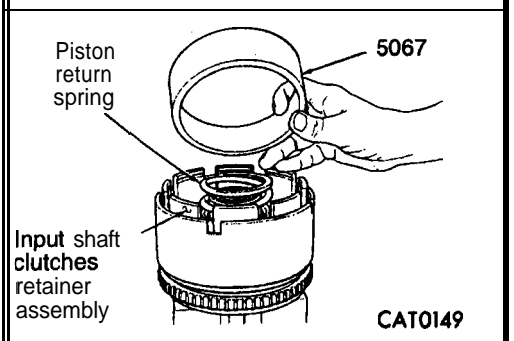
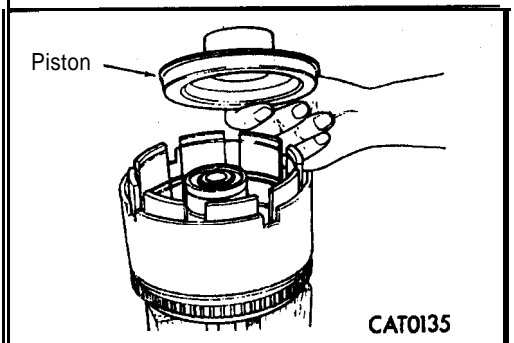
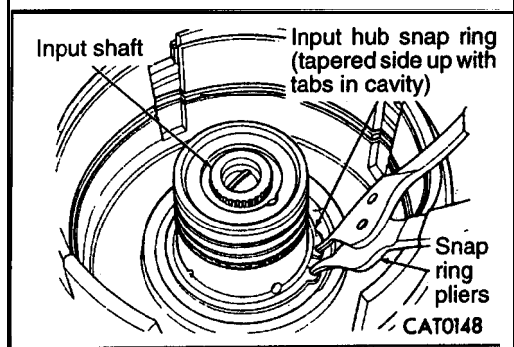
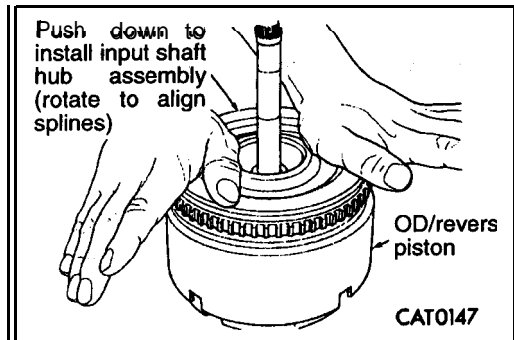


REASSEMBLY

23310130011

Use petrolatum on all seals to ease assembly of component.

- (1) Install input shaft to hub.
- (2) Install input shaft snap ring.
Replace lip seals and O-rings.
Do not scratch bearing surface.
- (3) Install return spring and snap ring.
Replace O-ring and lip seal of OD/reverse piston.
- (4) While compressing return spring with Disc MB995010 and arbor press ram, install snap ring with a screwdriver.
- (5) Install overdrive/reverse piston by pushing down. Be sure to lubricate reverse piston O-ring and lip seal prior to installation.



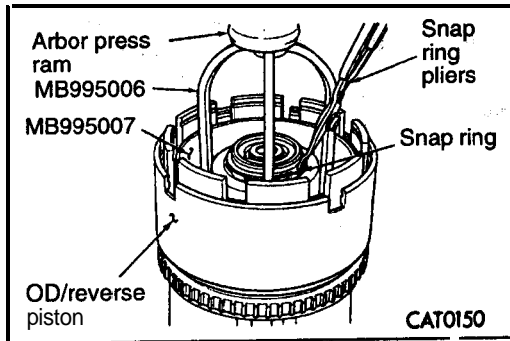
(8) To install input shaft hub assembly to overdrive/reverse piston, rotate input' shaft hub to align **splines with** overdrive/reverse piston and push down by hand.

(7) Install input hub tapered **snap ring** with snap' ring pliers.

(8) Install underdrive clutch piston.,

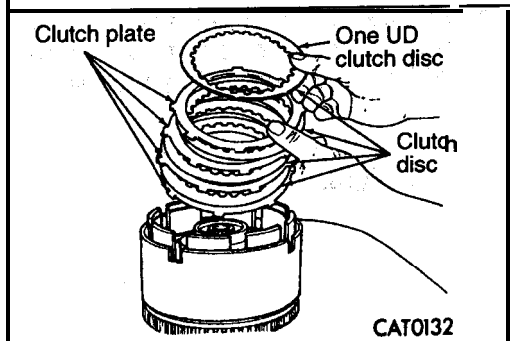
(9) Install piston return spring. **Install Seal Installer 5067.** Coat Installer inner surface lightly with petroleum' jelly. Place Installer into Input clutch assembly **with its large** inside diameter facing up.

(10) **Install** underdrive spring retainer. Remove Installer **MB995007.**

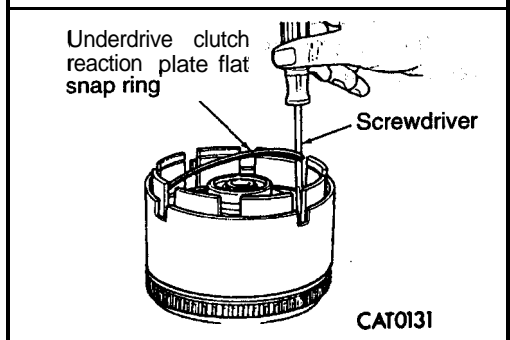


(11) While compressing spring with Spring Compressor MB995006 and arbor press ram, install snap ring with snap ring pliers.

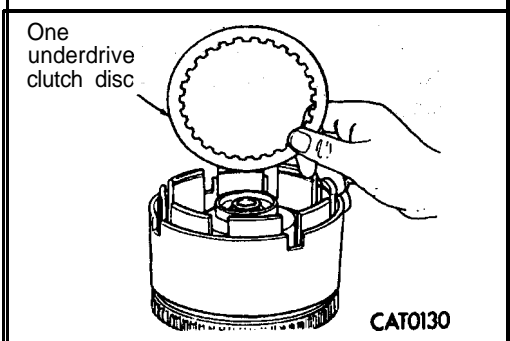
Caution
Compress return spring just enough to install snap ring.



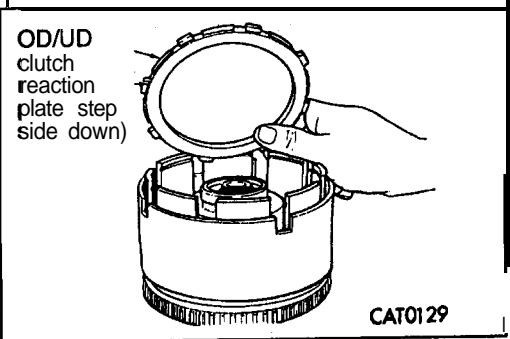
(12) Install underdrive clutch pack excluding one clutch disc.



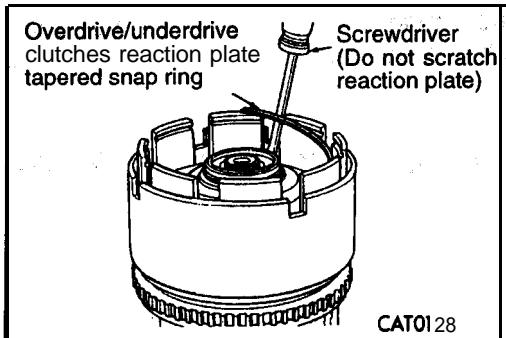
(13) Install underdrive clutch reaction plate flat snap ring with a screwdriver.



(14) Install last underdrive clutch disc.



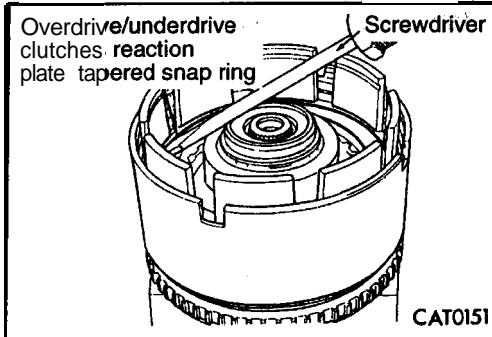
(15) Install overdrive/underdrive clutch reaction plate with stepped side facing down.



- (16) Install a new overdrive/underdrive clutches reaction plate tapered snap ring with its tapered side facing up.

Caution

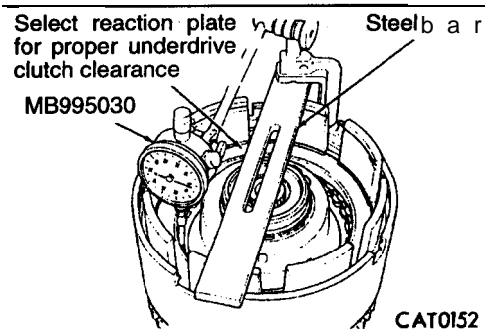
Do not reuse tapered, snap ring.



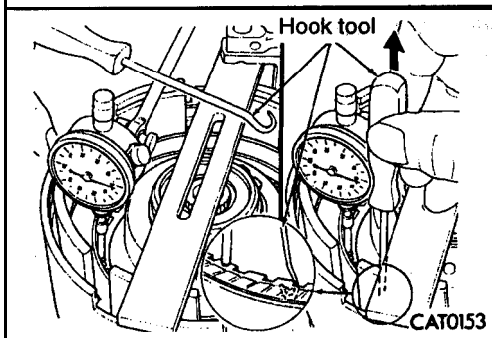
- Snap ring ends must be located within one finger of the input clutch hub. Be sure that snap ring is fully seated, by pushing with screwdriver, into snap ring groove all the way around.

Caution

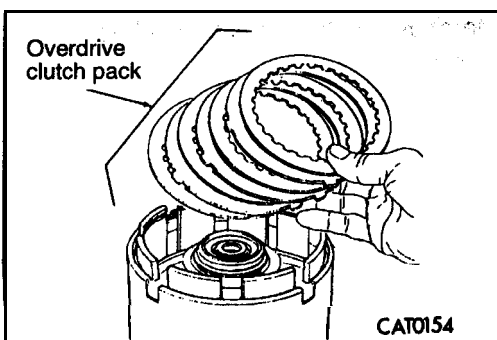
Do not scratch reaction plate.



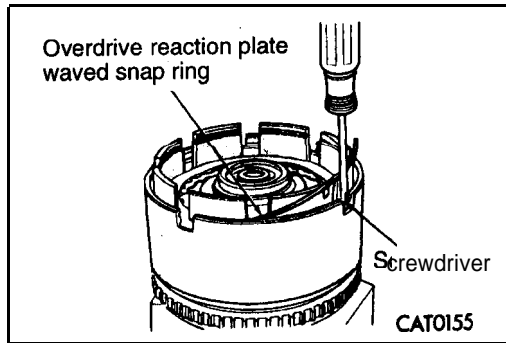
- (17) Set up dial indicator set MB995030 and steel bar as shown for checking clutch clearance. Compress clutch pack with finger to zero dial indicator.



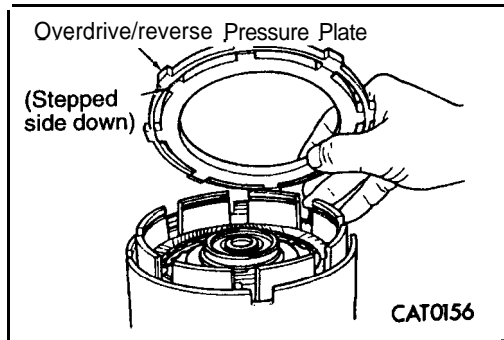
- (18) Use hook tool to raise top clutch disc. Read dial indicator. Underdrive clutch pack clearance must be 0.91 to 1.47 mm (.0358 to .0579 inch). Select the proper reaction plate to achieve specifications.



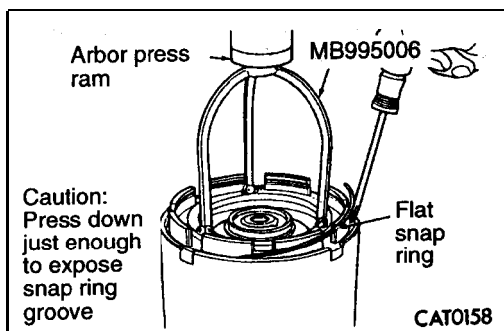
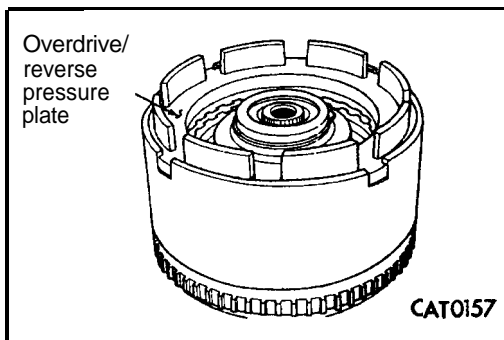
- (19) Install overdrive clutch pack starting with a clutch disc.



(20) Install overdrive reaction plate waved snap ring into the wide groove.

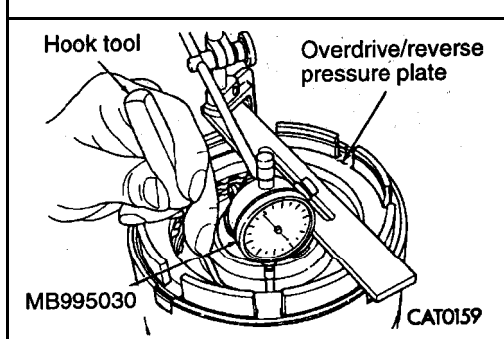


(21) Install overdrive/reverse pressure plate with stepped side down.

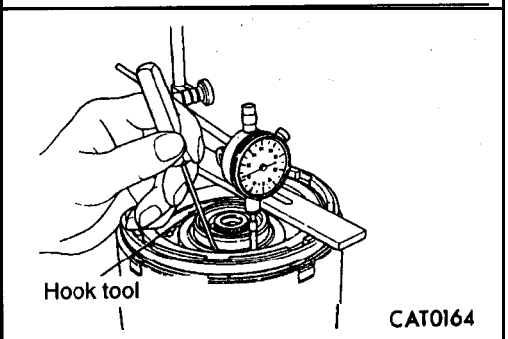
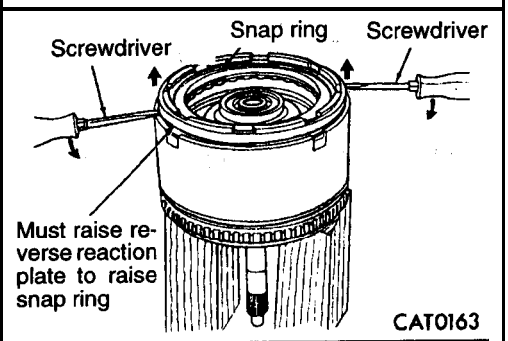
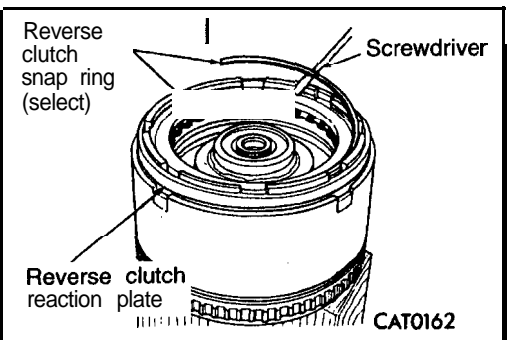
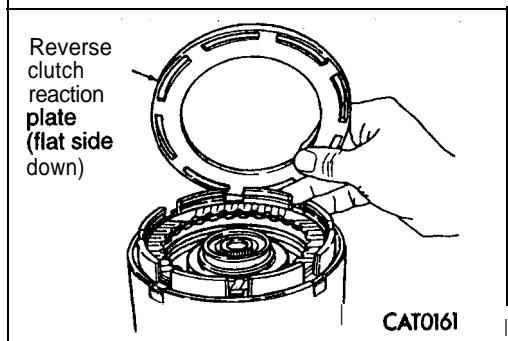
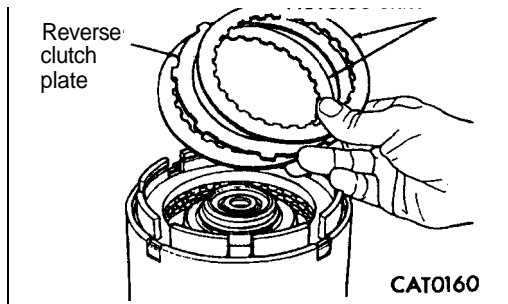


(22) While pressure down overdrive/reverse pressure plate with Spring Compressor MB995006 and arbor press ram, install flat snap ring.

Caution
Press down just enough to expose snap ring groove.



(23) Check overdrive clutch pack clearance. The overdrive (OD) clutch pack clearance is 1.07 to 2.44 mm (0.421 to .0961 inch). If not within specifications, the clutch is not assembled properly. There is no adjustment for the OD clutch clearance.



(25) Install reverse clutch reaction plate **with** flat side down.

(26) Install reverse clutch snap ring with a screwdriver.

(27) **Raise** reverse clutch reaction plate by prying up at two locations with screwdrivers to seat snap ring.

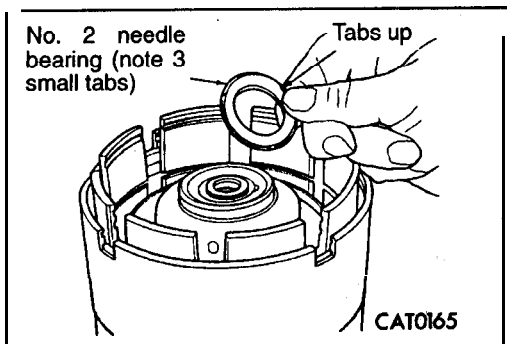
(28) **Check** reverse clutch pack clearance by (lifting **reverse** clutch reaction plate **using** a **hook** tool. The reverse clutch pack clearance is 9.76 to 1.24 mm (.0299 to .0488 inch). Select **the** proper reverse **clutch** snap ring to achieve specifications.

| Thickness |
|---------------------|
| 1.56 mm (.0614 in.) |
| 1.80 mm (.0709 in.) |
| 2.05 mm (.0807 in.) |
| 2.30 mm (.0906 in.) |

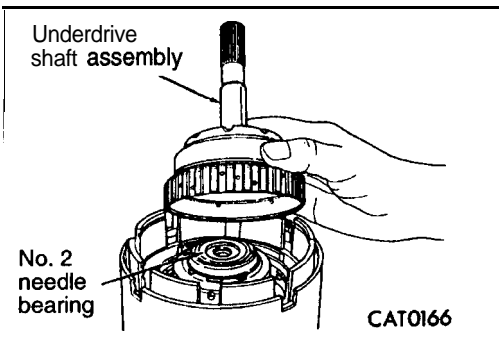
All clutch clearances in the input clutch retainer have now been checked and approved. To complete the **assembly** of the input clutch retainer, the reverse clutch and the overdrive clutch must be removed from the retainer.

Caution

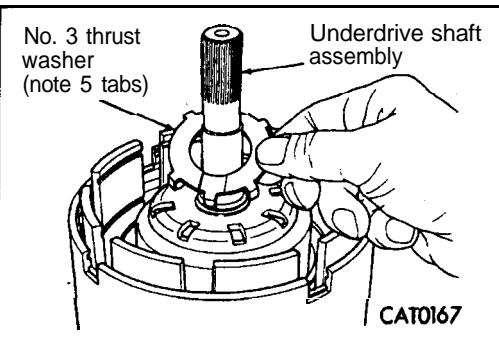
Do not intermix clutch parts. Keep in the same order.



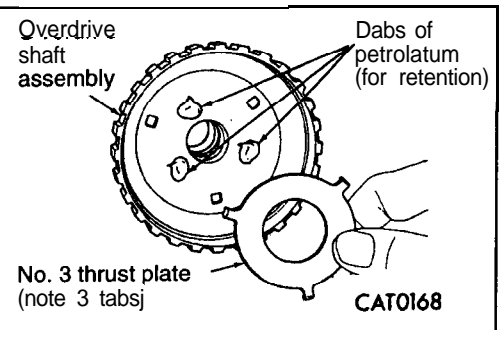
(29) After removing reverse and overdrive clutches, install No. 2 needle bearing with 3 small tabs facing up.



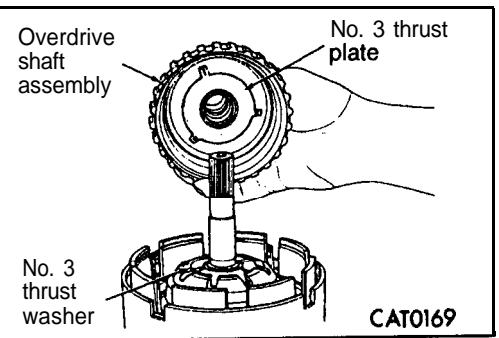
(30) Install underdrive shaft assembly.



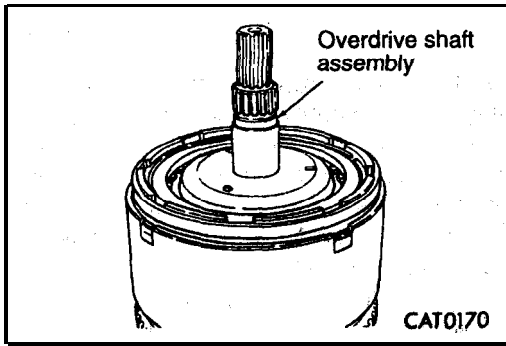
(31) Install No. 3 thrust washer.



(32) Stick No. 3 thrust plate onto overdrive shaft assembly with dabs of petrolatum.



(33) Install overdrive shaft assembly. Now that both shaft assemblies and thrust washers are properly installed, reinstall overdrive clutch and reverse clutch as shown in step 19 – 26. Rechecking these clutch clearances is not necessary, as they were set and approved previously.

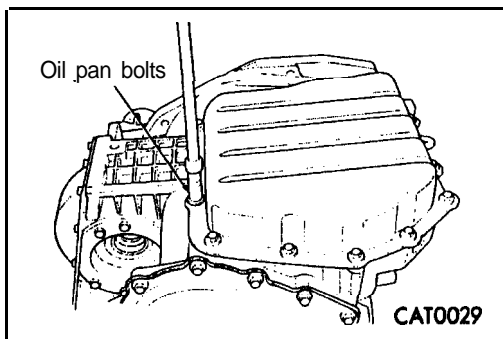


, (34) Reassembly of input clutch assembly is now complete.

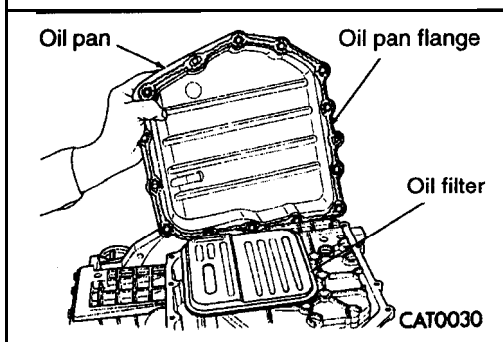
VALVE BODY

23310150017

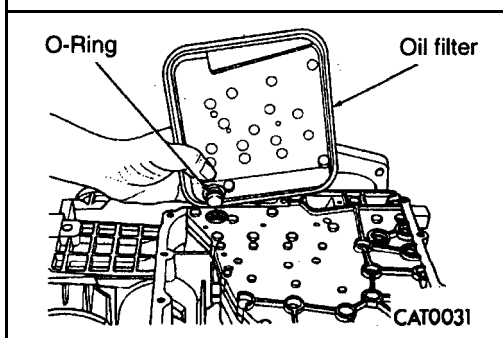
Before removing any transaxle subassemblies, plug all openings and thoroughly clean exterior of the unit, preferably by steam. Cleanliness through entire disassembly and assembly cannot be overemphasized. When disassembling, each part should be washed in a suitable solvent, then dried by compressed air. Do not wipe parts with shop towels. All mating surfaces in the transaxles are accurately machined; therefore, careful handling of all parts must be exercised to avoid nicks or burrs. Tag all springs as they are removed for reassembly identification.

**DISASSEMBLY**

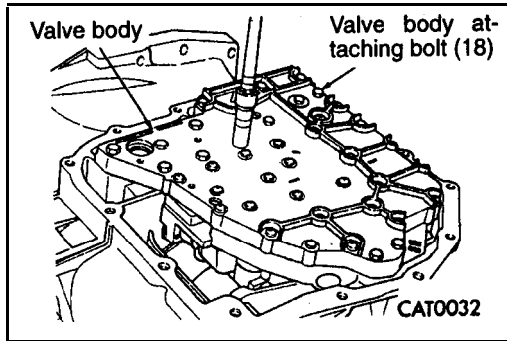
(1) Remove oil pan bolts.



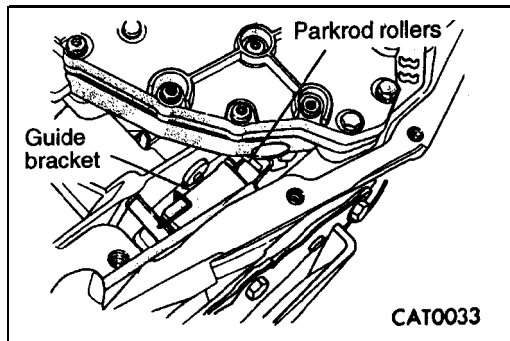
(2) Remove oil pan.



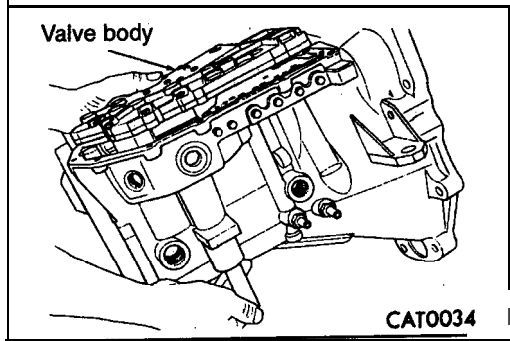
(3) Remove oil filter.



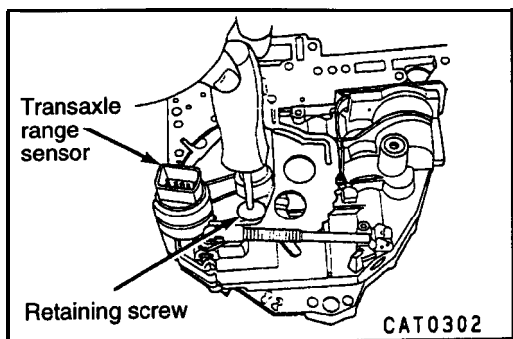
(4) Remove, valve body attaching bolts (18).



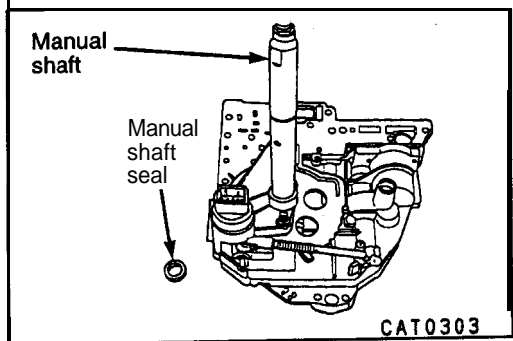
(5) Using a screwdriver, push park sprag rollers away from guide bracket.



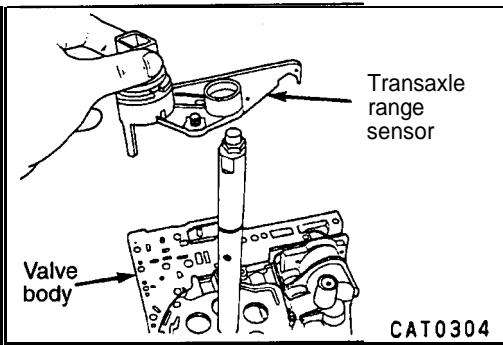
(6) Remove valve body.



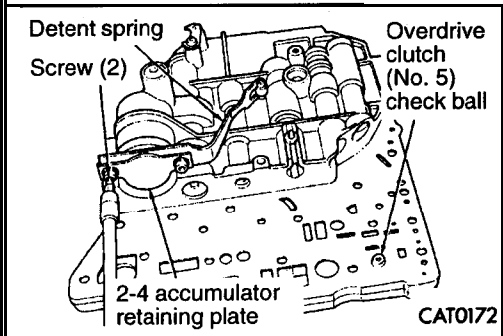
(7) Remove transaxle range sensor retaining screw.



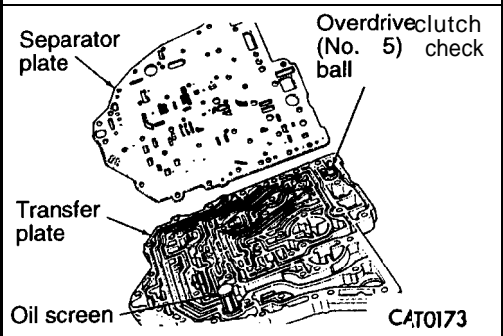
(8) Remove manual shaft seal.



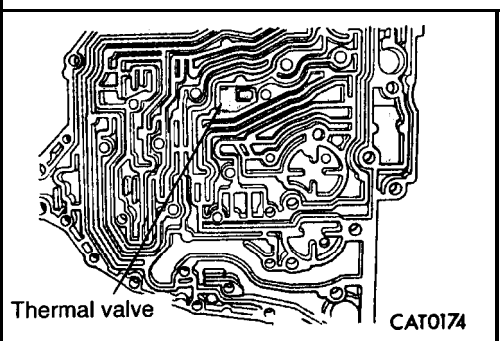
(9) Slide transaxle range sensor up the manual shaft and remove.



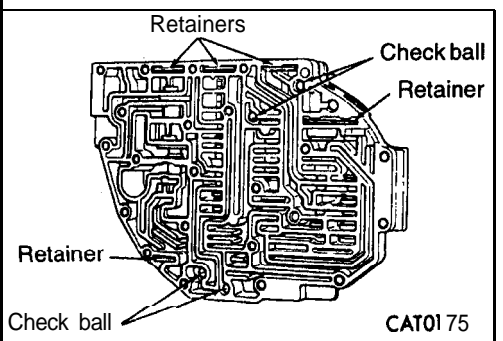
(10) Remove 2/4 accumulator retaining plate screws (2). Remove the upper valve body.



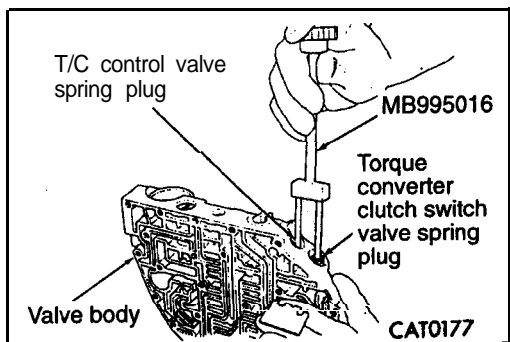
(11) Remove separator plate from transfer plate. Remove O/D clutch check ball and oil screen.



(12) Remove thermal valve.

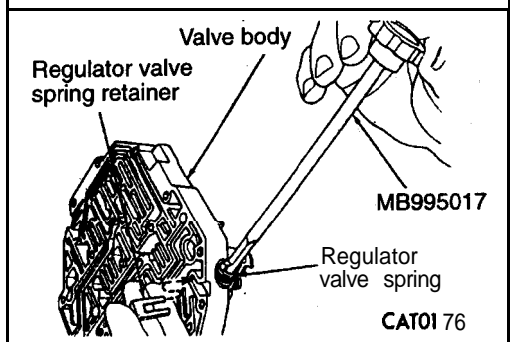


(13) Remove check balls and retainers.



(14) Remove dual retainer plate with **Installer/Remover MB995016**.

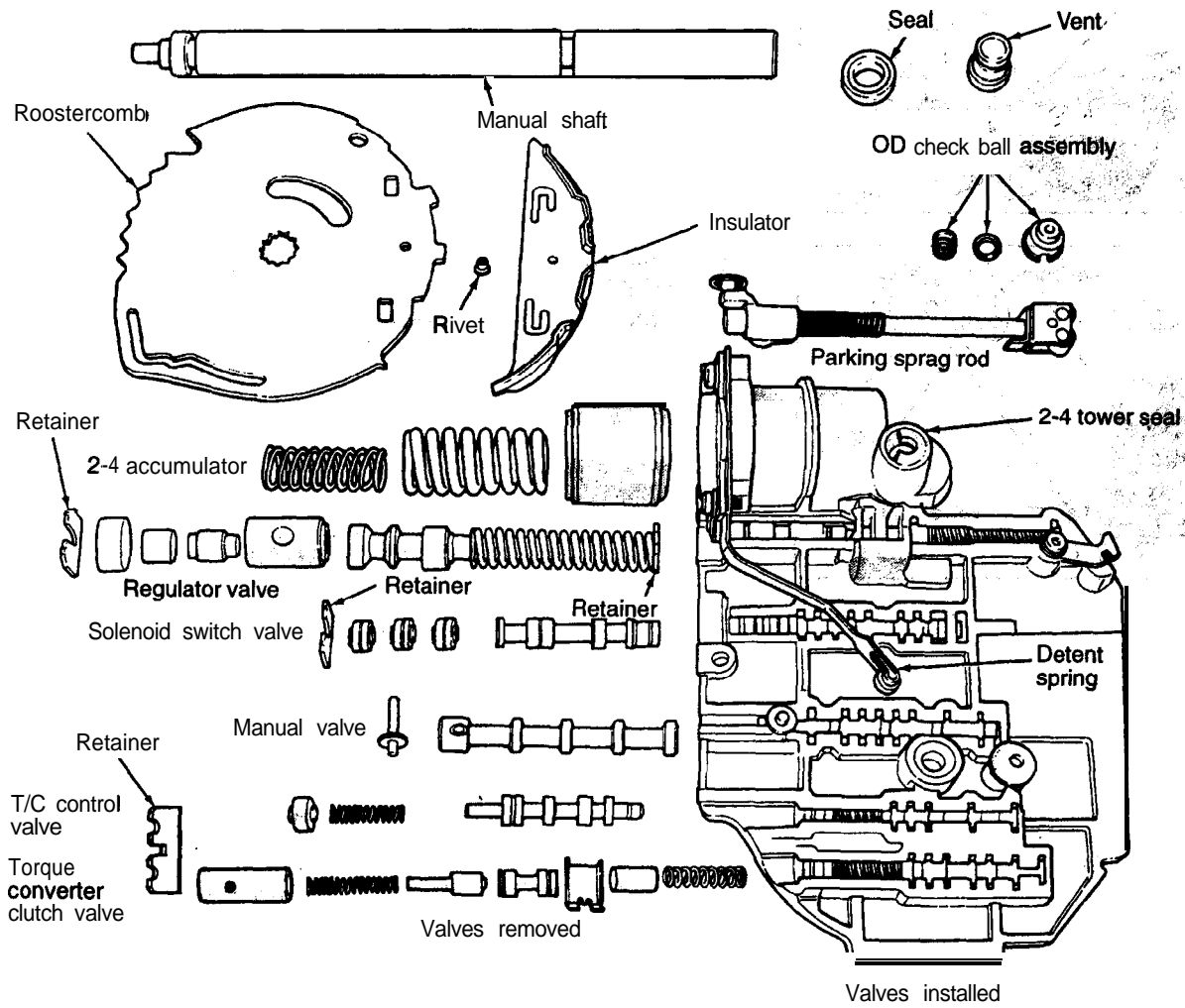
Remove torque converter control valve and torque converter clutch valve.



(15) Remove retainer plate using **Installer/Remover MB995017**.

Remove regulator valve.

SPRINGS AND VALVES IDENTIFICATION

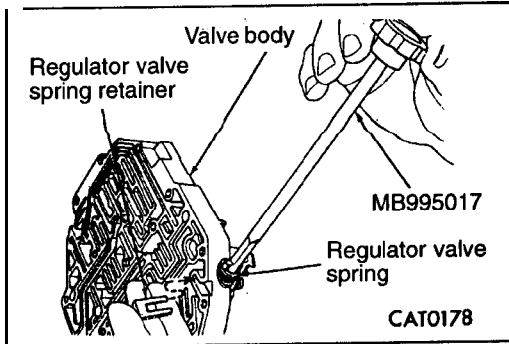


CAT01 76

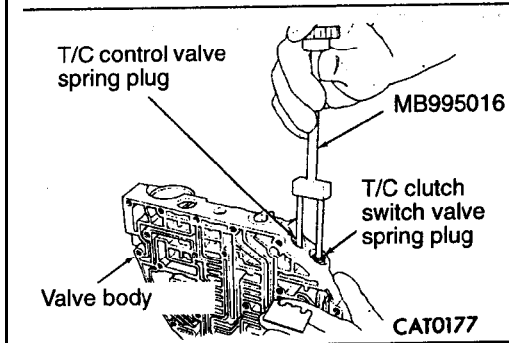
23310160010

REASSEMBLY

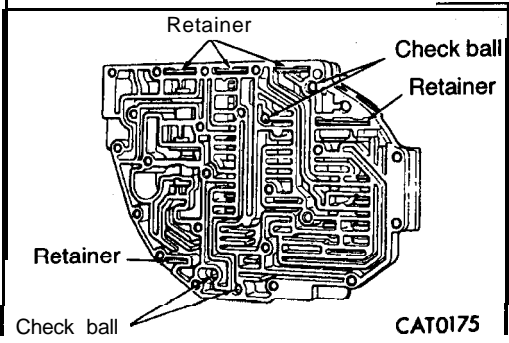
- (1) Install regulator valve.
Install retainer plate using **Installer/Remover MB995017.**



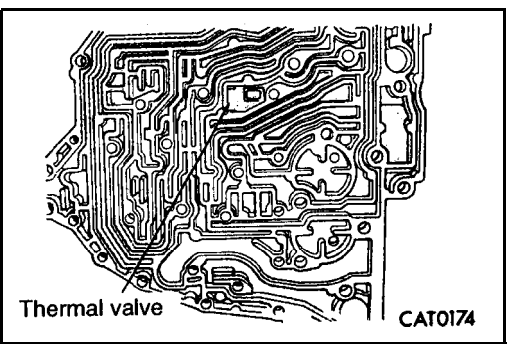
- (2) Install torque converter control valve and torque converter clutch valve.
Install dual retainer plate with **Installer/Remover MB995016.**



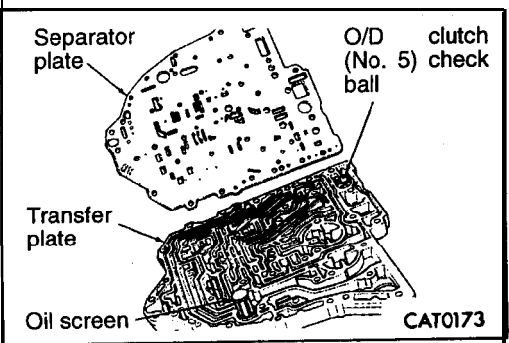
- (3) Install check balls and retainers.

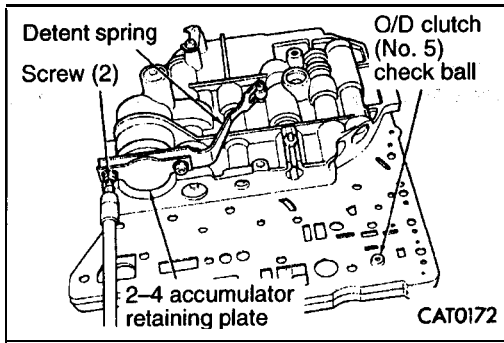


- (4) Install thermal valve.

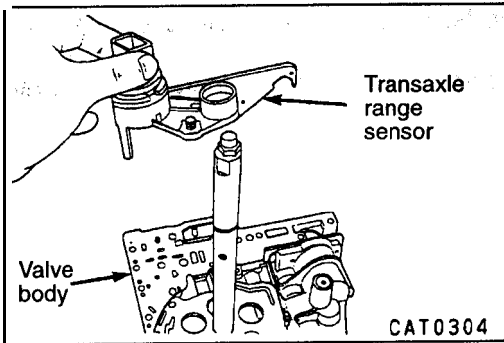


- (5) Install separator plate from transfer plate.
Install O/D clutch check ball and oil screen.

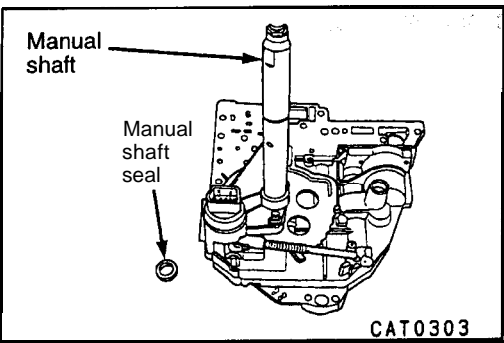




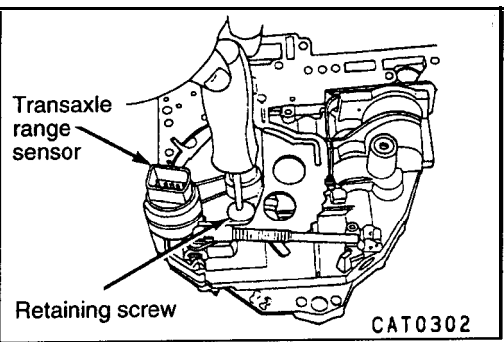
(6) Install 2-4 accumulator retaining plate screws (2).



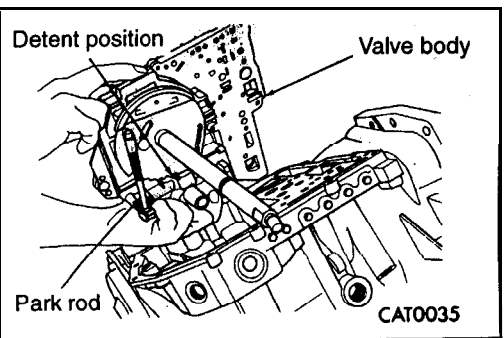
(7) Slide transaxle range sensor down the manual shaft and install.



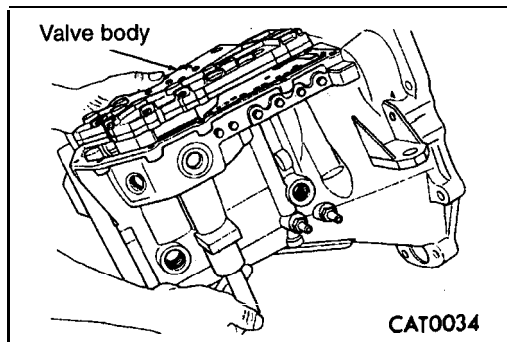
(8) Install manual shaft seal.



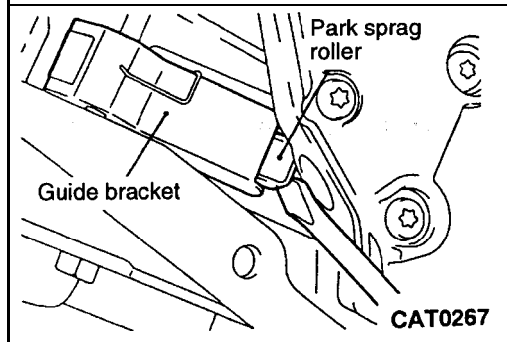
(9) Install transaxle range sensor retaining screw.



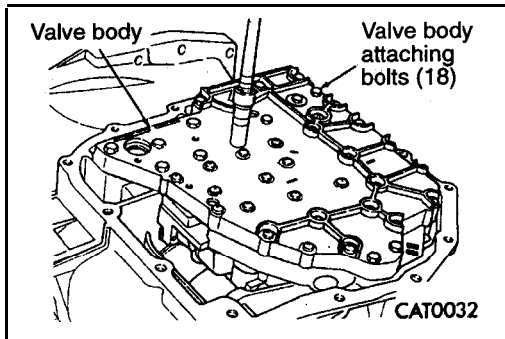
(10) Position detent as shown.



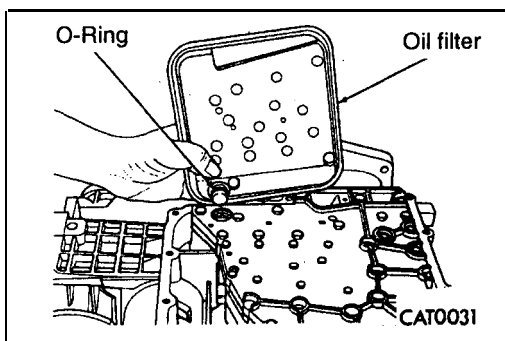
(11) Install valve body.



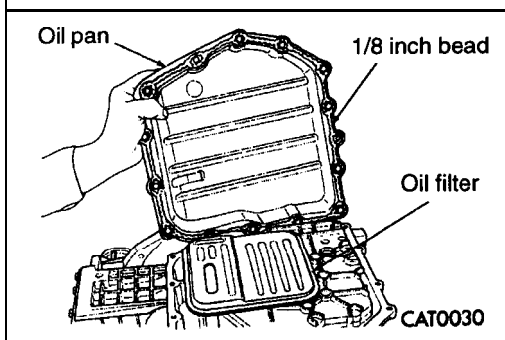
(12) Using a screwdriver, push guide bracket' away to park sprag rollers.



(13) Install valve body attaching bolts (18).



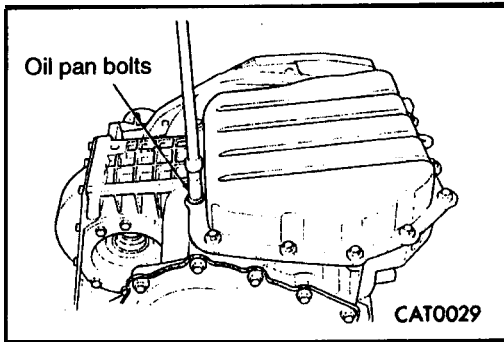
(14) Install oil filter.



(15) Install oil pan.

NOTE

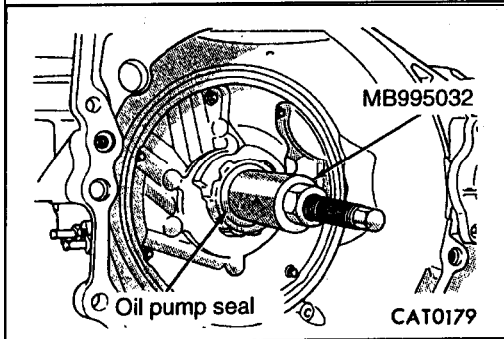
Apply a 1/8 inch wide bead of **Loctite** 18718 or equivalent.



(16) Install oil pan bolts.

NOTE

Use Loctite 18718 or equivalent under bolt heads.

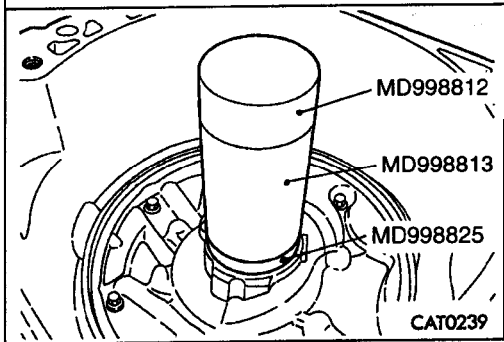


OIL PUMP SEAL

233101800-6

DISASSEMBLY

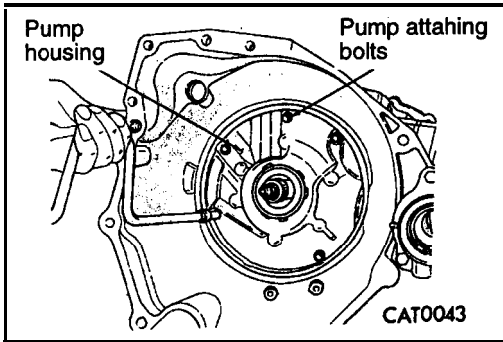
(1) Remove oil pump seal with Seal Remover **MB995032**.



REASSEMBLY

23310190019

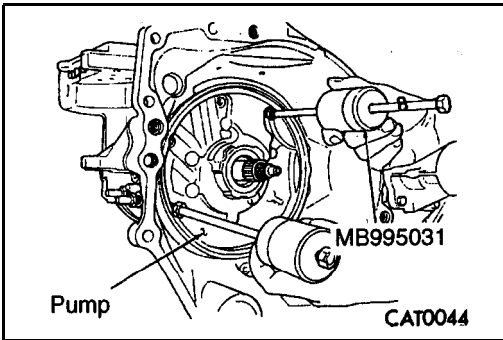
(1) Install new oil pump seal with **Installer Cap MD998812**, **Installer-100 MD998813** and **Installer Adapter (52) MD998825**.



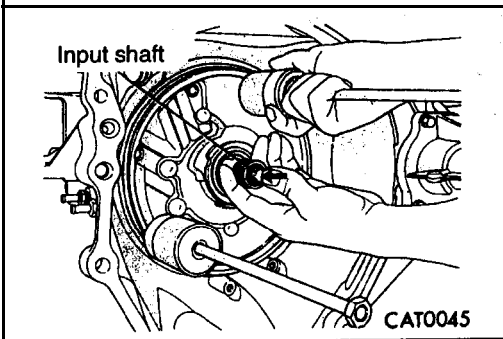
OIL PUMP

DISASSEMBLY

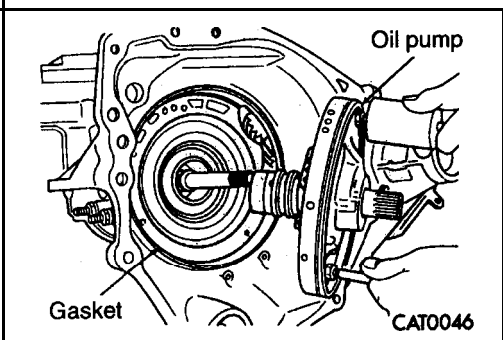
(1) Remove pump attaching bolts.



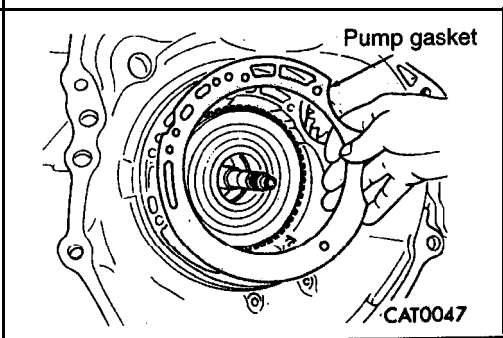
(2) Install Puller Set **MB995031** on **two** bolts holes.



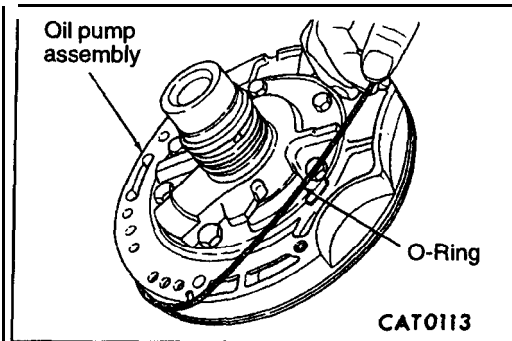
(3) Strike the weights of the pullers against **the** bolt heads of the tools to loosen the **pump**. **“Push in”** on **input shaft** while loosening pump.



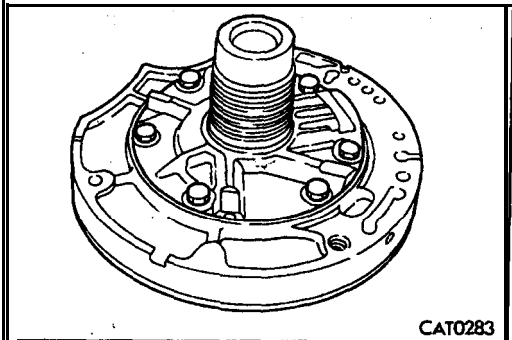
(4) Remove oil pump.



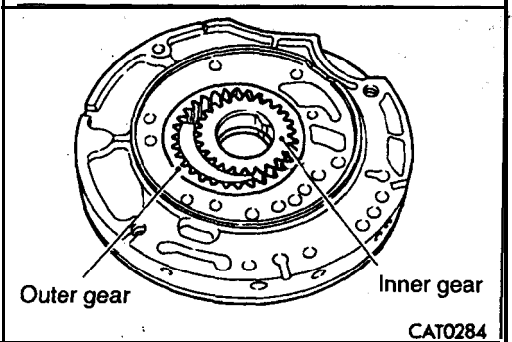
(5) Remove oil pump gasket.



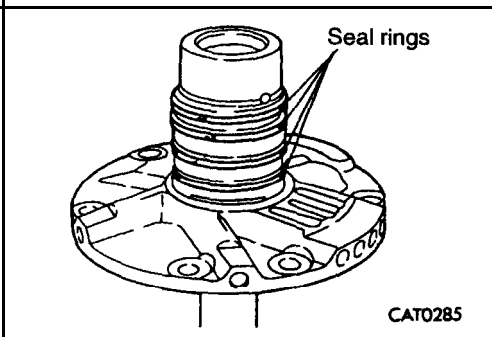
- (6) Remove the oil pump O-ring.



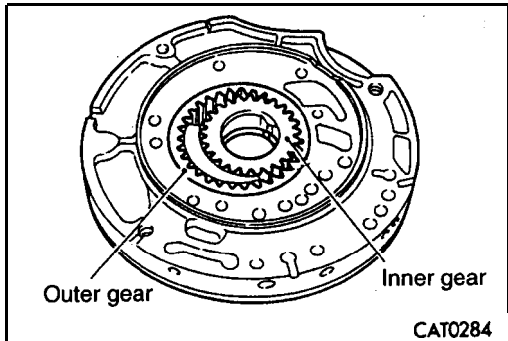
- (7) Remove the six bolts, and then disassemble the pump housing and reaction shaft support.



- (8) Remove the oil pump outer gear and oil pump inner gear from the pump housing. If the "gears are to be reused, place **mating** mark on the **gears** to ensure that the mounting direction will be correct; **when the** gears are installed. (Use a felt pen or **similar** to place **the mark.**)



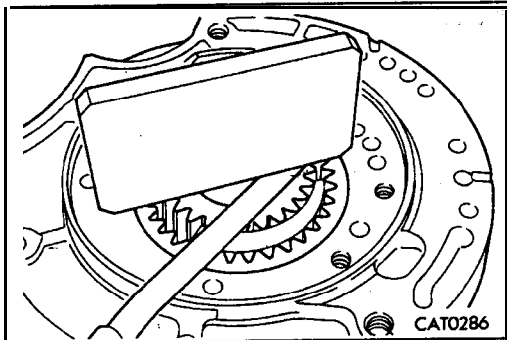
- (9) Remove the four seal rings from the reaction shaft support;



R E A S S E M B L Y

23310220015

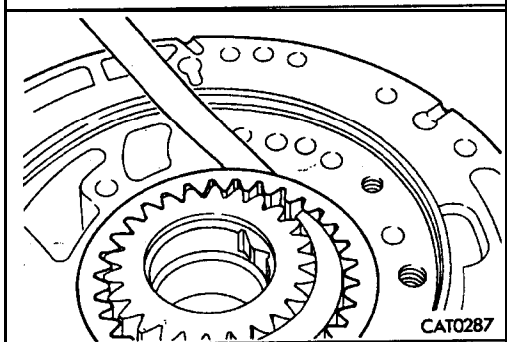
- (1) Install the oil pump outer gear and oil pump inner gear to the pump housing.
If reusing the old gears, install so that the mating marks that were made during disassembly are aligned.



- (2) Measure the side clearance between the oil pump outer gear and oil pump inner gear. If the clearance is greater than the standard value, replace the oil pump assembly.

Standard value:

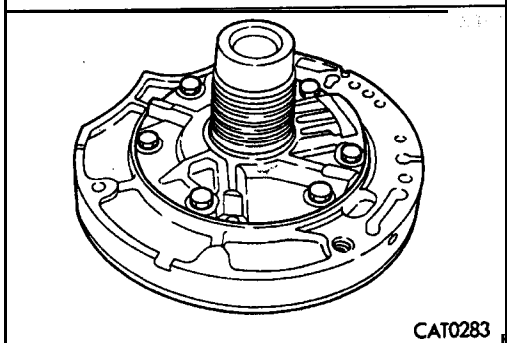
Side clearance between oil pump outer gear and oil pump inner gear 0.020 – 0.046 mm (.00079 – .00181 in.)



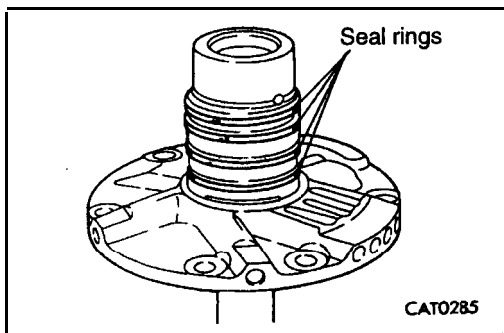
- (3) Measure the clearance between the oil pump outer gear and the pump housing pocket. If the clearance is greater than the standard value, replace oil pump assembly.

Standard value:

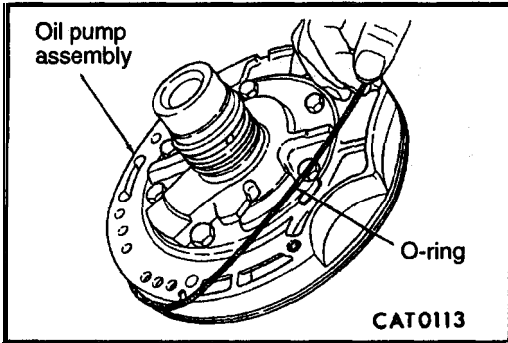
Clearance between oil pump outer gear and pocket 0.045 – 0.141 mm (.00177 – .00555 in.)



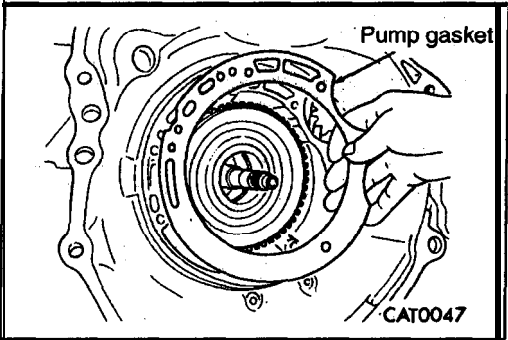
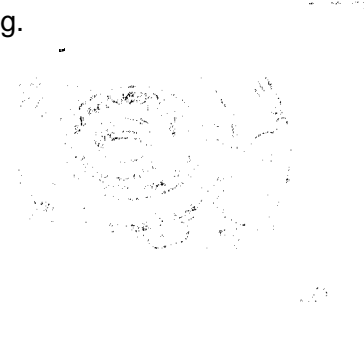
- (4) Assemble the pump housing and reaction shaft support, and then install them with the six bolts.



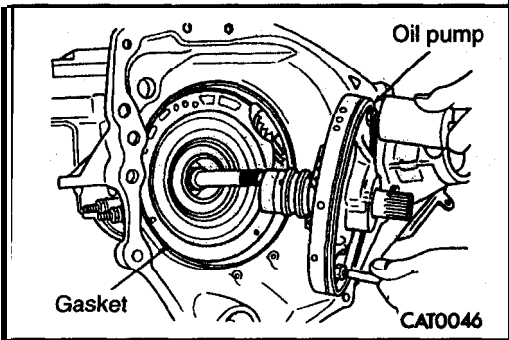
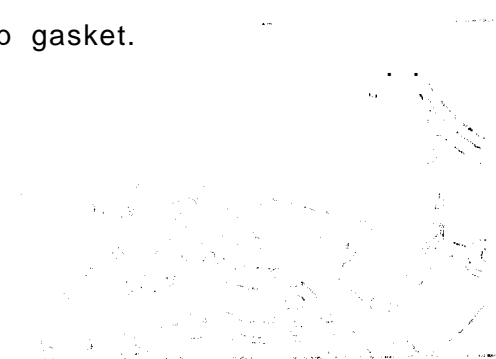
- (5) Place the four seal rings onto the reaction shaft support.



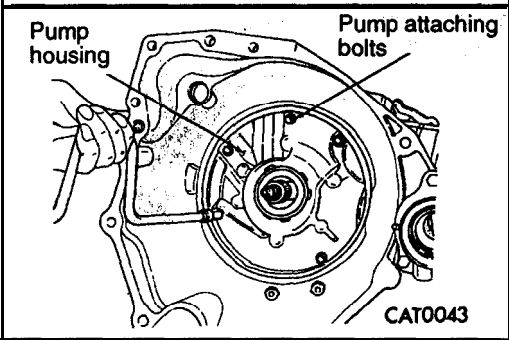
(6) Install the oil pump O-ring.



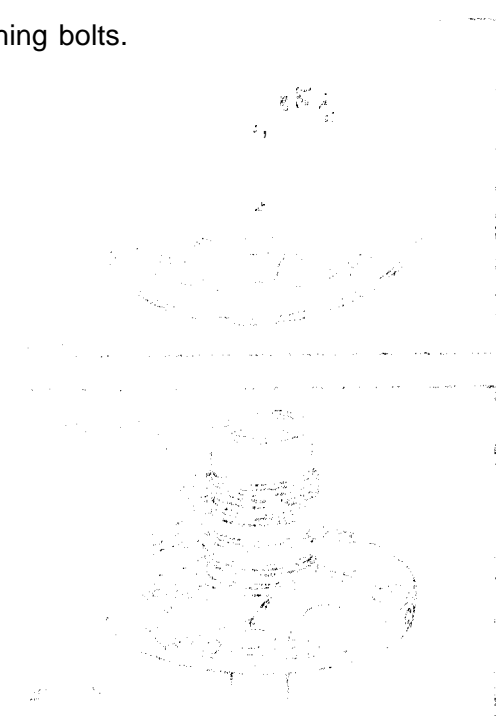
(7) Install oil pump gasket.



(8) Install oil pump.



(9) Install pump attaching bolts.

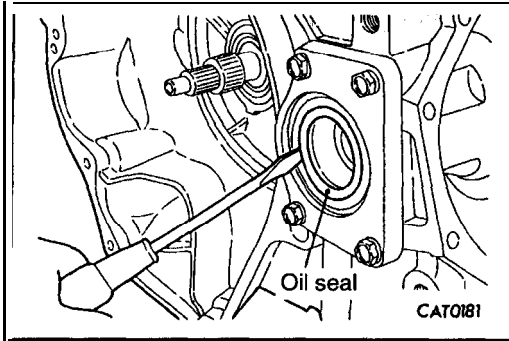


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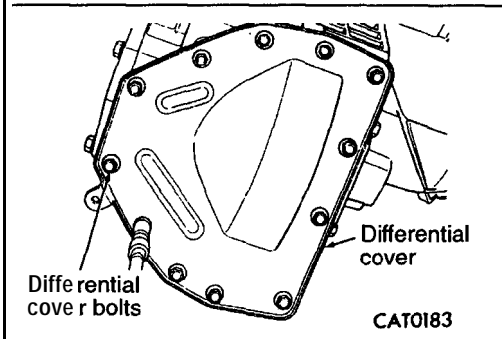
DIFFERENTIAL

DISASSEMBLY

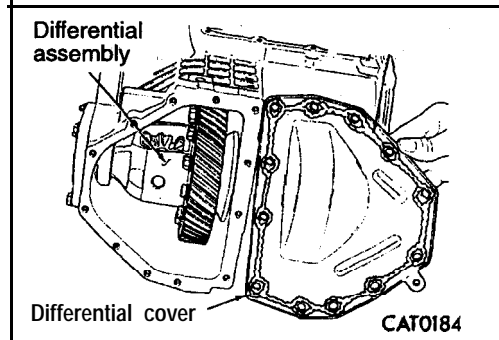
(1) Remove oil seal from **extension** housing.,



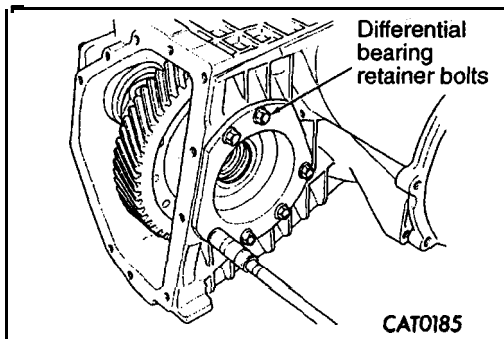
(2) Remove differential cover **bolts**.



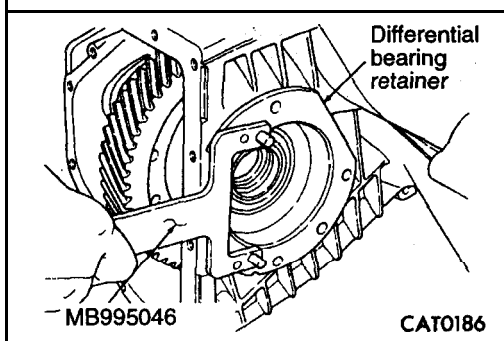
(3) Remove differential cover.

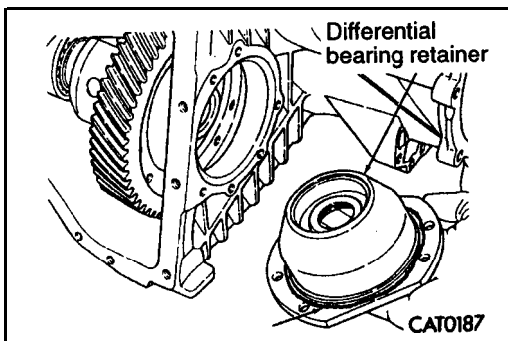


(4) Remove differential retainer bolts.

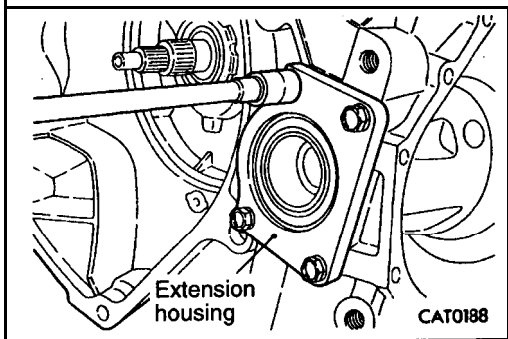


(5) Loosen differential bearing retainer with **Remover MB995046**.
Walk retainer out of housing using **special** tool.

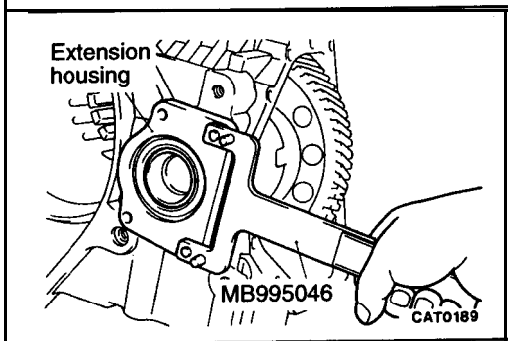




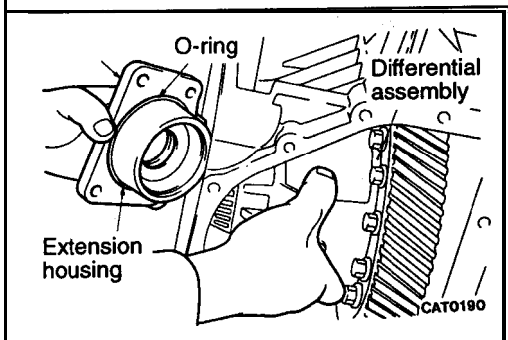
(6) Remove differential bearing **retainer**.



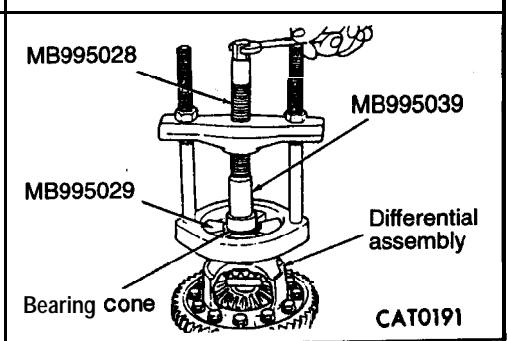
(7) Remove bolts from extension housing.



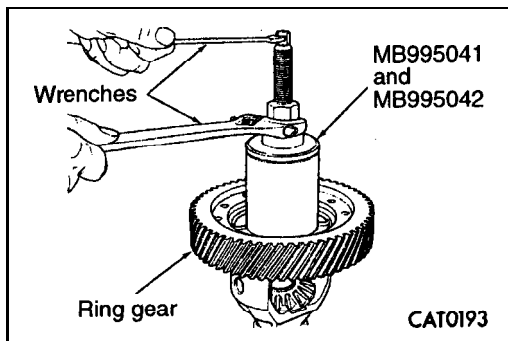
(8) Loosen extension housing with Remover **MB995046**.
Walk housing out of transaxle case using special tool.



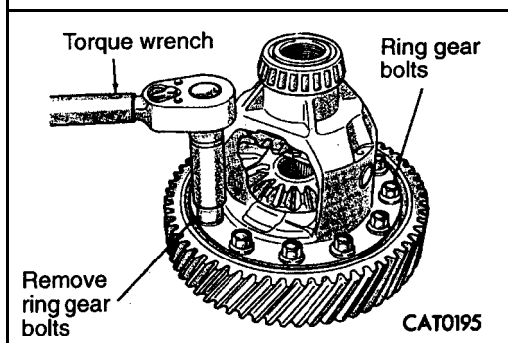
(9) Remove extension housing.



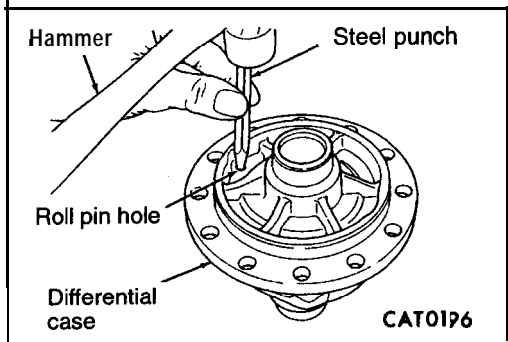
(10) Remove differential **bearing** from differential case side using Puller **MB995028**, four Adapter Blocks **MB995029** and Adapter **MB995039**.



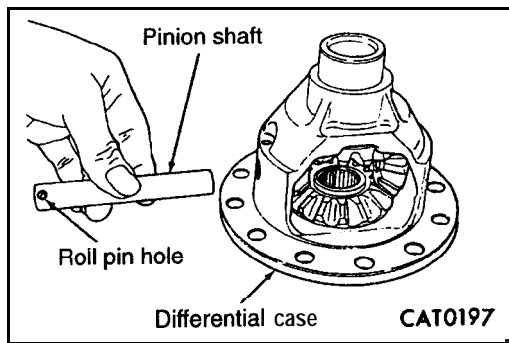
(11) Remove differential bearing from ring gear side with Bearing and Gear remover MB995041 and MB995042.



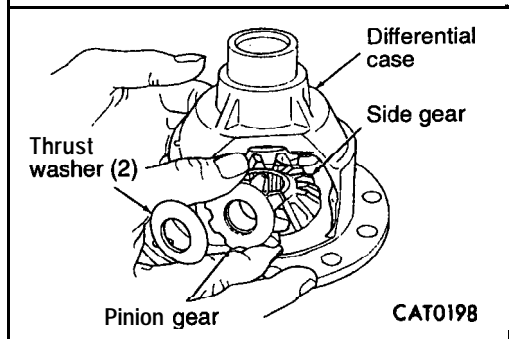
(12) Remove ring gear bolts.



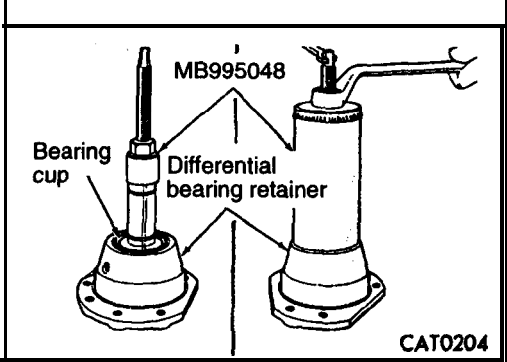
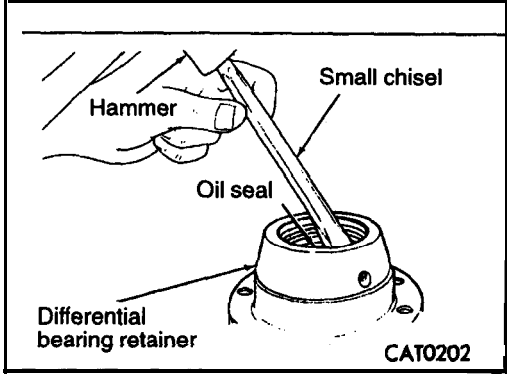
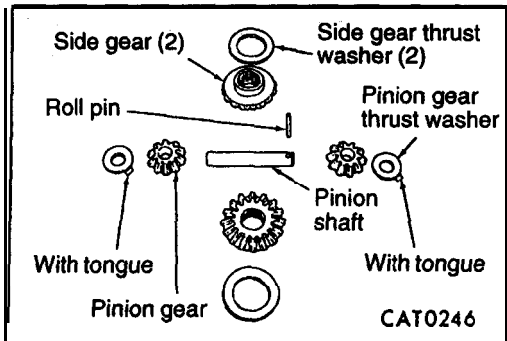
(13) Remove pinion shaft roll pin by tapping out with a hammer and steel punch.



(14) Remove pinion shaft.

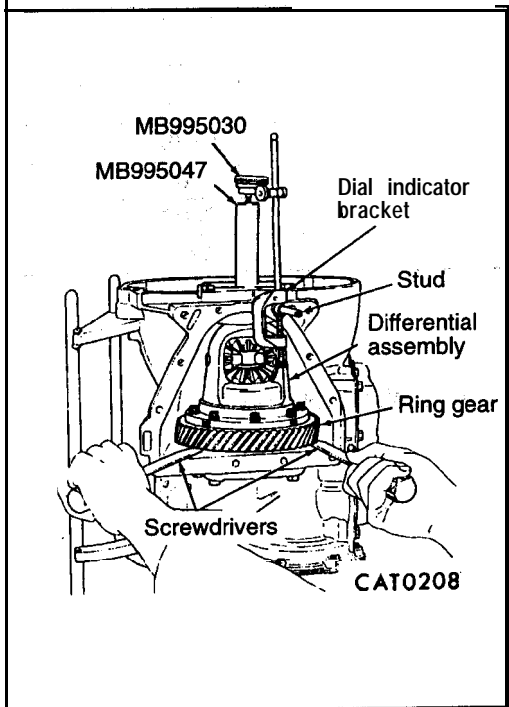
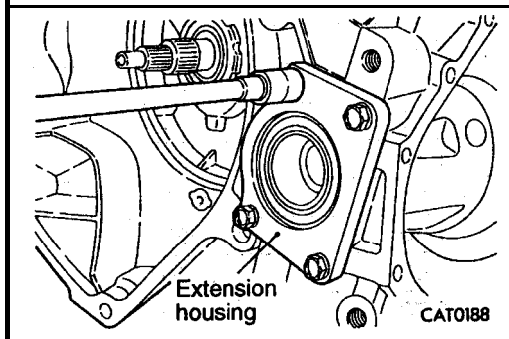
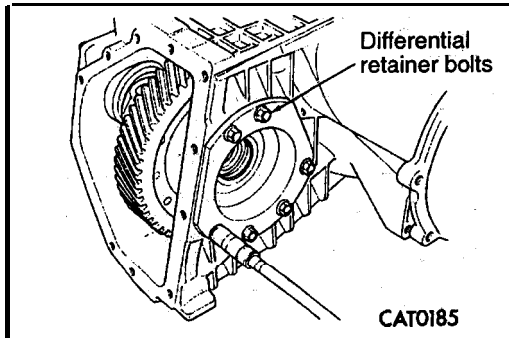
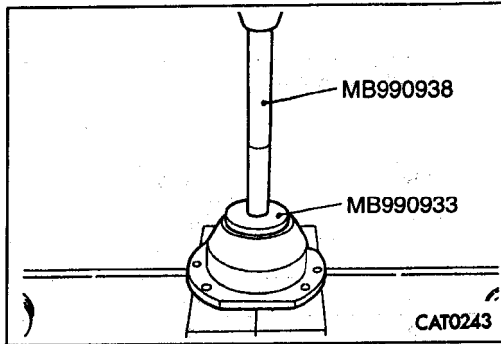


(15) Remove pinion gears, side gears and tabbed thrust washers by rotating pinion gears to opening in differential case.



(16) Remove oil seal from differential bearing retainer with a small chisel and hammer.

(17) Remove bearing cup with Cup Remover MB995048.



R E A S S E M B L Y

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(1) Install a 0.50 mm (.0197 in.) "test" shim and reinstall the bearing cup into the retainer. Install bearing cup, press in using Installer Bar MB990938 and Installer Adapter MB990933. Oil baffle is not required when making shim selection.

(2) Install bearing retainer into the case and torque bolts to 28 Nm (20 ft.lbs.).

(3) Install extension housing into the case and torque bolts to 28 Nm (20 ft.lbs.). Position transaxle assembly with oil pump facing up. Rotate ring gear one revolution to seal differential bearings.

(4) Attach a dial indicator set MB995030 to the case and zero the dial indicator.

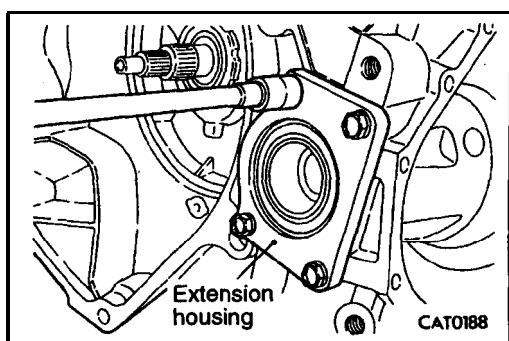
(5) Place a large screwdriver to each side of the ring gear and lift. Check the dial indicator for the amount of end play.

Caution
Do not damage the transaxle case and/or differential cover sealing surface.

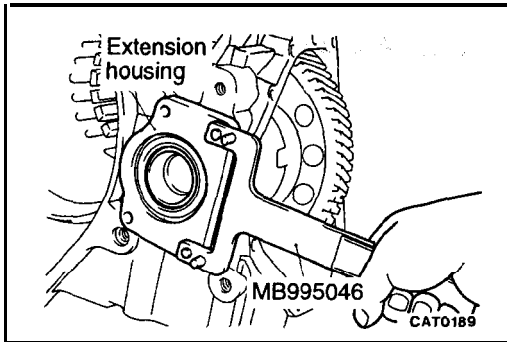
(6) When the end play has been determined, refer to the Differential Bearing Shim Chart for correct shim combination.

DIFFERENTIAL BEARING SHIM CHART

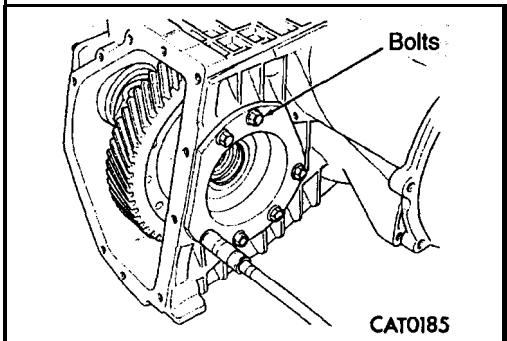
| End play with 0.50 mm (.0197 in.) gauging shim installed | | Required Shim Combination | | Total Thickness | |
|--|-------|---------------------------|-------------|-----------------|-------|
| mm | in. | mm | in. | mm | in. |
| 0 | 0 | 0.50 | .0197 | 0.50 | .0197 |
| 0.05 | .0020 | 0.75 | .0295 | 0.75 | .0295 |
| 0.10 | .0039 | 0.80 | .0315 | 0.80 | .0315 |
| 0.15 | .0059 | 0.85 | .0335 | 0.85 | .0335 |
| 0.20 | .0079 | 0.90 | .0354 | 0.90 | .0354 |
| 0.25 | .0098 | 0.95 | .0374 | 0.95 | .0374 |
| 0.30 | .0118 | 1.00 | .0394 | 1.00 | .0394 |
| 0.35 | .0138 | 1.05 | .0413 | 1.05 | .0413 |
| 0.40 | .0157 | 0.50+0.60 | .0197+.0236 | 1.10 | .0433 |
| 0.45 | .0177 | 0.50+0.65 | .0197+.0256 | 1.15 | .0453 |
| 0.50 | .0197 | 0.50+0.70 | .0197+.0276 | 1.20 | .0472 |
| 0.55 | .0217 | 0.50+0.75 | .0197+.0295 | 1.25 | .0492 |
| 0.60 | .0236 | 0.50+0.80 | .0197+.0315 | 1.30 | .0512 |
| 0.65 | .0256 | 0.50+0.85 | .0197+.0335 | 1.35 | .0531 |
| End play with 0.50 mm (.0197 in.) gauging shim installed | | Required Shim Combination | | Total Thickness | |
| mm | in. | mm | in. | mm | in. |
| 0.70 | .0276 | 0.50+0.90 | .0197+.0354 | 1.40 | .0551 |
| 0.75 | .0295 | 0.50+0.95 | .0197+.0374 | 1.45 | .0571 |
| 0.80 | .0315 | 0.50+1.00 | .0197+.0394 | 1.50 | .0591 |
| 0.85 | .0335 | 0.50+1.05 | .0197+.0413 | 1.55 | .0610 |
| 0.90 | .0354 | 1.00+0.60 | .0394+.0236 | 1.60 | .0630 |
| 0.95 | .0374 | 1.00+0.65 | .0394+.0256 | 1.65 | .0650 |
| 1.00 | .0394 | 1.00+0.70 | .0394+.0276 | 1.70 | .0669 |
| 1.05 | .0413 | 1.00+0.75 | .0394+.0295 | 1.75 | .0689 |
| 1.10 | .0433 | 1.00+0.80 | .0394+.0315 | 1.80 | .0709 |
| 1.15 | .0453 | 1.00+0.85 | .0394+.0335 | 1.85 | .0728 |
| 1.20 | .0472 | 1.00+0.90 | .0394+.0354 | 1.90 | .0748 |
| 1.25 | .0492 | 1.00+0.95 | .0394+.0374 | 1.95 | .0768 |
| 1.30 | .0512 | 1.00+1.00 | .0394+.0394 | 2.00 | .0787 |
| 1.35 | .0531 | 1.00+1.05 | .0394+.0413 | 2.05 | .0807 |
| 1.40 | .0551 | 1.05+1.05 | .0394+.0413 | 2.10 | .0827 |



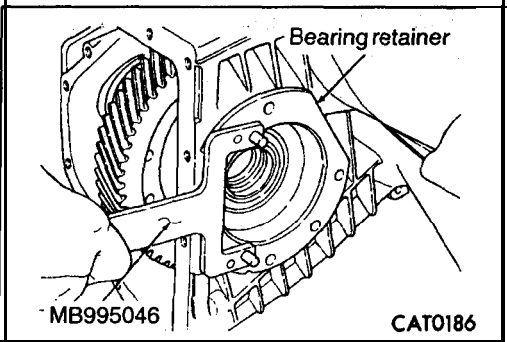
(7) Remove bolts from extension, **housing**.



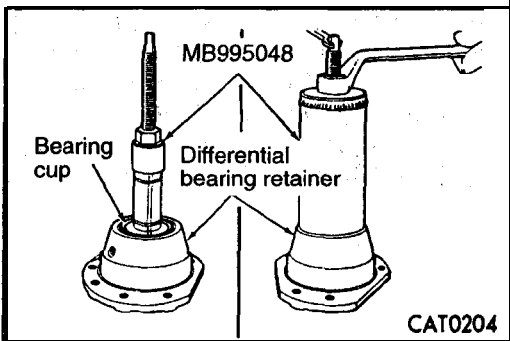
- (8) Loosen extension housing with Remover MB995046. Walk housing out of transaxle case, using special tool.
- (9) Remove extension housing.



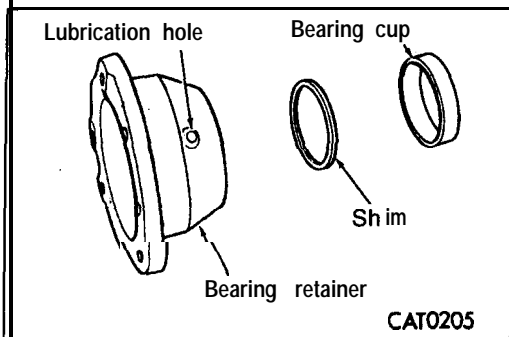
- (10) Remove differential retainer bolts.



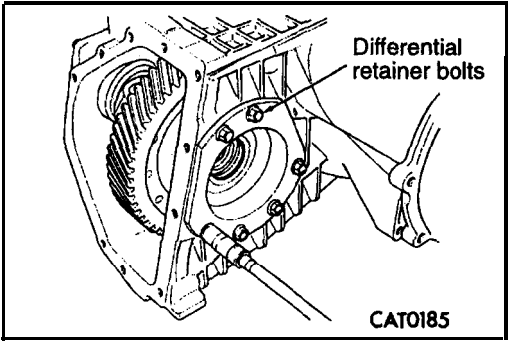
- (11) Loosen differential bearing retainer with Remover MB995046. Walk retainer out of transaxle using special tool.
- (12) Remove differential bearing retainer.



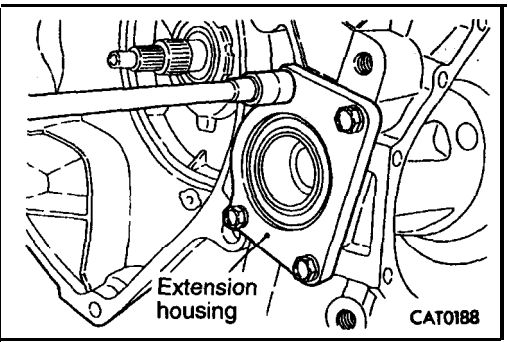
- (13) Remove bearing cup with Cup Remover MB995048.
- (14) Remove the 0.50 mm (.0197 in.) "test" shim.



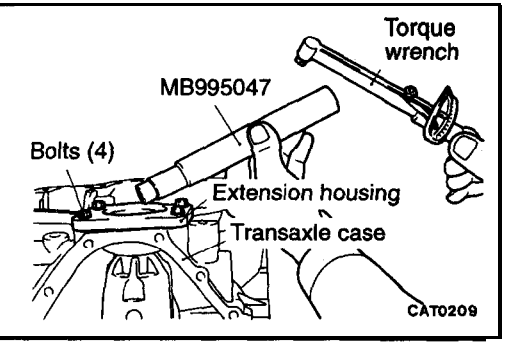
- (15) Install the proper shim combination under the bearing cup.



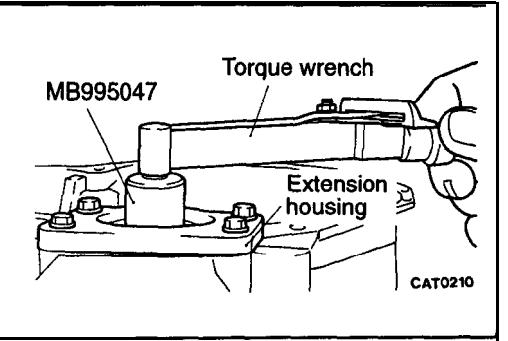
(17) Install differential bearing retainer into the case **and** torque bolts to 28 Nm (20 ft.lbs.).

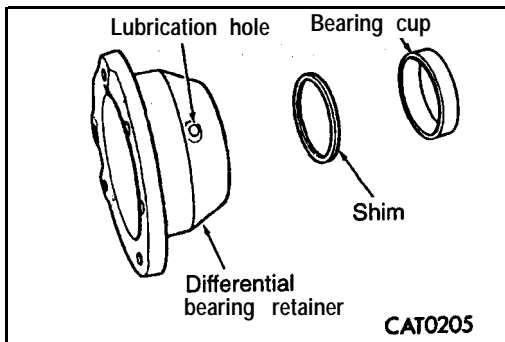


(18) Install extension housing into the case **and** torque bolts to 28 Nm (20 ft.lbs.).

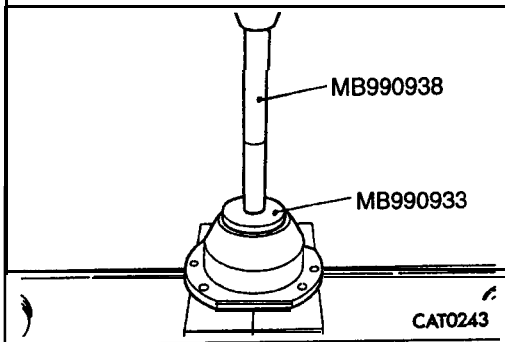


(19) Install Checking Tool **MB995047** and a torque wrench to check differential bearings turning torque. The turning torque should be 0.56 to 2.03 Nm (5 to 18 in. lbs.). If the turning torque is too high, install a 0.05 mm (.0020 in.) thinner shim. If the turning torque is too low, install a 0.05 mm (.0020 in.) thicker shim. Repeat until proper turning torque is obtained.

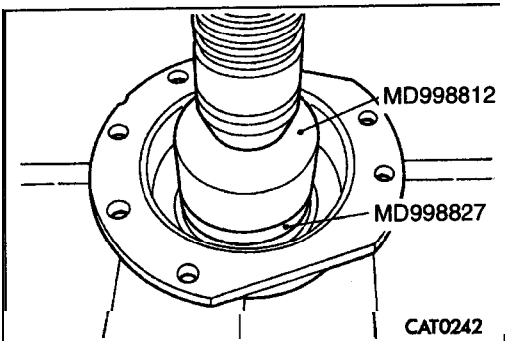




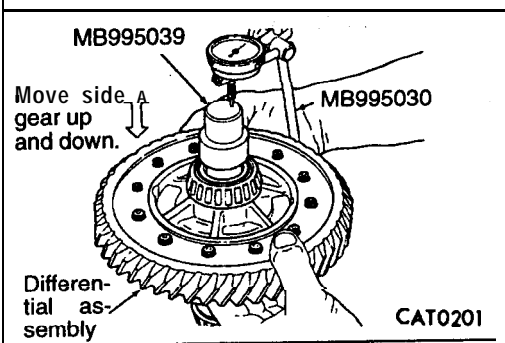
(20) Install proper shim.



(21) Install bearing cup, and then press in using Installer Bar MB990938 and Installer Adapter MB990933.



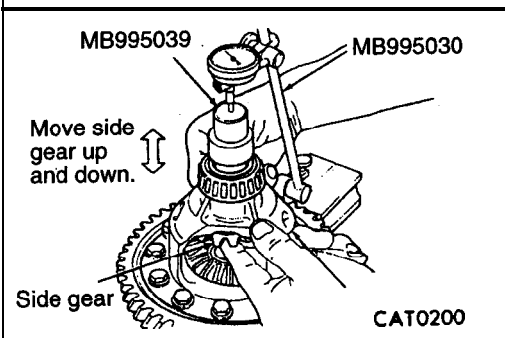
(22) Install new oil seal, press in using Installer Cap MB998812 and Installer Adapter (56) MB998827.



(23) Using dial indicator MB995030 and Adapter MB995039, check side gear end play at ring gear side and differential case side.

NOTE

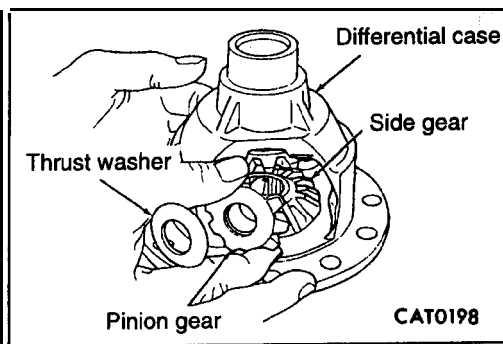
Side gear end play each side must be 0.025 to 0.330 mm (.00098 to .01299 inch).



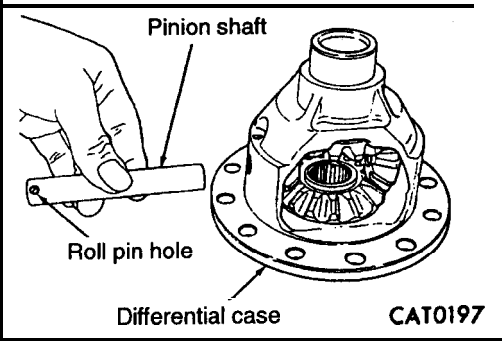
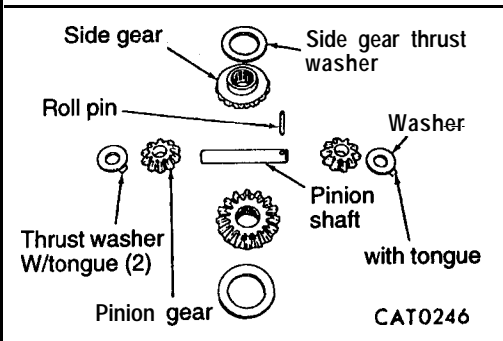
Four select thrust washer are available. 0.81, 0.93, 1.07 and 1.19 mm (.0319, .0366, .0421 and .0469 inch).

If either side gear end play is not within specifications, remove appropriate side gear thrust washer.

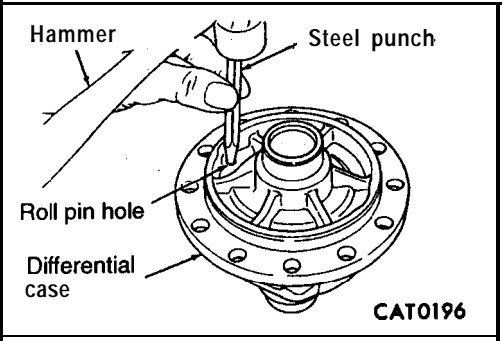
Measure existing thrust washer and replace with new thrust washer that provides end play closest to center of end play specifications.



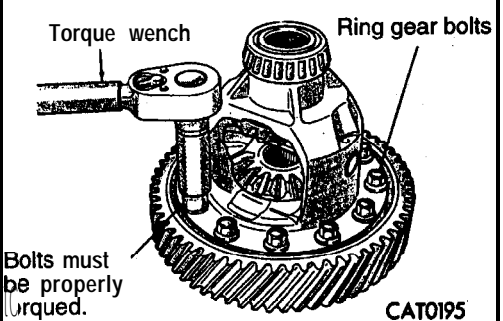
(24) Install pinion gears, side gears and tabbed thrust washers by rotating pinion gears to opening in differential case.



(25) Install pinion shaft.

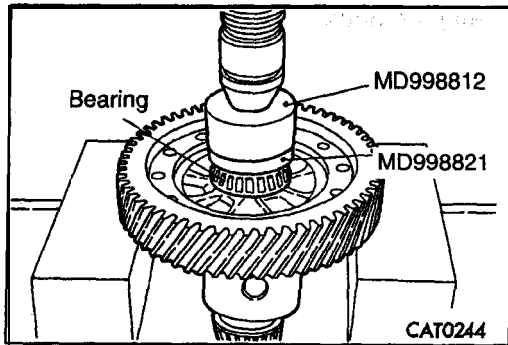


(26) Install pinion shaft roll pin by tapping in with a hammer and steel punch.

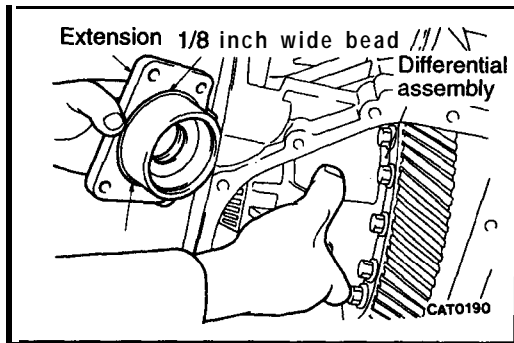
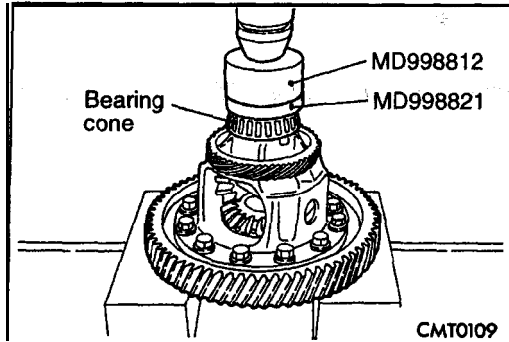


(27) Install ring gear bolts.

NOTE
Always use new ring gear bolts and torque to 95 Nm (70 ft.lbs.).



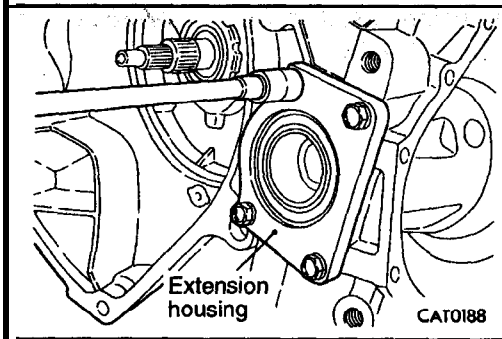
(28) Install differential bearing, and then **press in** using **Installer Cap MD998812** and **Installer Adapter (44) MD998821**.



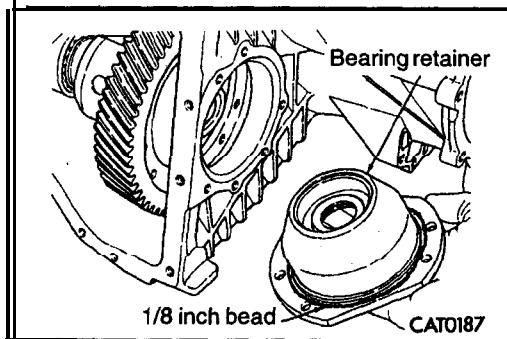
(29) Install extension.

NOTE

Apply an 1/8 inch wide bead of Loctite 18718 or equivalent.



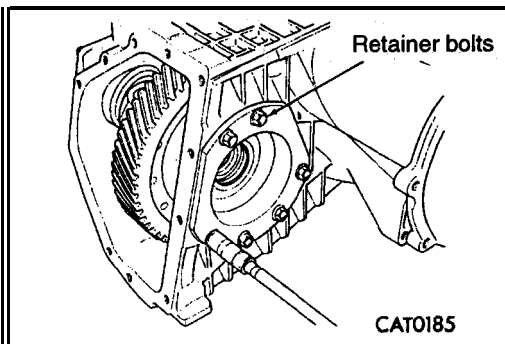
(30) Install bolts to extension housing.



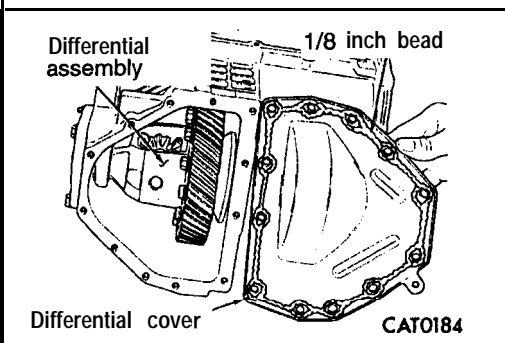
(31) Install differential bearing retainer.

NOTE

Apply an 1/8 inch wide bead of Loctite 18718 or equivalent.



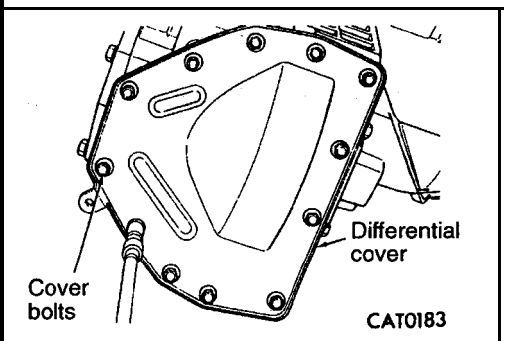
(32) Install differential retainer bolts.



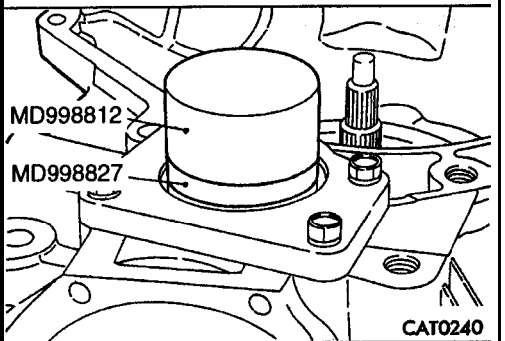
(33) Install differential cover.

NOTE

Apply an 1/8 inch wide bead of **Loctite 1 8718** or equivalent:



(34) Install differential cover bolts.



(35) Install new oil seal using Installer Cap **MD998812** and Installer Adapter (56) **MD998827**.