DAIHATSU

APPLAUSE

TO INDEX

AUTOMATIC TRANSMISSION

AT

AT00001-00000

NO. 9170-AE

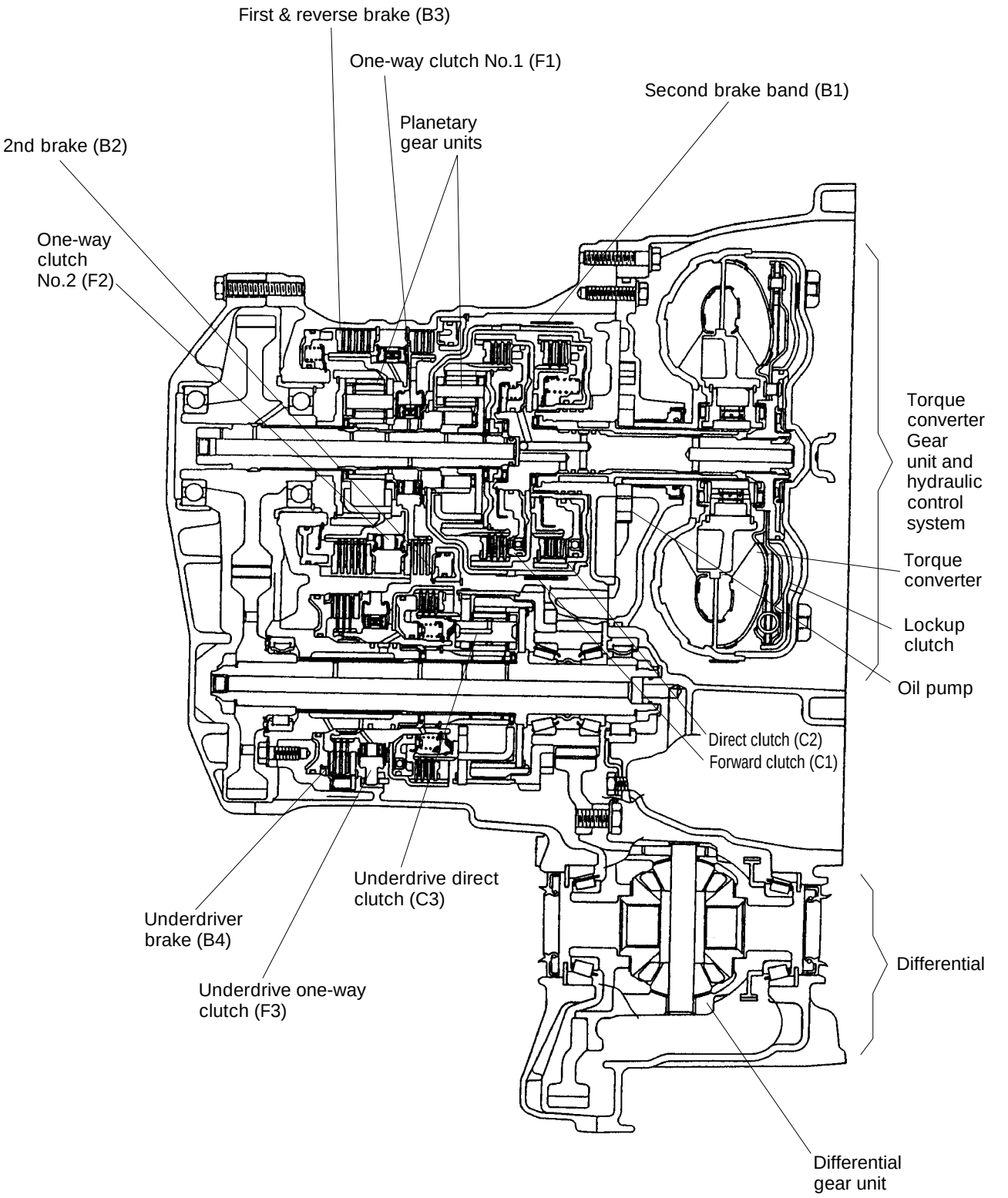
DESCRIPTION

The A240L automatic transaxle described in this AT section is a lockup type four-speed automatic transaxle developed exclusively for transversely-mounted engines the automatic transmission for the HD-E E/G models is changed on following parts because of engine torque up and line pressure up.

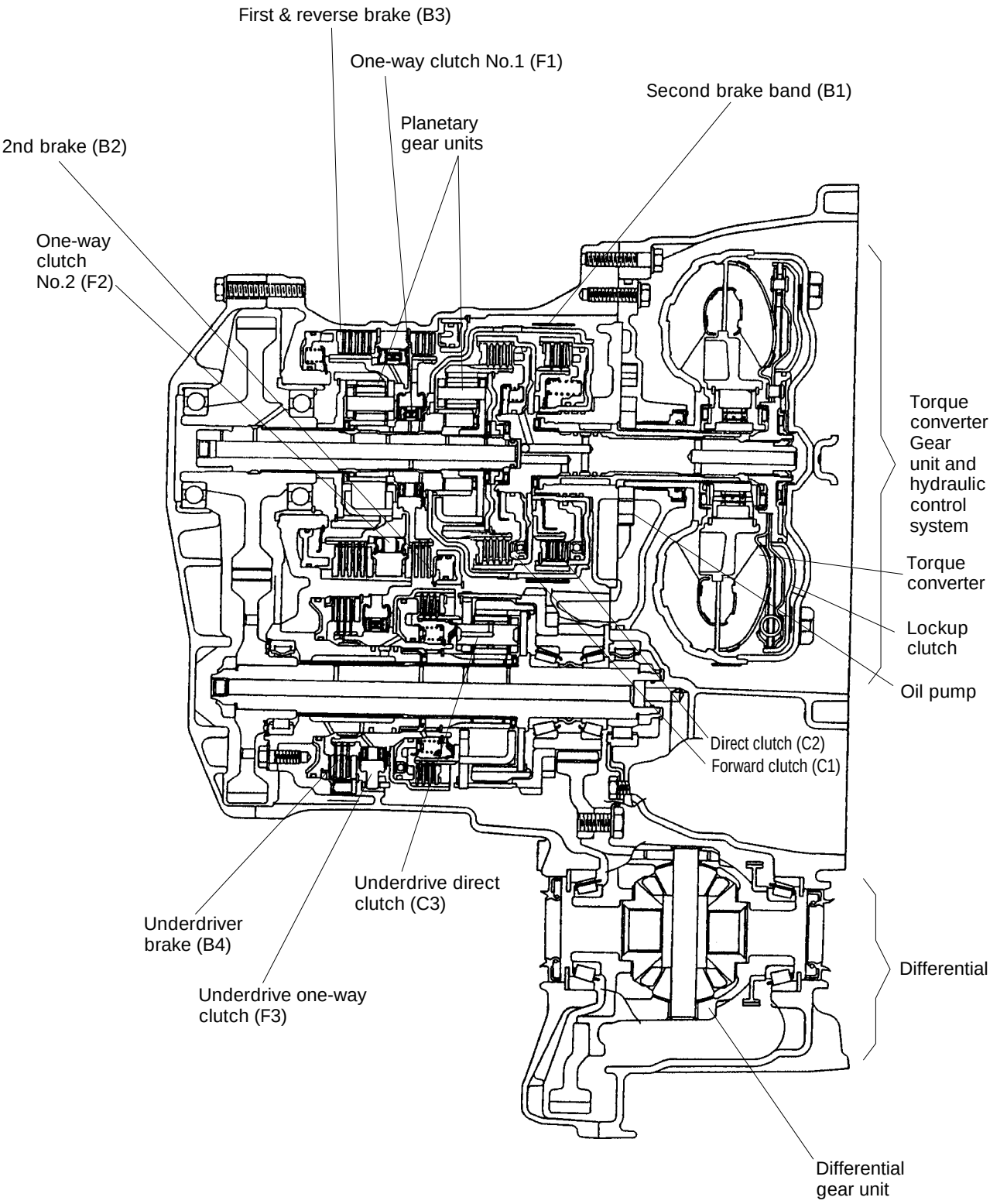
① Forward clutch disc & plate (from three pieces-each to four pieces)
② Forward clutch piston & return spring
③ Primary plunger sleeve & Primary valve plunger
④ 2nd brake accumulator piston
⑤ 1st & reverse brake piston

For the HD-C E/G models, the current type automatic transmission is provided.

AT00002-00000



(for HD-C E/G models)



(for HD-E E/G models)

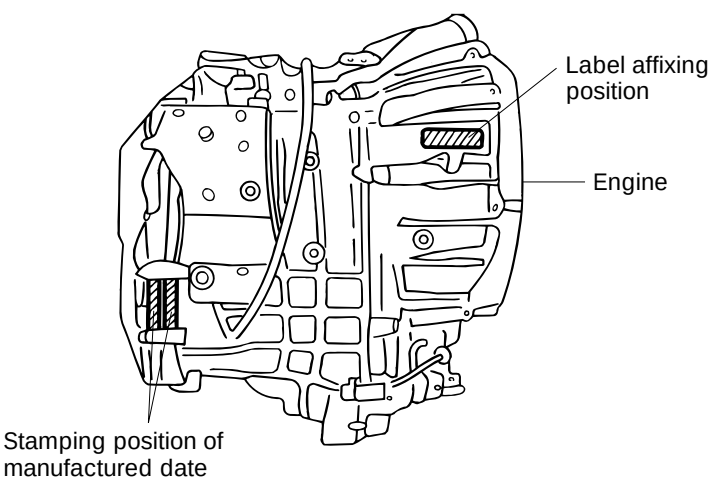
SPECIFICATIONS

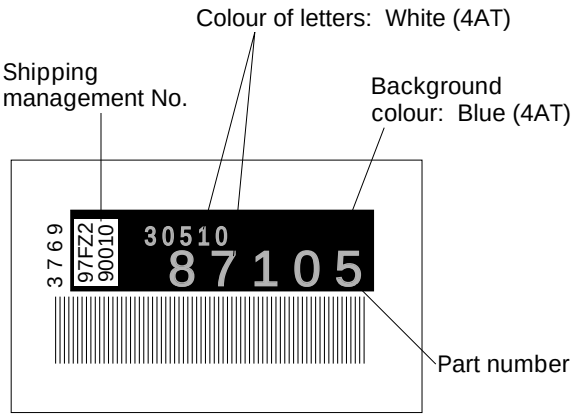
Item		Specifications
Torque converter	Type	Three-element, one-stage, two-phase type (with lock-up mechanism)
	Stall torque ratio/Stall revolution speed	2.40/2000 ~ 2300 rpm
	One-way clutch type	Sprag type
Transmission type	Type	Four forward speeds, one reverse gear, simpson planetary gear type
	Control element	Wet type multiple clutch 3 sets
		Band type brake 1 set
		Wet type multiple brake 3 sets
		One-way clutch 3 pieces
	Gear ratio	1st gear: 3.643 2nd gear: 2.008 3rd gear: 1.296 4th gear (O/D): 0.892, reverse gear: 2.977
	Reduction gear ratio	Counter gear: 0.892 (50/56), Differential gear: 2.821 (79/28)
	Speedometer	Number of drive gear teeth: 35, Number of driven gear teeth: 31
	Oil pump	Internal gear type
	Fluid to be used	ATF DEXRON® II or III
	Fluid capacity liter	APPROX: Transaxle 7.2
	Cooling method	Water-cooled (radiator built-in type)
Control system	Gear shift control method	Governor and throttle pressure shift control method
	Automatic gear shift	Four forward speeds, full automatic shift
	Manual control pattern	P—R—N—D—2—L (With overdrive)

AT00003-00000

- A label identifying 4AT is affixed on the upper surface of the transaxle case. Also, alphanumeric letters which indicate the manufacturing date and year are stamped on the transaxle case and rear cover.
  Manufacturing date and year
  E.g.: 7FZ-12345

External view of automatic transmission assembly as viewed from its exact top position



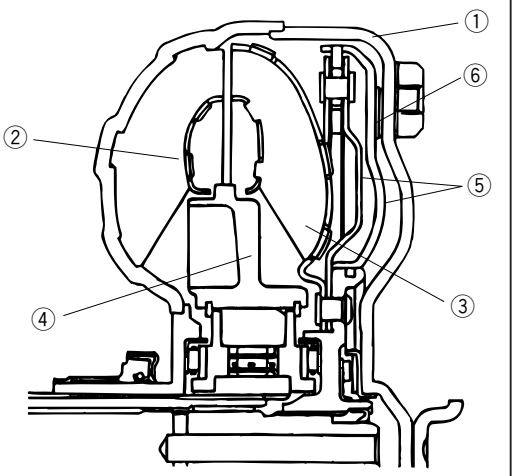


AT00004-00003

OUTLINE

TORQUE CONVERTER

The torque converter is composed of a torque converter cover on which the drive plate is mounted, a pump impeller integral with the torque converter cover, a turbine runner, a stator and a lockup clutch.
The employment of a lockup clutch has made it possible to eliminate the slip loss during the middle and high-speed running and to improve the fuel economy and power train performance.

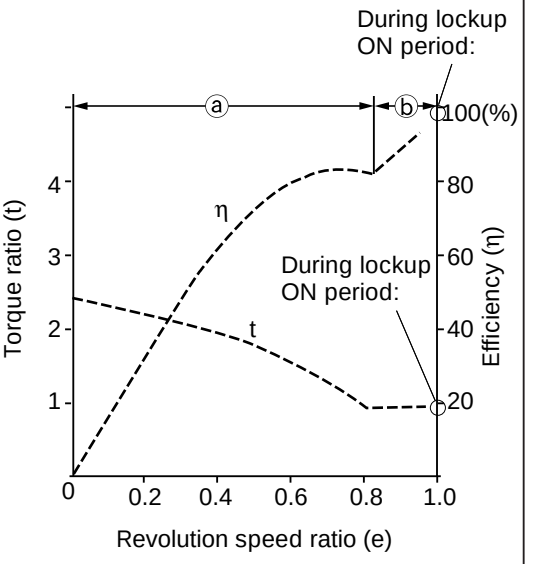


① Torque converter cover
② Pump impeller
③ Turbine runner
④ Stator
⑤ Lockup clutch
⑥ Paper lining

AT00005-00004

Operation of torque converter

When the difference in speed is small between the pump impeller and the turbine runner, the fluid from the turbine runner flows in a direction that prevents the pump impeller from rotating. Therefore, the stator converts the fluid flow to such a direction that may assist the rotation of the pump impeller.
The torque ratio becomes a maximum value, about 2.4, when the revolution speed ratio is zero (at time of stating). This torque ratio is called the stall torque ratio, whereas this stage is called the stall point.
The transmitted torque continues to increase, until the revolution speed ratio reaches about 0.8. However, the greater the revolution speed ratio, the smaller the torque ratio. This stage is called the torque converter range.
When the revolution speed ratio exceeds about 0.8, the torque ratio becomes about one. This means that the torque is transmitted without being altered. This stage is called the fluid coupling range.
The efficiency rises in proportion to the revolution speed ratio. However, the increasing rate of the efficiency begins to drop beyond a certain point. This is caused because the fluid from the turbine runner starts striking the back side of the stator, thus retarding the fluid flow. Consequently, the one-way clutch of the stator begins to function, thereby starting rotation of the stator. As a result, the increasing rate of the efficiency rises again.



ⓐ : Torque converter range

ⓑ : Fluid coupling range

e: Revolution speed ratio

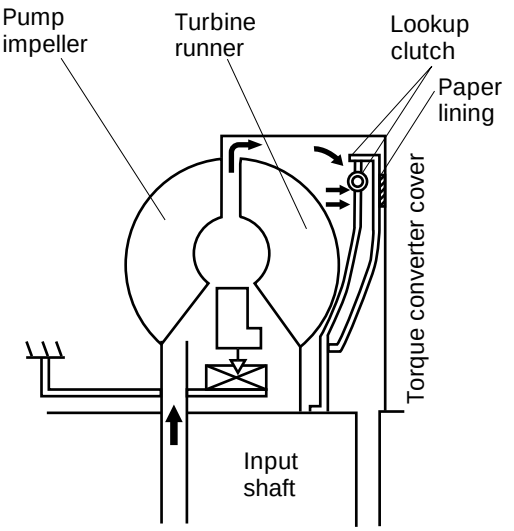
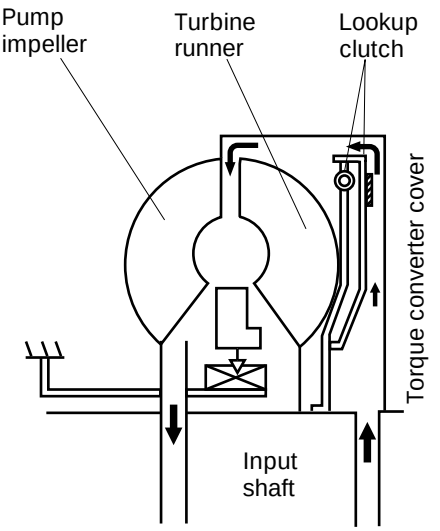
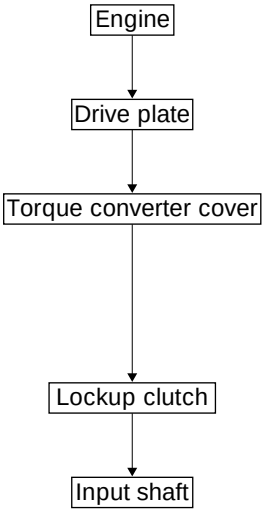
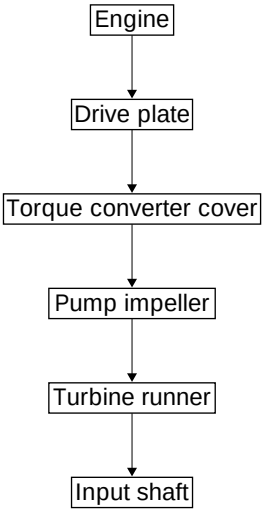
$$= \frac{\text{Turbine shaft revolution speed}}{\text{Pump shaft revolution speed}}$$

t: Torque ratio = $\dfrac{\text{Turbine shaft torque}}{\text{Pump shaft torque}}$

η: Efficiency = $\dfrac{\text{Output horsepower}}{\text{Input horsepower}} \times 100\ (\%)$

AT00006-00005

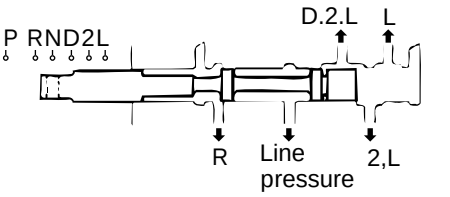
Lockup mechanism

	During lockup clutch operating period:	During lockup clutch non-operating period:
Operation	The figure below indicates the fluid flow inside the torque converter to the lockup clutch section when the lockup relay valve is switched. Consequently, the difference in hydraulic pressure between the right and left sides causes the lockup clutch plate to be pushed against the paper lining side of the torque converter cover. As a result, the lockup clutch section plate starts to rotate as a unit integral with the cover.	When the lockup relay valve is switched, the fluid flow inside the torque converter to the lockup clutch section is reversed as opposed to the time when the lockup clutch is operating. The figure below indicates this fluid flow. Consequently, the pressure at the torque converter side (the right side of the figure) of the lockup clutch plate rises. Hence, the lockup clutch plate is no longer integral with torque converter cover. As a result, power is transmitted in the same way as with the conventional torque converters.
Fluid flow		
Power trans-mission		

AT00007-00006

Manual value

The manual value is interlocked with the shift lever and push-pull cable. According to the lever movements, this manual valve switches the hydraulic pressure passages for each range of “P”, “R”, “N”, “D”, “2” and “L”.

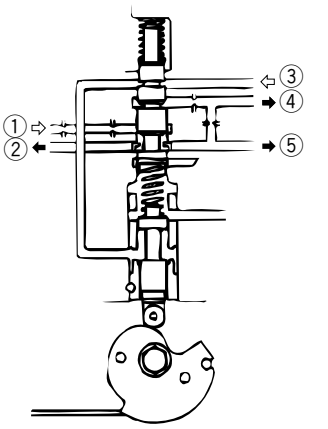


AT00008-00007

Throttle valve

The throttle valve provides the throttle pressure in proportion to the depression of the accelerator pedal, namely the engine output.

The throttle pressure is a hydraulic pressure which corresponds with the opening degree of the throttle valve and vehicle speed. This throttle pressure is applied to each of the 1-2, 2-3 and 3-4 shift valves as a pressure counteracting the governor pressure.



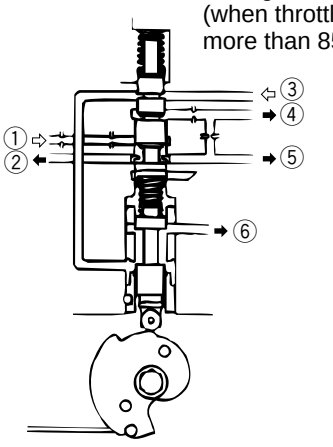
① Line pressure
② Throttle pressure (To throttle modulator valve)
③ Cut-back pressure
④ To cut-back valve
⑤ Throttle pressure (To each shift valve)

AT00009-00008

Downshift plug

When the accelerator pedal is depressed nearly to the full opening, the downshift plug moves greatly, thereby allowing the cut-back pressure to be introduced to the detent regulator valve as well as to the 3-4 shift valve.

During kickdown period (when throttle opening is more than 85%)

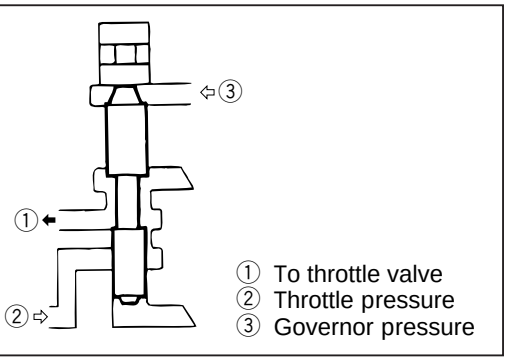


① Line pressure
② Throttle pressure (To throttle modulator valve)
③ Cut-back pressure
④ To cut-back valve
⑤ Throttle pressure
⑥ Detent regulator valve (To 3-4 shift valve)

AT00010-00009

Cut-back valve

The cut-back valve modulates the cut-back pressure to be applied to the throttle valve during the low-speed operation.
This cut-back valve functions on the governor pressure and throttle pressure.
When the cut-back pressure is applied to the throttle valve, the throttle pressure will be reduced, thereby preventing unnecessary power loss due to the oil pump.

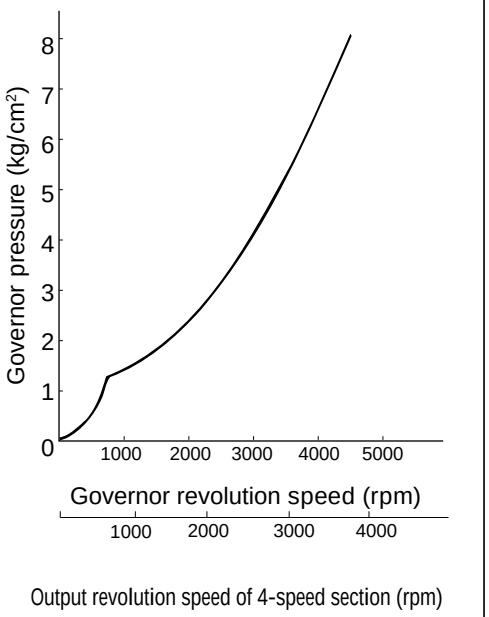


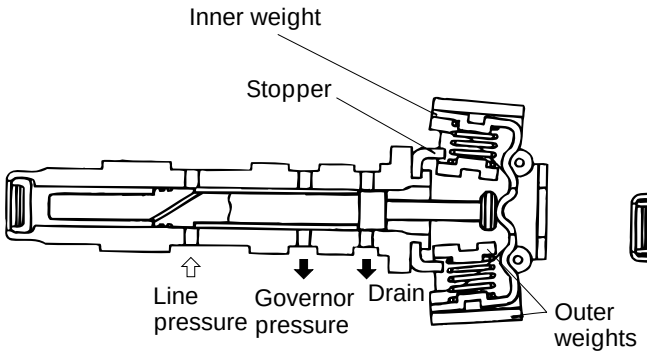
AT00011-00010

Governor valve

The governor valve provides the governor pressure which corresponds with the revolution speed of the drive pinion (vehicle speed). This valve is driven by means of the governor driving gear welded to the differential drive pinion.
At this governor valve, the line pressure from the primary regulator valve is counterbalanced by the centrifugal force being applied to the governor weights, thus making it possible to deliver a hydraulic pressure in proportion to the vehicle speed.

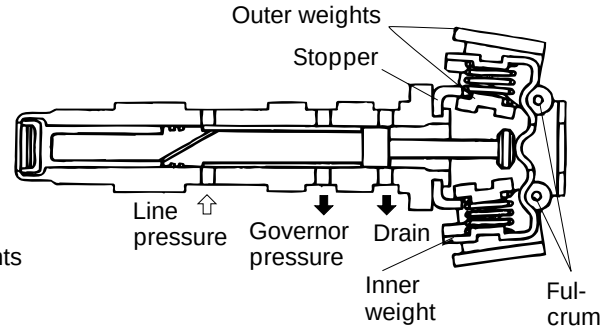
The governor valve functions over two stages. During the first stage, the outer weight, inner weight and spring function as a single unit. As the speed increases, the outer weight is retained by the governor body. Afterwards, only the inner weight and spring function, thus providing the respectively required governor pressures.





Low speed

Governor Pressuer Characteristics



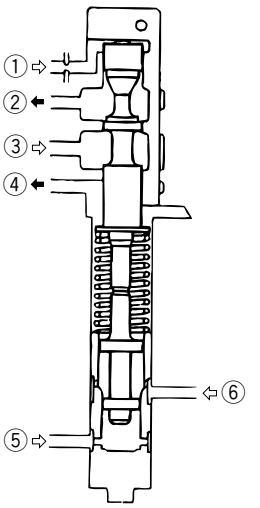
High speed

Operation of Governor Valve

AT00012-00011

Primary regulator valve

This primary regulator valve modulates the line pressure to be sent to each element by means of the throttle modulator pressure and line pressure during the reverse operation.

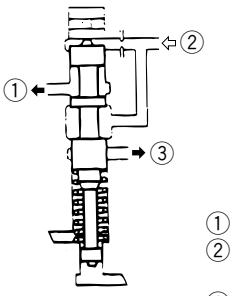


① Line pressure
② To secondary regulator valve and lockup relay valve
③ Line pressure
④ Drain
⑤ Throttle modulator pressure
⑥ Line pressure

AT00013-00012

Secondary regulator valve

The secondary regulator valve modulates the line pressure by means of the spring tension, thereby providing the converter pressure and lubrication pressure.

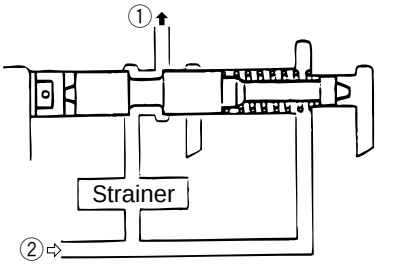


① Lubrication pressure
② From primary regulator valve
③ To pump

AT00014-00013

Throttle modulator valve

The throttle modulator valve modulates the throttle pressure. The thus-obtained pressure (throttle modulator pressure) is applied to the primary regulator valve in order that the line pressure may have such characteristics closely resembling to the engine output characteristics.
Consequently, gear shift shocks are improved and the oil pump driving loss during high throttle opening is reduced.

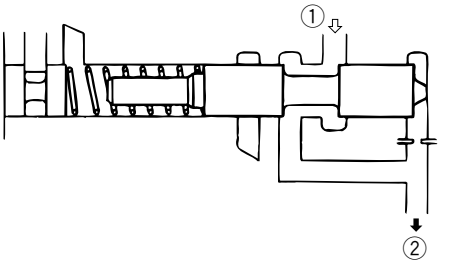


① To primary regulator valve
② Throttle pressure

AT00015-00014

Detent regulator valve

The detent regulator valve modulates the detent regulator pressure to be applied to the 1-2 shift valve and 2-3 shift valve during the kickdown period.



① Cut-back pressure (from downshift plug)
② To 1-2 and 2-3 shift valves

AT00016-00015

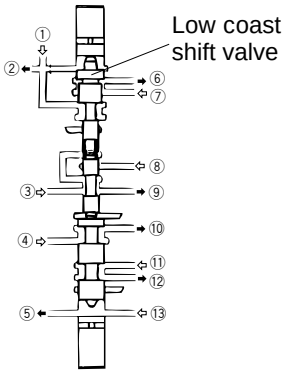
1-2 shift valve

The 1-2 shift valve automatically controls the switching of the 1st gear and the 2nd gear according to the governor pressure and throttle pressure.

When the L range is selected, the low modulator pressure is applied to the low coast shift valve. Consequently, no upshift to the 2nd gear takes place.

When governor pressure is low and throttle pressure is high:

During this period, the 1-2 shift valve is pushed down by the throttle pressure, thus closing the 2nd brake circuit. Hence, the transmission is placed in the 1st gear.



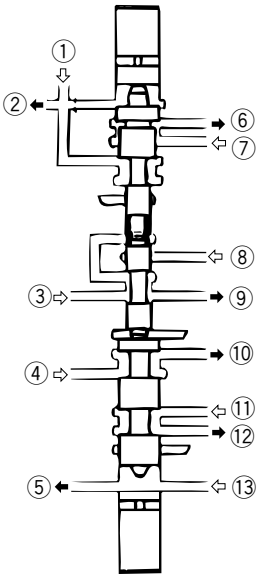
① Low modulator pressure
② To primary regulator valve
③ Detent regulator pressure
④ Line pressure
⑤ To cut-back valve and lockup signal valve
⑥ To 1st & reverse brake
⑦ Line pressure
⑧ Throttle pressure
⑨ To 2-3 shift valve
⑩ To 2nd brake
⑪ 2nd modulator pressure
⑫ To 2nd coast brake
⑬ Governor pressure

AT00017-00016

When governor pressure is high and throttle pressure is low:

During this period, the 1-2 shift valve is pushed up by the governor pressure, thus opening the circuit to the 2nd brake piston. Hence, the transmission is now placed in the 2nd gear. The hysteresis between the 1st gear and 2nd gear takes place because the throttle pressure passage is closed when the valve is pushed up.

Namely, with the throttle pressure passage closed, the downshift to the 1st gear depends upon the relationship between the spring tension and the governor pressure. Thus, the same vehicle speed is maintained, unless the detent regulator pressure is applied to the 1-2 shift valve, which is caused by the operation of the downshift plug.



The figures above correspond with those in the figures in the preceding page.

AT00018-00017

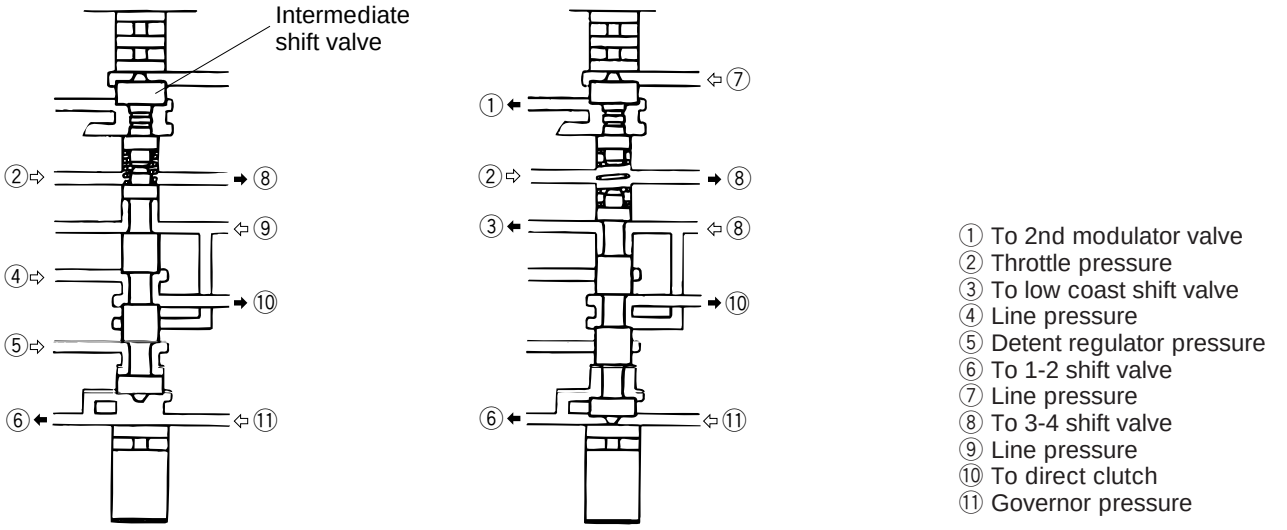
2-3 shift valve

The 2-3 shift valve controls the switching of the 2nd gear and the 3rd gear. And this control is made by the throttle pressure counteracting with the governor pressure and the spring.

As is evident from the left/lower figure, when the push-up force of the governor pressure is greater than the combined push-down force of the throttle pressure and spring, the 2-3 shift valve is pushed up. Consequently, the passage to the direct clutch piston is opened. Hence, the transmission is placed in the 3rd gear.

Next, when the governor pressure is low, as indicated in the right/lower figure, the 2-3 shift valve is pushed down by the throttle pressure and spring. As a result, the the passage to the direct clutch piston is closed. Hence, the transmission is placed in the 2nd gear.

During the kickdown period, the detent regulator pressure is applied to the 2-3 shift valve. Therefore, the downshift to the 2nd gear is made at a higher vehicle speed than the aforesaid case. Incidentally, the hysteresis between the 2nd gear and the 3rd gear occurs by the difference in area to which the governor pressure is applied. Since the acting area at the time of downshift is greater than that at the time of upshift, the downshift takes place at a lower vehicle speed to that extent.



AT00019-00018

Furthermore, when the “2” range is selected, the line pressure from the manual valve is applied to the intermediate shift valve. Hence, the 2-3 shift valve is pushed down. Consequently, the transmission is placed in the 2nd gear. Thus, no upshift to the 3rd gear takes place.

On the other hand, the line pressure that pushed the intermediate shift valve down is applied to the 2nd coast brake via the 2nd modulator valve and 1-2 shift valve, thus making it possible to obtain the engine braking.

AT00020-00000

3-4 shift valve

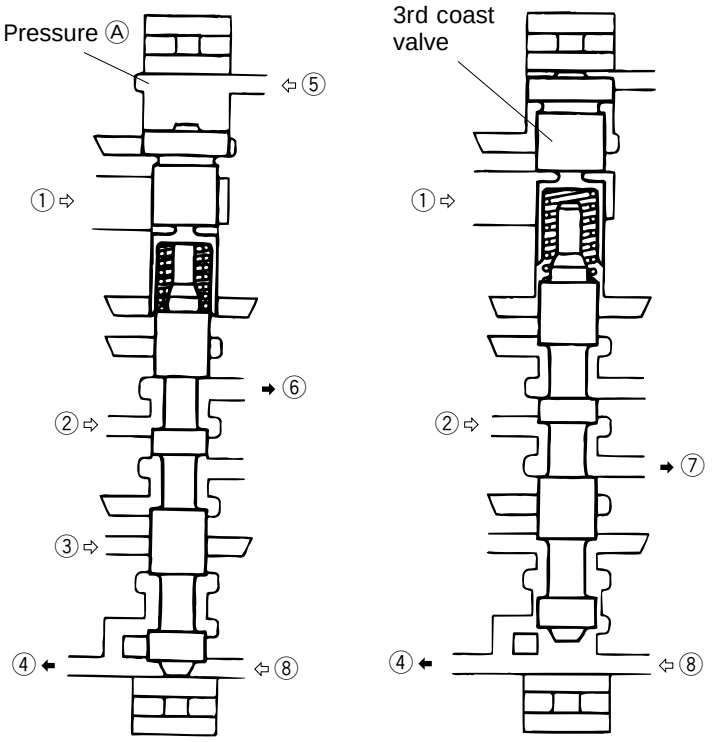
The 3-4 shift valve controls the switching of the passages to the underdrive (hereinafter referred to as “UD”) direct clutch and the UD brake. During the overdrive (hereinafter referred to as “OD”) running, the line pressure is applied to the UD brake.

The upshift to OD occurs only when all the following conditions given below are satisfied.

① OD switch is turned ON in D range.
② Throttle opening and vehicle speed
(See the gear shift characteristics diagram.)
③ Engine cooling water temperature is above 40°C.

When the hydraulic pressure Ⓐ is applied to the 3rd coast shift valve, no upshift to OD will take place.
(See the lower/left figure.)

When the hydraulic pressure Ⓐ no longer exists, the control is made by the combined force of the throttle pressure and spring and the governor pressure. When the force of governor pressure becomes greater, the 3-4 shift valve is pushed up. Consequently, the upshift to OD occurs.
(See the lower/right figure.)

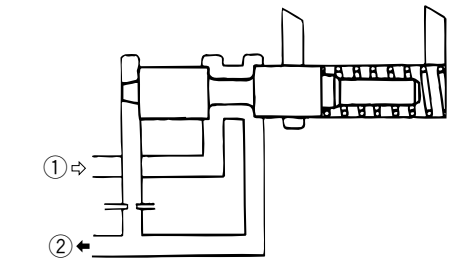


① Throttle pressure
② Line pressure
③ Cut-back pressure
④ To 2-3 shift valve
⑤ The following pressure is applied from 3-4 switch valve:
[Line pressure during OD switch OFF period
Cut-back pressure during kickdown period]
⑥ To UD brake
⑦ To UD direct clutch
⑧ Governor pressure

AT00021-00019

Low modulator valve

During the L range, the low modulator valve modulates the line pressure being applied to this valve so as to provide a lower hydraulic pressure (low modulator pressure). The low modulator pressure pushes down the low coast shift valve so that the pressure may be applied to the 1st & reverse brake. Consequently, shift shocks are reduced. On the other hand, this low modulator pressure, instead of the throttle modulator pressure, is applied to the primary regulator valve so as to regulate the line pressure.

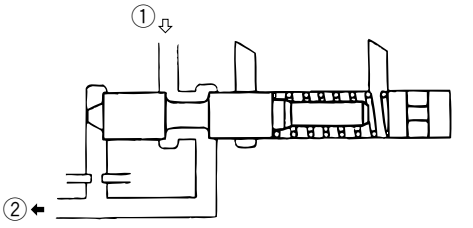


① Line pressure
② To 1st & reverse brake vie 1-2 shift valve

AT00022-00020

Second modulator valve

During the “2” range, the 2nd modulator valve modulates the line pressure from the intermediate shift valve to a lower hydraulic pressure (2nd modulator pressure). This pressure is applied to the 2nd coast brake via the 1-2 shift valve. Consequently, shift shocks are reduced.

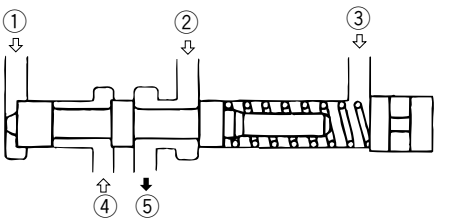


① Line pressure
② To 2nd coast brake via 1-2 shift valve

AT00023-00021

3-4 switch valve

The 3-4 switch valve controls the forced releasing of OD.
Upon receiving signals of the hydraulic pressure from the OD solenoid and the hydraulic pressure from the “2” range manual valve, the 3-4 switch valve sends the line pressure to the 3-4 coast shift valve. When the kickdown is made during the OD running, the cut-back pressure from the downshift plug is applied to the 3-4 coast shift valve.

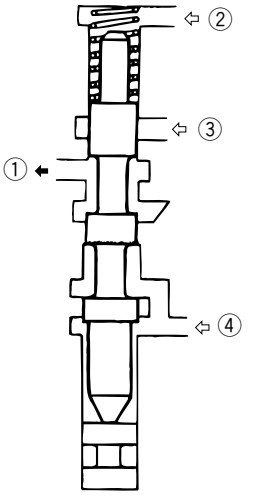


① ② ③ Line pressure
④ Cut-back pressure
⑤ To 3-4 shift valve

AT00024-00022

Lockup signal valve

Upon sensing the governor pressure, the lockup signal valve turns ON/OFF the hydraulic pressure being applied to the relay valve. In this way, this valve determines the ON/OFF point (operating point) of the lockup operation. When the governor pressure exceeds the preset pressure, the signal valve is pushed up. As a result, this allows the line pressure from the UD direct clutch to be applied to the tip end of the relay valve. Incidentally, during the ranges other than OD, the line pressure from the UD brake is applied to the spring side of the signal valve. Thus, the signal valve is held at a pushed-down state at all times.
Furthermore, the hysteresis of the lockup operation is made by altering the diameter at the lower part of the signal valve where the governor pressure is applied, as is the case with the 2-3 and 3-4 shift valves.



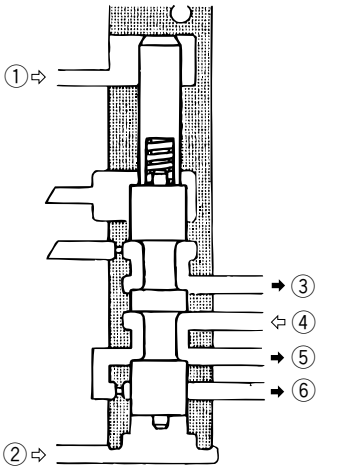
① To lockup relay valve
② Line pressure
③ Line pressure
④ Governor pressure

AT00025-00023

Lockup relay valve

Upon receiving signals from the signal valve, the lockup relay valve reverses the flow of fluid flowing to the torque converter (lockup clutch).

When the signal hydraulic pressure (line pressure from the UD direct clutch) from the signal valve is applied to this lockup relay valve, the relay valve is pushed up. Consequently, the lockup is turned ON. Incidentally, during the ranges other than OD, the relay valve is held at a pushed-down state, for the line pressure from the UD direct clutch is not applied to the relay valve.

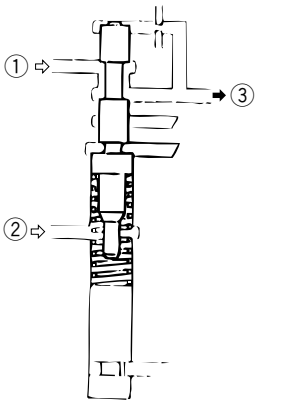


① Line pressure
② From lockup signal valve
③ Lockup OFF
④ From secondary regulator valve
⑤ Lockup ON
⑥ To cooler

AT00026-00024

Accumulator control valve

To reduce shift shocks, this accumulator control valve drops the back pressures for the accumulator for direct clutch use, the accumulator for UD direct clutch use and the accumulator for 2nd brake use. This drop occurs at a point near the low opening of the throttle.

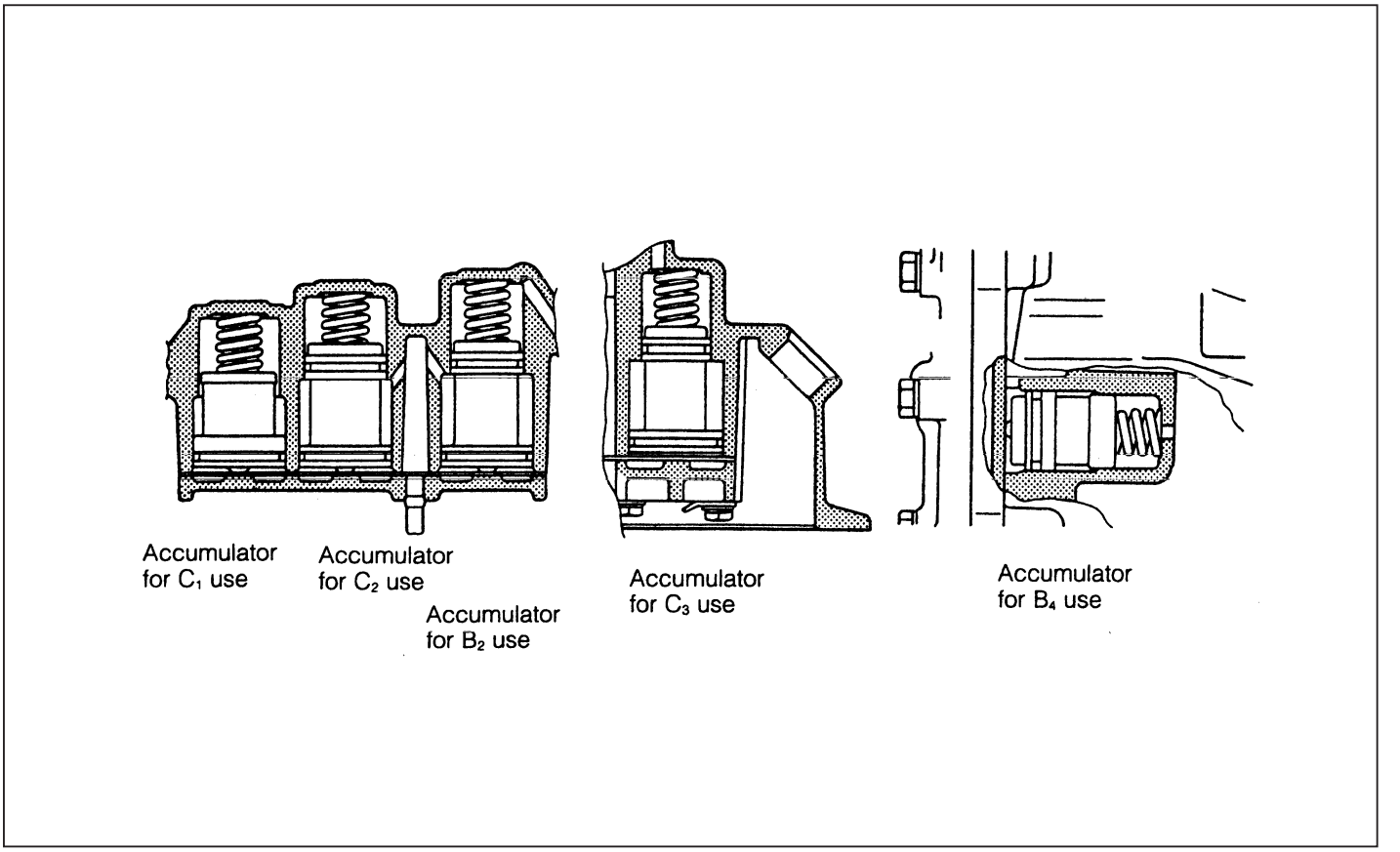


① Line pressure
② Throttle pressure
③ To accumulator for 2nd brake use, accumulator for direct clutch use and accumulator for UD direct clutch use

AT00027-00025

Accumulators

The accumulators have been provided to reduce shift shocks. This automatic transmission incorporates five accumulators. They are for use in the forward clutch (C1), direct clutch (C2), 2nd brake (B2), UD direct clutch (C3) and UD brake (B4). Those accumulators for C1, C2, B2 and C3 are located at the lower part of the transmission, while the accumulator for B4 is located at the rear of the transmission case. The hydraulic pressure from the accumulator control valve is applied to the back side of the accumulators for C2, C3 and B2 so that shift shocks at a point near the low opening of the throttle may be further reduced.



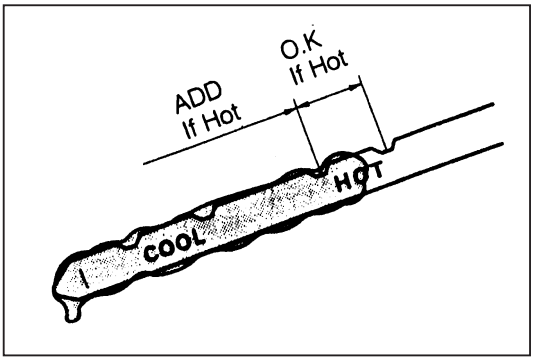
AT00028-00026

Operating Instructions on 4-Speed Automatic Transmission Vehicle

1. While the vehicle is running in the the [D] range or the “2” range, if you want to downshift to the [L] range, be sure to perform this downshift after the vehicle speed drops below 63 km/h. This is a good practice to assure the safety, although the transmission has been so constructed that, even if the shift lever is moved to the [L] range, no downshift to the 1st gear will take place when the vehicle speed is above 44 to 55 km/h.
2. When the automatic transmission vehicle is to be towed, make sure to place the shift lever in the [N] range. Also, ensure that the running speed is below 30 km/h.
   Furthermore, the towing distance should be limited to within 50 km.
   Moreover, if there is a likelihood that the inside of the transaxle is malfunctioning, be sure to lift up the front wheels of the vehicle by means of a wrecker truck.
   It should be noted that, when the engine is not running, no fluid will be circulated within the transaxle, thus leading to seizure of the gears, clutches and so forth.
3. As regards the fluid for the 4-speed automatic transmission, make certain to use Automatic Fluid, DEXRON® II or III.
4. The 4-speed automatic transmission has been so designed that the 4th gear (overdrive) is selected only when the following two conditions are fulfilled: The overdrive switch is turned ON. The engine cooling water temperature is above 40°C.

AT00029-00000

PRELIMINARY CHECK



AT00030-00027

1. Check of transaxle fluid level
   NOTE:
   - Prior to the fluid level check, be sure to run the vehicle until the engine and transaxle have reached their normal operating temperature.
     (Fluid temperature: 50 - 80°C)

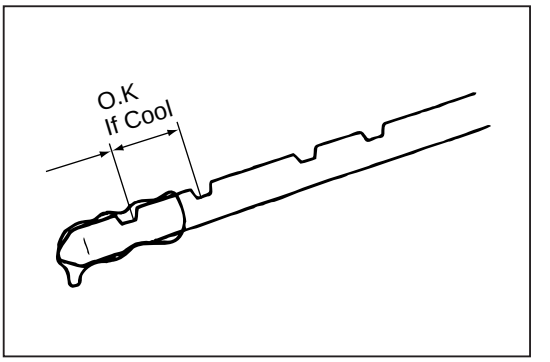
2. Check of engine idling speed
   Specified Value: 850 ± 50 rpm

   (a) Park the vehicle on a level surface. Apply the parking brake.
   (b) With the engine idling, smoothly move the shift lever all through the ranges from P to L. Finally, return the shift lever to the P range.
   (c) Pull out the transaxle fluid level gauge and wipe it clean.
   (d) Push it back fully into the tube.
   (e) Pull it out and check that the fluid level is in the HOT range.

   If the fluid level is too low, add the fluid.
   Fluid To Be Used: DEXRON® II or III
   Full Capacity: Approx. 7.2 ℓ
   Drain and Refill: Approx. 4.7 ℓ

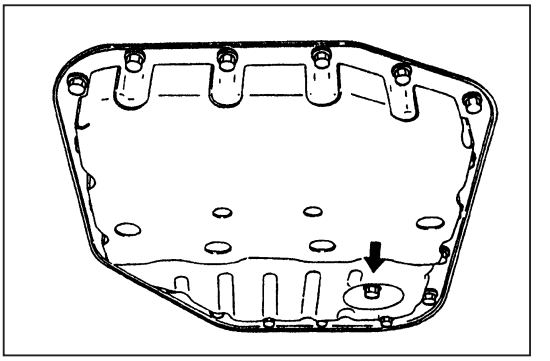
   CAUTION:
   - Do not overfill the fluid.

   NOTE:
   - If it is necessary to check the fluid level at a low temperature (20 - 30°C), e.g. at the time of fluid change, first adjust the fluid level so that it may become within the COOL range. Then, recheck the fluid level under the hot conditions.
   - If the fluid level fails to reach the COOL range on the fluid level gauge, be sure to check the transaxle for fluid leakage. Also, pull out the fluid level gauge and check the fluid for contamination or smell of fluid burning.

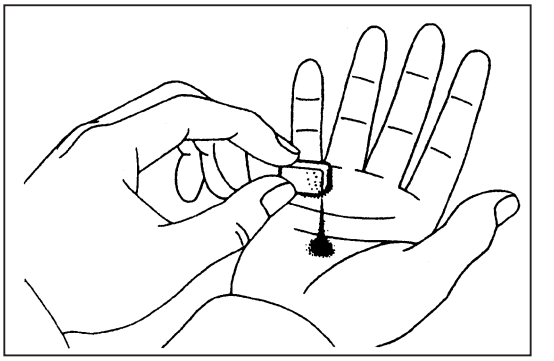


AT00031-00028

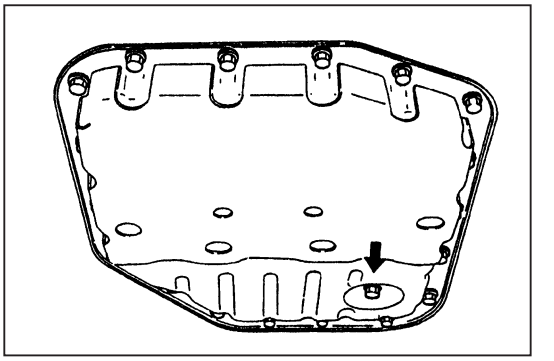
3. Check of fluid condition
   If the fluid smells burning or it presents a black appearance, change the fluid.
4. Change of transaxle fluid
   (1) Remove the transaxle and differential of the drain plug together with the gasket. Drain the fluid.
   NOTE:
   - Never reuse the removed gasket.


AT00032-00029

(2) Examine particles in pan.
Remove the magnets and use them to collect any steel chips. Lock carefully at the chips and particles in the oil pan and on the magnet to anticipate what type of wear you will find in the transmission:
Steel (magnetic) ... bearing, gear and plate wear
Brass (non-magnetic) ... bushing wear

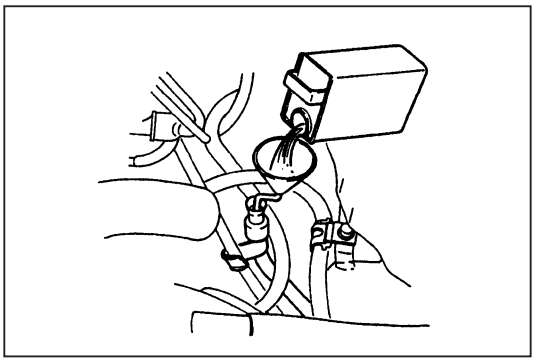

AT00033-00030

(3) With a new gasket interposed, tighten the drain plugs on both transaxle and differential sides securely.
Tightening Torque: 14.7 - 19.6 N·m
At Differential: 23.5 - 54.9 N·m


AT00034-00031

(4) Add new fluid through the filler tube.
Fluid To Be Used: ATF DEXRON® II or III
Full Capacity: Approx. 7.2 ℓ
Drain and Refill: Approx. 4.7 ℓ

(5) Start the engine. Move the shift lever to all positions from P through L. Then, move it to the P position.
(6) With the engine idling, check the fluid level. Add fluid up to the COOL level on the fluid level gauge.
(7) Check the fluid level at the normal fluid operating temperature (50 - 80°C). Add the fluid, as required.

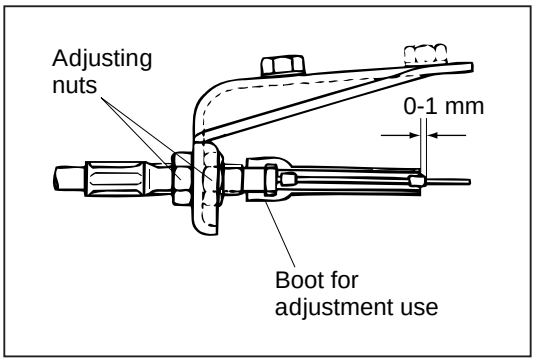

AT00035-00032

5. Inspection and adjustment of throttle cable
(a) Depress the accelerator pedal fully and check that the throttle valve opens fully.
NOTE:
- If the valve will not open fully, adjust the accelerator link.

(b) Fully depress the accelerator.
(c) Loosen the adjusting nuts.
(d) Adjust the cable housing so that the distance between the end of the boot and the stopper on the cable becomes the specified distance.
Boot-to-Cable Stopper Specified Distance: 0 - 1 mm

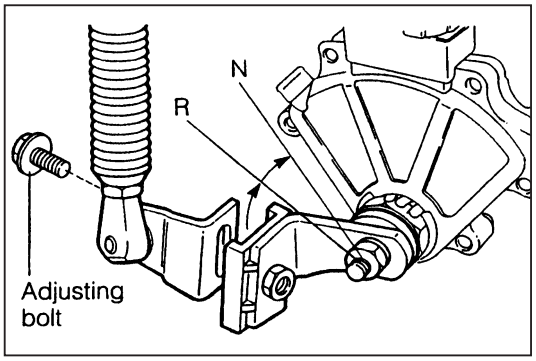
(e) Tighten the adjusting nuts.
Tightening Torque: 10.8 - 18.6 N·m

(f) Recheck the adjustments.



AT00036-00033

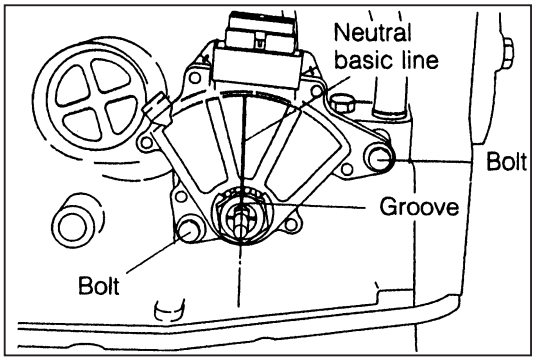
6. Adjustment of control cable
   (a) Loosen the adjusting bolt of the manual shift lever.
   (b) Pull the manual shift lever fully toward the underside of the vehicle.
   (c) Back off the lever two notches to the NEUTRAL position.
   (d) Move the shift lever to the N range.
   (e) While holding the lever lightly toward the R range side, tighten the adjusting bolt.
   Tightening Torque: 15.7 - 23.5 N·m



AT00037-00034

7. Adjustment of neutral start switch
   If the engine should start with the shift lever in any range other than N or P range, the adjustment is required.
   (a) Loosen the neutral start switch bolts and move the shift lever to the N range.
   (b) Align the groove with the neutral basic line.
   (c) Hold in position and tighten the bolts.
   Tightening Torque: 4.9 - 5.9 N·m

   (d) Check the continuity of the terminals in the neutral start switch connector. (See page AT–31.)
8. Inspection of idle speed (N range)
   (Refer to the EM Section.)



AT00038-00035

TESTING

STALL TEST

The purpose of this test is to check the overall performance of the automatic transmission and engine by measuring the maximum engine speeds in the D and R ranges.

CAUTION:

(a) Perform the stall test at the normal fluid operating temperature (50 - 80°C).
(b) Do not conduct this test continuously for more than five seconds.
(c) Wait at least one minute before the switching is made from the D range to the R range.
(d) Be sure to turn OFF the air conditioner and over drive during the test.

Measurement of stall speed

(a) Place chocks at the four wheels.
(b) Install an engine tachometer.
(c) Fully apply the parking brake.
(d) Keep depressing the brake pedal firmly by your left foot during the test.
(e) Start the engine.
(f) Move the shift lever to the D range. Depress the accelerator pedal fully by your right foot.
Quickly read the highest engine rpm at this time.
Stall Speed: 2000 - 2300 rpm

(g) Perform the same test in the R range.

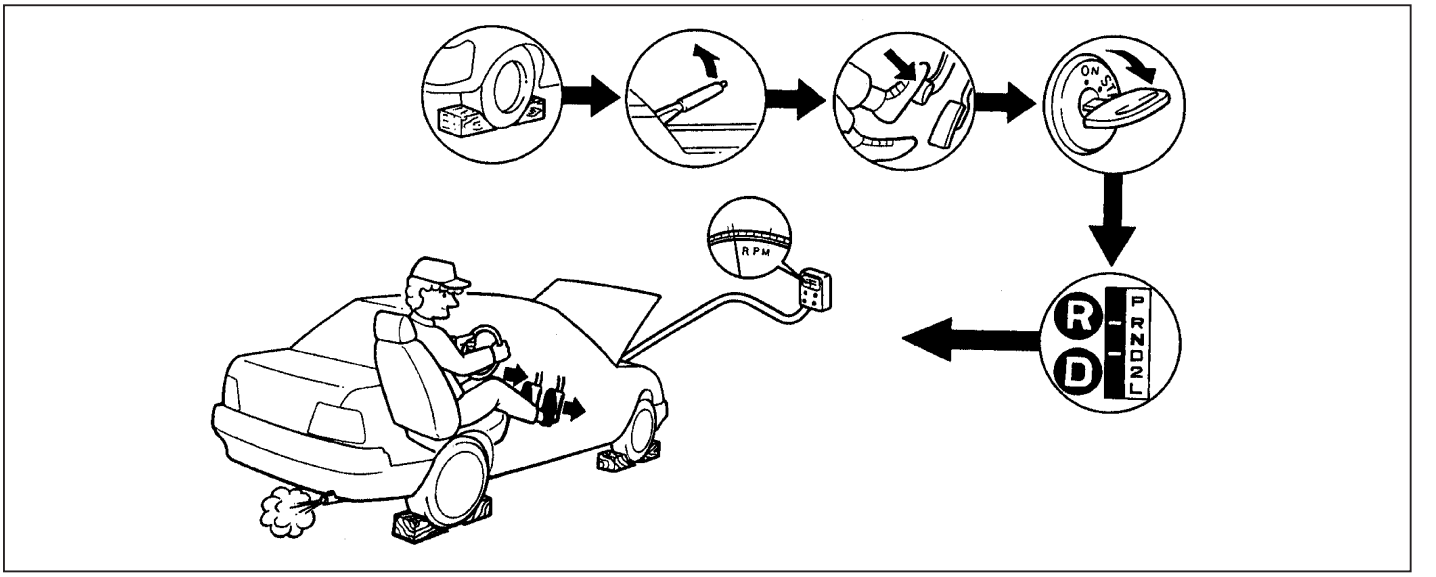
Evaluation

(a) If the engine speed is the same for both ranges but lower than specified value:
- Engine output insufficient (e.g. throttle valve is not opened fully.)
- Stator one-way clutch malfunctioning

(b) If the stall speed at the D range is higher than specified value:
- Line pressure too low
- Forward clutch slipping
- One-way clutch No. 2 malfunctioning

(c) If the stall speed in the R range is higher than specified value:
- Line pressure too low
- Direct clutch slipping
- First & reverse brake slipping

(d) If the stall speed in the R and D ranges is higher than specified value:
- Line pressure too low
- Fluid level improper



AT00039-00036

TIME LAG TEST

When the shift lever is shifted while the engine is idling, there will be a certain time lapse or lag before you can feel a shock. This time lag can be used for checking those conditions of the forward clutch, the direct clutch and the first & reverse brake.

CAUTION:

(a) Perform the time lag test at the normal fluid operating temperature (50 - 80°C).
(b) Be sure to allow one minute intervals between tests.
(c) Conduct the measurement three times and take the average value.

Measurement of time lag

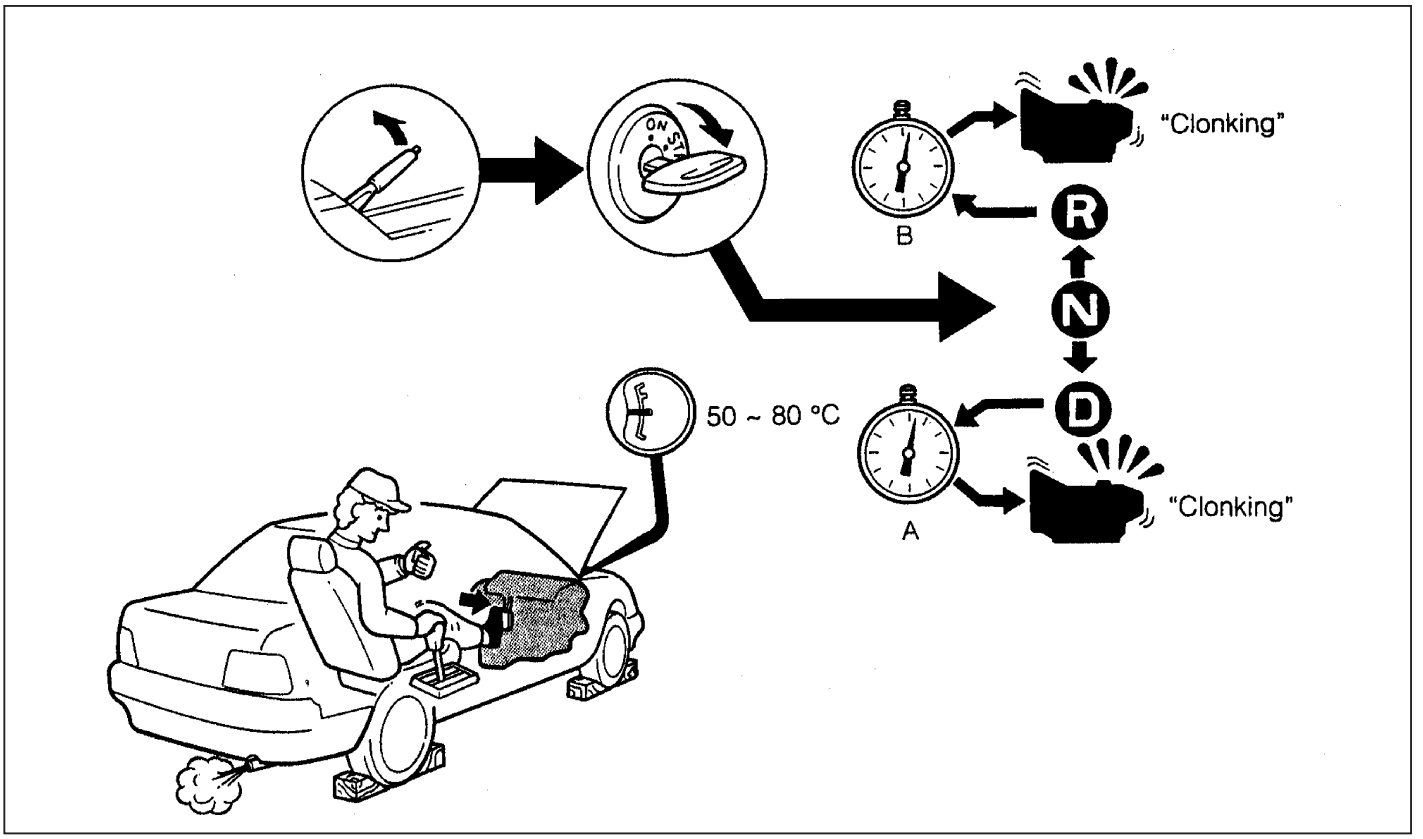
(a) Place chocks at the four wheels.
(b) Fully apply the parking brake.
(c) Start the engine and check the idle speed.
(Refer to the EM Section.)
(d) Move the shift lever from the N to the D range. Using a stopwatch, measure the time required from the lever shifting to the time when you feel a shock.
Time Lag for A: Not to Exceed 0.7 second

(e) In the same manner, measure the time lag when shifting is made from the N to the R range.
Time Lag for B: Not to Exceed 1.2 seconds

Evaluation

(a) If the N-to-D time lag is longer than the specified value:
- Line pressure too low
- Forward clutch worn

(b) If the N-to-R time lag is longer than the specified value:
- Line pressure too low
- Direct clutch worn
- First & reverse brake worn
- Underdrive brake worn



AT00040-00037

HYDRAULIC TEST

1. Measurement of line pressure
   (a) Warm up the transmission fluid.
   (b) Remove the transmission case test plug and install the oil pressure gauge (SST).
   SST: 09992-00094-000

   CAUTION:
   - Perform the test at the normal fluid operating temperature (50 - 80°C).

   (c) Fully apply the parking brake and place chocks at the four wheels.
   (d) Start the engine and check the idle speed.
   (e) Move the shift lever to the D range. Depress the brake pedal firmly by your left foot. While manipulating the accelerator pedal by your right foot, measure the line pressure at the engine speeds specified in the table.
   (f) Perform the test in the R range in the same way.

kg/cm²

D range		R range	
Idling	Stall	Idling	Stall
3.7 - 4.3	9.2 - 10.7	5.4 - 7.2 (for HD-C E/G) 6.6 - 8.1 (for HD-E E/G)	14.4 - 16.8 (for HD-C E/G) 15.9 - 19.3 (for HD-E E/G)

   (g) If the measured pressure does not comply with the specified values, recheck the throttle cable adjustment and perform the test again.

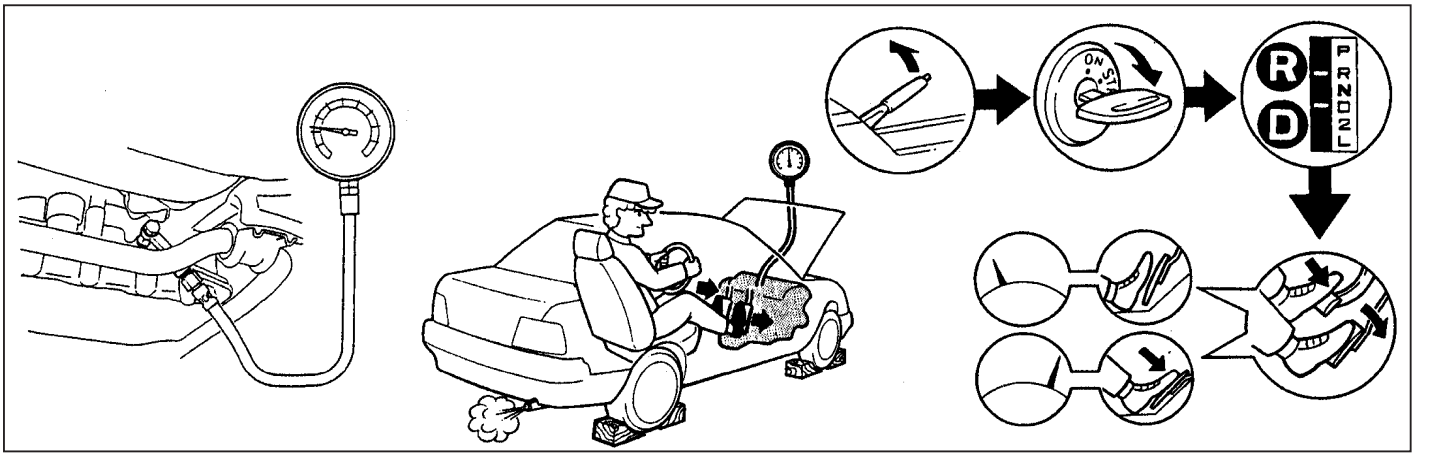
Evaluation

   (a) If the measured values at all ranges are higher than specified value:
   - Throttle cable out of adjustment
   - Throttle valve defective
   - Regulator valve defective

   (b) If the measured values at all ranges are lower than the specified value:
   - Throttle cable out of adjustment
   - Throttle valve defective
   - Regulator valve defective
   - Oil pump defective

   (c) If the pressure is low in the D range only:
   - Fluid leakage at the D range circuit
   - Forward clutch defective

   (d) If the pressure is low in the R range only:
   - Fluid leakage at the R range circuit
   - First & reverse brake defective
   - Direct clutch defective



AT00041-00038

2. Measurement of governor pressure
   (a) Warm up the transmission fluid. (50 - 80°C).
   (b) Jack up the vehicle.
   (c) Remove the transmission case test plug and install the oil pressure gauge (SST).
   SST: 09992-00094-000

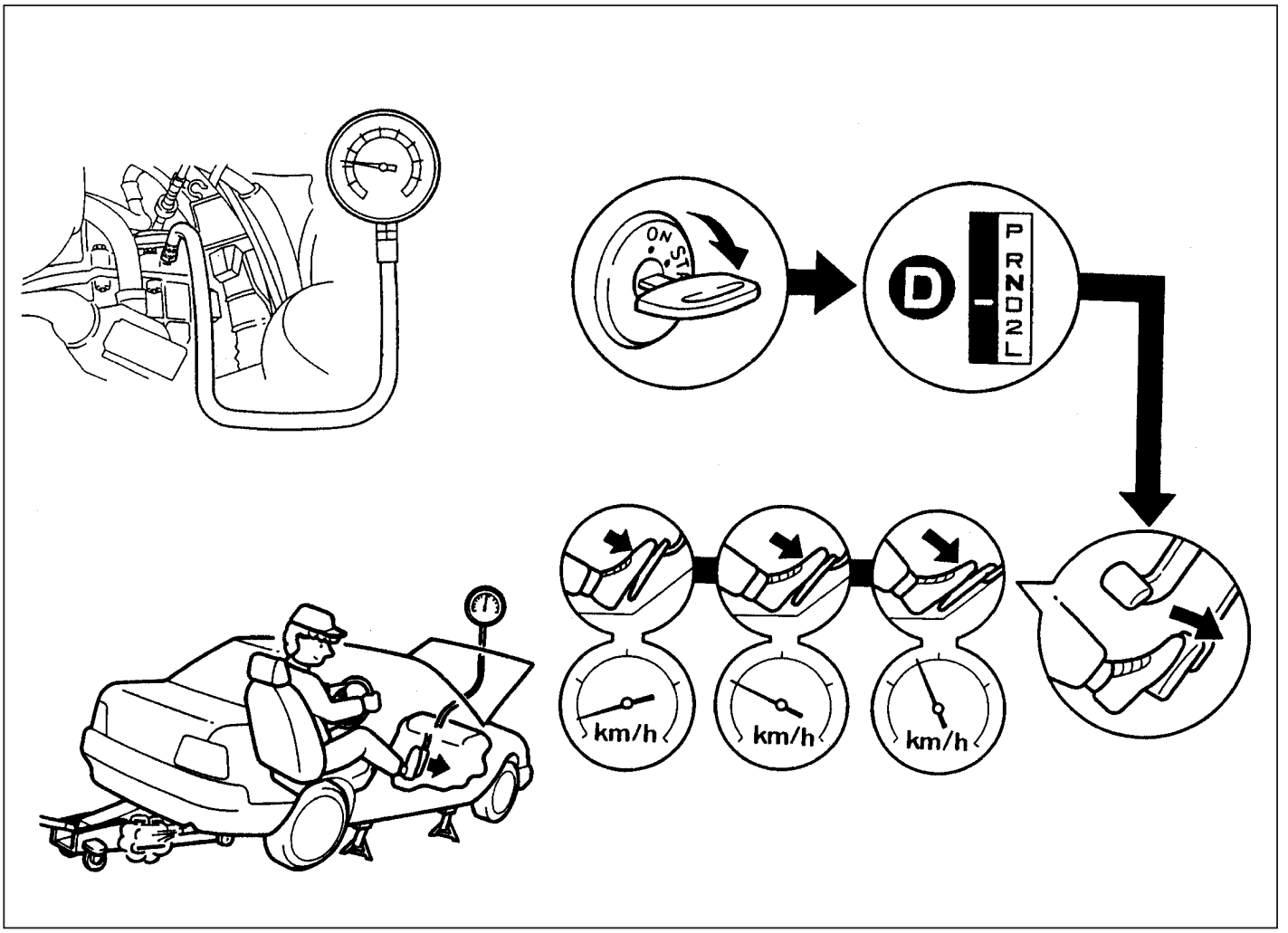
   CAUTION:
   - Perform the test at the normal fluid operating temperature (50 - 80°C).

   (d) Ensure that the parking brake is not applied.
   (e) Start the engine.
   (f) Move the shift lever to the D range and measure the governor pressure at the engine speeds specified in the table.

Evaluation

If the governor pressure is incorrect:
- Line pressure incorrect
- Fluid leakage in the governor pressure circuit
- Governor valve malfunctioning

Drive pinion	Vehicle speed (Reference)	Governor pressure kg/cm^2
1000 rpm	30 km/h	0.9 - 1.7
1800 rpm	60 km/h	1.8 - 2.6
3500 rpm	90 km/h	3.2 - 4.0

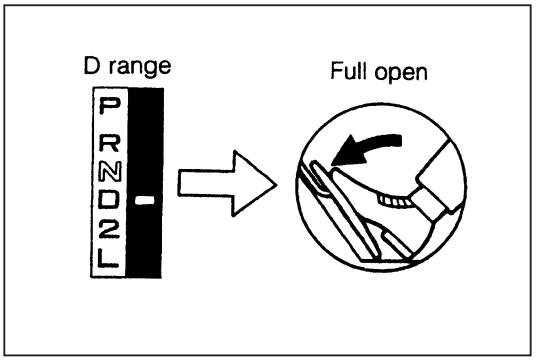


AT00042-00039

ROAD TEST

CAUTION:
- Perform this test at the normal fluid operating temperature (50 - 80°C).

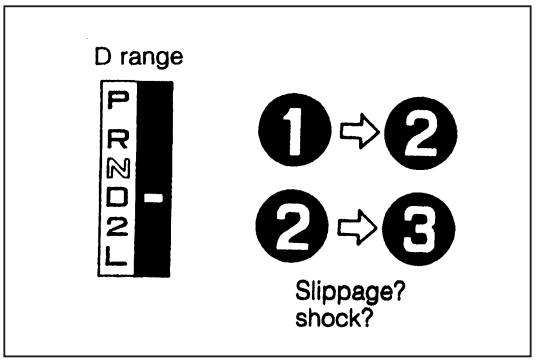
1. D range test
Move the shift lever to the D range. While driving with the accelerator pedal fully depressed, check the following points:
(a) Check that the 1-2 and 2-3 upshifts take place and also that the shift points conform to those shown in the automatic shift schedule. (See page AT–27.)



AT00043-00040

Evaluation
- If no 1-2 upshift takes place:
  Governor valve defective
  1-2 shift valve stuck
- If no 2-3 upshift takes place:
  2-3 shift valve stuck
- If the shift point is incorrect:
  Throttle cable out of adjustment
  Throttle valve, 1-2 shift valve and 2-3 shift valve, etc. defective

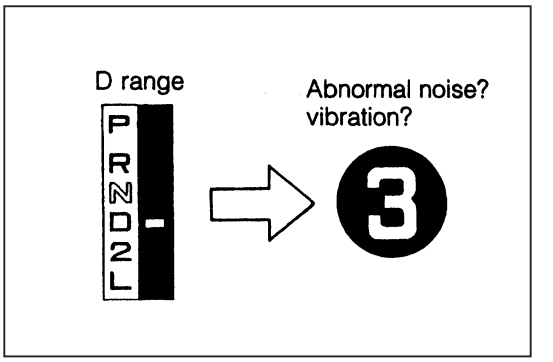
(b) In the same manner, check for shocks and slippage during 1-2 and 2-3 upshifts.



AT00044-00041

Evaluation
- If the shock is severe:
  Line pressure too high
  Accumulator defective
  Check ball defective

(c) While running in the 3rd gear of the D range, check to see if the vehicle emits any abnormal noise or vibration.
NOTE:
- Extreme care must be exercised during check for cause of abnormal noise and vibration. These symptoms are caused often by imbalance in the drive shaft, differential, tires, torque converter and so forth.

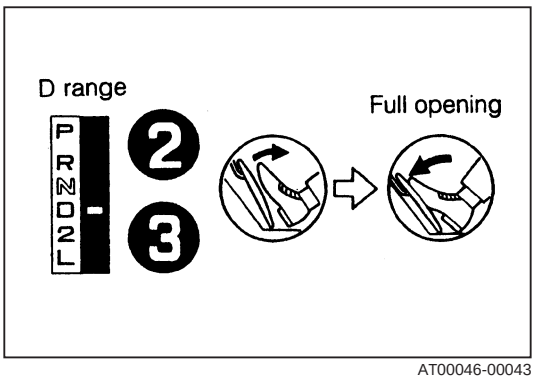


AT00045-00042

(d) While running in the 3rd gear of the D range, ensure that the kickdown vehicle speed limits for the 3-1 and 3-2 kickdown conform to those indicated in the automatic shift schedule. (See page AT–27.)

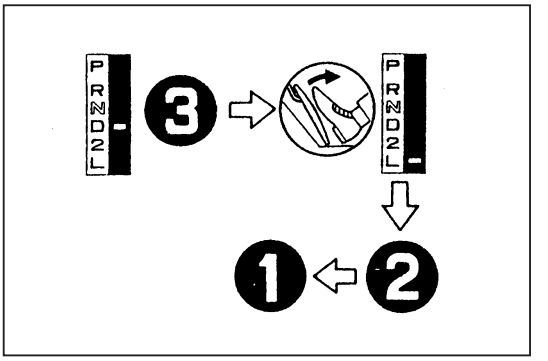
Evaluation
- If the kickdown vehicle speed limit is incorrect:
  Throttle cable out of adjustment
  Throttle valve, 1-2 shift valve and 2-3 shift valve, etc. defective

(e) Check for abnormal shocks and slippage during kickdown period.



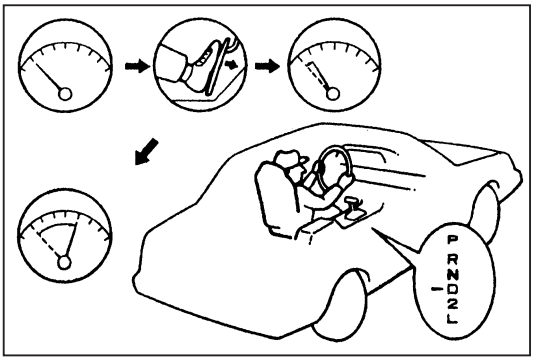
AT00046-00043

(f) While running at a speed of about 60 km/h (37 mph) in the 3rd gear of the D range, release your foot from the accelerator pedal and move the shift lever to the L range. Then, check to see if the 2-1 downshift point conforms to those indicated in the automatic shift schedule. (See page AT–27.)



AT00047-00044

2. Inspection of lockup mechanism
   (a) Drive the vehicle in the D range at a steady speed (lockup ON) of about 70 km/h (44 mph).
   (b) Lightly depress the accelerator pedal and check that the engine speed does not change abruptly.
   If there is a sharp rise in the engine rpm, it indicates that there is no lockup.

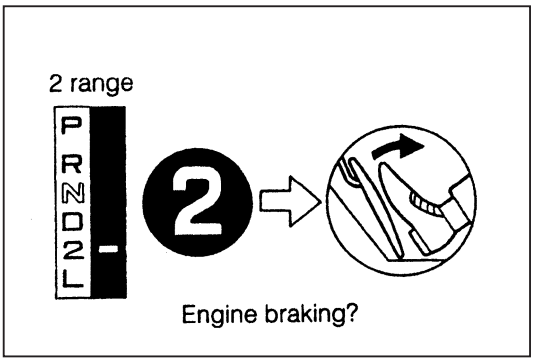


AT00048-00045

3. "2" range test
   (a) While running in the 2nd gear of the "2" range, release the accelerator pedal and check the engine braking effect.

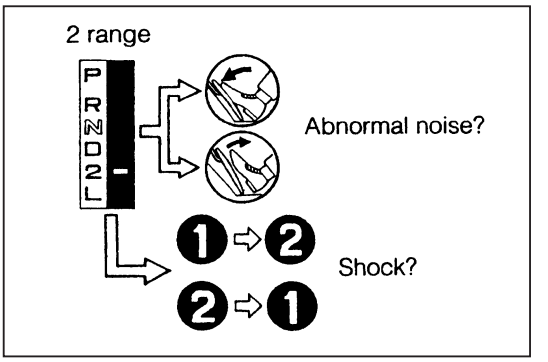
Evaluation

- If there is no engine braking effect:
  Second coast brake defective



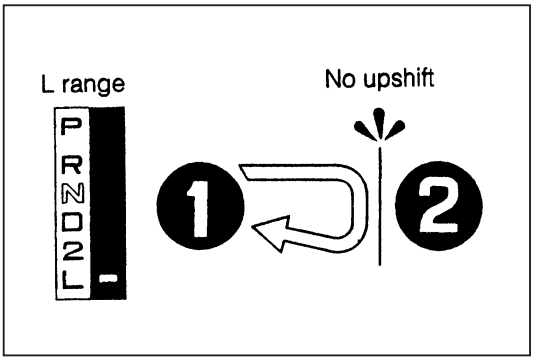
AT00049-00046

   (b) Check to see if the vehicle emits abnormal noise during acceleration and deceleration.
   (c) Check for shocks during the upshift and downshift periods.



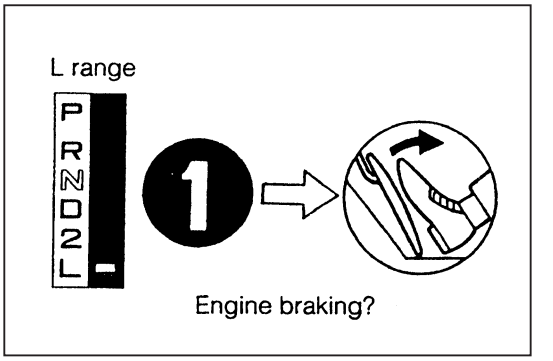
AT00050-00047

4. L range test
   (a) While running in the L range, ensure that no upshift to the 2nd gear takes place.



AT00051-00048

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

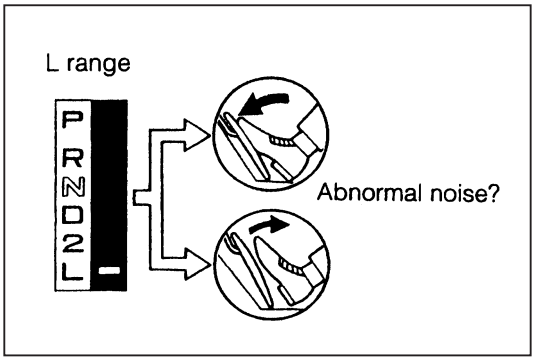


AT00052-00049

Evaluation

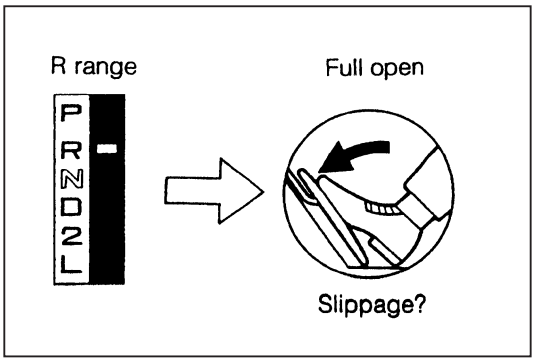
- If there is no engine braking effect:
  First and reverse brake defective

(c) Check to see if the vehicle emits abnormal noise during acceleration and deceleration.



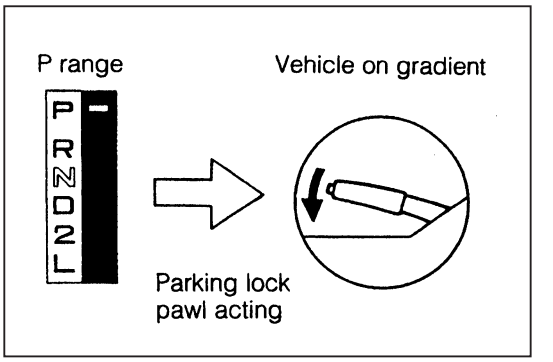
AT00053-00050

5. R range test
   Move the shift lever to the R range. While running at the full throttle, check to see if slippage is taking place.



AT00054-00051

6. P range test
   Stop the vehicle on a gradient (more than 9%). After moving the shift lever to the P range, release the parking brake. Then, check that the parking lock pawl prevents the vehicle from moving.



AT00055-00052

LOCKUP TEST

1. While running in the overdrive gear, accelerate the vehicle gradually. Ensure that the vehicle speed at which the engine rpm drops due to the lockup being turned ON conforms to the gear shift characteristics diagram. At this time, tap the accelerator pedal lightly. Ensure that the engine rpm will not rise according to the throttle valve opening degree.
2. From the condition 1, return the accelerator pedal slightly, thus reducing the vehicle speed gradually. Ensure that the vehicle speed at which the engine rpm rises due to the lockup being turned OFF conforms to the gear shift characteristics diagram. At this time, also tap the accelerator pedal lightly. Ensure that the engine rpm will rise according to the throttle valve opening degree.

AT00056-00000

D RANGE TEST

1. Run the vehicle in the D range with the overdrive (hereinafter referred to as “OD”) switch turned ON. Ensure that the gear shifts take place in accordance with the gear shift characteristics diagram and at the specified shift points.

   Reference: If the gear shifting will not conform to the specifications, the following are possible causes.

If no 1-2 upshift takes place:	1. Governor valve defective 2. 1-2 shift valve malfunctioning
If no 2-3 upshift takes place:	1. 2-3 shift valve malfunctioning
If no 3-OD upshift takes place:	1. 3-4 shift valve malfunctioning 2. Solenoid malfunctioning
If gear shift points are incorrect:	1. 1-2, 2-3, 3-4 shift valves malfunctioning 2. Throttle cable out of adjustment 3. Governor valve defective

AT00057-00000

OPERATING MECHANISM FOR EACH GEAR

Shift lever position	Gear position	C1	C2	C3	B1	B2	B3	B4	F1	F2	F3
P	Parking							○			
R	Reverse		○				○	○			
N	Neutral							○			
D	1st	○						○		○	○
	2nd	○				○		○	○		○
	3rd	○	○			○		○			○
	OD	○	○	○		○					
2	1st	○						○		○	○
	2nd	○			○	○		○	○		○
L	1st	○					○	○		○	○

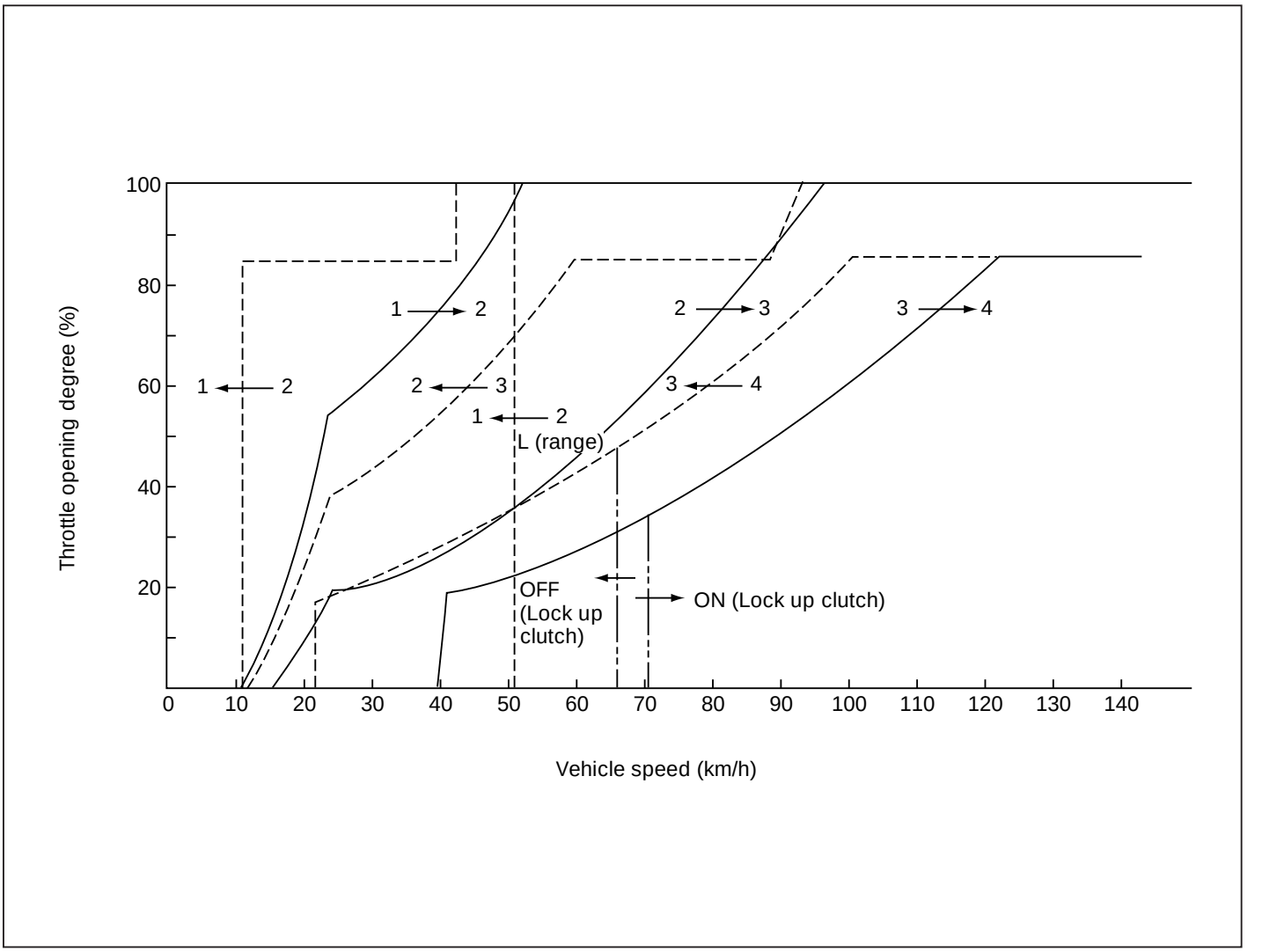
AT00058-00000

AUTOMATIC SHIFT SCHEDULE

Shift range	D range								L range
Throttle valve opening	100%			0% Lock Up		100%			100%
Gear position	1 → 2	2 → 3	3 → OD	ON	OFF	OD → 3	3 → 2	2 → 1	2 → 1
Vehicle speed (Reference) (km/h)	48 - 63	95 - 110	No gear shifting is made up to maximum speed	70 - 80	65 - 75	Speed down is possible up to maximum speed	90 - 108	35 - 46	44 - 55

AT00059-00000

GEAR SHIFT CHARACTERISTICS DIAGRAM



AT00060-00053

IN-VEHICLE REPAIRS

VALVE BODY

Removal of valve body

(See page AT–54.)

Disassembly and assembly of valve body

(See page AT–118.)

Installation of valve body

(See page AT–156.)

AT00061-00000

THROTTLE CABLE

Removal of throttle cable

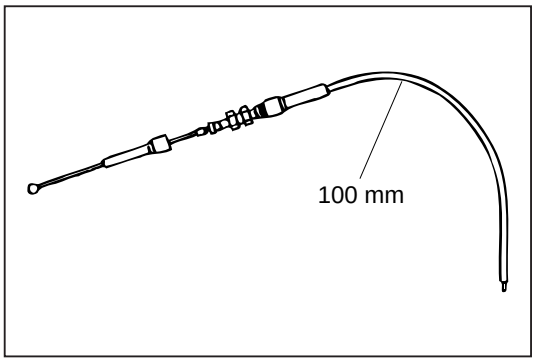
1. Disconnect the throttle cable from the engine.
2. Remove the neutral start switch.
3. Remove the valve body.
4. Removal the throttle cable.

AT00062-00000

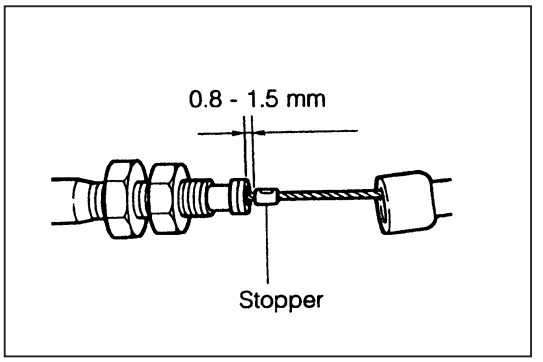
Installation of throttle cable

1. Install the cable in the transmission case.
2. Install the valve body.
3. When the throttle cable is new, stake the stopper at the inner cable.
   NOTE:
   - A new cable does not have a staked cable stopper.

   (a) Bend the cable so that it may form a radius of about 100 mm.
   (b) Pull the inner cable lightly until you can feel a slight resistance and hold it.
   (c) Stake the stopper at a point 0.8 - 1.5 mm from the end of the outer cable.
4. Connect the throttle cable to the engine.
5. Adjust the throttle cable. (See page AT–18.)
6. Install and adjust the neutral start switch.
7. Perform the road test.



AT00063-00054



AT00064-00055

GOVERNOR VALVE

Removal of governor valve

1. Remove the transaxle dust cover.
2. Disconnect the LH drive shaft. (Refer to the FS Section.)
3. Remove the governor valve. (See page AT–54.)

Installation of governor valve

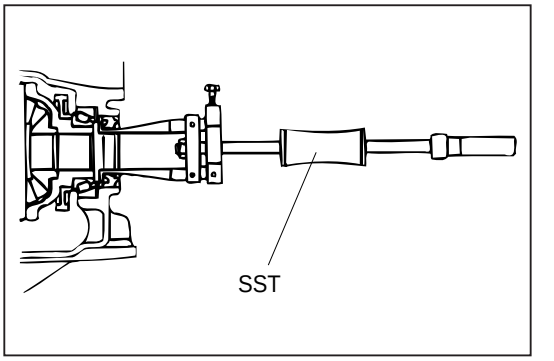
1. Install the governor valve. (See page AT–160.)
2. Connect the LH drive shaft. (Refer to the FS Section.)
3. Install the transaxle dust cover.

AT00065-00000

Replacement of oil seal

1. Remove the drive shaft-related parts.
2. Remove the oil seal on both the right and left sides, using the following SST.
   SST: 09350-32014-000 (09308-10010-000)

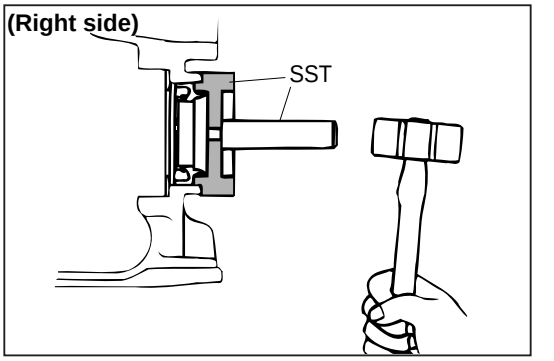
   NOTE:
   - Never reuse the removed oil seal.



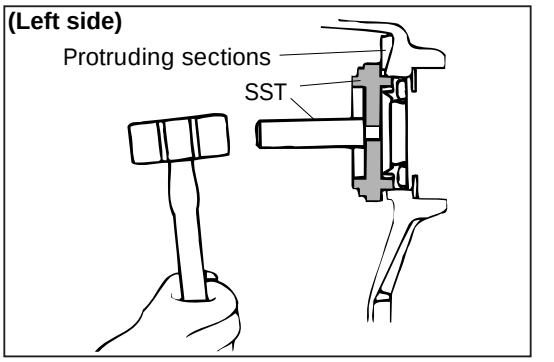
AT00066-00056

3. Apply lithium base multi-purpose grease to the oil seal lip section.
4. Drive a new oil seal into position, until the specified value from the edge of the transaxle case is obtained, using the following SSTs in a combination of a plastic hammer.
   SSTs: 09350-32014-000 (09351-32130-000, 09351-32150-000 (only for right side), 09351-32111-000 (only for lift side))

   Specified Value:
   Right Side: 3.1 ± 0.5 mm from edge of case
   Left Side: 5.3 ± 0.5 mm from three protruding sections



AT00067-00057



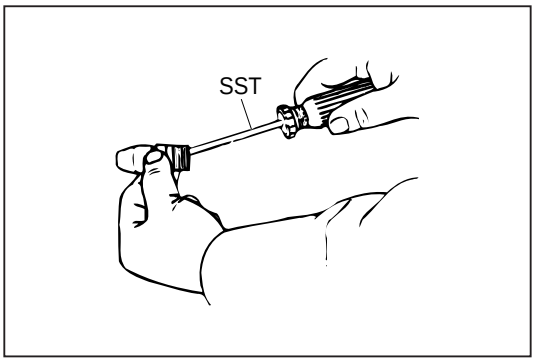
AT00068-00058

SPEEDOMETER DRIVEN GEAR

Replacement of speedometer driven gear oil seal

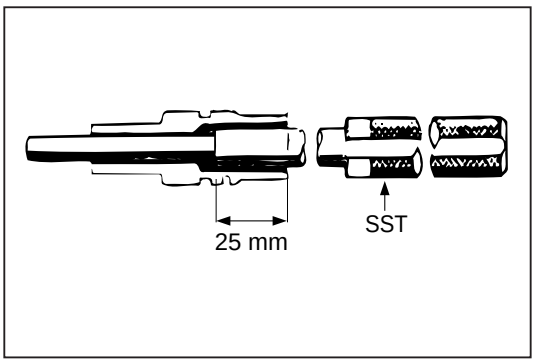
1. Remove the speedometer driven gear oil seal.
   Pull out the oil seal, using the following SST.
   SST: 09921-00010-000

   NOTE:
   - Never reuse the removed oil seal.



AT00069-00059

2. Install the speedometer driven gear oil seal.
   Drive a new oil seal, using the following SST.
   SST: 09201-60011-000
   Drive Depth: 25 mm



AT00070-00060

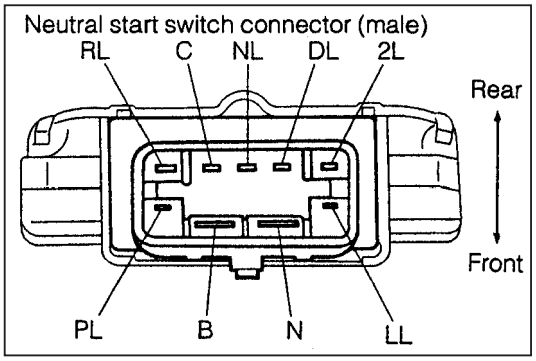
NEUTRAL START SWITCH

Inspection of neutral start switch

Using an ohmmeter, check the continuity of the terminals for each switch position shown in the table below.

Range \ Terminal	B	N	C	PL	RL	NL	DL	2L	LL
P	○	○	○	○					
R			○		○				
N	○	○	○			○			
D			○				○		
2			○					○	
L			○						○

If the continuity does not conform to the specifications, replace the switch.



AT00071-00061

COMPONENT PARTS

GENERAL NOTES

The instructions here have been arranged so that you may work on only one component group at a time. This will help avoid confusing resemblant parts of different subassemblies that may exist on your workbench at the same time.
The component groups are inspected and repaired from the converter housing side.
Whenever possible, complete the inspection, repair and assembly before proceeding to the next component group. If a component group can not be assembled because you are waiting for ordered parts, be sure to keep all parts of that group in a separate container while carrying out the disassembly, inspection, repair and assembly of other component groups.
The recommended fluid of the automatic transaxle is ATF type DEXRON® II or III.

General cleaning notes:

1. All disassembled parts should be washed clean with each of fluid passages and holes blown through with compressed air.
2. When using compressed air to dry parts, always aim away from yourself to prevent accidental spraying of the ATF or kerosene to your face.
3. The recommended ATF or kerosene should be used for cleaning.

Parts arrangement:

1. After cleaning, the parts should be arranged in proper order so that the inspection, repairs and reassembly may be performed with efficiency.
2. When disassembling the valve body, be sure to keep each valve together with the corresponding spring.
3. New brakes and clutches that are to be used for replacement must be soaked in transmission fluid for at least two hours prior to assembly.

General assembly:

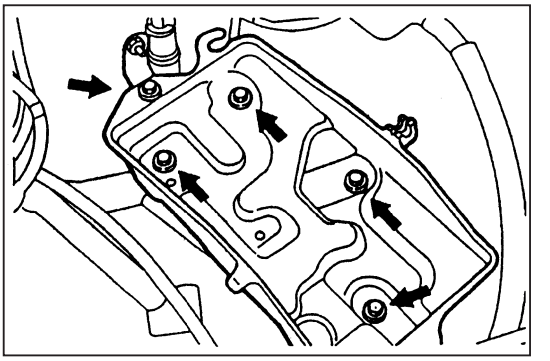
1. All oil seal rings, clutch discs, clutch plates, rotating parts and surfaces should be coated with transmission fluid prior to reassembly.
2. All gaskets and rubber O-rings should be replaced.
3. Make sure that the ends of a snap ring are not aligned with one of the cutout sections and are installed in the groove correctly.
4. If a worn bush is to be replaced, the subassembly containing that bush must be replaced.
5. Check the thrust bearings and races for wear or damage. Replace them if necessary.
6. Use petroleum jelly to keep parts in place.

AT00072-00000

REMOVAL AND INSTALLATION OF TRANSMISSION

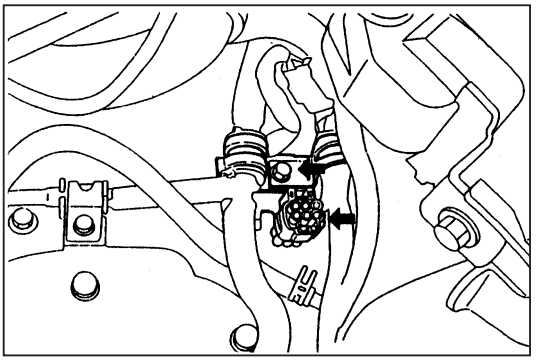
REMOVAL

1. Jack up the vehicle and support it with safety stands securely.
2. Drain the automatic transmission fluid by removing the drain plug with the gasket.
   NOTE:
   - Never reuse the removed gasket.

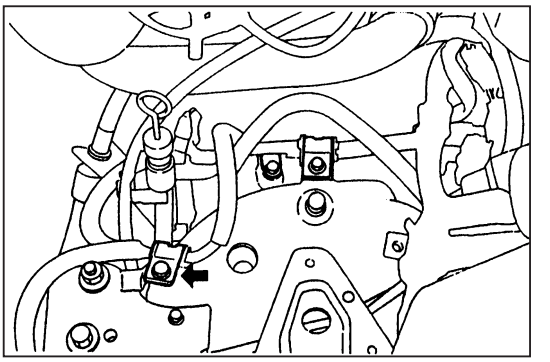

AT00073-00062

3. Remove the battery.
4. Remove the battery carrier by removing the five bolts.

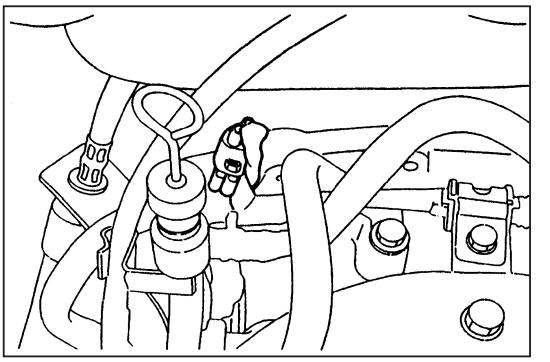
5. Remove the bolt of the harness clamp.
6. Disconnect the check terminal.


AT00074-00063

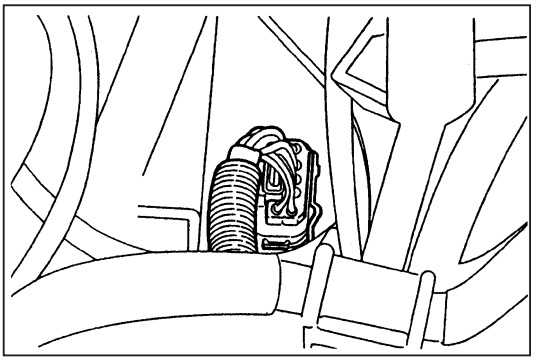
7. Remove the earth bolt together with the harness clamp.


AT00075-00064

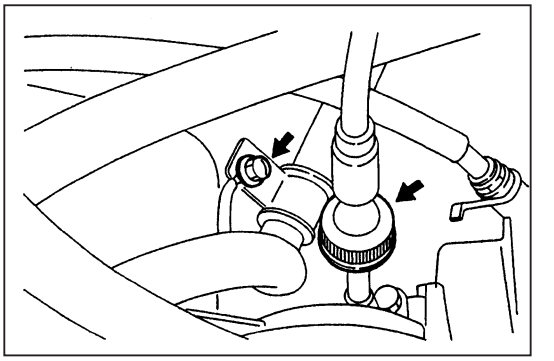
8. Disconnect the white connector of the overdrive solenoid coupler.


AT00076-00065

9. Disconnect the neutral start switch connector.

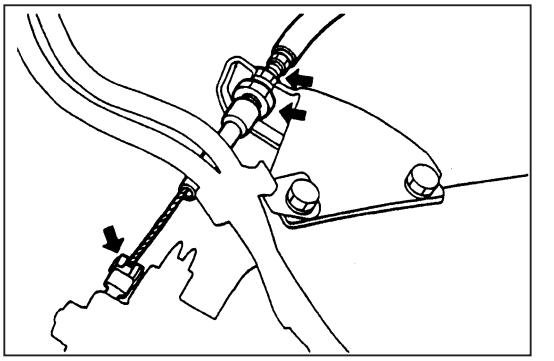

AT00077-00066

10. Disconnect the speedometer cable.
11. Remove the bolt of the harness clamp.



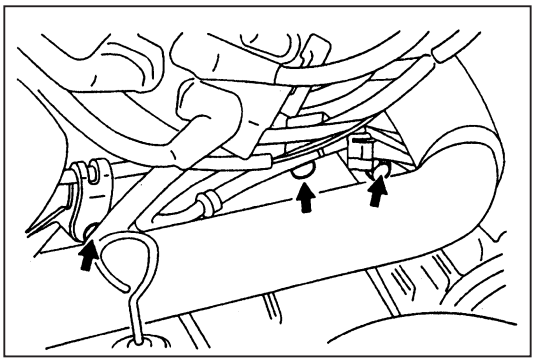
AT00078-00067

12. Disconnect the throttle cable at the end of the nipple section.
13. Remove the throttle cable by removing the adjusting nuts.



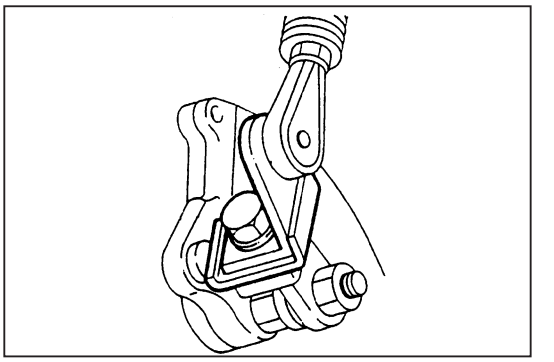
AT00079-00068

14. Remove the three direct-connecting bolts on the upper side of the transaxle case.



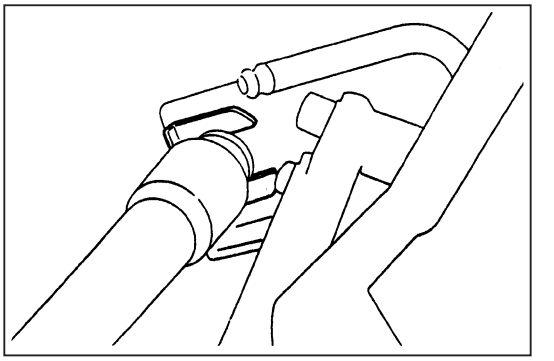
AT00080-00069

15. Remove the stabilizer.
16. Remove the stabilizer left bracket.
17. Remove the bolt of the control cable.



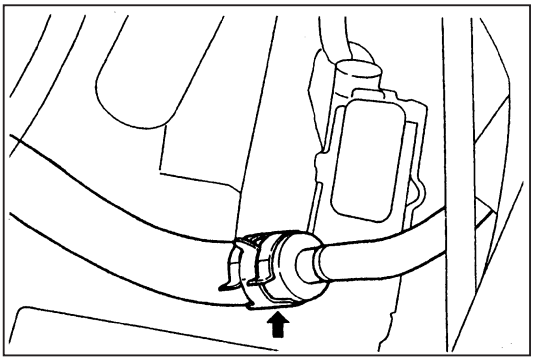
AT00081-00070

18. Detach the clip of the control cable.

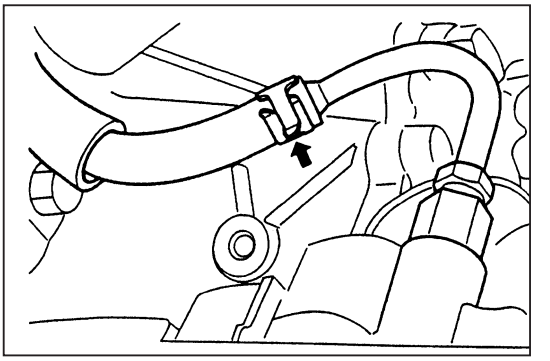


AT00082-00071

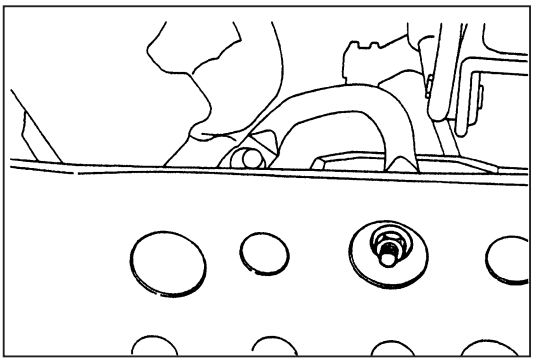
19. Detach the clip of the oil cooler inlet hose at the transaxle case side.


AT00083-00072

20. Detach the clip of the oil cooler outlet hose at the transaxle case side.
21. Remove the attaching bolt and nut of the lower arm.

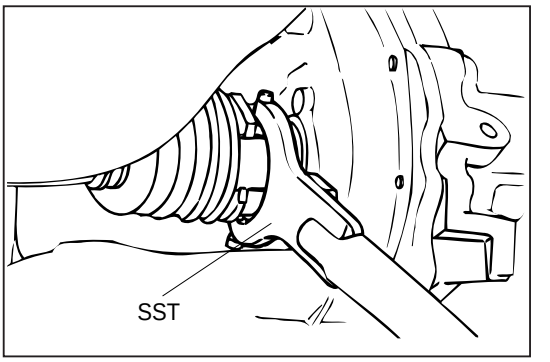

AT00084-00073

22. Remove the nut of the exhaust pipe support bracket.
23. While supporting the front suspension member with a suitable transmission jack, remove the front suspension member with the lower arm installed.


AT00085-00074

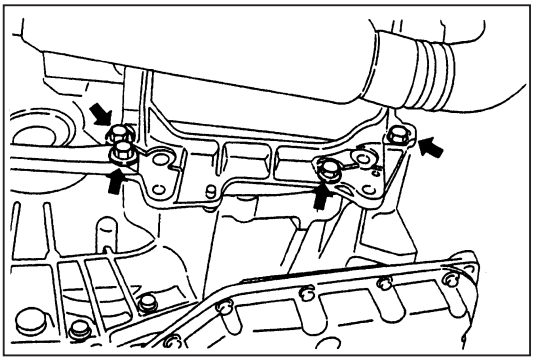
24. Remove the drive shafts, using the following SST.
    SST: 09648-87201-000

    NOTE:
    - Be very careful not to damage the oil seal lip section during the removal.
    - Using a suitable small wire, suspend the removed drive shaft.

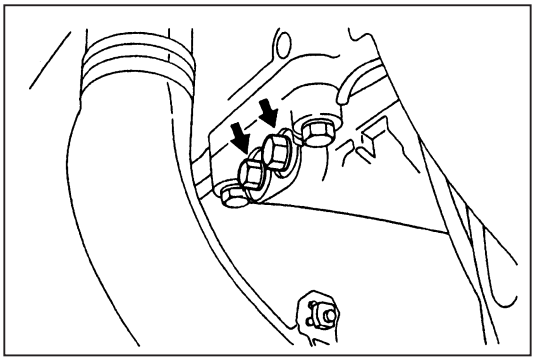


AT00086-00075

25. Remove the power train stiffener by removing the four bolts.

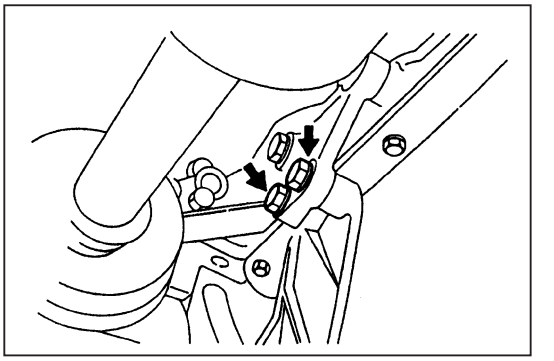

AT00087-00076

26. Remove the two bolts at the engine front side.



AT00088-00077

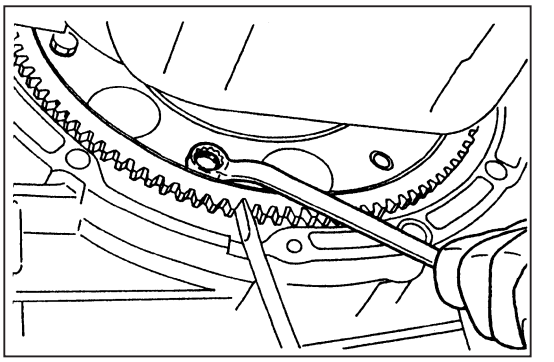
27. Remove the two bolts at the engine rear side.



AT00089-00078

28. Remove the six bolts connecting the drive plate to the torque converter.
    CAUTION:
    - Be sure to arrange the removed six bolts (one white bolt and other five bolts) separately from bolts of the other parts so that you may not lose the six bolts.

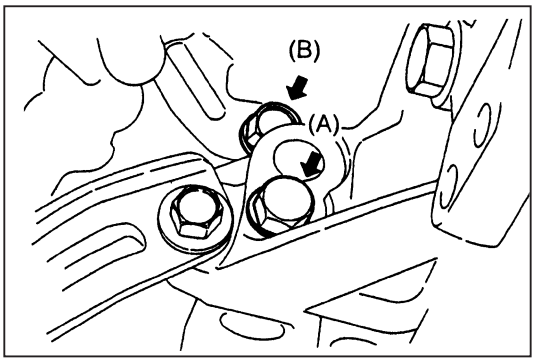
    NOTE:
    - Prevent the ring gear from rotating by means of a screwdriver.



AT00090-00079

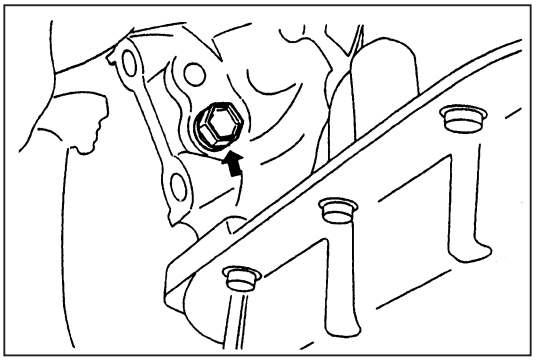
29. Support the engine and transaxle case with a jack and a transmission jack.
    NOTE:
    - Prior to supporting, it is recommended to interpose a wooden block on the lower surface of the engine oil pan so that the oil pan may not be damaged.

30. Remove the bolts for starter (A) and rear stiffener (B).



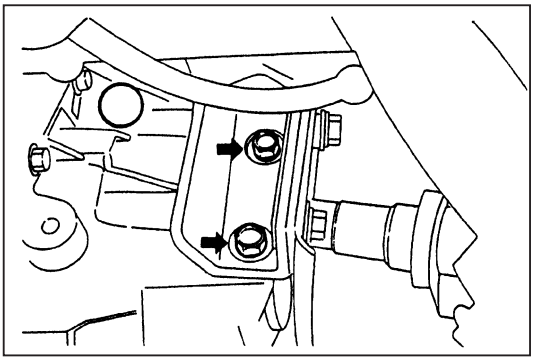
AT00091-00080

31. Remove the direct-connecting bolt at the transaxle front side.



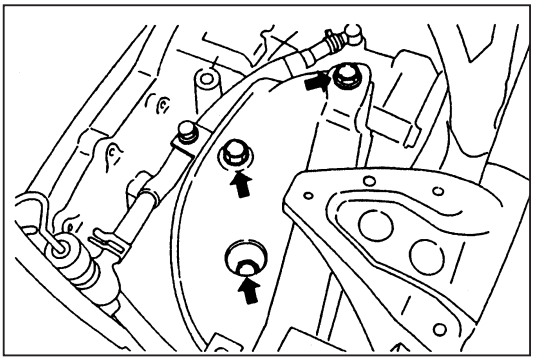
AT00092-00081

32. Remove the two bolts of the engine mounting rear bracket.



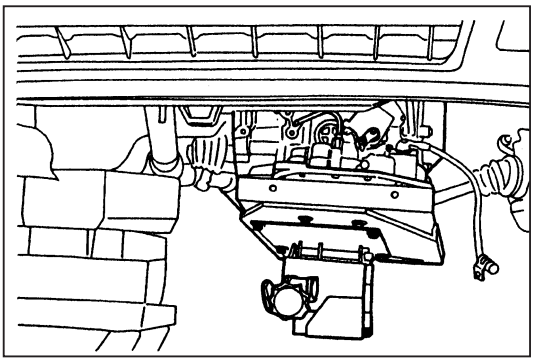
AT00093-00082

33. Remove the three bolts of the engine front left mounting.



AT00094-00083

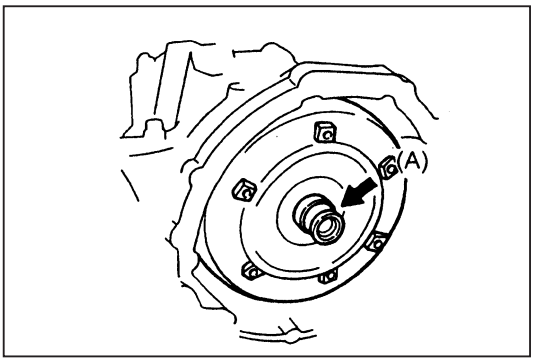
34. Remove the transaxle case with the torque converter installed, lifting it slightly by means of a transmission jack.



AT00095-00084

CAUTION:

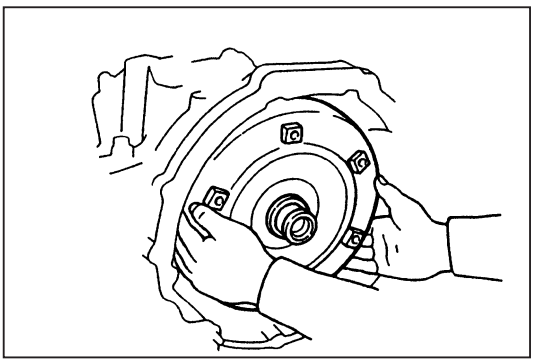
- When removing the transaxle case from the engine, be very careful not to apply excessive force to the section (A) at the center piece of the torque converter. Failure to observe this caution will damage the oil pump of the torque converter.



AT00096-00085

35. Remove the torque converter from the transaxle case.
NOTE:

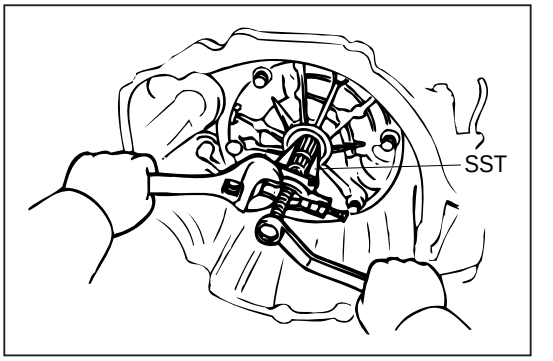
- Since the automatic transmission fluid inside the torque converter flows out onto the floor when removing the torque converter, be sure to place a container in advance to receive the automatic transmission fluid.



AT00097-00086

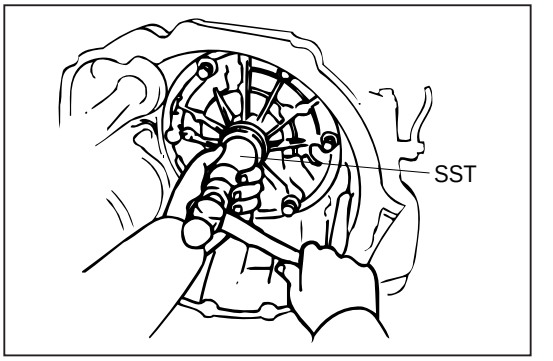
REPLACEMENT OF OIL SEAL

1. Remove the oil seal from the oil pump, using the following SST.
   SST: 09350-32014-000 (09308-10010-000)



AT00098-00087

2. Drive a new oil seal into the oil pump, using the following SST in combination with a plastic hammer.
   SST: 09350-32014-000 (09351-32140-000)

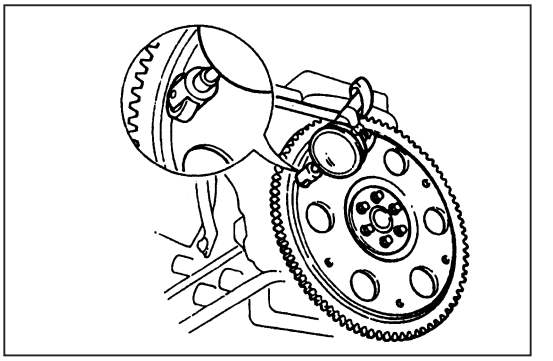


AT00099-00088

TORQUE CONVERTER

1. Inspection of torque converter

Set up a dial indicator and measure the drive plate runout. If the runout exceeds 0.25 mm or if the ring gear is damaged, replace the drive plate. When installing a new drive plate, note the direction of the spacers and tighten the bolts.

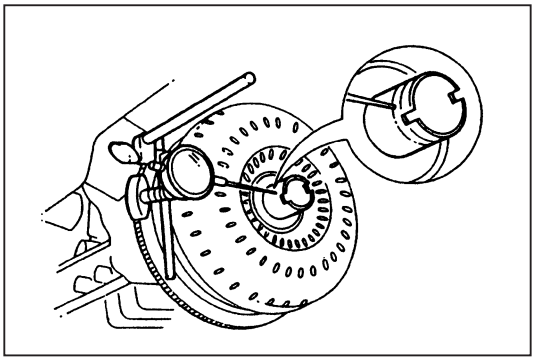

AT00100-00089

2. Measurement of torque converter sleeve runout

(a) Temporarily mount the torque converter to the drive plate. Set up a dial indicator.
   If the runout exceeds 0.20 mm, correct it by changing the installation direction of the converter. If excessive runout can not be corrected, replace the torque converter.

NOTE:

- Mark the position of the converter to ensure correct installation.

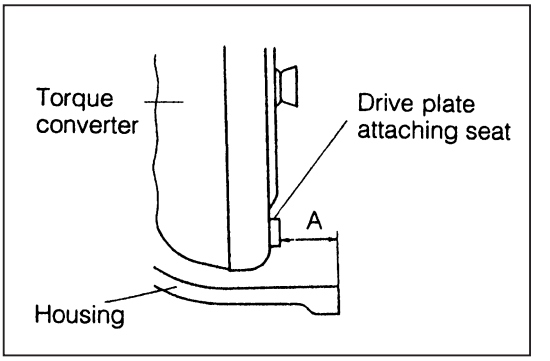

AT00101-00090

(b) Remove the torque converter from the drive plate.

INSTALLATION

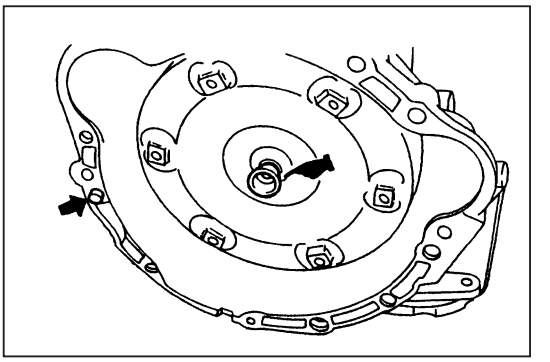
1. Ensure that the torque converter is fitted positively with the automatic transmission.
   Specified Dimension A: 22.83 mm or more

   CAUTION:
   - If the automatic transmission should be installed to the engine with the torque converter not fitted positively in place (i.e. the dimension A in the right figure is smaller than the specified value.), it may result in problems, such as seizure of the oil pump bush on the torque converter sleeve, abnormal noise, cracks of the oil pump drive gear and cracks of the torque converter sleeve. Therefore, be sure to measure the dimension indicated in the right figure.

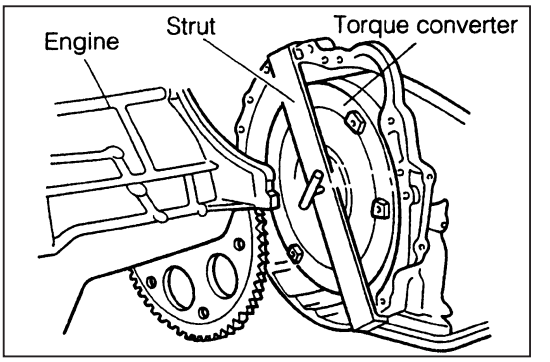


AT00102-00091

2. Install the torque converter to the transaxle case assembly.
3. Apply multi-purpose grease to the fitting section of the torque converter with the crankshaft end.
4. Make sure that the knock pin is inserted into the hole indicated in by the arrow mark in the illustration. Also, when replacing with a new transmission assembly, be sure to insert a knock pin positively.

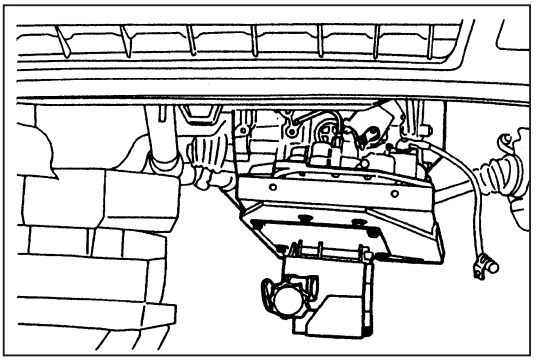

AT00103-00092

5. Install a strut, as indicated in the right figure, so as to prevent the torque converter from being displaced or dropping. (The strut should be removed just before the automatic transmission is installed to the engine.)

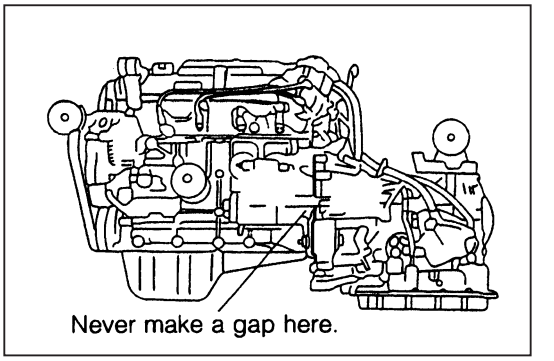


AT00104-00093

6. Slowly jack up the transaxle assembly with a jack and hold it halfway. Then, remove the strut.
7. After removing the strut, slowly jack up the transaxle assembly further and set it to the engine installation position.

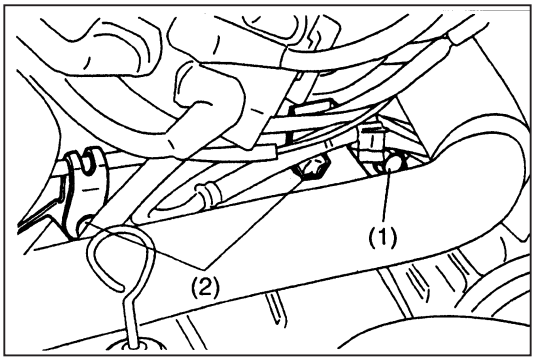

AT00105-00094

8. Joint the mating surfaces of the transaxle assembly and engine.



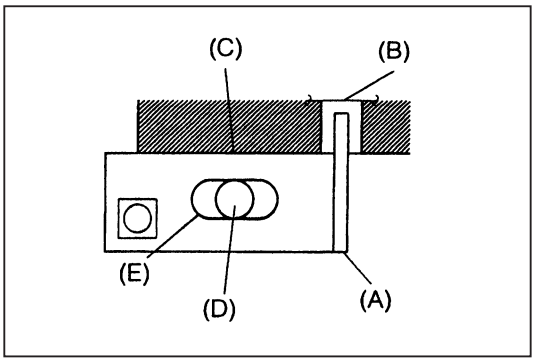
AT00106-00095

9. Temporarily tighten the three direct-connecting bolts on the upper case of the transaxle assembly.



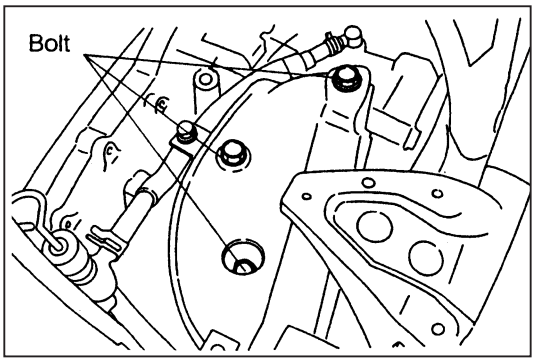
AT00107-00096

10. Insert the upper protruding section of the engine support rear bracket (A) into the cylinder block machining reference hole (B). Bring the upper surface into close contact with the lower surface of the cylinder block.
(At this time, be sure to visually ensure that the rear end plate (D) is aligned with the knock hole (E) of the bracket.)



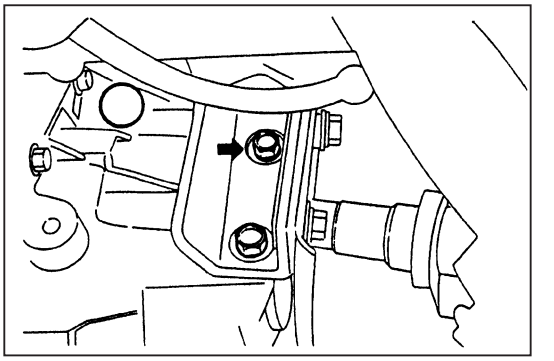
AT00108-00097

11. Tighten the three bolts of the engine front left mounting.
Tightening Torque: 29.4 - 44.1 N·m



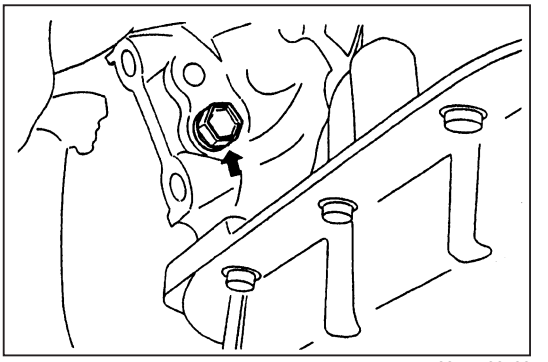
AT00109-00098

12. Tighten the two bolts of the engine mounting rear bracket.
Tightening Torque: 53.9 - 68.6 N·m



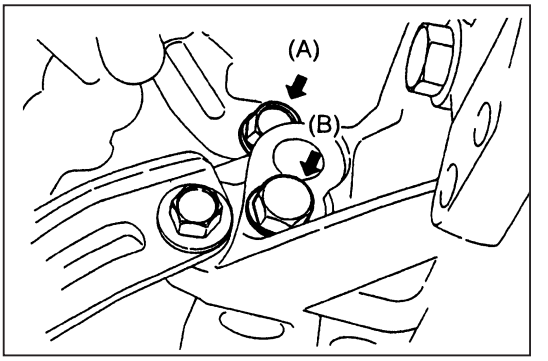
AT00110-00099

13. Tighten the bolt at the transaxle case front side assembly.
    Tightening Torque: 49.0 - 68.6 N·m



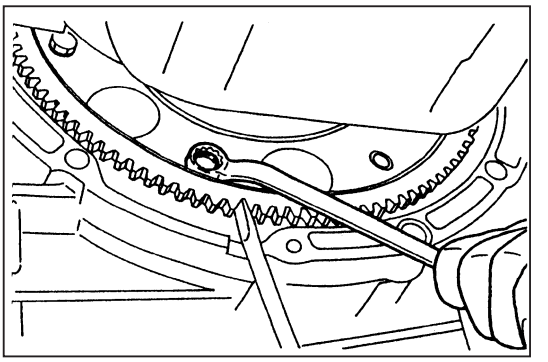
AT00111-00100

14. Tighten both attaching bolts for the starter (A) and rear stiffener (B).
    Tightening Torque:
    (A): 49.0 - 68.6 N·m
    (B): 29.4 - 44.1 N·m



AT00112-00101

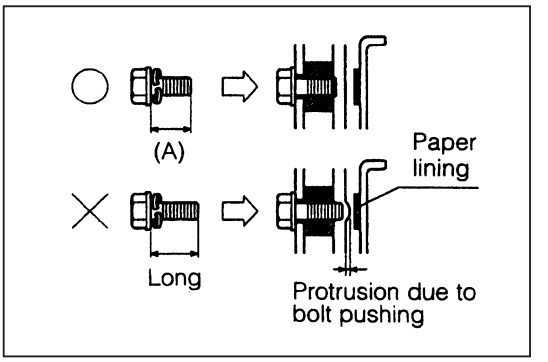
15. Tightening of torque converter
    (1) Temporarily install the white bolt and other five bolts with your fingers.
    (2) Tighten the bolts evenly over several stages.
    Tightening Torque: 22.6 - 32.4 N·m



AT00113-00102

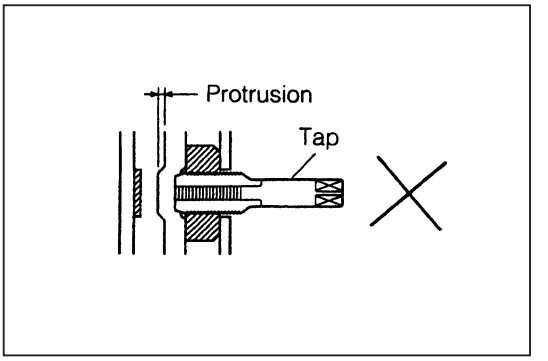
CAUTION:

- If longer bolts other than the designated one should be used, these bolts peel off the clutch lining inside the torque converter. Then, the peeled clutch lining (paper) may be lodged at the hydraulic passage, thus causing malfunctioning of the transaxle.
- If shorter bolts should be used, these bolts can not withstand the rotating torque, leading to rupture at the threaded portion of the bolt.
  Nominal Length (A) of Specified Bolt: $10.5\ ^{+0.5}_{+1}$ mm



AT00114-00103

- If the specified bolt breaks off or it is inserted slantly, the threaded hole can not be corrected by means of a tap. Therefore, replace a new torque converter and a bolt (A) specified above as a set.



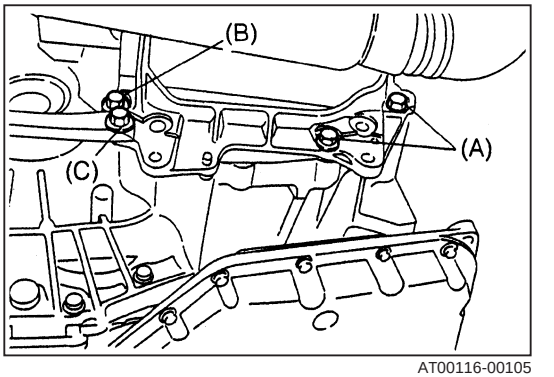
AT00115-00104

NOTE:

- Prevent the ring gear from rotating by means of a screwdriver.

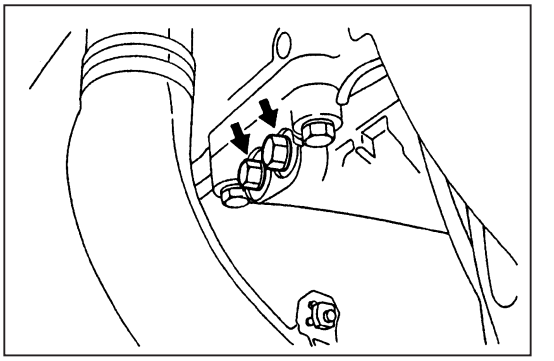
16. Tighten the two bolts (A).
    Tightening Torque: 29.4 - 44.1 N·m

17. Tighten the two bolts (B) and (C).
    Tightening Torque:
    (B): 29.4 - 44.1 N·m
    (C): 53.9 - 68.6 N·m



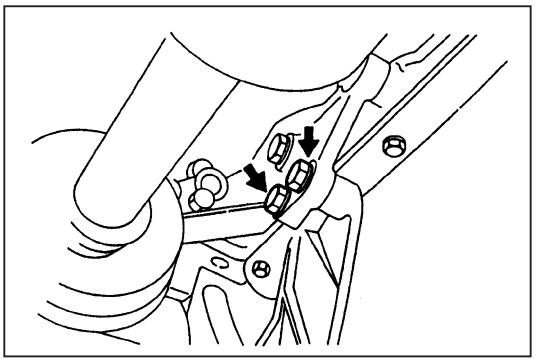
AT00116-00105

18. Tighten the two bolts at the engine front side.
    Tightening Torque: 29.4 - 44.1 N·m

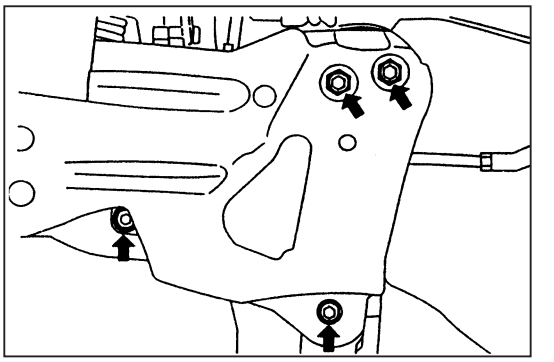

AT00117-00106

19. Tighten the two bolts at the engine rear side.
    Tightening Torque: 29.4 - 44.1 N·m

20. Install the drive shafts.
    NOTE:
    - Be very careful not to damage the oil seal lip section during the installation.

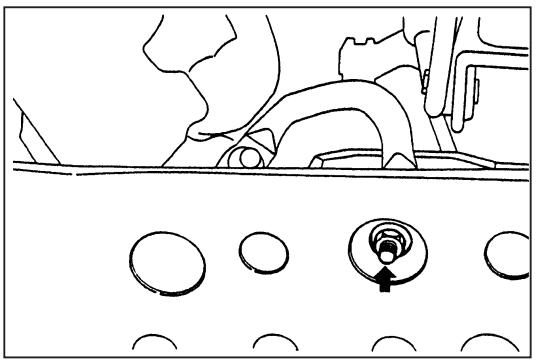

AT00118-00107

21. While supporting the transaxle case assembly with a transmission jack, tighten the four bolts of the front suspension member on both right and left sides.
    Tightening Torque: 73.5 - 103.0 N·m

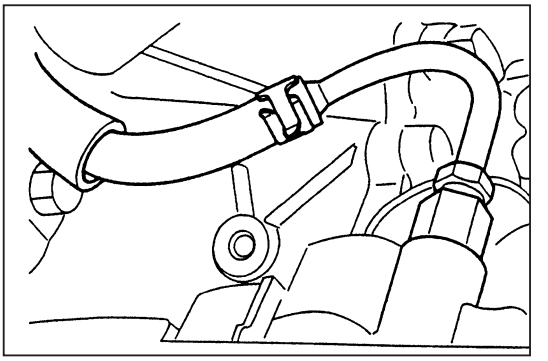

AT00119-00108

22. Tighten the nut of the exhaust pipe support bracket.
    Tightening Torque: 14.7 - 24.5 N·m

23. Tighten the attaching bolt and nut of the lower arm.
    Tightening Torque: 78.5 - 103.0 N·m


AT00120-00109

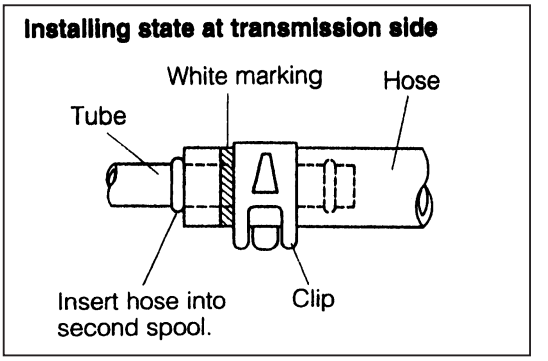
24. Attach the clip of the oil cooler outlet hose.



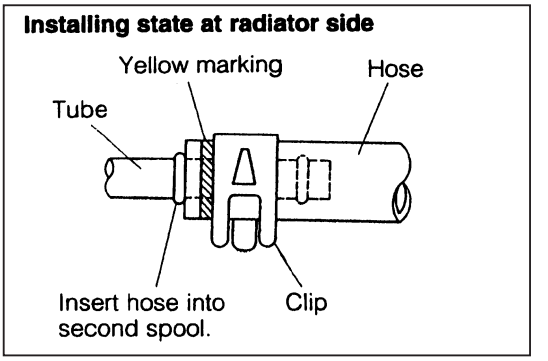
AT00121-00110

NOTE:

- Wipe off completely any oil that may adhere to the outside of the tube.
- Never apply oil to the hoses for the purpose of facilitating the hose insertion. However, you may apply white gasoline to the hoses for this purpose.
- Be very careful not to install the hoses in a twisted or deformed state.
- Make sure that the installing direction of each hose is correct by confirming the marking color.
- Be sure to attach the clip in such a way that it may not ride on the spool section.



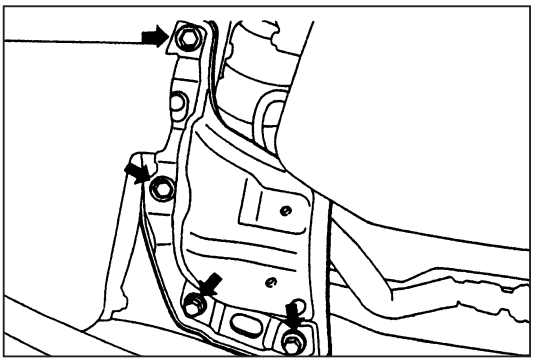
AT00122-00111



AT00000-00112

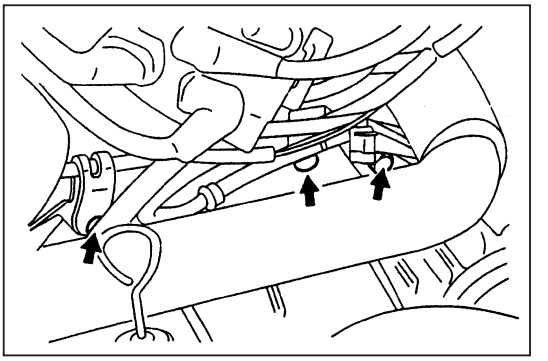
25. Tighten the stabilizer bracket with the four bolts.
    Tightening Torque: 58.8 - 83.4 N·m

26. Temporarily tighten the stabilizer.



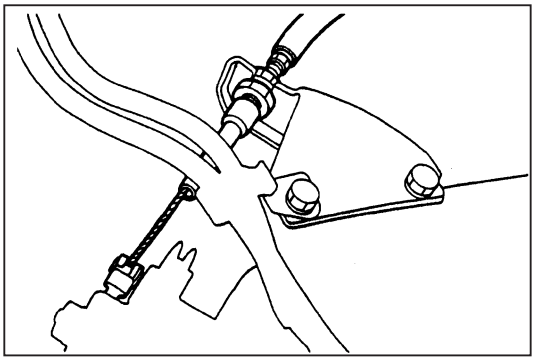
AT00123-00113

27. Tighten the three direct-connecting bolts.
    Tightening Torque: 49.0 - 68.6 N·m



AT00124-00114

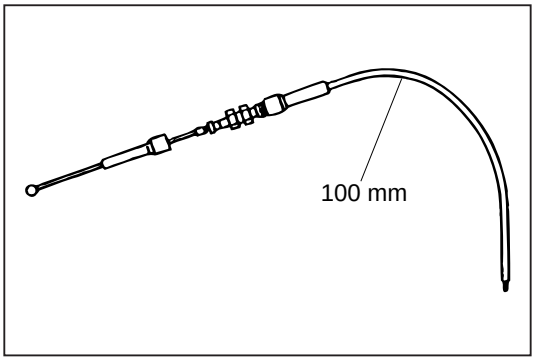
28. Connect the throttle cable to the engine.



AT00125-00115

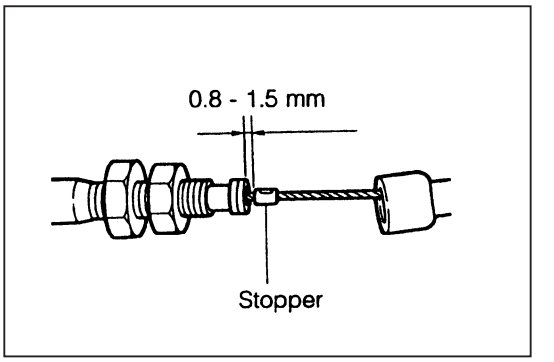
29. If the throttle cable is new, stake a stopper on the inner cable.
    NOTE:
    - A new cable does not have a staked cable stopper.

    (a) Bend the cable so that it may form a radius of about 100 mm.
    (b) Pull the inner cable lightly until you can feel a slight resistance and hold it.



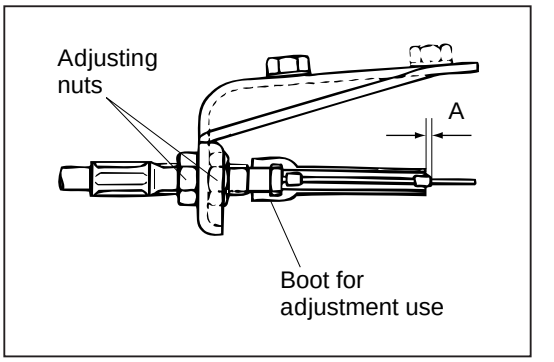
AT00126-00116

    (c) Stake the stopper at a point 0.8 - 1.5 mm from the end of the outer cable.



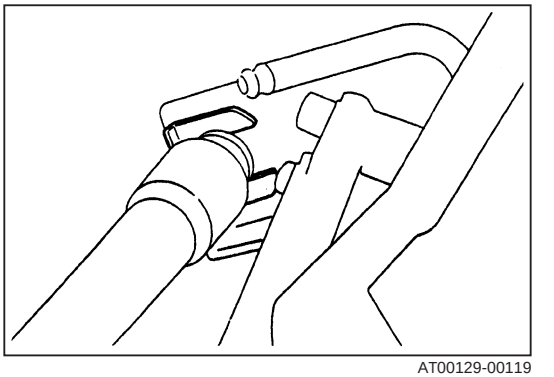
AT00127-00117

30. Perform the adjustment by turning the adjusting nuts so that the dimension A may conform to the specification with the throttle cable opened fully.
    Specified Value A: 0 - 1 mm
    Tightening Torque for Adjusting Nuts: 10.8 - 18.6 N·m



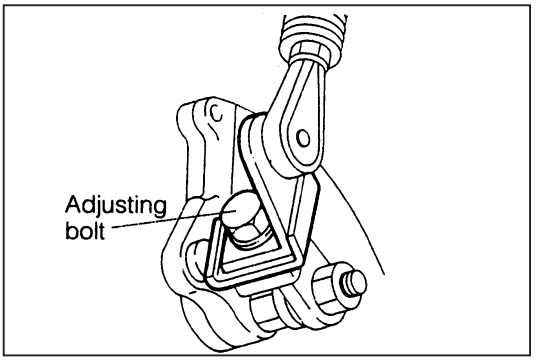
AT00128-00118

31. Attach the clip of the control cable bracket.



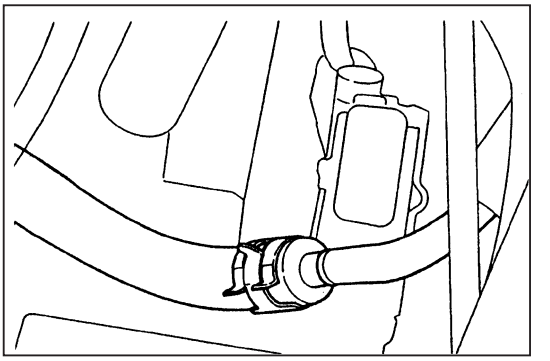
AT00129-00119

32. Installation of shift control cable
    (1) Shift the control shaft lever into the [N] range. Tighten the adjusting bolt while the shift lever is being pulled slightly from the [N] position to the [R] position with the shift control cable at the transmission side.
    (2) Ensure that the shift lever can be moved to each range with a proper detent feeling.
    Tightening Torque for Adjusting Bolt: 15.7 - 23.5 N·m



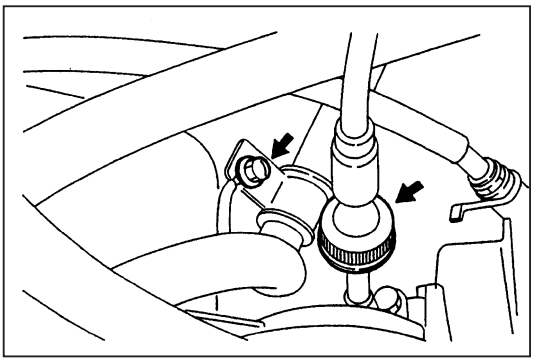
AT00130-00120

33. Attach the clip of the oil cooler inlet hose.
    (As for the installation of the inlet hose, see page AT–159.)

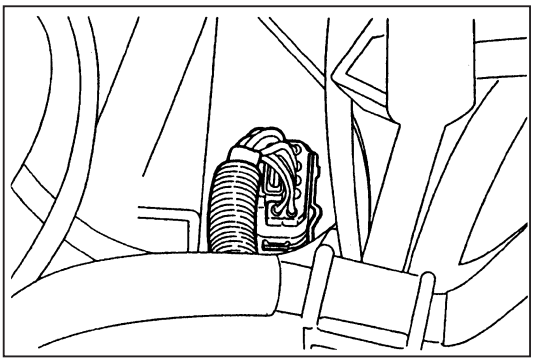

AT00131-00121

34. Tighten the bolt of the harness clamp.
    Tightening Torque: 14.7 - 21.6 N·m

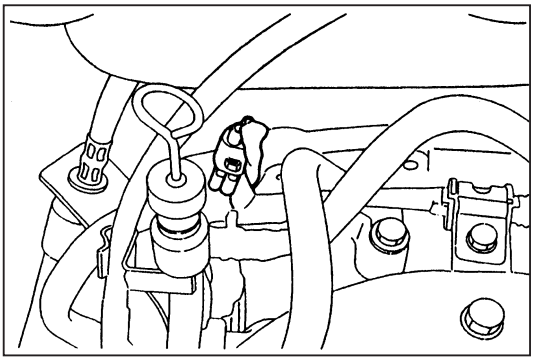
35. Connect the speedometer cable.


AT00132-00122

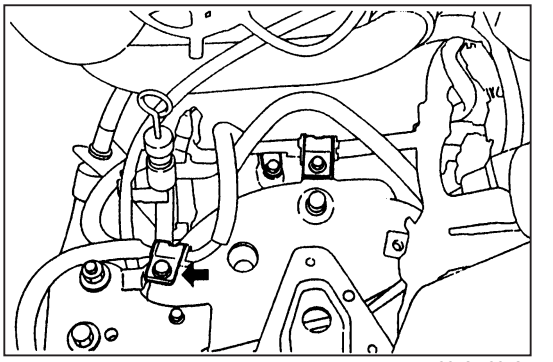
36. Connect the neutral start switch connector.


AT00133-00123

37. Connect the white coupler of the overdrive solenoid coupler.

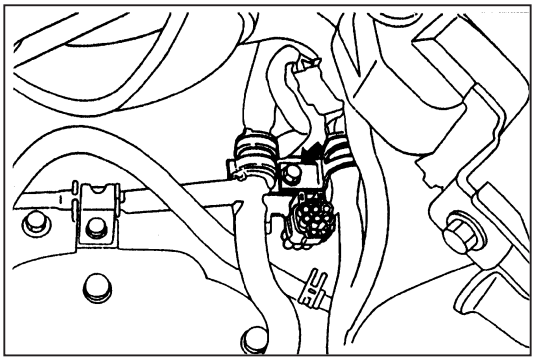

AT00134-00124

38. Tighten the earth bolt with the harness clamp.



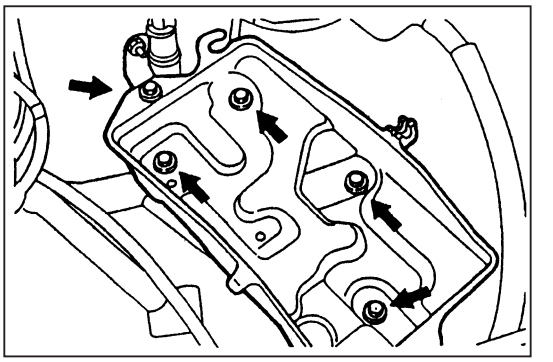
AT00135-00125

39. Tighten the bolt of the harness clamp.
    Tightening Torque: 14.7 - 21.6 N·m



AT00136-00126

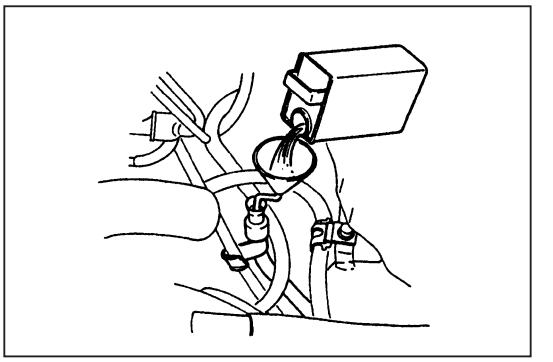
40. Connect the check terminal.
41. Install the battery carrier with the five bolts.
42. Install the battery.
43. Securely tighten the drain plug with a new gasket interposed.
    Tightening Torque: 43.1 - 64.7 N·m



AT00137-00127

44. Add new fluid through the filler tube.
    Fluid Type: ATF DEXRON® II or III
    Full Capacity: Approx. 7.2 liters
    Drain and Refill: Approx. 4.7 liters

    (a) Start the engine and move the shift lever to all positions from P through L and then shift into P.
    (b) With the engine idling, check the fluid level. Add fluid up to the COOL level on the fluid level gauge.
    (c) Check the fluid level at the normal fluid operating temperature (50 - 80°C) and add as required.



AT00138-00128

45. Adjustment of neutral start switch

If the engine should start with the shift lever in any range other than N or P range, the adjustment is required.

(a) Loosen the neutral start switch bolts and move the shift lever to the N range.

(b) Align the groove with the neutral basic line.

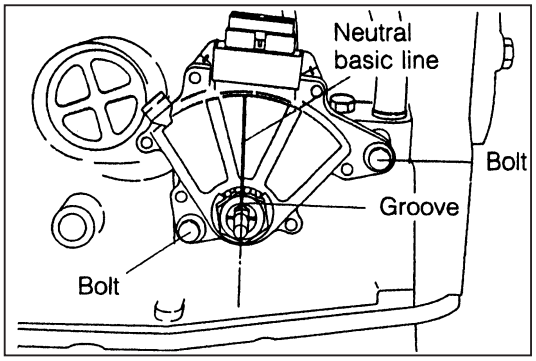
(c) Hold the neutral switch in position and tighten the bolts.

Tightening Torque: 4.9 - 5.9 N·m

(d) Check the continuity of the terminals of the neutral start switch connector. (See page AT–31.)

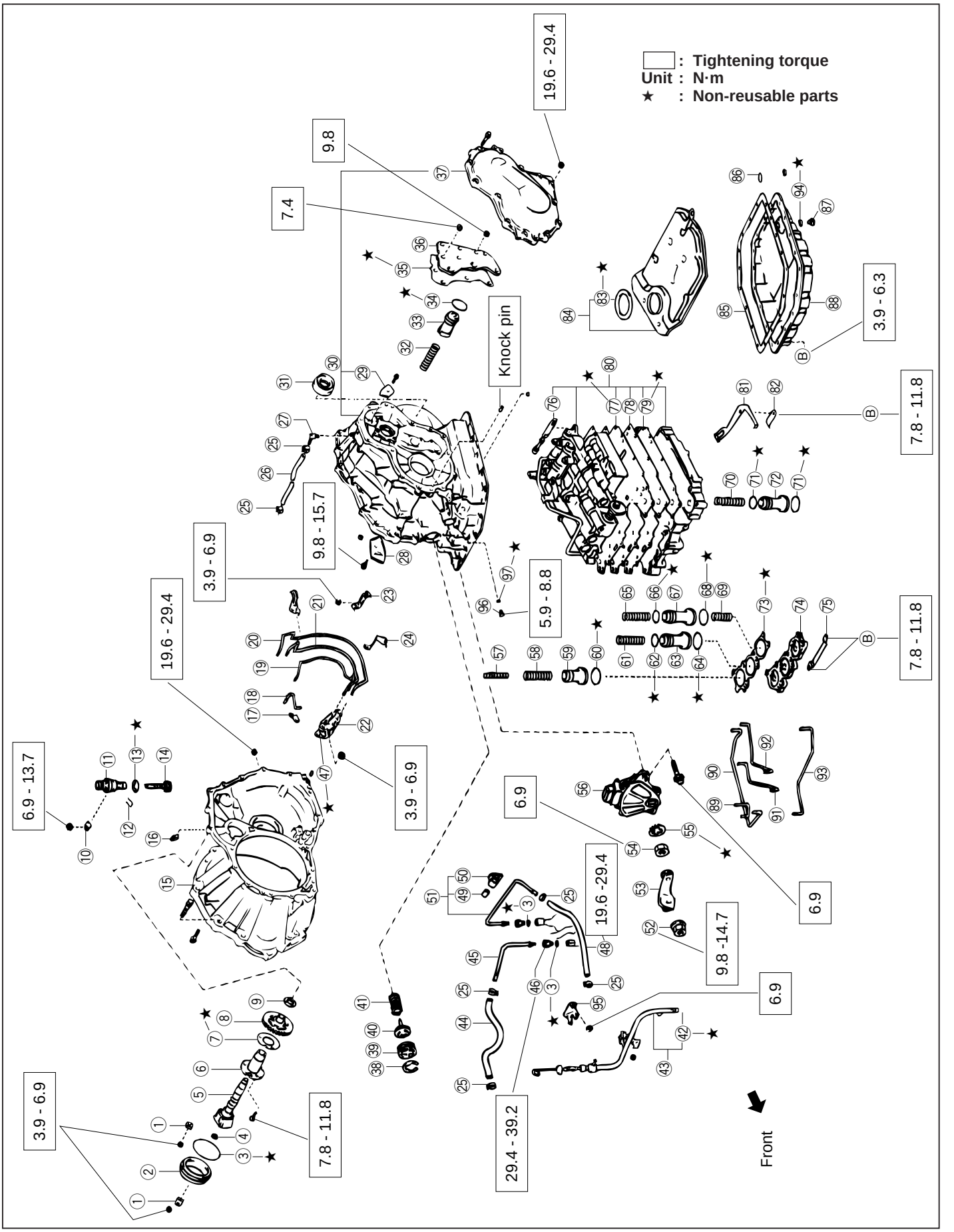
Inspect the idle speed (N range).

(Refer to the EF Section.)



AT00139-00129

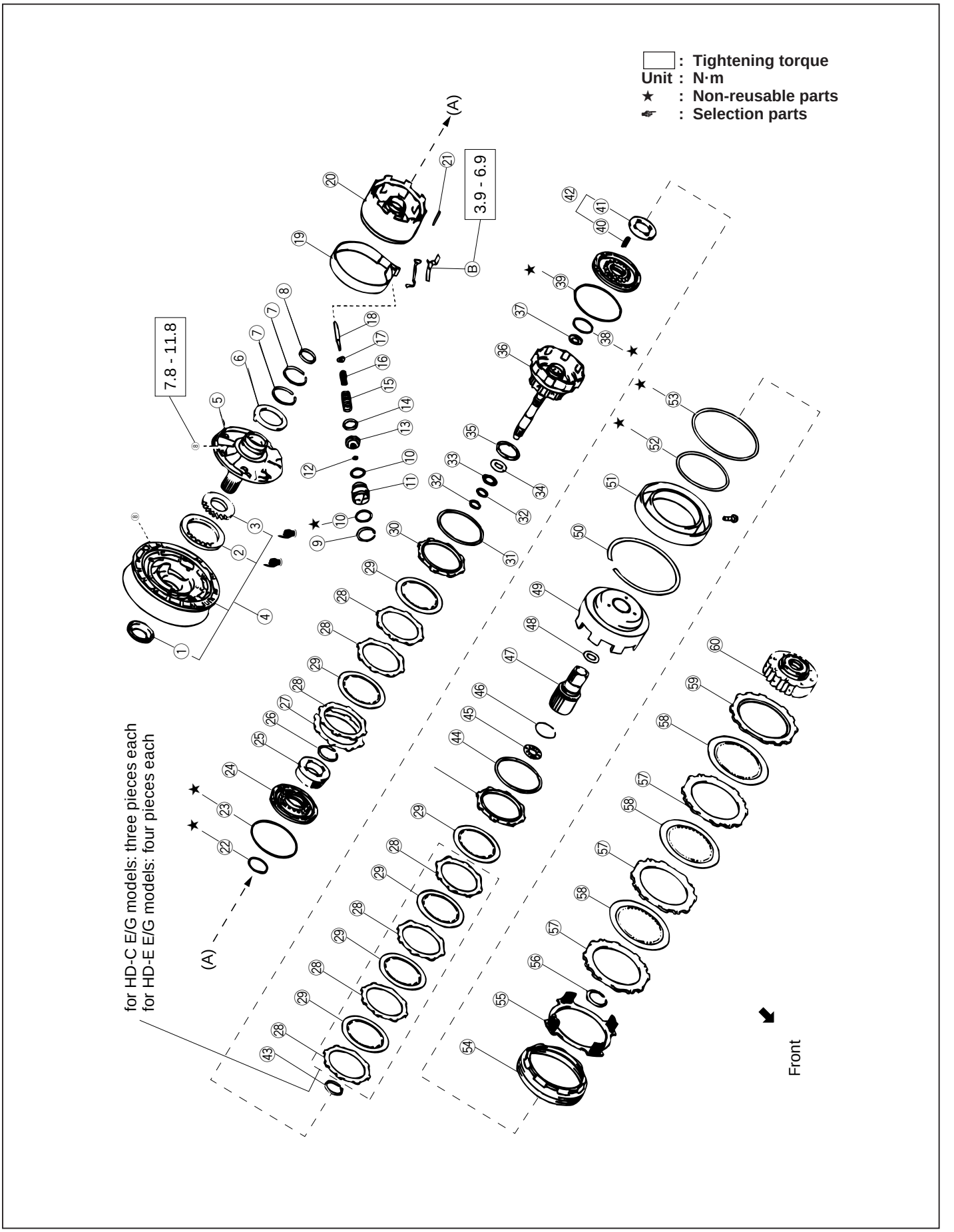
COMPONENTS



AT00140-00130

① Governor cover bracket
② Governor cover
③ O-ring
④ Governor thrust washer
⑤ Governor body assembly
⑥ Governor body adaptor
⑦ Governor adaptor gasket
⑧ Governor driven gear
⑨ Governor adaptor gasket
⑩ Speedometer sleeve lock plate
⑪ Speedometer shaft sleeve subassembly
⑫ Clip
⑬ O-ring
⑭ Speedometer driven gear
⑮ Transaxle housing
⑯ Governor oil strainer
⑰ Transaxle apply tube No. 3 clamp
⑱ Differential gear tube apply tube
⑲ Transmission tube apply tube
⑳ Governor pressure tube
㉑ Governor apply tube
㉒ Transaxle housing cover
㉓ Transaxle apply tube clamp No. 2
㉔ Transaxle apply tube clamp No. 1
㉕ Hose clip
㉖ Hose
㉗ Breather plug
㉘ Transmission case plate No. 1
㉙ Transmission case plate No. 3
㉚ Transmission case subassembly
㉛ T type oil seal
㉜ Compression spring
㉝ B-4 accumulator piston
㉞ O-ring
㉟ Transmission case plate No. 2 gasket
㊱ Transmission case plate No. 2
㊲ Transmission case rear cover subassembly
㊳ Hole snap ring
㊴ 2nd coast brake cover
㊵ 2nd coast brake piston
㊶ Compression spring
㊷ O-ring
㊸ Transmission oil filler tube subassembly
㊹ Oil cooler outlet hose
㊺ Oil cooler outlet tube
㊻ Union
㊼ Transaxle housing cover gasket
㊽ Oil cooler inlet hose
㊾ Cushion
㊿ Clamp
(51) Elbow
(52) Lock nut with washer
(53) Manual shift lever
(54) Manual valve shaft nut
(55) Lock washer
(56) Neutral start switch
(57) Compression spring (Inner)
(58) Compression spring (Outer)
(59) C-1 accumulator piston
(60) O-ring
(61) Compression spring
(62) O-ring
(63) C-2 accumulator piston
(64) O-ring
(65) Compression spring
(66) O-ring
(67) B-2 accumulator piston
(68) O-ring
(69) Compression spring
(70) Compression spring
(71) O-ring
(72) C-3 accumulator piston
(73) Accumulator body gasket
(74) Accumulator cover
(75) Bracket
(76) Manual valve
(77) Valve body No. 2 gasket
(78) Valve body plate
(79) Lower valve body cover gasket
(80) Valve body assembly
(81) Manual detent spring
(82) Manual detent spring cover
(83) Oil strainer gasket
(84) Oil strainer subassembly
(85) Transaxle oil pan gasket
(86) Oil cleaner magnet
(87) Drain plug
(88) Transaxle oil pan subassembly
(89) Forward clutch accumulator tube
(90) Rear clutch accumulator tube
(91) Line pressure tube
(92) Brake accumulator tube
(93) Accumulator back pressure tube
(94) Gasket
(95) Control cable bracket
(96) Plug (for line pressure)
(97) O-ring

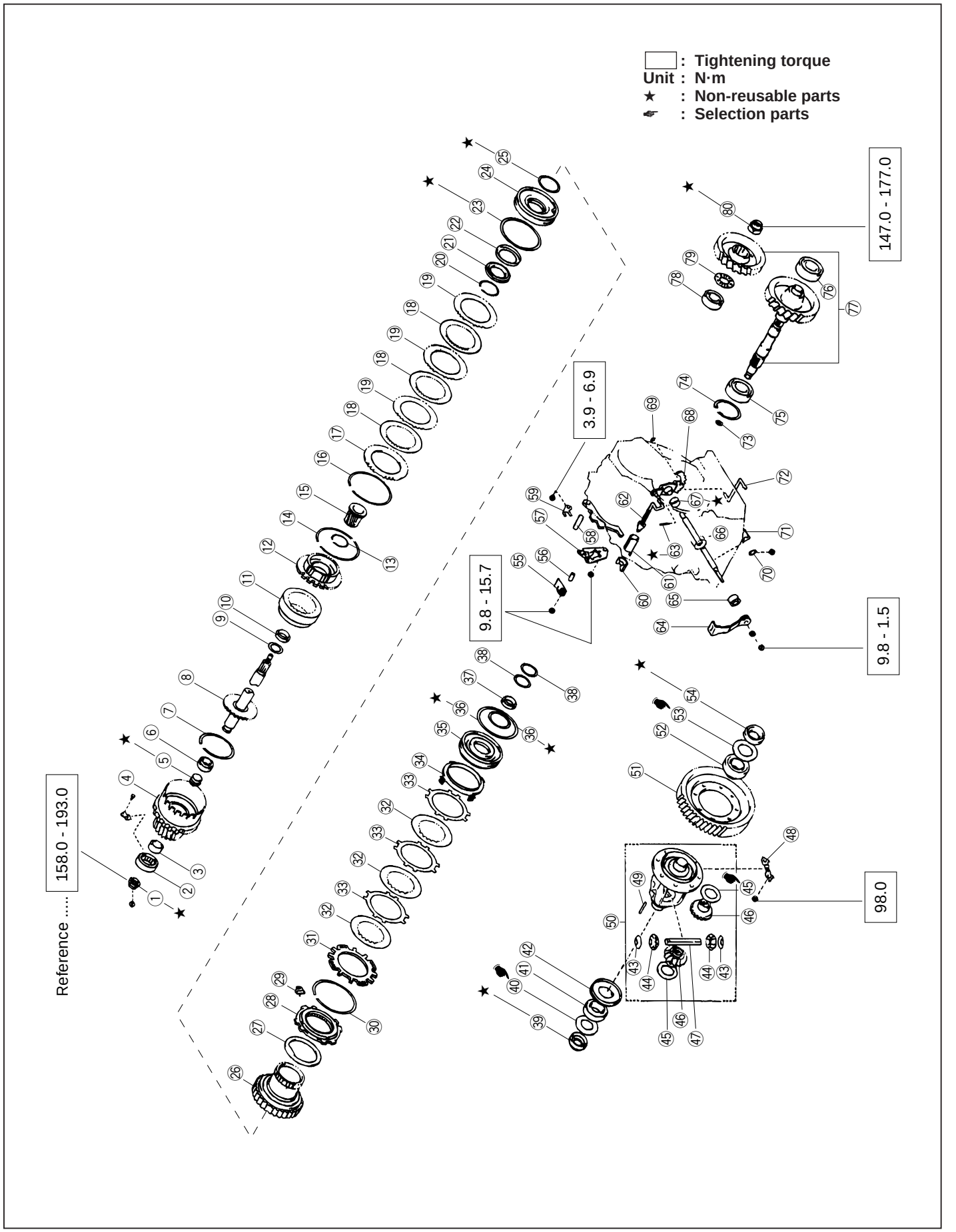
COMPONENTS



AT00142-00131

① T type oil seal
② Oil pump driven gear
③ Oil pump drive gear
④ Oil pump body & gear set
⑤ Stator shaft subassembly
⑥ Clutch drum thrust washer
⑦ Clutch drum oil seal ring
⑧ Thrust bearing race
⑨ Hole snap ring
⑩ O-ring
⑪ 2nd coast brake cover
⑫ E-ring
⑬ 2nd coast brake piston
⑭ 2nd brake piston oil seal ring No. 1
⑮ Compression spring
⑯ Compression spring
⑰ Plate washer
⑱ 2nd coast brake piston rod
⑲ Transmission brake band assembly
⑳ Direct clutch drum subassembly
㉑ Straight pin
㉒ O-ring
㉓ O-ring
㉔ Direct clutch outer piston subassembly
㉕ Direct clutch return spring
㉖ Shaft snap ring
㉗ Clutch cushion plate
㉘ Clutch plate
㉙ Clutch disc
㉚ Direct clutch flange
㉛ Snap ring
㉜ Input shaft oil seal ring
㉝ Thrust needle roller bearing
㉞ Thrust bearing race
㉟ Clutch drum thrust washer
㊱ Input shaft subassembly
㊲ Thrust bearing race
㊳ O-ring
㊴ O-ring
㊵ Compression spring
㊶ Clutch piston return spring seat
㊷ Forward clutch return spring subassembly
㊸ Shaft snap ring
㊹ Snap ring
㊺ Thrust needle roller bearing
㊻ Shaft snap ring
㊼ Planetary sun gear
㊽ Thrust bearing race
㊾ Sun gear input drum
㊿ Hole snap ring
(51) 2nd brake cylinder
(52) O-ring
(53) O-ring
(54) 2nd brake piston
(55) 2nd brake piston return spring
(56) Shaft snap ring
(57) Clutch plate
(58) Clutch disc
(59) Brake flange
(60) 1 way clutch

COMPONENTS



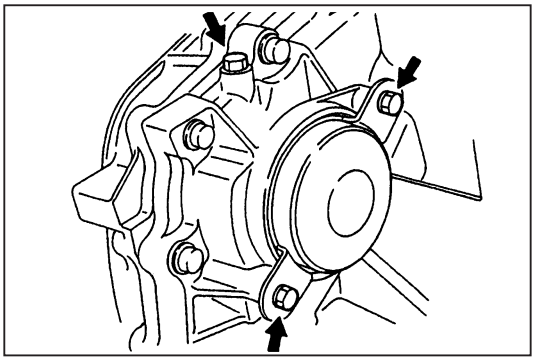
AT00144-00132

① Lock nut
② Tapered roller bearing
③ Thrust needle bearing
④ Differential drive pinion
⑤ Drive pinion bearing spacer
⑥ Tapered roller bearing
⑦ Hole snap ring
⑧ Underdrive input shaft subassembly
⑨ Thrust bearing race
⑩ Thrust needle roller bearing
⑪ Underdrive planetary ring gear
⑫ Underdrive planetary gear
⑬ Hole snap ring
⑭ Hole snap ring
⑮ Underdrive planetary sun gear subassembly
⑯ Hole snap ring
⑰ Underdrive clutch flange No. 1
⑱ Underdrive clutch disc No. 1
⑲ Underdrive clutch plate No. 1
⑳ Shaft snap ring
㉑ Underdrive clutch return spring subassembly
㉒ Underdrive clutch return spring plate
㉓ O-ring
㉔ Underdrive clutch piston subassembly
㉕ O-ring
㉖ Underdrive clutch drum subassembly
㉗ Underdrive clutch drum thrust washer
㉘ Underdrive 1 way clutch assembly
㉙ Anti-rattle clip
㉚ Hole snap ring
㉛ Underdrive clutch flange No. 2
㉜ Underdrive clutch disc No. 2
㉝ Underdrive clutch plate No. 2
㉞ Underdrive brake return spring subassembly
㉟ Underdrive brake piston
㊱ O-ring
㊲ Hole snap ring
㊳ Clutch drum oil seal ring
㊴ T type oil seal
㊵ Plate washer
㊶ Tapered roller bearing
㊷ Speedometer drive gear
㊸ Differential pinion thrust washer
㊹ Differential pinion
㊺ Differential side gear thrust washer
㊻ Differential side gear
㊼ Differential pinion shaft
㊽ Ring gear set bolt lock plate
㊾ Straight pin
㊿ Differential case
(51) Differential ring gear
(52) Tapered roller bearing
(53) Plate washer
(54) T type oil seal
(55) Torsion spring
(56) Spring guide sleeve
(57) Pawl stopper plate
(58) Parking rock pawl
(59) Pawl shaft clamp
(60) Parking lock sleeve
(61) Cam guide sleeve
(62) Parking lock rod
(63) Slotted spring pin
(64) T/M control shaft lever assembly
(65) T type oil seal
(66) Manual valve lever shaft subassembly
(67) Spacer
(68) Manual valve lever
(69) E-ring
(70) Washer
(71) Retainer spring
(72) Manual valve connecting rod
(73) Intermediate shaft oil seal ring
(74) Hole snap ring
(75) Radial ball bearing
(76) Radial ball bearing
(77) Automatic transaxle counter gear kit
(78) Cylindrical roller bearing
(79) Thrust needle roller bearing
(80) Lock nut

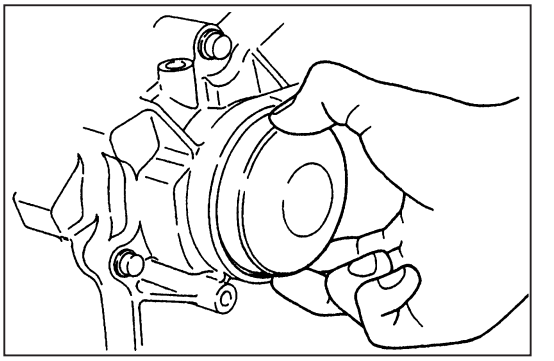
REMOVAL

1. Remove the plug (for the governor pressure inspection) with the O-ring.
   NOTE:
   - Never reuse the removed O-ring.

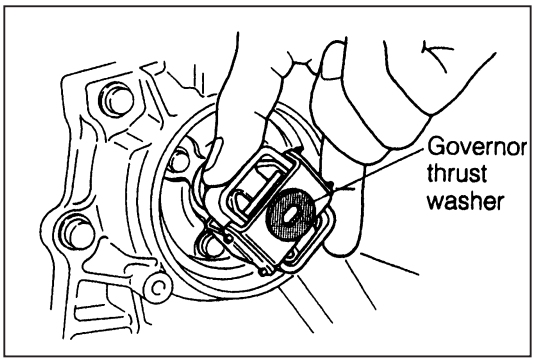
2. Remove the governor cover bracket by removing the two bolts.


AT00146-00133

3. Pull out the governor plate with the O-ring installed.
   NOTE:
   - Never reuse the removed O-ring.

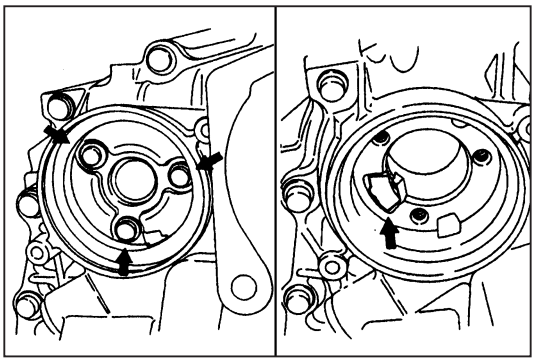

AT00147-00134

4. Pull out the governor body assembly with the governor thrust washer installed.

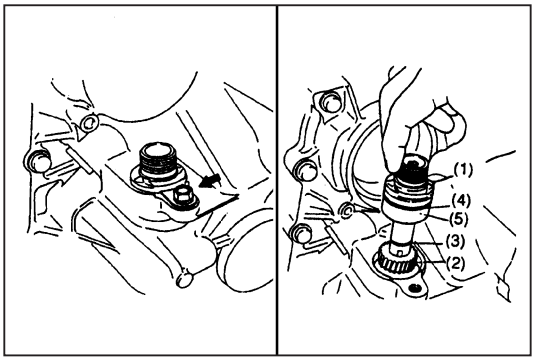


AT00148-00135

5. Remove the governor body adapter and governor adapter gasket by removing the three bolts.
6. Remove the oil strainer.
   NOTE:
   - Wash the removed oil strainer with white kerosene. Then, clean the filter section of the oil strainer with compressed air.


AT00149-00136

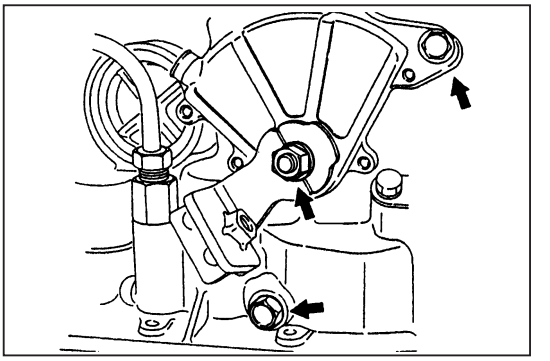
7. Remove the bolt of the speedometer sleeve lock plate.
8. Remove the following parts from the transaxle case as a set.
   (1) Speedometer shaft sleeve subassembly
   (2) Speedometer driven gear
   (3) Clip
   (4) O-ring
   (5) Oil seal



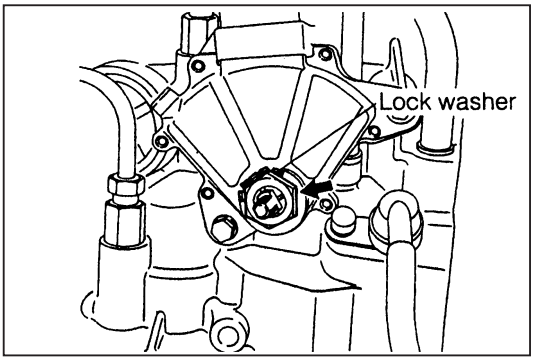
AT00150-00137

9. Remove the plug (for line pressure) and O-ring from the transaxle case assembly.
   NOTE:
   - Never reuse the removed O-ring.

10. Remove the transmission control shaft lever by removing the nut and spring washer.

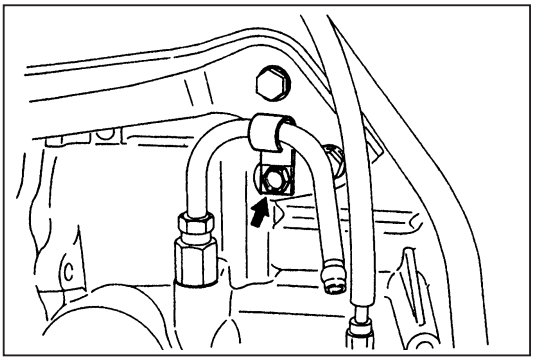

AT00151-00138

11. Pry off the lock washer and remove the manual valve shaft nut.
12. Pull out the neutral start switch toward you by removing the two bolts.

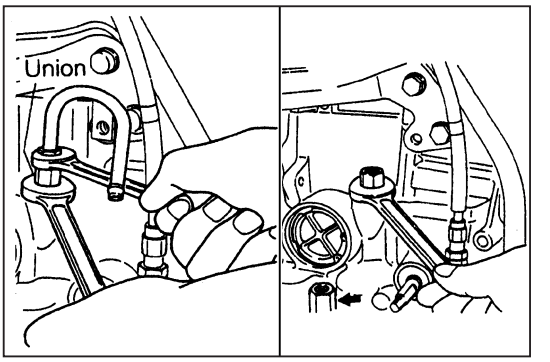


AT00152-00139

13. Remove the bolt of the inlet hose.

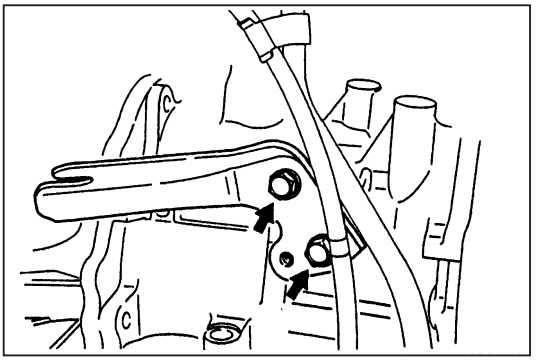

AT00153-00140

14. Remove the flare nut while securing the unions at the inlet and outlet hose sides by means of a standard spanner.
15. Remove the unions on both inlet and outlet sides with the O-ring installed.
16. Remove the O-rings from the union.
    NOTE:
    - Never reuse the removed O-ring.

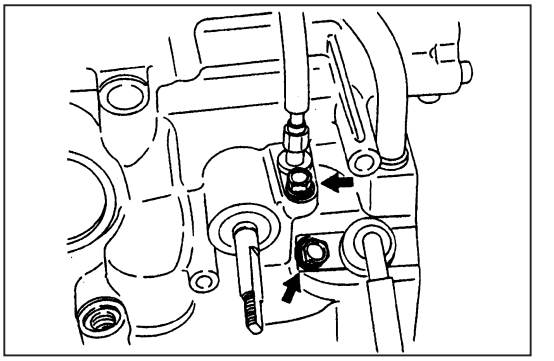


AT00154-00141

17. Remove the control shaft bracket by removing the two bolts.

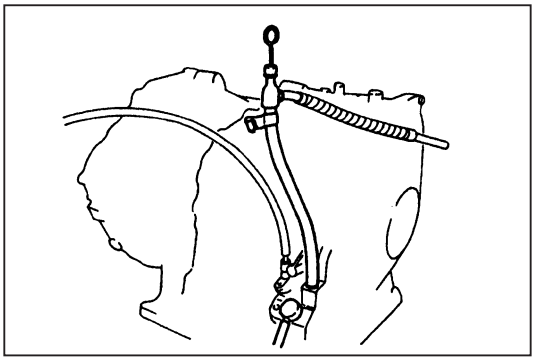

AT00155-00142

18. Remove the bolts of the throttle cable solenoid wiring and remove the plates.



AT00156-00143

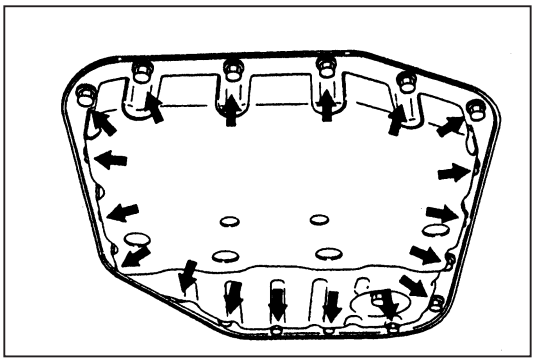
19. Disconnect the clamp of the breather hose at the breather plug.
20. Remove the oil filter tube and fluid level gauge with the O-ring installed.



AT00157-00144

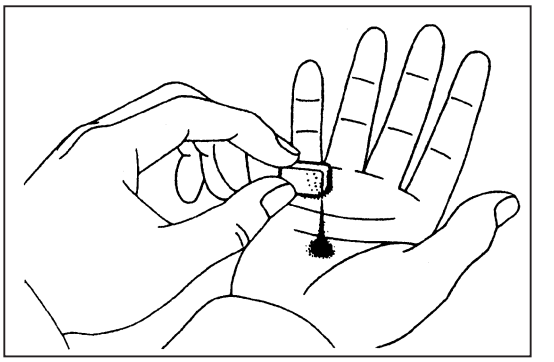
21. Removal of oil pan and gasket
    (a) Remove the 18 bolts.
    (b) Remove the oil pan by lifting the transmission case.
    CAUTION:
    - Do not turn over the transmission, for this will contaminate the valve body with foreign materials deposited at the bottom of the oil pan.

    (c) Place the transmission on a suitable jig to prevent damage to the tube bracket.
    NOTE:
    - Never reuse the removed gasket.



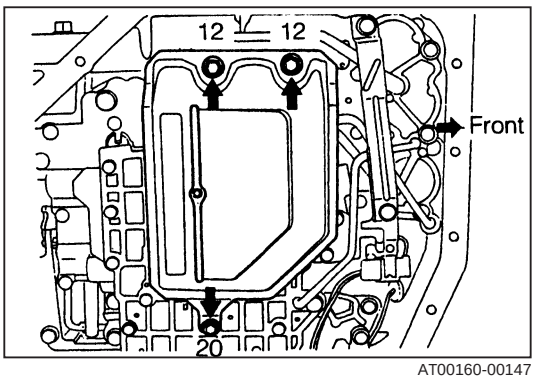
AT00158-00145

22. Check of pan for particles
    Remove the magnets and use them to collect any steel chips. Inspect the oil pan for any chips and particles collected on the magnet. Inspect them carefully to find out the type of wear of the transmission.
    Steel (magnetic) ... Wear of bearing, gear and plate
    Brass (nonmagnetic) ... Wear of bush



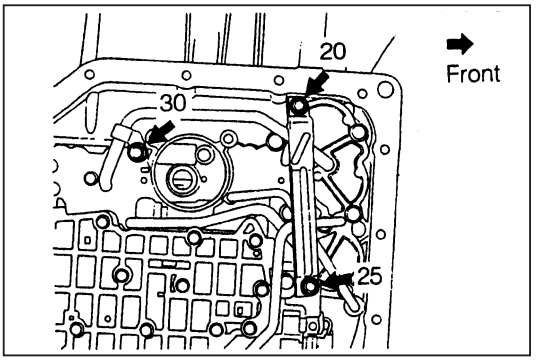
AT00159-00146

23. Remove the oil strainer subassembly with the oil strainer gasket by removing the three bolts.
    NOTE:
    - Never reuse the removed gasket.
    - The numerals in the right illustration indicate the nominal length of the bolt.



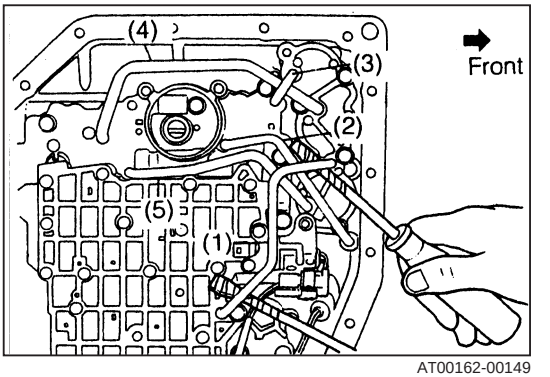
AT00160-00147

24. Remove the tube bracket by removing the two bolts.
25. Remove the bolt of the direct clutch accumulator tube.
    NOTE:
    - The numerals in the right illustration indicate the nominal length of the bolt.



AT00161-00148

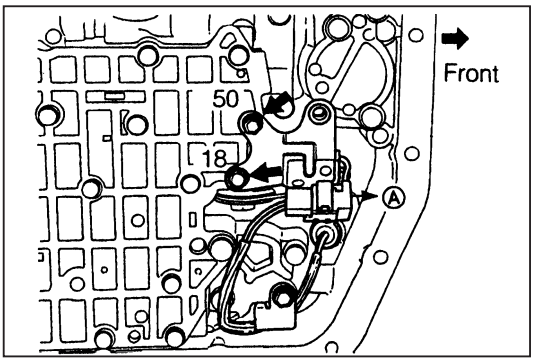
26. Disconnect the five tubes given below, using a standard flat screwdriver wound with a protection tape.
    (1) Accumulator back pressure tube
    (2) Line pressure tube
    (3) Forward clutch accumulator tube
    (4) Rear (direct) clutch accumulator tube
    (5) Brake accumulator tube
    NOTE:
    - Be very careful not to deform the tubes and not to scratch the valve body during the tube removal.



AT00162-00149

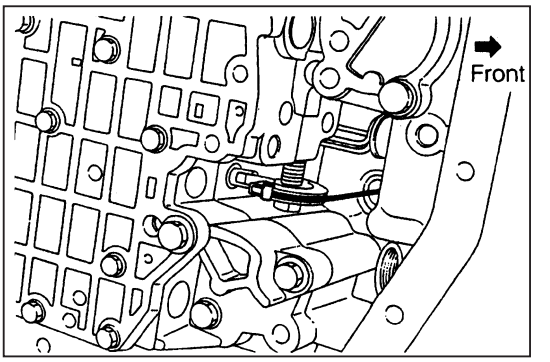
27. Remove the two bolts attaching the solenoid valve bracket.
    NOTE:
    - The numerals in the right illustration indicate the nominal lengths of the bolts.

28. Remove the solenoid valve and bracket from the valve body assembly by removing them in the direction (A) indicated in the right figure.
29. Disconnect the connector.
30. Remove the O-ring from the solenoid valve.
    NOTE:
    - Never reuse the removed O-ring.



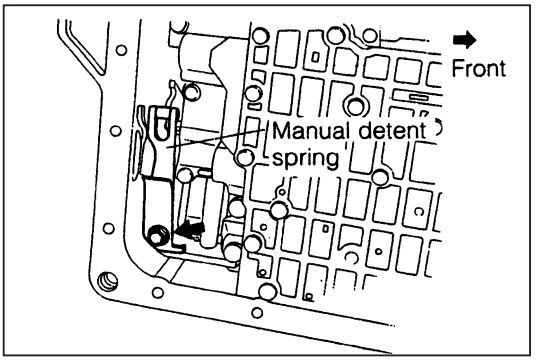
AT00163-00150

31. Removal of valve body
    (1) Disconnect the throttle cable from the throttle cam.



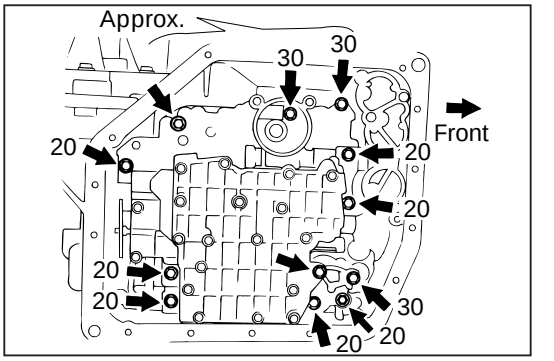
AT00164-00151

    (2) Remove the bolt of the manual detent spring and manual detent spring cover.



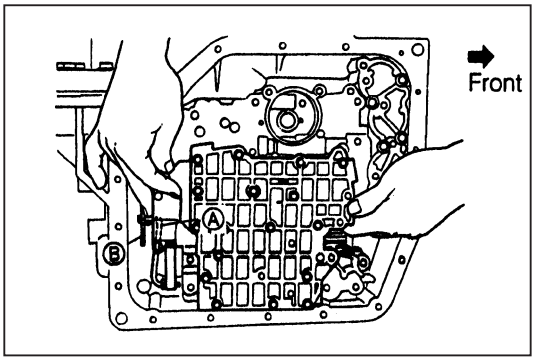
AT00165-00152

(3) Remove the 12 bolts of the valve body assembly.
NOTE:
- Be sure to loosen the bolts evenly and diagonally.
- Never reuse the removed gasket.
- The numerals in the right illustration indicate the nominal length of the bolt.



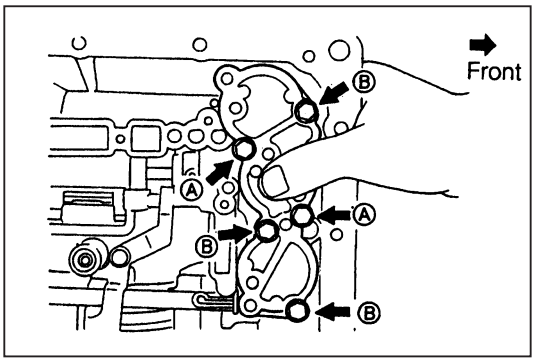
AT00166-00153

(4) While holding the valve body assembly by both hands, remove the valve body by removing the manual connecting rod Ⓐ from the manual valve lever Ⓑ.
CAUTION:
- When removing the manual connecting rod from the manual valve lever, be very careful not to apply excessive force to the rod and lever. Failure to observe this caution may cause the rod to be deformed. As a result, shift operation becomes hard or impossible.



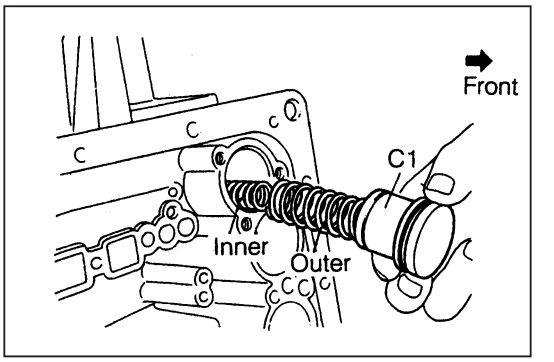
AT00167-00154

32. Slacken the two bolts Ⓐ.
33. While pushing down the accumulator cover with your fingers, remove the three bolts Ⓑ.
34. Remove the accumulator cover by removing the slackened two bolts Ⓐ with the accumulator body gasket.
NOTE:
- Never reuse the removed gasket.



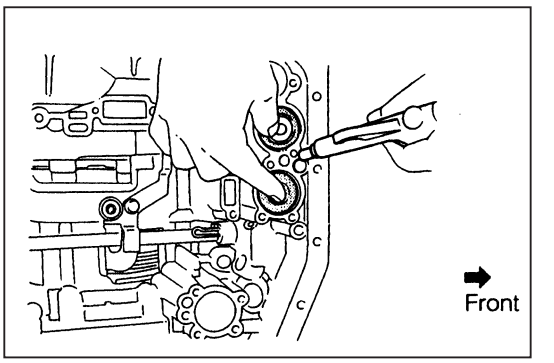
AT00168-00155

35. Remove the following parts from the transaxle case.
(1) C-1 accumulator piston with O-ring installed
(2) Inner and outer compression springs
(3) Remove the O-ring from the C-1 accumulator piston.
NOTE:
- Never reuse the removed O-ring.



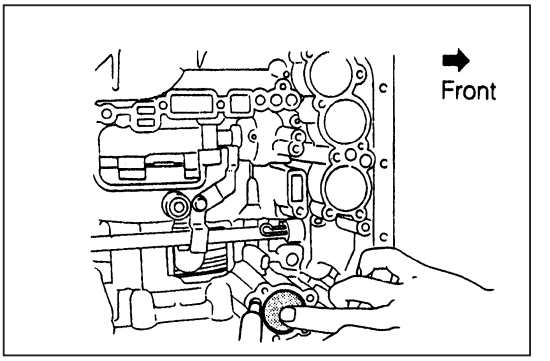
AT00169-00156

36. Removal of C-2 and B-2 accumulator pistons, O-ring and compression spring
(1) Lightly hold the head sections of the C-2 and B-2 pistons with your fingers. Remove the pistons by applying compressed air into the oil hole indicated in the right figure.
NOTE:
- Be sure to put on protection goggles since oil may splash when using compressed air.
- Never reuse the removed O-rings.



AT00170-00157

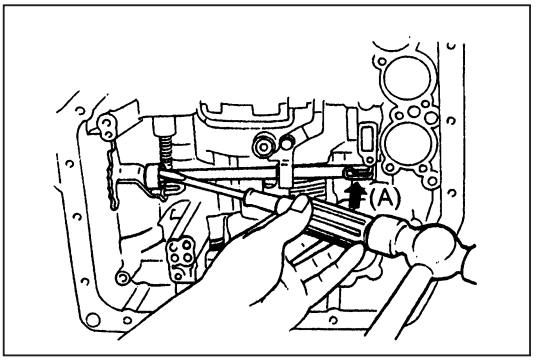
37. Removal of C-3 accumulator piston, O-ring and compression spring
    (1) Lightly hold the head section of the C-3 piston with your fingers. Remove the piston by applying compressed air into the oil hole indicated in the right figure.
    NOTE:
    - Be sure to put on protection goggles since oil may splash when using compressed air.
    - Never reuse the removed O-rings.



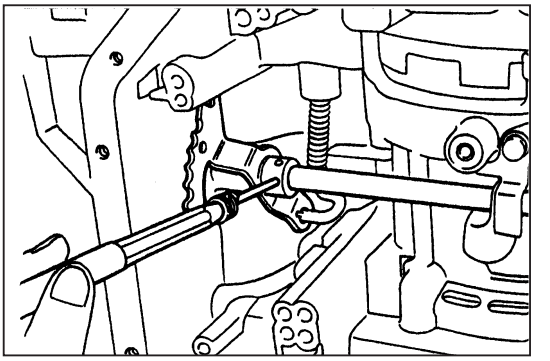
AT00171-00158

38. Removal of manual valve lever shaft
    (1) Cut off the staked section of the spacer, using a feather-edged minus screwdriver in combination with a plastic hammer.
    NOTE:
    - When cutting off the spacer, do not strongly tap the manual valve lever shaft. (There is a possibility that the manual valve lever shaft is bent.)

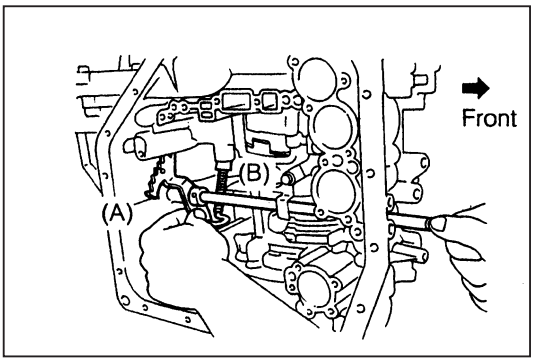
    (2) Remove the spring retainer (A) by pulling it toward you.
    (3) Drive out the slotted spring pin, using a standard pin punch in combination with a hammer.
    NOTE:
    - Never reuse the removed slotted spring pin.



AT00172-00159

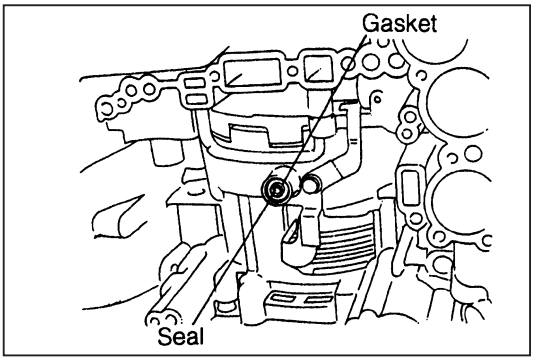

AT00173-0160

    (4) Remove the manual valve lever shaft and washer by pulling them towards front side of the transaxle case.
    (5) Remove the manual valve lever shaft from the transaxle case assembly by disconnecting it from the manual lever (A) and parking lock rod (B).



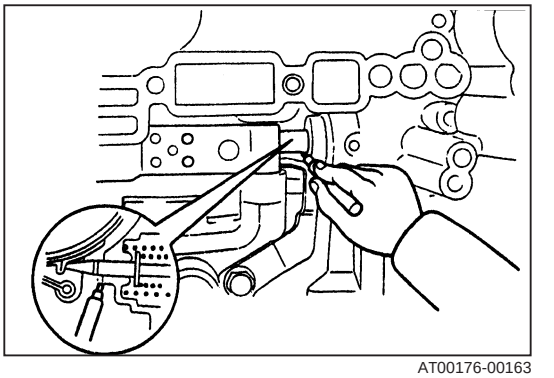
AT00174-00161

39. Remove the second brake applying gasket and drum oil seal.
    NOTE:
    - Never reuse the removed gasket and oil seal.



AT00175-00162

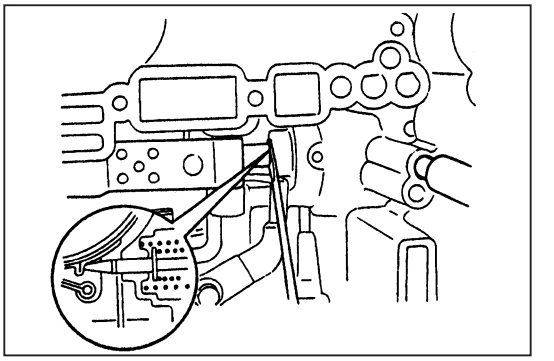
40. Measurement of piston stroke of second coast brake
    (1) Apply a small amount of paint or blue lead to the piston rod at the point it meets the case as shown in the illustration.



AT00176-00163

    (2) Measure the piston stroke while applying and releasing the compressed air (4 - 8 kg/cm^2) as shown in the right figure. For this operation, use the following SST or a standard feeler gauge.
    SST: 09240-00020-000
    Piston Stroke: 1.5 - 3.0 mm

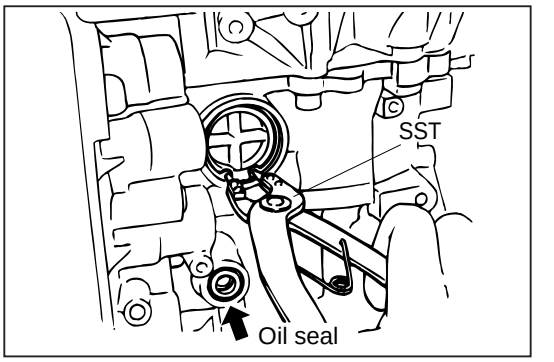
    If the piston stroke exceeds the limit, inspect the brake band.



AT00177-00164

    NOTE:
    - Be sure to put on protection goggles before using compressed air.

41. Removal of second coast brake piston
    (1) Remove the snap ring, using the following SST.
    SST: 09350-32014-000 (09351-32050-000)



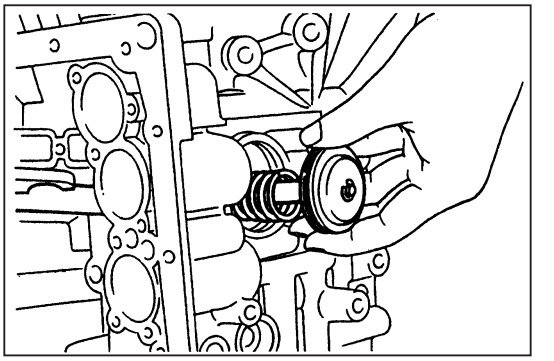
AT00178-00165

    NOTE:
    - Be very careful not to deform the snap ring by compressing it excessively.

    (2) Wind a feather-edged flat screwdriver with a protection tape to prevent the second coast brake cover from being damaged. Using the screwdriver, remove the two O-rings.

    NOTE:
    - Never reuse the removed O-rings.

    (3) Remove the piston assembly and compression spring by applying compressed air (4 - 8 kgf/cm^2) into the oil hole.



AT00179-00166

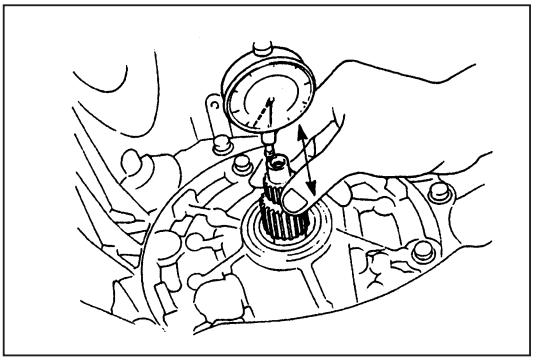
    NOTE:
    - Be sure to put on protection goggles before using compressed air.

    (4) Remove the two O-rings from the cover.

    NOTE:
    - Never reuse the removed O-rings.

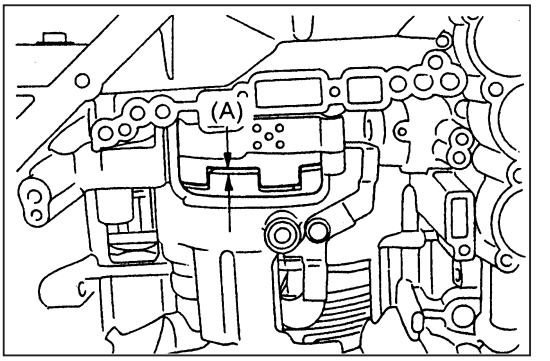
42. Measurement of input shaft thrust end play
Measure the thrust end play by applying a dial gauge at the tip end of the input shaft (as indicated in the right figure).
Specified Value: 0.2 - 0.9 mm

NOTE:
- If the thrust end play exceeds the specified value above, most likely the thrust bearing race assembled in the oil pump is worn out. Be sure to record the measured value for a guide during the assembly.


AT00180-00167

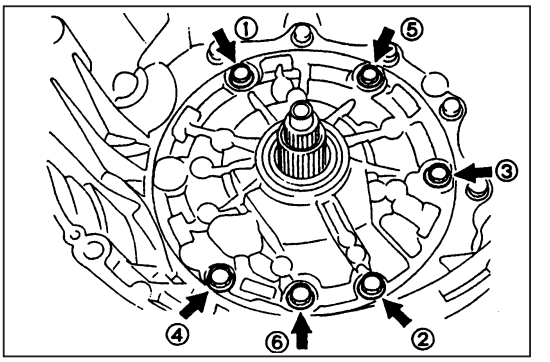
43. Measure the clearance (section A) between the forward clutch and the direct clutch by means of a standard feeler gauge.
Standard Value: Approx. 3 mm

NOTE:
- If the clearance (section A) above exceeds the specified value, most likely the forward clutch and direct clutch are installed improperly. Be sure to record the measured value for a guide during the assembly.



AT00181-00168

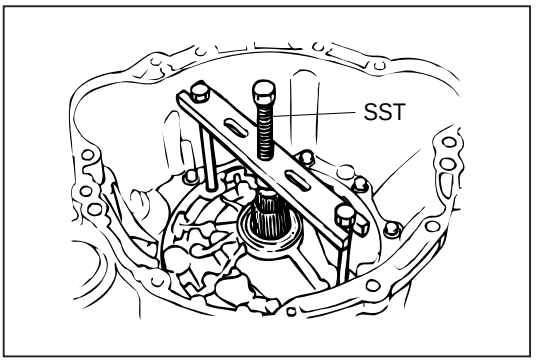
44. Remove the six bolts attaching the oil pump body & gear set and transaxle case by loosening these bolts evenly and diagonally.
NOTE:
- The right illustration shows an example of the removing sequence.



AT00182-00169

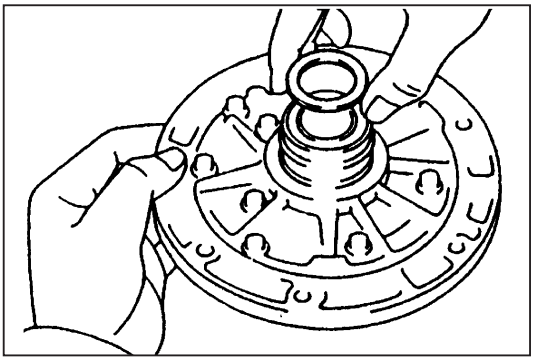
45. Pull out the oil pump from the transmission case, using the following SST.
SST: 09350-32014-000 (09351-32061-000)

NOTE:
- Push the 2nd coast brake band into the case, being careful not to catch it on the direct clutch drum.

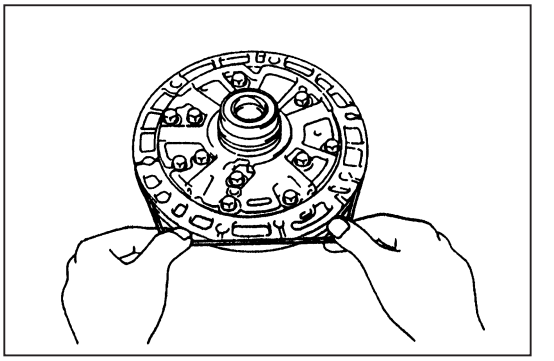


AT00183-00170

46. Remove the bearing race.

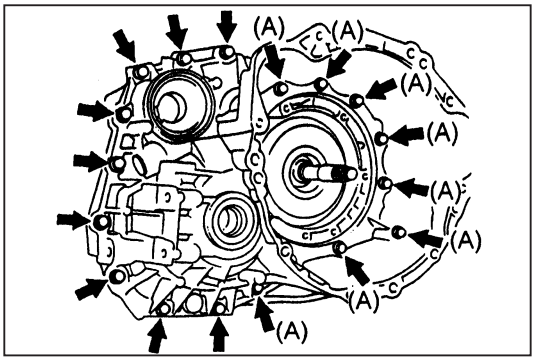

AT00184-00171

47. Remove the O-ring from the oil pump.



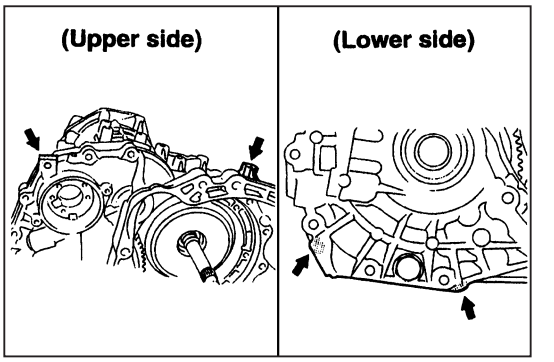
AT00185-00172

48. Remove the 18 bolts of the transaxle case.
    NOTE:
    - The bolts of the sections (A) indicated in the right figure are pre-coated. When reusing the bolt, be sure to completely clean and wash the threaded portion in advance.



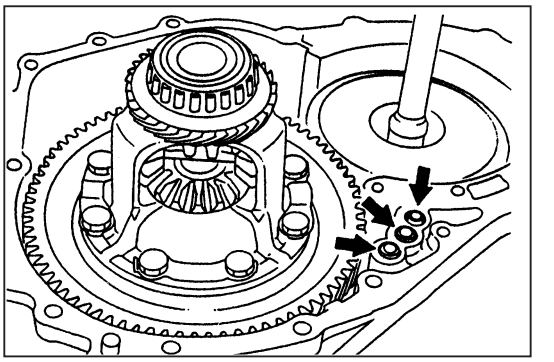
AT00186-00173

49. Remove the transaxle case by evenly tapping it at the four hub sections, using a standard plastic hammer.



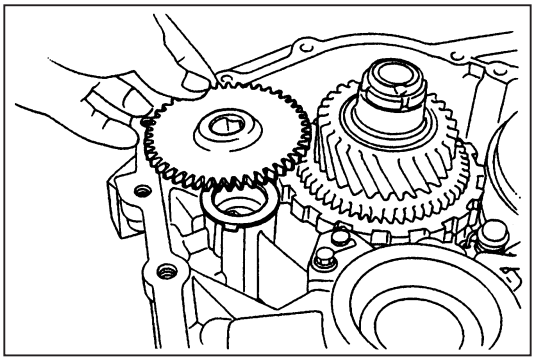
AT00187-00174

50. Remove the differential case assembly and the three gaskets.
    NOTE:
    - Never reuse the removed gasket.



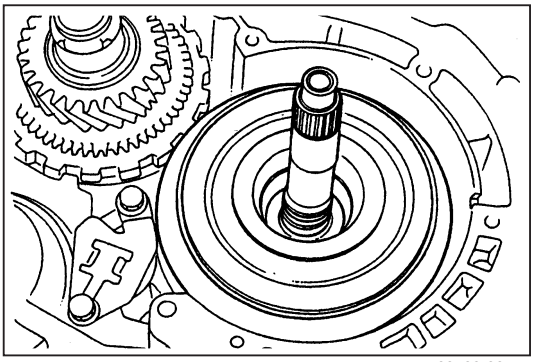
AT00188-00175

51. Remove the governor driven gear and thrust washer.



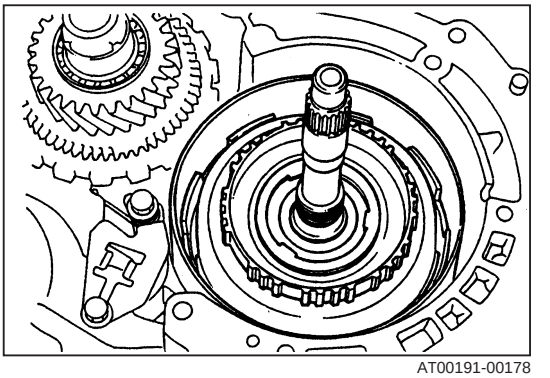
AT00189-00176

52. Remove the direct clutch.



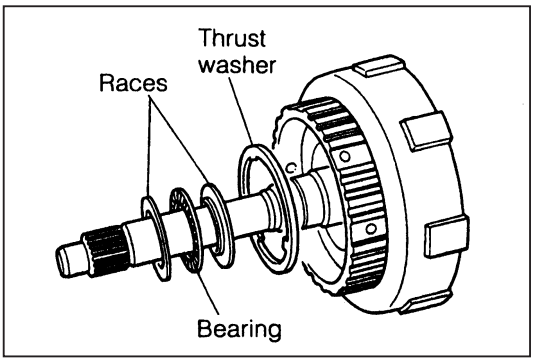
AT00190-00177

53. Remove the forward clutch.



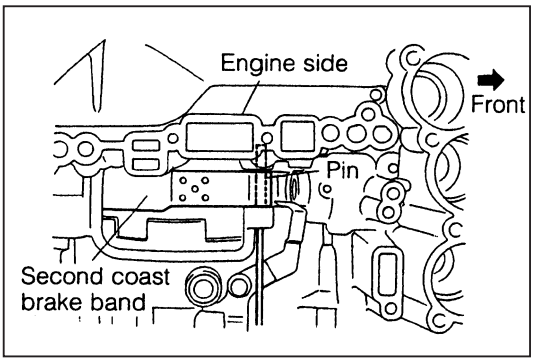
AT00191-00178

54. Remove the thrust washer, thrust needle bearing and races from the forward clutch.



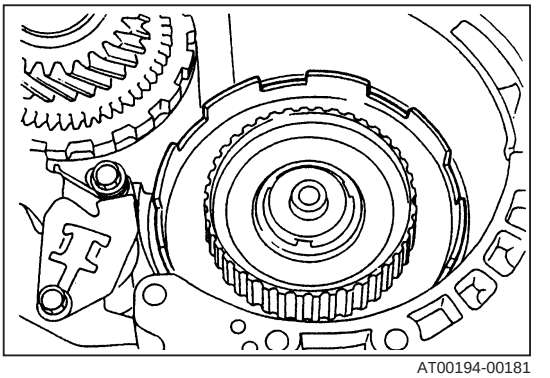
AT00192-00179

55. Removal of second coast brake band
    (1) Remove the pin through the bolt hole of the oil pump mounting by pushing it upward with a small driver or the like.
    (2) Remove the second coast brake band.



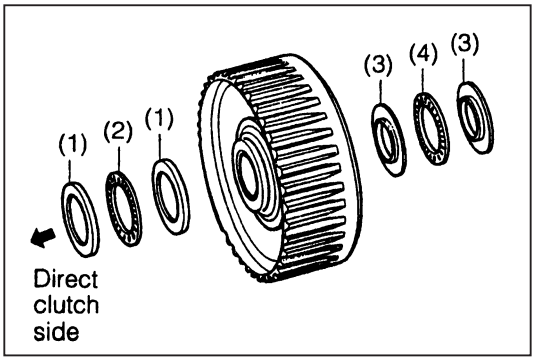
AT00193-00180

56. Remove the front planetary ring gear with the bearings and races installed.



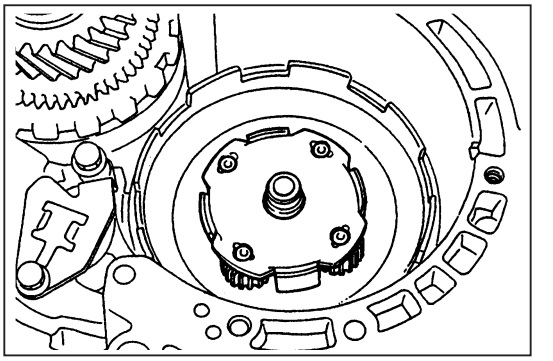
AT00194-00181

57. Remove the following parts from the front planetary ring gear.
    (1) Front inner bearing race
    (2) Thrust needle bearing
    (3) Rear outer bearing race
    (4) Thrust needle bearing

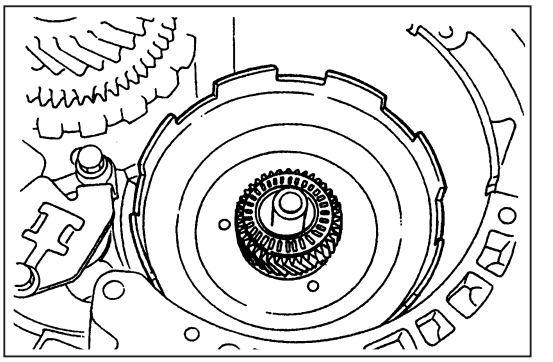


AT00195-00182

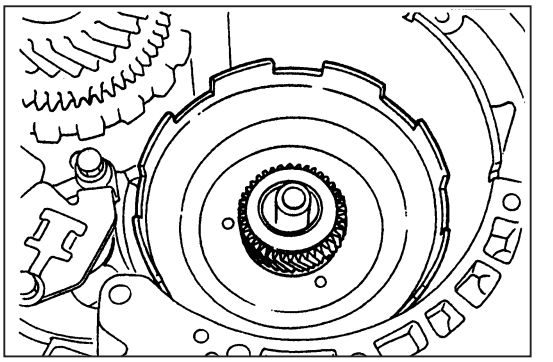
58. Remove the front planetary gear with the race and bearing.


AT00196-00183

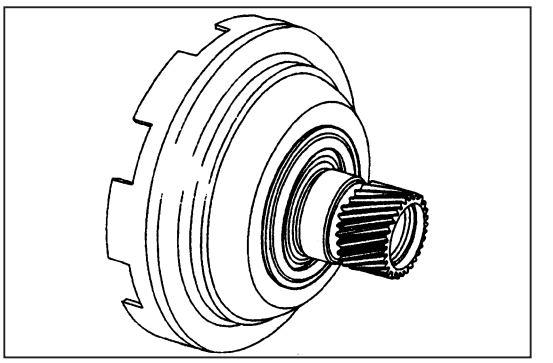
59. Remove the races and bearing from the front planetary gear.


AT00197-00184

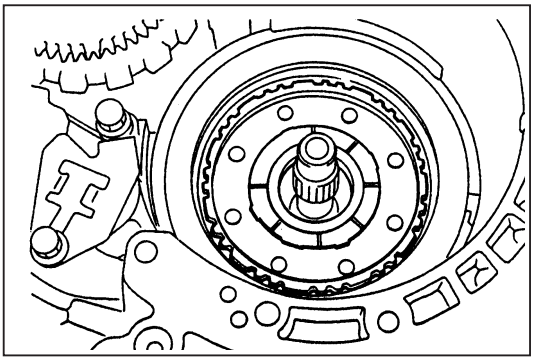
60. Remove the sun gear, sun gear input drum and thrust washer.


AT00198-00185

61. Remove the planetary carrier thrust No. 3 washer from the sun gear input drum.

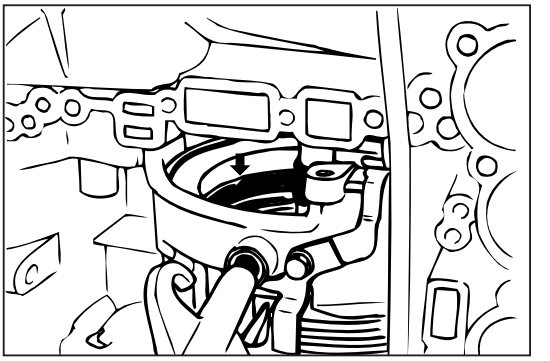

AT00199-00186

62. Remove the second brake hub and No. 1 one-way clutch.



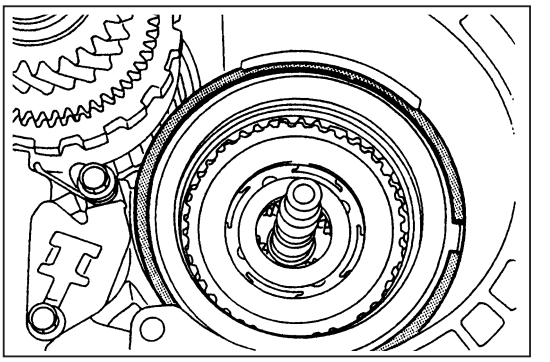
AT00200-00187

63. Inspection of second brake piston
When applying air (4 - 8 kgf/cm^2) into the oil hole indicated in the right figure, using an air gun, ensure that the piston slides smoothly in an arrow-headed direction. Also, make sure that the operating sound of the piston is emitted when the piston is sliding.



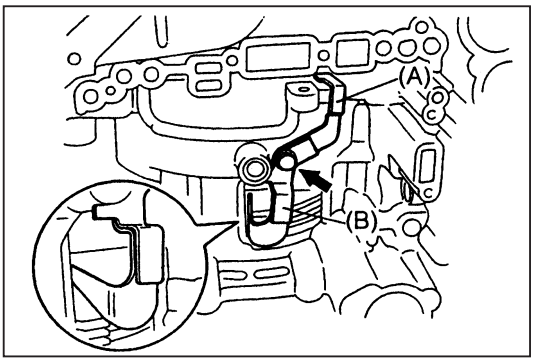
AT00201-00188

64. Remove the snap ring hole, using a standard flat screwdriver.



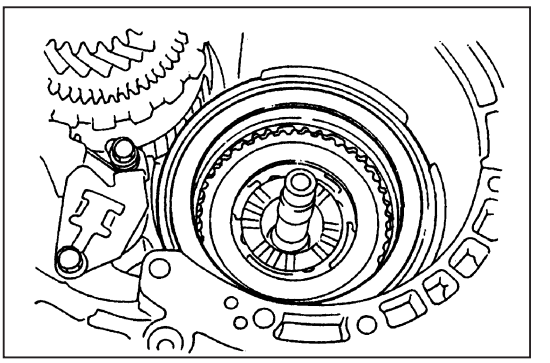
AT00202-00189

65. Remove the brake band guide plate retainer (B) and second coast brake band plate (A) by removing the bolt.



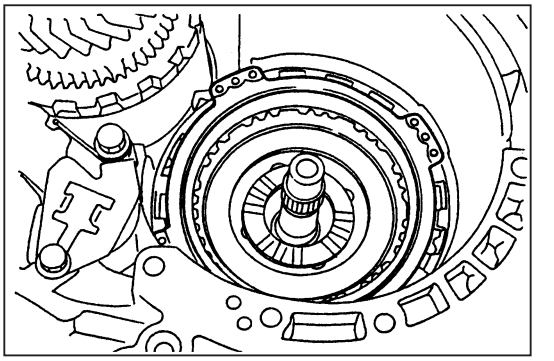
AT00203-00190

66. Remove the second brake cylinder with the piston.
NOTE:
- If any difficulty is encountered in removing the second brake cylinder, lightly tap it with a wooden block or the like.



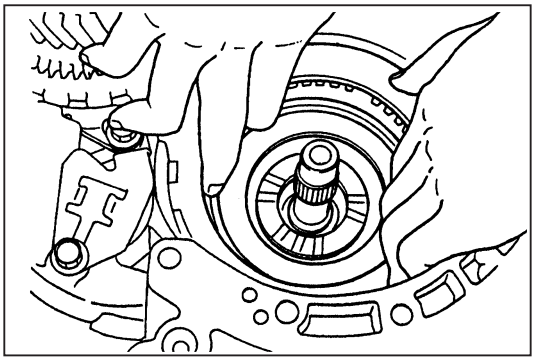
AT00204-00191

67. Remove the return spring.



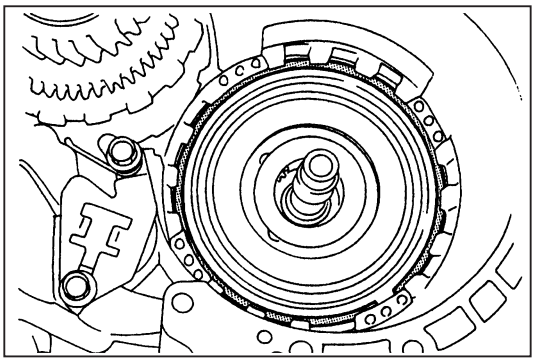
AT00205-00192

68. Remove the plates and discs in the following sequence.
    P = Clutch plate, D = Clutch disc
    F = Clutch flange
    D → P → D → P → D → P → F (inner)



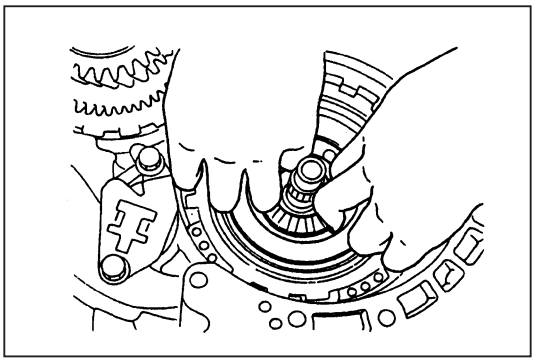
AT00206-00193

69. Remove the snap ring, using a standard flat driver.



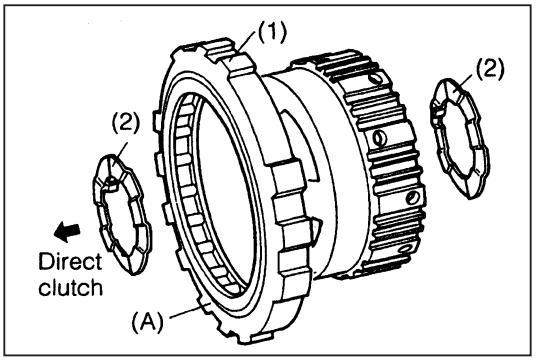
AT00207-00194

70. Remove the one-way clutch No. 2 with the rear planetary gear and thrust washers installed.



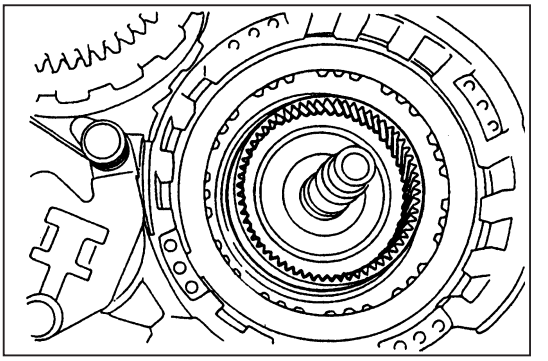
AT00208-00195

71. Remove the following parts from the rear planetary gear.
    (1) One-way clutch No. 2
    (2) Thrust washers (2 pieces)



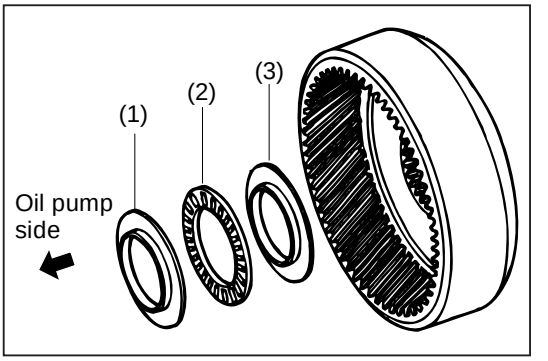
AT00209-00196

72. Remove the rear planetary ring gear with the thrust bearing and races installed.



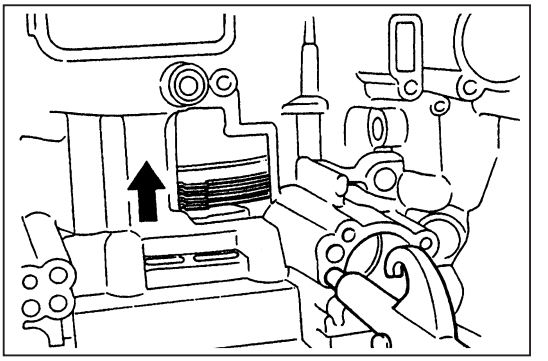
AT00210-00197

73. Remove the following parts from the rear planetary ring gear.
    (1) Front bearing thrust race
    (2) Thrust needle bearing
    (3) Rear bearing thrust race



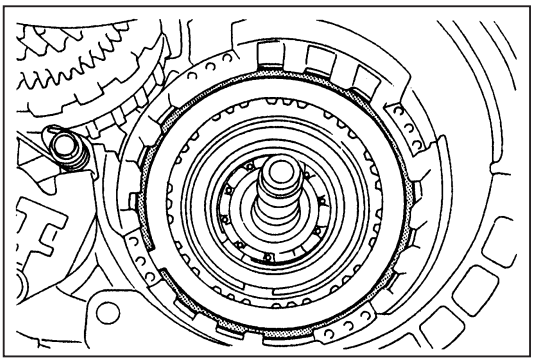
AT00211-00198

74. Inspection of first & reverse piston
    When applying air (4 - 8 kgf/cm^2) into the oil hole indicated in the right figure, using an air gun, ensure that the piston slides smoothly in an arrow-headed direction. Also, make sure that the operating sound of the piston is emitted when the piston is sliding.



AT00212-00199

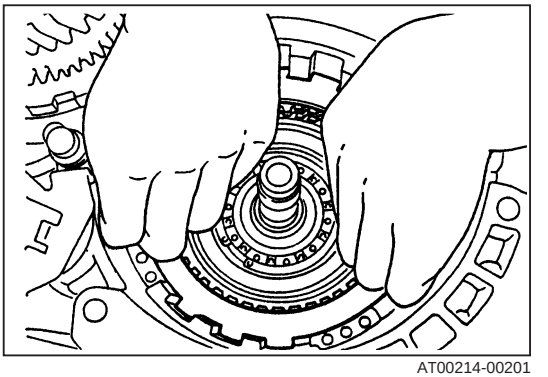
75. Remove the snap ring, using a standard flat driver.



AT00213-00200

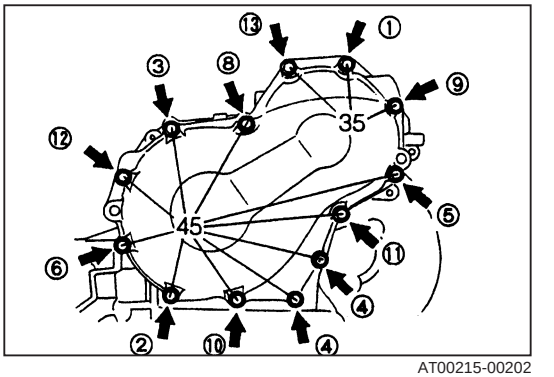
76. Remove the flange, discs and plates in the following sequence.
    F = Brake flange, D = Clutch disc
    P = Clutch plate
    F → D → P → D → P → D → P → D → P → D
    P → D → F (inner)

    NOTE:
    - Make sure to rotate the intermediate shaft smoothly before removing the parts.



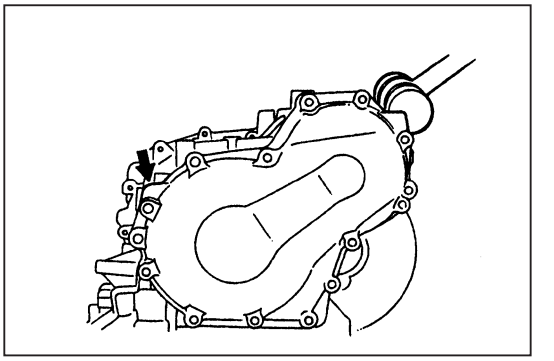
AT00214-00201

77. Remove the transaxle rear cover by removing the 13 bolts.
NOTE:
- Remove the bolts by loosening them evenly and diagonally.
- The right illustration shows an example of the removing sequence of the bolts.
- Never reuse the removed gasket.
- The numeral in the right illustration indicates the nominal length of the bolt.

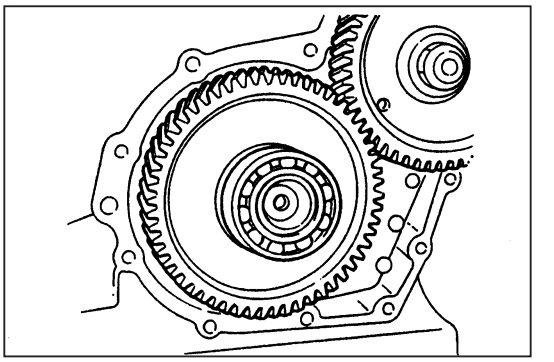


AT00215-00202

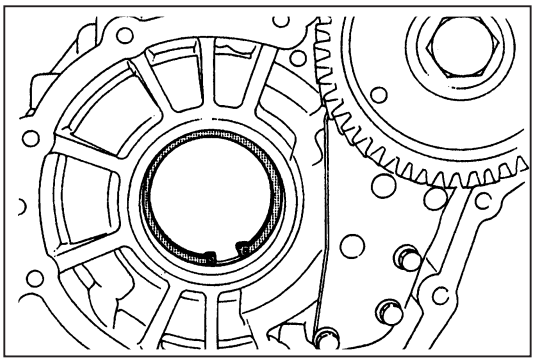
78. Lightly and uniformly tap the rib sections of the transaxle rear cover, using a standard plastic hammer.


AT00216-00203

79. Remove the intermediate shaft with the bearing installed from the transmission case.

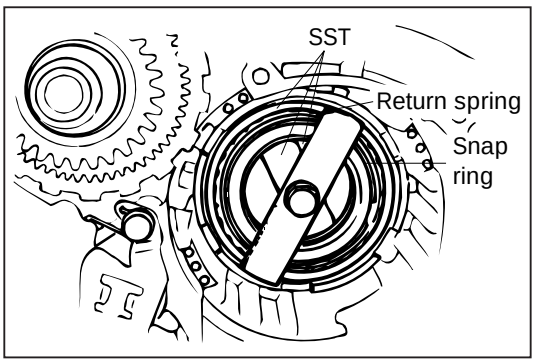

AT00217-00204

80. Remove the snap ring, using standard snap ring pliers.


AT00218-00205

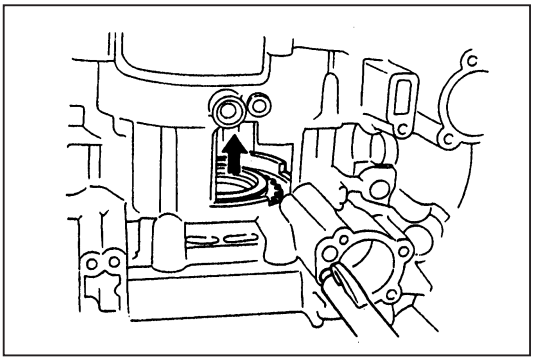
81. Remove the snap ring, using the following SST.
SST: 09350-32014-000 (09351-32040-000)

82. Remove the return spring.

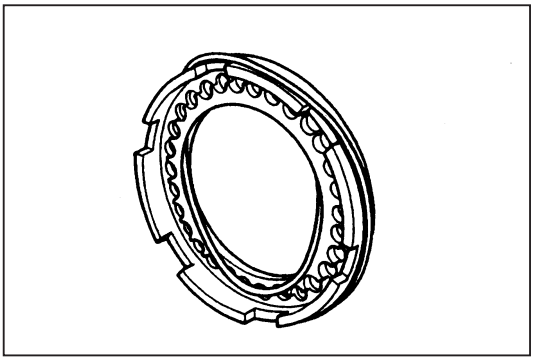


AT00219-00206

83. Remove the piston by applying compressed air (4 - 8 gf/cm^2) into the fluid passage of the case.
NOTE:
- If the piston will not pop out with the compressed air, it is recommended to use needle nose pliers for the removal.
- Be sure to wear protection goggles.

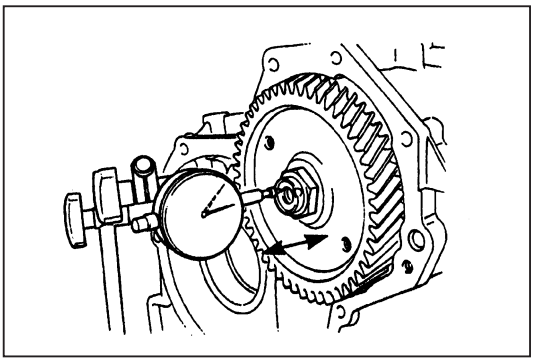

AT00220-00207

84. Remove the two O-rings from the piston.
NOTE:
- Never reuse the removed O-rings.

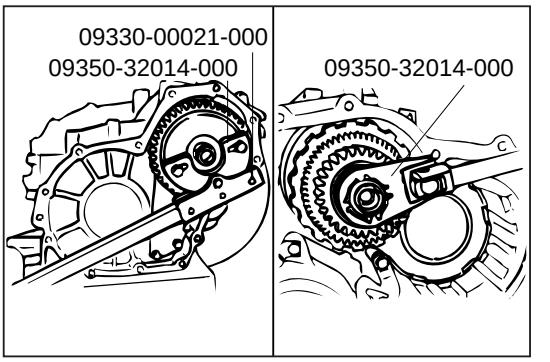

AT00221-00208

85. Measure the end play of the countershaft, using a standard dial gauge.
Specified Value: 0.20 - 0.90 mm

NOTE:
- If the end play of the countershaft exceeds the specified value above, be sure to record the actually measured value so that it may be referred to during the assembling.


AT00222-00209

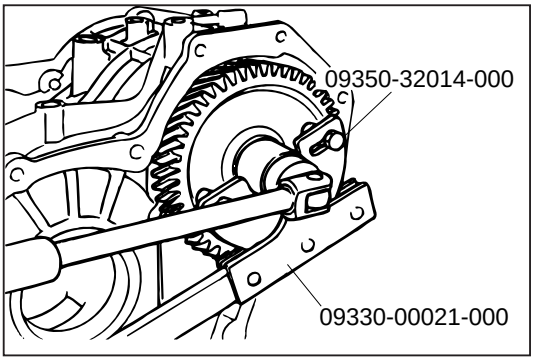
86. Release the staked state of the lock section of the lock nuts for countershaft on both sides, using a standard chisel and a hammer.
87. To hold the counter gear with the SSTs, 09350-32014 (09351-32170), remove the lock nut of the counter gear side.
NOTE:
- Never reuse the removed lock nut.



AT00223-00210

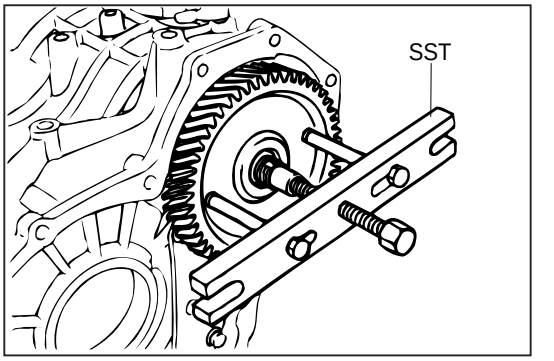
88. Remove the lock nut of the counter driven gear, using the following SSTs.
SSTs: 09350-32014-000 (09351-32032-000),
09330-00021-000

NOTE:
- Never reuse the removed lock nut.



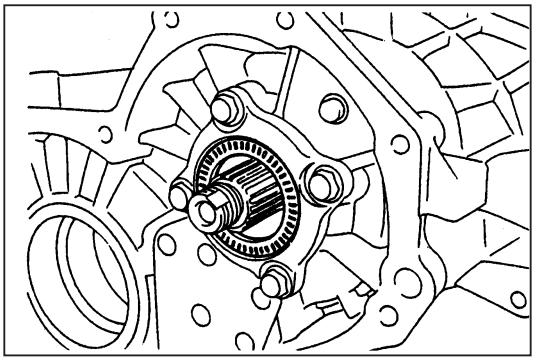
AT00224-00211

89. Remove the counter driven gear, using the following SST.
    SST: 09350-32014-000 (09351-32061-000)

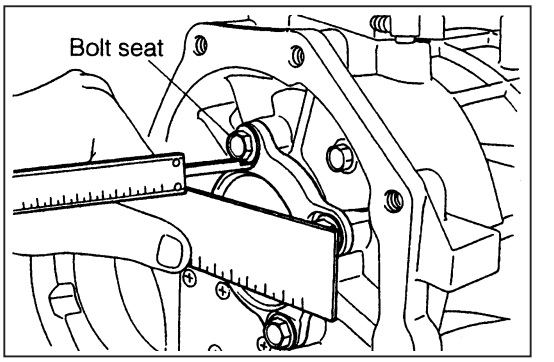


AT00225-00212

90. Remove the thrust needle roller bearing.

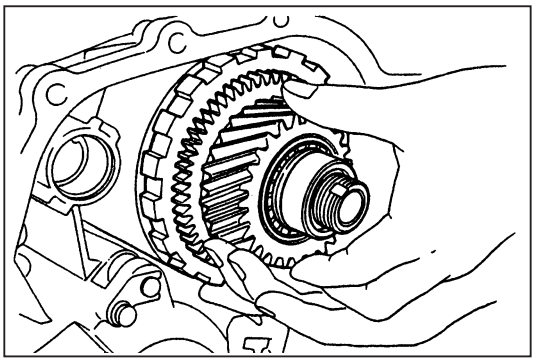

AT00226-00213

91. Measure the distance between the tip of the countershaft and the bolt seat of the clutch support.
    Specified Value: 33.3 - 35.5 mm

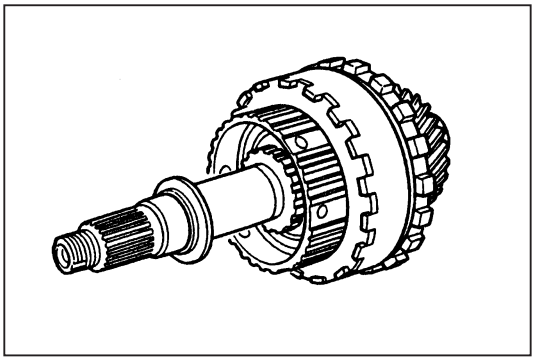


AT00227-00214

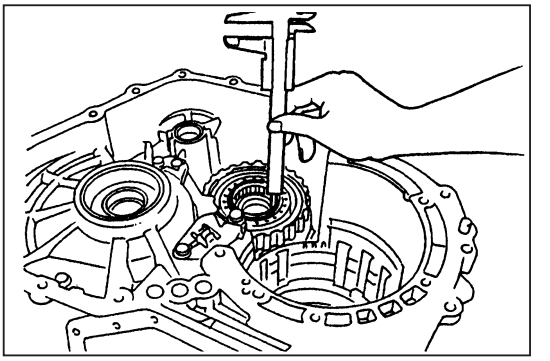
92. While holding the countershaft assembly with your hands, pull them out toward you.


AT00228-00215

93. Remove the thrust bearing with race from the countershaft assembly.

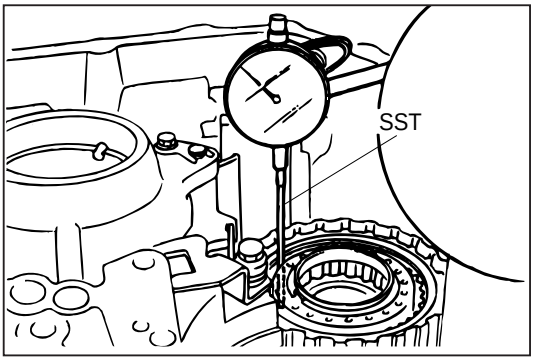

AT00229-00216

94. Measure the distance from the sleeve to the inner race, using vernier calipers.
    Specified Value: 17.3 - 18.2 mm


AT00230-00217

95. Measurement of underdrive clutch piston stroke
    (1) Set a dial gauge with a long type pickup or SST as shown in the right figure.
    SST: 09350-32014-000 (09351-32190-000)

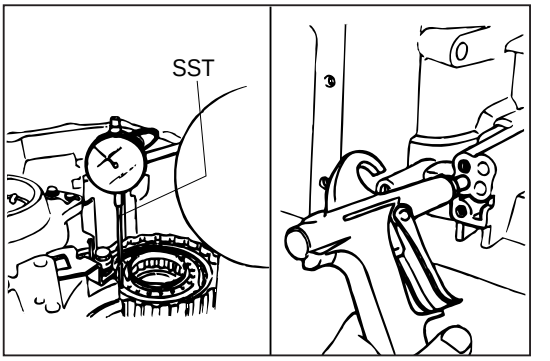
    NOTE:
    - Be sure to bring the SST or long type pickup into contact with the piston at right angles.



AT00231-00218

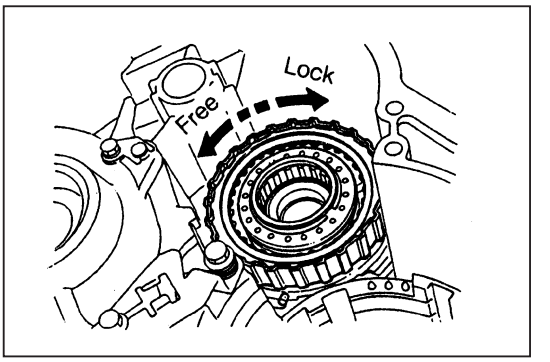
    (2) Measure the underdrive clutch piston stroke by applying compressed air (4 - 8 kgf/cm^2) through the oil hole of the case, as illustrated in the right figure.
    Specified Value: 1.50 - 1.86 mm

    NOTE:
    - If the piston stroke exceeds the specified value above, select the flange thickness.
    Flange Thickness: 2.04 mm, 2.40 mm



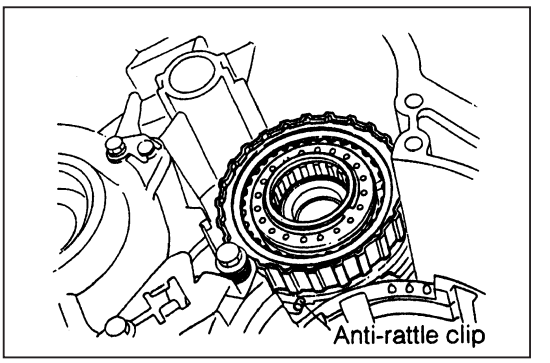
AT00232-00219

96. Inspection of underdrive clutch assembly
    Make sure that the underdrive clutch assembly turns freely counterclockwise and is locked when turned clockwise.



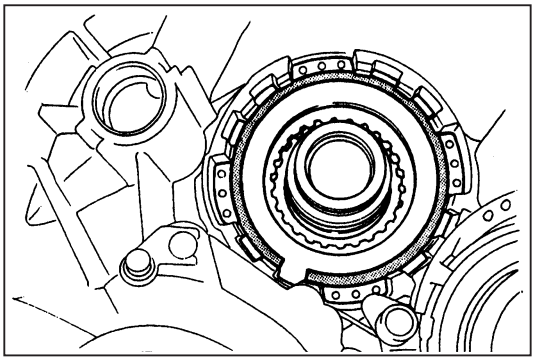
AT00233-00220

97. Remove the underdrive clutch drum with the anti-rattle clip.
    NOTE:
    - Before removing the underdrive clutch drum, mark the installation position of the anti-rattle clip at the case side in a readily identifiable color. This will be used as a reference during the installation.



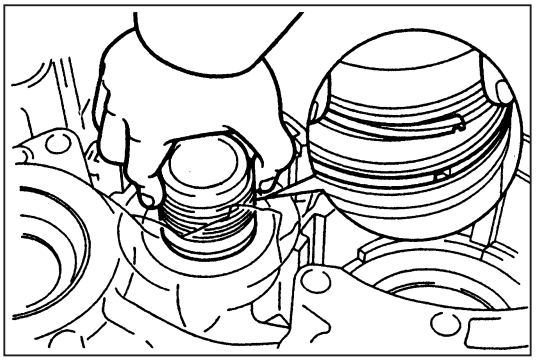
AT00234-00221

98. Remove the snap ring hole, using a standard flat driver.



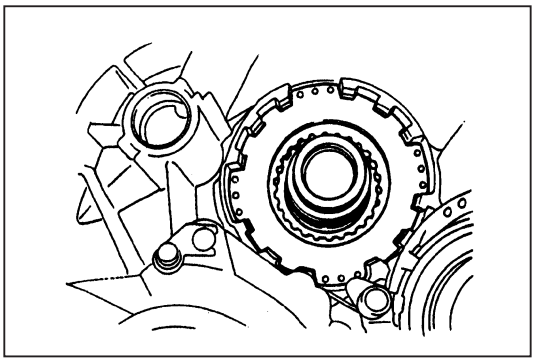
AT00235-00222

99. Remove the two oil seal rings.



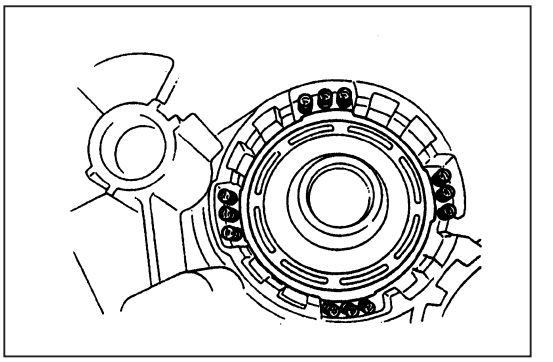
AT00236-00223

100. Remove the flange, plates and discs in the following sequence.
F = Clutch flange, P = Clutch plate, D = Clutch disc
F → D →P → D → P → D → P



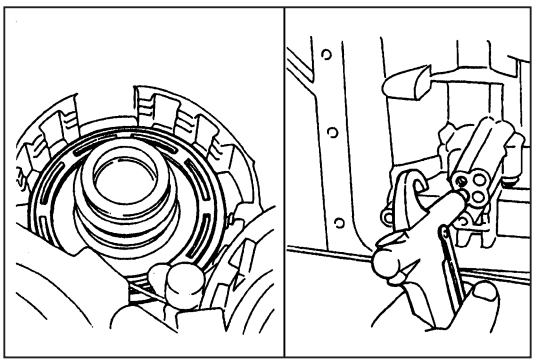
AT00237-00224

101. Remove the return spring.



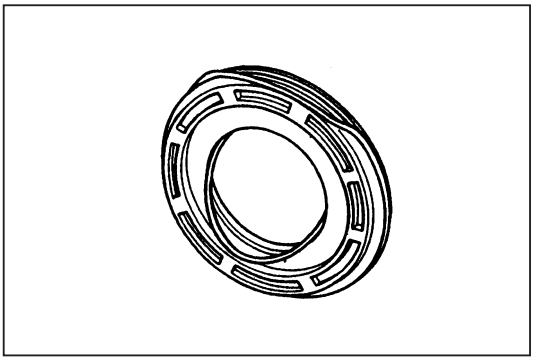
AT00238-00225

102. Remove the piston by applying the compressed air into the fluid passage of the case.
NOTE:
- If the piston will not pop out with low-pressure compressed air, it is recommended to use needle nose pliers for the removal.
- Be sure to wear protection goggles.



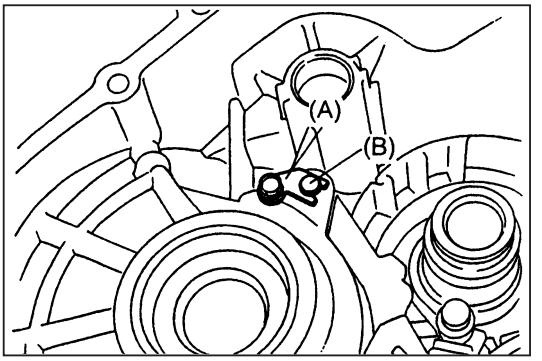
AT00239-00226

103. Remove the two O-rings from the piston.
NOTE:
- Never reuse the removed O-rings.



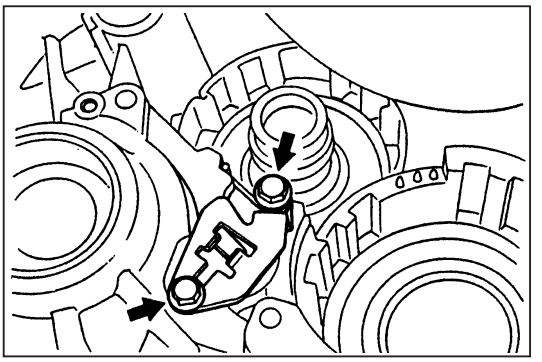
AT00240-00227

104. Remove the pawl shaft clamp (A) by removing a bolt.
105. Pull out the parking lock pawl shaft (B).



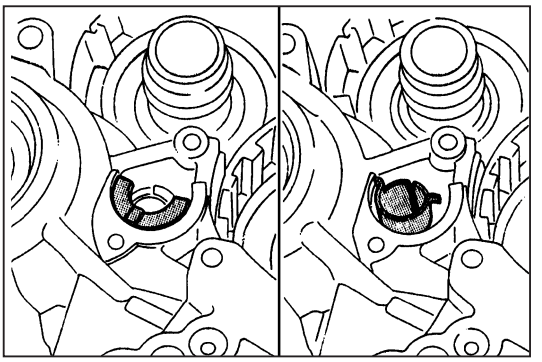
AT00241-00228

106. Remove the pawl stopper plate and lock pawl by removing the two bolts.
107. Remove the torsion spring and spring guide sleeve.



AT00242-00229

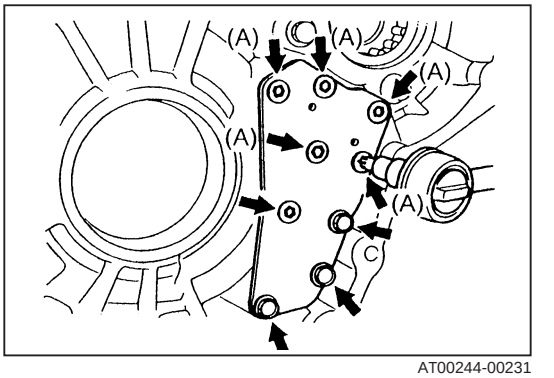
108. Remove the parking lock sleeve.
109. Remove the cam guide bracket.



AT00243-00230

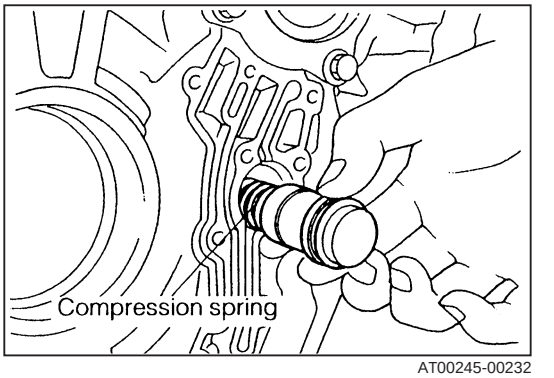
DISASSEMBLY OF CASE COVER

1. Remove the oil gallery cover with the gasket by removing the six Torx screws and three bolts.
   NOTE:
   - The threaded portions of the Torx screws are pre-coated. Therefore, be sure to wash and clean them thoroughly before reusing it.
   - Never reuse the removed gasket.



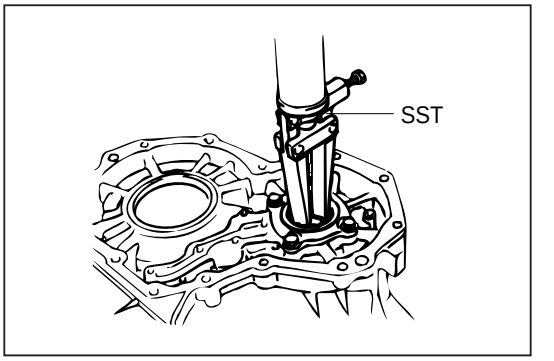
AT00244-00231

2. Remove the B4 accumulator piston and compression spring.



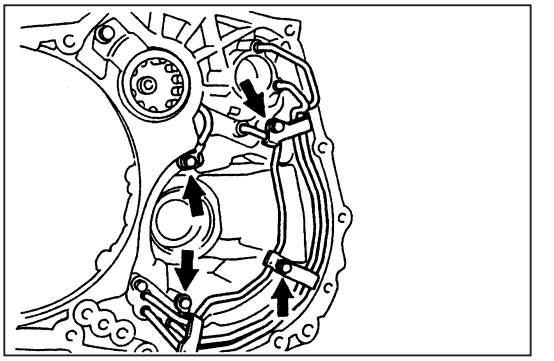
AT00245-00232

3. Remove the bearing, using the following SST.
   SST: 09308-00010-000

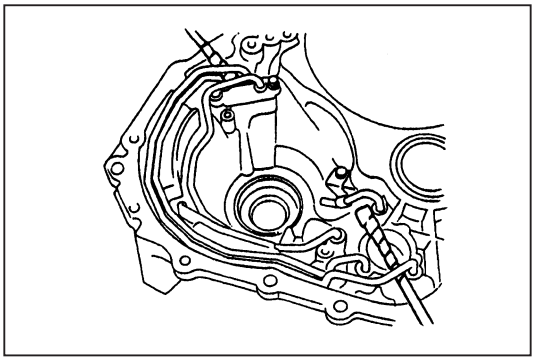


AT00246-00233

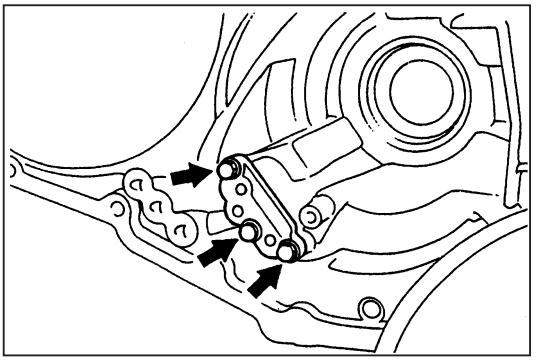
4. Remove the four tube clamps by removing the bolts on transaxle housing.


AT00247-00234

5. Remove the four oil tubes, using a standard flat screwdriver whose end is wound with tape.

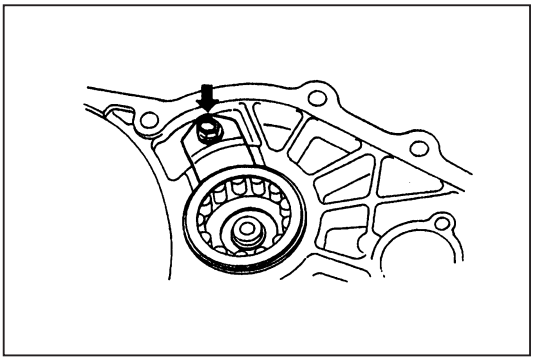

AT00248-00235

6. Remove the oil apply tube cover with gasket by removing the three bolts.



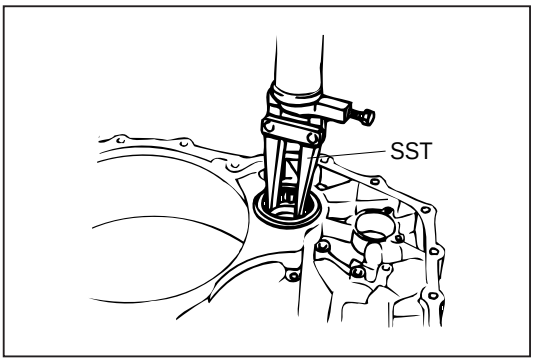
AT00249-00236

7. Remove the stopper by removing the bolt.



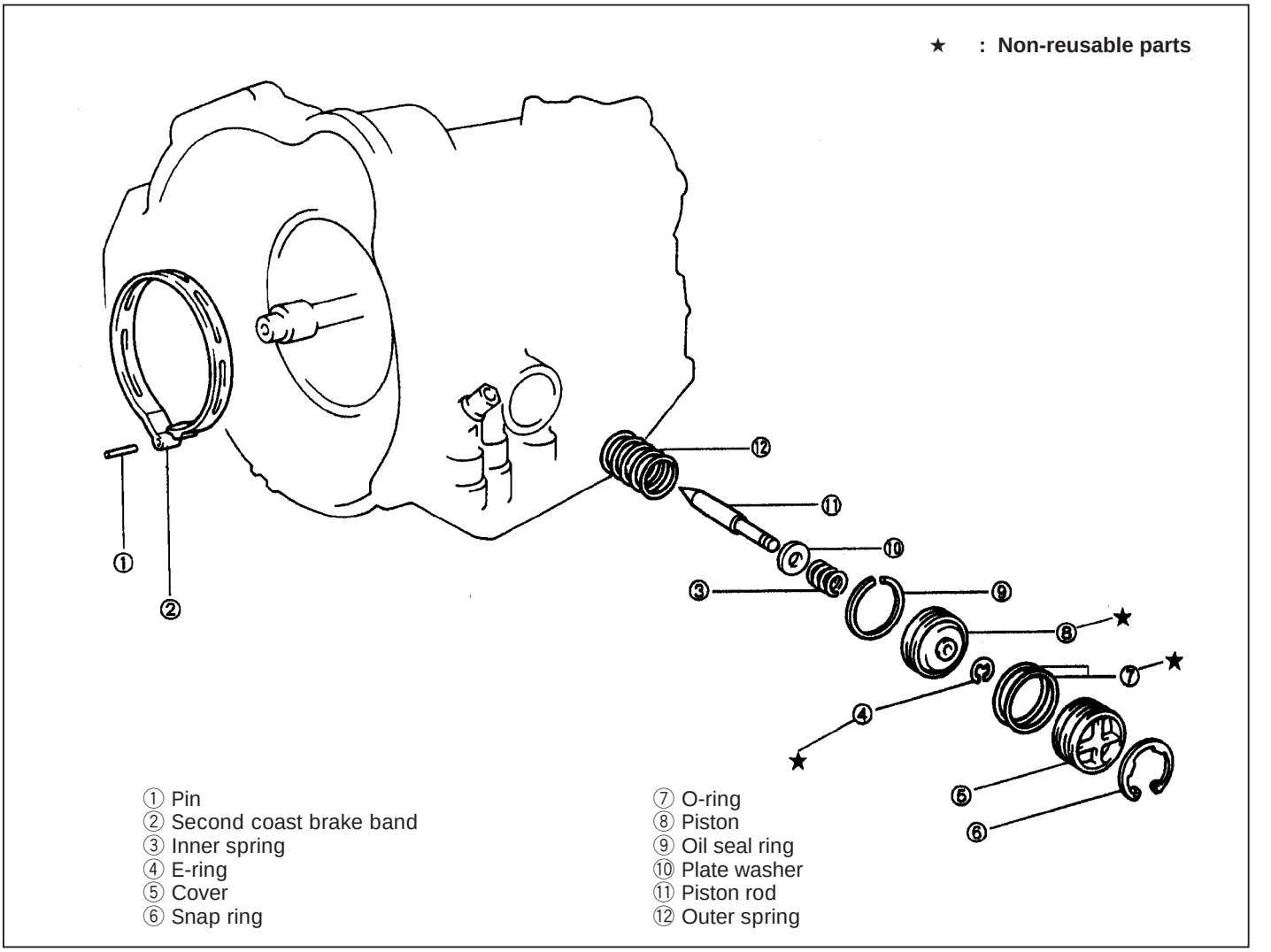
AT00250-00237

8. Remove the bearing, using the following SST.
   SST: 09308-00010-000



AT00251-00238

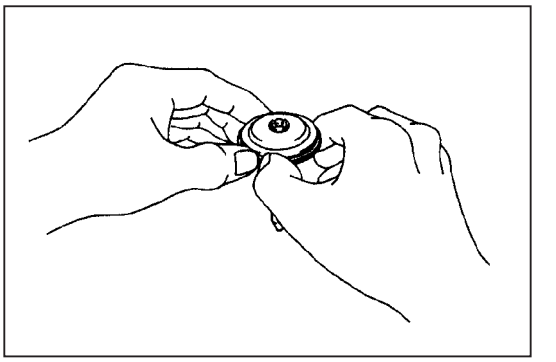
SECOND COAST BRAKE



AT00252-00239

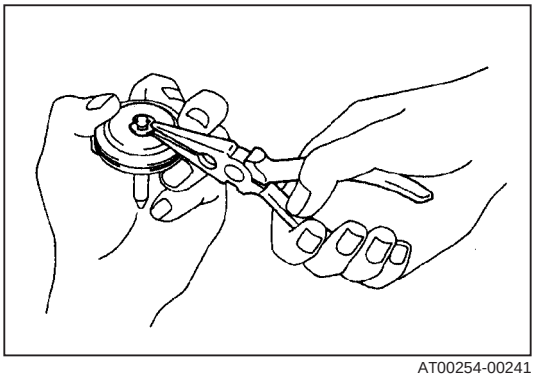
DISASSEMBLY OF SECOND COAST BRAKE PISTON

1. Removal of oil seal ring
   Remove the oil seal ring from the piston.



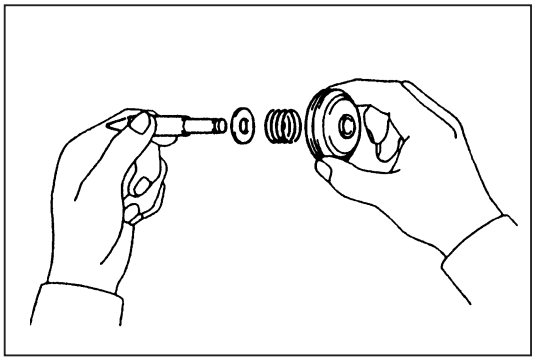
AT00253-00240

2. Removal of piston rod
   (a) Remove the E-ring while pushing the piston with needle-nose pliers.



AT00254-00241

(b) Remove the spring, washer and piston rod.

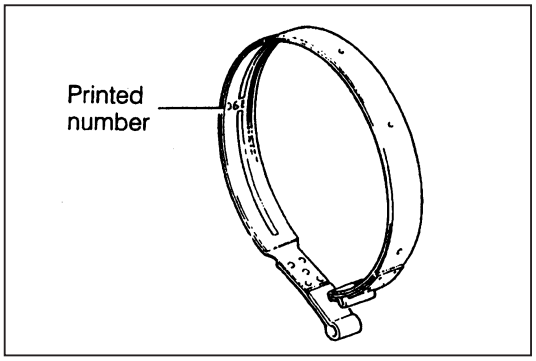


AT00255-00242

Inspection of second coast brake component

Inspection of brake band

If the lining of the brake band is exfoliated or discolored, or even a part of the printed numbers is defaced, replace the brake band.



AT00256-00243

Assembly of second coast brake piston

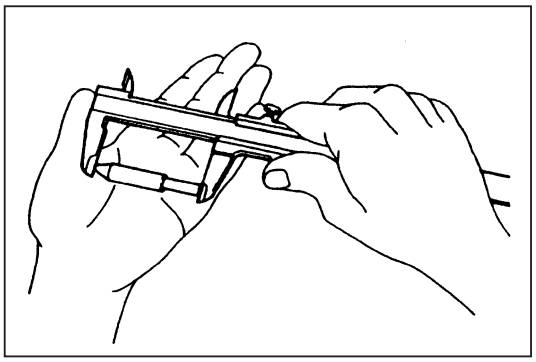
1. Selection of piston rod

   If the band is satisfactory, but the piston stroke is not within the specified value, select the piston rod.

   Piston Stroke: 1.5 - 3.0 mm

   The piston rod comes in two lengths.

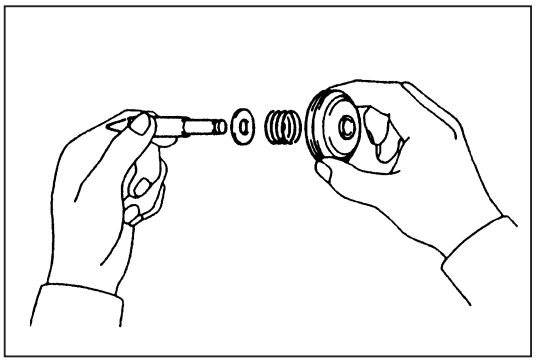
Piston Rod Length	Identification
72.9 mm	Groove is provided at cone section.
71.4 mm	No groove is provided at cone section.



AT00257-00244

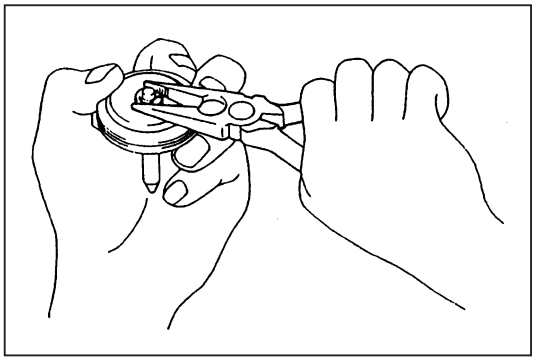
2. Assembly of piston rod

   (a) Install the washer and spring to the piston rod.



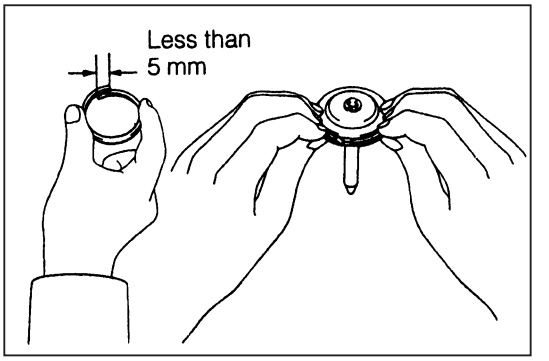
AT00258-00245

   (b) Install the new E-ring while pushing the piston.



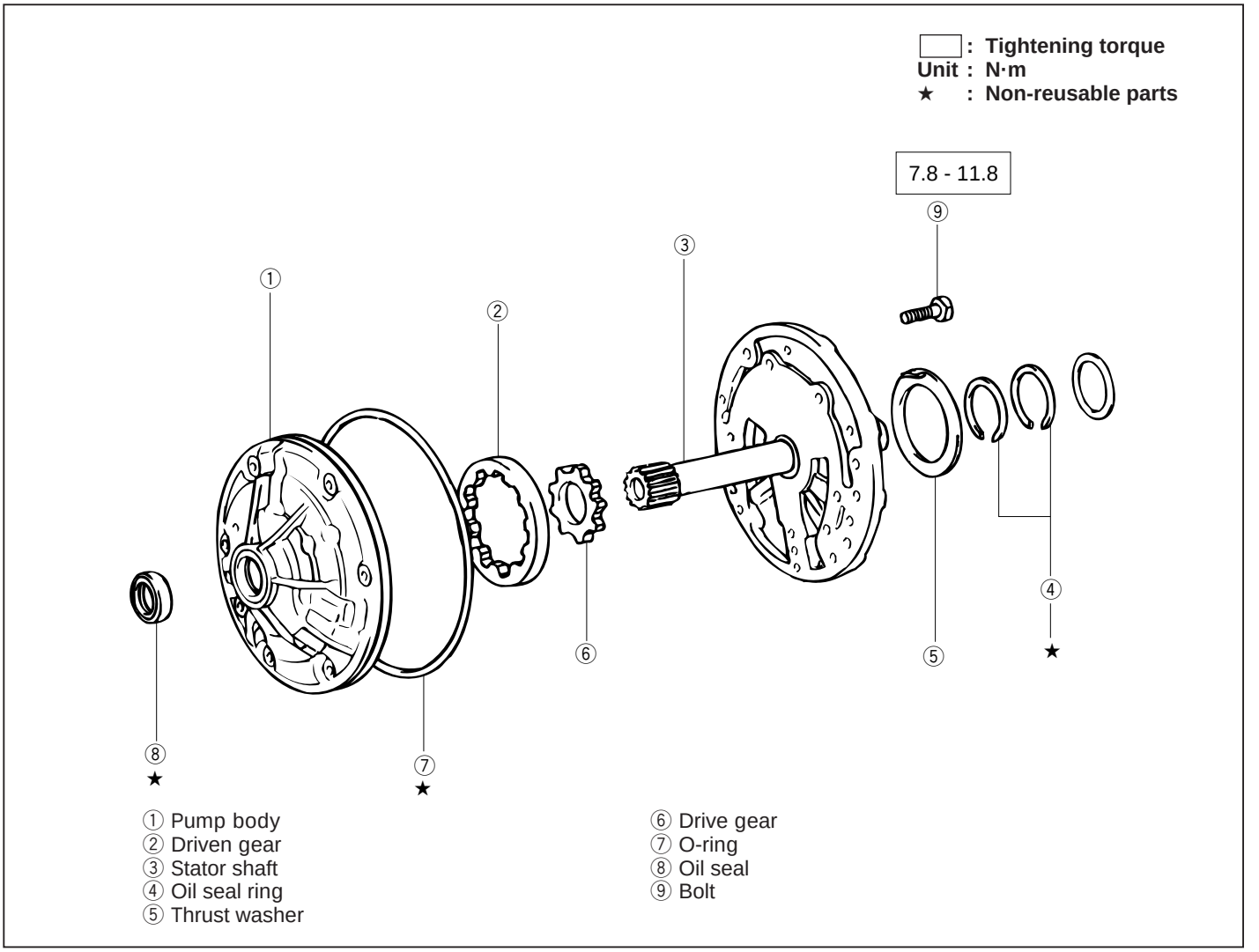
AT00259-00246

3. Installation of oil seal ring
   (a) Apply the ATF to the oil seal ring.
   (b) Install the oil seal ring to the piston.
   CAUTION:
   - Do not spread the ring ends unnecessarily.



AT00260-00247

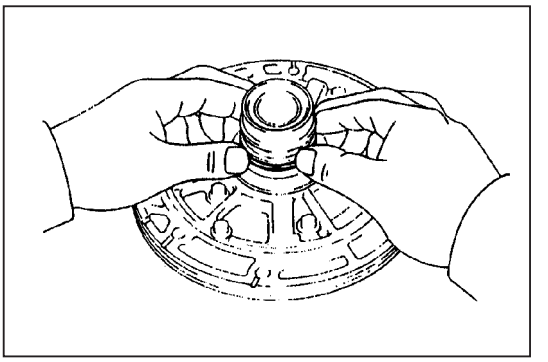
OIL PUMP



AT00261-00248

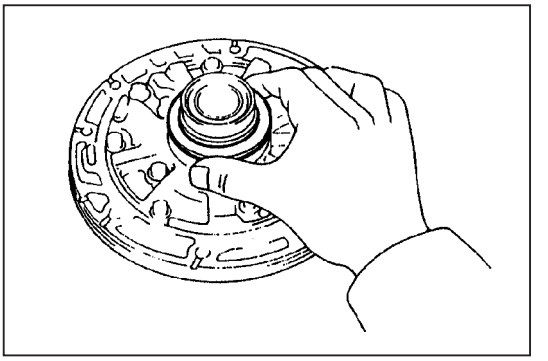
DISASSEMBLY OF OIL PUMP

1. Removal of oil seal rings
   Remove the two oil seal rings from the stator shaft back side.



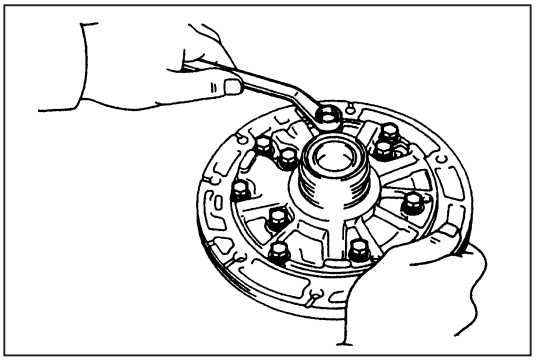
AT00262-00249

2. Remove the thrust washer from the stator shaft back side.

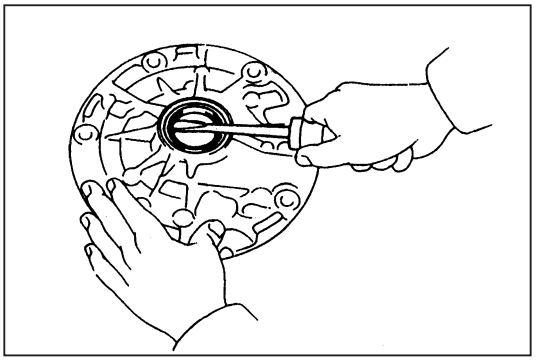


AT00263-00250

3. Removal of stator shaft
   Remove the 10 bolts and stator shaft.
   Keep the gears according to the assembly order.


AT00264-00251

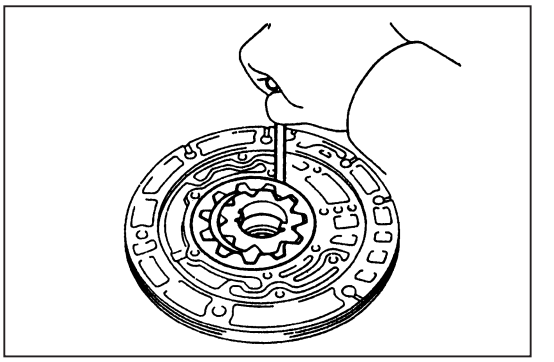
4. Removal of front oil seal
   Pry off the oil seal with a screwdriver.
   NOTE:
   - Never reuse the removed oil seal.


AT00265-00252

INSPECTION OF OIL PUMP

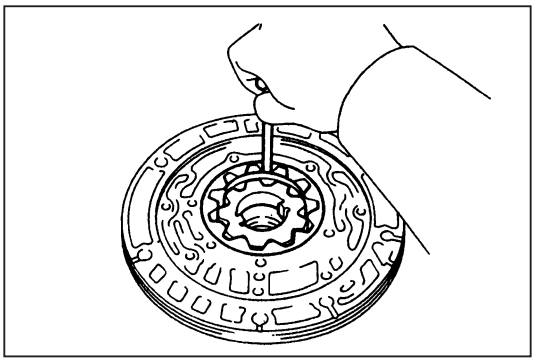
1. Check of body clearance of driven gear
   Push the driven gear to one side of the body. Measure the clearance, using a feeler gauge.
   Specified Body Clearance: 0.07 - 0.15 mm
   Maximum Body Clearance: 0.3 mm

   If the body clearance is greater than the maximum, replace the oil pump body subassembly.

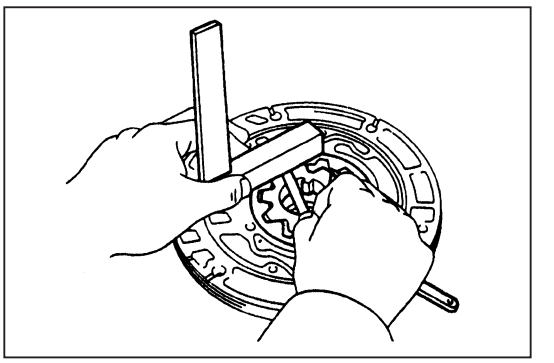

AT00266-00253

2. Check of tip clearance of driven gear
   Measure the clearance between the driven gear teeth and the crescent-shaped part of the pump body.
   Specified Tip Clearance: 0.11 - 0.14 mm
   Maximum Tip Clearance: 0.3 mm

   If the tip clearance is greater than the maximum, replace the oil pump body subassembly.


AT00267-00254

3. Check of side clearance of both gears
   Measure the side clearance of both gears, using a steel straightedge and a feeler gauge.
   Specified Side Clearance: 0.02 - 0.05 mm
   Maximum Side Clearance: 0.1 mm


AT00268-00255

The drive and driven gears come in three different thicknesses.

Drive and Driven Gear Thickness

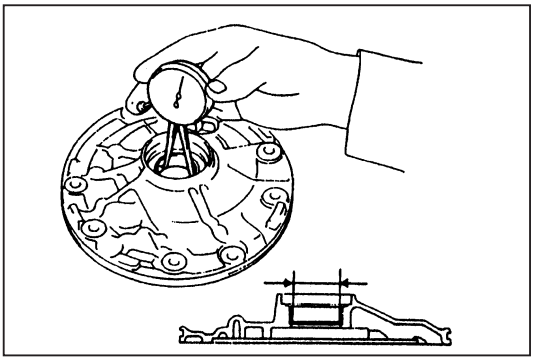
Mark	Thickness
A	9.440 - 9.456 mm
B	9.456 - 9.474 mm
C	9.474 - 9.490 mm

If the thickest gear can not make the side clearance within the specification, replace the oil pump body subassembly.

AT00269-00000

4. Check of oil pump body bush
   Measure the inside diameter of the oil pump body bush, using a dial indicator.
   Maximum Inside Diameter: 38.18 mm

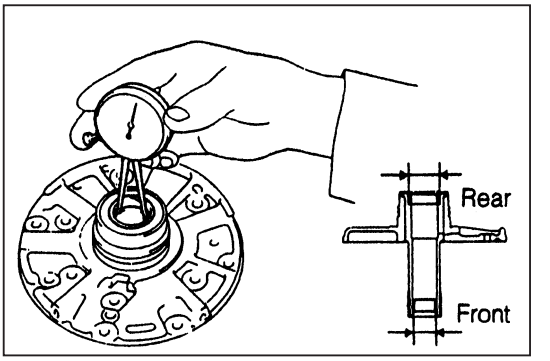
   If the inside diameter is greater than the maximum, replace the oil pump body subassembly.



AT00270-00256

5. Check of stator shaft bush
   Measure the inside diameter of the stator shaft bush, using a dial indicator.
   Maximum Inside Diameter:
   Front side: 21.57 mm
   Rear side: 27.07 mm

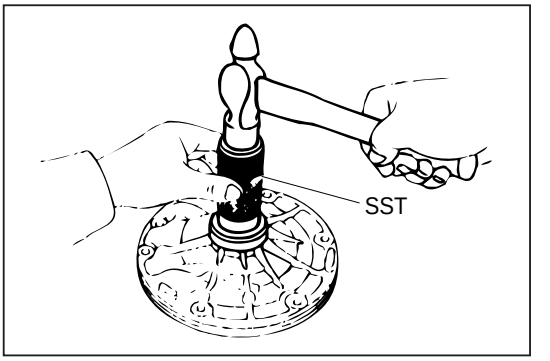
   If the inside diameter is greater than the maximum, replace the stator shaft.



AT00271-00257

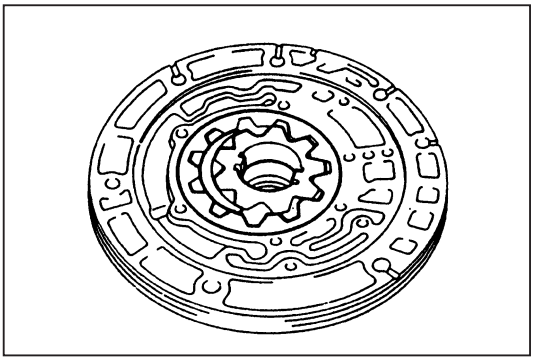
ASSEMBLY OF OIL PUMP

1. Installation of front oil seal
   Install a new oil seal, using the following SST in combination with a hammer. The seal end should be flush with the outer edge of the pump body.
   SST: 09350-32014-000 (09351-32140-000)



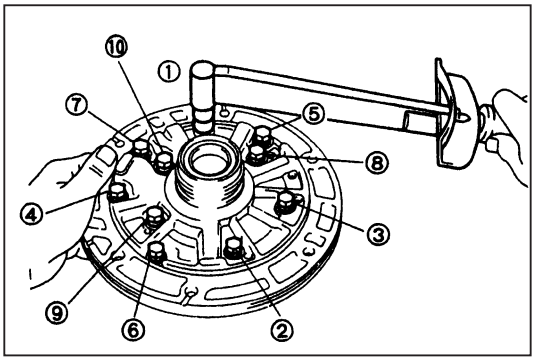
AT00272-00258

2. Install the driven gear and drive gear.
   Make sure that the top of the gears are facing upward.



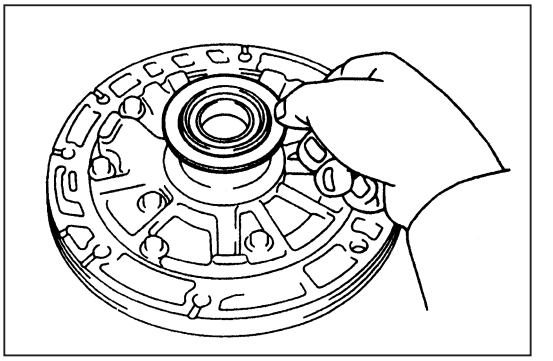
AT00273-00259

3. Installation of stator shaft to pump body
   (a) Align the stator shaft with each bolt hole.
   (b) Tighten the 10 bolts.
   NOTE:
   - Be sure to tighten the bolts alternately and uniformly. (The right figure indicates a typical example of the tightening sequence.)
     Tightening Torque: 7.8 - 11.8 N·m



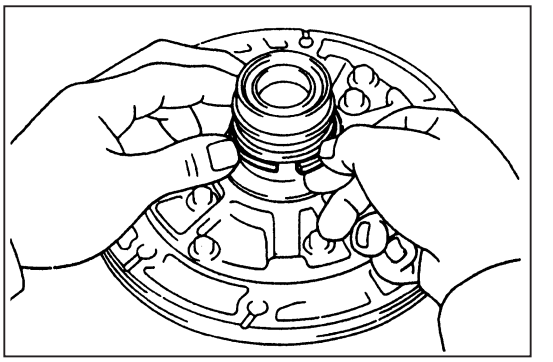
AT00274-00260

4. Installation of thrust washer
   (a) Coat the thrust washer with petroleum jelly.
   (b) Align the tab of the washer with the hollow of the pump body.

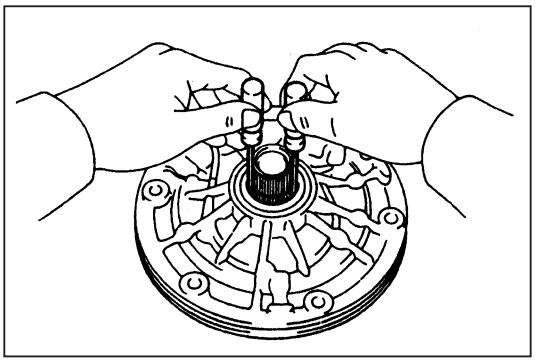

AT00275-00261

5. Installation of oil seal rings
   Install the two oil seal rings to the stator shaft back side.
   CAUTION:
   - Do not spread the ring ends excessively.

   NOTE:
   - After installing the oil seal rings, check that they move smoothly.

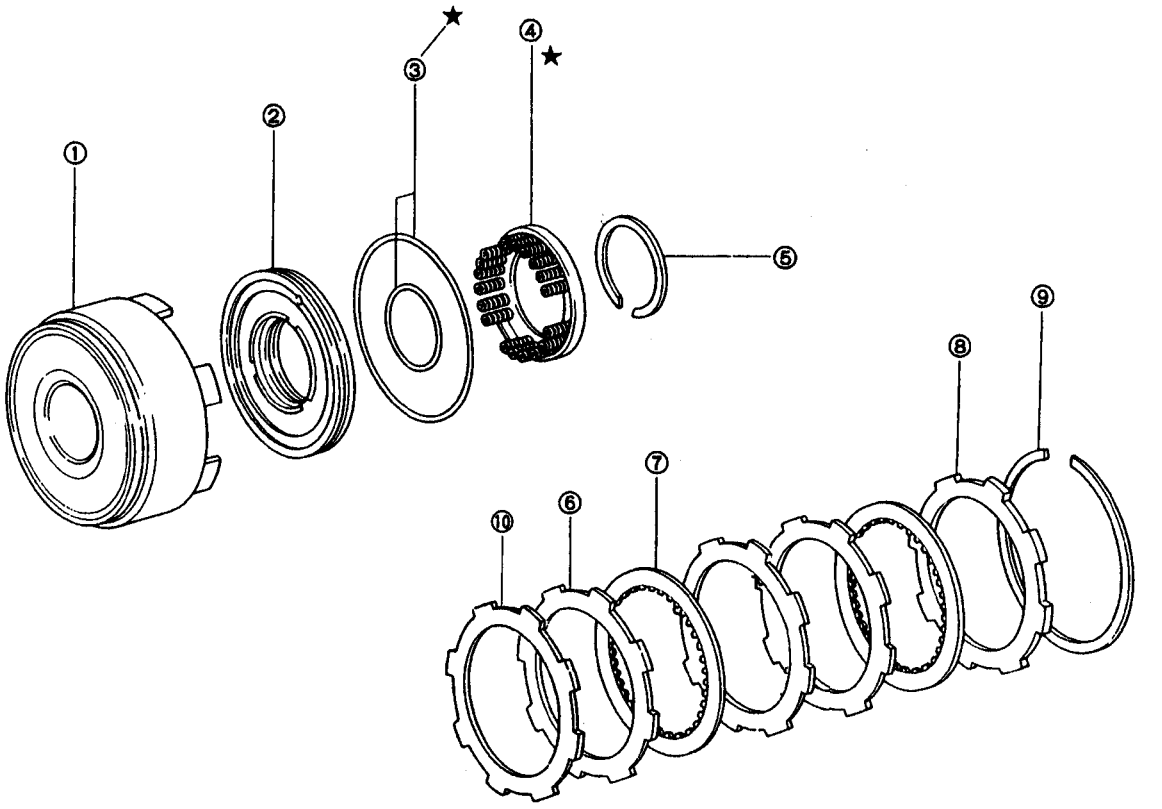

AT00276-00262

6. Check of pump drive gear rotation
   Turn the drive gear with two screwdrivers and make sure it rotates smoothly.
   CAUTION:
   - Be very careful not to damage the oil seal lip.


AT00277-00263

DIRECT CLUTCH

★ : Non-reusable parts

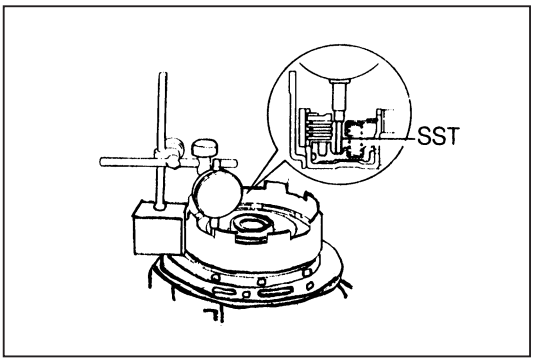


① Clutch drum
② Piston
③ O-ring
④ Piston return spring
⑤ Snap ring
⑥ Plate
⑦ Disc
⑧ Flange
⑨ Snap ring
⑩ Cushion plate

AT00278-00264

DISASSEMBLY OF DIRECT CLUTCH

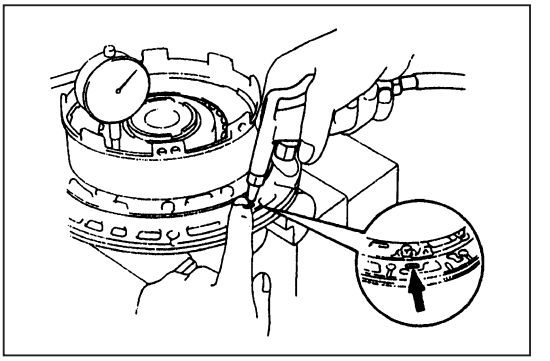
1. Check of piston stroke of direct clutch
   (a) Install the direct clutch on the oil pump.
   (b) Measure the direct clutch piston stroke while applying and releasing the compressed air (4 - 8 kg/cm²) as shown in the right figure. For this operation, use a dial indicator (long type pickup or the following SST).
   SST: 09350-32014-000 (09351-32190-000)



AT00279-00265

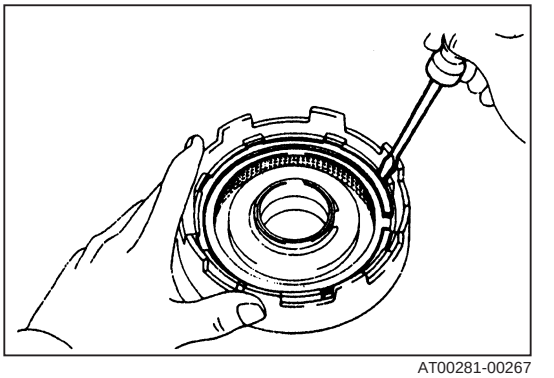
Piston Stroke: 1.37 - 1.70 mm

If the piston stroke is greater than the maximum, inspect each component.



AT00280-00266

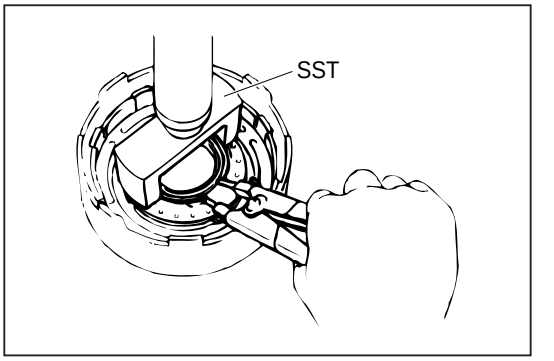
2. Remove the snap ring from the clutch drum.
3. Remove the flange, discs and plates.



AT00281-00267

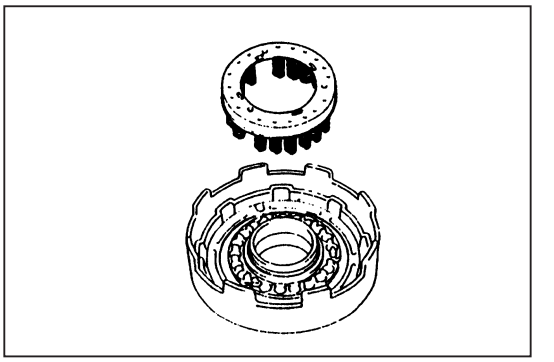
4. Removal of piston return spring
   (a) Place the following SST on the spring retainer and compress the springs with a shop press.
   SST: 09350-32014-000 (09351-32070-000)

   (b) Remove the snap ring with the snap ring pliers.



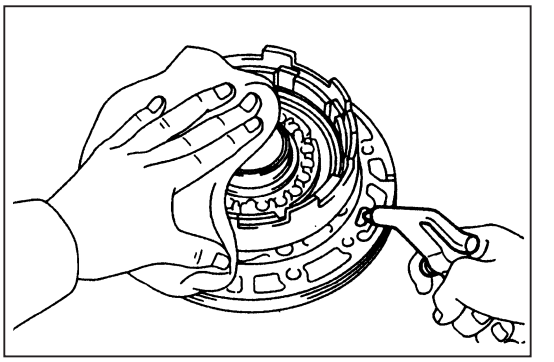
AT00282-00268

   (c) Remove the piston return spring.



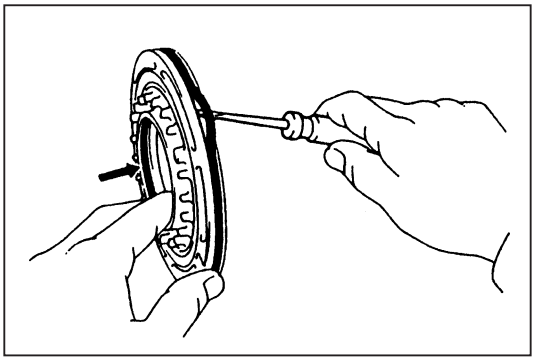
AT00283-00269

5. Removal of clutch piston
   (a) Install the direct clutch onto the oil pump.
   (b) Apply compressed air to the oil pump to remove the piston. (If the piston will not come out completely, use needle-nose pliers to removed it.)
   (c) Remove the direct clutch from the oil pump.



AT00284-00270

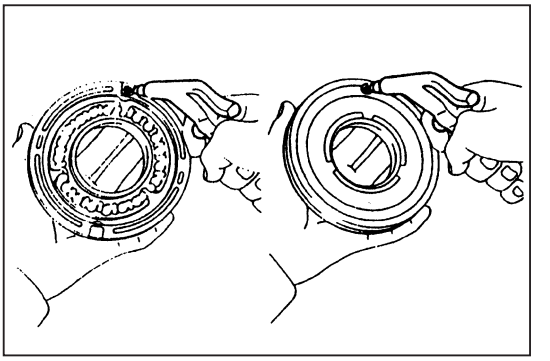
   (d) Remove the two O-rings from the piston.
   NOTE:
   - Never reuse the removed O-rings.



AT00285-00271

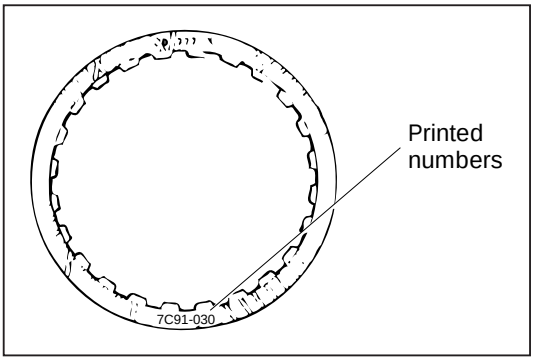
INSPECTION OF DIRECT CLUTCH

1. Inspection of clutch piston
   (a) Check that the check ball is free by shaking the piston.
   (b) Check that the valve exhibits no leakage by applying low-pressure compressed air.



AT00286-00272

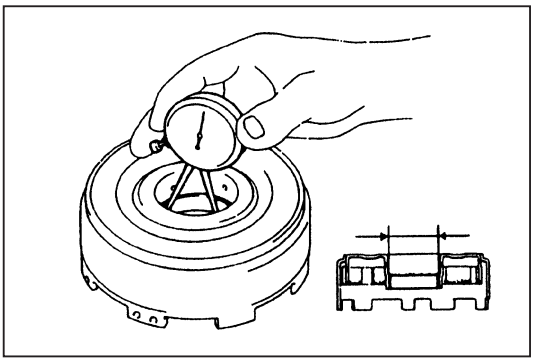
2. Inspection of discs, plates and flange
   Check that the sliding surfaces of the discs, plates and flange are not worn or burnt. If necessary, replace them.
   NOTE:
   - If the lining of the disc is exfoliated or discolored, or even a part of the printed numbers is defaced, replace all discs.
   - Before assembling new discs, soak them in the ATF for at least two hours.



AT00287-00273

3. Check of direct clutch bush
   Measure the inside diameter of the direct clutch bush, using a dial indicator.
   Maximum Inside Diameter: 47.07 mm

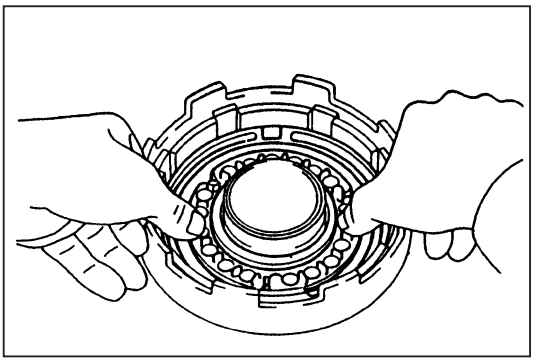
   If the inside diameter is greater than the maximum, replace the direct clutch.



AT00288-00274

ASSEMBLY OF DIRECT CLUTCH

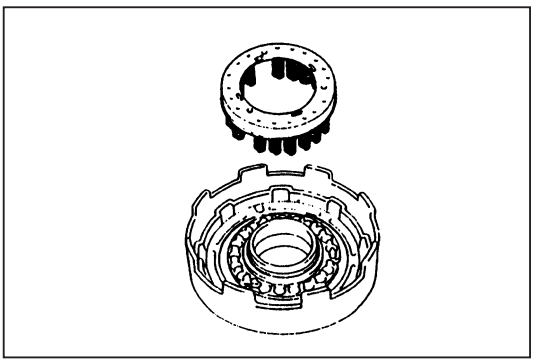
1. Installation of clutch piston in direct clutch drum
   (a) Install new O-rings to the piston. Coat the O-rings with the ATF.
   (b) Being careful not to damage the O-rings, press the piston into the drum with the cup side up.



AT00289-00275

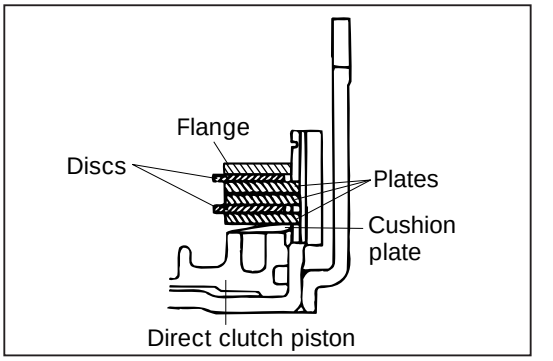
2. Installation of piston return spring
   (a) Place the return spring and snap ring onto the piston.
   (b) Place the following SST on the spring retainer, and compress the return spring with a shop press.
   SST: 09350-32014-000 (09351-32070-000)

   (c) Install the snap ring with the snap ring pliers. Be sure the end gap of snap ring is not aligned with the spring retainer claw.



AT00290-00276

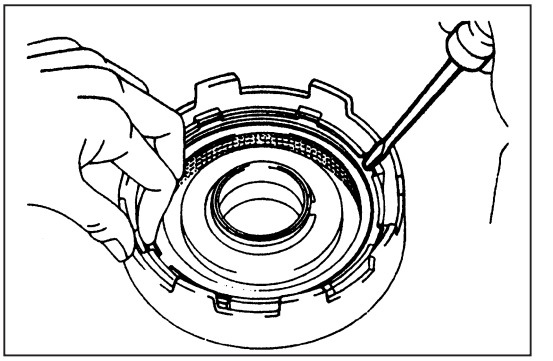
3. Installation of plates, discs and flange
   (a) Install the plates and discs in the following order.
   (b) Install the flange while facing the flat end downward.
   Install in order: Cushion plate—Plate—Disc—Plate—Plate—Disc—Flange



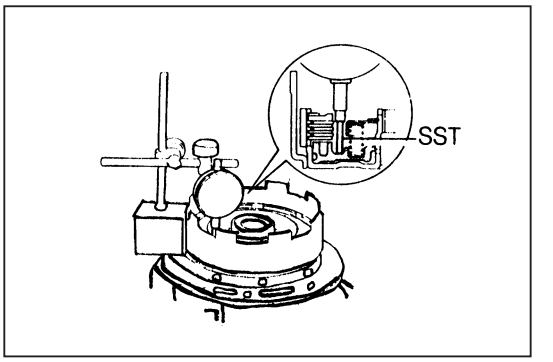
AT00291-00277

NOTE:
- A paint daub is marked on one of protrusions of the cushion plate. Install the cushion plate in such a direction that the side having this paint daub may face toward the direct clutch piston side.

4. Install the snap ring.
   Check that the end gap of the snap ring is not aligned with one of cutout sections.

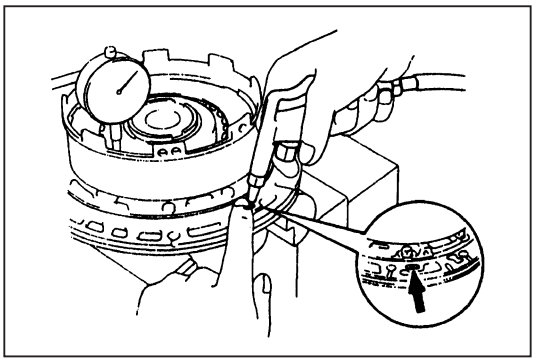

AT00292-00278

5. Recheck of piston stroke of direct clutch
   (a) Install the direct clutch on the oil pump.
   (b) Measure the direct clutch piston stroke while applying and releasing the compressed air (4 - 8 kg/cm^2) as shown in the right figure. For this operation, use a dial indicator (long type pickup or the following SST given below).
   SST: 09350-32014-000 (09351-32190-000)
   Piston Stroke: 1.37 - 1.70 mm

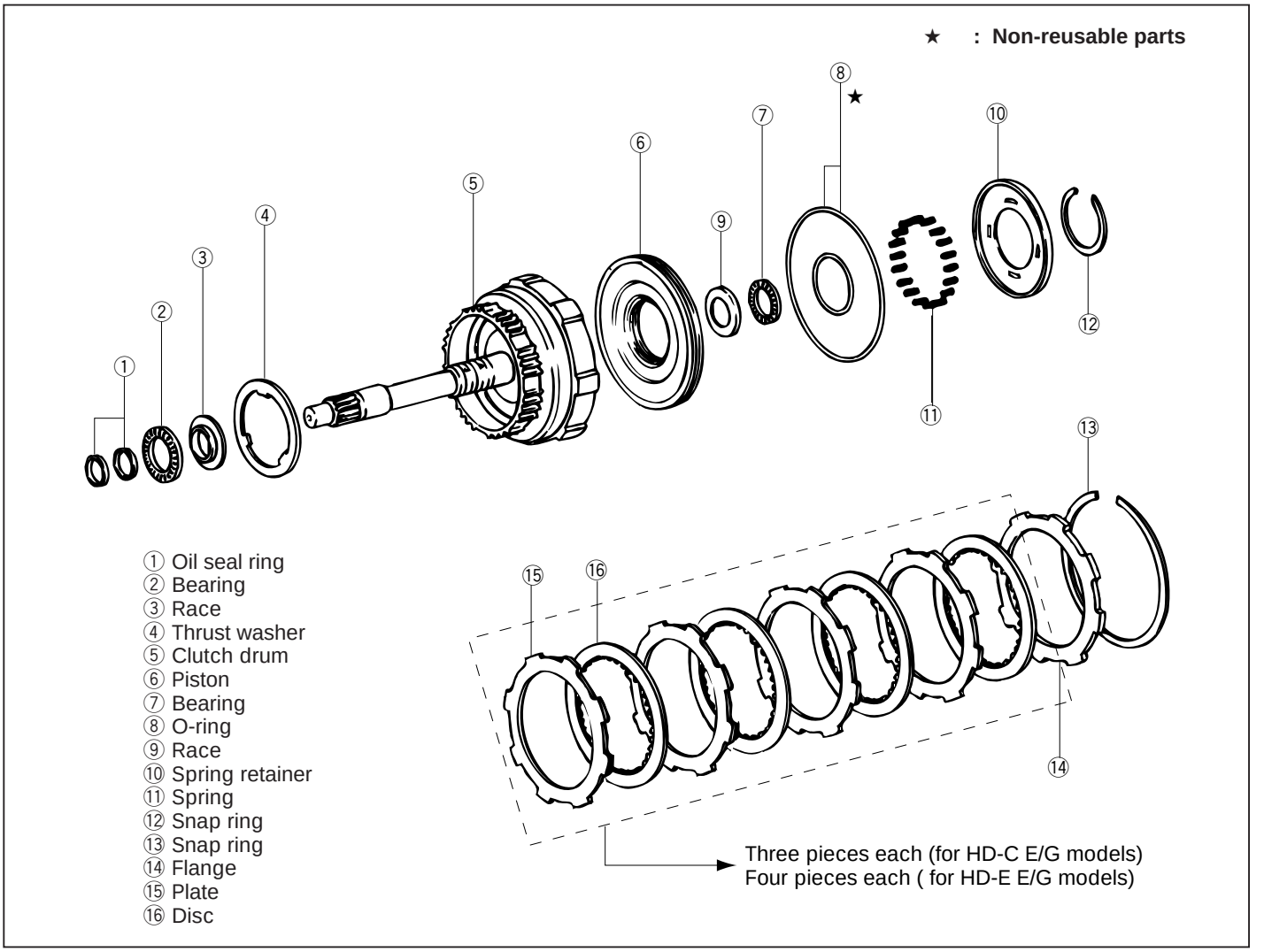


AT00293-00279

   If the piston stroke is not within the specification, select another flange (3.00 mm, 3.37 mm).


AT00294-00280

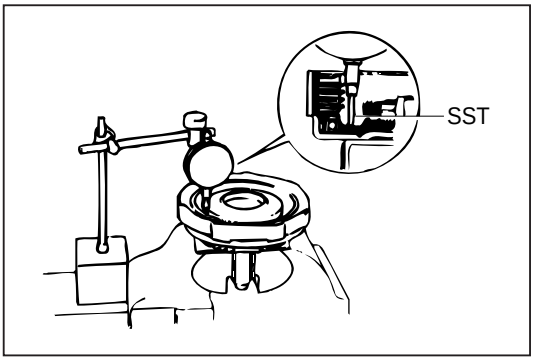
FORWARD CLUTCH



AT00295-00281

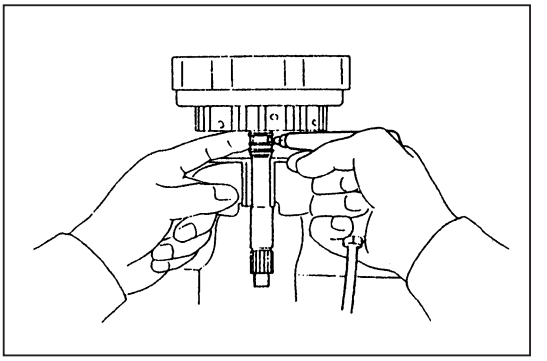
Disassembly of forward clutch

1. Check of piston stroke of forward clutch
   Measure the forward clutch piston stroke while applying and releasing the compressed air 392 - 784 kPa (4 - 8 kg/cm^2) as shown in the right figure illustration. For this operation, use a dial indicator (long type pickup or the following SST).
   SST: 09350-32014-000 (09351-32190-000)
   Piston Stroke: 1.11 - 1.47 mm



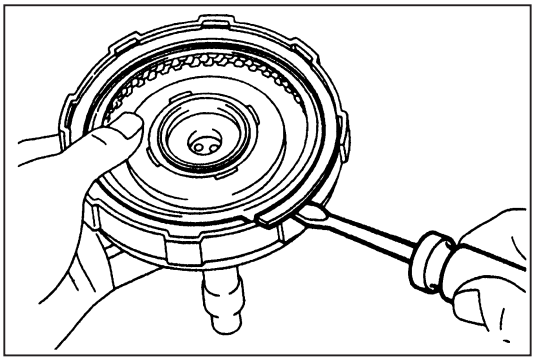
AT00296-00282

If the piston stroke is greater than the maximum, inspect each component.



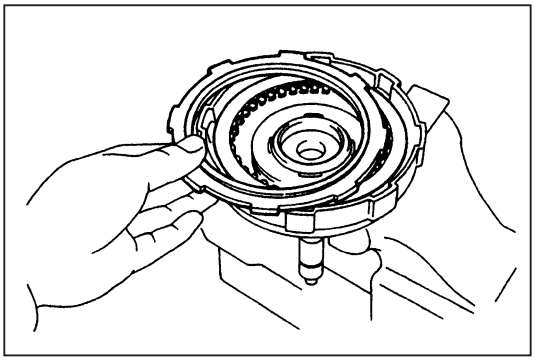
AT00297-00283

2. Remove the snap ring from the clutch drum.



AT00298-00284

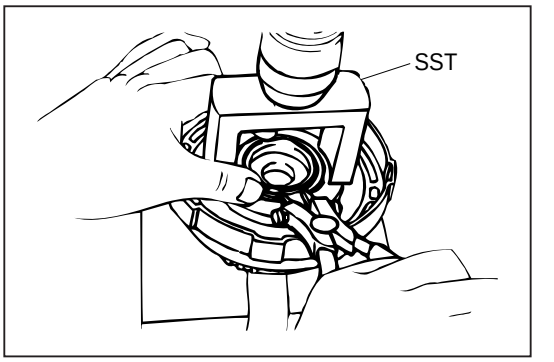
3. Remove the flange, discs and plates.



AT00299-00285

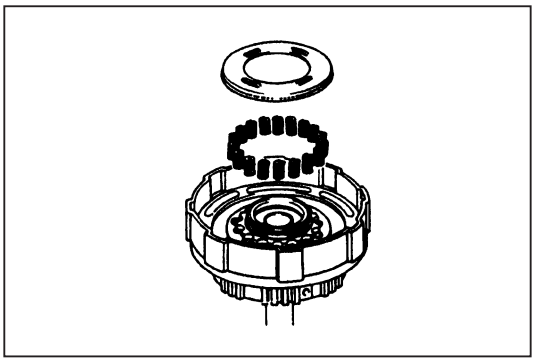
4. Removal of return springs
   (a) Place the following SST on the spring retainer and compress the springs with a shop press.
   SST: 09350-32014-000 (09351-32070-000)

   (b) Remove the snap ring with the snap ring pliers.



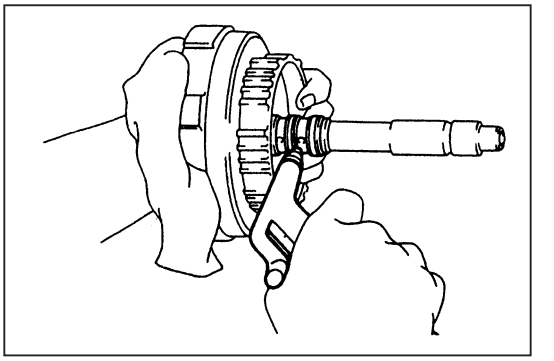
AT00300-00286

   (c) Remove the spring retainer and 20 return springs.



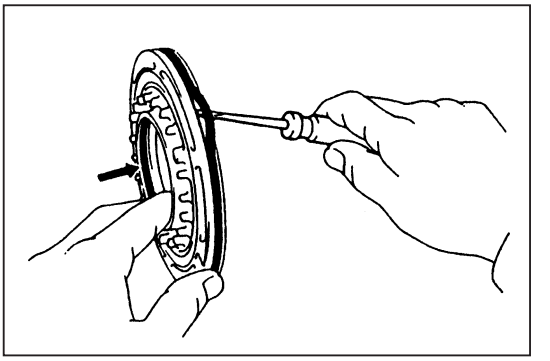
AT00301-00287

5. Removal of clutch piston
   (a) Apply compressed air into the oil passage to remove the piston.
   If the piston will not come out, use needle-nose pliers to remove it.



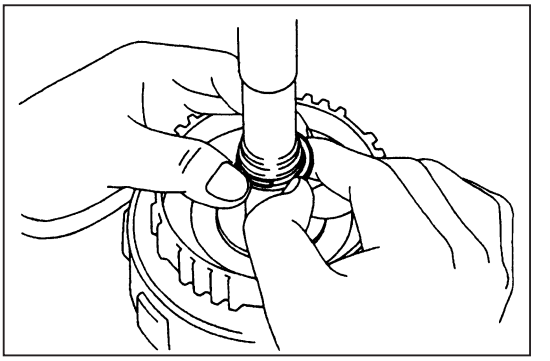
AT00302-00288

(b) Remove the two O-rings from the piston.



AT00303-00289

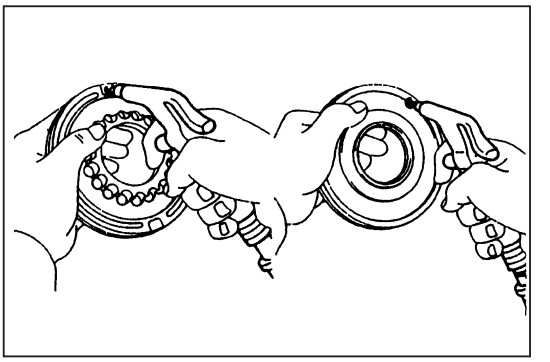
6. If necessary, remove the oil seal rings.
   Remove the two oil seal rings from the shaft.



AT00304-00290

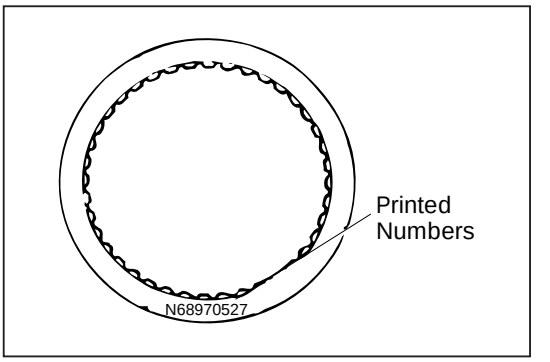
INSPECTION OF FORWARD CLUTCH

1. Inspection of clutch piston
   (a) Check that the check ball is free by shaking the piston.
   (b) Check that the valve exhibits no leakage by applying low-pressure compressed air.



AT00305-00291

2. Inspection of discs, plates and flange
   Check that the sliding surfaces of the discs, plates and flange are not worn or burnt. If necessary, replace them.
   NOTE:
   - If the lining of the disc is exfoliated or discolored, or even a part of the printed numbers is defaced, replace all discs.
   - Before assembling new discs, soak them in the ATF for at least two hours.

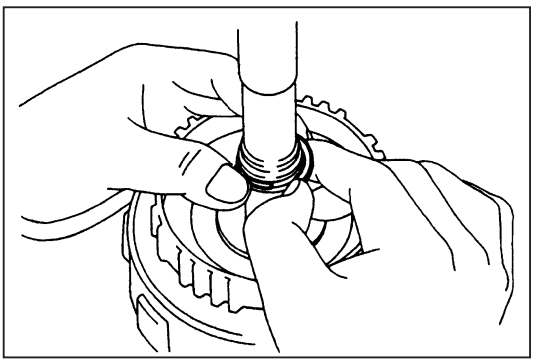


AT00306-00292

ASSEMBLY OF FORWARD CLUTCH

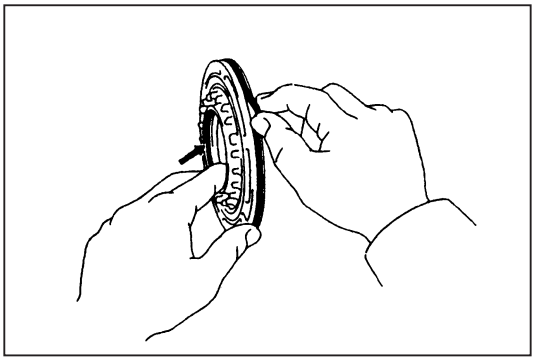
1. Installation of oil seal rings
   Install the two oil seal rings to the shaft.
   CAUTION:
   - Do not spread the ring ends excessively.

   NOTE:
   - After installing the oil seal rings, check that they move smoothly.



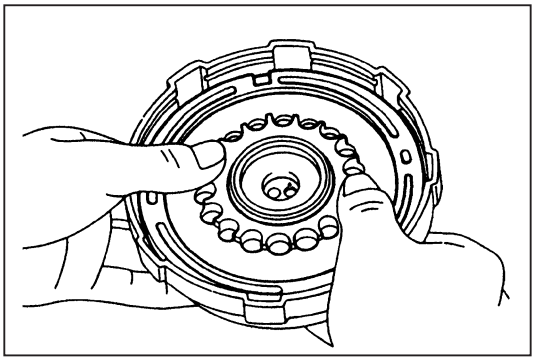
AT00307-00293

2. Installation of clutch piston to clutch drum
   (a) Install two new O-rings to the piston.



AT00308-00294

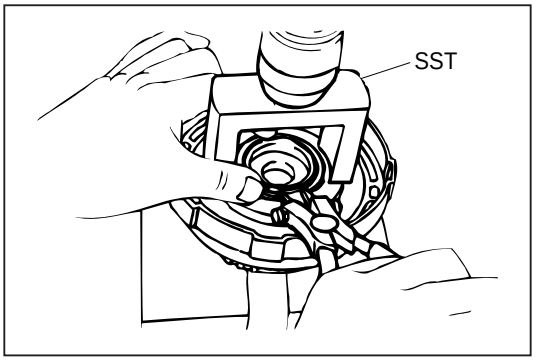
   (b) Coat the O-rings with the ATF.
   (c) Press the piston into the drum with the cup side up, being careful not to damage the O-rings.



AT00309-00295

3. Installation of piston return springs
   (a) Place the springs, spring retainer and snap ring onto the piston.
   (b) Place the following SST on the spring retainer, and compress the springs with a shop press.
   SST: 09350-32014-000 (09351-32070-000)

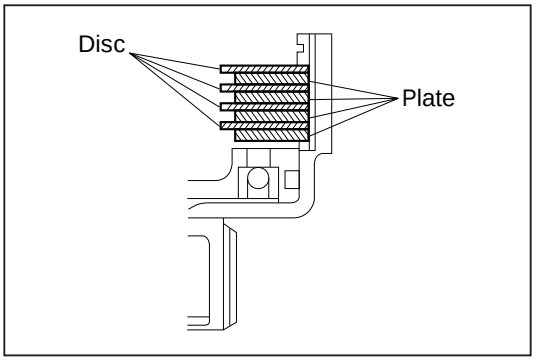
   (c) Install the snap ring with snap ring pliers.
   Be sure the end gap of snap ring is not aligned with the spring retainer claw.



AT00310-00296

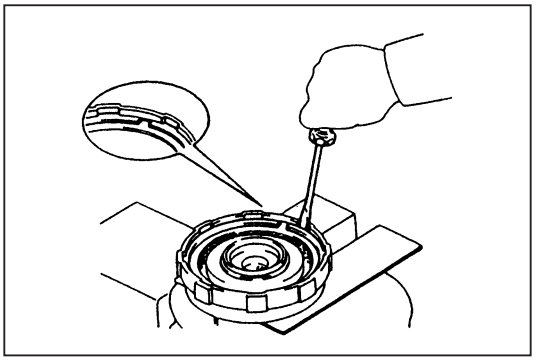
4. Installation of plates, discs and flange
   (a) Install the plates and discs in the following order.
   P = Plate D = Disc
   → P → D → P → D → P → D (for HD-C E/G models)
   → P → D → P → D → P → D→ P → D (for HD-E E/G models)

   (b) Install the flange while facing the flat end downward.



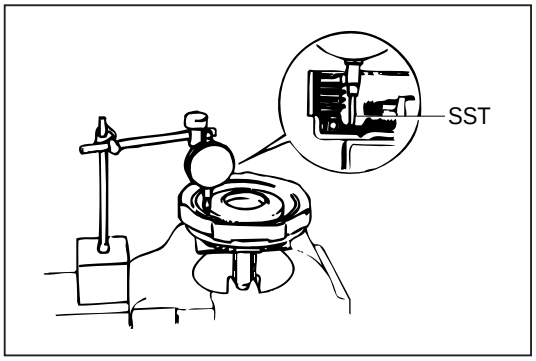
AT00311-00297

5. Install the snap ring.
   Check that the end gap of the snap ring is not aligned with one of the cutout sections.



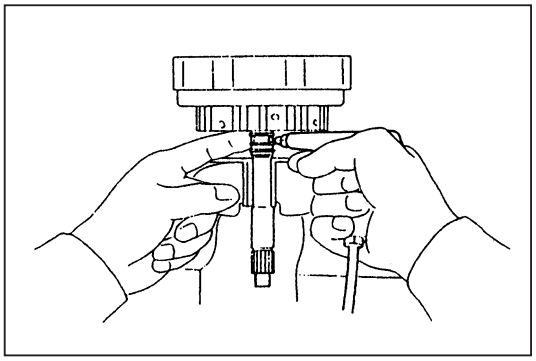
AT00312-00298

6. Recheck of piston stroke of forward clutch
   Measure the direct clutch piston stroke while applying and releasing the compressed air (4 - 8 kg/cm^2) as shown in the right figure. For this operation, use a dial indicator (long type pickup or the following SST).
   SST: 09350-32014-000 (09351-32190-000)
   Piston Stroke: 1.11 - 1.47 mm

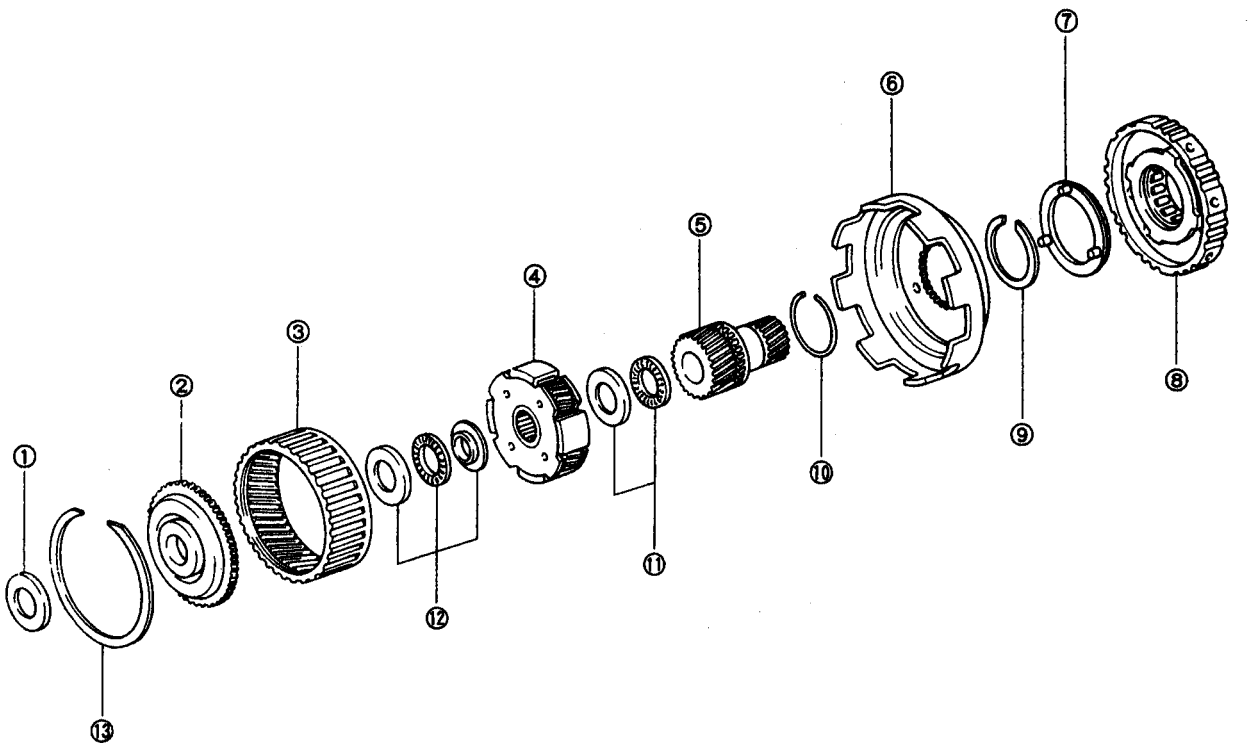


AT00313-00299

   If the piston stroke is not within the specification, select another flange.
   NOTE:
   - The flange comes in two different thicknesses.
     Flange Thickness: 3.00 mm
     3.37 mm


AT00314-00300

FRONT PLANETARY GEAR

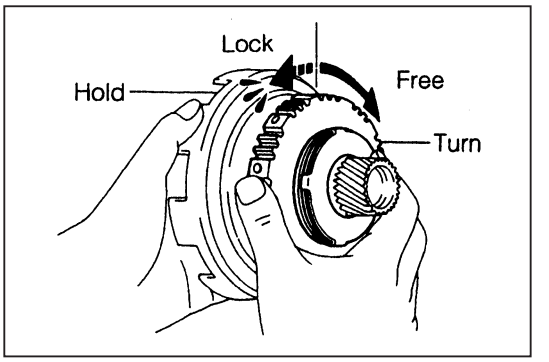


① Bearing race
② Ring gear flange
③ Ring gear
④ Planetary gear
⑤ Sun gear
⑥ Sun gear input drum
⑦ Thrust washer
⑧ No. 1 one-way clutch and B2 hub
⑨ Snap ring
⑩ Shaft snap ring
⑪ Bearing and race
⑫ Bearing and races
⑬ Snap ring

AT00315-00301

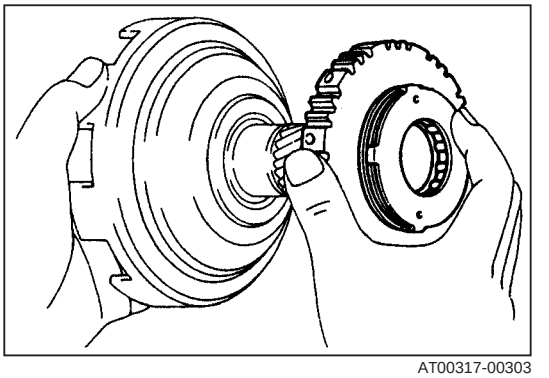
DISASSEMBLY OF ONE-WAY CLUTCH AND SUN GEAR

1. Operation check of one-way clutch
   Hold the sun gear and turn the hub. Ensure that the one-way clutch turns freely when turned clockwise. Also, ensure that the one-way clutch is locked when turned counterclockwise.



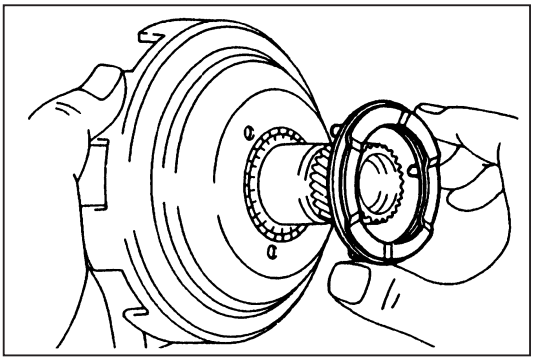
AT00316-00302

2. Removal of second brake hub and one-way clutch from sun gear
   While turning the hub clockwise, remove the one-way clutch from the sun gear.



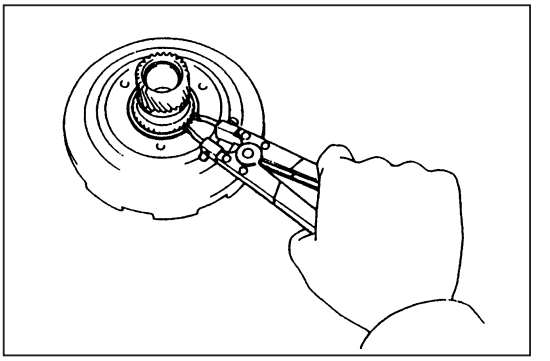
AT00317-00303

3. Remove the thrust washer from the sun gear input drum.



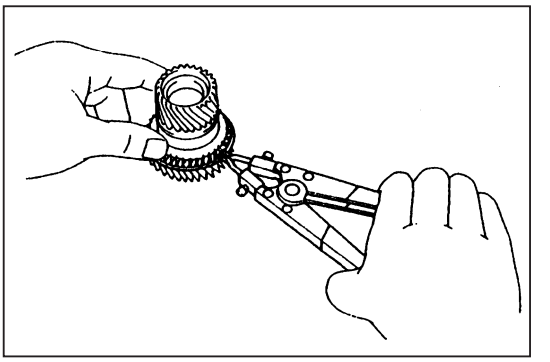
AT00318-00304

4. Removal of sun gear from drum
   (a) Remove the snap ring from the drum, using snap ring pliers.
   (b) Remove the sun gear from the drum.



AT00319-00305

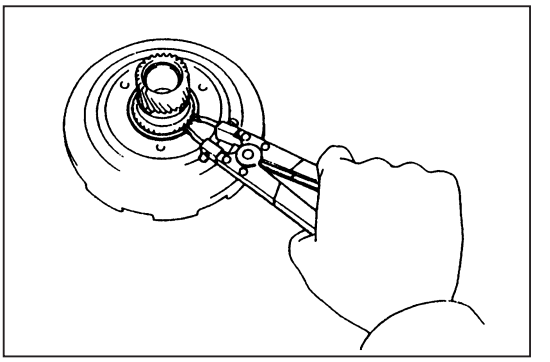
5. Removal of shaft snap ring
   Remove the shaft snap ring from the sun gear, using snap ring pliers.



AT00320-00306

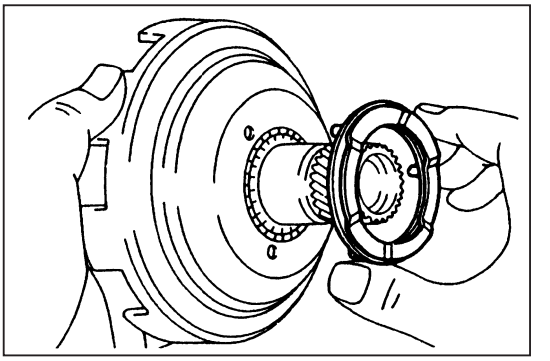
ASSEMBLY OF ONE-WAY CLUTCH AND SUN GEAR

1. Install the shaft snap ring to the sun gear.
2. Installation of sun gear to drum
   (a) Install the sun gear to the drum.
   (b) Install the snap ring to the drum, using snap ring pliers.



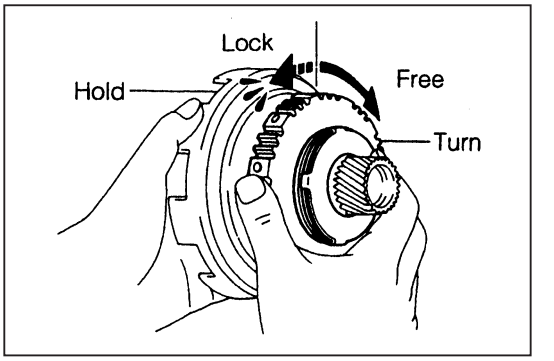
AT00321-00307

3. Install the thrust washer to the sun gear input drum.



AT00322-00308

4. Installation of one-way clutch and second brake hub on sun gear
   While turning the hub clockwise, slide the one-way clutch onto the sun gear.
5. Recheck the operation of the one-way clutch.

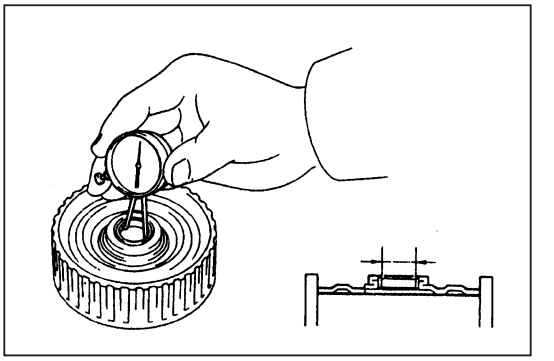


AT00323-00309

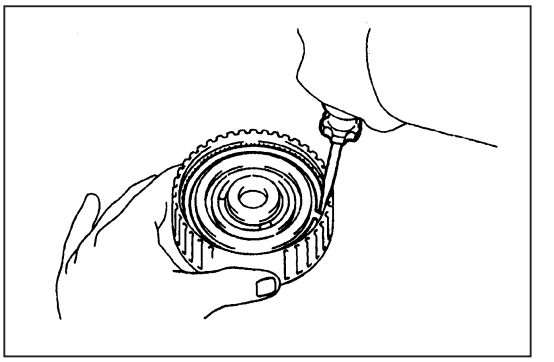
INSPECTION OF PLANETARY RING GEAR

1. Inspection of ring gear flange bush
   Measure the inside diameter of the flange bush, using a dial indicator.
   Specified Inside Diameter: 19.025 - 19.050 mm

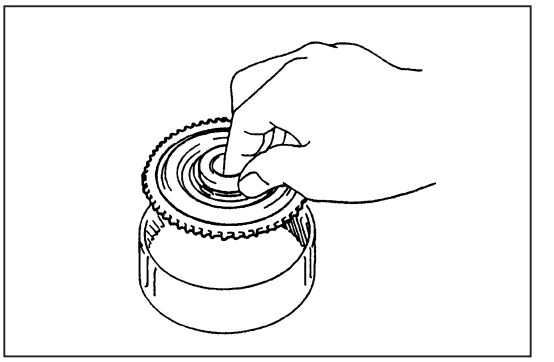
   If the inside diameter is greater than the maximum, replace the flange.


AT00324-00310

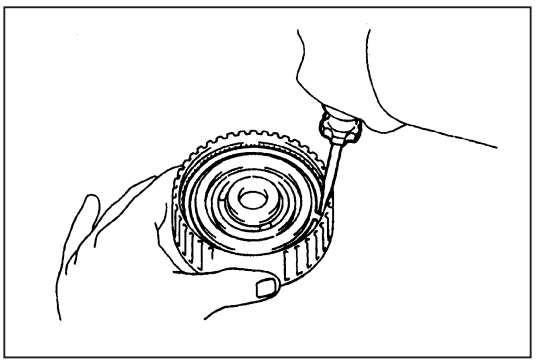
2. Removal of ring gear flange
   (a) Remove the snap ring, using a screwdriver.
   (b) Remove the flange from the ring gear.


AT00325-00311

3. Installation of ring gear flange
   (a) Position the flange into the ring gear.

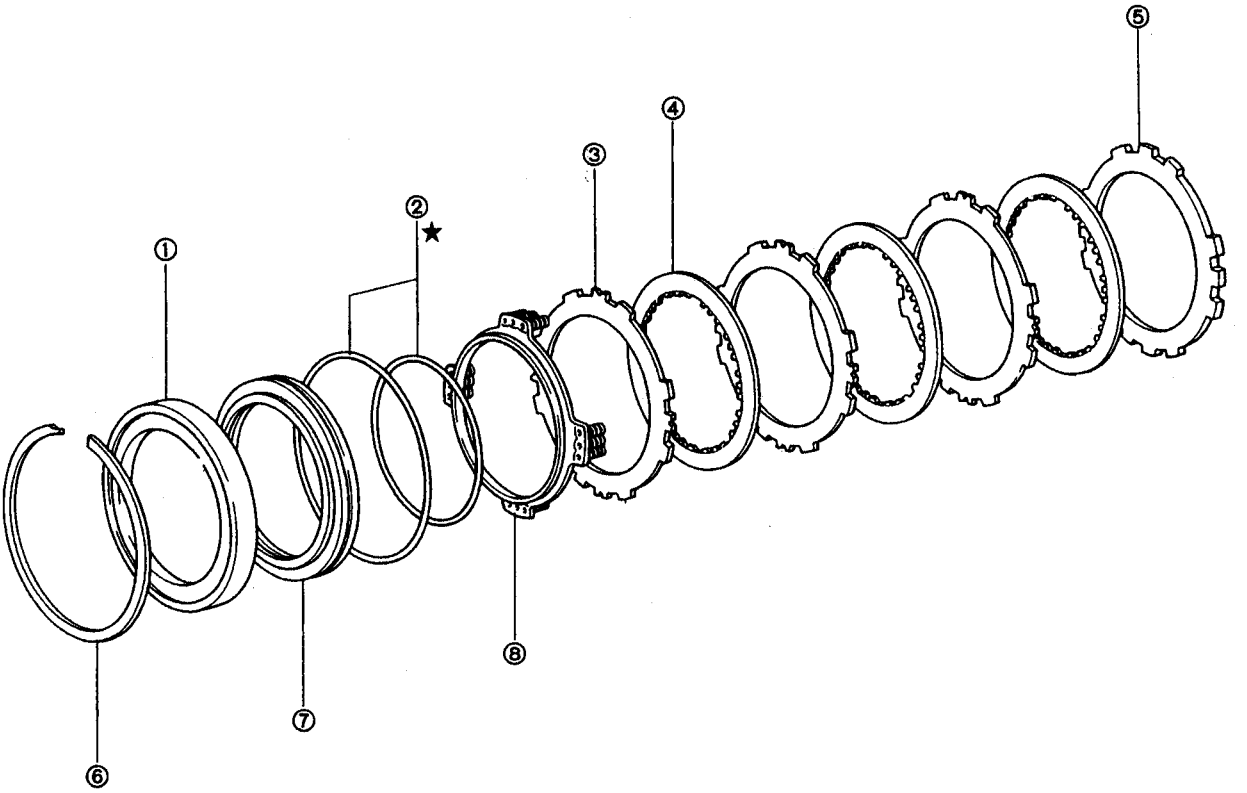

AT00326-00312

   (b) Install the snap ring, using a screwdriver.


AT00327-00313

SECOND BRAKE

★ : Non-reusable parts



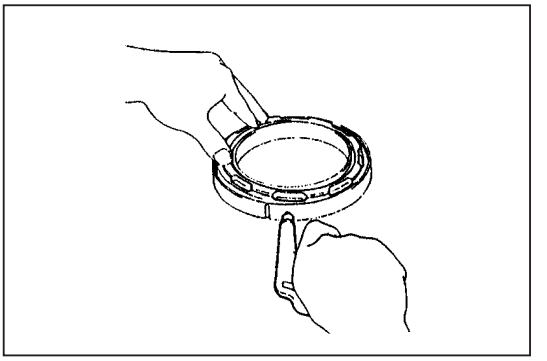
① Second brake drum
② O-ring
③ Plate
④ Disc
⑤ Flange
⑥ Snap ring
⑦ Piston
⑧ Piston return spring

AT00328-00314

DISASSEMBLY OF SECOND BRAKE PISTON

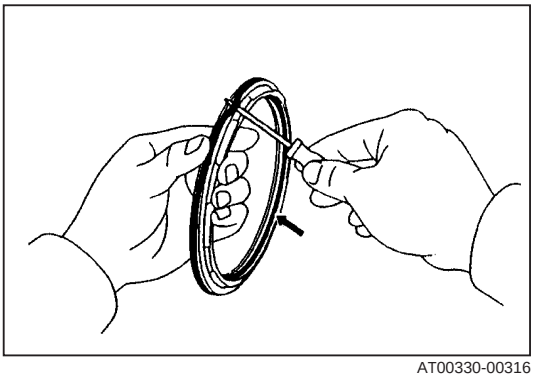
Removal of second brake piston

1. Apply compressed air to the oil hole to remove the piston.



AT00329-00315

2. Remove the two O-rings from the piston.



AT00330-00316

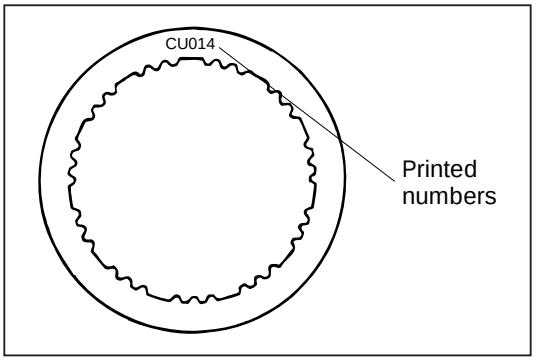
INSPECTION OF SECOND BRAKE COMPONENT

Inspection of discs, plate and flange

Check that the sliding surfaces of the disc, plate and flange are not worn or burnt. If necessary, replace them.

NOTE:

- If the lining of the disc is exfoliated or discolored, or even a part of the printed numbers is defaced, replace all discs.
- Before assembling new discs, soak them in the ATF for at least two hours.

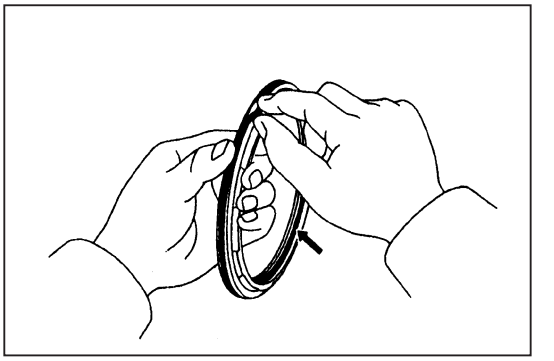


AT00331-00317

ASSEMBLY OF SECOND BRAKE PISTON

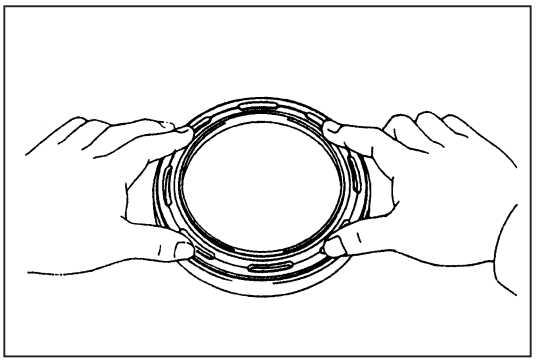
Installation of piston

1. Coat a new O-ring with the ATF.
2. Install new two O-rings on the piston.



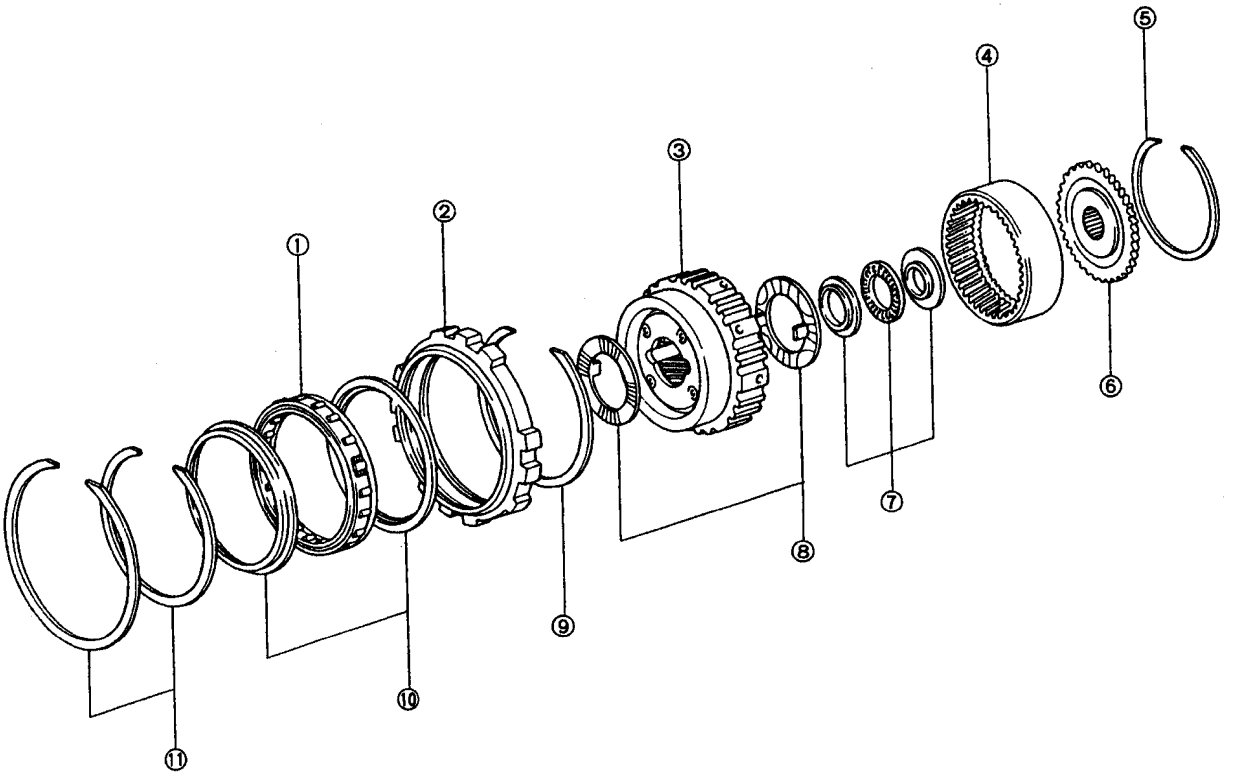
AT00332-00318

3. Press the piston into the drum, being very careful not to damage or twist the new O-rings.



AT00333-00319

REAR PLANETARY GEAR

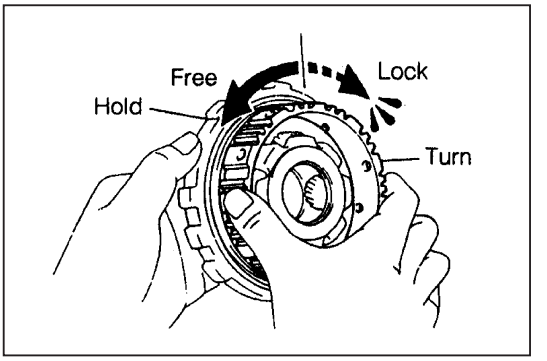


① No. 2 one-way clutch
② Outer race
③ Rear planetary gear
④ Ring gear
⑤ Snap ring
⑥ Flange
⑦ Bearing and races
⑧ Thrust washers
⑨ Snap ring
⑩ Retainers
⑪ Snap ring

AT00334-00320

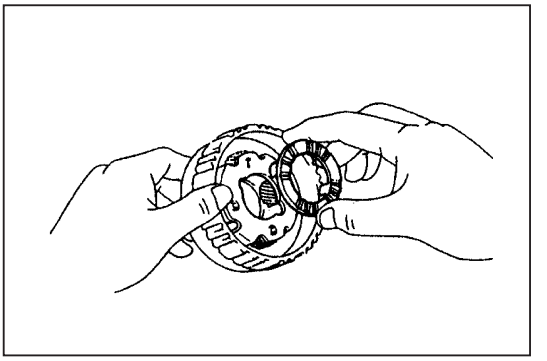
DISASSEMBLY OF ONE-WAY CLUTCH

1. Operation check of one-way clutch
   Hold the outer race and turn the hub. Ensure that the one-way clutch turns freely when turned counterclockwise. Also, ensure that the one-way clutch is locked when turned clockwise.



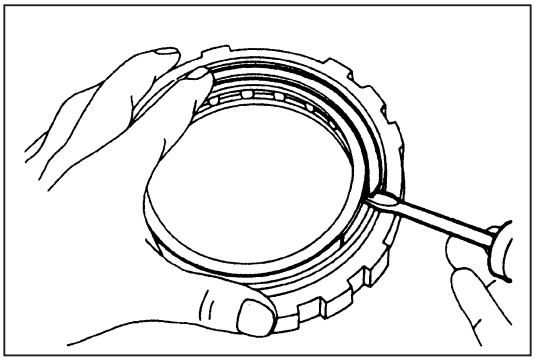
AT00335-00321

2. Removal of thrust washers
   Remove the two thrust washers from the both sides of the planetary gear.
3. Separate the one-way clutch and planetary gear.



AT00336-00322

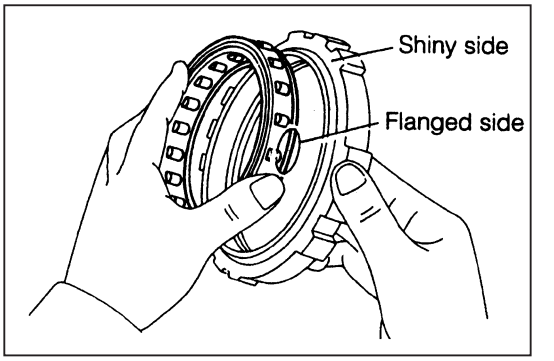
4. Removal of one-way clutch from outer race
   (a) Remove the two snap rings and retainers from both sides.
   (b) Remove the one-way clutch from the outer race.



AT00337-00323

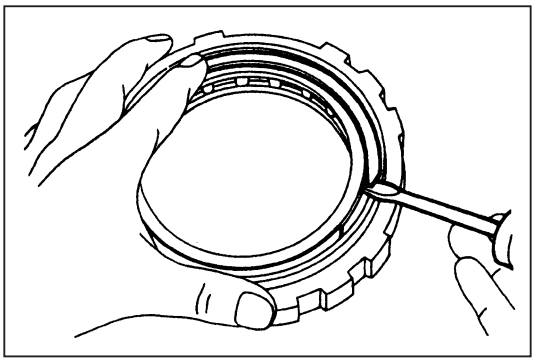
ASSEMBLY OF ONE-WAY CLUTCH

1. Installation of one-way clutch
   (a) Install the one-way clutch into the outer race, facing the flanged side of the one-way clutch toward the shiny side of the outer race.



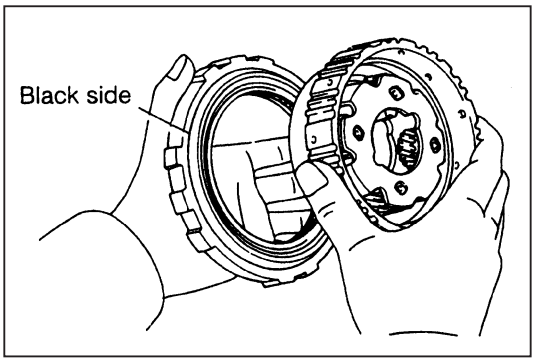
AT00338-00324

   (b) Install the two retainers and snap rings to both sides.



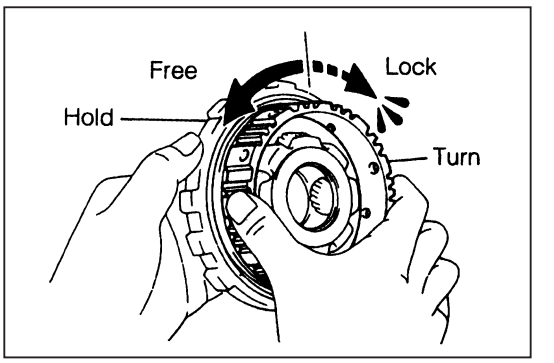
AT00339-00325

2. Installation of planetary gear into one-way clutch
   Install the planetary gear into the one-way clutch, facing the inner race of the planetary gear toward the black side of the one-way clutch outer race.



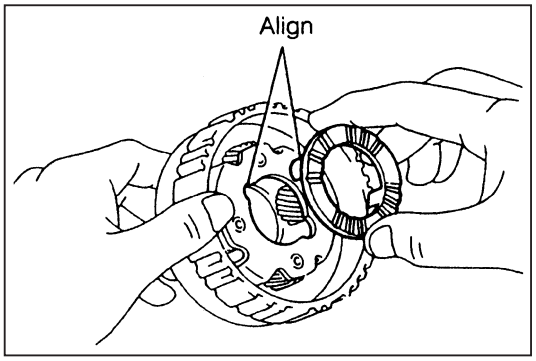
AT00340-00326

3. Check the operation of the one-way clutch.



AT00341-00327

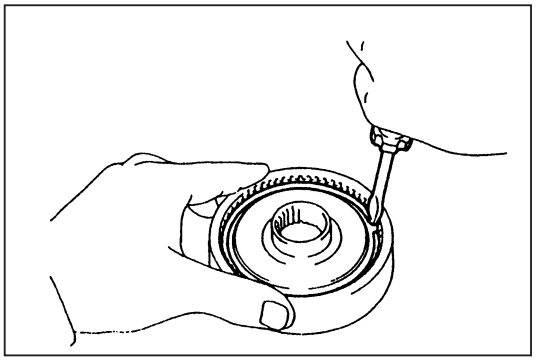
4. Installation of thrust washers
   (a) Coat the two thrust washers with petroleum jelly.
   (b) Align the tab of the washers with the hollow of the carrier.



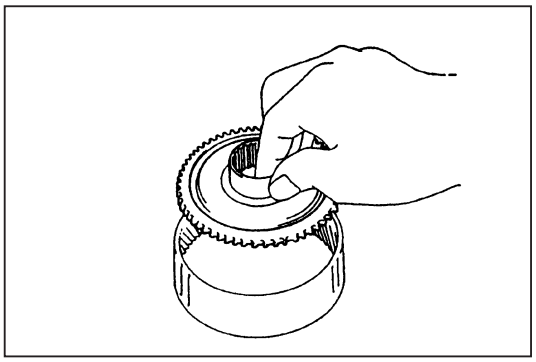
AT00342-00328

REPLACEMENT OF RING GEAR FLANGE

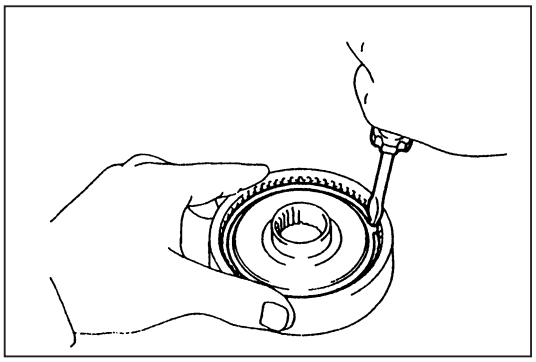
1. Removal of ring gear flange
   (a) Remove the snap ring, using a screwdriver.
   (b) Remove the flange from the ring gear.


AT00343-00329

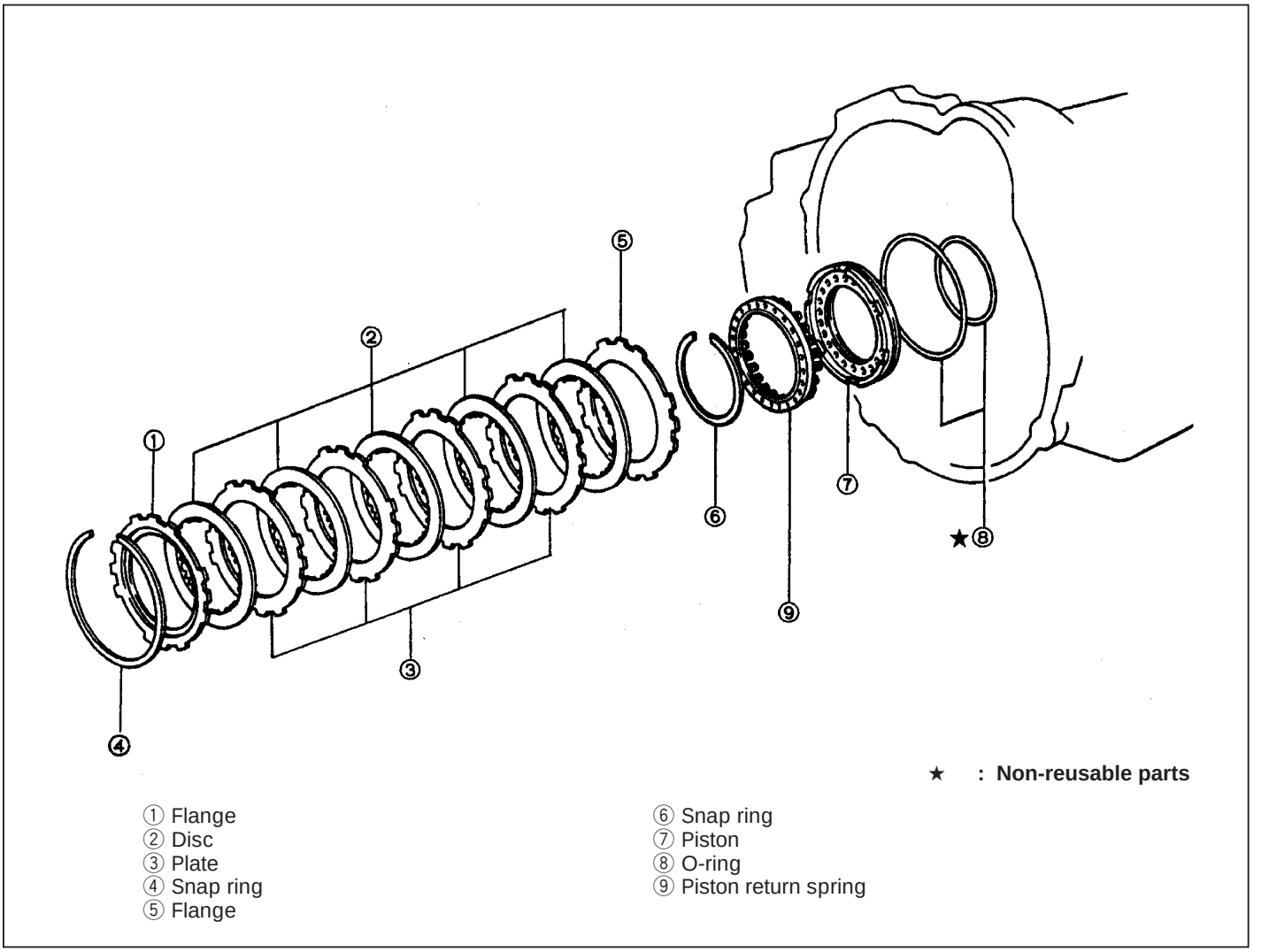
2. Installation of ring gear flange
   (a) Position the flange into the ring gear.


AT00344-00330

   (b) Install the snap ring, using a screwdriver.


AT00345-00331

FIRST AND REVERSE BRAKE



★ : **Non-reusable parts**

① Flange
② Disc
③ Plate
④ Snap ring
⑤ Flange
⑥ Snap ring
⑦ Piston
⑧ O-ring
⑨ Piston return spring

AT00346-00332

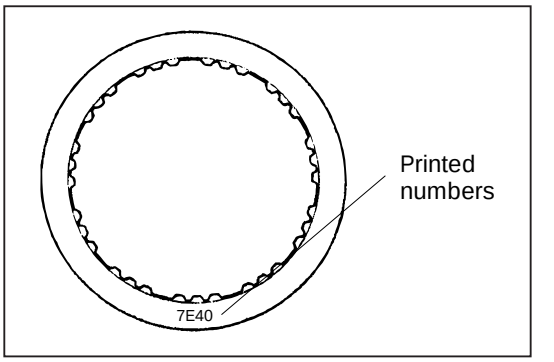
INSPECTION OF FIRST AND REVERSE BRAKE COMPONENT

Inspection of discs, plates and flanges

Check that the sliding surfaces of the discs, plates and flanges are not worn or burnt. If necessary, replace them.

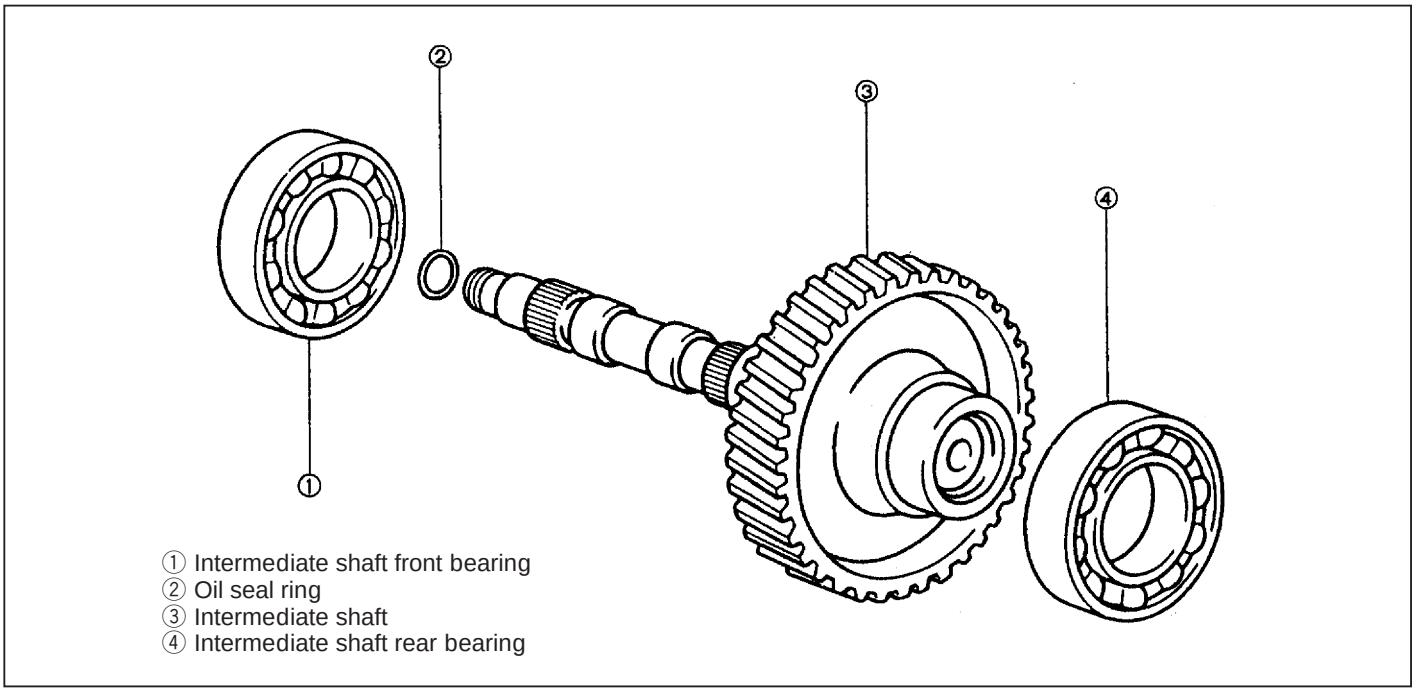
NOTE:

- If the lining of the disc is exfoliated or discolored, or even a part of the printed numbers is defaced, replace all discs.
- Before assembling new discs, soak them in the ATF for at least two hours.



AT00347-00333

INTERMEDIATE SHAFT

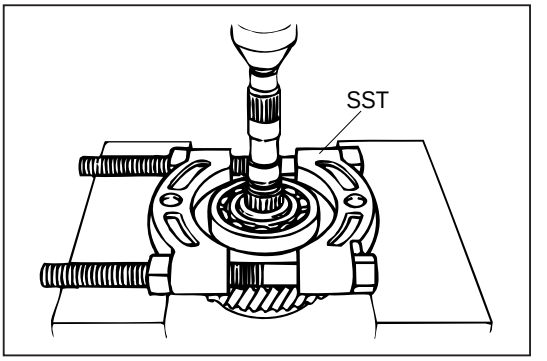


① Intermediate shaft front bearing
② Oil seal ring
③ Intermediate shaft
④ Intermediate shaft rear bearing

AT00348-00334

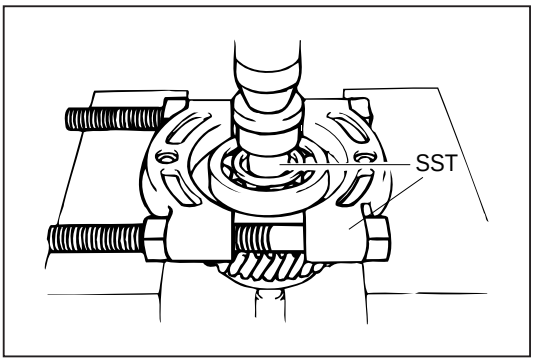
DISASSEMBLY OF INTERMEDIATE SHAFT

1. Removal of intermediate shaft front bearing
   Press out the bearing, using the following SST.
   SST: 09950-87701-000



AT00349-00335

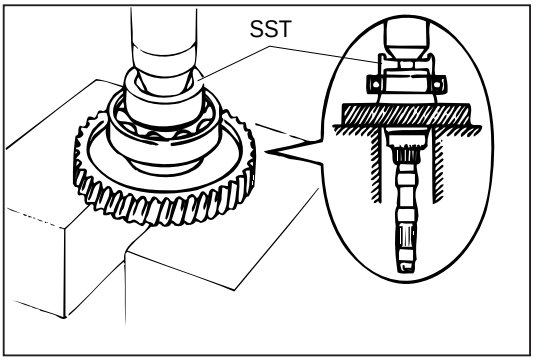
2. Removal of intermediate shaft rear bearing
   Press out the bearing, using the following SSTs.
   SST: 09350-32014-000 (09351-32090-000),
   09950-87701-000



AT00350-00336

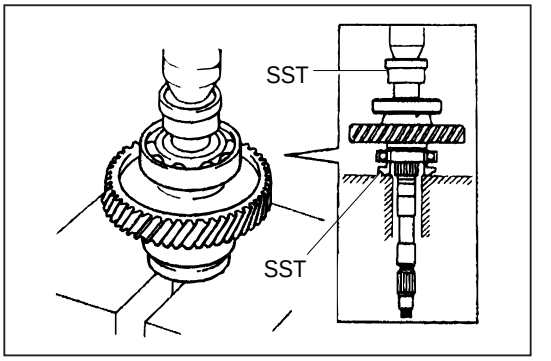
ASSEMBLY OF INTERMEDIATE SHAFT

1. Installation of intermediate shaft rear bearing
   Press a new bearing into position, using the following SST.
   SST: 09350-32014-000 (09351-32150-000)



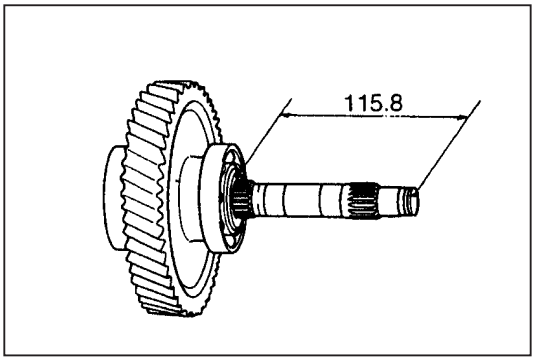
AT00351-00337

2. Installation of intermediate shaft front bearing
   (a) Press a new bearing into position, using the following SSTs.
   SST: 09350-32014-000
   (09351-32090-000, 09351-32120-000)



AT00352-00338

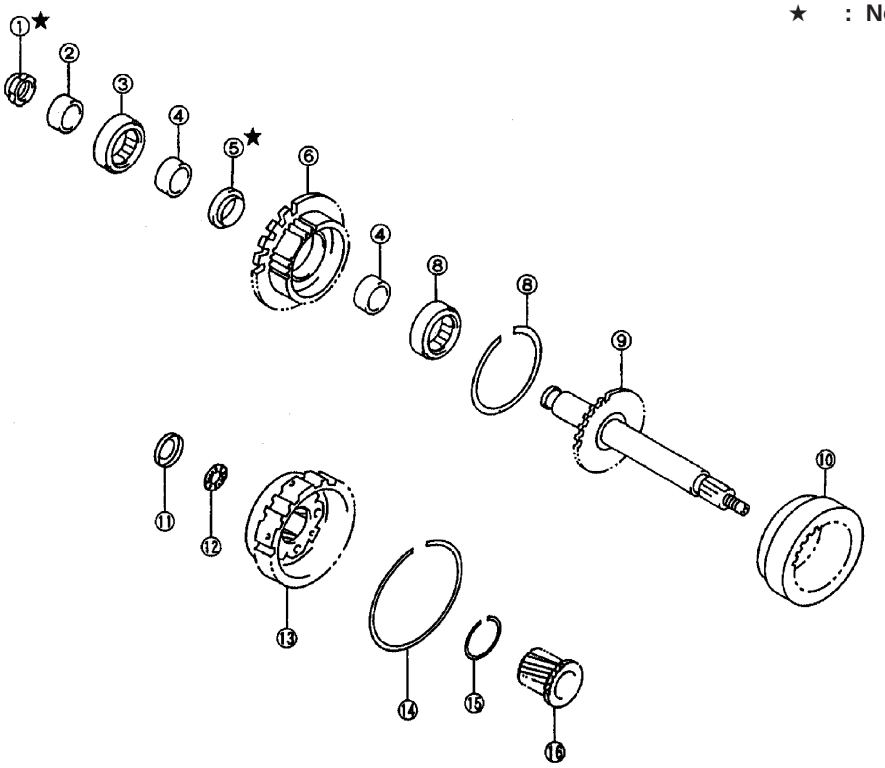
   (b) Check that the distance from the gear flange end to the intermediate shaft end is 115.8 mm.



AT00353-00339

COUNTERSHAFT

★ : Non-reusable parts

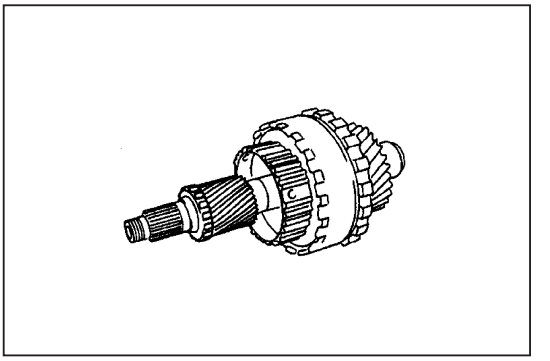


① Lock nut
② Inner race
③ Bearing
④ Outer race
⑤ Spacer
⑥ Drive pinion with output flange
⑦ Outer race
⑧ Bearing
⑨ Countershaft
⑩ Ring gear
⑪ Race
⑫ Bearing
⑬ Underdrive planetary gear
⑭ Hole snap ring
⑮ Hole snap ring
⑯ Planetary sun gear

AT00354-00340

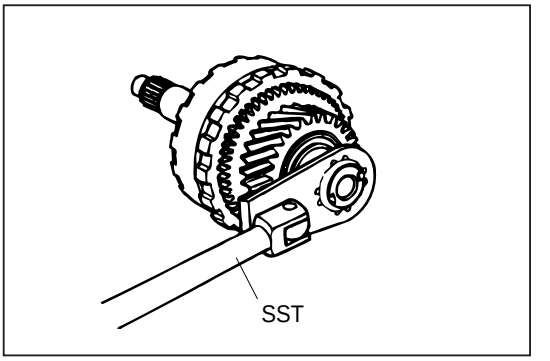
DISASSEMBLY OF COUNTERSHAFT

1. Remove the underdrive planetary sun gear from the countershaft with the hole snap ring installed.



AT00355-00341

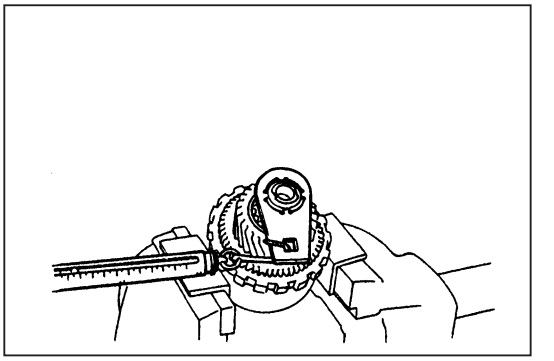
2. Temporarily tighten the removed lock nut, using the following SST.
   SST: 09350-32014-000 (09351-32170-000)



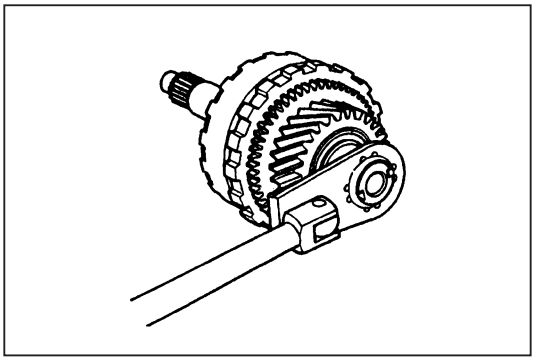
AT00356-00342

3. Hold the drive pinion in a vice, using soft jaws.
4. Measure the starting torque of the countershaft, using a spring tension gauge or the like.
   Specified Value for Starting Torque
   When Spring Tension Gauge Is Used:
   11.8 - 19.6 N
   When Torque Gauge Is Used:
   0.58 - 9.8 N·m

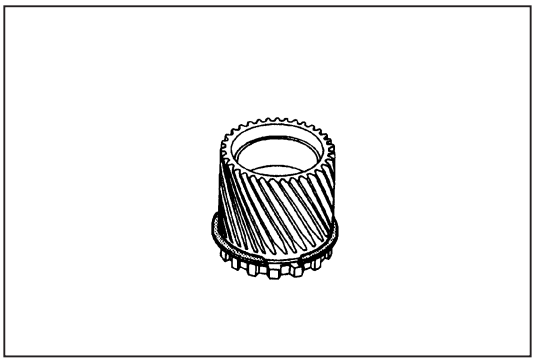
   NOTE:
   - If the starting torque exceeds the specified value above, replace the spacer with a new one.


AT00357-00343

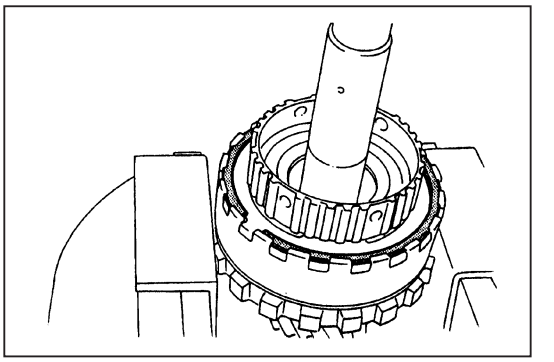
5. Remove the lock nut, using the following SST.
   SST: 09350-32014-000 (09351-32170-000)


AT00358-00344

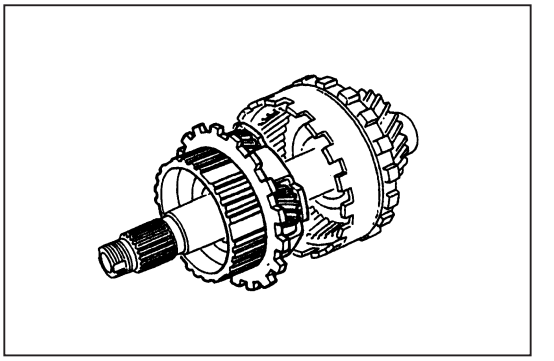
6. Remove the hole snap ring from the underdrive planetary sun gear, using standard snap ring pliers.


AT00359-00345

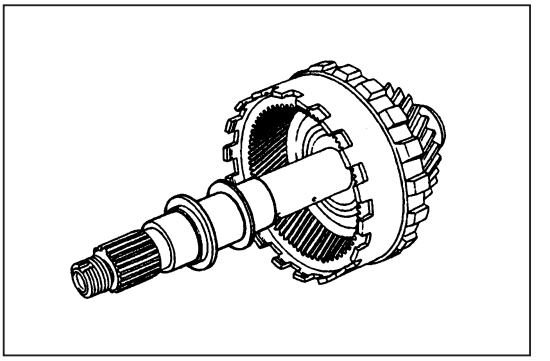
7. Remove the hole snap ring from the countershaft assembly, using a standard flat screwdriver.


AT00360-00346

8. Remove the underdrive planetary gear.

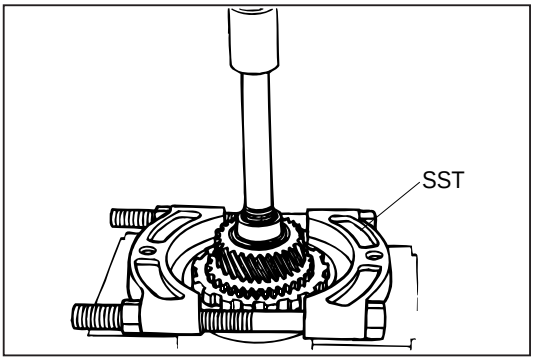

AT00361-00347

9. Remove the thrust needle bearing and race.



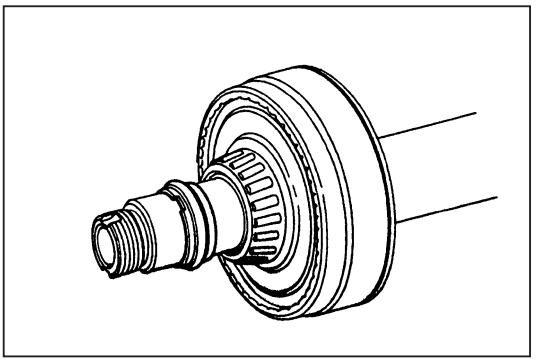
AT00362-00348

10. Remove the drive pinion with the output flange, bearing and inner race, using the following SST in conjunction with a press.
    SST: 09950-87701-000



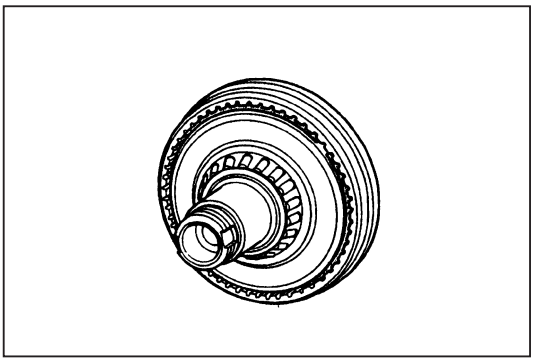
AT00363-00349

11. Remove the spacer from the countershaft.
    NOTE:
    - Never reuse the removed spacer, for it is a crush type.



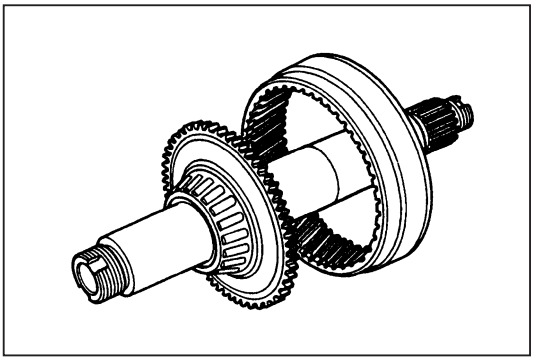
AT00364-00350

12. Remove the hole snap ring from the countershaft, using a standard flat screwdriver.



AT00365-00351

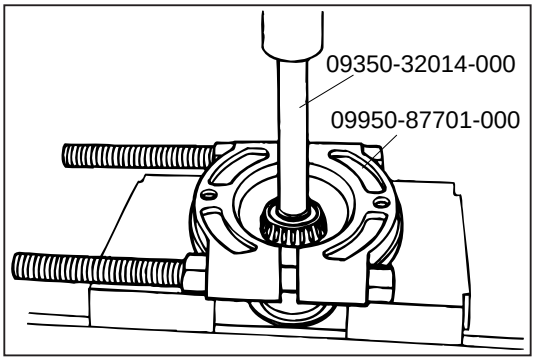
13. Remove the ring gear from the countershaft.



AT00366-00352

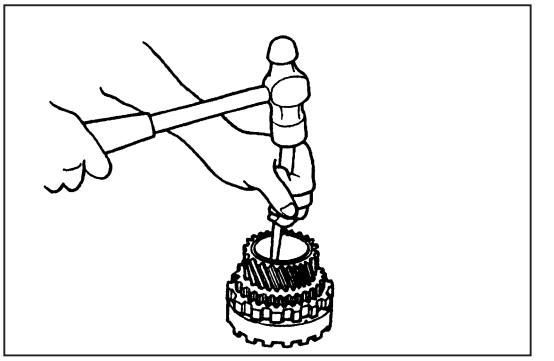
14. Remove the bearing, using the following SSTs in conjunction with a press.
    SSTs: 09950-87701-000
    09350-32014-000 (09351-32130-000)

    NOTE:
    - Never reuse the removed bearing.



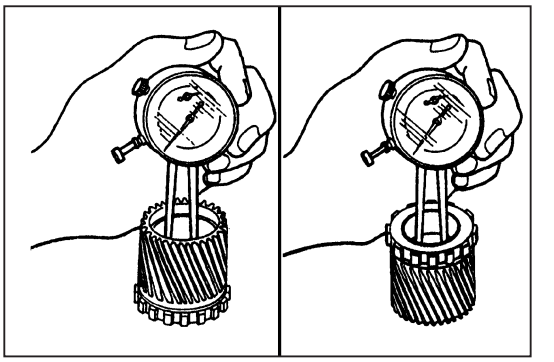
AT00367-00353

15. Drive out the inner races of both bearings, using a brass rod in combination with a hammer.


AT00368-00354

INSPECTION

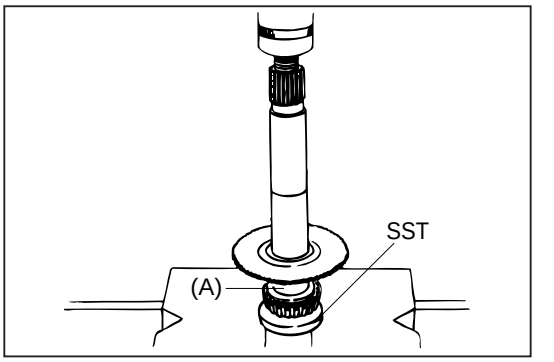
Measure the bush inside diameter of the planetary sun gear, using an inner caliper gauge.
Specified Value: 29.800 - 29.825 mm
Allowable Limit: 29.87 mm


AT00369-00355

ASSEMBLY OF COUNTERSHAFT

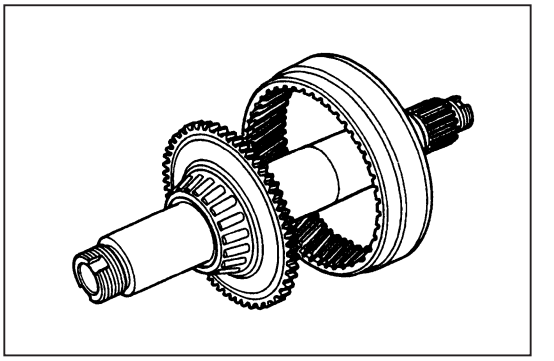
1. Install a new bearing to the countershaft, using the following SST in conjunction with a press.
    SST: 09350-32014-000

    NOTE:
    - Ensure that the thick section (A) of the inner race faces toward the countershaft side, as indicated in the right figure.

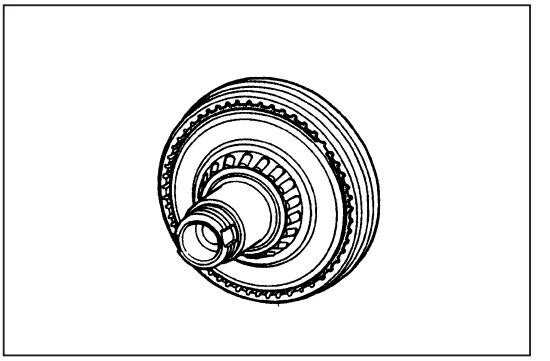


AT00370-00356

2. Install the ring gear to the countershaft.

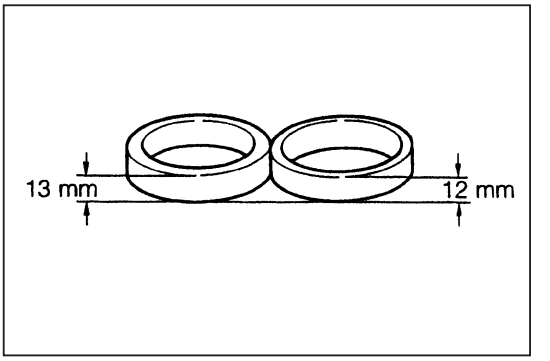

AT00371-00357

3. Install the hole snap ring.



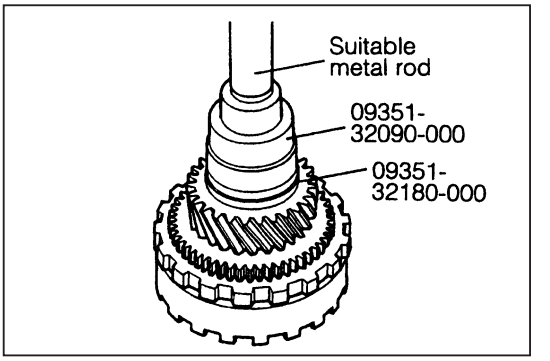
AT00372-00358

4. Measure each inner race width.
   Race Width 13 mm: Thick
   Race Width 12 mm: Thin



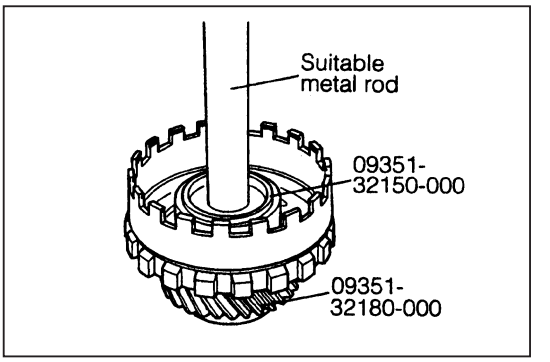
AT00373-00359

5. Press the thick race to the flange side of the drive pinion, using the following SST.
   SST: 09350-32014-000
   (09351-32090, 09351-32180)



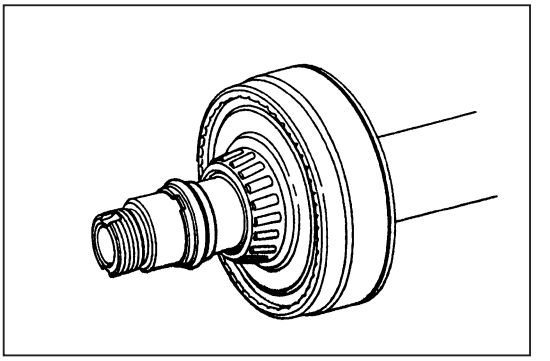
AT00374-00360

6. Press the thin race to the other side, using the following SST.
   SST: 09350-32014-000
   (09351-32150, 09351-32180)



AT00375-00361

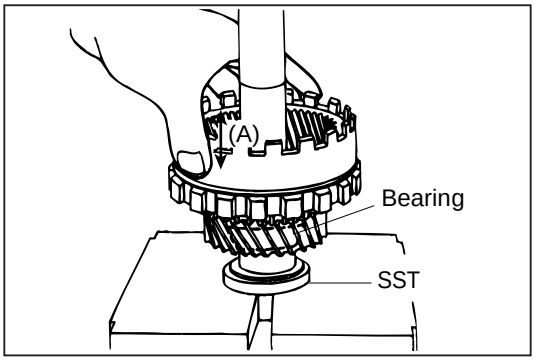
7. Install a new spacer to the countershaft.



AT00376-00362

8. Install the drive pinion to the countershaft.
9. Press a new bearing, using the following SST.
   SST: 09350-32014-000 (09351-32180)

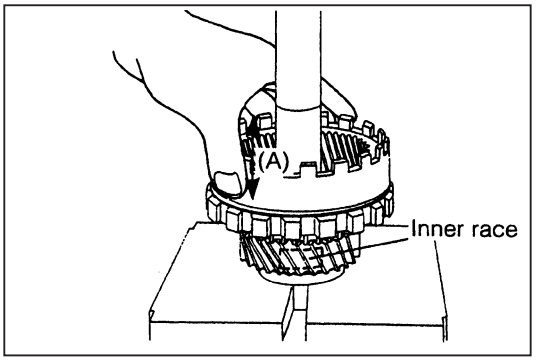
   NOTE:
   - Be sure to press the bearing to such an extent that a slight end play (in a direction A) still exists at the differential drive pinion. (Namely, the press should be performed to a point immediately before pre-pressure is applied to the bearing.)



AT00377-00363

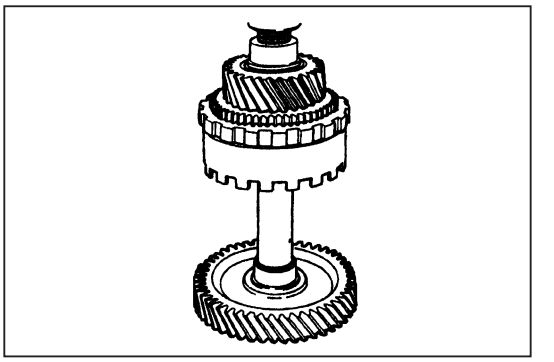
10. Press the inner race, using the following SST.
    SST: 09350-32014-000 (09351-32180)

    NOTE:
    - Be sure to press the bearing to such an extent that a slight end play (in a direction A) still exists at the differential drive pinion. (Namely, the press should be performed to a point immediately before pre-pressure is applied to the bearing.)

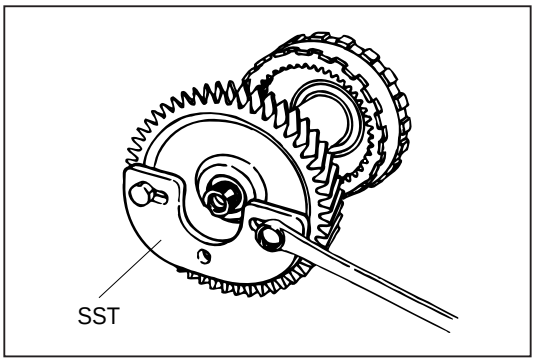


AT00378-00364

11. Measurement of countershaft starting torque
    (1) Press the counter driven gear to the countershaft, using the following SST.
    SST: 09350-32014-000 (09351-32100)

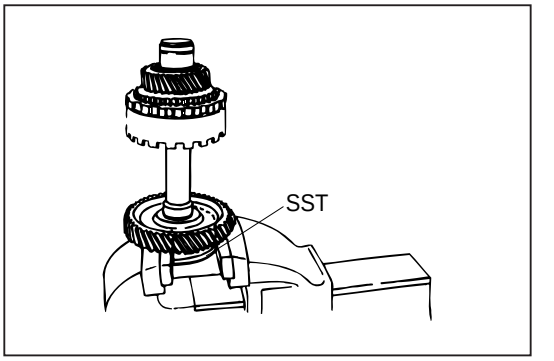

AT00379-00365

    (2) Install the following SST to the counter driven gear.
    SST: 09350-32014-000 (09351-32032)



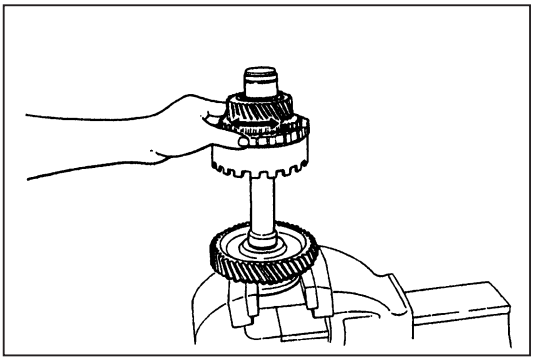
AT00380-00366

    (3) Secure the countershaft by holding the following SST in a vice.
    SST: 09350-32014-000 (09351-32032)



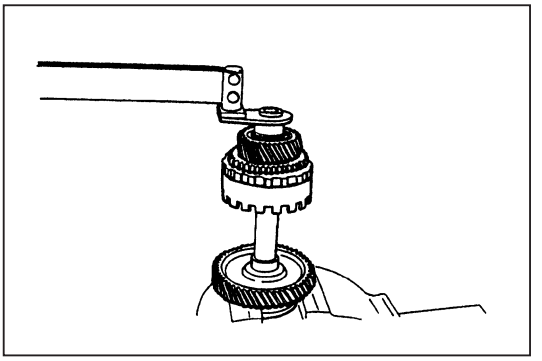
AT00381-00367

(4) Temporarily tighten a new lock nut with your hand to the countershaft.
(5) Turn the drive pinion clockwise and counterclockwise several turns so as to settle a new bearing.

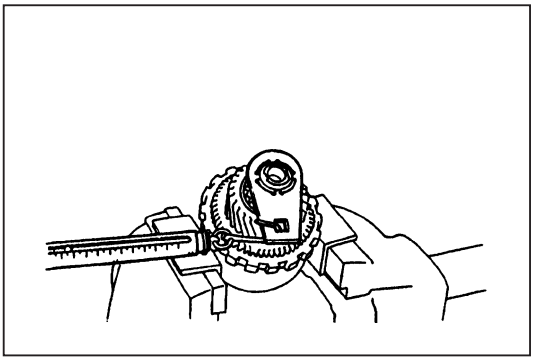

AT00382-00368

(6) Tighten a new lock nut over three or four stages, using the SST 09350-32014-000 (09351-32170-000) in combination with a torque wrench. At each stage, measure the starting torque at a time when the lock nut is tightened, using the SST above in combination with a torque wrench.
Reference Tightening Torque: 158.0 - 193.0 N·m

NOTE:
- It is recommended to use a torque wrench whose distance to the fulcrum is approx. 42 cm.


AT00383-00369

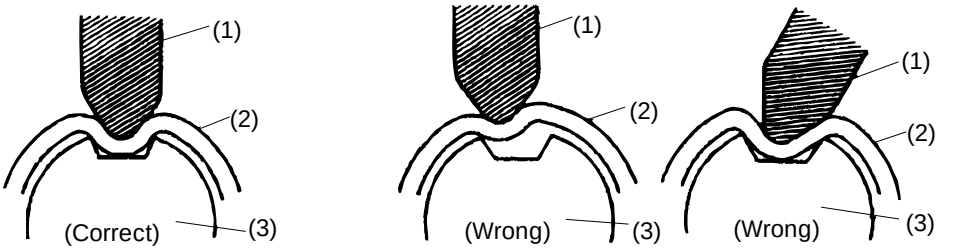
(7) Hold the drive pinion in a vice, using soft jaws.
(8) Measure the starting torque of the countershaft, using the following SST.
SST: 09350-32014-000 (09351-32170)
Specified Value for Starting Torque
When Spring Tension Gauge Is Used:
11.8 - 19.6 N
When Torque Wrench Is Used:
0.58 - 9.8 N·m


AT00384-00370

CAUTION:
- Be sure to measure the starting torque several times. Calculate the mean value.
- If the starting torque exceeds the specified value, remove the countershaft again and replace the spacer with a new one.

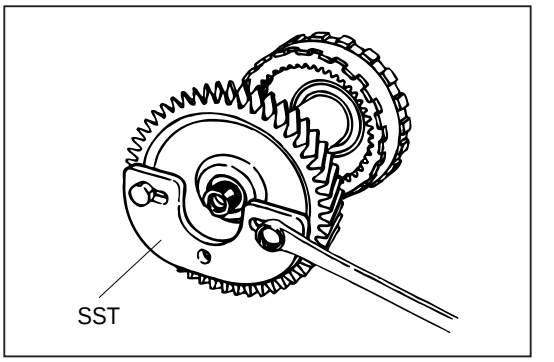
(9) Stake a new lock nut, using a standard punch or the like in combination with a hammer.
NOTE:
- When staking the lock nut, point a suitable staking tool toward the counter shaft axis center and stake the lock nut securely, as shown in the figure below. (Poor staking may cause abnormal noise.)

(1) Suitable staking tool
(2) New nut
(3) Shaft



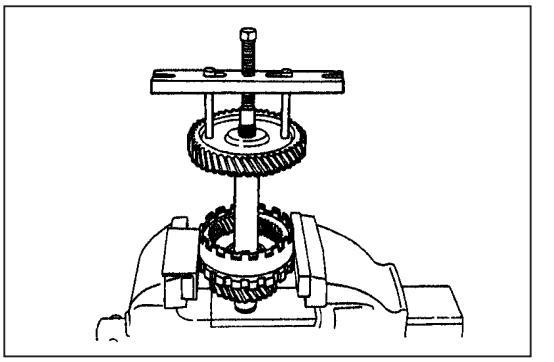
AT00385-00371

12. Remove the SST 09350-32014-000 (09351-032032) from the countershaft.



AT00386-00372

13. Remove the counter driven gear, using the following SST.
SST: 09350-32014-000 (09351-32061)

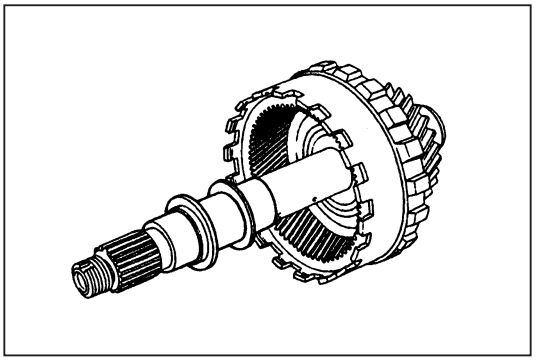


AT00387-00373

14. Coat the race and thrust needle bearing with petroleum jelly and install them to the countershaft.

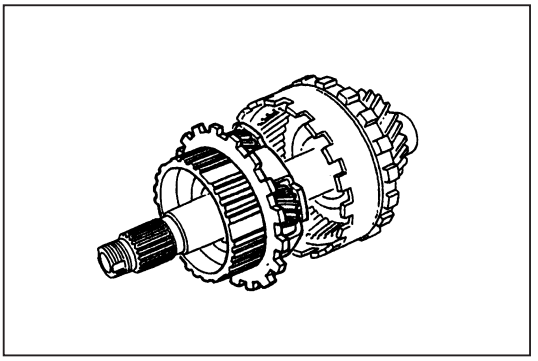
Unit: mm (APPROX.)

	Outer diameter	Inner diameter
Race	41.8	30.0
Thrust needle bearing	43.7	31.0



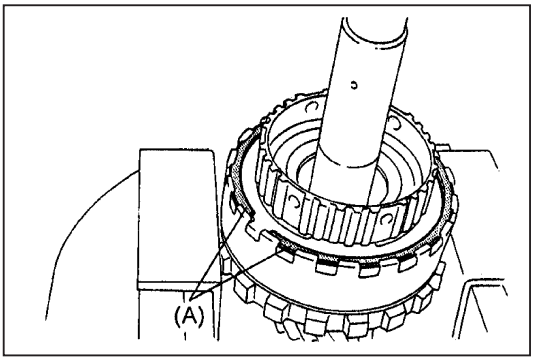
AT00388-00374

15. Install the underdrive planetary gear to the countershaft.



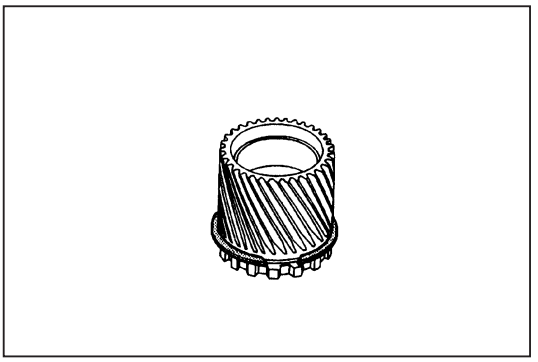
AT00389-00375

16. Install the hole snap ring, using a standard flat screwdriver.
    NOTE:
    - Make sure that both ends of the hole snap ring are fitted into the grooves (section A) of the drive pinion, as indicated in the right figure.
    - To prevent deformation, do not expand the snap ring excessively. Replace any deformed snap ring with a new part.



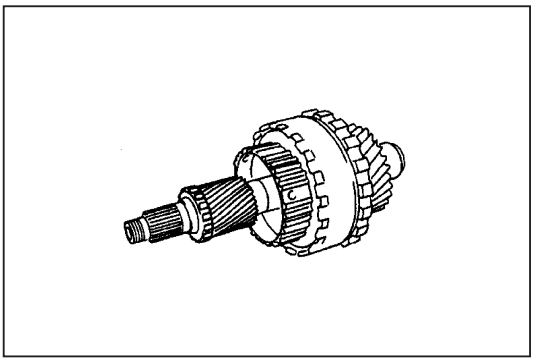
AT00390-00376

17. Install the hole snap ring to the underdrive planetary sun gear, using standard snap ring pliers.
    NOTE:
    - To prevent deformation, do not expand the snap ring excessively. Replace any deformed snap ring with a new part.



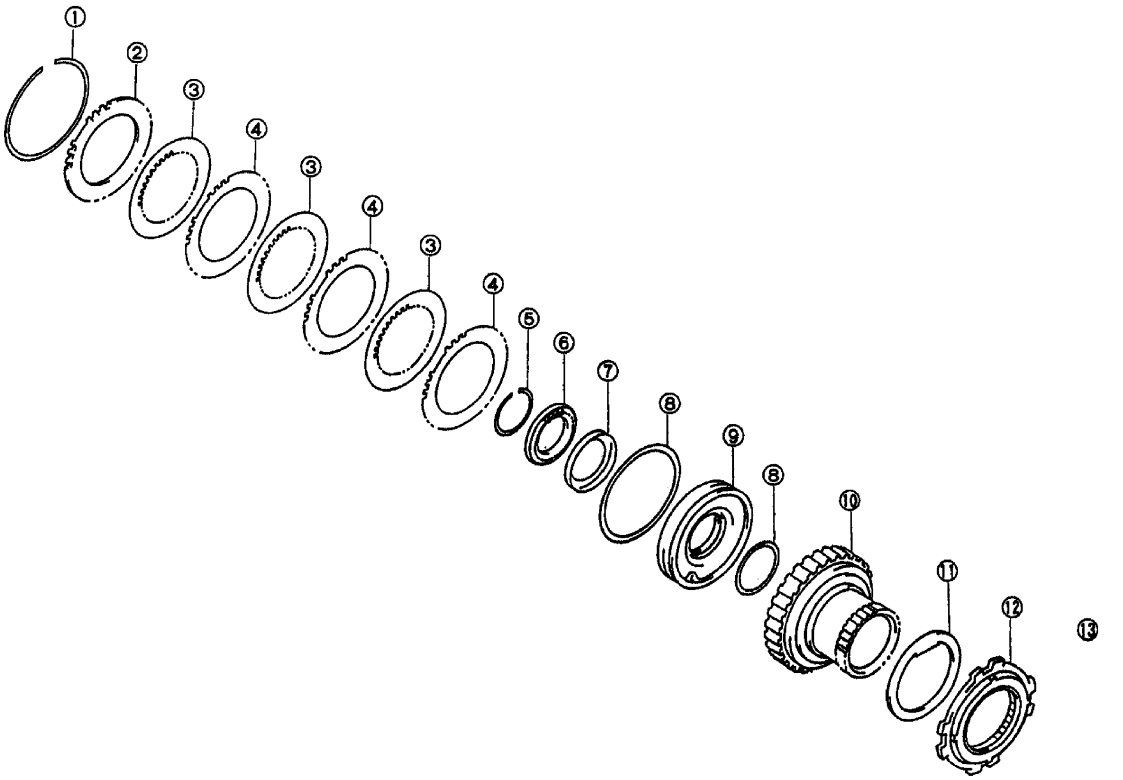
AT00391-00377

18. Install the underdrive planetary sun gear with the hole snap ring installed.



AT00392-00378

UNDERDRIVE CLUTCH AND ONE-WAY CLUTCH NO. 3

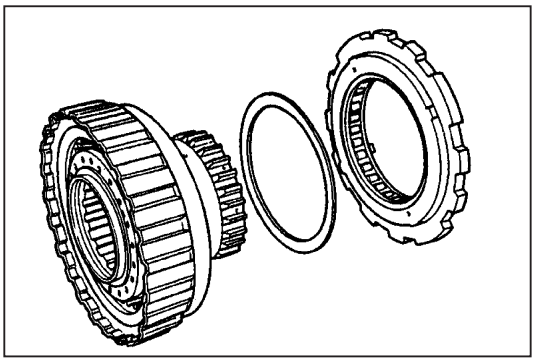


① Hole snap ring
② Underdrive clutch Flange No. 1
③ Underdrive clutch disc No. 1
④ Underdrive clutch plate No. 1
⑤ Shaft snap ring
⑥ Underdrive clutch return spring subassembly
⑦ Underdrive clutch return spring plate
⑧ O-ring
⑨ Underdrive clutch piston subassembly
⑩ Underdrive clutch drum subassembly
⑪ Underdrive clutch drum thrust washer
⑫ Underdrive one-way clutch assembly
⑬ One-way clutch retainner

AT00393-00379

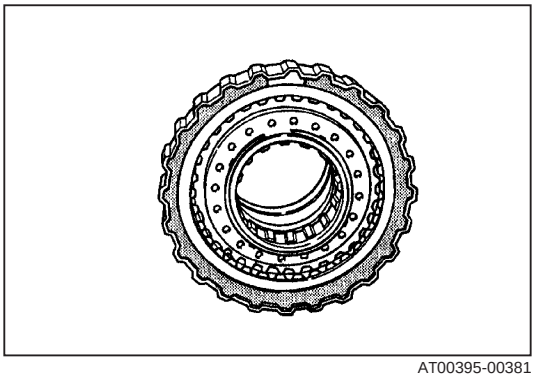
DISASSEMBLY OF UNDERDRIVE CLUTCH

1. Remove the one-way clutch and thrust washer from the underdrive clutch drum.



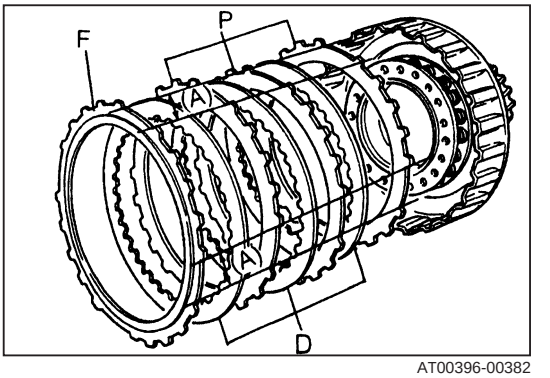
AT00394-00380

2. Remove the hole snap ring, using a standard flat screwdriver.



AT00395-00381

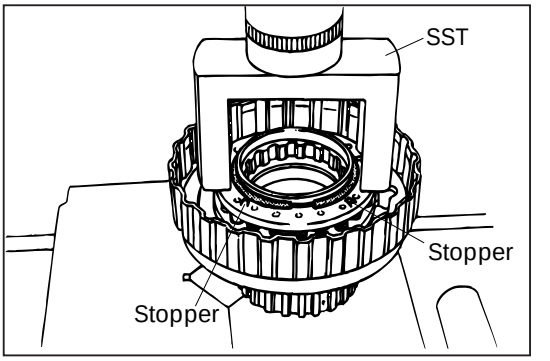
3. Remove the flange, discs and plates from the clutch drum in the following sequence.
   F = Clutch flange, D = Clutch disc,
   P = Clutch plate
   F → D → P → D → P → D → P



AT00396-00382

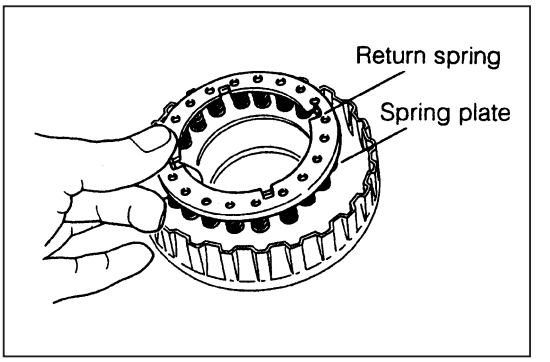
4. Remove the hole snap ring by compressing the return spring, using the following SST and standard snap ring pliers in conjunction with a press.
   SST: 09350-32014-000 (09351-32070)

   NOTE:
   - To prevent deformation, do not expand the snap ring excessively.



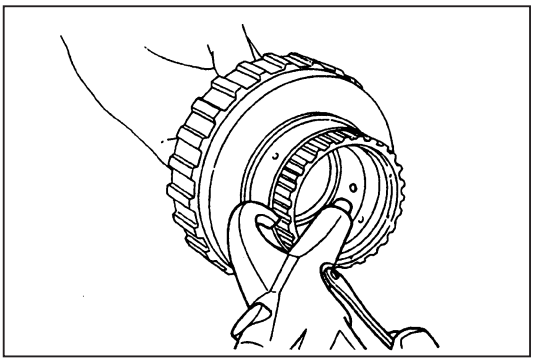
AT00397-00383

5. Remove the SST.
6. Remove the return spring and spring plate.

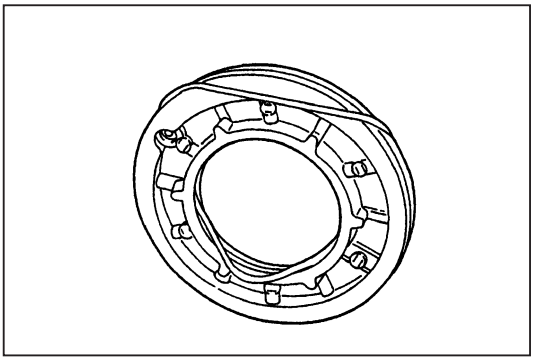


AT00398-00384

7. Remove the piston from the oil hole of the clutch drum, using compressed air.
   NOTE:
   - Be sure to put on protection goggles.

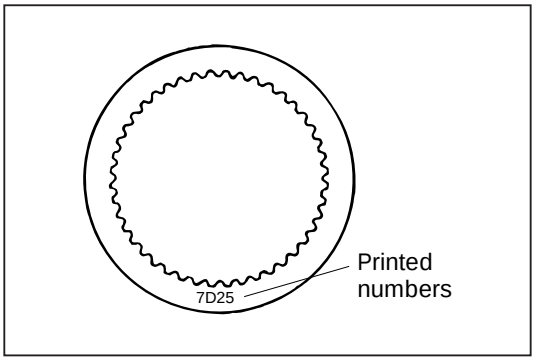

AT00399-00385

8. Remove the two O-rings from the piston.
   NOTE:
   - Never reuse the removed O-rings.


AT00400-00386

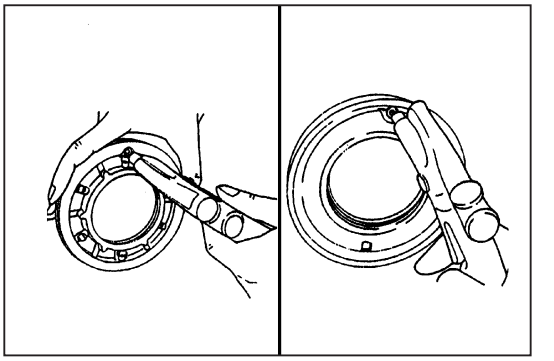
INSPECTION

1. Inspection of discs, plates and flanges
   Check that the sliding surfaces of the discs, plates and flanges are not worn or burnt. If necessary, replace them.
   NOTE:
   - If the lining of the disc is exfoliated or discolored, or even a part of the printed numbers is defaced, replace all discs.
   - Before assembling new discs, soak them in the ATF for at least two hours.

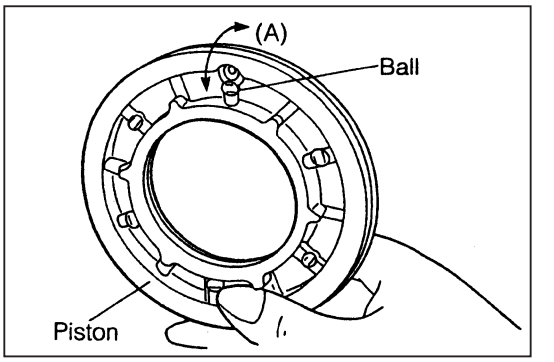


AT00401-00387

2. Check that the valve exhibits no leakage by applying the low-pressed air onto both sides.


AT00402-00388

3. Ensure that creaking noise of the ball is emitted when shaking the piston clockwise and counterclockwise. (Namely, ensure that the ball is free.)

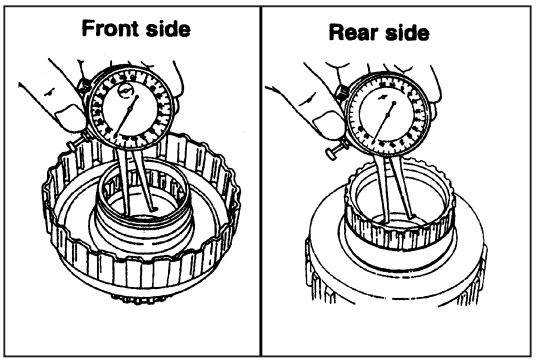


AT00403-00389

4. Measure the bush inner diameter of the underdrive clutch drum, using an inner caliper gauge.

Unit: mm

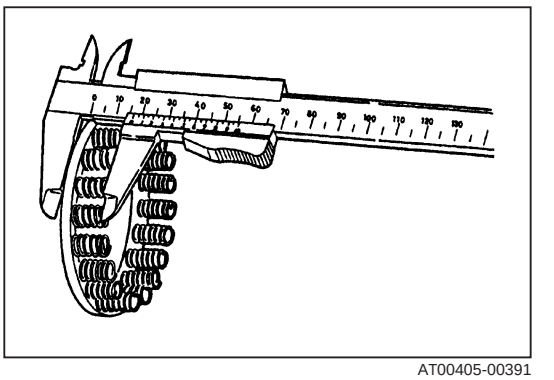
	Specified value	Allowable limit
Front	46.500 - 46.525	46.570
Rear	55.000 - 55.030	55.080



AT00404-00390

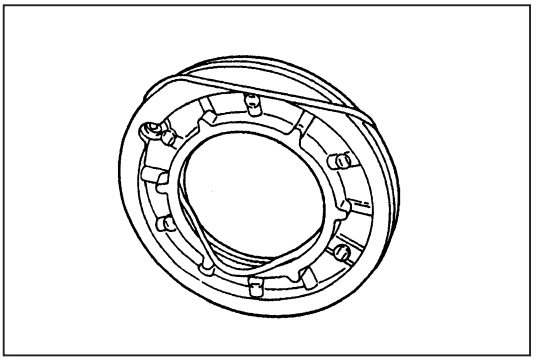
5. Measure the height of the return spring with the spring seat.
   Specified Value: 15.1 - 16.5 mm

   NOTE:
   - Do not apply excessive measuring force when measuring the height of the spring. Perform the measurement at several points.


AT00405-00391

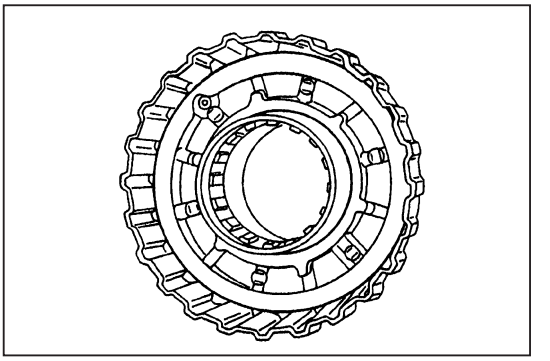
ASSEMBLY OF UNDERDRIVE CLUTCH

1. Coat two new O-rings with the ATF and install them to the piston.



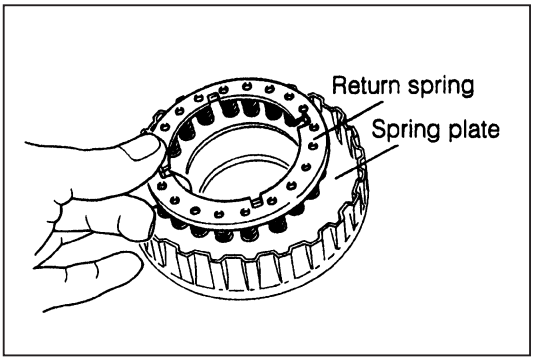
AT00406-00392

2. Install the underdrive clutch piston into the clutch drum.
   NOTE:
   - Be very careful not to damage or twist the new O-rings during the installation.



AT00407-00393

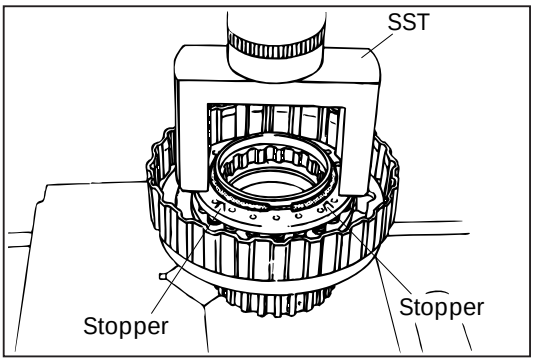
3. Install the spring seat and return spring to the underdrive clutch.



AT00408-00394

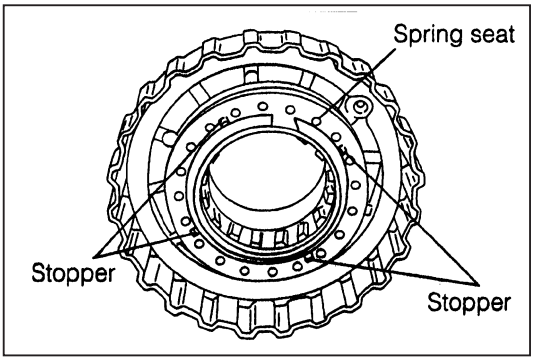
4. While compressing the return spring with a press in combination with the following SST, install the hole snap ring, using a standard flat screwdriver.
   SST: 09350-32014-000 (09351-32070-000)

   NOTE:
   - To prevent deformation, do not expand the snap ring excessively. Replace any deformed snap ring with a new part.



AT00409-00395

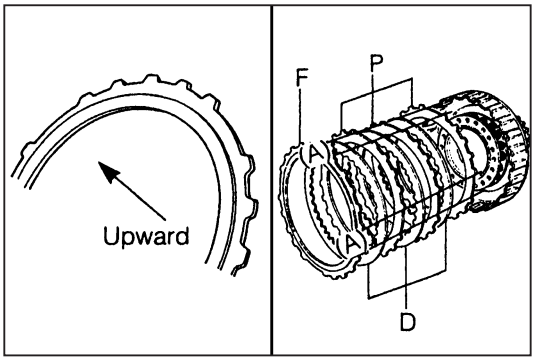
   - Make sure that the ends of the hole snap ring are not aligned with the stopper section of the spring seat, as indicated in the right figure.



AT00410-00396

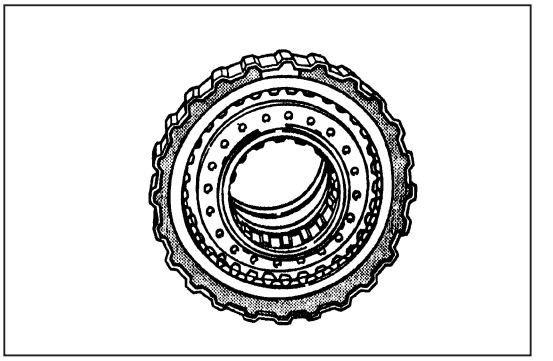
5. Install the plates, discs and flange in the following sequence.
   P = Clutch plate, D = Clutch disc,
   F = Clutch flange
   P → D → P → D → P → D → F

   NOTE:
   - Make sure that the flat end of the clutch flange faces downward.
   - Align the clutch flange with the section (A) where the teeth of the clutch plate are not machined.

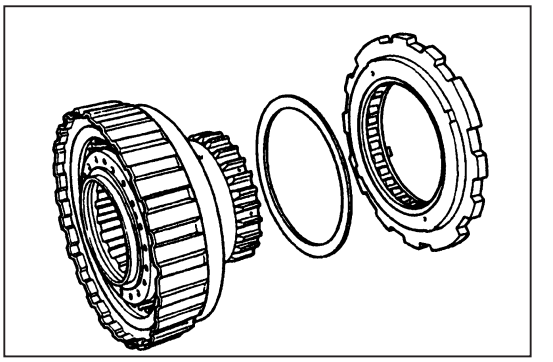


AT00411-00397

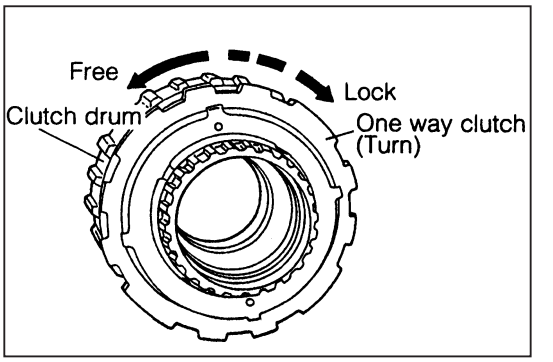
6. Install the hole snap ring, using a standard flat screwdriver.
   NOTE:
   - Make sure that the hole snap ring is installed to the groove section of the underdrive clutch drum.
   - Align the end of the snap ring with the inner tooth section of the clutch flange, as indicated in the right figure.


AT00412-00398

7. Install the thrust washer and one-way clutch to the underdrive clutch drum.

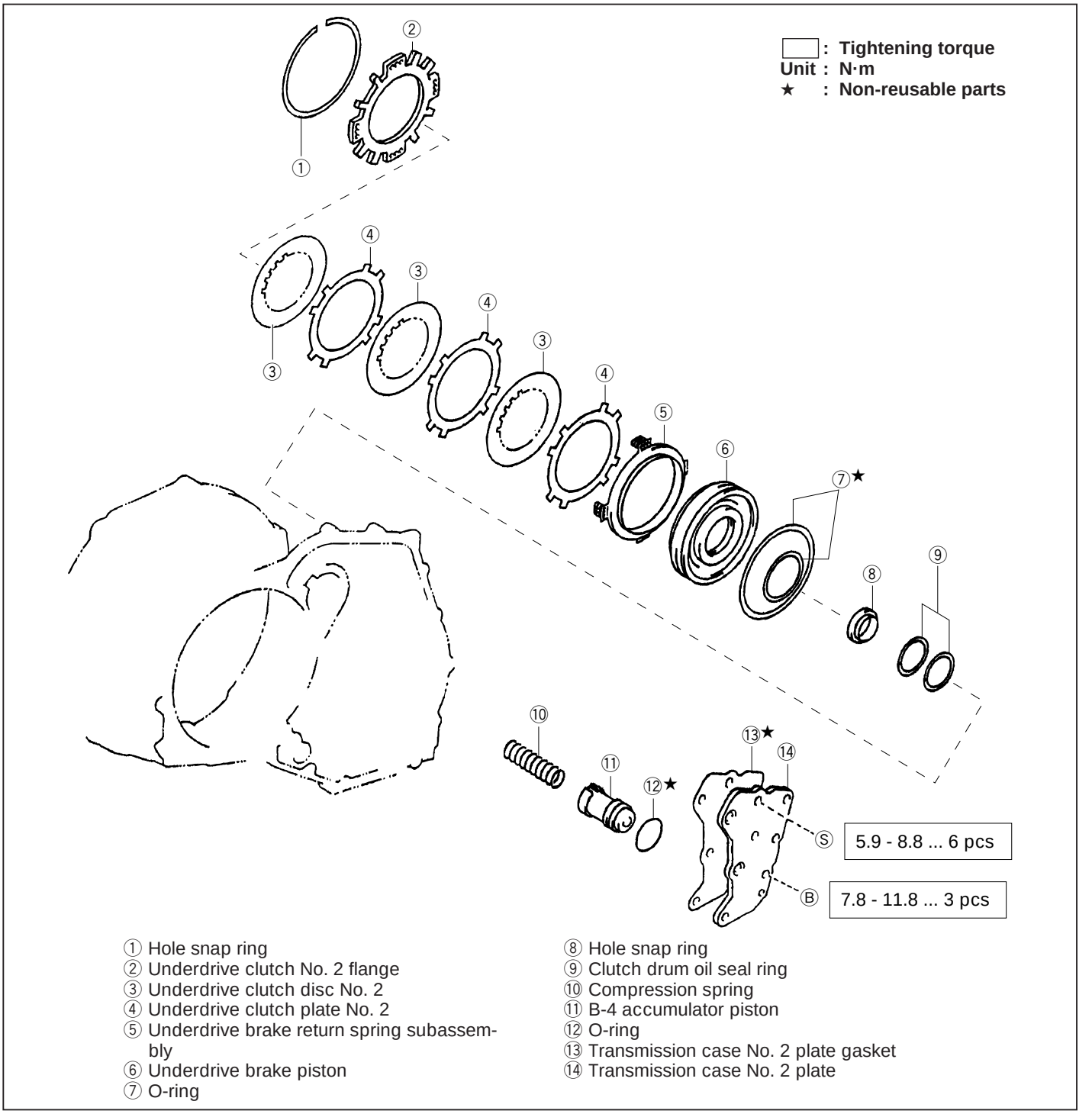

AT00413-00399

8. Inspection of one-way clutch
   Ensure that the one-way clutch turns freely when turned counterclockwise. Also, ensure that the one-way clutch is locked when turned clockwise.



AT00414-00400

UNDERDRIVE BRAKE AND B4 ACCUMULATOR PISTON



① Hole snap ring
② Underdrive clutch No. 2 flange
③ Underdrive clutch disc No. 2
④ Underdrive clutch plate No. 2
⑤ Underdrive brake return spring subassembly
⑥ Underdrive brake piston
⑦ O-ring
⑧ Hole snap ring
⑨ Clutch drum oil seal ring
⑩ Compression spring
⑪ B-4 accumulator piston
⑫ O-ring
⑬ Transmission case No. 2 plate gasket
⑭ Transmission case No. 2 plate

AT00415-00401

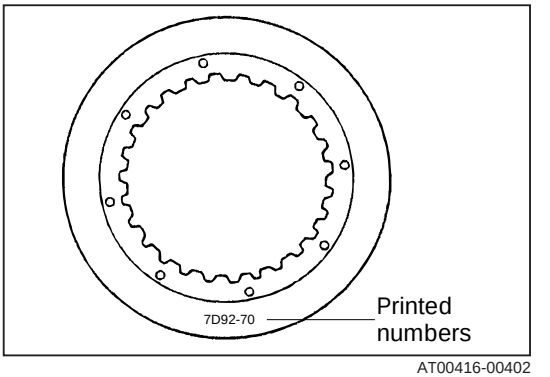
Inspection of first and reverse brake component

Inspect discs, plates and flanges.

Check that the sliding surfaces of discs, plates and flanges are worn or burnt. If necessary, replace them.

NOTE:

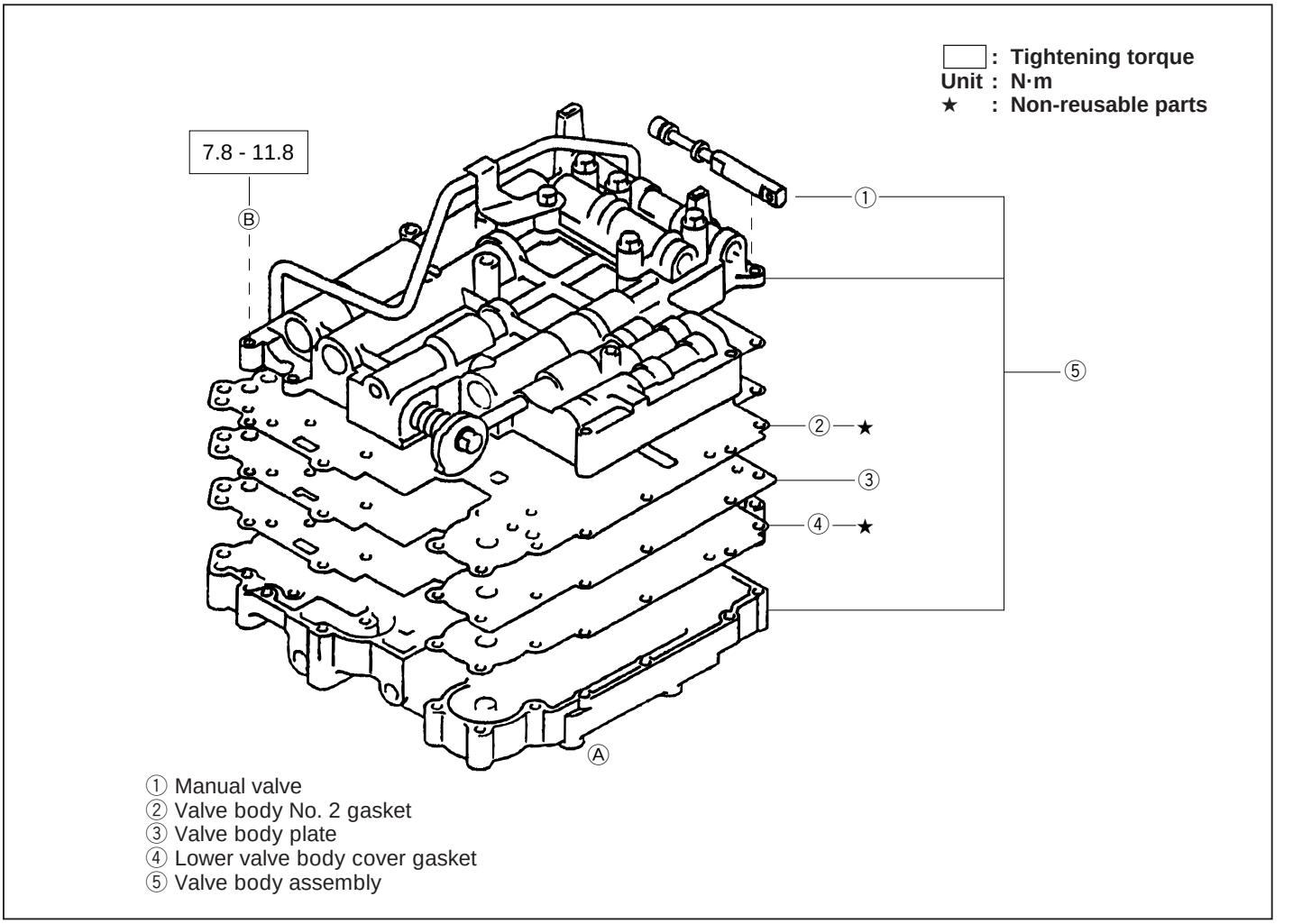
- If the lining of the disc is exfoliated or discolored, or even a part of the printed numbers are defaced, replace all discs.
- Before assembling new discs, soak them in ATF for at least two hours.



AT00416-00402

VALVE BODY

COMPONENTS



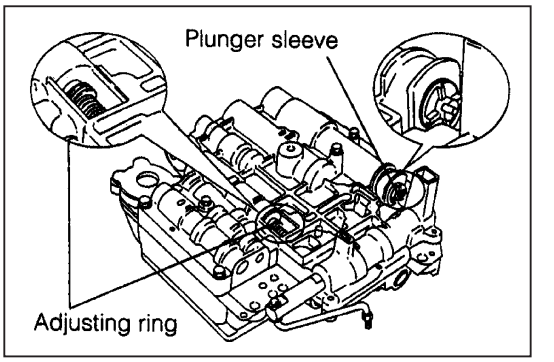
① Manual valve
② Valve body No. 2 gasket
③ Valve body plate
④ Lower valve body cover gasket
⑤ Valve body assembly

AT00417-00403

(Disassembly of valve body)

1. Note the number of adjusting rings.
   NOTE:
   - Count the number of adjusting rings before disassembly of the valve body because the throttle pressure is changed according to the number. (Some of the valve bodies do not have any adjusting rings.)

2. The position of plunger sleeve
   Note which step at the end of the plunger sleeve is in contact with valve body
   NOTE:
   - Be certain to check this before disassembly securely because the line pressure changes according to the part of plunger sleeve which comes into contact with the valve body.

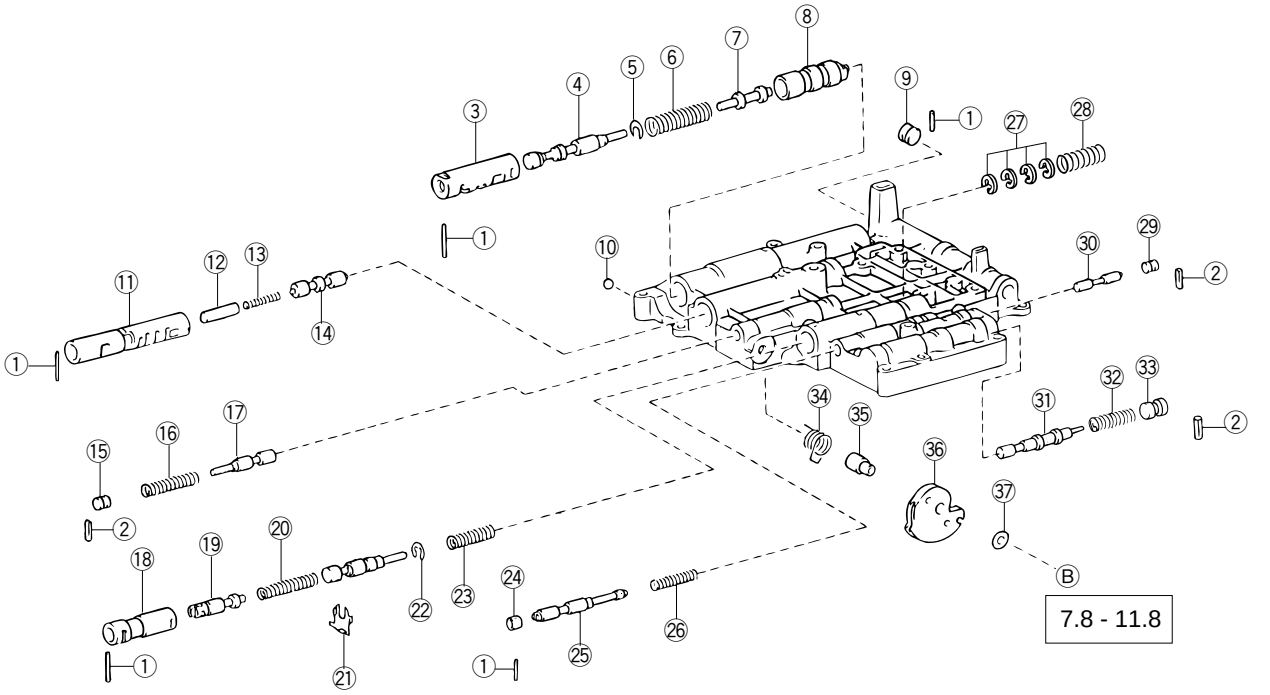


AT00418-00404

UPPER VALVE BODY

COMPONENTS

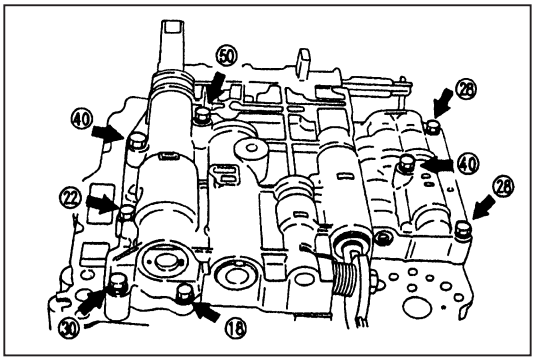
: Tightening torque
Unit : N·m



① Pin straight
② Key straight
③ Primary regulator valve sleeve
④ Primary regulator valve
⑤ Washer
⑥ Compression spring
⑦ Primary regulator valve plunger
⑧ Pressure regulator valve sleeve
⑨ Plug
⑩ Check ball (seven pieces)
⑪ Lock up relay valve sleeve
⑫ Lock up relay control valve
⑬ Compression spring
⑭ Lock up relay valve
⑮ Plug
⑯ Compression spring
⑰ Second coast modulator valve
⑱ Throttle valve sleeve
⑲ Down shift plug
⑳ Compression spring
㉑ Valve vibrating stopper
㉒ E-ring
㉓ Compression spring
㉔ Plug
㉕ Throttle modulator valve
㉖ Compression spring
㉗ E-ring
㉘ Compression spring
㉙ Plug
㉚ Cut back valve
㉛ Accumulator control valve
㉜ Compression spring
㉝ Plug
㉞ Torsion spring
㉟ Throttle valve cam pin
㊱ Throttle valve cam
㊲ Washer

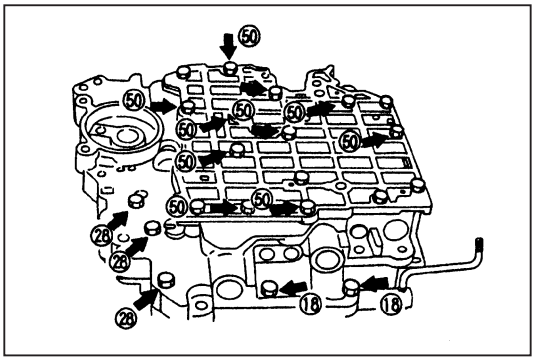
Disassembly of upper valve body

1. Remove the eight bolts of the upper valve body.
   NOTE:
   - The numeral in the right illustration indicates the nominal length of the bolt.



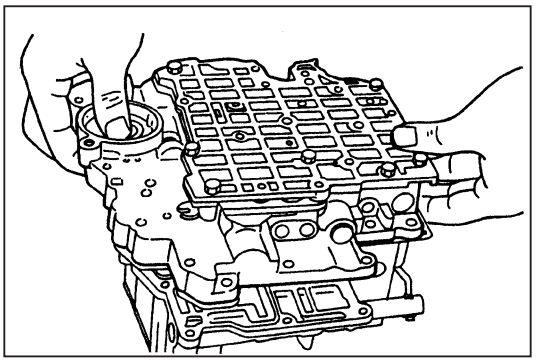
AT00420-00406

2. Turn over the valve body assembly.
3. Remove the fifteen bolts of the lower valve body cover.
   NOTE:
   - The numeral in the right illustration indicates the nominal length of the bolt.

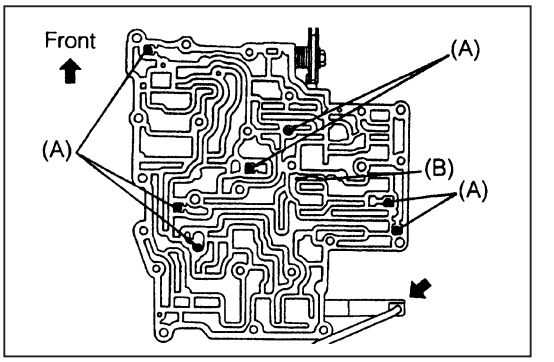


AT00421-00407

4. Lift up the lower valve body cover with lower valve body cover gasket, valve body plate and valve body No. 2 gasket.
   NOTE:
   - Never reuse the removed gasket

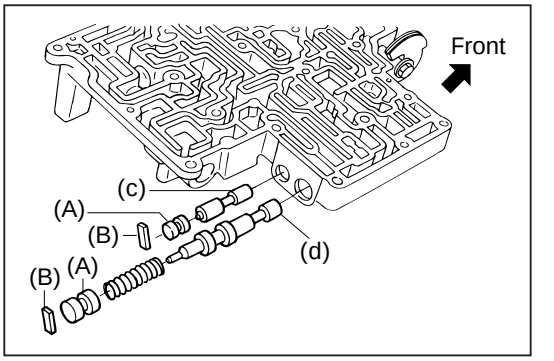

AT00422-00408

5. Be sure to confirm the location of the seven check balls (A) and vibrating stopper (B) as right figure illustration
6. Remove the seven check balls (dark blue) and vibrating stopper.
7. Pull out the manual valve toward you.



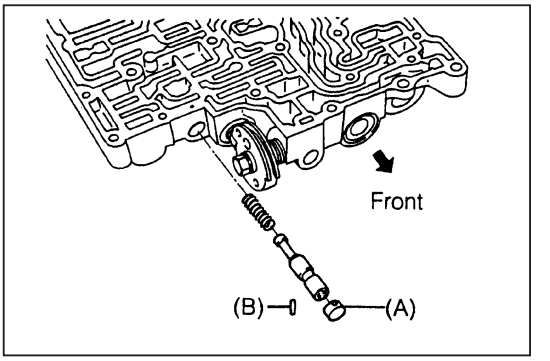
AT00423-00409

8. Cut back and Accumulator control valve removal
   (1) While pushing the plug (A) with your finger, remove the key (B) using the standard magnet hand.
   (2) Remove the plug.
   (3) Remove the cut back valve (c), compression spring and accumulator control valve (d) using the standard magnet hand.



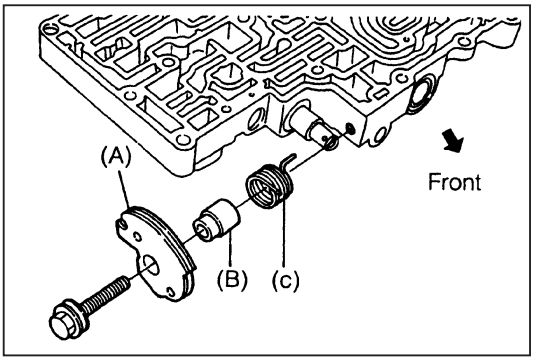
AT00424-00410

9. Throttle modulator valve removal
   (1) While pushing the plug (A) with your finger, remove the pin (B) with the standard magnet hand.
   (2) Remove the plug.
   (3) Remove the throttle modulator valve (c) and compression spring using the standard magnet hand.



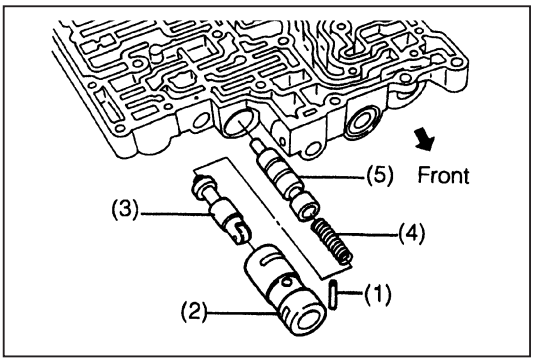
AT00425-00411

10. Remove the throttle valve cam (A), throttle valve cam pin (B) and torsion spring (c) by removing a bolt with plate washer.



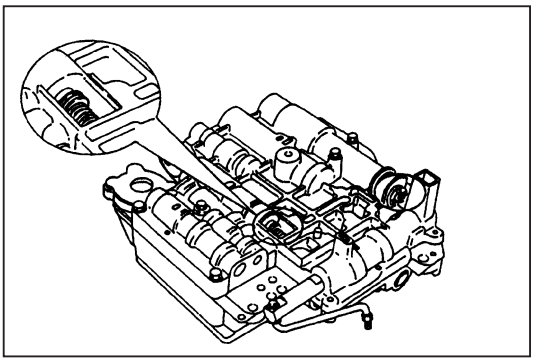
AT00426-00412

11. Remove the following parts, using the standard magnet hand.
   (1) Pin
   (2) Throttle valve sleeve
   (3) Down shift plug
   (4) Compression spring
   (5) Throttle valve

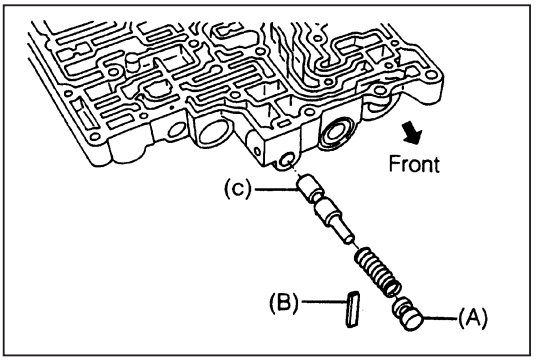


AT00427-00413

12. Turn over the valve body.
13. Remove the compression spring and E-ring(s), using the standard magnet hand.
   NOTE:
   • Count the number of adjusting rings before disassembly of the valve body because the throttle pressure is changed according to the number. (Some of the valve bodies do not have any adjusting rings.)

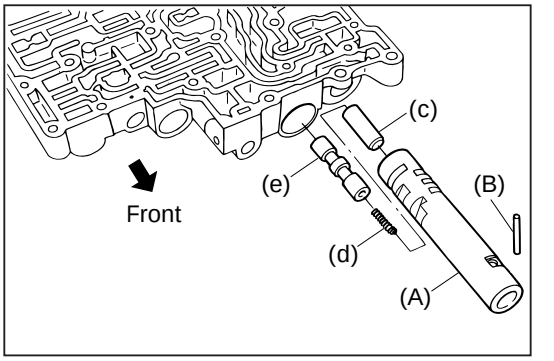

AT00428-00414

14. Turn over the valve body.
15. Coast modulator valve removal
   (1) While pushing the plug (A) with your finger, remove the key (B) with the standard magnet hand.
   (2) Remove the plug
   (3) Remove the compression spring and coast modulator valve (c), using the standard magnet hand.



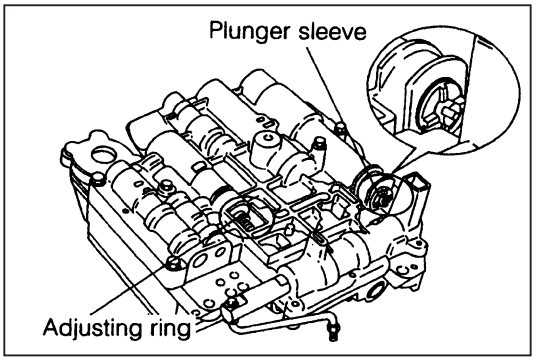
AT00429-00415

16. Lock up control valve removal
    (1) While pushing the lock up control valve sleeve (A), remove the pin (B) with the standard magnet hand.
    (2) Remove the following parts, using the standard magnet hand.
        (A) Lock up control valve sleeve
        (c) Lock up release valve
        (d) Compression spring
        (e) Lock up control valve



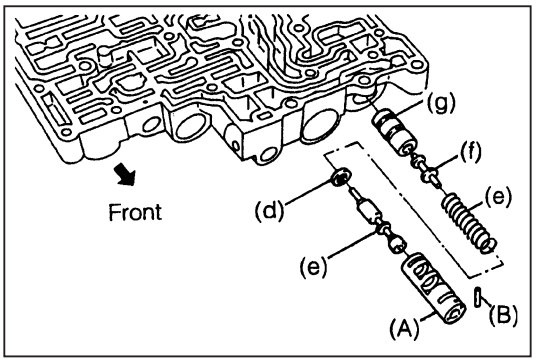
AT00430-00416

17. Be sure to check the position of regulator valve sleeve before disassembly because the line pressure changes according to the part of regulator sleeve which come into with valve body.



AT00431-00417

18. Primary regulator valve removal
    (1) While pushing the primary regulator valve (A) with your finger, remove the pin (B) with the standard magnet hand.
    (2) Remove the following parts.
        (A) Primary regulator valve sleeve
        (c) Primary regulator valve
        (d) Shim
        (e) Compression spring
        (f) Primary regulator plunger sleeve
        (g) Pressure regulator valve sleeve



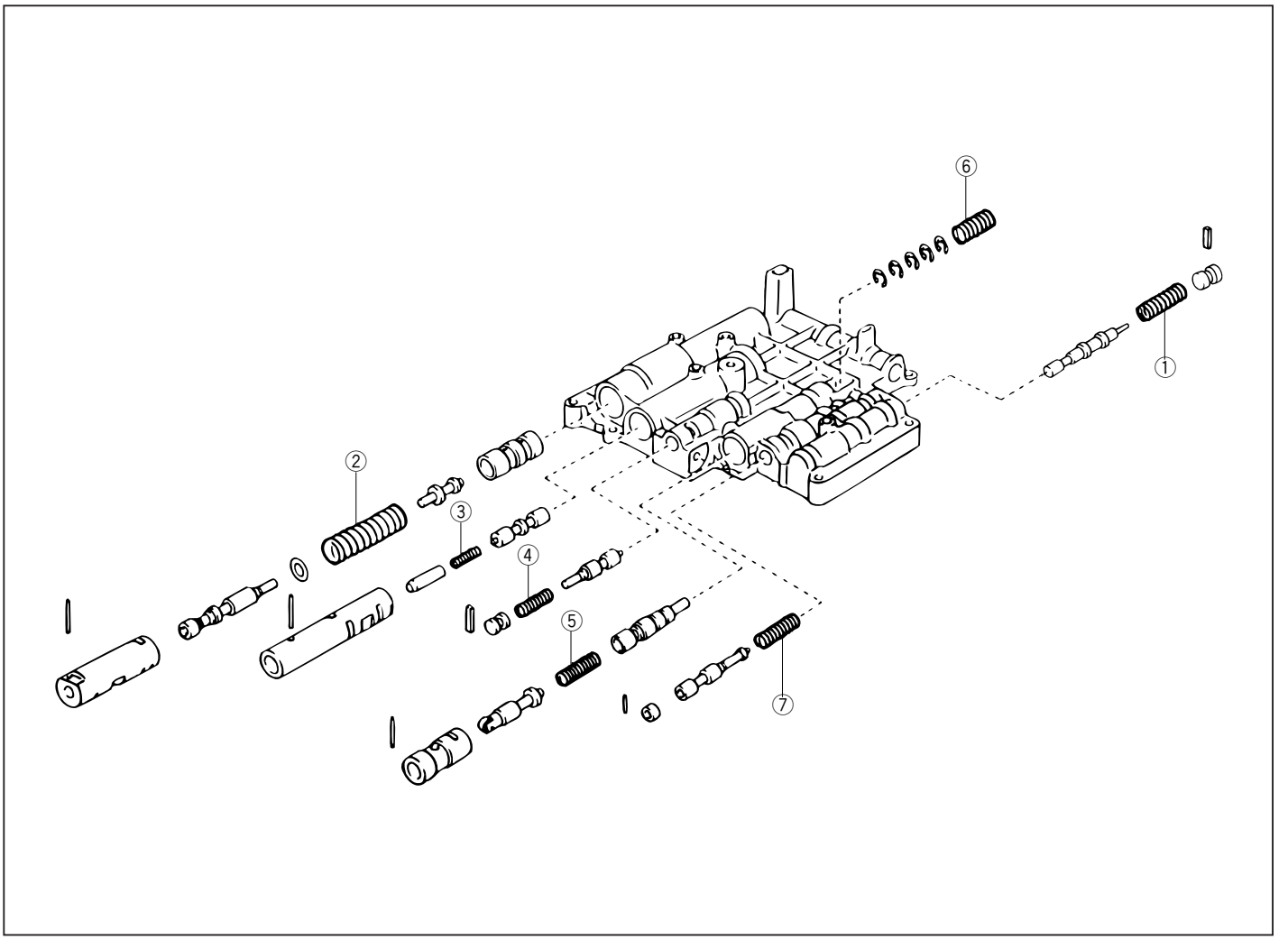
AT00432-00418

19. Remove the plug (for manual valve) by removing the pin with the standard magnet hand.

AT00433-00000

INSPECTION

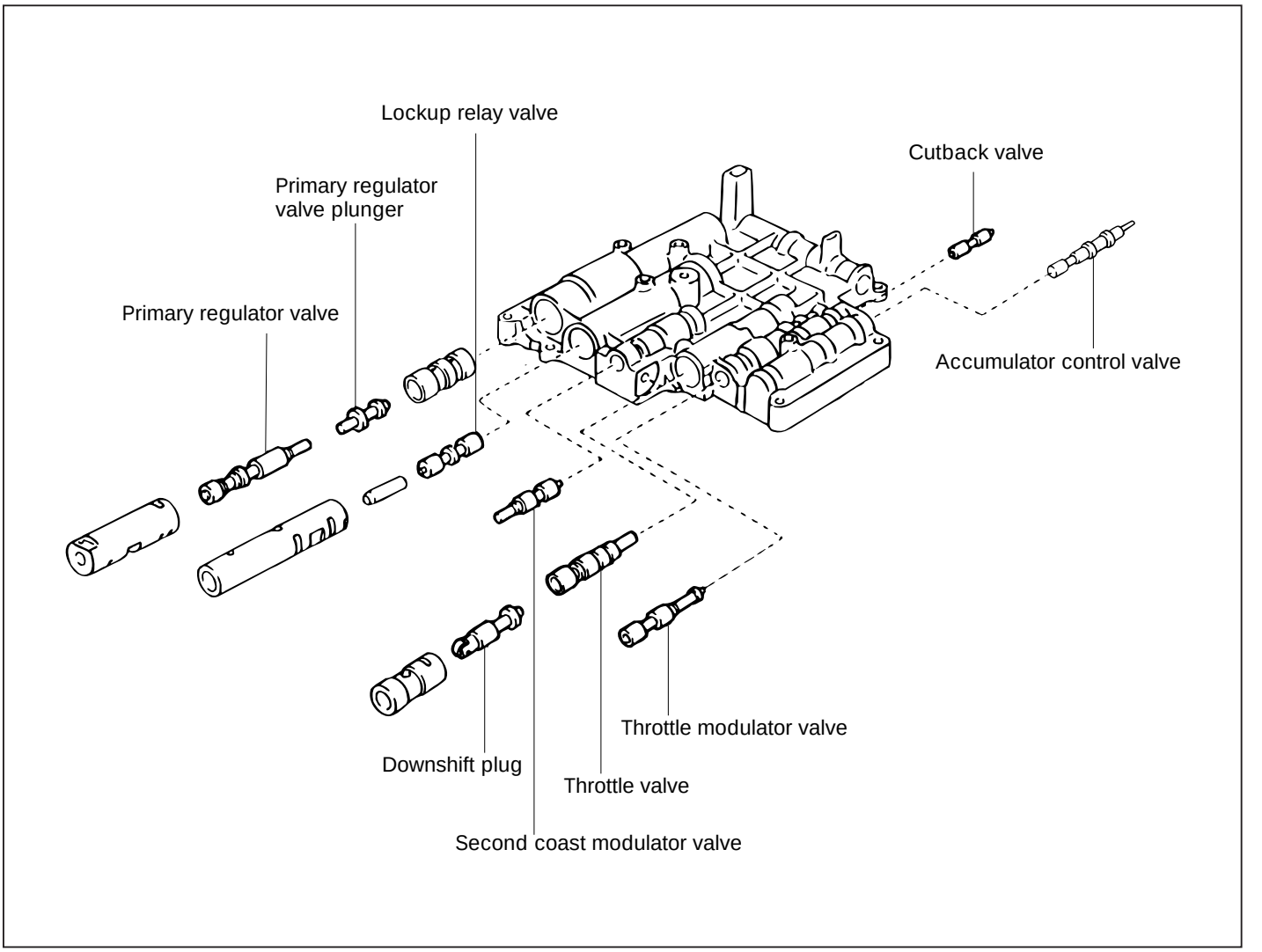
1. Measure the free length and outer diameter of the compression spring



No.	Parts name		Free length	Outer diameter	Identification color
①	Accum control valve	(for HD-C E/G models)	38.2	10.0	Orange
		(for HD-E E/G models)	34.8	9.8	None
②	Primary regulator valve		66.7	18.6	Purple
③	Lock up relay valve		18.8	5.1	None
④	Second coast modulator valve		29.7	8.3	Red
⑤	Down shift plug		29.8	8.8	Blue
⑥	Throttle valve		29.2	9.2	Light green
⑦	Throttle modulator valve		29.9	9.0	Green

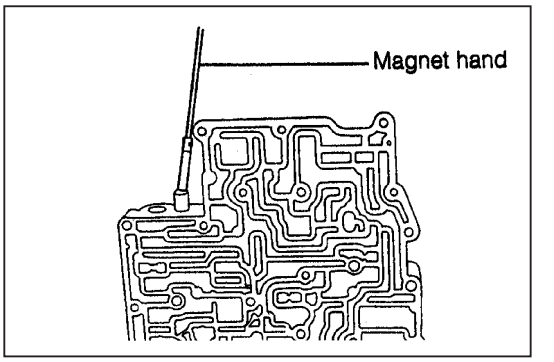
AT00434-00419

2. Valves



AT00435-00420

(1) Make sure that no scratch or damage is made on the installation hole of the valve body and outer periphery of the valve itself.
(2) Coat the valves with the ATF.
(3) Be sure to allow each valve to drop into the valve body by its own weight.
NOTE:
- Never push the valve with your fingers when conducting the check of valve dropping by its own weight. Failure to observe this caution may cause burrs at the valve as well as at the edge surface inside the valve body. If such faulty valves are installed, it will result in valve malfunctions. Hence, utmost care must be exercised when conducting the check.



AT00436-00421

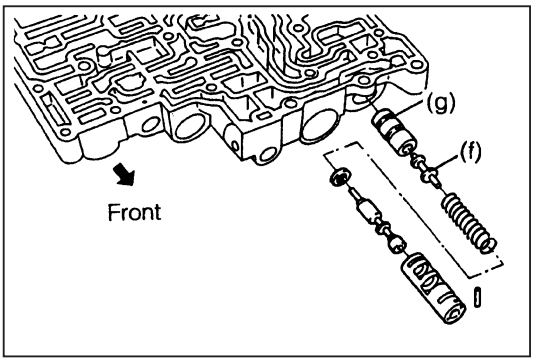
Assembly of upper valve body

NOTE:

- Prior to the installation of the removed parts, be sure to wash the parts including the valves, plugs, keys, compression springs and the valve body proper with white gasoline.
- Dry the washed parts by applying compressed air. At this time, be sure to put on protection goggles. (Never use gloves or the like during this operation. Failure to observe this caution will allow the ingress of dust or lint into the valve body.)
- Prior to the installation of all valves, plugs and sleeves, be sure to apply the ATF to the outer periphery of each part in advance.

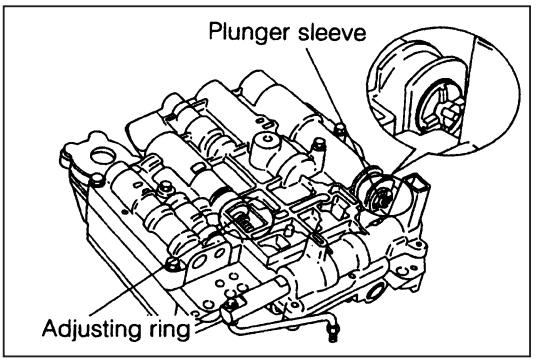
AT00437-00000

1. Install the plug (for manual valve) with the pin.
2. Insert the primary regulator plunger sleeve (f) into the primary regulator valve sleeve (g).



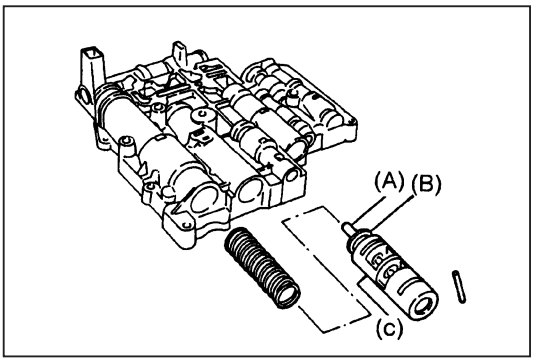
AT00438-00422

3. Insert the primary regulator valve sleeve into the valve body.
   NOTE:
   - Turn over the valve body to confirm that the stepped section at the end of the primary regulator valve sleeve is in contact with the same point as before the removal is made.



AT00439-00423

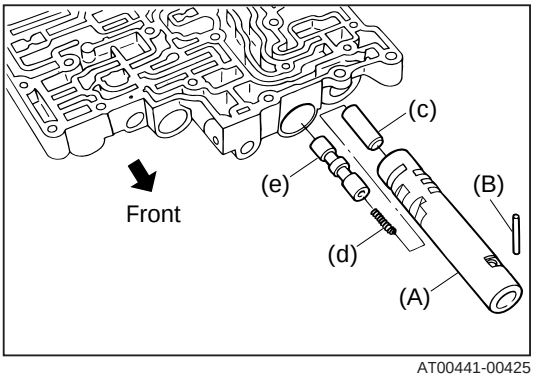
4. Insert the primary regulator valve (A) with the shim (B) into the primary regulator valve sleeve (C).
5. Install the following parts into the valve body with the pin.
   (1) Compression spring
   (2) Primary regulator valve sleeve



AT00440-00424

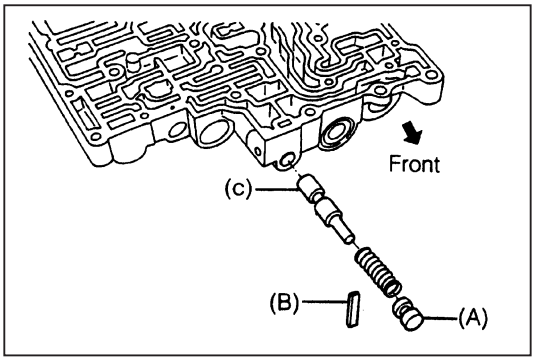
6. Install the following parts to the lockup control valve sleeve (A).
   (c) Lockup release valve
   (d) Compression spring
   (e) Lockup control valve
   NOTE:
   - The lockup control valve can be installed in both directions.

7. Install the control valve sleeve to the valve body with the pin.



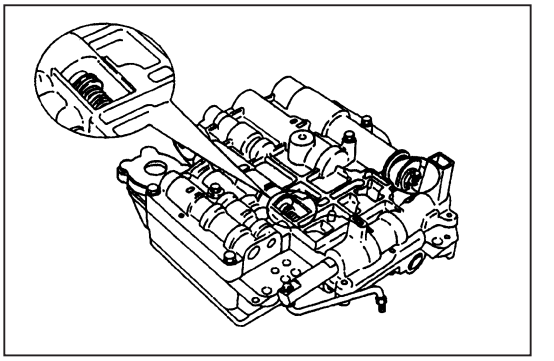
AT00441-00425

8. Insert the coast modulator valve (C) with the compression spring into the valve body.
9. Install the coast modulator valve with a key by pushing the plug (A) with your fingers.

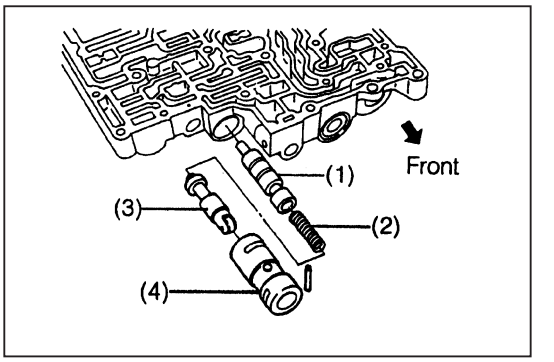


AT00442-00426

10. Turn over the valve body.
11. Install the removed E-ring(s) and compression spring.

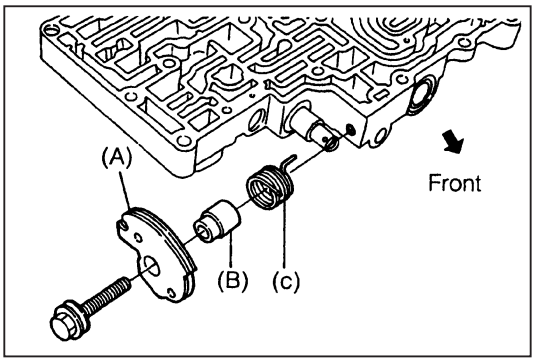

AT00443-00427

12. Turn over the valve body.
13. Insert the throttle valve-related parts into the throttle valve sleeve.
    (1) Throttle valve
    (2) Compression spring
    (3) Downshift plug
    (4) Throttle valve sleeve
14. While pushing the throttle valve sleeve with your fingers, install the pin.



AT00444-00428

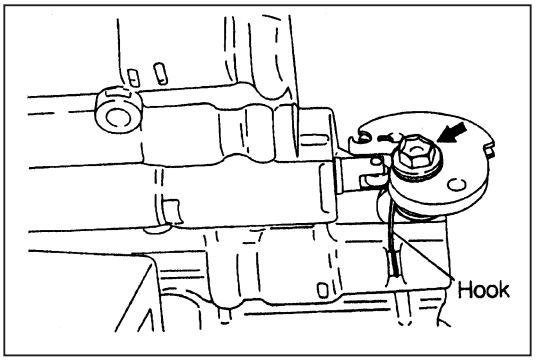
15. Installation of throttle cam
    (1) Install the throttle valve cam pin (B) to the throttle valve cam (A).



AT00445-00429

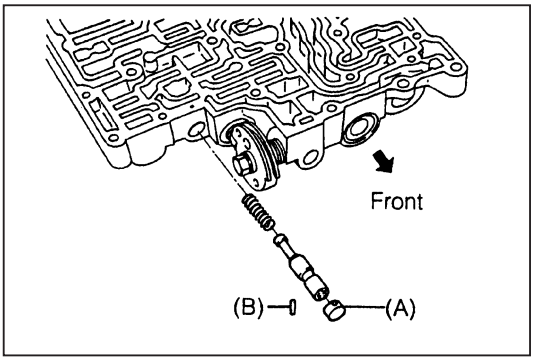
    (2) Hook the torsion spring to the throttle valve cam.
    (3) Tighten the throttle valve cam with a bolt.
    Tightening Torque: 7.8 - 11.8 N·m

NOTE:
- Make sure that the pawl of the torsion spring is hooked at the upper valve.
- Install the throttle valve cam in such a way that the roller of the downshift plug is installed exactly opposite to the cam.



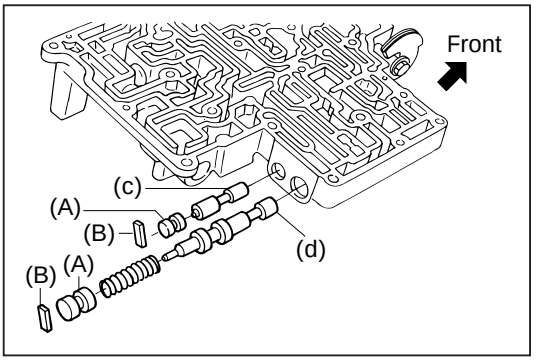
AT00446-00430

16. Installation of throttle modulator valve
    (1) Insert the compression spring and throttle modulator valve (c) into the valve body.
    (2) Install the plug.
    (3) While pushing the plug with your fingers, install the pin.



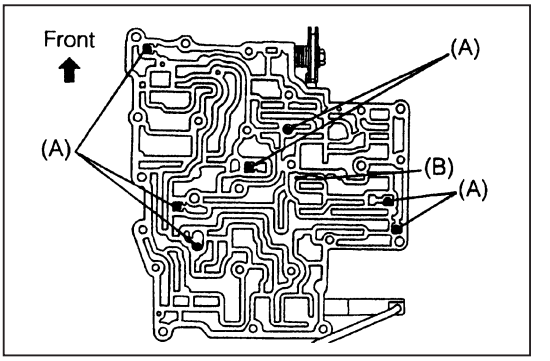
AT00447-00431

17. Installation of accumulator control valve and cutback valve
    (1) Insert the cutback valve (c), accumulator control valve (d) and compression spring into the valve body.
    (2) Install the plug (A).
    (3) While pushing the plug with your fingers, install the pin (B).



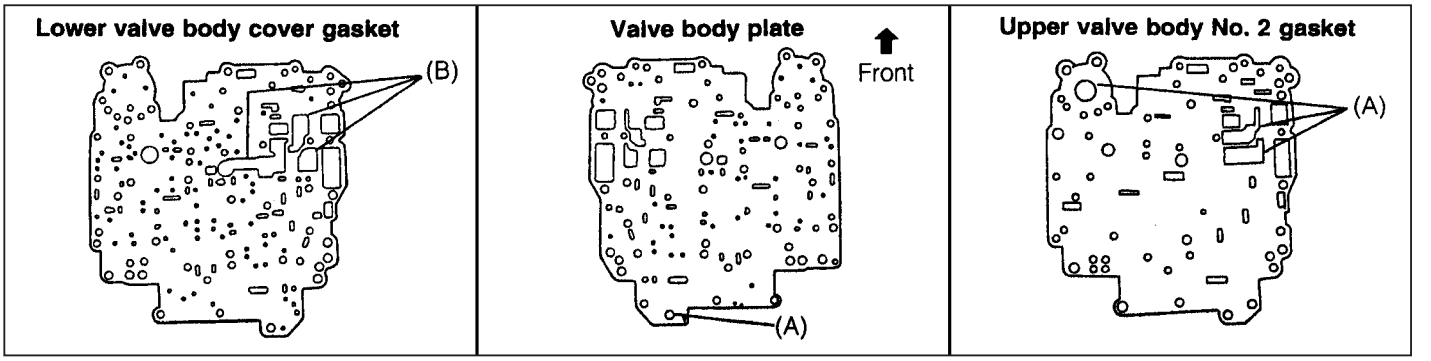
AT00448-00432

18. Place the vibration stopper (B) and seven check balls (dark blue) (A).
19. Install the manual valve.



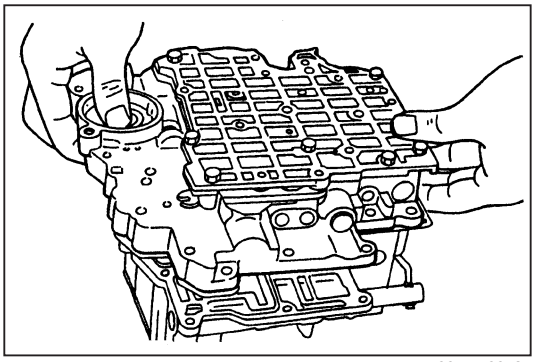
AT00449-00433

20. Place new gaskets and plate to the lower valve body cover.
    NOTE:
    - Distinguish difference in shape between the upper and lower gaskets by superposing one gasket over the other. (sections (A) and (B) in the figure below)
    - Make sure that the alphabet letter “A” stamped on the plate faces toward the lower valve body cover.



AT00450-00434

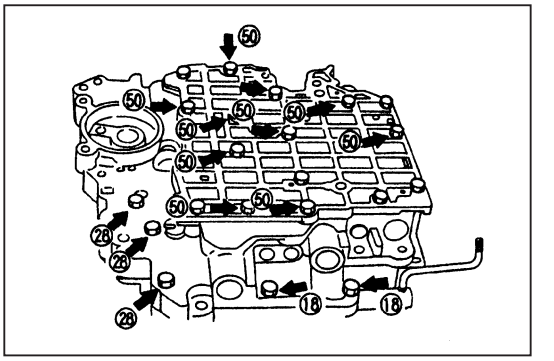
21. Place the lower valve body cover with valve body No. 2 gasket, valve body plate and lower valve body cover gasket to the upper valve body.



AT00451-00435

22. Turn over the valve body.
23. Temporally tighten the fifteen bolts with your finger.
24. Tighten the fifteen bolts.
    Tightening Torque: 7.8 - 11.8 N·m

    NOTE:
    - The numeral in the right illustration indicates the nominal length of the bolt.

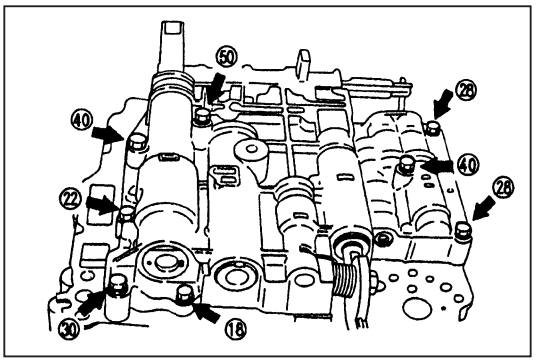


AT00452-00436

25. Turn over the valve body.
26. Temporally tighten the eight bolts with your finger.
27. Tighten the eight bolts of the upper valve body.
    Tightening Torque: 7.8 - 11.8 N·m

    NOTE:
    - The numeral in the right illustration indicates the nominal length of the bolt.

28. Install the valve body to the transaxle housing.

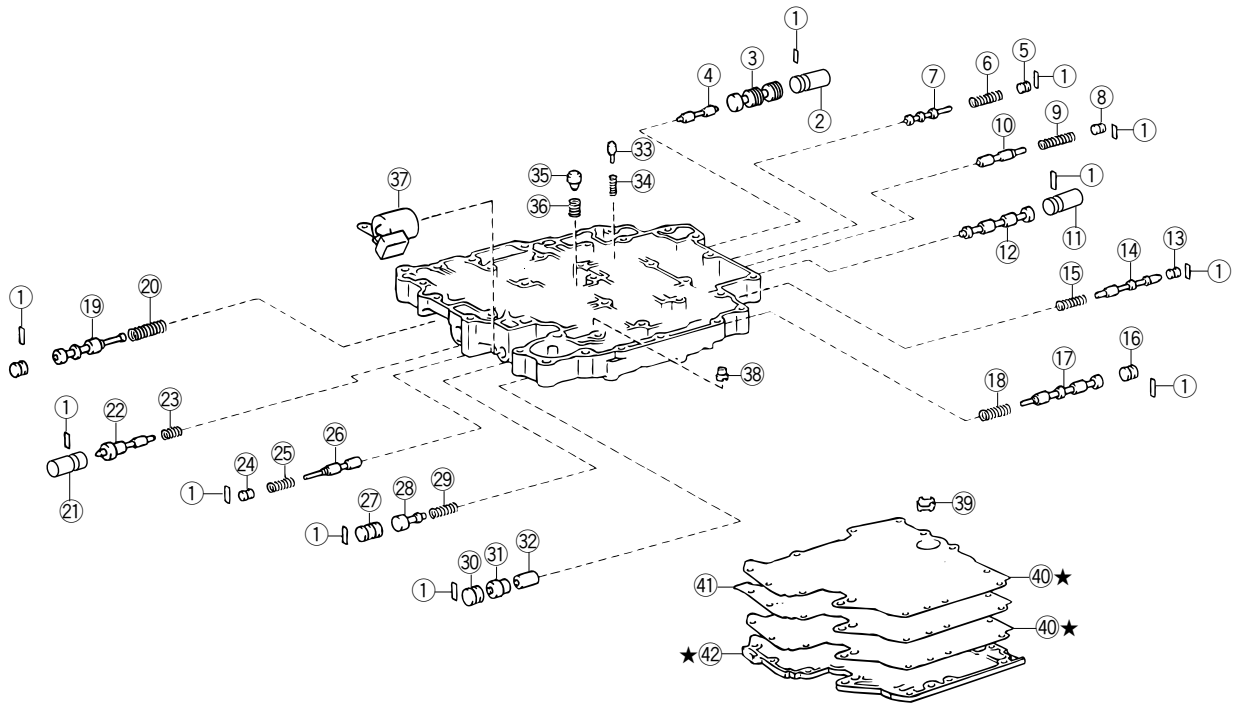


AT00453-00437

LOWER VALVE BODY

COMPONENTS

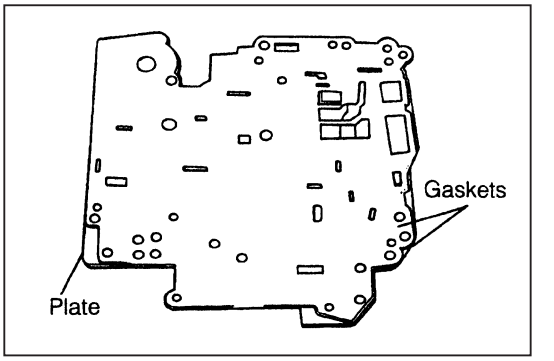
★ : **Non-reusable parts**



① Straight key
② Plug
③ 1-2 shift lower valve
④ 1-2 shift valve
⑤ Plug
⑥ Compression spring
⑦ Overdrive sequence valve
⑧ Plug
⑨ Compression spring
⑩ Detent regulator valve
⑪ Plug
⑫ 2-3 shift valve
⑬ Lock up signal valve plug
⑭ Lock up signal valve
⑮ Compression spring
⑯ Plug
⑰ 3-4 shift valve
⑱ Compression spring
⑲ Secondary regulator valve
⑳ Compression spring
㉑ Plug
㉒ Law coast shift valve
㉓ Compression spring
㉔ Plug
㉕ Compression spring
㉖ Low modulator valve
㉗ Intermediate shift valve plug
㉘ Intermediate shift valve
㉙ Compression spring
㉚ Plug
㉛ 3rd coast valve
㉜ 3-4 coast shift valve
㉝ Pressure relief valve
㉞ Compression spring
㉟ Check valve
㊱ Compression spring
㊲ Solenoid valve
㊳ Throttle modulator oil strainer
㊴ Line pressure oil strainer
㊵ Valve body cover gasket
㊶ Valve body cover plate
㊷ Lower valve body cover

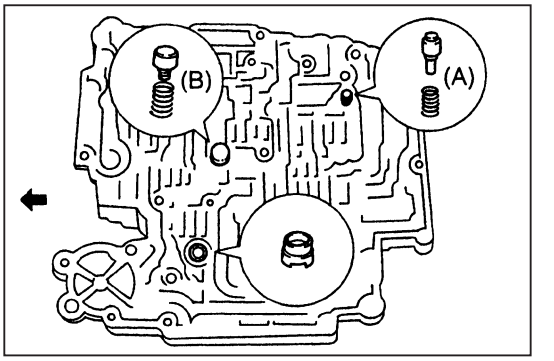
Disassembly of lower valve body

1. Remove the upper valve body.
2. Turn over the lower valve body.
3. Remove the two gaskets and plate by lifting up the upper valve body with your hands.
   NOTE:
   - Never reuse the removed gaskets.



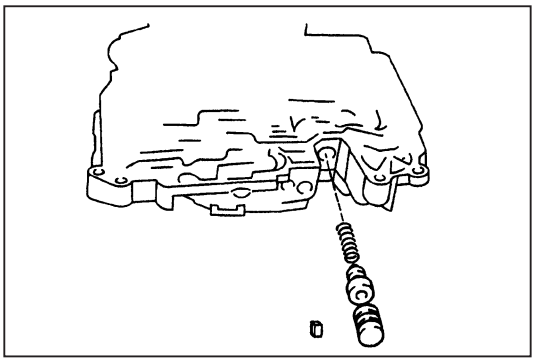
AT00455-00439

4. Remove the pressure relief valve (A) and compression spring
5. Remove the check valve (B) and compression spring.
6. Remove the throttle modulator oil strainer.

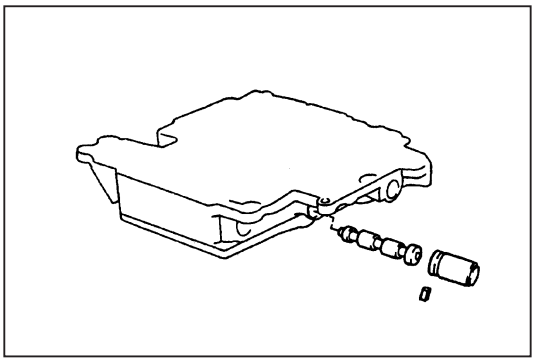


AT00456-00440

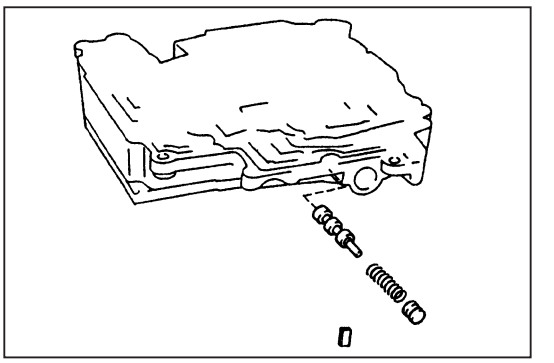
7. Intermediate shift valve removal
   (1) While pushing the plug with your finger, remove the key with standard magnet hand.
   (2) Remove the plug.
   (3) Remove the intermediate shift valve and compression spring, using the standard magnet hand.


AT00457-00441

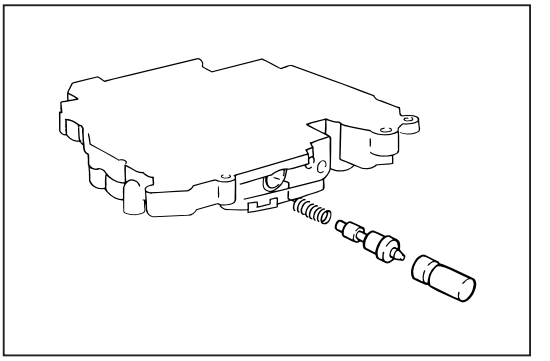
8. 2-3 shift valve removal
   (1) Remove the key, using the standard magnet hand.
   (2) Remove the plug.
   (3) Remove the 2-3 shift valve, using the standard magnet hand.


AT00458-00442

9. Overdrive sequence valve removal
   (1) While pushing the plug with your finger, remove the key with standard magnet hand.
   (2) Remove the plug.
   (3) Remove the compression spring and overdrive sequence valve, using the standard magnet hand.

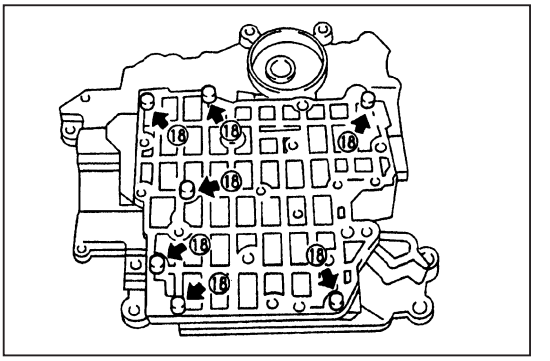

AT00459-00443

10. Removal of low coast shift valve
    (1) While pushing the plug with your fingers, remove the key with a standard magnet hand.
    (2) Remove the plug.
    (3) Remove the low coast shift valve and compression spring, using a standard magnet hand.



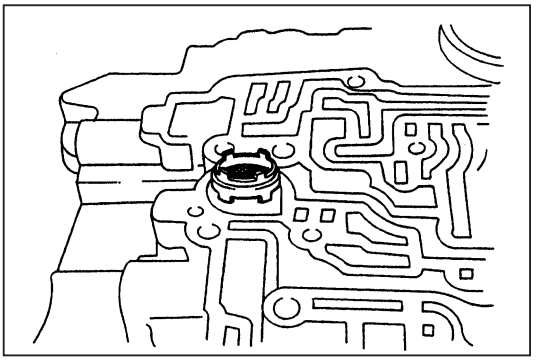
AT00460-00444

11. Turn over the lower valve body.
12. Remove the lower valve body cover with the two valve body No. 2 gaskets and valve body cover plate by removing the seven bolts.
    NOTE:
    - Never reuse the two removed gaskets.
    - The numeral in the right illustration indicates the nominal length of the bolt.



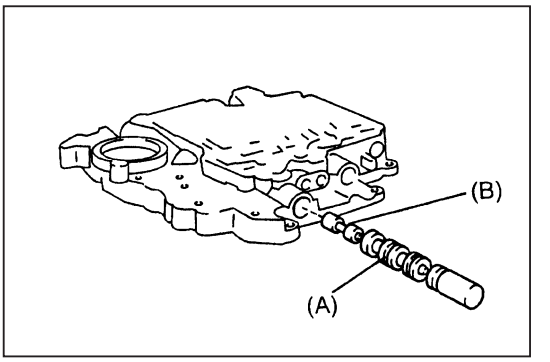
AT00461-00445

13. Remove the oil strainer.



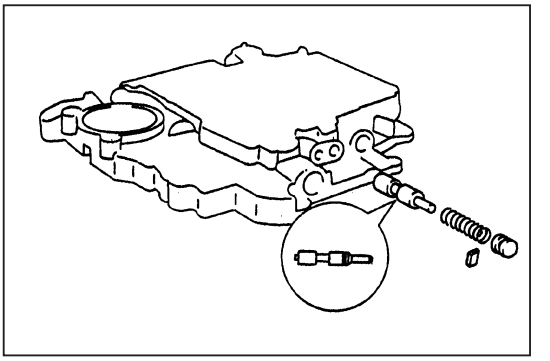
AT00462-00446

14. Removal of 1-2 shift lower and upper valves
    (1) Remove the key, using a standard magnet hand.
    (2) Remove the plug.
    (3) Remove the 1-2 shift lower valve (A) and 1-2 shift upper valve (B), using a standard magnet hand.



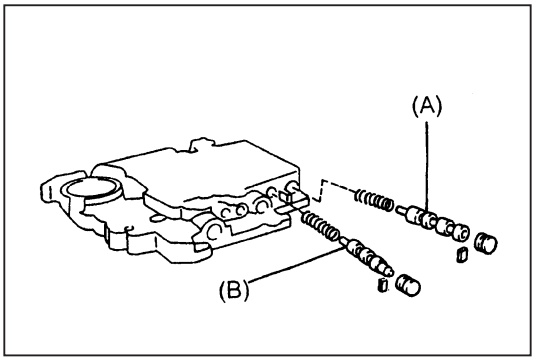
AT00463-00447

15. Removal of detent regulator valve
    (1) While pushing the plug with your fingers, remove the key with a standard magnet hand.
    (2) Remove the plug.
    (3) Remove the compression spring and detent regulator valve, using a standard magnet hand.
    NOTE:
    - The low modulator valve is similar in shape to the detent regulator valve. Hence, be sure to measure the overall length of these valves so that the valve may be installed correctly at the original position. (The detent regulator valve is longer than the low modulator valve.)



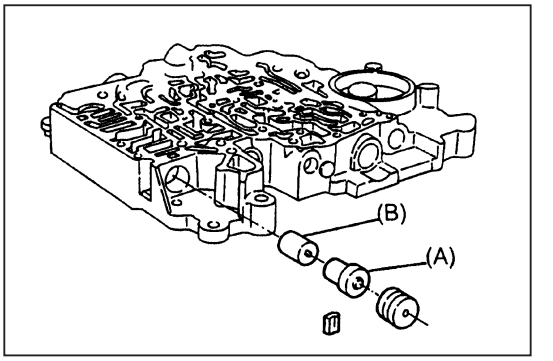
AT00464-00448

16. 3-4 shift valve and lock up signal valve removal
    (1) While pushing the plug with your finger, remove the key with standard magnet hand.
    (2) Remove the plug.
    (3) Remove the 3-4 shift valve (A), lock up signal valve (B) and compression springs, using the standard magnet hand.



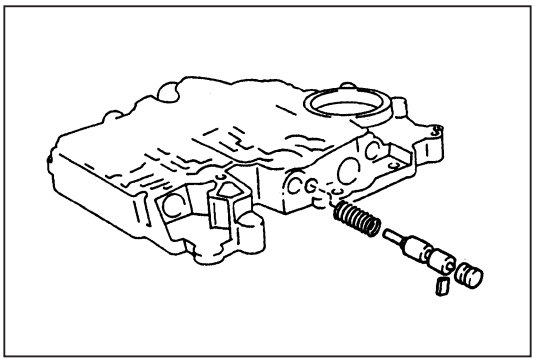
AT00465-00449

17. 3rd coast shift valve and 3-4 coast shift valve removal.
    (1) Remove the key, using the standard magnet hand.
    (2) Remove the plug.
    (3) Remove the 3rd coast shift valve (A) and 3-4 coast shift valve (B), using the standard magnet hand.

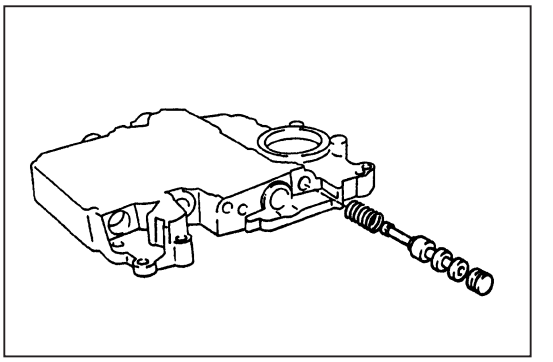


AT00466-00450

18. Low modulator valve removal
    (1) While pushing the plug with your finger, remove the key with standard magnet hand.
    (2) Remove the plug.
    (3) Remove the low modulator valve, using the standard magnet hand.

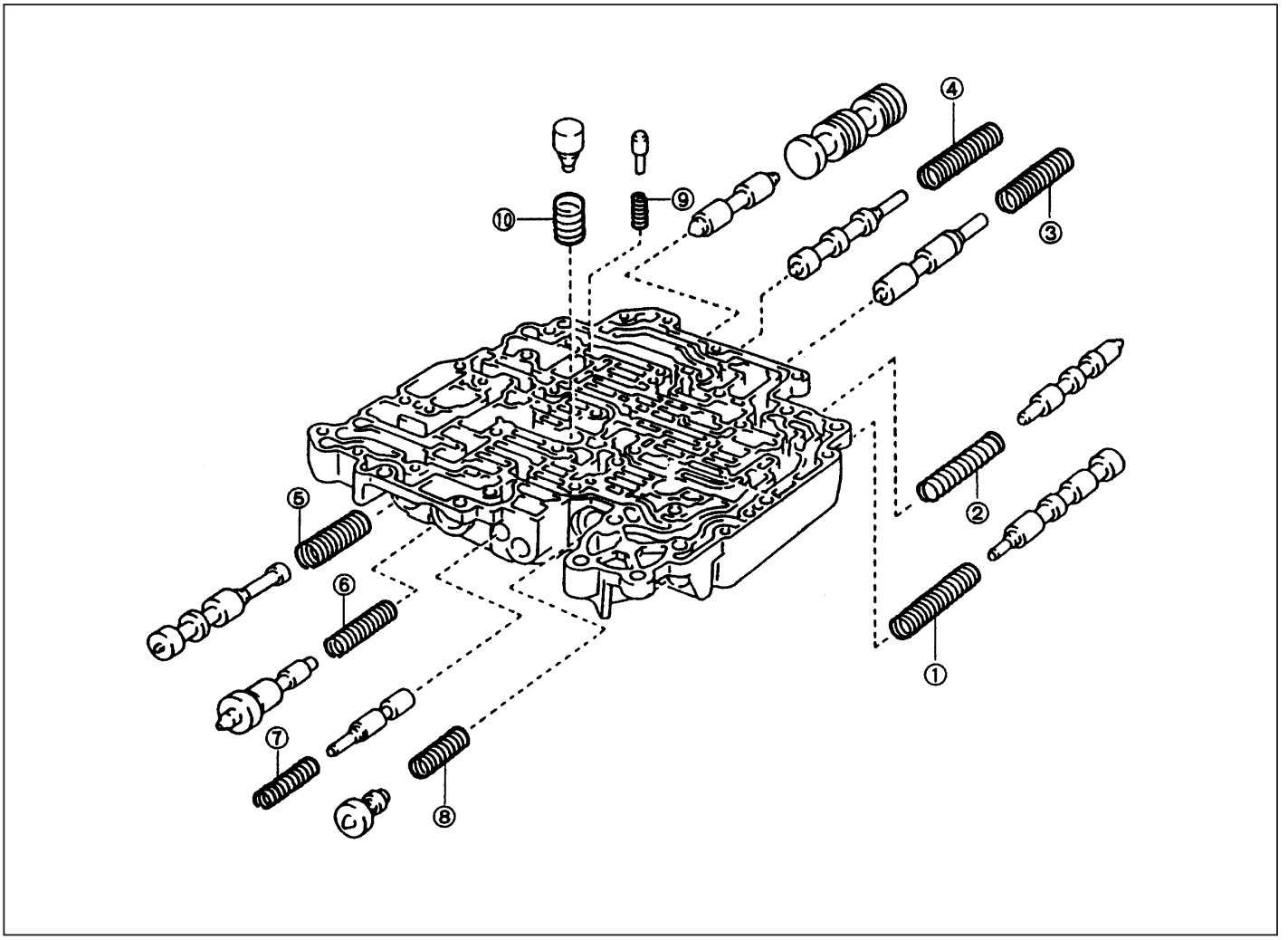

AT00467-00451

19. Secondary regulator valve removal
    (1) While pushing the plug with your finger, remove the key with standard magnet hand.
    (2) Remove the plug.
    (3)Remove the secondary regulator valve, using the standard magnet hand.


AT00468-00452

INSPECTION

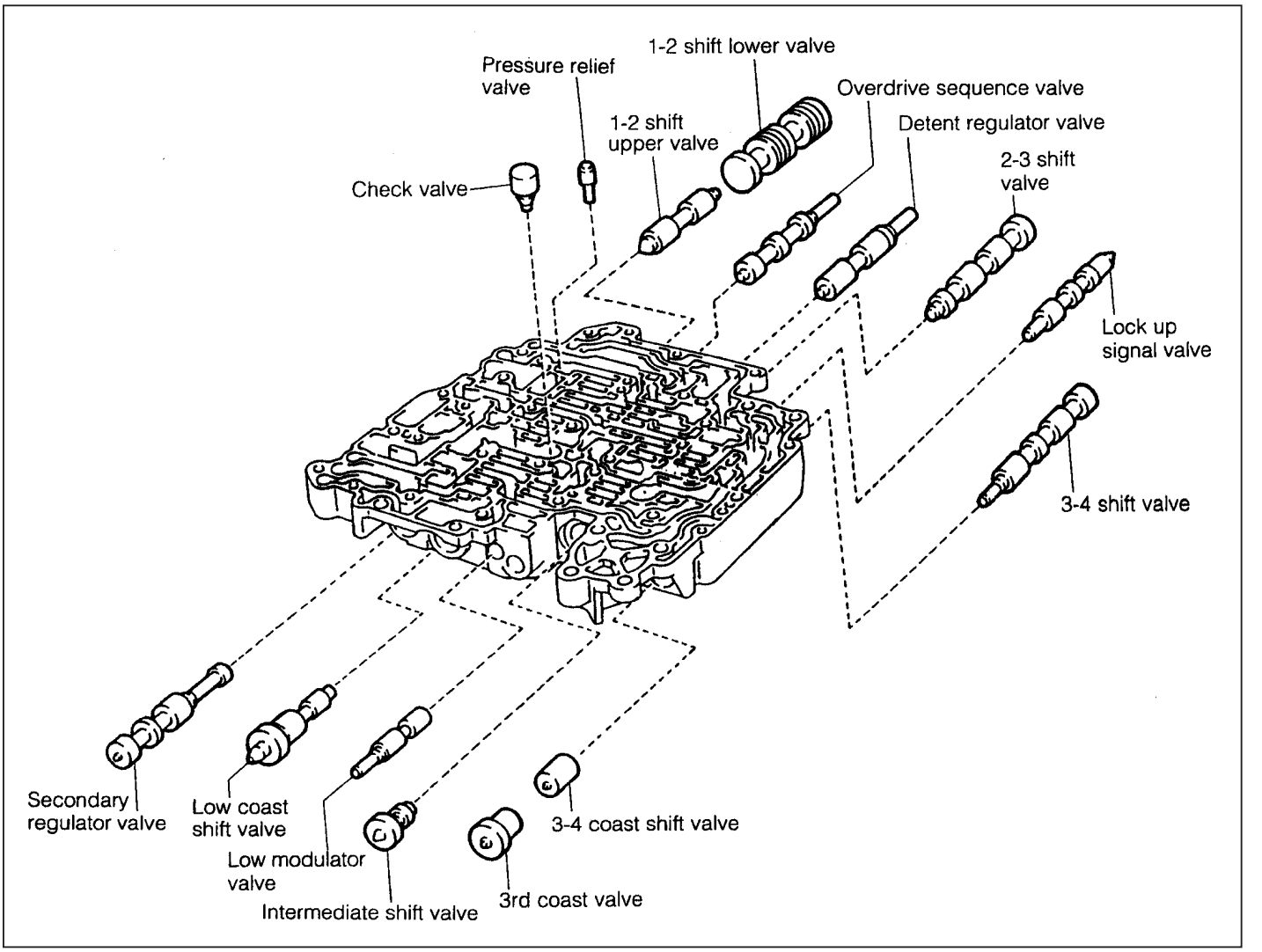
1. Measure the free length and outer diameter of the compression spring



No.	Parts name	Specified valve		Identification color
		Free length	Outer diameter	
①	3-4 shift valve spring	34.9	8.2	None
②	Lock up signal valve spring	41.4	8.2	White
③	Detent regulator valve spring	33.4	8.3	Brown
④	Overdrive sequence valve spring	30.9	7.0	None
⑤	Secondary regulator valve spring	27.3	11.0	Blue
⑥	1-2 shift valve spring	27.2	6.4	Yellow
⑦	Low modulator valve spring	29.2	8.3	None
⑧	2-3 shift valve spring	27.8	8.3	None
⑨	Pressure relief valve spring	11.2	6.4	None
⑩	Check valve spring	18.3	12.0	Yellow

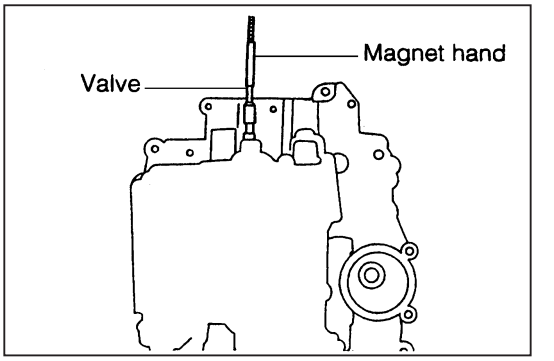
AT00469-00453

2. Valves



AT00470-00454

(1) Make sure that no scratch and damage made on an installation hole of the valve body and outer periphery of the valve selfs.
(2) Coast the valve with A.T.F
(3) Be sure to drop the valves into the valve body with their own weight.
NOTE:
- Never push the valve with your fingers when conducting the check of valve dropping by its own weight. Failure to observe this caution may cause burrs at the valve as well as at the edge surface inside the valve body. If such faulty valves are installed, it will result in valve malfunctions. Hence, utmost care must be exercised when conducting the check.



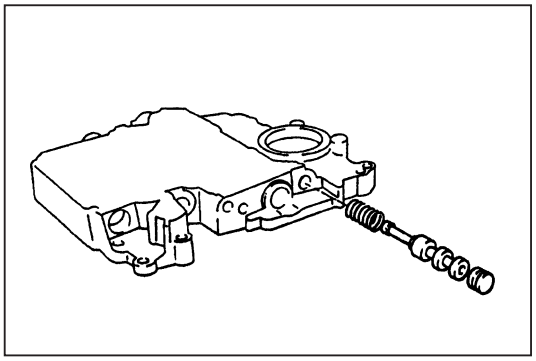
AT00471-00455

Assembly of lower valve body

- Prior to the installation of the removed parts, be sure to wash the parts including the valves, plugs, keys, compression springs and the valve body proper with white gasoline.
- Dry the washed parts by applying compressed air. At this time, be sure to put on protection goggles. (Never use gloves or the like during this operation. Failure to observe this caution will allow the ingress of dust or lint into the valve body.)
- Prior to the installation of all valves, plugs and sleeves, be sure to apply the ATF to the outer periphery of each part in advance.

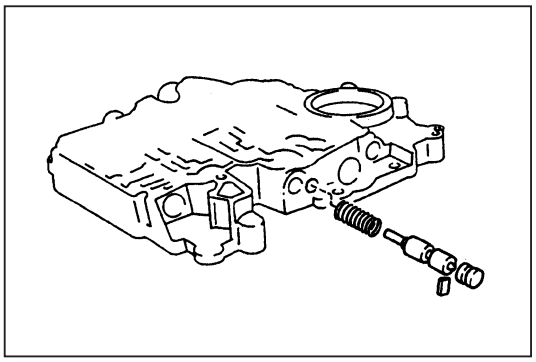
AT00472-00000

1. Secondary regulator valve installation
   (1) Insert the compression spring and secondary regulator valve, using the standard magnet hand.
   (2) Install the plug.
   (3) While pushing the plug with your finger, install the key.



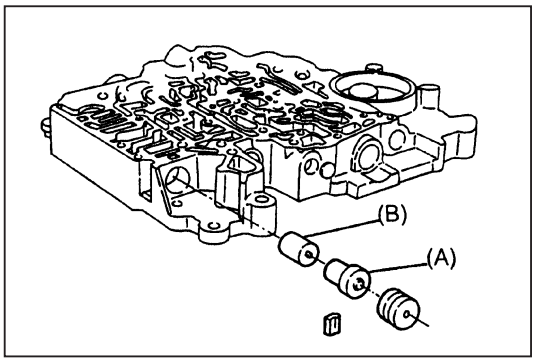
AT00473-00456

2. Low modulator valve installation
   (1) Insert the low modulator valve and compression spring, using the standard magnet hand.
   (2) Install the plug.
   (3) While pushing the plug with your finger, install the key.



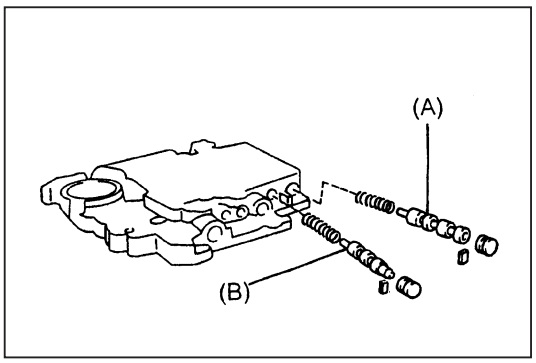
AT00474-00457

3. 3rd coast shift valve and 3-4 coast shift valve installation
   (1) Insert the 3-4 coast shift valve (B) and 3rd coast shift valve (A), using the standard magnet hand.
   (2) Install the plug.
   (3) While pushing the plug with your finger, install the key.



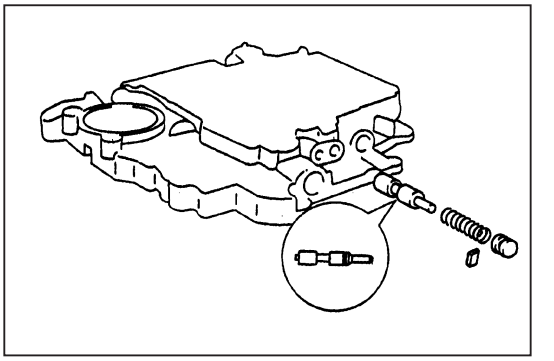
AT00475-00458

4. 3-4 shift valve and lock up signal valve installation
   (1) Install the compression springs, lock up signal valve (B) and 3-4 shift valve (A), using the standard magnet hand.
   (2) Install the plug.
   (3) While pushing the plug with your finger, install the key.

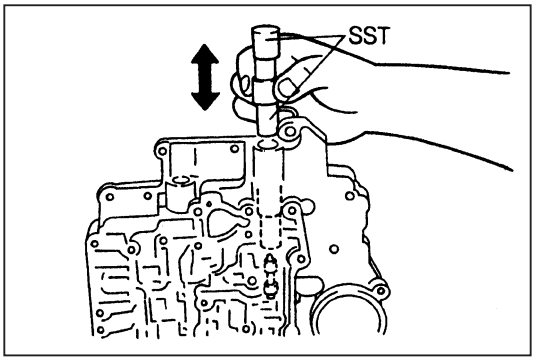


AT00476-00459

5. Detent regulator valve installation
   (1) Insert the detent regulator valve, using the standard magnet hand.
   (2) Install the plug.
   (3) While pushing the plug with your finger, install the key.
   NOTE:
   - The low modulator valve is similar in shape to the detent regulator valve. Hence, be sure to measure the overall length of these valves so that the valve may be installed correctly at the original position. (The detent regulator valve is longer than the low modulator valve.)

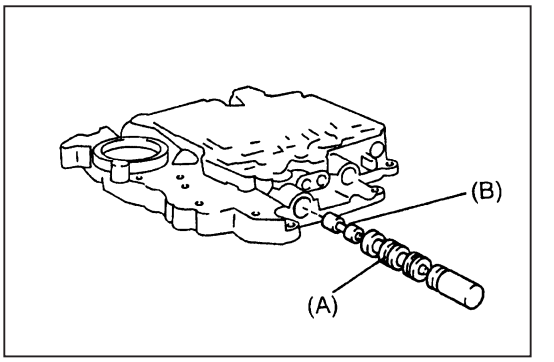

AT00477-00460

6. Installation of 1-2 shift upper and lower valves
   (1) Insert the SST into the 1-2 shift upper valve installation hole of the valve body.
   (2) Put the 1-2 shift upper valve into the SST.
   (3) Insert the 1-2 shift upper valve into the valve body by moving the SST in an up-and-down direction.
   SST: 09351-87102-000



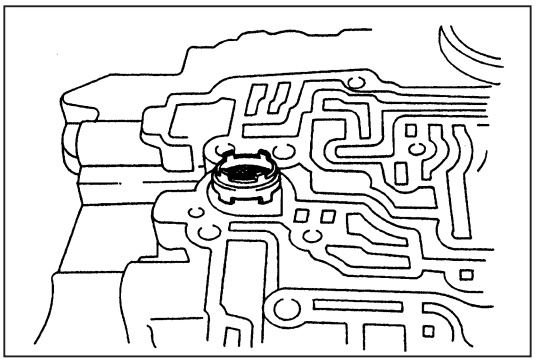
AT00478-00461

   (4) Insert the 1-2 shift valve (A).
   (5) Install the plug.
   (6) Install the key.

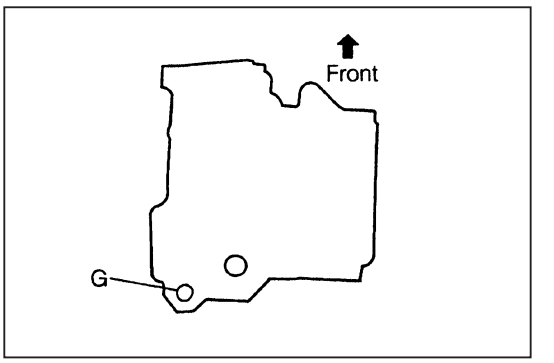


AT00479-00462

7. Install the oil strainer.
   NOTE:
   - Visually inspect whether the filter section of the oil strainer exhibits damage or not. (Replace any damaged part with a new one.)

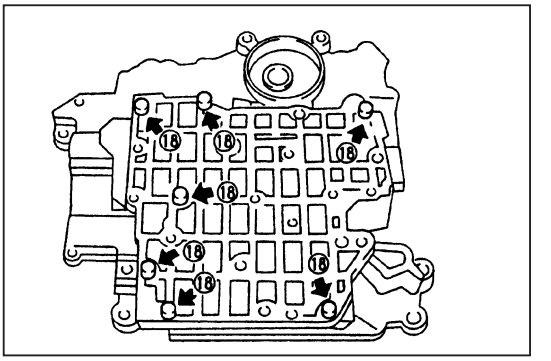

AT00480-00463

8. Place a new valve body No. 2 gasket.
9. Place the valve body cover plate.
   NOTE:
   - Make sure that the alphabet “G” stamped on the valve body cover plate faces toward the lower valve body cover side.



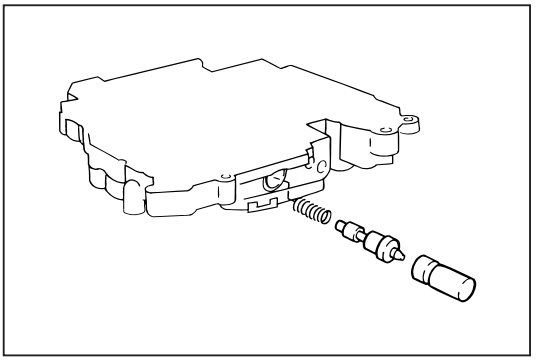
AT00481-00464

10. Place a new valve body No. 2 gasket.
11. Install the lower valve body cover and temporarily tighten the seven bolts with your fingers.
    NOTE:
    - The numeral in the right illustration indicates the nominal length of the bolt.

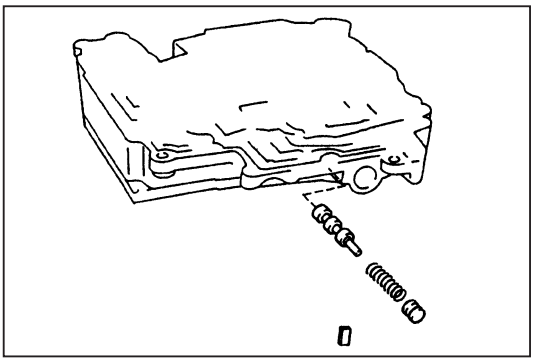


AT00482-00465

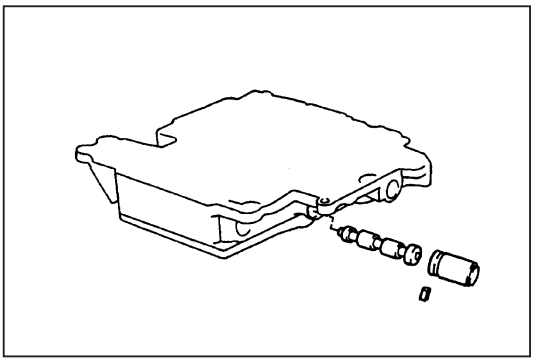
12. Turn over the lower valve body.
13. Low coast shift valve installation
    (1) Insert the compression spring and low coast shift valve, using the standard magnet hand.
    (2) Install the plug.
    (3) While pushing the plug with your finger, install the key.


AT00483-00466

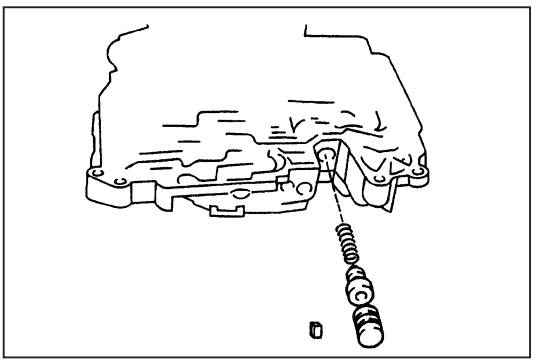
14. Overdrive sequence valve installation
    (1) Insert the compression spring and overdrive sequence valve, using the standard magnet hand.
    (2) Install the plug.
    (3) While pushing the plug with your finger, install the key.


AT00484-00467

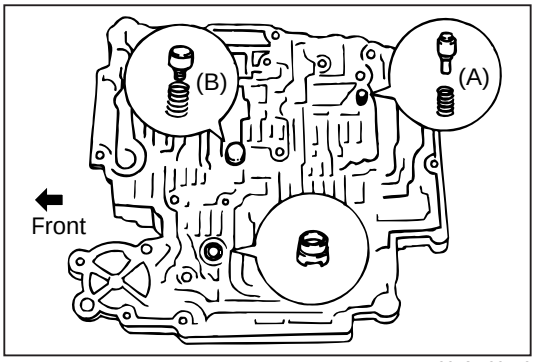
15. 2-3 shift valve installation
    (1) Insert the 2-3 shift valve, using the standard magnet hand.
    (2) Install the plug.
    (3) Install the key.


AT00485-00468

16. Intermediate shift valve installation
    (1) Insert the compression spring and intermediate shift valve, using the standard magnet hand.
    (2) Install the plug.
    (3) While pushing the plug with your finger, install the key.


AT00486-00469

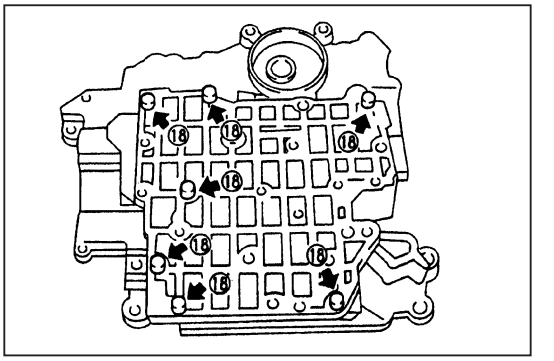
17. Place the throttle modulator oil strainer.
18. Install the compression spring and check valve (B).
19. Install the compression spring and pressure relief valve.



AT00487-00470

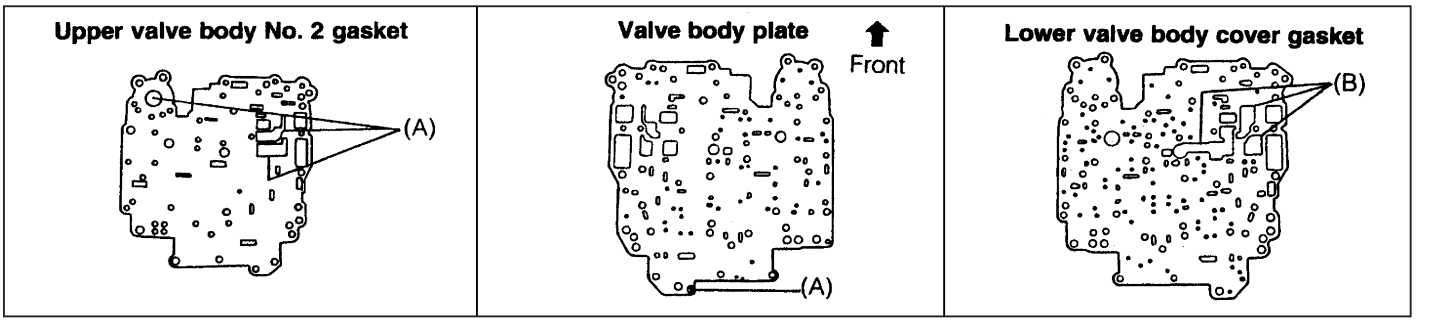
20. Tighten the lower valve body cover with the seven bolts.
    Tightening Torque: 7.8 - 11.8 N·m

    NOTE:
    - The numeral in the right illustration indicates the nominal length of the bolt.



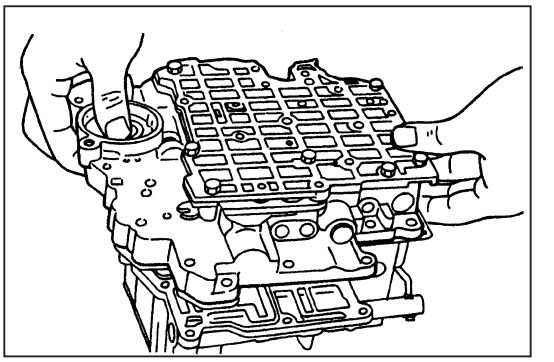
AT00488-00471

21. Place the two new gaskets and plate to the lower valve body in the following sequence.



AT00489-00472

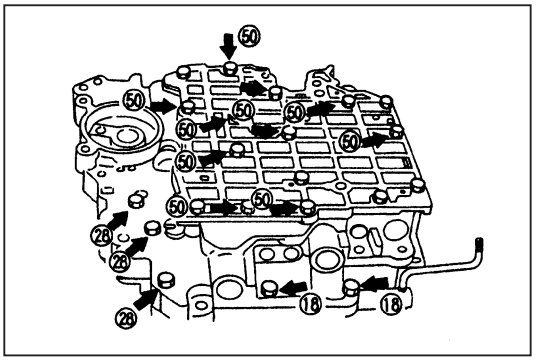
22. While holding the lower valve body by clamping the aforesaid two new gaskets and plate, place the lower valve body into the upper valve body.


AT00490-00473

23. Tighten the fifteen bolts of the lower valve body and lower valve body cover.
    Tightening Torque: 7.8 - 11.8 N·m

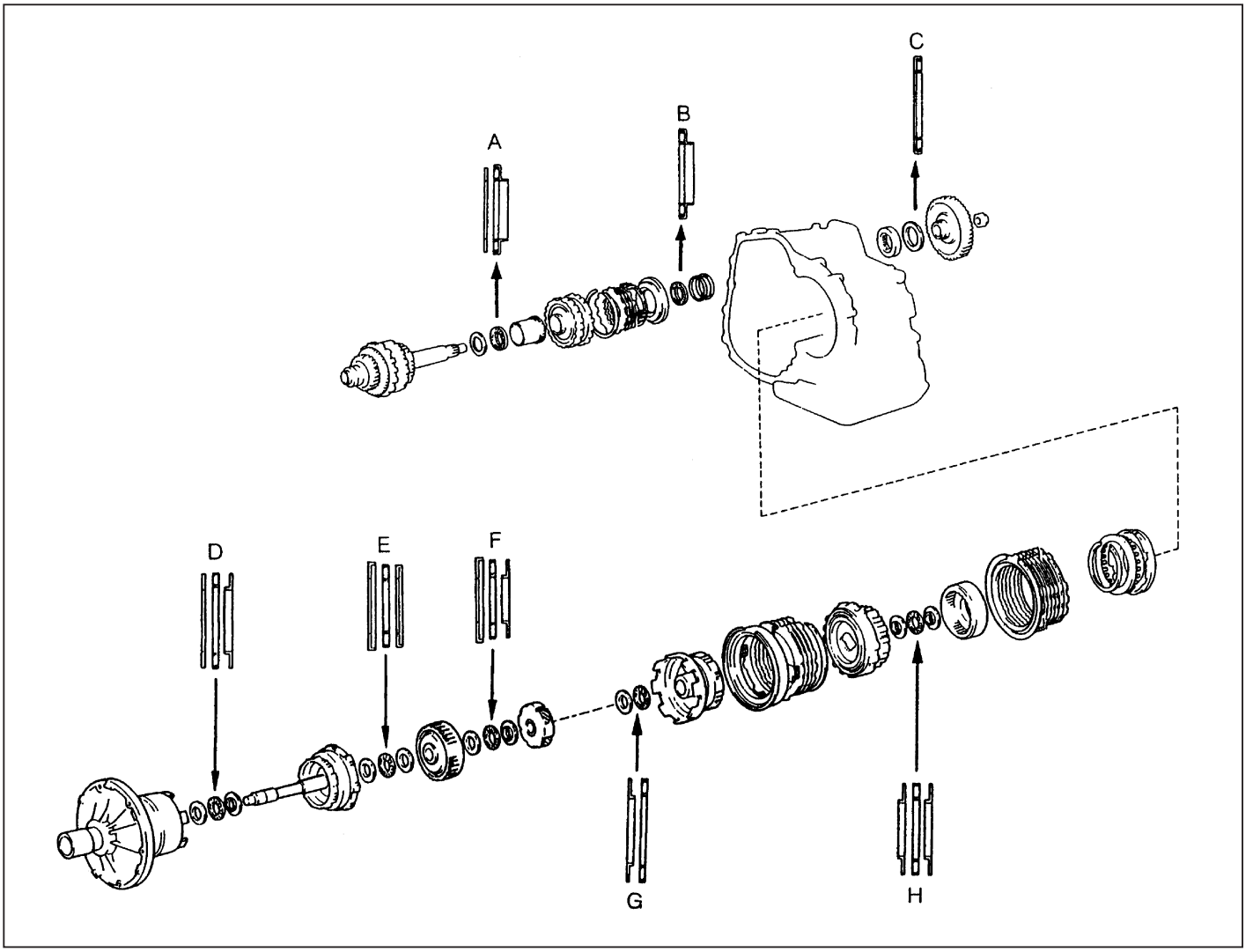
    NOTE:
    - The numeral in the right illustration indicates the nominal length of the bolt.

24. Install the valve body to the transaxle housing.



AT00491-00474

Be sure to install the thrust bearings and races in the correct direction and position.



Unit: mm

		A	B	C	D	E	F	G	H
Front bearing race	Outer diameter	41.8	41.5	—	43.0	37.9	←	45.0	37.3
	Inner diameter	30.0	30.2	—	30.5	22.0	←	28.0	24.1
Thrust bearing	Outer diameter	43.7	←	57.7	42.0	36.1	←	45.0	37.6
	Inner diameter	31.0	←	41.0	28.9	22.2	←	30.0	24.0
Rear bearing race	Outer diameter	—	—	—	42.0	35.8	35.0	—	37.6
	Inner diameter	—	—	—	27.0	23.0	19.0	—	22.2

AT00492-00475

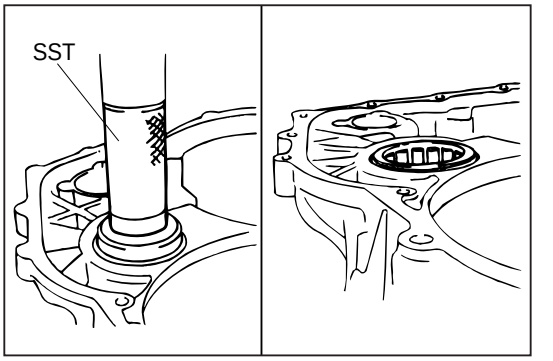
INSTALLATION

- Thoroughly wash and clean the transaxle case and removed bolts and parts with white gasoline.
- Be sure to put on protection goggles when removing oil or white gasoline that has collected at the oil hole inside the transaxle case and cover with compressed air.
- Remove the oil seal packing that has remained at the cover, case, bolts and bolt holes. Degrease the applying surfaces with white gasoline and dry them with compressed air. At this time, be sure to put on protection goggles. (Be very careful not to allow the removed seal packing to enter the case and cover.)

AT00493-00000

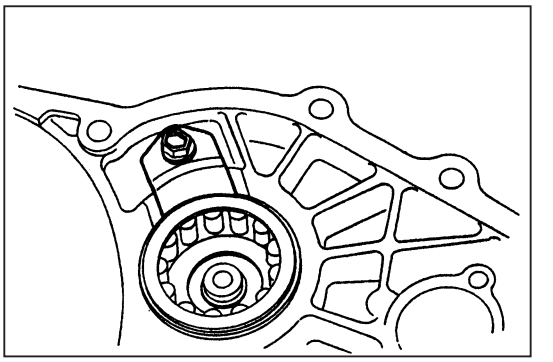
1. Press the bearing into the transaxle housing, using the following SST.
   SST: 09350-32014-000 (09351-32140)

   NOTE:
   - Prior to the pressing of the bearing, be sure to face the stepped side upward.



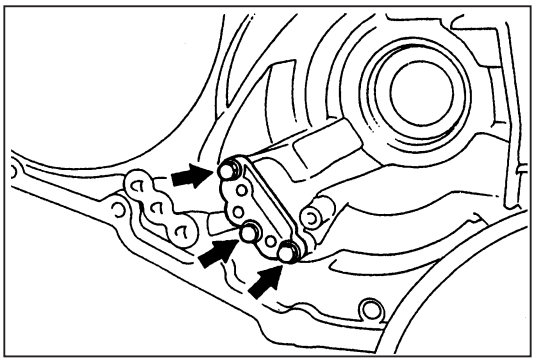
AT00494-00476

2. Tighten the bearing stopper with a bolt.
   Tightening Torque: 9.8 - 15.7 N·m



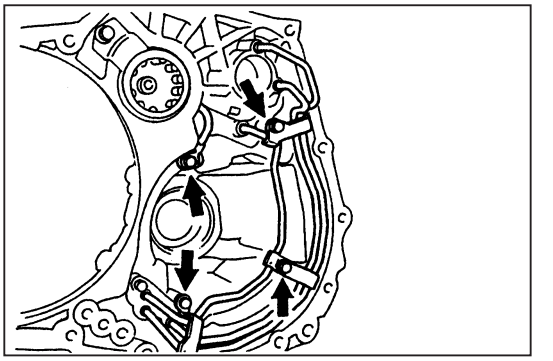
AT00495-00477

3. Install a new gasket.
4. Tighten the oil tube applying cover with the three bolts.
   Tightening Torque: 3.9 - 6.9 N·m



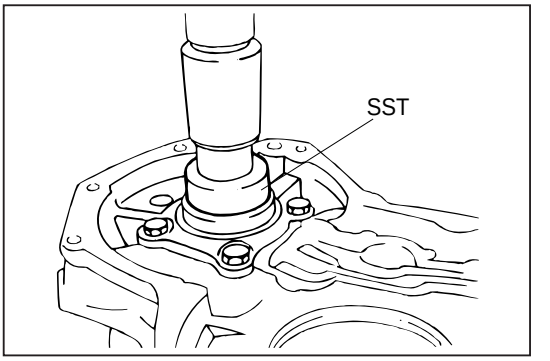
AT00496-00478

5. Tap the four tubes lightly, using a standard plastic hammer.
6. Tighten the tube clamps with the bolts.
   Tightening Torque: 3.9 - 6.9 N·m



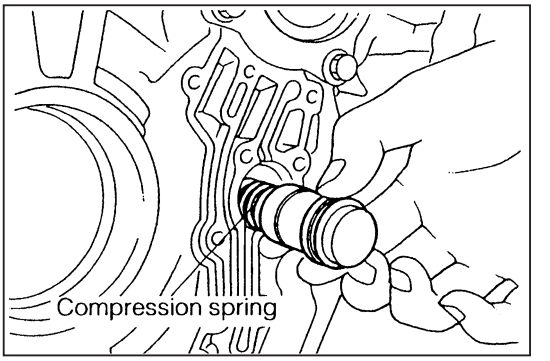
AT00497-00479

7. Press the bearing into the transmission case, using the following SST.
   SST: 09350-32014-000 (09351-32090)



AT00498-00480

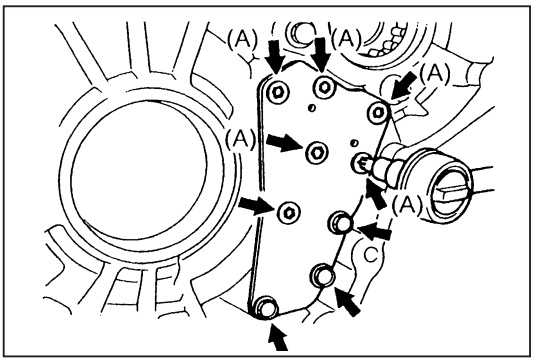
8. Install the compression spring and B4 accumulator piston.
   NOTE:
   - Free length and Identification colors of compression spring
     Free length: 65.4 mm
     Identification colors: None



AT00499-00481

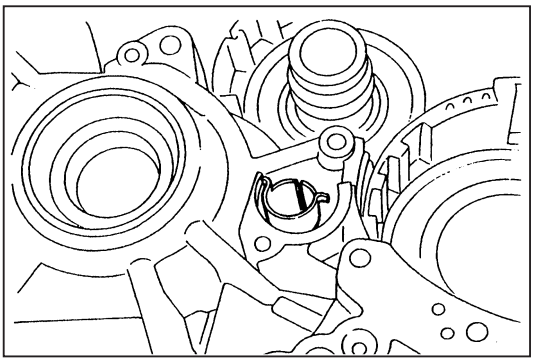
9. Clean the threaded portion of the five screws with white gasoline and apply following bond
   BOND: Three bond 1324 (Three bond made)

10. Tighten the screws (Use for torx socket wrench) and bolts.
    Tightening Torque
    Screws: 5.9 - 9.8 N·m ..... 6 pcs
    Bolts: 7.8 - 11.8 N·m ..... 3 pcs

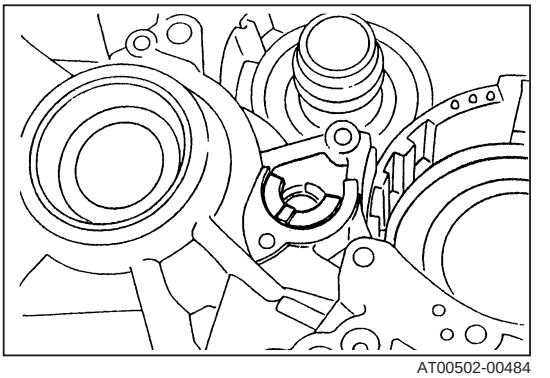


AT00500-00482

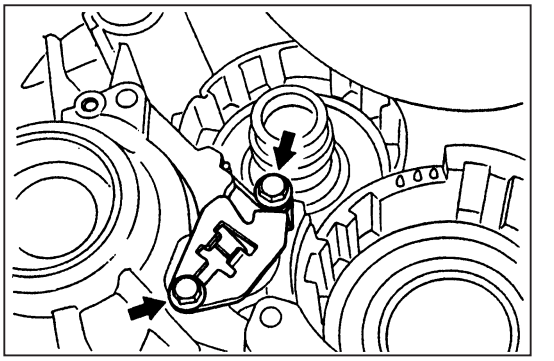
11. Parking lock pawl and related parts installation
    (1) Install the cam guide bracket.


AT00501-00483

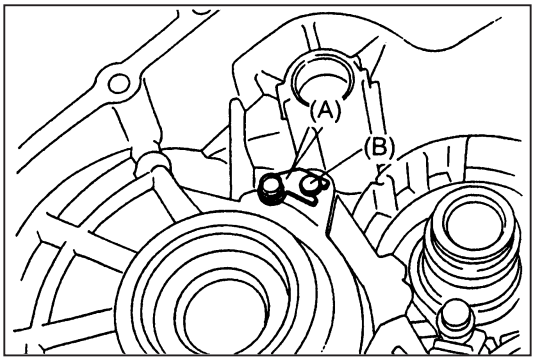
    (2) Install the parking rod sleeve.
    NOTE:
    - Ensure that the protruding portion of the parking rod sleeve faces upward.


AT00502-00484

(3) Place the stopper plate.
(4) Install the guide sleeve and spring.
(5) Insert the parking lock pawl.
(6) Tighten the two bolts.
Tightening Torque: 9.8 - 15.7 N·m

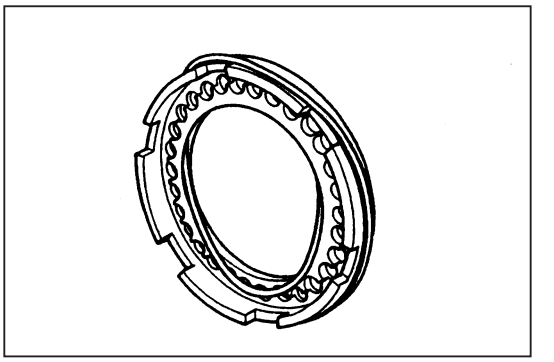

AT00503-00485

(7) Insert the pawl shaft clamp (A) to the groove section of the parking lock pawl shaft (B)
(8) Tighten the pawl shaft clamp with a bolt.
Tightening Torque: 3.9 - 6.9 N·m



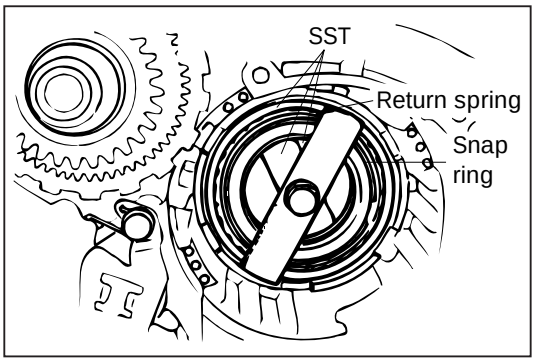
AT00504-00486

12. Install the two new O-rings to the first and reverse brake piston.
NOTE:
- Coat the two new O-rings with A.T.F, prior to install.


AT00505-00487

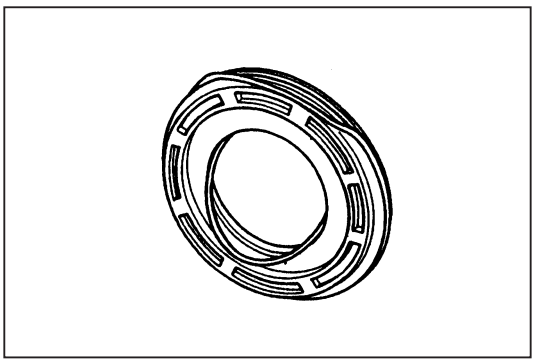
13. Place the piston into the bore of case
14. Place the return spring
15. Install the snap ring hole, using the following SST.
SST: 09350-32014-000 (09351-32040)

NOTE:
- Tighten the bolt gradually to compress the return spring, until snap ring hole is free from the return spring seat.

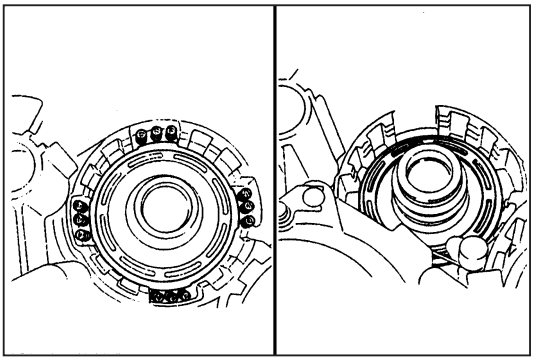


AT00506-00488

16. Install the two new O-rings to the underdrive brake piston.
NOTE:
- Coat the two new O-rings with A.T.F, prior to install.


AT00507-00489

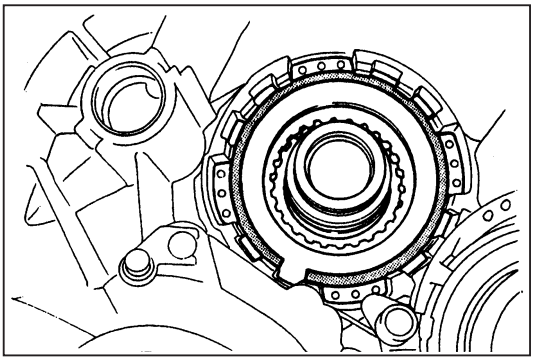
17. Install the underdrive brake piston into the transaxle housing.
    NOTE:
    - Be careful not to damage or twist the O-rings during installation.


AT00508-00490

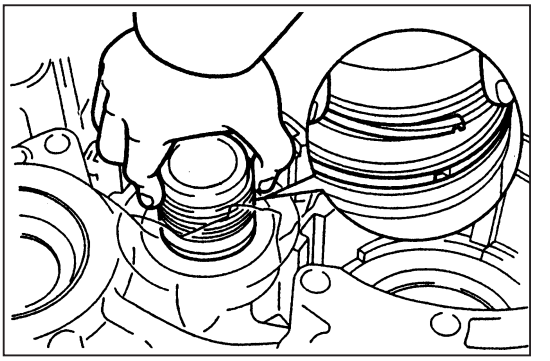
18. Place the return spring.

19. Install the plates, discs and flange in the following sequence.
    P = Clutch plate, D = Clutch disc, F = Clutch flange
    P → D → P → D → P → D → F

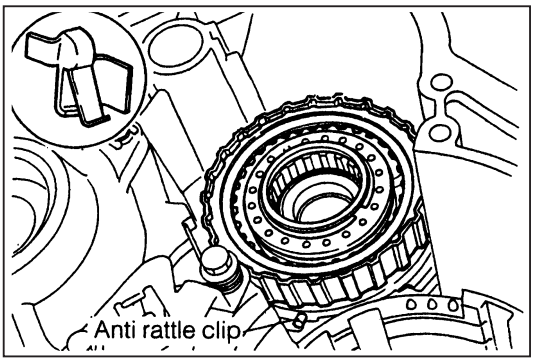
    NOTE:
    - Ensure that the flat end of clutch flange faces toward the up side.
    - Be sure that the end of the hole snap ring is not aligned with one of the transaxle case cutout sections.


AT00509-00491

20. Install the two oil seal rings to the case.

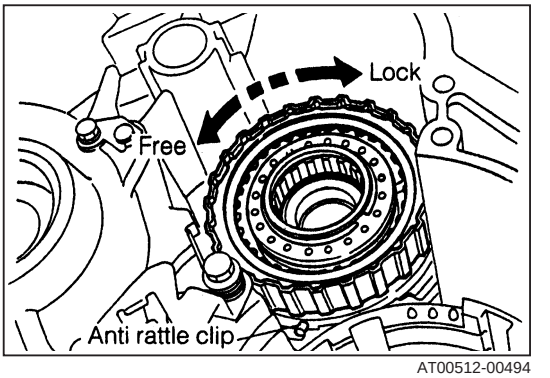

AT00510-00492

21. Install the underdrive one-way clutch
22. Install the anti-rattle clip by pushing with your finger until you hear the click.
    NOTE:
    - Be sure to install the anti-rattle clip between the one-way clutch outer race and case.



AT00511-00493

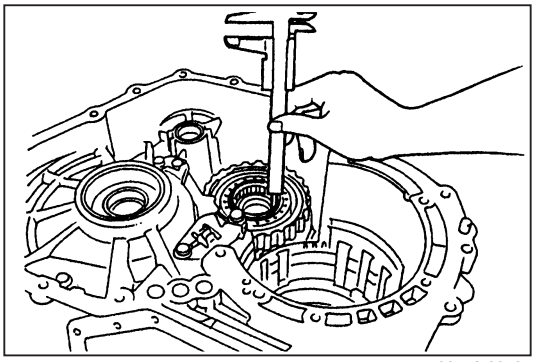
23. Install the underdrive clutch assembly by rotating freely counterclockwise while pushing down with your finger lightly.



AT00512-00494

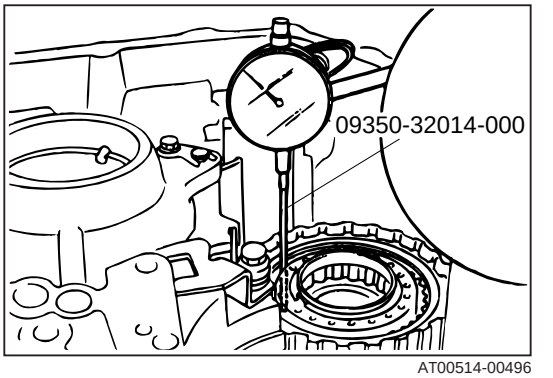
24. Measure the height from the sleeve to inner race, using the vernier caliper gauge.
    Specified Valve: 17.3 - 18.2 mm

    NOTE:
    - If the height exceeds than specified valve above, be sure to install the anti-rattle clip correctly or replace the disc(s) and return spring with new one.


AT00513-00495

25. Underdrive clutch piston stroke measurement
    (1) Set a dial gauge with the long type pick or SST as shown in the right figure illustration.
    (2) Measure the piston stroke by applying and releasing with compressed air (4-8 kgf/cm^2) the oil hole.
    Piston stroke specified valve: 1.50 - 1.86 mm

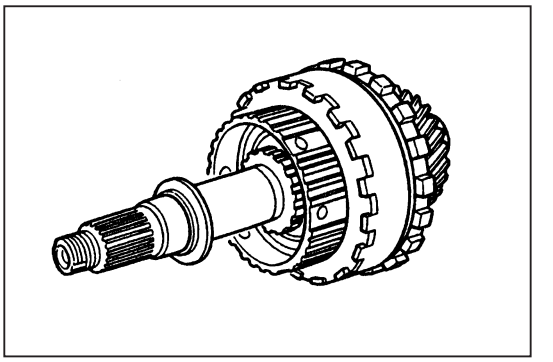
    NOTE:
    - If the piston stroke exceeds than specified value above, select the another flange.
    Flange Thickness: 2.04 mm, 2.40 mm



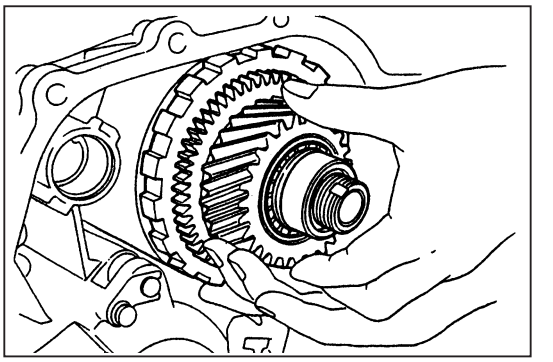
AT00514-00496

26. Coat the thrust needle bearing with yellow petroleum jelly
    Thrust needle bearing with race
    Outer diameter: 43.7 mm
    Inner diameter: 31.0 mm

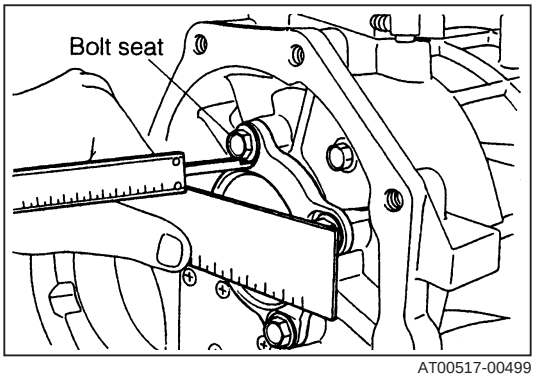
    NOTE:
    - Ensure that the needle bearing faces toward the differential drive pinion side


AT00515-00497

27. Install the counter shaft assembly.


AT00516-00498

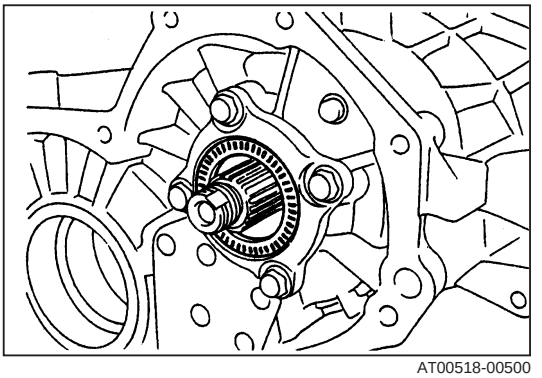
28. Measure the distance height between the tip of the counter shaft and ball seat of the clutch support.
    Specified height valve: 33.3 - 35.5 mm



AT00517-00499

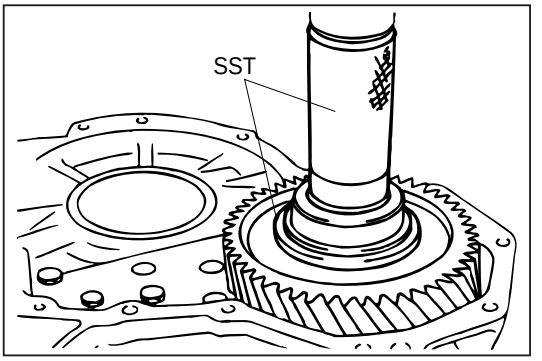
29. Install the thrust needle bearing with the race.
    Thrust needle bearing with race
    Outer Diameter: 57.7 mm
    Inner Diameter: 41.0 mm

    NOTE:
    - Make sure that the needle bearing faces toward the countershaft driven gear side.


AT00518-00500

30. Press the driven gear, using the following SST.
    SST: 09350-32014-000 (09351-32100, 09351-32140)

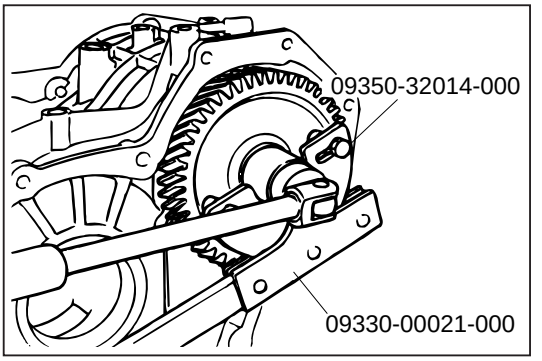
    NOTE:
    - Be very careful not to drop the anti-rattle clip during the installation of the counter driven gear.



AT00519-00501

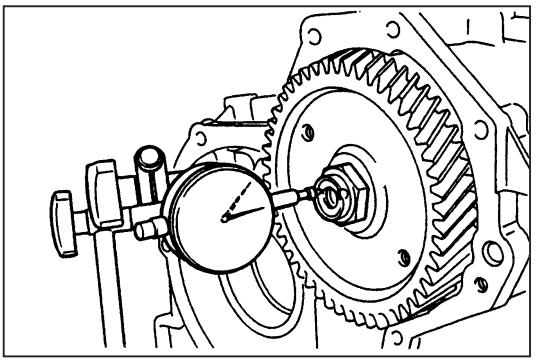
31. Install the following SSTs to the countershaft driven gear and tighten a new lock nut.
    SSTs: 09350-32014-000 (09351-32032-000),
    09330-00021-000
    Tightening Torque: 147.0 - 177.0 N·m

32. Remove the above SSTs.



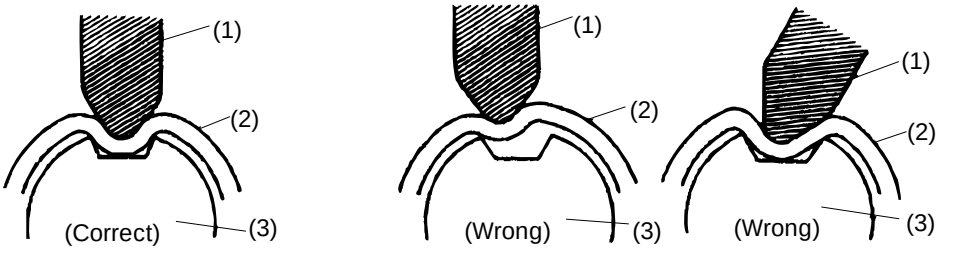
AT00520-00502

33. Measure the end play of the countershaft, using a standard dial indicator.
    Specified Value: 0.20 - 0.90 mm


AT00521-00503

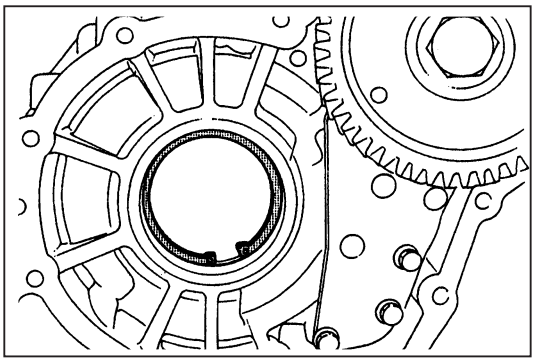
34. Stake a new lock nut, using a standard punch in combination with a hammer.
    NOTE:
    - When staking the lock nut, point a suitable staking tool toward the countershaft axis center and stake the lock nut securely, as shown in the figure below. (Poor staking may cause abnormal noise.)

(1) Suitable staking tool
(2) New nut
(3) Shaft



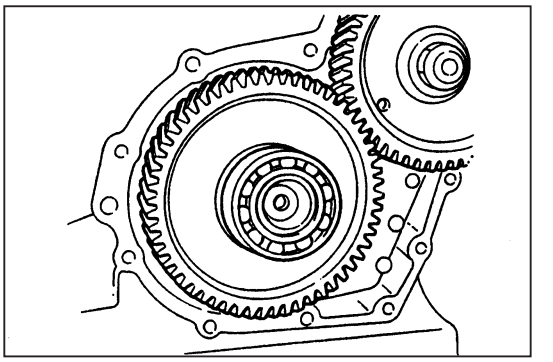
AT00522-00504

35. Install the snap ring, using the standard snap ring plier.



AT00523-00505

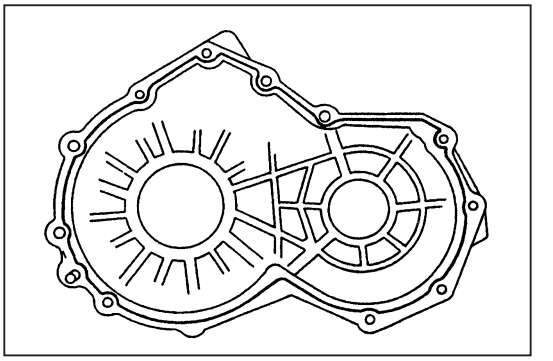
36. Install the intermediate shaft with the bearing installed.



AT00524-00506

37. Remove any packing material and clean the contacting surface between transaxle rear cover and transmission case.
    NOTE:
    - No oil get to contact surface

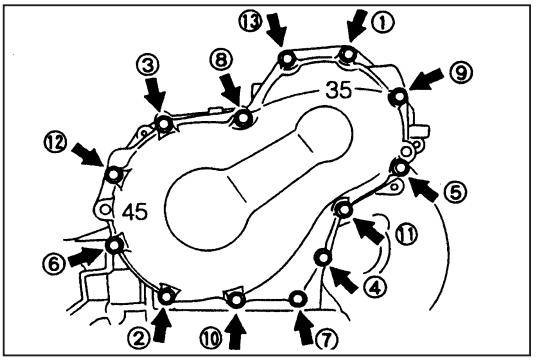
38. Apply sealer packing to the rear cover
    Seal Packing
    Three bond 1131 (Three bond made) or
    Loctite 518 (Locktite corporation made)



AT00525-00507

39. Tighten the transaxle rear cover with the thirteen bolts.
    Tightening Torque: 19.6 - 29.4 N·m

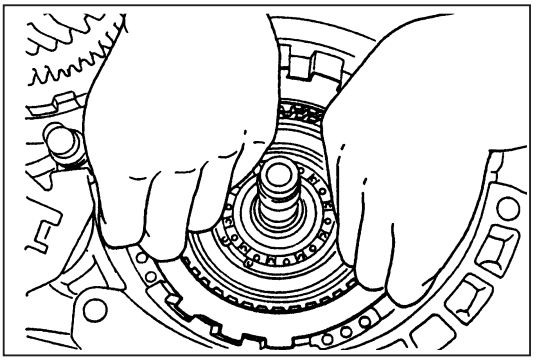
    NOTE:
    - Be sure to tighten the bolts alternately and diagonally (The right figure illustration indicates a typical example of the tightening sequence)



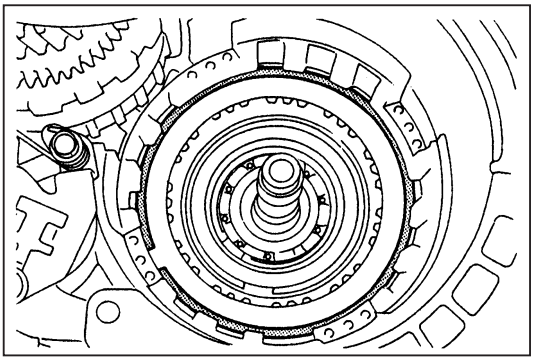
AT00526-00508

40. Make sure to rotate the intermediate shaft smoothly with out any binding.
41. Install the flange, discs and plate in the following sequence
    F = Brake flange, D = Clutch disc, P = Clutch plate
    F → D → P → D → P → D → P → D → P → D → P → D → F (outer)

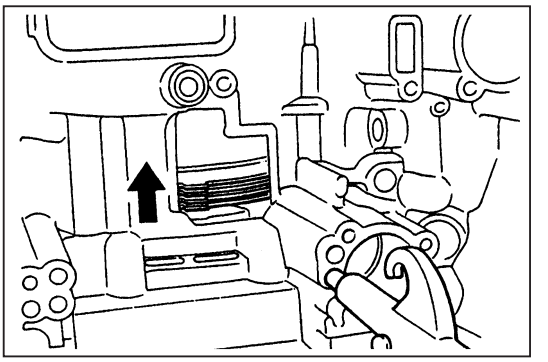
    NOTE:
    - Ensure that the flat end of the brake flange on both inner and outer sides faces toward the downside.


AT00527-00509

42. Install the snap ring, using a standard flat screwdriver.
    NOTE:
    - Make sure that the end gap of the snap ring is not aligned with one of the transaxle case cutout sections.


AT00528-00510

43. Inspection of first and reverse brake piston
    When applying air (4 - 8 kgf/cm^2) into the oil hole indicated in the right figure, using an air gun, ensure that the piston slides smoothly in an arrow-headed direction. Also, make sure that the operating sound of the piston is emitted when the piston is sliding.

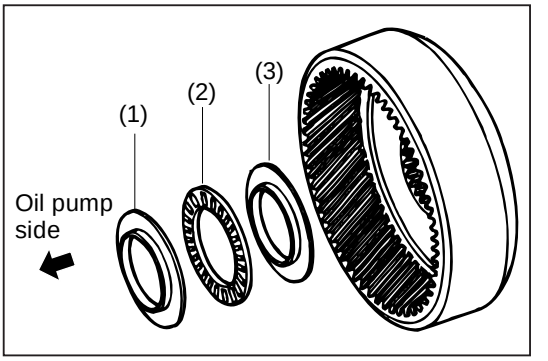

AT00529-00511

44. Coat the races and bearing with yellow petroleum jelly and install them onto the rear planetary ring gear.

Bearing and races

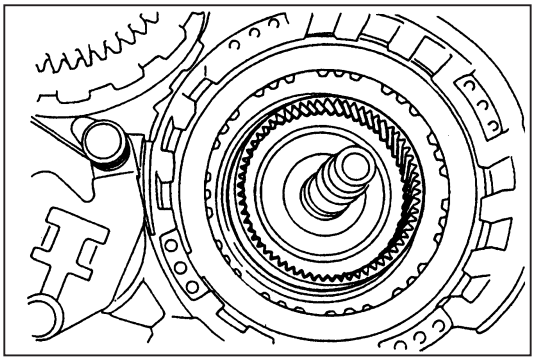
Unit: mm (APPROX.)

		Outer diameter	Inner diameter
①	Thrust front race	37.3	24.1
②	Thrust needle bearing	37.5	24.0
③	Thrust rear race	37.6	22.2



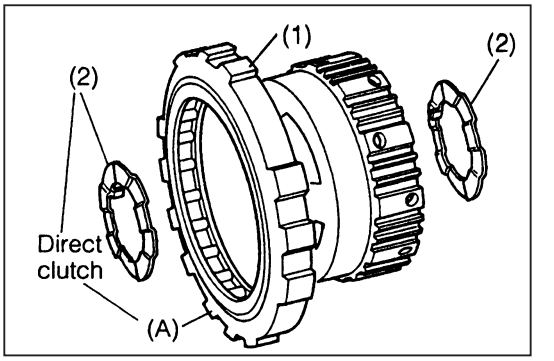
AT00530-00512

45. Install the rear planetary ring gear.



AT00531-00513

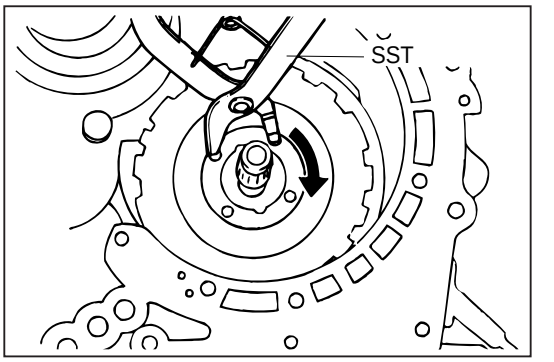
46. Coat the thrust washers with yellow petroleum jelly.
47. Install the one-way clutch No. 2 to the rear planetary gear with the thrust washer.
    NOTE:
    - Make sure that the outer race cut surface (section A) of the one-way clutch No. 2 faces toward the direct clutch side.



AT00532-00514

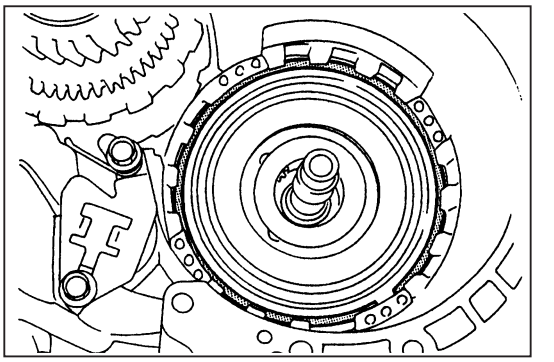
48. Install the one-way clutch No. 2 with rear planetary gear to the case.
49. Install the aforesaid parts securely until the flukes of discs align with each others, using the following SST.
    SST: 09350-32014-000 (09351-32050)

    NOTE:
    - Ensure that the one-way clutch No. 2 rotates freely for clockwise with the above SST.



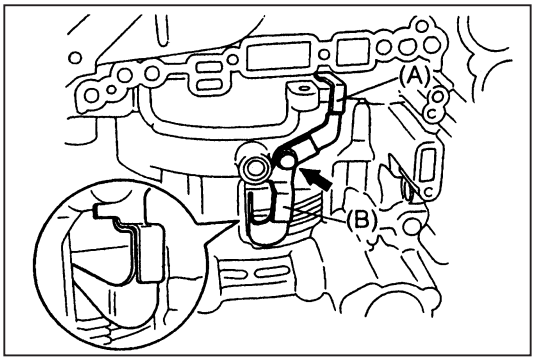
AT00533-00515

50. Coat the thrust washer with yellow petroleum jelly and install it to the rear planetary gear.
51. Install the snap ring hole, using the standard flat driver.
    NOTE:
    - Ensure that the end gap of snap ring hole is not aligned with one of transaxle case cut-out section.



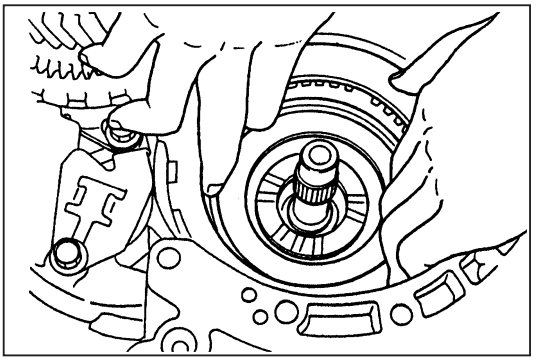
AT00534-00516

52. Tighten the 2nd coast brake band (A) and the brake band guide plate retainer (B) with a bolt
    Tightening Torque: 3.9 - 6.9 N·m

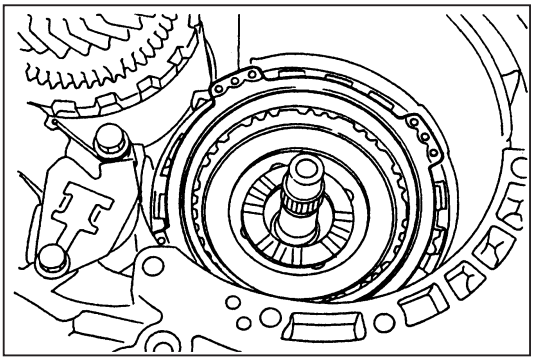


AT00535-00517

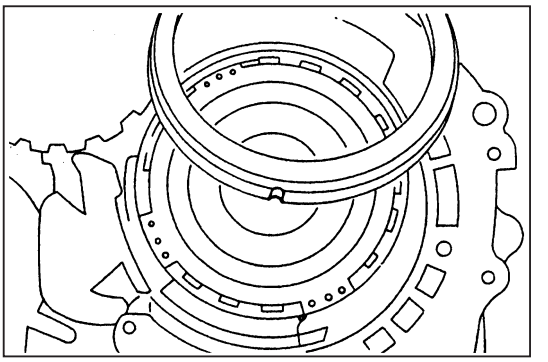
53. Install the flange, facing the flat end upward.
54. Install the discs and plates in the following sequence
    D = Clutch disc, P = Clutch plate
    D → P → D → P → D → P


AT00536-00518

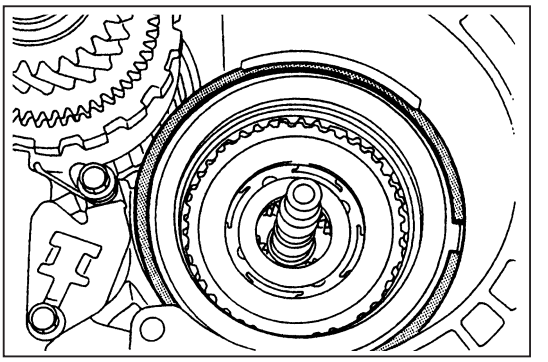
55. Install the second brake piston return spring.
    NOTE:
    - Make sure that the each of springs should be installed over the protrusions in the case


AT00537-00519

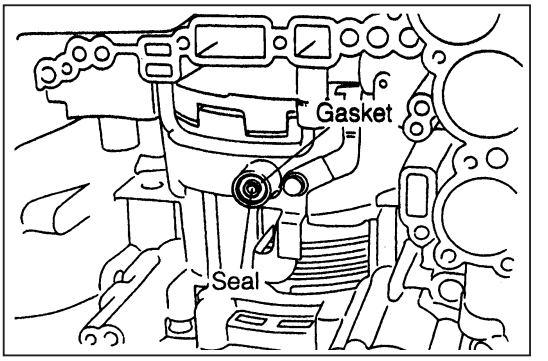
56. Align the groove of the second brake drum with bolt tightened the second coast brake hand
57. Place the second brake drum into the case.


AT00538-00520

58. Install the snap ring hole, using the standard flat driver.
    NOTE:
    - Make sure that the snap ring hole should be installed to the groove section in the case securely.

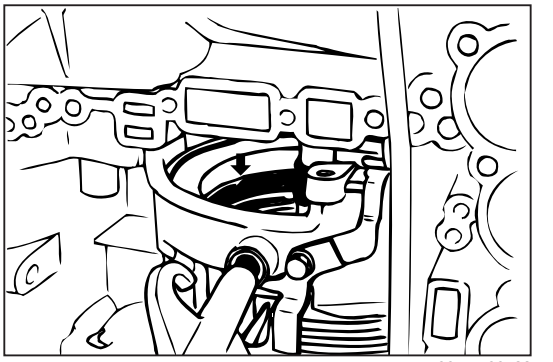

AT00539-00521

59. Drive in a new second brake drum gasket until it contacts with the second brake drum.
60. Install a new second brake apply gasket.

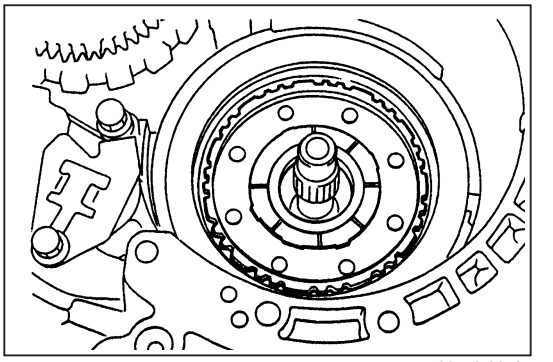


AT00540-00522

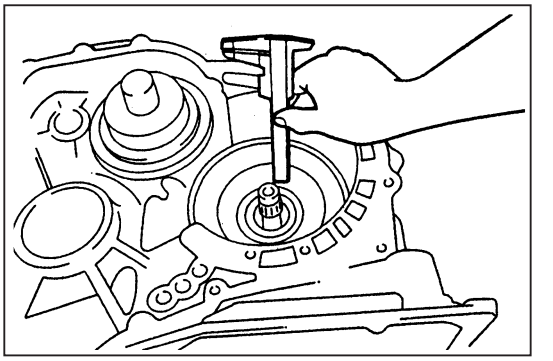
61. Second brake piston inspection
When applying air (4 - 8 kgf/cm^2) into the oil hole indicated in the right figure, using an air gun, ensure that the piston slides smoothly in an arrow-headed direction. Also, make sure that the operating sound of the piston is emitted when the piston is sliding.


AT00541-00523

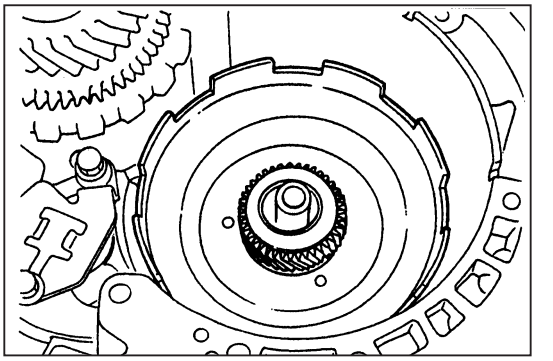
62. Install the No. 1 one way clutch and second brake hub by rotating the clockwise and counterclockwise until the flukes of discs align with second brake drum spline section.


AT00542-00524

63. Measure the distance between the surface of the second brake hub and rear planetary gear, using a vernier caliper gauge
Distance: APPROX. 5 mm


AT00543-00525

64. While rotating the sun gear for clockwise, install the sun gear input drum and sun gear into the No. 1 one way clutch.

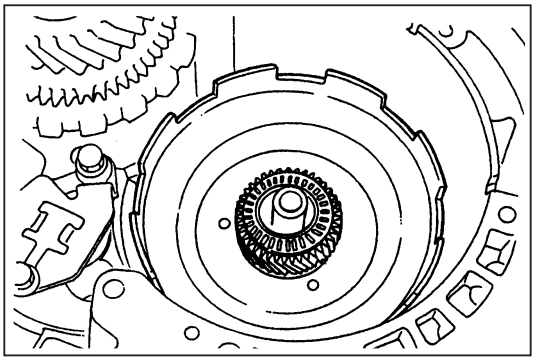

AT00544-00526

65. Coat the race and bearing with yellow petroleum jelly and install them to the planetary gear.

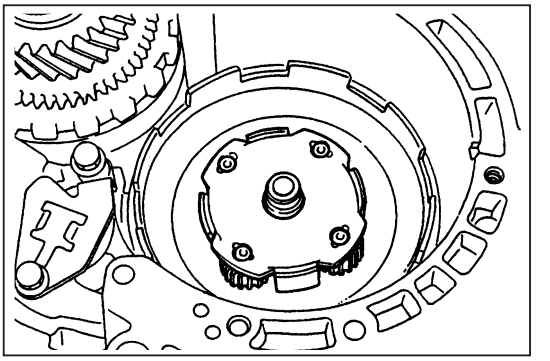
Bearing and race dimension

Unit: mm (APPROX.)

	Outer diameter	Inner diameter
Race	45.0	28.0
Bearing	45.0	30.0


AT00545-00527

66. Install the front planetary gear



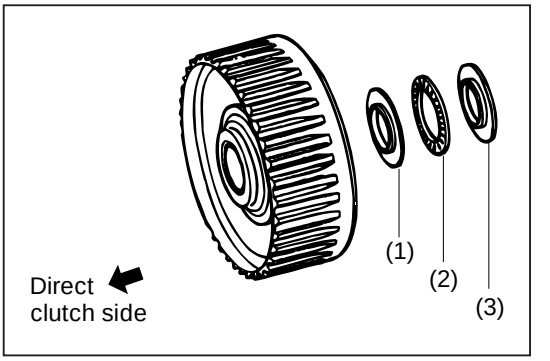
AT00546-00528

67. Coat the thrust bearing races and thrust needle bearing with yellow petroleum jelly and install them to the front planetary gear.

Races and bearing dimension

Unit: mm (APPROX.)

		Outer diameter	Inner diameter
Races	① Front	37.9	22.2
	③ Rear	35.0	23.0
Bearing ②		36.1	22.2



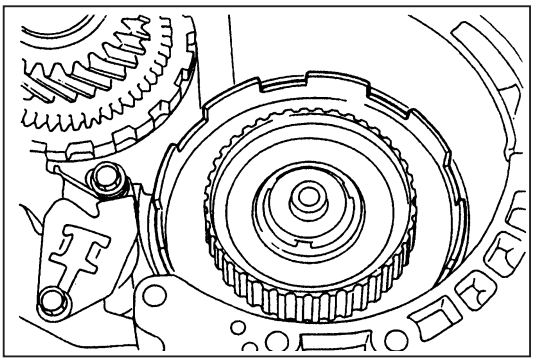
AT00547-00529

68. Install the front planetary ring gear.
69. Coat the race and bearing with yellow petroleum jelly and install them to the front planetary ring gear.

Races and bearing dimension

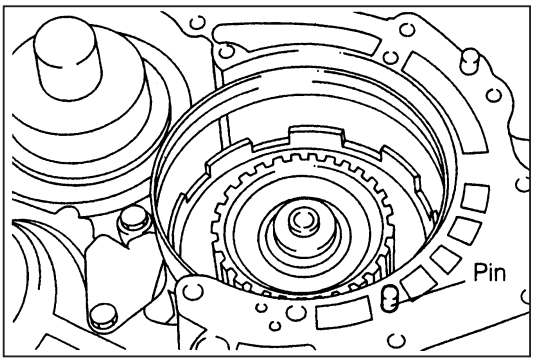
Unit: mm (APPROX.)

		Outer diameter	Inner diameter
Races	Front	37.9	22.0
	Rear	35.8	23.0
Bearing		36.1	22.2



AT00548-00530

70. Place the second coast brake band into the case.
71. Install the pin through the bolt hole of the oil pump mounting.



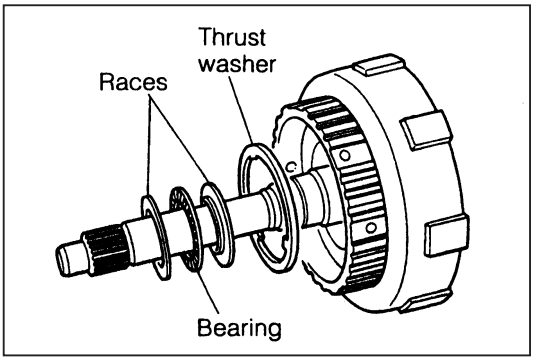
AT00549-00531

72. Coat the races, bearing and thrust washer with yellow petroleum jelly and install them to the forward clutch drum.

Races and Bearing dimension

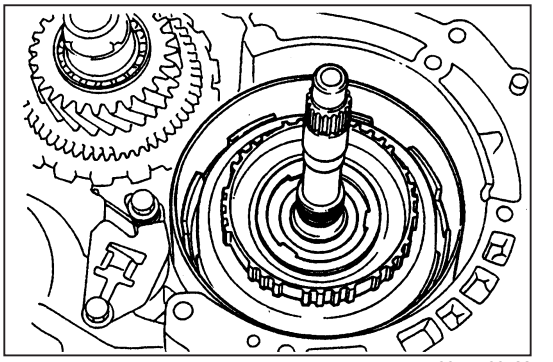
Unit: mm (APPROX.)

		Outer diameter	Inner diameter
Races	Front	43.0	30.5
	Rear	42.0	27.0
Bearing		42.0	28.9

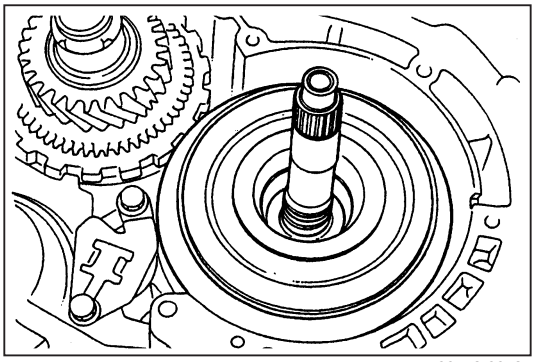


AT00550-00532

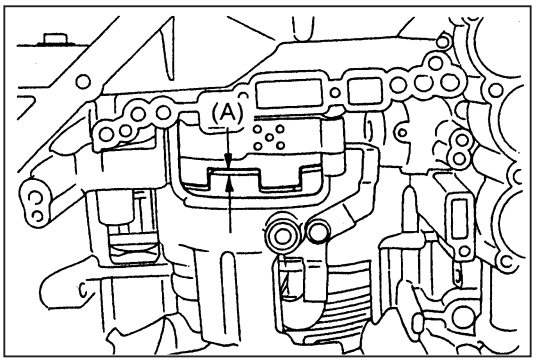
73. Place the forward clutch to the case by rotating the forward clutch counter and clockwise.


AT00551-00533

74. Place the direct clutch to the case by rotating the direct clutch counter and clockwise.

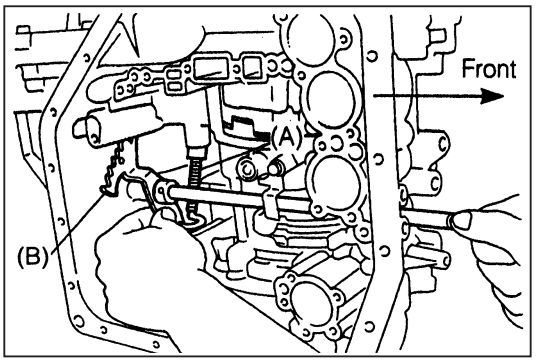

AT00552-00534

75. Measure the clearance of (A) section, using the standard feeler gauge or the like
    Clearance: APPROX. 3 mm



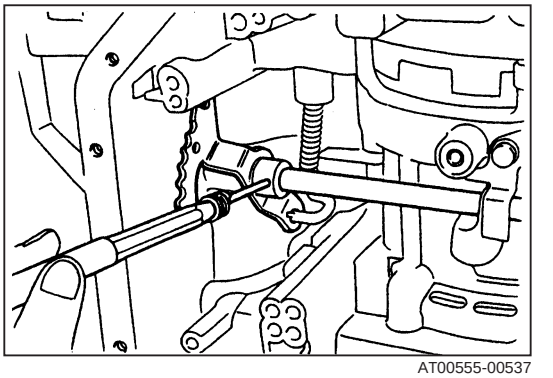
AT00553-00535

76. Manual valve lever shaft installation.
    (1) Insert the manual valve lever shaft into the case.
    (2) Connect the parking rod (A) with the manual lever (B).
    (3) Install the plate washer and new spacer to the shaft.

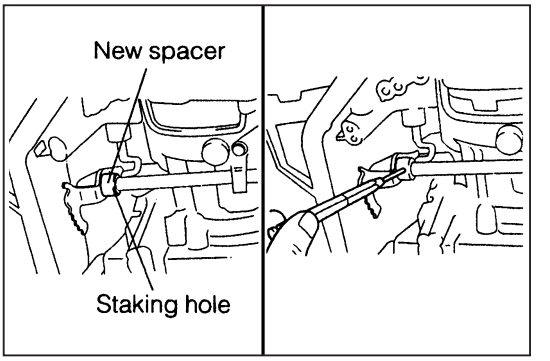


AT00554-00536

    (4) Drive a new slotted spring pin, using the standard punch and hammer.
    (5) Install the retaining spring to the shaft.

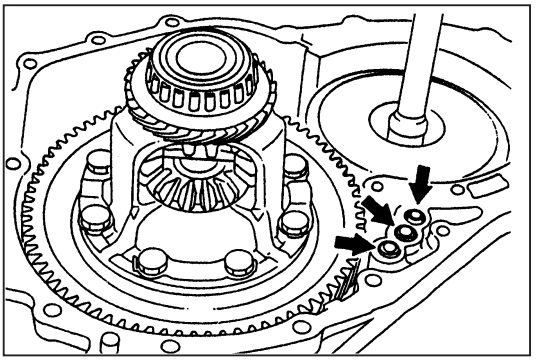

AT00555-00537

(6) Match the staking hole of the spacer with manual valve lever.
(7) Stake the spacer, using the standard pin punch and center punch and hammer securely.

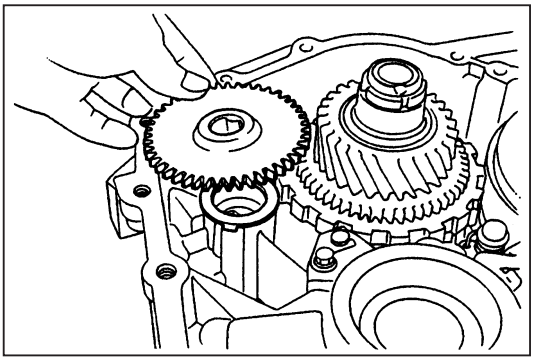


AT00556-00538

77. Install the differential case assembly and the new three pieces of the apply gasket.

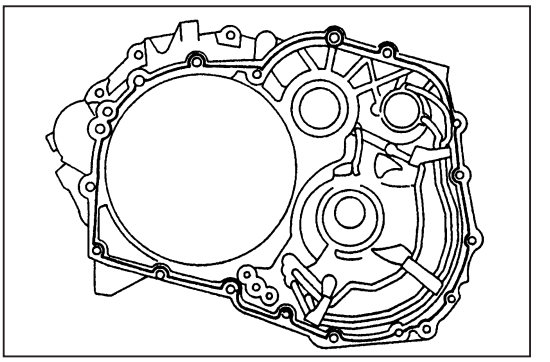

AT00557-00539

78. Install the thrust washer and governor driven gear.


AT00558-00540

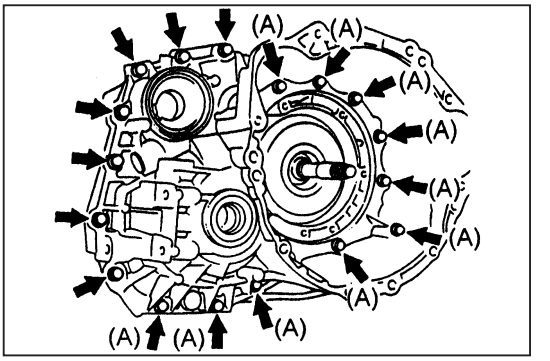
79. Remove any packing material and clean the contacting surface between housing and case.
NOTE:
- No oil get to contact surface.

80. Apply seal packing
SEAL PACKING:
THREE BOND 1131 (Three bond made) or
LOCKTITE 518 (Locktite corporation made)


AT00559-00541

81. Tighten the 17 bolts.
Tightening Torque: 19.6 - 29.4 N·m

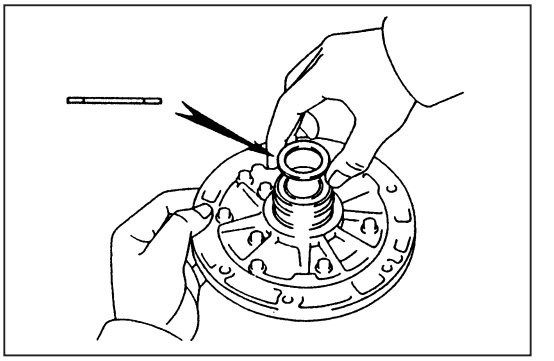
NOTE:
- Be sure to tighten the bolts alternately and diagonally.
- The numerals in the right figure indicate the nominal lengths of the bolts.



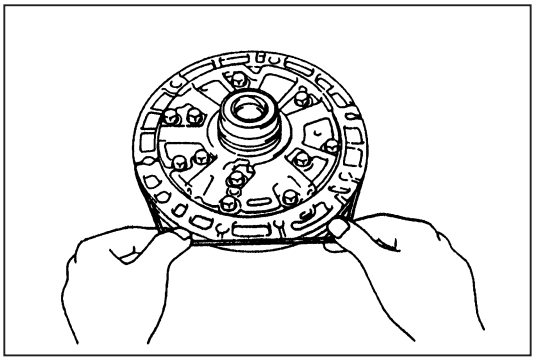
AT00560-00542

82. Coat the race with petroleum jelly and install it onto the stator shaft.
NOTE:
- After installing the oil pump, measure the input shaft thrust play.

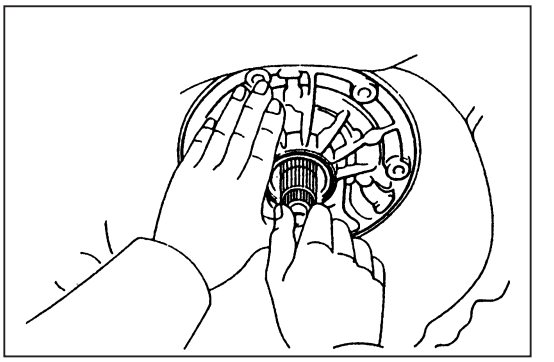
If the thrust play exceeds the specified value, select and insert one of the two different size races.


AT00561-00543

83. Coat a new O-ring with the ATF and install it to the oil pump.

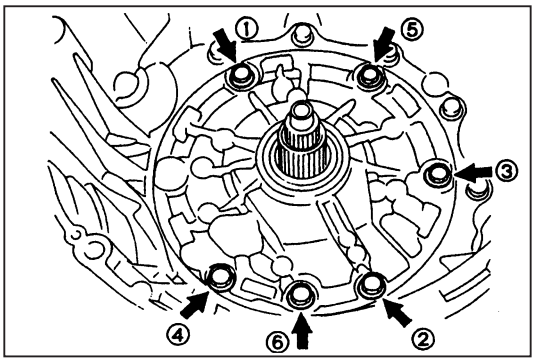

AT00562-00544

84. Installation of oil pump
(1) Place the oil pump through the input shaft, and align the bolt holes of the pump body with the transmission case.
(2) Hold the input shaft, and lightly press the oil pump body to slide the oil seal rings on the stator shaft through the direct clutch drum.
CAUTION:
- Do not push on the oil pump strongly or the oil seal ring will stick to the direct clutch drum.


AT00563-00545

85. Tighten the oil pump body with the six bolts.
Tightening Torque: 19.6 - 29.4 N·m

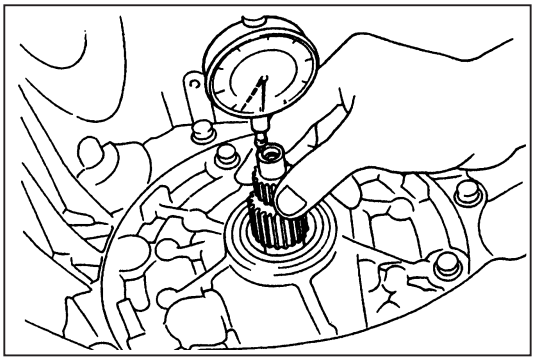
NOTE:
- Be sure to tighten the bolts alternately and diagonally.



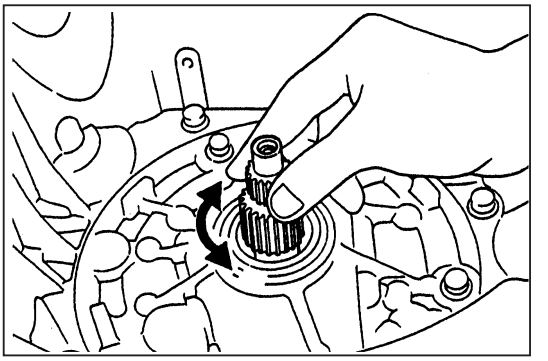
AT00564-00546

86. Measure the end play with a dial gauge.
Thrust play: 0.2 - 0.9 mm

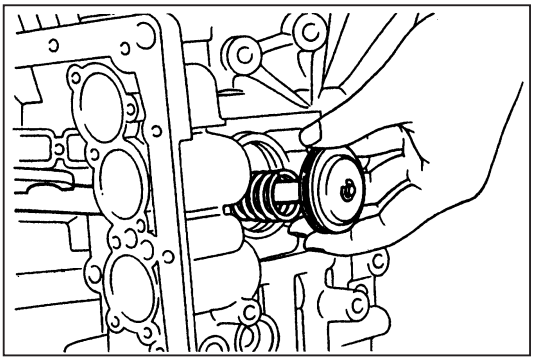
NOTE:
- There are two thickness of races for the end of stator shaft.
- If the thrust play is in excess of standard, select one of them.
Race thickness: 0.8 mm
1.4 mm


AT00565-00547

87. Check input shaft rotation.
Make sure that the input shaft rotates smoothly.

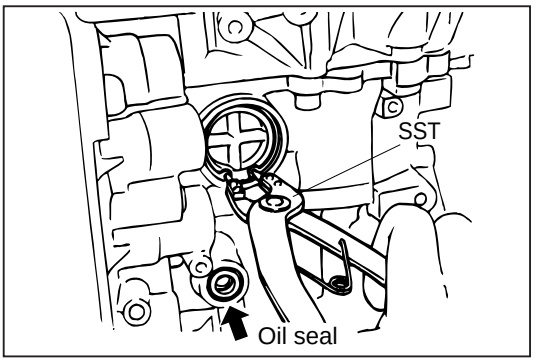

AT00566-00548

88. Second coast brake piston installation
(1) Coat the new O-ring with A.T.F
(2) Install the two new O-rings to the cover
(3) Install the compression spring, piston into the bore.


AT00567-00549

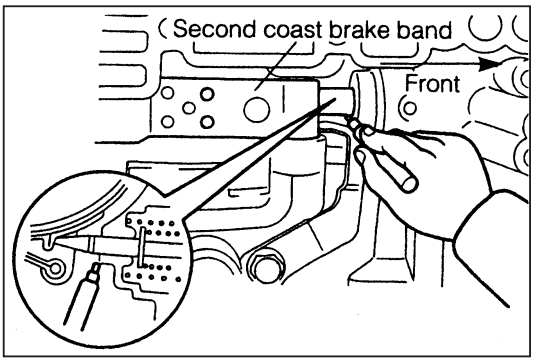
(4) While pressing the cover, install the snap ring using the following SST.
SST: 09350-32014-000 (09351-32050)

NOTE:
- Ensure that the front end of the piston rod contacts the center of the second brake band depression



AT00568-00550

89. Measure the second brake bad stroke.
(1) Apply a small amount of paint to the piston rod at the point it meets the case as shown in the illustration.

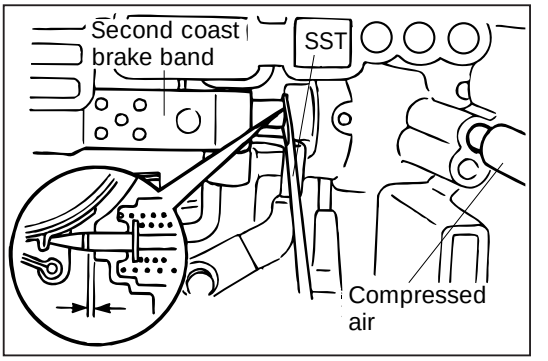


AT00569-00551

(2) Measure the piston stroke while applying and releasing compressed air (4 - 8 kg/cm^2) as shown in the right figure, using the following SST.
SST: 09240-00020-000
Piston Stroke: 1.5 - 3.0 mm

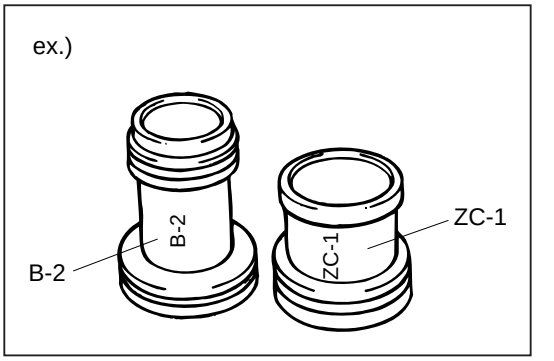
If the stroke exceeds the specified value, replace the piston rod with a longer one.
Piston Rod Length: 72.9 mm
71.4 mm

If the stroke still exceeds the specified value, replace the brake band with a new one.



AT00570-00552

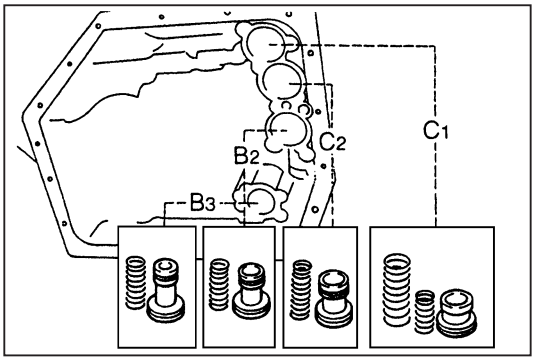
90. Coat new O-rings with the ATF and install them to the pistons.
91. Install the following compression springs and pistons into the bore.
    NOTE:
    - For easier identification, embossed letters (alphanumeric letters) are provided on each piston.



AT00571-00553

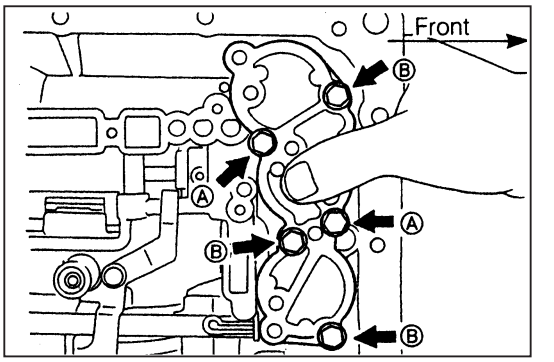
Unit: mm

		Free length and Identification colors	
		for HD-C E/G models	for HD-E E/G models
C_1	No.1 (Inner)	42.50 (None)	32.70 (Brown)
	No.2 (Outer)	77.80 (None)	52.26 (Pink)
C_2		63.50 (Orange)	64.80 (Green & White)
B_2	No.1 (Inside)	56.70 (Yellow)	58.80 (Blue)
	No.2 (Outside)		15.50 (Pink)
C_3		61.50 (White)	59.90 (Blue)



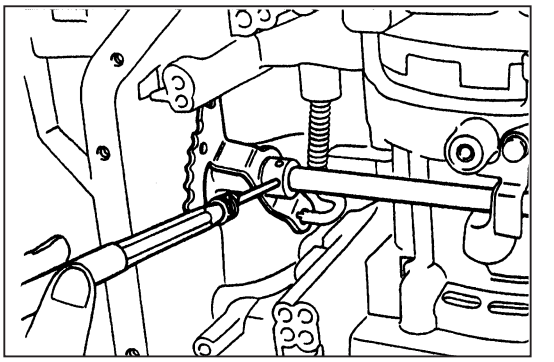
AT00572-00554

92. With a new accumulator gasket interposed, temporarily install the two bolts Ⓐ.
93. While pushing the accumulator cover, install the three bolts Ⓑ and tighten them.
    Tightening Torque: 7.8 - 11.8 N·m

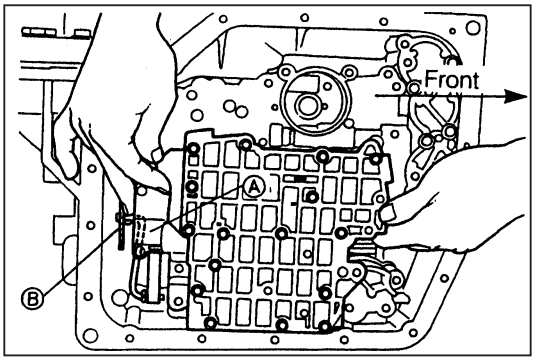


AT00573-00555

94. Install a new spacer.
95. Install the washer and connect the manual valve lever shaft to the manual lever.
96. Stake a new spacer, using a standard punch and a hammer.
97. Install the spring retainer.

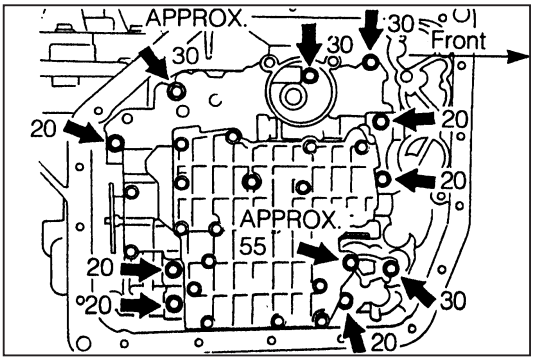

AT00574-00556

98. While holding the valve body assembly with your hands, connect the manual connecting rod Ⓐ to the manual valve lever Ⓑ.



AT00575-00557

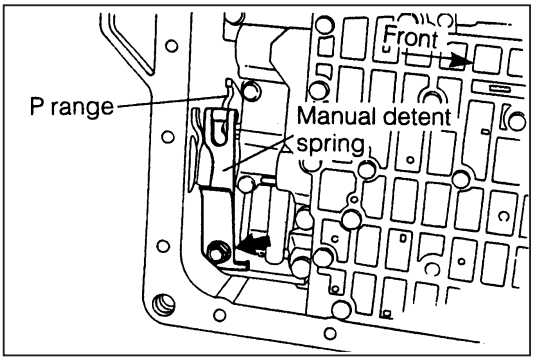
99. Tighten the valve body assembly with the eleven bolts.
    Tightening Torque: 7.8 - 11.8 N·m



AT00576-00558

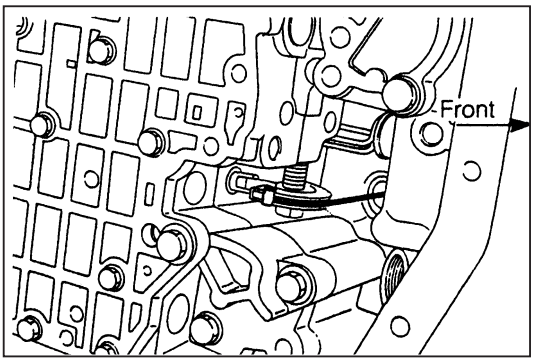
100. Tighten the manual detent spring and manual detent spring cover with a bolt.
    Tightening Torque: 7.8 - 11.8 N·m

    NOTE:
    - Ensure that the position of the manual lever should be P or R range.



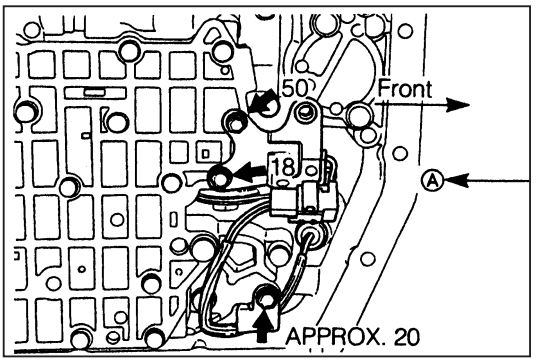
AT00577-00559

101. Insert the throttle cable.
102. Connect the throttle cable to the throttle cam.



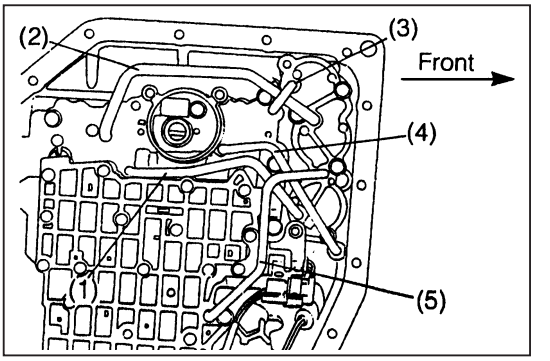
AT00578-00560

103. Install the new O-ring to the solenoid valve.
104. Coat the O-ring with A.T.F
105. Connect the wiring coupler to the solenoid valve.
106. Install the solenoid valve, clamp with three bolts and tightening them.
    Tightening Torque: 7.8 - 11.8 N·m



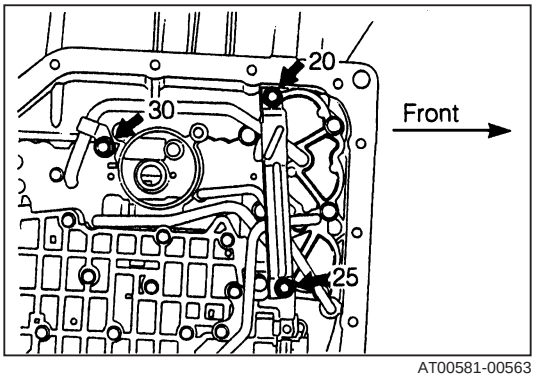
AT00579-00561

107. Install the following five tubes, using the standard plastic hammer.
    (1) Brake accumulator tube
    (2) Rear (direct) clutch accumulator tube
    (3) Forward clutch accumulator tube
    (4) Line pressure tube
    (5) Accumulator back pressure tube
    NOTE:
    - Ensure that the tubes should be installed to the stopper section securely.



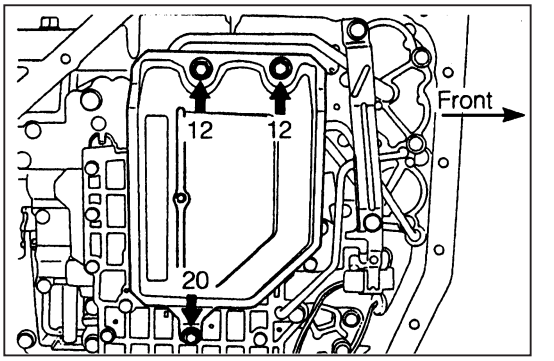
AT00580-00562

108. Tighten the tube bracket with two bolts.
Tightening Torque: 7.8 - 11.8 N·m



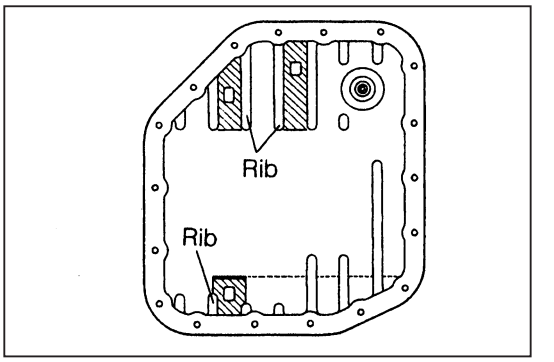
AT00581-00563

109. With the new gasket interposed, tighten the oil strainer with the three bolts.
Tightening Torque: 7.8 - 11.8 N·m



AT00582-00564

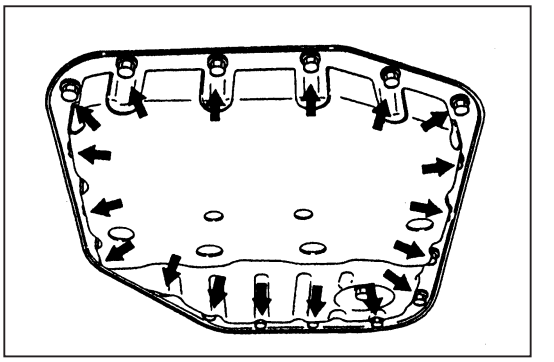
110. Wipe off any material from the magnets and clean it.
111. Place the three magnets to the inner side of oil pan (Slant line range in right figure).



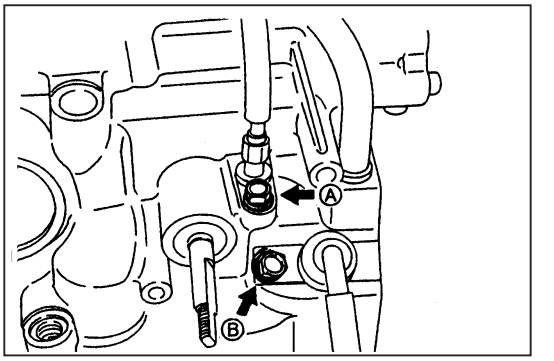
AT00583-00565

112. With the new gasket interposed, tighten the oil pan with eighteen bolts.
Tightening Torque: 3.9 - 6.3 N·m

NOTE:
- Ensure that the oil, grease or the like should be wiped off in the contacting surface of the transaxle housing.

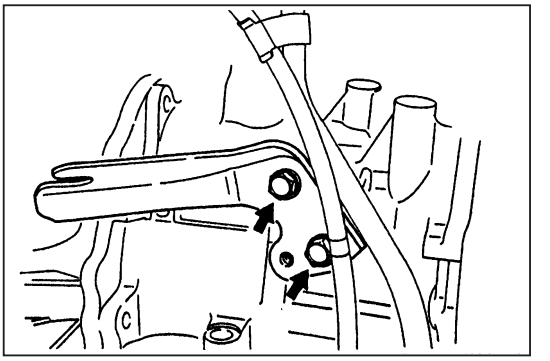

AT00584-00566

113. Tighten the plates with the bolts.
Tightening Torque:
Ⓐ: 3.9 - 6.9 N·m
Ⓑ: 9.8 - 15.7 N·m

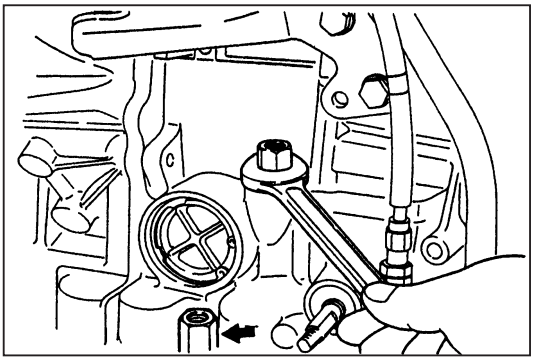


AT00585-00567

114. Tighten the control shaft bracket with the two bolts.
Tightening Torque: 26.5 - 49.0 N·m

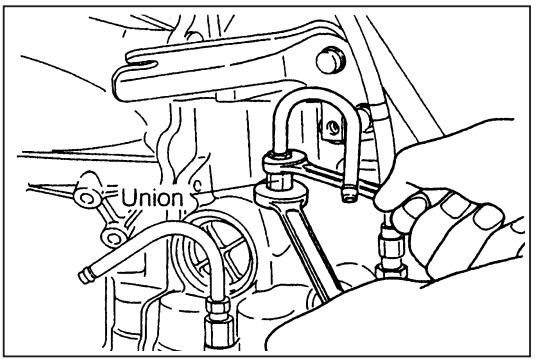

AT00586-00568

115. Install new O-rings on both inlet and outlet unions.
116. Tighten the unions.
Tightening Torque: 19.6 - 29.4 N·m


AT00587-00569

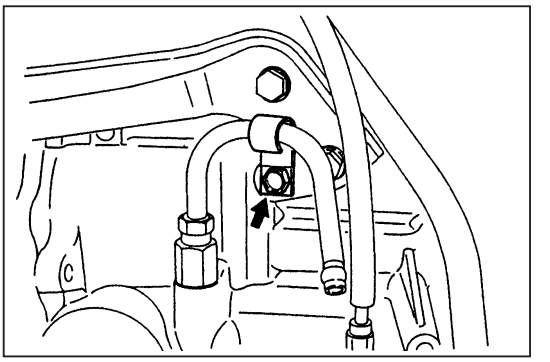
117. Connect the flare nut to the unions and tighten them.
Tightening Torque: 29.4 - 39.2 N·m

CAUTION:
- Be sure to secure the union when tightening the flare nut. Failure to observe this caution may result in breakage of the threaded portion of the transaxle case or case cracks.



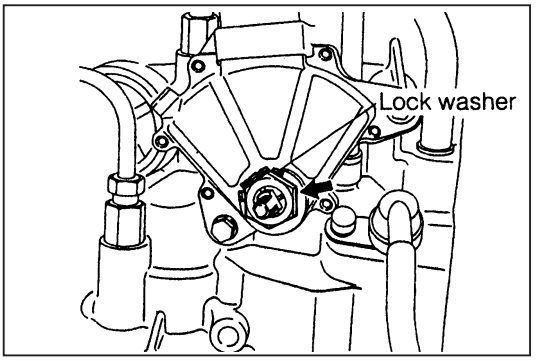
AT00588-00570

118. Tighten the bolt of the inlet hose.
Tightening Torque: 6.9 - 13.7 N·m


AT00589-00571

119. Place the neutral stare switch.
120. Install the new lock washer and nut.
121. Tighten the nut.
Tightening Torque: 5.4 N·m

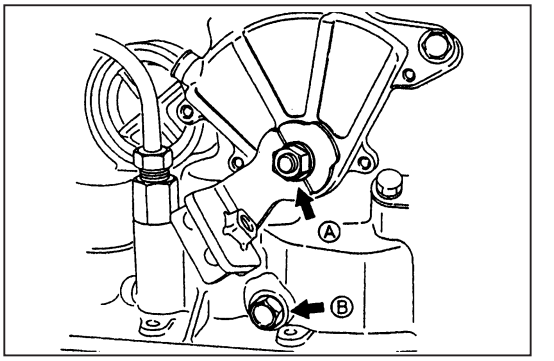
122. Stake the new lock washer, using the standard flat driver.



AT00590-00572

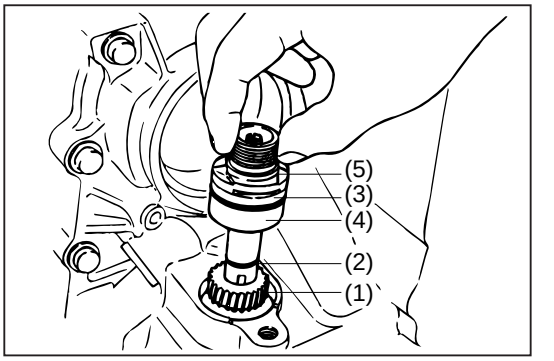
123. Install the transmission control shaft lever with a bolt and tightening it.
    Ⓐ: Tightening Torque: 9.8 - 14.7 N·m

124. With the new O-ring installed, tighten the plug (for line pressure).
    Ⓑ: Tightening Torque: 5.9 - 8.8 N·m



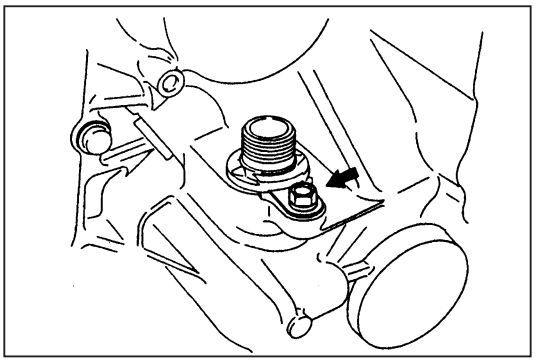
AT00591-00573

125. Install the following parts to the transaxle housing as a set.
    (1) Speedometer driven gear
    (2) Clip
    (3) O-ring
    (4) Oil seal
    (5) Speedometer shaft sleeve subassembly.
    NOTE:
    - Do not hit the speedometer driven gear with the hammer when install it.

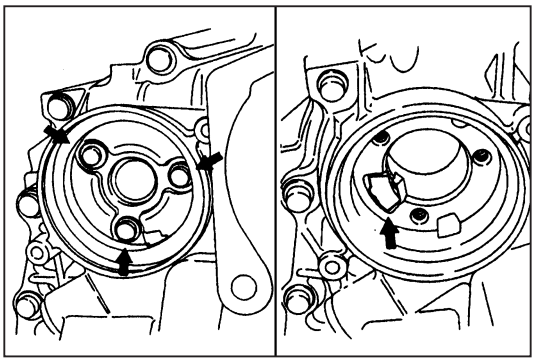


AT00592-00574

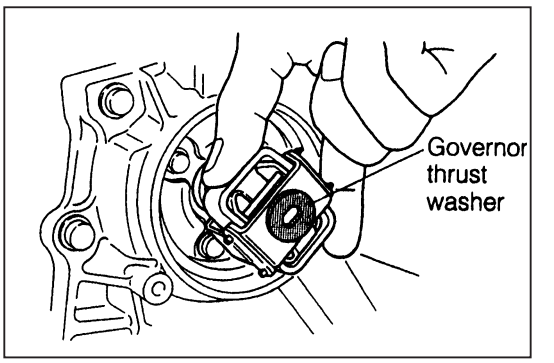
126. Tighten the speedometer sleeve lock plate with a bolt.
    Tightening Torque: 6.9 - 13.7 N·m


AT00593-00575

127. Place the oil strainer.
128. With the new gasket interposed, tighten the governer body adapter with the three bolts.
    Tightening Torque: 7.8 - 11.8 N·m

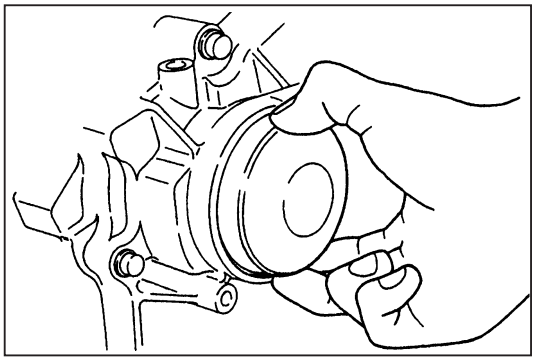

AT00594-00576

129. Place the governer body assembly with the governer thrust washer installed.



AT00595-00577

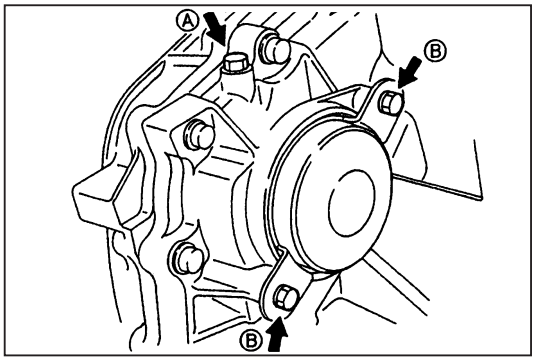
130. Install the new O-ring to the governer plate.
131. Coat the O-ring with A.T.F
132. Place the governer plate.
NOTE:
- Be careful not to damage or twist the O-ring during installation.


AT00596-00578

133. Tighten the plug (for governer pressure inspection) with the new O-ring installed.
Ⓐ: Tightening Torque: 5.9 - 8.8 N·m

134. Tighten the governer cover brackets with the two bolts.
Ⓑ: Tightening Torque: 3.9 - 6.9 N·m

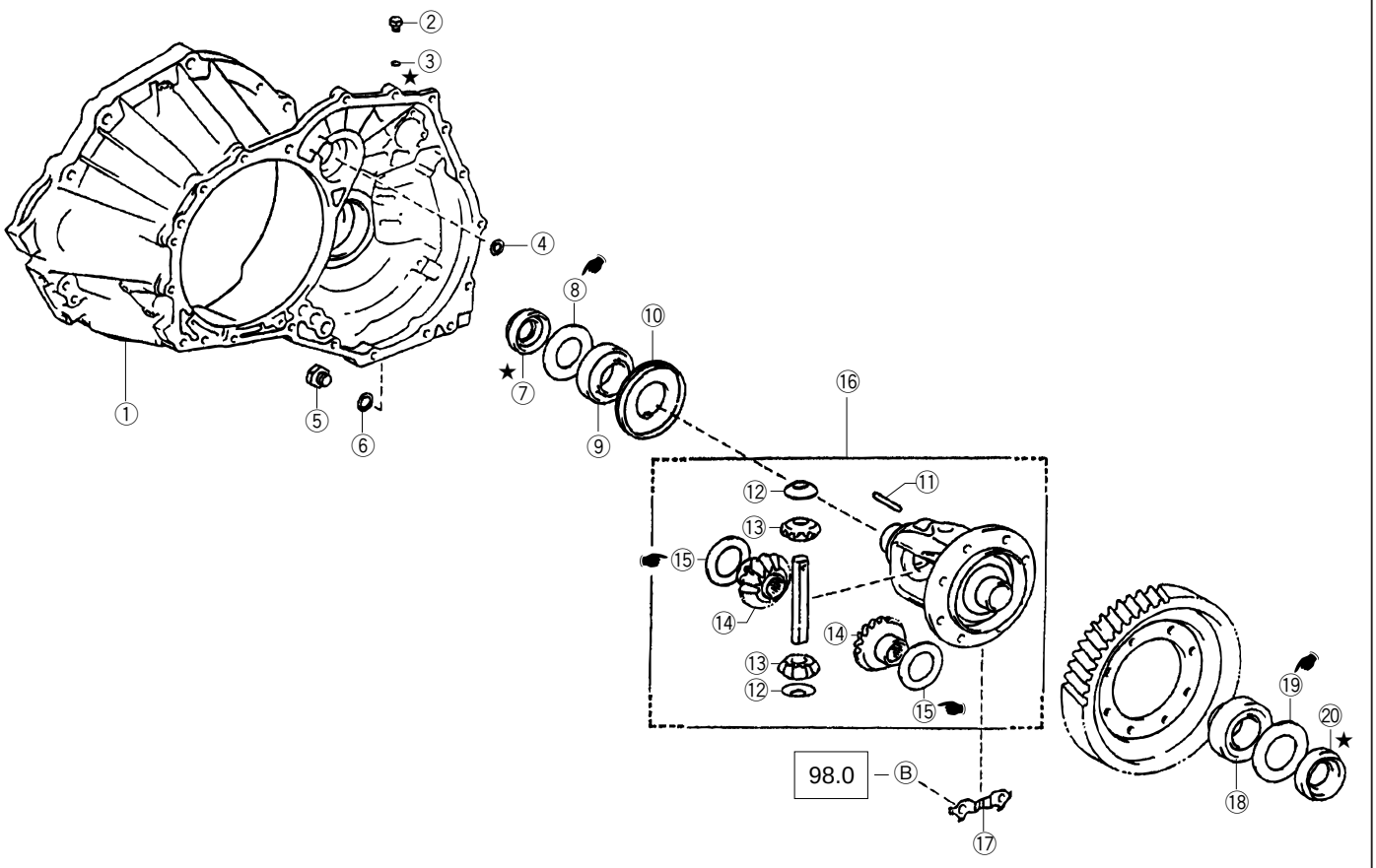
135. Install the transaxle housing to the vehicle.



AT00597-00579

DIFFERENTIAL

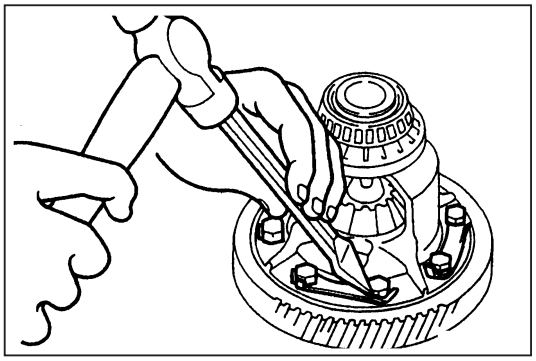
COMPONENTS



① Transaxle housing subassembly
② Plug subassembly W/head straight screw
③ O-ring
④ Seal washer
⑤ Plug subassembly W/head straight screw
⑥ Gasket
⑦ T-type oil seal
⑧ Plate washer
⑨ Tappered roller bearing
⑩ Speedometer drive gear
⑪ Straight pin
⑫ Differential pinion thrust washer
⑬ Differential pinion
⑭ Differential side gear
⑮ Differential side gear thrust washer
⑯ Differential case
⑰ Ring gear set bolt lock plate
⑱ Tappered roller bearing
⑲ Plate washer
⑳ T-type oil seal

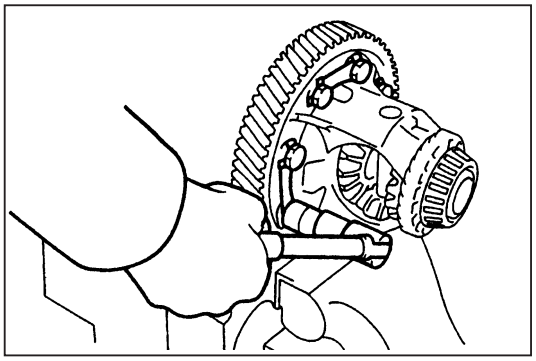
Disassembly of differential

1. Remove the transaxle housing from the vehicle.
2. Remove the differential.
3. Put a mating marks (Painted with white or the like) between ring gear and differential case.
4. Unstake the part of the four lock plates, using a chisel and hammer.



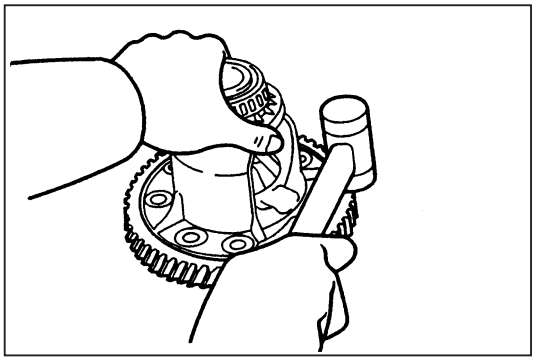
AT00599-00581

5. Remove the four lock plates and eight bolts of the ring gear.
   NOTE:
   - Never reuse the removed lock plates.



AT00600-00582

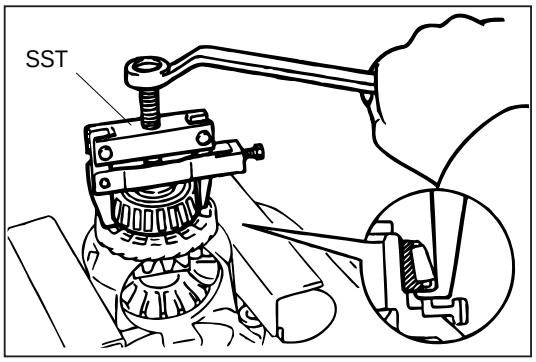
6. Remove the ring gear from the differential case by tapping with plastic hammer lightly.



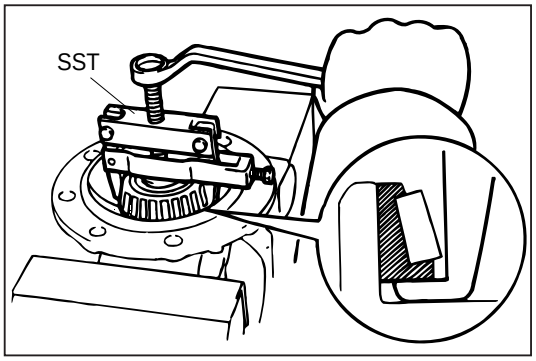
AT00601-00583

7. Remove the side bearings from the differential case, using the following SST.
   SST: 09502-10012-000

   NOTE:
   - Be sure to hook the SST to the cut-out section on the speedometer drive gear.

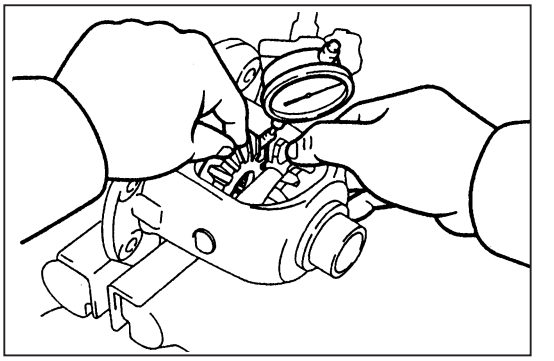


AT00602-00584

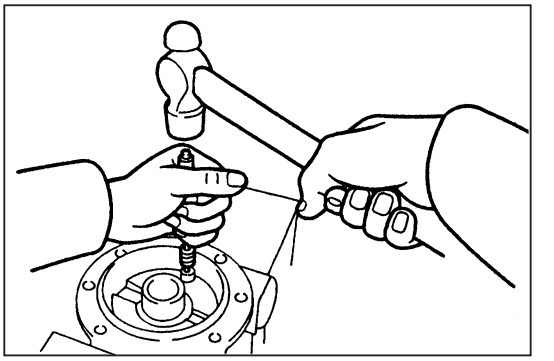


AT00000-00585

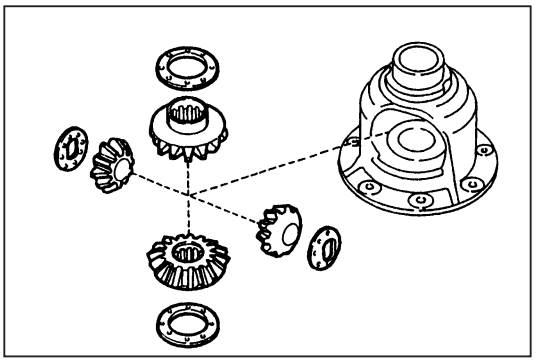
8. Clamp the differential case in a vice.
9. Measure the side gear backlash while the pinion gear pushed against the differential case side.
   Specified Valve: 0.05 - 0.20 mm


AT00603-00586

10. Drive off the straight pin from the ring gear side, using the standard hammer and punch.

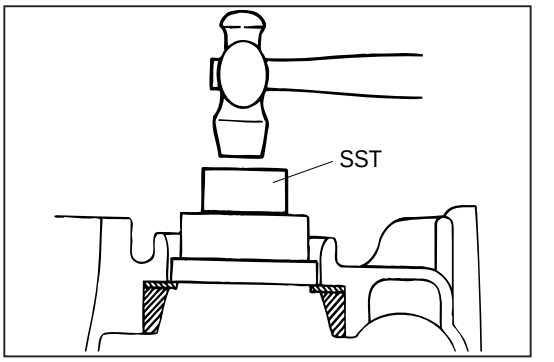

AT00604-00587

11. Pull out the pinion shaft toward you.
12. Remove the following parts.
    (1) Two pinions
    (2) Two side gears
    (3) Two thrust washers and two plate washers
    NOTE:
    - Measure the thickness of the removed side gear plate washers for the reference of installation.


AT00605-00588

13. Remove the oil seal of the transaxle housing, using the standard hammer and a driver.
    NOTE:
    - Never reuse the removed oil seal.

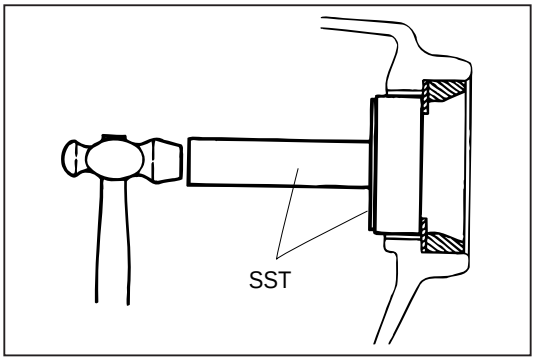
14. Drive out the outer race and shim, using the following SST and hammer.
    SST: 09350-32014-000 (09351-32090)



AT00606-00589

15. Remove the oil seal of the transaxle case, using the following SST and hammer.
    NOTE:
    - Never reuse the removed oil seal.

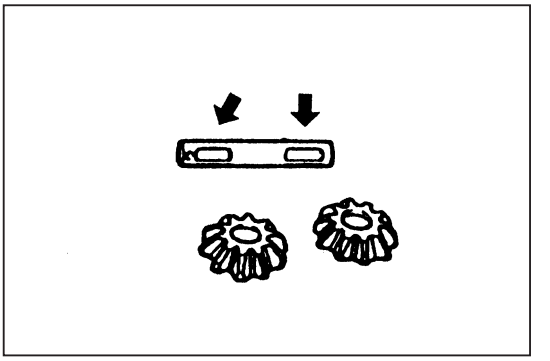
16. Drive out the outer race and shim, using the following SSTs and hammer.
    SSTs: 09351-32014-000
    (09351-32130, 09351-32150)



AT00607-00590

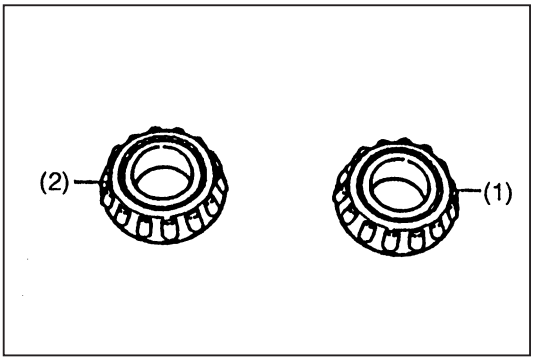
Inspection

1. Visually inspect the rotational sliding section between the differential pinion and the differential pinion shaft for damage and wear.



AT00608-00591

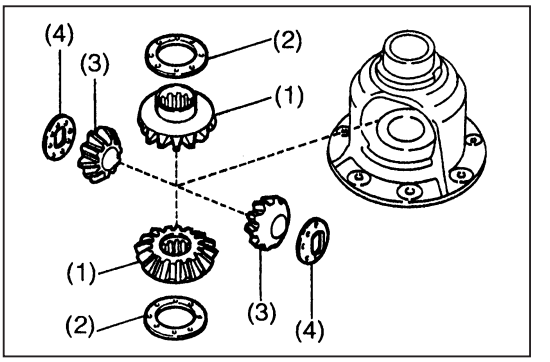
2. Bearings
   Turn the bearings lightly. Ensure that they rotate smoothly without any binding or abnormal noise.



AT00609-00592

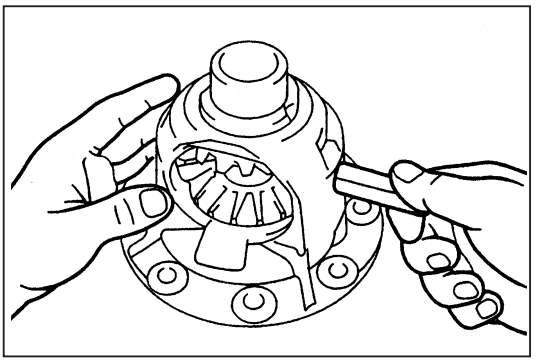
Assembly of differential

1. Install the following parts to the differential case.
   (1) Two side gears
   (2) Same thickness of the side gear thrust washers
   (3) Two pinion gears
   (4) Two pinion thrust washers



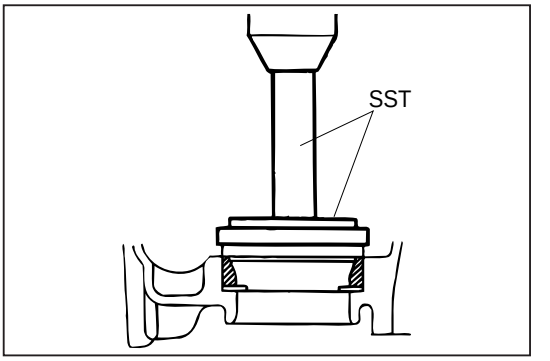
AT00610-00593

2. Insert the pinion shaft into the differential case.
3. Align the lock pin holes of the pinion shaft and differential case.



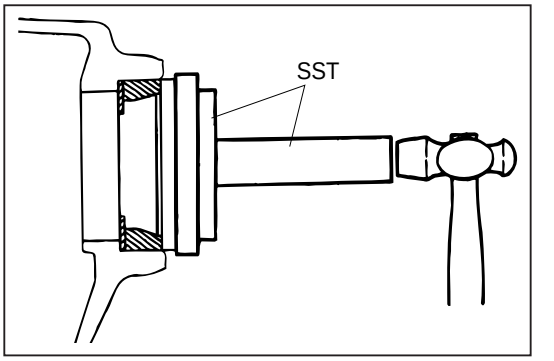
AT00611-00594

4. Place the shim onto transaxle housing.
5. Install a new side bearing outer race in conjunction with a press and the following SST.
   SST: 09350-32014-000
   (09351-32111, 09351-32130)



AT00612-00595

6. Place the adjusting shim (same thickness of removed shim) to the transaxle case.
7. Drive a new side bearing outer race into the transaxle case, using the following SSTs and hammer.
   SSTs: 09350-32014-000
   (09351-32111, 09351-32130)



AT00613-00596

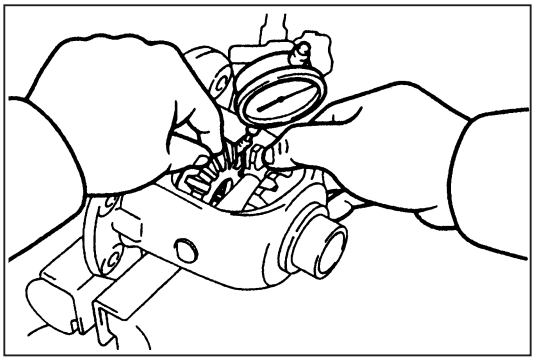
8. Measure the side gear backlash while the pinion gear pushed against the differential case side.
   Specified Valve: 0.05 - 0.20 mm

   NOTE:
   - If the side gear backlash exceeds than specified valve above, be certain to select the suitable thickness of side gear thrust washers.

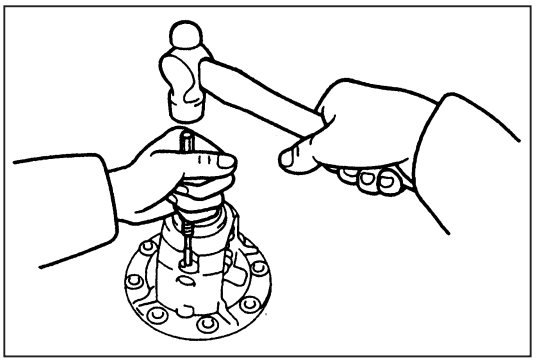
Unit: mm

Parts availability (Thickness)	
0.95	1.10
1.00	1.15
1.05	1.20

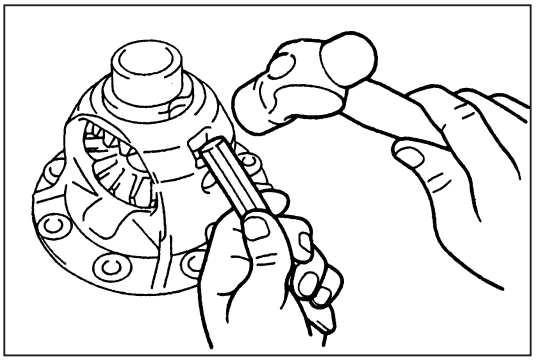
   - Ensure that the same size of select side gear thrust washers should be used on both sides.


AT00614-00597

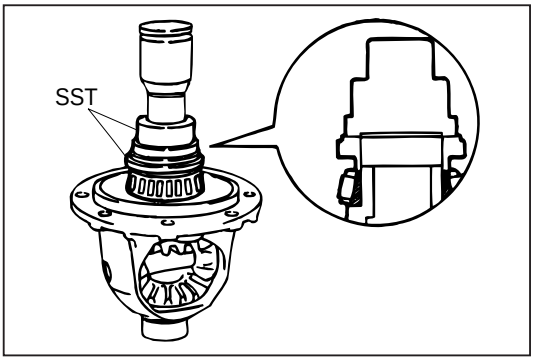
9. Drive the straight pin through differential case hole and pinion shaft, using a punch and hammer.


AT00615-00598

10. Stake the differential case.

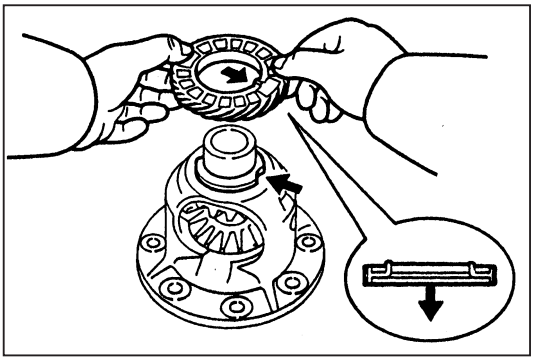

AT00616-00599

11. Press the side bearing into the differential case, using the following SST.
    SST: 09350-32014-000 (09351-32090, 09351-32120)

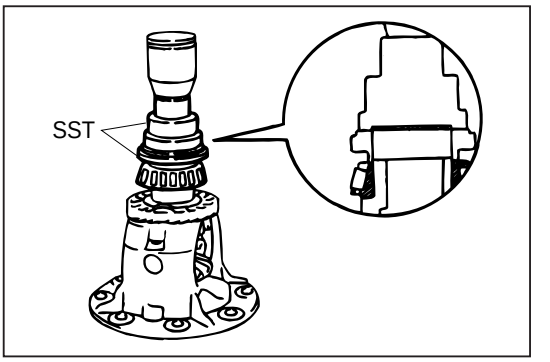


AT00617-00600

12. Install the speedometer drive gear.

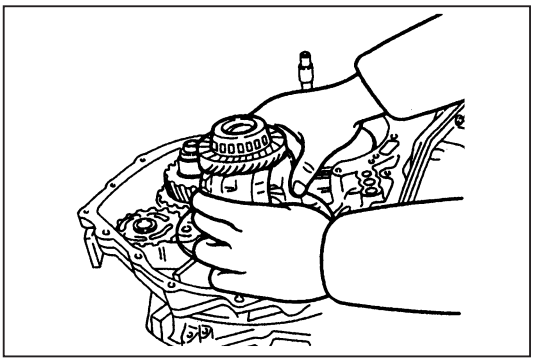

AT00618-00601

13. Press the side bearing into the differential case, using the following SST.
    SST: 09350-32014-000 (09351-32090, 09351-32120)

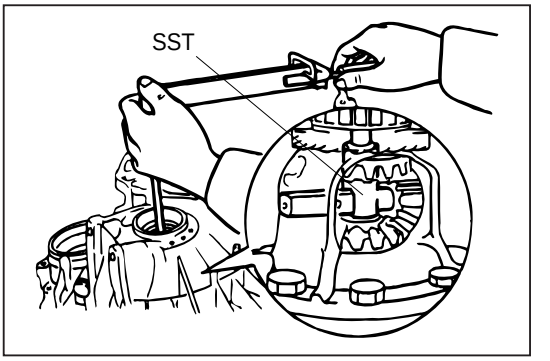


AT00619-00602

14. Side bearing preload adjustment.
    (1) Install the differential to the transaxle case.
    (2) Install the transaxle housing to the transaxle case.
    (3) Tighten the transaxle housing.

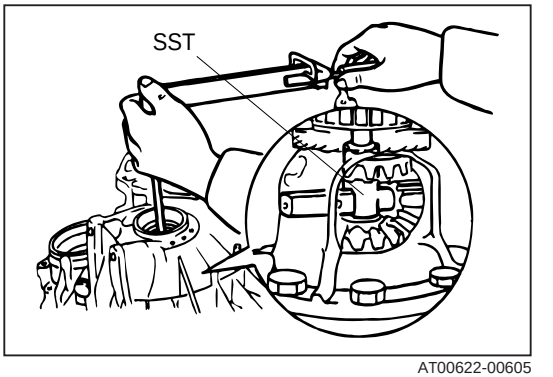

AT00620-00603

    (4) Rotate the differential on both clock and counterclockwise several times so as to snug the bearing down, using the following SST.
    SST: 09564-32011-000



AT00621-00604

(5) Measure the side bearing preload, using the following SST and a torque meter.
SST: 09564-32011-000
Specified Value Preload (at starting):
New Bearing: 0.8 - 1.4 N·m
Reused Bearing: 0.4 - 0.7 N·m



AT00622-00605

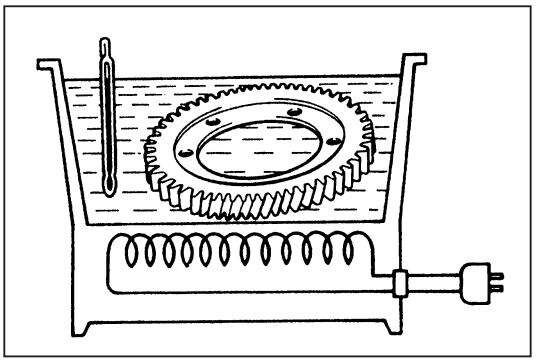
NOTE:
- If the preload exceeds the specified value above, re-select the transaxle case side plate washer.

( ): Identification mark
Unit: mm

Parts availability				
2.00 (V)	2.20 (S)	2.40 (B)	2.60 (F)	2.80 (K)
2.05 (W)	2.25 (T)	2.45 (C)	2.65 (G)	2.85 (L)
2.10 (Q)	2.30 (U)	2.50 (D)	2.70 (H)	2.90 (M)
2.15 (R)	2.35 (A)	2.55 (E)	2.75 (J)	

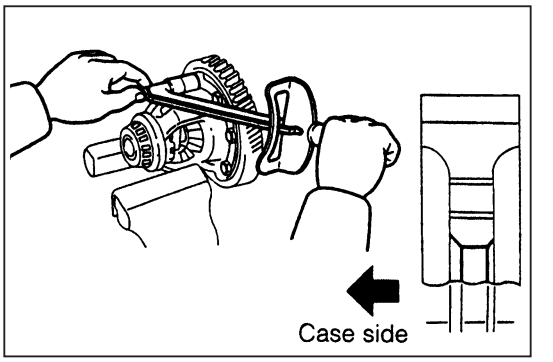
- The preload changes about 0.3 - 0.4 N·m with each plate washer thickness.

15. Remove the transaxle housing by removing the eighteen bolts.
16. Remove the differential case from the transaxle case.
17. Install ring gear.
(1) Clean the contact surface of the differential case.
(2) Heat the ring gear to about 100°C in an oil bath.
CAUTION:
- Do not heat the ring gear above 110°C.


AT00623-00606

(3) Clean the contact surface of the ring gear with cleaning solvent.
(4) Quickly install the ring gear to the differential case.
(5) Install a new four lock plates with the eight bolts and tighten them.
Tightening Torque: 98.0 N·m

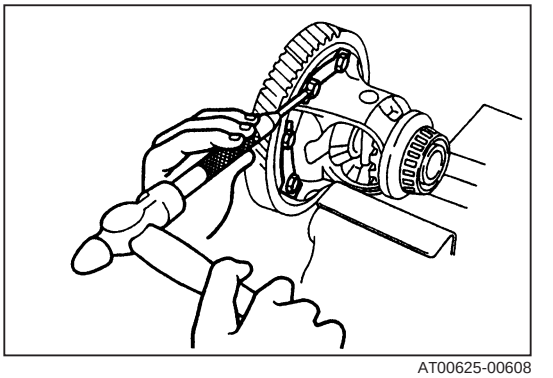
NOTE:
- Be sure to tighten the bolts alternately and diagonally and a little at a time.



AT00624-00607

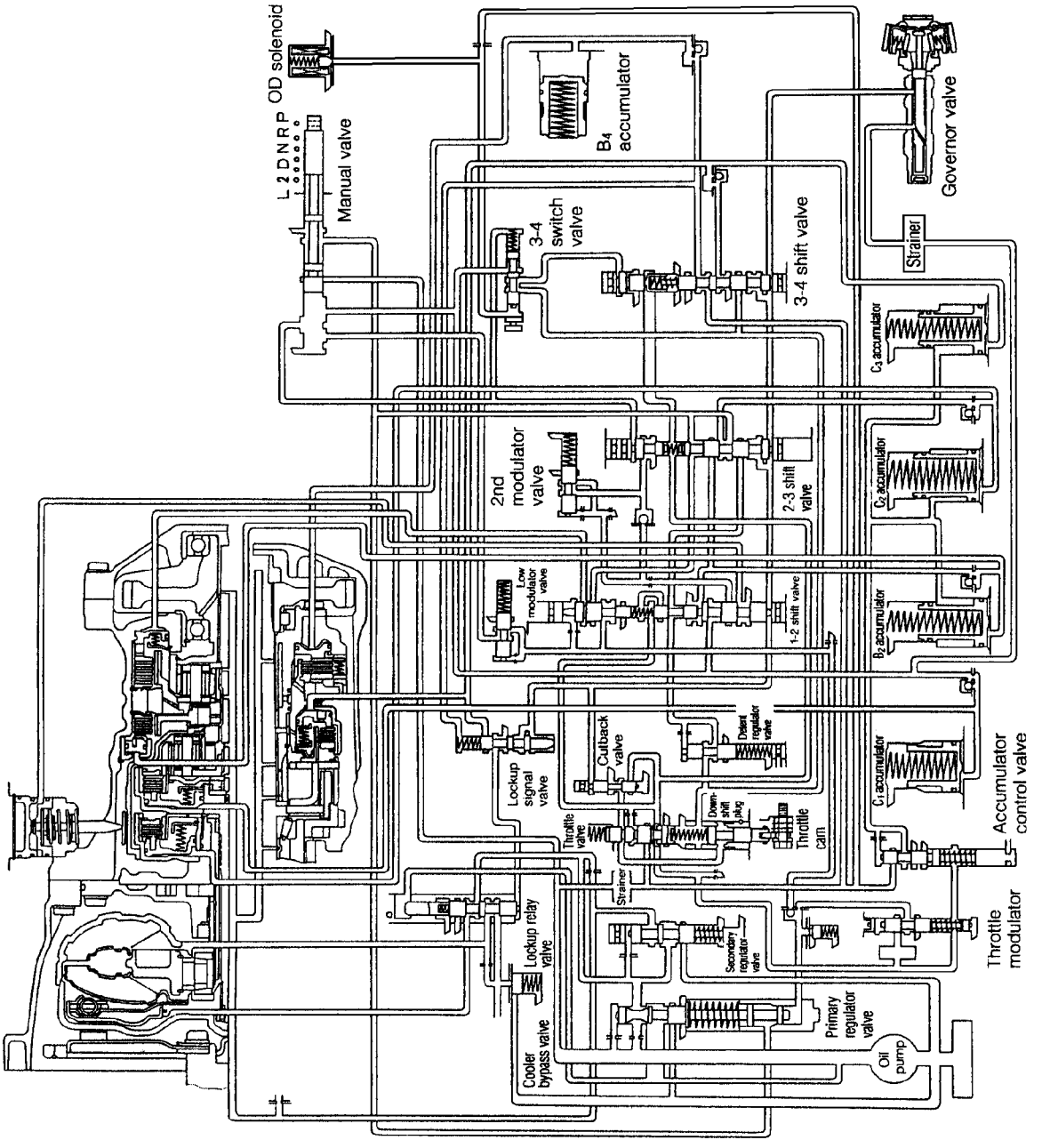
(6) Stake the new lock plates, using the hammer and drift punch or the like.
NOTE:
- Stake the lock plates only the half on the tightened side.

18. Install the transaxle housing to the vehicle.


AT00625-00608

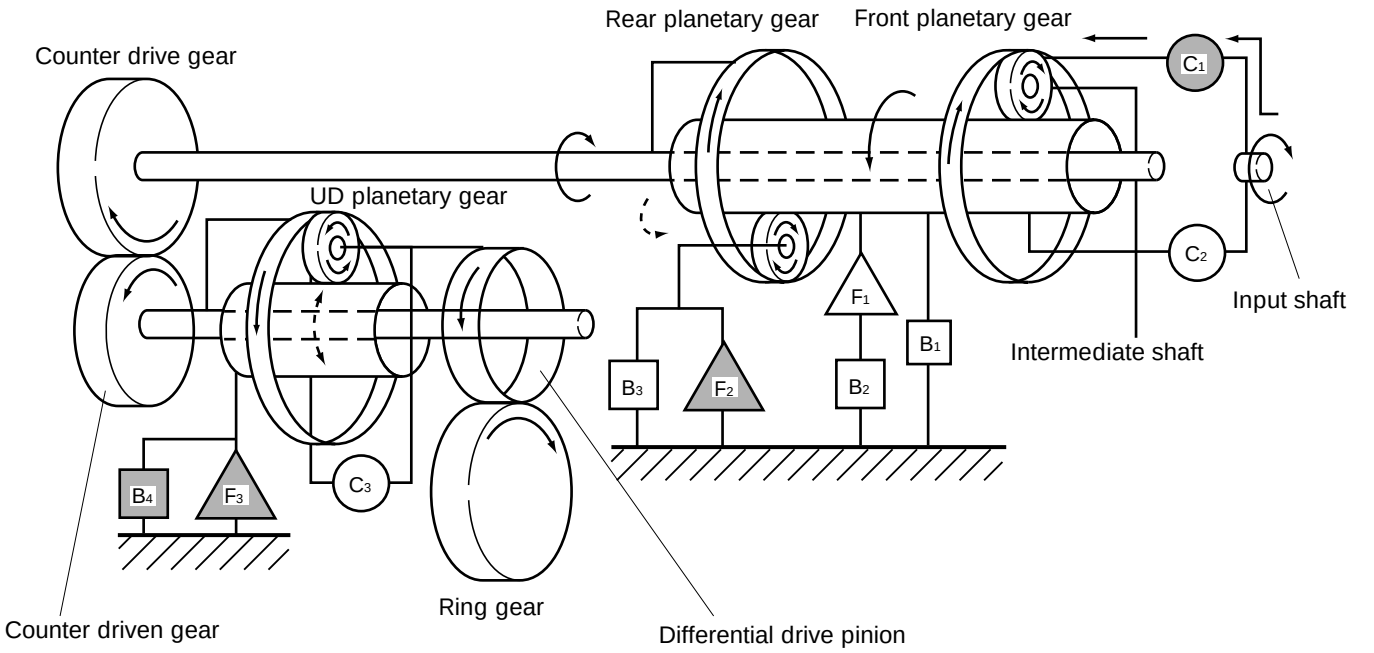
HYDRAULIC PRESSURE CONTROL SYSTEM

HYDRAULIC PRESSURE CONTROL CIRCUIT



OPERATION IN EACH RANGE

First Gear in D or 2 Range

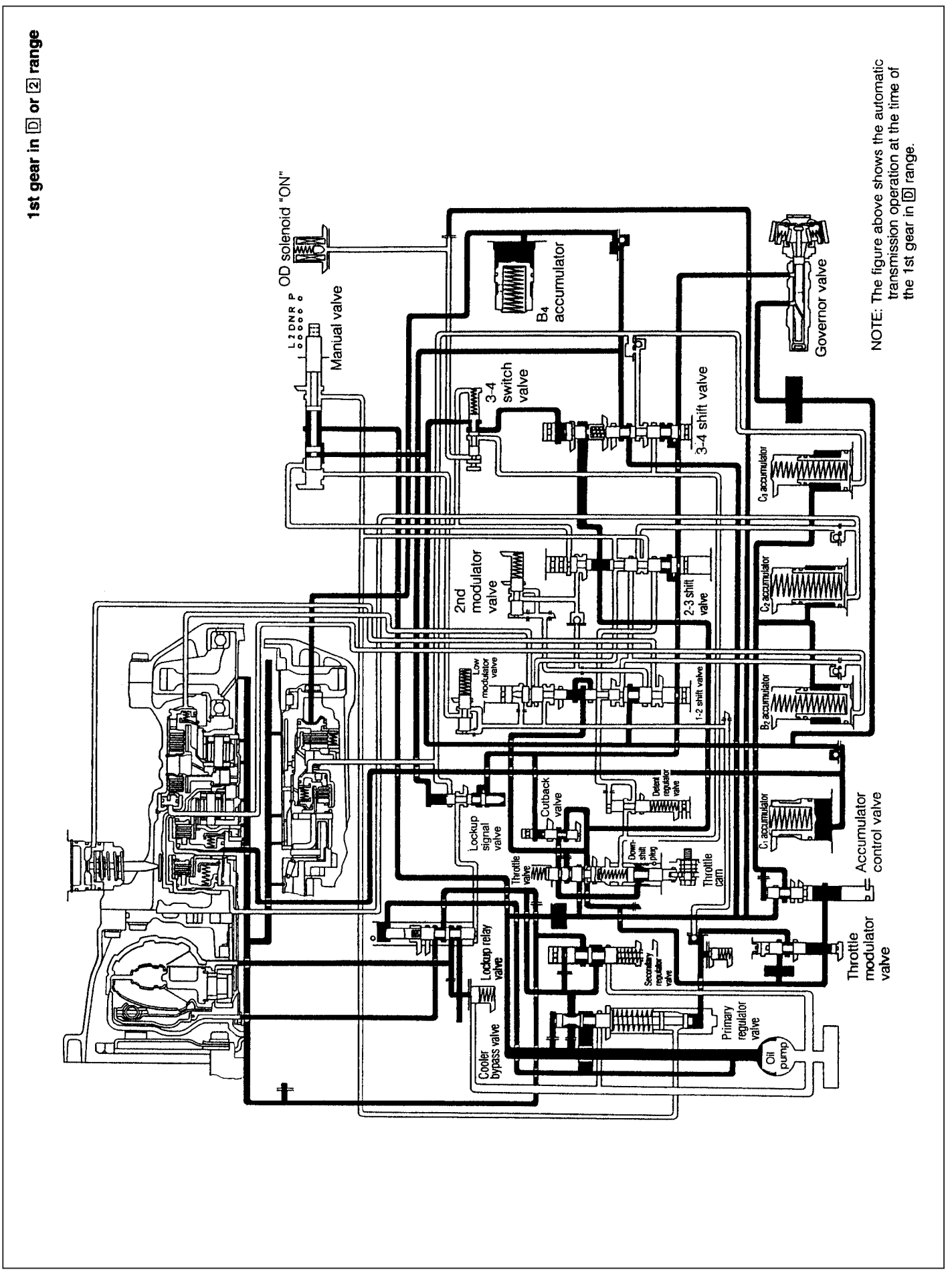


When the vehicle speed is comparatively low and the throttle valve opening is large, namely when a large driving force is required, the forward clutch and one-way clutch No. 2 operate. As a result, the counter drive gear rotates in the right direction at a reduction gear ratio of 2.810.

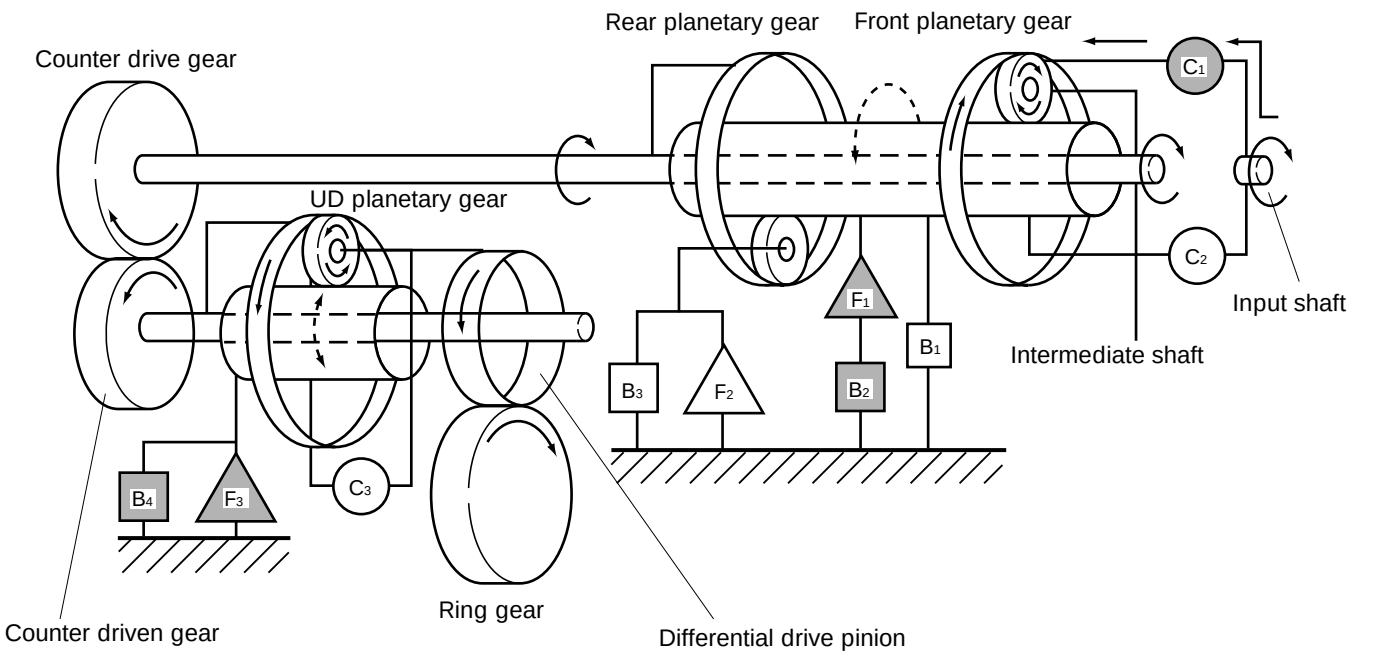
In the 1st gear, as is evident from the figure above, the forward clutch (C1) is operating. Therefore, the turning force of the input shaft is transmitted directly to the front planetary internal gear. Thus, the turning force in the right direction is transmitted to the front planetary carrier (intermediate shaft). On the other hand, the front planetary sun gear meshing with the front planetary gear pinions receives the turning force in the left direction and transmits power to the rear planetary gear pinion. Hence, this tries to turn the rear planetary carrier in the left direction. Since this rotation is prevented by the operation of the one-way clutch No. 2 (F2), the rear planetary internal gear (intermediate shaft) rotates in the right direction. Consequently, the intermediate shaft as well as the counter drive gear which is spline-fitted to the intermediate shaft rotates in the right direction. At the four-speed transmission section, the turning force from the counter drive gear rotates the counter driven gear and countershaft in the left direction. Since the underdrive (hereinafter referred to as UD) planetary sun gear is locked by means of the UD brake (B4) and UD one-way clutch (F3), this turning force makes the UD planetary gear pinion turn on its own axis and at the same time walk around inside the UD planetary gear. Hence, the UD planetary carrier (differential drive pinion) rotates in the left direction at a gear ratio of 1.452.

As a result, the reduction ratio of the whole automatic transmission becomes 3.643.

AT00627-00610


1st gear in D or 2 range
OD solenoid "ON"
L 2 D NR P
Manual valve
B4 accumulator
3-4 switch valve
3-4 shift valve
Governor valve
C0 accumulator
2nd modulator valve
2-3 shift valve
C2 accumulator
Low modulator valve
1-2 shift valve
B2 accumulator
Lockup signal valve
Cutback valve
Detent regulator valve
C1 accumulator
Throttle valve
Down-shift plug
Throttle cam
Accumulator control valve
Lockup relay valve
Secondary regulator valve
Throttle modulator valve
Cooler bypass valve
Primary regulator valve
Oil pump
NOTE: The figure above shows the automatic transmission operation at the time of the 1st gear in D range.

Second Gear in D Range



When the speed of the vehicle in the 1st gear condition is increased, the 1-2 shift valve causes the 2nd brake (B2) to operate. Thus, the automatic transmission assumes the 2nd gear. In this condition, the counter drive gear rotates in the right direction at a reduction gear ratio of 1.549.

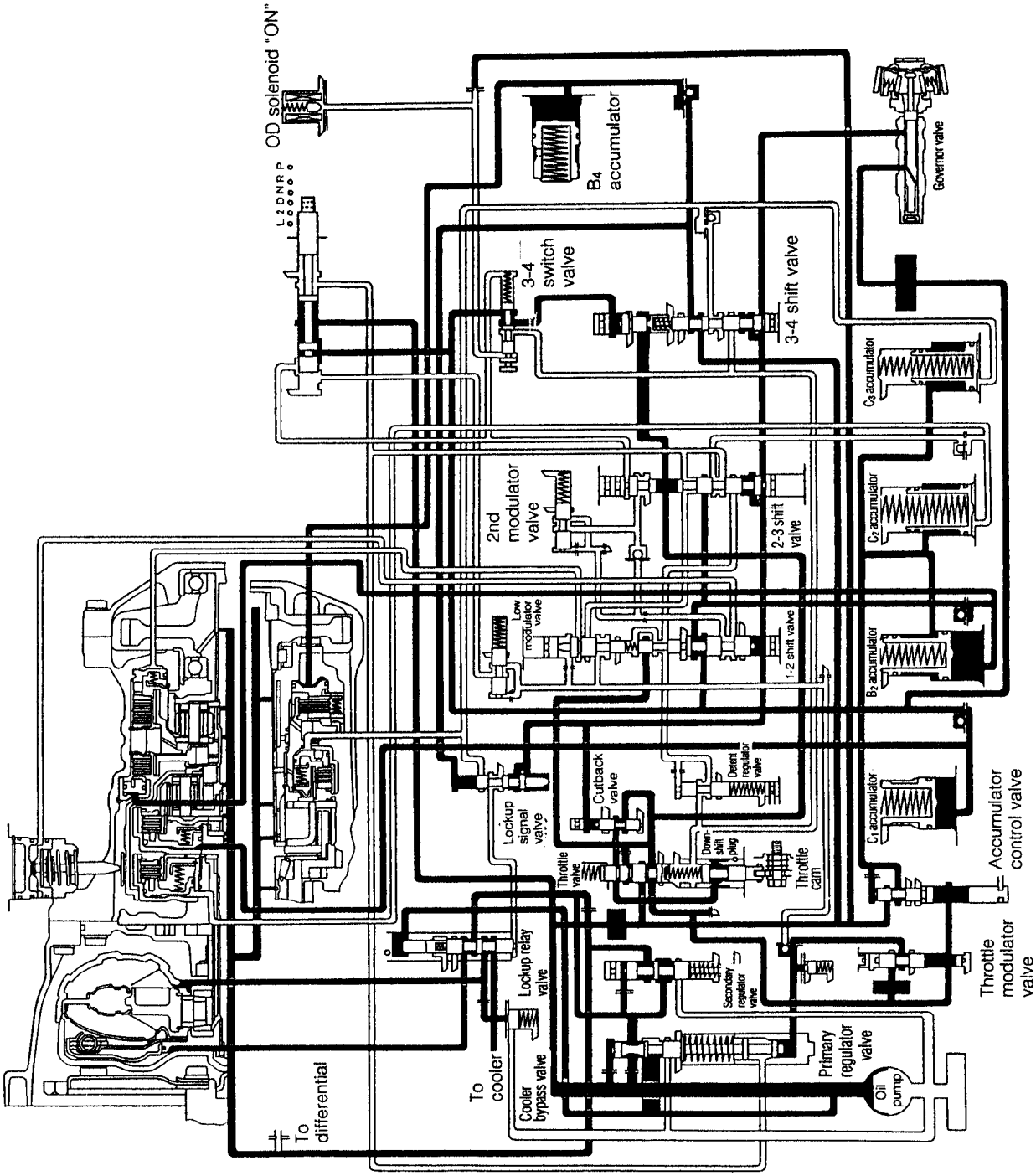
In the 2nd gear, as is evident from the figure above, the forward clutch (C1) is operating. Therefore, the turning force of the input shaft is transmitted directly to the front planetary internal gear. Thus, the turning force in the right direction is transmitted to the front planetary carrier (intermediate shaft). On the other hand, the front planetary sun gear meshing with the front planetary gear pinions receives the turning force in the left direction. However, this rotation is prevented by the one-way clutch No. 1 (F1) through the operation of the 2nd brake (B2). As a result, no turning force is transmitted to the rear planetary gear. Instead, the turning force in the right direction is transmitted from the front planetary internal gear to the front planetary carrier (intermediate shaft) through the front planetary gear pinions. Consequently, the turning force of the intermediate shaft is transmitted to the counter drive gear, as is the case with the 1st gear.

The operation of the four-speed transmission section is the same as that of the 1st gear. The gear ratio is 1.452.

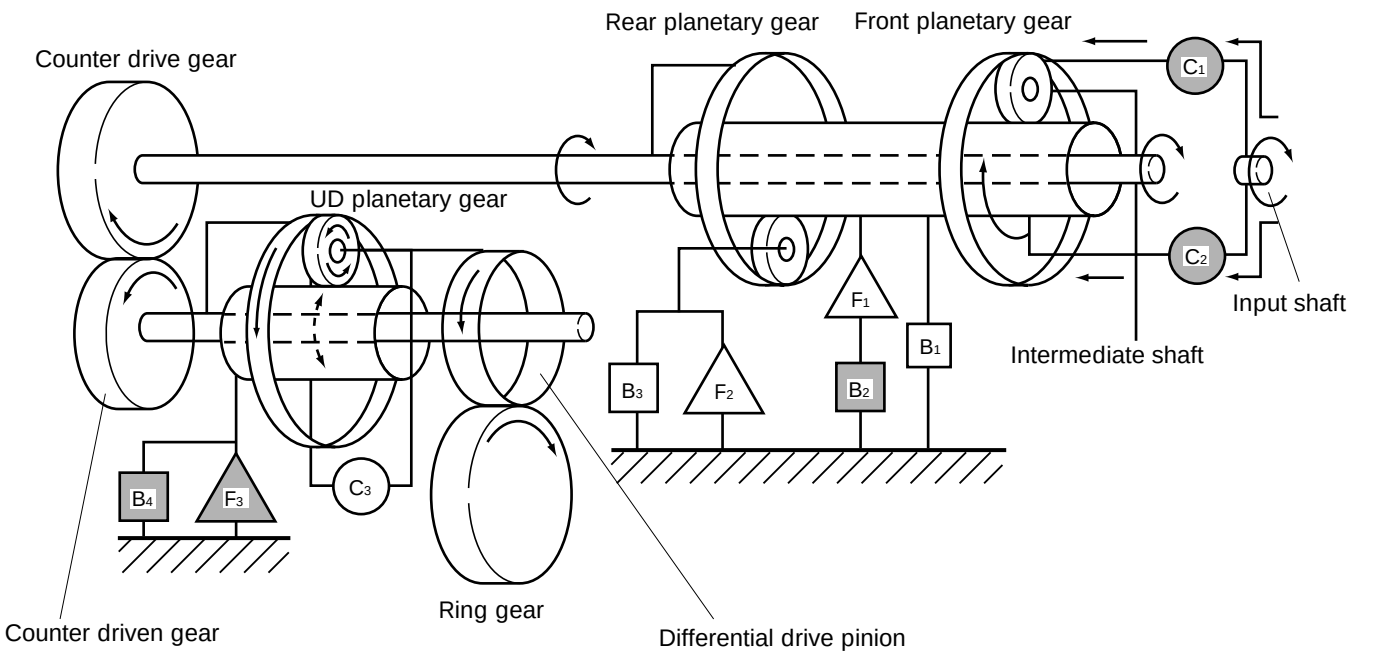
As a result, the reduction ratio of the whole automatic transmission becomes 2.008.

AT00628-00612

2nd gear in D range



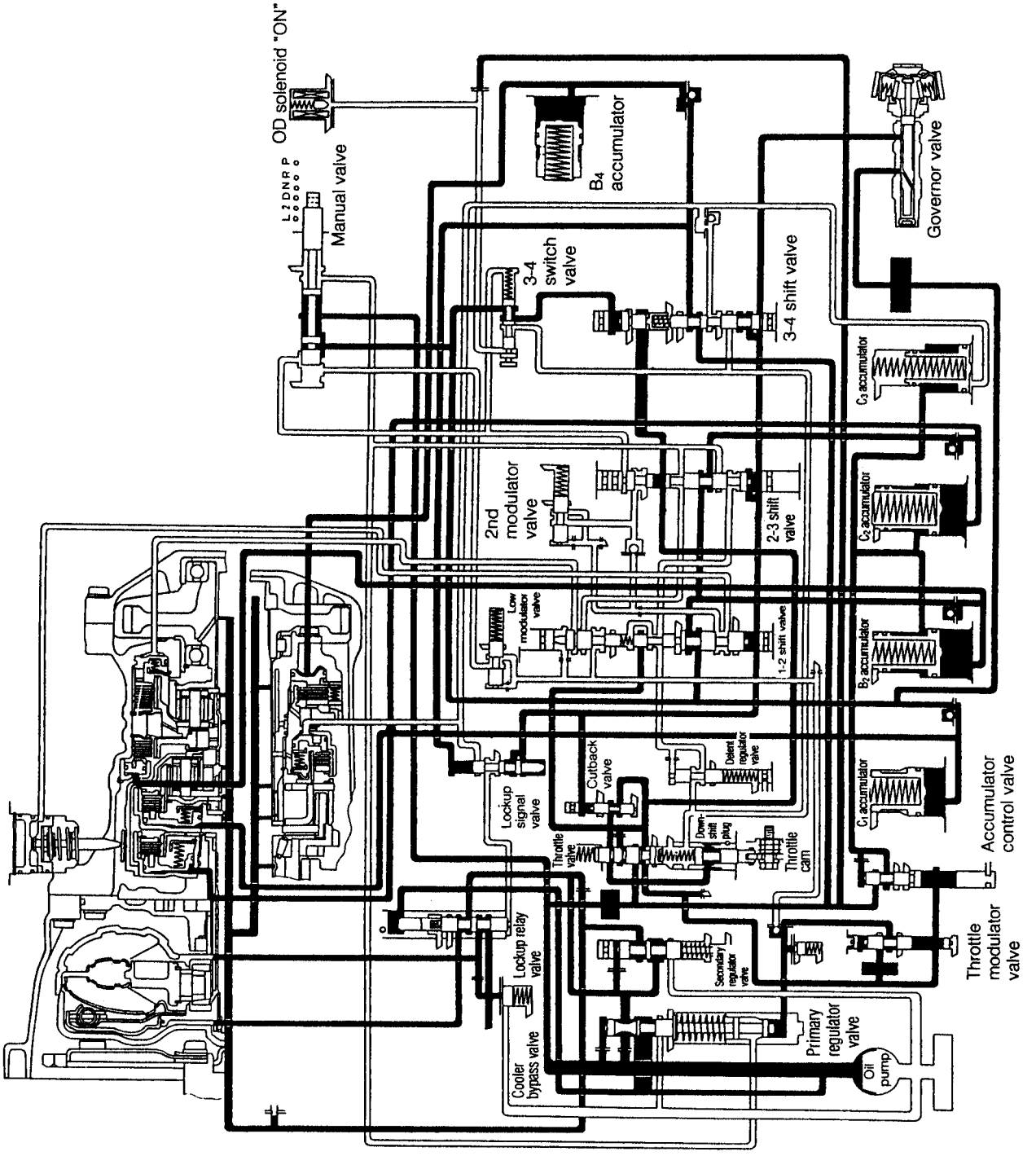
Third Gear in D Range



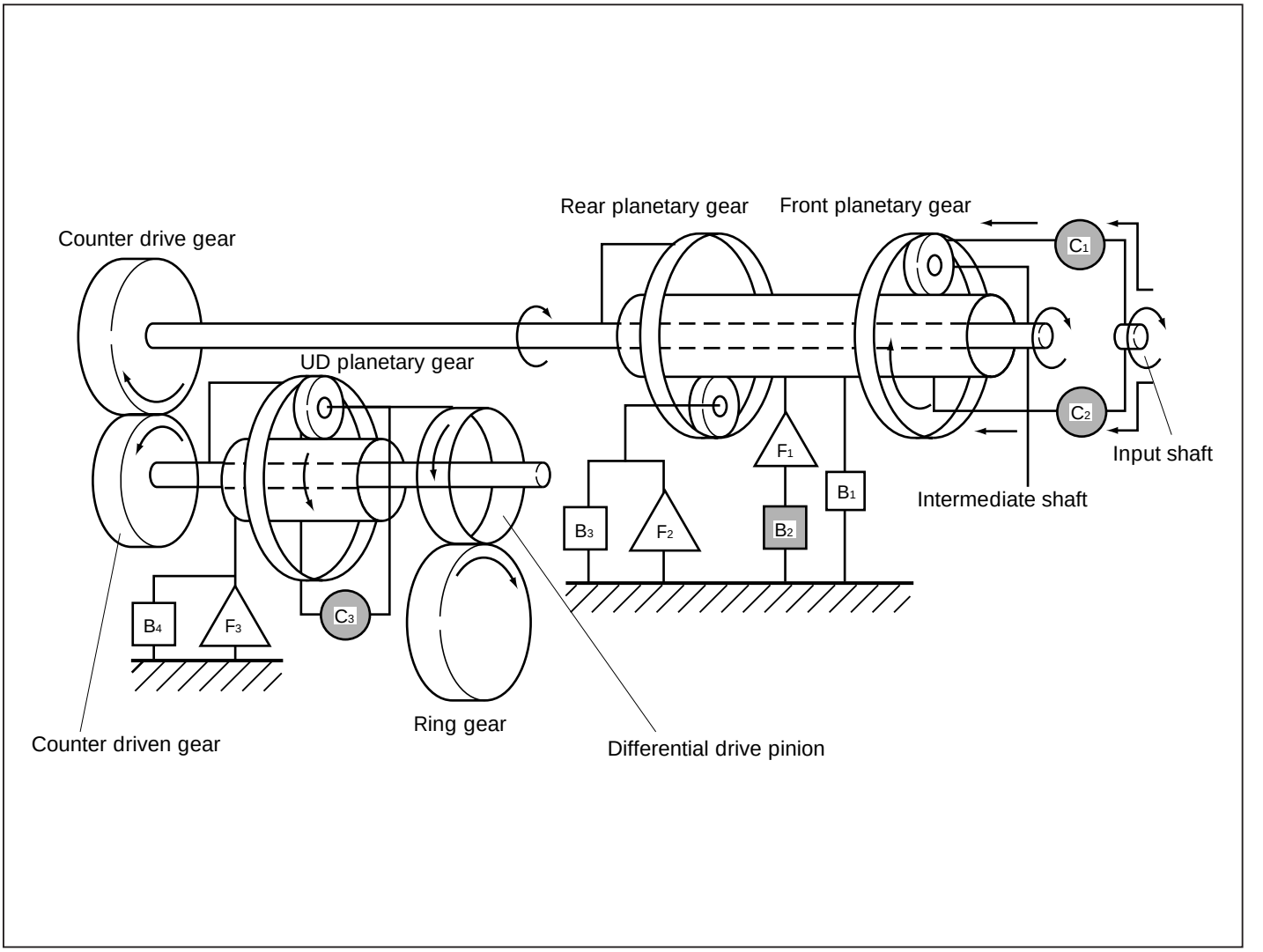
When the speed of the vehicle in the 2nd gear condition is further increased, the 2-3 shift valve causes the direct clutch to operate. Thus, the automatic transmission assumes the 3rd gear. In this directly connected condition, the counter drive gear rotates in the right direction at a reduction ratio of 1.000.
In the 3rd gear, as is evident from the figure above, the forward clutch (C1) and direct clutch (C2) are operating. Therefore, the input shaft, front planetary internal gear and sun gear are rotating in the same direction. Consequently, the front planetary gear pinions are put under a locked condition. Therefore, the whole front planetary gears rotate unitedly, thus permitting the turning force of the input shaft to be transmitted directly to the front planetary carrier (intermediate shaft). The turning force of the intermediate shaft is transmitted to the counter drive gear in the same way as with the 1st gear and 2nd gear. The operation of the four- speed transmission section is the same as that of the 1st gear. The gear ratio is 1.452.
As a result, the reduction ratio of the whole automatic transmission becomes 1.296.

AT00629-00614

Third gear in D range



D Range <OD>



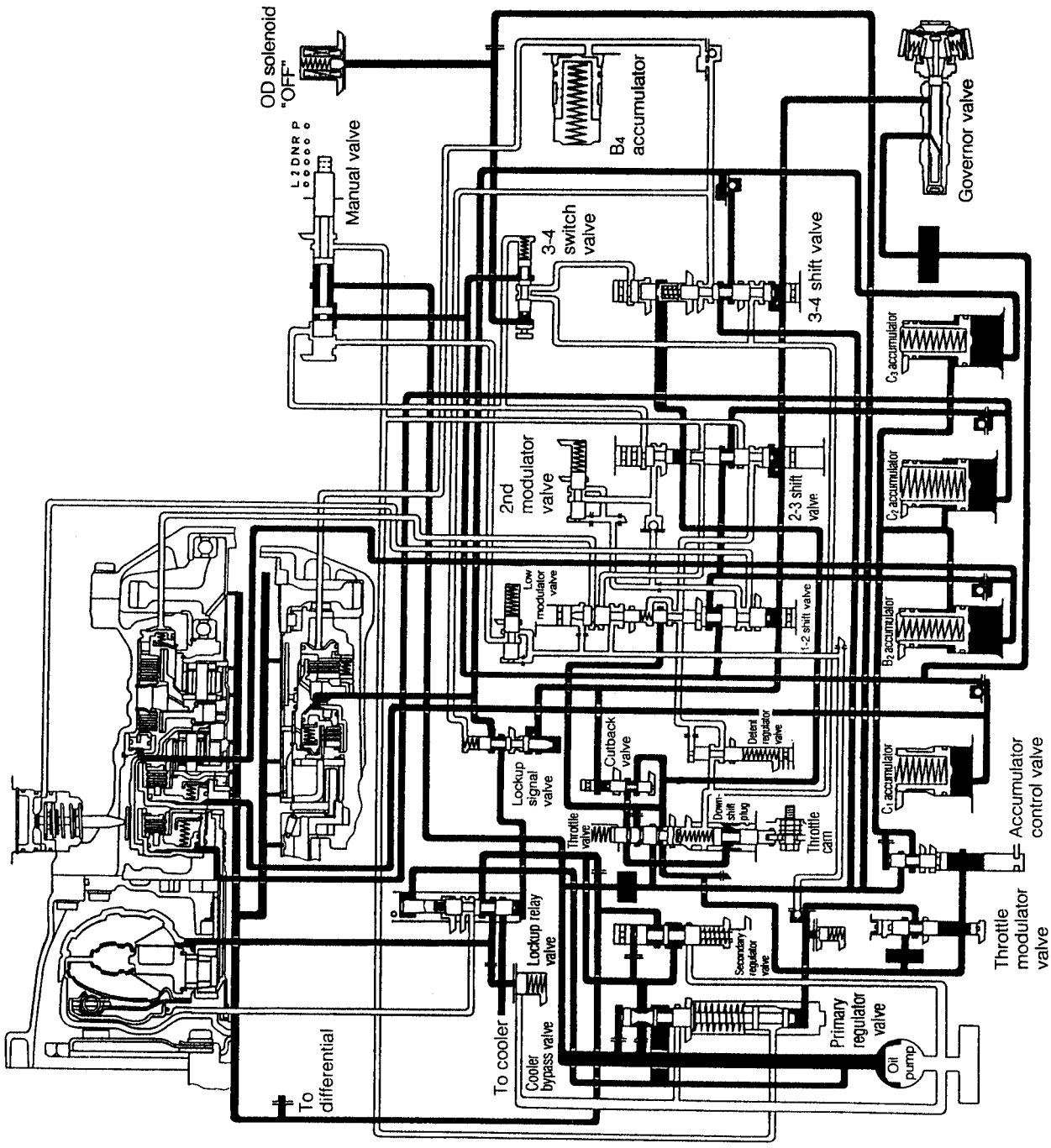
When the OD operating conditions are satisfied under the 3rd gear in the D range, the 3-4 shift valve releases the UD brake (B4). Simultaneously, the UD direct clutch (C3) operates, thus bringing the UD planetary gear unit to a directly-connected state. Consequently, the differential drive pinion rotates in the left direction. The gear ratio at this time becomes a countergear OD ratio of 0.892.

Under the OD state, as is evident from the figure above, the UD planetary sun gear is connected with the UD planetary carrier by means of the UD direct clutch (C3). Therefore, the UD planetary gear pinions are brought into a lock state. Hence, turning force which has been increased at the counter driven gear is transmitted to the UD planetary internal gear. Thus, the whole UD planetary gears unitedly rotate the differential drive pinions.

As is described above, each of the gear ratios at both three-speed transmission and four-speed transmission sections is 1.000. As a result, the reduction ratio of the whole automatic transmission becomes an overdrive ratio of 0.892.

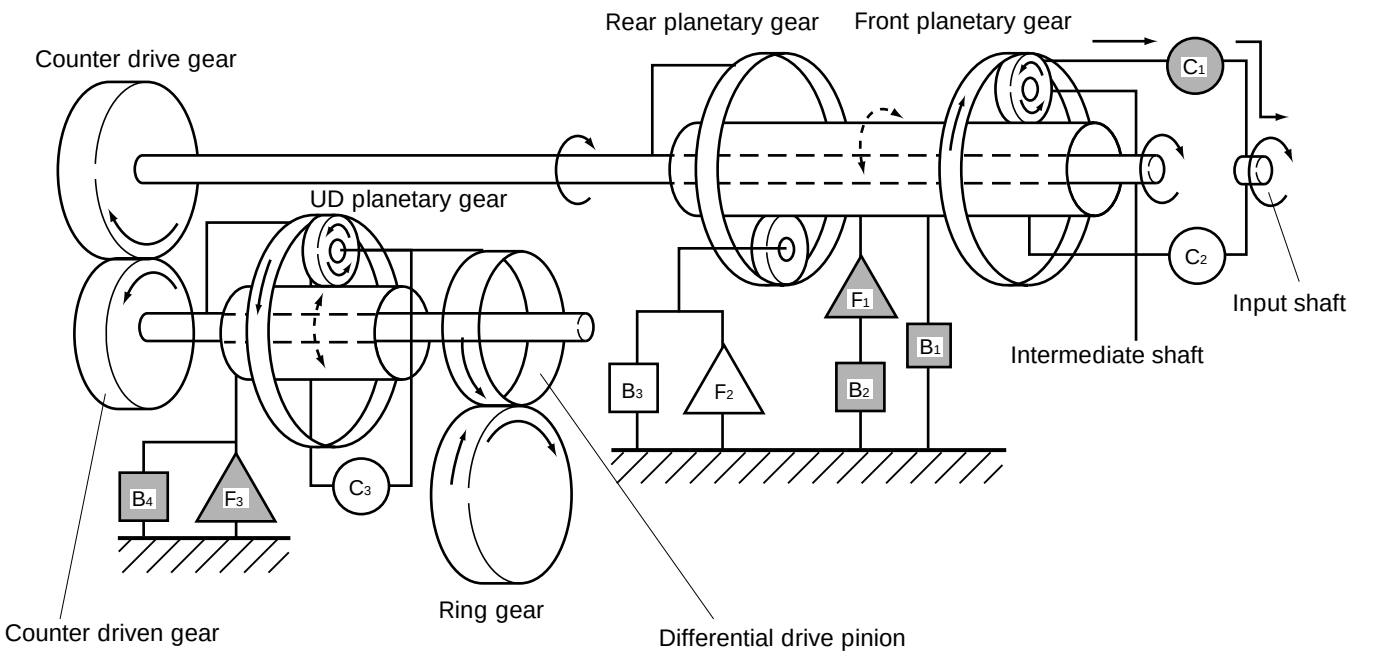
AT00630-00616

D range <OD>



NOTE: The figure above shows the automatic transmission operation when OD gear lockup is ON in D range.

Second gear in 2 range

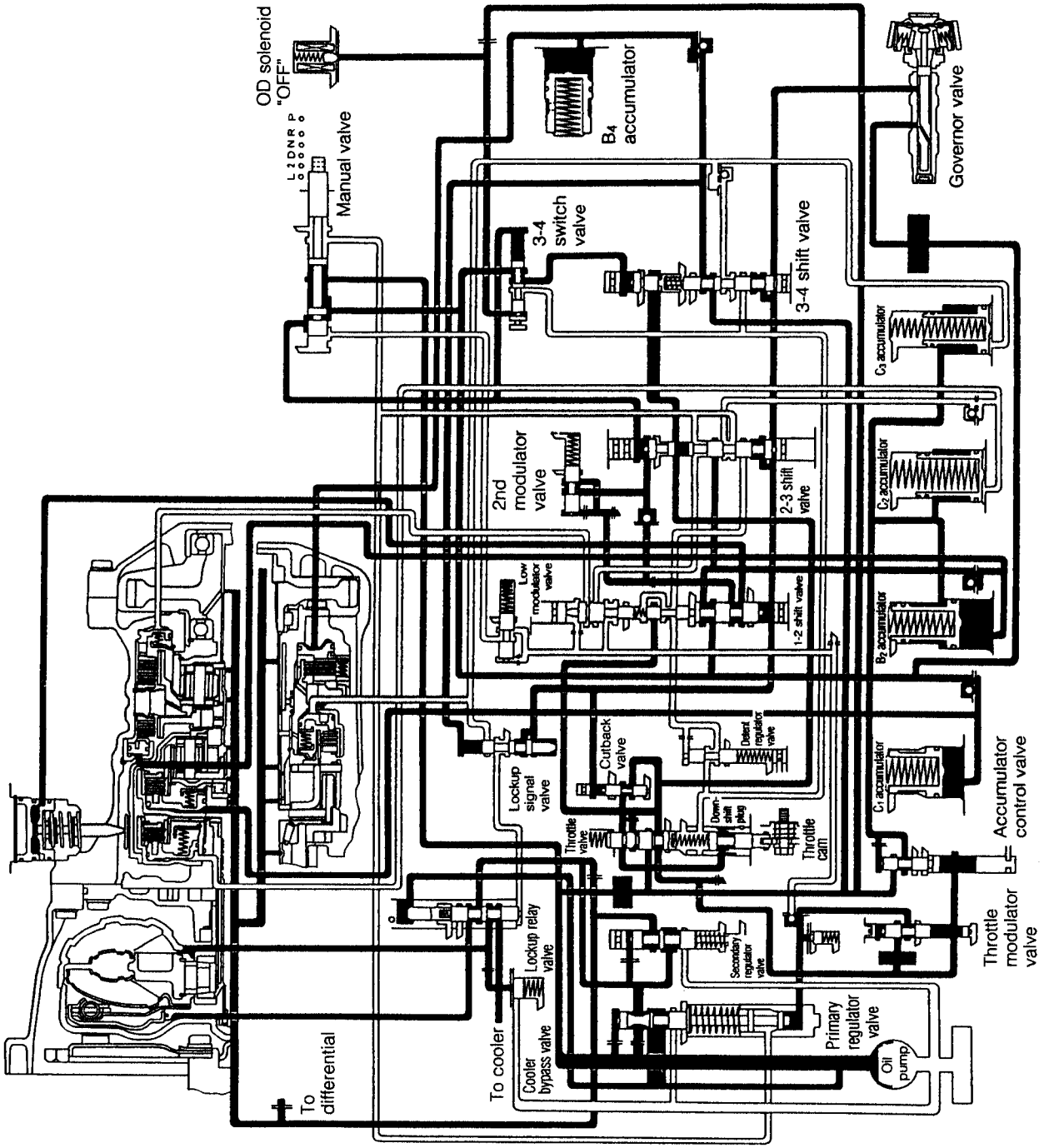


The turning force is transmitted in the same way as with the 2nd gear in the D range. However, under this mode, the 2nd coast brake (B1) prevents the sun gear from being rotated in the right direction during the engine braking period. Namely, during the 2nd gear in D range operation, the rotation of the sun gear in the left direction is locked by the one-way clutch No. 1 (F1) and 2nd brake (B2). Consequently, the turning force is transmitted to the front planetary carrier (intermediate shaft). However, the force in the right direction is applied to the sun gear during the engine braking period. Hence, the one-way clutch No. 1 (F1) will not operate and the sun gear is idling, thus producing no engine braking. Therefore, at the time of the 2nd gear in 2 range, the sun gear is held stationary by the operation of the 2nd coast brake (B1), thus making it possible to get engine braking.

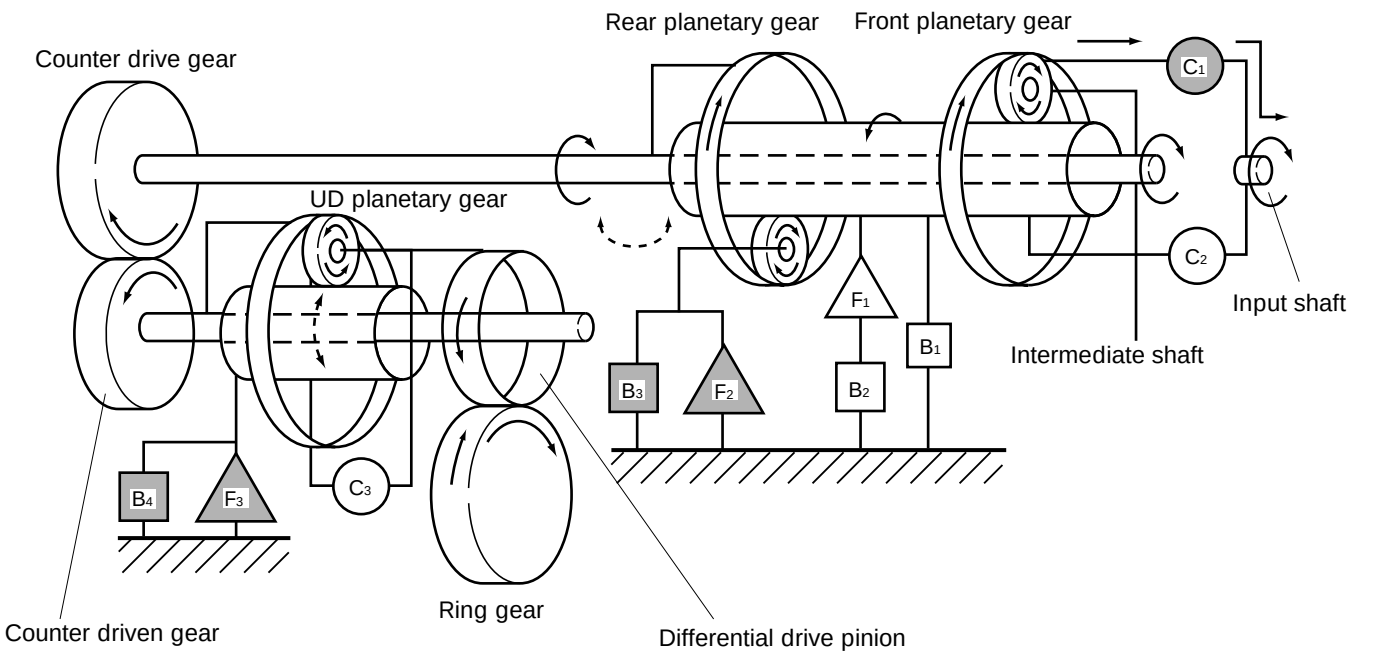
The gear ratio is 1.549 at the three-speed transmission section; 1.452 at the four-speed transmission section; and 0.892 at the countergear. As a result, the reduction ratio of the whole automatic transmission becomes 2.008.

AT00631-00618

2 range <2nd>


OD solenoid "OFF"
L 2 D N R P
Manual valve
B4 accumulator
Governor valve
3-4 switch valve
3-4 shift valve
C3 accumulator
2nd modulator valve
2-3 shift valve
C2 accumulator
Low modulator valve
1-2 shift valve
B2 accumulator
Cutback valve
Detent regulator valve
Lockup signal valve
Throttle valve
Down-shift plug
Throttle cam
C1 accumulator
Accumulator control valve
Lockup relay valve
Secondary regulator valve
Throttle modulator valve
Primary regulator valve
Oil pump
Cooler bypass valve
To cooler
To differential

First gear in [L] range

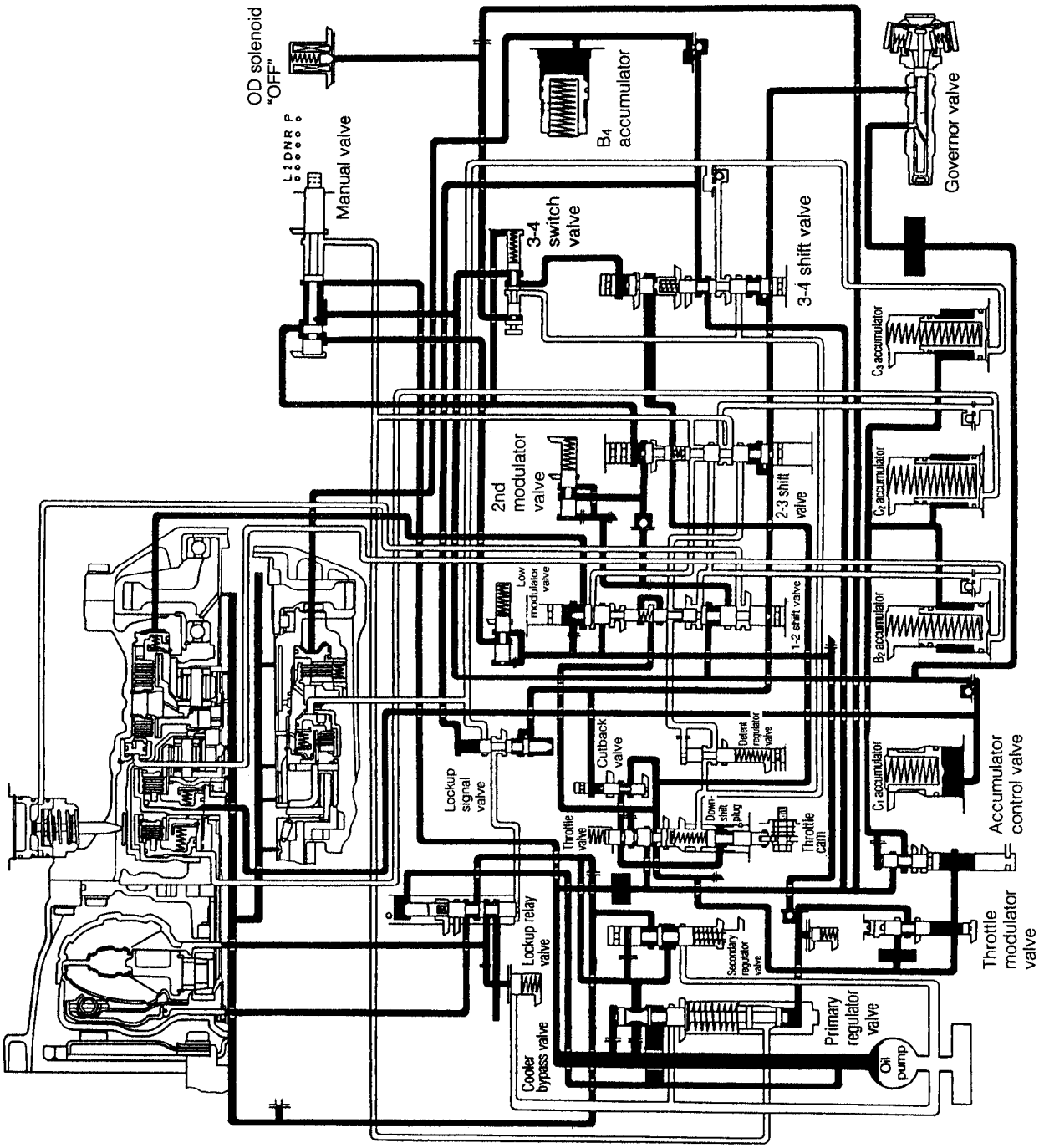


The turning force is transmitted in the same way as with the first gear in [D] range, which is described at the preceding pages. However, the 1st & reverse brake (B3) prevents the rear planetary carrier from rotating in the right direction. Namely, during the [D] range operation, the rotation of the rear planetary carrier in the left direction is locked by the one-way clutch No. 2 (F2). Consequently, the turning force is transmitted to the rear planetary internal gear (intermediate shaft). However, an opposite force acts during the engine braking period. Hence, the one-way clutch No. 2 (F2) will not operate and the rear planetary carrier is idling. Therefore, the rear planetary carrier is held stationary by the 1st & reverse brake (B3), thus making it possible to get engine braking.

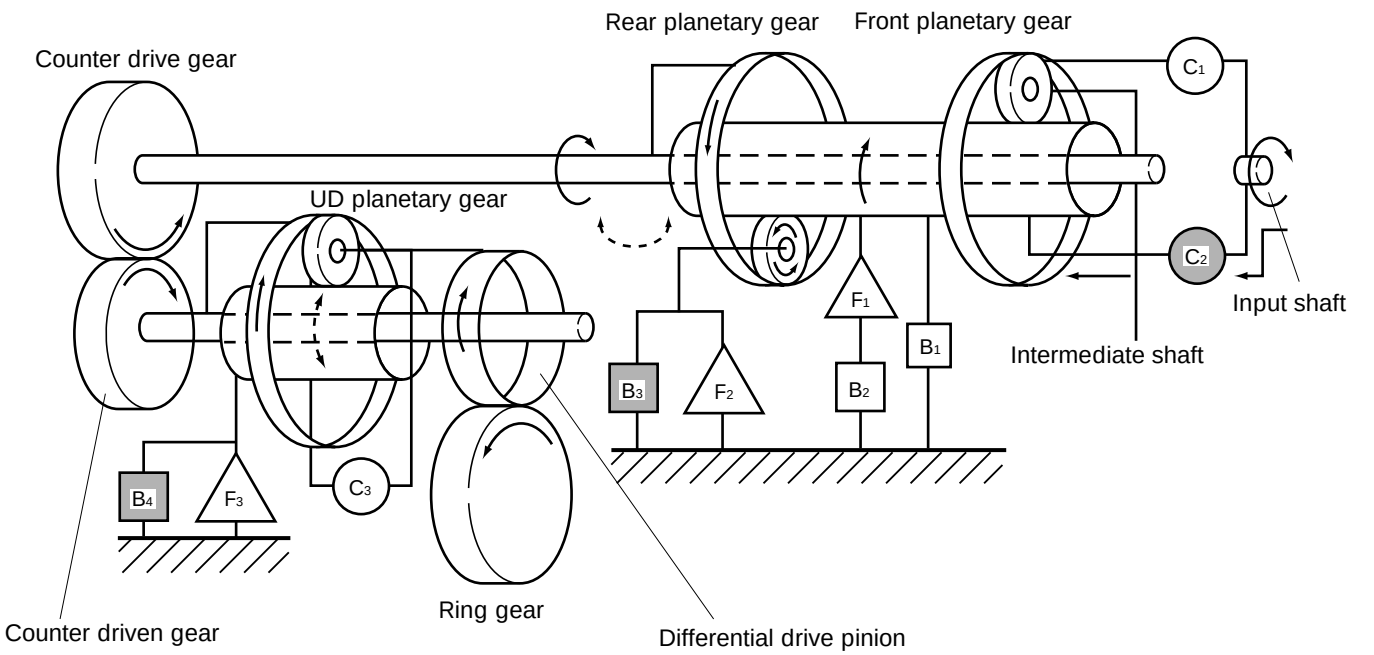
The gear ratio is 2.810 at the three-speed transmission section; 1.452 at the four-speed transmission section; and 0.892 at the countergear. As a result, the reduction ratio of the whole automatic transmission becomes 3.643.

AT00632-00620

First gear in L range



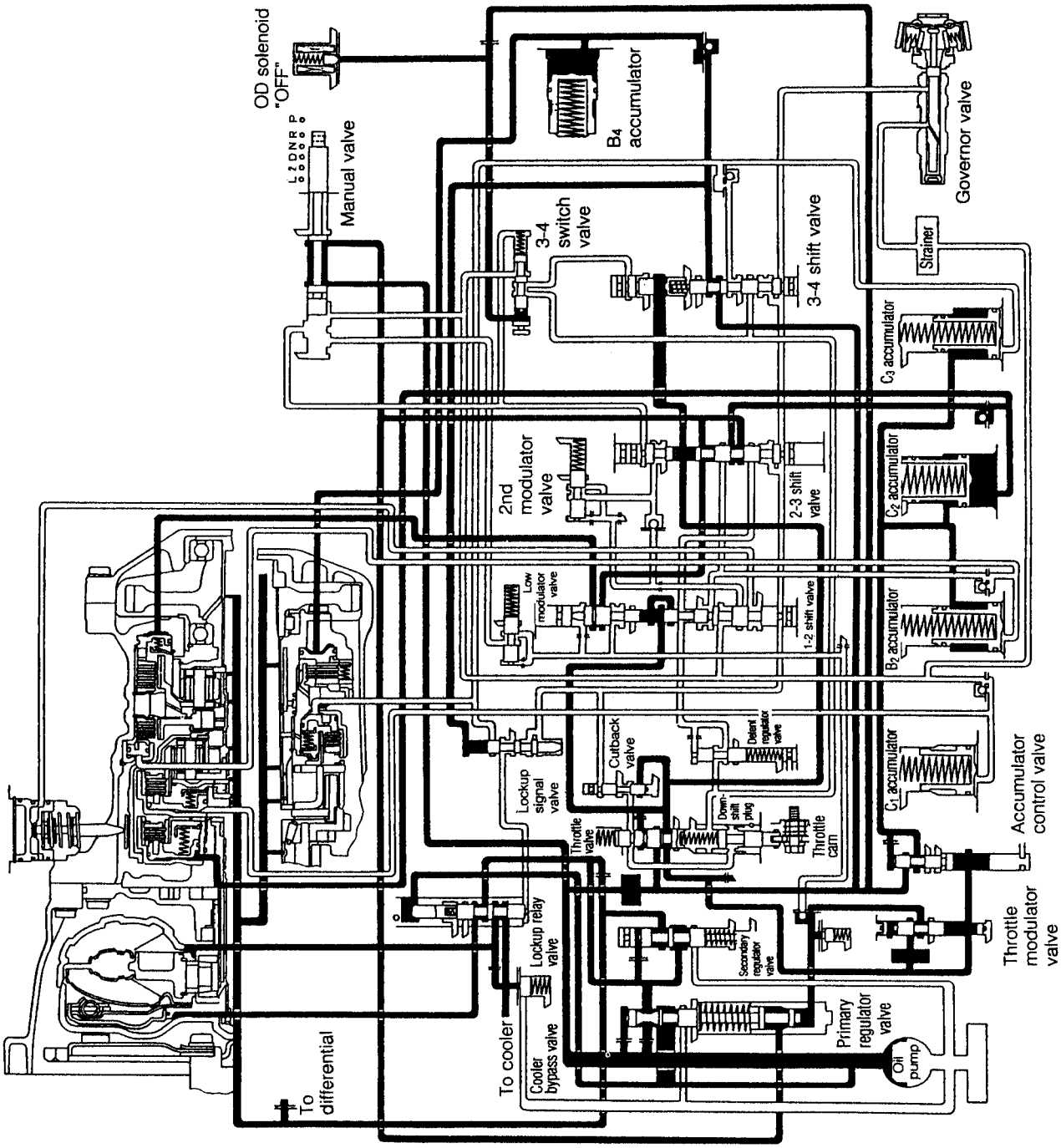
R range



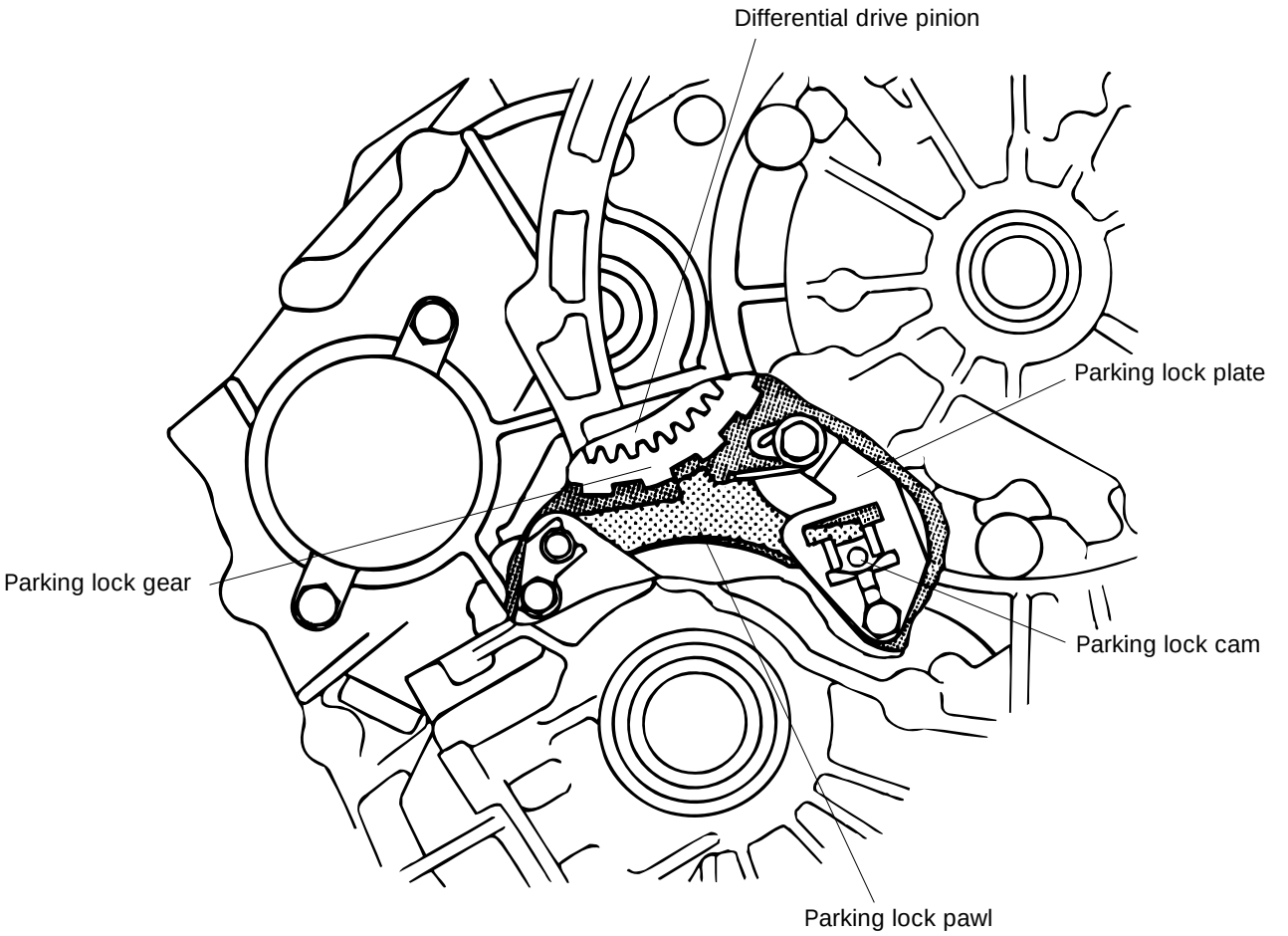
In the reverse gear, as is evident from the figure above, the direct clutch (C2) is operating. Therefore, the turning force of the input shaft is transmitted directly to the front & rear planetary sun gear. On the other hand, the rear planetary carrier is held stationary because of the 1st & reverse brake (B3). Consequently, the turning force in the right direction which has been transmitted to the sun gear will cause the rear planetary gear pinions to rotate on their own axes. In this way, the turning force in the left direction is transmitted to the rear planetary internal gear (intermediate shaft), i.e. the counter drive gear at a reduction ration of 2.296. Furthermore, in the UD mechanism, the UD planetary sun gear is locked by the UD brake (C4) in the same way as with the 1st gear in the D range. The turning force in the right direction is transmitted to the differential drive pinions at a reduction ratio of 1.452. Consequently, the turning force of the counter driven gear which has been transmitted to the UD planetary internal gear makes the UD planetary pinion gears turn on their own axes and, at the same time, walk around inside the UD planetary gear. This reduces the rotation speed of the UD planetary carrier (differential drive pinion).
As a result, the reduction ratio of the whole automatic transmission becomes 2.977.

AT00633-00622

R range


OD solenoid "OFF"
L 2 D N R P
Manual valve
B4 accumulator
Governor valve
3-4 switch valve
3-4 shift valve
Strainer
C3 accumulator
2nd modulator valve
2-3 shift valve
C2 accumulator
Low modulator valve
1-2 shift valve
B2 accumulator
Lockup signal valve
Cutback valve
Detent regulator valve
Down-shift plug
Throttle valve
Throttle cam
C1 accumulator
Accumulator control valve
Lockup relay valve
Secondary regulator valve
Throttle modulator valve
Primary regulator valve
Oil pump
To cooler
Cooler bypass valve
To differential

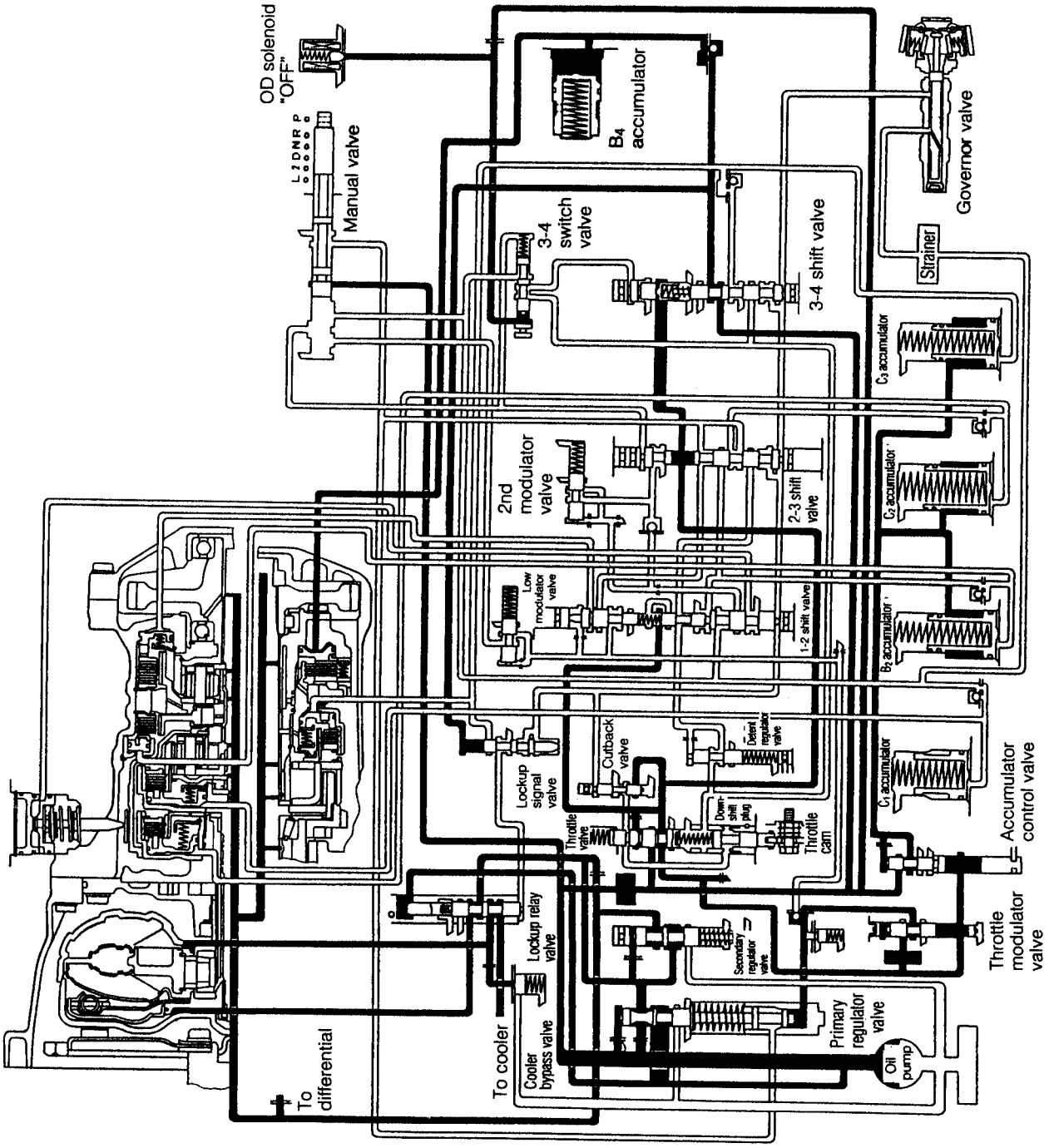
N, P ranges



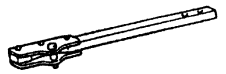
In the N and P ranges, no turning force will be transmitted to the counter drive gear, for the forward clutch (C1) and direct clutch (C2) are released.
Moreover, in the P range, the parking lock pawl is engaged with the parking lock gear of the counter driven gear which is spline-fitted with the differential drive pinion shaft. In this way, the vehicle is locked.

AT00634-00624

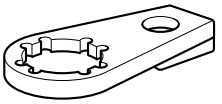
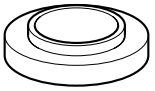
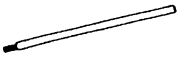
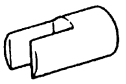
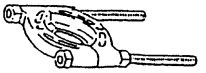
N, P ranges


OD solenoid "OFF"
L 2 D N R P
Manual valve
B4 accumulator
Governor valve
3-4 switch valve
3-4 shift valve
Strainer
C3 accumulator
2nd modulator valve
2-3 shift valve
C2 accumulator
Low modulator valve
1-2 shift valve
B2 accumulator
Lockup signal valve
Cutback valve
Detent regulator valve
C1 accumulator
Down shift plug
Throttle valve
Throttle cam
Accumulator control valve
Throttle modulator valve
Lockup relay valve
Secondary regulator valve
Primary regulator valve
Oil pump
Cooler bypass valve
To cooler
To differential

SSTs (Special Service Tools)

Shape	Parts/No.	Parts/Name
	09201-60011-000	Oil seal replacer
	09308-00010-000	Oil seal puller
	09330-00021-000	Companion flange holding tool
	*09350-32014-000	TOYOTA Automatic transmission tool set
	09308-10010-000	Oil seal puller
	09351-32010-000	One-way clutch test tool
	09351-32020-000	Stator stopper
	09351-32032-000	Counter driven gear holding tool
	09351-32040-000	No. 1 piston spring compressor
	09351-32050-000	Snap ring expander
	09351-32061-000	Oil pump puller
	09351-32070-000	No. 2 piston spring compressor
	09351-32090-000	Oil seal remover & replacer
	09351-32100-000	Drive pinion bearing replacer
	09351-32111-000	Side bearing race replacer

*It should be noted that 09350-32014 contains SSTs other than those posted in this section, since this SST is used on other models in common.

Shape	Parts/No.	Parts/Name
	09351-32120-000	Over drive bearing replacer
	09351-32130-000	Handle
	09351-32140-000	Oil seal replacer
	09351-32150-000	Oil seal replacer
	09351-32170-000	Lock nut replacer
	09351-32180-000	Countershaft race replacer
	09351-32190-000	Measure terminal
	09502-10012-000	Differential side bearing puller
	09564-32011-000	Differential preload adapter
	09648-87201-000	Drive shaft replacer
	09950-87701-000	Bearing remover

AT00635-00626

SERVICE SPECIFICATIONS

Unit: mm

Item			Specified value	Allowable limit	Remarks
Runout of drive plate			0.25 or less	—	
Runout of torque converter at sleeve section			0.20 or less	—	With torque converter installed on drive plate
Stroke of 2nd coast brake piston rod stroke (B1)			1.5 - 3.0	—	When pressure of 4 to 8 kg/cm^2 is applied:
Clutch	Direct clutch clearance (C2)		1.37 - 1.70	—	↑
	Forward clutch clearance (C1)		1.11 - 1.47	—	↑
	Underdrive clutch clearance		1.50 - 1.86	—	↑
Oil pump	Side clearance		0.02 - 0.05	0.10	
	Body clearance		0.07 - 0.15	0.30	
	Tip clearance		0.11 - 0.14	0.30	
	Body bush inner diameter		—	38.18	
	Stator shaft bush inner diameter	Front	—	21.57	
		Rear	—	27.07	
Bush inner diameter	Direct clutch		—	47.07	
	Front planetary gear		19.025 - 19.050	—	
	Underdrive planetary gear		29.800 - 29.825	29.870	
Counter shaft end play			0.20 - 0.90	—	
Underdrive height (sleeve to inner race)			17.3 - 18.2	—	
Distance	Tip of counter shaft × bolt seat		33.3 - 38.5	—	
	Gear flange end to shaft end		115.8	—	
Counter shaft starting torque with:					
	Spring tension gauge		11.8 - 19.6 N (1.2 - 2.0 kgf)	—	
	Torque gauge		0.58 - 9.8 N (0.06 - 1.0 kgf)	—	
Differential	Side gear backlash		0.05 - 0.20	—	
	Preload (at starting)		0.8 - 1.4 N·m (8 - 14 kgf-cm)	—	
	New bearing			—	
	Reused bearing		0.4 - 0.7 N·m (4 - 7 kgf-cm)	—	

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TIGHTENING TORQUE

Tightening components	Tightening torque	
	N·m	kgf-m
Drain plugs × T/A housing	14.7 - 19.6	1.5 - 2.0
Bolt × Neutral start switch	4.9 - 5.9	0.5 - 0.6
E/G mounting front left × T/A housing	29.4 - 44.1	3.0 - 4.5
E/G mounting bracket rear × T/A housing	53.9 - 68.6	5.5 - 7.0
E/G × T/A housing (direct connecting bolt)	49.0 - 68.6	5.0 - 7.0
Drive plate × Torque converter	22.6 - 32.4	2.3 - 3.3
Stator shaft × Oil pump body	19.6 - 29.4	2.0 - 3.0
Lock nut × Counter shaft driven gear	147.0 - 177.0	15.0 - 18.0
Throttle cam × Valve body	7.8 - 11.8	0.8 - 1.2
Upper valve body × Lower valve body	7.8 - 11.8	0.8 - 1.2
Oil tube apply cover × T/M rear cover	39. - 6.9	1.4 - 0.7
T/M rear cover × T/A housing	19.6 - 29.4	2.0 - 3.0
Oil pump body × T/A housing	19.6 - 29.4	2.0 - 3.0
Accumulator cover × T/A housing	7.8 - 11.8	0.8 - 1.2
Solenoid valve × Valve body	7.8 - 11.8	0.8 - 1.2
Detent spring cover × T/A housing	7.8 - 11.8	0.8 - 1.2
Tube bracket × Accumulator cover	7.8 - 11.8	0.8 - 1.2
Oil strainer × Valve body	7.8 - 11.8	0.8 - 1.2
Oil pan × T/A housing	3.9 - 6.3	0.4 - 0.65
Unions × T/A housing	19.6 - 29.4	2.0 - 3.0
Inlet, Outlet house × Union	29.4 - 39.2	3.0 - 4.0
Speedometer sleeve lock plate × T/A housing	6.9 - 13.7	0.7 - 1.4
Governor body adapter × T/A housing	7.8 - 11.8	0.8 - 1.2
Plug (governor, line pressure) × T/A housing	5.9 - 8.8	0.6 - 0.9
Governor cover bracket × T/A housing	3.9 - 6.9	0.4 - 0.7
Ring gear × Differential case	98.0	10.0

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