DAIHATSU

TERIOS

J100

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AUTOMATIC TRANSMISSION

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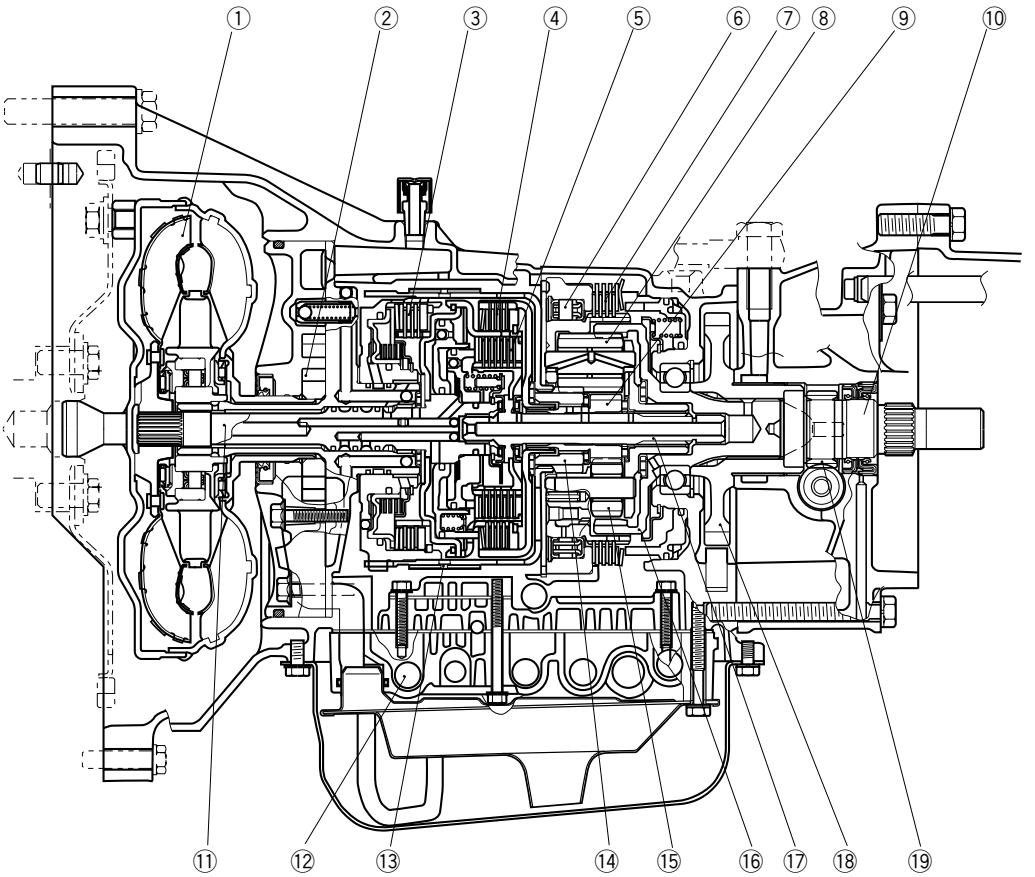
AT

NO.9710-JE

OUTLINE

1. A hydraulic pressure control planetary gear type, four-speed automatic transmission with overdrive is employed, which has been newly developed for FR vehicles with an engine mounted longitudinally.
2. The automatic transmission fluid has employed a DEXRON®III which features excellent heat and oxidation stability.

SECTIONAL VIEW OF AUTOMATIC TRANSMISSION



① Torque converter
② Oil pump
③ Direct clutch
④ Forward clutch
⑤ Rear clutch
⑥ One-way clutch
⑦ 1st & reverse brake
⑧ Planetary long pinion
⑨ Rear planetary sun gear
⑩ Output shaft
⑪ Input shaft
⑫ Valve body
⑬ 2nd brake band
⑭ Front planetary sun gear
⑮ Planetary short pinion
⑯ Planetary output shaft
⑰ Intermediate shaft
⑱ Parking lock gear
⑲ Governor drive gear

SPECIFICATIONS

Item		Specifications	
Torque converter	Type	Three-element, one-stage, two-phase type	
	Stall torque ratio/Stall revolution speed	2.0/1990 - 2540 rpm	
	One-way clutch type	Sprag type	
Transmission type	Type	Four forward speeds, one reverse gear, planetary gear type	
	Control element	Wet type multiple clutch	3 set
		Band type brake	1 set
		Wet type multiple brake	1 set
		One-way clutch	1 piece
	Gear ratio	1st gear: 2.800 2nd gear: 1.540 3rd gear: 1.000 4th gear: 0.700 Reverse gear: 2.333	
	Speedometer gear ratio	24/5	
	Oil pump	Internal gear type	
	Fluid to be used	ATF DEXRON® III	
	Fluid capacity liter	Except for EU: 4.2 liters , For EU: 4.29 liters	
	Cooling method	Except for EU: Water-cooled (radiator built-in type), For EU: Water-cooled (radiator built-in type) plus air-cooled oil cooler separately mounted	
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 switch)	

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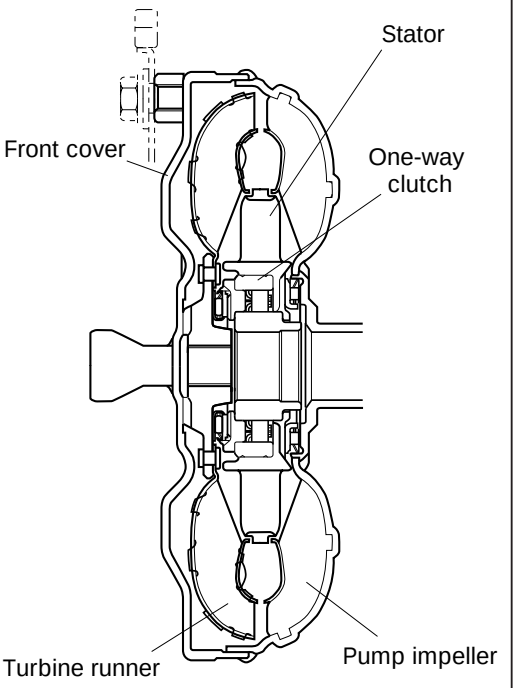
TORQUE CONVERTER

The torque converter employs a three-element, one-stage, two- phase type converter, as has been hitherto employed.

CONSTRUCTION

The torque converter consists of a front cover to which a drive plate is attached, a pump impeller integral with the torque converter cover, a turbine runner which is spline-fitted with the input shaft at the transmission side, a stator, a one-way clutch which supports the stator and so forth.



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OPERATION

When the ratio of the turbine runner speed to the pump impeller speed is small, the fluid returning from the turbine runner to the pump impeller flows in such a direction that prevents the rotation of the pump impeller. Therefore, the installation of the stator helps converting the fluid flow in such a direction that the pump impeller rotation is assisted.

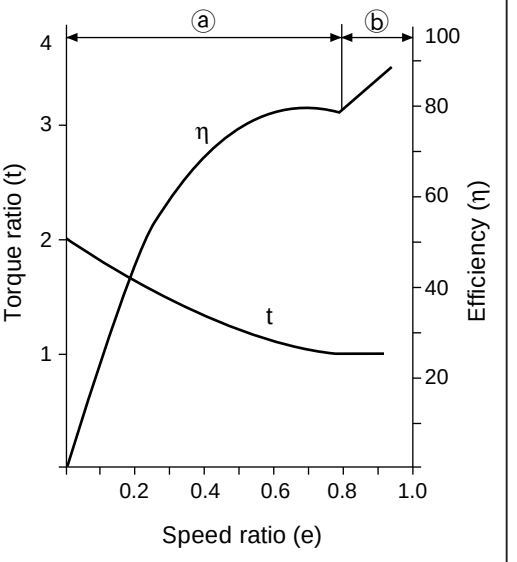
The torque ratio becomes a maximum of about 2.0 when the speed ratio is zero (at the time when the turbine runner is stopped). The torque ratio at this time is called the stall torque, whereas this stage is called the stall point.

Until the speed ratio reaches about 0.8, fluid transmission takes place, while increasing the torque. As the speed ratio becomes greater, the torque ratio decreases. This stage is called the torque converter range.

When the speed ratio becomes above about 0.8, the torque ratio is maintained at about one, transmitting the same torque without altering it. This stage is called the fluid coupling range.

The efficiency rises in proportion to the speed ratio. After passing a certain point, however, the increase rate of the efficiency starts to decline. This is because the fluid from the turbine runner begins to strike the back side of the stator, thus preventing the fluid flow.

Then, the one-way clutch of the stator operates, making the stator rotate. As a result, the increase rate of the efficiency starts to increase again.



ⓐ: Torque converter range

ⓑ: Fluid coupling range

e: Speed ratio = $\frac{\text{Turbine shaft revolution speed}}{\text{Pump shaft revolution speed}}$

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

η: Efficiency = $\frac{\text{Output horse power}}{\text{Input horse power}} \times 100\ (\%)$

JAT00005-00003

POWER TRAIN MECHANISM

DESCRIPTION

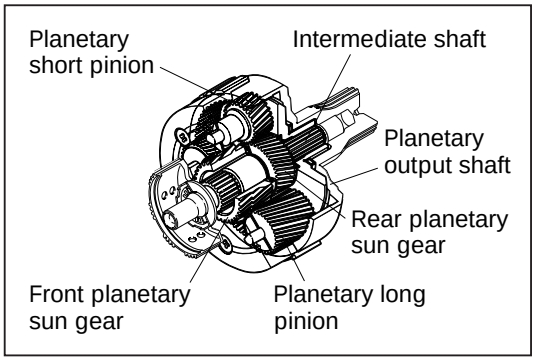
In the power train mechanism, the power that has been transmitted from the engine to the input shaft of the transmission through the torque converter is transmitted from various clutches to the planetary gear, using reduction ratios optimum for the running condition.

JAT00006-00000

CONSTRUCTION

(1) Planetary gear

A Ravingeau type planetary gear is employed.
The following are the main components: Intermediate shaft, front planetary sun gear, planetary short pinion, planetary long pinion, rear planetary sun gear and planetary output shaft.
The input section of the driving force at the planetary gear unit section is composed of three systems: One is the intermediate shaft; another is the front planetary sun gear; and the third is the rear planetary sun gear.
This input section is switched by making gear shifts.
Furthermore, the output section is the planetary output shaft.



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(2) Shift control element

The shift control element consists of three kinds of wet type multiple-disc clutches, namely, the direct clutch (C1), forward clutch (C2) and rear clutch (C3), as well as the 1st & reverse brake (B2) of the wet type multiple-disc brake, the 2nd brake (B1) of the band type brake, and the one-way clutch (F). Moreover, the following table shows functions of each control element.

Functions of Each Shift Control Element

Shift control element	Operations
Direct clutch (C1)	Connects input shaft with front planetary sun gear.
Forward clutch (C2)	Connects input shaft with rear planetary sun gear.
Rear clutch (C3)	Connects input shaft with intermediate shaft.
2nd brake band (B1)	Locks front planetary sun gear.
1st & reverse brake (B2)	Prevents planetary carrier from rotating.
One-way clutch (F)	Prevents planetary carrier from rotating counterclockwise.

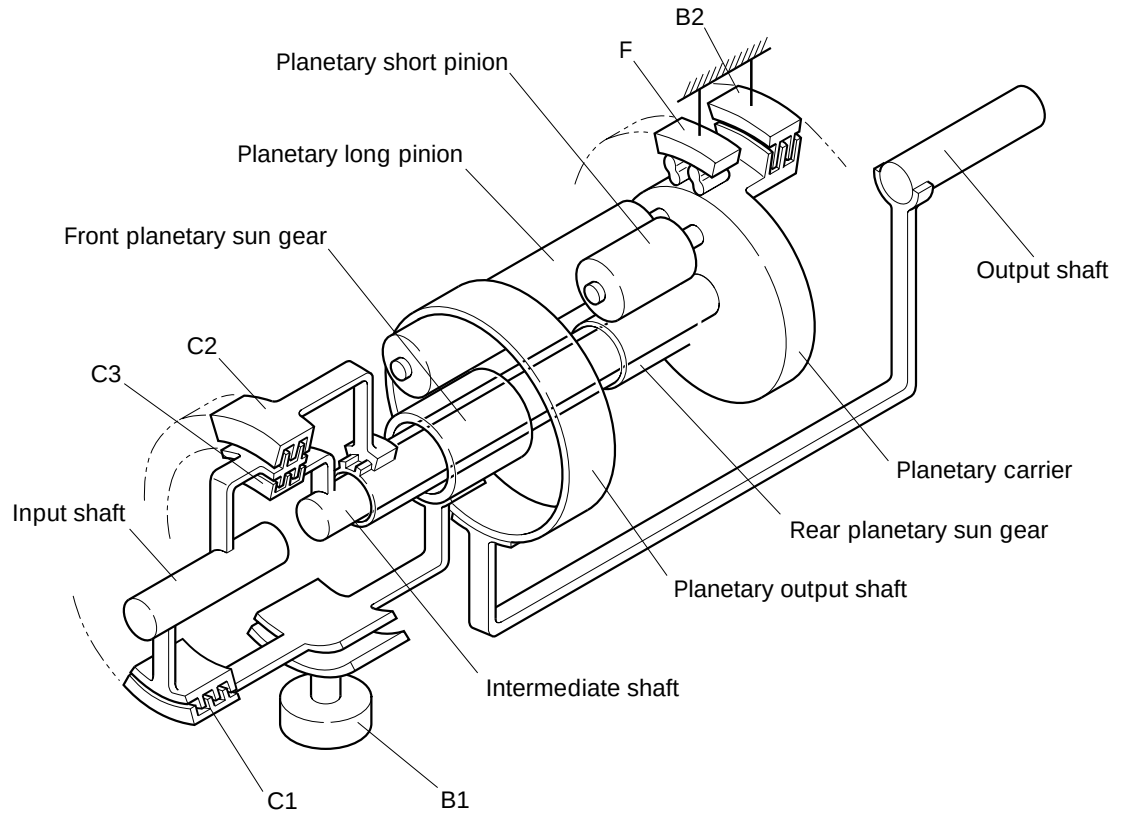
JAT00008-00000

OPERATION

(1) Power Train Route

The input route of the power train has three routes: One is a route in which the power is transmitted from the input shaft to the front planetary sun gear via the C1 clutch. Another is a route in which the power is transmitted to the rear planetary sun gear via the C2 clutch. The other is a route in which the power is transmitted to the intermediate shaft via the C3 clutch. Conversely, there is only one output route of the planetary output shaft.

Moreover, the following table shows functions of each shift control element according to the transmission gear.



JAT00009-00005

Table Showing Functions of Shift Control Elements

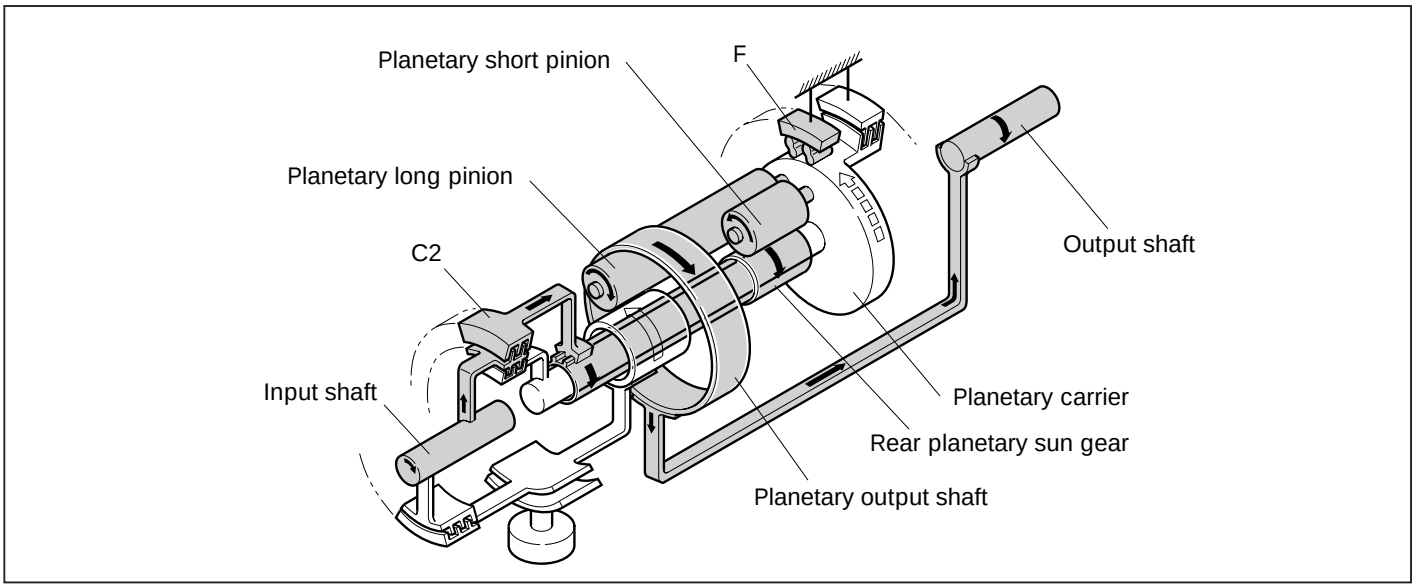
Shift position		C1	C2	C3	B1	B2	F
P	Parking						
R	Reverse	○				○	
N	Neutral						
D	1st		○				○
	2nd		○		○		
	3rd	○	○	○			
	4th (O/D)			○	○		
2	1st		○				○
	2nd		○		○		
	3rd	○	○	○			
L	1st		○			○	○

JAT00010-00000

(2) [D] and [2] ranges <1st gear> (without engine brake)

When the transmission is in the 1st gear with the shift lever set to the [D] or [2] range, the forward clutch (C2) is activated. Therefore, the rotating force of the input shaft is directly transmitted to the rear planetary sun gear, thus transmitting a counterclockwise rotating force to the planetary short pinion.

Conversely, the planetary long pinion which is in mesh with the planetary short pinion receives a clockwise rotating force and tries to rotate the planetary carrier counterclockwise. However, the rotation is prevented by the function of the one-way clutch (F). Consequently, the planetary output shaft receives a clockwise rotating force.

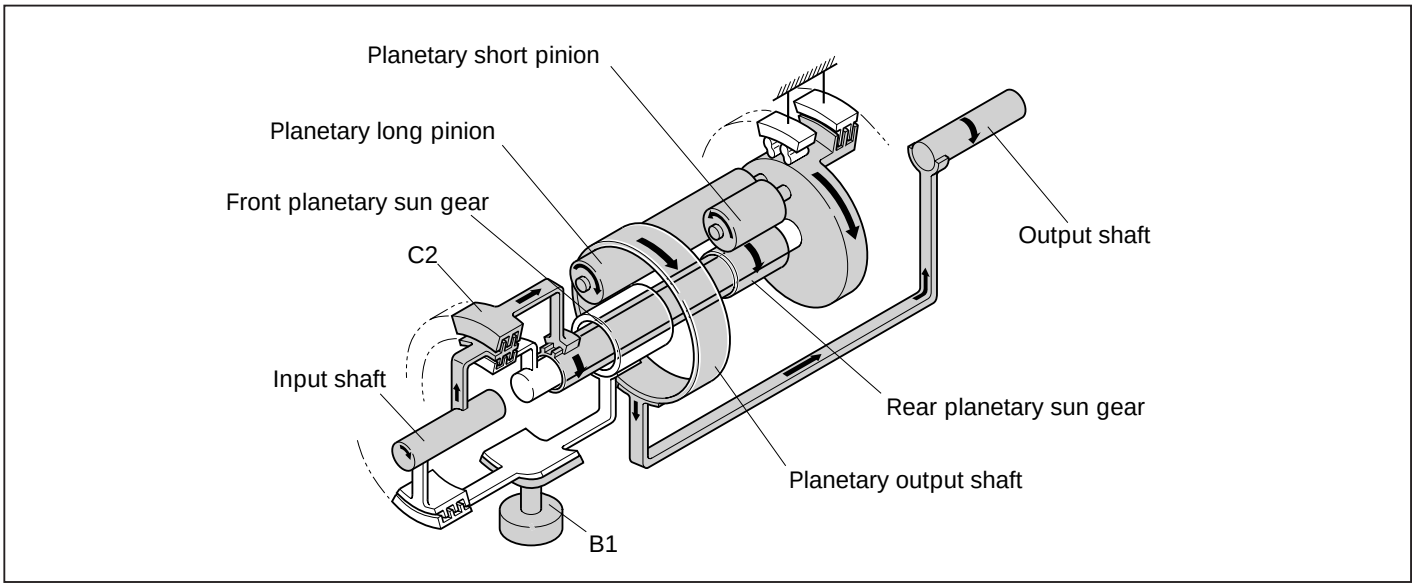


JAT00011-00006

(3) [D] and [2] ranges <2nd gear>

When the transmission is in the 2nd gear, the forward clutch (C2) is activated. Therefore, the rotating force of the input shaft is directly transmitted to the rear planetary sun gear, thus transmitting a counterclockwise rotating force to the planetary short pinion.

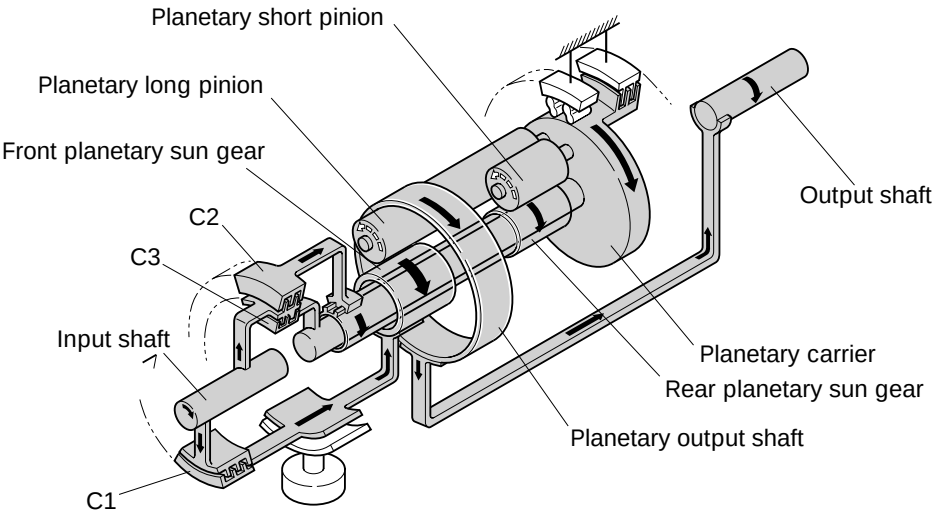
Conversely, the front planetary sun gear is locked by the 2nd brake band (B1). As a result, the planetary long pinion which is in mesh with the planetary short pinion receives a clockwise rotating force and revolves around the front planetary sun gear while rotating on its axis. Consequently, a clockwise rotating force is transmitted to the planetary output shaft.



JAT00012-00007

(4) D range <3rd gear>

When the transmission is in the 3rd gear, the direct clutch (C1) and forward clutch (C2) are activated. Therefore, the input shaft, front planetary sun gear and rear planetary sun gear rotate in the same direction. As a result, the planetary short pinion and planetary long pinion come in a locked state. Consequently, the planetary output shaft receives a clockwise rotating force.

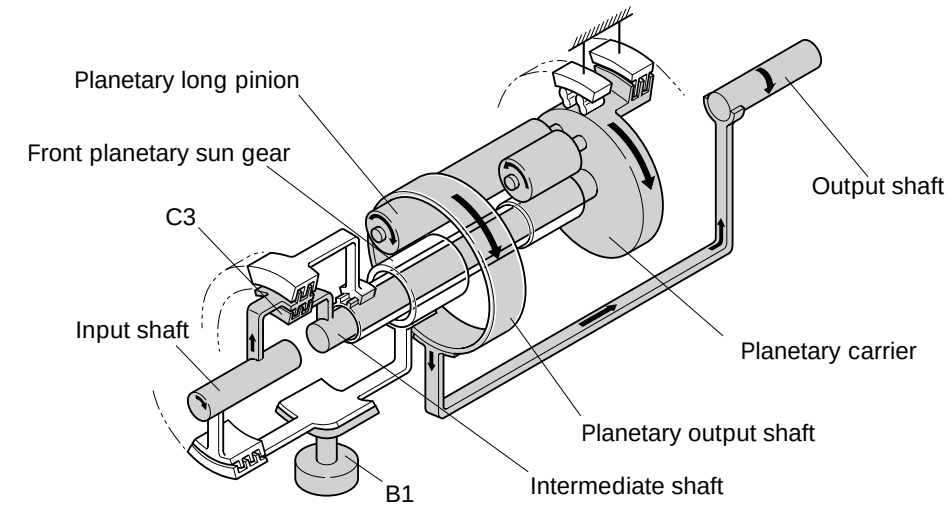


JAT00013-00008

(5) D range <4th gear>

When the transmission is in the 4th gear, the rear clutch (C3) is activated. The rotating force of the input shaft is directly transmitted to the intermediate shaft, thus transmitting a clockwise rotating force to the planetary carrier.

Conversely, the front planetary sun gear is locked by the 2nd brake band (B1). Therefore, the planetary long pinion supported by the planetary carrier receives a clockwise rotating force and revolves around the front planetary sun gear while rotating on its axis. Consequently, a clockwise rotating force is transmitted to the planetary output shaft.



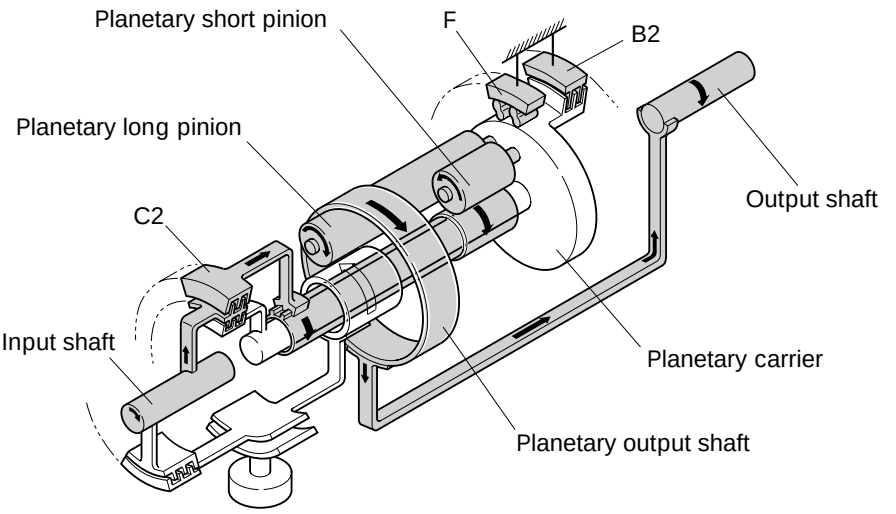
JAT00014-00009

(6) [L] range <1st gear>

The rotating force is transmitted in the same way as the 1st gear of the [D] range, as previously explained. However, the 1st & reverse brake (B2) operates to prevent the planetary carrier from rotating clockwise at the time of engine braking.

In other words, at the time of driving with the [D] range, the counterclockwise rotation of the planetary carrier is locked by the function of the one-way clutch (F). Thus, the rotating force is transmitted to the planetary output shaft.

However, at the time of engine braking, a reverse force is applied. As a result, the one-way clutch (F) will not operate and the planetary carrier rotates idly. Therefore, in order to make the function of engine brake possible, the planetary carrier is secured by operating the 1st & reverse brake (B2).

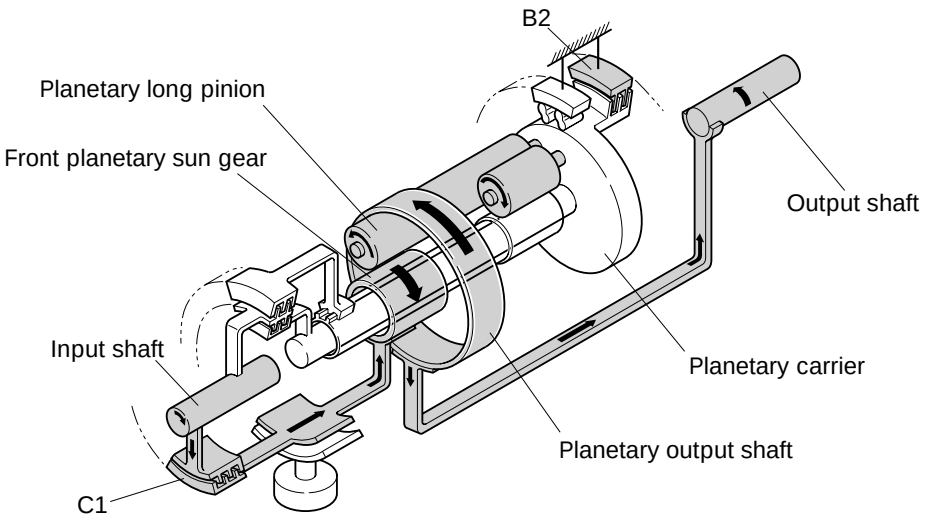


JAT00015-00010

(7) [R] range <Reverse gear>

When the transmission is in the reverse gear, the direct clutch (C1) is activated, as shown in the figure below. Therefore, the rotating force of the input shaft is directly transmitted to the front planetary sun gear.

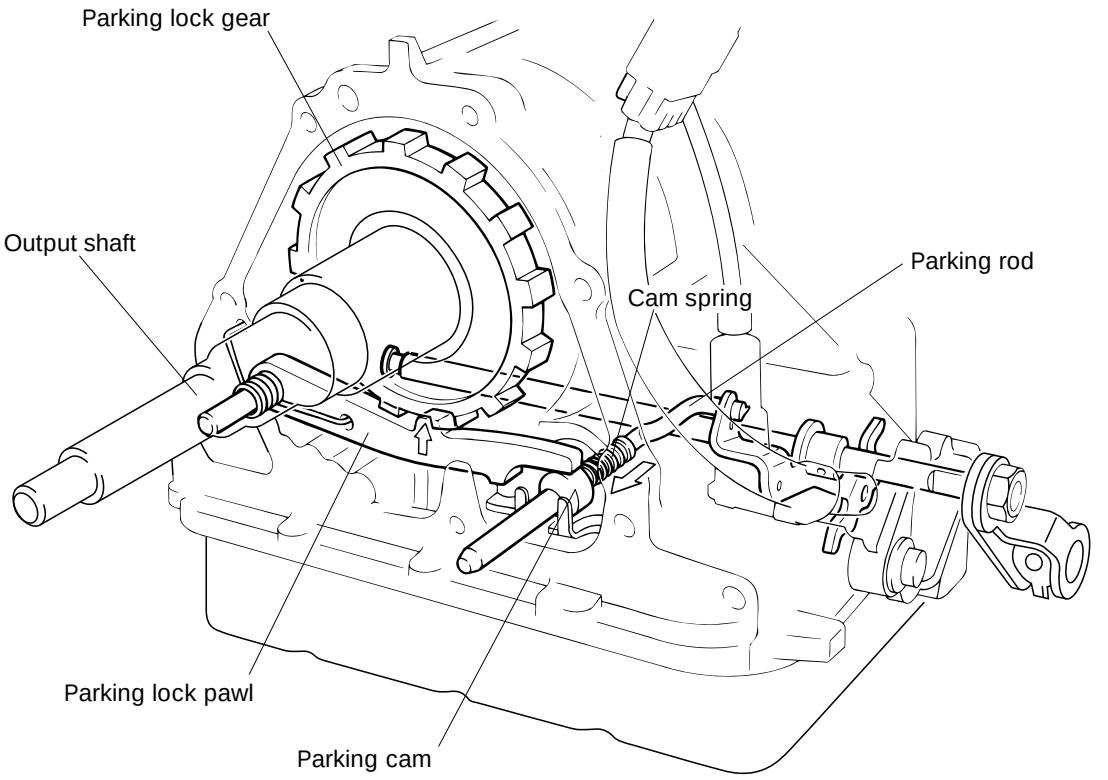
Conversely, the planetary carrier is locked by the function of the 1st & reverse brake (B2). Therefore, the rotating force transmitted to the front planetary sun gear makes the planetary long pinion rotate counterclockwise on its axis. Consequently, the counterclockwise rotating force is transmitted to the planetary output shaft.



JAT00016-00011

(8) [P] range

When shifted to the [P] range, the parking cam is pushed out through the parking rod. Thus, the parking cam pushes up the parking pawl. As a result, the parking lock pawl becomes engaged with the parking lock gear. Consequently, locking is made.



JAT00017-00012

HYDRAULIC PRESSURE CONTROL SYSTEM

DESCRIPTION

Utilizing the hydraulic pressure generated at the oil pump, the hydraulic pressure control system switches fluid passages leading to each shift control element of the power train mechanism according to running conditions, regulates the line pressure as well as lubricates each section of the transmission.
The following table shows operating conditions of the hydraulic pressure applied to each shift control element in each shift position.

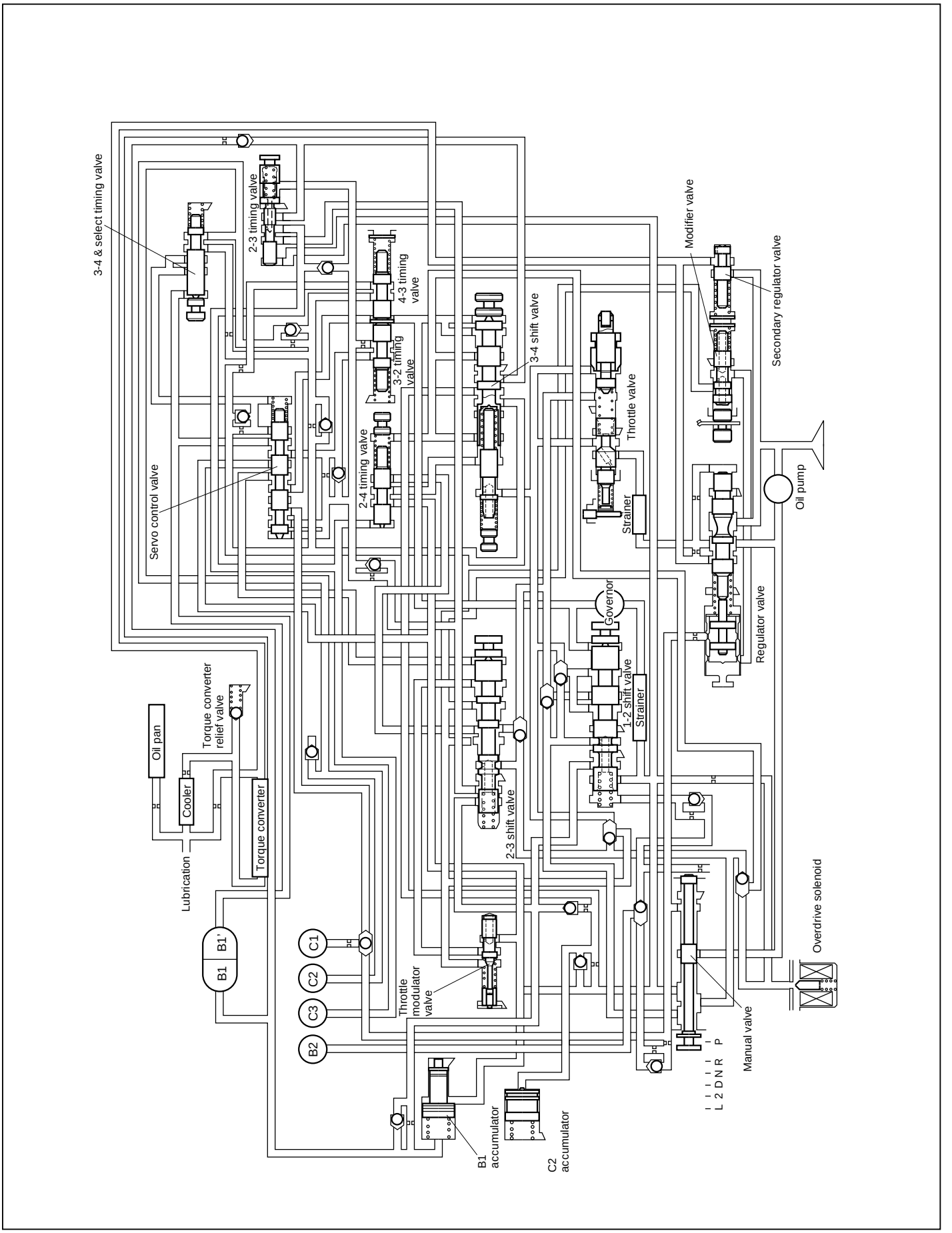
Table Showing Operating Conditions of Hydraulic Pressure

Shift position		C1	C2	C3	B1		B2
					B1 (Applied side)	B1' (Released side)	
P	Parking						
R	Reverse	○					○
N	Neutral						
D	1st		○				
	2nd		○		○		
	3rd	○	○	○	*○	*○	
	4th (O/D)			○	○		
2	1st		○				
	2nd		○		○		
L	1st		○				○

*: In cases where hydraulic pressure is applied both to the applied side and to the released side, B1 is released by the difference in the pressure-receiving area.

JAT00018-00000

HYDRAULIC PRESSURE CIRCUIT DIAGRAM

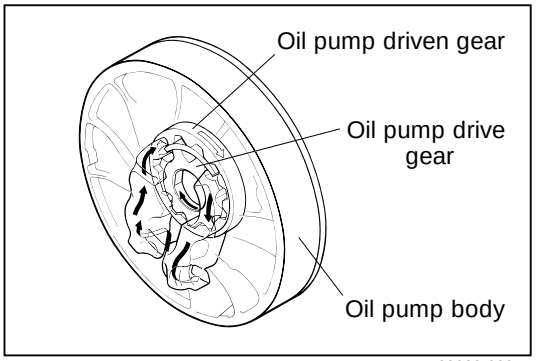


JAT00019-00013

COMPONENTS

(1) OIL PUMP

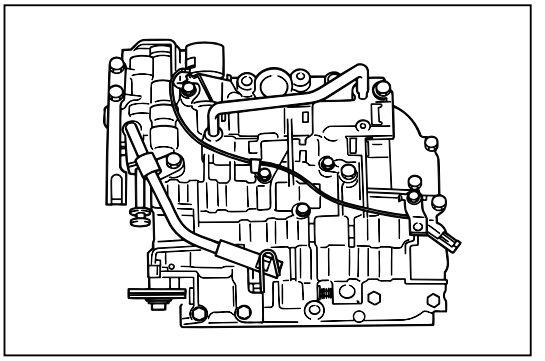
A trochoid type gear oil pump has been adopted.
The oil pump consists of an oil pump body, an oil pump drive gear, and an oil pump driven gear. The oil pump drive gear, which is driven by the torque converter, drives the oil pump driven gear to send the automatic transmission fluid to the hydraulic pressure control system under a pressurized state.



JAT00020-00014

(2) VALVE BODY

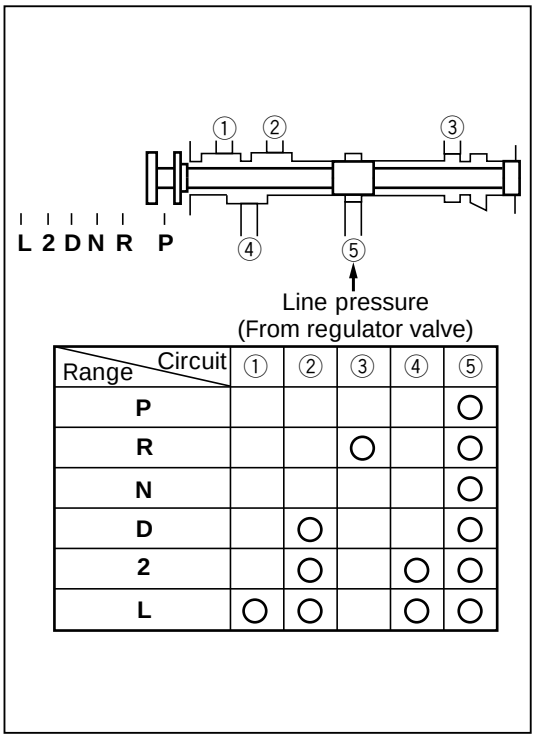
The valve body is mounted at the lower surface of the transmission. It incorporates hydraulic pressure-regulating valves, such as a throttle valve, a regulator valve, a modifier valve, a secondary regulator valve, and a throttle modulator valve. It also incorporates a manual valve, and valves that will switch fluid passages of each shift valve, thus reducing gear shift impacts of each timing valve, etc.



JAT00021-00015

1) Manual valve

The manual valve is interlocked with the shift lever by the control cable. According to the shift lever movement, the manual valve switches the line pressure of each range.



Range \ Circuit	①	②	③	④	⑤
P					○
R			○		○
N					○
D		○			○
2		○		○	○
L	○	○		○	○

JAT00022-00016

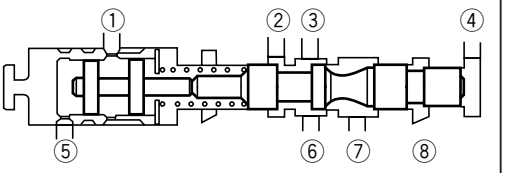
2) Regulator valve

The regulator valve regulates the pressurized fluid sent from the oil pump to a hydraulic pressure (line pressure) suited for the running condition.

The forces applied to the valve are the spring force (force F_S pushing to the right side), line pressure ④ (the discharging pressure from the oil pump ⑥ flowing via ③) (force F_L pushing to the left side), modifier pressure ⑤ (force F_{MF} pushing to the right side), and line pressure ② (force F_{RL} pushing to the right side) which will be applied only when the shift lever is moved to the R range.

Therefore, the line pressure ⑥ is regulated under the following conditions, thus becoming an optimum hydraulic pressure suited for the running condition.

1. Except R range: $F_L = F_S + F_{MF}$
2. R range: $F_L = F_S + F_{MF} + F_{RL}$



① Line pressure (R range)
② Lubrication pressure (To secondary regulator valve and torque converter)
③④⑥ Line pressure (From oil pump to manual valve and throttle valve)
⑤ Modifier pressure
⑦ Drain (To oil strainer)
⑧ Drain

JAT00023-00017

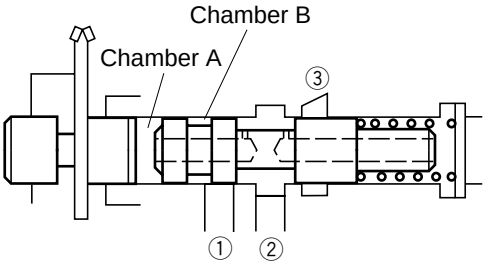
3) Modifier valve

The modifier valve regulates the modifier pressure which will regulate the line pressure to an optimum pressure according to the running condition (throttle opening angle).

The forces applied to the valve are the spring force (force F_S pushing to the left side), force applied to the valve by the modifier pressure ② when it enters the chamber A through the fluid passages inside the valve (force F_{MF} pushing to the right side), and throttle pressure ① (force F_{TH} pushing to the left side).

In cases where the throttle opening angle is less than approximately 25% with the shift lever set to a place other than the 2 and L ranges, the throttle pressure ① flows into ② without being regulated. Therefore, the modifier pressure becomes equal to the throttle pressure. Conversely, in cases where the throttle opening angle is more than approximately 25%, the modifier pressure will be regulated under a condition of $F_{MF} = F_S + F_{TH}$.

When the shift lever is moved to the 2 or L range, the line pressure will be applied to ①. As a result, the modifier pressure becomes a constant value, regardless of the throttle opening angle.



① Throttle pressure
(Except for 2 and L ranges)
Line pressure
(2 and L ranges)

② Modifier pressure

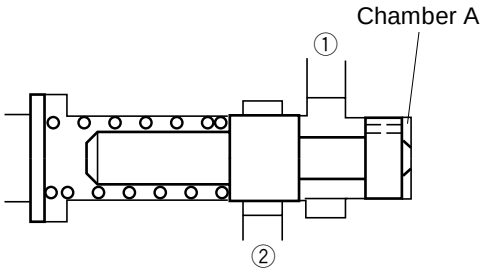
③ Drain

JAT00024-00018

4) Secondary regulator valve

The secondary regulator valve regulates the lubrication pressure to an optimum hydraulic pressure.

The forces applied to the valve are the spring force (force F_S pushing to the right side), and force pushing the valve by the lubrication pressure ① when it enters the chamber A through the fluid passages inside the valve (force F_{LUB} pushing to the left side). Hence, the lubrication pressure will be regulated under a condition of $F_{LUB} = F_S$.



① Lubrication pressure
(From regulator valve to torque converter)

② Drain (To oil strainer)

JAT00025-00019

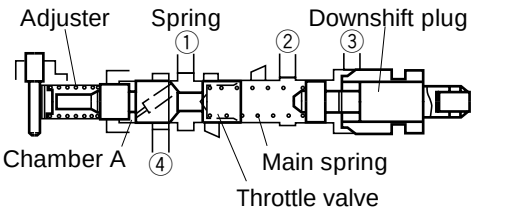
5) Throttle valve & downshift plug

The throttle pressure is generated in proportion to the throttle opening angle.

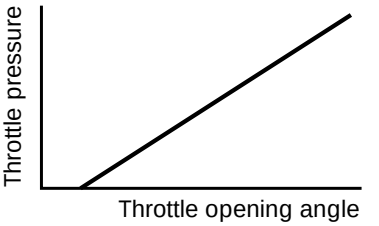
The forces applied to the throttle valve are the adjuster spring force (force F_{SA} pushing to the right side), main spring force (force F_{SM} pushing to the left), and force generated by the difference in the pressure-receiving area after the throttle pressure ① enters the chamber A through the fluid passages inside the valve (force F_{TH} pushing to the right side). As a result, the throttle pressure is regulated under a condition of $F_{TH} + F_{SA} = F_{SM}$. Since the F_{SM} becomes greater in proportion to the throttle opening angle, the throttle pressure is in proportion to the throttle opening angle.

The downshift plug outputs the throttle pressure from ② to the shift valve when the throttle opening angle becomes 85%. Then, this outputted pressure acts as a force counteracting the governor pressure, thus raising the shifting point.

The throttle pressure ③ acts as a force pushing the downshift plug to the left side, thus reducing the accelerator pedal application force.



① Throttle pressure
② Throttle pressure (Throttle opening angle is 85% or more.)
③ Throttle pressure
④ Line pressure



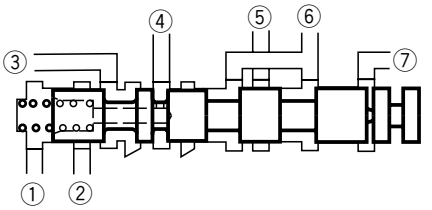
JAT00026-00020

6) 1-2 shift valve

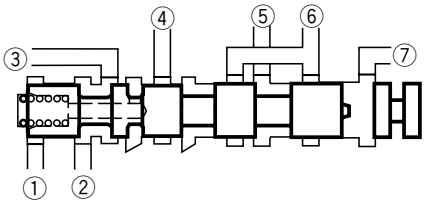
The 1-2 shift valve allows or does not allow the hydraulic pressure be applied to the B1 (the applied side), depending on conditions of the vehicle speed and throttle opening angle.

1. When shifted from 1st gear to 2nd gear:
   When the shift lever is set to the [D] or [2] range, the forces applied to the valve are the spring force (force F_S pushing to the right side), throttle pressure ⑥ (force F_{TH} pushing to the right side), and governor pressure ⑦ (force F_G pushing to the left side). When a condition of $F_G > F_S + F_{TH}$ is obtained, the valve is moved to the left side. Thus, the line pressure ② is applied to the B1 ③ (the applied side).
   When the shift lever is moved to the [L] range, the line pressure (force F_L pushing to the right side) is applied to ④ and ⑥ from the manual valve. In this case, since a condition of $F_G < F_S + F_L$ is always obtained, the valve will not move to the left side (The transmission will not be shifted to the 2nd gear). Furthermore, at this time the line pressure ④ is applied through the fluid passages inside the valve and ①, thereby causing B2 to operate.
2. When shifted from 2nd gear to 1st gear:
   In cases where the throttle opening angle is less than 85% with the shift lever set to the range other than the [L] range, the throttle pressure ⑥ will not be applied to the valve. Therefore, when a condition of $F_G < F_S$ is obtained, the valve moves to the right side. As a result, the hydraulic pressure will not be applied to the B1 ③ (the applied side). (The shifting point comes to a speed lower than the shifting point for 1st-to-2nd gear shifting.)
   In cases where the throttle opening angle is more than 85% with the shift lever set to the range other than the [L] range (at the time of kick down), the throttle pressure (force pushing to the right side) is applied to ⑤. Therefore, the valve moves to the right side under a condition of $F_G < F_S + F_{TH}$ (when the vehicle speed is lower than a certain value).
   When the shift lever is shifted to the [L] range while running with the 2nd gear, the line pressure (F_L) will be applied to ⑤. Therefore, the valve will not move to the right side, until a condition of $F_G < F_S + F_L$ is satisfied. (The 2nd gear is held, until the vehicle speed decreases below a certain vehicle speed, so as to prevent the engine from overrunning.)

<Except 2nd, 3rd and 4th gears>



<2nd, 3rd and 4th gears>



① To B2

② Line pressure ([D], [2] and [L] ranges)

③ To B1

④ Line pressure ([L] range)

⑤ Line pressure ([L] range), Throttle pressure ([D] and [2] ranges, throttle opening angle of 85% or more)

⑥ Line pressure ([L] range), throttle pressure (Except for [D] and [2] ranges)

⑦ Governor pressure

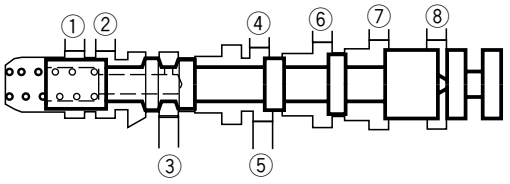
JAT00027-00021

7) 2-3 shift valve

The 2-3 shift valve allows or does not allow the hydraulic pressure be applied to the C1, C3, and B1' (at the released side), depending on conditions of the vehicle speed and throttle opening angle.

1. When shifted from 2nd gear to 3rd gear:
   When the shift lever is set to the [D] range, the forces applied to the valve are the spring force (force F_S pushing to the right side), throttle pressure ⑥ (force F_{TH} pushing to the right side), throttle modulator pressure ⑦ (force F_{TM} pushing to the right side), and governor pressure ⑧ (force pushing to the left side). When a condition of $F_G > F_S + F_{TH} + F_{TM}$ is satisfied, the valve moves to the left side. Thus, the line pressure from the 1-2 shift valve ① is applied to the C1 and B1' via the servo control valve from ②; and to the C3 via the 2-3 timing valve.
   When the shift lever is moved to the [2] or [L] range, the line pressure (force F_L pushing to the right side) is applied to ③, ⑤ and ⑥ from the manual valve. In this case, since a condition of $F_G < F_S + F_L$ is always satisfied, the valve will not move to the left side (The transmission will not be shifted to the 3rd gear).
2. When shifted from 3rd gear to 2nd gear:
   In cases where the throttle opening angle is less than 85% with the shift lever set to the [D] range, the throttle modulator pressure ⑦ will not be applied to the valve. Therefore, when a condition of $F_G < F_S + F_{TH}$ is satisfied, the valve moves to the right side. As a result, the hydraulic pressure will not be applied to the C1 ②, B1' and C3. (The shift point comes to a speed lower than the 2nd-to-3rd gear shift point.)
   In cases where the throttle opening angle is 85% or more with the shift lever set to the [D] range, the throttle pressure (force F_{KD} pushing to the right side) is applied to ⑤. Therefore, the valve is moved to the right side when a condition of $F_G < F_S + F_{KD} + F_{KD}$ is satisfied (when the vehicle speed is lower than a certain value).
   When the shift lever is shifted to the [2] or [L] range while running with the 3rd gear, the line pressure (F_L) of the manual valve will be applied to ③ and ⑤. Therefore, the valve will not move to the right side, until a condition of $F_G < F_S + F_L$ is satisfied. (The 3rd gear is held, until the vehicle speed decreases below a certain vehicle speed, so as to prevent the engine from overrunning.)

<Except for 3rd and 4th gears>



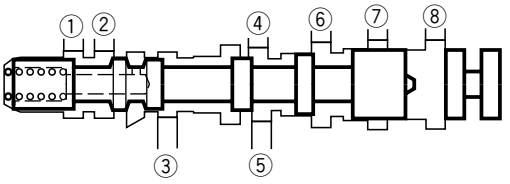
① Line pressure ← From 1-2 shift valve (2nd, 3rd and 4th gears)

② Servo control valve → To C1 and B1'
2-3 timing valve → To C3

③ Line pressure ← From manual valve ([2] and [L] ranges)

④ To 2-4 timing valve

<3rd and 4th gears>



⑤ Line pressure ← From manual valve ([2] and [L] ranges),
Throttle pressure ← From throttle valve (throttle opening angle of 85% or more)

⑥ Throttle pressure ← From throttle valve (Except for [2] and [L] ranges)
Line pressure → From manual valve ([2] and [L] ranges)

⑦ Throttle modulator pressure ← From throttle modulator valve

⑧ Governor pressure ← From servo control

JAT00028-00022

8) 3-4 shift valve & 3-4 relay valve

- **3-4 relay valve**

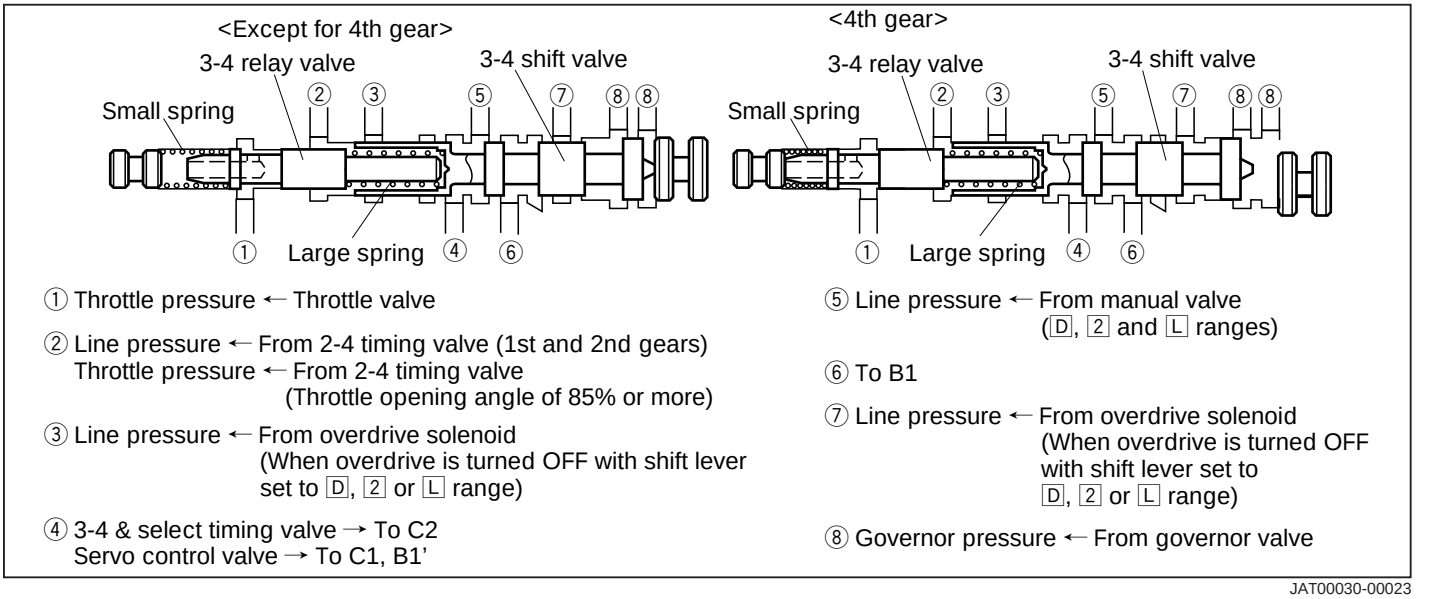
The relay valve changes the force applied to the shift valve, depending on the throttle opening angle.
The forces applied to the valve are the large spring force (force F_S pushing to the left side), small spring force (force $F_{S'}$ pushing to the right side) and throttle pressure ① (force F_{TH} pushing to the right side).
In cases where the throttle opening angle is less than approximately 20%, a condition of $F_S \geq F_{S'} + F_{TH}$ is satisfied. Consequently, the force applied to the shift valve becomes F_S.
In cases where the throttle opening angle is between approximately 20% and 85%, a condition of $F_S \leq F_{S'} + F_{TH}$ is satisfied. Then, the relay valve moves to the right side, coming into contact with the shift valve. Consequently, the force applied to the shift valve becomes $F_{S'} + F_{TH}$.
In cases where the throttle opening angle is more than 85%, the throttle pressure ② (force F_{KD} pushing to the left side) is applied, thus satisfying a condition of $F_S + F_{KD} > F_{S'} + F_{TH}$ (F_{KD}). As a result, the relay valve returns to the left again. Consequently, the force applied to the shift valve becomes $F_S + F_{KD}$.

JAT00029-00000

- **3-4 shift valve**

The 3-4 shift valve allows or does not allow the line pressure be applied to the servo control valve and C2, depending on conditions of the vehicle speed, throttle opening angle and overdrive switch, so as to perform gear shifting between the 3rd gear and the 4th gear.

1. When shifting from 3rd gear to 4th gear:
   The forces applied to the 3-4 shift valve are the force generated by the relay valve (force F_R pushing to the right side (= F_S, or $F_{S'} + F_{TH}$, or $F_S + F_{KD}$)), and governor pressure ⑧ (force F_G pushing to the left side).
   When running at a low speed ($F_G < F_R$), the valve is located at the right side. Therefore, the line pressure ⑤ will be applied to the servo control valve and C2 via ④. However, when running at a high speed ($F_G > F_R$), the valve moves to the left side. Consequently, the line pressure which was applied via ④ will be drained. Thus, gear shifting to the 4th gear takes place.
   Furthermore, when the overdrive is turned OFF, the line pressure (force F_L pushing to the right side) is applied to ③. Therefore, a condition of $F_G < F_S + F_L$ is always satisfied. Consequently, the valve will not move to the left side. (No gear shifting to the 4th gear will take place.)
2. When shifting from 4th gear to 3rd gear:
   When the valve is located at the left side, the pressure-receiving diameter of the governor pressure ⑧ becomes greater. As a result, the force ($F_{G'}$) pushing the valve to the left side also becomes greater. Consequently, the 4th-to-3rd gear shift point comes at a speed lower than the 3rd-to-4th gear shift point.
   Furthermore, when the overdrive is turned OFF, the line pressure (force $F_{L'}$ pushing to the right side) is applied to ③ and ⑦. However, since a condition of $F_{G'} < F_S + F_{L'}$ is always satisfied, the valve moves to the right side (gear shifting to the 3rd gear takes place), regardless of the vehicle speed and throttle opening angle.



① Throttle pressure ← Throttle valve

② Line pressure ← From 2-4 timing valve (1st and 2nd gears)
Throttle pressure ← From 2-4 timing valve (Throttle opening angle of 85% or more)

③ Line pressure ← From overdrive solenoid (When overdrive is turned OFF with shift lever set to D, 2 or L range)

④ 3-4 & select timing valve → To C2
Servo control valve → To C1, B1'

⑤ Line pressure ← From manual valve (D, 2 and L ranges)

⑥ To B1

⑦ Line pressure ← From overdrive solenoid (When overdrive is turned OFF with shift lever set to D, 2 or L range)

⑧ Governor pressure ← From governor valve

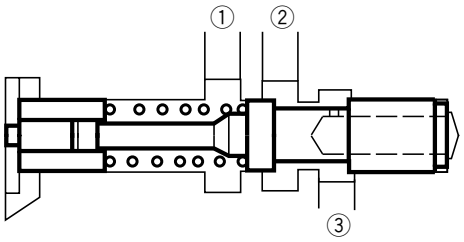
JAT00030-00023

9) Throttle modulator valve

The throttle modulator valve regulates the throttle modulator pressure which is applied to the 2-3 shift valve as a force counteracting the governor pressure. This throttle modulator valve causes shifting to take place at a low vehicle speed when the throttle is opened slightly; and at a high vehicle speed when the throttle is opened widely. Furthermore, when the throttle opening angle is less than approximately 10% and no throttle pressure is being generated, this valve assures the difference in speed between the 2nd-to-3rd gear shift point and the 3rd-to-2nd gear shift point (hysteresis).

In the D, 2 and L ranges, the line pressure is applied to ③ from the manual valve. This pressure flows into ②, thus generating the throttle modulator pressure.

The forces applied to the valve are the spring force (force F_S pushing to the right side), throttle pressure ① (force F_{TH} pushing to the right side), and throttle modulator pressure ② (force F_{TM} pushing to the left side). Thus, the throttle modulator pressure is regulated under a condition of $F_{TM} = F_S + F_{TH}$.



① Throttle pressure ← From throttle valve (Except for 2 and L ranges)
Line pressure ← From manual valve (2 and L ranges)

② Throttle modulator pressure → To 2-3 shift valve

③ Line pressure → From manual valve (D, 2 and L ranges)

JAT00031-00024

10) Servo control valve

When gear shift takes place between the 3rd gear and the 4th gear, the servo control valve turns ON and OFF the C1 pressure and B1' pressure (at released side) simultaneously.

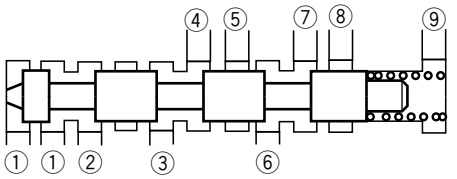
Moreover, in order to prevent downshift from the 4th gear to the 2nd gear from taking place all at once (because it will apply a great torque to the forward clutch suddenly), the servo control valve causes downshift to the 3rd gear to take place first. Then, the transmission is shifted to the 2nd gear.

When the transmission is in the 3rd gear, the forces applied to the valve are the spring force (force pushing to the left side), line pressure ⑨ (force pushing to the left side) from the 3-4 shift valve, and the line pressure ① (force pushing to the right side) from the 2-3 shift valve.

When conditions for upshifting to the 4th gear are satisfied and the 3-4 shift valve is switched, the line pressure ⑨ will be drained. Therefore, the valve moves to the right side. At this time, ⑦ and ⑧ are connected to each other. Consequently, the pressure B1' ⑦ will be drained from the 3-4 shift valve via ⑧. At the same time, the pressure C1 ② will be drained, too.

Moreover, although the vehicle speed decreases and conditions for switching the 2-3 shift valve (downshift to the 2nd gear) are satisfied, the servo control valve allows the 2-3 shift valve be switched only after the 3-4 shift valve has been switched (downshift to the 3rd gear has taken place). The servo control valve does this by making the line pressure, instead of governor pressure, applied to the 2-3 shift valve from ④.

<Except for 4th gear>



① Line pressure ← From 2-3 shift valve (3rd and 4th gears)

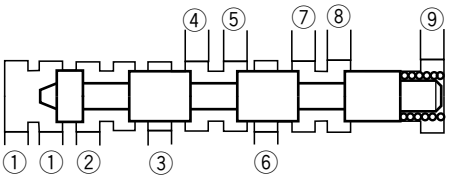
② To C1

③ Governor pressure (From governor valve)

④ To 2-3 shift valve

⑤ Line pressure ← From manual valve (D, 2 and L ranges)

<4th gear>



⑥ Line pressure ← From 2-3 shift valve (3rd and 4th gears)

⑦ To B1'
To 3-4 & select timing valve

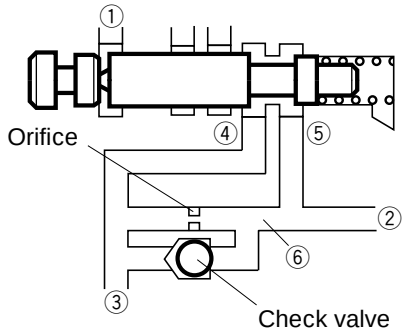
⑧, ⑨ Line pressure ← From 3-4 shift valve (1st, 2nd and 3rd gears)

JAT00032-00025

11) 3-4 & select timing valve

When upshift from the 3rd gear to the 4th gear takes place, the 3-4 & select timing valve makes the turning OFF of the pressure C2 synchronized with the turning OFF of the pressure B1', thus preventing the engine from racing and making smooth shifting possible.

When the transmission is in the 3rd gear, the forces applied to the valve are the spring force (force F_S pushing to the left side), and line pressure ① (pressure B1') (force pushing to the right side). Since a condition of $F_S < F_L$ is satisfied, the valve is located at the right side. If the line pressure ① (pressure B1') is turned OFF when upshifting to the 4th gear, the valve moves to the left side. Also, ④ and ⑤ are connected to each other simultaneously. In this way, the pressure C2 ② will be quickly drained.



① Line pressure (pressure B1')

② From C2

③ 3-4 shift valve → Drain

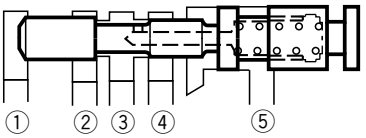
JAT00033-00026

12) 2-3 timing valve

When gear shift takes place between the 2nd gear and the 3rd gear, the 2-3 timing valve raises the pressure C3 after the pressure C1 reaches a certain pressure.

When the transmission is in the 2nd gear with the shift lever set to the D range, the forces applied to the valve are the spring force (force F_S pushing to the left side), and line pressure ① (force F_L pushing to the right side) from the manual valve. Furthermore, since a condition of $F_S < F_L$ is satisfied, the valve is located at the right side. When upshifting from the 2nd gear to the 3rd gear takes place, the line pressure ⑤ (force $F_{L'}$ pushing to the left side) from the 2-3 shift valve is applied gradually via the orifice. As a result, at the point when a condition of $F_S + F_{L'} > F_L$ is satisfied, the valve moves to the left. At the same time, ② and ③ are connected to each other. Consequently, the line pressure ② is applied to the C3 via ③.

<D range, 1st and 2nd gears>

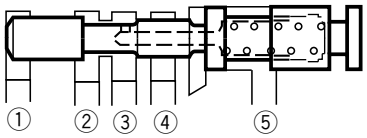


① Line pressure ← From manual valve (D, 2 and L ranges)

② Line pressure ← From 2-3 shift valve (3rd and 4th gears)

③ To C3

<D range, except for 1st and 2nd gears>



④ Line pressure ← From 3-4 shift valve (4th gear)

⑤ Line pressure ← From 2-3 shift valve (3rd and 4th gears)

JAT00034-00027

13) 2-4 timing valve

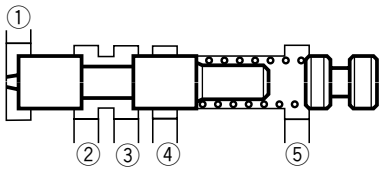
If upshift from the 2nd gear to the 4th gear takes place all at once (when making the C2 inoperative and the C3 operative), the engine starts racing, for no load is applied temporarily. In order to avoid this, the 2-4 timing valve prevents the pressure C2 from being turned OFF (through shifting to the 3rd gear temporarily), until the pressure C3 reaches a certain pressure.

When the transmission is in the 2nd gear with the shift lever set to the D range, only the spring force (force F_S pushing to the left side) is applied to the valve. Therefore, the valve is located at the left side. In this case, the line pressure from the manual valve is applied to the 3-4 shift valve via ③ as a force counteracting the governor pressure.

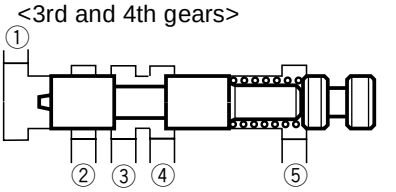
If conditions for upshift to the 4th gear are satisfied and the 2-3 shift valve is switched (moved to the left side), the line pressure ① (pressure C3) (force F_{C3} pushing to the right side) starts to be applied. However, the valve remains located at the left side, until a condition of $F_S < F_{C3}$ is satisfied. Therefore, since the line pressure is applied to the 3-4 shift valve, the 3-4 shift valve cannot move to the left side. In other words, the pressure C2 cannot be turned OFF and the transmission remains in the 3rd gear. When a condition of $C_S < F_{C3}$ is satisfied and the valve moves to the right side, ③ and ④ are connected to each other and the line pressure which was applied to the 3-4 shift valve will be drained. Consequently, the 3-4 shift valve moves and upshifting to the 4th gear takes place.

When the overdrive is turned OFF (the overdrive solenoid is energized), the line pressure (force F_L pushing to the left side) is applied to ⑤. Since a condition of $F_{C3} < F_S + F_L$ is always satisfied, the valve will not move to the right side (upshifting to the 4th gear will not take place).

<Except for 3rd and 4th gears>



<3rd and 4th gears>



① Line pressure (Pressure C3)

② Line pressure ← From manual valve (D, 2 and L ranges)

③ To 3-4 shift valve

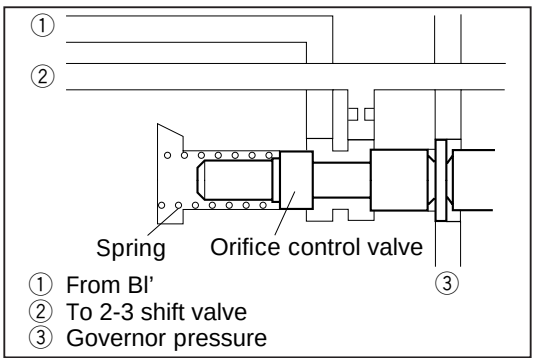
④ Line pressure (2 and L ranges) ← From 2-3 shift valve
Throttle pressure (opening angle of 85% or more) ←

⑤ Line pressure ← From overdrive solenoid (When overdrive is turned OFF with D, 2 or L range)

JAT00035-00028

14) 3-2 timing valve

When a downshift is made from the 3rd gear to the 2nd gear, the change in the engine speed is relatively small during low-speed operation. However, the change in the engine speed is great during high-speed operation, resulting in a strong shift shock. The 3-2 timing valve is provided to reduce this shift shock.



① From Bl'
② To 2-3 shift valve
③ Governor pressure

JAT00286-00257

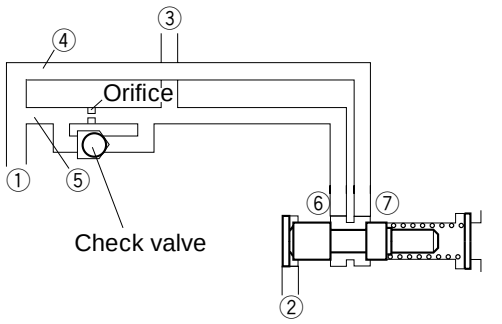
15) 4-3 timing valve

When downshift from the 4th gear to the 3rd gear takes place at a high speed, the 4-3 timing valve retards the rising speed of the line pressure (pressure C2), thus reducing shift impacts.

The forces applied to the valve are the spring force (force F_S pushing to the left side) and governor pressure ② (force F_G pushing to the right side).

When running at a low speed ($F_G < F_S$), the valve moves to the left side, and ⑥ and ⑦ are connected to each other. Therefore, the line pressure ① from the 3-4 shift valve is quickly raised through the route of ④ → ⑦ → ⑥ → ③.

When running at a high speed ($F_G > F_S$), the valve moves to the right side, and ⑥ and ⑦ are cut off. Therefore, the line pressure ① will be raised slowly through the route of ⑤ → orifice → ③.



① Line pressure ← From 3-4 shift valve (Except for 4th gear)

② Governor pressure

③ 3-4 & select timing valve → To C2

JAT00036-00029

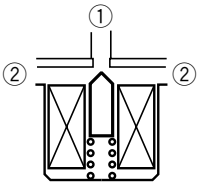
16) Overdrive solenoid

The overdrive solenoid makes the line pressure applied to the 3-4 shift valve and 2-4 timing valve, thus preventing upshift to the 4th gear from taking place.

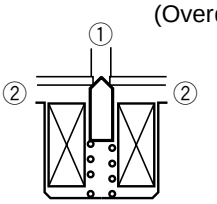
When the overdrive switch is turned ON (overdrive possible), the solenoid is not energized, thus draining the line pressure ①.

When the overdrive switch is turned OFF (overdrive impossible), the solenoid is energized. As a result, the plunger is pulled to close the fluid passage. Consequently, the line pressure ① is retained.

<When electric current is not energized (Overdrive "ON")>



<When electric current is energized (Overdrive "OFF")>



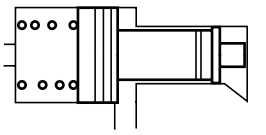
① Line pressure (D, 2 and L ranges)

② Drain

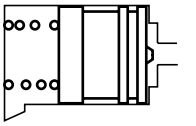
JAT00037-00030

17) Accumulators

The accumulator has functions to relax the connecting of the shift control elements and to reduce gear shift impacts. There are two kinds of accumulators: One is for the forward clutch (C2); and the other is for the 2nd brake band (B1). These are provided in the transmission case.



Accumulator B1



Accumulator C2

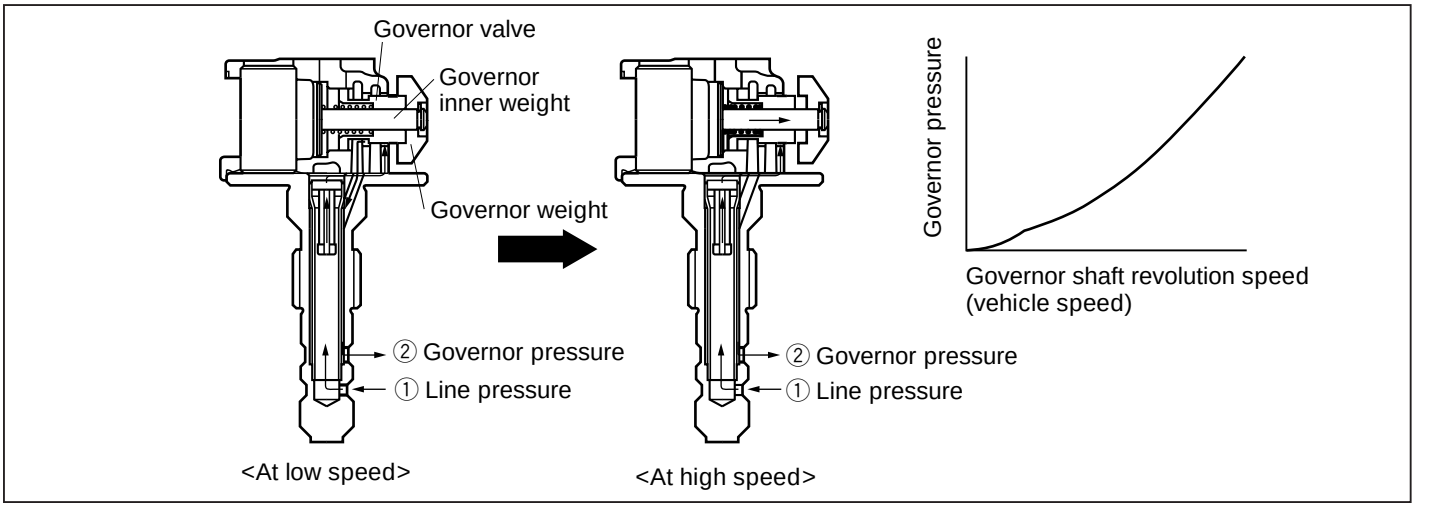
JAT00038-00031

(3) GOVERNOR VALVE

The governor valve is driven by the governor drive gear mounted on the output shaft. The governor valve generates a governor pressure which is corresponding to the vehicle speed (output shaft revolution speed).

The forces applied to the valve are the governor weight, centrifugal force of the governor inner weight (force F_1 pushing to the right side), centrifugal force of the governor valve (force F_2 pushing to the right side), and governor pressure ② (force pushing to the left side).

When running at a low speed (spring force $F_S > F_1$), the governor pressure is regulated under a condition of $F_G = F_1 + F_2$. As the vehicle speed becomes high ($F_S < F_1$), the governor inner weight comes in contact with the stopper. Consequently, the governor pressure is regulated under a condition of $F_G = F_S + F_2$.

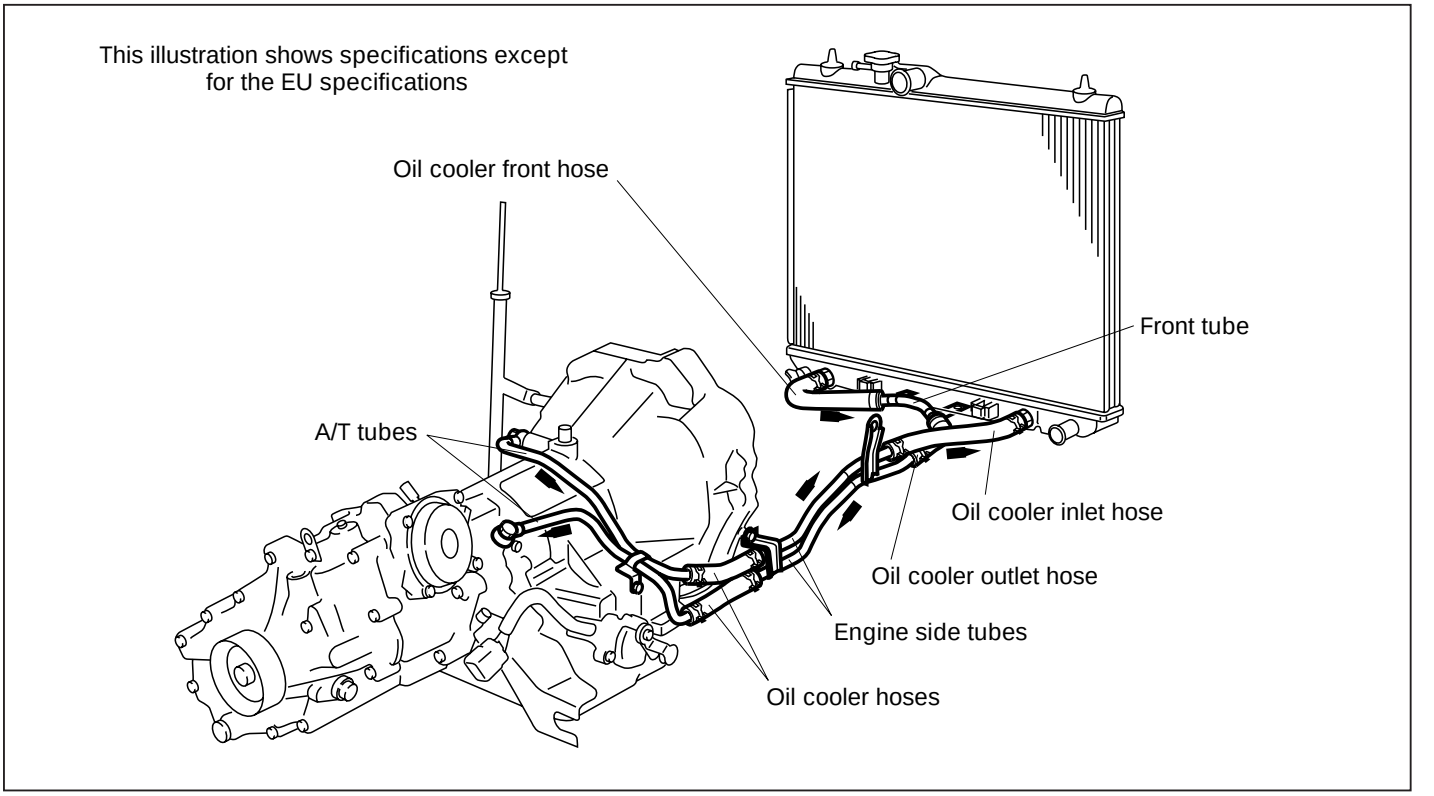


JAT00039-00032

(4) COOLING DEVICE

The automatic transmission fluid is cooled down by the oil cooler incorporated in the radiator.

On vehicles with the EU specifications, the fluid is once cooled down by the air-cooled oil cooler separately mounted. Then, the fluid is sent to the oil cooler inside the radiator to be cooled down further.

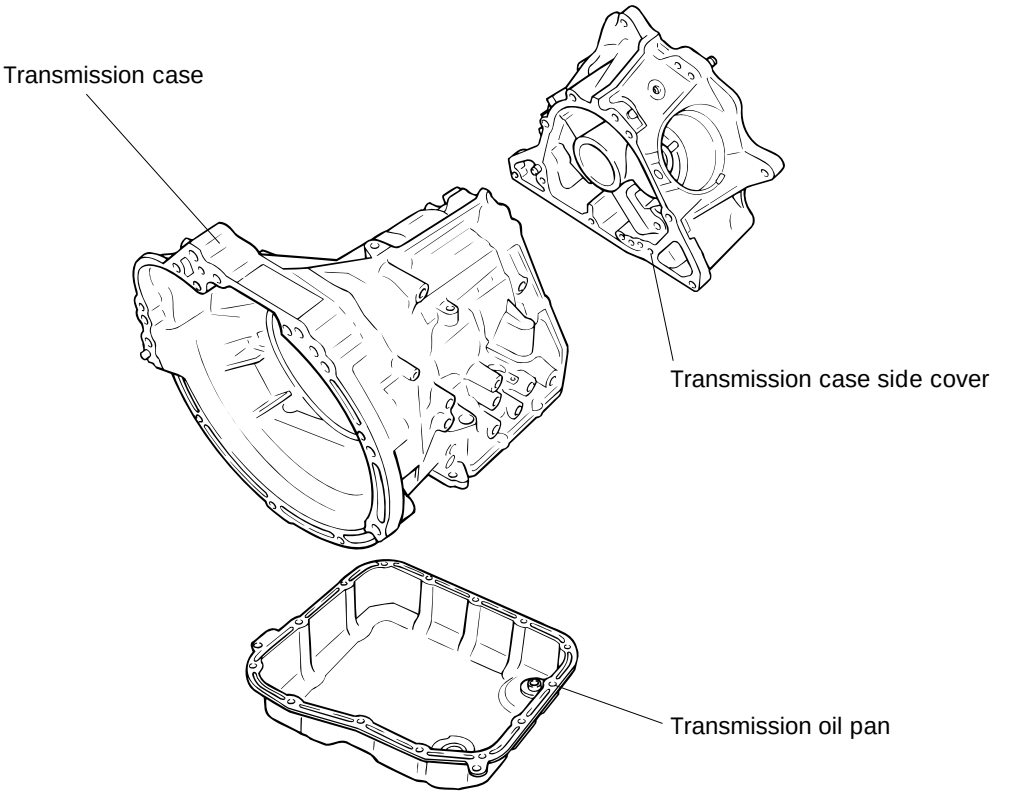


JAT00040-00033

CASE & COVER

DESCRIPTION

The case and cover consist of the transmission case, transmission case side cover, and transmission oil pan.
For improved rigidity of the case, the transmission case is integrated with the converter housing.
Furthermore, liquid gasket featuring excellent sealing ability has been applied at the mating surfaces of each case.



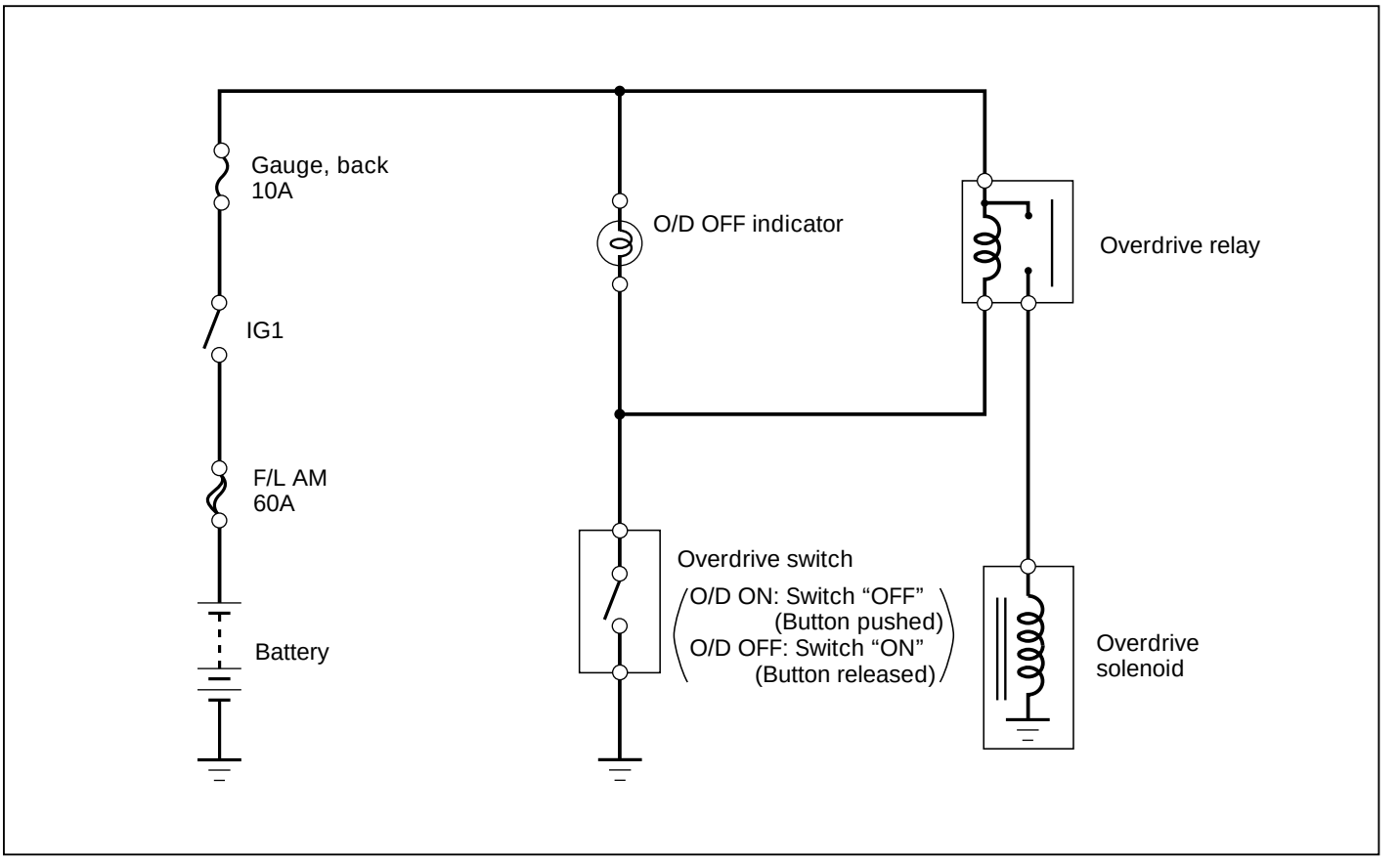
JAT00041-00034

ELECTRIC CONTROL SYSTEM

OVERDRIVE SWITCH

DESCRIPTION

The overdrive solenoid provided in the transmission valve body is energized (overdrive possible) by turning ON (pushing) the overdrive switch incorporated in the shift lever. Also, the overdrive solenoid is non-energized (overdrive impossible) by turning OFF (releasing) the overdrive switch.



JAT00042-00035

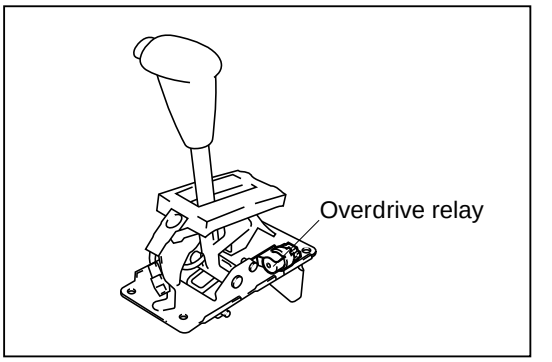
COMPONENTS

① **Overdrive switch**

② **Overdrive relay**

The overdrive relay is mounted on the floor shift assembly with a bracket interposed.

③ **Overdrive solenoid**

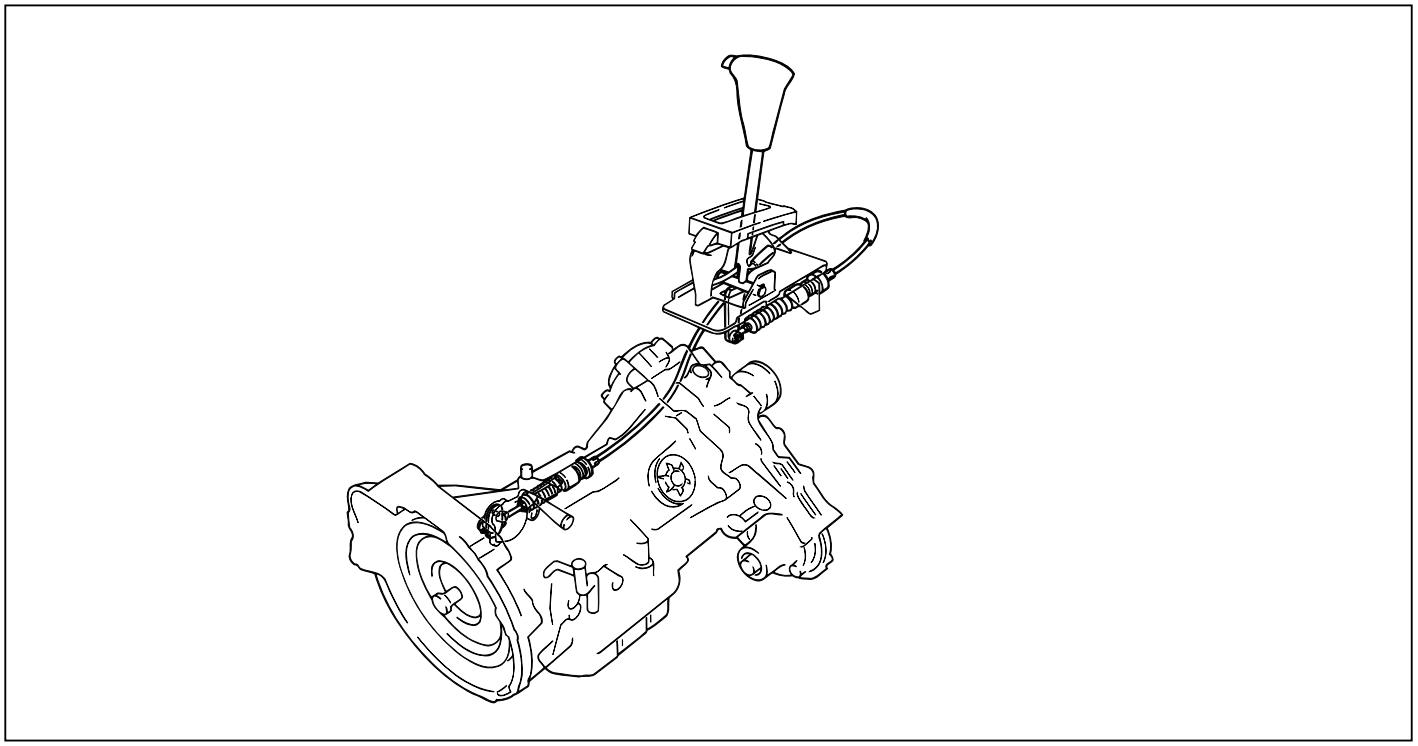


JAT00043-00036

SHIFT CONTROL MECHANISM

DESCRIPTION

1. The shift control mechanism has employed a remote control type, using a push-pull cable.

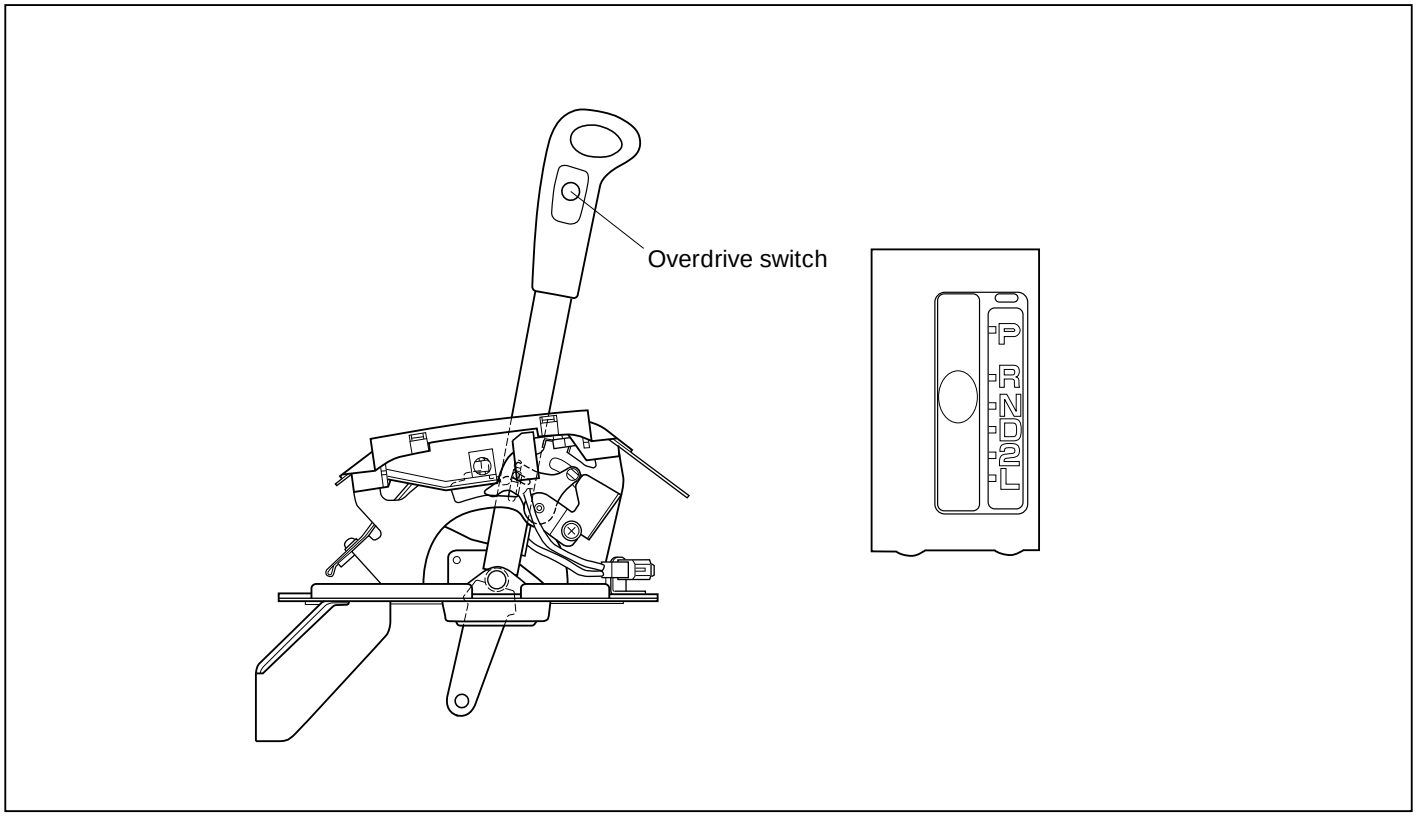


JAT00044-00037

COMPONENTS

(1) Shift lever assembly

The floor shift assembly has employed a six-position type having the P, R, N, D, 2 and L positions. Also, the overdrive switch is incorporated.



JAT00045-00038

PRELIMINARY CHECK

1. Check of transmission fluid level
   NOTE:
   - Prior to the fluid level check, be sure to run the vehicle until the engine and transmission have reached their normal operating temperature.
     (Fluid temperature: 70 - 90°C)

2. Check of engine idling speed.
   Specified Value: 850 ± 50 rpm
   (Refer to the EM section.)

   (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 transmission 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®III
   Full Capacity: Approx. 4.2 ℓ (For EU: 4.29 ℓ)
   Drain and Refill: Approx. 1.7 ℓ (For EU: 1.74 ℓ)

   CAUTION:
   - Do not overfill the fluid.

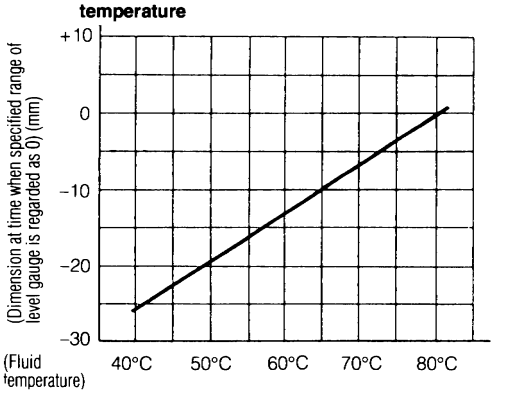
   NOTE:
   - If it is necessary to check the fluid level at a low temperature (20 - 30°C), e.g. at the time of fluid change, first adjust the fluid level so that it may become within the COLD level. Then, recheck the fluid level under the hot conditions.
   - If the fluid level fails to reach the cold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

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

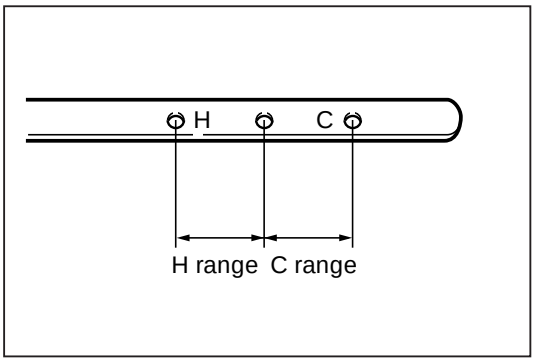
• Transmission warming-up method
1. Warm up the engine.
2. If the vehicle runs for about 15 minutes at a speed of 60 km/h or for about 30 minutes at a speed of 40 km/h, the temperature of the fluid inside the transmission becomes about 80 ± 10°C.

Reference
When the engine is cold, if the engine is operated for about 35 minutes at the idling speed after the engine has started, the temperature of the fluid inside the transmission will rise to about 60 ± 10°C.

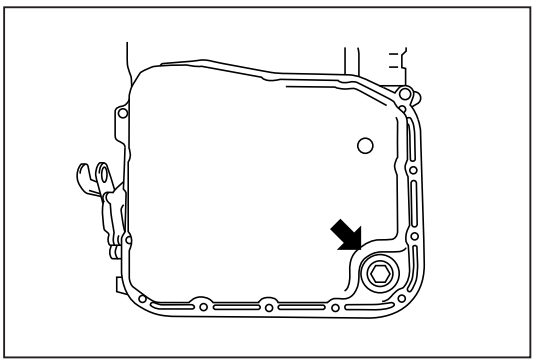
Reference
• Change of fluid level as a result of rise in fluid temperature



JAT00046-00039



JAT00047-00040



JAT00048-00041

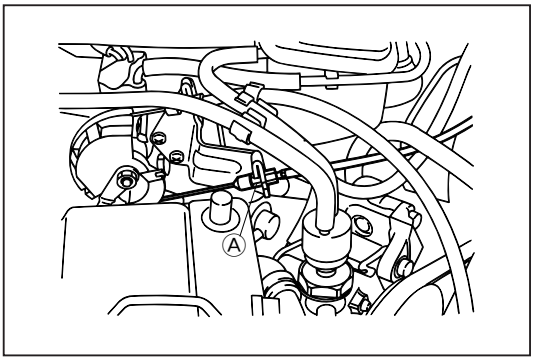
(2) With a new gasket interposed, tighten the drain plug securely.
Tightening Torque: 19.6 - 29.4 N·m (2.0 - 3.0 kgf-m)

(3) Add new fluid through the filler tube.
Fluid To Be Used: DEXRON®III
Full Capacity: Approx. 4.2 ℓ (For EU: 4.29 ℓ)
Drain and Refill: Approx. 1.7 ℓ (For EU: 1.74 ℓ)

(4) Start the engine. Move the shift lever to all positions from P through L. Then, move it to the P position.
(5) With the engine idling, check the fluid level. Add fluid up to the COLD level on the fluid level gauge.
(6) Check the fluid level at the normal fluid operating temperature (70 - 90°C). Add the fluid, as required.

JAT00049-00000

5. Adjustment of throttle cable
The purpose of this adjustment is to make the full open state of the throttle link of the throttle body at the engine side equal to the full-open position of the throttle valve inside the transmission.
NOTE:
- Do not perform the adjustment, using the attaching nut of the throttle link at the engine side. The nut Ⓐ in the right figure is secured with bond.



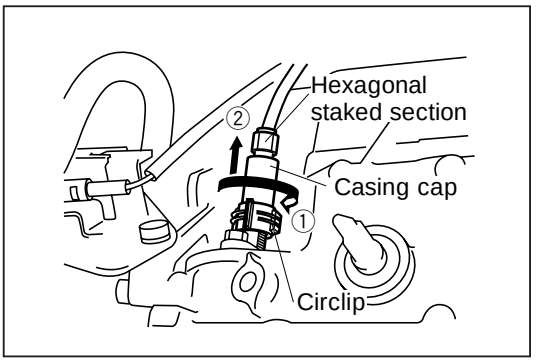
JAT00050-00043

(1) Remove the neutral start switch.
(2) Reset the automatic adjusting mechanism, following the procedure given below.
NOTE:
- When turning the casing cap with pliers or the like, be sure not to apply a lateral force. If a lateral force should be applied, it may damage (break) the casing cap section.

1) Turn the casing cap about 60 to 90 degrees. (The circlip will be expanded.)

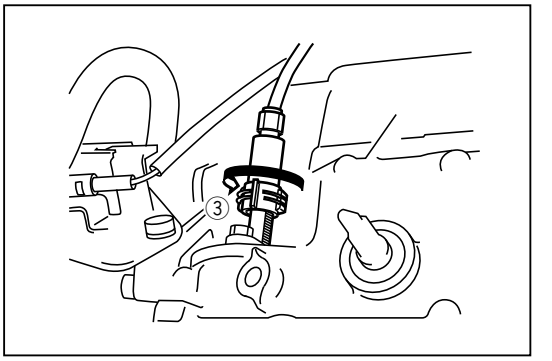
NOTE:
- When turning the casing cap with pliers or the like, be sure to clamp the hexagonal staked section of the casing cap.

2) Pull the casing cap, until it is brought into contact with the stopper.



JAT00051-00044

3) Turn the casing cap in the reverse direction of the step 1). (The circlip will be closed so that the casing cap may be secured.)



JAT00052-00045

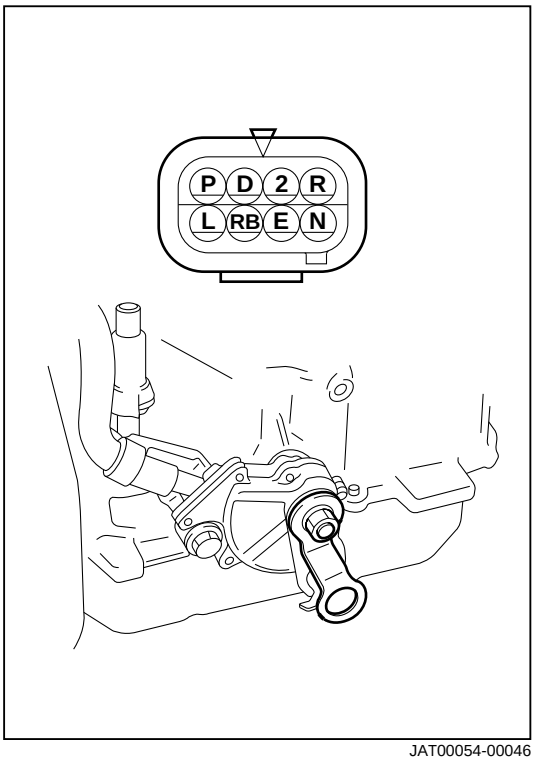
(3) Fully depress the accelerator pedal or turn the throttle link at the engine side, until it comes in contact with the full-open stopper.
At this time, ensure that the free play of the throttle cable has been automatically adjusted by listening to a clicking sound.
(4) Install the neutral start switch assembly.
(See the step 7.)

JAT00053-00000

6. 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	E	R	RB	P	N	D	2	L
P	○			○				
R		○	○					
N	○				○			
D	○					○		
2	○						○	
L	○							○

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

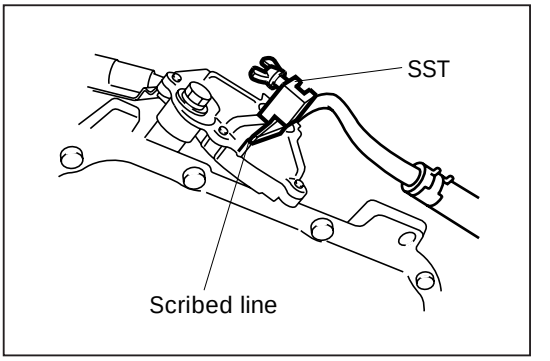


JAT00054-00046

7. Adjustment of neutral start switch
(1) Move the shift lever to the [N] range.
(2) Remove the attaching bolts of the control cable and control shaft lever subassembly.
(3) Remove the control shaft lever subassembly.

JAT00055-00000

(4) Install the SST. Check that the gauge section of the SST is aligned with the scribed line of the neutral start switch.
SST: 09302-87201-000



JAT00056-00047

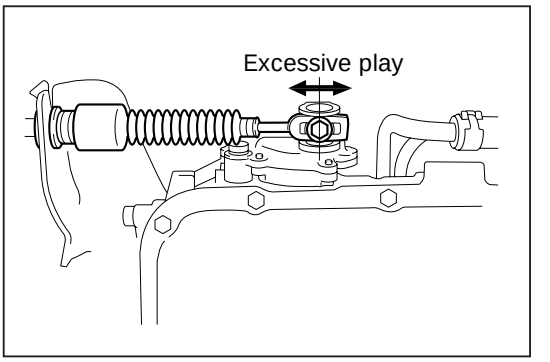
(5) If they are not aligned with each other, loosen the bolt. Then, perform the adjustment by turning the switch section so that they may be aligned. Tighten the bolt to the specified torque.
Tightening Torque: 14.7 - 21.6 N·m (1.5 - 2.2 kgf-m)

NOTE:
- Do not use an impact wrench to tighten the securing bolt of the neutral start switch.

(6) Remove the SST. Install the control shaft lever sub-assembly.
Tightening Torque: 9.8 - 15.7 N·m (1.0 - 1.6 kgf-m)

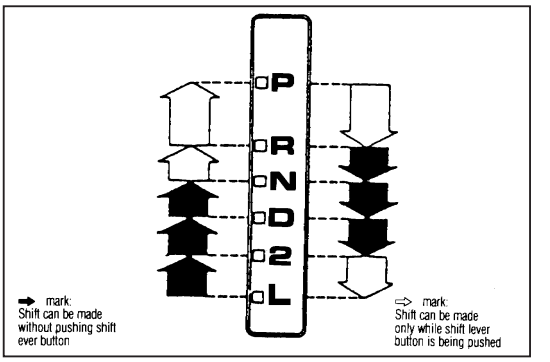
(7) In cases where the operation in (5) has been performed, confirm the operation of the control shaft lever, following the procedure given below:
1) With the control shaft lever set to the [P] range, move it approximately 2 to 3 mm toward the [R] range by your hand. At this time, ensure that the control shaft lever fully returns to the [P] range.
2) If the lever will not return to the [P] range, once loosen the securing bolt of the neutral start switch. After performing the adjustment, retighten the bolt.

(8) Install the control cable, making sure that the backlash will not be deviated to one side.
Tightening Torque: 6.9 - 9.8 N·m (0.7 - 1.0 kgf-m)



JAT00057-00048

8. Check of shift lever position
(1) Move the shift lever from the [N] range to each range. Ensure that the shift lever button and shift lever can be operated smoothly with a positive detent feeling at each range. Check that the position indicator functions properly.
(2) Start the engine. Ensure that the vehicle moves forward when you move the shift lever from the [N] range to the [D], [2] and [L] ranges, respectively. Make sure that the vehicle moves backward when you move the shift lever to the [R] range.
(3) With the ignition switch set to the ON position, move the shift lever from the [P] to [R] range and from the [N] to [R] range while depressing the brake pedal.
⇨ mark: Shift can be made only while shift lever button is being pushed
➡ mark: Shift can be made without pushing shift lever button
(4) With the ignition switch turned ON and the shift lever placed in the [R] range, check that the back-up lamp goes on and the reverse warning buzzer is set off.



JAT00058-00049

TESTING

CAUTION:
- Perform the stall test at the normal fluid operating temperature (70 - 90°C).
- Do not conduct this test continuously for more than five seconds.
- Wait at least one minute before the switching is made from the [D] range to the [R] range.
- Be sure to turn OFF the air conditioner (if equipped so on).

JAT00059-00000

STALL TEST

1. Place chocks at the wheels of the vehicle.
2. Connect an engine tachometer. Apply the parking brake.
3. Start the engine.
4. While strongly depressing the brake pedal by your left foot, move the shift lever to the [D] and [R] ranges, respectively. Then, depress the accelerator pedal fully by your right foot. At this time, quickly read the engine revolution speed.
   NOTE:
   - Do not conduct this test continuously for more than five seconds.
   - There must be an interval of at least one minute between the [D] range and the [R] range.
     Specified Value: 1990 - 2540 rpm

   REFERENCE:
   - If the stall revolution speed fails to conform to the specified value, most likely the following malfunctions are taking place.

Although the stall revolution speed in the [D] range is the same as that in the [R] range, they are lower than the specified value.	• Insufficient engine output • Faulty torque converter stator one-way clutch
Although the stall revolution speed in the [D] range is the same as that in the [R] range, they are higher than the specified value.	• Insufficient transmission fluid amount • Low line pressure • Slipping of forward clutch, direct clutch and 1st & reverse brake, and malfunction of one-way clutch
The stall revolution speed in the [D] range is higher than the specified value.	• Low line pressure • Slipping of forward clutch, and malfunction of one-way clutch
The stall revolution speed in the [R] range is higher than the specified value.	• Low line pressure • Slipping of direct clutch and 1st & reverse brake

JAT00060-00000

TIME LAG TEST

1. Apply the parking brake and place chocks at the wheels of the vehicle.
2. Start the engine.
3. While depressing the brake pedal, move the shift lever from the [N] range to the [D] range; and from the [N] range to the [R] range at the idle speed. At this time, measure the time elapsed from shifting until a shock is felt.
   NOTE:
   - If the time lag is to be measured consecutively, be sure to put a one-minute interval between the tests.
   - Conduct the test several times. Obtain the mean value.
     Specified Value:
     [N] → [D]: 1 second or less
     [N] → [R]: 1 second or less

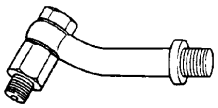
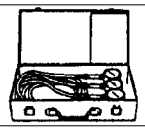
   REFERENCE:
   - If the time lag fails to conform to the specified value, most likely the following malfunctions are taking place.

The time lag when shifted from the [N] range to the [D] range is longer than the specified value.	• Forward clutch slipping • Low line pressure
The time lag when shifted from the [N] range to the [R] range is longer than the specified value.	• Direct clutch slipping • 1st & reverse brake slipping • Low line pressure

JAT00061-00000

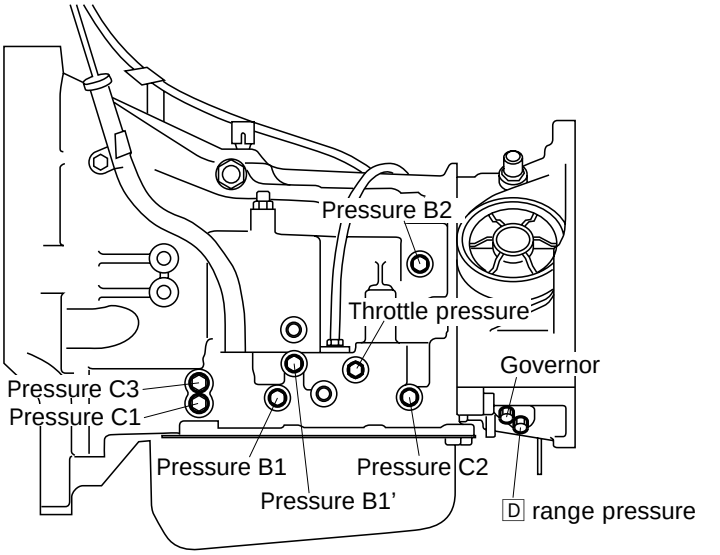
HYDRAULIC PRESSURE TEST

1. Articles to be prepared

	Shape	Part number, nomenclature
SST		09325-87201-000 A/T pressure gauge No. 1 adapter
Instrument		Pressure gauge for automatic transmission fluid
		Oil pressure gauge adapter
Grease	DEXRON®III	

JAT00062-00050

2. Plug position for hydraulic pressure test



Test plug tightening torque
6.9 - 9.8 (0.7 - 1.0)

Unit: N·m (kgf-m)

JAT00063-00051

3. Installation procedure for pressure gauges

NOTE:

- Be sure to use new gaskets for the SST and instrument.
- Never reuse the test plugs.

(1) Remove the test plug and install the pressure gauge.

NOTE:

- Be very careful not to allow the pressure gauge to interfere with the front propeller shaft.

(2) Start the engine and warm up the transmission (fluid temperature 70 - 90 °C). Check the fluid level. Also, check each section for fluid leakage.

4. Measurement procedure for each hydraulic pressure

① Throttle pressure, D range pressure, pressure C1, pressure C2 and pressure B2

(1) Apply the parking brake and place chocks at the wheels of the vehicle.
(2) Start the engine.
(3) Strongly depress the brake pedal by your left foot. With the shift lever moved to the D range, R range, and L range, respectively, operate the accelerator pedal by your right foot. At this time, measure each hydraulic pressure.

② Pressure B1

(1) Jack up the four wheels. Then, support the vehicle by rigid racks.
(2) Start the engine.
(3) With the shift lever moved to the D range and 2 range, gradually depress the accelerator pedal. Measure the hydraulic pressure after upshift to the 2nd gear takes place. However, in cases where the shift lever is set to the D range, measure the hydraulic pressure at the time when the accelerator pedal is released.

③ Pressure C3 and pressure B1'

(1) Jack up the four wheels. Then, support the vehicle by rigid racks.
(2) Start the engine.
(3) With the shift lever moved to the D range, gradually depress the accelerator pedal so that upshift to the 3rd gear may take place. Then, measure the hydraulic pressure at the time when the accelerator pedal is released.

JAT00064-00000

④ **Governor pressure**

(1) Drive the vehicle onto a speedometer tester.
(2) Start the engine.
(3) With the shift lever moved to the D range, gradually depress the accelerator pedal. Measure the hydraulic pressure at each vehicle speed.

Specified Value

Item		Measurement condition		Specified value (kPa {kg/cm^2})
Throttle pressure		D	Idling revolution condition	29 {0.3} or less
			Stall revolution condition	598 - 637 {6.1 - 6.5}
D range pressure		D	Idling revolution condition	530 - 628 {5.4 - 6.4}
			Stall revolution condition	843 - 941 {8.6 - 9.6}
Line pressure	C2	D	Idling revolution condition	530 - 628 {5.4 - 6.4}
			Stall revolution condition	843 - 941 {8.6 - 9.6}
	C1, B2	R	Idling revolution condition	1265 - 1363 {12.9 - 13.9}
			Stall revolution condition	1971 - 2069 {20.1 - 21.1}
	B2	L	—	431 - 530 {4.4 - 5.4}
		R	Idling revolution condition	1265 - 1363 {12.9 - 13.9}
			Stall revolution condition	1971 - 2069 {20.1 - 21.1}
	B1', C3	D	3rd gear with accelerator pedal "OFF"	530 - 628 {5.4 - 6.4}
	B1	D	2nd gear with accelerator pedal "OFF"	530 - 628 {5.4 - 6.4}
		2	2nd gear	902 - 1000 {9.2 - 10.2}
Governor pressure		30 km/h		49 - 147 {0.5 - 1.5}
		60 km/h		167 - 265 {1.7 - 2.7}

JAT00065-00000

REFERENCE:

- If each hydraulic pressure fails to conform to the specified value, most likely the following malfunctions are taking place.

All line pressures fail to conform to the specified value.	1. Oil pump faulty 2. Oil strainer clogged 3. Faulty O-ring of oil strainer 4. Improper adjustment of throttle cable 5. Faulty valve body assembly • Loose connecting bolt of valve body • Faulty modulator valve 6. Improper throttle pressure
Only a certain clutch or brake pressure fails to conform to the specified value.	1. Faulty valve body assembly • Leakage or clogging at circuit of the clutch or brake pressure concerned • Faulty piston accumulator of the clutch or brake pressure concerned • Shift valve faulty 2. Manual valve faulty, or improper adjustment of position
D range pressure fails to conform to the specified value.	1. Faulty valve body assembly • Faulty manual valve, or improper adjustment of position • Leakage or clogging of D range pressure circuit 2. Improper line pressure
Throttle pressure fails to conform to the specified value.	1. Improper adjustment of throttle cable 2. Throttle cable detached or broken 3. Faulty valve body assembly • Faulty throttle valve • Leakage or clogging of throttle pressure circuit 4. Improper line pressure
Governor pressure fails to conform to the specified value.	1. Faulty governor valve assembly 2. Faulty valve body assembly • Leakage or clogging of governor pressure circuit 3. Improper line pressure

JAT00066-00000

RUNNING TEST

NOTE:

- Be sure to confirm safety on the road when conducting the running test.
- Make sure that the fluid temperature is in a normal running condition (70 - 80 °C).

1. [D] range test

(1) Move off the vehicle with the shift lever set to the [D] range. Check to see if upshift and downshift take place between the 1st gear and the 2nd gear; between the 2nd gear and the 3rd gear; and between the 3rd gear and the 4th gear (overdrive). Also, check to see if each shift point conforms to the specified value. Furthermore, check that there is no abnormal shock and slipping, etc.

(2) While driving the vehicle with the shift lever set to the [D] range and the transmission in the 4th gear (overdrive), 3rd gear, and 2nd gear, respectively, perform the kick-down operation. At this time, check to see if kick-down takes place from the 4th gear (overdrive) to the 3rd gear, from the 3rd gear to the 2nd gear; and from the 2nd gear to the 1st gear. Also, check to see if the vehicle speed range during which kick-down is possible conforms to the specified value. Furthermore, check that there is no abnormal shock or slipping, etc.

(3) When the overdrive switch is turned OFF while driving the vehicle in the 4th gear (overdrive), ensure that the downshift from the 4th gear (overdrive) to the 3rd gear takes place.

2. [2] range test

(1) Move off the vehicle with the shift lever set to the [2] range. Check to see if upshift and downshift take place between the 1st gear and the 2nd gear. Also, check to see if each shift point conforms to the specified value. Furthermore, check that there is no abnormal shock and slipping, etc.

(2) Move off the vehicle with the shift lever set to the [2] range. At this time, ensure that upshift from the 1st gear to the 2nd gear takes place and that no upshift to the 3rd gear will take place.

(3) While driving the vehicle with the shift lever set to the [2] range and the transmission in the 2nd gear, perform the kick-down operation. Check to see if kick-down takes place from the 2nd gear to the 1st gear. Also, check to see if the vehicle speed range during which kick-down is possible conforms to the specified value. Furthermore, check that there is no abnormal shock and slipping, etc.

(4) When the shift lever is shifted to the [2] range while driving the vehicle with the shift lever set to the [D] range and the transmission in the 3rd gear, check that downshift from the 3rd gear to the 2nd gear takes place and engine brake is applied. Also, check to see if the shift point conforms to the specified value.

3. [L] range test

(1) Move off the vehicle with the shift lever set to the [L] range. At this time, ensure that no upshift to the 2nd gear will take place.

(2) When the shift lever is shifted to the [L] range while driving the vehicle with the shift lever set to the [D] range and the transmission in the 3rd gear, check that downshifts from the 3rd gear → the 2nd gear → the 1st gear take place and engine brake is applied. Also, check to see if the shift point conforms to the specified value.

JAT00067-00000

4. [P] range test

(1) Park the vehicle on a grade (approximately 5 degrees or more) in a climbing state and move the shift lever to the [P] range. Then, release the parking brake. At this time, check that the parking lock mechanism functions and the vehicle will not move.
(2) Park the vehicle in a descending state, and perform the same check as stated above.
(3) Under conditions above, move the shift lever from the [P] range to other ranges. At this time, check to see if the vehicle moves.

Specified Value

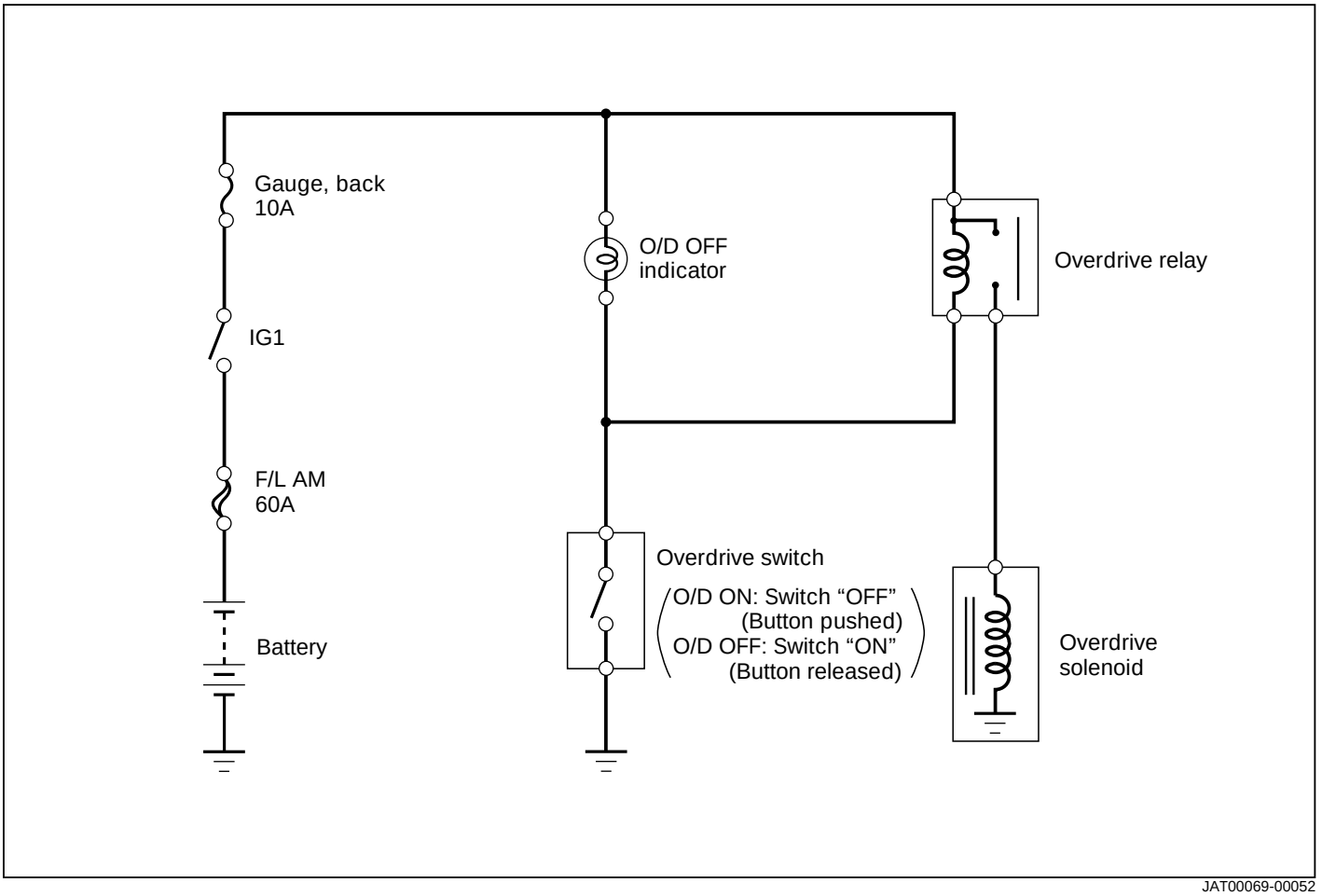
Throttle opening angle	Range	Gear shifting	Vehicle speed (km/h)
100 %	[D]	1st → 2nd	31.6 - 47.6
		2nd → 3rd	67.6 - 83.6
		3rd → 4th	107.8 - 123.8
		4th → 3rd	89.4 - 105.4
		3rd → 2nd	60.7 - 76.7
		2nd → 1st	24.5 - 40.5
0 %	[D]	4th → 3rd	12.0 - 28.0
		3rd → 1st	6.3 - 22.3
0 - 100%	[2], [L]	3rd → 2nd	85.6 - 101.6
	[L]	2nd → 1st	33.7 - 49.7

JAT00068-00000

ELECTRIC-RELATED TESTS

OVERDRIVE SYSTEM

① Wiring diagram

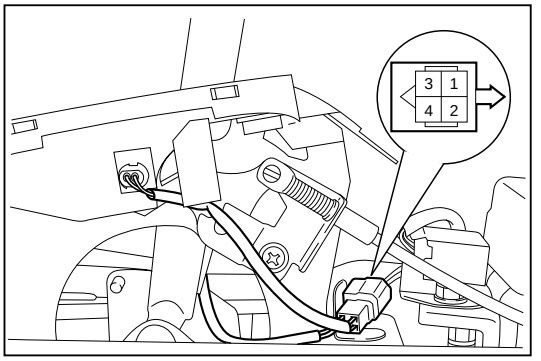


JAT00069-00052

② **Unit inspection**

- **Overdrive switch**

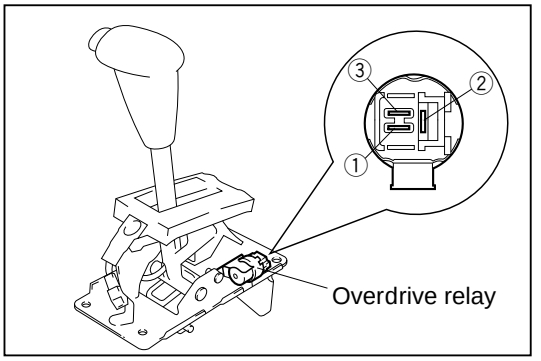
1. When the overdrive switch is turned ON (overdrive possible), check that no continuity exists between the terminals ① and ② of the connector in the right figure. Also, when the overdrive switch is turned OFF (overdrive impossible), check that continuity exists between the same terminals.



JAT00070-00053

- **Overdrive relay**

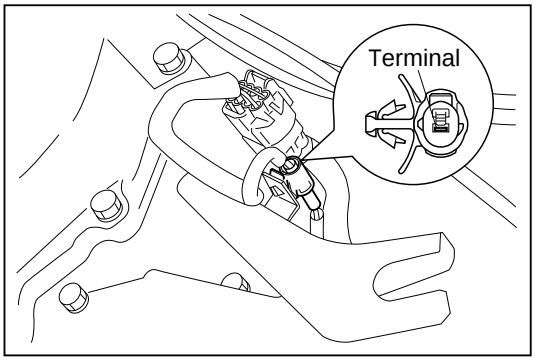
1. Measure the resistance between the terminals ① and ②.
   Specified Value: Approx. 70 Ω
2. Ensure that no continuity exists between the terminals ① and ③.
3. When the battery voltage is applied across the terminals ① and ③, ensure that continuity exists between the terminals ① and ②.



JAT00071-00054

- **Overdrive solenoid**

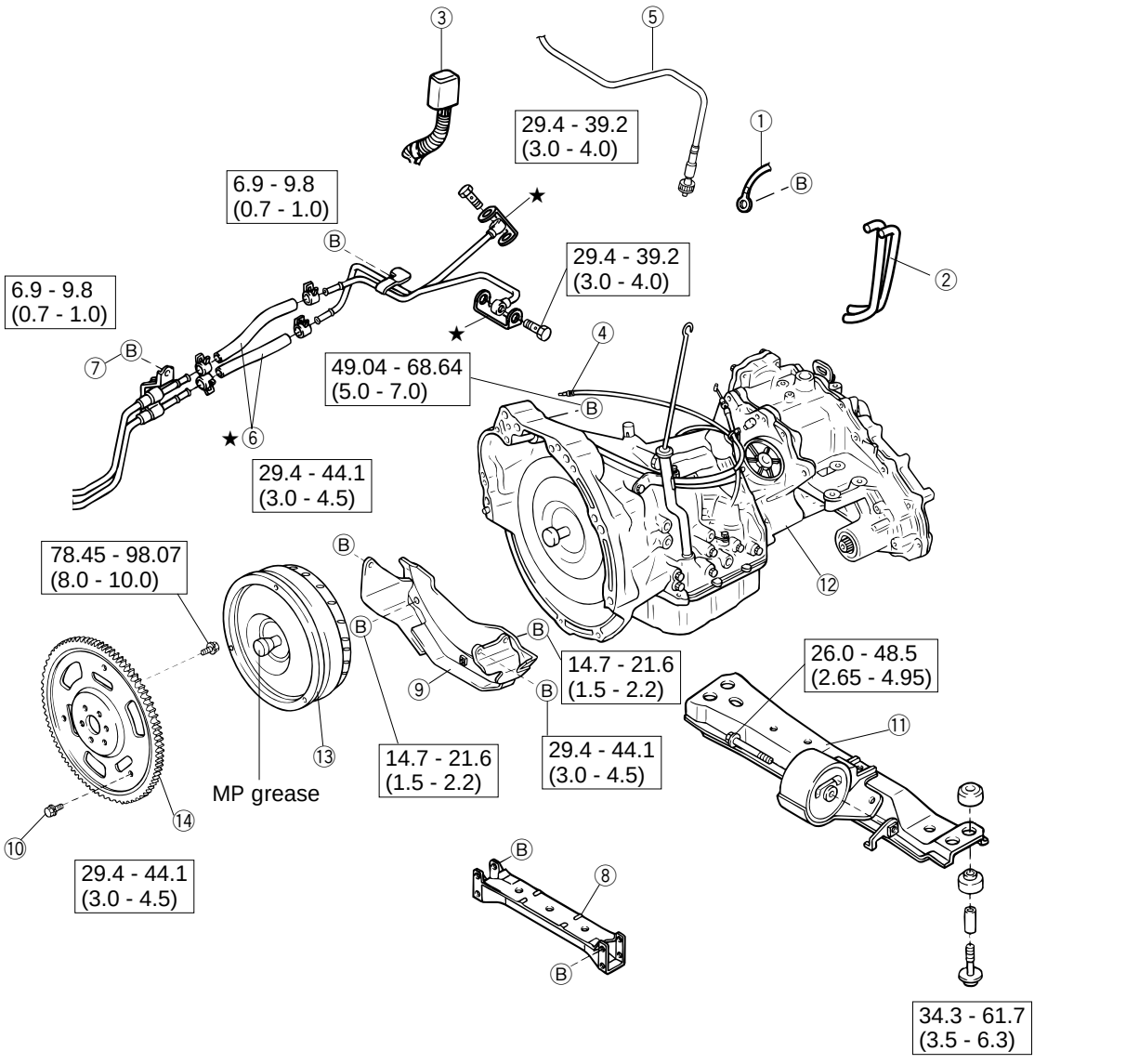
1. Measure the resistance between the terminal of the overdrive solenoid connector and the ground (transmission case).
   Specified Value: 24 - 27.2 Ω



JAT00072-00055

REMOVAL AND INSTALLATION OF AUTOMATIC TRANSMISSION

COMPONENTS



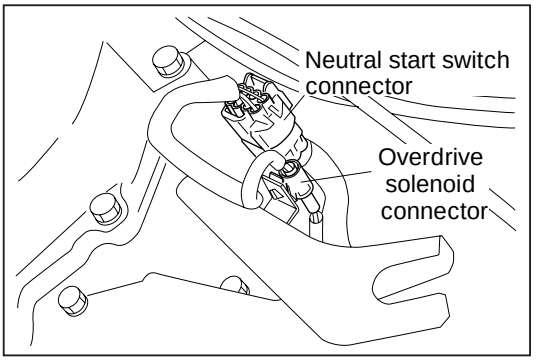
① Ground wire
② Vacuum hose
③ Neutral start switch connector
④ Overdrive solenoid connector
⑤ Speedometer drive cable assembly
⑥ Oil cooler hose
⑦ Bolt (tube bracket × transmission)
⑧ Front lower frame crossmember subassembly
⑨ Power train stiffener
⑩ Bolt (torque converter × drive plate)
⑪ Engine rear support member subassembly with engine mounting rear insulator
⑫ Transmission assembly with transfer assembly
⑬ Torque converter assembly
⑭ Drive plate & ring gear subassembly

JAT00073-00056

1. Operations prior to removal
   (1) Disconnect the negative (–) terminal of the battery.
   (2) Disconnect the throttle cable at the engine side.
   (3) Drain the automatic transmission fluid.
   (4) Remove the propeller front shaft.
   (5) Remove the propeller shaft.
   (6) Remove the front exhaust pipe.
   (7) Remove the starter assembly.
   (8) Disconnect the control cable at the transmission side.

JAT00074-00000

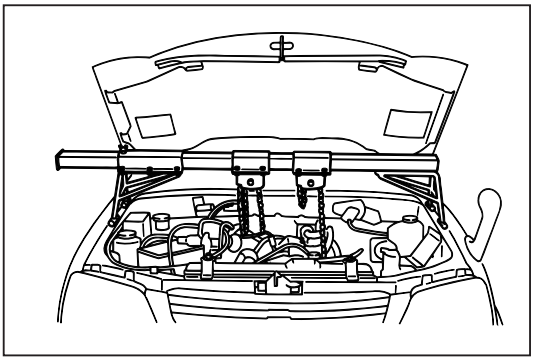
2. Main points of removal
   (1) Disconnect the neutral start switch connector and overdrive solenoid connector.



JAT00075-00057

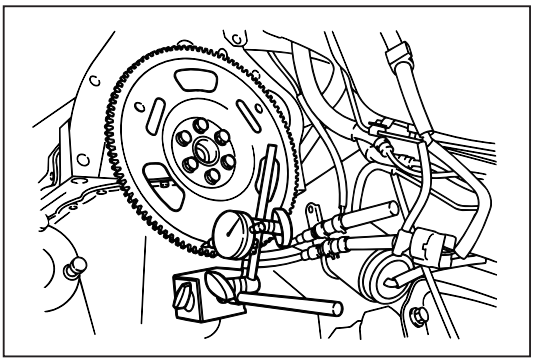
   (2) Support the engine, using an engine supporting bridge. Remove the engine rear support member sub-assembly with the rear engine mounting rear insulator.
   (3) Support the transmission assembly with the transfer, using a transmission jack, etc. Remove the transmission assembly with the transfer.

   NOTE:
   - Be very careful not to deform the oil pan during the removal.



JAT00076-00058

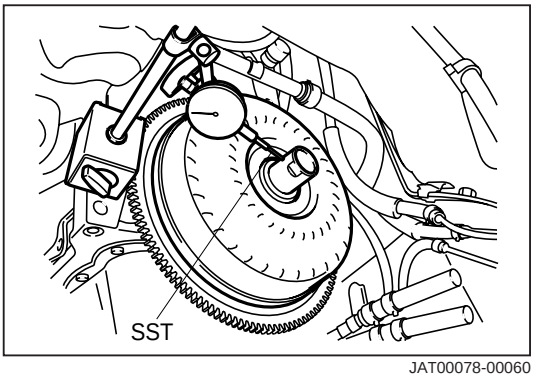
3. Check
   (1) Check the drive plate for runout.
      Limit: 0.25 mm



JAT00077-00059

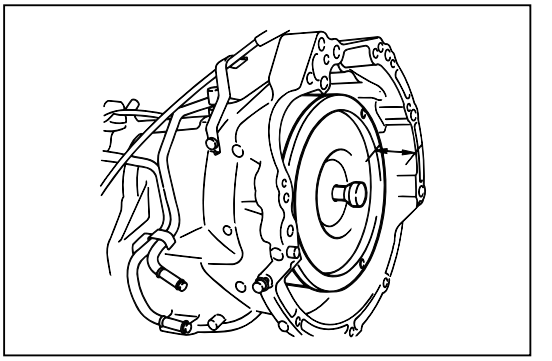
   (2) Install the torque converter to the drive plate. Check the shaft for runout, using the following SST.
      SST: 09351-87203-000
      Limit: 0.30 mm

   NOTE:
   - Be very careful not to drop the torque converter during the operation.



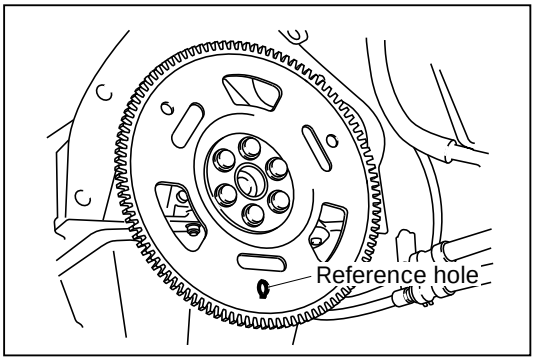
JAT00078-00060

4. Main points of installation
   (1) Insert the torque converter assembly into the transmission assembly. Ensure that the torque converter has been inserted securely.
   Specified Value: Dimension A is 28 mm or more. (Dimension A: Dimension between edge surface of housing and drive plate installation seat of torque converter)


JAT00079-00061

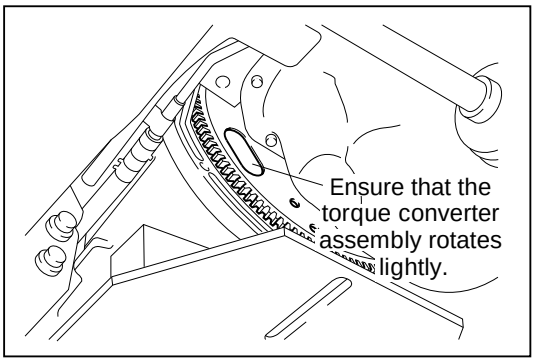
   (2) Install the transmission assembly with the transfer.
      1) Face the reference hole (elongated hole) of the drive plate downward.
      2) Support the transmission assembly with a transmission jack, etc. Then, connect the transmission assembly to the engine.

NOTE:
- Be very careful not to dent the oil pan during the operation.



JAT00080-00062

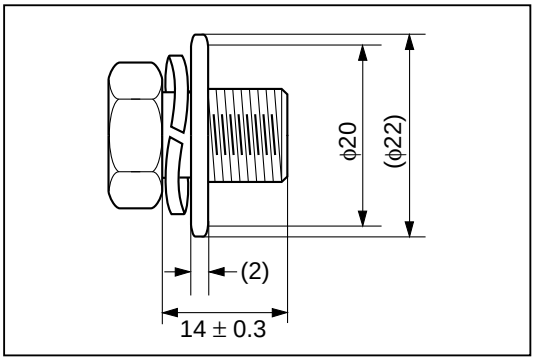
NOTE:
- Before securely tightening the bolts and nuts (engine × transmission), make sure that the torque converter turns lightly. If the torque converter will not turn lightly, it means that the torque converter is deviated from the specified position. Therefore, remove the transmission and securely insert the torque converter into the specified position. (If the bolts and nuts are tightened securely with the torque converter deviated from the specified position, there will be the possibility that the oil pump be damaged.)
  Tightening Torque: 49.04 - 68.64 N·m (5.0 - 7.0 kgf-m)



JAT00081-00063

   (3) Install the bolts (drive plate × torque converter).
      1) First, tighten the bolt in the reference hole (elongated hole) of the drive plate.

NOTE:
- Never use bolts other than the bolt indicated in the right figure. (If those bolts longer than the specified bolt should be used, it would lead to improper tightening or deformation of the inner shape of the converter, thus resulting in hampering the functions.)
  Tightening Torque: 29.4 - 44.1 N·m (3.0 - 4.5 kgf-m)

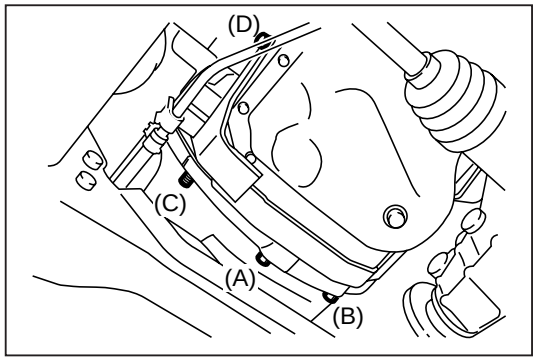


JAT00082-00064

(4) Install the power train stiffener. Tighten the bolts in the following sequence.
   1) Temporarily tighten the bolt (A).
   2) Securely tighten the bolts in the sequence of the bolt (B), bolt (A), bolt (E), bolt (F), bolt (C), and bolt (D).

REFERENCE:

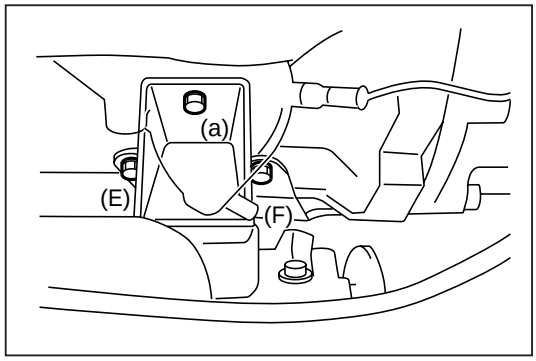
- If any difficulty is encountered in inserting the bolts (E) and (F), loosen the bolt (a) before the operation.



JAT00083-00065

Tightening Torque:

M10 29.4 - 44.1 N·m (3.0 - 4.5 kgf-m)
M8 14.7 - 21.6 N·m (1.5 - 2.2 Kgf-m)



JAT00084-00066

5. Operations after installation
   (1) Install the starter assembly.
   (2) Install the control cable assembly at the transmission side.
   (3) Install the front exhaust pipe.
   (4) Install the propeller shaft.
   (5) Install the propeller front shaft.
   (6) Connect the throttle cable at the engine side.
   (7) Fill automatic transmission fluid.
   (8) Perform the basic check and adjustment.

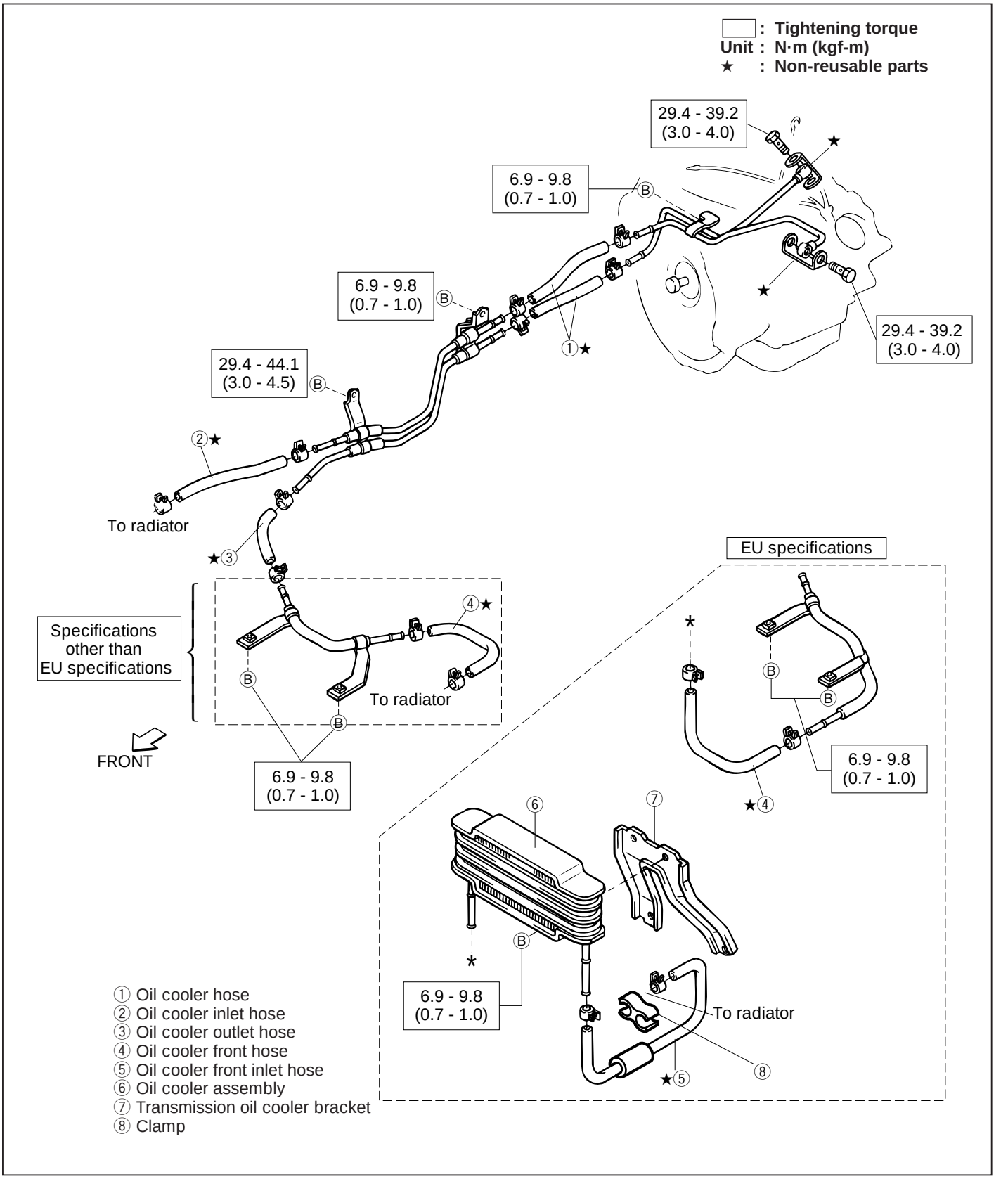
JAT00085-00000

CONNECTION AND DISCONNECTION OF OIL COOLER HOSES

COMPONENTS

1. Operations prior to removal

(1) • Remove the center engine undercover. (Except EU specifications)
• Remove the center engine undercover, radiator grill and front bumper cover. (EU only)



JAT00086-00067

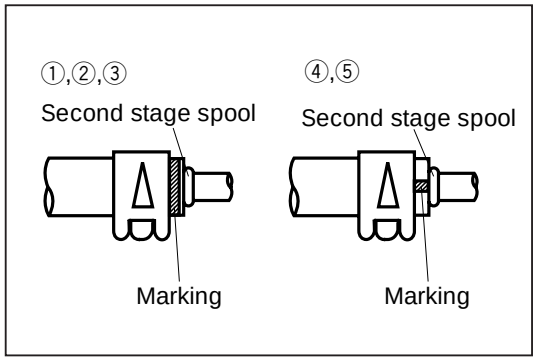
2. Main points of removal

Table showing identification of oil cooler hose

	Length (mm)	Remarks
① Oil cooler hose	125	—
② Oil cooler inlet hose	246	—
③ Oil cooler outlet hose	189	—
④ Oil cooler front hose	—	Moulded hose
⑤ Oil cooler front inlet hose		Moulded hose

JAT00087-00000

(1) Completely degrease the hose connecting section. Insert new oil cooler hoses ①, ②, ③, ④ and ⑤ up to the second stage spools of the oil cooler tube and the union at the oil cooler side, while making sure that those hoses may not be twisted. Then, attach the clip, while aligning it with the edge of the marking. However, the oil cooler front hoses (moulded hoses) ④ and ⑤ should be connected in such a way that the marking faces just downward of the vehicle.



JAT00088-00068

3. Operations after installation

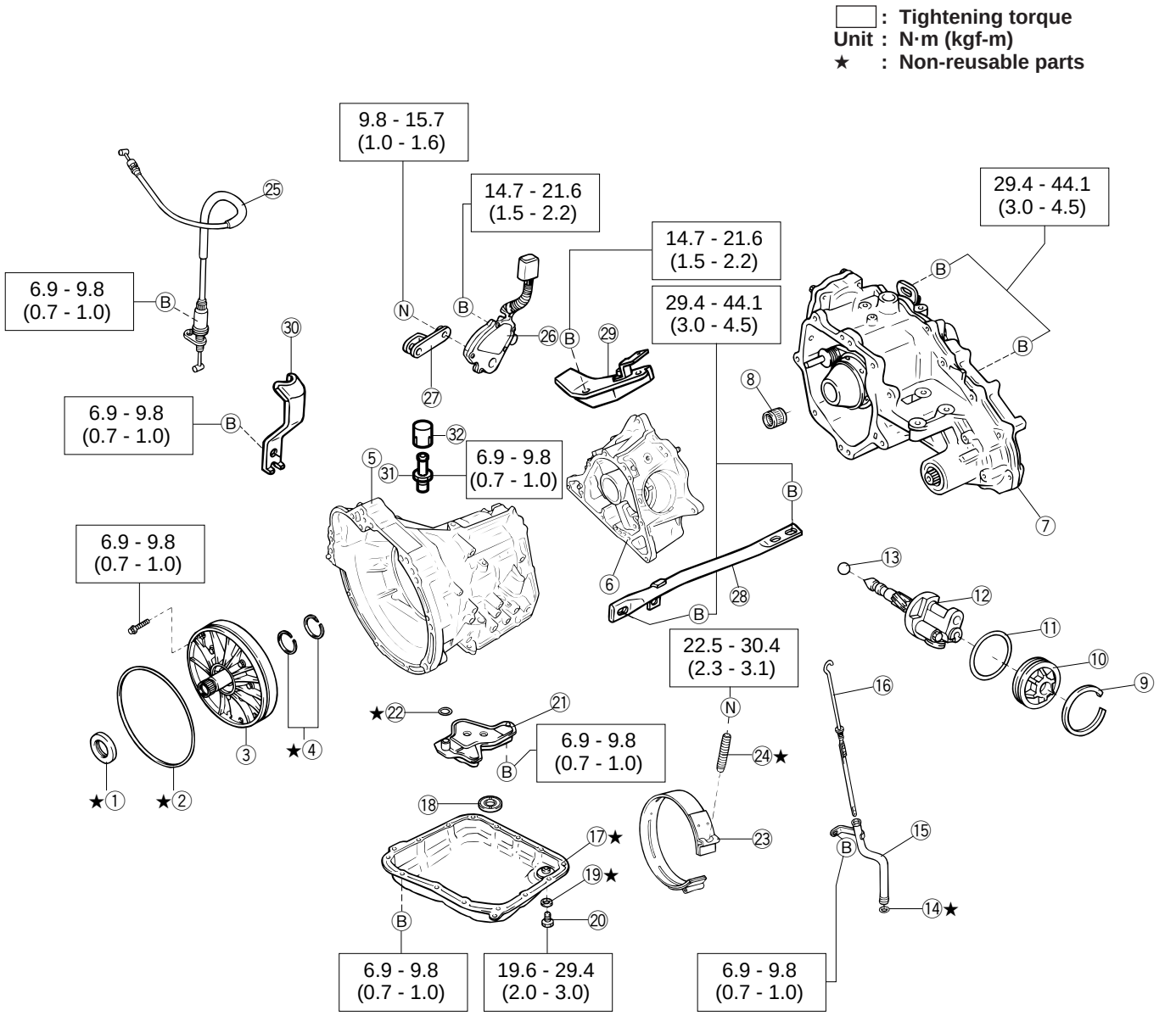
(1) Check the automatic transmission fluid level. Replenish the fluid, as required.

(2)
- Install the center engine undercover. (Except EU specifications)
- Install the center engine undercover, front bumper cover and radiator grill. (EU only)

JAT00089-00000

DISASSEMBLY AND ASSEMBLY OF AUTOMATIC TRANSMISSION

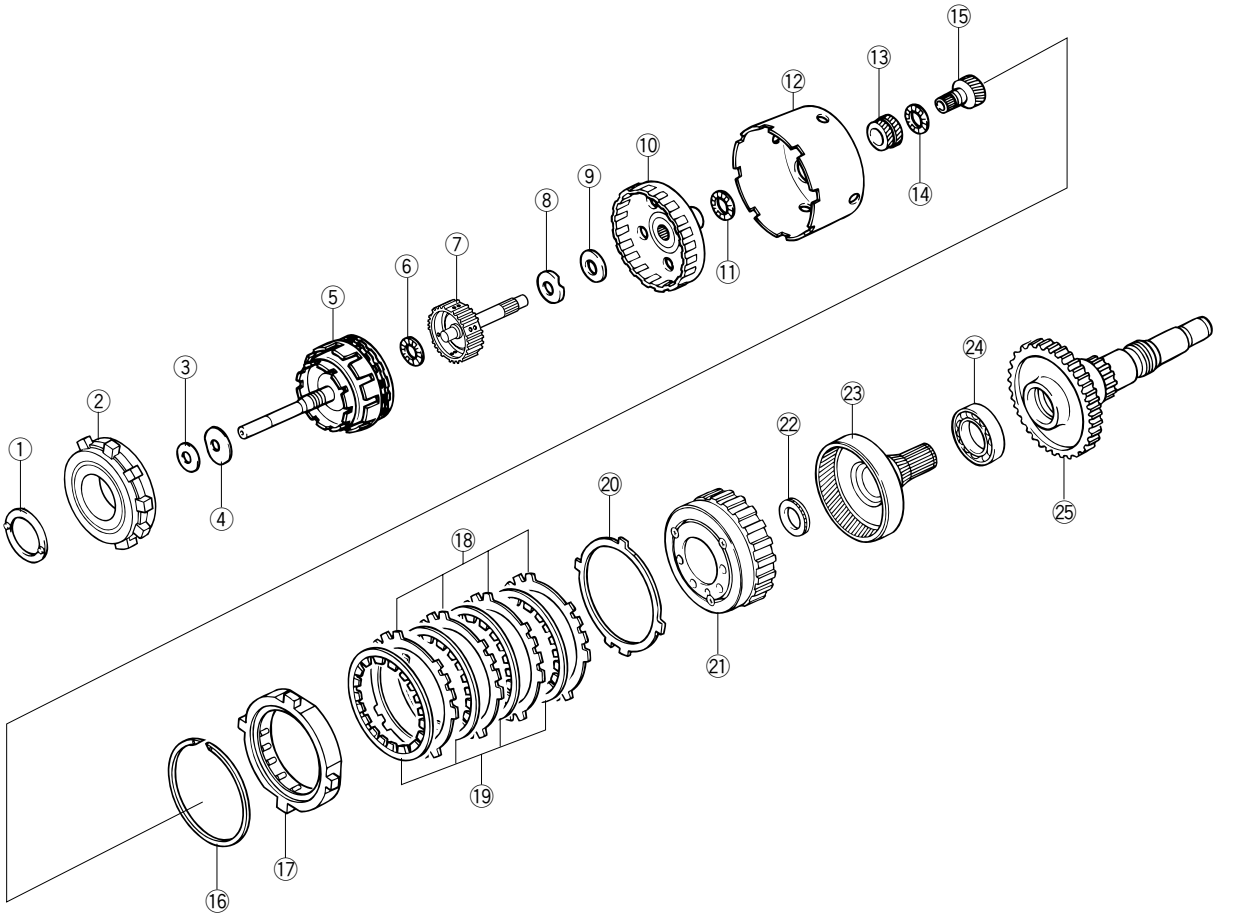
COMPONENTS



① T-type oil seal
② O-ring
③ Stator shaft & oil pump assembly
④ Clutch drum oil seal ring
⑤ Transmission case subassembly
⑥ Transmission case side cover subassembly
⑦ Transfer assembly
⑧ Needle roller bearing
⑨ Hole snap ring
⑩ Governor cover
⑪ O-ring
⑫ Governor body assembly
⑬ Ball
⑭ O-ring
⑮ Transmission oil filler tube subassembly
⑯ Transmission oil level gauge subassembly
⑰ Transmission oil pan assembly
⑱ Transmission magnet
⑲ gasket
⑳ W/head straight screw plug
㉑ Oil strainer subassembly
㉒ O-ring
㉓ Transmission brake band assembly
㉔ Transmission brake band adjusting anchor bolt
㉕ Throttle cable assembly
㉖ Neutral start switch assembly
㉗ Transmission control shaft lever subassembly
㉘ Power train stiffener
㉙ Control cable bracket
㉚ Throttle cable clamp
㉛ Breather plug No. 1
㉜ Breather plug No. 2

JAT00090-00069

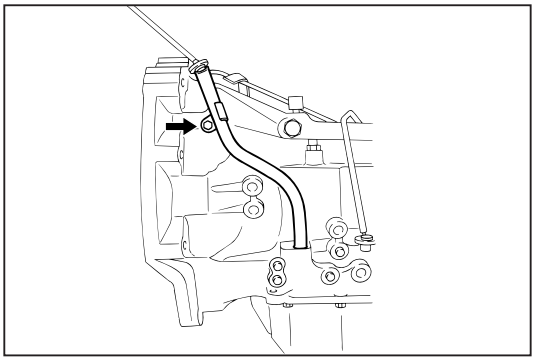
COMPONENTS (INNER PARTS)



① Clutch drum thrust washer
② Direct clutch assembly
③ Thrust needle roller bearing
④ Thrust bearing race
⑤ Forward clutch assembly
⑥ Thrust needle roller bearing
⑦ Intermediate shaft subassembly
⑧ Thrust needle roller bearing
⑨ Thrust bearing race
⑩ Forward clutch hub
⑪ Thrust needle roller bearing
⑫ 2nd brake drum
⑬ Planetary sun gear subassembly
⑭ Thrust needle roller bearing
⑮ Rear planetary sun gear subassembly
⑯ Hole snap ring
⑰ One-way clutch
⑱ Brake plate
⑲ Brake disc
⑳ Brake cushion plate
㉑ Planetary gear assembly
㉒ Thrust needle roller bearing
㉓ Planetary output shaft subassembly
㉔ Radial ball bearing
㉕ Output shaft assembly

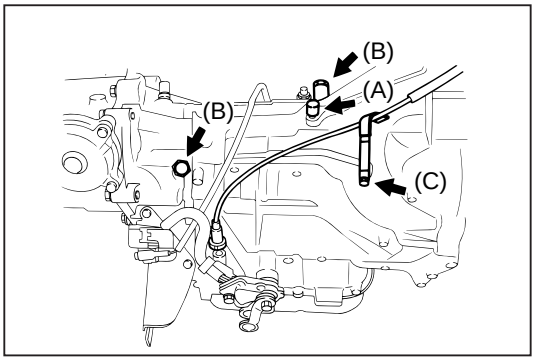
REMOVAL

1. Remove the bolt of the transmission oil filler tube subassembly.
2. Pull out the transmission oil filler tube subassembly toward upside.
3. Remove the O-ring from the transmission oil filler tube subassembly.
   NOTE:
   - Never reuse the removed O-ring.



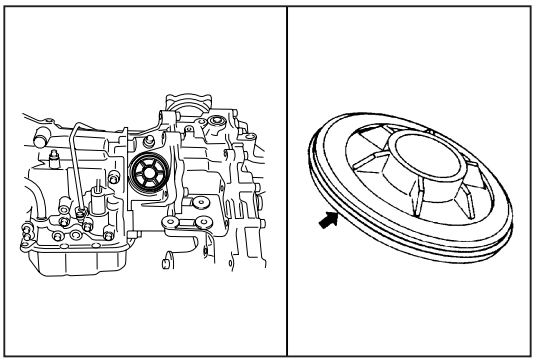
JAT00092-00071

4. Remove the breather plug (A) and union bolts (B) (for oil cooler).
   NOTE:
   - Never reuse the removed gaskets.
5. Remove the clamp (C) for the throttle cable.



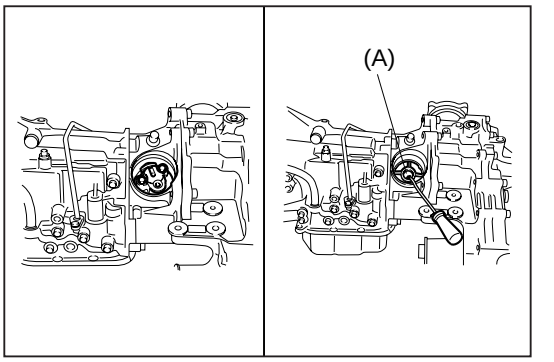
JAT00093-00072

6. Removal of governor valve
   (1) Remove the hole snap ring, using standard snap ring pliers.
   (2) Remove the governor cover with the O-ring installed, using standard pliers.
   (3) Remove the O-ring from the governor cover.
   NOTE:
   - Never reuse the removed O-ring.



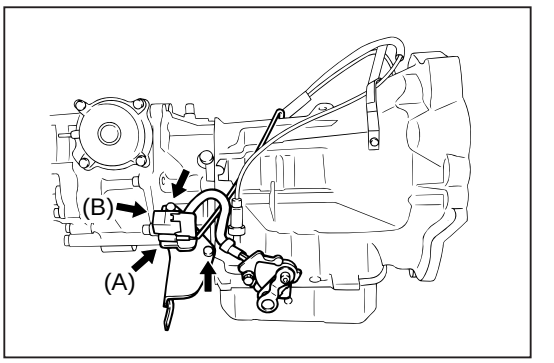
JAT00094-00073

   (4) Remove the governor body assembly from the transmission case.
   (5) Remove the ball (A), using a standard magnet hand.



JAT00095-00074

7. Detach the connector (A) of the solenoid wire assembly from the clamp of the control cable bracket.
8. Removal of neutral start switch assembly
   (1) Remove the control cable bracket by removing the two bolts.
   (2) Detach the connector (B) (of the neutral start switch) from the clamp of the control cable bracket.

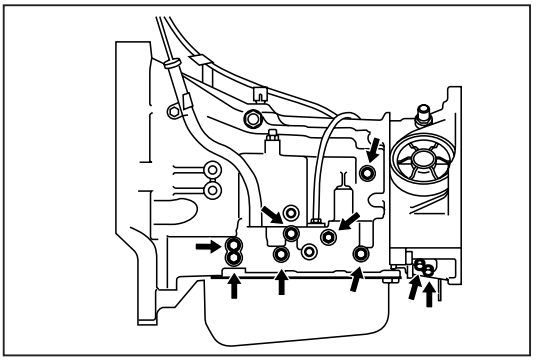


JAT00096-00075

(3) Remove the transmission control shaft lever sub-assembly by removing the nut.
(4) Remove the neutral start switch assembly by removing the bolt.

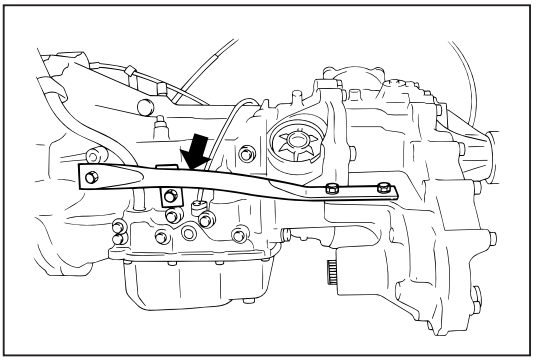
JAT00097-00000

9. Remove the nine inspection plugs from the transmission.
NOTE:
- Never reuse the removed plugs.



JAT00098-00076

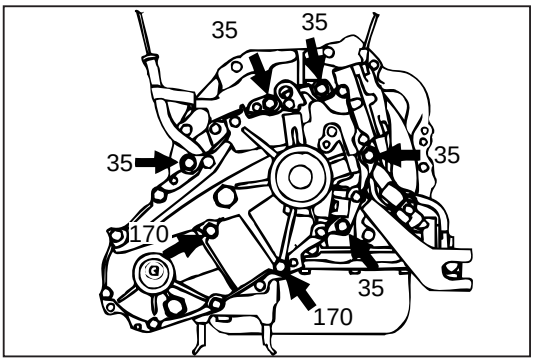
10. Remove the power train stiffener.



JAT00099-00077

11. Removal of transfer assembly
NOTE:
- For the disassembling procedure of the transfer, refer to the TR section.

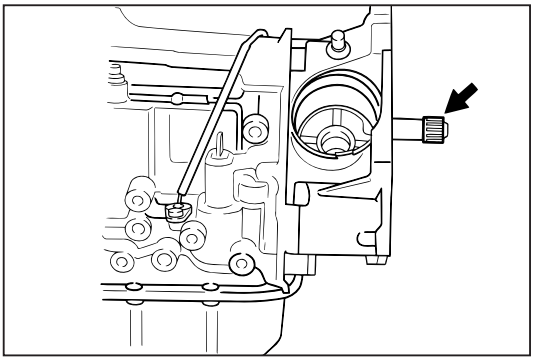
(1) Remove the seven bolts indicated in the right figure.
NOTE:
- The numerals in the right figure denote the nominal length of each bolt. (Unit: mm)



JAT00100-00078

(2) Tap the rib section of the transfer case. Then, pull it out toward you.

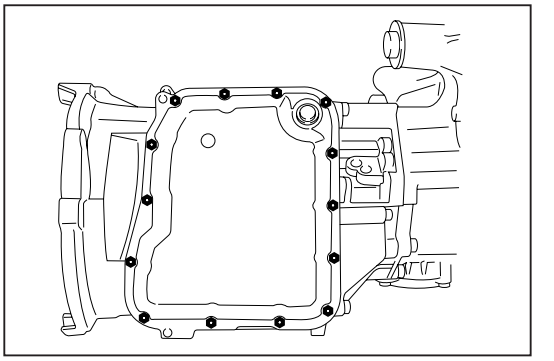
12. Remove the needle roller bearing at the forward end of the output shaft assembly.



JAT00101-00079

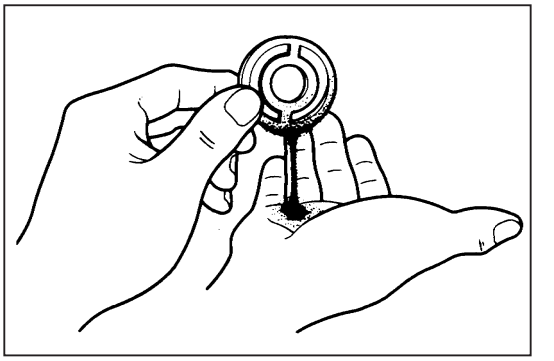
13. Remove the transmission oil pan assembly by removing the fourteen bolts.
    CAUTION:
    - Do not turn over the transmission, for this will contaminate the valve body with foreign materials deposited at the bottom of the oil pan.

    NOTE:
    - Never reuse the removed oil pan assembly.



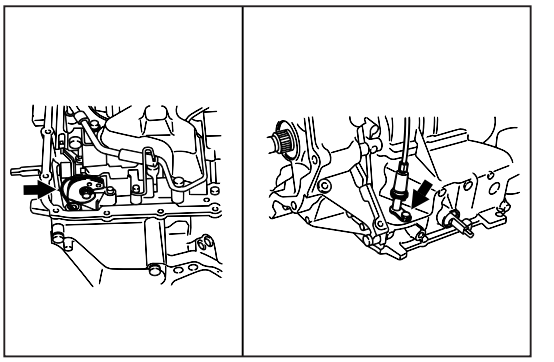
JAT00102-00080

14. Check of pan for particles
    Remove the transmission magnet 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



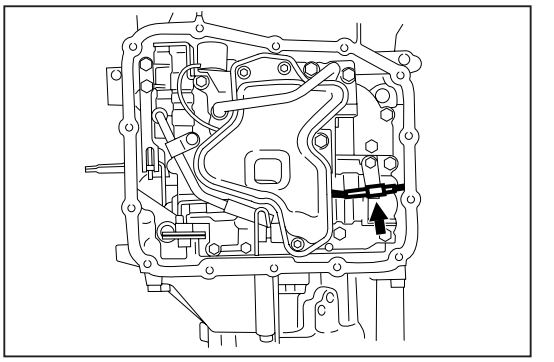
JAT00103-00081

15. Disconnect the throttle cable from the throttle valve cam.
16. Remove the throttle cable attaching bolt.
17. Pull out the throttle cable from the transmission case.
18. Remove the O-ring of the throttle cable.
    NOTE:
    - Never reuse the removed O-ring.



JAT00104-00082

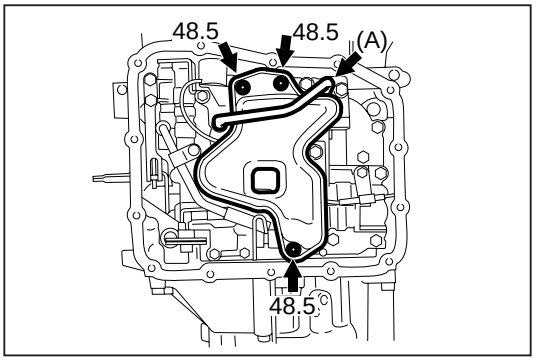
19. Disconnect the connector of the solenoid wire assembly indicated by the arrow mark in the right figure.



JAT00105-00083

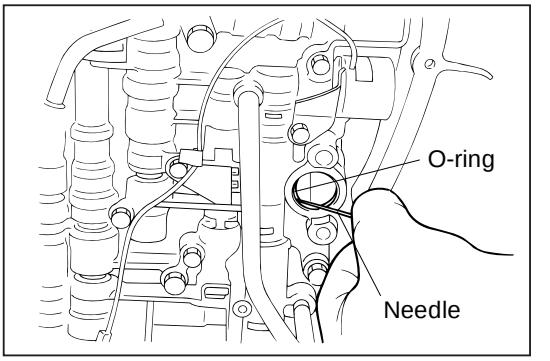
20. Remove the oil strainer subassembly by removing the three bolts.
    NOTE:
    - Be sure to remove the bolts evenly and uniformity.
    - The numerals in the right illustration indicate the nominal length of the bolt.

21. Disconnect the valve body tube (A).



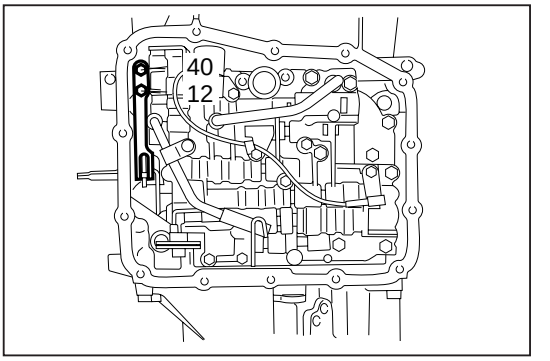
JAT00106-00084

22. Remove the O-ring by sticking a needle into the O-ring for the oil strainer which has been installed at the valve body side.
    NOTE:
    - Be very careful not to scratch the valve body when sticking the needle into the O-ring.
    - Never reuse the removed O-ring.



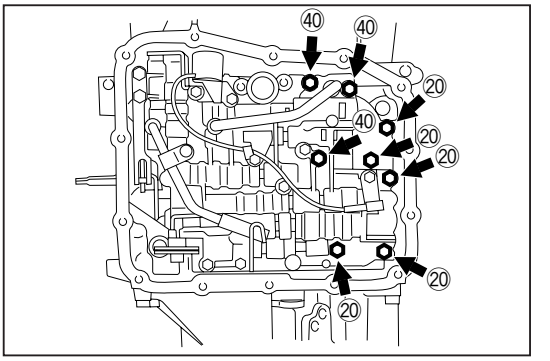
JAT00107-00085

23. Remove the manual detent spring by removing the two bolts.
    NOTE:
    - Be sure to remove the bolts evenly and uniformity.
    - The numerals in the right illustration indicate the nominal length of the bolt.



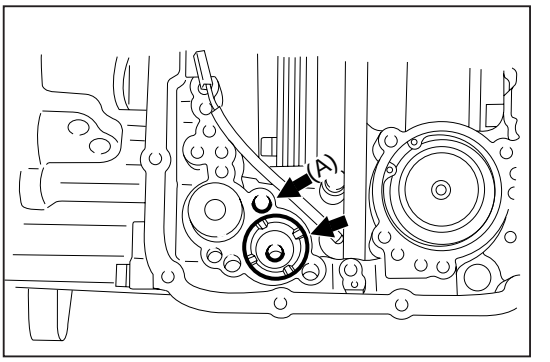
JAT00108-00086

24. Remove the valve body assembly.
    NOTE:
    - Be sure to remove the bolts evenly and diagonally.
    - The numerals in the right illustration indicate the nominal length of the bolt.



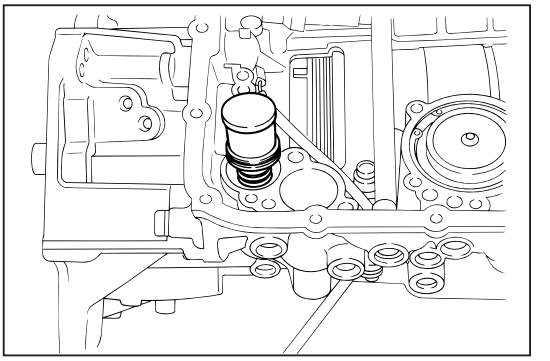
JAT00109-00087

25. Remove the compression spring of the B_1 accumulator piston.
26. Lightly hold the arrow-headed section of the accumulator No. 1 piston.
27. Remove the piston with the accumulator seal No. 1 and No. 2 rings installed by applying compressed air into the oil hole (A).
    NOTE:
    - Be sure to put on protection goggles since oil may splash when using compressed air.

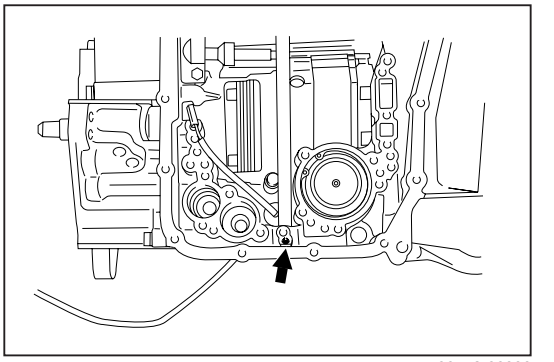


JAT00110-00088

28. Remove the accumulator No. 2 piston with the seal No. 1 ring installed and compression spring.

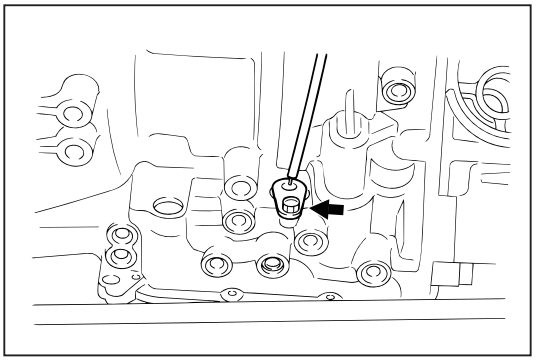

JAT00111-00089

29. Remove the roller for manual valve lever shaft subassembly, using a standard magnet hand.



JAT00112-00090

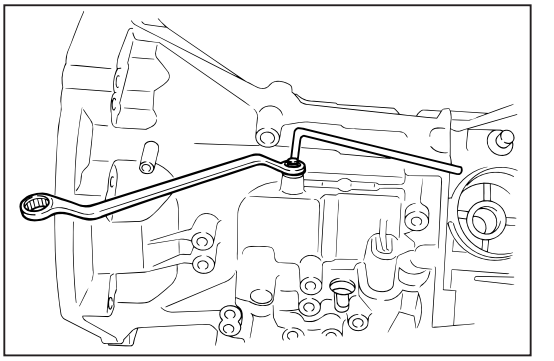
30. Remove the solenoid wire assembly attaching bolt.
31. Pull out the the solenoid wire assembly from the transmission case.



JAT00113-00091

32. Removal of 2nd brake piston assembly
    (1) Remove the lock nut of the transmission brake band adjusting anchor bolt.
    (2) Remove the transmission brake band adjusting anchor bolt, using a standard screwdriver or the like.

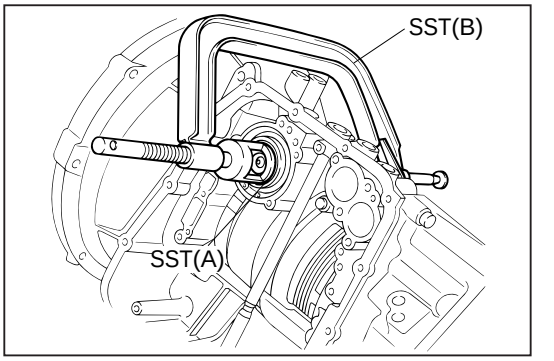
    NOTE:
    - Never reuse the removed anchor bolt.



JAT00114-00092

    (3) Remove the hole snap ring, using snap ring pliers in combination with the following SSTs.

        SST: 09202-87002-000 ..... (A)
             09202-87002-0A0 ..... (B)



JAT00115-00093

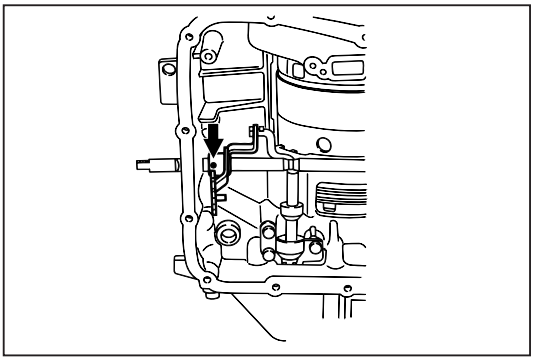
    (4) Gradually loosen the SSTs (A) and (B) above, until the compression spring for the 2nd coast brake piston is released fully. Then, remove the SSTs.

    NOTE:
    - In cases where the 2nd coast brake piston will not come out, slightly loosen the SSTs above. Then, apply a light impact by means of a plastic hammer to remove the 2nd coast brake piston.

    (5) Remove the 2nd brake piston assembly and compression spring.

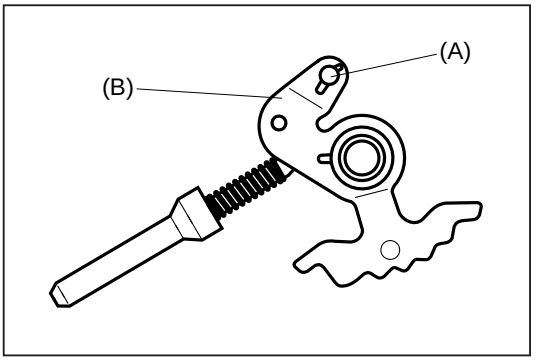
33. Remove the slotted spring pin, using a pin punch and a hammer.
    NOTE:
    - When removing the slotted spring pin, be very careful not to drop it into the transmission case.
    - Never reuse the removed slotted spring pin.

34. Pull out the manual valve lever shaft subassembly.



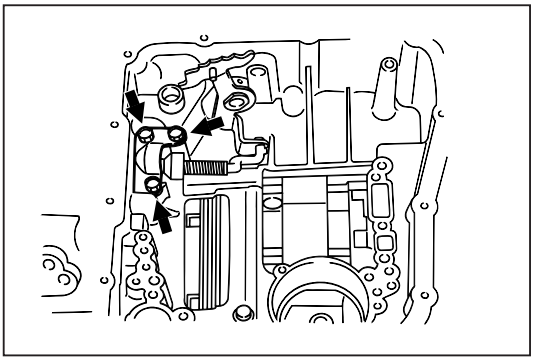
JAT00116-00094

35. Remove the manual valve lever by aligning the cut-out groove of the manual valve lever (B) with the protruding section of the parking lock rod (A).



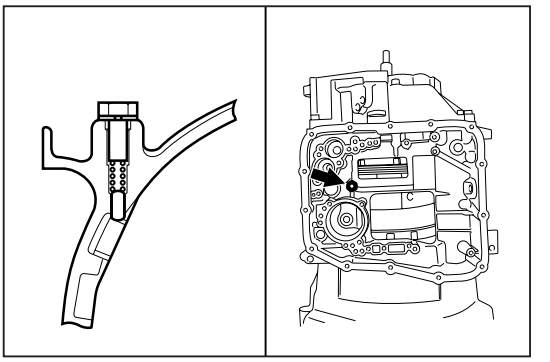
JAT00117-00095

36. Remove the parking lock cam support and parking lock rod subassembly by removing the three bolts.



JAT00118-00096

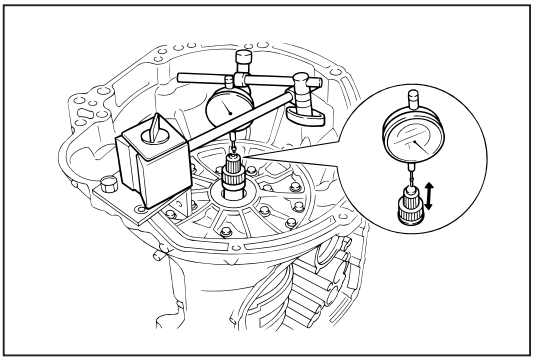
37. Remove the roller for the one-way clutch outer race, and compression spring by removing the bolt.



JAT00119-00097

38. Measure the input shaft end play, using a dial gauge in conjunction with the following SST.
    SST: 09351-87210-000
    Specified Value: 0.28 - 0.92 mm

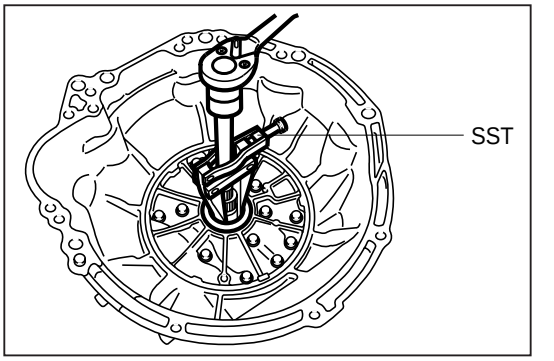
    NOTE:
    - Be sure to record the measured value for a guide during the assembly.



JAT00120-00098

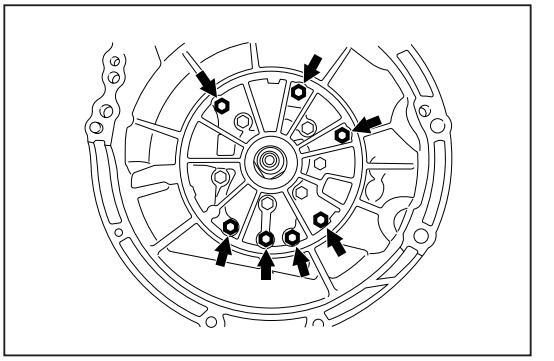
39. Remove the T type oil seal, using the following SST.
    SST: 09308-10010-000

    NOTE:
    - Never reuse the removed oil seal.



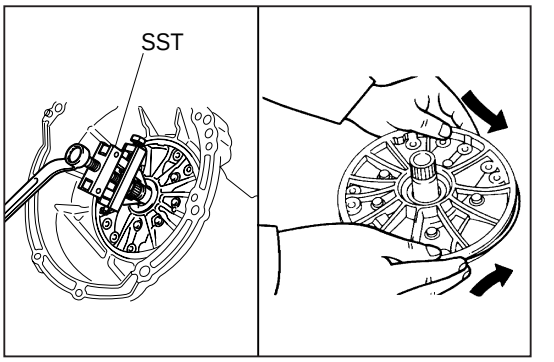
JAT00121-00099

40. Remove the seven bolts of the stator shaft & oil pump assembly.
    NOTE:
    - Be sure to remove the bolts evenly and diagonally.
    - Never loosen any bolt other than the specified ones in the right figure.


JAT00122-00100

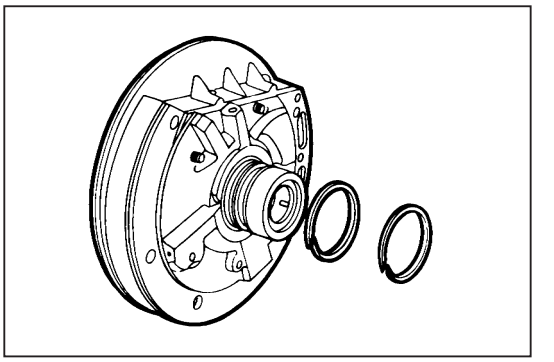
41. Remove the stator shaft & oil pump assembly with the O-ring installed, using the following SST.
    SST: 09820-00021-000

42. Remove the O-ring from the stator shaft & oil pump assembly.
    NOTE:
    - Never reuse the removed O-ring.

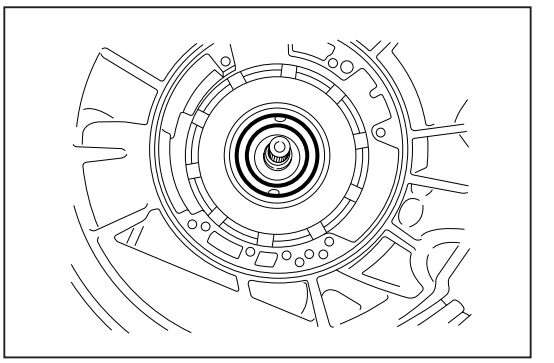


JAT00123-00101

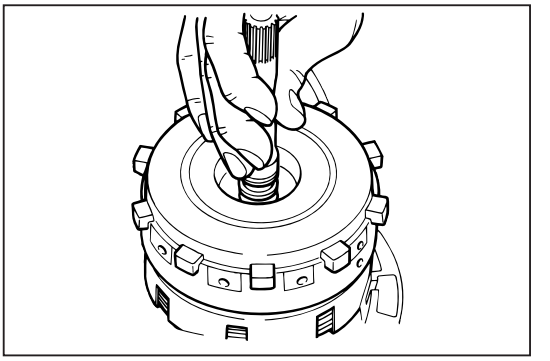
43. Remove the two clutch drum oil seal rings.
    NOTE:
    - Never reuse the removed oil seal rings.


JAT00124-00102

44. Remove the clutch drum thrust washer (resin made) from the direct clutch.
    NOTE:
    - If no thrust washer (resin made) is provided on the direct clutch, make sure that the thrust washer is installed at the stator shaft & oil pump assembly side.

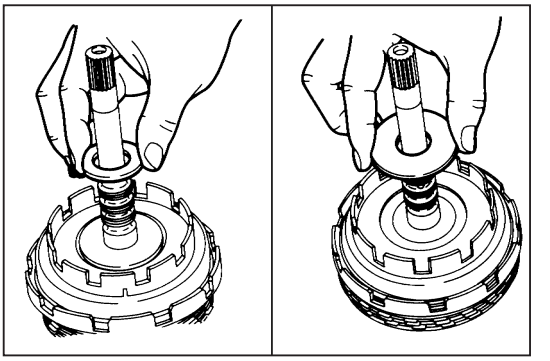

JAT00125-00103

45. Remove the direct clutch together with the forward clutch at the same time.
46. Remove the direct clutch from the forward clutch.



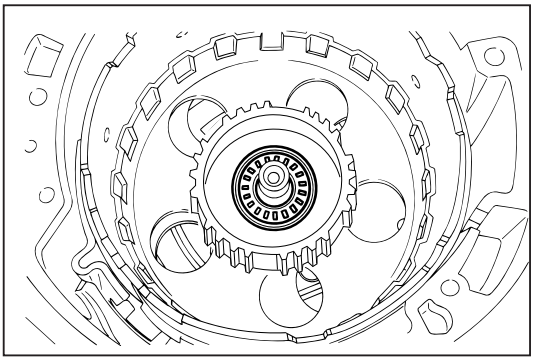
JAT00126-00104

47. Remove the thrust needle roller bearing from the forward clutch.
48. Remove the thrust bearing race from the forward clutch.



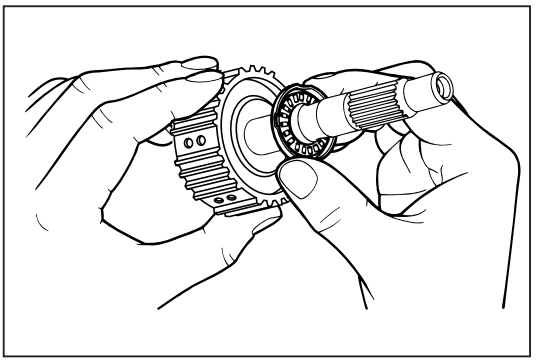
JAT00127-00105

49. Removal of intermediate shaft subassembly
    (1) Remove the thrust needle bearing from the intermediate shaft subassembly.
    (2) Remove the intermediate shaft subassembly.



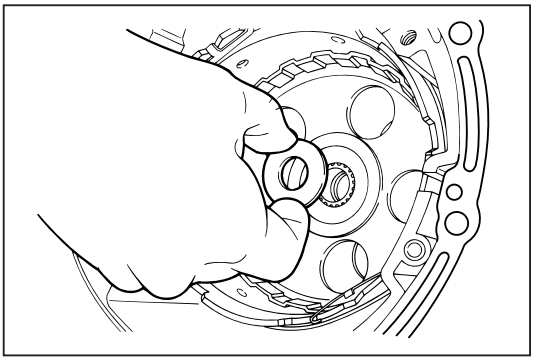
JAT00128-00106

    (3) Remove the thrust needle bearing from the intermediate shaft subassembly.



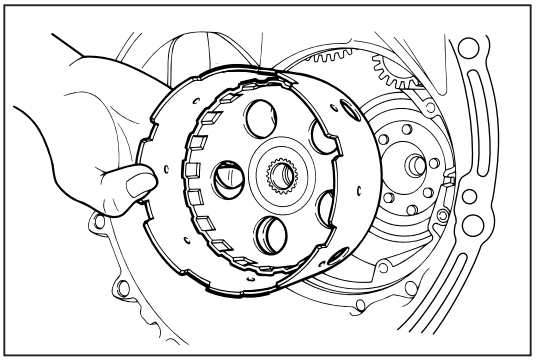
JAT00129-00107

50. Removal of forward clutch hub and 2nd brake drum
    (1) Remove the thrust bearing race from the forward clutch hub.



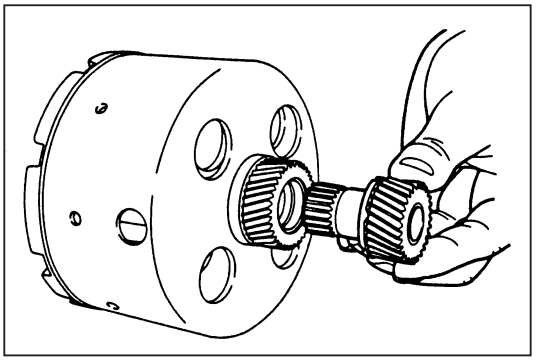
JAT00130-00108

(2) Remove the 2nd brake drum (together with the forward clutch hub).



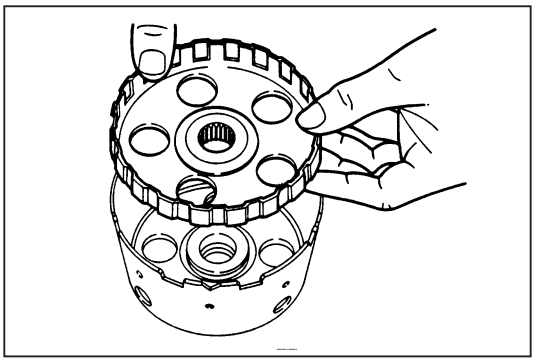
JAT00131-00109

(3) Remove the rear planetary sun gear subassembly from the 2nd brake drum.
(4) Remove the thrust needle bearing from the rear planetary sun gear subassembly.



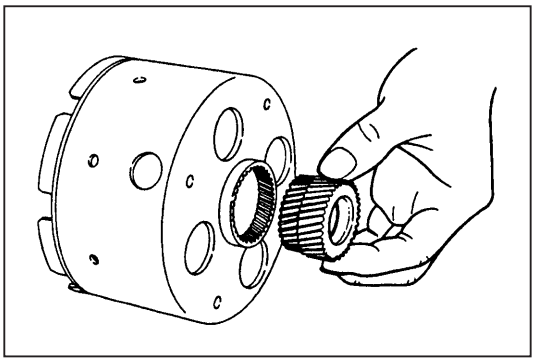
JAT00132-00110

(5) Remove the forward clutch hub from the 2nd brake drum.
(6) Remove the thrust needle bearing from the 2nd brake drum.



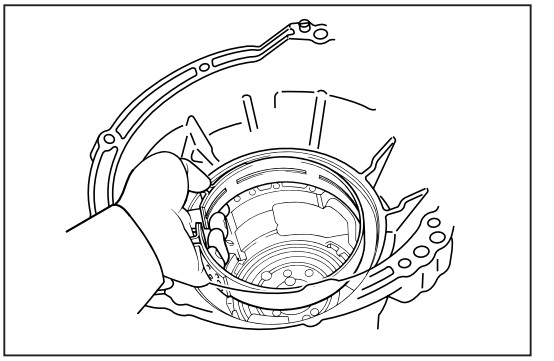
JAT00133-00111

(7) Remove the planetary sun gear assembly from the 2nd brake drum.



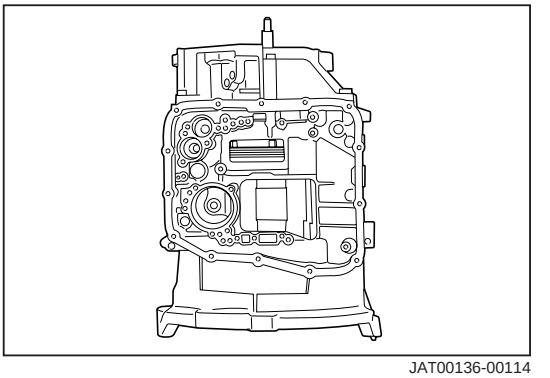
JAT00134-00112

51. Remove the transmission brake band assembly.



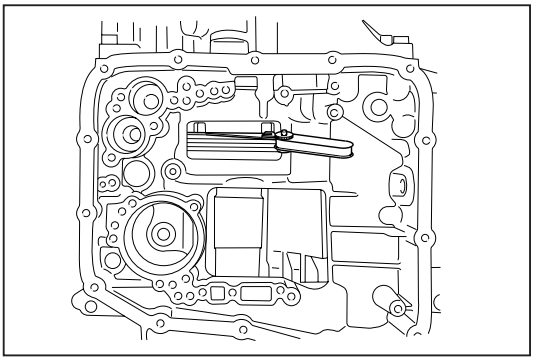
JAT00135-00113

52. Measurement of 1st & reverse brake end play
    (1) Turn over the transmission case.



JAT00136-00114

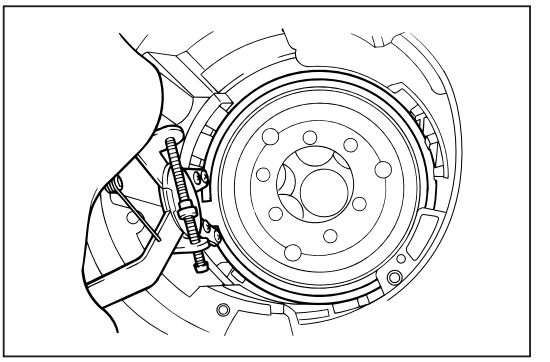
    (2) Measure the 1st & reverse brake end play, using a standard feeler gauge.
        Specified Value: 1.04 - 1.41 mm



JAT00137-00115

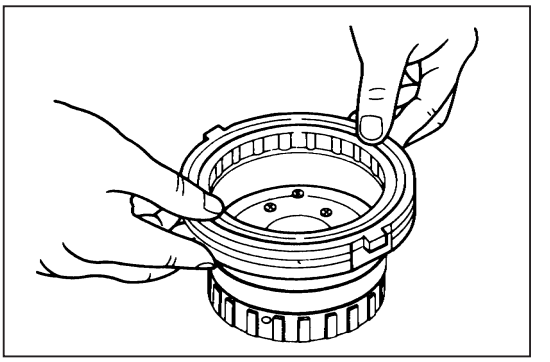
    NOTE:
    - Be sure to record the measured value for a guide during the assembly.
    - The tightness which you encounter during this insertion/withdrawal of the feeler gauge should be virtually the same as the tightness which you would encounter during the thickness adjustment of the valve rocker arm.

53. Removal of planetary gear and one-way clutch
    (1) Remove the hole snap ring, using snap ring pliers.
    (2) Remove the planetary gear assembly with the one-way clutch installed.



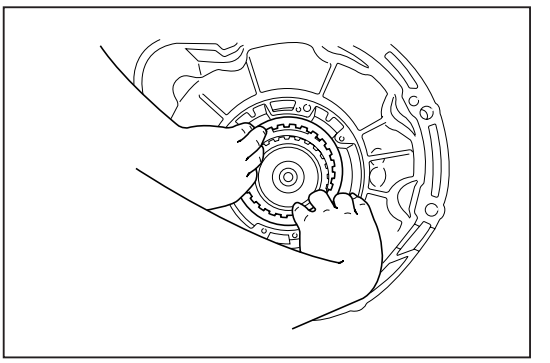
JAT00138-00116

    (3) Remove the one-way clutch from the planetary gear assembly.



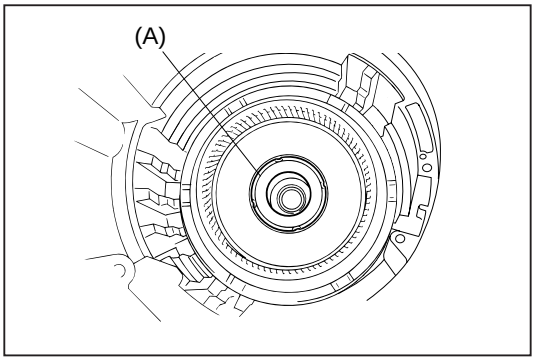
JAT00139-00117

54. Removal of 1st & reverse brake
    (1) Move the brake discs, brake plates and brake cushion plate as a set in such a way that they face toward the front side.
    (2) Remove the discs, plates and cushion plate in the following order.
        D = Brake disc, P = Brake plate
        B = Brake cushion plate
        D → P → D → P → D → P → D → P → B



JAT00140-00118

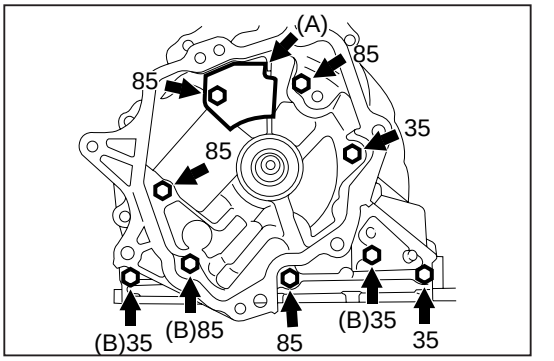
(3) Remove the thrust needle roller bearing (A) from the planetary output shaft subassembly.



JAT00141-00119

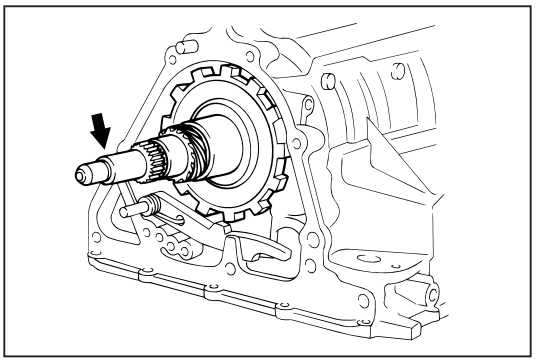
55. Removal of transmission case side cover
(1) Remove the nine bolts and oil guide plate (A).
NOTE:
- The numerals in the right figure denote the nominal length of each bolt.
- Never reuse the removed three bolts (B).

(2) Remove the transmission case side cover, using a plastic hammer.
NOTE:
- Lightly apply an impact to the right and left sides of the transmission case side cover, using a plastic hammer, when removing the cover.
- Be very careful not to scratch the oil seal lip by the spline of the output shaft when removing the transmission case side cover.



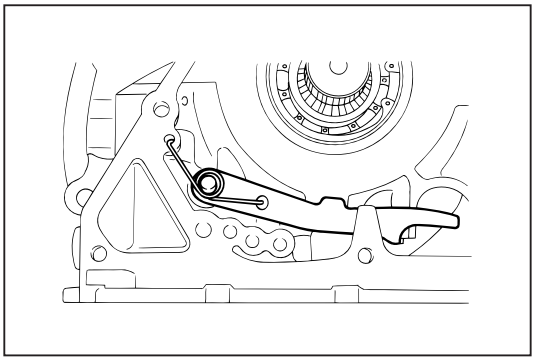
JAT00142-00120

56. Remove the output shaft assembly.



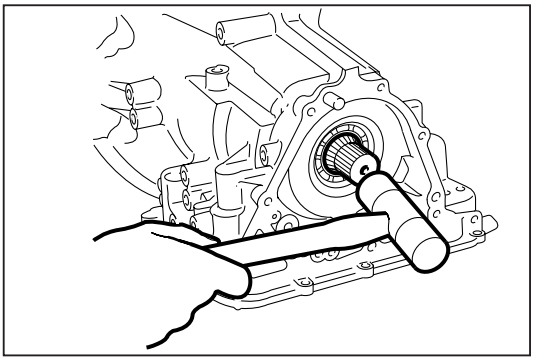
JAT00143-00121

57. Remove the torsion spring.
58. Remove the parking lock pawl.
59. Remove the parking lock pawl shaft.



JAT00144-00122

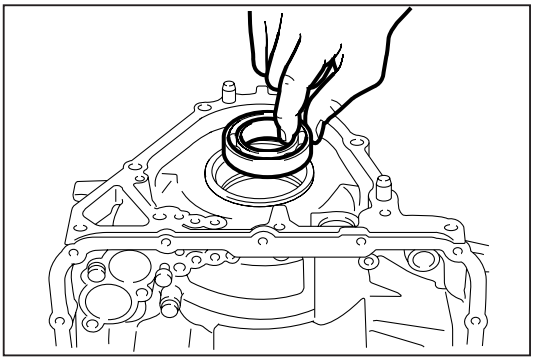
60. Removal of planetary output shaft subassembly
    (1) Tap the planetary output shaft subassembly lightly, using a plastic hammer, until the planetary output shaft subassembly becomes free.
    (2) Remove the planetary output shaft subassembly from the transmission case side.



JAT00145-00123

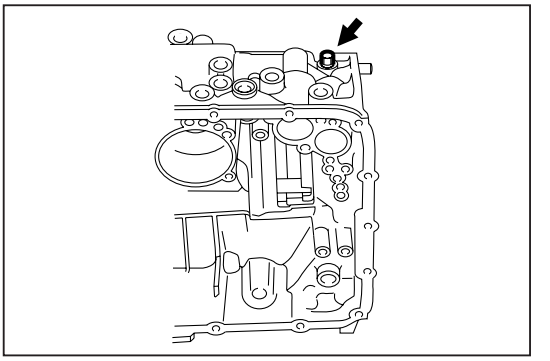
    (3) Remove the hole snap ring, using snap ring pliers.
    (4) Remove the radial ball bearing.

    NOTE:
    - If any difficulty is encountered in removing the radial ball bearing, remove it by applying a light impact from the inside of the transmission case, using a suitable brass bar in combination with a plastic hammer.



JAT00146-00124

61. Disassembling of first & reverse brake piston
    (1) Temporarily install the removed B2 inspection plug to the transmission case.

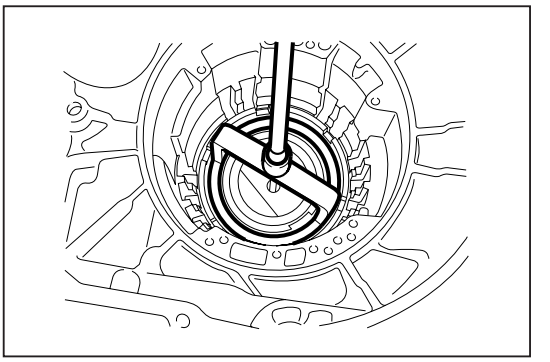


JAT00147-00125

    (2) Assemble the following SSTs and set them to the transmission case to remove the first & reverse brake return spring.

        SSTs: 09351-87201-000
              09351-87707-000
              09351-87709-000
              09351-87710-000

    NOTE:
    - To prevent the first & reverse brake return spring seat from being deformed, be sure to stop pressing when the first & reverse brake return spring seat has been lowered 1 to 2 mm from the shaft snap ring installation position.

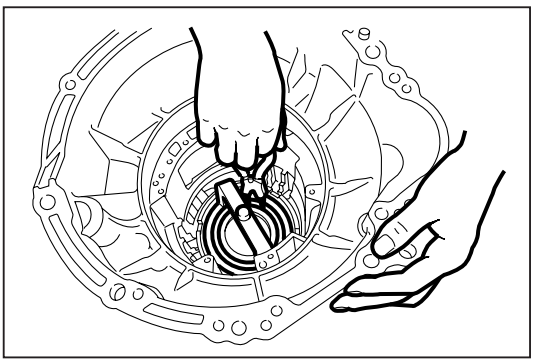


JAT00148-00126

    (3) Remove the shaft snap ring, using snap ring pliers.

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

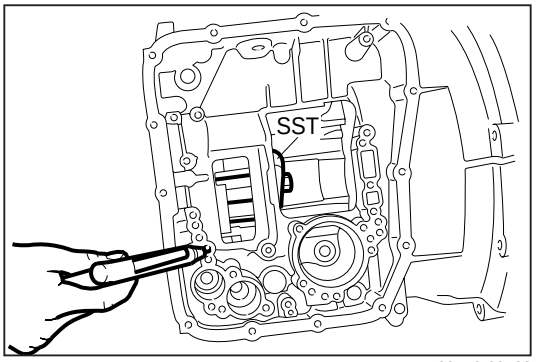
    (4) Remove the first & reverse brake return spring.



JAT00149-00127

(5) Hold the first & reverse brake piston, using the following SSTs (to prevent the piston from being tilted when removing the piston).

SSTs: 09351-87201-000
09351-87707-000
09351-87709-000
09351-87710-000



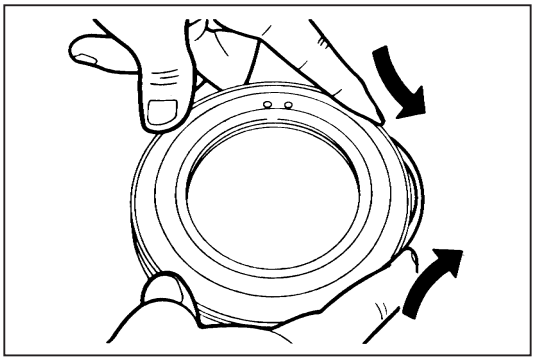
JAT00150-00128

(6) While applying compressed air of 392 - 784 kPa (4 - 8 kgf/cm^2) from the oil hole indicated in the right figure, gradually loosen the bolt of the SST and remove the first & reverse brake piston.

(7) Remove the outer O-ring of the first & reverse brake piston.

NOTE:

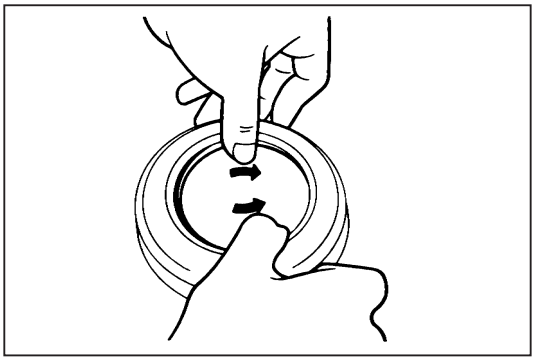
- Never reuse the removed O-ring.


JAT00151-00129

(8) Remove the inner O-ring of the first & reverse brake piston.

NOTE:

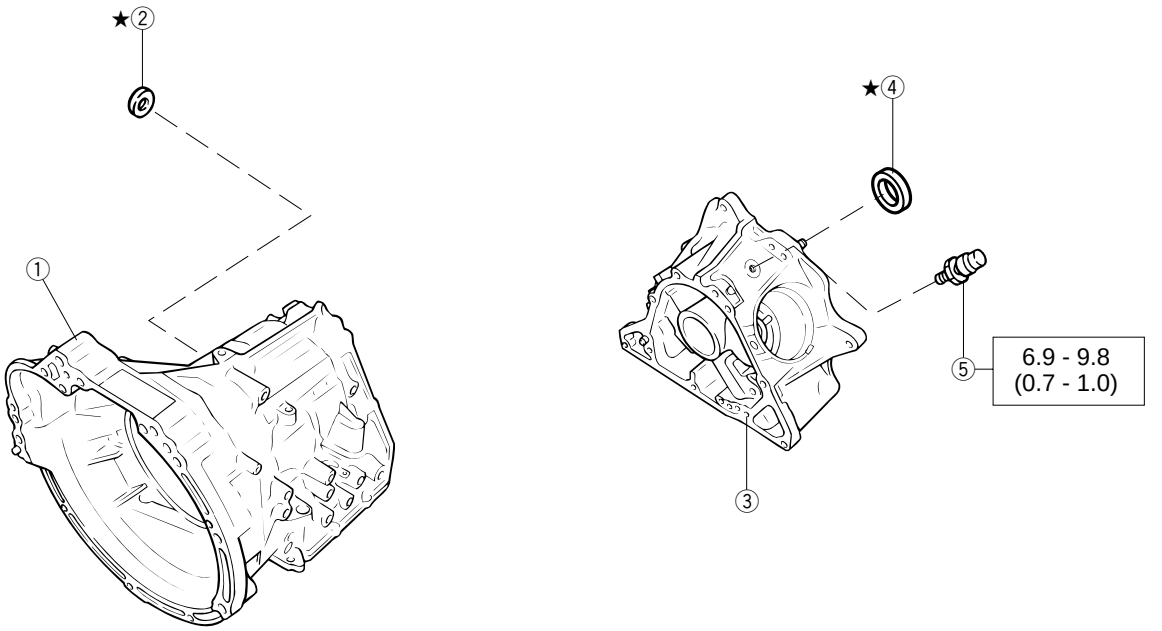
- Never reuse the removed O-ring.


JAT00152-00130

DISASSEMBLY AND ASSEMBLY OF COMPONENTS

COMPONENTS

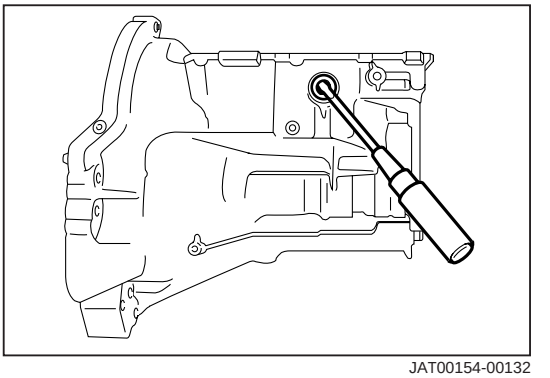
□ : Tightening torque
Unit : N·m (kgf-m)
★ : Non-reusable parts



① Transmission case
② T type oil seal
③ Transmission case side cover subassembly
④ D type oil seal
⑤ Breather plug

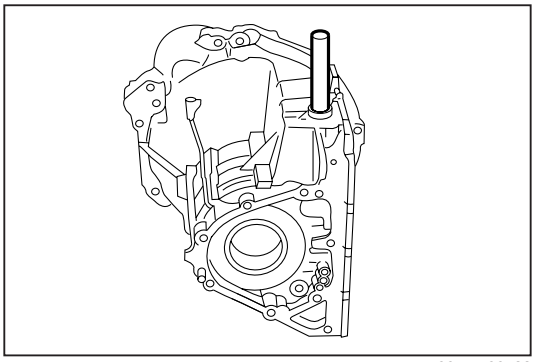
JAT00153-00131

1. Disassembly and assembly of transmission case
   (1) Remove the type T oil seal, using a standard screwdriver.
   NOTE:
   - Never reuse the removed oil seal.



JAT00154-00132

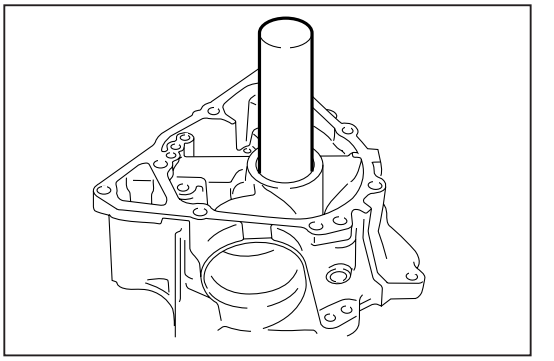
(2) Assemble a new type T oil seal, using the following SST.
SST: 09301-87702-000



JAT00155-00133

2. Disassembly and assembly of transmission case side cover subassembly
(1) Remove the type D oil seal, using the following SST.
SST: 09309-87502-000

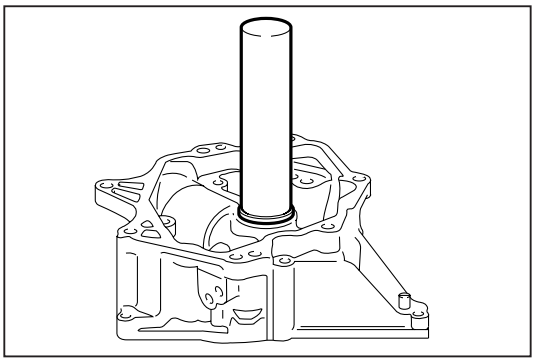
NOTE:
- Never reuse the removed oil seal.



JAT00156-00134

(2) Assemble a new type D oil seal, using the following SST.
SST: 09309-87203-000

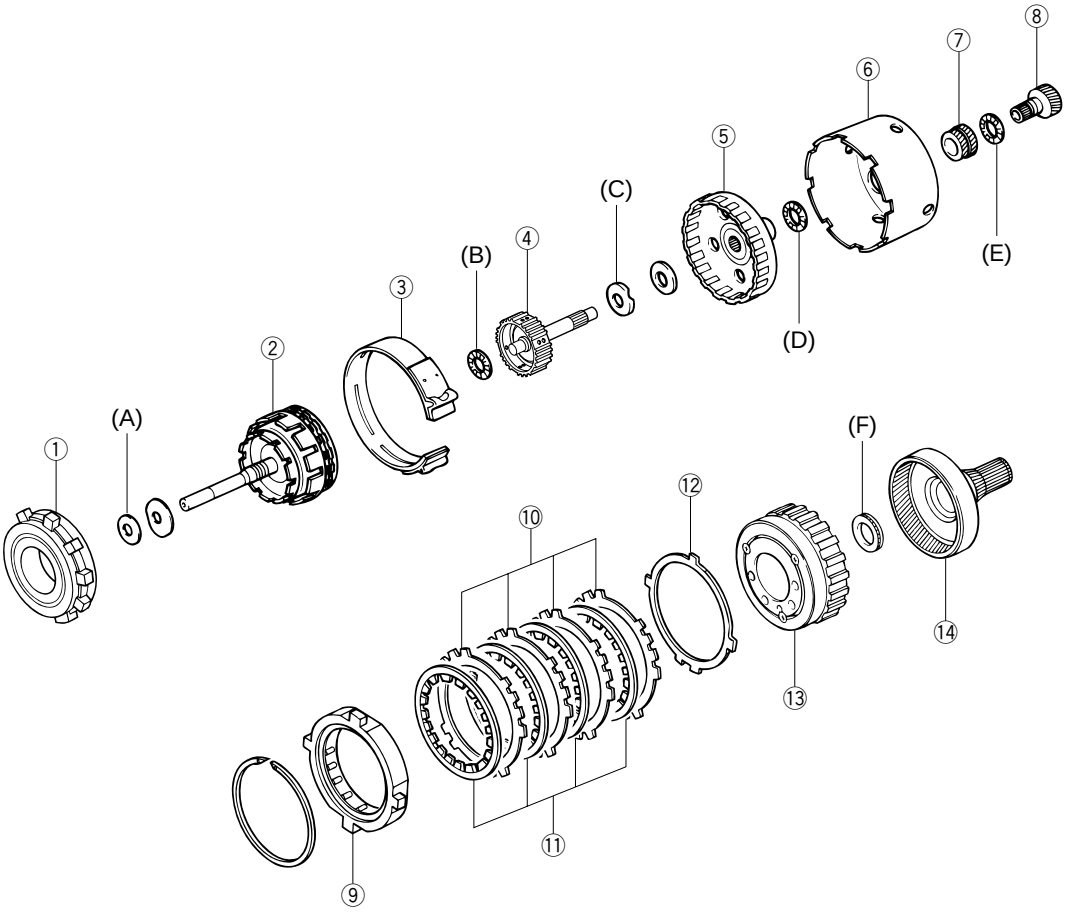
(3) Tighten the breather plug to the specified torque.
Tightening Torque: 6.9 - 9.8 N·m (0.7 - 1.0 kgf-m)



JAT00157-00135

INSPECTION

COMPONENTS



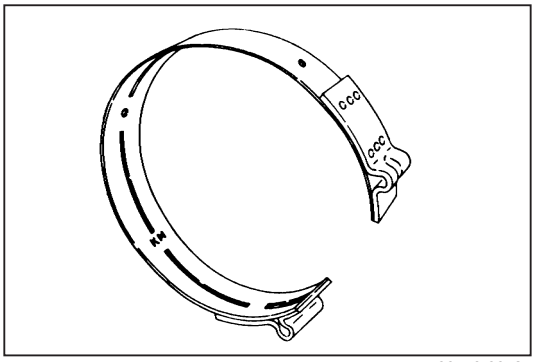
① Direct clutch assembly
② Forward clutch assembly
③ Brake band assembly
④ Intermediate shaft subassembly
⑤ Forward clutch hub
⑥ 2nd brake drum
⑦ Planetary sun gear subassembly
⑧ Rear planetary sun gear subassembly
⑨ One-way clutch
⑩ Brake plate
⑪ Brake disc
⑫ Brake cushion plate
⑬ Planetary gear assembly
⑭ Planetary output shaft subassembly
(A) - (F) Thrust needle roller bearing
Visually inspect each part for wear and damage.

1. Brake band assembly

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

NOTE:

- When the brake band assembly is replaced, be sure to check the band contacting surface at the 2nd brake drum side.
- If the contacting surface is damaged or discolored, be sure to replace the 2nd brake drum together with the band.
- Before assembling a new brake band, soak it in the ATF for at least two hours.



JAT00159-00137

2. Direct clutch assembly

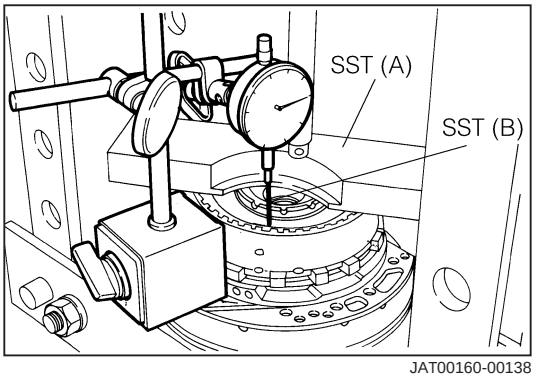
Check of piston stroke of direct clutch

(1) Install the clutch drum thrust washer (resin made) to the oil pump.

(2) Install the direct clutch on the oil pump.

NOTE:

- Be very careful not to scratch the clutch drum oil seal ring of the oil pump.

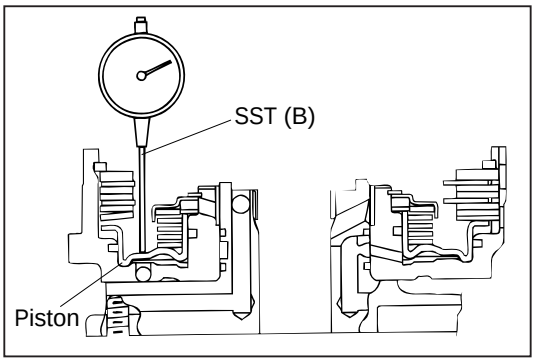


JAT00160-00138

(3) Secure the direct clutch, using the following SST in combination with a press, to such an extent that the direct clutch will not move in an up-&-down direction.

(4) Install the following SSTs to the dial gauge.

SST: 09351-87203-000 ... (B)
09527-87301-000 ... (A)



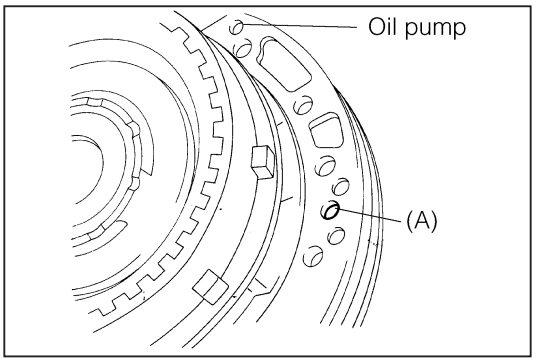
JAT00161-00139

NOTE:

- Make sure that the SST (09351-87203-000) installed to the dial gauge is in contact at right angles with the direct clutch outer piston. Make sure that the SST is not in contact with any part other than the piston.)

(5) Measure the direct clutch piston stroke while applying and releasing compressed air 392 - 784 kPa (4 - 8 kgf/cm^2) through the section (A) as shown in the right figure.

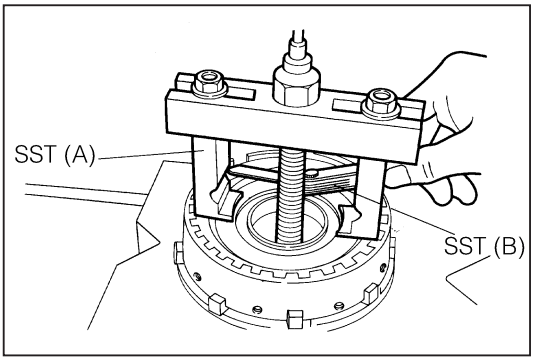
SST: 09527-87301-000, 09351-87203-000
Piston Stroke: 1.22 - 1.53 mm



JAT00162-00140

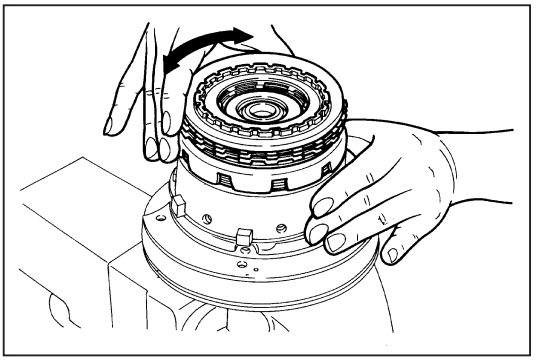
- If the piston stroke is greater than the maximum, replace the direct clutch with a new one.
- Perform the measurement at several points.
- Before assembling a new direct clutch, soak it in the ATF for at least two hours.

(6) While pressing the direct clutch flange with a force of 9.8 - 29.4 N (1.0 - 3.0 kgf), using the following SST (A) in combination with a suitable pushable gauge, measure the end play between the direct clutch flange and the snap ring, using a flat thickness gauge (B).
Specified Value: 0.93 $^{+0.15mm}_{-0.16mm}$
SST: 09306-87302-000 ... (A)



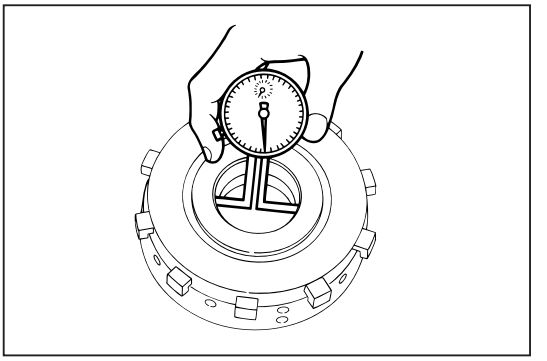
JAT00163-00141

(7) Confirmation of turning effort of clutch disc
Insert the input shaft (forward clutch) and rotate it. At this time, ensure that the clutch disc rotates lightly.


JAT00164-00142

(8) Measure the bush inner diameter of the direct clutch piston subassembly, using an inner caliper gauge.
Specified Value: 44.000 - 44.025 mm
Allowable Limit: 44.075 mm

NOTE:
- Ensure that the measurement should be performed at several points.
- If the measured value exceeds the allowable limit, replace the direct clutch drum subassembly with a new one.
- If the measured value exceeds the allowable limit of the bush inner diameter, check the bush contacting surface of the stator shaft of the oil pump assembly. If the contacting surface is scratched or discolored, replace the stator shaft & oil pump assembly with a new one, too.


JAT00165-00143

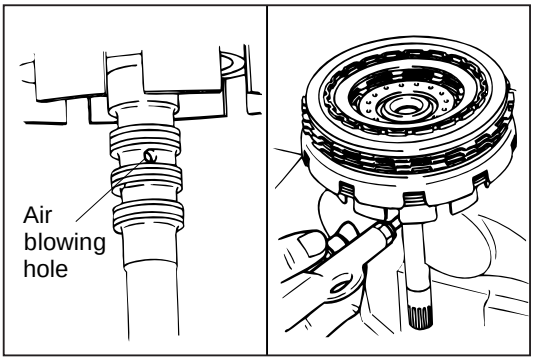
3. Forward clutch assembly

- Operation check of forward clutch piston

(1) Secure the input shaft on a vice with aluminum sheets interposed.

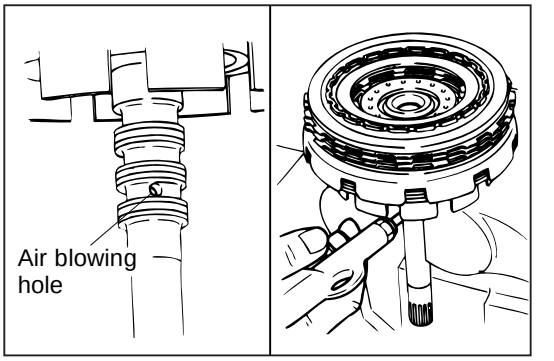
NOTE:
- Be very careful not to score the bush contacting surface of the input shaft.

(2) Blow compressed air of 392 - 784 kPa (4 - 8 kgf/cm^2) into the fluid hole of the input shaft indicated in the right figure. At this time, check that the piston slides smoothly.



JAT00166-00144

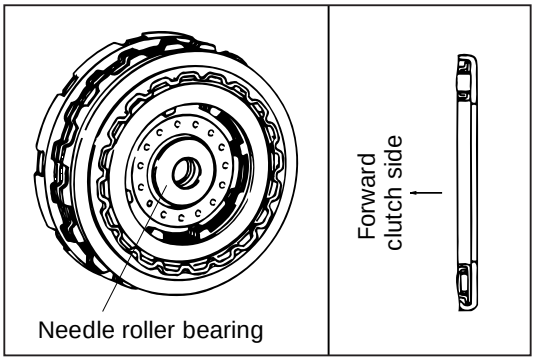
- Operation check of rear clutch piston
  (1) Blow compressed air of 392 - 784 kPa (4 - 8 kgf/cm^2) into the fluid hole of the input shaft indicated in the right figure. At this time, check that the piston slides smoothly.



JAT00167-00145

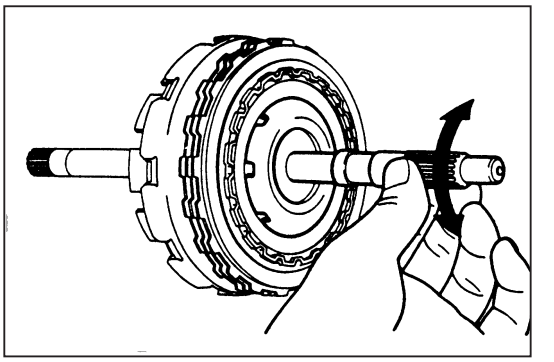
- Confirmation of rotating weight of clutch disc
  (1) Install the thrust needle bearing to the forward clutch.

REFERENCE:
Dimensions of thrust needle roller bearing:
Outer diameter: 32 mm
Inner diameter: 16.5 mm
Thickness: 4.1 mm



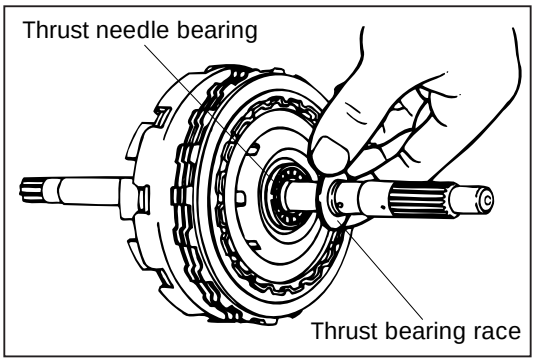
JAT00168-00146

(2) Assemble the intermediate shaft subassembly and rotate it. Ensure that the clutch No. 3 disc rotates lightly.


JAT00169-00147

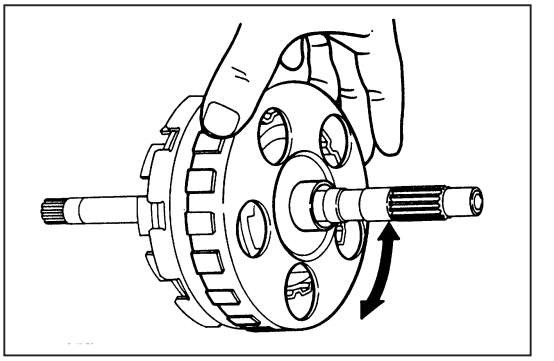
(3) Assemble the thrust needle bearing and thrust bearing race to the intermediate shaft subassembly.

REFERENCE:
Dimensions of thrust needle bearing:
Outer diameter: 32 mm
Inner diameter: 16.5 mm
Thickness: 4.1 mm



JAT00170-00148

(4) Assemble the forward clutch hub and rotate it. Ensure that the clutch No. 2 disc rotates lightly.

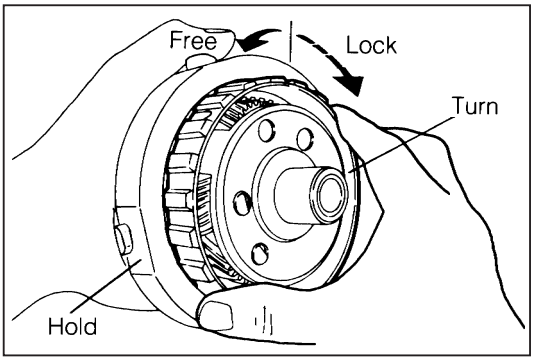

JAT00171-00149

4. One-way clutch

Hold the one-way clutch and turn the planetary gear assembly.

NOTE:

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



JAT00172-00150

5. Thrust bearing specifications

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

NOTE:

- Since the following six bearings have been staked at the race side, these bearings can not be removed from the race.

Approx

Unit: mm

	A	B	C	D	E	F
Outer diameter	35.7	32	32	46.5	35.7	46.5
Inner diameter	22.7	16.5	16.5	25.0	22.7	25.0
Thickness	2.8	4.1	4.1	5.0	2.8	5.0

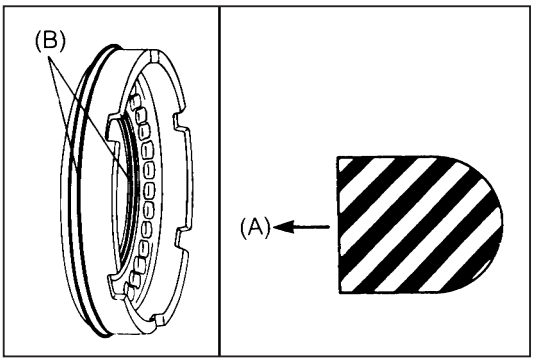
JAT00173-00000

ASSEMBLY

1. Assembly of 1st & reverse brake piston
   (1) Coat new O-rings with ATF.
   (2) Install the new O-rings (B) to the first & reverse brake piston

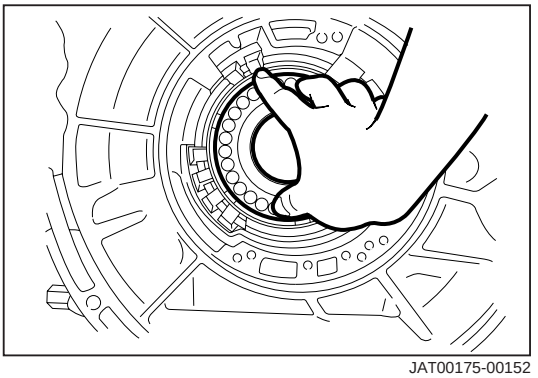
   NOTE:

   - Be sure to install the (A) section of the new O-rings faces toward the first & reverse brake piston side, for the O-ring has a D-type shape.



JAT00174-00151

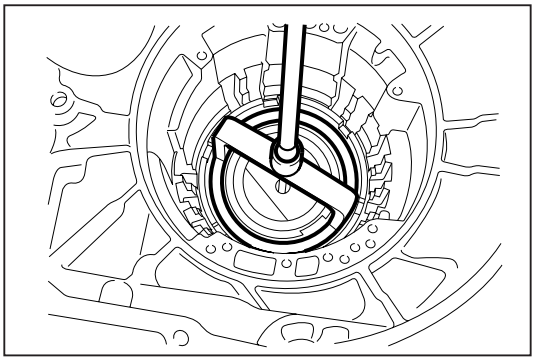
   (3) Apply ATF to the outer periphery of the first & reverse brake piston.
   (4) Apply ATF to the inserted section of the first & reverse brake piston of the transmission case.
   (5) Insert the first & reverse brake piston into the transmission case.



JAT00175-00152

(6) Install the first & reverse brake piston, using the following SSTs.

SSTs: 09351-87201-000
09351-87707-000
09351-87709-000
09351-87710-000



JAT00176 -00153

NOTE:

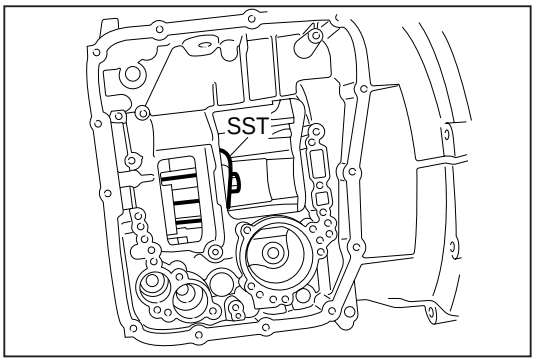
- When installing the first & reverse brake piston, care must be exercised to ensure that the O-ring may not be deviated from the specified position and may not be scratched.

(7) Remove the aforesaid SST from the transmission case.
(8) Place the first & reverse brake return spring.

JAT00177-00000

(9) Compress the first & reverse brake return spring (seat section), using the following SSTs.

SSTs: 09351-87201-000
09351-87707-000
09351-87709-000
09351-87710-000



JAT00178-00154

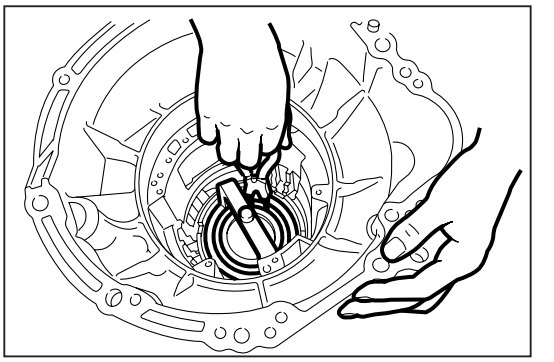
NOTE:

- To prevent deformation, be sure to stop tightening the SST when the first & reverse brake return spring has been lowered 1 to 2 mm from the snap ring installation groove.

(10) Install the shaft snap ring, using snap ring pliers.

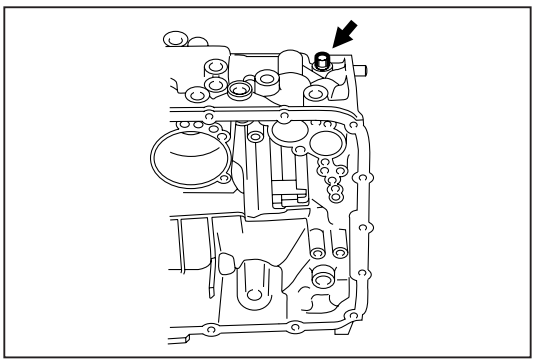
NOTE:

- Do not expand the ring excessively.
- Make sure that the end gap of the shaft snap ring is not aligned with the stopper section of the spring retainer claw.



JAT00179-00155

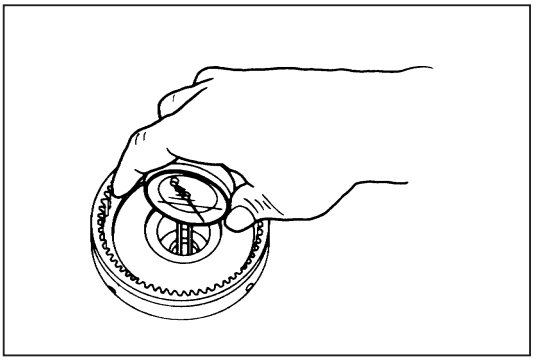
(11) Remove the B2 inspection plug.



JAT00180-00156

2. Measure the inner diameter of the planetary output shaft subassembly, using an inner caliper gauge.
   Specified Value: 12.000 - 12.018 mm
   Allowable Limit: 12.068 mm

   NOTE:
   - Perform the measurement at several points. Calculate the mean value.
   - If the measured value exceeds the allowable limit, replace the planetary output shaft subassembly with a new one. Moreover, when replacing the planetary output shaft subassembly, be sure to check the bush contacting surface of the intermediate shaft for scratch or discoloration. If the contacting surface is scratched or discolored, replace the intermediate shaft with a new part.



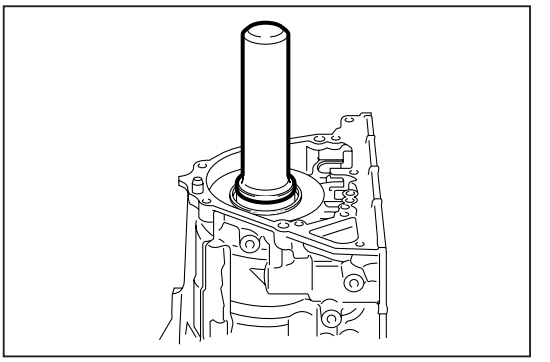
JAT00181-00157

3. Assembly of planetary output shaft subassembly
   (1) Install the radial ball bearing to the transmission case, using the following SST.
      SST: 09310-87301-0000

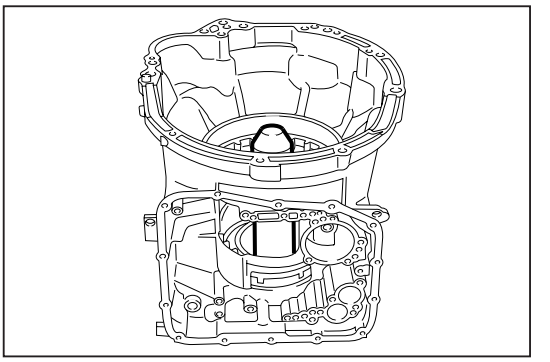
   (2) Assemble the hole snap ring into the groove of the transmission case, using snap ring pliers.
   NOTE:
   - Replace any scored or deformed hole snap ring with a new one.

   (3) Insert the planetary output shaft subassembly into the transmission case as far as it will go.

   (4) Install the planetary output shaft subassembly, using the following SST in combination with a hammer.
      SST: 09506-87303-000

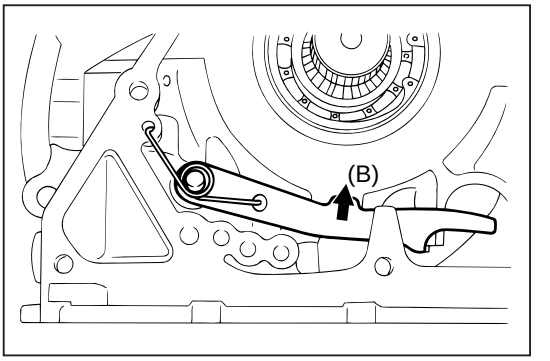


JAT00182-00158



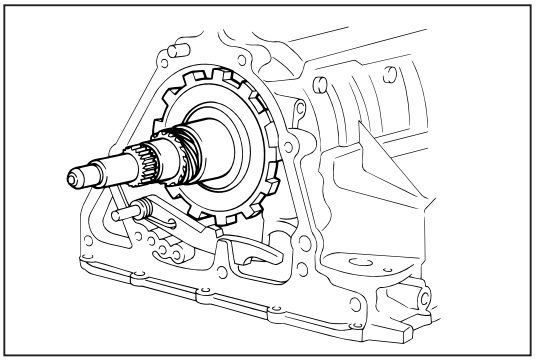
JAT00183-00159

4. Install the parking lock pawl shaft to the transmission case.
5. Install the parking lock pawl.
6. Install the torsion spring, as indicated in the right figure.
   NOTE:
   - Push the parking lock pawl toward the direction (B) and release it. At this time, make sure that the parking lock pawl returns to the original position by the reaction force of the torsion spring.

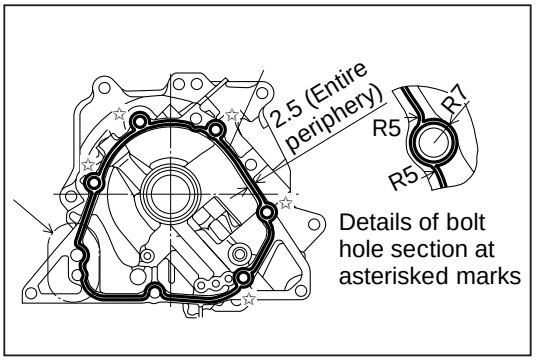


JAT00184-00160

7. Install the output shaft assembly.
   NOTE:
   - Securely insert the output shaft assembly into the spline of the planetary output shaft assembly.

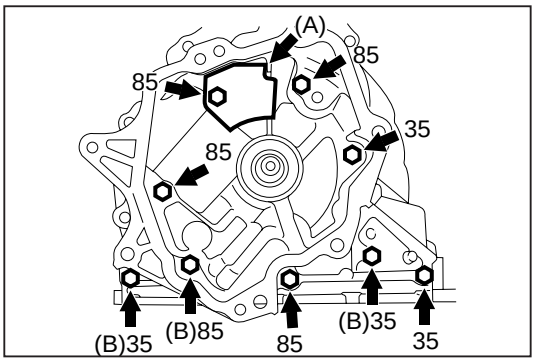

JAT00185-00161

8. Installation of transmission case side cover
   (1) Apply the Three Bond 1281B to the entire periphery of the transmission case without any discontinuation, as indicated in the right figure.



JAT00186-00162

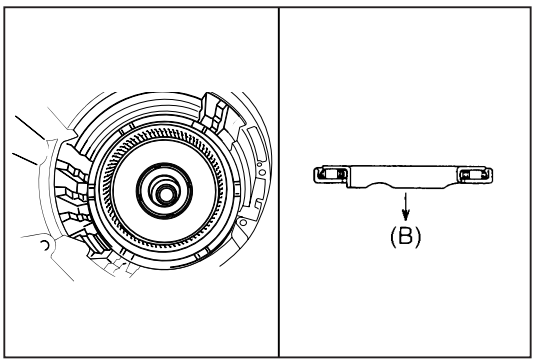
   (2) Assemble the transmission case side cover to the transmission case. Tighten the nine bolts.
   Among the nine bolts, one bolt should be tightened together with the oil guide plate (A).
   Tightening Torque: 14.7 - 21.6 N·m (1.5 - 2.2 kgf-m)



JAT00187-00163

   NOTE:
   - The numerals in the right figure denote the nominal length of each bolt.
   - Make sure that new bolts are used at the three sections (B).
   - Be very careful not to scratch the oil seal lip by the spline of the output shaft when installing the transmission case side cover.

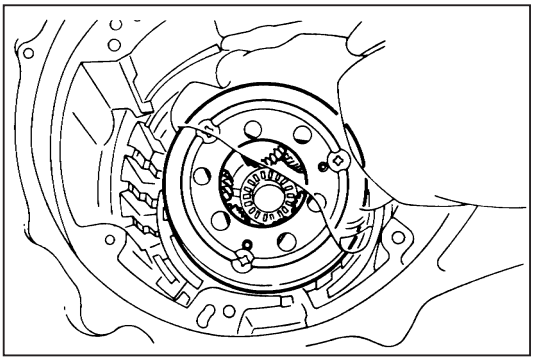
9. Install the thrust needle roller bearing to the planetary output shaft subassembly.
   Reference Value:
   Thrust needle roller bearing dimensions
   Outer Diameter: 46.5 mm
   Inner Diameter: 25 mm
   Thickness: 5 mm



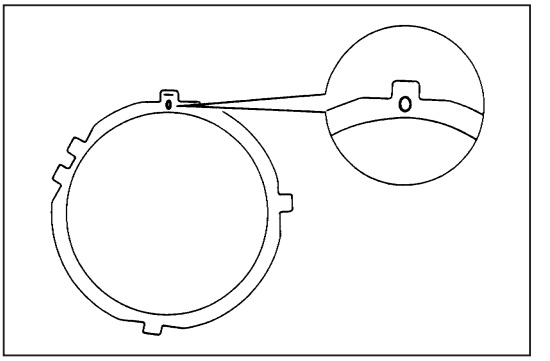
JAT00188-00164

   NOTE:
   - Be sure to install the (B) section of the thrust needle roller bearing in such a way that it faces toward the output shaft assembly side.

10. Install the planetary gear assembly.
NOTE:
- Ensure that the planetary gear assembly rotates smoothly.

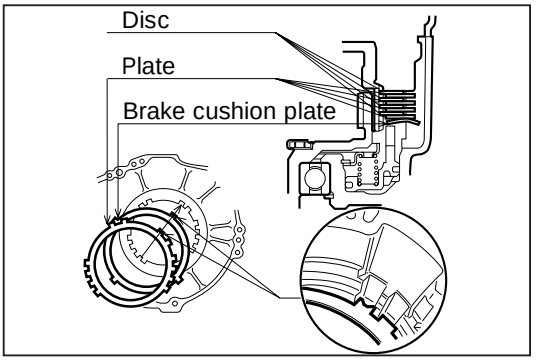

JAT00189-00165

11. Installation of first & reverse brake
(1) Install the brake cushion plate.
NOTE:
- Ensure that the stamped mark “O” of the brake cushion plate faces toward the upper side.


JAT00190-00166

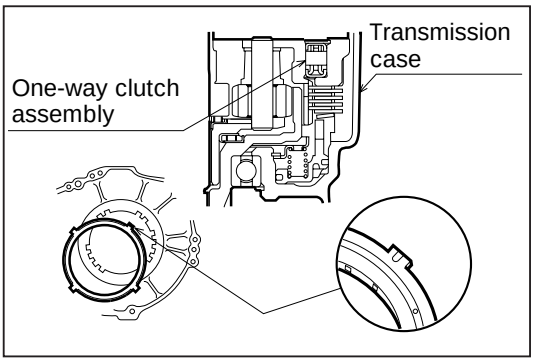
(2) Install the plates and discs in the following order.
P = Brake plate, D = Brake disc
P → D → P → D → P → D → P → D

NOTE:
- Before assembling new discs, soak them in the ATF for at least two hours.
- Be sure to align the cut-out section of the brake plate with the protruding section of the transmission when installing the brake plate.



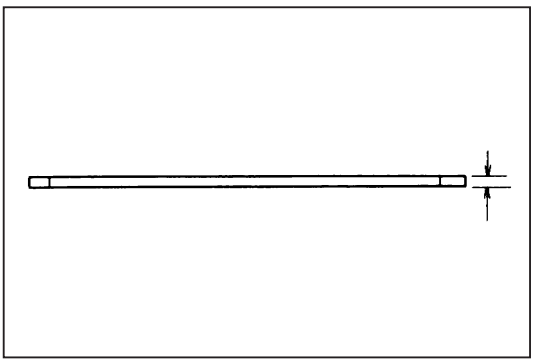
JAT00191-00167

(3) Coat the sliding section of the one-way clutch and planetary gear assembly with the ATF.
(4) Install the one-way clutch.
NOTE:
- Ensure that the one-way clutch with the snap ring faces toward the upside.
- Align the cut-out section at the inside of the transmission case with the protruding section provided with the groove (O mark) of the one-way clutch.

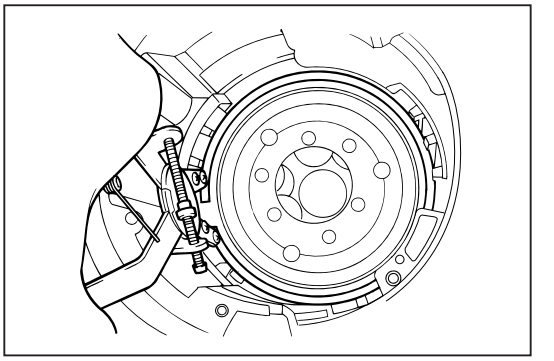


JAT00192-00168

(5) Measure and record the thickness of the hole snap ring.
NOTE:
- Replace any scratched or deformed hole snap ring with a new part.

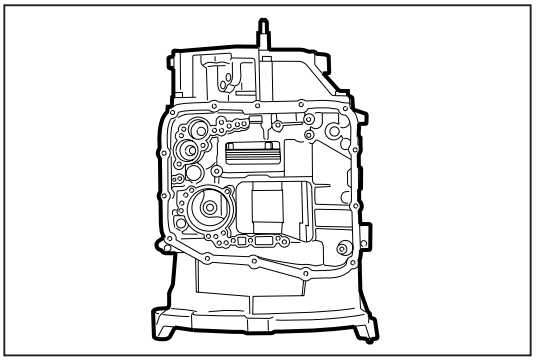

JAT00193-00169

(6) Install the hole snap ring to the grooved section of the transmission case.



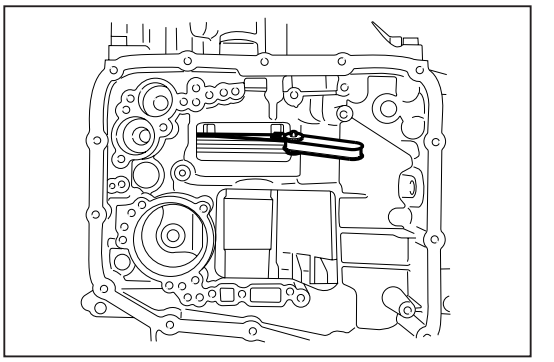
JAT00194-00170

12. Measurement of first & reverse brake end play
(1) Turn over the transmission case.



JAT00195-00171

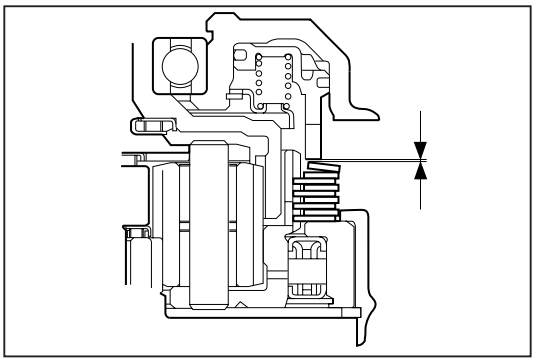
(2) Measure the first & reverse brake end play, using a flat thickness gauge.
Specified Value: 1.04 - 1.41 mm



JAT00196-00172

NOTE:
- The tightness which you encounter during this insertion/withdrawal of the flat thickness gauge should be virtually the same as the tightness which you would encounter during the thickness adjustment of the valve rocker arm.

- If the measured end play fails to conform to the specified value above, select a snap ring from the right lower table, using the following calculation formula. Then, install it.



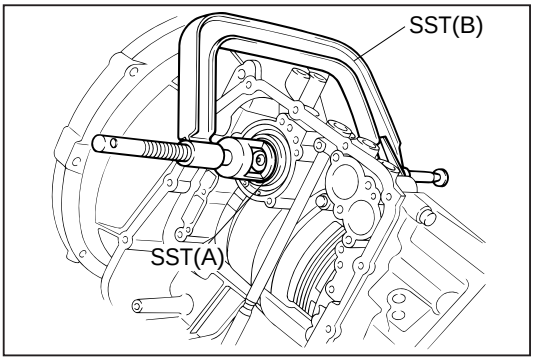
JAT00197-00173

Calculation formula
A = B - C + D
A = Thickness of snap ring to be selected
(Refer to the right table.) Measured value of end play
B = Measured value of end play
C = Specified value of end play
D = Thickness of snap ring that has been already installed

Snap ring thickness Unit: mm	Part No.
1.97 - 2.03	90045-21119-000
2.22 - 2.28	90045-21120-000
2.48 - 2.53	90045-21121-000
2.72 - 2.78	90045-21123-000

JAT00198-00000

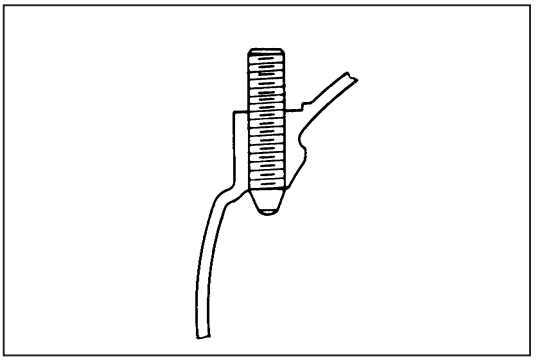
13. Installation of transmission brake band assembly-related parts
    (1) Install the compression spring to the second brake piston assembly.
    (2) Install the 2nd brake piston assembly to the transmission case together with the compression spring.
    (3) While compressing the 2nd brake piston with the following SSTs, install the hole snap ring, using snap ring pliers.
        SSTs: 09202-87002-000 ... (A)
              09202-87202-0A0 ... (B)



JAT00199-00174

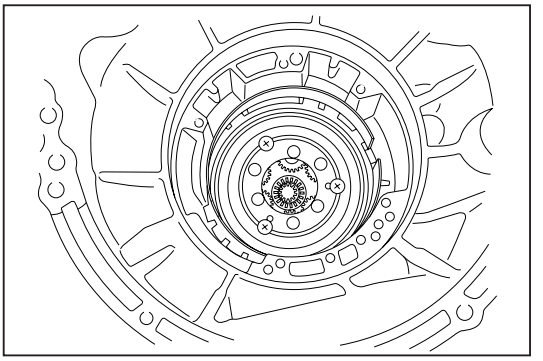
    (4) Install a new brake band adjusting anchor bolt to the transmission.

    NOTE:
    - Be sure to tighten the anchor bolt, until the head section of the anchor bolt appears at the inside of the transmission case, as indicated in the right figure.


JAT00200-00175

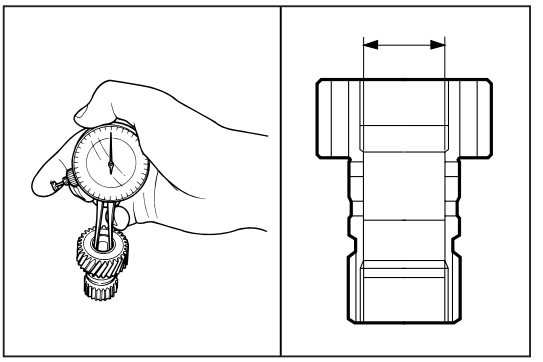
    (5) With the brake band assembly contracted, assemble the band while aligning its recessed section with the head of the brake band anchor bolt and with the head of the 2nd coast brake piston rod.

    NOTE:
    - Before assembling the brake band assembly, soak it in the ATF for at least two hours.


JAT00201-00176

14. Assembly of forward clutch hub and 2nd brake drum
    (1) Measure the bush bore diameter of the rear planetary sun gear subassembly.
        Specified Value: 15.500 - 15.518 mm
        Allowable limit: 15.568 mm

    NOTE:
    - The measurement should be performed at several points. Determine the mean value.
    - If the bore diameter exceeds the allowable limit, replace the rear planetary sun gear subassembly.
    - When replacing the rear planetary sun gear subassembly, be sure to check the bush contacting surface of the intermediate shaft subassembly. If the contacting surface is scored or discolored, replace the intermediate shaft subassembly, too, with a new one at the same time.


JAT00202-00177

(2) Assemble the thrust needle roller bearing to the rear planetary sun gear subassembly.

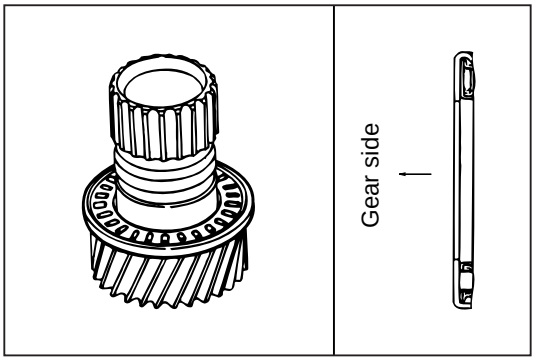
NOTE:

- Make sure that the thrust needle roller bearing is assembled in the correct direction.

REFERENCE:

Dimensions of thrust needle roller bearing

Outer diameter: 35.7 mm
Inner diameter: 22.7 mm
Thickness: 2.8 mm

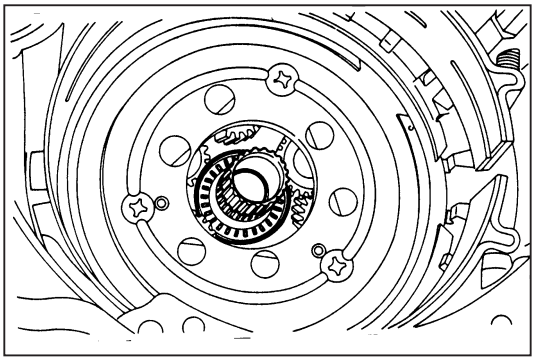


JAT00203-00178

(3) Assemble the rear planetary sun gear subassembly to the planetary gear assembly.

NOTE:

- Apply ATF to the bush section.



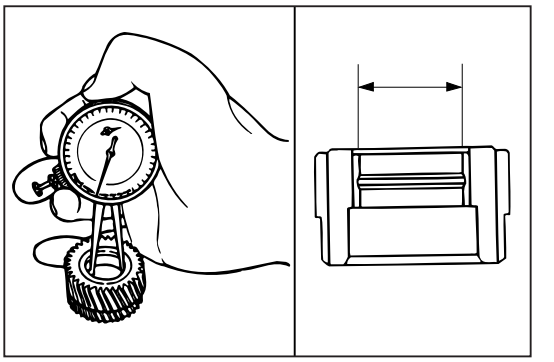
JAT00204-00179

(4) Measure the bush bore diameter of the planetary sun gear subassembly.

Specified Value: 22.020 - 22.038 mm
Allowable Limit: 22.088 mm

NOTE:

- The measurement should be performed at several points. Determine the mean value.
- If the bore diameter exceeds the allowable limit, replace the planetary sun gear subassembly.
- When replacing the planetary sun gear subassembly, be sure to check the bush contacting surface of the rear planetary sun gear subassembly. If the contacting surface is scored or discolored, replace the rear planetary sun gear subassembly with a new one, too, at the same time.

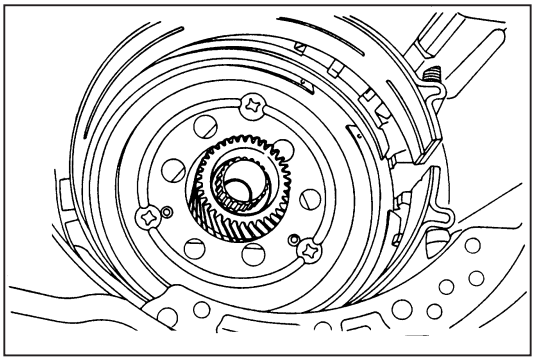


JAT00205-00180

(5) Assemble the planetary sun gear subassembly to the planetary gear assembly.

NOTE:

- Apply ATF to the bush section.



JAT00206-00181

(6) Assemble the thrust needle roller bearing to the 2nd brake drum.

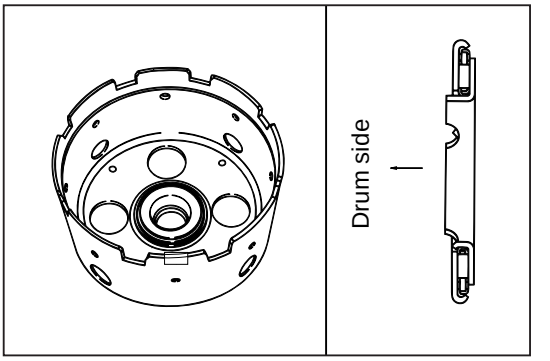
NOTE:

- Make sure that the thrust needle roller bearing is assembled in the correct direction.

REFERENCE:

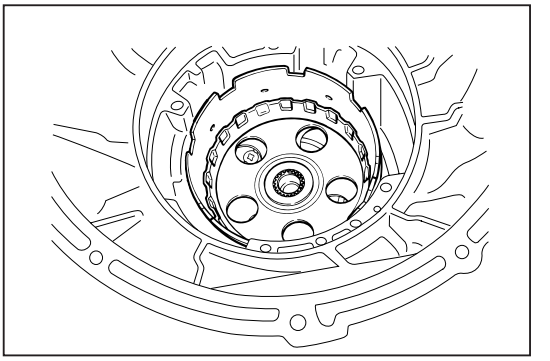
Dimensions of thrust needle roller bearing

Outer diameter: 46.5 mm
Inner diameter: 25 mm
Thickness: 5 mm



JAT00207-00182

(7) Assemble the forward clutch hub to the 2nd brake drum.
(8) Assemble the 2nd brake drum to the transmission case.



JAT00208-00183

15. Assembly of intermediate shaft subassembly

(1) Assemble the thrust needle roller bearing and thrust bearing race to the intermediate shaft subassembly.

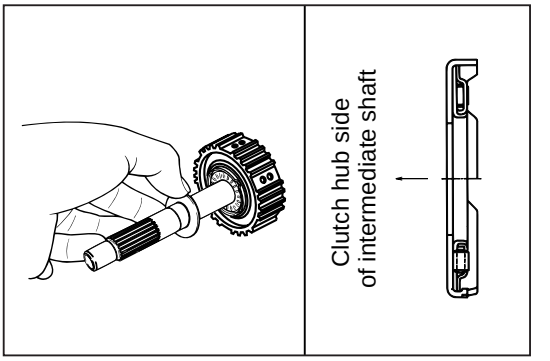
NOTE:

- Make sure that the thrust needle roller bearing is assembled in the correct direction.

REFERENCE:

Dimensions of thrust needle roller bearing

Outer diameter: 32 mm
Inner diameter: 16.5 mm
Thickness: 4.1 mm

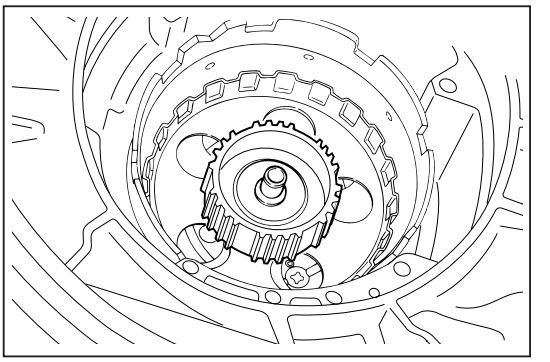


JAT00209-00184

(2) Assemble the intermediate shaft subassembly.

NOTE:

- Be sure to apply ATF to the intermediate shaft subassembly before assembling.



JAT00210-00185

16. Assemble the thrust needle roller bearing to the intermediate shaft subassembly.

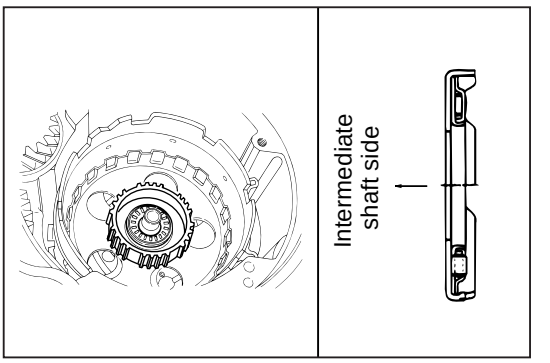
NOTE:

- Make sure that the thrust needle roller bearing is assembled in the correct direction.

REFERENCE:

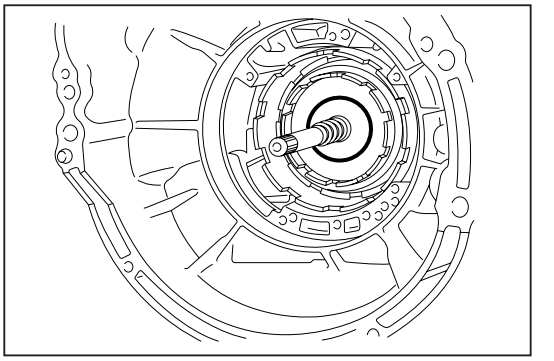
Dimensions of thrust needle roller bearing:

Outer diameter: 32 mm
Inner diameter: 16.5 mm
Thickness: 4.1 mm



JAT00211-00186

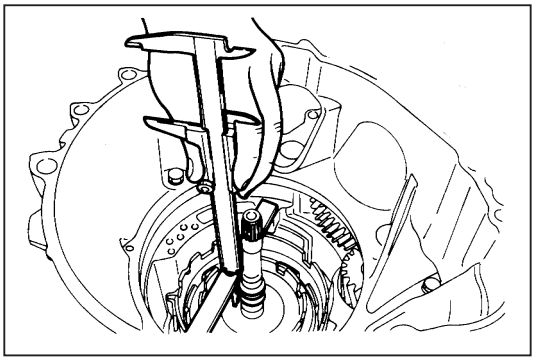
17. Align the pawls of the clutch disc of the forward clutch with each other.
18. While aligning the pawls of the clutch disc of the forward clutch with the groove of the forward clutch hub and with the groove of the intermediate shaft subassembly, assemble these parts.



JAT00212-00187

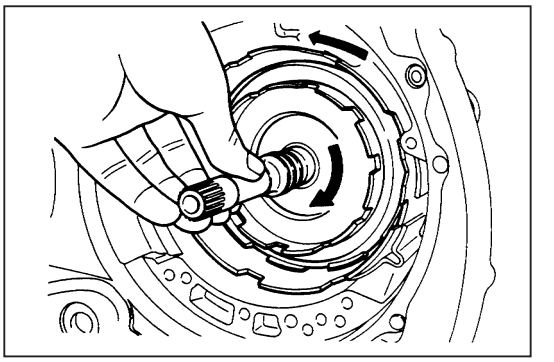
19. Measure the height of the forward clutch between the installation section of the oil pump and the thrust bearing race of the forward clutch, using the following SST.
    SST: 09351-87208-000
    Specified Value: Approx. 54 mm

    NOTE:
    - If the actually measured value is less than the specified value, there is the possibility that the pawl section of the forward clutch disc is not fitted in the groove of the forward clutch hub. Be sure to perform the operation of the step 15-(2) again and recheck the specified dimension.



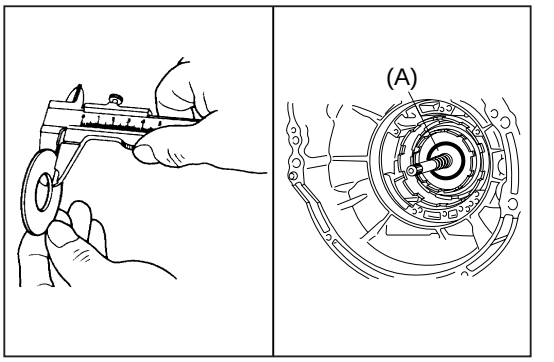
JAT00213-00188

20. Turn the forward clutch clockwise and counterclockwise. At this time, ensure that the forward clutch turns lightly and the 2nd brake drum makes a relative movement with the forward clutch.



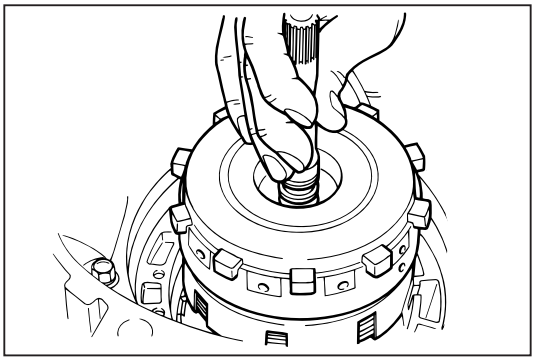
JAT00214-00189

21. Installation of direct clutch
    (1) Measure and record the thickness of the thrust bearing race.
    (2) Install the thrust bearing race (A).



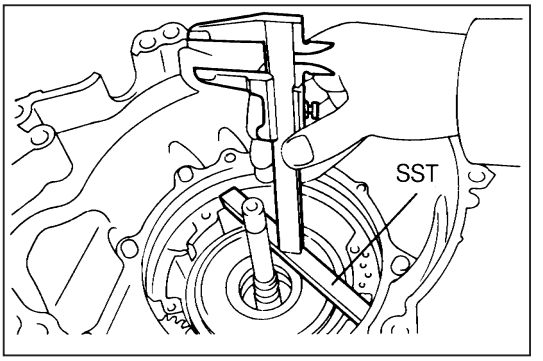
JAT00215-00190

    (3) Install the direct clutch.
    (4) Install the direct clutch to the 2nd brake drum while turning the direct clutch clockwise and counterclockwise.



JAT00216-00191

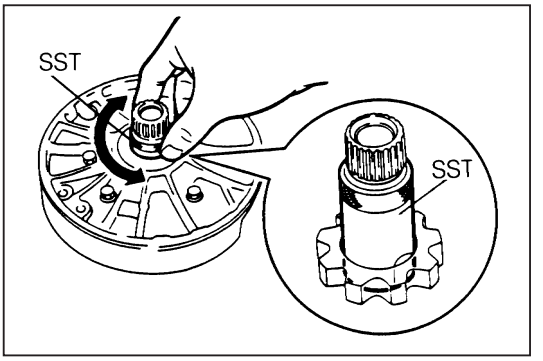
(5) Confirm the height of the oil pump attaching surface from the upper surface of the direct clutch, using the following SST.
SST: 09351-87208-000
Specified Height: Approx. 22 mm



JAT00217-00192

NOTE:
- If the actually measured value is less than the specified height, there is the possibility that the two pawls of the clutch disc are not fitted into the groove of the forward clutch. Be sure to perform the operation of the step (4) above again.

22. Inspection of stator shaft & oil pump assembly
(1) Inspection of oil pump operation
Ensure that the oil pump drive gear rotates smoothly, using the following SST.
SST: 09351-87206-000



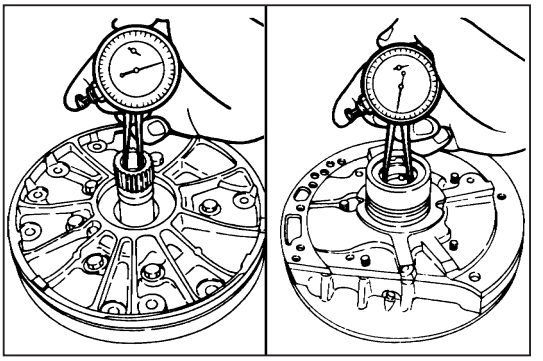
JAT00218-00193

NOTE:
- Be sure to insert the flat sections (2 points) of the SST into the flat sections of the oil pump drive gear.

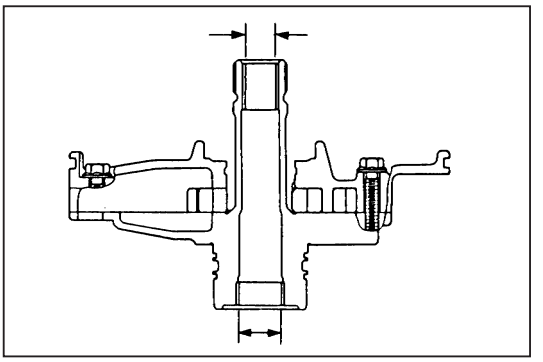
(2) Measure the inner diameter of the oil pump bush section, using an inner caliper gauge.

Unit: mm

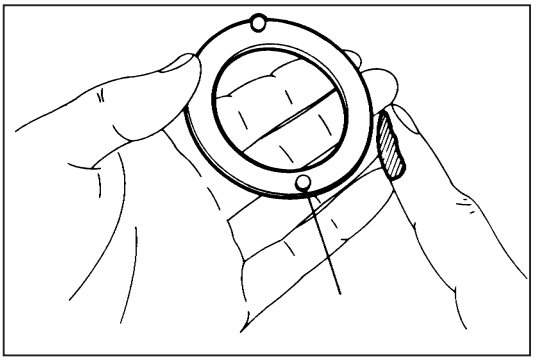
	Specified value	Allowable limit
Front side	15.50 - 15.522	15.572
Rear side	21.100 - 21.121	21.171


JAT00219-00194

NOTE:
- Perform the measurement at several points. Calculate the mean value.
- If the actually measured value exceeds the allowable limit, replace the stator shaft & oil pump assembly with a new one.
- When replacing the stator shaft & oil pump assembly, be sure to check the bush contacting surface of the input shaft subassembly. If the contacting surface is scratched or discolored, replace the input shaft subassembly with a new one, too, at the same time.


JAT00220-00195

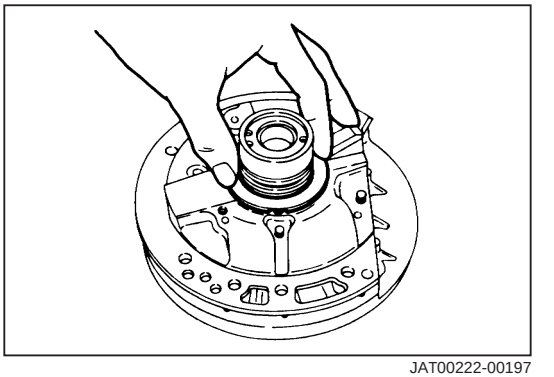
23. Check of input shaft end play
(1) Apply a small amount of vaseline to the protruding sections (2 points) of the clutch drum thrust washer.


JAT00221-00196

(2) Install the clutch drum thrust washer by aligning its protruding section with the recessed section of the oil pump assembly.

NOTE:

- Be sure to apply vaseline in a small amount enough to prevent the clutch drum thrust washer from dropping.

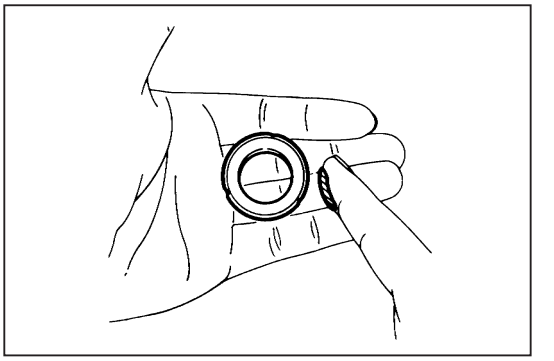


JAT00222-00197

(3) Apply a small amount of vaseline to the race side of the thrust needle roller bearing.

NOTE:

- Be sure to apply vaseline in a small amount enough to prevent the thrust needle roller bearing from dropping.

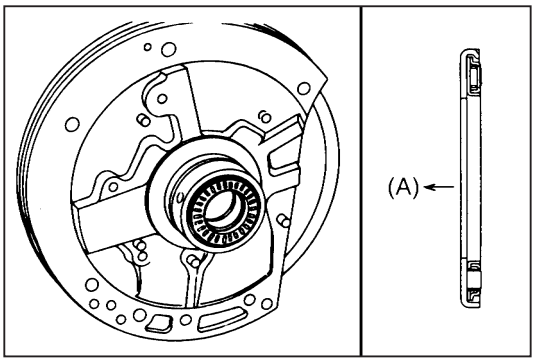


JAT00223-00198

(4) Install the thrust needle roller bearing to the oil pump assembly.

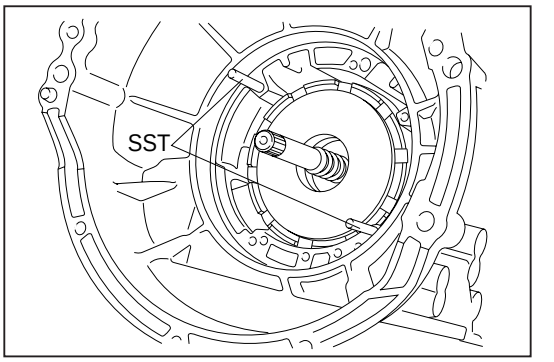
NOTE:

- Ensure that the section (A) of the thrust needle roller bearing race faces toward the oil pump assembly side.
  Reference Value:
  Thrust needle roller bearing dimensions
  Outer Diameter: 35.7 mm
  Inner Diameter: 22. 7 mm
  Thickness: 2.8 mm



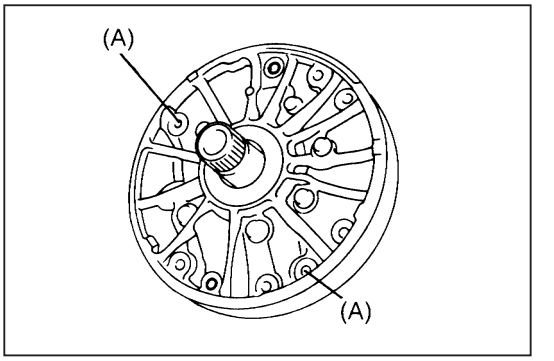
JAT00224-00199

(5) Install the following SST to the transmission case.
SST: 09351-87207-000



JAT00225-00200

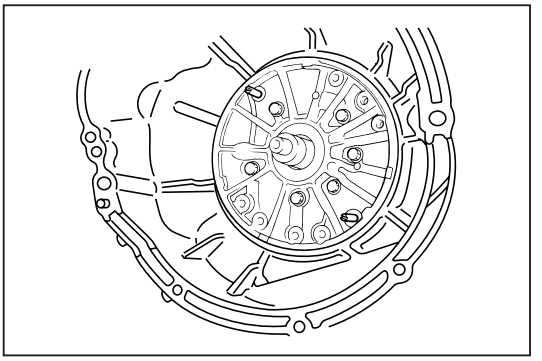
(6) Align the attaching holes (sections (A)) of the stator shaft & oil pump assembly with the SST that has been installed at the step (5).



JAT00226-00201

(7) Apply the ATF to the outer periphery of the stator shaft & oil pump assembly.
(8) Install the stator shaft & oil pump assembly to the transmission case.

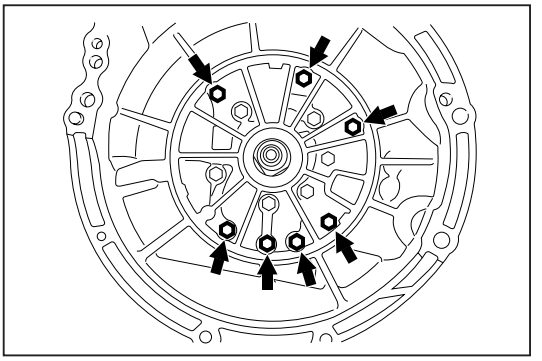
NOTE:
- Be very careful not to damage or twist the O-ring during the installation of the stator shaft & oil pump assembly.



JAT00227-00202

(9) Tighten the seven bolts of the stator shaft & oil pump assembly.
Tightening Torque: 6.9 - 9.8 N·m (0.7 - 1.0 kgf-m)

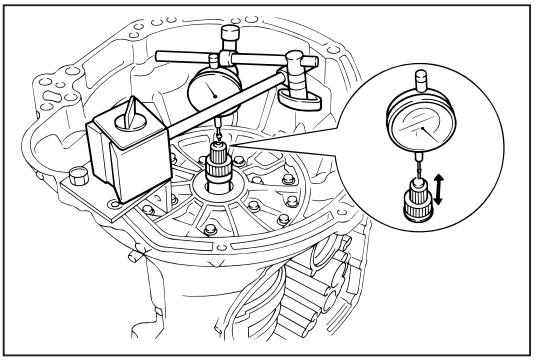
NOTE:
- Be sure to tighten the bolts alternately and diagonally.



JAT00228-00203

(10) Measure the input shaft end play with a dial gauge and the following SST.
SST: 09351-87210-000
Specified Value: 0.28 - 0.92 mm

NOTE:
- If the measured end play exceeds the specified value, remove the stator shaft & oil pump assembly and the direct clutch from the transmission case. Then, select the thickness of the thrust bearing race from the right lower table. Proceed to perform the operations of the steps from 21-(2) to 23-(10).



JAT00229-00204

Thrust Bearing Race Availability

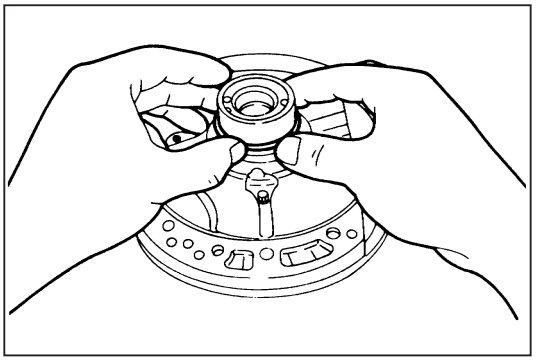
Thrust bearing race thickness Unit: mm	Part No.
1.55 - 1.65	35789-87208-000
1.95 - 2.05	35789-87209-000
2.35 - 2.45	35789-87210-000

JAT00230-00000

24. Assembly of stator shaft & oil pump assembly
    (1) Coat a new O-ring of the stator shaft & oil pump assembly with the ATF.
    (2) Install the two new clutch drum oil seal rings to the stator shaft & oil pump assembly.

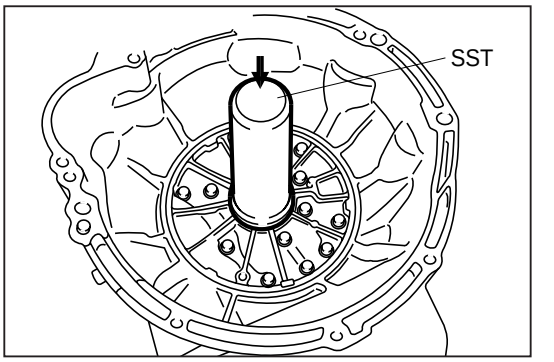
    NOTE:
    - Do not spread the new oil seal rings excessively.

    (3) Coat a new O-ring of the stator shaft & oil pump assembly with the ATF.
    (4) Install the new O-ring to the stator shaft & oil pump assembly.
    (5) Assemble the stator shaft & oil pump assembly, following the procedure given in the steps 23-(1) through 23-(9).


JAT00231-00205

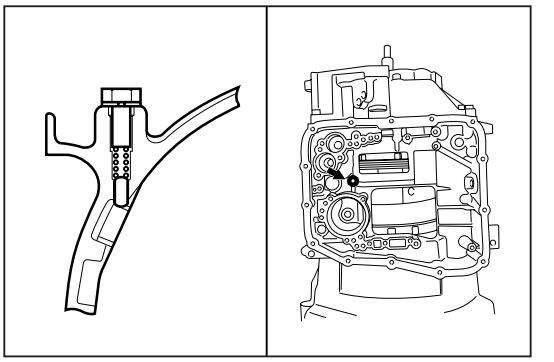
    (6) Install a new T-type oil seal, using the following SST.
        SST: 09310-87301-000

    NOTE:
    - Make sure that the T-type oil seal is in contact at right angles with the stator shaft & oil pump assembly when installing the oil seal.

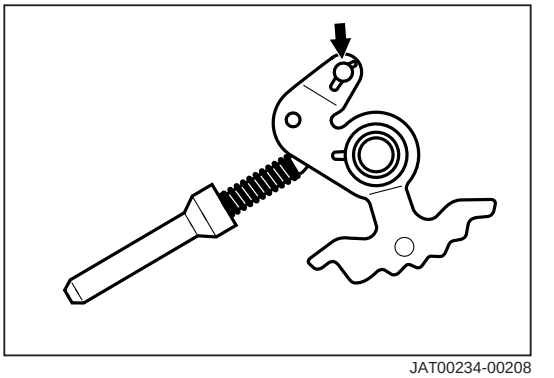


JAT00232-00206

25. Install the roller, compression spring and bolt to the transmission case in this order.
    Tightening Torque: 6.9 - 9.8 N·m (0.7 - 1.0 kgf-m)

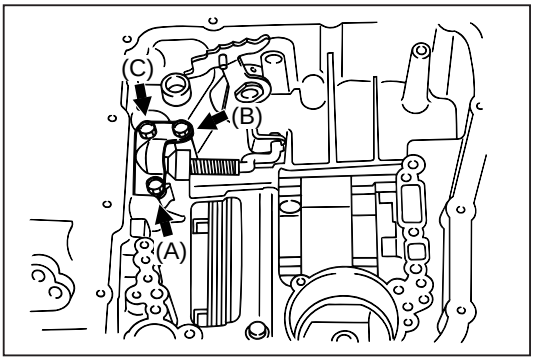

JAT00233-00207

26. Assemble the manual valve lever subassembly to the parking lock rod subassembly in advance.
    NOTE:
    - Apply ATF to the arrow-headed section indicated in the right figure.


JAT00234-00208

27. Install the parking lock rod subassembly and parking lock pawl cam support, as indicated in the right figure. Tighten the three bolts.
    Tightening Torque: 14.7 - 17.7 N·m (1.5 - 1.8 kgf-m)

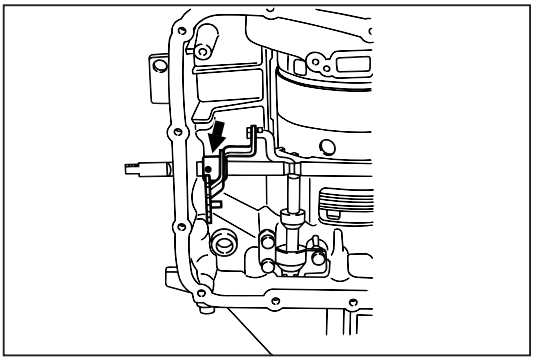
    NOTE:
    - Tightening should be made in the following sequence: (A) (Tighten temporarily.) → (B) (Tighten securely.) → (C) (Tighten securely.) → (A) (Tighten securely.)



JAT00235-00209

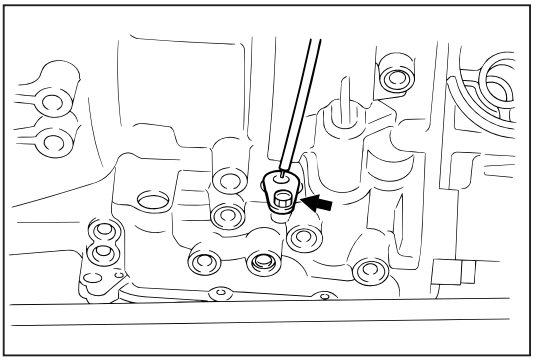
28. Installation of manual valve lever shaft assembly
    (1) Install the manual lever shaft subassembly.
    NOTE:
    - Care must be exercised so that the lip of the oil seal may not be scratched when installing the shaft.

    (2) Install a new slotted spring pin, using a pin punch and a hammer.
    NOTE:
    - Be sure to positively install the new slotted spring pin, until it becomes flush with the edge surface of the manual valve lever.

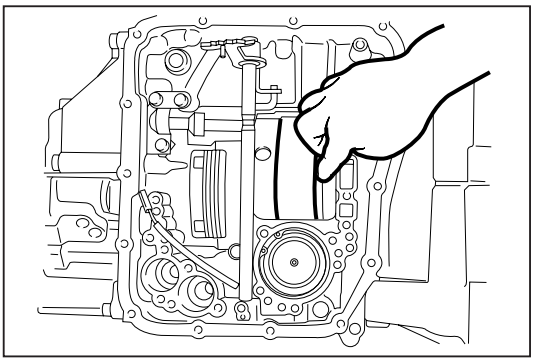

JAT00236-00210

29. Install the solenoid wire assembly to the transmission case.
    Tightening Torque: 6.9 - 9.8 N·m (0.7 - 1.0 kgf-m)

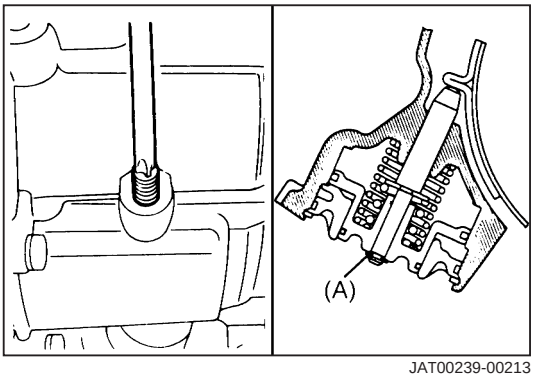
    NOTE:
    - Apply ATF to the outer periphery of the O-ring of the solenoid wire assembly. Care must be exercised so that the O-ring may not be caught in when inserting it.


JAT00237-00211

30. Adjustment of brake band
    (1) Set the brake band parallel to the 2nd brake drum.

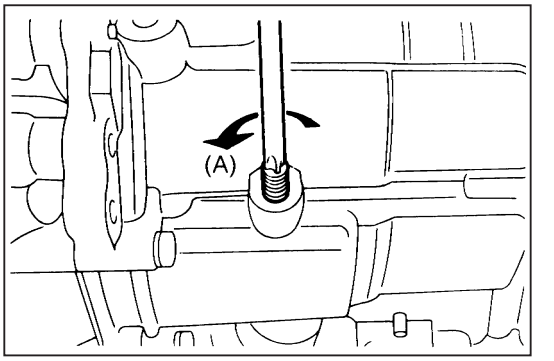

JAT00238-00212

    (2) Tighten the brake band adjusting anchor bolt, until the E-ring (A) of the 2nd coast brake piston slightly floats.
    (3) At the time when the E-ring of the 2nd coast brake piston floats, stop tightening the brake band adjusting anchor bolt.



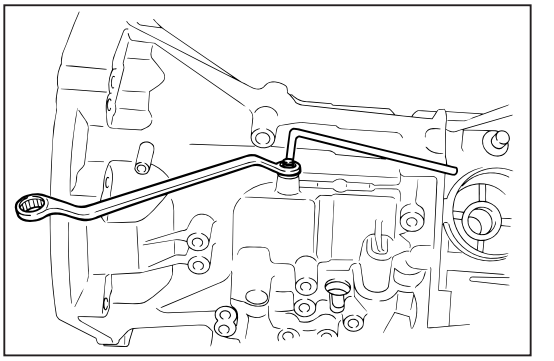
JAT00239-00213

(4) Under the condition of the step (3) above, loosen the brake band anchor bolt 3.2 turns counterclockwise (direction (A)).

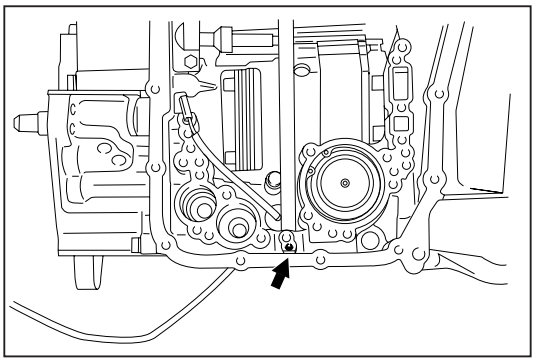


JAT00240-00214

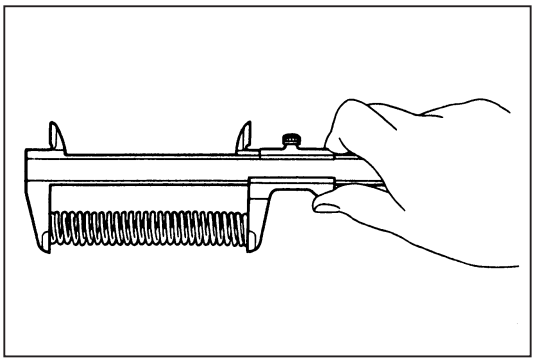
(5) Install the nut to the brake band anchor bolt.
(6) While holding the brake band anchor bolt by means of a screwdriver or the like, tighten the nut.
Tightening Torque: 22.5 - 30.4 N·m (2.3 - 3.1 kgf-m)


JAT00241-00215

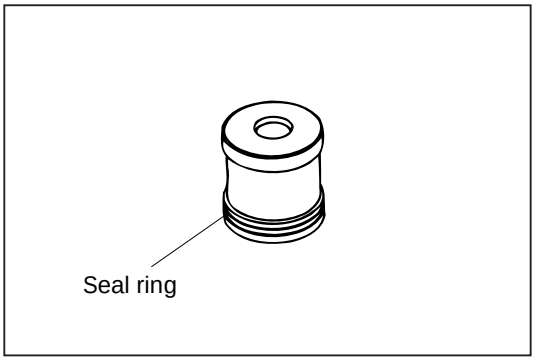
31. Install the roller for the manual valve lever shaft subassembly as illustrated in the right figure.
NOTE:
- Make sure that the roller edge surface is lower than the transmission case edge surface.


JAT00242-00216

32. Assembly of C2 accumulator piston
(1) Measure the free length and outer diameter of the C2 accumulator compression spring.
Reference Value:
Free Length: 85.8 mm
Outer Diameter: 18.3 mm

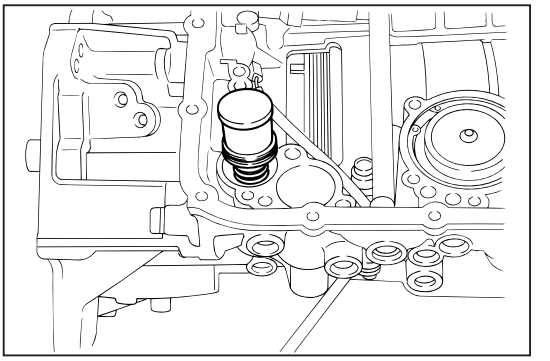

JAT00243-00217

(2) Apply ATF to a new C2 accumulator seal No. 1 ring. Then, assemble the ring to the accumulator No. 2 piston.
NOTE:
- Do not expand the oil seal ring beyond the minimum extent needed for assembly.
- Be sure to align the opening ends with each other after assembling.



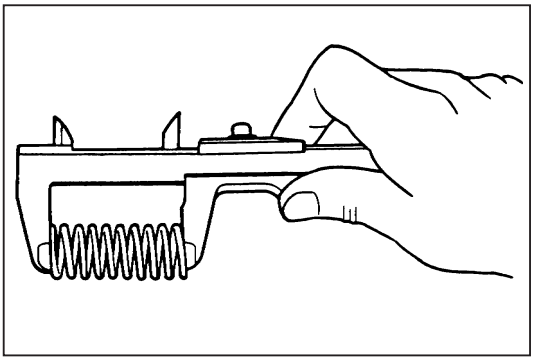
JAT00244-00218

(3) Assemble the compression spring and accumulator No. 2 piston to the transmission case.



JAT00245-00219

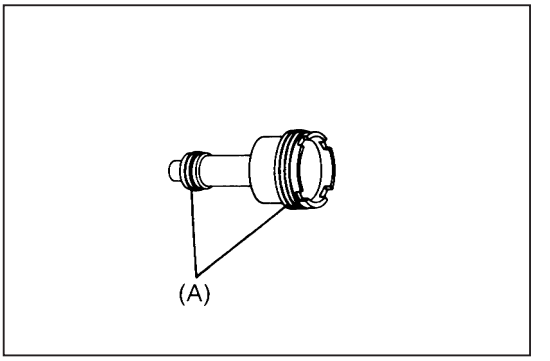
33. Assembly of B1 accumulator piston
(1) Measure the free length and outer diameter of the B1 accumulator compression spring.
Reference Value:
Free Length: 50.5 mm
Outer Diameter: 20 mm



JAT00246-00220

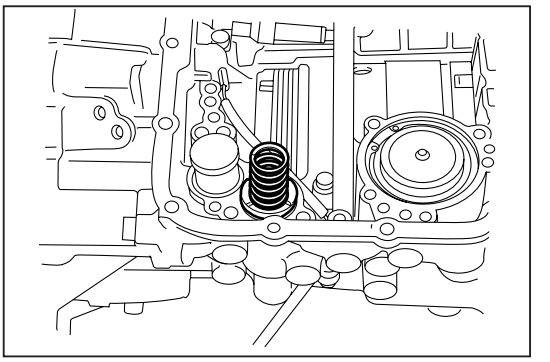
(2) Coat the A section of the new accumulator seal No. 1 and No. 2 ring with ATF.
(3) Install the accumulator seal No. 1 and No. 2 ring to the accumulator No. 1 piston.

NOTE:
- Do not spread the seal ring end excessively.



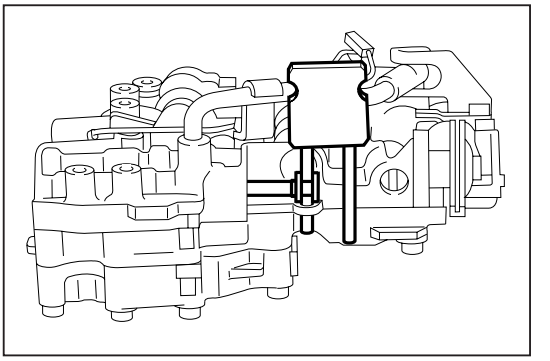
JAT00247-00221

(4) Install the accumulator No. 1 piston to the transmission case.
(5) Install the compression spring.



JAT00248-00222

34. Assembly of valve body
(1) Ensure that the manual valve operates smoothly without any binding.
(2) Set the manual valve to the neutral position, using the following SST.
SST: 09351-87211-000

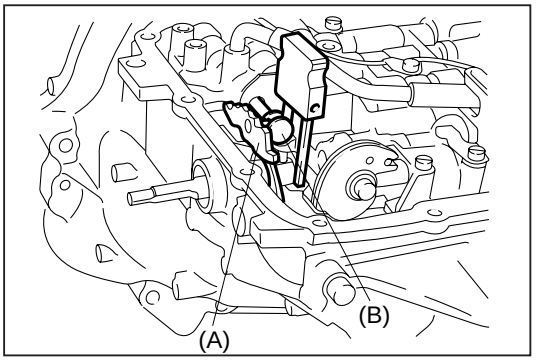


JAT00249-00223

(3) Install the valve body assembly with the aforesaid SST to the transmission case.

NOTE:

- Ensure that the protrusion of the manual valve lever (A) and grooved section of the manual valve (B) are matched securely.

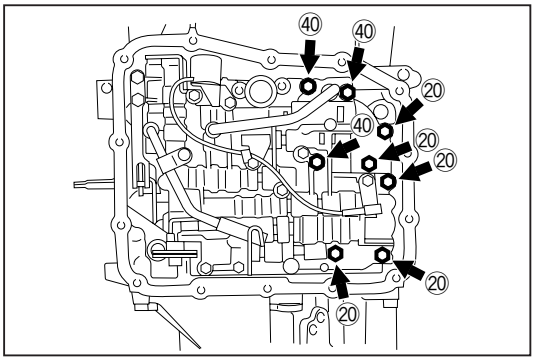


JAT00250-00224

(4) Tighten the bolts of the valve body assembly.
Tightening Torque: 6.9 - 9.8 N·m (0.7 - 1.0 kgf-m)

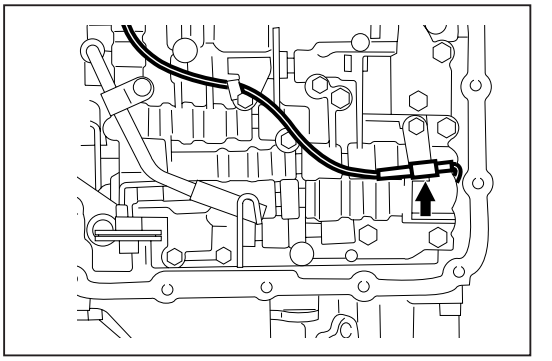
NOTE:

- The numeral in the right illustration indicates the nominal length of the bolt.
- If the bolt is tightened with any oil getting to the bolt's threaded portion, it may cause the bolt looseness. Therefore, be sure to clean the bolt threaded portion by applying compressed air.
- Care must be exercised so that the wire may not be caught in between the transmission case and the valve body assembly.



JAT00251-00225

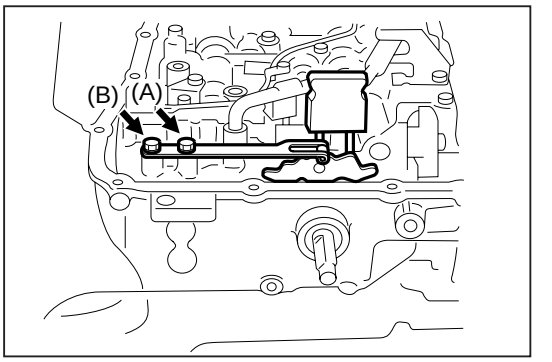
(5) Connect the connector of the solenoid wire assembly.


JAT00252-00226

35. Tighten the (A) bolt firstly with the aforesaid SST. Then, proceed to tighten the (B) bolt of the manual detent spring.
Tightening Torque: 6.9 - 9.8 N·m (0.7 - 1.0 kgf-m)

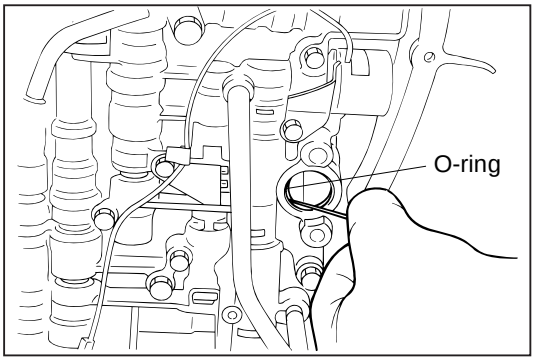
NOTE:

- The numeral in the right figure indicates the nominal length of the bolt.
(A) = 12 mm (B) = 40 mm
- Be sure to tighten the bolts alternately.



JAT00253-00227

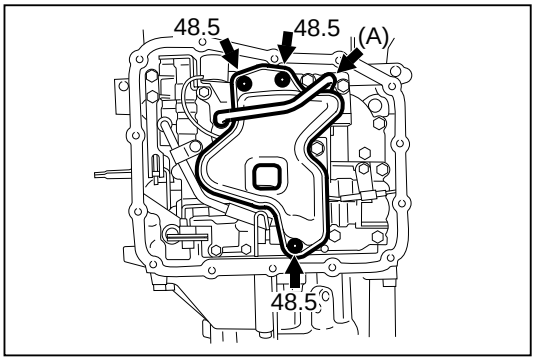
36. Assembly of oil strainer
(1) Coat a new O-ring (A) with ATF.
(2) Install the new O-ring to the groove section of the valve body.



JAT00254-00228

(3) Apply ATF to the O-ring contact section of the oil strainer.
(4) Install the valve body tube (A).
(5) Install the oil strainer with the 3 bolts.
Tightening Torque: 6.9 - 9.8 N·m (0.7 - 1.0 kgf-m)

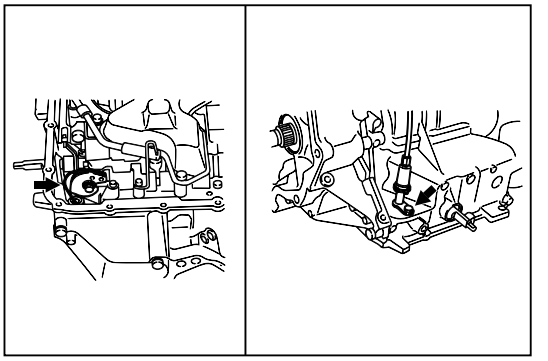
NOTE:
- The numeral in the right illustration indicates the nominal length of the bolt.
- Be sure to tighten the bolts alternately and diagonally.



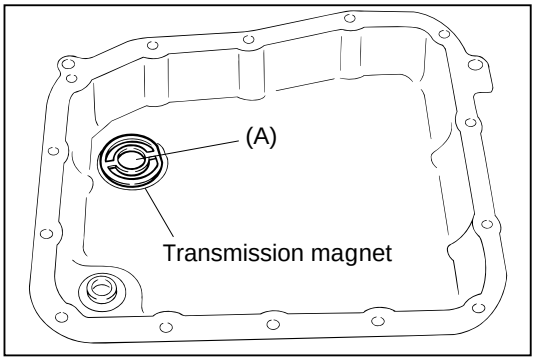
JAT00255-00229

37. Assembly of throttle cable
(1) Coat a new O-ring with the ATF.
(2) Install the new O-ring to the throttle cable.
(3) Insert the throttle cable to the transmission case.
(4) Tighten the throttle cable with a bolt.
Tightening Torque: 6.9 - 9.8 N·m (0.7 - 1.0 kgf-m)

(5) Connect the throttle cable to the throttle valve cam.

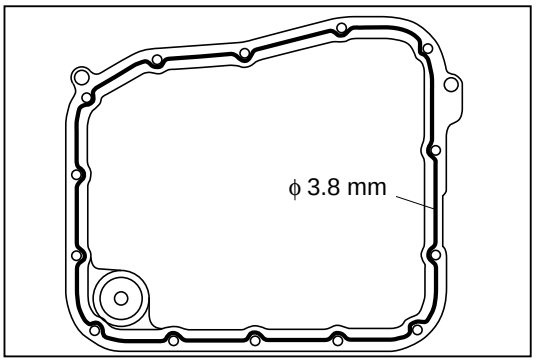

JAT00256-00230

38. Assembly of oil pan
(1) Place the transmission magnet in the protrusion (A) of the transmission oil pan assembly.



JAT00257-00231

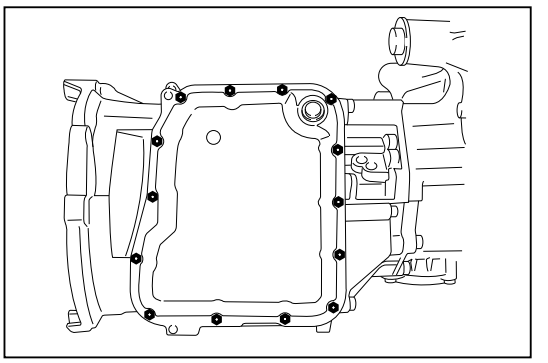
(2) Apply the Three Bond 1281B to the entire periphery of the oil pan without any discontinuation, as indicated in the right figure.
NOTE:
- Be very careful not to get oil to the application surface.



JAT00258-00232

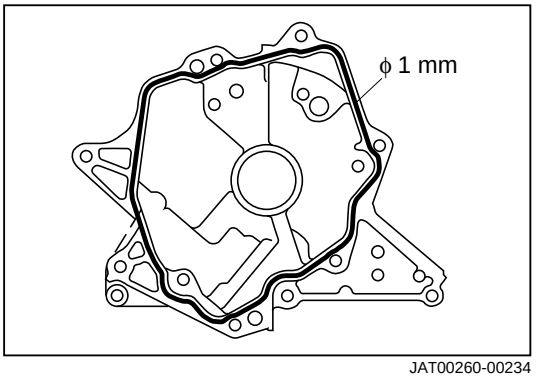
(3) Install the new transmission oil pan assembly with the 14 bolts.
Tightening Torque: 6.9 - 9.8 N·m (0.7 - 1.0 kgf-m)

NOTE:
- Be sure to tighten the bolts alternately and diagonally.
- When installing the transmission oil pan, be very careful not to allow the oil pan to come in contact with any inside part.


JAT00259-00233

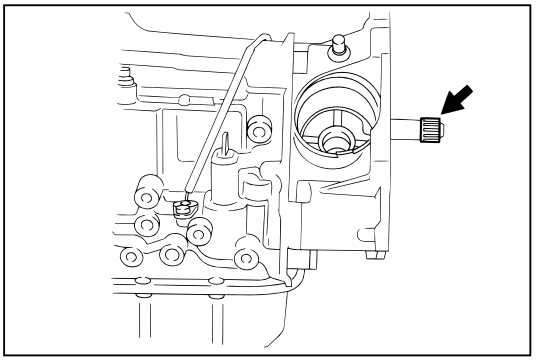
39. Clean the contact surface between the transmission case side cover subassembly and the transfer assembly, using solvent or the like.
40 Apply the following bond to the transmission case side cover subassembly surface as shown in the right figure.
Specified Bond: Three bond 1216 or 1217

NOTE:
- Be sure to apply the bond to the entire periphery without any discontinuation.



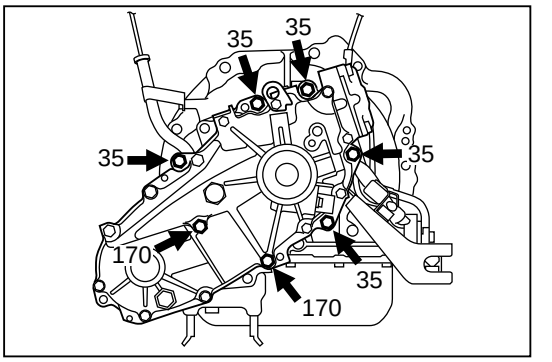
JAT00260-00234

41. Install the needle roller bearing to the forward end of the output shaft assembly.


JAT00261-00235

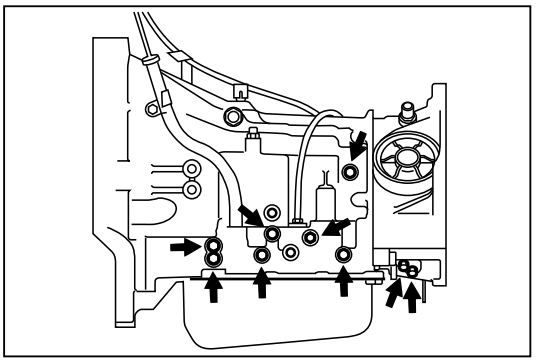
42. Install the transfer assembly. Tighten the seven bolts.
Tightening Torque: 29.4 - 44.1 N·m (3.0 - 4.5 kgf-m)

NOTE:
- The numerals in the right figure denote the nominal length of each bolt. (Unit: mm)

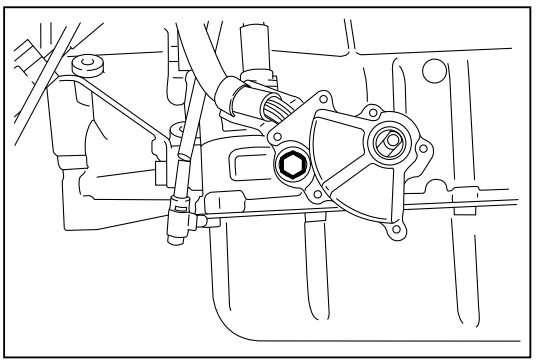


JAT00262-00236

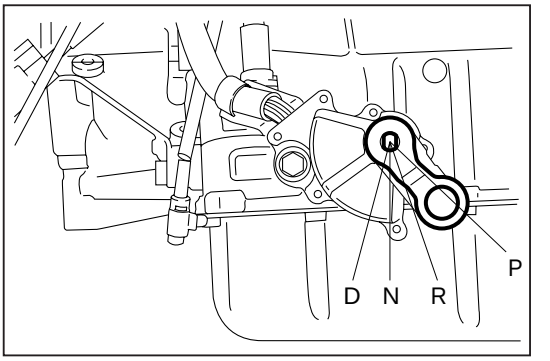
43. Tighten nine new inspection plugs to the transmission case.
Tightening Torque: 6.9 - 9.8 N·m (0.7 - 1.0 kgf-m)


JAT00263-00237

44. Adjustment of neutral start switch
(1) Temporarily tighten the bolt of the neutral start switch assembly.


JAT00264-00238

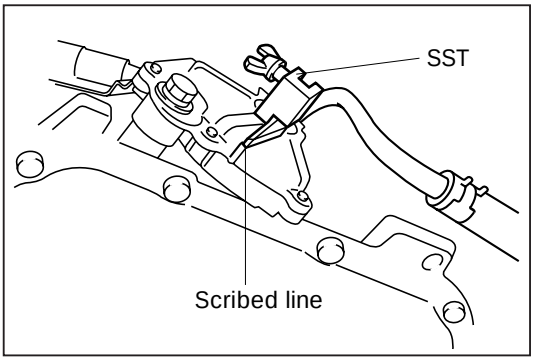
(2) Place the transmission control shaft lever subassembly.
(3) Push the transmission control shaft lever subassembly toward the front side (ie: P range)
(4) Back off the lever two notches to the NEUTRAL position
(5) Remove the transmission control shaft lever subassembly.



JAT00265-00239

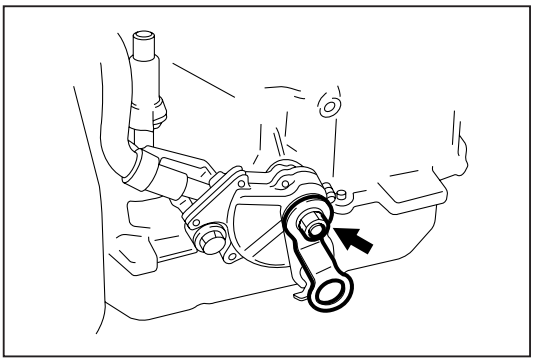
(6) Install the following SST
SST: 09302-87201-000

(7) Adjust the neutral start switch assembly until the neutral basic line should be aligned with the SST above.
(8) Tighten the bolt.
Tightening Torque: 14.7 - 21.6 N·m (1.5 - 2.2 kgf-m)



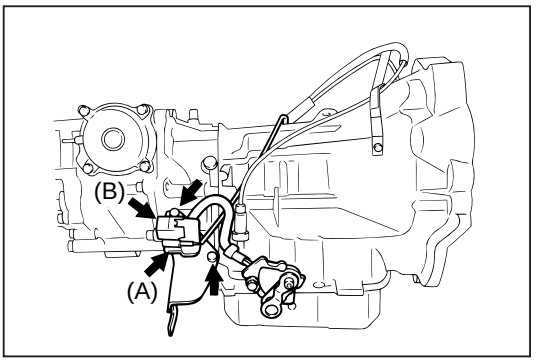
JAT00266-00240

45. Tighten the transmission control shaft lever subassembly with a nut.
Tightening Torque: 9.8 - 15.7 N·m (1.0 - 1.6 kgf-m)


JAT00267-00241

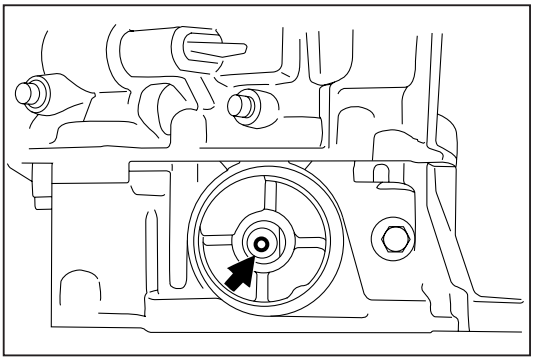
46. Install the control cable bracket. Tighten the two bolts.
Tightening Torque: 14.7 - 21.6 N·m (1.5 - 2.2 kgf-m)

47. Secure the connectors of the neutral start switch assembly (B) and solenoid wire assembly (A), respectively, to the control cable bracket.

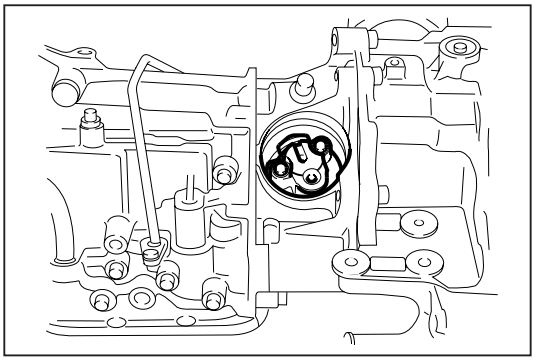


JAT00268-00242

48. Installation of governor valve.
(1) Place the ball into the transmission case side cover.

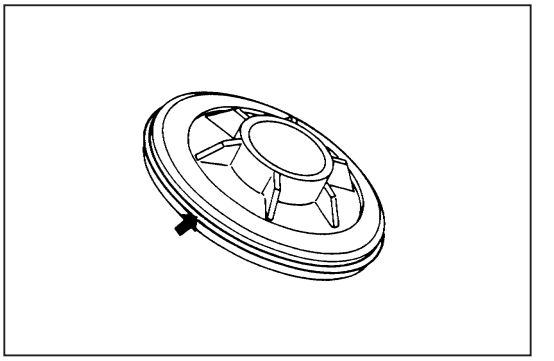

JAT00269-00243

(2) Coat the whole of governor body assembly with ATF.
(3) Install the governor body assembly into the transmission case side cover.


JAT00270-00244

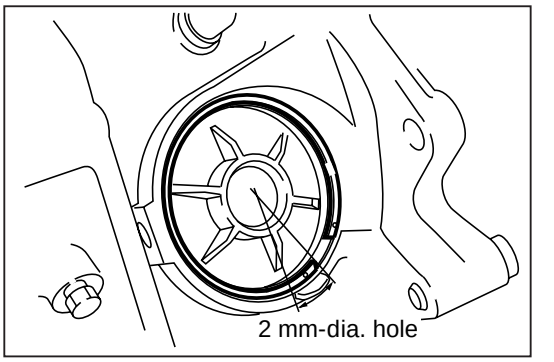
(4) Coat a new O-ring with ATF.
(5) Install the new O-ring to the governor cover.
(6) Install the governor cover to the transmission case side cover.

NOTE:
- Be very careful not to damage the new O-ring during installation.


JAT00271-00245

(7) Install the hole snap ring, using standard pliers.

NOTE:
- Make sure that the hole of the snap ring comes in the slant line section indicated in the right figure when assembling.

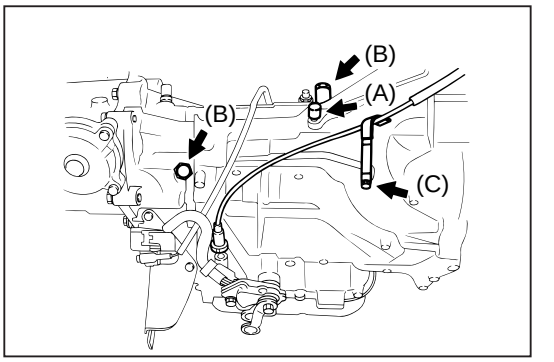


JAT00272-00246

49. Assemble the union bolts (B) with a new gasket interposed. (B)
    Tightening Torque: 29.4 - 39.2 N·m (3.0 - 4.0 kgf-m)

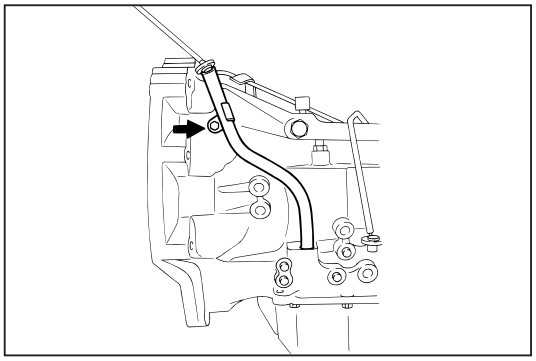
50. Tighten the breather plug (A).
    Tightening Torque: 6.9 - 9.8 N·m (0.7 - 1.0 kgf-m)

51. Assemble the clamp (C) for the throttle cable. Tighten the bolt to the specified torque.
    Tightening Torque: 6.9 - 9.8 N·m (0.7 - 1.0 kgf m)



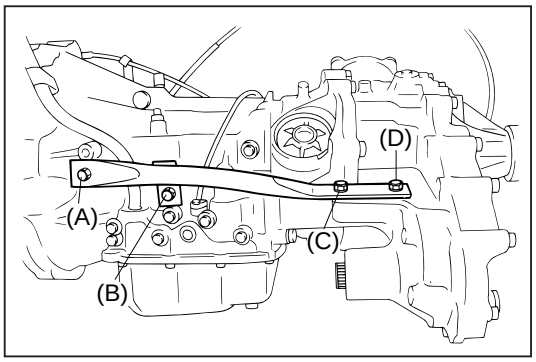
JAT00273-00247

52. Coat a new O-ring with the ATF.
53. Install the new O-ring to the transmission oil filler tube subassembly.
    NOTE:
    - Be very careful not to twist or damage the O-ring during the installation of the transmission oil filler tube subassembly.


JAT00274-00248

54. Insert the transmission oil filler tube subassembly to the transmission case.
55. Tighten the transmission oil filler tube subassembly with the bolt.
    Tightening Torque: 6.9 - 9.8 N·m (0.7 - 1.0 kgf-m)

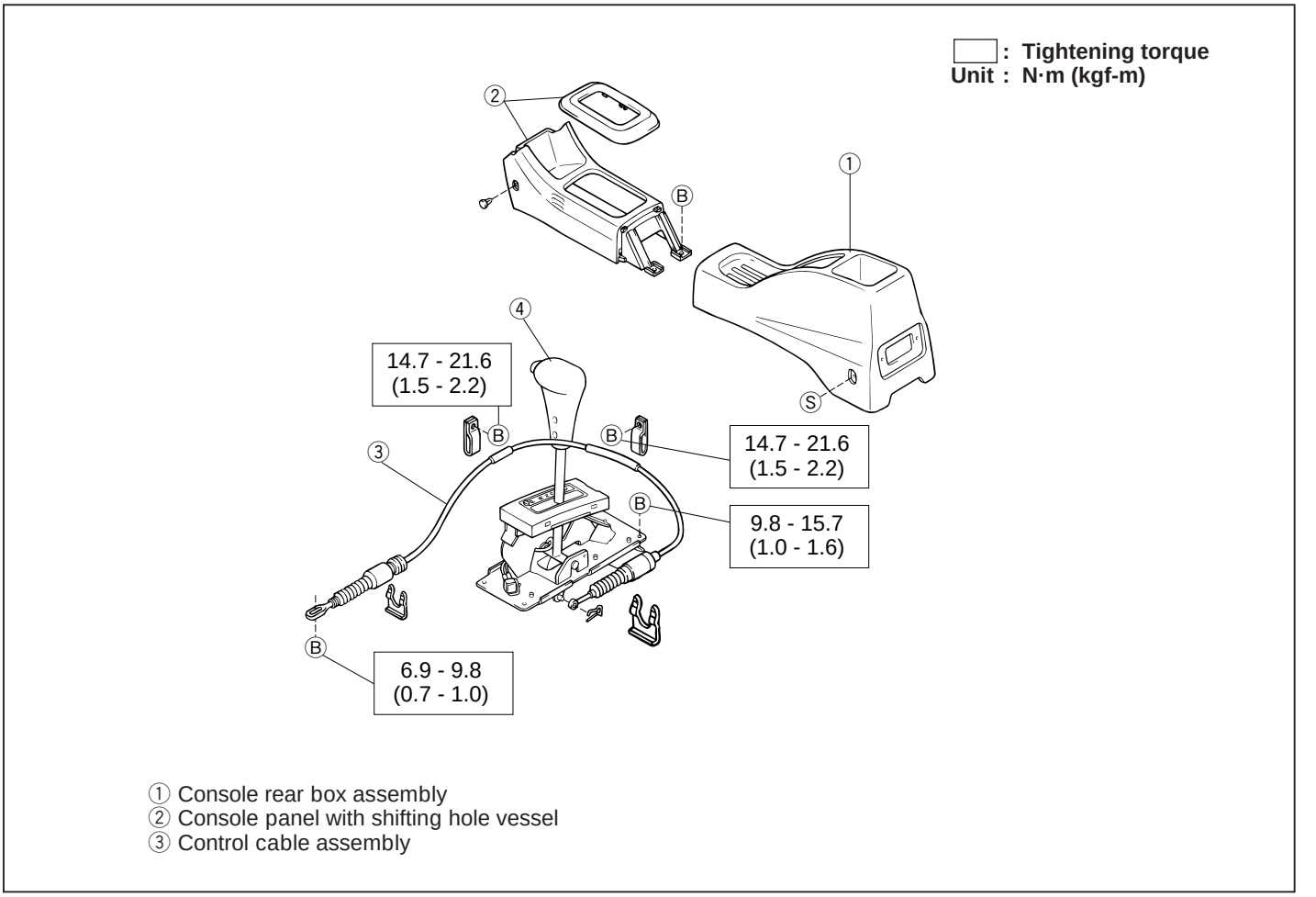
56. Install the power train stiffener. Tighten the bolts in the following sequence.
    (1) Temporarily tighten the bolt (A) and bolt (D).
    (2) Securely tighten the bolt (B).
    (3) Tighten the bolts in the sequence of the bolt (A), bolt (D) and bolt (C).
    Tightening Torque: 29.4 - 44.1 N·m (3.0 - 4.5 kgf-m)



JAT00275-00249

INSTALLATION AND REMOVAL OF CONTROL CABLE AND FLOOR SHIFT

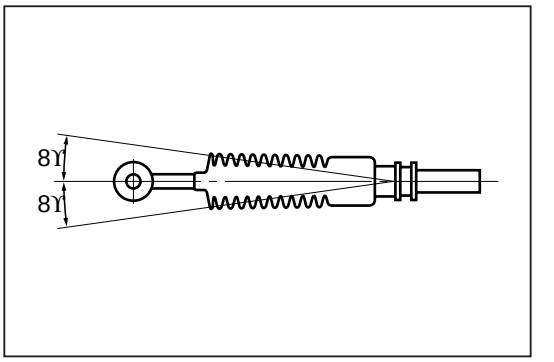
COMPONENTS



① Console rear box assembly
② Console panel with shifting hole vessel
③ Control cable assembly

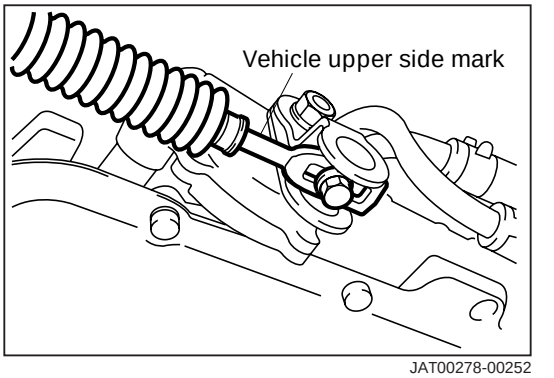
JAT00276-00250

1. Main points of removal
   NOTE:
   - Be very careful not to rock the control cable end (both shift lever side and transmission side) beyond 8 degrees. Also, never apply any load to it.



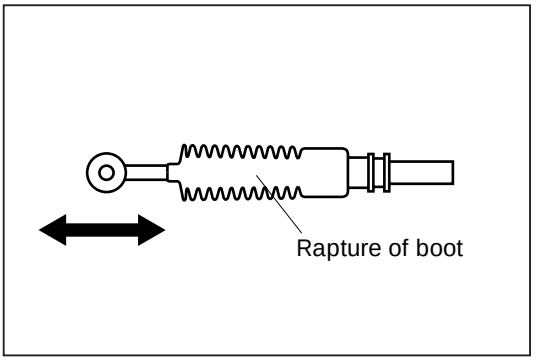
JAT00277-00251

   (1) Remove the control cable assembly.
      1) First, confirm that a white mark for identifying the upper side and lower side is put on the upper side of the cable end. Then, remove the control cable assembly at the transmission side. If the mark is erased, put a mark.



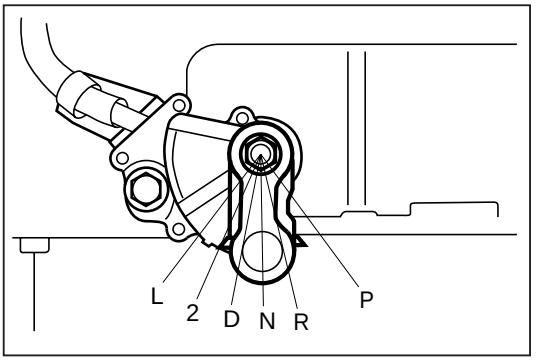
JAT00278-00252

2. Check
   (1) Check that the inner cable of the control cable assembly slides smoothly. Also, check that the control cable assembly exhibits no damage and deformation, such as rapture of the boot.



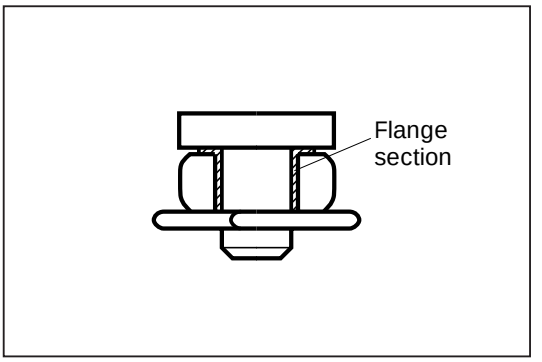
JAT00279-00253

3. Main points of installation
   (1) Install the control cable assembly.
      1) Move the shift lever and transmission control shaft lever to the N range.



JAT00280-00254

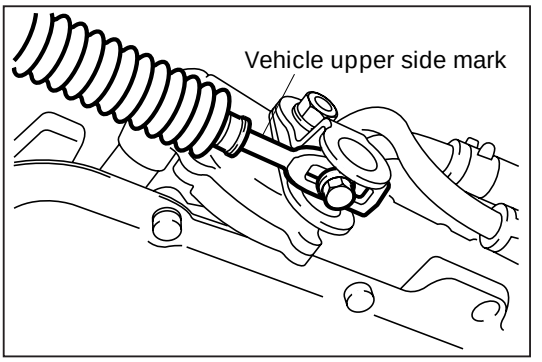
      2) Connect the control cable (at the shift lever side) to the floor shift assembly so that the flange section of the collar may come at the lever side. Then, secure the control cable with the clip.



JAT00281-00255

      3) Install the control cable end at the transmission side to the transmission control shaft lever assembly, while making sure that the white mark for identifying the upper side and lower side comes at the upper side.

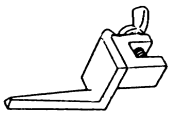
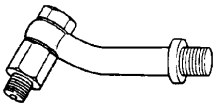
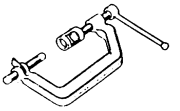
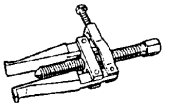
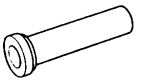
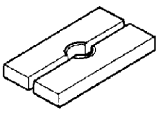
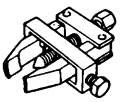
   Tightening Torque: 6.9 - 9.8 N·m (0.7 - 1.0 kgf-m)

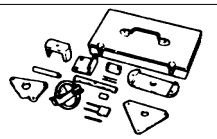
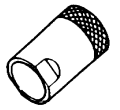
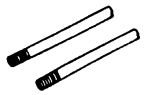
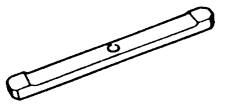
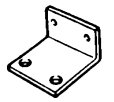
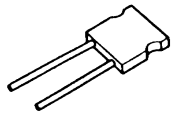
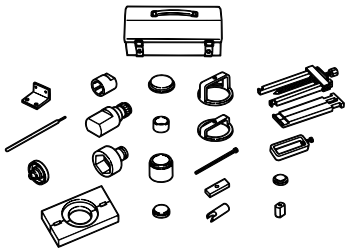
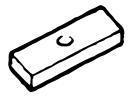


JAT00282-00256

APPENDIX

SSTs (Special Service Tools)

Shape	Part No.	Part name
	09302-87201-000	Neutral start switch adjusting gauge
	09325-87201-000	Automatic transmission pressure gauge No. 1 adapter
	09202-87002-000	Valve cutter remover & replacer
	09301-87702-000	Clutch guide tool
	09308-10010-000	Oil seal puller
	09309-87203-000	4M/T friction dumper No. 2 replacer
	09309-87502-000	4M/T friction dumper No. 2 replacer
	09310-87301-000	Countershaft front bearing replacer
	09527-87301-000	Rear axle shaft bearing remover
	09820-00021-000	Alternator rear bearing puller
	09306-87302-000	Counter gear front bearing puller

Shape	Part No.	Part name
	09350-87202-000	Automatic transmission tool set
	09351-87201-000	Piston spring No. 1 compressor
	09351-87203-000	Dial gauge attachment
	09351-87206-000	Oil pump driver
	09351-87207-000	Oil pump guide
	09351-87208-000	Direct & forward clutch measure
	09351-87210-000	Dial gauge stand base
	09351-87211-000	Manual valve setting tool
	09350-87704-000	Automatic tool set
	09351-87707-000	Piston spring No. 1 compressor
	09351-87709-000	Brake piston rod
	09351-87710-000	Brake piston plate

SERVICE SPECIFICATIONS

Unit: mm

Items		Specified value	Allowable limit
Free play of input shaft		0.28 - 0.92	—
Bush bore diameter of direct clutch drum subassembly		44.000 - 44.025	44.075
Stroke of direct clutch piston		1.22 - 1.53	—
End play of direct clutch		0.77 - 1.08	—
End play of 1st & reverse brake		1.04 - 1.41	—
Bush bore diameter of planetary sun gear subassembly		22.020 - 22.038	22.088
Bush bore diameter of rear planetary sun gear subassembly		15.500 - 15.518	15.568
Bush bore diameter of planetary output shaft subassembly		12.000 - 12.018	12.068
Bush bore diameter of stator shaft & oil pump assembly	Front side	15.500 - 15.522	15.572
	Rear side	21.100 - 21.121	21.171
Dimensions of compression spring for accumulator C2 piston	Free length	⟨85.8⟩	—
	Outer diameter	⟨18.3⟩	—
Dimensions of compression spring for accumulator B1 piston	Free length	⟨50.5⟩	—
	Outer diameter	⟨20.0⟩	—

The number in brackets < > denotes the reference value.

JAT00284-00000

TIGHTENING TORQUE

Tightening components		Tightening torque	
		N·m	kgf-m
Drive plate × Crankshaft		78.45 - 98.07	8.0 - 10.0
Transmission × Engine direct-connecting bolt		49.04 - 68.64	5.0 - 7.0
Torque convertor × Drive plate		29.4 - 44.1	3.0 - 4.5
Power train stiffener × Engine, Transmission	M8	14.7 - 21.6	1.5 - 2.2
	M10	29.4 - 44.1	3.0 - 4.5
Starter shaft & oil pump × Transmission case		6.9 - 9.8	0.7 - 1.0
Nut (for brake band anchor bolt) × Transmission case		22.5 - 30.4	2.3 - 3.1
Roller, bolt for securing spring × Transmission case		6.9 - 9.8	0.7 - 1.0
Parking lock pawl cam support × Transmission case		14.7 - 17.7	1.5 - 1.8
Valve body × Transmission case		6.9 - 9.8	0.7 - 1.0
Manual detent spring × Transmission case		6.9 - 9.8	0.7 - 1.0
Transmission oil pan × Transmission case		6.9 - 9.8	0.7 - 1.0
Inspection plugs × Transmission case		6.9 - 9.8	0.7 - 1.0
Breather plug × Transmission case		6.9 - 9.8	0.7 - 1.0
Throttle cable × Transmission case		6.9 - 9.8	0.7 - 1.0
Clamp for throttle cable × Transmission case		6.9 - 9.8	0.7 - 1.0
Oil strainer × Transmission case		6.9 - 9.8	0.7 - 1.0
Unions (for oil cooler) × Transmission case		29.4 - 39.2	3.0 - 4.0
Neutral start switch × Transmission case		14.7 - 21.6	1.5 - 2.2
Transmission control shaft lever × Manual shaft lever		9.8 - 15.7	1.0 - 1.6
Control cable bracket × Transmission case side cover		14.7 - 21.6	1.5 - 2.2
Transmission oil filter tube × Transmission case		6.9 - 9.8	0.7 - 1.0
Transmission case × Transmission case side cover		14.7 - 21.6	1.5 - 2.2
Breather plug × Transmission case side cover		6.9 - 9.8	0.7 - 1.0
Solenoid wire assembly × Transmission case		6.9 - 9.8	0.7 - 1.0
Transmission × Transfer		29.4 - 44.1	3.0 - 4.5
Control cable × Transmission control shaft lever		6.9 - 9.8	0.7 - 1.0
Drain plug × Oil pan		19.6 - 29.4	2.0 - 3.0
Oil cooler × Oil cooler bracket		6.9 - 9.8	0.7 - 1.0
Power train stiffener × Transmission, Transfer		29.4 - 44.1	3.0 - 4.5

JAT00285-00000

TO INDEX

TO NEXT SECTION