GENERAL INFORMATION

00
SECTION

00–00 GENERAL INFORMATION

HOW TO USE THIS MANUAL

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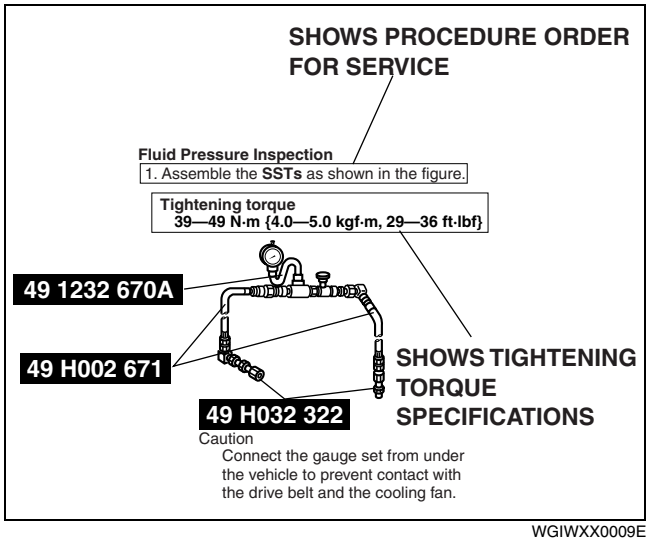
Range of Topics

- This manual contains procedures for performing all required service operations. The procedures are divided into the following five basic operations:
  — Removal/Installation
  — Disassembly/Assembly
  — Replacement
  — Inspection
  — Adjustment
- Simple operations which can be performed easily just by looking at the vehicle (i.e., removal/installation of parts, jacking, vehicle lifting, cleaning of parts, and visual inspection) have been omitted.

Service Procedure
Inspection, adjustment

- Inspection and adjustment procedures are divided into steps. Important points regarding the location and contents of the procedures are explained in detail and shown in the illustrations.



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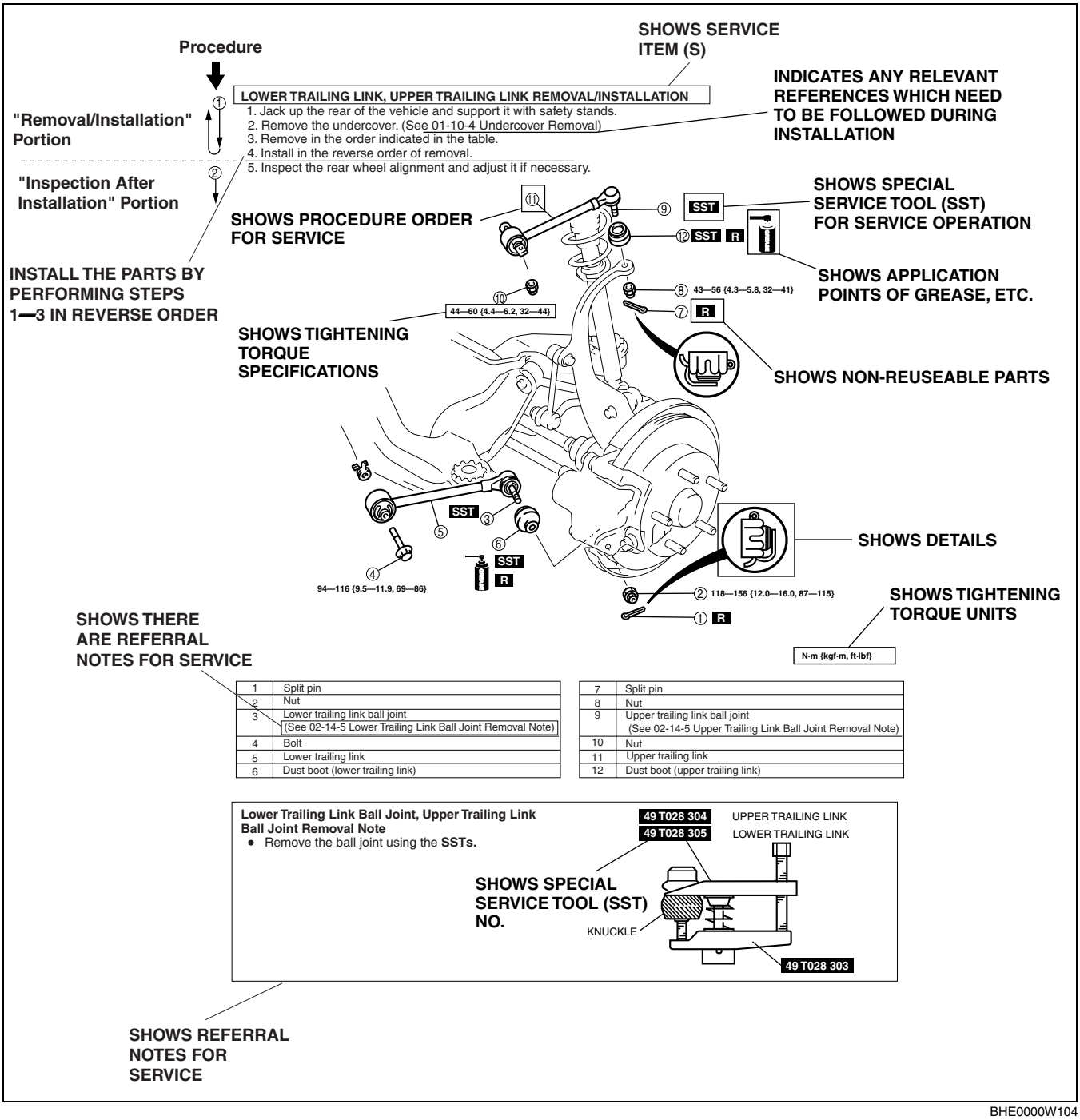
Repair procedure

1. Most repair operations begin with an overview illustration. It identifies the components, shows how the parts fit together, and describes visual part inspection. However, only removal/installation procedures that need to be performed methodically have written instructions.
2. Expendable parts, tightening torques, and symbols for oil, grease, and sealant are shown in the overview illustration. In addition, symbols indicating parts requiring the use of special service tools or equivalent are also shown.

3. Procedure steps are numbered and the part that is the main point of that procedure is shown in the illustration with the corresponding number. Occasionally, there are important points or additional information concerning a procedure. Refer to this information when servicing the related part.



1	Split pin	7	Split pin
2	Nut	8	Nut
3	Lower trailing link ball joint (See 02-14-5 Lower Trailing Link Ball Joint Removal Note)	9	Upper trailing link ball joint (See 02-14-5 Upper Trailing Link Ball Joint Removal Note)
4	Bolt	10	Nut
5	Lower trailing link	11	Upper trailing link
6	Dust boot (lower trailing link)	12	Dust boot (upper trailing link)

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Symbols

- There are eight symbols indicating oil, grease, fluids, sealant, and the use of **SST** or equivalent. These symbols show application points or use of these materials during service.

Symbol	Meaning	Kind
	Apply oil	New appropriate engine oil or gear oil

Symbol	Meaning	Kind
	Apply brake fluid	New appropriate brake fluid
	Apply automatic transaxle/ transmission fluid	New appropriate automatic transaxle/ transmission fluid
	Apply grease	Appropriate grease
	Apply sealant	Appropriate sealant
	Apply petroleum jelly	Appropriate petroleum jelly
R	Replace part	O-ring, gasket, etc.
SST	Use SST or equivalent	Appropriate tools

Advisory Messages
- You will find several **Warnings**, **Cautions**, **Notes**, **Specifications** and **Upper and Lower Limits** in this manual.

Warning
- A Warning indicates a situation in which serious injury or death could result if the warning is ignored.

Caution
- A Caution indicates a situation in which damage to the vehicle or parts could result if the caution is ignored.

Note
- A Note provides added information that will help you to complete a particular procedure.

Specification
- The values indicate the allowable range when performing inspections or adjustments.

Upper and lower limits
- The values indicate the upper and lower limits that must not be exceeded when performing inspections or adjustments.

UNITS

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Electric current	A (ampere)
Electric power	W (watt)
Electric resistance	ohm
Electric voltage	V (volt)
Length	mm (millimeter)
	in (inch)
Negative pressure	kPa (kilo pascal)
	mmHg (millimeters of mercury)
	inHg (inches of mercury)

Positive pressure	kPa (kilo pascal)
	kgf/cm^2 (kilogram force per square centimeter)
	psi (pounds per square inch)
Number of revolutions	rpm (revolutions per minute)
Torque	N·m (Newton meter)
	kgf·m (kilogram force meter)
	kgf·cm (kilogram force centimeter)
	ft·lbf (foot pound force)
	in·lbf (inch pound force)
Volume	L (liter)
	US qt (U.S. quart)
	Imp qt (Imperial quart)
	ml (milliliter)
	cc (cubic centimeter)
	cu in (cubic inch)
	fl oz (fluid ounce)
Weight	g (gram)
	oz (ounce)

Conversion to SI Units (Système International d'Unités)
- All numerical values in this manual are based on SI units. Numbers shown in conventional units are converted from these values.

Rounding Off
- Converted values are rounded off to the same number of places as the SI unit value. For example, if the SI unit value is 17.2 and the value after conversion is 37.84, the converted value will be rounded off to 37.8.

Upper and Lower Limits
- When the data indicates upper and lower limits, the converted values are rounded down if the SI unit value is an upper limit and rounded up if the SI unit value is a lower limit. Therefore, converted values for the same SI unit value may differ after conversion. For example, consider 2.7 kgf/cm^2 in the following specifications:

  210—260 kPa {2.1—2.7 kgf/cm^2, 30—38 psi}
  270—310 kPa {2.7—3.2 kgf/cm^2, 39—45 psi}

- The actual converted values for 2.7 kgf/cm^2 are 264 kPa and 38.4 psi. In the first specification, 2.7 is used as an upper limit, so the converted values are rounded down to 260 and 38. In the second specification, 2.7 is used as a lower limit, so the converted values are rounded up to 270 and 39.

FUNDAMENTAL PROCEDURES

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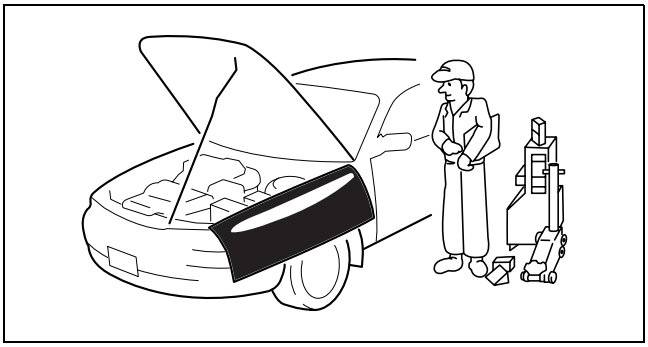
Preparation of Tools and Measuring Equipment
- Be sure that all necessary tools and measuring equipment are available before starting any work.



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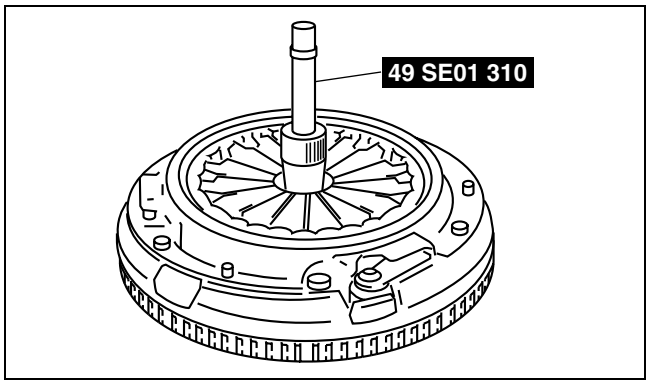
Special Service Tools

- Use special service tools or equivalent when they are required.



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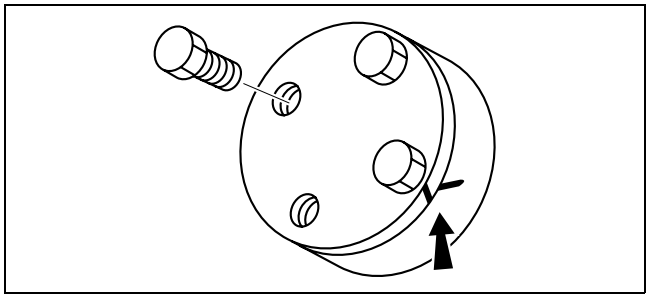
Disassembly

- If the disassembly procedure is complex, requiring many parts to be disassembled, all parts should be marked in a place that will not affect their performance or external appearance and identified so that reassembly can be performed easily and efficiently.



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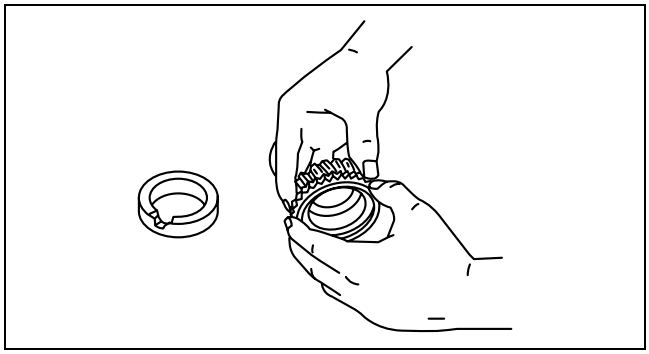
Inspection During Removal, Disassembly

- When removed, each part should be carefully inspected for malfunction, deformation, damage and other problems.



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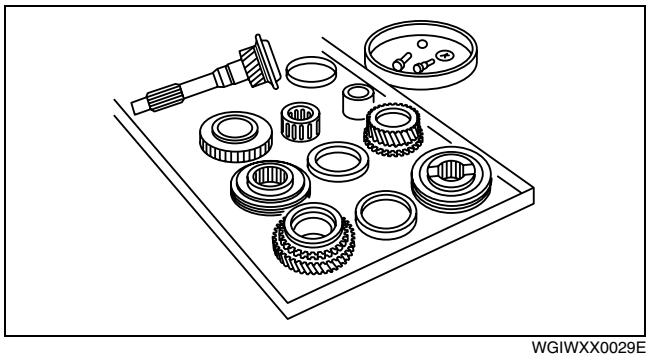
Arrangement of Parts

- All disassembled parts should be carefully arranged for reassembly.
- Be sure to separate or otherwise identify the parts to be replaced from those that will be reused.



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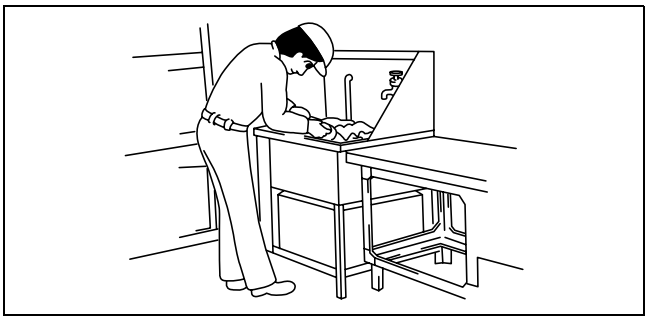
Cleaning of Parts

- All parts to be reused should be carefully and thoroughly cleaned in the appropriate method.

  Warning
  - **Using compressed air can cause dirt and other particles to fly out causing injury to the eyes. Wear protective eye wear whenever using compressed air.**



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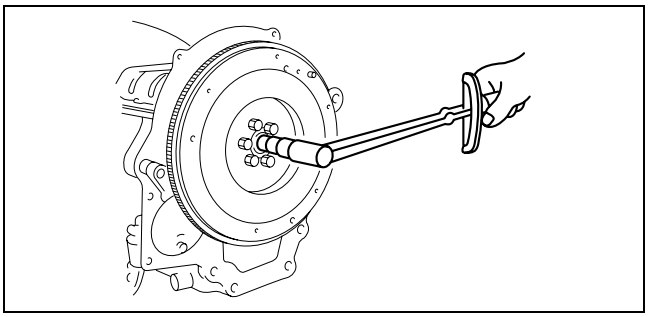
Reassembly

- Standard values, such as torques and certain adjustments, must be strictly observed in the reassembly of all parts.
- If removed, the following parts should be replaced with new ones:
  — Oil seals
  — Gaskets
  — O-rings
  — Lockwashers
  — Cotter pins
  — Nylon nuts



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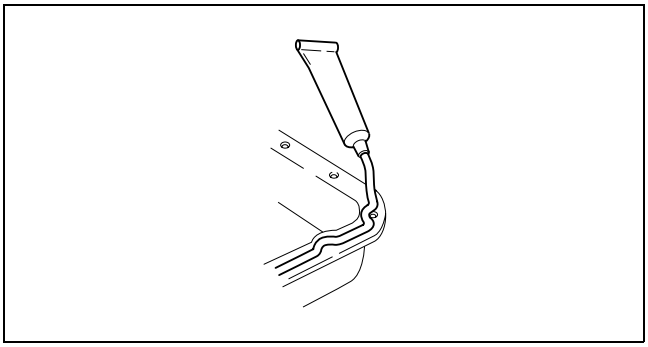
- Depending on location:
  — Sealant and gaskets, or both, should be applied to specified locations. When sealant is applied, parts should be installed before sealant hardens to prevent leakage.
  — Oil should be applied to the moving components of parts.
  — Specified oil or grease should be applied at the prescribed locations (such as oil seals) before reassembly.



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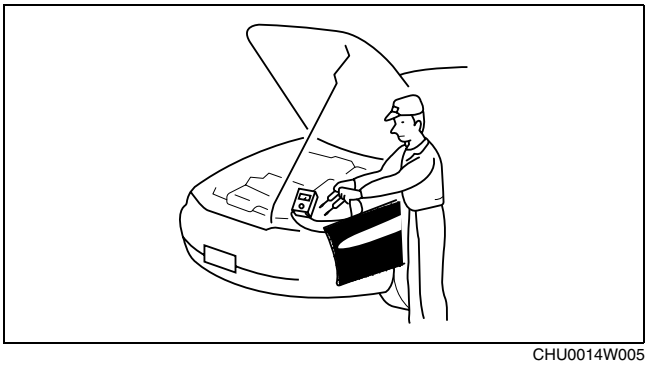
Adjustment

- Use suitable gauges and testers when making adjustments.



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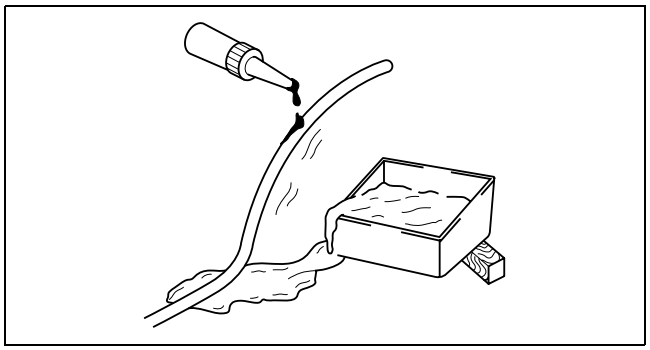
Rubber Parts and Tubing

- Prevent gasoline or oil from getting on rubber parts or tubing.



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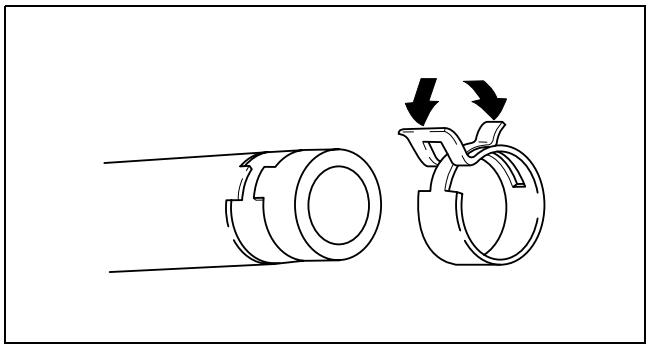
Hose Clamps

- When reinstalling, position the hose clamp in the original location on the hose and squeeze the clamp lightly with large pliers to ensure a good fit.



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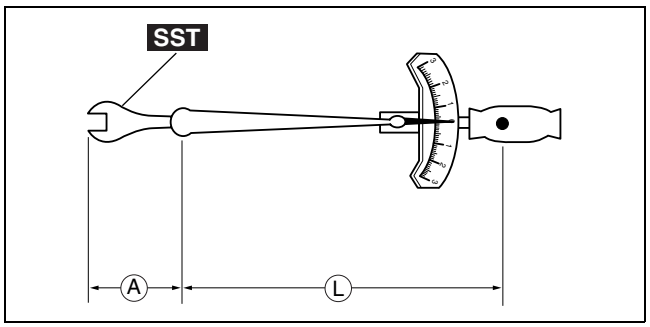
Torque Formulas

- When using a torque wrench-**SST** or equivalent combination, the written torque must be recalculated due to the extra length that the **SST** or equivalent adds to the torque wrench. Recalculate the torque by using the following formulas. Choose the formula that applies to you.

Torque Unit	Formula
N·m	N·m × [L/ (L+A)]
kgf·m	kgf·m × [L/ (L+A)]
kgf·cm	kgf·cm × [L/ (L+A)]
ft·lbf	ft·lbf × [L/ (L+A)]
in·lbf	in·lbf × [L/ (L+A)]

A : The length of the **SST** past the torque wrench drive.
L : The length of the torque wrench.



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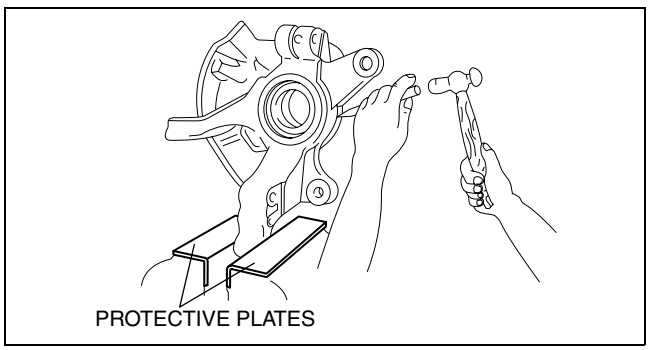
Vise

- When using a vise, put protective plates in the jaws of the vise to prevent damage to parts.



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ELECTRICAL SYSTEM

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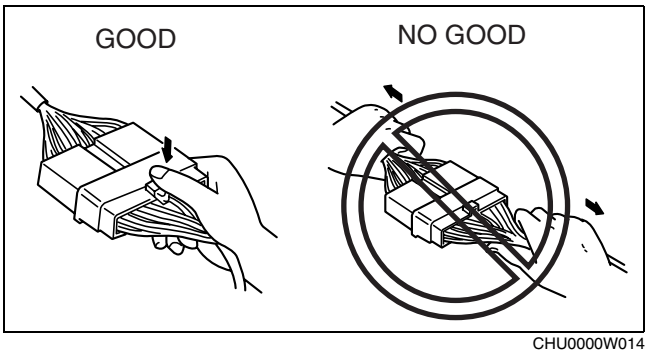
Connectors

Disconnecting connectors

- When disconnecting connector, grasp the connectors, not the wires.



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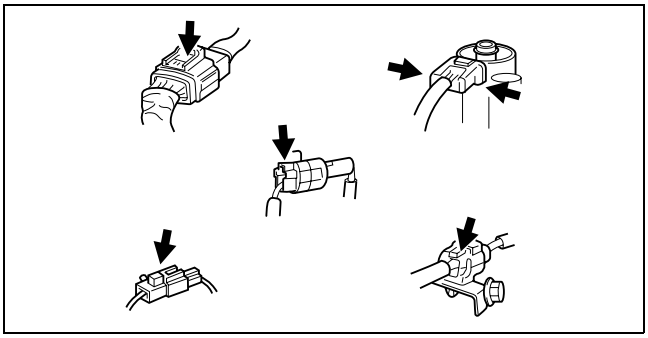
- Connectors can be disconnected by pressing or pulling the lock lever as shown.



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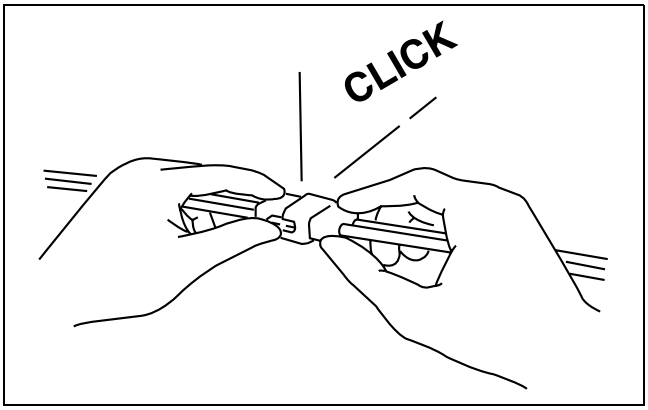
Locking connector

- When locking connectors, listen for a click indicating they are securely locked.



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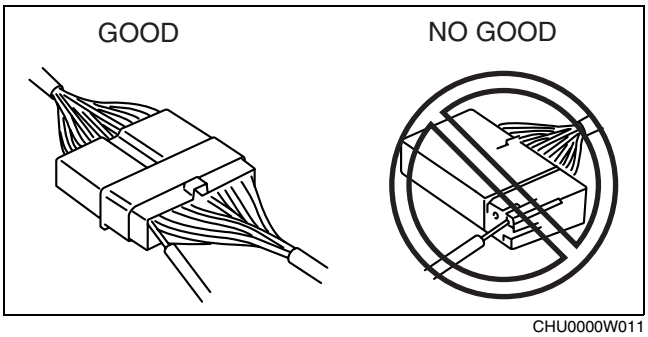
Inspection

- When a tester is used to inspect for continuity or measuring voltage, insert the tester probe from the wiring harness side.
- Inspect the terminals of waperproof connectors from the connector side since they cannot be accessed from the wiring harness side.

Caution

- **To prevent damage to the terminal, wrap a thin wire around the tester probe before inserting into terminal.**



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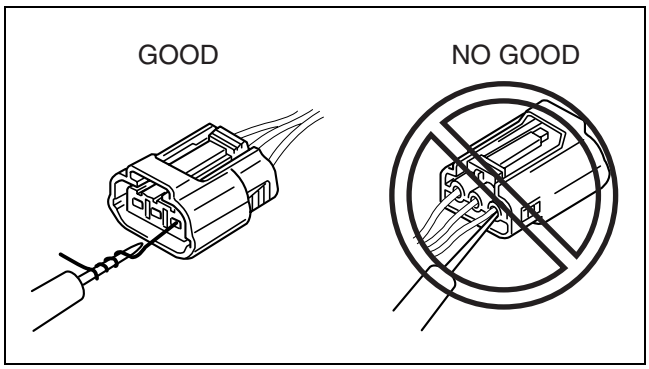

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NEW STANDARDS

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- Following is a comparison of the previous standard and the new standard.

New Standard		Previous Standard		Remark
Abbreviation	**Name**	**Abbreviation**	**Name**	
AP	Accelerator Pedal	—	Accelerator Pedal	
ACL	Air Cleaner	—	Air Cleaner	
A/C	Air Conditioning	—	Air Conditioning	
BARO	Barometric Pressure	—	Atmospheric Pressure	
B+	Battery Positive Voltage	Vb	Battery Voltage	
—	Brake Switch	—	Stoplight Switch	
—	Calibration Resistor	—	Corrected Resistance	#6
CMP sensor	Camshaft Position Sensor	—	Crank Angle Sensor	
CAC	Charge Air Cooler	—	Intercooler	
CLS	Closed Loop System	—	Feedback System	
CTP	Closed Throttle Position	—	Fully Closed	
CPP	Clutch Pedal Position	—	Idle Switch	
CIS	Continuous Fuel Injection System	—	Clutch Position	
CS sensor	Control Sleeve Sensor	CSP sensor	Control Sleeve Position Sensor	#6
CKP sensor	Crankshaft Position Sensor	—	Crank Angle Sensor 2	
DLC	Data Link Connector	—	Diagnosis Connector	
DTM	Diagnostic Test Mode	—	Test Mode	#1
DTC	Diagnostic Trouble Code(s)	—	Service Code(s)	
DI	Distributor Ignition	—	Spark Ignition	
DLI	Distributorless Ignition	—	Direct Ignition	
EI	Electronic Ignition	—	Electronic Spark Ignition	#2
ECT	Engine Coolant Temperature	—	Water Thermo	
EM	Engine Modification	—	Engine Modification	
—	Engine Speed Input Signal	—	Engine RPM Signal	
EVAP	Evaporative Emission	—	Evaporative Emission	
EGR	Exhaust Gas Recirculation	—	Exhaust Gas Recirculation	
FC	Fan Control	—	Fan Control	
FF	Flexible Fuel	—	Flexible Fuel	
4GR	Fourth Gear	—	Overdrive	
—	Fuel Pump Relay	—	Circuit Opening Relay	#3
FSO solenoid	Fuel Shut Off Solenoid	FCV	Fuel Cut Valve	#6
GEN	Generator	—	Alternator	
GND	Ground	—	Ground/Earth	
HO2S	Heated Oxygen Sensor	—	Oxygen Sensor	With heater
IAC	Idle Air control	—	Idle Speed Control	
—	IDM Relay	—	Spill Valve Relay	#6
—	Incorrect Gear Ratio	—	—	
—	Injection Pump	FIP	Fuel Injection Pump	#6

New Standard		Previous Standard		Remark
Abbreviation	Name	Abbreviation	Name	
—	Input/Turbine Speed Sensor	—	Pulse Generator	
IAT	Intake Air Temperature	—	Intake Air Thermo	
KS	Knock Sensor	—	Knock Sensor	
MIL	Malfunction Indicator Lamp	—	Malfunction Indicator Light	
MAP	Manifold Absolute Pressure	—	Intake Air Pressure	
MAF sensor	Mass Air Flow Sensor	—	Airflow Sensor	
MFL	Multiport Fuel Injection	—	Multiport Fuel Injection	
OBD	On-Board Diagnostic	—	Diagnosis/Self Diagnosis	
OL	Open Loop	—	Open Loop	
—	Output Speed Sensor	—	Vehicle Speed Sensor 1	
OC	Oxidation Catalytic Converter	—	Catalytic Converter	
O2S	Oxygen Sensor	—	Oxygen Sensor	
PNP	Park/Neutral Position	—	Park/Neutral Range	
—	PCM Control Relay	—	Main Relay	#6
PSP	Power Steering Pressure	—	Power Steering Pressure	
PCM	Powertrain Control Module	ECU	Engine Control Unit	#4
—	Pressure Control Solenoid	—	Line Pressure Solenoid Valve	
PAIR	Pulsed Secondary Air Injection	—	Secondary Air Injection System	Pulsed injection
—	Pump Speed Sensor	—	NE Sensor	#6
AIR	Secondary Air Injection	—	Secondary Air Injection System	Injection with air pump
SAPV	Secondary Air Pulse Valve	—	Reed Valve	
SFI	Sequential Multipoint Fuel Injection	—	Sequential Fuel Injection	
—	Shift Solenoid A	—	12 Shift Solenoid Valve	
		—	Shift A Solenoid Valve	
—	Shift Solenoid B	—	23 Shift Solenoid Valve	
		—	Shift B Solenoid Valve	
—	Shift Solenoid C	—	34 Shift Solenoid Valve	
3GR	Third Gear	—	3rd Gear	
TWC	Three Way Catalytic Converter	—	Catalytic Converter	
TB	Throttle Body	—	Throttle Body	
TP sensor	Throttle Position Sensor	—	Throttle Sensor	
TCV	Timer Control Valve	TCV	Timing Control Valve	#6
TCC	Torque Converter Clutch	—	Lockup Position	
TCM	Transmission (Transaxle) Control Module	—	EC-AT Control Unit	
—	Transmission (Transaxle) Fluid Temperature Sensor	—	ATF Thermosensor	
TR	Transmission (Transaxle) Range	—	Inhibitor Position	
TC	Turbocharger	—	Turbocharger	
VSS	Vehicle Speed Sensor	—	Vehicle Speed Sensor	
VR	Voltage Regulator	—	IC Regulator	
VAF sensor	Volume Air Flow Sensor	—	Air flow Sensor	
WUTWC	Warm Up Three Way Catalytic Converter	—	Catalytic Converter	#5
WOT	Wide Open Throttle	—	Fully Open	

#1 : Diagnostic trouble codes depend on the diagnostic test mode
#2 : Controlled by the PCM
#3 : In some models, there is a fuel pump relay that controls pump speed. That relay is now called the fuel pump relay (speed).
#4 : Device that controls engine and powertrain
#5 : Directly connected to exhaust manifold

#6 : Part name of diesel engine

ABBREVIATIONS

B3E000000011A01

ATF	Automatic Transaxle Fluid
AT	Automatic Transaxle
CAN	Controller Area Network
SST	Special Service Tools
TFT	Transaxle Fluid Temperature

TRANSMISSION/TRANSAXLE

05
SECTION

05–17 AUTOMATIC TRANSAXLE

AUTOMATIC TRANSAXLE OUTLINE

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- An electronically controlled automatic transaxle with FN4A-EL type four-speed torque converter clutch

combining advanced electronic and mechanical technologies has been adopted.
- In the FN4A-EL type automatic transaxle, the part count is greatly reduced to lessen its size and weight. Also, a well-balanced powertrain mechanism with high reliability is adopted to improve marketability.

AUTOMATIC TRANSAXLE FEATURES

B3E051701030A02

Realization of excellent shift quality	• Electronic pressure-adjusting control of line pressure by a liner type solenoid (pressure control solenoid) adopted • Electronic control (direct electric shift control) of clutch pressure by duty-cycle type solenoids (shift solenoid A, B, and C) adopted • Centrifugal balance clutch chamber adopted
High efficiency, compactness, and light weight	• Miniature trochoid gear type oil pump with torque converter direct drive adopted • Bonded seal piston adopted • Tow-step final gear drive mechanism adopted
Improved reliability, reduced NVH (noise, vibration and harshness)	• Double arranged gears with a single planetary gear unit adopted

AUTOMATIC TRANSAXLE CROSS-SECTIONAL VIEW

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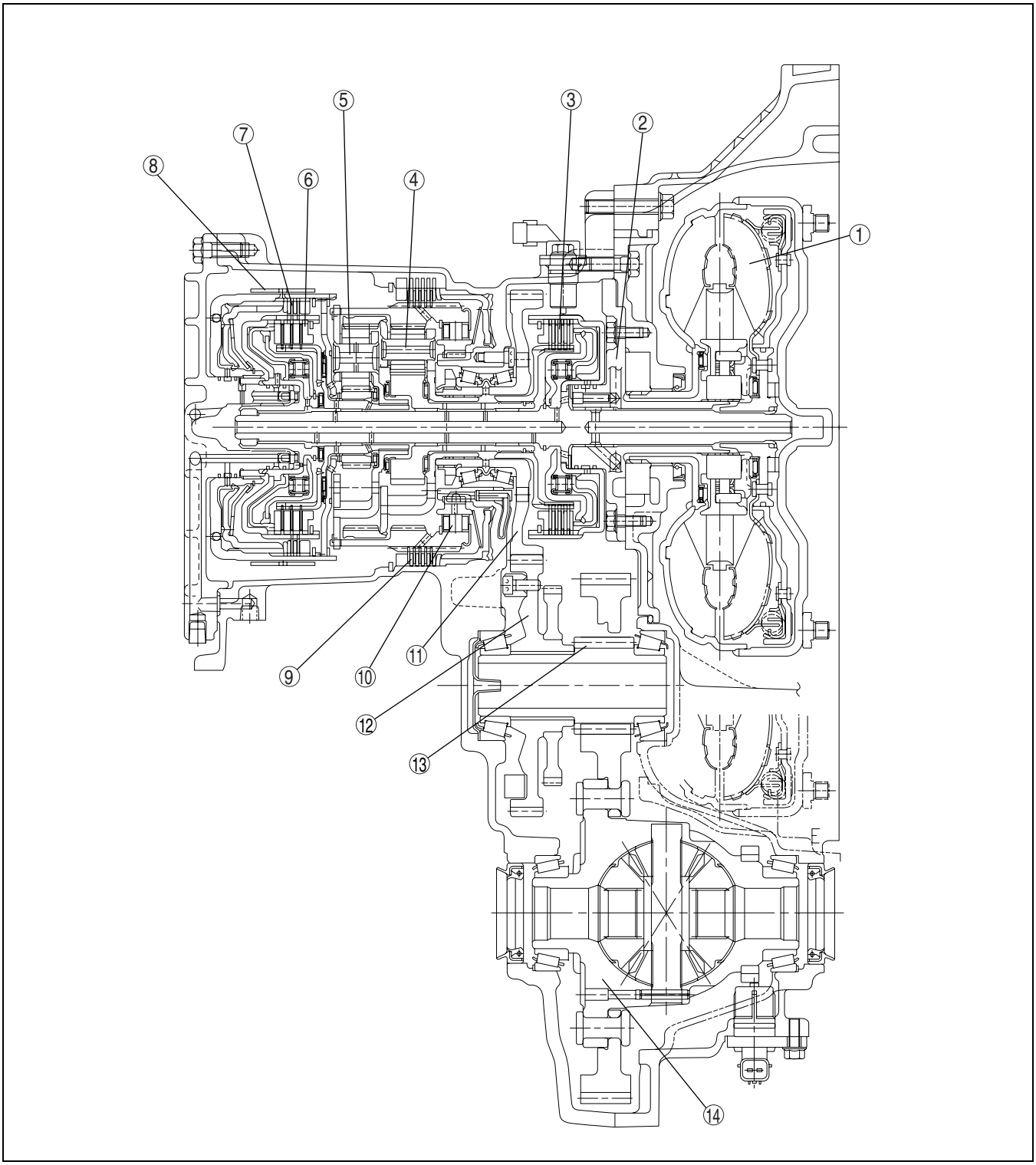

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1	Torque converter
2	Oil pump
3	Forward clutch
4	Front planetary gear
5	Rear planetary gear
6	3-4 clutch
7	Reverse clutch

8	2-4 brake band
9	Low and reverse brake
10	One-way clutch
11	Primary gear
12	Secondary gear
13	Output gear
14	Differential

OUTLINE OF OPERATION

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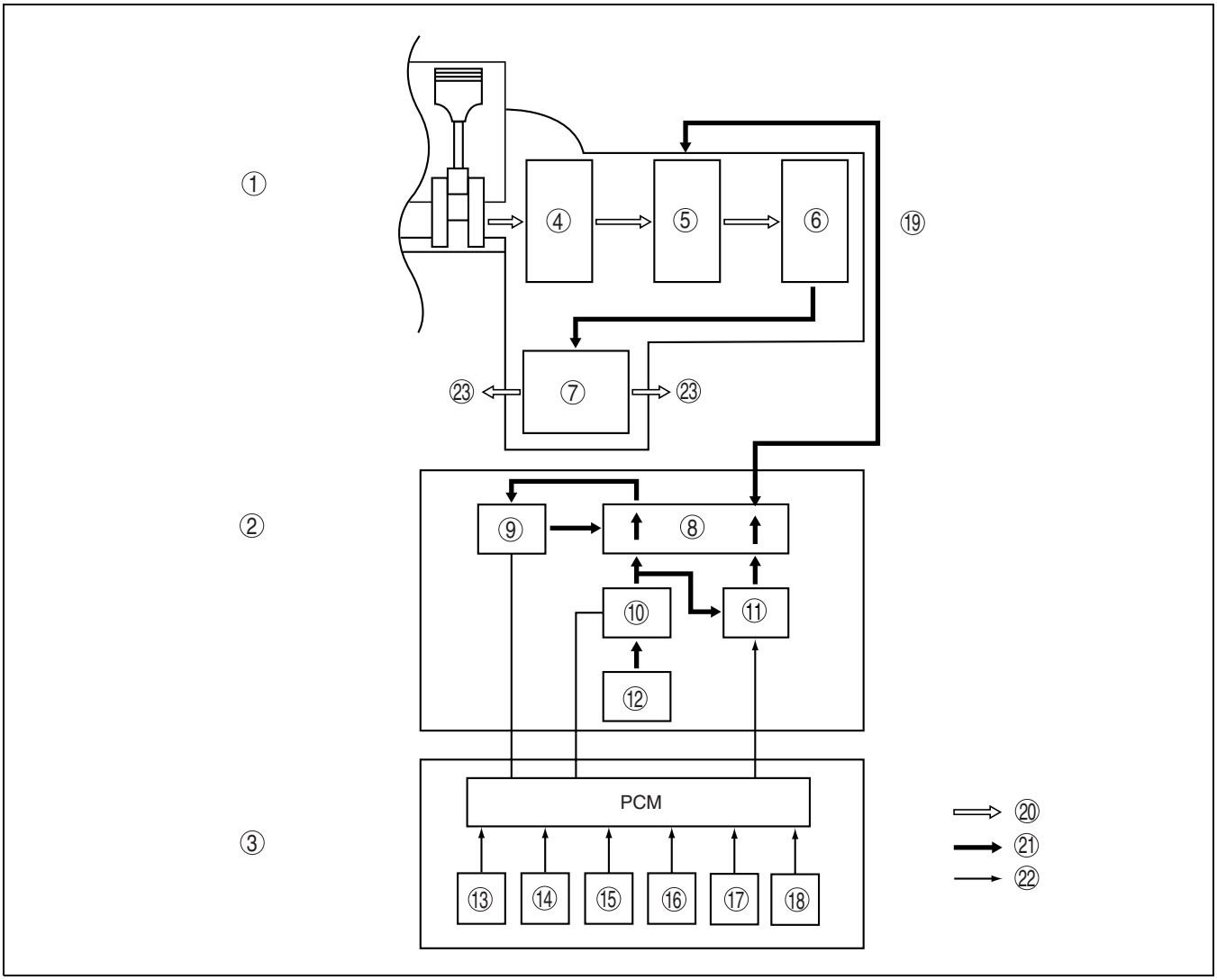
- The operation of the electronic automatic transaxle is classified into three systems: the electronic control mechanism, the hydraulic pressure control mechanism, and the powertrain mechanism (includes the torque converter mechanism). The operation of each system is as follows:
  - — Electronic control mechanism
    - According to the signals from the switches and sensors in the input system, the PCM outputs the signal which matches the present driving condition to the linear type solenoid, ON/OFF type solenoids and the duty-cycle type solenoids in the hydraulic pressure control mechanism.
  - — Hydraulic pressure control mechanism
    - According to the signals from the PCM, each solenoid operates to switch the hydraulic passages in the control valve body and controls the clutch engagement pressure.
    - The line pressure is adjusted by the linear type pressure control solenoid. The hydraulic passages are switched by the ON/OFF type solenoids (shift solenoids D and E.) And the clutch engagement pressure is controlled by the duty-cycle type solenoids (shift solenoids A, B, and C).
  - — Powertrain mechanism
    - The driving force from the engine is transmitted through the torque converter to the transaxle.
    - The transmitted driving force operates each clutch and brake according to the clutch engagement pressure from the duty-cycle type solenoid, and the planetary gears change the gear ratio to the optimal driving force. The changed driving force is transmitted through the differential to the axle shaft and then the tires.



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1	Powertrain mechanism
2	Hydraulic pressure control mechanism
3	Electronic control mechanism
4	Torque converter

5	Clutches, brakes
6	Planetary gear
7	Differential
8	Control valve body

9	Shift solenoid D, E (ON/OFF type)
10	Pressure control solenoid (linear type)
11	Shift solenoid A, B, C (duty-cycle type)
12	Oil pump
13	Oil pressure switch signal (vehicles with oil pressure switch)
14	Vehicle speed
15	ATF temperature
16	Forward clutch drum revolution speed
17	Engine revolution speed
18	Throttle position signal
19	Clutches, brakes engagement, release pressure
20	Power flow
21	Hydraulic pressure control signal
22	Electronic signal
23	Tire

EC-AT OPERATION CHART

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4AT

position/Range	Mode	Gear position		Shift pattern			Transaxle							Operation of shift solenoid				
										2–4 brake band				Solenoid valve (duty-cycle type)			Solenoid valve (ON / OFF type)	
				Shift	TCC	Engine brake	Forward clutch	3–4 clutch	Reverse clutch	Applied	Released	Low and reverse brake	One-way clutch	Shift solenoid A	Shift solenoid B	Shift solenoid C	Shift solenoid D	Shift solenoid E
P	–	–	–	–										–	–	–	ON	OFF
R	–	Reverse	2.648	–		×			×			×		OPEN	OPEN	OPEN	OFF	OFF
N	–	–	–	–										–	–	–	ON	OFF
D	*1 POWER/ NORMAL	1GR	2.816	↕			×						⊗	OPEN	CLOSED	CLOSED	OFF	OFF
		2GR	1.497	↕		×	×			×				OPEN	OPEN	CLOSED	OFF	OFF
		3GR	1.000	↕		×	×	×		×	×			OPEN	OPEN	OPEN	OFF	OFF
		4GR	0.725	↕		×		×		×				CLOSED	OPEN	OPEN	ON	OFF
		4GR *2 TCC ON	0.725	↕	×	×		×		×				CLOSED	OPEN	OPEN	ON	ON
	HOLD	2GR	1.497	↕		×	×			×				OPEN	OPEN	CLOSED	OFF	OFF
		3GR	1.000	↕		×	×	×		×	×			OPEN	OPEN	OPEN	OFF	OFF
		4GR *3	0.725	↑		×		×		×				CLOSED	OPEN	OPEN	ON	OFF
S	Non-HOLD	1GR	2.816	↕			×						⊗	OPEN	CLOSED	CLOSED	OFF	OFF
		2GR	1.497	↕		×	×			×				OPEN	OPEN	CLOSED	OFF	OFF
		3GR	1.000	↕		×	×	×		×	×			OPEN	OPEN	OPEN	OFF	OFF
		4GR *3	0.725	↑		×		×		×				CLOSED	OPEN	OPEN	ON	OFF
	HOLD	2GR	1.497	↕		×	×			×				OPEN	OPEN	CLOSED	OFF	OFF
		3GR *3	1.000	↕		×	×	×		×	×			OPEN	OPEN	OPEN	OFF	OFF
		4GR *3	0.725	↑		×		×		×				CLOSED	OPEN	OPEN	ON	OFF
L	Non-HOLD	1GR	2.816	↕		×	×					×	⊗	OPEN	OPEN	CLOSED	ON	ON
		2GR	1.497	↕		×	×			×				OPEN	OPEN	CLOSED	OFF	OFF
		3GR *3	1.000	↕		×	×	×		×	×			OPEN	OPEN	OPEN	OFF	OFF
		4GR *3	0.725	↑		×		×		×				CLOSED	OPEN	OPEN	ON	OFF
	HOLD	1GR	2.816	↕		×	×					×	⊗	OPEN	OPEN	CLOSED	ON	ON
		2GR *3	1.497	↕		×	×			×				OPEN	OPEN	CLOSED	OFF	OFF
		3GR *3	1.000	↕		×	×	×		×	×			OPEN	OPEN	OPEN	OFF	OFF
		4GR *3	0.725	↑		×		×		×				CLOSED	OPEN	OPEN	ON	OFF

*1: Automatically switches between POWER and NORMAL modes according to accelerator pedal depressing speed.
*2: Performs TCC operation in NORMAL mode.
*3: To prevent engine overspeed inhibits downshift until the engine speed is reduced to the preset speed.
×: Operating
⊗: Transmits the torque only when driving.
OPEN: Engages the line pressure to the clutch pressure.
CLOSED: Drains the clutch pressure.
ON: Engages the output port and the supply port (Solenoid reducing pressure).
OFF: Engages the output port and the drain port (Drains the output port).

A6E5614T003

Sport AT

Position/Range	Mode	Gear position		Shift pattern			Transaxle							Operation of shift solenoid				
										2–4 brake band				Solenoid valve (duty-cycle type)			Solenoid valve (ON / OFF type)	
				Shift	TCC	Engine brake	Forward clutch	3–4 clutch	Reverse clutch	Applied	Released	Low and reverse brake	One-way clutch	Shift solenoid A	Shift solenoid B	Shift solenoid C	Shift solenoid D	Shift solenoid E
P	–	Neutral	–	–										–	–	–	ON	OFF
R	–	Reverse	2.648	–		×			×			×		OPEN	OPEN	OPEN	OFF	OFF
N	–	Neutral	–	–										–	–	–	ON	OFF
D	*1 POWER/ NORMAL	1GR	2.816	↕			×						⊗	OPEN	CLOSE	CLOSE	OFF	OFF
		2GR	1.497	↕		×	×			×				OPEN	OPEN	CLOSE	OFF	OFF
		3GR	1.000	↕		×	×	×		×*3	×			OPEN	OPEN	OPEN	OFF	OFF
		4GR	0.725			×		×		×				CLOSE	OPEN	OPEN	ON	OFF
		4GR *2 TCC ON	0.725		×	×		×		×				CLOSE	OPEN	OPEN	ON	ON
M	MANUAL	1GR	2.816	↕ ↕ ↕		×	×					×	⊗	OPEN	OPEN	CLOSE	ON	ON
		2GR	1.497	↕ ↕ ↕		×	×			×				OPEN	OPEN	CLOSE	OFF	OFF
		3GR	1.000	↕ ↕ ↕		×	×	×		×*3	×			OPEN	OPEN	OPEN	OFF	OFF
		4GR	0.725	↕ ↕ ↕		×		×		×				CLOSE	OPEN	OPEN	ON	OFF
		4GR TCC ON	0.725	↕ ↕ ↕	×	×		×		×				CLOSE	OPEN	OPEN	ON	ON

↕ : Automatic shift according to set speed and throttle opening angle
↕ : Manual shift based on selector lever operation
↕ : Consecutive shift by tapping selector lever two times in the down-shift (−) direction or up-shift (+) direction
*1 : Automatically switches between POWER and NORMAL modes according to accelerator pedal depressing speed.
*2 : Performs TCC operation in NORMAL mode.
*3 : Indicates operation although the band servo remains deactivated due to the large area of the release pressure side.
× : Operating
⊗ : Transmits the torque only when driving.

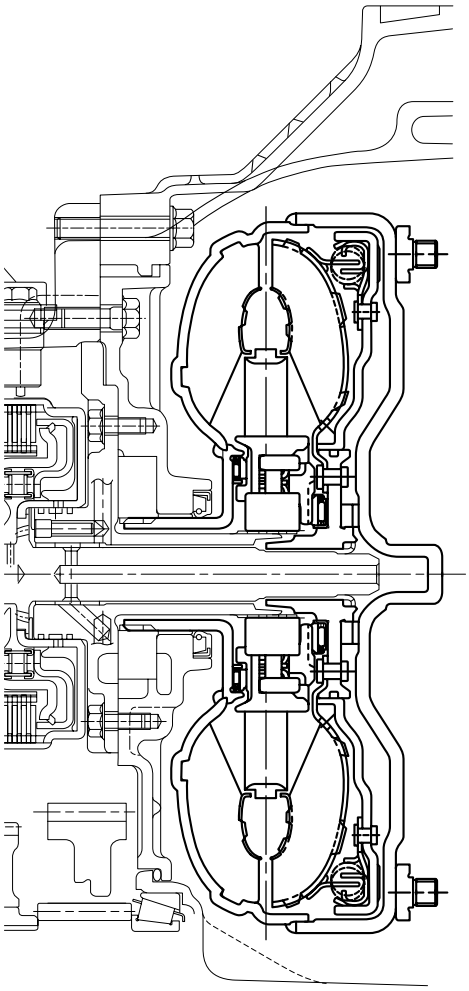
OPEN: Engages the line pressure to the clutch pressure (Solenoid de-energized).
CLOSE: Drains the clutch pressure (Solenoid energized).
ON: Engages the output port and the supply port (Solenoid reducing pressure).
OFF: Engages the output port and the drain port (Drains the output port).

B3E0517A016

TORQUE CONVERTER OUTLINE

B3E051719100A01

- The torque converter clutch mechanism mechanically engages the pump impeller and the turbine runner under a certain condition, and transmits the power, not through the fluid, but directly, preventing the slip loss of the torque converter.
- The torque converter has obtained sufficient transaxle efficiency and torque converting ratio that matches the output characteristic of each engine.



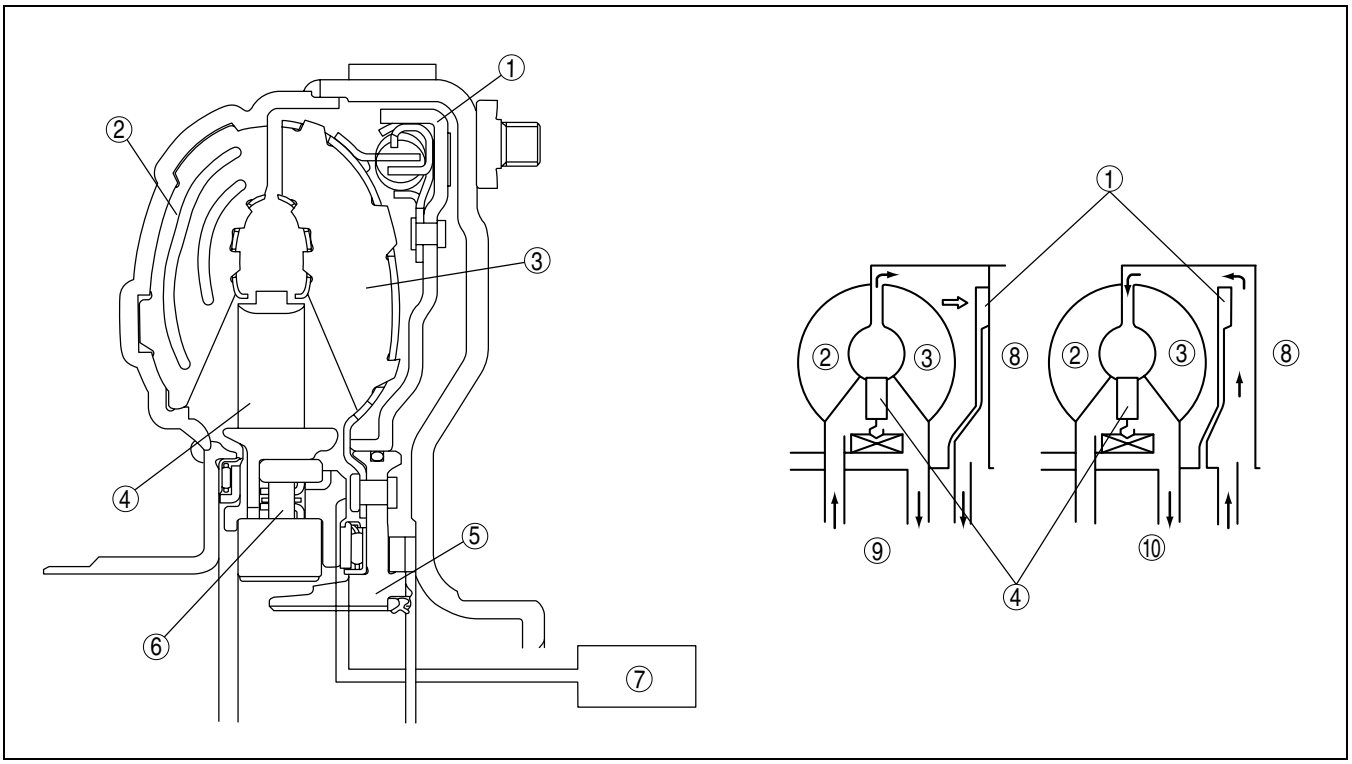
B3E0517A014

TORQUE CONVERTER STRUCTURE

B3E051719100A02

- The torque converter with the TCC control consists of the turbine runner, pump impeller, stator, and the TCC piston as shown in the figure. The TCC piston engages with the turbine runner and slides on the turbine hub to be pushed and contacts with the torque converter cover during the TCC control operation. In the TCC piston, a

spring for torsion damper is installed to absorb the engine torque fluctuation during TCC control.



B3E0517T014

1	TCC piston
2	Pump impeller
3	Turbine runner
4	Stator
5	Turbine hub

6	One-way clutch
7	Oil cooler
8	Converter cover
9	TCC operation
10	TCC non-operation

05

POWER FLOW OUTLINE

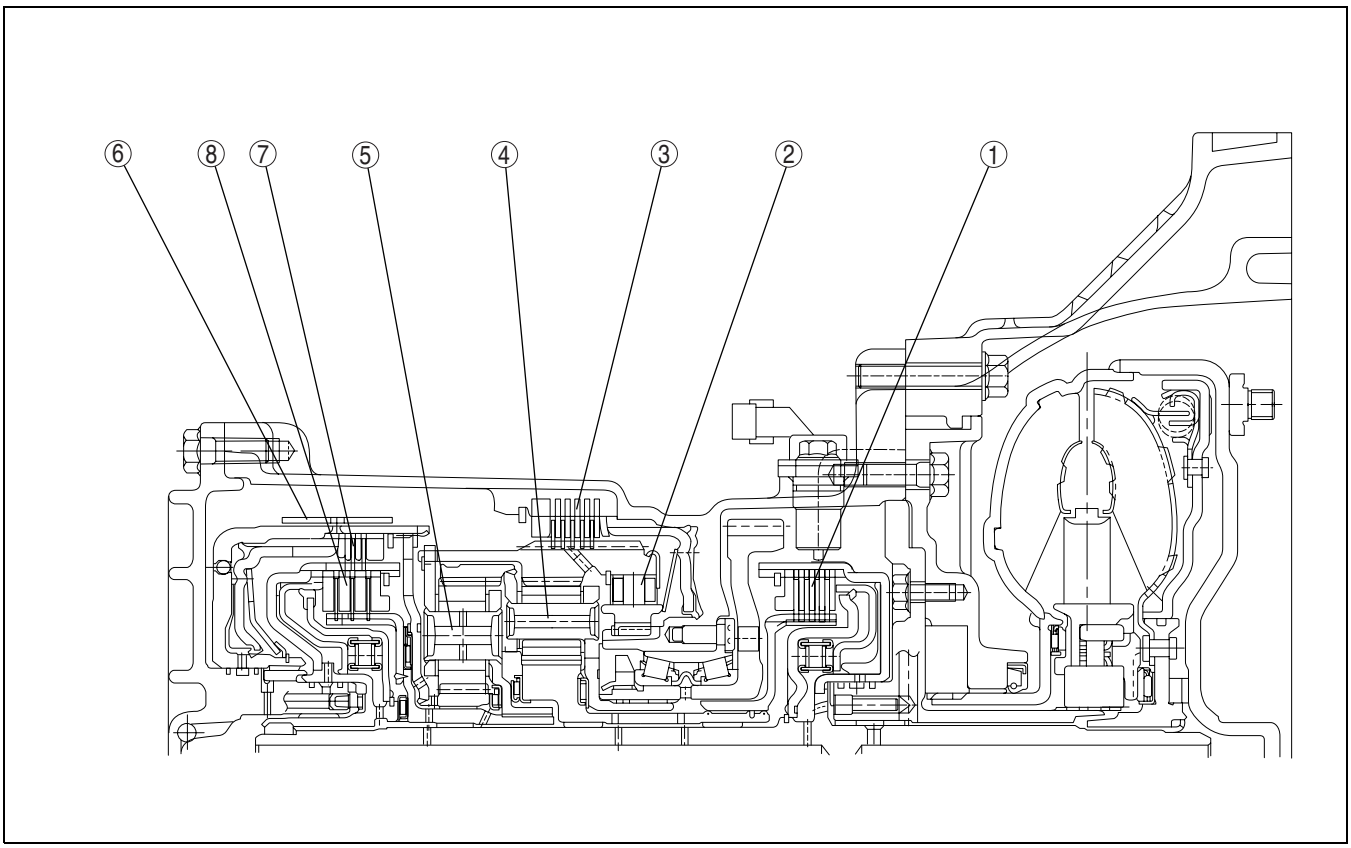
B3E051701030A06

- In the powertrain mechanism, hydraulic pressure is transported from the control valves or shift solenoid A, B, or C (duty cycle type) to operate the clutches and brakes, and the planetary gear changes the gear ratio according to the vehicle driving condition.

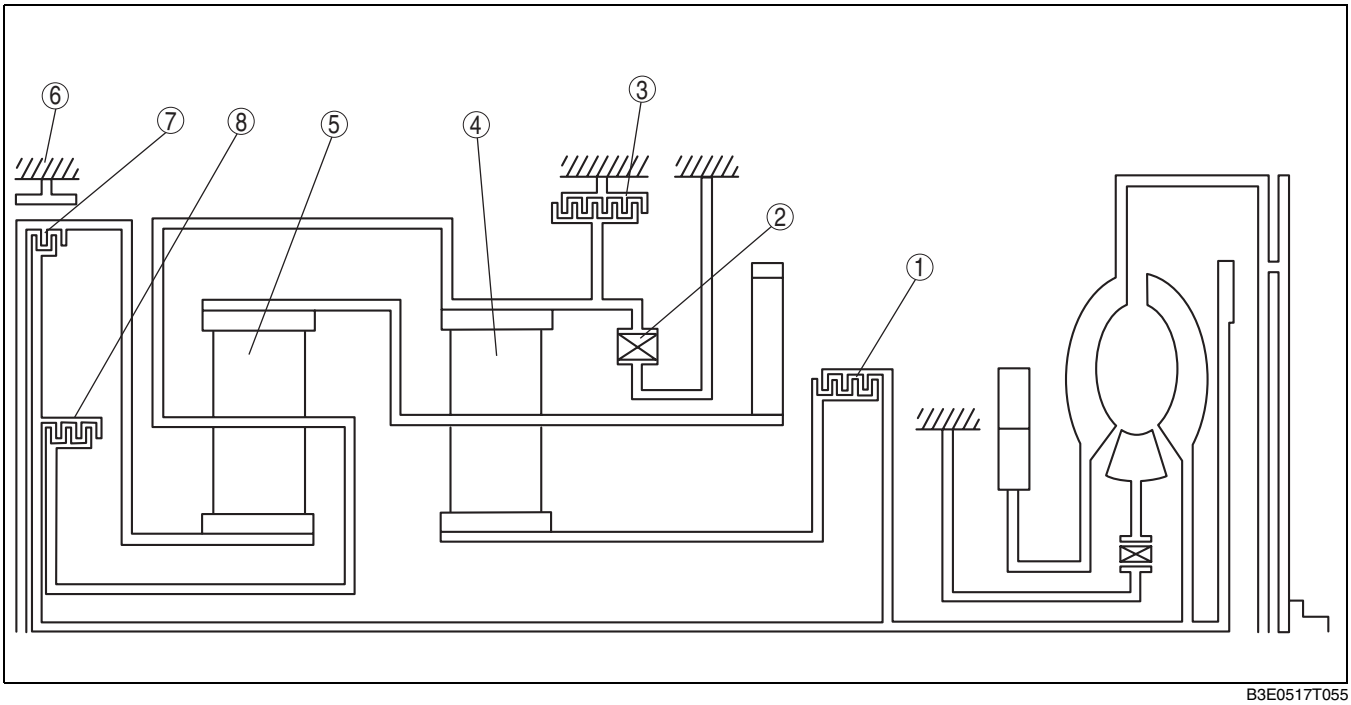
POWER FLOW STRUCTURE

B3E051701030A07

- The powertrain mechanism of the FN4A-EL type consists of three pairs of clutches, brake, band brake, one-way clutch, and two pairs of single type planetary gears.



B3E0517T004



B3E0517T055

1	Forward clutch
2	One-way clutch
3	Low and reverse brake
4	Front planetary gear

5	Rear planetary gear
6	2-4 brake band
7	Reverse clutch
8	3-4 clutch

POWER FLOW OPERATION

B3E051701030A08

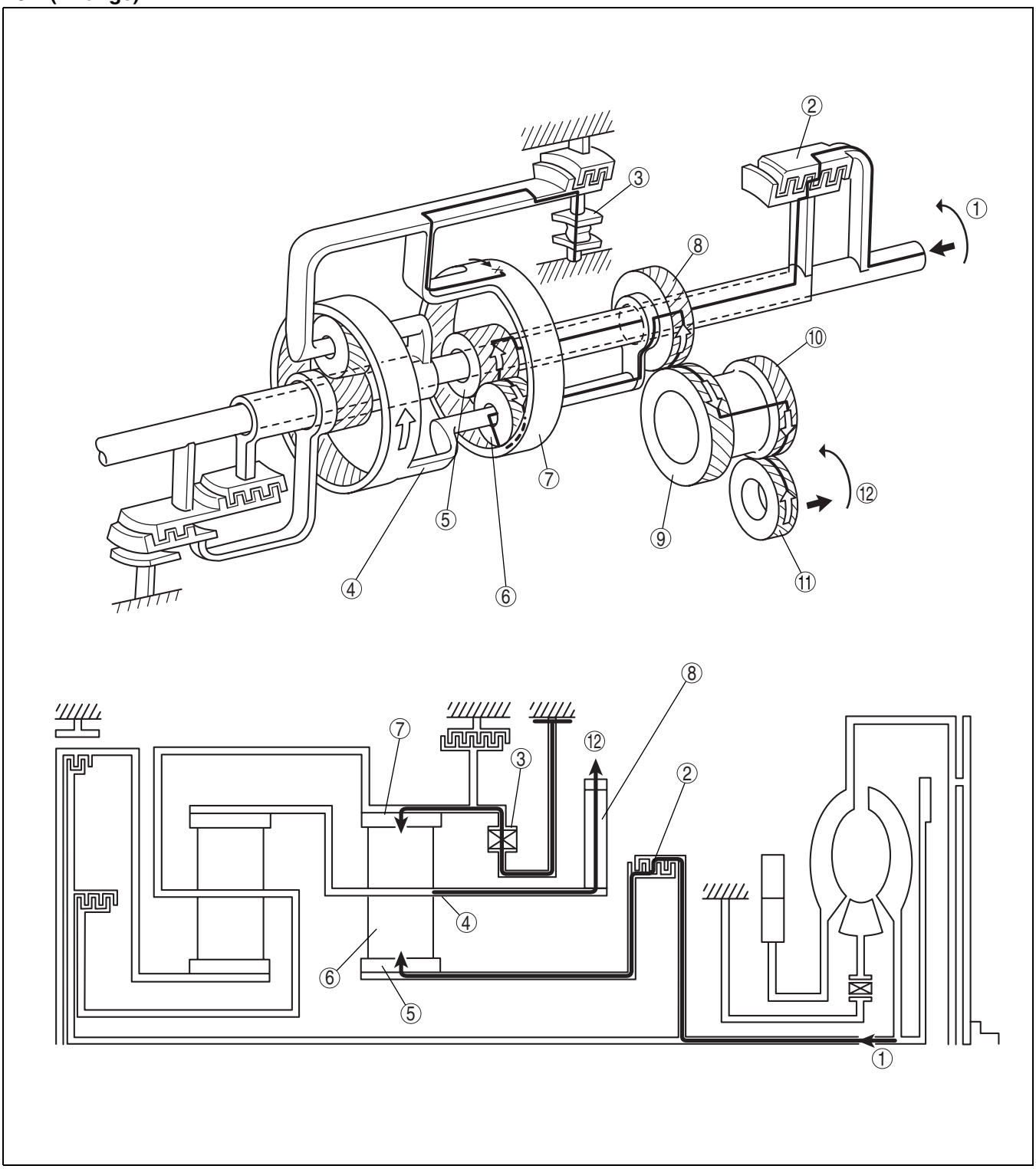
Component description

Component	Function
Forward clutch	• Transmits the input torque from the turbine shaft to the front sun gear. • Operates in the forward range of the first, second, or third gear position.
3-4 clutch	• Transmits the input torque from the turbine shaft to the rear planetary carrier. • Operates in the forward range of the third or fourth gear position.
Reverse clutch	• Transmits the input torque from the turbine shaft to the rear sun gear. • Operates when the vehicle is backing up.
2-4 brake band	• Locks rotation of the reverse drum and fixes the rear sun gear. • Operates in the second or fourth gear position.
Low and reverse brake	• Fixes the rotation of the front internal gear. • Operates when the vehicle is backing up or in the first gear position (L range HOLD and M range).
One-way clutch	• Locks the counterclockwise rotation of the front internal gear in the first gear position.
Planetary gear	• The planetary gear functions as a transmission due to the engagement/ disengagement of clutches and/or brakes, converts the transmitted driving force of the turbine shaft and transmits it to the output gear.

Note

- All directions of rotation are viewed from the torque converter.

1GR (D range)

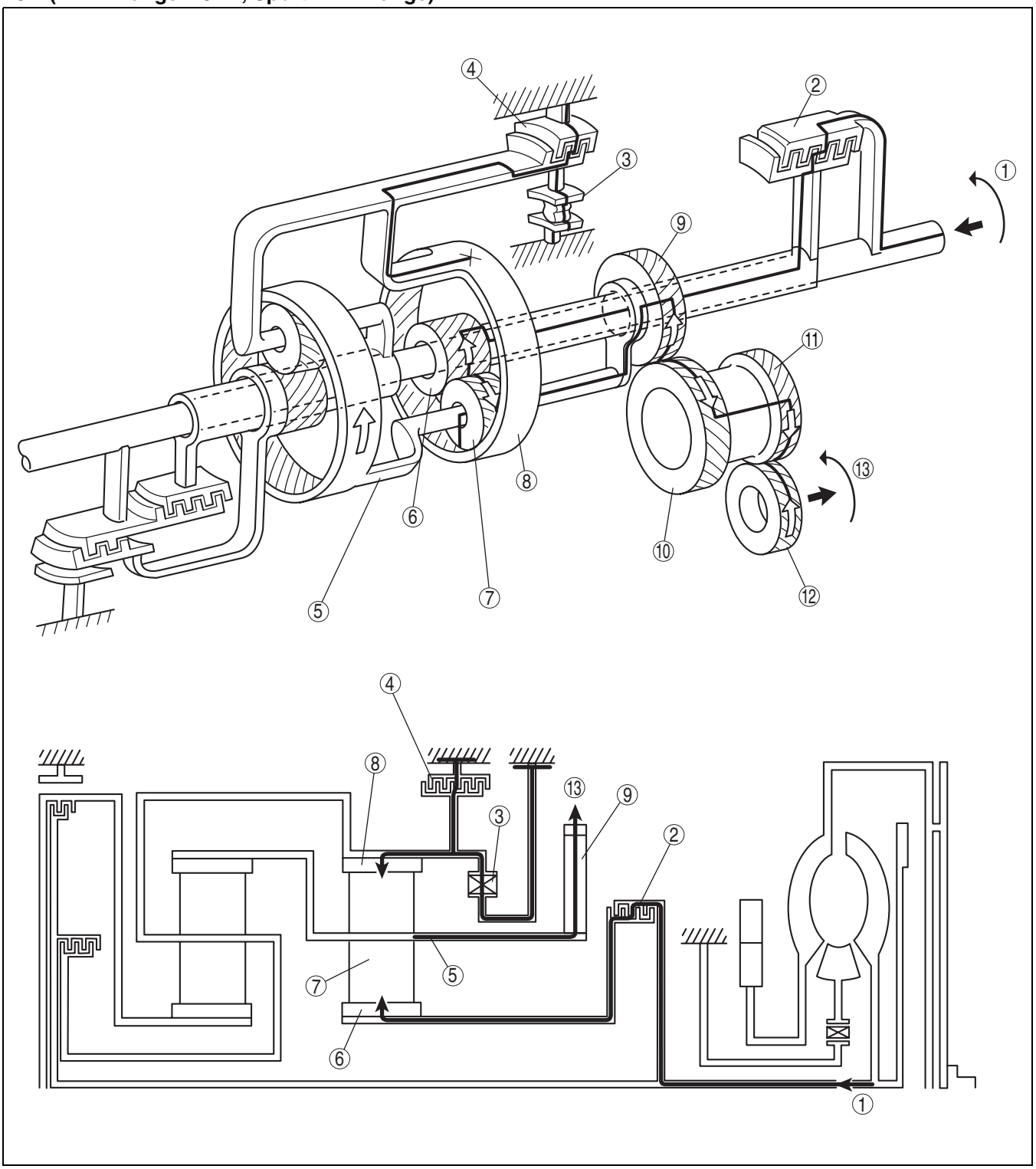


B3E0517T005

1	Input
2	Forward clutch
3	One-way clutch
4	Front planetary carrier
5	Front sun gear
6	Front pinion gear

7	Front internal gear
8	Primary gear
9	Secondary gear
10	Output gear
11	Ring gear (Differential)
12	Output

1GR (4AT: L range HOLD, Sport AT: M range)

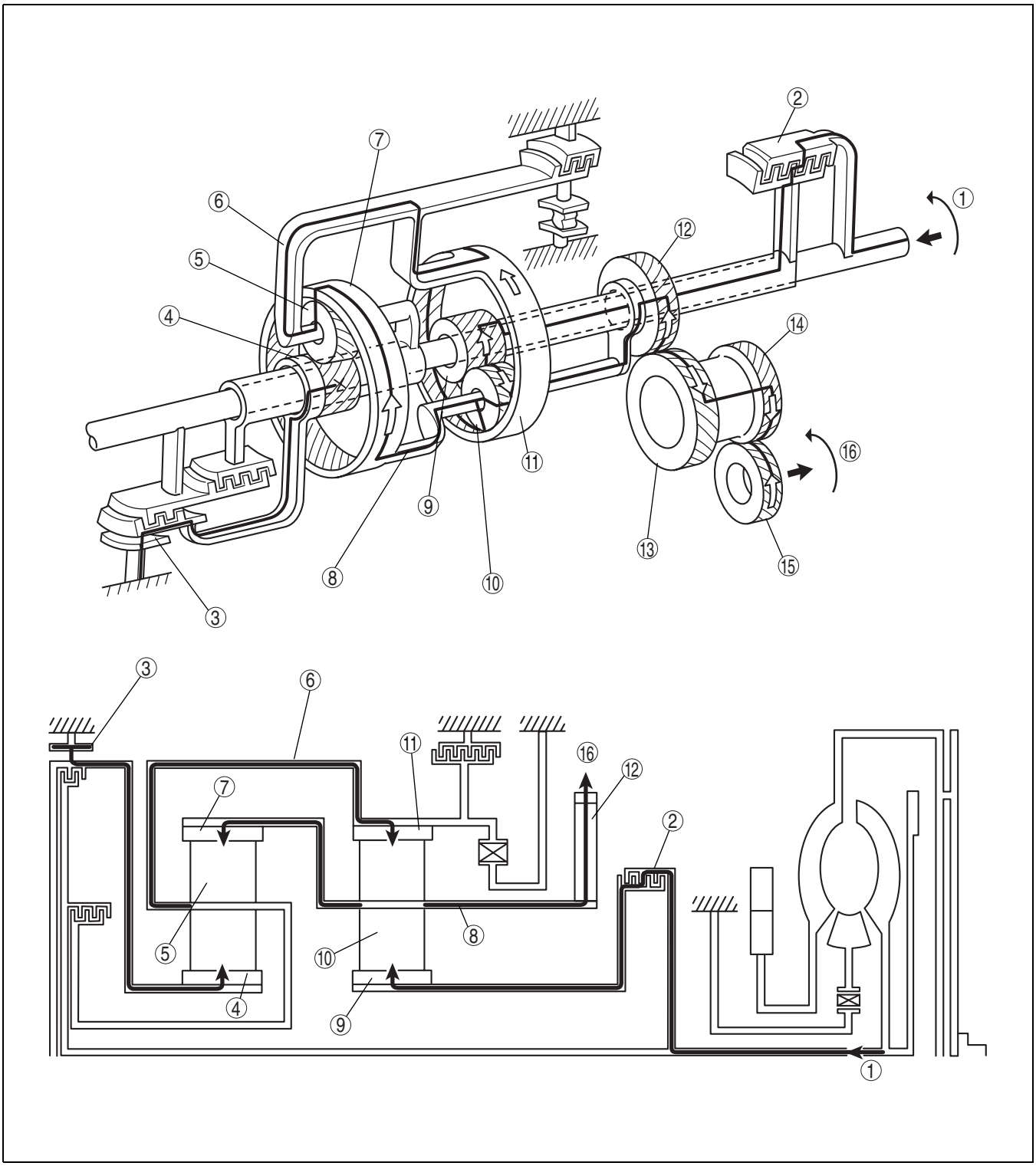


B3E0517T006

1	Input
2	Forward clutch
3	One-way clutch
4	Low and reverse brake
5	Front planetary carrier
6	Front sun gear
7	Front pinion gear

8	Front internal gear
9	Primary gear
10	Secondary gear
11	Output gear
12	Ring gear (Differential)
13	Output

2GR

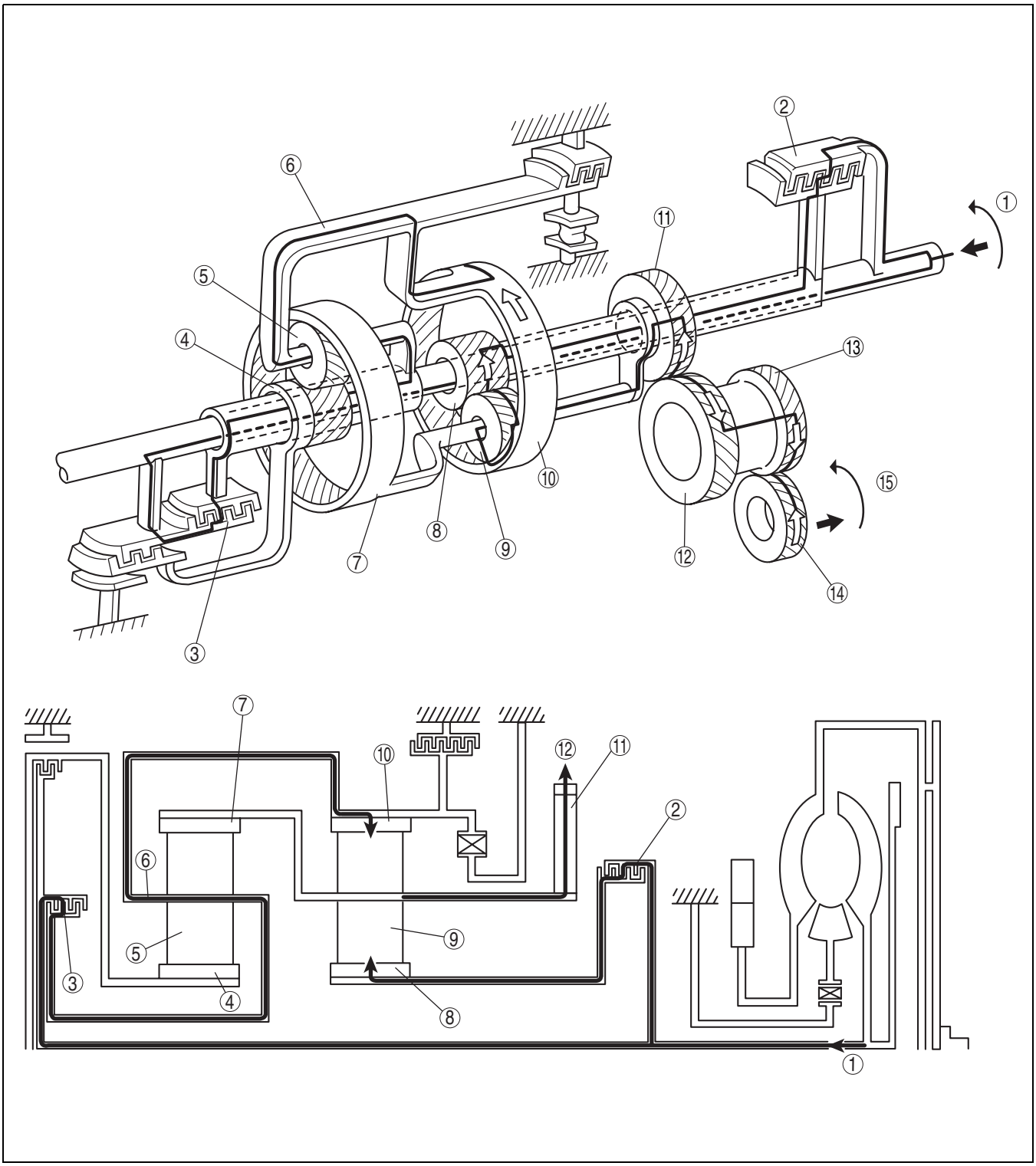


B3E0517T007

1	Input
2	Forward clutch
3	2-4 brake band
4	Rear sun gear
5	Rear pinion gear
6	Rear planetary carrier
7	Rear internal gear
8	Front planetary carrier

9	Front sun gear
10	Front pinion gear
11	Front internal gear
12	Primary gear
13	Secondary gear
14	Output gear
15	Ring gear (Differential)
16	Output

3GR

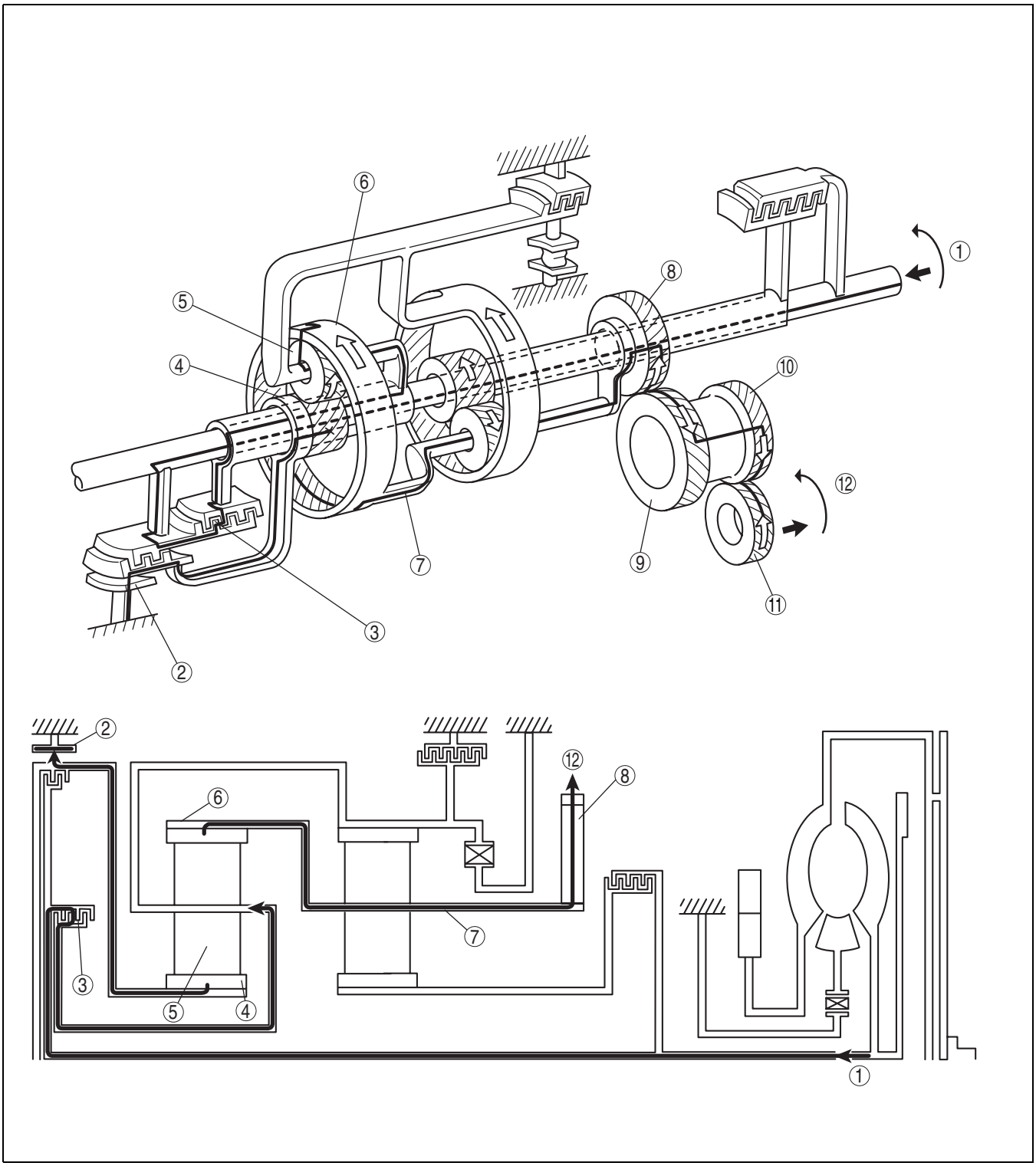


B3E0517T008

1	Input
2	Forward clutch
3	3-4 clutch
4	Rear sun gear
5	Rear pinion gear
6	Rear planetary carrier
7	Rear internal gear
8	Front sun gear

9	Front pinion gear
10	Front internal gear
11	Primary gear
12	Secondary gear
13	Output gear
14	Ring gear (Differential)
15	Output

4GR

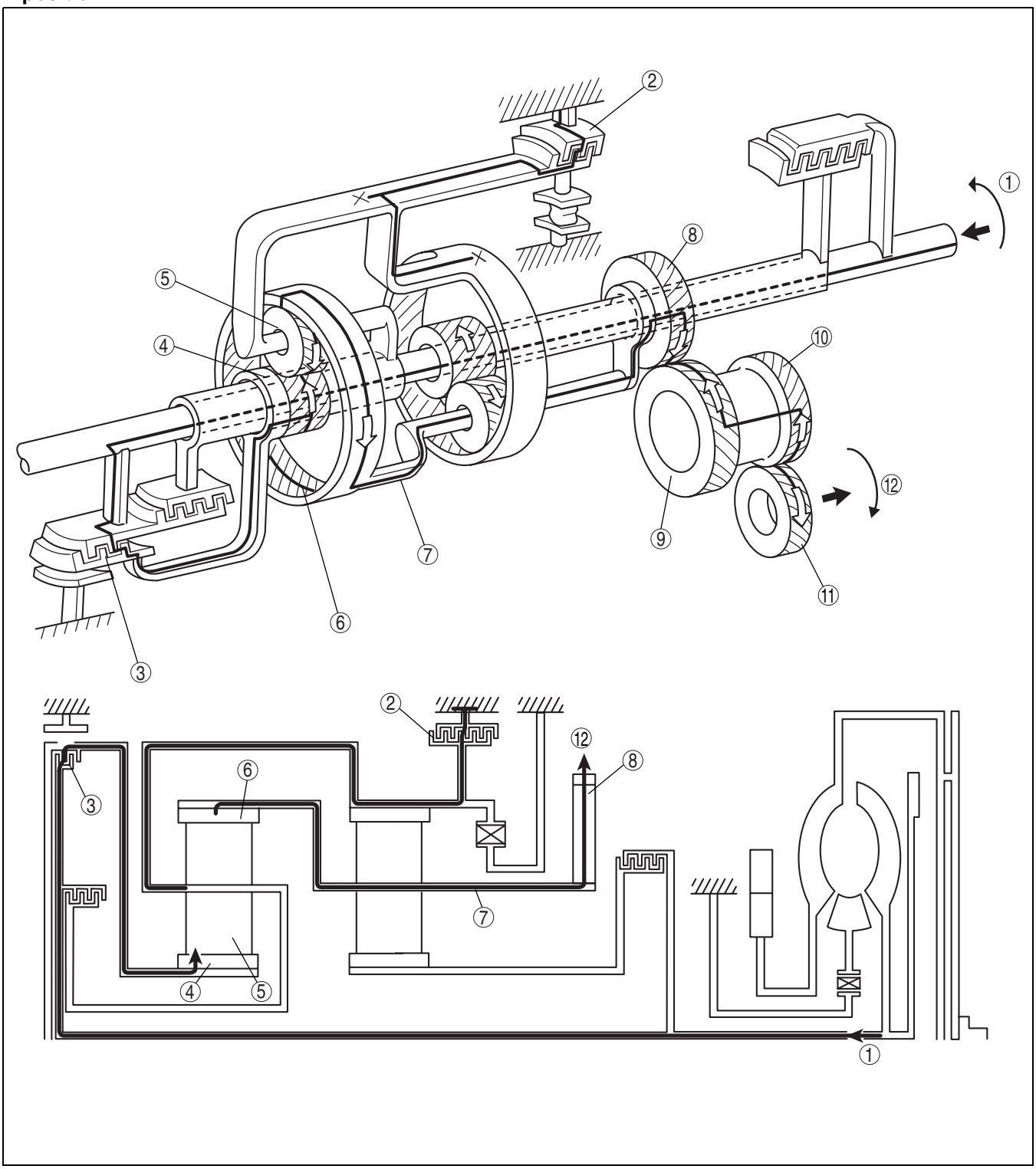


B3E0517T009

1	Input
2	2-4 brake band
3	3-4 clutch
4	Rear sun gear
5	Rear pinion gear
6	Rear internal gear

7	Front planetary carrier
8	Primary gear
9	Secondary gear
10	Output gear
11	Ring gear (Differential)
12	Output

R position



B3E0517T010

1	Input
2	Low and reverse brake
3	Reverse clutch
4	Rear sun gear
5	Rear pinion gear
6	Rear internal gear

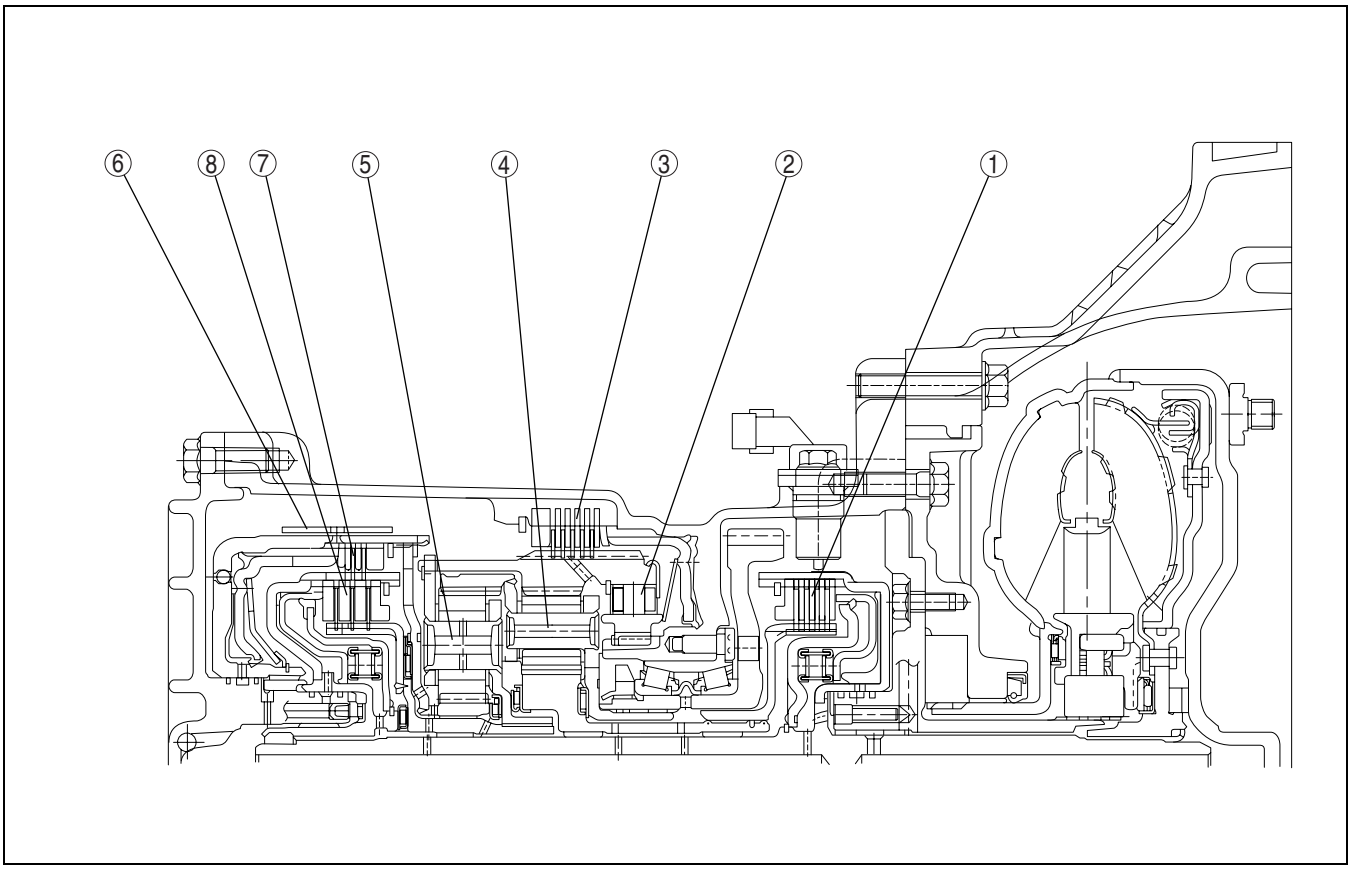
7	Front planetary carrier
8	Primary gear
9	Secondary gear
10	Output gear
11	Ring gear (Differential)
12	Output

FORWARD CLUTCH, 3-4 CLUTCH, REVERSE CLUTCH, LOW AND REVERSE BRAKE OUTLINE

B3E051701030A09

- Each multi-disc type clutch and brake has the following function and operates in the gear position(s) as shown in the figure.

Component	Function	Gear position
Forward clutch	• Transmits input torque from turbine shaft to front sun gear.	1GR, 2GR, 3GR
3-4 clutch	• Transmits input torque from turbine shaft to rear planetary carrier.	3GR, 4GR
Reverse clutch	• Transmits input torque from turbine shaft to rear sun gear.	Reverse
Low and reverse brake	• Fixes rotation of front internal gear or rear planetary carrier.	Reverse, 1GR (L range HOLD and M range)



B3E0517T004

1	Forward clutch
2	One-way clutch
3	Low and reverse brake
4	Front planetary gear

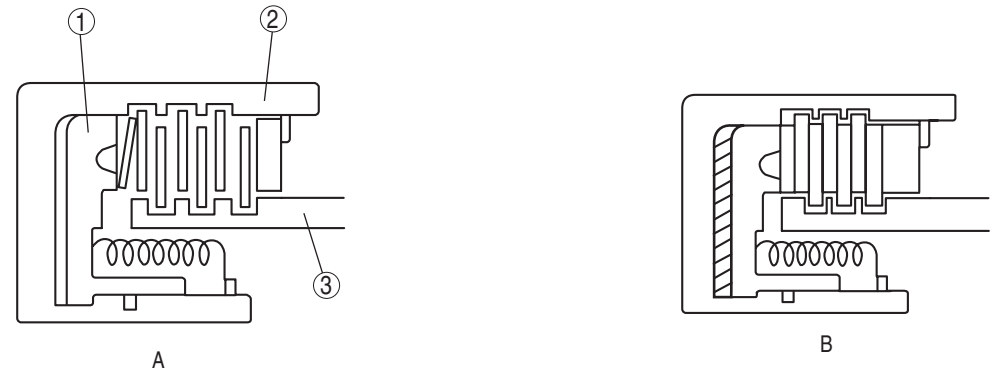
5	Rear planetary gear
6	2-4 brake band
7	Reverse clutch
8	3-4 clutch

FORWARD CLUTCH, 3-4 CLUTCH, REVERSE CLUTCH, LOW AND REVERSE BRAKE OPERATION

B3E051701030A10

- The basic structure is as shown in the figure below. In figure A, the fluid is in the clutch plates (drive plates, driven plates) and the power is not transmitted because of the fluid slippage on each plate. Figure B shows the clutch condition with the hydraulic pressure acted on the piston; the drive plates and the driven plates are pressed tightly together to transmit the clutch drum rotation speed to the hub. When the hydraulic pressure in the piston is drained, the clutches are separated because of the return spring and return to the condition in

figure A.



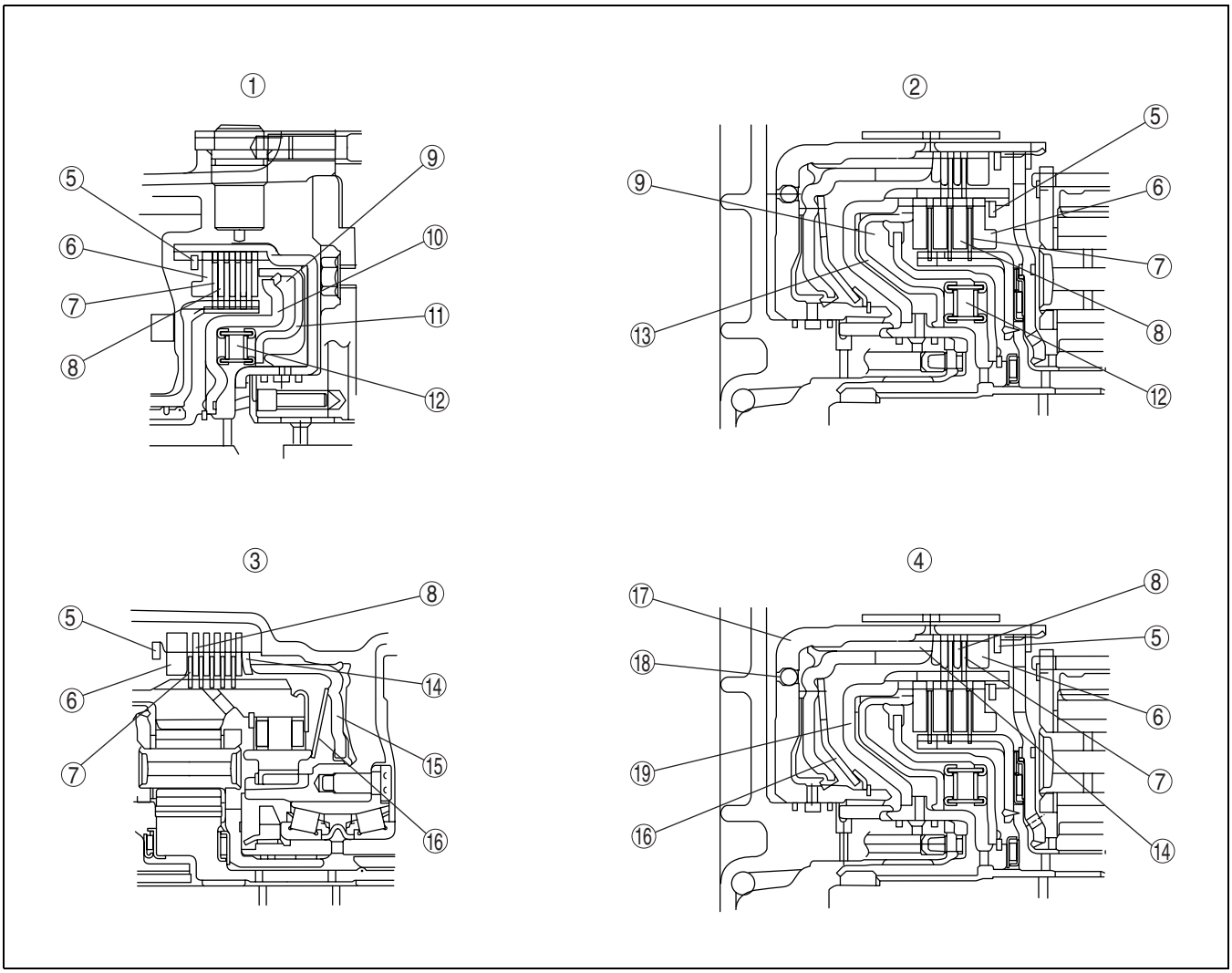
B3E0517A001

1	Piston
2	Clutch drum

3	Clutch hub

- The dished plates used for the reverse clutch and the low and reverse brake reduce the shock caused by the sudden clutch engagement. The piston check ball built in the 2-4 brake drum (reverse clutch) drains the ATF only during freewheel to prevent the hydraulic pressure from increasing to half-engage the clutches because of the residual ATF. In the forward clutch and the 3-4 clutch, the centrifugal balance chamber is installed opposite the general clutch chamber. The centrifugal balance chamber is always filled with the ATF from the exclusive

lubrication passage of the turbine shaft.



B3E0517A002

1	Forward clutch
2	3-4 clutch
3	Low and reverse brake
4	Reverse clutch
5	Snap ring
6	Retaining plate
7	Drive plate
8	Driven plate
9	Centrifugal balance chamber
10	Seal plate

11	Forward clutch piston (bonded seal piston)
12	Spring and retainer component
13	3-4 clutch piston (bonded seal piston)
14	Dish plate
15	Low and reverse brake piston (bonded seal piston)
16	Piston return spring
17	2-4 brake drum
18	Piston check ball
19	Reverse clutch piston (bonded seal piston)

CENTRIFUGAL BALANCE CLUTCH OUTLINE

B3E051701030A11

- The centrifugal balance clutch mechanism, which cancels the centrifugal oil pressure, is adopted for improve clutch control.
- A bonded seal piston (press-worked component of a piston and a seal) is adopted for each clutch and brake to reduce the piston size and weight.

CENTRIFUGAL BALANCE CLUTCH STRUCTURE

B3E051701030A12

- Centrifugal balance clutch chambers are installed opposite the clutch chamber. The centrifugal balance clutch chambers are constantly filled with ATF from an exclusive hydraulic passage of the turbine shaft.

CENTRIFUGAL BALANCE CLUTCH OPERATION

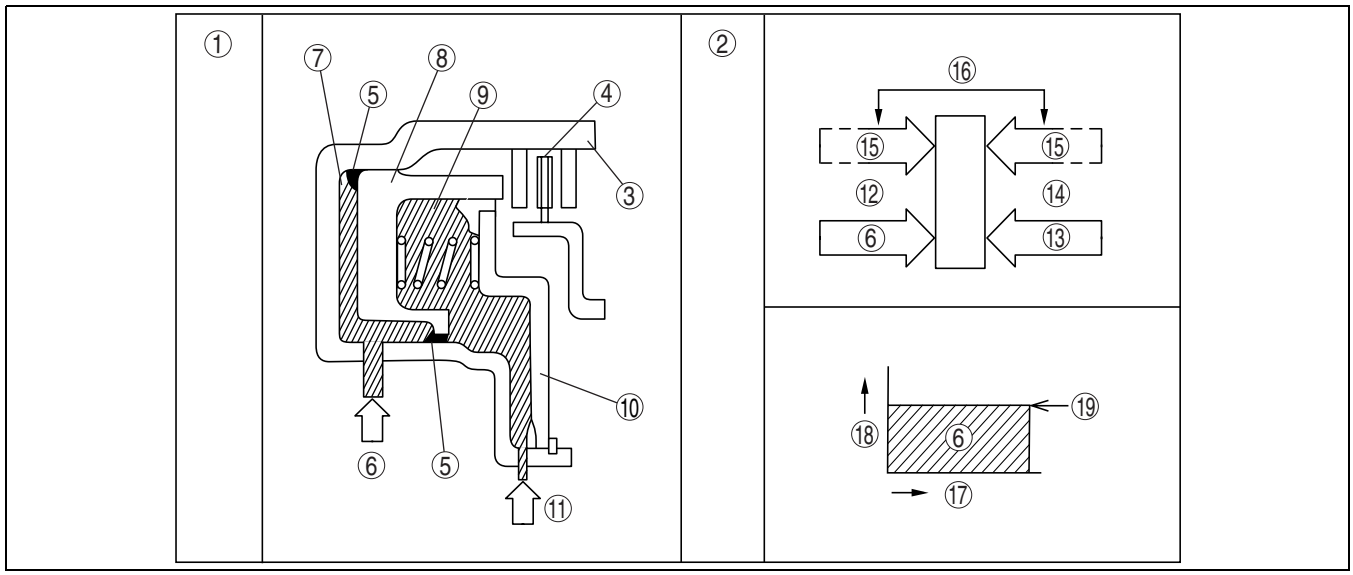
B3E051701030A13

When clutch pressure is not applied

- When the clutch drum rotates, centrifugal force acts on the residual ATF in the clutch chamber to push against the piston. However, centrifugal force also acts on the ATF filling the centrifugal balance clutch chamber to push back the piston. As a result, the two forces are eliminated and the piston remains stationary, thus preventing clutch engagement.

When clutch pressure is applied

- When clutch pressure is applied to the clutch chamber, the clutch pressure overcomes the oil pressure and spring force in the opposite centrifugal balance clutch chamber, and pushes the piston to engage the clutches. Because the centrifugal force acting on the clutch pressure in the clutch chamber is canceled by another centrifugal force acting on the ATF filling the centrifugal balance clutch chamber, the influence of the centrifugal force created by the clutch drum revolution speed is eliminated. As a result, stable piston pushing force is obtained in all rotation ranges, and smoother shifts can be made.



B3E0517T012

1	Structure
2	Operation
3	Clutch drum
4	Clutch
5	Seal
6	Clutch pressure
7	Clutch chamber
8	Bonded seal piston
9	Balance chamber
10	Seal plate

11	Lubrication passage
12	Centrifugal hydraulic pressure of piston chamber
13	Spring force
14	Centrifugal hydraulic pressure of balance chamber
15	Changes according to the rotation speed of clutch drum
16	Two forces are eliminated
17	Drum revolution speed
18	Piston pushing force
19	Piston pushing force required to obtain shift quality

2-4 BRAKE BAND OUTLINE

B3E051701030A14

- The 2-4 brake band locks the 2-4 brake drum and fixes the rear sun gear. The 2-4 brake band operates in 2GR or 4GR.

2-4 BRAKE BAND STRUCTURE

B3E051701030A15

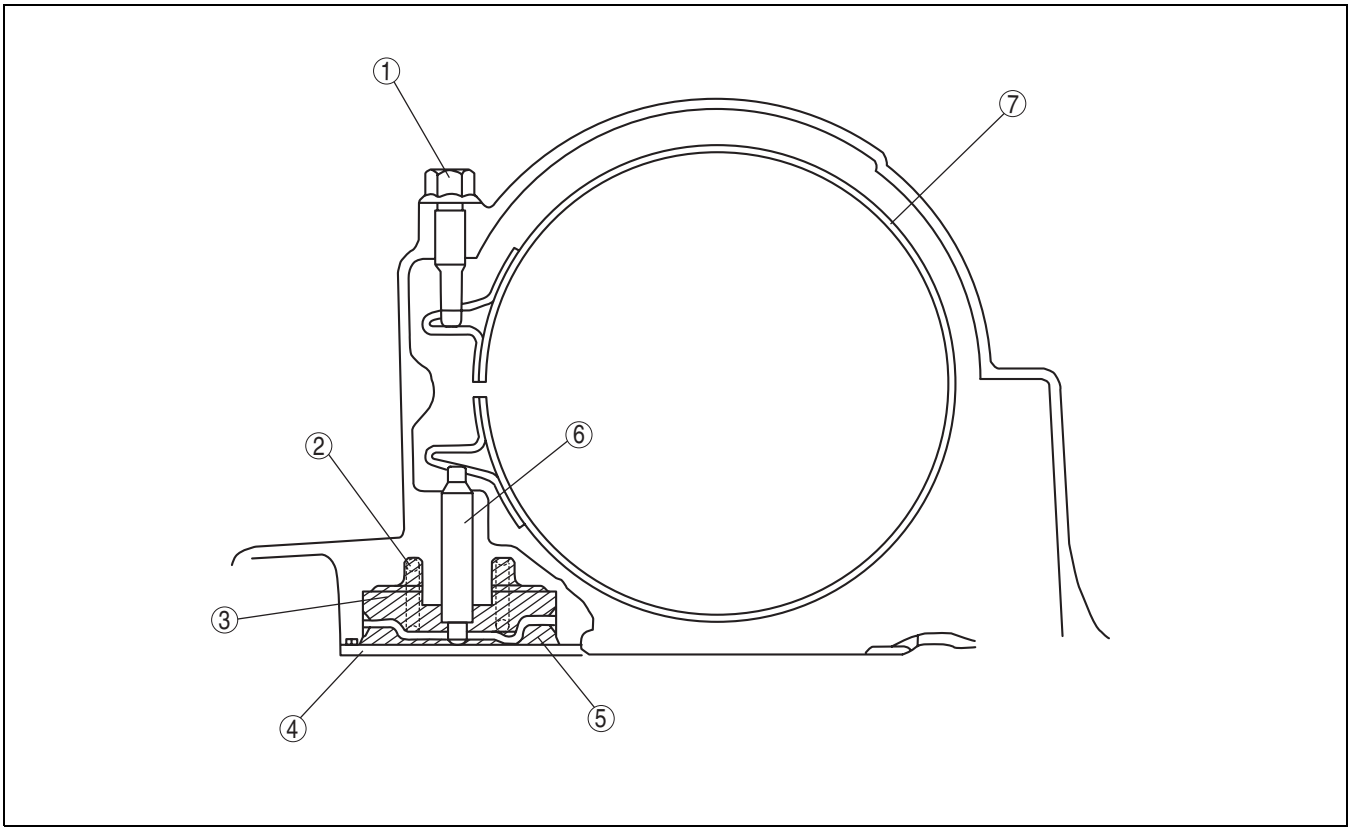
- The 2-4 brake band is set to wind the 2-4 brake drum and one end of the 2-4 brake band is fixed with a band strut. The servo piston is in the transaxle case.

2-4 BRAKE BAND OPERATION

B3E051701030A16

- When the hydraulic pressure acts between the servo retainer and the servo piston (2-4 brake band engagement side), the servo piston acts on the 2-4 brake band to lock the 2-4 brake drum. At the same time, the servo return spring also works as resistance to obtain the optimal 2-4 brake band engagement force. When the hydraulic pressure acts between the servo piston and the transaxle case (2-4 brake band release side), the servo piston is pushed to the servo retainer side. This causes the 2-4 brake band to extend by its own spring force and unlock the 2-4 brake drum.

When the hydraulic pressure acts between the servo retainer and the servo piston and between the servo piston and the transaxle case simultaneously, the servo piston is pushed to the servo retainer side and the 2-4 brake drum is unlocked because of the difference in the two areas and spring force.



B3E0517A003

1	Band strut
2	Servo return spring
3	Release side
4	Servo retainer

5	Engagement side
6	Servo piston
7	2-4 brake band

ONE-WAY CLUTCH OUTLINE

B3E051701030A17

- The one-way clutch locks the counterclockwise rotation (seen from the torque converter side) of the front internal gear. The one-way clutch operates in D, M, S, and L range of the first gear.

ONE-WAY CLUTCH STRUCTURE

B3E051701030A18

- The one-way clutch outer race is integrated with the front internal gear, and the one-way clutch inner race is fixed to the transaxle case.

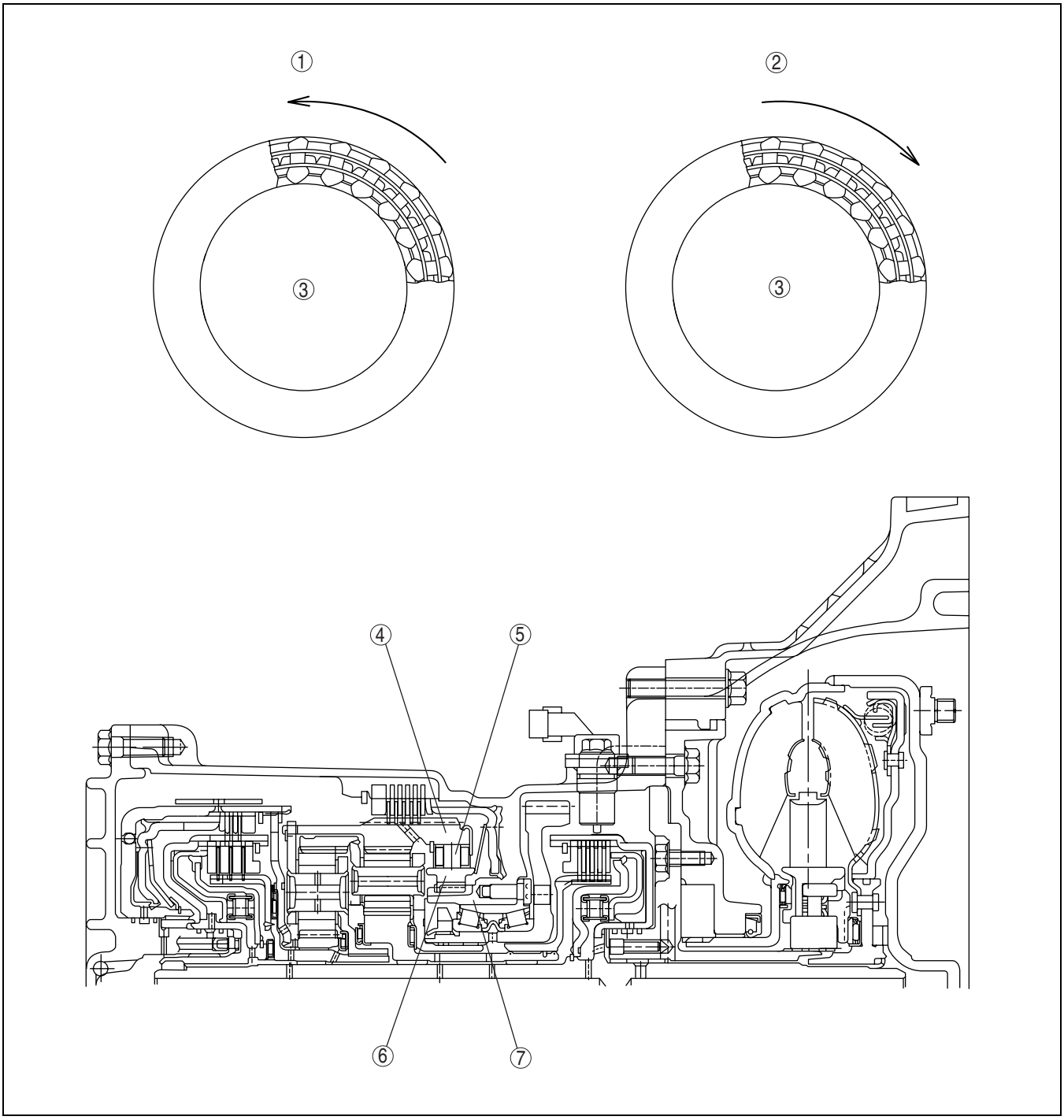
ONE-WAY CLUTCH OPERATION

B3E051701030A19

- The one-way clutch outer race (front internal gear) rotates clockwise (seen from the torque converter side) freely, but the sprags rise to lock the rotation when the outer race tries to rotate counterclockwise.
- The one-way clutch locks the counterclockwise rotation of the front internal gear, and also locks the counterclockwise revolution of the rear planetary gear via the rear planetary carrier.

Note

- All direction of rotation are viewed from the torque converter.



B3E0517A004

1	One-way clutch outer race (front internal gear) cannot rotate
2	One-way clutch outer race (front internal gear) can rotate
3	One-way clutch inner race (fixed to transaxle case)

4	One-way clutch outer race (front internal gear)
5	One-way clutch
6	One-way clutch inner race
7	Transaxle case

PLANETARY GEAR OUTLINE

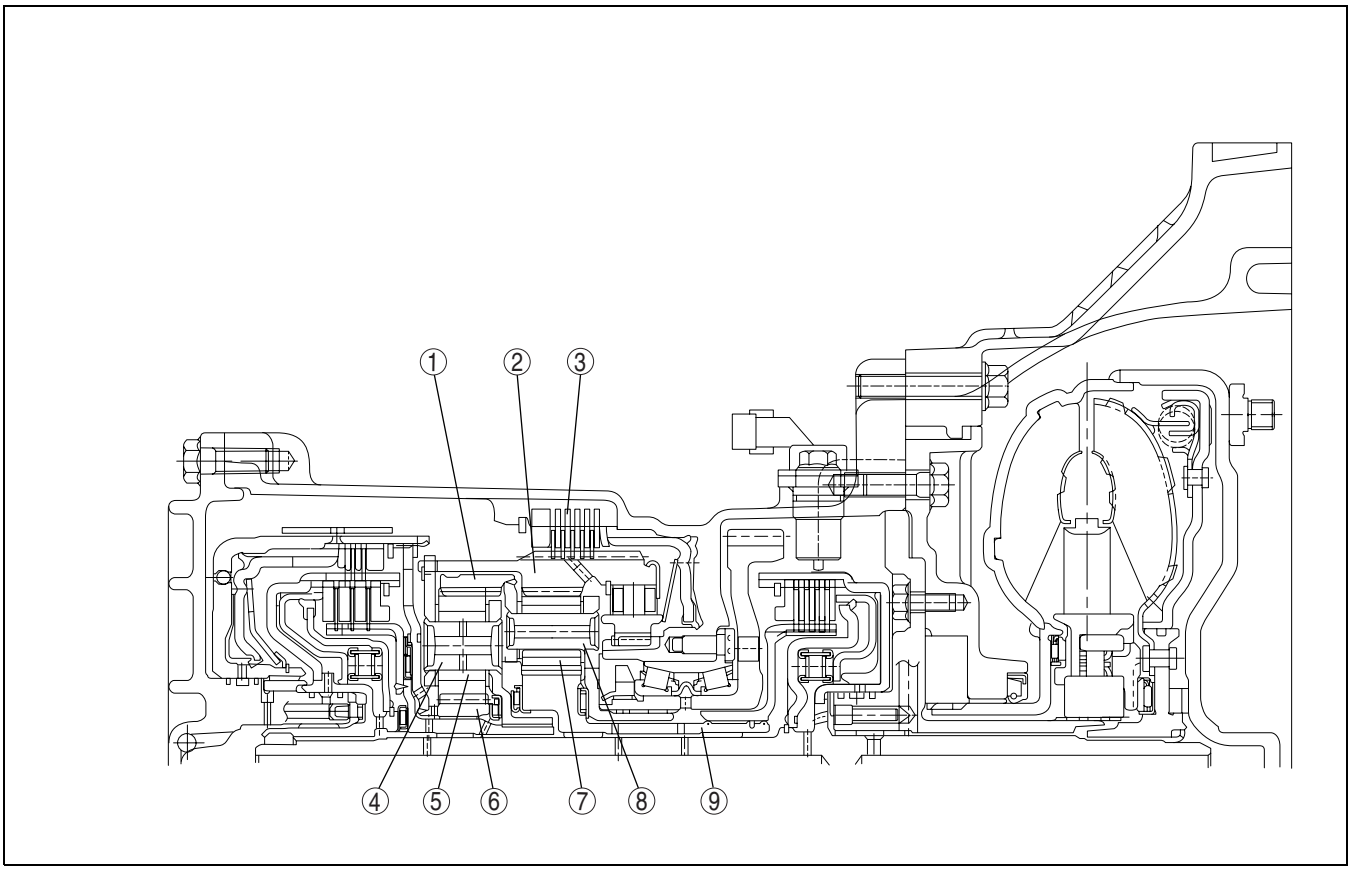
B3E051701030A20

- The planetary gear is a transaxle which converts the driving force of the turbine shaft to the optimal driving force and transmits it to the output gear through the operation of each clutch and brake.
- A double arranged gear with a single planetary gear unit is adopted for the planetary gear; they are the front planetary gear and the rear planetary gear (from converter side).
- The planetary gear consists of the internal gear, planetary carrier (pinion gears), and the sun gear.

PLANETARY GEAR STRUCTURE

B3E051701030A21

- The front planetary gear is integrated with the one-way clutch outer race and engaged with the drive plate of the low and reverse brake.
  Because of this, when the front planetary gear rotates, the one-way clutch outer race and the drive plate of the low and reverse brake also rotate together.
- The front sun gear is installed inside of the front pinion gears, and the front internal gear is installed outside of the front pinion gears. The front sun gear is engaged with the forward clutch hub, and the front internal gear is engaged with the rear planetary carrier.
- The rear planetary gear and the rear pinion gear have the rear sun gear installed inside and the rear internal gear outside. The rear sun gear is engaged with the turbine shaft via the 2-4 brake drum, and the rear internal gear is engaged with the primary gear via the front planetary carrier.



B3E0517A005

1	Rear internal gear
2	Front internal gear
3	Low and reverse brake
4	Rear planetary carrier
5	Rear pinion gear

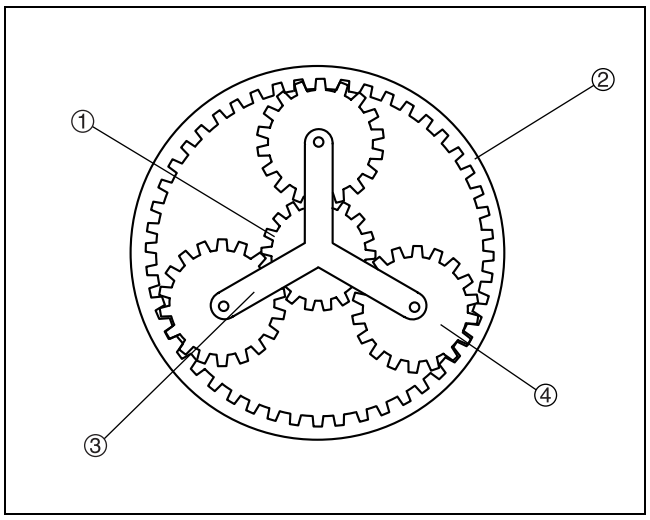
6	Rear sun gear
7	Front pinion gear
8	Front planetary carrier
9	Front sun gear

PLANETARY GEAR OPERATION

B3E051701030A22

- The planetary gear works as a transaxle when the sun gear and the internal gear are engaged.
- The sun gear, installed inside of the pinion gears, and the internal gear, installed outside of the pinion gears, are engaged with their respective gears.

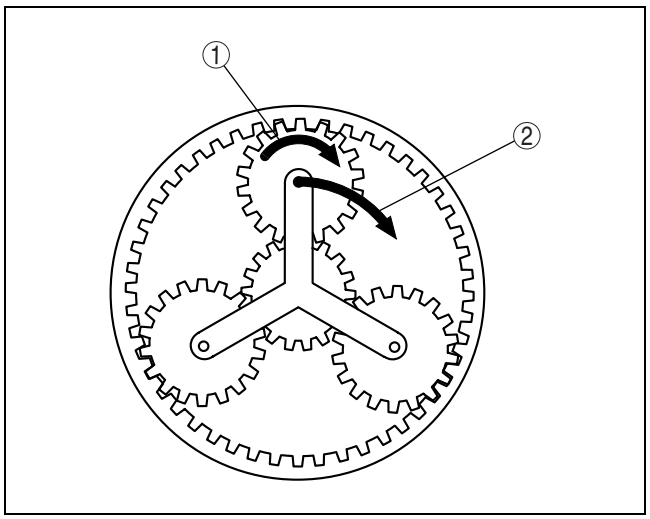
The sun gear and the internal gear rotate on the center of the planetary gear.



B3E0517A006

1	Sun gear
2	Internal gear
3	Planetary carrier
4	Pinion gear

- The pinion gears turn in the following two ways:
  — On their own centers (rotation)
  — On the center of the planetary gear (revolution)



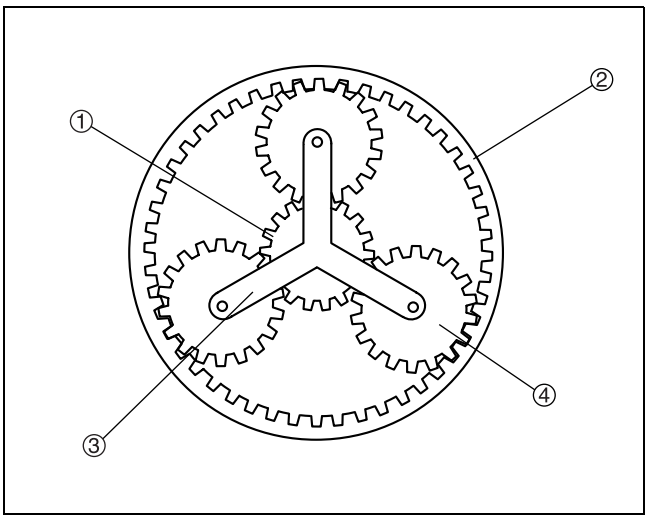
B3E0517A007

1	Rotation
2	Revolution

Gear ratio of each range

- The relation between each element of the planetary gear set and the rotation speed is generally indicated in the formula below.
  $(Z_R+Z_S)\ N_C=Z_RN_R+Z_SN_S$: formula (1)

In this formula Z stands for the number of teeth, N stands for the rotation speed, and R, S, C stand for each gear element (refer to the table below).



B3E0517A006

1	Sun gear
2	Internal gear
3	Planetary carrier
4	Pinion gear

Number of teeth and symbol of each gear

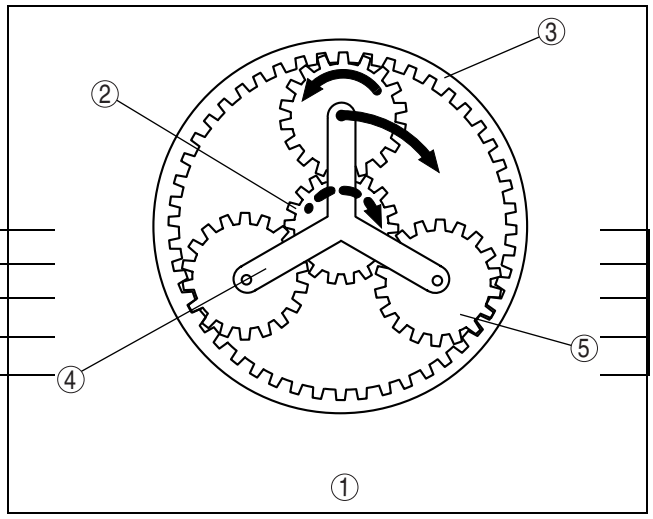
Planetary gear unit	Planetary gear element	Number of teeth	Unit identification symbol	
			Gear element	Unit
Front	Internal gear	89	R	F
	Planetary carrier (part of pinion gear)	20	C	F
	Sun gear	49	S	F
Rear	Internal gear	98	R	R
	Planetary carrier (part of pinion gear)	30	C	R
	Sun gear	37	S	R

First gear

1	Front planetary gear
2	Sun gear N_S (input)
3	Internal gear (fix)
4	Planetary carrier N_C (output)
5	Pinion gear

Gear rotation speed

Planetary gear unit	
Internal gear	
Planetary carrier	
Sun gear	

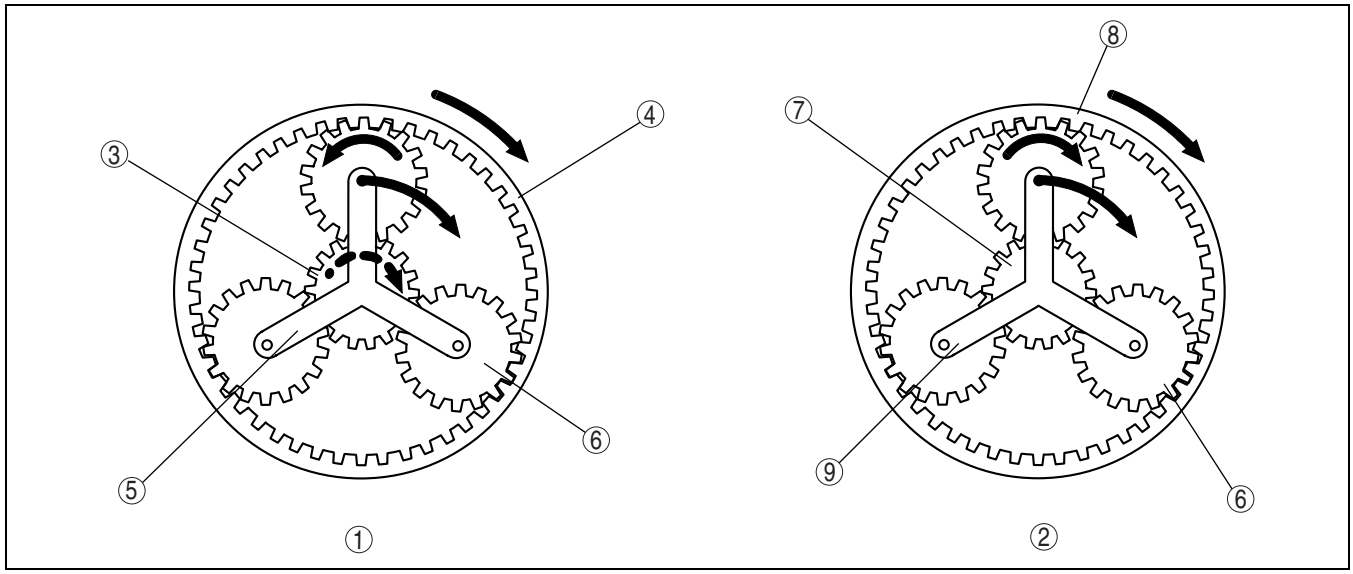


B3E0517A008

- Suppose gear ratio in first gear is i_1,
  $i_1=N_S/N_C$
- From the result $N_R=0$ in formula (1), the relation between the gear ratio in first gear and the rotation speed of the planetary gear set is indicated in the formula below.
  $(Z_{RF}+Z_{SF})\ N_C=Z_{SF}N_S$
  Therefore,
  $i_1=N_S/N_C= (Z_{RF}+Z_{SF})\ /Z_{SF}= (89+49)\ /49=2.8163$

As a result, the gear ratio in first gear is 2.816.

Second gear



B3E0517A009

1	Front planetary gear
2	Rear planetary gear
3	Sun gear N_S (input)
4	Internal gear N_R
5	Planetary carrier N_C (output)

6	Pinion gear
7	Sun gear N_S (fix)
8	Internal gear N_R (output)
9	Planetary carrier N_C

Gear rotation speed

Planetary gear	Front	Rear
Internal gear	N_R	N_R (output)
Planetary carrier	N_C (output)	N_C
Sun gear	N_S (input)	N_S (fix)

Note
- The front internal gear and the rear planetary carrier are integrated.
- The front planetary carrier and the rear internal gear rotate at the same speed.

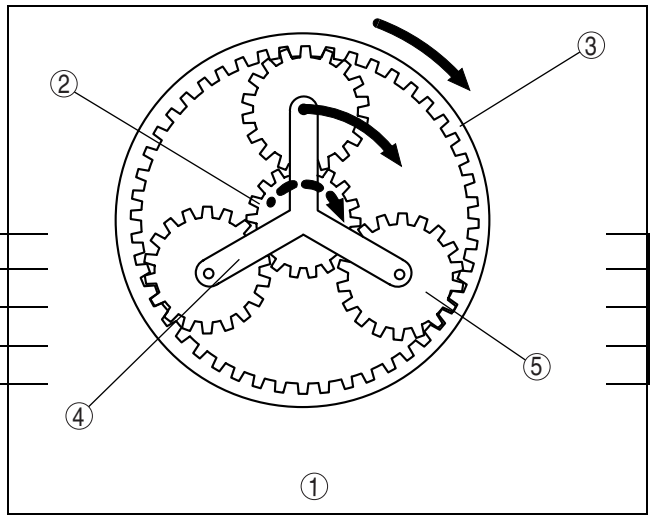
- Suppose gear ratio in second gear is i_2,
  $i_2=N_S/N_R$
- From formula (1), the relation between the gear ratio in second gear and the rotation speeds of the front and the rear planetary gar sets is indicated in formulas (2) and (3).
  $(Z_{RF}+Z_{SF})\ N_R=Z_{RF}N_C+Z_{SF}N_S$: (2) (Front planetary gear set)
  $(Z_{RR}+Z_{SR})\ N_C=Z_{RR}N_R+Z_{SR}N_S$: (3) (Rear planetary gear set)
- From the result $N_S=0$ in formula (3).
  $N_C= (Z_{RR}/ (Z_{RR}+Z_{SR}))\ N_R$: (4)
- Here we substitute formula (4) in formula (2).
  $Z_{SR}N_S= (((Z_{RR}+Z_{SR})\ (Z_{RF}+Z_{SF}) -Z_{RF}Z_{RR}) / (Z_{RR}+Z_{SR}))\ N_R$
  Therefore,
  $i_2=N_S/N_R= (((Z_{RR}+Z_{SR})\ (Z_{RF}+Z_{SF}) -Z_{RF}Z_{RR}) / (Z_{SF}\ (Z_{RR}+Z_{SR})))\ N_R= ((98+37)(84+49) -8998) / (49\ (98+37))$
  $=1.4978$
  As a result, the gear ratio in second gear is 1.497.

Third gear

1	Front planetary gear
2	Sun gear N_S (input)
3	Internal gear N_R (input)
4	Planetary carrier N_C (output)
5	Pinion gear

Gear rotation speed

Planetary gear		
Internal gear		
Planetary carrier		
Sun gear		



B3E0517A010

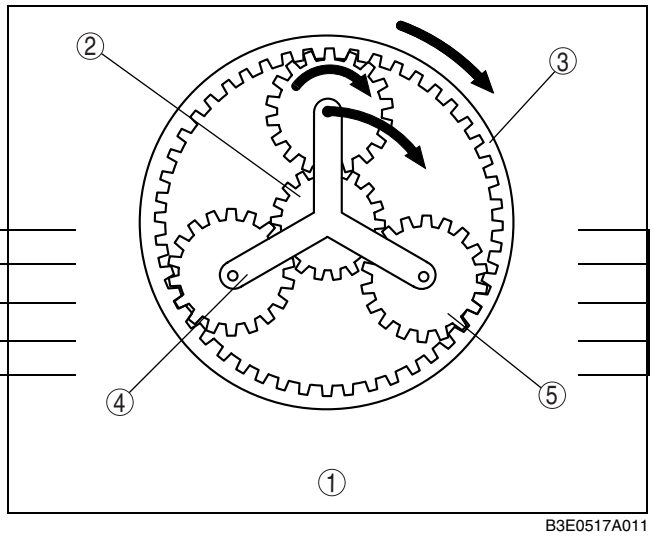
- Here we have the result on $N_R=N_S$.
- Suppose gear ratio in third gear is i_3,
  $i_3=N_R/N_C$
- From the result of $N_R=N_S$ in formula (1), the relation between the gear ratio in third gear and the rotation speed of the front planetary gar set is indicated in the formula below.
  $(N_{RF}+Z_{SF})\ N_C= (Z_{RF}+Z_{SF})\ N_R$
  Therefore,
  $i_3=N_R/N_C= (Z_{RF}+Z_{SF}) / (Z_{RF}+Z_{SF}) = (89+49) / (89+49) =1.000$
  As a result, the gear ratio in third gear is 1.000.

Fourth gear

1	Rear planetary gear
2	Sun gear (fix)
3	Internal gear N_R (output)
4	Planetary carrier N_C (input)
5	Pinion gear

Gear rotation speed

Planetary gear		
Internal gear		
Planetary carrier		
Sun gear		

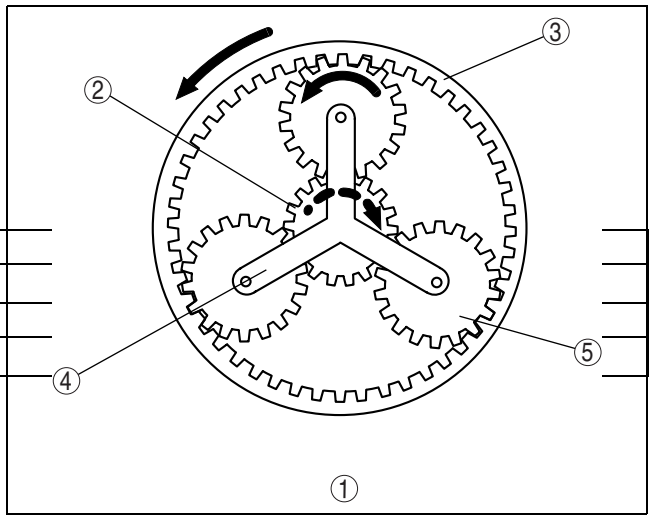


B3E0517A011

- Suppose gear ratio in fourth gear is i_4,
  $i_4=N_C/N_R$
- From the result of $N_S=0$ in formula (2), the relation between the gear ratio in fourth gear and the rotation speed of the rear planetary gear set is indicated in the formula below.
  $(Z_{RR}+Z_{SR})\ N_C=Z_{RR}N_R$
  Therefore,
  $i_4=N_C/N_R=Z_{RR}/ (Z_{RR}+Z_{SR}) =98/ (98+37) =0.7259$
  As a result, the gear ratio in fourth gear is 0.725.

Reverse

1	Rear planetary gear
2	Sun gear N_S (input)
3	Internal gear N_R (output)
4	Planetary carrier (fix)
5	Pinion gear



B3E0517A012

Gear rotation speed

Planetary gear					
Internal gear					
Planetary carrier					
Sun gear					

- Suppose gear ratio in reverse gear is i_{REV},
  $i_{REV}=N_S/N_R$
- From the result of $N_C=0$ in formula (2), the relation between the gear ratio during reverse movement and the rotation speed of the planetary gar set is indicated in the formula below.
  $(Z_{RR}+Z_{SR})\ 0=Z_{RR}N_R+Z_{SR}N_S$
  Therefore,
  $i_{REV}=N_S/N_R=Z_{RR}/Z_{SR}=-98/37=-2.6486$
  As a result, the gear ratio in reverse is 2.648.

PARKING MECHANISM OUTLINE

B3E051701030A23

- When the selector lever is shifted to P position, the parking pawl engages the parking gear and locks the output gear (i.e., rotation of the driving wheels).

PARKING MECHANISM STRUCTURE

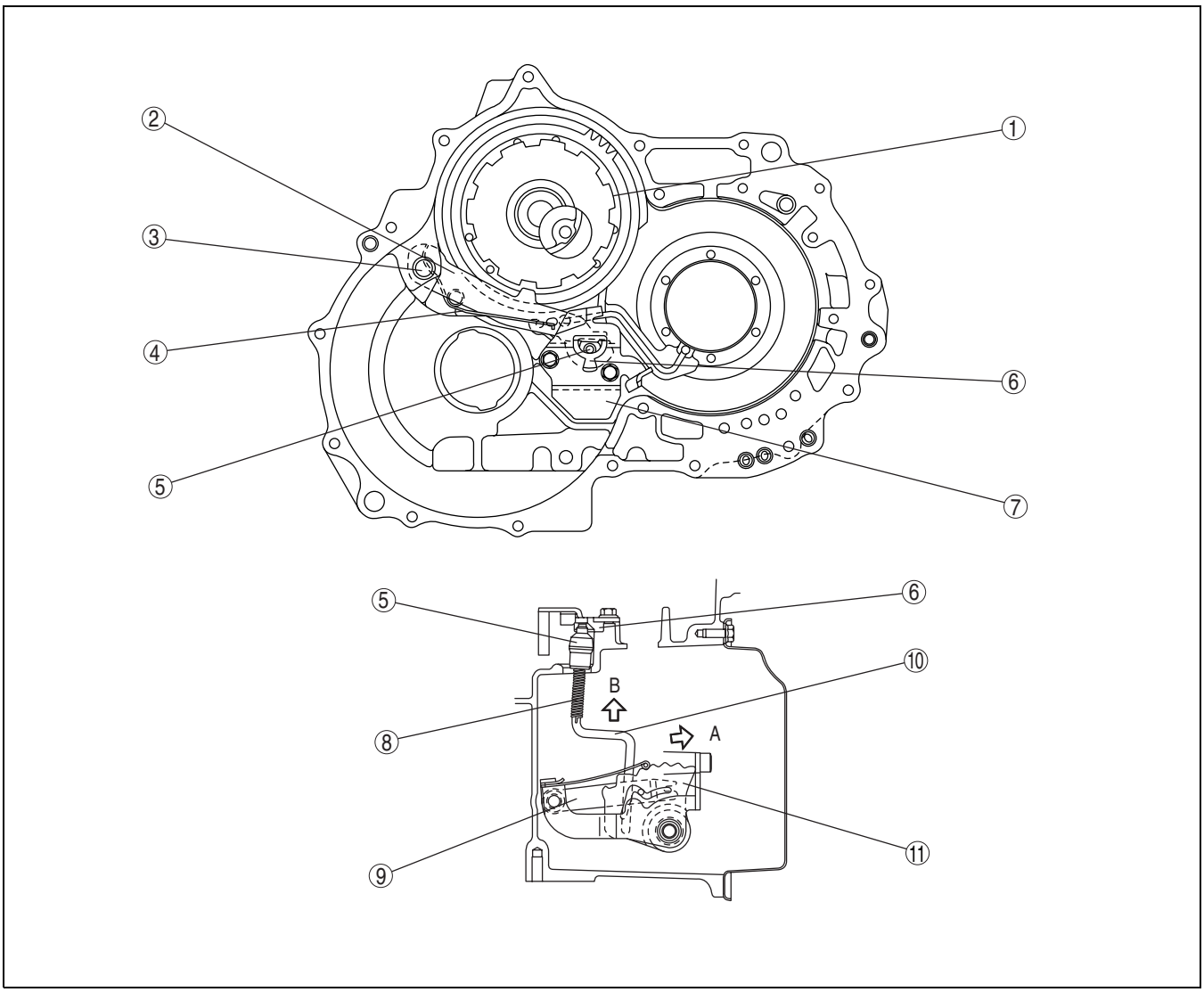
B3E051701030A24

- The parking pawl is installed in the transaxle case via the parking pawl shaft and pushed to the support actuator by the return spring except in P position.
  The parking rod component is designed to slide on the support actuator and connected to the manual plate.

PARKING MECHANISM OPERATION

B3E051701030A25

- When the selector lever is moved to P position, the manual shaft and the manual plate move in the direction of the arrow A to the position as shown in the figure below. Then the parking rod component moves in the direction of the arrow B, the parking rod component cam pushes up the parking pawl, and the parking pawl engages the parking gear.
  If the parking pawl hits the tooth of the parking gear, the parking pawl cannot be pushed up, so only the parking rod component is able to move. The cam presses the spring onto the parking pawl and the actuator. If the vehicle runs even a little under this condition, the wheels rotate and parking gear also rotates slightly. As a result, the parking pawl slides into the groove, and engages the parking gear.
  Thus, the parking mechanism prevents the vehicle from moving in P position.



B3E0517A013

1	Parking gear
2	Parking pawl
3	Parking pawl shaft
4	Pawl return spring
5	Cam (parking rod component)
6	Support actuator

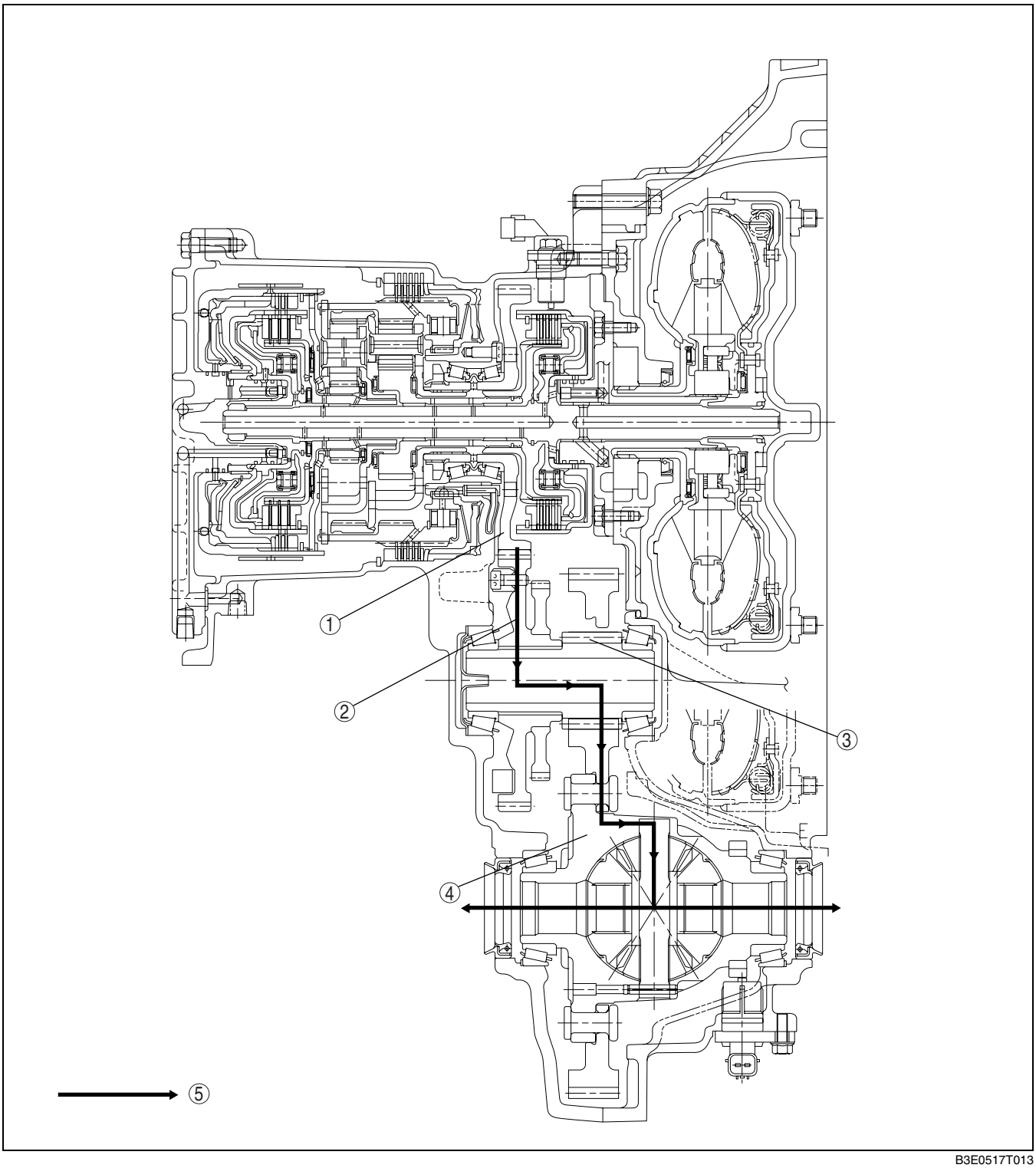
7	Actuator plate
8	Spring (parking rod component)
9	Parking assist lever component
10	Parking rod (parking rod component)
11	Manual plate

OUTPUT GEAR OUTLINE

B3E051719220A01

- The two-step final drive mechanism is adopted by arranging the secondary gear and the output gear on the

output gear shaft to miniaturize the transaxle.



B3E0517T013

1	Primary gear
2	Secondary gear
3	Output gear

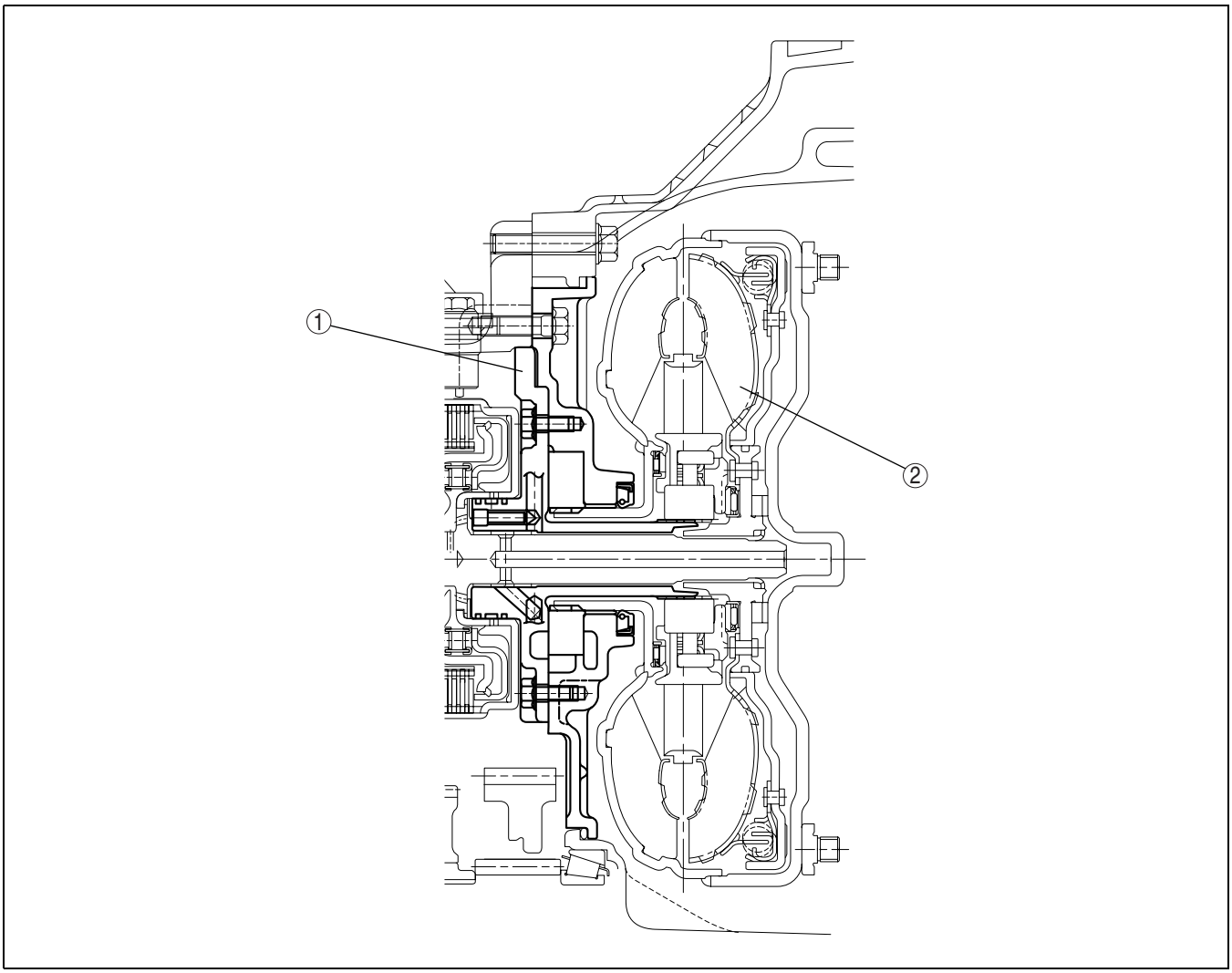
4	Differential
5	Power flow

OIL PUMP OUTLINE

B3E051719220A02

- The light-weight, compact, and quiet trochoid gear type oil pump is adopted to reduce the pump driving torque.

- The direct drive type oil pump is adopted and placed behind the torque converter.



B3E0517T015

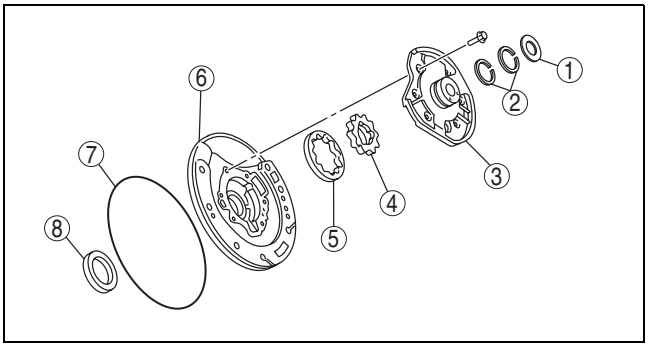
1	Oil pump

2	Torque converter

OIL PUMP STRUCTURE

B3E051719220A03

- The outer rotor and the inner rotor are installed in the oil pump housing.
- The inner rotor in the oil pump housing is driven by the torque converter.



B3E0517T016

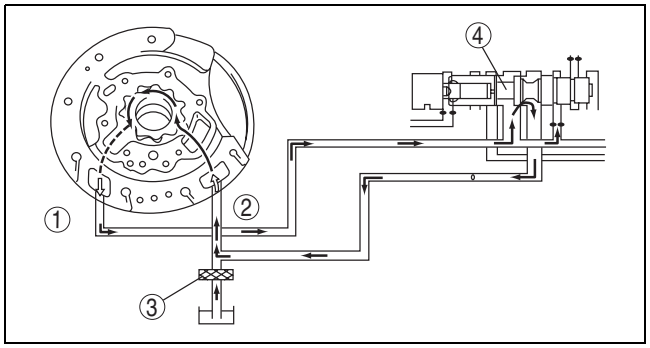
1	Thrust washer
2	Seal ring
3	Oil pump cover
4	Inner rotor
5	Outer rotor
6	Oil pump housing

7	O-ring
8	Oil seal

OIL PUMP OPERATION

- When the inner rotor in the oil pump rotates, the ATF is drawn to the oil pump and then discharged from the oil pump. The discharge amount is proportional to the rotating speed of the torque converter. The ATF discharge amount is controlled by the pressure regulator valve and the pressure control solenoid.

B3E051719220A04



B3E0517T017

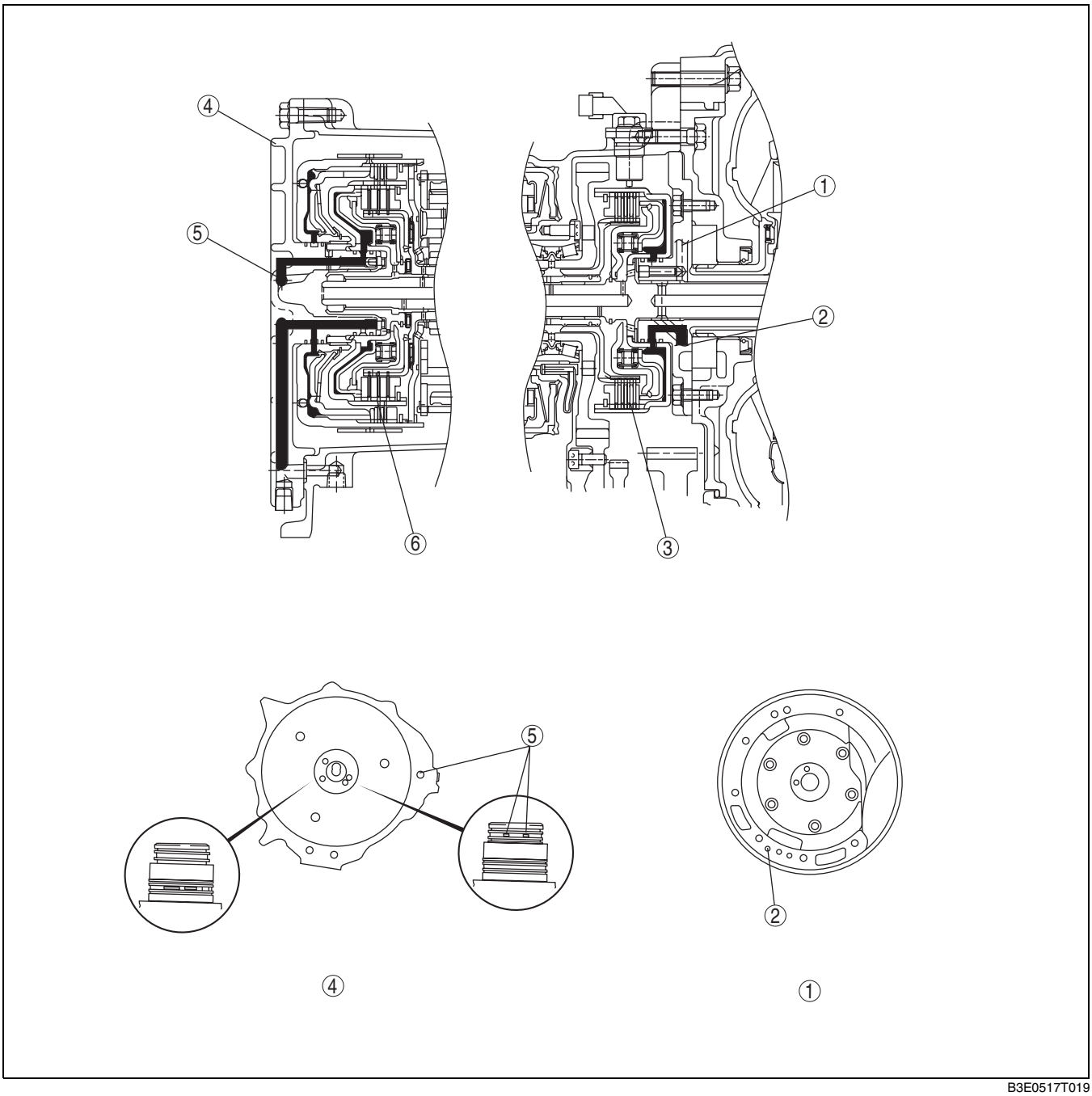
1	Out
2	In
3	Oil strainer
4	Pressure regulator valve

FORWARD CLUTCH, 3-4 CLUTCH HYDRAULIC CIRCUIT OUTLINE

B3E051701030A26

- By designing exclusive passages for the forward clutch and the 3-4 clutch in the transaxle case, via the oil pump and end cover the hydraulic pressure passages are shortened and control during clutch engagement is

improved.



B3E0517T019

1	Oil pump
2	Forward clutch hydraulic passage
3	Forward clutch

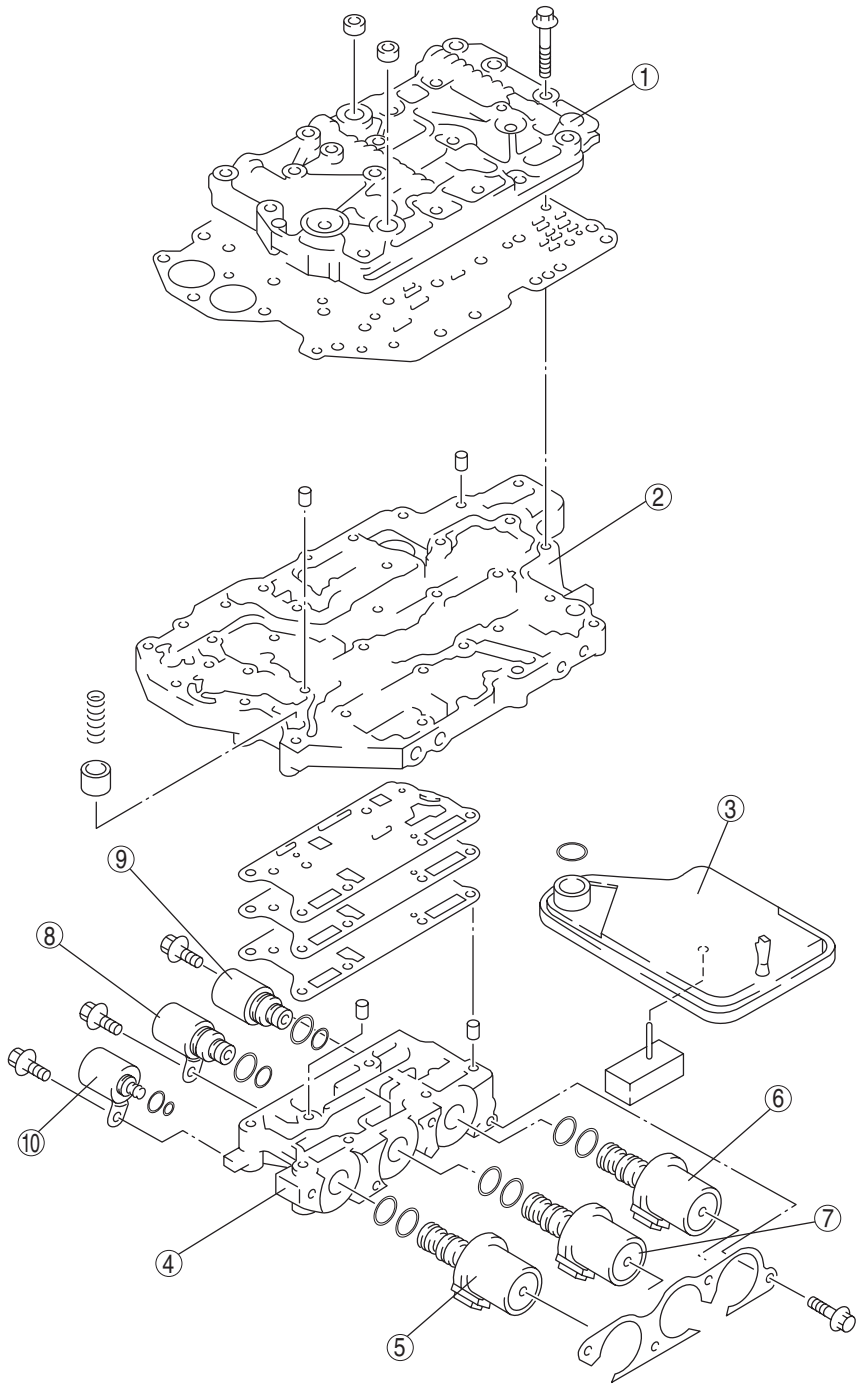
4	End cover
5	3-4 clutch hydraulic passage
6	3-4 clutch

CONTROL VALVE BODY OUTLINE

B3E051721100A01

- The control valve body is composed of three bodies: the upper control valve body, premain control valve body, and the solenoid control valve body.
- Because the clutch engagement pressure is controlled electronically, the hydraulic circuits are simplified, the valve types are reduced, and the control valve body is miniaturized.

- The nonwoven fabric oil strainer is installed in the control valve body to prevent contamination.



B3E0517T018

1	Upper control valve body
2	Main control valve body
3	Oil strainer
4	Solenoid valve body
5	Shift solenoid A

6	Shift solenoid B
7	Shift solenoid C
8	Shift solenoid D
9	Shift solenoid E
10	Pressure control solenoid

SHIFT SOLENOID A, B AND C (DUTY-CYCLE TYPE) OUTLINE

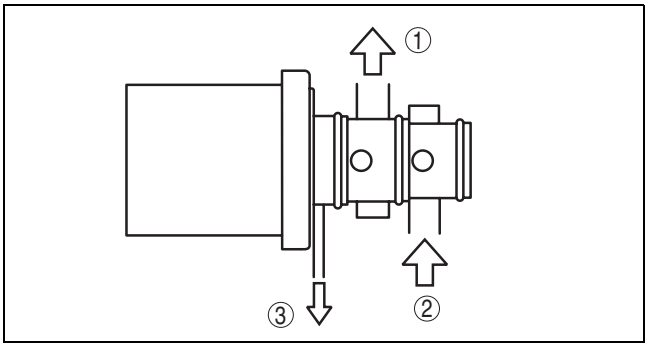
B3E051721100A02

- The clutch pressure direct control, which supplies the clutch pressure directly to each clutches and/or brake, is adopted. The three-way duty-cycle type solenoids with excellent controllability are adopted, to improve response.

SHIFT SOLENOID A, B AND C (DUTY-CYCLE TYPE) FUNCTION

B3E051721100A03

- The duty-cycle type shift solenoid adjusts the amount of output pressure according to the signal from the PCM, and controls the pressure of each clutch.
- The duty-cycle type shift solenoid, which switches ON/OFF at 50 Hz (20 ms cycle) and controls the output pressure, is adopted. By changing the ON time ratio a cycle (0—100 %), the solenoid adjusts the time ratio of the OPEN (supply) and CLOSE (drain), and maintains the clutch pressure at the designated hydraulic pressure. As a result, the clutch pressure rises when the duty ratio (50 Hz ON time ratio) is reduced, and falls when the duty ratio is raised.



B3E0517T035

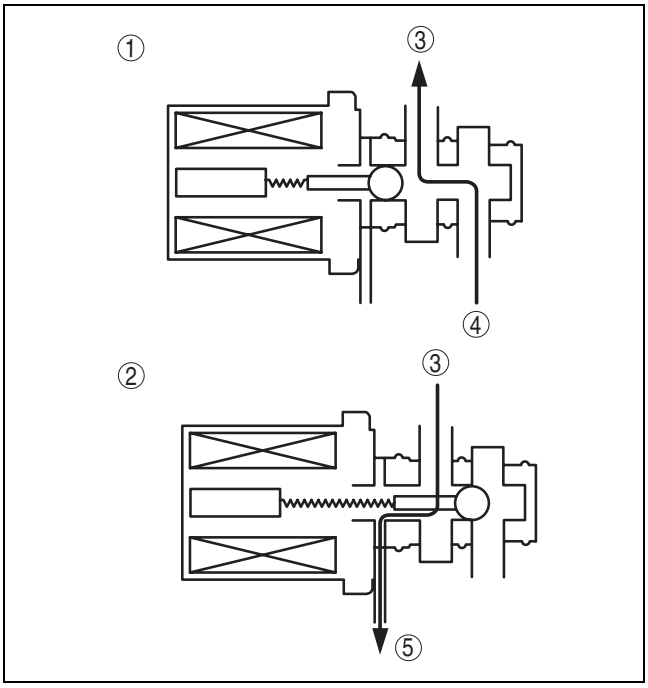
1	Output port (clutch pressure)
2	Supply port (line pressure)
3	Drain

SHIFT SOLENOID A, B AND C (DUTY-CYCLE TYPE) OPERATION

B3E051721100A04

OPEN:When the electrical current does not flow, the supply port (line pressure) in the solenoid opens and is engaged with the output port (clutch pressure). As a result, hydraulic pressure is supplied to the hydraulic passage for the clutch pressure.

CLOSE:When the electrical current flows, the supply port (line pressure) in the solenoid closes and the output port (clutch pressure) and the drain port are engaged to drain the clutch pressure.



B3E0517T036

1	Electrical current does not flow (OPEN)
2	Electrical current flows (CLOSE)
3	Output port (clutch pressure)
4	Supply port (line pressure)
5	Drain

SHIFT SOLENOID D, AND E (ON/OFF TYPE) OUTLINE

B3E051721100A05

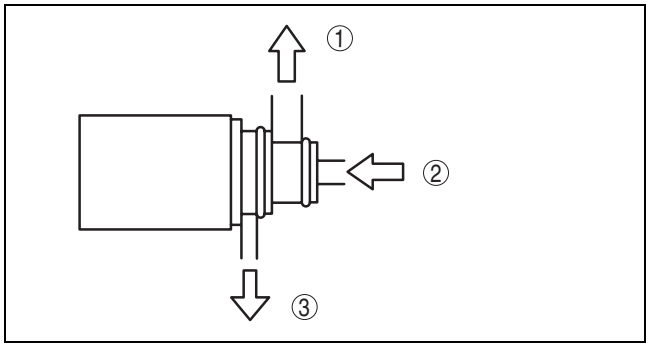
- Compact, light-weight three-way solenoid are adopted for shift solenoids D and E to reduce consumption discharge amount.

Shift solenoid	Function
Shift solenoid D	Switches bypass valve and 3-4 shift valve
Shift solenoid E	Switches low and reverse shift valve and TCC control valve

SHIFT SOLENOID D, AND E (ON/OFF TYPE) FUNCTION

B3E051721100A06

- ON/OFF type solenoid valve switches the supply drain of output port according to the electrical current flow switching.



B3E0517T037

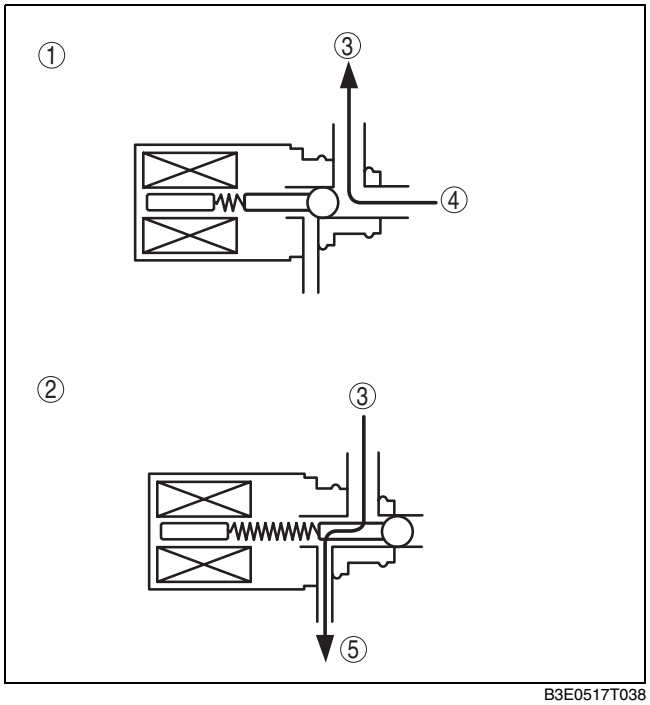
1	Output port
2	Supply port (solenoid reducing pressure)
3	Drain

SHIFT SOLENOID D, AND E (ON/OFF TYPE) OPERATION

B3E051721100A07

ON:When the electrical current flows, the output port and the supply port (solenoid reducing pressure) are engaged in the solenoid, and the output pressure becomes equivalent to the solenoid reducing pressure.

OFF:When the electrical current does not flow, the output port and the drain port are engaged in the solenoid, and the output pressure is drained.



B3E0517T038

1	Electrical current flows
2	Electrical current does not flow
3	Output port
4	Supply port (solenoid reducing pressure)

5	Drain

PRESSURE CONTROL SOLENOID (LINEAR TYPE) OUTLINE

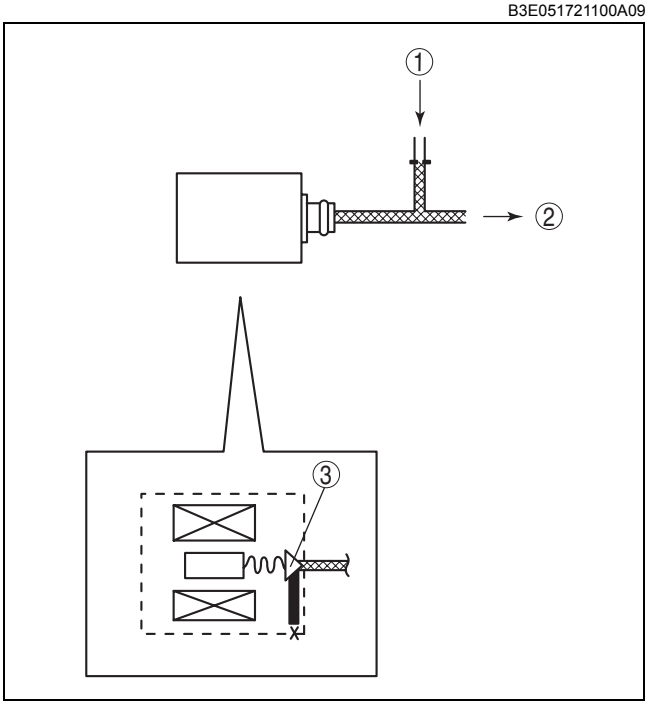
B3E051721100A08

- The pressure control solenoid with high stability in hydraulic pressure is adopted for the line pressure control.
- Because the pressure control solenoid controls the hydraulic pressure according to the current value, the degree of freedom in control increases. The controllability is maintained even under aeration, and pressure variation can be reduced.

PRESSURE CONTROL SOLENOID (LINEAR TYPE) OPERATION

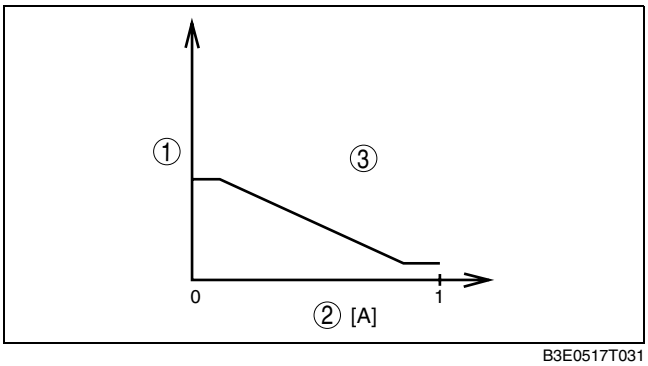
B3E051721100A09

- By changing the electrical current value (0 A—1 A) inside the solenoid, the pressure control solenoid adjusts the hold power of the hold pressure valve, controlling the pressure control solenoid pressure to the prescribed hydraulic pressure.



B3E0517T030

1	Solenoid reducing pressure
2	To pressure regulator valve
3	Hold pressure valve



B3E0517T031

1	Hydraulic pressure
2	Electrical current value
3	Pressure control solenoid pressure

AUTOMATIC TRANSAXLE CLEANING

B3E051701030A27

Cleaning Notes

1. Clean the transaxle exterior thoroughly with steam, cleaning solvents, or both, before disassembly.

Warning

- **Using compressed air can cause dirt and other particles to fly out, causing injury to the eyes.**

Wear protective eye wear whenever using compressed air.

2. Clean the removed parts with cleaning solvent, and dry with compressed air. Clean out all holes and passages with compressed air, and verify that there are no obstructions.

AUTOMATIC TRANSAXLE DISASSEMBLY

B3E051701030A28

Precaution

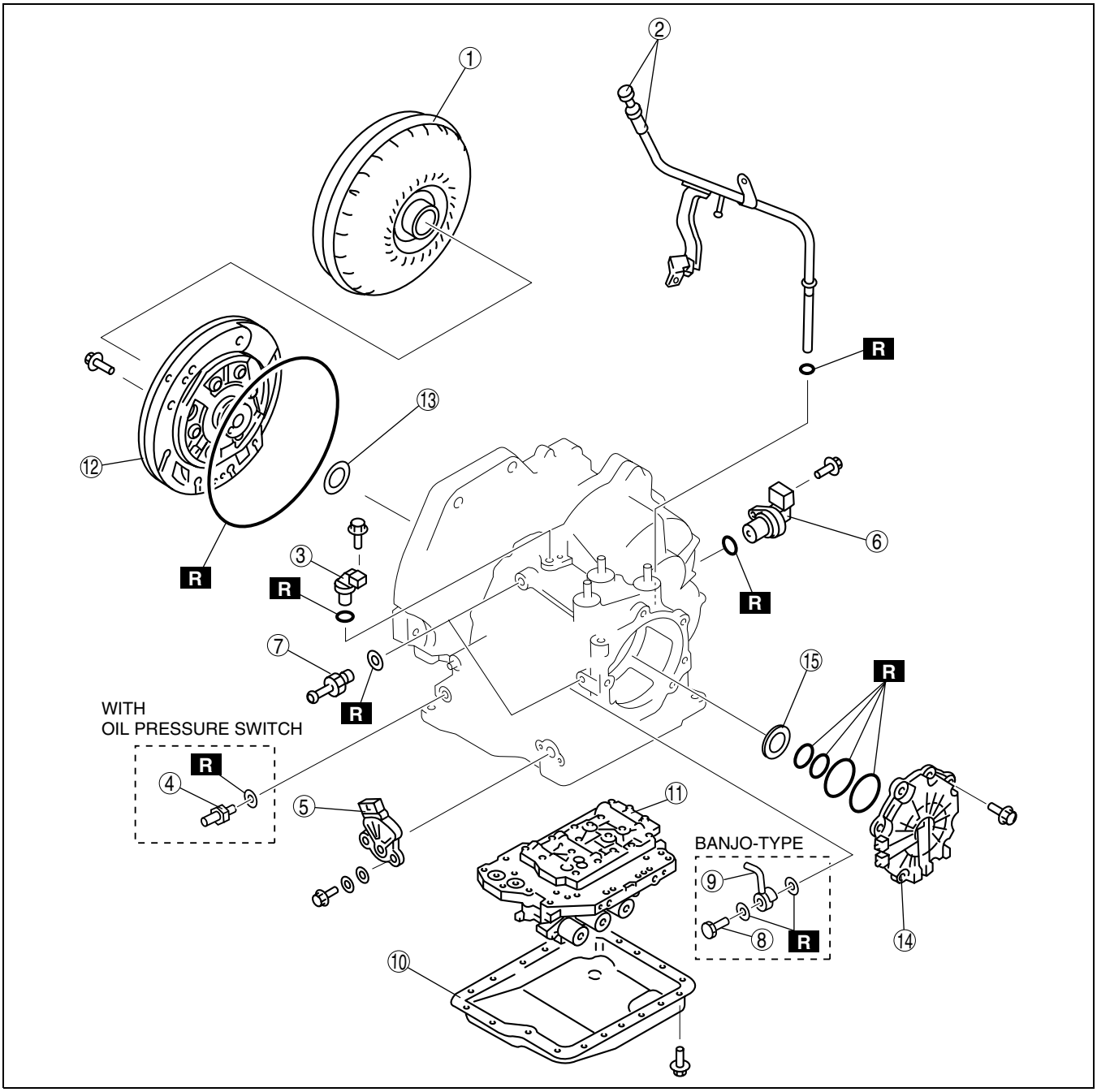
General notes

- The oil pan could contain small chips, shavings, and other particles which may be helpful in inspecting the condition of the transaxle and diagnosing certain problems.
  To ensure that all foreign particles stay in the oil pan, make sure that the transaxle is never tipped completely over while the oil pan is still installed.
  1. Disassemble the transaxle in a clean area (dustproof work space) to prevent entry of dust into the mechanisms.
  2. Inspect the individual transaxle components in accordance with the QUICK DIAGNOSIS CHART during disassembly.
  3. Use only plastic hammers when applying force to separate the light alloy case joints.
  4. Never use rags during disassembly; they may leave particles that can clog fluid passage.
  5. Several parts resemble one another; arrange them so that they do not get mixed up.
  6. Disassemble the control valve component and thoroughly clean it when the clutch or brake band has burned or when the ATF has degenerated.

Warning

- **Although the stand has a self-locking brake system, there is a possibility that the brake may not hold when the transaxle is held in a lopsided position on the stand. This would cause the transaxle to turn suddenly, causing serious injury. Never keep the transaxle tilted to one side. Always hold the rotating handle firmly when turning the transaxle.**

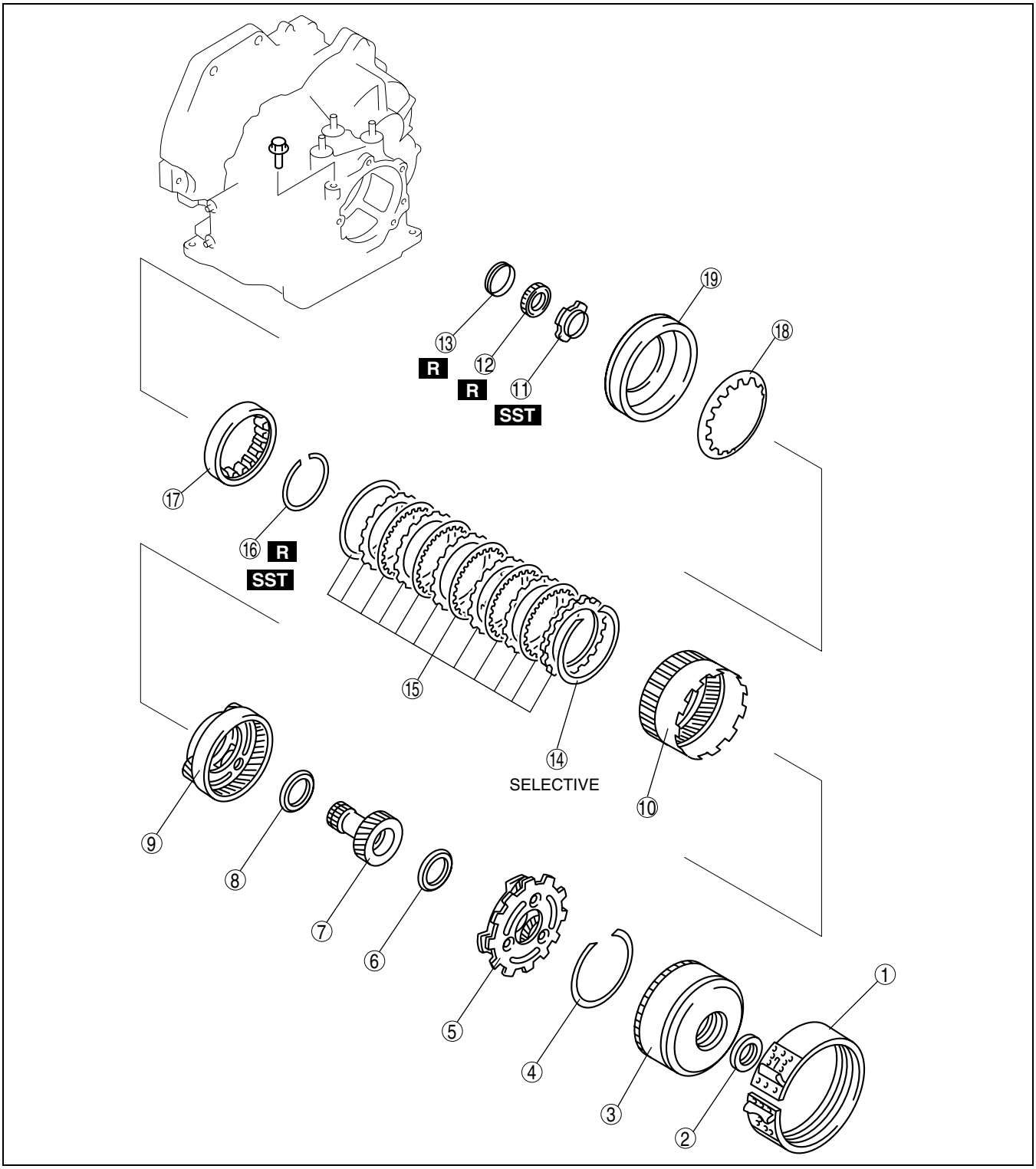
Disassembly
Components



CDA517ZAA001

1	Torque converter
2	Oil dipstick and oil filler tube
3	Input/turbine speed sensor
4	Oil pressure switch
5	Transaxle range switch
6	Vehicle speed sensor
7	Connector pipe
8	Connector bolt

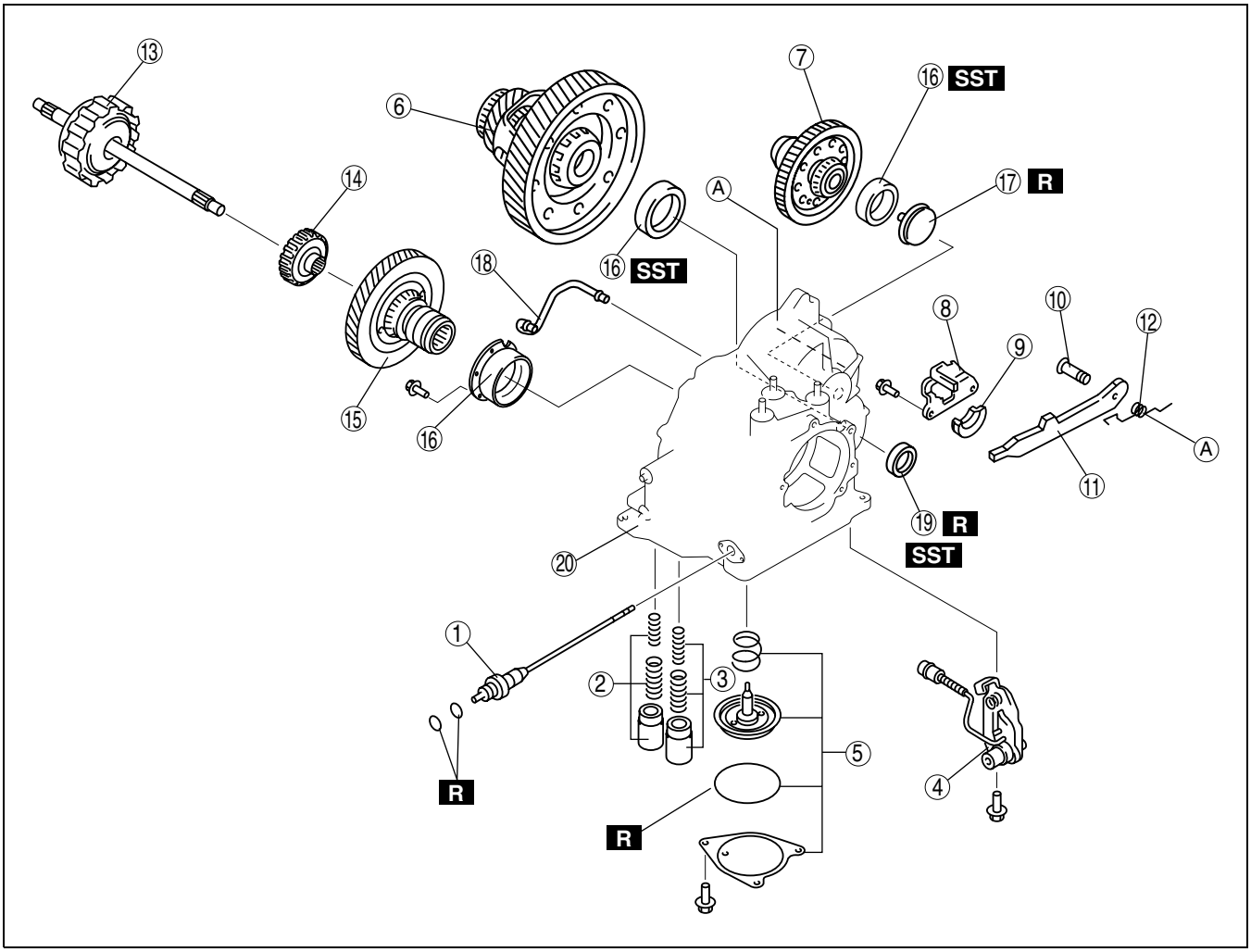
9	Oil pipe
10	Oil pan
11	Control valve body component
12	Oil pump
13	Thrust washer
14	End cover
15	Needle bearing



CDA517ZAA102

1	2–4 brake band
2	Needle bearing
3	Clutch component
4	Snap ring
5	Rear planetary gear component
6	Needle bearing
7	Front sun gear
8	Needle bearing
9	Front planetary gear component
10	Front internal gear and one-way clutch

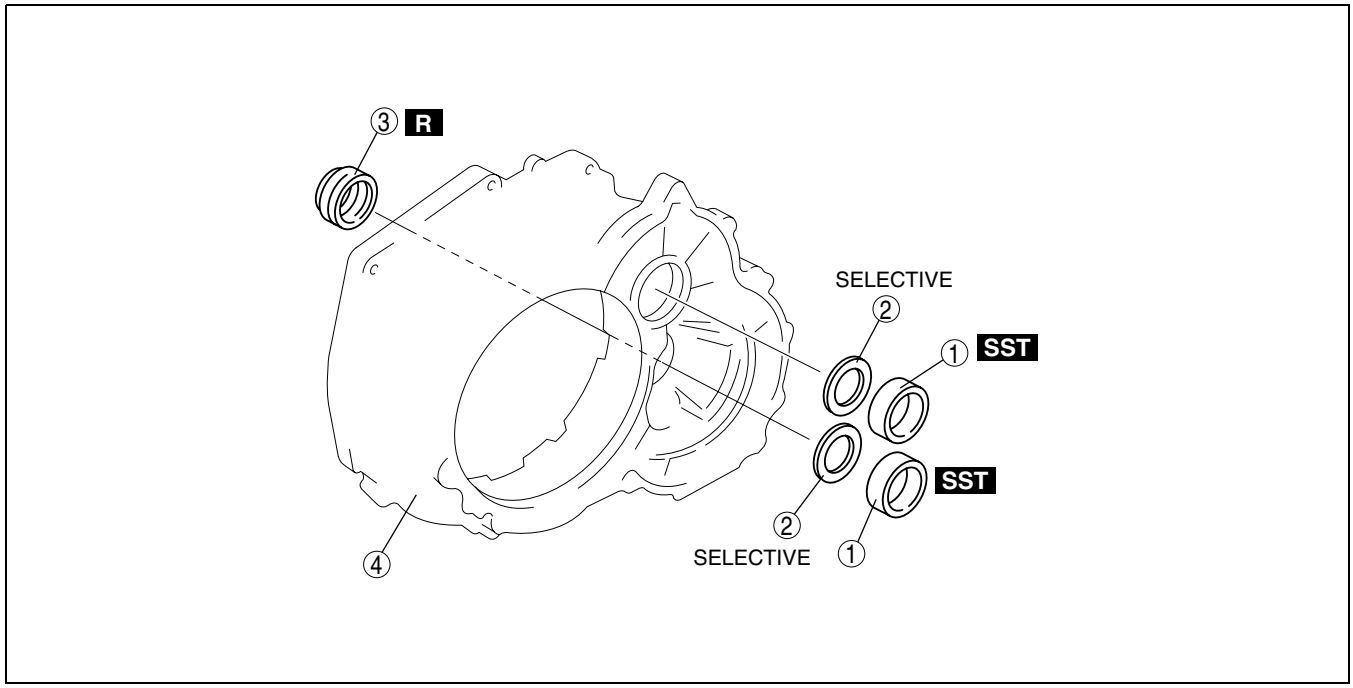
11	Lock nut
12	Bearing
13	Distance piece
14	Snap ring
15	Low and reverse brake
16	Snap ring
17	One-way clutch inner race
18	Piston return spring
19	Low and reverse brake piston



B3E0517A200

1	Manual shaft
2	Servo apply accumulator
3	Forward accumulator
4	Parking rod lever component
5	Band servo
6	Differential
7	Secondary gear and output gear
8	Actuator plate
9	Support actuator
10	Parking pawl shaft

11	Parking pawl
12	Pawl return spring
13	Forward clutch
14	Forward clutch hub
15	Primary gear
16	Bearing race
17	Funnel
18	Oil pipe
19	Oil seal
20	Transaxle case



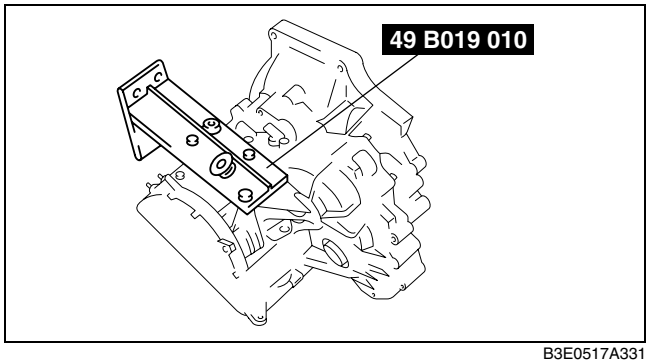
B3E0517A201

1	Bearing race
2	Adjustment shim

3	Oil seal
4	Converter housing

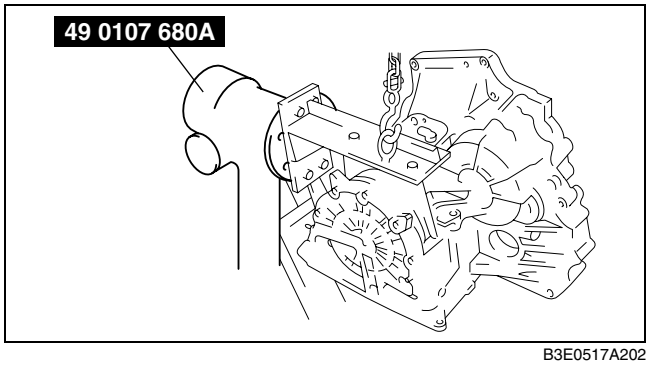
Disassembly procedure

1. Remove the torque converter, and immediately turn it so that the hole faces upward. This will help to keep any remaining fluid from spilling.
2. Remove the ATF dipstick and oil filler tube.
3. Remove the O-ring from the oil filler tube.
4. Remove the breather hose.
5. Assemble the **SST**.



B3E0517A331

6. Lift the transaxle and mount it on the **SST**.
7. Remove the input/turbine speed sensor.
8. Remove the O-ring from the input/turbine speed sensor.
9. Remove the oil pressure switch. (with oil pressure switch)
10. Remove the transaxle range switch.
11. Remove the vehicle speed sensor.
12. Remove the O-ring from the vehicle speedometer sensor.
13. Remove the connector pipe, connector bolt and oil pipe.



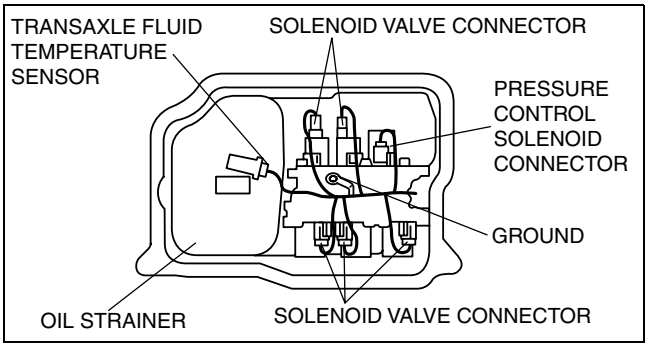
B3E0517A202

Warning

- **Using compressed air can cause dirt and other particles to fly, out, causing injury to the eyes. Wear protective eye wear whenever using compressed air.**

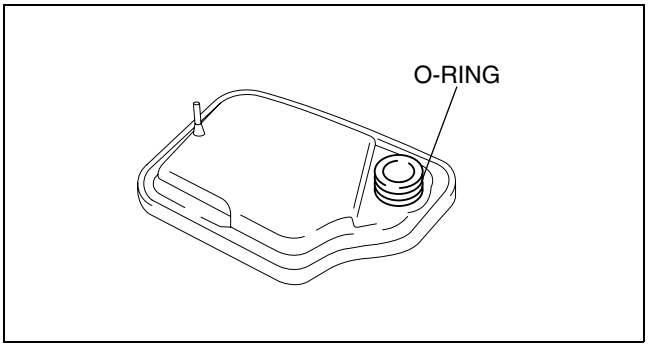
Caution
- **Clean the transaxle exterior thoroughly with a steam cleaner or cleaning solvents before removal.**
- **If any old sealant gets into the transaxle during installation of the oil pan, trouble may occur in the transaxle. Remove any old sealant from the transaxle case and oil pan, and clean with cleaning fluids.**

14. Remove the oil pan.
    Examine any material found in the pan or on the magnet to determine the condition of the transaxle. If large amounts of material are found, replace the torque converter and carefully inspect the transaxle for the cause.
    (1) Clutch facing material
        - Drive plate and brake band wear
    (2) Steel (magnetic)
        - Bearing, gear, and driven plate wear
    (3) Aluminum (nonmagnetic)
        - Aluminum part wear
15. Disconnect the solenoid valve connector, ground, and transaxle fluid temperature sensor.
16. Remove the oil strainer.



B3E0517A203

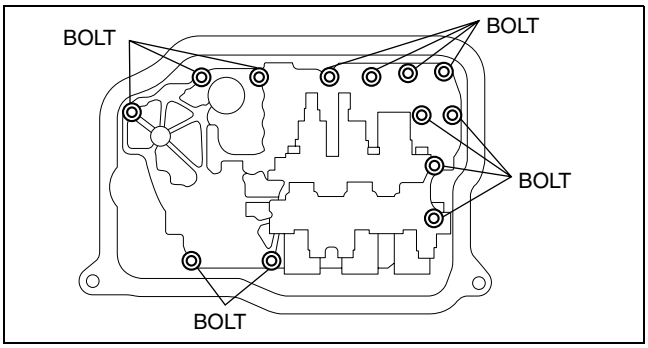
17. Remove the O-ring from the oil strainer.



B3E0517A204

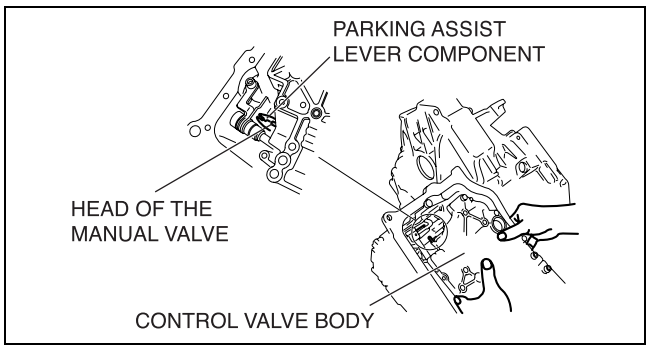
18. Remove the bolts as shown in the figure.

Note
- Remove the control valve body by removing the head of the manual valve from the port of the parking assist lever component.



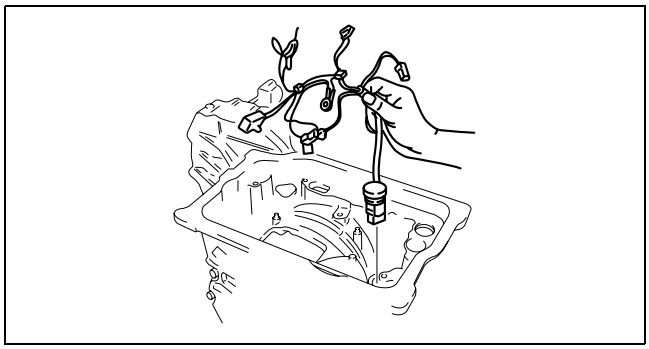
B3E0517W074

19. Remove the control valve body.



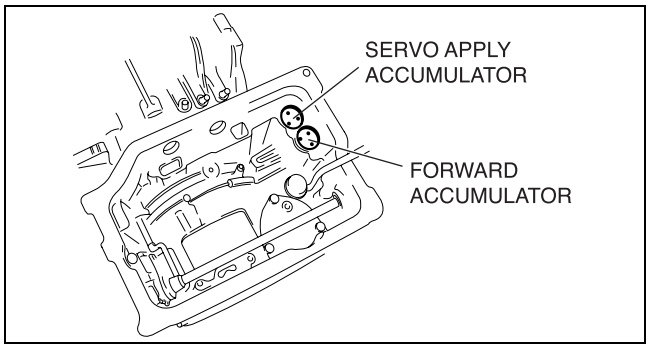
B3E0517A206

20. Remove the coupler component.



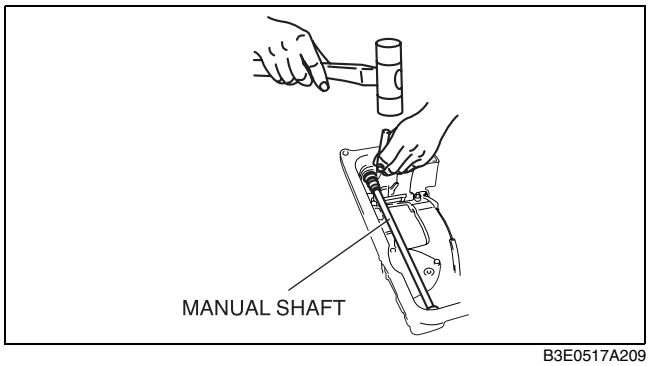
B3E0517A207

21. Remove the accumulator component.
22. Remove the manual shaft.



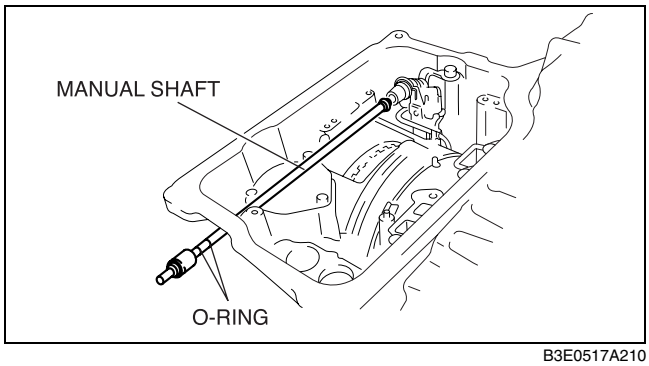
B3E0517A208

(1) Remove the roll pin using a pin punch.
(2) Remove the manual shaft.



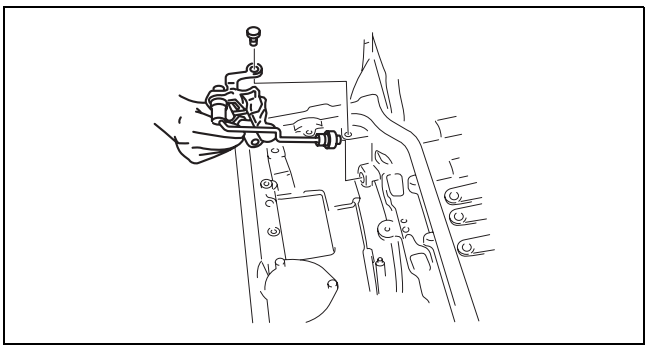
B3E0517A209

(3) Remove the O-ring from the manual shaft.



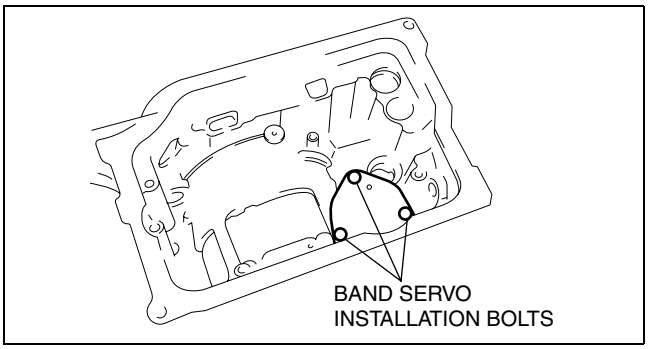
B3E0517A210

23. Remove the parking rod lever component.



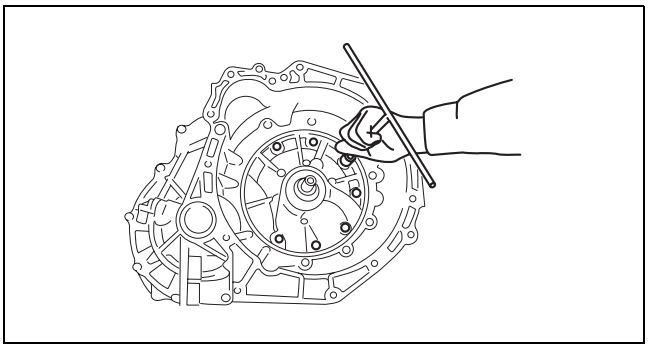
B3E0517A211

24. Remove the band servo component.



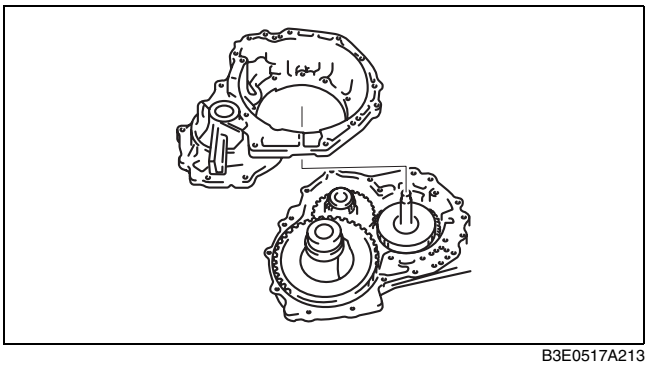
B3E0517A125

25. Remove the oil pump.



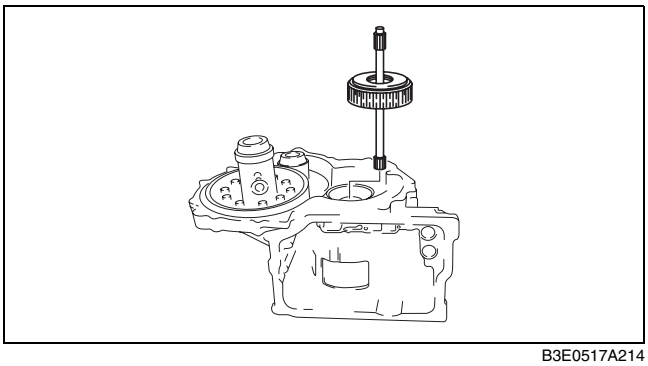
B3E0517A308

26. Remove the converter housing by tapping lightly with a plastic hammer.



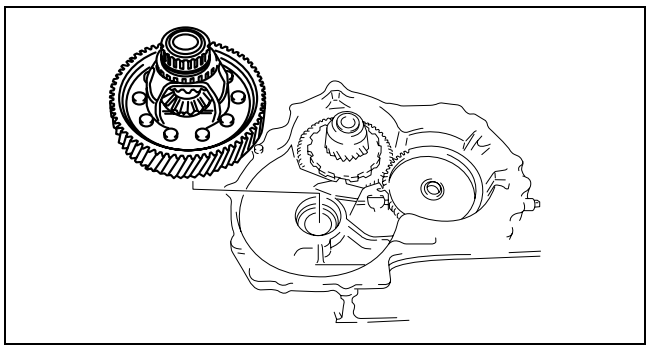
B3E0517A213

27. Remove the forward clutch component.



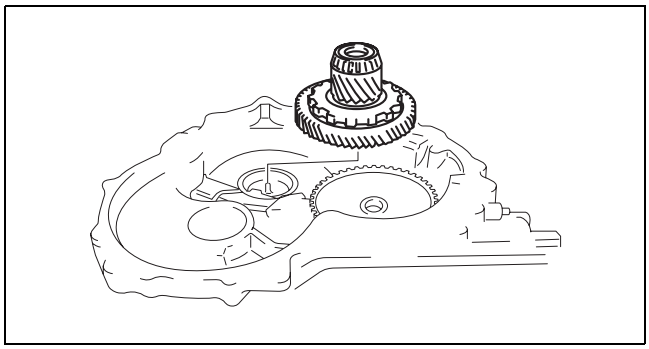
B3E0517A214

28. Remove the differential.



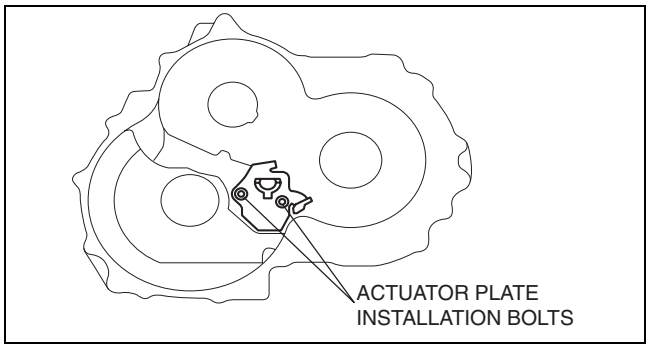
B3E0517A215

29. Remove the secondary gear and output gear.



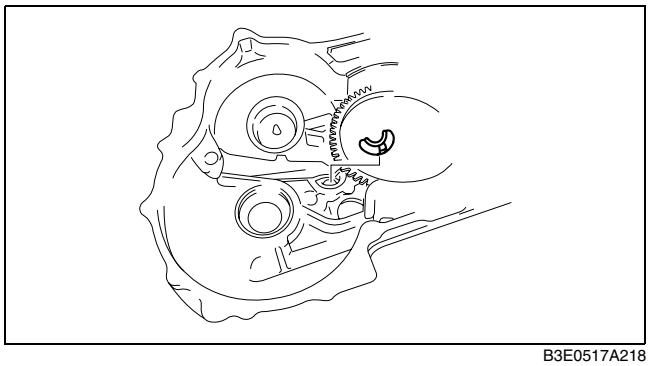
B3E0517A216

30. Remove the actuator plate.



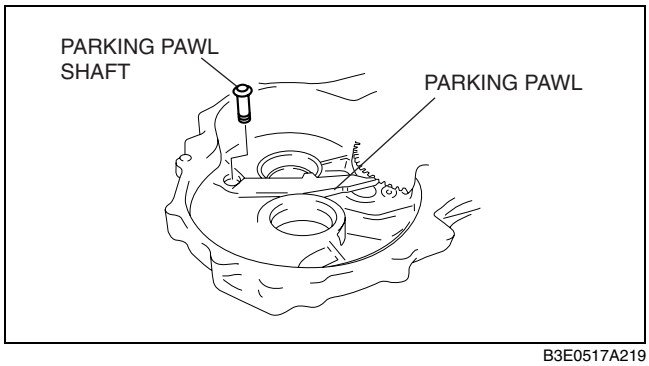
B3E0517A217

31. Remove the support actuator.



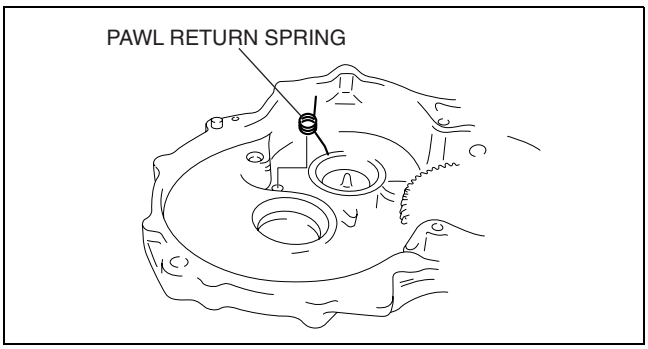
B3E0517A218

32. Pull out the parking pawl shaft.
33. Remove the parking pawl.



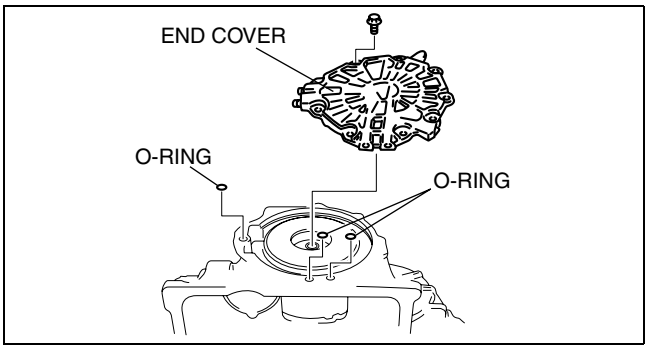
B3E0517A219

34. Remove the pawl return spring.
35. Remove the end cover.



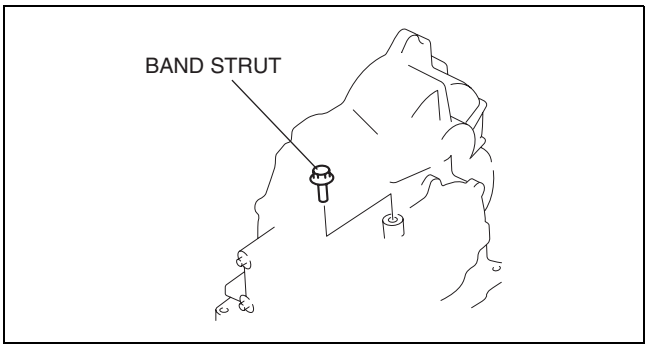
B3E0517A220

36. Remove the O-ring from the transaxle case.



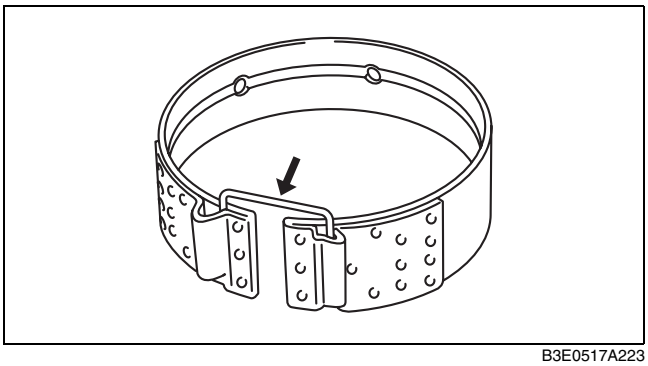
B3E0517A221

37. Remove the band strut.



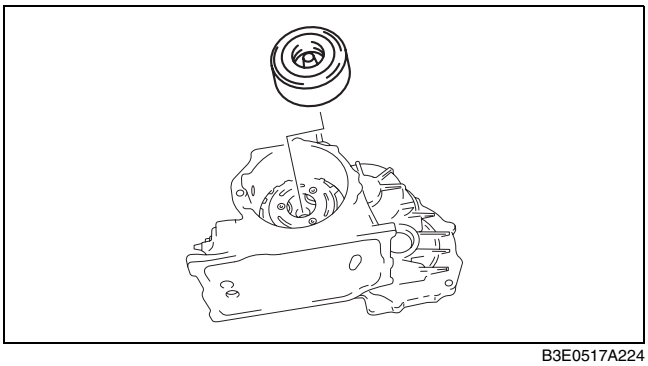
B3E0517A222

38. Remove the 2–4 brake band, and hold it together using a piece of wire as shown in the figure.



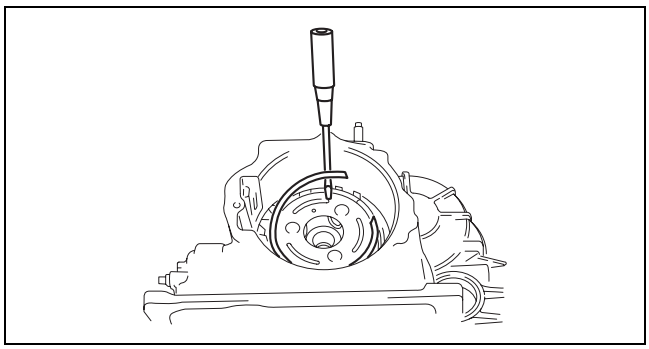
B3E0517A223

39. Remove the clutch component.



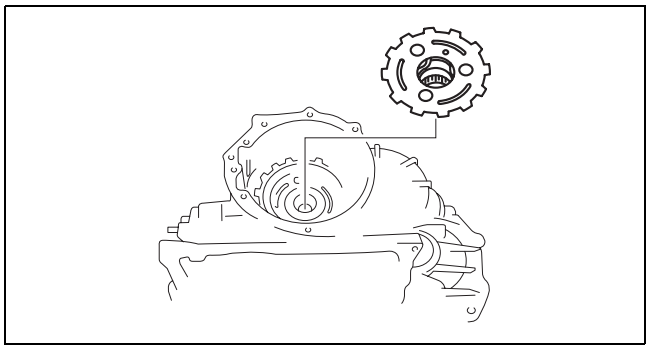
B3E0517A224

40. Remove the snap ring.



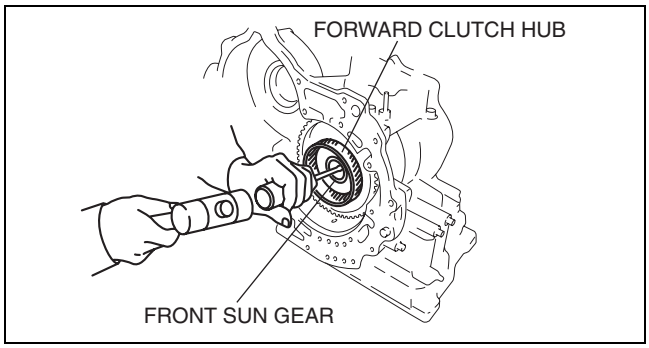
B3E0517A225

41. Remove the rear planetary gear component.



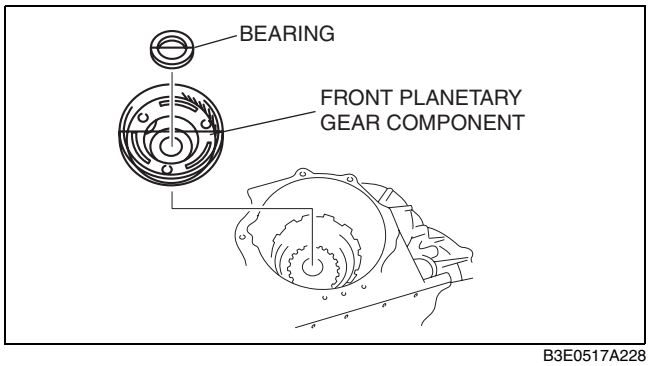
B3E0517A226

42. Remove the front sun gear by tapping its end with a flathead screwdriver or similar tool. as shown in the figure.
43. Remove the forward clutch hub.



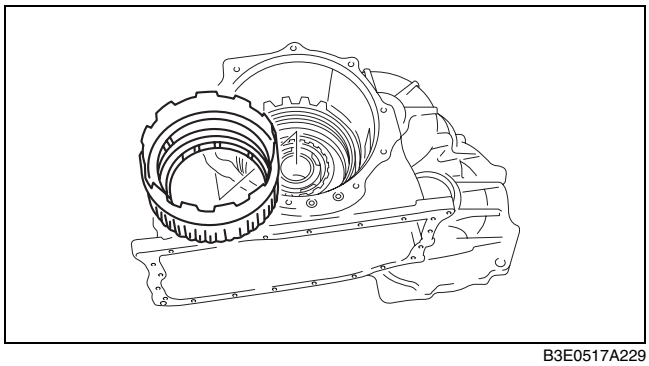
B3E0517A227

44. Remove the front planetary gear component.



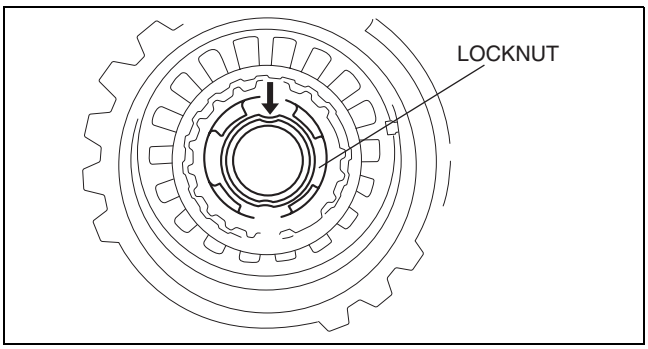
B3E0517A228

45. Remove the front internal gear and one-way clutch component.
46. Remove the locknut.



B3E0517A229

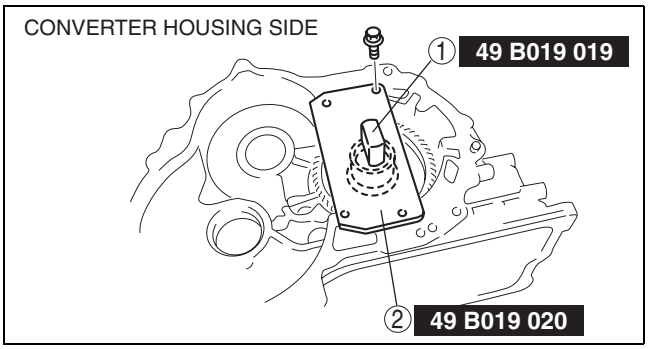
(1) Knock the crimped portion of the locknut outward by using a small chisel and a hammer.



B3E0517A230

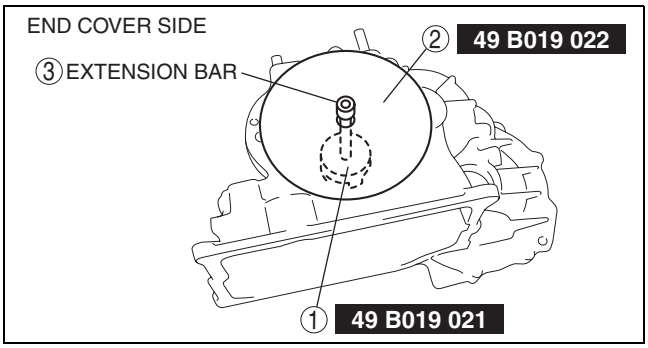
(2) Install the **SST** to the primary gear in the order shown.

Tightening torque
19—25 N·m {1.9—2.6 kgf·m, 14—18 ft·lbf}



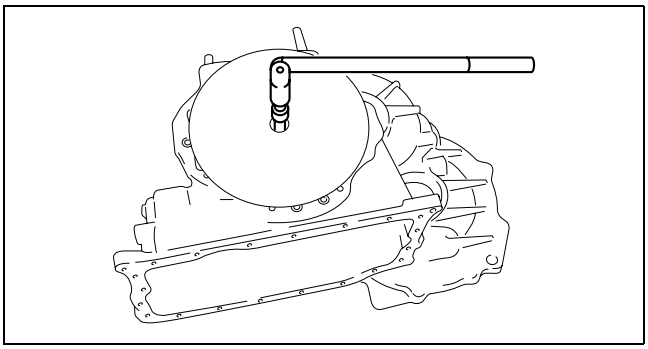
B3E0517A231

(3) Install the **SST** to the locknut in the order shown.

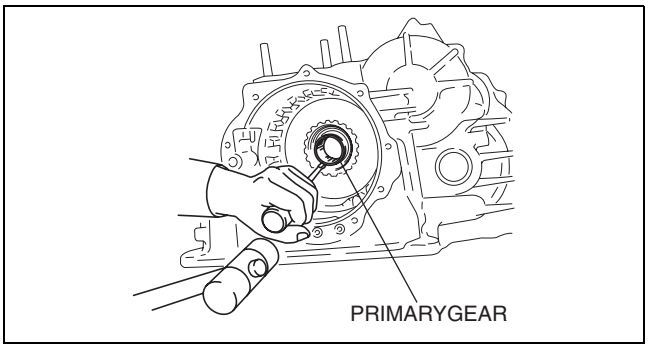


B3E0517A232

(4) Remove the locknut.


B3E0517A233

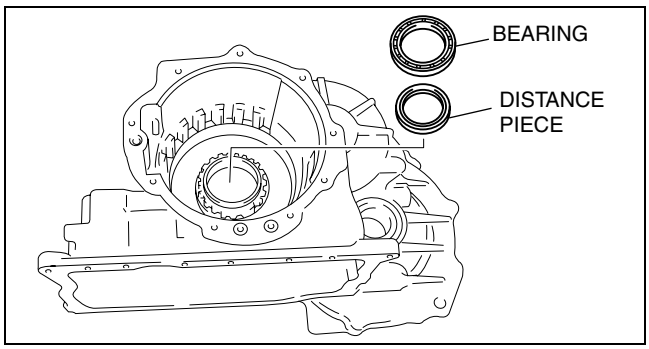
47. Remove the primary gear by tapping it with a flathead screwdriver, etc. as shown in the figure.



B3E0517A234

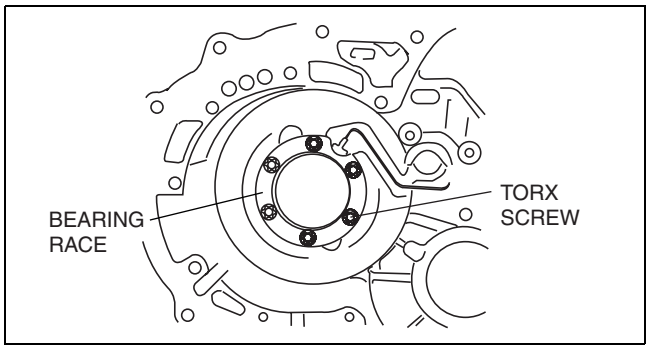
48. Remove the bearing and distance piece.

Caution
- **Removing the bearing race using a flathead screwdriver can damage the inside of the bearing race. Handle the flathead screwdriver carefully.**



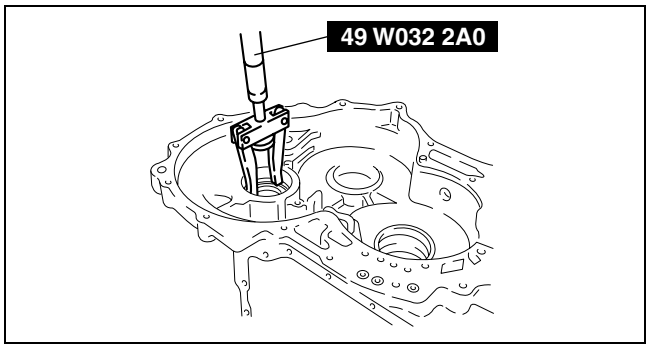
B3E0517A235

49. Remove torx screws from the converter housing side.
50. Remove the bearing race.



B3E0517A334

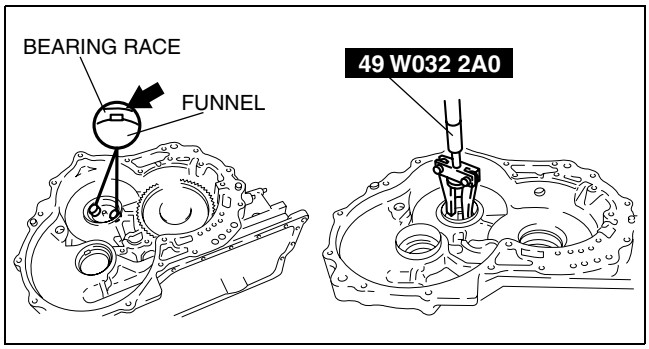
51. Remove the bearing race using the **SST** as shown in the figure.



B3E0517A238

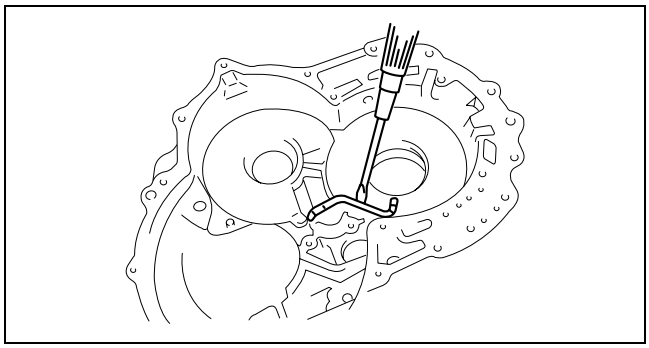
52. Tap the funnel at the areas indicated in the figure using a flathead screwdriver, etc. to make gaps big enough to install the **SST**. Then remove the bearing race.
53. Remove the funnel.

Caution
- **Removing the oil pipe using a flathead screwdriver can damage the oil pipe. Handle the flathead screwdriver carefully.**



B3E0517A239

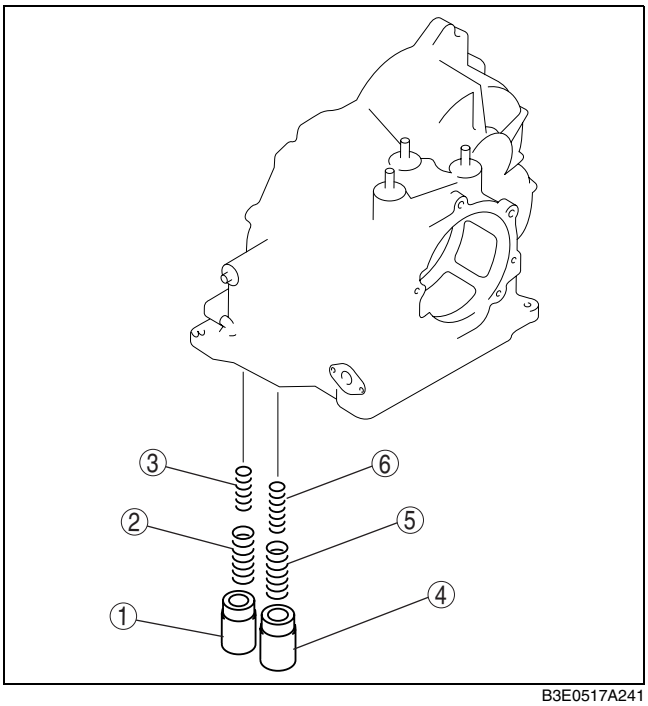
54. Remove the oil pipe.


B3E0517A240

ACCUMULATORS DISASSEMBLY/ASSEMBLY

B3E051719200A01

1. Disassemble in the order indicated in the table.
2. Assemble in the reverse order of disassembly.



B3E0517A241

1	Servo apply accumulator
2	Servo apply accumulator large spring
3	Servo apply accumulator small spring
4	Forward accumulator
5	Forward accumulator large spring
6	Forward accumulator small spring

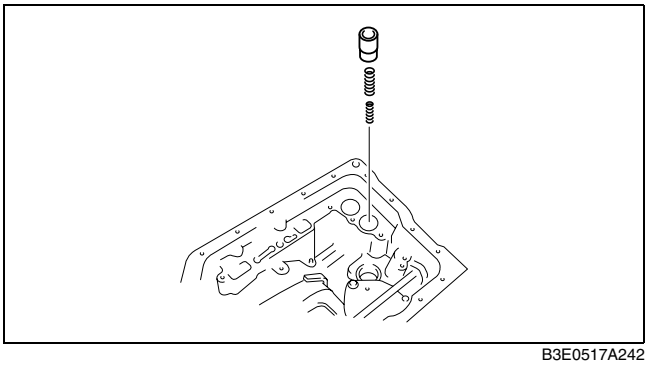
Assembly Procedure

1. Measure the spring free length.

Spring	Outer diameter mm {in}	Free length mm {in}	No. of coils	Wire diameter mm {in}
Servo apply accumulator large spring	21.0 {0.827}	67.8 {2.669}	10.3	3.5 {0.138}
Servo apply accumulator small spring	13.0 {0.512}	67.8 {2.669}	17.1	2.2 {0.087}
Forward accumulator large spring	21.0 {0.827}	75.0 {2.953}	10.7	2.3 {0.091}
Forward accumulator small spring	15.6 {0.614}	49.0 {1.929}	7.7	2.4 {0.094}

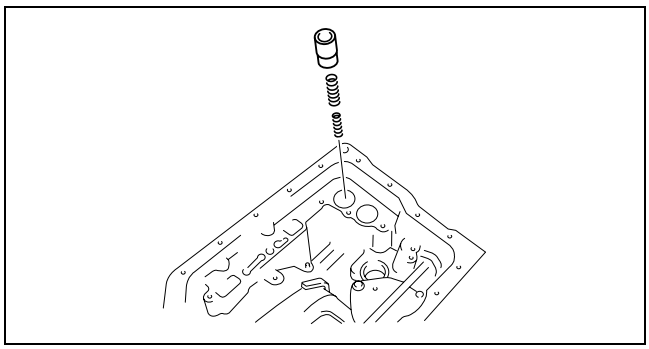
- If not as specified, replace the spring.

2. Install the forward accumulator small spring, forward accumulator large spring and forward accumulator.



B3E0517A242

3. Install the servo apply accumulator small spring, servo apply accumulator large spring and servo apply accumulator.

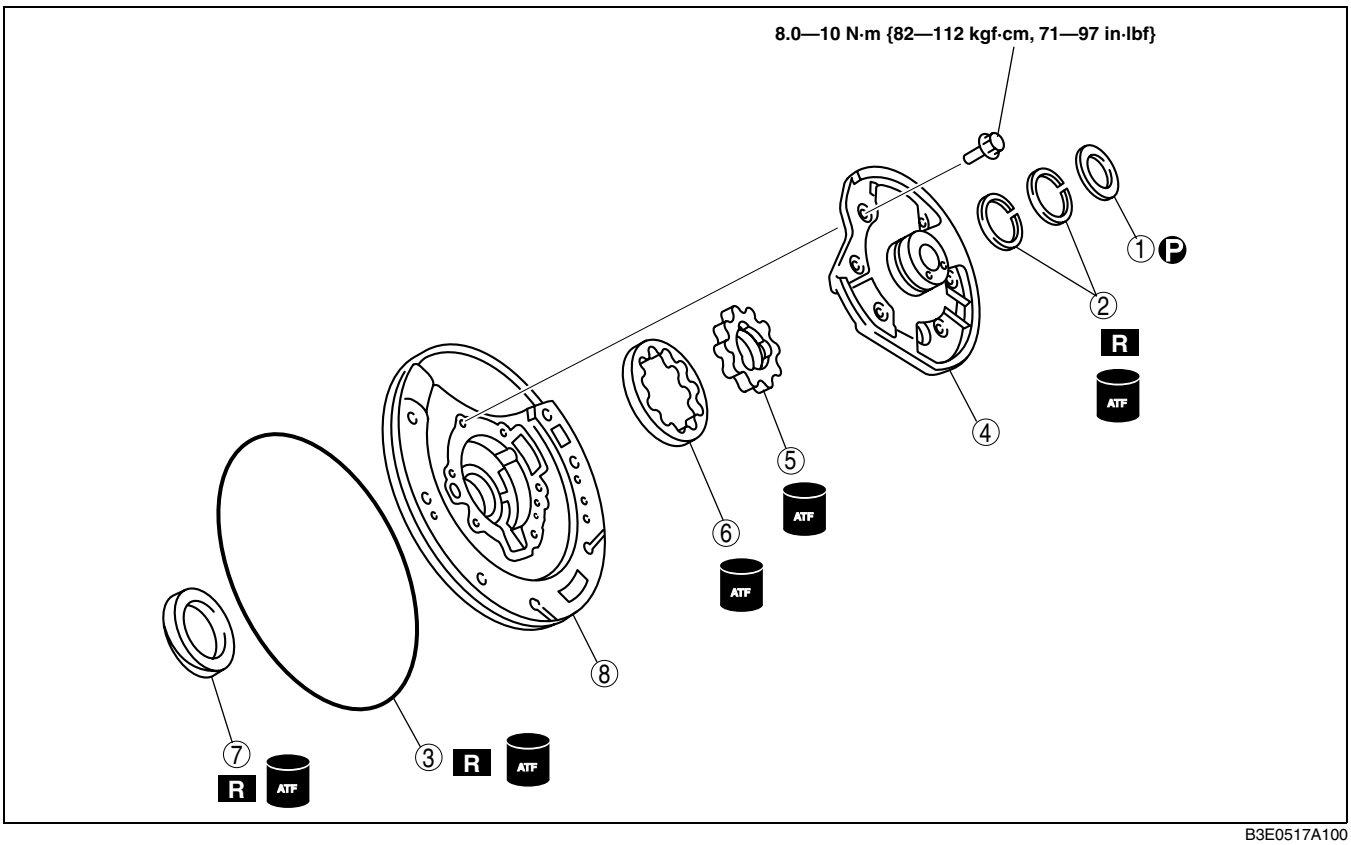


B3E0517A243

OIL PUMP DISASSEMBLY/ASSEMBLY

B3E051719220A05

1. Perform the preinspection before disassembly. (See 05–17–123 Oil Pump Preinspection.)
2. Disassemble in the order indicated in the table.
3. Assemble in the reverse order of disassembly.

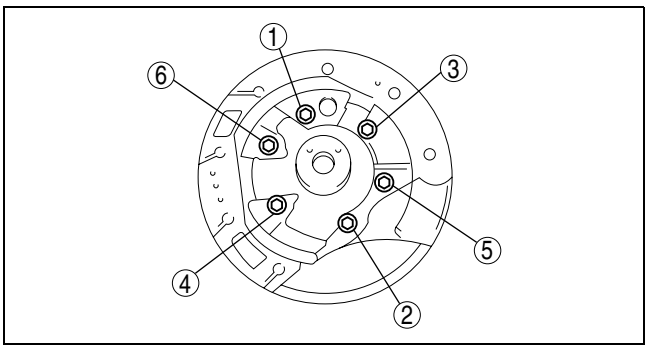


B3E0517A100

1	Thrust washer
2	Seal rings
3	O-ring
4	Oil pump cover (See 05–17–53 Oil Pump Cover Disassembly Note.)
5	Inner rotor (See 05–17–54 Inner Rotor, Outer Rotor Disassembly Note.)
6	Outer rotor (See 05–17–54 Inner Rotor, Outer Rotor Disassembly Note.)
7	Oil seal
8	Oil pump housing

Oil Pump Cover Disassembly Note

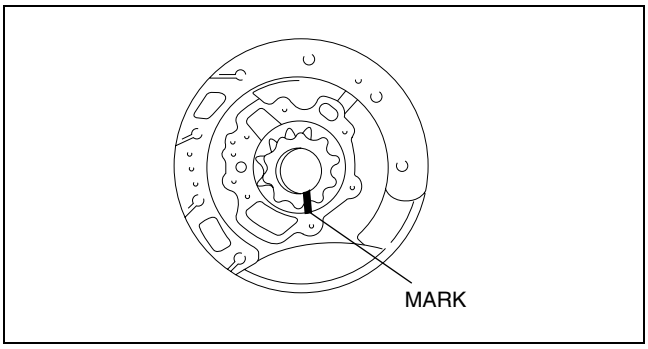
- Loosen the mounting bolts evenly in the pattern shown and remove the oil pump cover from the oil pump housing.



B3E0517A101

Inner Rotor, Outer Rotor Disassembly Note

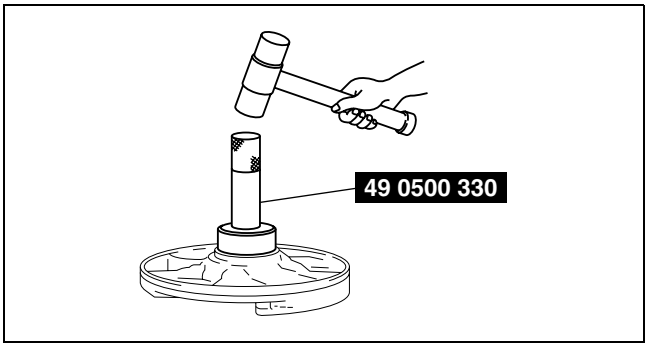
- Mark the outer and inner rotors without scratching or denting them, then remove the oil pump housing.



B3E0517A102

Assembly Procedure

1. Apply ATF to new oil seal and install it onto oil pump housing using the **SST**.

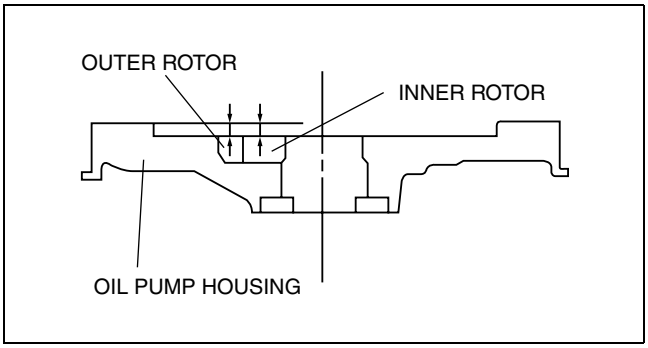


B3E0517A103

2. Measure the clearance between the end of the oil pump housing and the outer rotor and inner rotor at four places along their circumferences.

   Clearance
   Standard:
   0.04—0.05 mm {0.0015—0.0019 in}
   Maximum:
   0.06 mm {0.0023 in}

   - If not as specified, replace the oil pump.

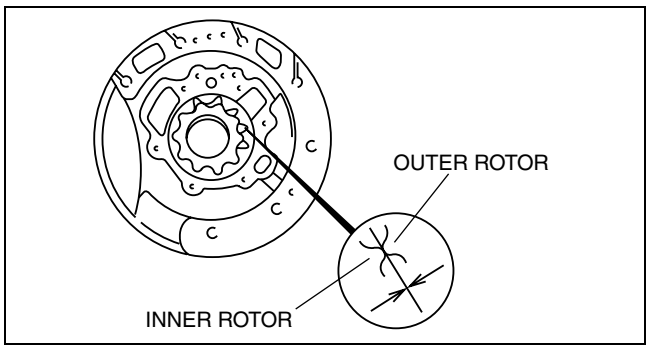


B3E0517A104

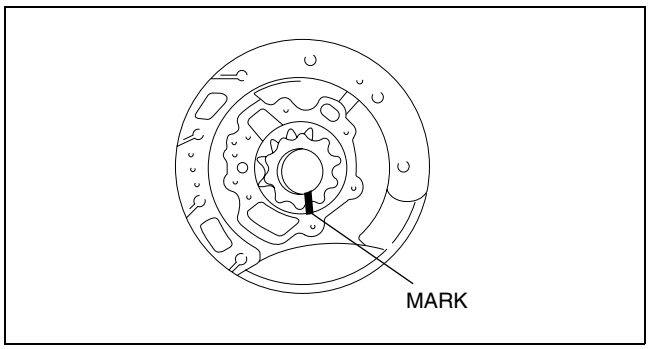
3. Measure the clearance between the outer rotor and the inner rotor.

   Oil clearance
   Standard:
   0.02—0.13 mm {0.0008—0.0051 in}
   Maximum:
   0.14 mm {0.0055 in}

   - If not within the specification, replace the oil pump.
4. Apply ATF to the outer and inner rotors.
5. Align the marks and install the outer and inner rotors.
6. Install the oil pump flange.
7. Mount the oil pump cover onto the oil pump housing.



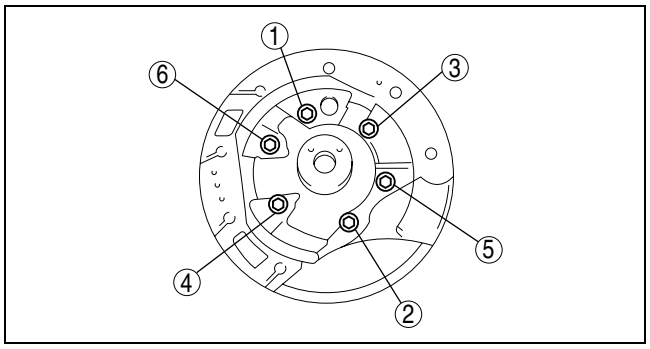
B3E0517A105



B3E0517A102

8. Tighten the bolts evenly and gradually in the order shown.

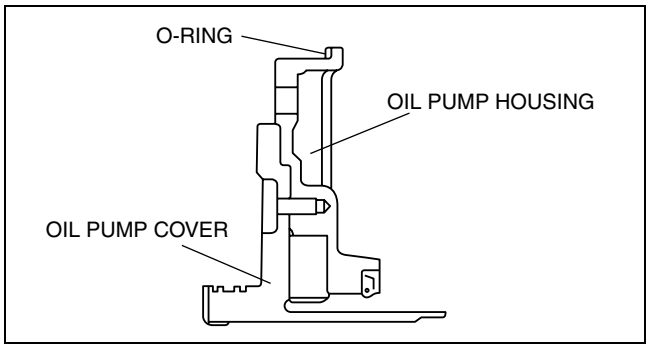
   Tightening torque
   8.0—10 N·m {82—112 kgf·cm, 71—97 in·lbf}



B3E0517A101

9. Apply ATF to new O-ring and install it onto the oil pump housing.

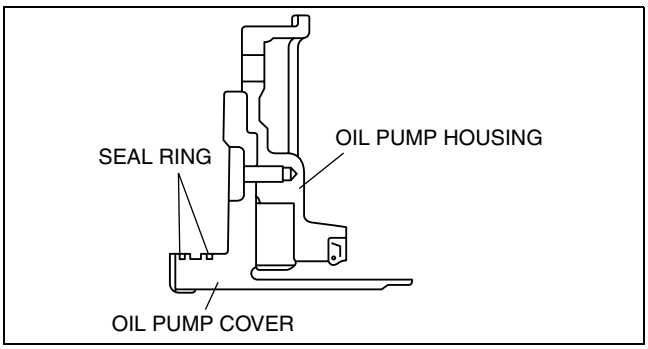
   O-ring inner diameter
   209.5 mm {8.248 in}



B3E0517A106

10. Apply ATF to new seal rings and install them onto the oil pump cover.

Seal ring inner diameter
47.1 mm {1.854 in}

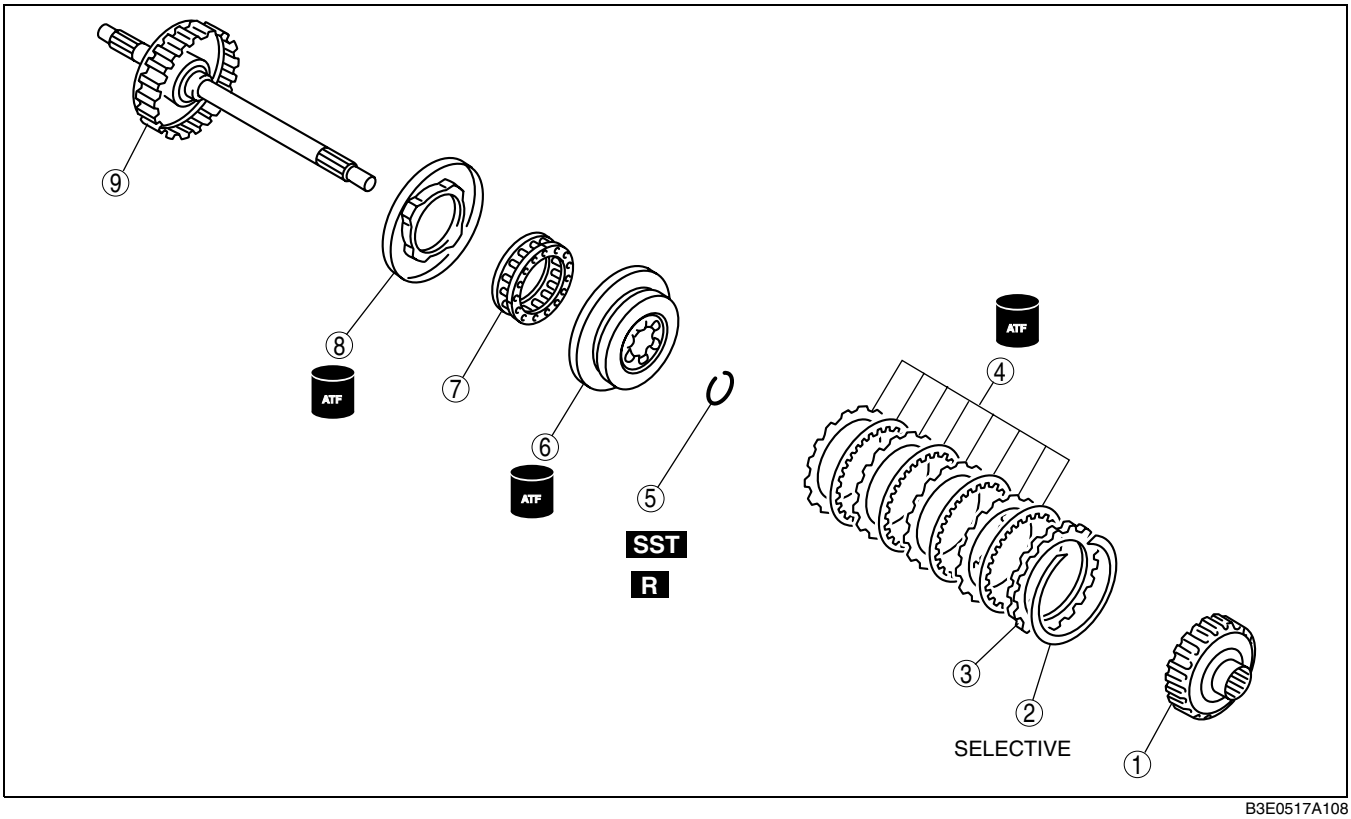


B3E0517A107

FORWARD CLUTCH DISASSEMBLY/ASSEMBLY

B3E051719500A01

1. Perform the preinspection before disassembly. (See 05–17–124 Forward Clutch Preinspection.)
2. Disassemble in the order indicated in the table.
3. Assemble in the reverse order of disassembly.



B3E0517A108

1	Forward clutch hub
2	Snap ring
3	Retaining plate
4	Drive and driven plate
5	Snap ring (See 05–17–56 Snap Ring Disassembly Note.)
6	Seal plate
7	Springs and retainer component
8	Forward clutch piston (See 05–17–57 Forward Clutch Piston Disassembly Note.)
9	Forward clutch drum and turbine shaft

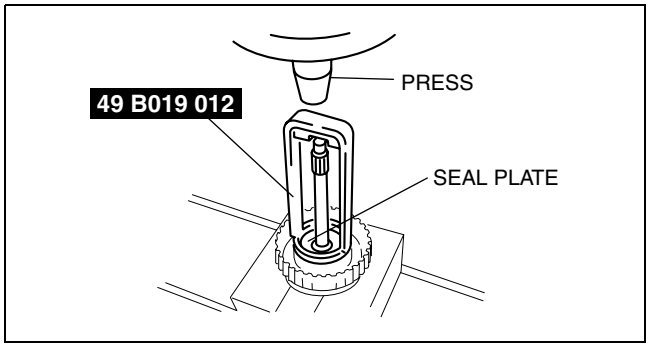
Snap Ring Disassembly Note

1. Install the **SST** to the forward clutch.

Caution

- **Depress the seal plate only enough to remove the snap ring. Overpressing will damage the seal plate assembly edges.**

2. Compress the seal plate.
3. Remove the snap ring.
4. Remove the **SST,** then remove the seal plate and spring and retainer component.

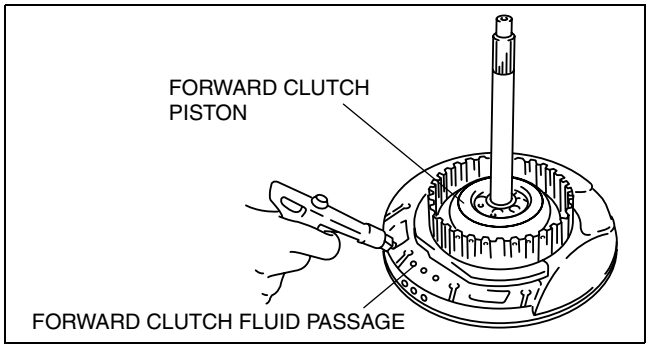


B3E0517A109

Forward Clutch Piston Disassembly Note

1. Set the forward clutch drum and turbine shaft onto the oil pump.
2. Remove the forward clutch piston by applying compressed air through the fluid passage.

Air pressure
392 kPa {4.0 kgf/cm^2, 57 psi} max.



B3E0517A110

Assembly Procedure

1. Measure the facing thickness in three places, and calculate the average value.

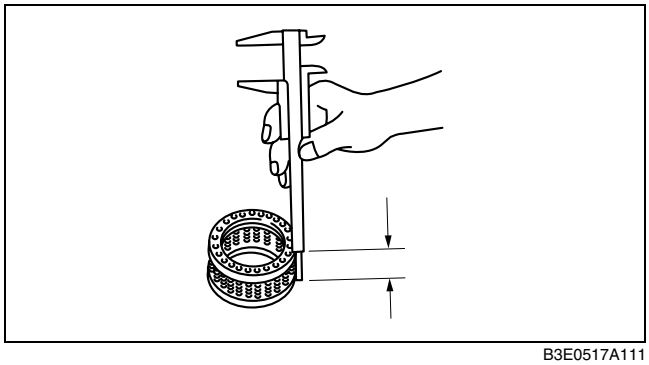
Standard
1.60 mm {0.063 in}
Minimum
1.45 mm {0.057 in}

- If not within the specification, replace the drive plates.

2. Measure the spring free length.

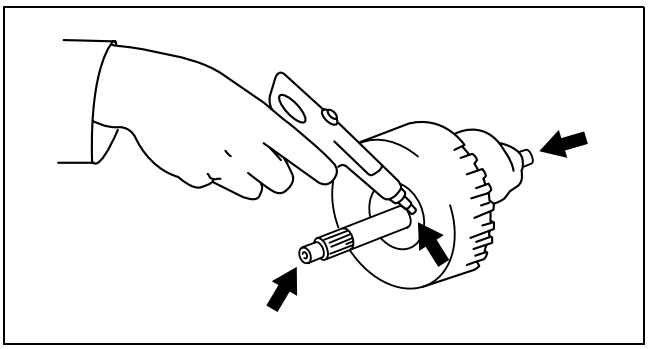
Spring free length
Standard: 17.2 mm {0.677 in}
Minimum: 15.2 mm {0.598 in}

- If not within the specification, replace the spring and retainer component.


B3E0517A111

3. Verify that there is airflow when applying compressed air through the fluid passage.

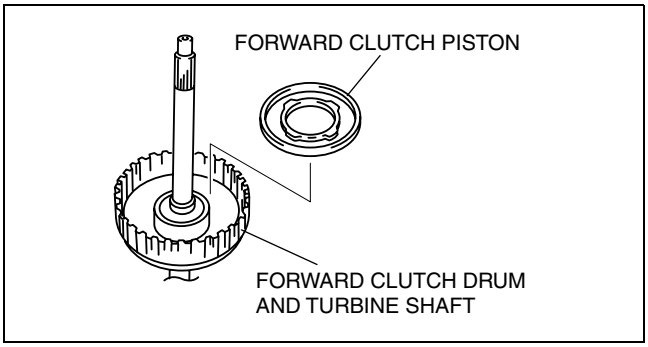
   Air pressure
   392 kPa {4.0 kgf/cm^2, 57 psi} max.


B3E0517A112

4. Replace the forward clutch drum and turbine shaft if damaged or malfunctioning.

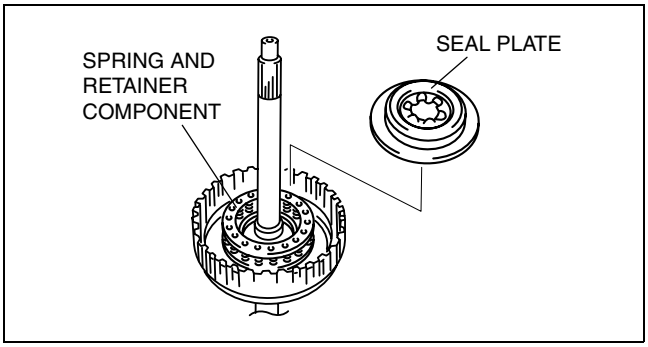
   Caution
   - **Installing the forward clutch piston may damage its seal. Carefully install the forward clutch piston by pushing evenly around the circumference.**

5. Apply ATF to the circumference of the forward clutch piston seal, and install the piston into the forward clutch drum and turbine shaft.
6. Install the spring and retainer component.



B3E0517A113

7. Apply ATF to the seal plate, and install it onto the forward clutch drum.

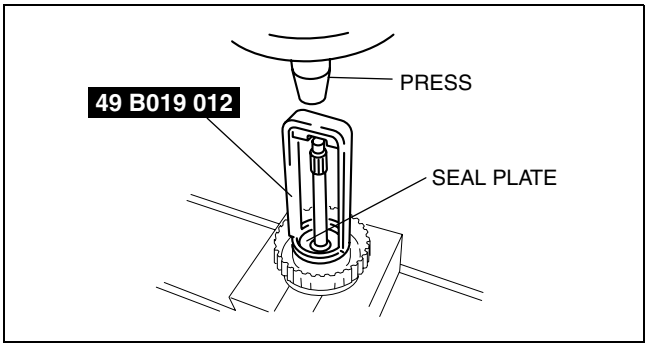


B3E0517A114

8. Install the **SST** to the forward clutch drum and turbine shaft as shown.

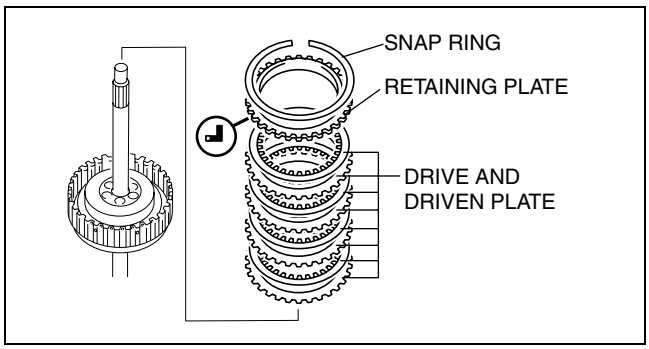
   Caution
   - **Depress the seal plate only enough to remove the snap ring. Overpressing will damage the seal plate assembly edges.**

9. Compress the seal plate.
10. Install the snap ring.
11. Remove the **SST**.
12. Install the drive and driven plates in the following order.
    Driven—Drive—Driven—Drive—Driven—Drive—Driven—Drive
13. Install the retaining plate.



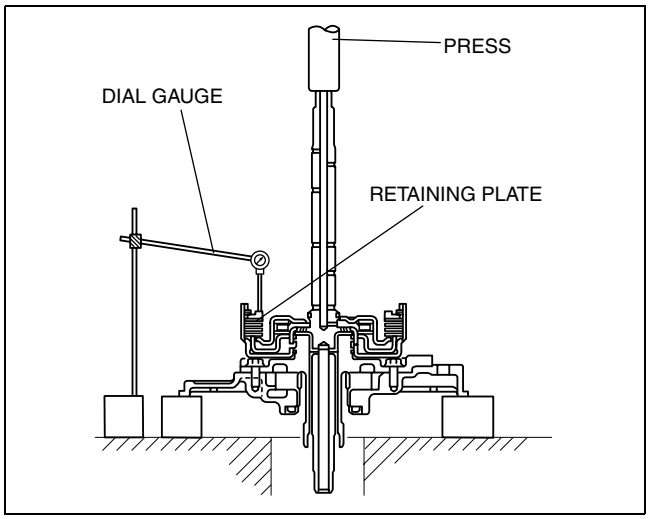
B3E0517A109

14. Install the snap ring.
15. Measure the forward clutch clearance.
    (1) Install the forward clutch in the oil pump, and set the dial gauge.



B3E0517A115

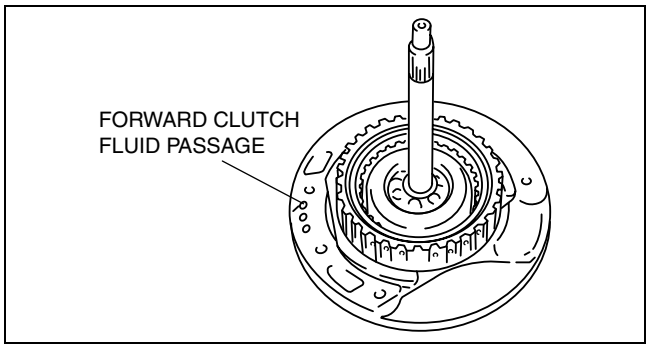
    (2) Secure the forward clutch by lightly pressing down with a press or similar tool.



B3E0517A116

    (3) Apply compressed air to the part indicated in the figure and let the forward clutch piston stroke three times.

Air pressure
392—441 kPa {4.0—4.5 kgf/cm^2, 57—63 psi}



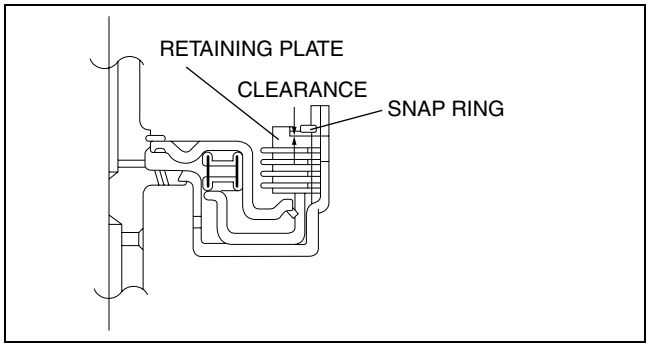
B3E0517A117

    (4) Apply compressed air and operate the forward clutch piston. Read the value when the indicator of the dial gauge stops.
    (5) Release the compressed air and read the dial gauge when the forward clutch piston is not operating.
    (6) Calculate the forward clutch clearance according to the following formula:
    Step (4) value— Step (5) value= Forward clutch clearance.
    (7) Measure the clearances at four locations (90° apart) by following the steps (3) to (6).
    Verify that the average value is within the specification below:

Forward clutch clearance
1.50—1.80 mm {0.059—0.071 in}

- If not as specified, remove the snap ring and measure its thickness.

    (8) Add the thickness to the average value calculated in step (7), and select the snap ring whose range includes the value.



B3E0517A118

Snap ring sizes

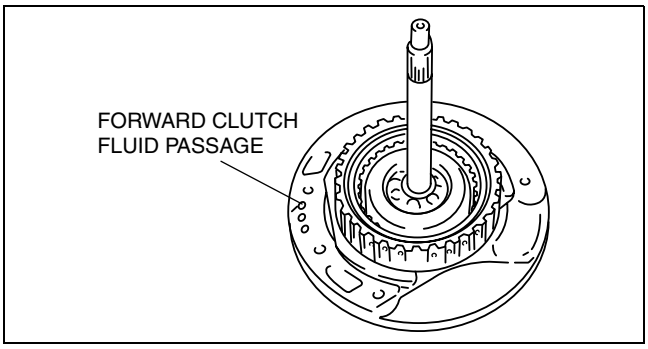
Range mm {in}	Snap ring sizes mm {in}
2.750—2.950 {0.108—0.116}	1.2 {0.047}
2.950—3.150 {0.116—0.124}	1.4 {0.055}
3.150—3.350 {0.124—0.132}	1.6 {0.063}
3.350—3.550 {0.132—0.140}	1.8 {0.071}
3.550—3.750 {0.140—0.148}	2.0 {0.079}
3.750—3.950 {0.148—0.155}	2.2 {0.087}

(9) Install the selected snap ring and perform steps (2) to (7) again. Verify that the calculated value satisfies the clearance specification.

16. Inspect the forward clutch operation.
    (1) Install the forward clutch drum and turbine shaft to the oil pump.
    (2) Inspect the forward clutch operation by applying compressed air as shown.

    Air pressure
    392—441 kPa {4.0—4.5 kgf/cm^2, 57—63 psi}

17. Install the forward clutch hub.

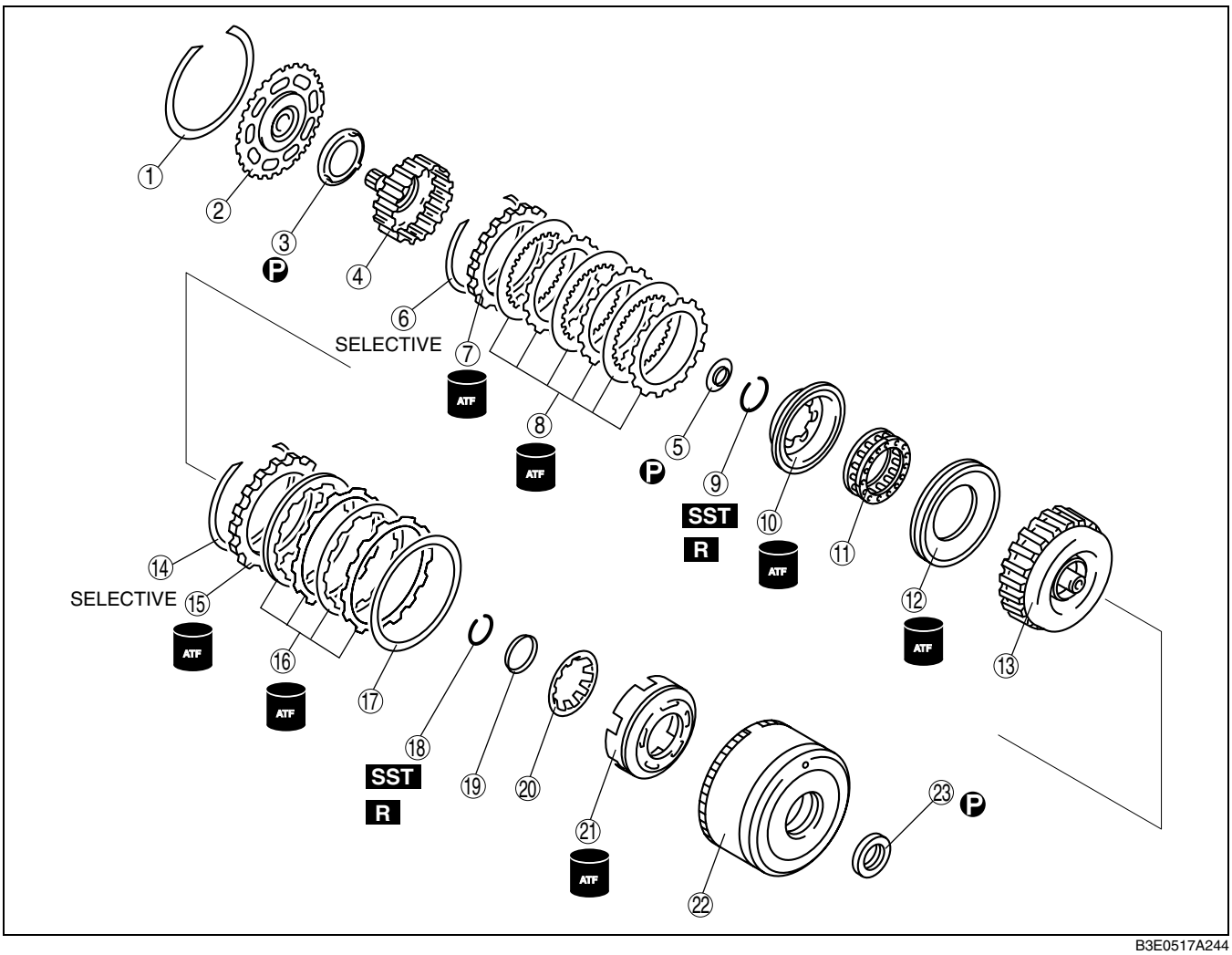


B3E0517A117

CLUTCH COMPONENT DISASSEMBLY/ASSEMBLY

B3E051719500A02

1. Perform the preinspection before disassembly. (See 05–17–125 Clutch Component Preinspection.)
2. Disassemble in the order indicated in the table.
3. Assemble in the reverse order of disassembly.



B3E0517A244

1	Snap ring
2	Rear sun gear plate
3	Bearing
4	3–4 clutch hub
5	Bearing
6	Snap ring
7	Retaining plate
8	Drive and driven plate
9	Snap ring (See 05–17–61 Snap Ring (3–4 clutch) Disassembly Note.)
10	Seal plate
11	Spring and retainer component
12	3–4 clutch piston (See 05–17–62 3–4 Clutch Piston Disassembly Note.)

13	3–4 clutch drum
14	Snap ring
15	Retaining plate
16	Drive and driven plate
17	Dish plate
18	Snap ring (See 05–17–62 Snap Ring (Reverse clutch) Disassembly Note.)
19	Reverse return stopper
20	Piston return spring
21	Reverse piston (See 05–17–62 Reverse Piston Disassembly Note.)
22	2–4 brake drum
23	Bearing

Snap Ring (3–4 clutch) Disassembly Note

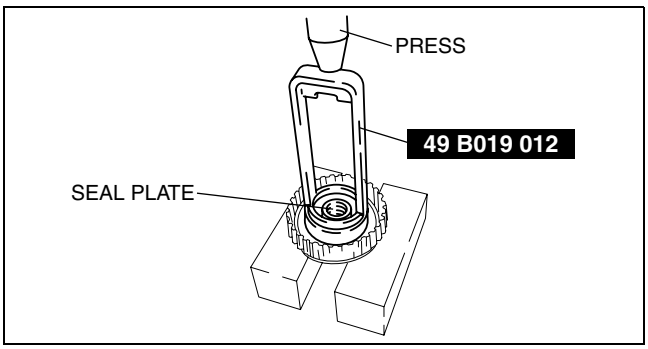
1. Install the **SST** as shown.

Caution

- **Depress the seal plate only enough to remove the snap ring. Overpressing will damage the seal plate assembly edges.**

2. Compress the seal plate.

3. Remove the snap ring.
4. Remove the **SST**, then remove the seal plate and spring and retainer component.

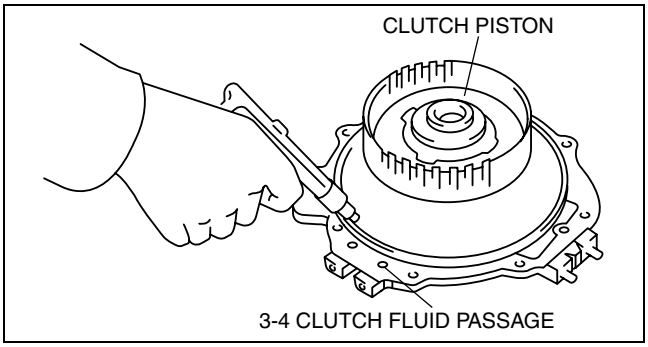


B3E0517A245

3–4 Clutch Piston Disassembly Note

1. Set the 3–4 clutch drum onto the end cover.
2. Remove the 3–4 clutch piston from the 3–4 clutch drum by applying compressed air through the fluid passage.

   Air pressure
   392 kPa {4.0 kgf/cm^2, 57 psi} max.



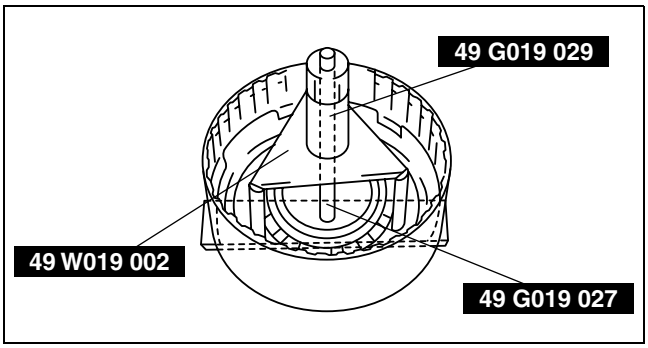
B3E0517A246

Snap Ring (Reverse clutch) Disassembly Note

1. Install the **SSTs** as shown.

Caution
- **Depress the piston return spring only enough to remove the snap ring. Overpressing will damage the piston return spring assembly edges.**

2. Compress the piston return spring.
3. Remove the snap ring.
4. Remove the **SSTs**, then remove the reverse return stopper and return spring.



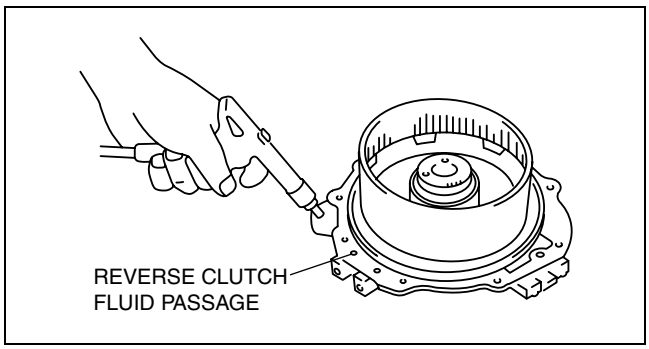
B3E0517A247

Reverse Piston Disassembly Note

1. Set the 2–4 brake drum onto the end cover.

2. Remove the reverse piston from the 2–4 brake drum by applying compressed air through the fluid passage.

   Air pressure
   392 kPa {4.0 kgf/cm^2, 57 psi} max.



B3E0517A248

Assembly Procedure

1. Measure the facing thickness in three places and calculate the average value.

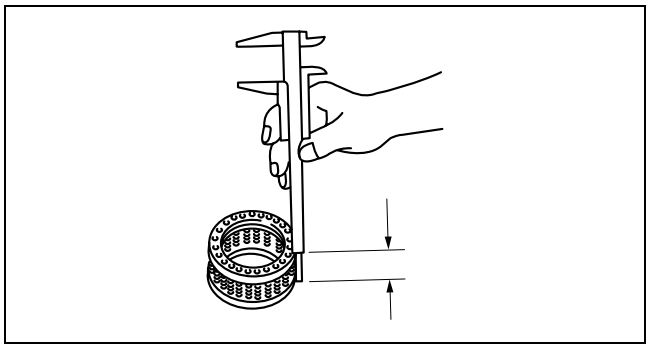
   Drive plate part number: FN11 19 370
   Standard: 1.60 mm {0.063 in}
   Minimum: 1.45 mm {0.057 in}
   Drive plate part number: FNE1 19 370
   Standard: 2.55 mm {0.100 in}
   Minimum: 2.40 mm {0.094 in}

   - If not within the specification, replace the drive plates.

2. Measure the free length of the spring and inspect for deformation.

   Spring free length
   Standard: 17.2 mm {0.677 in}
   Minimum: 15.2 mm {0.598 in}

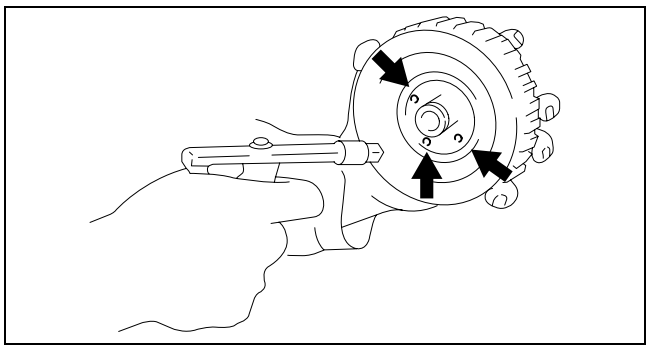
   - If not within the specification, replace the spring and retainer.


B3E0517A111

3. Verify that there is airflow when applying compressed air through the fluid passage of 3–4 clutch drum.

   Air pressure
   392 kPa {4.0 kgf/cm^2, 57 psi} max.

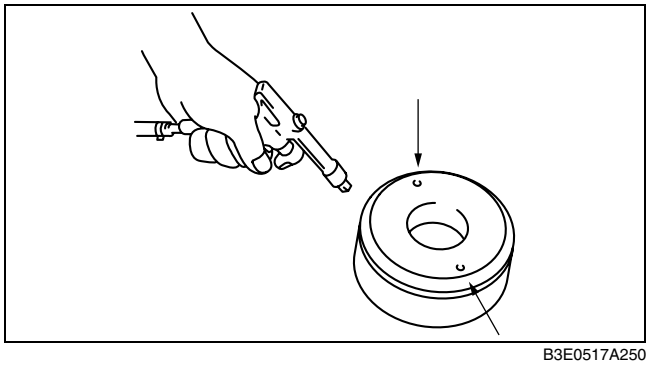
4. Replace the 3–4 clutch drum if damaged or malfunctioning.


B3E0517A249

5. Verify that there is airflow when applying compressed air through the fluid passage of 2–4 brake drum.

   Air pressure
   392 kPa {4.0 kgf/cm^2, 57 psi} max.

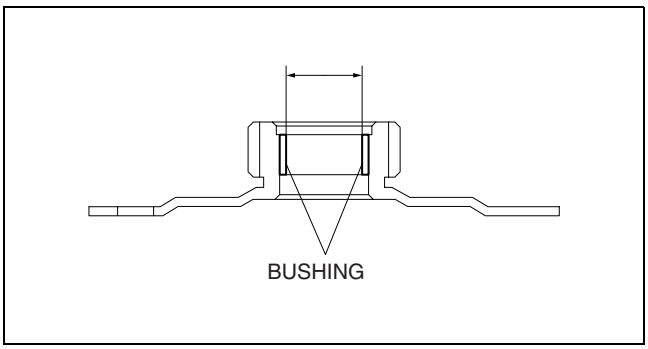
6. Replace the 2–4 brake drum if damaged or malfunctioning.


B3E0517A250

7. Measure the bushing of the rear sun gear.

Bushing inner diameter
Standard:
29.900—29.921 mm {1.17717—1.17799 in}
Maximum: 29.941 mm {1.17878 in}

- If not as specified, replace the rear sun gear plate.

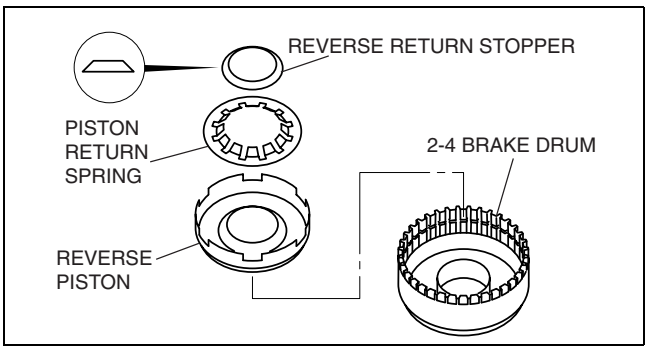


B3E0517A251

8. Install the reverse clutch.

Caution
- **Installing the reverse clutch piston may damage its seal. Carefully install the reverse clutch piston by pushing evenly around the circumference.**

(1) Apply ATF to the circumference of the reverse clutch piston seal, and install the piston into the 2–4 brake drum.
(2) Install the piston return spring and reverse return stopper to the reverse piston.

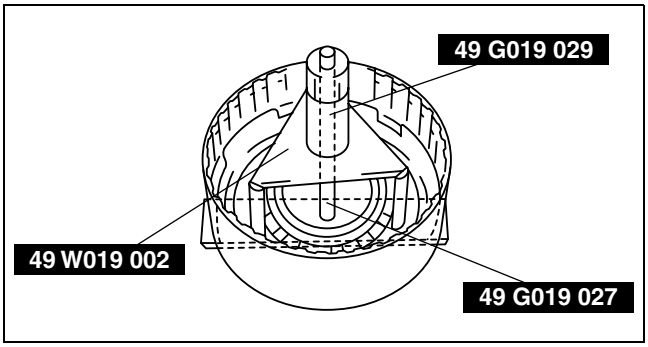


B3E0517A252

(3) Install the snap ring and the **SSTs** to the 2–4 brake drum as shown.

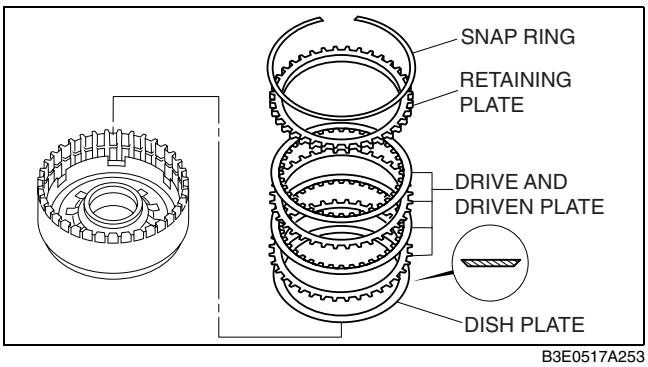
Caution
- **Depress the piston return spring only enough to install the snap ring. Overpressing will damage the piston return spring assembly edges.**

(4) Compress the piston return spring.
(5) Install the snap ring.
(6) Remove the **SSTs**.
(7) Install the dish plate.
(8) Install the drive and driven plates in the following order.
Driven—Drive—Driven—Drive
(9) Install the retaining plate.



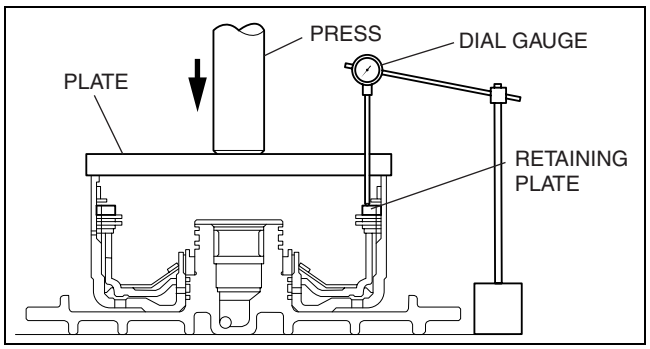
B3E0517A247

9. Measure the reverse clutch clearance.
(1) Install the reverse clutch into the end cover, and set the dial gauge.



B3E0517A253

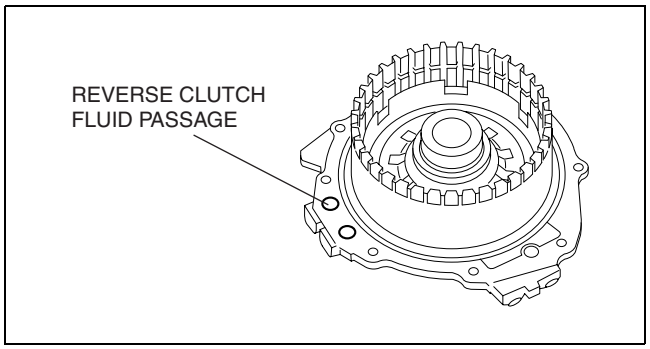
(2) Secure the reverse clutch by lightly pressing down with a press or similar tool.



B3E0517A254

(3) Apply compressed air to the part indicated in the figure and let the reverse clutch piston stroke three times.

Air pressure
392—441 kPa {4.0—4.5 kgf/cm^2, 57—63 psi}



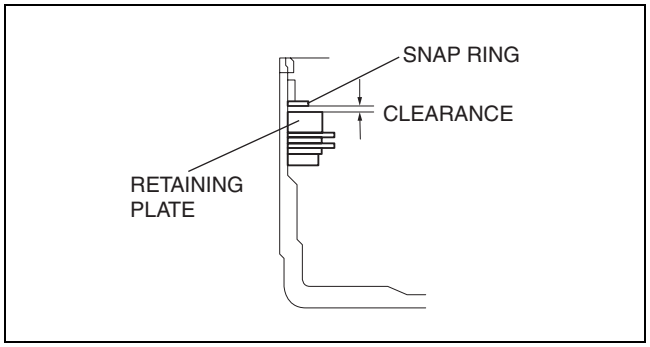
B3E0517A255

(4) Apply compressed air and operate the reverse clutch piston. Read the value when the indicator of the dial gauge stops.
(5) Release the compressed air and read the dial gauge when the reverse clutch piston is not operating.
(6) Calculate the reverse clutch clearance according to the following formula:
step (4) value – step (5) value = Reverse clutch clearance.
(7) Measure the clearances at four locations (90° apart) by following the steps from (3) to (6). Verify that the average value is within the specification below.

Reverse clutch clearance
1.00—1.30 mm {0.039—0.051 in}

- If not within the specification, remove the snap ring and measure its thickness.

(8) Add the thickness to the average value calculated in step (7), and select the snap ring whose range includes the value.



B3E0517A256

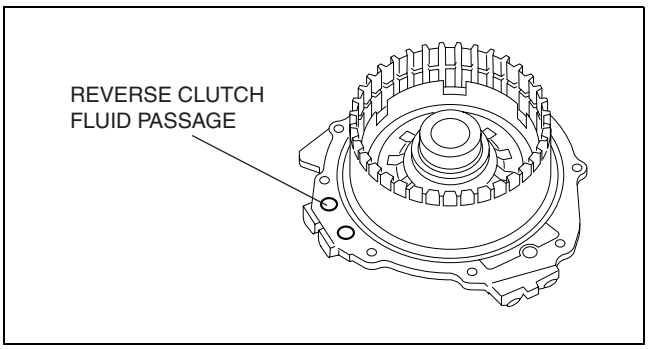
Snap ring sizes

Range mm {in}	Snap ring sizes mm {in}
2.250—2.450 {0.089—0.096}	1.2 {0.047}
2.450—2.650 {0.096—0.104}	1.4 {0.055}
2.650—2.850 {0.104—0.112}	1.6 {0.063}
2.850—3.050 {0.112—0.120}	1.8 {0.071}
3.050—3.250 {0.120—0.128}	2.0 {0.079}
3.250—3.450 {0.128—0.136}	2.2 {0.087}

(9) Install the selected snap ring and perform steps (2) to (7) again. Verify that the calculated value satisfies the clearance specification.
10. Inspect the reverse clutch operation.
(1) Install the 2–4 brake drum to the end cover.

(2) Inspect the reverse clutch operation by applying compressed air as shown.

Air pressure
392—441 kPa {4.0—4.5 kgf/cm^2, 57—63 psi}

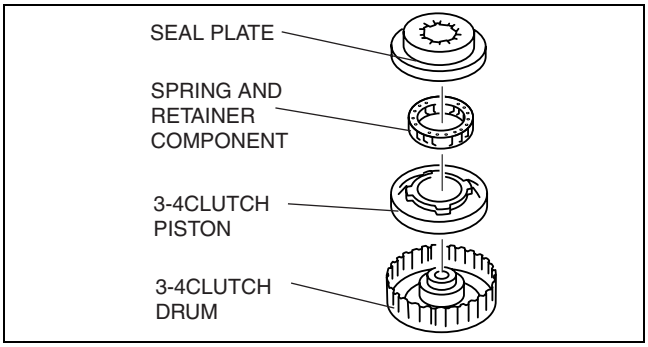


B3E0517A255

11. Install the 3–4 clutch.

Caution
- **Installing the 3-4 clutch piston may damage its seal. Carefully install the 3–4 clutch piston by pushing evenly around the circumference.**

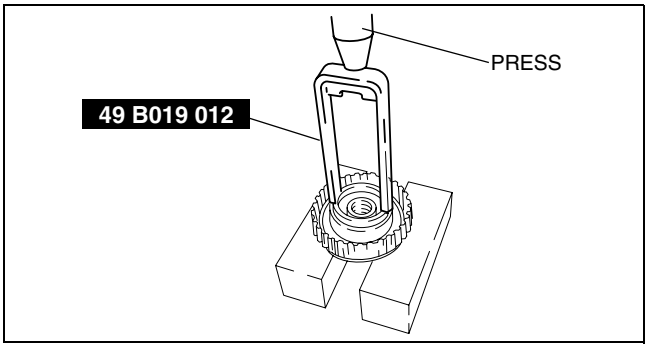
(1) Apply ATF to the circumference of the 3–4 clutch piston seal, and install the piston in to the 3–4 clutch drum.
(2) Install the spring and retainer.
(3) Apply ATF to the 3–4 seal plate, and install it onto the 3–4 clutch drum.



B3E0517A257

(4) Install the **SST** as shown.

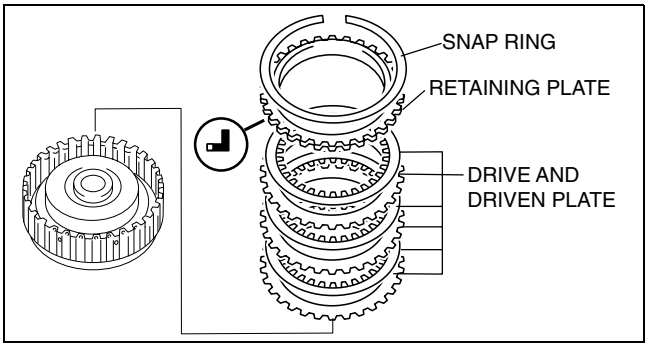
Caution
- **Depress the 3–4 seal plate only enough to install the snap ring. Overpressing will damage the 3–4 seal plate assembly edges.**



B3E0517A258

(5) Compress the spring and retainer component and 3–4 seal plate.
(6) Install the snap ring.
(7) Remove the **SST**.
(8) Install the drive and driven plates in the following order.
Driven—Drive—Driven—Drive—Driven—Drive
(9) Install the retaining plate.

DRIVE PLATE PART NUMBER: FN11 19 370



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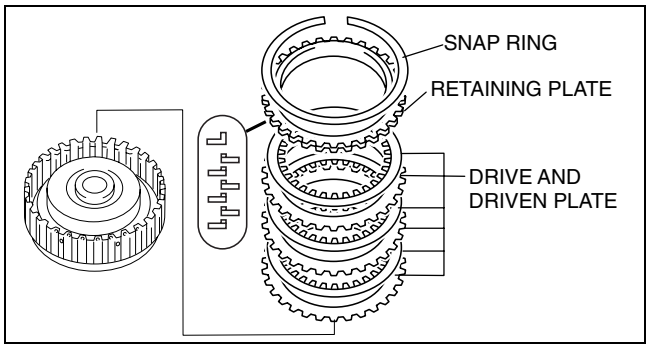
DRIVE PLATE PART NUMBER: FNE1 19 370

12. Measure the 3–4 clutch clearance.
    (1) Install the 3–4 clutch in the end cover, and set the dial gauge.



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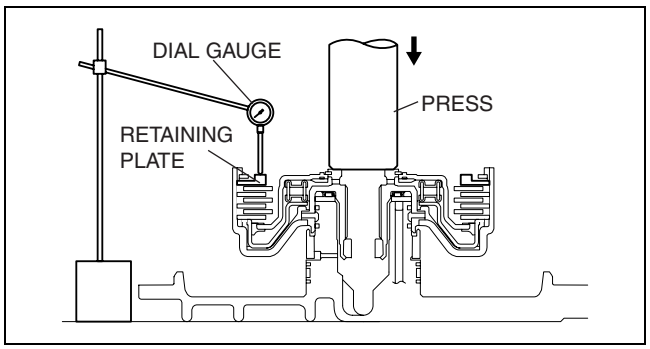
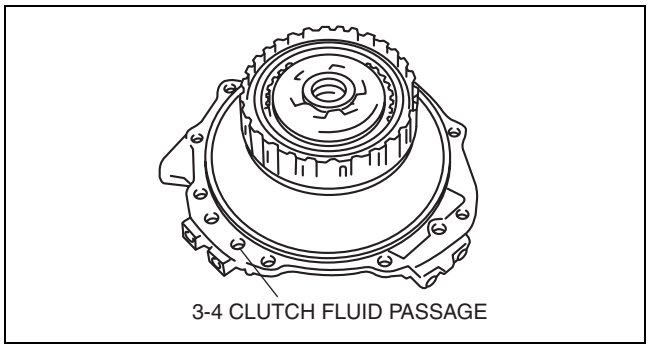
    (2) Secure the 3–4 clutch by lightly pressing down with a press or similar tool.



B3E0517A261

    (3) Apply compressed air to the part indicated in the figure and let the 3–4 clutch piston stroke three times.

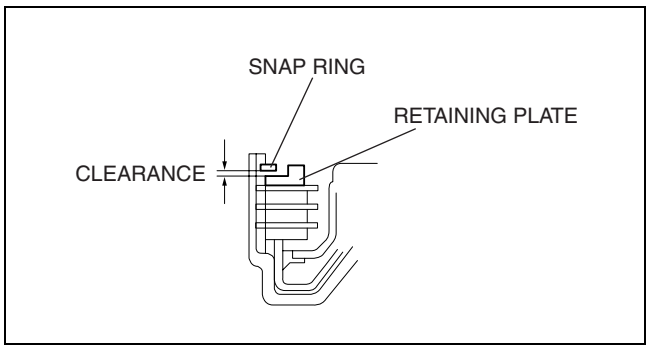
Air pressure
392—441 kPa {4.0—4.5 kgf/cm^2, 57—63 psi}



B3E0517A262

    (4) Apply compressed air and operate the 3–4 clutch piston. Read the value when the indicator of the dial gauge stops.
    (5) Release the compressed air and read the dial gauge when the 3–4 clutch piston is not operating.
    (6) Calculate the 3–4 clutch clearance according to the following formula:
    step (4) value – step (5) value = 3–4 clutch clearance.
    (7) Measure the clearances at four locations (90° apart) by following the steps from (3) to (6). Verify that the average value is within the specification below.

3-4 clutch clearance
Drive plate part number : FN11 19 370
1.00—1.30 mm {0.039—0.051 in}
Drive plate part number : FNE1 19 370
1.10—1.40 mm {0.043—0.055 in}



B3E0517A263

- If not within the specification, remove the snap ring and measure its thickness.

    (8) Add the thickness to the average value calculated in step (7), and select the snap ring whose range includes the value.

Snap ring sizes

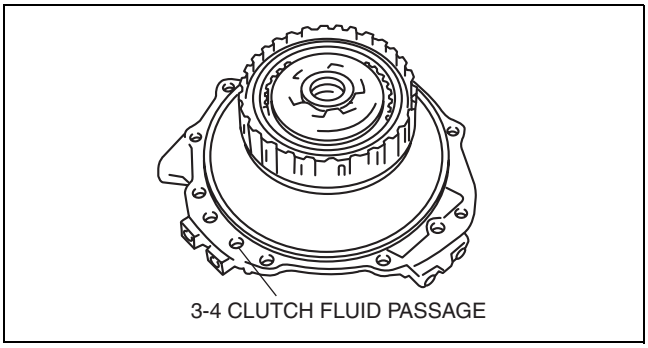
Range mm {in}		Snap ring sizes mm {in}
Drive plate part number:FN11 19 370	Drive plate part number:FNE1 19 370	
2.250—2.450 {0.089—0.096}	2.350—2.550 {0.093—0.100}	1.2 {0.047}
2.450—2.650 {0.096—0.104}	2.550—2.750 {0.100—0.108}	1.4 {0.055}
2.650—2.850 {0.104—0.112}	2.750—2.950 {0.108—0.116}	1.6 {0.063}
2.850—3.050 {0.112—0.120}	2.950—3.150 {0.116—0.124}	1.8 {0.071}
3.050—3.250 {0.120—0.128}	3.150—3.350 {0.124—0.132}	2.0 {0.079}
3.250—3.450 {0.128—0.136}	3.350—3.550 {0.132—0.140}	2.2 {0.087}

(9) Install the selected snap ring and perform steps (2) to (7) again. Verify that the calculated value satisfies the clearance specification.

13. Inspect the 3–4 clutch operation.
    (1) Install the 3–4 clutch drum to the end cover.
    (2) Inspect the 3–4 clutch operation by applying compressed air as shown.

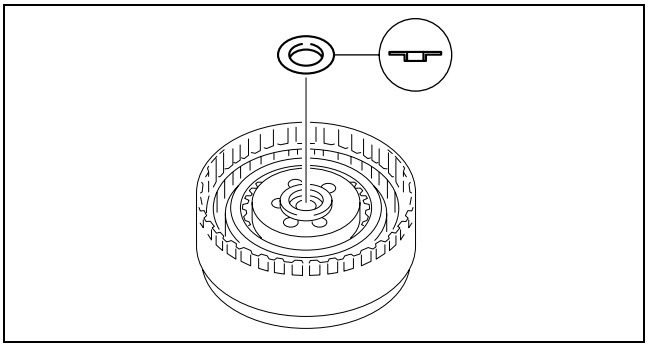
    Air pressure
    392—441 kPa {4.0—4.5 kgf/cm^2, 57—63 psi}

14. Install the 3–4 clutch component to the 2–4 brake drum.



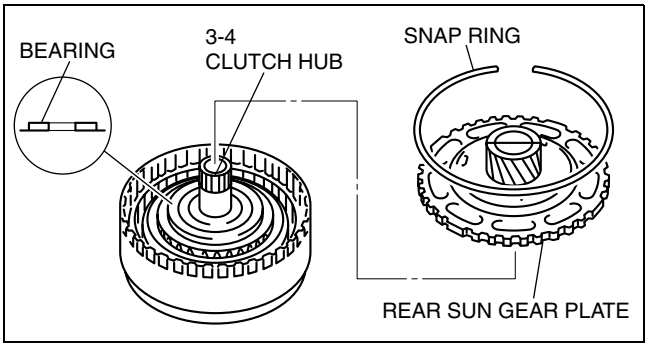
B3E0517A262

15. Apply petroleum jelly to the bearing, and secure it onto the 3–4 clutch component.



B3E0517A264

16. Install the 3–4 clutch hub.
17. Apply petroleum jelly to the bearing, and secure it onto the 3–4 clutch hub as shown in the figure.
18. Install the rear sun gear plate onto the 2–4 brake drum.
19. Install the snap ring.



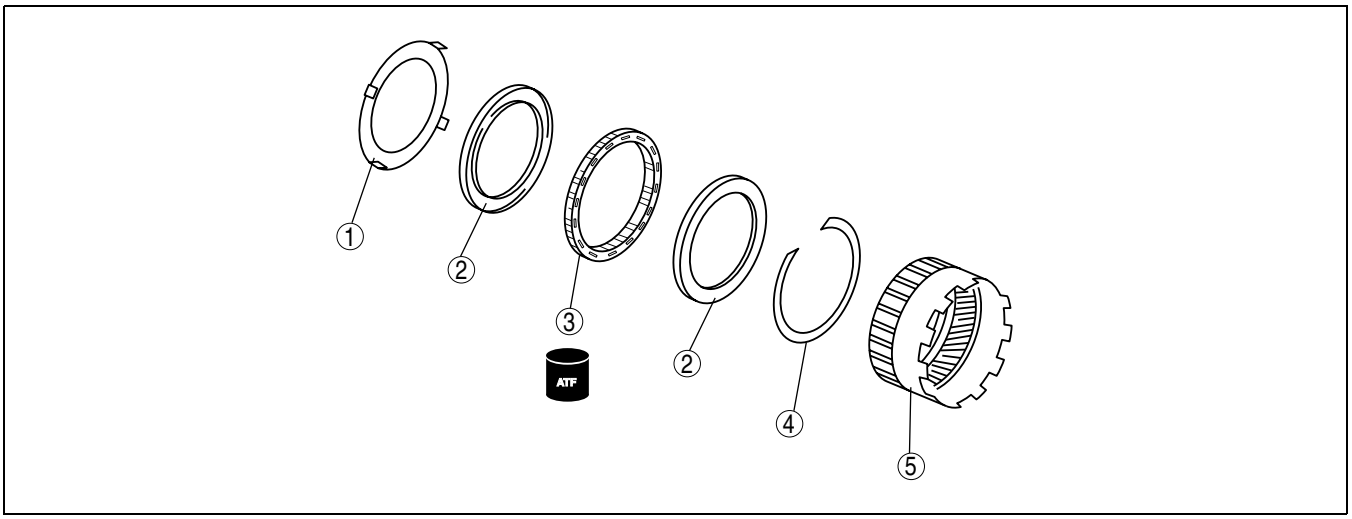
B3E0517A265

FRONT INTERNAL GEAR ONE-WAY CLUTCH COMPONENT DISASSEMBLY/ASSEMBLY

B3E051719500A03

1. Perform the preinspection before disassembly.
   (See 05–17–127 Front Internal Gear and One-Way Clutch Component.)
2. Disassemble in the order indicated in the table.

3. Assemble in the reverse order of disassembly.

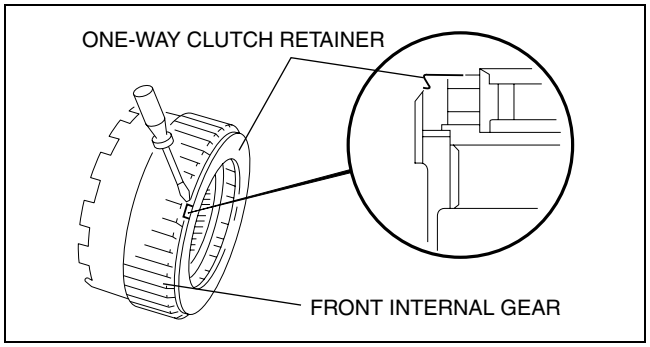


B3E0517A119

1	One-way clutch retainer (See 05–17–69 One-Way Clutch Retainer Disassembly Note.)
2	Side race
3	One-way clutch
4	Snap ring
5	Front internal gear

One-Way Clutch Retainer Disassembly Note

- Remove the one-way clutch retainer using a flathead screwdriver, etc. as shown in the figure.

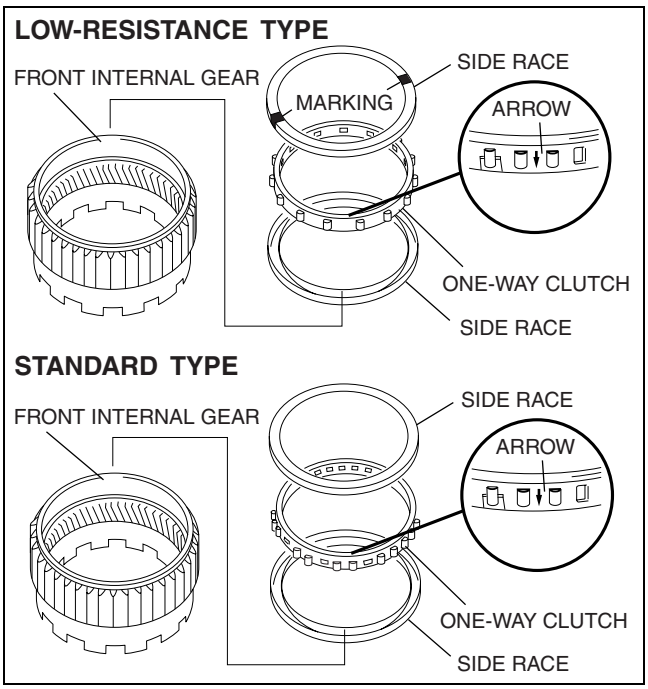


B3E0517A120

Assembly Procedure

1. Install the snap ring.

2. Install the one-way clutch to the front internal gear in the direction of the arrow (on the one-way clutch) as shown in the figure.
3. Install the side race.
4. Install the one-way clutch retainer.



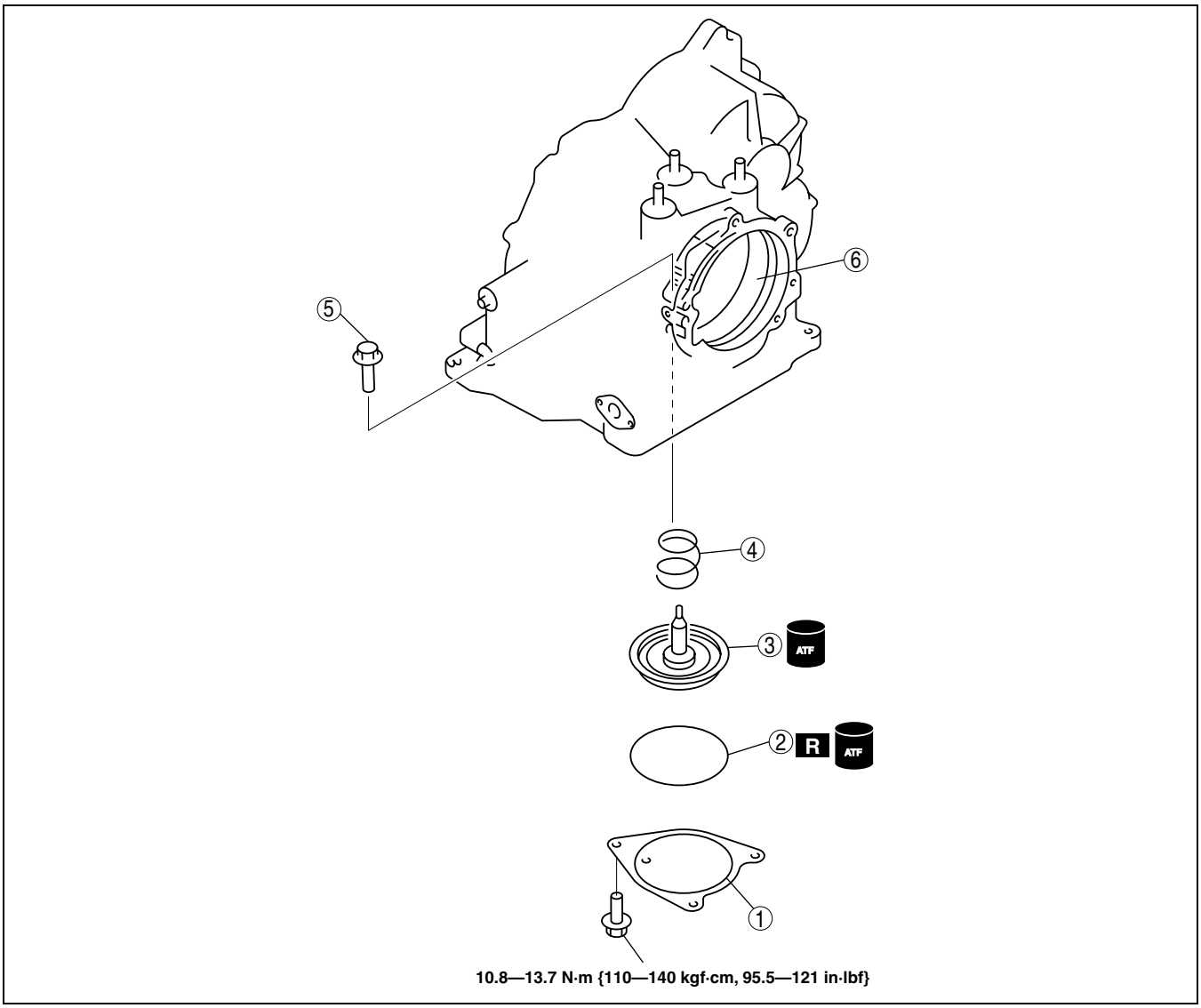
CDA517ZAA002

BAND SERVO DISASSEMBLY/ASSEMBLY

B3E051719500A04

1. Disassemble in the order indicated in the table.

2. Assemble in the reverse order of disassembly.



B3E0517A122

1	Servo retainer
2	O-ring
3	Servo piston
4	Servo return spring
5	Band strut
6	2–4 brake band

Assembly Procedure

1. Measure the spring free length.

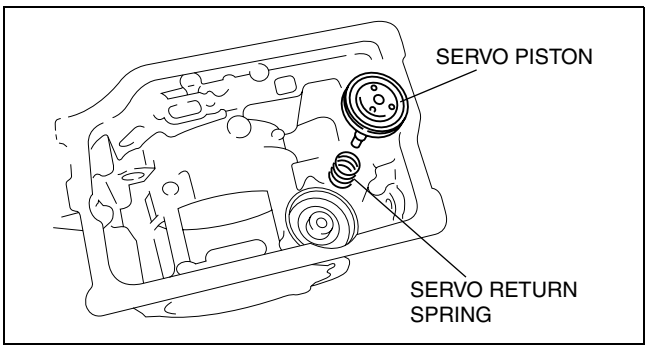
Specification

Outer diameter mm {in}	Free length mm {in}	No. of coils	Wire diameter mm {in}
34.0 {1.340}	36.4 {1.430}	2.5	4.0 {0.160}

- If not as specified, replace the spring.

2. Install the servo return spring to the transaxle case.

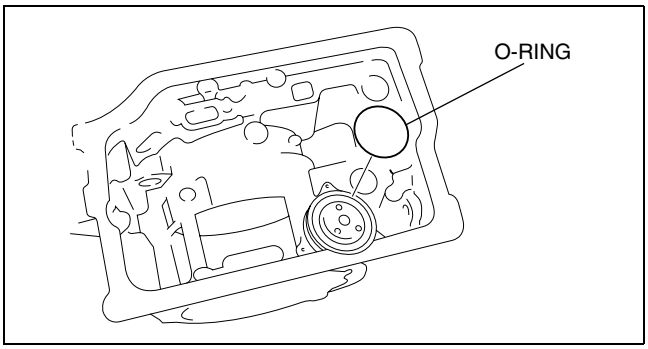
3. Install the servo piston to the transaxle case.



B3E0517A123

4. Apply ATF to new O-ring and install it to the transaxle case.

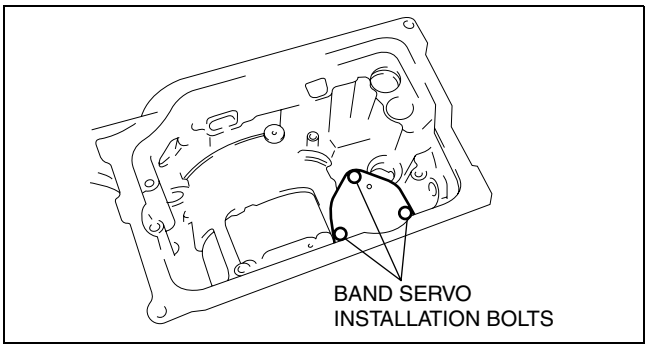
   O-ring inner diameter
   70.2 mm {2.76 in}



B3E0517A124

5. Install the servo retainer by tightening the bolts evenly and gradually.

   Tightening torque
   10.8—13.7 N·m
   {110—140 kgf·cm, 95.5—121 in·lbf}



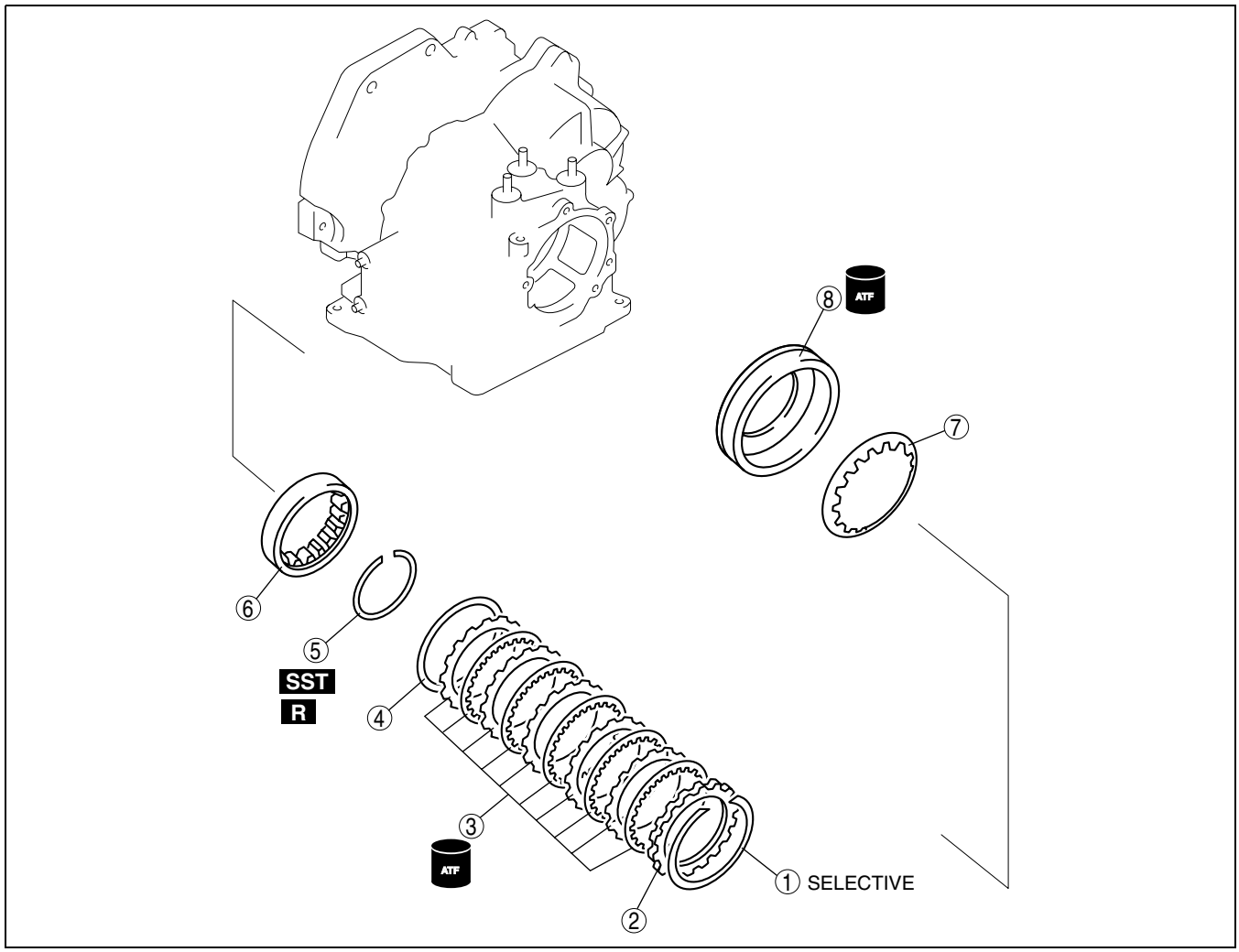
B3E0517A125

LOW AND REVERSE BRAKE AND ONE-WAY CLUTCH INNER RACE DISASSEMBLY/ASSEMBLY

B3E051719500A05

1. Perform the preinspection before disassembly.
   (See 05–17–127 Low and Reverse Brake Preinspection.)
2. Disassemble in the order indicated in the table.

3. Assemble in the reverse order of disassembly.



B3E0517A126

1	Snap ring
2	Retaining plate
3	Drive and driven plates
4	Dish plate
5	Snap ring (See 05–17–73 Snap Ring Disassembly Note.)

6	One-way clutch inner race
7	Piston return spring
8	Low and reverse brake piston (See 05–17–73 Low and Reverse Brake Piston Disassembly Note.)

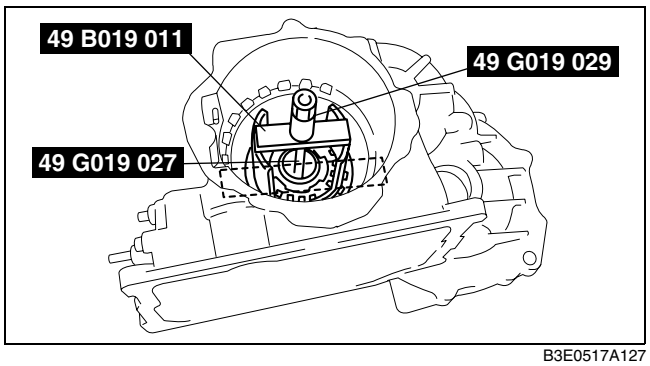
Snap Ring Disassembly Note

1. Install the **SSTs** as shown.

Caution

- **Depress the one-way clutch inner race only enough to remove the snap ring. Overpressing will damage the one-way clutch inner race assembly edges.**

2. Compress the one-way clutch inner race.
3. Remove the snap ring.
4. Remove the **SSTs** and remove one-way clutch inner race and the piston return spring.

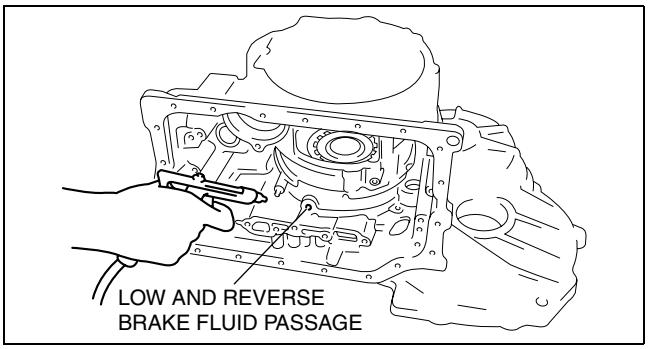


B3E0517A127

Low and Reverse Brake Piston Disassembly Note

- Remove the low and reverse brake piston by applying compressed air through the fluid passage.

Air pressure
98.1 kPa {1.0 kgf/cm^2, 14 psi} max.



B3E0517A128

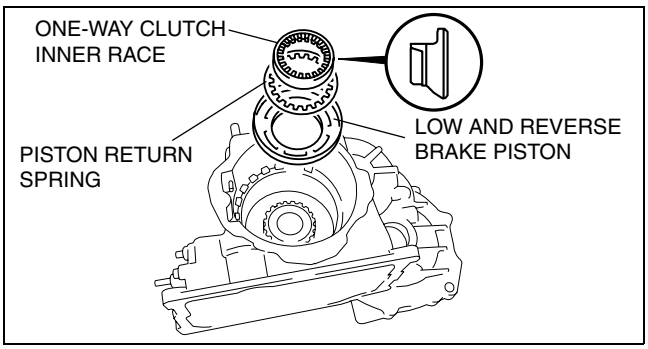
Assembly Procedure
1. Measure the facing thickness in three places, and determine the average of the three readings.

Standard
1.60 mm {0.063 in}
Minimum
1.45 mm {0.057 in}

- If not within the specification, replace the drive plates.

Caution
- **Installing the low and reverse brake piston may damage its seal. Carefully install the low and reverse brake piston by pushing evenly around the circumference.**

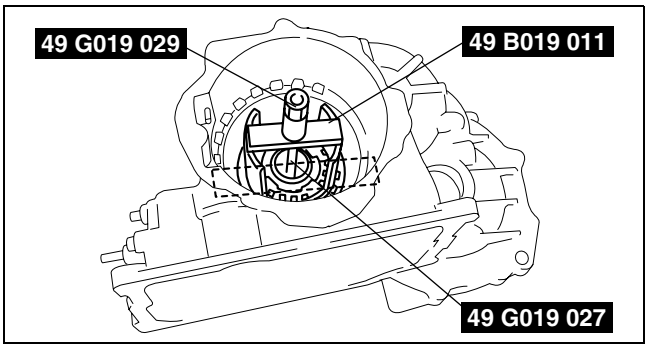
2. Apply ATF to the circumference of the low and reverse brake piston seal, and install the piston to the transaxle case.
3. Install the piston return spring and one-way clutch to the transaxle case.



B3E0517A129

4. Install the **SSTs** as shown.

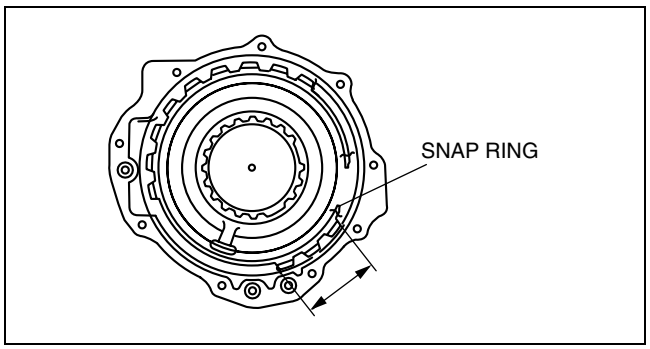
Caution
- **Depress the one-way clutch inner race only enough to install the snap ring. Overpressing will damage the one-way clutch inner race assembly edges.**



B3E0517A130

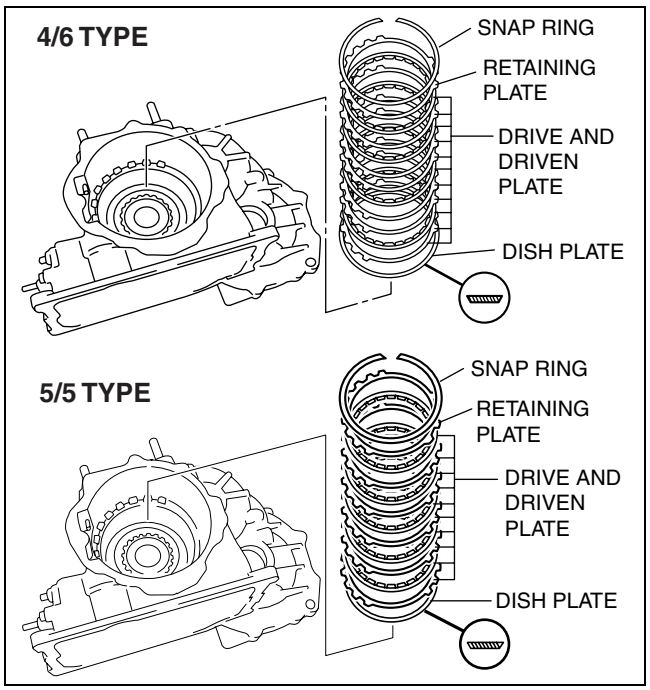
5. Compress the one-way clutch inner race.

Caution
- **The transaxle body may be damaged if installed incorrectly. Make sure to install the transaxle body in such a way that the end of the snap ring does not enter the area shown in the figure.**



B3E0517A131

6. Install the snap ring.
7. Remove the **SSTs**.
8. Install the dish plate.
9. Install the drive and driven plates in the following order.
   4/6 type
   Driven—Drive—Driven—Driven—Drive—Driven—Driven—Drive—Driven—Drive
   5/5 type
   Driven—Drive—Driven—Drive—Driven—Drive—Driven—Drive—Driven—Drive
10. Install the retaining plate and the snap ring.
11. Measure the low and reverse brake clearance.
    (1) Set the dial gauge to the low and reverse brake.



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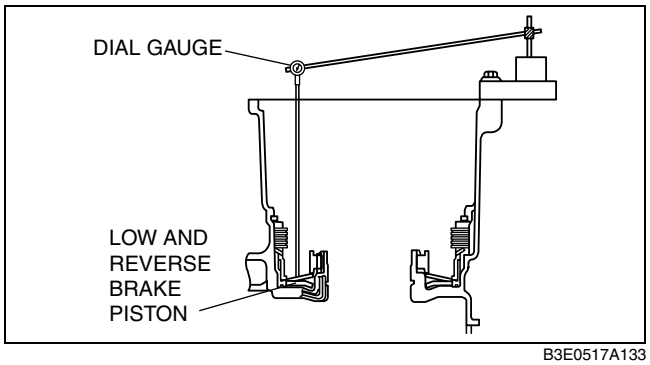
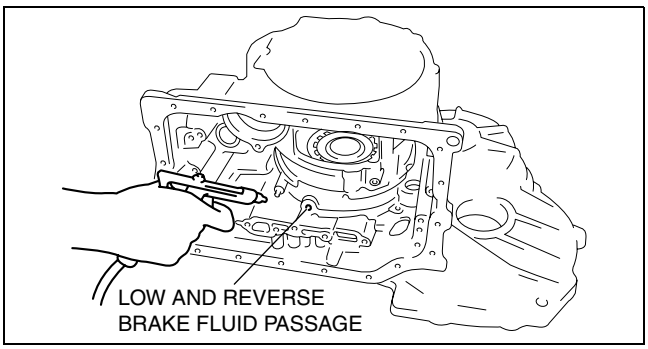
    (2) Set the measuring point of the dial gauge to the low and reverse brake piston.



B3E0517A133

(3) Apply compressed air to the part indicated in the figure and let the low and reverse brake piston stroke three times.

Air pressure
98.1 kPa {1.0 kgf/cm^2, 14 psi}



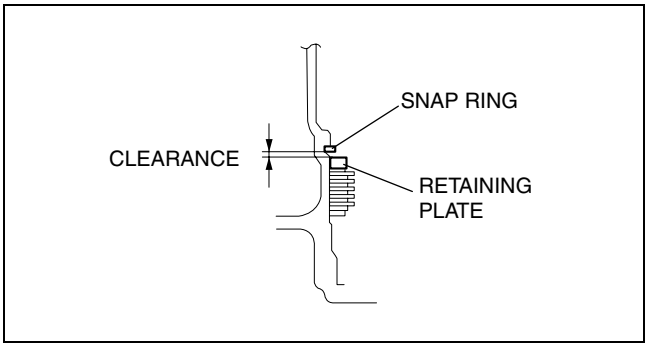
B3E0517A128

(4) Apply compressed air and operate the low and reverse brake piston. Read the value when the indicator of the dial gauge stops.
(5) Release the compressed air and read the dial gauge when the low and reverse brake piston is not operating.
(6) Calculate the low and reverse brake clearance according to the following formula:
Step (4) value—Step (5) value= low and reverse brake clearance.
(7) Measure the clearances at four locations (90° apart) by following the steps from (3) to (6). Verify that the average value is within the specification below:

Low and reverse brake clearance
2.20—2.50 mm {0.087—0.098 in}

- If not within the specification, remove the snap ring and measure its thickness.

(8) Add the thickness to the average value calculated in step (7), and select the snap ring whose range includes the value.



B3E0517A134

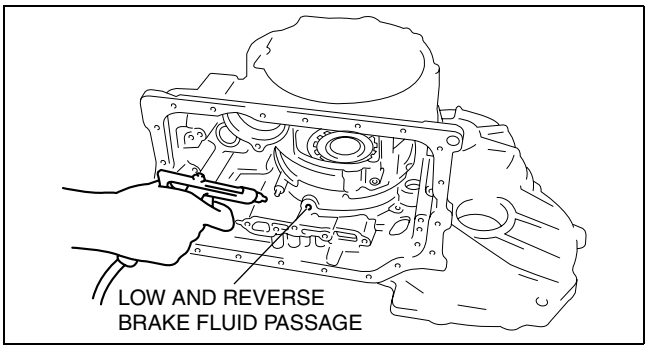
Snap ring seizes

Range mm {in}	Snap ring sizes mm {in}
4.050—4.250 {0.159—0.167}	1.8 {0.071}
4.250—4.450 {0.167—0.175}	2.0 {0.079}
4.450—4.650 {0.175—0.183}	2.2 {0.087}
4.650—4.850 {0.183—0.190}	2.4 {0.094}
4.850—5.050 {0.190—0.199}	2.6 {0.102}
5.050—5.250 {0.199—0.207}	2.8 {0.110}
5.250—5.450 {0.207—0.215}	3.0 {0.118}

(9) Install the selected snap ring and perform steps (2) to (7) again. Verify that the calculated value satisfies the clearance specification.

12. Inspect the low and reverse brake operation by applying compressed air as shown.

Air pressure
98.1 kPa {1.0 kgf/cm^2, 14 psi}



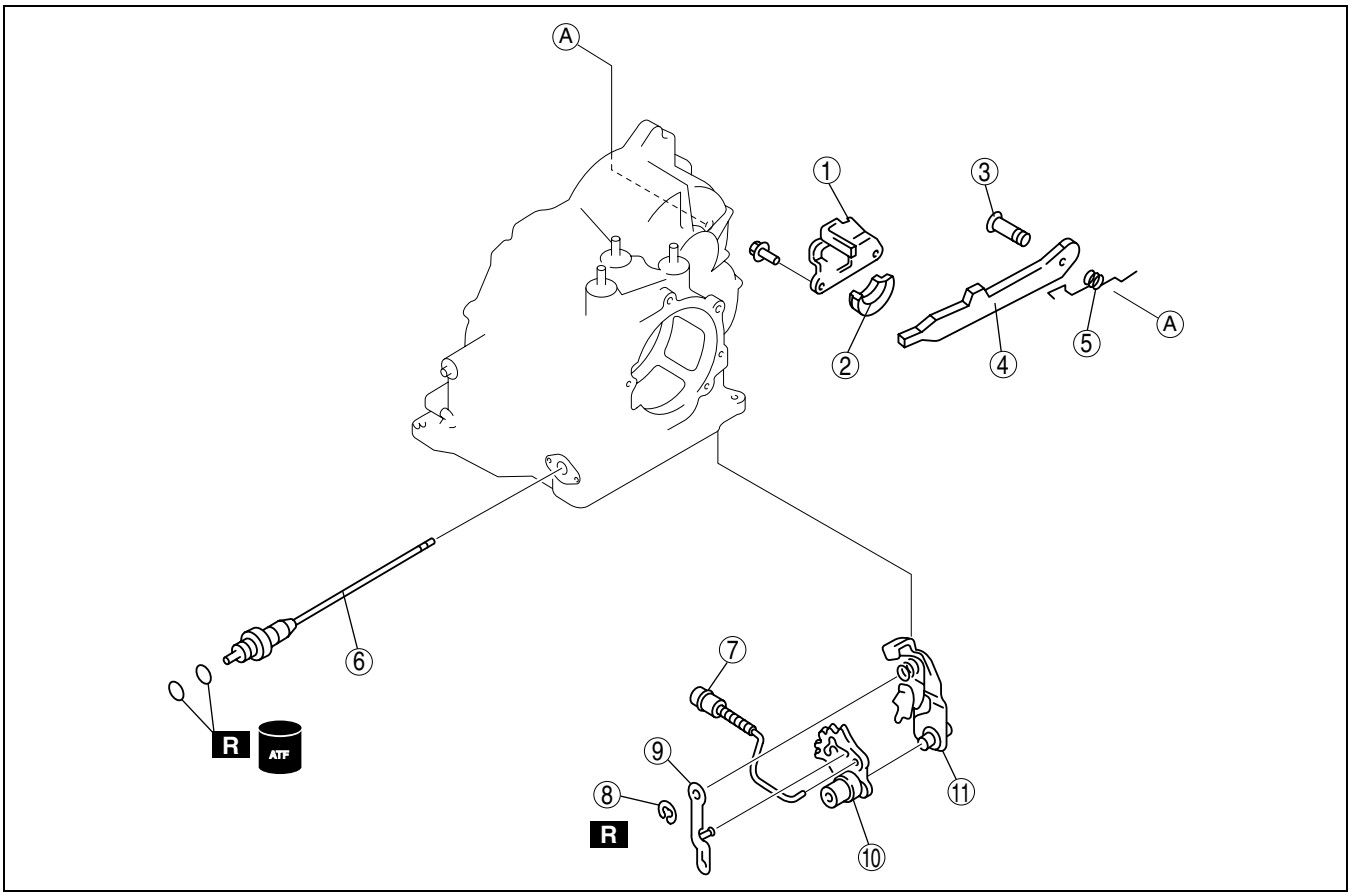
B3E0517A128

PARKING MECHANISM DISASSEMBLY/ASSEMBLY

B3E051721400A01

1. Disassemble in the order indicated in the table.

2. Assemble in the reverse order of disassembly.

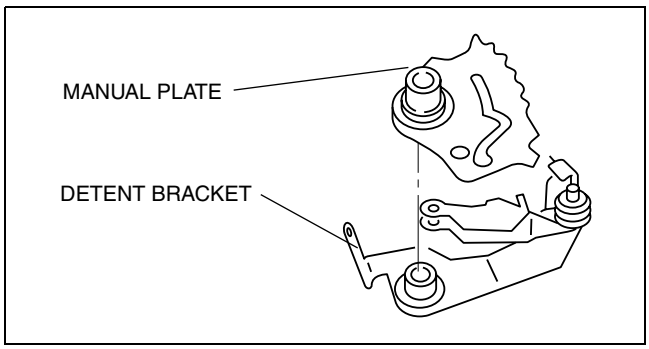


B3E0517A135

1	Actuator plate
2	Support actuator
3	Parking pawl shaft
4	Parking pawl
5	Pawl return spring
6	Manual shaft
7	Parking rod component
8	E-ring
9	Parking assist lever component
10	Manual plate
11	Detent bracket component

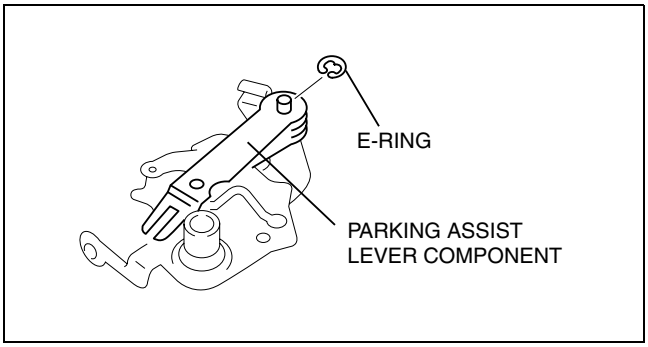
Assembly Procedure

1. Install the manual plate to the detent bracket component.
2. Install the parking assist lever component to the detent bracket component and the manual plate.



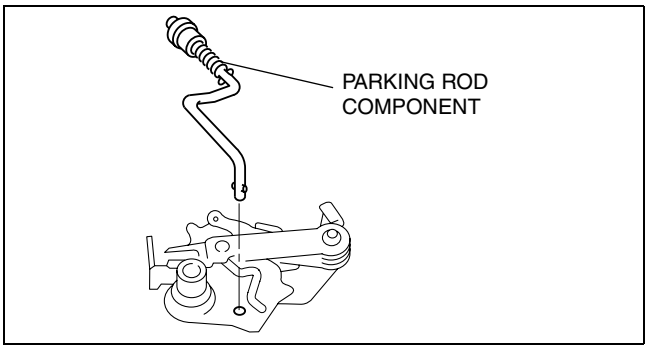
B3E0517A136

3. Install the E-ring.



B3E0517A137

4. Install the parking rod component.

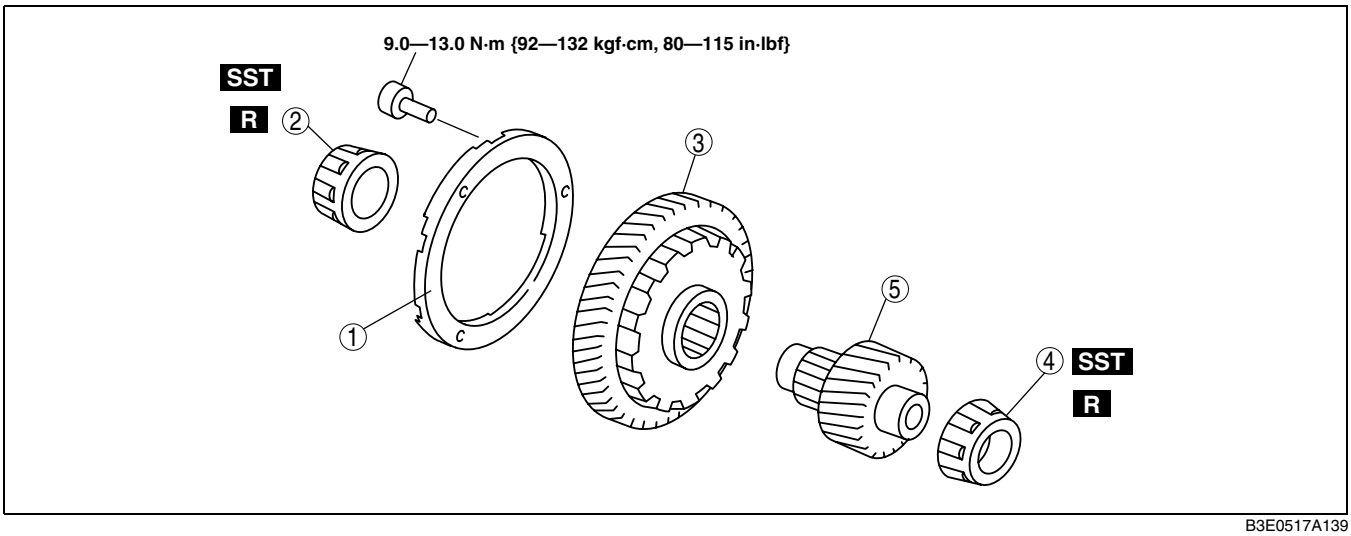


B3E0517A138

SECONDARY GEAR AND OUTPUT GEAR DISASSEMBLY/ASSEMBLY

B3E051719204A01

1. Disassemble in the order indicated in the table.
2. Assemble in the reverse order of disassembly.

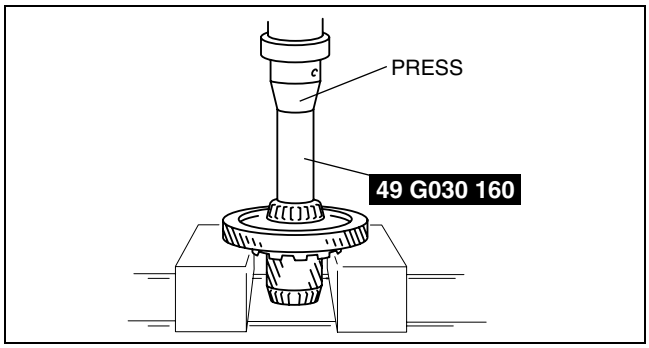


B3E0517A139

1	Ring
2	Bearing (See 05–17–79 Bearing Disassembly Note.)
3	Secondary gear
4	Bearing (See 05–17–79 Bearing Disassembly Note.)
5	Output gear

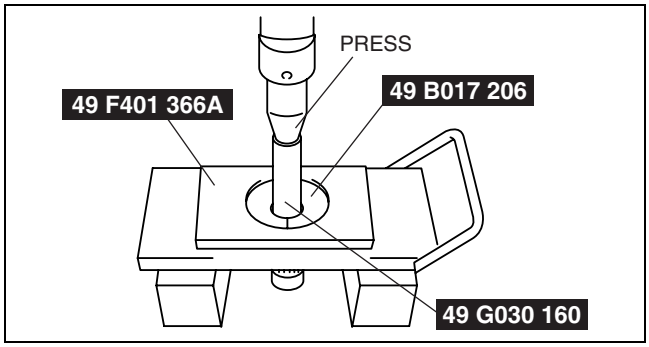
Bearing Disassembly Note

1. Remove the bearing (secondary gear side) from the output gear using the **SST**.



B3E0517A140

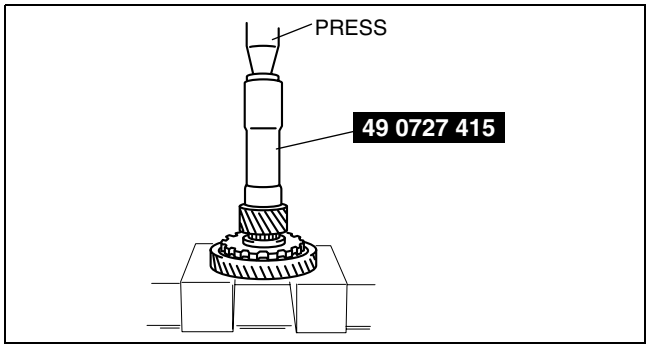
2. Remove the bearing (output gear side) from the output gear using the **SST**.



B3E0517A141

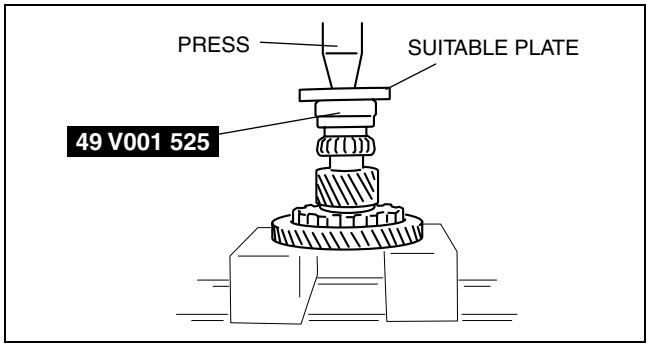
Assembly Procedure

1. Install the output gear to the secondary gear using the **SST**.



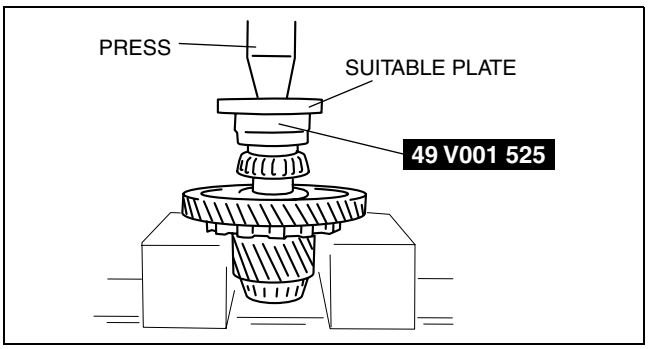
B3E0517A142

2. Install the bearing (output gear side) to the output gear using the **SST** and suitable plate.



B3E0517A143

3. Install the bearing (secondary gear side) to the output gear using **the SST** and suitable plate.

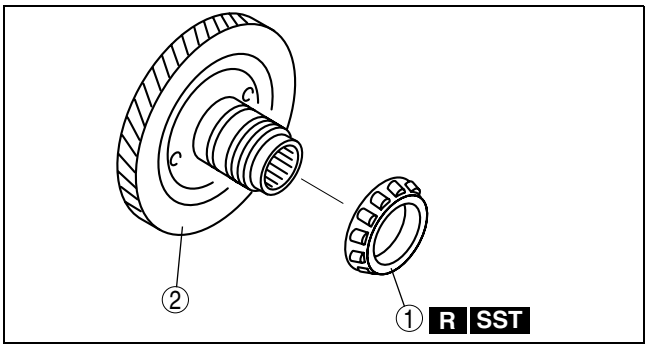


B3E0517A144

PRIMARY GEAR DISASSEMBLY/ASSEMBLY

B3E051719204A02

1. Disassemble in the order indicated in the table.
2. Assemble in the reverse order of disassembly.

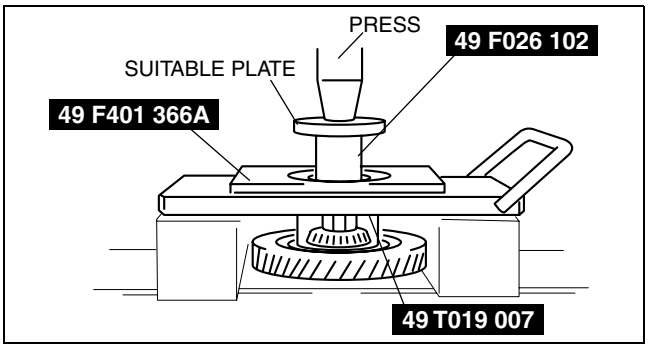


B3E0517A145

1	Bearing (See 05–17–80 Bearing Disassembly Note.) (See 05–17–80 Bearing Assembly Note.)
2	Primary gear

Bearing Disassembly Note

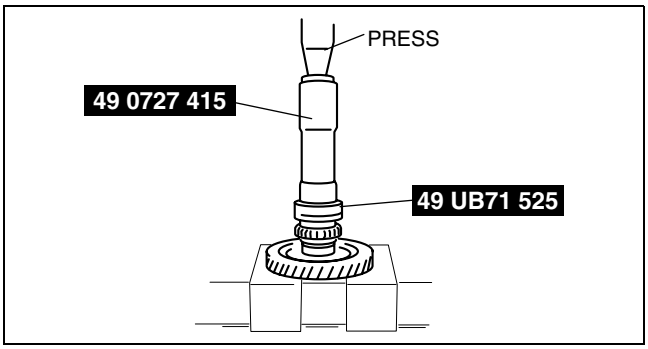
- Remove the bearing from the primary gear using the **SSTs** and suitable plate.



B3E0517A146

Bearing Assembly Note

- Install the bearing to the primary gear using the **SSTs**.



B3E0517A147

CONTROL VALVE BODY DISASSEMBLY/ASSEMBLY

B3E051721100A10

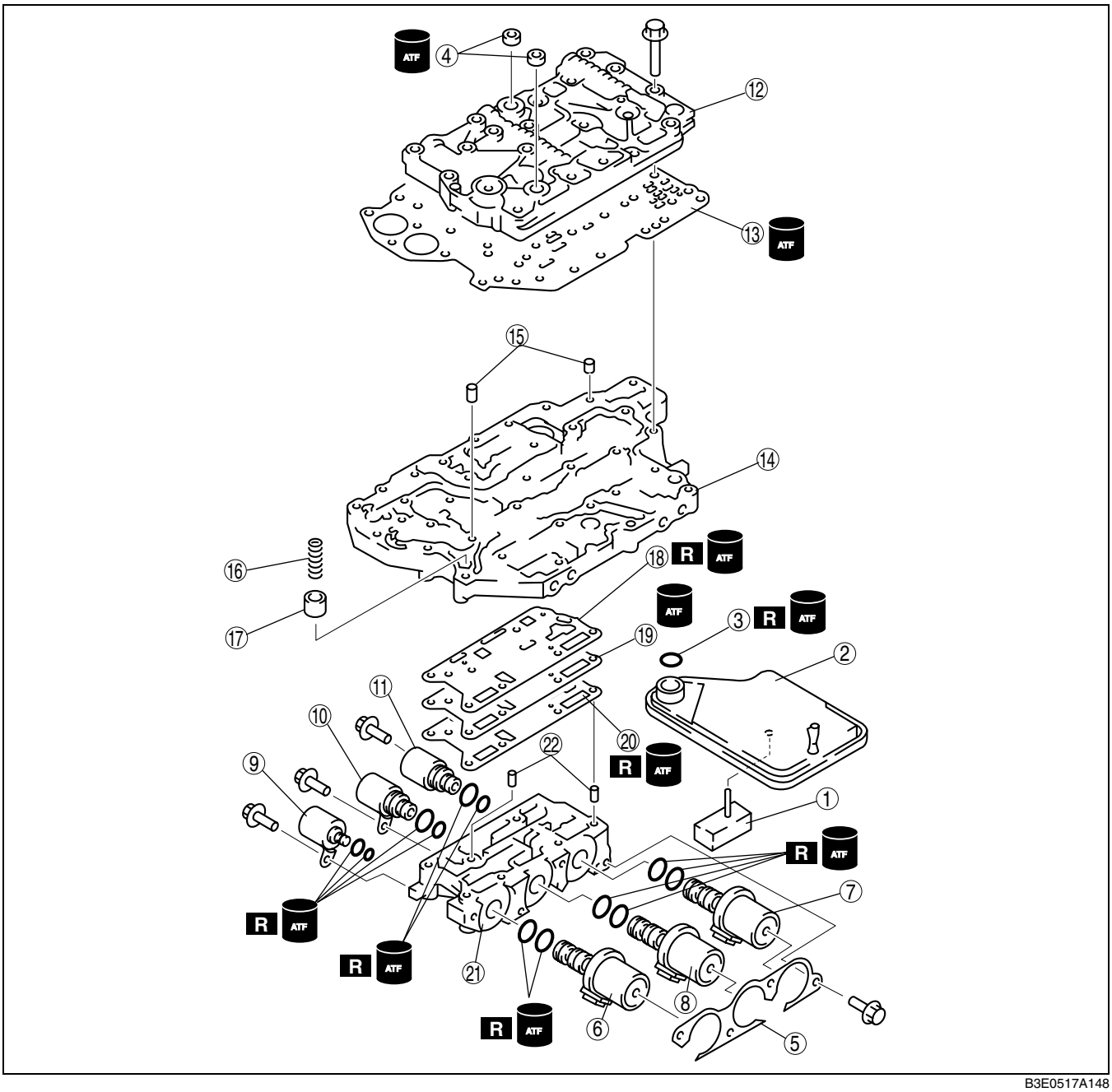
Control Valve Body Disassembly

Caution
- **Denting or scratching these components will reduce the ability of the transaxle to shift properly. When handling these components or the valve body that contains them, be careful not to drop or hit them.**

1. Disassemble in the order indicated in the table.
2. Neatly arrange the removed parts to avoid confusing the similar parts.

Warning
- **Using compressed air can cause dirt and other particles to fly out, causing injury to the eyes. Wear protective eye wear whenever using compressed air.**

3. Clean the removed parts with cleaning solvent, then use compressed air to dry them. Use compressed air to clean out all holes and passages.



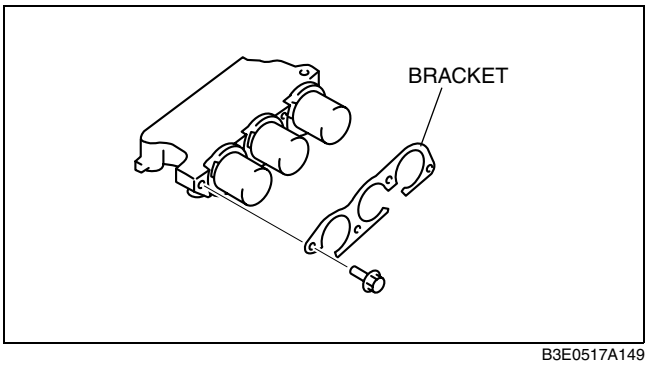
B3E0517A148

1	Transaxle fluid temperature sensor

2	Oil strainer
3	O-ring
4	Packing
5	Bracket
6	Shift solenoid A
7	Shift solenoid B
8	Shift solenoid C
9	Pressure control solenoid
10	Shift solenoid D
11	Shift solenoid E
12	Upper control valve body
13	Seal plate
14	Main control valve body
15	Tubular pin
16	Pressure modifier accumulator spring
17	Pressure modifier accumulator
18	Gasket D
19	Separator plate
20	Gasket C
21	Solenoid control valve body
22	Tubular pin

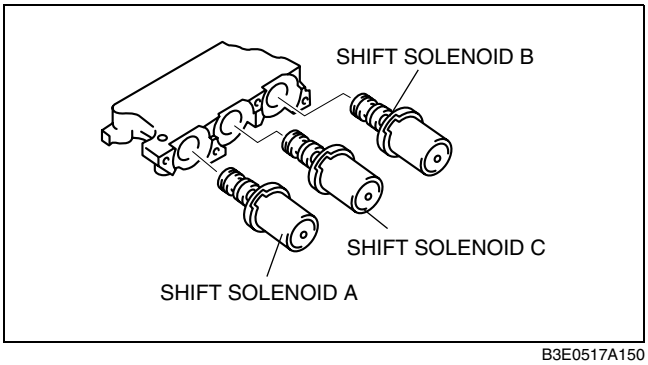
Disassembly procedure

1. Remove the oil strainer.
2. Remove the O-ring from the oil strainer.
3. Remove the packing.
4. Remove the bracket.



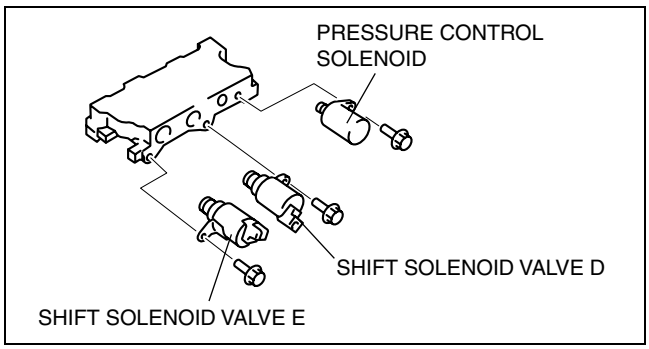
B3E0517A149

5. Remove the shift solenoid A, B, C.



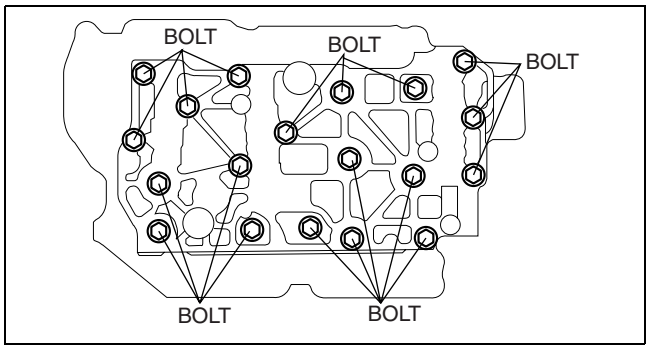
B3E0517A150

6. Remove the pressure control solenoid, shift solenoid D, E.



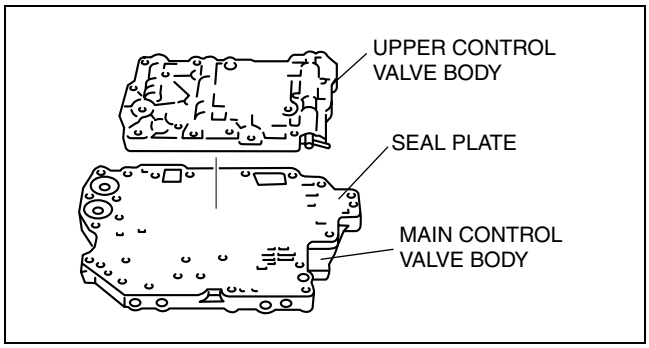
B3E0517A151

7. Loosen the bolts evenly in the pattern shown.



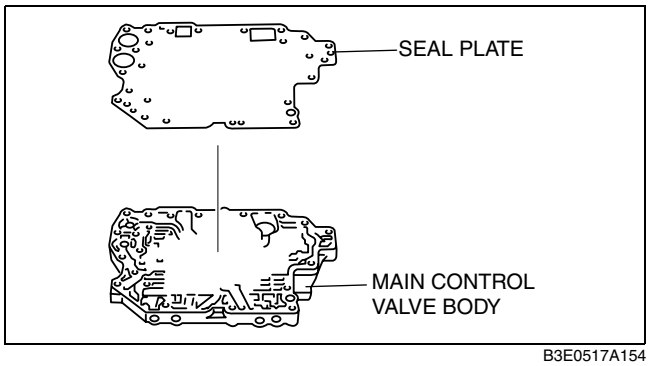
B3E0517A152

8. Remove the upper control valve body.



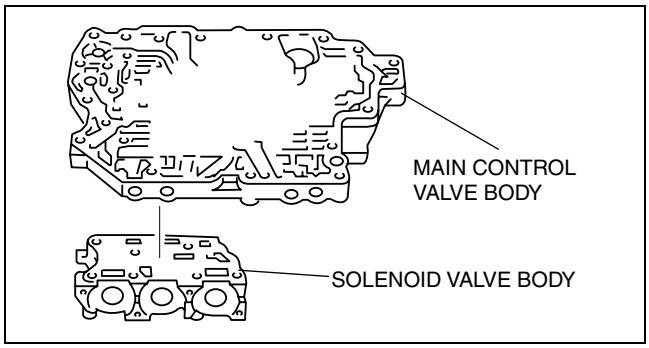
B3E0517A153

9. Remove the seal plate.



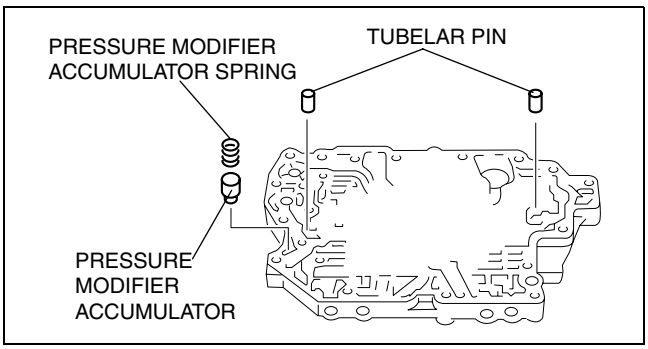
B3E0517A154

10. Remove the main control valve body.



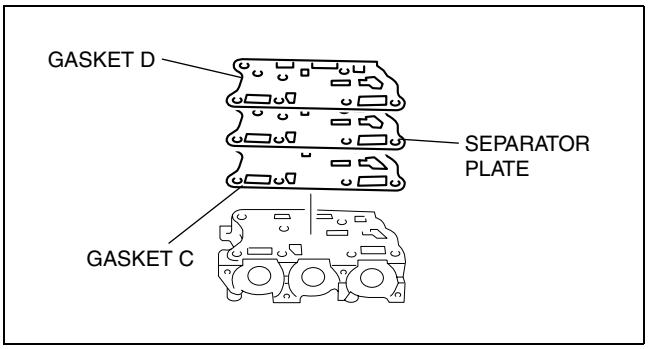
B3E0517A155

11. Remove the tubular pins, pressure modifier accumulator spring and pressure modifier accumulator from the main control valve body.



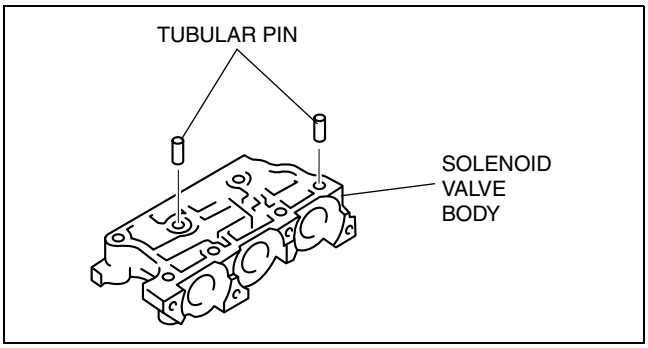
B3E0517A156

12. Remove the gasket D, separator plate and gasket C.



B3E0517A157

13. Remove the tubular pins.



B3E0517A158

Upper Control Valve Body Disassembly/Assembly

Caution
- **Denting or scratching these precisely machined components will reduce the ability of the transaxle to shift properly. When handling these components or the valve body that contains them, be careful not to drop or hit them.**

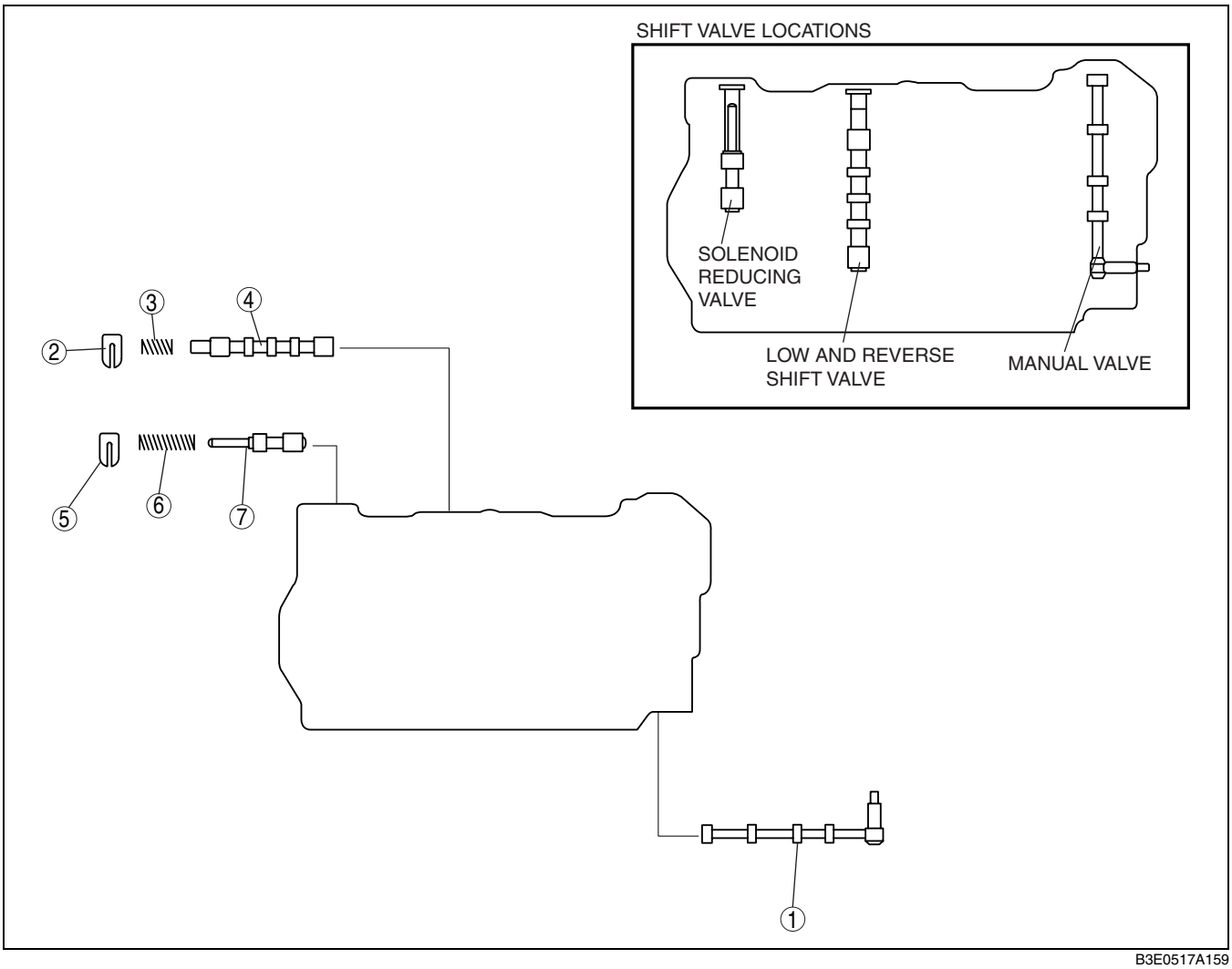
Note
- If a valve does not slide out under its own weight, place the valve body open-side down and tap on the valve body lightly with a plastic hammer.

1. Disassemble in the order indicated in the table.

Warning
- **Using compressed air can cause dirt and other particles to fly out, causing injury to the eyes. Wear protective eye wear whenever using compressed air.**

2. Clean all parts and holes using compressed air and apply ATF to them immediately before assembly.

3. Assemble in the reverse order of disassembly.



B3E0517A159

1	Manual valve
2	Retainer
3	Low and reverse shift valve spring
4	Low and reverse shift valve
5	Retainer
6	Solenoid reducing valve spring
7	Solenoid reducing valve

Assembly procedure

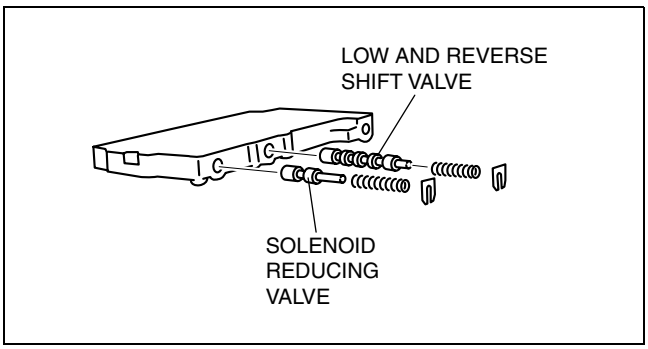
1. Measure the spring free length.

Item	Outer diameter mm {in}	Free length mm {in}	No. of coils	Wire diameter mm {in}
Low and reverse shift valve spring	8.7 {0.343}	31.3 {1.232}	9.0	0.8 {0.031}
Solenoid reducing valve spring	8.7 {0.343}	44.2 {1.740}	16.0	1.1 {0.043}

- If not as specified, replace the springs.

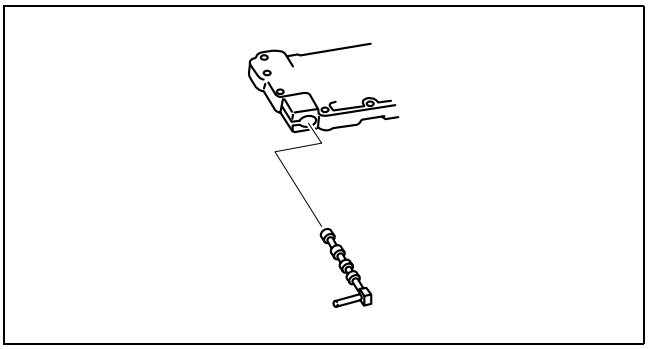
2. Install the solenoid reducing valve, solenoid reducing valve spring and retainer.

3. Install the low and reverse shift valve, low and reverse shift valve spring and retainer.



B3E0517A160

4. Install the manual valve.



B3E0517A161

Main Control Valve Body Disassembly/Assembly

Caution
- **Denting or scratching these precisely machined components will reduce the ability of the transaxle to shift properly. When handling these components or the valve body that contains them be careful not to drop or hit them.**

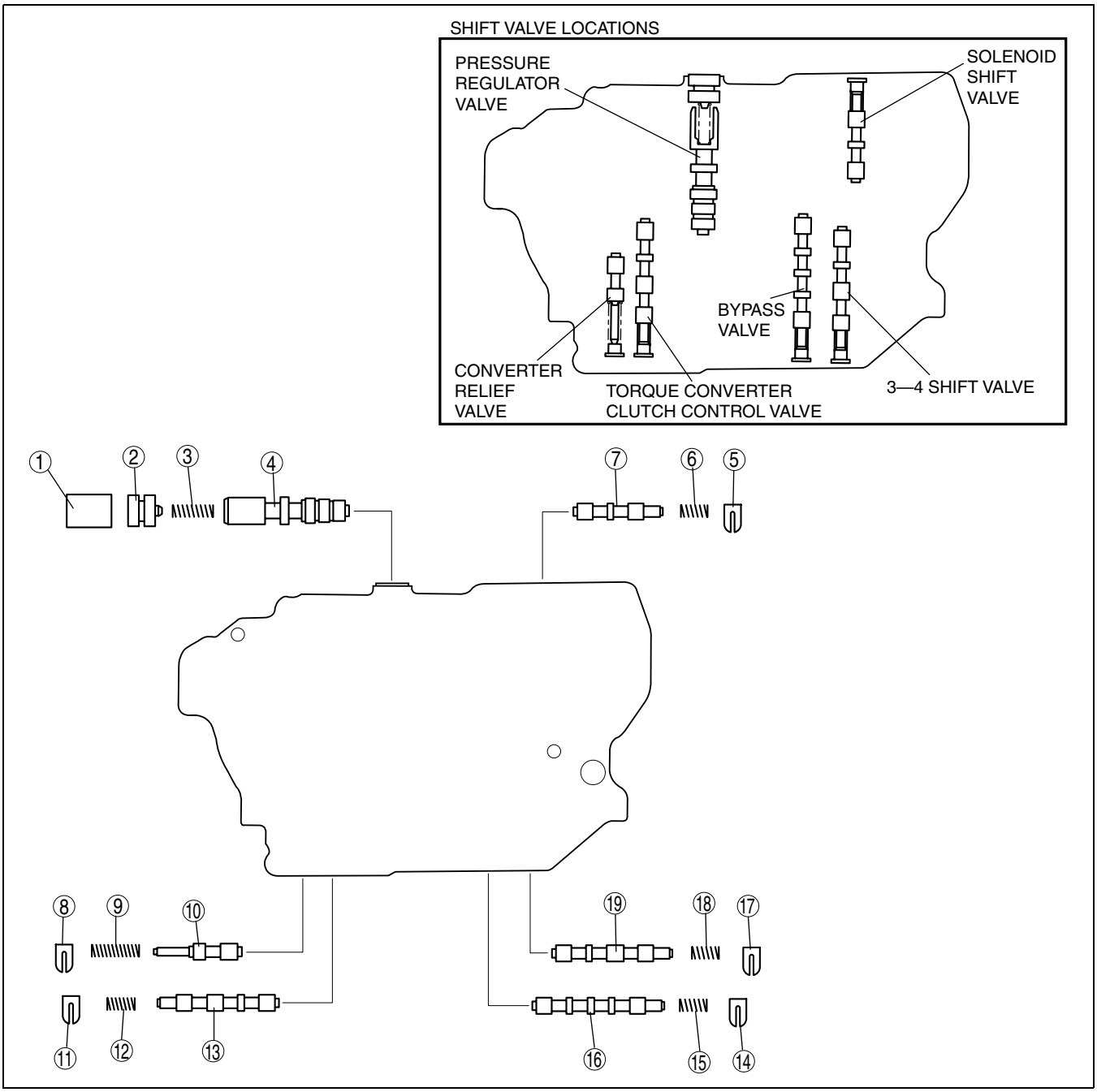
Note
- If a valve does not slide out under its own weight, place the valve body open-side down and tap on the valve body lightly with a plastic hammer.

1. Disassemble in the order indicated in the table.

Warning
- **Using compressed air can cause dirt and other particles to fly out, causing injury to the eyes. Wear protective eye wear whenever using compressed air.**

2. Clean all parts and holes using compressed air and apply ATF to them immediately before assembly.

3. Assemble in the reverse order of disassembly.



B3E0517A162

1	Retainer
2	Stopper plug
3	Pressure regulator valve spring
4	Pressure regulator valve
5	Retainer
6	Solenoid shift valve spring
7	Solenoid shift valve
8	Retainer
9	Converter relief valve spring
10	Converter relief valve
11	Retainer
12	Torque converter clutch valve spring
13	Torque converter clutch valve
14	Retainer

15	Bypass valve spring
16	Bypass valve
17	Retainer
18	3–4 shift valve spring
19	3–4 shift valve

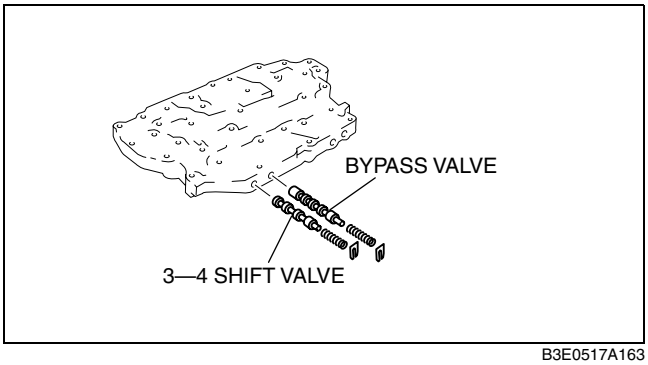
Assembly procedure

1. Measure the spring free length.

Item	Outer diameter mm {in}	Free length mm {in}	No. of coils	Wire diameter mm {in}
Pressure regulator valve spring	7.9 {0.311}	36.3 {1.429}	13.2	0.9 {0.035}
Solenoid shift valve spring	8.3 {0.327}	35.1 {1.382}	12.0	0.6 {0.024}
Converter relief valve spring	9.0 {0.354}	42.5 {1.673}	14.2	1.3 {0.051}
Torque converter clutch control valve spring	8.7 {0.343}	31.3 {1.232}	9.0	0.8 {0.031}
Bypass valve spring	8.7 {0.343}	31.3 {1.232}	9.0	0.8 {0.031}
3–4 shift valve spring	8.7 {0.343}	31.3 {1.232}	9.0	0.8 {0.031}

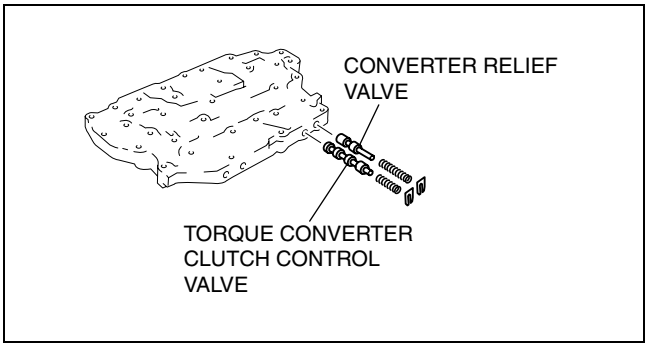
- If not as specified, replace the springs.

2. Install the 3–4 shift valve, 3–4 shift valve spring, and retainer.
3. Install the bypass valve, bypass valve spring, and retainer.
4. Install the torque converter clutch control valve, torque converter clutch control valve spring, and retainer.



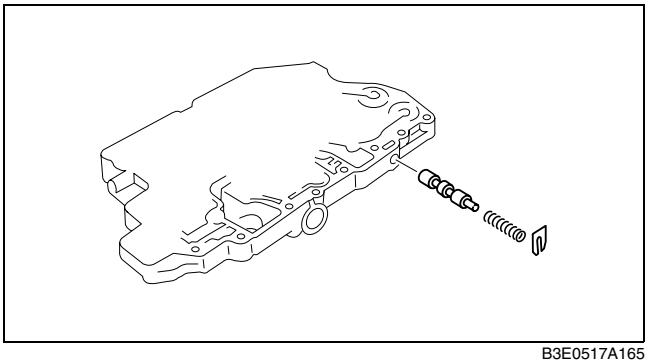
B3E0517A163

5. Install the converter relief valve, converter relief valve spring, and retainer.



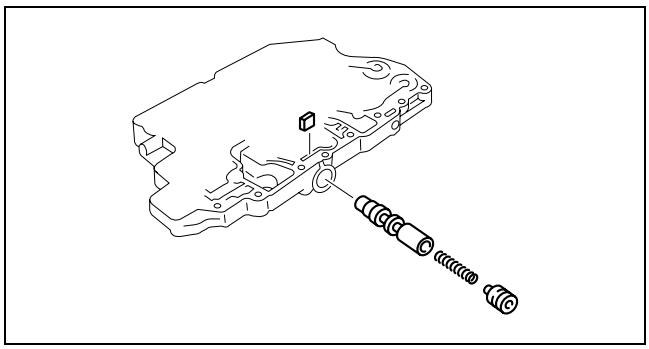
B3E0517A164

6. Install the solenoid shift valve, solenoid shift valve spring, and retainer.



B3E0517A165

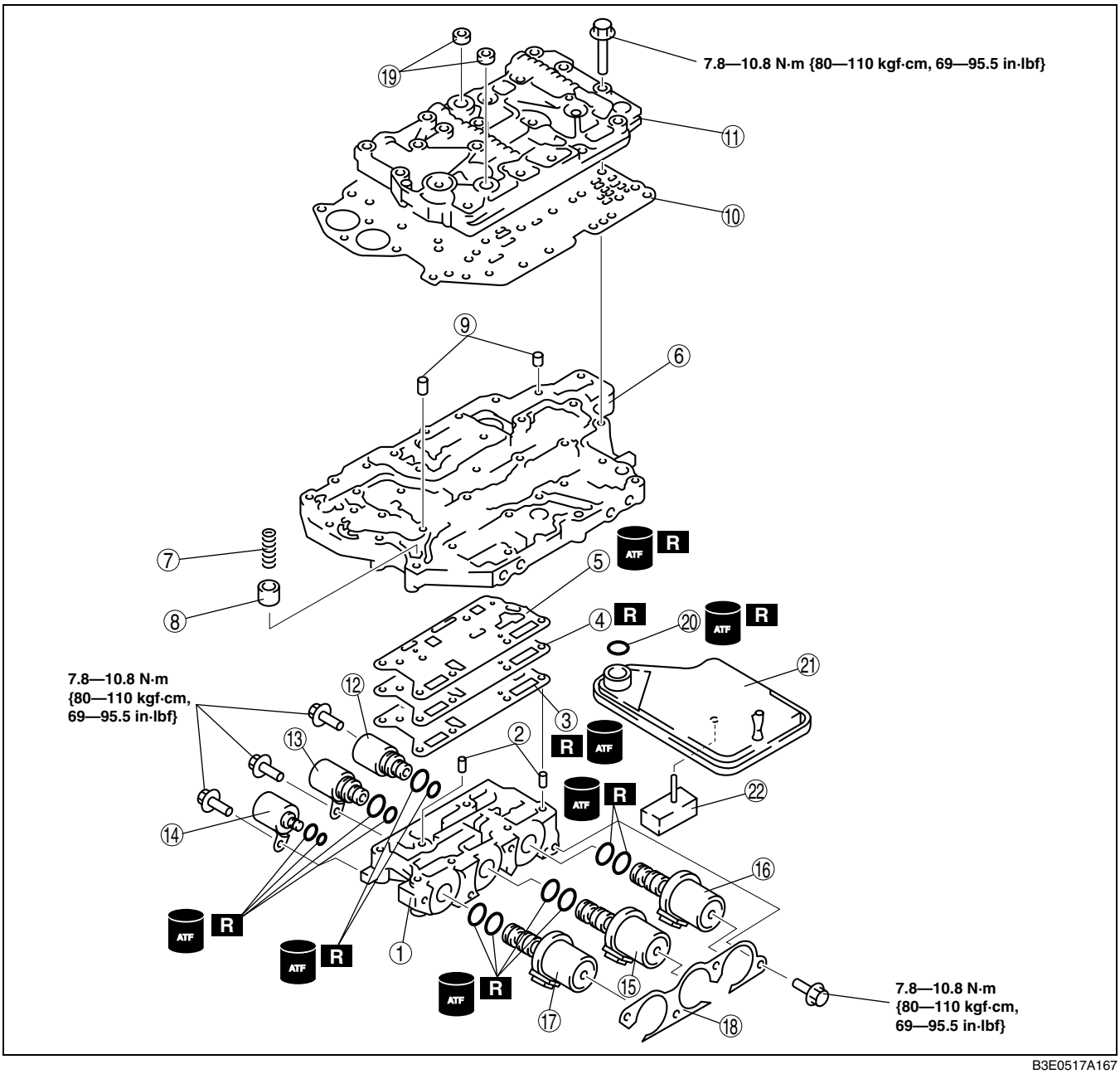
7. Install the pressure regulator valve, pressure regulator valve spring, and retainer.



B3E0517A166

Control Valve Body Assembly

1. Verify that all parts are clean and free of dust and other small particles.
2. Apply ATF to all parts.
3. Assemble in the reverse order of disassembly.



B3E0517A167

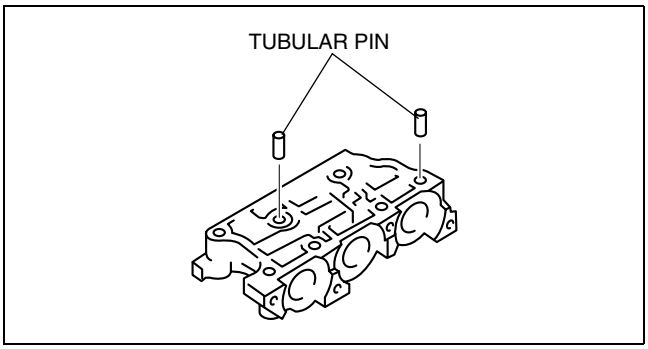
1	Solenoid control valve body
2	Tubular pin

3	Gasket C
4	Separator plate
5	Gasket D
6	Main control valve body
7	Pressure modifier accumulator
8	Pressure modifier accumulator spring
9	Tubular pin
10	Seal plate
11	Upper control valve body
12	Shift solenoid E
13	Shift solenoid D
14	Pressure control solenoid
15	Shift solenoid C
16	Shift solenoid B
17	Shift solenoid A
18	Bracket
19	Packing
20	O-ring
21	Oil strainer
22	Transaxle fluid temperature sensor

Assembly procedure

1. Install the tubular pins into the solenoid control valve body.

Caution
- **Do not confuse gaskets C and D.**

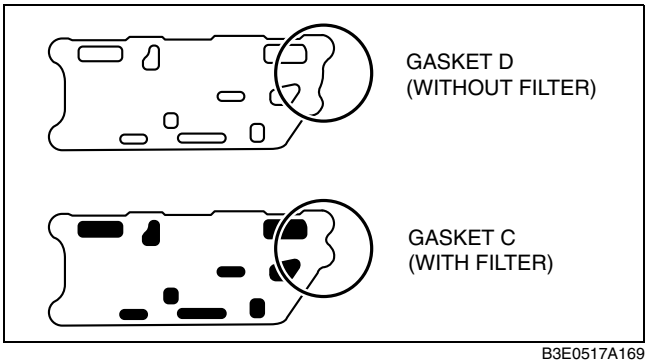


B3E0517A168

2. Set the new gasket C, separator plate, and new gasket D on the solenoid control valve body.
3. Install the pressure modifier accumulator and pressure modifier accumulator spring into the main control valve body.

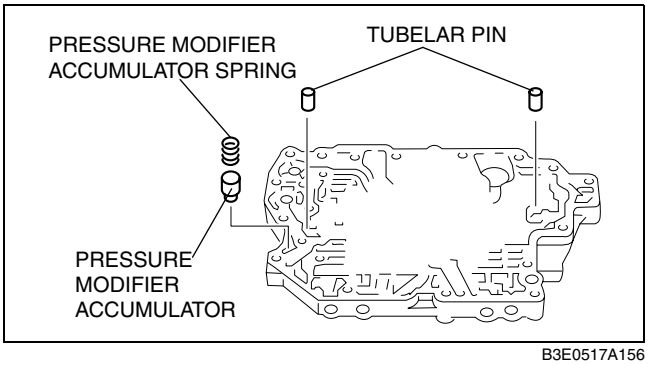
Pressure modifier accumulator spring free length

Outer diameter mm {in}	Free length mm {in}	No. of coils	Wire diameter mm {in}
11.0 {0.433}	23.0 {0.906}	6.6	1.5 {0.059}



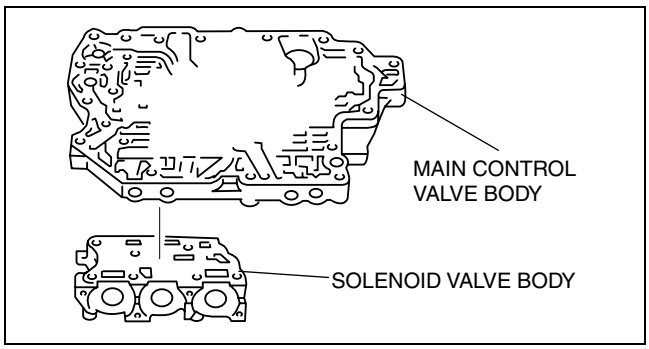
B3E0517A169

4. Install the tubular pins into the main control valve body.



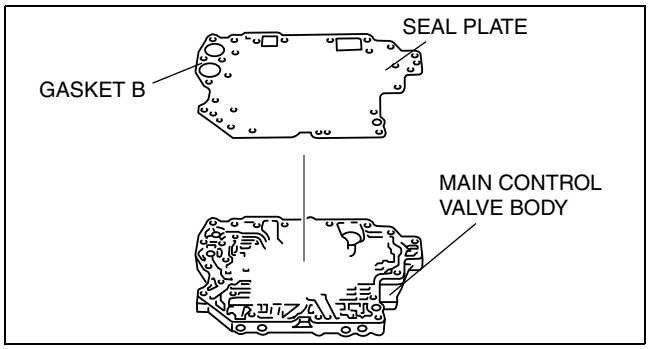
B3E0517A156

5. Set the main control valve body onto the solenoid control valve body.



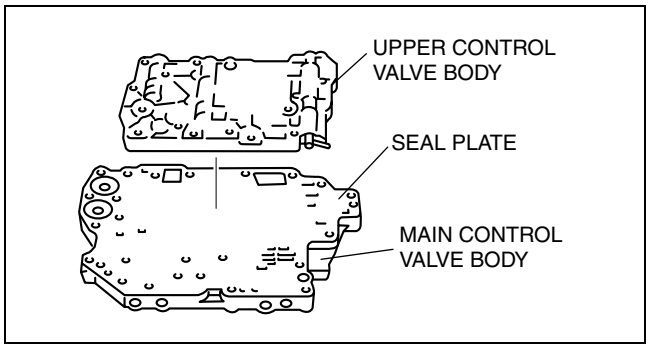
B3E0517A155

6. Set the seal plate on the main control valve body.



B3E0517A171

7. Set the upper control valve body onto the main control valve body.

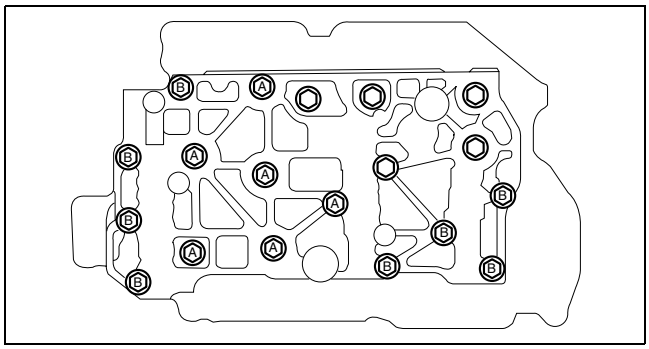


B3E0517A153

8. Hand-tighten the bolts shown in the figure. Each type of bolt has a different letter on its head. Match the bolt letter with the letter stamped next to its installation hole on the valve body.

Bolts identification

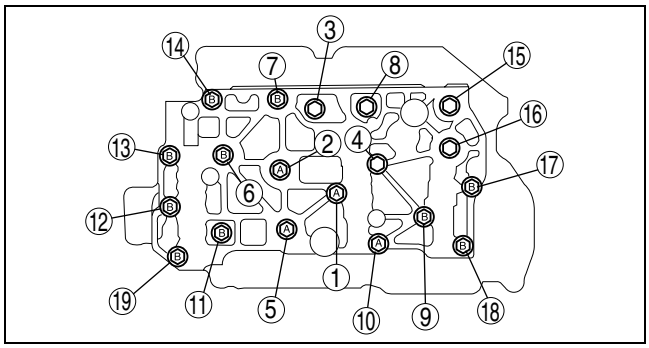
Identification mark	Length (measured from below the head) mm {in}
A	30 {1.181}
B	40 {1.575}
No mark	60 {2.362}



B3E0517A172

9. Tighten the bolts evenly and gradually in the order shown.

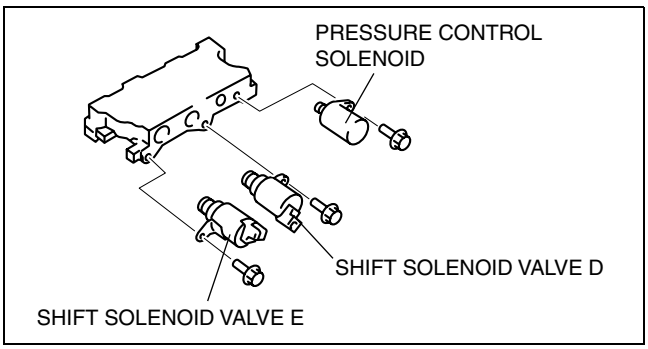
Tightening torque
7.8—10.8 N·m
{80—110 kgf·cm, 69—95.5 in·lbf}



B3E0517A173

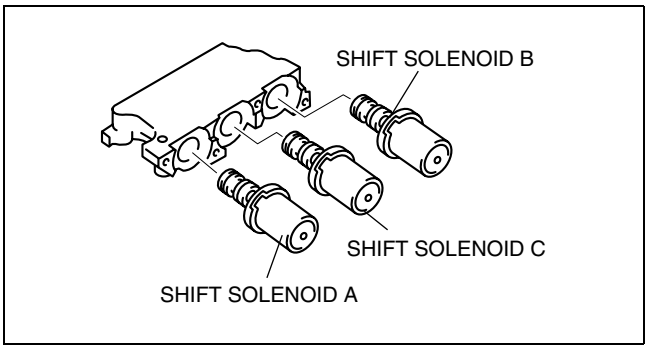
10. Install the shift solenoid D, E, and pressure control solenoid.

    Tightening torque
    7.8—10.8 N·m
    {80—110 kgf·cm, 69—95.5 in·lbf}



B3E0517A151

11. Install the shift solenoid A, B, C.

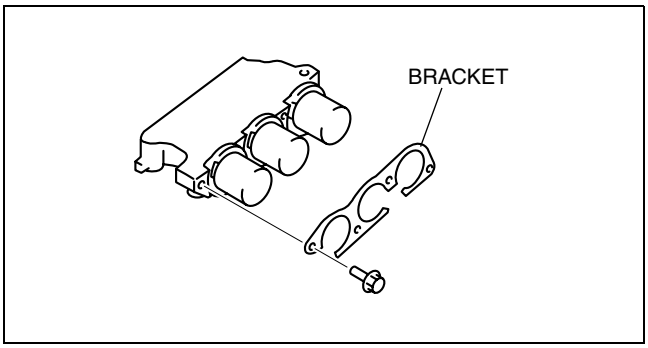


B3E0517A150

12. Install the bracket.

    Tightening torque
    7.8—10.8 N·m
    {80—110 kgf·cm, 69—95.5 in·lbf}

13. Install the packing.
14. Apply ATF to new O-ring and install it onto the oil strainer.
15. Install the oil strainer onto the main control valve body.



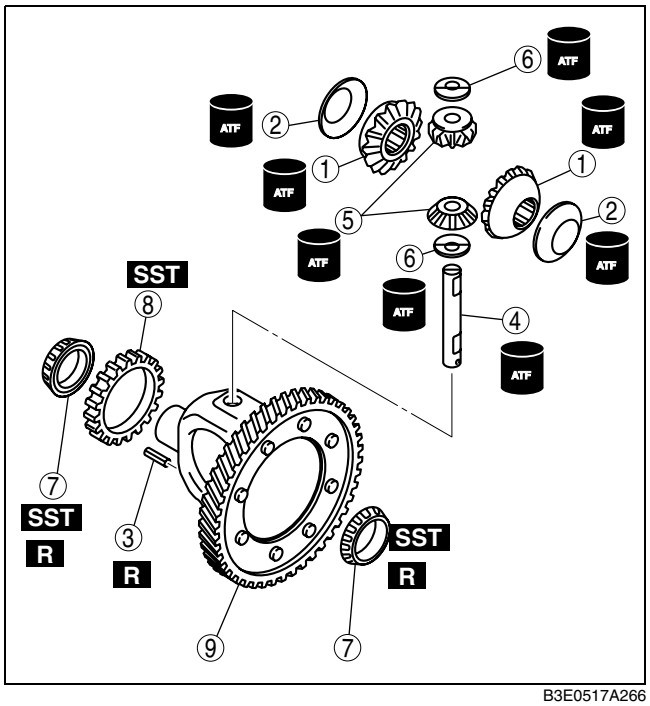
B3E0517A149

DIFFERENTIAL DISASSEMBLY/ASSEMBLY

B3E051727100A01

1. Perform the preinspeciton before disassembly. (See 05–17–129 Differential Preinspection.)
2. Disassemble in the order indicated in the table.
3. Assemble in the reverse order of disassembly.

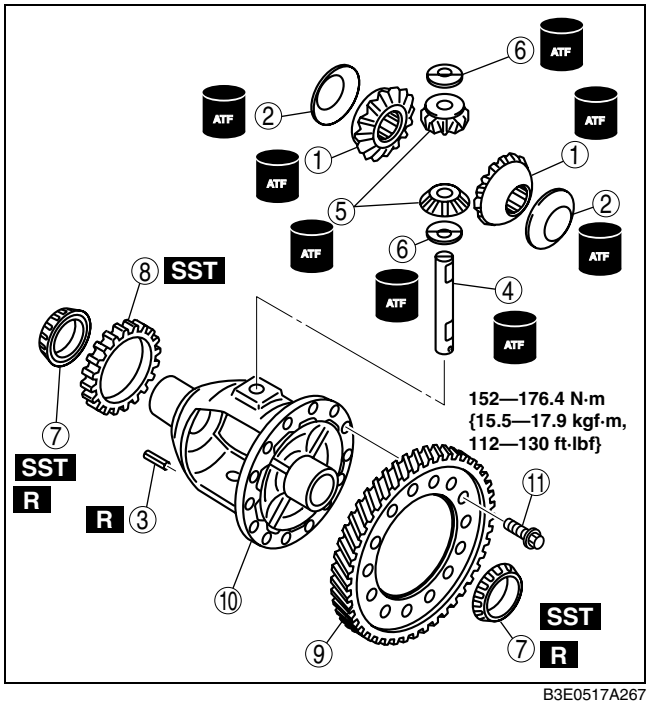
RIVET FIXED TYPE



B3E0517A266

1	Side gear
2	Thrust washer
3	Roll pin (See 05–17–94 Roll Pin Disassembly Note.)
4	Pinion shaft
5	Pinion gear
6	Thrust washer
7	Bearings (See 05–17–94 Bearings Disassembly Note.)
8	Sensor rotor (See 05–17–95 Sensor Rotor Disassembly Note.)
9	Ring gear and gear case

BOLT FIXED TYPE

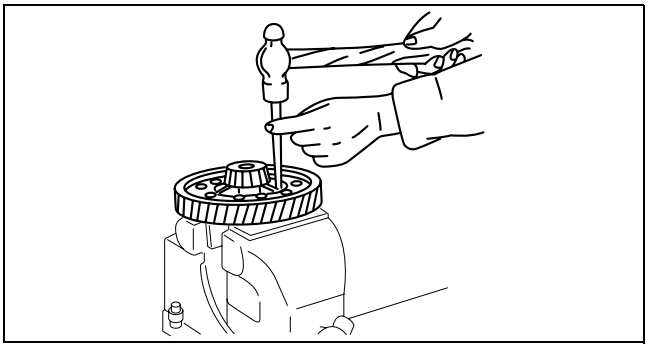


B3E0517A267

1	Side gear
2	Thrust washer
3	Roll pin (See 05–17–94 Roll Pin Disassembly Note.)
4	Pinion shaft
5	Pinion gear
6	Thrust washer
7	Bearings (See 05–17–94 Bearings Disassembly Note.)
8	Sensor rotor (See 05–17–95 Sensor Rotor Disassembly Note.)
9	Ring gear
10	Gear case
11	Bolt

Roll Pin Disassembly Note

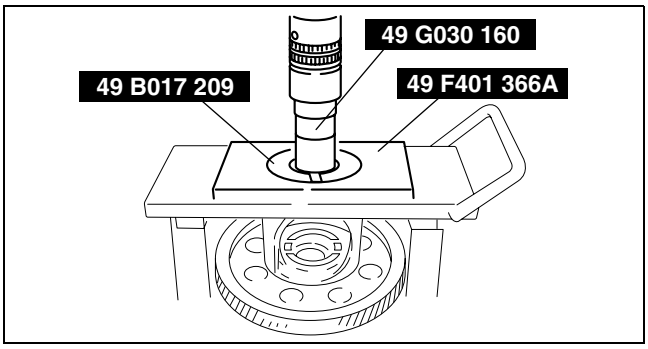
1. Place the gear case in a vise.
2. Insert a **2.0 mm {0.07 in}** punch into the roll pin hole from the ring gear side, and remove the roll pin.



B3E0517A268

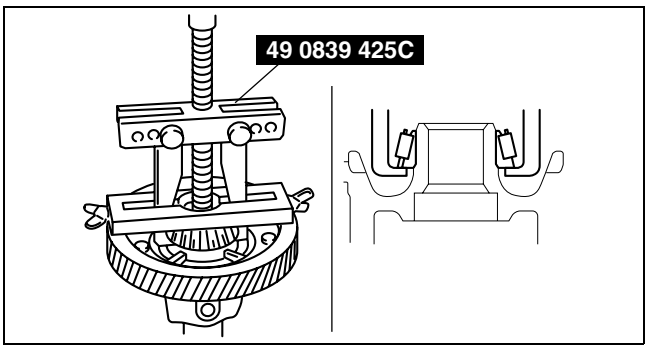
Bearings Disassembly Note

1. Remove the bearing (speedometer drive gear side) from the gear case using the **SSTs**.



B3E0517A269

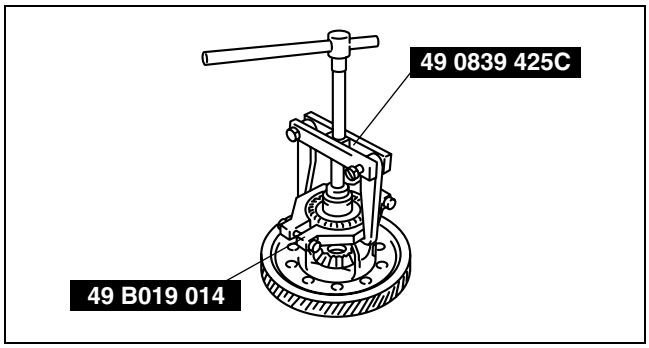
2. Remove the bearing (ring gear side) from the gear case using the **SST**.



B3E0517A270

Sensor Rotor Disassembly Note

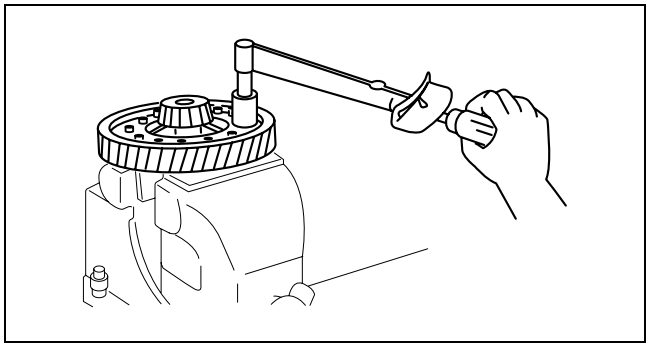
- Remove the sensor rotor from the gear case using the **SSTs**.



B3E0517A271

Assembly Procedure

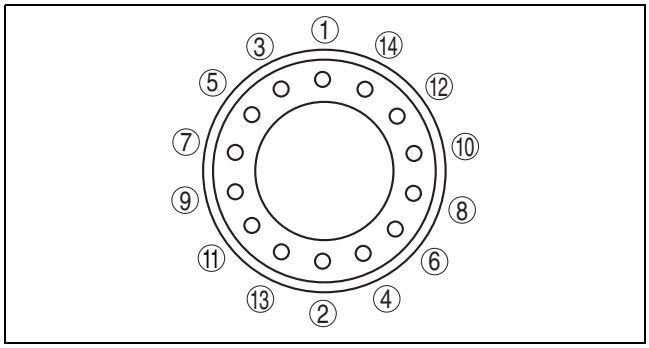
1. Install the ring gear to the gear case. (bolt fixed type)



B3E0517A272

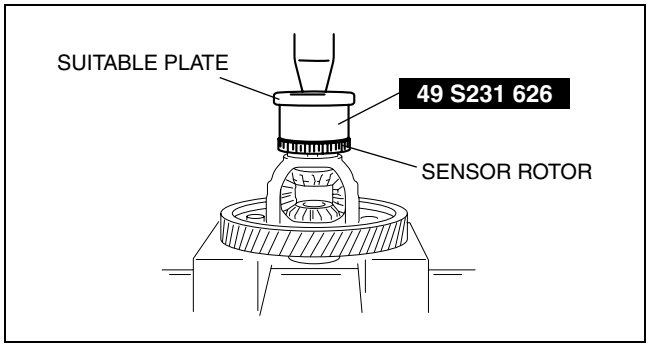
2. Tighten the bolts evenly and gradually in the order shown. (bolt fixed type)

   Tightening torque
   152—176 N·m
   {15.5—17.9 kgf·m, 112—130 ft·lbf}



B3E0517A273

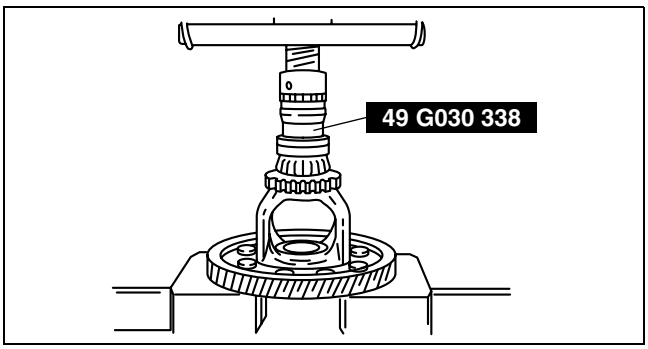
3. Install the sensor rotor to the gear case using the **SST** and suitable plate.
4. Install a new bearing.
   (1) Press the new bearing (speedometer drive gear side) onto the gear case using the **SST**.



B3E0517A274

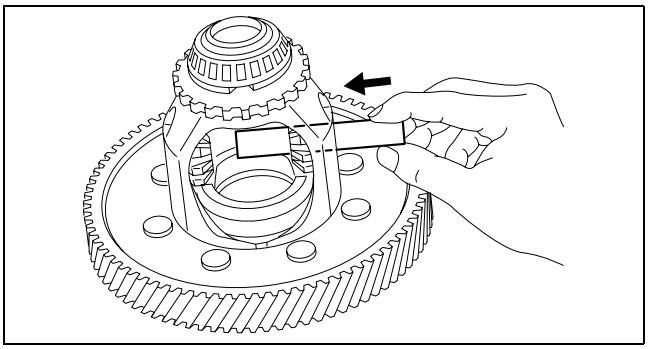
(2) Press on the other new bearing (ring gear side) in the same manner.

5. Apply ATF to the thrust washers and pinion shaft.
6. Install the pinion gear and thrust washers into the gear case.



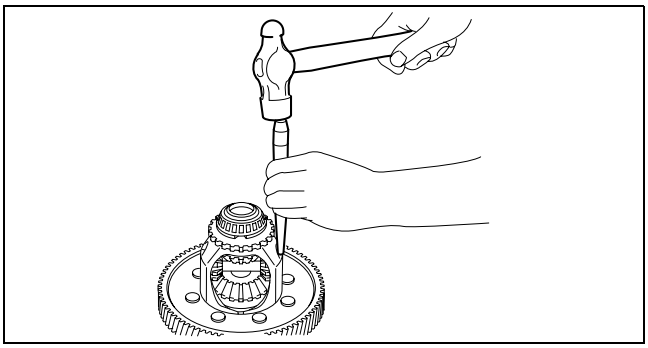
B3E0517A275

7. Install the pinion shaft.



B3E0517A276

8. Install the roll pin, and crimp it to prevent it from coming out of the gear case.
9. Apply ATF to the thrust washers.
10. Install the thrust washers and side gears into the gear case, then turn the side gears and align them with the drive shaft holes.
11. Measure the backlash of the side gears as follows:
    (1) Install the left and right drive shafts in the differential.
    (2) Support the drive shafts on V-blocks.

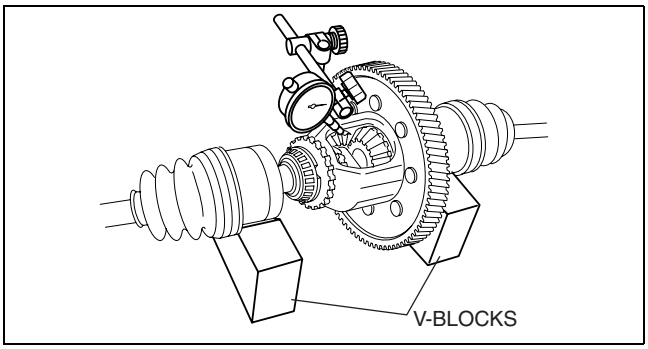


B3E0517A277

    (3) Measure the backlash of both side gears.

Backlash
Standard: 0.05—0.15 mm {0.002—0.005 in}
Maximum: 0.5 mm {0.020 in}

- If not as specified, replace the differential.



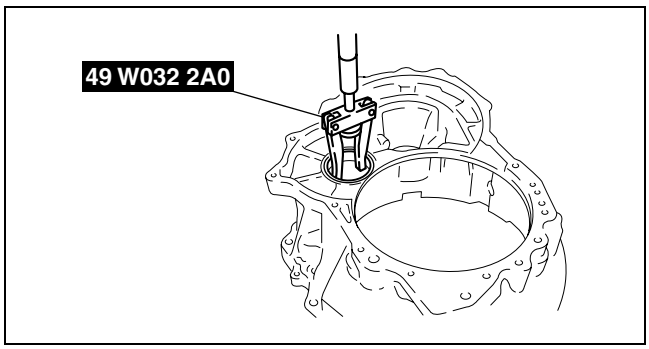
B3E0517A278

SECONDARY GEAR BEARING PRELOAD

B3E051719204A03

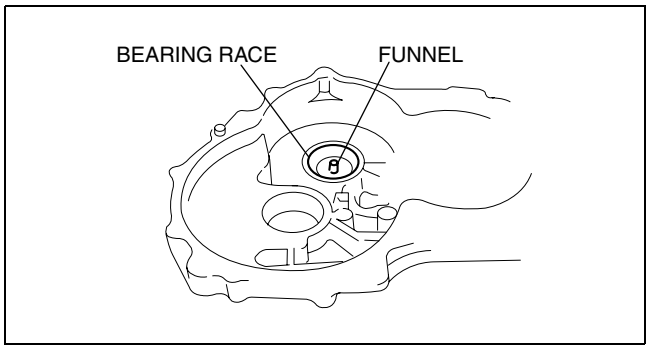
1. Set the primary gear into the transaxle case. (See 05–17–102 AUTOMATIC TRANSAXLE ASSEMBLY.)

2. Remove the bearing race and adjustment shim from the converter housing using the **SST**.



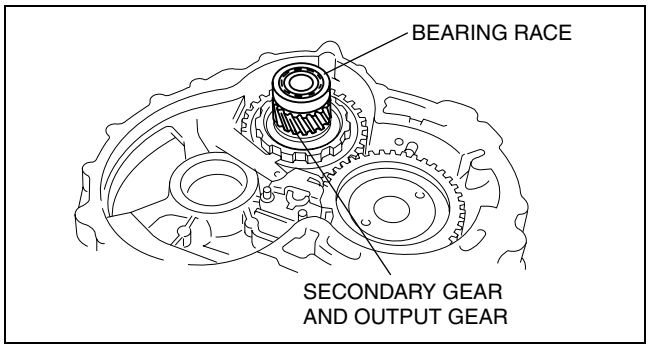
B3E0517A174

3. Install the funnel and bearing race into the transaxle case.
4. Set the secondary gear and output gear into the transaxle case.



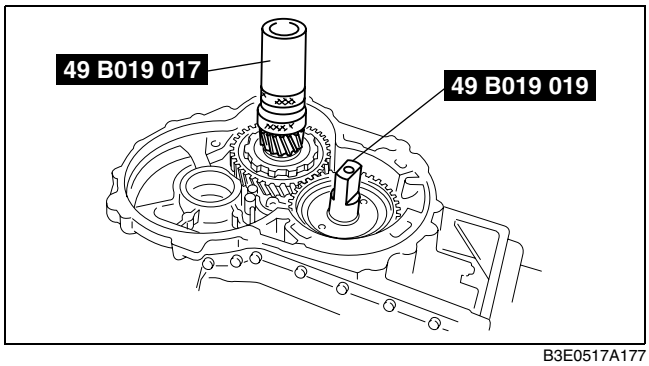
B3E0517A175

5. Install the bearing race removed in Step 2 into the secondary gear and output gear.



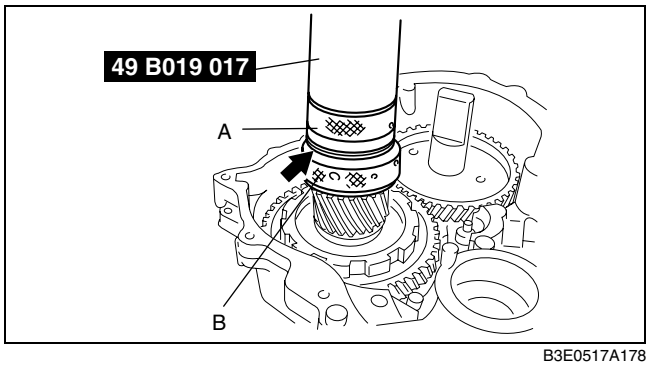
B3E0517A176

6. Set the **SSTs** onto the primary gear and secondary gear and output gear.



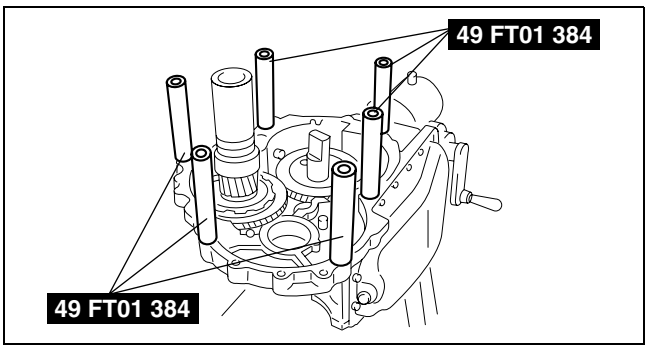
B3E0517A177

7. Turn the selector to eliminate the gap between its two halves.



B3E0517A178

8. Set the six **SSTs** (collars) on the transaxle case in the position shown.

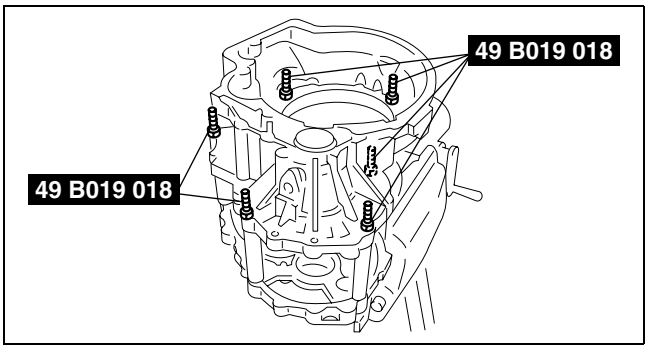


B3E0517A179

9. Set the converter housing on the transaxle case and tighten the **SSTs** (bolts) to the specified torque.

   Tightening torque
   19—25 N·m {1.9—2.6 kgf·m, 14—18 ft·lbf}

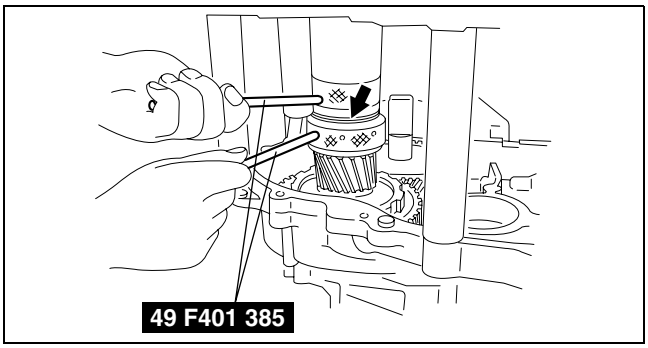
10. Turn the **SST** (selector) to increase the clearance (arrow) using the **SSTs** (bars), until it no longer turns. This is to seat the bearing race.



B3E0517A180

11. Turn the selector in the opposite direction until the preload is eliminated (gap is reduced).
12. Insert the joint through the converter housing and attach it the **SST** installed to the primary gear.

    Note
    - Read the preload when the primary gear starts to turn.
    - Measure several times and calculate the average value.

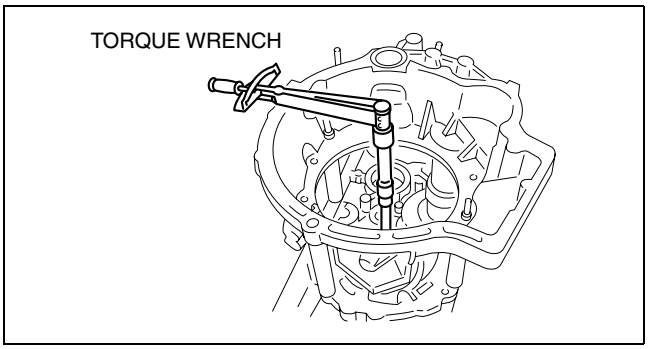


B3E0517A181

13. Adjust the clearance of the **SST** (selector) to obtain the specified preload reading.

    Preload:
    1.5—2.4 N·m {15—25 kgf·cm, 13—22 in·lbf}[*1]
    0.4—1.5 N·m {5—15 kgf·cm, 4—13 in·lbf}[*2]

*1 : Applied VIN (assumed): JM0 DY10Y100 100001—106898 JM6 DY10Y100 100001—106898
*2 : Except *1



B3E0517A182

    Note
    - Measure the clearance around the entire circumference, and select a shim based on the maximum clearance.
    - The maximum allowable number of adjustment shim is one.

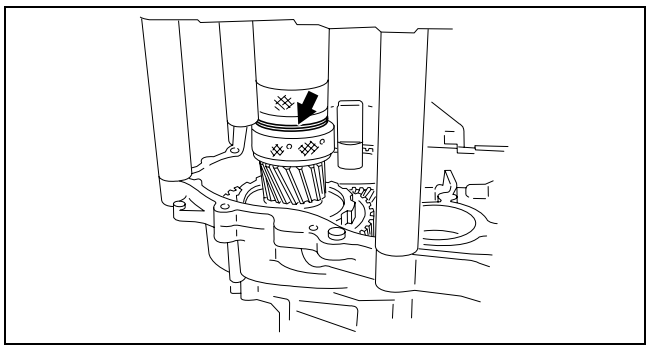
14. Measure the clearance as shown.

15. Take the maximum reading and determine the shim to be used.

Adjustment shim sizes

mm {in}

0.45 {0.018}*2	0.50 {0.020}	0.55 {0.022}
0.60 {0.024}	0.65 {0.026}	0.70 {0.028}
0.75 {0.030}	0.80 {0.031}	0.85 {0.033}
0.90 {0.035}	0.95 {0.037}	1.00 {0.039}
1.05 {0.041}	1.10 {0.043}	1.15 {0.045}
1.20 {0.047}	1.25 {0.049}	1.30 {0.051}*1



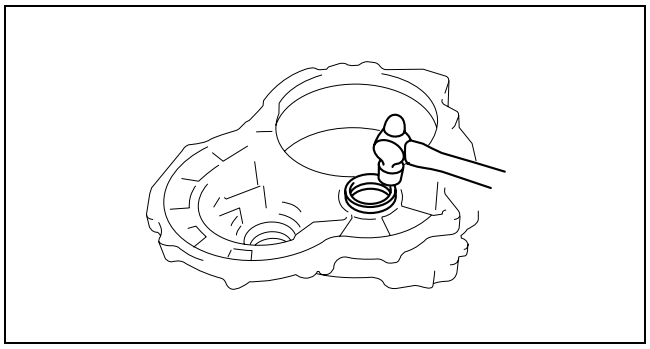
B3E0517A184

*1 : Applied VIN (assumed): JM0 DY10Y100 100001—106898 JM6 DY10Y100 100001—106898
*2 : Except *1

16. Remove the converter housing and **SST** (selector).
17. Install the required adjustment shim and tap the bearing race into the converter housing.
18. Install the converter housing.

Tightening torque
19—25 N·m {1.9—2.6 kgf·m, 14—18 ft·lbf}

19. Insert the **SST** (preload adapter) through the converter housing and attach it to the **SST**.
20. Verify that the preload is within the specification. If not, return to Step 1.



B3E0517A185

Preload:
1.5—2.4 N·m {15—25 kgf·cm, 13—22 in·lbf}*1
0.4—1.5 N·m {5—15 kgf·cm, 4—13 in·lbf}*2

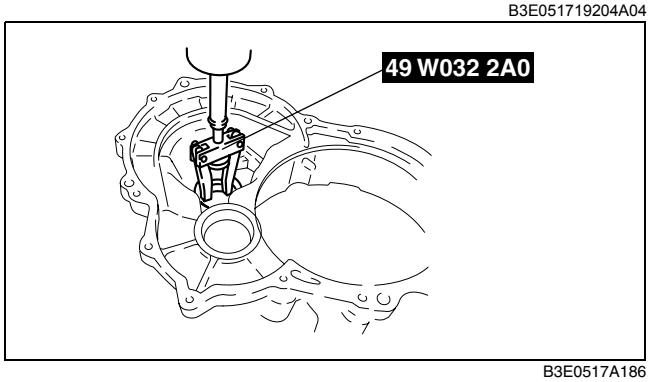
*1 : Applied VIN (assumed): JM0 DY10Y100 100001—106898 JM6 DY10Y100 100001—106898
*2 : Except *1

21. Remove the converter housing.

DIFFERENTIAL BEARING PRELOAD

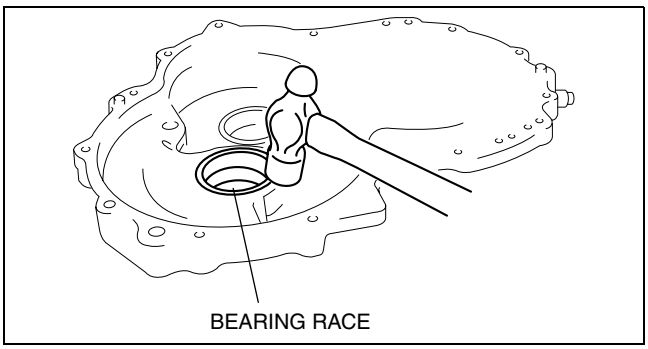
1. Remove the bearing race and adjustment shim from the converter housing using the **SST**.

B3E051719204A04



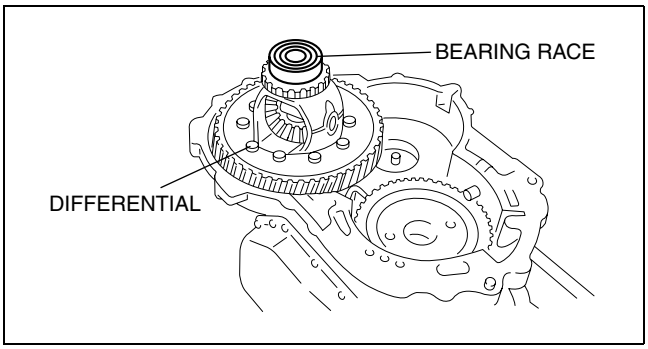
B3E0517A186

2. Install the bearing race into the transaxle case.



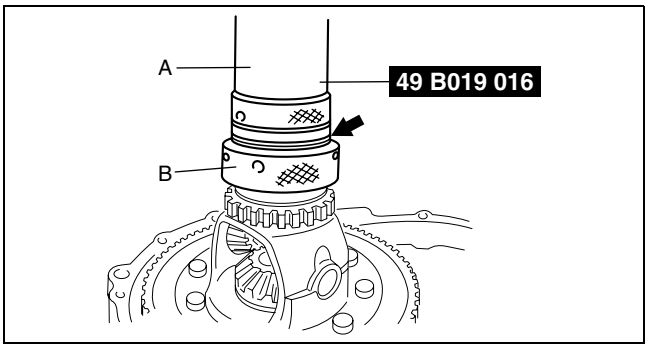
B3E0517A187

3. Set the differential on the transaxle case.



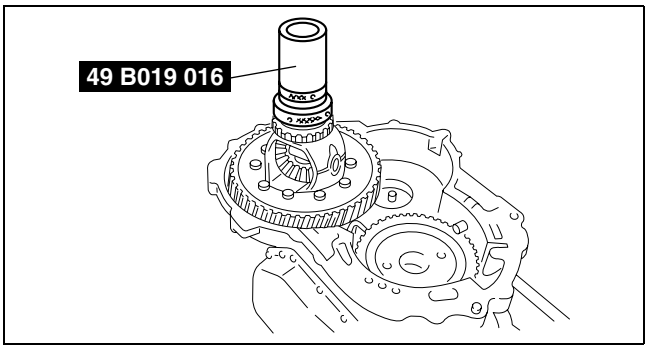
B3E0517A188

4. Turn the selector to eliminate the gap between its two halves.
5. Install the bearing race removed in Step 1 into the **SST**.



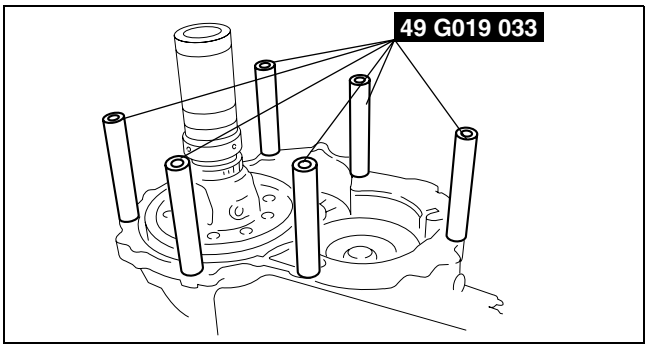
B3E0517A189

6. Set the differential on the **SST** (selector).



B3E0517A190

7. Set the six **SSTs** (collars) on the transaxle case in the position shown.

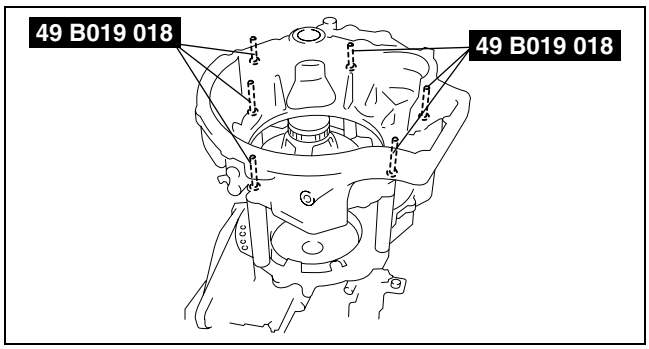


B3E0517A191

8. Set the converter housing on the transaxle case and tighten the **SSTs** (bolts) to the specified torque.

   Tightening torque
   19—25 N·m {1.9—2.6 kgf·m, 14—18 ft·lbf}

9. Turn the **SST** (selector) to increase the clearance (arrow) using the **SSTs** (bars), until it no longer turns. This is to seat the bearing race.



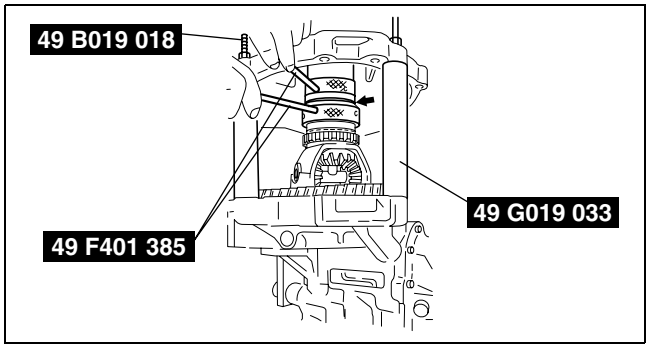
B3E0517A192

10. Turn the selector in the opposite direction until the preload is eliminated (gap is reduced).
11. Insert the **SST** through the converter housing and attach it to the pinion shaft.
12. Install the **SST** and a pull scale or torque wrench.

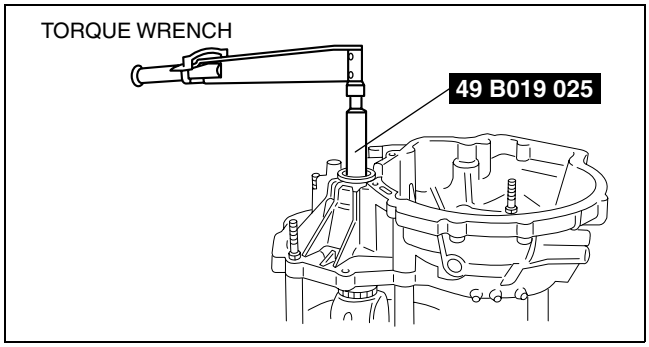
    Note
    - Read the preload when the differential starts to turn.
    - Measure several times and calculate the average value.

13. Adjust the clearance of the **SST** (selector) to obtain the specified preload/pull scale reading.

    Preload:
    1.4—2.3 N·m {14—24 kgf·cm, 12—20 in·lbf}
    Reading on pull scale:
    14—23 N {1.4—2.4 kgf, 3.1—5.3 lbf}



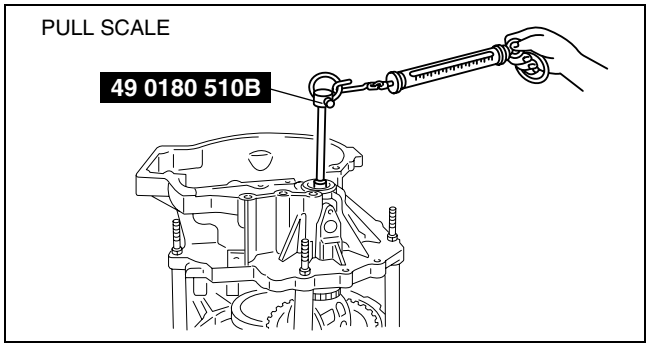
B3E0517A193



B3E0517A194

Note
- Measure the clearance around the entire circumference, and select a shim based on the maximum clearance.
- The maximum allowable number of adjustment shim is one.

14. Measure the clearance as shown.



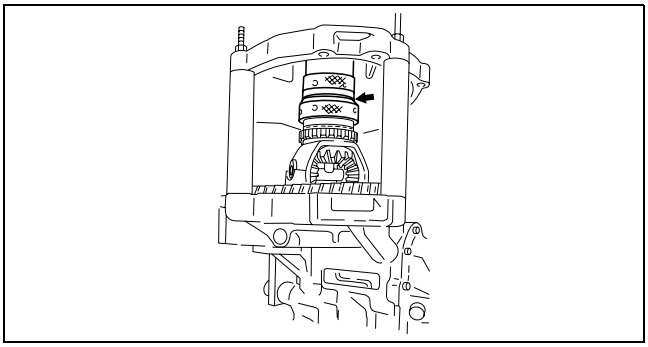
B3E0517A195

15. Take the maximum reading and determine the shim to be used.

Adjustment shim sizes

mm {in}

0.50 {0.020}	0.55 {0.022}	0.60 {0.024}
0.65 {0.026}	0.70 {0.028}	0.75 {0.030}
0.80 {0.031}	0.85 {0.033}	0.90 {0.035}
0.95 {0.037}	1.00 {0.039}	1.05 {0.041}
1.10 {0.043}	1.15 {0.045}	1.20 {0.047}
1.25 {0.049}	1.30 {0.051}	1.35 {0.053}
1.40 {0.055}	1.45 {0.057}	1.50 {0.059}
1.55 {0.061}	–	–



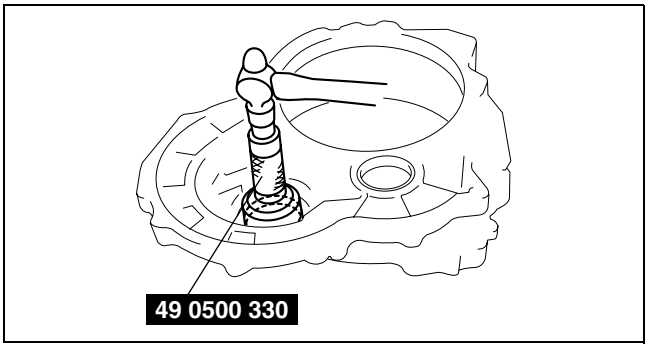
B3E0517A196

16. Remove the converter housing and **SST** (selector).
17. Install the required adjustment shim and tap the bearing race into the converter housing.
18. Install the converter housing.

Tightening torque
19—25 N·m {1.9—2.6 kgf·m, 14—18 ft·lbf}

19. Install the **SST** to the pinion shaft through the converter housing.

Note
- Measure several times and calculate the average value.



B3E0517A197

20. Verify that the preload is within the specification. If not, return to Step 1.

Preload
1.4—2.3 N·m {14—24 kgf·cm, 12—20 in·lbf}
Reading on pull scale
14—23 N {1.4—2.4 kgf, 3.1—5.3 lbf}

21. Remove the converter housing.

AUTOMATIC TRANSAXLE ASSEMBLY

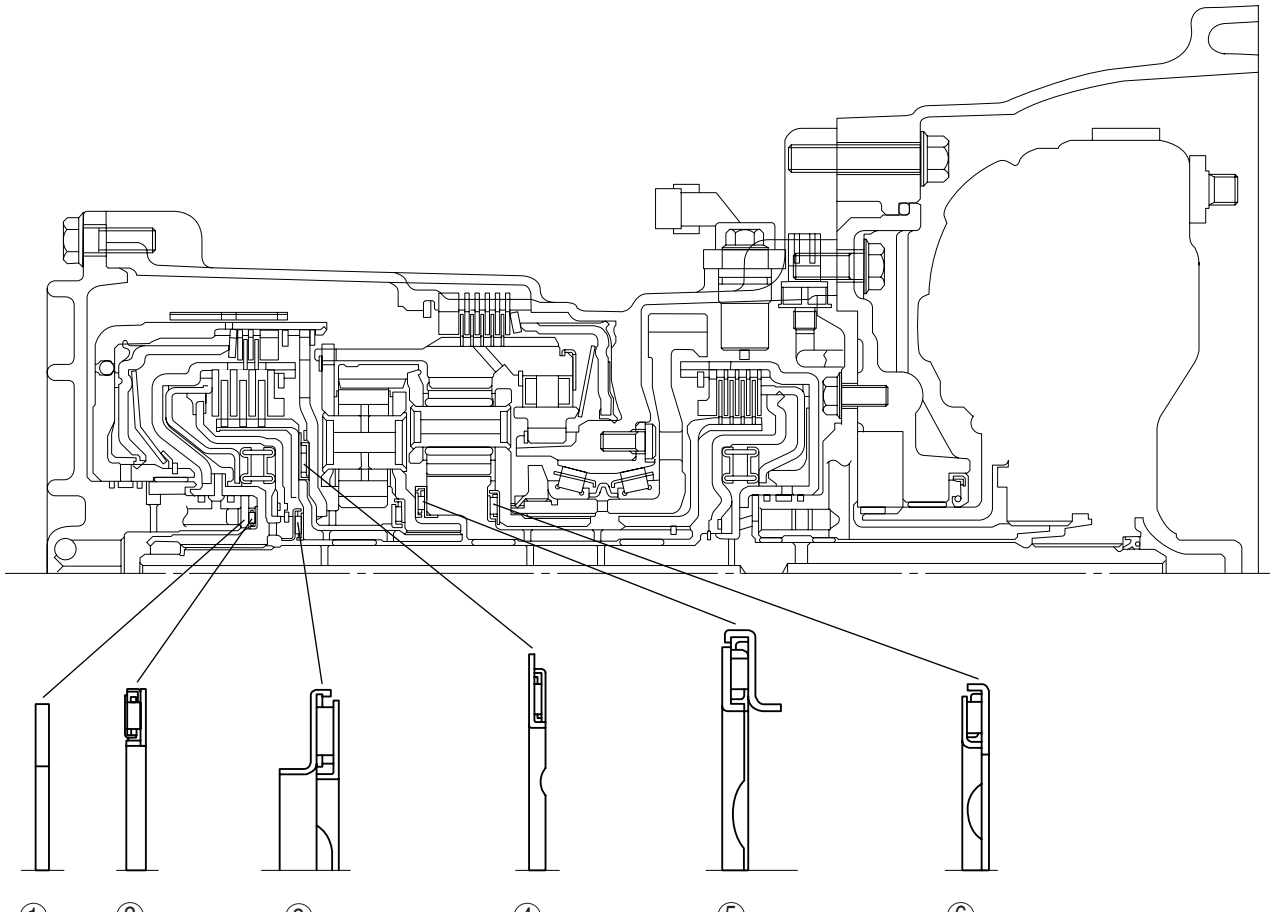
B3E051701030A29

Precaution
General notes

1. Select the adjustment shims, referring to **Bearing Preload**.
2. If the drive plates or 2-4 brake band are replaced with new ones, soak the new part in ATF for at least two hours before installation.
3. Before assembly, apply ATF to all seal rings, rotating parts, O-rings, and sliding parts.
4. All O-rings, seals, and gaskets must be replaced with the new ones included in the overhaul kit.
5. Use petroleum jelly, not grease, when assembling again.
6. When it is necessary to replace a bushing, replace the subassembly that includes that bushing.
7. Assemble the housing within 10 minutes after applying sealant, and allow it to cure for at least 30 minutes after assembly before filling the transaxle with ATF.

Warning
- **Although the stand has a self-locking brake system, there is a possibility that the brake may not hold when the transaxle is held in a lopsided position on the stand. This would cause the transaxle to turn suddenly, causing serious injury. Never keep the transaxle tilted to one side. Always hold the rotating handle firmly when turning the transaxle.**

Assembly
Bearing and race locations



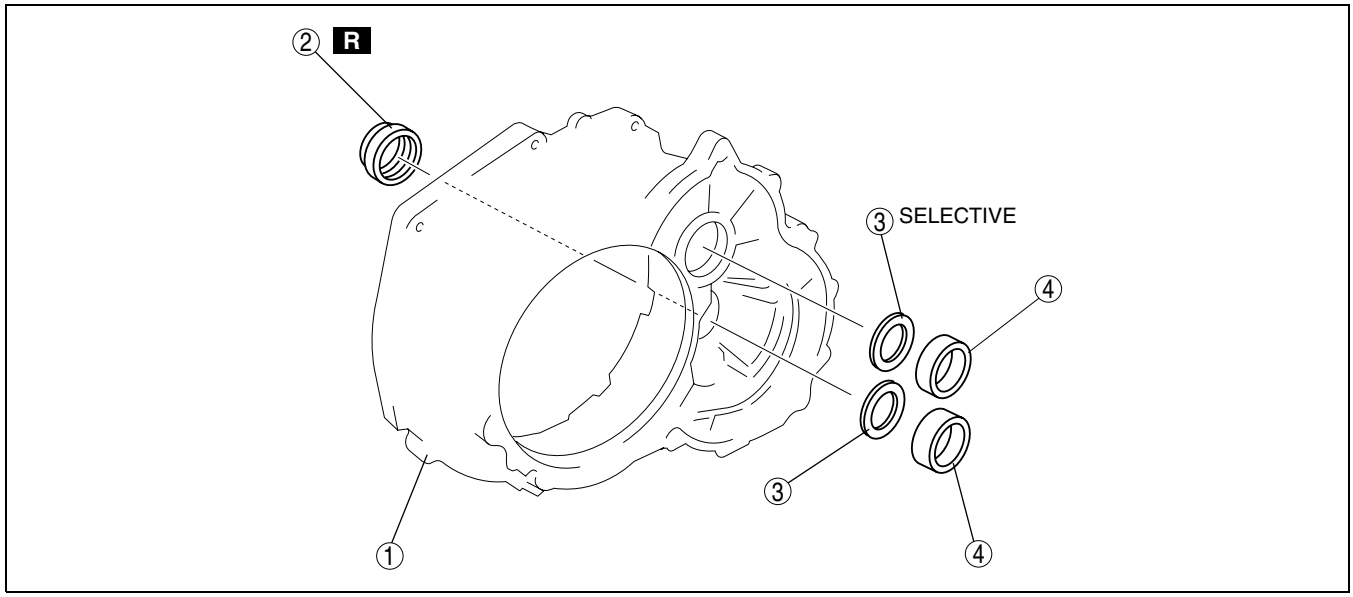
B3E0517A279

Note
- The bearing and race at locations 2, 3, 4, 5, and 6 are one-piece units.

Outer diameter of bearing and race

	1	2	3	4	5	6
Bearing (mm {in})	—	40.0 {1.57}	39.0 {1.54}	78.2 {3.08}	52.0 {2.05}	50.0 {1.97}
Race (mm {in})	40.2 {1.58}	—	—	—	—	—

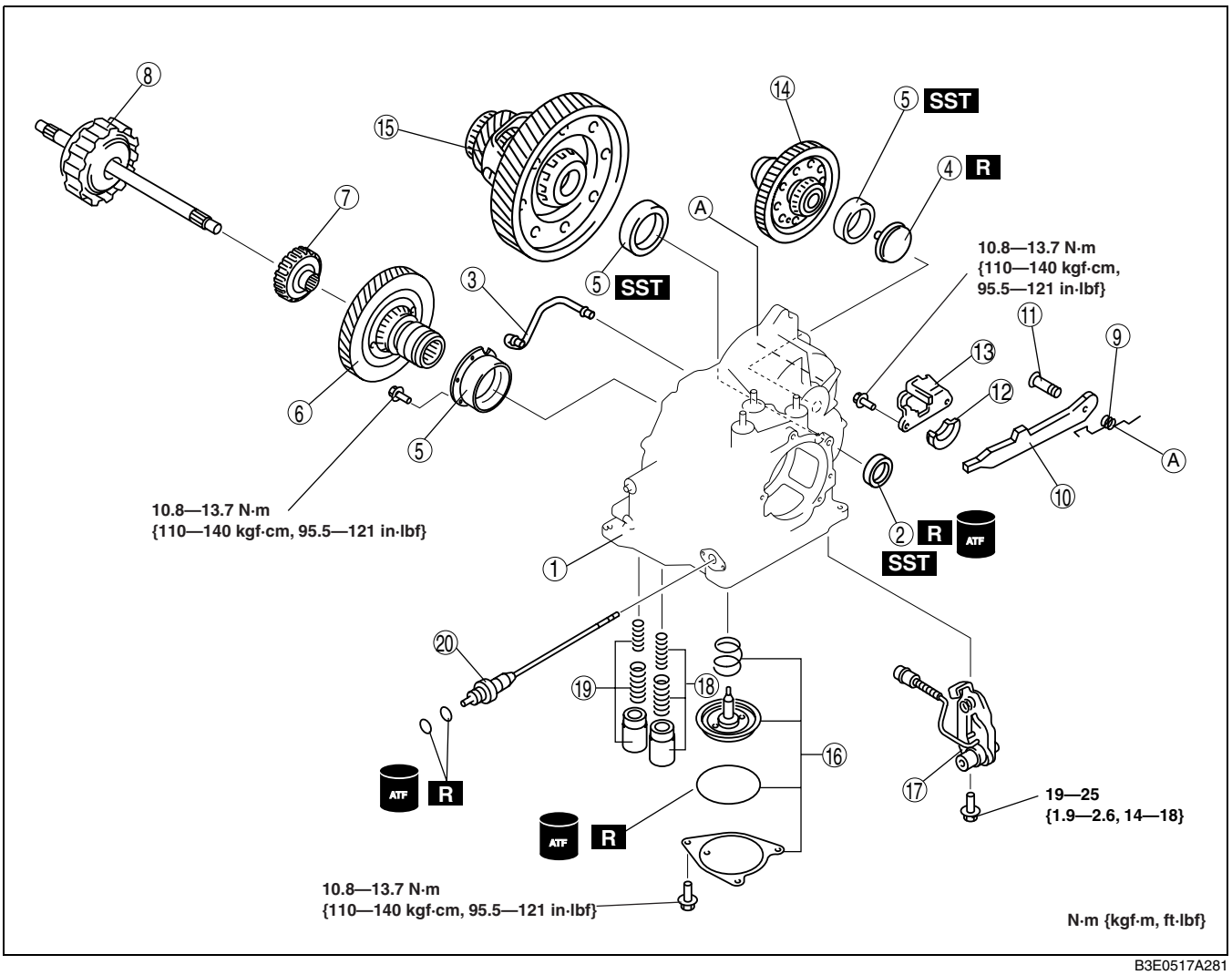
Components



B3E0517A280

1	Converter housing
2	Oil seal

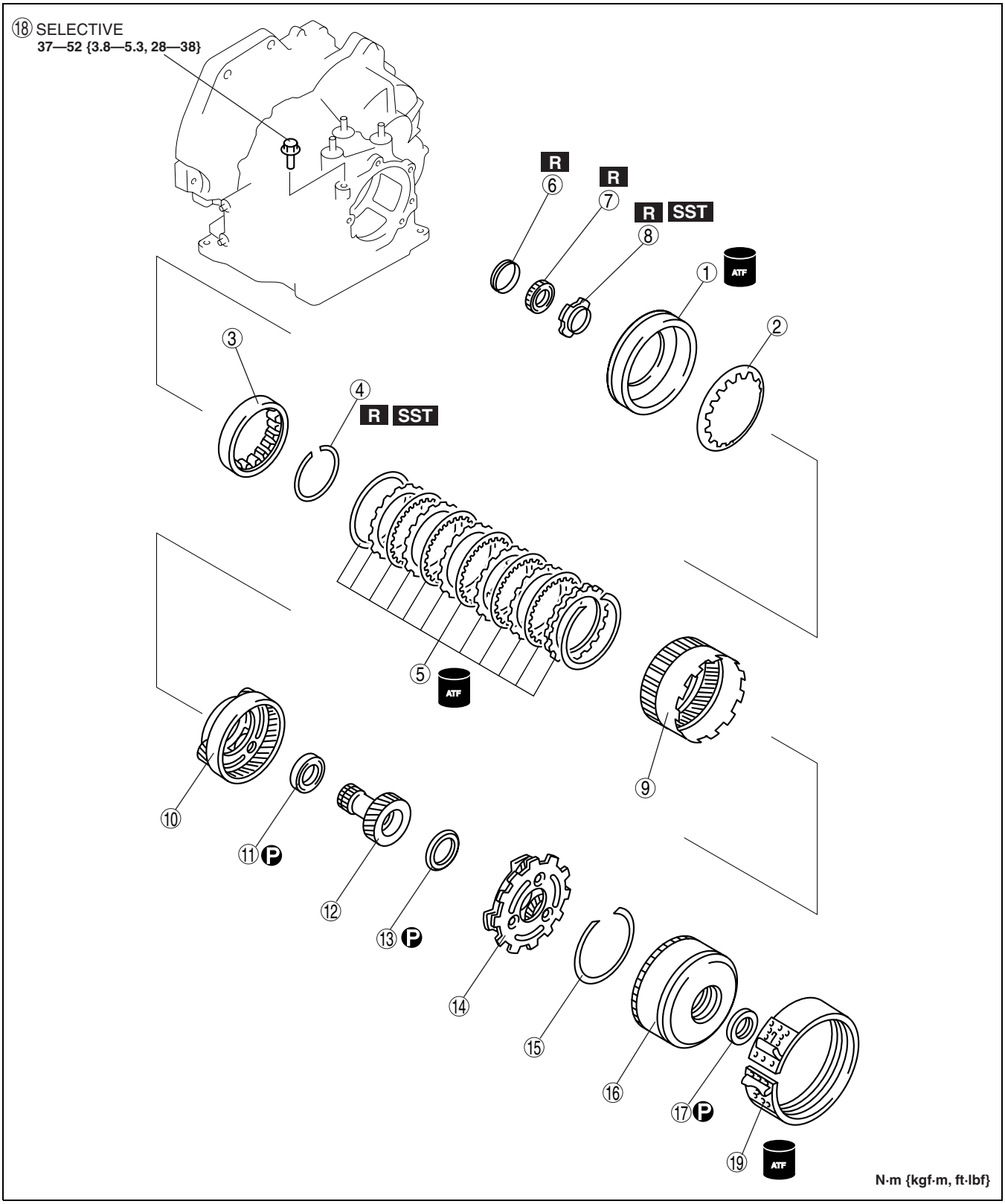
3	Adjustment shim
4	Bearing race



B3E0517A281

1	Transaxle case
2	Oil seal
3	Oil pipe
4	Funnel
5	Bearing race
6	Primary gear
7	Forward clutch hub
8	Forward clutch
9	Pawl return spring
10	Parking pawl

11	Parking pawl shaft
12	Support actuator
13	Actuator plate
14	Secondary gear and output gear
15	Differential
16	Band servo
17	Parking rod lever component
18	Forward accumulator
19	Servo apply accumulator
20	Manual shaft

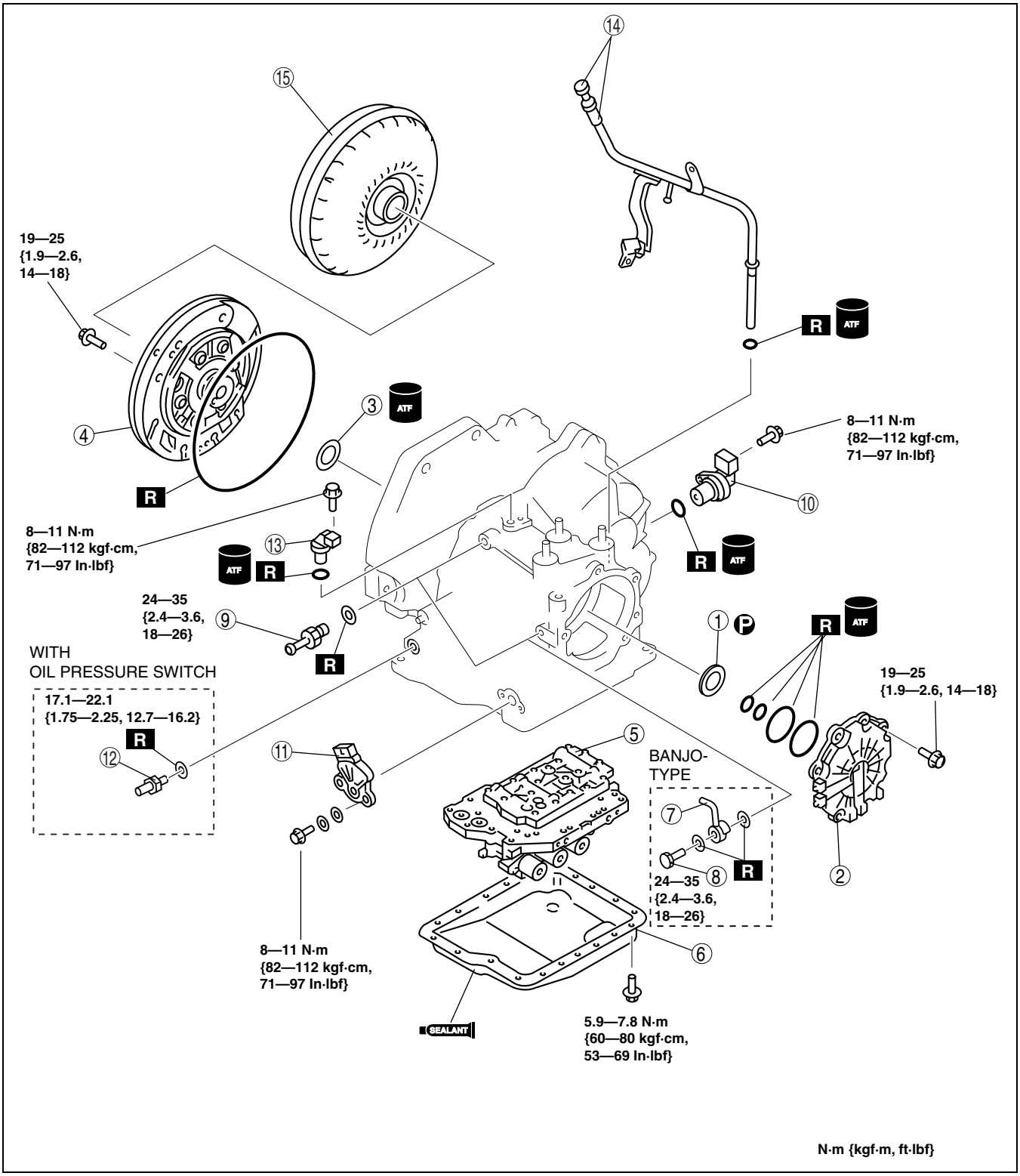


CDA517ZAA101

1	Low and reverse brake piston
2	Low and reverse brake return spring
3	One-way clutch inner race
4	Snap ring
5	Low and reverse brake
6	Distance piece
7	Bearing

8	Locknut
9	Front internal gear and one-way clutch
10	Front planetary gear component
11	Needle bearing
12	Front sun gear
13	Needle bearing
14	Rear planetary gear component

15	Snap ring
16	Clutch component
17	Needle bearing
18	Band strut
19	2–4 brake band



CDA517ZAA004

1	Needle bearing
2	End cover
3	Thrust washer

4	Oil pump
5	Control valve body
6	Oil pan

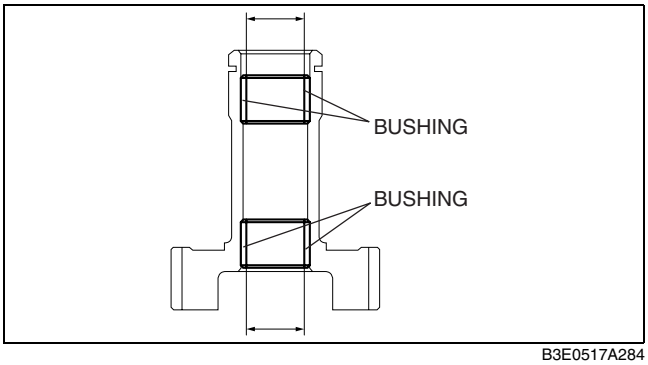
7	Oil pipe
8	Connector bolt
9	Connector pipe
10	Vehicle speed sensor
11	Transaxle range switch
12	Oil pressure switch
13	Input/turbine speed sensor
14	Oil dipstick and oil filler tube
15	Torque converter

Assembly procedure

1. Measure the bushing of the front sun gear.

   Bushing inner diameter
   Standard: 18.000—18.018 mm {0.70866—0.70936 in}
   Maximum: 18.038 mm {0.71016 in}

2. If not as specified, replace the front sun gear.

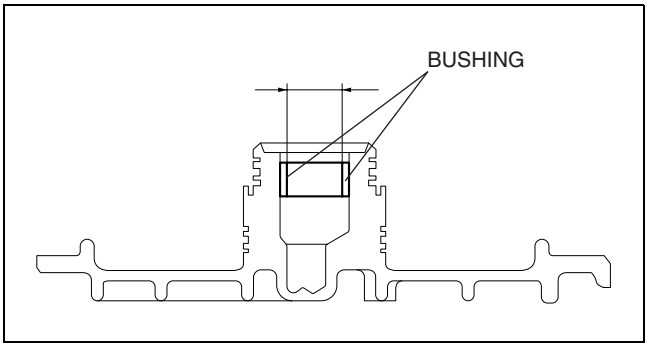


B3E0517A284

3. Measure the bushing of the end cover.

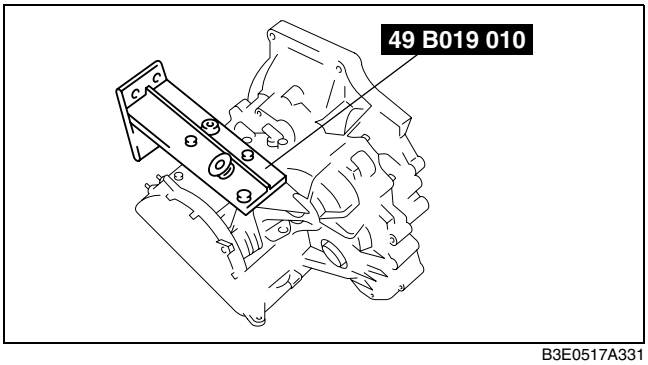
   Bushing inner diameter
   Standard: 23.600—23.621 mm {0.92913—0.92995 in}
   Maximum: 23.641 mm {0.93075 in}

4. If not as specified, replace the end cover.



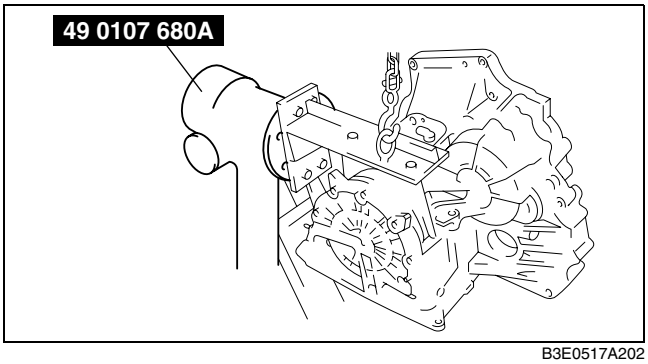
B3E0517A332

5. Assemble the **SST**.



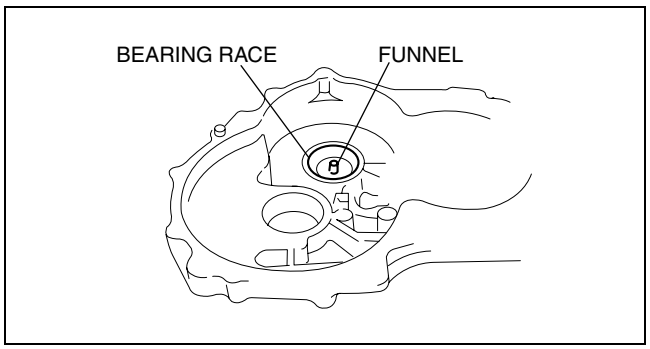
B3E0517A331

6. Lift the transaxle case and mount it on the **SST**.
7. Install the oil pipe.



B3E0517A202

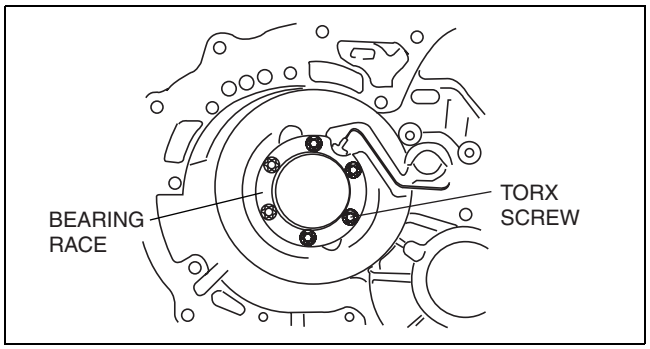
8. Install a new funnel and bearing race.



B3E0517A175

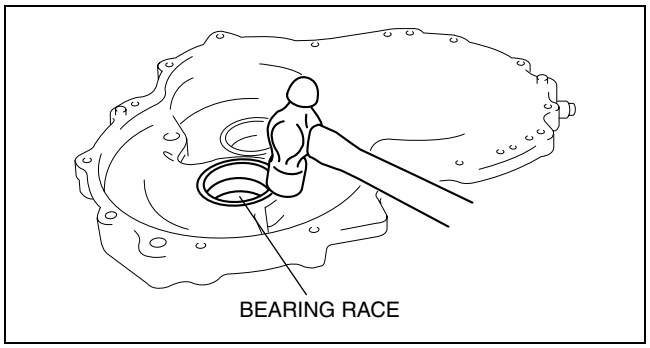
9. Install the bearing race, then tighten torx screws.

Tightening torque
10.8—13.7 N·m
{110—140 kgf·cm, 95.5—121 in·lbf}



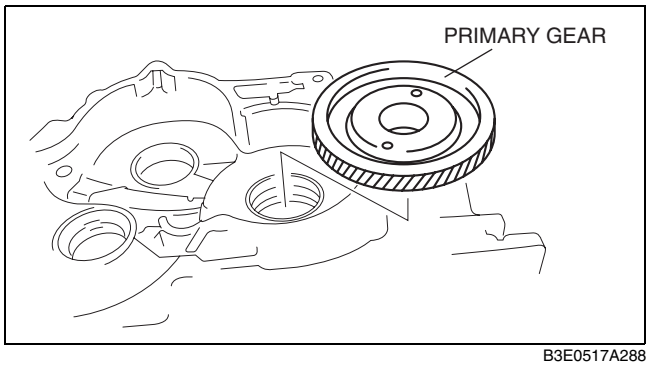
B3E0517A334

10. Install the bearing race to the transaxle case.
11. Install the locknut.



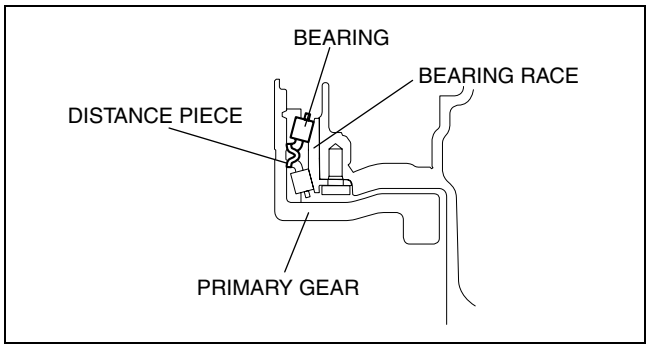
B3E0517A287

(1) Set the primary gear.



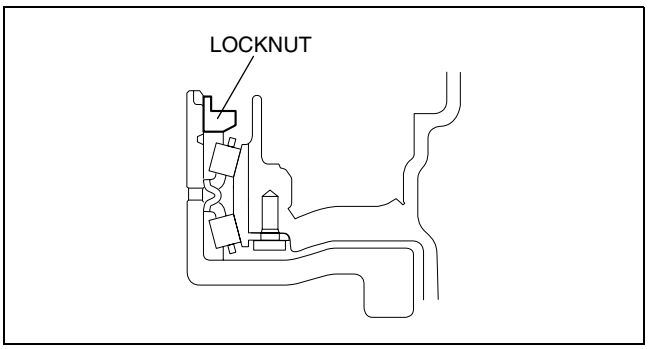
B3E0517A288

(2) Set the distance piece and bearing.



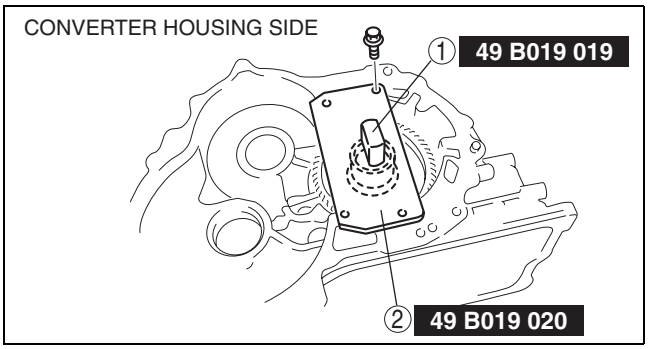
B3E0517A289

(3) Loosely tighten the locknut.

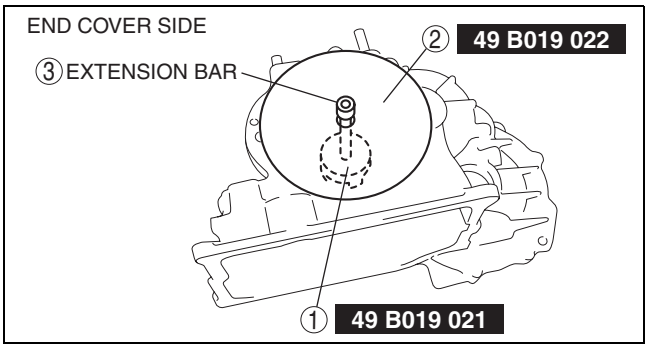


B3E0517A290

(4) Set the **SSTs** in the order shown.



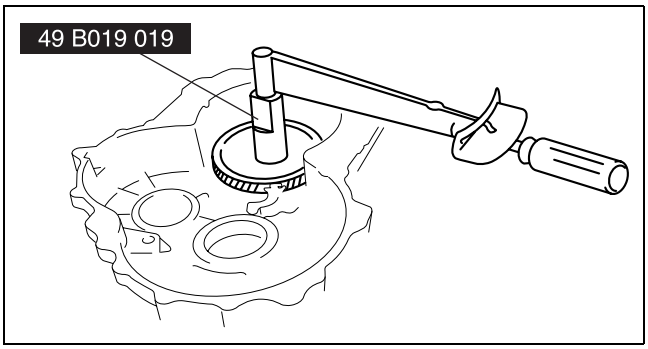
B3E0517A231



B3E0517A232

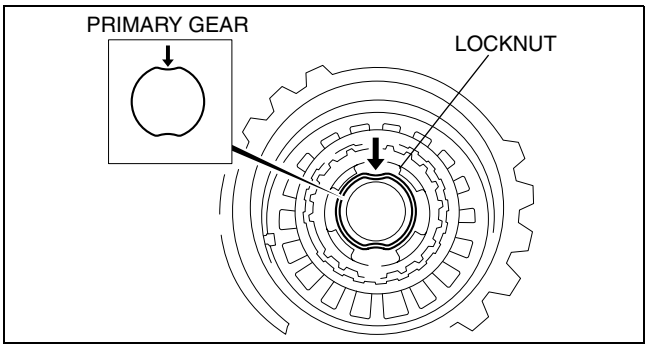
(5) Tighten the locknut from the end cover side to adjust the preload within the specification.

Preload
0.50—0.90 N·m
{5.10—9.17 kgf·cm, 4.42—7.96 in·lbf}



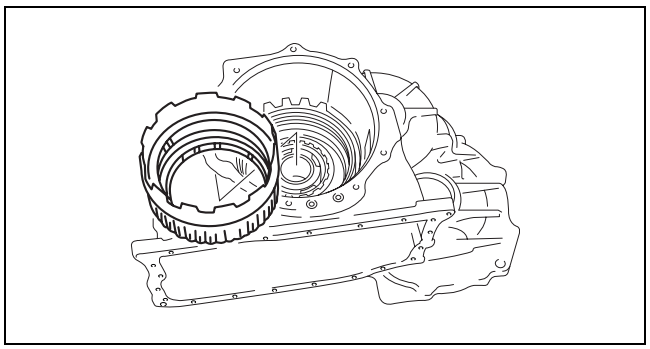
B3E0517A291

(6) Stake the locknut.
(7) Remove the **SST**



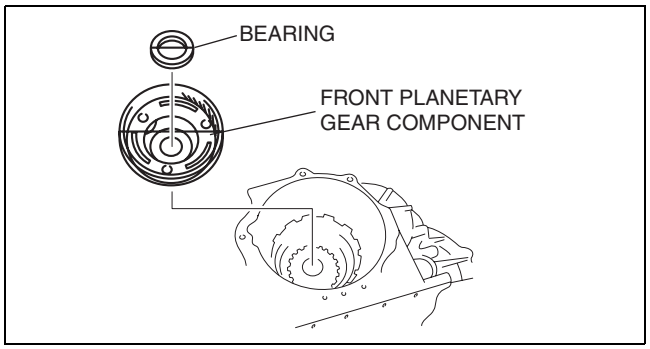
B3E0517A292

12. Install the front internal gear and one-way clutch.
13. Apply petroleum jelly to the bearing, and secure it to the front planetary gear component.



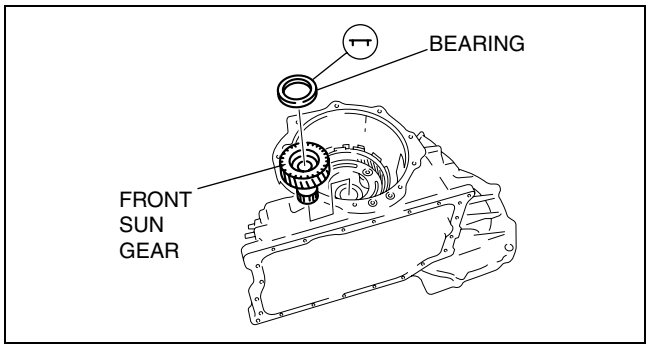
B3E0517A229

14. Install the front planetary gear component.
15. Apply petroleum jelly to the bearing, and secure it to the front sun gear.



B3E0517A228

16. Install the front sun gear.

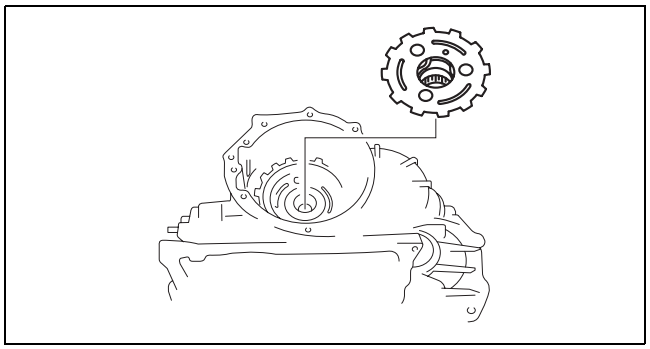


B3E0517A293

17. Install the rear planetary gear.

Note

- Rotate the engine stand so that the oil pan faces downward. Pull the front internal gear and one-way clutch component a little until the groove for the snap ring appears, then install the snap ring.



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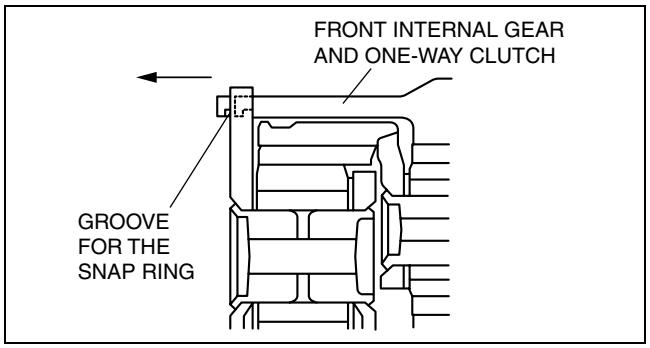
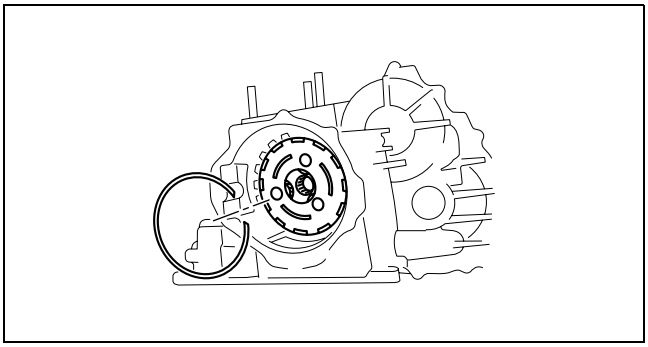


B3E0517A294

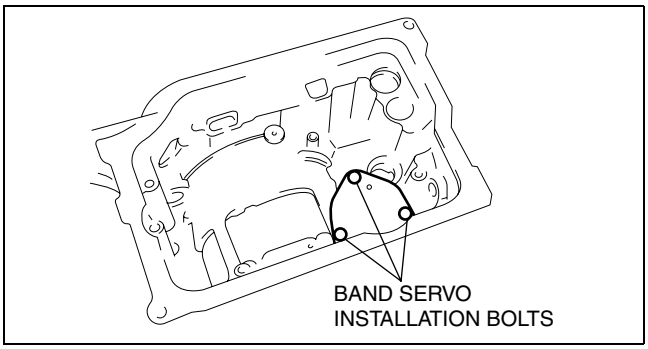
18. Install the snap ring.
19. Rotate the engine stand so that the end cover faces upward, and verify that the snap ring is installed accurately.
20. Install the band servo component.
    (1) Install the servo return spring and servo piston.
    (2) Apply ATF to the O-ring, and install it to the transaxle case.



B3E0517A295

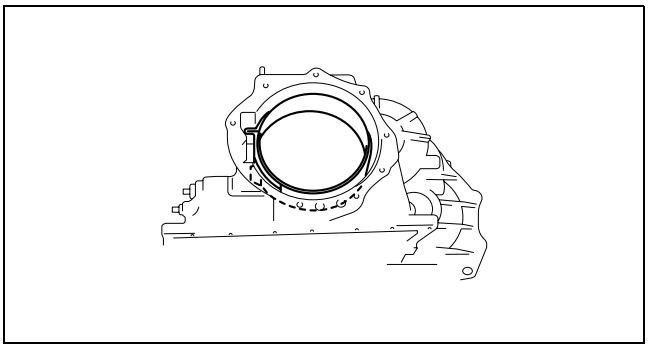
    (3) Install the servo retainer.

    Tightening torque
    10.8—13.7 N·m
    {110—140 kgf·cm, 95.5—121 in·lbf}



B3E0517A125

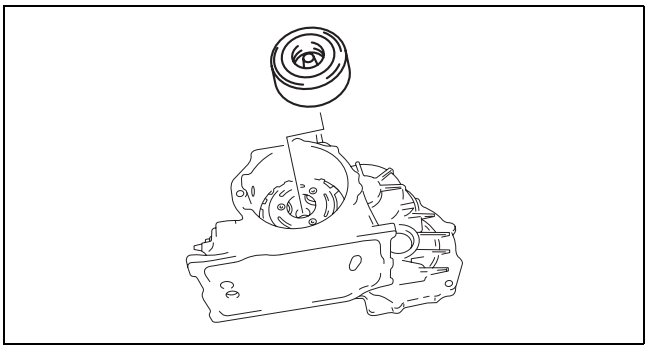
21. Install the 2-4 brake band.
22. Apply petroleum jelly to the bearing, and secure it to the clutch component.



B3E0517A296

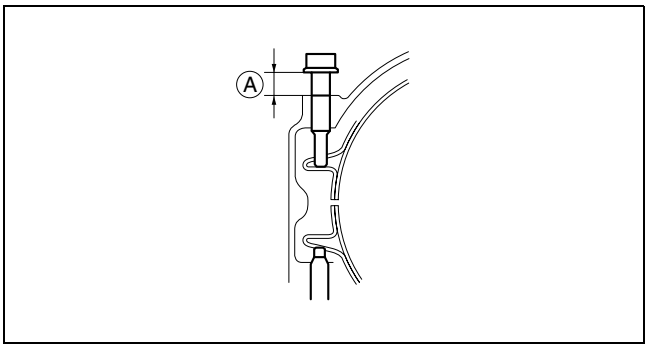
23. Install the clutch component.
24. Select the band strut.
    (1) Find an appropriate bolt (under head length: **60—70 mm {2.36—2.75 in}**), and tighten the 2-4 brake band with the bolt.

    Tightening torque
    4.9 N·m {50 kgf·cm, 43 in·lbf}



B3E0517A224

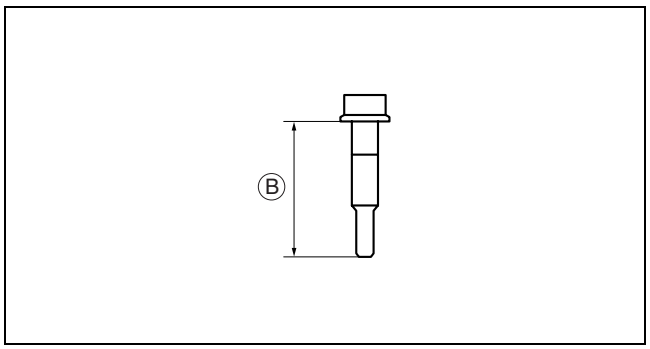
    (2) Measure the dimension A shown in the figure.
    (3) Remove the bolt.



B3E0517A297

(4) Measure the dimension B shown in the figure.
(5) Calculate according to the formula below.

B – A = C (The middle of the under head length)
C – 4 = D (The lower limit of under head length)
C – 4.7 = E (The upper limit of under head length)



B3E0517A298

(6) Select a band strut whose length should be between D and E.

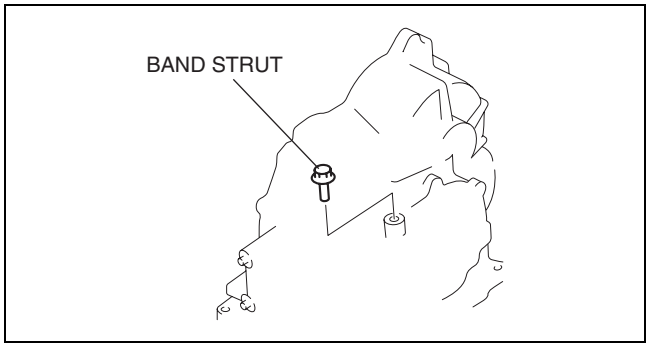
Band strut length

mm {in}

36.0 {1.417}	36.5 {1.437}	37.0 {1.457}
37.5 {1.476}	38.0 {1.496}	38.5 {1.516}
39.0 {1.535}	–	–

(7) Install the selected band strut.

Tightening torque
37—52 N·m {3.8—5.3 kgf·m, 28—38 ft·lbf}

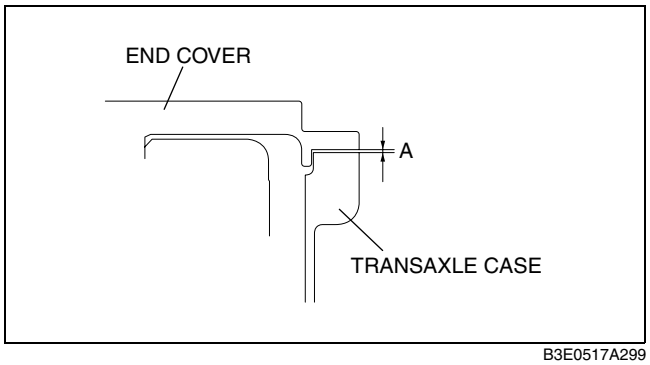


B3E0517A222

25. Use the following procedure to adjust the total end play.
(1) Install the thickest bearing race (**2.6 mm {0.102 in}**) to the end cover.
(2) Install the end cover to the clutch component.

(3) Measure the clearance A between transaxle case and end cover.
(4) Calculate according to the formulas below. Select an appropriate bearing race whose bearing thickness matches the calculated limits.

A – 2.6 mm {0.102} (Bearing thickness) = B
B – 0.25 = C (The lower limit of bearing thickness)
B – 0.50 = D (The upper limit of bearing thickness)



B3E0517A299

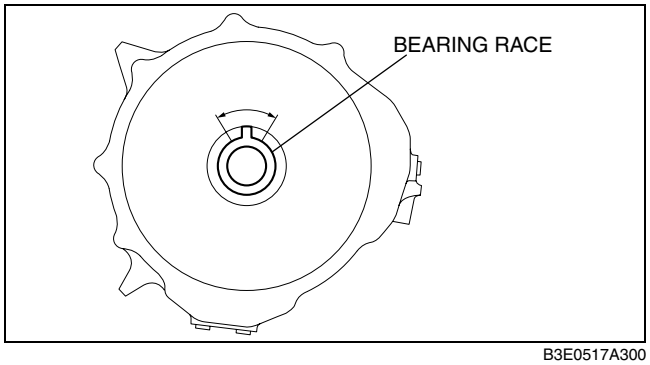
(5) Select a bearing race whose thickness is between D mm {in} and C mm {in}.

Bearing race sizes

mm {in}

1.8 {0.071}	2.0 {0.079}	2.2 {0.087}
2.4 {0.094}	2.6 {0.102}	–

Caution
- **The bearing race and end cover may be damaged if the end cover is not installed correctly to the transaxle case. Align the projection of the bearing race within the area of the arrows shown in the figure, and then install the end cover to the transaxle case.**

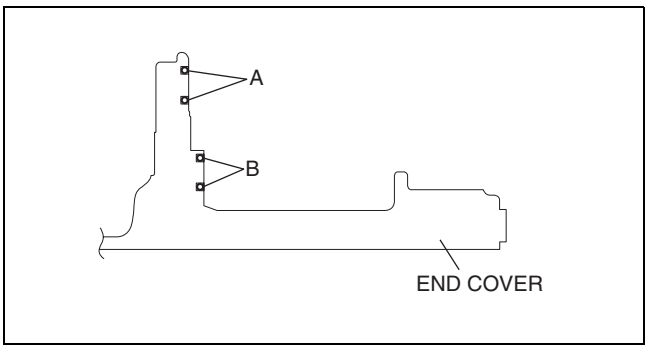


B3E0517A300

(6) Remove the end cover, apply petroleum jelly to the selected bearing race, then install it to the end cover.

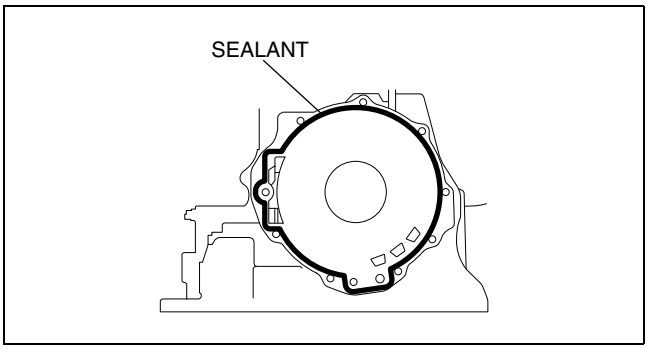
26. Apply ATF to new seal ring, and install it to the end cover.

    Seal ring inner diameter
    A: 47.1 mm {1.854 in}
    B: 55.8 mm {2.197 in}



B3E0517A301

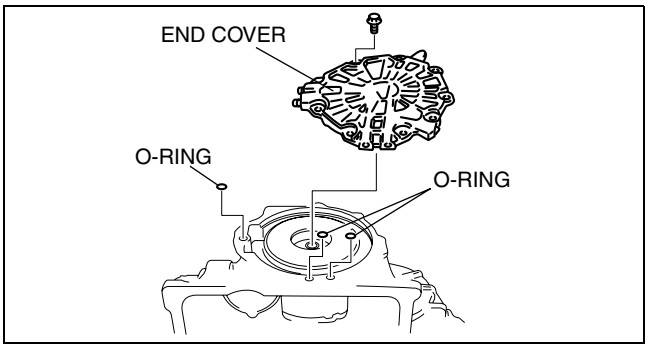
27. Apply a light coat of silicone sealant to the contact surfaces of the transaxle case and the end cover.
28. Apply ATF to the O-ring and install it to the transaxle case.



B3E0517A302

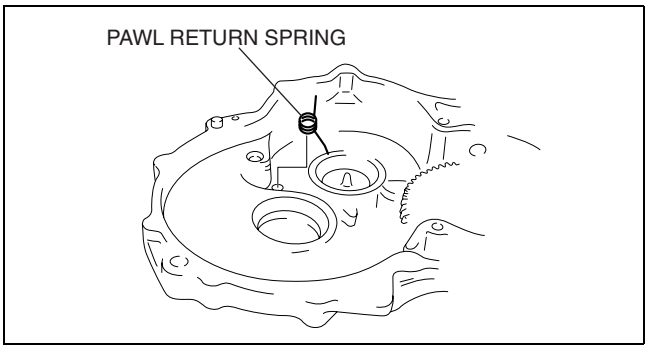
29. Install the end cover to the transaxle case.

    Tightening torque
    19—25 N·m {1.9—2.6 kgf·m, 14—18 ft·lbf}



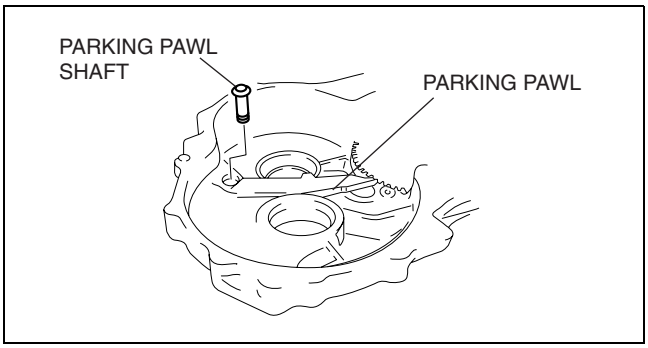
B3E0517A221

30. Install the pawl return spring to the transaxle case.



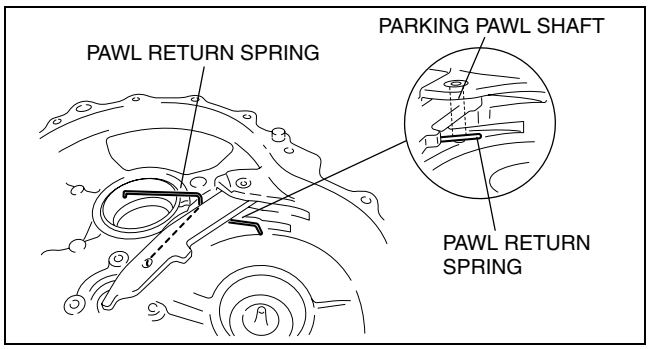
B3E0517A220

31. Install the packing pawl and parking pawl shaft to the transaxle case.



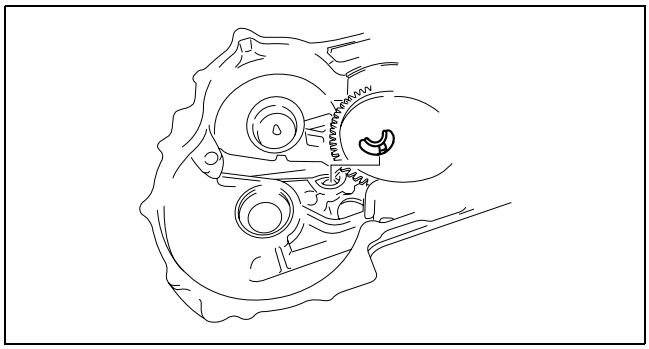
B3E0517A219

32. Install the pawl return spring to the parking pawl and parking pawl shaft.



B3E0517A303

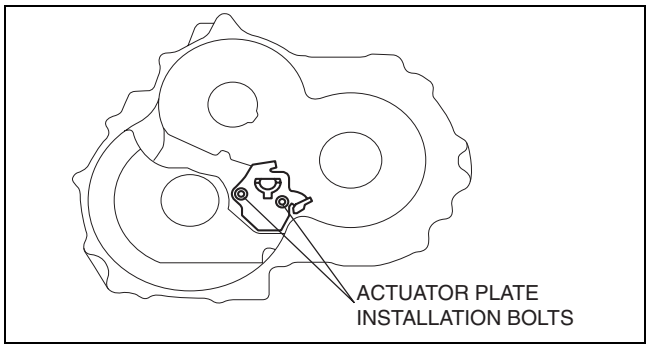
33. Install the support plate to the transaxle case.



B3E0517A218

34. Install the actuator plate to the transaxle case.

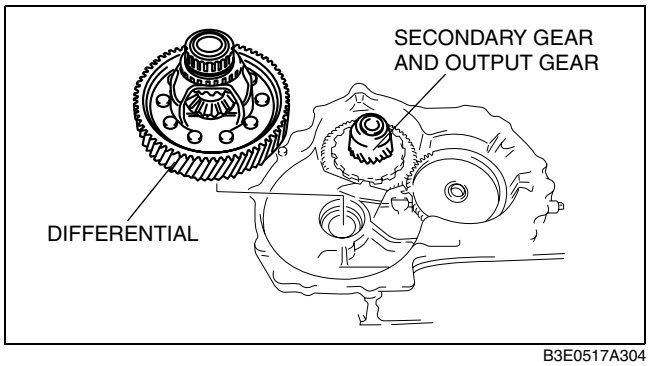
Tightening torque
10.8—13.7 N·m
{110—140 kgf·cm, 95.5—121 in·lbf}



B3E0517A217

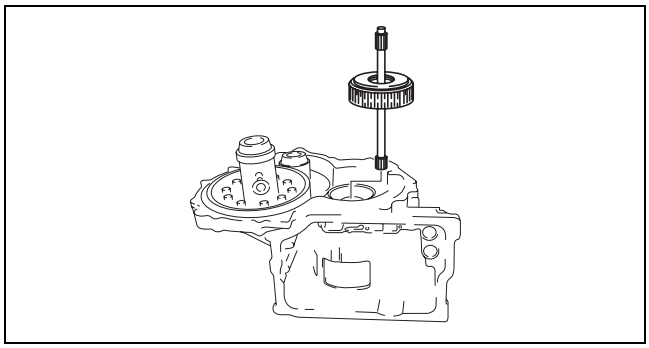
35. Install the secondary gear and output gear.

36. Install the differential.



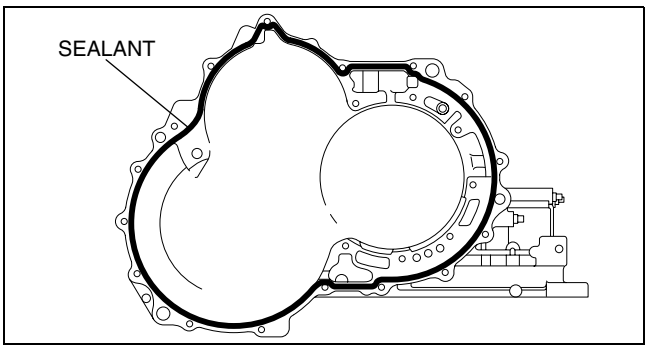
B3E0517A304

37. Install the forward clutch component.



B3E0517A214

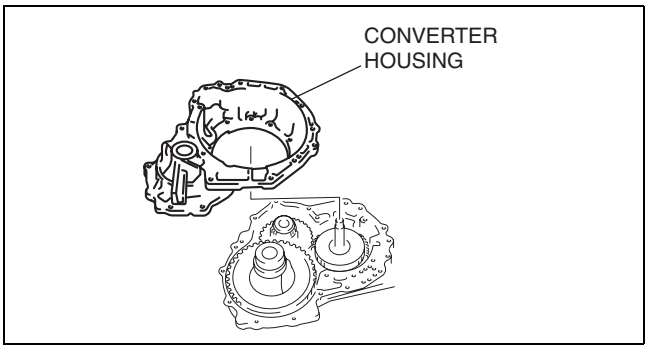
38. Apply a light coat of silicone sealant to the contact surfaces of the converter housing and the transaxle case.



B3E0517A305

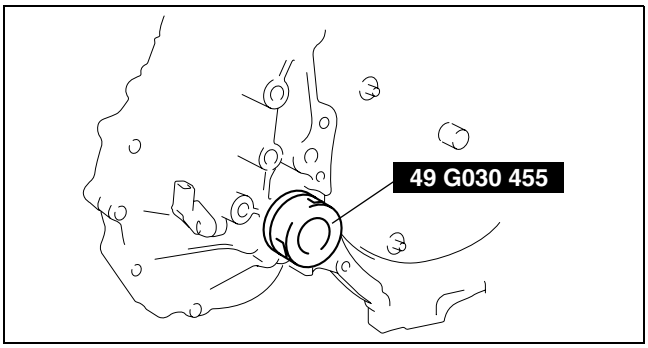
39. Install the converter housing.

Tightening torque
19—25 N·m {1.9—2.6 kgf·m, 14—18 ft·lbf}



B3E0517A306

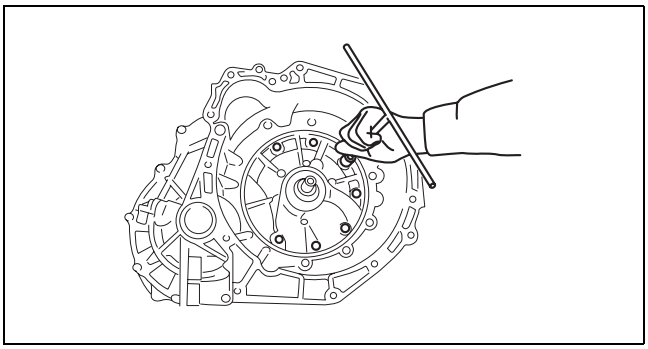
40. Install the **SST** into the differential side gears.
41. Apply ATF to the new O-ring and install it to the oil pump.



B3E0517A307

42. Install the oil pump.

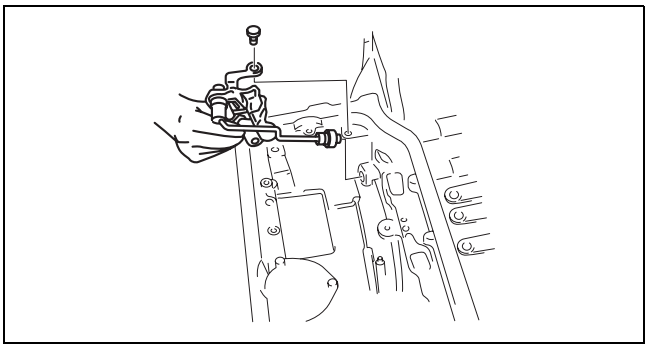
Tightening torque
19—25 N·m {1.9—2.6 kgf·m, 14—18 ft·lbf}


B3E0517A308

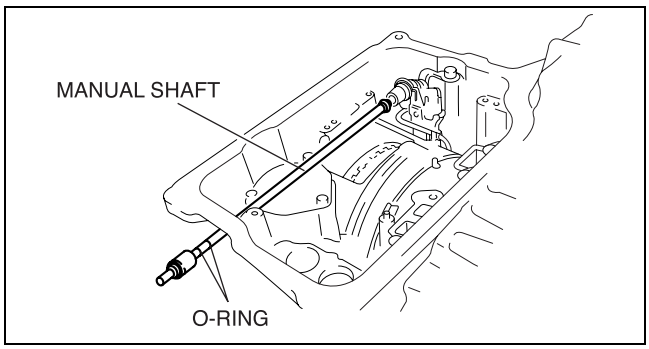
43. Install the parking rod lever component.

Tightening torque
19—25 N·m {1.9—2.6 kgf·m, 14—18 ft·lbf}

44. Apply ATF to the new O-ring and install it to the manual shaft.
45. Install the manual shaft.

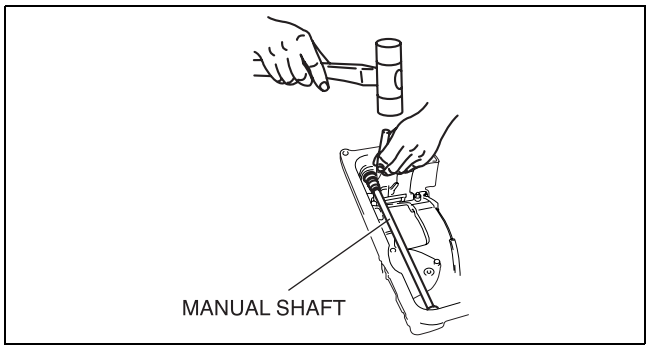

B3E0517A309

(1) Install the manual shaft to the manual plate and detent bracket component.



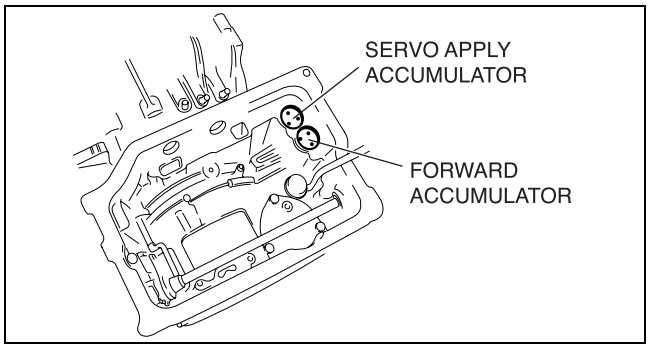
B3E0517A210

(2) Install the knock pin.



B3E0517A209

46. Install the accumulator component.

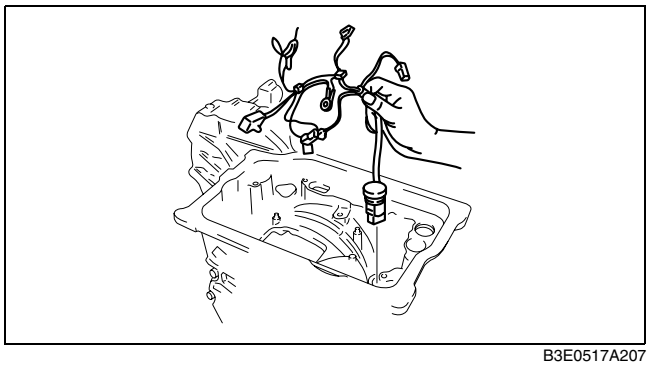


B3E0517A208

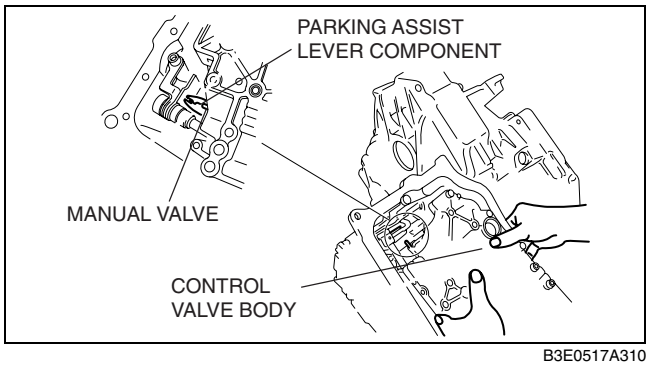
47. Install the coupler component.

Caution

- **Make sure that the head of the manual valve and the parking rod are assembled properly. If they are not, the ranges cannot be changed.**



B3E0517A207

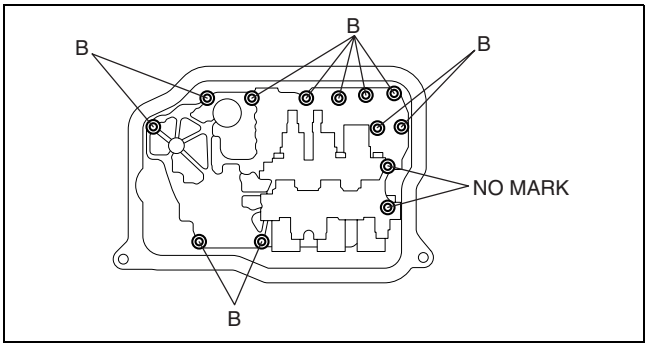


B3E0517A310

48. Install the control valve body.

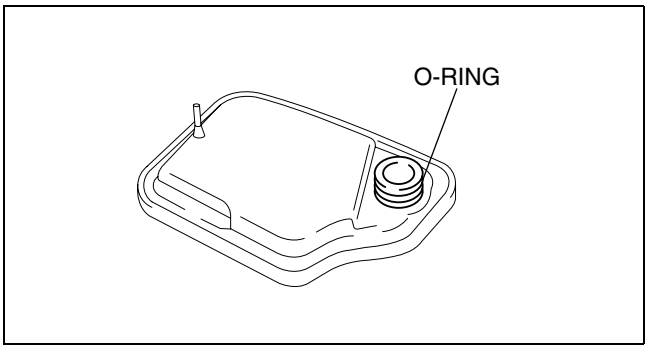
Tightening torque
7.8—10.8 N·m
{80—110 kgf·cm, 69—95.5 in·lbf}

Bolt length (measured from below the head)
B: 40 mm {1.575 in}
No mark: 70 mm {2.756 in}



B3E0517A311

49. Apply ATF to the new O-ring and install it to the oil strainer.



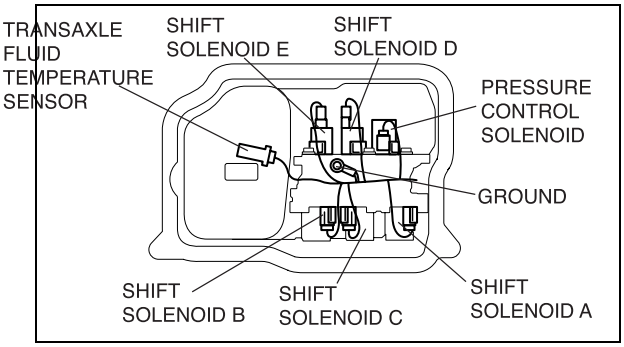
B3E0517A204

50. Install the oil strainer.
51. Match the harness colors, then connect the solenoid connector and transaxle fluid temperature sensor.

Solenoid valve	Color of connector (harness side)
Pressure control solenoid	Black
Shift solenoid A	White
Shift solenoid B	Blue
Shift solenoid C	Green
Shift solenoid D	White
Shift solenoid E	Black

52. Install the ground.

Tightening torque
7.8—10.8 N·m
{80—110 kgf·cm, 69—95.5 in·lbf}



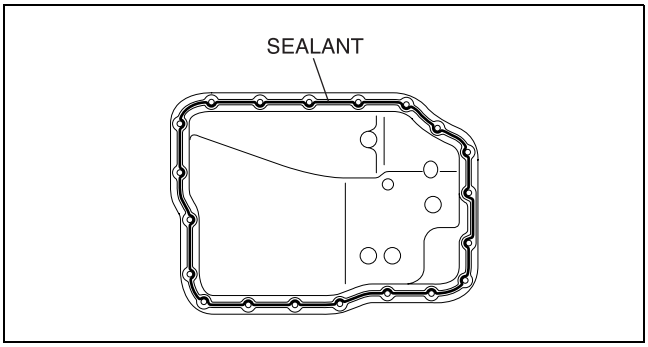
B3E0517A312

Warning
- **Using compressed air can cause dirt and other particles to fly out, causing injury to the eyes. Wear protective eye wear whenever using compressed air.**

Caution
- **Clean the transaxle exterior thoroughly with a steam cleaner or cleaning solvents before removal.**
- **If any old sealant gets into the transaxle during installation of the oil pan, trouble may occur in the transaxle case and oil pan, and clean with cleaning fluids.**

53. Apply a light coat of silicone sealant to the contact surfaces of oil pan and transaxle case.
54. Install the oil pan.

Tightening torque
5.9—7.8 N·m
{60—80 kgf·cm, 53—69 in·lbf}



B3E0517A313

55. Install the oil pipe and connector bolt.

Tightening torque
24—35 N·m
{2.4—3.6 kgf·cm, 18—26 in·lbf}

56. Install the connector pipe.

Tightening torque
24—35 N·m
{2.4—3.6 kgf·cm, 18—26 in·lbf}

57. Apply ATF to the new O-ring and install it to the vehicle speed sensor.
58. Install the vehicle speed sensor.

Tightening torque
8—11 N·m
{82—112 kgf·cm, 71—97 in·lbf}

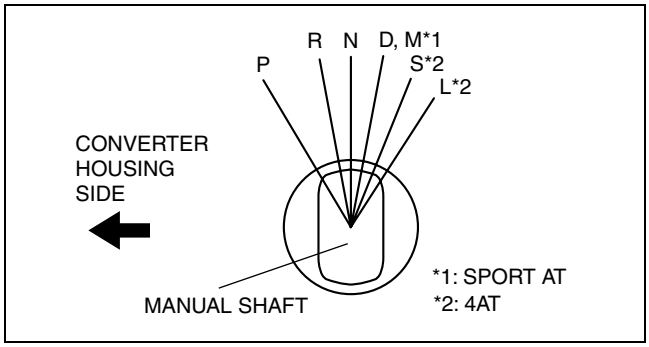
59. Apply ATF to the new O-ring and install it to the input/turbine speed sensor.
60. Install the oil pressure switch.

Tightening torque
17.1—22.1 N·m
{1.75—2.25 kgf·m, 12.7—16.2 ft·lbf}

61. Install the input/turbine speed sensor.

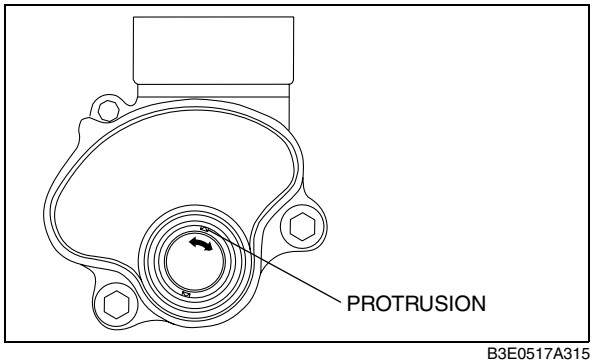
Tightening torque
8—11 N·m
{82—112 kgf·cm, 71—97 in·lbf}

62. Install the transaxle range switch. (6-terminal connector type)
    (1) Rotate the manual shaft to the N position.

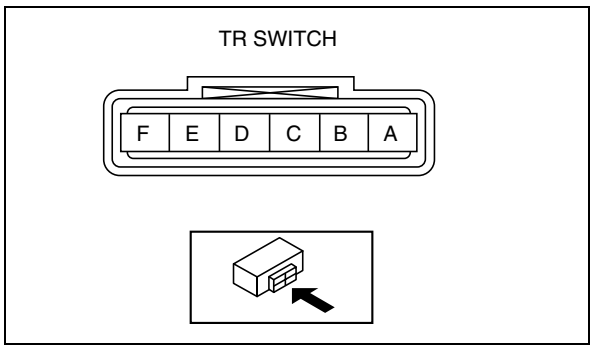


BME0517W305

    (2) Turn the protrusion a resistance between the terminals B and C become **750 ohms**.

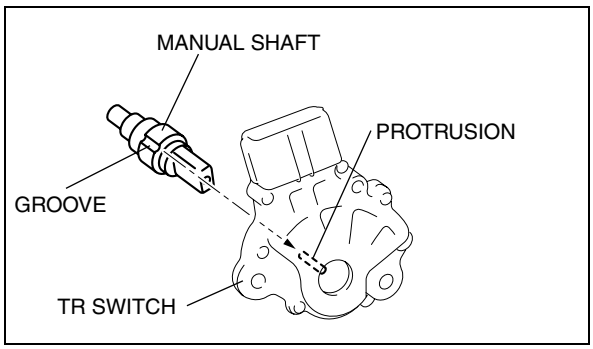


B3E0517A315



B3E0517A316

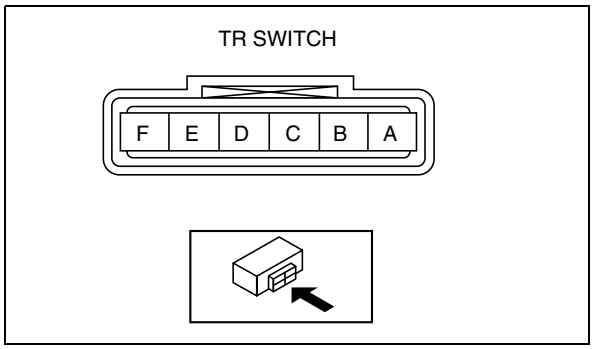
(3) Install the TR switch while aligning the protrusion and groove as shown.
(4) hand- tighten the TR switch mounting bolts.



B3E0517A317

(5) Inspect the resistance between the terminals B and C.
- If not as specified, readjust the TR switch.

Resistance
750 ohms



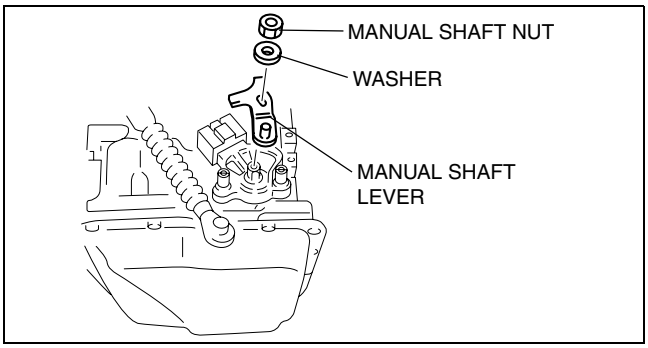
B3E0517A316

(6) Tighten the TR switch mounting bolts

Tightening torque
8—11 N·m
{82—112 kgf·cm, 71—97 in·lbf}

Caution
- **Do not use an impact wrench. Hold the manual shaft lever when removing the manual shaft nut, or the transaxle may be damaged.**

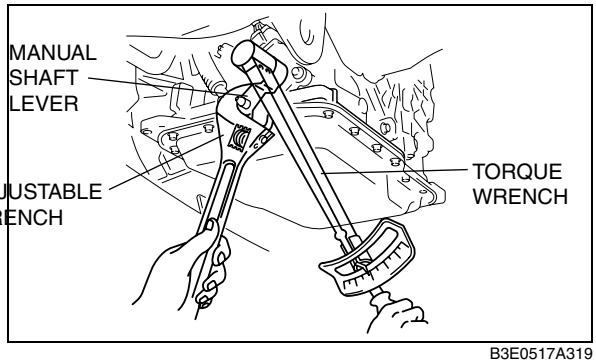
(7) Install the manual shaft lever and the washer.



B3E0517A318

(8) Set the adjustable wrench as shown to hold the manual shaft lever, and tighten the manual shaft nut.

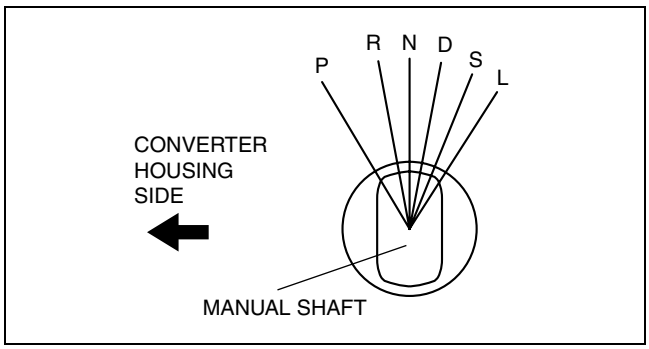
Tightening torque
32—46 N·m
{3.2—4.7 kgf·m, 24—33 ft·lbf}



B3E0517A319

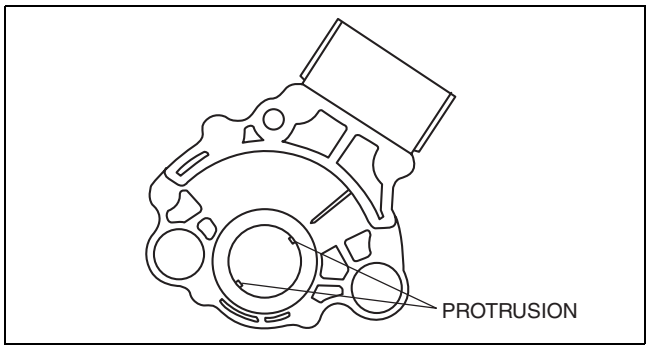
63. Install the transaxle range switch. (9-terminal connector type)

(1) Rotate the manual shaft to the N position.

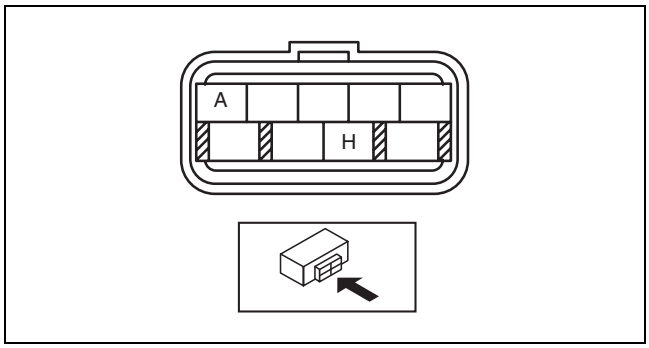


BME0517W306

(2) Align the protrusion to establish the continuity between the terminals A and H.

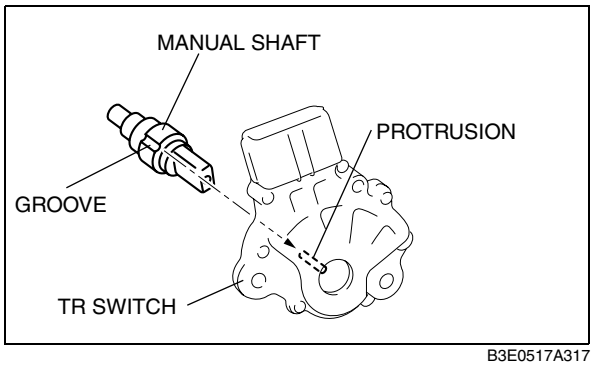


BME0517A301



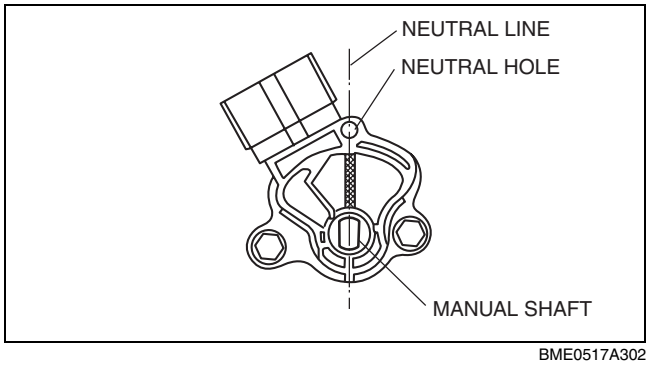
B3J0517A008

(3) Install the TR switch while aligning the protrusion and groove as shown in the figure.



B3E0517A317

(4) Turn the TR switch so that the neutral hole is in line with flat, straight surfaces on either side of the manual shaft.
(5) hand- tighten the TR switch mounting bolts.

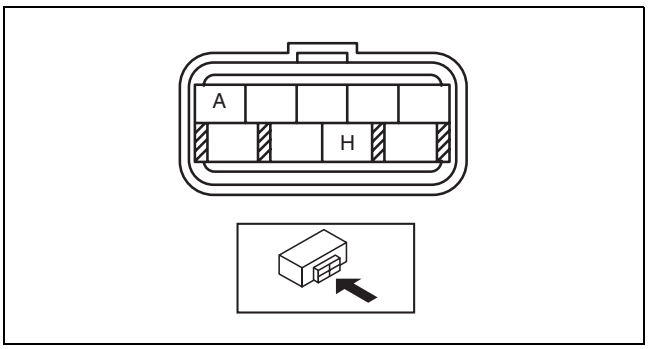


BME0517A302

(6) Verify that the continuity between the terminals A and H.
(7) Tighten the TR switch mounting bolts.

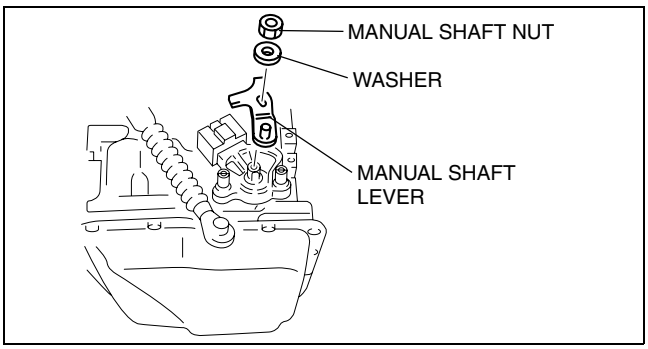
Tightening torque
8—11 N·m
{82—112 kgf·cm, 71—97 in·lbf}

Caution
- **Do not use an impact wrench. Hold the manual shaft lever when removing the manual shaft nut, or the transaxle may be damaged.**



B3J0517A008

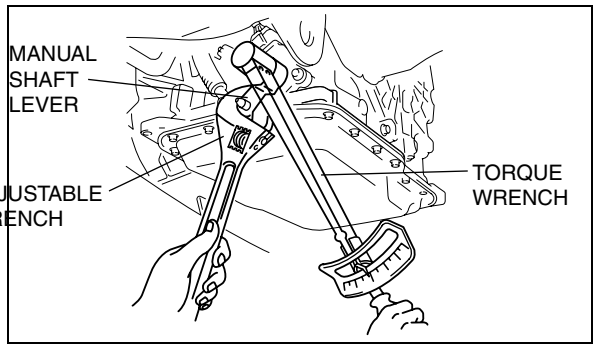
(8) Install the manual shaft lever and the washer.



B3E0517A318

(9) Set the adjustable wrench as shown to hold the manual shaft lever, and tighten the manual shaft nut.

Tightening torque
32—46 N·m
{3.2—4.7 kgf·m, 24—33 ft·lbf}



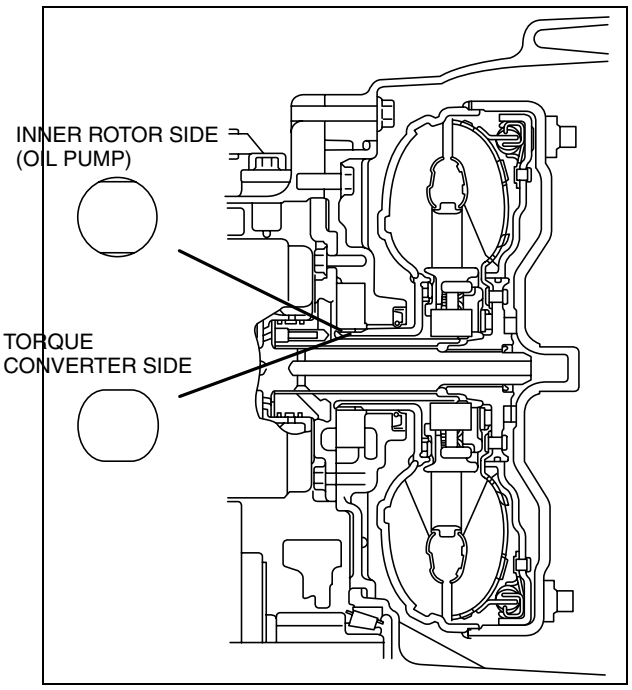
B3E0517A319

64. Remove the transaxle from the **SST**.
65. Apply ATF to the new O-ring and install it to the oil filler tube.
66. Install the oil dipstick and oil filler tube to the transaxle.

Tightening torque
7.8—10.8 N·m
{80—110 kgf·cm, 69—95.5 in·lbf}

67. Drain any ATF remaining in the torque converter.
68. Pour in solvent (**approx. 0.5 L {0.53 US qt, 0.44 Imp qt}**),
69. Shake the torque converter to clean the inside.
70. Pour out the solvent.
71. Pour the ATF.

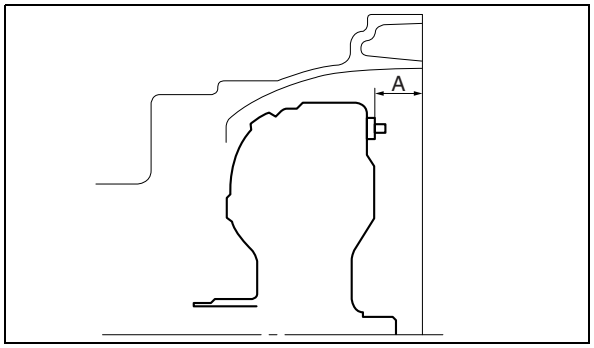
72. Install the torque converter by aligning its gap to the oil pump inner rotor gap as shown in the figure.



B3E0517A320

73. To ensure that the torque converter is installed accurately, measure distance A between the end of the torque converter and the end of the converter housing.

Distance A
Mazda2:
15.4 mm {0.60 in}
Mazda3, Mazda5:
31.4 mm {1.24 in}
Mazda6:
21.4 mm {0.84 in}
MPV:
17.9 mm {0.70 in}



B3E0517A321

05

AUTOMATIC TRANSAXLE INSPECTION

B3E051701030A30

Torque Converter Inspection

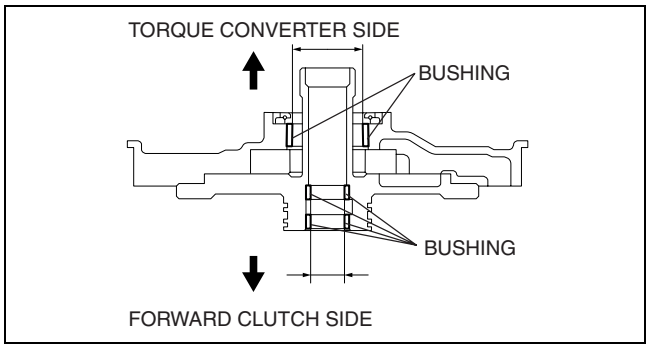
1. Inspect the outer surface of the torque converter for damage or cracks, and replace it if necessary.
2. Inspect for rust on the pilot hub of the torque converter or on the boss. If there is any, remove the rust completely.

Oil Pump Preinspection

1. Measure the bushing of the oil pump.

Bushing inner diameter
Torque converter side
Standard: 40.015—40.040 mm
{1.57539—1.57637 in}
Maximum: 40.060 mm {1.57716 in}

Forward clutch side
Standard: 19.000—19.021 mm
{0.74803—0.74885 in}
Maximum: 19.041 mm {0.74964 in}



B3E0517A322

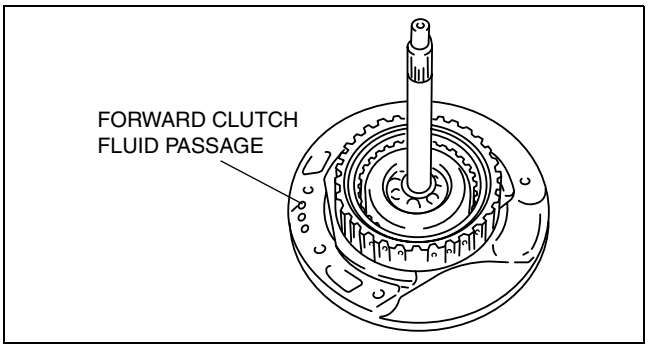
2. If not as specified, replace the oil pump housing and oil pump cover. (See 05–17–53 OIL PUMP DISASSEMBLY/ASSEMBLY.)

Forward Clutch Preinspection
Clutch operation
1. Set the forward clutch onto the oil pump.

Caution
- **Applying compressed air to the assembled clutch pack for longer than 3 s at a time will damage the seal.**
  Do not apply compressed air for more than the aforementioned time when testing the system.

2. Inspect the clutch operation by applying compressed air through the fluid passages shown.

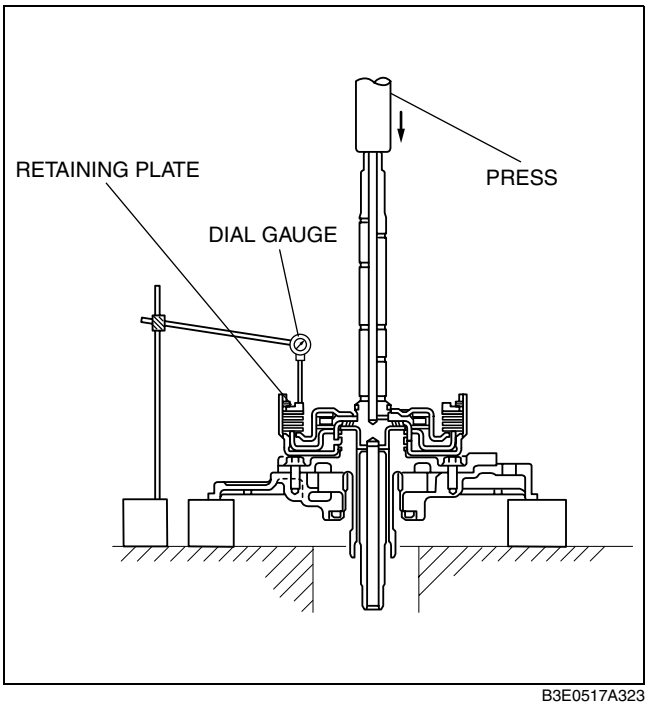
   Air pressure
   392 kPa {4.0 kgf/cm^2, 57 psi} max.



B3E0517A117

3. If not as specified, replace parts as necessary. (See 05–17–56 FORWARD CLUTCH DISASSEMBLY/ASSEMBLY.)

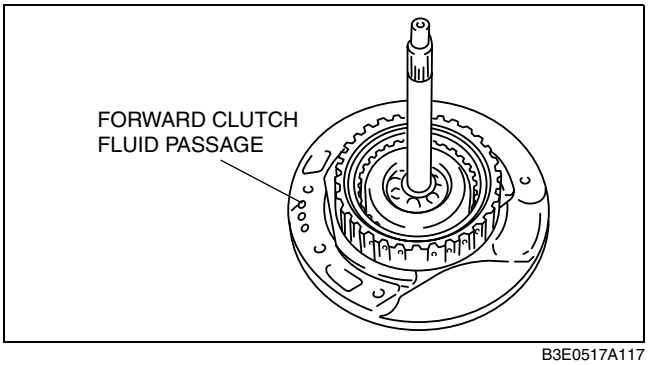
Clutch clearance
1. Measure the forward clutch clearance.
   (1) Install the forward clutch in the oil pump, and set the dial gauge.
   (2) Secure the forward clutch by lightly pressing down with a press, etc.



B3E0517A323

   (3) Apply compressed air to the part indicated in the figure and let the forward clutch piston stroke three times.

   Air pressure
   392—441 kPa {4.0—4.5 kgf/cm^2, 57—63 psi}



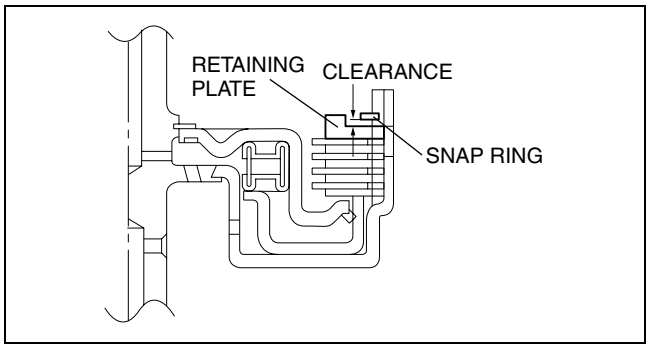
B3E0517A117

   (4) Apply compressed air and operate the forward clutch piston. Read the value when the indicator of the dial gauge stops.
   (5) Release the compressed air and read the dial gauge when the forward clutch piston is not operating.
   (6) Calculate the forward clutch clearance according to the following formula:

Step (4) value – Step (5) value = Forward clutch clearance.

(7) Measure the clearances at four locations (90° apart) by following the steps from (3) to (6). Verify that the average value is within the specification below.

Forward clutch clearance
1.50—1.80 mm {0.059—0.071 in}



B3E0517A324

2. If not as specified, replace parts as necessary. (See 05–17–56 FORWARD CLUTCH DISASSEMBLY/ASSEMBLY.)

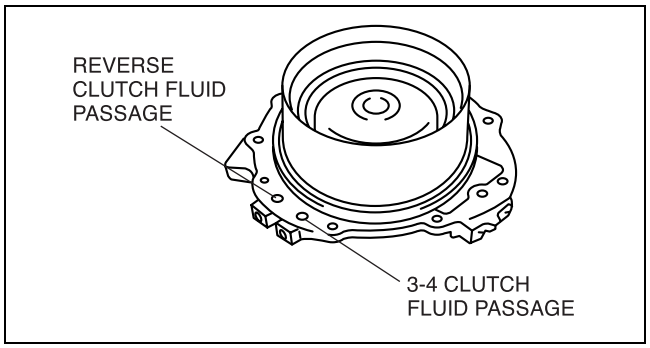
Clutch Component Preinspection
Clutch operation

1. Set the clutch component onto the end cover.

Caution
- **Applying compressed air to the assembled clutch pack for longer than 3 s at a time will damage the seal.**
  Do not apply compressed air for more than the aforementioned time when testing the system.

2. Inspect the clutch operation by applying compressed air as shown.

Air Pressure
392 kPa {4.0 kgf/cm^2, 57 psi} max.



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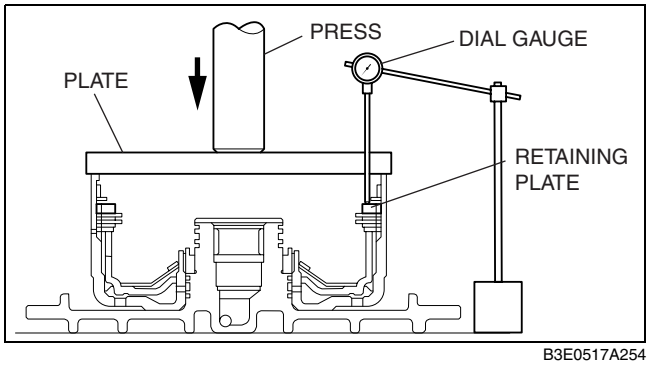
3. If not as specified, replace parts as necessary. (See 05–17–60 CLUTCH COMPONENT DISASSEMBLY/ASSEMBLY.)

Reverse clutch clearance

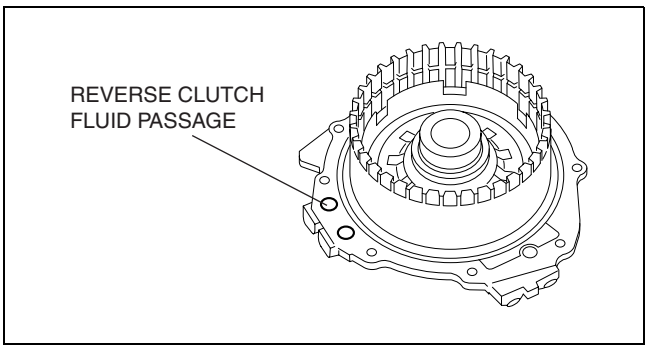
1. Measure the reverse clutch clearance.
   (1) Install the reverse clutch into the end cover, and set the dial gauge.
   (2) Secure the reverse clutch by lightly pressing down with a press, etc.



B3E0517A254

(3) Apply compressed air to the part indicated in the figure and let the reverse clutch piston stroke three times.

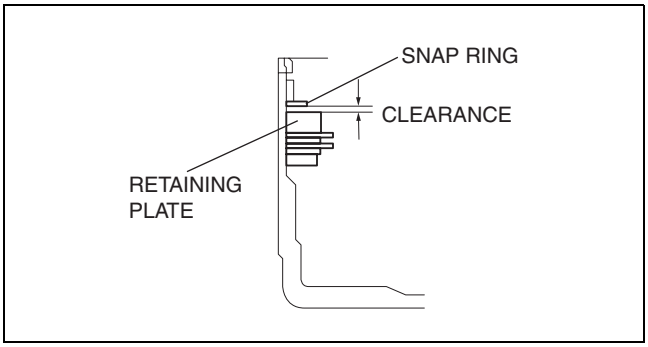
Air Pressure
392—441 kPa {4.0—4.5 kgf/cm^2, 57—63 psi}



B3E0517A255

(4) Apply compressed air and operate the reverse clutch piston. Read the value when the indicator of the dial gauge stops.
(5) Release the compressed air and read the dial gauge when the reverse clutch piston is not operating.
(6) Calculate the reverse clutch clearance according to the following formula: Step (4) value – Step (5) value = Reverse clutch clearance.
(7) Measure the clearances at four locations (90° apart) by following the steps from (3) to (6). Verify that the average value is within the specification below.

Reverse clutch clearance
1.00—1.30 mm {0.039—0.051 in}



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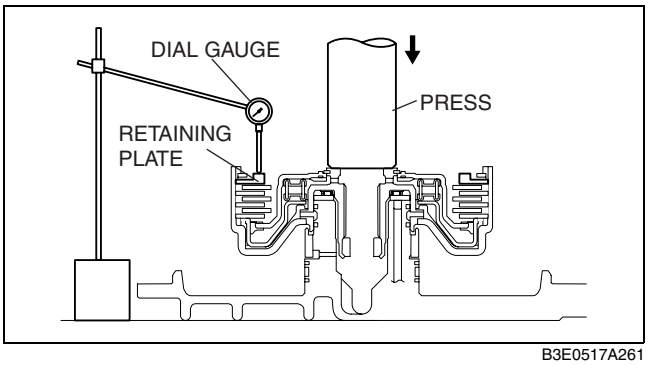
2. If not as specified, replace parts as necessary. (See 05–17–60 CLUTCH COMPONENT DISASSEMBLY/ASSEMBLY.)

3-4 clutch clearance
1. Measure the 3-4 clutch clearance.
(1) Install the 3-4 clutch in the end cover and set the dial gauge.
(2) Secure the 3-4 clutch by lightly pressing down with a press, etc.



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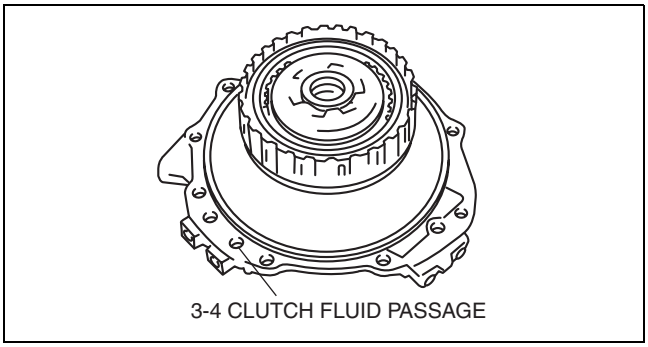
(3) Apply compressed air to the part indicated in the figure and let the 3-4 clutch piston stroke three times.

Air pressure
392—441 kPa {4.0—4.5 kgf/cm^2, 57—63 psi}



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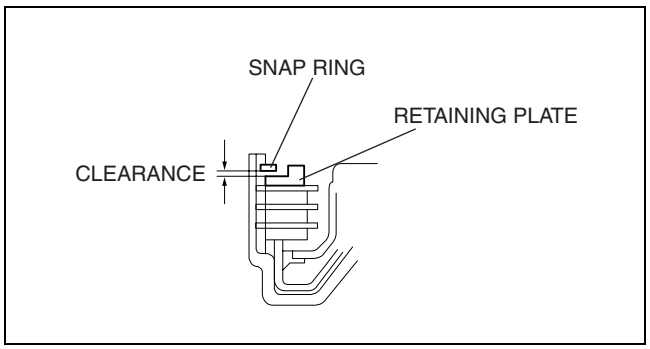
(4) Apply compressed air and operate the 3-4 clutch piston. Read the value when the indicator of the dial gauge stops.
(5) Release the compressed air and read the dial gauge when the 3-4 clutch piston is not operating.
(6) Calculate the 3-4 clutch clearance according to the following formula:
Step (4) value – Step (5) value = 3-4 clutch clearance.

(7) Measure the clearances at four locations (90° apart) by following the steps from (3) to (6). Verify that the average value is within the specification below.

3-4 clutch clearance
Drive plate part number: FN11 19 370
1.00—1.30 mm {0.039—0.051 in}
Drive plate part number: FNE1 19 370
1.10—1.40 mm {0.043—0.055 in}



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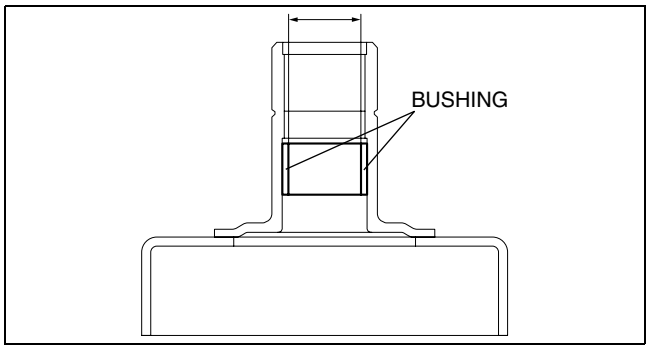
2. If not as specified, replace parts as necessary. (See 05–17–60 CLUTCH COMPONENT DISASSEMBLY/ASSEMBLY.)

Bushing inner diameter inspection

1. Measure the bushing of the 3-4 clutch hub.

Bushing inner diameter
Standard: 18.000—18.018 mm {0.70866—0.70936 in}
Maximum: 18.038 mm {0.71016 in}



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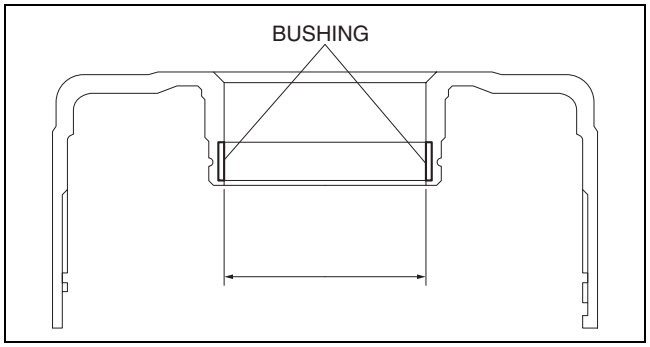
2. If not as specified, replace the 3-4 clutch hub. (See 05–17–60 CLUTCH COMPONENT DISASSEMBLY/ASSEMBLY.)

3. Measure the bushing of the 2-4 brake drum.

Bushing inner diameter
Standard: 55.005—55.030 mm {2.16555—2.16653 in}
Maximum: 55.050 mm {2.16732 in}



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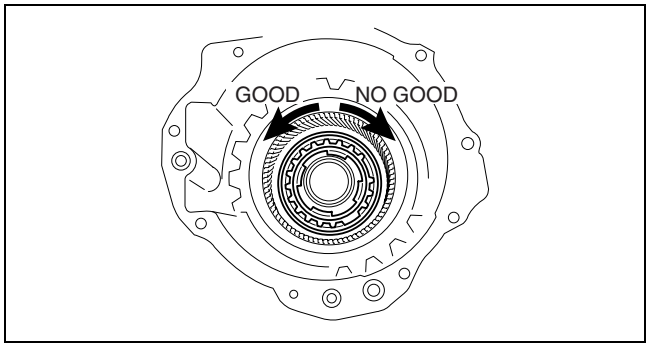
4. If not as specified, replace the 2-4 brake drum. (See 05–17–60 CLUTCH COMPONENT DISASSEMBLY/ASSEMBLY.)

Front Internal Gear and One-Way Clutch Component Preinspection

1. Set the front internal gear and one-way clutch component to the one-way clutch inner race. Verify that the one-way clutch rotates smoothly when turned counterclockwise and locks when turned clockwise.
2. If not as specified, replace parts as necessary. (See 05–17–68 FRONT INTERNAL GEAR ONE-WAY CLUTCH COMPONENT DISASSEMBLY/ASSEMBLY.)



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Low and Reverse Brake Preinspection
Clutch operation

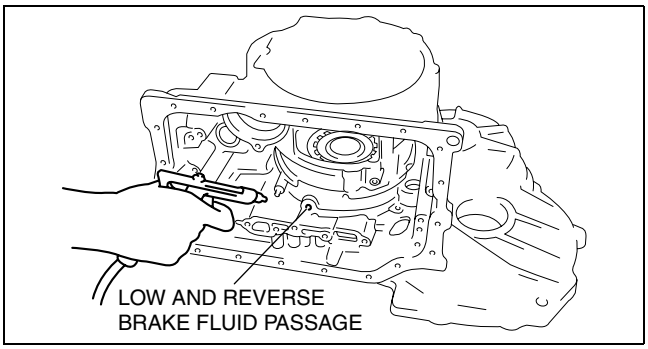
Caution
- **Applying compressed air to the assembled clutch pack for longer than 3 s at a time will damage the seal.**

Do not apply compressed air for more than the aforementioned time when testing the system.

1. Inspect the clutch operation by applying compressed air as shown.

   Air pressure
   392 kPa {4.0 kgf/cm^2, 57 psi} max.

2. If not as specified, replace parts as necessary. (See 05–17–72 LOW AND REVERSE BRAKE AND ONE-WAY CLUTCH INNER RACE DISASSEMBLY/ASSEMBLY.)



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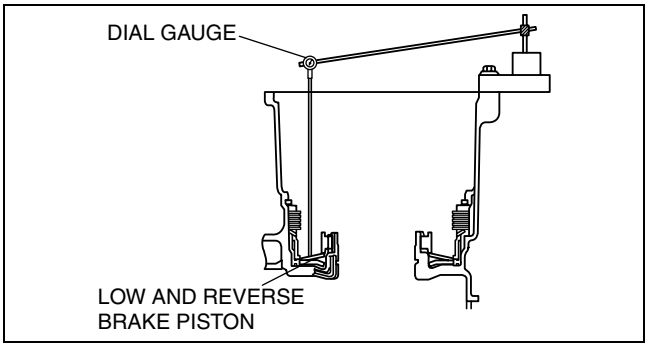
Clutch clearance

1. Measure the low and reverse brake clearance.
   (1) Set the dial gauge to the low and reverse brake.
   (2) Set the measuring point of the dial gauge to the low and reverse brake piston.

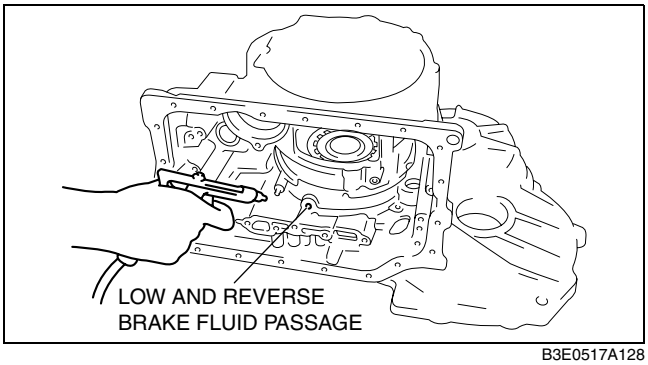


B3E0517A329

   (3) Apply compressed air to the part indicated in the figure and let the low and reverse brake piston stroke three times.

   Air pressure
   98.1 kPa {1.0 kgf/cm^2, 14 psi}

   (4) Apply compressed air and operate the low and reverse brake piston. Read the value when the indicator of the dial gauge stops.
   (5) Release the compressed air and read the dial gauge when the low and reverse brake piston is not operating.
   (6) Calculate the low and reverse brake clearance according to the following formula:
   Step (4) value – Step (5) value = low and reverse brake clearance.
   (7) Measure the clearances at four locations (90° apart) by following the steps from (3) to (6). Verify that the average value is within the specification below:



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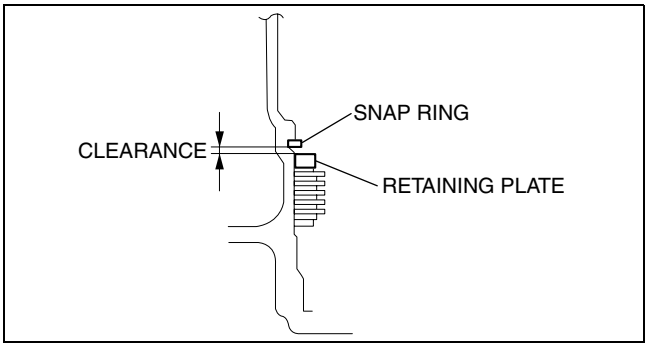
   Low and reverse brake clearance
   2.20—2.50 mm {0.087—0.098 in}

2. If not as specified, replace parts as necessary. (See 05–17–72 LOW AND REVERSE BRAKE AND ONE-WAY CLUTCH INNER RACE DISASSEMBLY/ASSEMBLY.)



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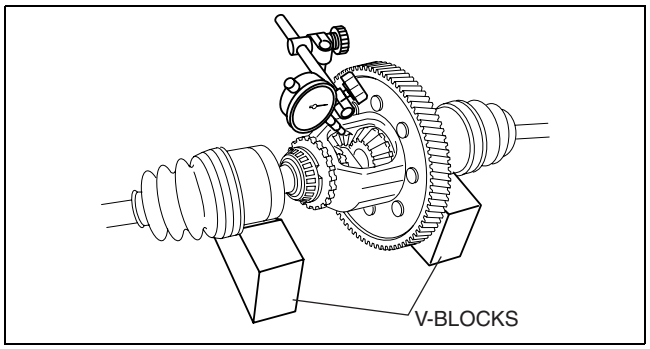
Differential Preinspection
Backlash

1. Measure the backlash of the side gear.

   Backlash
   Standard: 0.05—0.15 mm {0.002—0.005 in}
   Maximum: 0.5 mm {0.020 in}

2. If not specified, replace the differential. (See 05–17–92 DIFFERENTIAL DISASSEMBLY/ ASSEMBLY.)



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05–50 TECHNICAL DATA

TRANSMISSION/TRANSAXLE TECHNICAL DATA

B3E055000000A01

Item				Specification
Automatic transaxle type				FN4A-EL
Oil pump	Bushing inner diameter (torque converter side)	(mm {in})	Standard	40.015—40.040 {1.57539—1.57637}
			Maximum	40.060 {1.57716}
	Bushing inner diameter (Forward clutch side)	(mm {in})	Standard	19.000—19.021 {0.74803—0.74885}
			Maximum	19.041 {0.74964}
	Clearance between the end of the oil pump housing and the outer rotor and inner rotor	(mm {in})	Standard	0.04—0.05 {0.0015—0.0019}
			Maximum	0.06 {0.0023}
	Clearance between the outer rotor and the inner rotor	(mm {in})	Standard	0.02—0.13 {0.0008—0.0051}
			Maximum	0.14 {0.0055}
Forward clutch	Number of drive/driven plates			4/4
	Drive plate thickness	(mm {in})	Standard	1.60 {0.063}
			Maximum	1.45 {0.057}
	Forward clutch clearance		(mm {in})	1.50—1.80 {0.059—0.071}
	Snap ring size		(mm {in})	1.2 {0.047}, 1.4 {0.055}, 1.6 {0.063}, 1.8 {0.071}, 2.0 {0.079}, 2.2 {0.087}
Front sun gear	Bushing inner diameter	(mm {in})	Standard	18.000—18.018 {0.70866—0.70936}
			Maximum	18.038 {0.71016}
Rear sun gear	Bushing inner diameter	(mm {in})	Standard	29.900—29.921 {1.17717—1.17799}
			Maximum	29.941 {1.17878}
End cover	Bushing inner diameter	(mm {in})	Standard	23.600—23.621 {0.92913—0.92995}
			Maximum	23.641 {0.93075}
Reverse clutch	Number of drive/driven plates			2/2
	Drive plate thickness	(mm {in})	Standard	1.60 {0.063}
			Maximum	1.45 {0.057}
	Reverse clutch clearance		(mm {in})	1.00—1.30 {0.039—0.051}
	Snap ring size		(mm {in})	1.2 {0.047}, 1.4 {0.055}, 1.6 {0.063}, 1.8 {0.071}, 2.0 {0.079}, 2.2 {0.087}
3-4 clutch	Drive plate part number: FN11 19 370	Number of drive/driven plates		3/3
		Drive plate thickness (mm {in})	Standard	1.60 {0.063}
			Minimum	1.45 {0.057}
		3-4 clutch clearance	(mm {in})	1.00—1.30 {0.039—0.051}
		Snap ring size	(mm {in})	1.2 {0.047}, 1.4 {0.055}, 1.6 {0.063}, 1.8 {0.071}, 2.0 {0.079}, 2.2 {0.087}
		3-4 clutch hub busing inner diameter (mm {in})	Standard	18.000—18.018 {0.70866—0.70936}
			Minimum	18.038 {0.71016}
	Drive plate part number: FNE1 19 370	Number of drive/driven plates		3/3
		Drive plate thickness (mm {in})	Standard	2.55 {0.100}
			Minimum	2.40 {0.094}
		3-4 clutch clearance	(mm {in})	1.10—1.40 {0.043—0.055}
		Snap ring size	(mm {in})	1.2 {0.047}, 1.4 {0.055}, 1.6 {0.063}, 1.8 {0.071}, 2.0 {0.079}, 2.2 {0.087}
		3-4 clutch hub busing inner diameter (mm {in})	Standard	18.000—18.018 {0.70866—0.70936}
			Minimum	18.038 {0.71016}

Item			Specification
Low and reverse brake	Number of drive/driven plates		4/6[*3], 5/5[*4]
	Drive plate thickness (mm {in})	Standard	1.60 {0.063}
		Minimum	1.45 {0.057}
	Low and reverse clearance (mm {in})		2.20—2.50 {0.087—0.098}
	Snap ring size (mm {in})		1.8 {0.071}, 2.0 {0.079}, 2.2 {0.087}, 2.4 {0.094}, 2.6 {0.102}, 2.8 {0.110}, 3.0 {0.118}
2-4 brake band	Stroke adjust band strut (mm {in})		36.0 {1.417}, 36.5 {1.437}, 37.0 {1.457}, 37.5 {1.476}, 38.0 {1.496}, 38.5 {1.516}, 39.0 {1.535}
	2-4 brake drum bushing inner diameter (mm {in})	Standard	55.005—55.030 {2.16555—2.16653}
		Maximum	55.050 {2.16732}
Total end play	End play adjust race (mm {in})		1.8 {0.071}, 2.0 {0.079}, 2.2 {0.087}, 2.4 {0.094}, 2.6 {0.102}
Primary gear	Primary gear bearing preload (N·m {kgf·cm, in·lbf})		0.25—0.60 {2.55—6.12, 2.21—5.31}
Secondary gear	Secondary gear bearing preload (N·m {kgf·cm, in·lbf})		1.5—2.4 {15—25, 13—21}[*1] 0.4—1.5 {5—15, 4—13}[*2]
	Preload adjust shims (mm {in})		0.45 {0.018}[*2], 0.50 {0.020}, 0.55 {0.022}, 0.60 {0.024}, 0.65 {0.026}, 0.70 {0.028}, 0.75 {0.030}, 0.80 {0.031}, 0.85 {0.033}, 0.90 {0.035}, 0.95 {0.037}, 1.00 {0.039}, 1.05 {0.041}, 1.10 {0.043}, 1.15 {0.045}, 1.20 {0.047}, 1.25 {0.049}, 1.30 {0.051}[*1]
Differential	Differential bearing preload (N·m {kgf·cm, in·lbf})		1.4—2.3 {14—24, 12—20}
	Preload adjust shims (mm {in})		0.50 {0.020}, 0.55 {0.022}, 0.60 {0.024}, 0.65 {0.026}, 0.70 {0.028}, 0.75 {0.030}, 0.80 {0.031}, 0.85 {0.033}, 0.90 {0.035}, 0.95 {0.037}, 1.00 {0.039}, 1.05 {0.041}, 1.10 {0.043}, 1.15 {0.045}, 1.20 {0.047}, 1.25 {0.049}, 1.30 {0.051}, 1.35 {0.053}, 1.40 {0.055}, 1.45 {0.057} 1.50 {0.059}, 1.55 {0.061}
	Backlash of side gear and pinion (mm {in})	Standard	0.05—0.15 {0.002—0.005}
		Maximum	0.5 {0.020}
Distance A between end of torque converter and face of converter housing (mm {in})			15.4 {0.60}[*5], 17.9 {0.70}[*6], 21.4 {0.84}[*7], 31.4 {1.24}[*8]

*1 : Applied VIN (assumed): JM0 DY10Y100 100001—106898, JM6 DY10Y100 100001—106898
*2 : Except *1
*3 : Mazda2 (with WU-TWC)
*4 : Except *3
*5 : Mazda2
*6 : MPV
*7 : Mazda6
*8 : Mazda3, Mazda5

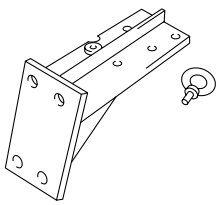
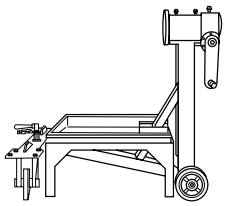
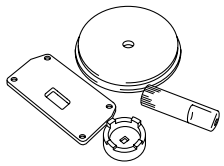
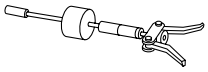
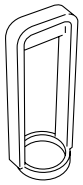
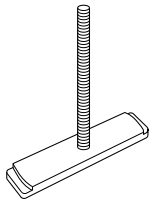
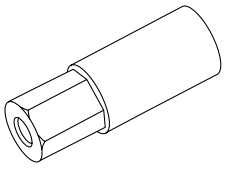
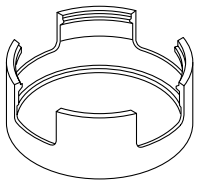
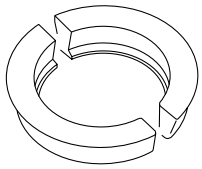
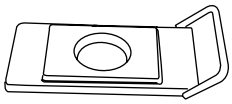
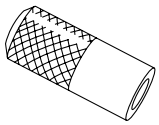
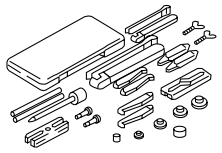
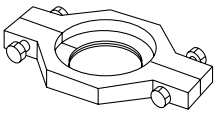
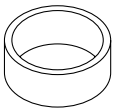
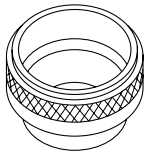
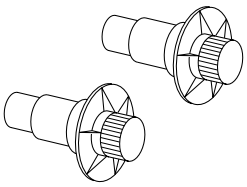
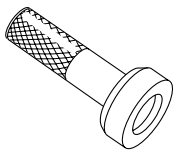
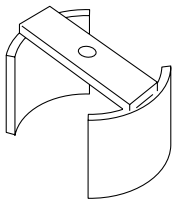
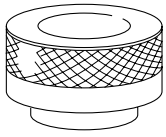
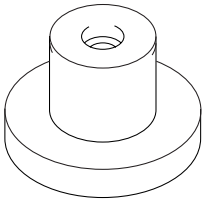
Spring name	Outer diameter (mm {in})	Free length (mm {in})	No. of coils	Wire diameter (mm {in})
Accumulators				
Servo apply accumulator small spring	13.0 {0.512}	67.8 {2.669}	17.1	2.2 {0.087}
Servo apply accumulator large spring	21.0 {0.827}	67.8 {2.669}	10.3	3.5 {0.138}
Forward accumulator small spring	15.6 {0.614}	49.0 {1.929}	7.7	2.4 {0.094}
Forward accumulator large spring	21.0 {0.827}	75.0 {2.953}	10.7	2.3 {0.091}
Forward clutch				

Spring name	Outer diameter (mm {in})	Free length (mm {in})	No. of coils	Wire diameter (mm {in})
Accumulators				
Spring and retainer component	—	17.2 {0.677}	—	—
3-4 clutch				
Spring and retainer component	—	17.2 {0.677}	—	—
Band servo				
Servo return spring	34.0 {1.340}	36.4 {1.430}	2.5	4.0 {0.160}
Control valve body				
Low and reverse shift valve spring	8.7 {0.343}	31.3 {1.232}	9.0	0.8 {0.031}
Solenoid reducing valve spring	8.7 {0.343}	44.2 {1.740}	16.0	1.1 {0.043}
Pressure regulator valve spring	7.9 {0.311}	36.3 {1.429}	13.2	0.9 {0.035}
Solenoid shift valve spring	8.3 {0.327}	35.1 {1.382}	12.0	0.6 {0.024}
Converter relief valve spring	9.0 {0.354}	42.5 {1.673}	14.2	1.3 {0.051}
Torque converter clutch control valve spring	8.7{0.343}	31.3 {1.232}	9.0	0.8 {0.031}
Bypass valve spring	8.7{0.343}	31.3 {1.232}	9.0	0.8 {0.031}
3-4 shift valve spring	8.7{0.343}	31.3 {1.232}	9.0	0.8 {0.031}
Pressure modifier accumulator spring	11.0 {0.433}	23.0 {0.906}	6.6	1.5 {0.059}

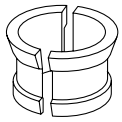
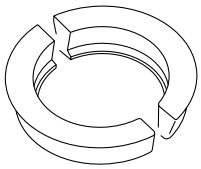
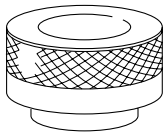
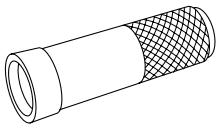
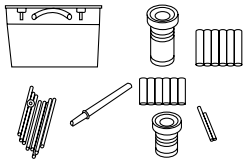
05–60 SERVICE TOOLS

TRANSMISSION/TRANSAXLE SST

B3E056001030A01

49 B019 010 Transmission Hanger 	49 0107 680A Engine Stand 	49 B019 0A1 Lock Nut Remover Set 
49 W032 2A0 Bearing Remover Set 	49 B019 012 Return Spring Compressor 	49 G019 027 Attachment A 
49 G019 029 Nut 	49 W019 002 Body 	49 B017 209 Attachment J 
49 F401 366A Plate 	49 G030 160 Valve Seal Pusher 	49 0839 425C Bearing Puller Set 
49 B019 014 Removing Plate 	49 S231 626 Support Block 	49 G030 338 Attachment E 
49 G030 455 Diff. Side Gear Holder 	49 0500 330 Bearing Installer 	49 B019 011 Return Spring Compressor 
49 0727 415 Bearing Installer 	49 V001 525 Bearing Installer 	49 F026 102 Bearing Installer 

SERVICE TOOLS

49 T019 007 Attachment 	49 B017 206 Attachment F 	49 UB71 525 Bearing Installer 
49 F401 331 Body 	49 B019 0A3 Shim Selector Set 	49 0180 510B Preload Measuring Attachment