Engine Workshop Manual SKYACTIV-G 2.0

FOREWORD

This manual explains the service points for the above-indicated automotive system. This manual covers all models with the above-indicated automotive system, not any one specific model.

In order to do these procedures safely, quickly, and correctly, you must first read this manual and any other relevant service materials carefully.

All the contents of this manual, including drawings and specifications, are the latest available at the time of printing.
As modifications affecting repair or maintenance occur, relevant information supplementary to this volume will be made available at Mazda dealers. This manual should be kept up-to-date.

Mazda Motor Corporation reserves the right to alter the specifications and contents of this manual without obligation or advance notice.

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Mazda Motor Corporation
HIROSHIMA, JAPAN

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PRINTED IN U.S.A., DECEMBER 2011
Form No. 1A08–1U–11L
Part No. 9999–95–EWPE–12

WARNING

Servicing a vehicle can be dangerous. If you have not received service-related training, the risks of injury, property damage, and failure of servicing increase. The recommended servicing procedures for the vehicle in this workshop manual were developed with Mazda-trained technicians in mind. This manual may be useful to non-Mazda trained technicians, but a technician with our service-related training and experience will be at less risk when performing service operations. However, all users of this manual are expected to at least know general safety procedures.

This manual contains "Warnings" and "Cautions" applicable to risks not normally encountered in a general technician's experience. They should be followed to reduce the risk of injury and the risk that improper service or repair may damage the vehicle or render it unsafe. It is also important to understand that the "Warnings" and "Cautions" are not exhaustive. It is impossible to warn of all the hazardous consequences that might result from failure to follow the procedures.

The procedures recommended and described in this manual are effective methods of performing service and repair. Some require tools specifically designed for a specific purpose. Persons using procedures and tools which are not recommended by Mazda Motor Corporation must satisfy themselves thoroughly that neither personal safety nor safety of the vehicle will be jeopardized.

The contents of this manual, including drawings and specifications, are the latest available at the time of printing, and Mazda Motor Corporation reserves the right to change the vehicle designs and alter the contents of this manual without notice and without incurring obligation.

Parts should be replaced with genuine Mazda replacement parts or with parts which match the quality of genuine Mazda replacement parts. Persons using replacement parts of lesser quality than that of genuine Mazda replacement parts must satisfy themselves thoroughly that neither personal safety nor safety of the vehicle will be jeopardized.

Mazda Motor Corporation is not responsible for any problems which may arise from the use of this manual. The cause of such problems includes but is not limited to insufficient service-related training, use of improper tools, use of replacement parts of lesser quality than that of genuine Mazda replacement parts, or not being aware of any revision of this manual.

GENERAL INFORMATION

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HOW TO USE THIS MANUAL

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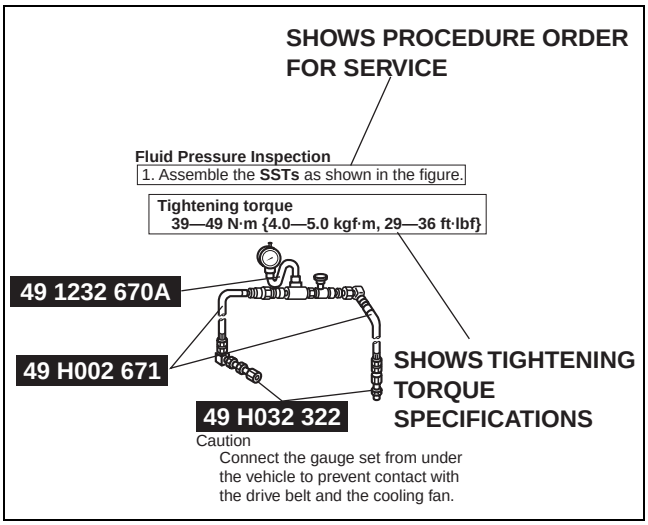
Range of Topics

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

Service Procedure

Inspection, adjustment

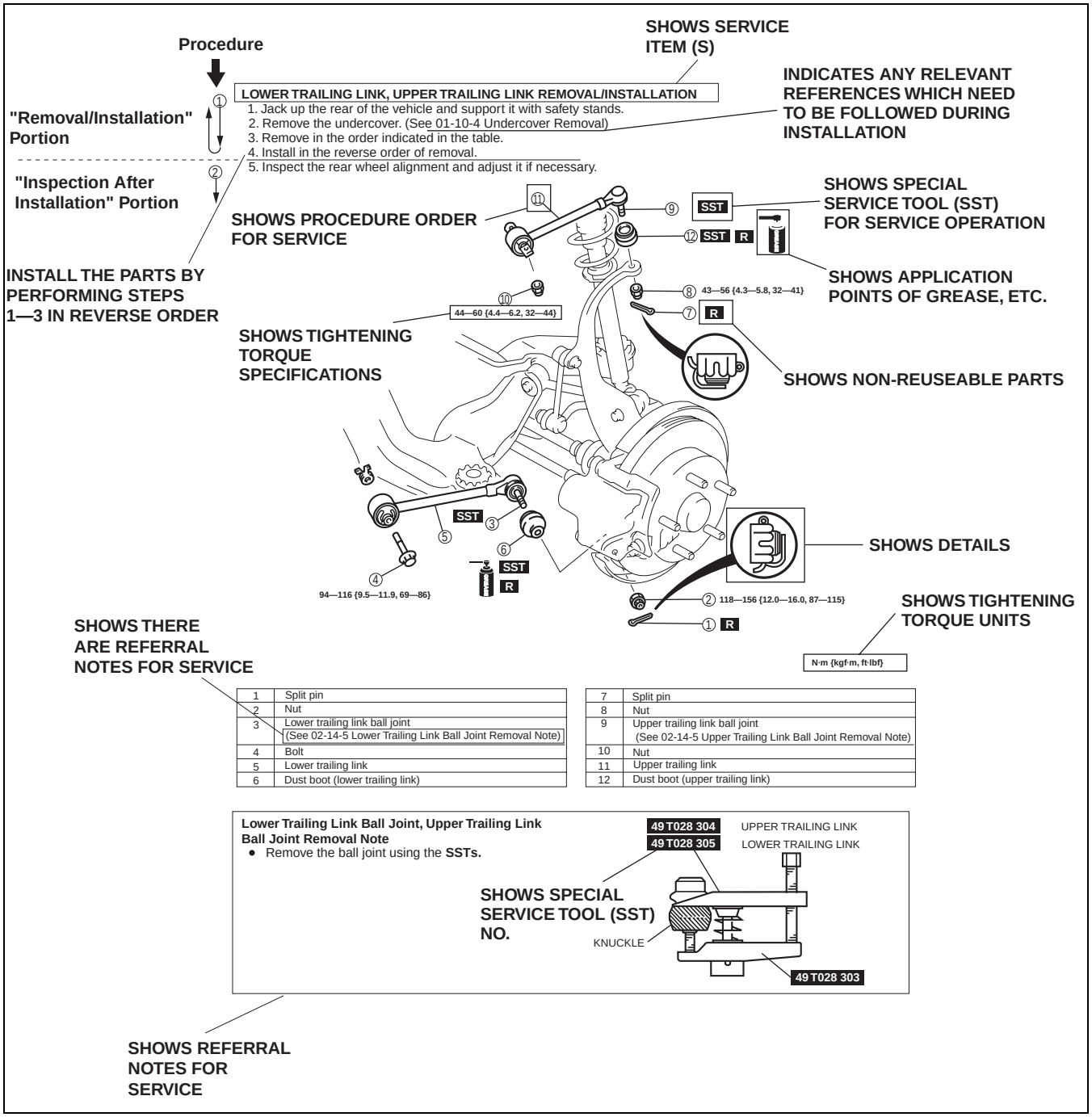
- Inspection and adjustment procedures are divided into steps. Important points regarding the location and contents of the procedures are explained in detail and shown in the illustrations.



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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
	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
	Replace part	O-ring, gasket, etc.
	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 From 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.

Number Of Digits For Converted Values

- The number digits for converted values is the same as the number of significant figures*1 of the SI unit.
- For the torque value, the number of significant figures is, in principle, is 2 digits, in consideration of market practicalities. However, if the number of decimal places at the upper and lower limits of the converted value differs, the one with least number of decimal places is used. In addition, if the integer part is 3 digits or more, the integer part becomes the significant number of figures.

*1 : The number of significant figures is the number of digits from the left-most non-zero digit to the right-most digit including 0. (Example: 0.12 is 2 digits, 41.0 is 3 digits)

Converted Value Rounding Off And Rounding Up/down

- If there is no tolerance in the SI unit value, after conversion, rounding off is to within the number of significant digits.
- If there is tolerance in the SI unit value and the figure after conversion indicates the upper limit, the number of digits is rounded down to within the number of significant figures. If it indicates the lower limit, they are rounded up to within the number of significant figures.
- Even if the SI unit value is the same, the converted value may differ based on whether that value is the upper or lower limit.

ABBREVIATIONS

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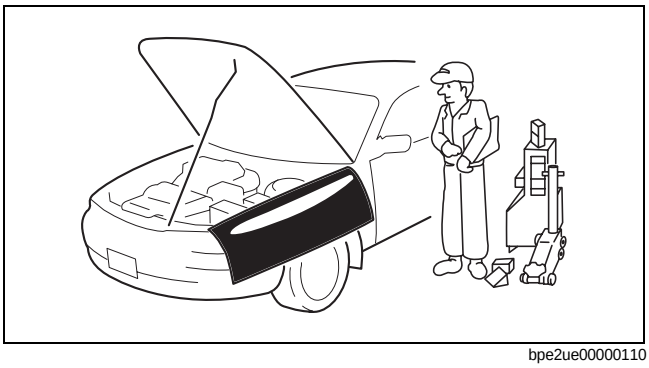
ATX	Automatic Transaxle
EX	Exhaust
HLA	Hydraulic Lash Adjuster
IN	Intake
MTX	Manual Transaxle
OCV	Oil Control Valve
TDC	Top Dead Center
SST	Special Service Tool

FUNDAMENTAL PROCEDURES

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Preparation of Tools and Measuring Equipment

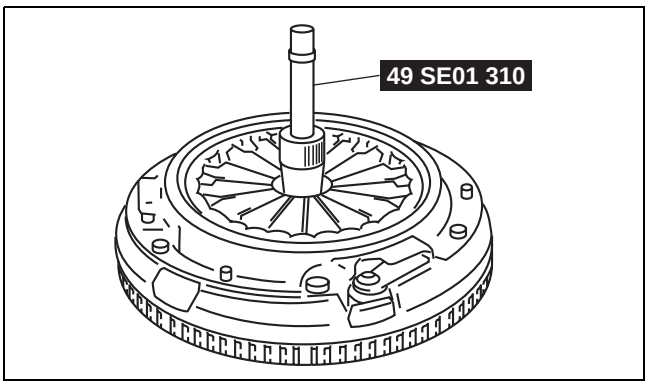
- Be sure that all necessary tools and measuring equipment are available before starting any work.



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Special Service Tools

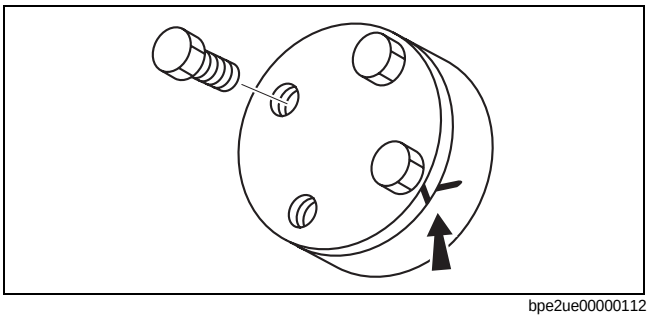
- Use special service tools or equivalent when they are required.



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Disassembly

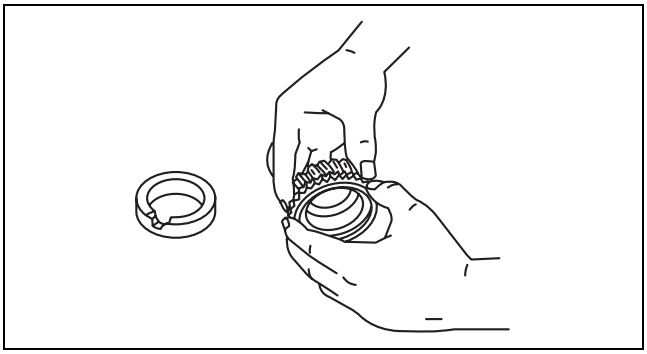
- If the disassembly procedure is complex, requiring many parts to be disassembled, all parts should be marked in a place that will not affect their performance or external appearance and identified so that reassembly can be performed easily and efficiently.



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Inspection During Removal, Disassembly

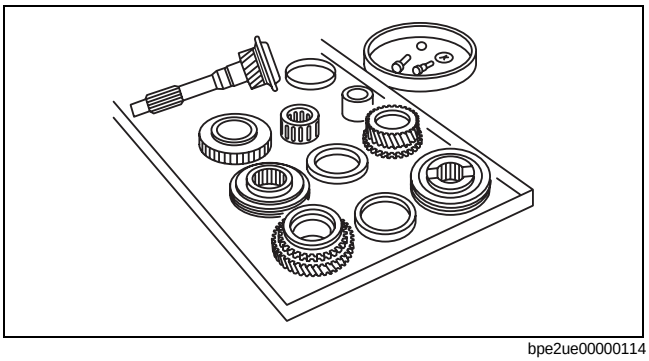
- When removed, each part should be carefully inspected for malfunction, deformation, damage and other problems.



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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.



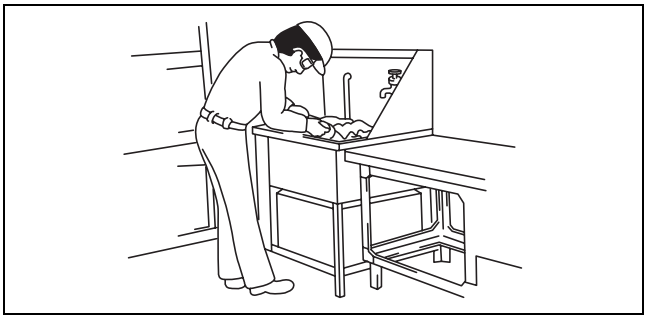
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Cleaning of Parts

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

Warning

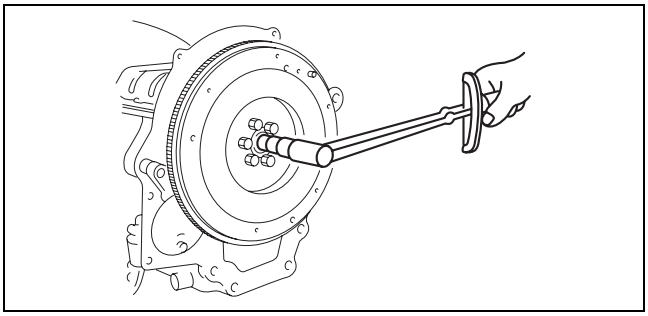
- **Using compressed air can cause dirt and other particles to fly out causing injury to the eyes. Wear protective eye wear whenever using compressed air.**



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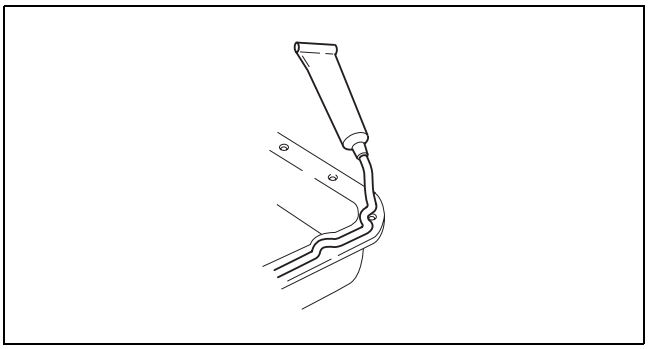
Reassembly

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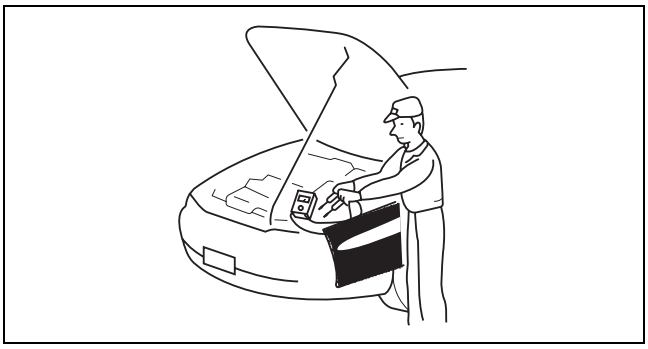
- Depending on location:
  — Sealant and gaskets, or both, should be applied to specified locations. When sealant is applied, parts should be installed before sealant hardens to prevent leakage.
  — Oil should be applied to the moving components of parts.
  — Specified oil or grease should be applied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



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Adjustment

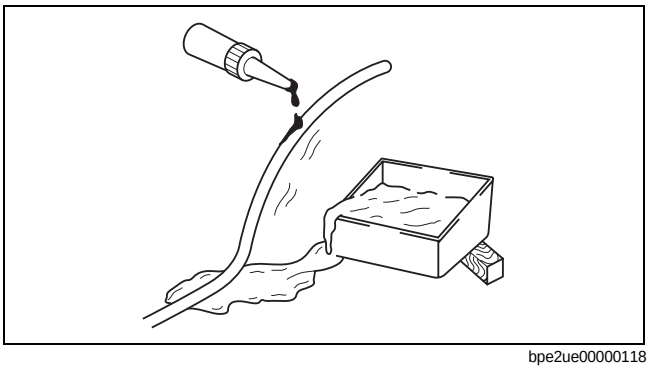
- Use suitable gauges and testers when making adjustments.



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Rubber Parts and Tubing

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

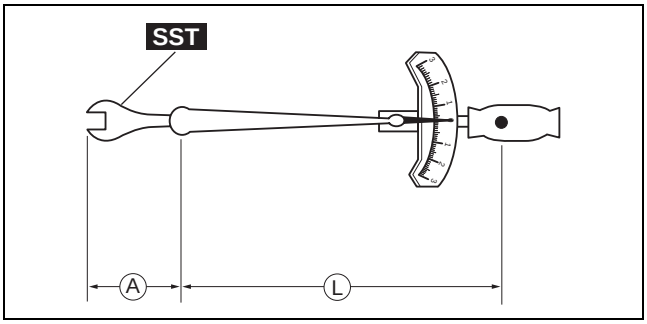


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Torque Formulas

- 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)]

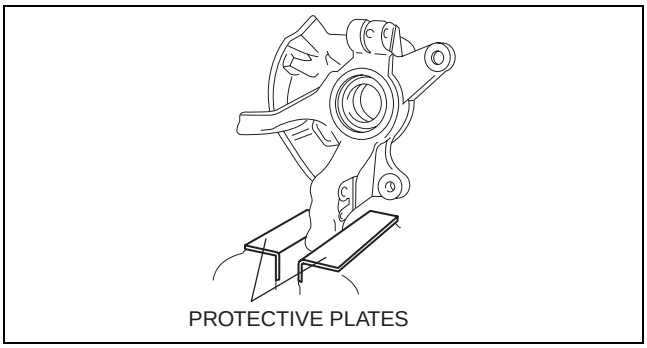


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A : The length of the **SST** past the torque wrench drive.
L : The length of the torque wrench.

Vise

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



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ENGINE

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SECTION

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ELECTRIC VARIABLE VALVE TIMING MOTOR/DRIVER INSPECTION

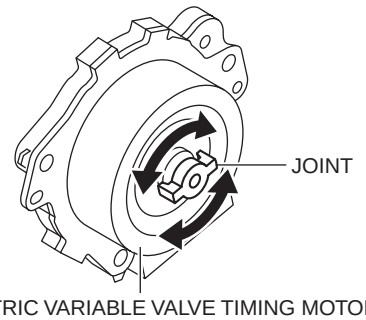
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Caution
- **Do not disassemble the electric variable valve timing motor/driver because it is a precision unit.**
- **Do not apply excessive force when rotating the electric variable valve timing motor joint. If it is rotated with excessive force, the electric variable valve timing motor could be damaged.**

1. Rotate the electric variable valve timing motor joint to the left and right by your fingers and verify that it rotates smoothly in **15**° increments.

Note
- Rotate the joint area smoothly using only the tips of your fingers.
- The electric variable valve timing motor joint moves in **15**° increments, and if the joint is moved **24** times, it rotates one full rotation.

- If it does not rotate smoothly, replace the electric variable valve timing motor/driver.



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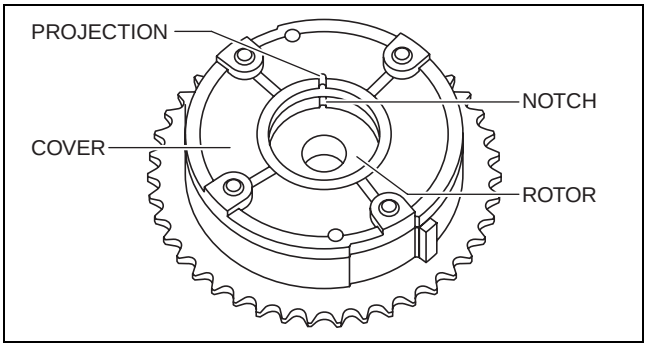
HYDRAULIC VARIABLE VALVE TIMING ACTUATOR INSPECTION

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Caution

- **Do not disassemble the hydraulic variable valve timing actuator because it is a precision unit.**

1. Verify that the notch of the rotor and projection of the cover on the hydraulic variable valve timing actuator are aligned and fitted.
   - If the projection and notch are not aligned, rotate the rotor (camshaft installation) until a click is heard and verify that they are aligned and fixed in place.
     — If the projection and notch are not aligned or the rotor and cover are not secured even if their projection and notch are aligned, replace the hydraulic variable valve timing actuator.



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ELECTRIC VARIABLE VALVE TIMING ACTUATOR INSPECTION

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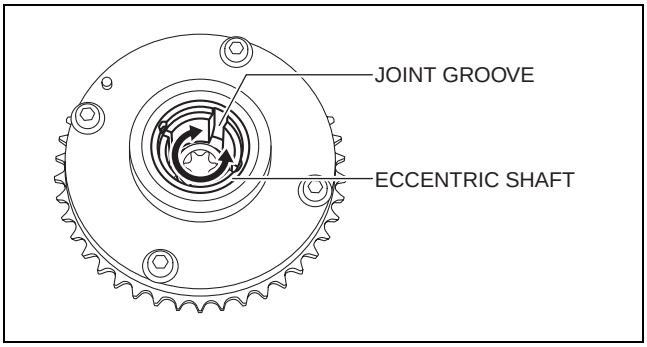
Caution

- **Do not disassemble the electric variable valve timing actuator because it is a precision unit.**

1. Rotate the eccentric shaft of the electric variable valve timing actuator to the left and right by hand and verify that it rotates smoothly.
   - If it does not rotate smoothly, replace the electric variable valve timing actuator.

Note

- Hook a finger onto the joint groove of the eccentric shaft to rotate the shaft easily.
- The eccentric shaft stops rotating at the maximum retard position when it is rotated counterclockwise as viewed from the front, and at the maximum advance position when rotated clockwise.
- The eccentric shaft rotates 15.8 turns from the maximum retard position to the maximum advance position.



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OIL CONTROL VALVE (OCV) INSPECTION

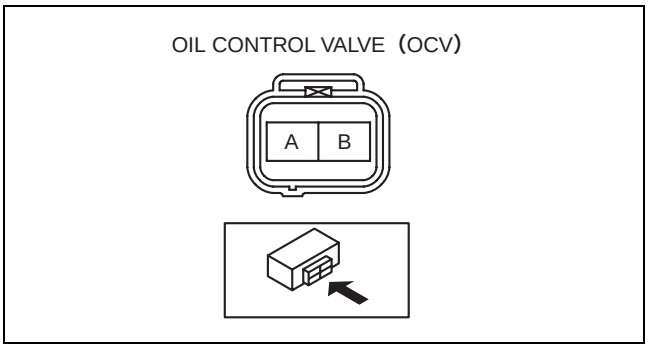
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Coil Resistance Inspection

1. Measure the resistance between terminals A and B using an ohmmeter.

   OCV coil resistance
   6.9—7.5 ohms [20°C {68°F}]

   - If it is not within the specification, replace the OCV.

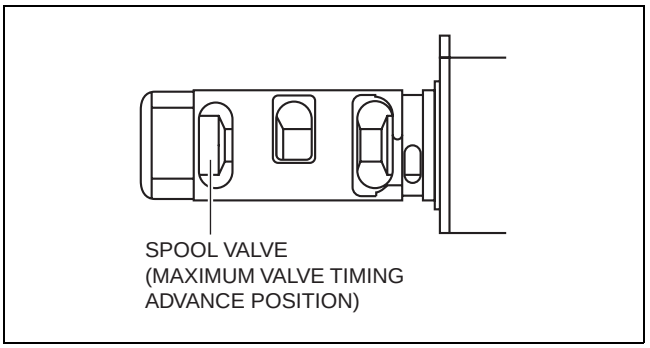


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Spool Valve Operation Inspection

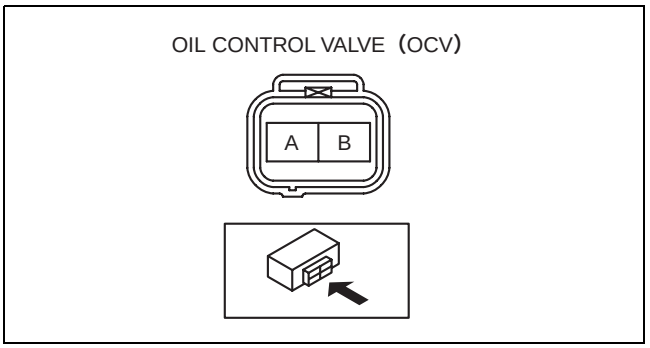
1. Verify that the spool valve in the OCV is in the maximum valve timing advance position as indicated in the figure.
   - If there is any malfunction, replace the OCV.

   Note
   - When applying battery positive voltage between the OCV terminals, the connection can be either of the following:
     — Positive battery cable to terminal A, negative battery cable to terminal B
     — Positive battery cable to terminal B, negative battery cable to terminal A



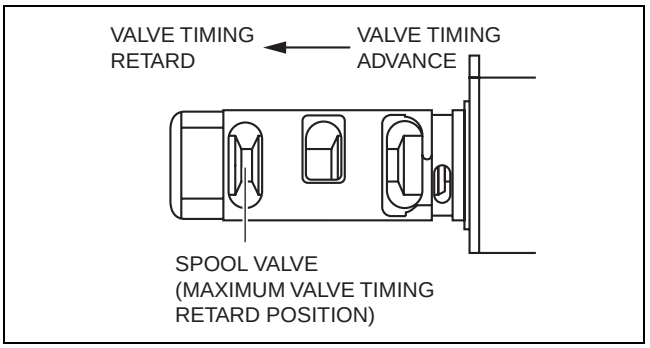
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2. Apply battery positive voltage between the OCV terminals and verify that the spool valve operates and moves to the maximum valve timing retard position.



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   - If there is any malfunction, replace the OCV.
3. Stop applying battery positive voltage and verify that the spool valve returns to the maximum valve timing advance position.
   - If there is any malfunction, replace the OCV.

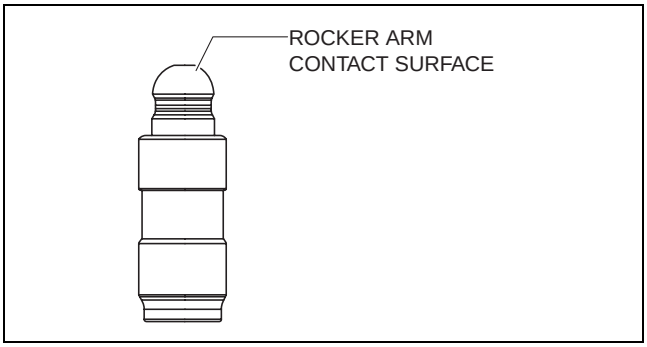


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HYDRAULIC LASH ADJUSTER (HLA) INSPECTION

id011000805000

1. Visually inspect the HLA surface where it contacts the rocker arm for wear or damage.
   - If there is any malfunction, replace the HLA.

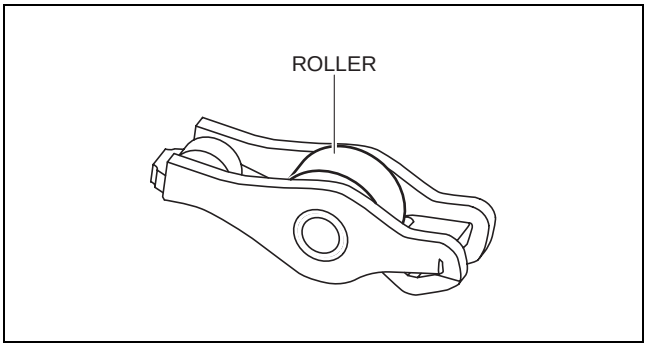


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ROCKER ARM INSPECTION

id011000904800

1. Rotate the roller or the rocker arm by hand and verify that rotates smoothly.
   - If it does not rotate smoothly, replace the rocker arm.
2. Visually inspect the rocker arm surface where it contacts the HLA and valve stem for wear or damage.
   - If there is any malfunction, replace the rocker arm.



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ENGINE OVERHAUL SERVICE WARNING

id011000503900

Warning

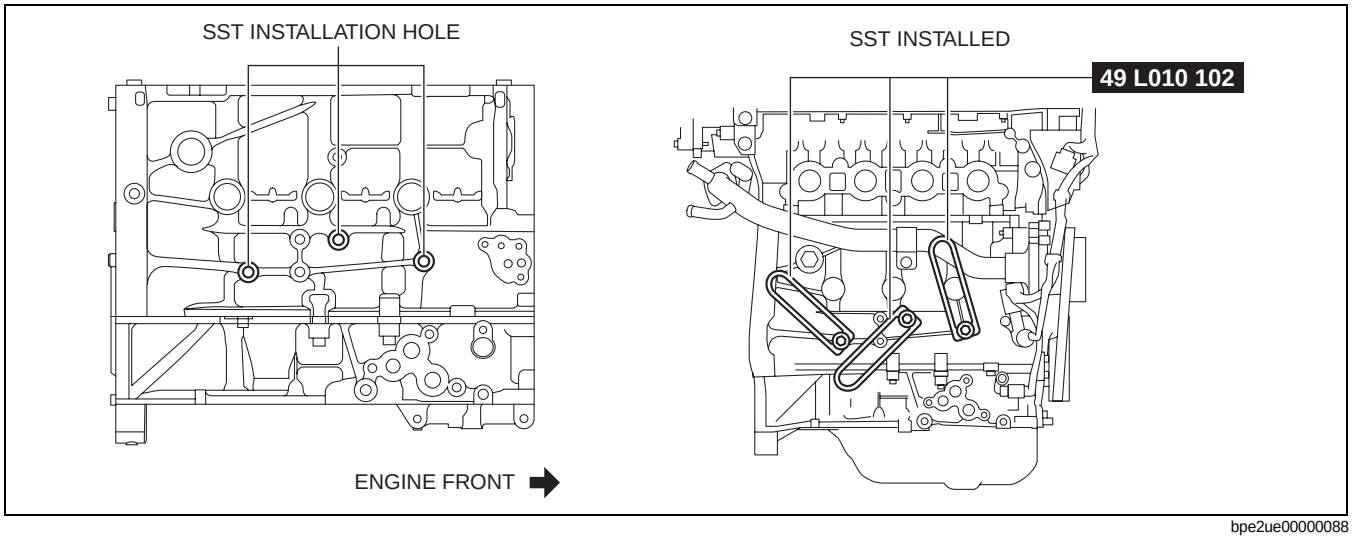
- **Continuous exposure to USED engine oil has been shown to cause skin cancer in laboratory mice. Protect your skin by washing with soap and water immediately after performing work.**

ENGINE MOUNTING/DISMOUNTING

id011000507000

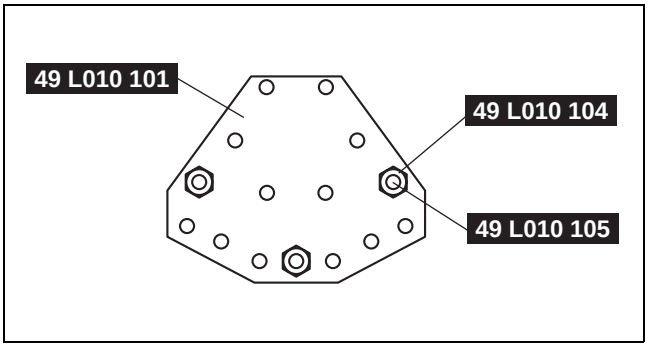
Mounting

1. Install the **SST** (arms) to the three positions as shown in the figure and temporarily tighten the bolts (Part No. **9YA20-1003** or **M10** × **1.5 length 90 mm {3.55 in}**).



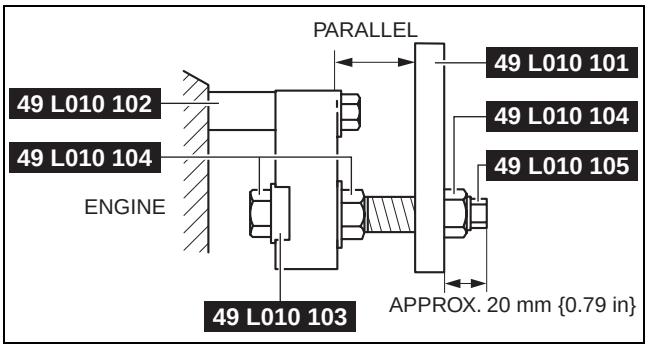
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2. Install the **SSTs** (bolts and nuts) to the three positions of the **SST** (plate) as shown in the figure.



bp31je00000140

3. Install the **SST** (bolts, nuts and plate) set in Step 2 to the **SST** (arms) set in Step 1 using the **SSTs** (hook and nuts).
4. Adjust the bolts so that **approx. 20 mm {0.79 in}** of thread is exposed from the side of the plate.
5. Adjust the bolts and nuts so that the plate and arms are parallel.
6. Tighten the **SSTs** (bolts and nuts) to affix the **SST** firmly.
7. Install the engine to the **SST** (engine stand).
8. Remove the oil drain plug and drain the engine oil.
9. Replace the gasket with a new one and install the oil pan drain plug.



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Tightening torque
30—41 N·m {3.1—4.1 kgf·m, 23—30 ft·lbf}

Dismounting

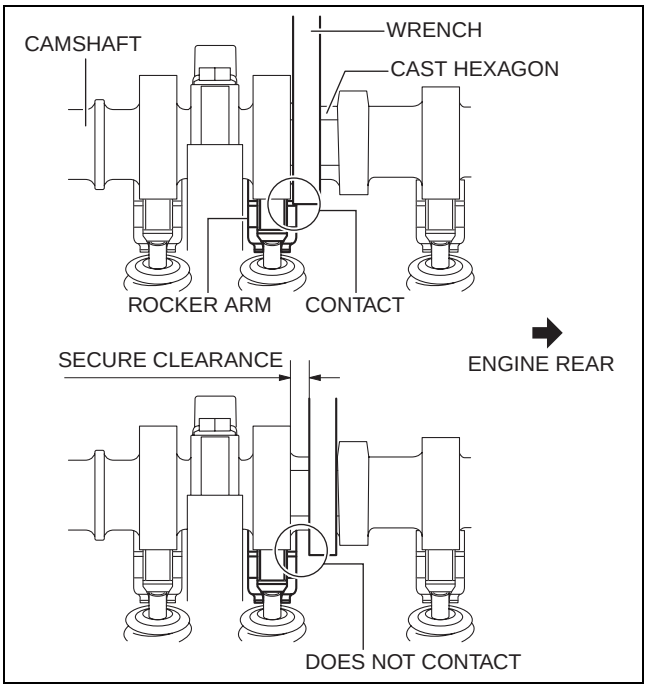
1. Dismount in the reverse order of mounting.

TIMING CHAIN DISASSEMBLY

id011000505500

Caution

- **If the camshaft is rotated with the timing chain removed and the piston at the top dead center position, the valve may contact the piston and the engine could be damaged. When rotating the camshaft with the timing chain removed, rotate it after lowering the piston from the top dead center position.**
- **When rotating the camshaft using a wrench on the cast hexagon, the wrench may contact the rocker arm and damage the rocker arm. To prevent damage to the rocker arm when holding the camshaft on the cast hexagon, use the wrench at engine rear side as shown in the figure to secure a clearance between the cam.**

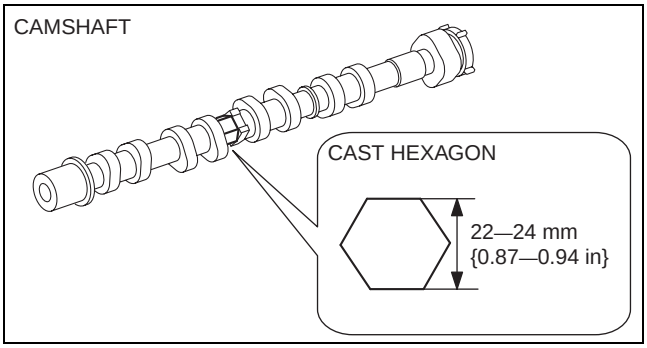


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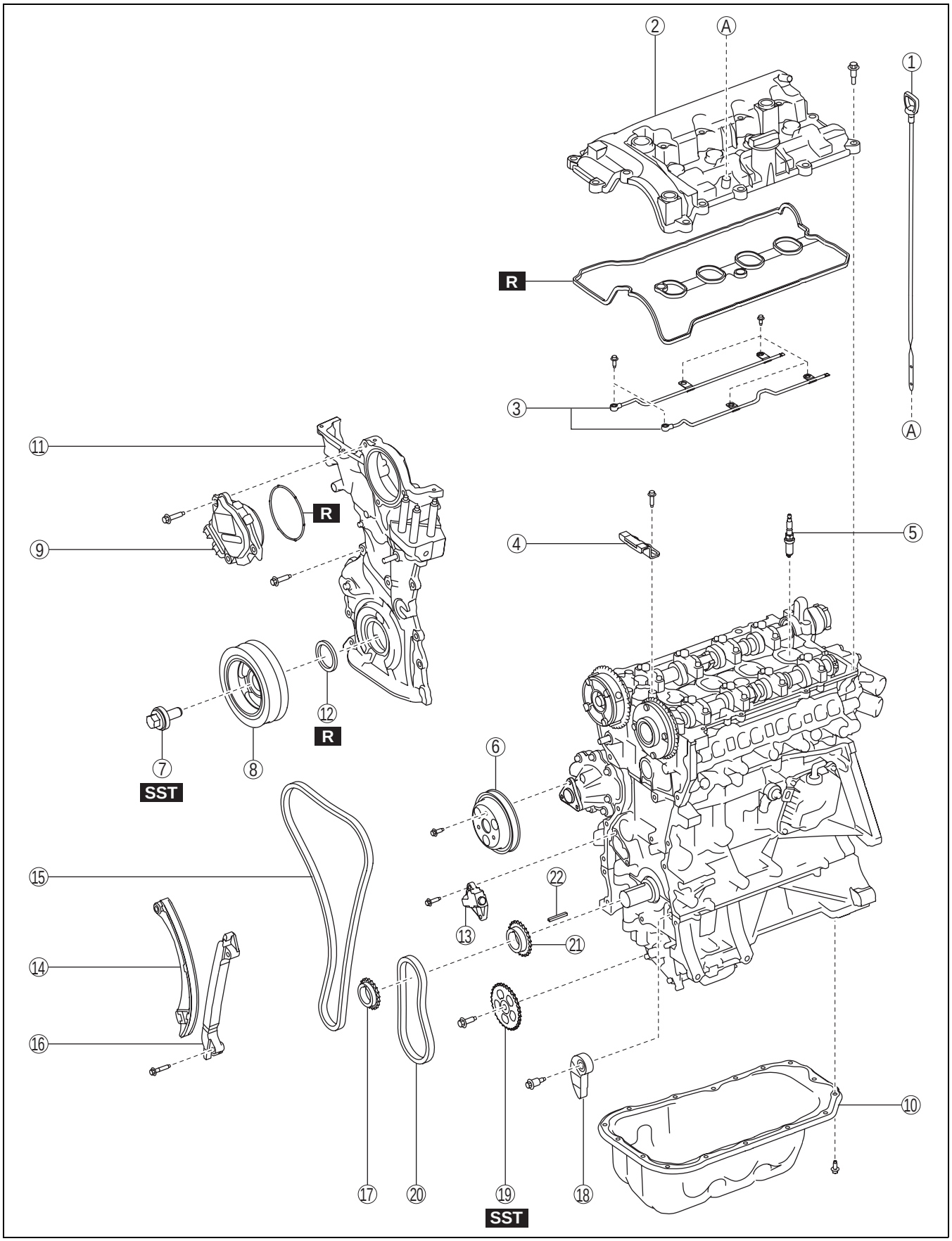
Note

- Width at the cast hexagon of the camshaft is 22—24 mm {0.87—0.94 in}.

1. Disassemble in the order indicated in the table.



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1	Dipstick
2	Cylinder head cover

3	Oil shower pipe
4	Chain guide (No.1)

5	Spark plug
6	Water pump pulley (See 01-10-9 Water Pump Pulley Disassembly Note.)
7	Crankshaft pulley lock bolt (See 01-10-10 Crankshaft Pulley Lock Bolt Disassembly Note.)
8	Crankshaft pulley
9	Electric variable valve timing motor/driver
10	Oil pan (See 01-10-10 Oil Pan Disassembly Note.)
11	Engine front cover (See 01-10-10 Engine Front Cover Disassembly Note.)
12	Front oil seal (See 01-10-11 Front Oil Seal Disassembly Note.)

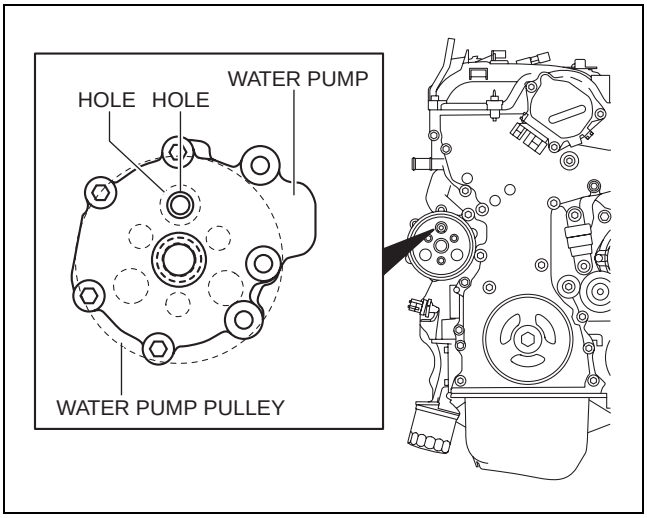
13	Chain tensioner (See 01-10-11 Chain Tensioner Removal Note.)
14	Tensioner arm
15	Timing chain
16	Chain guide (No.2)
17	Crankshaft sprocket
18	Oil pump chain tensioner
19	Oil pump driven sprocket (See 01-10-12 Oil Pump Driven Sprocket Disassembly Note.)
20	Oil pump chain
21	Oil pump drive sprocket
22	Key

Water Pump Pulley Disassembly Note

Caution

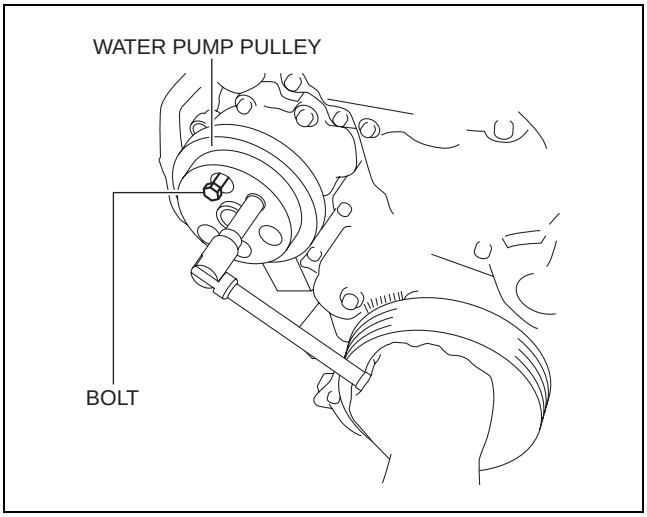
- **Be careful not to damage the belt groove and surface of the water pump pulley when using tools, otherwise it will cause wear, breakage, abnormal noise of the drive belt (stretch belt), damage to the pulley, and rust.**

1. Align the water pump pulley hole with the water pump hole as shown in the figure.



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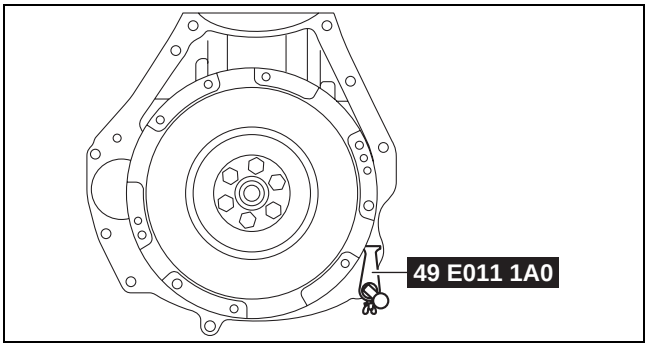
2. Insert an appropriate bolt (length **approx. 70 mm {2.8 in}**) into the water pump hole as shown in the figure, and lock the water pump pulley against rotation.
3. Remove the water pump pulley.
4. Remove the bolt used for locking the water pump pulley against rotation.



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Crankshaft Pulley Lock Bolt Disassembly Note

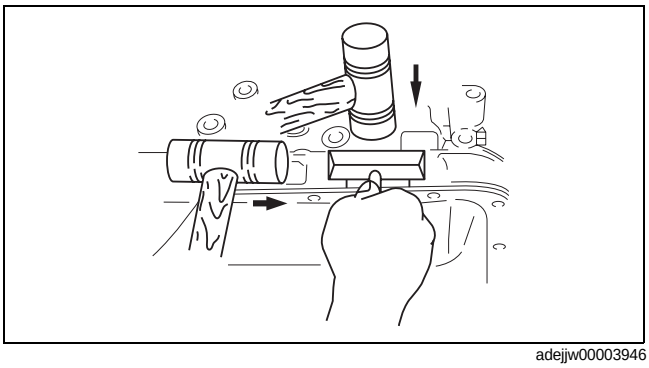
1. Hold the crankshaft using the **SST**.
2. Remove the crankshaft pulley lock bolt.



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Oil Pan Disassembly Note

1. Remove the oil pan using a separator tool.



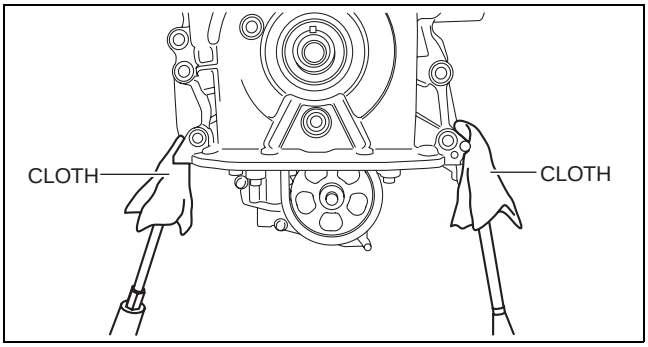
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Engine Front Cover Disassembly Note

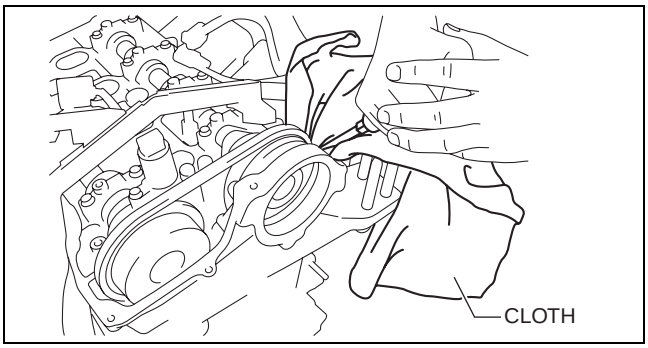
1. Remove the engine front cover installation bolts.
2. Using a screwdriver wrapped in a cloth, peel the sealant away a little at a time, and remove the engine front cover.

Caution

- **Do not apply excessive force to the screwdriver. Otherwise, the engine front cover could be damaged.**
- **Be careful not to scratch or damage the seal surface. Otherwise, it could cause oil leakage.**



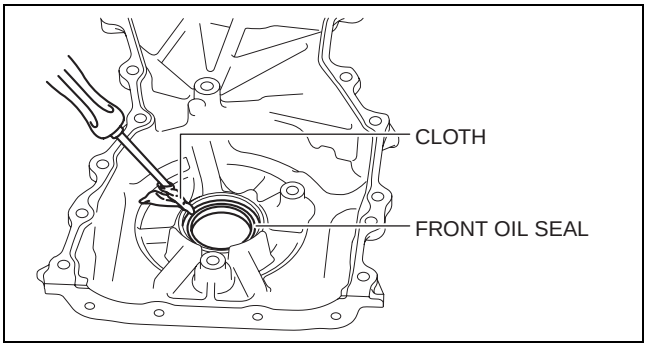
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Front Oil Seal Disassembly Note

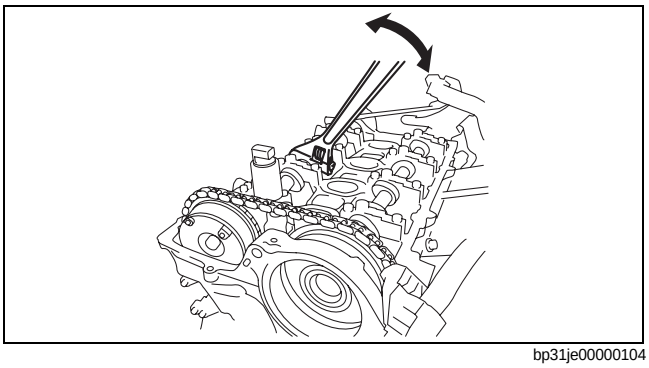
1. Remove the oil seal using a flathead screwdriver with the tip protected by a clean cloth.



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Chain Tensioner Removal Note

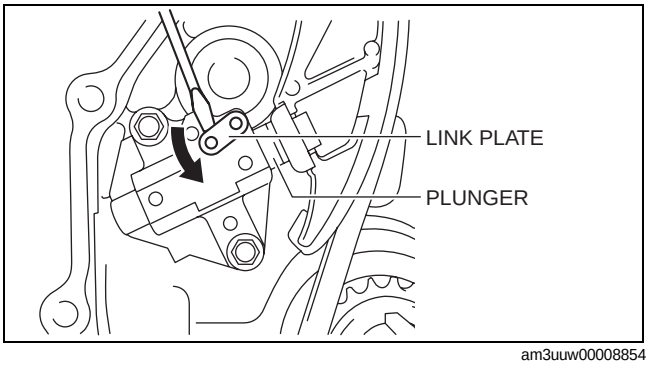
1. While moving the exhaust camshaft back and forth in the direction of the arrow using a wrench on the cast hexagon, press down the link plate of the timing chain tensioner using a precision screwdriver and release the plunger lock.



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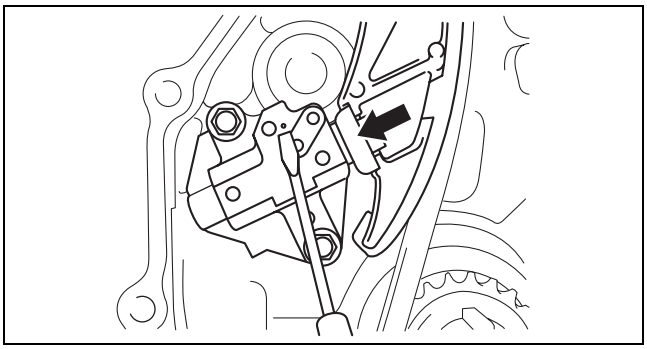
Note

- When moving the exhaust camshaft back and forth, the timing chain pushes the plunger in the chain tensioner making it easier to operate the link plate.



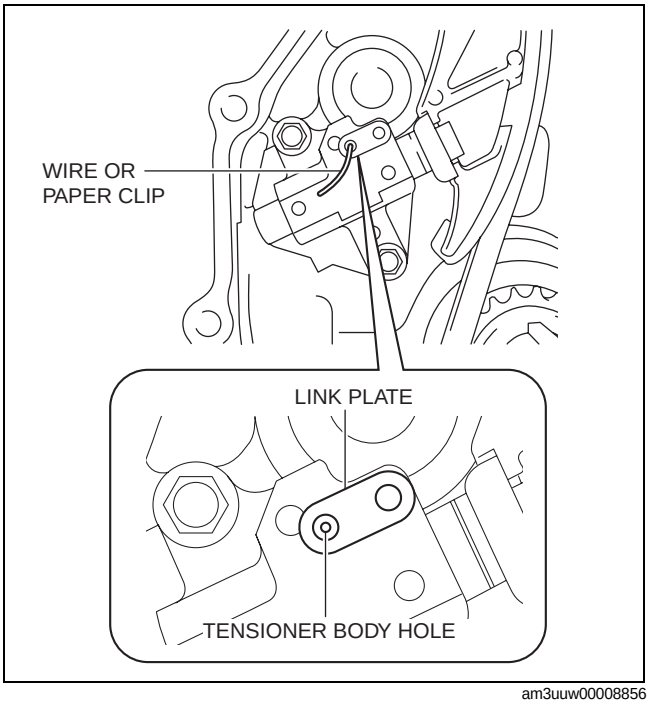
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2. Push back the plunger slowly in the direction shown in the figure with the link plate still pushed down.
3. Remove the screwdriver from the link plate with the plunger still pushed down.
4. Release the force slightly from the plunger, and move it back and forth **2—3 mm {0.08—0.11 in}**.



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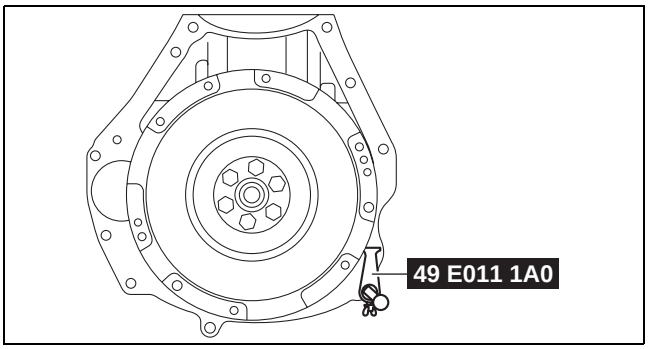
5. Insert a wire with an **approx. diameter of 1.5 mm {0.059 in}** or a paper clip where the link plate hole and the tensioner body hole overlap to secure the link plate and lock the plunger.
6. Remove the chain tensioner.



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Oil Pump Driven Sprocket Disassembly Note

1. Hold the crankshaft using the **SST**.
2. Remove the oil pump driven sprocket.



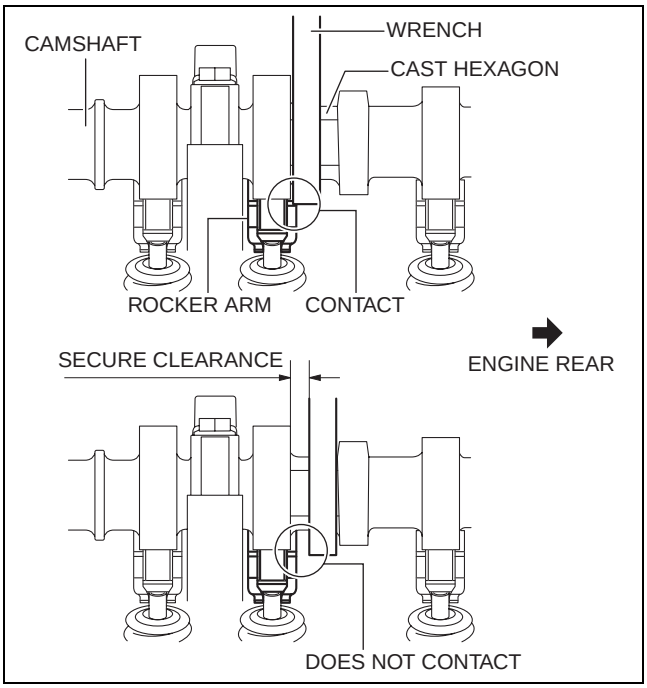
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CYLINDER HEAD DISASSEMBLY (I)

id011000500400

Caution

- **If the camshaft is rotated with the timing chain removed and the piston at the top dead center position, the valve may contact the piston and the engine could be damaged. When rotating the camshaft with the timing chain removed, rotate it after lowering the piston from the top dead center position.**
- **When rotating the camshaft using a wrench on the cast hexagon, the wrench may contact the rocker arm and damage the rocker arm. To prevent damage to the rocker arm when holding the camshaft on the cast hexagon, use the wrench at engine rear side as shown in the figure to secure a clearance between the cam.**

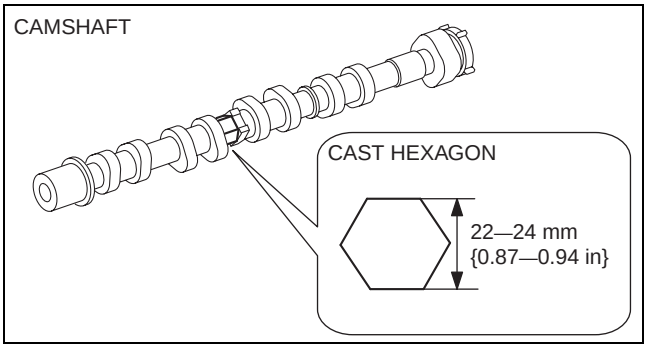


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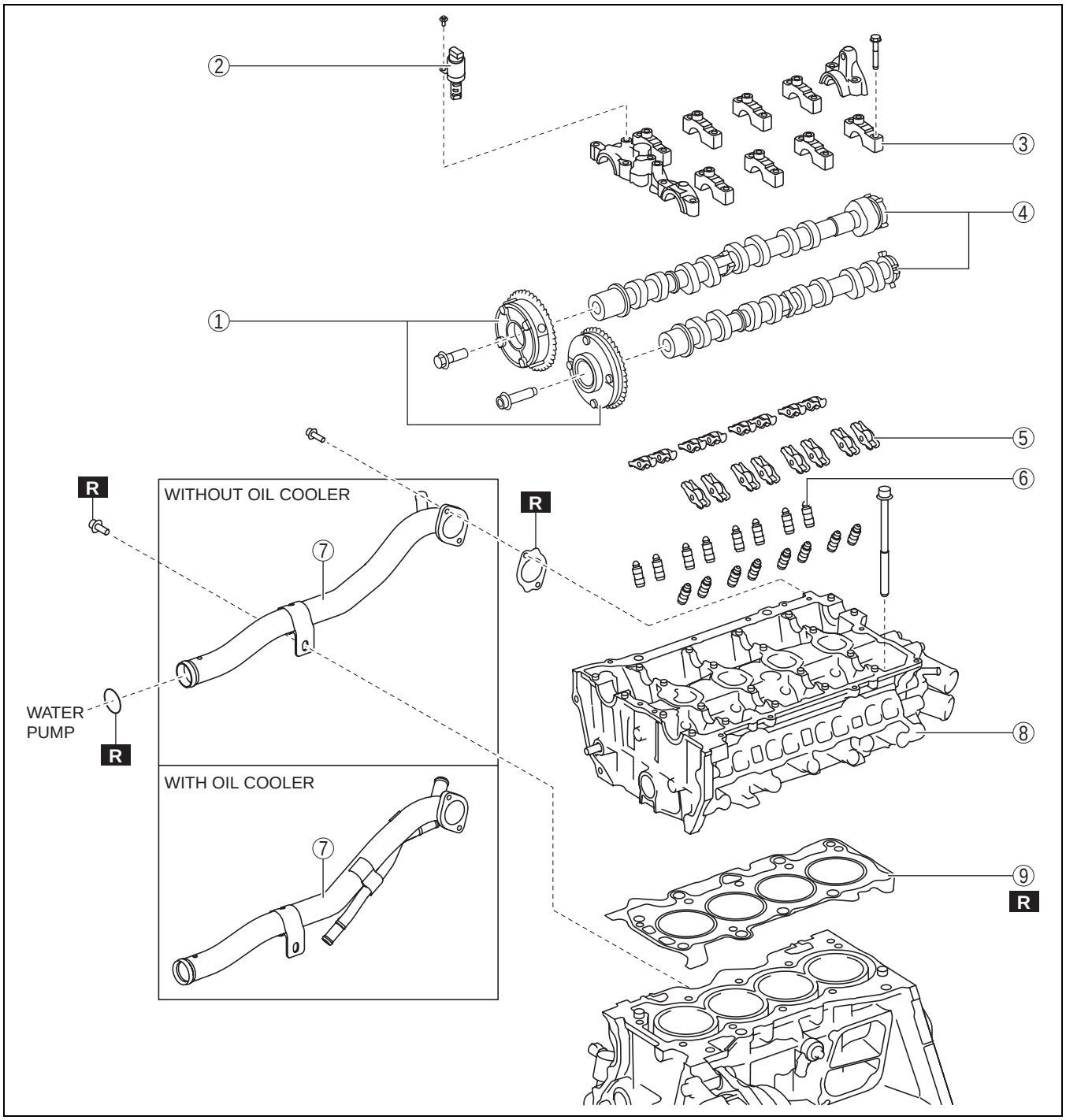
Note

- Width at the cast hexagon of the camshaft is 22—24 mm {0.87—0.94 in}.

1. Disassemble in the order indicated in the table.



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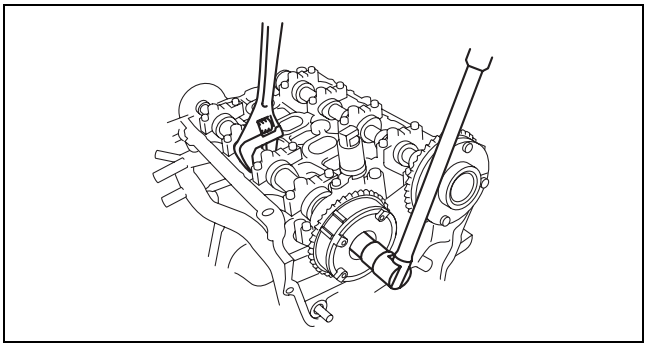
bpe2ue00000013

1	Electric variable valve timing actuator, hydraulic variable valve timing actuator (See 01-10-15 Electric Variable Valve Timing Actuator, Hydraulic Variable Valve Timing Actuator Disassembly Note.)
2	OCV
3	Camshaft cap (See 01-10-15 Camshaft Cap Disassembly Note.)
4	Camshaft

5	Rocker arm (See 01-10-15 Rocker Arm Disassembly Note.)
6	HLA (See 01-10-15 HLA Disassembly Note.)
7	Water inlet pipe
8	Cylinder head (See 01-10-15 Cylinder Head Disassembly Note.)
9	Cylinder head gasket

Electric Variable Valve Timing Actuator, Hydraulic Variable Valve Timing Actuator Disassembly Note

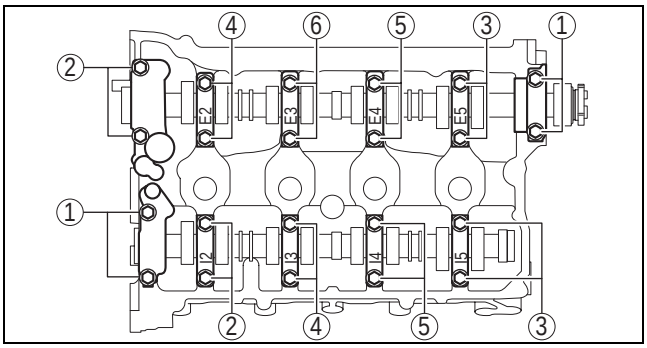
1. Hold the camshaft using a wrench on the cast hexagon and loosen the actuator installation bolt.



bp31je00000161

Camshaft Cap Disassembly Note

1. Before removing the camshaft cap, Inspect the camshaft end play. (See 01-10-28 CAMSHAFT INSPECTION.)
2. Loosen the camshaft cap installation bolts in two or three passes in the order shown in the figure and remove the camshaft caps.



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Rocker Arm Disassembly Note

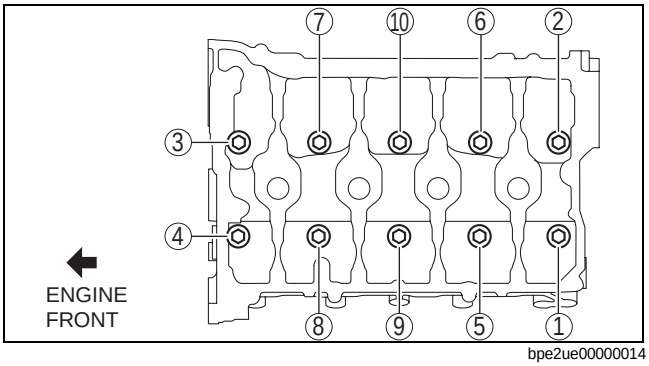
1. Keep the rocker arms in the order of removal to enable reassembly in their original positions.

HLA Disassembly Note

1. Keep the HLAs in the order of removal to enable reassembly in their original positions.

Cylinder Head Disassembly Note

1. Loosen the cylinder head installation bolts in two or three passes in the order shown in the figure and remove them.

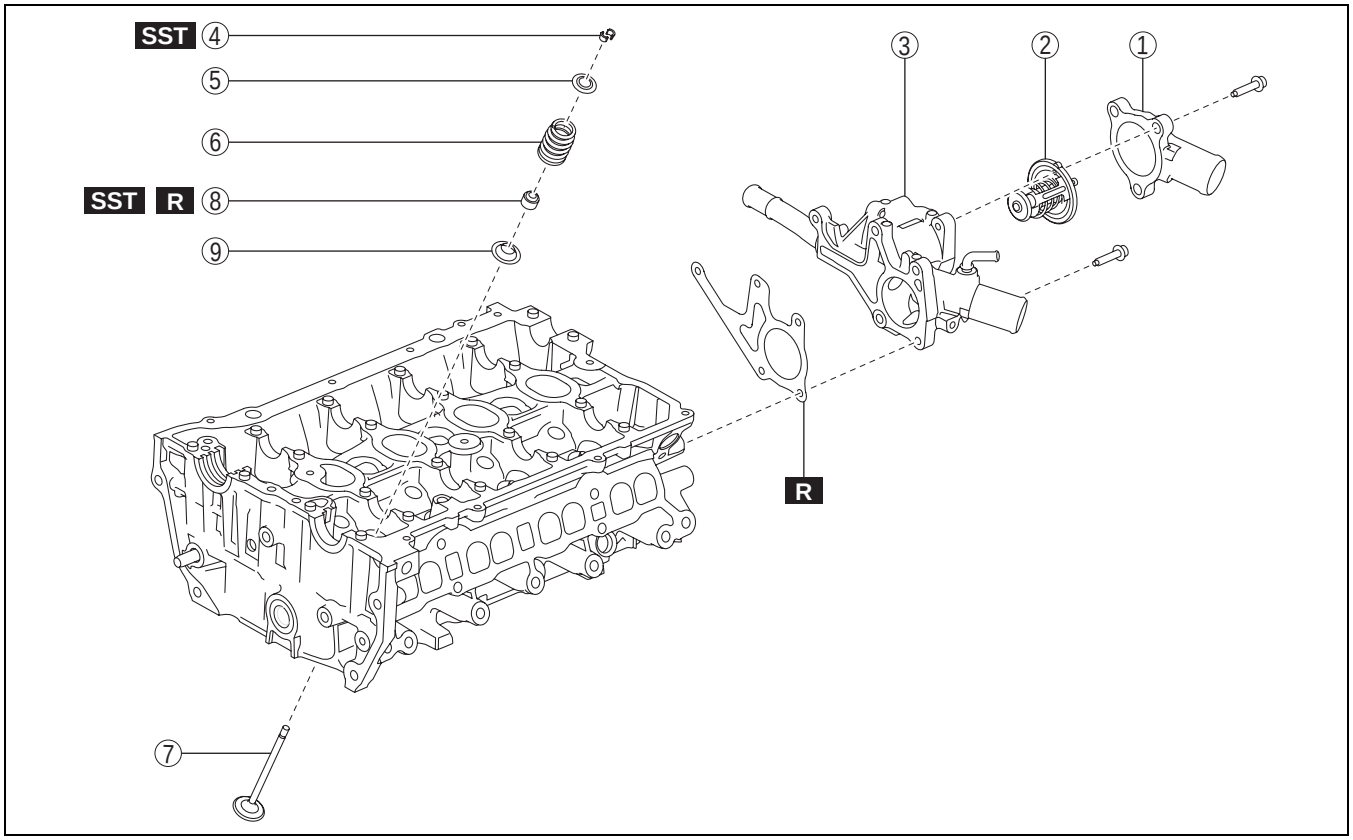


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CYLINDER HEAD DISASSEMBLY (II)

id011000500500

1. Disassemble in the order indicated in the table.



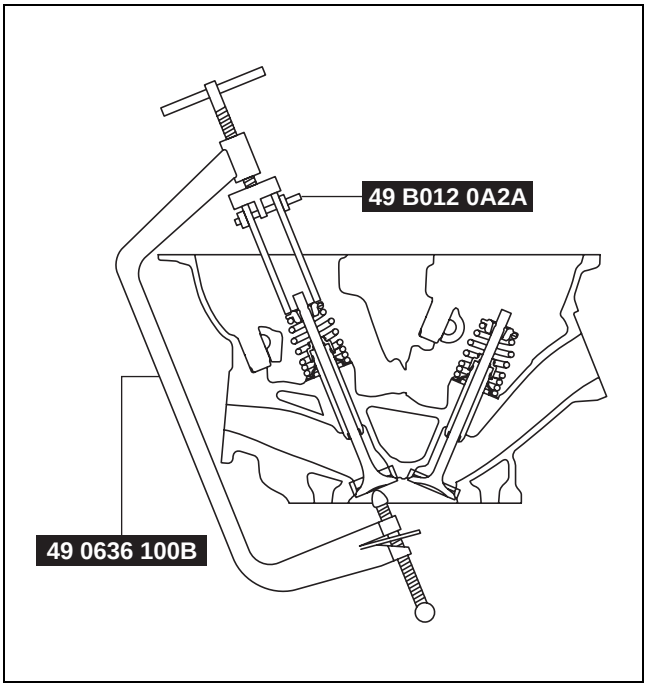
bpe2ue00000015

1	Thermostat cover
2	Thermostat
3	Water outlet
4	Valve keeper (See 01-10-17 Valve Keeper Disassembly Note.)
5	Upper valve spring seat

6	Valve spring
7	Valve
8	Valve seal (See 01-10-17 Valve Seal Disassembly Note.)
9	Lower valve spring seat

Valve Keeper Disassembly Note

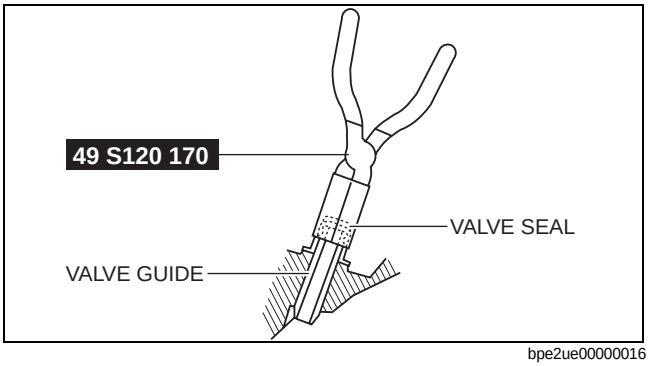
1. Remove the valve keeper using the **SSTs**.



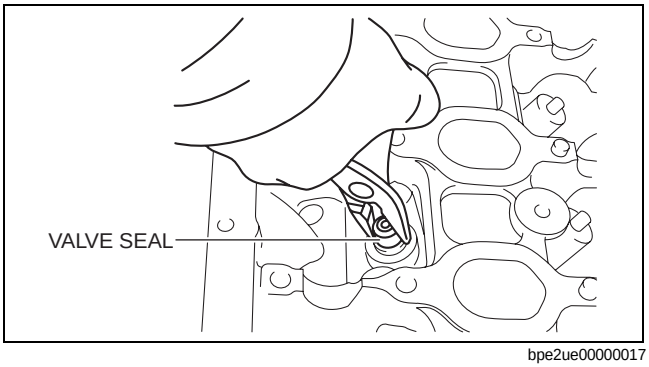
bp31je00000163

Valve Seal Disassembly Note

1. Remove the valve seal using the **SST** or pliers, etc.



bpe2ue00000016



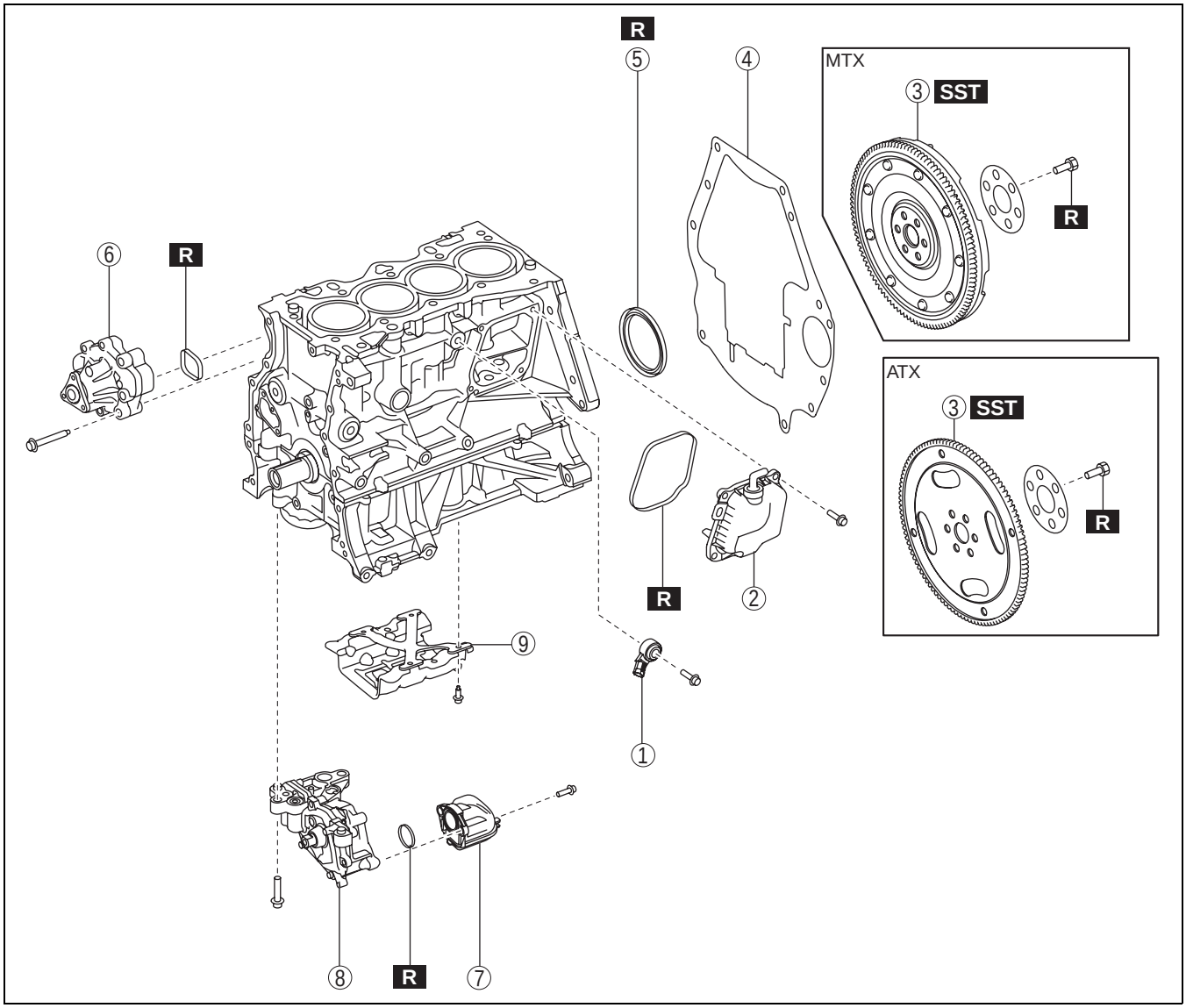
bpe2ue00000017

CYLINDER BLOCK DISASSEMBLY (I)

id011000500600

Caution
- **Do not disassemble the oil pump and water pump because it is a precision unit.**

1. Disassemble in the order indicated in the table.



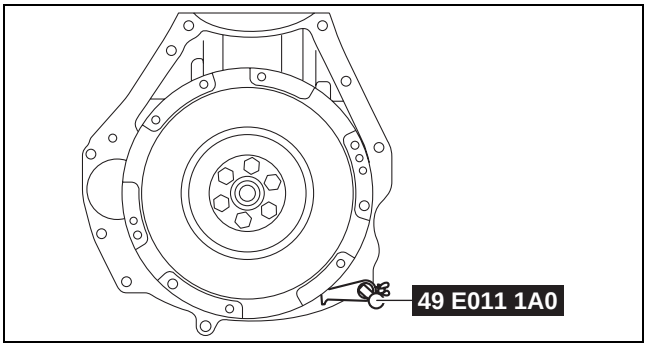
bpe2ue00000018

1	Knock sensor
2	Oil separator
3	Flywheel (MTX), Drive plate (ATX) (See 01-10-19 Flywheel (MTX), Drive Plate (ATX) Disassembly Note.)
4	End plate

5	Rear oil seal (See 01-10-19 Rear Oil Seal Removal Note.)
6	Water pump
7	Oil strainer
8	Oil pump
9	Oil baffle plate

Flywheel (MTX), Drive Plate (ATX) Disassembly Note

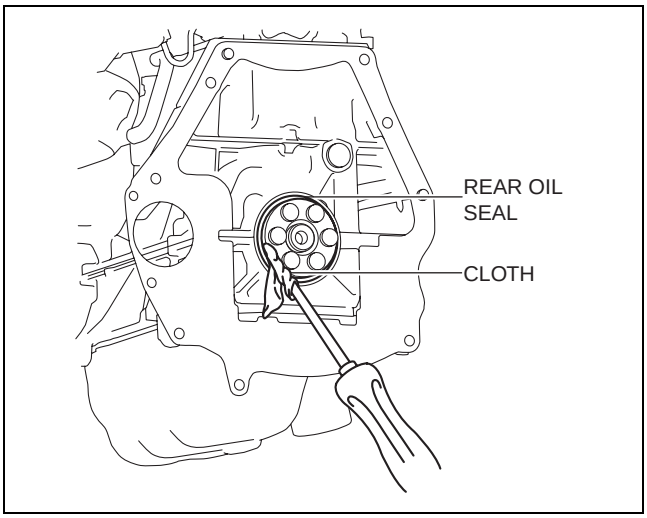
1. Hold the crankshaft using the **SST**.



bpe2ue00000019

Rear Oil Seal Removal Note

1. Cut the oil seal lip using a utility knife.
2. Remove the oil seal using a flathead screwdriver with the tip protected by a clean cloth to prevent damage to the oil seal sliding part of the crankshaft.

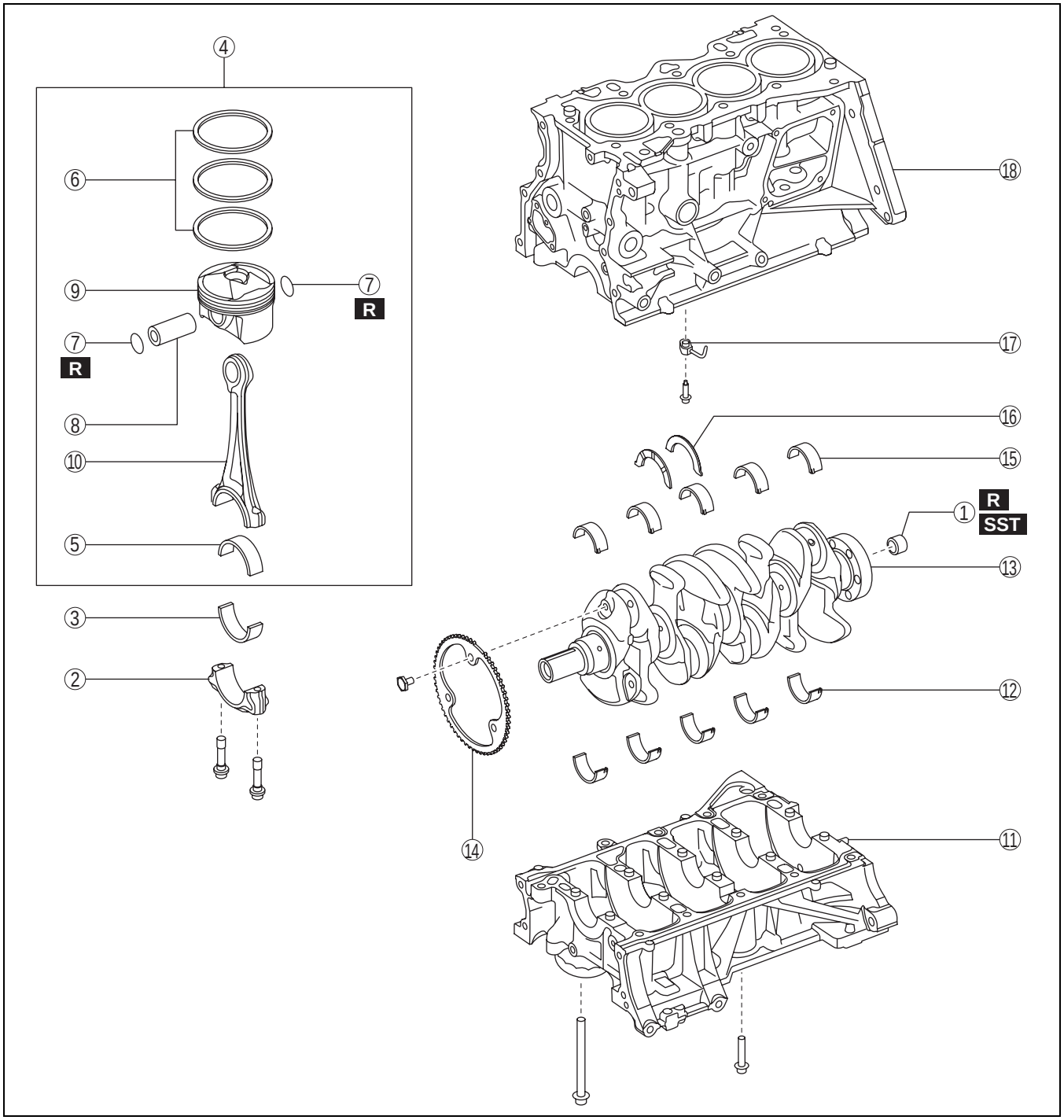


am3uuw00008834

CYLINDER BLOCK DISASSEMBLY (II)

id011000500700

1. Disassemble in the order indicated in the table.



bpe2ue00000020

1	Pilot bearing (MTX) (See 01-10-21 Pilot Bearing Disassembly Note.)
2	Connecting rod cap (See 01-10-21 Connecting Rod Cap Disassembly Note.)
3	Lower connecting rod bearing (See 01-10-21 Connecting Rod Bearing Disassembly Note.)
4	Piston, connecting rod (See 01-10-21 Piston, Connecting Rod Disassembly Note.)

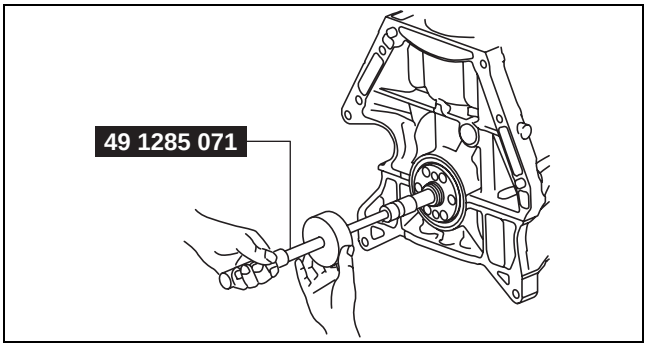
5	Upper connecting rod bearing (See 01-10-21 Connecting Rod Bearing Disassembly Note.)
6	Piston ring
7	Snap ring (See 01-10-22 Snap Ring Disassembly Note.)
8	Piston pin
9	Piston
10	Connecting rod

11	Lower cylinder block (See 01-10-22 Lower Cylinder Block Disassembly Note.)
12	Lower main bearing (See 01-10-23 Thrust Bearing And Main Bearing Disassembly Note.)
13	Crankshaft (See 01-10-23 Crankshaft Disassembly Note.)
14	Plate
15	Upper main bearing (See 01-10-23 Thrust Bearing And Main Bearing Disassembly Note.)
16	Thrust bearing (See 01-10-23 Thrust Bearing And Main Bearing Disassembly Note.)
17	Oil jet valve
18	Upper cylinder block

Pilot Bearing Disassembly Note

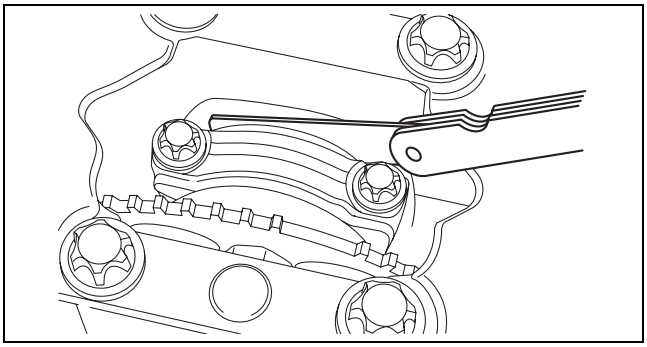
Note
- The pilot bearing does not need to be removed unless you are replacing it.

1. Use the **SST** to remove the pilot bearing.



bpe2ue00000021

Connecting Rod Cap Disassembly Note
1. Before removing the connecting rod cap, inspect the connecting rod side clearance. (See 01-10-33 CONNECTING ROD CLEARANCE INSPECTION.)
2. The removed connecting rod caps are to be kept so that they can be assembled to the same positions and in the direction as before removal.

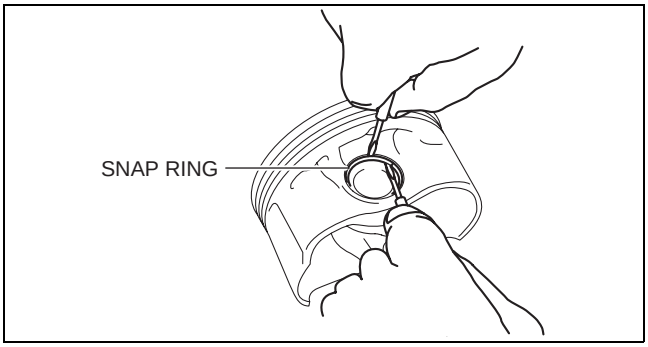

bp31je00000044

Connecting Rod Bearing Disassembly Note
1. The removed connecting rod bearings are to be kept so that they can be assembled to the same positions and in the direction as before removal.

Piston, Connecting Rod Disassembly Note
1. Before removing the piston and connecting rod, remove the carbon in the cylinder.
2. Before removing the piston and connecting rod, inspect the oil clearance at the large end of the connecting rod. (See 01-10-33 CONNECTING ROD CLEARANCE INSPECTION.)

Snap Ring Disassembly Note

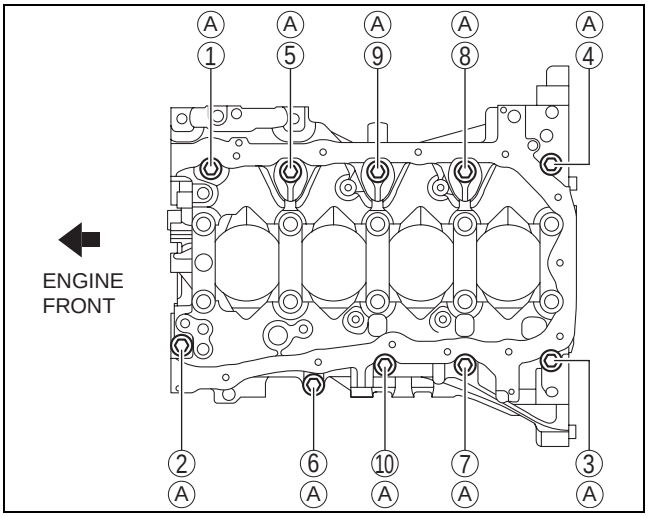
1. Before removing the snap ring, inspect that the large end of connecting rod drops under its own weight with no resistance. (See 01-10-33 PISTON AND CONNECTING ROD INSPECTION.)
2. Remove the snap ring using a flathead screwdriver.



bpe2ue00000022

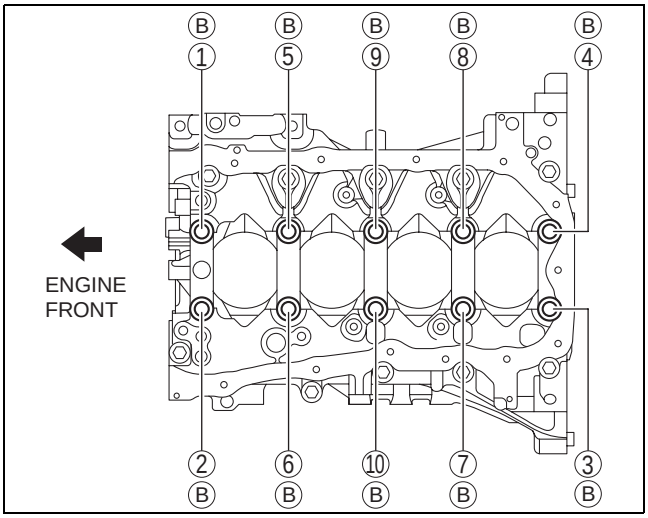
Lower Cylinder Block Disassembly Note

1. Before removing the lower cylinder block, inspect the crankshaft end play. (See 01-10-34 CRANKSHAFT INSPECTION.)
2. Loosen the lower cylinder block installation bolts A in two or three passes in the order shown in the figure and remove them.



bpe2ue00000023

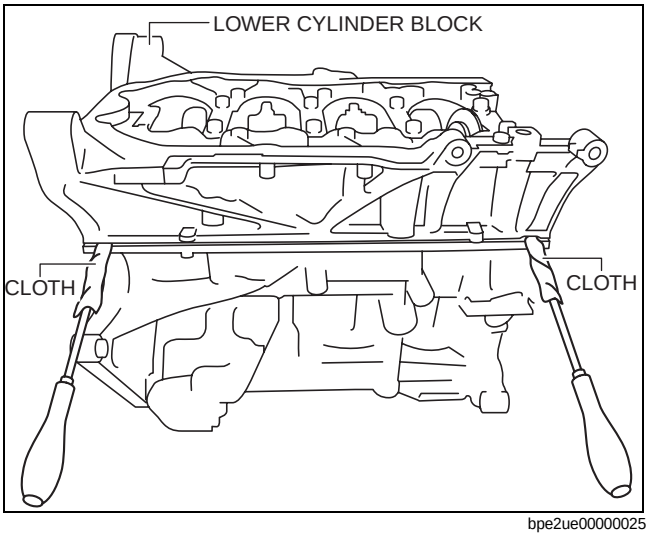
3. Loosen the lower cylinder block installation bolts B in two or three passes in the order shown in the figure and remove them.



bpe2ue00000024

4. Using a screwdriver wrapped in a cloth, peel the sealant away a little at a time, and remove the lower cylinder block.

Caution
- **Do not apply excessive force to the screwdriver. Otherwise, the lower cylinder block could be damaged.**
- **Be careful not to scratch or damage the seal surface. Otherwise, it could cause oil leakage.**



bpe2ue00000025

Thrust Bearing And Main Bearing Disassembly Note

1. The removed thrust bearings and main bearings are to be kept so that they can be assembled to the same positions and in the direction as before removal.

Crankshaft Disassembly Note

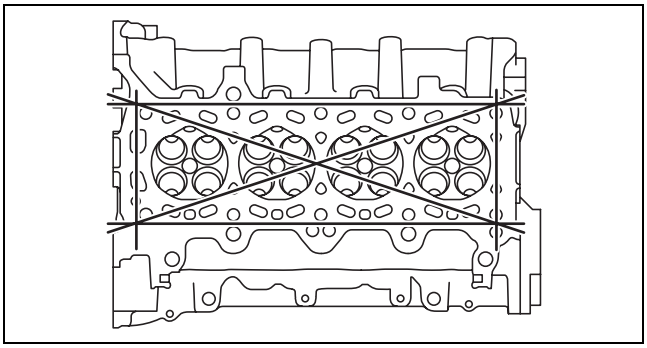
Caution
- **Placing the crankshaft on a disassembly bench will deform or damage it because the plate for the crankshaft position sensor signal detection installed to the crankshaft is larger than the counterweight. Therefore, set wood blocks or similar objects on the both sides of the crankshaft so that the plate does not contact the disassembly bench directly when placing the crankshaft on it bench.**

CYLINDER HEAD INSPECTION

id011000507100

1. Inspect the cylinder head surface for cracks and other damage using a red dye penetrant.
   - If there is a malfunction, replace the cylinder head.
2. Measure the combustion chamber side of the cylinder head for distortion in six directions as shown in the figure using a straight edge and feeler gauge.
   - If the distortion exceeds the maximum specification, replace the cylinder head.

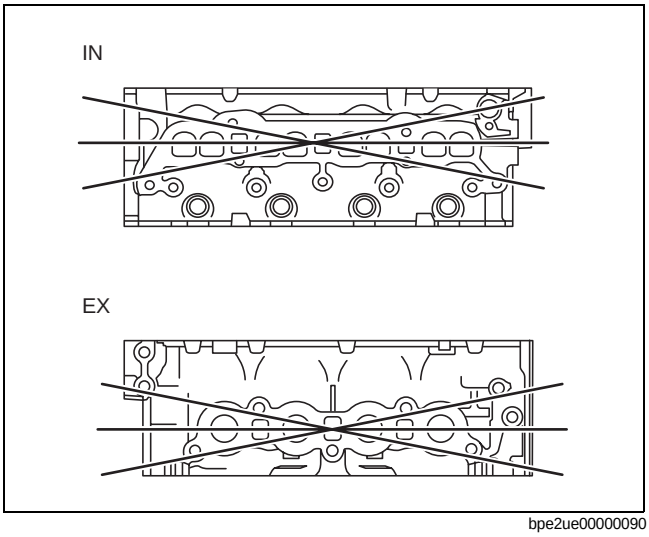
Maximum distortion, head gasket side of the cylinder head
0.05 mm {0.002 in}


bp31je00000142

3. Inspect the contact surface of the exhaust manifold and the intake manifold for distortion by measuring as shown in the figure using a straight edge and feeler gauge.
   - If the distortion on intake manifold side exceeds the maximum specification, replace the cylinder head.
   - If the distortion on exhaust manifold side exceeds the maximum specification, grind the surface or replace the cylinder head.

   Maximum distortion, manifold side
   IN: 0.10 mm {0.0039 in}
   EX: 0.05 mm {0.002 in}

   Maximum cutting length, manifold side
   IN: Cutting not authorized
   EX: 0.20 mm {0.0079 in}



bpe2ue00000090

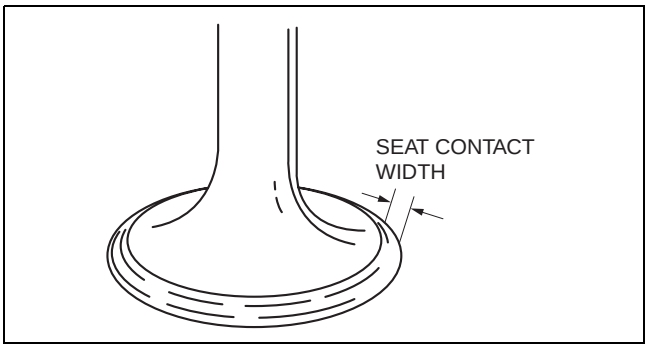
VALVE SEAT INSPECTION/REPAIR

id011000501300

1. Measure the contact width of the valve face and the valve seat using the valve lapping compound.
   - If it is not within the specification, resurface the valve seat using the **45**° valve seat cutter.

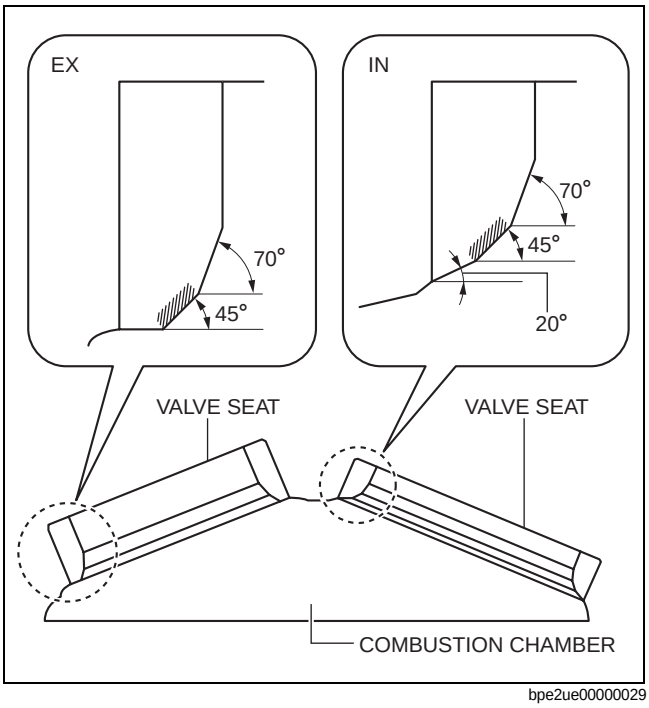
   Standard valve seat contact width
   1.41 mm {0.0555 in}

   Valve seat angle
   45°



bpe2ue00000028

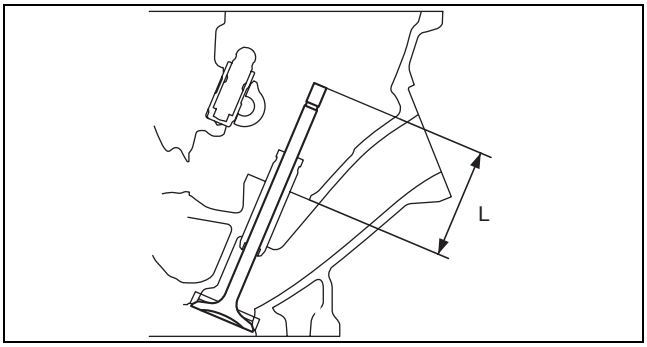
2. Verify that the area where the valve seat contacts the valve face is centered.
   - If the seating position is too high, correct the valve seat using a **70**° (IN) **70**° (EX) valve seat cutter and a **45**° valve seat cutter.
   - If the seating position is too low, correct as follows:
     — IN: Correct the valve seat using a **20**° valve seat cutter and then using a **45**° valve cutter.
     — EX: Correct the valve seat using a **45**° valve seat cutter.



bpe2ue00000029

3. Inspect the valve seat for sinkage. Measure the protruding length (dimension L) of the valve stem using a valve of standard length.
   - If it is not within the specification, replace the cylinder head.

   Standard valve seat sinkage amount (Dimension L)
   IN: 48.73—50.27 mm {1.919—1.979 in}
   EX: 48.73—50.27 mm {1.919—1.979 in}



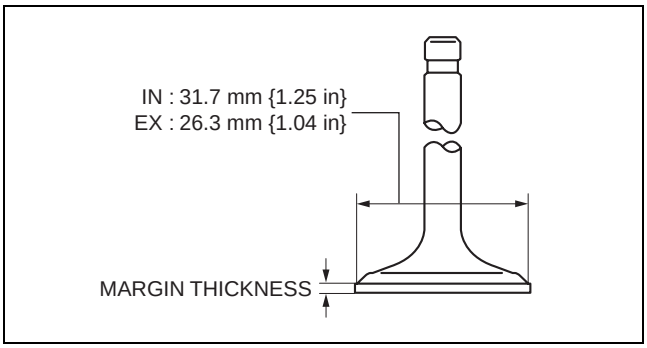
bp31je00000051

VALVE, VALVE GUIDE INSPECTION

id011000506200

1. Measure the valve head margin thickness using a vernier caliper.
   - If it is less than the standard specification, replace the valve.

   Standard valve head margin thickness
   IN: 1.75—1.95 mm {0.0689—0.0767 in}
   EX: 1.95—2.15 mm {0.0768—0.0846 in}

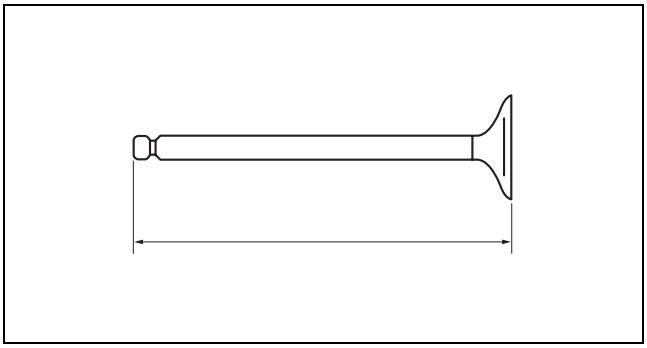


bpe2ue00000083

2. Measure the length of the each valve using a vernier caliper.
   - If it is less than the minimum specification, replace the valve.

   Standard valve length
   IN: 106.55—107.15 mm {4.1949—4.2185 in}
   EX: 116.55—117.15 mm {4.5886—4.6122 in}

   Minimum valve length
   IN: 106.33 mm {4.1862 in}
   EX: 116.33 mm {4.5799 in}

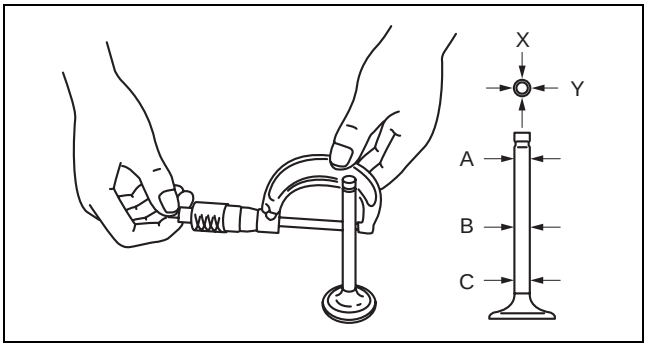


bez0je00000017

3. Measure the valve stem diameter of each valve using the micrometer. Measurement positions total six and are in the X and Y directions, at three points (A, B, and C) as shown in the figure.
   - If it is less than the minimum specification, replace the valve.

   Standard valve stem diameter
   IN: 5.470—5.485 mm {0.2154—0.2159 in}
   EX: 5.465—5.480 mm {0.2152—0.2157 in}

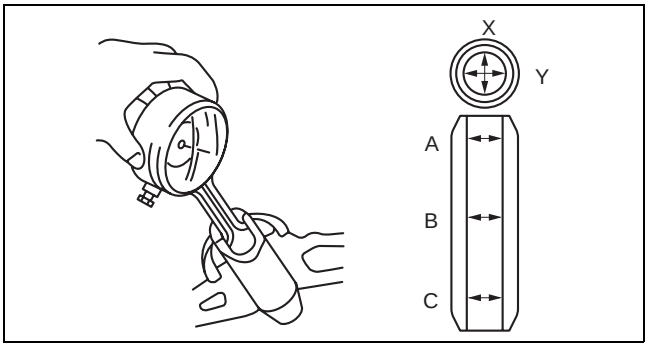
   Minimum valve stem diameter
   IN: 5.424 mm {0.2135 in}
   EX: 5.419 mm {0.2133 in}



bpe2ue00000084

4. Measure the inner diameter of each valve guide using the caliper gauge. Measurement positions total six and are in the X and Y directions, at three points (A, B, and C) as shown in the figure.
   - If it is not within the specification, replace the valve guide.

   Standard valve guide inner diameter
   IN: 5.510—5.530 mm {0.2170—0.2177 in}
   EX: 5.510—5.530 mm {0.2170—0.2177 in}

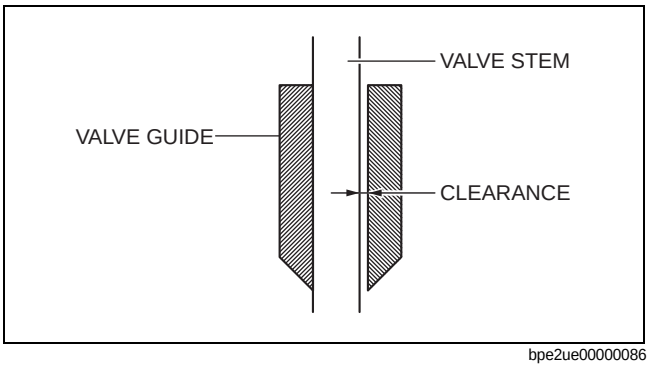


bpe2ue00000085

5. Calculate the clearance between the valve stem and the valve guide by subtracting the inner diameter of the valve guide from the outer diameter of the corresponding valve stem.
   - If it exceeds the maximum specification, replace the valve or valve guide.

   Standard clearance between valve stem and guide
   IN: 0.025—0.060 mm {0.0010—0.0023 in}
   EX: 0.030—0.065 mm {0.0012—0.0025 in}

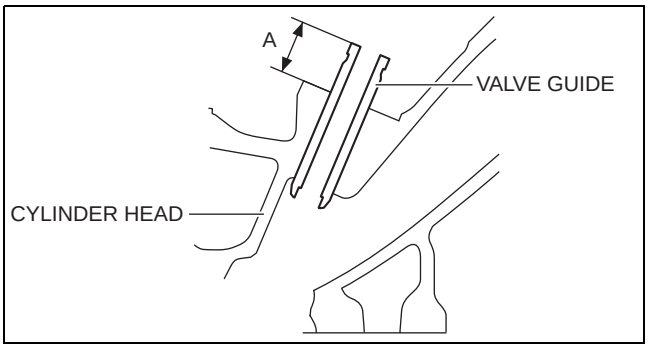
   Maximum clearance between valve stem and guide
   0.10 mm {0.0039 in}



bpe2ue00000086

6. Measure the projection height (dimension A) of each valve guide using the vernier caliper.
   - If it is not within the specification, replace the valve guide.

   Standard valve guide projection height
   IN: 16.4—17.0 mm {0.646—0.669 in}
   EX: 16.4—17.0 mm {0.646—0.669 in}



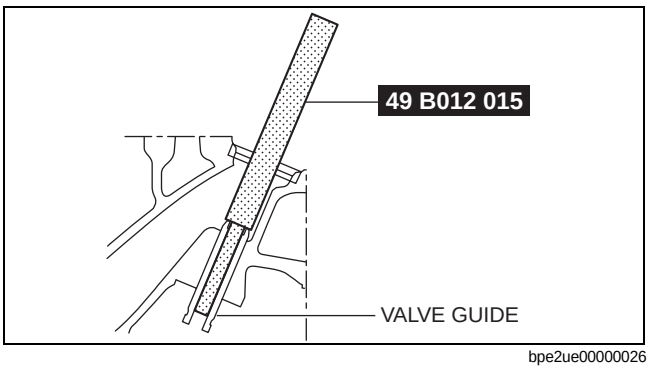
bpe2ue00000087

VALVE GUIDE REPLACEMENT

id011000501200

Removal

1. Tap the valve guide out from combustion chamber side using the **SST**.

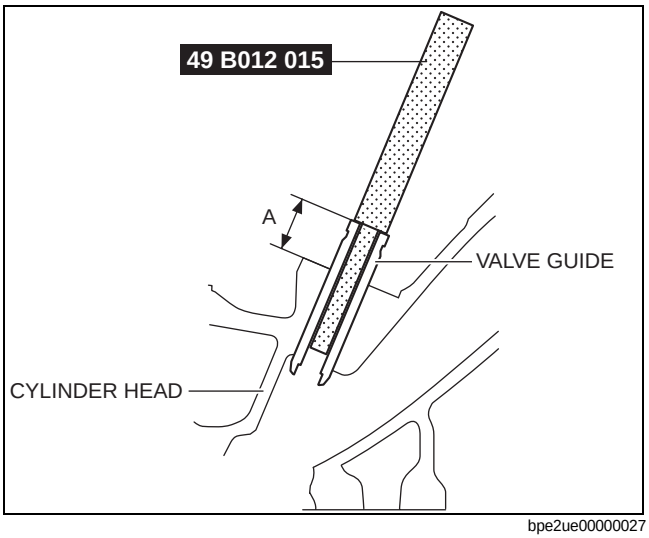


bpe2ue00000026

Installation

1. Apply clean engine oil to the valve guide.
2. Tap the valve guide from the camshaft side using the SST so that the projection height (dimension A) is within the specification.

Standard valve guide projection height
IN: 16.4—17.0 mm {0.646—0.669 in}
EX: 16.4—17.0 mm {0.646—0.669 in}

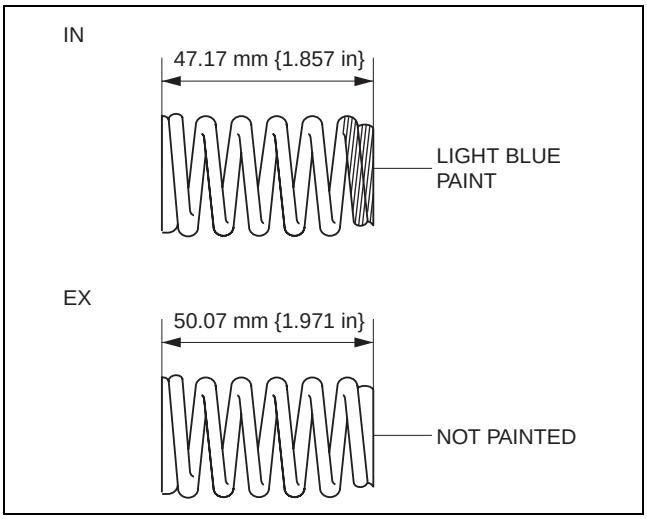


bpe2ue00000027

VALVE SPRING INSPECTION

id011000501400

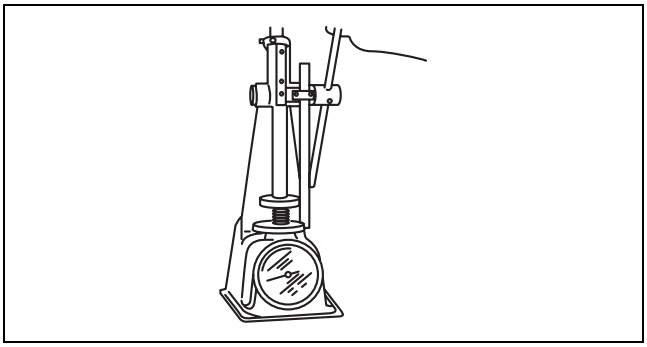
Caution
- **The valve springs differ depending on the IN and EX sides.Therefore, verify the free length or identification paint beforehand and inspect the valve springs.**



bpe2ue00000030

1. Measure the valve spring height using the spring tester.
   - If it is not within the specification, replace the valve spring.

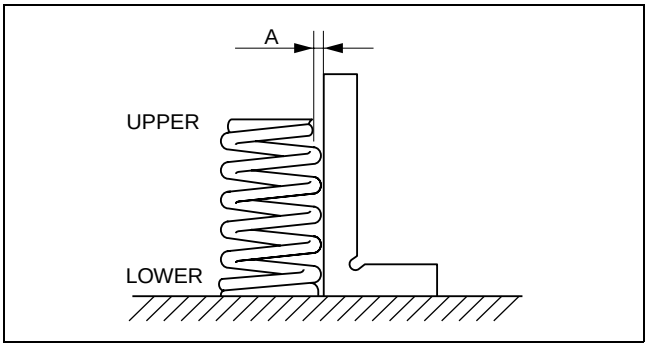
Valve spring installation height
IN: When pressurized with spring force of 190—210 N {19.4—21.4 kgf, 42.8—47.2 lbf}, spring height is 38.0 mm {1.50 in}
EX: When pressurized with spring force of 228—252 N {23.3—25.6 kgf, 51.3—56.6 lbf}, spring height is 38.0 mm {1.50 in}



bp31je00000053

2. Measure the amount of off-square on the valve spring using a square.
   (1) Rotate the valve spring one full turn and measure A at the point where the gap is the largest.
      - If it exceeds the maximum specification, replace the valve spring.

Maximum valve spring off-square
IN: 2.0 ° (1.6 mm {0.063 in})
EX: 2.0 ° (1.7 mm {0.067 in})



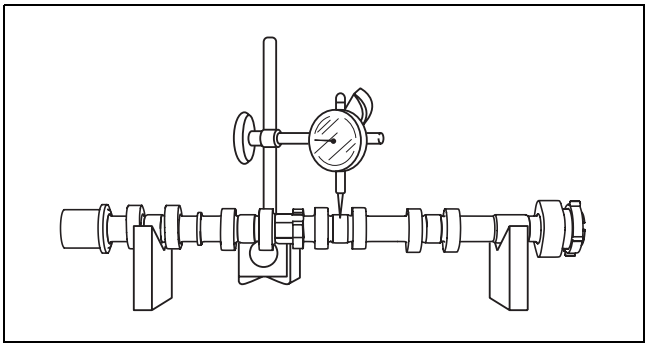
beltze00000017

CAMSHAFT INSPECTION

id011000501500

1. Set the No.1 and No.5 journals of the camshaft on V-blocks.
2. Measure the camshaft runout using the dial gauge.
   - If it exceeds the maximum specification, replace the camshaft.

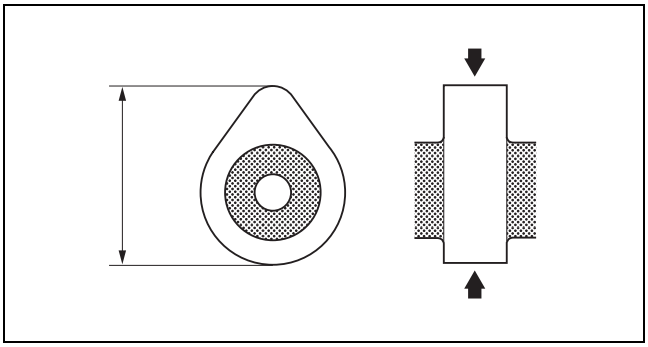
Maximum camshaft runout
0.030 mm {0.0012 in}


bpe2ue00000031

3. Measure the cam height using the micrometer as shown in the figure.
   - If it is less than the minimum specification, replace the camshaft.

Standard cam height
IN: 41.57 mm {1.637 in}
EX: 40.37 mm {1.589 in}

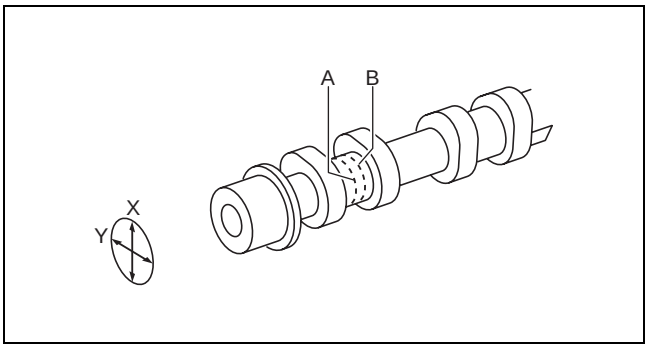
Minimum cam height
IN: 41.50 mm {1.634 in}
EX: 40.30 mm {1.587 in}


bp31je00000171

4. Measure the journal diameter using the micrometer. Measurement positions total four and are in the X and Y directions, at two points (A and B) as shown in the figure.
   - If it is less than the minimum specification, replace the camshaft.

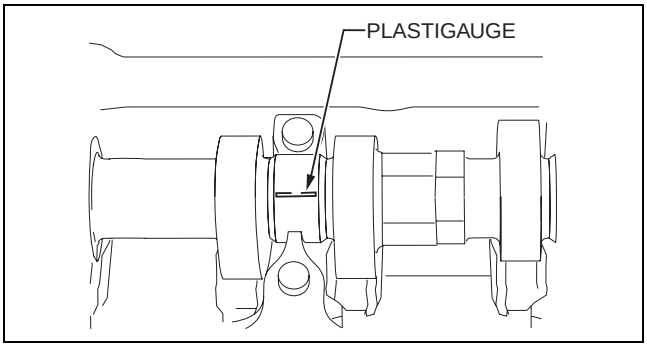
Standard camshaft journal diameter
24.96—24.98 mm {0.9827—0.9834 in}

Minimum camshaft journal diameter
24.93 mm {0.9815 in}



bp31je00000172

5. Measure the camshaft journal oil clearance using the following procedure:
   (1) Clean the camshaft journal and the journal receptacle part.
   (2) Put the camshaft on the cylinder head with the rocker arm detached.
   (3) Cut the plastigauge to the same length as the journal width and position it parallel to the camshaft.
   (4) Install the camshaft caps. (See 01-10-51 CYLINDER HEAD ASSEMBLY (II).)
   (5) Remove the camshaft caps. (See 01-10-13 CYLINDER HEAD DISASSEMBLY (I).)
   (6) Measure the camshaft journal oil clearance.
      - If it exceeds the maximum specification, replace the cylinder head.

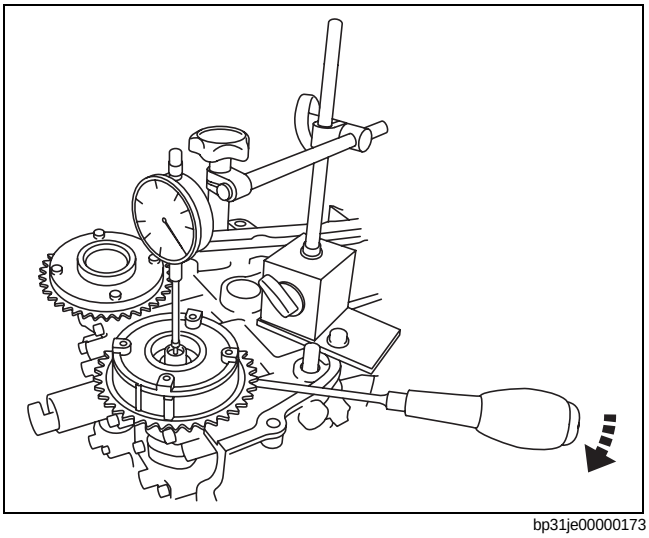


bpe2ue00000032

Standard camshaft journal oil clearance
0.035—0.080 mm {0.0014—0.0031 in}

Maximum camshaft journal oil clearance
0.090 mm {0.0035 in}

6. Measure the camshaft end play using a dial gauge.
   - If it exceeds the maximum specification, replace the cylinder head or camshaft.


bp31je00000173

Standard camshaft end play
0.07—0.22 mm {0.003—0.008 in}

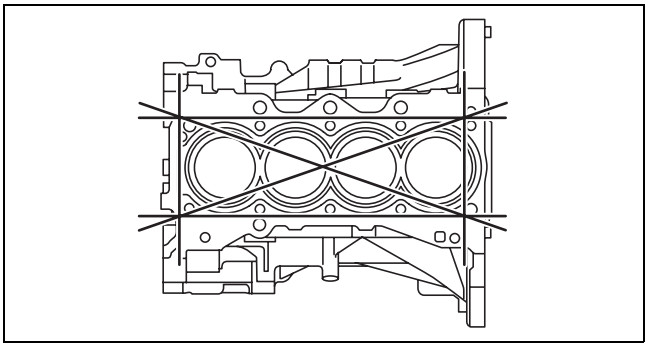
Maximum camshaft end play
0.23 mm {0.0091 in}

CYLINDER BLOCK INSPECTION

id011000507200

1. Measure the cylinder block for distortion in six directions as shown in the figure using a straight edge and feeler gauge.
   - If it exceeds the maximum specification, replace the cylinder block.

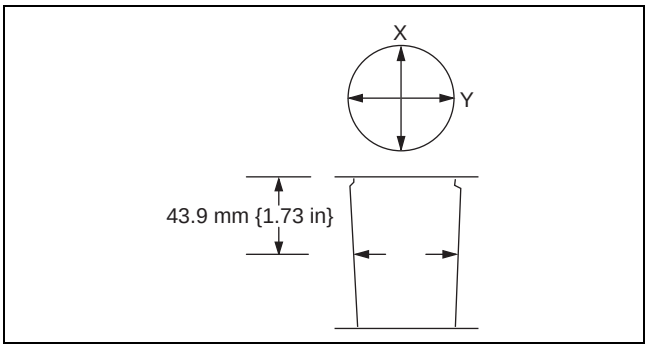
   Maximum distortion, head gasket side of the cylinder block
   0.10 mm {0.0039 in}



bp31je00000144

2. Measure the cylinder bore diameter using the cylinder gauge. The measurement position is in the X and Y directions at a point **43.9 mm {1.73 in}** below the top surface of the cylinder as shown in the figure.
   - If it is not within the specification, replace the cylinder block.

   Standard cylinder bore diameter
   83.50—83.53 mm {3.2875—3.2885 in}



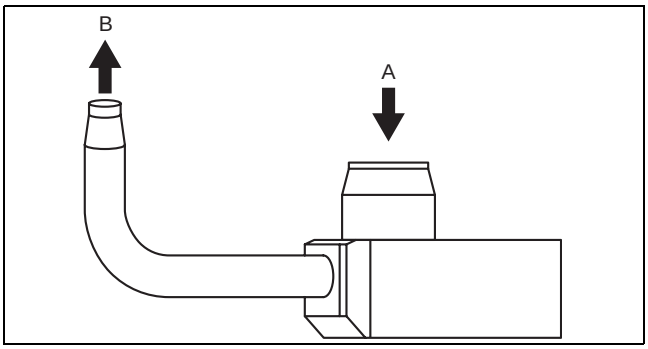
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OIL JET VALVE INSPECTION

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1. Apply compressed air to oil jet valve A and verify that air passes through oil jet valve B.
   - If air does not flow, replace the oil jet valve.
   - If there is air flow with air compressor of less than **180 kPa {1.84 kgf/cm^2, 26.1 psi}**, replace the oil jet valve.

   Air pressure
   180—220 kPa {1.84—2.24 kgf/cm^2, 26.2—31.9 psi}



bp31je00000131

PISTON INSPECTION

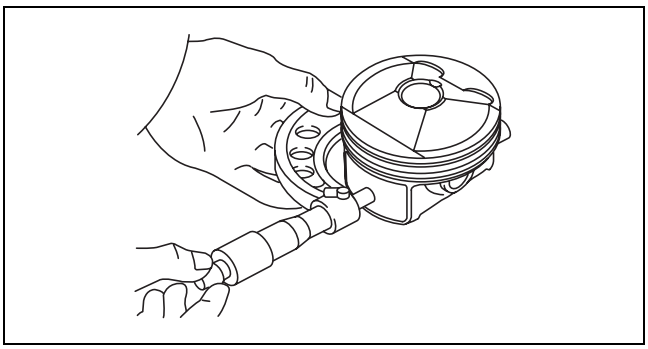
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Caution
- **If the piston is replaced, replace the piston, piston pin, and the snap ring as a single component.**

1. Measure the piston outer diameter using the micrometer. The measurement position is **8.0 mm {0.31 in}** from the lower end of the piston (area with no coating on the piston skirt) and in the thrust direction.
   - If it is not within the specification, replace the piston.

   Standard piston outer diameter
   83.465—83.495 mm {3.2861—3.2872 in}

2. Measure the cylinder bore diameter. (See 01-10-30 CYLINDER BLOCK INSPECTION.)



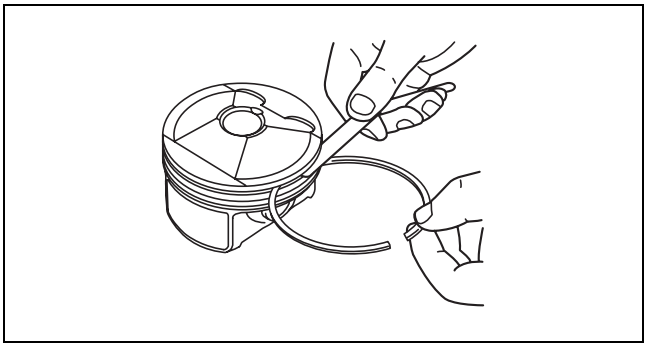
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3. Calculate the cylinder-to-piston clearance from the cylinder bore diameter and the piston outer diameter.
   - If the clearance exceeds the maximum specification, replace the piston or cylinder block.

Standard clearance between piston and cylinder
0.025—0.045 mm {0.0010—0.0017 in}

Maximum clearance between piston and cylinder
0.063 mm {0.0025 in}

4. Measure the piston-to-ring groove clearance along the perimeter using a feeler gauge. For the O-ring, measure the clearance with the O-ring assembled to the piston.
   - If the clearance exceeds the maximum specification, replace the piston or piston ring.



bpe2ue00000034

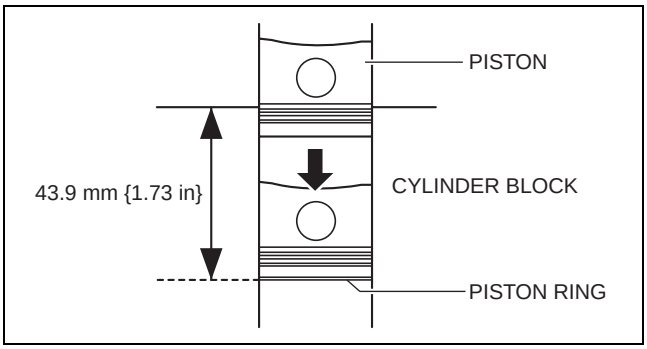
Standard clearance between piston ring and ring groove
Top: 0.04—0.08 mm {0.002—0.003 in}
Second: 0.03—0.07 mm {0.0012—0.0027 in}
Oil: 0.04—0.12 mm {0.002—0.004 in}

Maximum clearance between piston ring and ring groove
Top: 0.12 mm {0.0047 in}
Second: 0.10 mm {0.0039 in}
Oil: 0.17 mm {0.0067 in}

PISTON RING INSPECTION

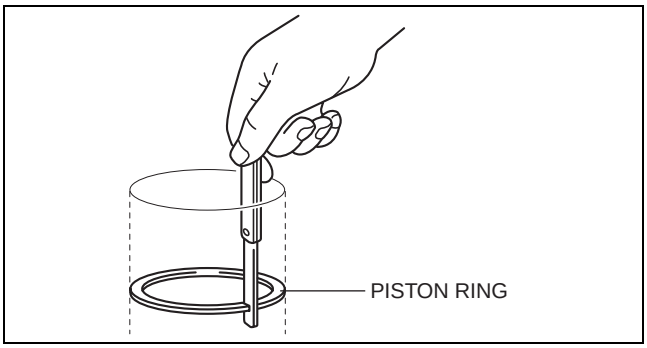
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1. Using the piston, press the piston ring parallel into the cylinder to **43.9 mm {1.73 in}** from the upper end of the cylinder block.



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2. Measure the piston ring end gap using a feeler gauge.
   - If it exceeds the maximum specification, replace the piston ring.



bpe2ue00000095

Standard piston ring end gap
Top: 0.13—0.18 mm {0.0052—0.0070 in}
Second: 0.18—0.28 mm {0.008—0.011 in}
Oil: 0.10—0.35 mm {0.004—0.013 in}

Maximum piston ring end gap
Top: 0.35 mm {0.014 in}
Second: 0.45 mm {0.018 in}
Oil: 0.52 mm {0.020 in}

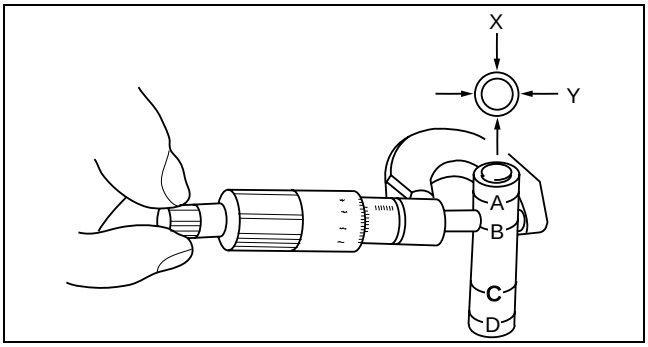
PISTON PIN INSPECTION

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Caution
- **If the piston or piston pin is replaced, replace the piston, piston pin and the snap ring as a single component.**

1. Measure the piston pin outer diameter using the micrometer. Measurement positions total eight and are in the X and Y directions, at four points (A, B, C, and D) as shown in the figure.

   Standard piston pin outer diameter
   20.995—21.000 mm {0.82658—0.82677 in}



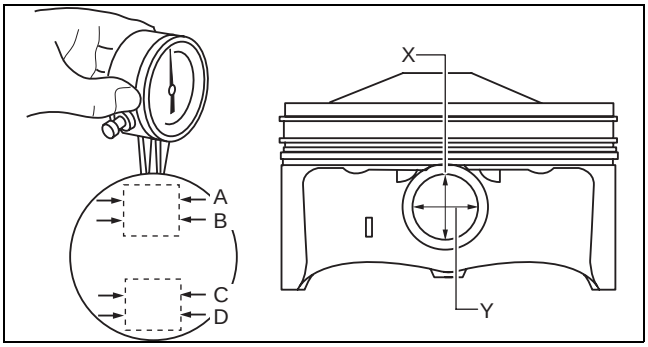
adj2224e255

2. Measure the piston pin hole diameter using the caliper gauge. Measurement positions total eight and are in the X and Y directions, at four points (A, B, C, and D) as shown in the figure.

   Standard piston pin hole diameter
   21.004—21.008 mm {0.82693—0.82708 in}

3. Calculate the clearance between the piston pin hole diameter and the piston pin outer diameter.
   - If it is not within the specification, replace the piston or the piston pin.

   Standard clearance between piston pin hole diameter and piston pin outer diameter
   0.004—0.013 mm {0.0002—0.0005 in}

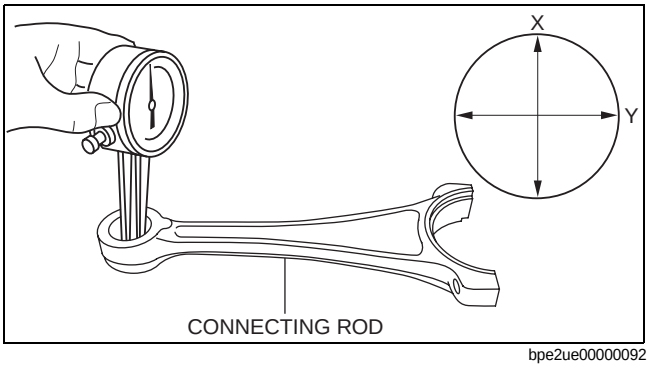


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4. Measure the inner diameter on the small end of the connecting rod using the caliper gauge in the X and Y directions as shown in the figure.

   Standard connecting rod small end inner diameter
   21.006—21.017 mm {0.82701—0.82744 in}

5. Calculate the clearance between the inner diameter on the small end of the connecting rod and the piston pin outer diameter.
   - If it is not within the specification, replace the connecting rod or the piston pin.



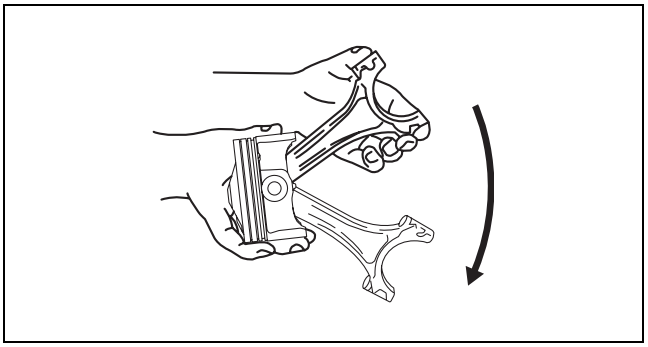
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Standard clearance between connecting rod small end inner diameter and piston pin outer diameter
0.006—0.022 mm {0.0003—0.0008 in}

PISTON AND CONNECTING ROD INSPECTION

1. Check the oscillation torque as shown in the figure. Verify that the large end drops under its own weight with no resistance.
   - If the piston shakes heavily or unsmoothly, disassemble the piston and connecting rod, then inspect the following: (See 01-10-32 PISTON PIN INSPECTION.)
     — Clearance between piston pin outer diameter and piston pin hole diameter.
     — Clearance between piston pin outer diameter and connecting rod small end inner diameter.

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CONNECTING ROD INSPECTION

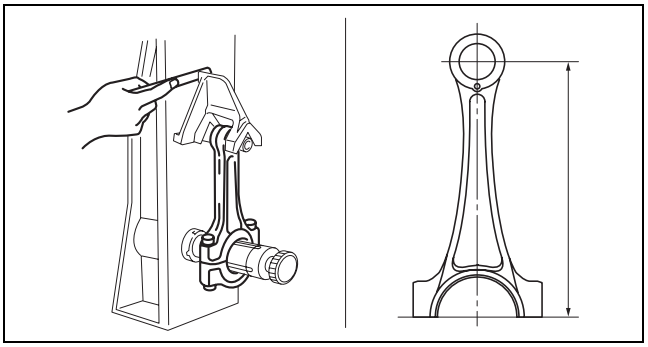
1. Inspect the connecting rod for bending and distortion using the connecting rod aligner.
   - If it exceeds the maximum specification, replace the connecting rod.

   Maximum connecting rod bending
   0.050 mm {0.0020 in}

   Maximum connecting rod distortion
   0.050 mm {0.0020 in}

   Connecting rod center-to-center distance
   155.2 mm {6.110 in}

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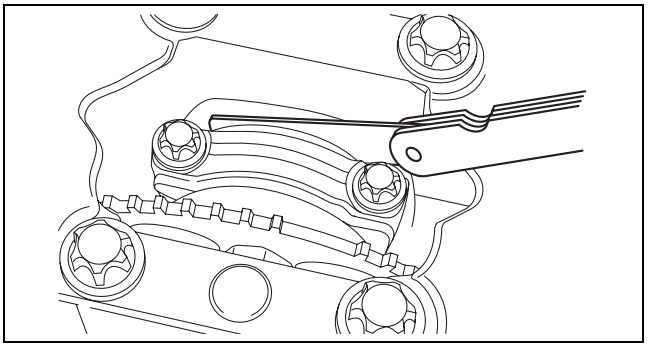
CONNECTING ROD CLEARANCE INSPECTION

1. Measure the side clearance at the large end of the connecting rod using a feeler gauge.
   - If it exceeds the maximum specification, replace the connecting rod or crankshaft.

   Standard side clearance at the large end of connecting rod
   0.14—0.36 mm {0.006—0.014 in}

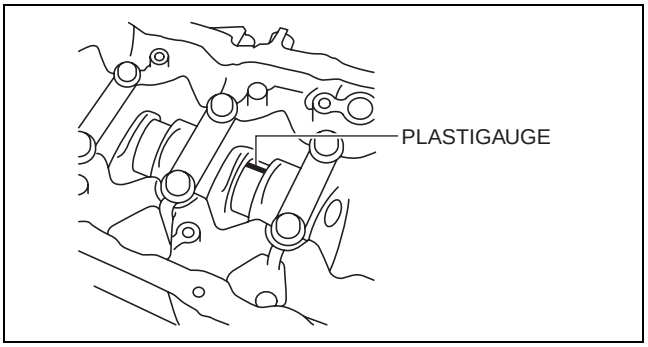
   Maximum side clearance at the large end of connecting rod
   0.465 mm {0.0183 in}

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2. Measure the oil clearance at the large end of the connecting rod using the following procedure:
   (1) Cut the plastigauge as wide as the connecting rod bearing width, place it parallel to the crankshaft, keeping away from the oil hole.
   (2) Install the lower connecting rod bearing and connecting rod cap. (See 01-10-37 CYLINDER BLOCK ASSEMBLY (I).)
   (3) Remove the connecting rod cap. (See 01-10-20 CYLINDER BLOCK DISASSEMBLY (II).)
   (4) Measure the oil clearance at the large end of the connecting rod.
      - If it exceeds the maximum specification, replace the bearing or grind the crank pin and use oversize bearings so that the specified clearance is obtained.



bpe2ue00000093

Standard bearing oil clearance at the large end of the connecting rod
0.026—0.052 mm {0.0011—0.0020 in}

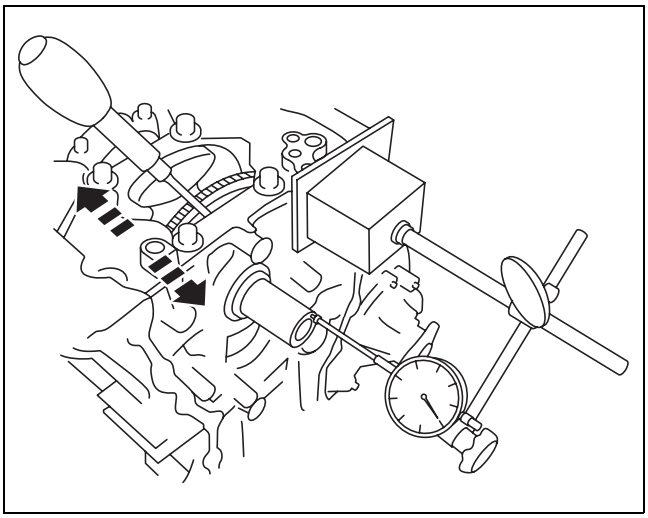
Maximum bearing oil clearance at the large end of the connecting rod
0.10 mm {0.0039 in}

Connecting rod bearing size
STD: 1.503—1.520 mm {0.05918—0.05984 in}
OS 0.25: 1.628—1.631 mm {0.06410—0.06421 in}
OS 0.50: 1.753—1.756 mm {0.06902—0.06913 in}

CRANKSHAFT INSPECTION

id011000502500

1. Measure the crankshaft end play using a dial gauge.
   - If it exceeds the maximum specification, replace the crankshaft or grind the thrust side of crankshaft and use oversize thrust bearing so that the specified end play is obtained.



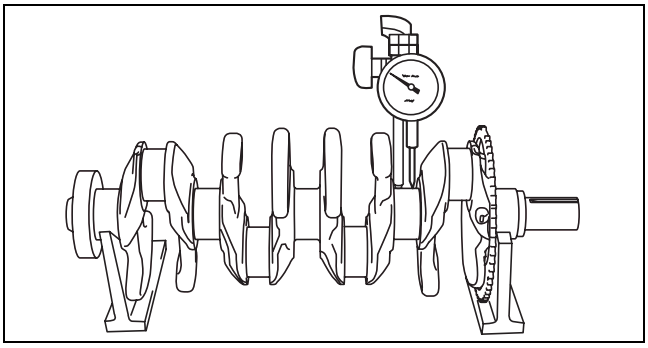
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Standard crankshaft end play
0.08—0.29 mm {0.004—0.011 in}

Maximum crankshaft end play
0.30 mm {0.012 in}

Thrust bearing size
STD: 2.500—2.550 mm {0.0985—0.1003 in}
OS0.25: 2.625—2.675 mm {0.1034—0.1053 in}

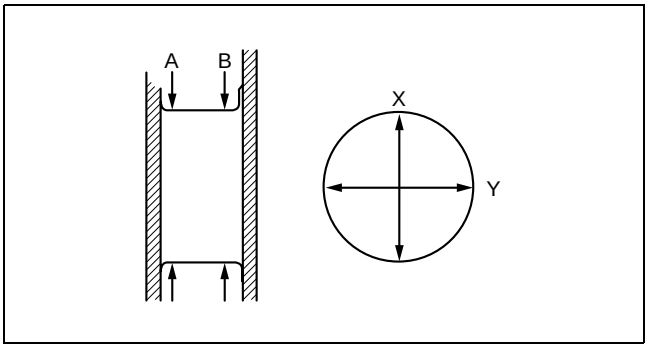
2. Measure the runout of the main journal using a V-block and dial gauge.
   - If it exceeds the maximum specification, replace the crankshaft.



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Maximum main journal runout
0.10 mm {0.0039 in}

3. Inspect the main journal diameter and crank pin diameter. Measurement positions total four and are in the X and Y directions, at two points (A and B) as shown in the figure.
   - If it is not within the specification or if it exceeds the maximum off-round, grind the journal with an oversized bearing.



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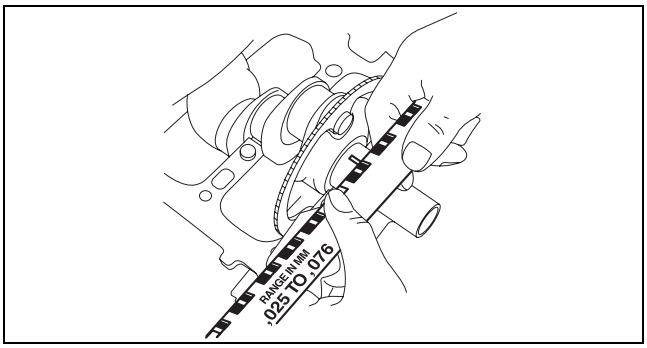
Standard main journal diameter
46.980—47.000 mm {1.8497—1.8503 in}

Maximum main journal off-round
0.005 mm {0.0002 in}

Standard crank pin diameter
46.980—47.000 mm {1.8497—1.8503 in}

Maximum crank pin off-round
0.005 mm {0.0002 in}

4. Inspect the main journal oil clearance using the following procedure:
   (1) Install the thrust bearing, upper main bearing and crankshaft.
   (2) Position a plastigauge on the journals.
   (3) Install the lower main bearing and lower cylinder block. (See 01-10-37 CYLINDER BLOCK ASSEMBLY (I).)
   (4) Remove the lower cylinder block. (See 01-10-20 CYLINDER BLOCK DISASSEMBLY (II).)
   (5) Measure the main journal oil clearance.
      - If it exceeds the maximum specification, replace the main bearing, or grind the main journal and use oversized bearings so that the specified oil clearance is obtained.



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Standard main journal oil clearance
0.016—0.039 mm {0.0007—0.0015 in}

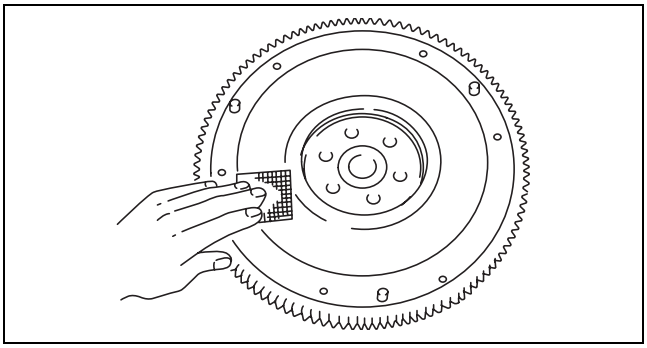
Maximum main journal oil clearance
0.084 mm {0.0033 in}

Main bearing size
STD: 2.489—2.510 mm {0.0980—0.0988 in}
OS 0.25: 2.614—2.617 mm {0.10292—0.10303 in}
OS 0.50: 2.739—2.742 mm {0.10784—0.10795 in}

FLYWHEEL INSPECTION

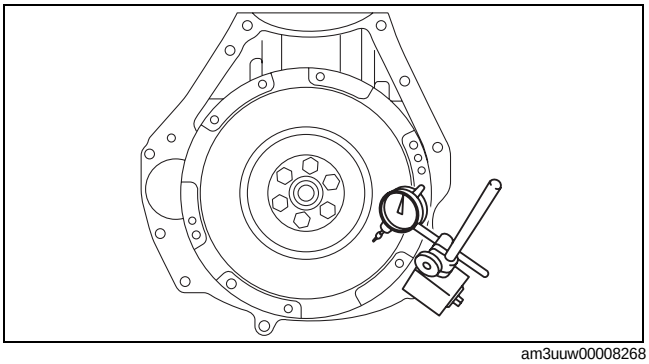
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1. Perform the following procedures to inspect the flywheel.
   - If there is any malfunction or it exceeds the maximum specification, replace the flywheel.
   (1) Inspect the surface that contacts the clutch disc for scratches, nicks, and discoloration.
      - Correct slight scratches and discoloration using sandpaper.
   (2) Inspect the ring gear teeth for damage and wear.


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   (3) Measure the runout of the surface that contacts the clutch disc using a dial gauge.

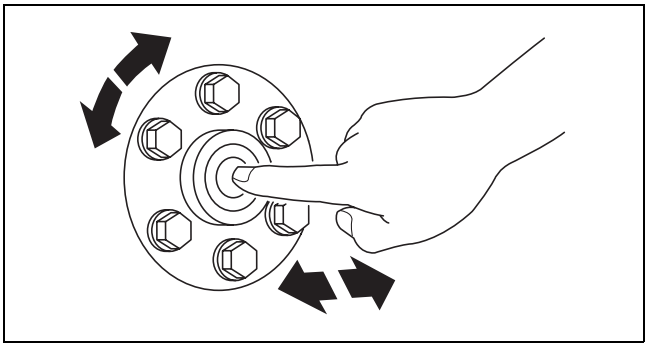
Flywheel maximum runout
0.10 mm {0.0039 in}


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PILOT BEARING INSPECTION

id011000505200

1. Without removing the pilot bearing, turn the bearing while applying force in the axial direction.
   - If there is any malfunction, replace the pilot bearing.



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BOLT INSPECTION

id011000503300

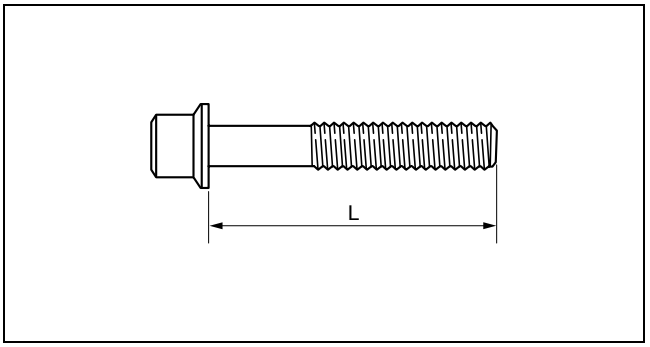
1. Measure the length of the each bolt.
   - If it exceeds the maximum specification, replace the bolt.

   Standard cylinder head bolt length
   145.2—145.8 mm {5.717—5.740 in}

   Maximum cylinder head bolt length
   146.5 mm {5.768 in}

   Standard connecting rod bolt length
   43.7—44.3 mm {1.73—1.74 in}

   Maximum connecting rod bolt length
   45.0 mm {1.77 in}

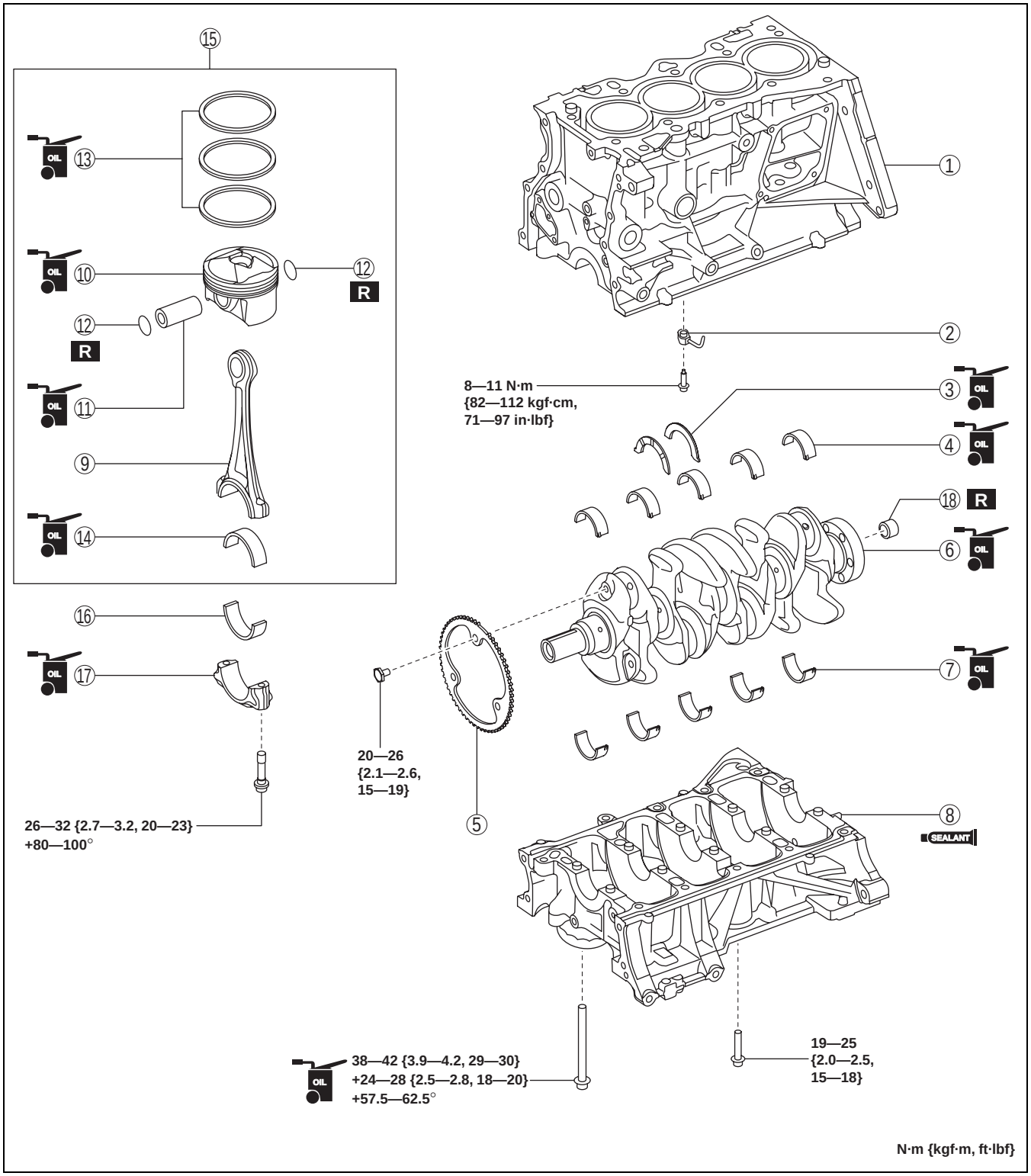


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CYLINDER BLOCK ASSEMBLY (I)

id011000504000

1. Assemble in the order indicated in the table.



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1	Upper cylinder block
2	Oil jet valve
3	Thrust bearing (See 01-10-38 Thrust Bearing And Main Bearing Assembly Note.)

4	Upper main bearing (See 01-10-38 Thrust Bearing And Main Bearing Assembly Note.)
5	Plate (See 01-10-38 Plate Assembly Note.)
6	Crankshaft

7	Lower main bearing (See 01-10-38 Thrust Bearing And Main Bearing Assembly Note.)
8	Lower cylinder block (See 01-10-39 Lower Cylinder Block Assembly Note.)
9	Connecting rod
10	Piston
11	Piston pin (See 01-10-40 Piston Pin Assembly Note.)
12	Snap ring (See 01-10-40 Snap Ring Assembly Note.)
13	Piston ring (See 01-10-41 Piston Ring Assembly Note.)
14	Upper connecting rod bearing (See 01-10-41 Connecting Rod Bearing Assembly Note.)
15	Piston, connecting rod (See 01-10-41 Piston, Connecting Rod Assembly Note.)
16	Lower connecting rod bearing (See 01-10-41 Connecting Rod Bearing Assembly Note.)
17	Connecting rod cap (See 01-10-42 Connecting Rod Cap Assembly Note.)
18	Pilot bearing (MTX) (See 01-10-42 Pilot Bearing Assembly Note.)

Thrust Bearing And Main Bearing Assembly Note

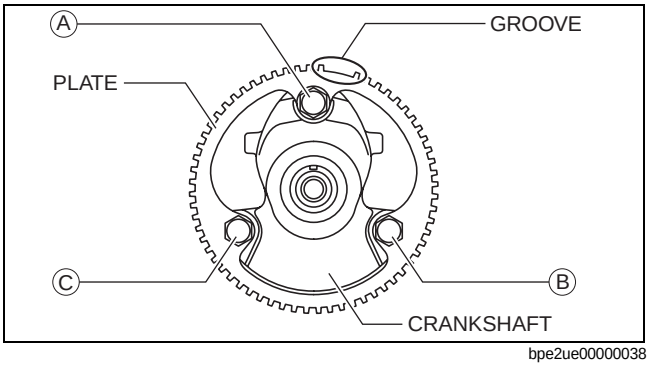
Caution
- **If the thrust bearings and main bearings are reused, assemble the bearings to the same positions and in the direction as before removal to prevent engine damage due to seizure or burning of the bearing.**
- **To prevent engine damage due to seizure or burning of the bearing, apply engine oil to the sliding part when assembling.**

Plate Assembly Note

Caution
- **Placing the crankshaft on a disassembly bench will deform or damage it because the plate for the crankshaft position sensor signal detection installed to the crankshaft is larger than the counterweight. Therefore, set wood blocks or similar objects on the both sides of the crankshaft so that the plate does not contact the disassembly bench directly when placing the crankshaft on it bench.**

1. Install the plate using the following procedure:
   (1) Install the groove of the plate tooth to the position shown in the figure and temporarily tighten bolt A.
   (2) Temporarily tighten the bolt B.
   (3) Install bolt C and tighten the bolts to the specified tightening torque in the order of C, B, and A.

Tightening torque
20—26 N·m {2.1—2.6 kgf·m, 15—19 ft·lbf}



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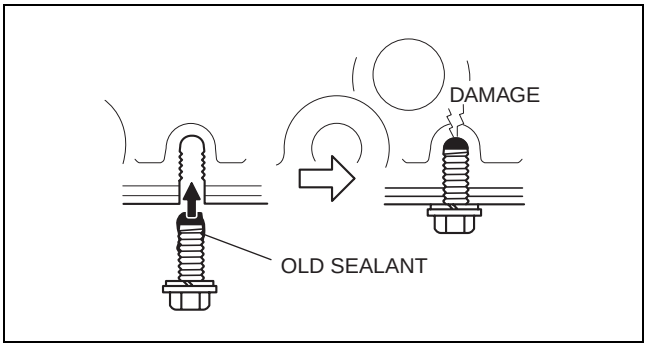
Lower Cylinder Block Assembly Note

1. Completely clean and remove any oil, dirt, sealant or other foreign material that may be adhering to the lower cylinder block and cylinder block.
2. When reusing the lower cylinder block installation bolts, clean any old sealant from the bolts.

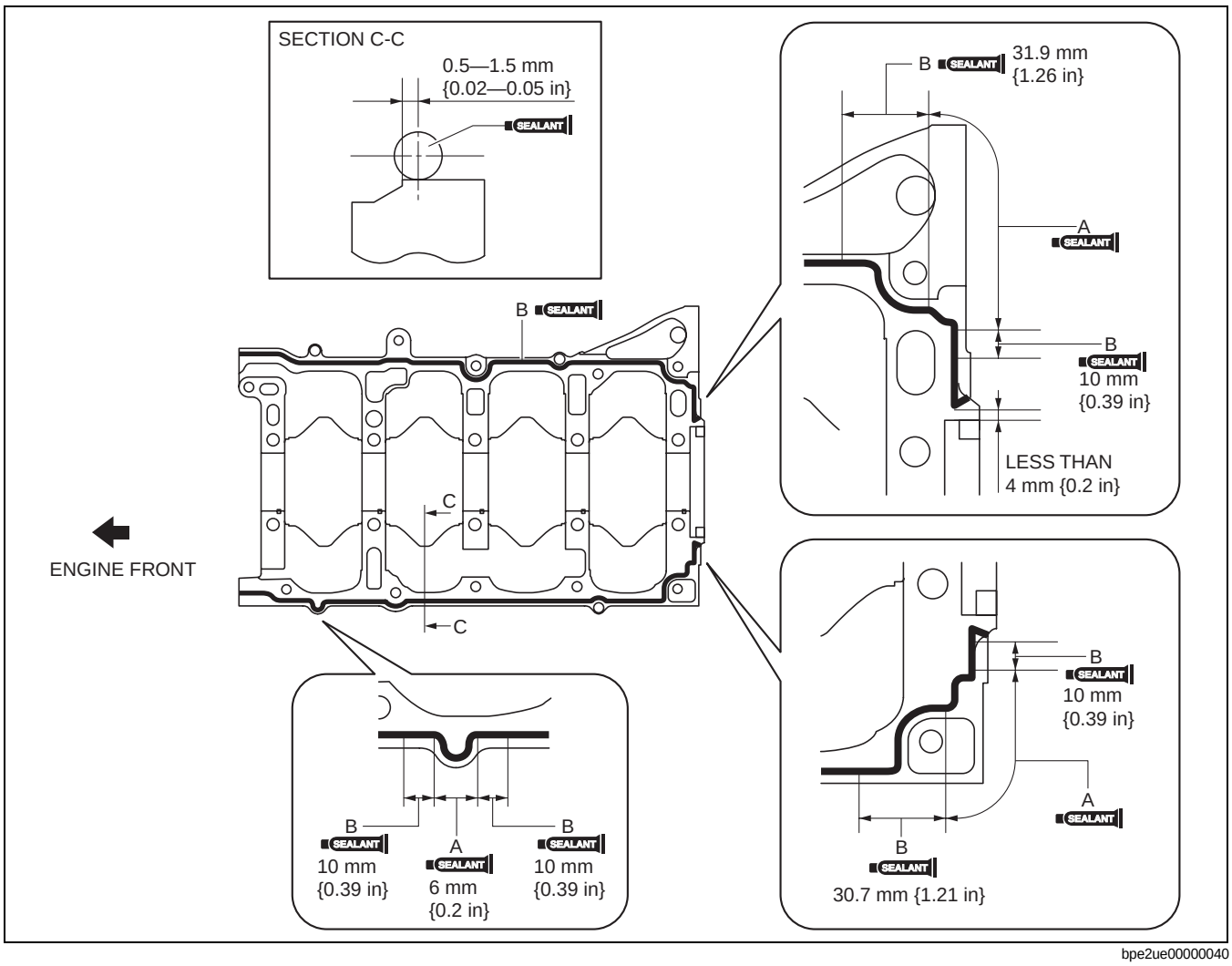
Caution

- **Apply silicon sealant in a single, unbroken line.**
- **To prevent silicon sealant from hardening, adhere the engine front cover and the cylinder block firmly within 10 min. after applying silicon sealant. After adhering them, tighten the installation bolts immediately.**
- **Using bolts with the old seal adhering could cause cracks in the cylinder block, etc.**

3. Apply silicon sealant to the lower cylinder block shown in the figure.



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bpe2ue00000040

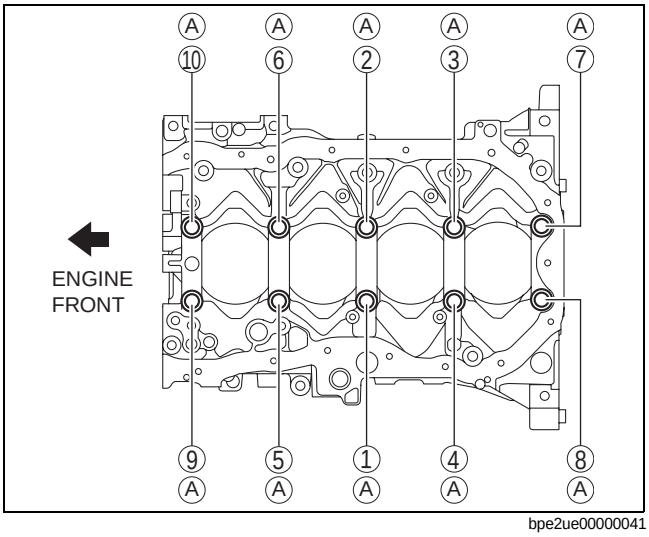
Bead thickness

A: 3—7 mm {0.12—0.27 in}
B: 2—6 mm {0.1—0.2 in}

4. Install the lower cylinder block.
5. Tighten the lower cylinder block installation bolts using the following procedure:
   (1) Apply clean engine oil to seating surface and thread of the lower cylinder block installation bolts A.
   (2) Tighten the lower cylinder block installation bolts A in the order shown in the figure using the following procedure:

Tightening procedure

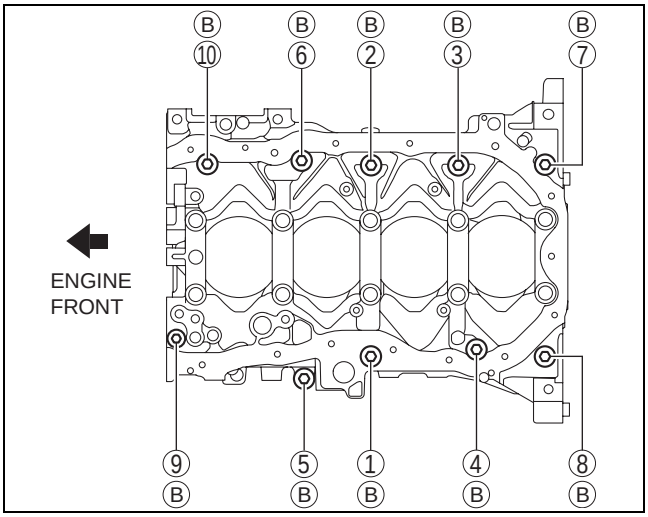
1. **38—42 N·m {3.9—4.2 kgf·m, 29—30 ft·lbf}**
2. **Loosen all the bolts (until bolts are torque-free).**
3. **24—28 N·m {2.5—2.8 kgf·m, 18—20 ft·lbf}**
4. **57.5—62.5°**



bpe2ue00000041

   (3) Tighten the lower cylinder block installation bolts B in the order shown in the figure.

Tightening torque
19—25 N·m {2.0—2.5 kgf·m, 15—18 ft·lbf}



bpe2ue00000042

6. After verifying that silicone sealant protrudes to the rear oil seal press-in part, wipe away the excess silicone sealant.
   - If silicone sealant does not protrude to the rear oil seal press-in part, remove the lower cylinder block and apply silicone sealant again.

Piston Pin Assembly Note

1. Apply clean engine oil to the piston pin.
2. Insert the piston pin to the piston and connecting rod.

Note

- When assembling the piston to the connecting rod, each one can be assembled in either direction.

Snap Ring Assembly Note

Caution

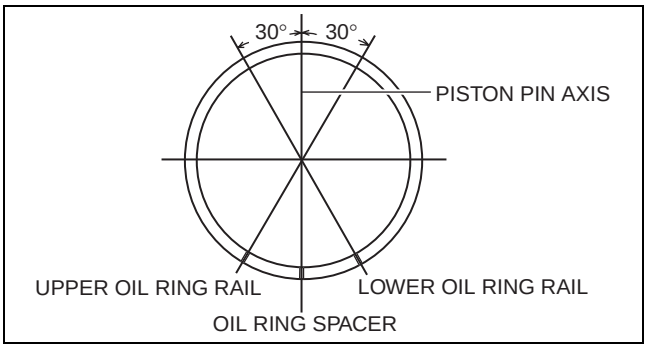
- **Do not compress the outer diameter of the snap ring more than necessary when assembling the snap ring (reference: 20.66 mm {0.8134 in} or less).**

1. Insert a new snap ring using a thin plier.

Piston Ring Assembly Note

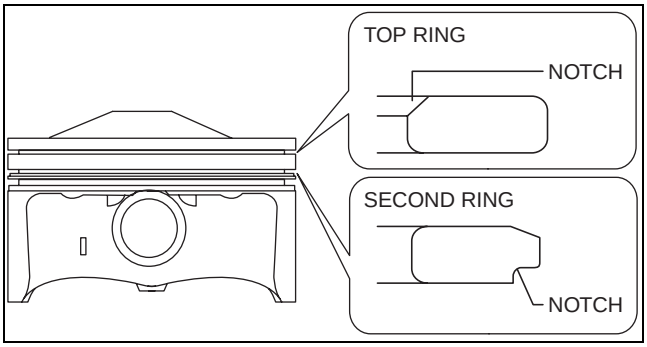
Note
- It is not required to position the end gap between the top ring and second ring.

1. Assemble the piston ring so that the end gap of each oil ring does not overlap as shown in the figure.



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2. Install the second ring with the notch facing downward.
3. Install the top ring with the notch facing upward.



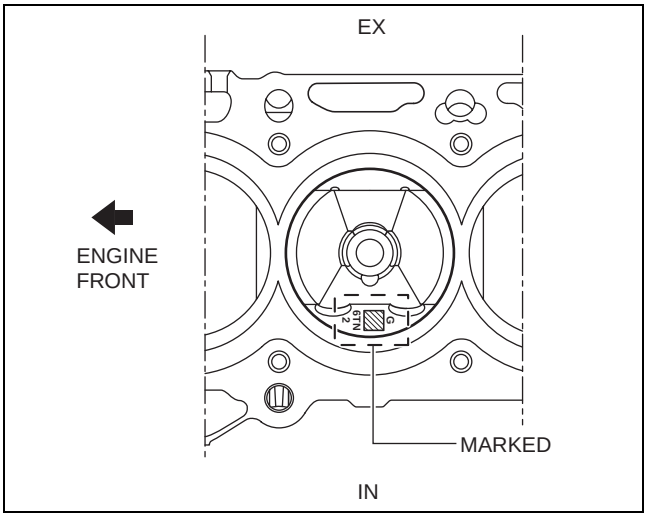
bpe2ue00000044

Connecting Rod Bearing Assembly Note

Caution
- **If a connecting rod bearing is reused, assemble it to the same position and in the direction as before removal to prevent engine damage due to seizure or burning of the bearing.**
- **To prevent engine damage due to seizure or burning of the bearing, apply engine oil to the sliding part when assembling.**

Piston, Connecting Rod Assembly Note

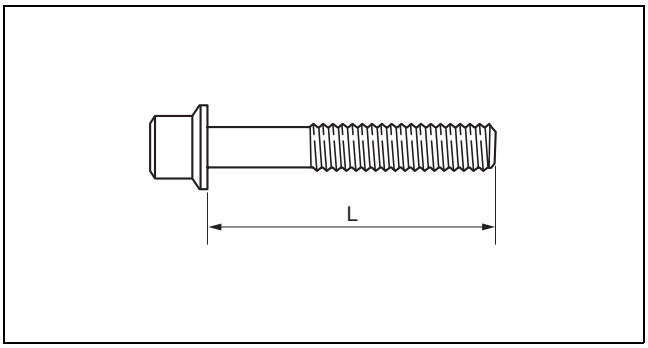
1. Insert the piston into the cylinder with the mark on top of the piston facing the intake side.



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Connecting Rod Cap Assembly Note

Caution
- **When assembling the connecting rod caps, align the broken, rough faces of the connecting rods and connecting rod caps.**
- **If the following condition is met, replace the connecting rod cap bolts.**
  - **— Length exceeds maximum specification**



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Standard connecting rod cap bolt length
43.7—44.3 mm {1.73—1.74 in}

Maximum connecting rod cap bolt length
45.0 mm {1.77 in}

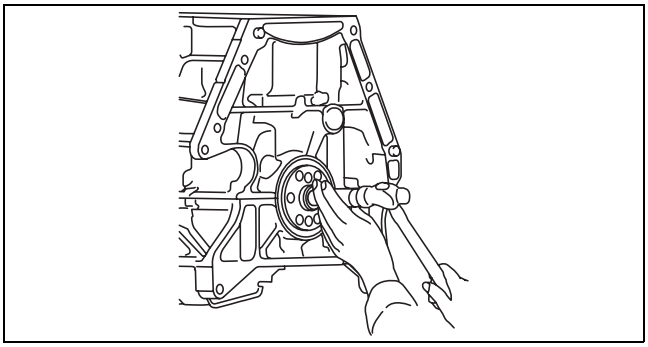
1. Position so that the broken, rough faces of the connecting rods and connecting rod caps are aligned exactly, and assemble the connecting rod caps.
2. Tighten the connecting rod cap bolts in the following two steps.

Tightening procedure
Step 1: 26—32 N·m {2.7—3.2 kgf·m, 20—23 ft·lbf}
Step 2: 80—100°

Pilot Bearing Assembly Note

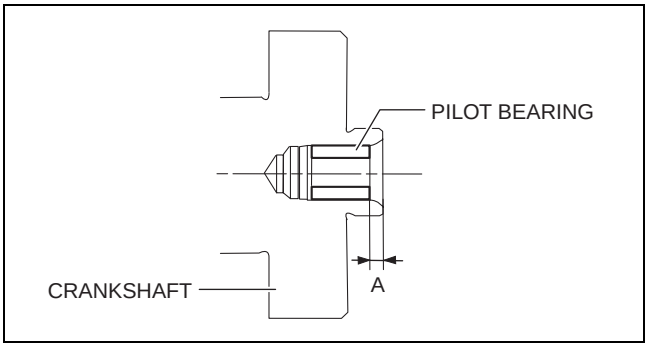
1. Install new pilot bearing to the specified position using the following tools.

Tool
Snap-on brand millimeter size bushing driver set (A160M) adapter A160M7 (20—22 mm {0.79—0.86 in})
- **Use the adapter with the 20 mm {0.79 in} side of the A160M7 (20—22 mm {0.79—0.86 in}) facing the pilot bearing side.**


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Substitution tool
Outer diameter: 21 mm {0.83 in}
Inner diameter: 19 mm {0.75 in}

Standard pilot bearing position
Distance A of pilot bearing from crankshaft end: 1.5—2.5 mm {0.060—0.098 in}

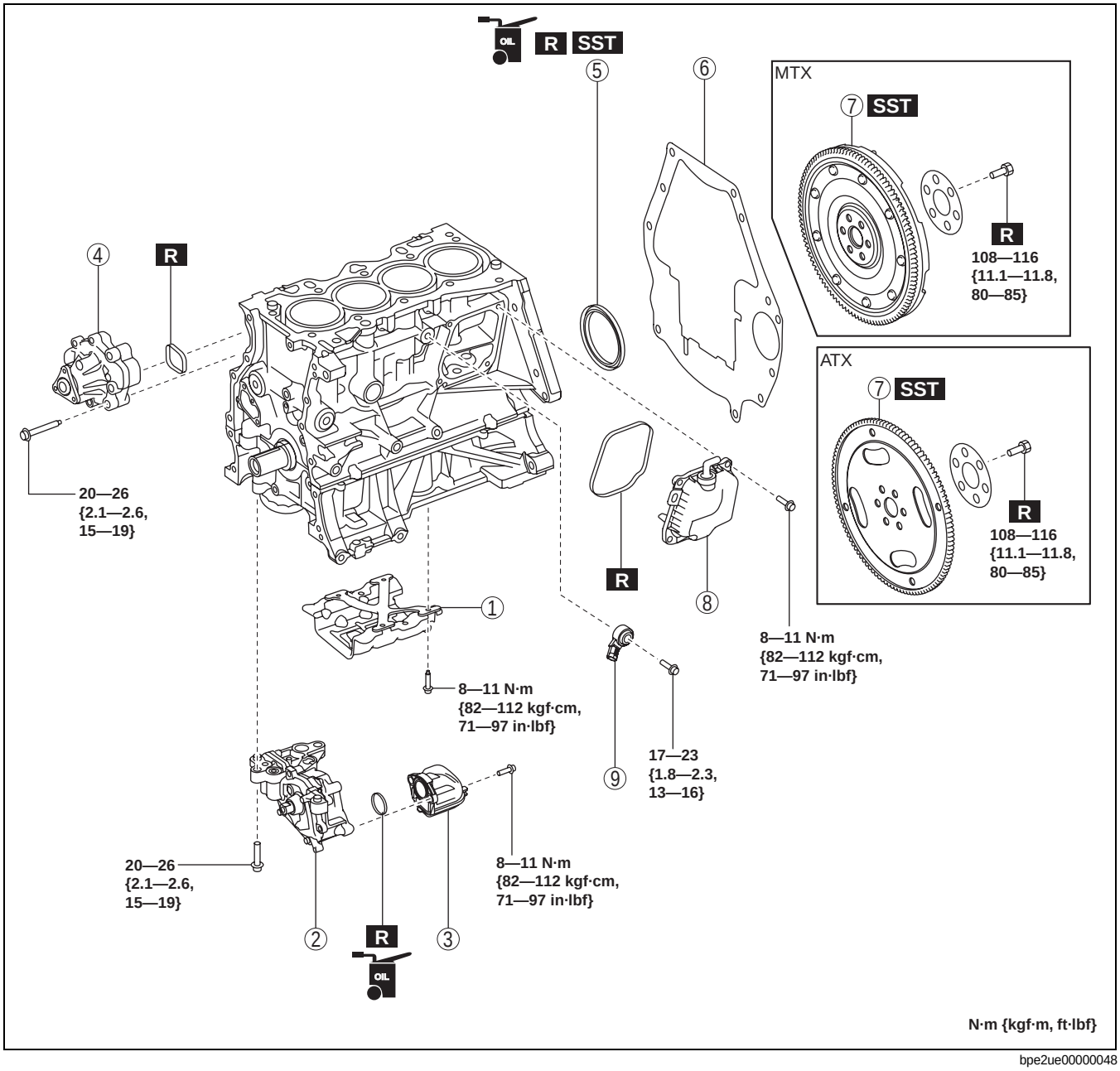


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CYLINDER BLOCK ASSEMBLY (II)

id011000504100

1. Assemble in the order indicated in the table.



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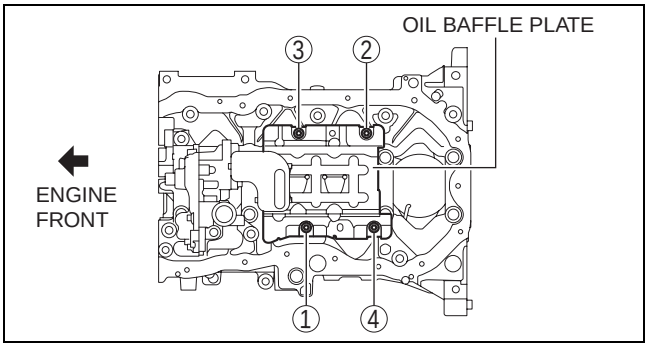
1	Oil baffle plate (See 01-10-44 Oil Baffle Plate Assembly Note.)
2	Oil pump (See 01-10-44 Oil Pump Assembly Note.)
3	Oil strainer
4	Water pump (See 01-10-45 Water Pump Assembly Note.)
5	Rear oil seal (See 01-10-46 Rear Oil Seal Assembly Note.)

6	End plate (See 01-10-47 End Plate Assembly Note.)
7	Flywheel (MTX), drive plate (ATX) (See 01-10-48 Flywheel (MTX), Drive Plate (ATX) Assembly Note.)
8	Oil separator
9	Knock sensor

Oil Baffle Plate Assembly Note

1. Tighten the bolts in the order shown in the figure.

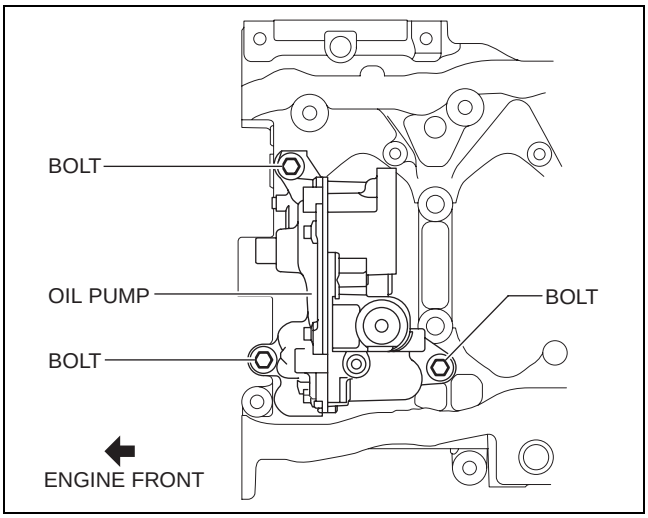
Tightening torque
8—11 N·m {82—112 kgf·cm, 71—97 in·lbf}



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Oil Pump Assembly Note

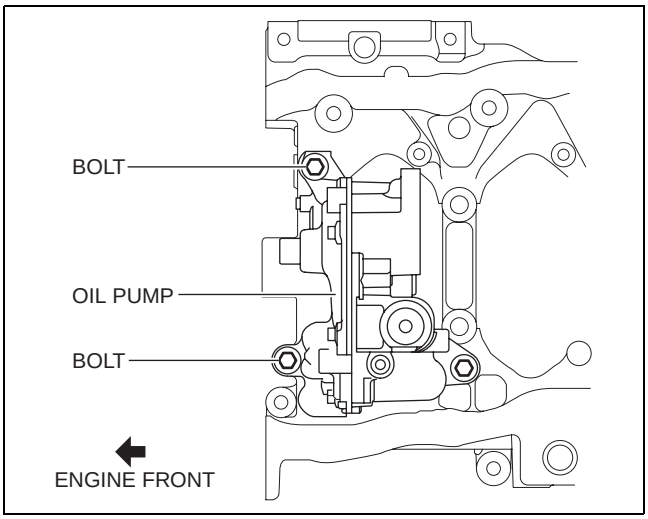
1. Tighten the oil pump using the following procedure:
   (1) Temporarily tighten the three bolts shown in the figure.



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   (2) Tighten the two bolts shown in the figure to specified torque.
   - The tightening order for the two bolts is optional.

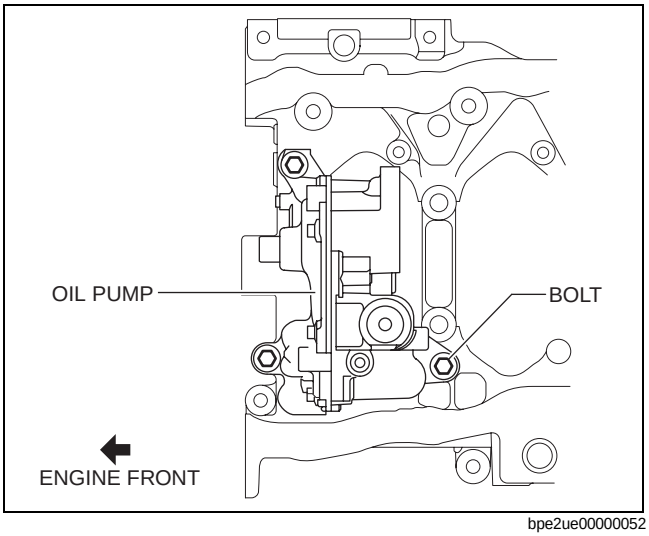
Tightening torque
20—26 N·m {2.1—2.6 kgf·m, 15—19 ft·lbf}



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(3) Finally, tighten the bolt shown in the figure to the specified torque.

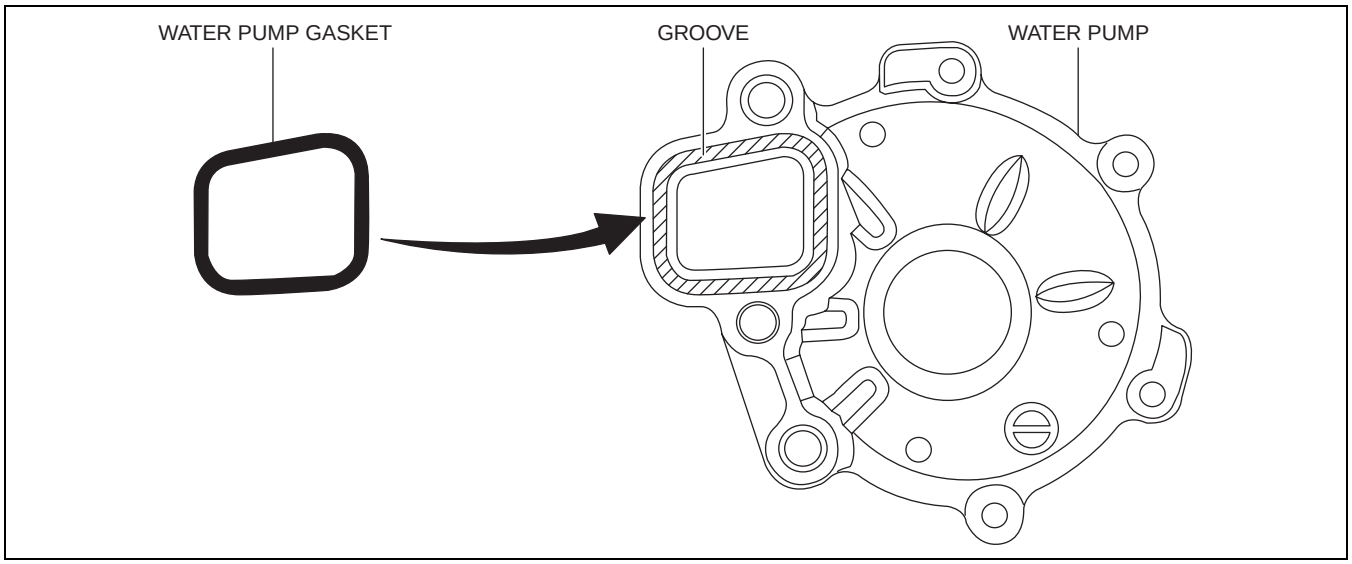
Tightening torque
20—26 N·m {2.1—2.6 kgf·m, 15—19 ft·lbf}



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Water Pump Assembly Note

Caution
- **Assemble the water pump gasket to the correct direction shown in the figure. Otherwise, it could leak engine coolant and damage the engine.**

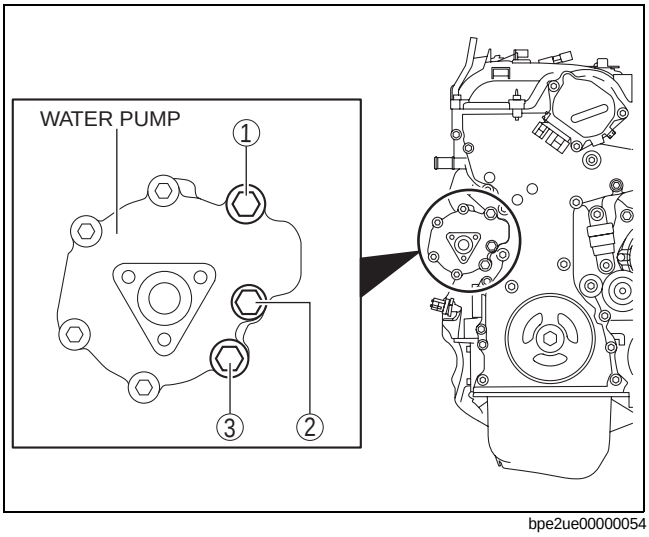


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1. Insert a new water pump gasket into the water pump groove.
2. Install the water pump.

3. Tighten the bolts in the order shown in the figure.

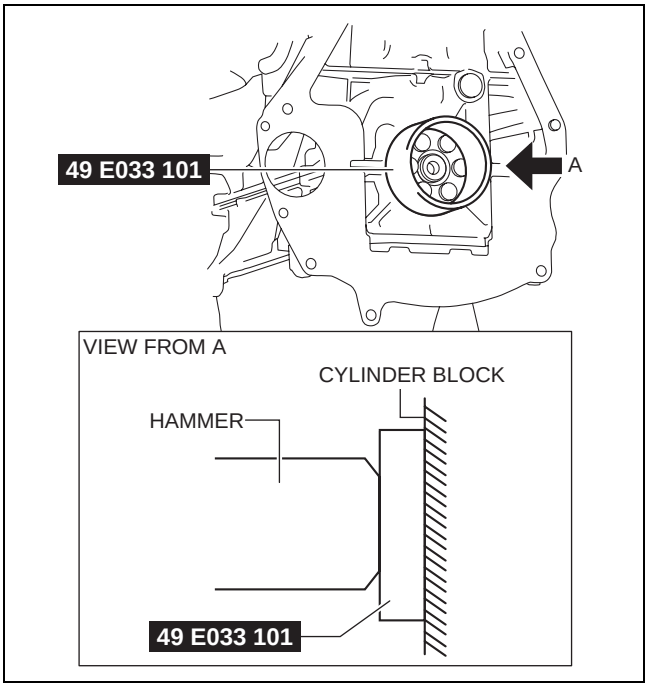
Tightening torque
20—26 N·m {2.1—2.6 kgf·m, 15—19 ft·lbf}



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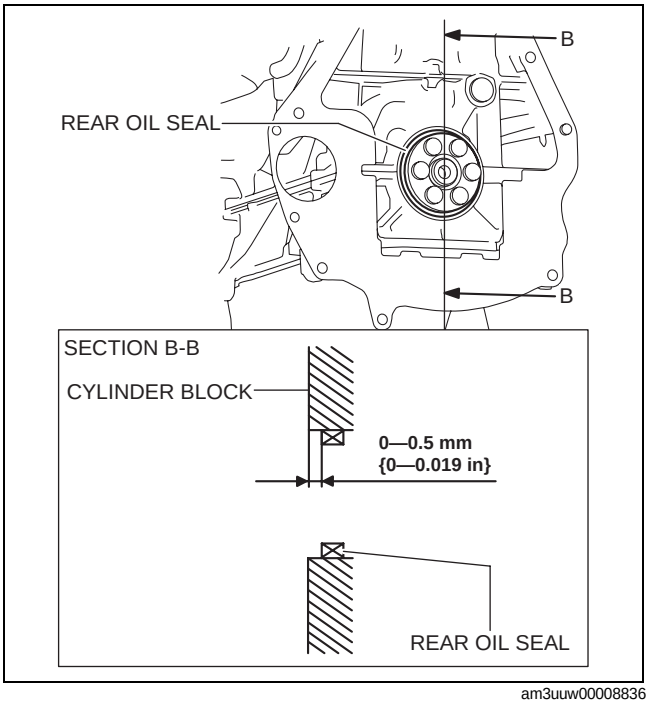
Rear Oil Seal Assembly Note

1. Apply clean engine oil to the inner surface of a new rear oil seal.
2. Insert the rear oil seal into the cylinder block by hand.
3. Tap the oil seal in evenly using the **SST** and a hammer.



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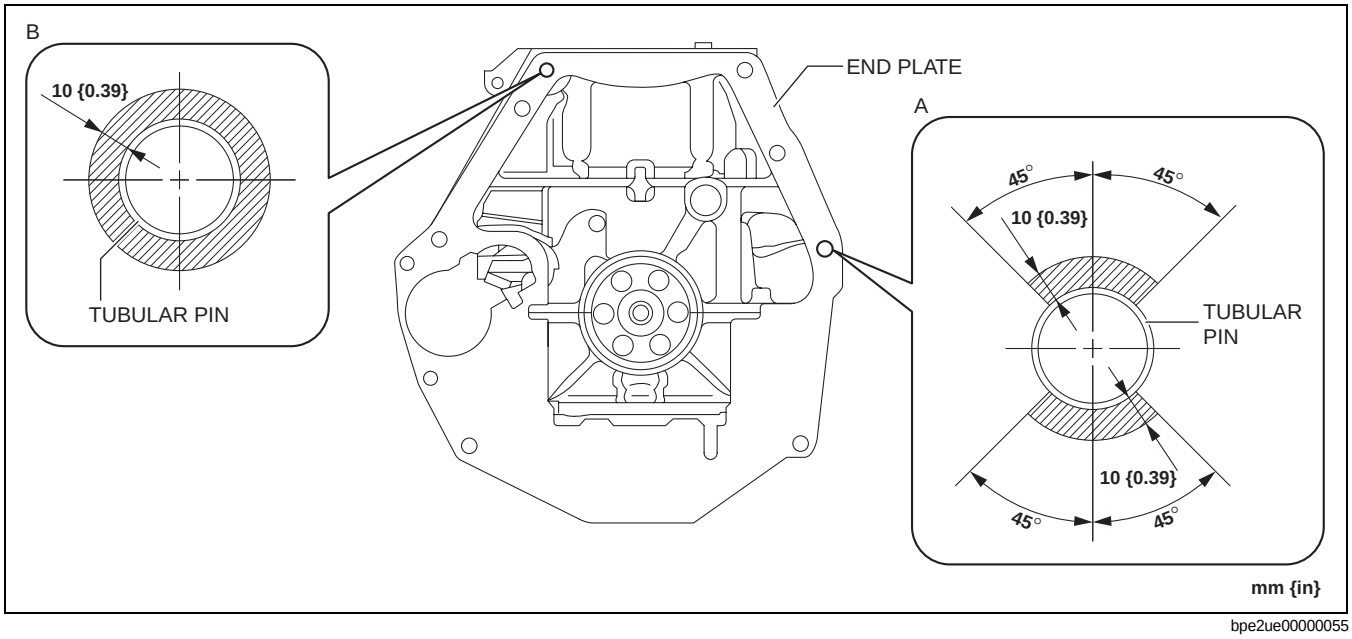
Rear oil seal press-in amount
0—0.5 mm {0—0.019 in}



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End Plate Assembly Note

1. After end plate assembly, crimp the parts A and B shown in the figure.



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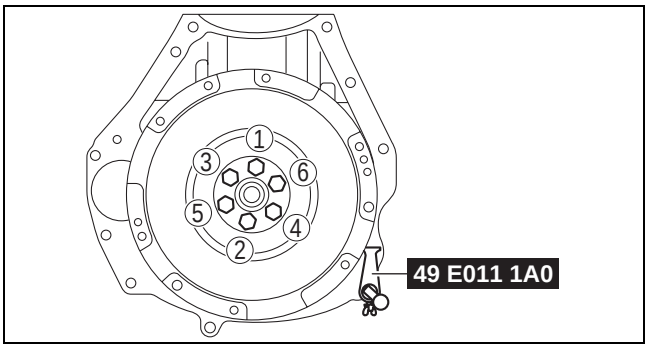
Crimp procedure
Crimp depth: 0.1—1.0 mm {0.004—0.039 in}
Crimp width: 0.5—10.0 mm {0.02—0.39 in}
Crimp locations: Part A is 1 or more on one-side within shaded area and part B is 2 or more within shaded areas

2. After crimping, verify that there is no damage and removal of the end plate.

Flywheel (MTX), Drive Plate (ATX) Assembly Note

1. Hold the crankshaft using the **SST**.
2. Tighten the new installation bolts in two or three passes in the order shown in the figure.

Tightening torque
108—116 N·m {11.1—11.8 kgf·m, 80—85 ft·lbf}

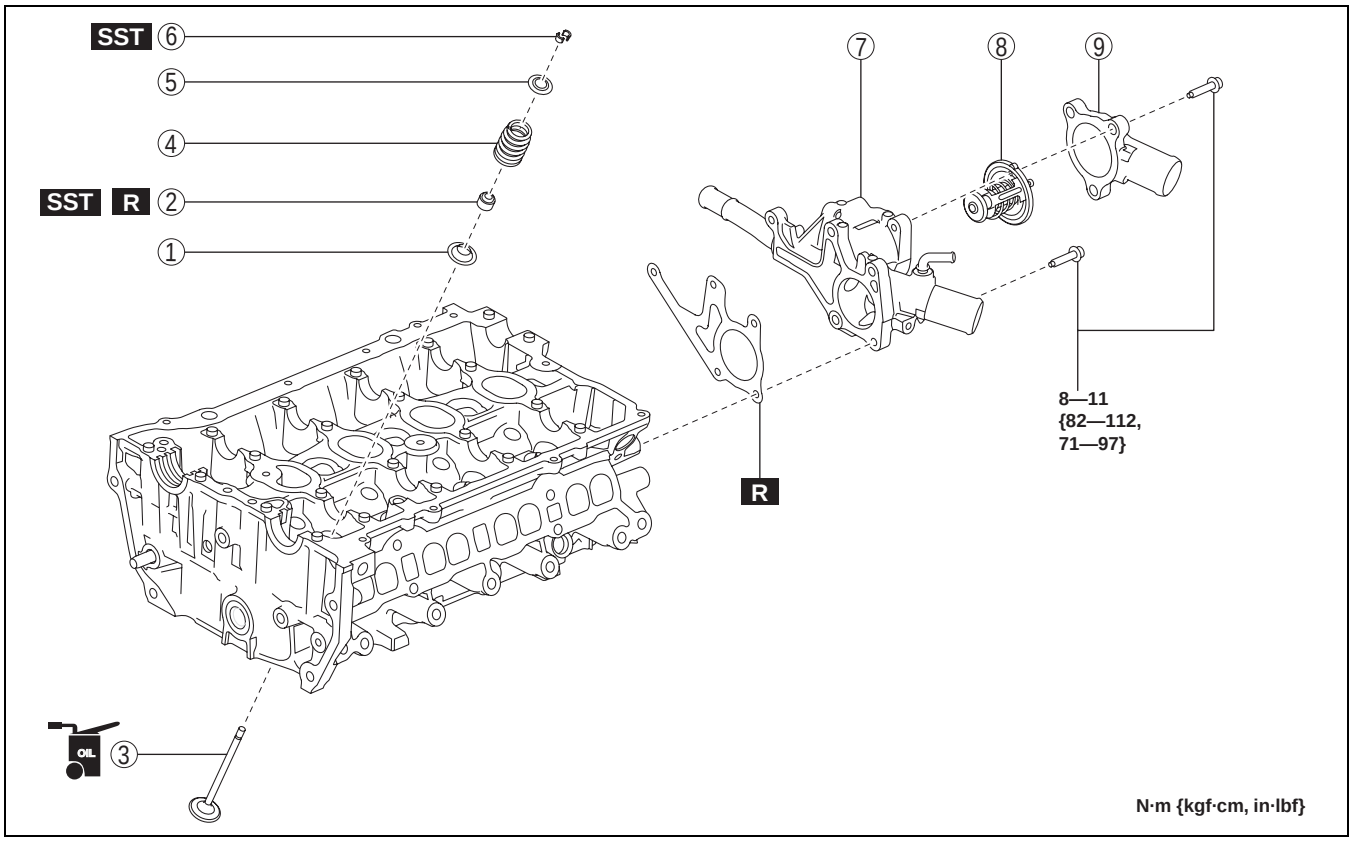


bpe2ue00000056

CYLINDER HEAD ASSEMBLY (I)

id011000504300

1. Assemble in the order indicated in the table.



bpe2ue00000057

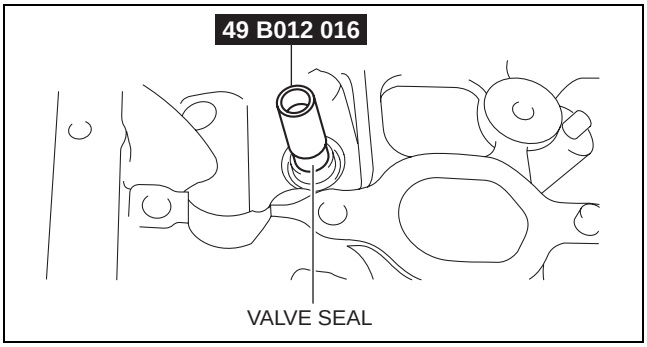
1	Lower valve spring seat
2	Valve seal (See 01-10-49 Valve Seal Assembly Note.)
3	Valve
4	Valve spring (See 01-10-49 Valve Spring Assembly Note.)
5	Upper valve spring seat

6	Valve keeper (See 01-10-49 Valve Keeper Assembly Note.)
7	Water outlet (See 01-10-50 Water Outlet Assembly Note.)
8	Thermostat (See 01-10-50 Thermostat Assembly Note.)
9	Thermostat cover

Valve Seal Assembly Note

1. Press in the valve seal to the valve guide using the **SST** by hand.

Valve seal identification color
IN: GREEN
EX: GRAY

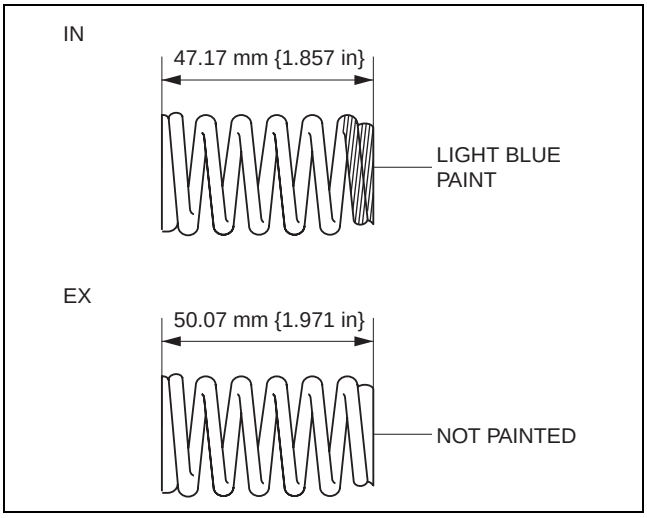


bpe2ue00000058

Valve Spring Assembly Note

Caution
- **The valve springs differ depending on IN and EX sides. Therefore, verify the free length or identification paint beforehand and assemble the valve springs correctly.**

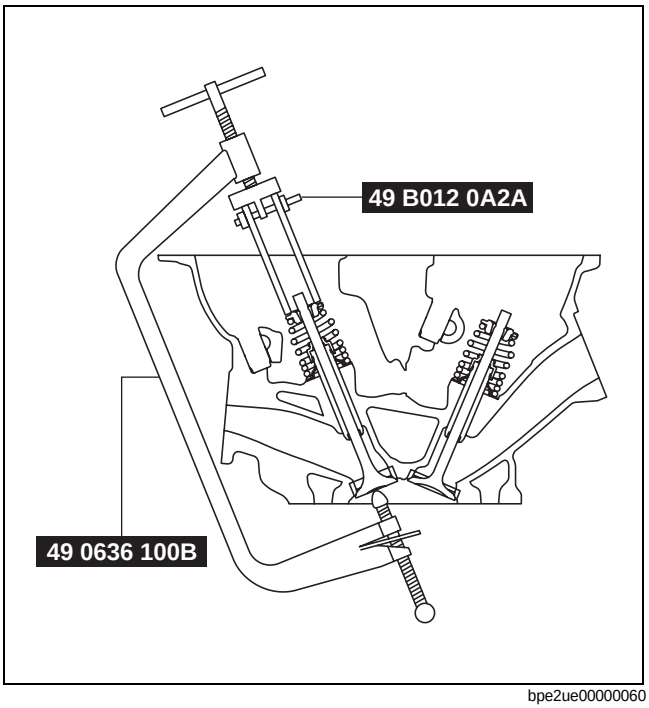
1. Assemble the valve spring with the small diameter side of the valve spring facing upward.



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Valve Keeper Assembly Note

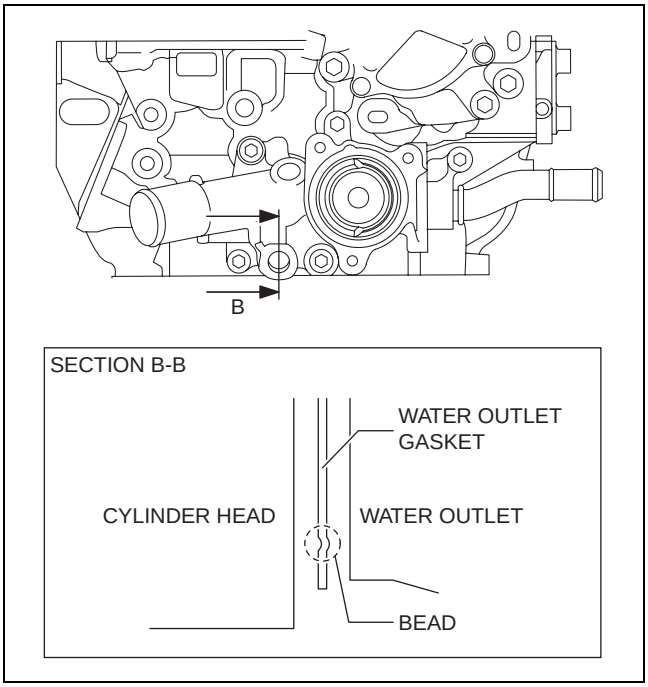
1. Install the valve keeper using the **SST**.



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Water Outlet Assembly Note

1. Install the water outlet gasket with the bead of gasket facing the direction shown in the figure.
2. Temporarily tighten the water outlet installation bolts.

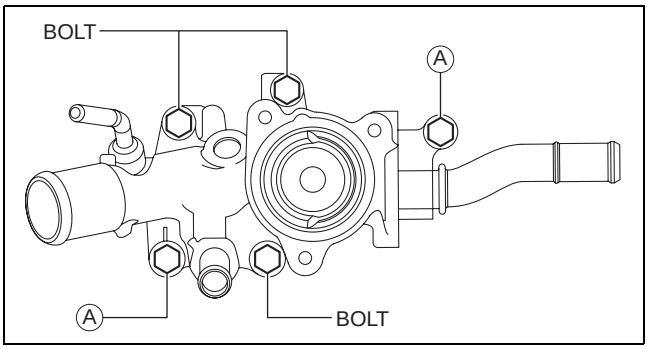


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3. Tighten bolt A of the 5 bolts shown in the figure to the specified torque first.

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

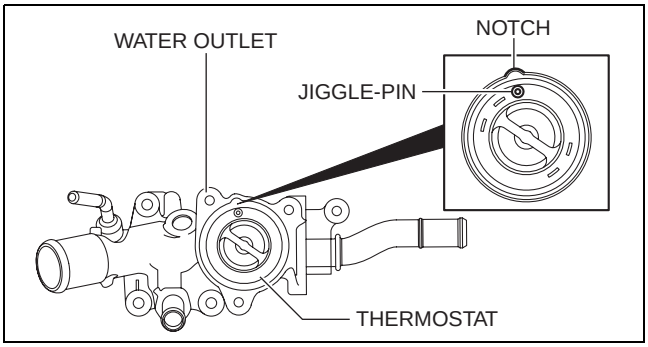
   Note
   - The tightening order for the remaining 3 bolts is optional.



bpe2ue00000062

Thermostat Assembly Note

1. Install the thermostat with the jiggle pin aligned with the notch of the water outlet.



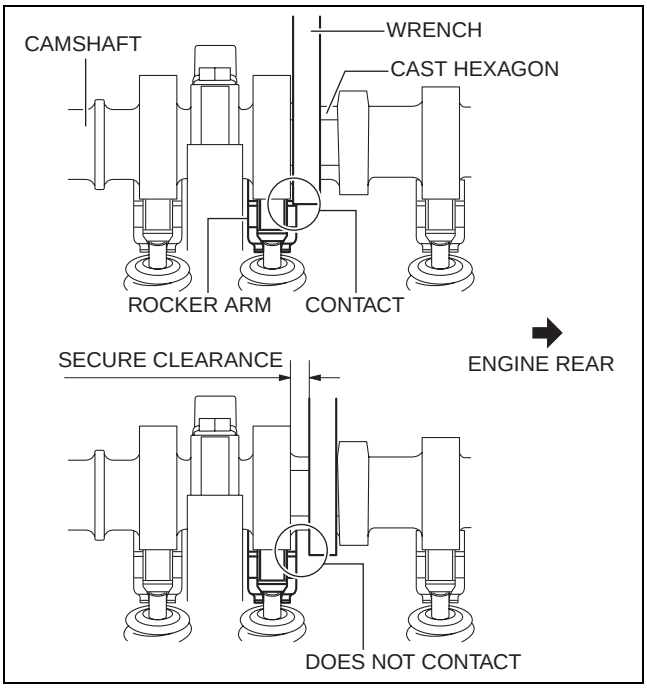
bpe2ue00000063

CYLINDER HEAD ASSEMBLY (II)

id011000504400

Caution

- **If the camshaft is rotated with the timing chain removed and the piston at the top dead center position, the valve may contact the piston and the engine could be damaged. When rotating the camshaft with the timing chain removed, rotate it after lowering the piston from the top dead center position.**
- **When rotating the camshaft using a wrench on the cast hexagon, the wrench may contact the rocker arm and damage the rocker arm. To prevent damage to the rocker arm when holding the camshaft on the cast hexagon, use the wrench at engine rear side as shown in the figure to secure a clearance between the cam.**

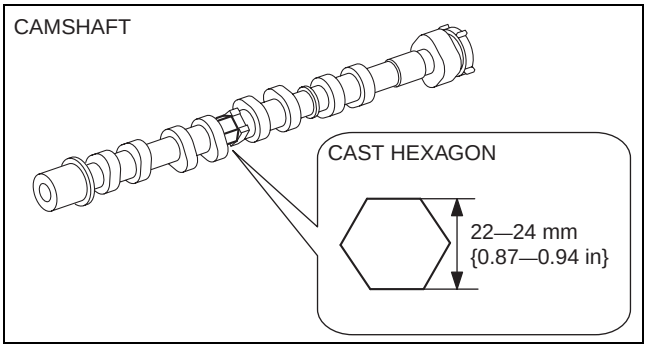


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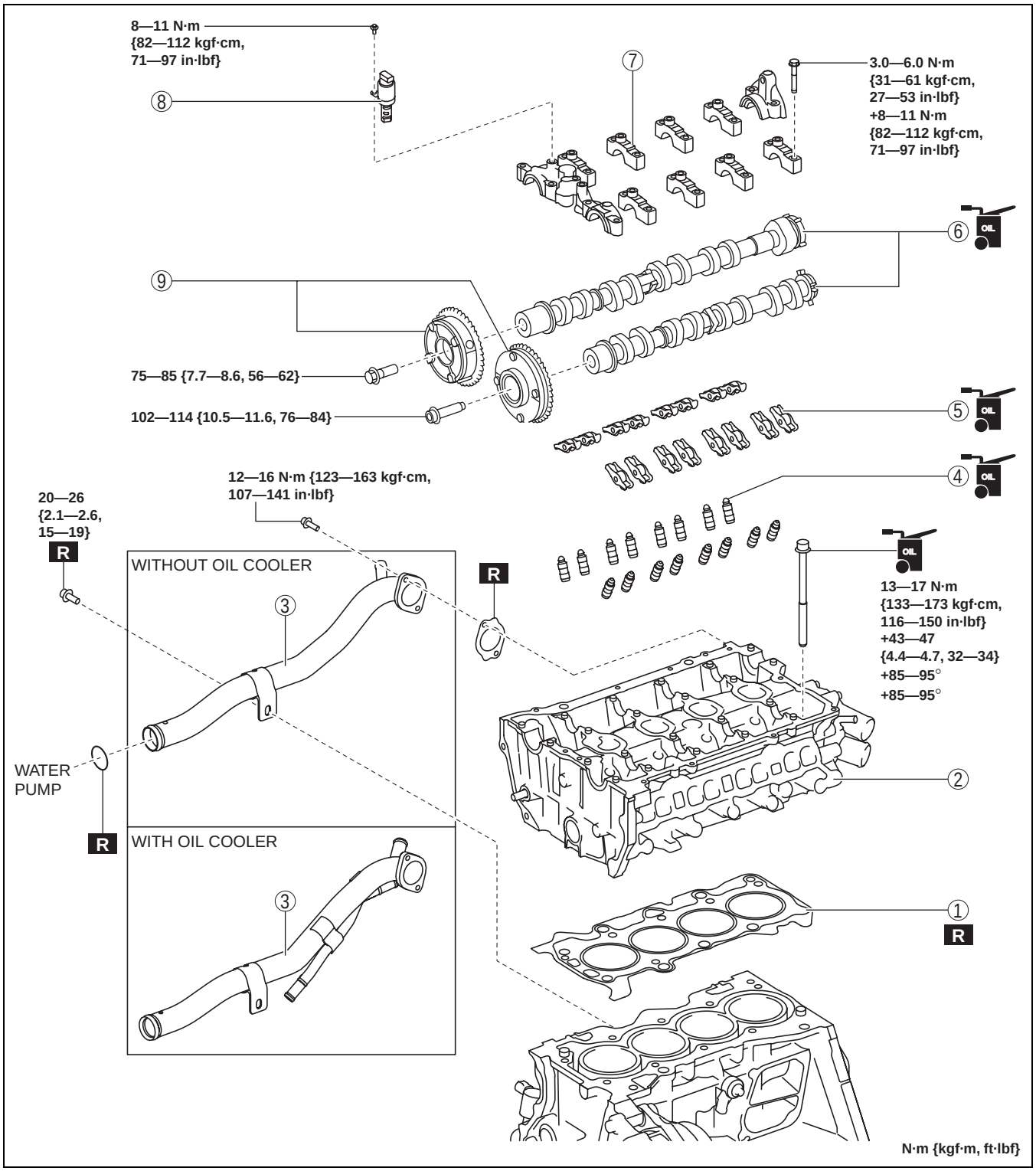
Note

- Width at the cast hexagon of the camshaft is 22—24 mm {0.87—0.94 in}.

1. Assemble in the order indicated in the table.



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bpe2ue00000064

1	Cylinder head gasket
2	Cylinder head (See 01-10-53 Cylinder Head Assembly Note.)
3	Water inlet pipe (See 01-10-54 Water Inlet Pipe Assembly Note.)
4	HLA (See 01-10-55 HLA Assembly Note.)
5	Rocker arm (See 01-10-55 Rocker Arm Assembly Note.)

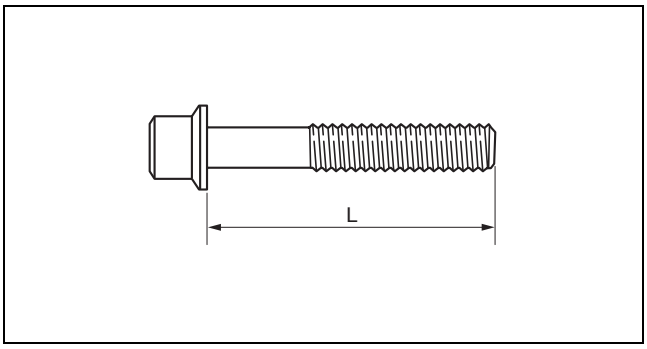
6	Camshaft (See 01-10-56 Camshaft Assembly Note.)
7	Camshaft cap (See 01-10-56 Camshaft Assembly Note.)
8	OCV
9	Electric variable valve timing actuator, hydraulic variable valve timing actuator (See 01-10-58 Electric Variable Valve Timing Actuator, Hydraulic Variable Valve Timing Actuator Assembly Note.)

Cylinder Head Assembly Note

Caution
- **If the following condition is met, replace the cylinder head bolts.**
  - **— Length exceeds maximum specification**

Standard cylinder head bolt length L
145.2—145.8 mm {5.717—5.740 in}

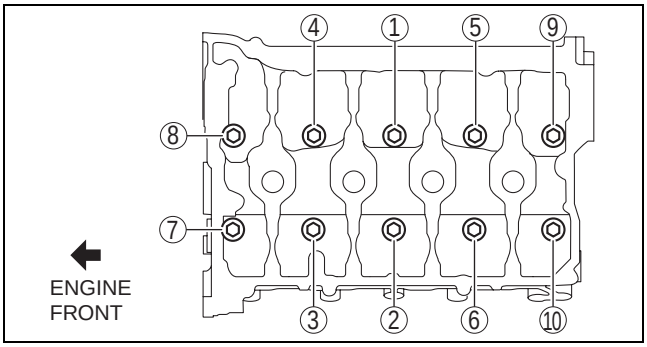
Maximum cylinder head bolt length L
146.5 mm {5.767 in}



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1. When a cylinder head bolt is reused, apply engine oil to any part of the following:
   - Bolt seating surface
   - Bolt thread
   - Cylinder head seating surface
2. Tighten the cylinder head bolts in the order shown in the following four steps.

Tightening procedure
Step 1: 13—17 N·m {133—173 kgf·cm, 116—150 in·lbf}
Step 2: 43—47 N·m {4.4—4.7 kgf·m, 32—34 ft·lbf}
Step 3: 85—95°
Step 4: 85—95°

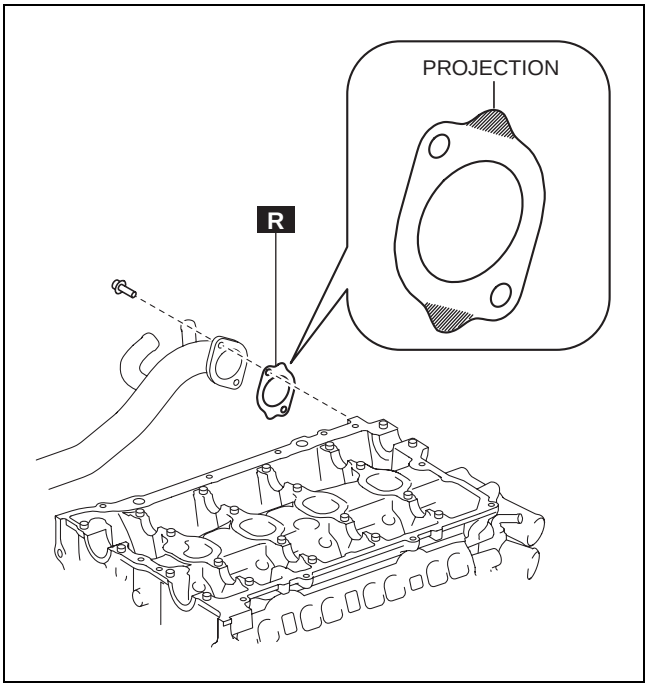


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Water Inlet Pipe Assembly Note

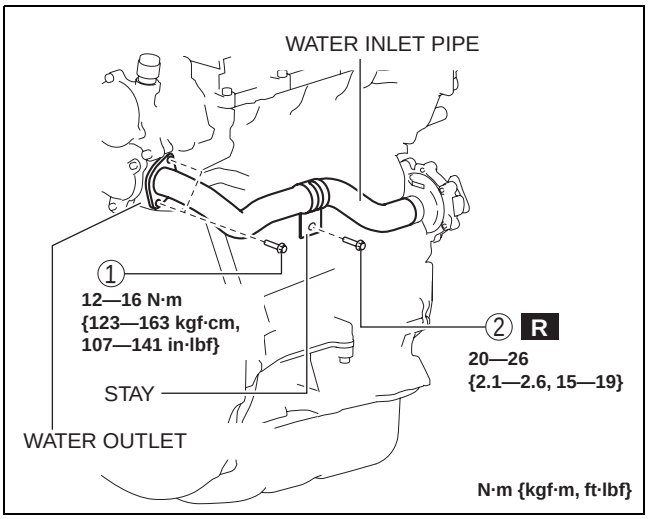
Caution
- **Do not apply oil (engine oil, ATF etc.) to the O-ring of the water inlet pipe. Otherwise, the O-ring could swell causing a seal malfunction.**

1. Clean away the sealant adhering to the bolt hole on the cylinder block side of the water inlet pipe stay.
2. Apply engine coolant to the O-ring.
3. Install the O-ring to the water inlet pipe.
4. Insert the water inlet pipe into the water pump being careful not to damage the O-ring.
5. Install the water inlet pipe gasket with the gasket projection facing the direction shown in the figure.



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6. Tighten the bolts in the order shown in the figure.



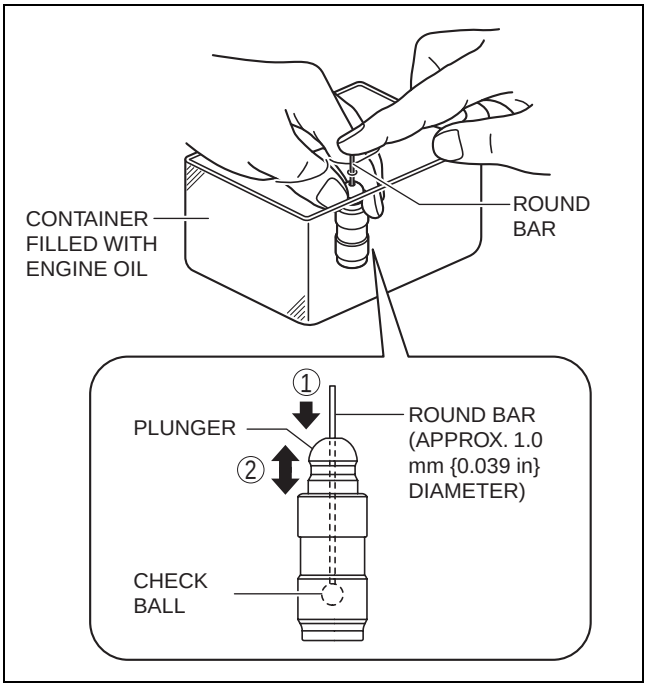
bpe2ue00000066

HLA Assembly Note

1. Perform HLA air bleeding using the following procedure:
   (1) Put the HLA in a container filled with engine oil.

   Caution
   - **Do not insert the round bar firmly because the check ball spring force is extremely weak.**

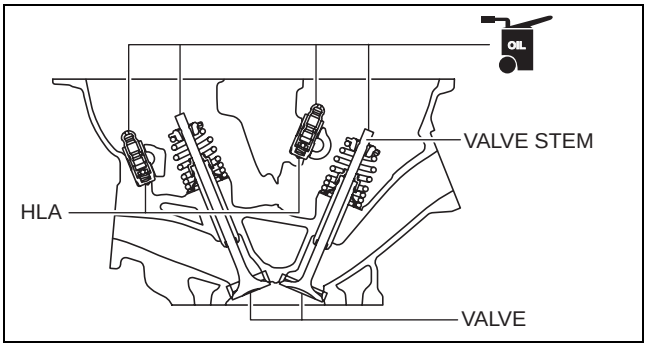
   (2) While lightly pressing the check ball using a round bar (**approx. 1.0 mm {0.039 in}** diameter), bleed air by moving the plunger up and down.
   (3) Press the end of the plunger in the oil and verify that there is no rebounding feel.
      - If rebounding feel cannot be eliminated, replace the HLA.
2. Install the HLAs to their original positions as before removal.



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Rocker Arm Assembly Note

1. Apply engine oil to the HLAs and the end of the valve stems.
2. Install the rocker arms to their original positions as before removal.



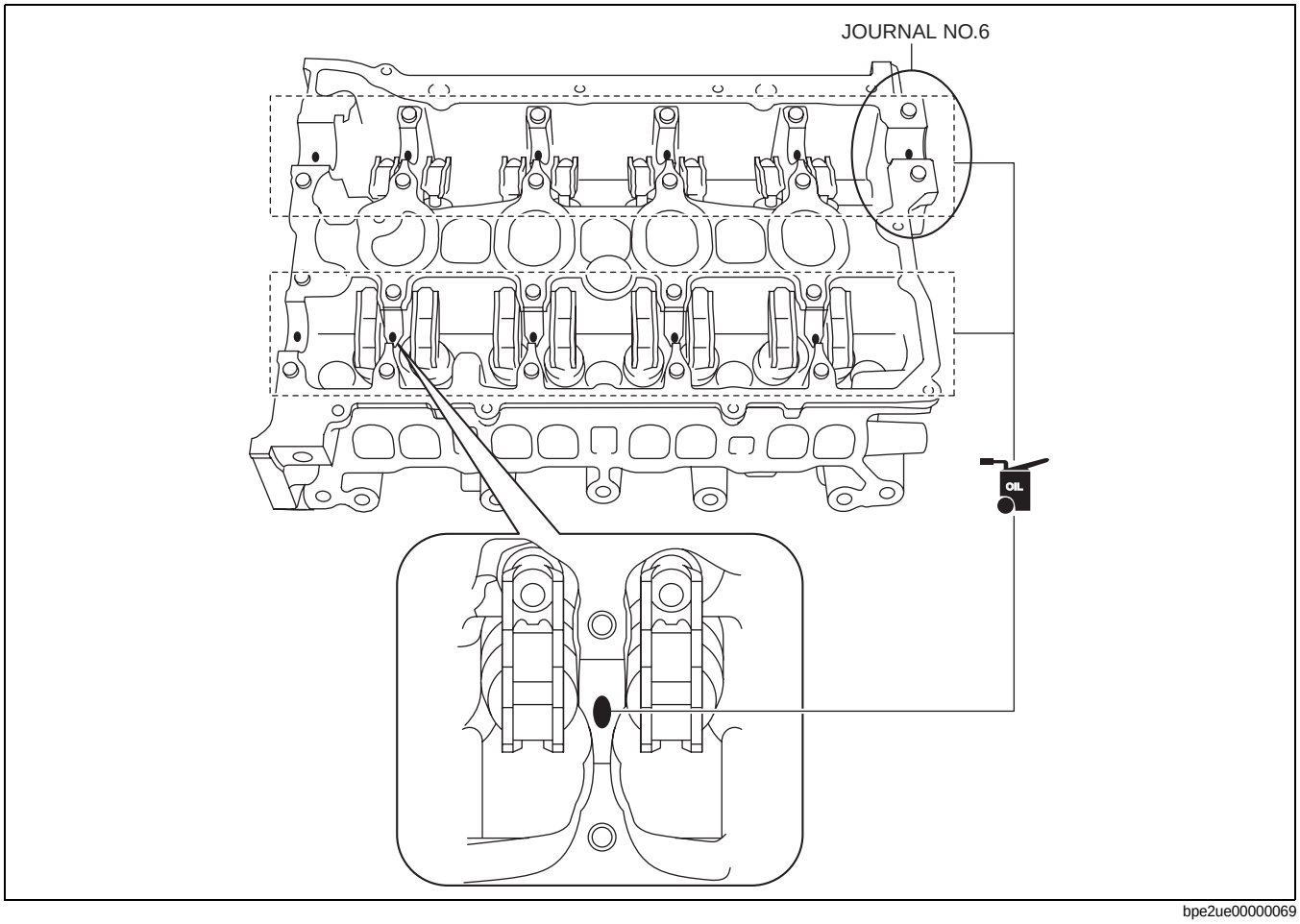
bpe2ue00000068

Camshaft Assembly Note

1. As shown in the figure, apply gear oil (SAE No. 90 or equivalent) or engine oil to the center area of each journal of the cylinder head.

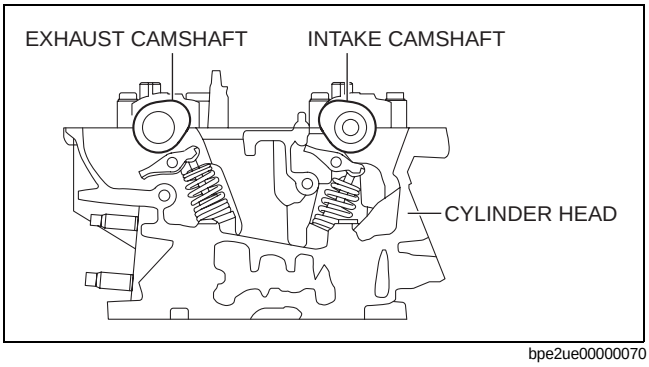
Caution

- **Apply 0.05 ml {0.05 cc, 0.003 in^3} or less of oil to journal No.6.**



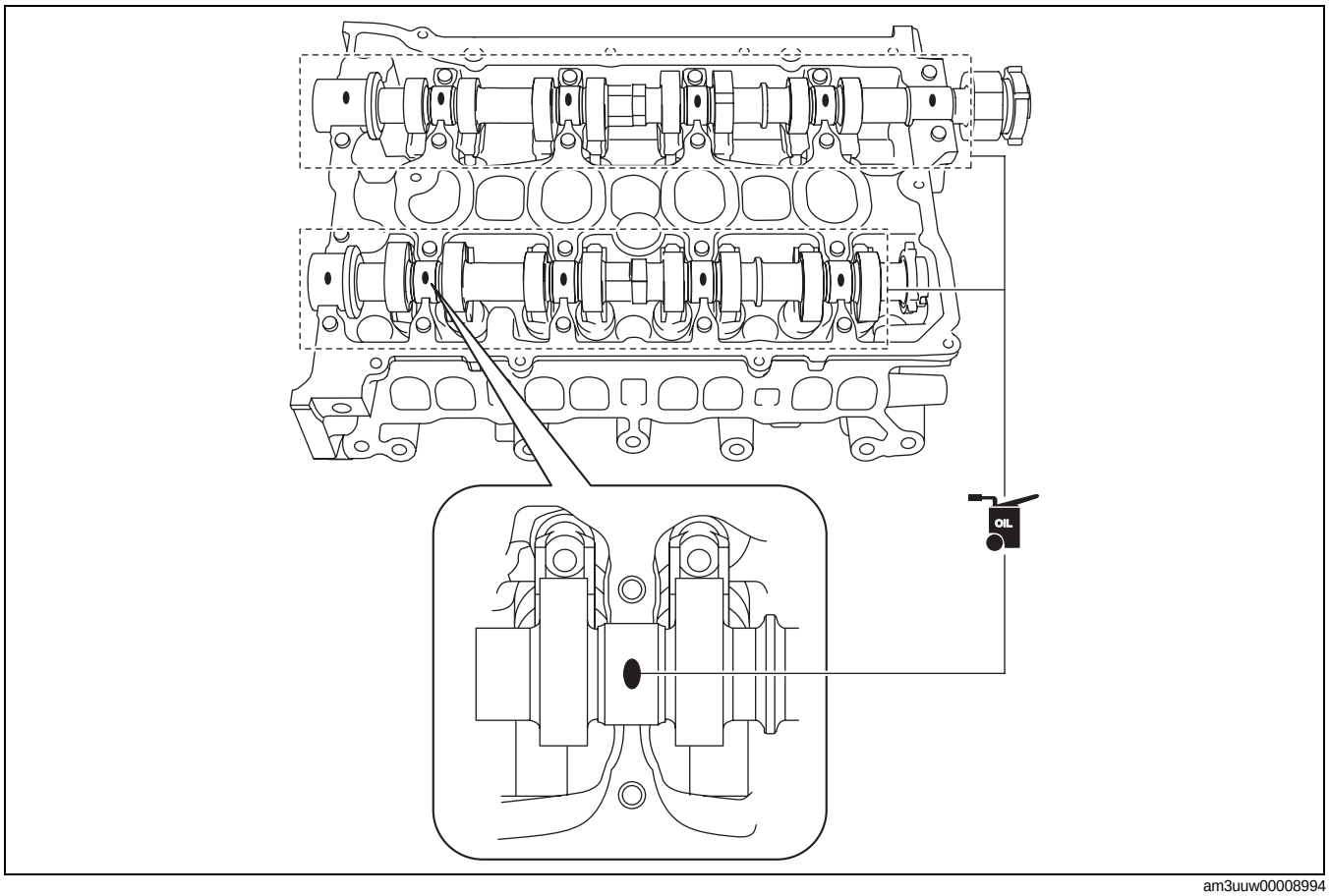
bpe2ue00000069

2. As shown in the figure, align the cam position of cylinder No.1 around top dead center (TDC) and place the camshafts on the cylinder head.



bpe2ue00000070

3. As shown in the figure, apply gear oil (SAE No. 90 or equivalent) or engine oil to the center area of each journal of the camshaft.



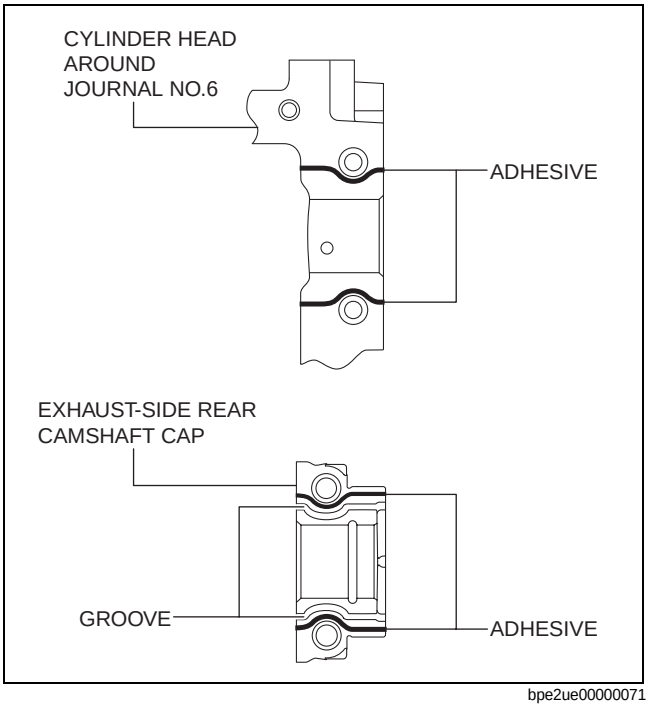
am3uuw00008994

4. Apply adhesive agent (Loctite 962T) around journal No.6 of the cylinder head or the exhaust-side rear camshaft cap.

Caution
- **Verify that there is no adhesive agent on the journal.**

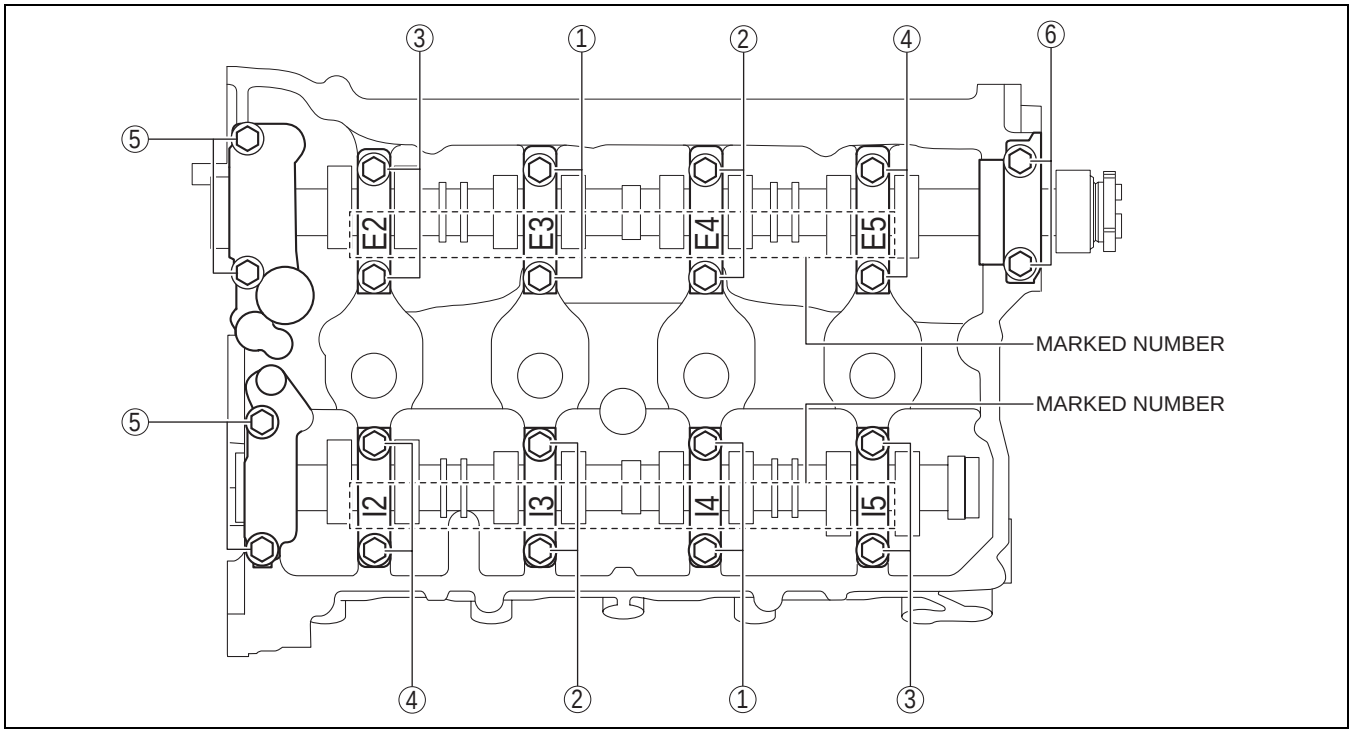
Adhesive agent bead width
0.5—1.5 mm {0.02—0.05 in}

5. Install the camshaft caps in the marked number order, and temporarily tighten the camshaft cap installation bolts in two or three passes evenly.



bpe2ue00000071

6. Tighten the camshaft cap installation bolts in two steps in the order shown in the figure.

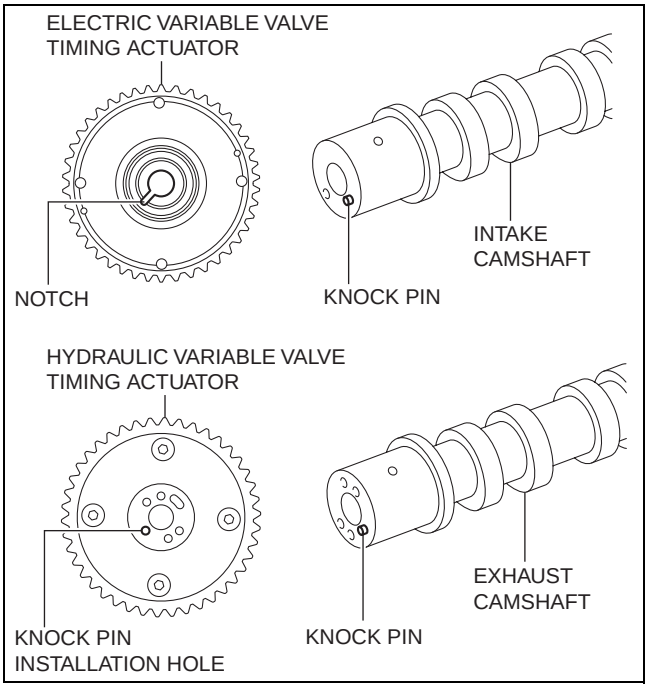


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Tightening torque
Step 1: 3.0—6.0 N·m {31—61 kgf·cm, 27—53 in·lbf}
Step 2: 8—11 N·m {82—112 kgf·cm, 71—97 in·lbf}

Electric Variable Valve Timing Actuator, Hydraulic Variable Valve Timing Actuator Assembly Note

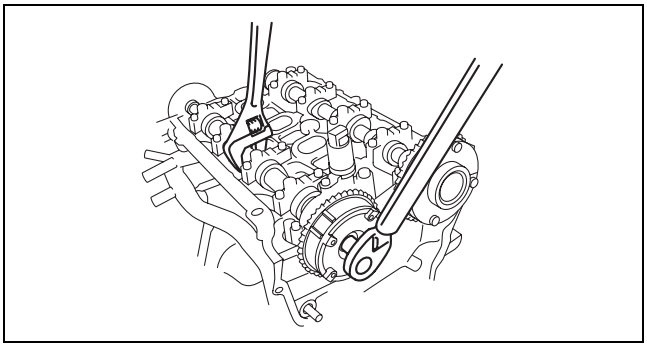
1. Align the knock pin on the end of the camshaft with the notch on the actuator (intake side) or knock pin installation hole (exhaust side), then install the actuator to the camshaft.



bpe2ue00000072

2. Hold the camshaft using a wrench on the cast hexagon, and tighten the actuator installation bolt.

Tightening torque
Electric variable valve timing actuator (intake side): 102—114 N·m {10.5—11.6 kgf·m, 76—84 ft·lbf}
Hydraulic variable valve timing actuator (exhaust side): 75—85 N·m {7.7—8.6 kgf·m, 56—62 ft·lbf}

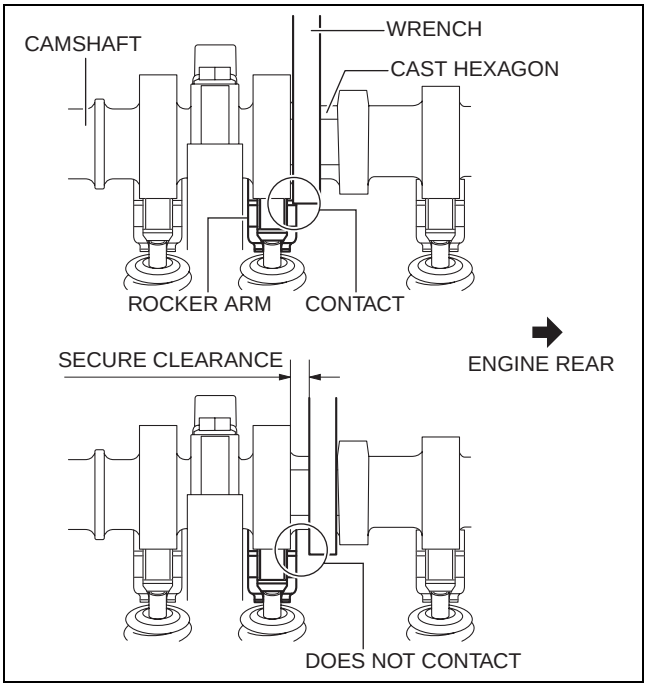


bpe2ue00000073

TIMING CHAIN ASSEMBLY

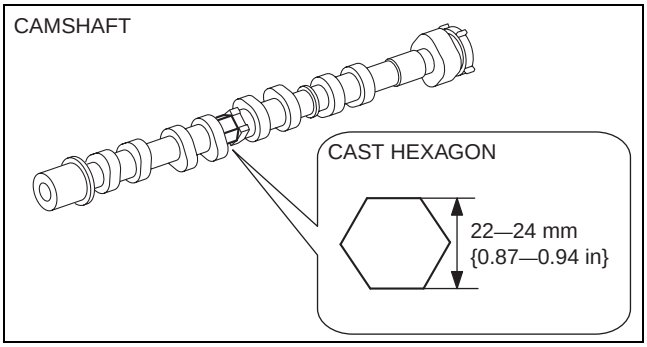
id011000505600

Caution
- **If the camshaft is rotated with the timing chain removed and the piston at the top dead center position, the valve may contact the piston and the engine could be damaged. When rotating the camshaft with the timing chain removed, rotate it after lowering the piston from the top dead center position.**
- **When rotating the camshaft using a wrench on the cast hexagon, the wrench may contact the rocker arm and damage the rocker arm. To prevent damage to the rocker arm when holding the camshaft on the cast hexagon, use the wrench at engine rear side as shown in the figure to secure a clearance between the cam.**



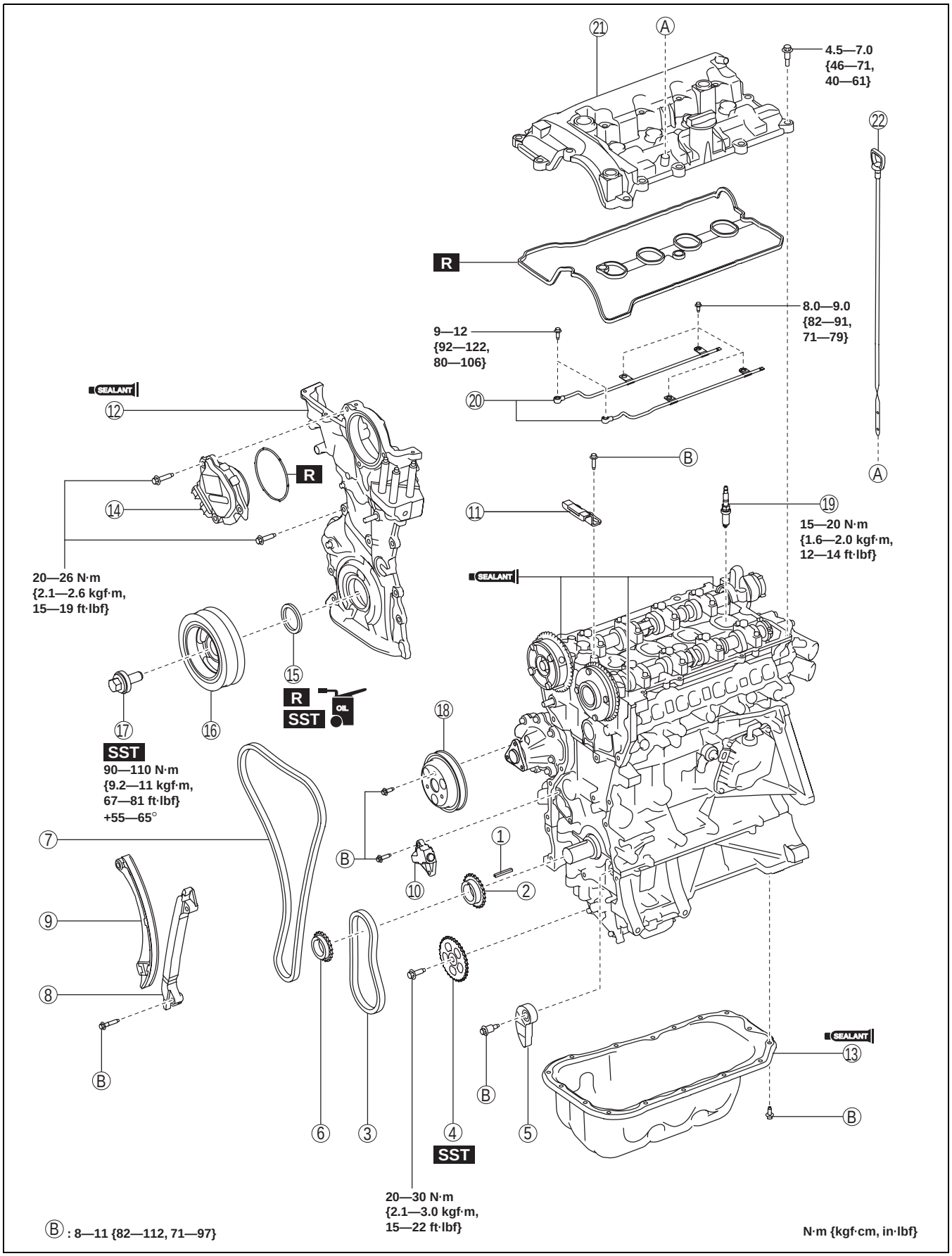
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Note
- Width at the cast hexagon of the camshaft is 22—24 mm {0.87—0.94 in}.



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1. Assemble in the order indicated in the table.



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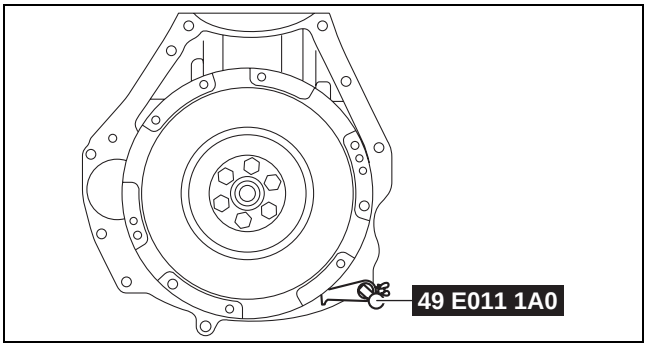
1	Key	2	Oil pump drive sprocket

3	Oil pump chain
4	Oil pump driven sprocket (See 01-10-61 Oil Pump Driven Sprocket Assembly Note.)
5	Oil pump chain tensioner
6	Crankshaft sprocket
7	Timing chain (See 01-10-62 Timing Chain Assembly Note.)
8	Chain guide (No.2) (See 01-10-62 Timing Chain Assembly Note.)
9	Tensioner arm (See 01-10-62 Timing Chain Assembly Note.)
10	Chain tensioner (See 01-10-62 Timing Chain Assembly Note.)
11	Chain guide (No.1) (See 01-10-62 Timing Chain Assembly Note.)
12	Engine front cover (See 01-10-64 Engine Front Cover Assembly Note.)
13	Oil pan (See 01-10-68 Oil Pan Assembly Note.)
14	Electric variable valve timing motor/driver (See 01-10-69 Electric Variable Valve Timing Motor/Driver Assembly Note.)
15	Front oil seal (See 01-10-70 Front Oil Seal Assembly Note.)
16	Crankshaft pulley
17	Crankshaft pulley lock bolt (See 01-10-71 Crankshaft Pulley Lock Bolt Assembly Note.)
18	Water pump pulley (See 01-10-72 Water Pump Pulley Assembly Note.)
19	Spark plug
20	Oil shower pipe (See 01-10-73 Oil Shower Pipe Installation Note.)
21	Cylinder head cover (See 01-10-73 Cylinder Head Cover Installation Note.)
22	Dipstick

Oil Pump Driven Sprocket Assembly Note

1. Hold the crankshaft using the **SST**.
2. Install the oil pump driven sprocket.

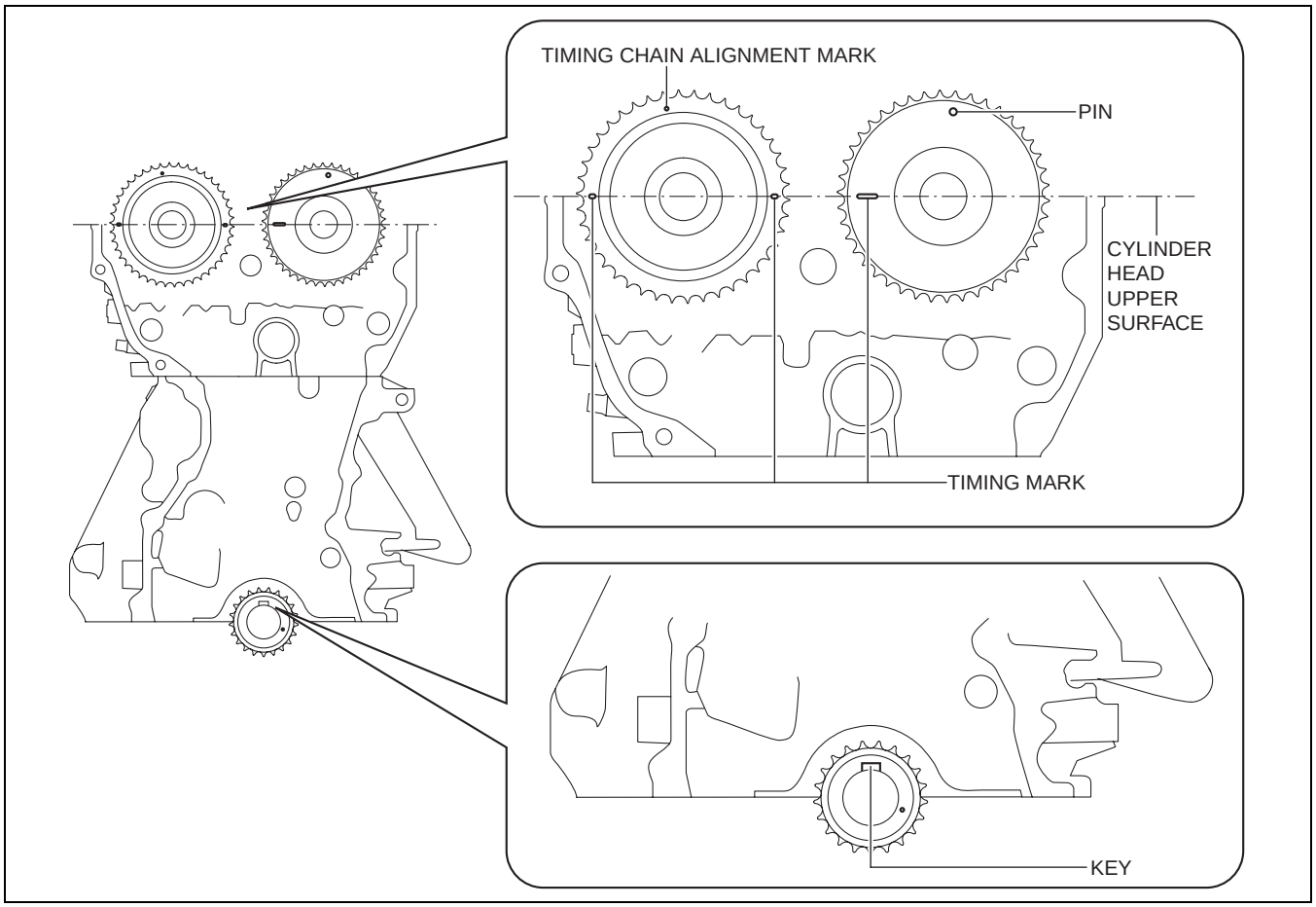
Tightening torque
20—30 N·m {2.1—3.0 kgf·m, 15—22 ft·lbf}



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Timing Chain Assembly Note

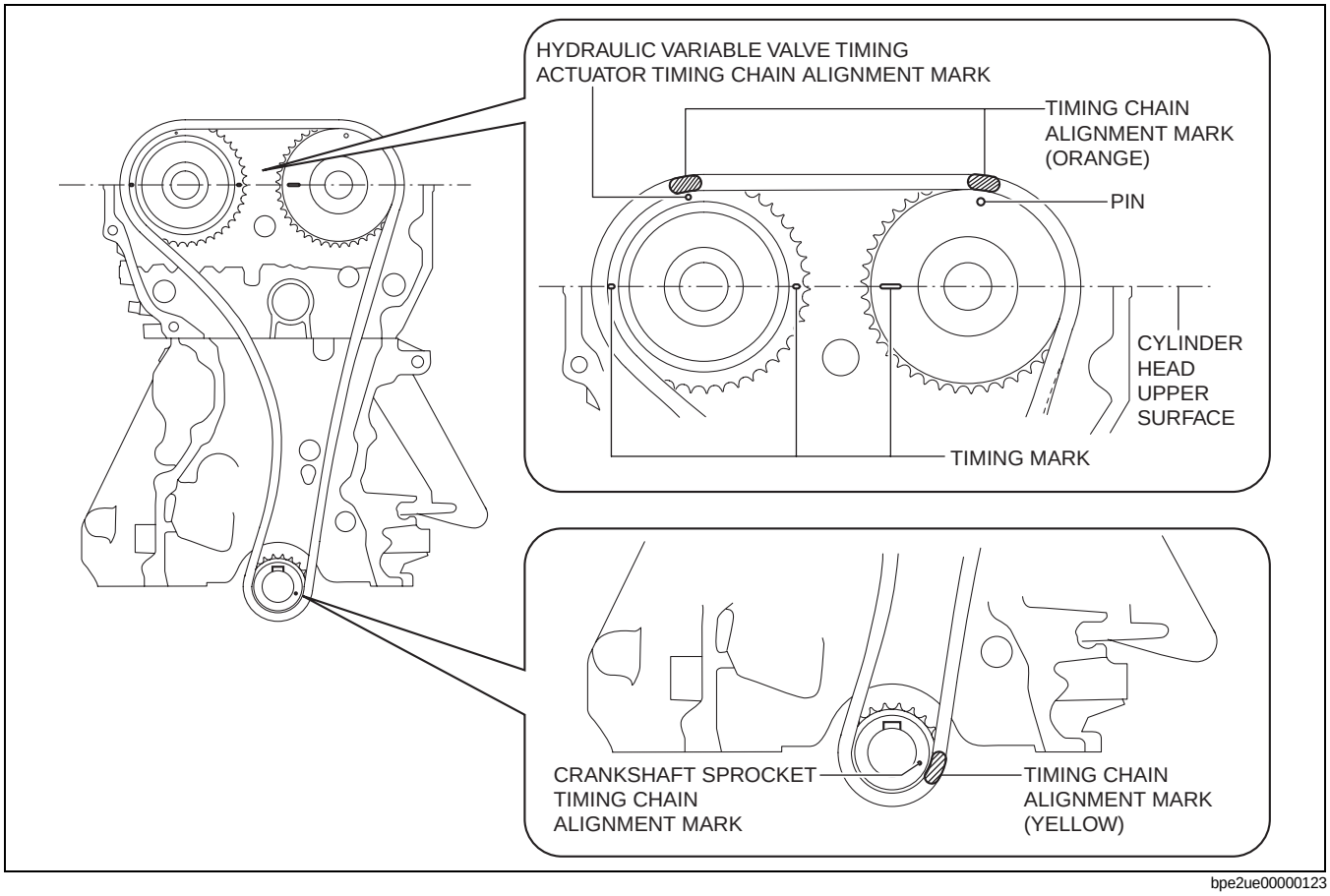
1. Verify that the timing marks and the key are aligned to the position shown in the figure.



bpe2ue00000122

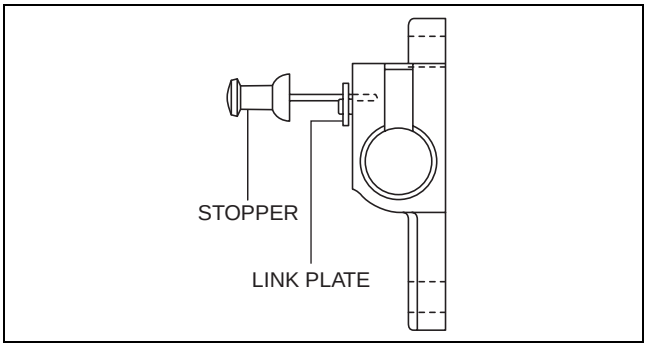
- If they are not in the position shown in the figure, rotate the camshaft and crankshaft to set the cylinder No.1 top dead center (TDC).

2. Install the timing chain while aligning the marks on each sprocket and the timing chain as shown in the figure.



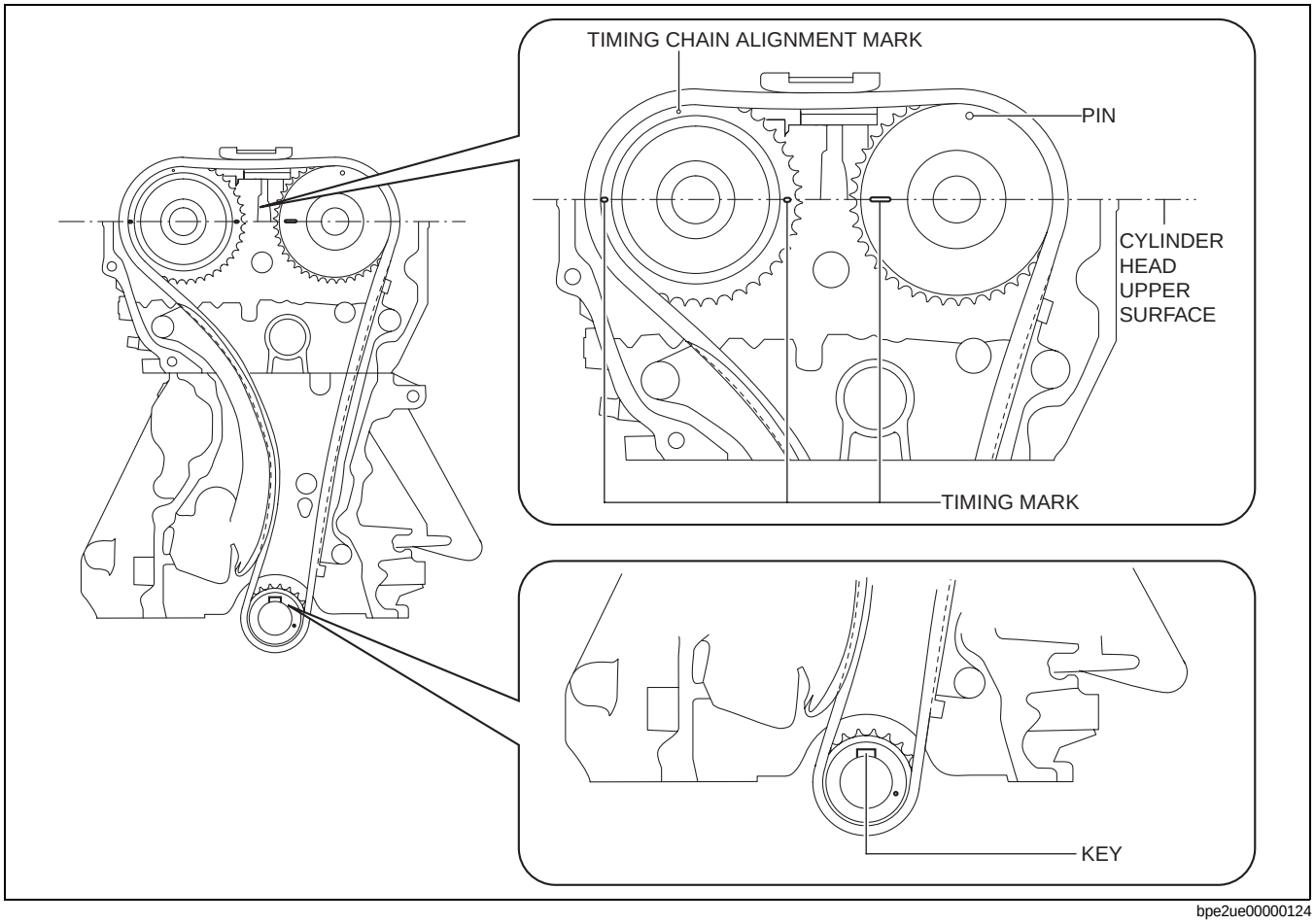
bpe2ue00000123

3. Install the chain guide (No.2).
4. Install the tensioner arm.
5. Install the chain tensioner.
6. After installing the chain tensioner, remove the installed wire or paper clip, and then apply tension to the timing chain.
   - If a new chain tensioner is used, remove the installed stopper.
7. Install the chain guide (No.1).
8. Verify that there is no looseness in the timing chain, and re-verify that each sprocket is in the specified location.



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9. Rotate the crankshaft clockwise two turns and inspect the valve timing.

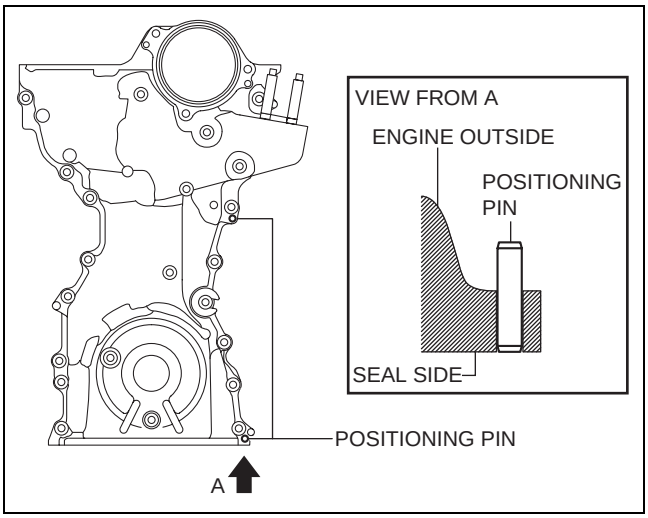


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Engine Front Cover Assembly Note

Note

- For a new engine front cover, the positioning pins in the two locations shown in the figure project to the outside of the engine.

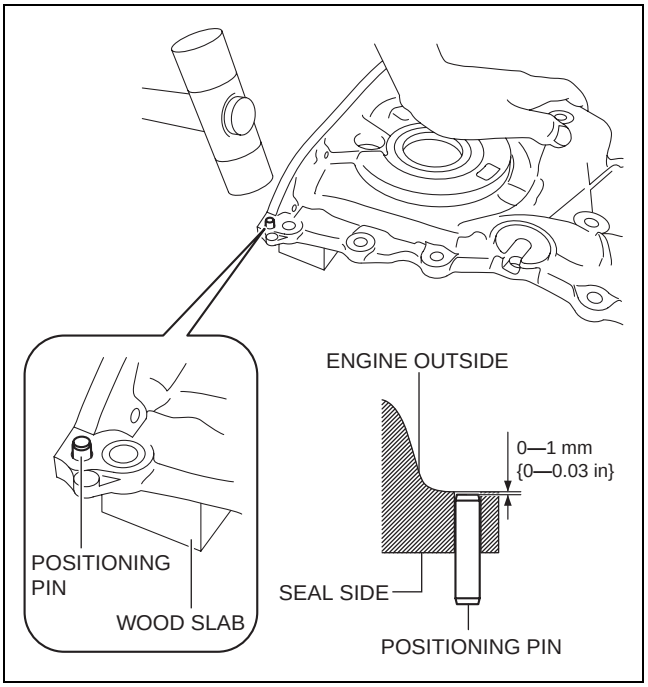


bpe2ue00000125

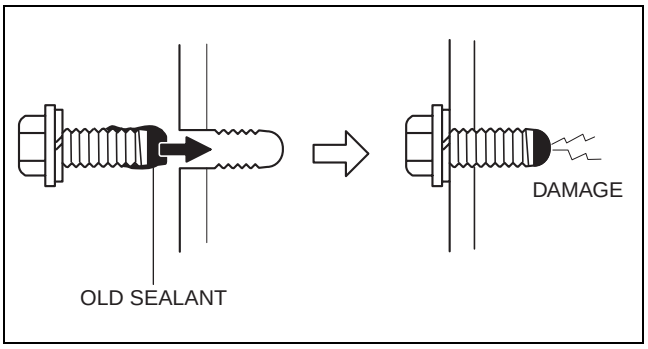
1. If the engine front cover is newly replaced, tap the positioning pins in the two locations to the seal surface side.
2. Completely clean and remove any oil, dirt, sealant or other foreign material that may be adhering to the engine front cover, cylinder head, and cylinder block.
3. When reusing the engine front cover installation bolts, clean any old sealant from the bolts.

Caution

- **Apply the silicon sealant in a single, unbroken line.**
- **To prevent silicone sealant from hardening, adhere the engine front cover to the cylinder block within 10 min. after silicone sealant is applied. Tighten the installation bolts completely soon after adhering.**
- **Using bolts with the old seal adhering could cause cracks in the cylinder head and cylinder block.**

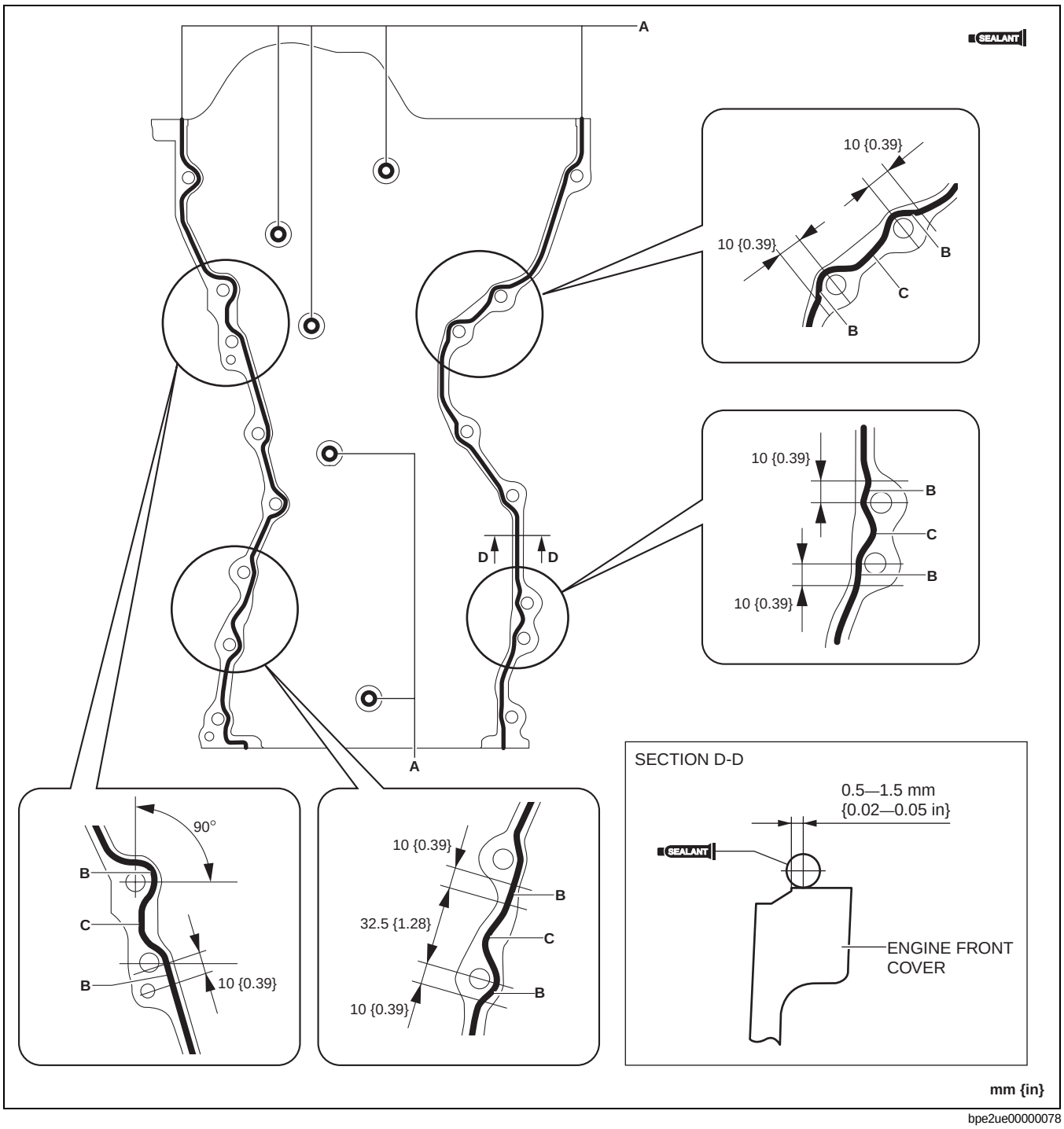


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bpe2ue00000127

4. Apply silicone sealant to the engine front cover as shown in the figure.



bpe2ue00000078

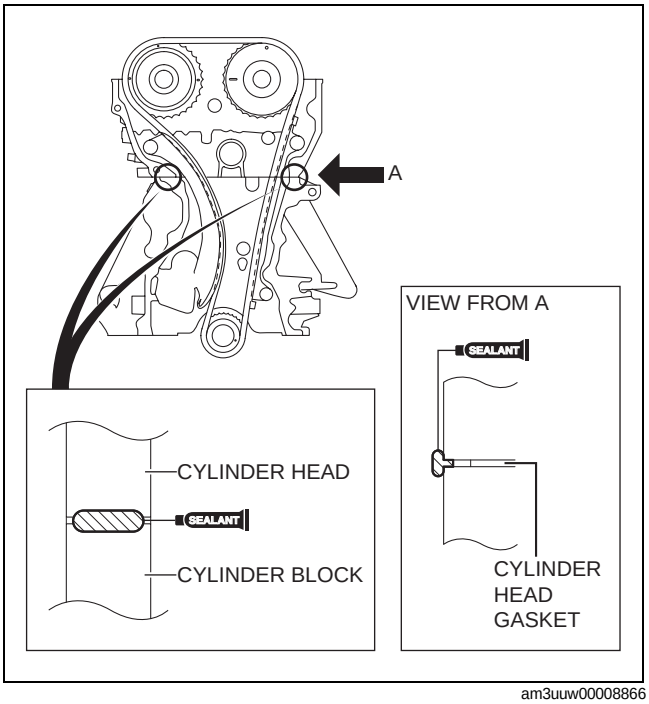
Bead thickness
A: 2—6 mm {0.1—0.2 in}
B: 4—6 mm {0.16—0.23 in}
C: 4—8 mm {0.2—0.3 in}

5. Apply silicone sealant to the areas shown in the figure.

Caution
- **Apply the silicone sealant so that it goes into the cylinder head gasket.**

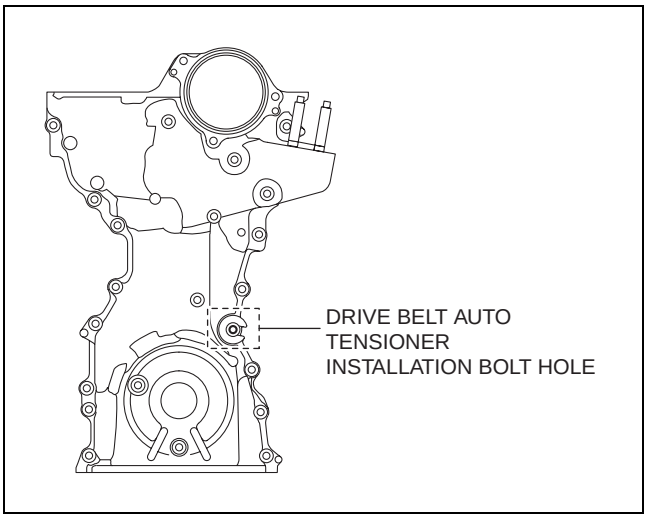
6. Install the engine front cover to the engine.

Note
- Temporarily install an appropriate bolt to the drive belt auto tensioner installation bolt hole to prevent:
  - — A silicone sealant adhesion malfunction in the drive belt auto tensioner installation bolt hole.
  - — A bolt mis-installation due to silicone sealant hardening.



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7. Prepare an appropriate **M8 X 1.25** bolt (length **40 mm {1.6 in}**).

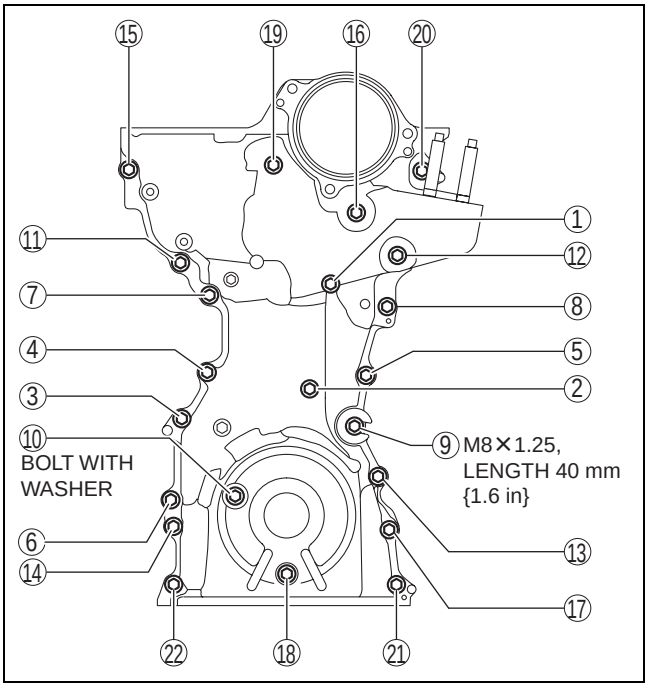


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8. Tighten the engine front cover installation bolts in the order shown in the figure.

   Tightening torque
   20—26 N·m {2.1—2.6 kgf·cm, 15—19 in·lbf}

9. Remove the bolt installed to the drive belt auto tensioner installation bolt hole when installing the drive belt auto tensioner.



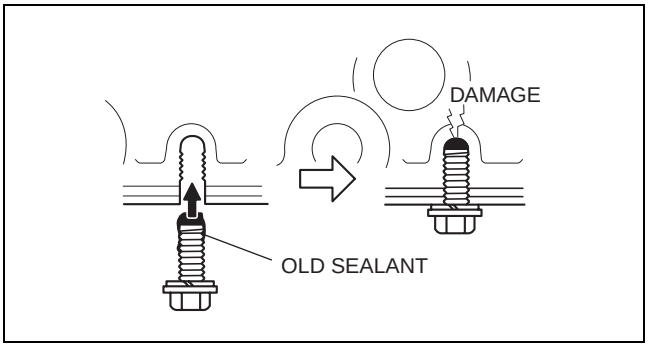
bpe2ue00000079

Oil Pan Assembly Note

1. Completely clean and remove any oil, dirt, sealant or other foreign material that may be adhering to the cylinder block and oil pan.
2. When reusing the oil pan installation bolts, clean any old sealant from the bolts.

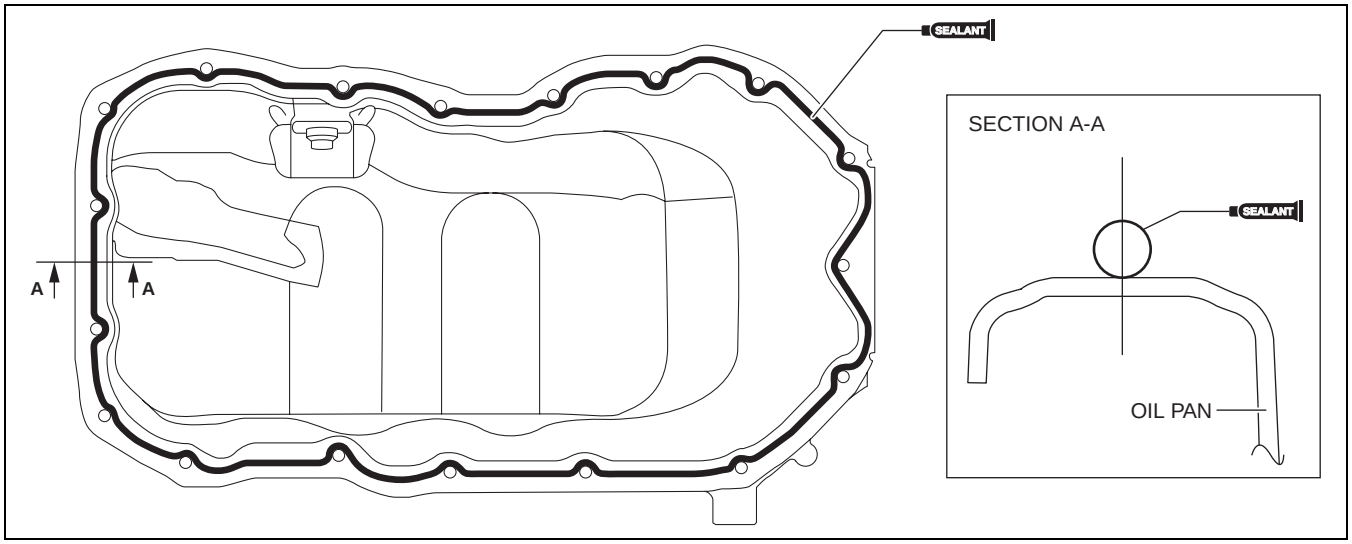
Caution

- **Apply the silicon sealant in a single, unbroken line around the whole perimeter.**
- **To prevent silicone sealant from hardening, adhere the oil pan to the cylinder block within 10 min. after silicone sealant is applied. Tighten the installation bolts completely soon after adhering.**
- **Using bolts with the old seal adhering could cause cracks in the cylinder block, etc.**



am6zzw00002304

3. Apply silicone sealant to the oil pan along the inside of the bolt holes as shown in the figure.

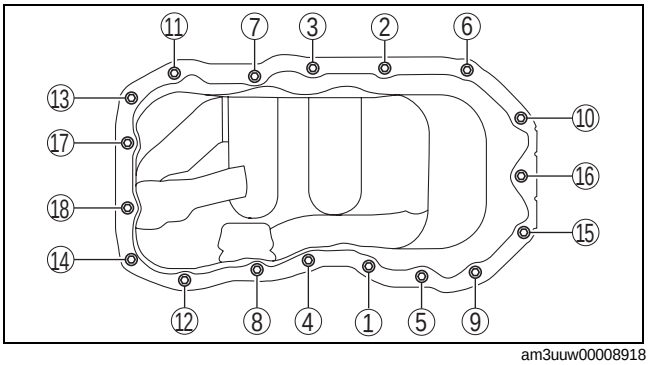


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Thickness
2.0—6.0 mm {0.08—0.23 in}

4. Install the oil pan to the cylinder block.
5. Tighten the bolts in the order shown in the figure.

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



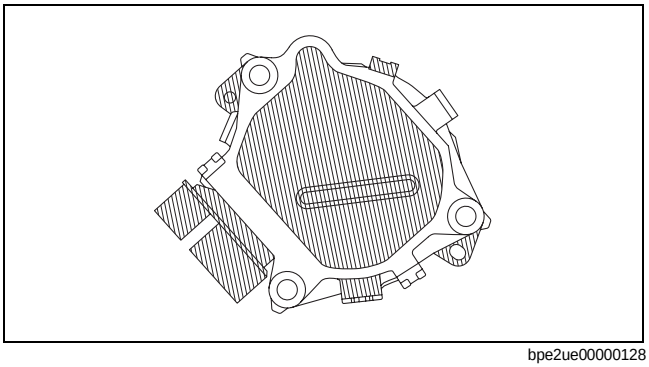
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Electric Variable Valve Timing Motor/Driver Assembly Note

1. Install a new O-ring to the O-ring installation groove of the engine front cover.

Caution

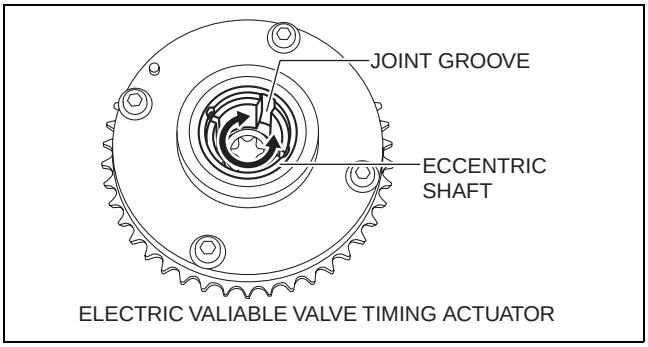
- **To prevent damage to the electric variable valve timing motor/driver, do not apply excessive force (force of 100 N {10.2 kgf, 22.5 lbf} or more) to the shaded areas shown in the figure.**



bpe2ue00000128

2. Install the electric variable valve timing motor/driver using the following procedures.

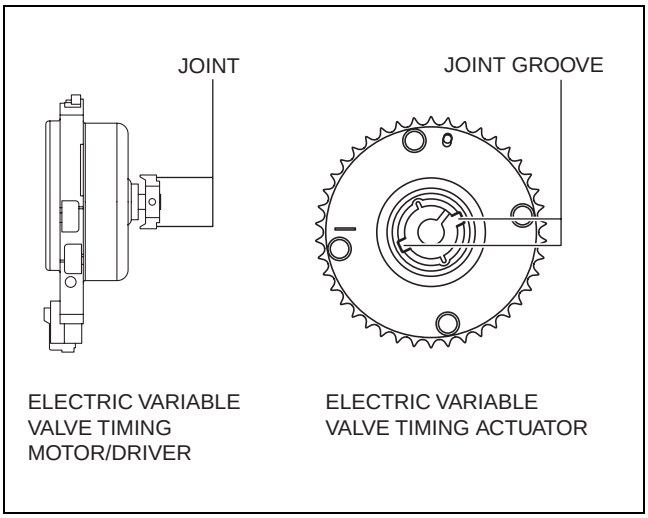
Note
- The eccentric shaft on the electric variable valve timing actuator side can be rotated to the left and right.
- The electric variable valve timing motor/driver can be assembled with the joint groove of the eccentric shaft in any position, and it will not lead to vehicle damage or performance reduction.



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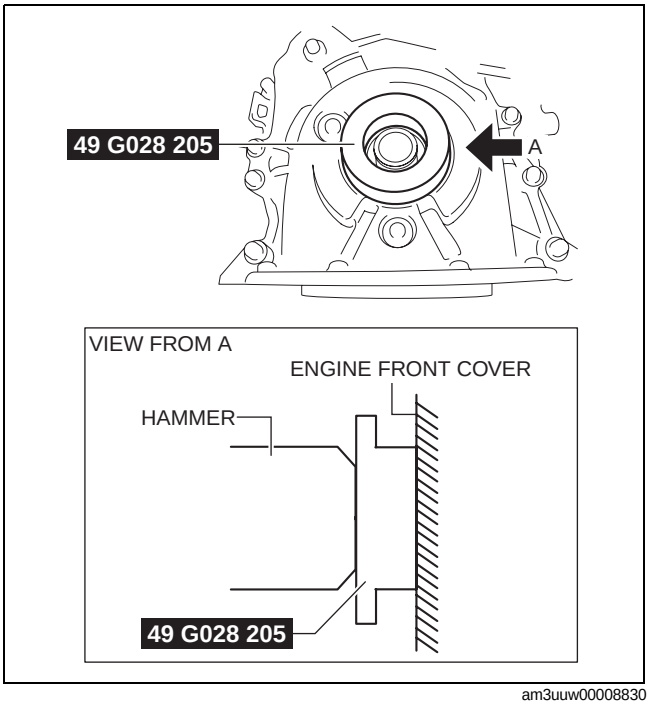
(1) Before installation, rotate the joint of the end of the electric variable valve timing motor so that it is aligned to the joint groove on the electric variable valve timing actuator side.
(2) Engage the joint on the end of the electric variable valve timing motor with the joint groove on the electric variable valve timing actuator side.
(3) Attach the seal surface.
(4) Tighten the electric variable valve timing motor/driver installation bolts.

Tightening torque
20—26 N·m {2.1—2.6 kgf·m, 15—19 ft·lbf}



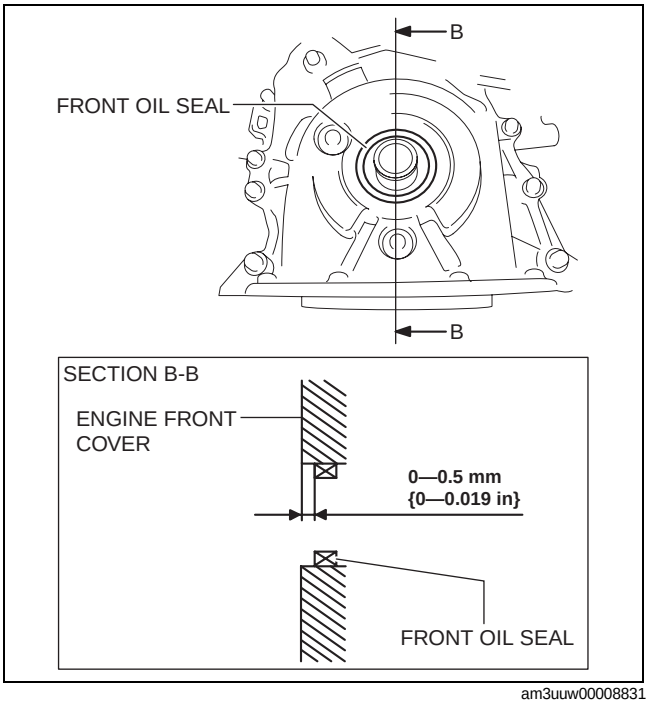
am3uuw00009043

Front Oil Seal Assembly Note
1. Apply clean engine oil to the inner surface of a new front oil seal.
2. Insert the front oil seal into the engine front cover by hand.
3. Tap the oil seal in evenly using the **SST** and a hammer.



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Front oil seal press-in amount
0—0.5 mm {0—0.019 in}

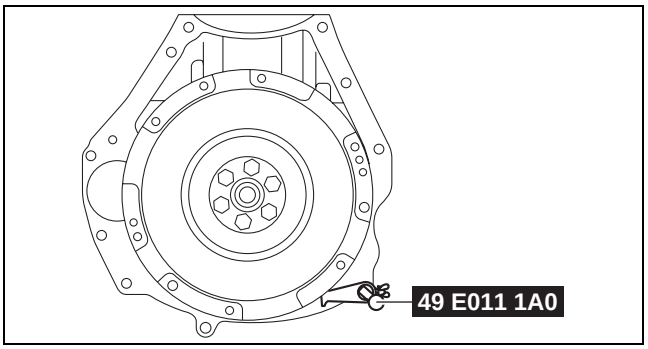


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Crankshaft Pulley Lock Bolt Assembly Note

1. Hold the crankshaft using the **SST**.
2. Tighten the crankshaft pulley lock bolt in the order shown in the following two steps.

Tightening procedure
Step 1: 90—110 N·m {9.2—11 kgf·m, 67—81 ft·lbf}
Step 2: 55—65°

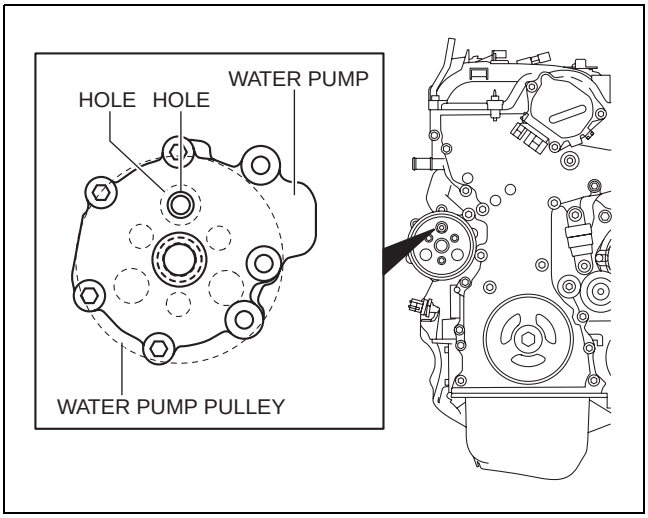


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Water Pump Pulley Assembly Note

Caution
- **Be careful not to damage the belt groove and surface of the water pump pulley when using tools, otherwise it will cause wear, breakage, abnormal noise of the drive belt (stretch belt), damage to the pulley, and rust.**

1. Install the water pump pulley to the water pump and temporarily tighten the bolt.
2. Align the water pump pulley hole with the water pump hole as shown in the figure.

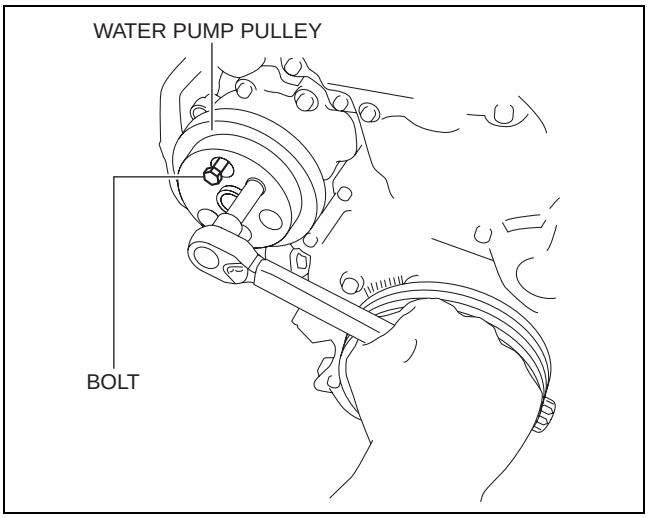


bpe2ue00000081

3. Insert an appropriate bolt (length **70 mm {2.8 in}**) into the water pump hole shown in the figure and lock the water pump pulley against rotation.
4. Completely tighten the water pump pulley bolt to the specified torque.

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

5. Remove the bolt used for locking the water pump pulley against rotation.

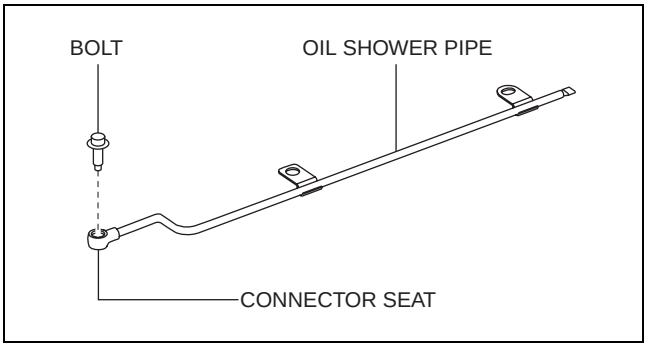


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Oil Shower Pipe Installation Note

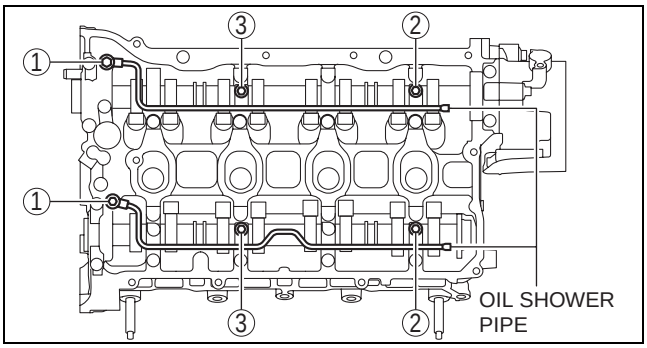
Caution

- **If the bolt is tightened with oil adhering to the bolt and the oil shower pipe connector seat shown in the figure, the axial force of the bolt will strengthen and could cause the connector seat to deform. Before installing, remove oil from the bolt and the oil shower pipe connector seat.**



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1. Install the oil shower pipe in the order shown in the figure.



bpe2ue00000129

Tightening torque

Installation position	Tightening torque
1	9—12 N·m {92—122 kgf·cm, 80—106 in·lbf}
2, 3	8.0—9.0 N·m {82—91 kgf·cm, 71—79 in·lbf}

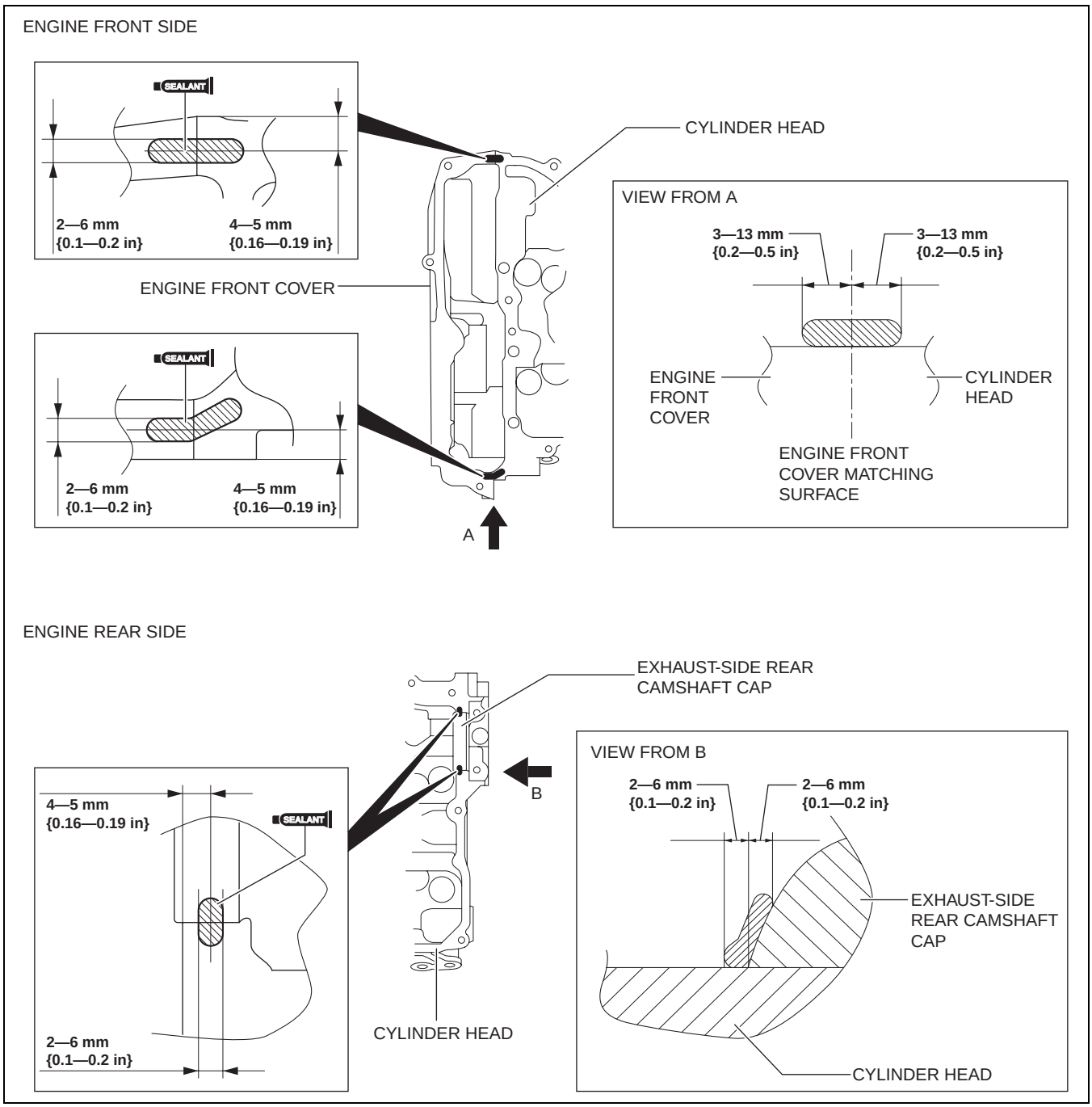
Cylinder Head Cover Installation Note

Caution

- **To assure the sealing performance of the cylinder head cover, be careful of the following:**
  - **— Verify that the cylinder head cover gasket is inserted into the cylinder head cover groove and install the cylinder head cover.**
  - **— Completely clean and remove any oil, dirt, sealant or other foreign material from the seal surface.**
- **To prevent silicone sealant from hardening, adhere the cylinder head cover and the cylinder head within 10 min. after silicone sealant is applied. Tighten the installation bolts completely soon after adhering.**

1. Insert a new cylinder head cover gasket into the cylinder head cover groove.

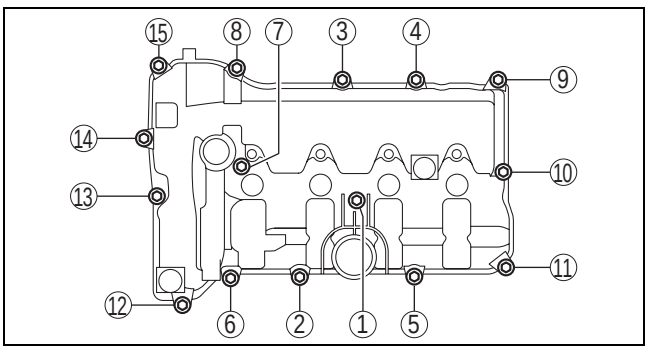
2. Apply silicone sealant to the areas shown in the figure.



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3. Tighten the cylinder head cover bolts in the order shown in the figure.

Tightening torque
4.5—7.0 N·m {46—71 kgf·cm, 40—61 in·lbf}



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1A08-1U-11L.book　1 ページ　２０１１年１２月１３日　火曜日　午前１１時１１分

01-50 TECHNICAL DATA

ENGINE TECHNICAL DATA 01-50–1

ENGINE TECHNICAL DATA

id015000800100

Item	Specification
OCV coil resistance	6.9—7.5 ohms [20°C {68°F}]
Maximum distortion, head gasket side of the cylinder head	0.05 mm {0.002 in}
Maximum distortion, manifold side	IN: 0.10 mm {0.0039 in} EX: 0.05 mm {0.002 in}
Maximum cutting length, manifold side	IN: Cutting not authorized EX: 0.20 mm {0.0079 in}
Standard valve seat contact width	1.41 mm {0.0555 in}
Valve seat angle	45°
Standard valve seat sinkage amount (Dimension L)	IN: 48.73—50.27 mm {1.919—1.979 in} EX: 48.73—50.27 mm {1.919—1.979 in}
Standard valve head margin thickness	IN: 1.75—1.95 mm {0.0689—0.0767 in} EX: 1.95—2.15 mm {0.0768—0.0846 in}
Standard valve length	IN: 106.55—107.15 mm {4.1949—4.2185 in} EX: 116.55—117.15 mm {4.5886—4.6122 in}
Minimum valve length	IN: 106.33 mm {4.1862 in} EX: 116.33 mm {4.5799 in}
Standard valve stem diameter	IN: 5.470—5.485 mm {0.2154—0.2159 in} EX: 5.465—5.480 mm {0.2152—0.2157 in}
Minimum valve stem diameter	IN: 5.424 mm {0.2135 in} EX: 5.419 mm {0.2133 in}
Standard valve guide inner diameter	IN: 5.510—5.530 mm {0.2170—0.2177 in} EX: 5.510—5.530 mm {0.2170—0.2177 in}
Standard clearance between valve stem and guide	IN: 0.025—0.060 mm {0.0010—0.0023 in} EX: 0.030—0.065 mm {0.0012—0.0025 in}
Maximum clearance between valve stem and guide	0.10 mm {0.0039 in}
Standard valve guide projection height	IN: 16.4—17.0 mm {0.646—0.669 in} EX: 16.4—17.0 mm {0.646—0.669 in}
Valve spring installation height	IN: When pressurized with spring force of 190—210 N {19.4—21.4 kgf, 42.8—47.2 lbf}, spring height is 38.0 mm {1.50 in} EX: When pressurized with spring force of 228—252 N {23.3—25.6 kgf, 51.3—56.6 lbf}, spring height is 38.0 mm {1.50 in}
Maximum valve spring off-square	IN: 2.0 ° (1.6 mm {0.063 in}) EX: 2.0 ° (1.7 mm {0.067 in})
Maximum camshaft runout	0.030 mm {0.0012 in}
Standard cam height	IN: 41.57 mm {1.637 in} EX: 40.37 mm {1.589 in}
Minimum cam height	IN: 41.50 mm {1.634 in} EX: 40.30 mm {1.587 in}
Standard camshaft journal diameter	24.96—24.98 mm {0.9827—0.9834 in}
Minimum camshaft journal diameter	24.93 mm {0.9815 in}
Standard camshaft journal oil clearance	0.035—0.080 mm {0.0014—0.0031 in}
Maximum camshaft journal oil clearance	0.090 mm {0.0035 in}
Standard camshaft end play	0.07—0.22 mm {0.003—0.008 in}
Maximum camshaft end play	0.23 mm {0.0091 in}
Maximum distortion, head gasket side of the cylinder block	0.10 mm {0.0039 in}
Standard cylinder bore diameter	83.50—83.53 mm {3.2875—3.2885 in}
Air pressure	180—220 kPa {1.84—2.24 kgf/cm^2, 26.2—31.9 psi}
Standard piston outer diameter	83.465—83.495 mm {3.2861—3.2872 in}
Standard clearance between piston and cylinder	0.025—0.045 mm {0.0010—0.0017 in}

1A08-1U-11L.book 2 ページ ２０１１年１２月１３日 火曜日 午前１１時１１分

TECHNICAL DATA

Item	Specification
Maximum clearance between piston and cylinder	0.063 mm {0.0025 in}
Standard clearance between piston ring and ring groove	Top: 0.04—0.08 mm {0.002—0.003 in} Second: 0.03—0.07 mm {0.0012—0.0027 in} Oil: 0.04—0.12 mm {0.002—0.004 in}
Maximum clearance between piston ring and ring groove	Top: 0.12 mm {0.0047 in} Second: 0.10 mm {0.0039 in} Oil: 0.17 mm {0.0067 in}
Standard piston ring end gap	Top: 0.13—0.18 mm {0.0052—0.0070 in} Second: 0.18—0.28 mm {0.008—0.011 in} Oil: 0.10—0.35 mm {0.004—0.013 in}
Maximum piston ring end gap	Top: 0.35 mm {0.014 in} Second: 0.45 mm {0.018 in} Oil: 0.52 mm {0.020 in}
Standard piston pin outer diameter	20.995—21.000 mm {0.82658—0.82677 in}
Standard piston pin hole diameter	21.004—21.008 mm {0.82693—0.82708 in}
Standard clearance between piston pin hole diameter and piston pin outer diameter	0.004—0.013 mm {0.0002—0.0005 in}
Standard connecting rod small end inner diameter	21.006—21.017 mm {0.82701—0.82744 in}
Standard clearance between connecting rod small end inner diameter and piston pin outer diameter	0.006—0.022 mm {0.0003—0.0008 in}
Maximum connecting rod bending	0.050 mm {0.0020 in}
Maximum connecting rod distortion	0.050 mm {0.0020 in}
Connecting rod center-to-center distance	155.2 mm {6.110 in}
Standard side clearance at the large end of connecting rod	0.14—0.36 mm {0.006—0.014 in}
Maximum side clearance at the large end of connecting rod	0.465 mm {0.0183 in}
Standard bearing oil clearance at the large end of the connecting rod	0.026—0.052 mm {0.0011—0.0020 in}
Maximum bearing oil clearance at the large end of the connecting rod	0.10 mm {0.0039 in}
Connecting rod bearing size	STD: 1.503—1.520 mm {0.05918—0.05984 in} OS 0.25: 1.628—1.631 mm {0.06410—0.06421 in} OS 0.50: 1.753—1.756 mm {0.06902—0.06913 in}
Standard crankshaft end play	0.08—0.29 mm {0.004—0.011 in}
Maximum crankshaft end play	0.30 mm {0.012 in}
Thrust bearing size	STD: 2.500—2.550 mm {0.0985—0.1003 in} OS0.25: 2.625—2.675 mm {0.1034—0.1053 in}
Maximum main journal runout	0.10 mm {0.0039 in}
Standard main journal diameter	46.980—47.000 mm {1.8497—1.8503 in}
Maximum main journal off-round	0.005 mm {0.0002 in}
Standard crank pin diameter	46.980—47.000 mm {1.8497—1.8503 in}
Maximum crank pin off-round	0.005 mm {0.0002 in}
Standard main journal oil clearance	0.016—0.039 mm {0.0007—0.0015 in}
Maximum main journal oil clearance	0.084 mm {0.0033 in}
Main bearing size	STD: 2.489—2.510 mm {0.0980—0.0988 in} OS 0.25: 2.614—2.617 mm {0.10292—0.10303 in} OS 0.50: 2.739—2.742 mm {0.10784—0.10795 in}
Flywheel maximum runout	0.10 mm {0.0039 in}
Standard cylinder head bolt length	145.2—145.8 mm {5.717—5.740 in}
Maximum cylinder head bolt length	146.5 mm {5.768 in}
Standard connecting rod bolt length	43.7—44.3 mm {1.73—1.74 in}
Maximum connecting rod bolt length	45.0 mm {1.77 in}
Rear oil seal press-in amount	0—0.5 mm {0—0.019 in}
Front oil seal press-in amount	0—0.5 mm {0—0.019 in}

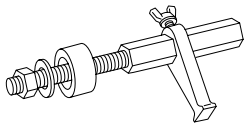
01-60 SERVICE TOOLS

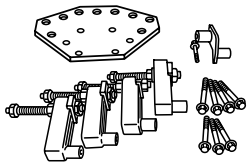
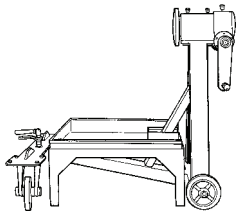
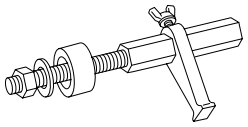
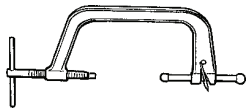
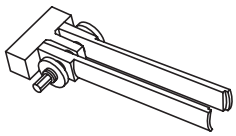
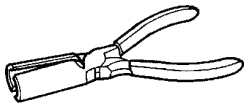
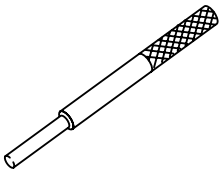
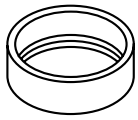
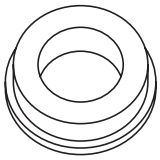
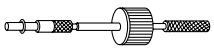
ENGINE SST 01-60–1

ENGINE SST

id016000119200

1: Mazda SST number
2: Global SST number
Example

1:49 E011 1A0 2: – Ring gear brake set	

1:49 L010 1A0 2: – Engine hanger set 	1:49 0107 680A 2: – Engine stand 	1:49 E011 1A0 2: – Ring gear brake set 
1:49 0636 100B 2: – Valve spring lifter arm 	1:49 B012 0A2A 2: – Pivot 	1:49 S120 170 2: – Valve seal remover 
1:49 B012 015 2: – Valve guide installer 	1:49 E033 101 2: – Dust cover installer 	1:49 B012 016 2: – Attachment 
1:49 G028 205 2: – Oil seal installer 	1:49 1285 071 2: – Bearing puller 	–

Engine Workshop Manual SKYACTIV-G 2.5

FOREWORD

This manual explains the service points for the above-indicated automotive system. This manual covers all models with the above-indicated automotive system, not any one specific model.

In order to do these procedures safely, quickly, and correctly, you must first read this manual and any other relevant service materials carefully.

All the contents of this manual, including drawings and specifications, are the latest available at the time of printing.
As modifications affecting repair or maintenance occur, relevant information supplementary to this volume will be made available at Mazda dealers. This manual should be kept up-to-date.

Mazda Motor Corporation reserves the right to alter the specifications and contents of this manual without obligation or advance notice.

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Mazda Motor Corporation
HIROSHIMA, JAPAN

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PRINTED IN U.S.A., DECEMBER 2012
Form No. 1A36–1U–12L
Part No. 9999–95–EWPY–14

WARNING

Servicing a vehicle can be dangerous. If you have not received service-related training, the risks of injury, property damage, and failure of servicing increase. The recommended servicing procedures for the vehicle in this workshop manual were developed with Mazda-trained technicians in mind. This manual may be useful to non-Mazda trained technicians, but a technician with our service-related training and experience will be at less risk when performing service operations. However, all users of this manual are expected to at least know general safety procedures.

This manual contains "Warnings" and "Cautions" applicable to risks not normally encountered in a general technician's experience. They should be followed to reduce the risk of injury and the risk that improper service or repair may damage the vehicle or render it unsafe. It is also important to understand that the "Warnings" and "Cautions" are not exhaustive. It is impossible to warn of all the hazardous consequences that might result from failure to follow the procedures.

The procedures recommended and described in this manual are effective methods of performing service and repair. Some require tools specifically designed for a specific purpose. Persons using procedures and tools which are not recommended by Mazda Motor Corporation must satisfy themselves thoroughly that neither personal safety nor safety of the vehicle will be jeopardized.

The contents of this manual, including drawings and specifications, are the latest available at the time of printing, and Mazda Motor Corporation reserves the right to change the vehicle designs and alter the contents of this manual without notice and without incurring obligation.

Parts should be replaced with genuine Mazda replacement parts or with parts which match the quality of genuine Mazda replacement parts. Persons using replacement parts of lesser quality than that of genuine Mazda replacement parts must satisfy themselves thoroughly that neither personal safety nor safety of the vehicle will be jeopardized.

Mazda Motor Corporation is not responsible for any problems which may arise from the use of this manual. The cause of such problems includes but is not limited to insufficient service-related training, use of improper tools, use of replacement parts of lesser quality than that of genuine Mazda replacement parts, or not being aware of any revision of this manual.

GENERAL INFORMATION

00
SECTION

GENERAL INFORMATION 00-00

00-00 GENERAL INFORMATION

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HOW TO USE THIS MANUAL

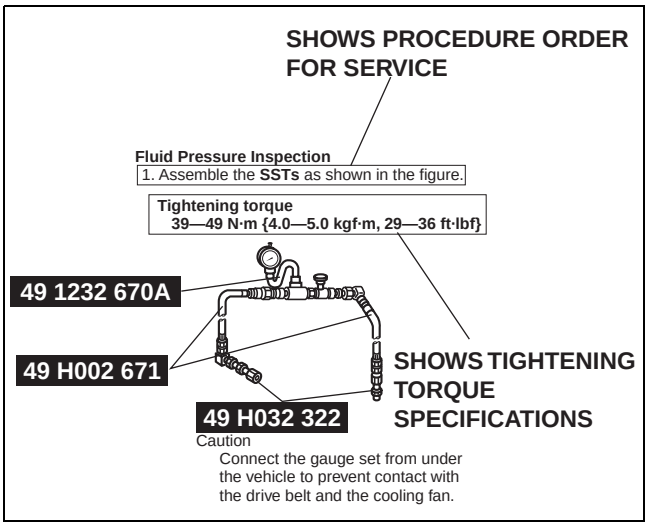
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Range of Topics

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

Service Procedure
Inspection, adjustment

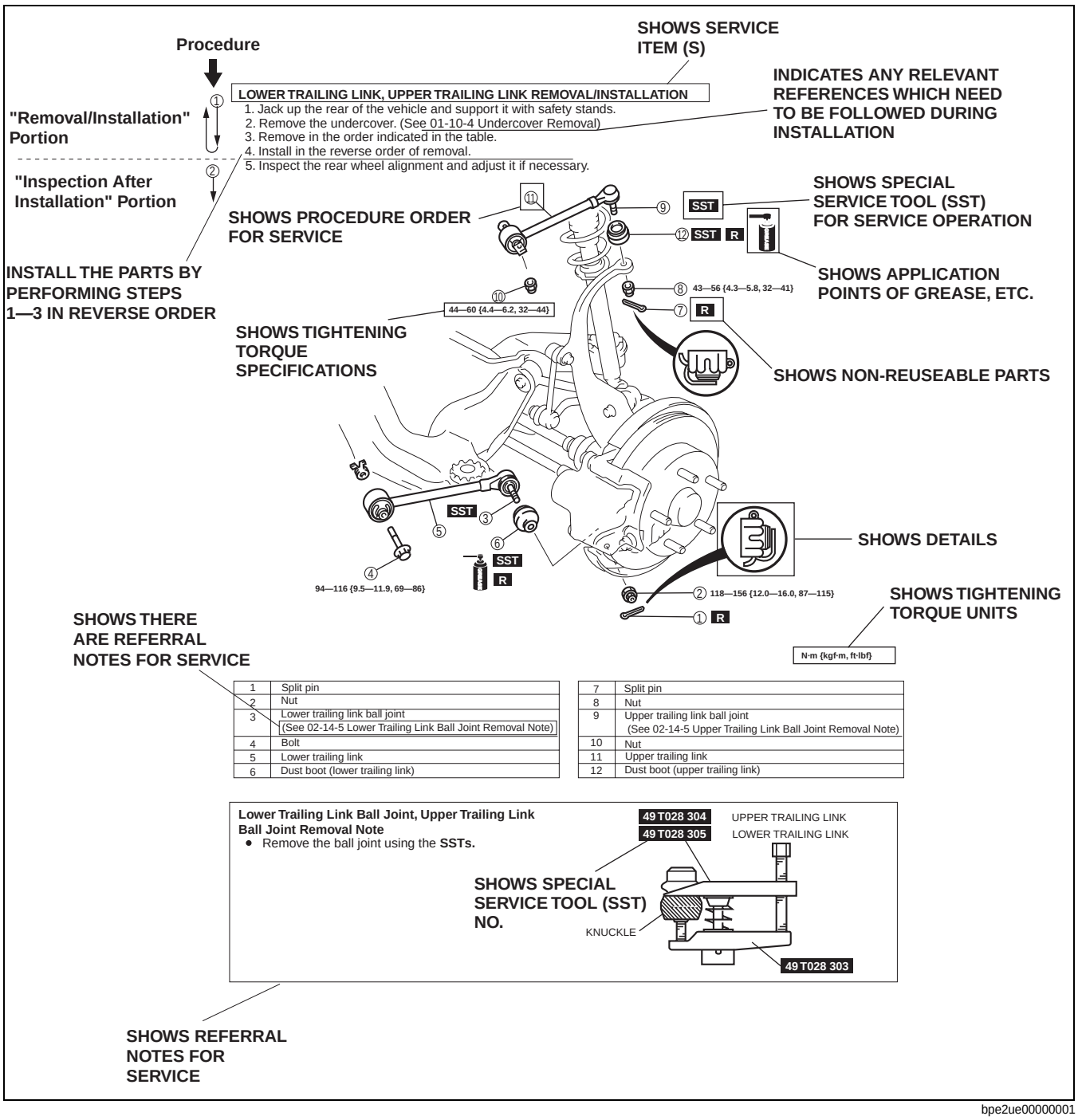
- Inspection and adjustment procedures are divided into steps. Important points regarding the location and contents of the procedures are explained in detail and shown in the illustrations.



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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
2	Nut
3	Lower trailing link ball joint (See 02-14-5 Lower Trailing Link Ball Joint Removal Note)
4	Bolt
5	Lower trailing link
6	Dust boot (lower trailing link)

7	Split pin
8	Nut
9	Upper trailing link ball joint (See 02-14-5 Upper Trailing Link Ball Joint Removal Note)
10	Nut
11	Upper trailing link
12	Dust boot (upper trailing link)

Lower Trailing Link Ball Joint, Upper Trailing Link Ball Joint Removal Note

- Remove the ball joint using the **SSTs.**

SHOWS REFERRAL NOTES FOR SERVICE

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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
	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

id000000100400

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 From 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.

Number Of Digits For Converted Values

- The number digits for converted values is the same as the number of significant figures*1 of the SI unit.
- For the torque value, the number of significant figures is, in principle, is 2 digits, in consideration of market practicalities. However, if the number of decimal places at the upper and lower limits of the converted value differs, the one with least number of decimal places is used. In addition, if the integer part is 3 digits or more, the integer part becomes the significant number of figures.

*1 : The number of significant figures is the number of digits from the left-most non-zero digit to the right-most digit including 0. (Example: 0.12 is 2 digits, 41.0 is 3 digits)

Converted Value Rounding Off And Rounding Up/down

- If there is no tolerance in the SI unit value, after conversion, rounding off is to within the number of significant digits.
- If there is tolerance in the SI unit value and the figure after conversion indicates the upper limit, the number of digits is rounded down to within the number of significant figures. If it indicates the lower limit, they are rounded up to within the number of significant figures.
- Even if the SI unit value is the same, the converted value may differ based on whether that value is the upper or lower limit.

ABBREVIATIONS

id000000010100

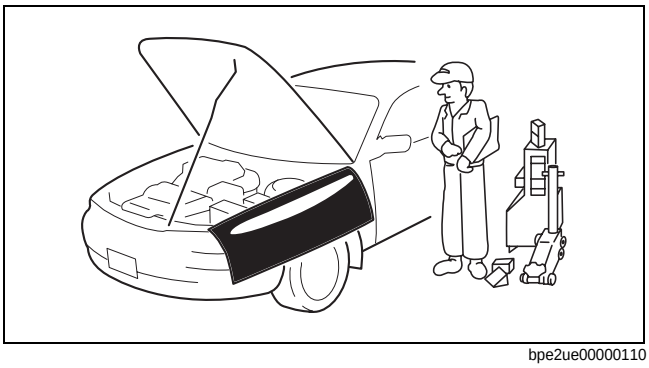
ATX	Automatic Transaxle
EX	Exhaust
HLA	Hydraulic Lash Adjuster
IN	Intake
MTX	Manual Transaxle
OCV	Oil Control Valve
TDC	Top Dead Center
SST	Special Service Tool

FUNDAMENTAL PROCEDURES

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Preparation of Tools and Measuring Equipment

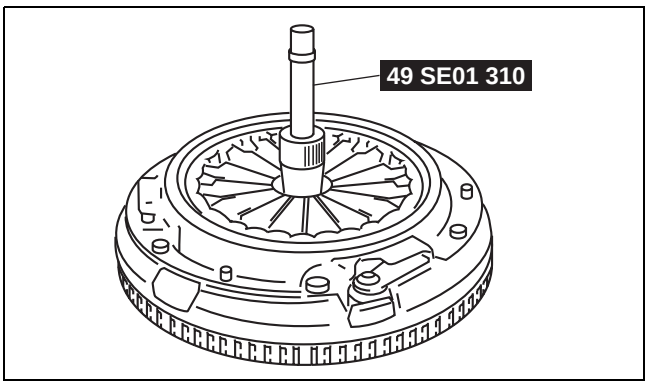
- Be sure that all necessary tools and measuring equipment are available before starting any work.



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Special Service Tools

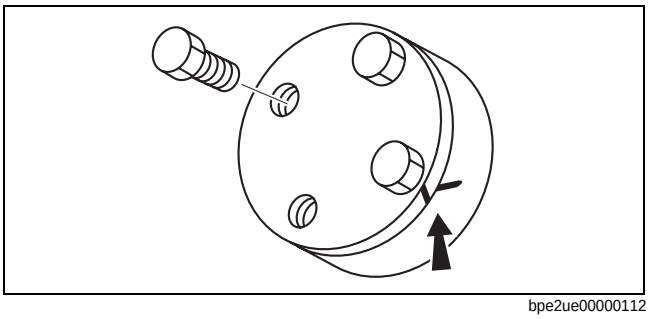
- Use special service tools or equivalent when they are required.



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Disassembly

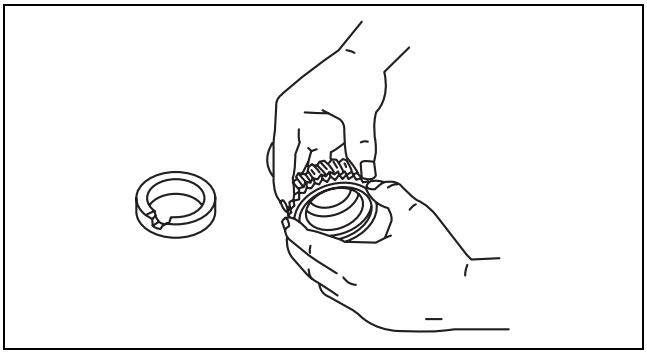
- If the disassembly procedure is complex, requiring many parts to be disassembled, all parts should be marked in a place that will not affect their performance or external appearance and identified so that reassembly can be performed easily and efficiently.



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Inspection During Removal, Disassembly

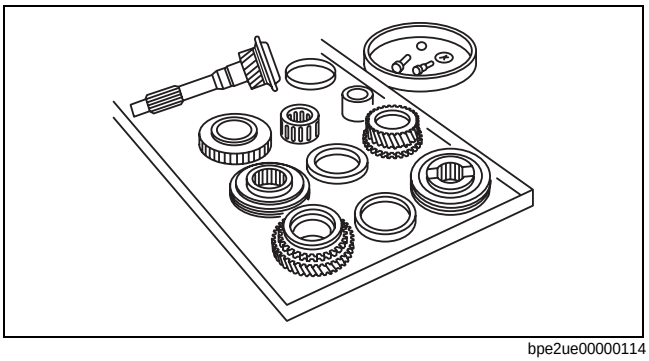
- When removed, each part should be carefully inspected for malfunction, deformation, damage and other problems.



bpe2ue00000113

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.



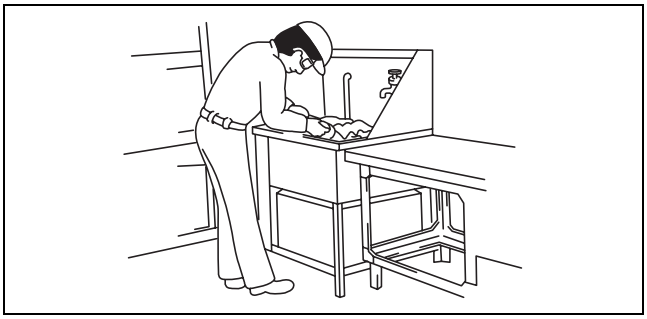
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Cleaning of Parts

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

Warning

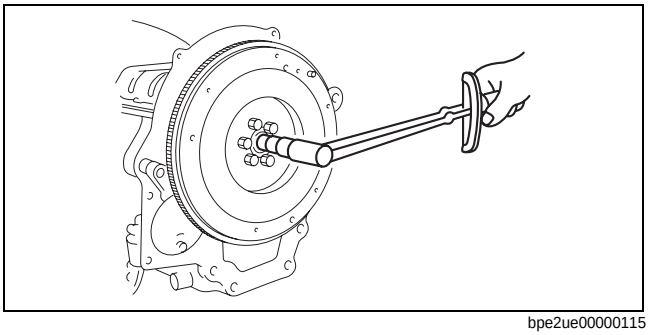
- **Using compressed air can cause dirt and other particles to fly out causing injury to the eyes. Wear protective eye wear whenever using compressed air.**



bpe2ue00000002

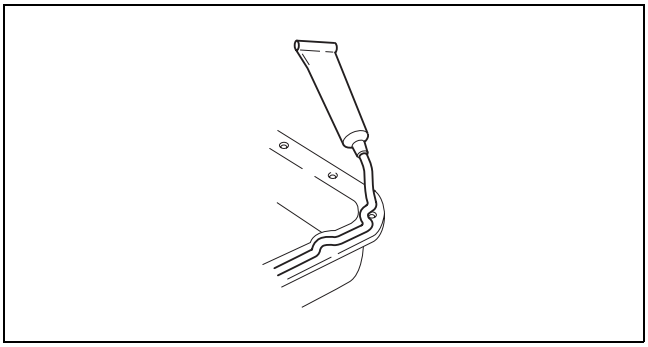
Reassembly

- 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



bpe2ue00000115

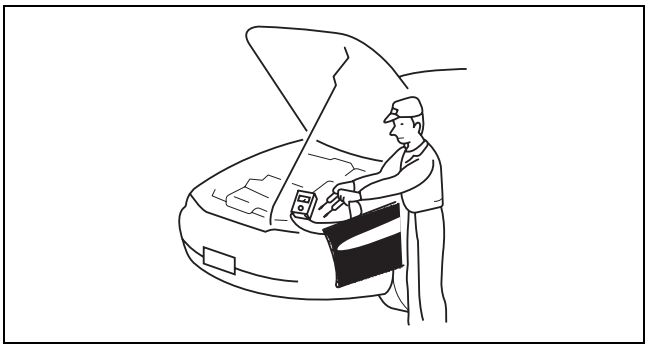
- Depending on location:
  - — Sealant and gaskets, or both, should be applied to specified locations. When sealant is applied, parts should be installed before sealant hardens to prevent leakage.
  - — Oil should be applied to the moving components of parts.
  - — Specified oil or grease should be applied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



bpe2ue00000116

Adjustment

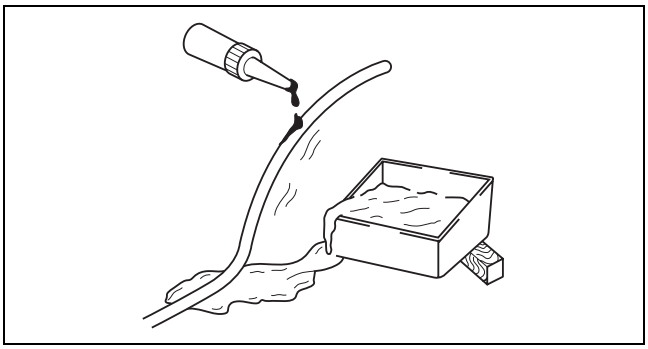
- Use suitable gauges and testers when making adjustments.



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Rubber Parts and Tubing

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

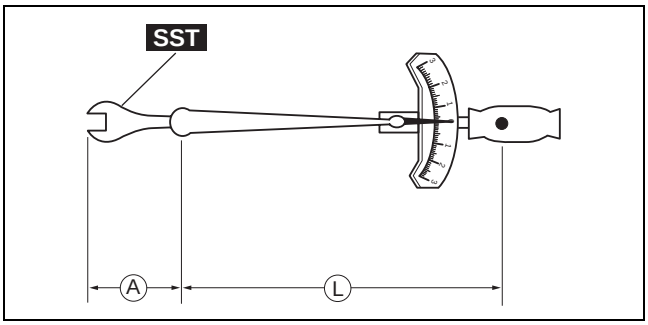


bpe2ue00000118

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)]

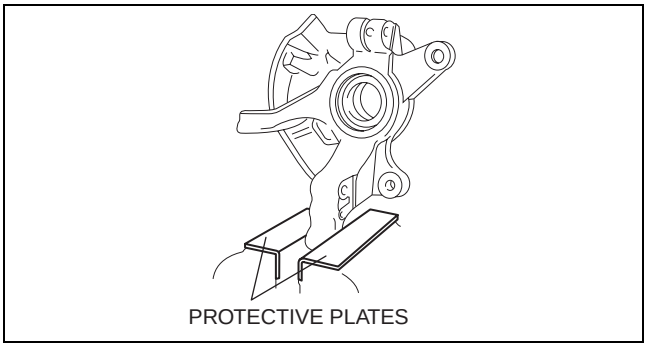


bpe2ue00000119

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

Vise

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



PROTECTIVE PLATES

bpe2ue00000120

ENGINE

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ELECTRIC VARIABLE VALVE TIMING MOTOR/DRIVER INSPECTION

id011000828100

Caution

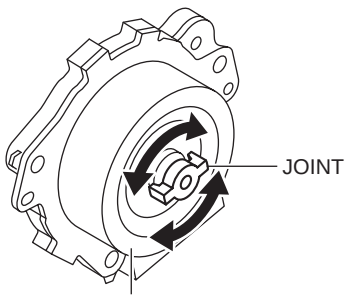
- **Do not disassemble the electric variable valve timing motor/driver because it is a precision unit.**
- **Do not apply excessive force when rotating the electric variable valve timing motor joint. If it is rotated with excessive force, the electric variable valve timing motor could be damaged.**

1. Rotate the electric variable valve timing motor joint to the left and right by your fingers and verify that it rotates smoothly in **15**° increments.

Note

- Rotate the joint area smoothly using only the tips of your fingers.
- The electric variable valve timing motor joint moves in **15**° increments, and if the joint is moved **24** times, it rotates one full rotation.

- If it does not rotate smoothly, replace the electric variable valve timing motor/driver.



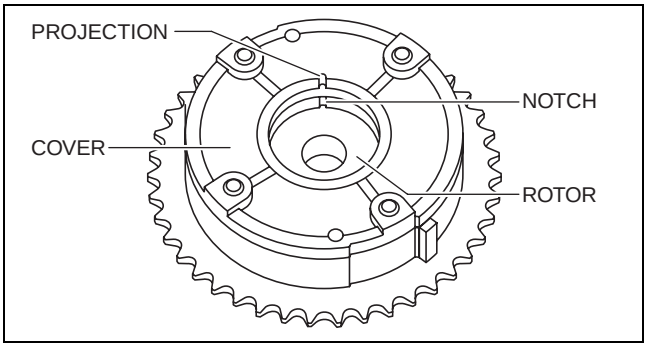
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HYDRAULIC VARIABLE VALVE TIMING ACTUATOR INSPECTION

id011000126800

Caution
- **Do not disassemble the hydraulic variable valve timing actuator because it is a precision unit.**

1. Verify that the notch of the rotor and projection of the cover on the hydraulic variable valve timing actuator are aligned and fitted.
   - If the projection and notch are not aligned, rotate the rotor (camshaft installation) until a click is heard and verify that they are aligned and fixed in place.
     — If the projection and notch are not aligned or the rotor and cover are not secured even if their projection and notch are aligned, replace the hydraulic variable valve timing actuator.



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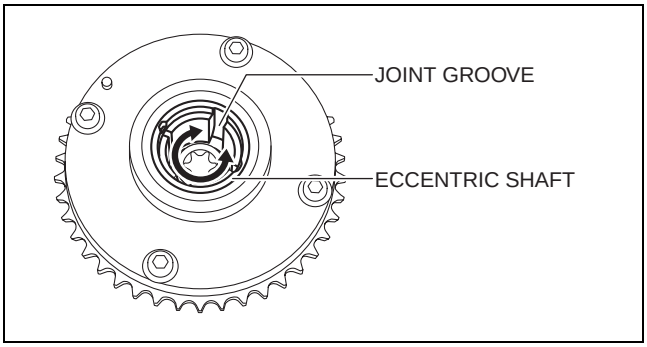
ELECTRIC VARIABLE VALVE TIMING ACTUATOR INSPECTION

id011000555500

Caution
- **Do not disassemble the electric variable valve timing actuator because it is a precision unit.**

1. Rotate the eccentric shaft of the electric variable valve timing actuator to the left and right by hand and verify that it rotates smoothly.
   - If it does not rotate smoothly, replace the electric variable valve timing actuator.

Note
- Hook a finger onto the joint groove of the eccentric shaft to rotate the shaft easily.
- The eccentric shaft stops rotating at the maximum retard position when it is rotated counterclockwise as viewed from the front, and at the maximum advance position when rotated clockwise.
- The eccentric shaft rotates 15.8 turns from the maximum retard position to the maximum advance position.



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OIL CONTROL VALVE (OCV) INSPECTION

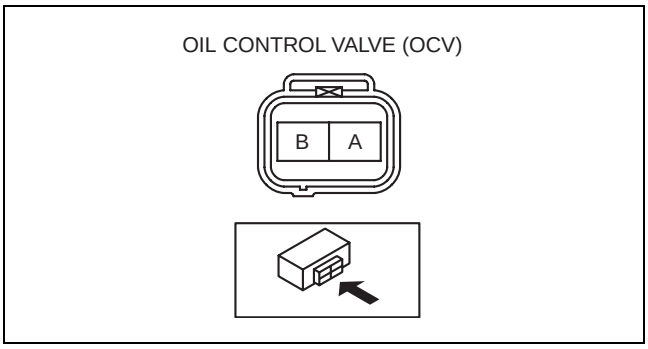
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Coil Resistance Inspection

1. Measure the resistance between terminals A and B using an ohmmeter.

   OCV coil resistance
   6.9—7.5 ohms [20°C {68°F}]

   - If it is not within the specification, replace the OCV.

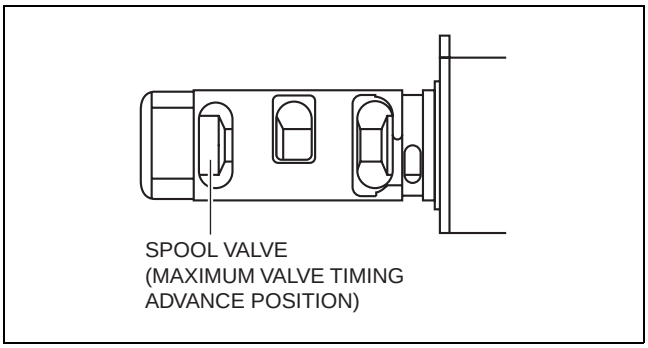


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Spool Valve Operation Inspection

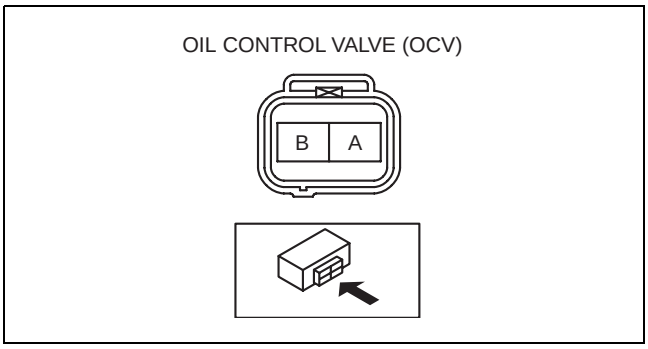
1. Verify that the spool valve in the OCV is in the maximum valve timing advance position as indicated in the figure.
   - If there is any malfunction, replace the OCV.

   Note
   - When applying battery positive voltage between the OCV terminals, the connection can be either of the following:
     — Positive battery cable to terminal A, negative battery cable to terminal B
     — Positive battery cable to terminal B, negative battery cable to terminal A



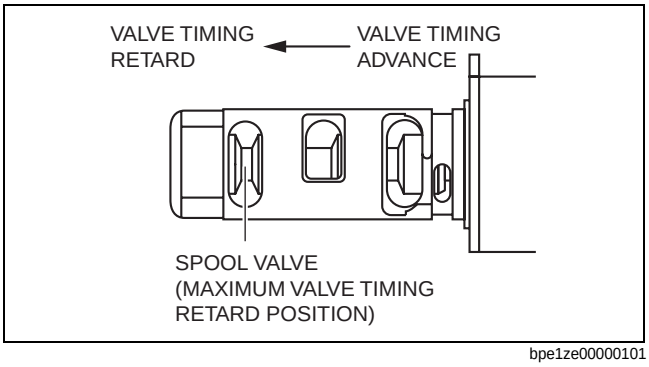
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2. Apply battery positive voltage between the OCV terminals and verify that the spool valve operates and moves to the maximum valve timing retard position.



bpe5ue00000015

   - If there is any malfunction, replace the OCV.
3. Stop applying battery positive voltage and verify that the spool valve returns to the maximum valve timing advance position.
   - If there is any malfunction, replace the OCV.

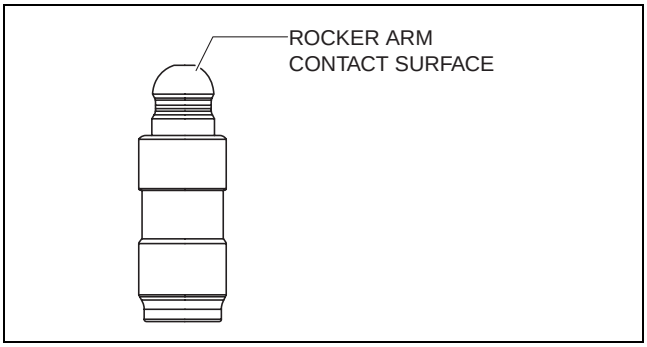


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HYDRAULIC LASH ADJUSTER (HLA) INSPECTION

id011000805000

1. Visually inspect the HLA surface where it contacts the rocker arm for wear or damage.
   - If there is any malfunction, replace the HLA.

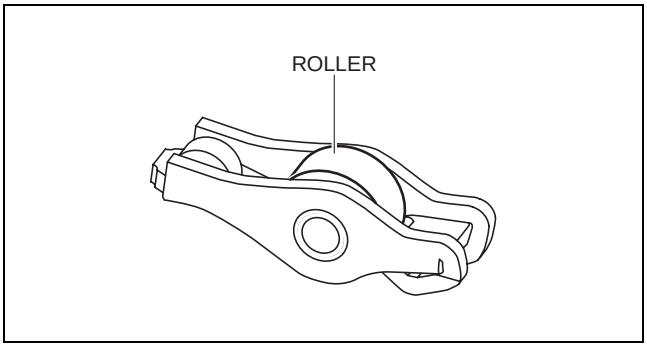


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ROCKER ARM INSPECTION

id011000904800

1. Rotate the roller or the rocker arm by hand and verify that rotates smoothly.
   - If it does not rotate smoothly, replace the rocker arm.
2. Visually inspect the rocker arm surface where it contacts the HLA and valve stem for wear or damage.
   - If there is any malfunction, replace the rocker arm.



bpe2ue00000096

ENGINE OVERHAUL SERVICE WARNING

id011000503900

Warning

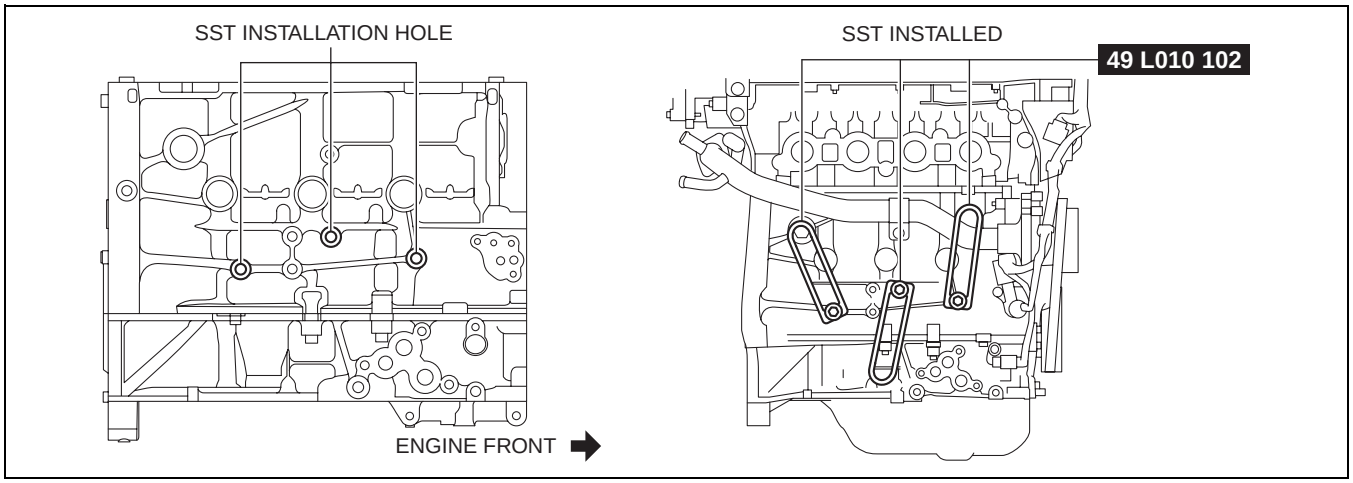
- **Continuous exposure to USED engine oil has been shown to cause skin cancer in laboratory mice. Protect your skin by washing with soap and water immediately after performing work.**

ENGINE MOUNTING/DISMOUNTING

id011000507000

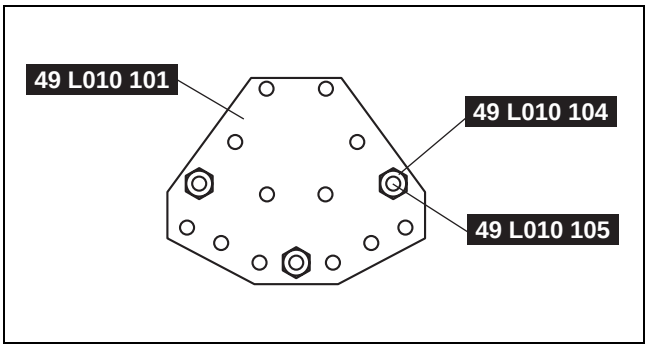
Mounting

1. Install the **SST** (arms) to the three positions as shown in the figure and temporarily tighten the bolts (Part No. **9YA20-1003** or **M10 × 1.5 length 90 mm {3.55 in}**).



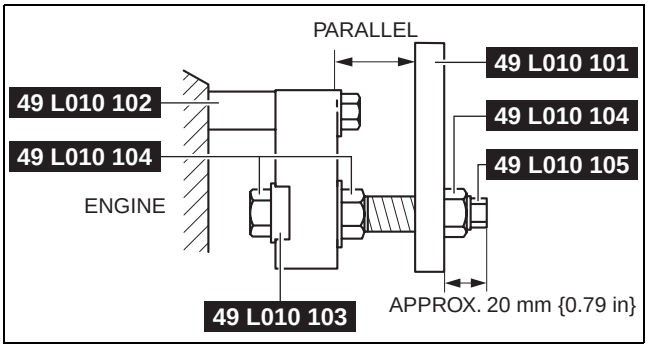
bpe1ze00000084

2. Install the **SSTs** (bolts and nuts) to the three positions of the **SST** (plate) as shown in the figure.



bp31je00000140

3. Install the **SST** (bolts, nuts and plate) set in Step 2 to the **SST** (arms) set in Step 1 using the **SSTs** (hook and nuts).
4. Adjust the bolts so that **approx. 20 mm {0.79 in}** of thread is exposed from the side of the plate.
5. Adjust the bolts and nuts so that the plate and arms are parallel.
6. Tighten the **SSTs** (bolts and nuts) to affix the **SST** firmly.
7. Install the engine to the **SST** (engine stand).
8. Remove the oil drain plug and drain the engine oil.
9. Replace the gasket with a new one and install the oil pan drain plug.



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Tightening torque
30—41 N·m {3.1—4.1 kgf·m, 23—30 ft·lbf}

Dismounting

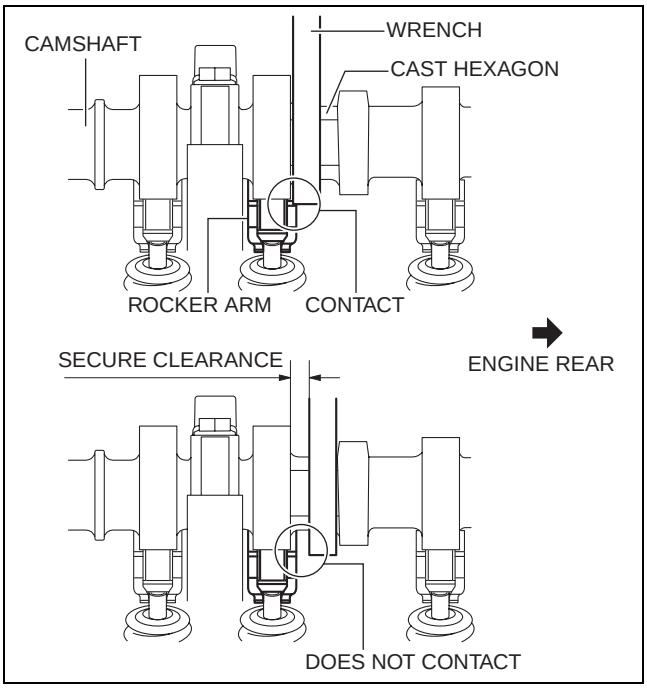
1. Dismount in the reverse order of mounting.

TIMING CHAIN DISASSEMBLY

id011000505500

Caution

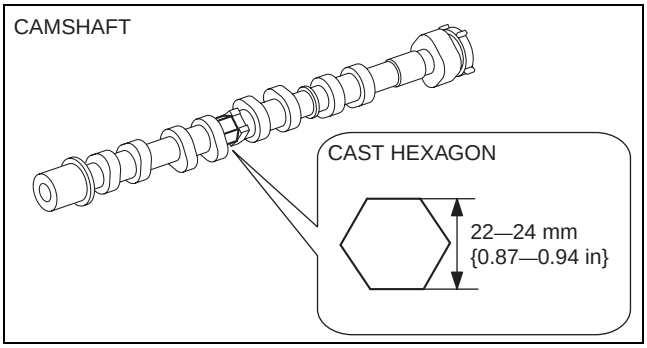
- **If the camshaft is rotated with the timing chain removed and the piston at the top dead center position, the valve may contact the piston and the engine could be damaged. When rotating the camshaft with the timing chain removed, rotate it after lowering the piston from the top dead center position.**
- **When rotating the camshaft using a wrench on the cast hexagon, the wrench may contact the rocker arm and damage the rocker arm. To prevent damage to the rocker arm when holding the camshaft on the cast hexagon, use a wrench on the rear side of the engine as shown in the figure to secure a clearance between the cam.**



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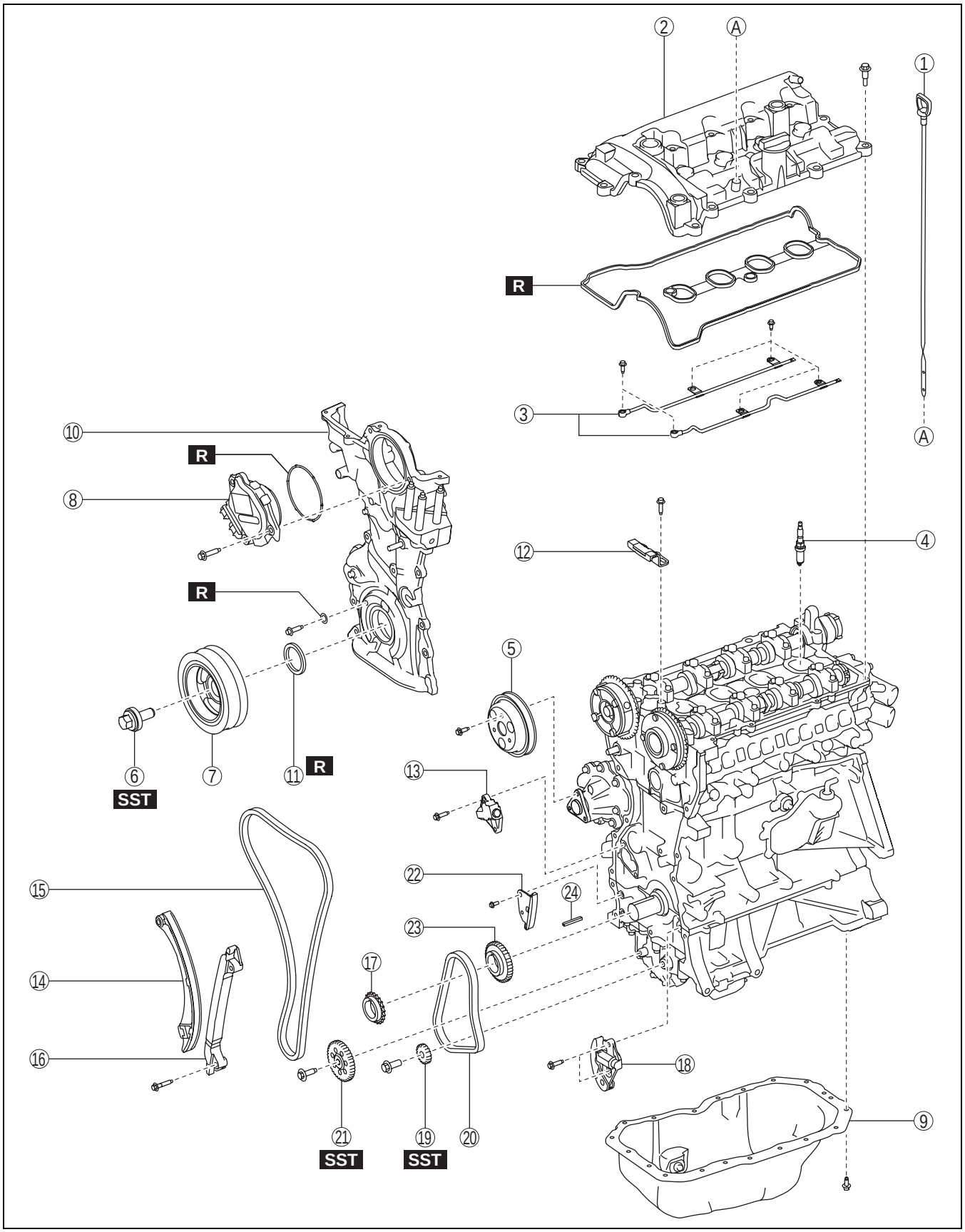
Note

- Width at the cast hexagon of the camshaft is 22—24 mm {0.87—0.94 in}.



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1. Disassemble in the order indicated in the table.



bpe1ze00000062

1	Dipstick
2	Cylinder head cover
3	Oil shower pipe

4	Spark plug
5	Water pump pulley (See 01-10-9 Water Pump Pulley Disassembly Note.)

6	Crankshaft pulley lock bolt (See 01-10-10 Crankshaft Pulley Lock Bolt Disassembly Note.)
7	Crankshaft pulley
8	Electric variable valve timing motor/driver
9	Oil pan (See 01-10-10 Oil Pan Disassembly Note.)
10	Engine front cover (See 01-10-10 Engine Front Cover Disassembly Note.)
11	Front oil seal (See 01-10-11 Front Oil Seal Disassembly Note.)
12	Chain guide (No.1)
13	Chain tensioner (See 01-10-11 Chain Tensioner Disassembly Note.)
14	Tensioner arm

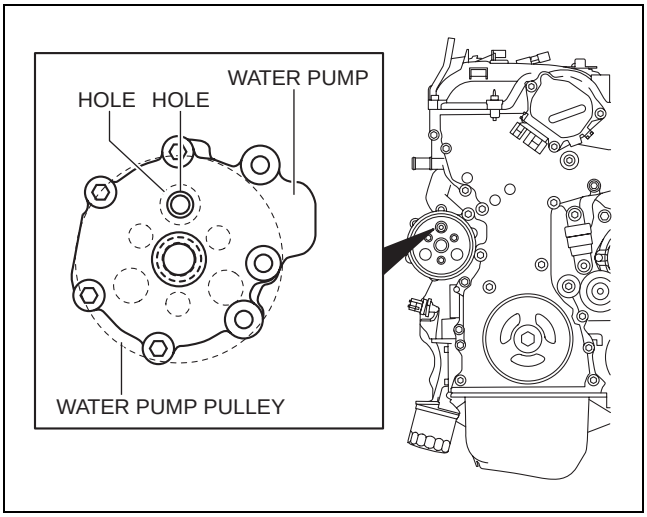
15	Timing chain
16	Chain guide (No.2)
17	Crankshaft sprocket
18	Oil pump chain tensioner (See 01-10-12 Oil Pump Chain Disassembly Note.)
19	Balancer shaft sprocket (See 01-10-12 Oil Pump Chain Disassembly Note.)
20	Oil pump chain (See 01-10-12 Oil Pump Chain Disassembly Note.)
21	Oil pump driven sprocket (See 01-10-12 Oil Pump Chain Disassembly Note.)
22	Oil pump chain guide
23	Oil pump drive sprocket
24	Key

Water Pump Pulley Disassembly Note

Caution

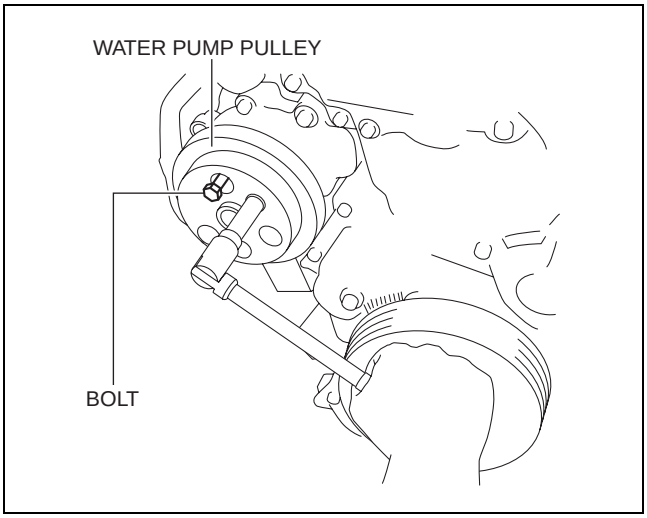
- **Be careful not to damage the belt groove and surface of the water pump pulley when using tools, otherwise it will cause wear, breakage, abnormal noise of the drive belt (stretch belt), damage to the pulley, and rust.**

1. Align the water pump pulley hole with the water pump hole as shown in the figure.



am3uuw00008841

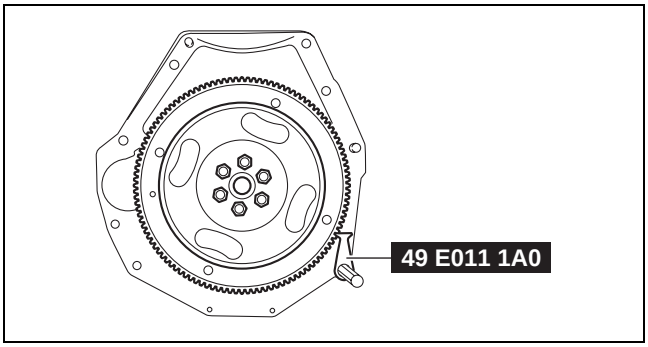
2. Insert an appropriate bolt (length **approx. 70 mm {2.8 in}**) into the water pump hole as shown in the figure, and lock the water pump pulley against rotation.
3. Remove the water pump pulley.
4. Remove the bolt used for locking the water pump pulley against rotation.



am3uuw00008842

Crankshaft Pulley Lock Bolt Disassembly Note

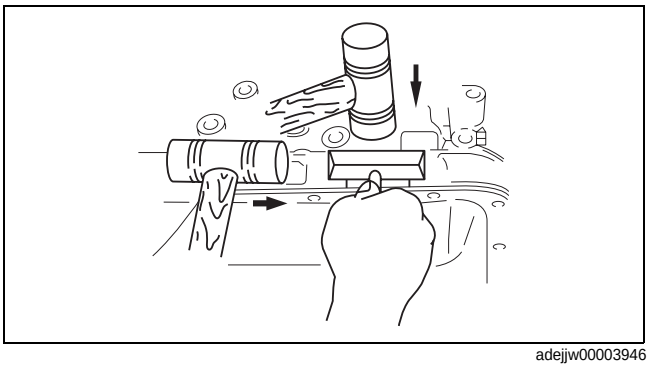
1. Hold the crankshaft using the **SST**.
2. Remove the crankshaft pulley lock bolt.



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Oil Pan Disassembly Note

1. Remove the oil pan using a separator tool.



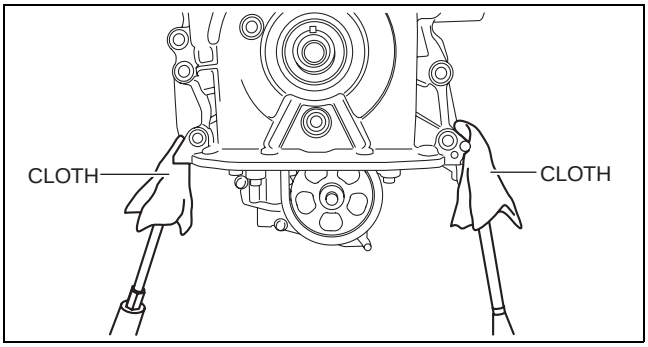
adejjw00003946

Engine Front Cover Disassembly Note

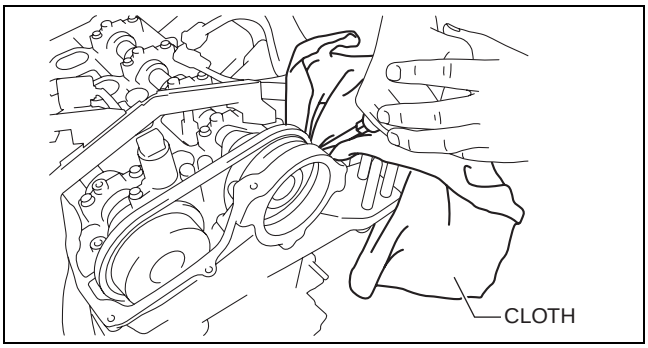
1. Remove the engine front cover installation bolts.
2. Using a screwdriver wrapped in a cloth, peel the sealant away a little at a time, and remove the engine front cover.

Caution

- **Do not apply excessive force to the screwdriver. Otherwise, the engine front cover could be damaged.**
- **Be careful not to scratch or damage the seal surface. Otherwise, it could cause oil leakage.**



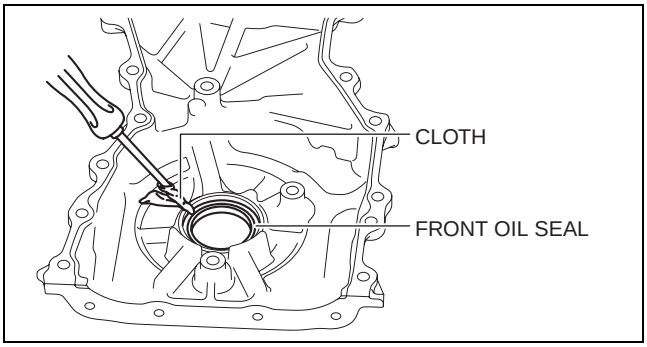
am3uuw00008851



am3uuw00008852

Front Oil Seal Disassembly Note

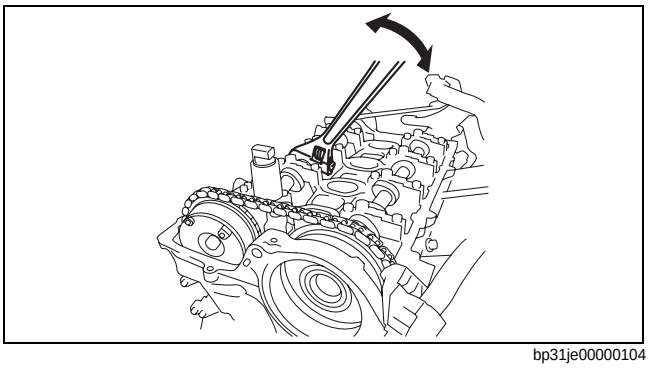
1. Remove the oil seal using a flathead screwdriver with the tip protected by a clean cloth.



bpe2ue00000100

Chain Tensioner Disassembly Note

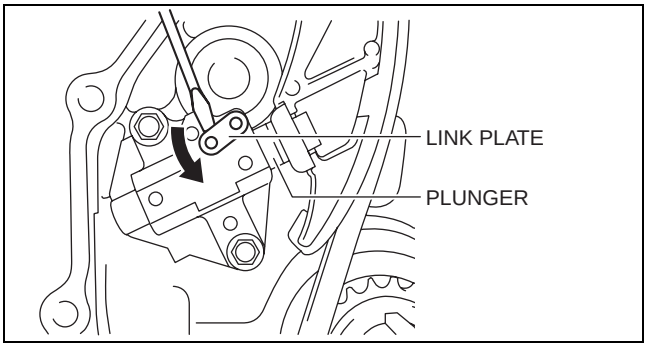
1. While moving the exhaust camshaft back and forth in the direction of the arrow using a wrench on the cast hexagon, press down the link plate of the timing chain tensioner using a precision screwdriver and release the plunger lock.



bp31je00000104

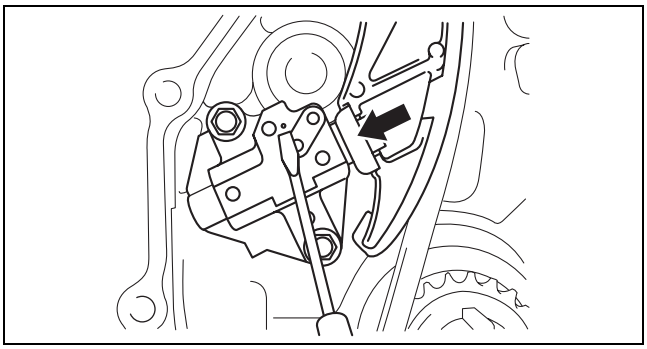
Note

- When moving the exhaust camshaft back and forth, the timing chain pushes the plunger in the chain tensioner making it easier to operate the link plate.



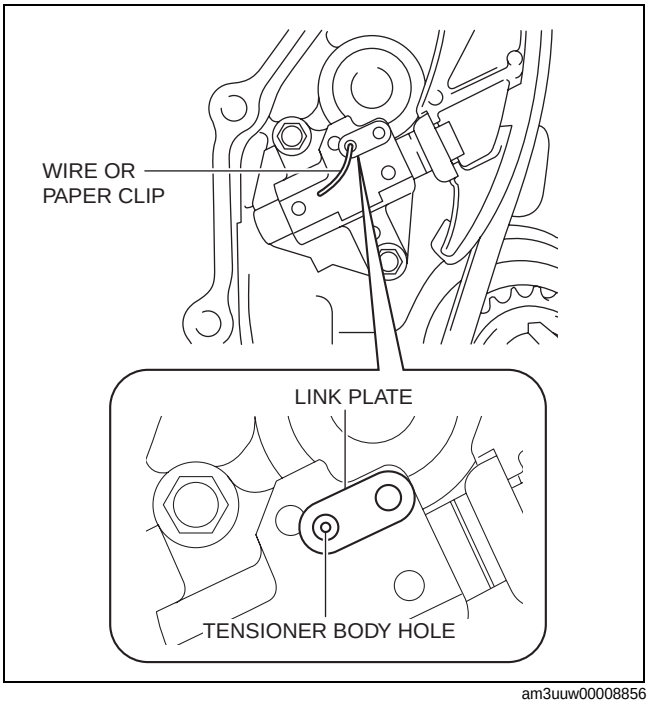
am3uuw00008854

2. Push back the plunger slowly in the direction shown in the figure with the link plate still pushed down.
3. Remove the screwdriver from the link plate with the plunger still pushed down.
4. Release the force slightly from the plunger, and move it back and forth **2—3 mm {0.08—0.11 in}**.



am3uuw00008855

5. Insert a wire with an **approx. diameter of 1.5 mm {0.059 in}** or a paper clip where the link plate hole and the tensioner body hole overlap to secure the link plate and lock the plunger.
6. Remove the chain tensioner.



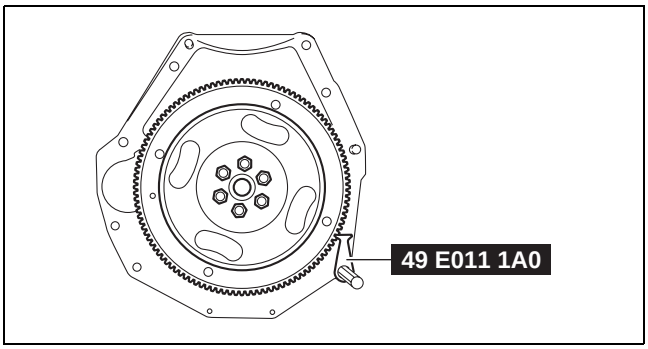
am3uuw00008856

Oil Pump Chain Disassembly Note

1. Hold the crankshaft using the **SST**.
2. Slightly loosen the balancer shaft sprocket and oil pump driven sprocket installation bolts.

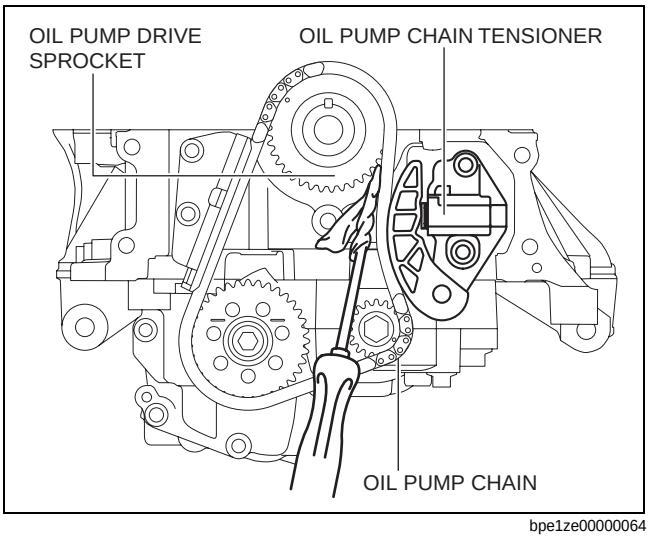
Note

- At this stage, only loosen the installation bolts, do not remove them. Remove the bolts after removing the oil pump chain tensioner.



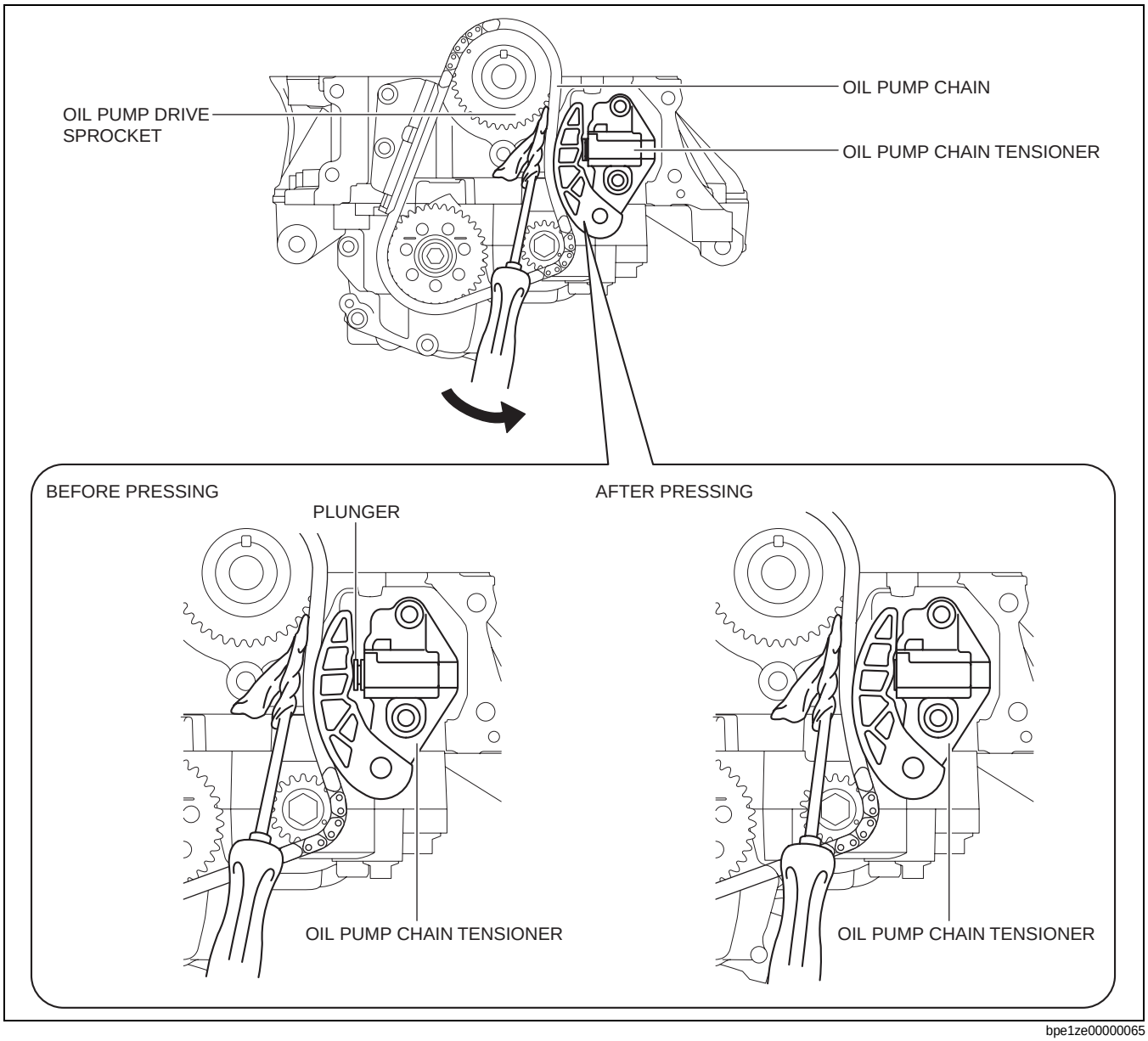
bpe1ze00000095

3. Set a cloth wrapped flathead screwdriver in the gap between the oil pump drive sprocket and the oil pump chain as shown in the figure.



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4. Move the screwdriver in the direction of the arrow and press the oil pump chain, and then press on the plunger of the oil pump chain tensioner.

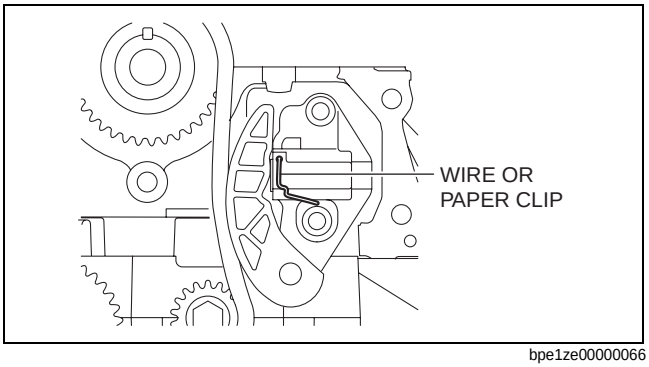


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5. Insert a wire with an approx. diameter of 1.4 mm {0.055 in} or a paper clip into the body hole of the oil pump chain tensioner with the plunger pressed.

Note

- The wire or paper clip secures the plunger, and the tension can be released.



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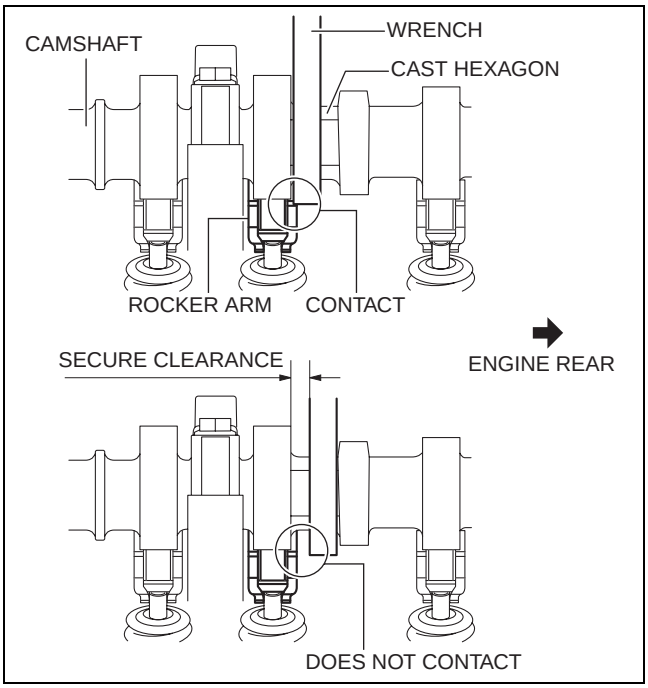
6. Remove the oil pump chain tensioner.
7. Remove the oil pump chain and balancer shaft sprocket as a single unit.
8. Remove the oil pump driven sprocket.

CYLINDER HEAD DISASSEMBLY (I)

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Caution

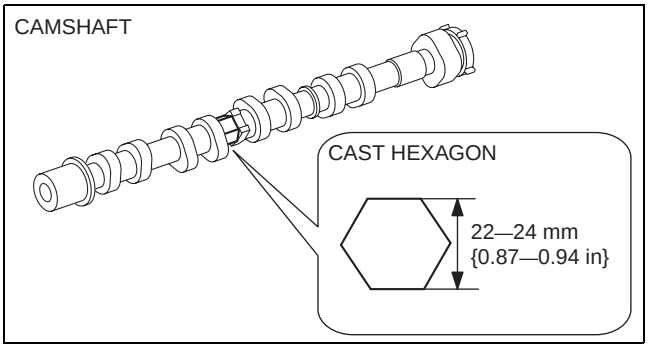
- **If the camshaft is rotated with the timing chain removed and the piston at the top dead center position, the valve may contact the piston and the engine could be damaged. When rotating the camshaft with the timing chain removed, rotate it after lowering the piston from the top dead center position.**
- **When rotating the camshaft using a wrench on the cast hexagon, the wrench may contact the rocker arm and damage the rocker arm. To prevent damage to the rocker arm when holding the camshaft on the cast hexagon, use a wrench on the rear side of the engine as shown in the figure to secure a clearance between the cam.**



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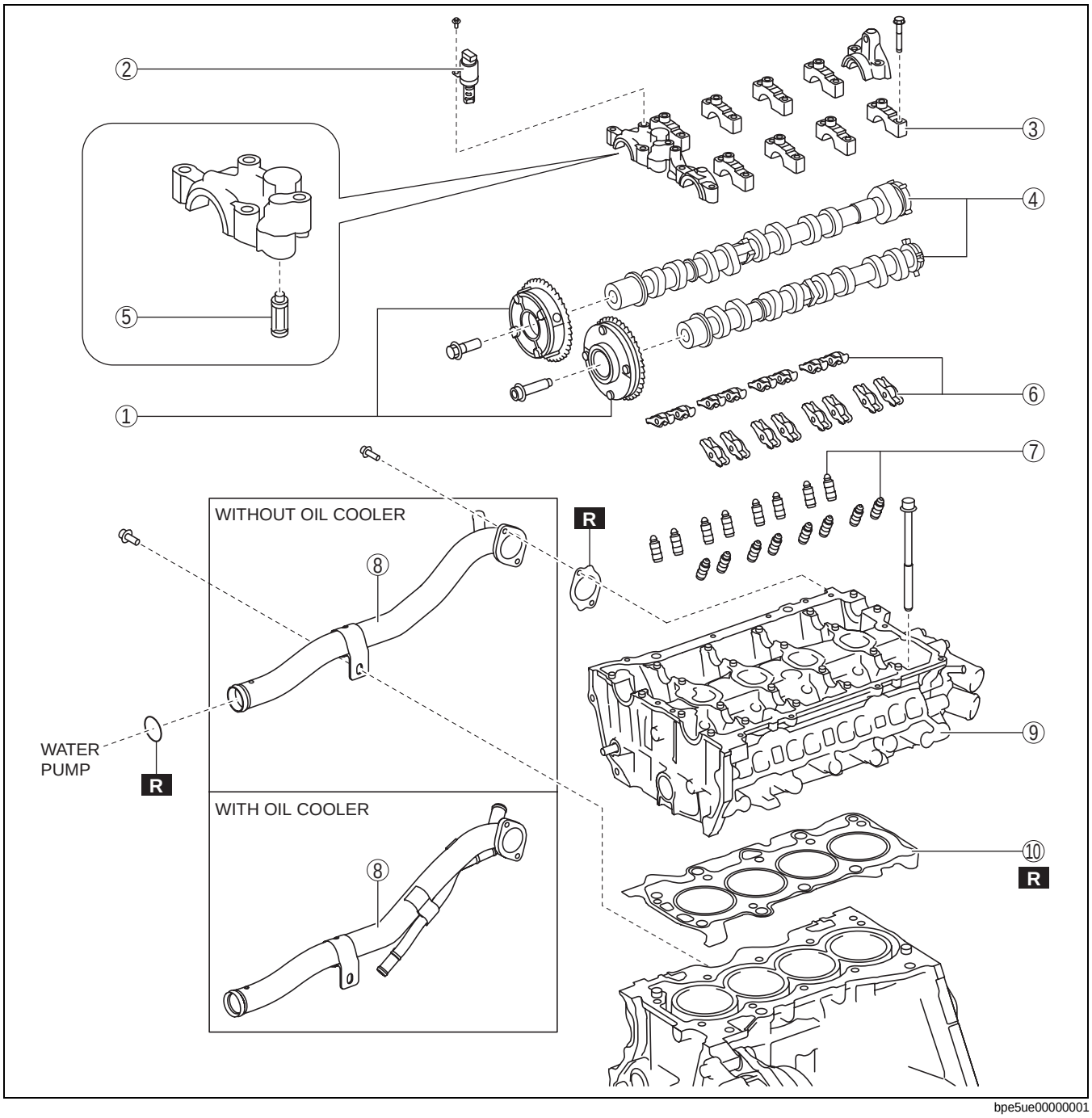
Note

- Width at the cast hexagon of the camshaft is 22—24 mm {0.87—0.94 in}.



am3uuw00009029

1. Disassemble in the order indicated in the table.



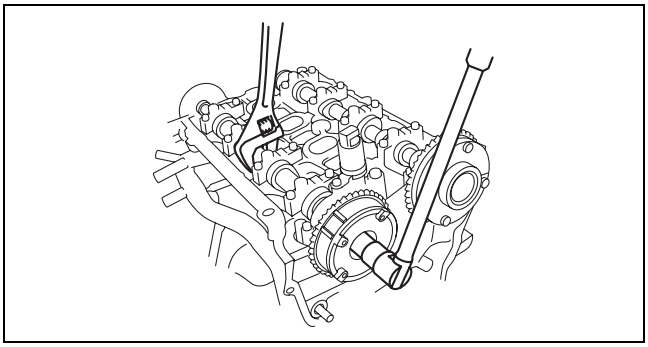
bpe5ue00000001

1	Electric variable valve timing actuator, hydraulic variable valve timing actuator (See 01-10-16 Electric Variable Valve Timing Actuator, Hydraulic Variable Valve Timing Actuator Disassembly Note.)
2	OCV
3	Camshaft cap (See 01-10-16 Camshaft Cap Disassembly Note.)
4	Camshaft

5	OCV oil filter
6	Rocker arm (See 01-10-16 Rocker Arm Disassembly Note.)
7	HLA (See 01-10-16 HLA Disassembly Note.)
8	Water inlet pipe
9	Cylinder head (See 01-10-16 Cylinder Head Disassembly Note.)
10	Cylinder head gasket

Electric Variable Valve Timing Actuator, Hydraulic Variable Valve Timing Actuator Disassembly Note

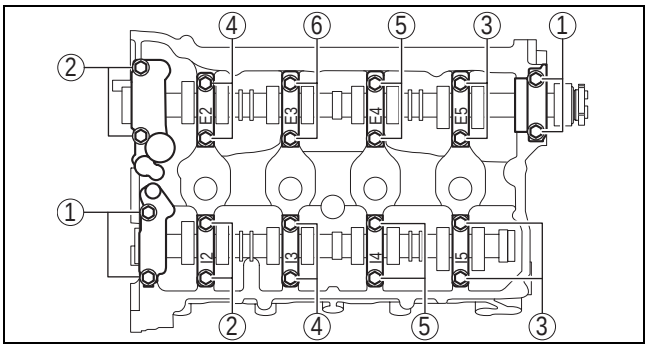
1. Hold the camshaft using a wrench on the cast hexagon and loosen the actuator installation bolt.



bp31je00000161

Camshaft Cap Disassembly Note

1. Before removing the camshaft cap, Inspect the camshaft end play. (See 01-10-30 CAMSHAFT INSPECTION.)
2. Loosen the camshaft cap installation bolts in two or three passes in the order shown in the figure and remove the camshaft caps.



am3uuw00008985

Rocker Arm Disassembly Note

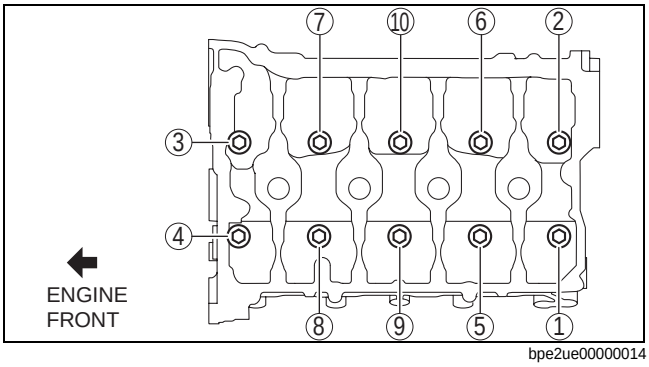
1. Keep the rocker arms in the order of removal to enable reassembly in their original positions.

HLA Disassembly Note

1. Keep the HLAs in the order of removal to enable reassembly in their original positions.

Cylinder Head Disassembly Note

1. Loosen the cylinder head installation bolts in two or three passes in the order shown in the figure and remove them.

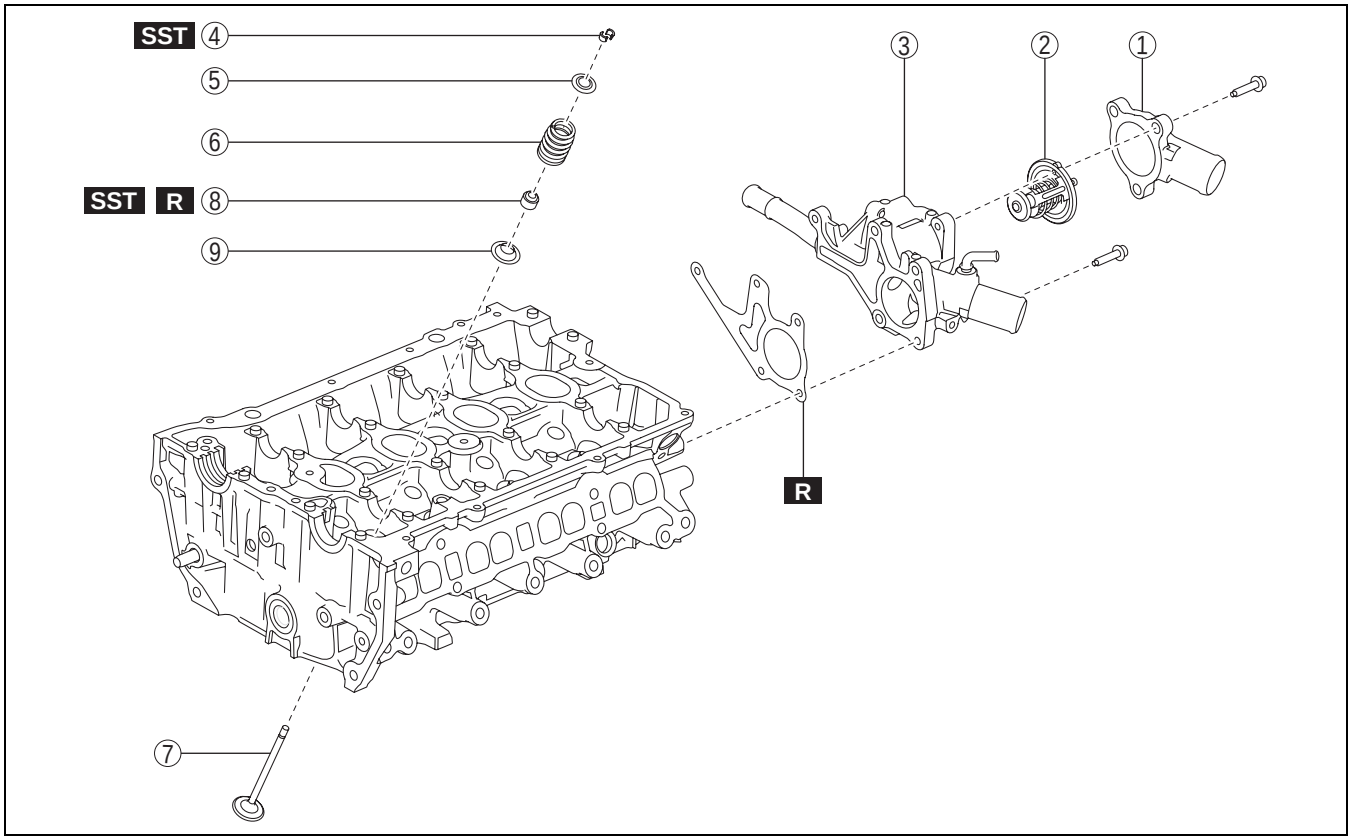


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CYLINDER HEAD DISASSEMBLY (II)

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1. Disassemble in the order indicated in the table.



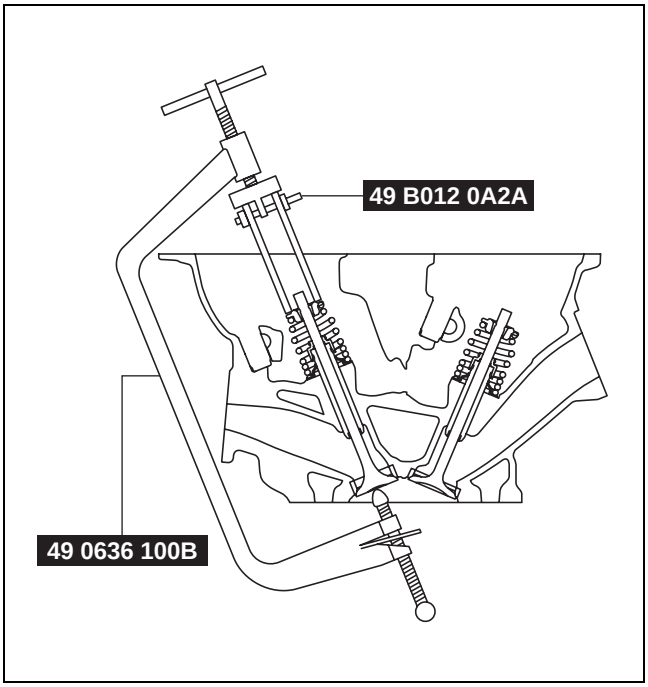
bpe1ze00000013

1	Thermostat cover
2	Thermostat
3	Water outlet
4	Valve keeper (See 01-10-18 Valve Keeper Disassembly Note.)
5	Upper valve spring seat

6	Valve spring
7	Valve
8	Valve seal (See 01-10-18 Valve Seal Disassembly Note.)
9	Lower valve spring seat

Valve Keeper Disassembly Note

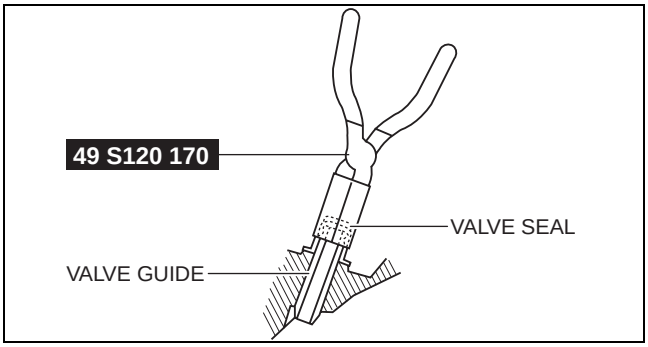
1. Remove the valve keeper using the **SSTs**.



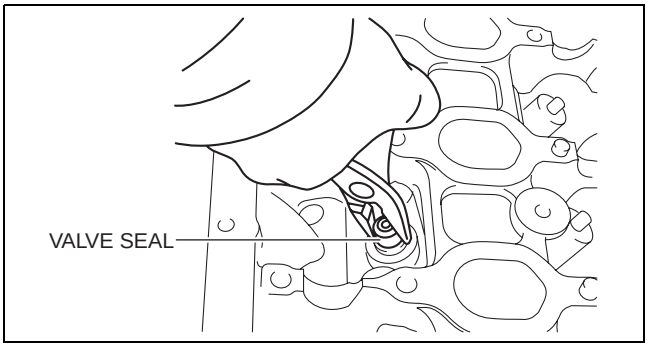
bpe1ze00000014

Valve Seal Disassembly Note

1. Remove the valve seal using the **SST** or pliers.



bpe1ze00000015



bpe1ze00000016

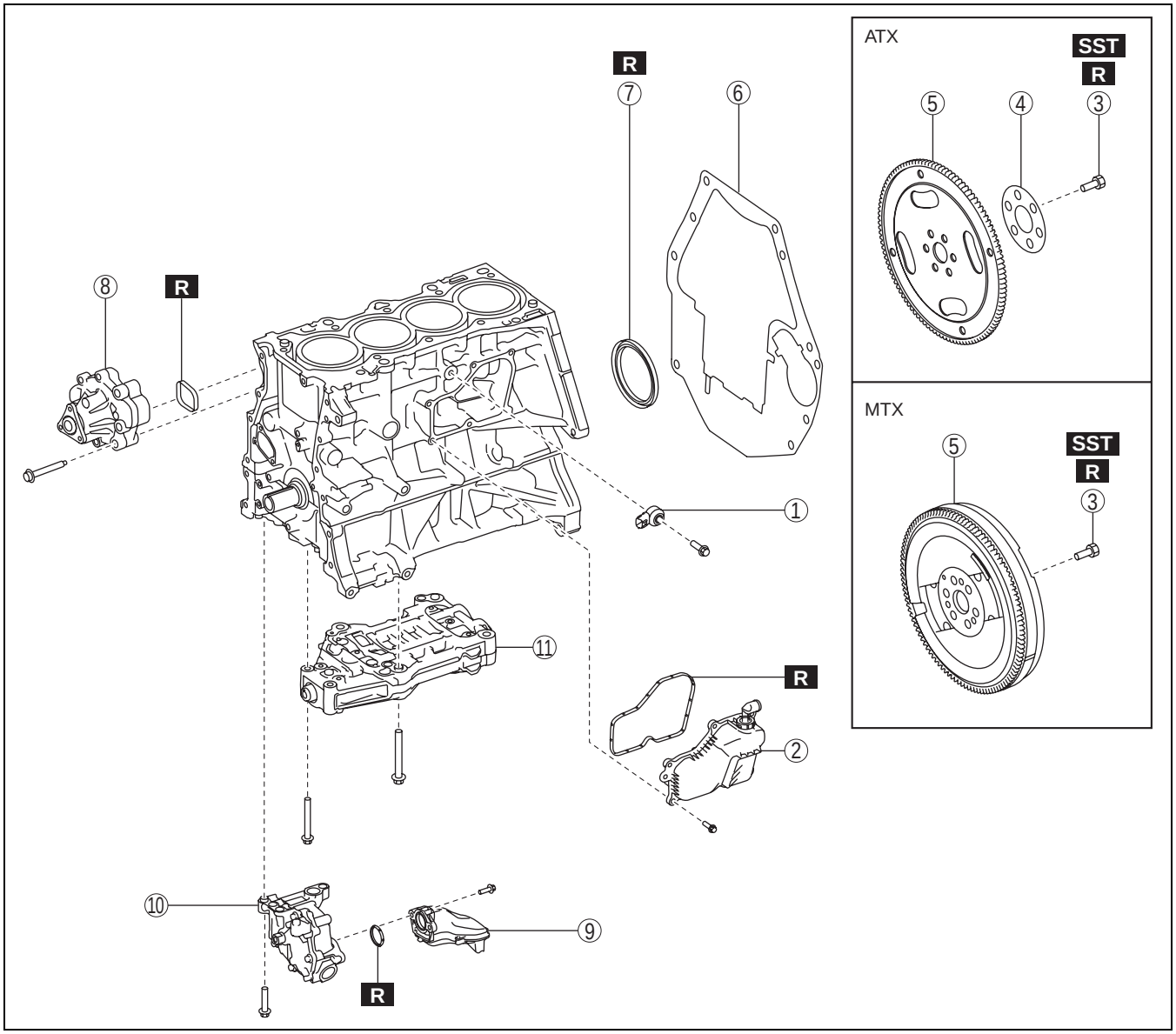
CYLINDER BLOCK DISASSEMBLY (I)

id011000500600

Caution

- **Do not disassemble the oil pump, water pump and balancer unit because it is a precision unit.**

1. Disassemble in the order indicated in the table.



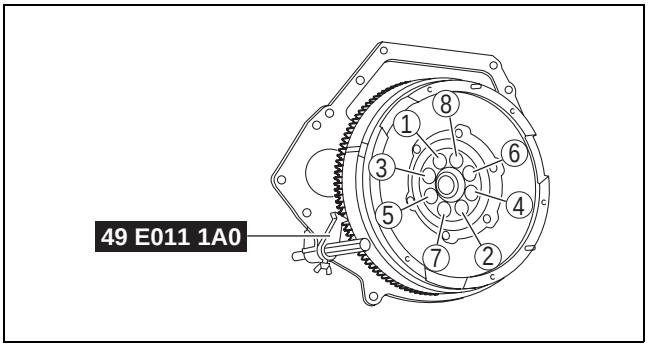
bpe5ue00000002

1	Knock sensor (KS)
2	Oil separator
3	Dual-mass flywheel (MTX)/ drive plate (ATX) installation bolt (See 01-10-20 Dual-mass Flywheel (MTX)/ Drive Plate (ATX) Installation Bolt Disassembly Note.)
4	Backing plate (ATX)
5	Dual-mass flywheel (MTX), drive plate (ATX) (See 01-10-21 Dual-mass Flywheel Disassembly Note (MTX).)

6	End plate
7	Rear oil seal (See 01-10-21 Rear Oil Seal Disassembly Note.)
8	Water pump
9	Oil strainer
10	Oil pump
11	Balancer unit

Dual-mass Flywheel (MTX)/ Drive Plate (ATX) Installation Bolt Disassembly Note
Dual-mass flywheel installation bolt (MTX)

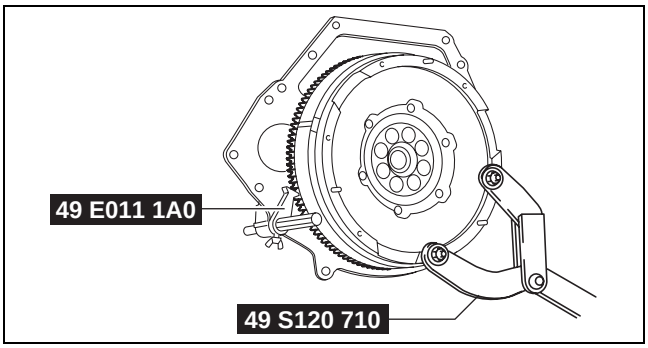
1. Hold the crankshaft using the **SST (49 E011 1A0)**.
2. Loosen the bolts uniformly and gradually in the order shown in the figure.



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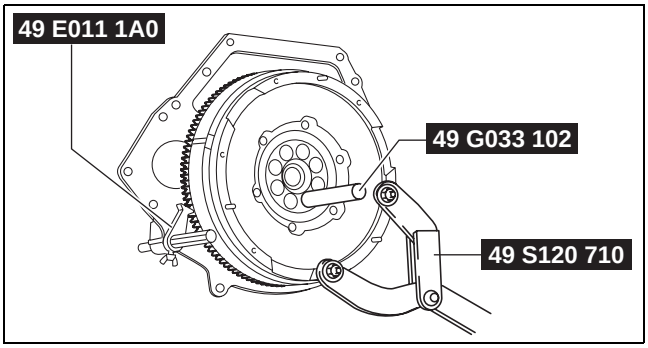
Note
- If the bolt installation holes are not positioned properly, perform the following procedure:

(1) Install the **SST (49 S120 710)** to the dual-mass flywheel.
(2) Rotate the dual-mass flywheel (secondary flywheel side) using the **SST (49 S120 710)**.
(3) When the bolt installation holes are positioned properly, hold the position and remove one of the bolts.



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(4) After removing the bolt, set up the **SST (49 G033 102)** to lock the dual-mass flywheel (secondary flywheel side) against rotation.



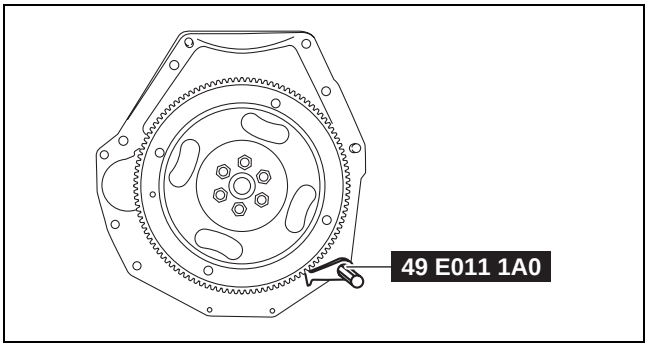
am6xuw00005541

Warning
- **If all of the bolts are removed without locking the dual-mass flywheel (secondary flywheel side) against rotation, the dual-mass flywheel (primary or secondary flywheel side) may rotate, resulting in injury. Therefore, always set up the SST (49 G033 102).**
- **When the bolts are removed from the dual-mass flywheel, always cover the bolt holes using tape. If the SST (49 G033 102) is removed while the operator's finger is inserted in the bolt hole, the dual-mass flywheel may rotate and the operator could be injured.**

(5) Remove the remaining bolts.

Drive plate installation bolt (ATX)

1. Hold the crankshaft using the **SST**.
2. Loosen the bolts uniformly and gradually in the order shown in the figure.



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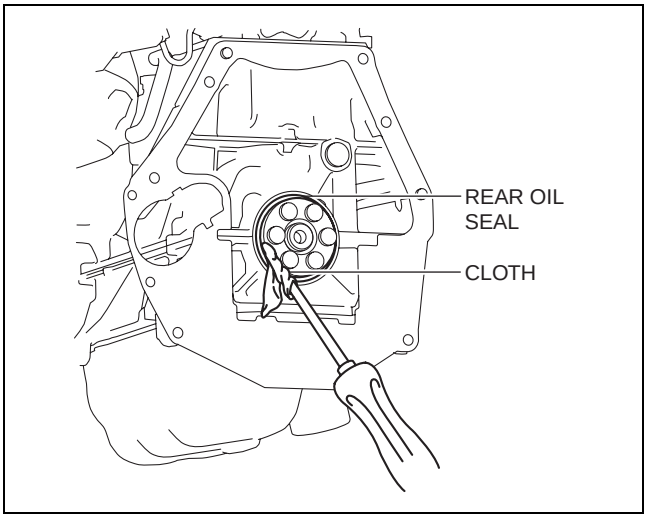
Dual-mass Flywheel Disassembly Note (MTX)

Note

- When reusing the dual-mass flywheel, do not remove the **SST (49 G033 102)** locking the dual-mass flywheel (secondary flywheel side) against rotation.

Rear Oil Seal Disassembly Note

1. Cut the oil seal lip using a utility knife.
2. Remove the oil seal using a flathead screwdriver with the tip protected by a clean cloth to prevent damage to the oil seal sliding part of the crankshaft.

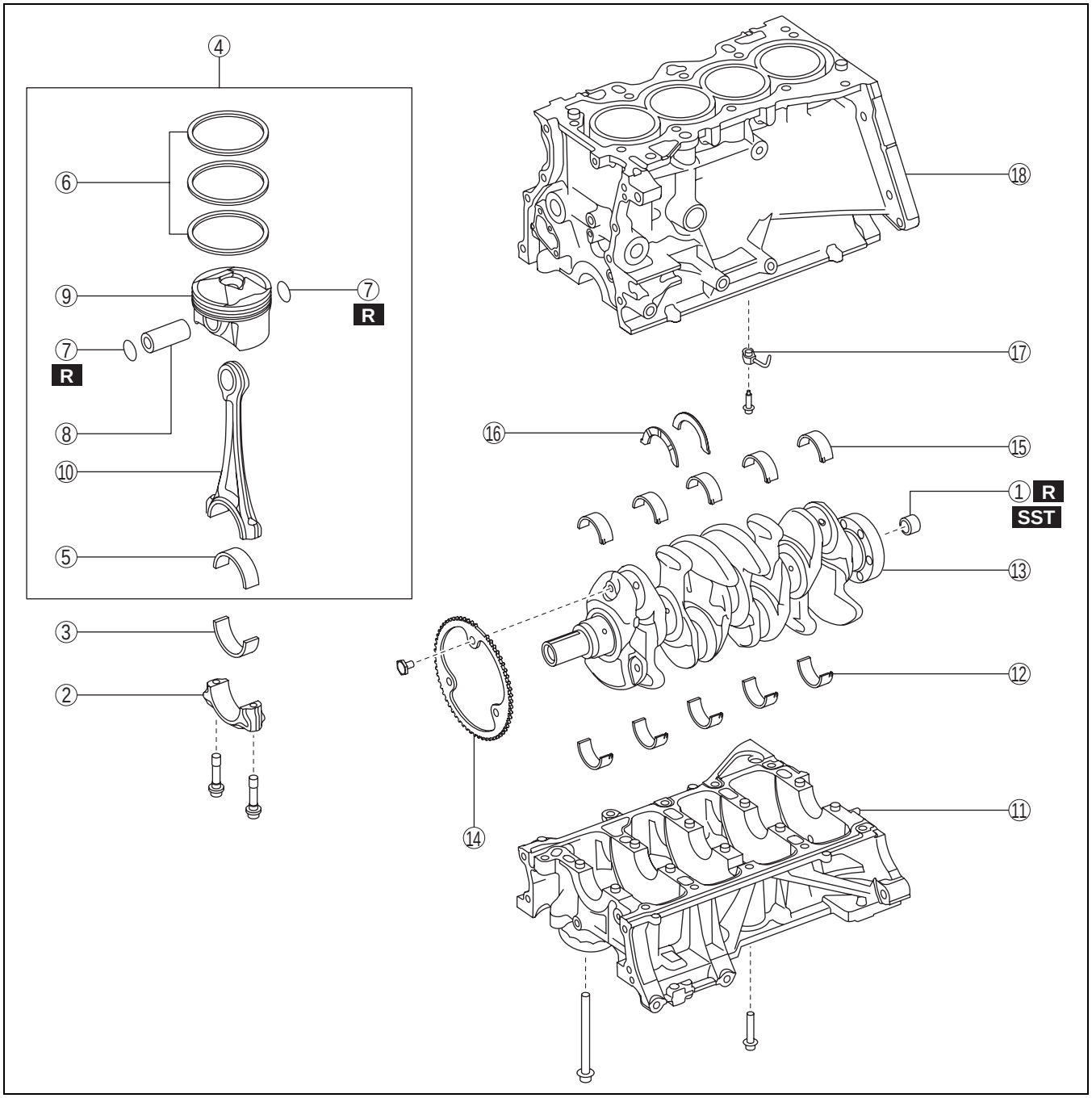


bpe5ue00000003

CYLINDER BLOCK DISASSEMBLY (II)

id011000500700

1. Disassemble in the order indicated in the table.



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1	Pilot bearing (MTX) (See 01-10-23 Pilot Bearing Disassembly Note.)
2	Connecting rod cap (See 01-10-23 Connecting Rod Cap Disassembly Note.)
3	Lower connecting rod bearing (See 01-10-23 Connecting Rod Bearing Disassembly Note.)
4	Piston, connecting rod (See 01-10-23 Piston, Connecting Rod Disassembly Note.)
5	Upper connecting rod bearing (See 01-10-23 Connecting Rod Bearing Disassembly Note.)

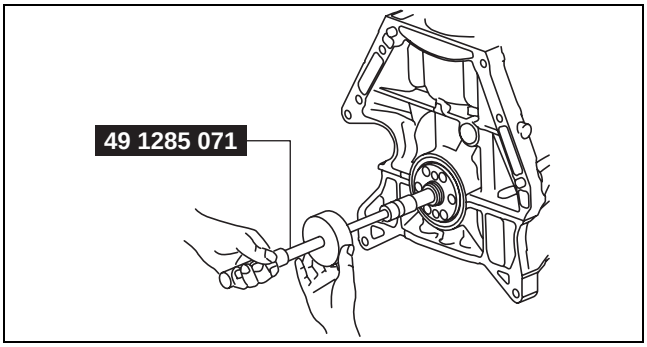
6	Piston ring
7	Snap ring (See 01-10-24 Snap Ring Disassembly Note.)
8	Piston pin
9	Piston
10	Connecting rod
11	Lower cylinder block (See 01-10-24 Lower Cylinder Block Disassembly Note.)
12	Lower main bearing (See 01-10-25 Thrust Bearing And Main Bearing Disassembly Note.)

13	Crankshaft (See 01-10-25 Crankshaft Disassembly Note.)
14	Plate
15	Upper main bearing (See 01-10-25 Thrust Bearing And Main Bearing Disassembly Note.)
16	Thrust bearing (See 01-10-25 Thrust Bearing And Main Bearing Disassembly Note.)
17	Oil jet valve
18	Upper cylinder block

Pilot Bearing Disassembly Note

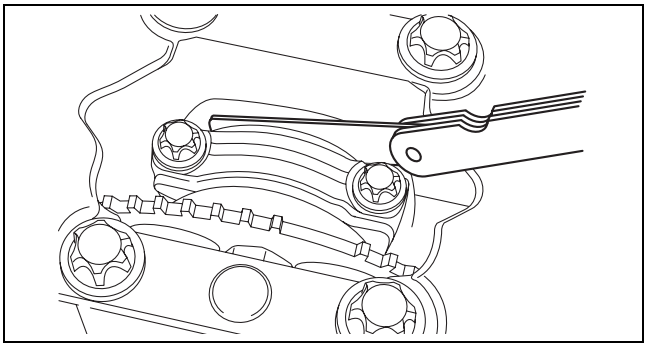
Note
- The pilot bearing does not need to be removed unless you are replacing it.

1. Use the **SST** to remove the pilot bearing.



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Connecting Rod Cap Disassembly Note
1. Before removing the connecting rod cap, inspect the connecting rod side clearance. (See 01-10-35 CONNECTING ROD CLEARANCE INSPECTION.)
2. The removed connecting rod caps are to be kept so that they can be assembled to the same positions and in the direction as before removal.

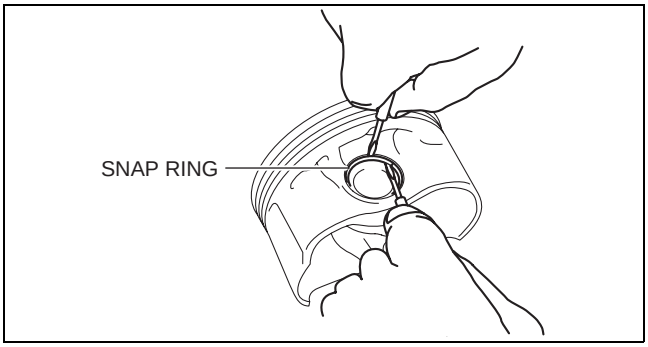

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Connecting Rod Bearing Disassembly Note
1. The removed connecting rod bearings are to be kept so that they can be assembled to the same positions and in the direction as before removal.

Piston, Connecting Rod Disassembly Note
1. Before removing the piston and connecting rod, remove the carbon in the cylinder.
2. Before removing the piston and connecting rod, inspect the oil clearance at the large end of the connecting rod. (See 01-10-35 CONNECTING ROD CLEARANCE INSPECTION.)

Snap Ring Disassembly Note

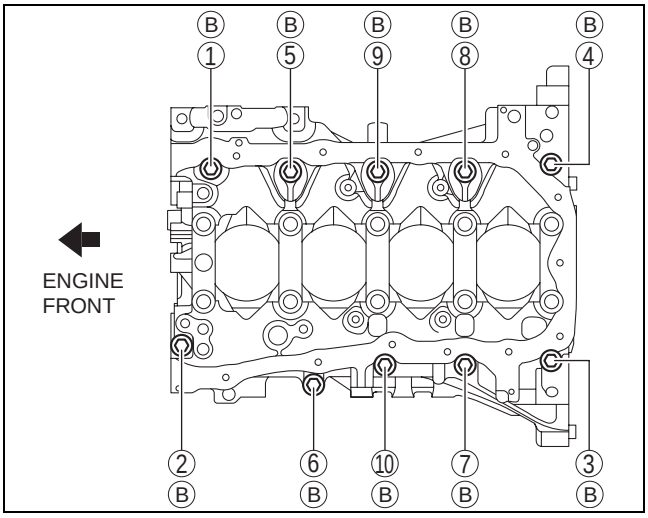
1. Before removing the snap ring, verify that the large end of connecting rod drops under its own weight with no resistance. (See 01-10-35 PISTON AND CONNECTING ROD INSPECTION.)
2. Remove the snap ring using a flathead screwdriver.



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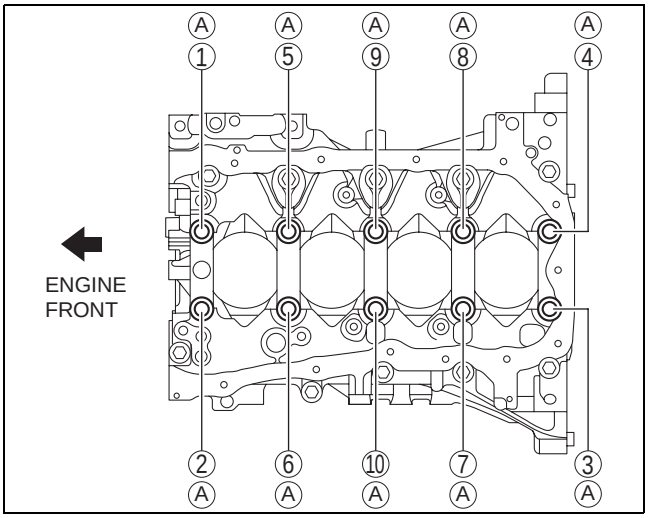
Lower Cylinder Block Disassembly Note

1. Before removing the lower cylinder block, inspect the crankshaft end play. (See 01-10-36 CRANKSHAFT INSPECTION.)
2. Loosen the lower cylinder block installation bolts B in two or three passes in the order shown in the figure and remove them.



bpe1ze00000039

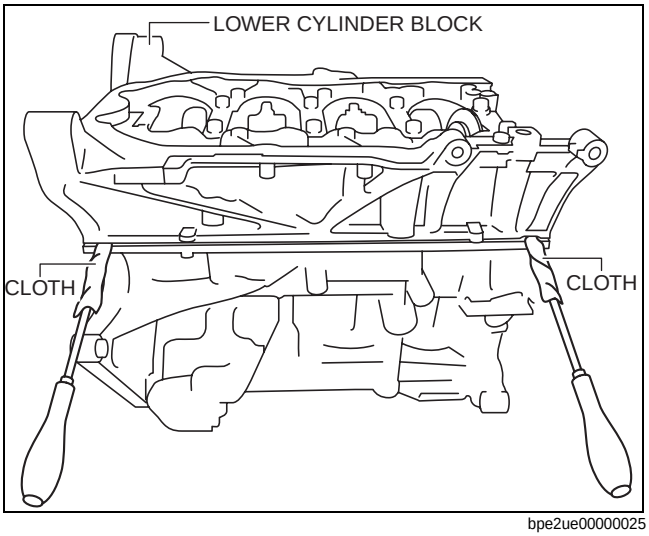
3. Loosen the lower cylinder block installation bolts A in two or three passes in the order shown in the figure and remove them.



bpe1ze00000040

4. Using a screwdriver wrapped in a cloth, peel the sealant away a little at a time, and remove the lower cylinder block.

Caution
- **Do not apply excessive force to the screwdriver. Otherwise, the lower cylinder block could be damaged.**
- **Be careful not to scratch or damage the seal surface. Otherwise, it could cause oil leakage.**



bpe2ue00000025

Thrust Bearing And Main Bearing Disassembly Note

1. The removed thrust bearings and main bearings are to be kept so that they can be assembled to the same positions and in the direction as before removal.

Crankshaft Disassembly Note

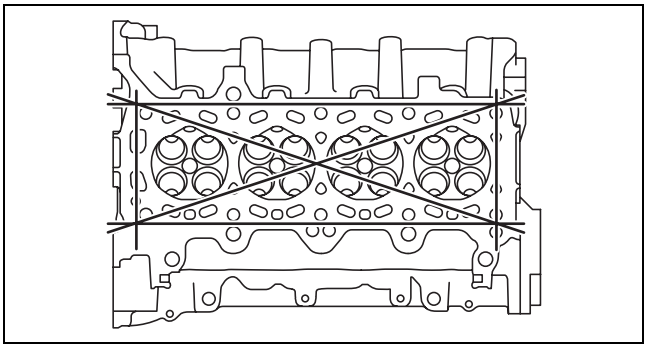
Caution
- **Placing the crankshaft on a disassembly bench will deform or damage it because the plate for the crankshaft position sensor signal detection installed to the crankshaft is larger than the counterweight. Therefore, set wood blocks or similar objects on the both sides of the crankshaft so that the plate does not contact the disassembly bench directly when placing the crankshaft on the bench.**

CYLINDER HEAD INSPECTION

id011000507100

1. Inspect the cylinder head surface for cracks and other damage using a red dye penetrant.
   - If there is a malfunction, replace the cylinder head.
2. Measure the combustion chamber side of the cylinder head for distortion in six directions as shown in the figure using a straight edge and feeler gauge.
   - If the distortion exceeds the maximum specification, replace the cylinder head. Do not attempt to repair the cylinder head by milling or grinding.

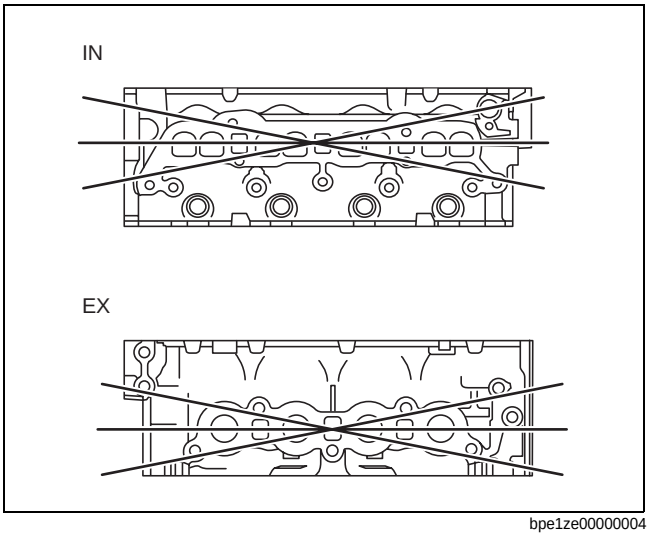
Maximum distortion, head gasket side of the cylinder head
0.05 mm {0.002 in}


bpe1ze00000003

3. Inspect the contact surface of the exhaust manifold and the intake manifold for distortion by measuring as shown in the figure using a straight edge and feeler gauge.
   - If the distortion on the intake manifold side exceeds the maximum specification, replace the cylinder head.
   - If the distortion on the exhaust manifold side exceeds the maximum specification, grind the surface or replace the cylinder head.

   Maximum distortion, manifold side
   IN: 0.10 mm {0.0039 in}
   EX: 0.05 mm {0.002 in}

   Maximum cutting length, manifold side
   IN: Cutting not authorized
   EX: 0.20 mm {0.0079 in}



bpe1ze00000004

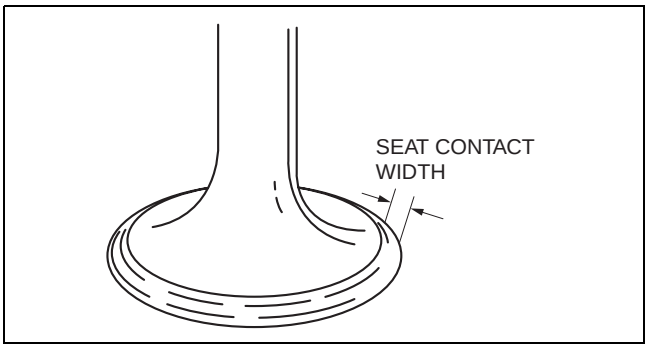
VALVE SEAT INSPECTION/REPAIR

id011000501300

1. Measure the contact width of the valve face and the valve seat using the valve lapping compound.
   - If it is not within the specification, resurface the valve seat using the **45**° valve seat cutter.

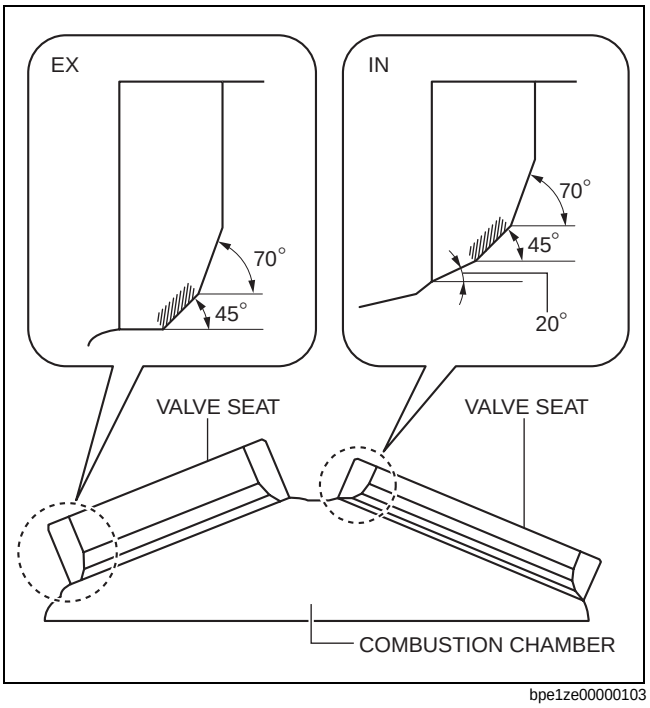
   Standard valve seat contact width
   1.37—1.84 mm {0.0540—0.0724 in}

   Valve seat angle
   45°



bpe1ze00000102

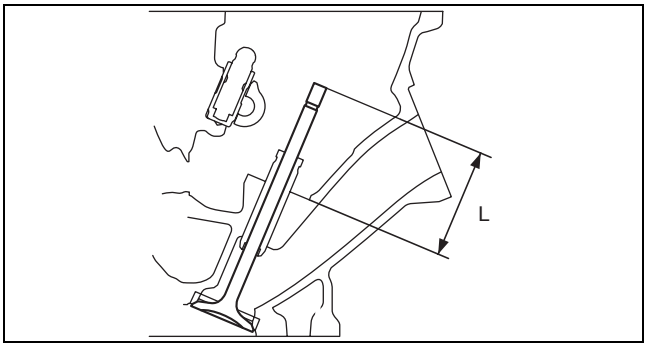
2. Verify that the area where the valve seat contacts the valve face is centered.
   - If the seating position is too high, correct the valve seat using a **70**° (IN) **70**° (EX) valve seat cutter and a **45**° valve seat cutter.
   - If the seating position is too low, correct as follows:
     — IN: Correct the valve seat using a **20**° valve seat cutter and then using a **45**° valve cutter.
     — EX: Correct the valve seat using a **45**° valve seat cutter.



bpe1ze00000103

3. Inspect the valve seat for sinkage. Measure the protruding length (dimension L) of the valve stem using a valve of standard length.
   - If it is not within the specification, replace the cylinder head.

   Standard valve seat sinkage amount (Dimension L)
   IN: 48.93—50.17 mm {1.927—1.975 in}
   EX: 48.87—50.11 mm {1.925—1.972 in}



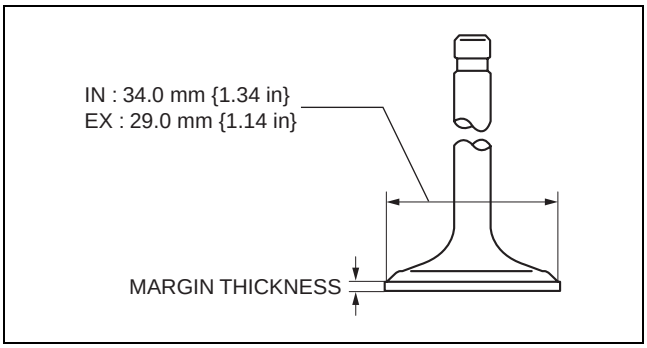
bpe1ze00000104

VALVE, VALVE GUIDE INSPECTION

id011000506200

1. Measure the valve head margin thickness using a vernier caliper.
   - If it is less than the standard specification, replace the valve.

   Standard valve head margin thickness
   IN: 1.75—1.95 mm {0.0689—0.0767 in}
   EX: 1.95—2.15 mm {0.0768—0.0846 in}

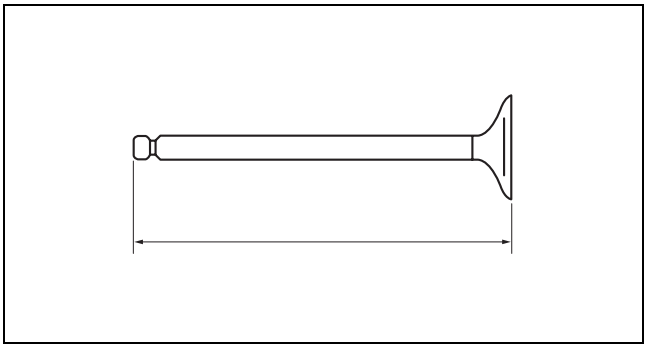


bpe5ue00000012

2. Measure the length of the each valve using a vernier caliper.
   - If it is less than the minimum specification, replace the valve.

   Standard valve length
   IN: 107.00—107.60 mm {4.2127—4.2362 in}
   EX: 117.09—117.69 mm {4.6099—4.6334 in}

   Minimum valve length
   IN: 106.78 mm {4.2039 in}
   EX: 116.87 mm {4.6012 in}.

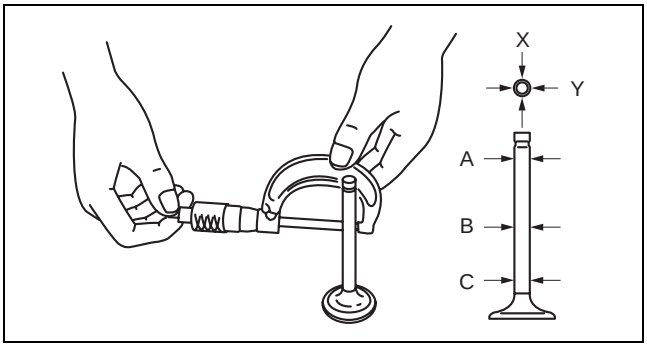


bez0je00000017

3. Measure the valve stem diameter of each valve using the micrometer. Measurement positions total six and are in the X and Y directions, at three points (A, B, and C) as shown in the figure.
   - If it is less than the minimum specification, replace the valve.

   Standard valve stem diameter
   IN: 5.470—5.485 mm {0.2154—0.2159 in}
   EX: 5.465—5.480 mm {0.2152—0.2157 in}

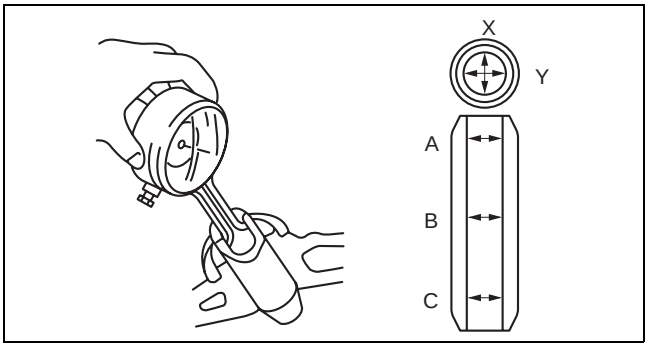
   Minimum valve stem diameter
   IN: 5.424 mm {0.2135 in}
   EX: 5.419 mm {0.2133 in}



bpe2ue00000084

4. Measure the inner diameter of each valve guide using the caliper gauge. Measurement positions total six and are in the X and Y directions, at three points (A, B, and C) as shown in the figure.
   - If it is not within the specification, replace the valve guide.

   Standard valve guide inner diameter
   IN: 5.510—5.530 mm {0.2170—0.2177 in}
   EX: 5.510—5.530 mm {0.2170—0.2177 in}

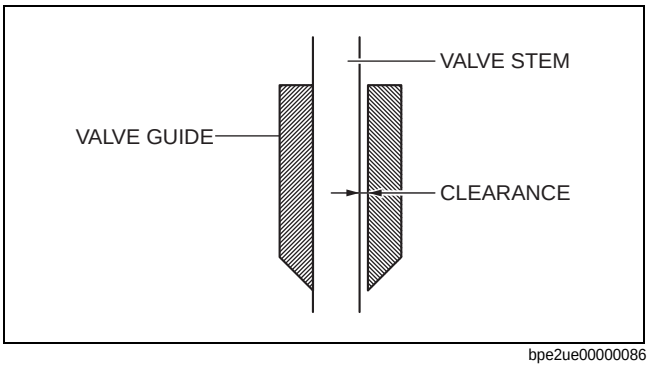


bpe2ue00000085

5. Calculate the clearance between the valve stem and the valve guide by subtracting the inner diameter of the valve guide from the outer diameter of the corresponding valve stem.
   - If it exceeds the maximum specification, replace the valve or valve guide.

   Standard clearance between valve stem and guide
   IN: 0.025—0.060 mm {0.0010—0.0023 in}
   EX: 0.030—0.065 mm {0.0012—0.0025 in}

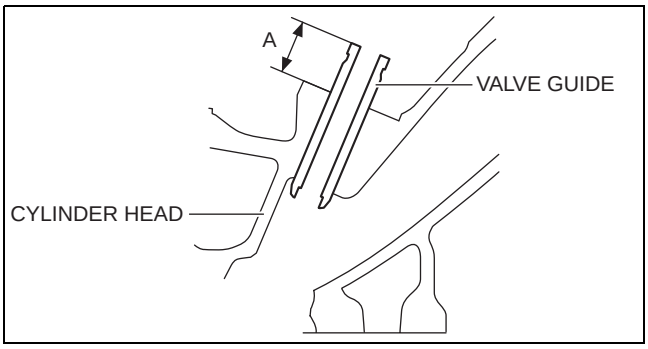
   Maximum clearance between valve stem and guide
   0.10 mm {0.0039 in}



bpe2ue00000086

6. Measure the projection height (dimension A) of each valve guide using the vernier caliper.
   - If it is not within the specification, replace the valve guide.

   Standard valve guide projection height
   IN: 16.4—17.0 mm {0.646—0.669 in}
   EX: 16.4—17.0 mm {0.646—0.669 in}



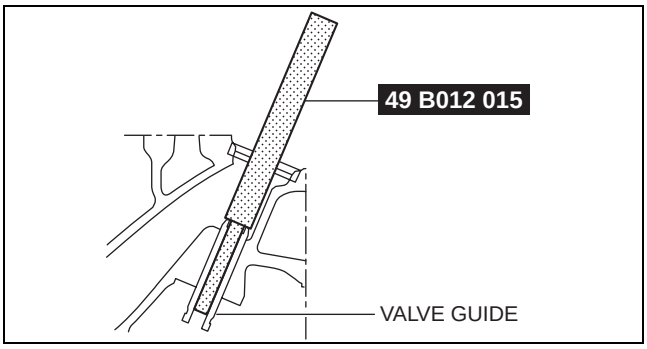
bpe2ue00000087

VALVE GUIDE REPLACEMENT

id011000501200

Removal

1. Tap the valve guide out from combustion chamber side using the **SST**.

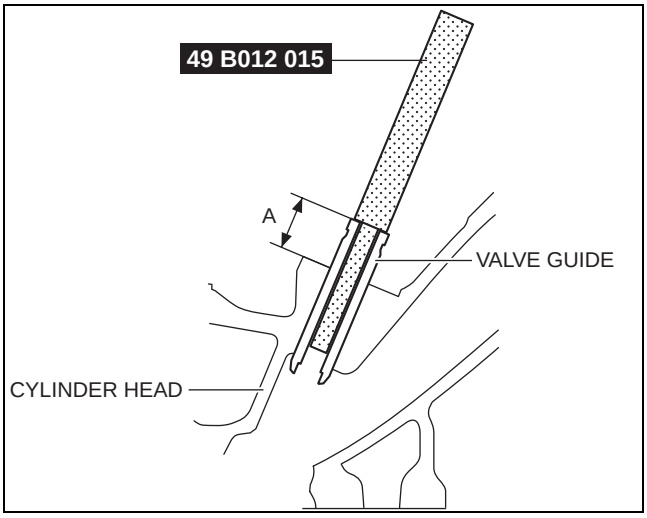


bpe2ue00000026

Installation

1. Apply clean engine oil to the valve guide.
2. Tap the valve guide from the camshaft side using the SST so that the projection height (dimension A) is within the specification.

   Standard valve guide projection height
   IN: 16.4—17.0 mm {0.646—0.669 in}
   EX: 16.4—17.0 mm {0.646—0.669 in}



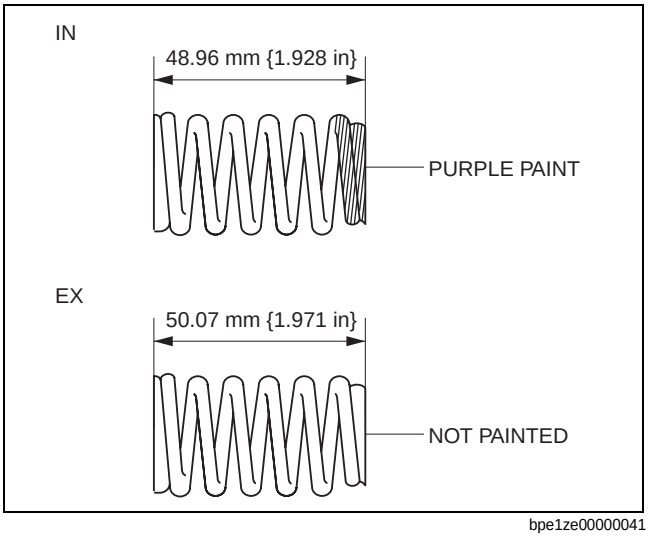
bpe2ue00000027

VALVE SPRING INSPECTION

id011000501400

Caution

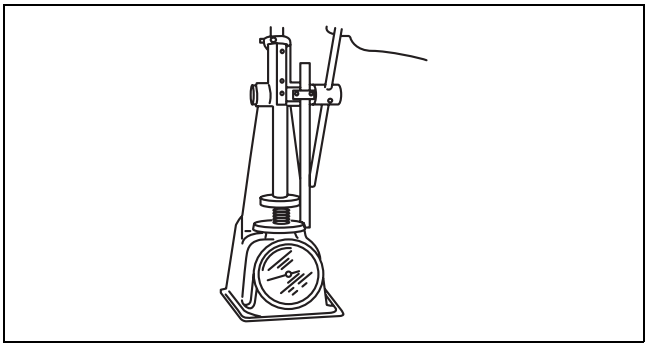
- **The valve springs differ depending on the IN and EX sides.Therefore, verify the free length or identification paint beforehand and inspect the valve springs.**



bpe1ze00000041

1. Measure the valve spring height using the spring tester.
   - If it is not within the specification, replace the valve spring.

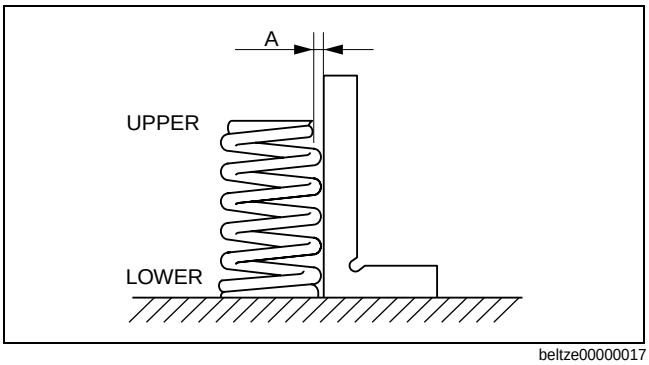
   Valve spring installation height
   When pressurized with spring force of 228—252 N {23.3—25.6 kgf, 51.3—56.6 lbf}, spring height is 38.0 mm {1.50 in}



bp31je00000053

2. Measure the amount of off-square on the valve spring using a square.
   (1) Rotate the valve spring one full turn and measure A at the point where the gap is the largest.
      - If it exceeds the maximum specification, replace the valve spring.

   Maximum valve spring off-square
   IN: 2.0 ° (1.7 mm {0.067 in})
   EX: 2.0 ° (1.7 mm {0.067 in})



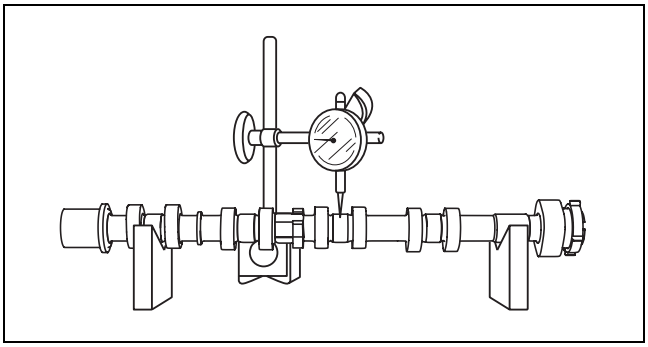
beltze00000017

CAMSHAFT INSPECTION

id011000501500

1. Set the No.1 and No.5 journals of the camshaft on V-blocks.
2. Measure the camshaft runout using the dial gauge.
   - If it exceeds the maximum specification, replace the camshaft.

   Maximum camshaft runout
   0.030 mm {0.0012 in}

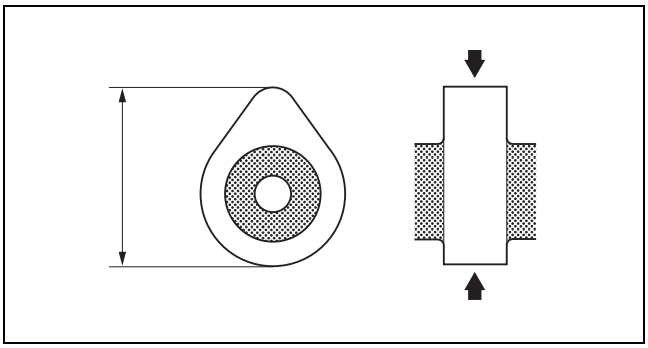


bpe2ue00000031

3. Measure the cam height using the micrometer as shown in the figure.
   - If it is less than the minimum specification, replace the camshaft.

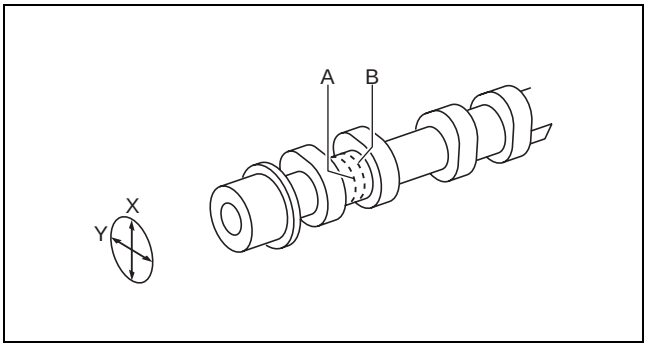
   Standard cam height
   IN: 42.34 mm {1.667 in}
   EX: 40.37 mm {1.589 in}

   Minimum cam height
   IN: 42.27 mm {1.664 in}
   EX: 40.30 mm {1.587 in}



bp31je00000171

4. Measure the journal diameter using the micrometer. Measurement positions total four and are in the X and Y directions, at two points (A and B) as shown in the figure.
   - If it is less than the minimum specification, replace the camshaft.

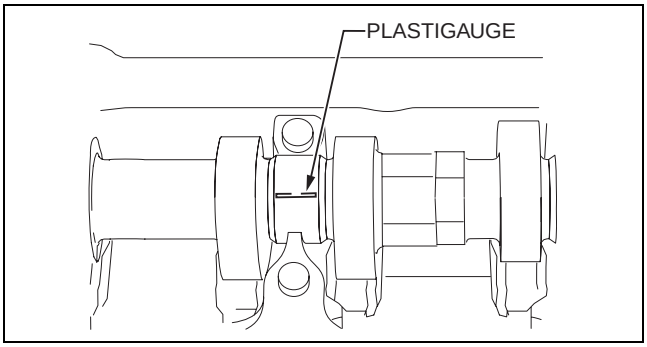


bp31je00000172

Standard camshaft journal diameter
24.96—24.98 mm {0.9827—0.9834 in}

Minimum camshaft journal diameter
24.93 mm {0.9815 in}

5. Measure the camshaft journal oil clearance using the following procedure:
   (1) Clean the camshaft journal and the journal receptacle part.
   (2) Put the camshaft on the cylinder head with the rocker arm detached.
   (3) Cut the plastigauge to the same length as the journal width and position it parallel to the camshaft.
   (4) Install the camshaft caps. (See 01-10-59 CYLINDER HEAD ASSEMBLY (II).)
   (5) Remove the camshaft caps. (See 01-10-14 CYLINDER HEAD DISASSEMBLY (I).)
   (6) Measure the camshaft journal oil clearance.
      - If it exceeds the maximum specification, replace the cylinder head.

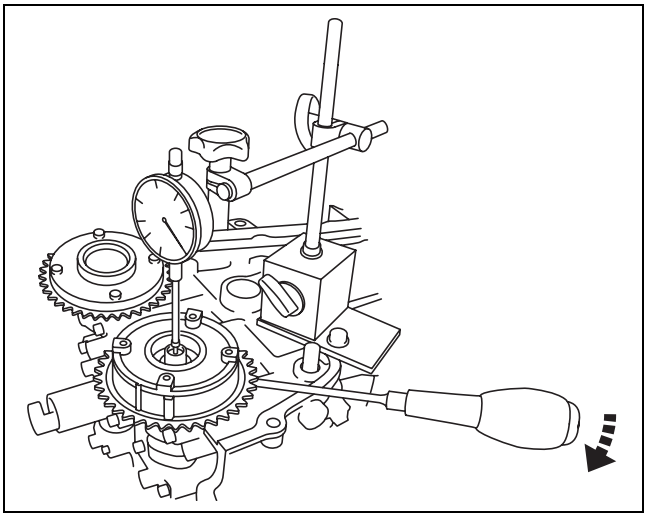


bpe2ue00000032

Standard camshaft journal oil clearance
0.035—0.080 mm {0.0014—0.0031 in}

Maximum camshaft journal oil clearance
0.090 mm {0.0035 in}

6. Measure the camshaft end play using a dial gauge.
   - If it exceeds the maximum specification, replace the cylinder head or camshaft.


bp31je00000173

Standard camshaft end play
0.07—0.22 mm {0.003—0.008 in}

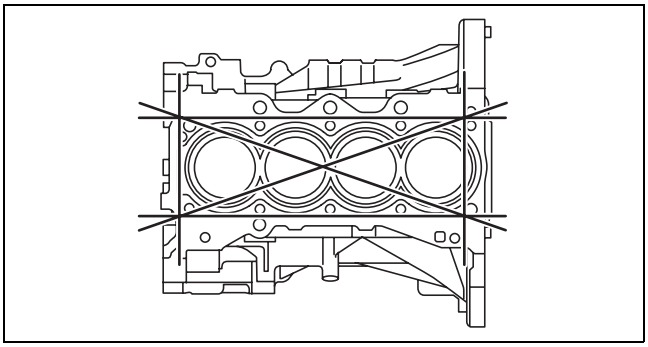
Maximum camshaft end play
0.23 mm {0.0091 in}

CYLINDER BLOCK INSPECTION

id011000507200

1. Measure the cylinder block for distortion in six directions as shown in the figure using a straight edge and feeler gauge.
   - If it exceeds the maximum specification, replace the cylinder block.

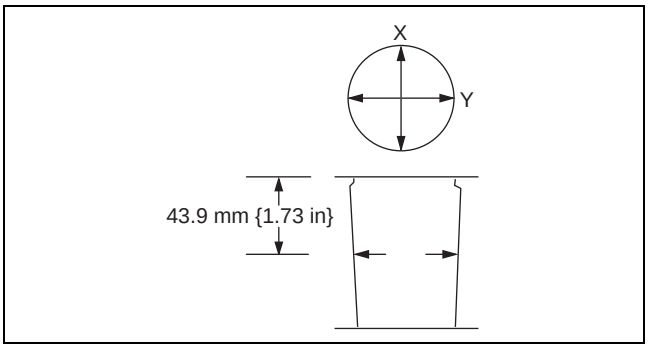
   Maximum distortion, head gasket side of the cylinder block
   0.10 mm {0.0039 in}



bp31je00000144

2. Measure the cylinder bore diameter using the cylinder gauge. The measurement position is in the X and Y directions at a point **43.9 mm {1.73 in}** below the top surface of the cylinder as shown in the figure.
   - If it is not within the specification, replace the cylinder block.

   Standard cylinder bore diameter
   89.000—89.030 mm {3.5040—3.5051 in}



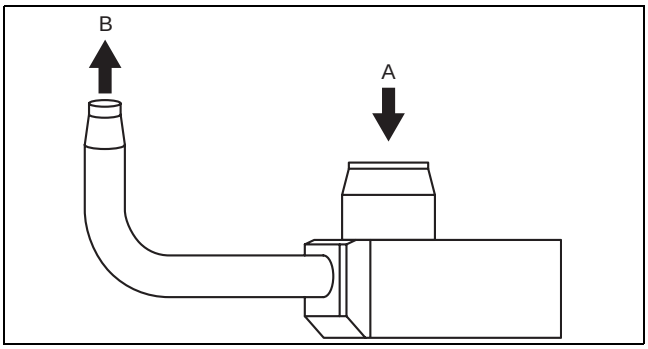
bpe2ue00000098

OIL JET VALVE INSPECTION

id011000505900

1. Apply compressed air to oil jet valve A and verify that air passes through oil jet valve B.
   - If air does not flow, replace the oil jet valve.
   - If there is air flow with air compressor of less than **180 kPa {1.84 kgf/cm^2, 26.1 psi}**, replace the oil jet valve.

   Oil jet valve opening pressure
   180—220 kPa {1.84—2.24 kgf/cm^2, 26.2—31.9 psi}



bp31je00000131

PISTON INSPECTION

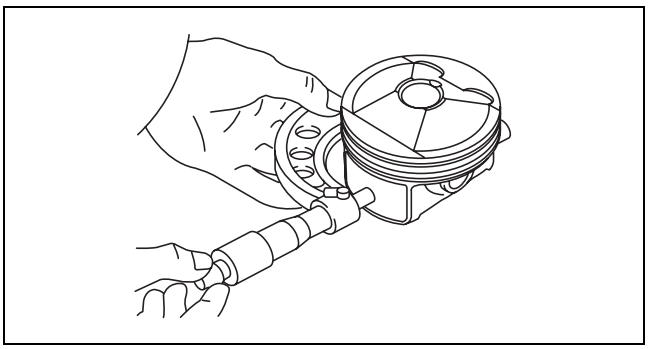
id011000502100

Caution
- **If the piston is replaced, replace the piston, piston pin, and the snap ring as a single component.**

1. Measure the piston outer diameter using the micrometer. The measurement position is **8.0 mm {0.31 in}** from the lower end of the piston (area with no coating on the piston skirt) and in the thrust direction.
   - If it is not within the specification, replace the piston.

   Standard piston outer diameter
   88.965—88.995 mm {3.5026—3.5037 in}

2. Measure the cylinder bore diameter. (See 01-10-32 CYLINDER BLOCK INSPECTION.)



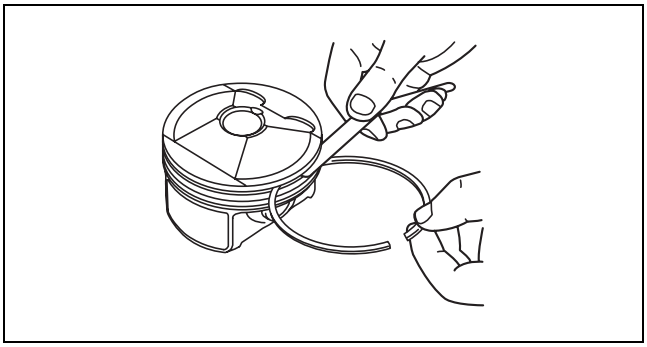
bpe1ze00000097

3. Calculate the cylinder-to-piston clearance from the cylinder bore diameter and the piston outer diameter.
   - If the clearance exceeds the maximum specification, replace the piston or cylinder block.

Standard clearance between piston and cylinder
0.025—0.045 mm {0.0010—0.0017 in}

Maximum clearance between piston and cylinder
0.066 mm {0.0026 in}

4. Measure the piston-to-ring groove clearance along the perimeter using a feeler gauge. For the O-ring, measure the clearance with the O-ring assembled to the piston.
   - If the clearance exceeds the maximum specification, replace the piston or piston ring.



bpe1ze00000098

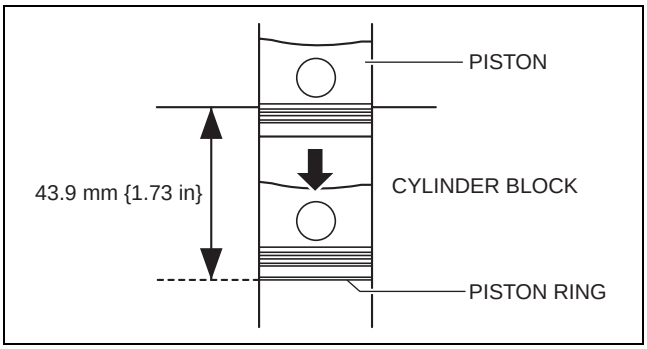
Standard clearance between piston ring and ring groove
Top: 0.04—0.08 mm {0.002—0.003 in}
Second: 0.03—0.07 mm {0.0012—0.0027 in}
Oil: 0.04—0.12 mm {0.002—0.004 in}

Maximum clearance between piston ring and ring groove
Top: 0.12 mm {0.0047 in}
Second: 0.10 mm {0.0039 in}
Oil: 0.17 mm {0.0067 in}

PISTON RING INSPECTION

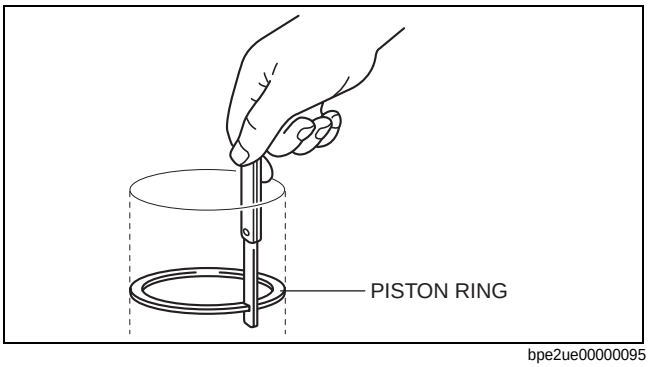
id011000592300

1. Using the piston, press the piston ring parallel into the cylinder to **43.9 mm {1.73 in}** from the upper end of the cylinder block.



bpe2ue00000094

2. Measure the piston ring end gap using a feeler gauge.
   - If it exceeds the maximum specification, replace the piston ring.



bpe2ue00000095

Standard piston ring end gap
Top: 0.13—0.18 mm {0.0052—0.0070 in}
Second: 0.18—0.28 mm {0.008—0.011 in}
Oil (Rail): 0.10—0.35 mm {0.004—0.013 in}

Maximum piston ring end gap
Top: 0.35 mm {0.014 in}
Second: 0.45 mm {0.018 in}
Oil (Rail): 0.52 mm {0.020 in}

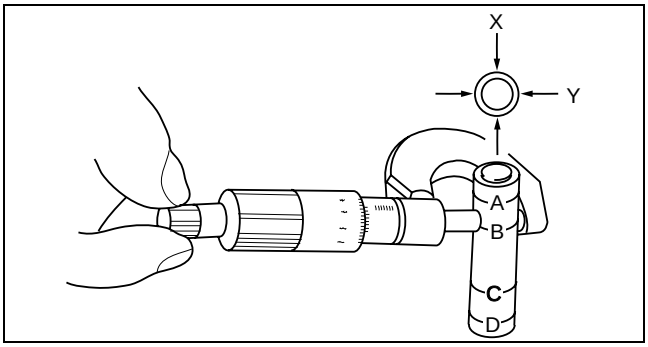
PISTON PIN INSPECTION

id011000507500

Caution
- **If the piston or piston pin is replaced, replace the piston, piston pin and the snap ring as a single component.**

1. Measure the piston pin outer diameter using the micrometer. Measurement positions total eight and are in the X and Y directions, at four points (A, B, C, and D) as shown in the figure.

   Standard piston pin outer diameter
   20.995—21.000 mm {0.82658—0.82677 in}



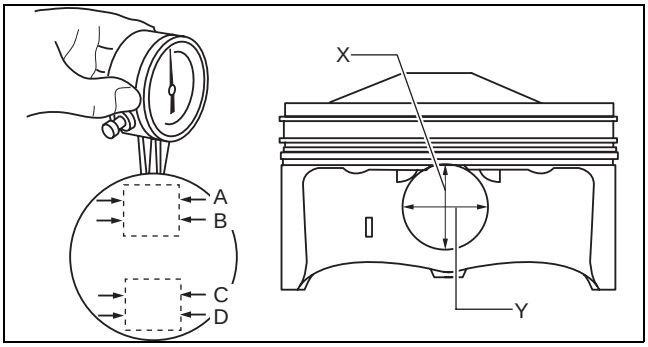
adj2224e255

2. Measure the piston pin hole diameter using the caliper gauge. Measurement positions total eight and are in the X and Y directions, at four points (A, B, C, and D) as shown in the figure.

   Standard piston pin hole diameter
   21.004—21.008 mm {0.82693—0.82708 in}

3. Calculate the clearance between the piston pin hole diameter and the piston pin outer diameter.
   - If it is not within the specification, replace the piston or the piston pin.

   Standard clearance between piston pin hole diameter and piston pin outer diameter
   0.004—0.013 mm {0.0002—0.0005 in}

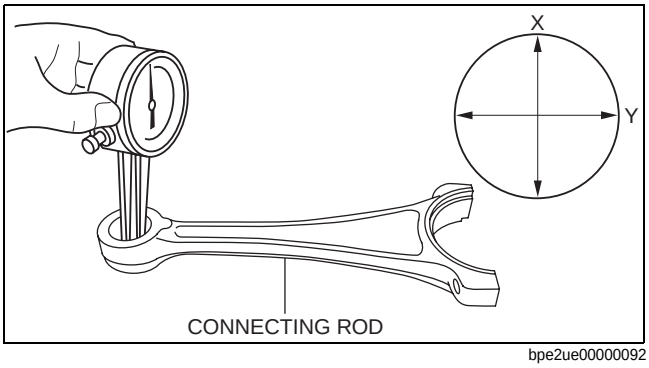


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4. Measure the inner diameter on the small end of the connecting rod using the caliper gauge in the X and Y directions as shown in the figure.

   Standard connecting rod small end inner diameter
   21.002—21.013 mm {0.82686—0.82728 in}

5. Calculate the clearance between the inner diameter on the small end of the connecting rod and the piston pin outer diameter.
   - If it is not within the specification, replace the connecting rod or the piston pin.



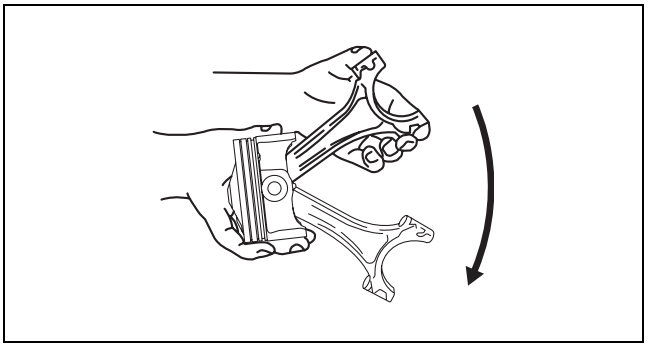
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Standard clearance between connecting rod small end inner diameter and piston pin outer diameter
0.002—0.018 mm {0.00008—0.00070 in}

PISTON AND CONNECTING ROD INSPECTION

1. Check the oscillation torque as shown in the figure. Verify that the large end drops under its own weight with no resistance.
   - If the piston shakes heavily or unsmoothly, disassemble the piston and connecting rod, then inspect the following: (See 01-10-34 PISTON PIN INSPECTION.)
     — Clearance between piston pin outer diameter and piston pin hole diameter.
     — Clearance between piston pin outer diameter and connecting rod small end inner diameter.

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CONNECTING ROD INSPECTION

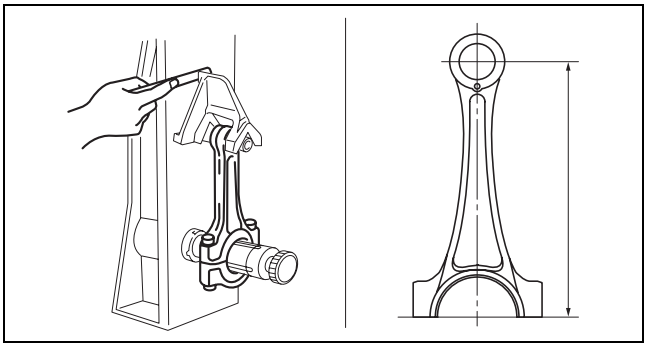
1. Inspect the connecting rod for bending and distortion using the connecting rod aligner.
   - If it exceeds the maximum specification, replace the connecting rod.

   Maximum connecting rod bending
   0.050 mm {0.0020 in}

   Maximum connecting rod distortion
   0.050 mm {0.0020 in}

   Connecting rod center-to-center distance
   154.8 mm {6.094 in}

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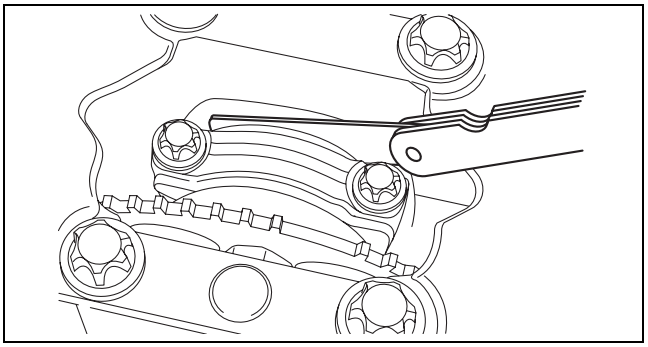
CONNECTING ROD CLEARANCE INSPECTION

1. Measure the side clearance at the large end of the connecting rod using a feeler gauge.
   - If it exceeds the maximum specification, replace the connecting rod or crankshaft.

   Standard side clearance at the large end of connecting rod
   0.14—0.36 mm {0.006—0.014 in}

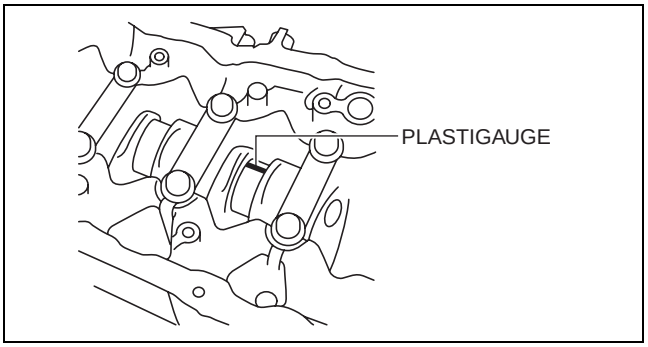
   Maximum side clearance at the large end of connecting rod
   0.465 mm {0.0183 in}

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2. Measure the oil clearance at the large end of the connecting rod using the following procedure:
   (1) Cut the plastigauge as wide as the connecting rod bearing width, place it parallel to the crankshaft, avoiding the oil hole.
   (2) Install the lower connecting rod bearing and connecting rod cap. (See 01-10-40 CYLINDER BLOCK ASSEMBLY (I).)
   (3) Remove the connecting rod cap. (See 01-10-22 CYLINDER BLOCK DISASSEMBLY (II).)
   (4) Measure the oil clearance at the large end of the connecting rod.
      - If it exceeds the maximum specification, replace the bearing or grind the crank pin and use oversize bearings so that the specified clearance is obtained.



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Standard bearing oil clearance at the large end of the connecting rod
0.026—0.052 mm {0.0011—0.0020 in}

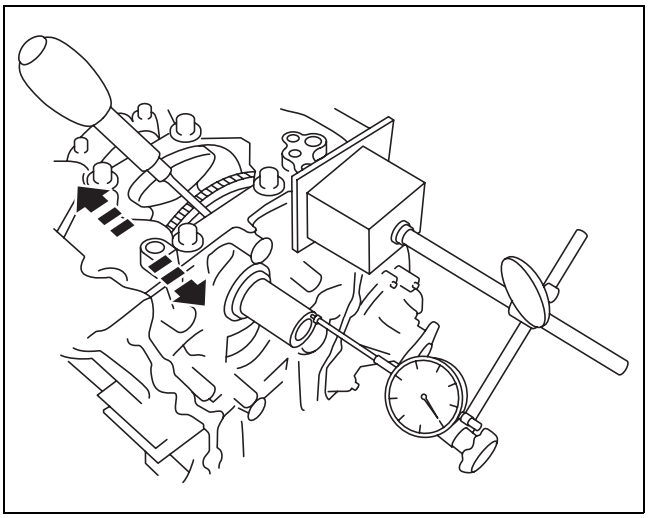
Maximum bearing oil clearance at the large end of the connecting rod
0.10 mm {0.0039 in}

Connecting rod bearing size
STD: 1.502—1.519 mm {0.05914—0.05980 in}
OS 0.25: 1.628—1.631 mm {0.06410—0.06421 in}
OS 0.50: 1.753—1.756 mm {0.06902—0.06913 in}

CRANKSHAFT INSPECTION

id011000502500

1. Measure the crankshaft end play using a dial gauge.
   - If it exceeds the maximum specification, replace the crankshaft or grind the thrust side of crankshaft and use the oversize thrust bearing so that the specified end play is obtained.



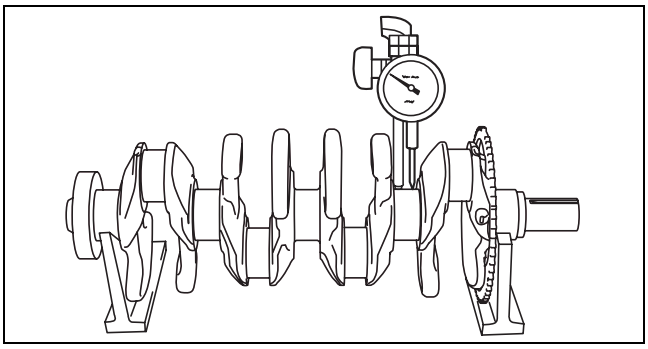
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Standard crankshaft end play
0.08—0.29 mm {0.004—0.011 in}

Maximum crankshaft end play
0.30 mm {0.012 in}

Thrust bearing size
STD: 2.500—2.550 mm {0.0985—0.1003 in}
OS 0.25: 2.625—2.675 mm {0.1034—0.1053 in}

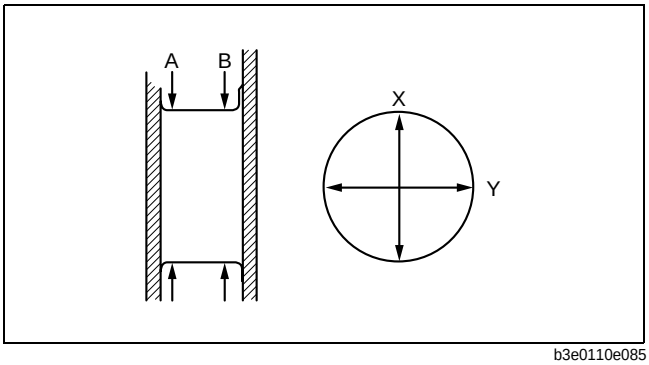
2. Measure the runout of the main journal using a V-block and dial gauge.
   - If it exceeds the maximum specification, replace the crankshaft.



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Maximum main journal runout
0.10 mm {0.0039 in}

3. Inspect the main journal diameter and crank pin diameter. Measurement positions total four and are in the X and Y directions, at two points (A and B) as shown in the figure.
   - If it is not within the specification or if it exceeds the maximum off-round, grind the journal with an oversized bearing.



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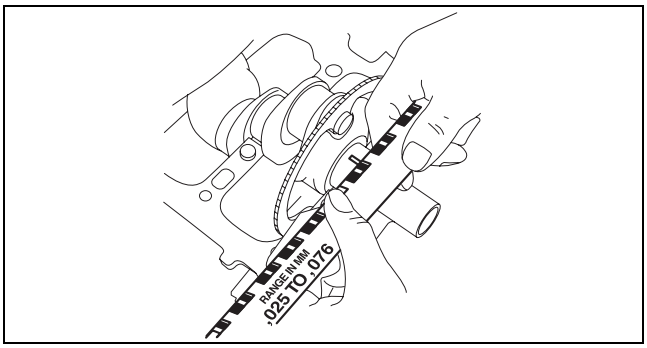
Standard main journal diameter
49.980—50.000 mm {1.9678—1.9685 in}

Maximum main journal off-round
0.005 mm {0.0002 in}

Standard crank pin diameter
49.980—50.000 mm {1.9678—1.9685 in}

Maximum crank pin off-round
0.005 mm {0.0002 in}

4. Inspect the main journal oil clearance using the following procedure:
   (1) Install the thrust bearing, upper main bearing and crankshaft.
   (2) Position a plastigauge on the journals.
   (3) Install the lower main bearing and lower cylinder block. (See 01-10-40 CYLINDER BLOCK ASSEMBLY (I).)
   (4) Remove the lower cylinder block. (See 01-10-22 CYLINDER BLOCK DISASSEMBLY (II).)
   (5) Measure the main journal oil clearance.
      - If it exceeds the maximum specification, replace the main bearing, or grind the main journal and use oversized bearings so that the specified oil clearance is obtained.



bp31je00000152

Standard main journal oil clearance
0.016—0.039 mm {0.0007—0.0015 in}

Maximum main journal oil clearance
0.084 mm {0.0033 in}

Main bearing size
STD: 2.489—2.510 mm {0.0980—0.0988 in}
OS 0.25: 2.614—2.617 mm {0.10292—0.10303 in}
OS 0.50: 2.739—2.742 mm {0.10784—0.10795 in}

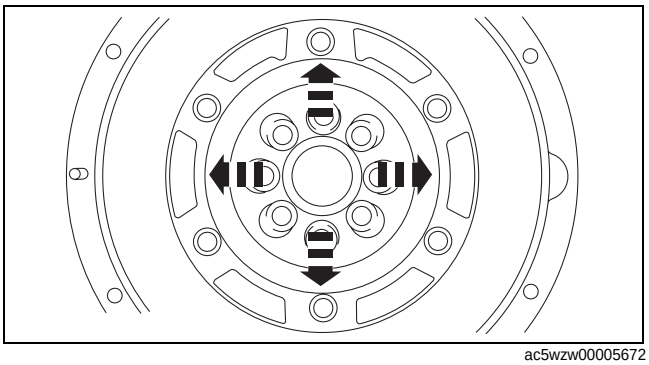
DUAL-MASS FLYWHEEL INSPECTION

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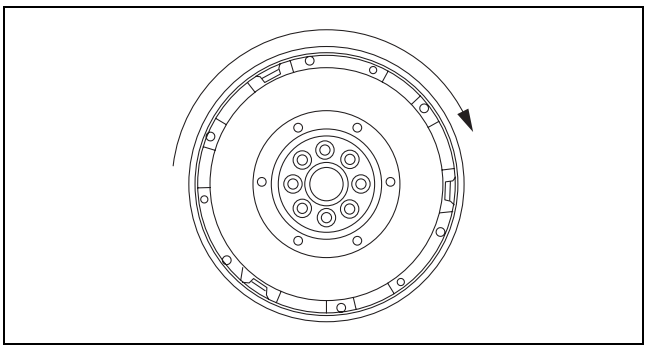
Caution
- **Do not rework the dual-mass flywheel if it is distorted.**
- **Do not clean the dual-mass flywheel with any kind of fluid. Clean the dual-mass flywheel with a dry cloth only.**
- **Do not clean the gap between the primary and secondary mass. Only clean the bolt connection surface and the clutch surface.**

Inspection Before Removal

1. Rotate the dual-mass flywheel or attempt to move it up and down, and left and right to verify that the center of the dual-mass flywheel does not move.
   - If there is any movement as indicated by the arrows in the figure, replace the dual-mass flywheel.

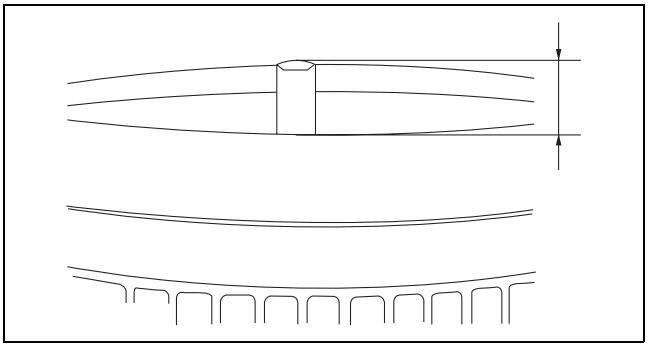

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2. Verify that the secondary mass does not rotate by 15 teeth or more.
   - If it rotates by 15 teeth or more, replace the dual-mass flywheel.


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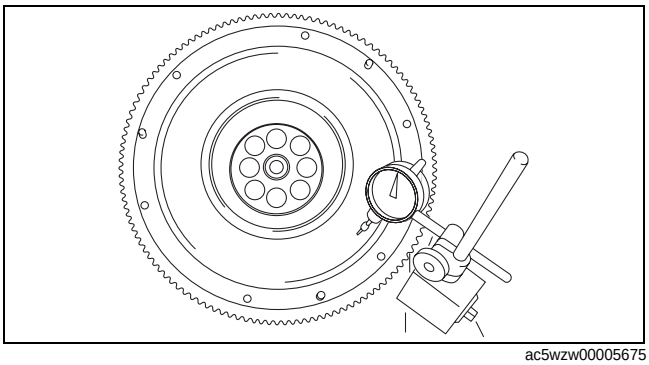
3. Measure the amount of guide pin projection of the dual-mass flywheel.
   - If it exceeds the maximum amount, replace the dual-mass flywheel.

   Dual-mass flywheel guide pin projection maximum amount
   11.0—12.0 mm {0.434—0.472 in}


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4. Using a dial indicator, measure the dual-mass flywheel runout.
   - If it exceeds the maximum runout, replace the dual-mass flywheel.

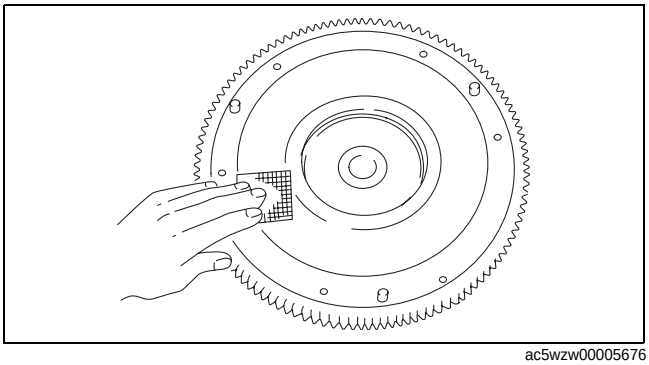
   Dual-mass flywheel maximum runout
   1.5 mm {0.059 in}


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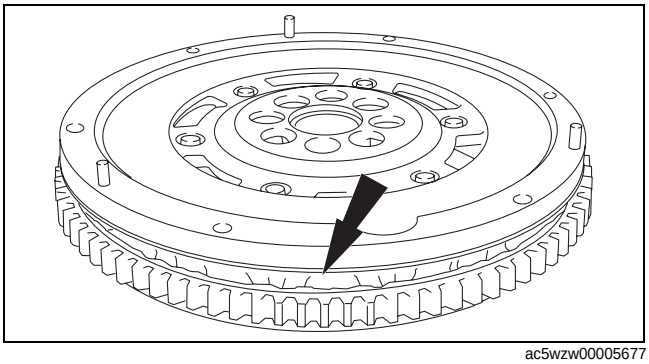
Inspection After Removal

1. Visually inspect the dual-mass flywheel for crack.
   - If there is any crack, replace the dual-mass flywheel.
2. Visually inspect the ring gear on the dual-mass flywheel for damage.
   - If there is any damage, replace the dual-mass flywheel.
3. Visually inspect the surface that contacts the clutch disc for scratches, nicks, and discoloration.
   - If there is any malfunction, replace the dual-mass flywheel.

   Note
   - Correct slight scratches and discoloration using sandpaper.


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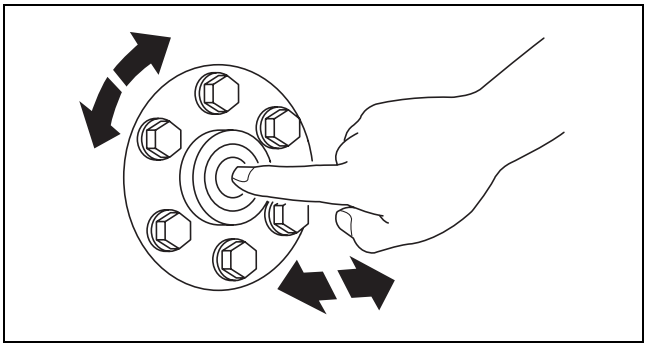
4. Visually inspect for grease leakage between the primary mass and secondary mass.
   - If there is grease leakage, replace the dual-mass flywheel.


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PILOT BEARING INSPECTION

id011000505200

1. Without removing the pilot bearing, turn the bearing while applying force in the axial direction.
   - If there is any malfunction, replace the pilot bearing.

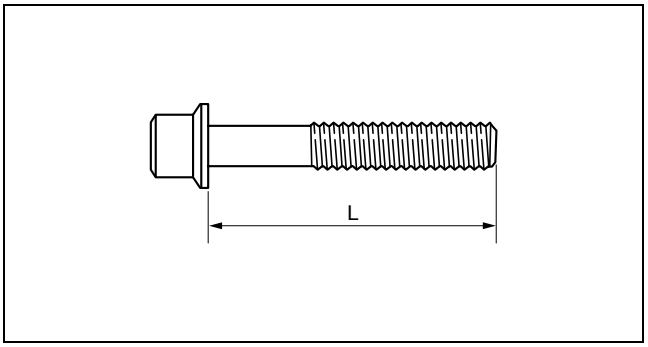


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BOLT INSPECTION

id011000503300

1. Measure the length of the each bolt.
   - If it exceeds the maximum specification, replace the bolt.



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Standard cylinder head bolt length
145.2—145.8 mm {5.717—5.740 in}

Maximum cylinder head bolt length
146.5 mm {5.768 in}

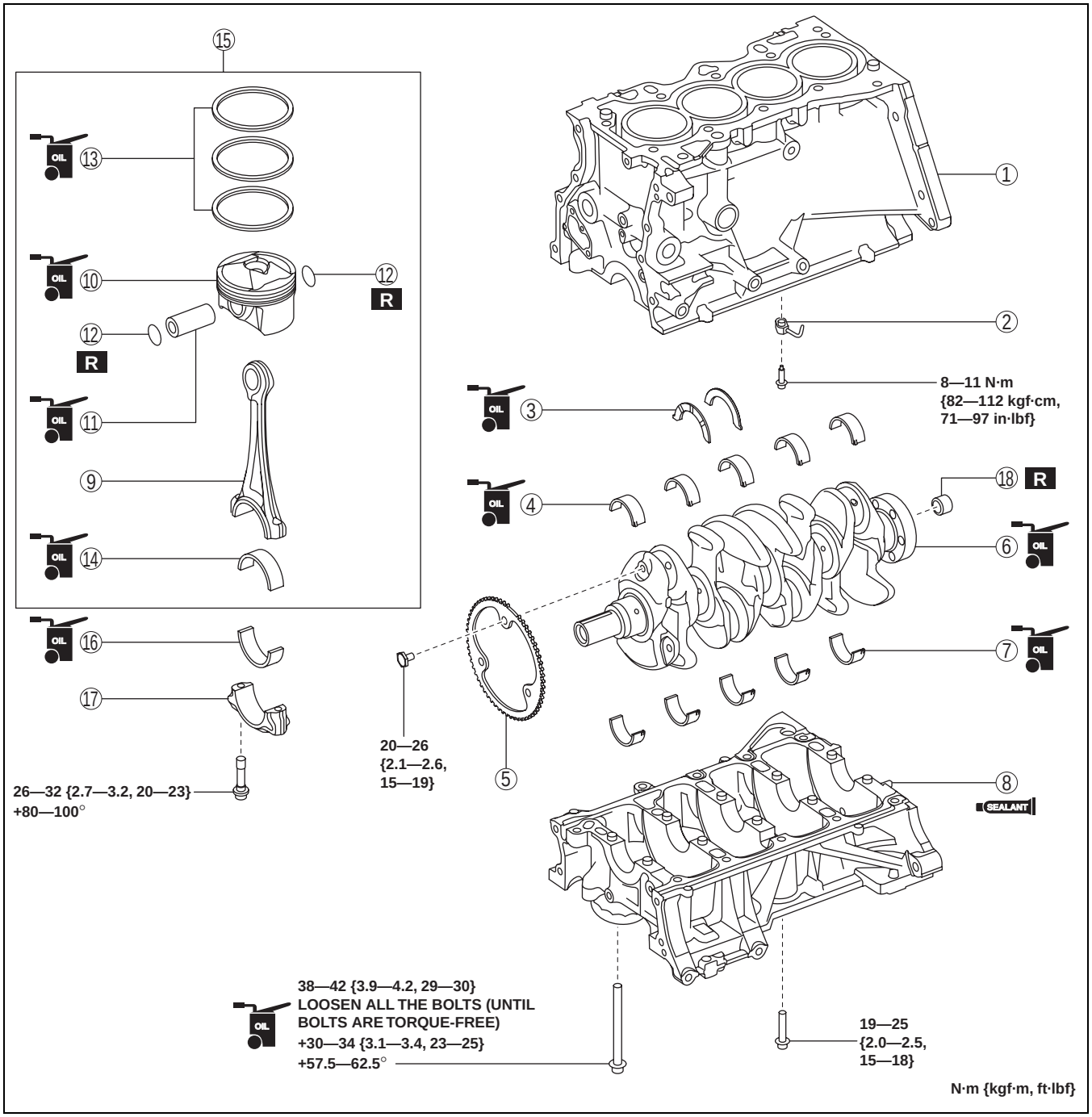
Standard connecting rod bolt length
43.7—44.3 mm {1.73—1.74 in}

Maximum connecting rod bolt length
45.0 mm {1.77 in}

CYLINDER BLOCK ASSEMBLY (I)

id011000504000

1. Assemble in the order indicated in the table.



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1	Upper cylinder block
2	Oil jet valve
3	Thrust bearing (See 01-10-41 Thrust Bearing And Main Bearing Assembly Note.)
4	Upper main bearing (See 01-10-41 Thrust Bearing And Main Bearing Assembly Note.)
5	Plate (See 01-10-42 Plate Assembly Note.)
6	Crankshaft

7	Lower main bearing (See 01-10-41 Thrust Bearing And Main Bearing Assembly Note.)
8	Lower cylinder block (See 01-10-42 Lower Cylinder Block Assembly Note.)
9	Connecting rod
10	Piston
11	Piston pin (See 01-10-44 Piston Pin Assembly Note.)
12	Snap ring (See 01-10-44 Snap Ring Assembly Note.)

13	Piston ring (See 01-10-45 Piston Ring Assembly Note.)
14	Upper connecting rod bearing (See 01-10-46 Connecting Rod Bearing Assembly Note.)
15	Piston, connecting rod (See 01-10-46 Piston, Connecting Rod Assembly Note.)
16	Lower connecting rod bearing (See 01-10-46 Connecting Rod Bearing Assembly Note.)
17	Connecting rod cap (See 01-10-47 Connecting Rod Cap Assembly Note.)
18	Pilot bearing (MTX) (See 01-10-47 Pilot Bearing Assembly Note.)

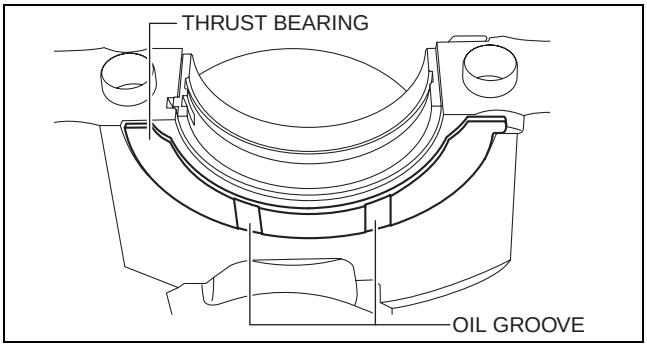
Thrust Bearing And Main Bearing Assembly Note

Caution

- **If the thrust bearings and main bearings are reused, assemble the bearings to the same positions and in the direction as before removal to prevent engine damage due to seizure or burning of the bearing.**
- **To prevent engine damage due to seizure or burning of the bearing, apply engine oil to the sliding part when assembling.**

Thrust bearing

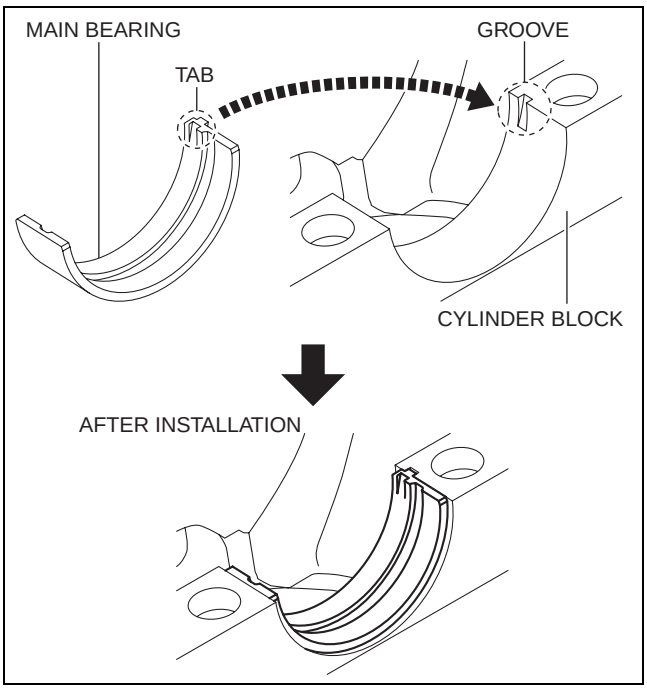
1. Apply clean engine oil to the thrust bearings.
2. Assemble the bearings with the oil groove of the thrust bearing pointed toward the sliding surface.



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Main bearing

1. Apply clean engine oil to the main bearings.
2. Align the positioning tab of the main bearing with the positioning groove of the lower and upper cylinder block, and assemble the bearings.



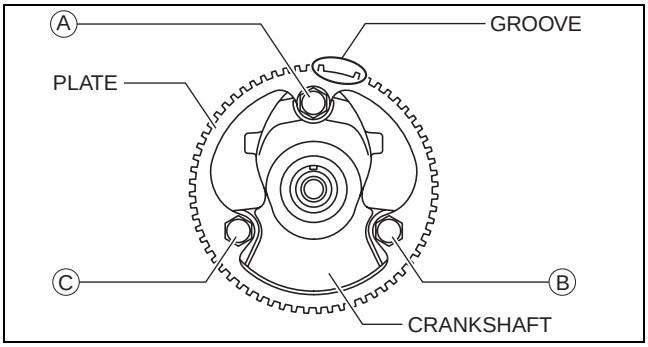
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Plate Assembly Note

Caution
- **Placing the crankshaft on a disassembly bench will deform or damage it because the plate for the crankshaft position sensor signal detection installed to the crankshaft is larger than the counterweight. Therefore, set wood blocks or similar objects on the both sides of the crankshaft so that the plate does not contact the disassembly bench directly when placing the crankshaft on it bench.**

1. Install the plate using the following procedure:
   (1) Install the groove of the plate tooth to the position shown in the figure and temporarily tighten bolt A.
   (2) Temporarily tighten the bolt B.
   (3) Install bolt C and tighten the bolts to the specified tightening torque in the order of C, B, and A.

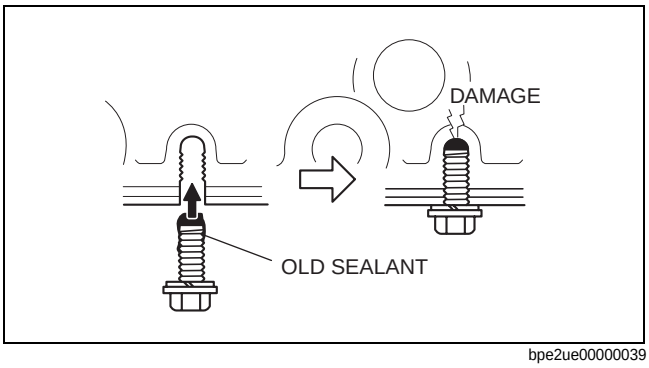
Tightening torque
20—26 N·m {2.1—2.6 kgf·m, 15—19 ft·lbf}



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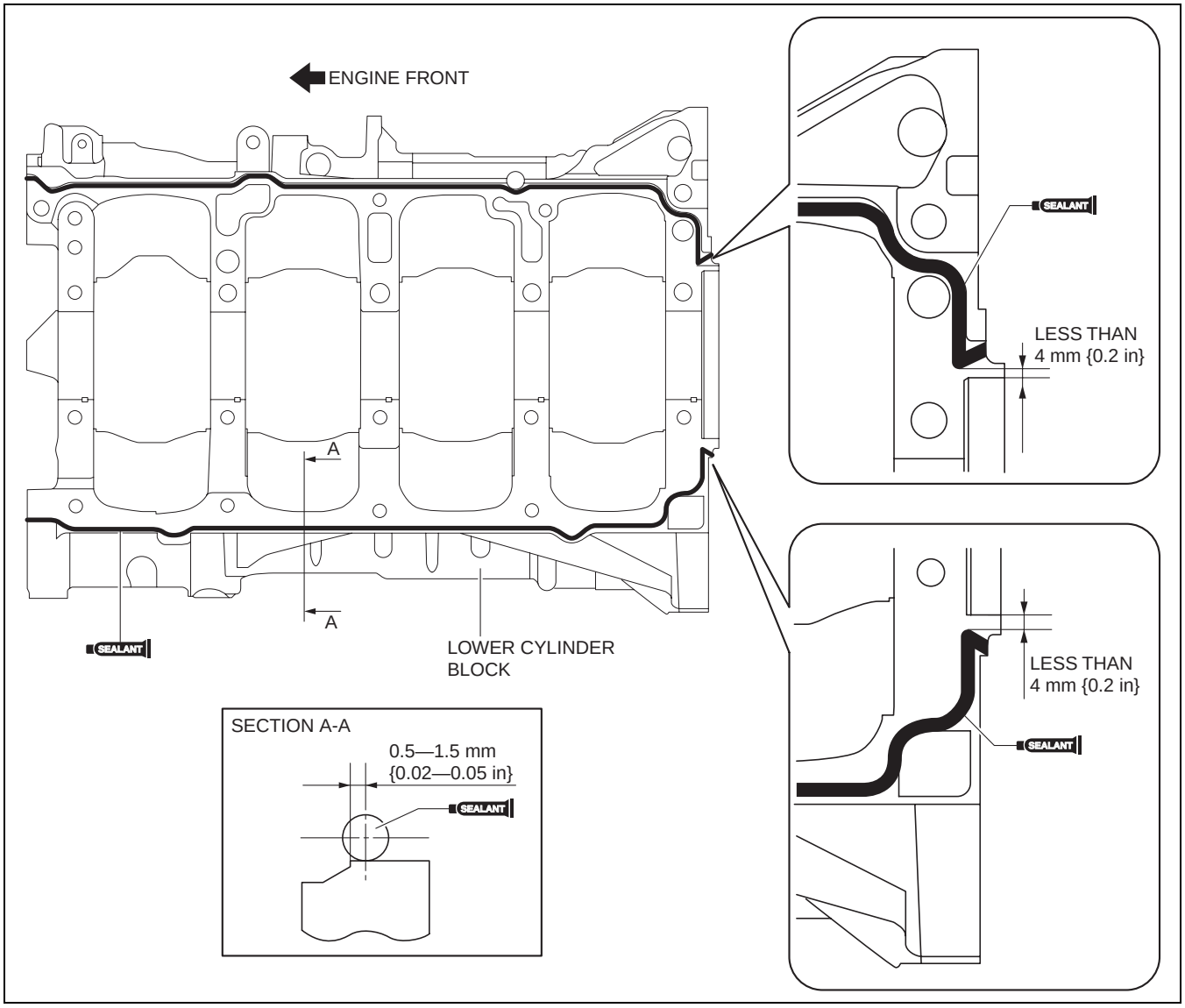
Lower Cylinder Block Assembly Note
1. Completely clean and remove any oil, dirt, sealant or other foreign matter that may be adhering to the lower cylinder block and cylinder block.
2. When reusing the lower cylinder block installation bolts, clean any old sealant from the bolts.

Caution
- **Apply silicon sealant in a single, unbroken line.**
- **To prevent silicon sealant from hardening, adhere the engine front cover and the cylinder block firmly within 10 min. after applying silicon sealant. After adhering them, tighten the installation bolts immediately.**
- **Using bolts with the old seal adhering could cause cracks in the cylinder block.**



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3. Apply silicon sealant to the lower cylinder block shown in the figure.



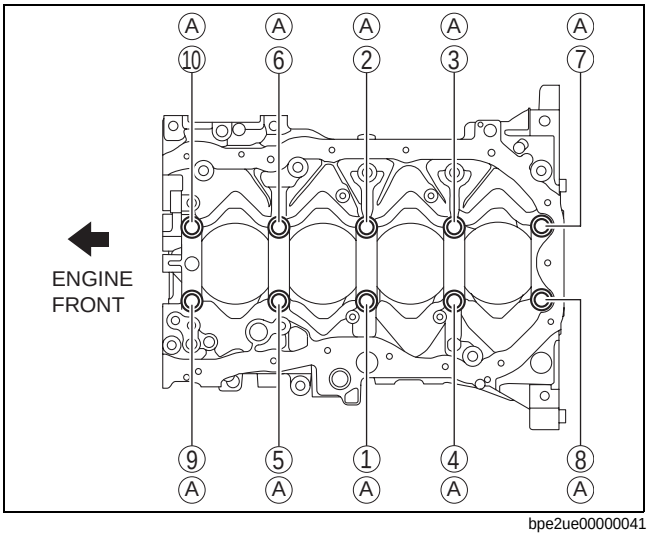
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Bead thickness
2—6 mm {0.1—0.2 in}

4. Install the lower cylinder block.
5. Tighten the lower cylinder block installation bolts using the following procedure:
   (1) Apply clean engine oil to the seating surface and thread of lower cylinder block installation bolts A.

(2) Tighten lower cylinder block installation bolts A in the order shown in the figure using the following procedure:

Tightening procedure
Step 1: 38—42 N·m {3.9—4.2 kgf·m, 29—30 ft·lbf}
Step 2: Loosen all the bolts (until bolts are torque-free).
Step 3: 30—34 N·m {3.1—3.4 kgf·m, 23—25 ft·lbf}
Step 4: 57.5—62.5°

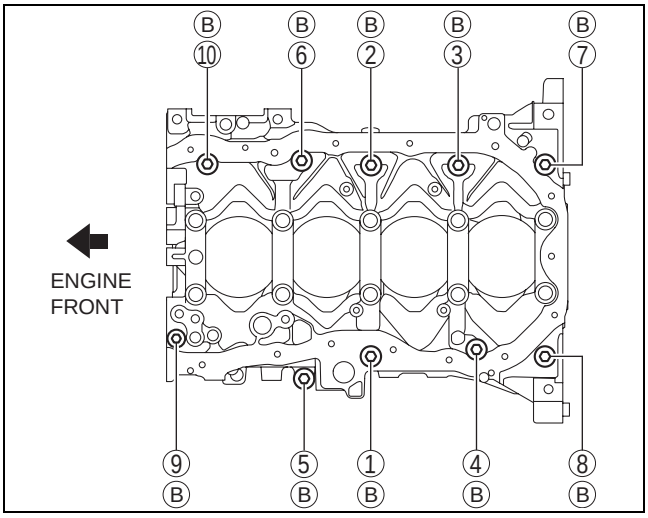


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(3) Tighten the lower cylinder block installation bolts B in the order shown in the figure.

Tightening torque
19—25 N·m {2.0—2.5 kgf·m, 15—18 ft·lbf}

6. After verifying that silicone sealant protrudes to the rear oil seal press-in part, wipe away the excess silicone sealant.
   - If silicone sealant does not protrude to the rear oil seal press-in part, remove the lower cylinder block and apply silicone sealant again.



bpe2ue00000042

Piston Pin Assembly Note
1. Apply clean engine oil to the piston pin.
2. Insert the piston pin to the piston and connecting rod.

Note
- When assembling the piston to the connecting rod, each one can be assembled in either direction.

Snap Ring Assembly Note

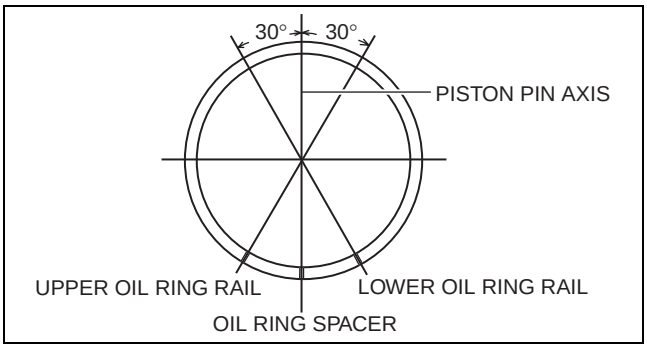
Caution
- **Do not compress the outer diameter of the snap ring more than necessary when assembling the snap ring (20.66 mm {0.8134 in} or less).**

1. Insert a new snap ring using a thin plier.

Piston Ring Assembly Note

Note
- It is not required to position the end gap between the top ring and second ring.

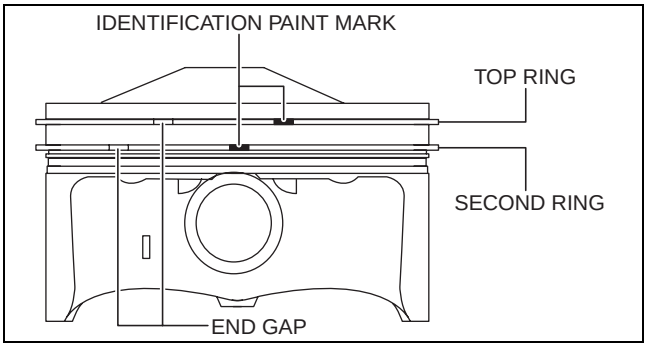
1. Assemble the oil ring so that the end gap of each oil ring rail does not overlap as shown in the figure.



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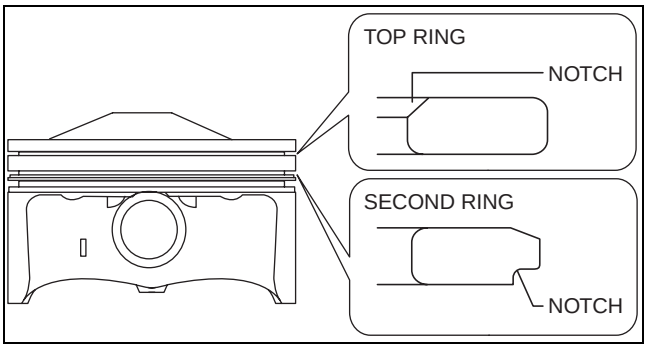
2. Assemble so that the identification paint marks on the top and second rings are visible to the right side of each end gap.

Note



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- If there are no identification paint marks on the top and second rings, place the ring with the bigger inner circumference at the top as shown in the figure.

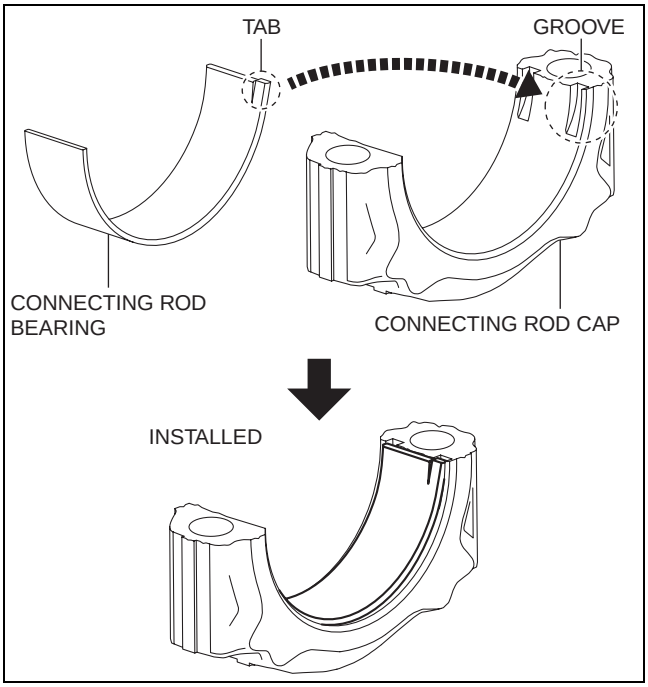


bpe2ue00000044

Connecting Rod Bearing Assembly Note

Caution
- **If a connecting rod bearing is reused, assemble it to the same position and in the direction as before removal to prevent engine damage due to seizure or burning of the bearing.**
- **To prevent engine damage due to seizure or burning of the bearing, apply engine oil to the sliding part when assembling.**

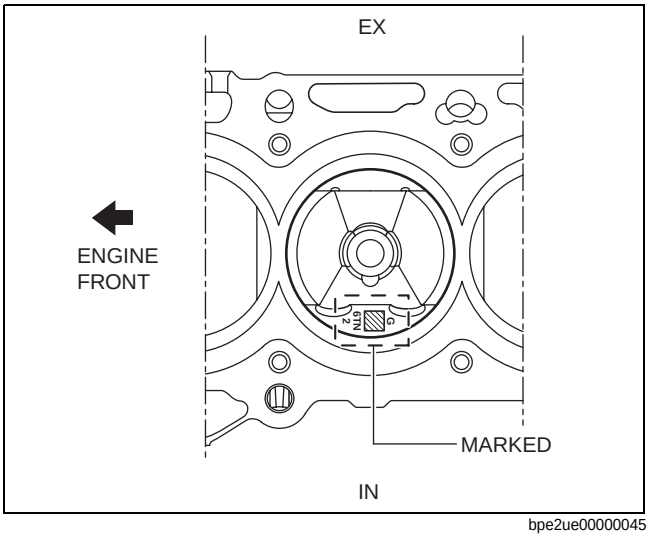
1. Apply engine oil to the connecting rod bearings.
2. Align the positioning tab of the connecting rod bearing with the positioning groove of the connecting rod and connecting rod cap, and assemble the bearings.



bpe1ze00000048

Piston, Connecting Rod Assembly Note

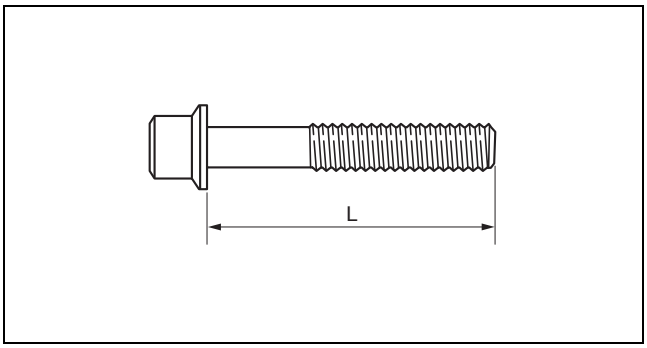
1. Insert the piston into the cylinder with the mark on top of the piston facing the intake side.



bpe2ue00000045

Connecting Rod Cap Assembly Note

Caution
- **When assembling the connecting rod caps, align the broken, rough faces of the connecting rods and connecting rod caps.**
- **If the following condition is met, replace the connecting rod cap bolts.**
  - **— Length exceeds maximum specification**



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Standard connecting rod cap bolt length
43.7—44.3 mm {1.73—1.74 in}

Maximum connecting rod cap bolt length
45.0 mm {1.77 in}

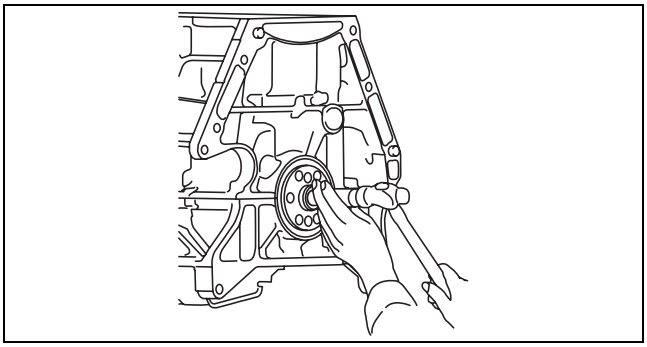
1. Position so that the broken, rough faces of the connecting rods and connecting rod caps are aligned exactly, and assemble the connecting rod caps.
2. Tighten the connecting rod cap bolts in the following two steps.

Tightening procedure
Step 1: 26—32 N·m {2.7—3.2 kgf·m, 20—23 ft·lbf}
Step 2: 80—100°

Pilot Bearing Assembly Note

1. Install new pilot bearing to the specified position using the following tools.

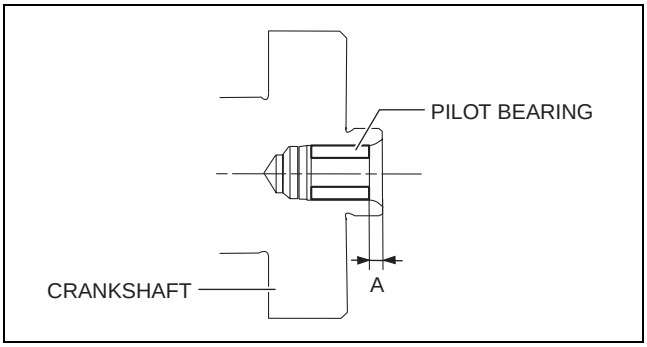
Tool
Snap-on brand millimeter size bushing driver set (A160M) adapter A160M7 (20—22 mm {0.79—0.86 in})
- **Use the adapter with the 20 mm {0.79 in} side of the A160M7 (20—22 mm {0.79—0.86 in}) facing the pilot bearing side.**



bpe2ue00000046

Substitution tool
Outer diameter: 21 mm {0.83 in}
Inner diameter: 19 mm {0.75 in}

Standard pilot bearing position
Distance A of pilot bearing from crankshaft end: 1.5—2.5 mm {0.060—0.098 in}

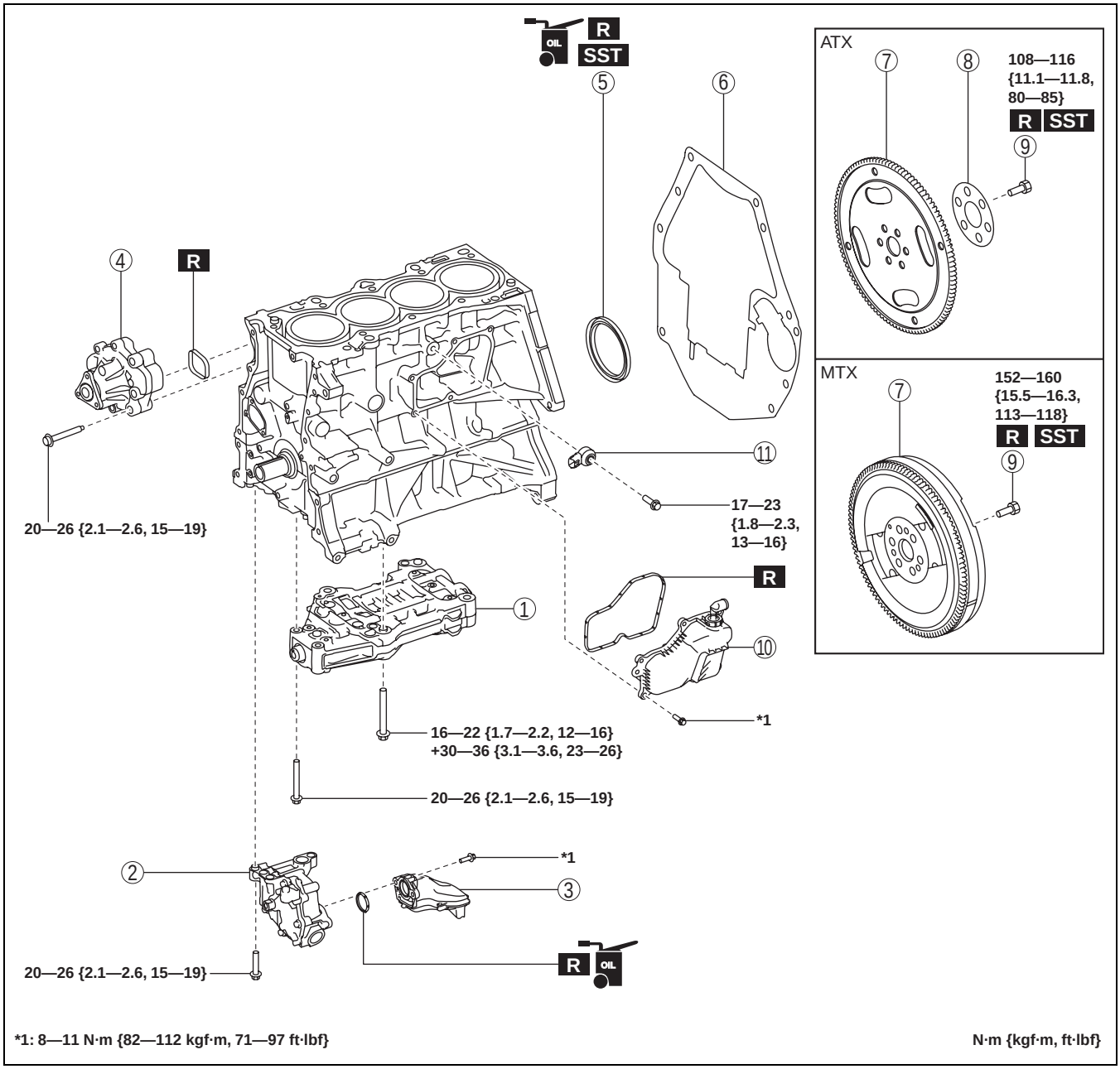


bpe2ue00000047

CYLINDER BLOCK ASSEMBLY (II)

id011000504100

1. Assemble in the order indicated in the table.



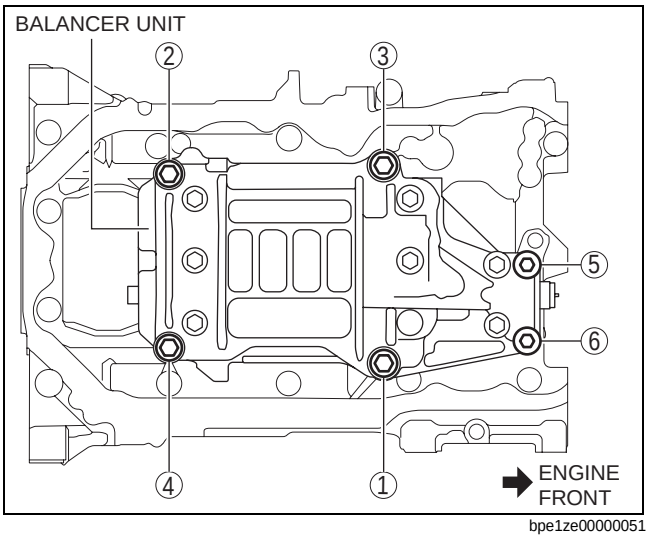
bpe5ue00000005

1	Balancer unit (See 01-10-49 Balancer Unit Assembly Note.)
2	Oil pump (See 01-10-50 Oil Pump Assembly Note.)
3	Oil strainer
4	Water pump (See 01-10-51 Water Pump Assembly Note.)
5	Rear oil seal (See 01-10-52 Rear Oil Seal Assembly Note.)
6	End plate (See 01-10-53 End Plate Assembly Note.)

7	Dual-mass flywheel (MTX), drive plate (ATX)
8	Backing plate (ATX)
9	Dual-mass flywheel (MTX)/ drive plate (ATX) installation bolt (See 01-10-53 Dual-mass Flywheel (MTX)/ Drive Plate (ATX) Installation Bolt Assembly Note.)
10	Oil separator
11	Knock sensor (KS) (See 01-10-54 Knock Sensor (KS) Assembly Note.)

Balancer Unit Assembly Note

1. Assemble the balancer unit using the following procedure:
   (1) Tighten the bolts in the order shown in the figure.



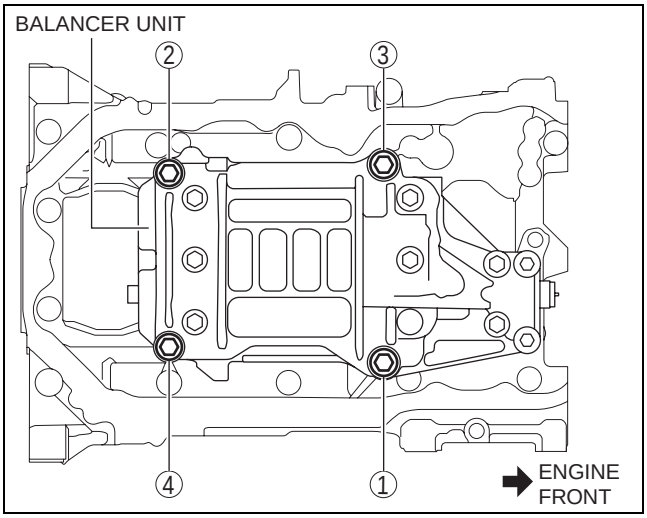
bpe1ze00000051

Tightening torque

Installation position	Tightening torque
1—4	16—22 N·m {1.7—2.2 kgf·m, 12—16 ft·lbf}
5, 6	20—26 N·m {2.1—2.6 kgf·m, 15—19 ft·lbf}

   (2) Retighten the bolts in the order of the numbers indicated in the figure.

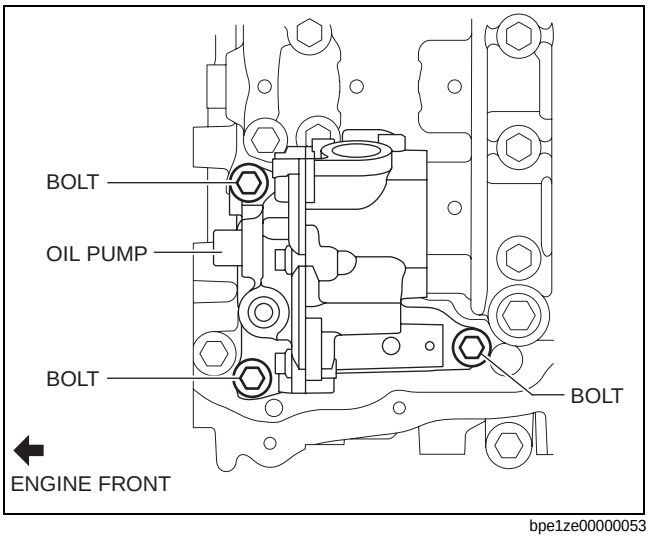
Tightening torque
30—36 N·m {3.1—3.6 kgf·m, 23—26 ft·lbf}



bpe1ze00000052

Oil Pump Assembly Note

1. Install the oil pump using the following procedure:
   (1) Temporarily tighten the **three bolts** shown in the figure.



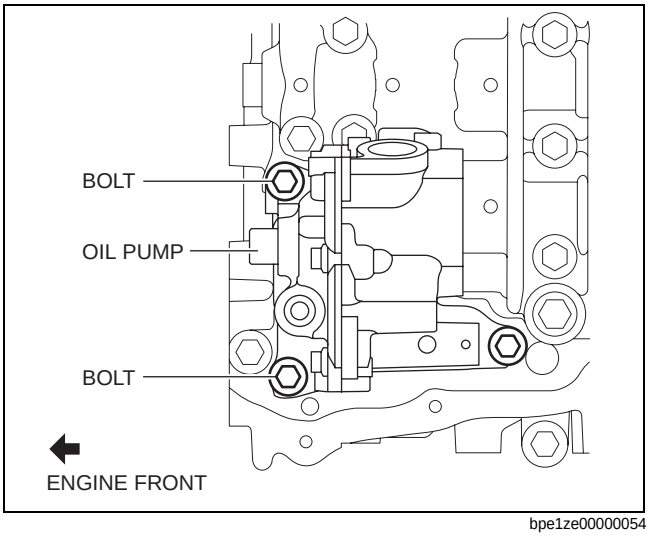
bpe1ze00000053

   (2) Tighten the **two bolts** shown in the figure to the specified torque.

Note

- The tightening order for the two bolts is optional.

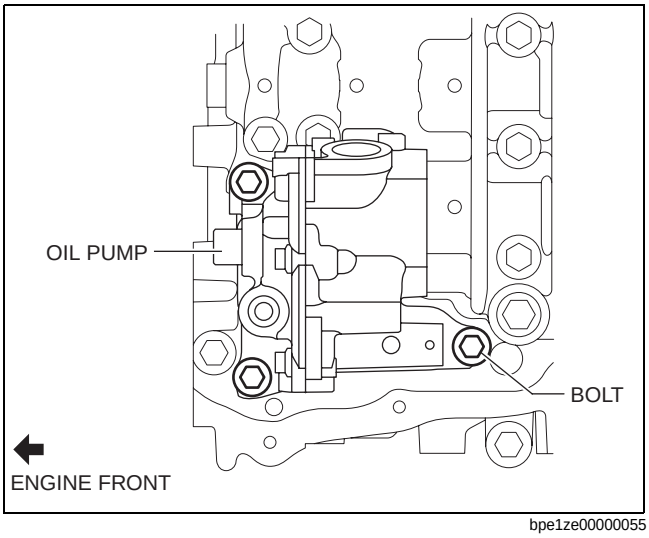
Tightening torque
20—26 N·m {2.1—2.6 kgf·m, 15—19 ft·lbf}



bpe1ze00000054

   (3) Finally, tighten the bolt shown in the figure to the specified torque.

Tightening torque
20—26 N·m {2.1—2.6 kgf·m, 15—19 ft·lbf}

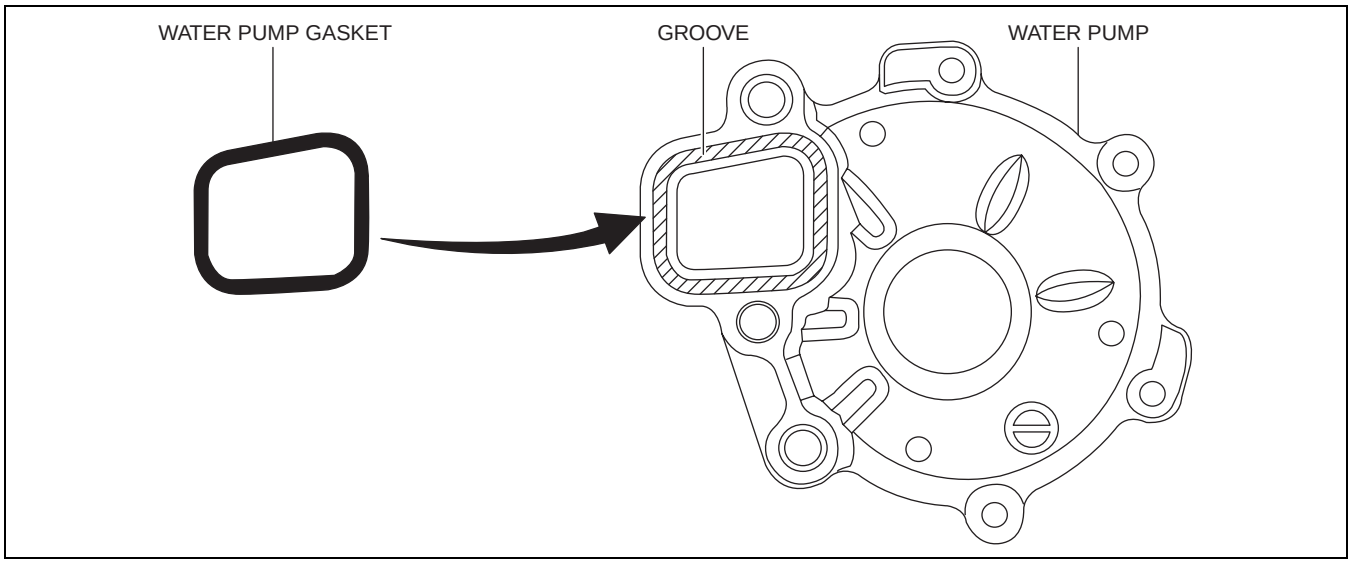


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Water Pump Assembly Note

Caution

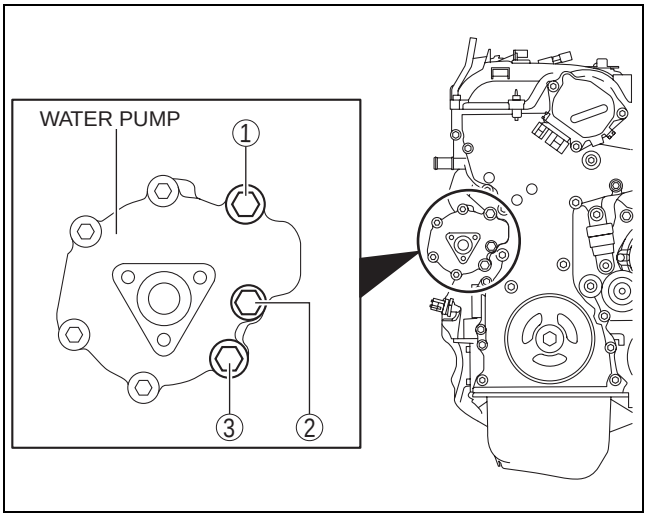
- **Assemble the water pump gasket to the correct direction shown in the figure. Otherwise, it could leak engine coolant and damage the engine.**



bpe2ue00000053

1. Insert a new water pump gasket into the water pump groove.
2. Install the water pump.
3. Tighten the bolts in the order shown in the figure.

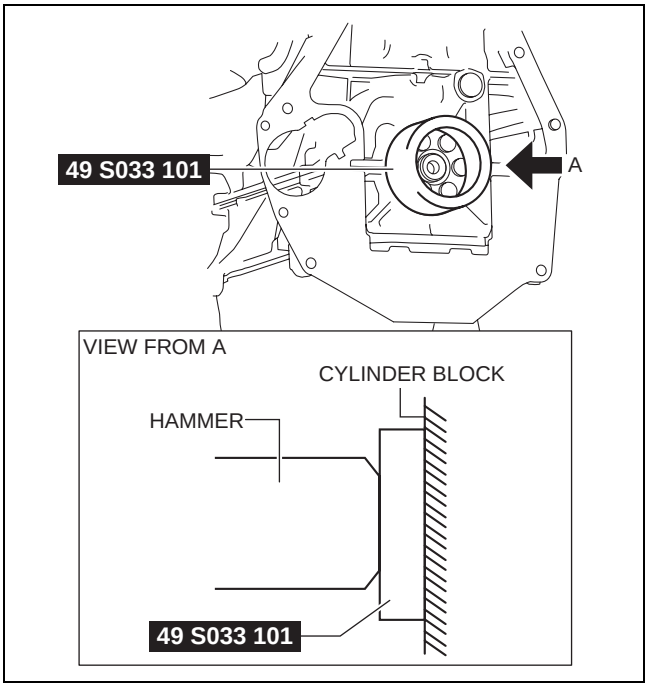
Tightening torque
20—26 N·m {2.1—2.6 kgf·m, 15—19 ft·lbf}



bpe2ue00000054

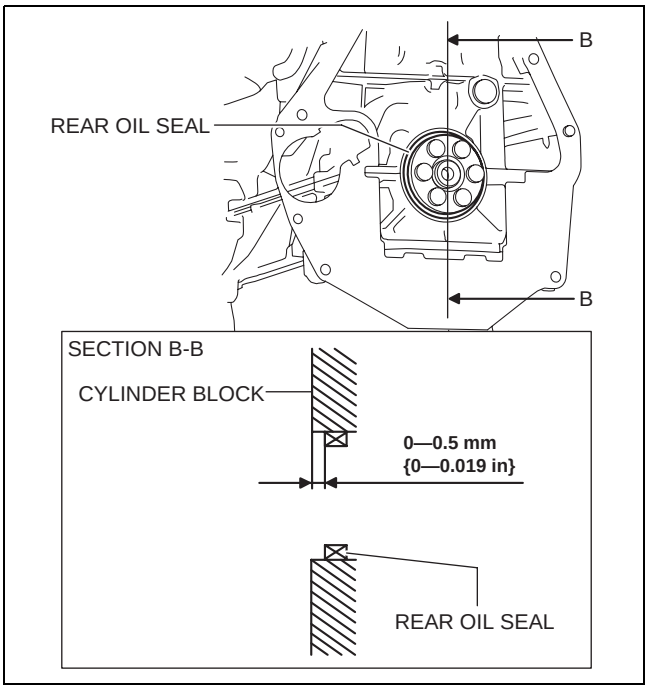
Rear Oil Seal Assembly Note

1. Apply clean engine oil to the inner surface of a new rear oil seal.
2. Insert the rear oil seal into the cylinder block by hand.
3. Tap the oil seal in evenly using the **SST** and a hammer.



bpe1ze00000056

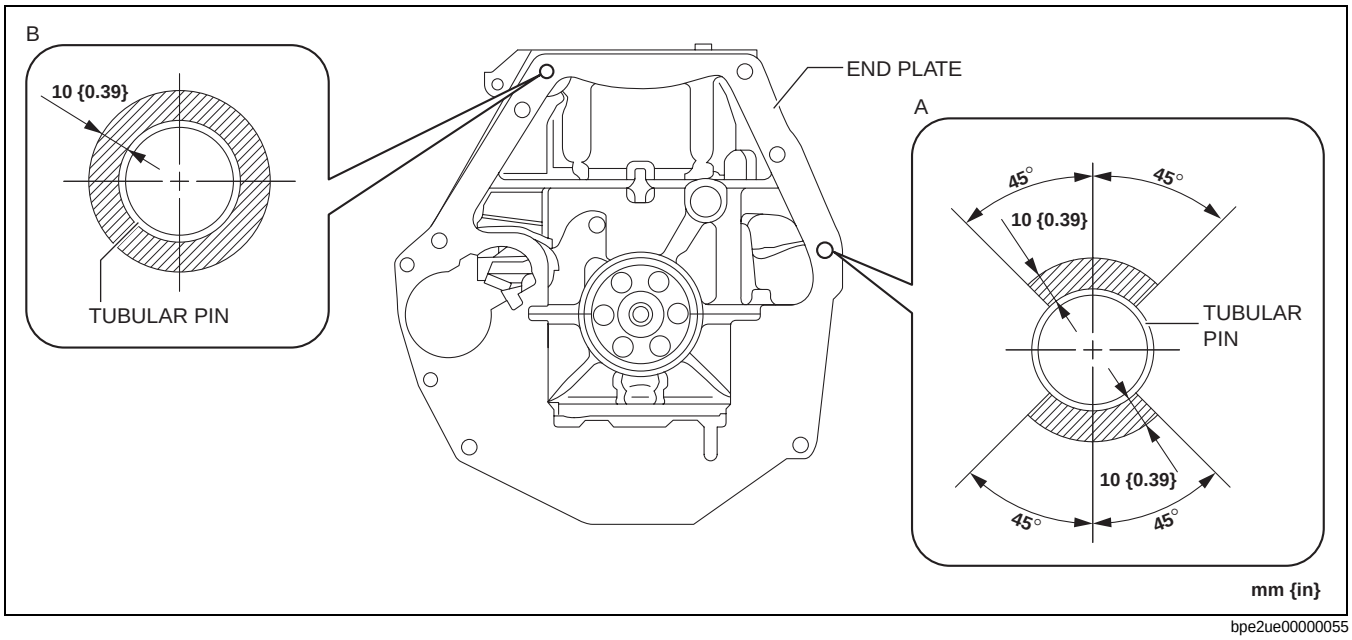
Rear oil seal press on amount
0—0.5 mm {0—0.019 in}



bpe5ue00000006

End Plate Assembly Note

1. After end plate assembly, crimp the parts A and B shown in the figure.



bpe2ue00000055

Crimp procedure
Crimp depth: 0.1—1.0 mm {0.004—0.039 in}
Crimp width: 0.5—10.0 mm {0.02—0.39 in}
Crimp locations: Part A is 1 or more on one-side within shaded area and part B is 2 or more within shaded areas

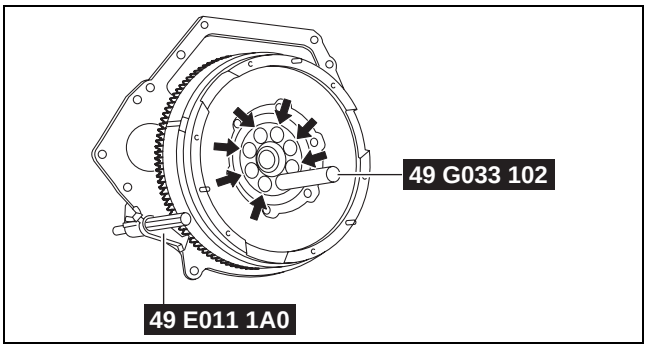
2. After crimping, verify that there is no damage and removal of the end plate.

Dual-mass Flywheel (MTX)/ Drive Plate (ATX) Installation Bolt Assembly Note
Dual-mass flywheel installation bolt (MTX)

1. Hold the crankshaft using the **SST (49 E011 1A0)**.
2. Temporarily tighten the new bolts.

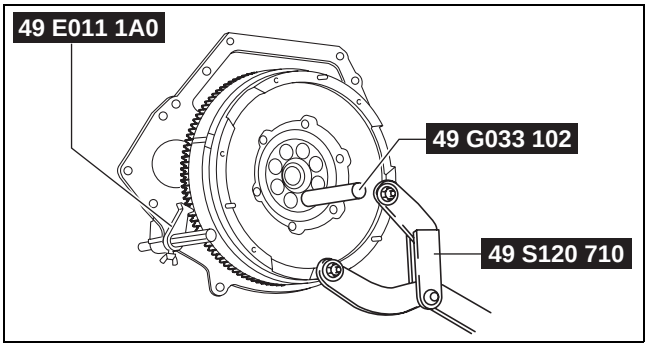
Note
- If the dual-mass flywheel (secondary flywheel side) is not positioned properly, perform the following procedure to install it:

(1) Temporarily tighten the new bolts to the position as shown in the figure.



am6zzw00011777

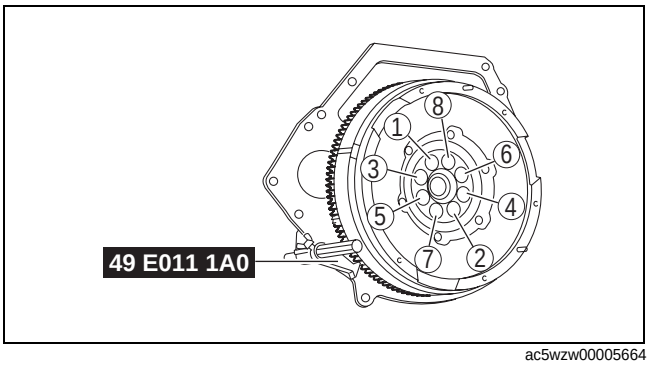
(2) Install the **SST (49 S120 710)** to the dual-mass flywheel.
(3) Rotate the dual-mass flywheel (secondary flywheel side) using the **SST (49 S120 710)**, and then temporarily tighten the remaining new bolt after removing the **SST (49 G033 102)**.



am6xuw00005541

3. Tighten the new bolts in two or three passes in the order shown in the figure.

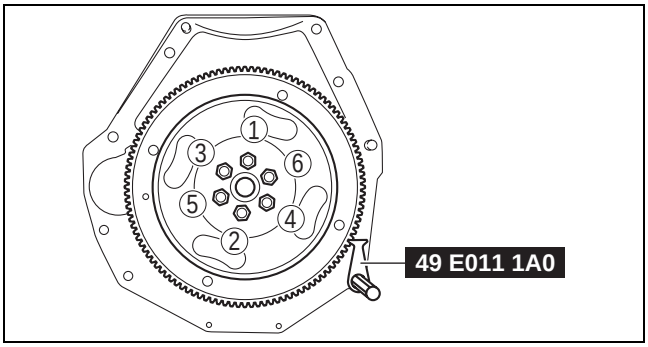
Tightening torque
152—160 N·m {15.5—16.3 kgf·m, 113—118 ft·lbf}



ac5wzw00005664

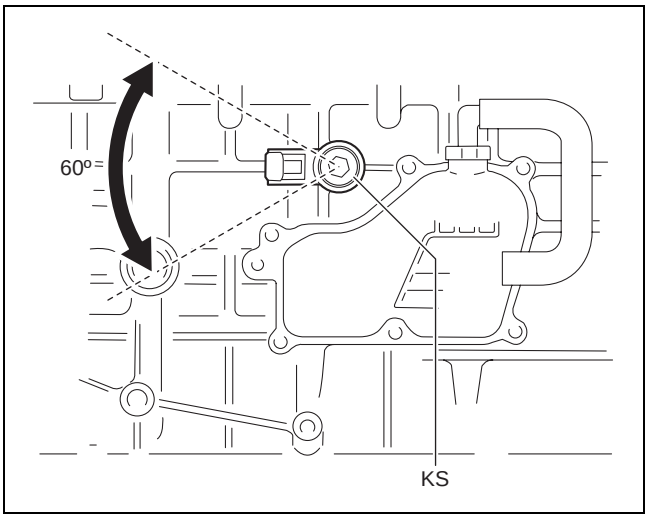
Drive plate installation bolt (ATX)
1. Hold the crankshaft using the **SST**.
2. Tighten the new bolts in two or three passes in the order shown in the figure.

Tightening torque
108—116 N·m {11.1—11.8 kgf·m, 80—85 ft·lbf}



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Knock Sensor (KS) Assembly Note
- Verify that there is no foreign matter caught between the KS unit and cylinder block.
- The direction of the knock sensor connector must be within the range shown in the figure.

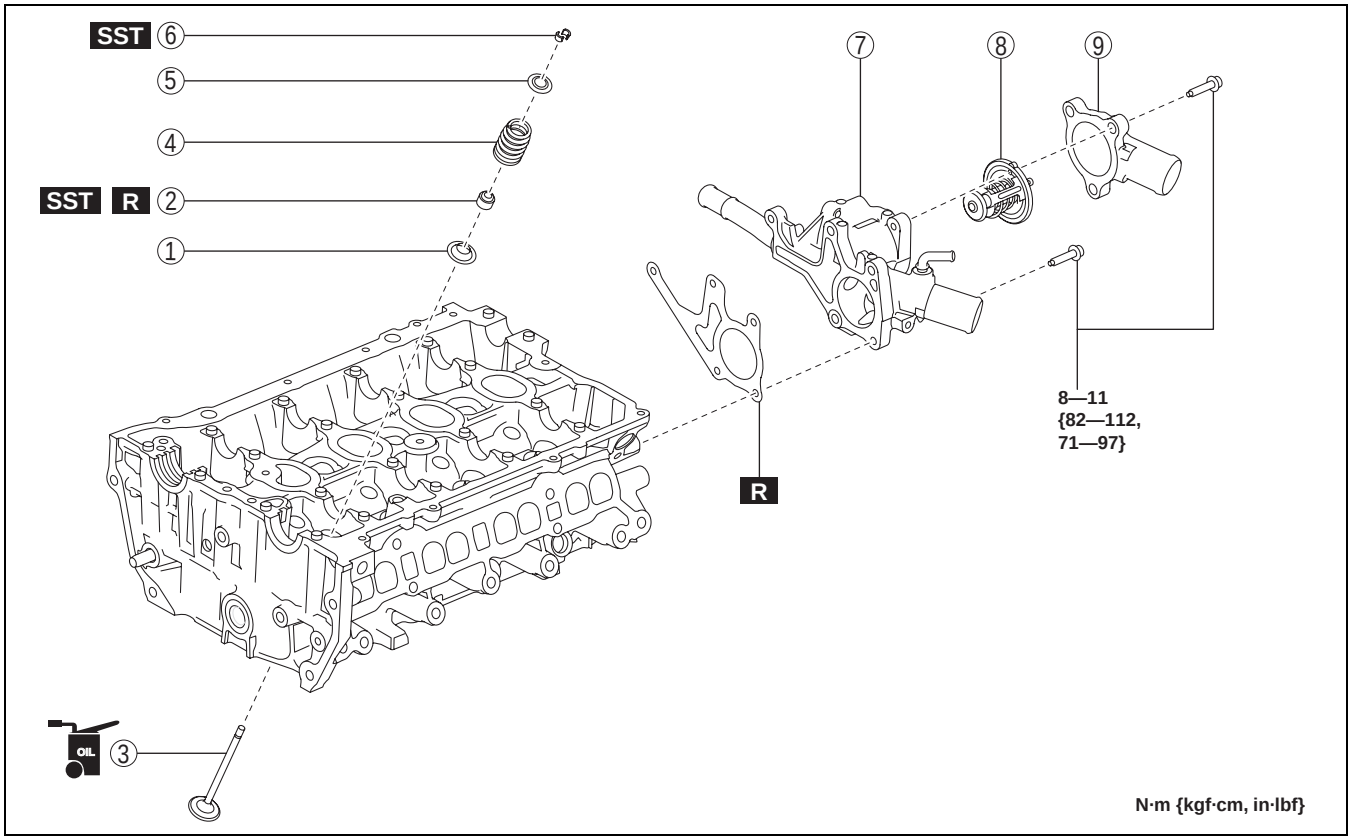


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CYLINDER HEAD ASSEMBLY (I)

id011000504300

1. Assemble in the order indicated in the table.



bpe1ze00000017

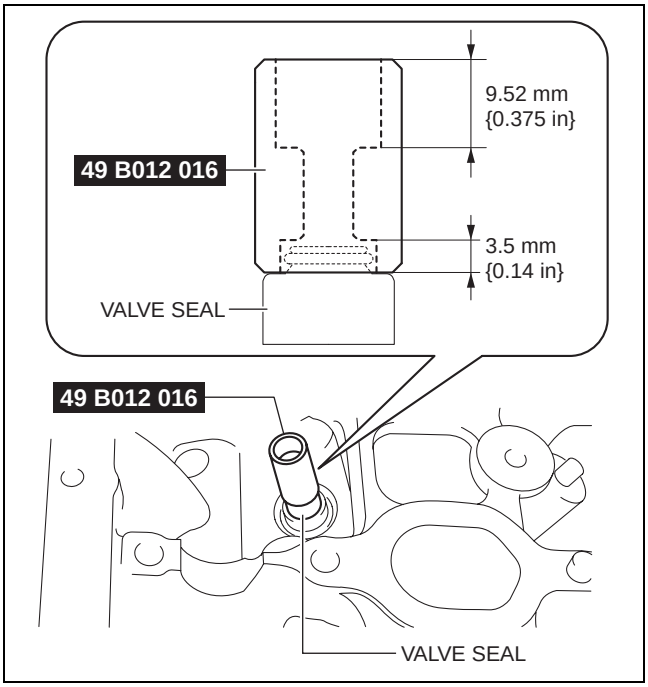
1	Lower valve spring seat
2	Valve seal (See 01-10-56 Valve Seal Assembly Note.)
3	Valve
4	Valve spring (See 01-10-56 Valve Spring Assembly Note.)
5	Upper valve spring seat

6	Valve keeper (See 01-10-57 Valve Keeper Assembly Note.)
7	Water outlet (See 01-10-57 Water Outlet Assembly Note.)
8	Thermostat (See 01-10-58 Thermostat Assembly Note.)
9	Thermostat cover

Valve Seal Assembly Note

1. Press on the valve seal to the valve guide using the **SST** by hand.

Valve seal identification color
IN: GREEN
EX: GRAY

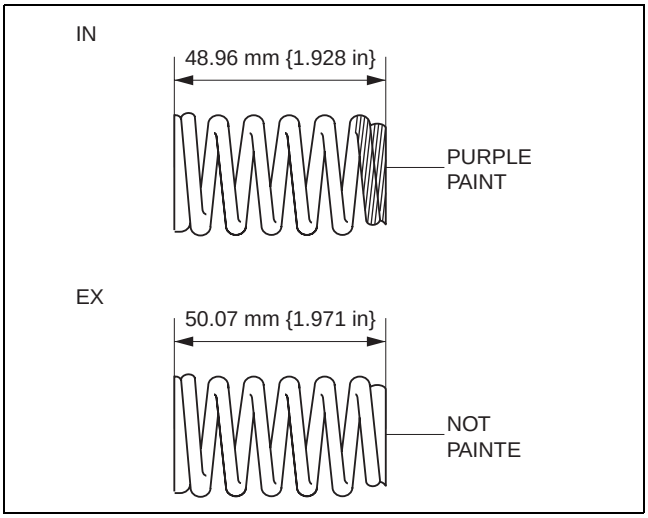


bpe1ze00000057

Valve Spring Assembly Note

Caution
- **The valve springs differ depending on IN and EX sides. Therefore, verify the free length or identification paint beforehand and assemble the valve springs correctly.**

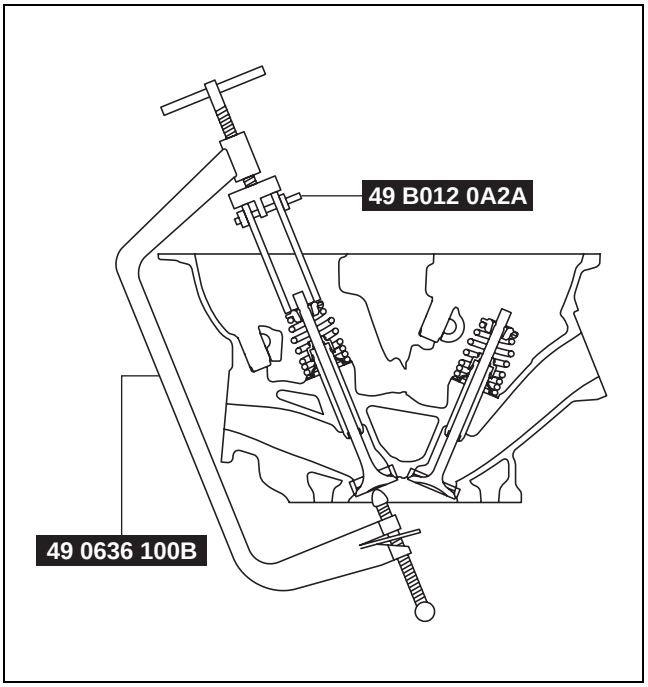
1. Assemble the valve spring with the small diameter side of the valve spring facing upward.



bpe1ze00000094

Valve Keeper Assembly Note

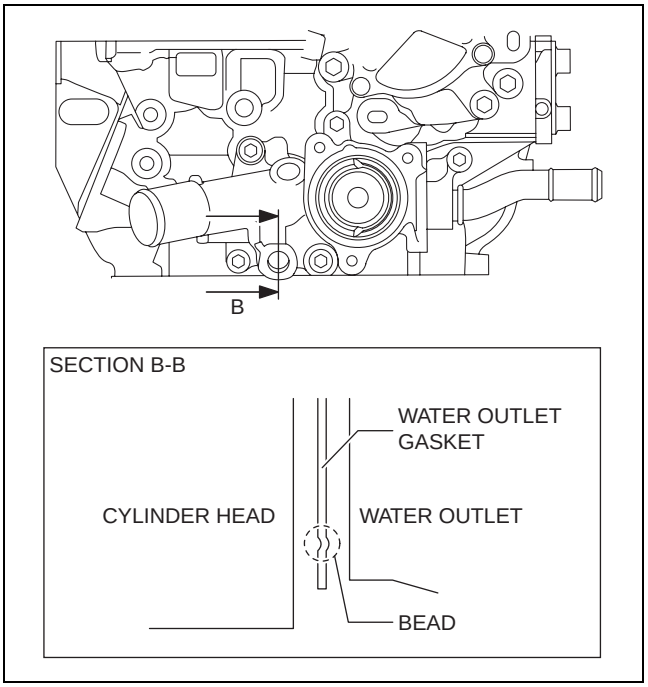
1. Install the valve keeper using the **SST**.



bpe1ze00000020

Water Outlet Assembly Note

1. Install the water outlet gasket with the bead of the gasket facing the direction shown in the figure.
2. Temporarily tighten the water outlet installation bolts.

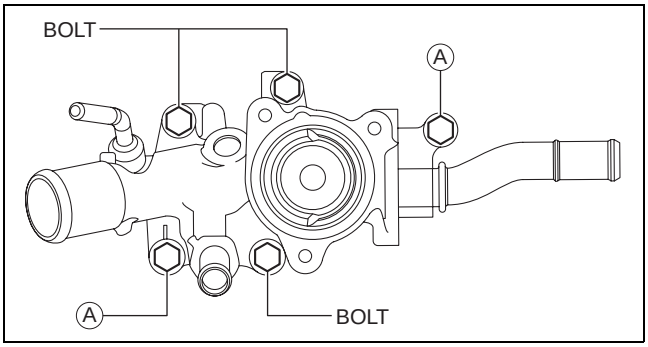


bpe1ze00000021

3. Tighten bolt A of the 5 bolts shown in the figure to the specified torque first.

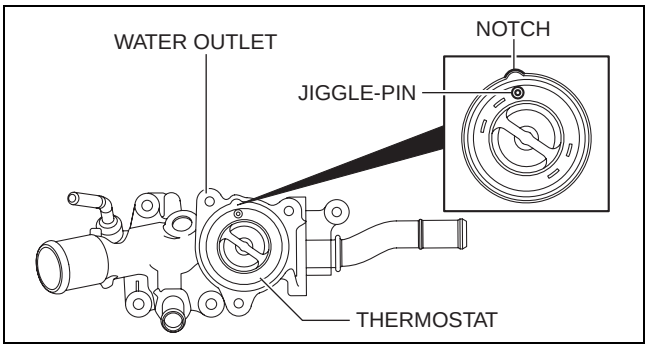
Tightening torque
8—11 N·m {82—112 kgf·cm, 71—97 in·lbf}

Note
- The tightening order for the remaining 3 bolts is optional.



bpe1ze00000022

Thermostat Assembly Note
1. Install the thermostat with the jiggle pin aligned with the notch of the water outlet.



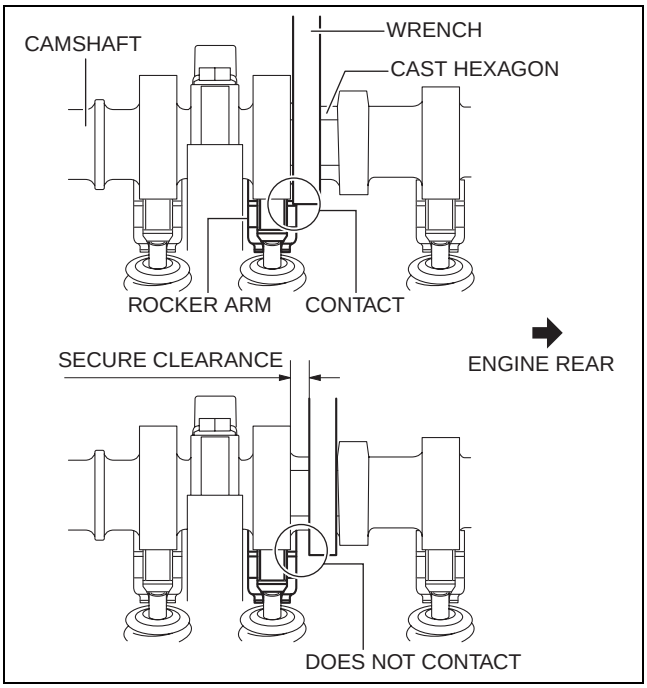
bpe1ze00000023

CYLINDER HEAD ASSEMBLY (II)

id011000504400

Caution

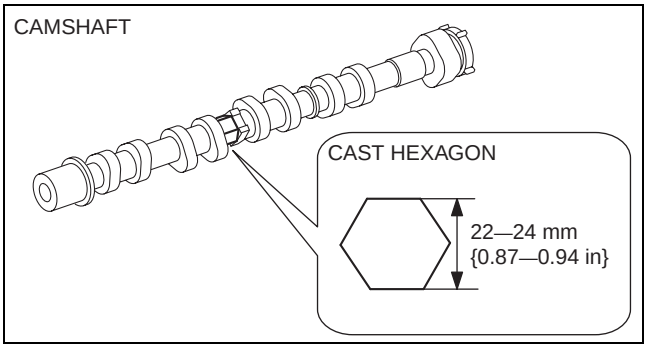
- **If the camshaft is rotated with the timing chain removed and the piston at the top dead center position, the valve may contact the piston and the engine could be damaged. When rotating the camshaft with the timing chain removed, rotate it after lowering the piston from the top dead center position.**
- **When rotating the camshaft using a wrench on the cast hexagon, the wrench may contact the rocker arm and damage the rocker arm. To prevent damage to the rocker arm when holding the camshaft on the cast hexagon, use a wrench on the rear side of the engine as shown in the figure to secure a clearance between the cam.**



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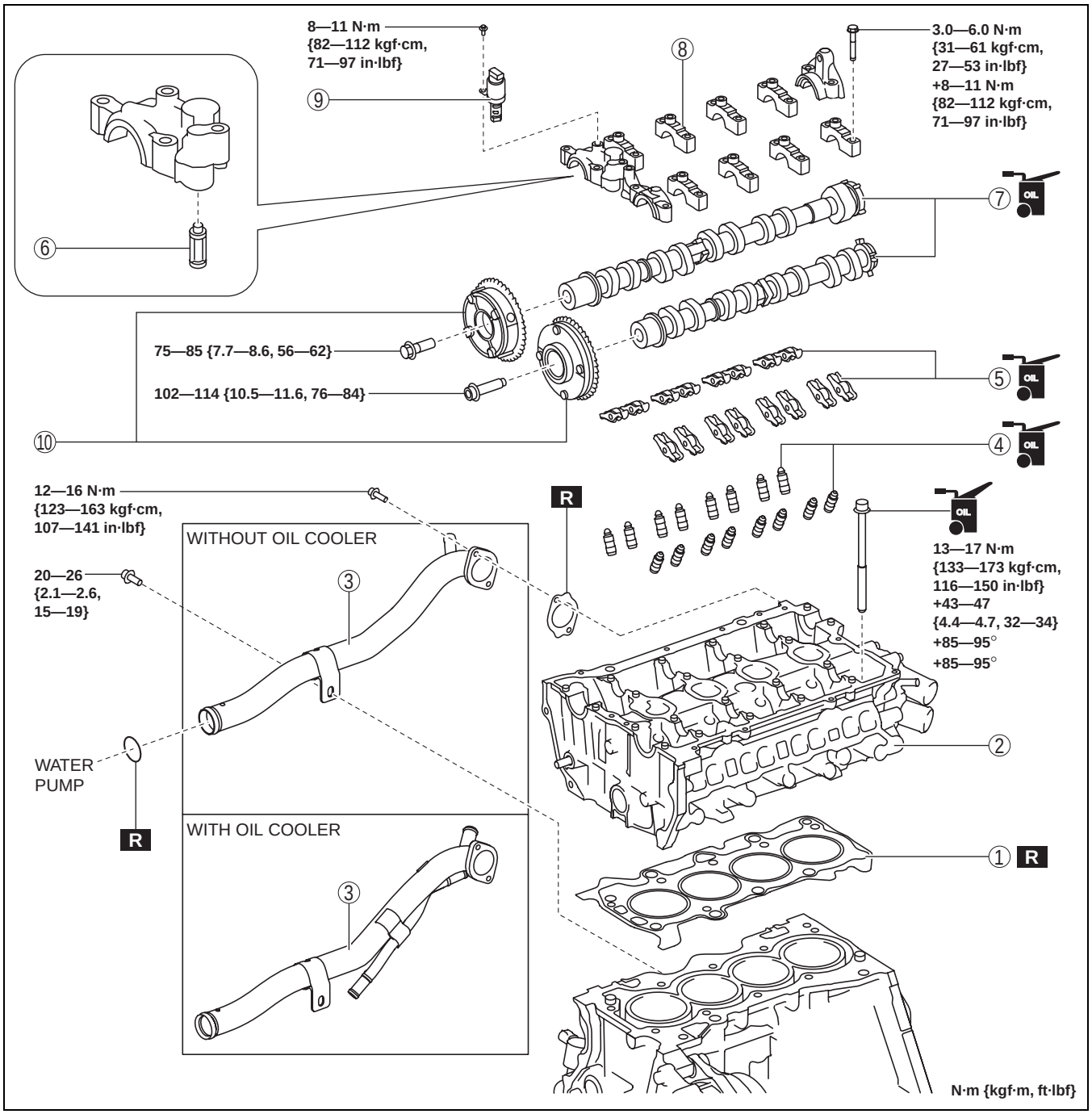
Note

- Width at the cast hexagon of the camshaft is 22—24 mm {0.87—0.94 in}.



am3uuw00009029

1. Assemble in the order indicated in the table.



bpe5ue00000007

1	Cylinder head gasket
2	Cylinder head (See 01-10-61 Cylinder Head Assembly Note.)
3	Water inlet pipe (See 01-10-62 Water Inlet Pipe Assembly Note.)
4	HLA (See 01-10-63 HLA Assembly Note.)
5	Rocker arm (See 01-10-63 Rocker Arm Assembly Note.)
6	OCV oil filter

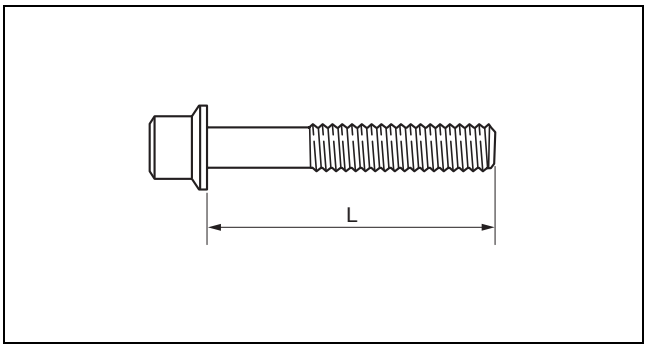
7	Camshaft (See 01-10-64 Camshaft Assembly Note.)
8	Camshaft cap (See 01-10-64 Camshaft Assembly Note.)
9	OCV
10	Electric variable valve timing actuator, hydraulic variable valve timing actuator (See 01-10-66 Electric Variable Valve Timing Actuator, Hydraulic Variable Valve Timing Actuator Assembly Note.)

Cylinder Head Assembly Note

Caution
- **If the following condition is met, replace the cylinder head bolts.**
  - **— Length exceeds maximum specification**

Standard cylinder head bolt length L
145.2—145.8 mm {5.717—5.740 in}

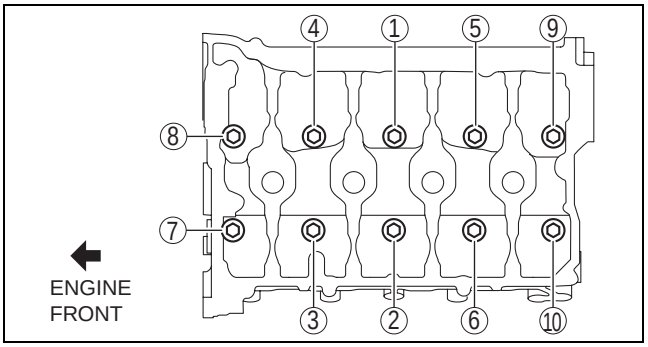
Maximum cylinder head bolt length L
146.5 mm {5.767 in}



adejjw00001214

1. When a cylinder head bolt is reused, apply engine oil to any part of the following:
   - Bolt seating surface
   - Cylinder head seating surface
2. Tighten the cylinder head bolts in the order shown in the following four steps.

Tightening procedure
Step 1: 13—17 N·m {133—173 kgf·cm, 116—150 in·lbf}
Step 2: 43—47 N·m {4.4—4.7 kgf·m, 32—34 ft·lbf}
Step 3: 85—95°
Step 4: 85—95°

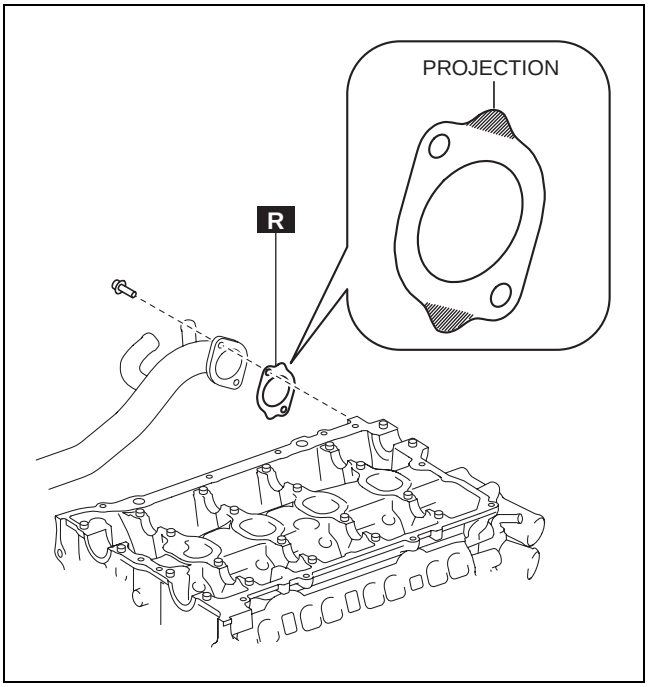


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Water Inlet Pipe Assembly Note

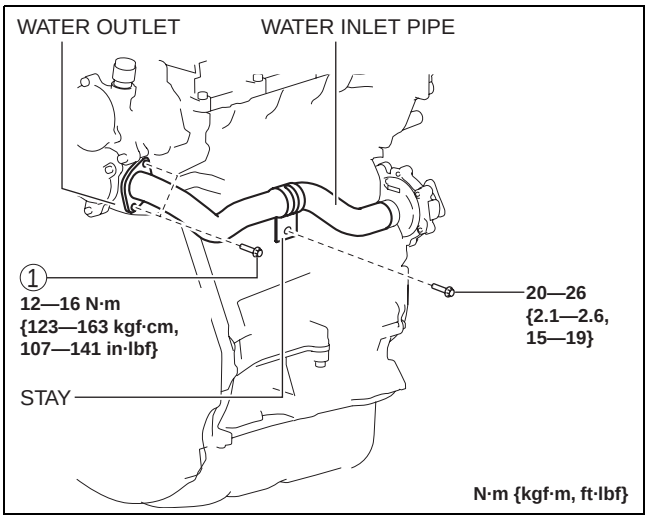
Caution
- **Do not apply oil (such as engine oil, ATF) to the O-ring of the water inlet pipe. Otherwise, the O-ring could swell causing a seal malfunction.**

1. Clean away the sealant adhering to the bolt hole on the cylinder block side of the water inlet pipe stay.
2. Apply engine coolant to the O-ring.
3. Install the O-ring to the water inlet pipe.
4. Insert the water inlet pipe into the water pump being careful not to damage the O-ring.
5. Install the water inlet pipe gasket with the gasket projection facing the direction shown in the figure.



bpe2ue00000065

6. Tighten the bolts in the order shown in the figure.



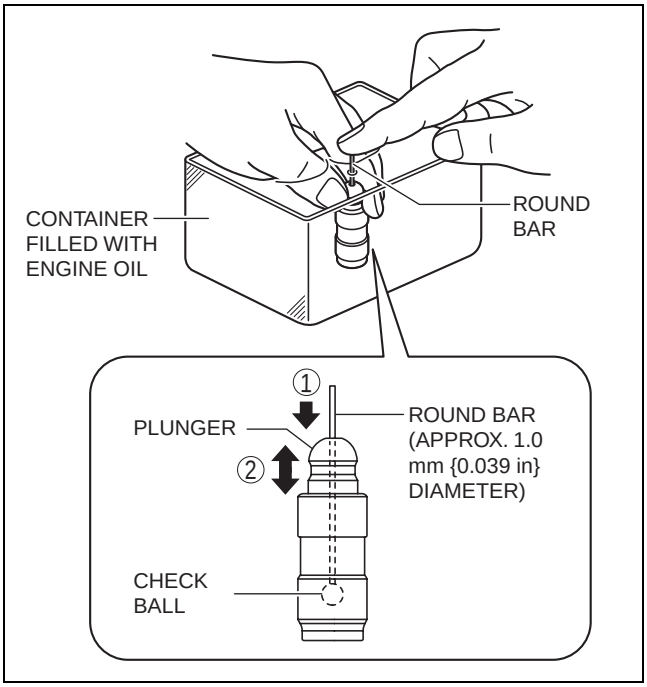
bpe5ue00000008

HLA Assembly Note

1. Perform HLA air bleeding using the following procedure:
   (1) Put the HLA in a container filled with engine oil.

   Caution
   - **Do not insert the round bar firmly because the check ball spring force is extremely weak.**

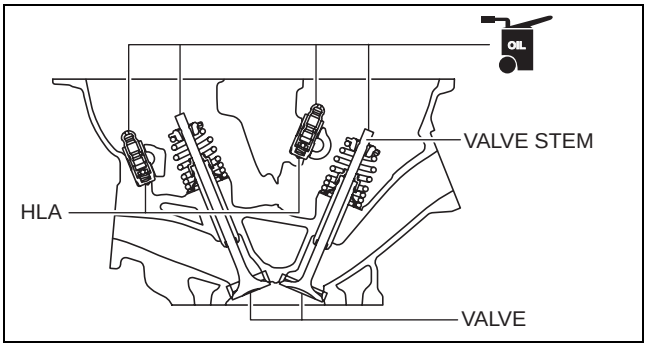
   (2) While lightly pressing the check ball using a round bar (**approx. 1.0 mm {0.039 in}** diameter), bleed air by moving the plunger up and down.
   (3) Press the end of the plunger in the oil and verify that there is no rebounding feel.
      - If rebounding feel cannot be eliminated, replace the HLA.
2. Install the HLAs to their original positions as before removal.



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Rocker Arm Assembly Note

1. Apply engine oil to the HLAs and the end of the valve stems.
2. Install the rocker arms to their original positions as before removal.



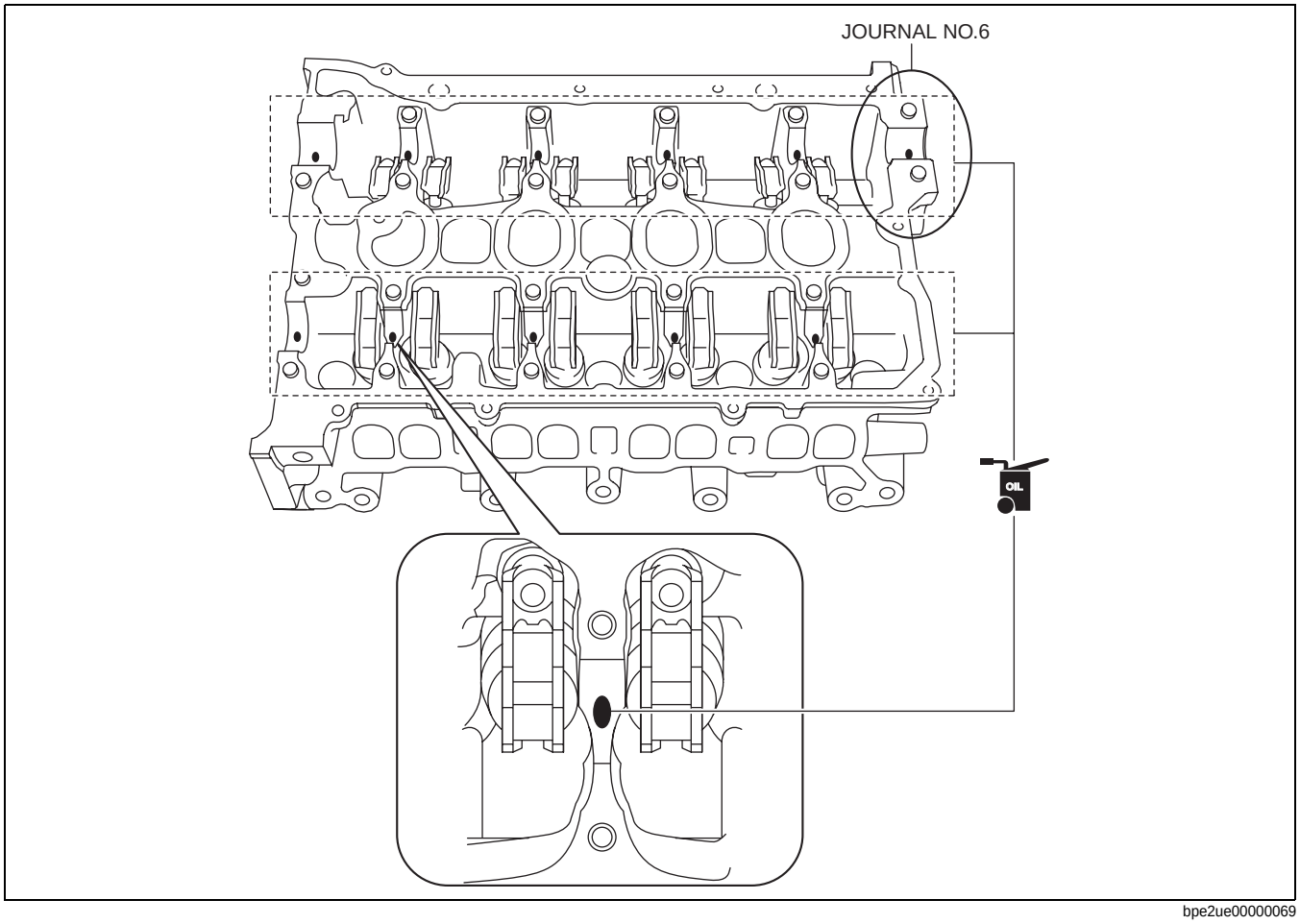
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Camshaft Assembly Note

1. As shown in the figure, apply gear oil (SAE No. 90 or equivalent) or engine oil to the center area of each journal of the cylinder head.

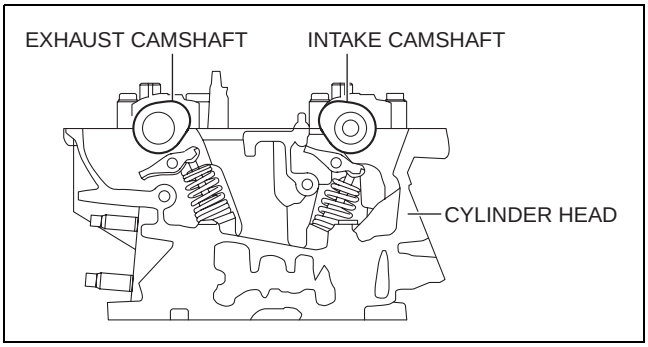
Caution

- **Apply 0.05 ml {0.05 cc, 0.003 in^3} or less of oil to journal No.6.**



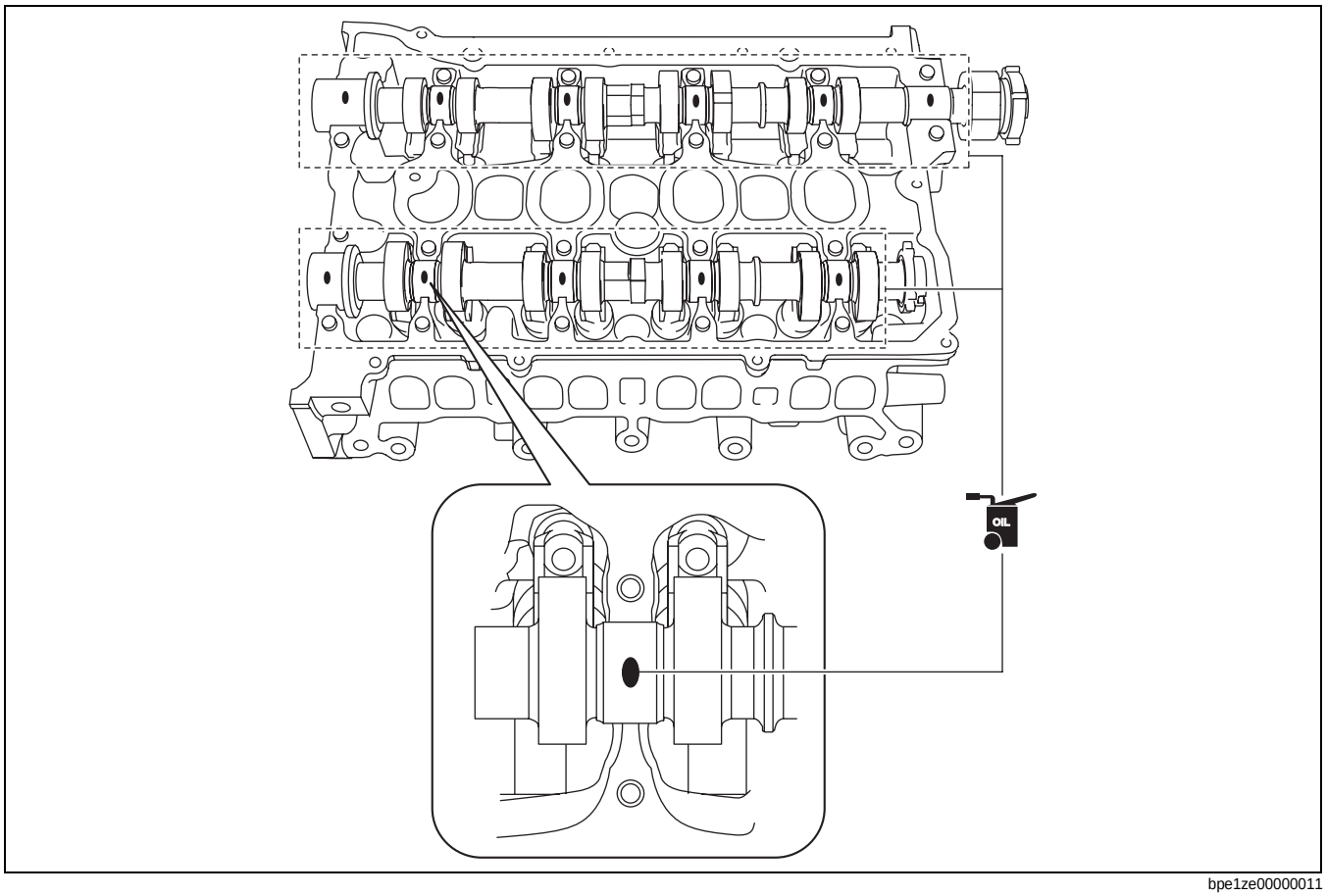
bpe2ue00000069

2. Apply gear oil (SAE No. 90 or equivalent) or engine oil to the following locations of each camshaft.
   - Thrust surface of front journal
3. As shown in the figure, align the cam position of cylinder No.1 around top dead center (TDC) and place the camshafts on the cylinder head.



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4. As shown in the figure, apply gear oil (SAE No. 90 or equivalent) or engine oil to the center area of each journal of the camshaft.



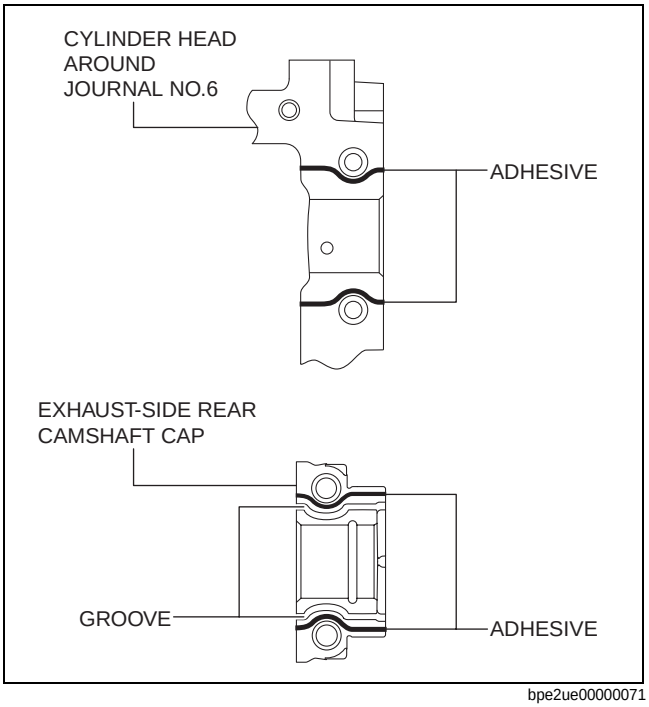
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5. Apply adhesive agent (Loctite 962T) around journal No.6 of the cylinder head or the exhaust-side rear camshaft cap.

Caution
- **Verify that there is no adhesive agent on the journal.**

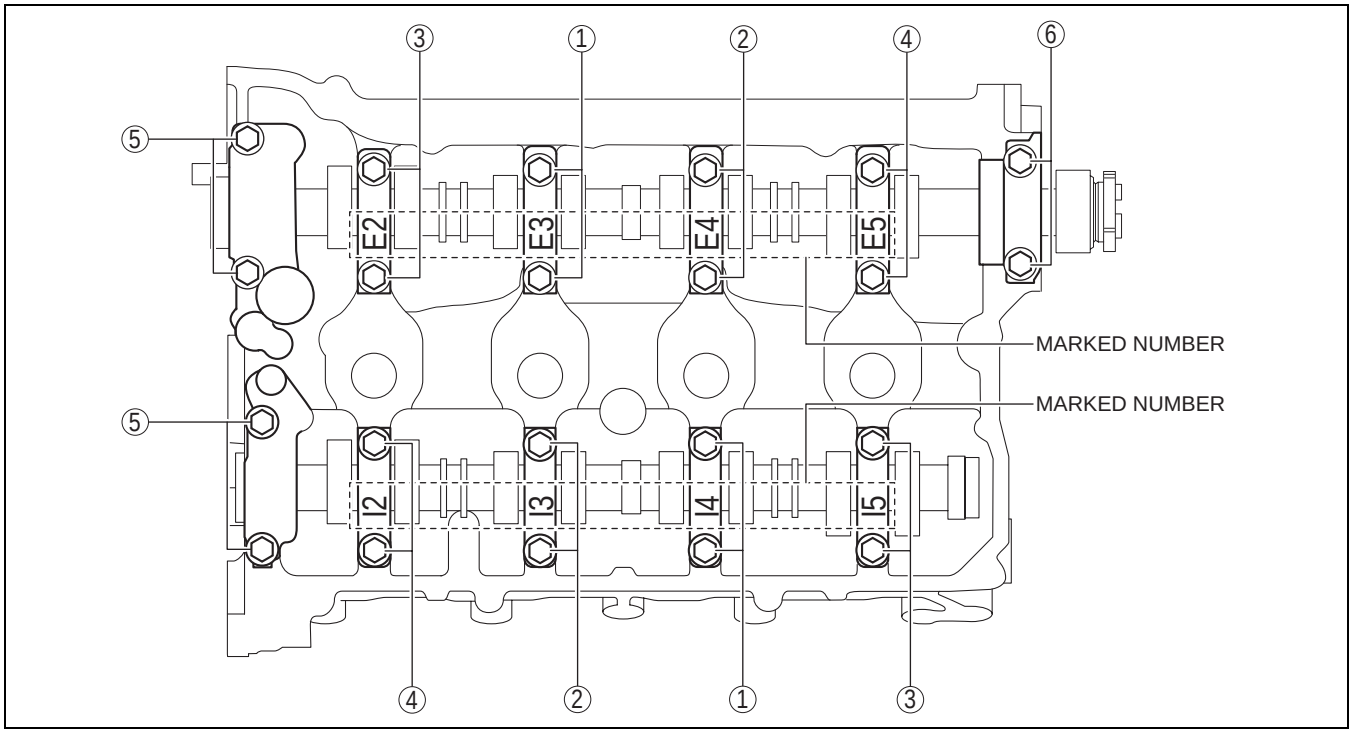
Adhesive agent bead width
0.5—1.5 mm {0.02—0.05 in}

6. Install the camshaft caps in the marked number order, and temporarily tighten the camshaft cap installation bolts in two or three passes evenly.



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7. Tighten the camshaft cap installation bolts in two steps in the order shown in the figure.

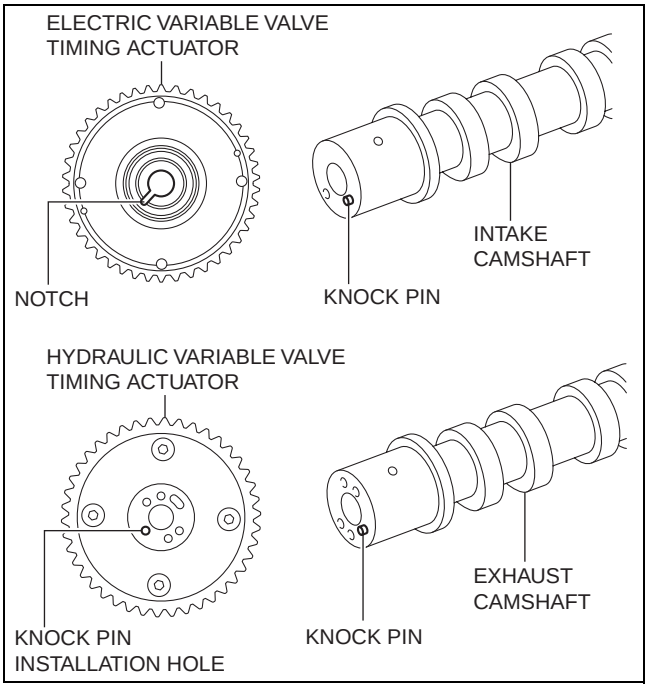


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Tightening torque
Step 1: 3.0—6.0 N·m {31—61 kgf·cm, 27—53 in·lbf}
Step 2: 8—11 N·m {82—112 kgf·cm, 71—97 in·lbf}

Electric Variable Valve Timing Actuator, Hydraulic Variable Valve Timing Actuator Assembly Note

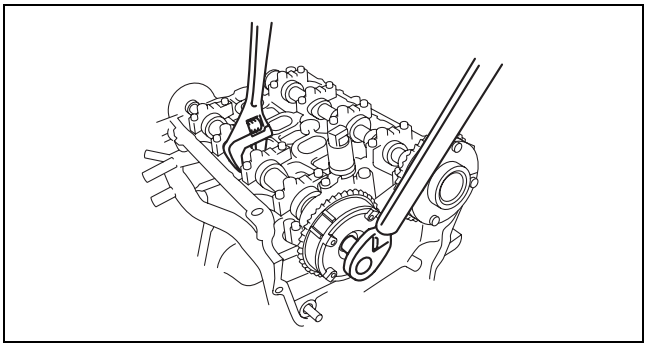
1. Align the knock pin on the end of the camshaft with the notch on the actuator (intake side) or knock pin installation hole (exhaust side), then install the actuator to the camshaft.



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2. Hold the camshaft using a wrench on the cast hexagon, and tighten the actuator installation bolt.

Tightening torque
Electric variable valve timing actuator (intake side): 102—114 N·m {10.5—11.6 kgf·m, 76—84 ft·lbf}
Hydraulic variable valve timing actuator (exhaust side): 75—85 N·m {7.7—8.6 kgf·m, 56—62 ft·lbf}

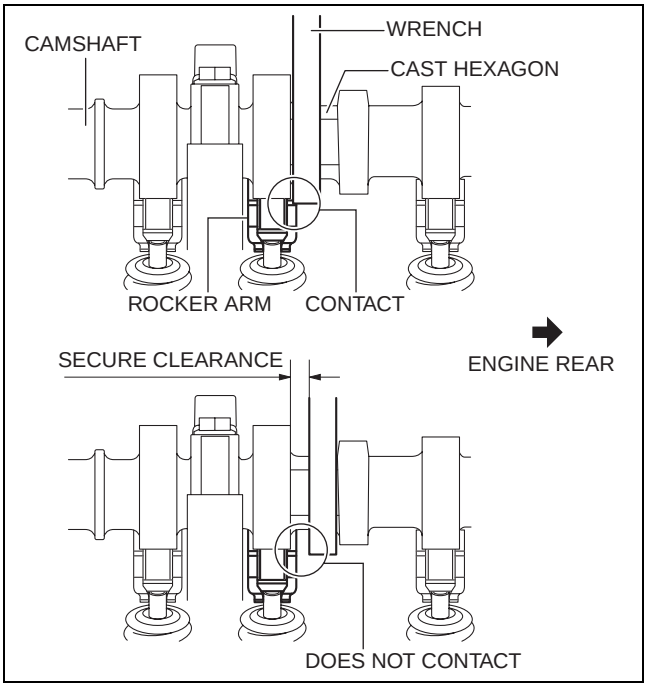


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TIMING CHAIN ASSEMBLY

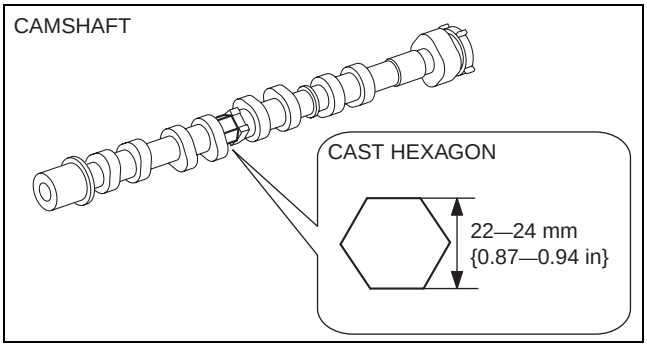
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Caution
- **If the camshaft is rotated with the timing chain removed and the piston at the top dead center position, the valve may contact the piston and the engine could be damaged. When rotating the camshaft with the timing chain removed, rotate it after lowering the piston from the top dead center position.**
- **When rotating the camshaft using a wrench on the cast hexagon, the wrench may contact the rocker arm and damage the rocker arm. To prevent damage to the rocker arm when holding the camshaft on the cast hexagon, use a wrench on the rear side of the engine as shown in the figure to secure a clearance between the cam.**



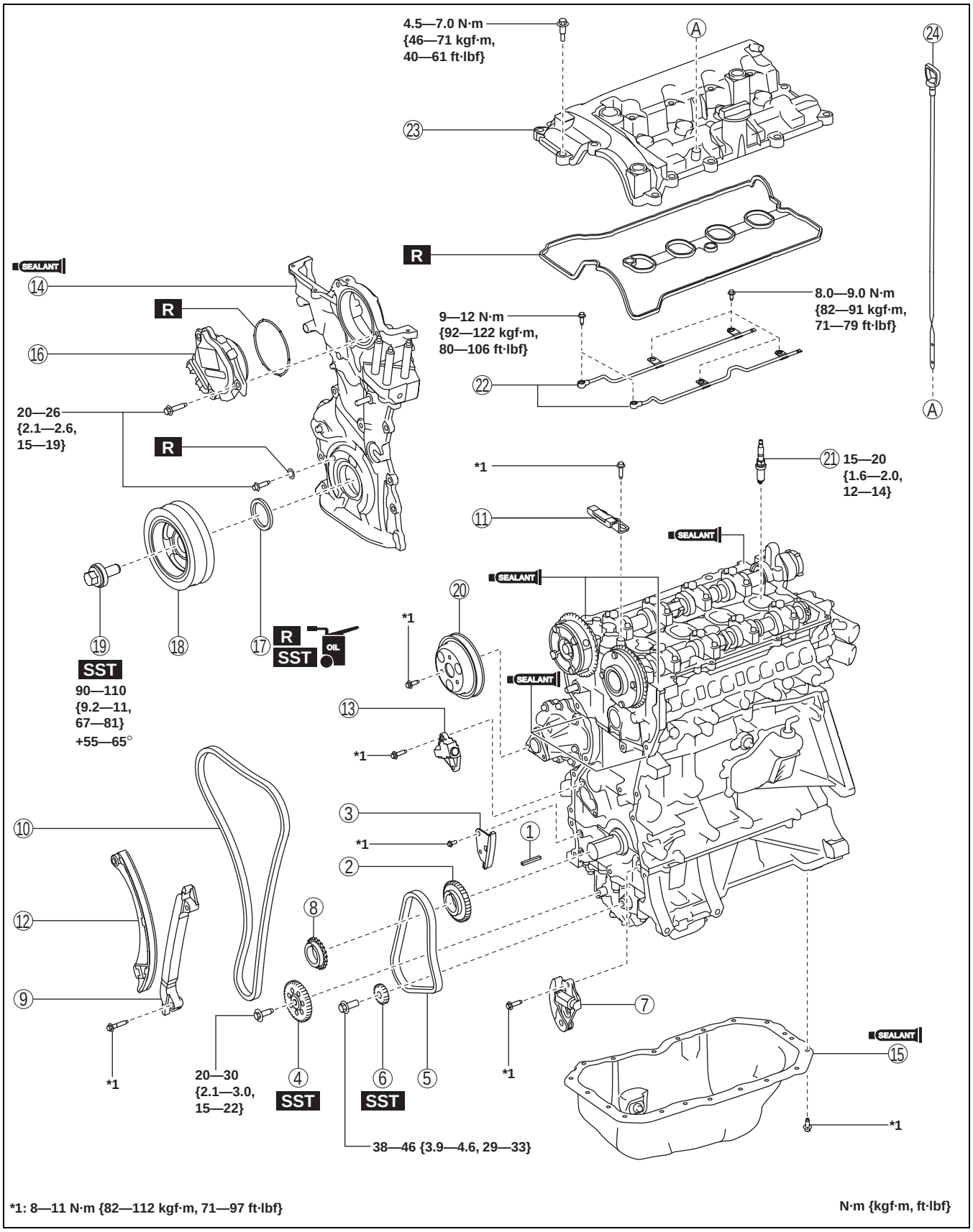
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Note
- Width at the cast hexagon of the camshaft is 22—24 mm {0.87—0.94 in}.



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1. Assemble in the order indicated in the table.



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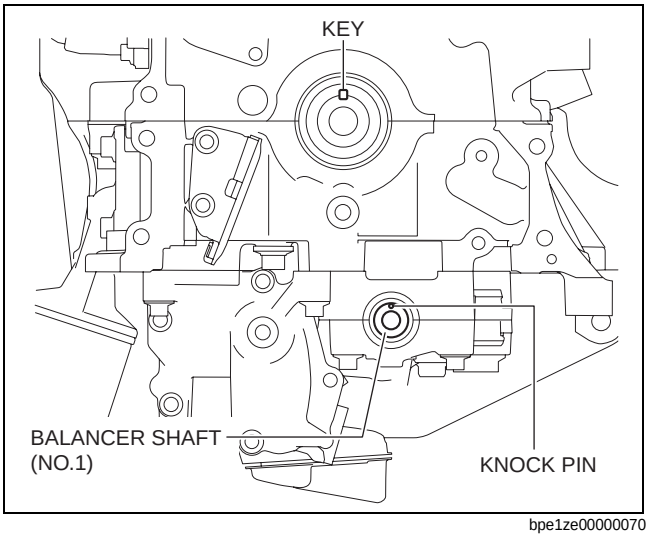
1	Key
2	Oil pump drive sprocket
3	Oil pump chain guide

4	Oil pump driven sprocket (See 01-10-69 Oil Pump Chain Assembly Note.)

5	Oil pump chain (See 01-10-69 Oil Pump Chain Assembly Note.)
6	Balancer shaft sprocket (See 01-10-69 Oil Pump Chain Assembly Note.)
7	Oil pump chain tensioner (See 01-10-69 Oil Pump Chain Assembly Note.)
8	Crankshaft sprocket
9	Chain guide (No.2)
10	Timing chain (See 01-10-71 Timing Chain Assembly Note.)
11	Chain guide (No.1) (See 01-10-71 Timing Chain Assembly Note.)
12	Tensioner arm (See 01-10-71 Timing Chain Assembly Note.)
13	Chain tensioner (See 01-10-71 Timing Chain Assembly Note.)
14	Engine front cover (See 01-10-74 Engine Front Cover Assembly Note.)
15	Oil pan (See 01-10-77 Oil Pan Assembly Note.)
16	Electric variable valve timing motor/driver (See 01-10-79 Electric Variable Valve Timing Motor/Driver Assembly Note.)
17	Front oil seal (See 01-10-80 Front Oil Seal Assembly Note.)
18	Crankshaft pulley
19	Crankshaft pulley lock bolt (See 01-10-80 Crankshaft Pulley Lock Bolt Assembly Note.)
20	Water pump pulley (See 01-10-81 Water Pump Pulley Assembly Note.)
21	Spark plug
22	Oil shower pipe (See 01-10-81 Oil Shower Pipe Assembly Note.)
23	Cylinder head cover (See 01-10-82 Cylinder Head Cover Assembly Note.)
24	Dipstick

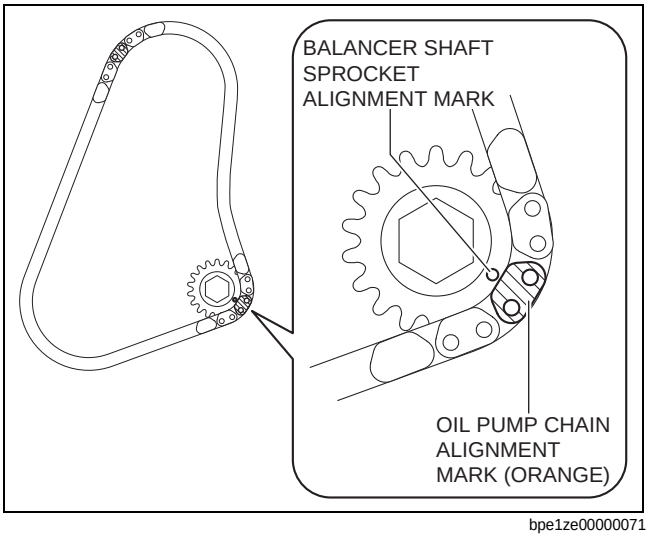
Oil Pump Chain Assembly Note

1. Verify that the key and knock pin are aligned to the positions shown in the figure.
   - If they are not in the positions shown in the figure, rotate the crankshaft and balancer shaft (No.1) to set cylinder No.1 to top dead center (TDC).
2. Temporarily assemble the oil pump driven sprocket.
3. Temporarily tighten the oil pump driven sprocket installation bolt.



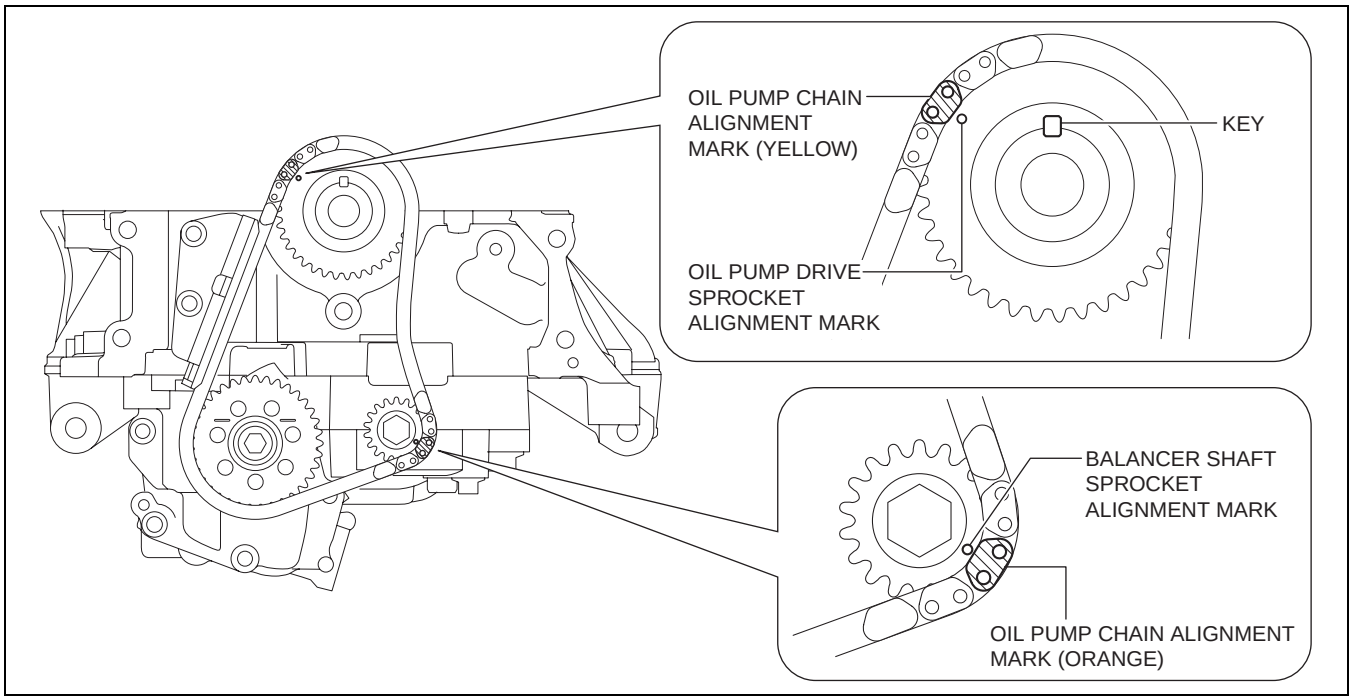
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4. Align the oil pump chain alignment mark with the balancer shaft sprocket alignment mark.



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5. Install the oil pump chain and balancer shaft sprocket as a single unit while aligning the alignment marks on each sprocket and oil pump chain as shown in the figure.



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6. Temporarily tighten the balancer shaft sprocket installation bolt.
7. Install the oil pump chain tensioner.

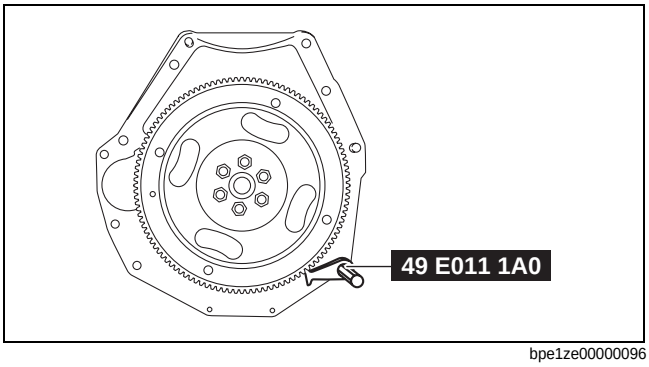
Caution
- **At this stage, do not remove the wire or paper clip installed to the oil pump chain tensioner.**

8. Hold the crankshaft using the **SST**.
9. Tighten the oil pump driven sprocket installation bolt.

Tightening torque
20—30 N·m {2.1—3.0 kgf·m, 15—22 ft·lbf}

10. Tighten the balancer shaft sprocket installation bolt.

Tightening torque
38—46 N·m {3.9—4.6 kgf·m, 29—33 ft·lbf}

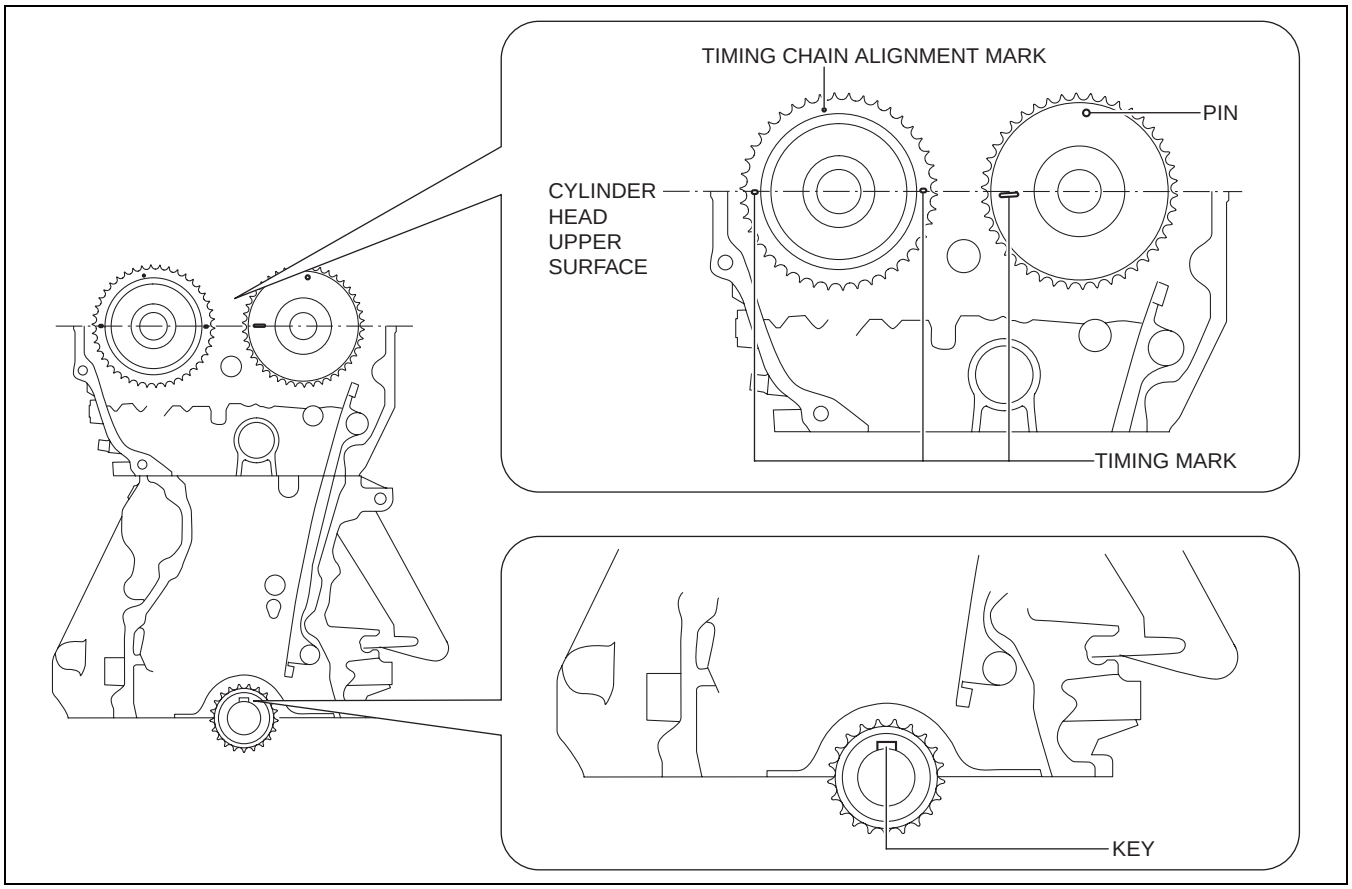


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11. Remove the wire or paper clip installed to the oil pump chain tensioner and apply tension to the oil pump chain.
    - If a new oil pump chain tensioner is used, remove the installed stopper.

Timing Chain Assembly Note

1. Verify that the timing marks and the key are aligned to the position shown in the figure.



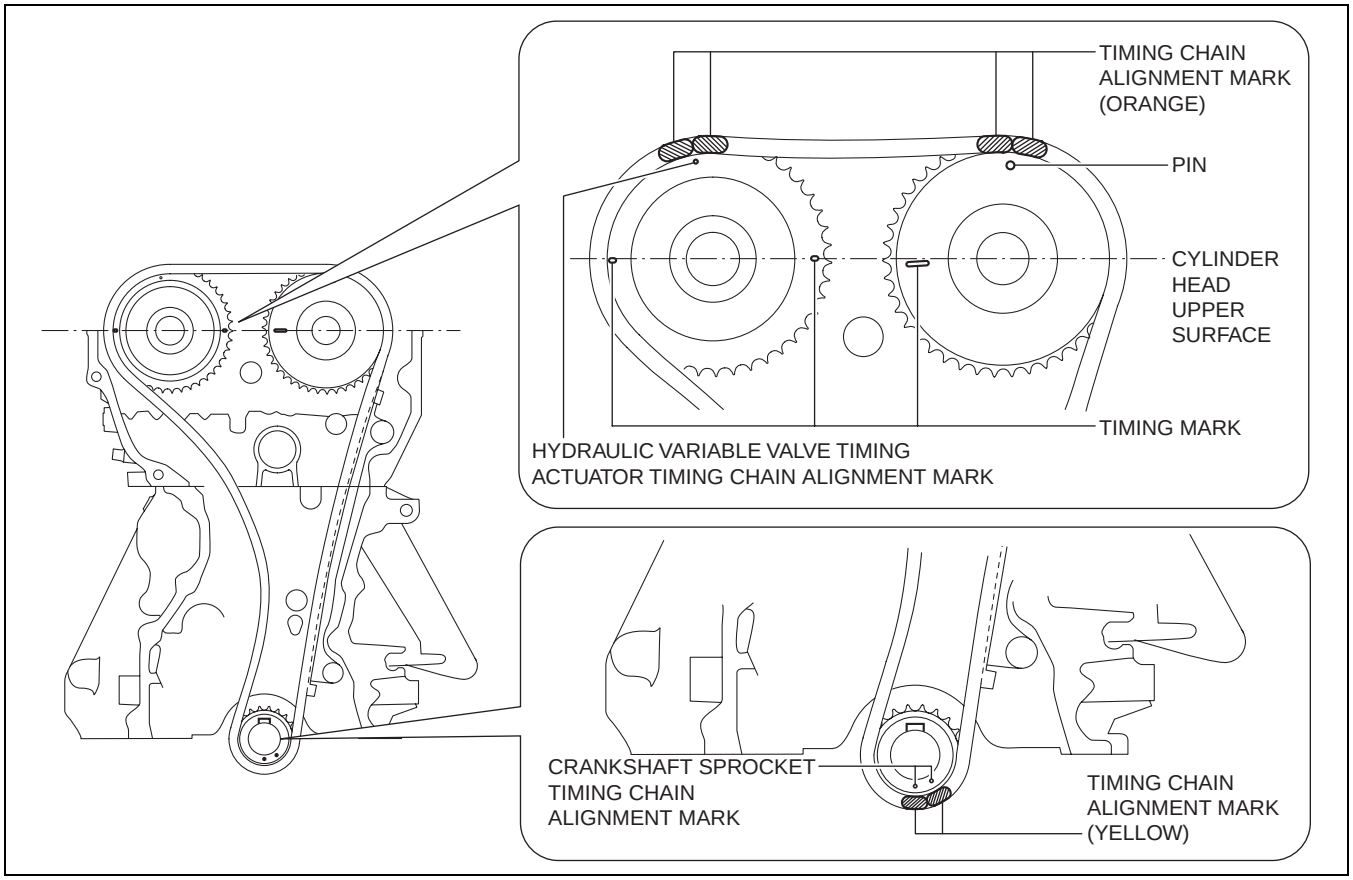
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Note

- The timing mark of SKYACTIV-G 2.5 is not completely parallel with the upper surface of the cylinder head.

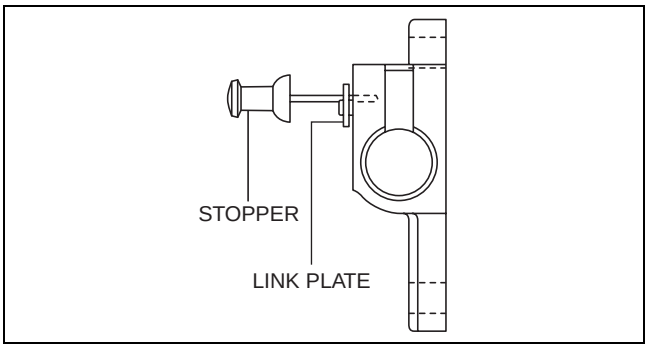
- If they are not in the position shown in the figure, rotate the camshaft and crankshaft to set the cylinder No.1 top dead center (TDC).

2. Install the timing chain while aligning the marks on each sprocket and the timing chain as shown in the figure.



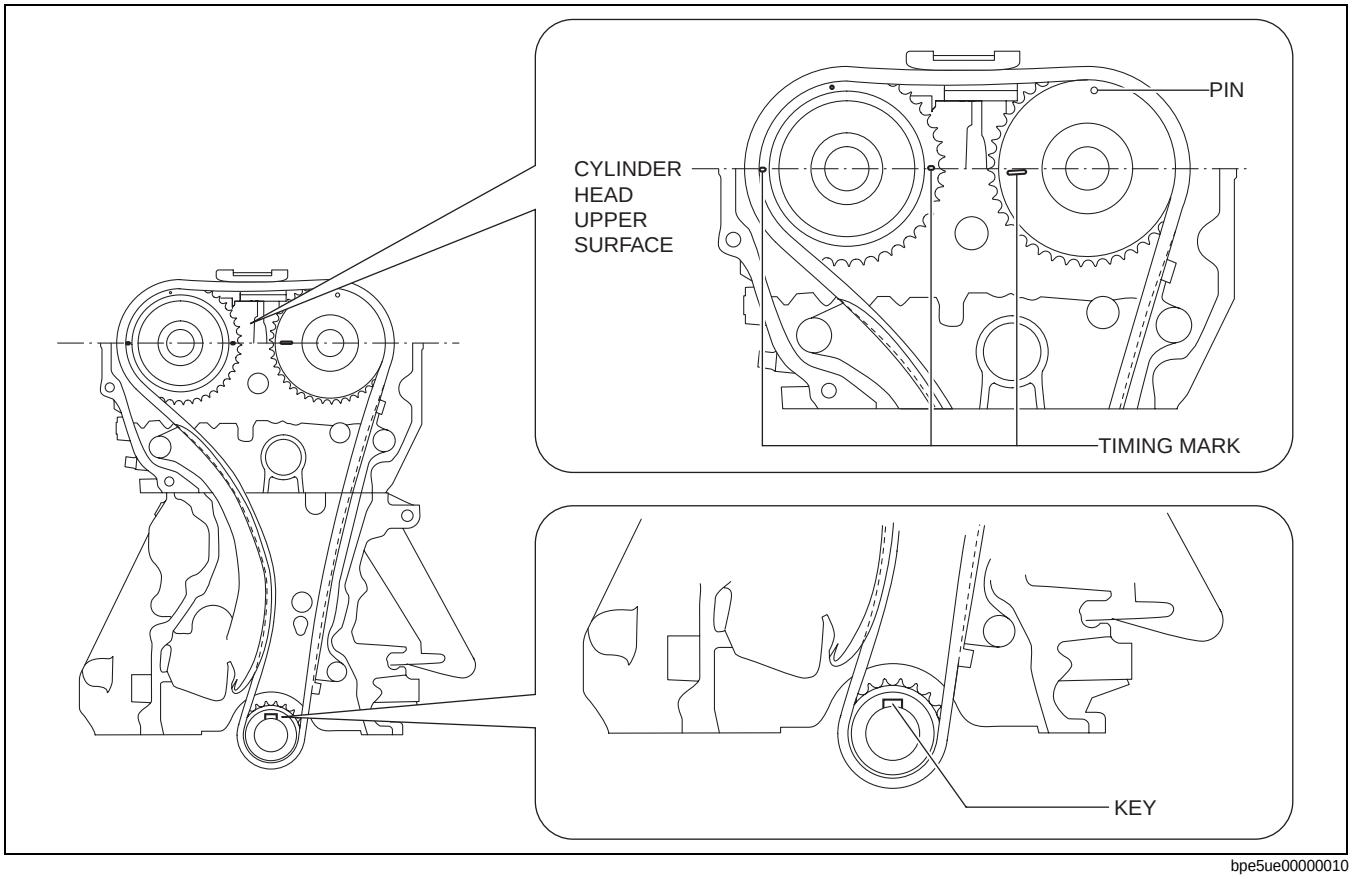
bpe1ze00000075

3. Install the tensioner arm.
4. Install the chain tensioner.
5. After installing the chain tensioner, remove the installed wire or paper clip, and then apply tension to the timing chain.
   - If a new chain tensioner is used, remove the installed stopper.
6. Install the chain guide (No.1).
7. Verify that there is no looseness in the timing chain, and re-verify that each sprocket is in the specified location.



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8. Rotate the crankshaft clockwise two turns and inspect the valve timing.



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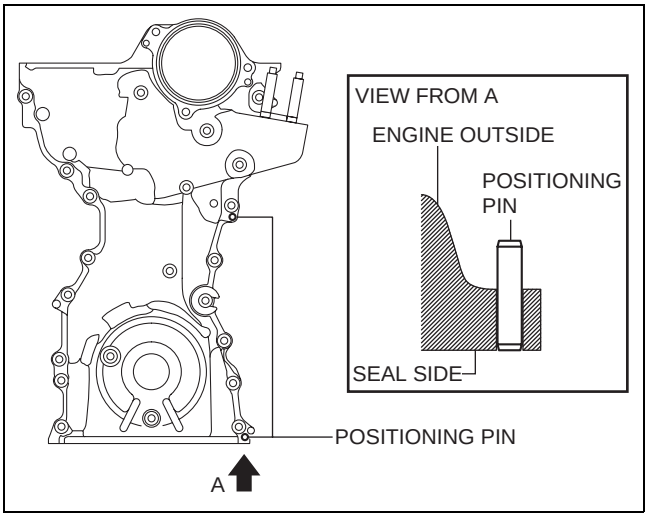
Note

- The timing mark of SKYACTIV-G 2.5 is not completely parallel with the upper surface of the cylinder head.

Engine Front Cover Assembly Note

Note

- For a new engine front cover, the positioning pins in the two locations shown in the figure project to the outside of the engine.

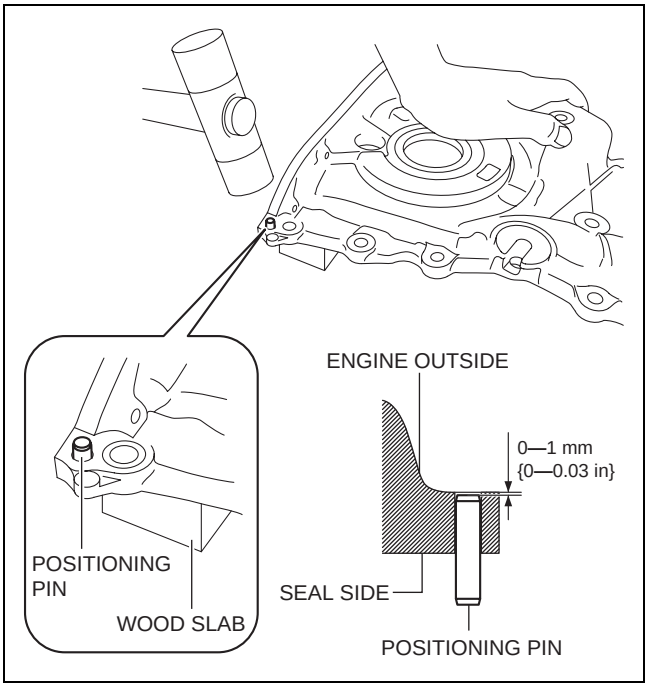


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1. If the engine front cover is newly replaced, tap the positioning pins in the two locations to the seal surface side.
2. Completely clean and remove any oil, dirt, sealant or other foreign matter that may be adhering to the engine front cover, cylinder head, and cylinder block.
3. When reusing the engine front cover installation bolts, clean any old sealant from the bolts.

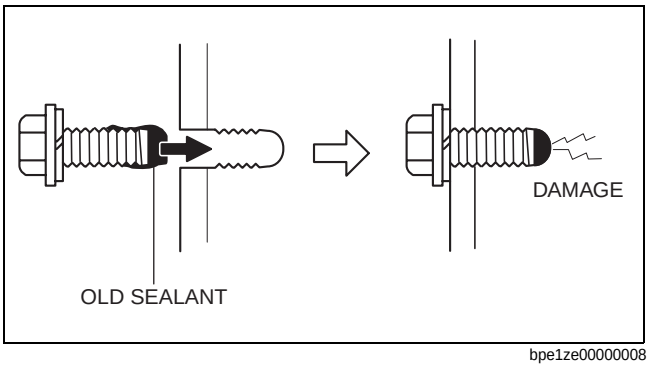
Caution

- **Apply the silicon sealant in a single, unbroken line.**
- **To prevent silicone sealant from hardening, adhere the engine front cover to the cylinder block within 10 min. after silicone sealant is applied. Tighten the installation bolts completely soon after adhering.**



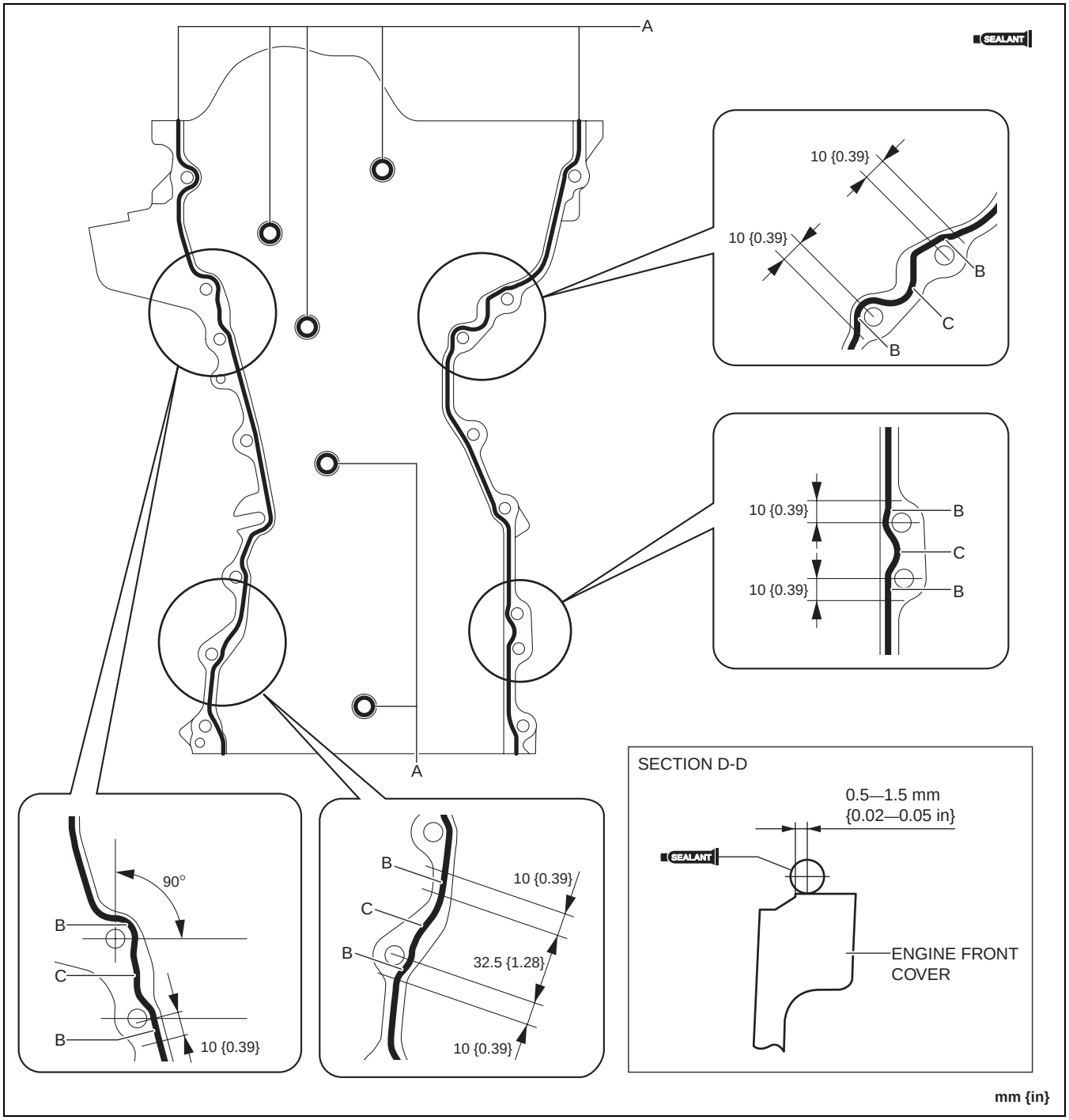
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- **Using bolts with the old seal adhering could cause cracks in the cylinder head and cylinder block.**



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4. Apply silicone sealant to the engine front cover as shown in the figure.



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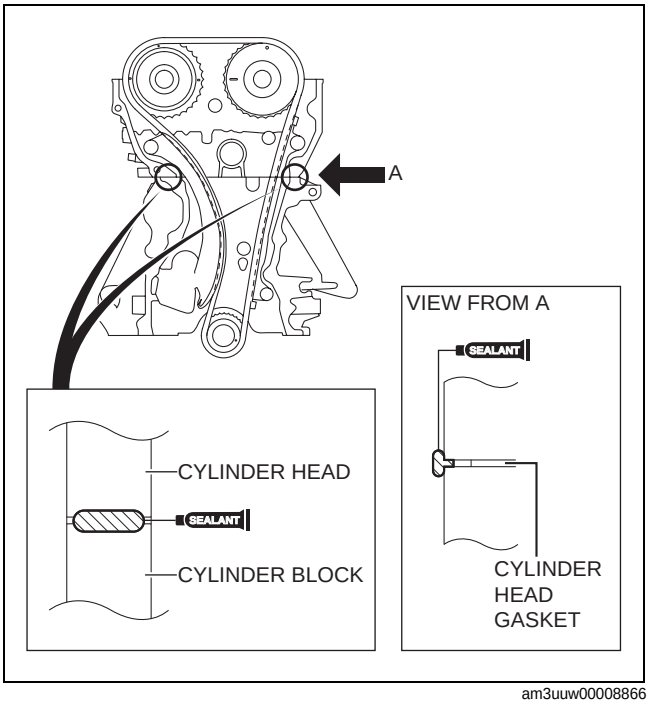
Bead thickness
A: 2—6 mm {0.1—0.2 in}
B: 4—6 mm {0.16—0.23 in}
C: 4—8 mm {0.2—0.3 in}

5. Apply silicone sealant to the areas shown in the figure.

Caution
- **Apply the silicone sealant so that it goes into the cylinder head gasket.**

6. Install the engine front cover to the engine.

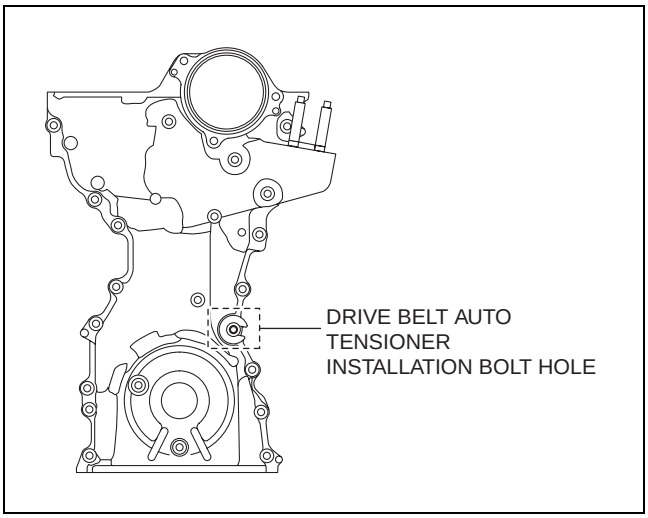
Note
- Temporarily install an appropriate bolt to the drive belt auto tensioner installation bolt hole to prevent:
  - — A silicone sealant adhesion malfunction in the drive belt auto tensioner installation bolt hole.
  - — A bolt mis-installation due to silicone sealant hardening.



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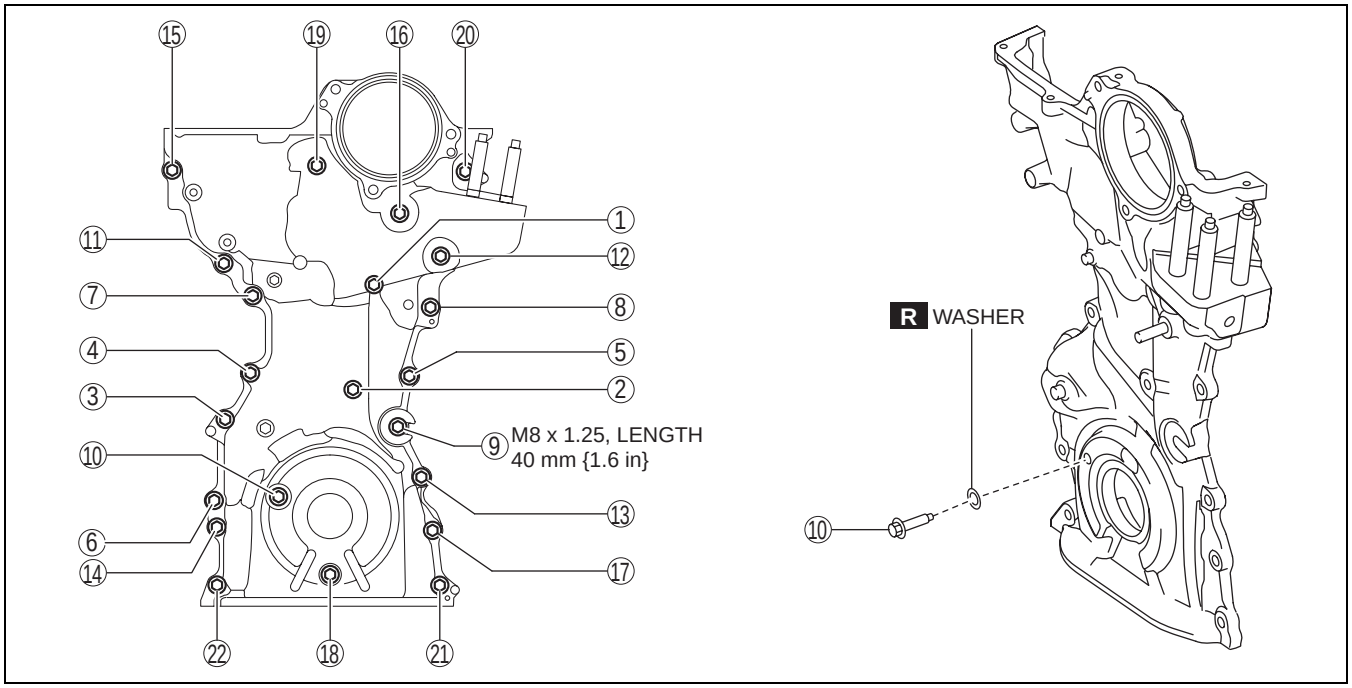
7. Prepare an appropriate **M8 X 1.25** bolt (length **40 mm {1.6 in}**).

Caution
- **For the number 10 bolt of the tightening order, install the bolts with new washer.**



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8. Tighten the engine front cover installation bolts in the order shown in the figure.



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Tightening torque
20—26 N·m {2.1—2.6 kgf·cm, 15—19 in·lbf}

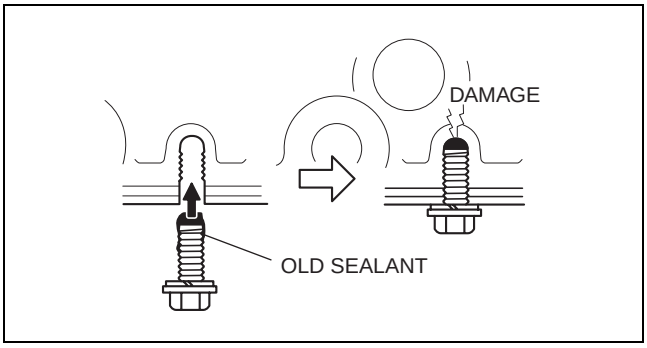
9. Remove the bolt installed to the drive belt auto tensioner installation bolt hole when installing the drive belt auto tensioner.

Oil Pan Assembly Note

1. Completely clean and remove any oil, dirt, sealant or other foreign matter that may be adhering to the cylinder block and oil pan.
2. When reusing the oil pan installation bolts, clean any old sealant from the bolts.

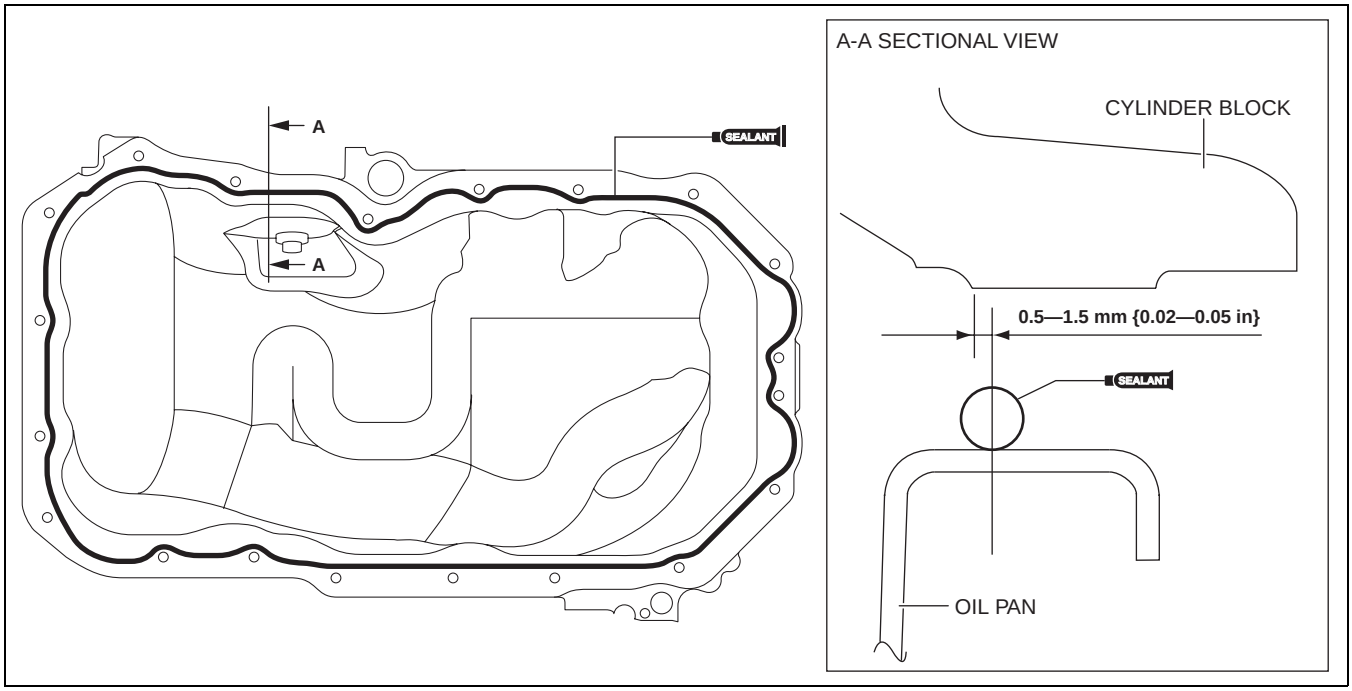
Caution

- **Apply the silicon sealant in a single, unbroken line around the whole perimeter.**
- **To prevent silicone sealant from hardening, adhere the oil pan to the cylinder block within 10 min. after silicone sealant is applied. Tighten the installation bolts completely soon after adhering.**
- **Using bolts with the old seal adhering could cause cracks in the cylinder block.**



am6zzw00002304

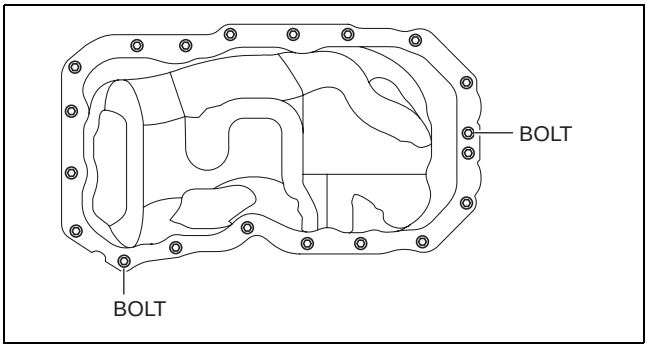
3. Apply silicone sealant to the oil pan along the inside of the bolt holes as shown in the figure.



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Thickness
3.0—7.0 mm {0.12—0.27 in}

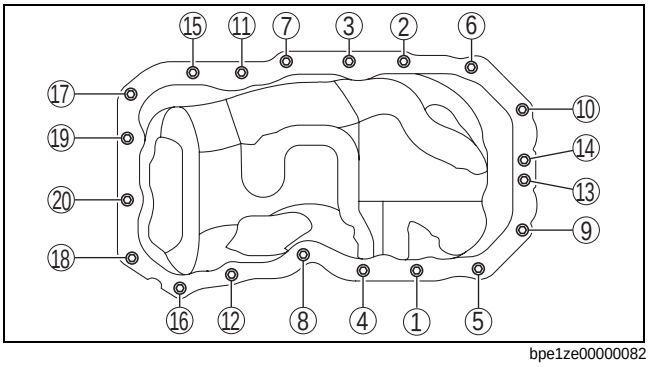
4. Install the oil pan using the following procedure:
   (1) Install the oil pan to the cylinder block.
   (2) Temporarily tighten the two bolts shown in the figure.



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   (3) Tighten the bolts in the order shown in the figure.

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



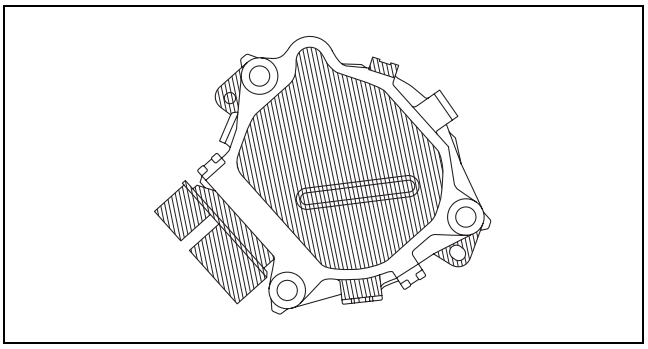
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Electric Variable Valve Timing Motor/Driver Assembly Note

1. Install a new O-ring to the O-ring installation groove of the engine front cover.

Caution

- **To prevent damage to the electric variable valve timing motor/driver, do not apply excessive force (force of 100 N {10.2 kgf, 22.5 lbf} or more) to the shaded areas shown in the figure.**

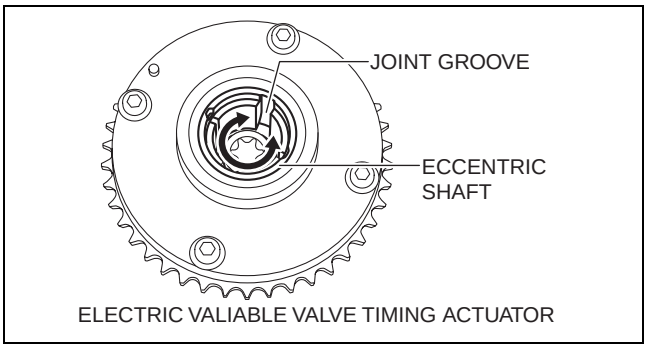


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2. Install the electric variable valve timing motor/driver using the following procedures.

Note

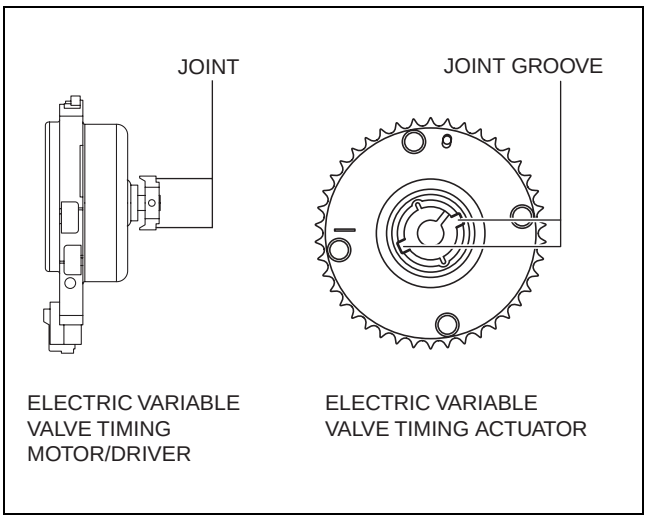
- The eccentric shaft on the electric variable valve timing actuator side can be rotated to the left and right.
- The electric variable valve timing motor/driver can be assembled with the joint groove of the eccentric shaft in any position, and it will not lead to vehicle damage or performance reduction.



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(1) Before installation, rotate the joint on the end of the electric variable valve timing motor so that it is aligned to the joint groove on the electric variable valve timing actuator side.
(2) Engage the joint on the end of the electric variable valve timing motor with the joint groove on the electric variable valve timing actuator side.
(3) Attach the seal surface.
(4) Tighten the electric variable valve timing motor/driver installation bolts.

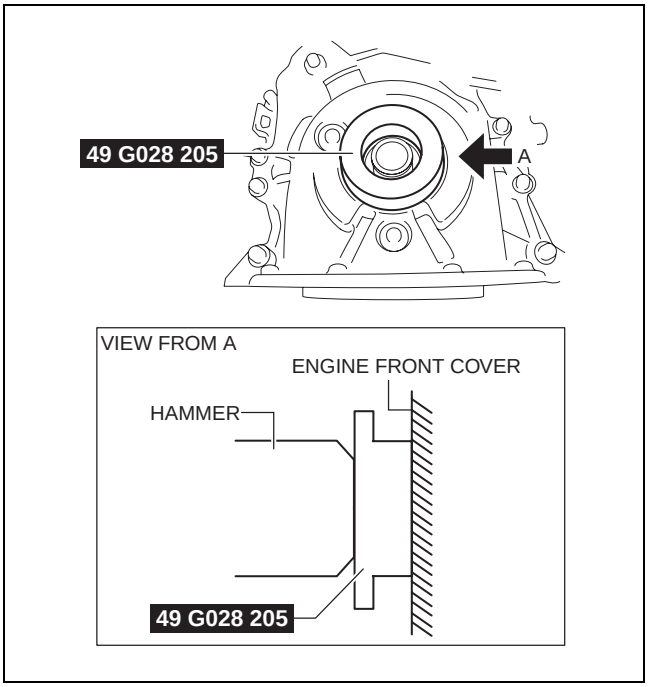
Tightening torque
20—26 N·m {2.1—2.6 kgf·m, 15—19 ft·lbf}



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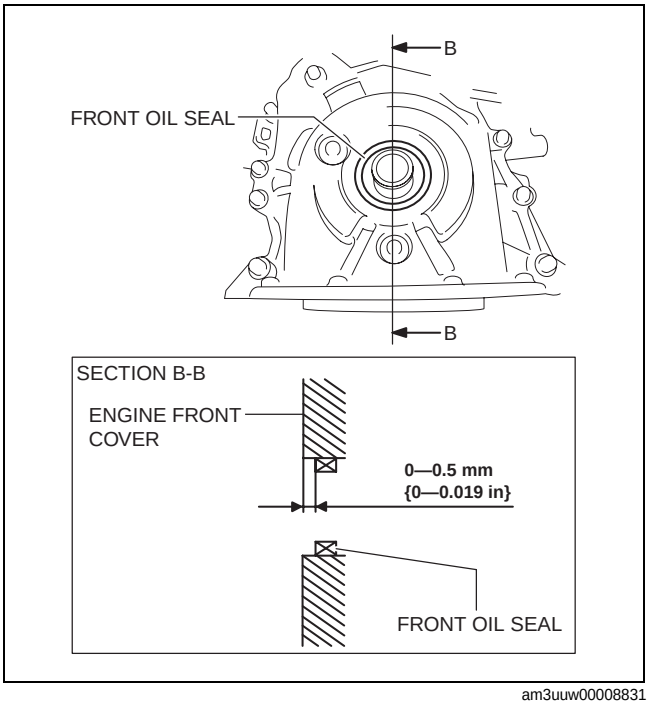
Front Oil Seal Assembly Note

1. Apply clean engine oil to the inner surface of a new front oil seal.
2. Insert the front oil seal into the engine front cover by hand.
3. Tap the oil seal in evenly using the **SST** and a hammer.



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Front oil seal press on amount
0—0.5 mm {0—0.019 in}

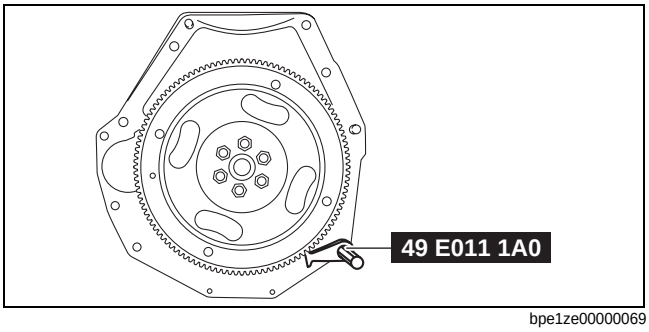


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Crankshaft Pulley Lock Bolt Assembly Note

1. Hold the crankshaft using the **SST**.
2. Tighten the crankshaft pulley lock bolt in the order shown in the following two steps.

Tightening procedure
Step 1: 90—110 N·m {9.2—11 kgf·m, 67—81 ft·lbf}
Step 2: 55—65°



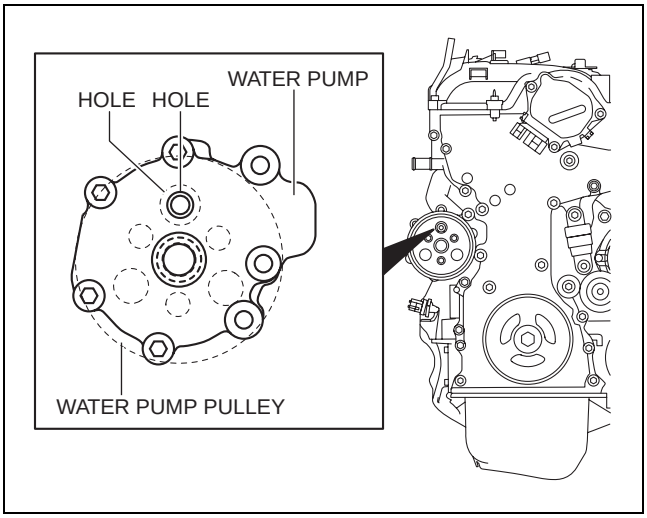
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Water Pump Pulley Assembly Note

Caution

- **Be careful not to damage the belt groove and surface of the water pump pulley when using tools, otherwise it will cause wear, breakage, abnormal noise of the drive belt (stretch belt), damage to the pulley, and rust.**

1. Install the water pump pulley to the water pump and temporarily tighten the bolt.
2. Align the water pump pulley hole with the water pump hole as shown in the figure.

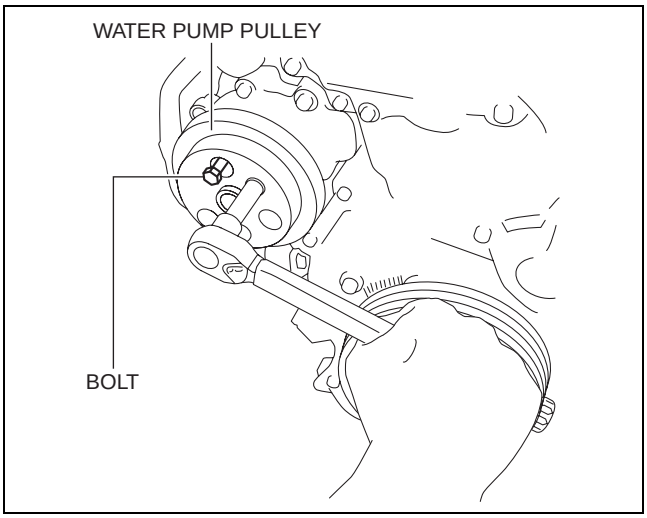


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3. Insert an appropriate bolt (length **70 mm {2.8 in}**) into the water pump hole shown in the figure and lock the water pump pulley against rotation.
4. Completely tighten the water pump pulley bolt to the specified torque.

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

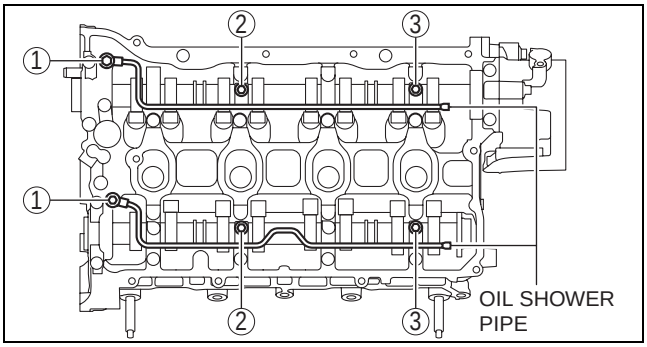
5. Remove the bolt used for locking the water pump pulley against rotation.



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Oil Shower Pipe Assembly Note

1. Install the oil shower pipe in the order shown in the figure.



am3zzw00012759

Tightening torque

Installation position	Tightening torque
1	9—12 N·m {92—122 kgf·cm, 80—106 in·lbf}
2, 3	8.0—9.0 N·m {82—91 kgf·cm, 71—79 in·lbf}

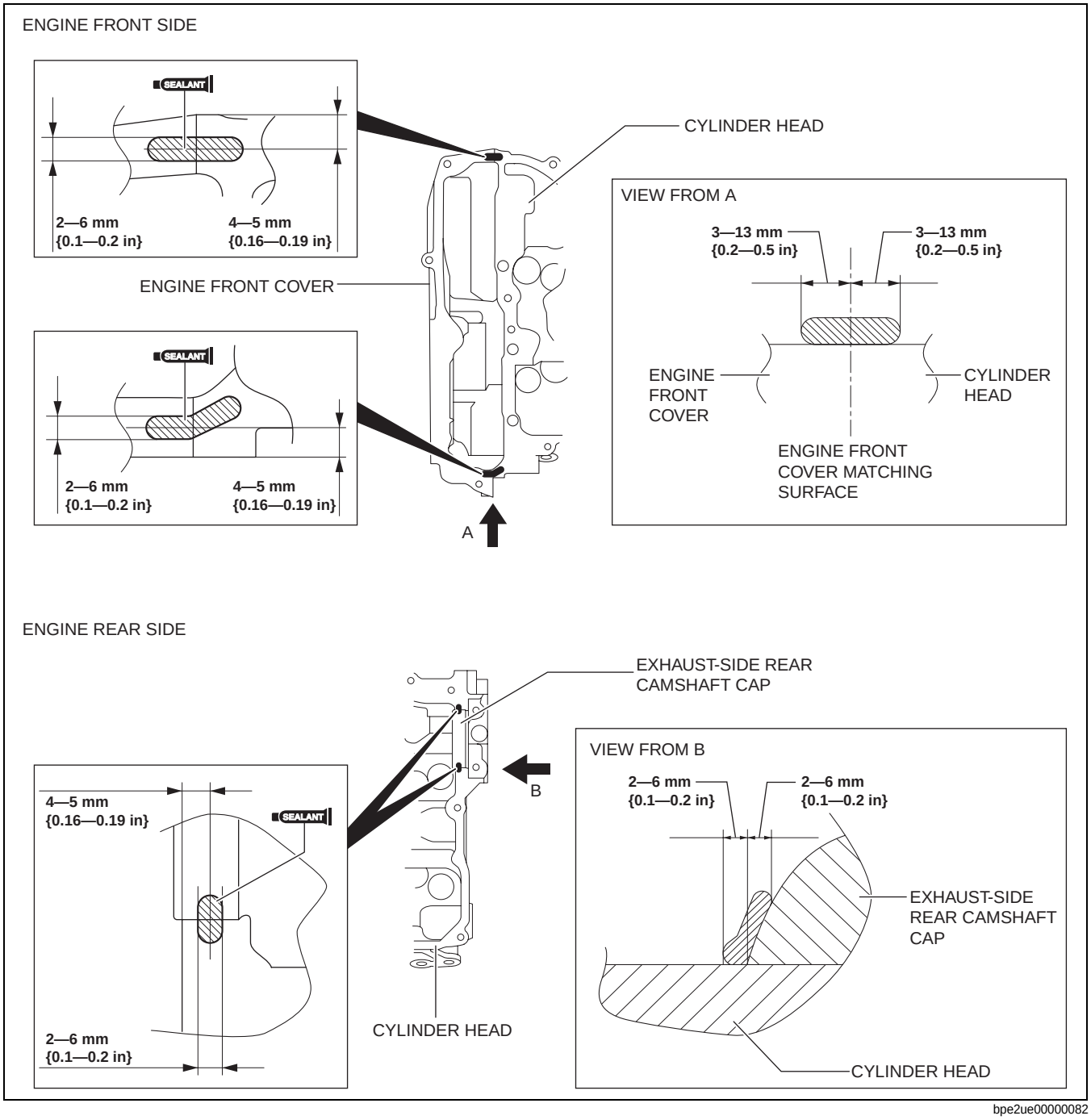
Cylinder Head Cover Assembly Note

Caution

- **To assure the sealing performance of the cylinder head cover, be careful of the following:**
  - **— Verify that the cylinder head cover gasket is inserted into the cylinder head cover groove and install the cylinder head cover.**
  - **— Completely clean and remove any oil, dirt, sealant or other foreign matter from the seal surface.**
- **To prevent silicone sealant from hardening, adhere the cylinder head cover and the cylinder head within 10 min. after silicone sealant is applied. Tighten the installation bolts completely soon after adhering.**

1. Insert a new cylinder head cover gasket into the cylinder head cover groove.

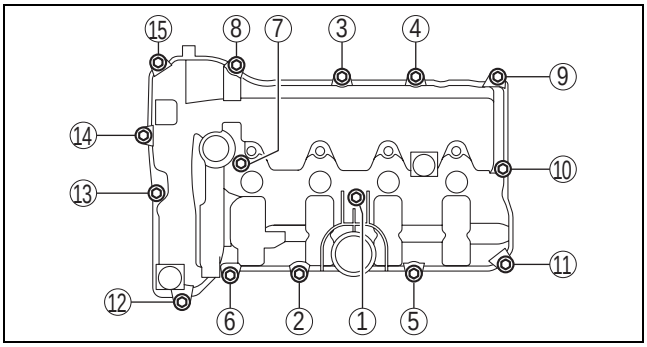
2. Apply silicone sealant to the areas shown in the figure.



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3. Tighten the cylinder head cover bolts in the order shown in the figure.

Tightening torque
4.5—7.0 N·m {46—71 kgf·cm, 40—61 in·lbf}



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01-50 TECHNICAL DATA

ENGINE TECHNICAL DATA 01-50–1

ENGINE TECHNICAL DATA

id015000800100

Item	Specification
OCV coil resistance	6.9—7.5 ohms [20°C {68°F}]
Maximum distortion, head gasket side of the cylinder head	0.05 mm {0.002 in}
Maximum distortion, manifold side	IN: 0.10 mm {0.0039 in} EX: 0.05 mm {0.002 in}
Maximum cutting length, manifold side	IN: Cutting not authorized EX: 0.20 mm {0.0079 in}
Standard valve seat contact width	1.37—1.84 mm {0.0540—0.0724 in}
Valve seat angle	45°
Standard valve seat sinkage amount (Dimension L)	IN: 48.93—50.17 mm {1.927—1.975 in} EX: 48.87—50.11 mm {1.925—1.972 in}
Standard valve head margin thickness	IN: 1.75—1.95 mm {0.0689—0.0767 in} EX: 1.95—2.15 mm {0.0768—0.0846 in}
Standard valve length	IN: 107.00—107.60 mm {4.2127—4.2362 in} EX: 117.09—117.69 mm {4.6099—4.6334 in}
Minimum valve length	IN: 106.78 mm {4.2039 in} EX: 116.87 mm {4.6012 in}.
Standard valve stem diameter	IN: 5.470—5.485 mm {0.2154—0.2159 in} EX: 5.465—5.480 mm {0.2152—0.2157 in}
Minimum valve stem diameter	IN: 5.424 mm {0.2135 in} EX: 5.419 mm {0.2133 in}
Standard valve guide inner diameter	IN: 5.510—5.530 mm {0.2170—0.2177 in} EX: 5.510—5.530 mm {0.2170—0.2177 in}
Standard clearance between valve stem and guide	IN: 0.025—0.060 mm {0.0010—0.0023 in} EX: 0.030—0.065 mm {0.0012—0.0025 in}
Maximum clearance between valve stem and guide	0.10 mm {0.0039 in}
Standard valve guide projection height	IN: 16.4—17.0 mm {0.646—0.669 in} EX: 16.4—17.0 mm {0.646—0.669 in}
Valve spring installation height	When pressurized with spring force of 228—252 N {23.3—25.6 kgf, 51.3—56.6 lbf}, spring height is 38.0 mm {1.50 in}
Maximum valve spring off-square	IN: 2.0 ° (1.7 mm {0.067 in}) EX: 2.0 ° (1.7 mm {0.067 in})
Maximum camshaft runout	0.030 mm {0.0012 in}
Standard cam height	IN: 42.34 mm {1.667 in} EX: 40.37 mm {1.589 in}
Minimum cam height	IN: 42.27 mm {1.664 in} EX: 40.30 mm {1.587 in}
Standard camshaft journal diameter	24.96—24.98 mm {0.9827—0.9834 in}
Minimum camshaft journal diameter	24.93 mm {0.9815 in}
Standard camshaft journal oil clearance	0.035—0.080 mm {0.0014—0.0031 in}
Maximum camshaft journal oil clearance	0.090 mm {0.0035 in}
Standard camshaft end play	0.07—0.22 mm {0.003—0.008 in}
Maximum camshaft end play	0.23 mm {0.0091 in}
Maximum distortion, head gasket side of the cylinder block	0.10 mm {0.0039 in}
Standard cylinder bore diameter	89.000—89.030 mm {3.5040—3.5051 in}
Oil jet valve opening pressure	180—220 kPa {1.84—2.24 kgf/cm^2, 26.2—31.9 psi}
Standard piston outer diameter	88.965—88.995 mm {3.5026—3.5037 in}
Standard clearance between piston and cylinder	0.025—0.045 mm {0.0010—0.0017 in}
Maximum clearance between piston and cylinder	0.066 mm {0.0026 in}

Item	Specification
Standard clearance between piston ring and ring groove	Top: 0.04—0.08 mm {0.002—0.003 in} Second: 0.03—0.07 mm {0.0012—0.0027 in} Oil: 0.04—0.12 mm {0.002—0.004 in}
Maximum clearance between piston ring and ring groove	Top: 0.12 mm {0.0047 in} Second: 0.10 mm {0.0039 in} Oil: 0.17 mm {0.0067 in}
Standard piston ring end gap	Top: 0.13—0.18 mm {0.0052—0.0070 in} Second: 0.18—0.28 mm {0.008—0.011 in} Oil (Rail): 0.10—0.35 mm {0.004—0.013 in}
Maximum piston ring end gap	Top: 0.35 mm {0.014 in} Second: 0.45 mm {0.018 in} Oil (Rail): 0.52 mm {0.020 in}
Standard piston pin outer diameter	20.995—21.000 mm {0.82658—0.82677 in}
Standard piston pin hole diameter	21.004—21.008 mm {0.82693—0.82708 in}
Standard clearance between piston pin hole diameter and piston pin outer diameter	0.004—0.013 mm {0.0002—0.0005 in}
Standard connecting rod small end inner diameter	21.002—21.013 mm {0.82686—0.82728 in}
Standard clearance between connecting rod small end inner diameter and piston pin outer diameter	0.002—0.018 mm {0.00008—0.00070 in}
Maximum connecting rod bending	0.050 mm {0.0020 in}
Maximum connecting rod distortion	0.050 mm {0.0020 in}
Connecting rod center-to-center distance	154.8 mm {6.094 in}
Standard side clearance at the large end of connecting rod	0.14—0.36 mm {0.006—0.014 in}
Maximum side clearance at the large end of connecting rod	0.465 mm {0.0183 in}
Standard bearing oil clearance at the large end of the connecting rod	0.026—0.052 mm {0.0011—0.0020 in}
Maximum bearing oil clearance at the large end of the connecting rod	0.10 mm {0.0039 in}
Connecting rod bearing size	STD: 1.502—1.519 mm {0.05914—0.05980 in} OS 0.25: 1.628—1.631 mm {0.06410—0.06421 in} OS 0.50: 1.753—1.756 mm {0.06902—0.06913 in}
Standard crankshaft end play	0.08—0.29 mm {0.004—0.011 in}
Maximum crankshaft end play	0.30 mm {0.012 in}
Thrust bearing size	STD: 2.500—2.550 mm {0.0985—0.1003 in} OS 0.25: 2.625—2.675 mm {0.1034—0.1053 in}
Maximum main journal runout	0.10 mm {0.0039 in}
Standard main journal diameter	49.980—50.000 mm {1.9678—1.9685 in}
Maximum main journal off-round	0.005 mm {0.0002 in}
Standard crank pin diameter	49.980—50.000 mm {1.9678—1.9685 in}
Maximum crank pin off-round	0.005 mm {0.0002 in}
Standard main journal oil clearance	0.016—0.039 mm {0.0007—0.0015 in}
Maximum main journal oil clearance	0.084 mm {0.0033 in}
Main bearing size	STD: 2.489—2.510 mm {0.0980—0.0988 in} OS 0.25: 2.614—2.617 mm {0.10292—0.10303 in} OS 0.50: 2.739—2.742 mm {0.10784—0.10795 in}
Dual-mass flywheel guide pin projection maximum amount	11.0—12.0 mm {0.434—0.472 in}
Dual-mass flywheel maximum runout	1.5 mm {0.059 in}
Standard cylinder head bolt length	145.2—145.8 mm {5.717—5.740 in}
Maximum cylinder head bolt length	146.5 mm {5.768 in}
Standard connecting rod bolt length	43.7—44.3 mm {1.73—1.74 in}
Maximum connecting rod bolt length	45.0 mm {1.77 in}
Rear oil seal press on amount	0—0.5 mm {0—0.019 in}
Front oil seal press on amount	0—0.5 mm {0—0.019 in}

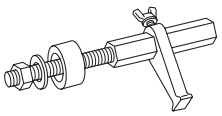
01-60 SERVICE TOOLS

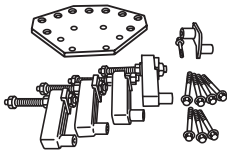
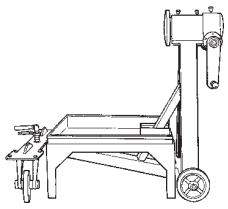
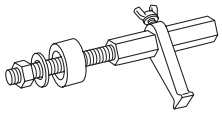
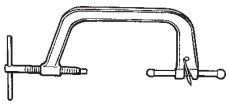
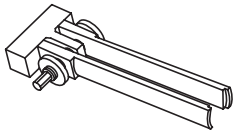
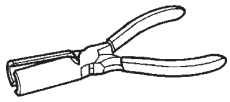
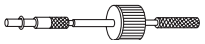
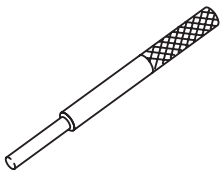
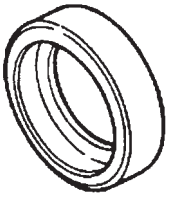
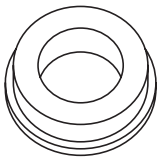
ENGINE SST 01-60–1

ENGINE SST

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1: Mazda SST number
2: Global SST number
Example

1: 49 E011 1A0 2: – Ring gear brake set	

1: 49 L010 1A0 2: – Engine hanger set 	1: 49 0107 680A 2: – Engine stand 	1: 49 E011 1A0 2: – Ring gear brake set 
1: 49 0636 100B 2: – Valve spring lifter arm 	1: 49 B012 0A2A 2: – Pivot 	1: 49 S120 170 2: – Valve seal remover 
1: 49 S120 710 2: – Coupling flange holder 	1: 49 G033 102 2: – Handle 	1: 49 1285 071 2: – Bearing puller 
1: 49 B012 015 2: – Valve guide installer 	1: 49 S033 101 2: – Dust cover installer 	1: 49 B012 016 2: – Attachment 
1: 49 G028 205 2: – Oil seal installer 	—	—

WARNING

Servicing a vehicle can be dangerous. If you have not received service-related training, the risks of injury, property damage, and failure of servicing increase. The recommended servicing procedures for the vehicle in this workshop manual were developed with Mazda-trained technicians in mind. This manual may be useful to non-Mazda trained technicians, but a technician with our service-related training and experience will be at less risk when performing service operations. However, all users of this manual are expected to at least know general safety procedures.

This manual contains "Warnings" and "Cautions" applicable to risks not normally encountered in a general technician's experience. They should be followed to reduce the risk of injury and the risk that improper service or repair may damage the vehicle or render it unsafe. It is also important to understand that the "Warnings" and "Cautions" are not exhaustive. It is impossible to warn of all the hazardous consequences that might result from failure to follow the procedures.

The procedures recommended and described in this manual are effective methods of performing service and repair. Some require tools specifically designed for a specific purpose. Persons using procedures and tools which are not recommended by Mazda Motor Corporation must satisfy themselves thoroughly that neither personal safety nor safety of the vehicle will be jeopardized.

The contents of this manual, including drawings and specifications, are the latest available at the time of printing, and Mazda Motor Corporation reserves the right to change the vehicle designs and alter the contents of this manual without notice and without incurring obligation.

Parts should be replaced with genuine Mazda replacement parts or with parts which match the quality of genuine Mazda replacement parts. Persons using replacement parts of lesser quality than that of genuine Mazda replacement parts must satisfy themselves thoroughly that neither personal safety nor safety of the vehicle will be jeopardized.

Mazda Motor Corporation is not responsible for any problems which may arise from the use of this manual. The cause of such problems includes but is not limited to insufficient service-related training, use of improper tools, use of replacement parts of lesser quality than that of genuine Mazda replacement parts, or not being aware of any revision of this manual.

Automatic Transaxle Workshop Manual FW6A-EL

FOREWORD

This manual explains the service points for the above-indicated automotive system. This manual covers all models with the above-indicated automotive system, not any one specific model.

In order to do these procedures safely, quickly, and correctly, you must first read this manual and any other relevant service materials carefully.

All the contents of this manual, including drawings and specifications, are the latest available at the time of printing.
As modifications affecting repair or maintenance occur, relevant information supplementary to this volume will be made available at Mazda dealers. This manual should be kept up-to-date.

Mazda Motor Corporation reserves the right to alter the specifications and contents of this manual without obligation or advance notice.

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Mazda Motor Corporation
HIROSHIMA, JAPAN

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PRINTED IN U.S.A., JANUARY 2012
Form No. 1A10–1U–12A
Part No. 9999–95–FW6A–12

GENERAL INFORMATION

00
SECTION

GENERAL INFORMATION 00-00

00-00 GENERAL INFORMATION

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HOW TO USE THIS MANUAL

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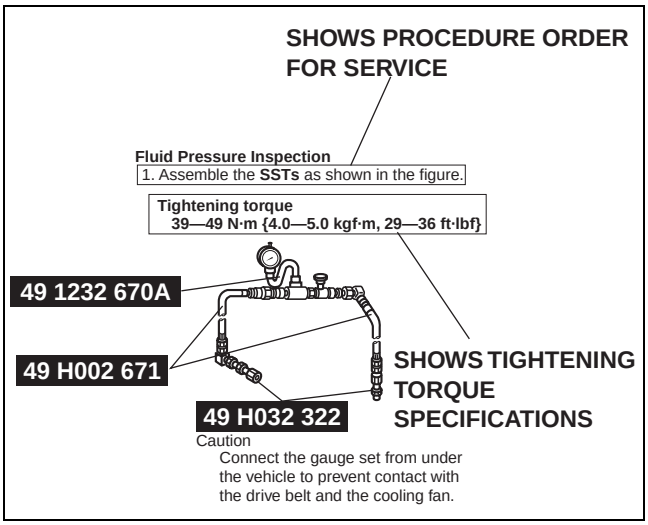
Range of Topics

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

Service Procedure

Inspection, adjustment

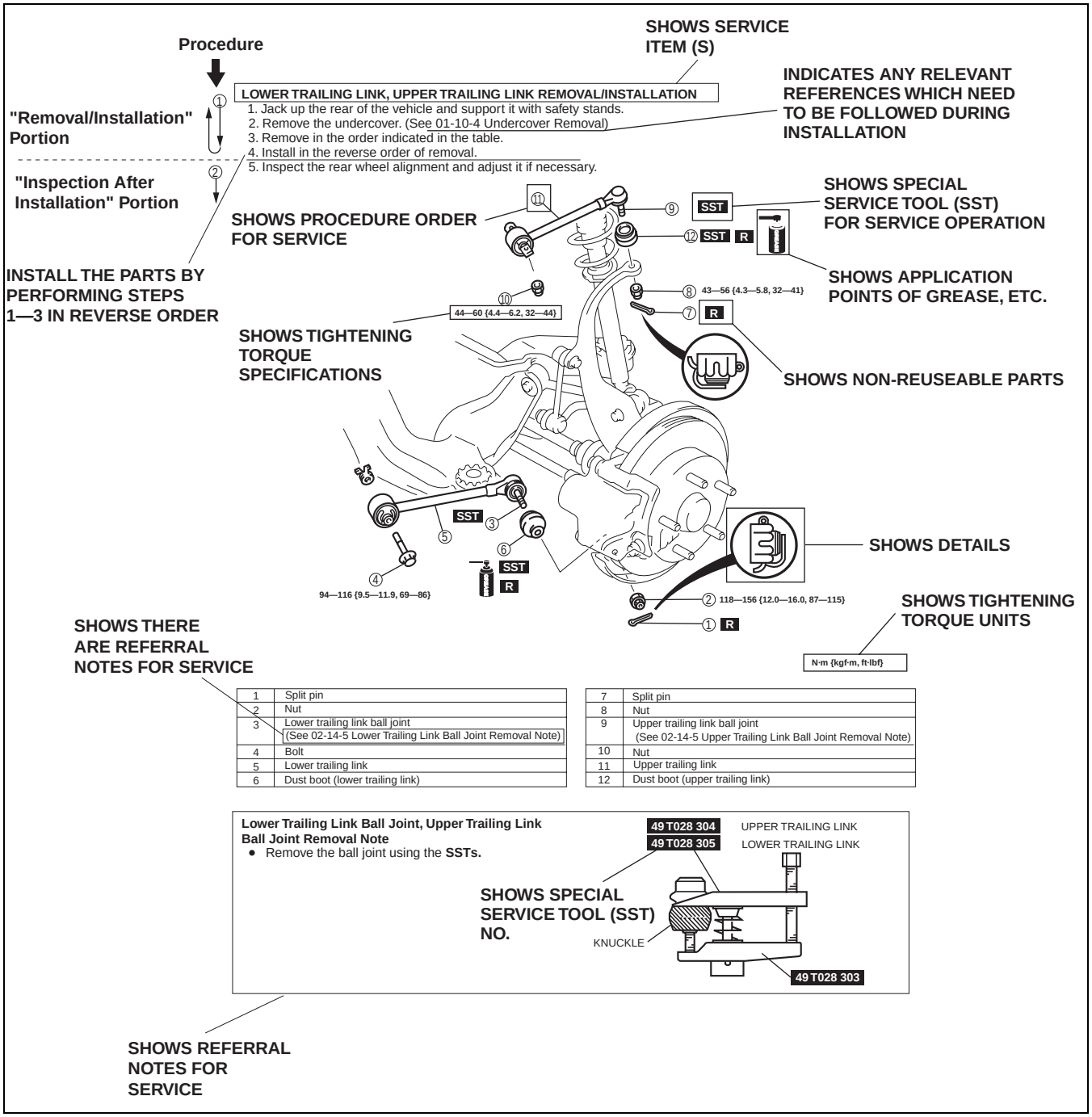
- Inspection and adjustment procedures are divided into steps. Important points regarding the location and contents of the procedures are explained in detail and shown in the illustrations.



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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.



bpe2ue00000001

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
	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

id000000100400

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 From 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.

Number Of Digits For Converted Values

- The number digits for converted values is the same as the number of significant figures*1 of the SI unit.
- For the torque value, the number of significant figures is, in principle, is 2 digits, in consideration of market practicalities. However, if the number of decimal places at the upper and lower limits of the converted value differs, the one with least number of decimal places is used. In addition, if the integer part is 3 digits or more, the integer part becomes the significant number of figures.

*1 : The number of significant figures is the number of digits from the left-most non-zero digit to the right-most digit including 0. (Example: 0.12 is 2 digits, 41.0 is 3 digits)

Converted Value Rounding Off And Rounding Up/down

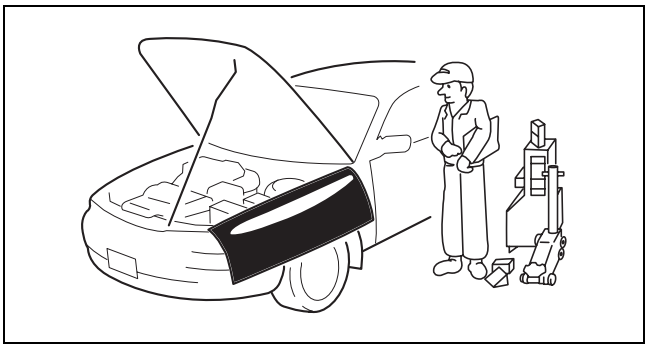
- If there is no tolerance in the SI unit value, after conversion, rounding off is to within the number of significant digits.
- If there is tolerance in the SI unit value and the figure after conversion indicates the upper limit, the number of digits is rounded down to within the number of significant figures. If it indicates the lower limit, they are rounded up to within the number of significant figures.
- Even if the SI unit value is the same, the converted value may differ based on whether that value is the upper or lower limit.

FUNDAMENTAL PROCEDURES

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Preparation of Tools and Measuring Equipment

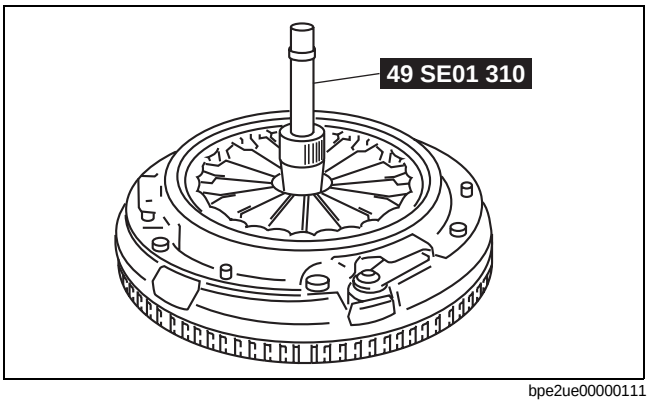
- Be sure that all necessary tools and measuring equipment are available before starting any work.



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Special Service Tools

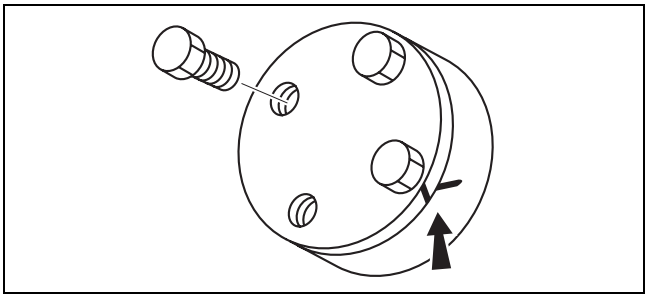
- Use special service tools or equivalent when they are required.



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Disassembly

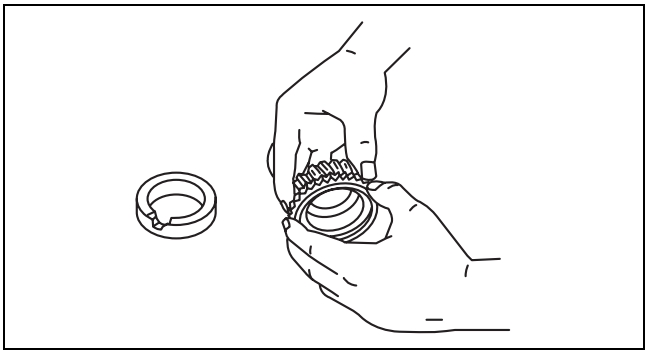
- If the disassembly procedure is complex, requiring many parts to be disassembled, all parts should be marked in a place that will not affect their performance or external appearance and identified so that reassembly can be performed easily and efficiently.



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Inspection During Removal, Disassembly

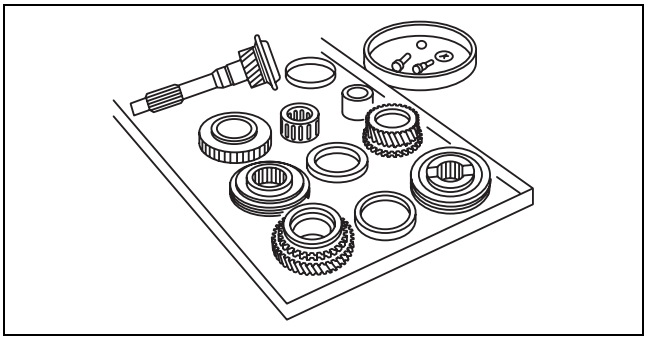
- When removed, each part should be carefully inspected for malfunction, deformation, damage and other problems.



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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.



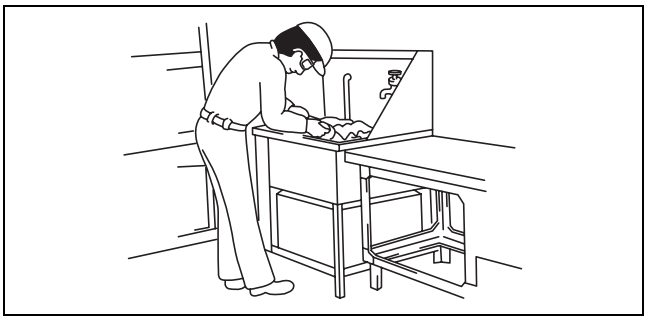
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Cleaning of Parts

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

Warning

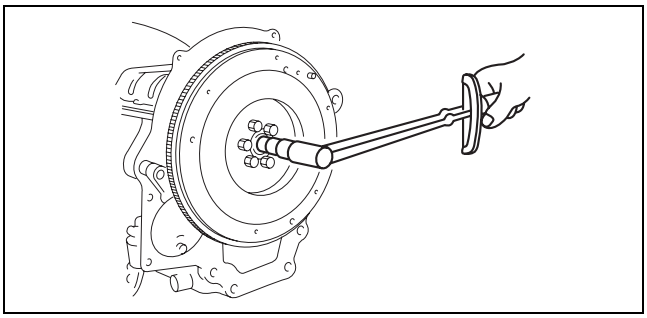
- **Using compressed air can cause dirt and other particles to fly out causing injury to the eyes. Wear protective eye wear whenever using compressed air.**



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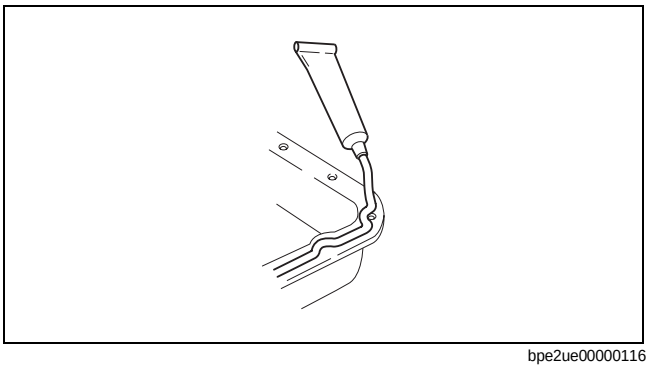
Reassembly

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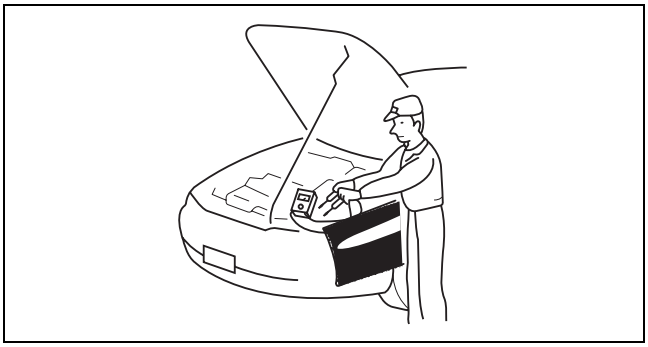
- Depending on location:
  - — Sealant and gaskets, or both, should be applied to specified locations. When sealant is applied, parts should be installed before sealant hardens to prevent leakage.
  - — Oil should be applied to the moving components of parts.
  - — Specified oil or grease should be applied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



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Adjustment

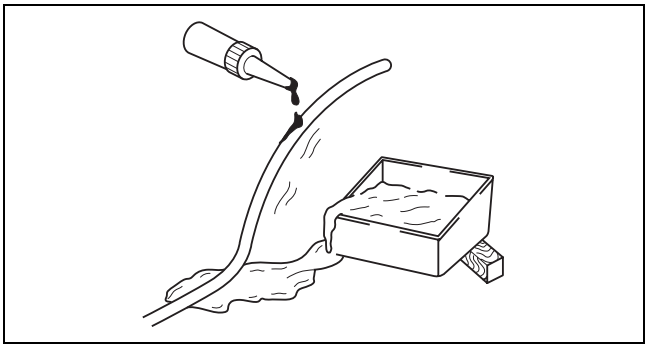
- Use suitable gauges and testers when making adjustments.



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Rubber Parts and Tubing

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

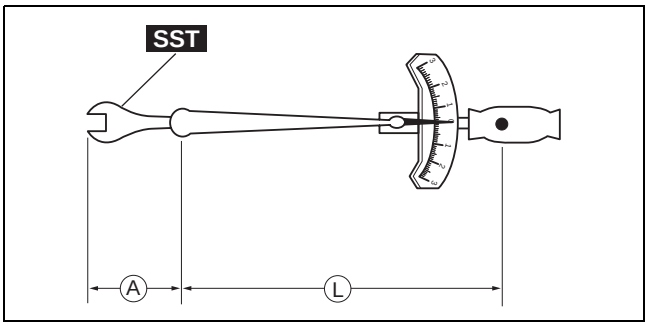


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Torque Formulas

- 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)]

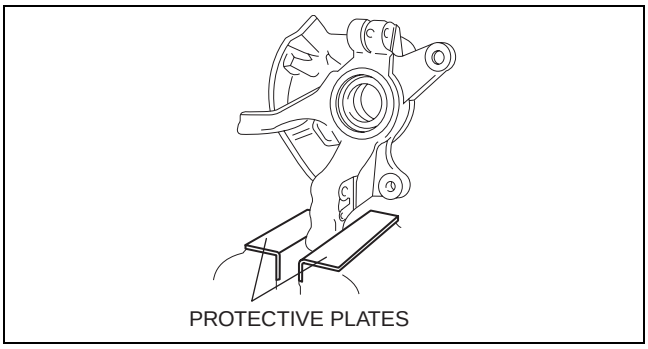


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A : The length of the **SST** past the torque wrench drive.
L : The length of the torque wrench.

Vise

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



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ABBREVIATIONS

id000000010100

ATF	Automatic Transaxle Fluid
LH	Left Hand
SST	Special Service Tool
TCC	Torque Converter Clutch
TCM	Transaxle Control Module

TRANSMISSION/TRANSAXLE

05
SECTION

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FOREWORD

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Warning

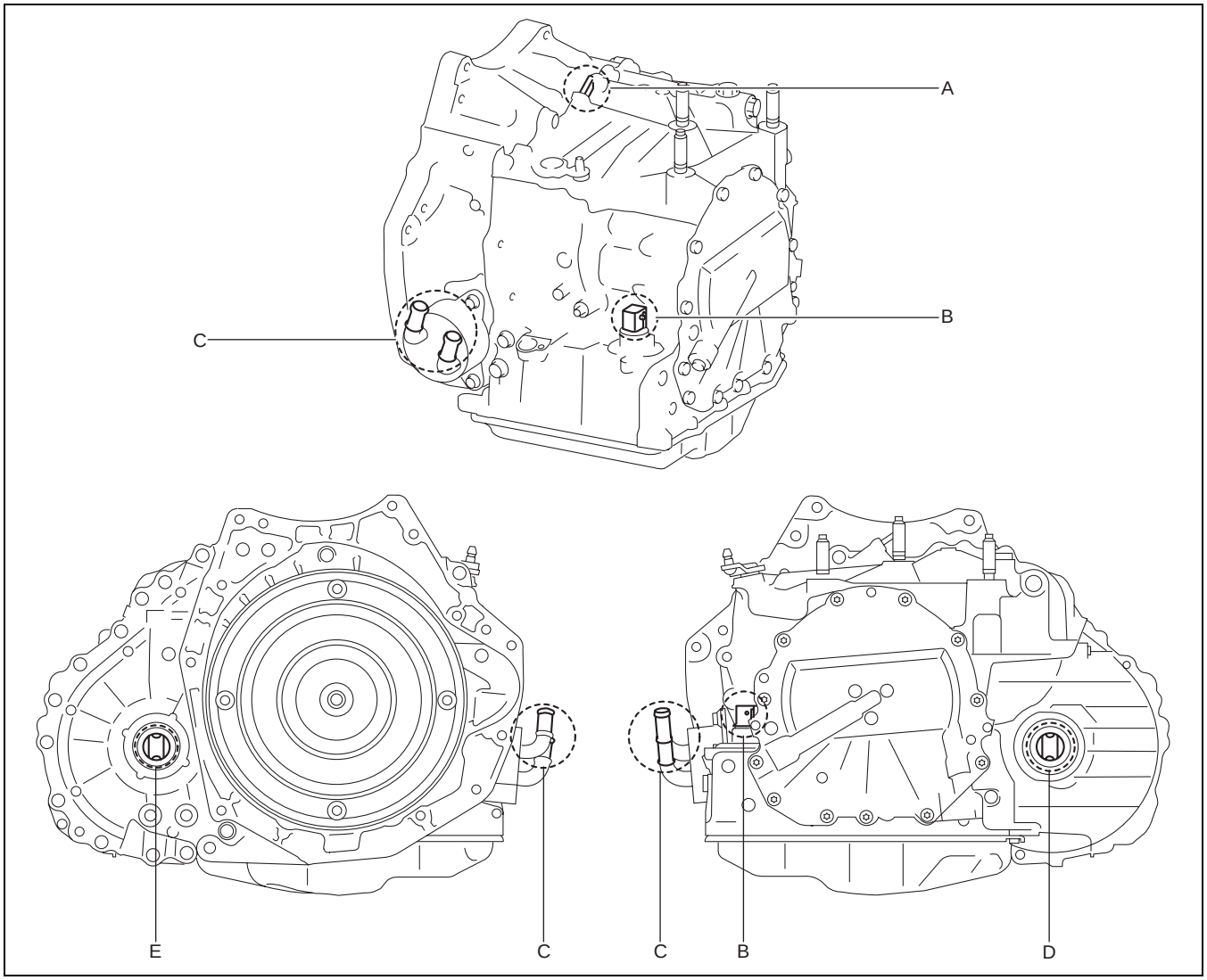
- **The engine stand is equipped with a self-lock mechanism. However, if the transaxle is tilted, the self-lock mechanism could become inoperative. This could cause the transaxle to rotate accidentally, resulting in injury. Therefore, make sure that the transaxle is not tilted when it is on the engine stand. When turning the transaxle, grasp the rotation handle firmly.**
- **Always wear protective eye wear when using the air compressor. Otherwise, ATF or dirt particles blown off by the air compressor could get into the eyes.**

Operation Cautions

- Prevent foreign matter penetration into the transaxle.
  — Clean the outside of the transaxle using steam or degreaser before disassembly.

Caution

- **If the outside of the transaxle is cleaned, plug the position shown in the figure with packing tape and be careful that foreign matter, water, or degreaser does not penetrate the transaxle and connector.**



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A: Breather pipe
B: Control valve body connector
C: Oil cooler
D: Oil seal
E: Oil seal

- — To prevent dust penetration into the transaxle, perform the procedure in a dust free room.
- — To prevent lint penetration into the transaxle, perform the procedure with bare hands or wearing vinyl gloves. Do not use cotton gloves or rag.
- — Organize and store the disassembled parts to protect them from dust or dirt.
- — Before assembly, verify that each part is clean and dried.
- — Clean off remaining old sealant before applying new sealant.
- — Do not clean the following parts, otherwise foreign matter or degreaser may penetrate the oil passage or internal part:
  - Control valve body (including the following parts:)
    - — ON/OFF solenoid
    - — Oil pressure switch A
    - — Oil pressure switch B
    - — Coupler component

- Disassemble while looking for damage, cracks, deformation, scratches, and the assembly condition of parts.
- When servicing, be very careful not to get injured by the edges of parts.
- If ATF is dripping on the floor, wipe it off immediately because a slippery floor is dangerous.
- If the connecting part of a light-alloy part for the transaxle case is disassembled, disassemble it by lightly tapping using a plastic hammer. Do not twist the part or use a flathead screwdriver.
- Thoroughly inspect the foreign matter found in the transaxle or on the magnet to help determine the transaxle condition.
- If using a vise, secure the component using a protective plate (aluminum plate) to prevent component damage.
- Be very careful when handling electronic components.
  - — If a connector is disconnected, do not pull the wiring harness. Pull the connector at a straight angle after releasing the lock.
  - — Do not touch the terminal as the connector terminal could be damaged.
  - — Verify that there is no foreign matter adhering to the connector before connecting the connector.
  - — When connecting a connector, insert it straight until it is securely locked.
  - — Do not apply impact to electronic components. Replace with a new component if one was dropped or received an impact.
- To prevent damage to parts, always use an air compressor adjusted to the indicated pressure.
- Always use ATF FZ for the ATF.
- Always use silicone sealant TB1217E for sealant.
- If the drive plate is replaced with a new one, immerse it in ATF (ATF FZ) for 2 hours or more to permeate the facing with ATF.
- Do not clean the drive plate using degreaser.
- Do not clean the internal part of the torque converter using degreaser.
- Do not clean the internal part of the oil cooler using degreaser.
- Do not clean aluminum and rubber parts using an alkaline agent.
- Do not clean rubber parts using white gasoline and kerosene.
- When assembling a part which is designated for replacement with every disassembly, always use a new part.
- Replace the damaged or deformed snap ring with a new one.

Required SSTs, Measuring Instruments, and Parts for Servicing

- SST
  (See 05-60-1 SERVICE TOOLS.)
- Measuring instrument
  - — Vernier caliper
  - — Micrometer
  - — Cylinder gauge or caliper gauge
  - — Dial gauge
  - — Magnetic stand
  - — Depth gauge
  - — Depth micrometer
  - — Straight edge ruler (two of the same type)
  - — Thickness gauge
  - — Torque wrench

- Part

Part name	Part number	Quantity	Comment
Bolt	9YA02 1440	3	M14×1.5 bolt, length to 100 mm {3.94 in}
Bolt	9YA02 1015	2	M10×1.5 bolt, length to 35 mm {1.4 in}
Bolt	9YA02 A220	4	M12×1.75 bolt, length to 40 mm {1.6 in}
Snap ring	FZ01 19 469	1	Measurement/adjustment for R-3-5 brake clearance
Shim	FZ01 19 2L1	1	Measurement/adjustment for total end play
ATF	—	—	ATF FZ
Sealant	—	—	Silicone sealant TB1217E

After Service Precaution

- After installing the overhauled transaxle to the vehicle, perform the procedure in the following order.

Note

- For the service procedure, verify the Workshop Manual.

1. TCM configuration

Caution

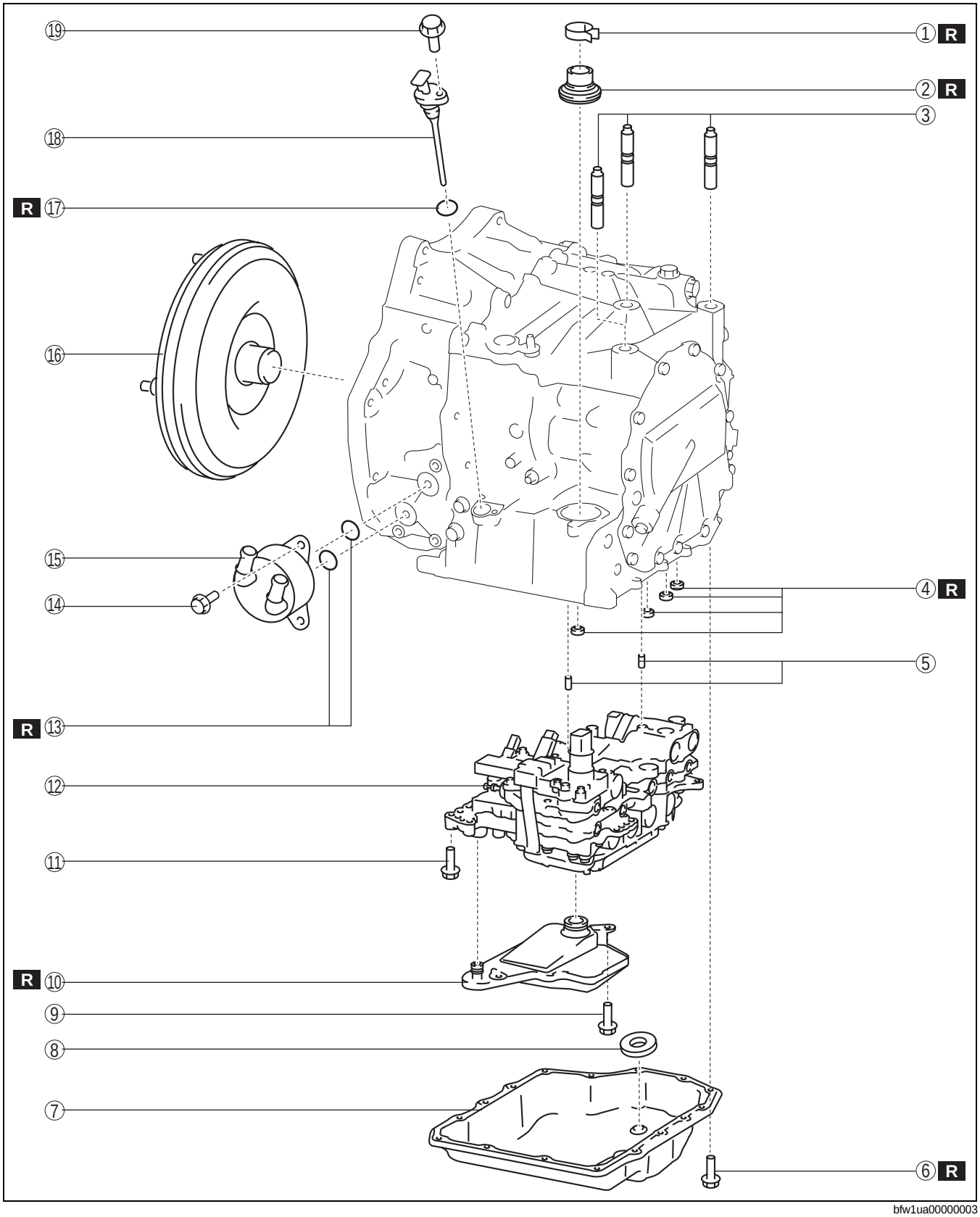
- **Perform the TCM configuration only if the control valve body is replaced.**

2. Initial learning
3. Mechanical system test
4. Road test

AUTOMATIC TRANSAXLE LOCATION INDEX

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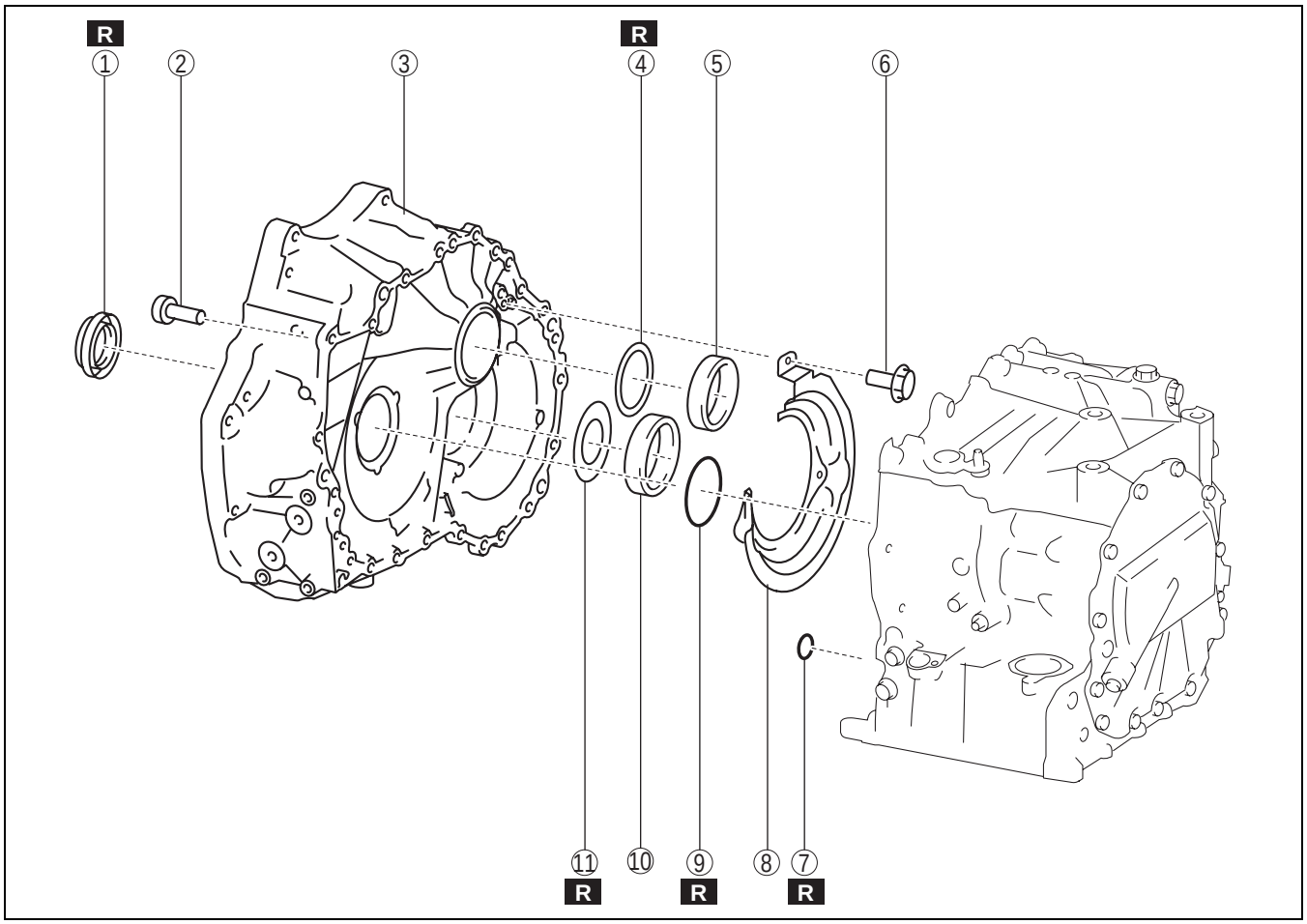
Automatic Transaxle 1



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1	Hose clamp (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.)
2	Oil seal (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.)
3	Stud bolt (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.)
4	Gasket (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.)
5	Dowel pin (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.)
6	16 bolts (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.)
7	Oil pan (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.)
8	Magnet (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.)
9	2 bolts (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.)
10	Oil strainer (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.)
11	11 bolts (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.)
12	Control valve body (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.) (See 05-17-25 Control Valve Body.)
13	O-ring (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.)
14	3 bolts (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.)
15	Oil cooler (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.) (See 05-17-147 OIL COOLER CLEANING.) (See 05-17-177 OIL COOLER INSPECTION.)
16	Torque converter (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.) (See 05-17-145 TORQUE CONVERTER CLEANING.) (See 05-17-154 TORQUE CONVERTER INSPECTION.)
17	O-ring (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.)
18	Dipstick (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.)
19	Bolt (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.)

Automatic Transaxle 2

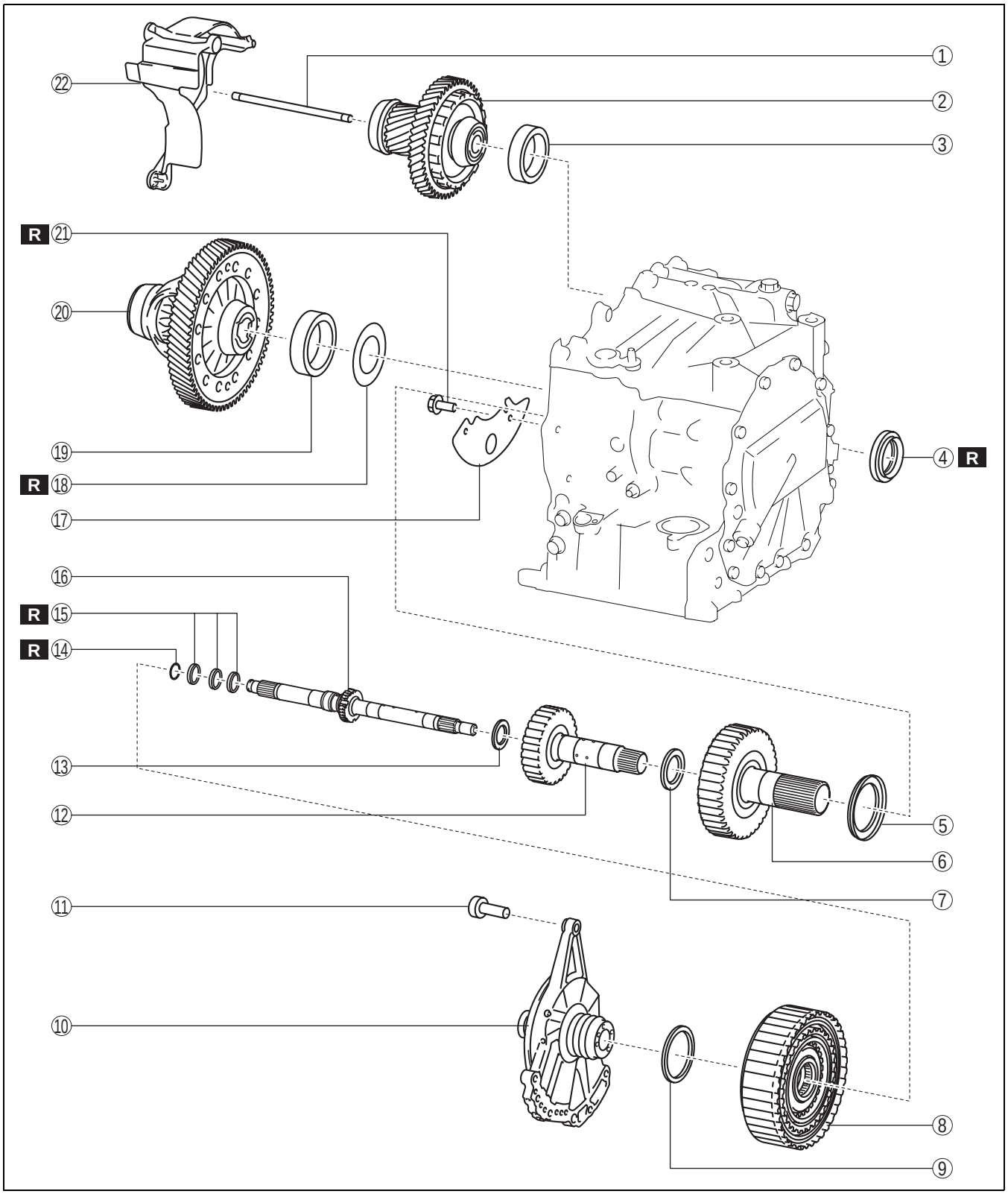


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1	Oil seal (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.)
2	24 bolts (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.)
3	Converter housing (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.)
4	Shim (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.) (See 05-17-364 SECONDARY GEAR AND OUTPUT GEAR PRELOAD MEASUREMENT/ ADJUSTMENT.)
5	Bearing race (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.)
6	3 bolts (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.)
7	O-ring (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.)
8	Baffle plate (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.)
9	O-ring (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.)
10	Bearing race (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.)

11	Shim (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.) (See 05-17-375 RING GEAR AND DIFFERENTIAL PRELOAD MEASUREMENT/ADJUSTMENT.)

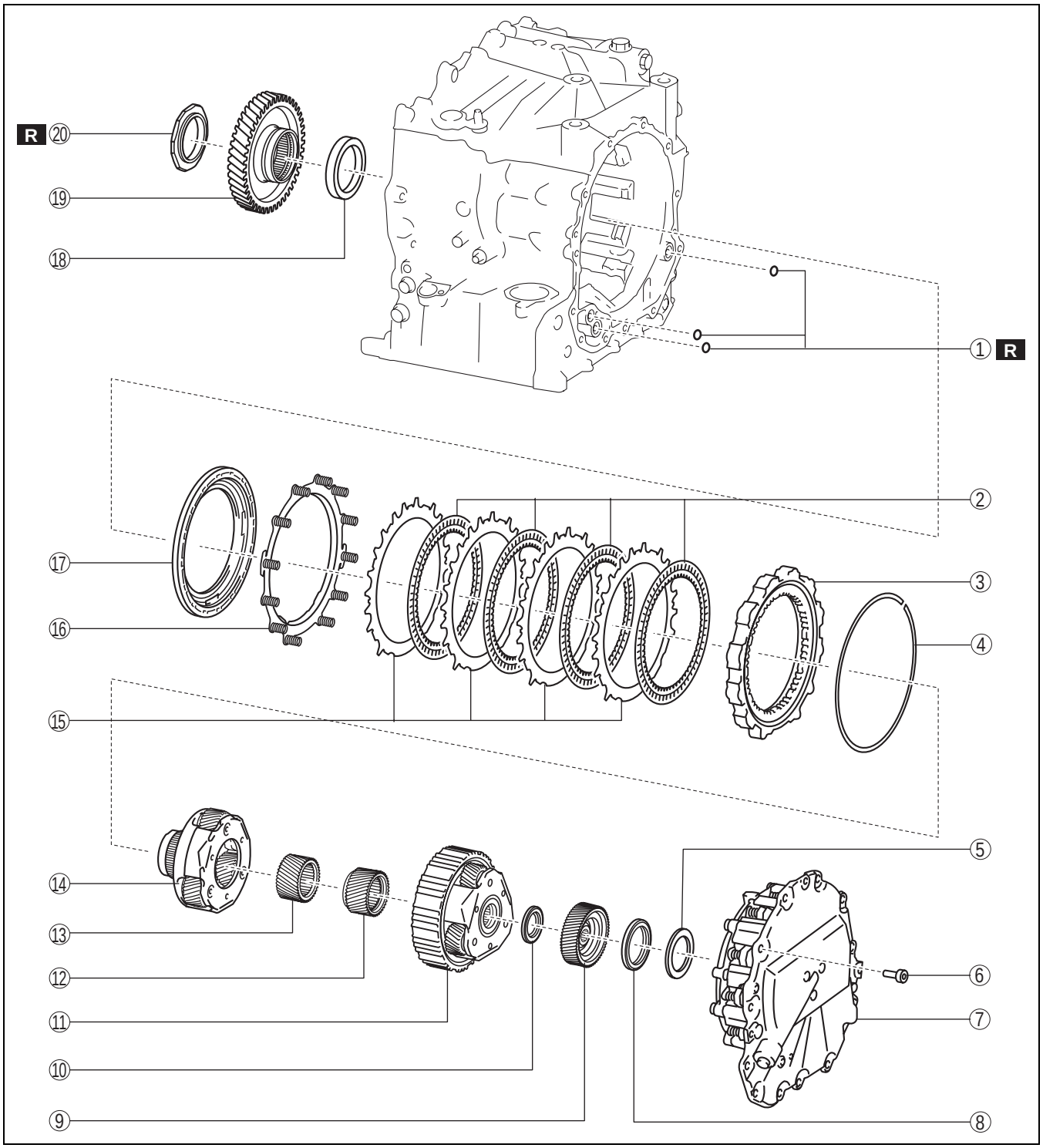
Automatic Transaxle 3



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1	Oil pipe (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.)
2	Secondary gear and output gear (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.) (See 05-17-19 Secondary Gear and Output Gear.)
3	Bearing race (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.)
4	Oil seal (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.)
5	Thrust needle bearing (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.) (See 05-17-155 THRUST NEEDLE BEARING INSPECTION.)
6	Low clutch hub (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.) (See 05-17-173 LOW CLUTCH HUB INSPECTION.)
7	Thrust needle bearing (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.) (See 05-17-155 THRUST NEEDLE BEARING INSPECTION.)
8	Clutch component (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.) (See 05-17-17 Clutch Component.)
9	Thrust needle bearing (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.) (See 05-17-155 THRUST NEEDLE BEARING INSPECTION.)
10	Oil pump (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.) (See 05-17-16 Oil Pump.)
11	7 bolts (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.)
12	High clutch hub (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.) (See 05-17-173 HIGH CLUTCH HUB INSPECTION.)
13	Thrust needle bearing (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.) (See 05-17-155 THRUST NEEDLE BEARING INSPECTION.)
14	D-ring (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.)
15	Seal ring (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.)
16	Turbine shaft (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.)
17	Baffle plate (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.)
18	Shim (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.)
19	Bearing race (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.)
20	Ring gear and differential (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.) (See 05-17-20 Ring Gear and Differential.)
21	2 bolts (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.)
22	Baffle plate (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.)

Automatic Transaxle 4



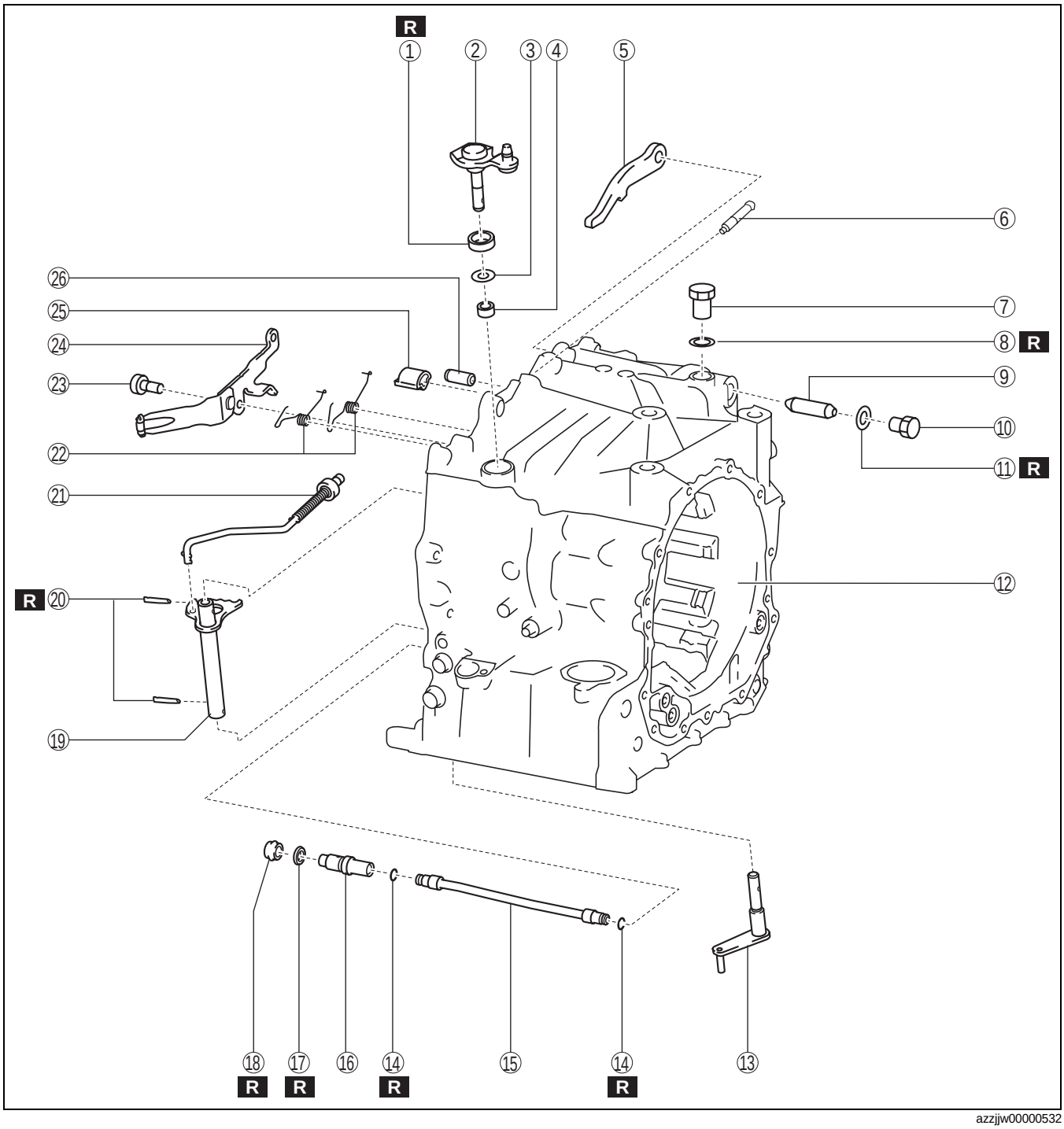
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1	O-ring (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.)
2	Drive plate (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.) (See 05-17-170 LOW AND REVERSE BRAKE INSPECTION.)

3	One-way clutch (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.) (See 05-17-172 ONE-WAY CLUTCH INSPECTION.)

4	Snap ring (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.) (See 05-17-353 LOW AND REVERSE BRAKE CLEARANCE MEASUREMENT/ADJUSTMENT.)
5	Shim (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.) (See 05-17-385 TOTAL END PLAY MEASUREMENT/ADJUSTMENT.)
6	12 bolts (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.)
7	End cover component (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.) (See 05-17-22 End Cover Component.)
8	Thrust needle bearing (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.) (See 05-17-155 THRUST NEEDLE BEARING INSPECTION.)
9	Reduction sun gear (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.)
10	Thrust needle bearing (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.) (See 05-17-155 THRUST NEEDLE BEARING INSPECTION.)
11	Rear planetary gear (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.) (See 05-17-18 Rear Planetary Gear.)
12	Rear sun gear (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.)
13	Front sun gear (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.)
14	Front planetary gear (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.) (See 05-17-155 FRONT PLANETARY GEAR INSPECTION.)
15	Driven plate (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.)
16	Springs and retainer component (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.)
17	Low and reverse brake piston (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.)
18	Angular contact ball bearing (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.)
19	Primary gear (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.)
20	Locknut (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.)

Automatic Transaxle 5



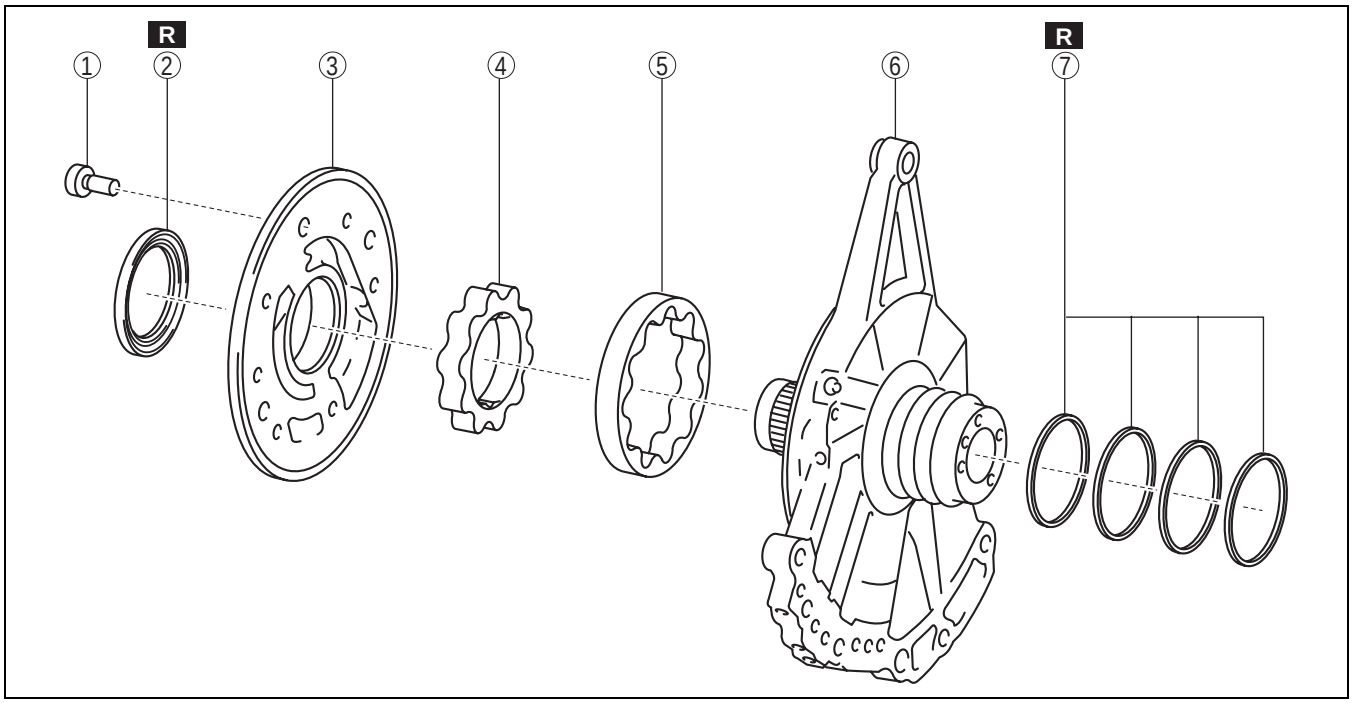
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1	Oil seal (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.) (See 05-17-41 OIL SEAL (PARKING SHIFT LEVER) REPLACEMENT.)
2	Parking shift lever component (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.)

3	Washer (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.)
4	Radial needle bearing (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.)
5	Parking pawl (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.)

6	Breather pipe (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.)
7	Plug (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.)
8	Gasket (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.)
9	Parking pawl shaft (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.)
10	Plug (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.)
11	Gasket (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.)
12	Transaxle case (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.)
13	Parking assist lever component (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.)
14	O-ring (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.)
15	Oil pipe (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.)
16	Connector (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.)
17	Gasket (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.)
18	Gasket (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.)
19	Manual plate component (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.)
20	Roll pin (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.)
21	Parking rod component (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.)
22	Pawl return spring (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.)
23	2 bolts (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.)
24	Detent bracket component (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.)
25	Support actuator (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.)
26	Parking pawl pin (See 05-17-64 AUTOMATIC TRANSAXLE DISASSEMBLY.) (See 05-17-180 AUTOMATIC TRANSAXLE ASSEMBLY.)

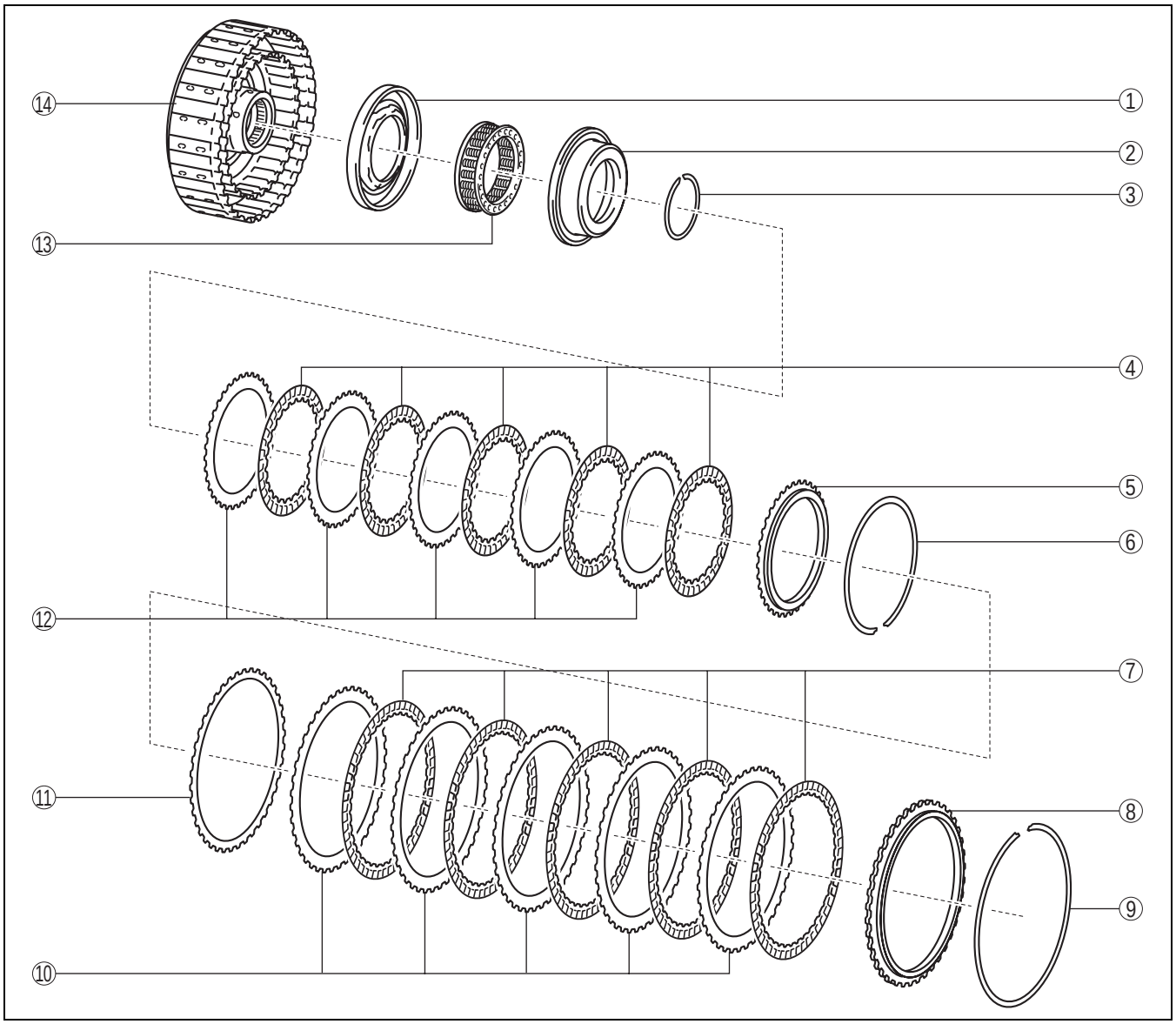
Oil Pump



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1	7 bolts (See 05-17-115 OIL PUMP DISASSEMBLY.) (See 05-17-243 OIL PUMP ASSEMBLY.)
2	Oil seal (See 05-17-115 OIL PUMP DISASSEMBLY.) (See 05-17-243 OIL PUMP ASSEMBLY.) (See 05-17-29 OIL SEAL (OIL PUMP) REPLACEMENT.)
3	Oil pump cover (See 05-17-115 OIL PUMP DISASSEMBLY.) (See 05-17-243 OIL PUMP ASSEMBLY.) (See 05-17-174 OIL PUMP INSPECTION.)
4	Inner rotor (See 05-17-115 OIL PUMP DISASSEMBLY.) (See 05-17-243 OIL PUMP ASSEMBLY.) (See 05-17-174 OIL PUMP INSPECTION.)
5	Outer rotor (See 05-17-115 OIL PUMP DISASSEMBLY.) (See 05-17-243 OIL PUMP ASSEMBLY.) (See 05-17-174 OIL PUMP INSPECTION.)
6	Oil pump housing (See 05-17-115 OIL PUMP DISASSEMBLY.) (See 05-17-243 OIL PUMP ASSEMBLY.) (See 05-17-174 OIL PUMP INSPECTION.)
7	Seal ring (See 05-17-115 OIL PUMP DISASSEMBLY.) (See 05-17-243 OIL PUMP ASSEMBLY.)

Clutch Component

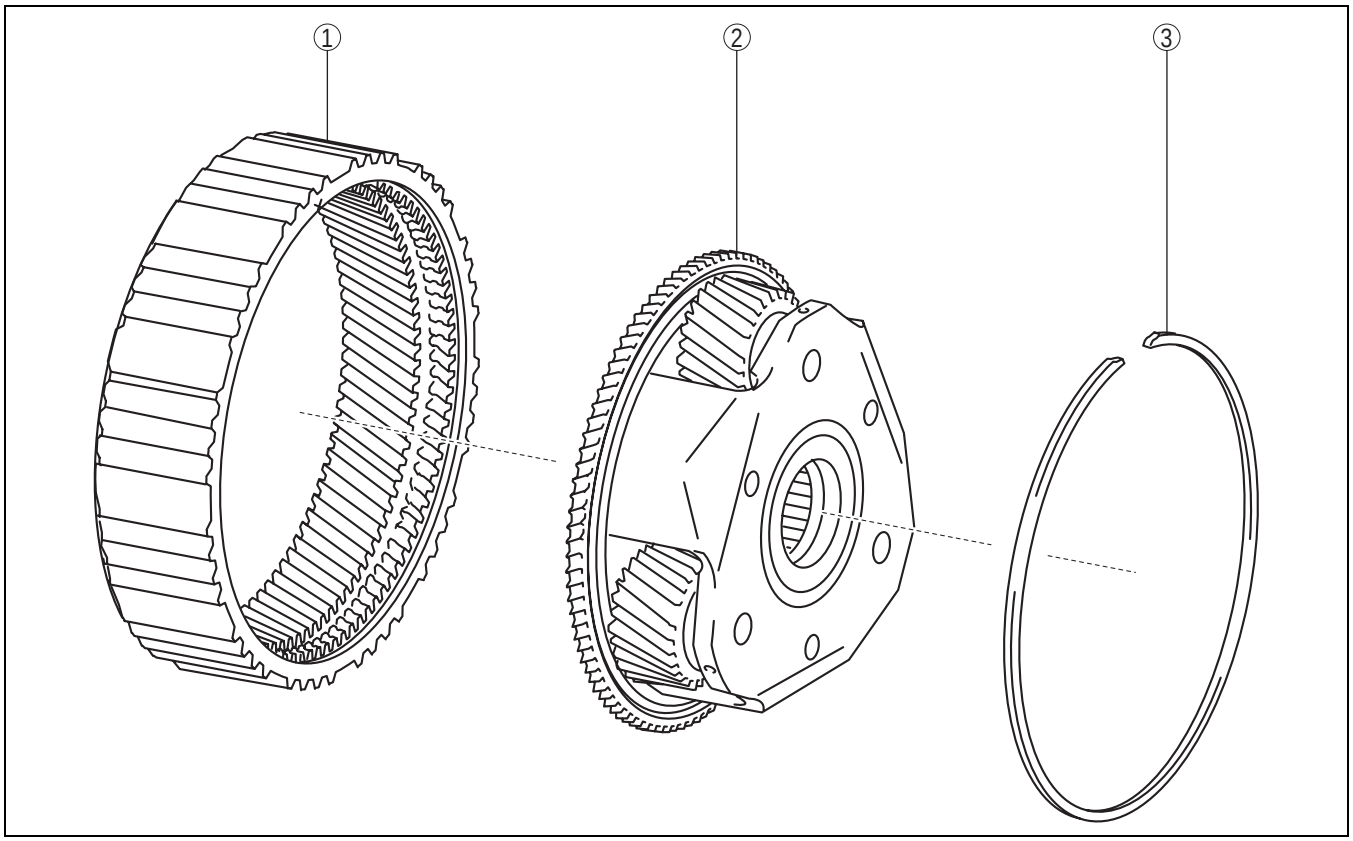


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1	High clutch piston (See 05-17-104 CLUTCH COMPONENT DISASSEMBLY.) (See 05-17-247 CLUTCH COMPONENT ASSEMBLY.)
2	Seal plate (See 05-17-104 CLUTCH COMPONENT DISASSEMBLY.) (See 05-17-247 CLUTCH COMPONENT ASSEMBLY.)
3	Snap ring (See 05-17-104 CLUTCH COMPONENT DISASSEMBLY.) (See 05-17-247 CLUTCH COMPONENT ASSEMBLY.)
4	Drive plate (See 05-17-104 CLUTCH COMPONENT DISASSEMBLY.) (See 05-17-247 CLUTCH COMPONENT ASSEMBLY.) (See 05-17-169 HIGH CLUTCH INSPECTION.)
5	Retaining plate (See 05-17-104 CLUTCH COMPONENT DISASSEMBLY.) (See 05-17-247 CLUTCH COMPONENT ASSEMBLY.)
6	Snap ring (See 05-17-104 CLUTCH COMPONENT DISASSEMBLY.) (See 05-17-247 CLUTCH COMPONENT ASSEMBLY.) (See 05-17-317 HIGH CLUTCH CLEARANCE MEASUREMENT/ADJUSTMENT.)
7	Drive plate (See 05-17-104 CLUTCH COMPONENT DISASSEMBLY.) (See 05-17-247 CLUTCH COMPONENT ASSEMBLY.) (See 05-17-169 LOW CLUTCH INSPECTION.)
8	Retaining plate (See 05-17-104 CLUTCH COMPONENT DISASSEMBLY.) (See 05-17-247 CLUTCH COMPONENT ASSEMBLY.)

9	Snap ring (See 05-17-104 CLUTCH COMPONENT DISASSEMBLY.) (See 05-17-247 CLUTCH COMPONENT ASSEMBLY.) (See 05-17-327 LOW CLUTCH CLEARANCE MEASUREMENT/ADJUSTMENT.)
10	Driven plate (See 05-17-104 CLUTCH COMPONENT DISASSEMBLY.) (See 05-17-247 CLUTCH COMPONENT ASSEMBLY.)
11	Wave spring (See 05-17-104 CLUTCH COMPONENT DISASSEMBLY.) (See 05-17-247 CLUTCH COMPONENT ASSEMBLY.)
12	Driven plate (See 05-17-104 CLUTCH COMPONENT DISASSEMBLY.) (See 05-17-247 CLUTCH COMPONENT ASSEMBLY.)
13	Springs and retainer component (See 05-17-104 CLUTCH COMPONENT DISASSEMBLY.) (See 05-17-247 CLUTCH COMPONENT ASSEMBLY.) (See 05-17-169 HIGH CLUTCH INSPECTION.)
14	High clutch drum component (See 05-17-104 CLUTCH COMPONENT DISASSEMBLY.) (See 05-17-247 CLUTCH COMPONENT ASSEMBLY.) (See 05-17-169 HIGH CLUTCH INSPECTION.)

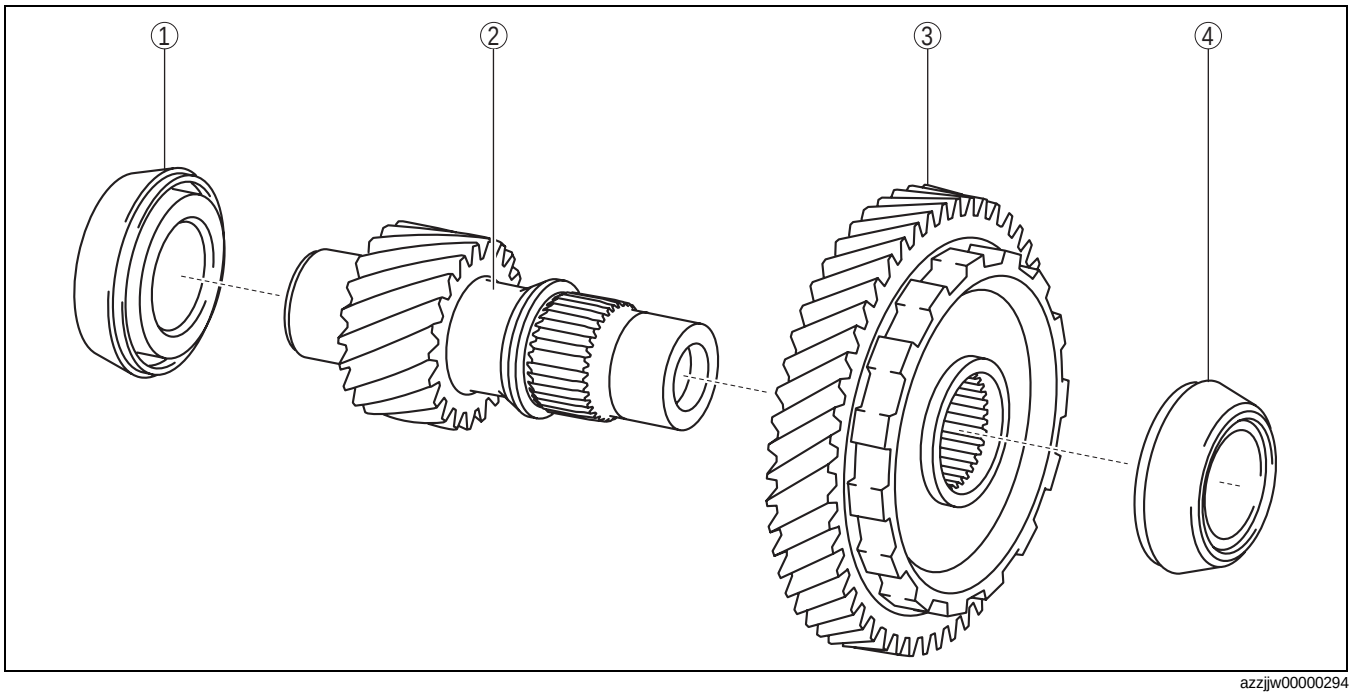
Rear Planetary Gear



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1	Front internal gear (See 05-17-117 REAR PLANETARY GEAR DISASSEMBLY.) (See 05-17-259 REAR PLANETARY GEAR ASSEMBLY.)
2	Rear planetary carrier (See 05-17-117 REAR PLANETARY GEAR DISASSEMBLY.) (See 05-17-259 REAR PLANETARY GEAR ASSEMBLY.) (See 05-17-158 REAR PLANETARY GEAR INSPECTION.)
3	Snap ring (See 05-17-117 REAR PLANETARY GEAR DISASSEMBLY.) (See 05-17-259 REAR PLANETARY GEAR ASSEMBLY.)

Secondary Gear and Output Gear

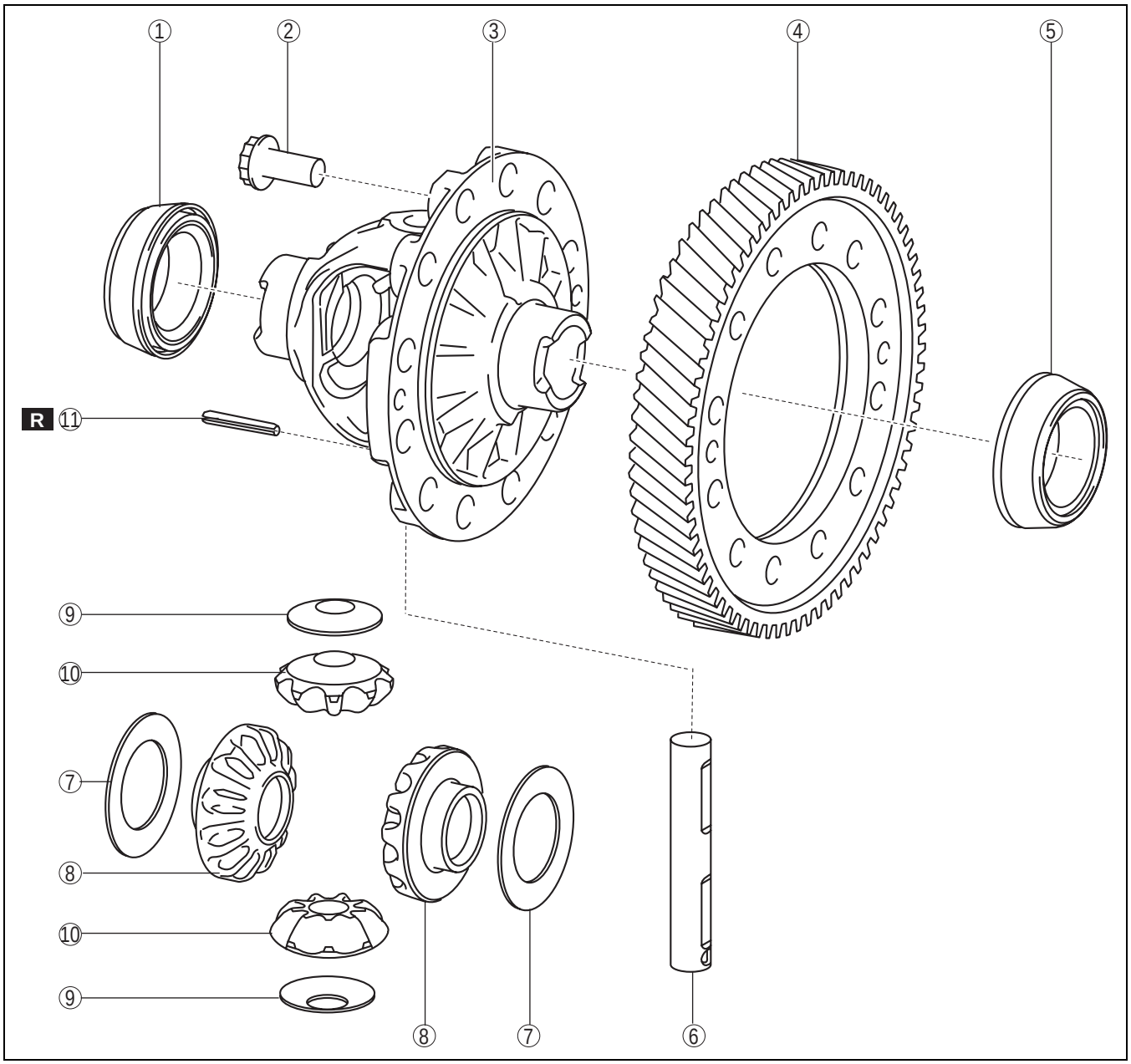


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1	Tapered roller bearing (See 05-17-119 SECONDARY GEAR AND OUTPUT GEAR DISASSEMBLY.) (See 05-17-263 SECONDARY GEAR AND OUTPUT GEAR ASSEMBLY.) (See 05-17-163 SECONDARY GEAR AND OUTPUT GEAR INSPECTION.)
2	Output gear (See 05-17-119 SECONDARY GEAR AND OUTPUT GEAR DISASSEMBLY.) (See 05-17-263 SECONDARY GEAR AND OUTPUT GEAR ASSEMBLY.)

3	Secondary gear (See 05-17-119 SECONDARY GEAR AND OUTPUT GEAR DISASSEMBLY.) (See 05-17-263 SECONDARY GEAR AND OUTPUT GEAR ASSEMBLY.)
4	Tapered roller bearing (See 05-17-119 SECONDARY GEAR AND OUTPUT GEAR DISASSEMBLY.) (See 05-17-263 SECONDARY GEAR AND OUTPUT GEAR ASSEMBLY.) (See 05-17-163 SECONDARY GEAR AND OUTPUT GEAR INSPECTION.)

Ring Gear and Differential

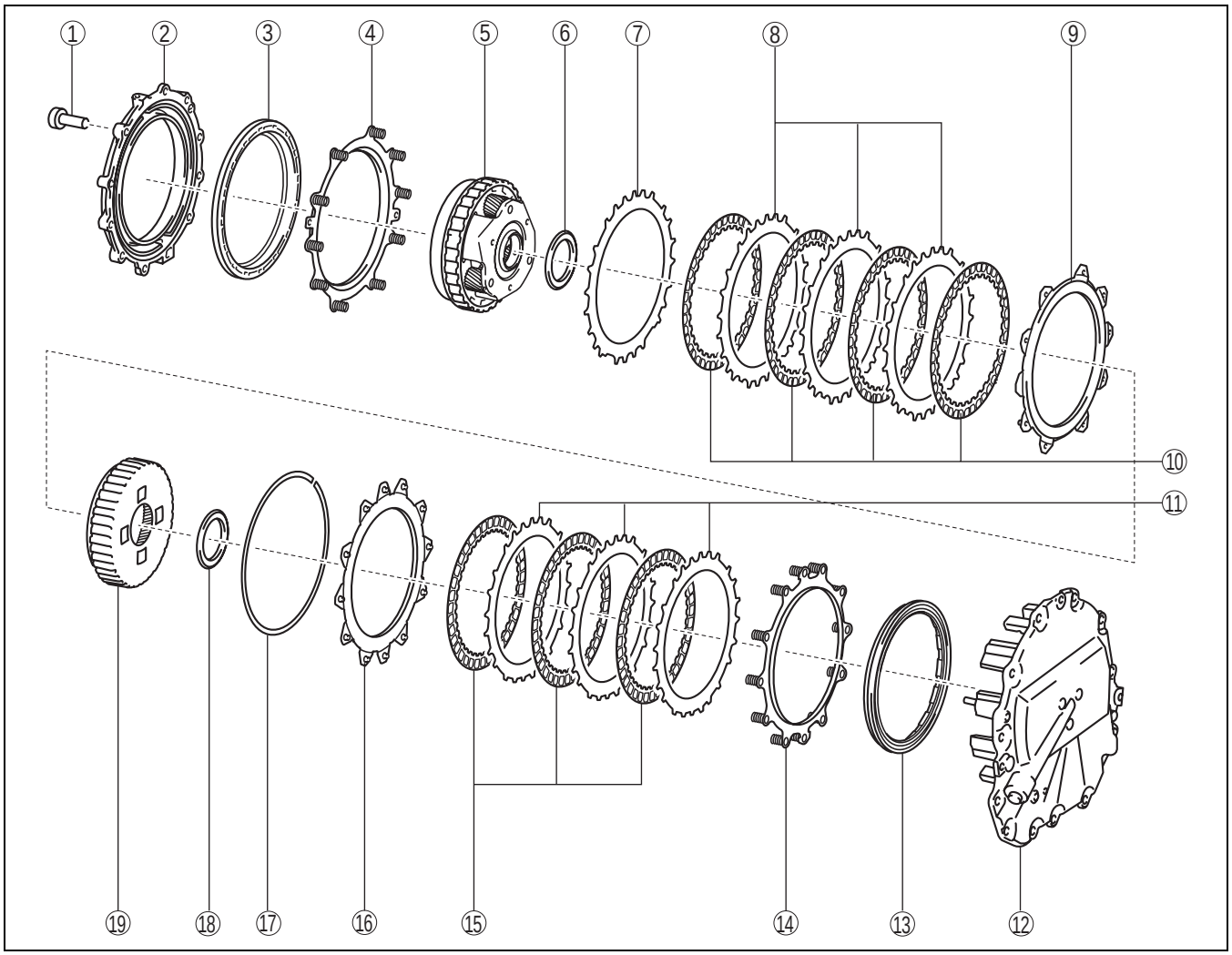


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1	Tapered roller bearing (See 05-17-121 RING GEAR AND DIFFERENTIAL DISASSEMBLY.) (See 05-17-266 RING GEAR AND DIFFERENTIAL ASSEMBLY.) (See 05-17-165 RING GEAR AND DIFFERENTIAL INSPECTION.)
2	12 bolts (See 05-17-121 RING GEAR AND DIFFERENTIAL DISASSEMBLY.) (See 05-17-266 RING GEAR AND DIFFERENTIAL ASSEMBLY.)
3	Differential gear case (See 05-17-121 RING GEAR AND DIFFERENTIAL DISASSEMBLY.) (See 05-17-266 RING GEAR AND DIFFERENTIAL ASSEMBLY.) (See 05-17-165 RING GEAR AND DIFFERENTIAL INSPECTION.)
4	Ring gear (See 05-17-121 RING GEAR AND DIFFERENTIAL DISASSEMBLY.) (See 05-17-266 RING GEAR AND DIFFERENTIAL ASSEMBLY.)
5	Tapered roller bearing (See 05-17-121 RING GEAR AND DIFFERENTIAL DISASSEMBLY.) (See 05-17-266 RING GEAR AND DIFFERENTIAL ASSEMBLY.) (See 05-17-165 RING GEAR AND DIFFERENTIAL INSPECTION.)
6	Pinion shaft (See 05-17-121 RING GEAR AND DIFFERENTIAL DISASSEMBLY.) (See 05-17-266 RING GEAR AND DIFFERENTIAL ASSEMBLY.)

7	Thrust washer (See 05-17-121 RING GEAR AND DIFFERENTIAL DISASSEMBLY.) (See 05-17-266 RING GEAR AND DIFFERENTIAL ASSEMBLY.) (See 05-17-303 DIFFERENTIAL BACKLASH MEASUREMENT/ADJUSTMENT.)
8	Side gear (See 05-17-121 RING GEAR AND DIFFERENTIAL DISASSEMBLY.) (See 05-17-266 RING GEAR AND DIFFERENTIAL ASSEMBLY.)
9	Thrust washer (See 05-17-121 RING GEAR AND DIFFERENTIAL DISASSEMBLY.) (See 05-17-266 RING GEAR AND DIFFERENTIAL ASSEMBLY.)
10	Pinion gear (See 05-17-121 RING GEAR AND DIFFERENTIAL DISASSEMBLY.) (See 05-17-266 RING GEAR AND DIFFERENTIAL ASSEMBLY.)
11	Roll pin (See 05-17-121 RING GEAR AND DIFFERENTIAL DISASSEMBLY.) (See 05-17-266 RING GEAR AND DIFFERENTIAL ASSEMBLY.)

End Cover Component

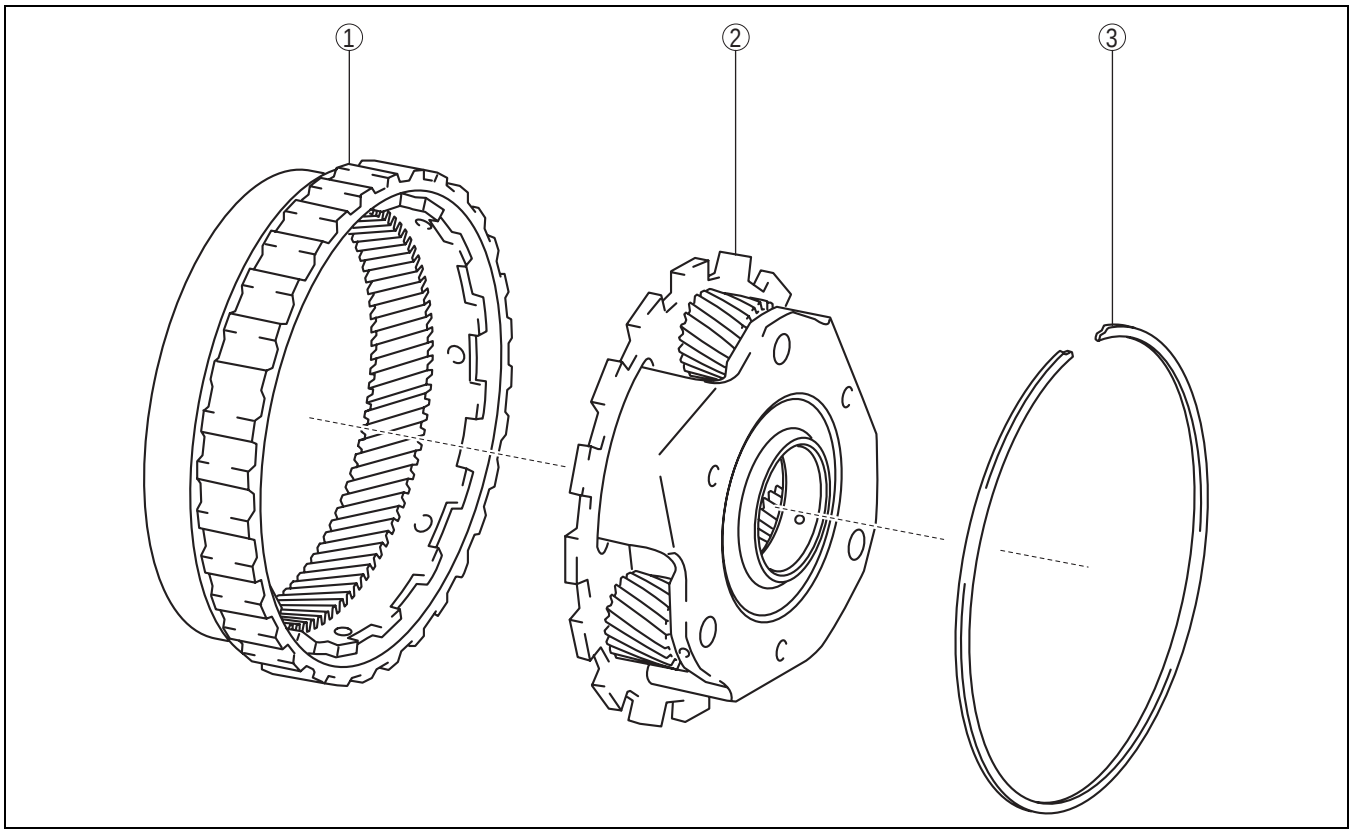


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1	8 bolts (See 05-17-128 END COVER COMPONENT DISASSEMBLY.) (See 05-17-273 END COVER COMPONENT ASSEMBLY.)
2	Brake housing (See 05-17-128 END COVER COMPONENT DISASSEMBLY.) (See 05-17-273 END COVER COMPONENT ASSEMBLY.)
3	2-6 brake piston (See 05-17-128 END COVER COMPONENT DISASSEMBLY.) (See 05-17-273 END COVER COMPONENT ASSEMBLY.)
4	Springs and retainer component (See 05-17-128 END COVER COMPONENT DISASSEMBLY.) (See 05-17-273 END COVER COMPONENT ASSEMBLY.)
5	Reduction planetary gear (See 05-17-128 END COVER COMPONENT DISASSEMBLY.) (See 05-17-273 END COVER COMPONENT ASSEMBLY.) (See 05-17-24 Reduction Planetary Gear.)
6	Thrust needle bearing (See 05-17-128 END COVER COMPONENT DISASSEMBLY.) (See 05-17-273 END COVER COMPONENT ASSEMBLY.) (See 05-17-155 THRUST NEEDLE BEARING INSPECTION.)
7	Retaining plate (See 05-17-128 END COVER COMPONENT DISASSEMBLY.) (See 05-17-273 END COVER COMPONENT ASSEMBLY.) (See 05-17-347 2-6 BRAKE CLEARANCE MEASUREMENT/ADJUSTMENT.)
8	Driven plate (See 05-17-128 END COVER COMPONENT DISASSEMBLY.) (See 05-17-273 END COVER COMPONENT ASSEMBLY.)
9	Retaining plate (See 05-17-128 END COVER COMPONENT DISASSEMBLY.) (See 05-17-273 END COVER COMPONENT ASSEMBLY.)

10	Drive plate (See 05-17-128 END COVER COMPONENT DISASSEMBLY.) (See 05-17-273 END COVER COMPONENT ASSEMBLY.) (See 05-17-171 2-6 BRAKE INSPECTION.)
11	Driven plate (See 05-17-128 END COVER COMPONENT DISASSEMBLY.) (See 05-17-273 END COVER COMPONENT ASSEMBLY.)
12	End cover (See 05-17-128 END COVER COMPONENT DISASSEMBLY.) (See 05-17-273 END COVER COMPONENT ASSEMBLY.) (See 05-17-177 END COVER INSPECTION.)
13	R-3-5 brake piston (See 05-17-128 END COVER COMPONENT DISASSEMBLY.) (See 05-17-273 END COVER COMPONENT ASSEMBLY.)
14	Springs and retainer component (See 05-17-128 END COVER COMPONENT DISASSEMBLY.) (See 05-17-273 END COVER COMPONENT ASSEMBLY.)
15	Drive plate (See 05-17-128 END COVER COMPONENT DISASSEMBLY.) (See 05-17-273 END COVER COMPONENT ASSEMBLY.) (See 05-17-171 R-3-5 BRAKE INSPECTION.)
16	Retaining plate (See 05-17-128 END COVER COMPONENT DISASSEMBLY.) (See 05-17-273 END COVER COMPONENT ASSEMBLY.)
17	Snap ring (See 05-17-128 END COVER COMPONENT DISASSEMBLY.) (See 05-17-273 END COVER COMPONENT ASSEMBLY.) (See 05-17-339 R-3-5 BRAKE CLEARANCE MEASUREMENT/ADJUSTMENT.)
18	Thrust needle bearing (See 05-17-128 END COVER COMPONENT DISASSEMBLY.) (See 05-17-273 END COVER COMPONENT ASSEMBLY.) (See 05-17-155 THRUST NEEDLE BEARING INSPECTION.)
19	Reduction internal gear (See 05-17-128 END COVER COMPONENT DISASSEMBLY.) (See 05-17-273 END COVER COMPONENT ASSEMBLY.)

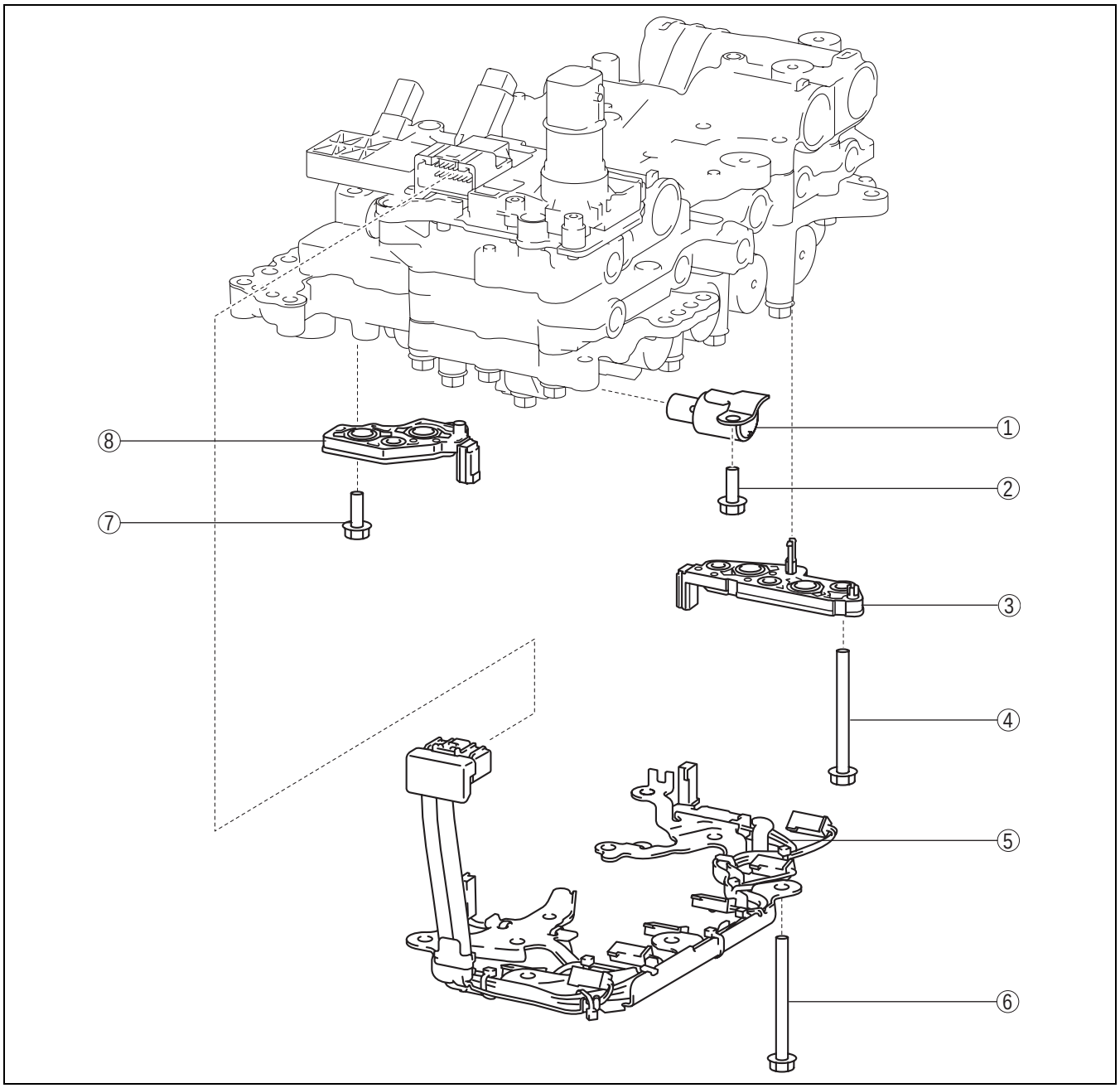
Reduction Planetary Gear



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1	Rear internal gear (See 05-17-136 REDUCTION PLANETARY GEAR DISASSEMBLY.) (See 05-17-261 REDUCTION PLANETARY GEAR ASSEMBLY.)
2	Reduction planetary carrier (See 05-17-136 REDUCTION PLANETARY GEAR DISASSEMBLY.) (See 05-17-261 REDUCTION PLANETARY GEAR ASSEMBLY.) (See 05-17-161 REDUCTION PLANETARY GEAR INSPECTION.)
3	Snap ring (See 05-17-136 REDUCTION PLANETARY GEAR DISASSEMBLY.) (See 05-17-261 REDUCTION PLANETARY GEAR ASSEMBLY.)

Control Valve Body



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1	ON/OFF solenoid (See 05-17-138 CONTROL VALVE BODY DISASSEMBLY.) (See 05-17-288 CONTROL VALVE BODY ASSEMBLY.)
2	Bolt (See 05-17-138 CONTROL VALVE BODY DISASSEMBLY.) (See 05-17-288 CONTROL VALVE BODY ASSEMBLY.)
3	Oil pressure switch A (See 05-17-138 CONTROL VALVE BODY DISASSEMBLY.) (See 05-17-288 CONTROL VALVE BODY ASSEMBLY.)

4	3 bolts (See 05-17-138 CONTROL VALVE BODY DISASSEMBLY.) (See 05-17-288 CONTROL VALVE BODY ASSEMBLY.)
5	Coupler component (See 05-17-138 CONTROL VALVE BODY DISASSEMBLY.) (See 05-17-288 CONTROL VALVE BODY ASSEMBLY.)
6	8 bolts (See 05-17-138 CONTROL VALVE BODY DISASSEMBLY.) (See 05-17-288 CONTROL VALVE BODY ASSEMBLY.)

7	3 bolts (See 05-17-138 CONTROL VALVE BODY DISASSEMBLY.) (See 05-17-288 CONTROL VALVE BODY ASSEMBLY.)
8	Oil pressure switch B (See 05-17-138 CONTROL VALVE BODY DISASSEMBLY.) (See 05-17-288 CONTROL VALVE BODY ASSEMBLY.)

AUTOMATIC TRANSAXLE CLEANING

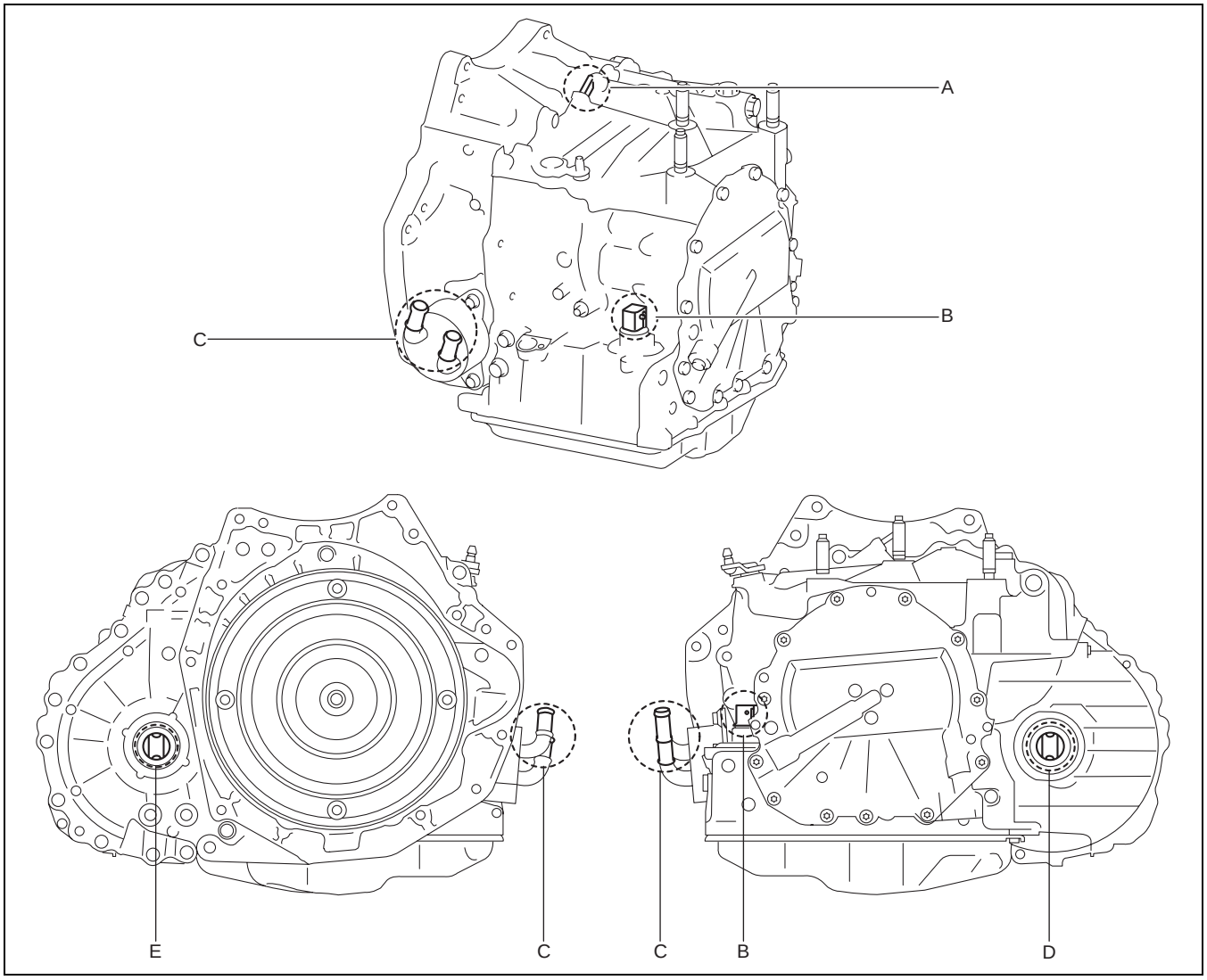
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Cleaning Before Disassembly

1. Clean the outside of the transaxle using steam or degreaser before disassembly.

Caution

- **If foreign matter, water, or degreaser penetrates the transaxle and connector, it could cause a malfunction. Before cleaning the outside of the transaxle, plug the position shown in the figure with the packing tape.**



bfw1ua00000005

A: Breather pipe
B: Control valve body connector
C: Oil cooler
D: Oil seal
E: Oil seal

2. Dry the outside of the transaxle with an air compressor.

Warning
- **Always wear protective eye wear when using the air compressor. Otherwise, ATF or dirt particles blown off by the air compressor could get into the eyes.**

Cleaning After Disassembly

Caution
- **Do not clean the following parts, otherwise foreign matter or degreaser may penetrate the oil passage or internal part:**
  - **— Control valve body (including the following parts:)**
    - **ON/OFF solenoid**
    - **Oil pressure switch A**
    - **Oil pressure switch B**
    - **Coupler component**

1. Clean the torque converter. (See 05-17-145 TORQUE CONVERTER CLEANING.)

Caution
- **To prevent damage to the parts, do not clean the inside of the torque converter using degreaser.**

2. Clean the oil cooler. (See 05-17-147 OIL COOLER CLEANING.)

Caution
- **To prevent damage to the parts, do not clean the inside of the oil cooler using degreaser.**

3. Flush dirt on the surface of the drive plate with ATF (ATF FZ).

Caution
- **To prevent damage to the parts, do not clean the drive plate using degreaser.**

4. Clean the disassembled parts using degreaser and dry them using an air compressor. In addition, clean the oil passage using the air compressor.

Warning
- **Always wear protective eye wear when using the air compressor. Otherwise, ATF or dirt particles blown off by the air compressor could get into the eyes.**

Caution
- **To prevent damage to parts, do not clean aluminum and rubber parts using alkaline agent.**
- **To prevent damage to parts, do not clean rubber parts using white gasoline and kerosene.**

Cleaning After Assembly

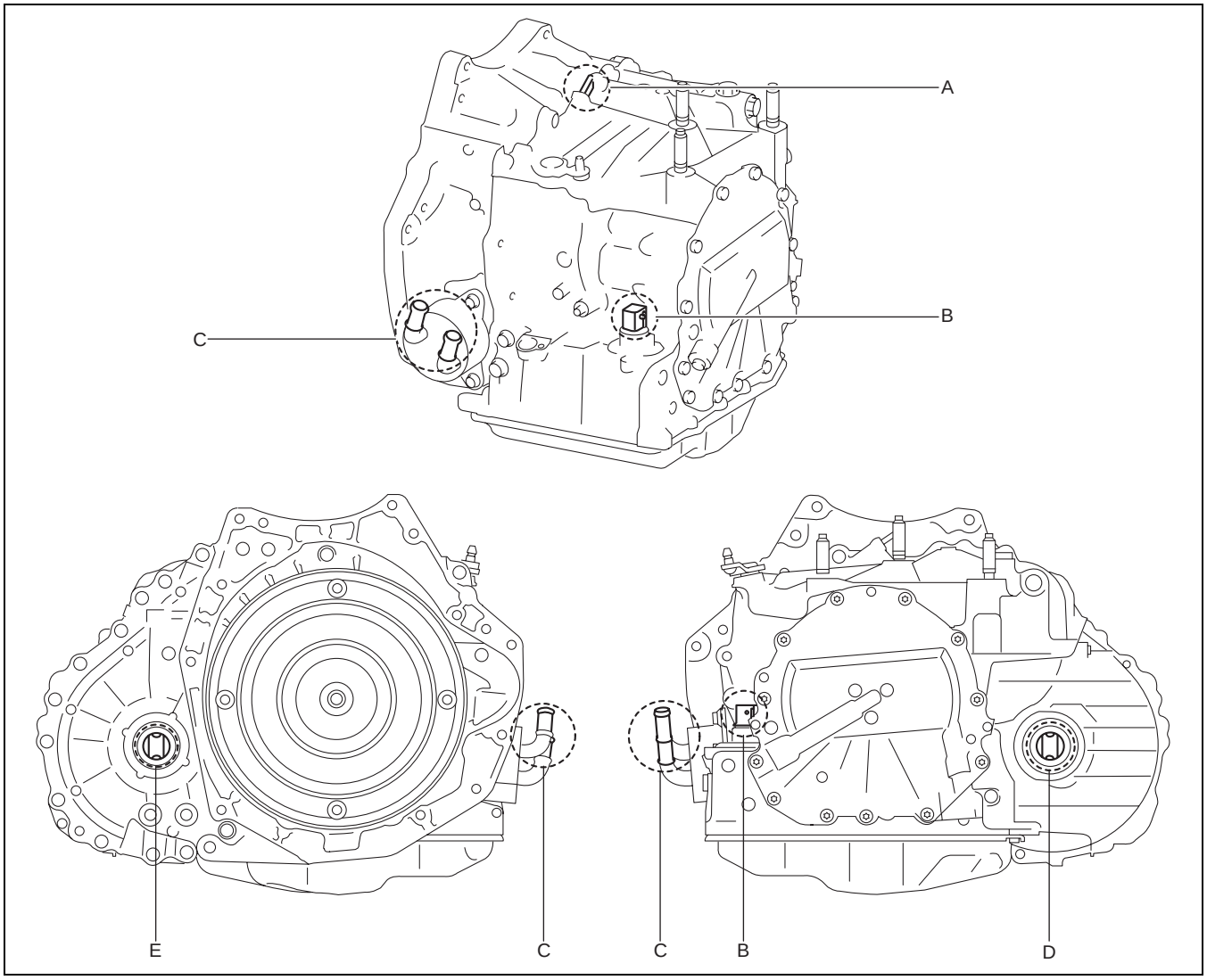
1. Remove the ATF or foreign matter adhering to the outside of the transaxle using degreaser or the air compressor.

Warning

- **Always wear protective eye wear when using the air compressor. Otherwise, ATF or dirt particles blown off by the air compressor could get into the eyes.**

Caution

- **If foreign matter, water, or degreaser penetrates the transaxle and connector, it could cause a malfunction. Before cleaning the outside of the transaxle, plug the position shown in the figure with the packing tape.**



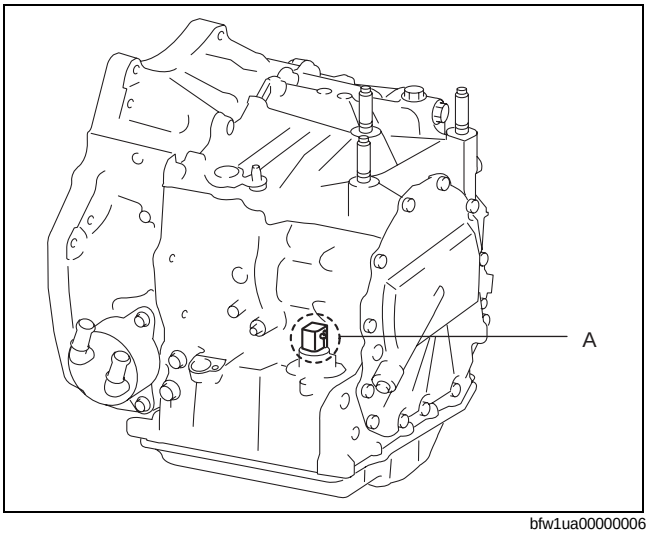
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A: Breather pipe
B: Control valve body connector
C: Oil cooler
D: Oil seal
E: Oil seal

2. Verify that there is no ATF or foreign matter on the connector shown in the figure.

A : Control valve body connector

- If there is ATF or foreign matter on the connector shown in the figure, remove it.



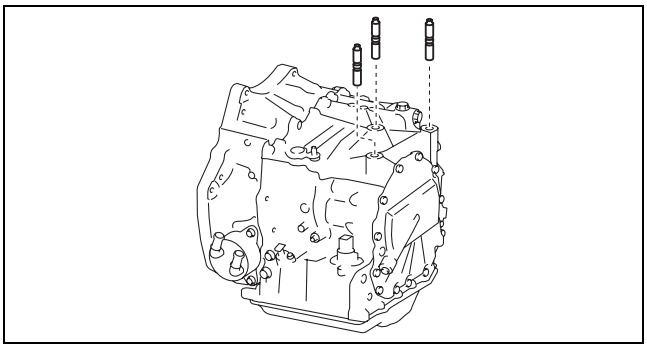
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OIL SEAL (OIL PUMP) REPLACEMENT

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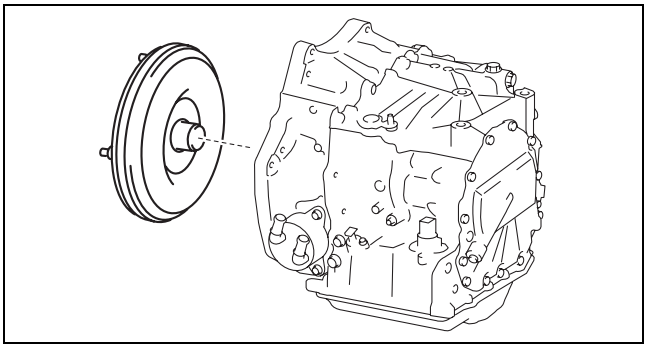
Note
- Perform the following servicing only if the oil seal is replaced due to ATF leakage from the oil seal (oil pump).

1. Clean the outside of the transaxle. (See 05-17-26 AUTOMATIC TRANSAXLE CLEANING.)
2. Remove the stud bolts.



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3. Remove the torque converter.



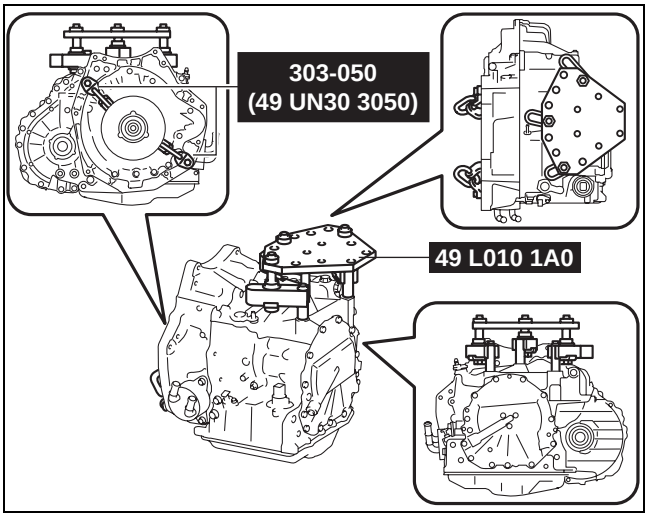
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4. Install the transaxle to the SST (engine stand) using the following procedure:

Caution
- **When installing the transaxle to the SST (engine stand) using chain hoists, be careful not to allow the transaxle (oil cooler in particular) to contact the SST (engine stand). If the transaxle contacts the SST, check the areas that made contact and replace damaged parts with new ones.**

(1) Install the SSTs to the transaxle using the following procedure.

Note
- When installing the SST (49 L010 1A0) to the transaxle (stud bolt holes), use part number: 9YA02 1440 or M14×1.5 bolts, length to 100 mm {3.94 in}.
- When installing the SST (49 UN30 3050) to the transaxle, use part number: 9YA02 1015, or M10×1.5 bolts, length to 35 mm {1.4 in}.

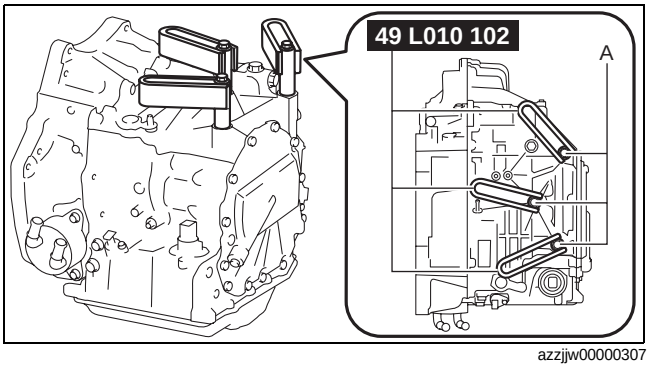


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1) Temporarily install the arms (49 L010 102) using part number: 9YA02 1440, or M14×1.5 bolts, length to 100 mm {3.94 in}.

A : Part number: 9YA02 1440, or M14×1.5 bolt, length to 100 mm {3.94 in}

Note
- To adjust the installation position of the SST in Step 3), temporarily tighten the bolts.

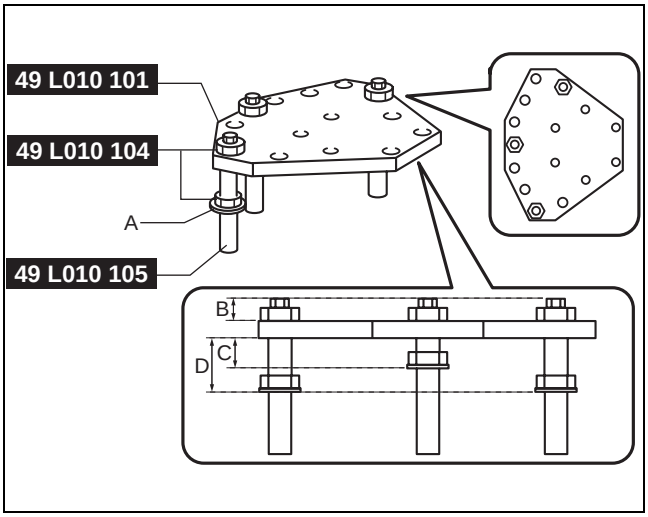


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2) Assemble the SST (49 L010 1A0).

A : Washer
B : Approx. 20 mm {0.79 in}
C : Approx. 26 mm {1.0 in}
D : Approx. 47 mm {1.9 in}

Note
- Use bolts (49 L010 105) with a length of 138 mm {5.43 in}.

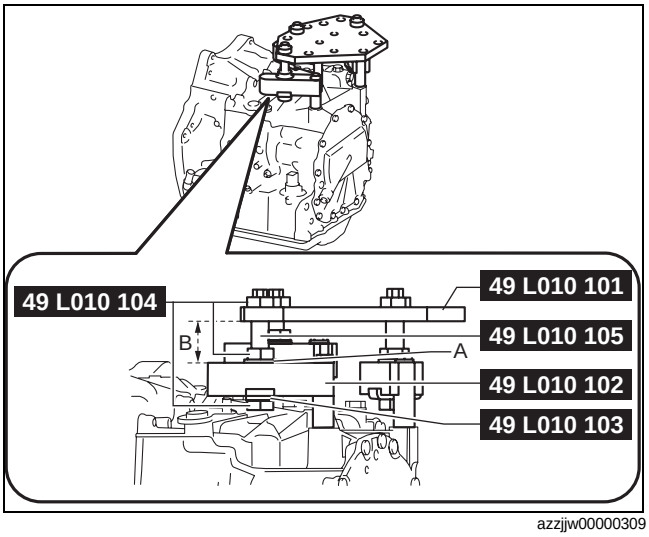


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3) Install the SST assembled in Step 2).

A : Washer
B : Level out

Note
- Adjust so that the plate (49 L010 101) and arms (49 L010 102) are level, and install.



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4) Verify that nothing other than the SST arms (49 L010 102) installation area contacts the transaxle.

Caution
- **If something other than the SST arms (49 L010 102) installation area contacts the transaxle, readjust the SST to prevent damaging the part.**

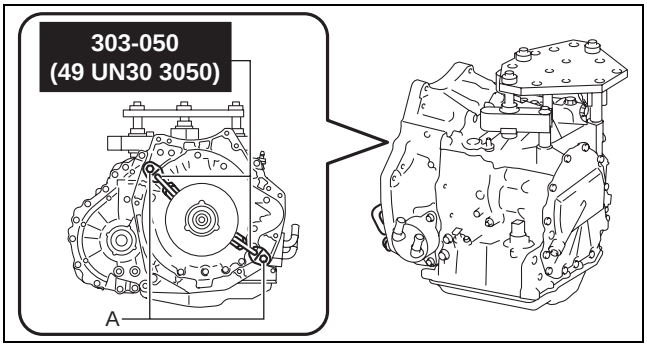
5) Tighten the nuts and bolts.

Tightening torque
- **Bolt: Part number: 9YA02 1440, or M14×1.5 bolt, length to 100 mm {3.94 in}**
  40—52 N·m {4.1—5.3 kgf·m, 30—38 ft·lbf}
- **Nut: 49 L010 104**
  140—160 N·m {15—16 kgf·m, 104—118 ft·lbf}

6) Assemble the SSTs using part number: 9YA02 1015, or M10×1.5 bolts, length to 35 mm {1.4 in}.

A : Part number: 9YA02 1015, or M10×1.5 bolt, length to 35 mm {1.4 in}

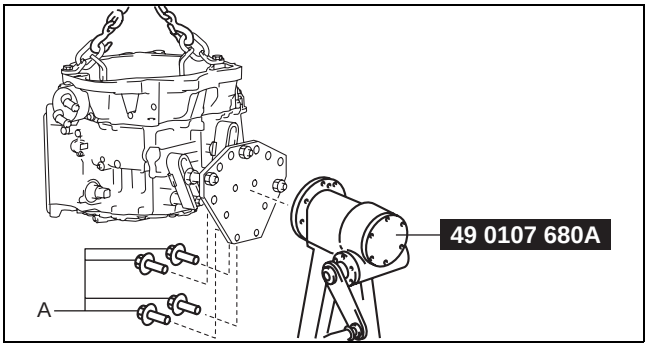
Tightening torque
38—52 N·m {3.9—5.3 kgf·m, 29—38 ft·lbf}



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(2) Using chain hoists, install the transaxle to the SST (engine stand) using part number: 9YA02 A220, or M12×1.75 bolts, length to 40 mm {1.6 in}.

A : Part number: 9YA02 A220, or M12×1.75 bolt, length to 40 mm {1.6 in}



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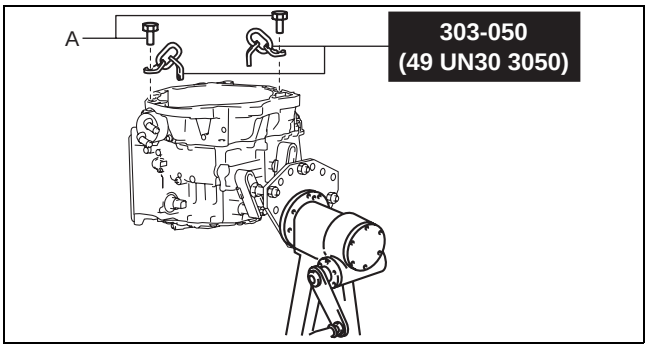
Caution
- **When installing the transaxle to the SST (engine stand) using chain hoists, be careful not to allow the transaxle (oil cooler in particular) to contact the SST (engine stand). If the transaxle contacts the SST, check the areas that made contact and replace damaged parts with new ones.**

Note
- Tighten the four locations with bolts and securely install the transaxle to the SST (engine stand).

Tightening torque
88—118 N·m {9.0—12 kgf·m, 65—87 ft·lbf}

(3) Remove the SSTs.

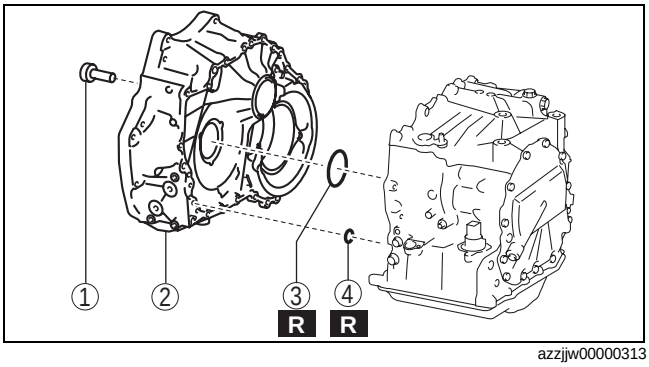
A : Part number: 9YA02 1015, or M10×1.5 bolt, length to 35 mm {1.4 in}



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5. Remove the converter housing using the following procedure:

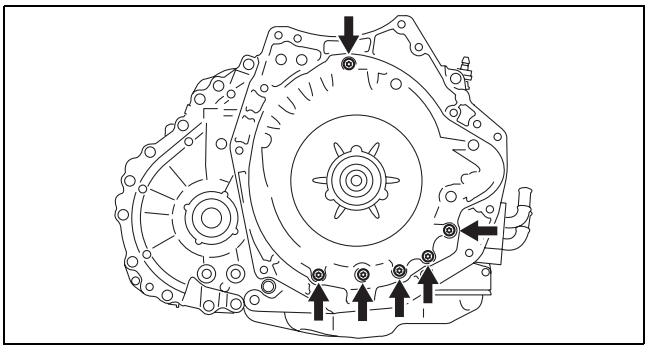
1	24 bolts
2	Converter housing
3	O-ring (oil pump)
4	O-ring (oil cooler oil passage)



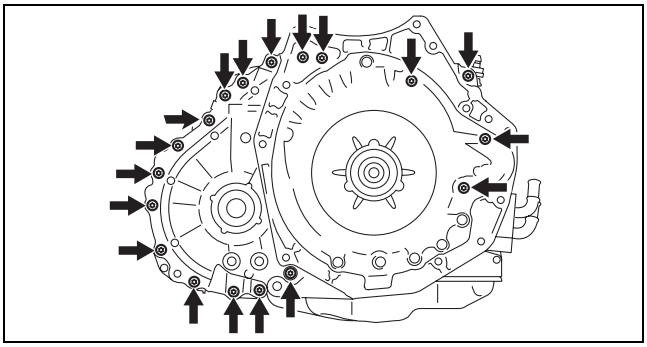
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(1) Remove the bolts shown in the figure.

Caution
- **Sealant has been applied to the removed bolts. If the bolts are reused it could cause ATF leakage, therefore when performing assembly use new bolts.**

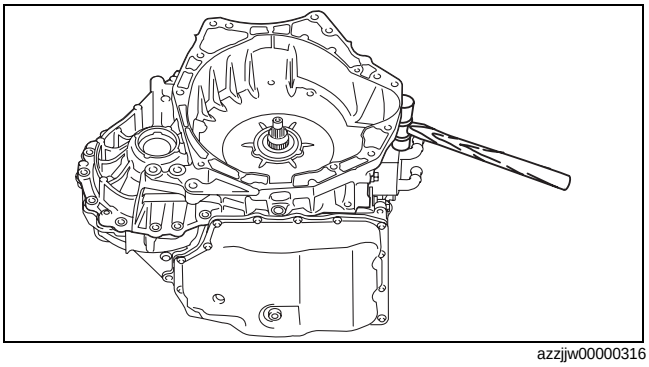

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(2) Remove the bolts shown in the figure.

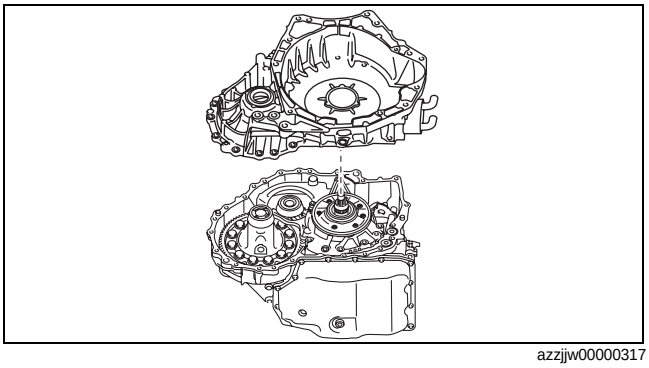


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(3) Lightly tap the converter housing using a plastic hammer to remove it.

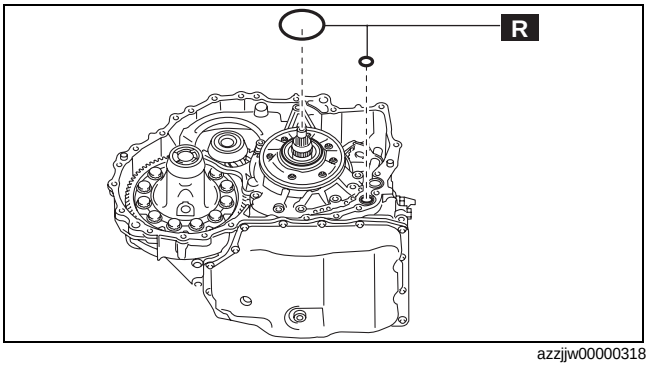


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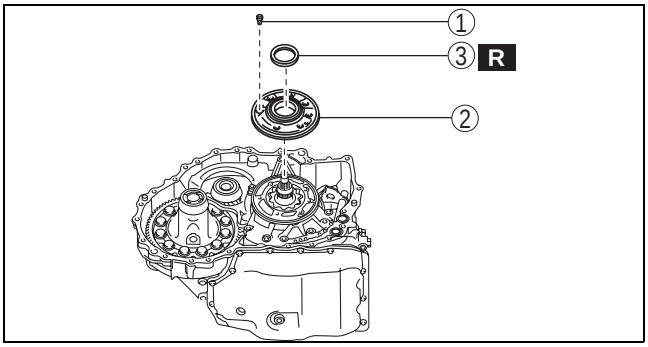
(4) Remove the O-rings.



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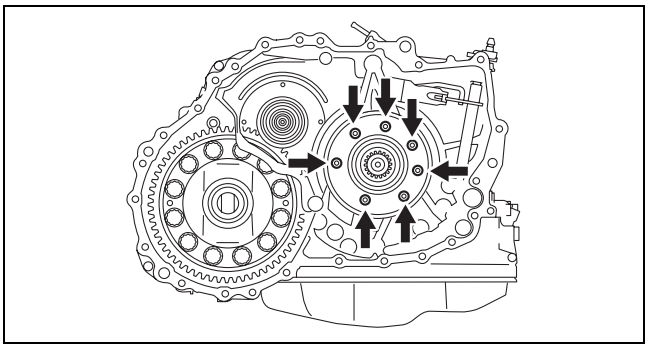
6. Remove the oil seal using the following procedure:

1	7 bolts
2	Oil pump cover
3	Oil seal

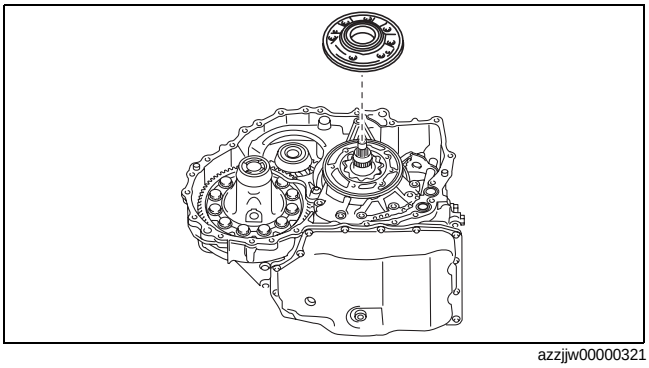


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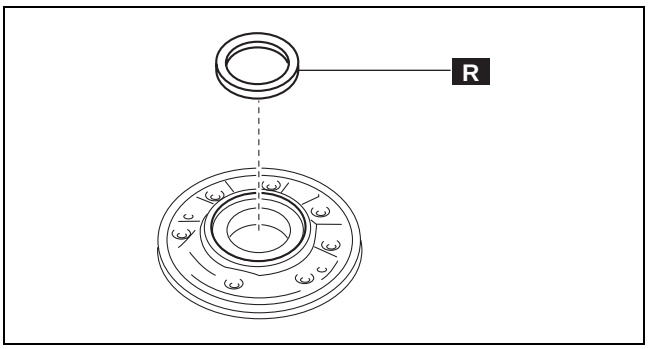
(1) Remove the bolts shown in the figure.


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(2) Remove the oil pump cover.


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(3) Remove the oil seal.

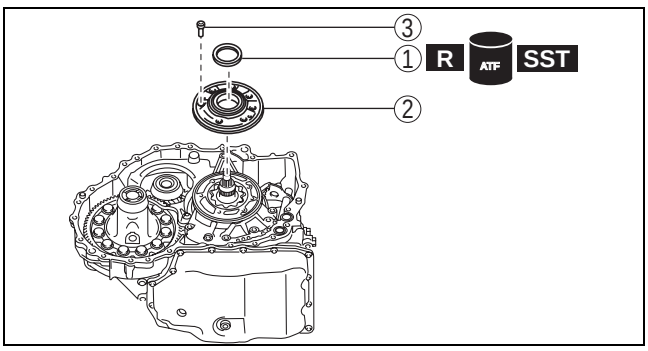


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7. Assemble a new oil seal using the following procedure:.

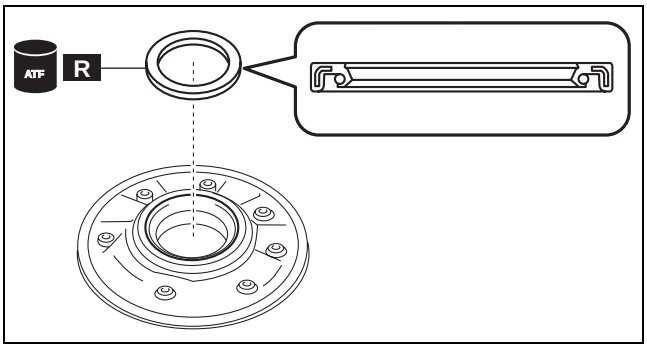
1	Oil seal
2	Oil pump cover
3	7 bolts (M6×1.0 bolt, length to approx. 13 mm {0.51 in})

Caution
- **If an oil seal is reused it could cause ATF leakage, therefore use a new oil seal.**



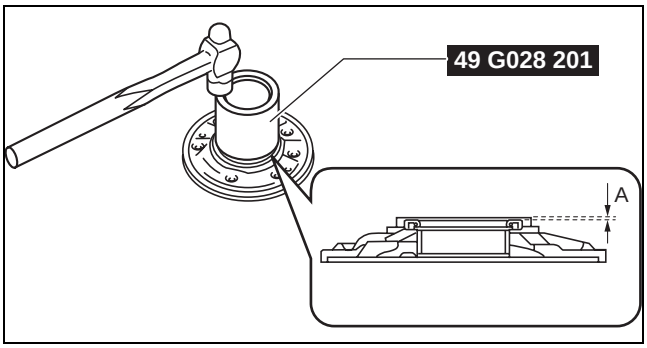
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(1) Apply ATF (ATF FZ) to the engagement area of the new oil seal and oil pump cover.
(2) Apply ATF (ATF FZ) to the lip of the new oil seal.
(3) Assemble the new oil seal to the position shown in the figure using the SST.



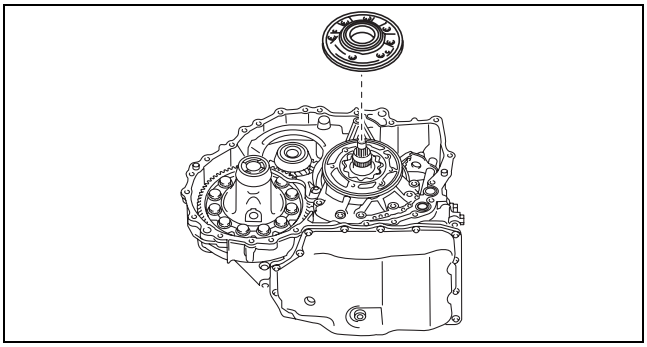
azzjjw00000324

A : 0—0.5 mm {0—0.01 in}

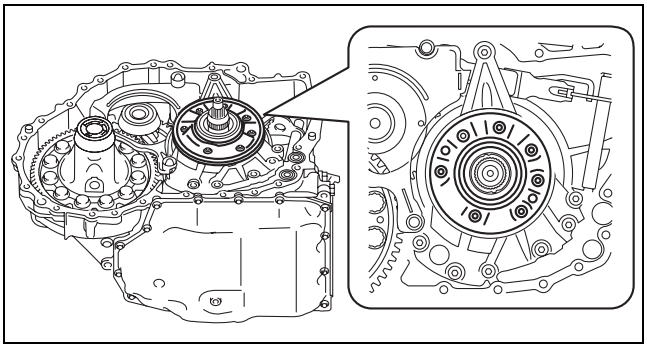


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(4) Assemble the oil pump cover.



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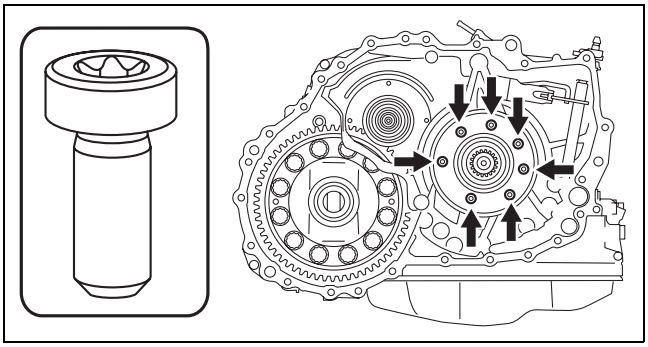


azzjjw00000326

(5) Assemble and tighten the bolts shown in the figure.

Note
- Bolt size: M6×1.0 bolt, length to approx. 13 mm {0.51 in}

Tightening torque
9—10 N·m {92—101 kgf·cm, 80—88 in·lbf}

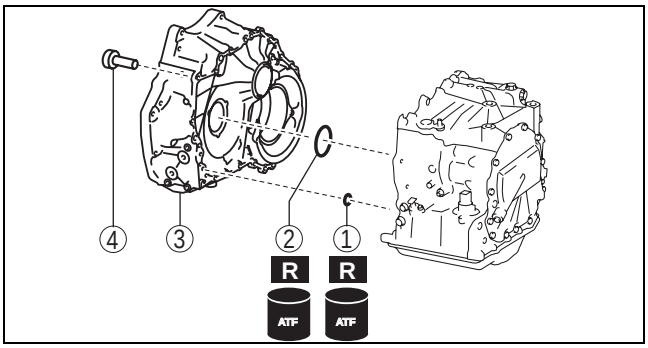


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8. Assemble the converter housing using the following procedure:

1	O-ring (outer diameter approx. 15.6 mm {0.614 in}, thickness approx. 2.4 mm {0.094 in})
2	O-ring (outer diameter approx. 73.3 mm {2.89 in}, thickness approx. 3.0 mm {0.12 in})
3	Converter housing
4	24 bolts * (M8×1.25 bolt, length to approx. 28 mm {1.1 in})

* : Of the 24 bolts, 6 are applied with sealant



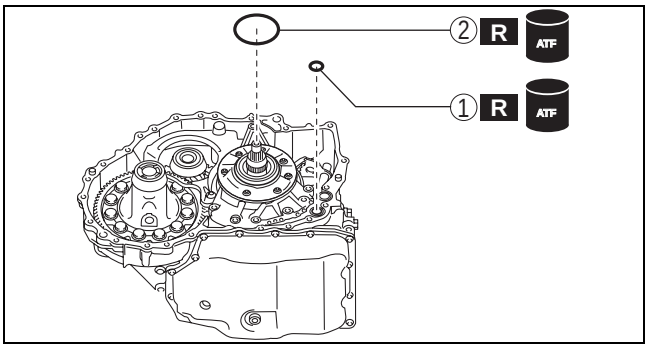
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(1) Assemble new O-rings using the following procedure:

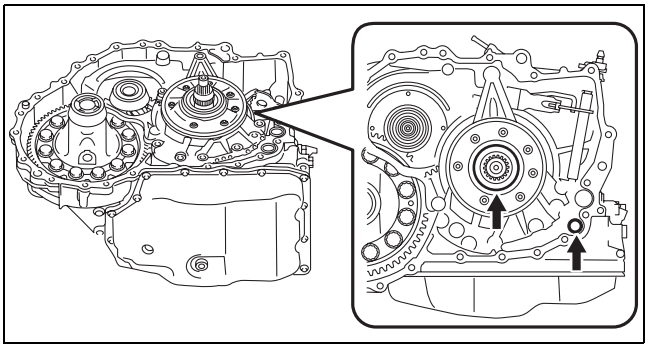
Caution
- **If an O-ring is reused it could cause ATF leakage, therefore use a new O-ring.**

1) Apply ATF (ATF FZ) to the new O-rings.
2) Assemble the new O-rings.

1	O-ring (outer diameter approx. 15.6 mm {0.614 in}, thickness approx. 2.4 mm {0.094 in})
2	O-ring (outer diameter approx. 73.3 mm {2.89 in}, thickness approx. 3.0 mm {0.12 in})



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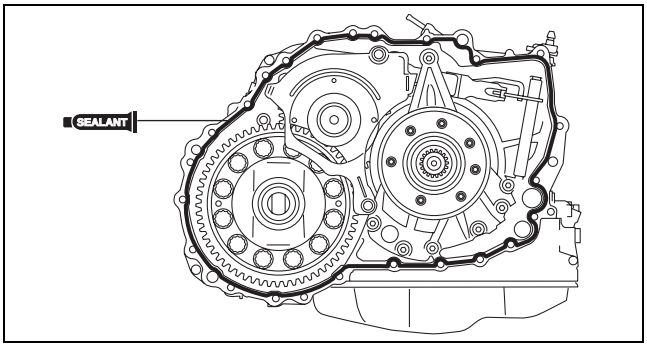


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(2) Remove any remaining old sealant on the contact surfaces of the transaxle case and converter housing, and degrease the contact surfaces.

Caution
- **When degreasing and if degreaser is used, use a rag saturated with degreaser and be careful not to allow degreaser to penetrate the interior of the transaxle.**
  In addition, after degreasing, visually verify that there is no foreign matter (such as old sealant, cloth fibers) which has penetrated the interior of the transaxle.

(3) Apply sealant (silicone sealant TB1217E) to the transaxle case.

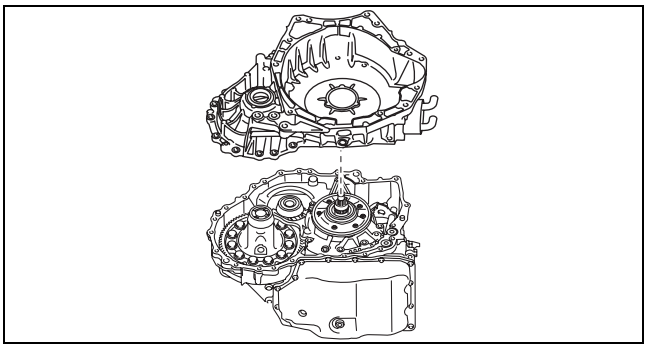


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Caution
- **If sealant is applied excessively or applied to a part other than the indicated part, the O-ring could deform and the sealant could penetrate the oil passage. Apply an appropriate amount of sealant to the indicated part.**

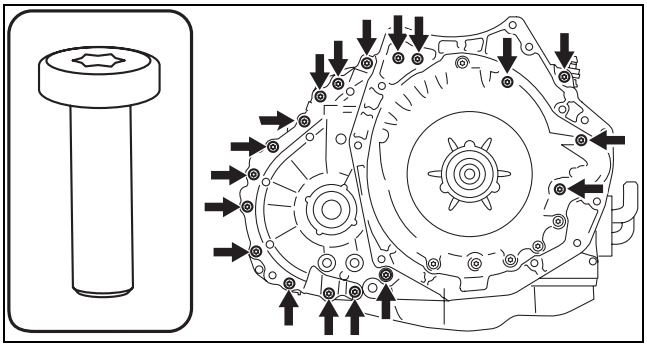
Note
- Sealant application amount (bead thickness): ϕ 1.8—2.5 mm {0.071—0.098 in}

(4) Assemble the converter housing before the applied sealant starts to harden.


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(5) Assemble and temporarily tighten the bolts to the positions shown in the figure.

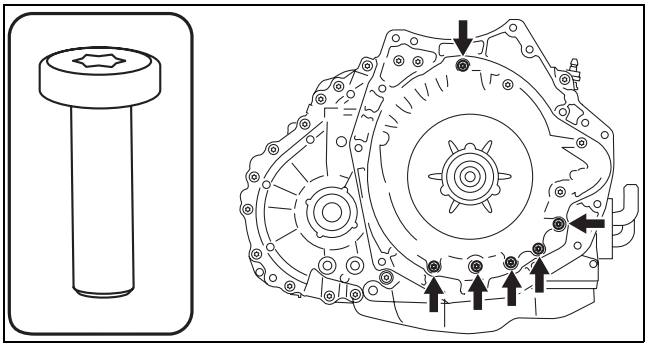
Note
- Bolt size: M8×1.25 bolt, length to approx. 28 mm {1.1 in}


azzjjw00000332

(6) Assemble and temporarily tighten the new bolts to the positions shown in the figure.

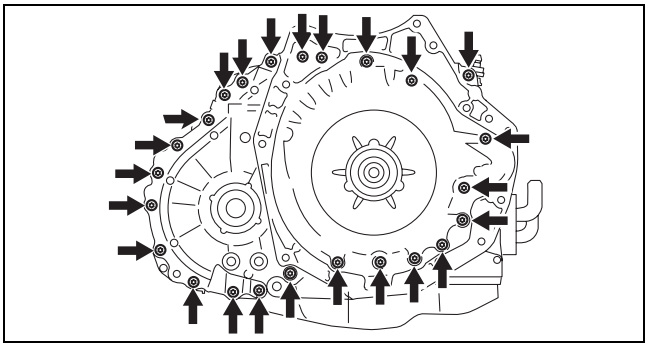
Caution
- **The bolts for the assembly are applied with sealant. If the bolts are reused it could cause ATF leakage, therefore use new bolts.**

Note
- Bolt size: M8×1.25 bolt, length to approx. 28 mm {1.1 in} (with sealant applied)


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(7) Tighten the bolts shown in the figure.

Tightening torque
19—25 N·m {2.0—2.5 kgf·m, 15—18 ft·lbf}


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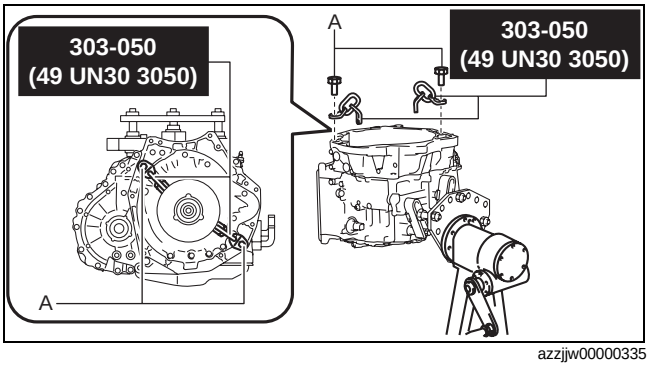
9. Remove the SSTs from the transaxle using the following procedure:

Caution
- **When removing the transaxle from the SST (engine stand) using chain hoists, be careful not to allow the transaxle (oil cooler in particular) to contact the SST (engine stand). If the transaxle contacts the SST, check the areas that made contact and replace damaged parts with new ones.**

(1) Assemble the SSTs using part number: 9YA02 1015, or M10×1.5 bolts, length to 35 mm {1.4 in}.

A : Part number: 9YA02 1015, or M10×1.5 bolt, length to 35 mm {1.4 in}

Tightening torque
38—52 N·m {3.9—5.3 kgf·m, 29—38 ft·lbf}

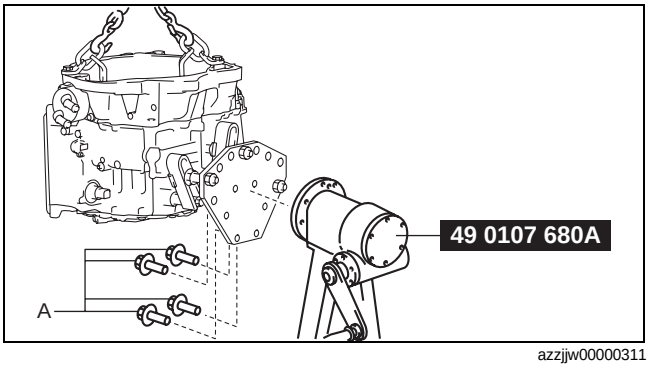


azzjjw00000335

(2) Using chain hoists, remove the SST (engine stand) from the transaxle.

A : Part number: 9YA02 A220, or M12×1.75 bolt, length to 40 mm {1.6 in}

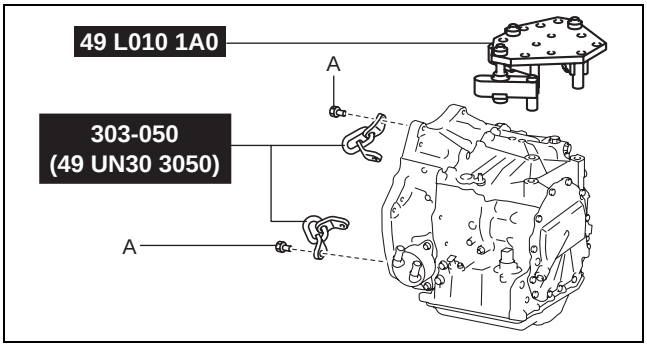
Caution
- **When removing the transaxle from the SST (engine stand) using chain hoists, be careful not to allow the transaxle (oil cooler in particular) to contact the SST (engine stand). If the transaxle contacts the SST, check the areas that made contact and replace damaged parts with new ones.**



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(3) Remove the SSTs.

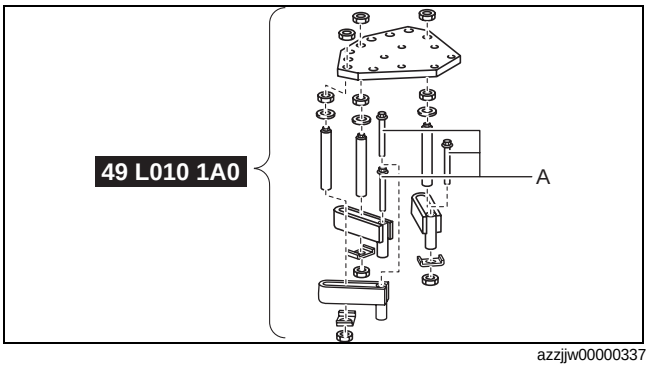
A : Part number: 9YA02 1015, or M10×1.5 bolt, length to 35 mm {1.4 in}



azzjjw00000336

(4) Disassemble the SST.

A : Part number: 9YA02 1440, or M14×1.5 bolt, length to 100 mm {3.94 in}



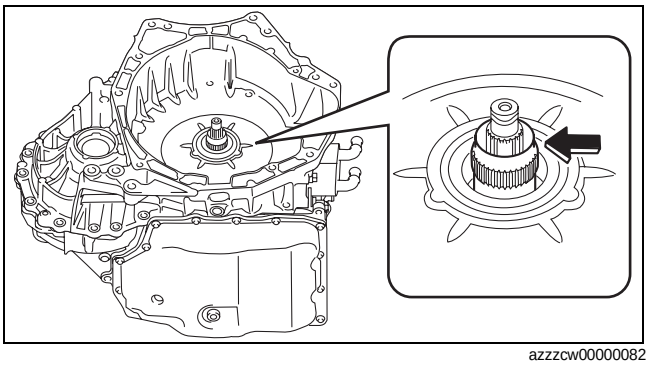
azzjjw00000337

10. Assemble the torque converter using the following procedure:

(1) Apply ATF (ATF FZ) to the end of the starter shaft of the oil pump shown in the figure.

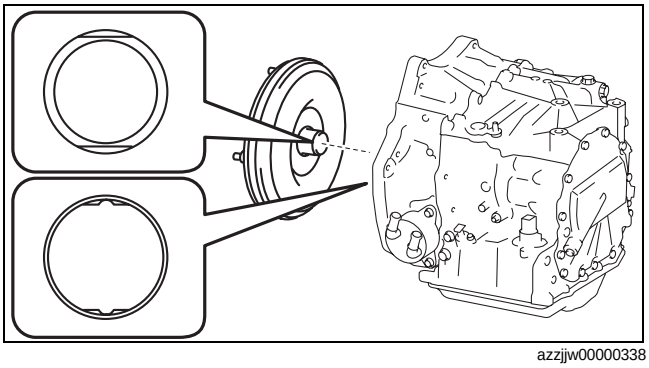
Caution

- **Accurately perform to protect the torque converter internal parts.**



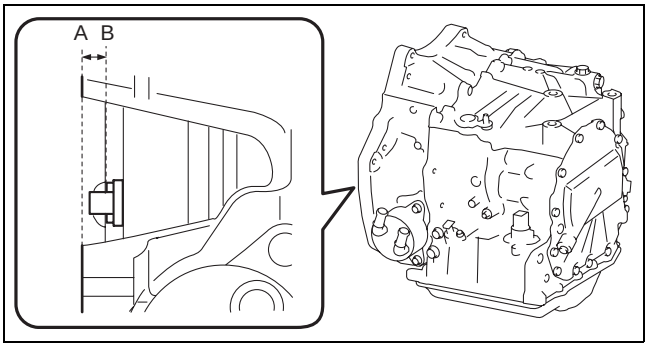
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(2) Assemble the torque converter so that the two surfaces of the notch on the end of the torque converter engage the inner rotor of the oil pump.



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(3) To verify that the torque converter is securely assembled, measure the distance shown in the figure.



azzjjw00001417

A : Converter housing end (alignment surface with engine)
B : Torque converter stud bolt seat

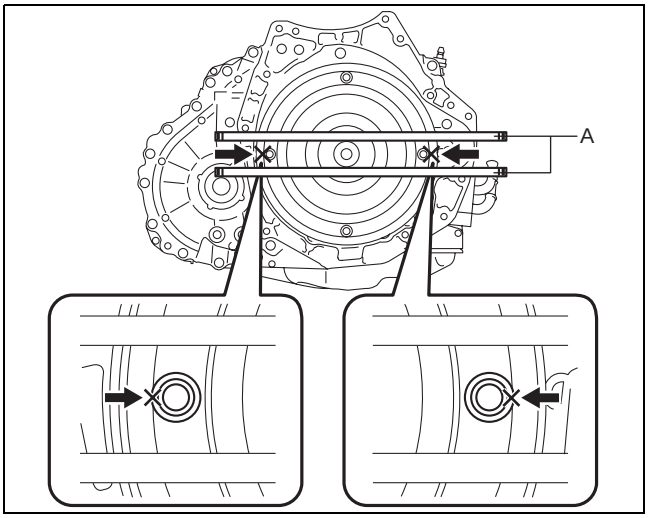
Note
- Recommended measuring instrument: Depth gauge, straight edge ruler

Specification
14.6 mm {0.575 in} or more

- If not within the specification, remove the torque converter and reassemble.

Note
- Measurement method

1) Set two straight edge rulers along the alignment surface of the converter housing with the engine as shown in the figure.



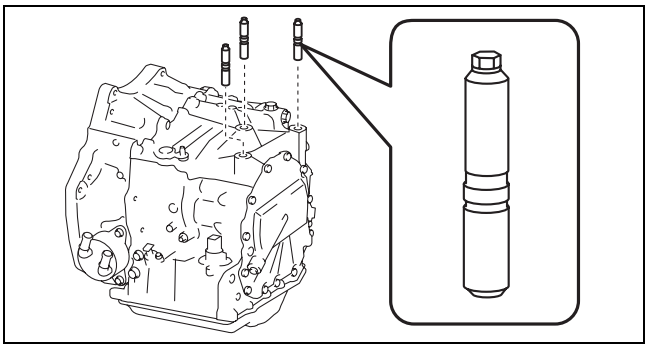
azzjjw00000340

A : Straight edge ruler

2) Measure the positions (2 locations) shown in the figure using a depth gauge and calculate the average value.
3) Subtract the thickness of the straight edge ruler from the average value.

11. Assemble and tighten the stud bolts.

Tightening torque
15—25 N·m {1.6—2.5 kgf·m, 12—18 ft·lbf}

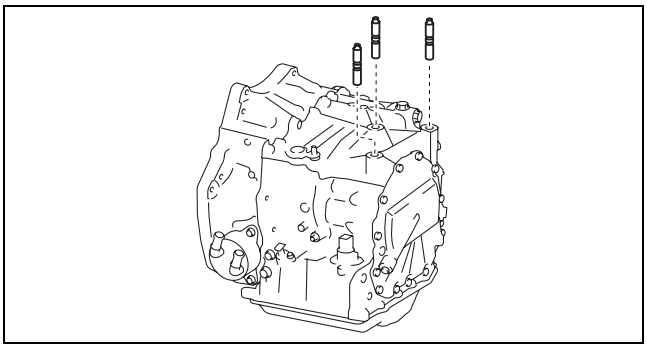

azzjjw00000341

OIL SEAL (PARKING SHIFT LEVER) REPLACEMENT

id051700660500

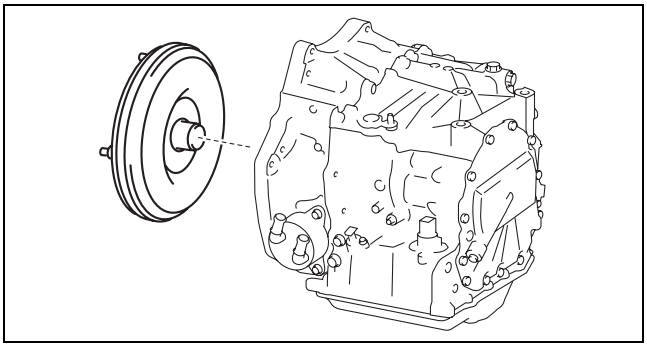
Note
- Perform the following servicing only if the oil seal is replaced due to ATF leakage from the oil seal (parking shift lever).

1. Clean the outside of the transaxle. (See 05-17-26 AUTOMATIC TRANSAXLE CLEANING.)
2. Remove the stud bolts.



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3. Remove the torque converter.



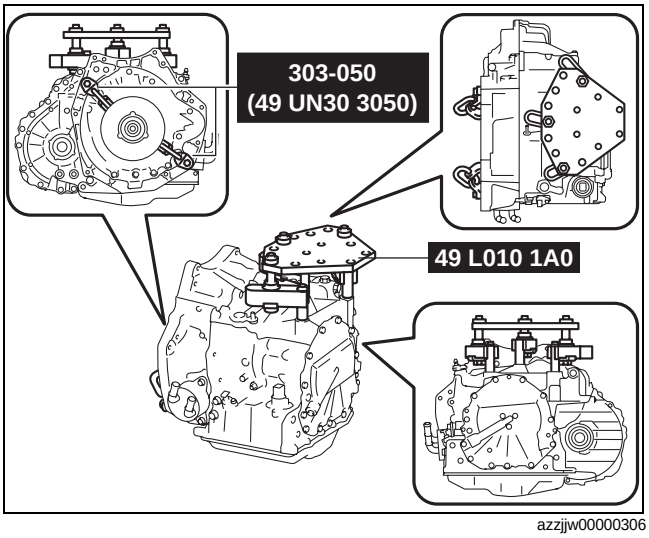
azzjjw00000305

4. Install the transaxle to the SST (engine stand) using the following procedure:

Caution
- **When installing the transaxle to the SST (engine stand) using chain hoists, be careful not to allow the transaxle (oil cooler in particular) to contact the SST (engine stand). If the transaxle contacts the SST, check the areas that made contact and replace damaged parts with new ones.**

(1) Install the SSTs to the transaxle using the following procedure.

Note
- When installing the SST (49 L010 1A0) to the transaxle (stud bolt holes), use part number: 9YA02 1440 or M14×1.5 bolts, length to 100 mm {3.94 in}.
- When installing the SST (49 UN30 3050) to the transaxle, use part number: 9YA02 1015, or M10×1.5 bolts, length to 35 mm {1.4 in}.

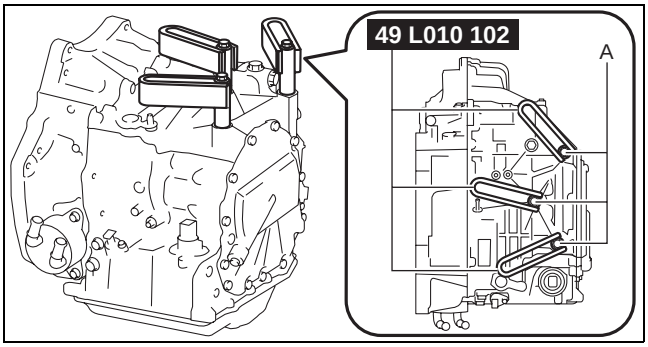


azzjjw00000306

1) Temporarily install the arms (49 L010 102) using part number: 9YA02 1440, or M14×1.5 bolts, length to 100 mm {3.94 in}.

A : Part number: 9YA02 1440, or M14×1.5 bolt, length to 100 mm {3.94 in}

Note
- To adjust the installation position of the SST in Step 3), temporarily tighten the bolts.

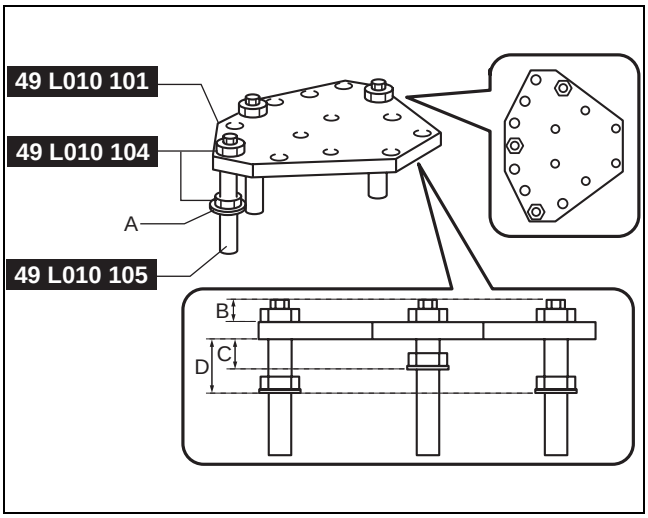


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2) Assemble the SST (49 L010 1A0).

A : Washer
B : Approx. 20 mm {0.79 in}
C : Approx. 26 mm {1.0 in}
D : Approx. 47 mm {1.9 in}

Note
- Use bolts (49 L010 105) with a length of 138 mm {5.43 in}.

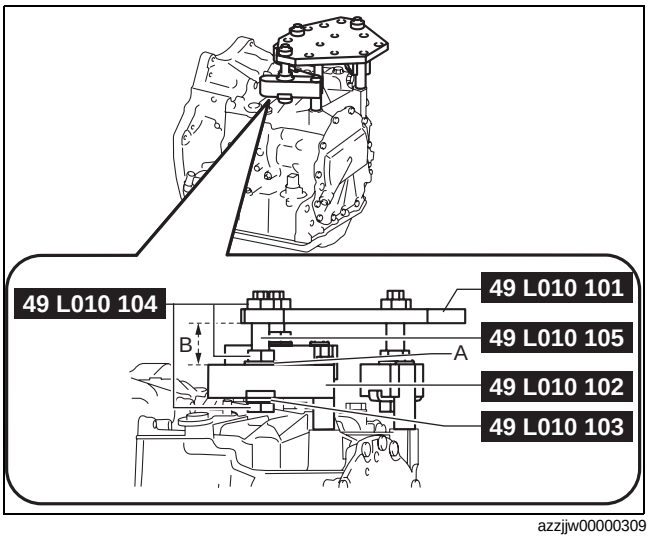


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3) Install the SST assembled in Step 2).

A : Washer
B : Level out

Note
- Adjust so that the plate (49 L010 101) and arms (49 L010 102) are level, and install.



azzjjw00000309

4) Verify that nothing other than the SST arms (49 L010 102) installation area contacts the transaxle.

Caution
- **If something other than the SST arms (49 L010 102) installation area contacts the transaxle, readjust the SST to prevent damaging the part.**

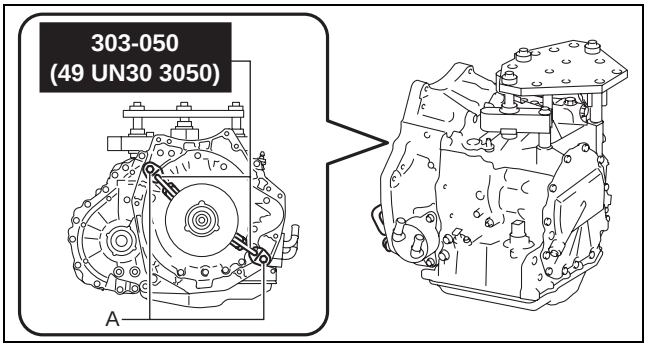
5) Tighten the nuts and bolts.

Tightening torque
- **Bolt: Part number: 9YA02 1440, or M14×1.5 bolt, length to 100 mm {3.94 in}**
  40—52 N·m {4.1—5.3 kgf·m, 30—38 ft·lbf}
- **Nut: 49 L010 104**
  140—160 N·m {15—16 kgf·m, 104—118 ft·lbf}

6) Assemble the SSTs using part number: 9YA02 1015, or M10×1.5 bolts, length to 35 mm {1.4 in}.

A : Part number: 9YA02 1015, or M10×1.5 bolt, length to 35 mm {1.4 in}

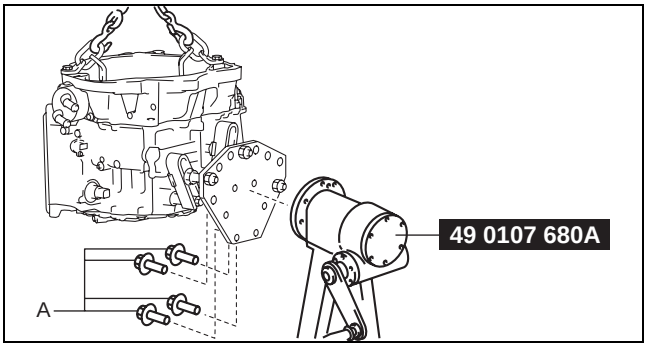
Tightening torque
38—52 N·m {3.9—5.3 kgf·m, 29—38 ft·lbf}



azzjjw00000310

(2) Using chain hoists, install the transaxle to the SST (engine stand) using part number: 9YA02 A220, or M12×1.75 bolts, length to 40 mm {1.6 in}.

A : Part number: 9YA02 A220, or M12×1.75 bolt, length to 40 mm {1.6 in}



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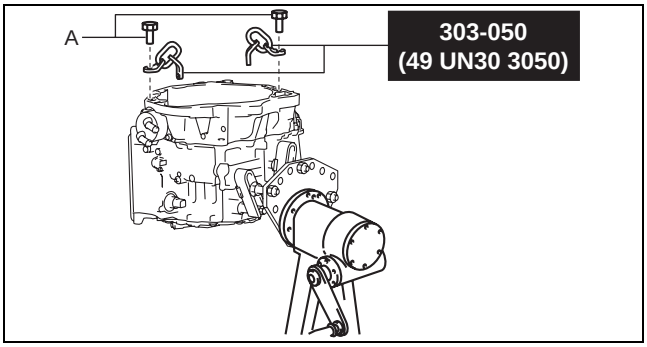
Caution
- **When installing the transaxle to the SST (engine stand) using chain hoists, be careful not to allow the transaxle (oil cooler in particular) to contact the SST (engine stand). If the transaxle contacts the SST, check the areas that made contact and replace damaged parts with new ones.**

Note
- Tighten the four locations with bolts and securely install the transaxle to the SST (engine stand).

Tightening torque
88—118 N·m {9.0—12 kgf·m, 65—87 ft·lbf}

(3) Remove the SSTs.

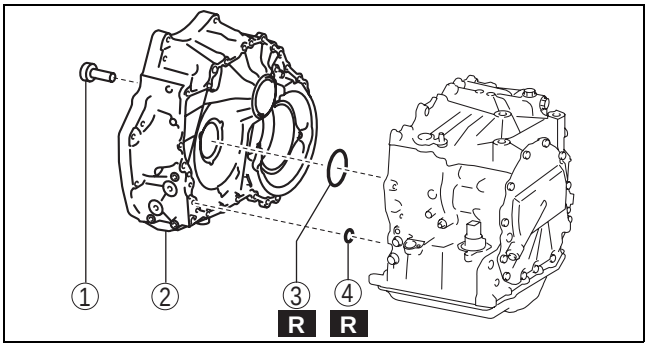
A : Part number: 9YA02 1015, or M10×1.5 bolt, length to 35 mm {1.4 in}



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5. Remove the converter housing using the following procedure:

1	24 bolts
2	Converter housing
3	O-ring (oil pump)
4	O-ring (oil cooler oil passage)

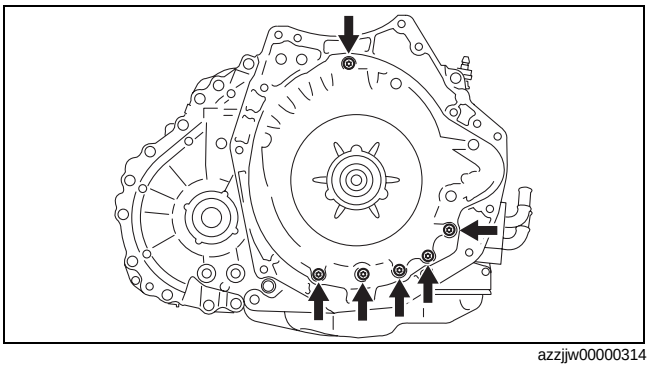


azzjjw00000313

(1) Remove the bolts shown in the figure.

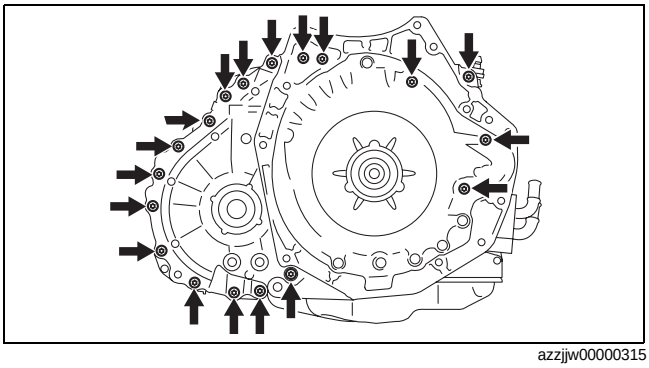
Caution

- **Sealant has been applied to the removed bolts. If the bolts are reused it could cause ATF leakage, therefore when performing assembly use new bolts.**



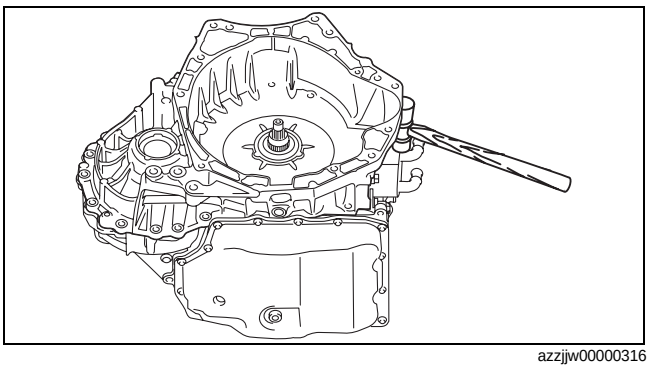
azzjjw00000314

(2) Remove the bolts shown in the figure.

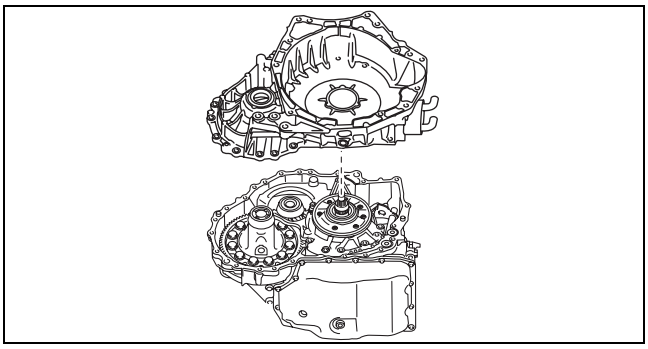


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(3) Lightly tap the converter housing using a plastic hammer to remove it.

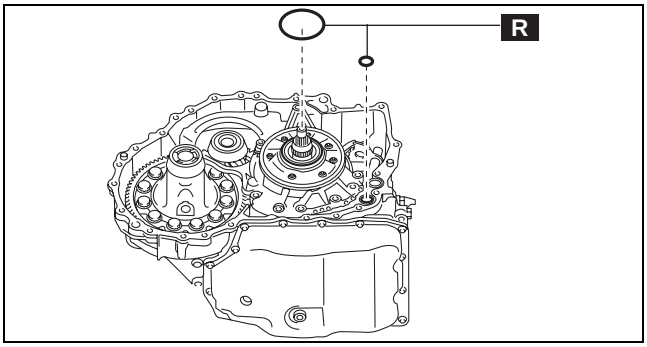


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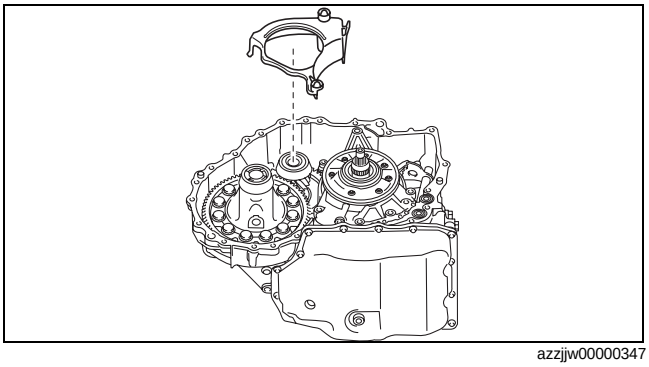
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(4) Remove the O-rings.



azzjjw00000318

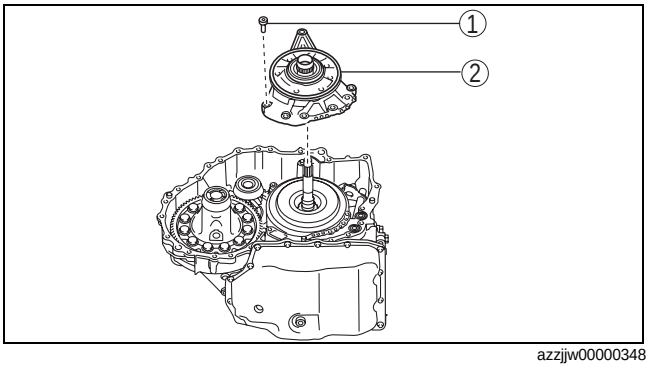
6. Remove the baffle plate.



azzjjw00000347

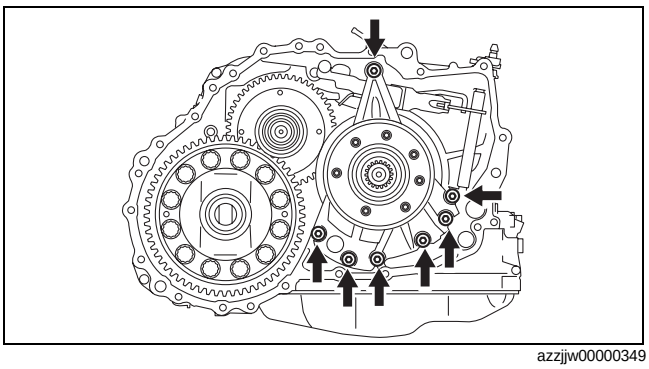
7. Remove the oil pump using the following procedure:

1	7 bolts
2	Oil pump



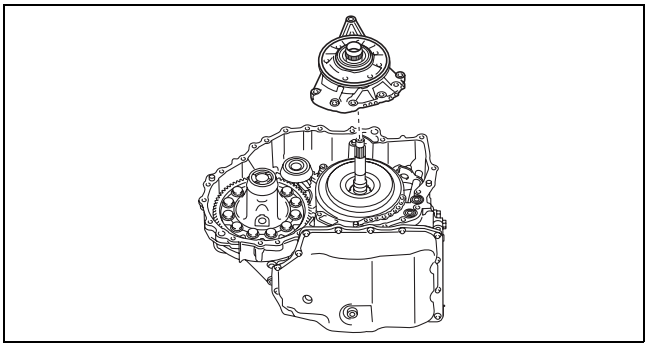
azzjjw00000348

(1) Remove the bolts shown in the figure.



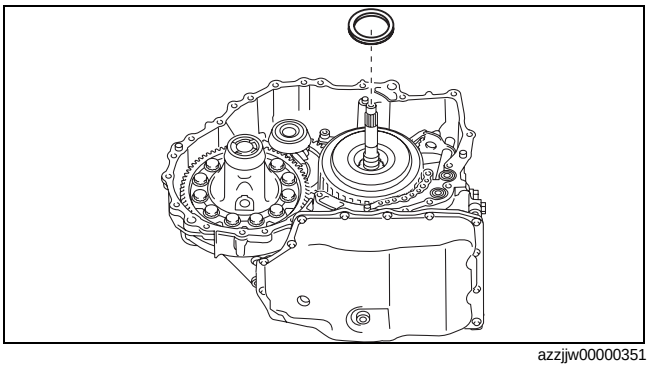
azzjjw00000349

(2) Remove the oil pump.



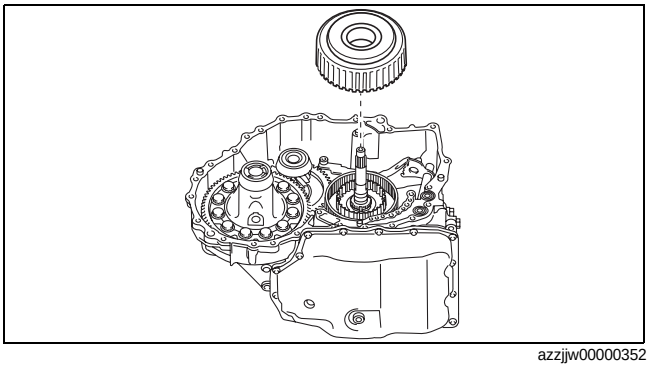
azzjjw00000350

8. Remove the thrust needle bearing.



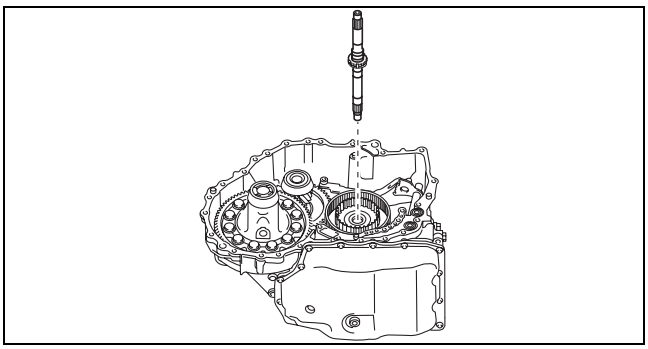
azzjjw00000351

9. Remove the clutch component.



azzjjw00000352

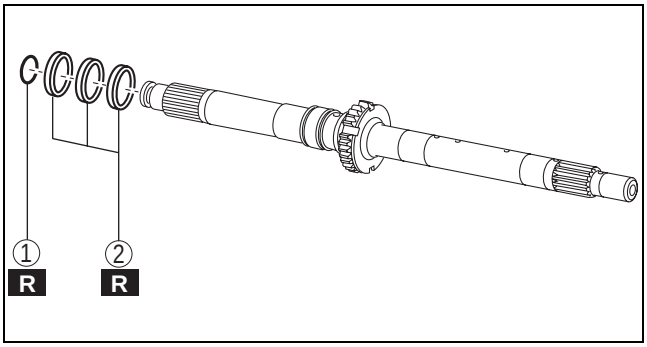
10. Remove the turbine shaft.



azzjjw00000353

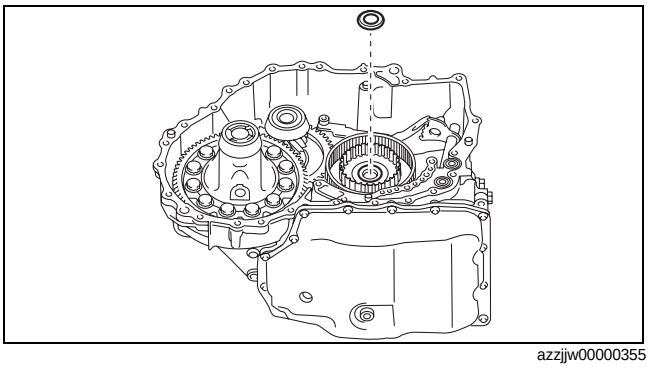
11. Remove the D-ring and seal rings from the turbine shaft using the procedure in the figure:

1	D-ring
2	Seal ring



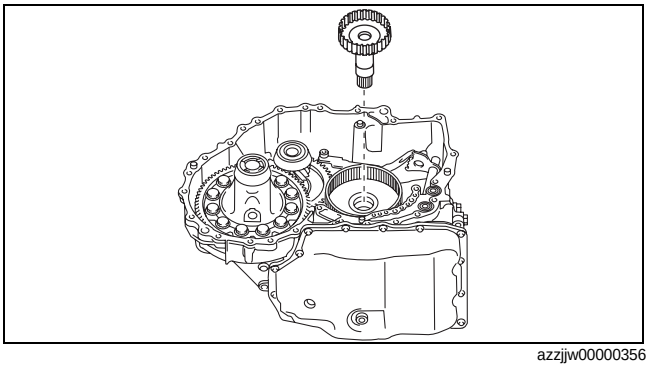
azzjjw00000354

12. Remove the thrust needle bearing.



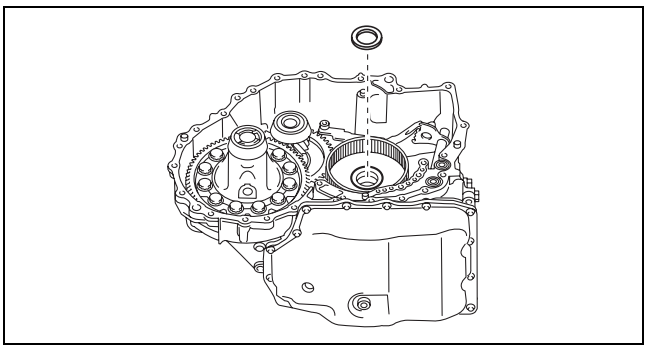
azzjjw00000355

13. Remove the high clutch hub.



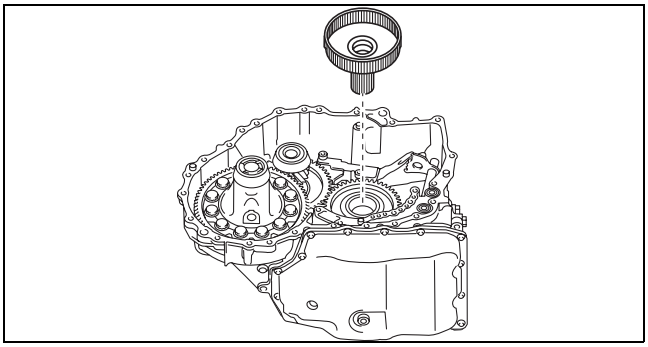
azzjjw00000356

14. Remove the thrust needle bearing.



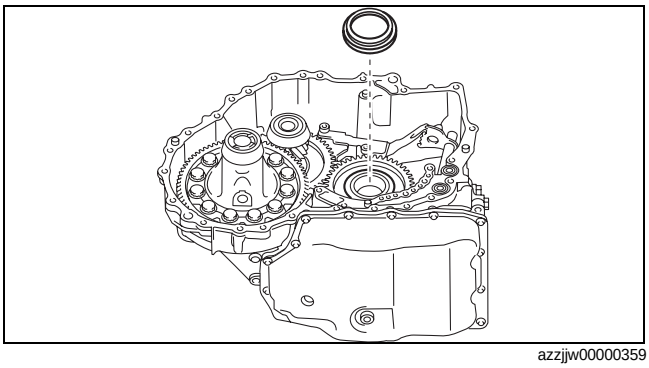
azzjjw00000357

15. Remove the low clutch hub.



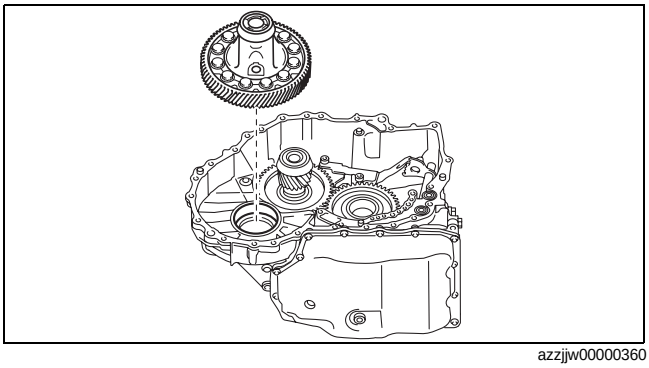
azzjjw00000358

16. Remove the thrust needle bearing.



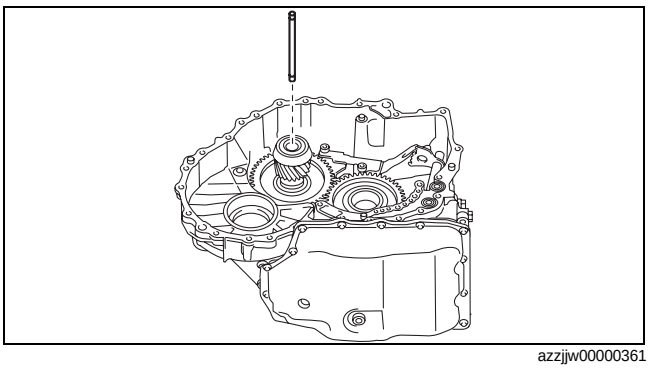
azzjjw00000359

17. Remove the ring gear and differential.



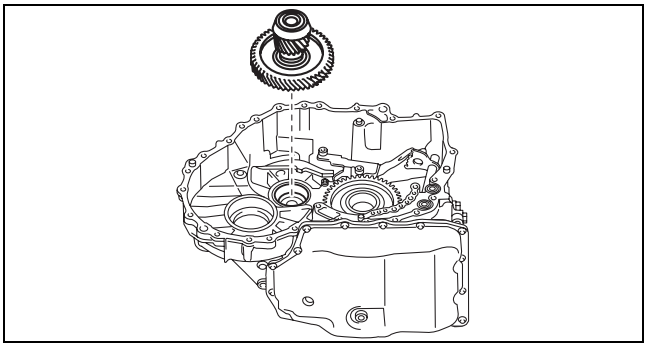
azzjjw00000360

18. Remove the oil pipe.



azzjjw00000361

19. Remove the secondary gear and output gear.

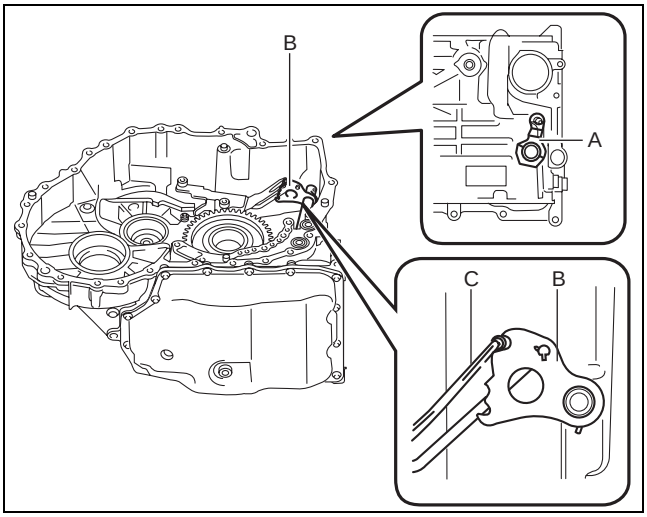


azzjjw00000362

20. Remove the roll pin using the following procedure:
    (1) Verify that the parking shift lever component is in the P position.

A : Parking shift lever component
B : Manual plate component
C : Detent bracket component

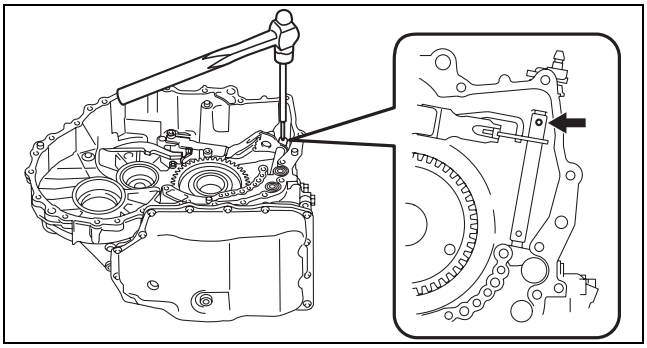
Caution
- **If the parking shift lever component is at a position other than P, shift the parking shift lever component to the P position.**



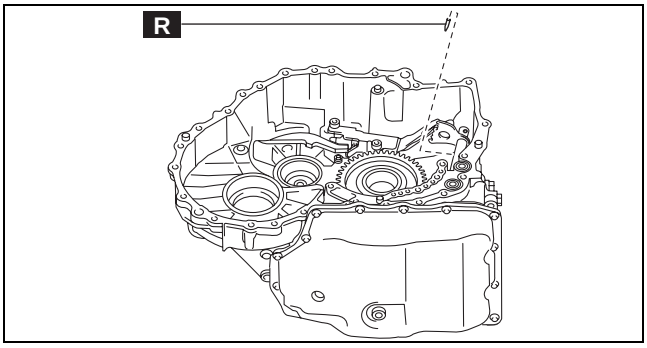
azzjjw00001376

(2) Remove the roll pin shown in the figure using a pin punch.

Note
- Use a pin punch with an end outer diameter of 3 mm {0.119 in} or more, and within 4 mm {0.157 in}.

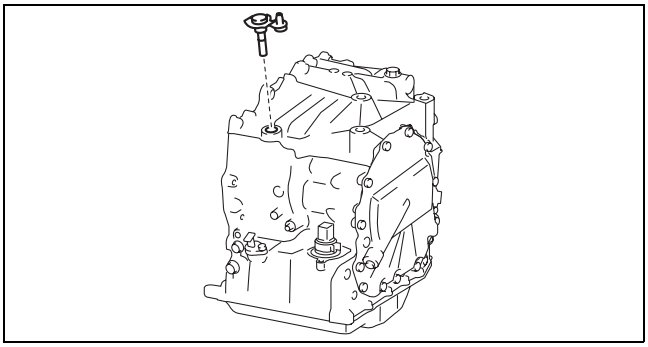


azzjjw00001370



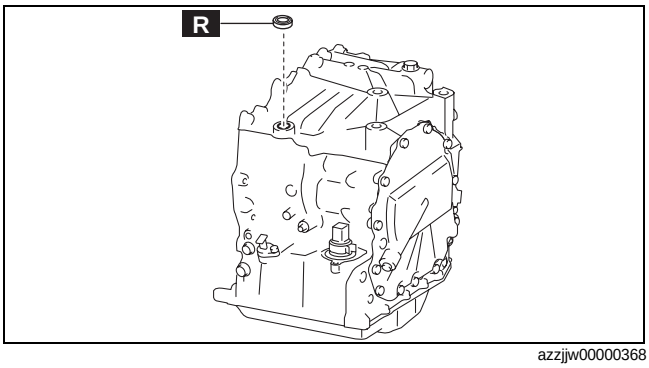
azzjjw00001371

21. Remove the parking shift lever component.



azzjjw00000367

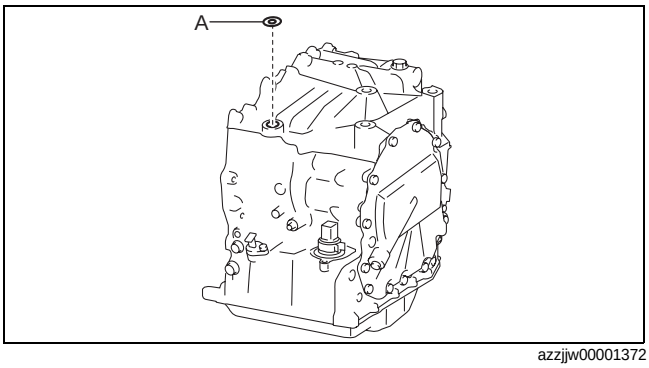
22. Remove the oil seal.



azzjjw00000368

Caution

- **If the washer comes off together when the oil seal is removed, clean the washer and assemble it.**
  A: Washer

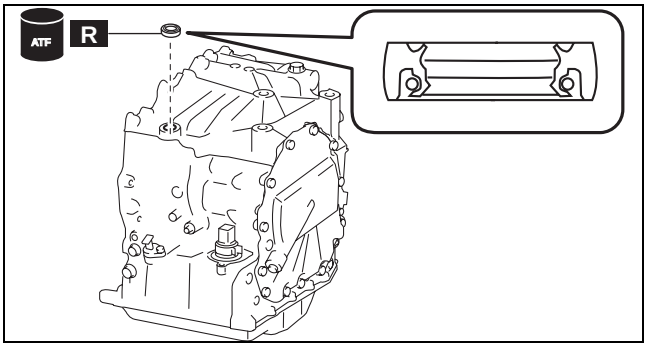


azzjjw00001372

23. Assemble a new oil seal using the following procedure:

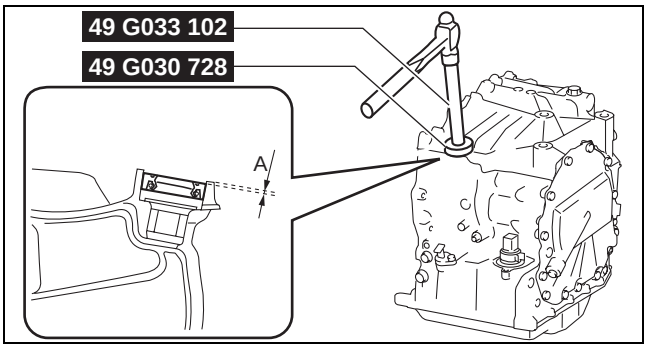
Caution
- **If an oil seal is reused it could cause ATF leakage, therefore use a new oil seal.**

(1) Apply ATF (ATF FZ) to the engagement area of the new oil seal and transaxle case.
(2) Apply ATF (ATF FZ) to the lip of the new oil seal.
(3) Assemble the new oil seal to the position shown in the figure using the SSTs.



azzjjw00000369

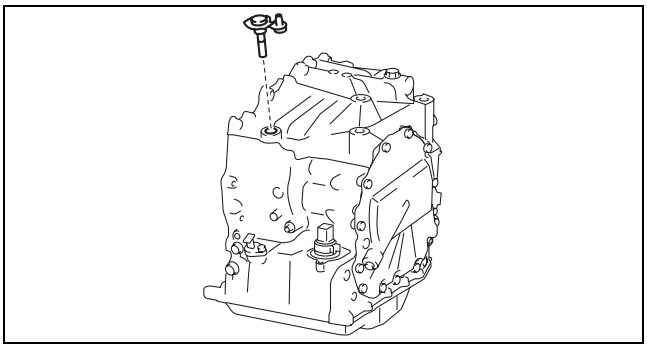
A : –0.3—0.3 mm {–0.01—0.01 in}



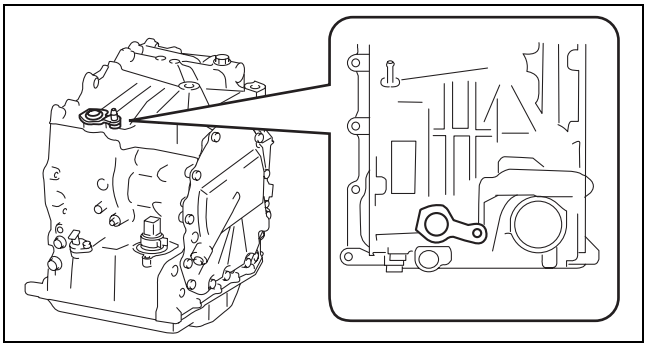
azzjjw00000370

24. Assemble the parking shift lever component.

Note
- Pass the end of the parking shift lever component through the assembly hole (radial needle bearing) of the transaxle case, and assemble it to the manual plate component.



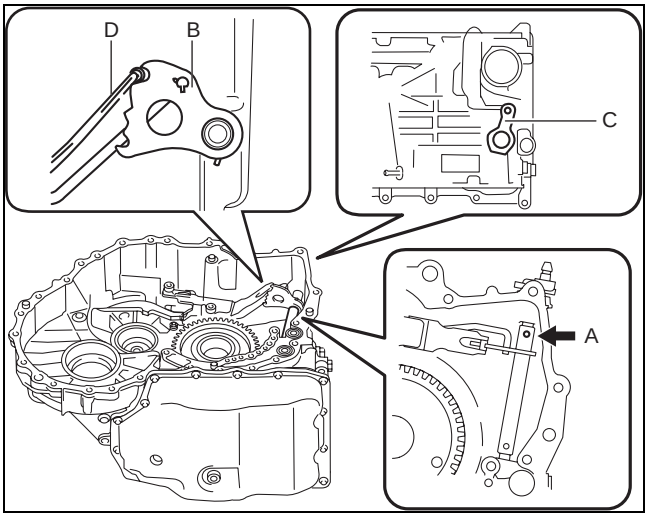
azzjjw00000367



azzjjw00000371

25. Assemble a new roll pin using the following procedure:
    (1) Set the manual plate component and parking shift lever component as shown in the figure and align with the roll pin hole.

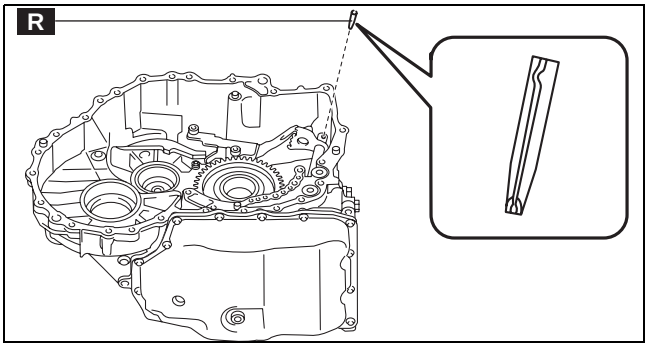
A : Roll pin hole
B : Manual plate component
C : Parking shift lever component
D : Detent bracket component



azzjjw00001373

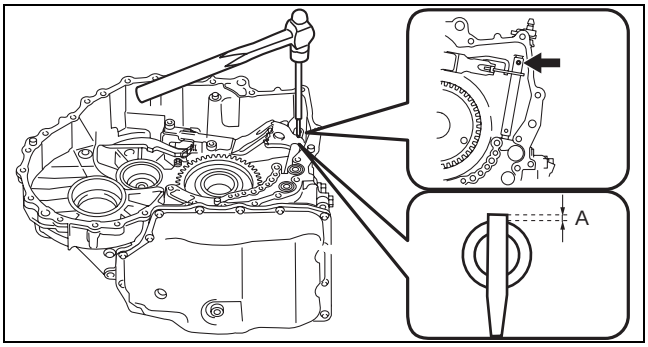
    (2) Assemble the new roll pin to the position shown in the figure using a pin punch.

Note
- Use a pin punch with an end outer diameter of 5 mm {0.197 in} or more.



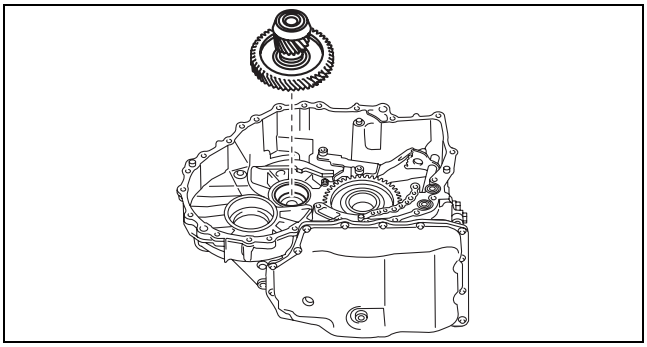
azzjjw00001374

A : 0—1 mm {0—0.03 in}

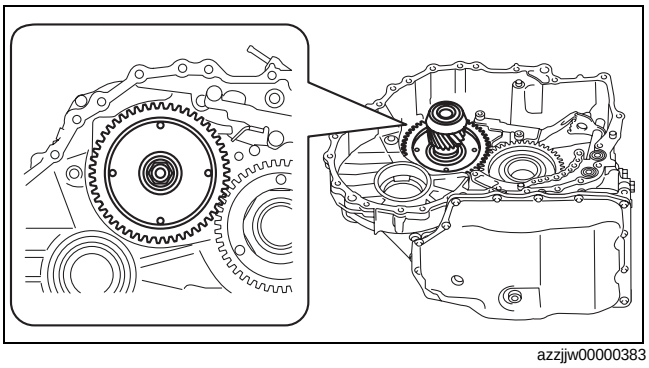


azzjjw00001375

26. Assemble the secondary gear and output gear.



azzjjw00000362

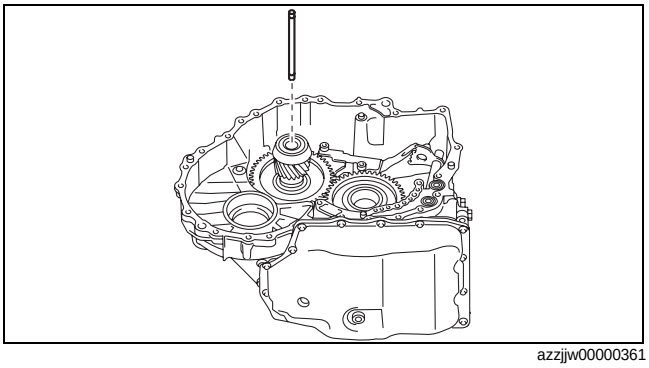


azzjjw00000383

27. Assemble the oil pipe.

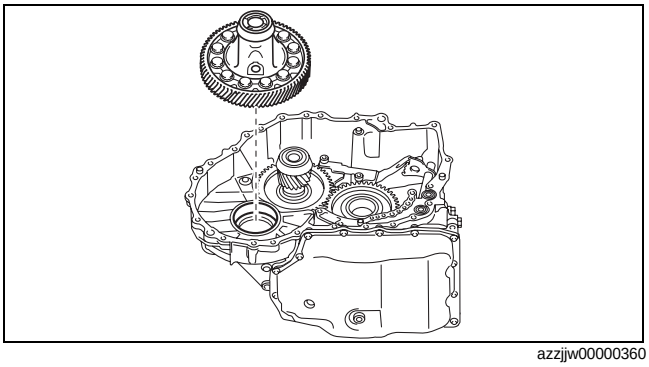
Caution

- **Do not assemble the oil pipe using a tool such as a hammer to prevent damaging the part. For the oil pipe assembly, it is better to only use your hands to put the oil pipe into the output gear.**

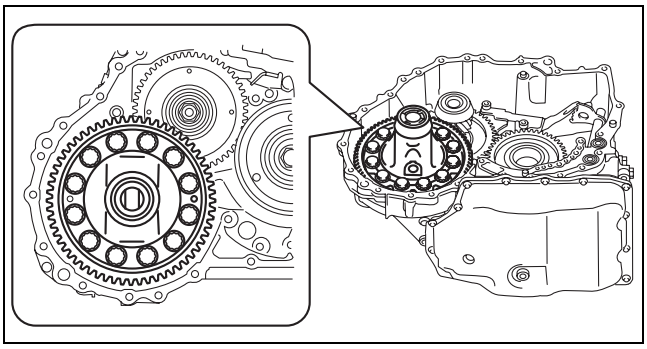


azzjjw00000361

28. Assemble the ring gear and differential.



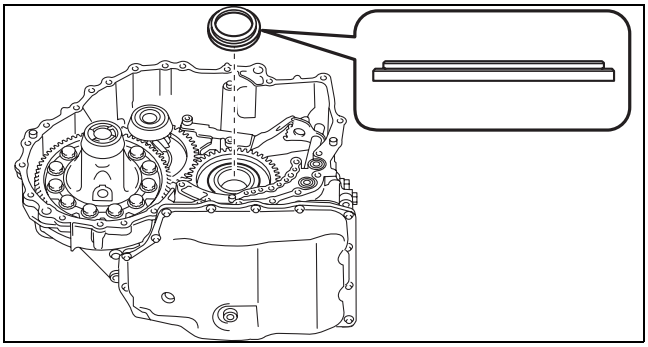
azzjjw00000360



azzjjw00000384

29. Assemble the thrust needle bearing.

Note
- Thrust needle bearing size: Outer diameter approx. 80.3 mm {3.16 in}



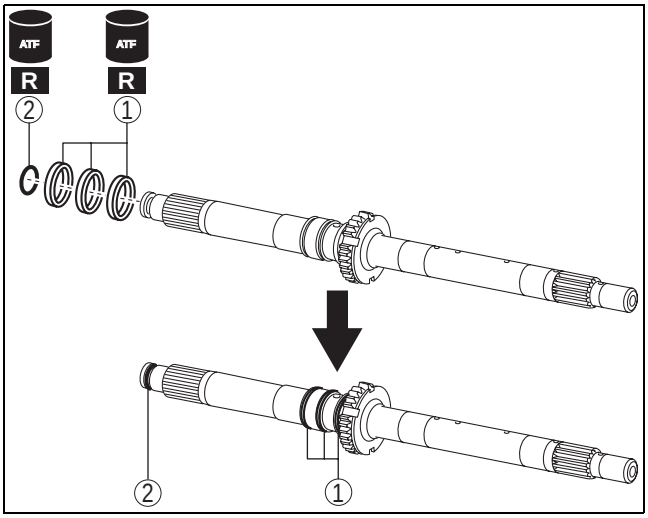
azzjjw00000385

30. Assemble a new D-ring and new seal rings to the turbine shaft using the following procedure:

Caution
- **If a D-ring is reused it could cause ATF leakage, therefore use a new D-ring.**
- **If a seal ring is reused it could cause ATF leakage, therefore use a new seal ring.**

(1) Apply ATF (ATF FZ) to the new D-ring and new seal rings.
(2) Assemble the new D-ring and new seal rings to the turbine shaft using the procedure shown in the figure:

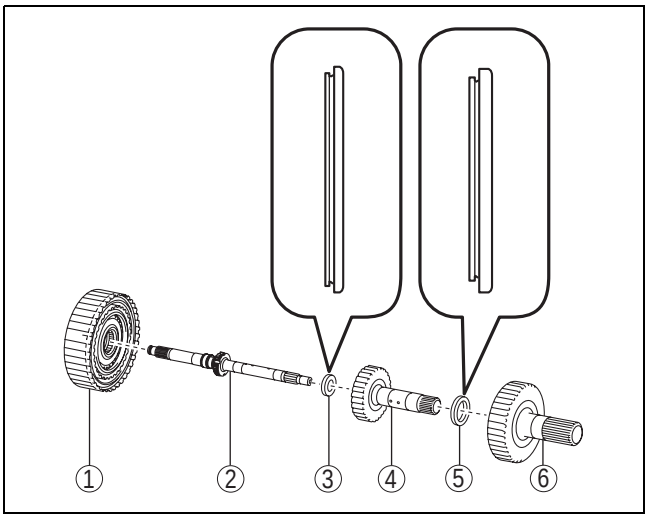
1	Seal ring (outer diameter approx. 24.4 mm {0.961 in}, thickness approx. 1.5 mm {0.059 in})
2	D-ring (outer diameter approx. 16.4 mm {0.646 in}, thickness approx. 2.4 mm {0.094 in})



azzjjw00000386

31. Assemble together the clutch component, turbine shaft, high clutch hub, low clutch hub, and thrust needle bearing using the following procedure:
(1) Assemble the parts using the procedure shown in the figure:

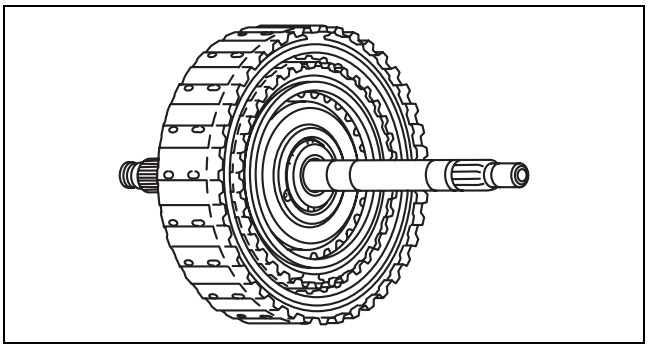
1	Clutch component
2	Turbine shaft
3	Thrust needle bearing (outer diameter approx. 37.3 mm {1.47 in})
4	High clutch hub
5	Thrust needle bearing (outer diameter approx. 51.3 mm {2.02 in})
6	Low clutch hub



azzjjw00001415

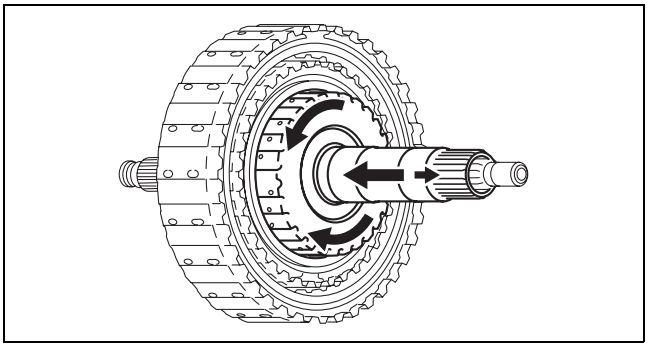
Note

- For the high clutch hub and low clutch hub assembly, assembly is easier if the work is performed using the following procedure:
  - — High clutch hub
    1. Place the assembled parts on the workbench with the clutch component situated sideways.



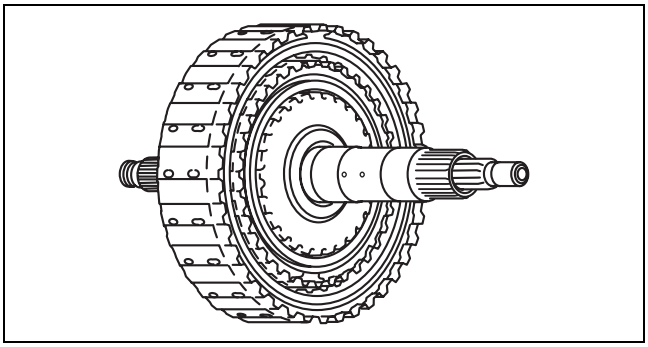
azzjjw00000389

    2. While rotating the high clutch hub, engage the splines of each of the high clutch drive plates one by one, and assemble.



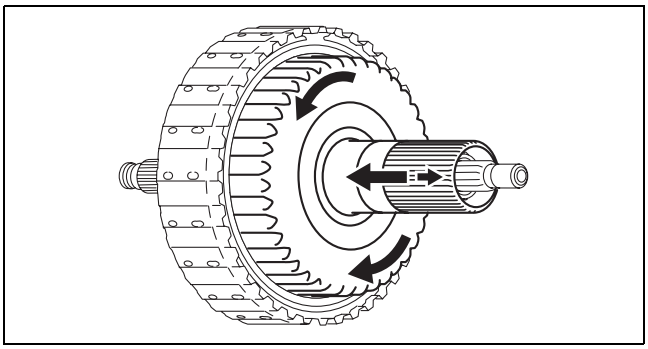
azzjjw00000390

  - — Low clutch hub
    1. Place the assembled parts on the workbench with the clutch component situated sideways.



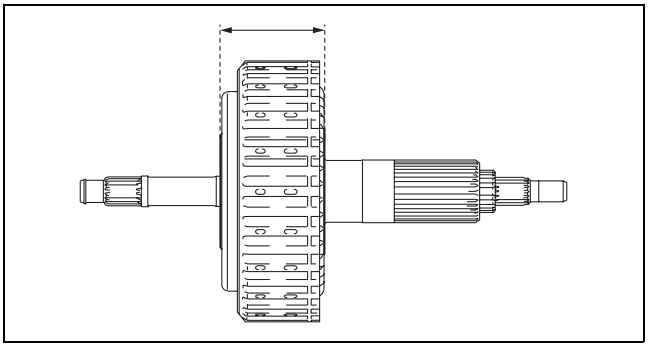
azzjjw00000391

    2. While rotating the low clutch hub, engage the splines of each of the low clutch drive plates one by one, and assemble.



azzjjw00000392

(2) To verify that the parts are securely assembled together, measure the distance shown in the figure.

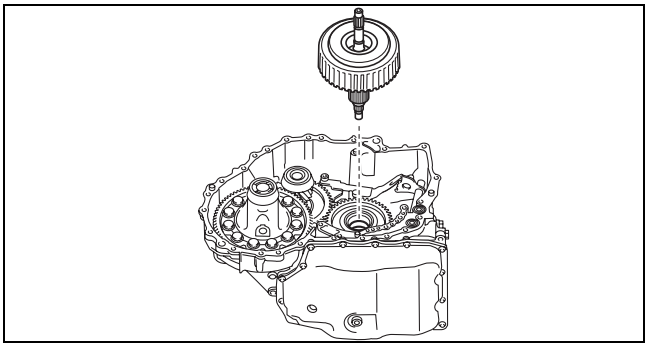

azzjjw00000388

Note
- Recommended measuring instrument: Vernier caliper

Specification
63.9—66.0 mm {2.52—2.59 in}

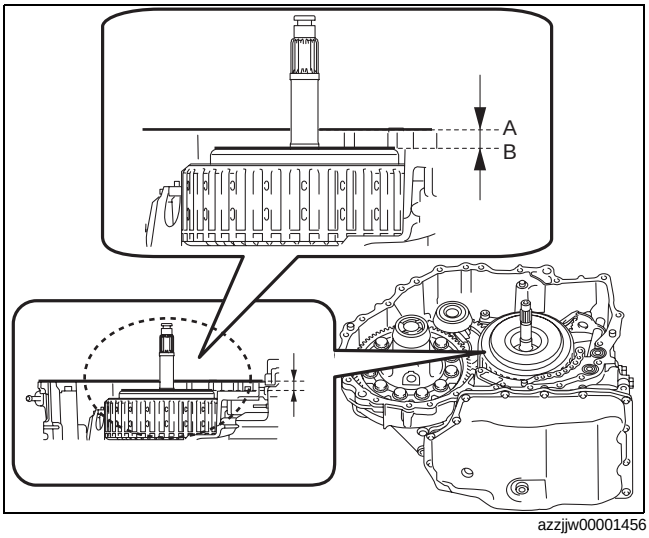
- If not within the specification, disassemble the assembled parts and reassemble.

32. Assemble the parts which were assembled together in Step 31 using the following procedure:
(1) Assemble the parts assembled together in Step 31.


azzjjw00000393

(2) To verify that the parts are securely assembled, measure the distance shown in the figure.

A : Transaxle case end (alignment surface with converter housing)
B : Clutch component end



azzjjw00001456

Note
- Recommended measuring instrument: Depth gauge, straight edge ruler

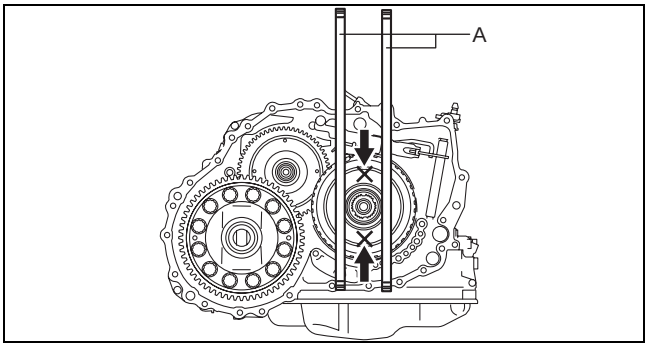
Specification
11.6—14.8 mm {0.457—0.582 in}

- If not within the specification, remove the parts and perform re-assembly from Step 31.

Note
- Measurement method

1) Set two straight edge rulers along the alignment surface of the transaxle case with the converter housing as shown in the figure.

A : Straight edge ruler

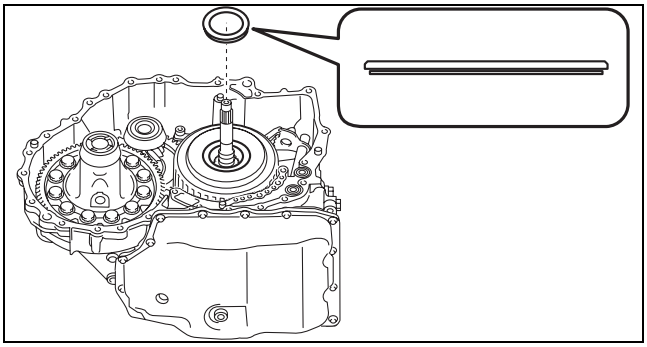


azzjjw00000395

2) Measure the positions (2 locations) shown in the figure using a depth gauge and calculate the average value.
3) Subtract the thickness of the straight edge ruler from the average value.

33. Assemble the thrust needle bearing.

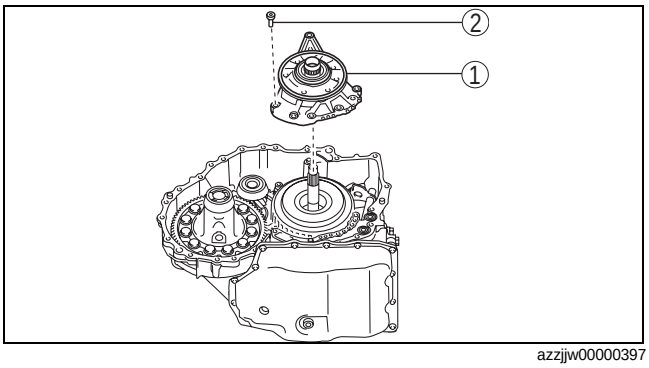
Note
- Thrust needle bearing size: Outer diameter approx. 72.7 mm {2.86 in}



azzjjw00000396

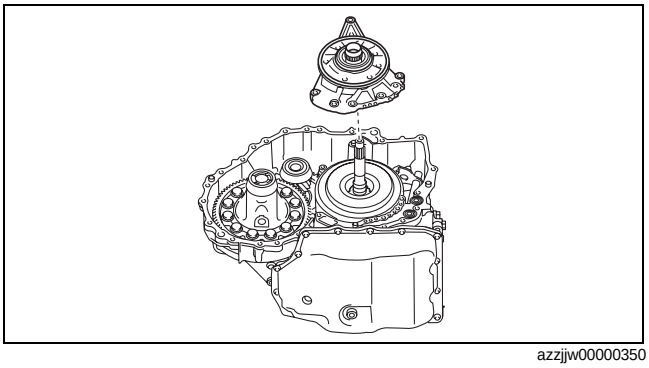
34. Assemble the oil pump using the following procedure:

1	Oil pump
2	7 bolts (M8×1.25 bolt, length to approx. 31 mm {1.2 in})



azzjjw00000397

(1) Assemble the oil pump.

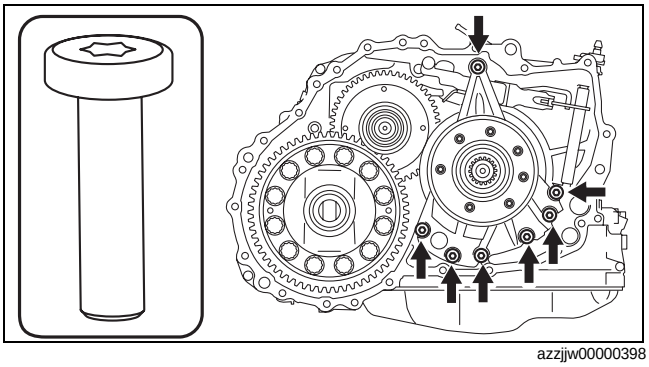


azzjjw00000350

(2) Assemble and tighten the bolts shown in the figure.

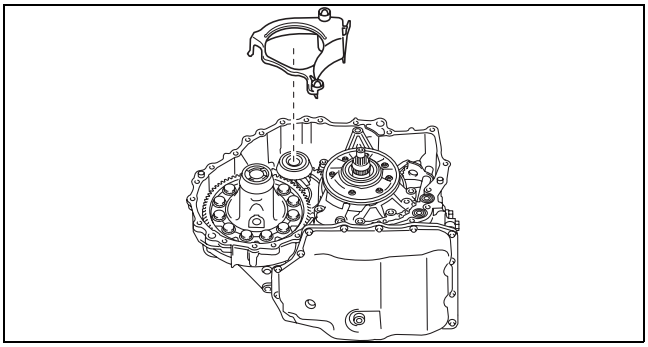
Note
- Bolt size: M8×1.25 bolt, length to approx. 31 mm {1.2 in}

Tightening torque
19—25 N·m {2.0—2.5 kgf·m, 15—18 ft·lbf}

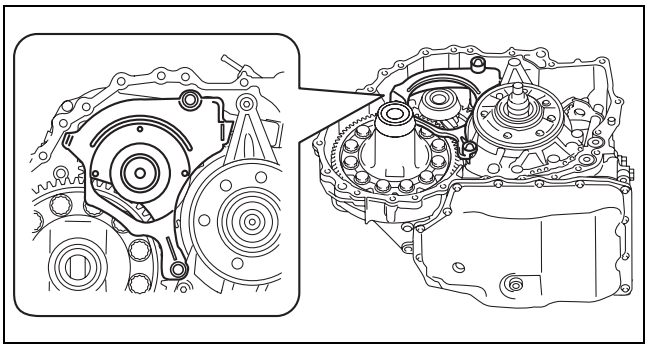


azzjjw00000398

35. Assemble the baffle plate.



azzjjw00000347

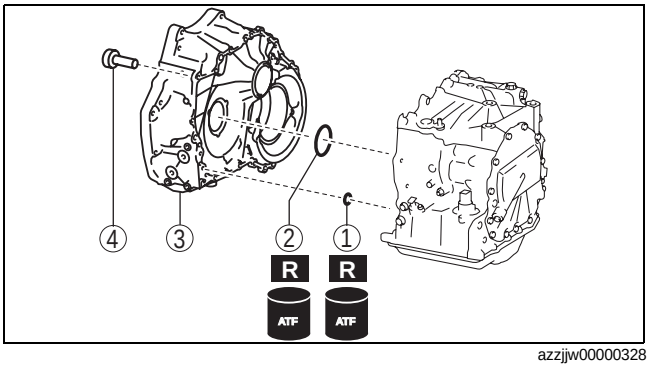


azzjjw00000399

36. Assemble the converter housing using the following procedure:

1	O-ring (outer diameter approx. 15.6 mm {0.614 in}, thickness approx. 2.4 mm {0.094 in})
2	O-ring (outer diameter approx. 73.3 mm {2.89 in}, thickness approx. 3.0 mm {0.12 in})
3	Converter housing
4	24 bolts * (M8×1.25 bolt, length to approx. 28 mm {1.1 in})

* : Of the 24 bolts, 6 are applied with sealant



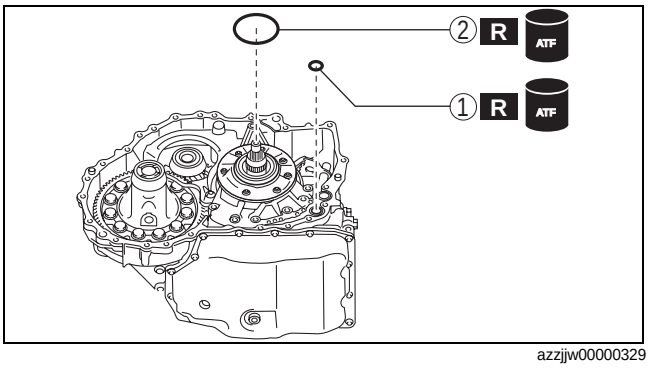
azzjjw00000328

(1) Assemble new O-rings using the following procedure:

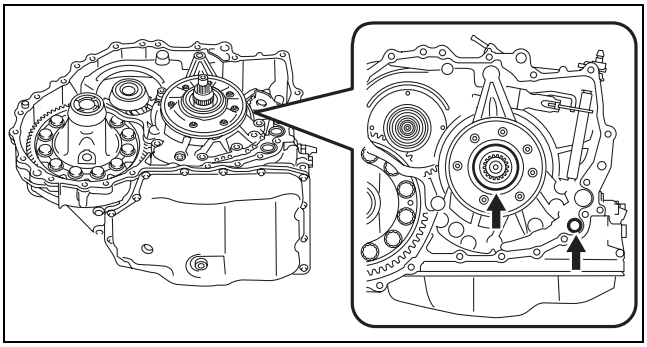
Caution
- **If an O-ring is reused it could cause ATF leakage, therefore use a new O-ring.**

1) Apply ATF (ATF FZ) to the new O-rings.
2) Assemble the new O-rings.

1	O-ring (outer diameter approx. 15.6 mm {0.614 in}, thickness approx. 2.4 mm {0.094 in})
2	O-ring (outer diameter approx. 73.3 mm {2.89 in}, thickness approx. 3.0 mm {0.12 in})



azzjjw00000329



azzjjw00000330

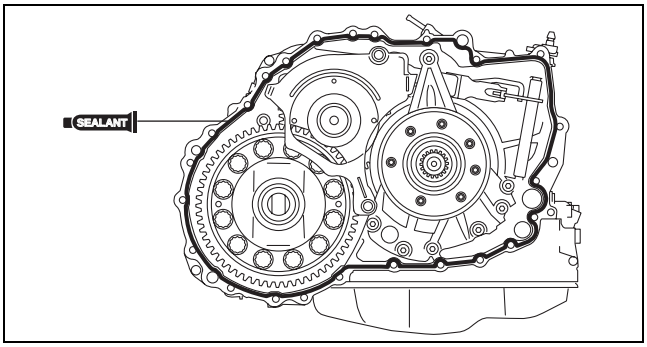
(2) Remove any remaining old sealant on the contact surfaces of the transaxle case and converter housing, and degrease the contact surfaces.

Caution
- **When degreasing and if degreaser is used, use a rag saturated with degreaser and be careful not to allow degreaser to penetrate the interior of the transaxle.**
  In addition, after degreasing, visually verify that there is no foreign matter (such as old sealant, cloth fibers) which has penetrated the interior of the transaxle.

(3) Apply sealant (silicone sealant TB1217E) to the transaxle case.

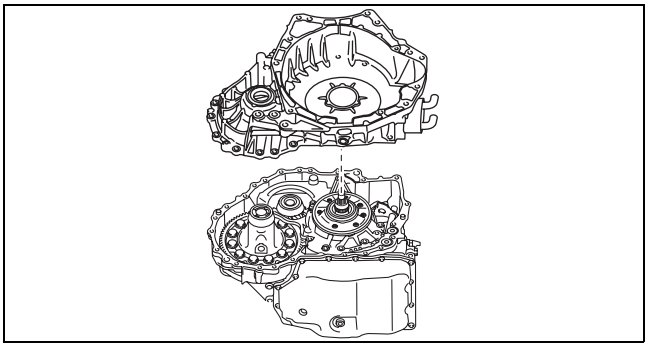
Caution
- **If sealant is applied excessively or applied to a part other than the indicated part, the O-ring could deform and the sealant could penetrate the oil passage. Apply an appropriate amount of sealant to the indicated part.**

Note
- Sealant application amount (bead thickness): ϕ 1.8—2.5 mm {0.071—0.098 in}



azzjjw00000331

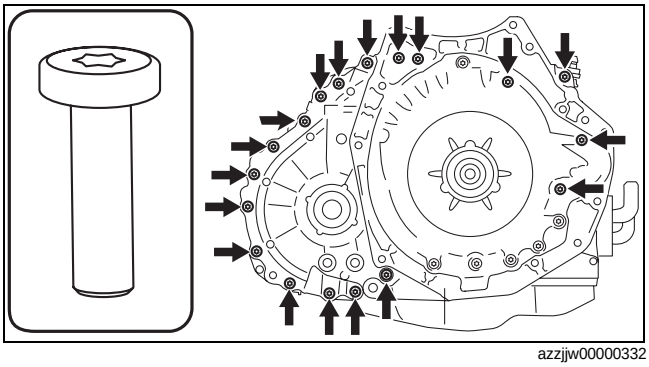
(4) Assemble the converter housing before the applied sealant starts to harden.



azzjjw00000317

(5) Assemble and temporarily tighten the bolts to the positions shown in the figure.

Note
- Bolt size: M8×1.25 bolt, length to approx. 28 mm {1.1 in}

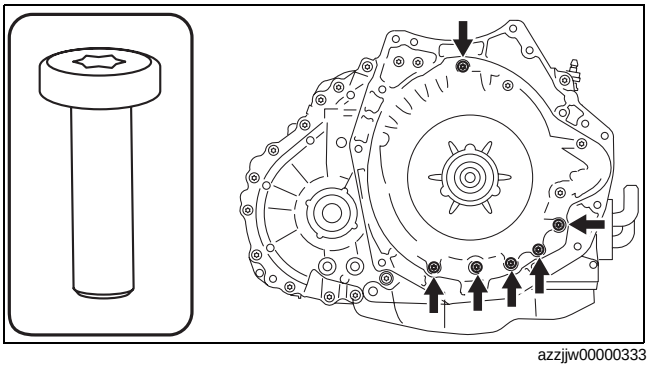


azzjjw00000332

(6) Assemble and temporarily tighten the new bolts to the positions shown in the figure.

Caution
- **The bolts for the assembly are applied with sealant. If the bolts are reused it could cause ATF leakage, therefore use new bolts.**

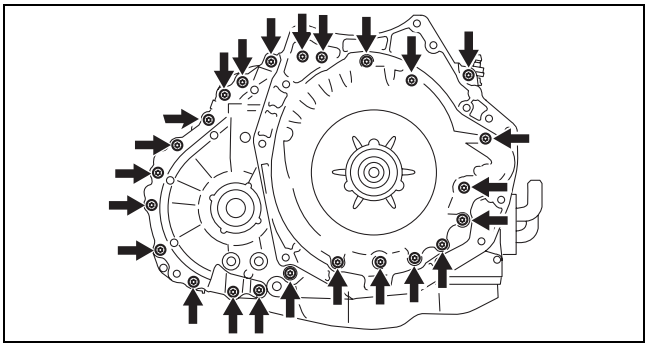
Note
- Bolt size: M8×1.25 bolt, length to approx. 28 mm {1.1 in} (with sealant applied)



azzjjw00000333

(7) Tighten the bolts shown in the figure.

Tightening torque
19—25 N·m {2.0—2.5 kgf·m, 15—18 ft·lbf}



azzjjw00000334

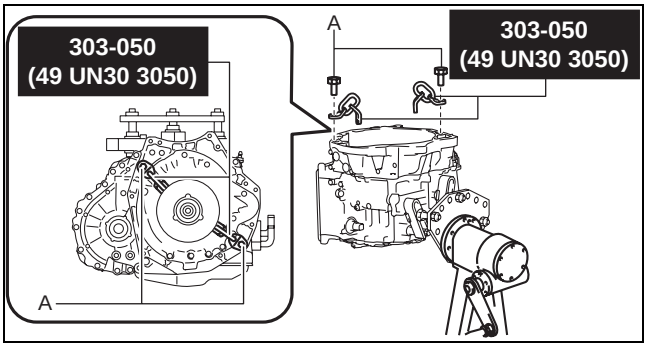
37. Remove the SSTs from the transaxle using the following procedure:

Caution
- **When removing the transaxle from the SST (engine stand) using chain hoists, be careful not to allow the transaxle (oil cooler in particular) to contact the SST (engine stand). If the transaxle contacts the SST, check the areas that made contact and replace damaged parts with new ones.**

(1) Assemble the SSTs using part number: 9YA02 1015, or M10×1.5 bolts, length to 35 mm {1.4 in}.

A : Part number: 9YA02 1015, or M10×1.5 bolt, length to 35 mm {1.4 in}

Tightening torque
38—52 N·m {3.9—5.3 kgf·m, 29—38 ft·lbf}

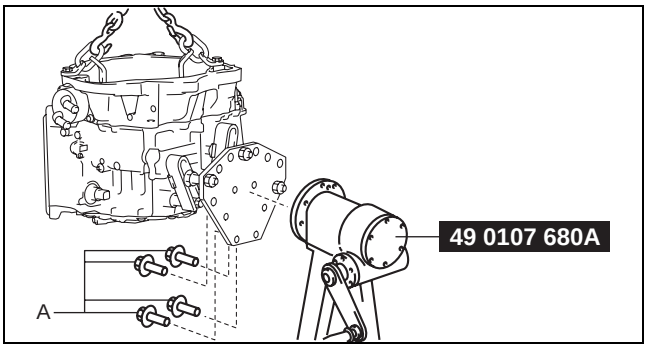


azzjjw00000335

(2) Using chain hoists, remove the SST (engine stand) from the transaxle.

A : Part number: 9YA02 A220, or M12×1.75 bolt, length to 40 mm {1.6 in}

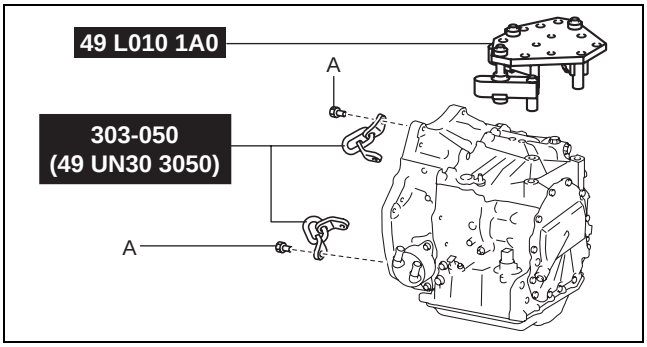
Caution
- **When removing the transaxle from the SST (engine stand) using chain hoists, be careful not to allow the transaxle (oil cooler in particular) to contact the SST (engine stand). If the transaxle contacts the SST, check the areas that made contact and replace damaged parts with new ones.**



azzjjw00000311

(3) Remove the SSTs.

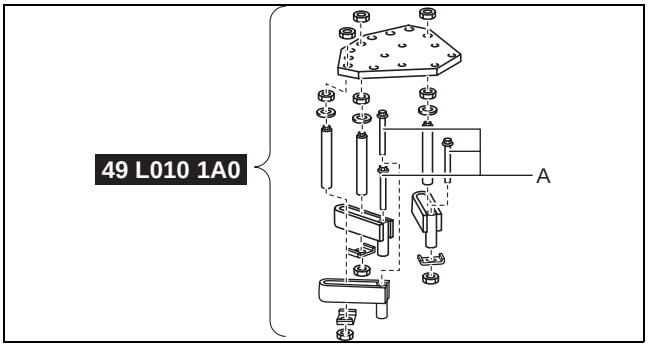
A : Part number: 9YA02 1015, or M10×1.5 bolt, length to 35 mm {1.4 in}



azzjjw00000336

(4) Disassemble the SST.

A : Part number: 9YA02 1440, or M14×1.5 bolt, length to 100 mm {3.94 in}



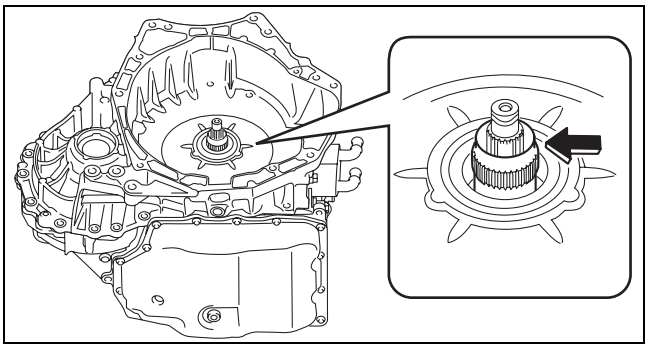
azzjjw00000337

38. Assemble the torque converter using the following procedure:

(1) Apply ATF (ATF FZ) to the end of the starter shaft of the oil pump shown in the figure.

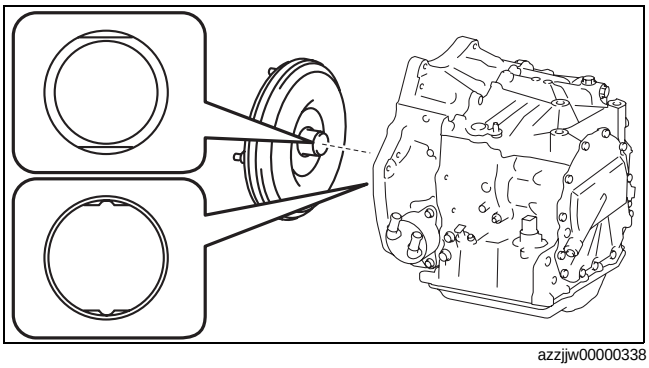
Caution

- **Accurately perform to protect the torque converter internal parts.**



azzzcw00000083

(2) Assemble the torque converter so that the two surfaces of the notch on the end of the torque converter engage the inner rotor of the oil pump.



azzjjw00000338

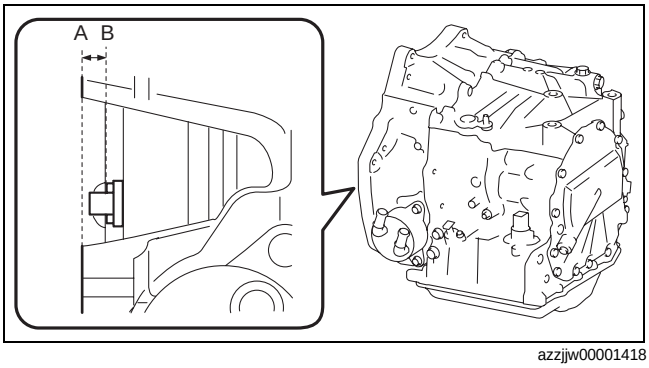
(3) To verify that the torque converter is securely assembled, measure the distance shown in the figure.

A : Converter housing end (alignment surface with engine)

B : Torque converter stud bolt seat

Note

- Recommended measuring instrument: Depth gauge, straight edge ruler



azzjjw00001418

Specification

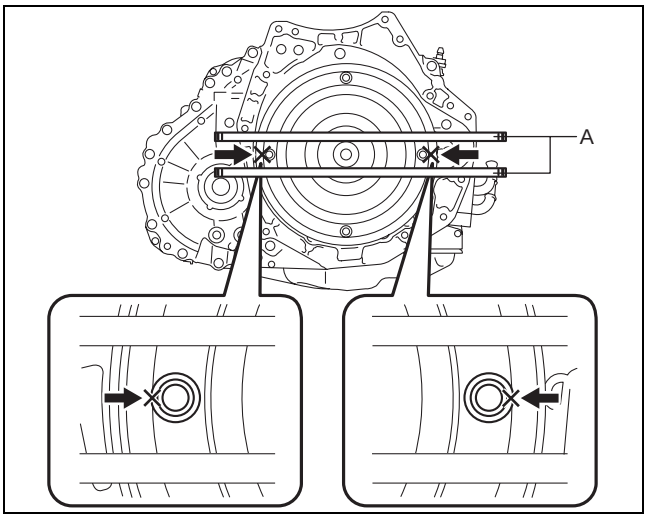
14.6 mm {0.575 in} or more

- If not within the specification, remove the torque converter and reassemble.

Note
- Measurement method

1) Set two straight edge rulers along the alignment surface of the converter housing with the engine as shown in the figure.

A : Straight edge ruler

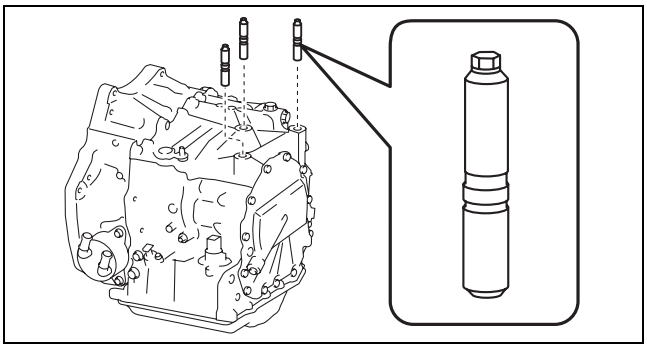


azzjjw00000340

2) Measure the positions (2 locations) shown in the figure using a depth gauge and calculate the average value.
3) Subtract the thickness of the straight edge ruler from the average value.

39. Assemble and tighten the stud bolts.

Tightening torque
15—25 N·m {1.6—2.5 kgf·m, 12—18 ft·lbf}

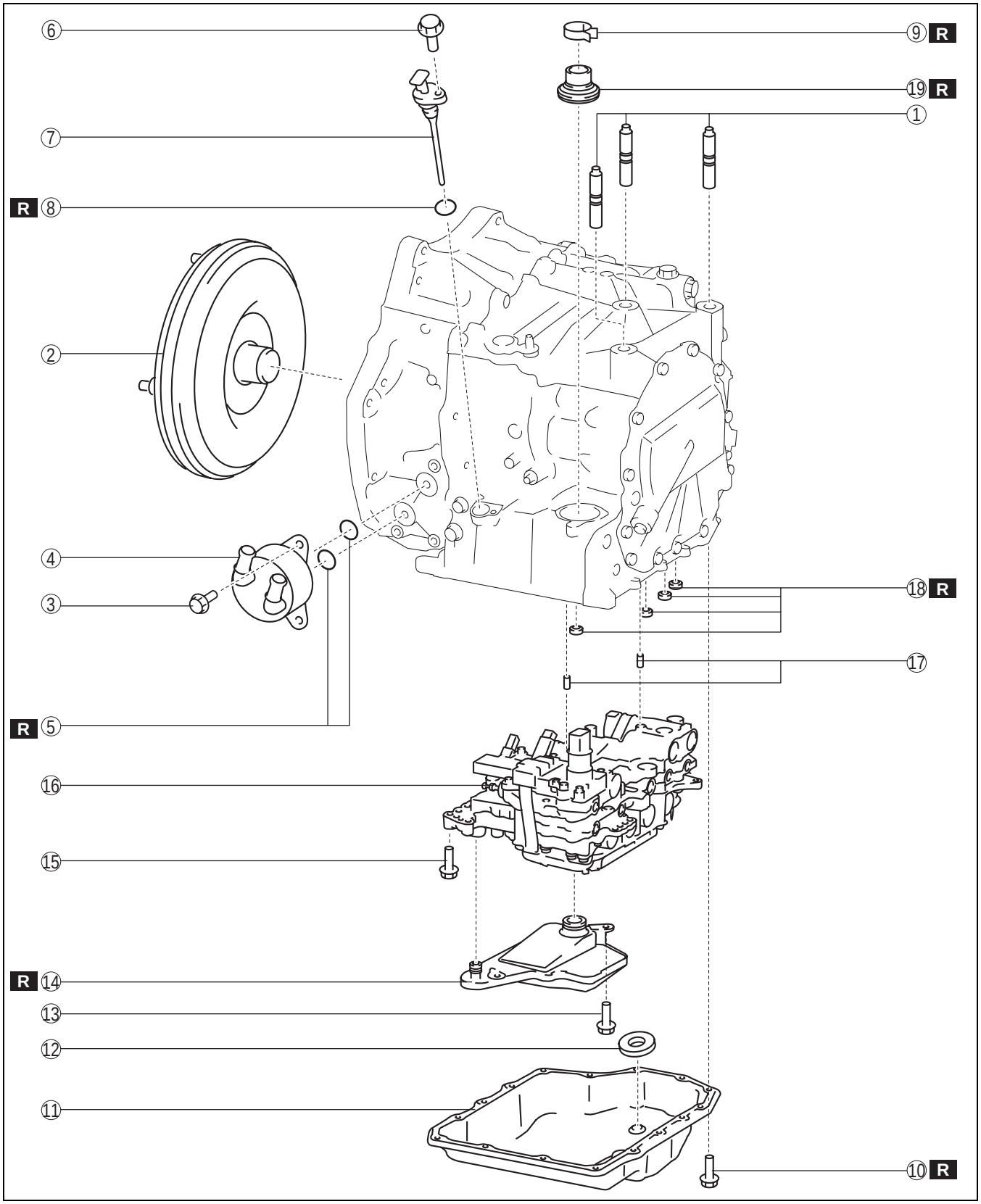


azzjjw00000341

AUTOMATIC TRANSAXLE DISASSEMBLY

id051700660600

Structural View
Automatic transaxle 1

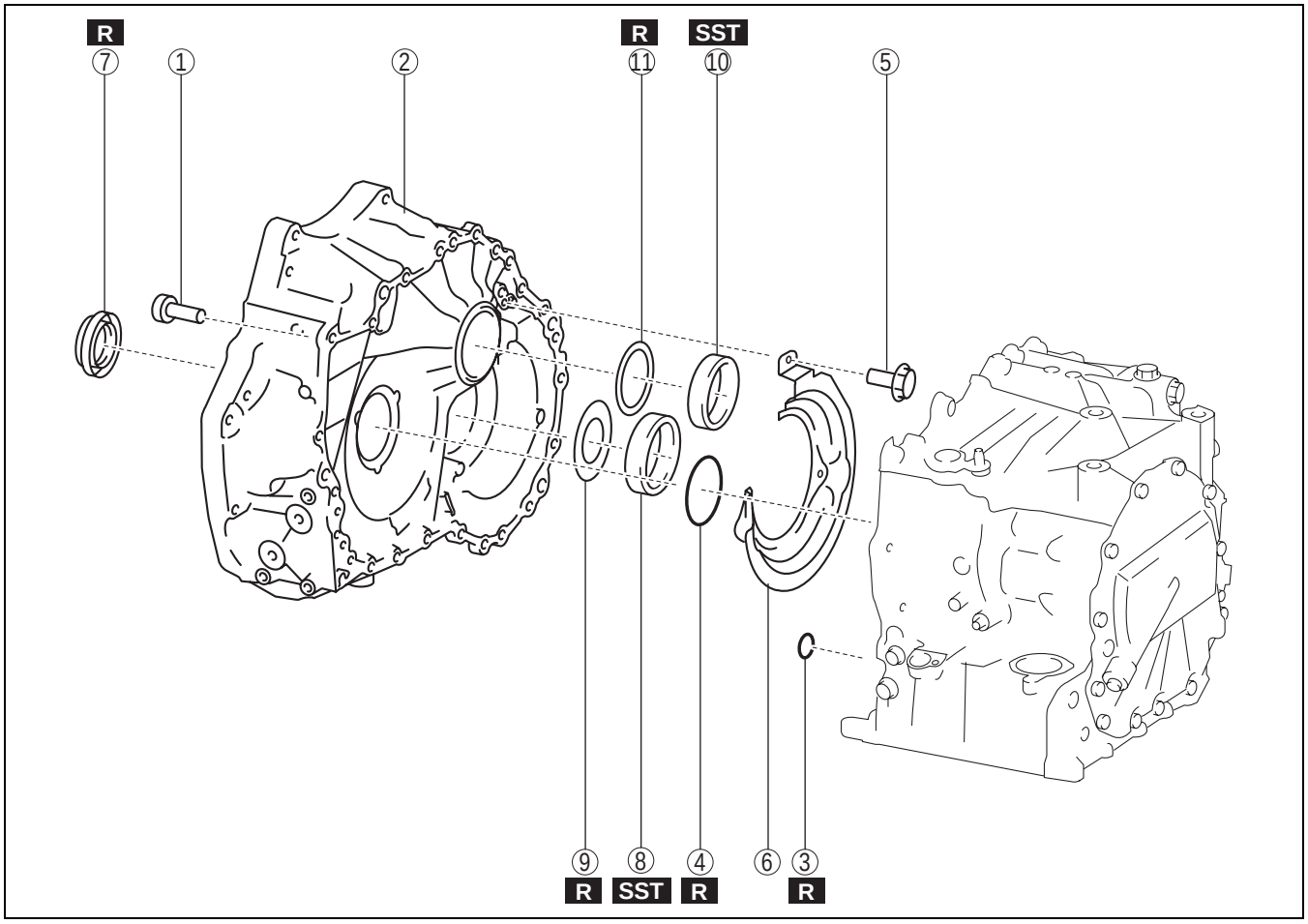


bfw1ua00000001

1	Stud bolt
2	Torque converter
3	3 bolts
4	Oil cooler
5	O-ring
6	Bolt
7	Dipstick
8	O-ring
9	Hose clamp
10	16 bolts

11	Oil pan
12	Magnet
13	2 bolts
14	Oil strainer
15	11 bolts
16	Control valve body
17	Dowel pin
18	Gasket
19	Oil seal

Automatic transaxle 2

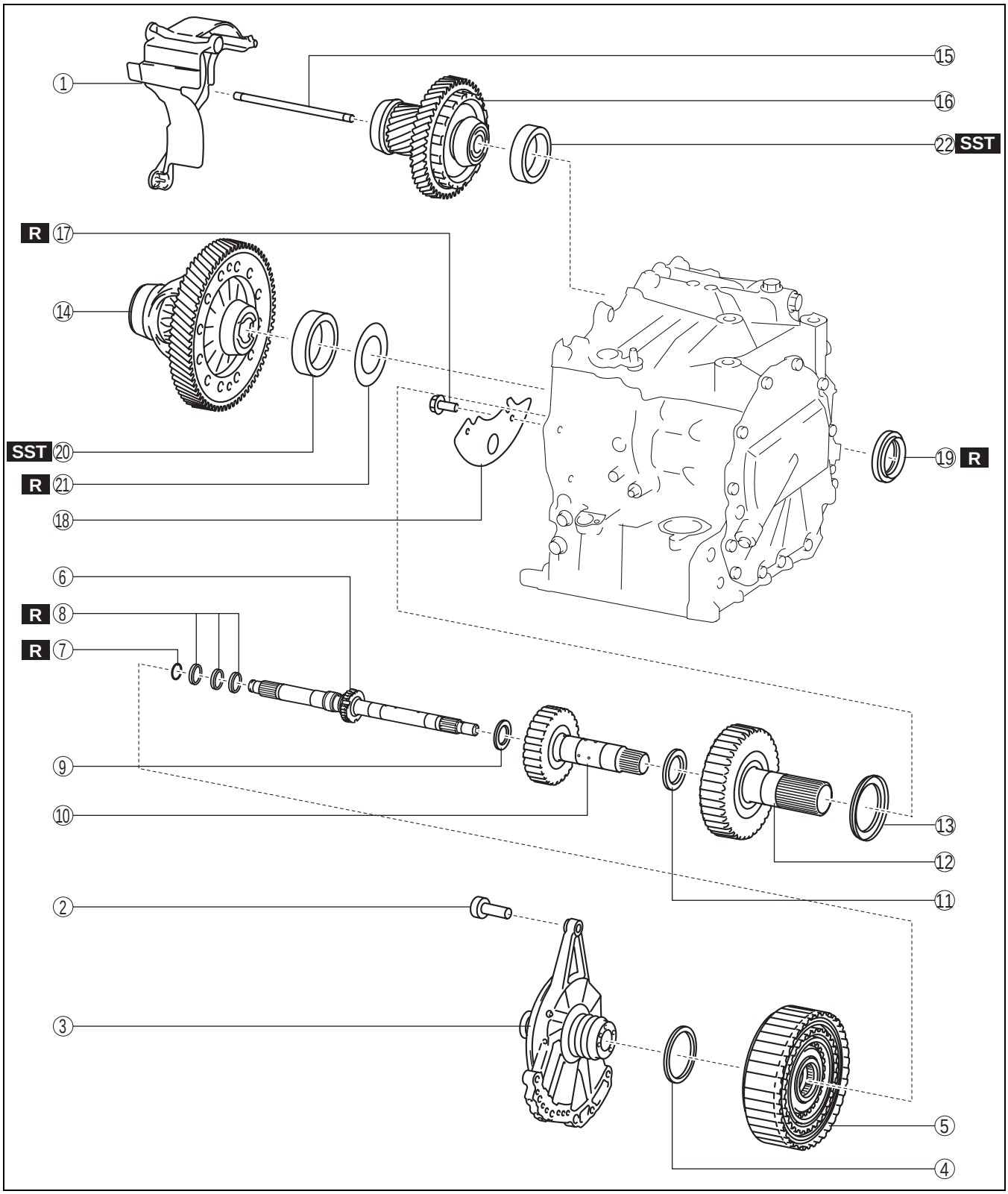


azzjjw00001420

1	24 bolts
2	Converter housing
3	O-ring
4	O-ring
5	3 bolts
6	Baffle plate

7	Oil seal
8	Bearing race
9	Shim
10	Bearing race
11	Shim

Automatic transaxle 3



azzjjw00001421

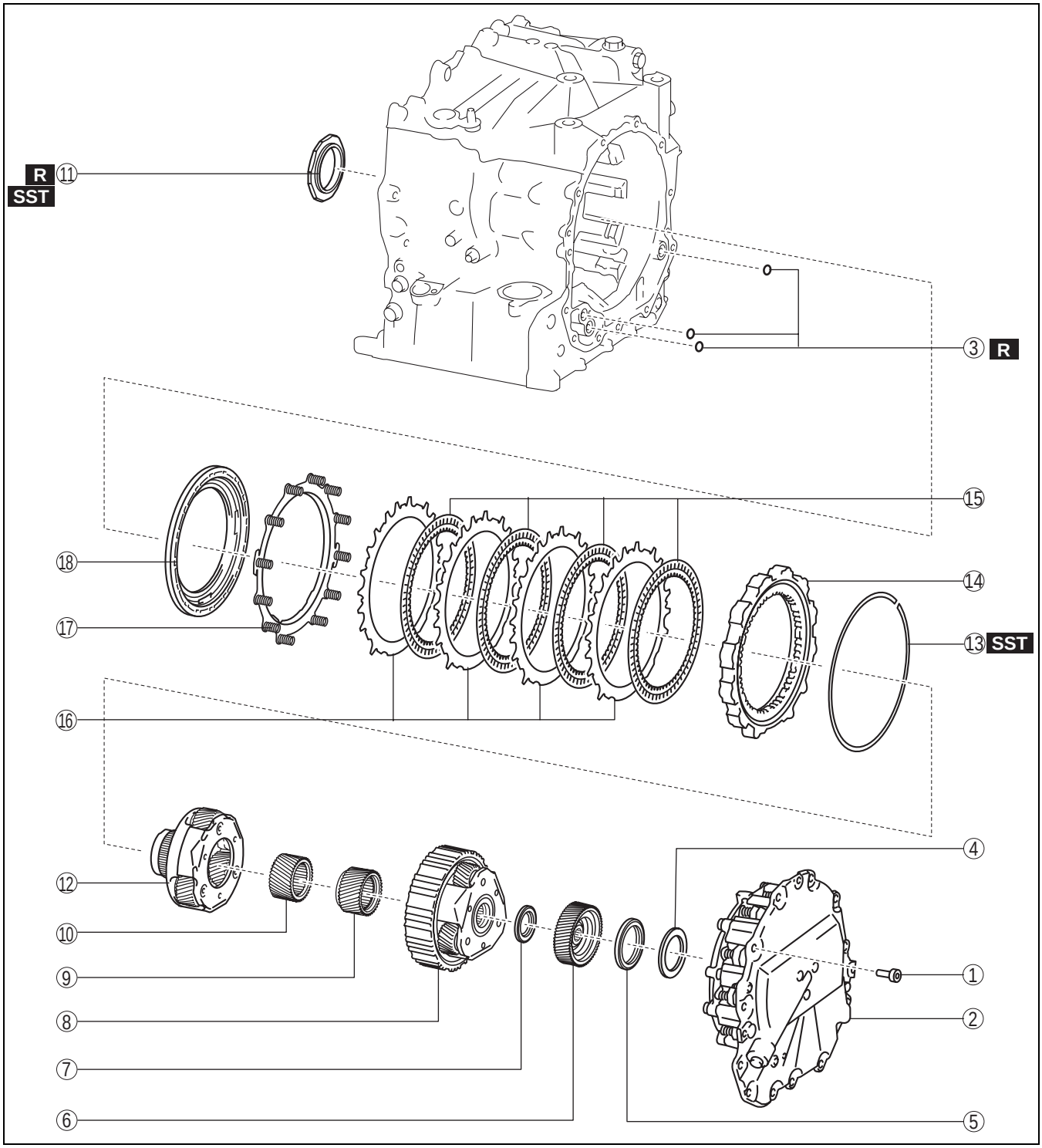
1	Baffle plate
2	7 bolts
3	Oil pump
4	Thrust needle bearing
5	Clutch component
6	Turbine shaft

7	D-ring
8	Seal ring
9	Thrust needle bearing
10	High clutch hub
11	Thrust needle bearing
12	Low clutch hub

13	Thrust needle bearing
14	Ring gear and differential
15	Oil pipe
16	Secondary gear and output gear
17	2 bolts

18	Baffle plate
19	Oil seal
20	Bearing race
21	Shim
22	Bearing race

Automatic transaxle 4

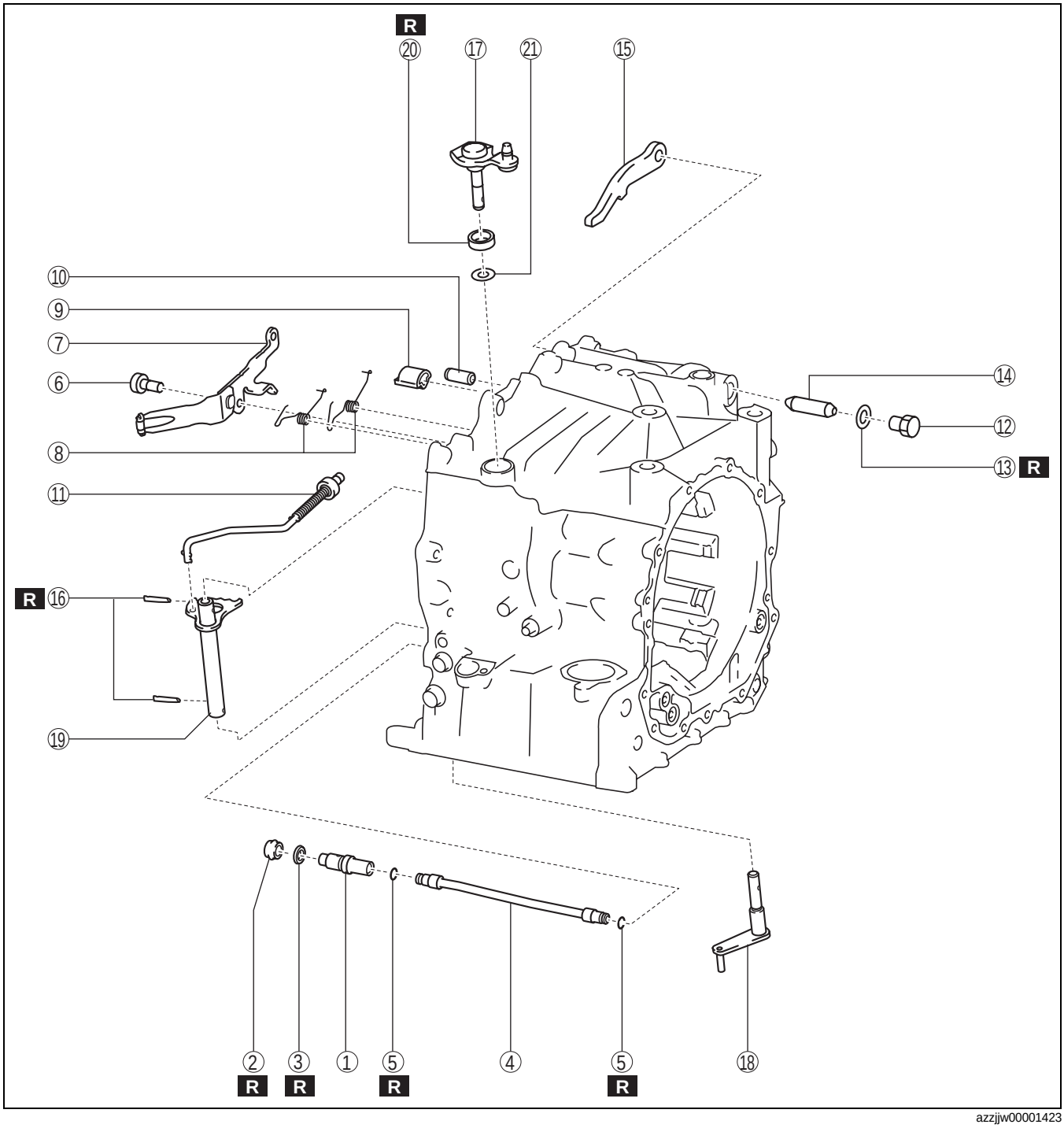


azzjjw00001422

1	12 bolts
2	End cover component
3	O-ring
4	Shim
5	Thrust needle bearing
6	Reduction sun gear
7	Thrust needle bearing
8	Rear planetary gear
9	Rear sun gear

10	Front sun gear
11	Locknut
12	Front planetary gear
13	Snap ring
14	One-way clutch
15	Drive plate
16	Driven plate
17	Springs and retainer component
18	Low and reverse brake piston

Automatic transaxle 5

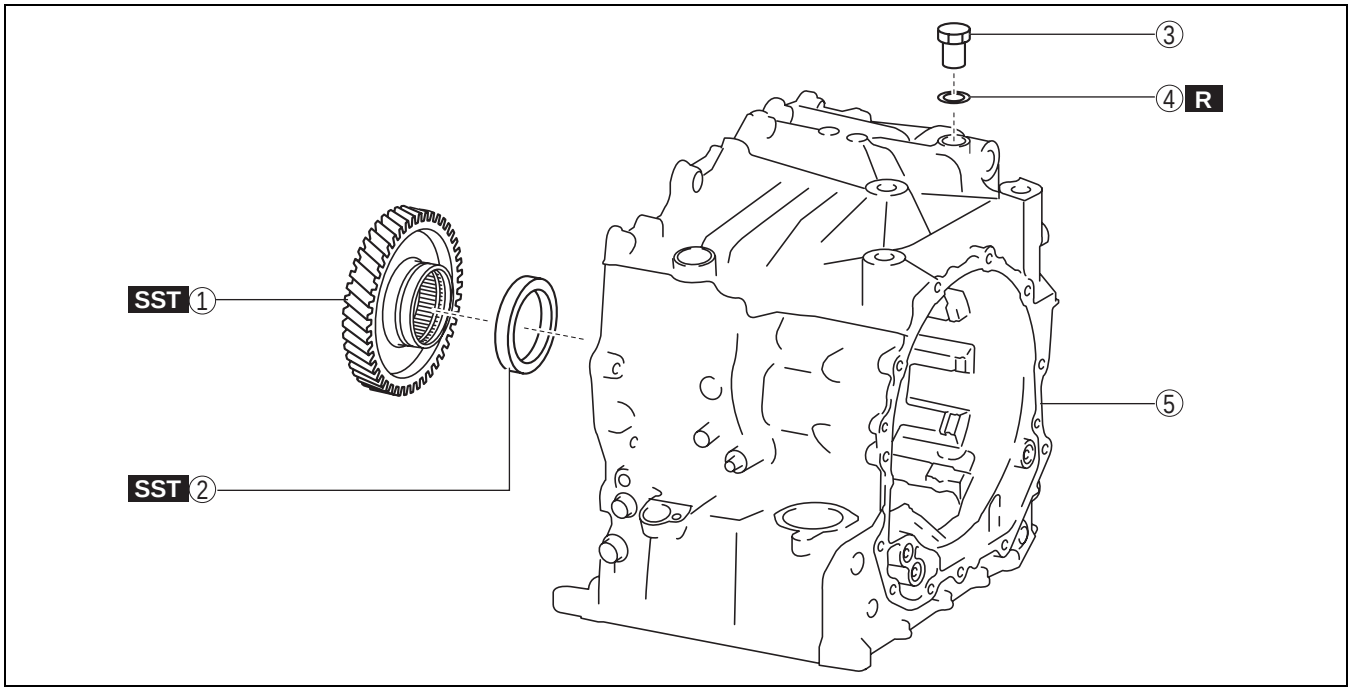


azzjjw00001423

1	Connector
2	Gasket
3	Gasket
4	Oil pipe
5	O-ring
6	2 bolts
7	Detent bracket component
8	Pawl return spring
9	Support actuator
10	Parking pawl pin
11	Parking rod component

12	Plug
13	Gasket
14	Parking pawl shaft
15	Parking pawl
16	Roll pin
17	Parking shift lever component
18	Parking assist lever component
19	Manual plate component
20	Oil seal
21	Washer

Automatic transaxle 6



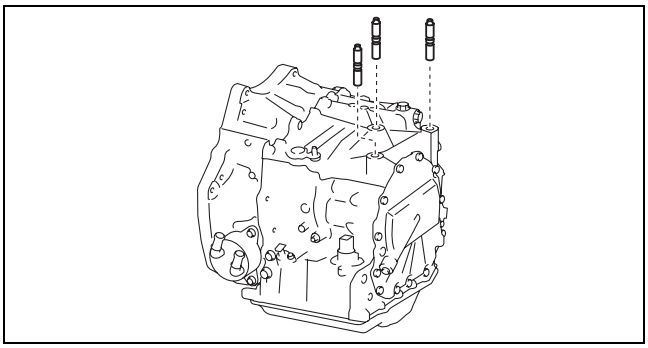
azzjjw00001463

1	Primary gear
2	Angular contact ball bearing
3	Plug

4	Gasket
5	Transaxle case

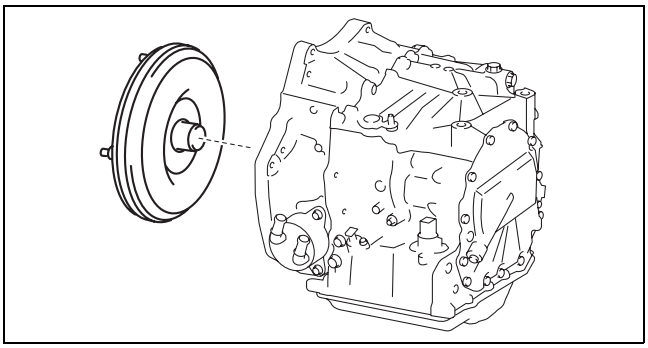
Disassembly Procedure

1. Clean the outside of the transaxle. (See 05-17-26 AUTOMATIC TRANSAXLE CLEANING.)
2. Remove the stud bolts.



azzjjw00000410

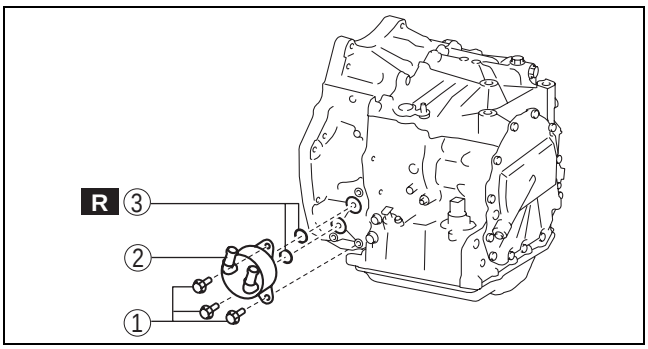
3. Remove the torque converter.



azzjjw00000411

4. Remove the oil cooler in the order shown in the figure.

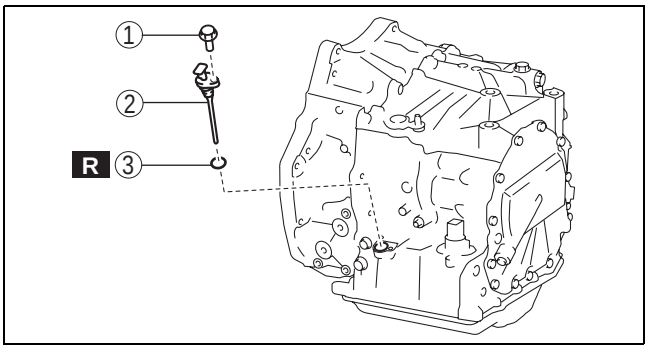
1	Bolt
2	Oil cooler
3	O-ring



azzjjw00000412

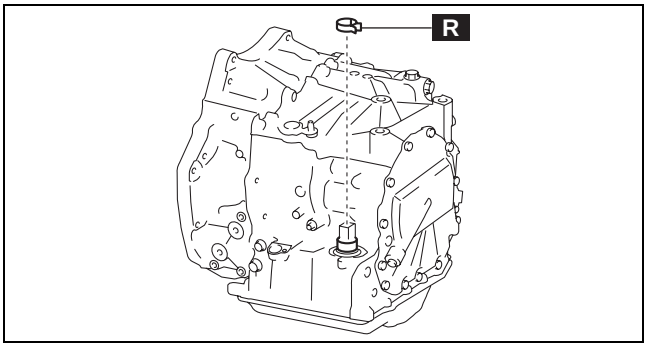
5. Remove the dipstick in the order shown in the figure.

1	Bolt
2	Dipstick
3	O-ring



azzjjw00000413

6. Remove the hose clamp.



azzjjw00000414

7. Install the transaxle to the SST (engine stand) using the following procedure:

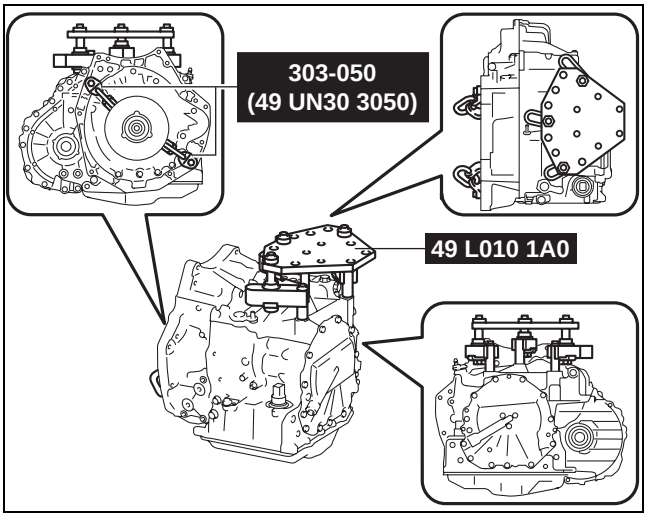
Caution

- **When installing the transaxle to the SST (engine stand) using chain hoists, be careful not to allow the transaxle to contact the SST (engine stand). If the transaxle contacts the SST, check the areas that made contact and replace damaged parts with new ones.**

(1) Install the SSTs to the transaxle using the following procedure.

Note

- When installing the SST (49 L010 1A0) to the transaxle (stud bolt holes), use part number: 9YA02 1440 or M14×1.5 bolts, length to 100 mm {3.94 in}.
- When installing the SST (49 UN30 3050) to the transaxle, use part number: 9YA02 1015, or M10×1.5 bolts, length to 35 mm {1.4 in}.



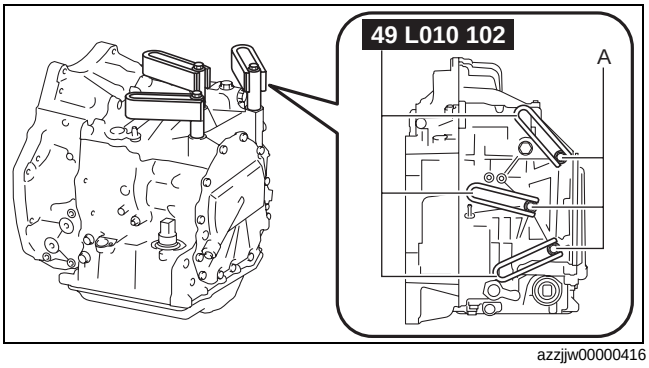
azzjjw00000415

1) Temporarily install the arms (49 L010 102) using part number: 9YA02 1440, or M14×1.5 bolts, length to 100 mm {3.94 in}.

A : Part number: 9YA02 1440, or M14×1.5 bolt, length to 100 mm {3.94 in}

Note

- To adjust the installation position of the SST in Step 3), temporarily tighten the bolts.

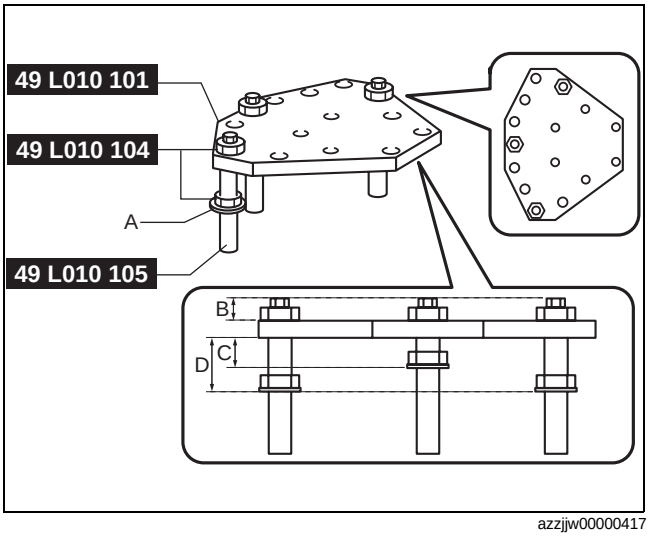


azzjjw00000416

2) Assemble the SST (49 L010 1A0).

A : Washer
B : Approx. 20 mm {0.79 in}
C : Approx. 26 mm {1.0 in}
D : Approx. 47 mm {1.9 in}

Note
- Use bolts (49 L010 105) with a length of 138 mm {5.43 in}.

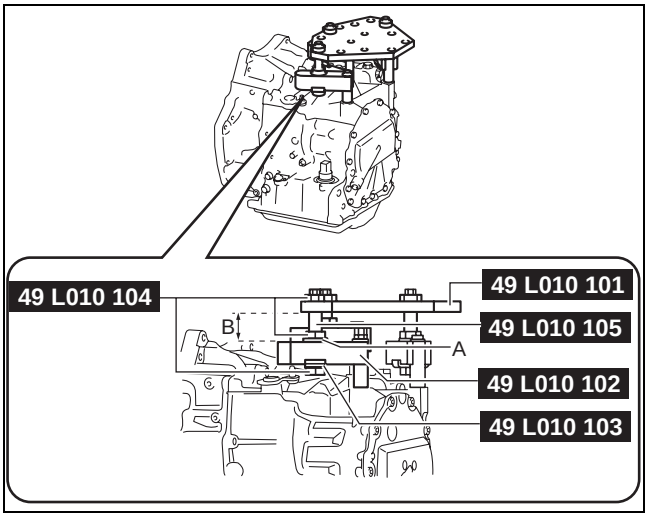


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3) Install the SST assembled in Step 2).

A : Washer
B : Level out

Note
- Adjust so that the plate (49 L010 101) and arms (49 L010 102) are level, and install.



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4) Verify that nothing other than the SST arms (49 L010 102) installation area contacts the transaxle.

Caution
- **If something other than the SST arms (49 L010 102) installation area contacts the transaxle, readjust the SST to prevent damaging the part.**

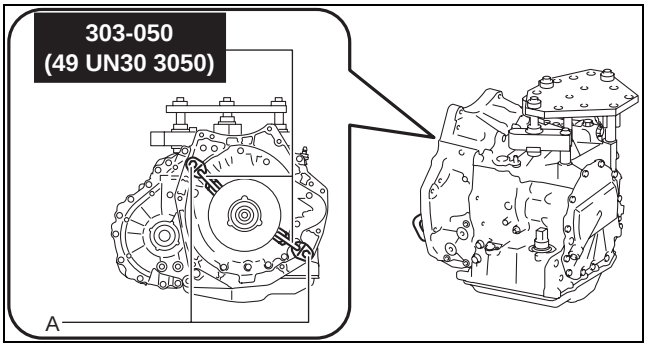
5) Tighten the nuts and bolts.

Tightening torque
- **Bolt: Part number: 9YA02 1440, or M14×1.5 bolt, length to 100 mm {3.94 in}**
  40—52 N·m {4.1—5.3 kgf·m, 30—38 ft·lbf}
- **Nut: 49 L010 104**
  140—160 N·m {15—16 kgf·m, 104—118 ft·lbf}

6) Assemble the SSTs using part number: 9YA02 1015, or M10×1.5 bolts, length to 35 mm {1.4 in}.

A : Part number: 9YA02 1015, or M10×1.5 bolt, length to 35 mm {1.4 in}

Tightening torque
38—52 N·m {3.9—5.3 kgf·m, 29—38 ft·lbf}

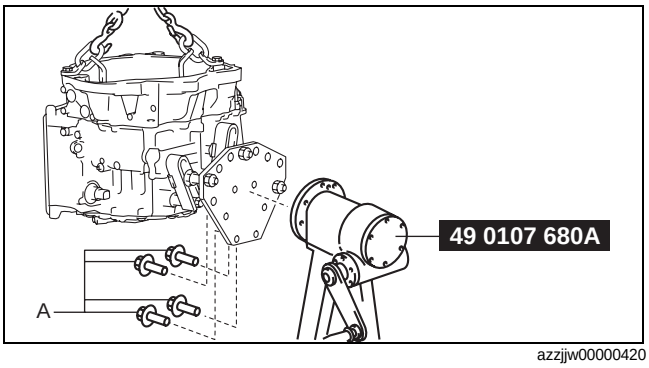


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(2) Using chain hoists, install the transaxle to the SST (engine stand) using part number: 9YA02 A220, or M12×1.75 bolts, length to 40 mm {1.6 in}.

A : Part number: 9YA02 A220, or M12×1.75 bolt, length to 40 mm {1.6 in}

Caution
- **When installing the transaxle to the SST (engine stand) using chain hoists, be careful not to allow the transaxle to contact the SST (engine stand). If the transaxle contacts the SST, check the areas that made contact and replace damaged parts with new ones.**



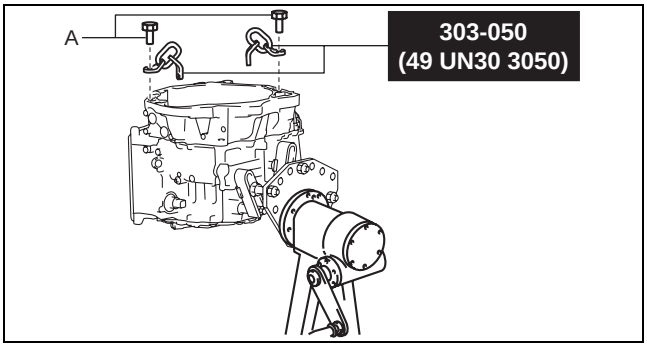
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Note
- Tighten the four locations with bolts and securely install the transaxle to the SST (engine stand).

Tightening torque
88—118 N·m {9.0—12 kgf·m, 65—87 ft·lbf}

(3) Remove the SSTs.

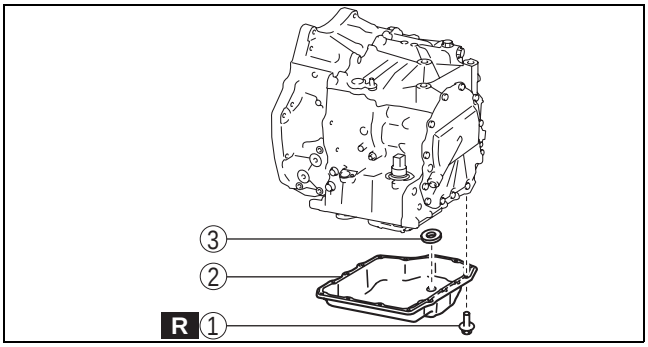
A : Part number: 9YA02 1015, or M10×1.5 bolt, length to 35 mm {1.4 in}



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8. Remove the oil pan and magnet using the following procedure:

1	16 bolts
2	Oil pan
3	Magnet

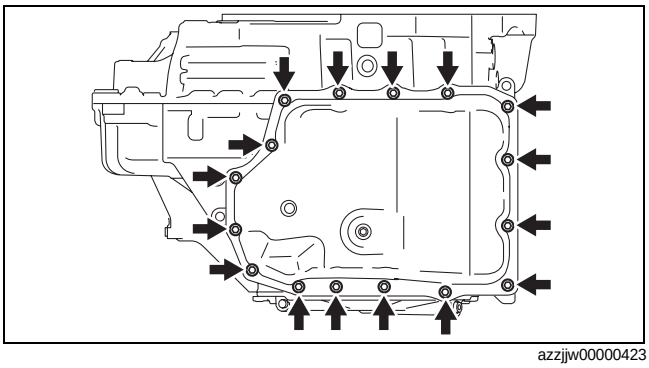


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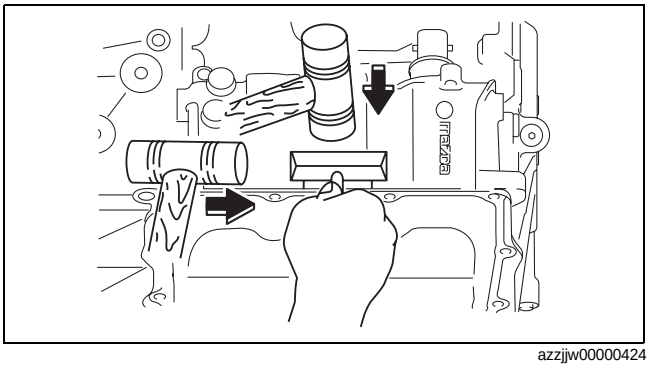
(1) Remove the bolts shown in the figure.

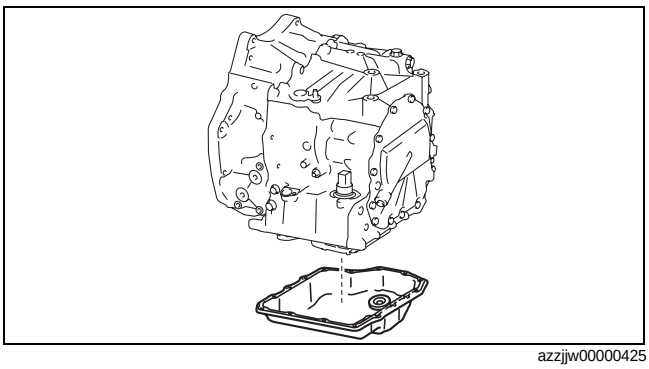
Caution

- **If the removed bolts with spring washers are reused it could loosen the bolts due to spring weakness, therefore when performing the automatic transaxle assembly, use new bolts.**

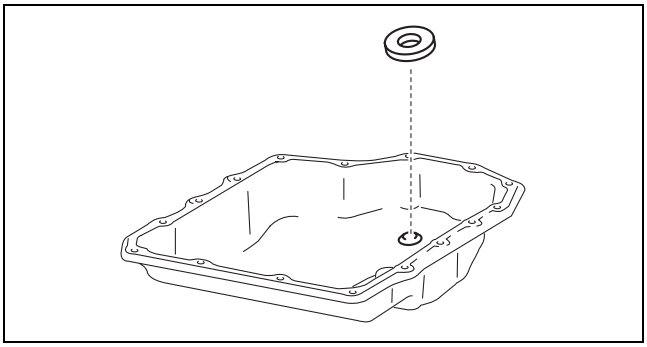

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(2) Remove the oil pan using the separator tool.


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azzjjw00000425

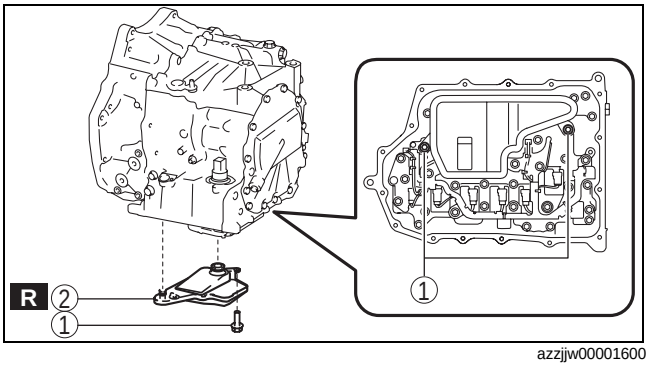
(3) Remove the magnet.



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9. Remove the oil strainer in the order shown in the figure..

1	Bolt
2	Oil strainer



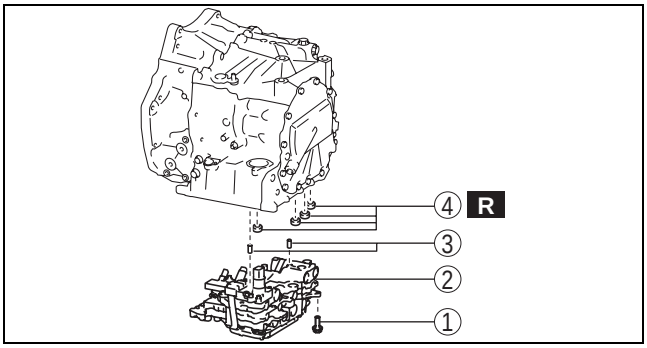
azzjjw00001600

Caution

- **If the oil strainer is reused while containing excessive foreign matter, it could cause an operation malfunction, therefore when performing the automatic transaxle assembly, use a new oil strainer.**

10. Remove the control valve body using the following procedure:.

1	11 bolts
2	Control valve body
3	Dowel pin
4	Gasket

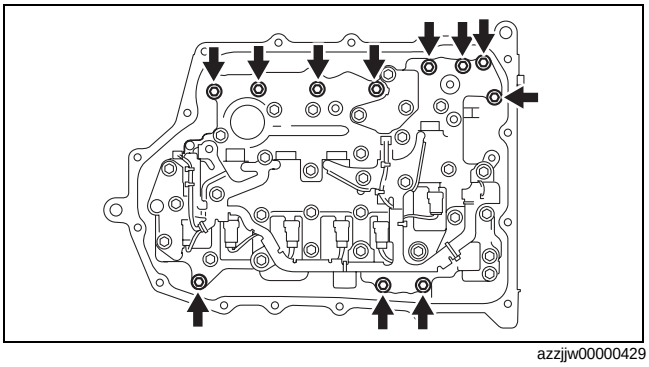


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Caution

- **Place the removed control valve body with the TCM side pointing upward on a workbench. If placing it with the TCM side pointing downward on a workbench, the TCM could be damaged.**
- **Do not drop or apply an impact to the control valve body. Replace the control valve body with a new one if it was dropped or received an impact.**

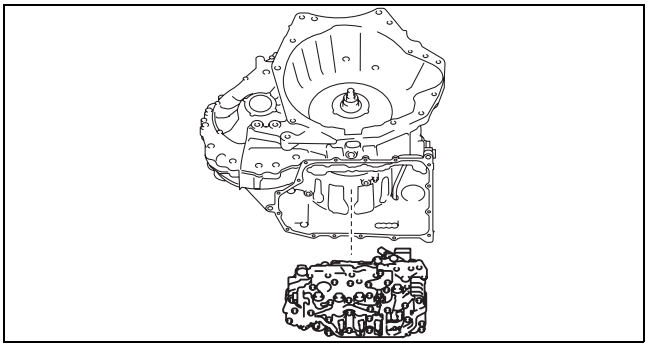
(1) Remove the bolts shown in the figure.



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(2) Remove the control valve body.

Caution
- **Remove the control valve body straight so that force is not applied to the control valve body connector in the lateral direction.**

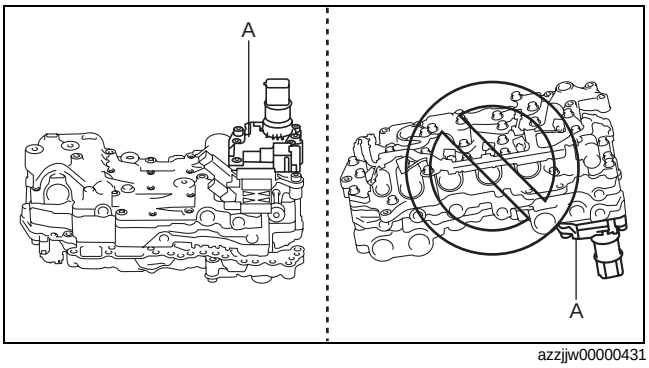


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(3) Place the removed control valve body with the TCM side pointing upward on a workbench.

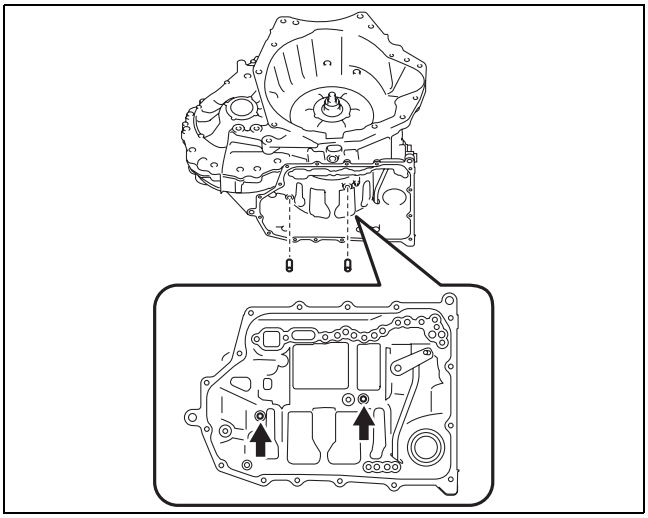
A : TCM

Caution
- **Place the removed control valve body with the TCM side pointing upward on a workbench. If placing it with the TCM side pointing downward on a workbench, the TCM could be damaged.**



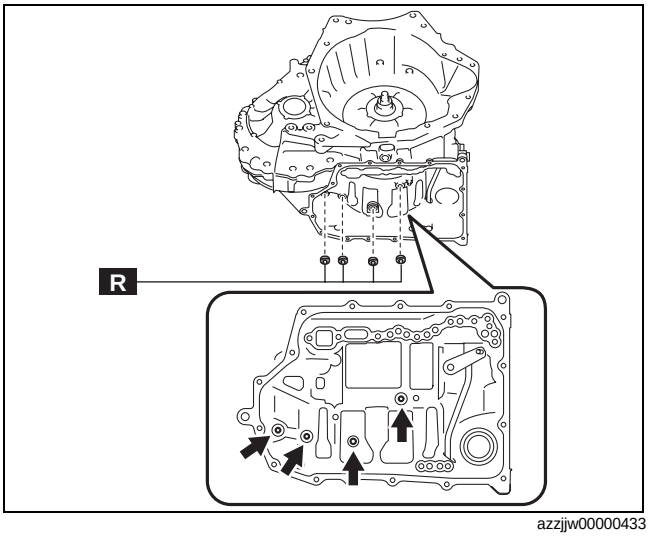
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(4) Remove the dowel pins.



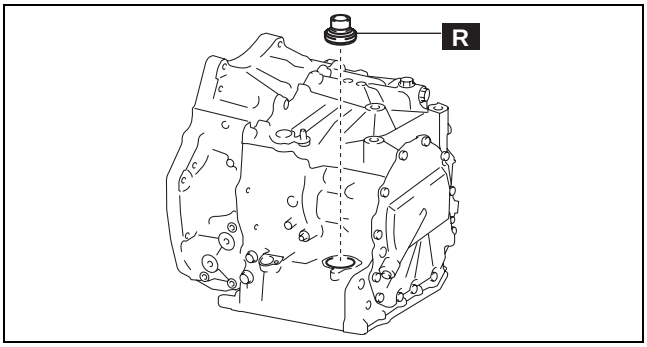
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(5) Remove the gaskets.



azzjjw00000433

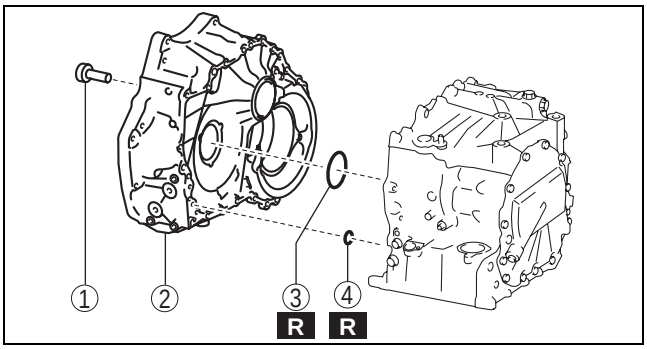
11. Remove the oil seal.



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12. Remove the converter housing using the following procedure:

1	24 bolts
2	Converter housing
3	O-ring (oil pump)
4	O-ring (oil cooler oil passage)

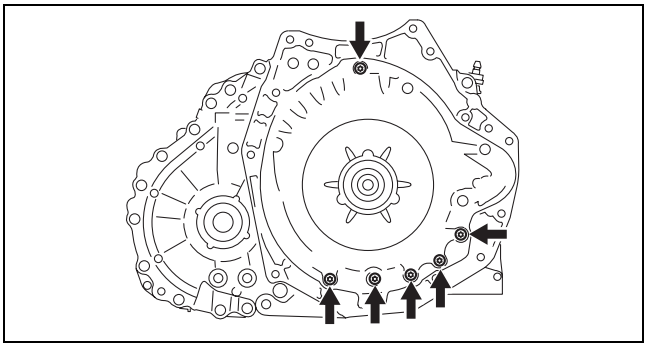


azzjjw00000435

(1) Remove the bolts shown in the figure.

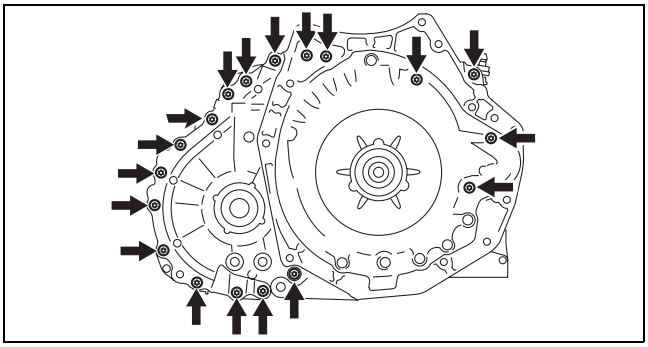
Caution

- **Sealant has been applied to the removed bolts. If the bolts are reused it could cause ATF leakage, therefore when performing the automatic transaxle assembly, use new bolts.**



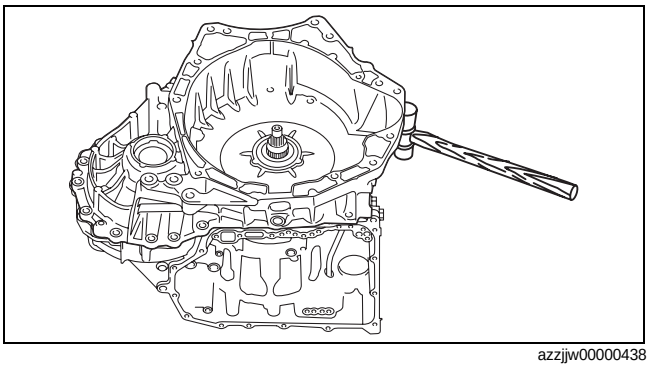
azzjjw00000436

(2) Remove the bolts shown in the figure.

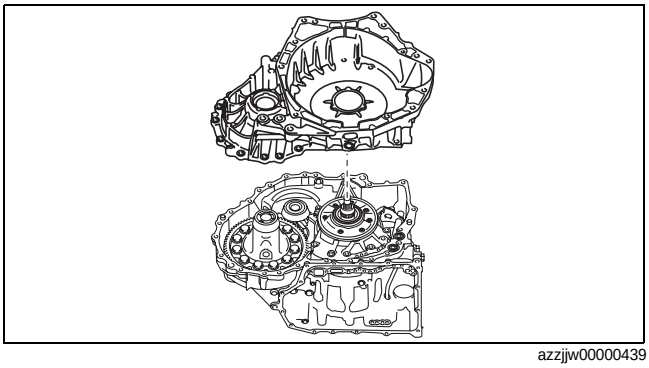


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(3) Lightly tap the converter housing using a plastic hammer to remove it.

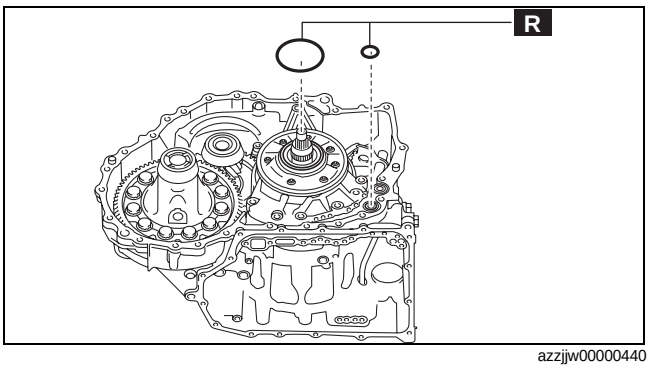


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azzjjw00000439

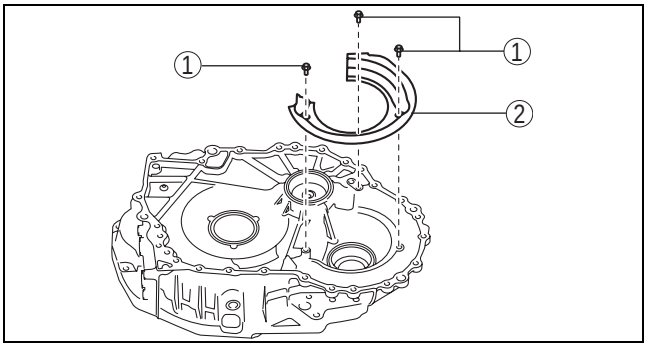
(4) Remove the O-rings.



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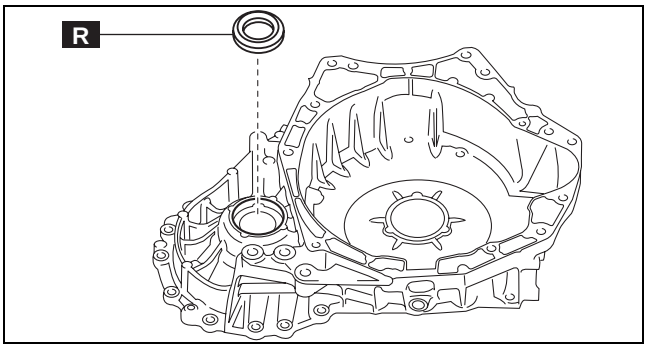
13. Remove the accessories from the converter housing using the following procedure:
    (1) Remove the baffle plate using the procedure shown in the figure.

1	Bolt
2	Baffle plate



azzjjw00000441

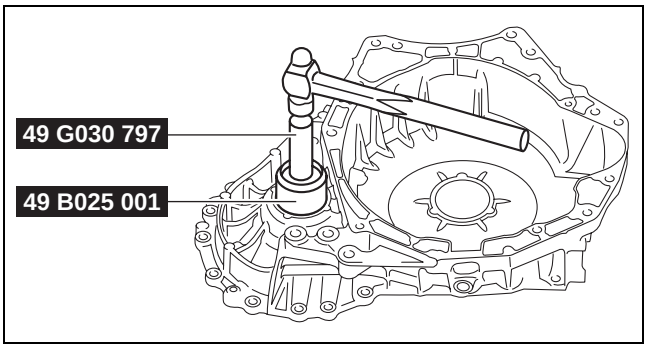
    (2) Remove the oil seal.



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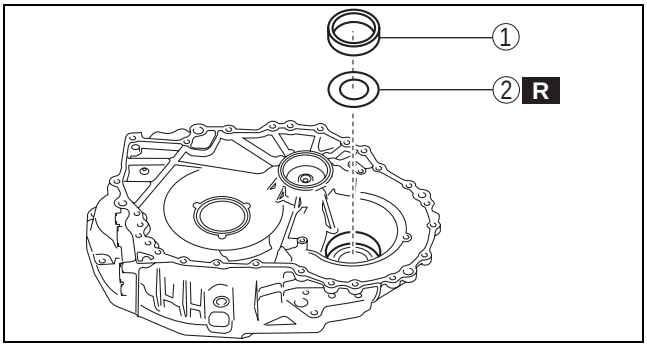
    (3) Remove the bearing race and shim using the SSTs and procedure shown in the figure.

Caution
- **Because the shim will deform when removing the bearing race, use a new shim when performing the automatic transaxle assembly.**



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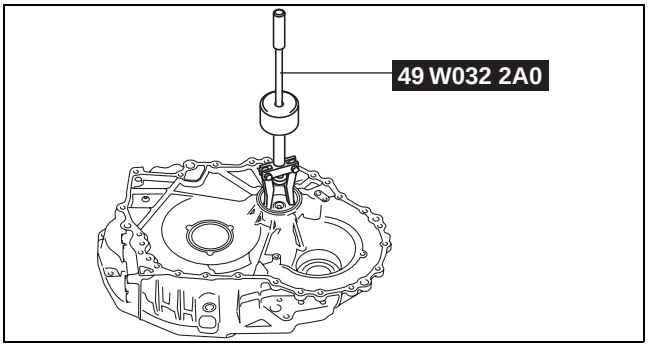
1	Bearing race
2	Shim



azzjjw00000444

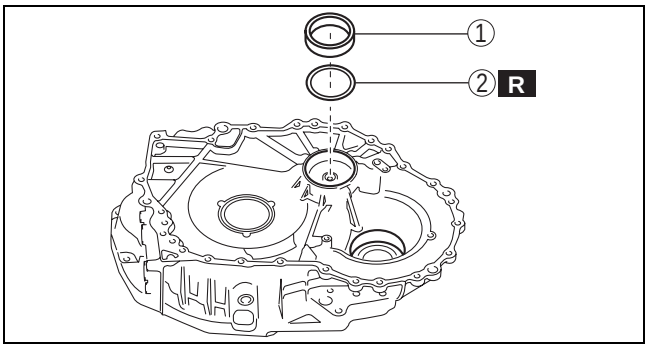
(4) Remove the bearing race and shim using the SST and procedure shown in the figure.

Caution
- **Because the shim will deform when removing the bearing race, use a new shim when performing the automatic transaxle assembly.**



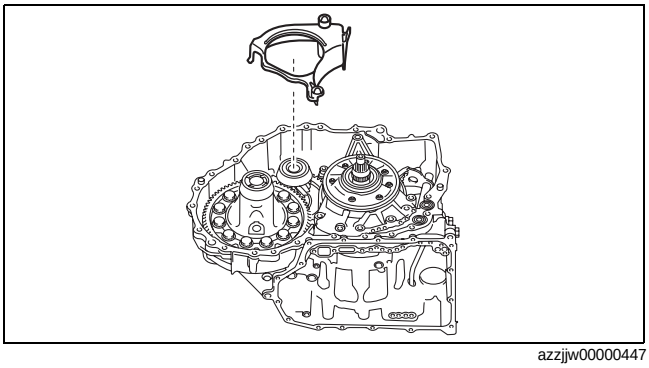
azzjjw00000445

1	Bearing race
2	Shim



azzjjw00000446

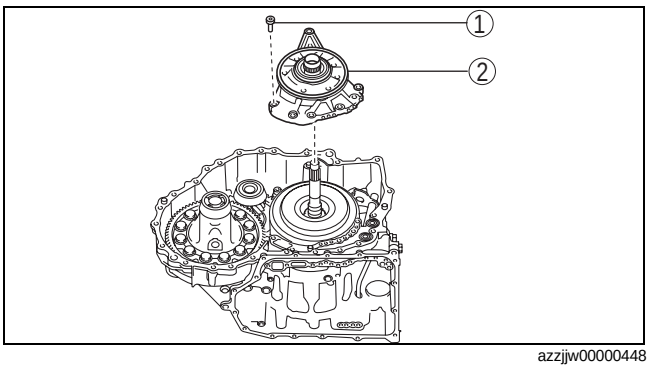
14. Remove the baffle plate.



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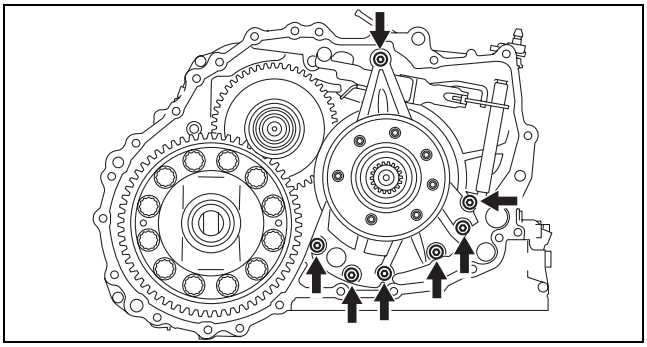
15. Remove the oil pump using the following procedure:

1	7 bolts
2	Oil pump



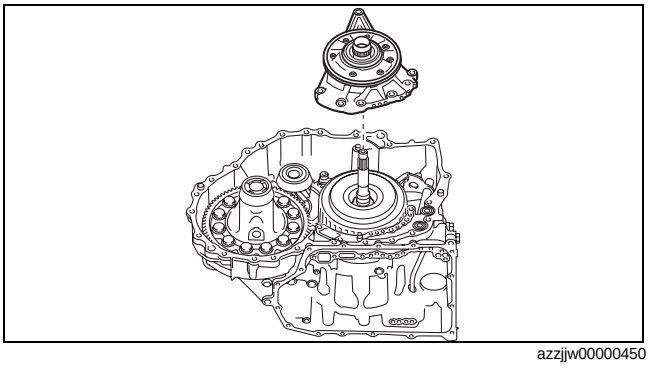
azzjjw00000448

(1) Remove the bolts shown in the figure.



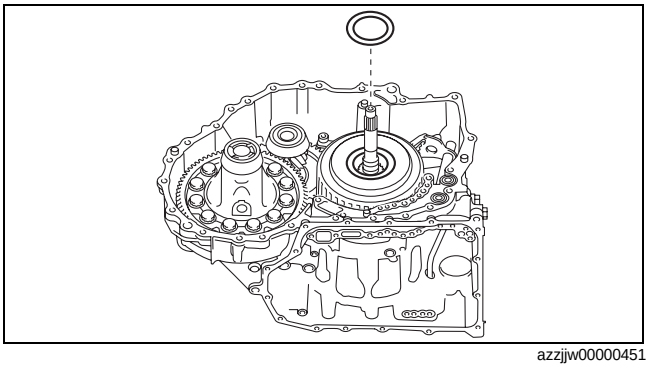
azzjjw00000449

(2) Remove the oil pump.



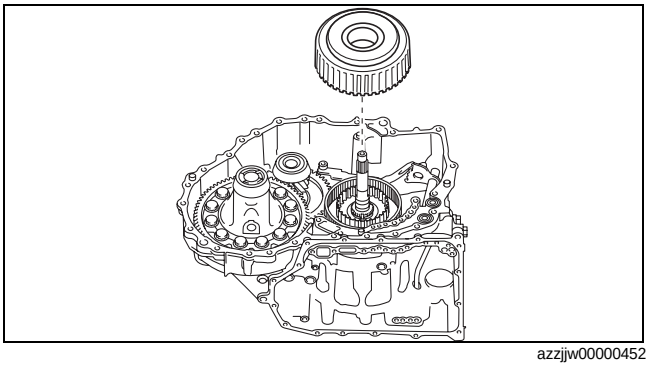
azzjjw00000450

16. Remove the thrust needle bearing.



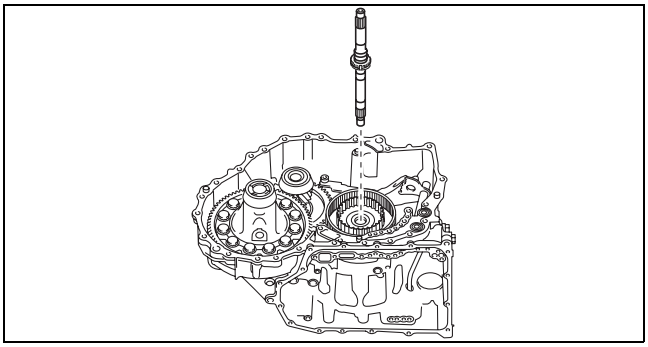
azzjjw00000451

17. Remove the clutch component.



azzjjw00000452

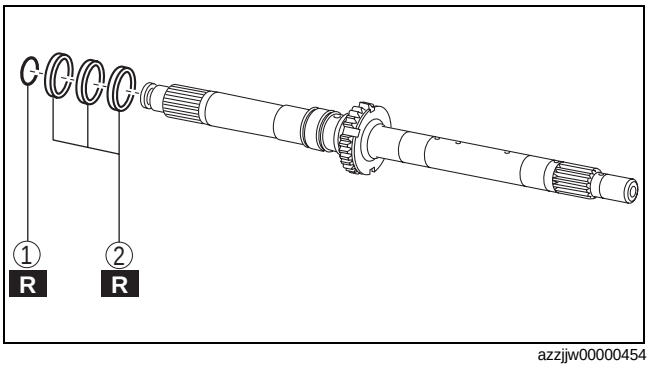
18. Remove the turbine shaft.



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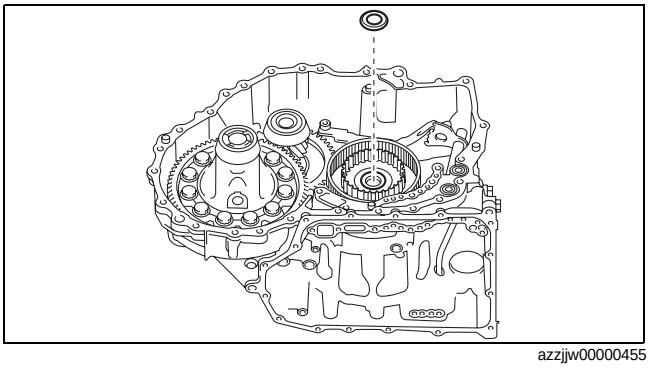
19. Remove the D-ring and seal rings from the turbine shaft using the procedure in the figure:

1	D-ring
2	Seal ring



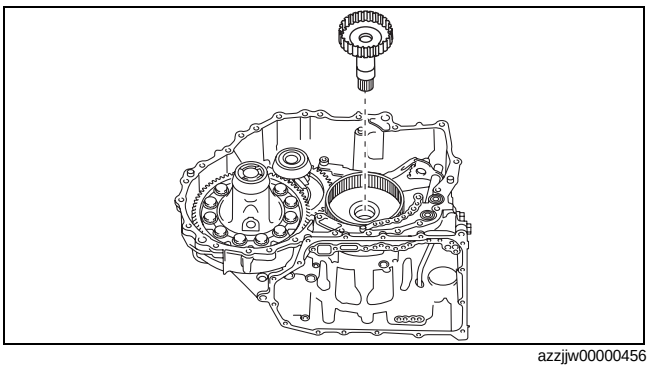
azzjjw00000454

20. Remove the thrust needle bearing.



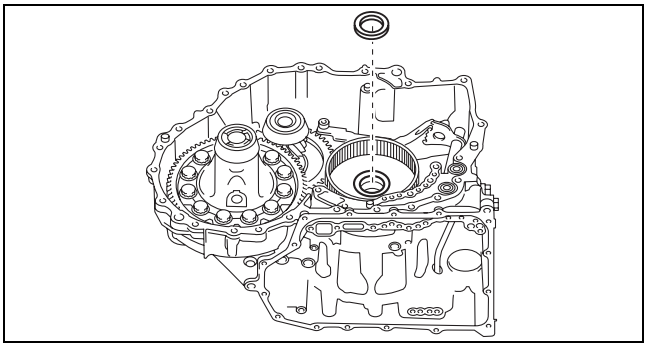
azzjjw00000455

21. Remove the high clutch hub.



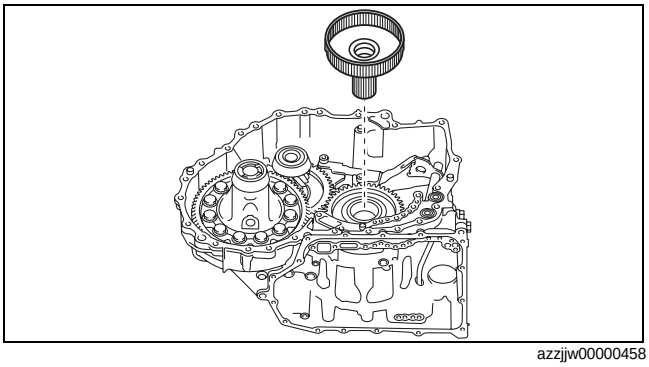
azzjjw00000456

22. Remove the thrust needle bearing.



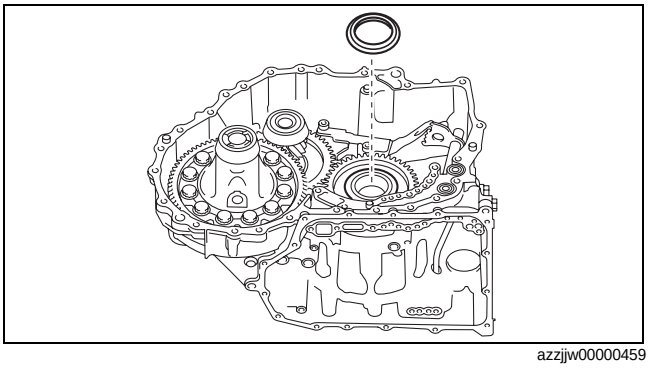
azzjjw00000457

23. Remove the low clutch hub.



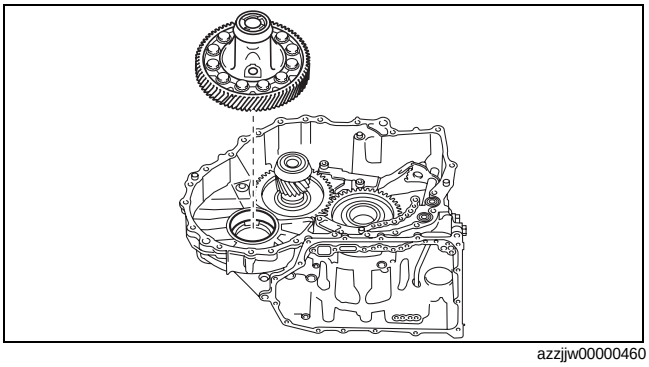
azzjjw00000458

24. Remove the thrust needle bearing.



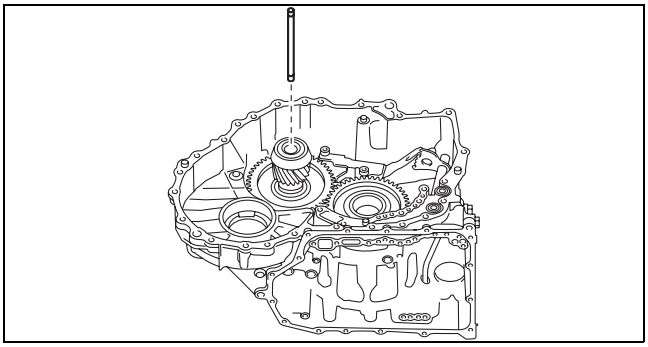
azzjjw00000459

25. Remove the ring gear and differential.



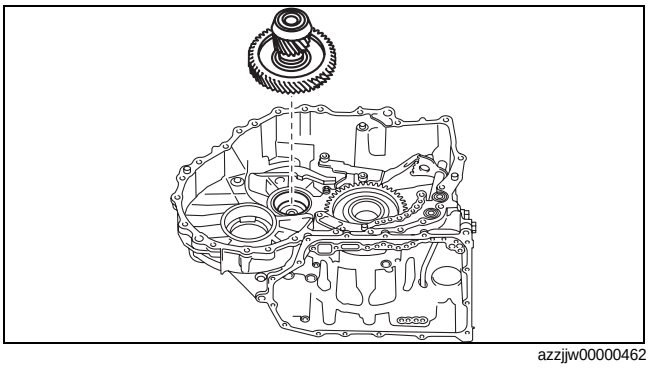
azzjjw00000460

26. Remove the oil pipe.



azzjjw00000461

27. Remove the secondary gear and output gear.



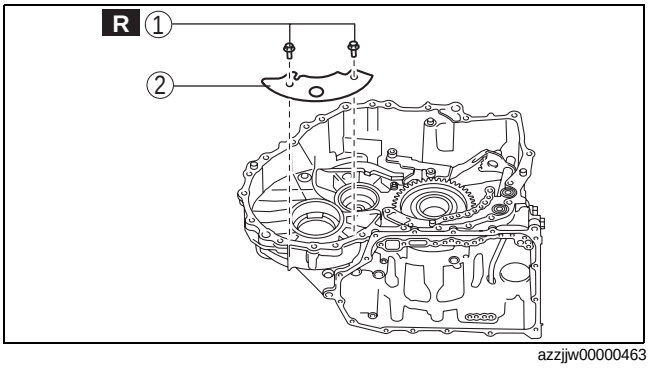
azzjjw00000462

28. Remove the baffle plate using the procedure shown in the figure..

1	Bolt
2	Baffle plate

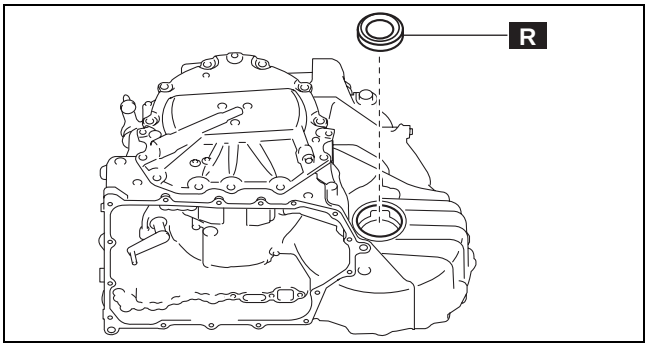
Caution

- **The bolts for the baffle plate assembly are applied with thread-locking compound. If the bolts are reused it could loosen the bolts, therefore when performing the automatic transaxle assembly, use new bolts.**



azzjjw00000463

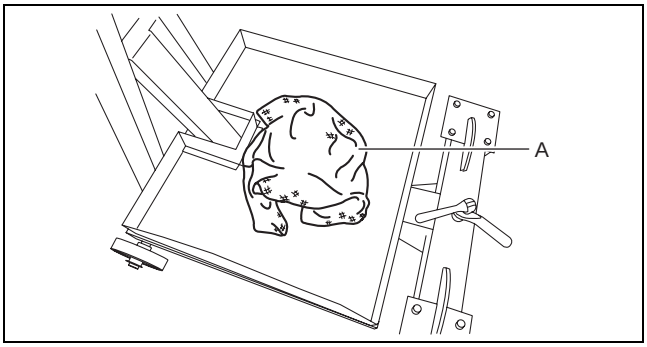
29. Remove the oil seal.



azzjjw00000464

30. Remove the bearing race and shim using the following procedure:
    (1) When removing the bearing race and shim using the SST, place a rag as an impact-absorbing material on the oil catch area of the SST (engine stand) because the bearing race and shim will drop when removed.

A : Impact-absorbing material (rag)

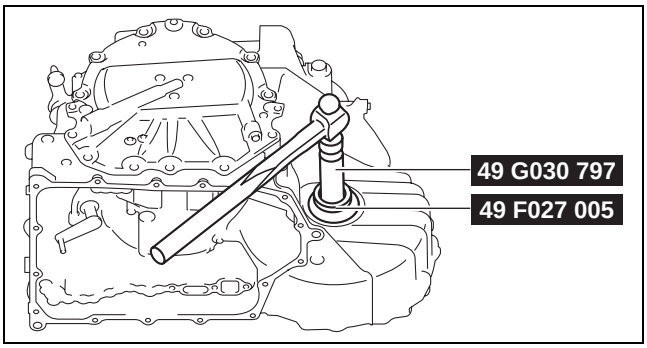


azzjjw00000465

    (2) Remove the bearing race and shim using the SSTs and procedure shown in the figure.

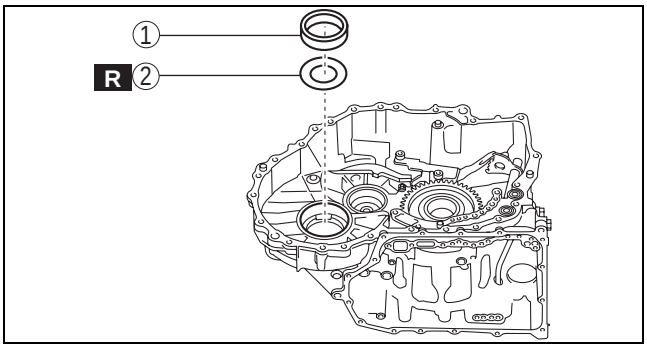
Caution

- **Because the shim will deform when removing the bearing race, use a new shim when performing the automatic transaxle assembly.**



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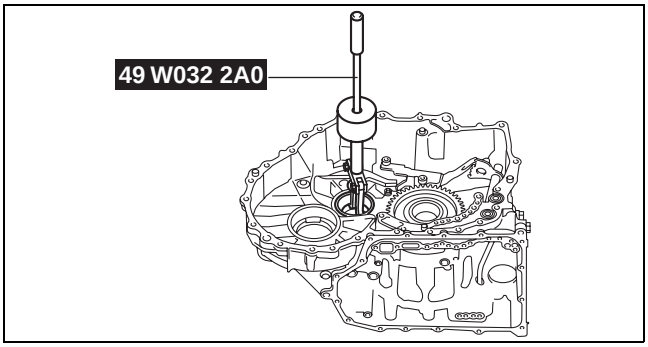
1	Bearing race
2	Shim



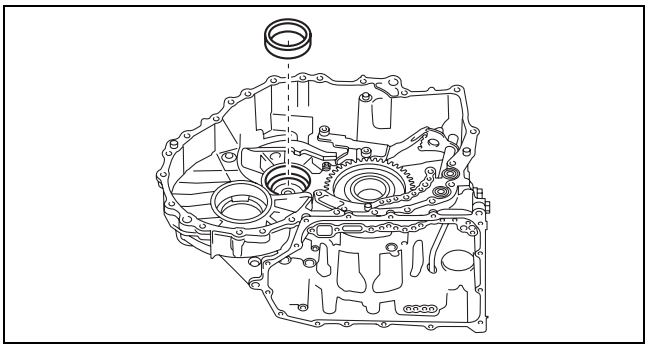
azzjjw00000467

    (3) Remove the rag placed on the oil catch area of the SST (engine stand) used as an impact-absorbing material.

31. Remove the bearing race using the SST.



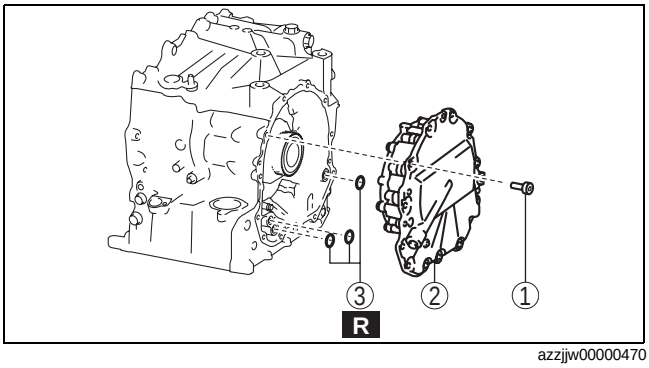
azzjjw00000468



azzjjw00000469

32. Remove end cover component using the following procedure:

1	12 bolts
2	End cover component
3	O-ring

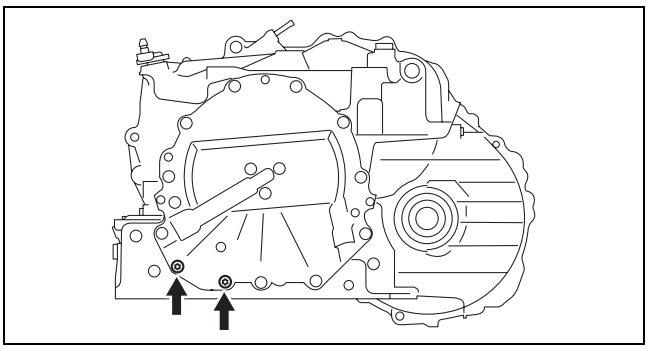


azzjjw00000470

(1) Remove the bolts shown in the figure.

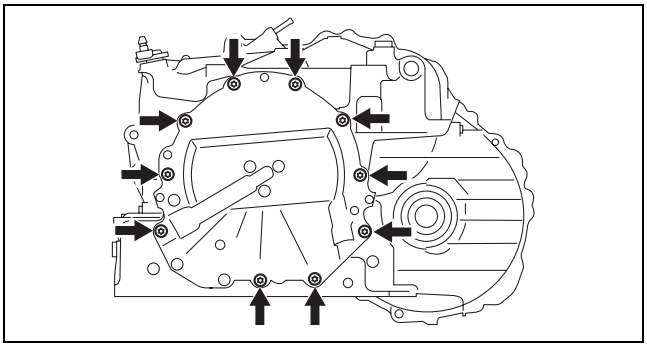
Caution

- **Sealant has been applied to the removed bolts. If the bolts are reused it could cause ATF leakage, therefore when performing the automatic transaxle assembly, use new bolts.**



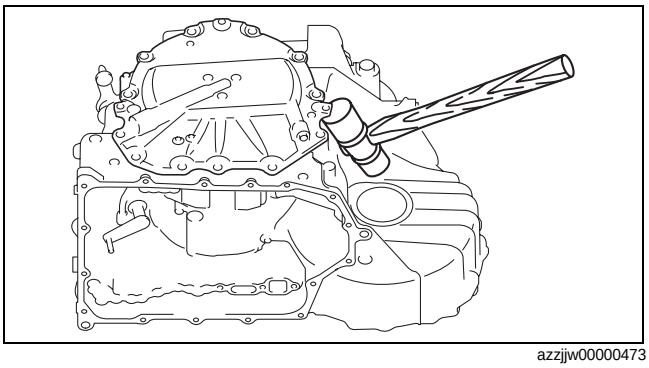
azzjjw00000471

(2) Remove the bolts shown in the figure.

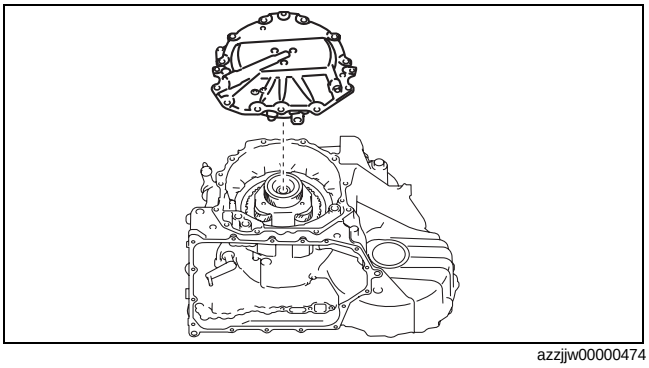


azzjjw00000472

(3) Lightly tap the end cover component using a plastic hammer to remove it.

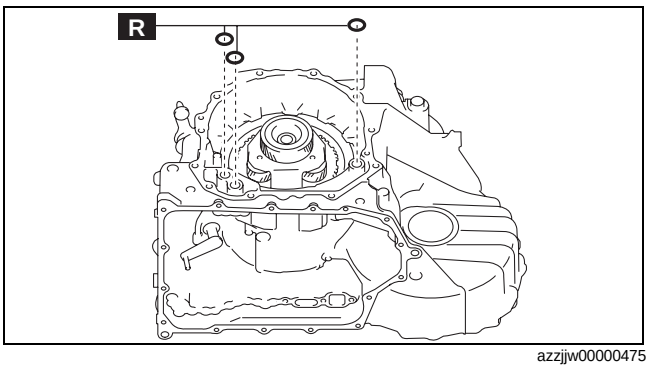


azzjjw00000473



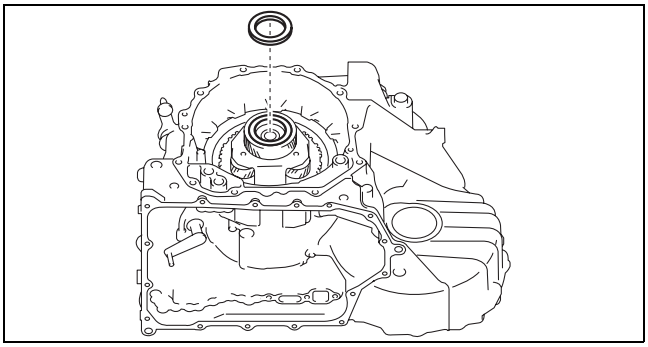
azzjjw00000474

(4) Remove the O-rings.



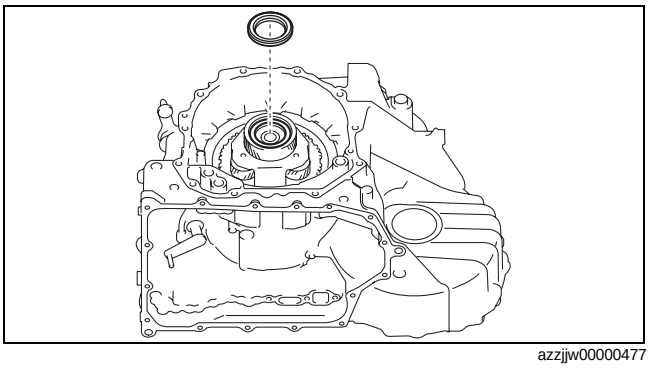
azzjjw00000475

33. Remove the shim.



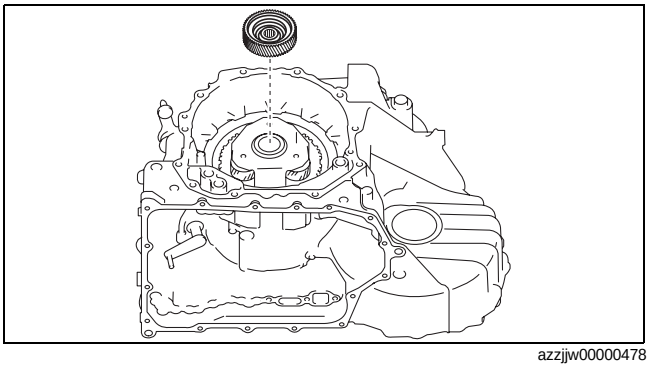
azzjjw00000476

34. Remove the thrust needle bearing.



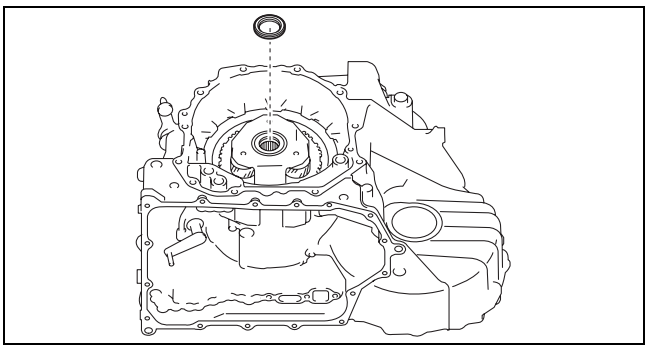
azzjjw00000477

35. Remove the reduction sun gear.



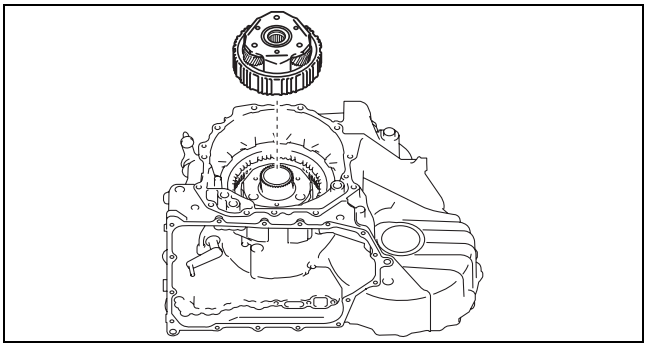
azzjjw00000478

36. Remove the thrust needle bearing.



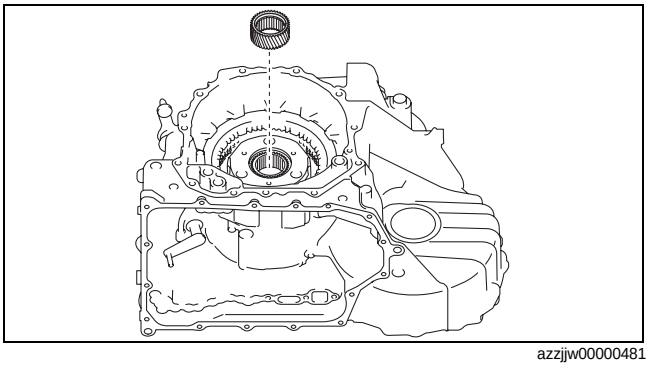
azzjjw00000479

37. Remove the rear planetary gear.



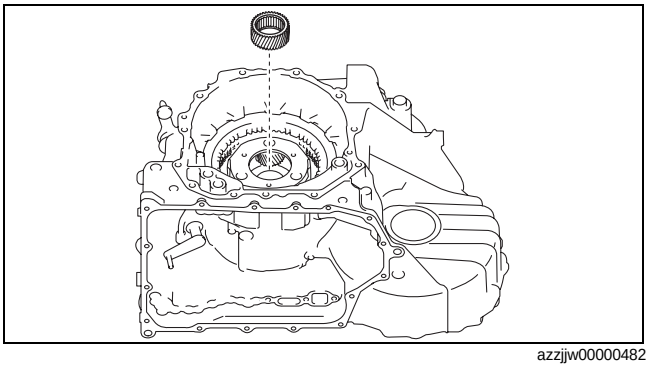
azzjjw00000480

38. Remove the rear sun gear.



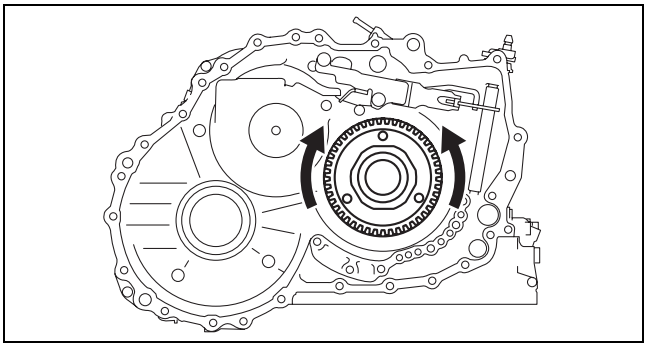
azzjjw00000481

39. Remove the front sun gear.



azzjjw00000482

40. Inspect the transaxle case, primary gear, and the angular contact ball bearing using the following procedure:
    (1) Visually inspect the transaxle case and primary gear. (See 05-17-151 VISUAL INSPECTION OF PARTS.)
    (2) Rotate the primary gear by hand and verify that there is no malfunction in the angular contact ball bearing (rotation sticking).
        - If there is a malfunction, remove the primary gear in Step 63 and replace the malfunctioning parts with new ones as when performing the automatic transaxle assembly.

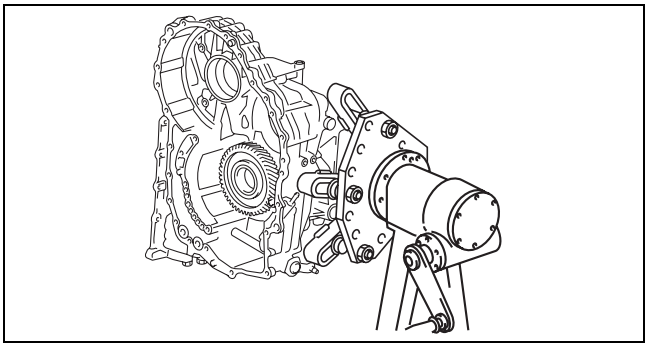


azzjjw00000483

41. Remove the locknut using the following procedure:

Caution
- **Rotate and adjust the rotation handle of the engine stand so that the end cover side is situated sideways and remove the locknut. If the locknut is removed with the end cover side pointed downward, the front planetary gear will drop.**
- **Torque of approx. 500 N·m {51 kgf·m, 369 ft·lbf} is required to loosen the locknut. For safety purposes, perform the procedure using two people, one loosens the locknut and the other supports the engine stand.**

(1) Rotate and adjust the rotation handle of the engine stand so that the end cover side is situated sideways.

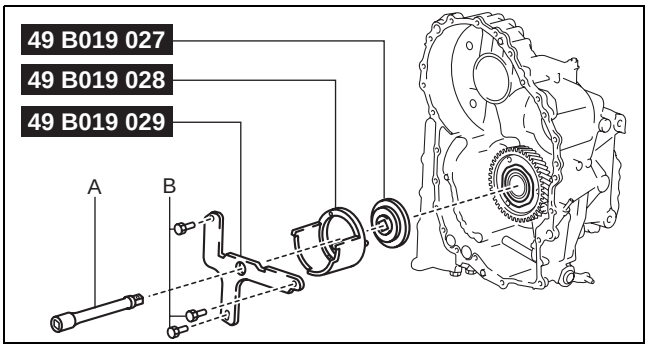


azzjjw00000484

(2) Install the SSTs.

A : Extension bar
B : Bolt supplied with SST (49 B019 029) or M8×1.25, length to 18 mm {0.71 in}

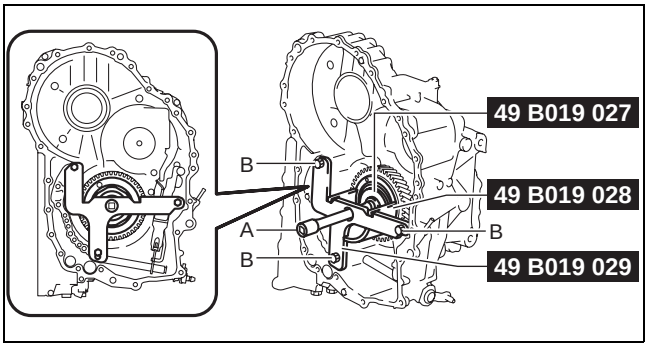
Note
- Engage the three projections of the SST (49 B019 028) to the three holes of the primary gear.
- When installing the SST (49 B019 029), use the bolts supplied with the SST (49 B019 029), or M8×1.25 bolts, length to 18 mm {0.71 in}.



azzjjw00000485

A : Extension bar
B : Bolt supplied with SST (49 B019 029) or M8×1.25, length to 18 mm {0.71 in}

SST installation bolt tightening torque
19—25 N·m {2.0—2.5 kgf·m, 15—18 ft·lbf}

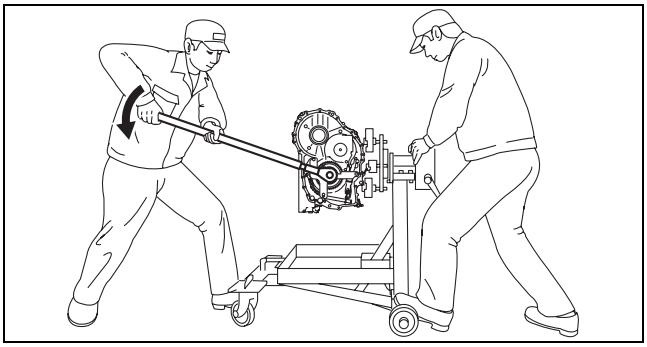


azzjjw00000486

(3) Loosen the locknut and remove it.

Caution

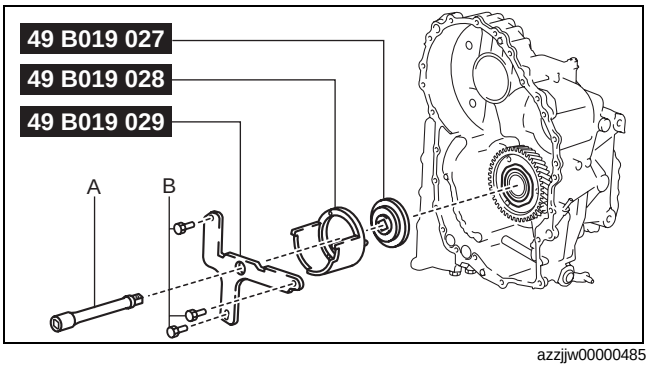
- **Torque of approx. 500 N·m {51 kgf·m, 369 ft·lbf} is required to loosen the locknut. For safety purposes, perform the procedure using two people, one loosens the locknut and the other supports the engine stand.**



azzjjw00000487

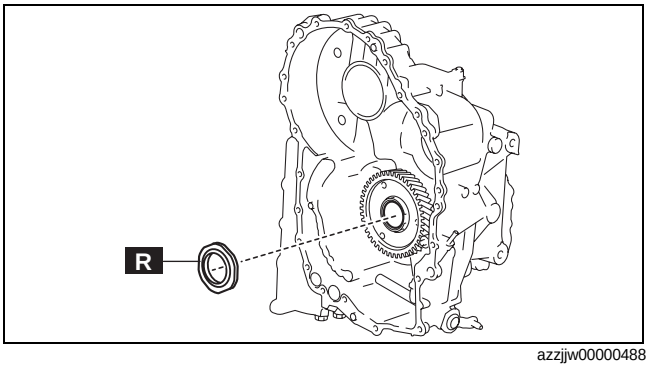
(4) Remove the SSTs.

A : Extension bar
B : Bolt supplied with SST (49 B019 029) or M8×1.25, length to 18 mm {0.71 in}



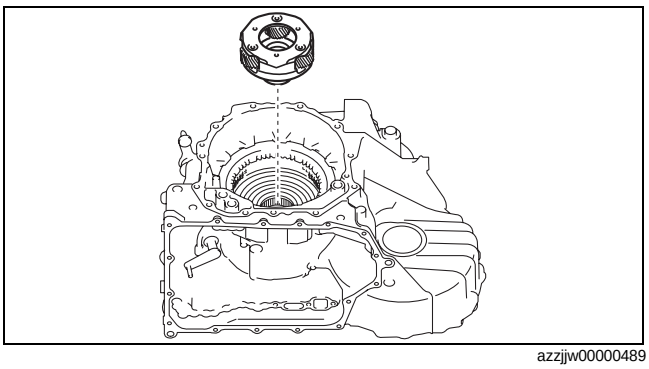
azzjjw00000485

(5) Remove the locknut from the front planetary gear.



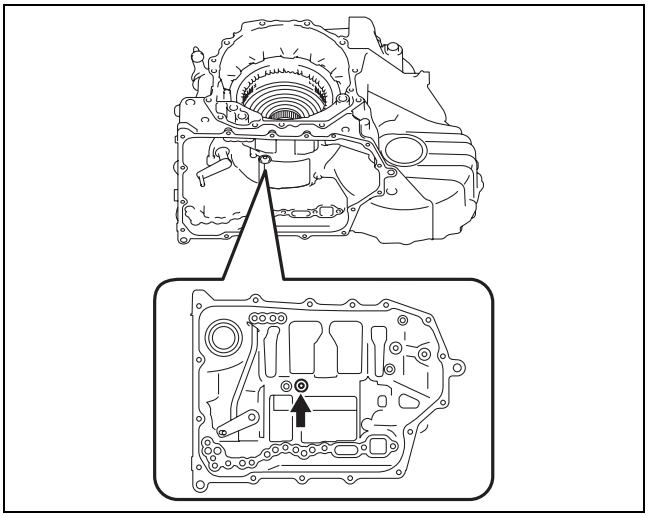
azzjjw00000488

42. Remove the front planetary gear.



azzjjw00000489

43. Perform a simple inspection of the low and reverse brake using the following procedure:
    (1) Blow compressed air into the oil passage shown in the figure and verify the operation condition of the low and reverse brake.



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Warning

- **Always wear protective eye wear when using the air compressor. Otherwise, ATF or dirt particles blown off by the air compressor could get into the eyes.**

Caution

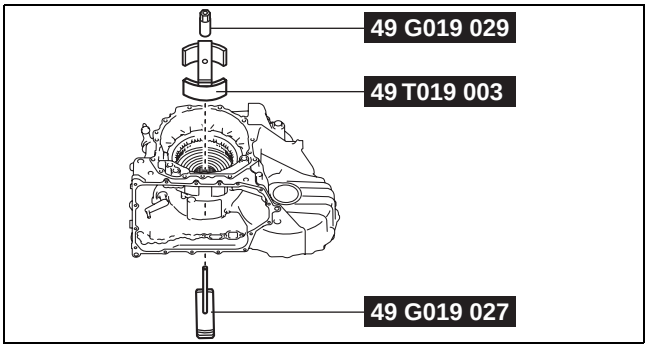
- **To prevent damage to parts, always use an air compressor which is adjusted to the indicated pressure.**

Compressed air pressure

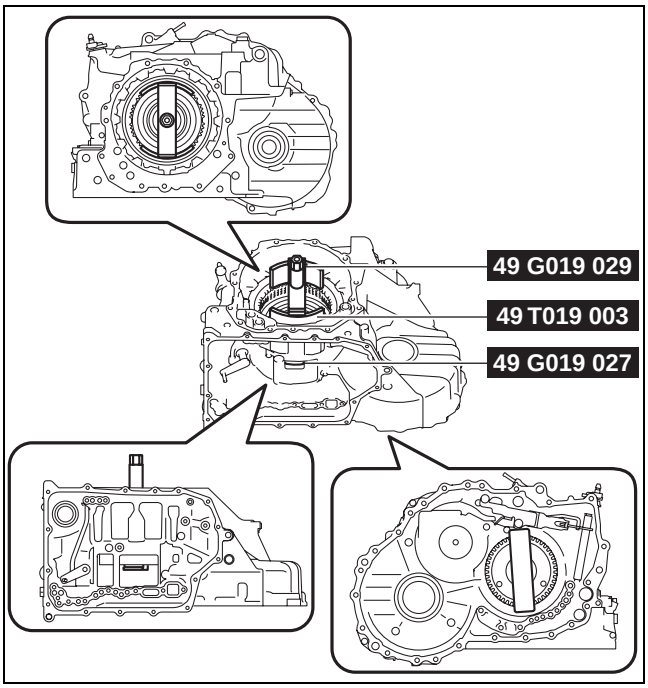
0.39—0.44 MPa {4.0—4.4 kgf/cm^2, 57—63 psi}

- If there is a malfunction, verify the cause and repair the applicable part after disassembly.

44. Remove the snap ring using the following procedure:
    (1) Install the SSTs.



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azzjjw00000492

(2) Tighten the SST (49 G019 029) until there is no longer any spring force from the springs and retainer component applied to the snap ring.

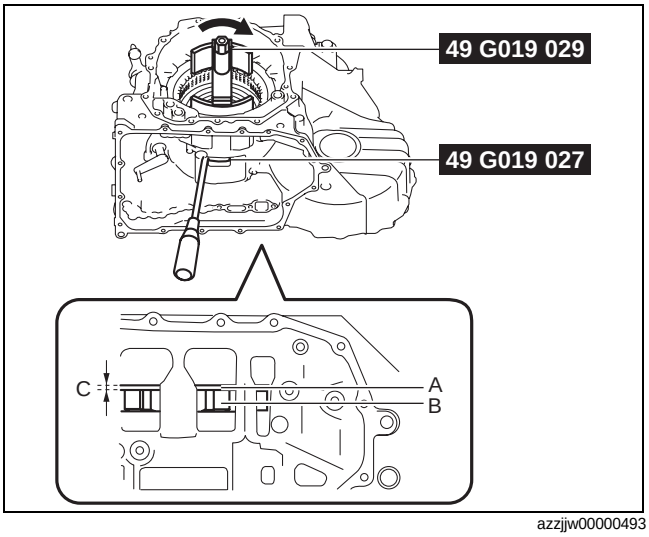
A : Snap ring
B : One-way clutch
C : Gap

Caution

- **If the SST (49 G019 029) is tightened with excessive force, surrounding parts could be damaged. Stop tightening if a gap appears between the snap ring and one-way clutch**

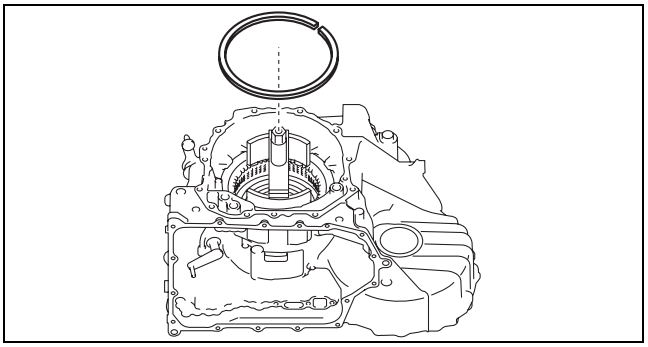
Note

- Lock the SST (49 G019 027) against rotation using a flathead screwdriver and tighten the SST (49 G019 029).



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(3) Remove the snap ring.

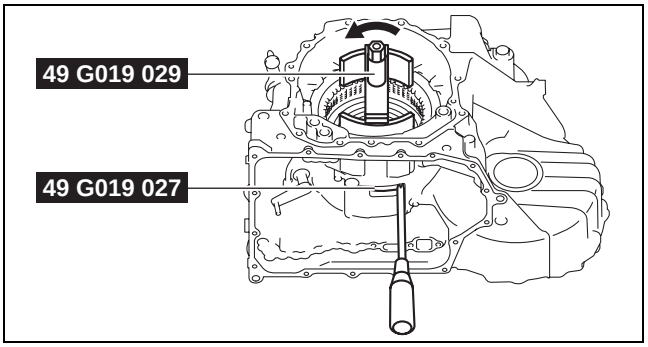


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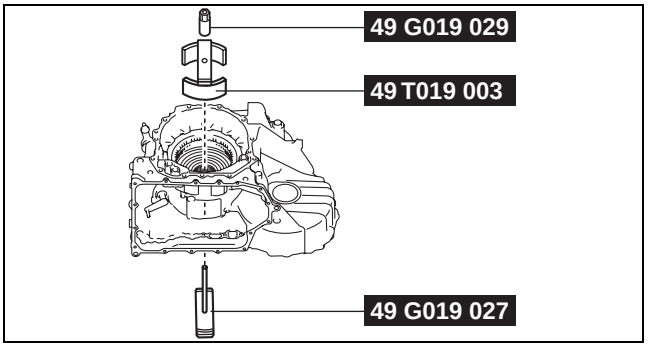
(4) Loosen the SST (49 G019 029) and remove the SSTs.

Note

- Lock the SST (49 G019 027) against rotation using a flathead screwdriver and loosen the SST (49 G019 029).



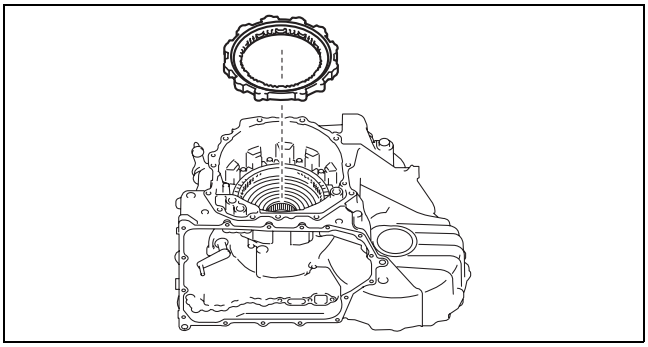
azzjjw00000495



azzjjw00000491

45. Remove the one-way clutch.

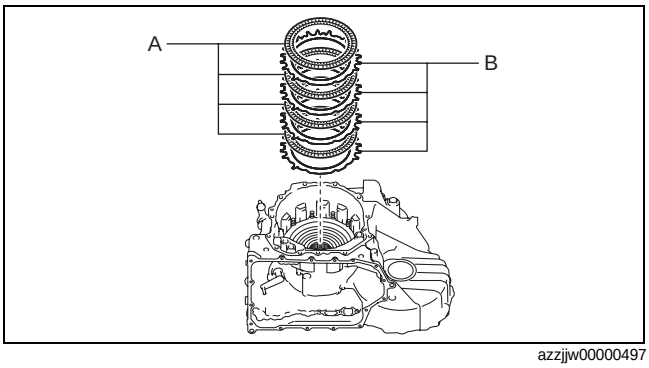
Caution
- **Do not disassemble the one-way clutch. If it has been disassembled, replace the one-way clutch with a new one.**



azzjjw00000496

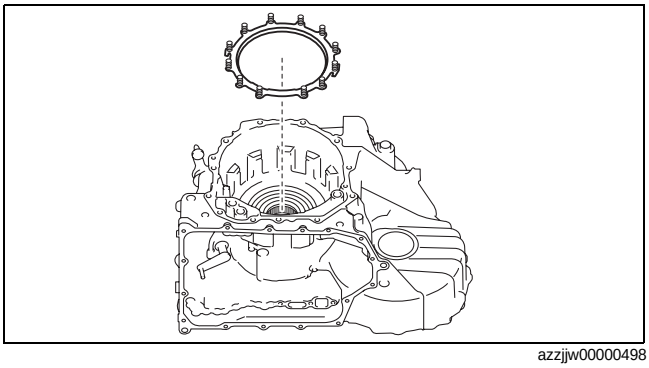
46. Remove the drive plates and driven plates.

A : Drive plate
B : Driven plate



azzjjw00000497

47. Remove the springs and retainer component.



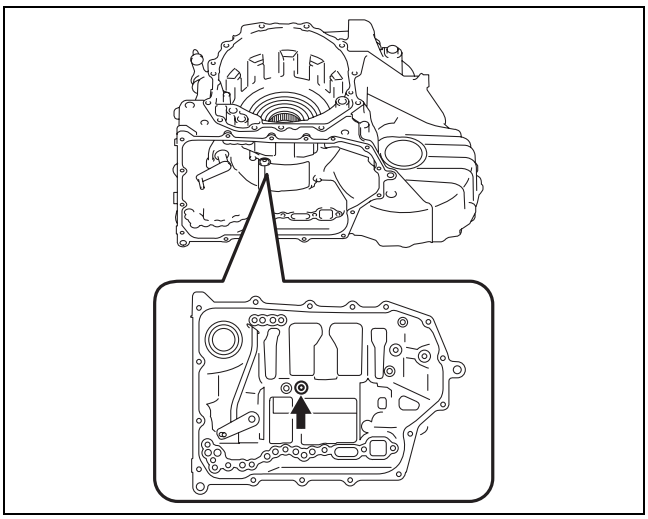
azzjjw00000498

48. Remove the low and reverse brake piston using the following procedure:
    (1) Blow compressed air into the oil passage shown in the figure.

Warning
- **Always wear protective eye wear when using the air compressor. Otherwise, ATF or dirt particles blown off by the air compressor could get into the eyes.**

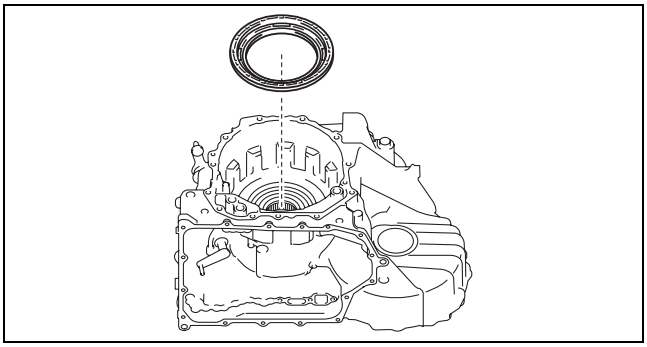
Caution
- **To prevent damage to parts, always use an air compressor which is adjusted to the indicated pressure.**

Compressed air pressure
0.39—0.44 MPa {4.0—4.4 kgf/cm^2, 57—63 psi}



azzjjw00000499

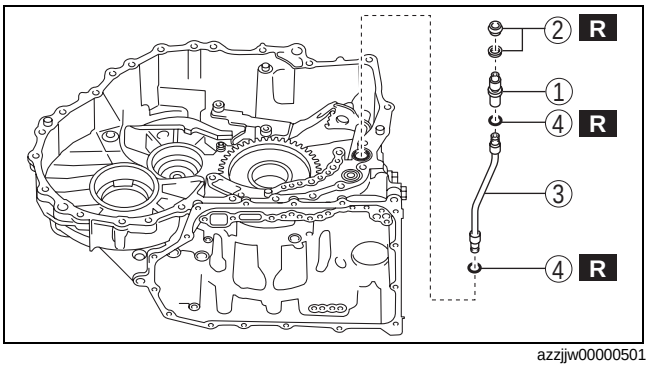
(2) Remove the low and reverse brake piston removed from the transaxle case.



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49. Remove the connector, gaskets, oil pipe, and the O-rings in the order shown in the figure.

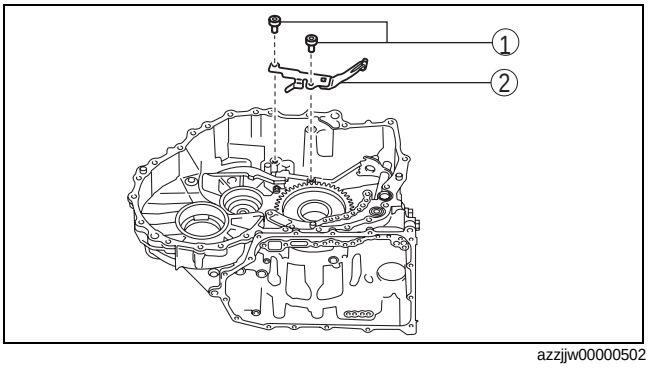
1	Connector
2	Gasket
3	Oil pipe
4	O-ring



azzjjw00000501

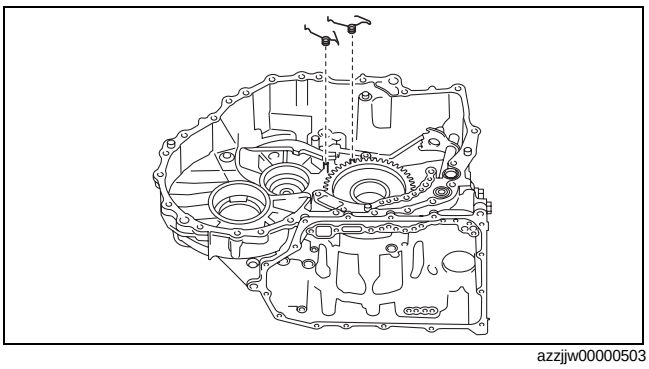
50. Remove the detent bracket component in the order shown in the figure.

1	Bolt
2	Detent bracket component



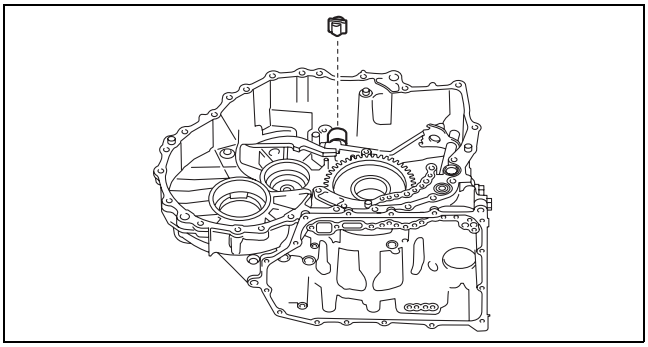
azzjjw00000502

51. Remove the pawl return springs.



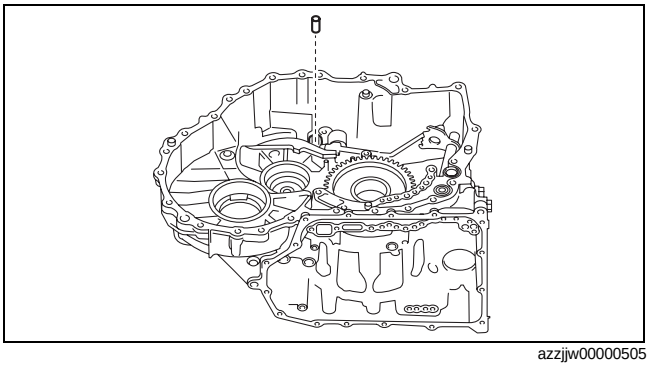
azzjjw00000503

52. Remove the support actuator.



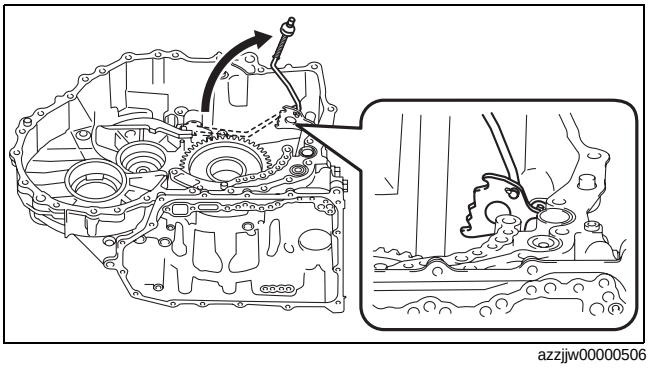
azzjjw00000504

53. Remove the parking pawl pin.



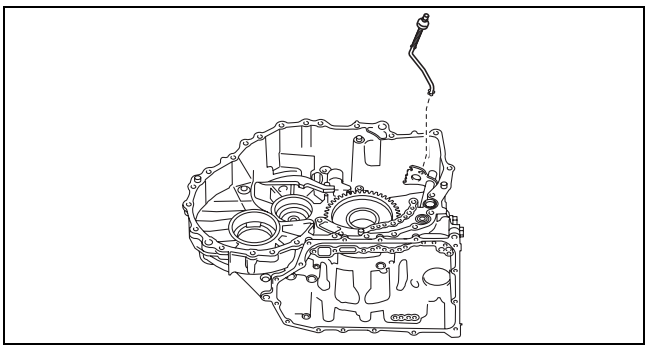
azzjjw00000505

54. Remove the parking rod component using the following procedure:
    (1) Rotate the parking rod component as shown in the figure and align the parking rod component projection with the keyhole of the manual plate component.



azzjjw00000506

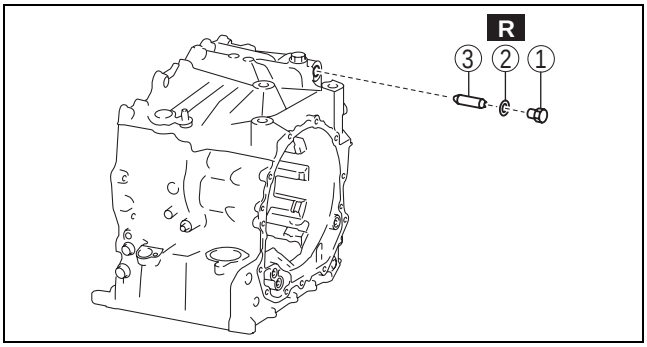
    (2) Remove the parking rod component.



azzjjw00000507

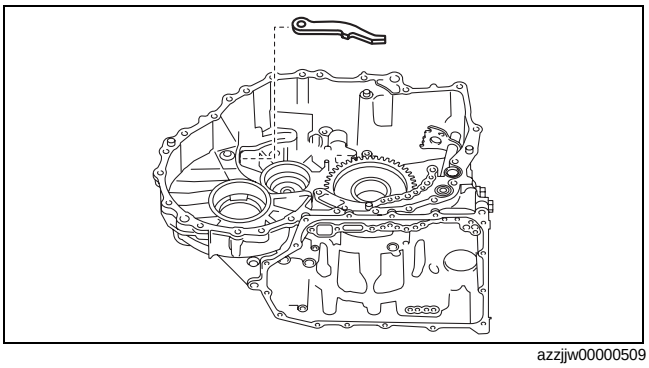
55. Remove the parking pawl shaft in the order shown in the figure.

1	Plug
2	Gasket
3	Parking pawl shaft



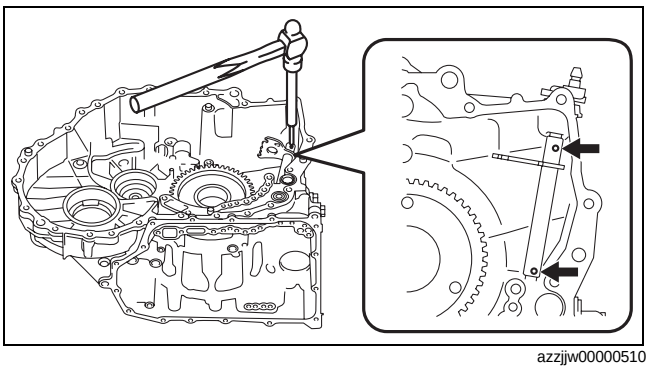
azzjjw00000508

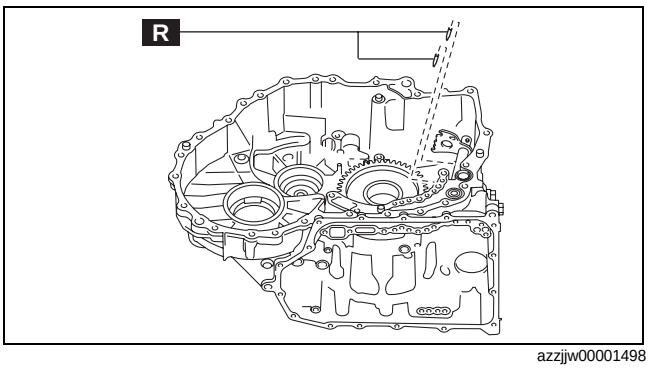
56. Remove the parking pawl.


azzjjw00000509

57. Remove the roll pins shown in the figure using a pin punch.

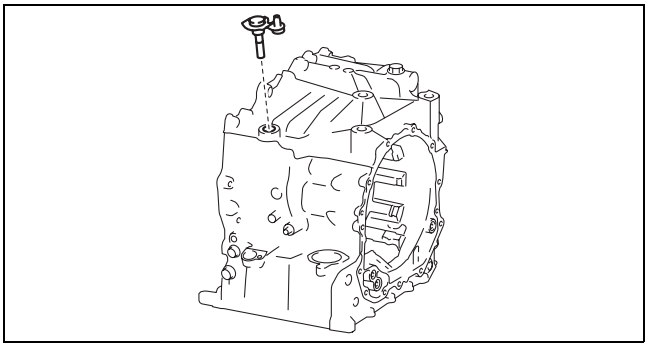
Note
- Use a pin punch with an end outer diameter of 3 mm {0.119 in} or more, and within 4 mm {0.157 in}.


azzjjw00000510



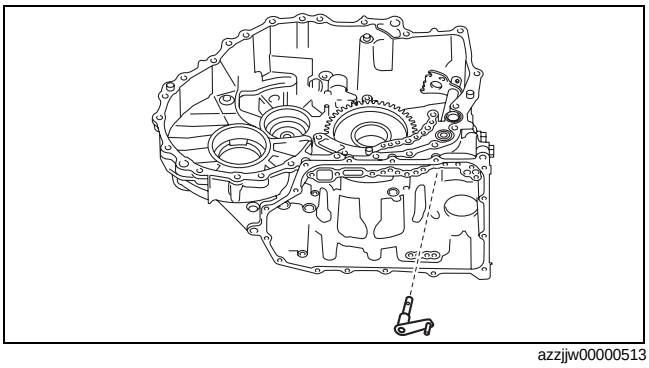
azzjjw00001498

58. Remove the parking shift lever component.



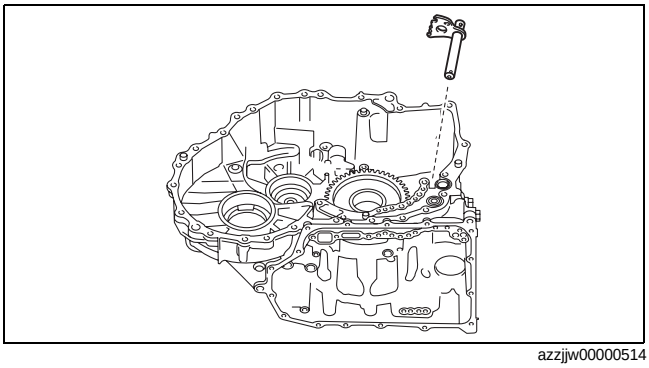
azzjjw00000512

59. Remove the parking assist lever component.



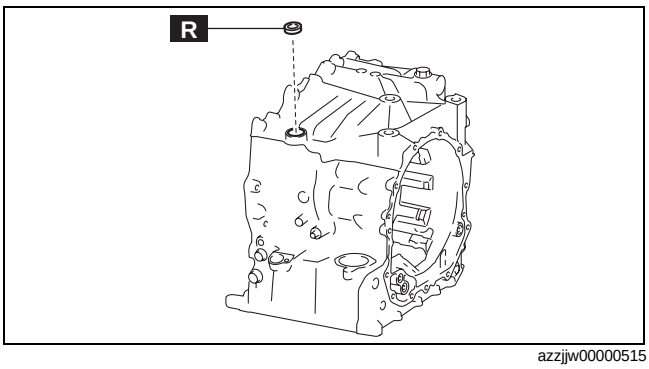
azzjjw00000513

60. Remove the manual plate component.



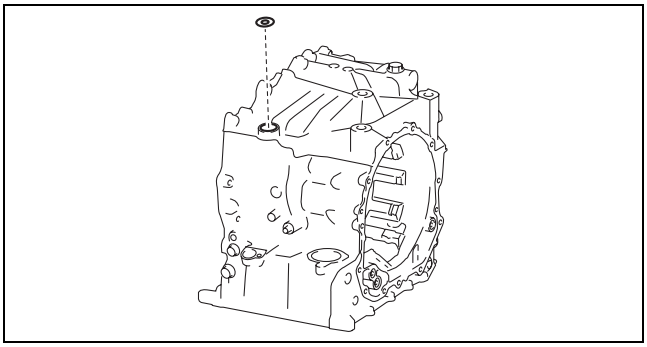
azzjjw00000514

61. Remove the oil seal.



azzjjw00000515

62. Remove the washer.



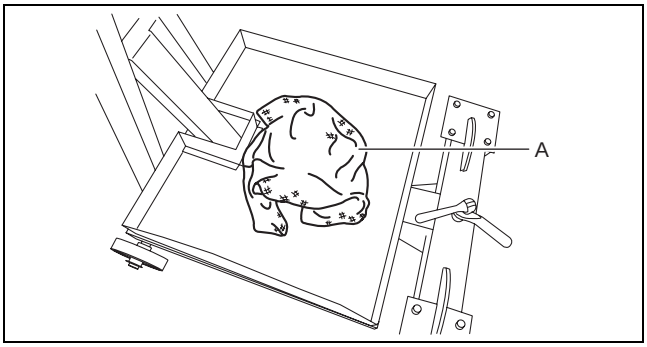
azzjjw00000516

63. Perform the following procedure only if there is a malfunction found in the Step 40 inspection.
(1) Remove the primary gear using the following procedure:

Caution
- **Because the angular contact ball bearing will be damaged if the primary gear is removed, remove the primary gear only if there is a malfunction found in the Step 40 inspection.**
- **Because the angular contact ball bearing is integrated with the transaxle case, if the primary gear is removed, replace the transaxle case with a new one as when performing the automatic transaxle assembly.**

1) When removing the primary gear using the SST, place a rag as an impact-absorbing material on the oil catch area of the SST (engine stand) because the primary gear will drop when removed.

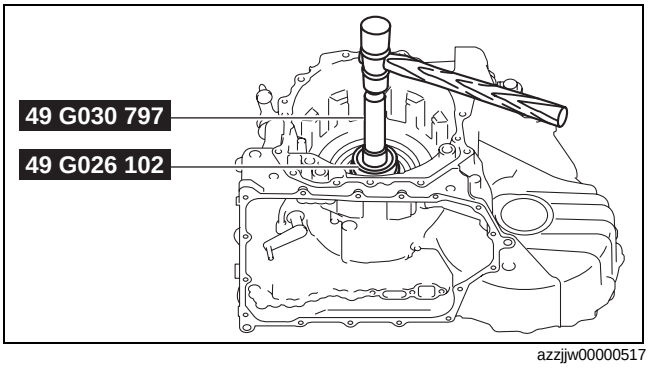
A : Impact-absorbing material (rag)



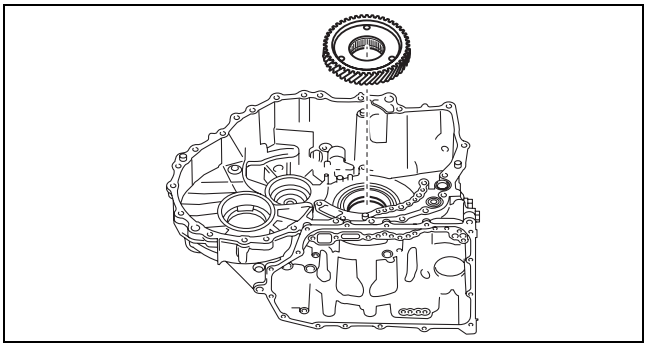
azzjjw00000465

2) Remove the primary gear using the SSTs.

Note
- Use a plastic hammer.



azzjjw00000517



azzjjw00000518

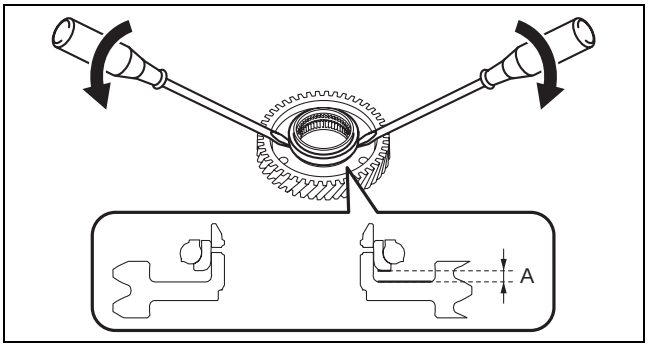
3) Remove the rag placed on the oil catch area of the SST (engine stand) used as an impact-absorbing material.

(2) Remove the angular contact ball bearing from the primary gear using the following procedure:

Note
- When removing the primary gear, if the angular contact ball bearing remains in the transaxle case and only the primary gear is removed, the following angular contact ball bearing removal procedure is not necessary.

1) Pry the angular contact ball bearing evenly using two flathead screwdrivers to create a gap between the primary gear end and the angular contact ball bearing end until the tab of the SST (49 0839 425C) is inserted.

A : Gap



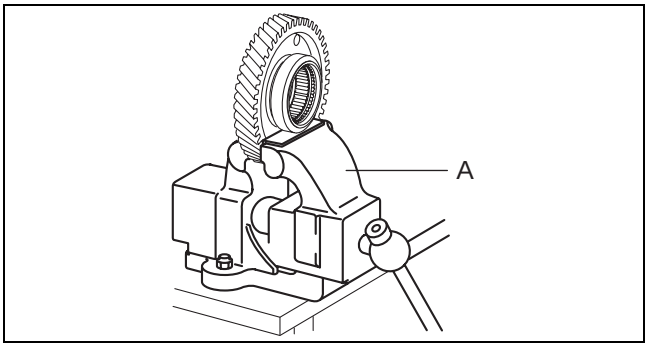
azzjjw00001205

Note
- If there is already a gap between the primary gear end and the angular contact ball bearing end in which the tab of the SST (49 0839 425C) is inserted when removing the primary gear, this procedure is not necessary.

2) Secure the primary gear in a vise.

A : Vise

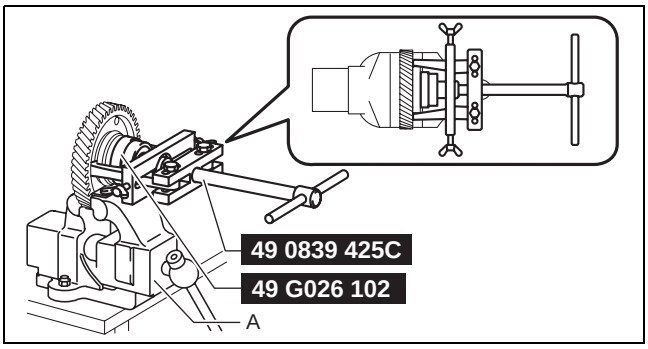
Caution
- **Insert a protective plate between the vise and the part so as not to damage the part.**



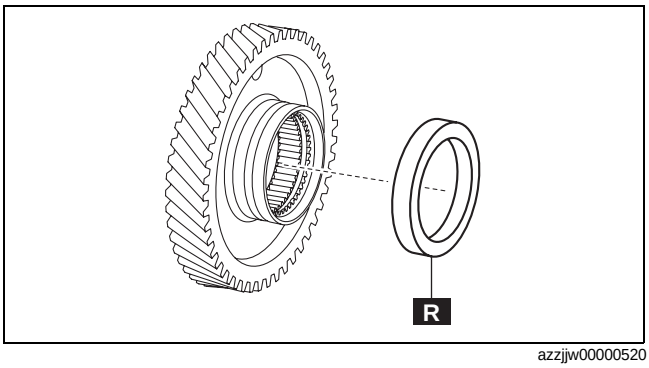
azzjjw00001206

3) Remove the angular contact ball bearing using the SSTs.

A : Vise



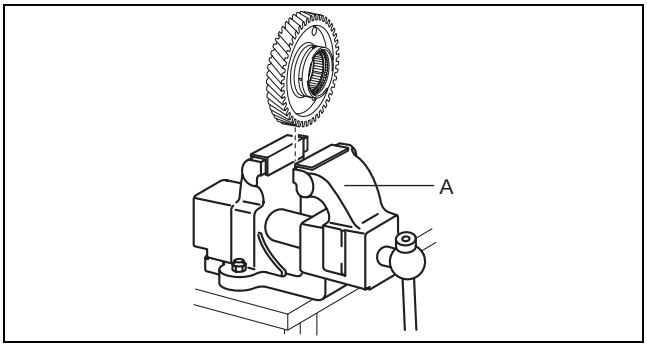
azzjjw00001207



azzjjw00000520

4) Remove the primary gear from the vise.

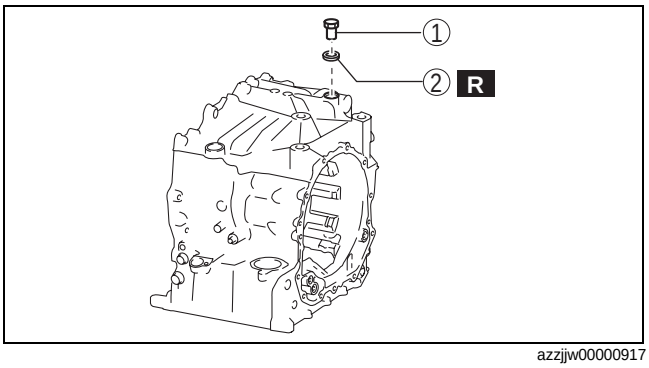
A : Vise



azzjjw00001208

(3) Remove the plug and gasket in the order shown in the figure.

1	Plug
2	Gasket



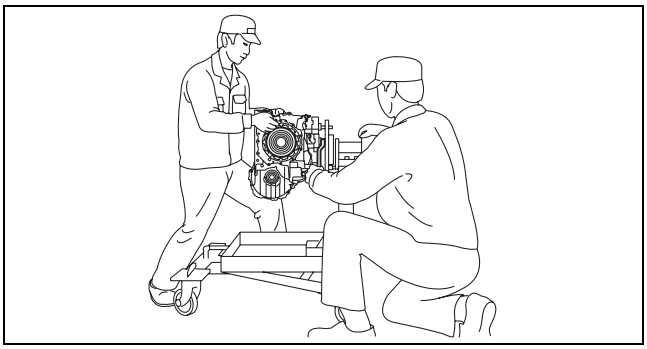
azzjjw00000917

64. Remove the SST from the transaxle case using the following procedure:

(1) Remove the transaxle case from the SST (engine stand).

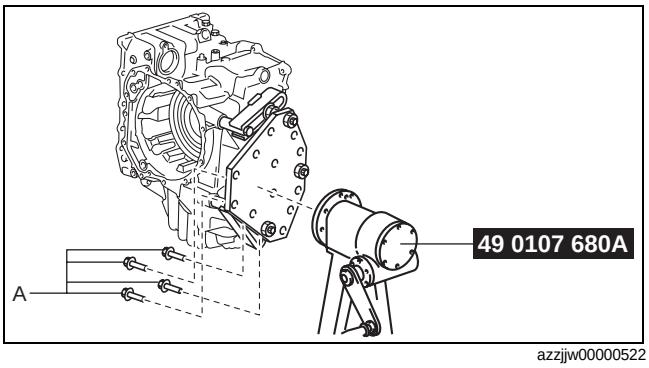
Caution

- **For safety purposes, perform the procedure using two people, one removes the transaxle case from the SST and the other supports the transaxle case.**



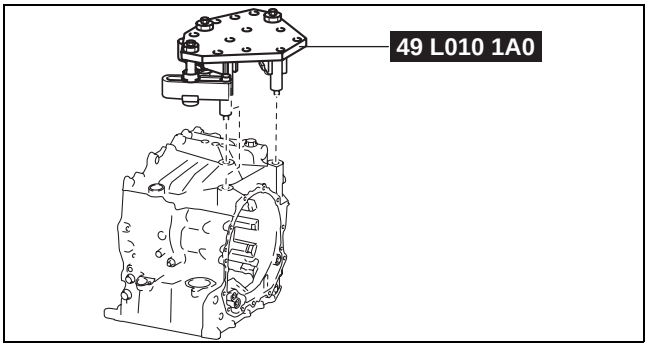
azzjjw00000521

A : Part number: 9YA02 A220, or M12×1.75 bolt, length to 40 mm {1.6 in}



azzjjw00000522

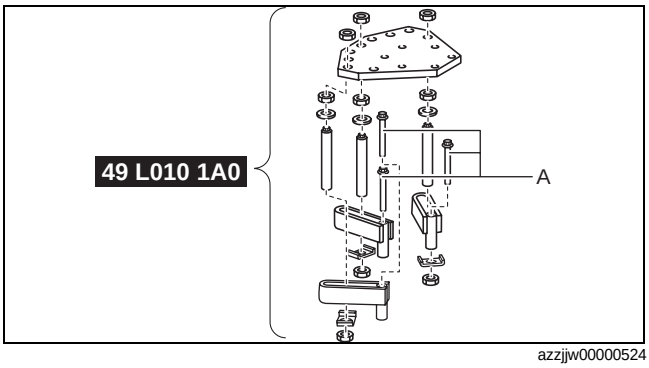
(2) Remove the SST from the transaxle case.



azzjjw00000523

(3) Disassemble the SST.

A : Part number: 9YA02 1440, or M14×1.5 bolt, length to 100 mm {3.94 in}



azzjjw00000524

65. Disassemble the parts in the following order.

Note
- Disassemble the parts in the following order because the parts in the transaxle may be used for inspection, measurement, or adjustment.

(1) Clutch component (See 05-17-104 CLUTCH COMPONENT DISASSEMBLY)
(2) Oil pump (See 05-17-115 OIL PUMP DISASSEMBLY)
(3) Rear planetary gear (See 05-17-117 REAR PLANETARY GEAR DISASSEMBLY)
(4) Secondary gear and output gear (See 05-17-119 SECONDARY GEAR AND OUTPUT GEAR DISASSEMBLY)
(5) Ring gear and differential (See 05-17-121 RING GEAR AND DIFFERENTIAL DISASSEMBLY)
(6) End cover component (See 05-17-128 END COVER COMPONENT DISASSEMBLY)
(7) Reduction planetary gear (See 05-17-136 REDUCTION PLANETARY GEAR DISASSEMBLY)
(8) Control valve body (See 05-17-138 CONTROL VALVE BODY DISASSEMBLY)

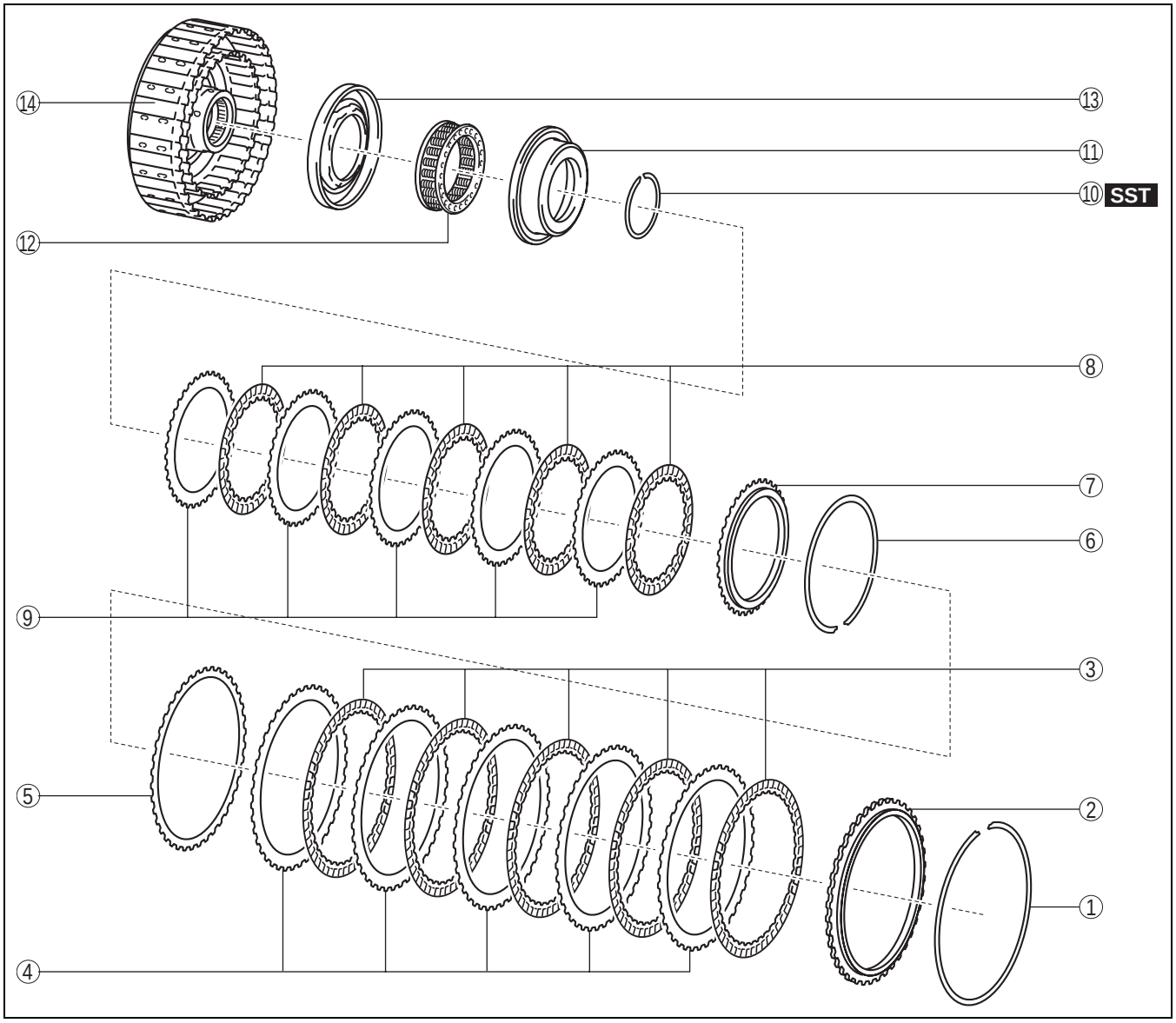
66. Clean away the remaining silicone sealant on the transaxle case, converter housing, end cover, and the oil pan.
67. Clean the disassembled parts. (See 05-17-26 AUTOMATIC TRANSAXLE CLEANING.)

68. Perform the following inspection and replace a malfunctioning part with a new one.
    - Visual inspection of parts (See 05-17-151 VISUAL INSPECTION OF PARTS)
    - Torque converter inspection (See 05-17-154 TORQUE CONVERTER INSPECTION)
    - Thrust needle bearing inspection (See 05-17-155 THRUST NEEDLE BEARING INSPECTION)
    - Front planetary gear inspection (See 05-17-155 FRONT PLANETARY GEAR INSPECTION)
    - Rear planetary gear inspection (See 05-17-158 REAR PLANETARY GEAR INSPECTION)
    - Reduction planetary gear inspection (See 05-17-161 REDUCTION PLANETARY GEAR INSPECTION)
    - Secondary gear and output gear inspection (See 05-17-163 SECONDARY GEAR AND OUTPUT GEAR INSPECTION)
    - Ring gear and differential inspection (See 05-17-165 RING GEAR AND DIFFERENTIAL INSPECTION)
    - Low clutch inspection (See 05-17-169 LOW CLUTCH INSPECTION)
    - High clutch inspection (See 05-17-169 HIGH CLUTCH INSPECTION)
    - Low and reverse brake inspection (See 05-17-170 LOW AND REVERSE BRAKE INSPECTION)
    - 2-6 brake inspection (See 05-17-171 2-6 BRAKE INSPECTION)
    - R-3-5 brake inspection (See 05-17-171 R-3-5 BRAKE INSPECTION)
    - One-way clutch inspection (See 05-17-172 ONE-WAY CLUTCH INSPECTION)
    - Low clutch hub inspection (See 05-17-173 LOW CLUTCH HUB INSPECTION)
    - High clutch hub inspection (See 05-17-173 HIGH CLUTCH HUB INSPECTION)
    - Oil pump inspection (See 05-17-174 OIL PUMP INSPECTION)
    - End cover inspection (See 05-17-177 END COVER INSPECTION)
    - Oil cooler inspection (See 05-17-177 OIL COOLER INSPECTION)

CLUTCH COMPONENT DISASSEMBLY

id051700660700

Structural View



azzjjw00001430

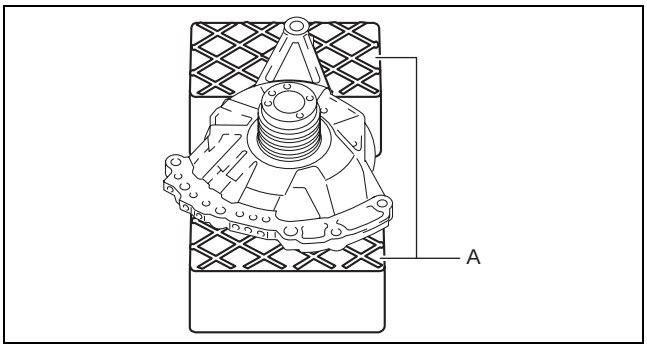
1	Snap ring
2	Retaining plate
3	Drive plate
4	Driven plate
5	Wave spring
6	Snap ring
7	Retaining plate

8	Drive plate
9	Driven plate
10	Snap ring
11	Seal plate
12	Springs and retainer component
13	High clutch piston
14	High clutch drum component

Disassembly Procedure

1. Perform a simple inspection of the low clutch and high clutch using the following procedure:
   (1) Set the oil pump on the workbench as shown in the figure.

A : Rubber plate



azzjjw00000802

Note

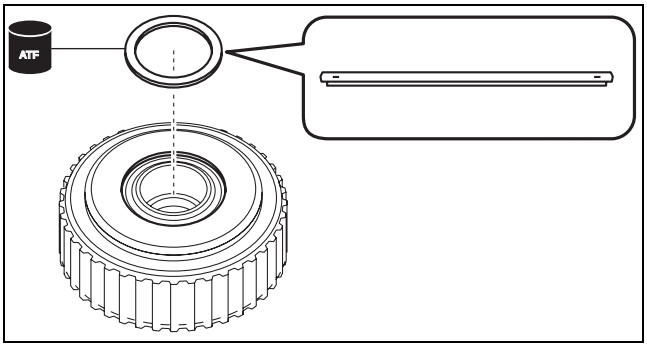
- Using the rubber plates, adjust the alignment surface of the oil pump with the transaxle case so that it is level.

(2) Assemble the thrust needle bearing to the clutch component using the following procedure:

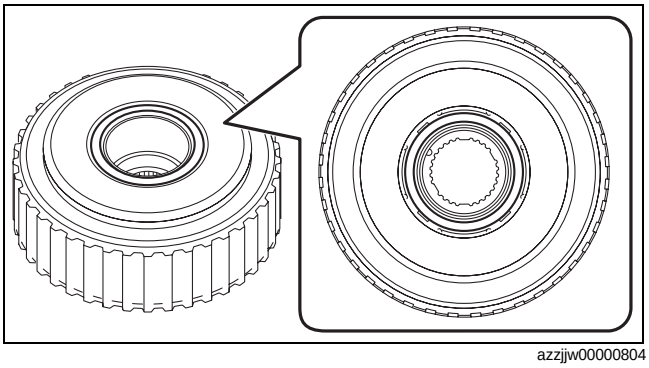
Note

- Thrust needle bearing size: Outer diameter approx. 72.7 mm {2.86 in}

1) To prevent the thrust needle bearing from dropping out, apply ATF (ATF FZ) to the thrust needle bearing.
2) Assemble the thrust needle bearing.

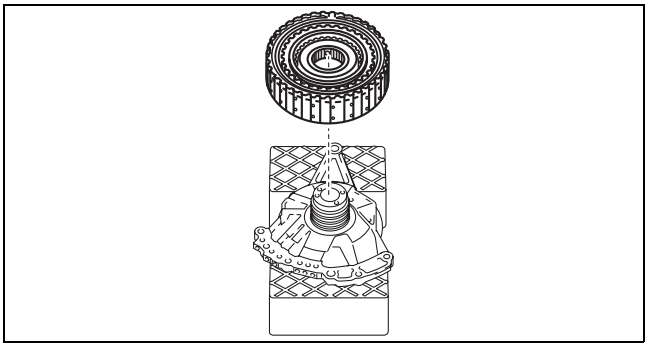


azzjjw00000803

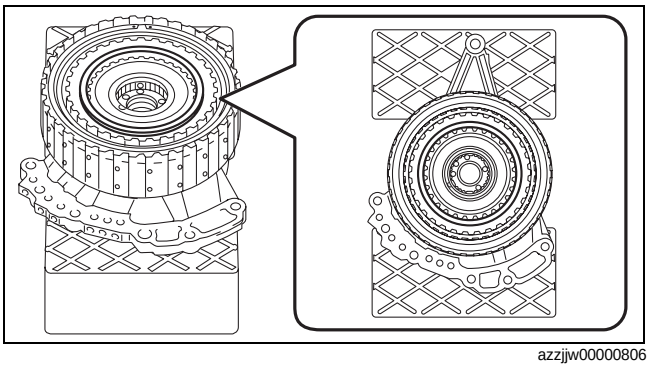


azzjjw00000804

(3) Assemble the parts assembled together in Step (2) to the oil pump.

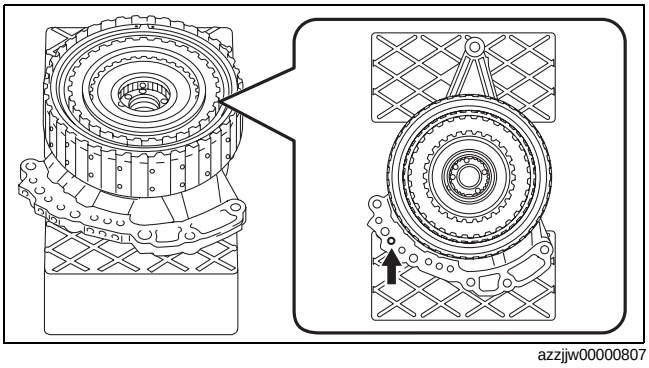


azzjjw00000805



azzjjw00000806

(4) Blow compressed air into the oil passage shown in the figure and verify the operation condition of the low clutch.



azzjjw00000807

Warning

- **Always wear protective eye wear when using the air compressor. Otherwise, ATF or dirt particles blown off by the air compressor could get into the eyes.**

Caution

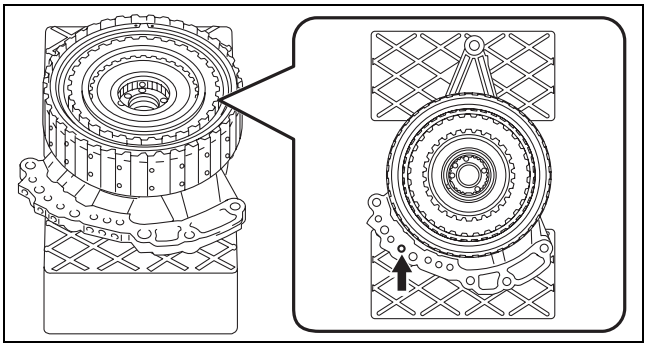
- **To prevent damage to parts, always use an air compressor which is adjusted to the indicated pressure.**

Compressed air pressure

0.39—0.44 MPa {4.0—4.4 kgf/cm^2, 57—63 psi}

- If there is a malfunction, verify the cause and repair the applicable part after disassembly.

(5) Blow compressed air into the oil passage shown in the figure and verify the operation condition of the high clutch.



azzjjw00000808

Warning

- **Always wear protective eye wear when using the air compressor. Otherwise, ATF or dirt particles blown off by the air compressor could get into the eyes.**

Caution

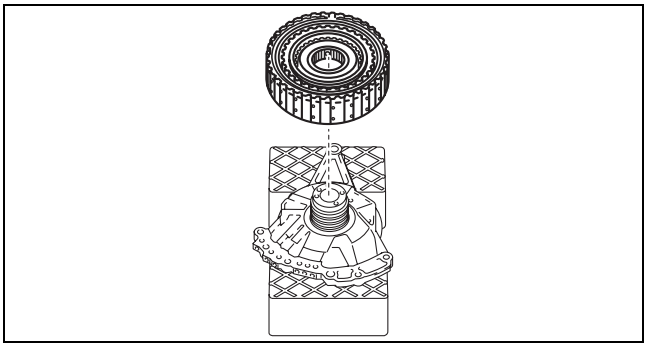
- **To prevent damage to parts, always use an air compressor which is adjusted to the indicated pressure.**

Compressed air pressure

0.39—0.44 MPa {4.0—4.4 kgf/cm^2, 57—63 psi}

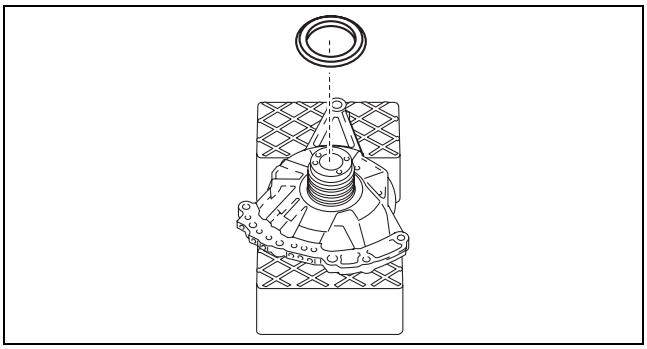
- If there is a malfunction, verify the cause and repair the applicable part after disassembly.

(6) Remove the clutch component.



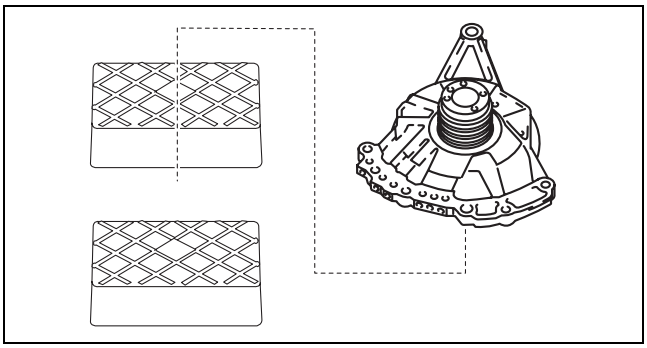
azzjjw00000809

(7) Remove the thrust needle bearing.



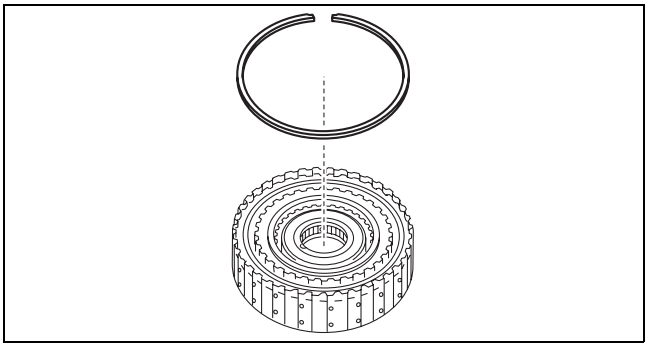
azzjjw00000810

(8) Take the oil pump off the rubber plates.



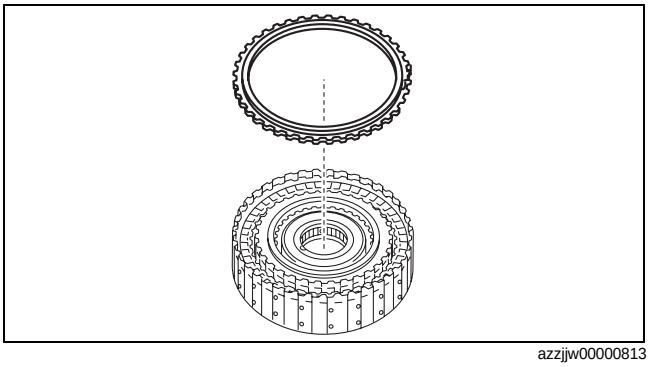
azzjjw00001202

2. Remove the snap ring.



azzjjw00000812

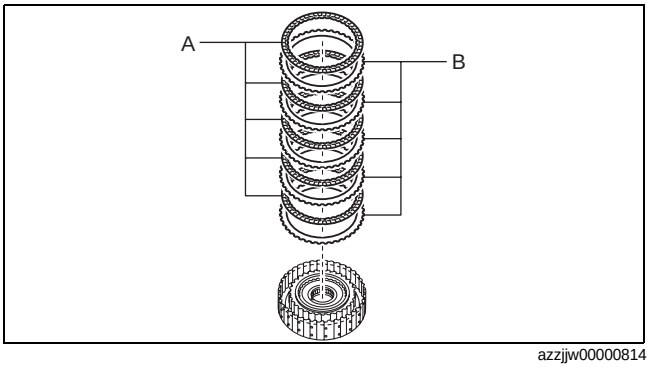
3. Remove the retaining plate.



azzjjw00000813

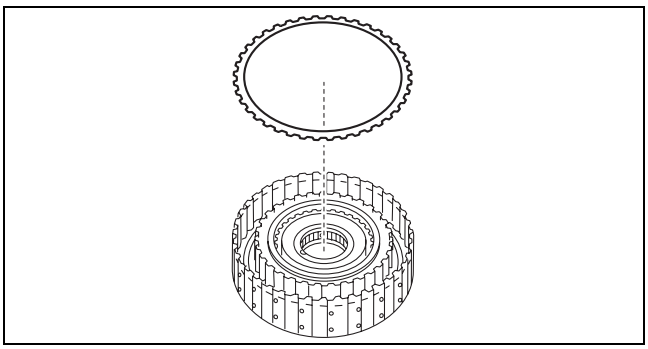
4. Remove the drive plates and driven plates.

A : Drive plate
B : Driven plate



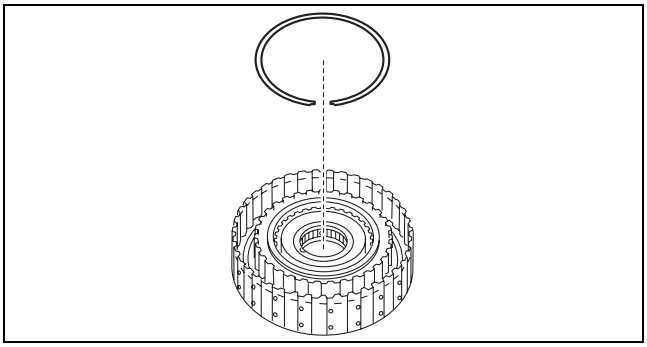
azzjjw00000814

5. Remove the wave spring.



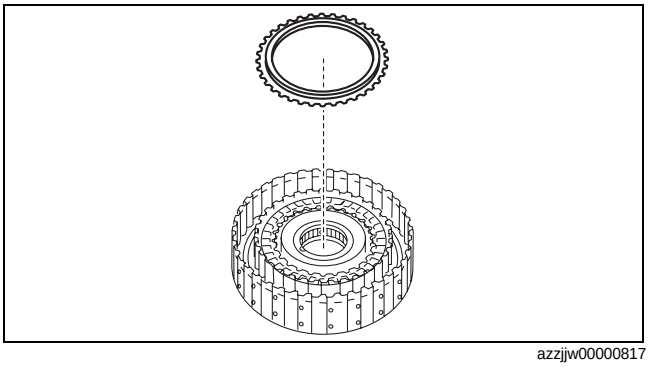
azzjjw00000815

6. Remove the snap ring.



azzjjw00000816

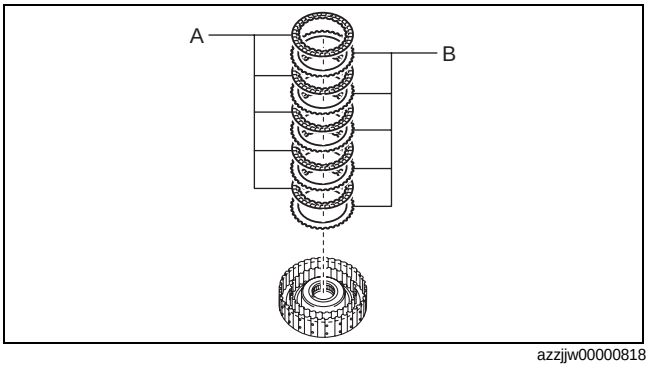
7. Remove the retaining plate.



azzjjw00000817

8. Remove the drive plates and driven plates.

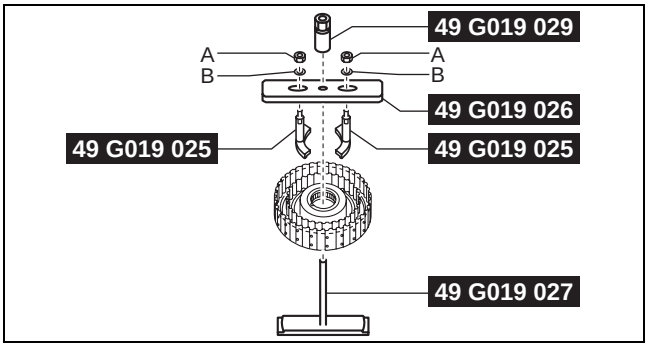
A : Drive plate
B : Driven plate



azzjjw00000818

9. Remove the snap ring using the following procedure:
   (1) Install the SSTs.

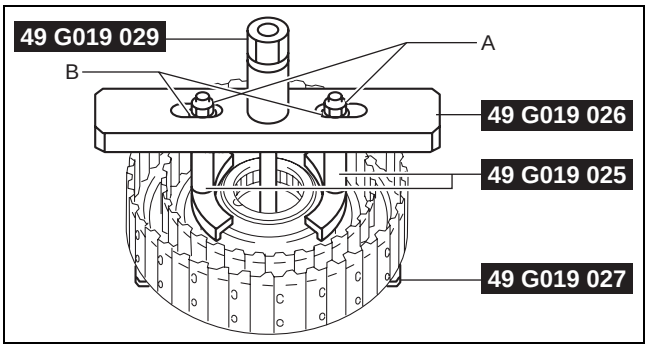
A : Nut included with SST (49 G019 025), or M8×1.25 nut
B : Washer



azzjjw00000819

Note
- When installing the SST (49 G019 025) to the SST (49 G019 026), use the nuts included with the SST (49 G019 025), or M8×1.25 nuts.

A : Nut included with SST (49 G019 025), or M8×1.25 nut
B : Washer

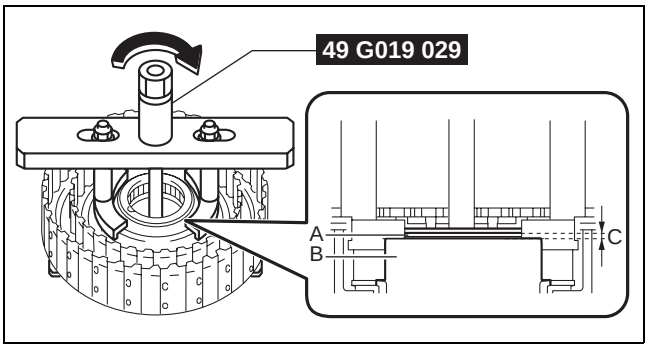


azzjjw00000820

   (2) Tighten the SST (49 G019 029) until there is no longer any spring force from the springs and retainer component applied to the snap ring.

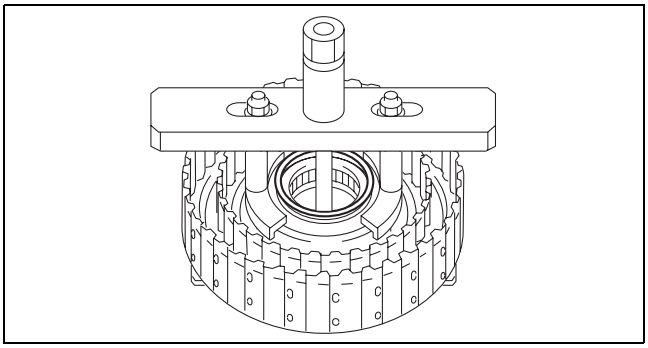
A : Snap ring
B : Seal plate
C : Gap

Caution
- **If the SST (49 G019 029) is tightened with excessive force, surrounding parts could be damaged. Stop tightening if a gap appears between the snap ring and seal plate.**

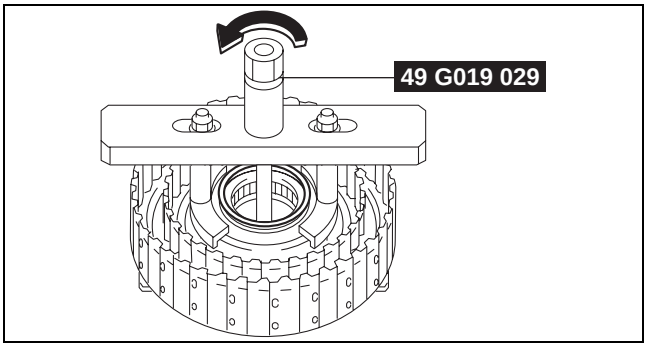


azzjjw00000821

   (3) Remove the snap ring from the snap ring groove.

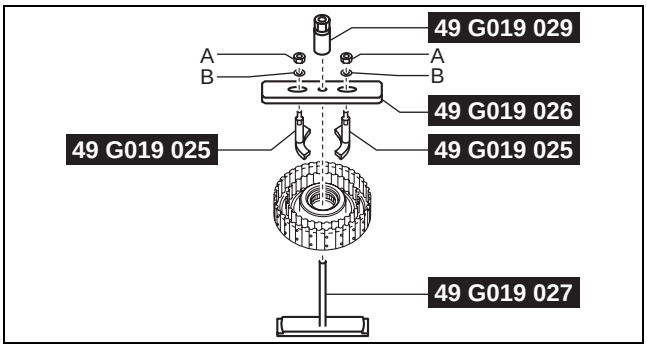

azzjjw00000822

(4) Loosen the SST (49 G019 029) and remove the SSTs.



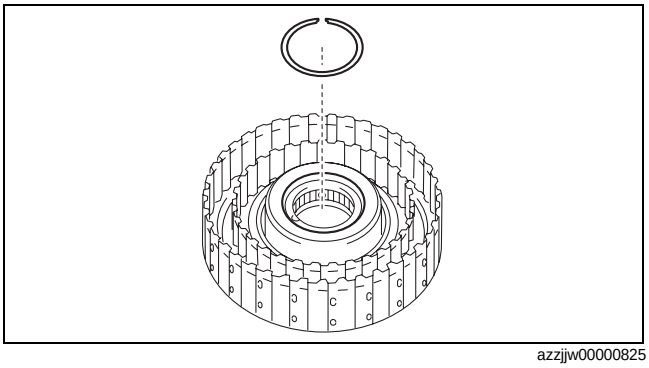
azzjjw00000823

A : Nut included with SST (49 G019 025), or M8×1.25 nut
B : Washer



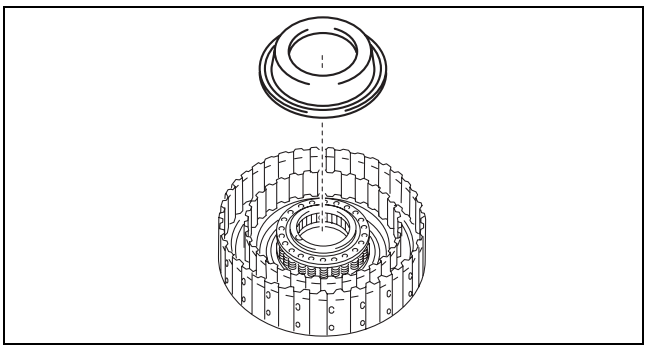
azzjjw00000824

(5) Remove the snap ring removed from the snap ring groove.



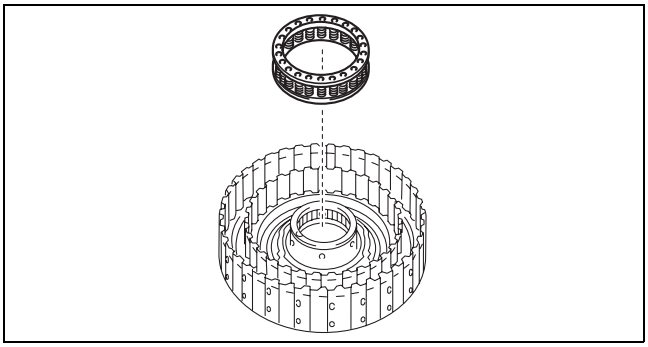
azzjjw00000825

10. Remove the seal plate.



azzjjw00000826

11. Remove the springs and retainer component.

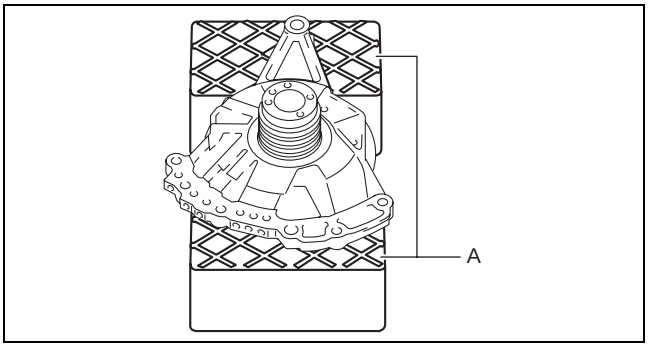


azzjjw00000827

12. Remove the high clutch piston using the following procedure:
    (1) Set the oil pump on the workbench as shown in the figure.

A : Rubber plate

Note
- Using the rubber plates, adjust the alignment surface of the oil pump with the transaxle case so that it is level.

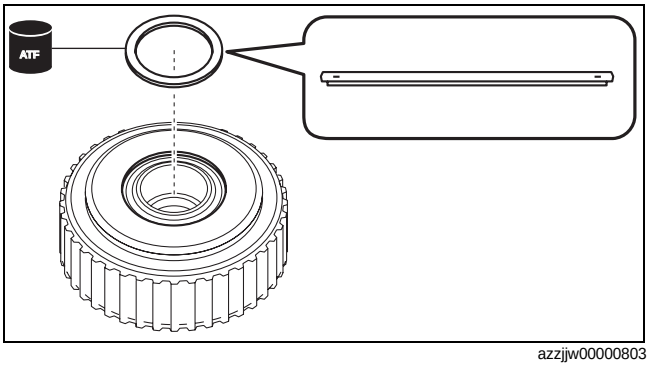


azzjjw00000802

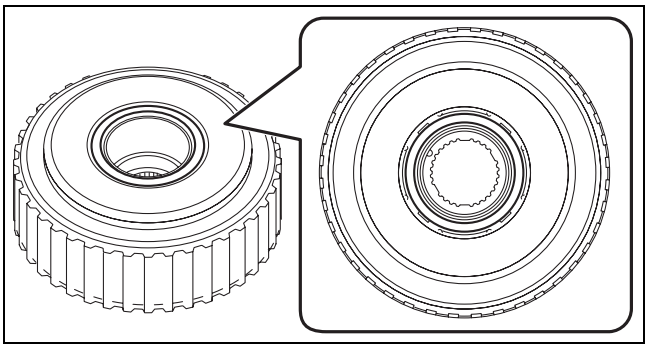
(2) Assemble the thrust needle bearing to the high clutch drum component using the following procedure:

Note
- Thrust needle bearing size: Outer diameter approx. 72.7 mm {2.86 in}

1) To prevent the thrust needle bearing from dropping out, apply ATF (ATF FZ) to the thrust needle bearing.
2) Assemble the thrust needle bearing.

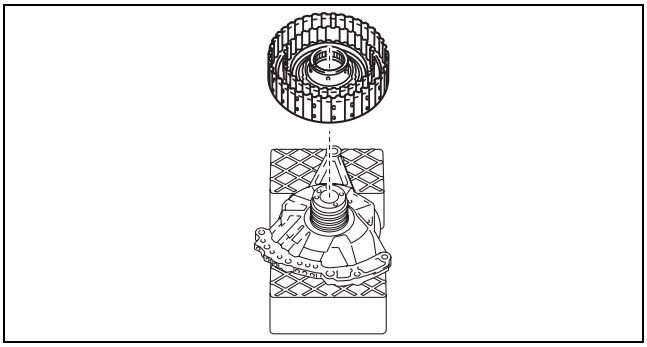


azzjjw00000803

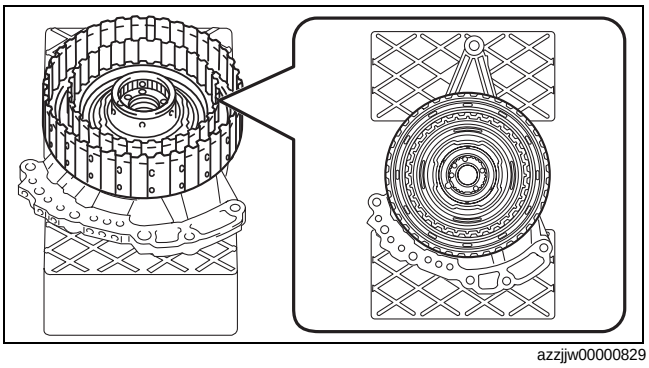


azzjjw00000804

(3) Assemble the parts assembled together in Step (2) to the oil pump.



azzjjw00000828



azzjjw00000829

(4) Blow compressed air into the oil passage shown in the figure.

Warning

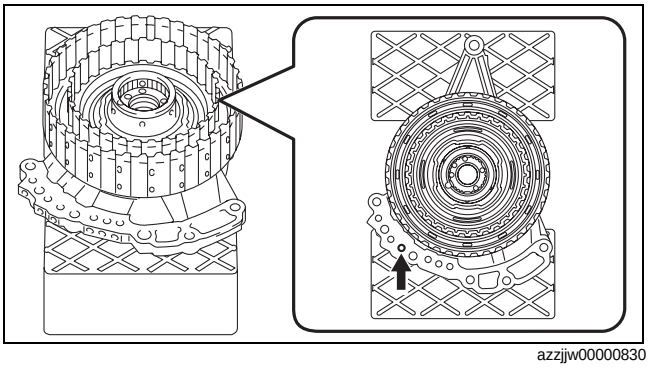
- **Always wear protective eye wear when using the air compressor. Otherwise, ATF or dirt particles blown off by the air compressor could get into the eyes.**

Caution

- **To prevent damage to parts, always use an air compressor which is adjusted to the indicated pressure.**

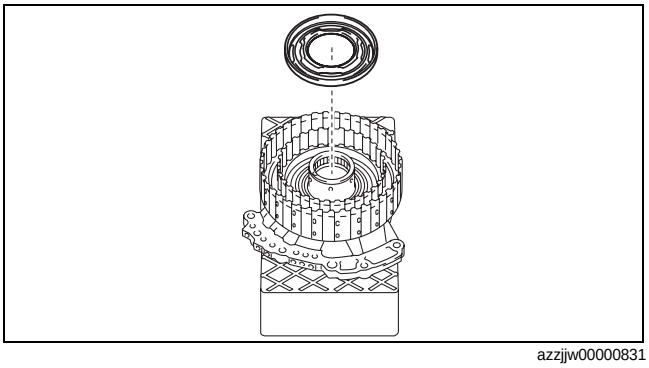
Compressed air pressure

0.39—0.44 MPa {4.0—4.4 kgf/cm^2, 57—63 psi}



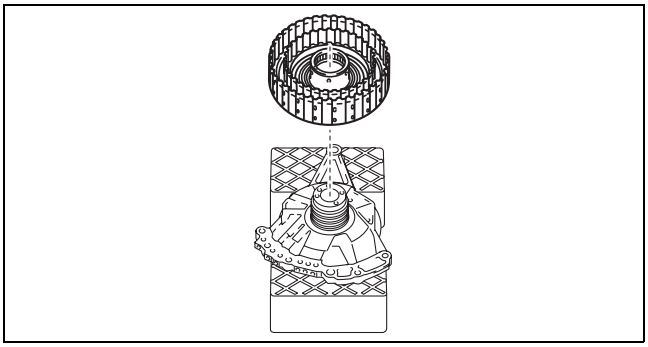
azzjjw00000830

(5) Remove the high clutch piston removed from the high clutch drum component.



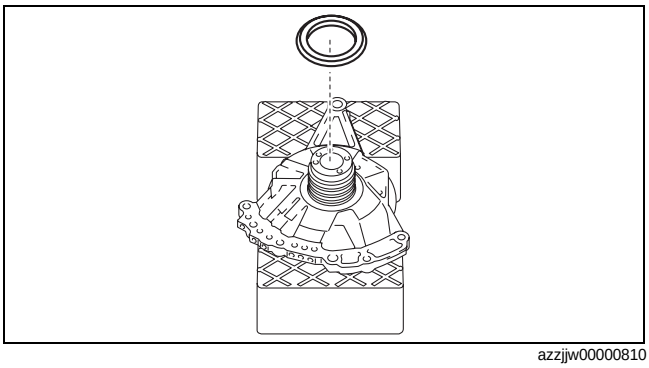
azzjjw00000831

(6) Remove the high clutch drum component.



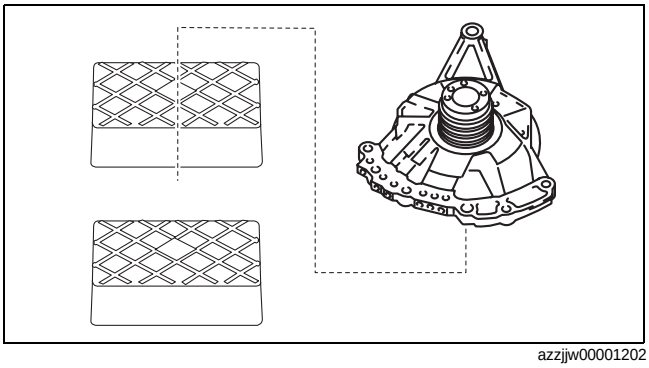
azzjjw00000832

(7) Remove the thrust needle bearing.



azzjjw00000810

(8) Take the oil pump off the rubber plates.



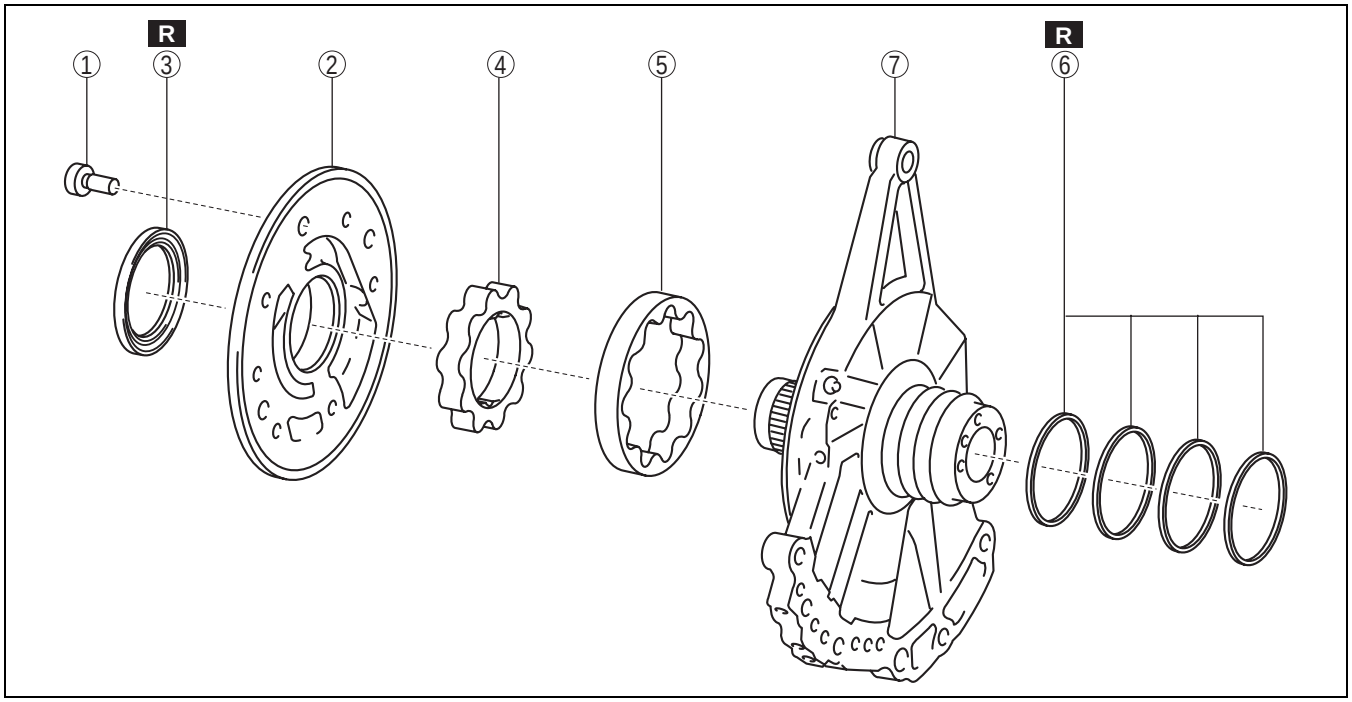
azzjjw00001202

13. Clean the disassembled parts. (See 05-17-26 AUTOMATIC TRANSAXLE CLEANING.)
14. Perform the following inspection and replace a malfunctioning part with a new one.
    - Visual inspection of parts (See 05-17-151 VISUAL INSPECTION OF PARTS)
    - Low clutch inspection (See 05-17-169 LOW CLUTCH INSPECTION)
    - High clutch inspection (See 05-17-169 HIGH CLUTCH INSPECTION)

OIL PUMP DISASSEMBLY

id051700660800

Structural View



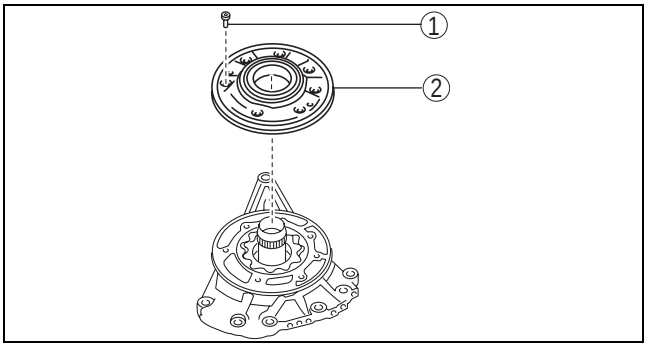
azzjjw00001431

1	7 bolts
2	Oil pump cover
3	Oil seal
4	Inner rotor
5	Outer rotor
6	Seal ring
7	Oil pump housing

Disassembly Procedure

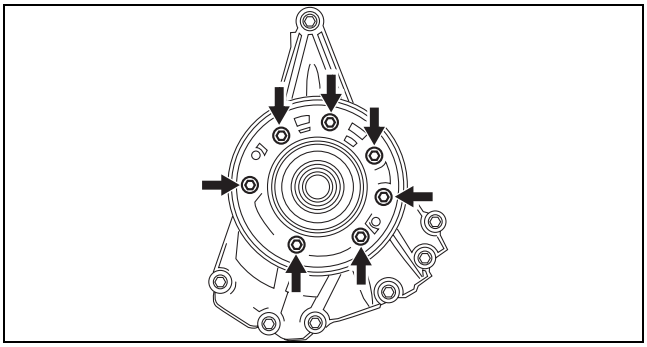
1. Remove the oil pump cover using the following procedure:

1	7 bolts
2	Oil pump cover



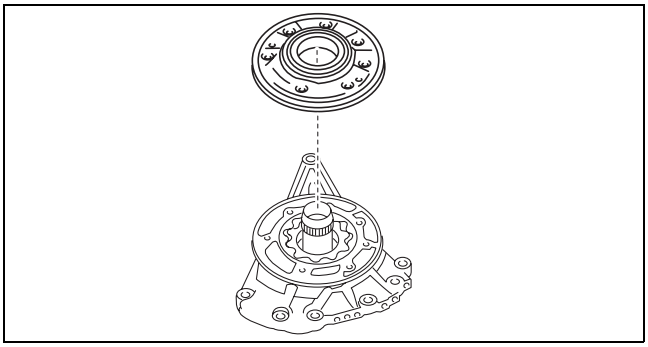
azzjjw00000833

(1) Remove the bolts shown in the figure.



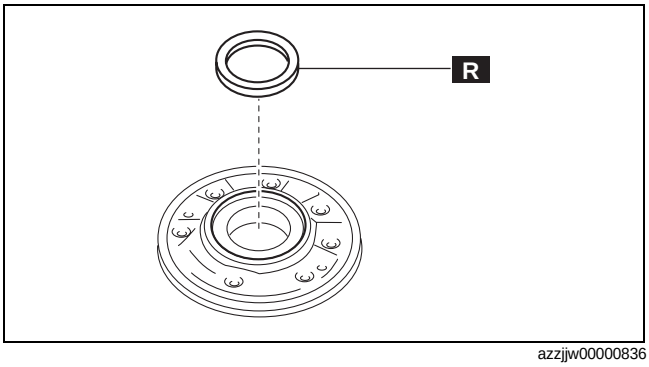
azzjjw00000834

(2) Remove the oil pump cover.



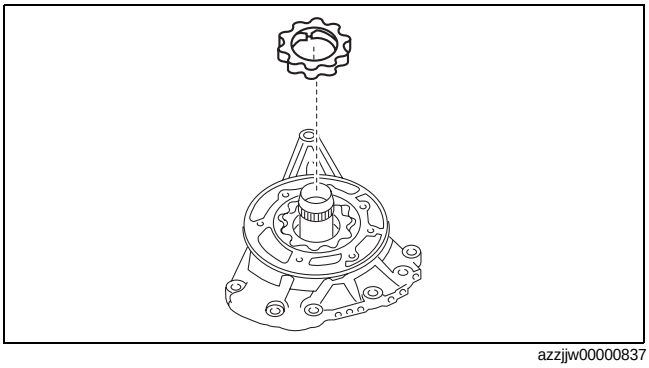
azzjjw00000835

2. Remove the oil seal.



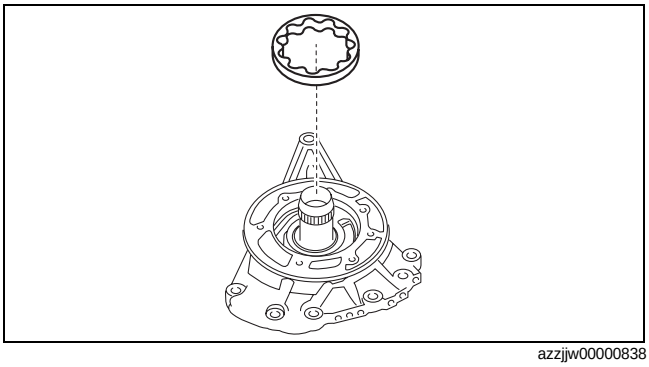
azzjjw00000836

3. Remove the inner rotor.



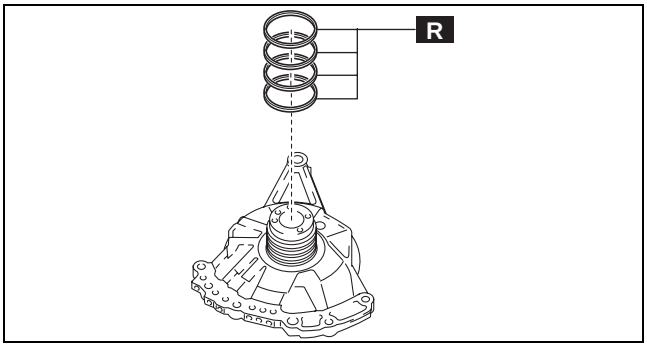
azzjjw00000837

4. Remove the outer rotor.



azzjjw00000838

5. Remove the seal rings.



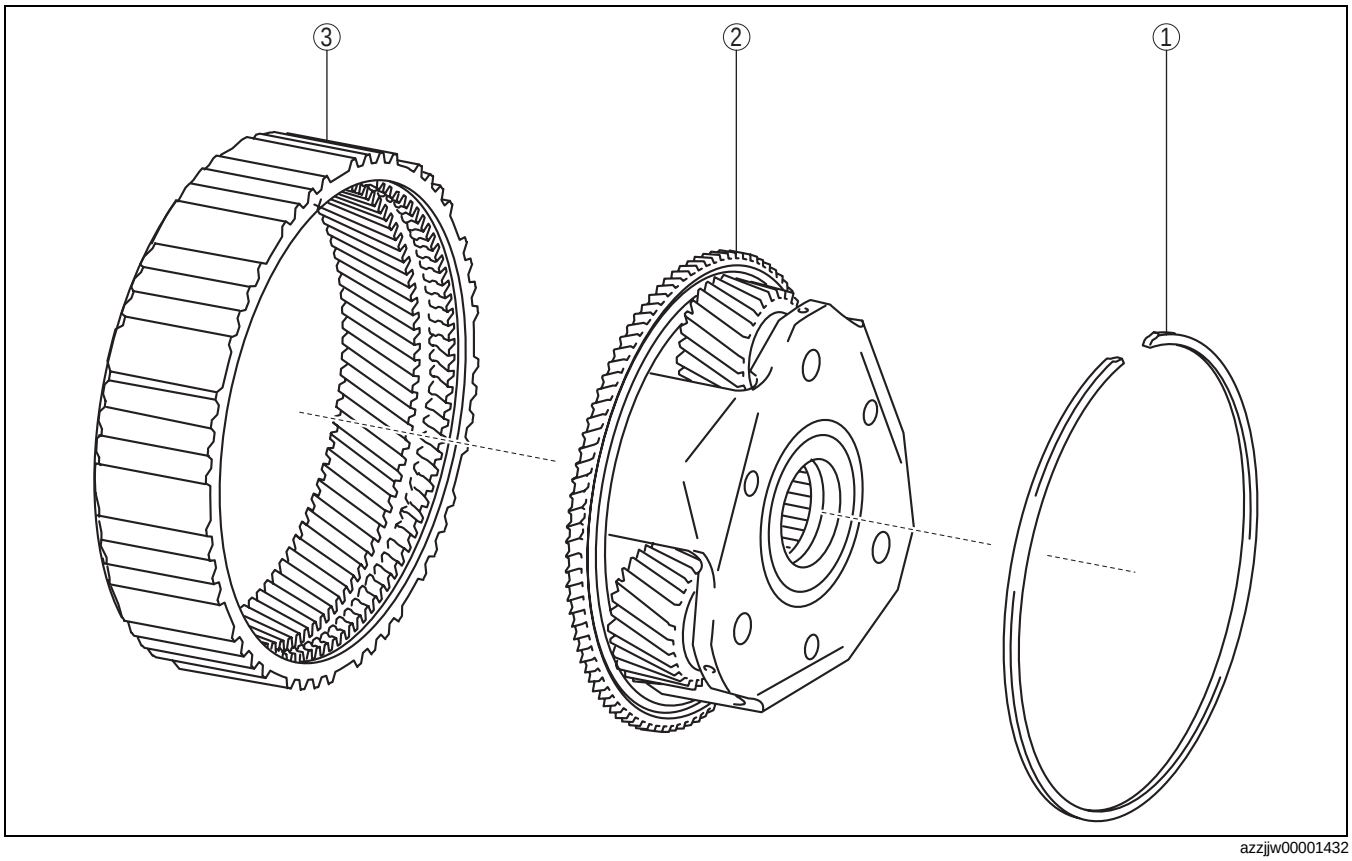
azzjjw00000839

6. Clean the disassembled parts. (See 05-17-26 AUTOMATIC TRANSAXLE CLEANING.)
7. Perform the following inspection and replace a malfunctioning part with a new one.
   - Visual inspection of parts (See 05-17-151 VISUAL INSPECTION OF PARTS)
   - Oil pump inspection (See 05-17-174 OIL PUMP INSPECTION)

REAR PLANETARY GEAR DISASSEMBLY

id051700660900

Structural View



azzjjw00001432

1	Snap ring
2	Rear planetary carrier
3	Front internal gear

Disassembly Procedure

1. Perform the following inspection:

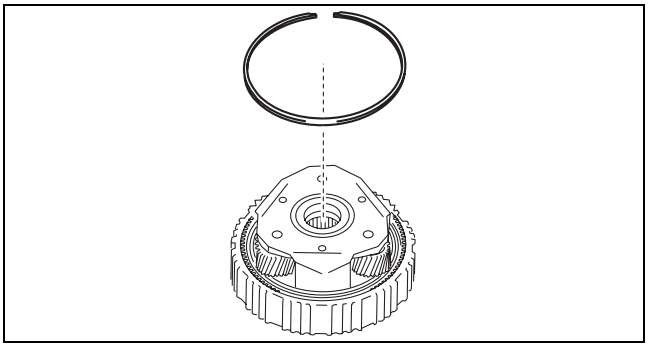
Caution

- **If there is no malfunction based on the results of the inspection, it is not necessary to disassemble the rear planetary gear.**

- Visual inspection of parts (See 05-17-151 VISUAL INSPECTION OF PARTS)
- Rear planetary gear inspection (See 05-17-158 REAR PLANETARY GEAR INSPECTION)

- If there is a malfunction, disassemble the rear planetary gear and replace the malfunctioning part with a new part.

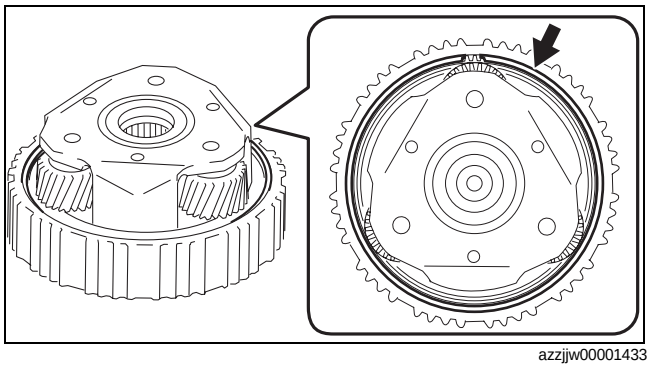
2. Remove the snap ring.



azzjjw00000840

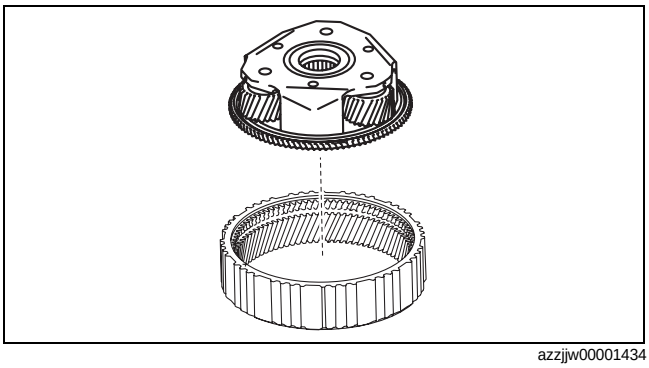
Note

When removing the snap ring, insert a precision flathead screwdriver into the position (between front internal gear and snap ring brim) shown in the figure and the snap ring can be easily removed by prying the snap ring brim.



azzjjw00001433

3. Remove the rear planetary carrier.



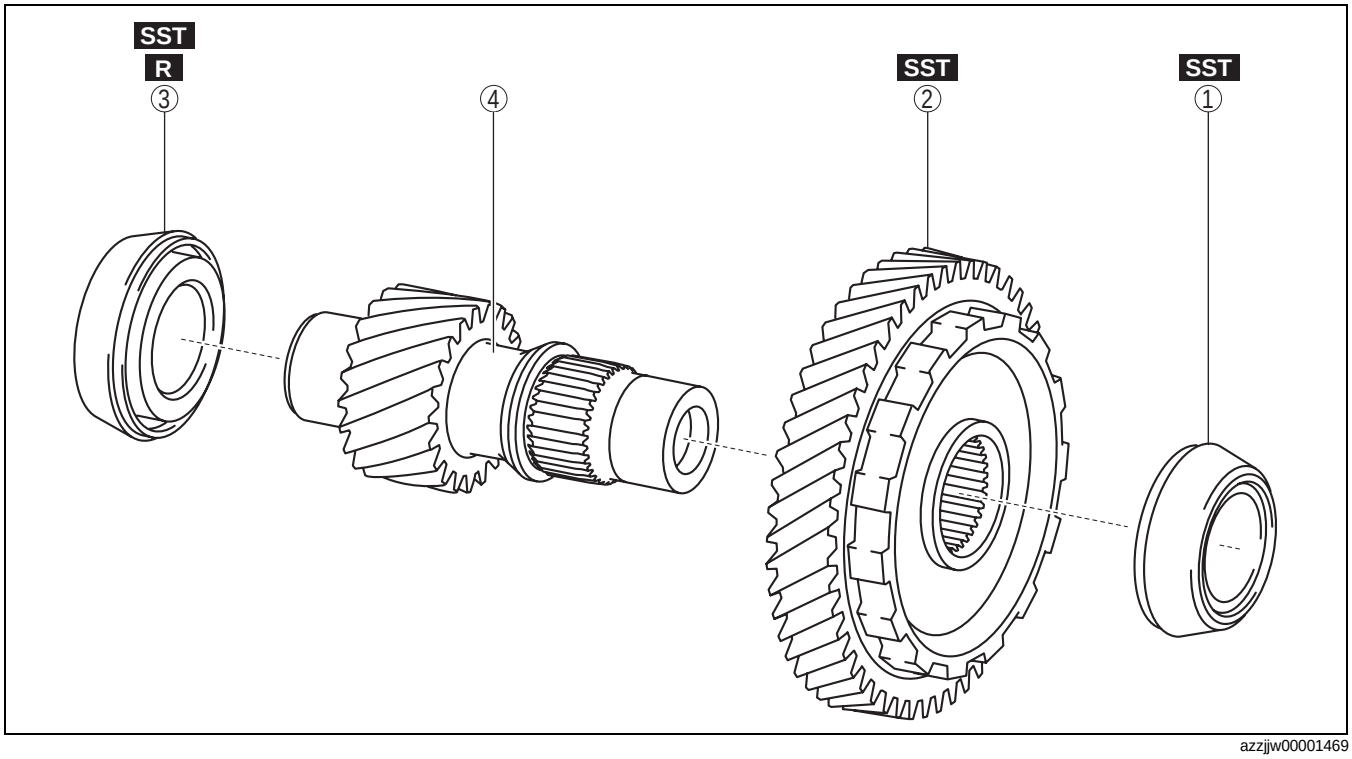
azzjjw00001434

4. Clean the disassembled parts. (See 05-17-26 AUTOMATIC TRANSAXLE CLEANING.)

SECONDARY GEAR AND OUTPUT GEAR DISASSEMBLY

id051700661000

Structural View



azzjjw00001469

1	Taper roller bearing (transaxle case side)
2	Secondary gear

3	Taper roller bearing (converter housing side)
4	Output gear

Disassembly Procedure

1. Perform the following inspection:

Caution

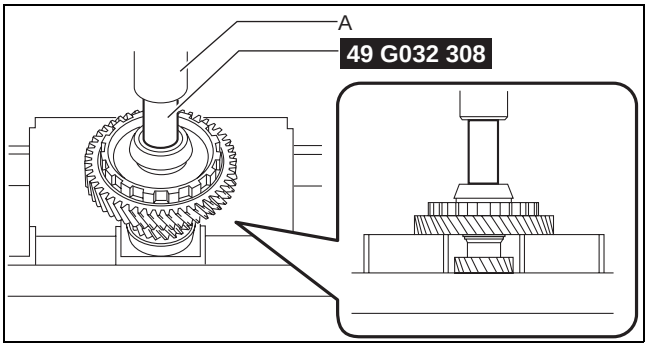
- **If there is no malfunction based on the results of the inspection, it not necessary to disassemble the secondary gear and output gear.**

- Visual inspection of parts (See 05-17-151 VISUAL INSPECTION OF PARTS)
- Secondary gear and output gear inspection (See 05-17-163 SECONDARY GEAR AND OUTPUT GEAR INSPECTION)

- If there is a malfunction, disassemble the secondary gear and output gear and replace the malfunctioning part with a new part.

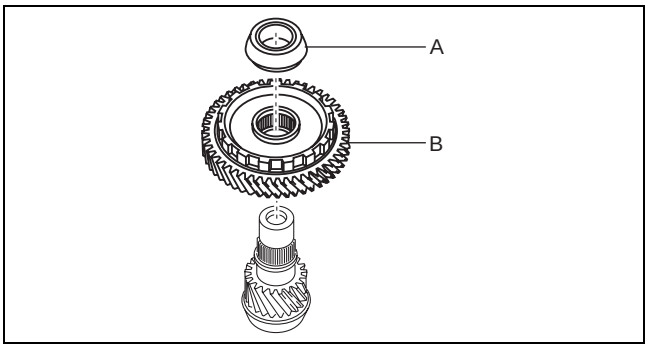
2. Using the SST and press, remove the secondary gear and the taper roller bearing (transaxle case side).

A : Press



azzjjw00000947

A : Taper roller bearing (transaxle case side)
B : Secondary gear



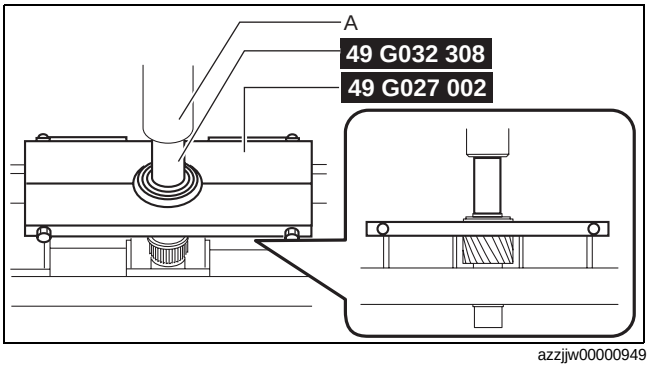
azzjjw00000948

3. Using the SSTs and press, remove the taper roller bearing (converter housing side).

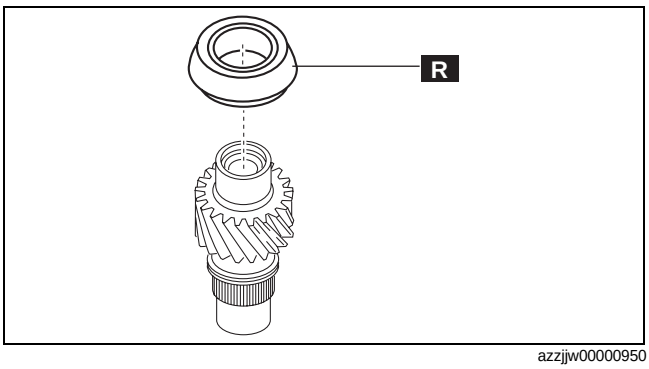
A : Press

Caution

- **When removing the taper roller bearing, the cage will deform when the SST is put on the taper roller bearing cage. When assembling the secondary gear and output gear, use a new taper roller bearing.**



azzjjw00000949



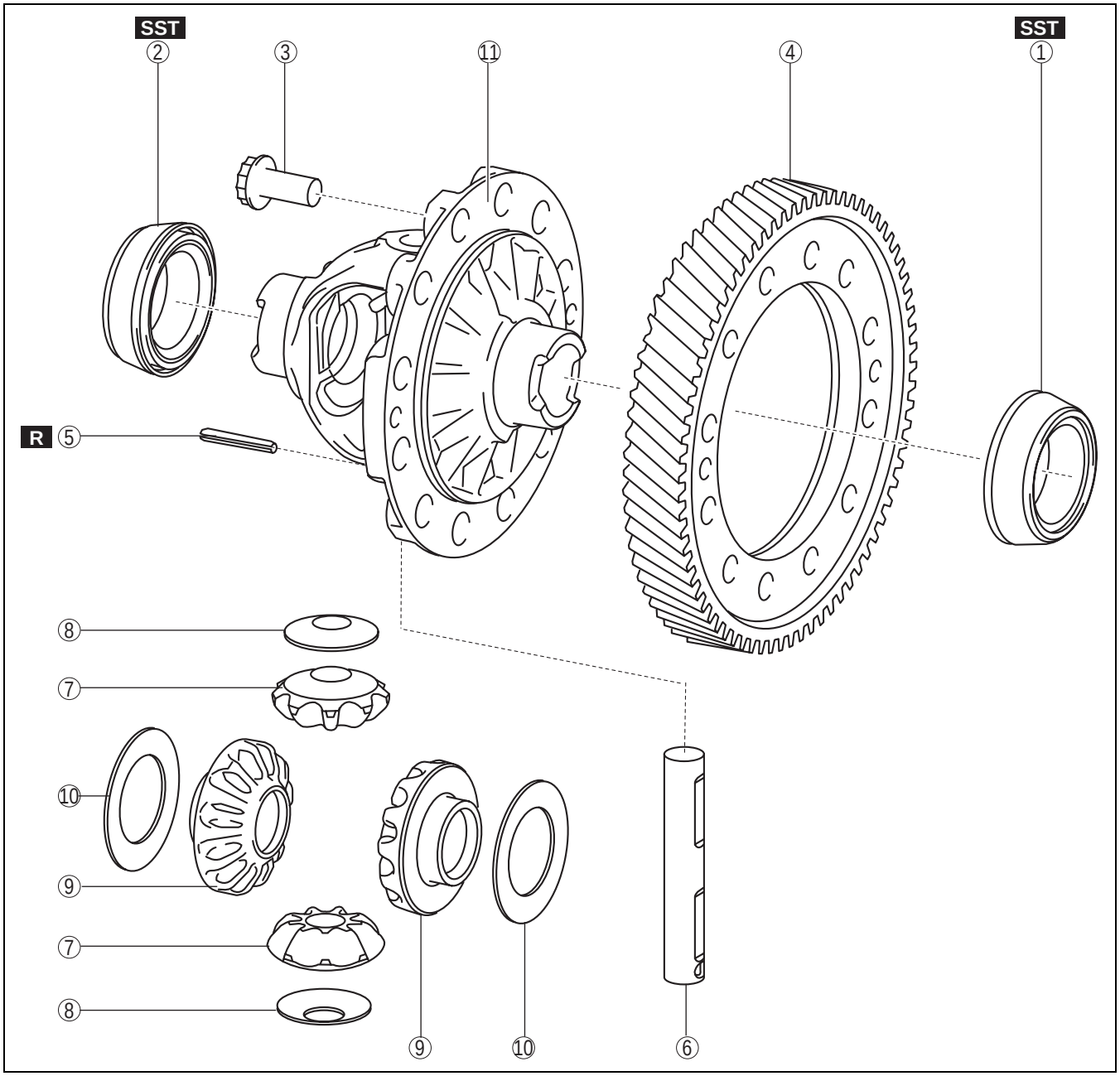
azzjjw00000950

4. Clean the disassembled parts. (See 05-17-26 AUTOMATIC TRANSAXLE CLEANING.)

RING GEAR AND DIFFERENTIAL DISASSEMBLY

id051700661100

Structural View



azzjjw00001486

1	Taper roller bearing (transaxle case side)
2	Taper roller bearing (converter housing side)
3	12 bolts
4	Ring gear
5	Roll pin
6	Pinion shaft

7	Pinion gear
8	Thrust washer
9	Side gear
10	Thrust washer
11	Differential gear case

Disassembly Procedure

1. Perform the following inspection:

Caution

- **If there is no malfunction based on the results of the inspection, it not necessary to disassemble the ring gear and differential.**

- Visual inspection of parts (See 05-17-151 VISUAL INSPECTION OF PARTS)
- Ring gear and differential inspection (See 05-17-165 RING GEAR AND DIFFERENTIAL INSPECTION)

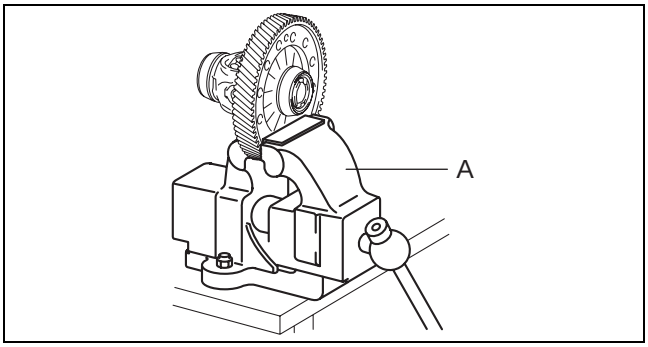
- If there is a malfunction, disassemble the ring gear and differential and replace the malfunctioning part with a new part.

2. Remove the taper roller bearing (transaxle case side) using the following procedure:
   (1) Secure the ring gear and differential in a vise.

A : Vise

Caution

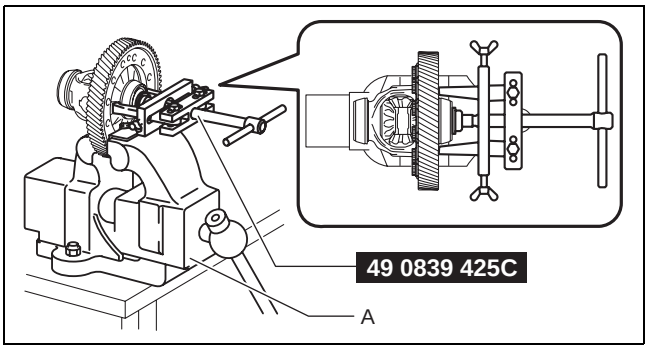
- **Insert a protective plate between the vise and the part so as not to damage the part.**



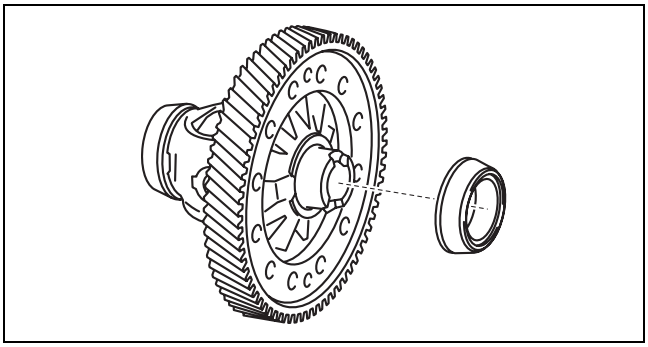
azzjjw00001254

   (2) Remove the taper roller bearing (transaxle case side) using the SST.

A : Vise



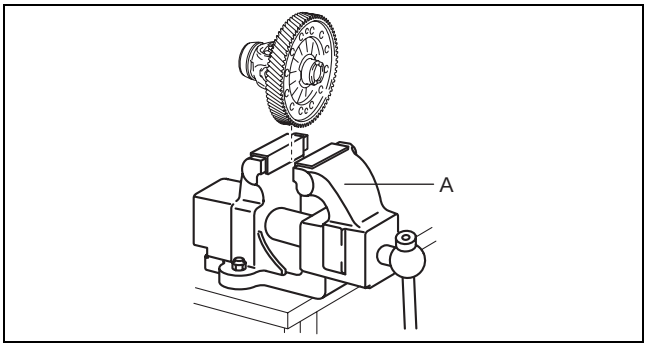
azzjjw00000952



azzjjw00000953

(3) Remove the ring gear and differential from the vise.

A : Vise

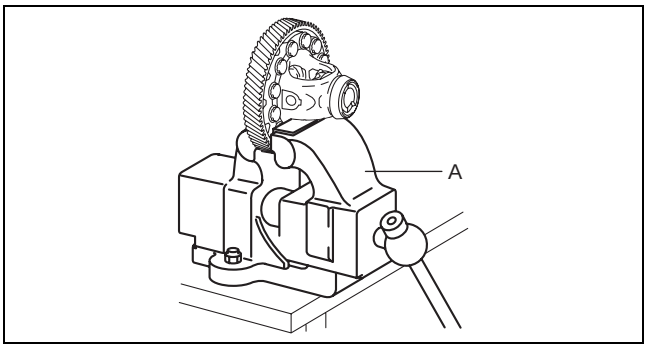


azzjjw00001255

3. Remove the taper roller bearing (converter housing side) using the following procedure:
   (1) Secure the ring gear and differential in a vise.

A : Vise

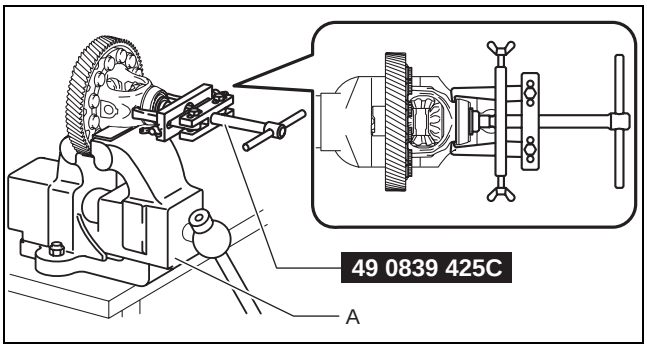
Caution
- **Insert a protective plate between the vise and the part so as not to damage the part.**



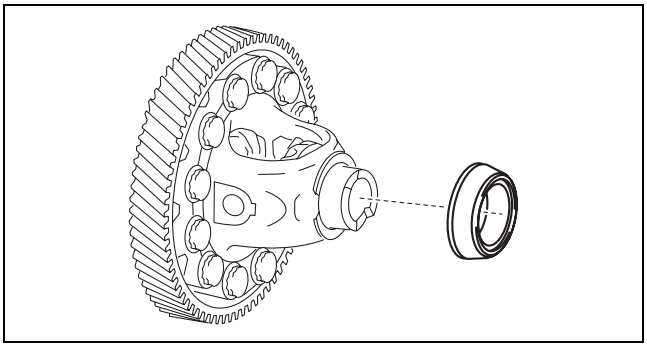
azzjjw00001256

(2) Remove the taper roller bearing (converter housing side) using the SST.

A : Vise



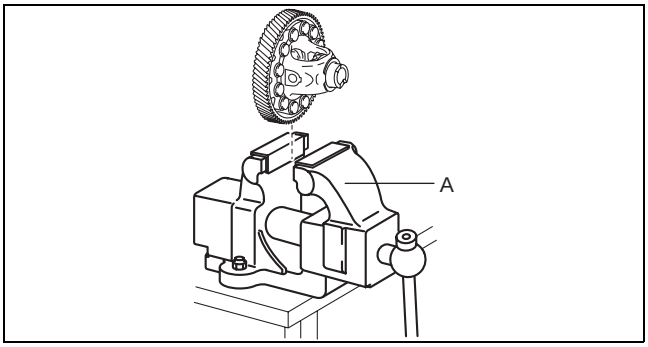
azzjjw00000956



azzjjw00000957

(3) Remove the ring gear and differential from the vise.

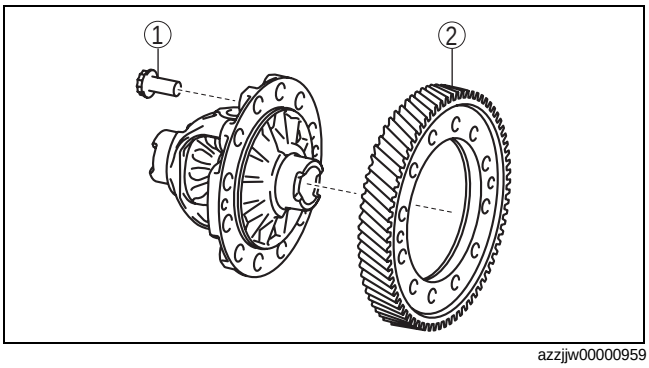
A : Vise



azzjjw00000958

4. Remove the ring gear using the following procedure:

1	12 bolts
2	Ring gear



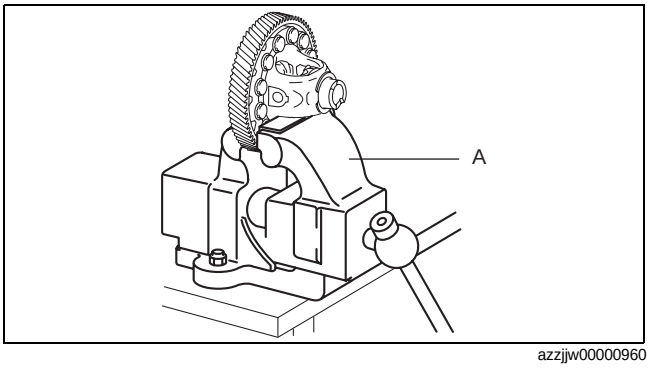
azzjjw00000959

(1) Secure the ring gear and differential in a vise.

A : Vise

Caution

- **Insert a protective plate between the vise and the part so as not to damage the part.**



azzjjw00000960

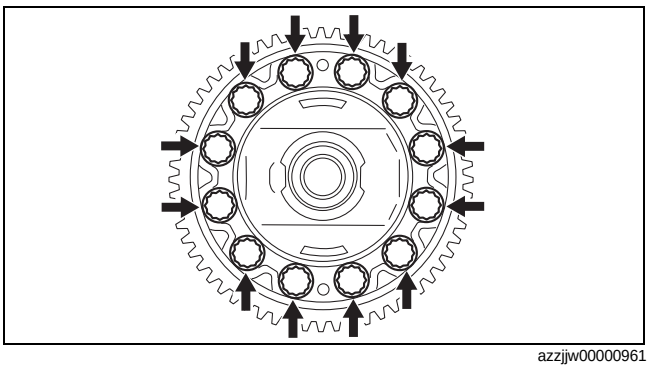
(2) Loosen the bolts shown in the figure.

Caution

- **Only loosen the bolts, do not remove them, otherwise the ring gear and differential will fall off.**

Note

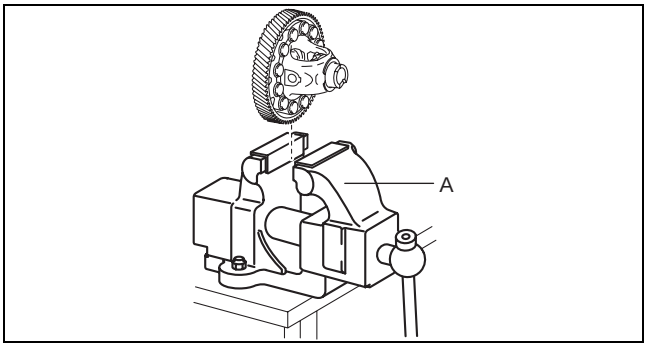
- Change the securing position of the ring gear and differential with the vise and loosen all of the bolts shown in the figure.



azzjjw00000961

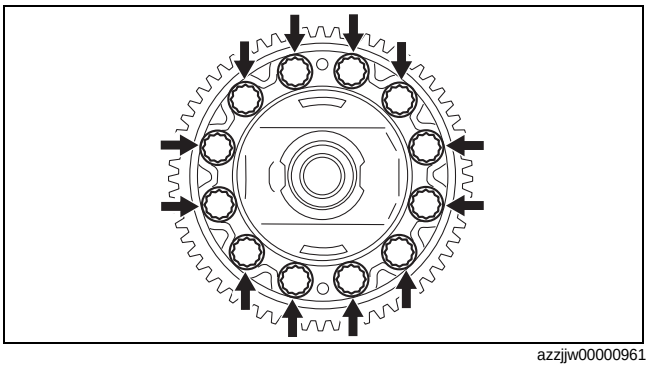
(3) Remove the ring gear and differential from the vise.

A : Vise



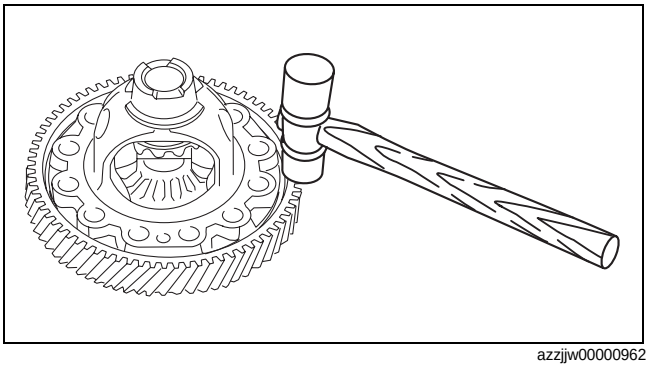
azzjjw00000958

(4) Remove the bolts shown in the figure.

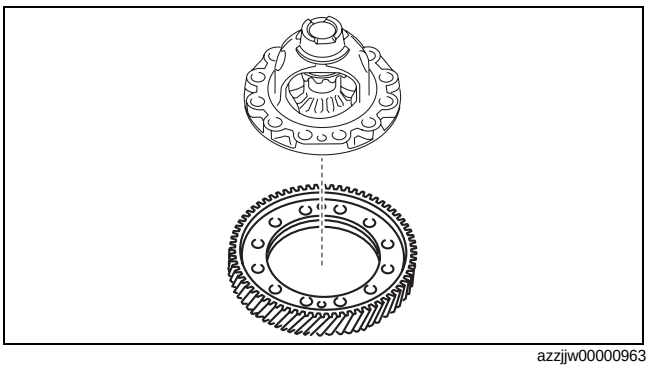


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(5) Lightly tap the ring gear with a plastic hammer and remove the ring gear.



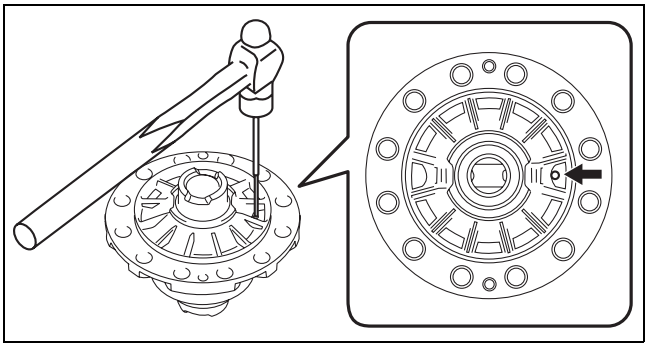
azzjjw00000962



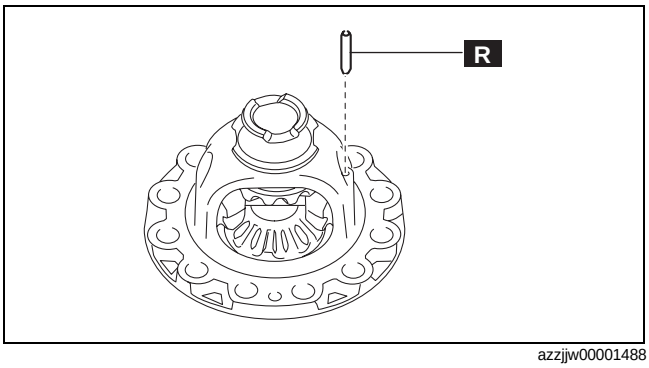
azzjjw00000963

5. Remove the roll pin shown in the figure using a pin punch.

Note
- Use a pin punch with an end outer diameter of 3 mm {0.119 in} or more, and within 4 mm {0.157 in}, and an end length of 50 mm {2.0 in} or more.

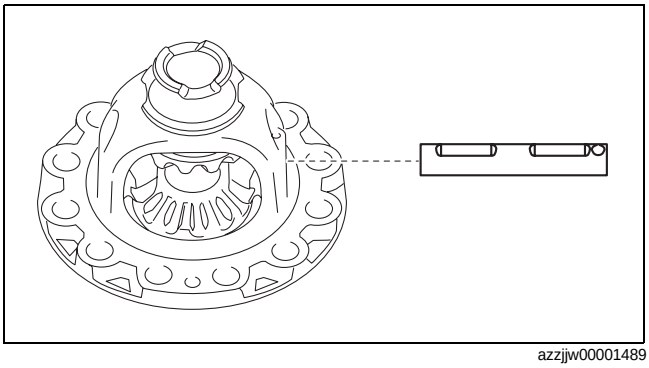


azzjjw00001487



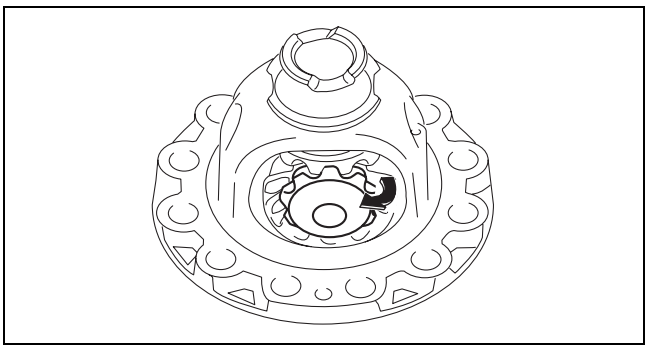
azzjjw00001488

6. Remove the pinion shaft.



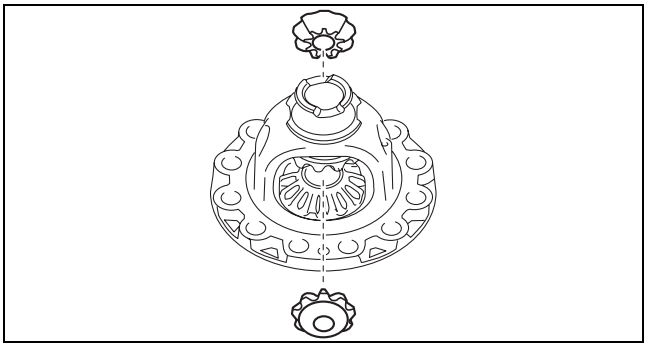
azzjjw00001489

7. Remove the pinion gears using the following procedure:
   (1) Rotate the pinion gears as shown in the figure.



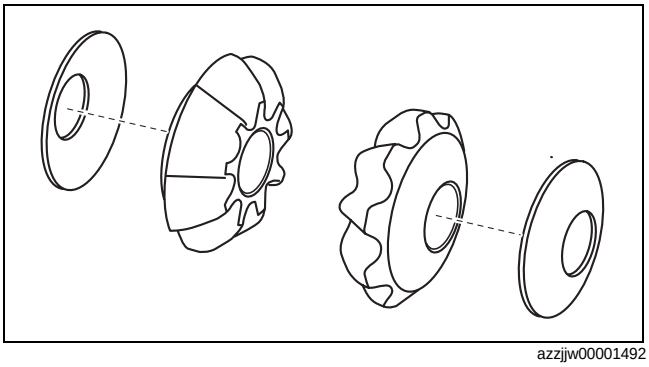
azzjjw00001490

(2) Remove the pinion gears.



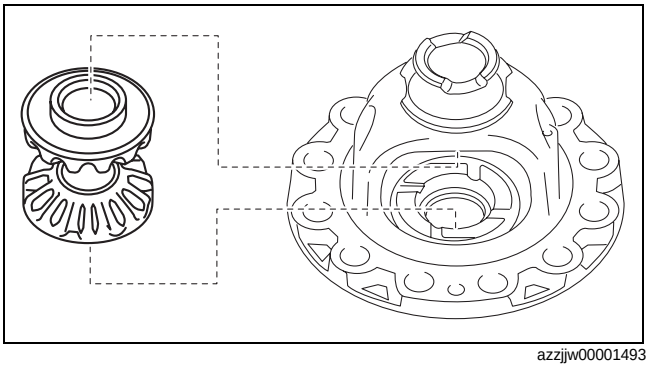
azzjjw00001491

8. Remove the thrust washers from the pinion gears.



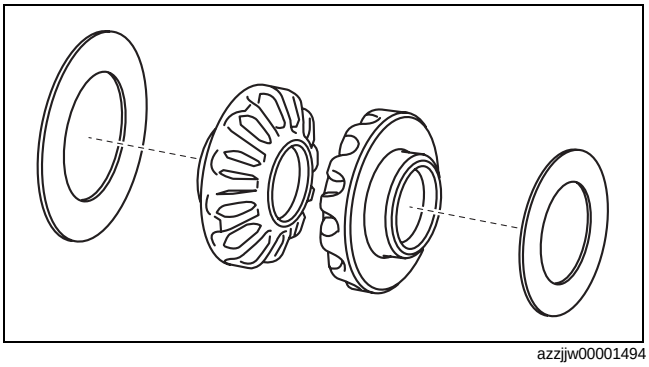
azzjjw00001492

9. Remove the side gears.



azzjjw00001493

10. Remove the thrust washers from the side gears.



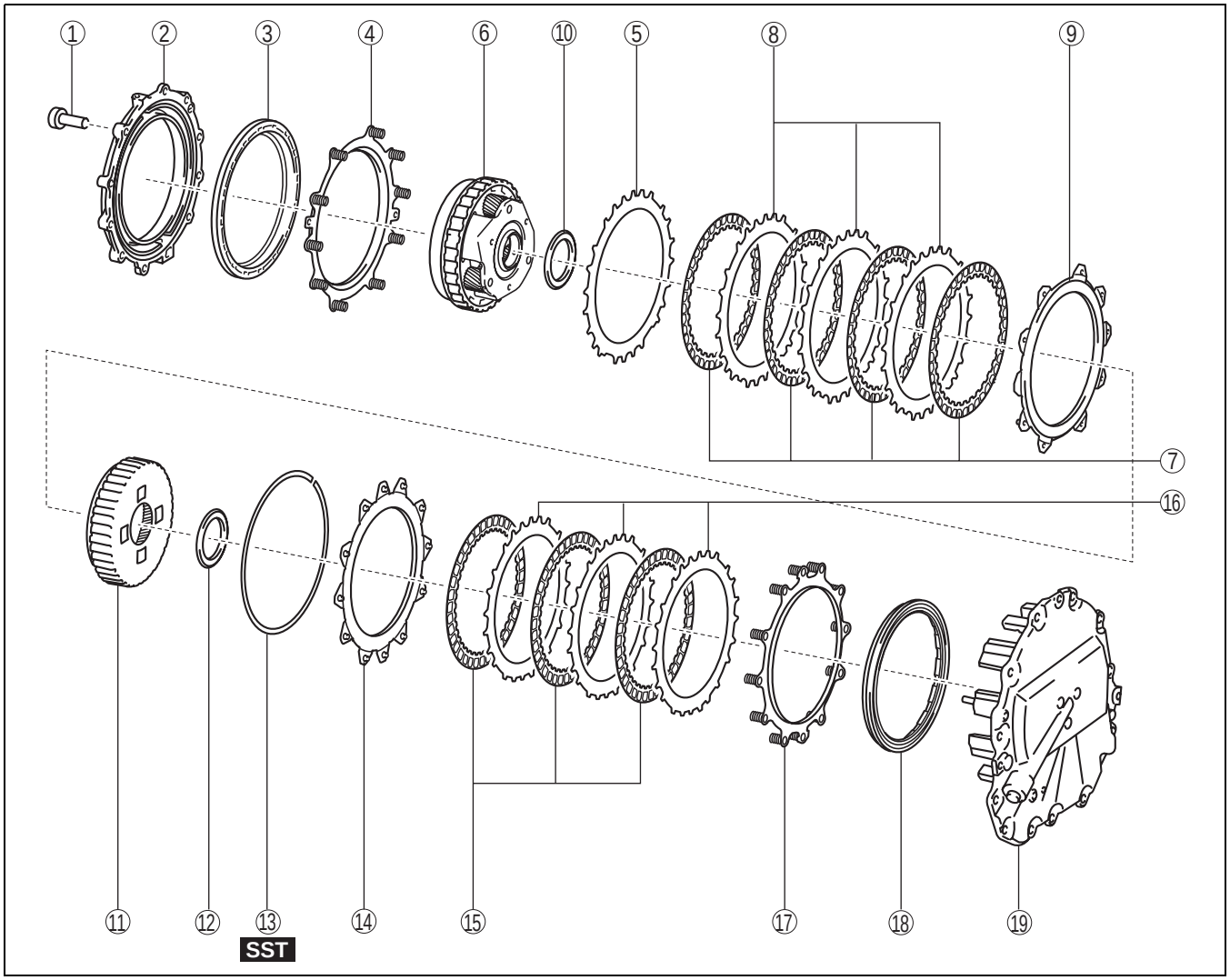
azzjjw00001494

11. Clean the disassembled parts. (See 05-17-26 AUTOMATIC TRANSAXLE CLEANING.)

END COVER COMPONENT DISASSEMBLY

id051700661200

Structural View



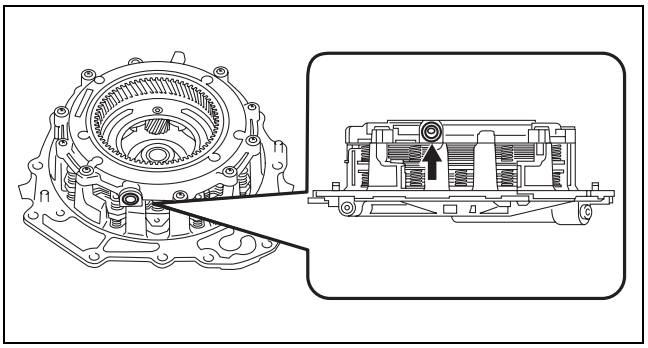
azzjjw00001495

1	8 bolts
2	Brake housing
3	2-6 brake piston
4	Springs and retainer component
5	Retaining plate
6	Reduction planetary gear
7	Drive plate
8	Driven plate
9	Retaining plate
10	Thrust needle bearing

11	Reduction internal gear
12	Thrust needle bearing
13	Snap ring
14	Retaining plate
15	Drive plate
16	Driven plate
17	Springs and retainer component
18	R-3-5 brake piston
19	End cover

Disassembly Procedure

1. Perform a simple inspection of the 2-6 brake using the following procedure:
   (1) Blow compressed air into the oil passage shown in the figure and verify the operation condition of the 2-6 brake.



azzjjw00000964

Warning

- **Always wear protective eye wear when using the air compressor. Otherwise, ATF or dirt particles blown off by the air compressor could get into the eyes.**

Caution

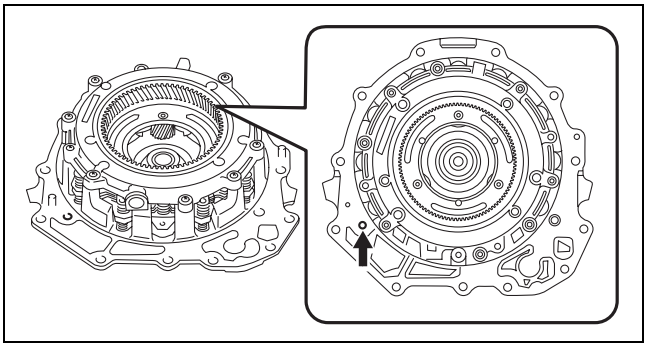
- **To prevent damage to parts, always use an air compressor which is adjusted to the indicated pressure.**

Compressed air pressure

0.39—0.44 MPa {4.0—4.4 kgf/cm^2, 57—63 psi}

- If there is a malfunction, verify the cause and repair the applicable part after disassembly.

2. Perform a simple inspection of the R-3-5 brake using the following procedure:
   (1) Blow compressed air into the oil passage shown in the figure and verify the operation condition of the R-3-5 brake.



azzjjw00000965

Warning

- **Always wear protective eye wear when using the air compressor. Otherwise, ATF or dirt particles blown off by the air compressor could get into the eyes.**

Caution

- **To prevent damage to parts, always use an air compressor which is adjusted to the indicated pressure.**

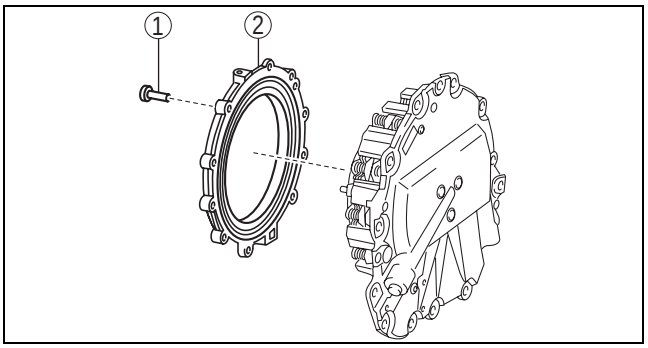
Compressed air pressure

0.39—0.44 MPa {4.0—4.4 kgf/cm^2, 57—63 psi}

- If there is a malfunction, verify the cause and repair the applicable part after disassembly.

3. Remove the brake housing using the following procedure:

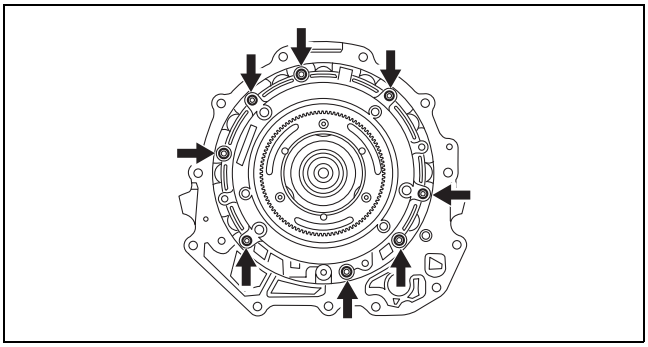
1	8 bolts
2	Brake housing



azzjjw00000966

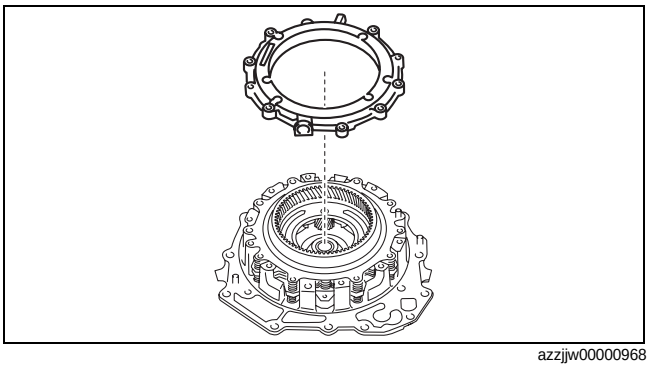
(1) Loosen the bolts shown in the figure uniformly and remove them.

Caution
- **If the bolts are not loosened uniformly and removed, the brake housing will slant and parts could be damaged due to the spring force of the springs and retainer component in the brake housing.**



azzjjw00000967

(2) Remove the brake housing.

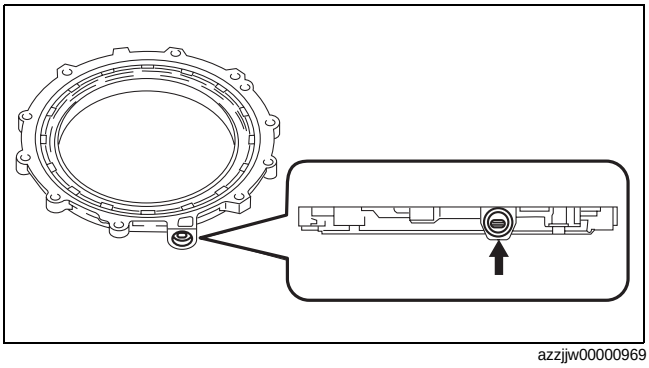


azzjjw00000968

4. Remove the 2-6 brake piston from the brake housing using the following procedure:
(1) Blow compressed air into the oil passage shown in the figure.

Warning
- **Always wear protective eye wear when using the air compressor. Otherwise, ATF or dirt particles blown off by the air compressor could get into the eyes.**

Caution
- **To prevent damage to parts, always use an air compressor which is adjusted to the indicated pressure.**

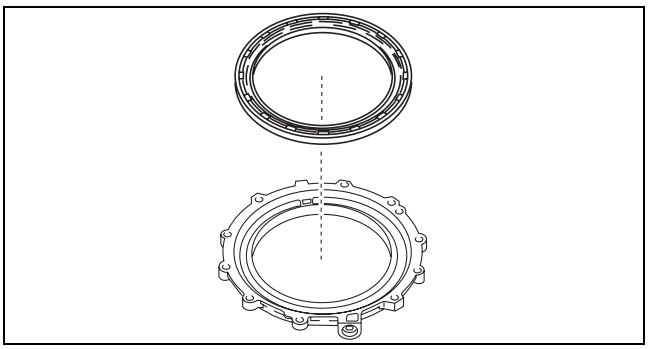


azzjjw00000969

Compressed air pressure

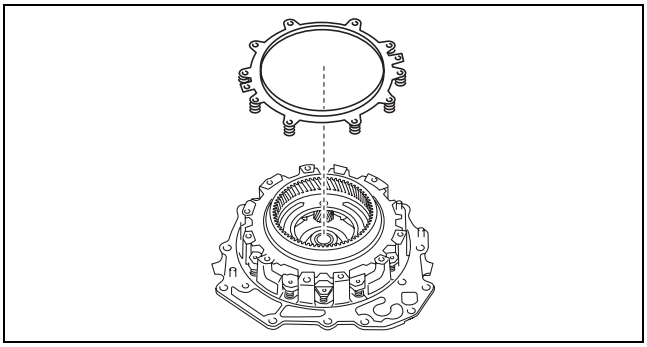
0.39—0.44 MPa {4.0—4.4 kgf/cm^2, 57—63 psi}

(2) Remove the 2-6 brake piston removed from the brake housing.



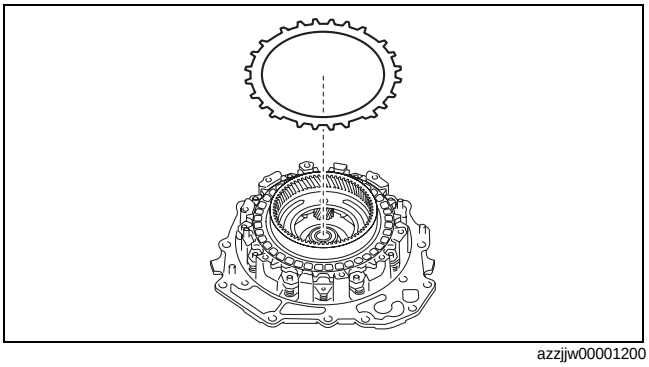
azzjjw00000970

5. Remove the springs and retainer component.



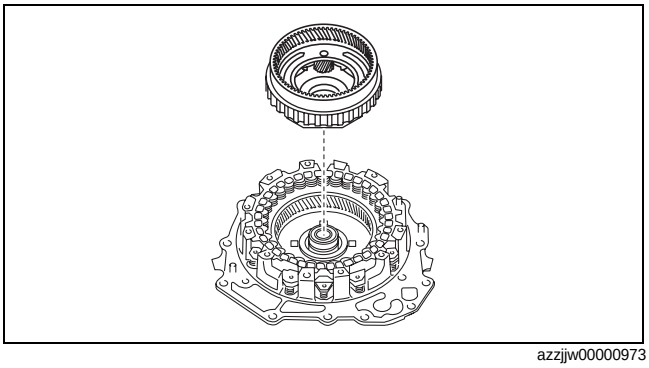
azzjjw00000971

6. Remove the retaining plate.



azzjjw00001200

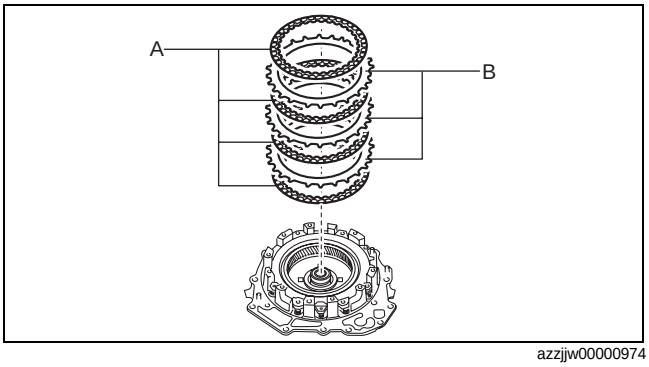
7. Remove the reduction planetary gear.



azzjjw00000973

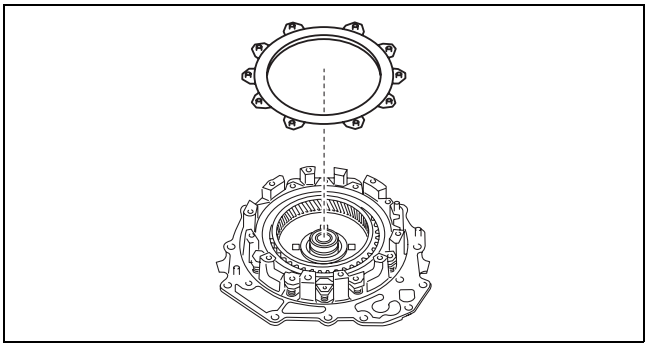
8. Remove the drive plates and driven plates.

A : Drive plate
B : Driven plate



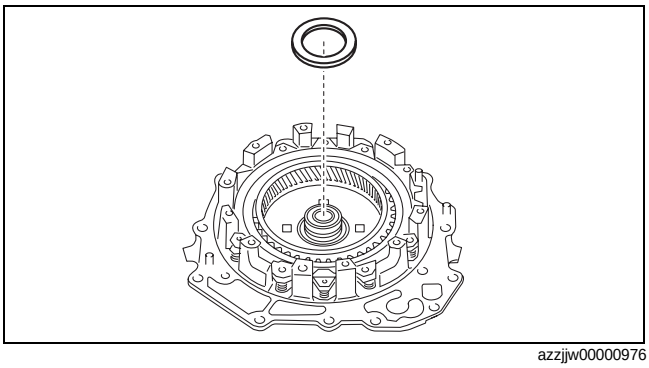
azzjjw00000974

9. Remove the retaining plate.



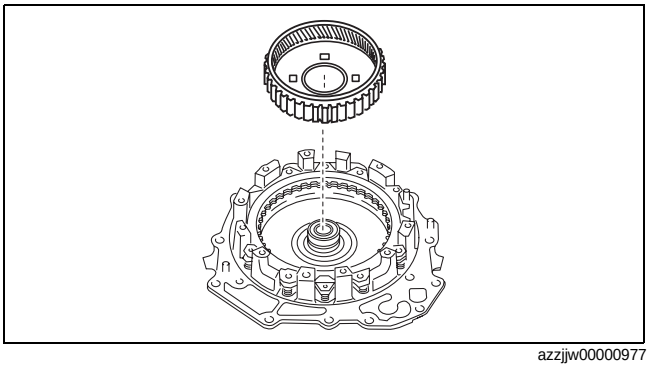
azzjjw00000975

10. Remove the thrust needle bearing.



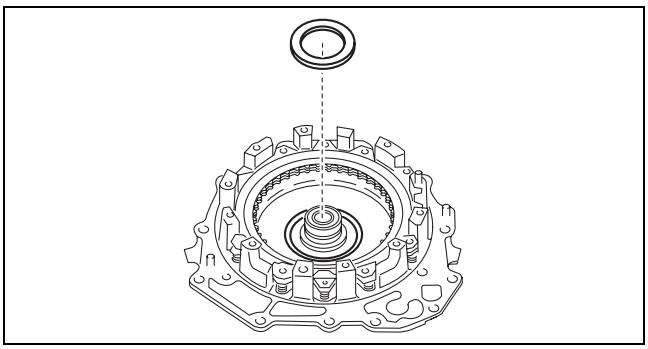
azzjjw00000976

11. Remove the reduction internal gear.



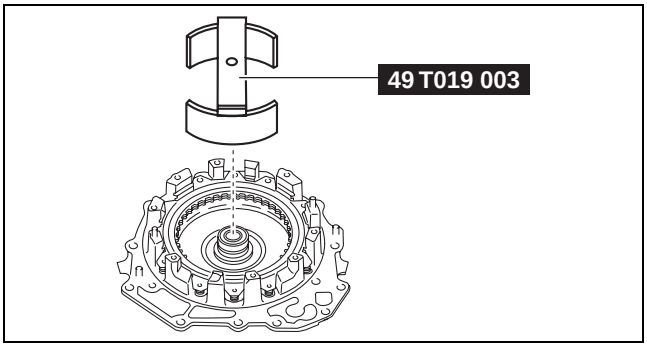
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12. Remove the thrust needle bearing.

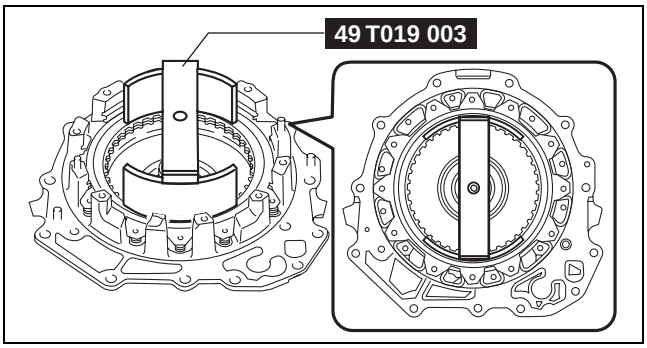


azzjjw00000978

13. Remove the snap ring using the following procedure:
    (1) Install the SST.



azzjjw00000979



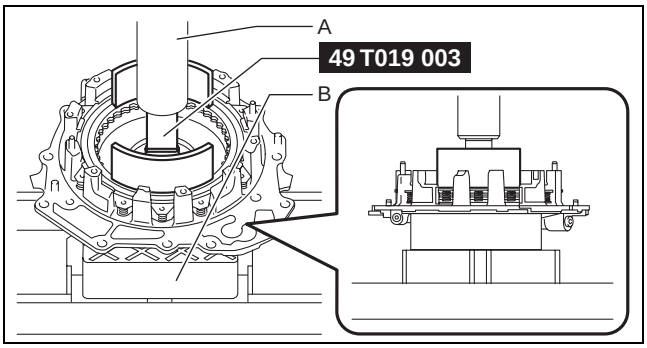
azzjjw00001201

    (2) Set the SST and part to the press as shown in the figure.

A : Press
B : Rubber plate

Caution

- **Using the rubber plates, adjust the alignment surface of the end cover with the transaxle case so that it is level. Otherwise the parts could tip over during the procedure and get damaged.**



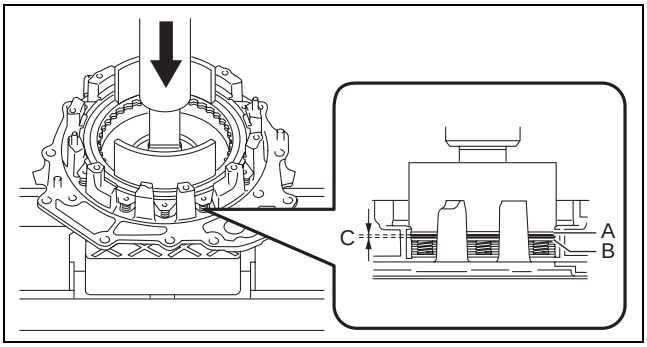
azzjjw00000981

    (3) Press the SST down using a press until there is no longer any spring force from the springs and retainer component applied to the snap ring.

A : Snap ring
B : Retaining plate
C : Gap

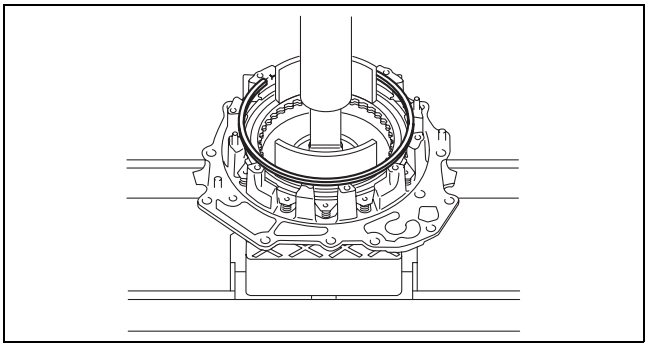
Caution

- **If the SST is pressed excessively by the press, surrounding parts could be damaged. Stop pressing the SST down using a press if a gap appears between the snap ring and retaining plate.**



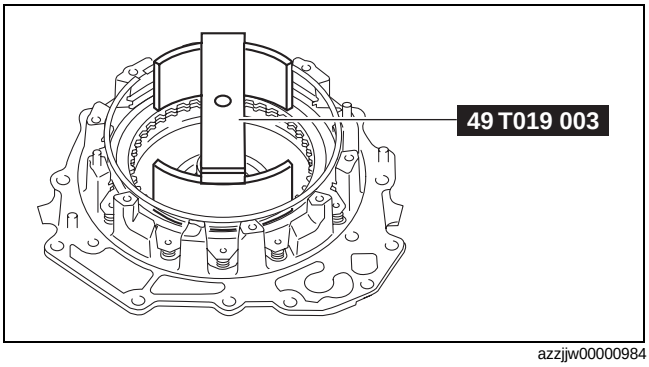
azzjjw00000982

(4) Remove the snap ring from the snap ring groove.



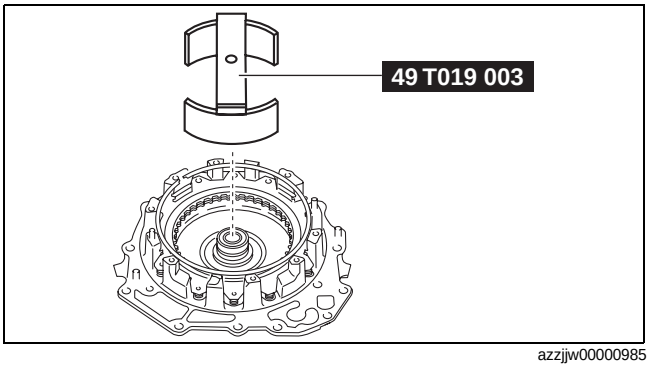
azzjjw00000983

(5) Take the SST and part off the press.



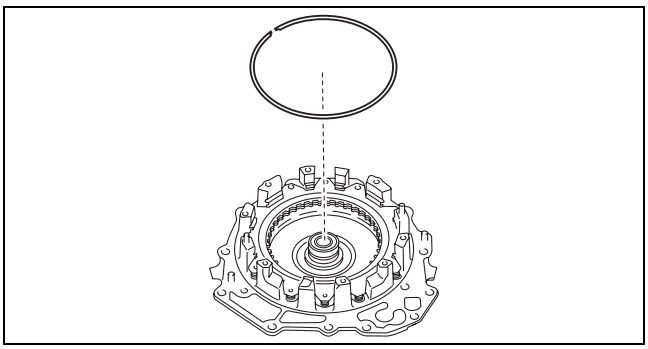
azzjjw00000984

(6) Remove the SST.



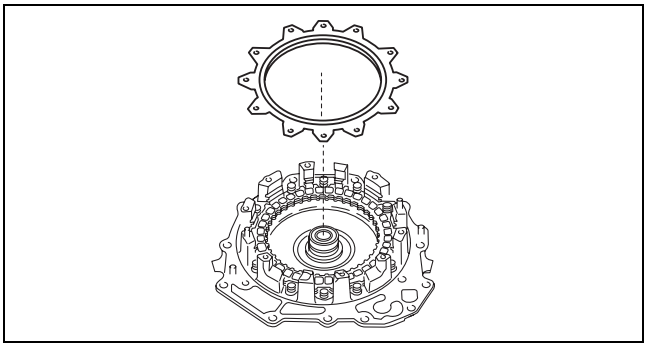
azzjjw00000985

(7) Remove the snap ring removed from the snap ring groove.



azzjjw00000986

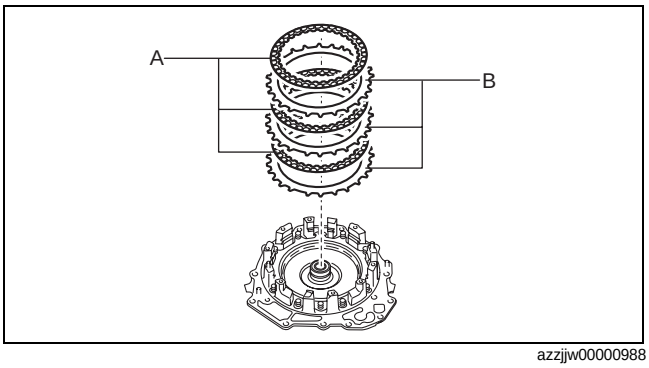
14. Remove the retaining plate.



azzjjw00000987

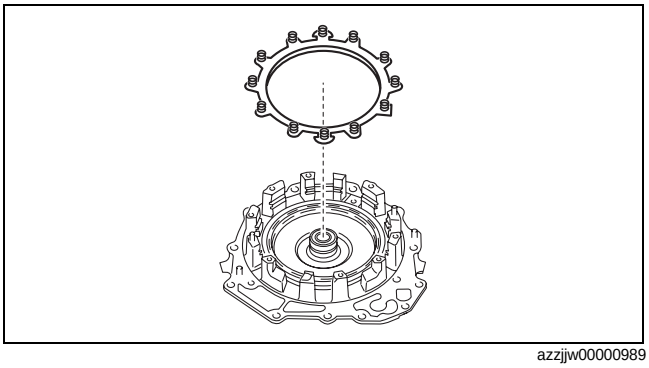
15. Remove the drive plates and driven plates.

A : Drive plate
B : Driven plate



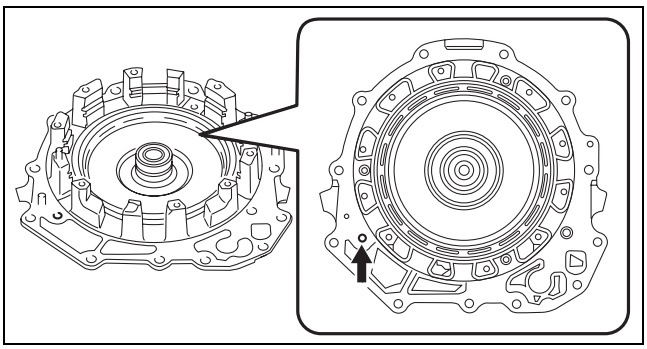
azzjjw00000988

16. Remove the springs and retainer component.



azzjjw00000989

17. Remove the R-3-5 brake piston using the following procedure:
    (1) Blow compressed air into the oil passage shown in the figure.



azzjjw00000990

Warning

- **Always wear protective eye wear when using the air compressor. Otherwise, ATF or dirt particles blown off by the air compressor could get into the eyes.**

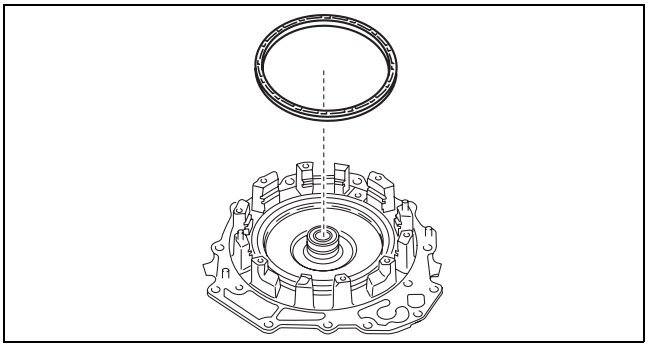
Caution

- **To prevent damage to parts, always use an air compressor which is adjusted to the indicated pressure.**

Compressed air pressure

0.39—0.44 MPa {4.0—4.4 kgf/cm^2, 57—63 psi}

(2) Remove the R-3-5 brake piston removed from the end cover.



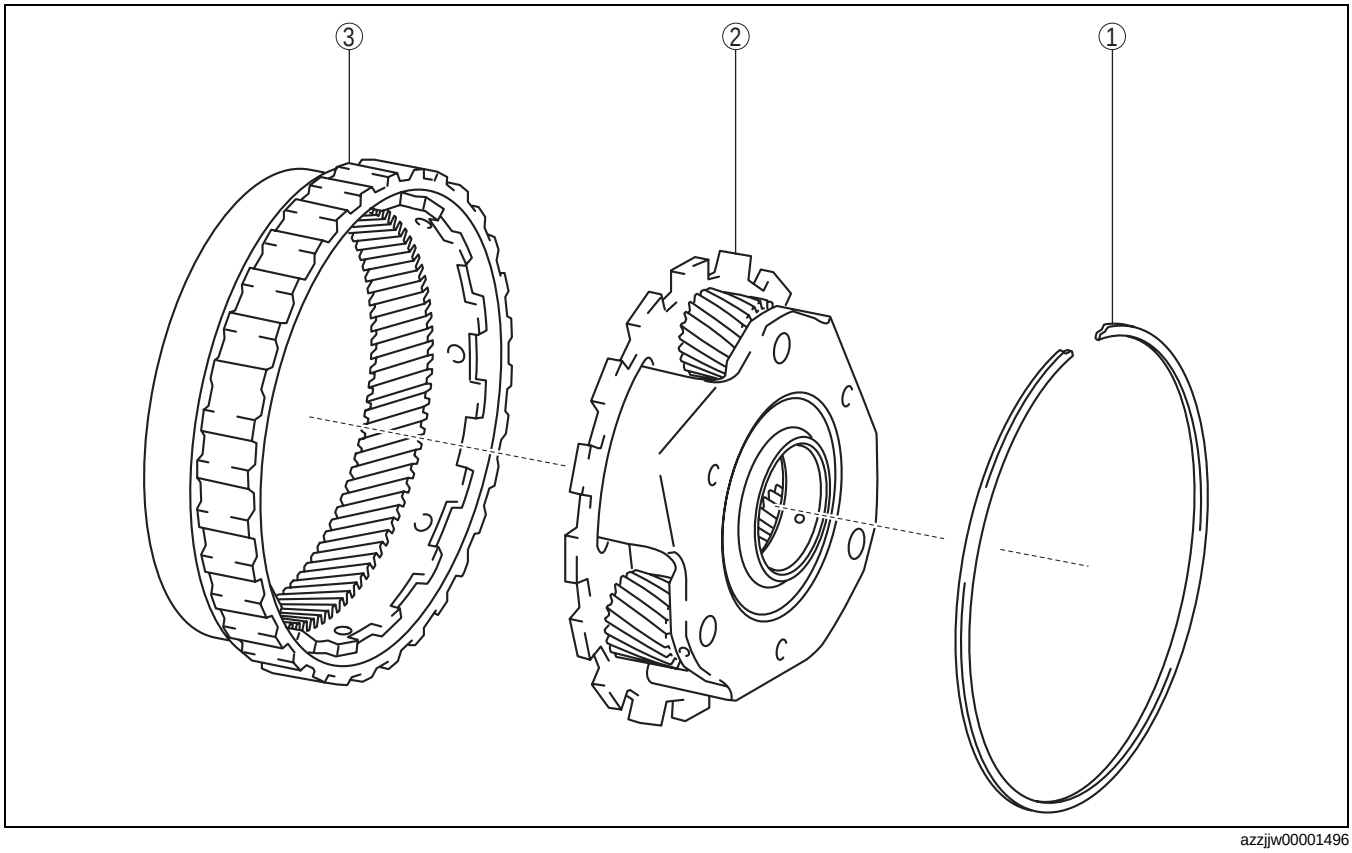
azzjjw00000991

18. Clean the disassembled parts. (See 05-17-26 AUTOMATIC TRANSAXLE CLEANING.)
19. Perform the following inspection and replace a malfunctioning part with a new one.
    - Visual inspection of parts (See 05-17-151 VISUAL INSPECTION OF PARTS)
    - Thrust needle bearing inspection (See 05-17-155 THRUST NEEDLE BEARING INSPECTION)
    - Reduction planetary gear inspection (See 05-17-161 REDUCTION PLANETARY GEAR INSPECTION)
    - 2-6 brake inspection (See 05-17-171 2-6 BRAKE INSPECTION)
    - R-3-5 brake inspection (See 05-17-171 R-3-5 BRAKE INSPECTION)
    - End cover inspection (See 05-17-177 END COVER INSPECTION)

REDUCTION PLANETARY GEAR DISASSEMBLY

id051700661300

Structural View



azzjjw00001496

1	Snap ring
2	Reduction planetary carrier
3	Rear internal gear

Disassembly Procedure

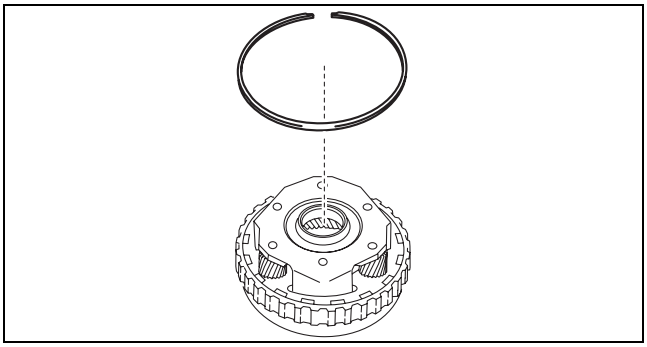
1. Perform the following inspection:

   Caution
   - **If there is no malfunction based on the results of the inspection, it is not necessary to disassemble the reduction planetary gear.**

   - Visual inspection of parts (See 05-17-151 VISUAL INSPECTION OF PARTS)
   - Reduction planetary gear inspection (See 05-17-161 REDUCTION PLANETARY GEAR INSPECTION)

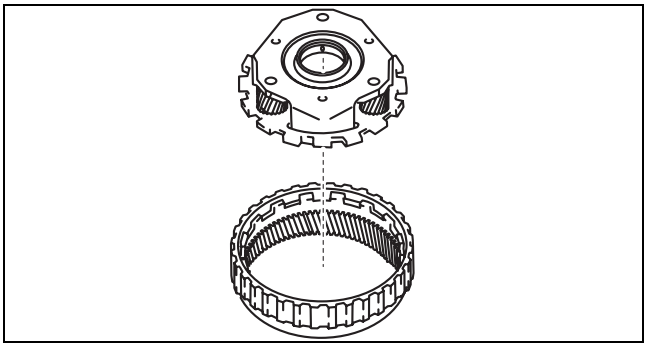
   - If there is a malfunction, disassemble the reduction planetary gear and replace the malfunctioning part with a new part.

2. Remove the snap ring.



azzjjw00000872

3. Remove the reduction planetary carrier.



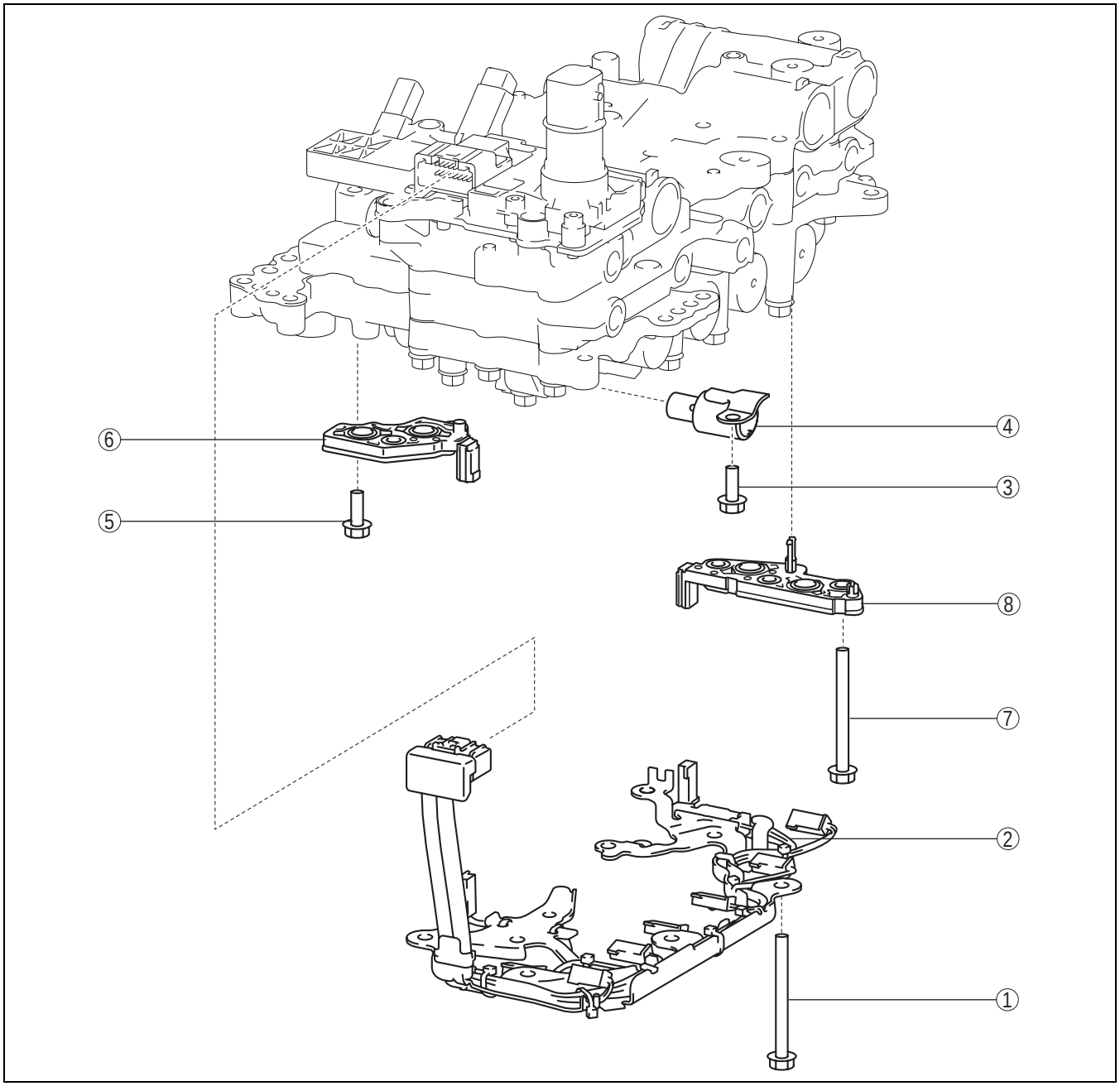
azzjjw00000873

4. Clean the disassembled parts. (See 05-17-26 AUTOMATIC TRANSAXLE CLEANING.)

CONTROL VALVE BODY DISASSEMBLY

id051700661400

Structural View



azzjjw00001499

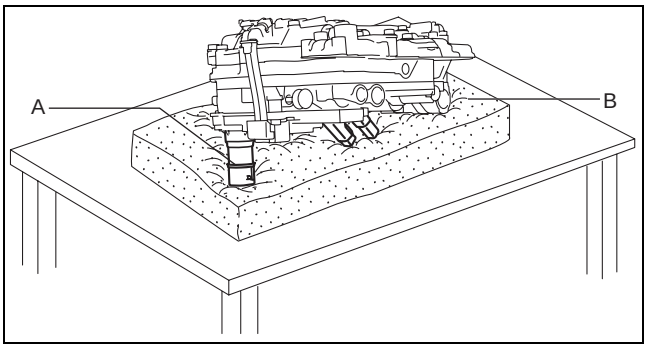
1	8 bolts
2	Coupler component
3	Bolt
4	ON/OFF solenoid

5	3 bolts
6	Oil pressure switch B
7	3 bolts
8	Oil pressure switch A

Disassembly Procedure

Caution

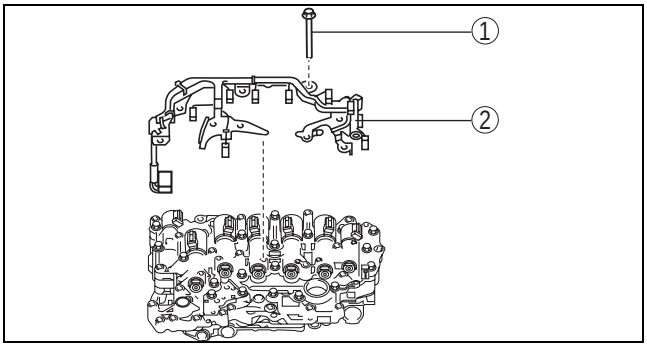
- **Disassemble the control valve body and replace the malfunctioning part only if there is a malfunction in the control valve body determined by the troubleshooting procedure and using the vehicle diagnostic tester (M-MDS).**
  However, if there is a malfunction in the parts other than the following, replace the control valve body with a new one because the parts other than the following are not shipped from the factory as a single component.
  - **— ON/OFF solenoid**
  - **— Oil pressure switch A**
  - **— Oil pressure switch B**
  - **— Coupler component**
- **Do not drop or apply an impact to the control valve body. Replace the control valve body with a new one if it was dropped or received an impact.**
- **Placing the TCM side pointed downward on a workbench directly could damage the TCM. If the TCM side is placed pointed downward, place the control valve body on an impact-absorbing material so that the TCM does not contact the workbench directly.**
  A: TCM
  B: Impact-absorbing material



azzjjw00001500

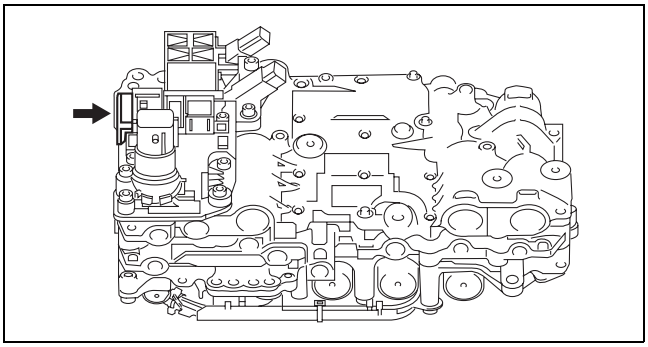
1. Remove the coupler component using the following procedure.

1	8 bolts
2	Coupler component



azzjjw00000900

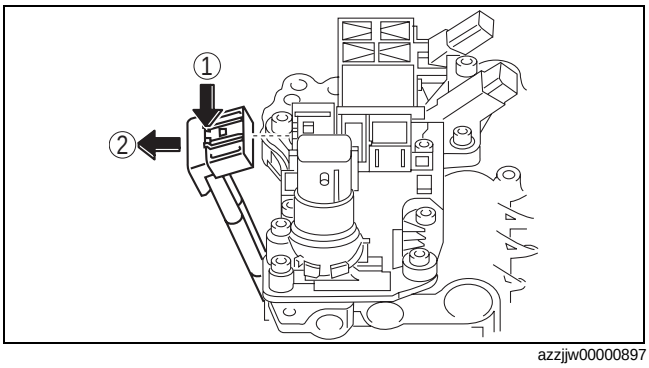
(1) Disconnect the connector shown in the figure.



azzjjw00000896

Caution

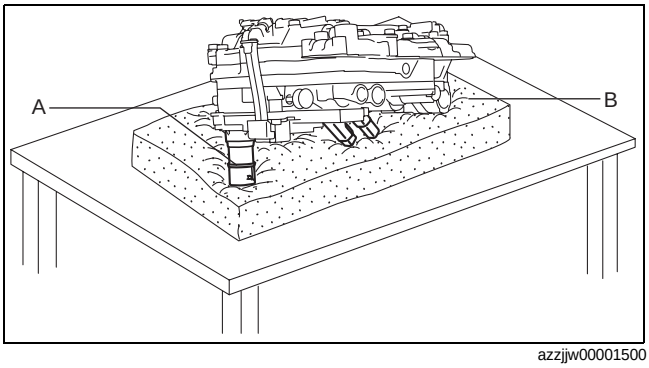
- **If a connector is disconnected, do not pull the wiring harness. Pull the connector at a straight after releasing the lock.**



azzjjw00000897

(2) Place the control valve body on an impact-absorbing material with the TCM side facing downward as shown in the figure.

A : TCM
B : Impact-absorbing material

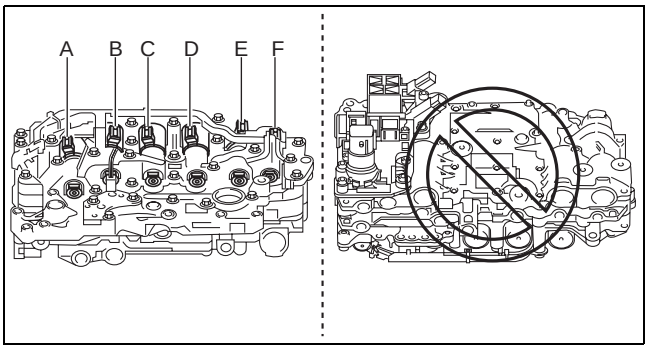


azzjjw00001500

Caution

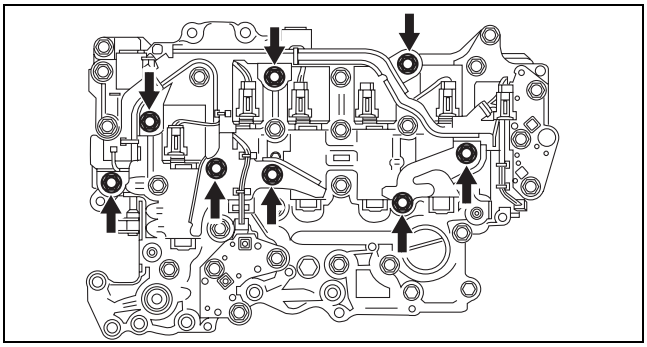
- **Placing the TCM side pointed downward on a workbench directly could damage the TCM. If the TCM side is placed pointed downward, place the control valve body on an impact-absorbing material so that the TCM does not contact the workbench directly.**
- **After removing the coupler component, if the control valve body is placed on the workbench with the TCM side facing upward, the pins securing the solenoids shown in the figure could fall off and become lost.**
  If the solenoid installation position shown in the figure is changed, it will cause a malfunction.
  To prevent the pin securing the solenoid from falling, always place the control valve body on an impact-absorbing material with the TCM side facing downward after removing the coupler component.

A : Shift solenoid No.1
B : Shift solenoid No.4
C : TCC control solenoid
D : Shift solenoid No.3
E : Shift solenoid No.2
F : Pressure control solenoid



azzjjw00001501

(3) Remove the bolts shown in the figure.

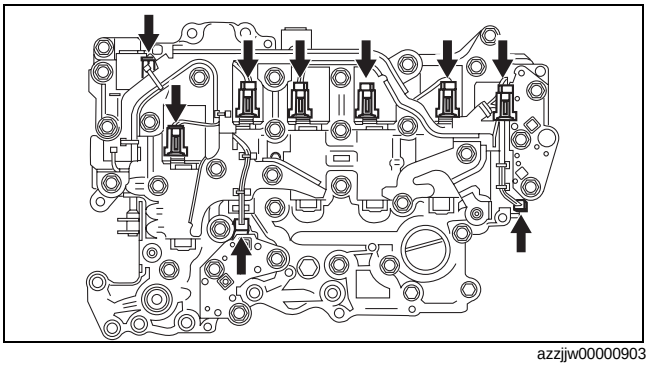


azzjjw00000902

(4) Disconnect the connectors shown in the figure.

Caution

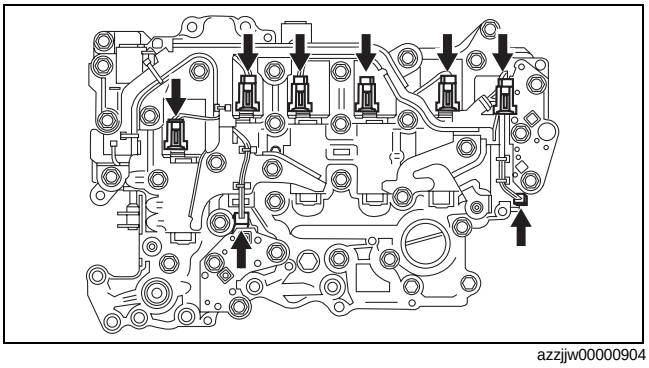
- **If a connector is disconnected, do not pull the wiring harness. Pull the connector at a straight after releasing the lock.**



azzjjw00000903

Caution

- **For the connector shown in the figure, pull the connector at a straight after releasing the lock using a precision flathead screwdriver.**

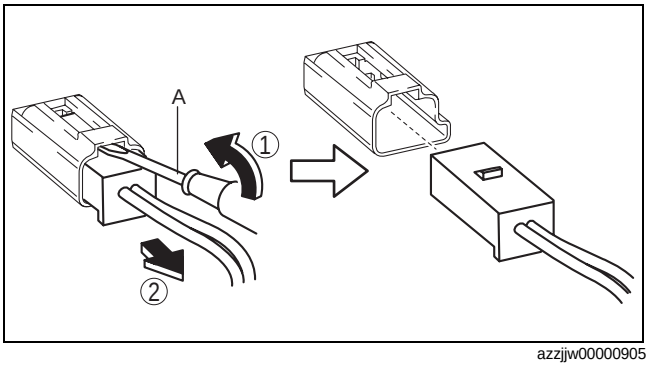


azzjjw00000904

Caution

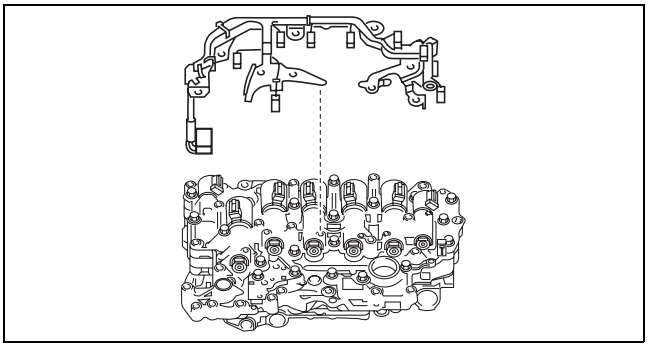
- **Be careful not to damage the connector using a precision flathead screwdriver.**

A : Precision flathead screwdriver



azzjjw00000905

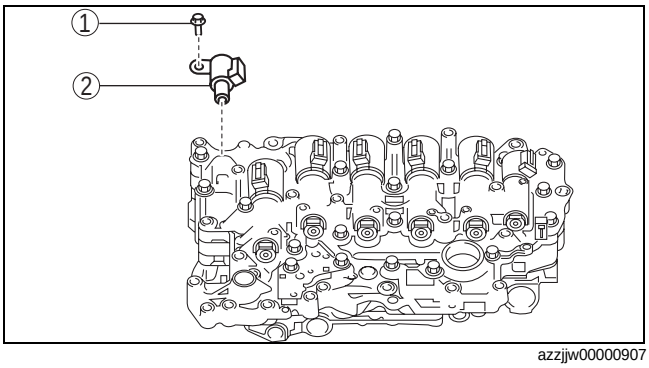
(5) Remove the coupler component.



azzjjw00000906

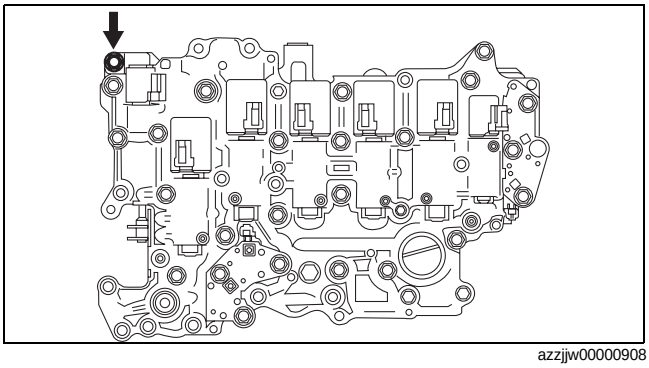
2. Remove the ON/OFF solenoid using the following procedure:

1	Bolt
2	ON/OFF solenoid



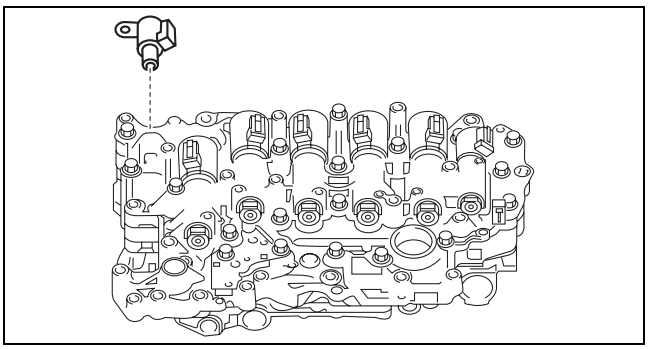
azzjjw00000907

(1) Remove the bolt shown in the figure.



azzjjw00000908

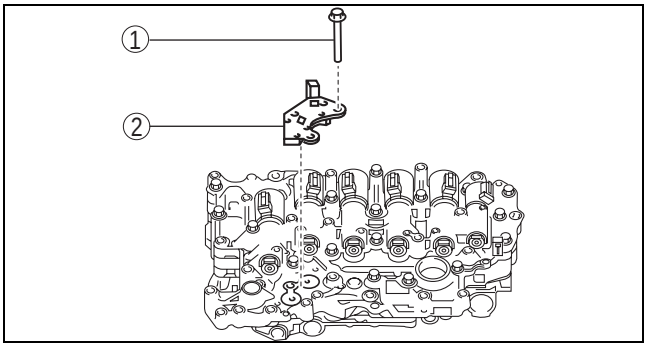
(2) Remove the ON/OFF solenoid.



azzjjw00000909

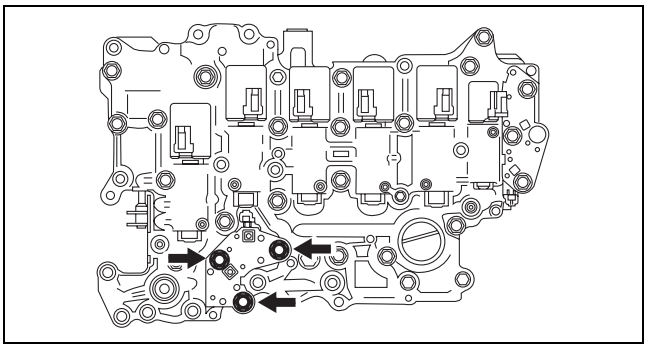
3. Remove oil pressure switch B using the following procedure:

1	3 bolts
2	Oil pressure switch B



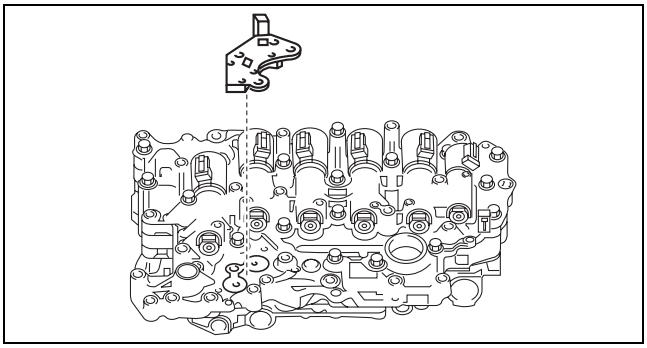
azzjjw00000910

(1) Remove the bolts shown in the figure.



azzjjw00000911

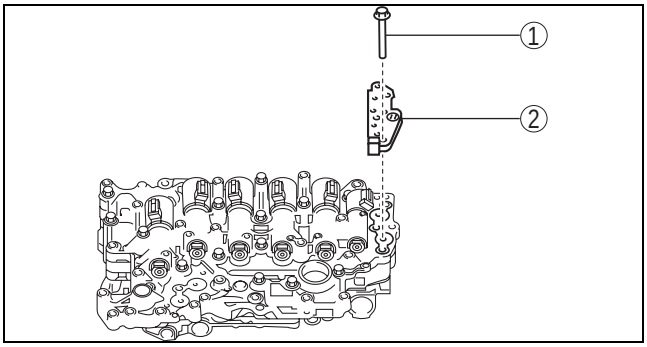
(2) Remove oil pressure switch B.



azzjjw00000912

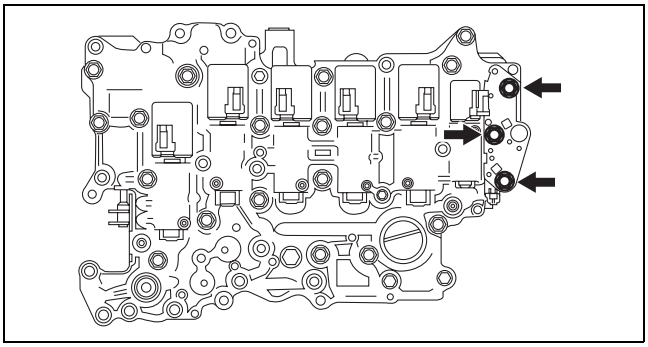
4. Remove oil pressure switch A using the following procedure:

1	3 bolts
2	Oil pressure switch A



azzjjw00000913

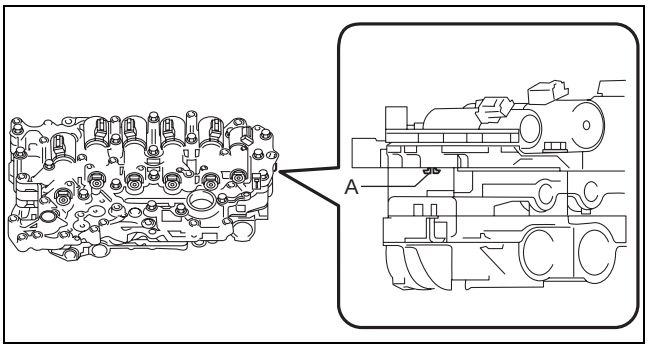
(1) Remove the bolts shown in the figure.



azzjjw00000914

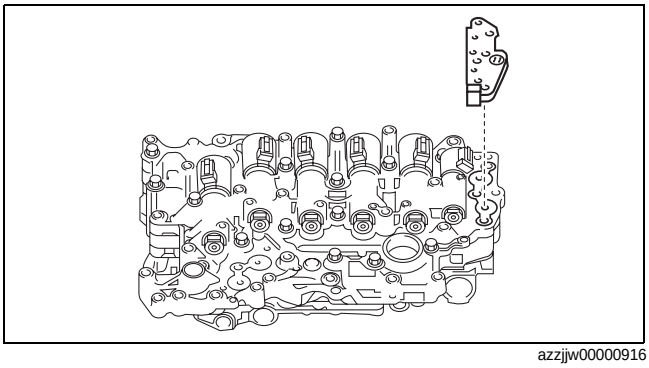
(2) Disengage oil pressure switch A tab.

A : Tab



azzjjw00000915

(3) Remove oil pressure switch A.



azzjjw00000916

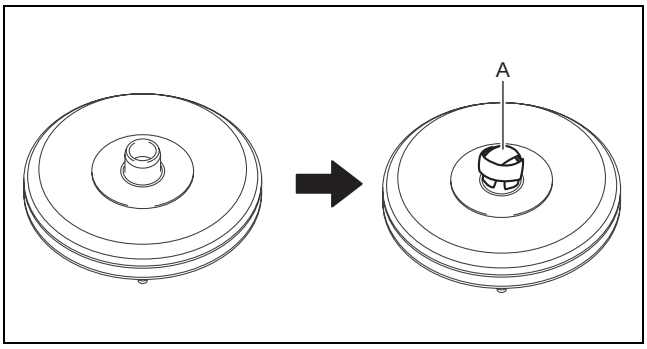
TORQUE CONVERTER CLEANING

id051700661500

Cleaning Outside of Torque Converter

1. Plug to the position shown in the figure with packing tape.

A : Plug (packing tape)



azzjjw00001502

Caution

- **If foreign matter penetrates the torque converter, it could cause a malfunction. Therefore, when cleaning the outside of the torque converter, plug the position shown in the figure with packing tape.**

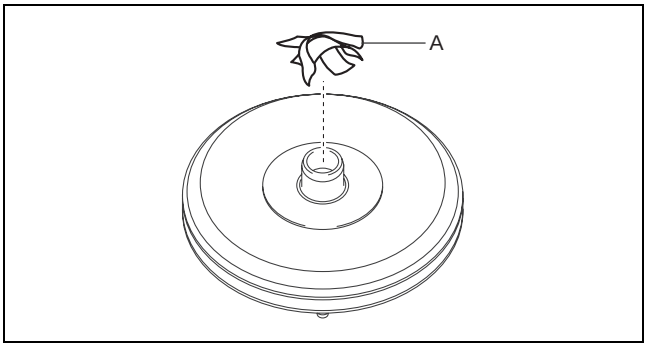
2. Wipe off any dirt or foreign matter adhering to the outside of the torque converter using a rag. Clean depending on the condition using degreaser and dry them using an air compressor.

Warning

- **Always wear protective eye wear when using the air compressor. Otherwise, degreaser or dirt particles blown off by the air compressor could get into the eyes.**

3. Clean away the used packing tape as a plug.

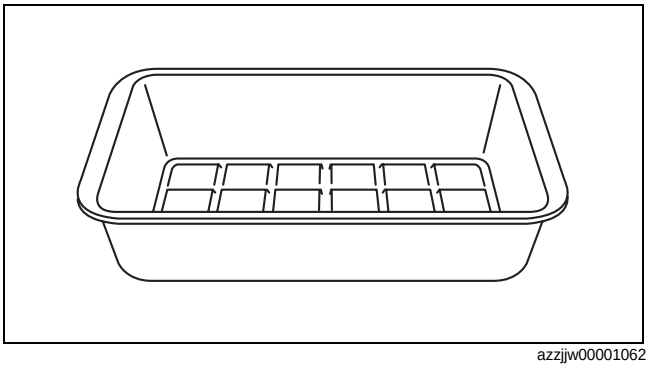
A : Plug (packing tape)



azzjjw00001503

Torque Converter Flushing

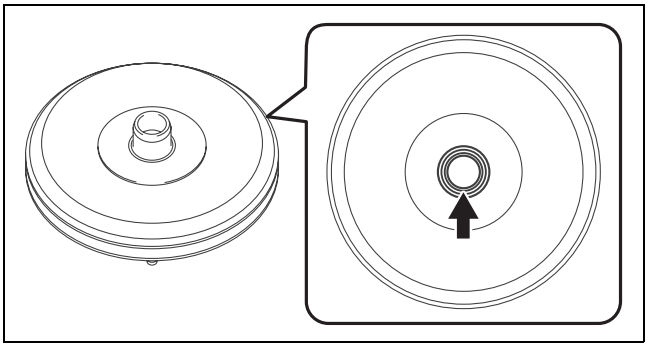
1. Prepare a clean oil receptacle.



azzjjw00001062

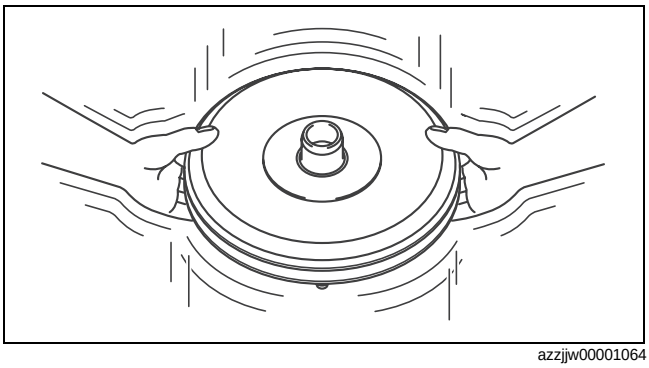
2. Add new ATF (ATF FZ) to the torque converter from the position shown in the figure.

Note
- Because the ATF in the torque converter needs to be well stirred, when adding ATF do not completely fill the torque converter. Fill only about halfway.



azzjjw00001063

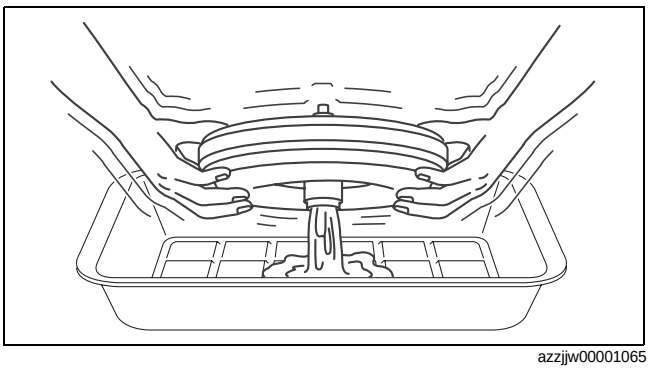
3. Shake the torque converter to stir the ATF in the torque converter.



azzjjw00001064

4. Drain the ATF in the torque converter into the clean oil receptacle.

Note
- While shaking the torque converter, drain as much of the ATF in the torque converter as possible.



azzjjw00001065

5. Verify that none of the following foreign material is mixed in with the ATF drained from the torque converter:
   - Large metal fragments of ϕ 0.5 mm {0.02 in} or more that cannot pass through the oil strainer
   - Fibrous clutch or brake facing
6. Dispose of the ATF in the oil receptacle and clean the oil receptacle.
7. Perform Steps 2—6 three times.
   - If metal fragments and facing material continue to appear in the drained ATF from the torque converter after it is flushed repeatedly, replace the torque converter with a new one.

OIL COOLER CLEANING

id051700661600

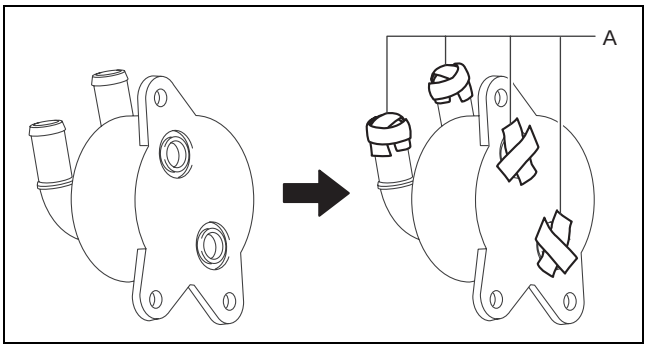
Cleaning Outside of Oil Cooler

1. Plug to the position shown in the figure with packing tape.

A : Plug (packing tape)

Caution

- **If foreign matter penetrates the oil cooler, it could cause a malfunction. Therefore, when cleaning the outside of the oil cooler, plug the position shown in the figure with packing tape.**



azzjjw00001504

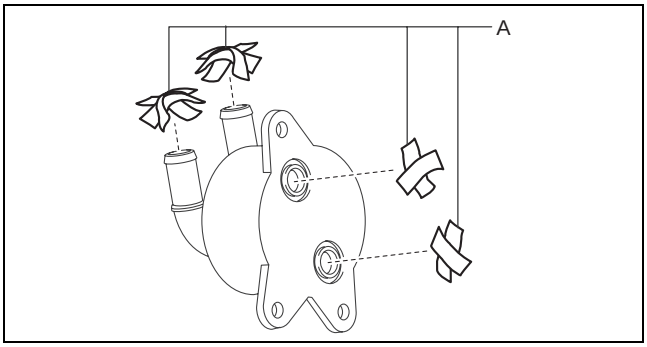
2. Wipe off any dirt or foreign matter adhering to the outside of the oil cooler using a rag. Clean depending on the condition using degreaser and dry them using an air compressor.

Warning

- **Always wear protective eye wear when using the air compressor. Otherwise, degreaser or dirt particles blown off by the air compressor could get into the eyes.**

3. Clean away the used packing tape as a plug.

A : Plug (packing tape)



azzjjw00001505

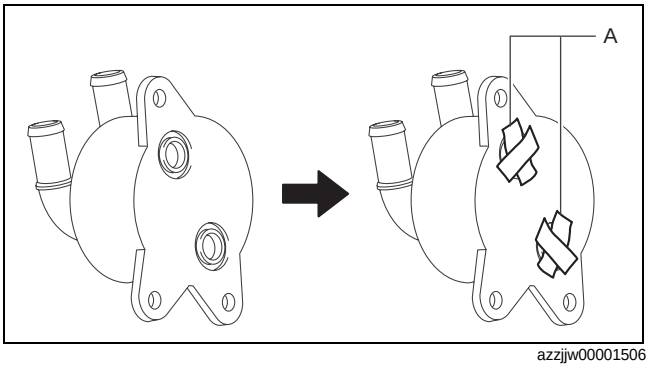
Oil Cooler Flushing (Water Passage)

1. Plug the position (water passage) shown in the figure with packing tape.

A : Plug (packing tape)

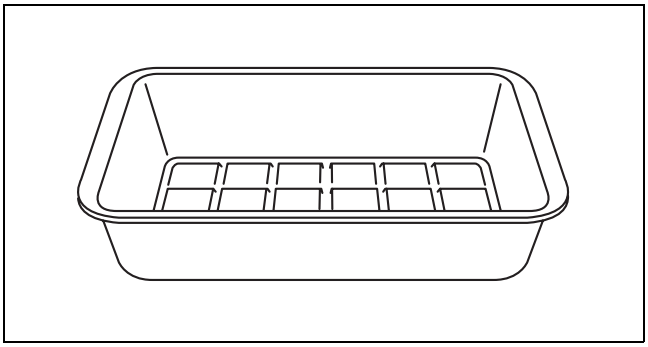
Caution

- **If engine coolant or water penetrates the oil cooler (in oil passage), it could cause a malfunction. Therefore, when flushing the oil cooler (water passage), plug the position (oil passage) shown in the figure with packing tape.**



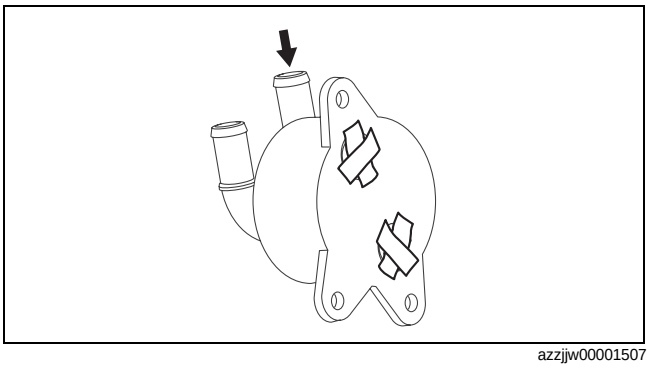
azzjjw00001506

2. Prepare a clean oil receptacle.



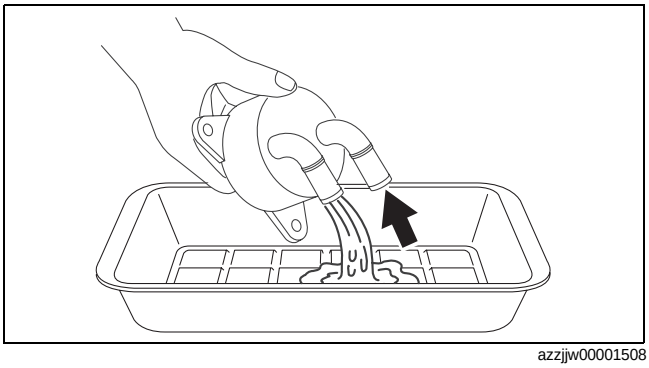
azzjjw00001066

3. Add water to the oil cooler from the water passage shown in the figure.



azzjjw00001507

4. Blow compressed air into the water passage shown in the figure and drain the engine coolant and water in the oil cooler.



azzjjw00001508

Warning

- **Always wear protective eye wear when using the air compressor. Otherwise, engine coolant, water, or dirt particles blown off by the air compressor could get into the eyes.**

Caution

- **Perform the work at a position where the engine coolant and water in the oil cooler can be drained into a clean oil receptacle.**
- **To prevent damage to parts, always use an air compressor which is adjusted to the indicated pressure.**

Compressed air pressure

150—200 kPa {1.53—2.03 kgf/cm^2, 21.8—29.0 psi}

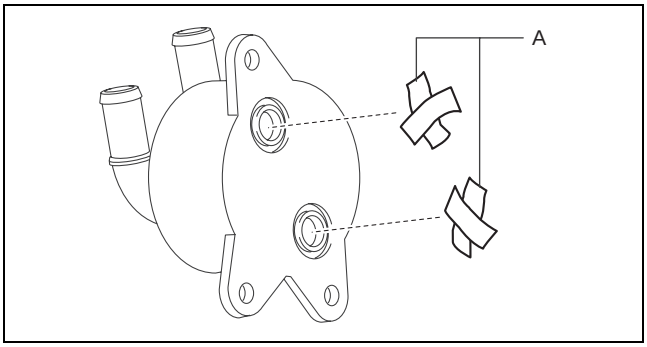
5. Verify that none of the following foreign material is mixed in with the engine coolant and water drained from the oil cooler.
   - Rust or water stain due to deterioration of engine coolant
   - Engine oil
   - Fragments of cooling system parts (plastic, metal, or rubber fragments)
6. Dispose of the engine coolant and water in the oil receptacle and clean the oil receptacle.

7. Perform Steps 3—6 three times.
   - If foreign material remains even after the oil cooler is flushed repeatedly, replace the oil cooler with a new one and inspect the cooling system part.

Note
- For the cooling system part inspection, verify the Workshop Manual.

8. Clean away the used packing tape as a plug.

A : Plug (packing tape)



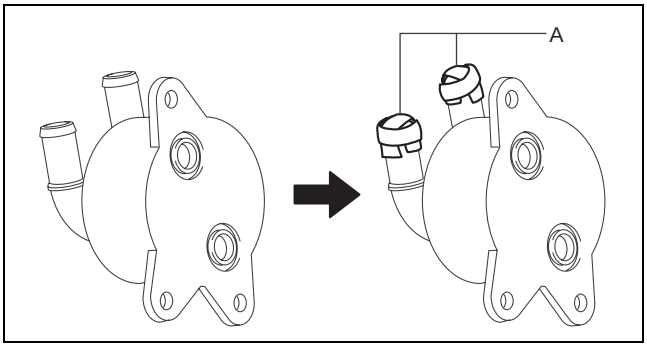
azzjjw00001509

Oil Cooler Flushing (Oil Passage)

1. Plug to the position (water passage) shown in the figure with packing tape.

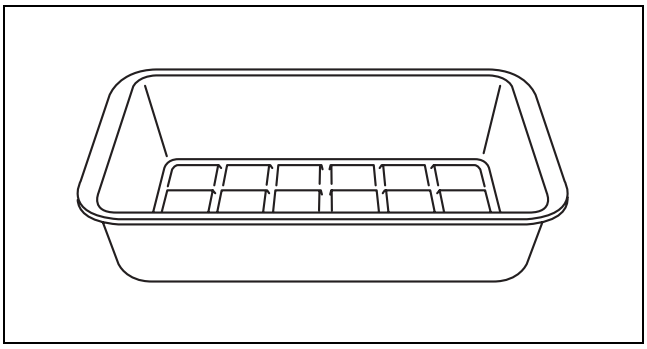
A : Plug (packing tape)

Caution
- **If ATF penetrates the oil cooler (in water passage), it could cause a malfunction. Therefore, when flushing the oil cooler (oil passage), plug the position (water passage) shown in the figure with packing tape.**



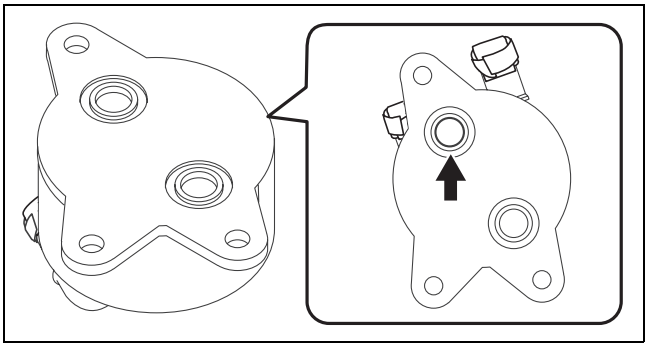
azzjjw00001510

2. Prepare a clean oil receptacle.



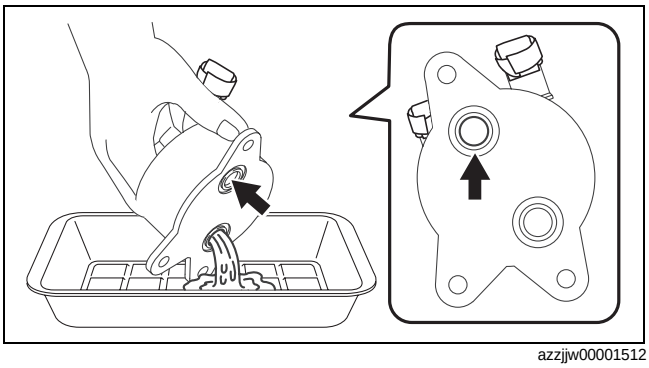
azzjjw00001066

3. Add new ATF (ATF FZ) to the oil cooler from the oil passage shown in the figure.



azzjjw00001511

4. Blow compressed air into the oil passage shown in the figure and drain the ATF in the oil cooler.



azzjjw00001512

Warning

- **Always wear protective eye wear when using the air compressor. Otherwise, ATF or dirt particles blown off by the air compressor could get into the eyes.**

Caution

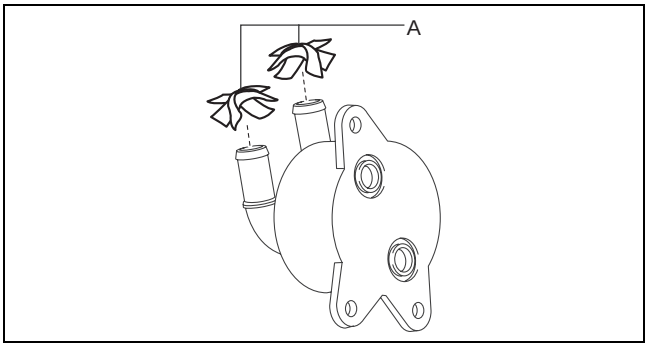
- **Perform the work at a position where the ATF in the oil cooler can be drained into a clean oil receptacle.**
- **To prevent damage to parts, always use an air compressor which is adjusted to the indicated pressure.**

Compressed air pressure

491—882 kPa {5.01—8.99 kgf/cm^2, 71.3—127.0 psi}

5. Verify that none of the following foreign material is mixed in with the ATF drained from the oil cooler.
   - Large metal fragments of ϕ 0.5 mm {0.02 in} or more that cannot pass through the oil strainer
   - Fibrous clutch or brake facing
6. Dispose of the ATF in the oil receptacle and clean the oil receptacle.
7. Perform Steps 3—6 three times.
   - If foreign material such as metal fragments or facing remain even after the oil cooler is flushed repeatedly, replace the oil cooler with a new one.
8. Clean away the used packing tape used as the plug.

A : Plug (packing tape)



azzjjw00001513

VISUAL INSPECTION OF PARTS

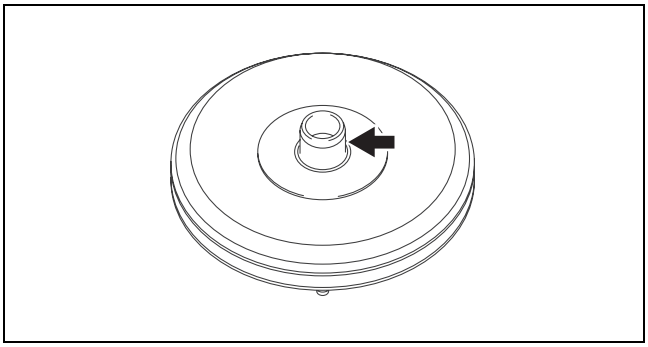
id051700661700

1. Visually inspect the parts according to the following table and replace a malfunctioning part with a new one.

Note
- Check the color depending on the condition to specify the malfunctioning part.

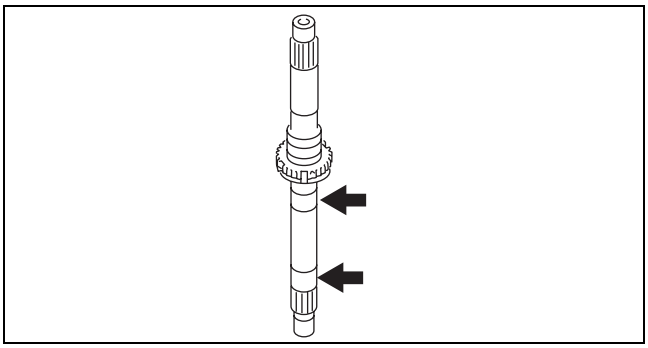
Part name (mechanism name)	Inspection item
Gear	Missing teeth or tooth loss
	Peeling on tooth surface
	Other damage (cracks, wear, impact, deformation, burning or seizure)
Tapered roller bearing	Peeling on sliding surface
	Cage deformation
	Discoloration due to burning (temper color)
	Other damage (cracks, wear, impact, deformation, burning or seizure)
Thrust needle bearing	Peeling on sliding surface
	Discoloration due to burning (temper color)
	Other damage (cracks, wear, impact, deformation, burning or seizure)
Radial needle bearing	Peeling on sliding surface
	Cage deformation
	Discoloration due to burning (temper color)
	Other damage (cracks, wear, impact, deformation, burning or seizure)
Clutch (brake) drive plate	Facing peeling
	Discoloration due to burning (temper color)
	Other damage (cracks, wear, impact, deformation, burning or seizure)
Clutch (brake) piston and seal plate	Lip (rubber) tear or wear
	Other damage (cracks, impact, deformation)
Clutch (brake) springs and retainer component	Spring removal
	Spring deformation (significant attitude)
	Retainer deformation
	Other damage (cracks, wear, impact)
Parts other than the above	External appearance damage (cracks, wear, impact, deformation, burning or seizure)

2. Verify that there is no bushing adhesion trace or significant sliding trace on the following bushing sliding part.
   - Torque converter
     — If there is a malfunction, replace the torque converter with a new one.



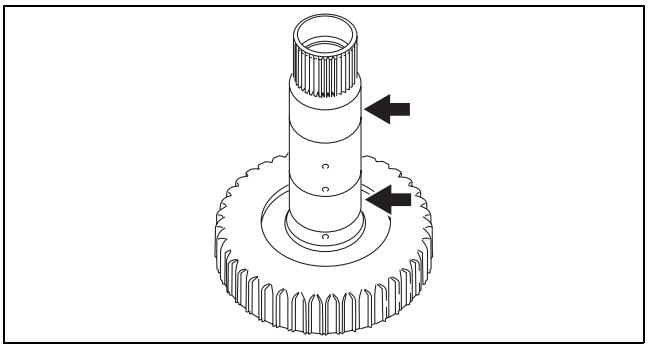
azzjjw00001514

   - Turbine shaft
     — If there is a malfunction, replace the turbine shaft with a new one.



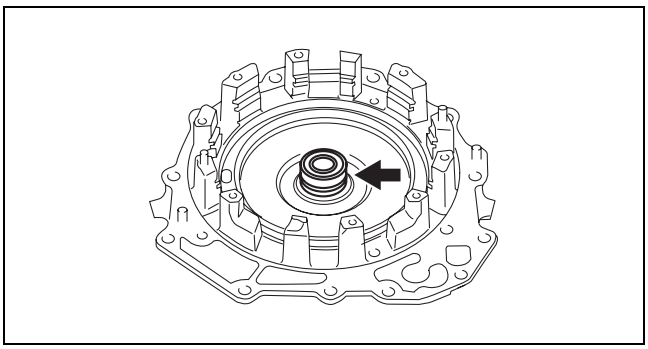
azzjjw00001515

   - High clutch hub
     — If there is a malfunction, replace the high clutch hub with a new one.



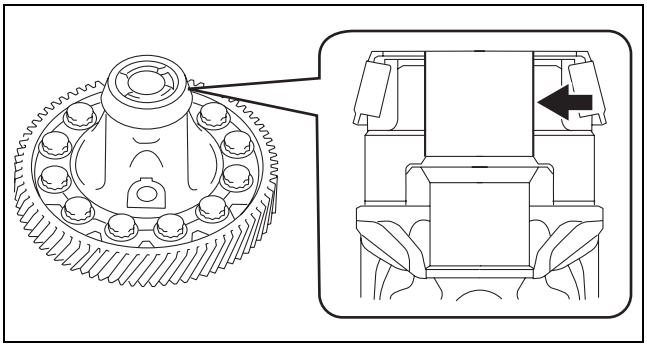
azzjjw00001516

   - End cover
     — If there is a malfunction, replace the end cover with a new one.



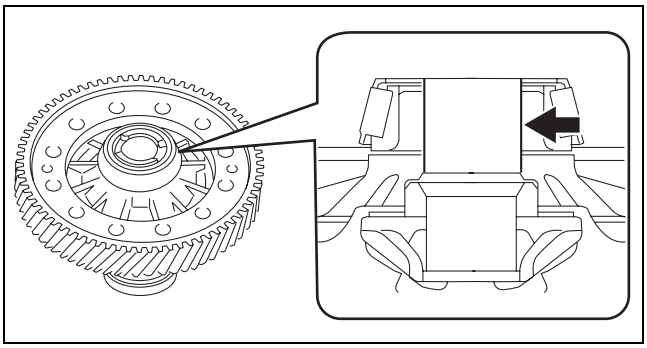
azzjjw00001517

3. Verify that there is no significant sliding trace on the following journal part.
   - Ring gear and differential



azzjjw00001518

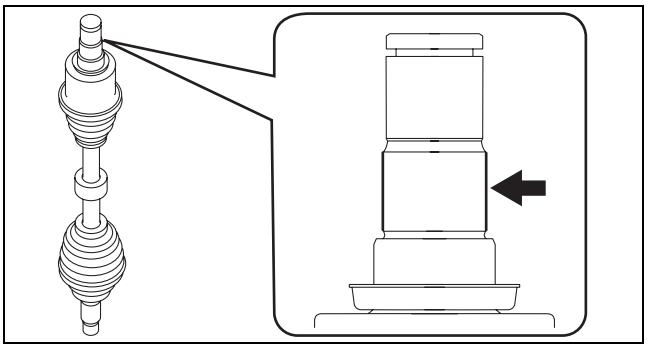
   — If there is a malfunction, disassemble the ring gear and differential and replace the differential gear case with a new one. (See 05-17-121 RING GEAR AND DIFFERENTIAL DISASSEMBLY.) (See 05-17-266 RING GEAR AND DIFFERENTIAL ASSEMBLY.)



azzjjw00001521

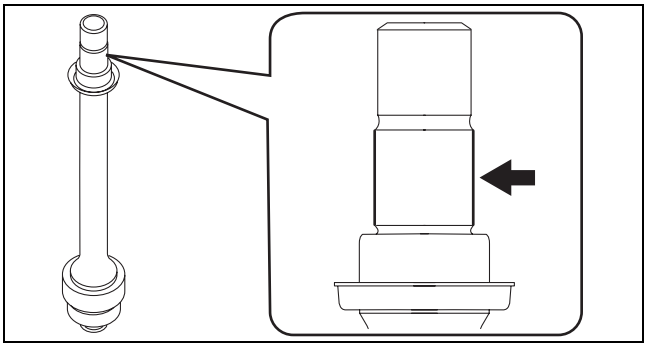
   - Drive shaft (LH)
     — If there is a malfunction, disassemble the drive shaft (LH) and replace the outer ring with a new one.

Note
- For the drive shaft disassembly/assembly procedure, verify the Workshop Manual.



azzjjw00001519

   - Joint shaft
     — If there is a malfunction, replace the joint shaft with a new one.



azzjjw00001520

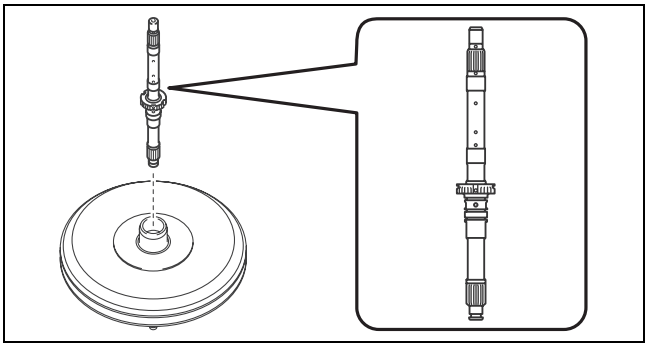
TORQUE CONVERTER INSPECTION

id051700661800

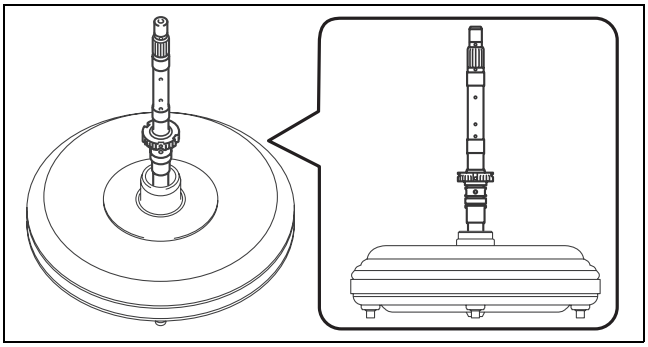
Caution

- **For the torque converter inspection, only an inspection for burning or seizure of the TCC clutch can be performed. For other malfunctions, on-vehicle inspection is required.**

1. Assemble the turbine shaft to the torque converter.



azzjjw00001069



azzjjw00001070

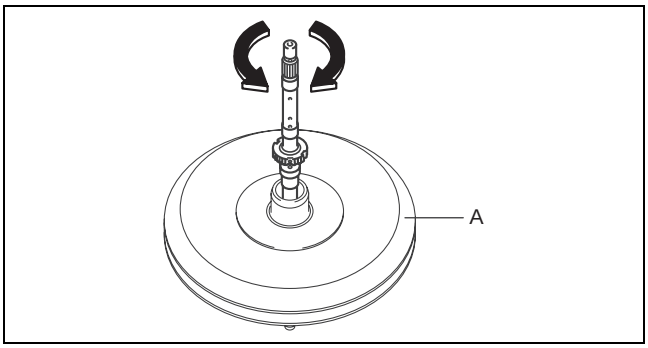
2. With the torque converter secured by hand, rotate the turbine shaft.

A : Secure by hand

Note

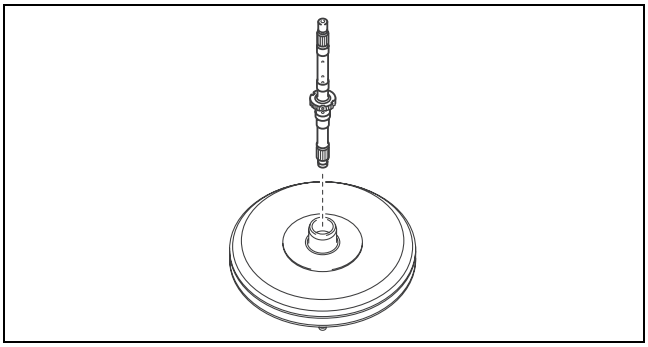
- When rotating the turbine shaft, a little force is required depending on the amount of ATF in the torque converter.

- If the turbine shaft cannot be rotated, burning or seizure of the TCC clutch can be considered, therefore replace the torque converter with a new one.



azzjjw00001071

3. Remove the turbine shaft.



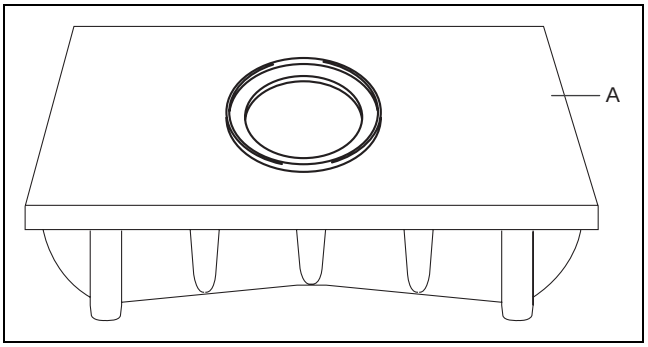
azzjjw00001072

THRUST NEEDLE BEARING INSPECTION

id051700661900

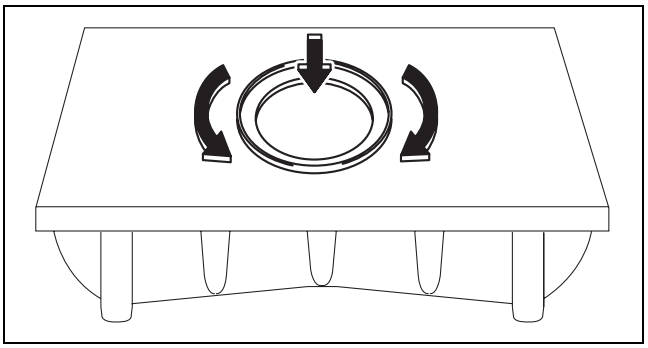
1. Point the flat surface of the thrust needle bearing downward and place it on the surface plate.

A : Surface plate



azzjjw00001073

2. With a load applied by hand to the thrust needle bearing, rotate the thrust needle bearing and verify that there is no malfunction (rotation sticking).
   - If there is a malfunction, replace the thrust needle bearing with a new one.



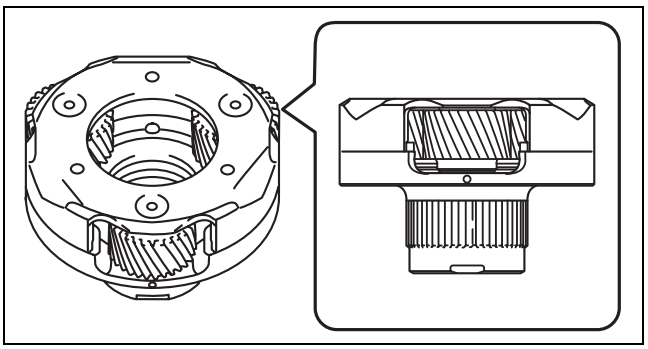
azzjjw00001074

FRONT PLANETARY GEAR INSPECTION

id051700662000

Radial Needle Bearing Inspection (In Pinion Gear)

1. Place the front planetary gear on a workbench as shown in the figure.

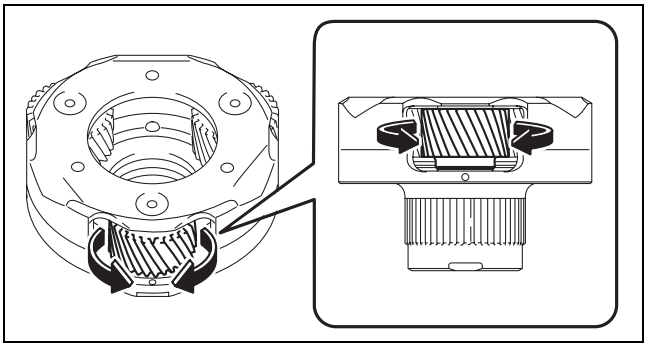


azzjjw00001259

2. Rotate the pinion gears by hand and verify that there is no malfunction in the radial needle bearing in the pinion gear (rotation sticking).

   Caution
   - **Verify for all the pinion gears.**

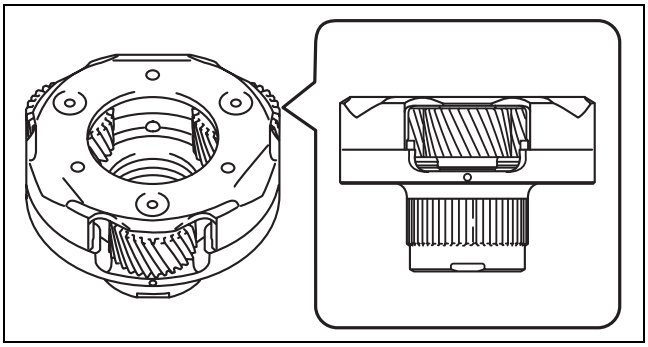
   - If there is a malfunction, replace the front planetary gear with a new one.



azzjjw00001277

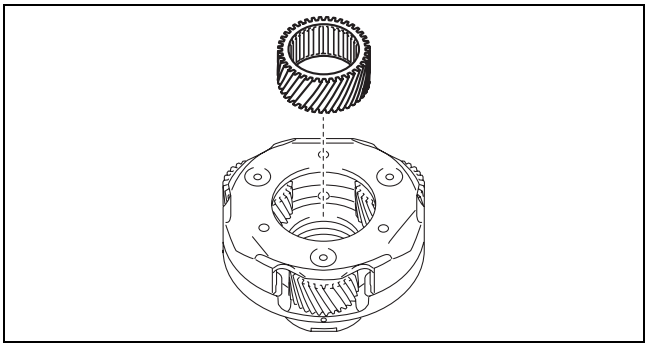
Thrust Needle Bearing Inspection

1. Place the front planetary gear on a workbench as shown in the figure.

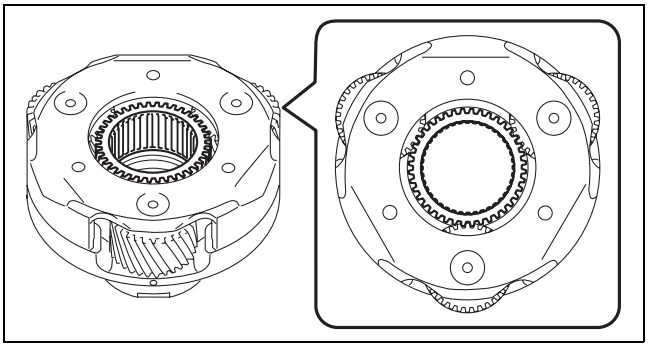


azzjjw00001259

2. Assemble the front sun gear to the front planetary gear.

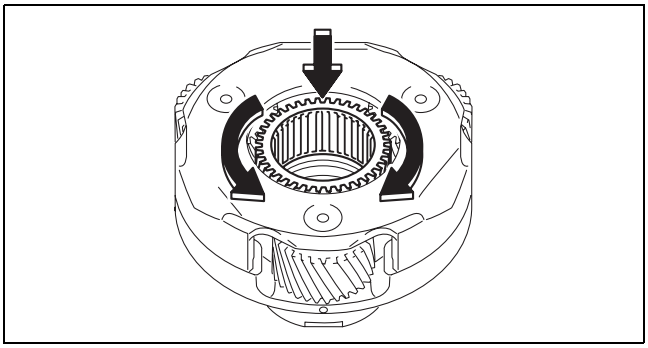


azzjjw00001261



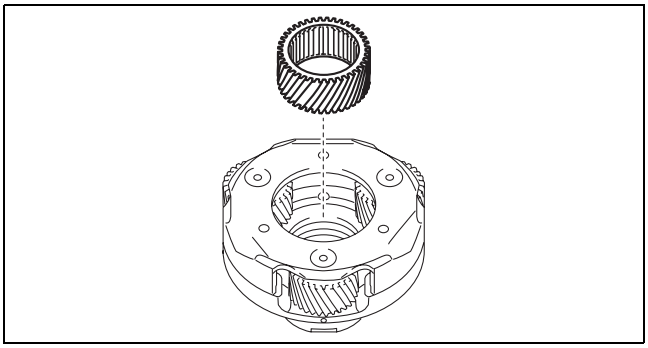
azzjjw00001262

3. With a load applied by hand to the front sun gear, rotate the front sun gear and verify that there is no malfunction in the thrust needle bearing (rotation sticking).
   - If there is a malfunction, replace the front planetary gear with a new one.



azzjjw00001263

4. Remove the front sun gear.



azzjjw00001261

Pinion Washer Inspection
Pinion washer visual inspection

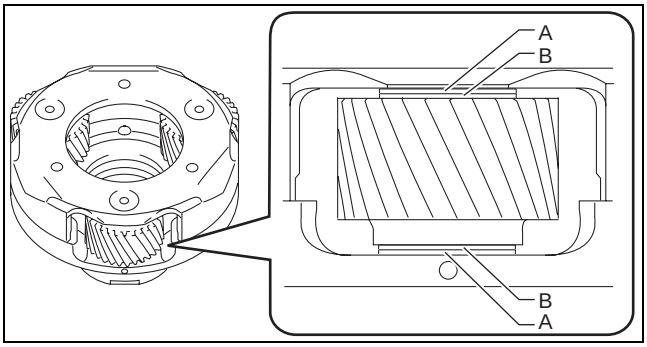
1. Visually verify that all of the following washers are between the pinion gear and planetary carrier for one pinion gear.

Caution
- **Verify for all the pinion gears.**

— Copper washer (outer side): 2
— Iron washer (inner side): 2

A : Copper washer (outer side)
B : Iron washer (inner side)

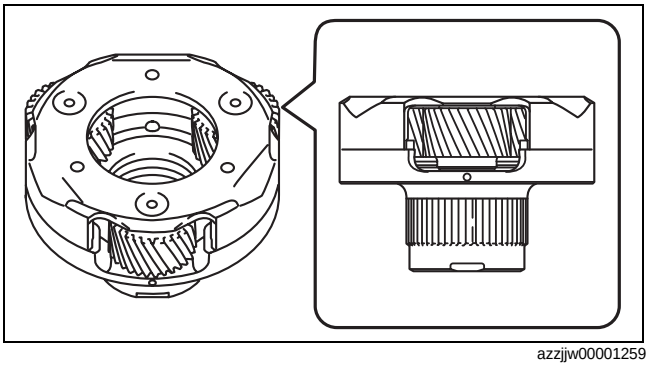
- Even if one of the washers is damaged, replace the front planetary gear with a new one.



azzjjw00001522

Pinion washer wear inspection

1. Place the front planetary gear on a workbench as shown in the figure.


azzjjw00001259

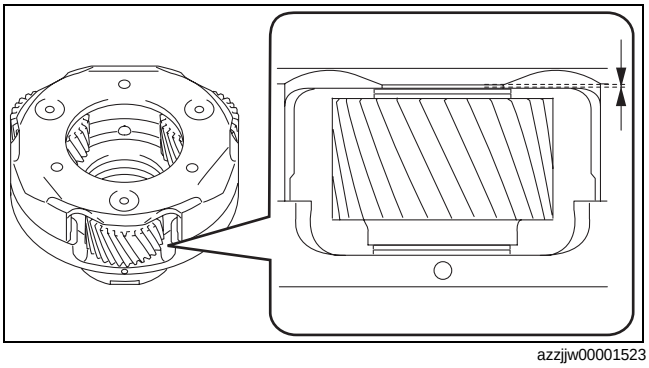
2. Measure the gap between the pinion washer and planetary carrier.

Caution
- **Measure for all the pinion gears.**

Note
- Recommended measuring instrument: Thickness gauge

Maximum:
0.879 mm {0.0346 in}

- If it is more than the maximum specification, replace the front planetary gear with a new one.

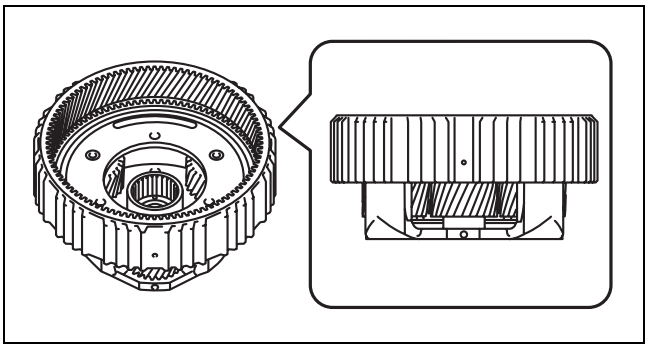

azzjjw00001523

REAR PLANETARY GEAR INSPECTION

id051700662100

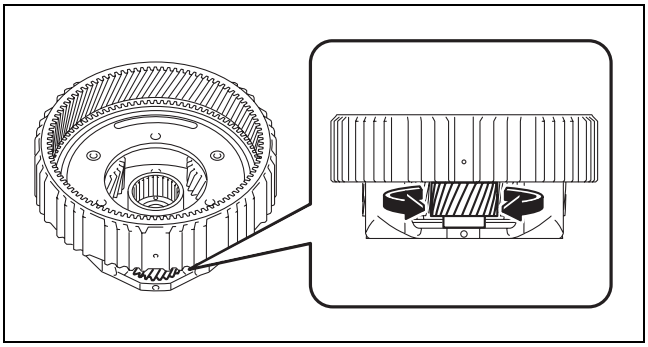
Radial Needle Bearing Inspection (In Pinion Gear)

1. Place the rear planetary gear with the front internal gear side pointing upward on a workbench.



azzjjw00001265

2. Rotate the pinion gears by hand and verify that there is no malfunction in the radial needle bearing in the pinion gear (rotation sticking).



azzjjw00001278

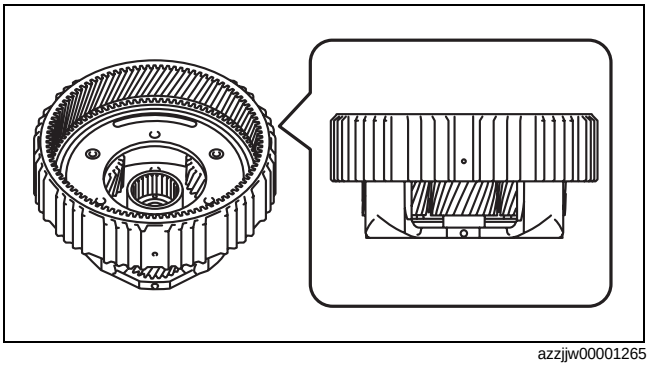
Caution

- **Verify for all the pinion gears.**

- If there is a malfunction, disassemble the rear planetary gear and replace the rear planetary carrier with a new one.
  (See 05-17-117 REAR PLANETARY GEAR DISASSEMBLY.)
  (See 05-17-259 REAR PLANETARY GEAR ASSEMBLY.)

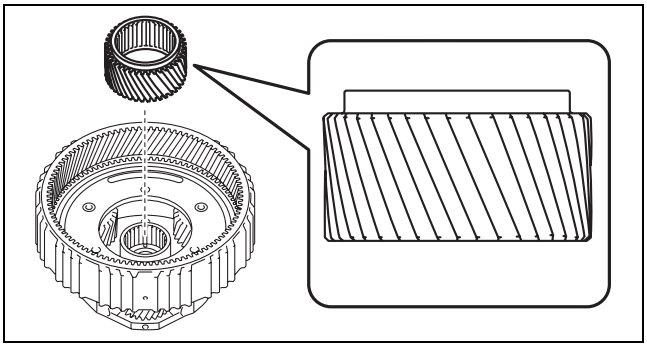
Thrust Needle Bearing Inspection

1. Place the rear planetary gear with the front internal gear side pointing upward on a workbench.

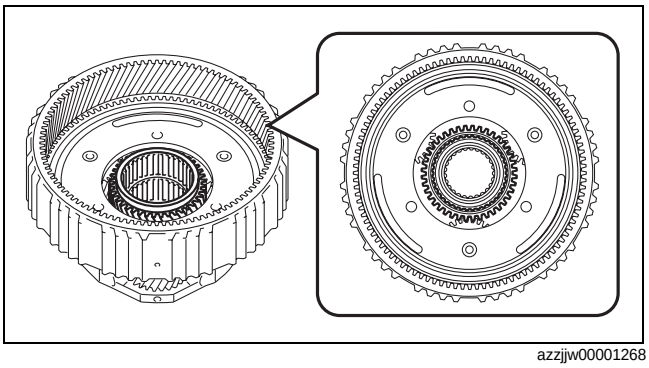


azzjjw00001265

2. Assemble the rear sun gear to the rear planetary gear.

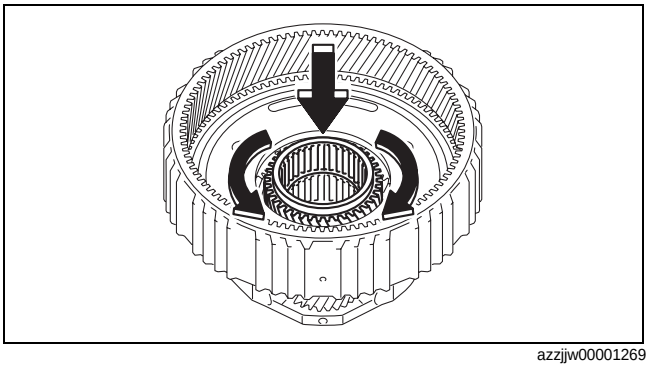


azzjjw00001267



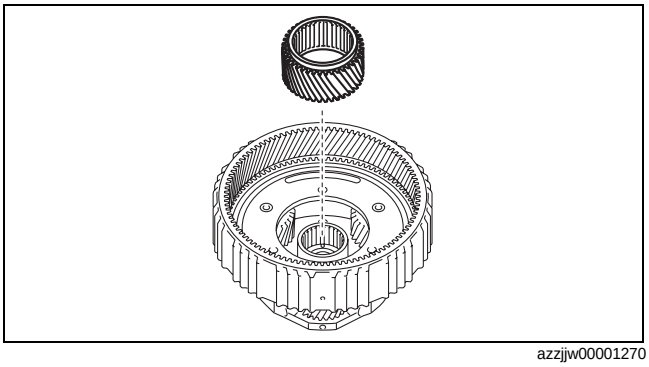
azzjjw00001268

3. With a load applied by hand to the rear sun gear, rotate the rear sun gear and verify that there is no malfunction in the thrust needle bearing (rotation sticking).
   - If there is a malfunction, disassemble the rear planetary gear and replace the rear planetary carrier with a new one.
     (See 05-17-117 REAR PLANETARY GEAR DISASSEMBLY.)
     (See 05-17-259 REAR PLANETARY GEAR ASSEMBLY.)



azzjjw00001269

4. Remove the rear sun gear.



azzjjw00001270

Pinion Washer Inspection
Pinion washer visual inspection

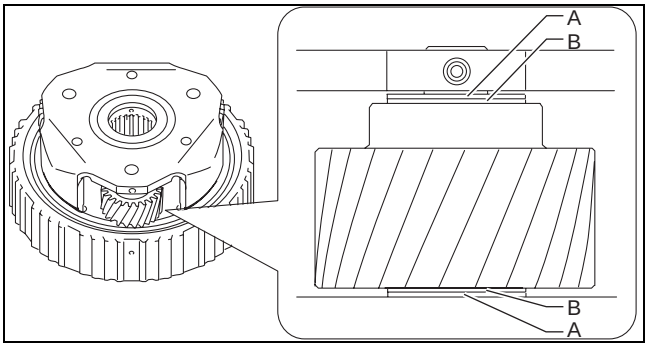
1. Visually verify that all of the following washers are between the pinion gear and planetary carrier for one pinion gear.

Caution
- **Verify for all the pinion gears.**

— Copper washer (outer side): 2
— Iron washer (inner side): 2

A : Copper washer (outer side)
B : Iron washer (inner side)

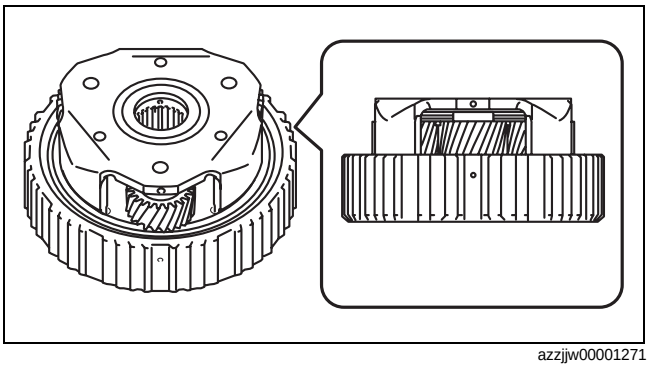
- Even if one of the washers is damaged, disassemble the rear planetary gear and replace the rear planetary carrier with a new one.
(See 05-17-117 REAR PLANETARY GEAR DISASSEMBLY.)
(See 05-17-259 REAR PLANETARY GEAR ASSEMBLY.)



azzjjw00001524

Pinion washer wear inspection

1. Place the rear planetary gear with the front internal gear side pointing downward on a workbench.

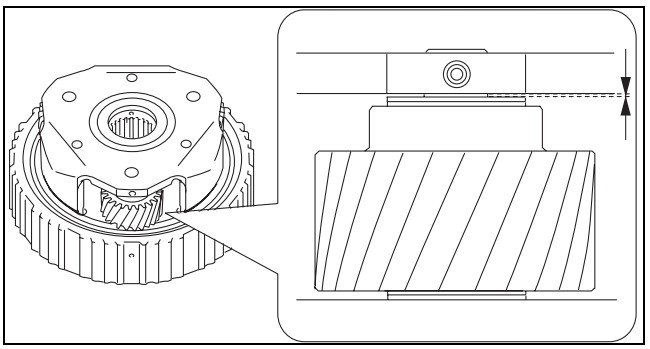

azzjjw00001271

2. Measure the gap between the pinion washer and planetary carrier.

Caution
- **Measure for all the pinion gears.**

Note
- Recommended measuring instrument: Thickness gauge

Maximum:
0.879 mm {0.0346 in}


azzjjw00001525

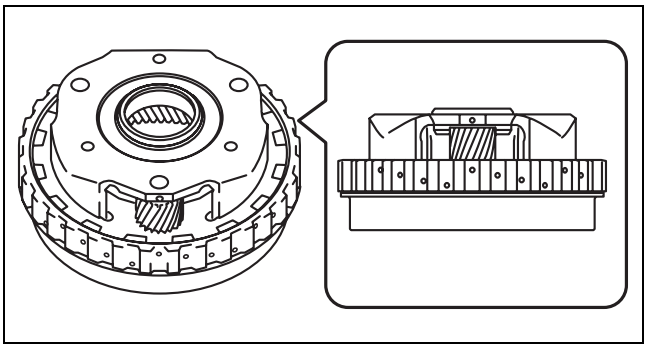
- If it is more than the maximum specification, disassemble the rear planetary gear and replace the rear planetary carrier with a new one.
(See 05-17-117 REAR PLANETARY GEAR DISASSEMBLY.)
(See 05-17-259 REAR PLANETARY GEAR ASSEMBLY.)

REDUCTION PLANETARY GEAR INSPECTION

id051700662200

Radial Needle Bearing Inspection (In Pinion Gear)

1. Place the reduction planetary gear with the rear internal gear side pointing downward on a workbench.

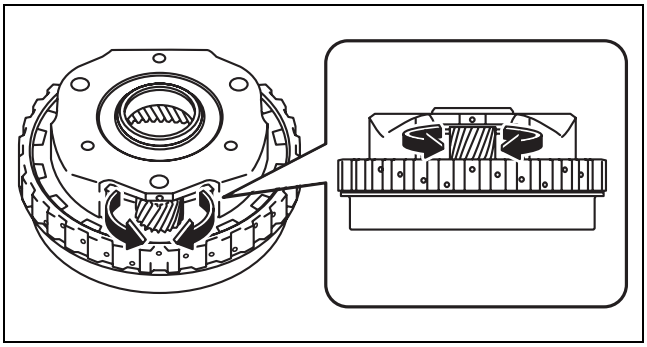


azzjjw00001273

2. Rotate the pinion gears by hand and verify that there is no malfunction in the radial needle bearing in the pinion gear (rotation sticking).

Caution
- **Verify for all the pinion gears.**

- If there is a malfunction, disassemble the reduction planetary gear and replace the reduction planetary carrier with a new one.
(See 05-17-136 REDUCTION PLANETARY GEAR DISASSEMBLY.)
(See 05-17-261 REDUCTION PLANETARY GEAR ASSEMBLY.)



azzjjw00001274

Pinion Washer Inspection

Pinion washer visual inspection

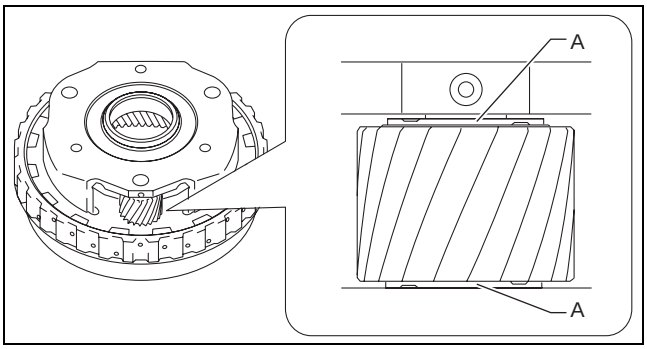
1. Visually verify that all of the following washers are between the pinion gear and planetary carrier for one pinion gear.

Caution
- **Verify for all the pinion gears.**

— Copper washer: 2

A : Copper washer

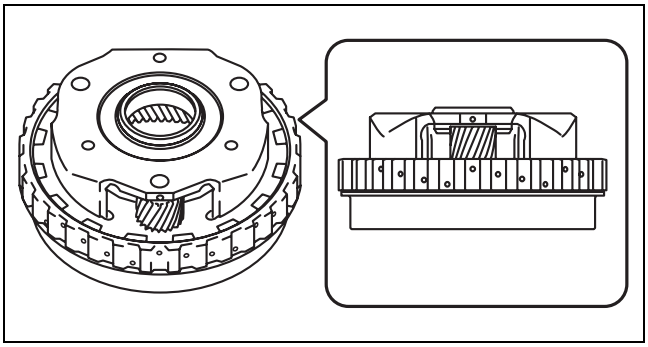
- Even if one of the washers are damaged, disassemble the reduction planetary gear and replace the reduction planetary carrier with a new one.
(See 05-17-136 REDUCTION PLANETARY GEAR DISASSEMBLY.)
(See 05-17-261 REDUCTION PLANETARY GEAR ASSEMBLY.)



azzjjw00001526

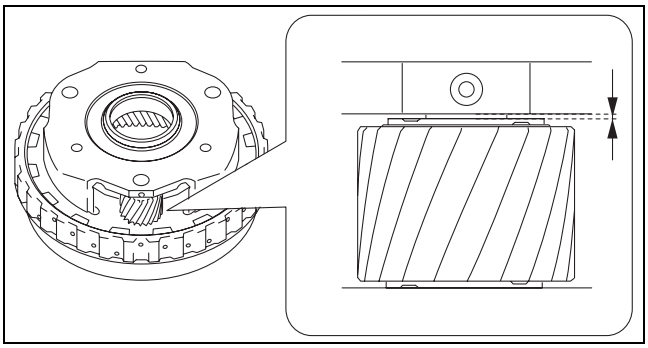
Pinion washer wear inspection

1. Place the reduction planetary gear with the rear internal gear side pointing downward on a workbench.



azzjjw00001273

2. Measure the gap between the pinion washer and planetary carrier.



azzjjw00001527

Caution
- **Measure for all the pinion gears.**

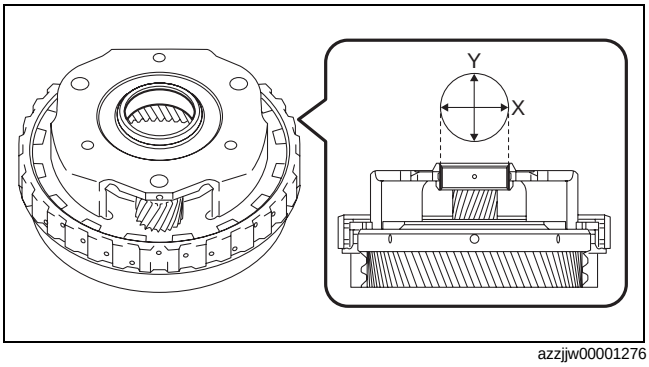
Note
- Recommended measuring instrument: Thickness gauge

Maximum:
0.820 mm {0.0322 in}

- If it is more than the maximum specification, disassemble the reduction planetary gear and replace the reduction planetary carrier with a new one.
(See 05-17-136 REDUCTION PLANETARY GEAR DISASSEMBLY.)
(See 05-17-261 REDUCTION PLANETARY GEAR ASSEMBLY.)

Bush Inner Diameter Inspection

1. Measure the inner diameter of the bush shown in the figure.



azzjjw00001276

Note
- When measuring, measure near the center of the bush avoiding the oil groove, and then calculate the average value of the X and Y directions as shown in the figure.
- Recommended measuring instrument: Cylinder gauge or caliper gauge

Maximum:
35.095 mm {1.3816 in}

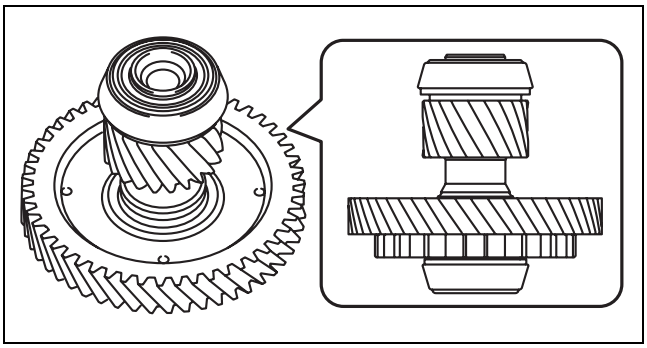
- If it is more than the maximum specification, disassemble the reduction planetary gear and replace the reduction planetary carrier with a new one.
(See 05-17-136 REDUCTION PLANETARY GEAR DISASSEMBLY.)
(See 05-17-261 REDUCTION PLANETARY GEAR ASSEMBLY.)

SECONDARY GEAR AND OUTPUT GEAR INSPECTION

id051700662300

Taper Roller Bearing Inspection

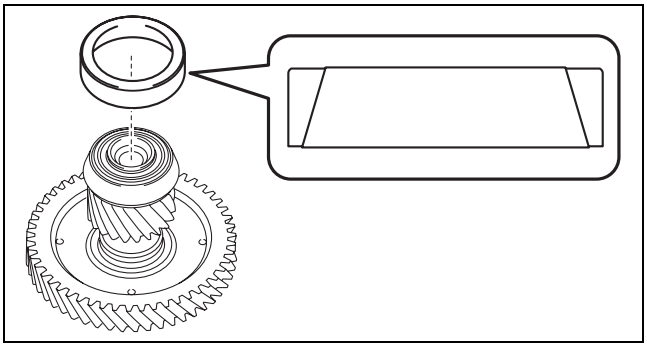
1. Place the secondary gear and output gear with the output gear side pointing upward on a workbench.



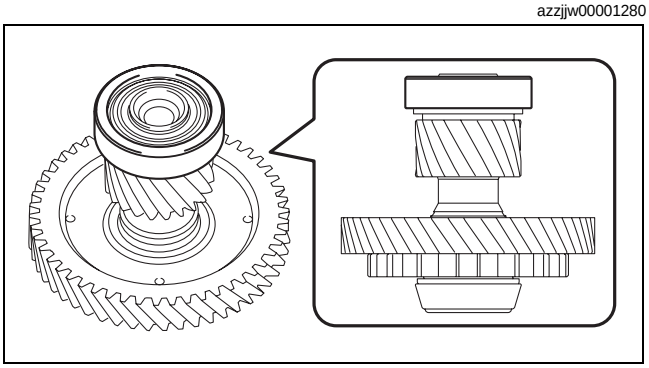
azzjjw00001279

2. Assemble the bearing race to the secondary gear and output gear.

Note
- Bearing race size: Outer diameter approx. 75 mm {3.0 in}

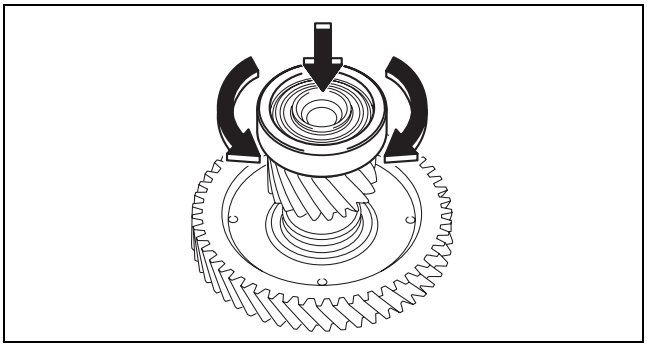


azzjjw00001280



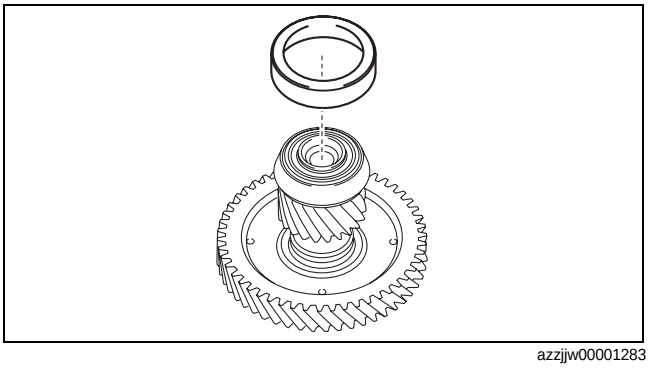
azzjjw00001281

3. With a load applied by hand to the bearing race, rotate the bearing race and verify that there is no malfunction in the taper roller bearing (rotation sticking).
   - If there is a malfunction, disassemble the secondary gear and output gear and replace the taper roller bearing with a new one.
     (See 05-17-119 SECONDARY GEAR AND OUTPUT GEAR DISASSEMBLY.)
     (See 05-17-263 SECONDARY GEAR AND OUTPUT GEAR ASSEMBLY.)



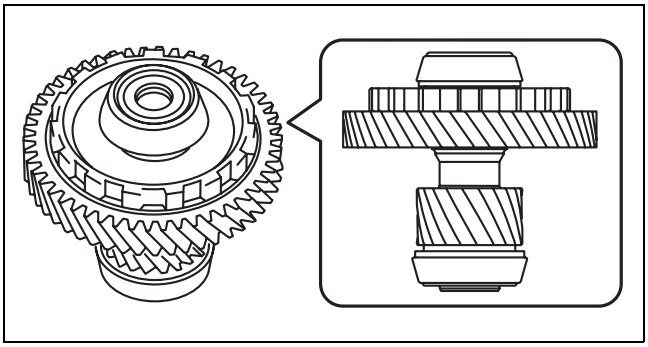
azzjjw00001282

4. Remove the bearing race.



azzjjw00001283

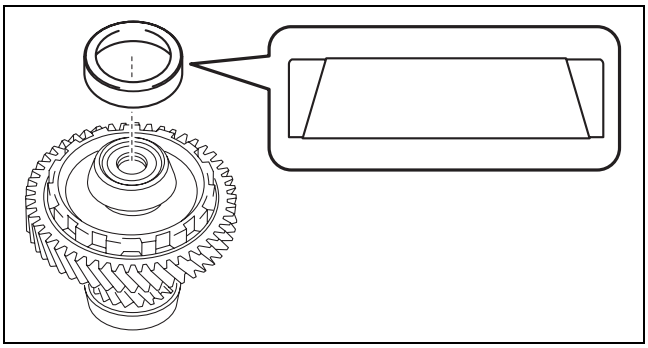
5. Place the secondary gear and output gear with the output gear side pointing downward on a workbench.



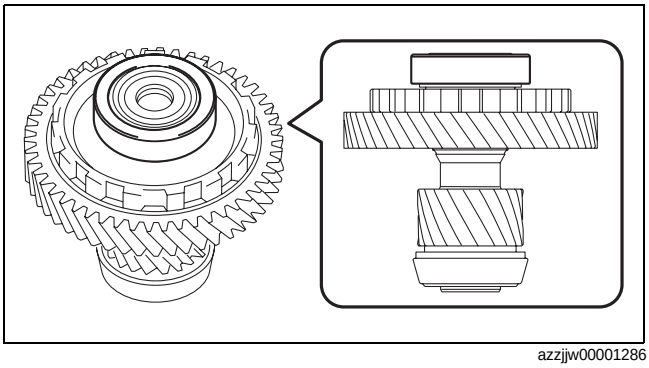
azzjjw00001284

6. Assemble the bearing race to the secondary gear and output gear.

Note
- Bearing race size: Outer diameter approx. 70 mm {2.8 in}

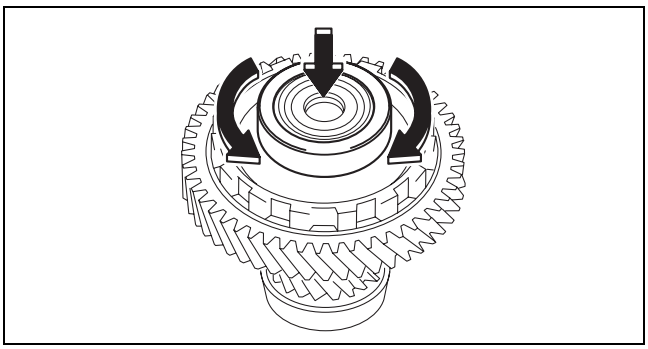


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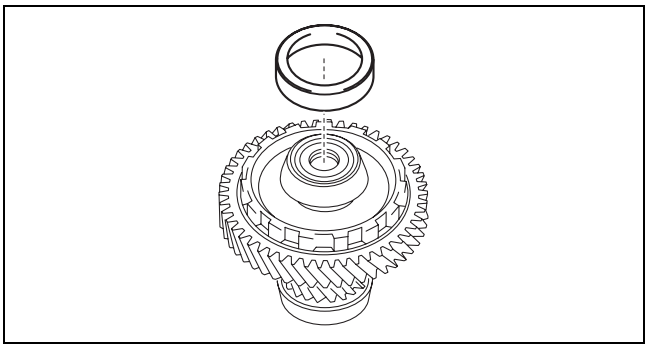
azzjjw00001286

7. With a load applied by hand to the bearing race, rotate the bearing race and verify that there is no malfunction in the taper roller bearing (rotation sticking).
   - If there is a malfunction, disassemble the secondary gear and output gear and replace the taper roller bearing with a new one. (See 05-17-119 SECONDARY GEAR AND OUTPUT GEAR DISASSEMBLY.) (See 05-17-263 SECONDARY GEAR AND OUTPUT GEAR ASSEMBLY.)



azzjjw00001287

8. Remove the bearing race.



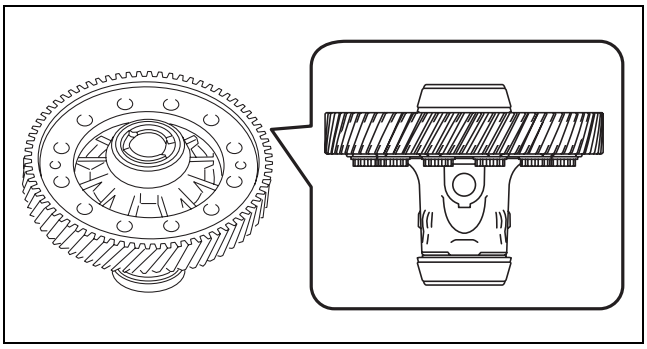
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RING GEAR AND DIFFERENTIAL INSPECTION

id051700662400

Taper Roller Bearing Inspection

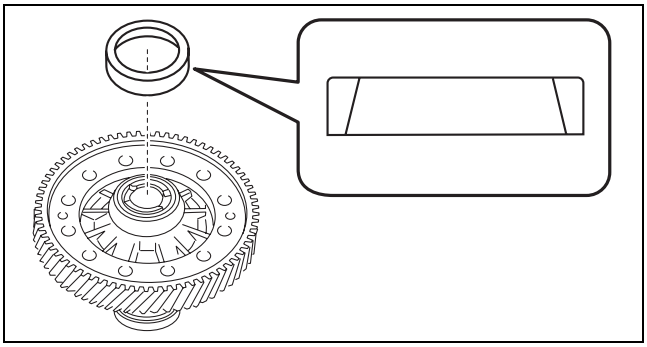
1. Place the ring gear and differential with the ring gear side pointing upward on a workbench.



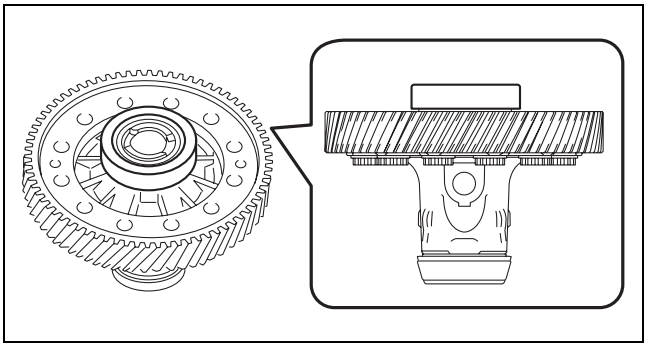
azzjjw00001289

2. Assemble the bearing race to the ring gear and differential.

Note
- Bearing race size: Outer diameter approx. 80 mm {3.1 in}

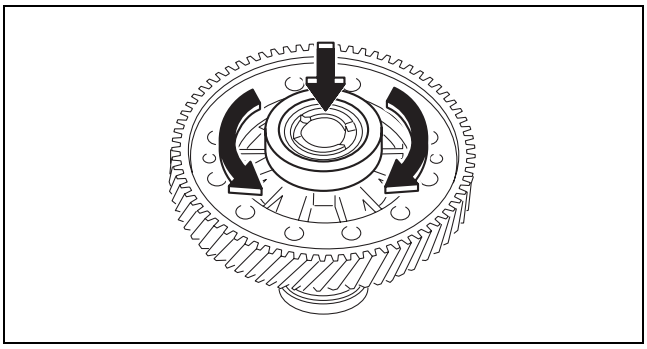


azzjjw00001290



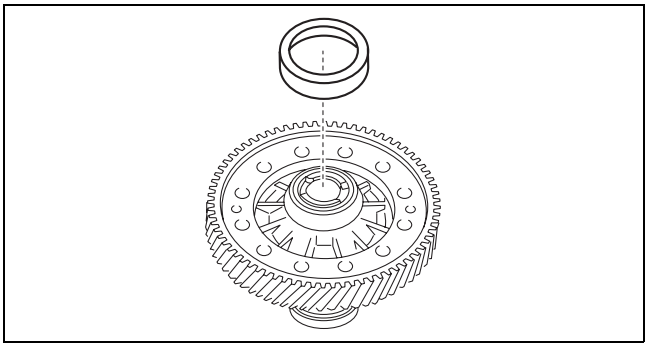
azzjjw00001291

3. With a load applied by hand to the bearing race, rotate the bearing race and verify that there is no malfunction in the taper roller bearing (rotation sticking).
   - If there is a malfunction, disassemble the ring gear and differential and replace the taper roller bearing with a new one.
     (See 05-17-121 RING GEAR AND DIFFERENTIAL DISASSEMBLY.)
     (See 05-17-266 RING GEAR AND DIFFERENTIAL ASSEMBLY.)



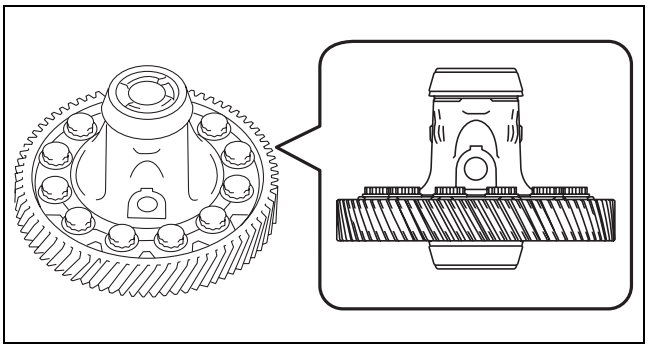
azzjjw00001292

4. Remove the bearing race.



azzjjw00001293

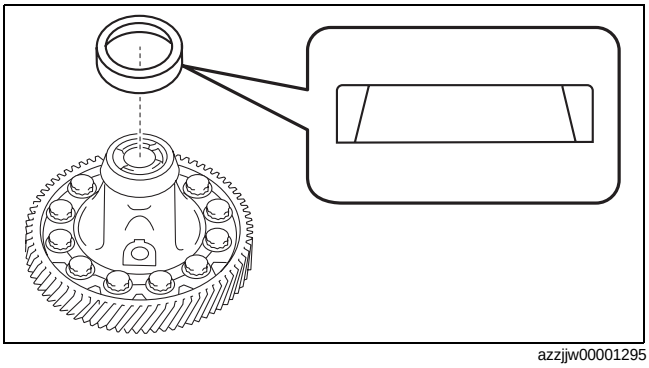
5. Place the ring gear and differential with the ring gear side pointing downward on a workbench.



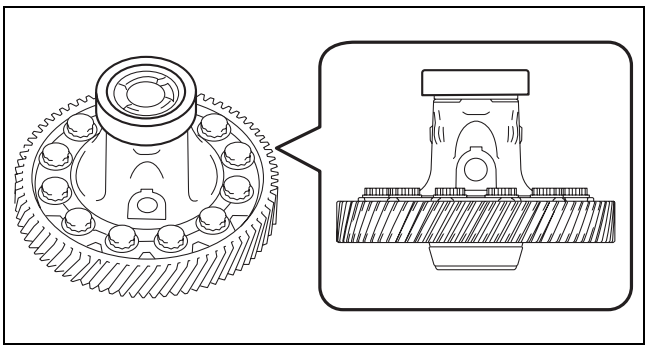
azzjjw00001294

6. Assemble the bearing race to the ring gear and differential.

Note
- Bearing race size: Outer diameter approx. 80 mm {3.1 in}

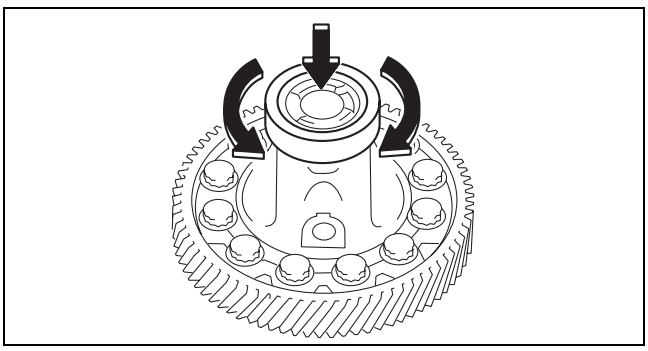


azzjjw00001295



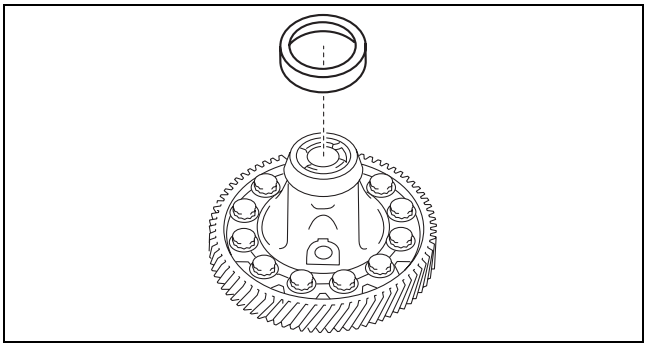
azzjjw00001296

7. With a load applied by hand to the bearing race, rotate the bearing race and verify that there is no malfunction in the taper roller bearing (rotation sticking).
   - If there is a malfunction, disassemble the ring gear and differential and replace the taper roller bearing with a new one.
     (See 05-17-121 RING GEAR AND DIFFERENTIAL DISASSEMBLY.)
     (See 05-17-266 RING GEAR AND DIFFERENTIAL ASSEMBLY.)



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8. Remove the bearing race.



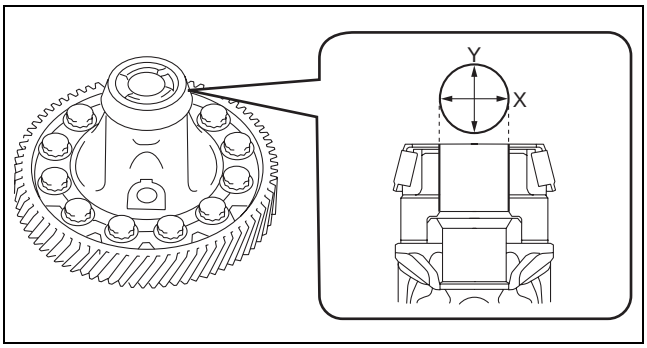
azzjjw00001298

Differential Journal Inspection

1. Measure the inner diameter of the journal (front side) shown in the figure.

   Note
   - When measuring, measure near the center of the journal avoiding the oil groove, and then calculate the average value of the X and Y directions as shown in the figure.
   - Recommended measuring instrument: Cylinder gauge or caliper gauge

   Maximum:
   30.046 mm {1.1829 in}



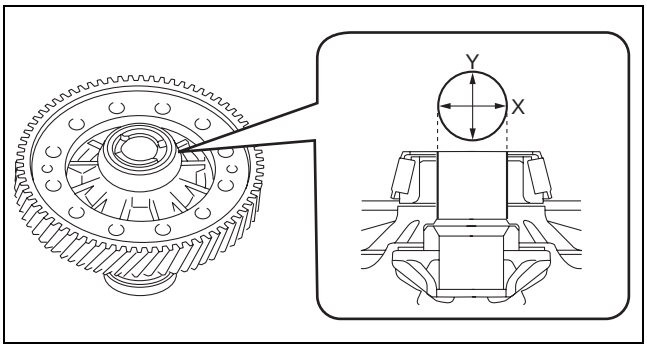
azzjjw00001299

   - If it is more than the maximum specification, disassemble the ring gear and differential and replace the differential gear case with a new one.
     (See 05-17-121 RING GEAR AND DIFFERENTIAL DISASSEMBLY.)
     (See 05-17-266 RING GEAR AND DIFFERENTIAL ASSEMBLY.)

2. Measure the inner diameter of the journal (rear side) shown in the figure.

   Note
   - When measuring, measure near the center of the journal avoiding the oil groove, and then calculate the average value of the X and Y directions as shown in the figure.
   - Recommended measuring instrument: Cylinder gauge or caliper gauge

   Maximum:
   30.046 mm {1.1829 in}



azzjjw00001300

   - If it is more than the maximum specification, disassemble the ring gear and differential and replace the differential gear case with a new one.
     (See 05-17-121 RING GEAR AND DIFFERENTIAL DISASSEMBLY.)
     (See 05-17-266 RING GEAR AND DIFFERENTIAL ASSEMBLY.)

Differential Backlash Inspection

1. Perform the following the inspection and measurement/adjustment in the order and replace a malfunctioning part with a new one.
   (1) Drive shaft journal inspection (See 05-17-168 DRIVE SHAFT JOURNAL INSPECTION.)
   (2) Differential backlash measurement/adjustment (See 05-17-303 DIFFERENTIAL BACKLASH MEASUREMENT/ADJUSTMENT.)

DRIVE SHAFT JOURNAL INSPECTION

id051700665500

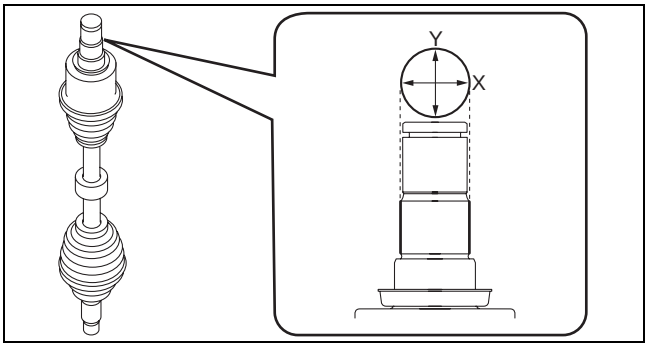
1. Remove the drive shaft (LH) from the vehicle.

   Note
   - For the drive shaft (LH) removal procedure from the vehicle, verify the Workshop Manual.

2. Measure the outer diameter of the drive shaft (LH) journal.

   Note
   - When measuring, measure near the center of the journal, and then calculate the average value of the X and Y directions as shown in the figure.
   - Recommended measuring instrument: Micrometer

   Minimum:
   29.959 mm {1.1795 in}



azzjjw00001301

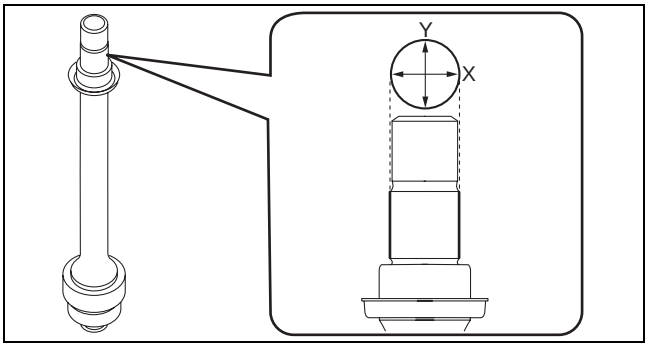
   - If it is less than the minimum specification, disassemble the drive shaft (LH) and replace the outer ring with a new one.

   Note
   - For the drive shaft disassembly/assembly procedure, verify the Workshop Manual.

3. Measure the outer diameter of the joint shaft journal.

   Note
   - When measuring, measure near the center of the journal, and then calculate the average value of the X and Y directions as shown in the figure.
   - Recommended measuring instrument: Micrometer

   Minimum:
   29.944 mm {1.1789 in}



azzjjw00001302

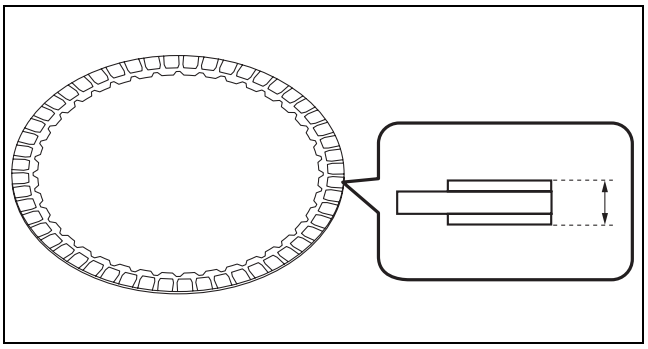
   - If it is less than the minimum specification, replace the joint shaft with a new one.

LOW CLUTCH INSPECTION

id051700662500

Drive Plate Inspection

1. Measure the thickness of the drive plate in four locations (each separated by 90°) and calculate the average value.



azzjjw00001312

Caution
- **When measuring the thickness of the drive plate, measure the thickness including the facing.**
- **Measure the thickness of all the drive plates.**

Note
- Drive plate size: Outer diameter approx. 159.1 mm {6.264 in}
- Recommended measuring instrument: Micrometer

Minimum:
1.475 mm {0.05808 in}

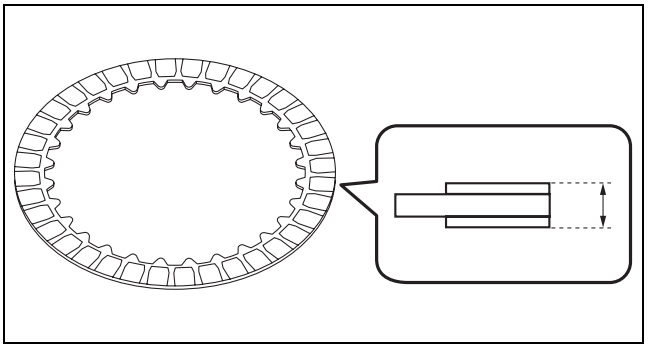
- If it is less than the minimum specification, replace the drive plate with a new one.

HIGH CLUTCH INSPECTION

id051700662600

Drive Plate Inspection

1. Measure the thickness of the drive plate in four locations (each separated by 90°) and calculate the average value.



azzjjw00001313

Caution
- **When measuring the thickness of the drive plate, measure the thickness including the facing.**
- **Measure the thickness of all the drive plates.**

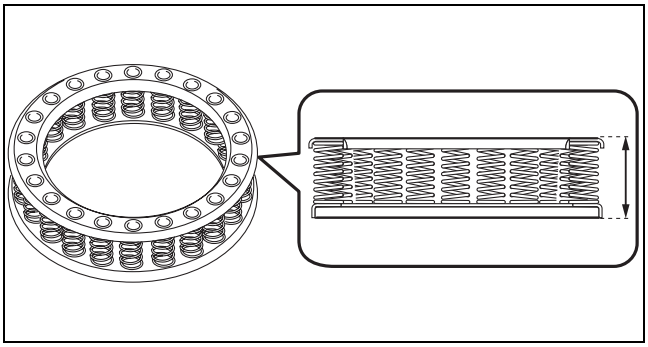
Note
- Drive plate size: Outer diameter approx. 116.8 mm {4.598 in}
- Recommended measuring instrument: Micrometer

Minimum:
1.375 mm {0.05414 in}

- If it is less than the minimum specification, replace the drive plate with a new one.

Springs and Retainer Component Inspection

1. Measure the free length of the springs and retainer component in four locations (each separated by 90°) and calculate the average value.



azzjjw00001528

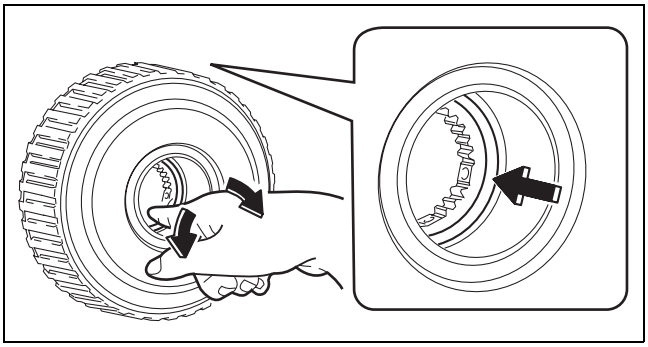
Note
- Springs and retainer component size: Outer diameter approx. 79.5 mm {3.13 in}
- Recommended measuring instrument: Vernier caliper

Minimum:
25.4 mm {1.01 in}

- If it is less than the minimum specification, replace the springs and retainer component with a new one.

Radial Needle Bearing Inspection (In High Clutch Drum Component)

1. Rotate the radial needle bearing shown in the figure by hand and verify that there is no malfunction in the radial needle bearing (rotation sticking).
   - If there is a malfunction, replace the high clutch drum component with a new one.



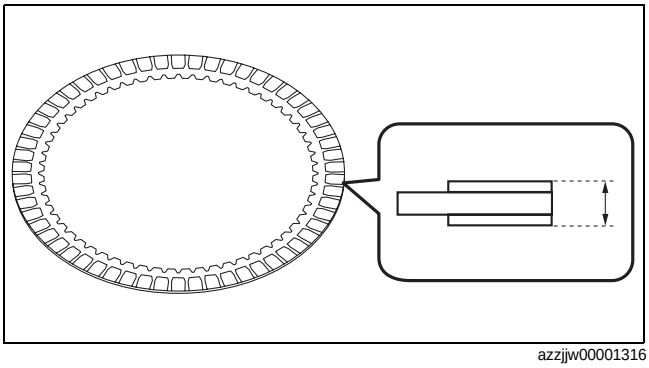
azzjjw00001315

LOW AND REVERSE BRAKE INSPECTION

id051700662700

Drive Plate Inspection

1. Measure the thickness of the drive plate in four locations (each separated by 90°) and calculate the average value.



azzjjw00001316

Caution
- **When measuring the thickness of the drive plate, measure the thickness including the facing.**
- **Measure the thickness of all the drive plates.**

Note
- Drive plate size: Outer diameter approx. 174.1 mm {6.854 in}
- Recommended measuring instrument: Micrometer

Minimum:
1.475 mm {0.05808 in}

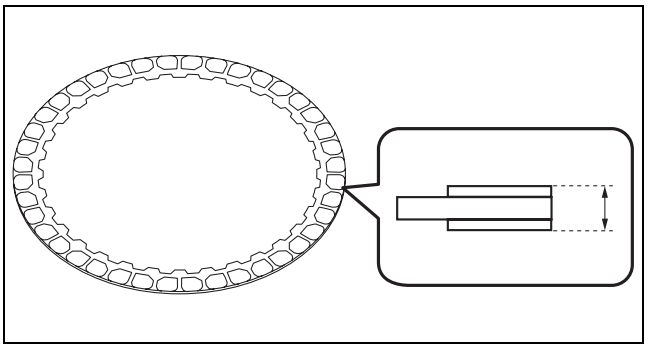
- If it is less than the minimum specification, replace the drive plate with a new one.

2-6 BRAKE INSPECTION

id051700662800

Drive plate inspection

1. Measure the thickness of the drive plate in four locations (each separated by 90°) and calculate the average value.



azzjjw00001318

Caution
- **When measuring the thickness of the drive plate, measure the thickness including the facing.**
- **Measure the thickness of all the drive plates.**

Note
- Drive plate size: Outer diameter approx. 171.9 mm {6.768 in}
- Recommended measuring instrument: Micrometer

Minimum:
1.475 mm {0.05808 in}

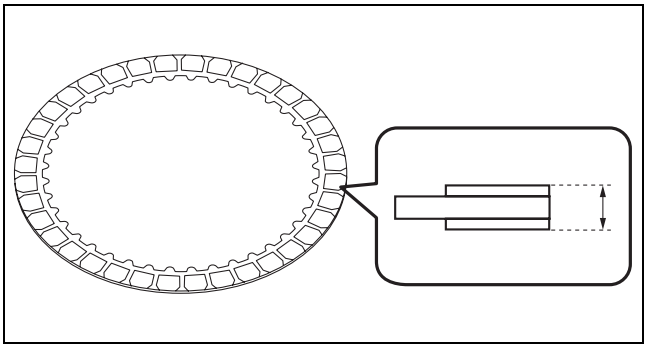
- If it is less than the minimum specification, replace the drive plate with a new one.

R-3-5 BRAKE INSPECTION

id051700662900

Drive Plate Inspection

1. Measure the thickness of the drive plate in four locations (each separated by 90°) and calculate the average value.



azzjjw00001320

Caution
- **When measuring the thickness of the drive plate, measure the thickness including the facing.**
- **Measure the thickness of all the drive plates.**

Note
- Drive plate size: Outer diameter approx. 169.4 mm {6.669 in}
- Recommended measuring instrument: Micrometer

Minimum:
1.635 mm {0.06438 in}

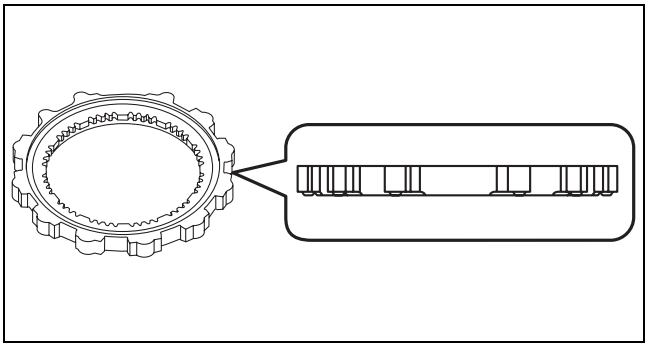
- If it is less than the minimum specification, replace the drive plate with a new one.

ONE-WAY CLUTCH INSPECTION

id051700663000

Caution
- **Do not disassemble the one-way clutch. If it has been disassembled, replace the one-way clutch with a new one.**

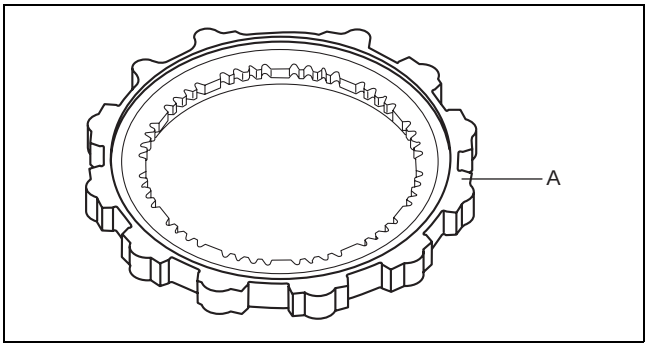
1. Place the one-way clutch on a workbench as shown in the figure.



azzjjw00001322

2. Secure the outer plate of the one-way clutch by hand.

A : Secure by hand

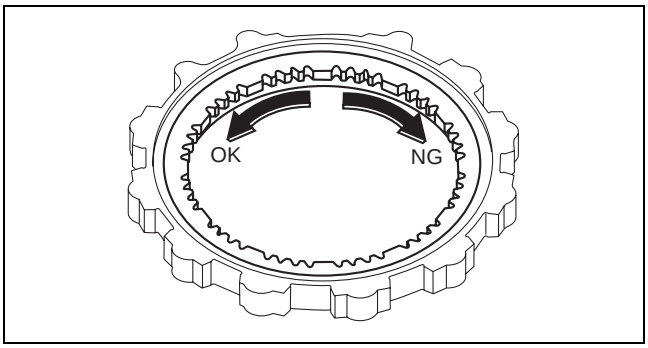


azzjjw00001323

3. Rotate the inner plate of the one-way clutch by hand and verify that it rotates counterclockwise and locks, and does not rotate clockwise.

Caution
- **When the inner plate of the one-way clutch is rotated, a ratchet sound occurs because it is a mechanical diode-type one-way clutch, but this does not indicate a malfunction.**

- If there is a malfunction, replace the one-way clutch with a new one.



azzjjw00001324

LOW CLUTCH HUB INSPECTION

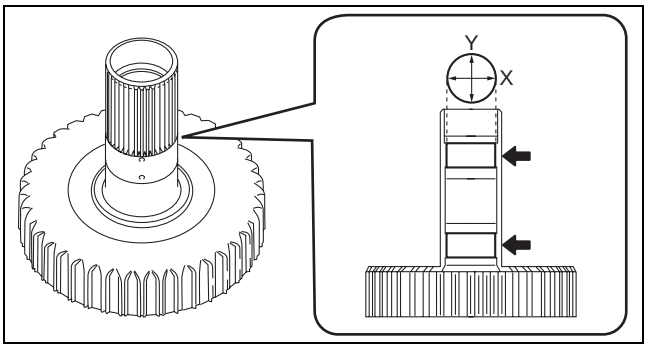
id051700663100

Bush Inner Diameter Inspection

1. Measure the inner diameter of bush in two locations shown in the figure.

Note

- When measuring, measure near the center of the bush avoiding the oil groove, and then calculate the average value of the X and Y directions as shown in the figure.
- Recommended measuring instrument: Cylinder gauge or caliper gauge



azzjjw00001348

Maximum:
31.270 mm {1.2311 in}

- If it is more than the maximum specification, replace the low clutch hub with a new one.

HIGH CLUTCH HUB INSPECTION

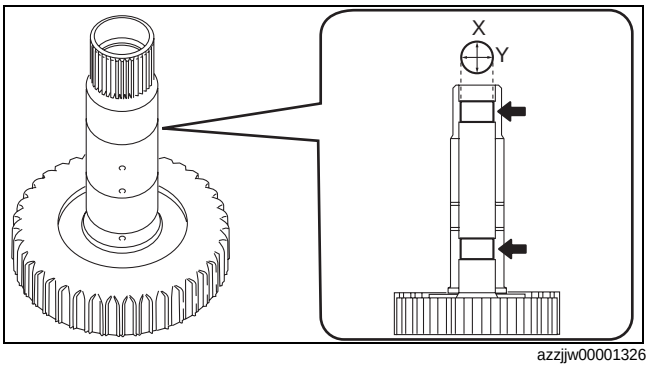
id051700663200

Bush Inner Diameter Inspection

1. Measure the inner diameter of bush in two locations shown in the figure.

Note

- When measuring, measure near the center of the bush avoiding the oil groove, and then calculate the average value of the X and Y directions as shown in the figure.
- Recommended measuring instrument: Cylinder gauge or caliper gauge



azzjjw00001326

Maximum:
18.038 mm {0.71015 in}

- If it is more than the maximum specification, replace the high clutch hub with a new one.

OIL PUMP INSPECTION

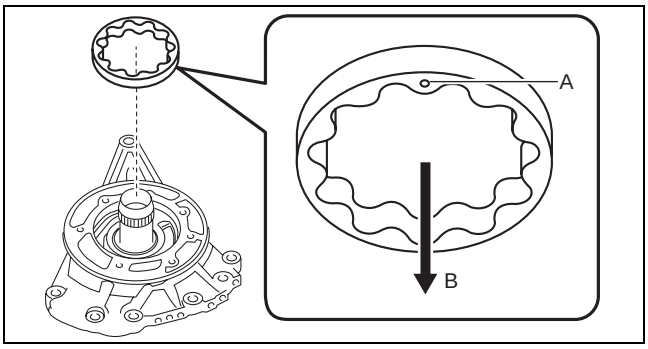
id051700663300

Side Clearance Inspection

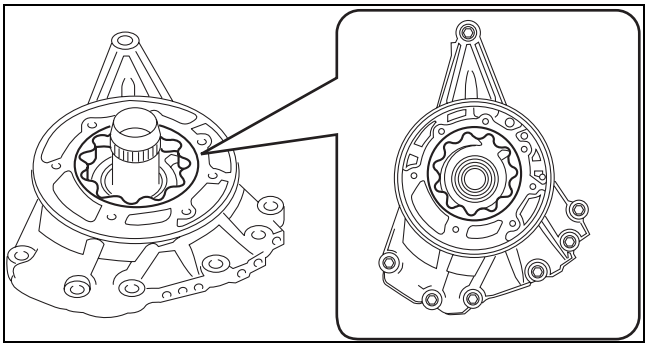
1. Assemble the outer rotor.

A : Mark
B : Assembly direction (oil pump housing side)

Note
- Assemble so that the outer rotor marking is facing the oil pump housing.



azzjjw00001327

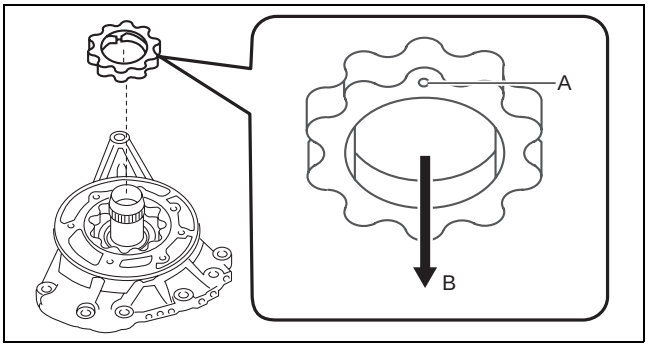


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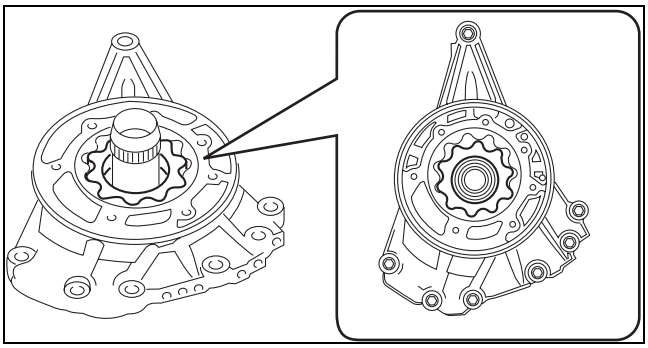
2. Assemble the inner rotor.

A : Mark
B : Assembly direction (oil pump housing side)

Note
- Assemble with the inner rotor marking pointed at the oil pump housing.



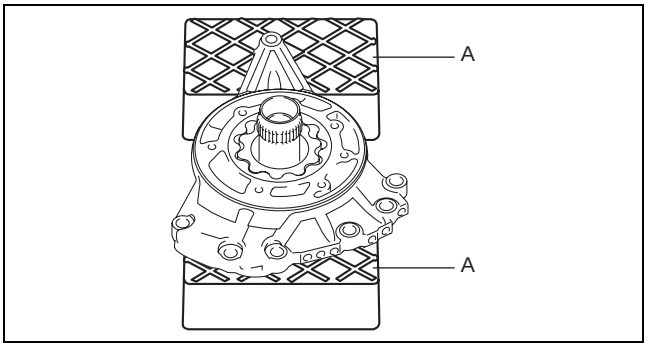
azzjjw00001529



azzjjw00001330

3. Set the assembled parts on the workbench as shown in the figure.

A : Rubber plate



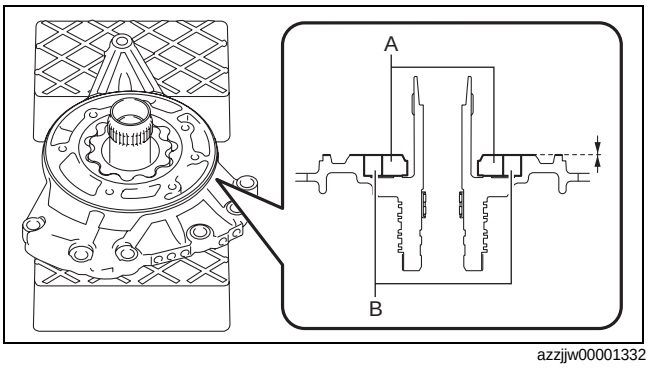
azzjjw00001331

Caution

- **To reduce error during the side clearance measurement, use the rubber plates to adjust the alignment surface of the oil pump housing with the oil pump cover so that it is level.**

4. Measure the side clearance shown in the figure in four locations (each separated by 90°) and calculate the average value.

A : Inner rotor
B : Outer rotor



azzjjw00001332

Caution

- **Measure the inner rotor and outer rotor side clearances.**

Note

- Recommended measuring instrument: Thickness gauge, straight edge ruler

Maximum:

- **Inner rotor: 0.045 mm {0.0017 in}**
- **Outer rotor: 0.050 mm {0.0019 in}**

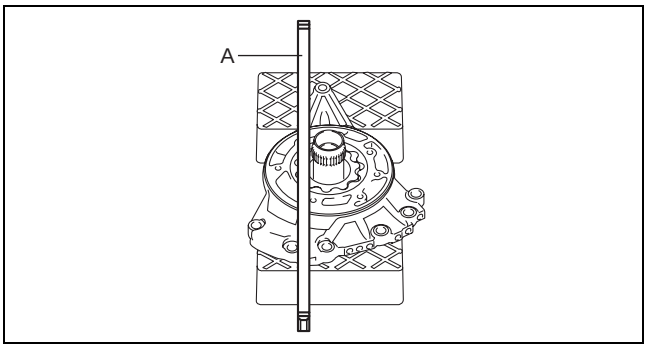
- If it is more than the maximum specification, replace the oil pump with a new one.

Note

- Measurement method

(1) Set the straight edge ruler along the alignment surface of the oil pump housing with the oil pump cover as shown in the figure.

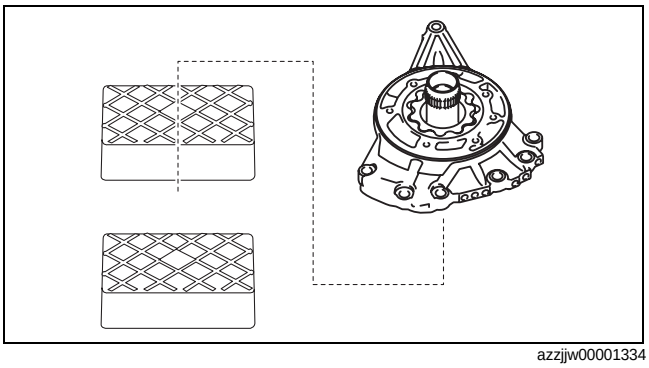
A : Straight edge ruler



azzjjw00001333

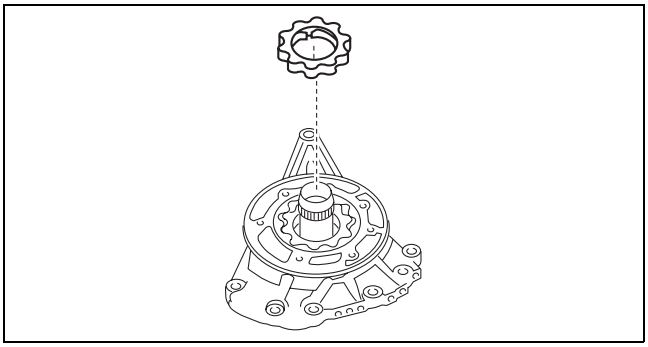
(2) Measure the gaps between the straight edge ruler and the inner rotor, and the straight edge ruler and the outer rotor using a thickness gauge.

5. Take the parts in which the side clearance has been measured off the rubber plates.



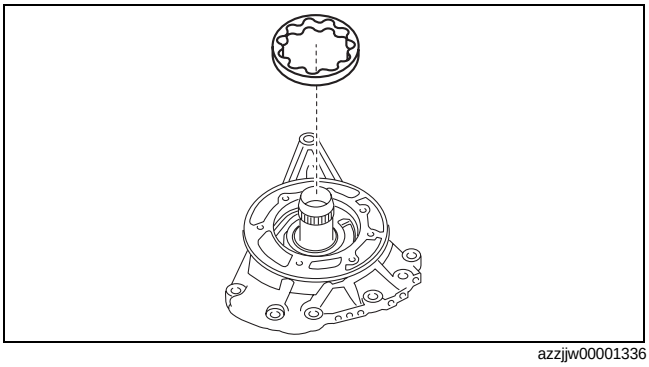
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6. Remove the inner rotor.



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7. Remove the outer rotor.



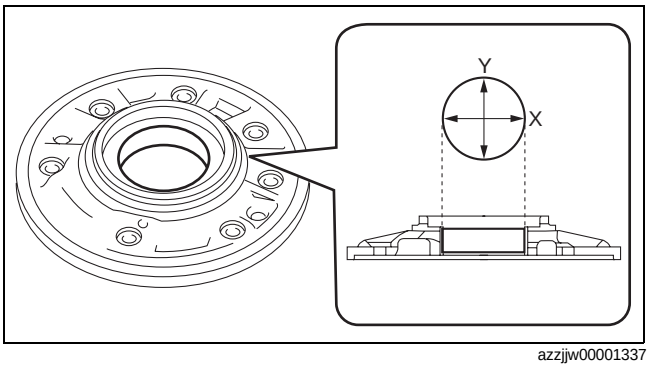
azzjjw00001336

Bush Inner Diameter Inspection (In Oil Pump Cover)

1. Measure the inner diameter of the bush shown in the figure.

   Note
   - When measuring, measure near the center of the bush avoiding the dimple, and then calculate the average value of the X and Y directions as shown in the figure.
   - Recommended measuring instrument: Cylinder gauge or caliper gauge

   Maximum:
   44.006 mm {1.7325 in}

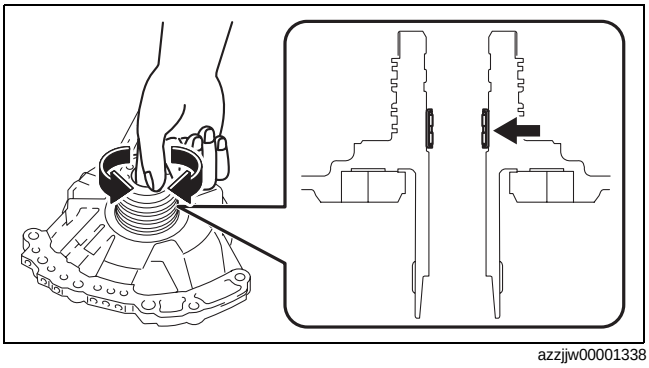


azzjjw00001337

- If it is more than the maximum specification, replace the oil pump cover with a new one.

Radial Needle Bearing Inspection (In Oil Pump Housing)

1. Rotate the radial needle bearing shown in the figure by hand and verify that there is no malfunction in the radial needle bearing (rotation sticking).
   - If there is a malfunction, replace the oil pump with a new one.



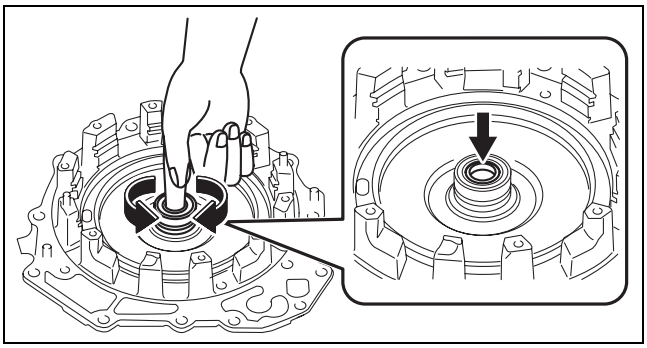
azzjjw00001338

END COVER INSPECTION

id051700663400

Radial Needle Bearing Inspection

1. Rotate the radial needle bearing shown in the figure by hand and verify that there is no malfunction in the radial needle bearing (rotation sticking).
   - If there is a malfunction, replace the end cover with a new one.

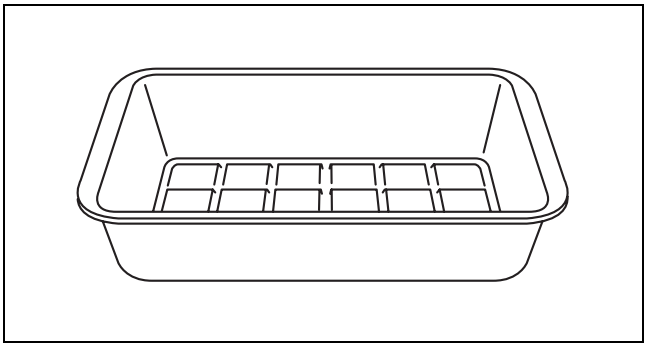


azzjjw00001340

OIL COOLER INSPECTION

id051700663500

1. Prepare a clean oil receptacle.

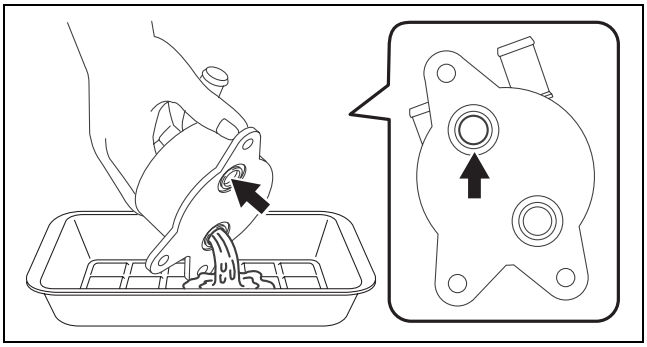


azzjjw00001341

2. Blow compressed air into the oil passage shown in the figure and drain the ATF in the oil cooler.

   Warning
   - **Always wear protective eye wear when using the air compressor. Otherwise, ATF or dirt particles blown off by the air compressor could get into the eyes.**

   Caution
   - **Perform the work at a position where the ATF in the oil cooler can be drained into a clean oil receptacle.**
   - **To prevent damage to parts, always use an air compressor which is adjusted to the indicated pressure.**



azzjjw00001342

   Compressed air pressure

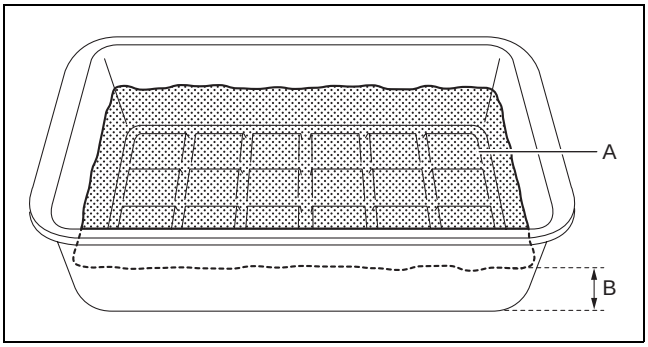
   491—882 kPa {5.01—8.99 kgf/cm^2, 71.3—127.0 psi}

3. Dispose of the ATF in the oil receptacle and clean the oil receptacle.

4. Add water into the clean oil receptacle.

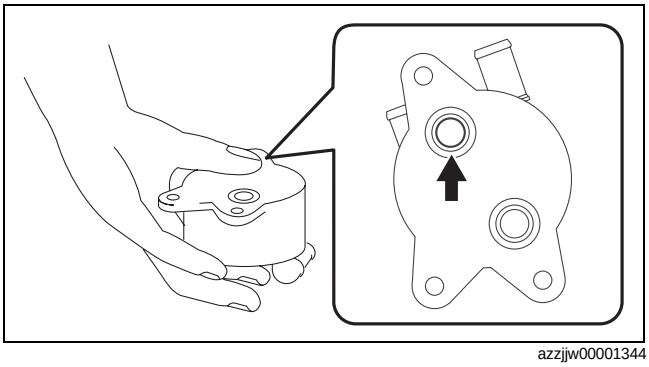
A : Water
B : Approx. 70 mm {2.8 in}

Note
- Add water until the water depth reaches approx. 70 mm {2.8 in}.



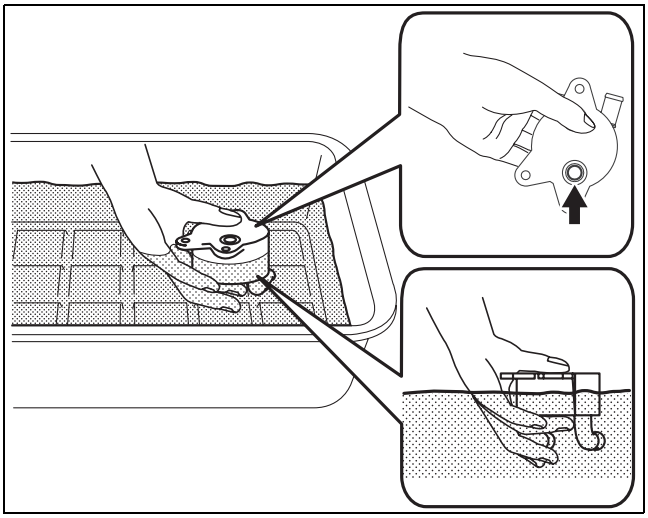
azzjjw00001343

5. Cover the oil passage by hand.

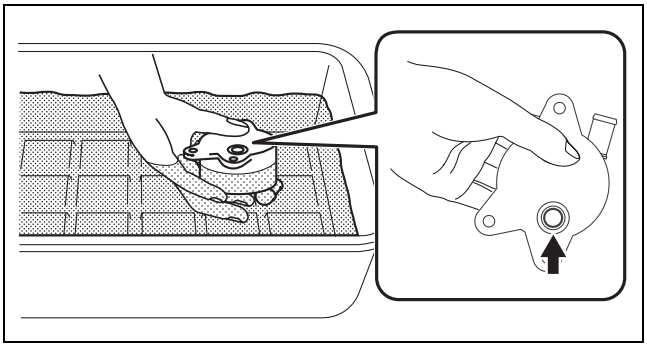

azzjjw00001344

6. Immerse the oil cooler in the water in the oil receptacle to the level shown in the figure.

Caution
- **Be careful not to allow water to penetrate the oil passage shown in the figure. If water penetrates the oil passage, flush and drain the water in the oil cooler oil passage. (See 05-17-147 OIL COOLER CLEANING.)**


azzjjw00001345

7. Blow compressed air into the oil passage shown in the figure, apply compressed air pressure to the oil cooler for 3 min, and verify that there is no air leakage from the part which was soaked in water in the oil cooler.



azzjjw00001346

Warning

- **Always wear protective eye wear when using the air compressor. Otherwise, ATF or dirt particles blown off by the air compressor could get into the eyes.**

Caution

- **To prevent damage to parts, always use an air compressor which is adjusted to the indicated pressure.**

Note

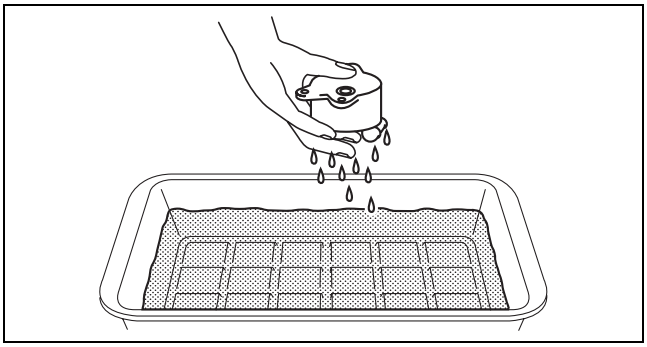
- A small amount of air leakage due to the compressed air pressure from the area where the oil passage is covered by your hand is of no concern, therefore, apply compressed air pressure to the oil cooler for 3 min.

Compressed air pressure

150—200 kPa {1.53—2.03 kgf/cm^2, 21.8—29.0 psi}

- If there is a malfunction, replace the oil cooler with a new one.

8. Remove the oil cooler from the water and wipe off any water remaining around the oil cooler.



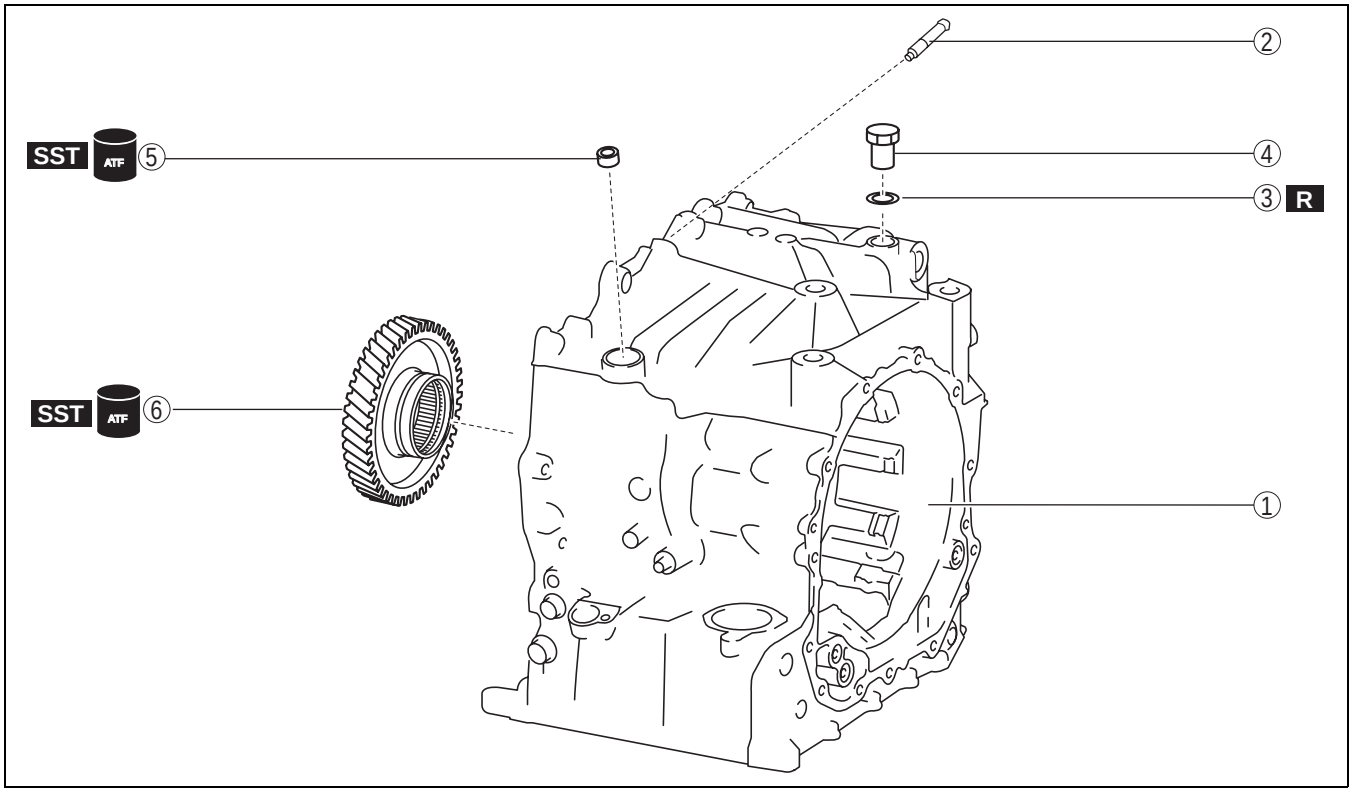
azzjjw00001347

9. Dispose of the water in the oil receptacle and clean the oil receptacle.

AUTOMATIC TRANSAXLE ASSEMBLY

id051700664400

Structural View
Automatic transaxle 1

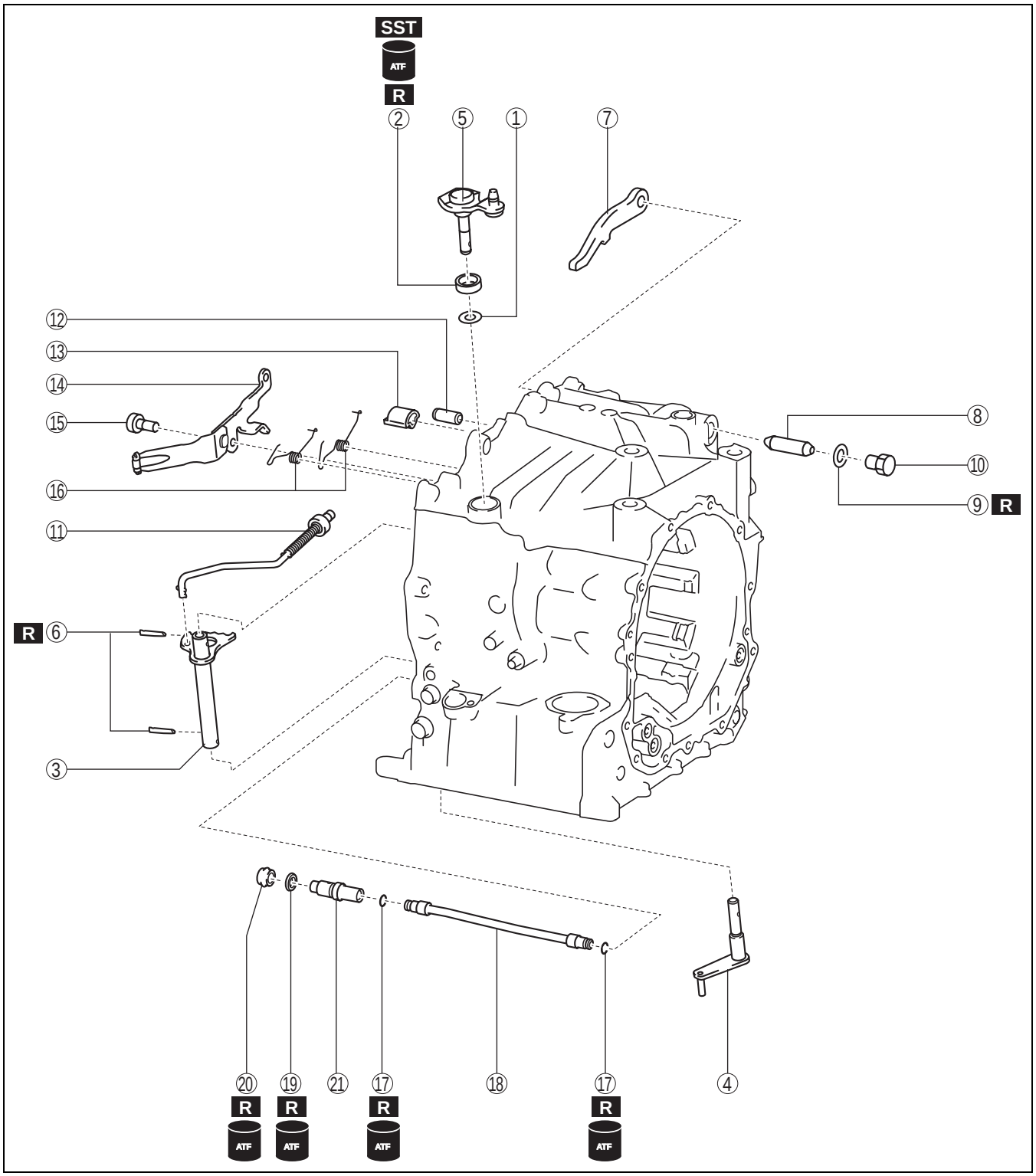


azzjjw00001554

1	Transaxle case
2	Breather pipe
3	Gasket

4	Plug (M18×1.5 bolt, length to approx. 21.5 mm {0.846 in})
5	Radial needle bearing
6	Primary gear

Automatic transaxle 2



azzjjw00001555

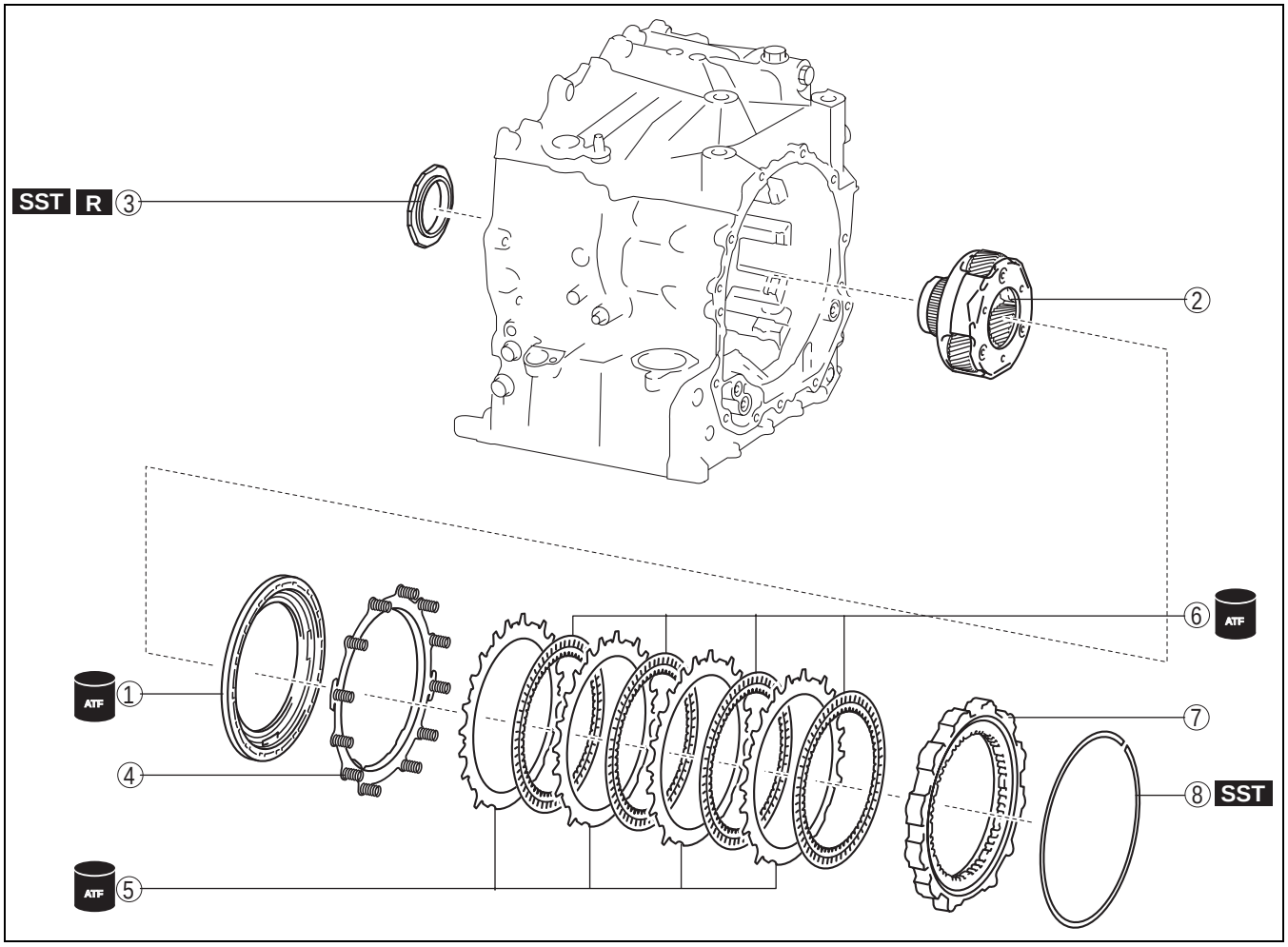
1	Washer
2	Oil seal
3	Manual plate component
4	Parking assist lever component
5	Parking shift lever component
6	Roll pin
7	Parking pawl
8	Parking pawl shaft

9	Gasket
10	Plug (M14×1.5, length to approx. 10 mm {0.39 in})
11	Parking rod component
12	Parking pawl pin
13	Support actuator
14	Detent bracket component
15	2 bolts (M8×1.25 bolt, length to approx. 16 mm {0.63 in})

16	Pawl return spring
17	O-ring (outer diameter approx. 11.6 mm {0.457 in}, thickness approx. 1.9 mm {0.075 in})
18	Oil pipe

19	Gasket
20	Gasket
21	Connector

Automatic transaxle 3

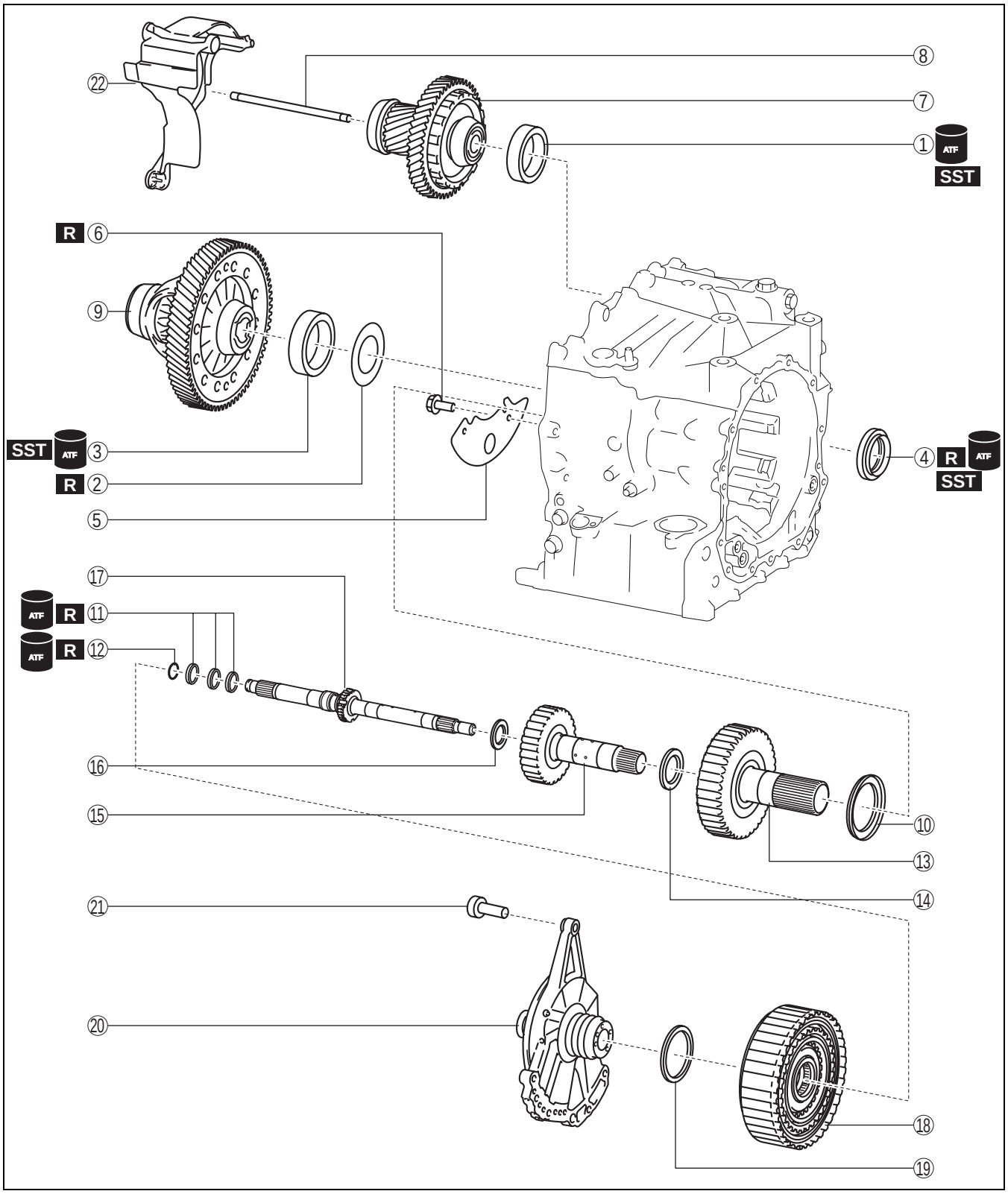


azzjjw00001556

1	Low and reverse brake piston
2	Front planetary gear
3	Locknut
4	Springs and retainer component (inner diameter approx. 152.3 mm {5.996 in})

5	Driven plate (inner diameter approx. 149.6 mm {5.890 in})
6	Drive plate (outer diameter approx. 174.1 mm {6.854 in})
7	One-way clutch
8	Snap ring (outer diameter approx. 198.0 mm {7.795 in}) (selection)

Automatic transaxle 4



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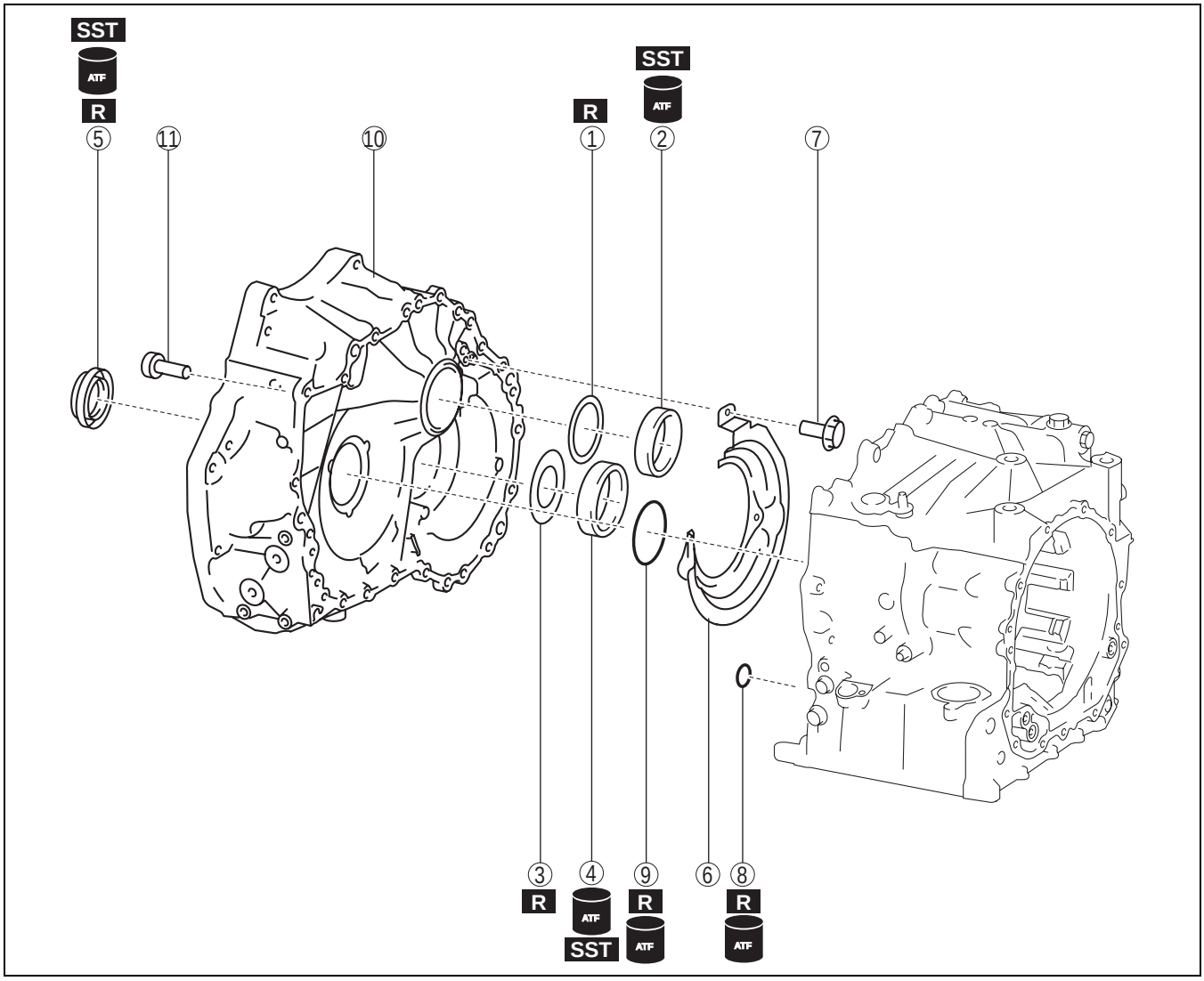
1	Bearing race (outer diameter approx. 70 mm {2.8 in})
2	Shim (outer diameter approx. 79 mm {3.1 in}, thickness approx. 0.5 mm {0.02 in})
3	Bearing race (outer diameter approx. 80 mm {3.1 in})
4	Oil seal (outer diameter approx. 63 mm {2.5 in})

5	Baffle plate
6	2 bolts (M6×1.0 bolt, length to approx. 15 mm {0.59 in}*)
7	Secondary gear and output gear
8	Oil pipe
9	Ring gear and differential

10	Thrust needle bearing (outer diameter approx. 80.3 mm {3.16 in})
11	Seal ring (outer diameter approx. 24.4 mm {0.961 in}, thickness approx. 1.5 mm {0.059 in})
12	D-ring (outer diameter approx. 16.4 mm {0.646 in}, thickness approx. 2.4 mm {0.094 in})
13	Low clutch hub
14	Thrust needle bearing (outer diameter approx. 51.3 mm {2.02 in})
15	High clutch hub
16	Thrust needle bearing (outer diameter approx. 37.3 mm {1.47 in})
17	Turbine shaft
18	Clutch component
19	Thrust needle bearing (outer diameter approx. 72.7 mm {2.86 in})
20	Oil pump
21	7 bolts (M8×1.25 bolt, length to approx. 31 mm {1.2 in})
22	Baffle plate

* : Length without spring washer is indicated due to bolt with spring washer. Length with spring washer is approx. 13 mm {0.51 in}. In addition, this bolt is applied with thread-locking compound.

Automatic transaxle 5



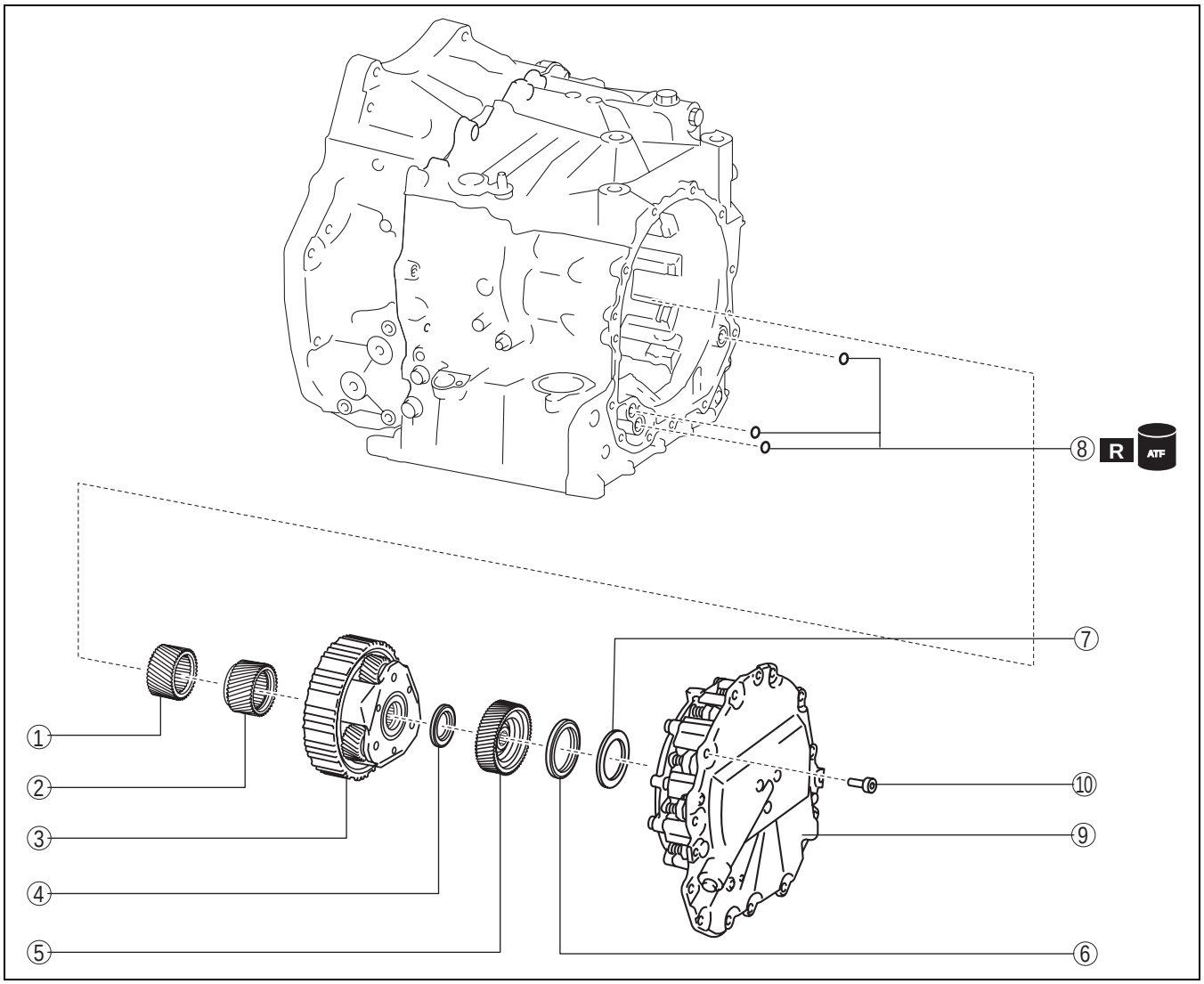
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1	Shim (outer diameter approx. 74 mm {2.9 in}) (selection)
2	Bearing race (outer diameter approx. 75 mm {3.0 in})
3	Shim (outer diameter approx. 79 mm {3.1 in}) (selection)
4	Bearing race (outer diameter approx. 80 mm {3.1 in})
5	Oil seal (outer diameter approx. 65 mm {2.6 in})
6	Baffle plate
7	3 bolts (M6×1.0 bolt, length to approx. 14 mm {0.55 in})
8	O-ring (outer diameter approx. 15.6 mm {0.614 in}, thickness approx. 2.4 mm {0.094 in})

9	O-ring (outer diameter approx. 73.3 mm {2.89 in}, thickness approx. 3.0 mm {0.12 in})
10	Converter housing
11	24 bolts * (M8×1.25 bolt, length to approx. 28 mm {1.1 in})

* : Of the 24 bolts, 6 are applied with sealant

Automatic transaxle 6

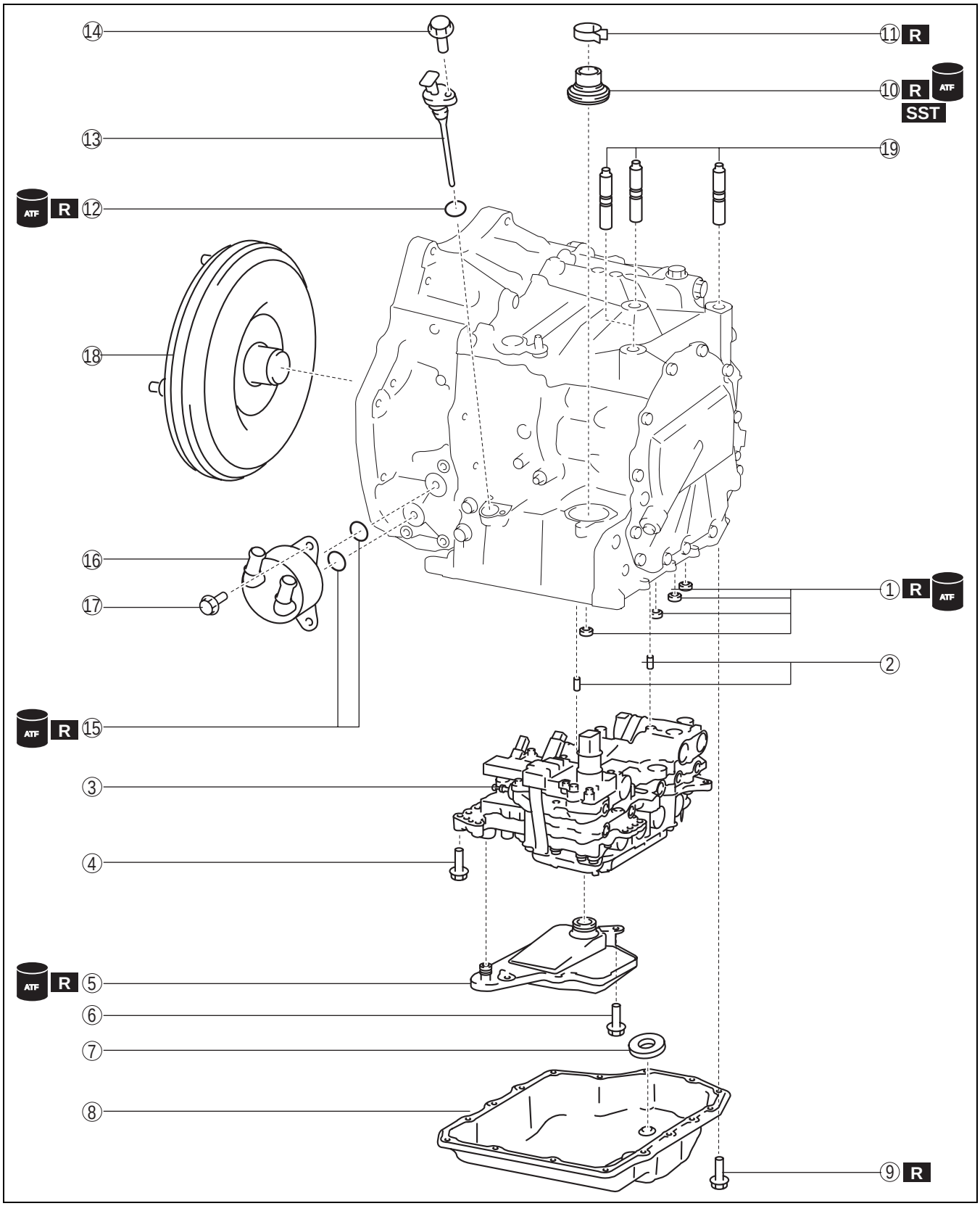


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1	Front sun gear
2	Rear sun gear
3	Rear planetary gear
4	Thrust needle bearing (outer diameter approx. 44 mm {1.7 in})
5	Reduction sun gear
6	Thrust needle bearing (outer diameter approx. 61.5 mm {2.42 in})
7	Shim (outer diameter approx. 59.5 mm {2.34 in}) (selection)
8	O-ring (outer diameter approx. 15.6 mm {0.614 in}, thickness approx. 2.4 mm {0.094 in})
9	End cover component
10	12 bolts * (M8×1.25 bolt, length to approx. 21 mm {0.83 in})

* : Of the 12 bolts, 2 are applied with sealant

Automatic transaxle 7



bfw1ua00000002

1	Gasket
2	Dowel pin
3	Control valve body
4	11 bolts (M6×1.0 bolt, length to approx. 30 mm {1.2 in})
5	Oil strainer
6	2 bolts (M6×1.0 bolt, length to approx. 16 mm {0.63 in})
7	Magnet
8	Oil pan
9	16 bolts (M6×1.0 bolt, length to approx. 15 mm {0.59 in}*)
10	Oil seal
11	Hose clamp
12	O-ring (outer diameter approx. 16.6 mm {0.654 in}, thickness approx. 2.4 mm {0.094 in})
13	Dipstick
14	Bolt (M6×1.0 bolt, length to approx. 16 mm {0.63 in})
15	O-ring (outer diameter approx. 24.4 mm {0.961 in}, thickness approx. 2.4 mm {0.094 in})
16	Oil cooler
17	3 bolts (M8×1.25 bolt, length to approx. 25 mm {0.98 in})
18	Torque converter
19	Stud bolt

* : Length without spring washer is indicated due to bolt with spring washer. Length with spring washer is approx. 13 mm {0.51 in}.

Assembly Procedure

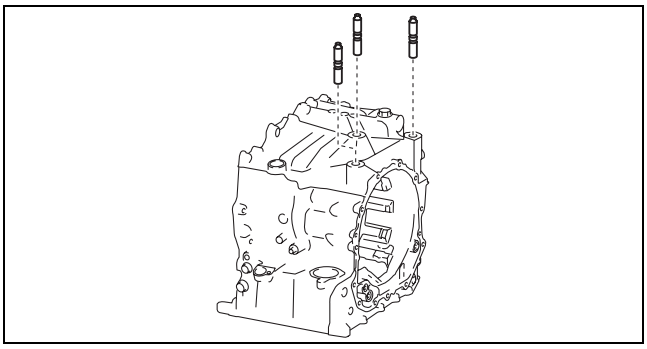
1. Assemble the parts in the following order.

Note

- Assemble the parts in the following order because the parts in the transaxle may be used for measurement/adjustment.

(1) Oil pump (See 05-17-243 OIL PUMP ASSEMBLY)
(2) Clutch component (See 05-17-247 CLUTCH COMPONENT ASSEMBLY)
(3) Rear planetary gear (See 05-17-259 REAR PLANETARY GEAR ASSEMBLY)
(4) Reduction planetary gear (See 05-17-261 REDUCTION PLANETARY GEAR ASSEMBLY)
(5) Secondary gear and output gear (See 05-17-263 SECONDARY GEAR AND OUTPUT GEAR ASSEMBLY)
(6) Ring gear and differential (See 05-17-266 RING GEAR AND DIFFERENTIAL ASSEMBLY)
(7) End cover component (See 05-17-273 END COVER COMPONENT ASSEMBLY)
(8) Control valve body (See 05-17-288 CONTROL VALVE BODY ASSEMBLY)

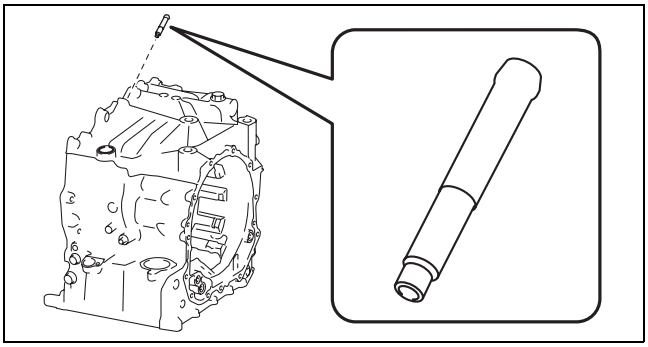
2. If the transaxle case is replaced with a new one, perform the following procedure:
   (1) Remove the stud bolts.



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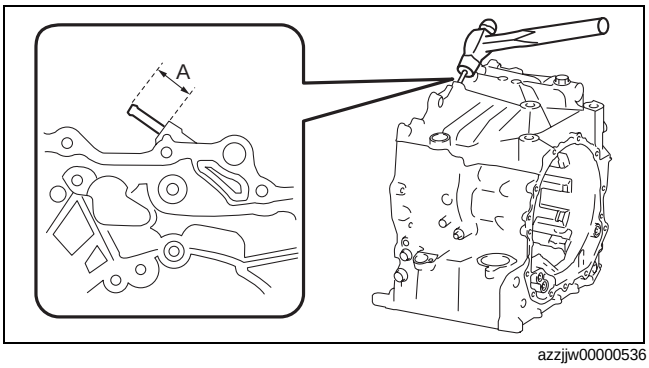
(2) Assemble a new breather pipe to the position shown in the figure.

Note
- Lightly tap and assemble so as not damage the breather pipe.



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A : 25—27 mm {1.0—1.06 in}



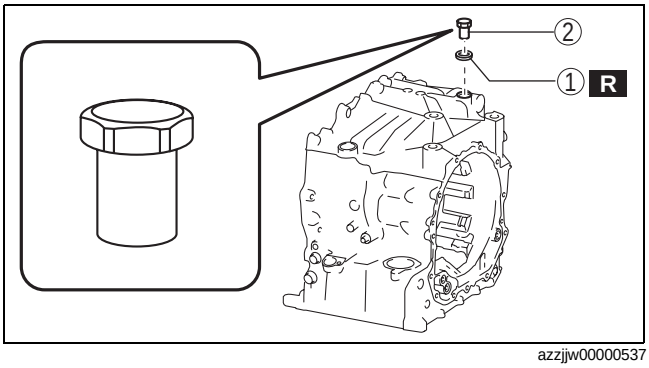
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(3) Assemble the plug and new gasket in the order shown in the figure..

1	Gasket
2	Plug (M18×1.5 bolt, length to approx. 21.5 mm {0.846 in})

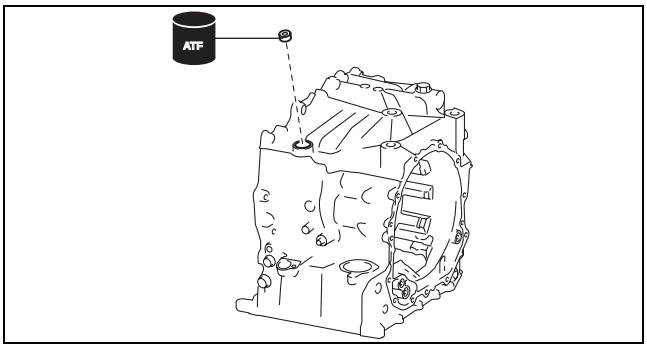
Caution
- **If a gasket is reused it could cause ATF leakage, therefore use a new gasket.**

Plug tightening torque
39—59 N·m {4.0—6.0 kgf·m, 29—43 ft·lbf}



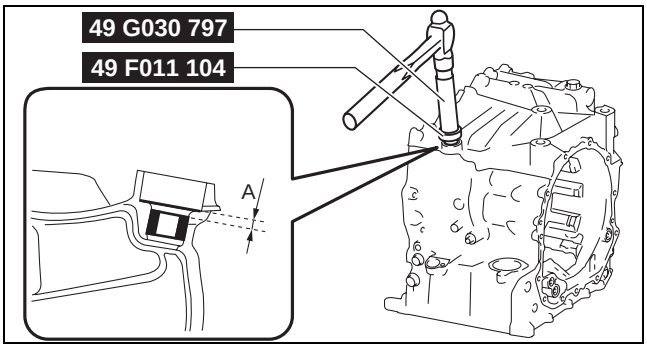
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(4) Assemble a new radial needle bearing using the following procedure:
1) Apply ATF (ATF FZ) to the engagement area of the new radial needle bearing and transaxle case.
2) Assemble the new radial needle bearing to the position shown in the figure using the SSTs.



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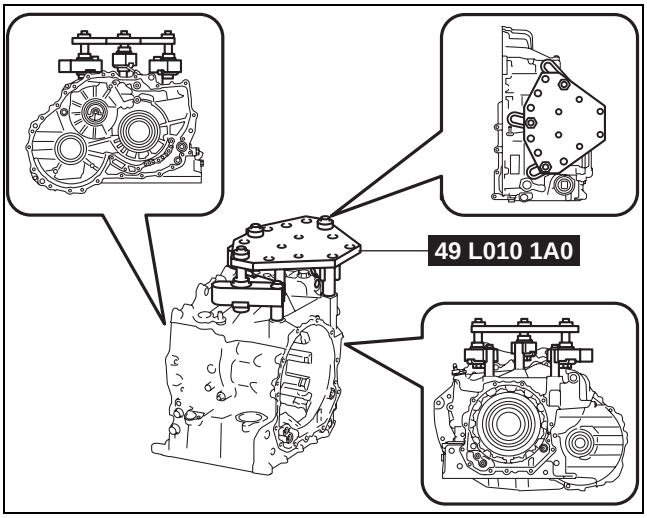
A : 1.9—2.9 mm {0.08—0.11 in}



azzjjw00001253

3. Install the transaxle case to the SST (engine stand) using the following procedure:
(1) Install the SSTs to the transaxle case using the following procedure.

Note
- When installing the SST (49 L010 1A0) to the transaxle case (stud bolt holes), use part number: 9YA02 1440 or M14×1.5 bolts, length to 100 mm {3.94 in}.
- When installing the SST (49 UN30 3050) to the transaxle case, use part number: 9YA02 1015, or M10×1.5 bolts, length to 35 mm {1.4 in}.

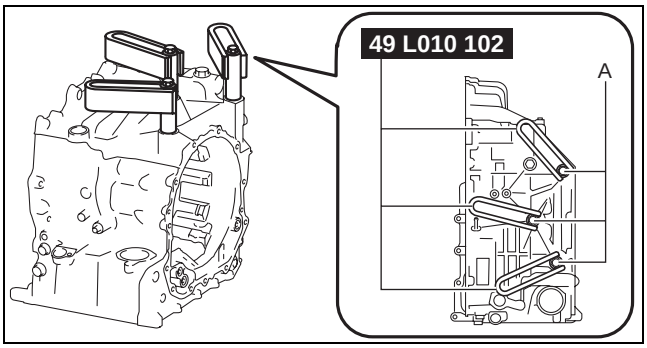


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1) Temporarily install the arms (49 L010 102) using part number: 9YA02 1440, or M14×1.5 bolts, length to 100 mm {3.94 in}.

A : Part number: 9YA02 1440, or M14×1.5 bolt, length to 100 mm {3.94 in}

Note
- To adjust the installation position of the SST in Step 3), temporarily tighten the bolts.

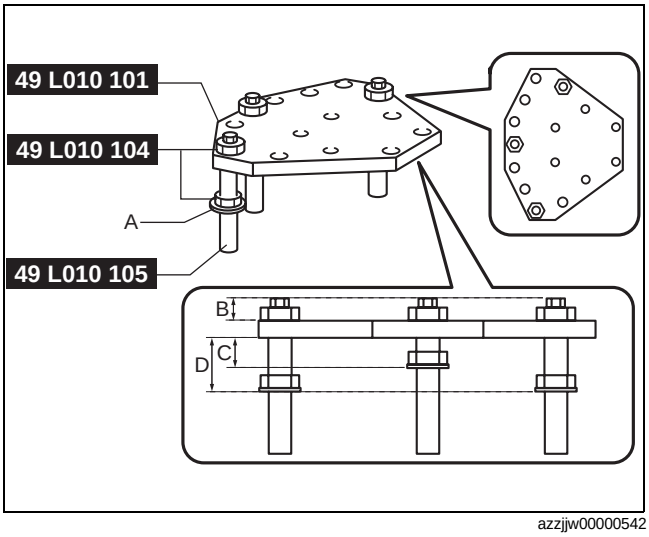


azzjjw00000541

2) Assemble the SST (49 L010 1A0).

A : Washer
B : Approx. 20 mm {0.79 in}
C : Approx. 26 mm {1.0 in}
D : Approx. 47 mm {1.9 in}

Note
- Use bolts (49 L010 105) with a length of 138 mm {5.43 in}.

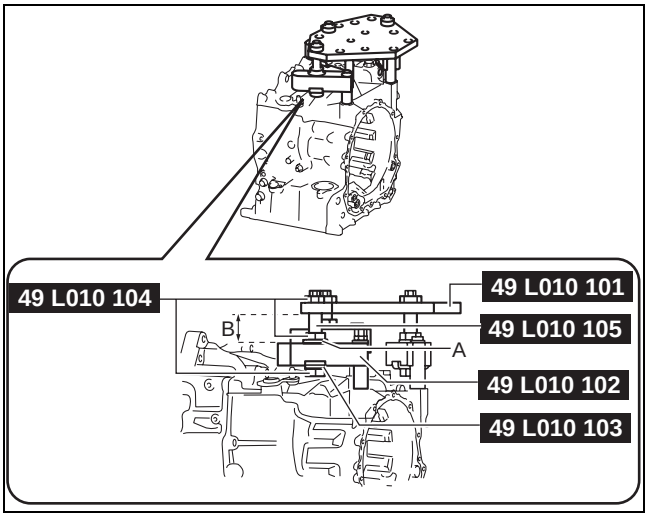


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3) Install the SST assembled in Step 2).

A : Washer
B : Level out

Note
- Adjust so that the plate (49 L010 101) and arms (49 L010 102) are level, and install.



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4) Verify that nothing other than the SST arms (49 L010 102) installation area contacts the transaxle case and breather pipe.

Caution
- **If something other than the SST arms (49 L010 102) installation area contacts the transaxle case and breather pipe, readjust the SST to prevent damaging the part.**

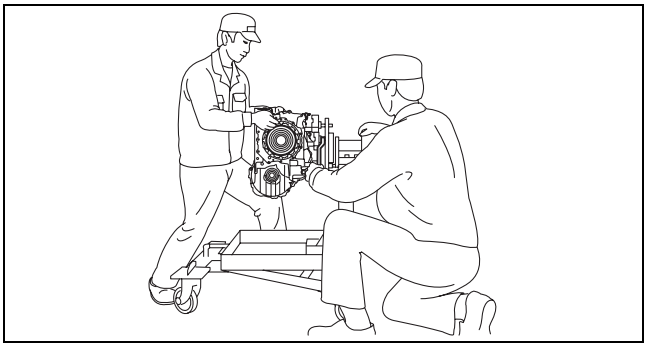
5) Tighten the nuts and bolts.

Tightening torque
- **Bolt: Part number: 9YA02 1440, or M14×1.5 bolt, length to 100 mm {3.94 in}**
  40—52 N·m {4.1—5.3 kgf·m, 30—38 ft·lbf}
- **Nut: 49 L010 104**
  140—160 N·m {15—16 kgf·m, 104—118 ft·lbf}

(2) Install the transaxle case to the SST (engine stand) using part number: 9YA02 A220, or M12×1.75 bolts, length to 40 mm {1.6 in}.

Caution
- **For safety purposes, perform the procedure using two people, one installs the transaxle case to the SST and the other supports the transaxle case.**

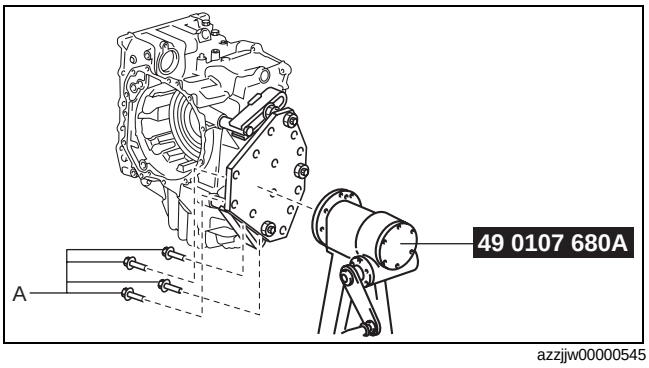
Note
- Tighten the four locations with bolts and securely install the transaxle case to the SST (engine stand).



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A : Part number: 9YA02 A220, or M12×1.75 bolt, length to 40 mm {1.6 in}

Tightening torque
88—118 N·m {9.0—12 kgf·m, 65—87 ft·lbf}

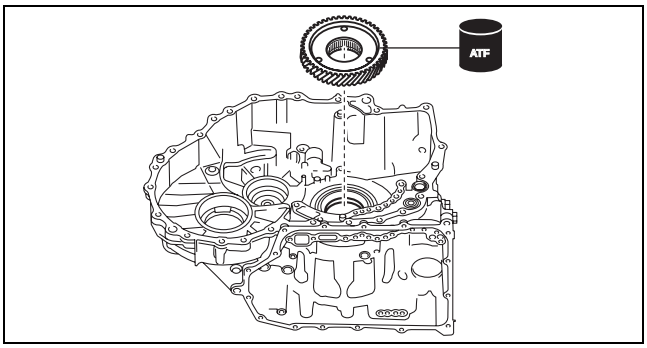


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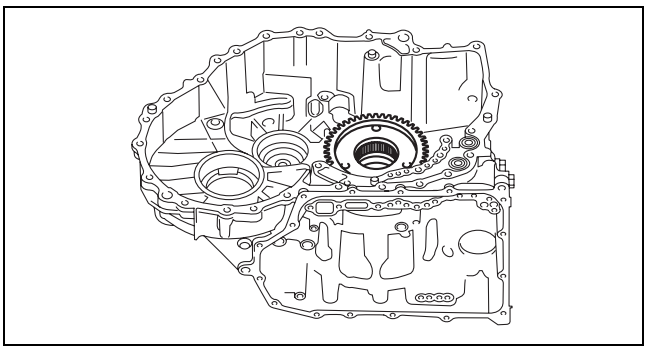
4. Assemble the primary gear using the following procedure:

Note
- Perform this procedure only if the transaxle case is replaced with a new one.

(1) Apply ATF (ATF FZ) to the engagement area of the primary gear and angular contact ball bearing.
(2) Assemble the primary gear on the angular contact ball bearing.

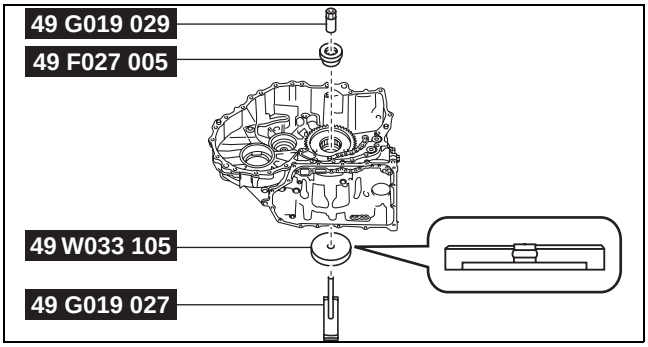


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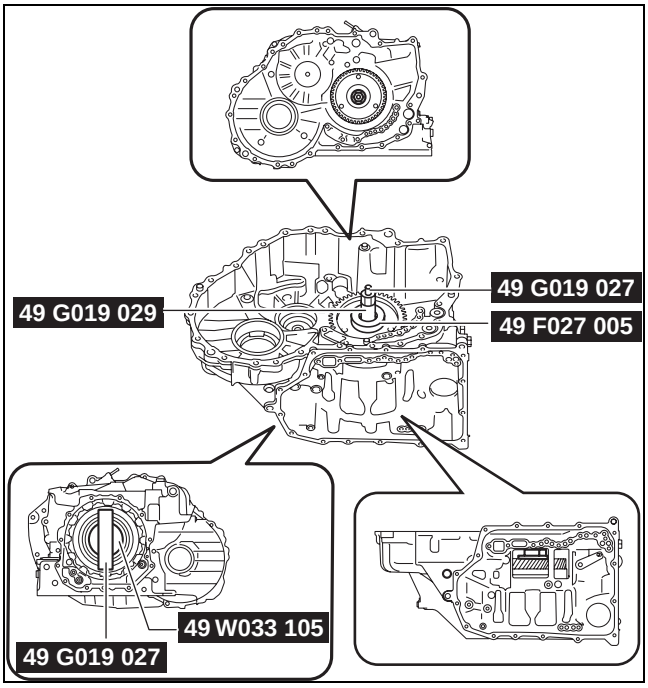


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(3) Install the SSTs.

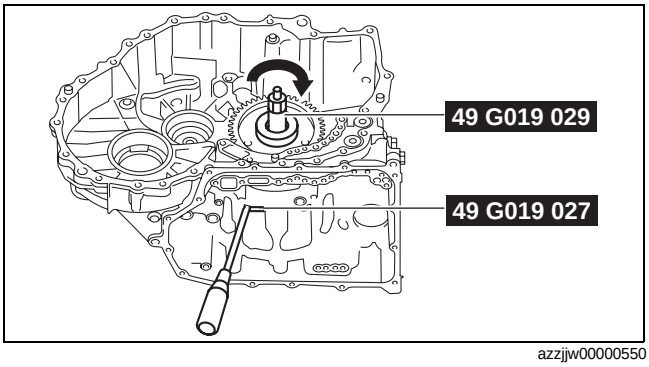


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(4) Lock the SST (49 G019 027) against rotation using a flathead screwdriver, tighten the SST (49 G019 029), and assemble the primary gear.

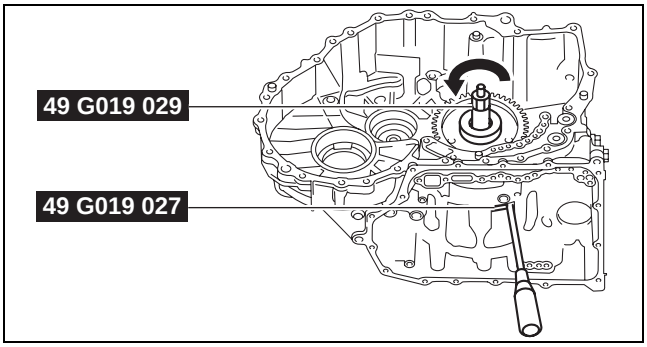


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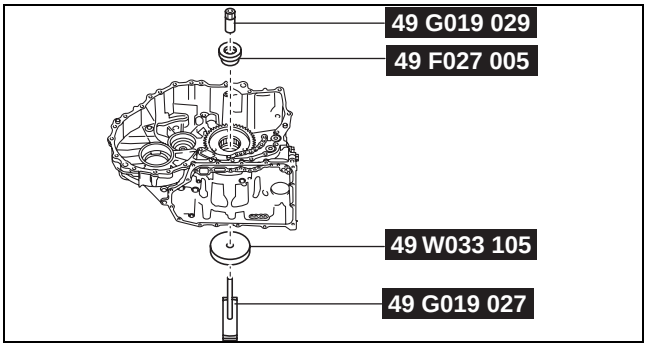
(5) Loosen the SST (49 G019 029) and remove the SSTs.

Note

- Lock the SST (49 G019 027) against rotation using a flathead screwdriver and loosen the SST (49 G019 029).

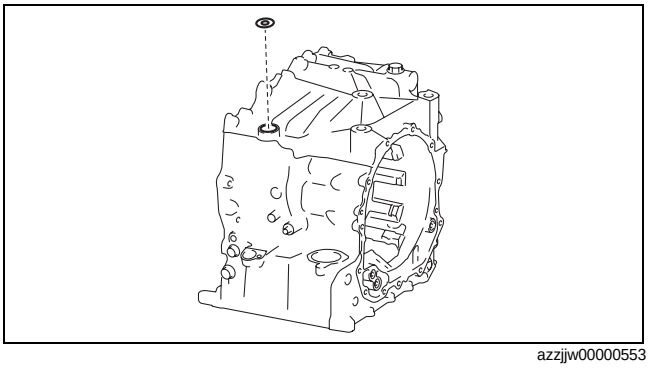


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5. Assemble the washer.

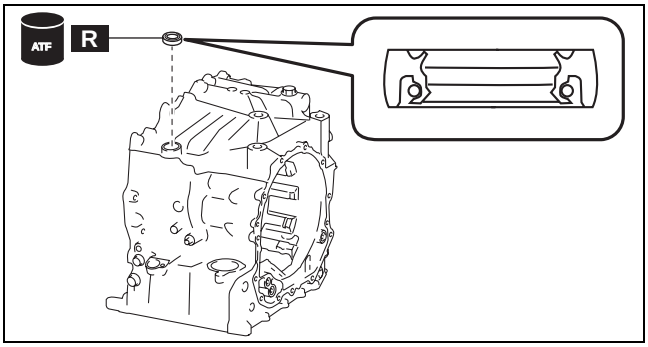


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6. Assemble a new oil seal using the following procedure:

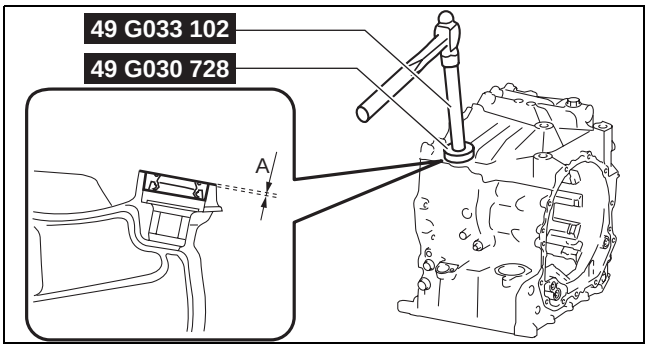
Caution
- **If an oil seal is reused it could cause ATF leakage, therefore use a new oil seal.**

(1) Apply ATF (ATF FZ) to the engagement area of the new oil seal and transaxle case.
(2) Apply ATF (ATF FZ) to the lip of the new oil seal.
(3) Assemble the new oil seal to the position shown in the figure using the SSTs.



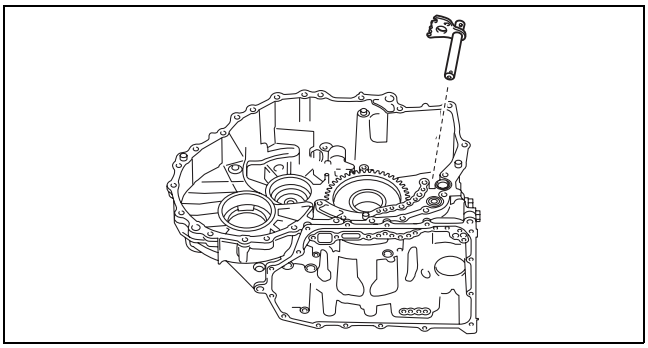
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A : –0.3—0.3 mm {–0.01—0.01 in}

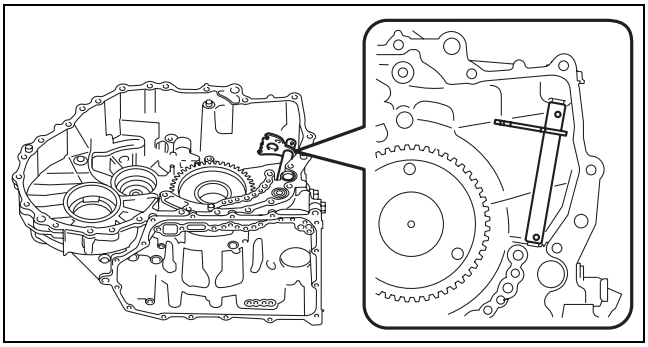


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7. Assemble the manual plate component.



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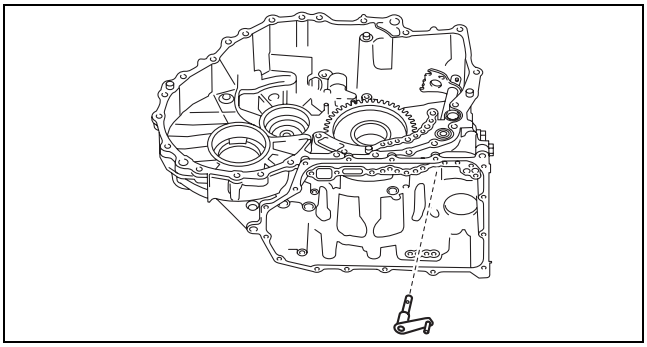


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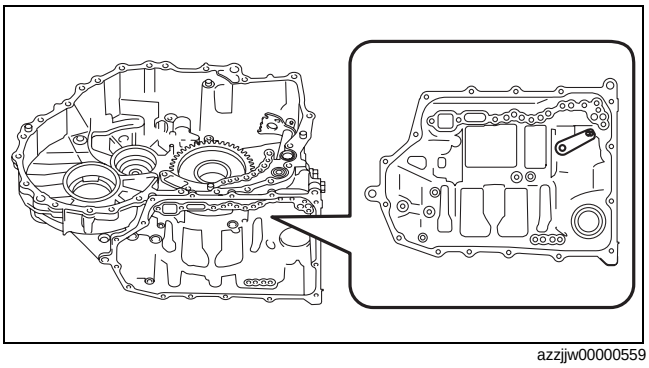
8. Assemble the parking assist lever component.

Note

- Pass the end of the parking assist lever component through the assembly hole of the transaxle case, and assemble it to the manual plate component.



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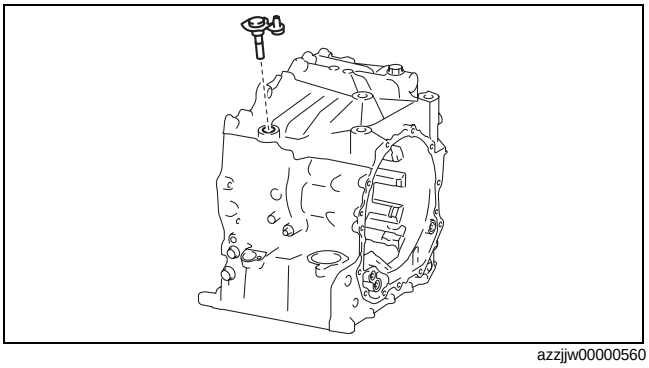


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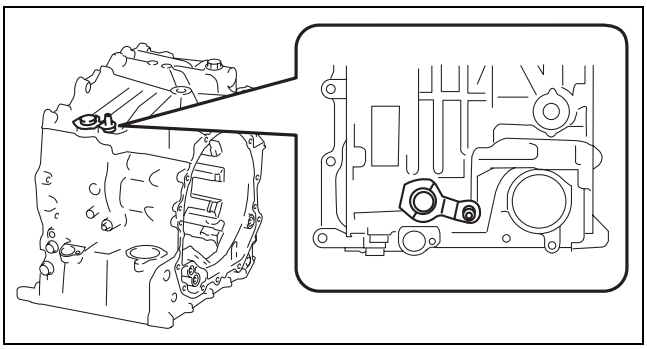
9. Assemble the parking shift lever component.

Note

- Pass the end of the parking shift lever component through the assembly hole (radial needle bearing) of the transaxle case, and assemble it to the manual plate component.



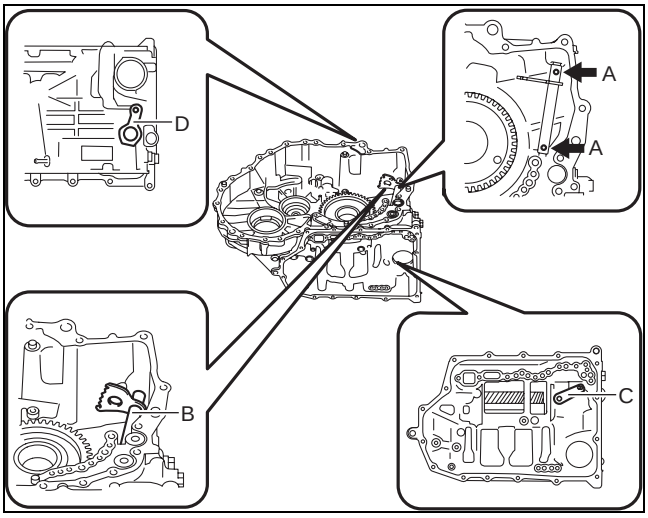
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10. Assemble the new roll pins using the following procedure:
    (1) Set the manual plate component, parking assist lever component, and the parking shift lever component as shown in the figure and align with the roll pin hole.

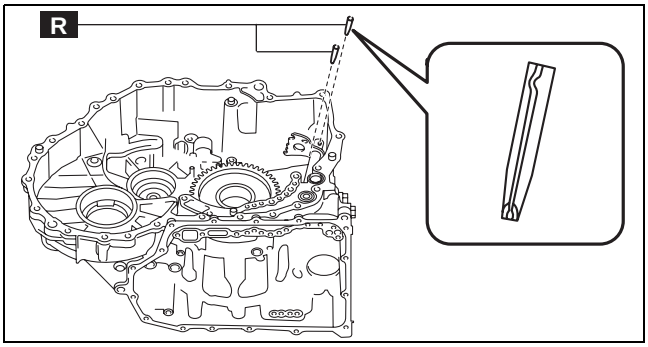
A : Roll pin hole
B : Manual plate component
C : Parking assist lever component
D : Parking shift lever component



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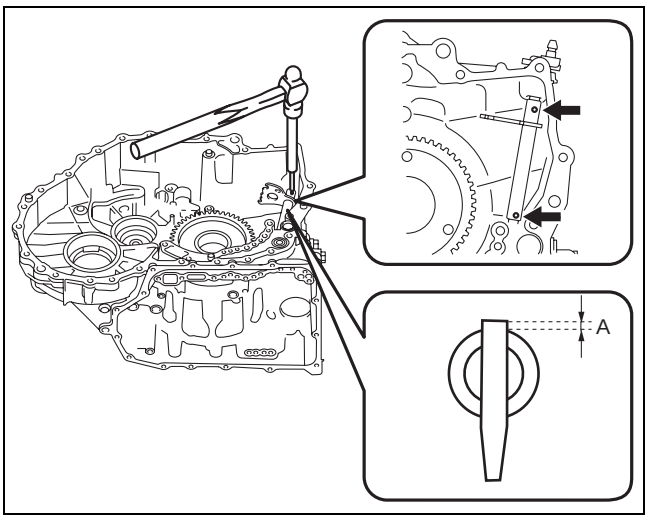
    (2) Assemble the new roll pins to the position shown in the figure using a pin punch.

Note
- Use a pin punch with an end outer diameter of 5 mm {0.197 in} or more.



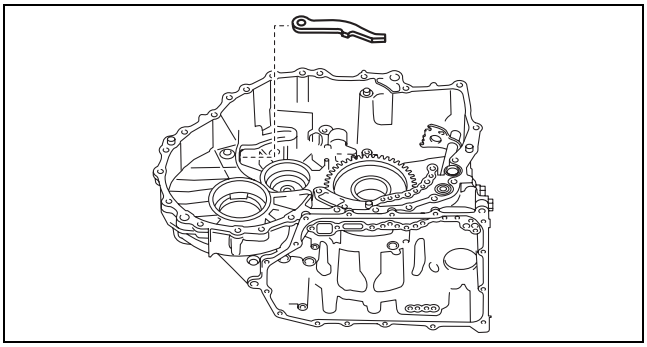
azzjjw00001562

A : 0—1 mm {0—0.03 in}

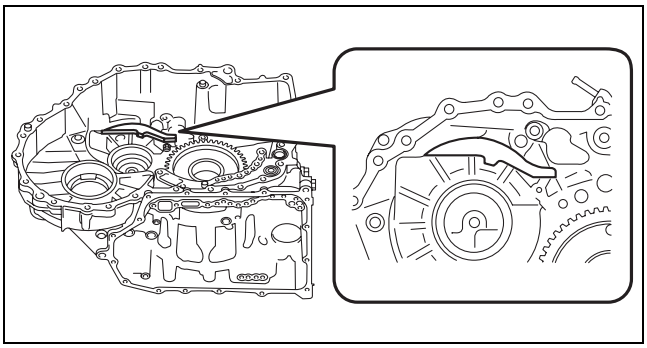


azzjjw00000564

11. Assemble the parking pawl.



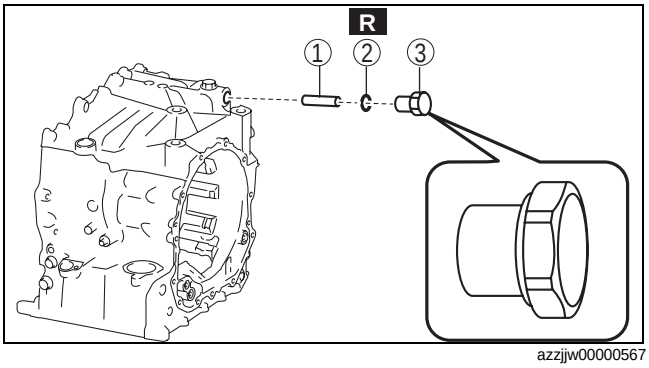
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azzjjw00000566

12. Assemble the parking pawl shaft using the procedure shown in the figure..

1	Parking pawl shaft
2	Gasket
3	Plug (M14×1.5, length to approx. 10 mm {0.39 in})



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Caution

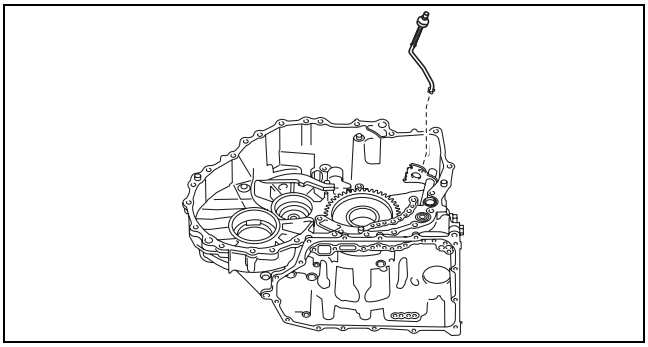
- **If a gasket is reused it could cause ATF leakage, therefore use a new gasket.**

Note

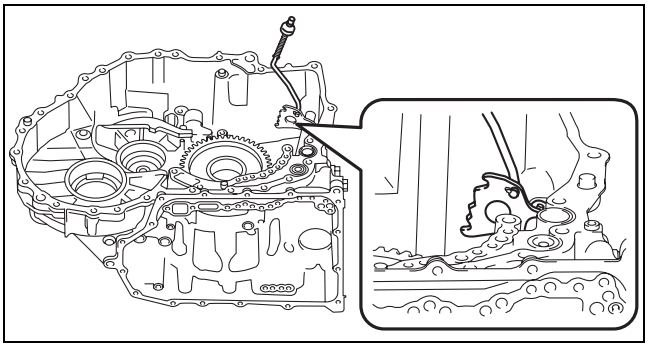
- Pass the parking pawl shaft through the assembly holes of the transaxle case and the parking pawl and assemble.

Plug tightening torque
20—29 N·m {2.1—2.9 kgf·m, 15—21 ft·lbf}

13. Assemble the parking rod component using the following procedure:
    (1) Align the parking rod component projection to the key hole of the manual plate component and assemble.

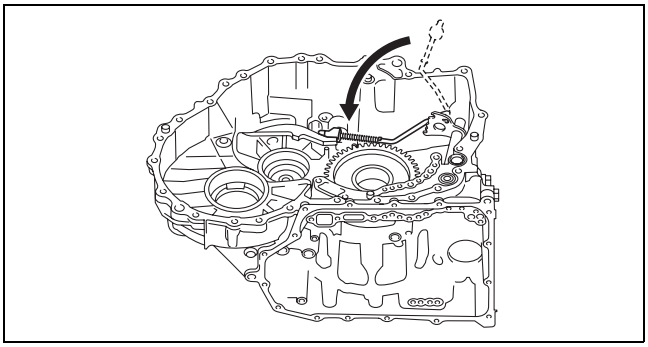


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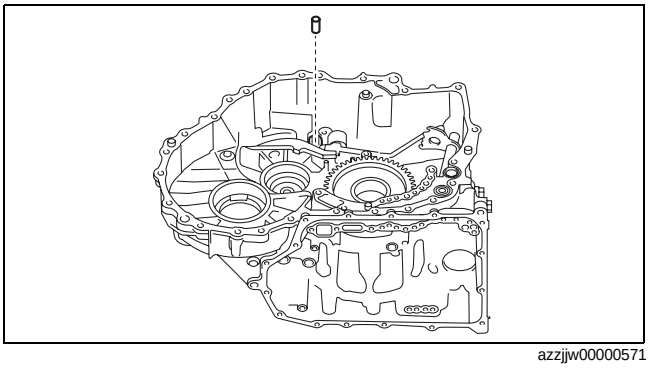
azzjjw00000569

    (2) Rotate the parking rod component as shown in the figure.

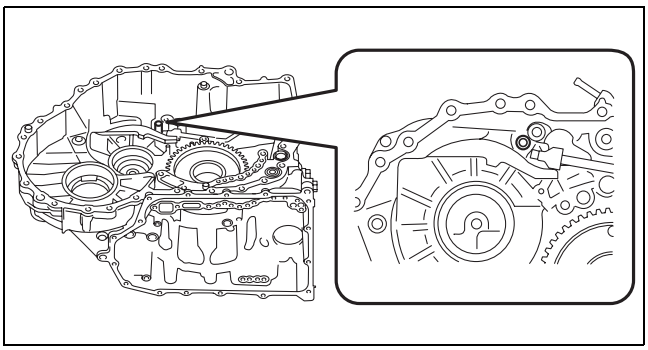


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14. Assemble the parking pawl pin.

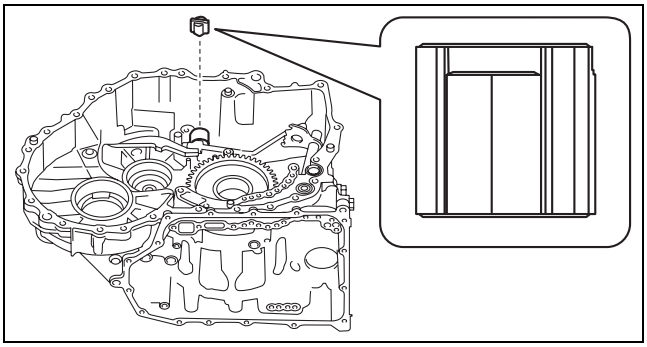


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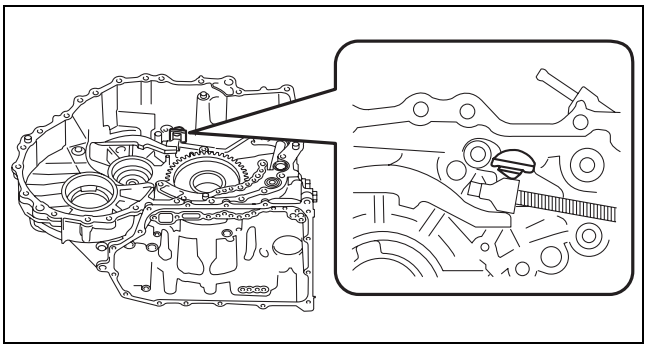


azzjjw00000572

15. Assemble the support actuator.



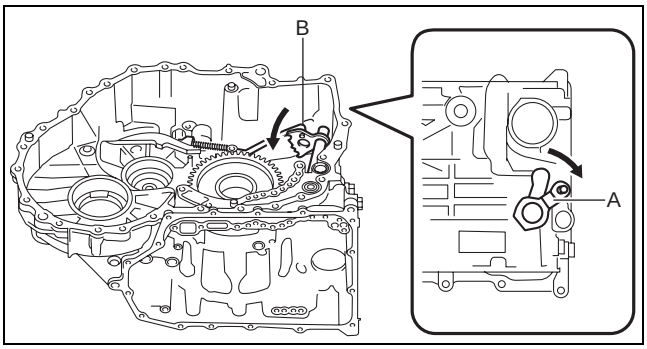
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azzjjw00000574

16. Assemble the detent bracket component using the following procedure:
    (1) Rotate the parking shift lever component (manual plate component) as shown in the figure.

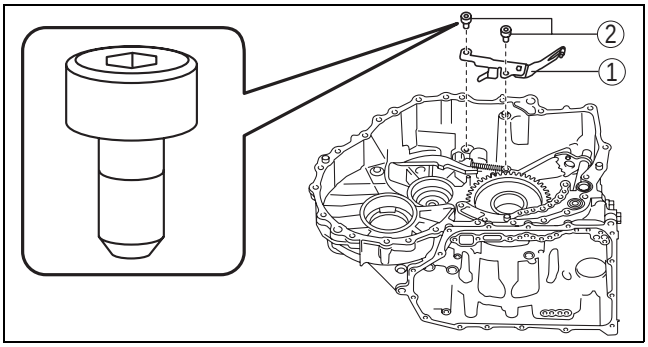
A : Parking shift lever component
B : Manual plate component



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(2) Assemble the detent bracket component using the procedure shown in the figure..

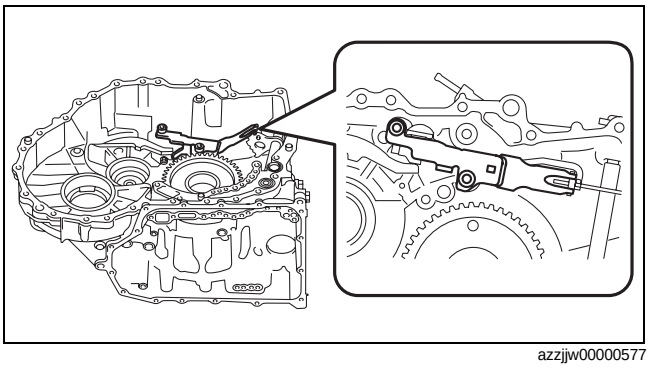
1	Detent bracket component
2	Bolt (M8×1.25 bolt, length to approx. 16 mm {0.63 in})



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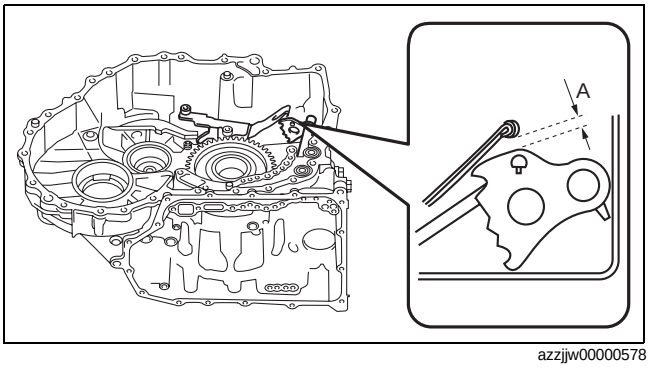
Caution

- **When tightening bolts, verify that the detent bracket component does not interfere with the manual plate component to prevent damaging the part.**


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A : Gap

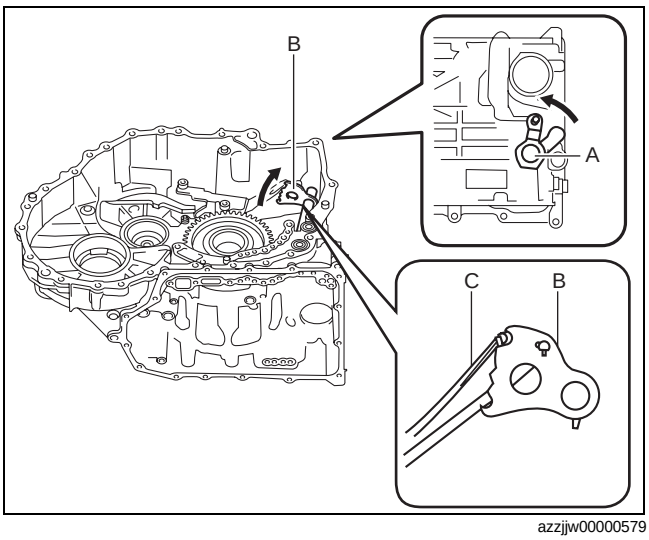
Detent bracket component assembly bolt tightening torque
11—14 N·m {113—142 kgf·cm, 98—123 in·lbf}



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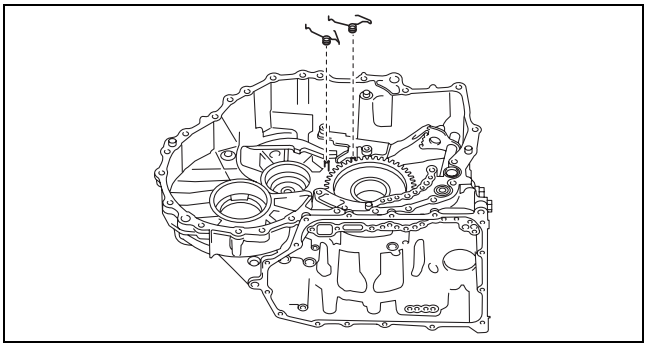
(3) Rotate the parking shift lever component (manual plate component) as shown in the figure, and align the detent bracket component with the groove of the manual plate component.

A : Parking shift lever component
B : Manual plate component
C : Detent bracket component

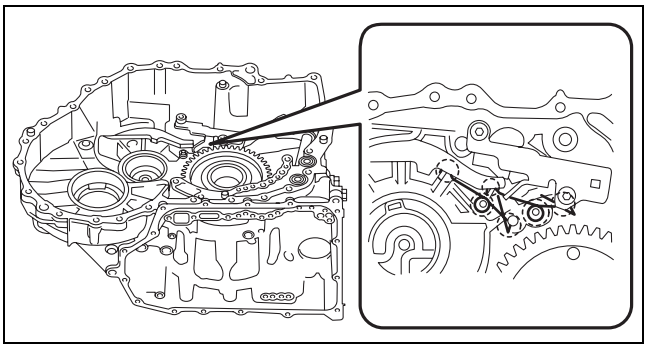


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17. Assemble the pawl return springs using the following procedure:
    (1) Assemble the pawl return springs.



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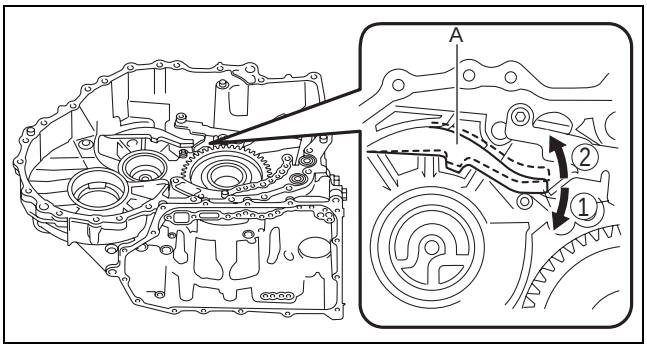


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    (2) To verify that the parts are securely assembled, move the parking pawl in the direction of (1) by hand, and verify that the parking pawl returns to its original position (direction (2)) when removing your hand.

A : Parking pawl

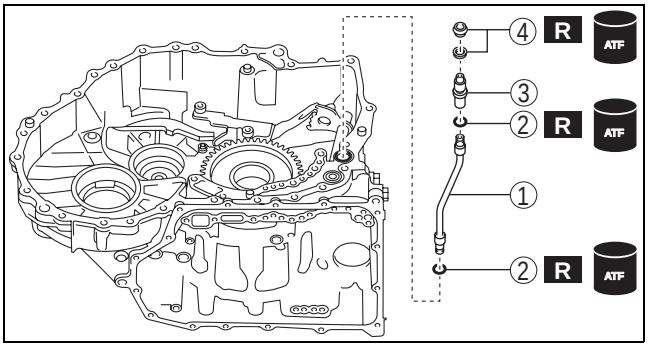
- If there is a malfunction, remove the pawl return springs and reassemble.



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18. Assemble the connector, new gaskets, the oil pipe, and new O-rings using the following procedure:.

1	Oil pipe
2	O-ring (outer diameter approx. 11.6 mm {0.457 in}, thickness approx. 1.9 mm {0.075 in})
3	Connector
4	Gasket



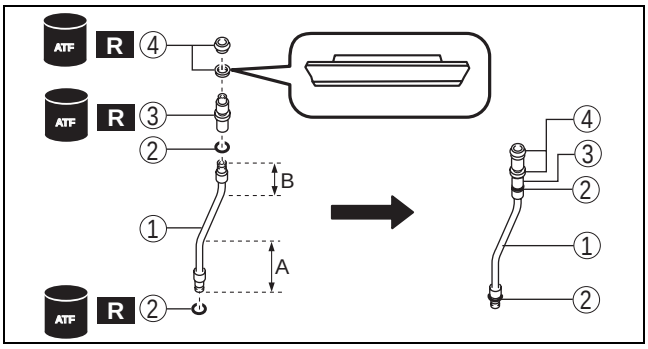
azzjjw00000727

Caution
- **If a gasket is reused it could cause ATF leakage, therefore use a new gasket.**
- **If an O-ring is reused it could cause ATF leakage, therefore use a new O-ring.**

(1) Apply ATF (ATF FZ) to the new gaskets and new O-rings.
(2) Assemble the connector, new gaskets, the oil pipe, and new O-rings using the following procedure:

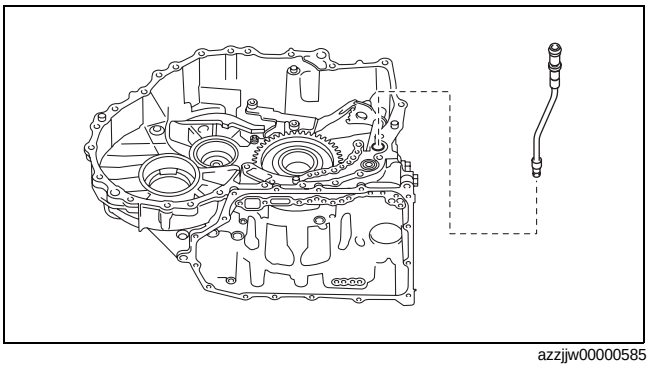
1	Oil pipe
2	O-ring (outer diameter approx. 11.6 mm {0.457 in}, thickness approx. 1.9 mm {0.075 in})
3	Connector
4	Gasket

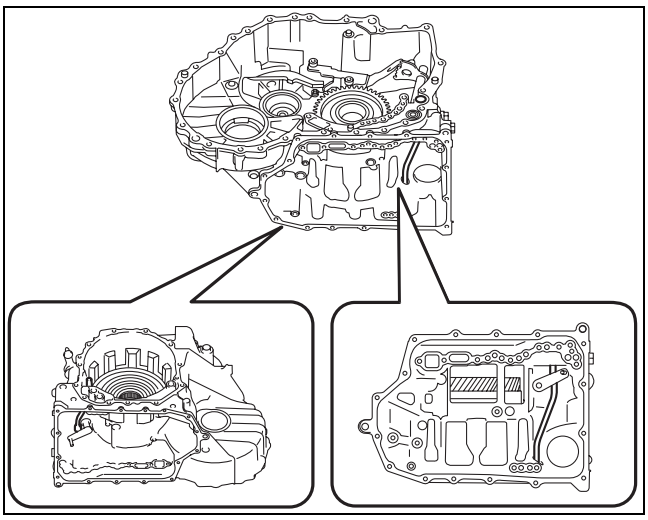
A : Long
B : Short



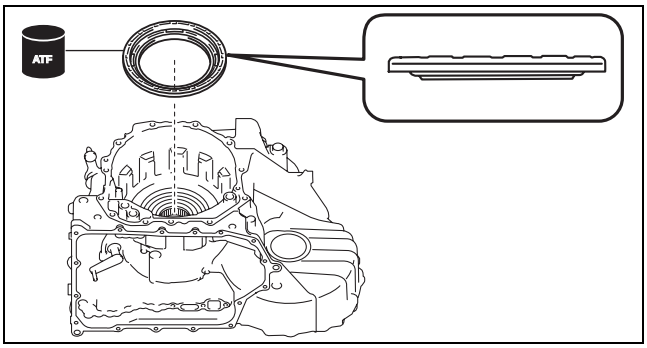
azzjjw00000728

(3) Assemble the parts assembled together in Step (2).

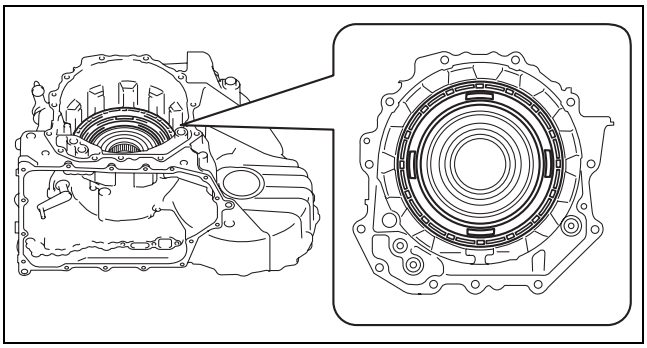

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19. Assemble the low and reverse brake piston using the following procedure:
    (1) Apply ATF (ATF FZ) to the lip of the low and reverse brake piston.
    (2) Assemble the low and reverse brake piston.



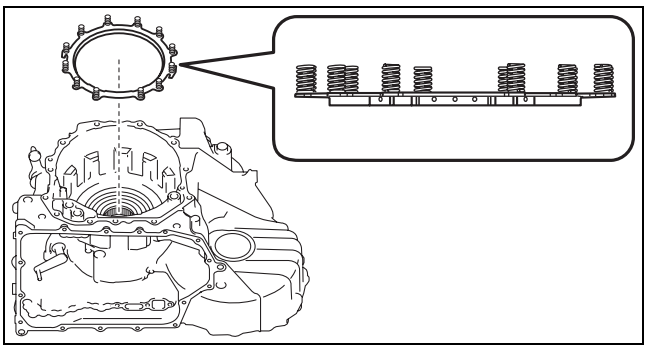
azzjjw00000587



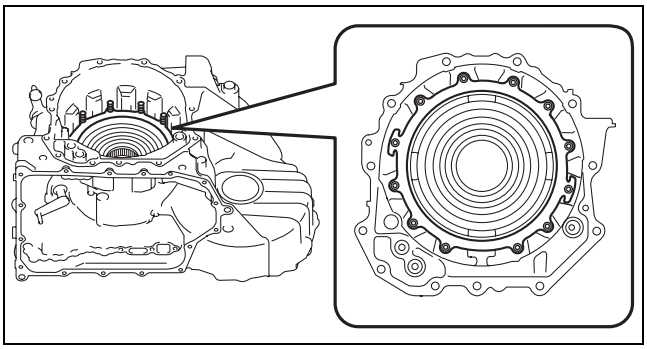
azzjjw00000588

20. Assemble the springs and retainer component.

Note
- Springs and retainer component size: Inner diameter approx. 152.3 mm {5.996 in}



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21. Assemble the drive plates and driven plates using the following procedure:

Note
- Drive plate size: Outer diameter approx. 174.1 mm {6.854 in}
- Driven plate size: Inner diameter approx. 149.6 mm {5.890 in}

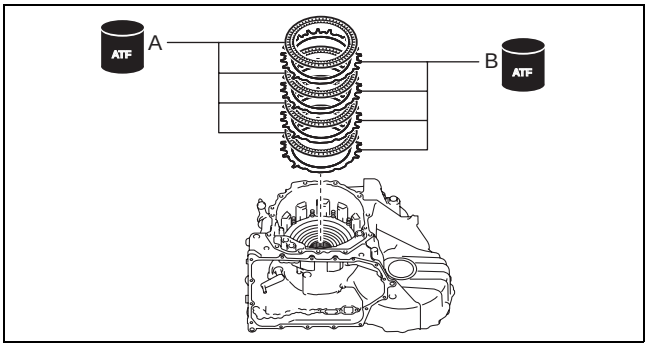
(1) Apply ATF (ATF FZ) to the drive plates and driven plates.

Caution
- **If the drive plate is replaced with a new one, immerse it in ATF (ATF FZ) for 2 hours or more to permeate the facing with ATF.**

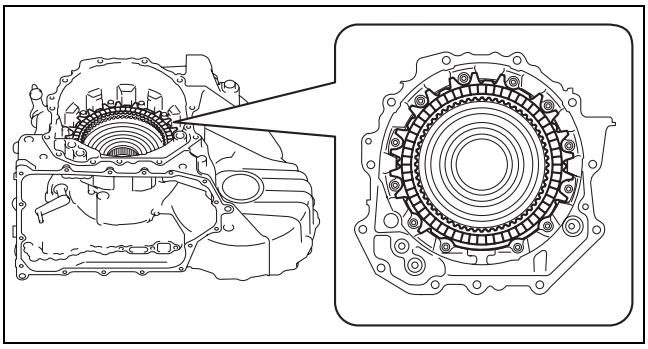
(2) Assemble the drive plates and driven plates.

A : Drive plate
B : Driven plate

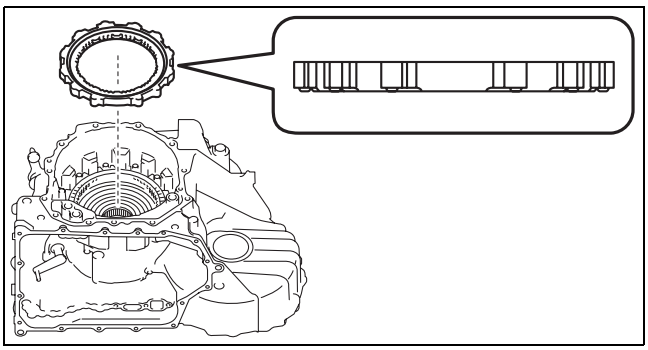
Assembly order
Driven plate—drive plate—driven plate—drive plate—driven plate—drive plate—driven plate—drive plate

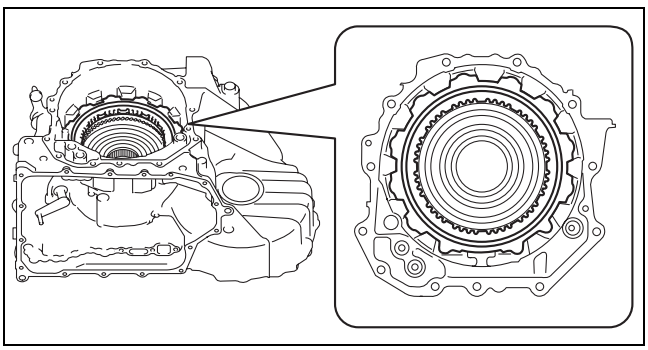


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22. Assemble the one-way clutch.


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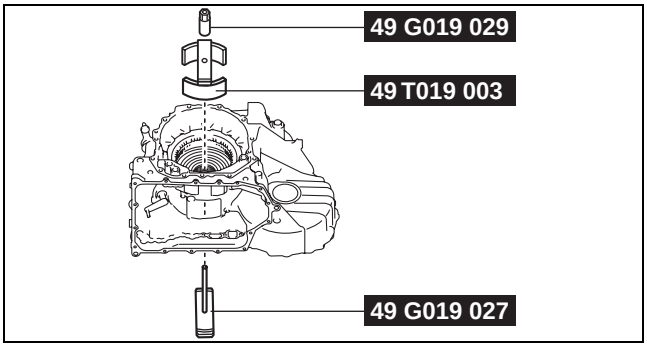
23. Assemble the snap ring using the following procedure:

Note
- Snap ring size: Outer diameter approx. 198.0 mm {7.795 in}

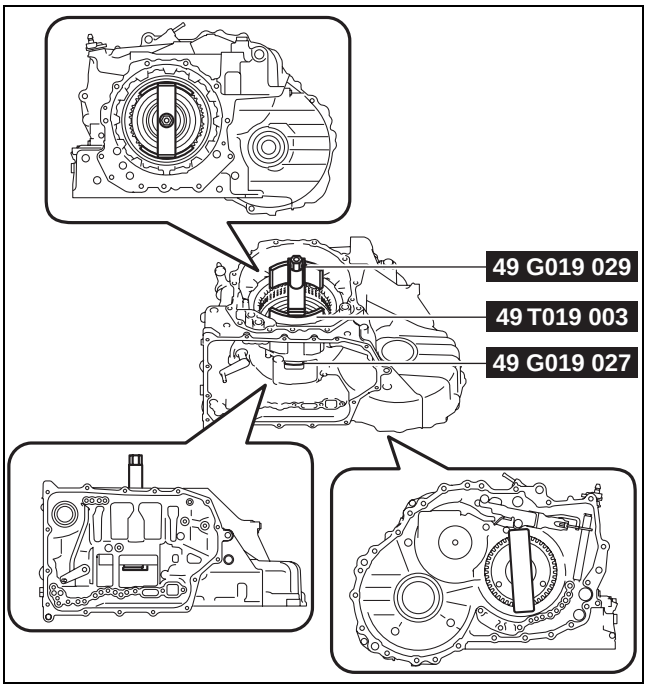
(1) Measure the low and reverse brake clearance and select the appropriate snap ring. (See 05-17-353 LOW AND REVERSE BRAKE CLEARANCE MEASUREMENT/ADJUSTMENT.)

Note
- If the snap ring is assembled for the low and reverse brake clearance measurement/adjustment, the following snap ring assembly procedure is not necessary.

(2) Install the SSTs.



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(3) Tighten the SST (49 G019 029) until the snap ring groove of the transaxle case comes out.

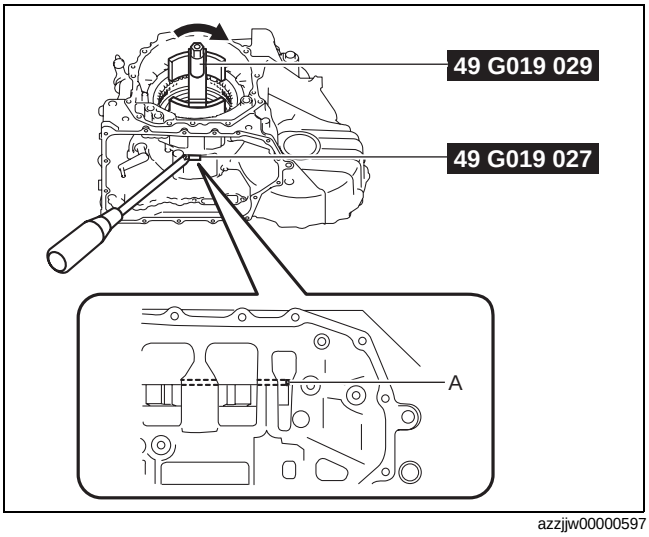
A : Snap ring groove

Caution

- **If the SST (49 G019 029) is tightened with excessive force, surrounding parts could be damaged. Stop tightening the SST when the snap ring groove of the transaxle case comes out.**

Note

- Lock the SST (49 G019 027) against rotation using a flathead screwdriver and tighten the SST (49 G019 029).



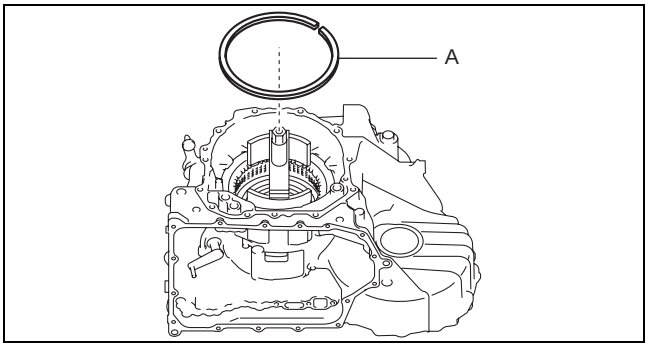
azzjjw00000597

(4) Assemble the selected snap ring in Step (1) to the position shown in the figure.

A : Selection

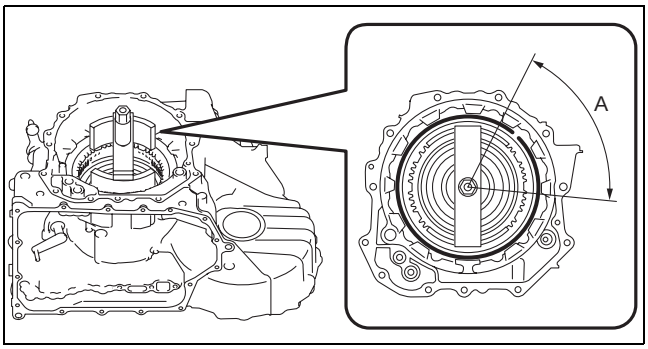
Caution

- **Assemble the snap ring so that the end gap of the snap ring is in the area shown in the figure.**
- **After assembling the snap ring, verify that the snap ring is securely assembled to the bottom of the snap ring groove.**



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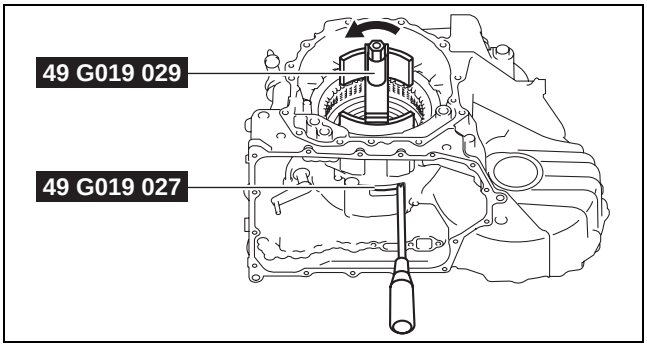
A : End of snap ring assembly area



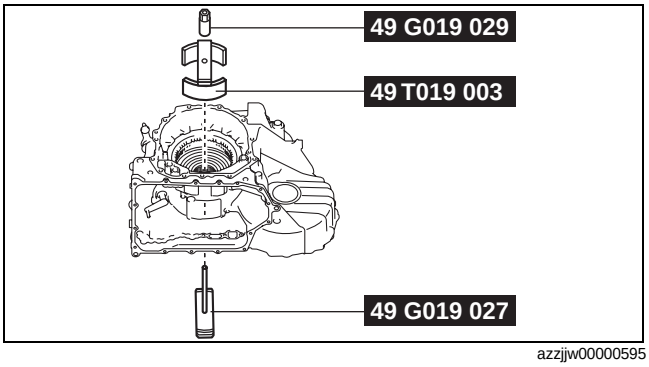
azzjjw00000599

(5) Loosen the SST (49 G019 029) and remove the SSTs.

Note
- Lock the SST (49 G019 027) against rotation using a flathead screwdriver and loosen the SST (49 G019 029).



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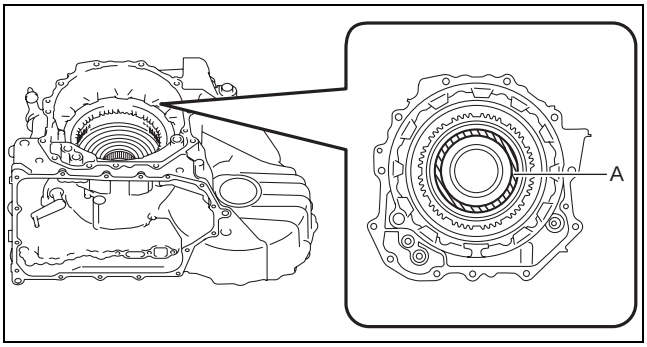
azzjjw00000595

24. Apply ATF to the angular contact ball bearing using the following procedure:

Caution
- **To reduce error during the secondary gear and output gear preload measurement, accurately perform the following procedure:**

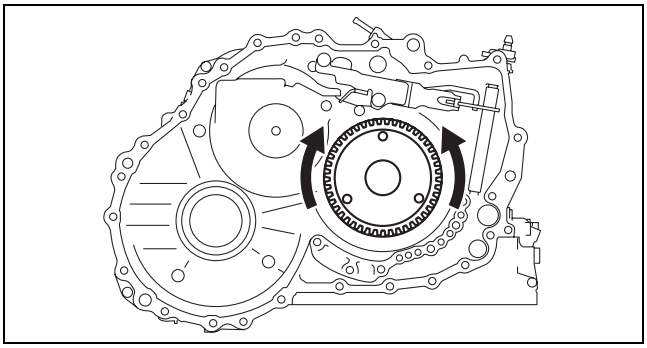
(1) Apply ATF (ATF FZ) to the angular contact ball bearing ball.

A : ATF application area



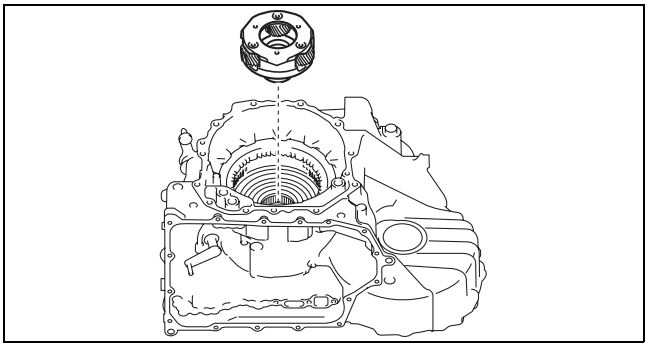
azzjjw00000601

(2) Rotate the primary gear and apply ATF to the angular contact ball bearing.

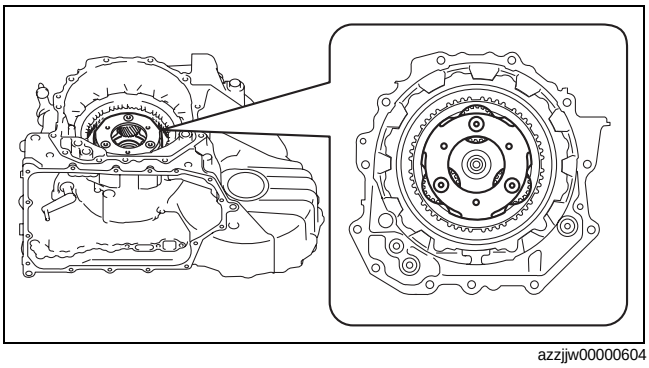


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25. Assemble the front planetary gear.



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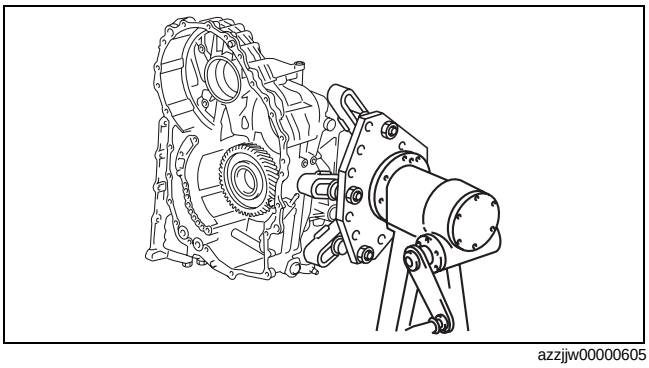
azzjjw00000604

26. Assemble a new locknut using the following procedure:

Caution

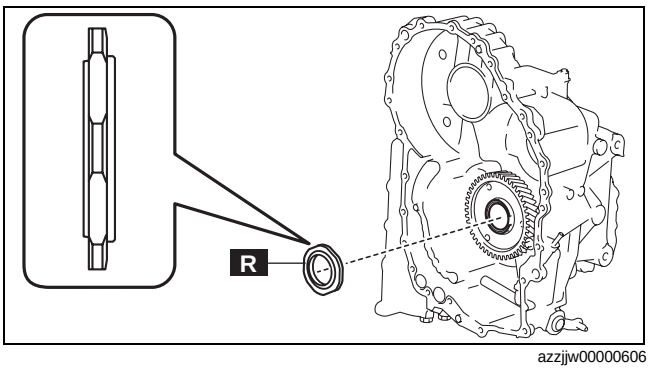
- **Because the front planetary gear will drop if the end cover side is pointed downward before assembling the locknut, rotate the engine stand rotation handle, adjust so that the end cover side is situated sideways, and assemble the locknut.**
- **Always use a new locknut. If the removed locknut is reused, it may cause a transaxle malfunction.**
- **For tightening the locknut, 321—345 N·m {33—35 kgf·m, 237—254 ft·lbf} torque is required. For safety purposes, perform the procedure using two people, one tightens the locknut and the other supports the engine stand (transaxle case).**

(1) Rotate and adjust the rotation handle of the engine stand so that the end cover side is situated sideways.



azzjjw00000605

(2) Assemble and temporarily tighten a new locknut.

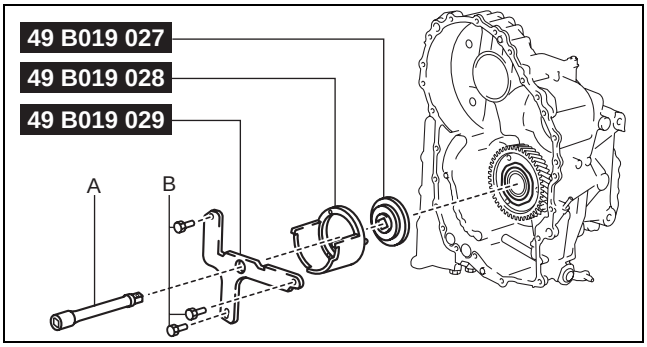


azzjjw00000606

(3) Install the SSTs.

A : Extension bar
B : Bolt supplied with SST (49 B019 029) or M8×1.25, length to 18 mm {0.71 in}

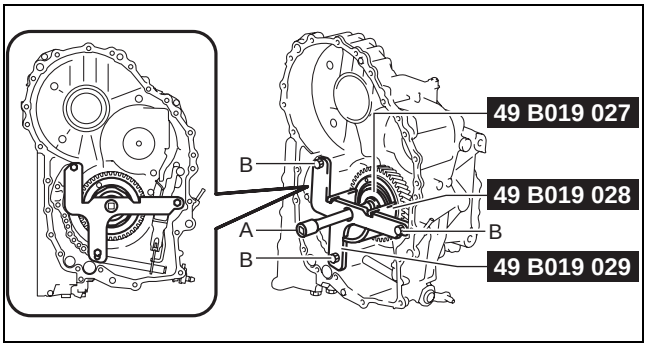
Note
- Engage the three projections of the SST (49 B019 028) to the three holes of the primary gear.
- When installing the SST (49 B019 029), use the bolts supplied with the SST (49 B019 029), or M8×1.25 bolt, length to 18 mm {0.71 in}.



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A : Extension bar
B : Bolt supplied with SST (49 B019 029) or M8×1.25, length to 18 mm {0.71 in}

SST installation bolt tightening torque
19—25 N·m {2.0—2.5 kgf·m, 15—18 ft·lbf}

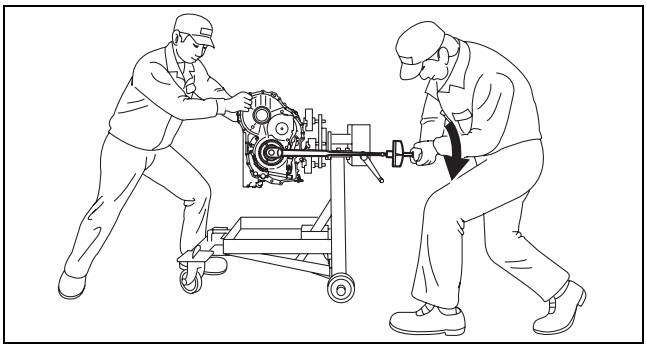


azzjjw00000608

(4) Tighten the locknut.

Caution
- **For tightening the locknut, 321—345 N·m {33—35 kgf·m, 237—254 ft·lbf} torque is required. For safety purposes, perform the procedure using two people, one tightens the locknut and the other supports the engine stand (transaxle case).**

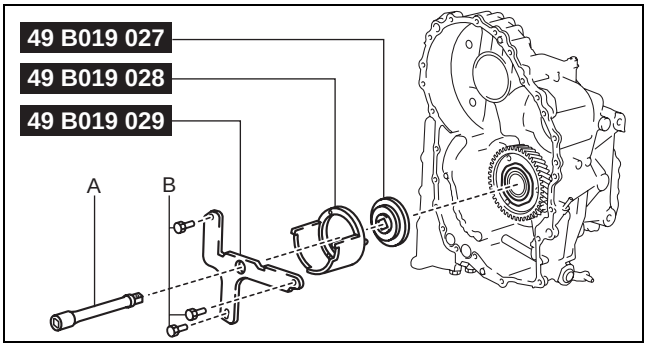
Tightening torque
321—345 N·m {33—35 kgf·m, 237—254 ft·lbf}



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(5) Remove the SSTs.

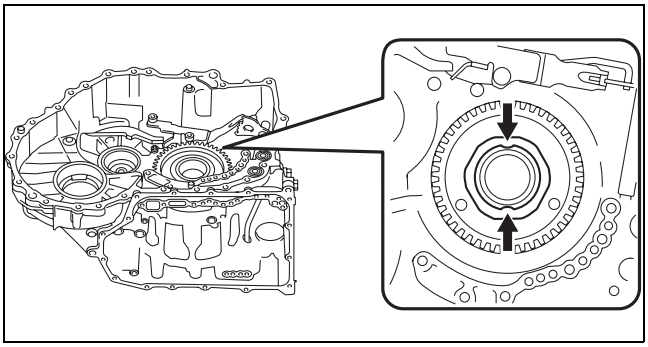
A : Extension bar
B : Bolt supplied with SST (49 B019 029) or M8×1.25, length to 18 mm {0.71 in}



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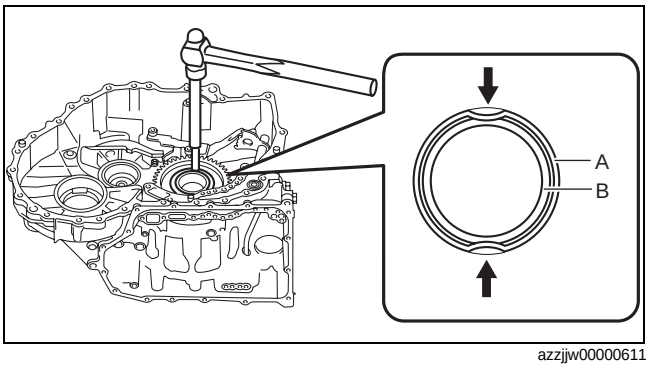
(6) Crimp the locknut at the two positions shown in the figure using a pin punch.

Note
- Crimp the locknut flange until it contacts the whole groove of the front planetary gear end.



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A : Locknut flange
B : Front planetary gear end

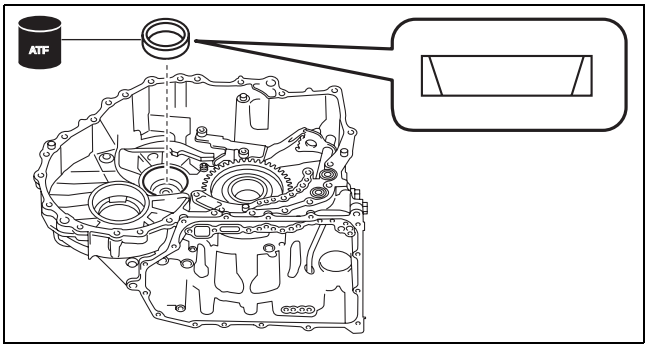


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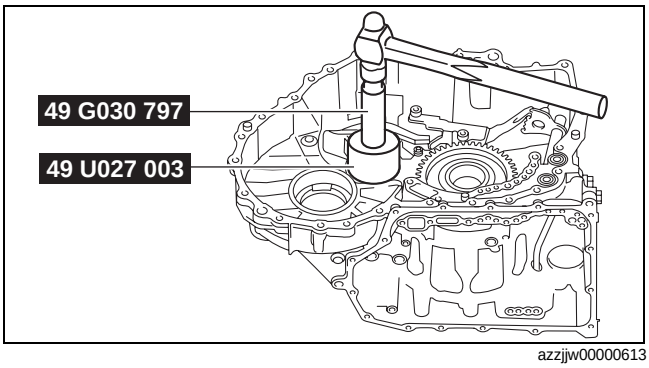
27. Assemble the bearing race using the following procedure:

Note
- Bearing race size: Outer diameter approx. 70 mm {2.8 in}

(1) Apply ATF (ATF FZ) to the engagement area of the bearing race and transaxle case.
(2) Assemble the bearing race using the SSTs.



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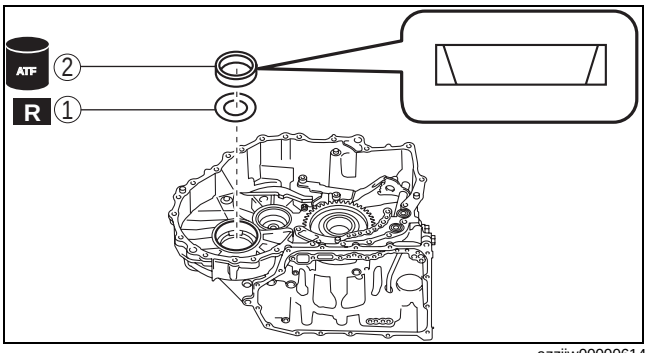
azzjjw00000613

28. Assemble the bearing race and a new shim using the following procedure:

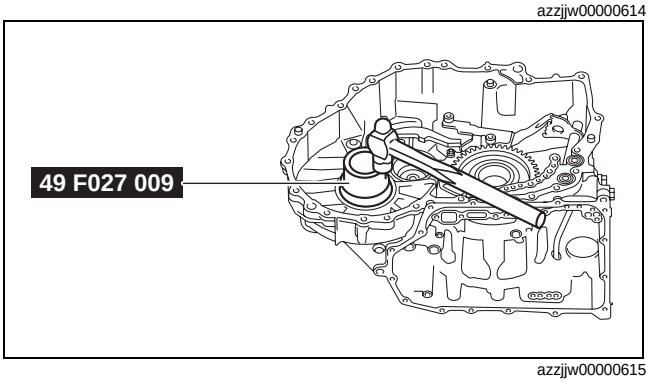
Caution
- **Always use a new shim. If a deformed shim is reused, it may cause a transaxle malfunction.**

(1) Apply ATF (ATF FZ) to the engagement area of the bearing race and transaxle case.
(2) Using the SST, assemble the bearing race and a new shim using the following procedure:

1	Shim (outer diameter approx. 79 mm {3.1 in}, thickness approx. 0.5 mm {0.02 in})
2	Bearing race (outer diameter approx. 80 mm {3.1 in})



azzjjw00000614



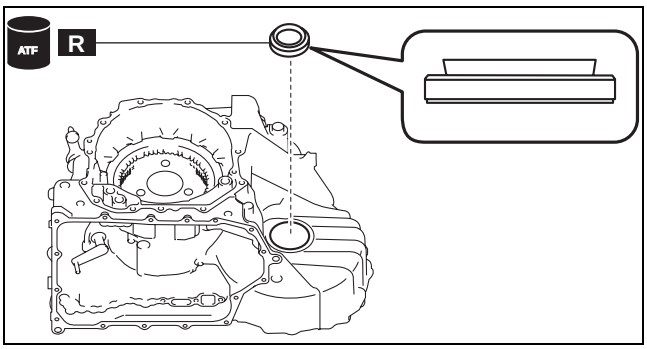
azzjjw00000615

29. Assemble a new oil seal using the following procedure:

Caution
- **If an oil seal is reused it could cause ATF leakage, therefore use a new oil seal.**

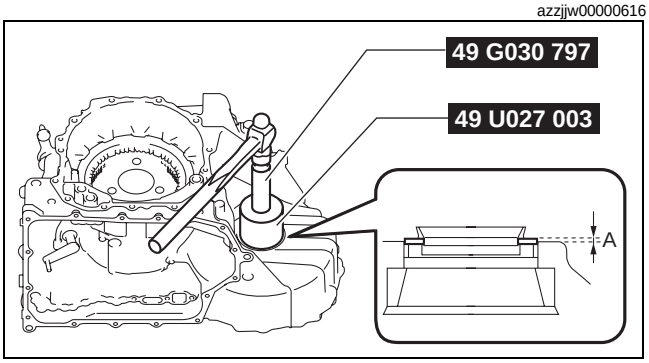
Note
- Oil seal size: Outer diameter approx. 63 mm {2.5 in}

(1) Apply ATF (ATF FZ) to the engagement area of the new oil seal and transaxle case.
(2) Apply ATF (ATF FZ) to the lip of the new oil seal.
(3) Assemble the new oil seal to the position shown in the figure using the SSTs.



azzjjw00000616

A : –0.8—0.5 mm {–0.03—0.01 in}



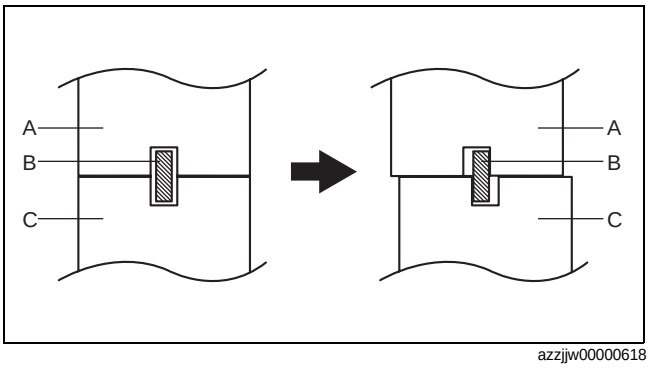
azzjjw00000617

30. Press the angular contact ball bearing to the primary gear side using the following procedure:

Caution
- **To reduce error during the total end play measurement, accurately perform the following procedure:**

Note
- Work overview
  — There is a gap between the snap ring groove of the angular contact ball bearing, snap ring, and the snap ring groove of the transaxle case because the angular contact ball bearing is fixed to the transaxle case by the snap ring.
  The gap causes an error during the total end play measurement.
  Using the following procedure, the error during the total end play measurement is reduced by moving the angular contact ball bearing to the standard position.

A : Transaxle case
B : Snap ring
C : Angular contact ball bearing

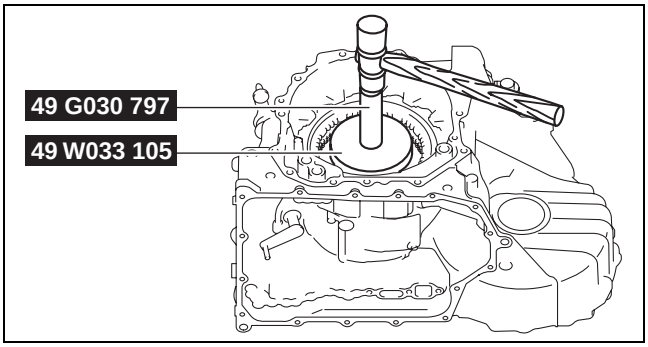


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(1) Press the angular contact ball bearing to the primary gear side using the SSTs.

Caution
- **Do not strongly tap the SST contacting the front planetary gear to prevent damage to the parts.**

Note
- Lightly tap the SST contacting the front planetary gear 2—3 times using a plastic hammer and press the angular contact ball bearing to the primary gear side.

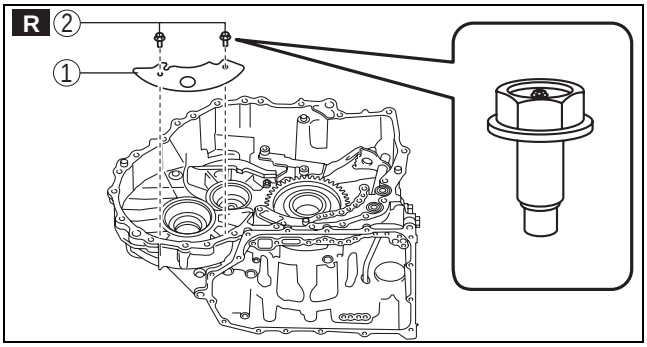


azzjjw00000619

31. Assemble the baffle plate using the procedure shown in the figure..

1	Baffle plate
2	Bolt (M6×1.0 bolt, length to approx. 15 mm {0.59 in}*)

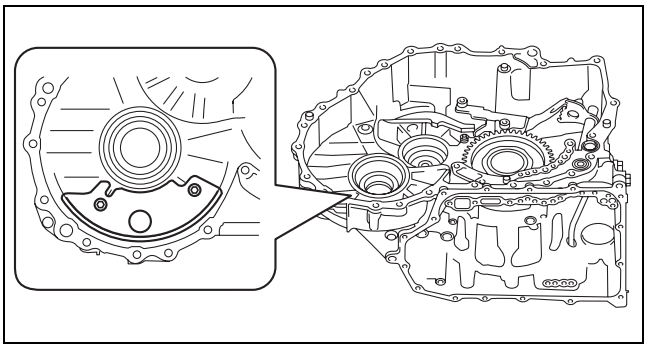
* : Length without spring washer is indicated due to bolt with spring washer. Length with spring washer is approx. 13 mm {0.51 in}.



azzjjw00000620

Caution
- **The bolts for the baffle plate assembly are applied with thread-locking compound. If the bolts are reused it could loosen the bolts, therefore use new bolts.**

Baffle plate assembly bolt tightening torque
8—10 N·m {82—101 kgf·cm, 71—88 in·lbf}


azzjjw00000621

32. Assemble the accessories included in the converter housing using the following procedure:
(1) Assemble the bearing race and a new shim using the following procedure:

Caution
- **Always use a new shim. If a deformed shim is reused, it may cause a transaxle malfunction.**

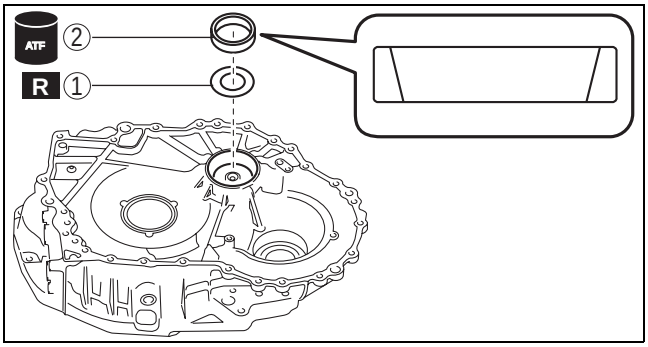
1) Measure the secondary gear and output gear preload and select the appropriate new shim. (See 05-17-364 SECONDARY GEAR AND OUTPUT GEAR PRELOAD MEASUREMENT/ADJUSTMENT.)

Note
- If the bearing race and a new shim are assembled for the secondary gear and output gear preload measurement/adjustment, the following assembly procedure for the bearing race and a new shim is not necessary.

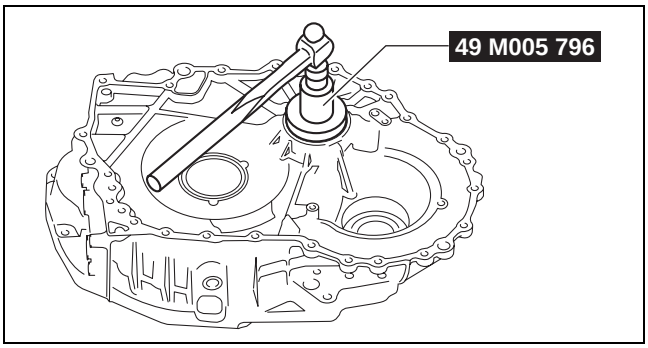
2) Apply ATF (ATF FZ) to the engagement area of the bearing race and converter housing.

3) Using the SST, assemble the bearing race and the selected new shim in Step 1) using the following procedure:

1	Shim (outer diameter approx. 74 mm {2.9 in}) (selection)
2	Bearing race (outer diameter approx. 75 mm {3.0 in})



azzjjw00000622



azzjjw00000733

(2) Assemble the bearing race and a new shim using the following procedure:

Caution
- **Always use a new shim. If a deformed shim is reused, it may cause a transaxle malfunction.**

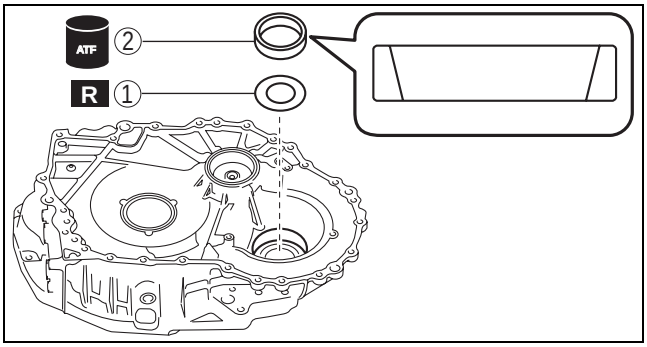
1) Measure the ring gear and differential preload and select the appropriate new shim. (See 05-17-375 RING GEAR AND DIFFERENTIAL PRELOAD MEASUREMENT/ADJUSTMENT.)

Note
- If the bearing race and a new shim are assembled for the ring gear and differential preload measurement/adjustment, the following assembly procedure for the bearing race and a new shim is not necessary.

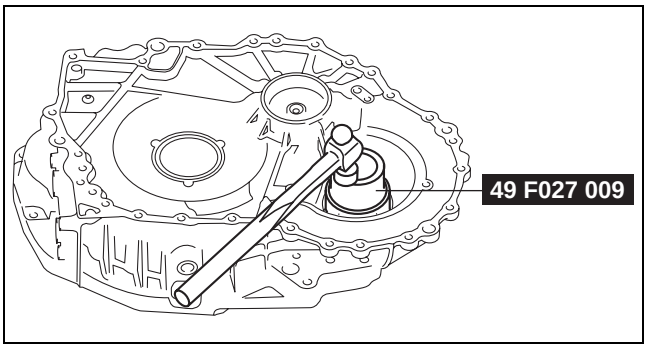
2) Apply ATF (ATF FZ) to the engagement area of the bearing race and converter housing.

3) Using the SST, assemble the bearing race and the selected new shim in Step 1) using the following procedure:

1	Shim (outer diameter approx. 79 mm {3.1 in}) (selection)
2	Bearing race (outer diameter approx. 80 mm {3.1 in})



azzjjw00000624



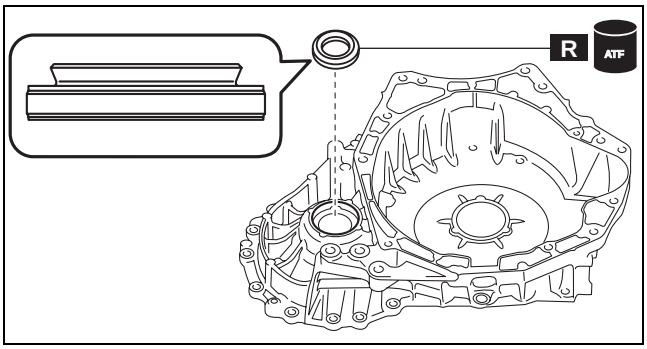
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(3) Assemble a new oil seal using the following procedure:

Caution
- **If an oil seal is reused it could cause ATF leakage, therefore use a new oil seal.**

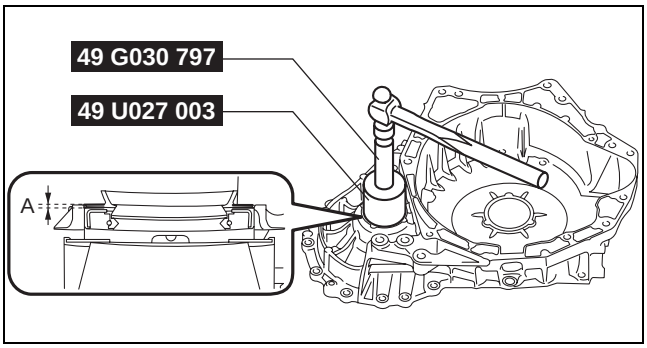
Note
- Oil seal size: Outer diameter approx. 65 mm {2.6 in}

1) Apply ATF (ATF FZ) to the engagement area of the new oil seal and converter housing.
2) Apply ATF (ATF FZ) to the lip of the new oil seal.
3) Assemble the new oil seal to the position shown in the figure using the SSTs.



azzjjw00000626

A : –0.8—0.5 mm {–0.03—0.01 in}

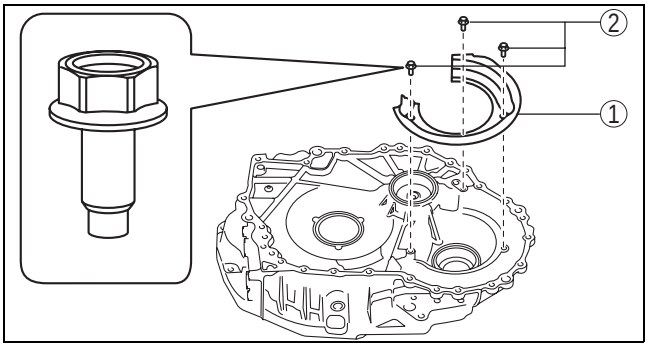


azzjjw00000627

4) Assemble the baffle plate using the procedure shown in the figure.

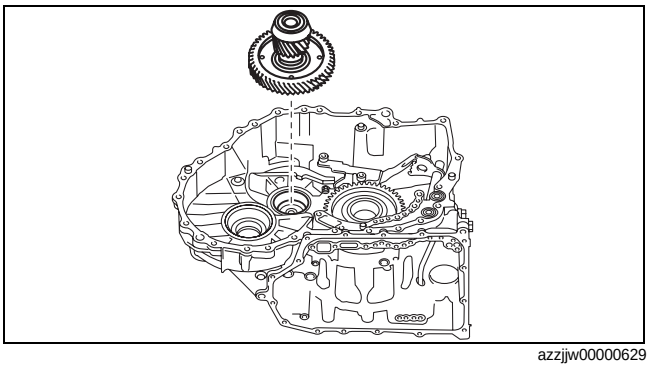
1	Baffle plate
2	Bolt (M6×1.0 bolt, length to approx. 14 mm {0.55 in})

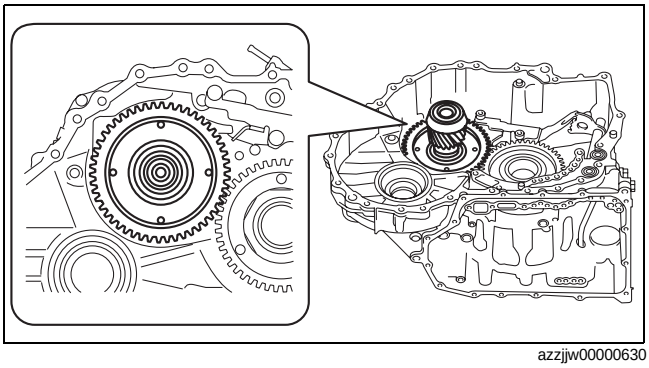
Baffle plate assembly bolt tightening torque
8—10 N·m {82—101 kgf·cm, 71—88 in·lbf}



azzjjw00000628

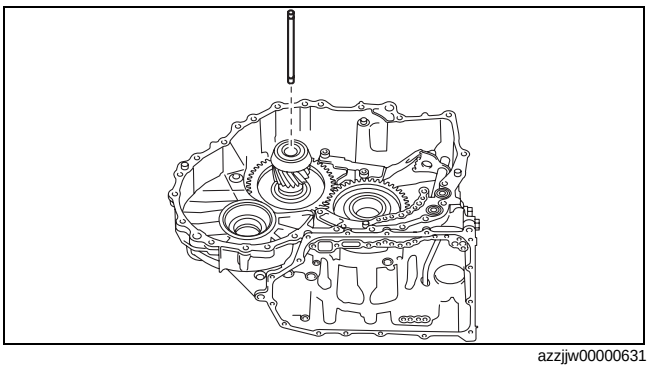
33. Assemble the secondary gear and output gear.


azzjjw00000629

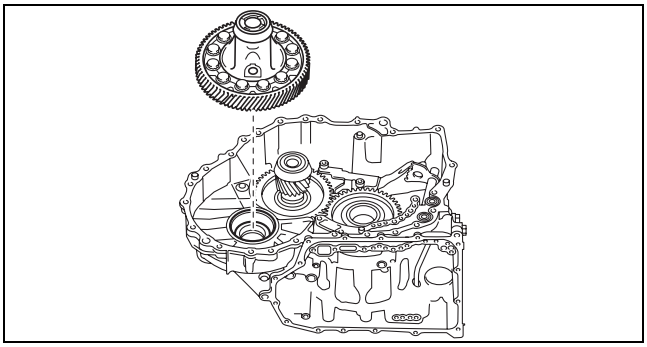

azzjjw00000630

34. Assemble the oil pipe.

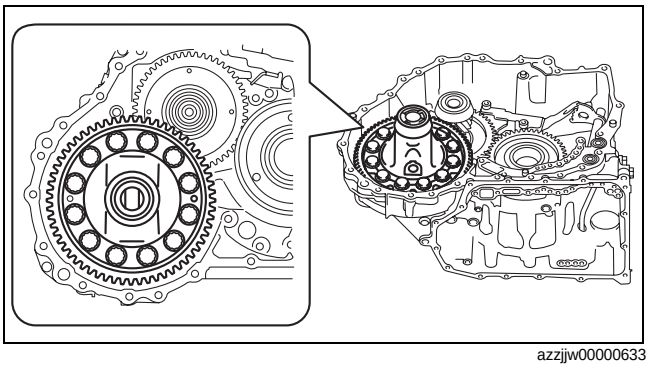
Caution
- **Do not assemble the oil pipe using a tool such as a hammer to prevent damaging the part. For the oil pipe assembly, it is better to only use your hands to put the oil pipe into the output gear.**


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35. Assemble the ring gear and differential.



azzjjw00000632

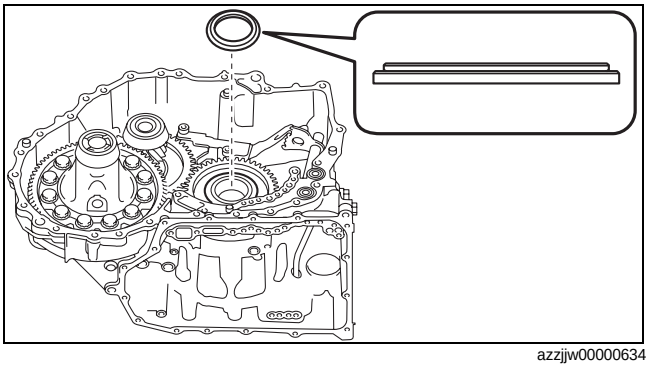


azzjjw00000633

36. Assemble the thrust needle bearing.

Note

- Thrust needle bearing size: Outer diameter approx. 80.3 mm {3.16 in}



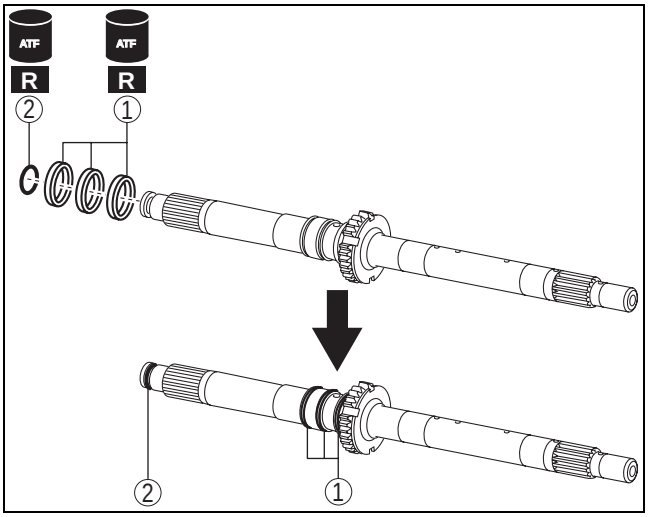
azzjjw00000634

37. Assemble a new D-ring and new seal rings to the turbine shaft using the following procedure:

Caution
- **If a D-ring is reused it could cause ATF leakage, therefore use a new D-ring.**
- **If a seal ring is reused it could cause ATF leakage, therefore use a new seal ring.**

(1) Apply ATF (ATF FZ) to the new D-ring and new seal rings.
(2) Assemble the new D-ring and new seal rings to the turbine shaft using the procedure shown in the figure:

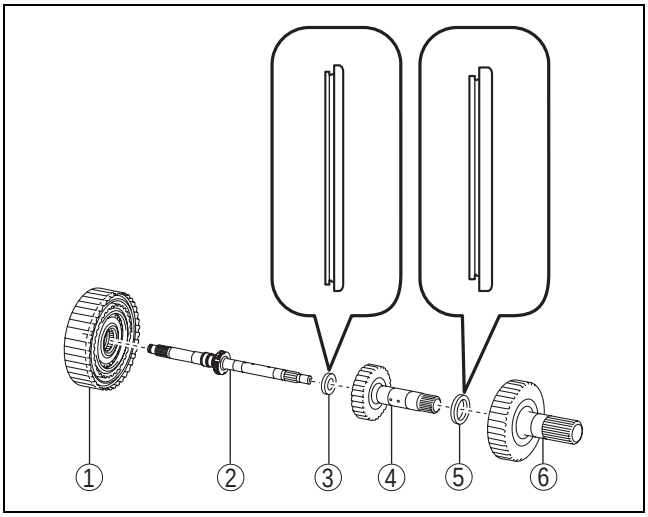
1	Seal ring (outer diameter approx. 24.4 mm {0.961 in}, thickness approx. 1.5 mm {0.059 in})
2	D-ring (outer diameter approx. 16.4 mm {0.646 in}, thickness approx. 2.4 mm {0.094 in})



azzjjw00000635

38. Assemble together the clutch component, turbine shaft, high clutch hub, low clutch hub, and thrust needle bearing using the following procedure:
(1) Assemble the parts using the procedure shown in the figure:

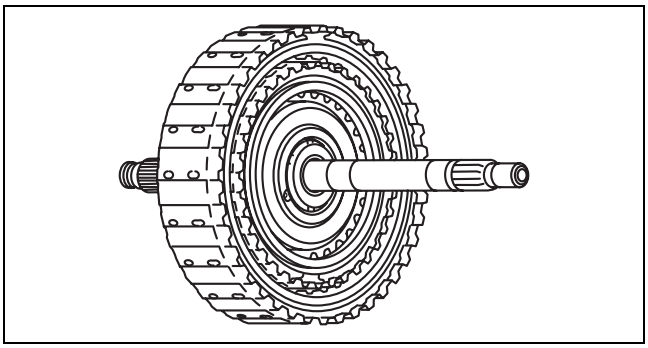
1	Clutch component
2	Turbine shaft
3	Thrust needle bearing (outer diameter approx. 37.3 mm {1.47 in})
4	High clutch hub
5	Thrust needle bearing (outer diameter approx. 51.3 mm {2.02 in})
6	Low clutch hub



azzjjw00001563

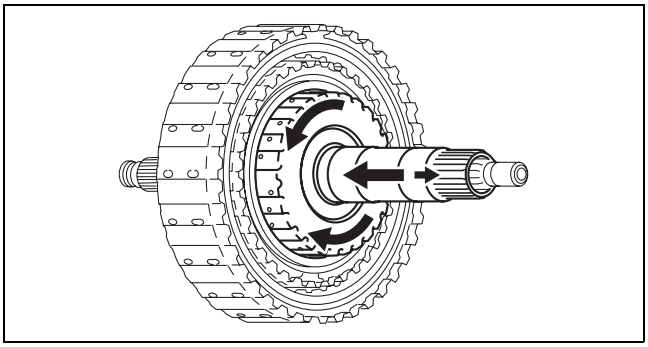
Note

- For the high clutch hub and low clutch hub assembly, assembly is easier if the work is performed using the following procedure:
  - — High clutch hub
    1. Place the assembled parts on the workbench with the clutch component situated sideways.



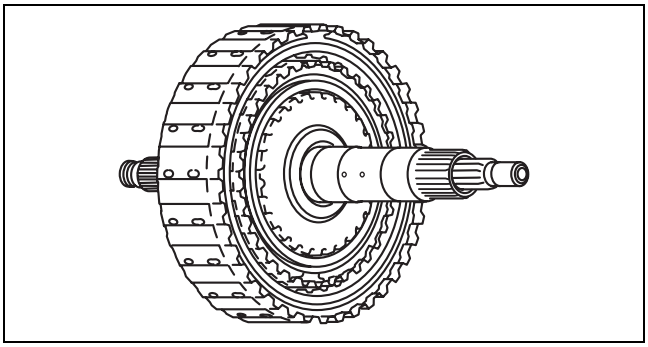
azzjjw00000638

    2. While rotating the high clutch hub, engage the splines of each of the high clutch drive plates one by one, and assemble.



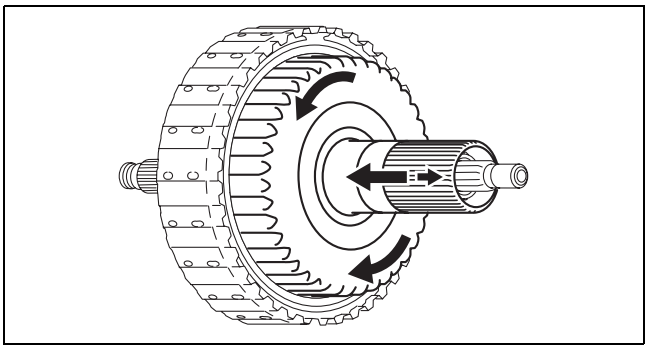
azzjjw00000639

  - — Low clutch hub
    1. Place the assembled parts on the workbench with the clutch component situated sideways.



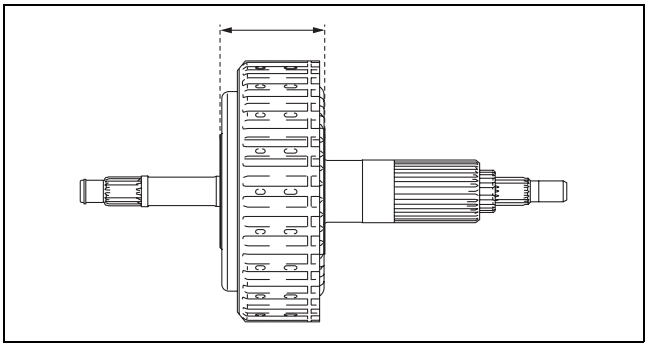
azzjjw00000640

    2. While rotating the low clutch hub, engage the splines of each of the low clutch drive plates one by one, and assemble.



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(2) To verify that the parts are securely assembled together, measure the distance shown in the figure.

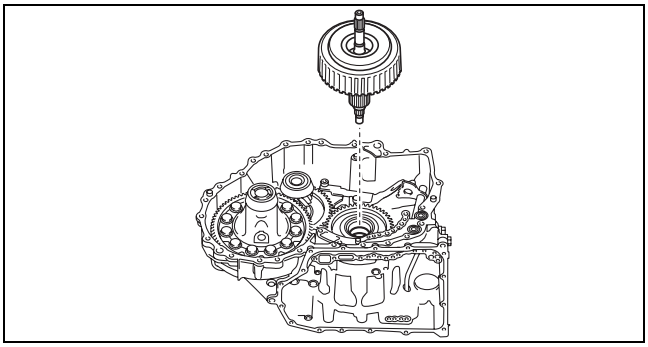

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Note
- Recommended measuring instrument: Vernier caliper

Specification
63.9—66.0 mm {2.52—2.59 in}

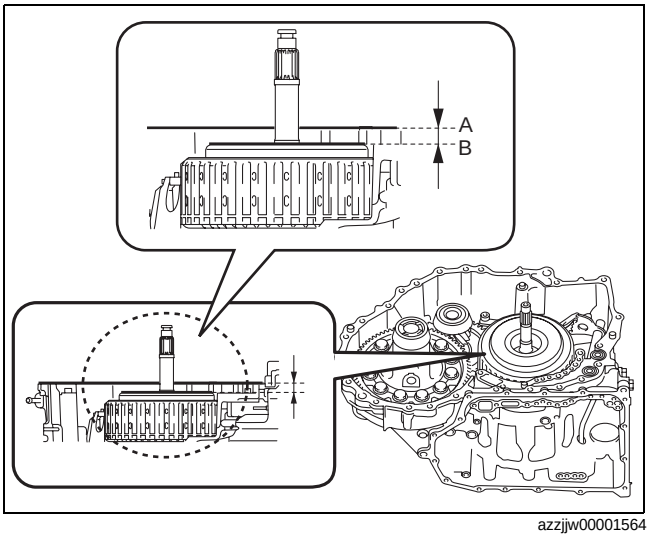
- If not within the specification, disassemble the assembled parts and reassemble.

39. Assemble the parts which were assembled together in Step 38 using the following procedure:
(1) Assemble the parts assembled together in Step 38.


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(2) To verify that the parts are securely assembled, measure the distance shown in the figure.

A : Transaxle case end (alignment surface with converter housing)
B : Clutch component end



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Note
- Recommended measuring instrument: Depth gauge, straight edge ruler

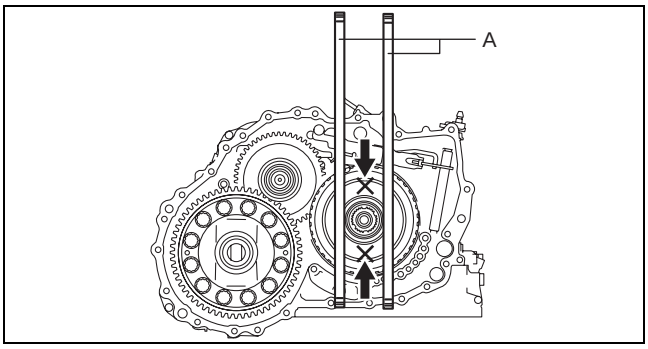
Specification
11.6—14.8 mm {0.457—0.582 in}

- If not within the specification, remove the parts and perform re-assembly from Step 38.

Note
- Measurement method

1) Set two straight edge rulers along the alignment surface of the transaxle case with the converter housing as shown in the figure.

A : Straight edge ruler

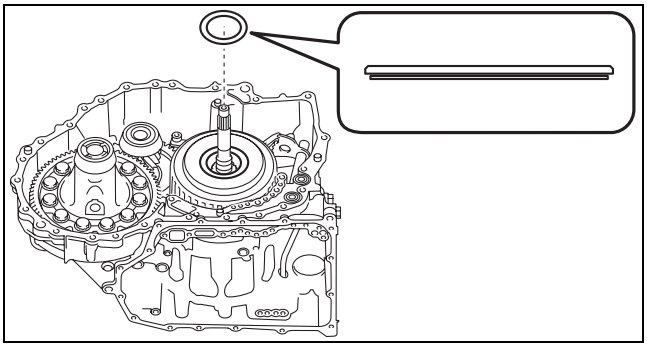


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2) Measure the positions (2 locations) shown in the figure using a depth gauge and calculate the average value.
3) Subtract the thickness of the straight edge ruler from the average value.

40. Assemble the thrust needle bearing.

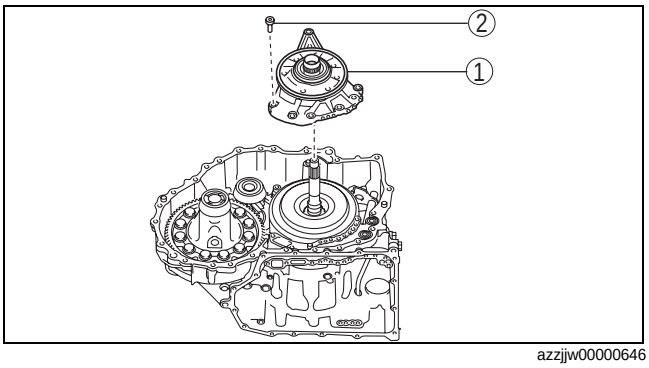
Note
- Thrust needle bearing size: Outer diameter approx. 72.7 mm {2.86 in}



azzjjw00000645

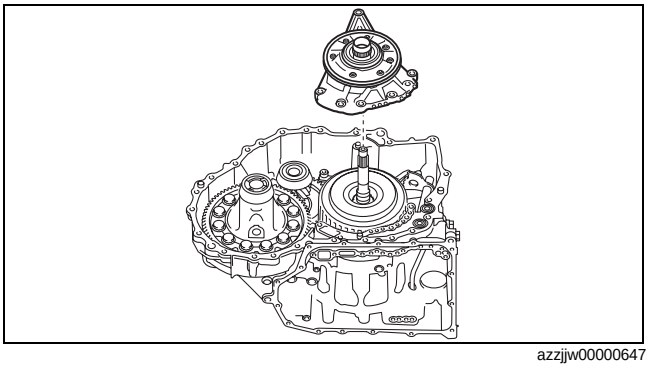
41. Assemble the oil pump using the following procedure:

1	Oil pump
2	7 bolts (M8×1.25 bolt, length to approx. 31 mm {1.2 in})



azzjjw00000646

(1) Assemble the oil pump.

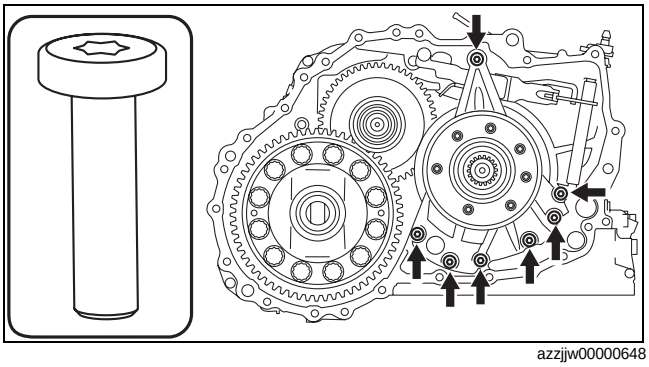


azzjjw00000647

(2) Assemble and tighten the bolts shown in the figure.

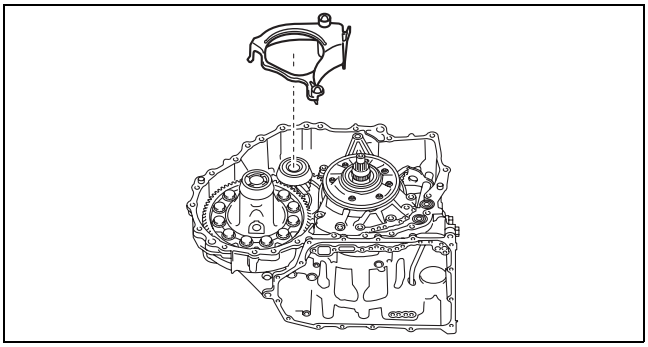
Note
- Bolt size: M8×1.25 bolt, length to approx. 31 mm {1.2 in}

Tightening torque
19—25 N·m {2.0—2.5 kgf·m, 15—18 ft·lbf}

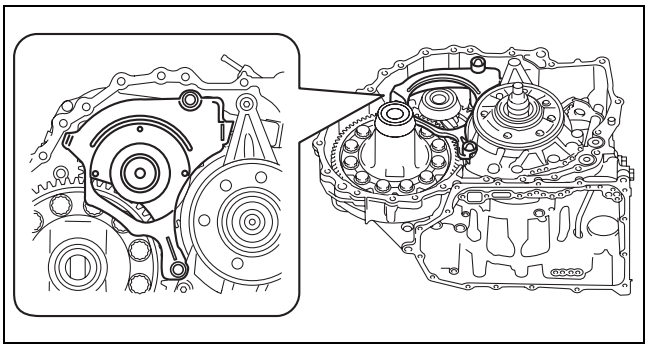


azzjjw00000648

42. Assemble the baffle plate.



azzjjw00000649

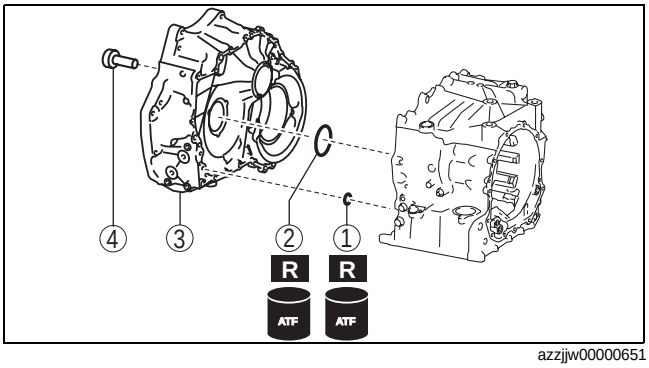


azzjjw00000650

43. Assemble the converter housing using the following procedure:

1	O-ring (outer diameter approx. 15.6 mm {0.614 in}, thickness approx. 2.4 mm {0.094 in})
2	O-ring (outer diameter approx. 73.3 mm {2.89 in}, thickness approx. 3.0 mm {0.12 in})
3	Converter housing
4	24 bolts * (M8×1.25 bolt, length to approx. 28 mm {1.1 in})

* : Of the 24 bolts, 6 are applied with sealant



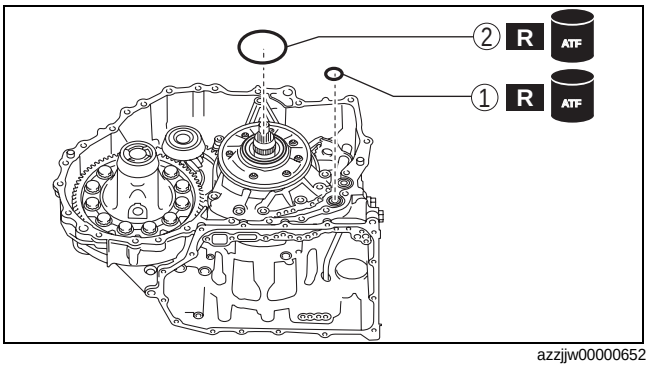
azzjjw00000651

(1) Assemble new O-rings using the following procedure:

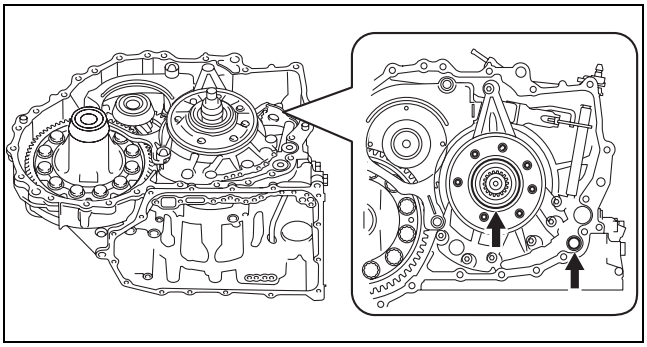
Caution
- **If an O-ring is reused it could cause ATF leakage, therefore use a new O-ring.**

1) Apply ATF (ATF FZ) to the new O-rings.
2) Assemble the new O-rings in the order shown in the figure.

1	O-ring (outer diameter approx. 15.6 mm {0.614 in}, thickness approx. 2.4 mm {0.094 in})
2	O-ring (outer diameter approx. 73.3 mm {2.89 in}, thickness approx. 3.0 mm {0.12 in})



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azzjjw00000653

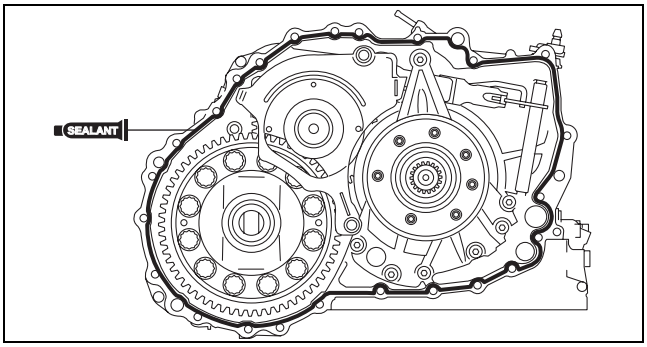
(2) Remove any remaining old sealant on the contact surfaces of the transaxle case and converter housing, and degrease the contact surfaces.

Caution
- **When degreasing and if degreaser is used, use a rag saturated with degreaser and be careful not to allow degreaser to penetrate the interior of the transaxle.**
  In additon, after degreasing, visually verify that there is no foreign matter (such as old sealant, cloth fibers) which has penetrated the interior of the transaxle.

(3) Apply sealant (silicone sealant TB1217E) to the transaxle case.

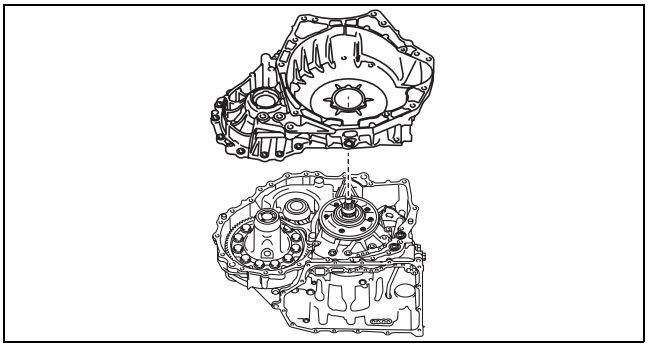
Caution
- **If sealant is applied excessively or applied to a part other than the indicated part, the O-ring could deform and the sealant could penetrate the oil passage. Apply an appropriate amount of sealant to the indicated part.**

Note
- Sealant application amount (bead thickness): ϕ 1.8—2.5 mm {0.071—0.098 in}



azzjjw00000654

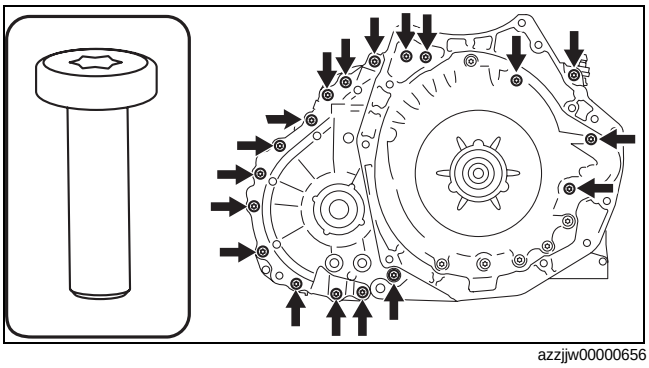
(4) Assemble the converter housing before the applied sealant starts to harden.



azzjjw00000655

(5) Assemble and temporarily tighten the bolts to the positions shown in the figure.

Note
- Bolt size: M8×1.25 bolt, length to approx. 28 mm {1.1 in}

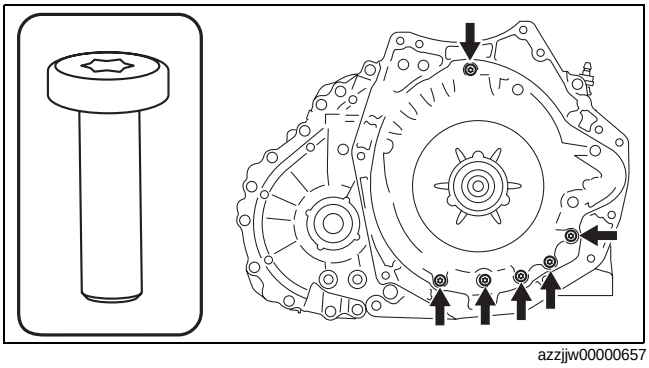


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(6) Assemble and temporarily tighten the new bolts to the positions shown in the figure.

Caution
- **The bolts for the assembly are applied with sealant. If the bolts are reused it could cause ATF leakage, therefore use new bolts.**

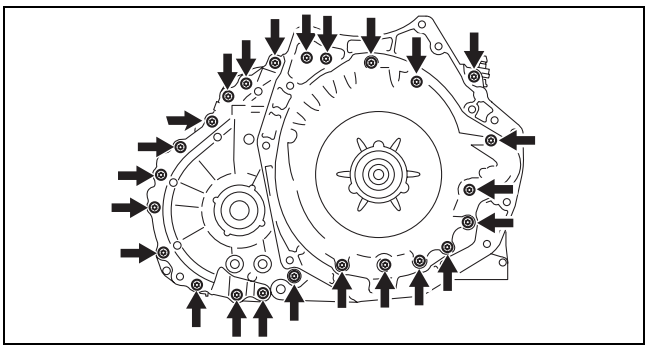
Note
- Bolt size: M8×1.25 bolt, length to approx. 28 mm {1.1 in} (with sealant applied)



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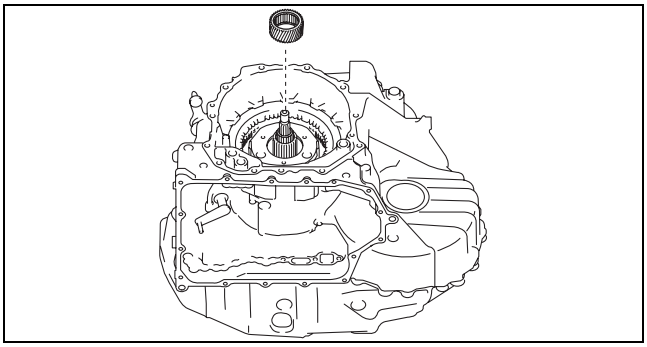
(7) Tighten the bolts shown in the figure.

Tightening torque
19—25 N·m {2.0—2.5 kgf·m, 15—18 ft·lbf}

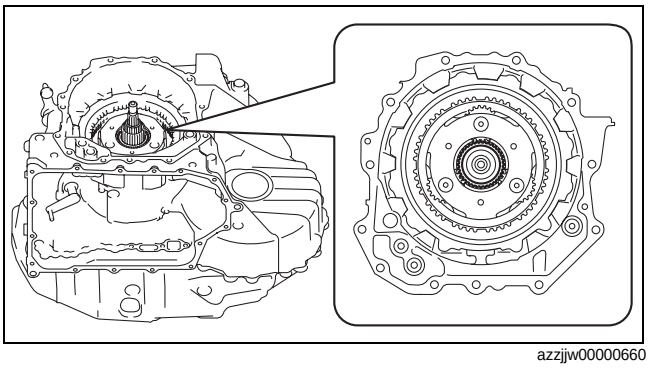


azzjjw00000658

44. Assemble the front sun gear.

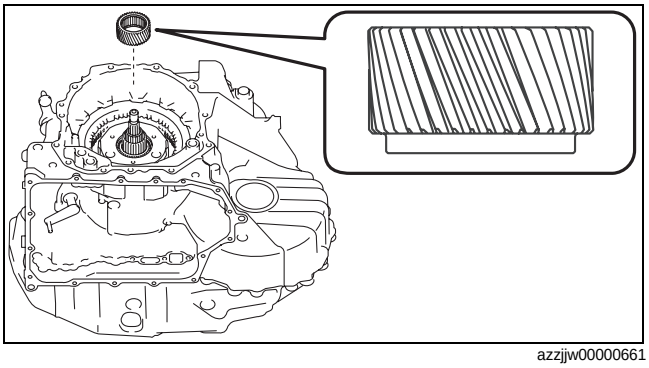


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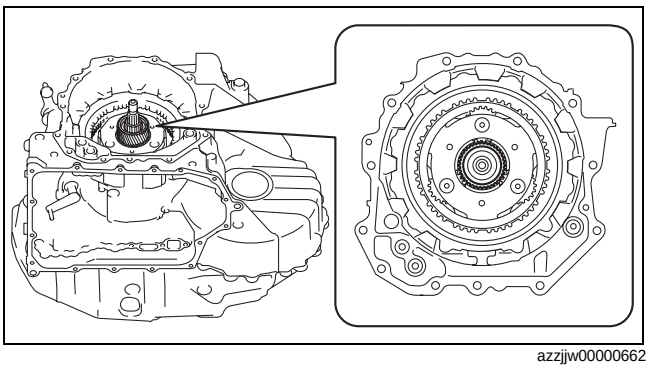


azzjjw00000660

45. Assemble the rear sun gear.

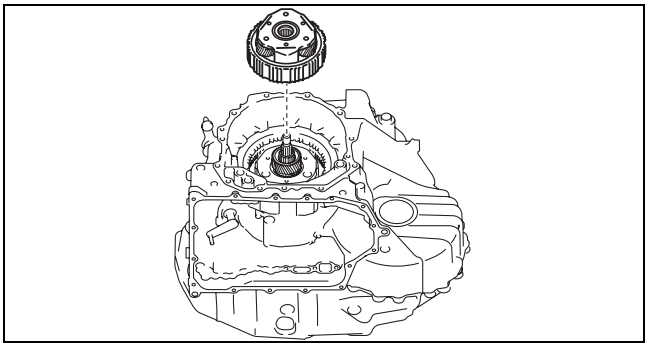


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azzjjw00000662

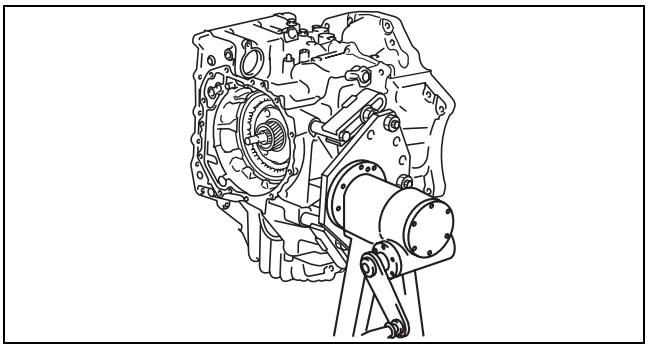
46. Assemble the rear planetary gear using the following procedure:
    (1) Assemble the rear planetary gear.



azzjjw00000663

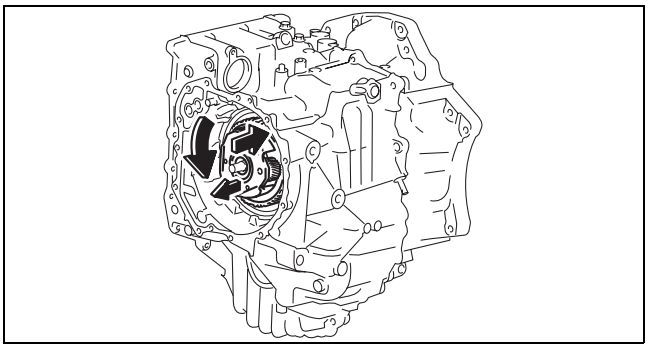
Note
- If the rear planetary gear assembly is difficult, assembly is easier if the work is performed using the following procedure:

1. Rotate and adjust the rotation handle of the engine stand so that the end cover side is situated sideways.



azzjjw00000664

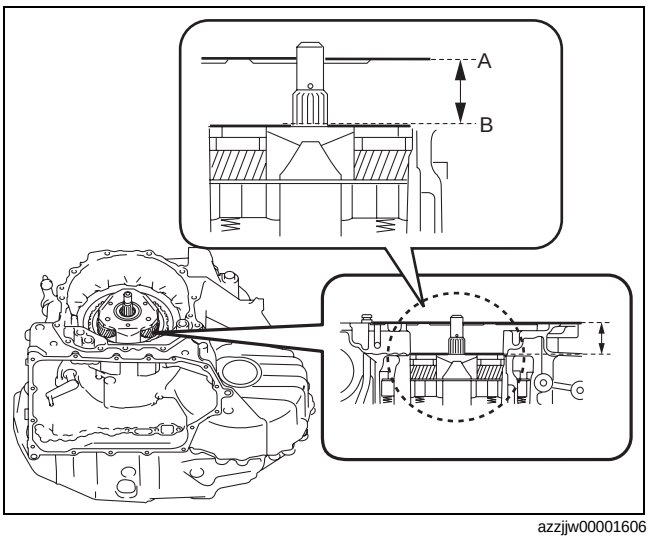
2. While rotating the rear planetary gear, engage the splines of each drive plate of the low and reverse brake one by one, and assemble.



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    (2) To verify that the rear planetary gear is securely assembled, measure the distance shown in the figure.

A : Transaxle case end (alignment surface with end cover)
B : Rear planetary gear end



azzjjw00001606

Note
- Recommended measuring instrument: Depth gauge, straight edge ruler

Specification
32.8—35.1 mm {1.30—1.38 in}

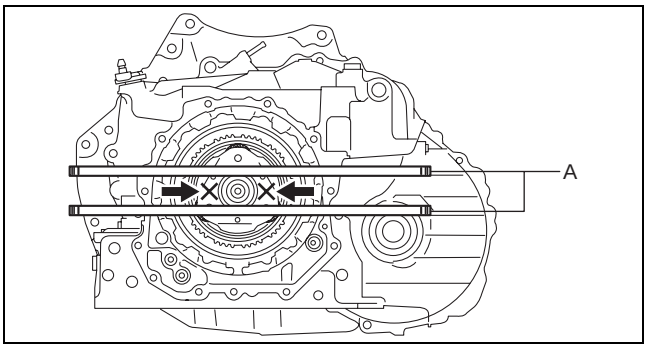
- If not within the specification, remove the rear planetary gear and reassemble.

Note
- Measurement method

1) Set two straight edge rulers along the alignment surface of the transaxle case with the end cover as shown in the figure.

A : Straight edge ruler

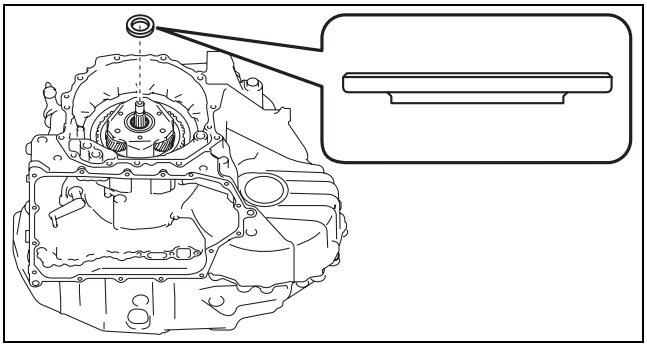
2) Measure the positions (2 locations) shown in the figure using a depth gauge and calculate the average value.
3) Subtract the thickness of the straight edge ruler from the average value.



azzjjw00000667

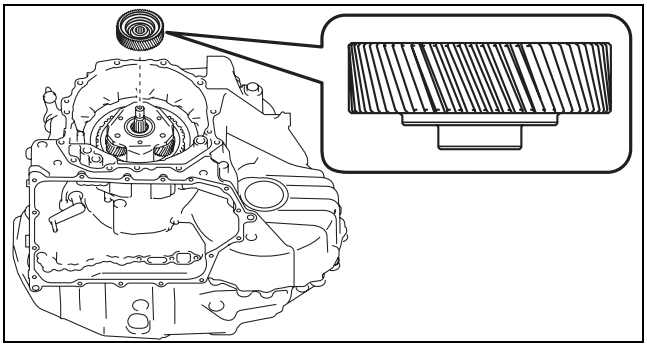
47. Assemble the thrust needle bearing.

Note
- Thrust needle bearing size: Outer diameter approx. 44 mm {1.7 in}

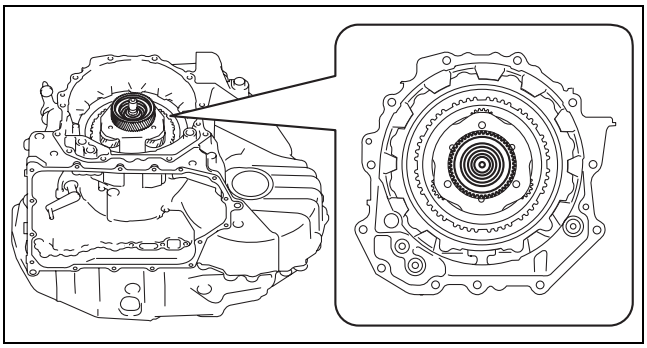


azzjjw00000668

48. Assemble the reduction sun gear.



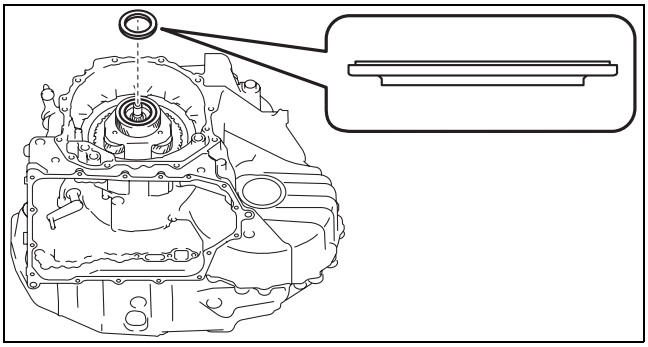
azzjjw00000669



azzjjw00000670

49. Assemble the thrust needle bearing.

Note
- Thrust needle bearing size: Outer diameter approx. 61.5 mm {2.42 in}



azzjjw00000671

50. Assemble the shim using the following procedure:

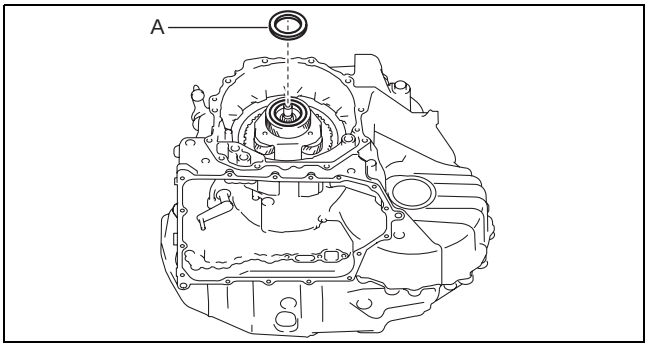
Note
- Shim size: Outer diameter approx. 59.5 mm {2.34 in}

(1) Measure the total end play and select the appropriate shim. (See 05-17-385 TOTAL END PLAY MEASUREMENT/ADJUSTMENT.)

Caution
- **The total end play is the play (gap) in the axial direction of each planetary gear. If the total end play adjustment is not performed, it may cause damage to the thrust needle bearing between each planetary gear or other parts.**

(2) Assemble the selected shim in Step (1).

A : Selection

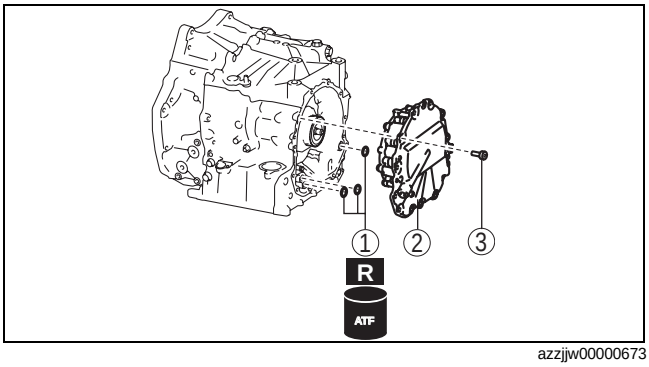


azzjjw00000672

51. Assemble the end cover component using the following procedure:

1	O-ring (outer diameter approx. 15.6 mm {0.614 in}, thickness approx. 2.4 mm {0.094 in})
2	End cover component
3	12 bolts * (M8×1.25 bolt, length to approx. 21 mm {0.83 in})

* : Of the 12 bolts, 2 are applied with sealant



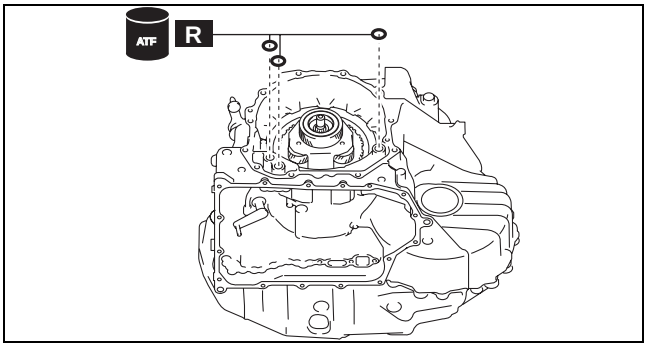
azzjjw00000673

(1) Assemble new O-rings using the following procedure:

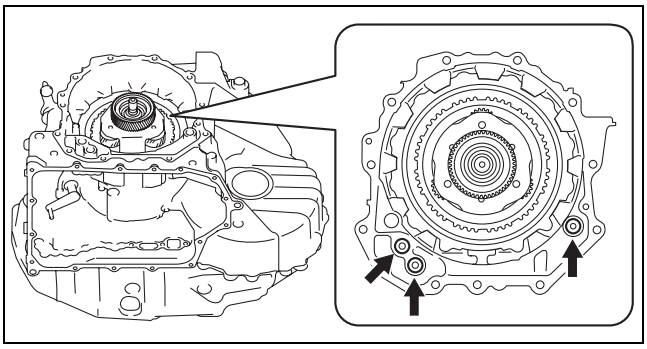
Caution
- **If an O-ring is reused it could cause ATF leakage, therefore use a new O-ring.**

Note
- O-ring size: Outer diameter approx. 15.6 mm {0.614 in}, thickness approx. 2.4 mm {0.094 in}

1) Apply ATF (ATF FZ) to the new O-rings.
2) Assemble the new O-rings.



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azzjjw00000675

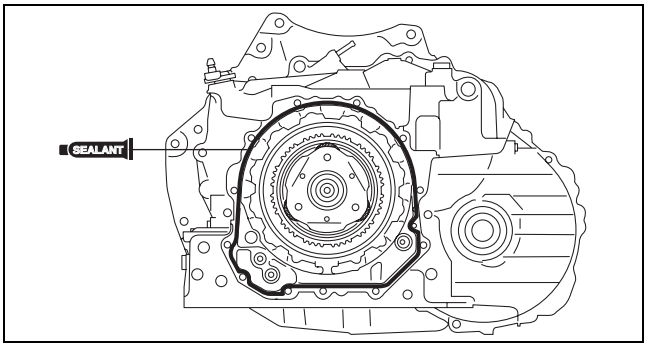
(2) Remove any remaining old sealant on the contact surfaces of the transaxle case and end cover, and degrease the contact surfaces.

Caution
- **When degreasing and if degreaser is used, use a rag saturated with degreaser and be careful not to allow degreaser to penetrate the interior of the transaxle.**
  In additon, after degreasing, visually verify that there is no foreign matter (such as old sealant, cloth fibers) which has penetrated the interior of the transaxle.

(3) Apply sealant (silicone sealant TB1217E) to the transaxle case.

Caution
- **If sealant is applied excessively or applied to a part other than the indicated part, the O-ring could deform and the sealant could penetrate the oil passage. Apply an appropriate amount of sealant to the indicated part.**

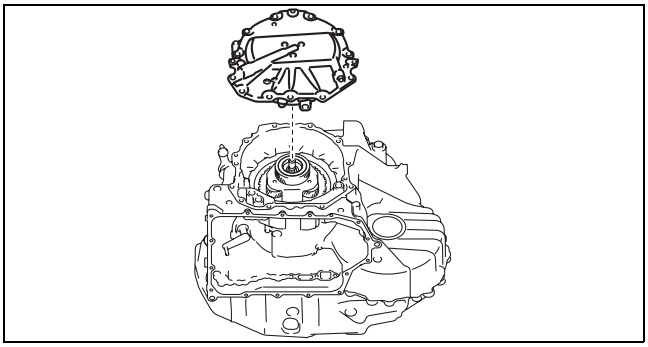
Note
- Sealant application amount (bead thickness): ϕ 0.5—1.8 mm {0.02—0.07 in}



azzjjw00000676

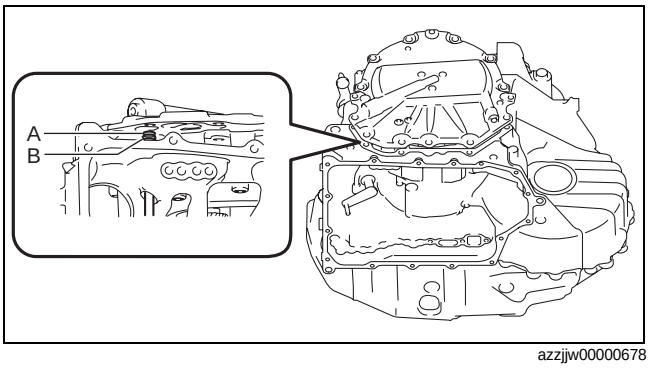
(4) Assemble the end cover component before the applied sealant starts to harden.

Note
- Adjust the oil pipe and assemble the end cover component so that the oil pipe is assembled to the end cover oil passage.



azzjjw00000677

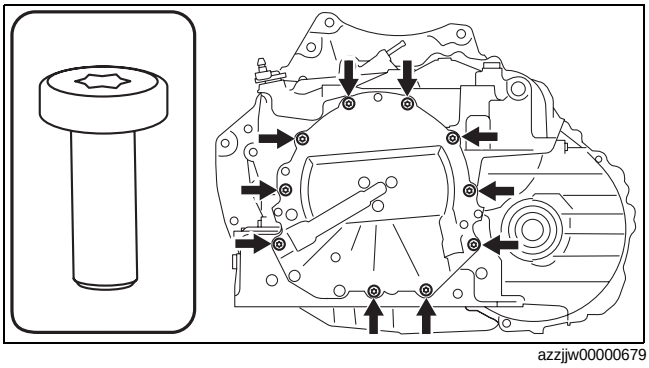
A : End cover oil passage
B : Oil pipe



azzjjw00000678

(5) Assemble and temporarily tighten the bolts to the positions shown in the figure.

Note
- Bolt size: M8×1.25 bolt, length to approx. 21 mm {0.83 in}

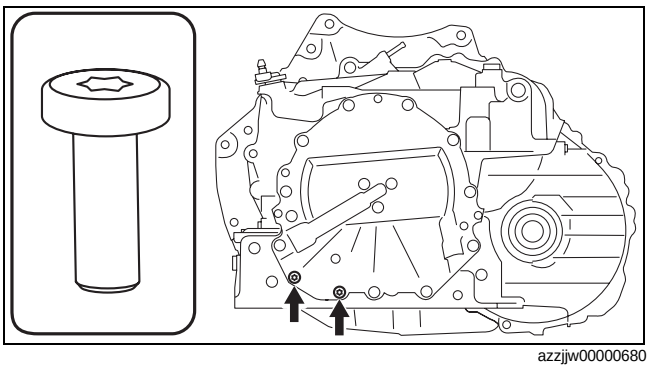


azzjjw00000679

(6) Assemble and temporarily tighten the new bolts to the positions shown in the figure.

Caution
- **The bolts for the assembly are applied with sealant. If the bolts are reused it could cause ATF leakage, therefore use new bolts.**

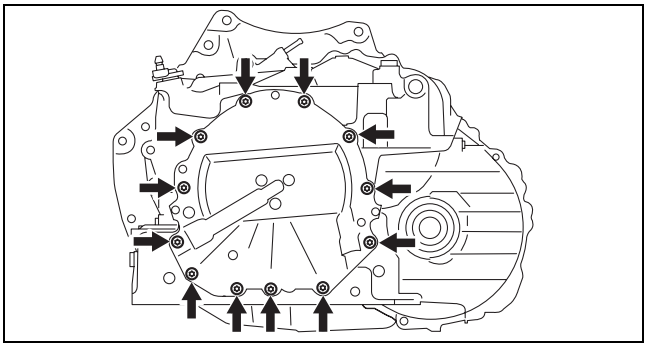
Note
- Bolt size: M8×1.25 bolt, length to approx. 21 mm {0.83 in} (with sealant applied)



azzjjw00000680

(7) Tighten the bolts shown in the figure.

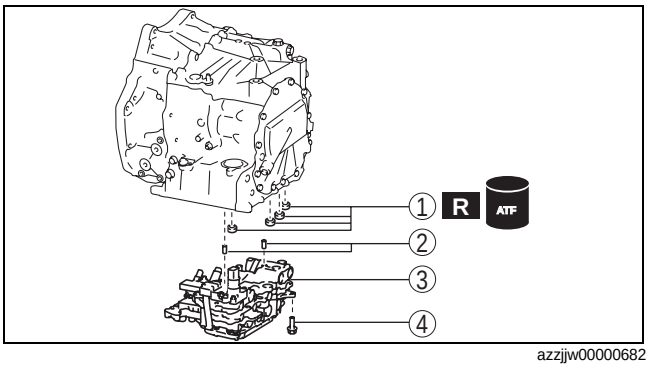
Tightening torque
19—25 N·m {2.0—2.5 kgf·m, 15—18 ft·lbf}



azzjjw00000681

52. Assemble the control valve body using the following procedure:.

1	Gasket
2	Dowel pin
3	Control valve body
4	11 bolts (M6×1.0 bolt, length to approx. 30 mm {1.2 in})



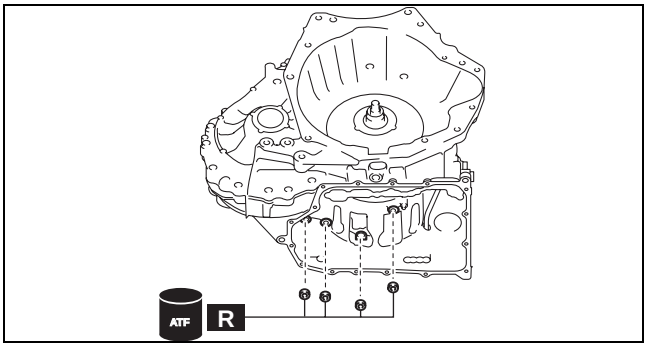
azzjjw00000682

Caution
- **Do not drop or apply an impact to the control valve body. Replace the control valve body with a new one if it was dropped or received an impact.**

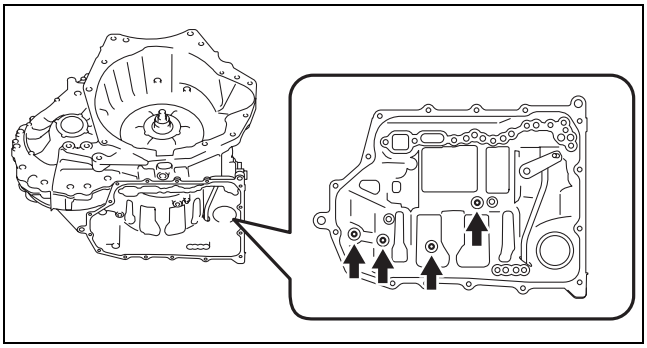
(1) Assemble new gaskets using the following procedure:

Caution
- **If a gasket is reused it could cause ATF leakage, therefore use a new gasket.**

1) Apply ATF (ATF FZ) to the new gaskets.
2) Assemble the new gaskets.



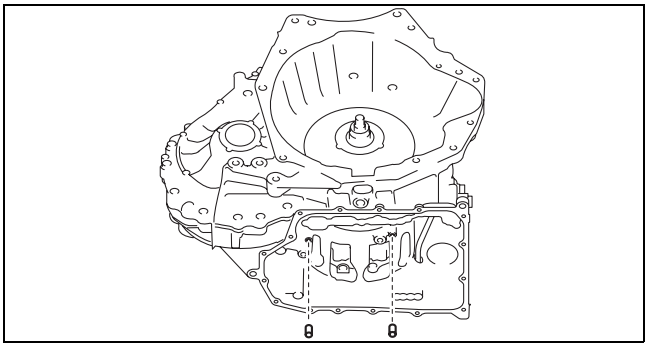
azzjjw00000683



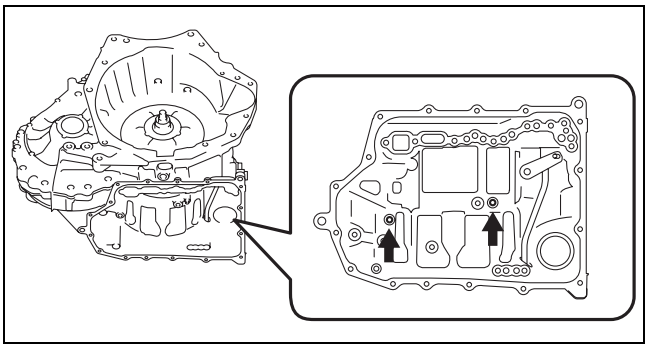
azzjjw00000684

(2) Assemble the dowel pins.

Caution
- **Do not assemble the dowel pin using a tool such as a hammer to prevent damaging the part. For the dowel pin assembly, only insert the dowel pin to the transaxle case assembly hole by hand.**

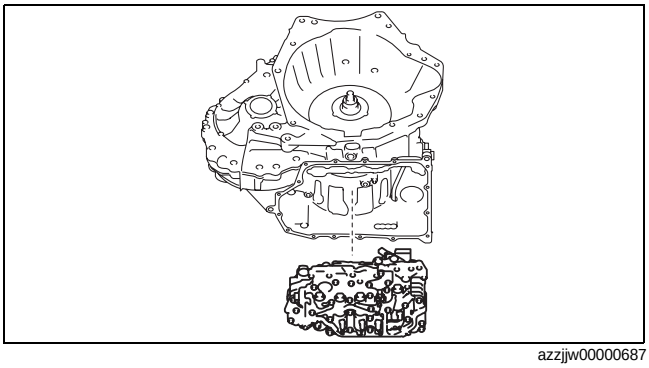


azzjjw00000685



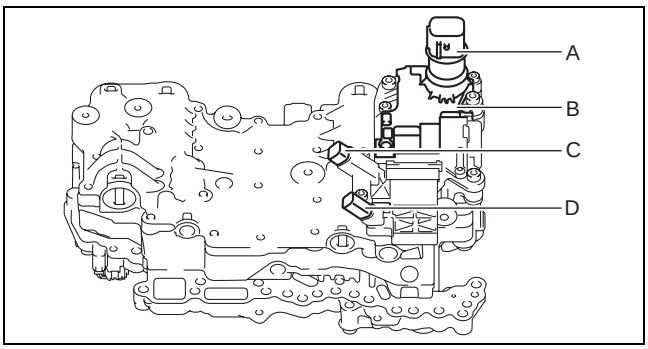
azzjjw00000686

(3) Assemble the control valve body.



azzjjw00000687

Caution
- **Assemble the control valve body at a straight angle so that force is not applied to the control valve body connector in the lateral direction.**
- **Assemble the control valve body so that the TCM, turbine/input shaft speed sensor, and the output shaft speed sensor do not contact the transaxle case.**

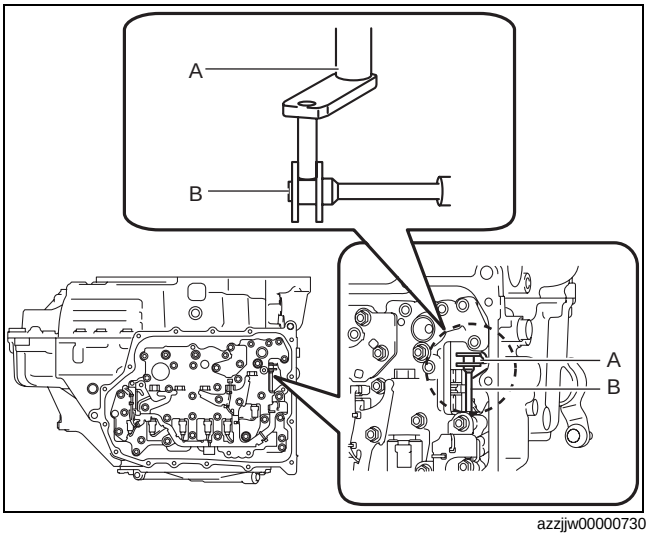


azzjjw00001566

A : Control valve body connector
B : TCM
C : Output shaft speed sensor
D : Turbine/input shaft speed sensor

Caution
- **Adjust the manual valve and assemble the control valve body so that the parking assist lever component end is engaged with the manual valve.**

A : Parking assist lever component
B : Manual valve

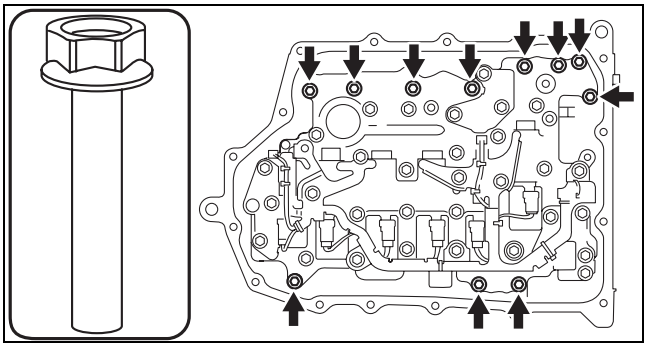


azzjjw00000730

(4) Assemble and tighten the bolts shown in the figure.

Note
- Bolt size: M6×1.0 bolt, length to approx. 30 mm {1.2 in}

Tightening torque
9—10 N·m {92—101 kgf·cm, 80—88 in·lbf}

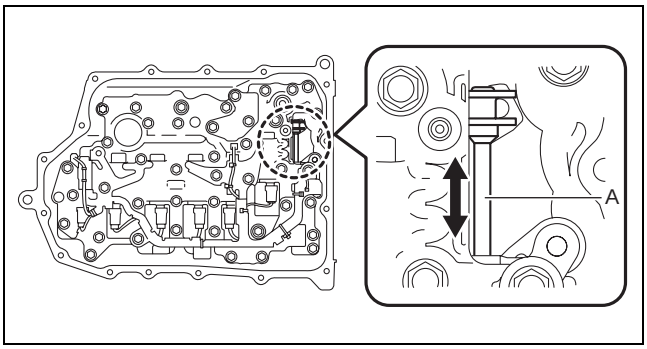


azzjjw00000689

(5) Move the manual valve in the direction shown in the figure and verify that the manual valve is engaged with the parking assist lever component end.

A : Manual valve

Note
- If the manual valve is only moved for excessive play on both surfaces of the parking assist lever component and the manual valve, the manual valve is correctly connected to the parking assist lever component.



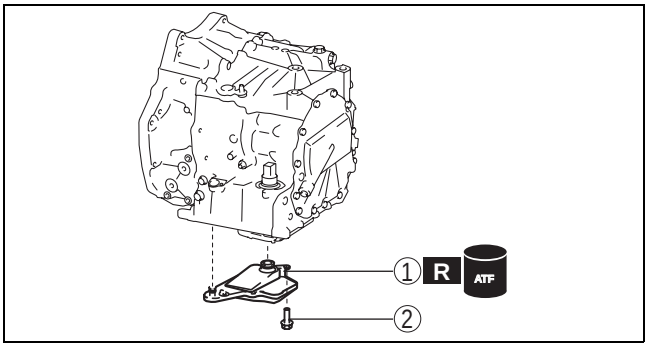
azzjjw00001212

- If there is a malfunction, remove the control valve body and reassemble.

53. Assemble a new oil strainer using the following procedure:.

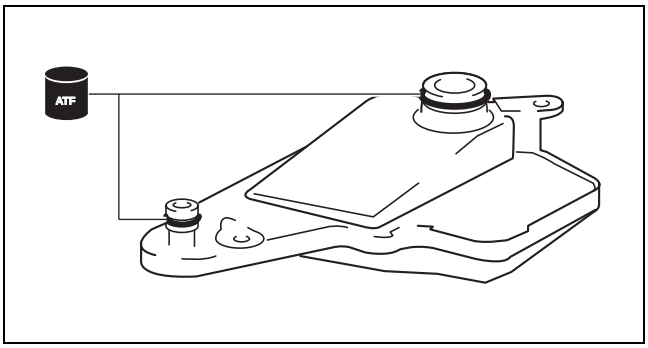
1	Oil strainer
2	2 bolts (M6×1.0 bolt, length to approx. 16 mm {0.63 in})

Caution
- **If an oil strainer is reused while containing excessive foreign matter, it could cause an operation malfunction, therefore use a new oil strainer.**



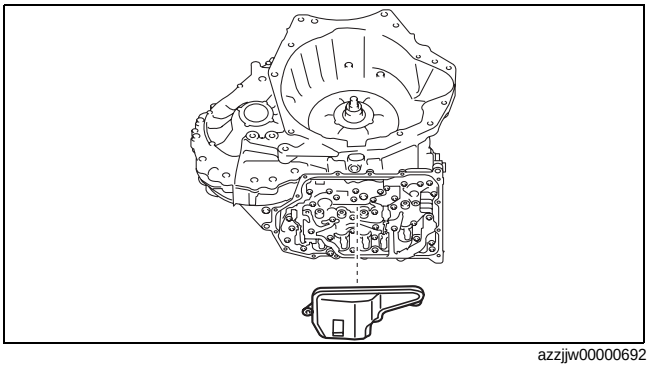
azzjjw00001607

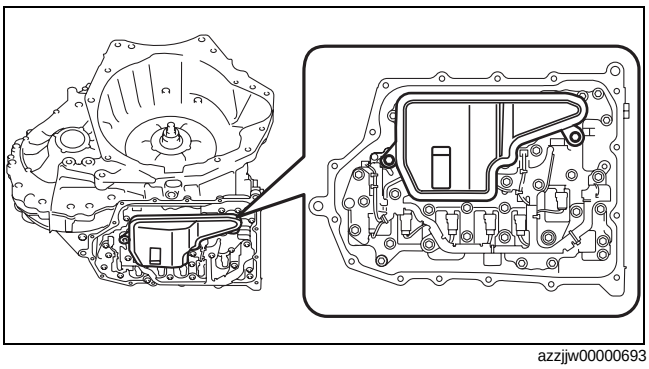
(1) Apply ATF (ATF FZ) to the new oil strainer O-rings.



azzjjw00001608

(2) Assemble the new oil strainer.

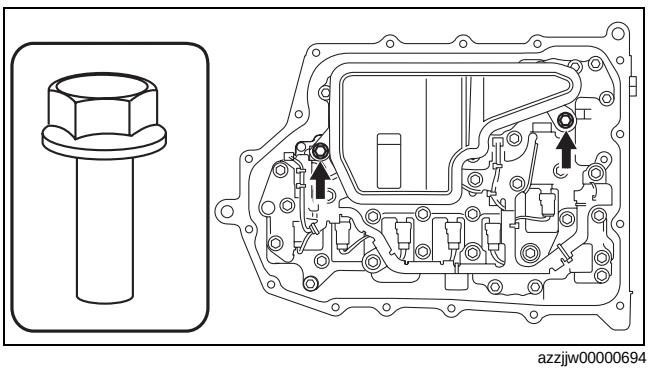

azzjjw00000692


azzjjw00000693

(3) Assemble and tighten the bolts shown in the figure.

Note
- Bolt size: M6×1.0 bolt, length to approx. 16 mm {0.63 in}

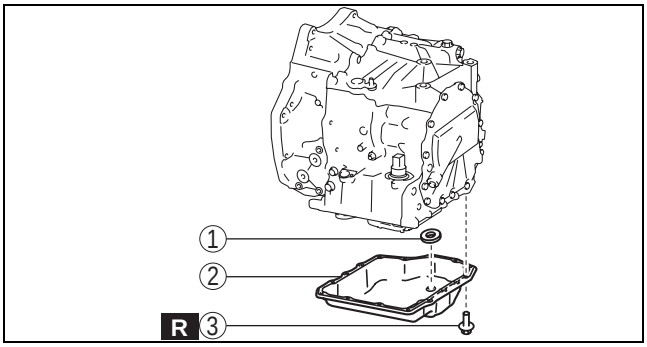
Tightening torque
9—10 N·m {92—101 kgf·cm, 80—88 in·lbf}


azzjjw00000694

54. Assemble the oil pan and magnet using the following procedure:

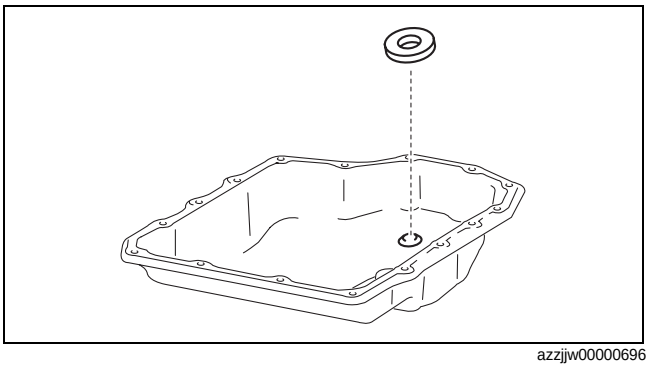
1	Magnet
2	Oil pan
3	16 bolts (M6×1.0 bolt, length to approx. 15 mm {0.59 in}*)

* : Length without spring washer is indicated due to bolt with spring washer. Length with spring washer is approx. 13 mm {0.51 in}.



azzjjw00001567

(1) Assemble the magnet.



azzjjw00000696

(2) Remove any remaining old sealant on the contact surfaces of the transaxle case and oil pan, and degrease the contact surfaces.

Caution

- **When degreasing and if degreaser is used, use a rag saturated with degreaser and be careful not to allow degreaser to penetrate the interior of the transaxle.**
  In additon, after degreasing, visually verify that there is no foreign matter (such as old sealant, cloth fibers) which has penetrated the interior of the transaxle.

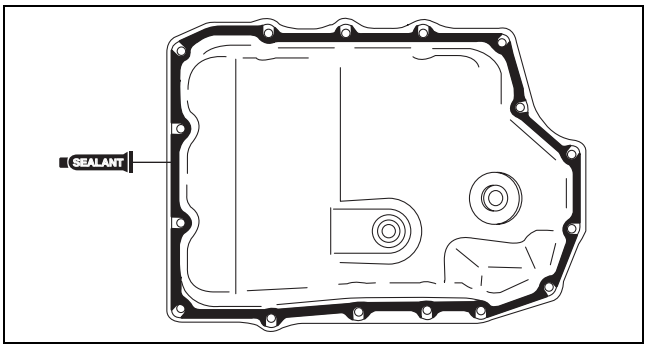
(3) Apply sealant (silicone sealant TB1217E) to the oil pan.

Caution

- **If sealant is applied excessively or applied to a part other than the indicated part, the sealant could penetrate the transaxle inside. Apply an appropriate amount of sealant to the indicated part.**

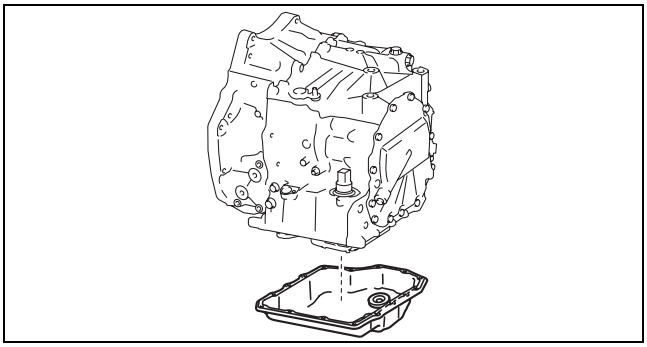
Note

- Sealant application amount (bead thickness): ϕ 1.9—6.7 mm {0.08—0.26 in}



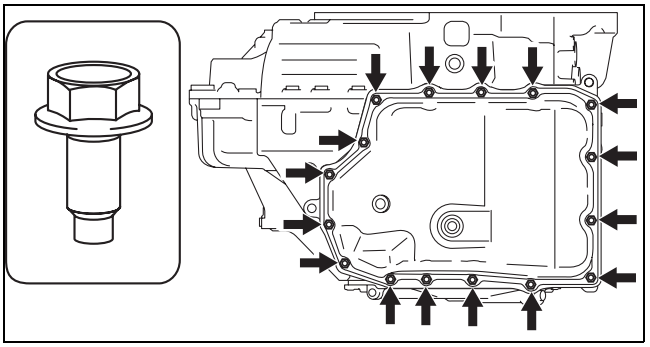
azzjjw00000697

(4) Assemble the oil pan before the applied sealant starts to harden.



azzjjw00000698

(5) Assemble and tighten the new bolts to the positions shown in the figure.


azzjjw00000699

Caution
- **The bolts for assembling are used for bolts with spring washer. If the bolts with spring washer are reused it could loosen the bolts due to spring weakness, therefore use new bolts.**

Note
- Bolt size: M6×1.0 bolt, length to approx. 15 mm {0.59 in}*

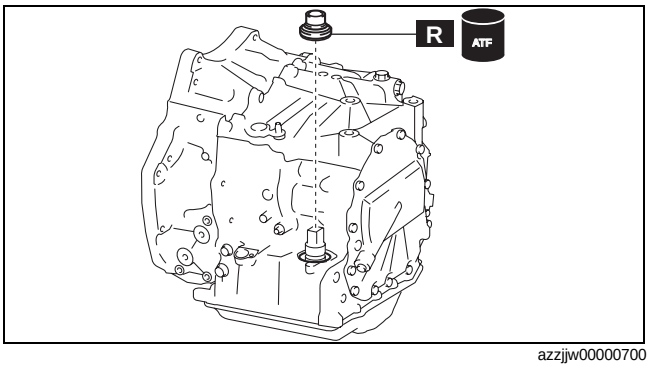
* : Length without spring washer is indicated due to bolt with spring washer. Length with spring washer is approx. 13 mm {0.51 in}.

Tightening torque
8—10 N·m {82—101 kgf·cm, 71—88 in·lbf}

55. Assemble a new oil seal using the following procedure:

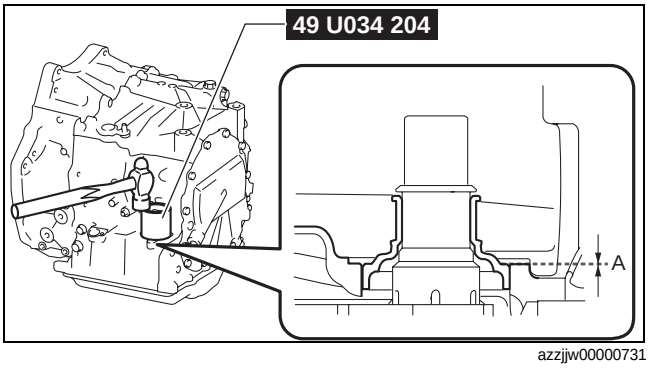
Caution
- **If an oil seal is reused it could cause ATF leakage, therefore use a new oil seal.**

(1) Apply ATF (ATF FZ) to the engagement area of the new oil seal and transaxle case.
(2) Apply ATF (ATF FZ) to the engagement area of the new oil seal and connector.
(3) Assemble the new oil seal to the position shown in the figure using the SST.



azzjjw00000700

A : –0.5—1.5 mm {–0.01—0.05 in}



azzjjw00000731

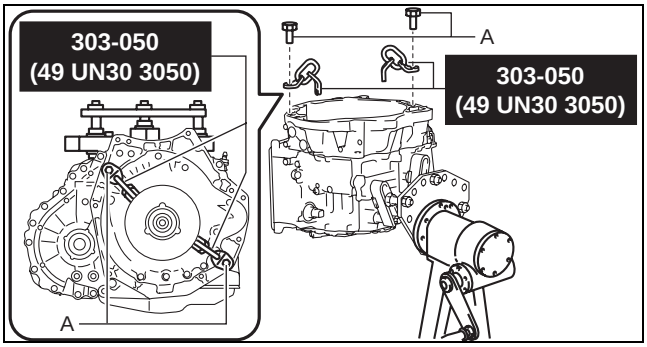
56. Remove the SSTs from the transaxle using the following procedure:

Caution
- **When removing the transaxle from the SST (engine stand) using chain hoists, be careful not to allow the transaxle to contact the SST (engine stand). If the transaxle contacts the SST, check the areas that made contact and replace damaged parts with new ones.**

(1) Assemble the SSTs using part number: 9YA02 1015, or M10×1.5 bolts, length to 35 mm {1.4 in}.

A : Part number: 9YA02 1015, or M10×1.5 bolt, length to 35 mm {1.4 in}

Tightening torque
38—52 N·m {3.9—5.3 kgf·m, 29—38 ft·lbf}

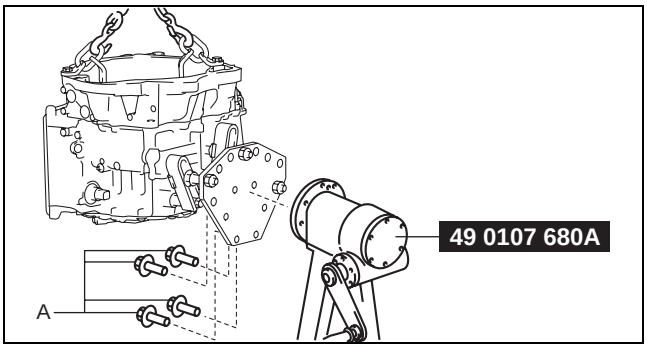


azzjjw00000702

(2) Using chain hoists, remove the SST (engine stand) from the transaxle.

A : Part number: 9YA02 A220, or M12×1.75 bolt, length to 40 mm {1.6 in}

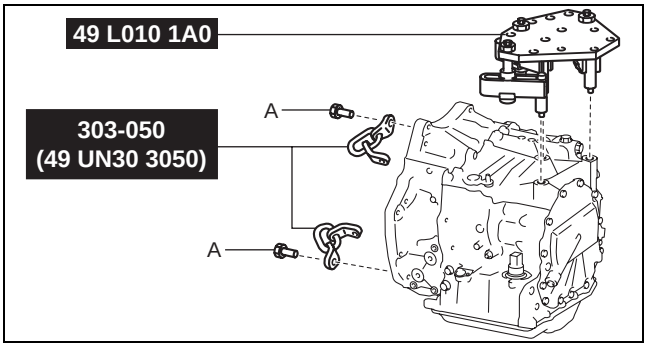
Caution
- **When removing the transaxle from the SST (engine stand) using chain hoists, be careful not to allow the transaxle to contact the SST (engine stand). If the transaxle contacts the SST, check the areas that made contact and replace damaged parts with new ones.**



azzjjw00000703

(3) Remove the SSTs.

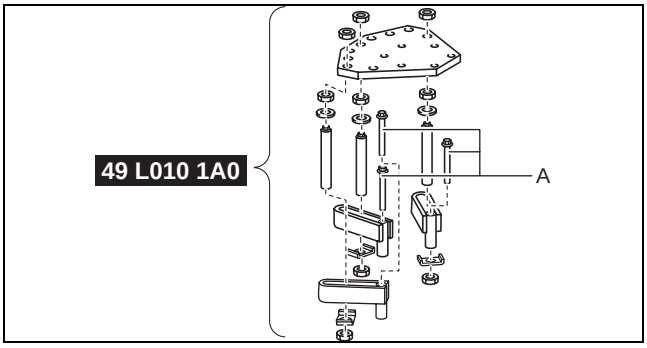
A : Part number: 9YA02 1015, or M10×1.5 bolt, length to 35 mm {1.4 in}



azzjjw00000704

(4) Disassemble the SST.

A : Part number: 9YA02 1440, or M14×1.5 bolt, length to 100 mm {3.94 in}

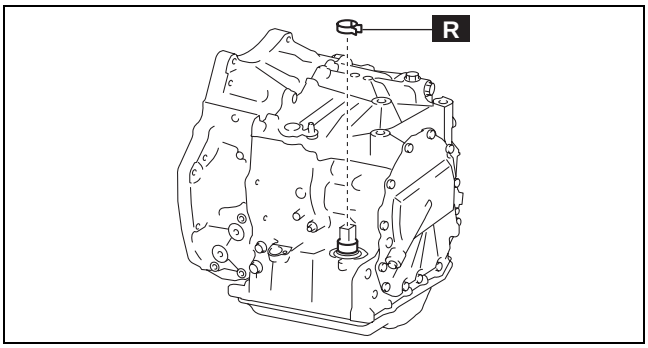


azzjjw00000705

57. Assemble a new hose clamp using the following procedure:

Caution
- **If a hose clamp is reused it could cause ATF leakage, therefore use a new hose clamp.**

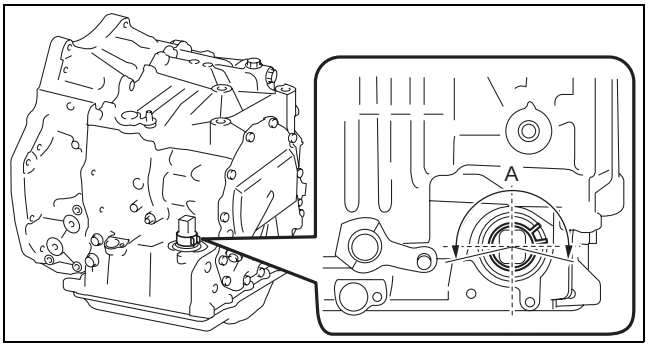
(1) Assemble the new hose clamp to the position shown in the figure.



azzjjw00000706

Caution
- **Assemble the hose clamp tab to within the range shown in the figure.**

A : 210°

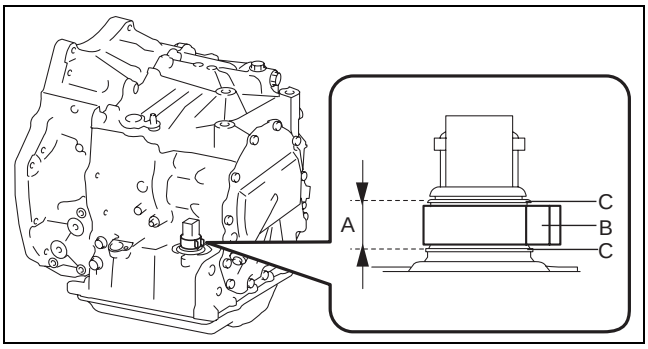


azzzcw00000084

(2) Verify that the hose clamp is assembled to within the position shown in the figure.

A : Hose clamp assembly area
B : Hose clamp
C : Oil seal flange

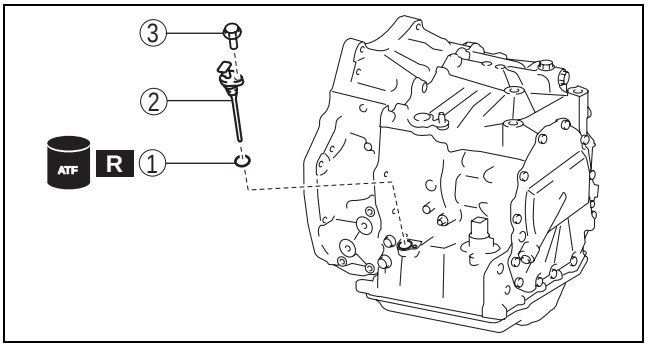
Caution
- **Verify that the hose clamp does not contact the oil seal flange.**
  - If not within the area, adjust so that the hose clamp assembly position is within the area.



azzjjw00000732

58. Assemble the dipstick using the following procedure:

1	O-ring (outer diameter approx. 16.6 mm {0.654 in}, thickness approx. 2.4 mm {0.094 in})
2	Dipstick
3	Bolt (M6×1.0 bolt, length to approx. 16 mm {0.63 in})



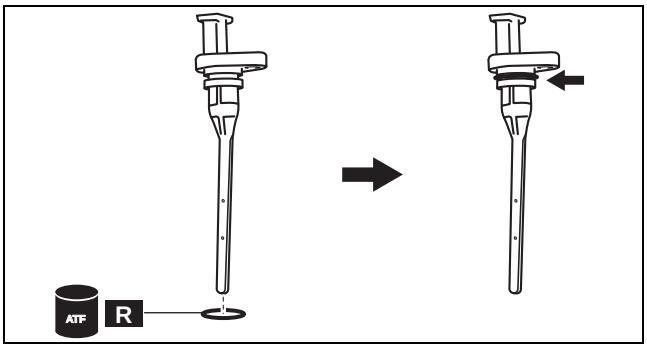
azzjjw00000709

(1) Assemble a new O-ring using the following procedure:

Caution
- **If an O-ring is reused it could cause ATF leakage, therefore use a new O-ring.**

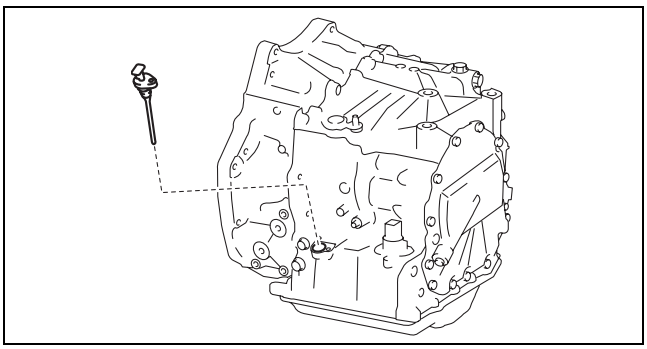
Note
- O-ring size: Outer diameter approx. 16.6 mm {0.654 in}, thickness approx. 2.4 mm {0.094 in}

1) Apply ATF (ATF FZ) to the new O-ring.
2) Assemble the new O-ring.



azzjjw00000710

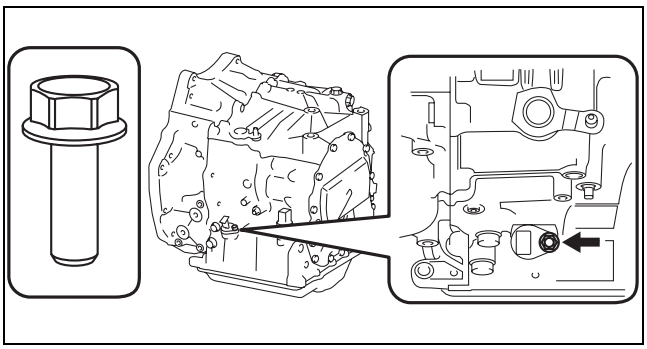
(2) Assemble the dipstick.


azzjjw00000711

(3) Assemble and tighten the bolt shown in the figure.

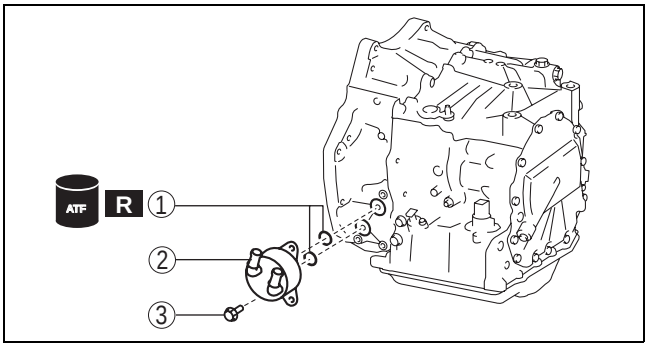
Note
- Bolt size: M6×1.0 bolt, length to approx. 16 mm {0.63 in}

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


azzjjw00000712

59. Assemble the oil cooler using the following procedure:

1	O-ring (outer diameter approx. 24.4 mm {0.961 in}, thickness approx. 2.4 mm {0.094 in})
2	Oil cooler
3	3 bolts (M8×1.25 bolt, length to approx. 25 mm {0.98 in})



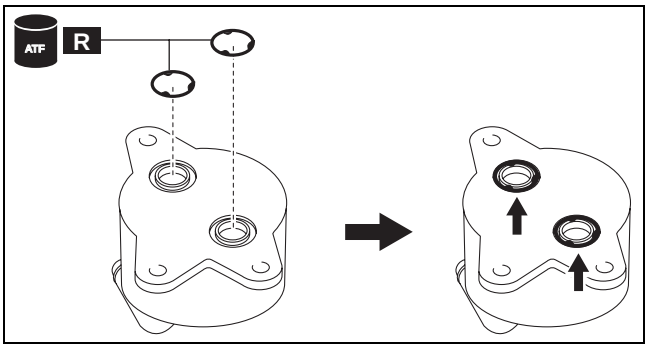
azzjjw00000713

(1) Assemble new O-rings using the following procedure:

Caution
- **If an O-ring is reused it could cause ATF leakage, therefore use a new O-ring.**

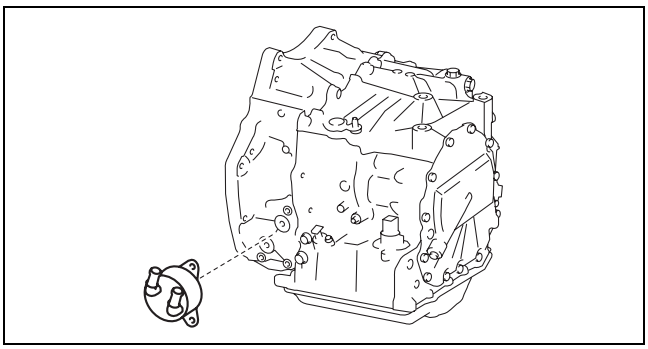
Note
- O-ring size: Outer diameter approx. 24.4 mm {0.961 in}, thickness approx. 2.4 mm {0.094 in}

1) Apply ATF (ATF FZ) to the new O-rings.
2) Assemble the new O-rings.



azzjjw00000714

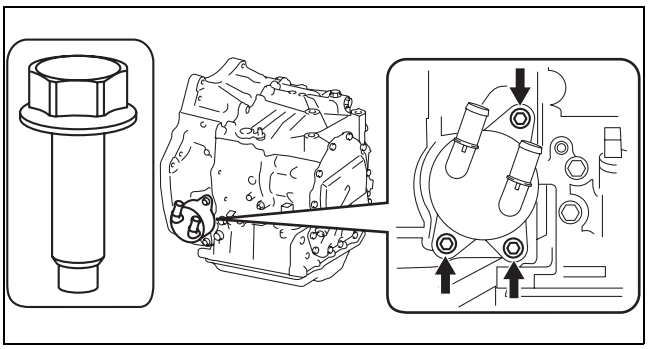
(2) Assemble the oil cooler.


azzjjw00000715

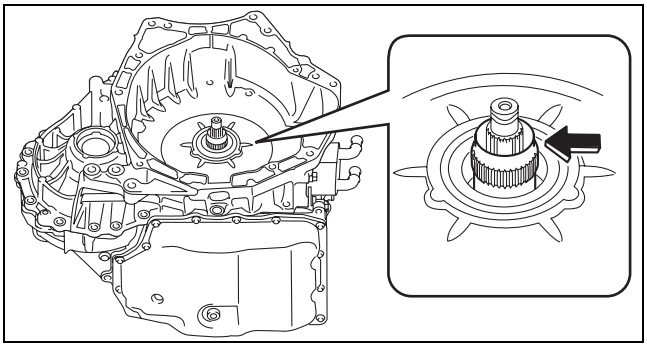
(3) Assemble and tighten the bolts shown in the figure.

Note
- Bolt size: M8×1.25 bolt, length to approx. 25 mm {0.98 in}

Tightening torque
22—27 N·m {2.3—2.7 kgf·m, 17—19 ft·lbf}


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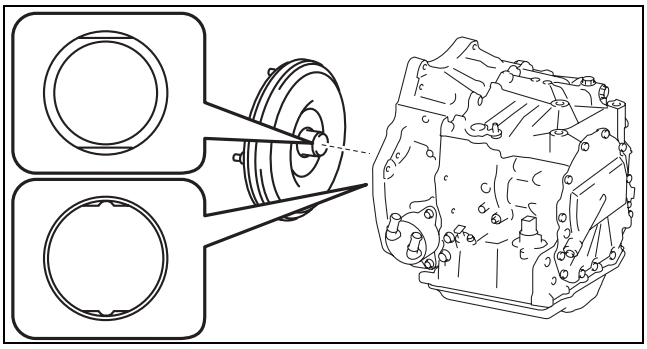
60. Assemble the torque converter using the following procedure:
    (1) Apply ATF (ATF FZ) to the stator shaft end of the oil pump shown in the figure.



azzzcw00000085

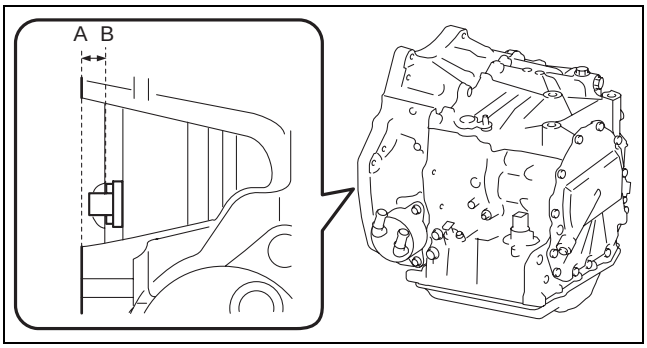
Caution
- **Accurately perform the procedure to protect the internal parts of the torque converter.**

    (2) Assemble the torque converter so that the two surfaces of the notch on the end of the torque converter engage the inner rotor of the oil pump.



azzjjw00000717

    (3) To verify that the torque converter is securely assembled, measure the distance shown in the figure.



azzjjw00001418

A : Converter housing end (alignment surface with engine)
B : Stud bolt seating face of torque converter

Note
- Recommended measuring instrument: Depth gauge, straight edge ruler

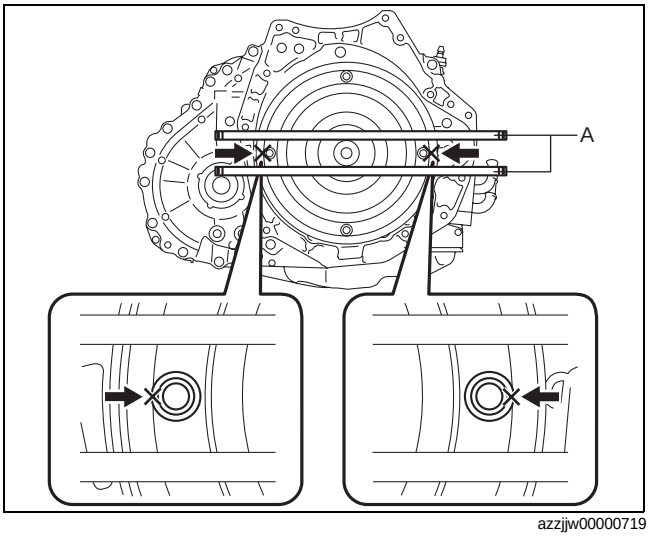
Specification
14.6 mm {0.575 in} or more

- If not within the specification, remove the torque converter and reassemble.

Note
- Measurement method

1) Set two straight edge rulers along the alignment surface of the converter housing with the engine as shown in the figure.

A : Straight edge ruler



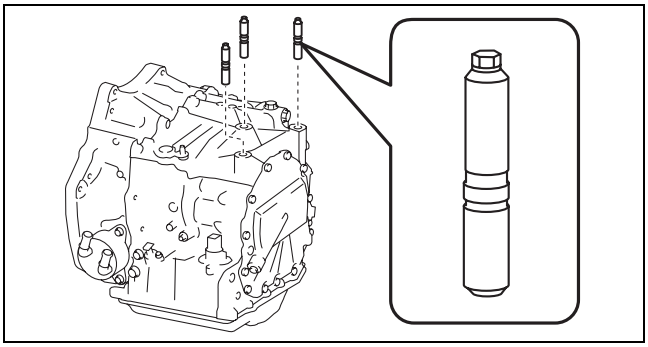
azzjjw00000719

2) Measure the positions (2 locations) shown in the figure using a depth gauge and calculate the average value.

3) Subtract the thickness of the straight edge ruler from the average value.

61. Assemble and tighten the stud bolts.

Tightening torque
15—25 N·m {1.6—2.5 kgf·m, 12—18 ft·lbf}

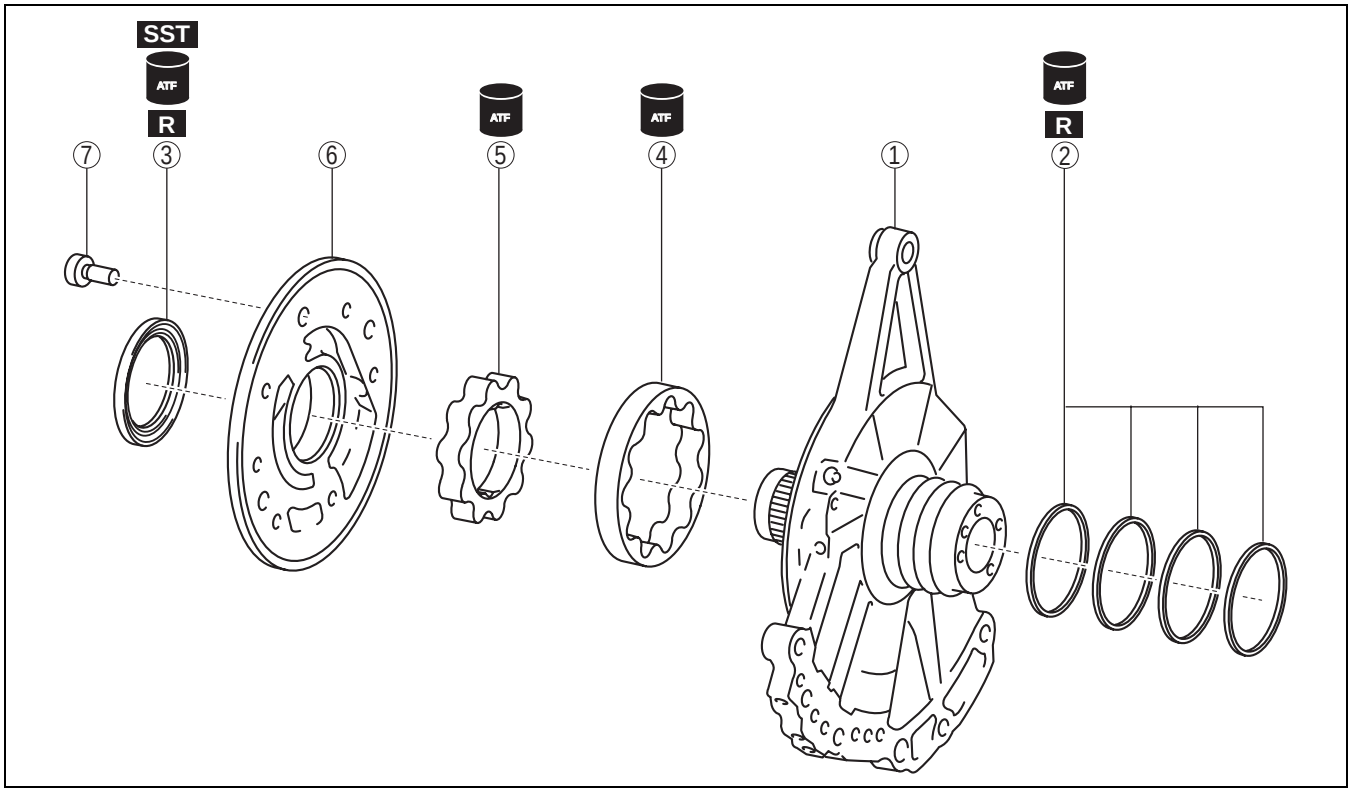


azzjjw00000720

OIL PUMP ASSEMBLY

id051700663600

Structural View



azzjjw00001530

1	Oil pump housing
2	Seal ring (outer diameter approx. 52.5 mm {2.07 in}, thickness approx. 1.5 mm {0.059 in})
3	Oil seal
4	Outer rotor

5	Inner rotor
6	Oil pump cover
7	7 bolts (M6×1.0 bolt, length to approx. 13 mm {0.51 in})

Assembly Procedure

1. Assemble new seal rings using the following procedure:

Caution

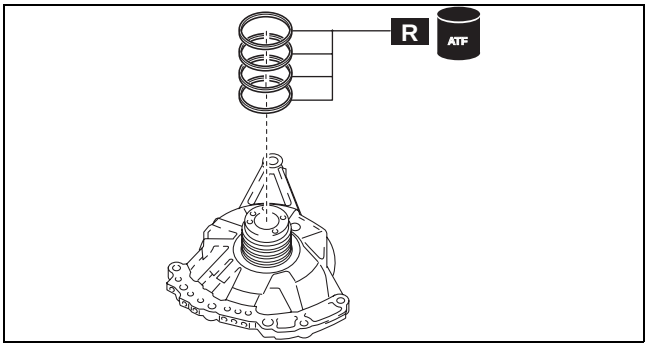
- **If a seal ring is reused it could cause ATF leakage, therefore use a new seal ring.**

Note

- Seal ring size: Outer diameter approx. 52.5 mm {2.07 in}, thickness approx. 1.5 mm {0.059 in}

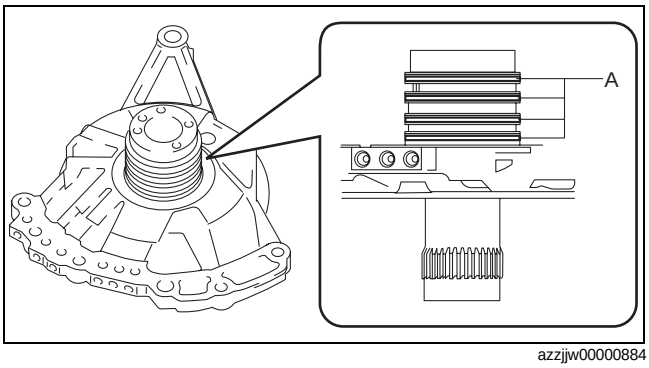
(1) Apply ATF (ATF FZ) to the new seal rings.

(2) Assemble the new seal rings.



azzjjw00000883

A : Seal ring

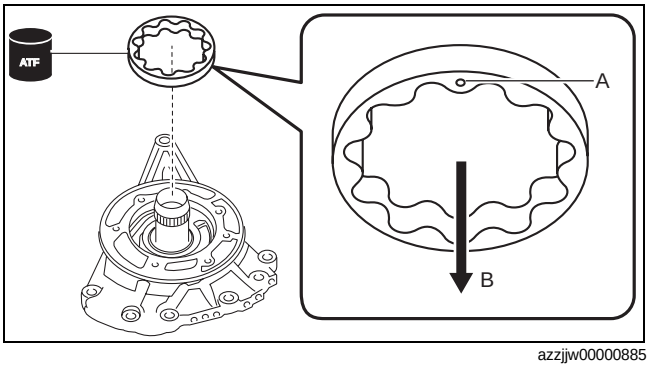


azzjjw00000884

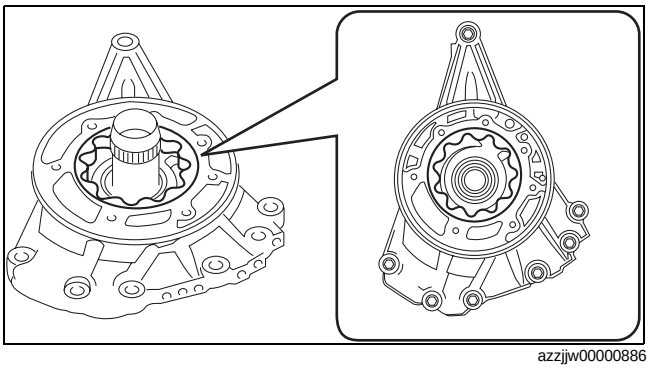
2. Assemble the outer rotor using the following procedure:
   (1) Apply ATF (ATF FZ) to the outer rotor.
   (2) Assemble the outer rotor.

A : Mark
B : Assembly direction (oil pump housing side)

Note
- Assemble so that the outer rotor marking is facing the oil pump housing.



azzjjw00000885

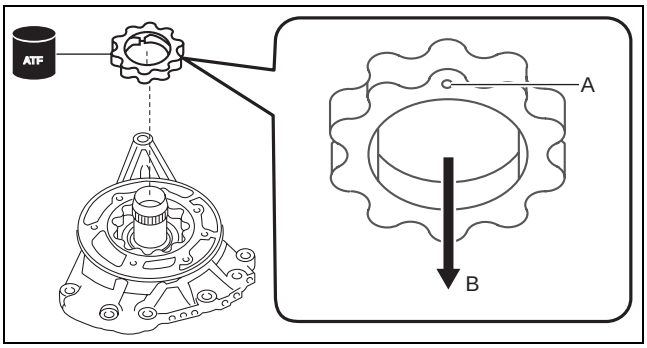


azzjjw00000886

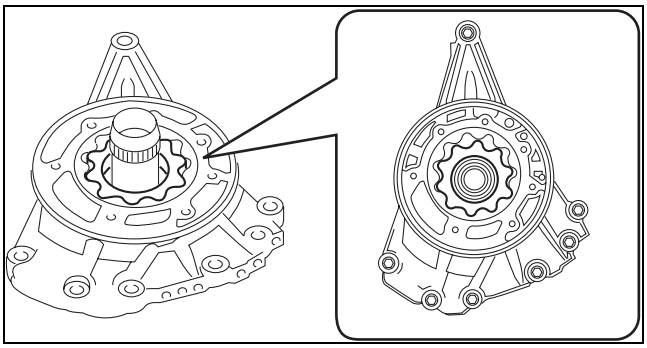
3. Assemble the inner rotor using the following procedure:
   (1) Apply ATF (ATF FZ) to the inner rotor.
   (2) Assemble the inner rotor.

A : Mark
B : Assembly direction (oil pump housing side)

Note
- Assemble so that the inner rotor marking is facing the oil pump housing.



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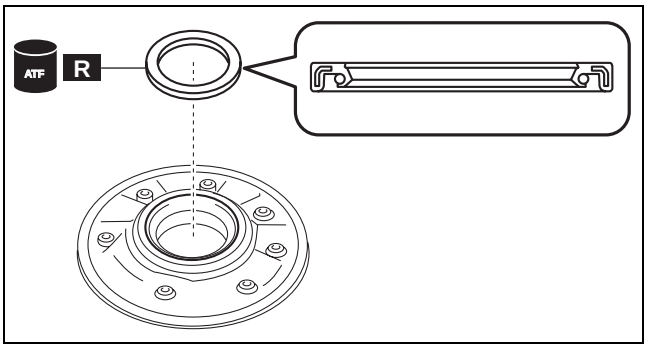


azzjjw00000888

4. Assemble a new oil seal using the following procedure:

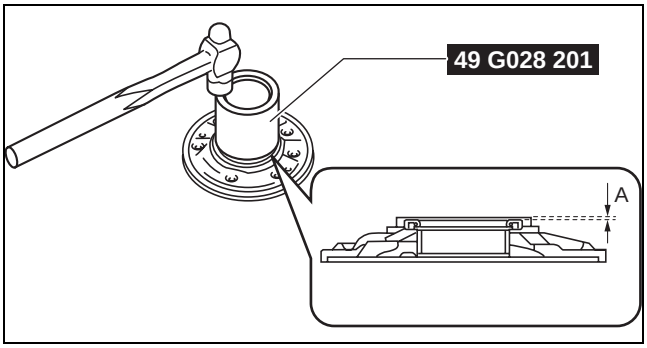
Caution
- **If an oil seal is reused it could cause ATF leakage, therefore use a new oil seal.**

(1) Apply ATF (ATF FZ) to the engagement area of the new oil seal and oil pump cover.
(2) Apply ATF (ATF FZ) to the lip of the new oil seal.
(3) Assemble the new oil seal to the position shown in the figure using the SST.



azzjjw00000889

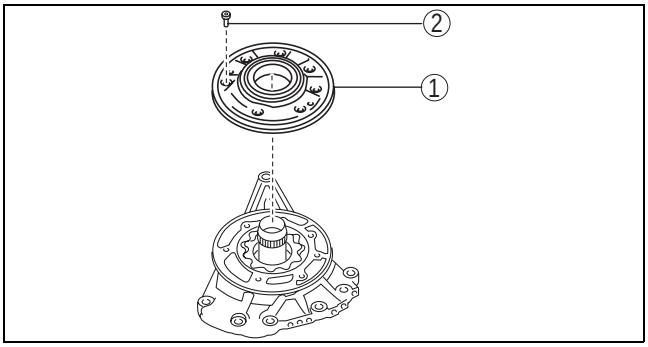
A : 0—0.5 mm {0—0.01 in}



azzjjw00000890

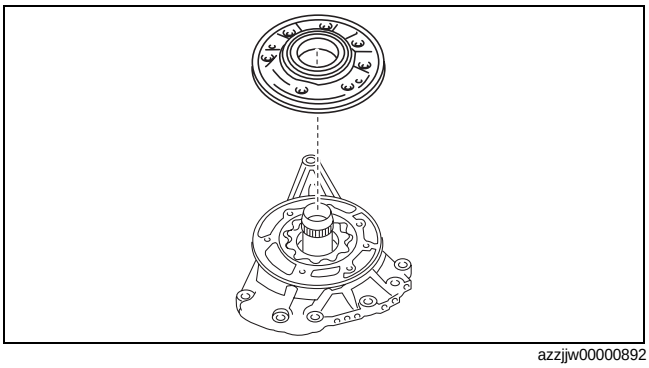
5. Assemble the oil pump cover using the following procedure:

1	Oil pump cover
2	7 bolts (M6×1.0 bolt, length to approx. 13 mm {0.51 in})

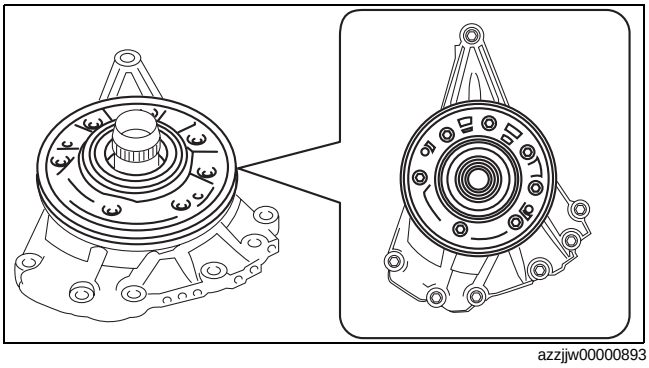


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(1) Assemble the oil pump cover.



azzjjw00000892

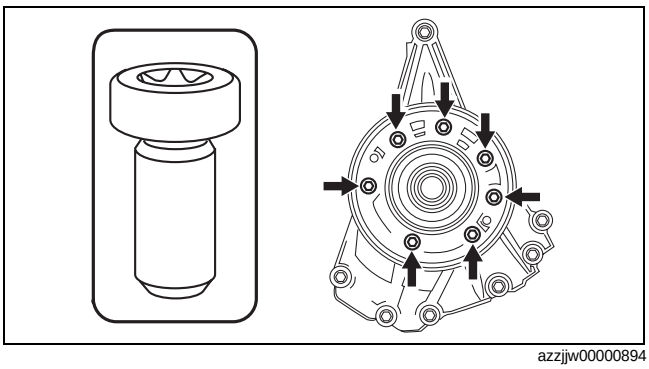


azzjjw00000893

(2) Assemble and tighten the bolts shown in the figure.

Note
- Bolt size: M6×1.0 bolt, length to approx. 13 mm {0.51 in}

Tightening torque
9—10 N·m {92—101 kgf·cm, 80—88 in·lbf}

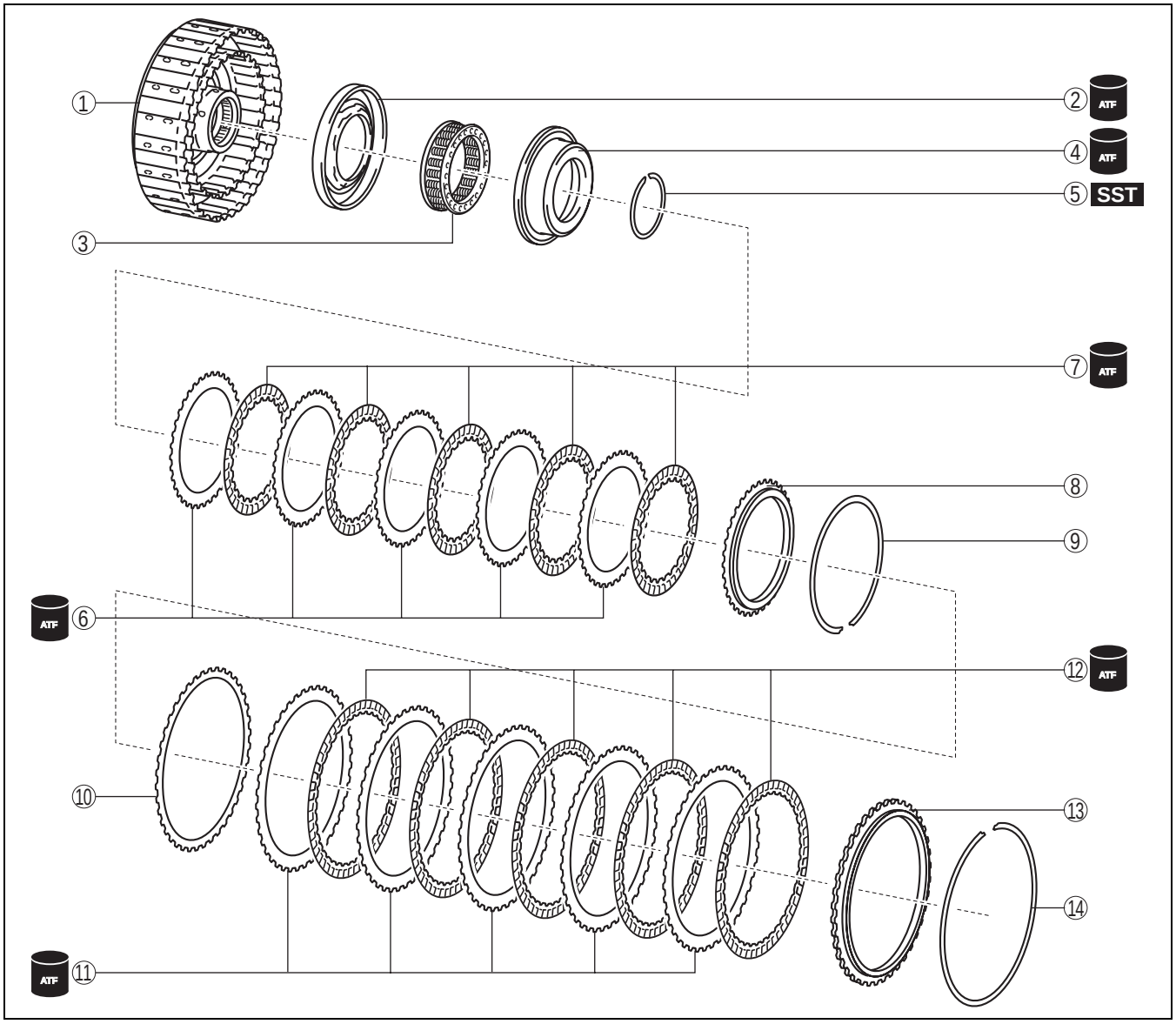


azzjjw00000894

CLUTCH COMPONENT ASSEMBLY

id051700663700

Structural View



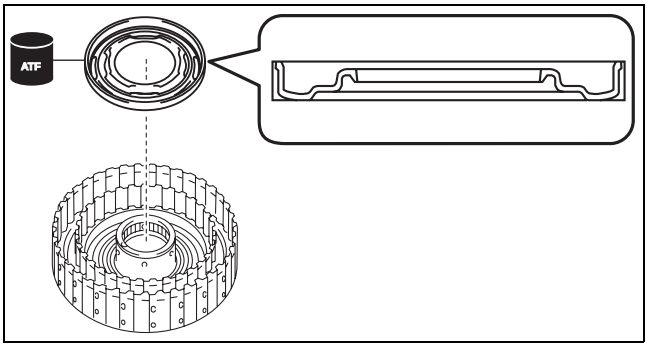
azzjjw00001532

1	High clutch drum component
2	High clutch piston
3	Springs and retainer component (outer diameter approx. 79.5 mm {3.13 in})
4	Seal plate
5	Snap ring (outer diameter approx. 56.5 mm {2.22 in})
6	Driven plate (inner diameter approx. 95.5 mm {3.76 in})
7	Drive plate (outer diameter approx. 116.8 mm {4.598 in})

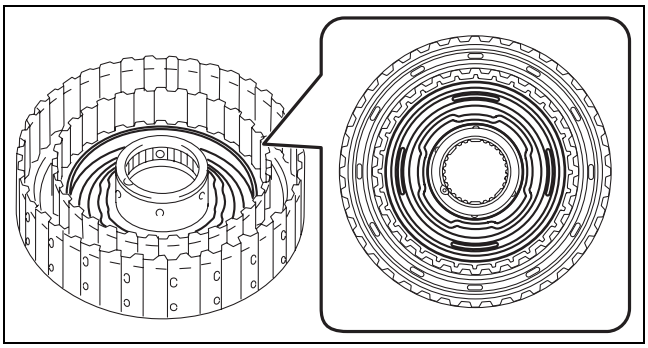
8	Retaining plate (inner diameter approx. 95.5 mm {3.76 in})
9	Snap ring (outer diameter approx. 127.4 mm {5.016 in}) (selection)
10	Wave spring
11	Driven plate (inner diameter approx. 139.9 mm {5.508 in})
12	Drive plate (outer diameter approx. 159.1 mm {6.264 in})
13	Retaining plate (inner diameter approx. 139.9 mm {5.508 in})
14	Snap ring (outer diameter approx. 169.3 mm {6.665 in}) (selection)

Assembly Procedure

1. Assemble the high clutch piston using the following procedure:
   (1) Apply ATF (ATF FZ) to the high clutch piston lip.
   (2) Assemble the high clutch piston.



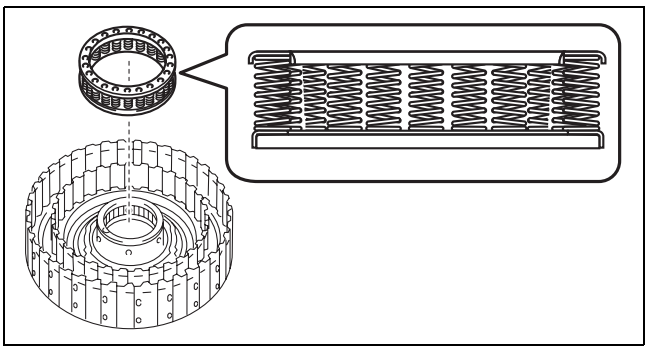
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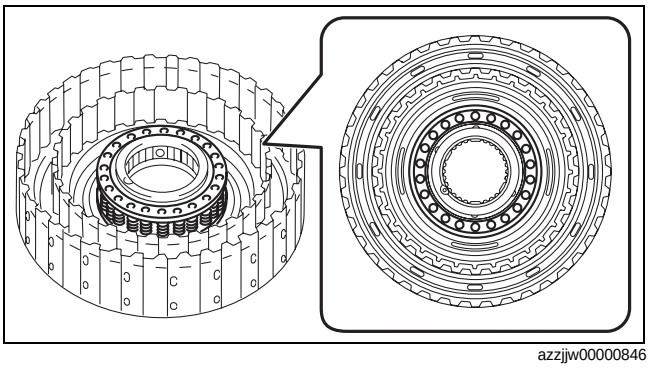
azzjjw00000844

2. Assemble the springs and retainer component.

   Note
   - Springs and retainer component size: Outer diameter approx. 79.5 mm {3.13 in}

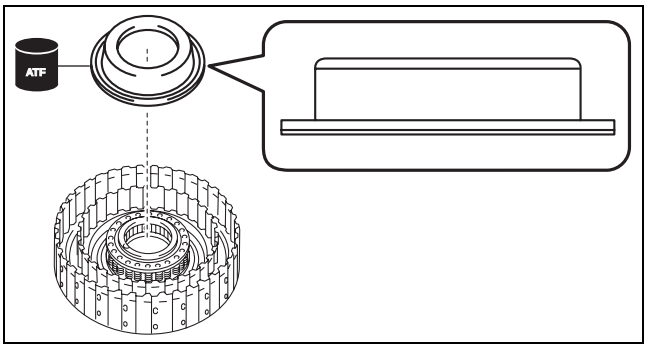


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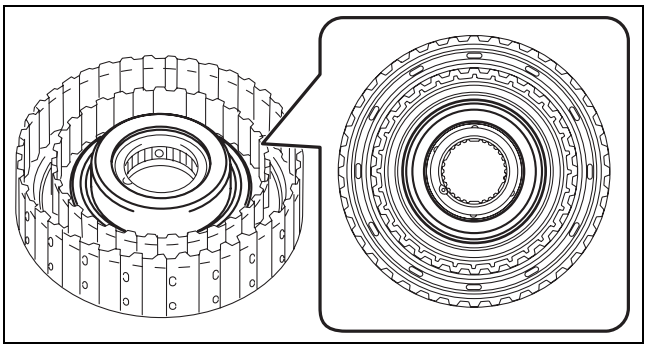


azzjjw00000846

3. Assemble the seal plate using the following procedure:
   (1) Apply ATF (ATF FZ) to the seal plate lip.
   (2) Assemble the seal plate.



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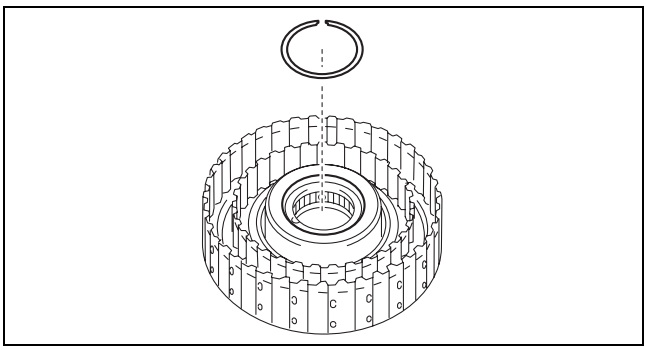


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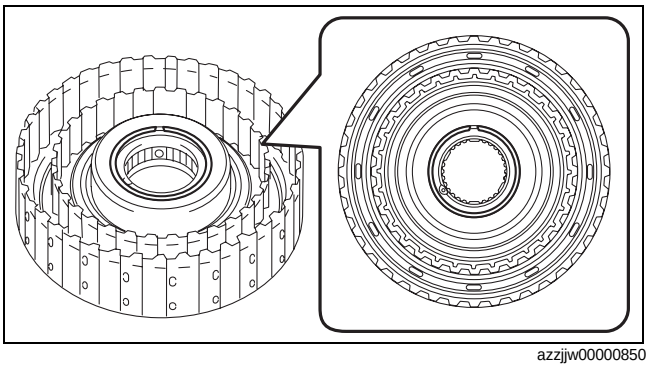
4. Assemble the snap ring using the following procedure:

Note
- Snap ring size: Outer diameter approx. 56.5 mm {2.22 in}

(1) Set the snap ring to the top of the seal plate.



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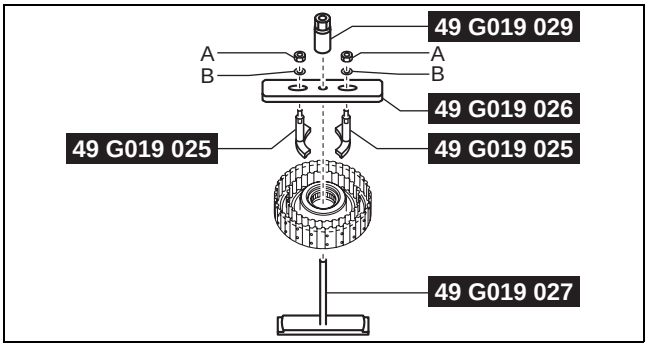


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(2) Install the SSTs.

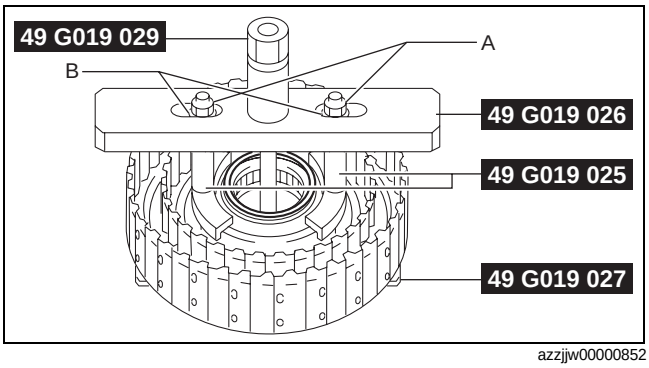
A : Nut included with SST (49 G019 025), or M8×1.25 nut
B : Washer

Note
- When installing the SST (49 G019 025) to the SST (49 G019 026), use the nuts included with the SST (49 G019 025), or M8×1.25 nuts.



azzjjw00000851

A : Nut included with SST (49 G019 025), or M8×1.25 nut
B : Washer

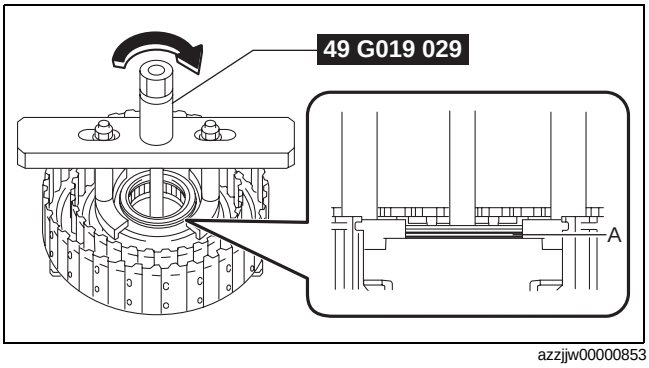


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(3) Tighten the SST (49 G019 029) until the snap ring groove of the high clutch drum component comes out.

A : Snap ring groove

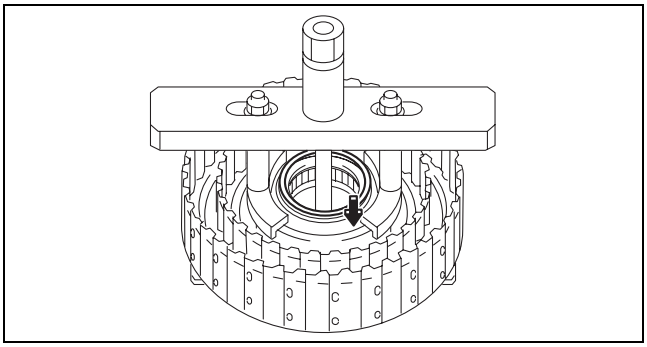
Caution
- **If the SST (49 G019 029) is tightened with excessive force, surrounding parts could be damaged. Stop tightening the SST when the snap ring groove of the high clutch drum component comes out.**



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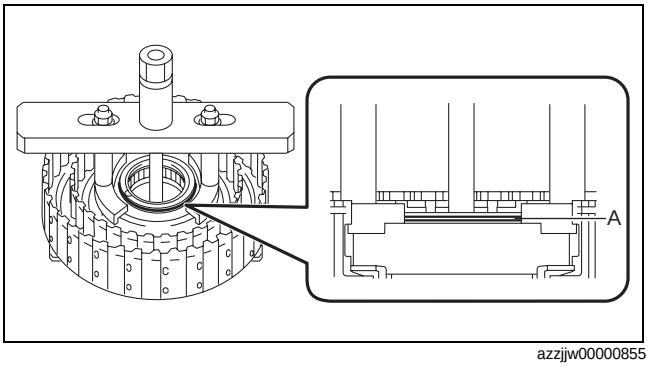
(4) Assemble the snap ring.

Caution
- **After assembling the snap ring, verify that the snap ring is securely inserted into the bottom of the snap ring groove.**



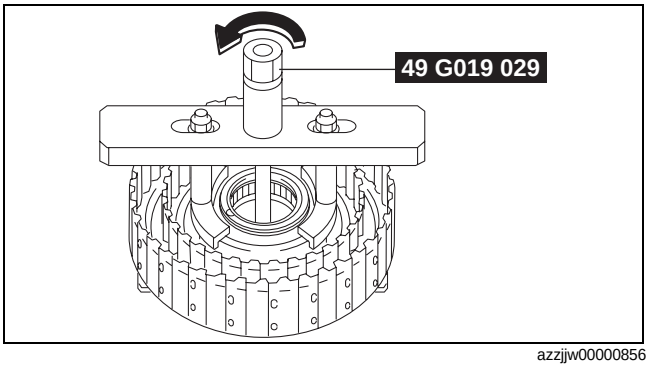
azzjjw00000854

A : Snap ring



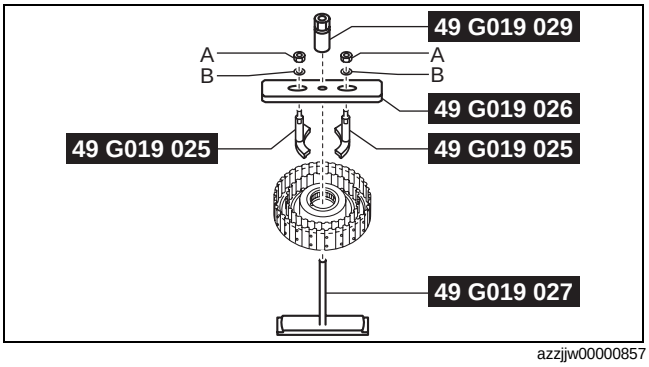
azzjjw00000855

(5) Loosen the SST (49 G019 029) and remove the SSTs.



azzjjw00000856

A : Nut included with SST (49 G019 025), or M8×1.25 nut
B : Washer



azzjjw00000857

5. Assemble the drive plates and driven plates using the following procedure:

Note
- Drive plate size: Outer diameter approx. 116.8 mm {4.598 in}
- Driven plate size: Inner diameter approx. 95.5 mm {3.76 in}

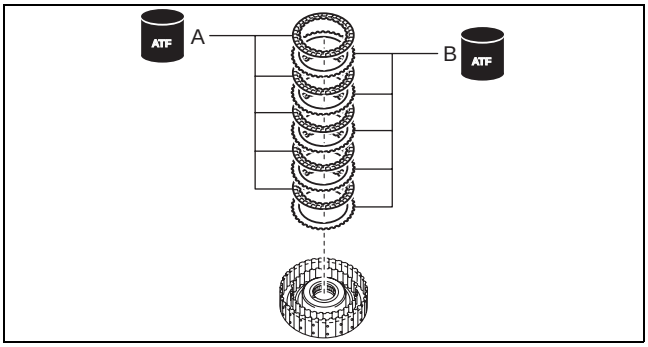
(1) Apply ATF (ATF FZ) to the drive plates and driven plates.

Caution
- **If the drive plate is replaced with a new one, immerse it in ATF (ATF FZ) for 2 hours or more to permeate the facing with ATF.**

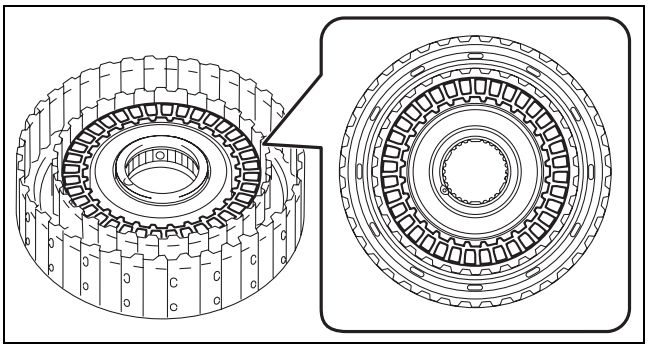
(2) Assemble the drive plates and driven plates.

A : Drive plate
B : Driven plate

Assembly order
Driven plate—drive plate—driven plate—drive plate—driven plate—drive plate—driven plate—drive plate

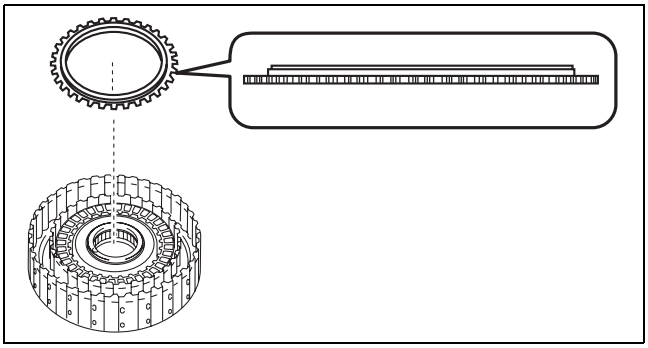


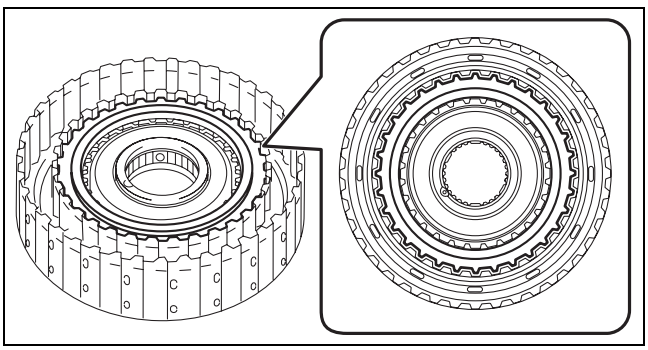
azzjjw00000858


azzjjw00000859

6. Assemble the retaining plate.

Note
- Retaining plate size: Inner diameter approx. 95.5 mm {3.76 in}


azzjjw00000860


azzjjw00000861

7. Assemble the snap ring using the following procedure:

Note
- Snap ring size: Outer diameter approx. 127.4 mm {5.016 in}

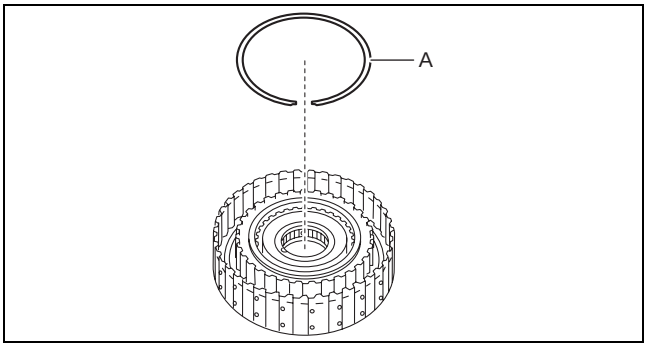
(1) Measure the high clutch clearance and select the appropriate snap ring. (See 05-17-317 HIGH CLUTCH CLEARANCE MEASUREMENT/ADJUSTMENT.)

Note
- If the snap ring is assembled for the high clutch clearance measurement/adjustment, the following snap ring assembly procedure is not necessary.

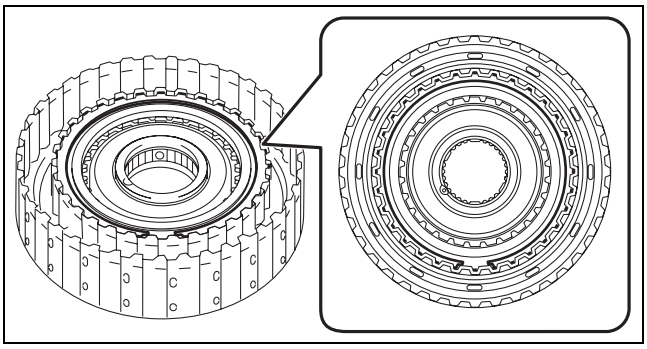
(2) Assemble the selected snap ring in Step (1).

A : Selection

Caution
- **After assembling the snap ring, verify that the snap ring is securely inserted into the bottom of the snap ring groove.**

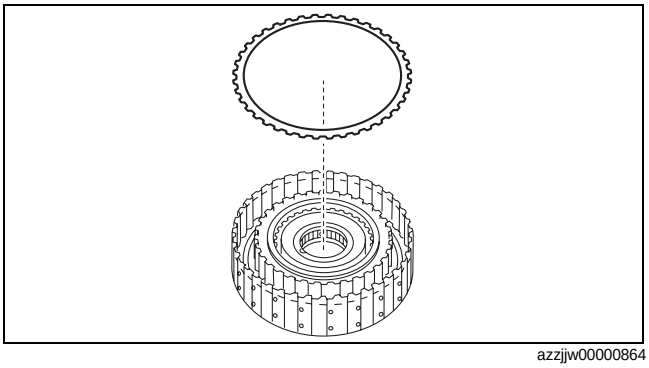


azzjjw00000862

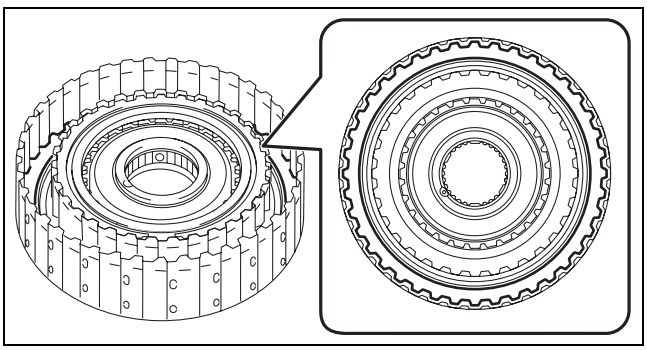


azzjjw00000863

8. Assemble the wave spring.



azzjjw00000864



azzjjw00000865

9. Assemble the drive plates and driven plates using the following procedure:

Note
- Drive plate size: Outer diameter approx. 159.1 mm {6.264 in}
- Driven plate size: Inner diameter approx. 139.9 mm {5.508 in}

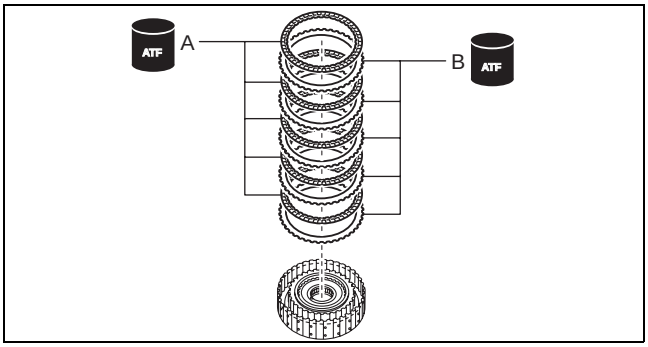
(1) Apply ATF (ATF FZ) to the drive plates and driven plates.

Caution
- **If the drive plate is replaced with a new one, immerse it in ATF (ATF FZ) for 2 hours or more to permeate the facing with ATF.**

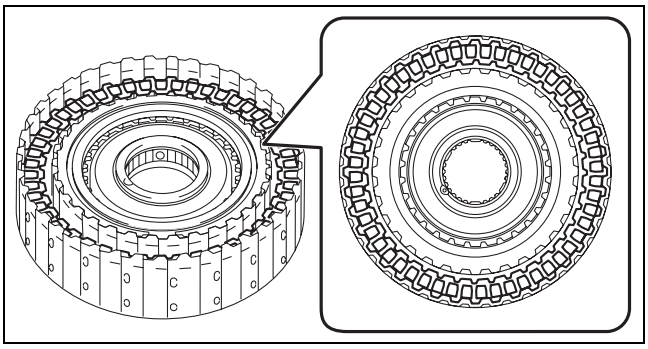
(2) Assemble the drive plates and driven plates.

A : Drive plate
B : Driven plate

Assembly order
Driven plate—drive plate—driven plate—drive plate—driven plate—drive plate—driven plate—drive plate

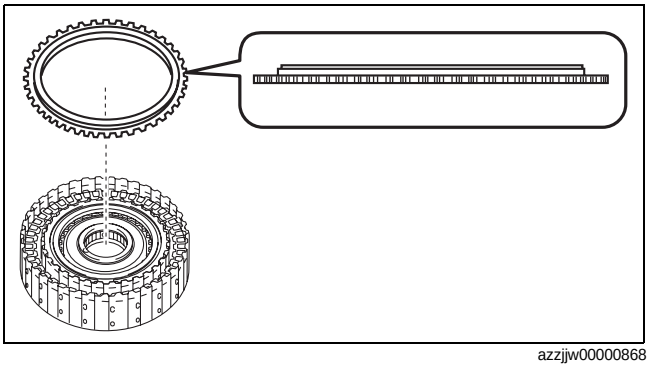


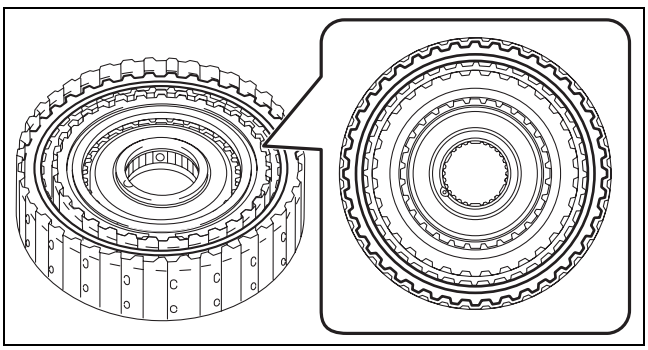
azzjjw00000866


azzjjw00000867

10. Assemble the retaining plate.

Note
- Retaining plate size: Inner diameter approx. 139.9 mm {5.508 in}


azzjjw00000868


azzjjw00000869

11. Assemble the snap ring using the following procedure:

Note
- Snap ring size: Outer diameter approx. 169.3 mm {6.665 in}

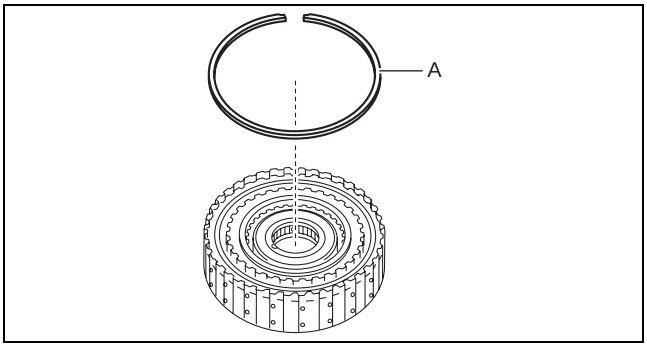
(1) Measure the low clutch clearance and select the appropriate snap ring. (See 05-17-327 LOW CLUTCH CLEARANCE MEASUREMENT/ADJUSTMENT.)

Note
- If the snap ring is assembled for the low clutch clearance measurement/adjustment, the following snap ring assembly procedure is not necessary.

(2) Assemble the selected snap ring in Step (1) to the position shown in the figure.

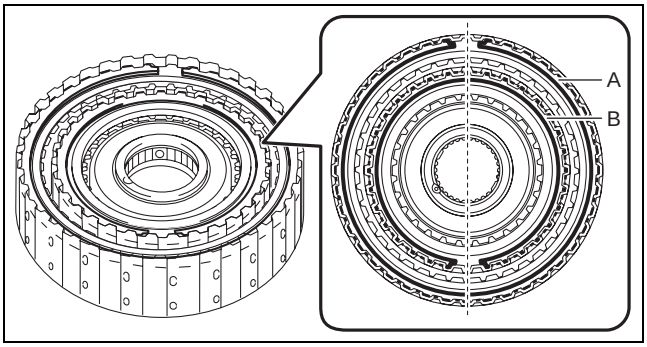
A : Selection

Caution
- **Assemble so that the end gap of the snap ring is positioned diagonally opposed to the end gap of the snap ring for the high clutch.**
- **After assembling the snap ring, verify that the snap ring is securely inserted into the bottom of the snap ring groove.**



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A : Snap ring (low clutch)
B : Snap ring (high clutch)



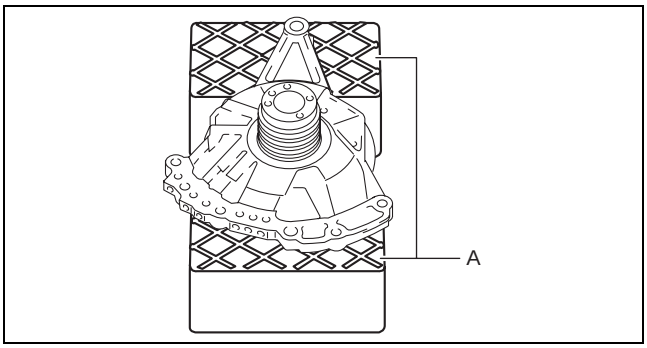
azzjjw00000871

12. Perform a simple inspection of the low clutch and high clutch using the following procedure:

(1) Set the oil pump on the workbench as shown in the figure.

A : Rubber plate

Note
- Using the rubber plates, adjust the alignment surface of the oil pump with the transaxle case so that it is level.

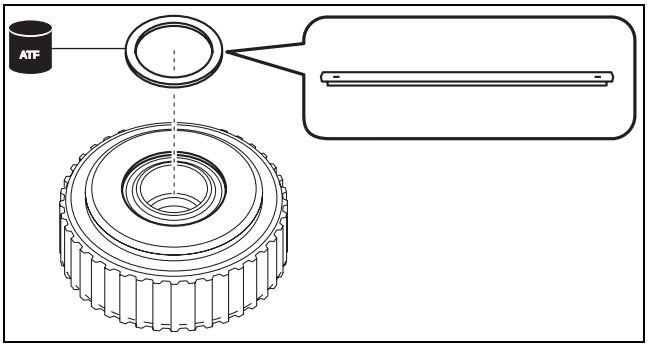


azzjjw00000802

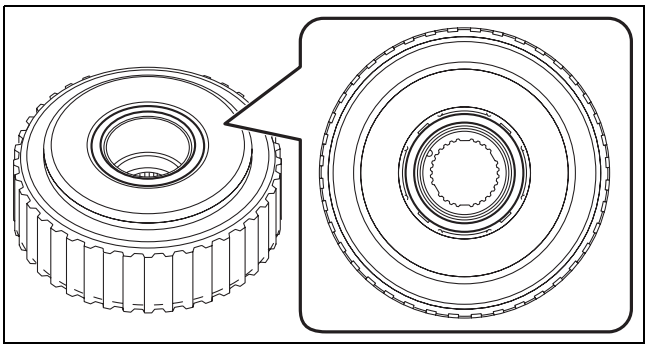
(2) Assemble the thrust needle bearing to the clutch component using the following procedure:

Note
- Thrust needle bearing size: Outer diameter approx. 72.7 mm {2.86 in}

1) To prevent the thrust needle bearing from dropping out, apply ATF (ATF FZ) to the thrust needle bearing.
2) Assemble the thrust needle bearing.

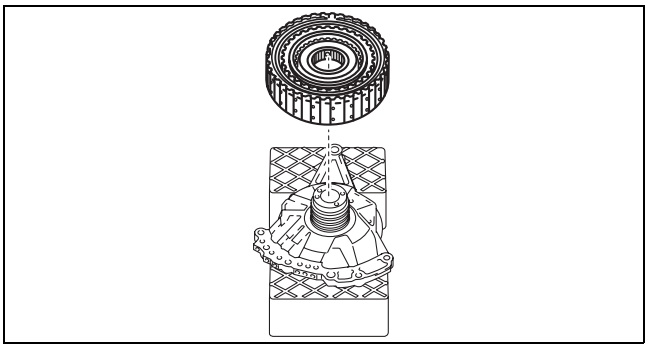


azzjjw00000803

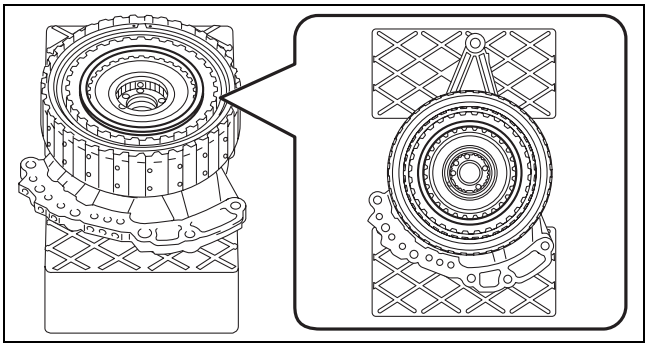


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(3) Assemble the parts assembled together in Step (2) to the oil pump.

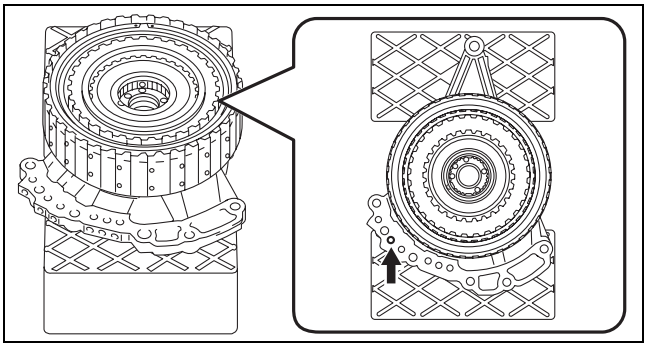


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azzjjw00000806

(4) Blow compressed air into the oil passage shown in the figure and verify the operation condition of the low clutch.


azzjjw00000807

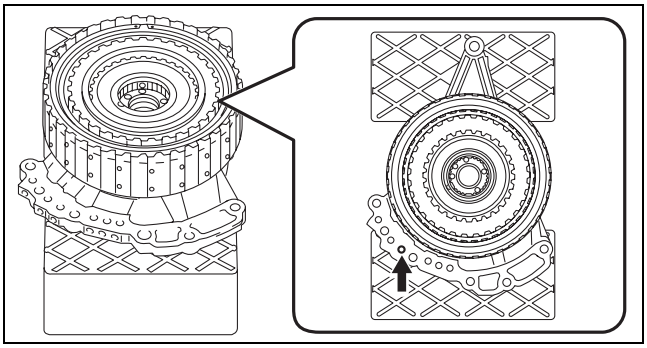
Warning
- **Always wear protective eye wear when using the air compressor. Otherwise, ATF or dirt particles blown off by the air compressor could get into the eyes.**

Caution
- **To prevent damage to parts, always use an air compressor which is adjusted to the indicated pressure.**

Compressed air pressure
0.39—0.44 MPa {4.0—4.4 kgf/cm^2, 57—63 psi}

- If there is a malfunction, perform disassembly again, verify the cause and repair the applicable part. (See 05-17-104 CLUTCH COMPONENT DISASSEMBLY.)

(5) Blow compressed air into the oil passage shown in the figure and verify the operation condition of the high clutch.


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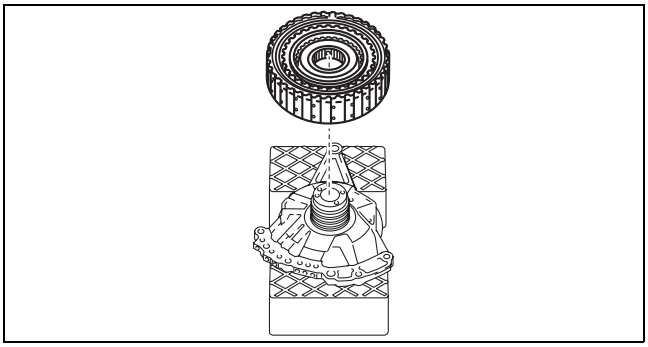
Warning
- **Always wear protective eye wear when using the air compressor. Otherwise, ATF or dirt particles blown off by the air compressor could get into the eyes.**

Caution
- **To prevent damage to parts, always use an air compressor which is adjusted to the indicated pressure.**

Compressed air pressure
0.39—0.44 MPa {4.0—4.4 kgf/cm^2, 57—63 psi}

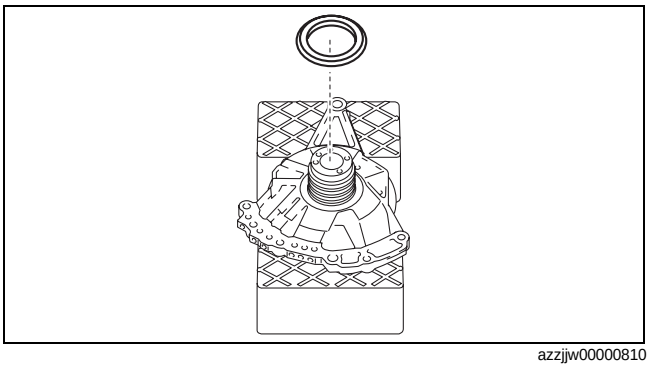
- If there is a malfunction, perform disassembly again, verify the cause and repair the applicable part. (See 05-17-104 CLUTCH COMPONENT DISASSEMBLY.)

(6) Remove the clutch component.



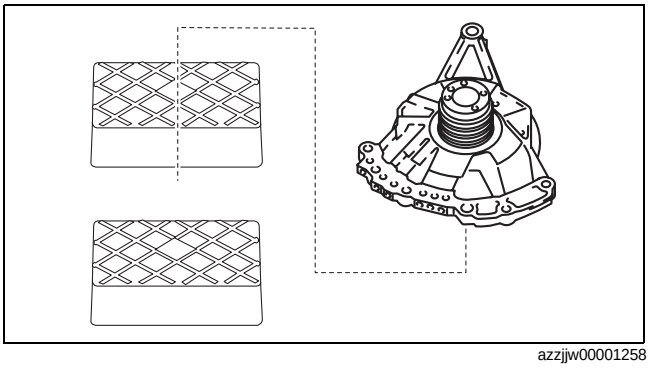
azzjjw00000809

(7) Remove the thrust needle bearing.



azzjjw00000810

(8) Take the oil pump off the rubber plates.

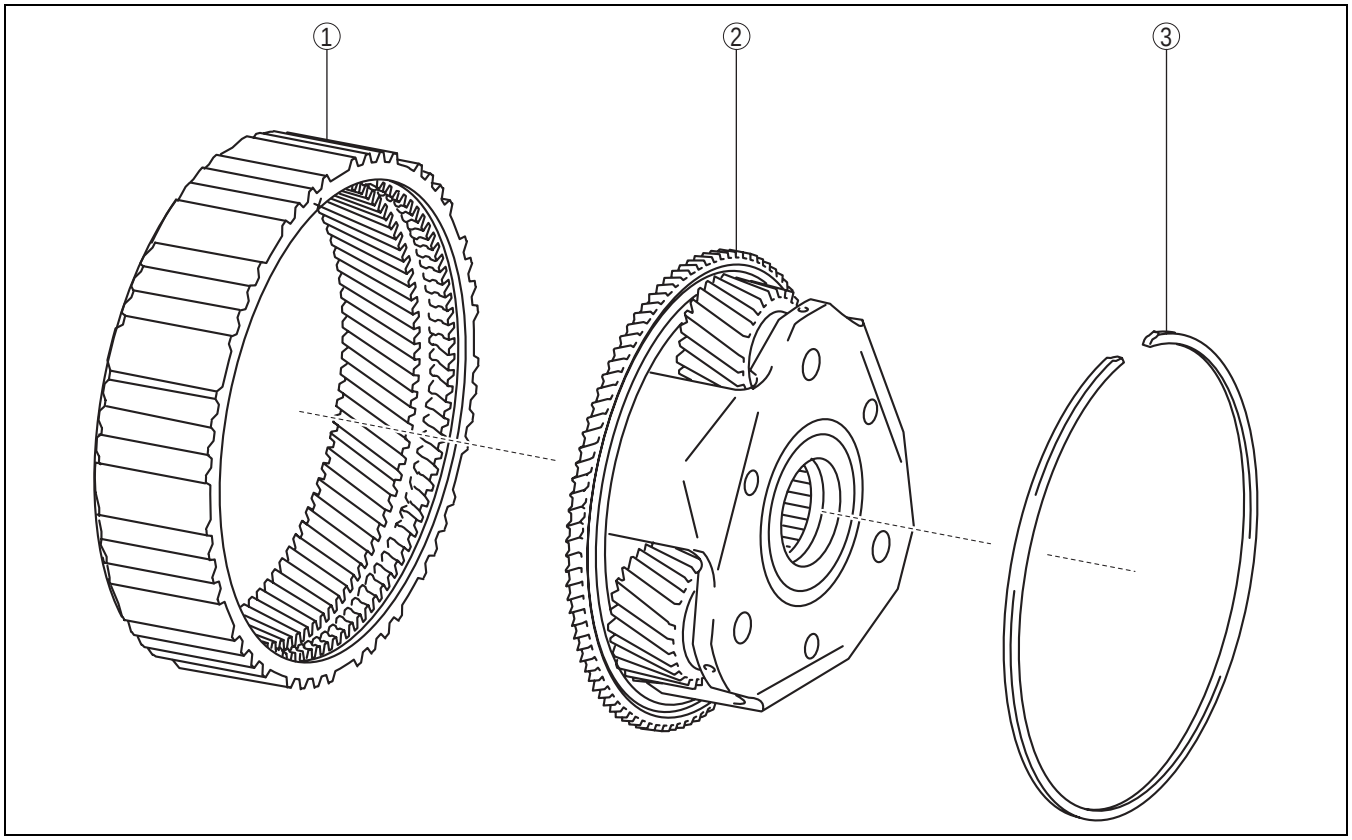


azzjjw00001258

REAR PLANETARY GEAR ASSEMBLY

id051700663800

Structural View

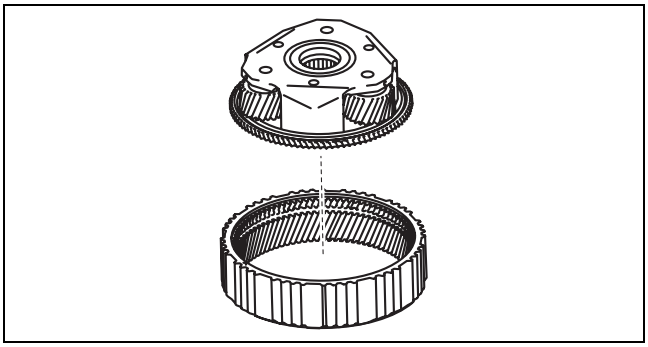


azzjjw00000293

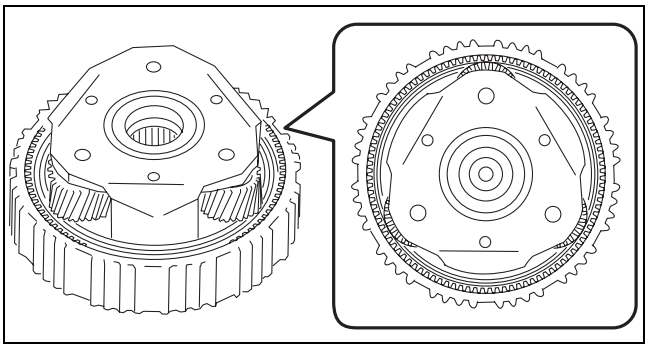
1	Front internal gear
2	Rear planetary carrier
3	Snap ring (outer diameter approx. 135.6 mm {5.339 in})

Assembly Procedure

1. Assemble the rear planetary carrier.



azzjjw00000874



azzjjw00000875

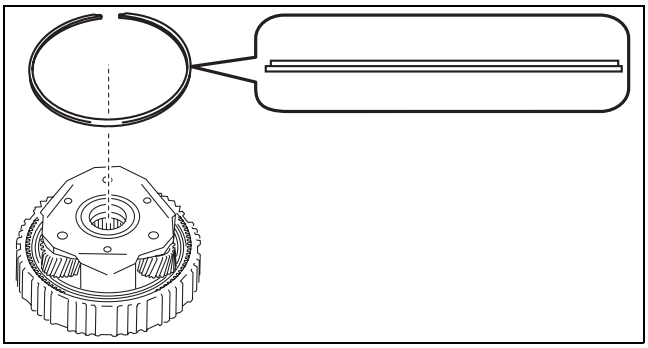
2. Assemble the snap ring.

Caution

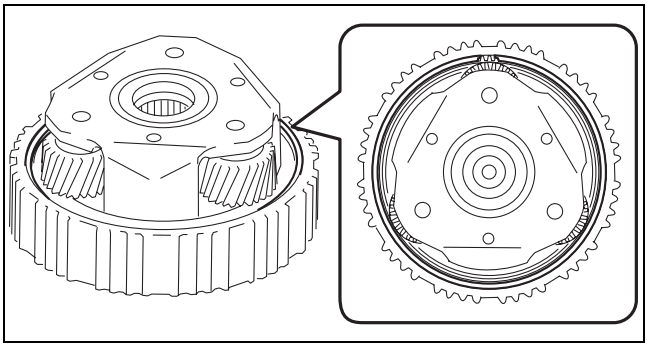
- **After assembling the snap ring, verify that the snap ring is securely inserted into the bottom of the snap ring groove.**

Note

- Snap ring size: Outer diameter approx. 135.6 mm {5.339 in}



azzjjw00000876

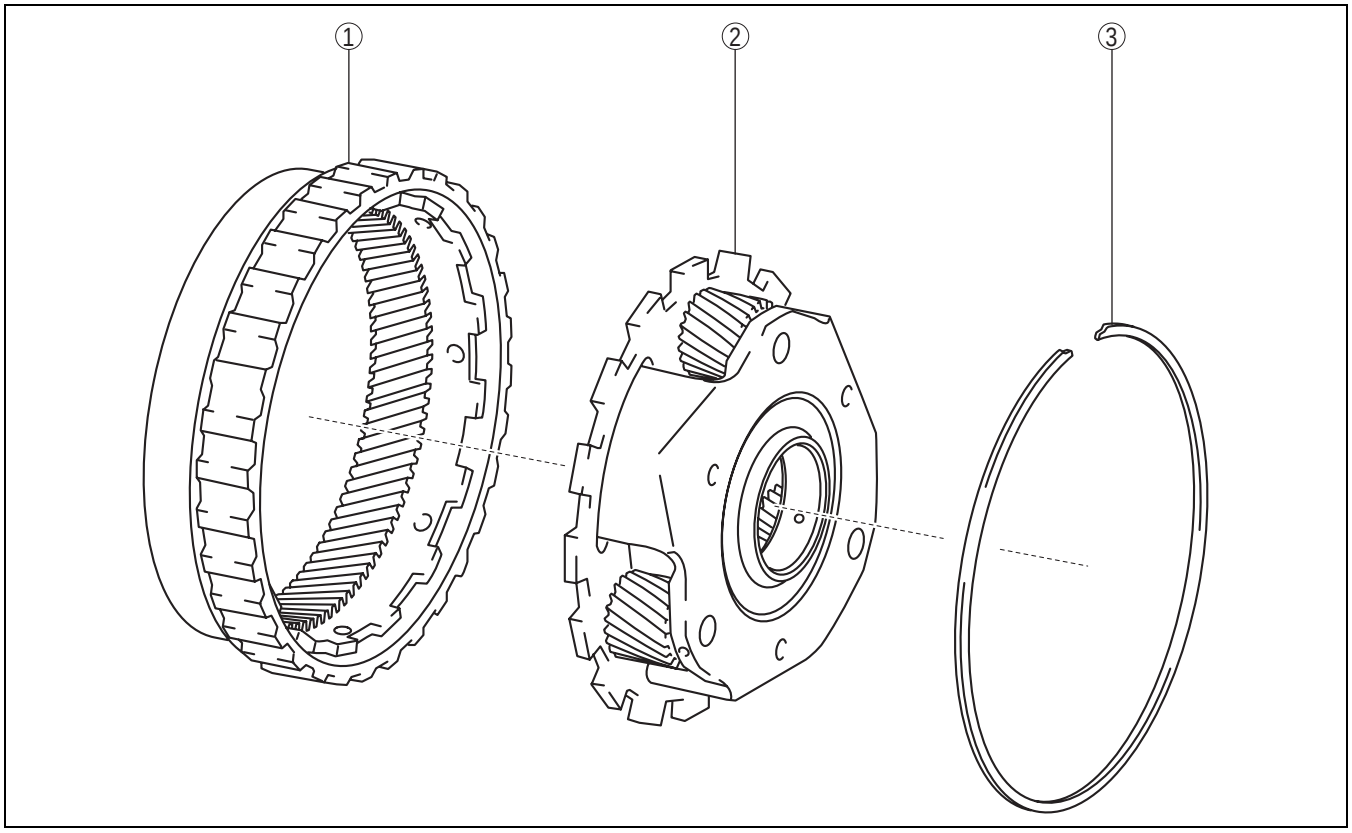


azzjjw00000877

REDUCTION PLANETARY GEAR ASSEMBLY

id051700663900

Structural View



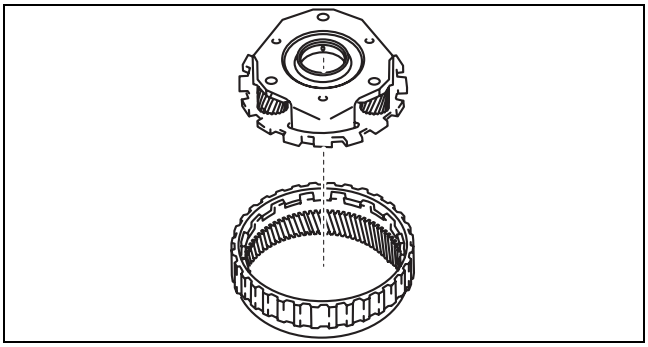
azzjjw00000297

1	Rear internal gear
2	Reduction planetary carrier

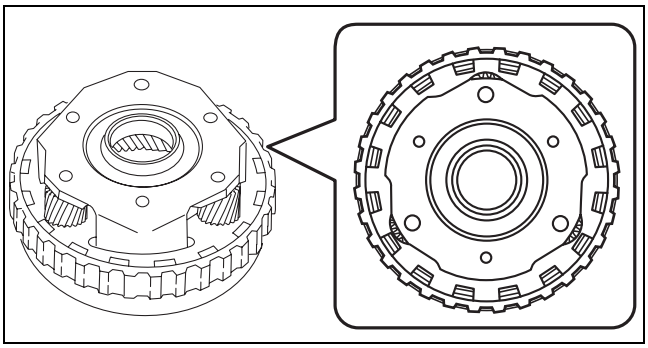
3	Snap ring (outer diameter approx. 142.5 mm {5.610 in})

Assembly Procedure

1. Assemble the reduction planetary carrier.



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azzjjw00000879

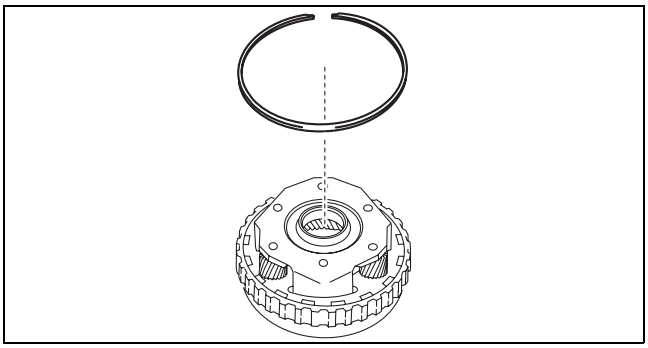
2. Assemble the snap ring.

Caution

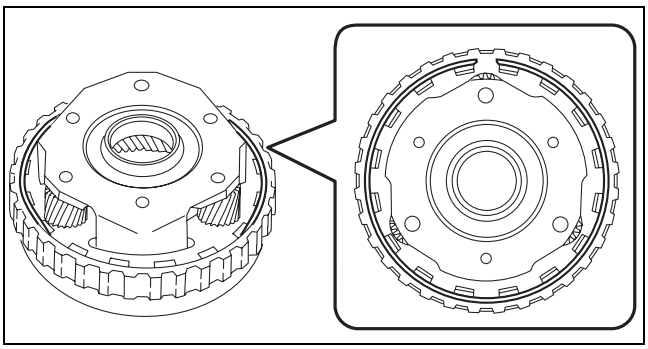
- **After assembling the snap ring, verify that the snap ring is securely inserted into the bottom of the snap ring groove.**

Note

- Snap ring size: Outer diameter approx. 142.5 mm {5.610 in}



azzjjw00000880

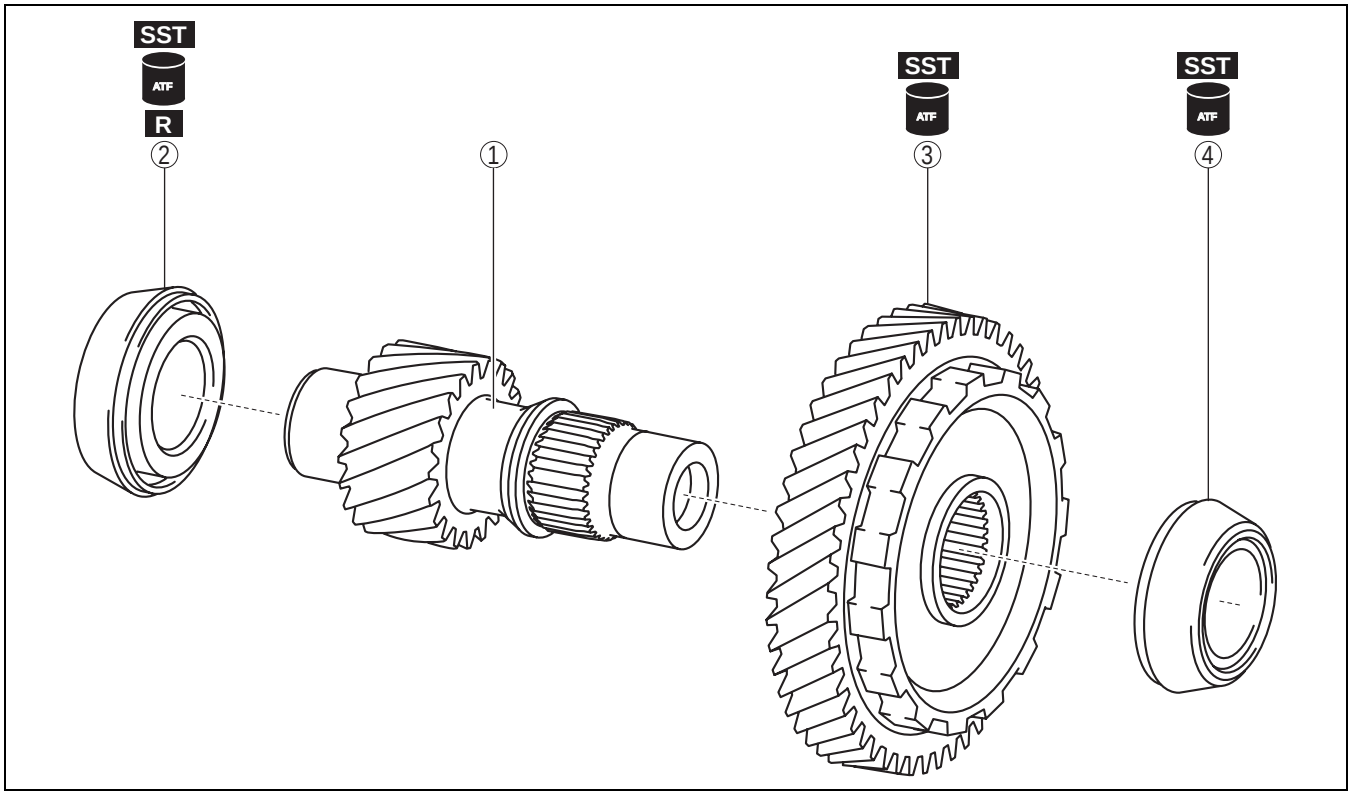


azzjjw00000881

SECONDARY GEAR AND OUTPUT GEAR ASSEMBLY

id051700664000

Structural View



azzjjw00001533

1	Output gear
2	Taper roller bearing (converter housing side) (inner diameter 35.5 mm {1.398 in})

3	Secondary gear
4	Taper roller bearing (transaxle case side) (inner diameter 35 mm {1.378 in})

Assembly Procedure

1. Assemble a new taper roller bearing (converter housing side) using the following procedure:

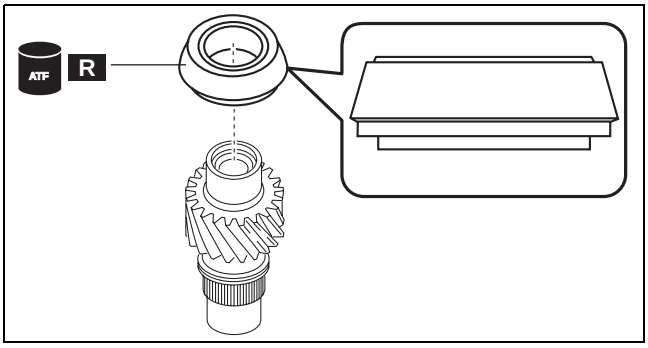
Caution

- **Use a new taper roller bearing. If taper roller bearing with a deformed cage are reused, it may cause a transaxle malfunction.**

Note

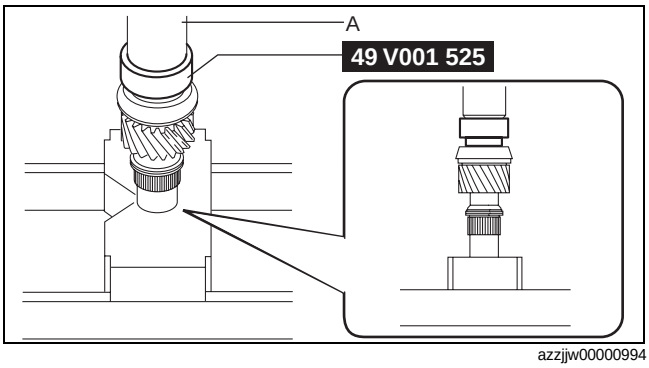
- Taper roller bearing size: Inner diameter approx. 35.5 mm {1.398 in}

(1) Apply ATF (ATF FZ) to the engagement area of the new taper roller bearing and output gear.
(2) Using the SST and press, assemble the new taper roller bearing.



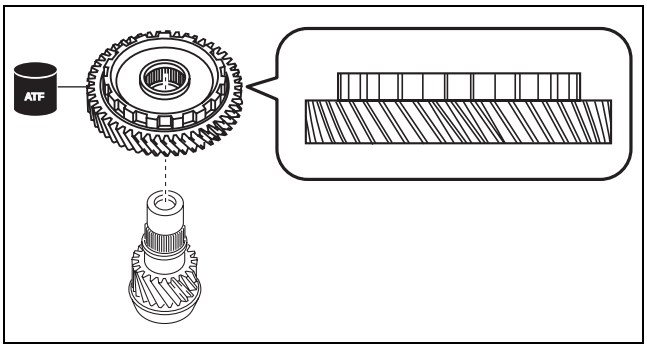
azzjjw00000993

A : Press



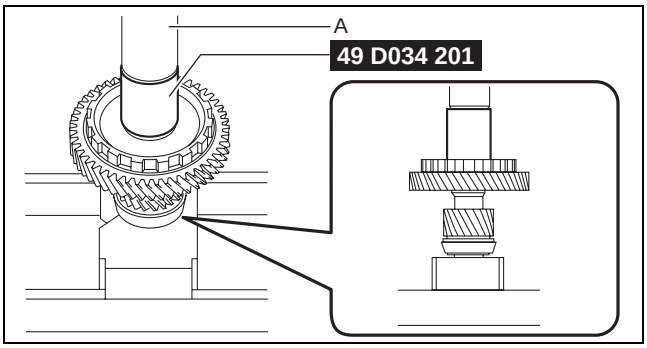
azzjjw00000994

2. Assemble the secondary gear using the following procedure:
   (1) Apply ATF (ATF FZ) to the engagement area (spline area) of the secondary gear and output gear.
   (2) Using the SST and press, assemble the secondary gear.



azzjjw00000995

A : Press

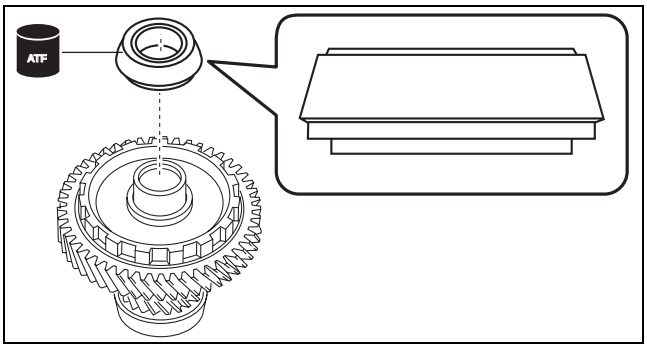


azzjjw00000996

3. Assemble the taper roller bearing (transaxle case side) using the following procedure:

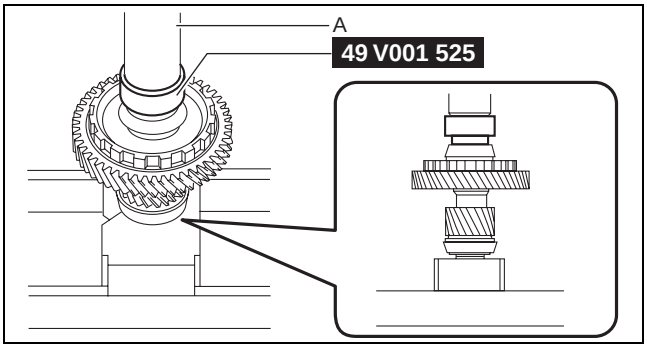
Note
- Taper roller bearing size: Inner diameter approx. 35 mm {1.378 in}

   (1) Apply ATF (ATF FZ) to the engagement area of the taper roller bearing and output gear.
   (2) Using the SST and press, assemble the taper roller bearing.



azzjjw00000997

A : Press

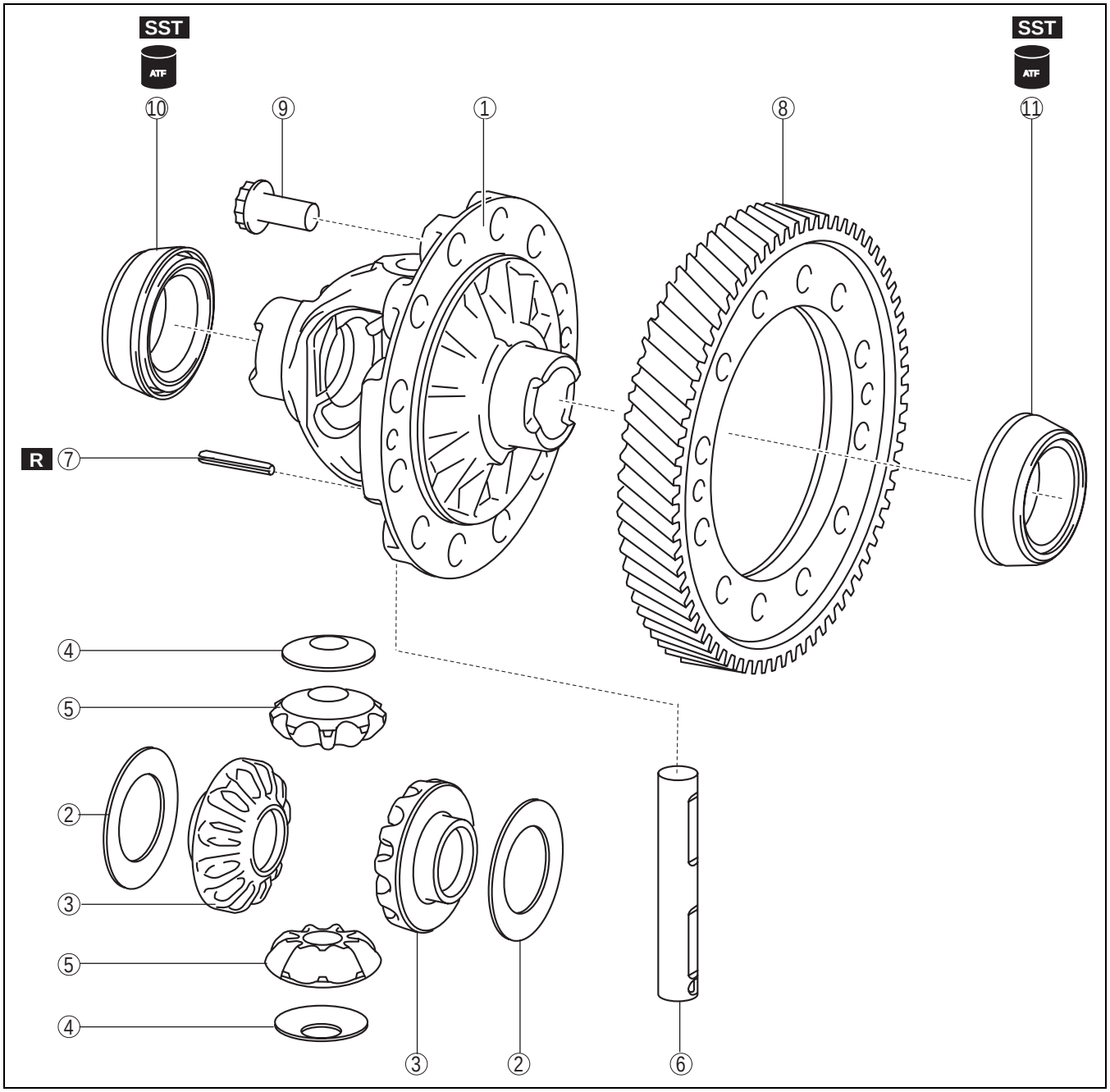


azzjjw00000998

RING GEAR AND DIFFERENTIAL ASSEMBLY

id051700664100

Structural View



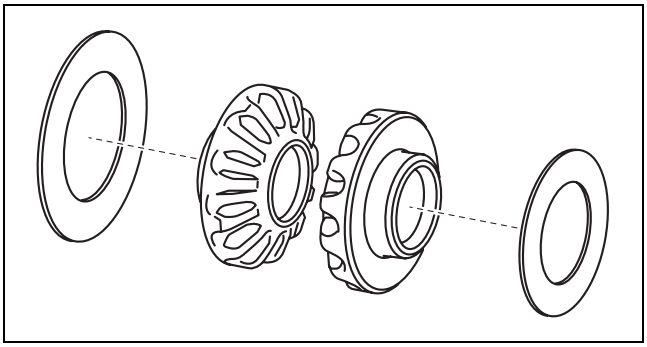
azzjjw00001534

1	Differential gear case
2	Thrust washer (selection)
3	Side gear
4	Thrust washer
5	Pinion gear
6	Pinion shaft
7	Roll pin

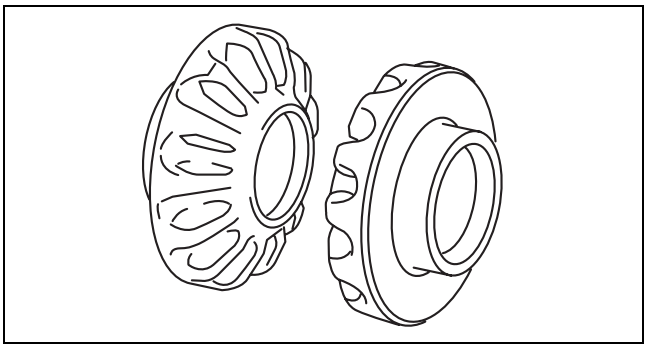
8	Ring gear
9	12 bolts (M13×1.0 bolt, length to approx. 26.2 mm {1.03 in})
10	Taper roller bearing (converter housing side) (inner diameter approx. 45 mm {1.8 in})
11	Taper roller bearing (transaxle case side) (inner diameter approx. 45 mm {1.8 in})

Assembly Procedure

1. Assemble the thrust washers to the side gears.

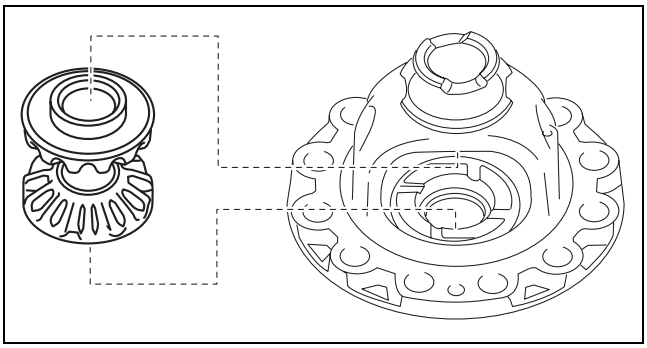


azzjjw00001535

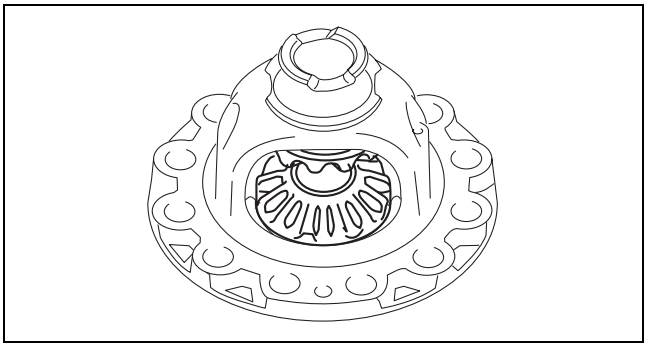


azzjjw00001536

2. Assemble the side gears which have the thrust washers assembled to them.

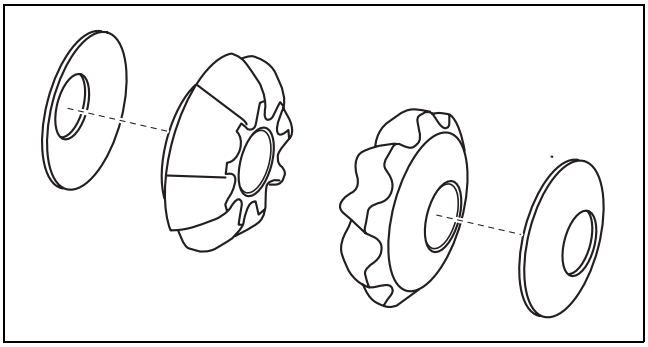


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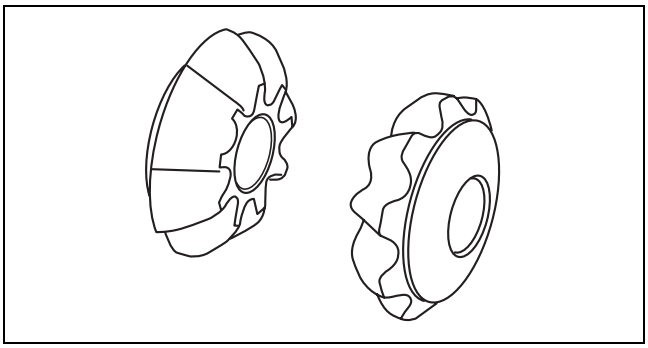


azzjjw00001538

3. Assemble the thrust washers to the pinion gears.

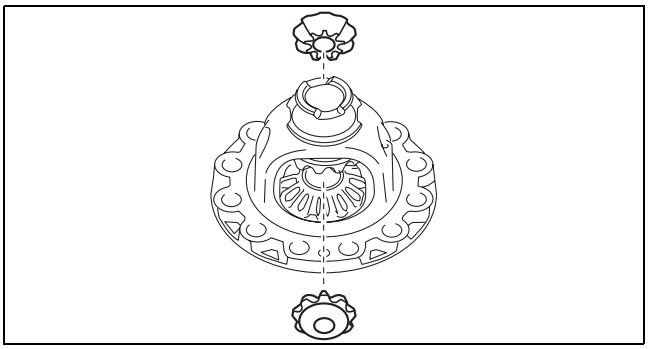


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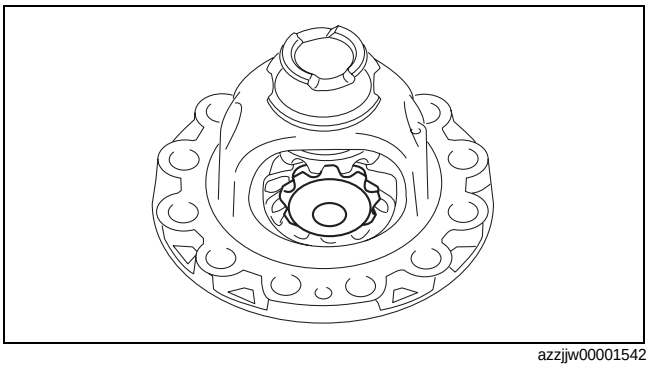


azzjjw00001540

4. Assemble the pinion gears which have the thrust washers assembled to them using the following procedure:
   (1) Assemble the pinion gears which have the thrust washers assembled to them.



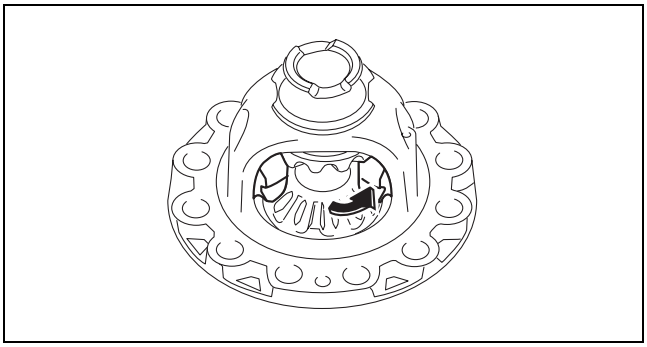
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azzjjw00001542

(2) Rotate the pinion gears so that the pinion shaft holes of the differential gear case and the pinion gears are aligned as shown in the figure.

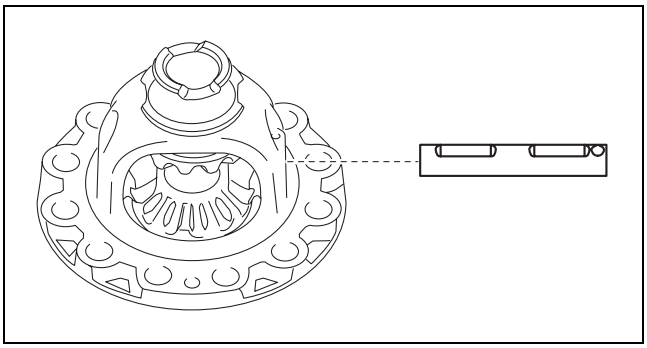
Note
- If the pinion shaft holes of the differential gear case and the pinion gears are not aligned, remove the pinion gears, change the side gears combination, and reassemble.



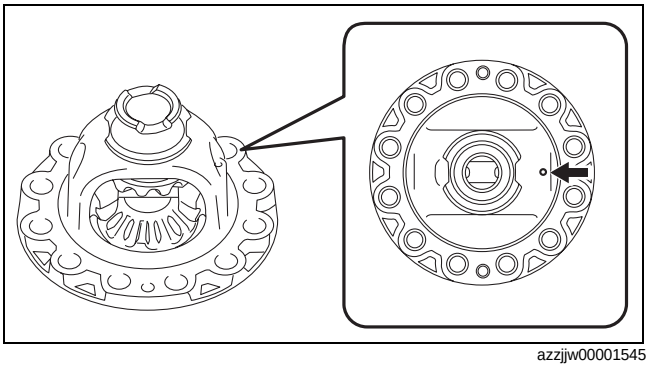
azzjjw00001543

5. Assemble the pinion shaft.

Caution
- **Assemble the pinion shaft so that the roll pin holes of the differential gear case and the pinion shaft are aligned.**



azzjjw00001544

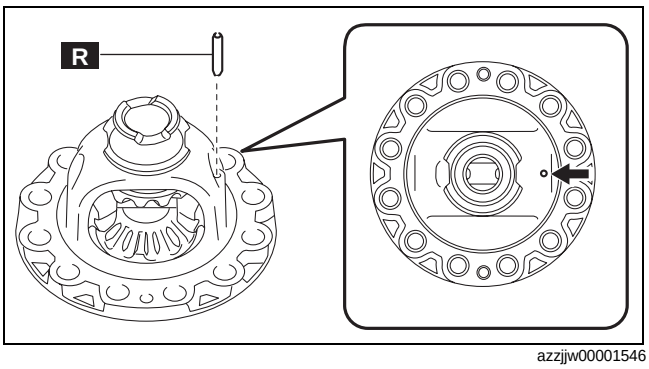


azzjjw00001545

6. Assemble a new roll pin to the position shown in the figure using a pin punch.

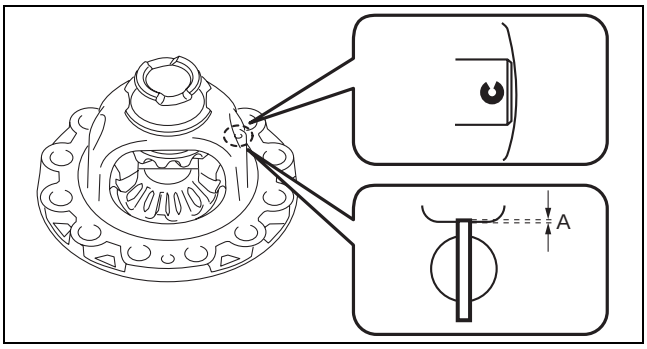
Caution
- **Assemble so that the end gap of the roll pin is positioned in the direction shown in the figure.**

Note
- Use a pin punch with an end outer diameter of 5 mm {0.197 in} or more, and within 8 mm {0.314 in}.



azzjjw00001546

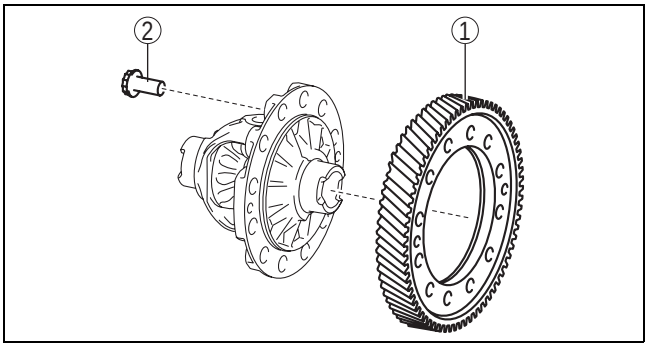
A : –0.5—0.5 mm {–0.01—0.01 in}



azzjjw00001547

7. Assemble the ring gear using the following procedure:

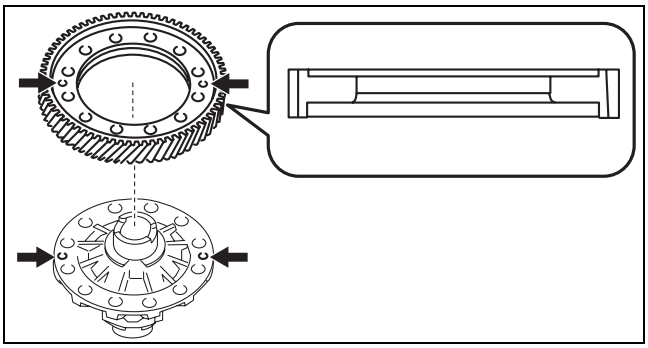
1	Ring gear
2	12 bolts (M13×1.0 bolt, length to approx. 26.2 mm {1.03 in})

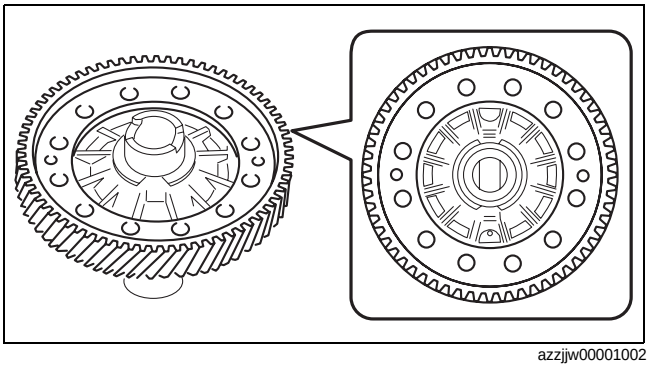


azzjjw00001000

(1) Assemble the ring gear.

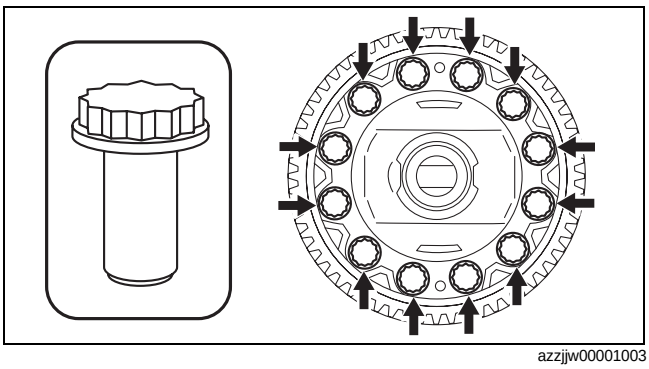
Note
- Assemble the ring gear so that the differential holes and ring gear holes shown in the figure are aligned.


azzjjw00001001


azzjjw00001002

(2) Assemble and temporarily tighten the bolts to the positions shown in the figure.

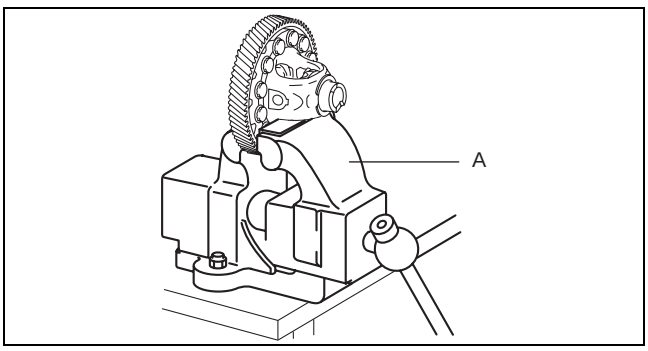
Note
- Bolt size: M13×1.0 bolt, length to approx. 26.2 mm {1.03 in}


azzjjw00001003

(3) Secure the ring gear and differential in a vise.

A : Vise

Caution
- **Insert a protective plate between the vise and the part so as not to damage the part.**

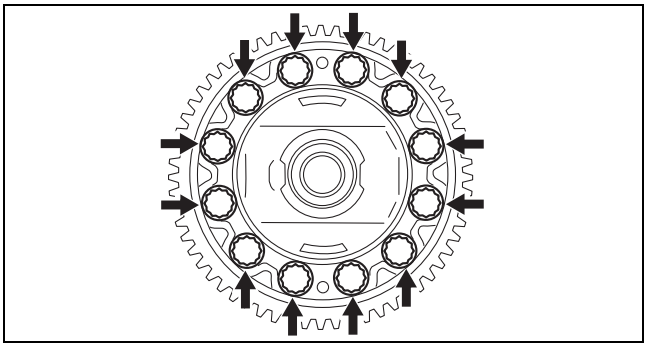


azzjjw00001004

(4) Tighten the bolts shown in the figure.

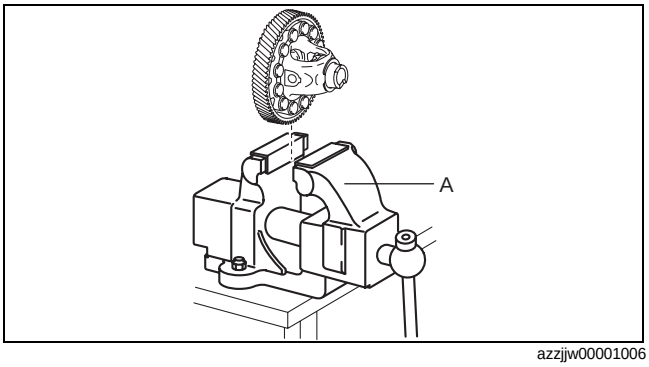
Note
- Change the vise securing position of the ring gear and differential and tighten all of the bolts shown in the figure.

Tightening torque
152—176 N·m {16—17 kgf·m, 113—129 ft·lbf}


azzjjw00001005

(5) Remove the ring gear and differential from the vise.

A : Vise

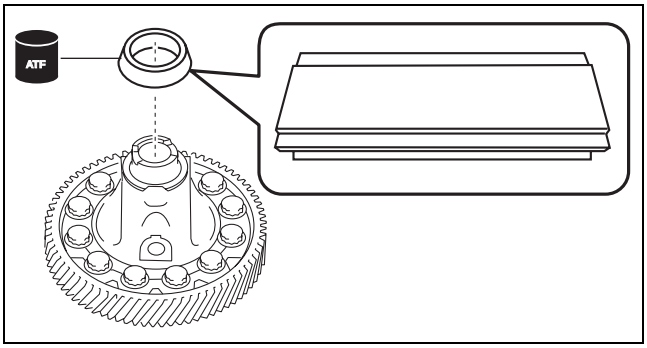


azzjjw00001006

8. Assemble the taper roller bearing (converter housing side) using the following procedure:

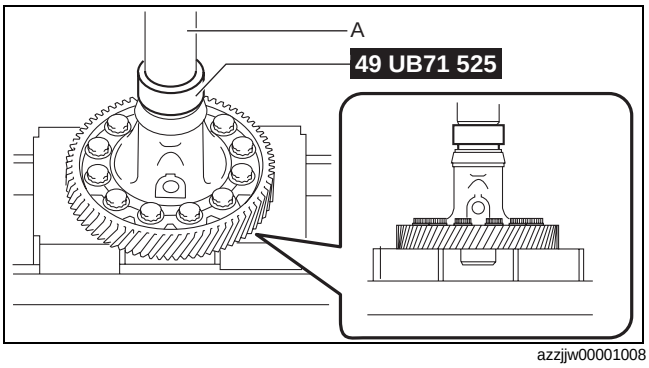
Note
- Taper roller bearing size: Inner diameter approx. 45 mm {1.8 in}

(1) Apply ATF (ATF FZ) to the engagement area of the taper roller bearing and differential.
(2) Using the SST and press, assemble the taper roller bearing.



azzjjw00001007

A : Press

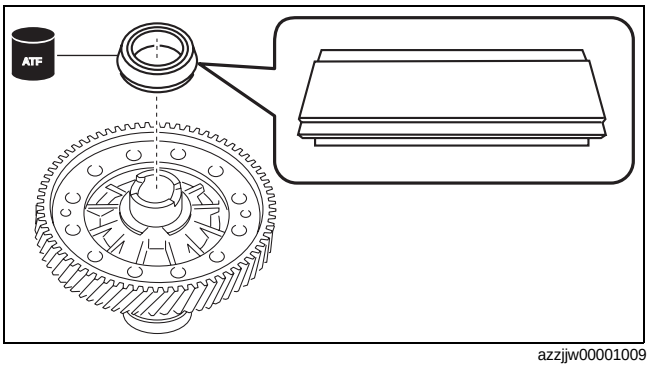


azzjjw00001008

9. Assemble the taper roller bearing (transaxle case side) using the following procedure:

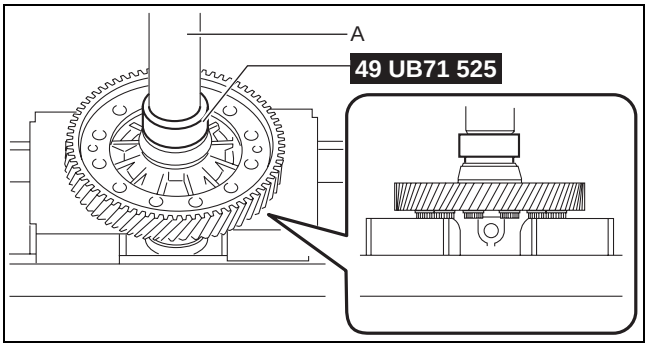
Note
- Taper roller bearing size: Inner diameter approx. 45 mm {1.8 in}

(1) Apply ATF (ATF FZ) to the engagement area of the taper roller bearing and differential.
(2) Using the SST and press, assemble the taper roller bearing.



azzjjw00001009

A : Press



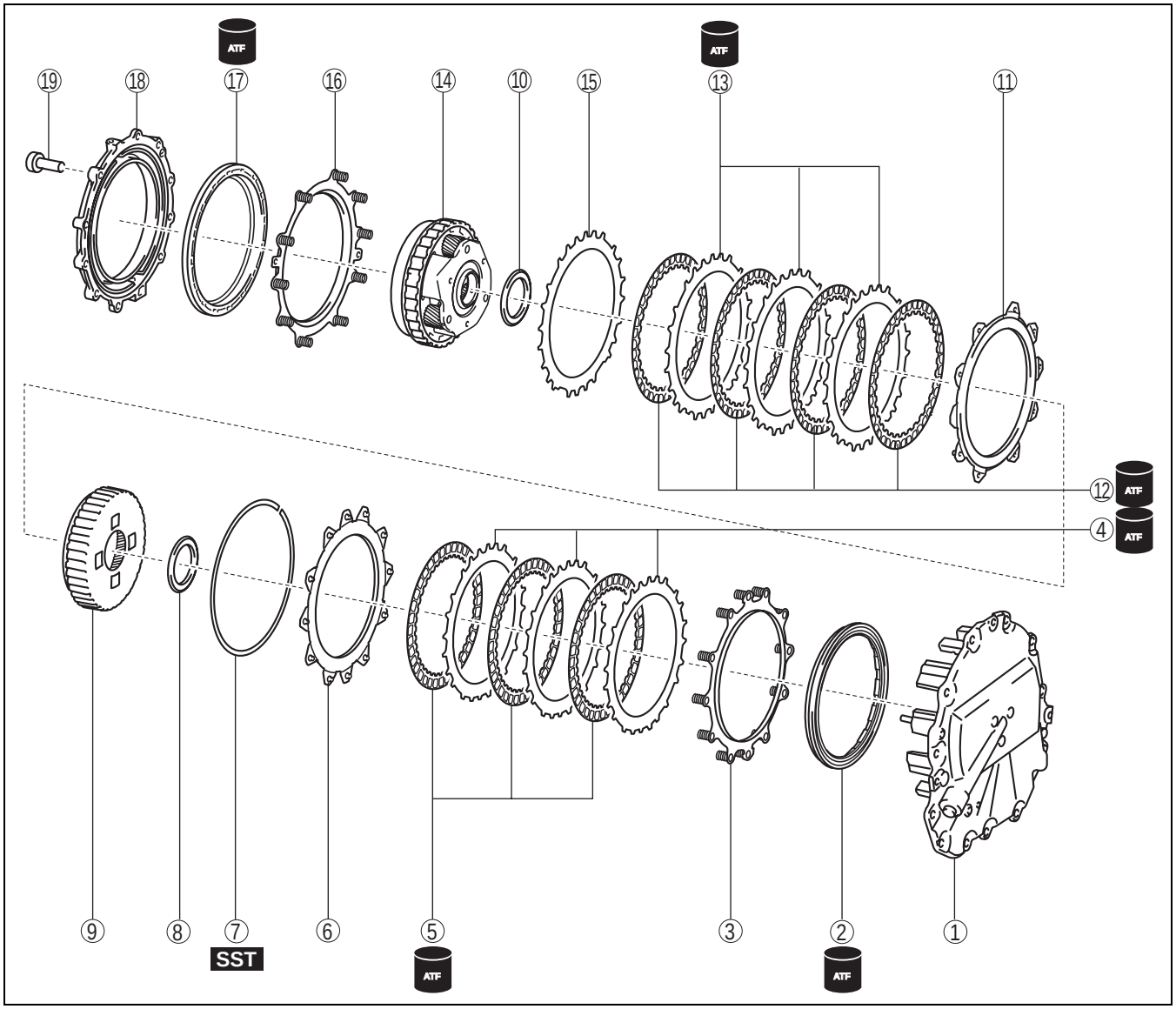
azzjjw00001010

10. Perform the differential backlash measurement/adjustment. (See 05-17-303 DIFFERENTIAL BACKLASH MEASUREMENT/ADJUSTMENT.)

END COVER COMPONENT ASSEMBLY

id051700664200

Structural View



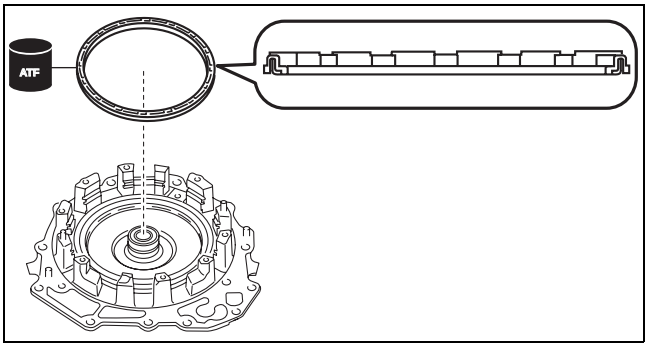
azzjjw00001548

1	End cover
2	R-3-5 brake piston
3	Springs and retainer component (inner diameter approx. 148.8 mm {5.858 in})
4	Driven plate (inner diameter approx. 141.8 mm {5.583 in})
5	Drive plate (outer diameter approx. 169.4 mm {6.669 in})
6	Retaining plate (inner diameter approx. 141.8 mm {5.583 in})
7	Snap ring (outer diameter approx. 186.2 mm {7.331 in}) (selection)
8	Thrust needle bearing (outer diameter approx. 63 mm {2.5 in})
9	Reduction internal gear
10	Thrust needle bearing (outer diameter approx. 63 mm {2.5 in})

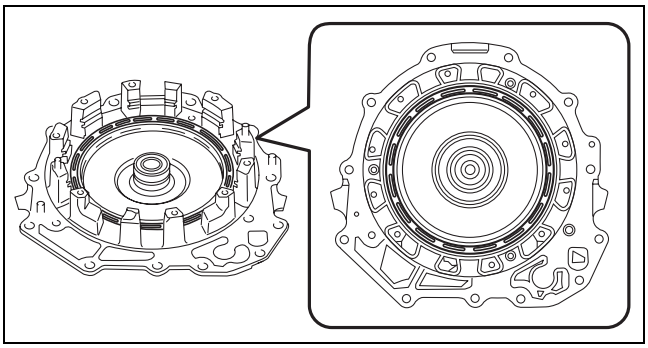
11	Retaining plate (inner diameter approx. 148 mm {5.83 in})
12	Drive plate (outer diameter approx. 171.9 mm {6.768 in})
13	Driven plate (outer diameter approx. 148 mm {5.83 in}, thickness approx. 1.6 mm {0.063 in})
14	Reduction planetary gear
15	Retaining plate (inner diameter approx.148 mm {5.83 in}) (selection)
16	Springs and retainer component (inner diameter approx. 150.6 mm {5.929 in})
17	2-6 brake piston
18	Brake housing
19	8 bolts (M6×1.0 bolt, length to approx. 25 mm {0.98 in})

Assembly Procedure

1. Assemble the R-3-5 brake piston using the following procedure:
   (1) Apply ATF (ATF FZ) to the R-3-5 brake piston lip.
   (2) Assemble the R-3-5 brake piston.



azzjjw00001012

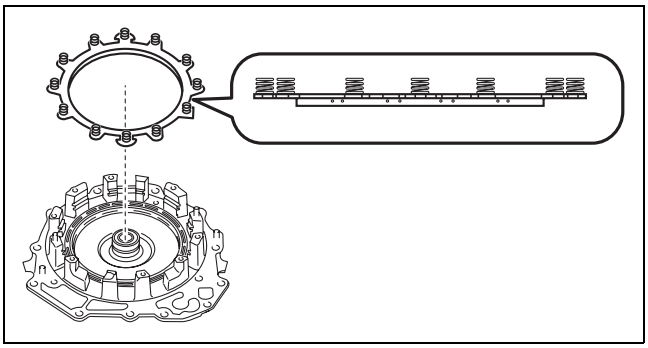


azzjjw00001013

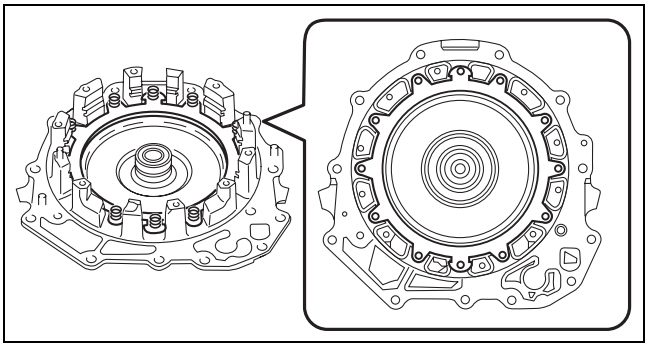
2. Measure the R-3-5 brake clearance and select the appropriate snap ring. (See 05-17-339 R-3-5 BRAKE CLEARANCE MEASUREMENT/ADJUSTMENT.)
3. Assemble the springs and retainer component.

Note

- Springs and retainer component size: Inner diameter approx. 148.8 mm {5.858 in}



azzjjw00001014



azzjjw00001015

4. Assemble the drive plates and driven plates using the following procedure:

Note
- Drive plate size: Outer diameter approx. 169.4 mm {6.669 in}
- Driven plate size: Inner diameter approx. 141.8 mm {5.583 in}

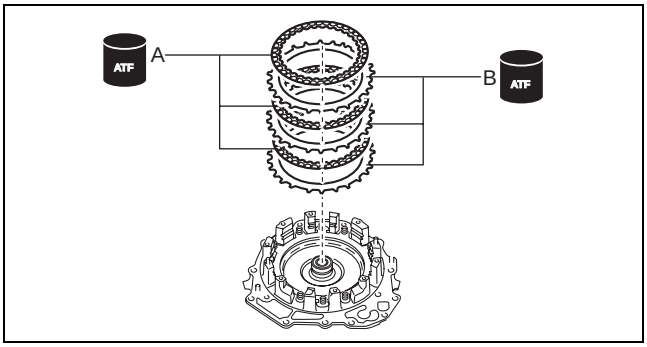
(1) Apply ATF (ATF FZ) to the drive plates and driven plates.

Caution
- **If the drive plate is replaced with a new one, immerse it in ATF (ATF FZ) for 2 hours or more to permeate the facing with ATF.**

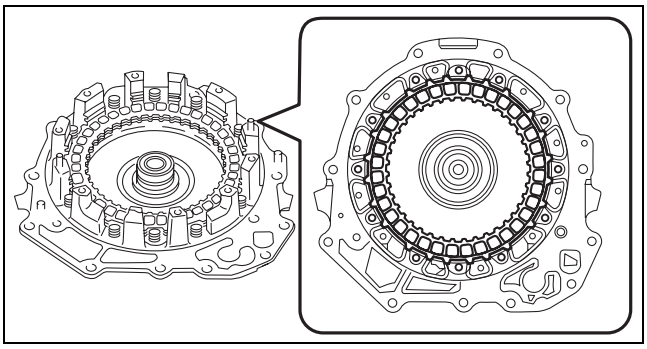
(2) Assemble the drive plates and driven plates.

A : Drive plate
B : Driven plate

Assembly order
Driven plate—drive plate—driven plate—drive plate—driven plate—drive plate



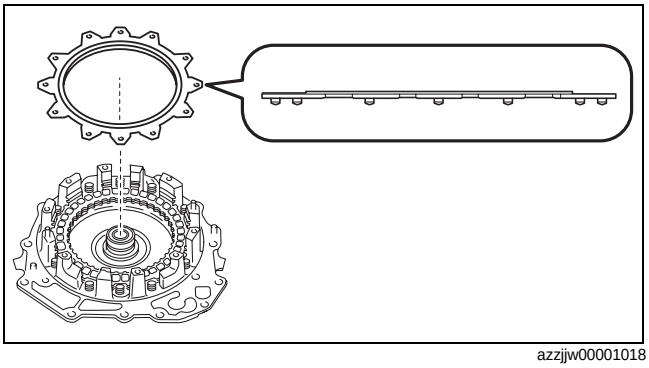
azzjjw00001016



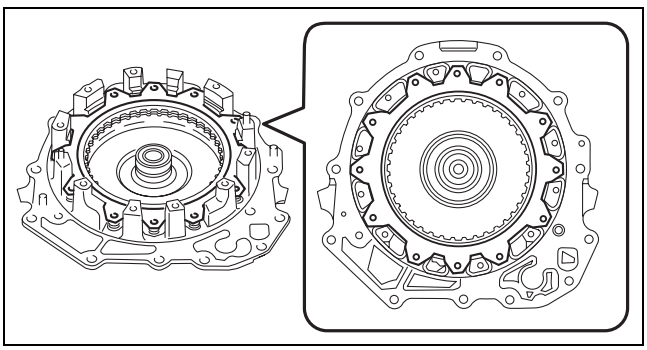
azzjjw00001017

5. Assemble the retaining plate.

Note
- Retaining plate size: Inner diameter approx. 141.8 mm {5.583 in}



azzjjw00001018



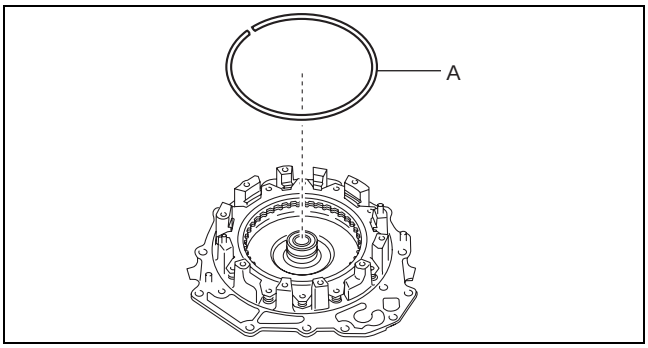
azzjjw00001019

6. Assemble the snap ring using the following procedure:

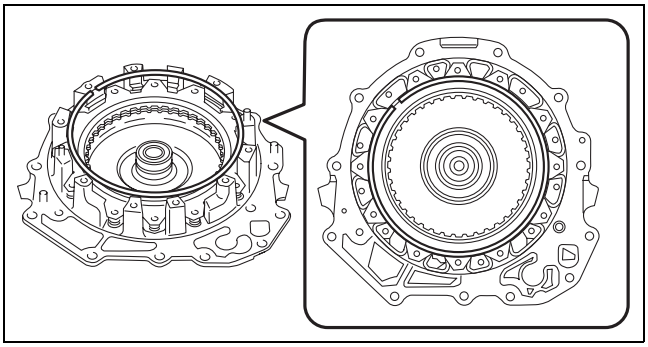
Note
- Snap ring size: Outer diameter approx. 186.2 mm {7.331 in}

(1) Set the snap ring selected in Step 2 on top of the end cover.

A : Selection

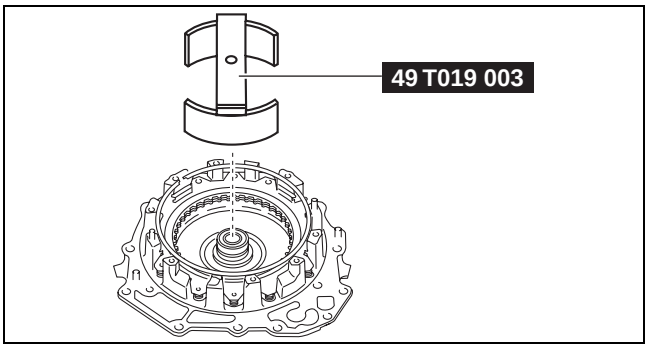


azzjjw00001020

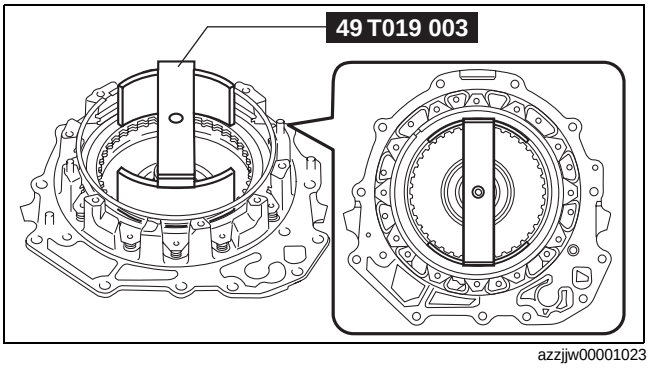


azzjjw00001021

(2) Install the SST.



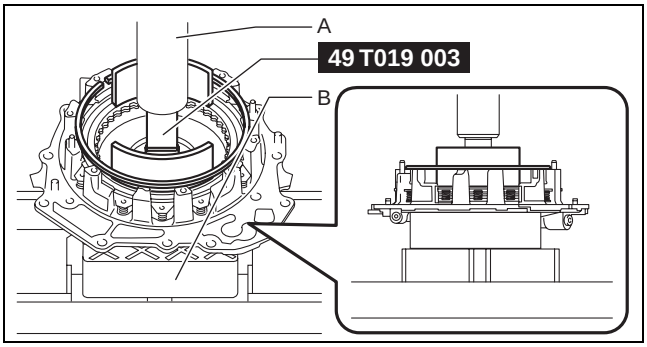
azzjjw00001022



azzjjw00001023

(3) Set the SST and part to the press as shown in the figure.

A : Press
B : Rubber plate

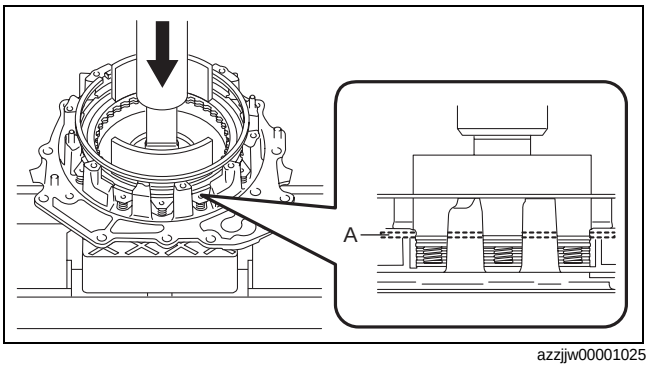


azzjjw00001024

Caution
- **Using the rubber plates, adjust the alignment surface of the end cover with the transaxle case so that it is level. Otherwise the parts could tip over during the procedure and get damaged.**

(4) Press down the SST using the press until the snap ring groove of the end cover comes out.

A : Snap ring groove

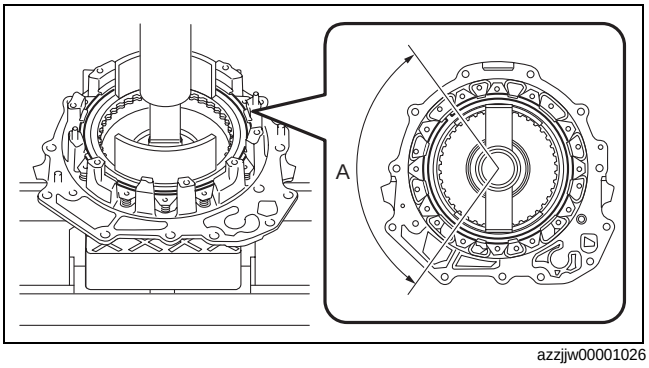


azzjjw00001025

Caution
- **If the SST is pressed excessively by the press, surrounding parts could be damaged. Stop pressing down the SST using the press when the snap ring groove of the end cover comes out.**

(5) Assemble the snap ring to the position shown in the figure.

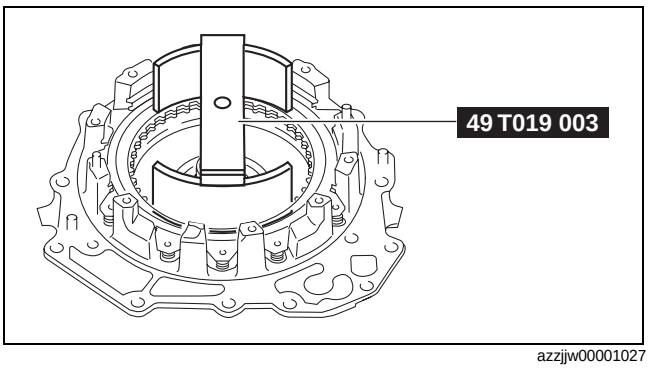
A : End gap of snap ring assembly area



azzjjw00001026

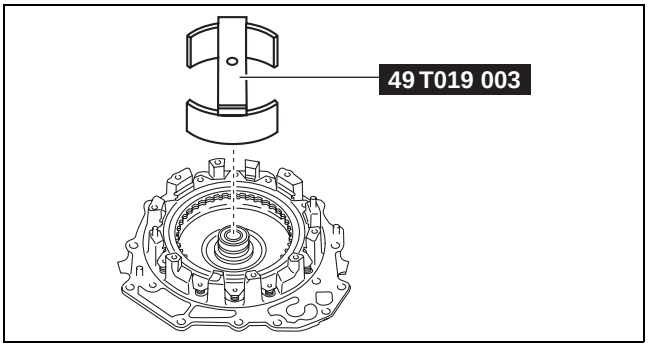
Caution
- **Assemble the snap ring so that the end gap of the snap ring is in the area shown in the figure.**
- **After assembling the snap ring, verify that the snap ring is securely inserted into the bottom of the snap ring groove.**

(6) Take the SST and part off the press.



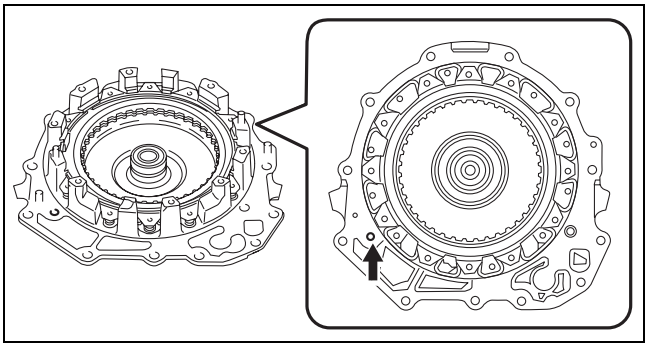
azzjjw00001027

(7) Remove the SST.



azzjjw00001028

7. Perform an operation verification of the R-3-5 brake using the following procedure:
   (1) Blow compressed air into the oil passage shown in the figure and verify the operation condition of the R-3-5 brake.



azzjjw00001029

Warning

- **Always wear protective eye wear when using the air compressor. Otherwise, ATF or dirt particles blown off by the air compressor could get into the eyes.**

Caution

- **To prevent damage to parts, always use an air compressor which is adjusted to the indicated pressure.**

Compressed air pressure

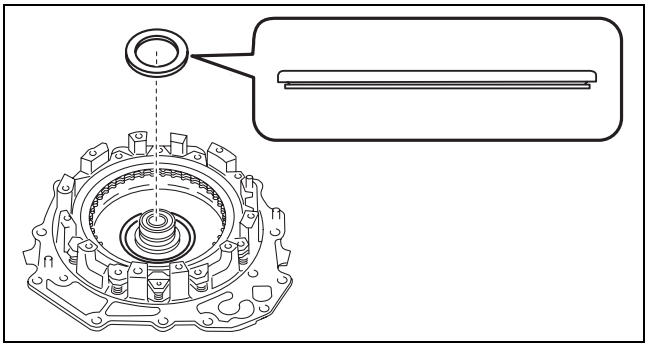
0.39—0.44 MPa {4.0—4.4 kgf/cm^2, 57—63 psi}

- If there is a malfunction, perform disassembly again, verify the cause and repair the applicable part. (See 05-17-128 END COVER COMPONENT DISASSEMBLY.)

8. Assemble the thrust needle bearing.

Note

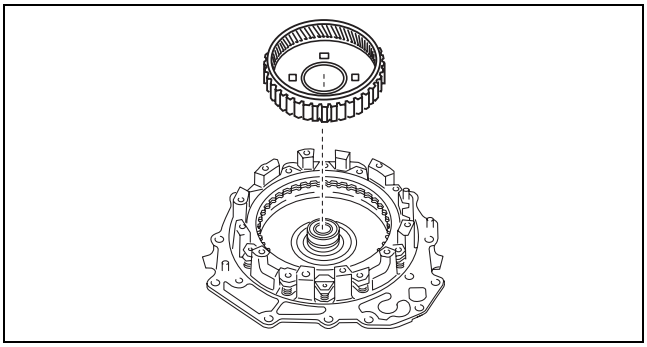
- Thrust needle bearing size: Outer diameter approx. 63 mm {2.5 in}



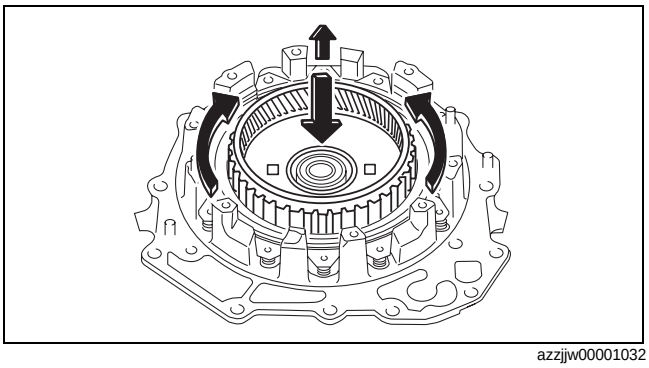
azzjjw00001030

9. Assemble the reduction internal gear.

Note
- While rotating the reduction internal gear, engage the splines of each of the R-3-5 brake drive plates one by one, and assemble.



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azzjjw00001032

10. To verify that the reduction internal gear is securely assembled, measure the distance shown in the figure.

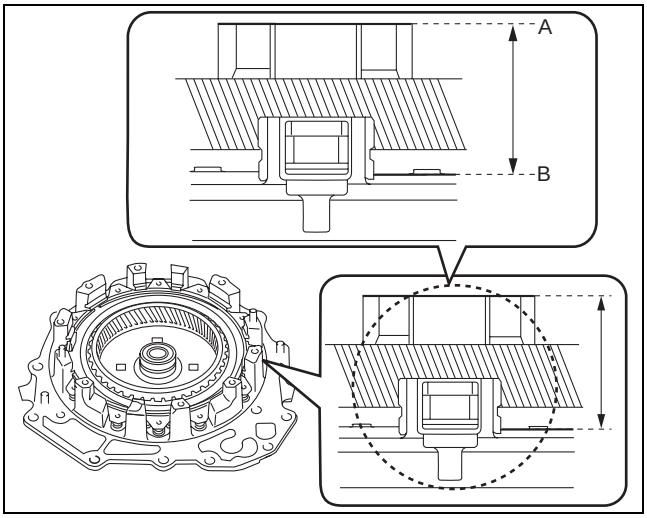
A : End cover end (alignment surface with brake housing)

B : Reduction internal gear end

Note
- Recommended measuring instrument: Depth gauge, straight edge ruler

Specification
45.0—46.1 mm {1.78—1.81 in}

- If not within the specification, remove the reduction internal gear and reassemble.



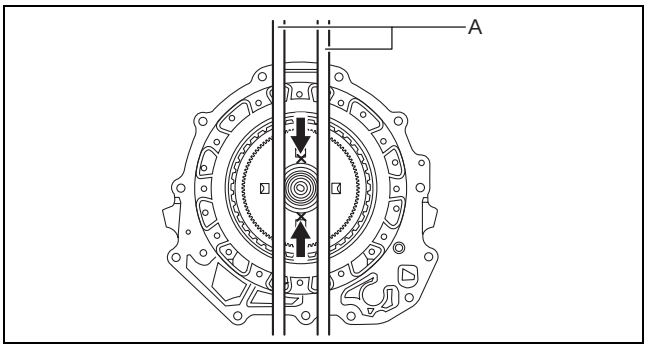
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Note
- Measurement method

(1) Set two straight edge rulers along the alignment surfaces of the end cover with the brake housing as shown in the figure.

A : Straight edge ruler

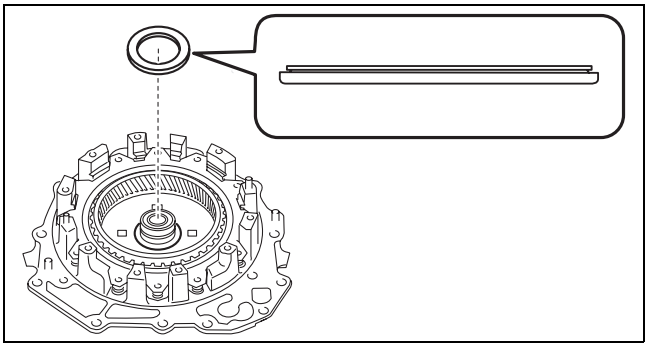
(2) Measure the positions (2 locations) shown in the figure using a depth gauge and calculate the average value.
(3) Subtract the thickness of the straight edge ruler from the average value.



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11. Assemble the thrust needle bearing.

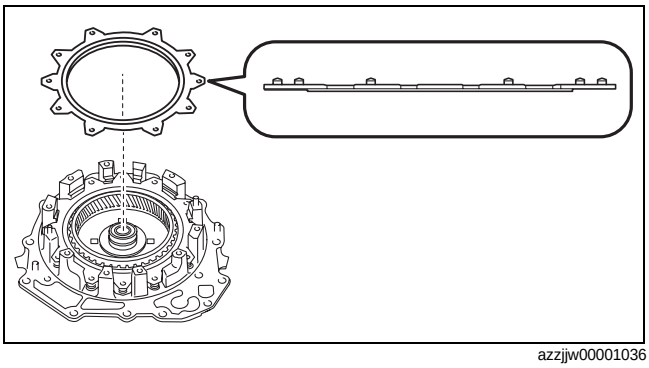
Note
- Thrust needle bearing size: Outer diameter approx. 63 mm {2.5 in}



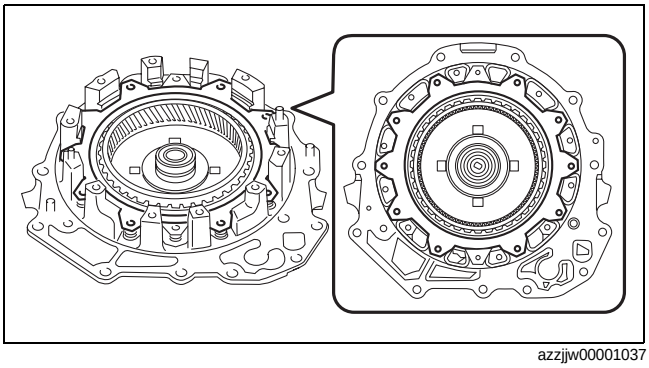
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12. Assemble the retaining plate.

Note
- Retaining plate size: Inner diameter approx. 148 mm {5.83 in}



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azzjjw00001037

13. Assemble the drive plates and driven plates using the following procedure:

Caution
- **The driven plate has a similar shape to the retaining plate used for the 2-6 brake clearance adjustment. Before assembling the driven plate, always verify the plate thickness and the shape.**

Note
- Drive plate size: Outer diameter approx. 171.9 mm {6.768 in}
- Driven plate size: Inner diameter approx. 148 mm {5.83 in}, thickness approx. 1.6 mm {0.063 in}

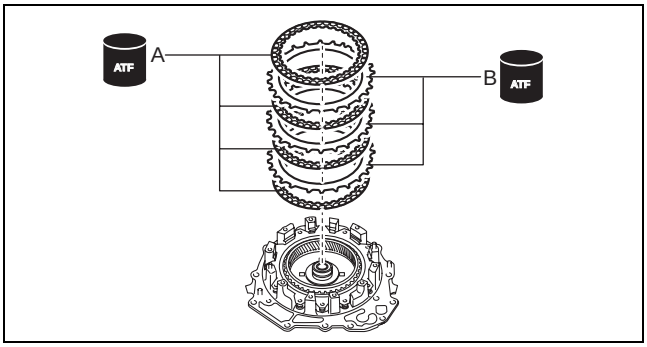
(1) Apply ATF (ATF FZ) to the drive plates and driven plates.

Caution
- **If the drive plate is replaced with a new one, immerse it in ATF (ATF FZ) for 2 hours or more to permeate the facing with ATF.**

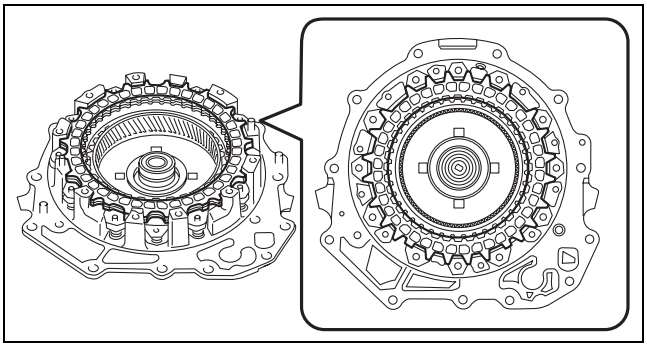
(2) Assemble the drive plates and driven plates.

A : Drive plate
B : Driven plate

Assembly order
Drive plate—driven plate—drive plate—driven plate—drive plate—driven plate—drive plate

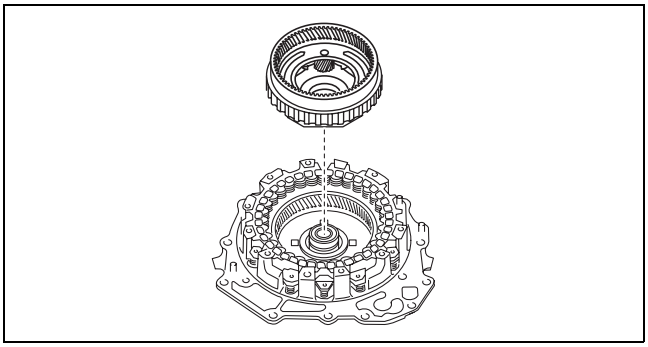


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14. Assemble the reduction planetary gear.

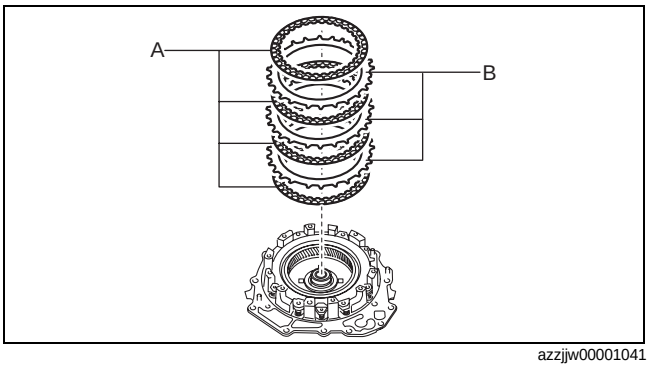
Note
- If the reduction planetary gear assembly is difficult, assembly is easier if the work is performed using the following procedure:



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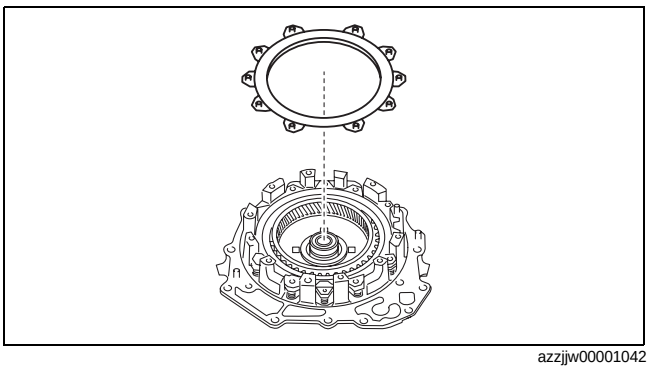
(1) Remove the drive plates and driven plates.

A : Drive plate
B : Driven plate



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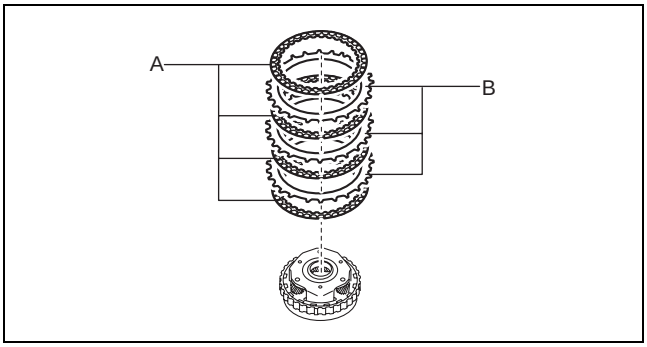
(2) Remove the retaining plate.



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(3) Assemble the drive plates and driven plates to the reduction planetary gear shown in the figure.

A : Drive plate
B : Driven plate



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Caution

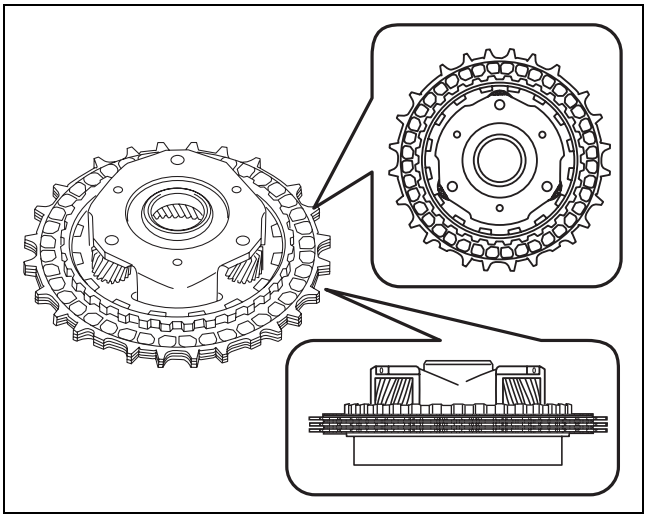
- **The driven plate has a similar shape to the retaining plate used for the 2-6 brake clearance adjustment. Before assembling the driven plate, always verify the plate thickness and the shape.**

Note

- Drive plate size: Outer diameter approx. 171.9 mm {6.768 in}
- Driven plate size: Inner diameter approx. 148 mm {5.83 in}, thickness approx. 1.6 mm {0.063 in}
- Align the spline positions of the driven plate while assembling.

Assembly order

Drive plate—driven plate—drive plate—driven plate—drive plate—driven plate—drive plate

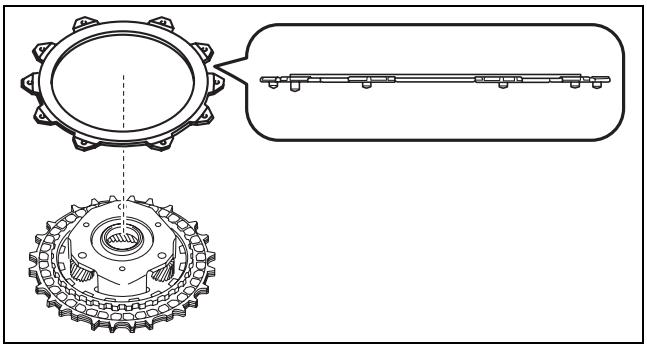


azzjjw00001044

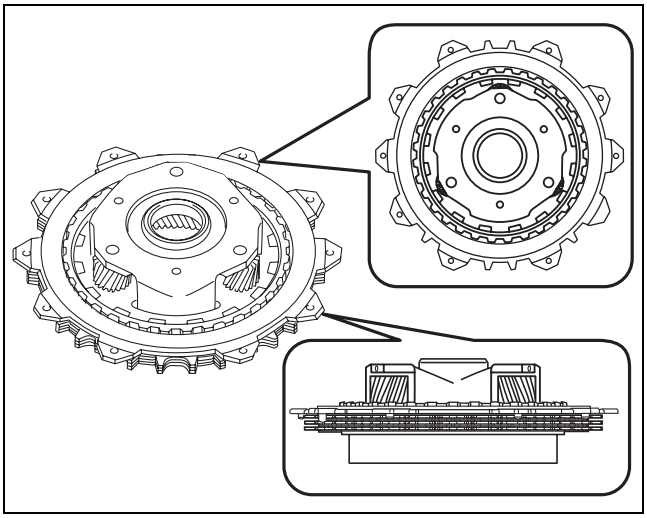
(4) Assemble the retaining plate to the reduction planetary gear as shown in the figure.

Note

- Retaining plate size: Inner diameter approx. 148 mm {5.83 in}
- Assemble the retaining plate so that the splines of the retaining plate and the splines of the driven plates are positioned as shown in the figure.

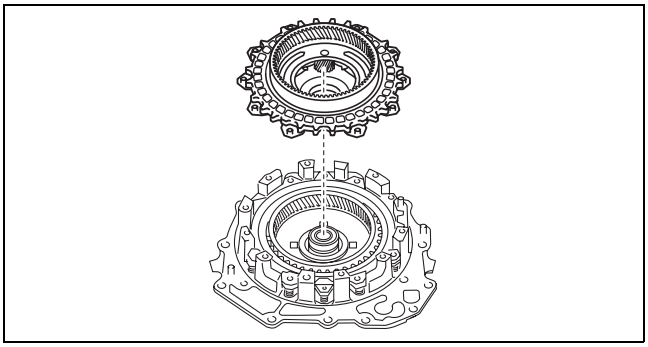


azzjjw00001045

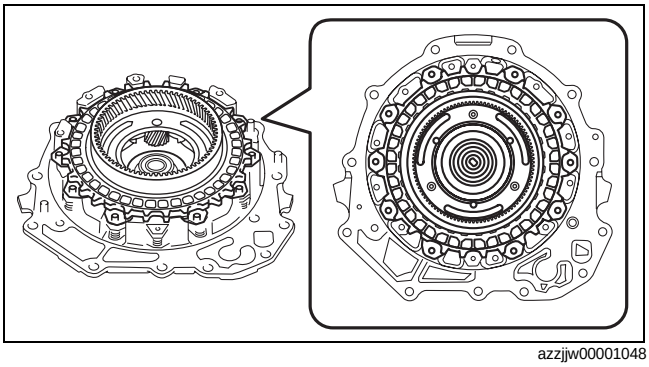


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(5) Assemble the parts assembled together in Steps (3) and (4).



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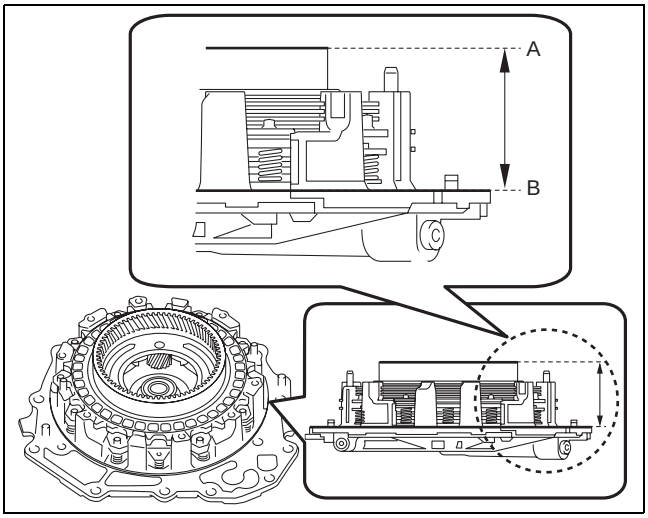


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15. To verify that the reduction planetary gear is securely assembled, measure the distance shown in the figure.

A : Reduction planetary gear end (rear internal gear end)

B : End cover end (alignment surface with transaxle case)



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Note

- Recommended measuring instrument: Depth gauge, straight edge ruler

Specification

61.3—63.1 mm {2.42—2.48 in}

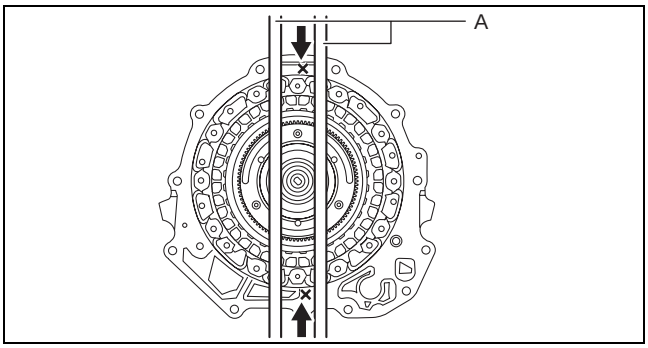
- If not within the specification, remove the reduction planetary gear and reassemble.

Note

- Measurement method

(1) Set two straight edge rulers on the reduction planetary gear (rear internal gear) as shown in the figure.

A : Straight edge ruler



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(2) Measure the positions (2 locations) shown in the figure using a depth gauge and calculate the average value.

(3) Subtract the thickness of the straight edge ruler from the average value.

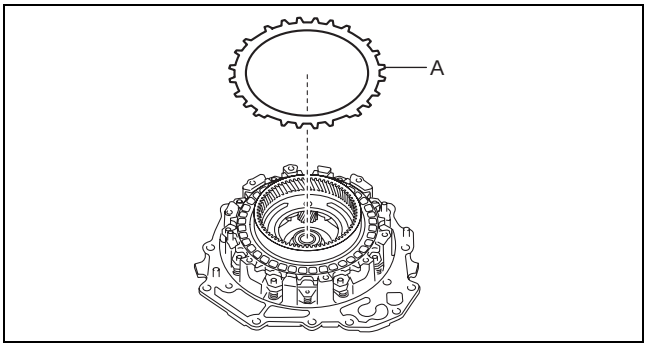
16. Assemble the retaining plate using the following procedure:
    (1) Measure the 2-6 brake clearance and select the appropriate retaining plate. (See 05-17-347 2-6 BRAKE CLEARANCE MEASUREMENT/ADJUSTMENT.)

Note
- If the retaining plate is assembled for the 2-6 brake clearance measurement/adjustment, the following retaining plate assembly procedure is not necessary.

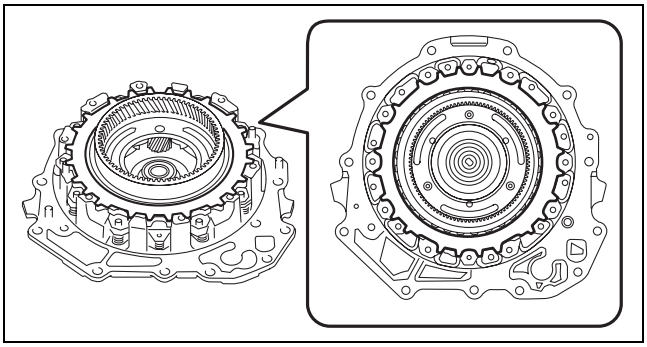
    (2) Assemble the retaining plate selected in Step (1).

A : Selection

Note
- Retaining plate: Inner diameter approx. 148 mm {5.83 in}



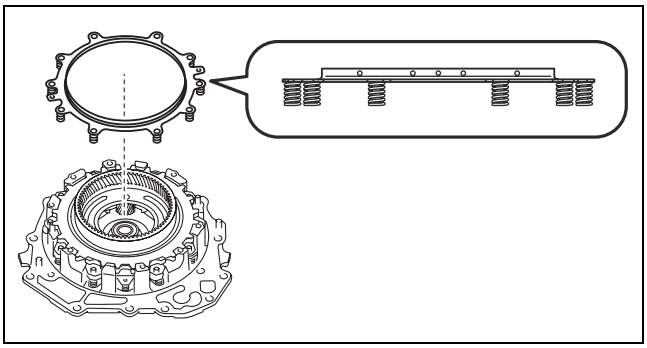
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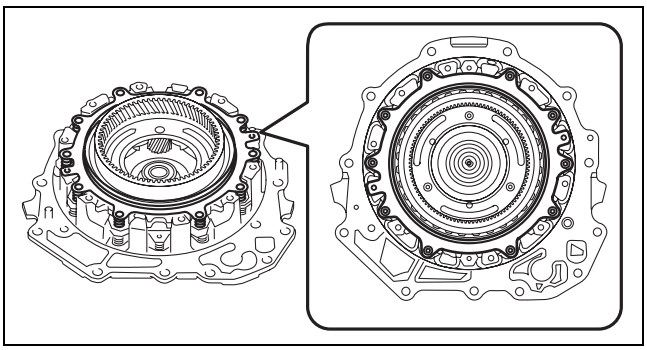
azzjjw00001052

17. Assemble the springs and retainer component.

Note
- Springs and retainer component size: Inner diameter approx. 150.6 mm {5.929 in}

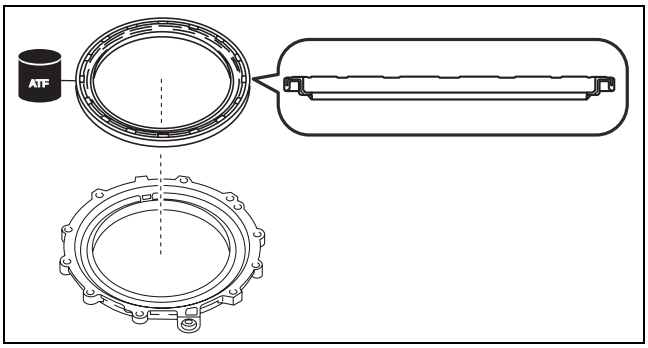


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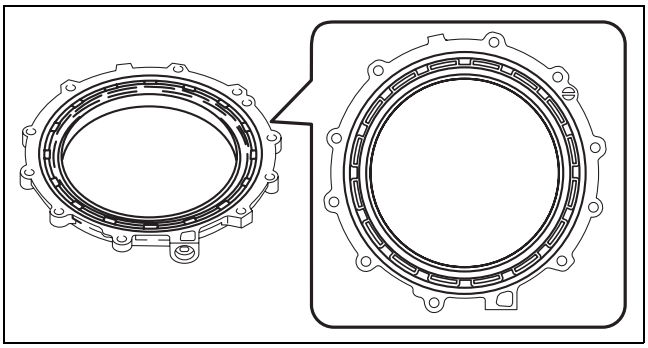


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18. Assemble the 2-6 brake piston to the brake housing using the following procedure:
    (1) Apply ATF (ATF FZ) to the 2-6 brake piston lip.
    (2) Assemble the 2-6 brake piston.



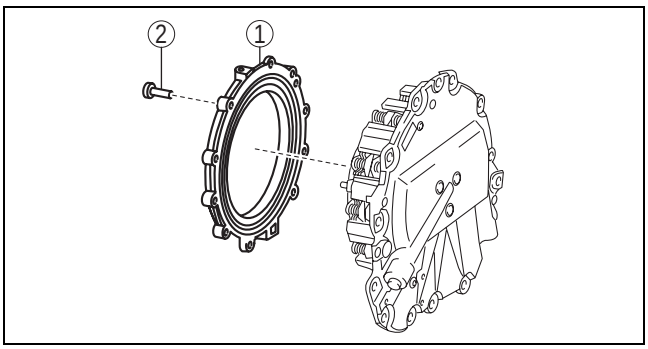
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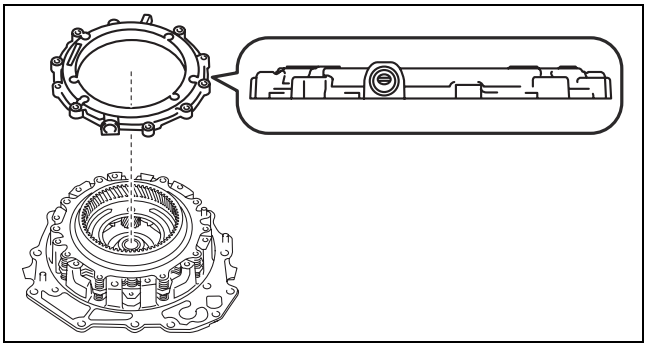
19. Assemble the brake housing using the following procedure:

1	Brake housing
2	8 bolts (M6×1.0 bolt, length to approx. 25 mm {0.98 in})

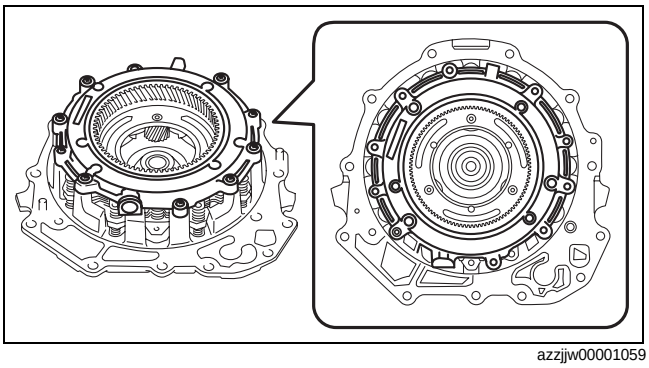


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(1) Assemble the brake housing.



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azzjjw00001059

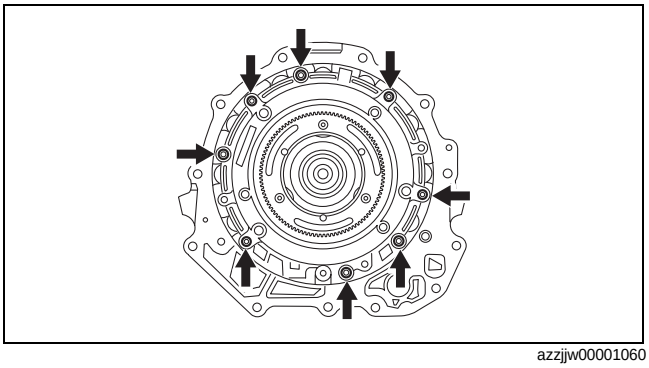
(2) Assemble and tighten the bolts shown in the figure uniformly.

Caution

- **If the bolts are not tightened uniformly, the brake housing will slant and parts could be damaged due to the spring force of the springs and retainer component in the brake housing.**

Note

- Bolt size: M6×1.0 bolt, length to approx. 25 mm {0.98 in}



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Tightening torque

8—10 N·m {82—101 kgf·cm, 71—88 in·lbf}

20. Perform an operation verification of the 2-6 brake using the following procedure:

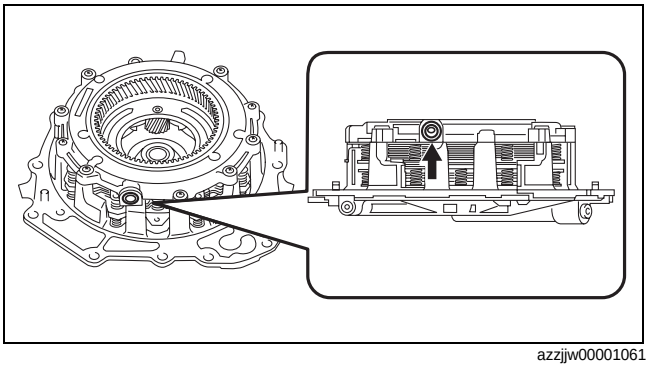
(1) Blow compressed air into the oil passage shown in the figure and verify the operation condition of the 2-6 brake.

Warning

- **Always wear protective eye wear when using the air compressor. Otherwise, ATF or dirt particles blown off by the air compressor could get into the eyes.**

Note

- To prevent damage to parts, always use an air compressor which is adjusted to the indicated pressure.



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Compressed air pressure

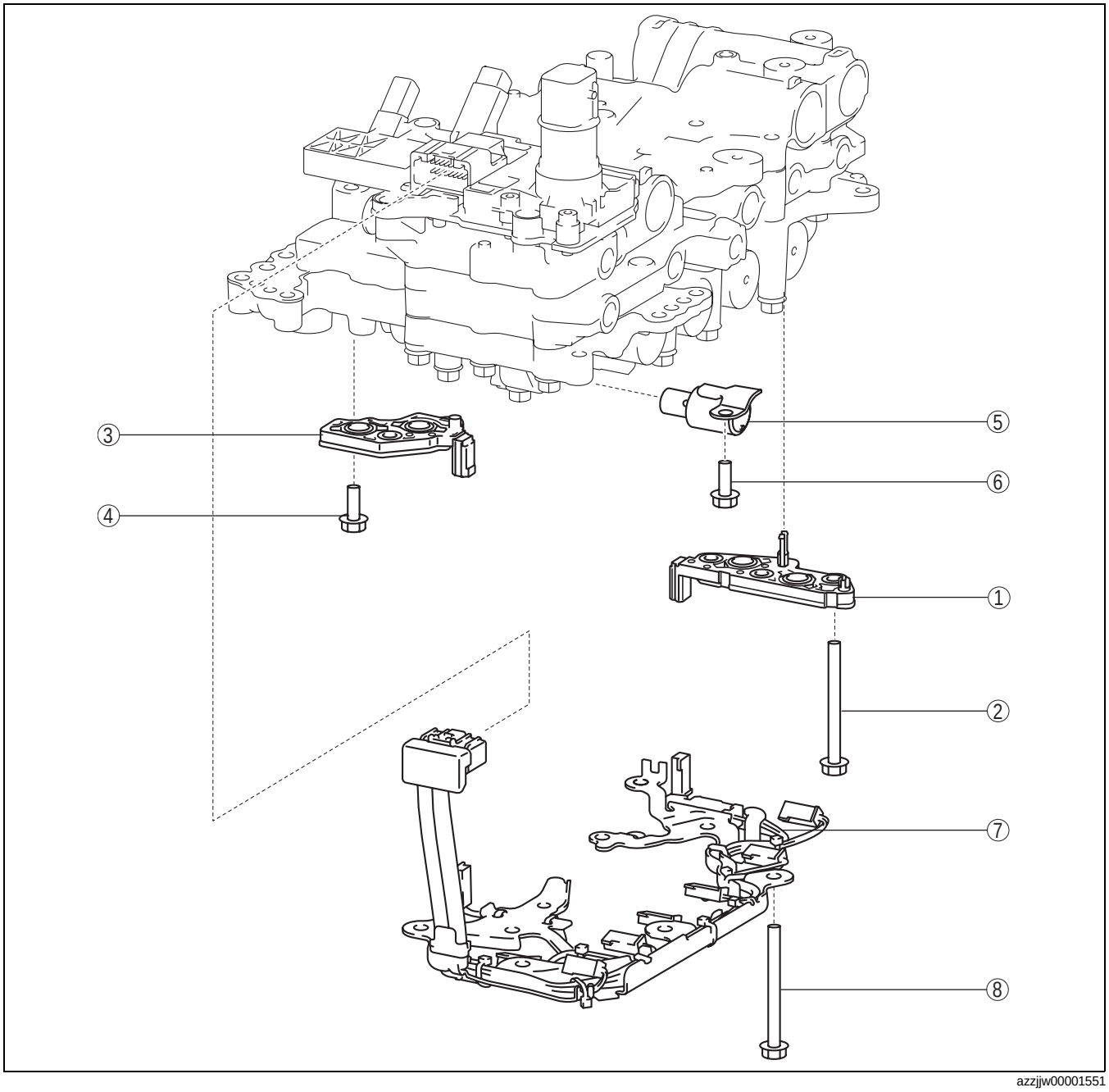
0.39—0.44 MPa {4.0—4.4 kgf/cm^2, 57—63 psi}

- If there is a malfunction, perform disassembly again, verify the cause and repair the applicable part. (See 05-17-128 END COVER COMPONENT DISASSEMBLY.)

CONTROL VALVE BODY ASSEMBLY

id051700664300

Structural View



azzjjw00001551

1	Oil pressure switch A
2	3 bolts (M6×1.0 bolt, length to approx. 60 mm {2.4 in})
3	Oil pressure switch B
4	2 bolts (M6×1.0 bolt, length to approx. 60 mm {2.4 in}) 1 bolt (M6×1.0 bolt, length to approx. 16 mm {0.63 in})

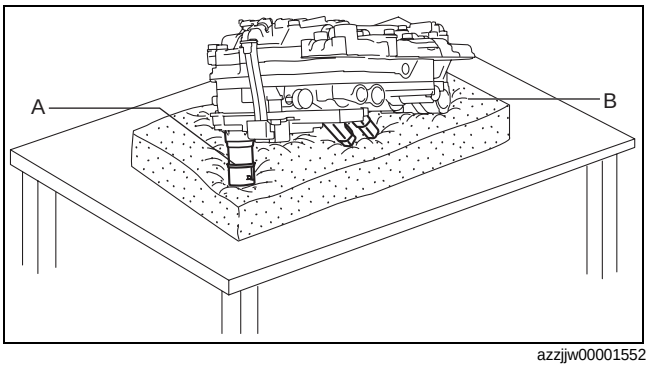
5	ON/OFF solenoid
6	Bolt (M6×1.0 bolt, length to approx. 16 mm {0.63 in})
7	Coupler component
8	6 bolts (M6×1.0 bolt, length to approx. 80 mm {3.1 in}) 1 bolt (M6×1.0 bolt, length to approx. 60 mm {2.4 in}) 1 bolt (M6×1.0 bolt, length to approx. 16 mm {0.63 in})

Assembly Procedure

Caution
- **Do not drop or apply an impact to the control valve body. Replace the control valve body with a new one if it was dropped or received an impact.**

1. Place the control valve body with the TCM side pointing downward on an impact-absorbing material as shown in the figure.

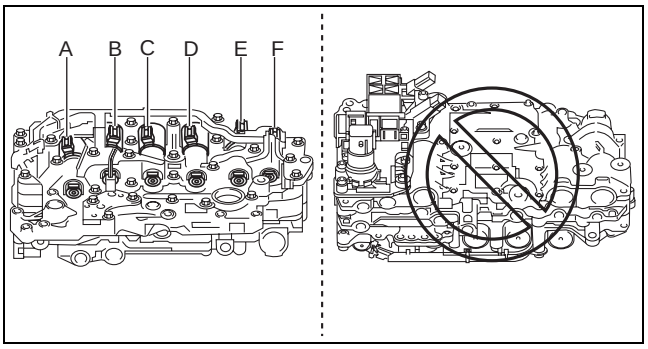
A : TCM
B : Impact-absorbing material



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Caution
- **Placing the TCM side pointed downward on a workbench directly could damage the TCM. If the TCM side is placed pointed downward, place the control valve body on an impact-absorbing material so that the TCM does not contact the workbench directly.**
- **If the control valve body is placed on the workbench with the TCM side pointing upward, the pins securing the solenoids shown in the figure could fall off and become lost.**
  If the solenoid installation position shown in the figure is changed, it will cause a malfunction.
  To prevent the pin securing the solenoid from falling, always place the control valve body on an impact-absorbing material with the TCM side pointing downward until the coupler component is assembled.

A : Shift solenoid No.1
B : Shift solenoid No.4
C : TCC control solenoid
D : Shift solenoid No.3
E : Shift solenoid No.2
F : Pressure control solenoid

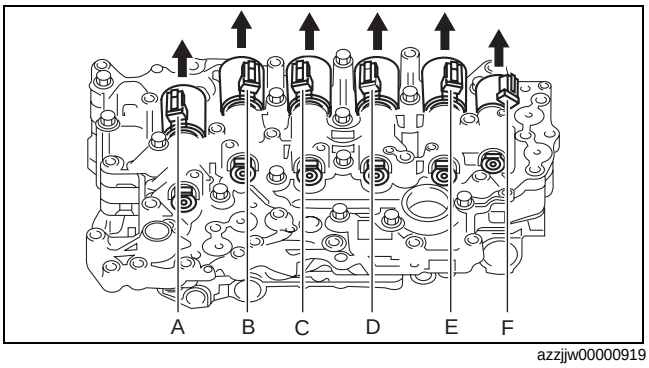


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2. Verify that the pins securing the pressure control solenoid, TCC control valve, and each shift solenoid are not removed using the following procedure:

   (1) Pull each solenoid in the direction of the arrow shown in the figure and verify that it is secured.

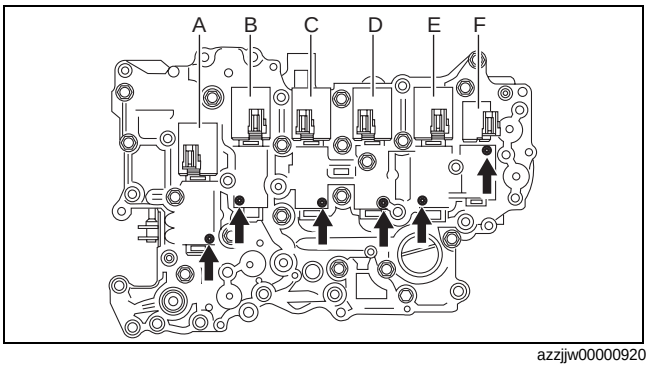
A : Shift solenoid No.1
B : Shift solenoid No.4
C : TCC control solenoid
D : Shift solenoid No.3
E : Shift solenoid No.2
F : Pressure control solenoid



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   - If there is a malfunction, assemble the pin securing the solenoid to the malfunctioning part.

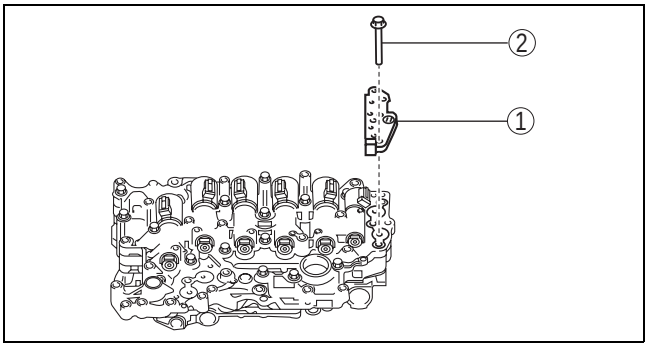
A : Shift solenoid No.1
B : Shift solenoid No.4
C : TCC control solenoid
D : Shift solenoid No.3
E : Shift solenoid No.2
F : Pressure control solenoid



azzjjw00000920

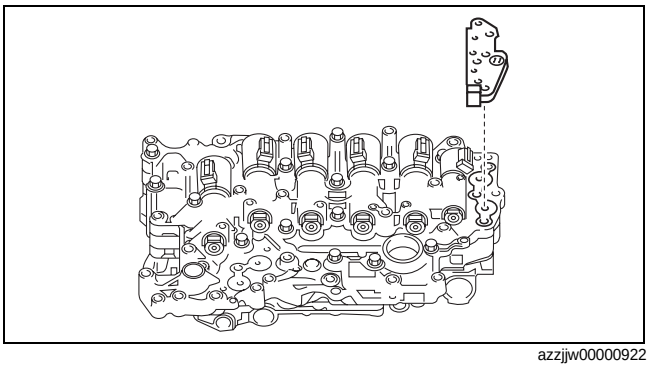
3. Assemble the oil pressure switch A using the following procedure:

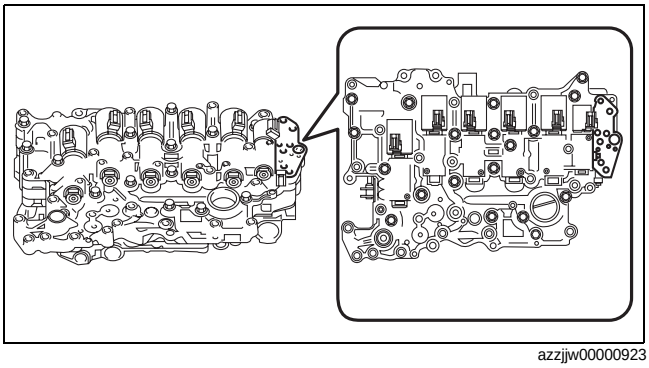
1	Oil pressure switch A
2	3 bolts (M6×1.0 bolt, length to approx. 60 mm {2.4 in})



azzjjw00000921

(1) Assemble the oil pressure switch A.

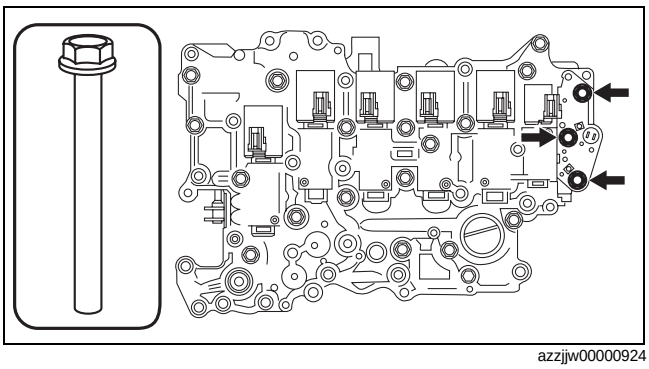

azzjjw00000922


azzjjw00000923

(2) Assemble and tighten the bolts shown in the figure.

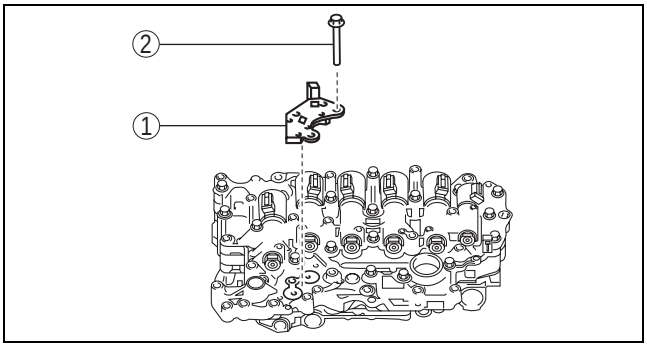
Note
- Bolt size: M6×1.0 bolt, length to approx. 60 mm {2.4 in}

Tightening torque
9—10 N·m {92—101 kgf·cm, 80—88 in·lbf}


azzjjw00000924

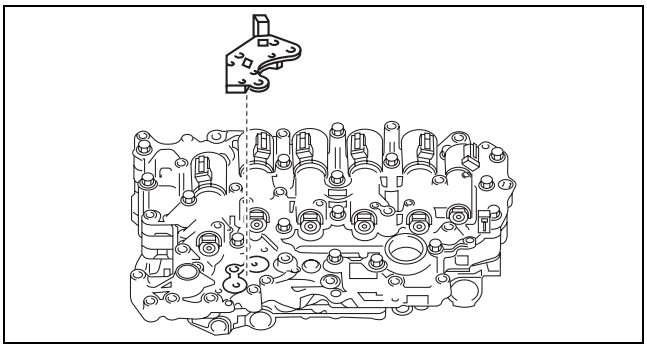
4. Assemble the oil pressure switch B using the following procedure:

1	Oil pressure switch B
2	2 bolts (M6×1.0 bolt, length to approx. 60 mm {2.4 in}) 1 bolt (M6×1.0 bolt, length to approx. 16 mm {0.63 in})

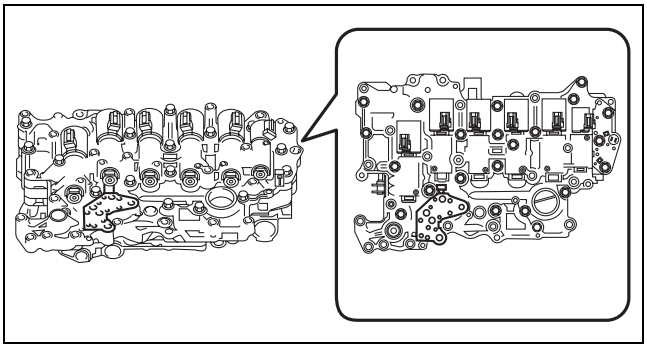


azzjjw00000925

(1) Assemble the oil pressure switch B.



azzjjw00000926



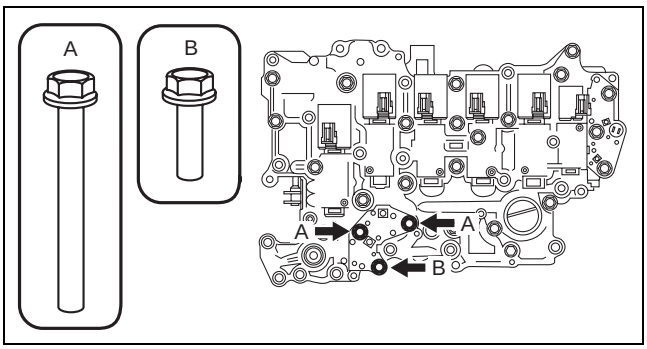
azzjjw00000927

(2) Assemble and tighten the bolts shown in the figure.

A : Bolt (M6×1.0 bolt, length to approx. 60 mm {2.4 in})

B : Bolt (M6×1.0 bolt, length to approx. 16 mm {0.63 in})

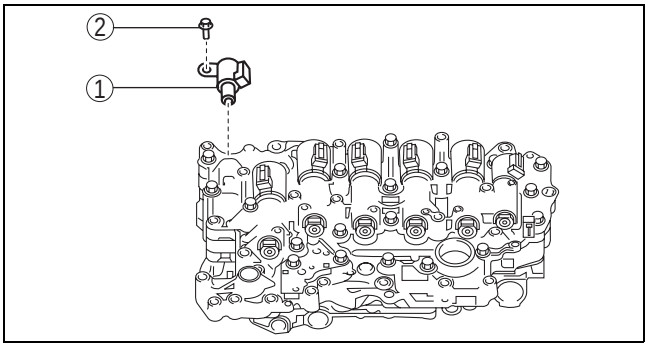
Tightening torque
9—10 N·m {92—101 kgf·cm, 80—88 in·lbf}



azzjjw00000928

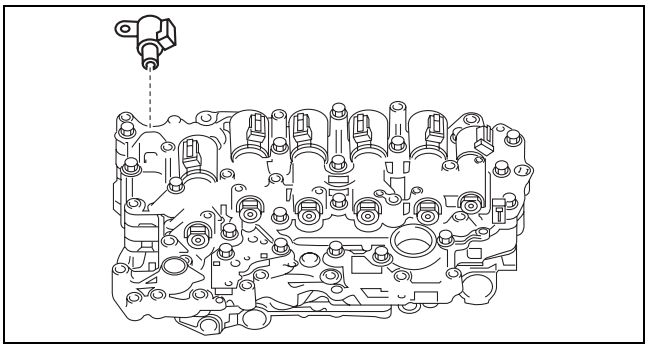
5. Assemble the ON/OFF solenoid using the following procedure:

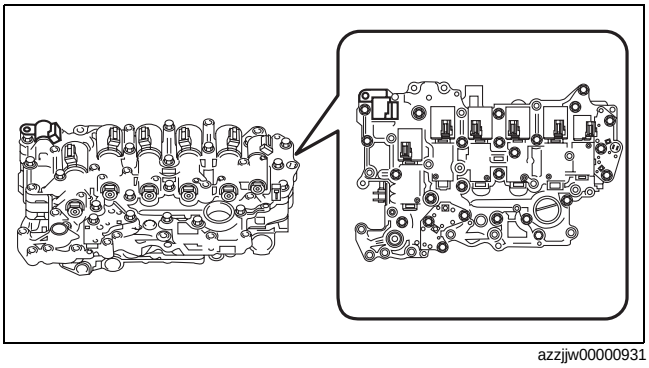
1	ON/OFF solenoid
2	Bolt (M6×1.0 bolt, length to approx. 16 mm {0.63 in})



azzjjw00000929

(1) Assemble the ON/OFF solenoid.

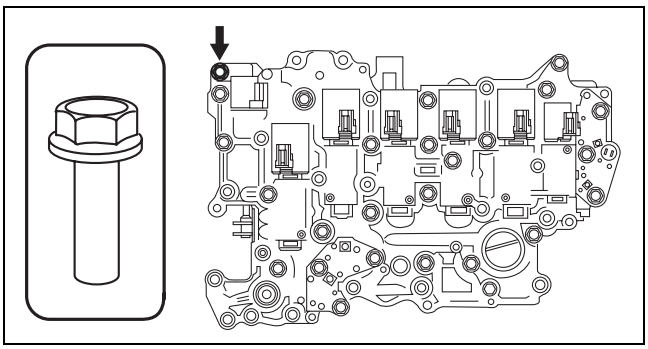

azzjjw00000930


azzjjw00000931

(2) Assemble and tighten the bolt shown in the figure.

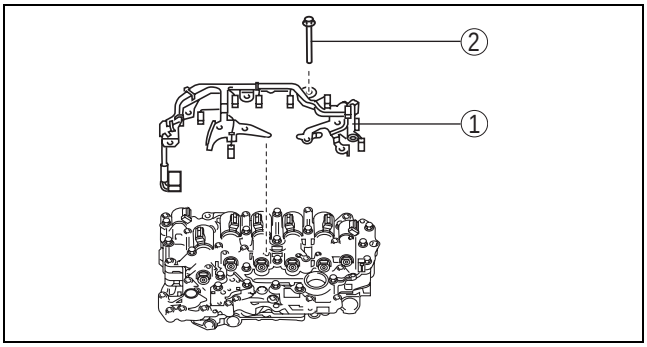
Note
- Bolt size: M6×1.0 bolt, length to approx. 16 mm {0.63 in}

Tightening torque
9—10 N·m {92—101 kgf·cm, 80—88 in·lbf}


azzjjw00000932

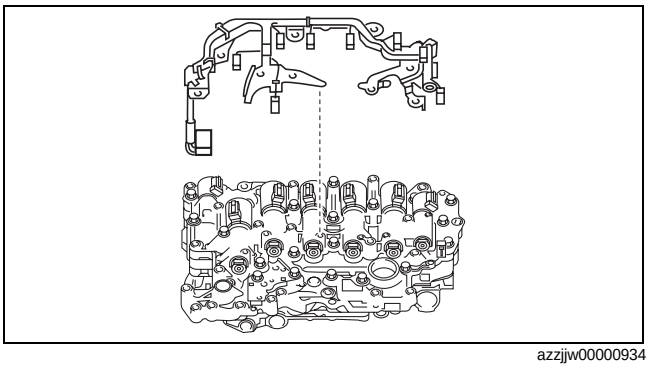
6. Assemble the coupler component using the following procedure:

1	Coupler component
2	6 bolts (M6×1.0 bolt, length to approx. 80 mm {3.1 in}) 1 bolt (M6×1.0 bolt, length to approx. 60 mm {2.4 in}) 1 bolt (M6×1.0 bolt, length to approx. 16 mm {0.63 in})

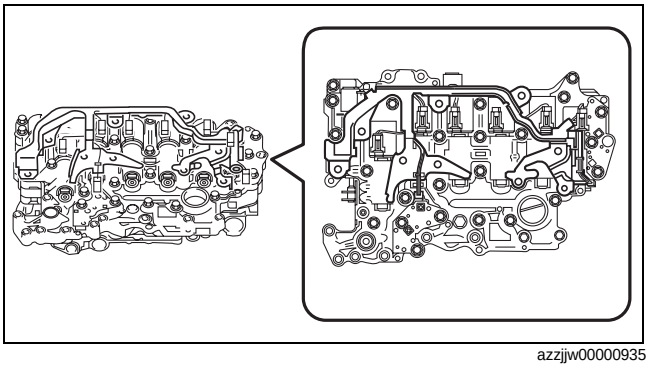


azzjjw00000933

(1) Assemble the coupler component.



azzjjw00000934

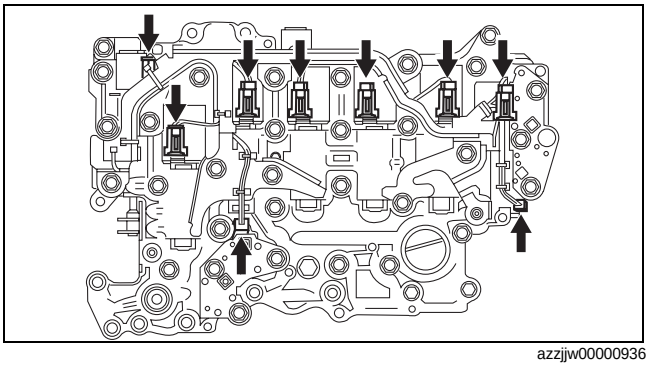


azzjjw00000935

(2) Connect the connectors shown in the figure.

Caution

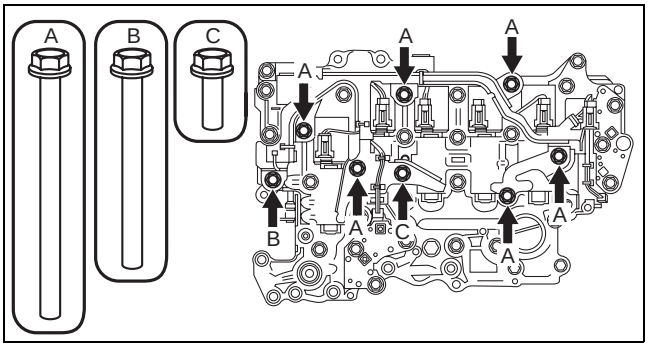
- **When connecting a connector, insert it straight until it is securely locked.**



azzjjw00000936

(3) Assemble and tighten the bolts shown in the figure.

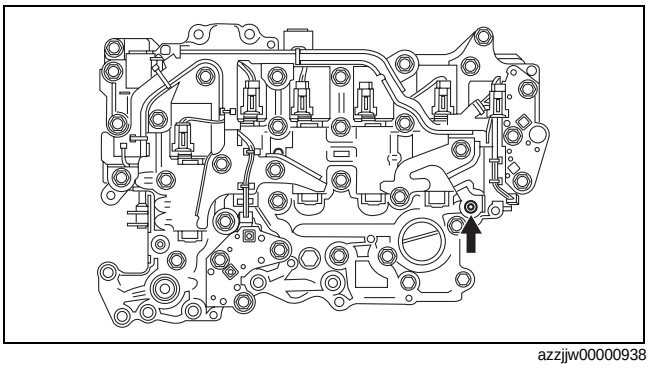
A : Bolt (M6×1.0 bolt, length to approx. 80 mm {3.1 in})
B : Bolt (M6×1.0 bolt, length to approx. 60 mm {2.4 in})
C : Bolt (M6×1.0 bolt, length to approx. 16 mm {0.63 in})



azzjjw00000937

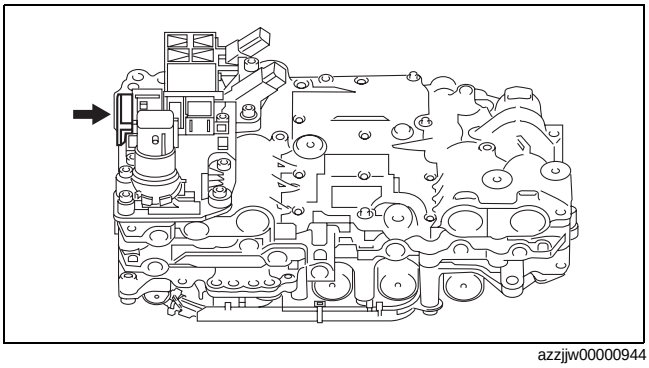
Caution
- **Tighten the bolts while pressing the coupler component so that the bolt hole shown in the figure and coupler component hole do not shift.**

Tightening torque
9—10 N·m {92—101 kgf·cm, 80—88 in·lbf}


azzjjw00000938

(4) Connect the connector shown in the figure.

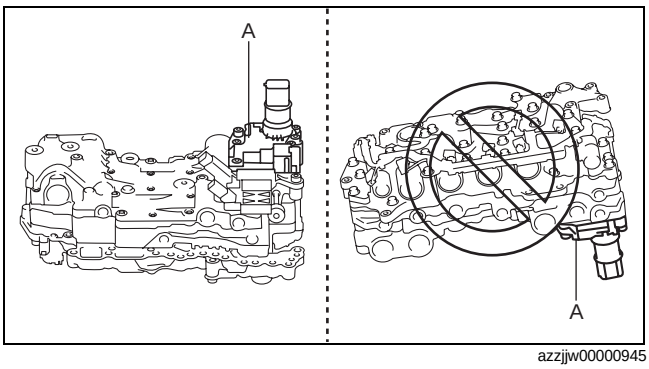
Caution
- **When connecting a connector, insert it at a straight angle until it is securely locked.**


azzjjw00000944

7. Place the assembled control valve body with the TCM side pointing upward on a workbench.

A : TCM

Caution
- **Place the assembled control valve body with the TCM side pointing upward on a workbench. If it is placed with the TCM side pointing downward on the workbench, the TCM could be damaged.**



azzjjw00000945

MEASUREMENT/ADJUSTMENT VALUE INPUT SHEET

id051700665300

Differential Backlash Measurement/Adjustment

Symbol	Item	Formula	Unit	First time		Second time		Third time	
A	FRONT SIDE GEAR AND PINION GEAR BACKLASH	—	mm {in}						
B	REAR SIDE GEAR AND PINION GEAR BACKLASH	—	mm {in}						
C	FRONT DIFFERENTIAL BACKLASH	Average value of A	mm {in}						
D	REAR DIFFERENTIAL BACKLASH	Average value of B	mm {in}						
E	STANDARD DIFFERENTIAL BACKLASH	—	mm {in}	0.030—0.150 {0.0012—0.0059}					
F	MEASUREMENT RESULT OF FRONT DIFFERENTIAL BACKLASH	—	mm {in}	OK/NG		OK/NG		OK/NG	
G	MEASUREMENT RESULT OF REAR DIFFERENTIAL BACKLASH	—	mm {in}	OK/NG		OK/NG		OK/NG	
H	THICKNESS OF REMOVED FRONT THRUST WASHER	—	mm {in}						
I	THICKNESS OF REMOVED REAR THRUST WASHER	—	mm {in}						
J	MEDIAN VALUE OF DIFFERENTIAL BACKLASH SPECIFICATION	—	mm {in}	0.090 {0.00354}					
K	FRONT DIFFERENTIAL BACKLASH GAP	C - J	mm {in}						
L	REAR DIFFERENTIAL BACKLASH GAP	D - J	mm {in}						
M	FRONT THRUST WASHER THICKNESS GAP	K × 0.1 mm {0.00394 in} / 0.08 mm {0.00315 in}	mm {in}						
N	REAR THRUST WASHER THICKNESS GAP	L × 0.1 mm {0.00394 in} / 0.08 mm {0.00315 in}	mm {in}						
O	THICKNESS OF OPTIMUM FRONT THRUST WASHER	H + M	mm {in}						
P	THICKNESS OF OPTIMUM REAR THRUST WASHER	I + N	mm {in}						

azzzcw00000074

Description example

Symbol	Item	Formula	Unit	First time		Second time		Third time	
A	FRONT SIDE GEAR AND PINION GEAR BACKLASH	—	mm {in}	0.160 {0.00630}	0.170 {0.00669}	0.110 {0.00433}	0.100 {0.00394}		
B	REAR SIDE GEAR AND PINION GEAR BACKLASH	—	mm {in}	0.160 {0.00630}	0.150 {0.00591}	0.085 {0.00335}	0.075 {0.00295}		
C	FRONT DIFFERENTIAL BACKLASH	Average value of A	mm {in}	0.165 {0.00650}		0.105 {0.00413}			
D	REAR DIFFERENTIAL BACKLASH	Average value of B	mm {in}	0.155 {0.00610}		0.080 {0.00315}			
E	STANDARD DIFFERENTIAL BACKLASH	—	mm {in}	0.030—0.150 {0.0012—0.0059}					
F	MEASUREMENT RESULT OF FRONT DIFFERENTIAL BACKLASH	—	mm {in}	OK/(NG)		(OK)/NG		OK/NG	
G	MEASUREMENT RESULT OF REAR DIFFERENTIAL BACKLASH	—	mm {in}	OK/(NG)		(OK)/NG		OK/NG	
H	THICKNESS OF REMOVED FRONT THRUST WASHER	—	mm {in}	0.810 {0.03189}					
I	THICKNESS OF REMOVED REAR THRUST WASHER	—	mm {in}	0.795 {0.0313}					
J	MEDIAN VALUE OF DIFFERENTIAL BACKLASH SPECIFICATION	—	mm {in}	0.090 {0.00354}					
K	FRONT DIFFERENTIAL BACKLASH GAP	C - J	mm {in}	0.075 {0.00295}					
L	REAR DIFFERENTIAL BACKLASH GAP	D - J	mm {in}	0.065 {0.00256}					
M	FRONT THRUST WASHER THICKNESS GAP	K × 0.1 mm {0.00394 in} / 0.08 mm {0.00315 in}	mm {in}	0.094 {0.00369}					
N	REAR THRUST WASHER THICKNESS GAP	L × 0.1 mm {0.00394 in} / 0.08 mm {0.00315 in}	mm {in}	0.081 {0.00320}					
O	THICKNESS OF OPTIMUM FRONT THRUST WASHER	H + M	mm {in}	0.904 {0.03559}					
P	THICKNESS OF OPTIMUM REAR THRUST WASHER	I + N	mm {in}	0.876 {0.03449}					

azzzcw00000075

High Clutch Clearance Measurement/Adjustment

Symbol	Item	Formula	Unit	First time	Second time	Third time
A	DIAL GAUGE VALUE WITH PISTON OPERATED	—	mm {in}			
B	DIAL GAUGE VALUE WITHOUT PISTON OPERATED	—	mm {in}			
C	HIGH CLUTCH CLEARANCE	A - B	mm {in}			
D	HIGH CLUTCH CLEARANCE SPECIFICATION	—	mm {in}	1.300—1.500 {0.05119—0.05905}		
E	MEASUREMENT RESULT OF HIGH CLUTCH CLEARANCE	—	mm {in}	OK/NG	OK/NG	OK/NG
F	THICKNESS OF REMOVED SNAP RING	—	mm {in}			
G	RANGE	C + F	mm {in}			

azzzcw00000066

Description example

Symbol	Item	Formula	Unit	First time	Second time	Third time
A	DIAL GAUGE VALUE WITH PISTON OPERATED	—	mm {in}	1.605 {0.06319}	1.245 {0.04902}	
B	DIAL GAUGE VALUE WITHOUT PISTON OPERATED	—	mm {in}	0.055 {0.00217}	-0.090 {-0.00354}	
C	HIGH CLUTCH CLEARANCE	A - B	mm {in}	1.550 {0.06102}	1.335 {0.05256}	
D	HIGH CLUTCH CLEARANCE SPECIFICATION	—	mm {in}	1.300—1.500 {0.05119—0.05905}		
E	MEASUREMENT RESULT OF HIGH CLUTCH CLEARANCE	—	mm {in}	OK/(NG)	(OK)/NG	OK/NG
F	THICKNESS OF REMOVED SNAP RING	—	mm {in}	1.615 {0.06358}		
G	RANGE	C + F	mm {in}	3.165 {0.12461}		

azzzcw00000067

Low Clutch Clearance Measurement/Adjustment

Symbol	Item	Formula	Unit	First time	Second time	Third time
A	WEIGHT OF WEIGHT	—	N {kgf, lbf}			
B	CORRECTION VALUE OF LOW CLUTCH CLEARANCE (WEIGHT OF UNIT N)	(A - 90 N) × 0.00157 mm {0.0000618 in}	mm {in}			
	CORRECTION VALUE OF LOW CLUTCH CLEARANCE (WEIGHT OF UNIT kgf)	(A - 9.18 kgf) × 0.01540 mm {0.0006063 in}	mm {in}			
	CORRECTION VALUE OF LOW CLUTCH CLEARANCE (WEIGHT OF UNIT lbf)	(A - 20.23 lbf) × 0.00698 mm {0.0002748 in}	mm {in}			
C	DIAL GAUGE VALUE WITH PISTON OPERATED	—	mm {in}			
D	DIAL GAUGE VALUE WITHOUT PISTON OPERATED	—	mm {in}			
E	LOW CLUTCH CLEARANCE	C - D - B	mm {in}			
F	LOW CLUTCH CLEARANCE SPECIFICATION	—	mm {in}	1.400—1.600 {0.05512—0.06299}		
G	MEASUREMENT RESULT OF LOW CLUTCH CLEARANCE	—	mm {in}	OK/NG	OK/NG	OK/NG
H	THICKNESS OF REMOVED SNAP RING	—	mm {in}			
I	RANGE	E + H	mm {in}			

azzzcw00000064

Description example

Symbol	Item	Formula	Unit	First time	Second time	Third time
A	WEIGHT OF WEIGHT	—	N {kgf, lbf}	150 {15.30, 33.72}	150 {15.30, 33.72}	
B	CORRECTION VALUE OF LOW CLUTCH CLEARANCE (WEIGHT OF UNIT N)	(A - 90 N) × 0.00157 mm {0.0000618 in}	mm {in}	0.0942 {0.00371}	0.0942 {0.00371}	
	CORRECTION VALUE OF LOW CLUTCH CLEARANCE (WEIGHT OF UNIT kgf)	(A - 9.18 kgf) × 0.01540 mm {0.0006063 in}	mm {in}			
	CORRECTION VALUE OF LOW CLUTCH CLEARANCE (WEIGHT OF UNIT lbf)	(A - 20.23 lbf) × 0.00698 mm {0.0002748 in}	mm {in}			
C	DIAL GAUGE VALUE WITH PISTON OPERATED	—	mm {in}	2.320 {0.09134}	2.115 {0.08327}	
D	DIAL GAUGE VALUE WITHOUT PISTON OPERATED	—	mm {in}	0.595 {0.02343}	0.480 {0.01890}	
E	LOW CLUTCH CLEARANCE	C - D - B	mm {in}	1.6308 {0.06420}	1.5408 {0.06066}	
F	LOW CLUTCH CLEARANCE SPECIFICATION	—	mm {in}	1.400—1.600 {0.05512—0.06299}		
G	MEASUREMENT RESULT OF LOW CLUTCH CLEARANCE	—	mm {in}	OK/(NG)	(OK)/NG	OK/NG
H	THICKNESS OF REMOVED SNAP RING	—	mm {in}	1.705 {0.06713}		
I	RANGE	E + H	mm {in}	3.3358 {0.13133}		

azzzcw00000065

R-3-5 Brake Clearance Measurement/Adjustment

Symbol	Item	Formula	Unit	First time
A	RETAINER THICKNESS OF SPRINGS AND RETAINER COMPONENT	—	mm{in}	
B	DIAL GAUGE VALUE WITH R-3-5 BRAKE PISTON OPERATED	—	mm{in}	
C	DIAL GAUGE VALUE WITHOUT R-3-5 BRAKE PISTON OPERATED	—	mm{in}	
D	R-3-5 BRAKE CLEARANCE ADJUSTMENT VALUE	B - C	mm{in}	
E	THICKNESS OF SNAP RING (FZ01 19 469) FOR R-3-5 BRAKE CLEARANCE MEASUREMENT/ ADJUSTMENT	—	mm{in}	
F	RANGE	D + E - A	mm{in}	

azzzcw00000072

Description example

Symbol	Item	Formula	Unit	First time
A	RETAINER THICKNESS OF SPRINGS AND RETAINER COMPONENT	—	mm{in}	1.225 {0.04823}
B	DIAL GAUGE VALUE WITH R-3-5 BRAKE PISTON OPERATED	—	mm{in}	2.280 {0.08976}
C	DIAL GAUGE VALUE WITHOUT R-3-5 BRAKE PISTON OPERATED	—	mm{in}	0.205 {0.00807}
D	R-3-5 BRAKE CLEARANCE ADJUSTMENT VALUE	B - C	mm{in}	2.075 {0.08169}
E	THICKNESS OF SNAP RING (FZ01 19 469) FOR R-3-5 BRAKE CLEARANCE MEASUREMENT/ ADJUSTMENT	—	mm{in}	2.625 {0.10335}
F	RANGE	D + E - A	mm{in}	3.475 {0.13681}

azzzcw00000073

2-6 Brake Clearance Measurement/Adjustment

Symbol	Item	Formula	Unit	First time	Second time	Third time
A	RETAINER THICKNESS OF SPRINGS AND RETAINER COMPONENT	—	mm {in}		←	←
B	DISTANCE A	—	mm {in}			
C	AVERAGE VALUE OF DISTANCE A	Average value of B	mm {in}			
D	2-6 BRAKE CLEARANCE	C - A	mm {in}			
E	2-6 BRAKE CLEARANCE SPECIFICATION	—	mm {in}	1.000—1.200 {0.03938—0.04724}		
F	MEASUREMENT RESULT OF 2-6 BRAKE CLEARANCE	—	mm {in}	OK/NG	OK/NG	OK/NG
G	THICKNESS OF REMOVED RETAINING PLATE	—	mm {in}			
H	RANGE	D + G	mm {in}			

azzzcw00000070

Description example

Symbol	Item	Formula	Unit	First time	Second time	Third time
A	RETAINER THICKNESS OF SPRINGS AND RETAINER COMPONENT	—	mm {in}	1.425 {0.05610}	←	←
B	DISTANCE A	—	mm {in}	2.675 {0.10532} / 2.650 {0.10433} / 2.665 {0.10492} / 2.670 {0.10512}	2.580 {0.10157} / 2.555 {0.10059} / 2.560 {0.10079} / 2.565 {0.10098}	
C	AVERAGE VALUE OF DISTANCE A	Average value of B	mm {in}	2.665 {0.10492}	2.565 {0.10098}	
D	2-6 BRAKE CLEARANCE	C - A	mm {in}	1.240 {0.04882}	1.140 {0.04488}	
E	2-6 BRAKE CLEARANCE SPECIFICATION	—	mm {in}	1.000—1.200 {0.03938—0.04724}		
F	MEASUREMENT RESULT OF 2-6 BRAKE CLEARANCE	—	mm {in}	OK/(NG)	(OK)/NG	OK/NG
G	THICKNESS OF REMOVED RETAINING PLATE	—	mm {in}	2.015 {0.07933}		
H	RANGE	D + G	mm {in}	3.255 {0.12815}		

azzzcw00000071

Low and Reverse Brake Clearance Measurement/Adjustment

Symbol	Item	Formula	Unit	First time				Second time				Third time			
A	DIAL GAUGE VALUE WITH PISTON OPERATED	—	mm {in}												
B	DIAL GAUGE VALUE WITHOUT PISTON OPERATED	—	mm {in}												
C	LOW AND REVERSE BRAKE CLEARANCE	A - B	mm {in}												
D	AVERAGE VALUE OF LOW AND REVERSE BRAKE CLEARANCE	Average value of C	mm {in}												
E	LOW AND REVERSE BRAKE CLEARANCE SPECIFICATION	—	mm {in}	1.650—1.850 {0.06497—0.07283}											
F	MEASUREMENT RESULT OF LOW AND REVERSE BRAKE CLEARANCE	—	mm {in}	OK/NG				OK/NG				OK/NG			
G	THICKNESS OF REMOVED SNAP RING	—	mm {in}												
H	RANGE	D + G	mm {in}												

azzzcw00000068

Description example

Symbol	Item	Formula	Unit	First time				Second time				Third time			
A	DIAL GAUGE VALUE WITH PISTON OPERATED	—	mm {in}	2.470 {0.09724}	2.665 {0.10492}	2.070 {0.08150}	1.840 {0.07244}	1.570 {0.06181}	1.845 {0.07264}	1.695 {0.06673}	1.760 {0.06929}				
B	DIAL GAUGE VALUE WITHOUT PISTON OPERATED	—	mm {in}	0.595 {0.02343}	0.765 {0.03012}	0.205 {0.00807}	-0.035 {-0.00138}	-0.105 {-0.00413}	0.155 {0.00610}	0.010 {0.00039}	0.090 {0.00354}				
C	LOW AND REVERSE BRAKE CLEARANCE	A - B	mm {in}	1.875 {0.07382}	1.900 {0.07480}	1.865 {0.07343}	1.875 {0.07382}	1.675 {0.06594}	1.690 {0.06654}	1.685 {0.06634}	1.670 {0.06575}				
D	AVERAGE VALUE OF LOW AND REVERSE BRAKE CLEARANCE	Average value of C	mm {in}	1.879 {0.07398}				1.680 {0.06614}							
E	LOW AND REVERSE BRAKE CLEARANCE SPECIFICATION	—	mm {in}	1.650—1.850 {0.06497—0.07283}											
F	MEASUREMENT RESULT OF LOW AND REVERSE BRAKE CLEARANCE	—	mm {in}	OK/(NG)				(OK)/NG				OK/NG			
G	THICKNESS OF REMOVED SNAP RING	—	mm {in}	2.305 {0.09075}											
H	RANGE	D + G	mm {in}	4.184 {0.16472}											

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Secondary Gear and Output Gear Preload Measurement/Adjustment

Symbol	Item	Formula	Unit	First time	Second time	Third time
A	ANGULAR CONTACT BALL BEARING PRELOAD	—	N·m {kgf·cm, in·lbf}		←	←
B	TOTAL PRELOAD	—	N·m {kgf·cm, in·lbf}			
C	SECONDARY GEAR AND OUTPUT GEAR PRELOAD	B - A	N·m {kgf·cm, in·lbf}			
D	SECONDARY GEAR AND OUTPUT GEAR PRELOAD SPECIFICATION	—	N·m {kgf·cm, in·lbf}	2.8—3.7 {28.6—37.7, 24.8—32.7}		
E	MEASUREMENT RESULT OF SECONDARY GEAR AND OUTPUT GEAR PRELOAD	—	—	OK/NG	OK/NG	OK/NG
F	THICKNESS OF REMOVED SHIM	—	mm {in}			
G	MEDIAN VALUE OF SECONDARY GEAR AND OUTPUT GEAR PRELOAD SPECIFICATION	—	N·m {kgf·cm, in·lbf}	3.25 {33.1, 28.7}		
H	PRELOAD GAP	G - C	N·m {kgf·cm, in·lbf}			
I	SHIM THICKNESS GAP	H × 0.1 mm {0.00394 in} / 1.6 N·m {16.3 kgf·cm, 14.1 in·lbf}	mm {in}			
J	THICKNESS OF OPTIMUM SHIM	F + I	mm {in}			

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Description example

Symbol	Item	Formula	Unit	First time	Second time	Third time
A	ANGULAR CONTACT BALL BEARING PRELOAD	—	N·m {kgf·cm, in·lbf}	1.2 {12.2, 10.6}	←	←
B	TOTAL PRELOAD	—	N·m {kgf·cm, in·lbf}	3.7 {37.7, 32.7}	4.4 {44.8, 38.9}	
C	SECONDARY GEAR AND OUTPUT GEAR PRELOAD	B - A	N·m {kgf·cm, in·lbf}	2.5 {25.5, 22.1}	3.2 {32.6, 28.3}	
D	SECONDARY GEAR AND OUTPUT GEAR PRELOAD SPECIFICATION	—	N·m {kgf·cm, in·lbf}	2.8—3.7 {28.6—37.7, 24.8—32.7}		
E	MEASUREMENT RESULT OF SECONDARY GEAR AND OUTPUT GEAR PRELOAD	—	—	OK/(NG)	(OK)/NG	OK/NG
F	THICKNESS OF REMOVED SHIM	—	mm {in}	0.855 {0.03366}		
G	MEDIAN VALUE OF SECONDARY GEAR AND OUTPUT GEAR PRELOAD SPECIFICATION	—	N·m {kgf·cm, in·lbf}	3.25 {33.1, 28.7}		
H	PRELOAD GAP	G - C	N·m {kgf·cm, in·lbf}	0.75 {7.6, 6.6}		
I	SHIM THICKNESS GAP	H × 0.1 mm {0.00394 in} / 1.6 N·m {16.3 kgf·cm, 14.1 in·lbf}	mm {in}	0.047 {0.00185}		
J	THICKNESS OF OPTIMUM SHIM	F + I	mm {in}	0.902 {0.03551}		

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Ring Gear and Differential Preload Measurement/Adjustment

Symbol	Item	Formula	Unit	First time	Second time	Third time
A	RING GEAR AND DIFFERENTIAL PRELOAD	—	N·m {kgf·cm, in·lbf}			
B	RING GEAR AND DIFFERENTIAL PRELOAD SPECIFICATION	—	N·m {kgf·cm, in·lbf}	2.8—4.1 {28.6—41.8, 24.8—36.2}		
C	MEASUREMENT RESULT OF RING GEAR AND DIFFERENTIAL PRELOAD	—	—	OK/NG	OK/NG	OK/NG
D	THICKNESS OF REMOVED SHIM	—	mm {in}			
E	MEDIAN VALUE OF RING GEAR AND DIFFERENTIAL PRELOAD SPECIFICATION	—	N·m {kgf·cm, in·lbf}	3.45 {35.2, 30.5}		
F	PRELOAD GAP	E - A	N·m {kgf·cm, in·lbf}			
G	SHIM THICKNESS GAP	F × 0.1 mm {0.00394 in} / 1.5 N·m {15.3 kgf·cm, 13.3 in·lbf}	mm {in}			
H	THICKNESS OF OPTIMUM SHIM	D + G	mm {in}			

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Description example

Symbol	Item	Formula	Unit	First time	Second time	Third time
A	RING GEAR AND DIFFERENTIAL PRELOAD	—	N·m {kgf·cm, in·lbf}	2.5 {25.5, 22.1}	3.4 {34.7, 30.1}	
B	RING GEAR AND DIFFERENTIAL PRELOAD SPECIFICATION	—	N·m {kgf·cm, in·lbf}	2.8—4.1 {28.6—41.8, 24.8—36.2}		
C	MEASUREMENT RESULT OF RING GEAR AND DIFFERENTIAL PRELOAD	—	—	OK/(NG)	(OK)/NG	OK/NG
D	THICKNESS OF REMOVED SHIM	—	mm {in}	0.905 {0.03563}		
E	MEDIAN VALUE OF RING GEAR AND DIFFERENTIAL PRELOAD SPECIFICATION	—	N·m {kgf·cm, in·lbf}	3.45 {35.2, 30.5}		
F	PRELOAD GAP	E - A	N·m {kgf·cm, in·lbf}	0.95 {9.7, 8.4}		
G	SHIM THICKNESS GAP	F × 0.1 mm {0.00394 in} / 1.5 N·m {15.3 kgf·cm, 13.3 in·lbf}	mm {in}	0.063 {0.00248}		
H	THICKNESS OF OPTIMUM SHIM	D + G	mm {in}	0.968 {0.03811}		

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Total End Play Measurement/Adjustment

Symbol	Item	Formula	Unit	First time			
A	TOTAL END PLAY ADJUSTMENT VALUE	—	mm{in}				
B	AVERAGE OF TOTAL END PLAY ADJUSTMENT VALUE	Average value of A	mm{in}				
C	THICKNESS OF SHIM (FZ01 19 2L1) FOR TOTAL END PLAY MEASUREMENT/ ADJUSTMENT	—	mm{in}				
D	RANGE	B + C	mm{in}				

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Description example

Symbol	Item	Formula	Unit	First time			
A	TOTAL END PLAY ADJUSTMENT VALUE	—	mm{in}	0.120 {0.00472}	0.110 {0.00433}	0.110 {0.00433}	0.120 {0.00472}
B	AVERAGE OF TOTAL END PLAY ADJUSTMENT VALUE	Average value of A	mm{in}	0.115 {0.00453}			
C	THICKNESS OF SHIM (FZ01 19 2L1) FOR TOTAL END PLAY MEASUREMENT/ ADJUSTMENT	—	mm{in}	3.010 {0.11850}			
D	RANGE	B + C	mm{in}	3.125 {0.12303}			

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DIFFERENTIAL BACKLASH MEASUREMENT/ADJUSTMENT

id051700665400

Preparation Before Servicing

1. Print out the measurement/adjustment value input sheet. (See 05-17-295 MEASUREMENT/ADJUSTMENT VALUE INPUT SHEET.)

Note
- When performing the measurement/adjustment, input the measured and calculated values into the measurement/adjustment value input sheet.
- When performing the other measurements/adjustments, if the measurement/adjustment value input sheet has been printed out, use the printed sheet.

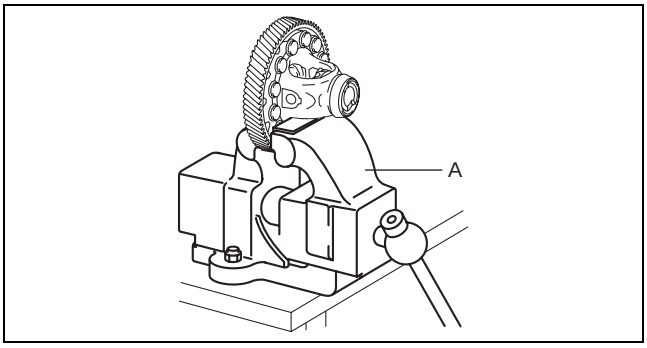
Differential Backlash Measurement

Note
- Measure the tooth play (gap) between the side gear and pinion gear as the differential backlash.

1. Secure the ring gear and differential in a vise.

A : Vise

Caution
- **Insert a protective plate between the vise and the part so as not to damage the part.**

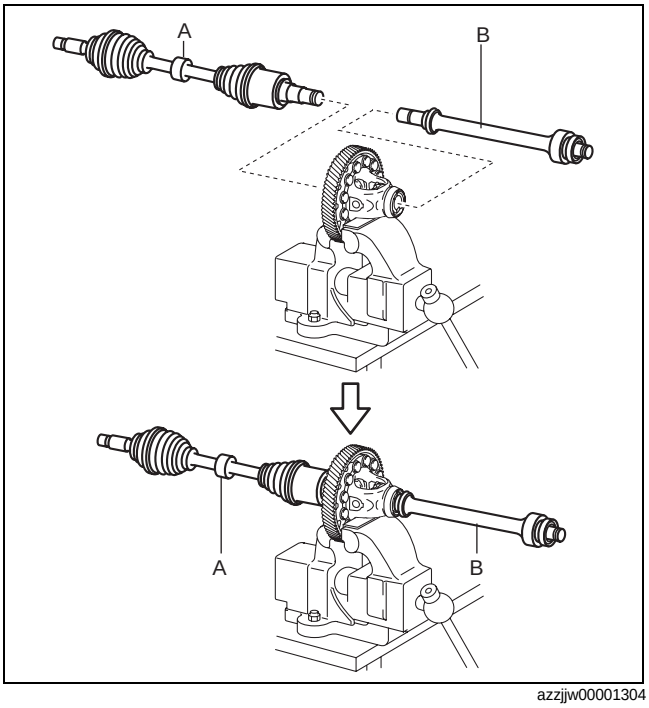


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2. Assemble the drive shaft (LH) and joint shaft to the ring gear and differential.

A : Drive shaft (LH)
B : Joint shaft

Caution
- **Because the drive shaft (LH) clip is not required for the differential backlash measurement, do not assemble it.**

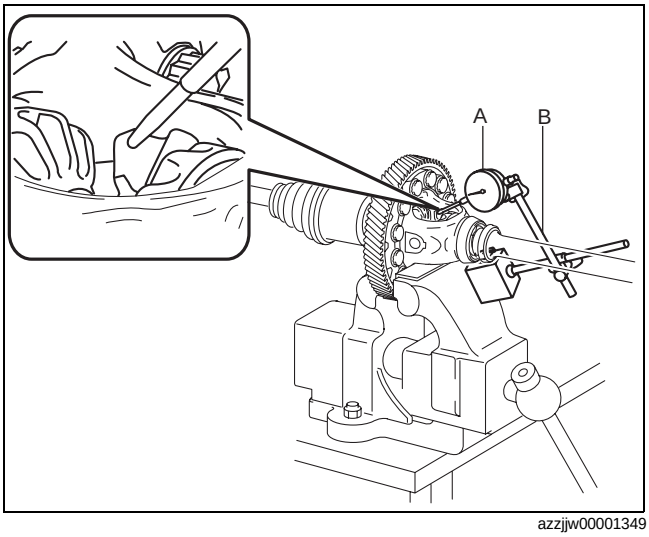


azzjjw00001304

3. Set the dial gauge and magnetic stand as shown in the figure.

A : Dial gauge
B : Magnetic stand

Caution
- **To reduce error during the backlash measurement, set the dial gauge so that it is perpendicular to the teeth of the pinion gear.**

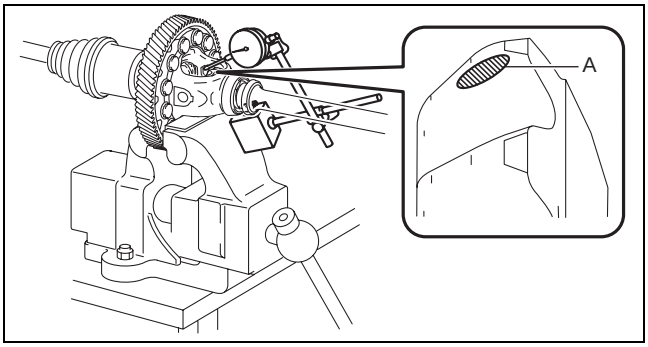


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4. Set the dial gauge end to the pinion gear teeth.

A : Area in which dial gauge end is set

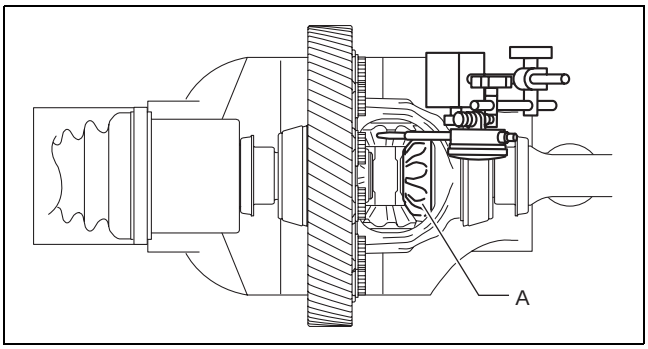
Caution
- **To reduce error during the backlash measurement, set the dial gauge end to within the area shown in the figure.**



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5. Secure the side gear on the front side by hand.

A : Secure by hand

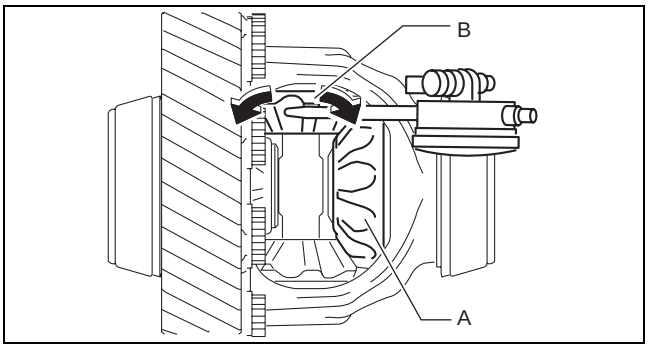


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6. Move the pinion gear with the dial gauge that has been set by hand and measure the backlash.

A : Secure by hand
B : Move the pinion gear by hand such that the secured side gear does not move.

Caution
- **Because a difference occurs in the backlash measurement value if the secured side gear moves, move the pinion gear by hand so that the secured side gear does not move.**



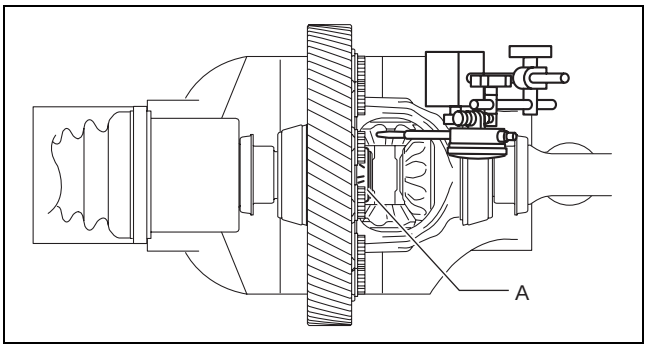
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7. Input the measured side gear on the front side and pinion gear backlash into the measurement/adjustment value input sheet.

Note
- Input into section A in the measurement/adjustment value input sheet.

8. Secure the side gear on the rear side by hand.

A : Secure by hand

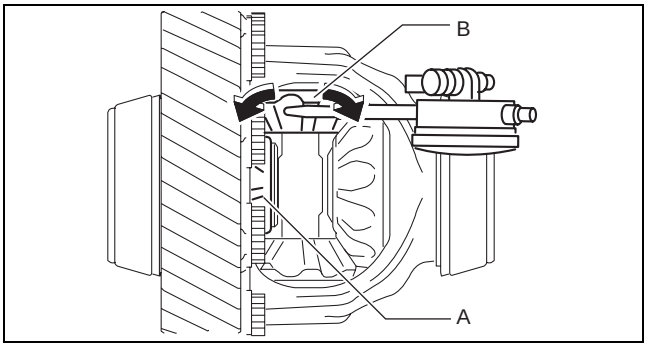


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9. Move the pinion gear with the dial gauge that has been set by hand and measure the backlash.

A : Secure by hand
B : Move the pinion gear by hand such that the secured side gear does not move.

Caution
- **Because a difference occurs in the backlash measurement value if the secured side gear moves, move the pinion gear by hand so that the secured side gear does not move.**



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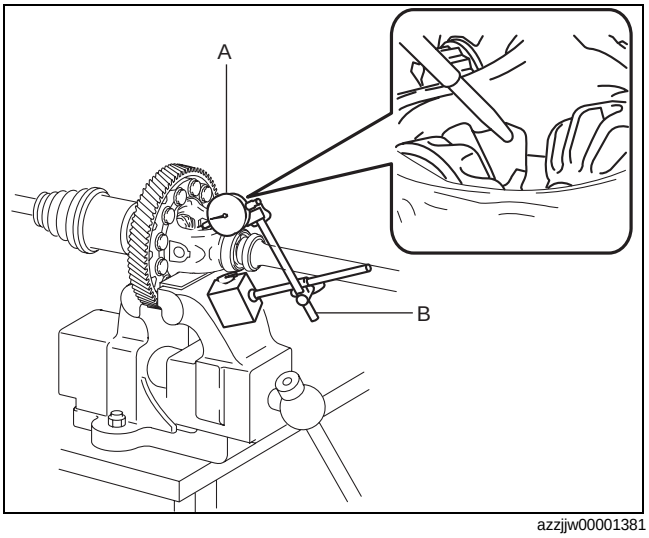
10. Input the measured side gear on the rear side and the pinion gear backlash into the measurement/adjustment value sheet.

Note
- Input into section B in the measurement/adjustment value sheet.

11. Set the dial gauge and magnetic stand to the pinion gear on the opposite side.

A : Dial gauge
B : Magnetic stand

Caution
- **To reduce error during the backlash measurement, set the dial gauge so that it is perpendicular to the teeth of the pinion gear.**



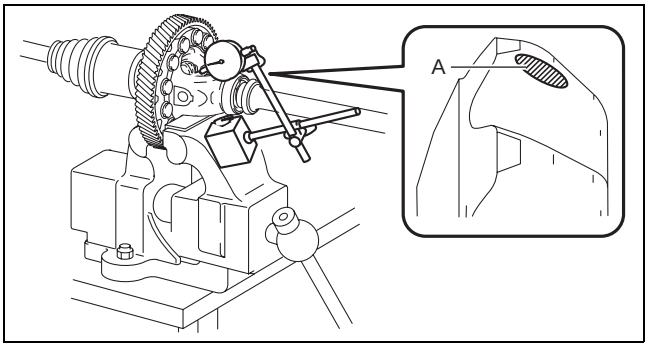
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12. Set the dial gauge end to the pinion gear teeth.

A : Area in which dial gauge end is set

Caution

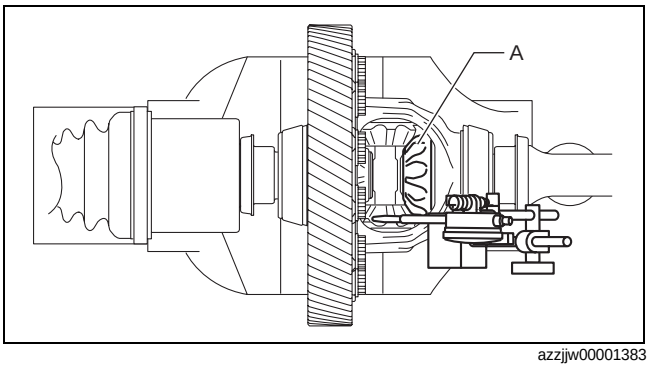
- **To reduce error during the backlash measurement, set the dial gauge end to within the area shown in the figure.**



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13. Secure the side gear on the front side by hand.

A : Secure by hand



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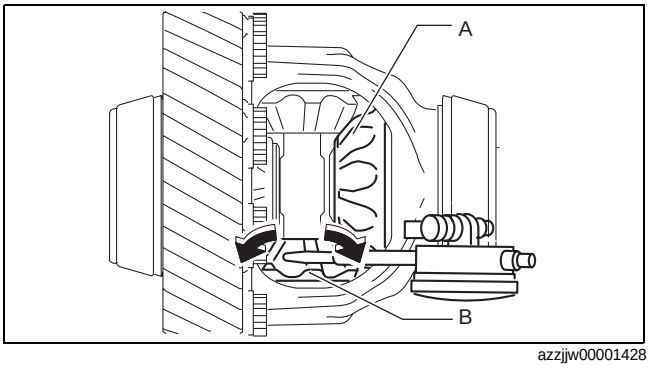
14. Move the pinion gear with the dial gauge that has been set by hand and measure the backlash.

A : Secure by hand

B : Move the pinion gear by hand such that the secured side gear does not move.

Caution

- **Because a difference occurs in the backlash measurement value if the secured side gear moves, move the pinion gear by hand so that the secured side gear does not move.**



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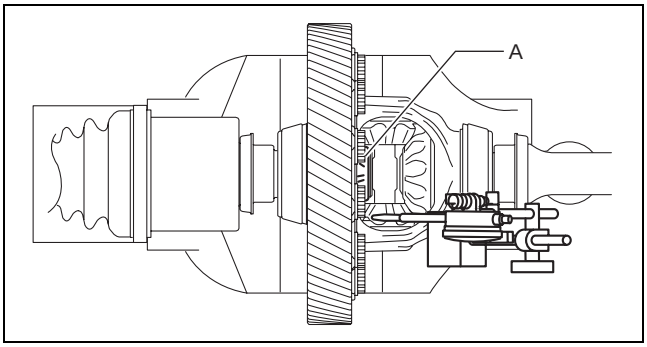
15. Input the measure side gear on the front side and the pinion gear backlash into the measurement/adjustment value sheet.

Note

- Input into section A in the measurement/adjustment value sheet.

16. Secure the side gear on the rear side by hand.

A : Secure by hand



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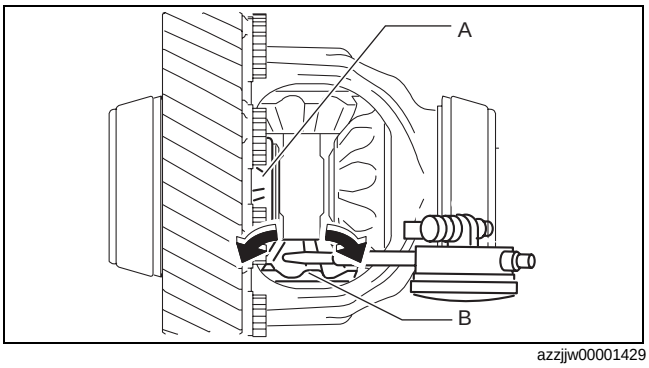
17. Move the pinion gear with the dial gauge that has been set by hand and measure the backlash.

A : Secure by hand

B : Move the pinion gear by hand such that the secured side gear does not move.

Caution

- **Because a difference occurs in the backlash measurement value if the secured side gear moves, move the pinion gear by hand so that the secured side gear does not move.**



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18. Input the measured side gear on the rear side and the pinion gear backlash into the measurement/adjustment value sheet.

Note

- Input into section B in the measurement/adjustment value sheet.

19. Calculate the average value of the measured side gear on the front side and the pinion gear backlash.
20. Input the average value of the calculated side gear on the front side and the pinion gear backlash into the measurement/adjustment value sheet.

Note

- The average value of the calculated side gear on the front side and the pinion gear backlash is the differential backlash on the front side.

21. Calculate the average value of the measured side gear on the rear side and the pinion gear backlash.
22. Input the average value of the calculated side gear on the rear side and the pinion gear backlash into the measurement/adjustment value sheet.

Note

- The average value of the calculated side gear on the rear side and the pinion gear backlash is the differential backlash on the rear side.

23. Verify that the differential backlash on the front side and the differential backlash on the rear side satisfy the specification.

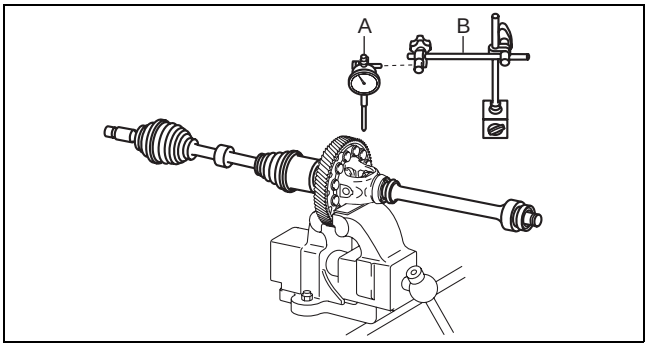
Specification

0.030—0.150 mm {0.0012—0.0059 in}

- If not within the specification, perform the differential backlash adjustment. (See 05-17-309 Differential Backlash Adjustment.)
- If it exceeds the specification even if the thrust washer with a thickness of 0.95 mm {0.037 in}, which is the thickest, is assembled after performing the differential backlash adjustment, disassemble the ring gear and differential and replace the differential gear case with a new one.
  (See 05-17-121 RING GEAR AND DIFFERENTIAL DISASSEMBLY.)
  (See 05-17-266 RING GEAR AND DIFFERENTIAL ASSEMBLY.)

24. Remove the dial gauge and magnetic stand.

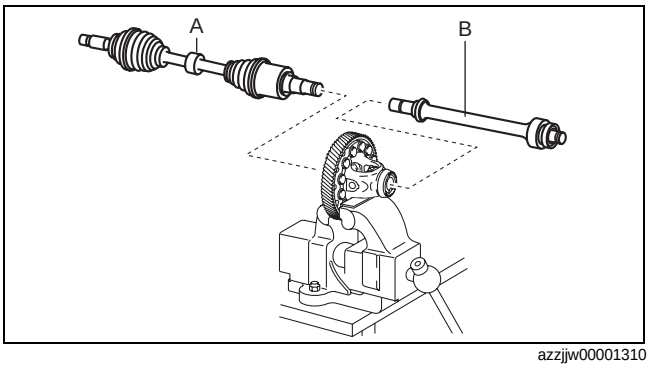
A : Dial gauge
B : Magnetic stand



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25. Remove the drive shaft (LH) and joint shaft.

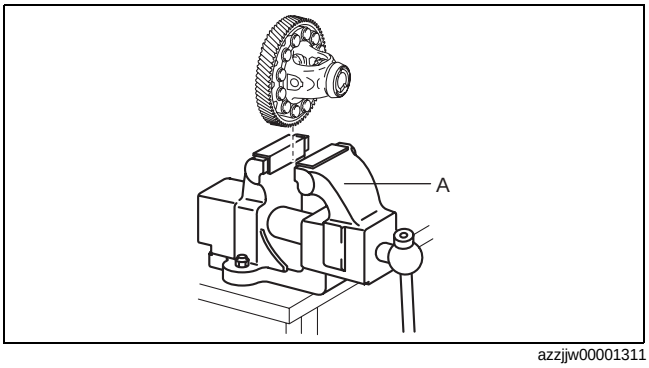
A : Drive shaft (LH)
B : Joint shaft



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26. Remove the ring gear and differential from the vise.

A : Vise

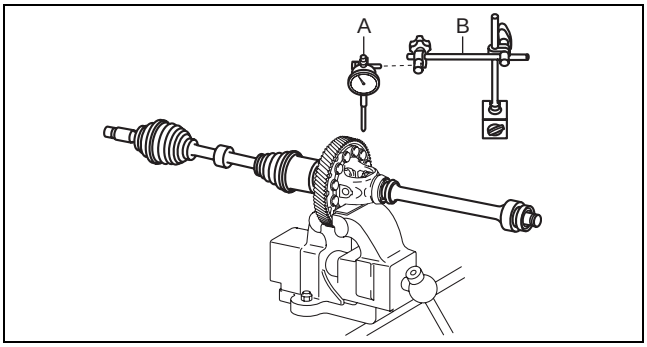


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Differential Backlash Adjustment

1. Remove the dial gauge and magnetic stand.

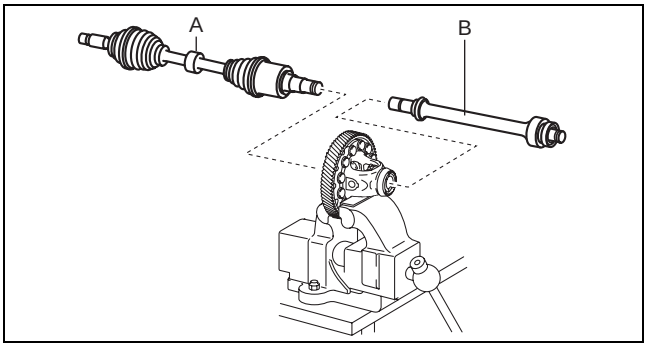
A : Dial gauge
B : Magnetic stand



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2. Remove the drive shaft (LH) and joint shaft.

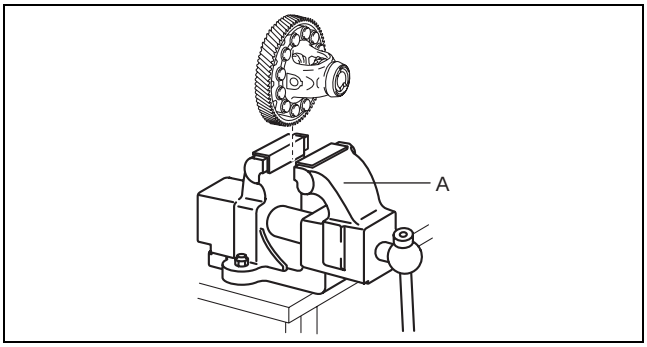
A : Drive shaft (LH)
B : Joint shaft



azzjjw00001310

3. Remove the ring gear and differential from the vise.

A : Vise

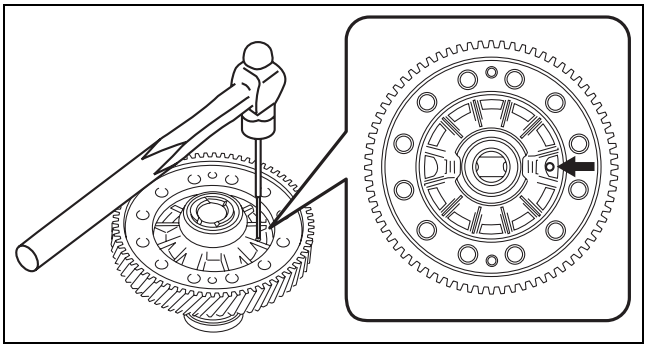


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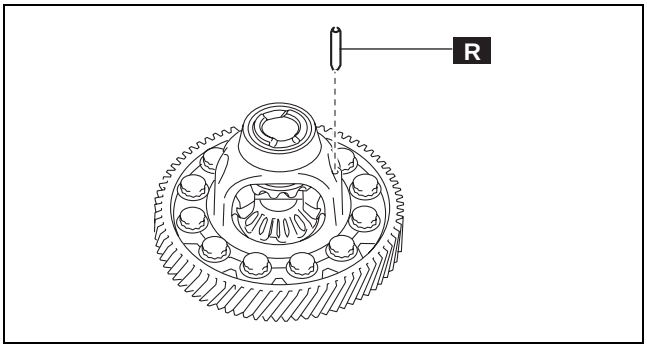
4. Remove the roll pin shown in the figure using a pin punch.

Note

- Use a pin punch with an end outer diameter of 3 mm {0.119 in} or more, and within 4 mm {0.157 in} and an end length of 50 mm {2.0 in} or more.

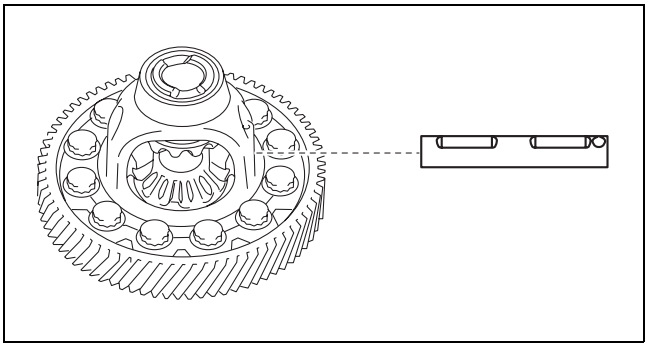


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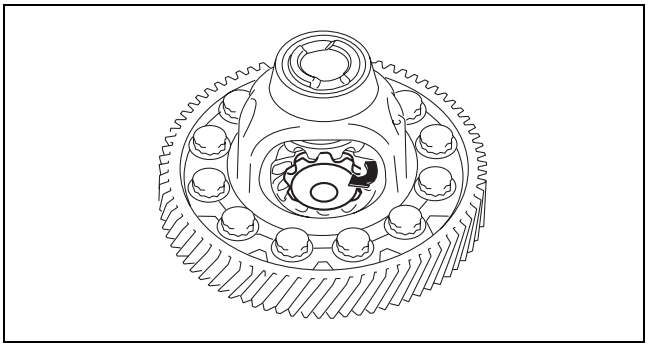
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5. Remove the pinion shaft.



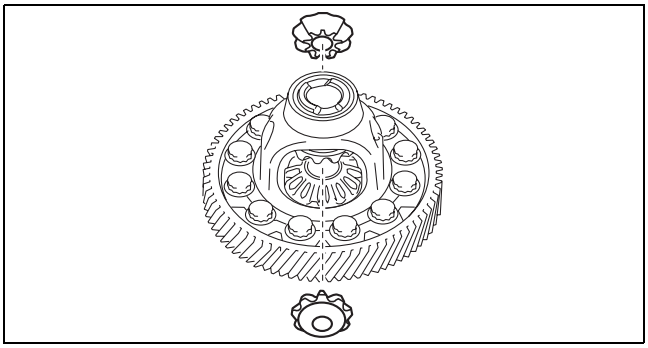
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6. Remove the pinion gears using the following procedure:
   (1) Rotate the pinion gears as shown in the figure.



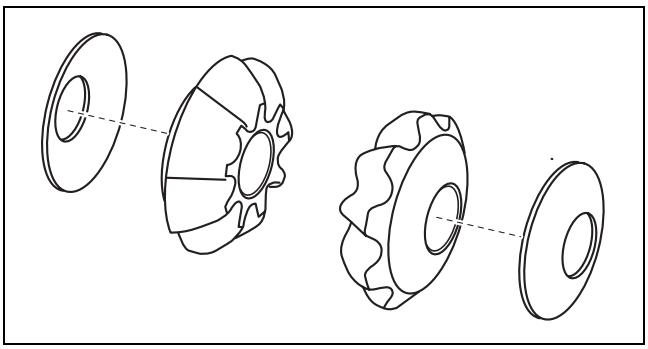
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   (2) Remove the pinion gears.



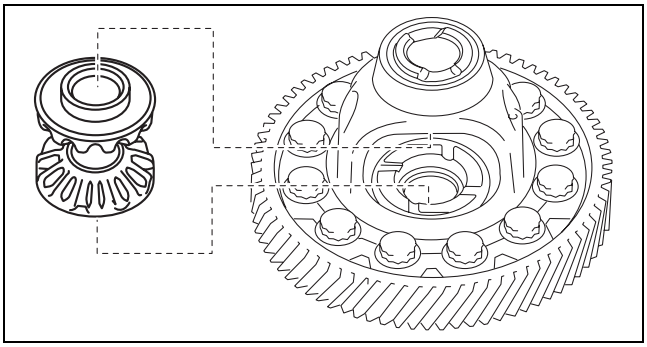
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7. Remove the thrust washers from the pinion gears.



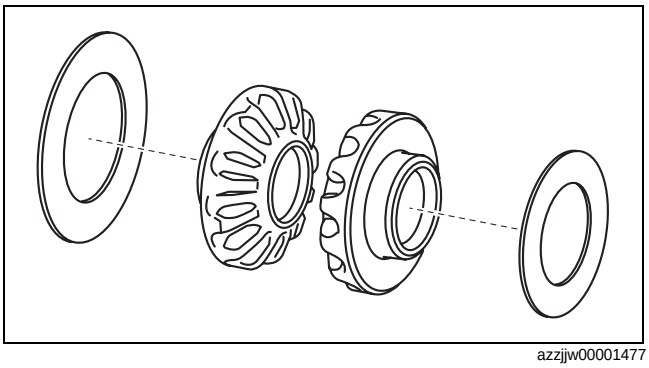
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8. Remove the side gears.



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9. Remove the thrust washers from the side gears.



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10. Measure the thickness of the removed thrust washers from the side gears.

Note
- Recommended measuring instrument: Micrometer

11. Input the measured thrust washer thickness into the measurement/adjustment value input sheet.
12. Perform the following calculation to calculate the differential backlash gap.

Note
- The differential backlash gap is the difference between the differential backlash and the median value of the differential backlash specification.

Differential backlash gap on front side = C - J
C: Differential backlash on front side
J: Median value of differential backlash specification (0.090 mm {0.00354 in})

Note
Example
C: Differential backlash on front side is 0.165 mm {0.00650 in}
Differential backlash gap on front side = 0.165 mm {0.00650 in} - 0.090 mm {0.00354 in} = 0.075 mm {0.00295 in}

Differential backlash gap on rear side = D - J
D: Differential backlash on rear side
J: Median value of differential backlash specification (0.090 mm {0.00354 in})

Note
Example
D: Differential backlash on rear side is 0.155 mm {0.00610 in}
Differential backlash gap on rear side = 0.155 mm {0.00610 in} - 0.090 mm {0.00354 in} = 0.065 mm {0.00256 in}

13. Input the differential backlash gap into the measurement/adjustment value sheet.

14. Perform the following calculation to calculate the gap in the thrust washer thickness.

Note
- The gap in the thrust washer thickness is the difference between the removed thrust washer thickness and the optimum thrust washer thickness.
- If the thrust washer thickness is thickened 0.1 mm {0.00394 in}, the differential backlash decreases approx. 0.08 mm {0.00315 in}.

Thrust washer thickness gap on front side = K × 0.1 mm {0.00394 in} / 0.08 mm {0.00315 in}
K: Differential backlash gap on front side

Note
Example
K: Differential backlash gap on front side is 0.075 mm {0.00295 in}
Thrust washer thickness gap on front side = 0.075 mm {0.00295 in} × 0.1 mm {0.00394 in} / 0.08 mm {0.00315 in} = 0.094 mm {0.00369 in}

Thrust washer thickness gap on rear side = L × 0.1 mm {0.00394 in} / 0.08 mm {0.00315 in}
L: Differential backlash gap on rear side

Note
Example
L: Differential backlash gap on rear side is 0.065 mm {0.00256 in}
Thrust washer thickness gap on rear side = 0.065 mm {0.00256 in} × 0.1 mm {0.00394 in} / 0.08 mm {0.00315 in} = 0.081 mm {0.00320 in}

15. Input the calculated thrust washer thickness gap into the measurement/adjustment value sheet.
16. Perform the following calculation to calculate the optimum thrust washer thickness.
Optimum thrust washer thickness on front side = H + M
H: Thickness of removed thrust washer on front side
M: Thrust washer thickness gap on front side

Note
Example
H: Thickness of removed thrust washer on front side is 0.810 mm {0.03189 in}
M: Thrust washer thickness gap on front side is 0.094 mm {0.00369 in}
Thickness of optimum thrust washer on front side = 0.810 mm {0.03189 in} + 0.094 mm {0.00369 in} = 0.904 mm {0.03559 in}

Thickness of optimum thrust washer on rear side = I + N
I: Thickness of removed thrust washer on rear side
N: Thrust washer thickness gap on rear side

Note
Example
I: Thickness of removed thrust washer on rear side is 0.795 mm {0.0313 in}
N: Thrust washer thickness gap on rear side is 0.081 mm {0.00320 in}
Thickness of optimum thrust washer on rear side = 0.795 mm {0.0313 in} + 0.081 mm {0.00320 in} = 0.876 mm {0.03449 in}

17. Input the calculated optimum thrust washer thickness into the measurement/adjustment value sheet.

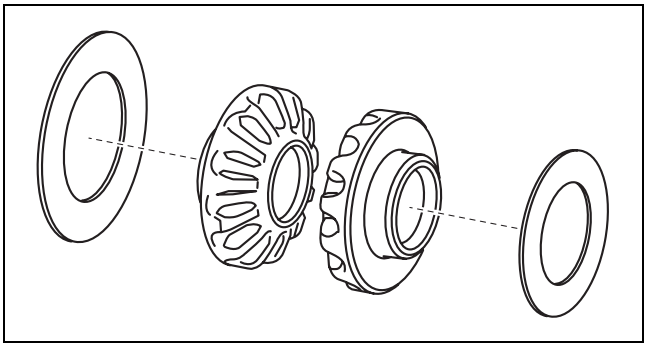
18. Select the nearest thrust washer for the calculated optimum thrust washer thickness from the following table:

Caution

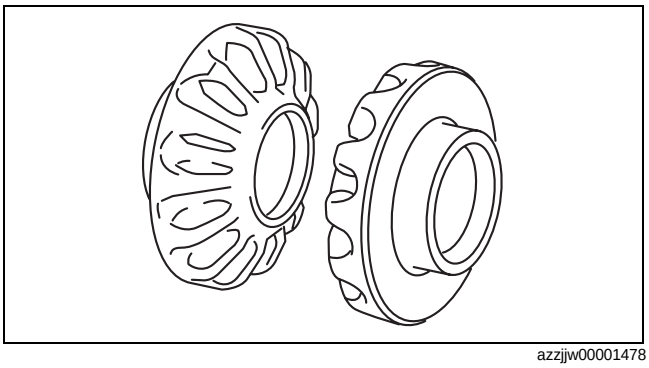
- **Select the same thickness of the thrust washers on the front and rear sides**
  If the thrust washers of the same thickness are assembled on the front and rear sides, measure the differential backlash again, and if the measurement value does not satisfy the specification, thrust washers of varied thickness on the front and rear sides is alright.

Selected thrust washer thickness
0.95 mm {0.037 in}
0.90 mm {0.035 in}
0.85 mm {0.033 in}
0.80 mm {0.031 in}
0.75 mm {0.030 in}

19. Assemble the selected thrust washers to the side gears.

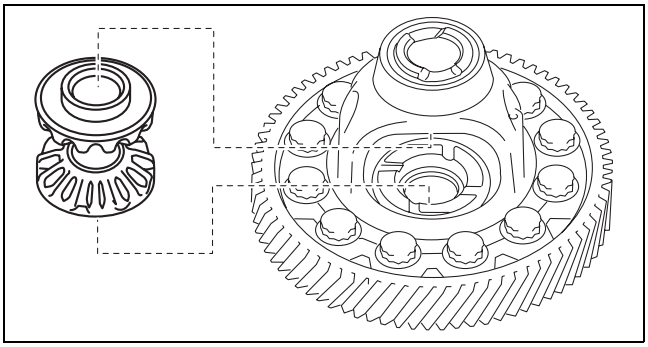


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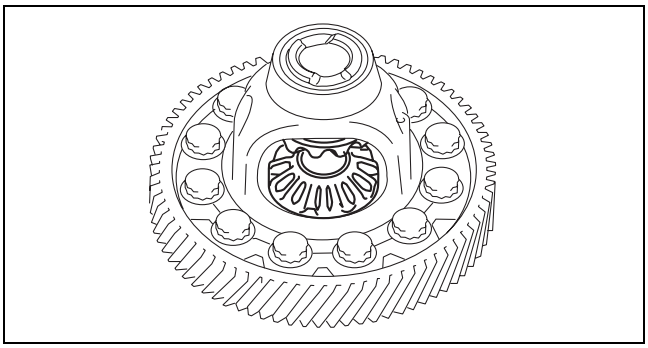


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20. Assemble the side gears which have the thrust washers assembled to them.

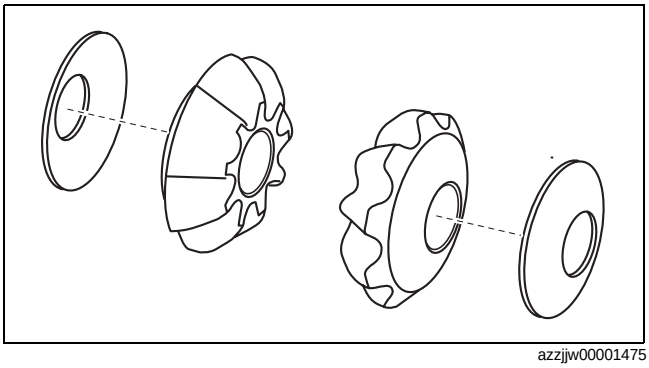


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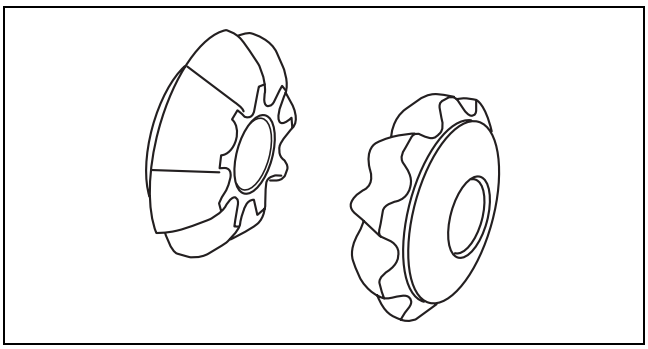


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21. Assemble the thrust washers to the pinion gears.

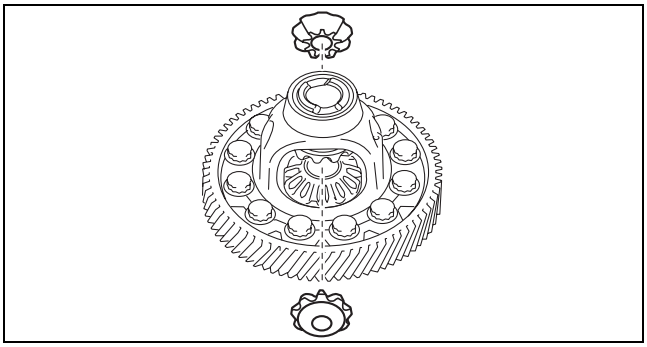


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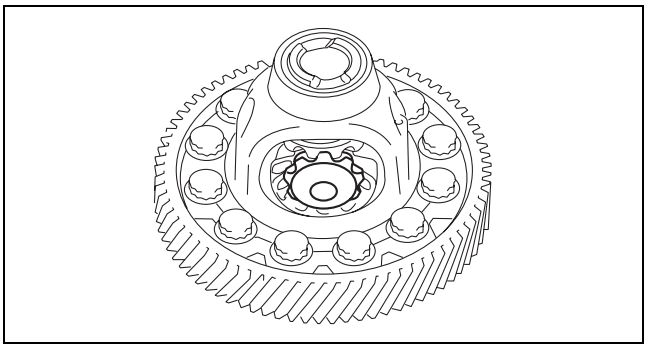


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22. Assemble the pinion gears which have the thrust washers assembled to them using the following procedure:
    (1) Assemble the pinion gears which have the thrust washers assembled to them.



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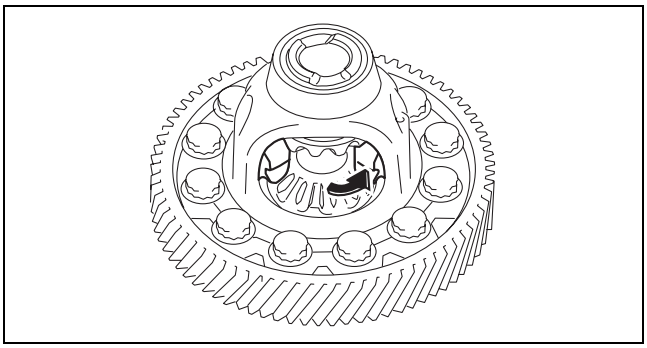


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    (2) Rotate the pinion gears so that the pinion shaft holes of the differential gear case and the pinion gears are aligned as shown in the figure.

Note

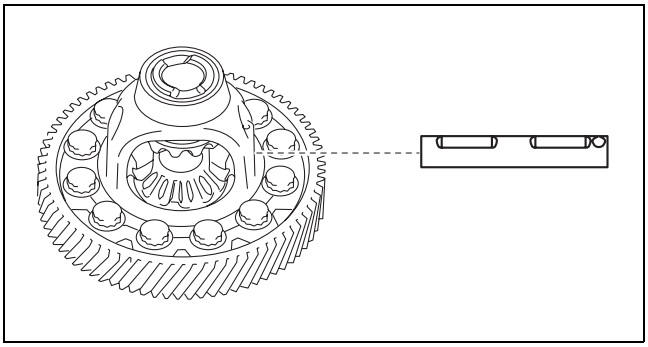
- If the pinion shaft holes of the differential gear case and the pinion gears are not aligned, remove the pinion gears, change the side gears combination, and reassemble.



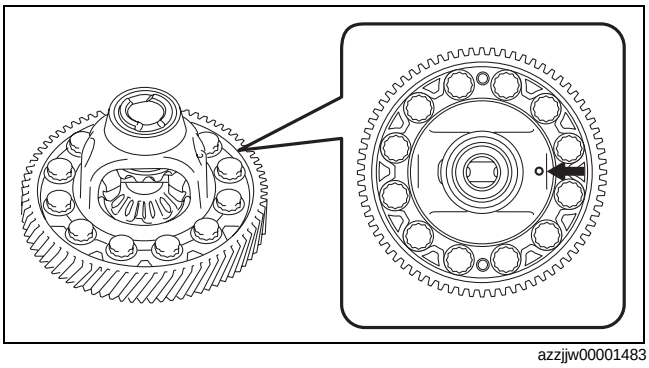
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23. Assemble the pinion shaft.

Caution
- **Assemble the pinion shaft so that the roll pin holes of the differential gear case and the pinion shaft are aligned.**



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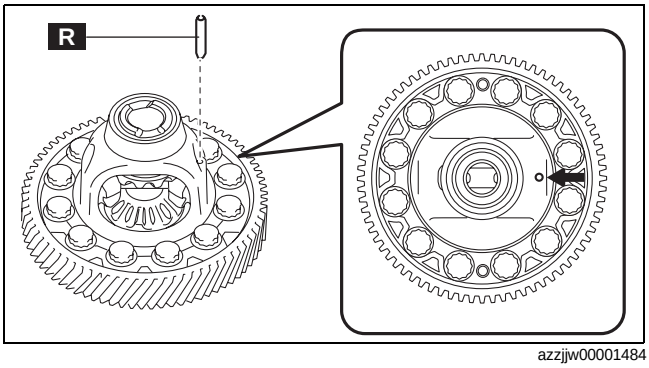


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24. Assemble a new roll pin to the position shown in the figure using a pin punch.

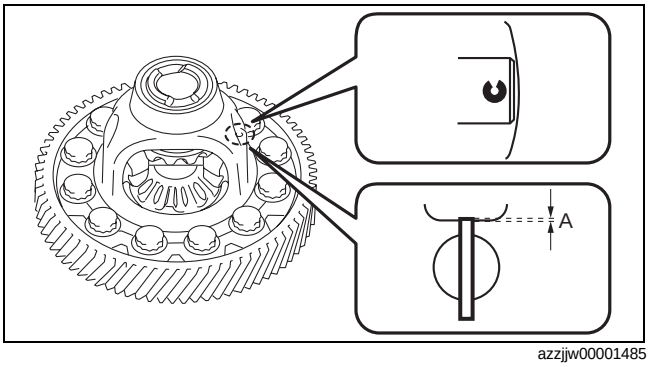
Caution
- **Assemble so that the end gap of the roll pin is positioned in the direction shown in the figure.**

Note
- Use a pin punch with an end outer diameter of 5 mm {0.197 in} or more, and within 8 mm {0.314 in}.



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A : –0.5—0.5 mm {–0.01—0.01 in}



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25. Perform the differential backlash measurement. (See 05-17-303 Differential Backlash Measurement.)

HIGH CLUTCH CLEARANCE MEASUREMENT/ADJUSTMENT

id051700664600

Preparation Before Servicing

1. Print out the measurement/adjustment value input sheet. (See 05-17-295 MEASUREMENT/ADJUSTMENT VALUE INPUT SHEET.)

Note

- When performing the measurement/adjustment, input the measured and calculated values into the measurement/adjustment value input sheet.
- When performing the other measurements/adjustments, if the measurement/adjustment value input sheet has been printed out, use the printed sheet.

High Clutch Clearance Measurement

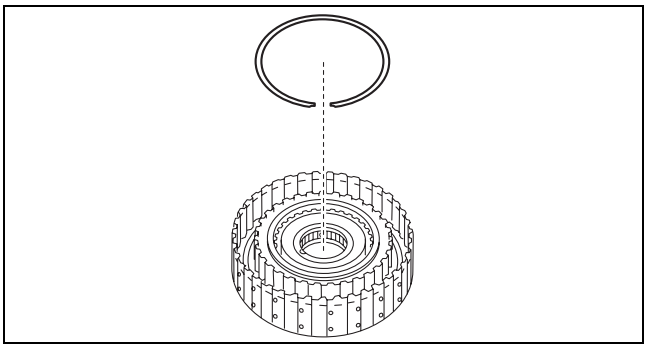
1. Assemble the snap ring.

Caution

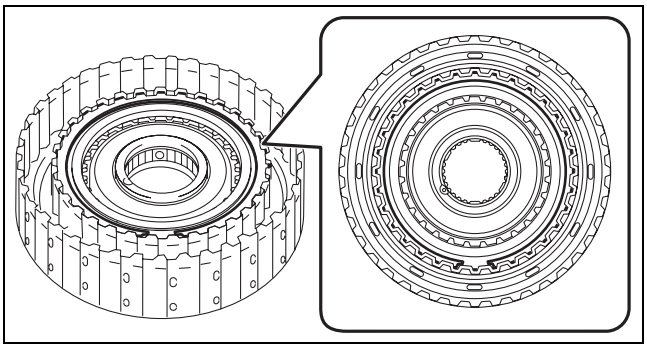
- **After assembling the snap ring, verify that the snap ring is securely inserted into the bottom of the snap ring groove.**

Note

- Snap ring size: Outer diameter approx. 127.4 mm {5.016 in}



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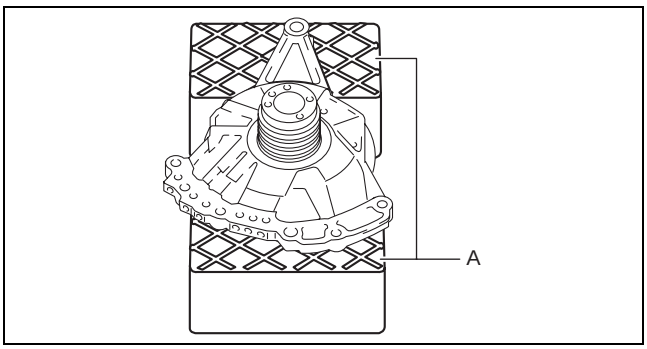
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2. Set the oil pump on the workbench as shown in the figure.

A : Rubber plate

Caution

- **To reduce error during the high clutch clearance measurement, use the rubber plates to adjust the alignment surface of the oil pump with the transaxle case so that it is level.**

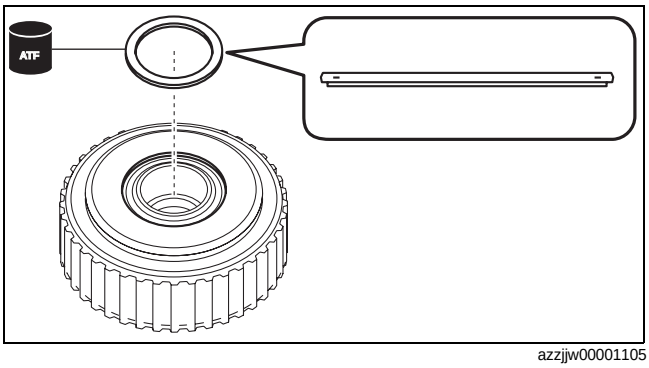


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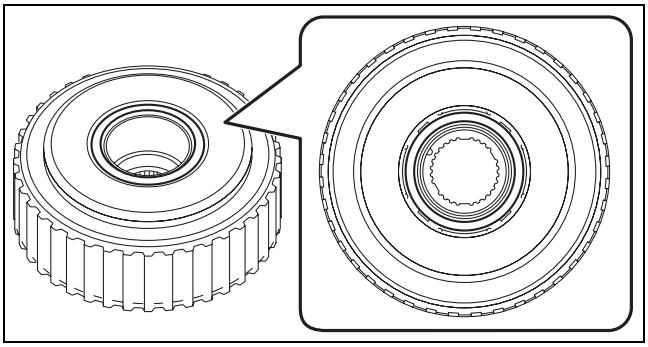
3. Assemble the thrust needle bearing to the clutch component using the following procedure:

Note
- Thrust needle bearing size: Outer diameter approx. 72.7 mm {2.86 in}

(1) To prevent the thrust needle bearing from dropping out, apply ATF (ATF FZ) to the thrust needle bearing.
(2) Assemble the thrust needle bearing.

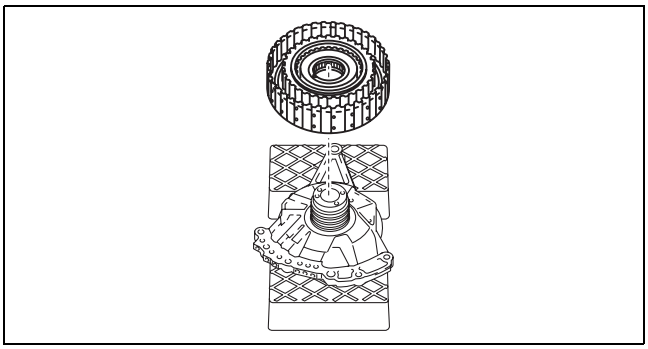


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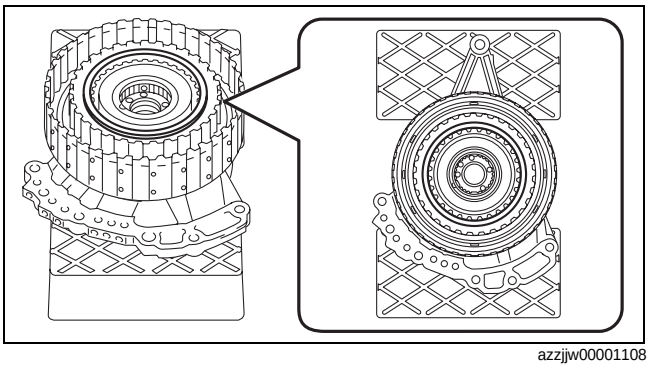


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4. Assemble the parts assembled together in Step 3 to the oil pump.

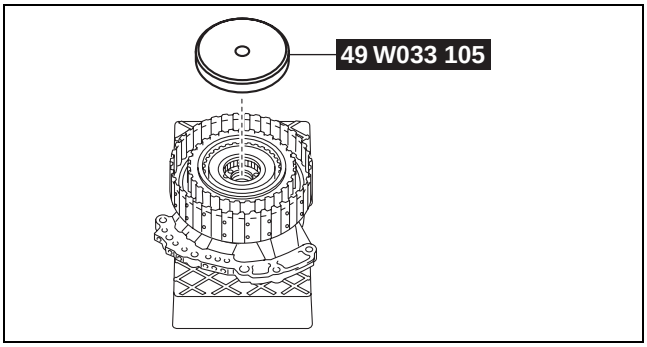


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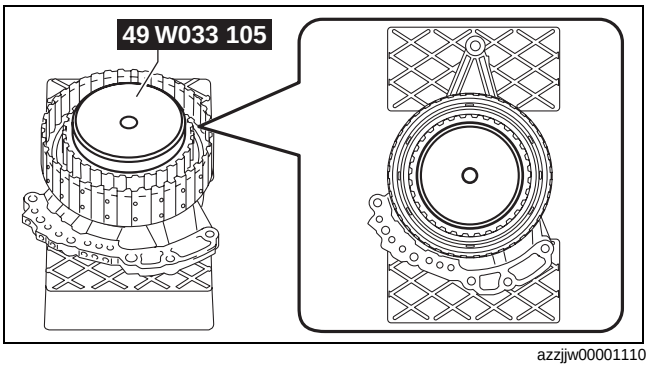


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5. Install the SST.



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6. Place a 98—196 N {10.0—19.9 kgf, 23.0—44.0 lbf} weight on the SST.

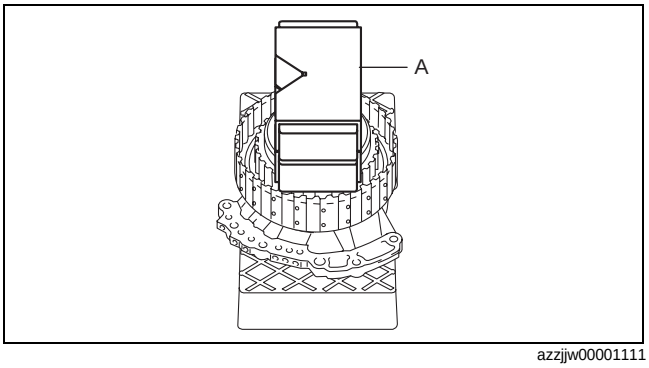
A : Weight (V-block)

Caution

- **To reduce error during the high clutch clearance measurement, place the weight near the center of the SST.**

Note

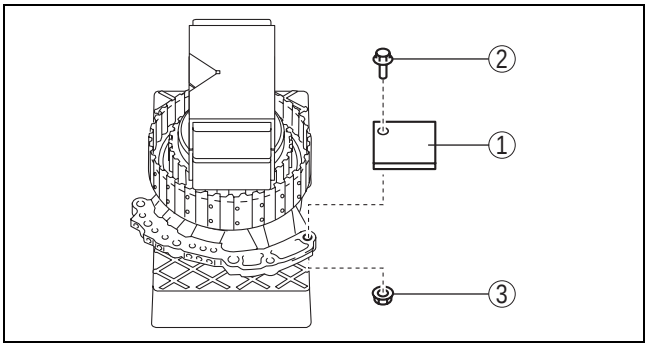
- Use a V-block as a weight.



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7. Set the measuring instrument to the oil pump using the following procedure:
   (1) Install an appropriate steel plate for securing the magnetic stand used in the procedure shown in the figure..

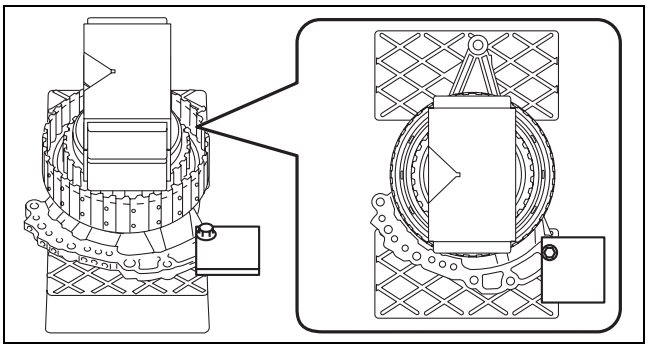
1	Steel plate (for securing magnetic stand)
2	Bolt (M8)
3	Nut (M8)



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Caution
- **If the bolt and nut are tightened with excessive force when installing the steel plate, the alignment surface of the oil pump with the transaxle case could be damaged. Tighten the bolt and nut so that the steel plate does not move during the high clutch clearance measurement.**

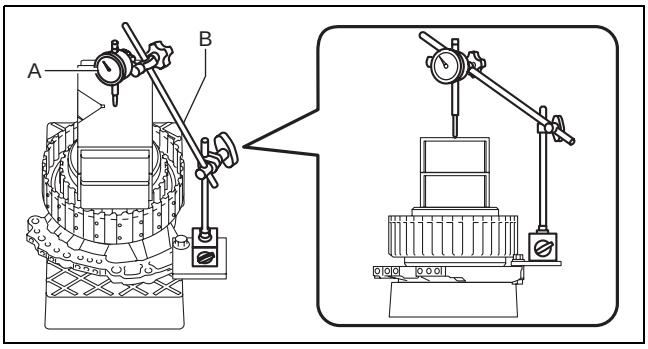
Note
- When installing the steel plate to the oil pump, use an M8 bolt and nut.


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Steel plate installation bolt tightening torque
15 N·m {1.5 kgf·m, 11 ft·lbf} or less (tighten so that steel plate does not move during high clutch clearance measurement)

   (2) Set the dial gauge and magnetic stand as shown in the figure.

A : Dial gauge
B : Magnetic stand

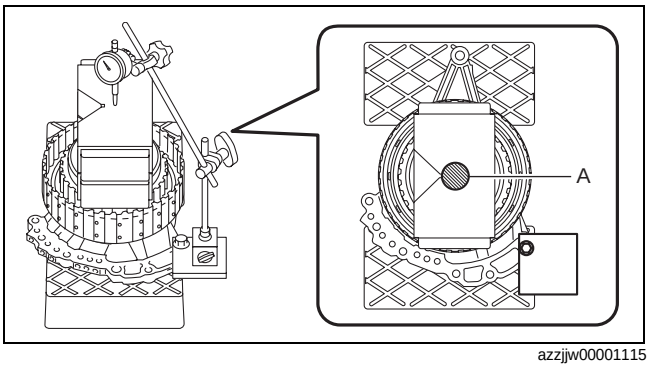


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Caution
- **To reduce error during the high clutch clearance measurement, set the dial gauge so that it is perpendicular to the alignment surface of the oil pump with the transaxle case.**

   (3) Set the dial gauge end near the center of the weight.

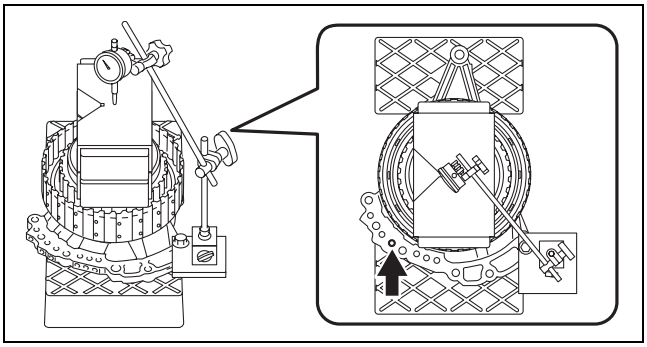
A : Area in which dial gauge end is set



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Caution
- **To reduce error during the high clutch clearance measurement, set the dial gauge end to within the area shown in the figure.**

8. Measure the high clutch clearance using the following procedure:
   (1) Blow compressed air into the oil passage shown in the figure and verify the operation condition of the high clutch piston (approx. 3 times).

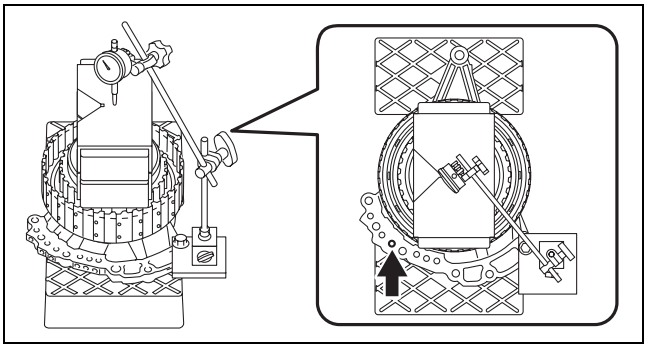

azzjjw00001116

Warning
- **Always wear protective eye wear when using the air compressor. Otherwise, ATF or dirt particles blown off by the air compressor could get into the eyes.**

Caution
- **To prevent damage to parts, always use an air compressor which is adjusted to the indicated pressure.**

Compressed air pressure
0.39—0.44 MPa {4.0—4.4 kgf/cm^2, 57—63 psi}

   (2) Blow compressed air into the oil passage shown in the figure and operate the high clutch piston to read the value when the dial gauge is stabilized.


azzjjw00001116

Warning
- **Always wear protective eye wear when using the air compressor. Otherwise, ATF or dirt particles blown off by the air compressor could get into the eyes.**

Caution
- **To prevent damage to parts, always use an air compressor which is adjusted to the indicated pressure.**

Compressed air pressure
0.39—0.44 MPa {4.0—4.4 kgf/cm^2, 57—63 psi}

   (3) Input the dial gauge value, which was read while the high clutch piston was operating, into the measurement/adjustment value input sheet.
   (4) Release the compressed air and read the dial gauge value without the high clutch piston operating.
   (5) Input the dial gauge value, which was read without the high clutch piston operating, into the measurement/adjustment value input sheet.
   (6) Perform the following calculation to calculate the high clutch clearance.
   High clutch clearance = A - B
   A: Dial gauge value with high clutch piston operated
   B: Dial gauge value without high clutch piston operated

Note
Example
A: Dial gauge value with high clutch piston operating is 1.605 mm {0.06319 in}
B: Dial gauge value without high clutch piston operating is 0.055 mm {0.00217 in}
High clutch clearance = 1.605 mm {0.06319 in} - 0.055 mm {0.00217 in} = 1.550 mm {0.06102 in}

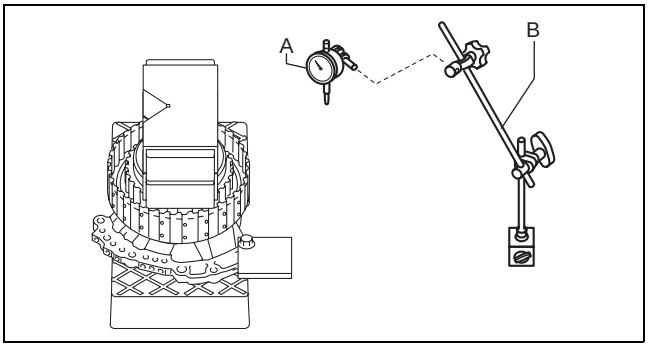
   (7) Input the calculated high clutch clearance into the measurement/adjustment value input sheet.
   (8) Verify that the high clutch clearance satisfies the specification.

Specification
1.300—1.500 mm {0.05119—0.05905 in}

- If not within the specification, adjust the high clutch clearance. (See 05-17-324 High Clutch Clearance Adjustment.)

9. Remove the dial gauge and magnetic stand.

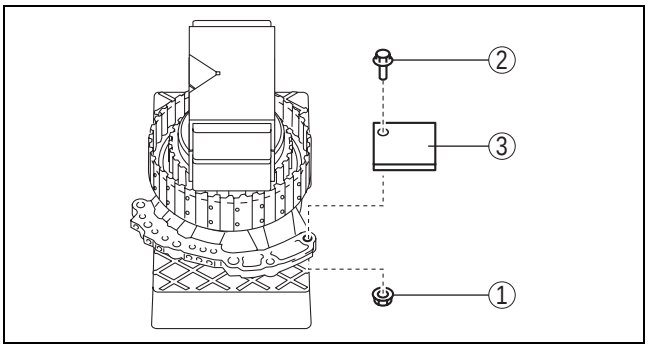
A : Dial gauge
B : Magnetic stand



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10. Remove the steel plate for securing the magnetic stand using the procedure shown in the figure.

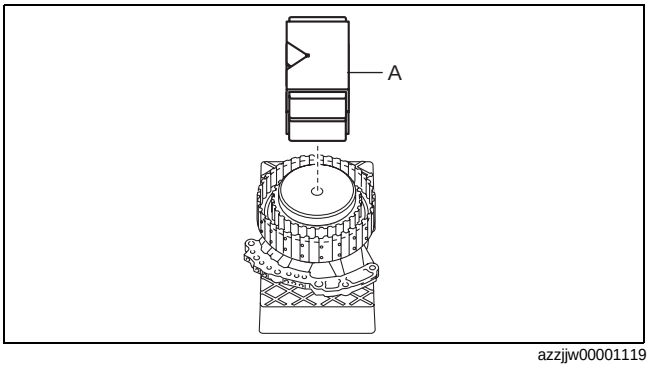
1	Nut (M8)
2	Bolt (M8)
3	Steel plate (for securing magnetic stand)



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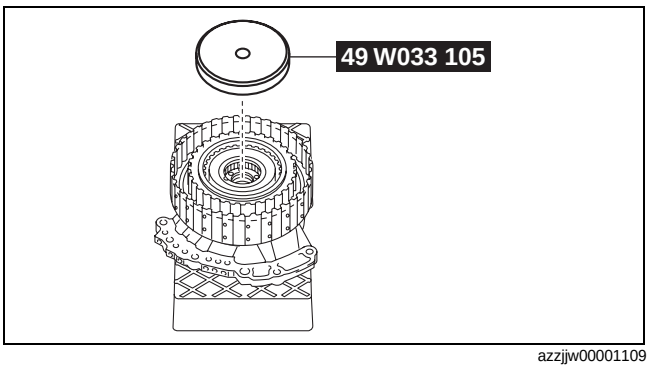
11. Remove the weight on the SST.

A : Weight (V-block)



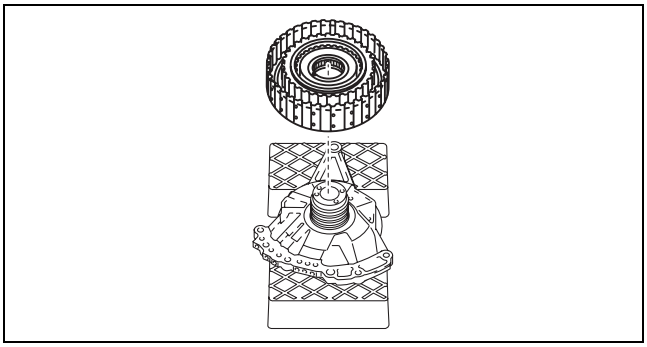
azzjjw00001119

12. Remove the SST.



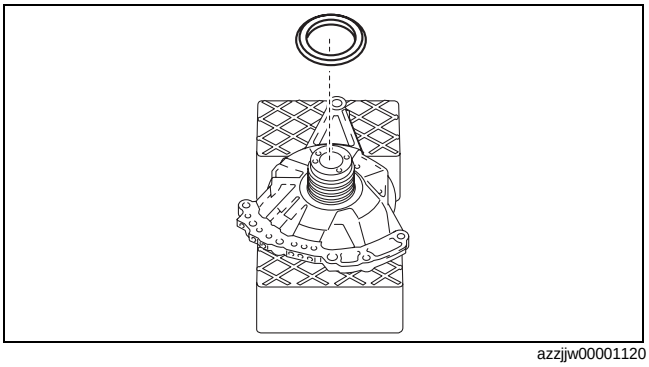
azzjjw00001109

13. Remove the clutch component.



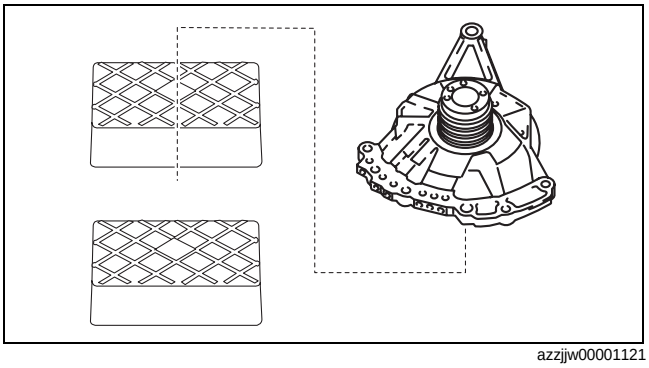
azzjjw00001107

14. Remove the thrust needle bearing.



azzjjw00001120

15. Take the oil pump off the rubber plates.

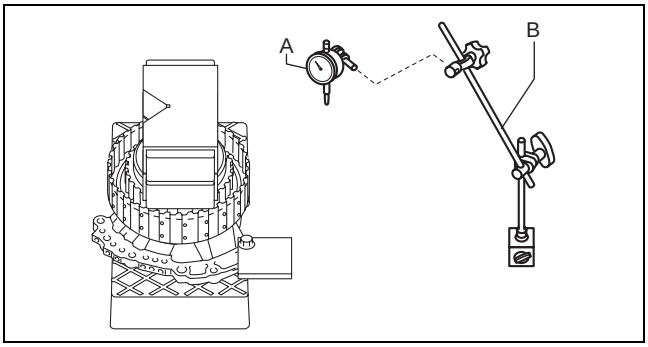


azzjjw00001121

High Clutch Clearance Adjustment

1. Remove the dial gauge and magnetic stand.

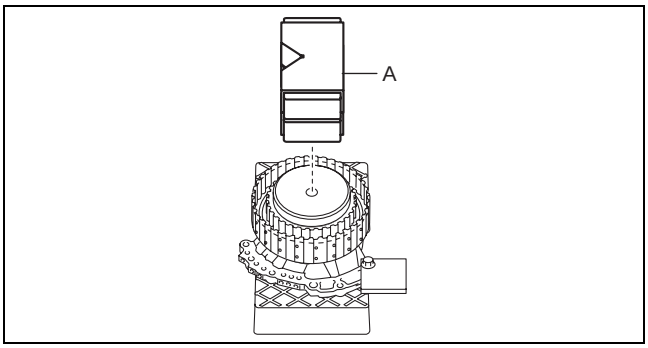
A : Dial gauge
B : Magnetic stand



azzjjw00001117

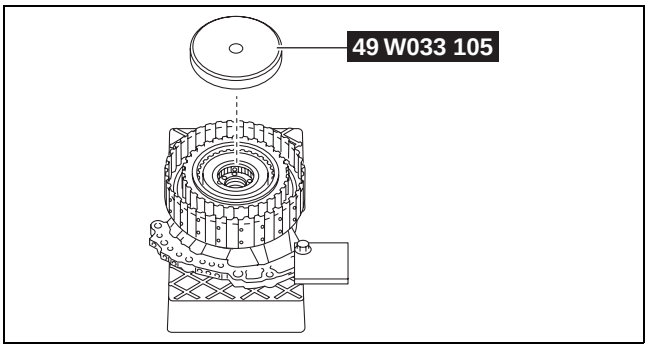
2. Remove the weight on the SST.

A : Weight (V-block)



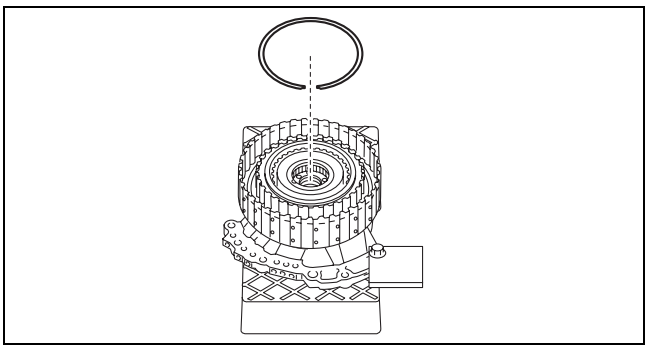
azzjjw00001122

3. Remove the SST.



azzjjw00001123

4. Remove the snap ring.



azzjjw00001124

5. Measure the thickness of the removed snap ring.

Note
- Recommended measuring instrument: Micrometer

6. Input the measured snap ring thickness into the measurement/adjustment value input sheet.

7. Select the appropriate snap ring from the following table:

Range*	Selected snap ring thickness
Exceeds 3.450 mm {0.1358 in}, 3.550 mm {0.1398 in} or less	2.1 mm {0.083 in}
Exceeds 3.350 mm {0.1319 in}, 3.450 mm {0.1358 in} or less	2.0 mm {0.079 in}
Exceeds 3.250 mm {0.1280 in}, 3.350 mm {0.1319 in} or less	1.9 mm {0.075 in}
Exceeds 3.150 mm {0.1240 in}, 3.250 mm {0.1280 in} or less	1.8 mm {0.071 in}
Exceeds 3.050 mm {0.1201 in}, 3.150 mm {0.1240 in} or less	1.7 mm {0.067 in}
Exceeds 2.950 mm {0.1161 in}, 3.050 mm {0.1201 in} or less	1.6 mm {0.063 in}
Exceeds 2.850 mm {0.1122 in}, 2.950 mm {0.1161 in} or less	1.5 mm {0.059 in}
Exceeds 2.750 mm {0.1083 in}, 2.850 mm {0.1122 in} or less	1.4 mm {0.055 in}
Exceeds 2.650 mm {0.1043 in}, 2.750 mm {0.1083 in} or less	1.3 mm {0.051 in}
Exceeds 2.550 mm {0.1004 in}, 2.650 mm {0.1043 in} or less	1.2 mm {0.047 in}

* : The range is the sum of the high clutch clearance and the thickness value of the removed snap ring.

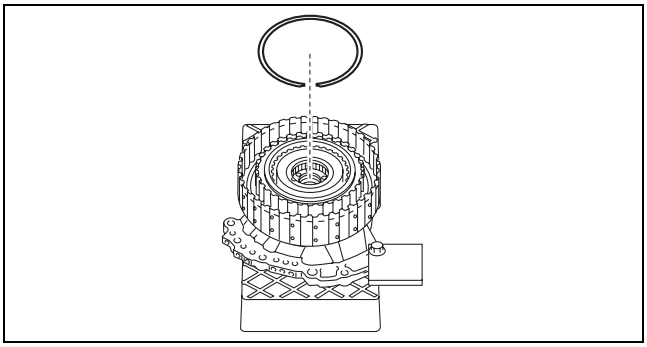
Range = C + F
C: High clutch clearance
F: Thickness of removed snap ring

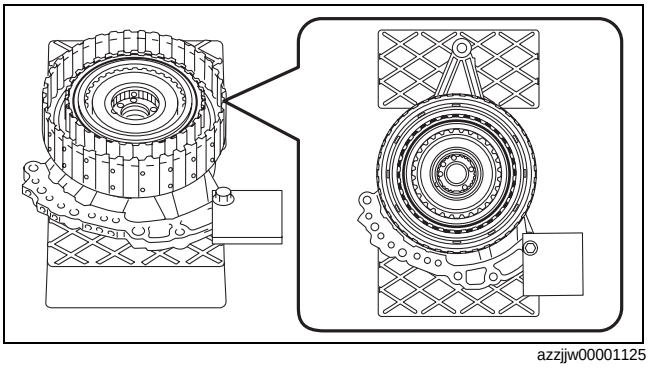
Note
Example
C: High clutch clearance is 1.550 mm {0.06102 in}
F: Thickness of removed snap ring is 1.615 mm {0.06358 in}
Range = 1.550 mm {0.06102 in} + 1.615 mm {0.06358 in} = 3.165 mm {0.1246 in}, the selected snap ring has a thickness of 1.8 mm {0.071 in}.

8. Assemble the selected snap ring.

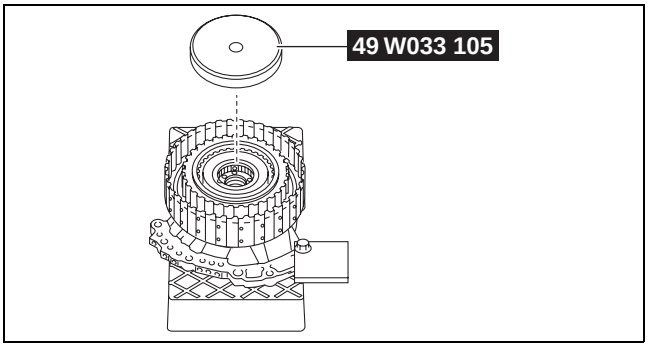
Caution
- **After assembling the snap ring, verify that the snap ring is securely inserted into the bottom of the snap ring groove.**

Note
- Snap ring size: Outer diameter approx. 127.4 mm {5.016 in}

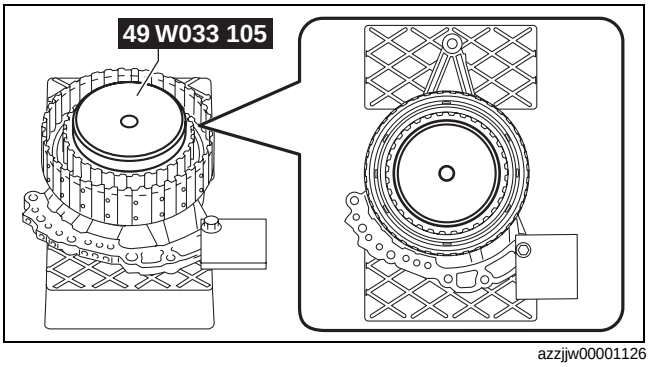

azzjjw00001124


azzjjw00001125

9. Install the SST.



azzjjw00001123



azzjjw00001126

10. Place a 98—196 N {10.0—19.9 kgf, 23.0—44.0 lbf} weight on the SST.

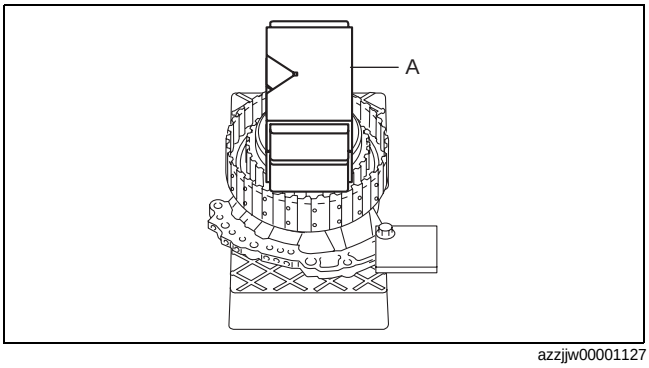
A : Weight (V-block)

Caution

- **To reduce error during the high clutch clearance measurement, place the weight near the center of the SST.**

Note

- Use a V-block as a weight.



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11. Perform the high clutch clearance measurement from Step 7 (2). (See 05-17-317 High Clutch Clearance Measurement.)

LOW CLUTCH CLEARANCE MEASUREMENT/ADJUSTMENT

id051700664500

Preparation Before Servicing

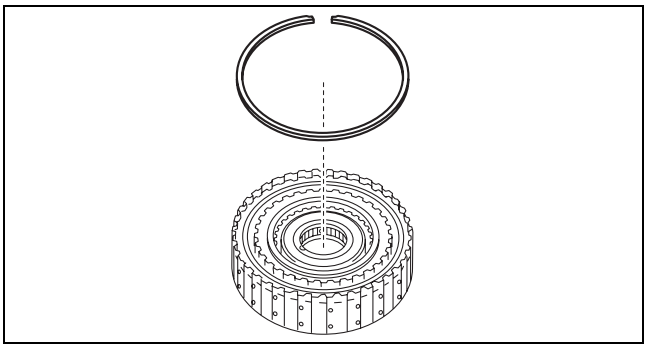
1. Print out the measurement/adjustment value input sheet. (See 05-17-295 MEASUREMENT/ADJUSTMENT VALUE INPUT SHEET.)

Note

- When performing the measurement/adjustment, input the measured and calculated values into the measurement/adjustment value input sheet.
- When performing the other measurements/adjustments, if the measurement/adjustment value input sheet has been printed out, use the printed sheet.

Low Clutch Clearance Measurement

1. Assemble the snap ring to the position shown in the figure.



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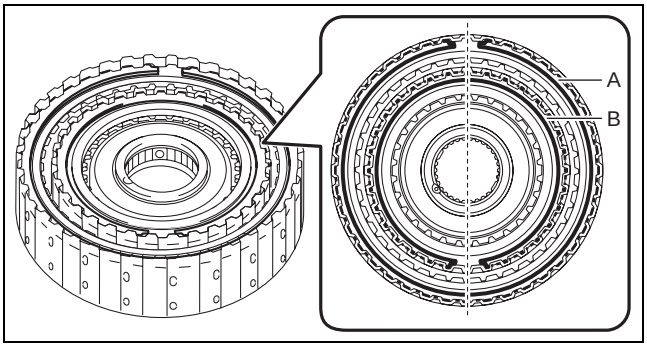
Caution

- **Assemble so that the end gap of the snap ring is positioned diagonally opposed to the end gap of the snap ring for the high clutch.**
- **After assembling the snap ring, verify that the snap ring is securely inserted into the bottom of the snap ring groove.**

Note

- Snap ring size: Outer diameter approx. 169.3 mm {6.665 in}

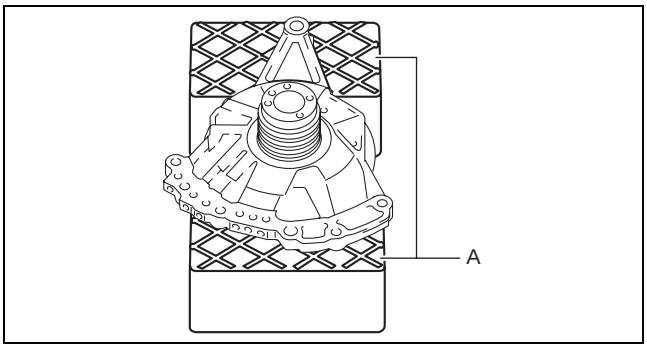
A : Snap ring (low clutch)
B : Snap ring (high clutch)



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2. Set the oil pump on the workbench as shown in the figure.

A : Rubber plate



azzjjw00001077

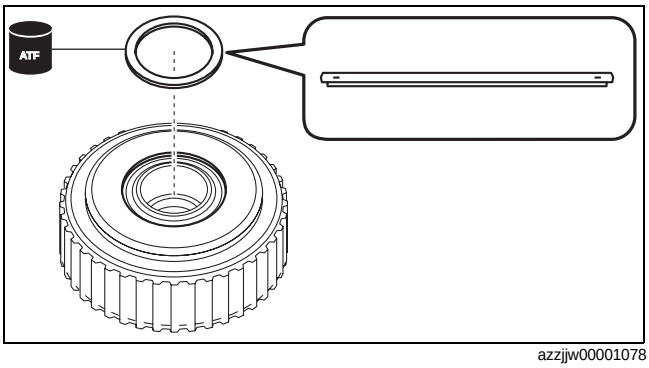
Caution

- **To reduce error during the low clutch clearance measurement, use the rubber plates to adjust the alignment surface of the oil pump with the transaxle case so that it is level.**

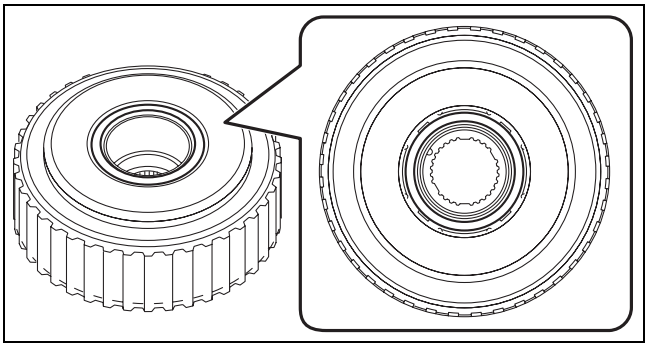
3. Assemble the thrust needle bearing to the clutch component using the following procedure:

Note
- Thrust needle bearing size: Outer diameter approx. 72.7 mm {2.86 in}

(1) To prevent the thrust needle bearing from dropping out, apply ATF (ATF FZ) to the thrust needle bearing.
(2) Assemble the thrust needle bearing.

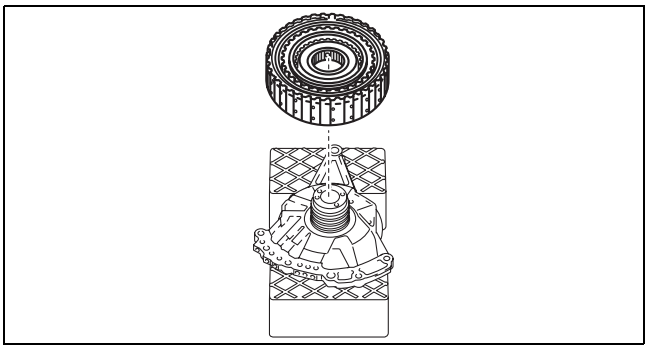


azzjjw00001078

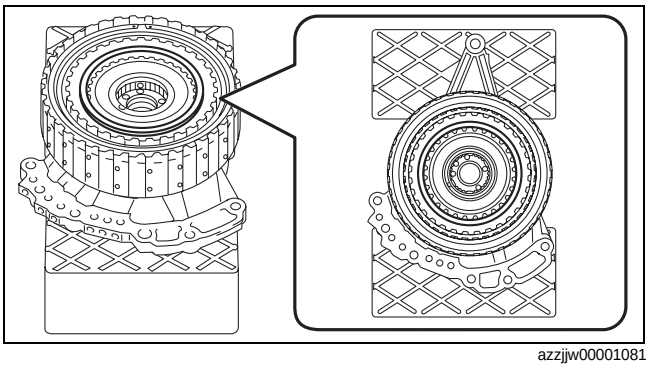


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4. Assemble the parts assembled together in Step 3 to the oil pump.

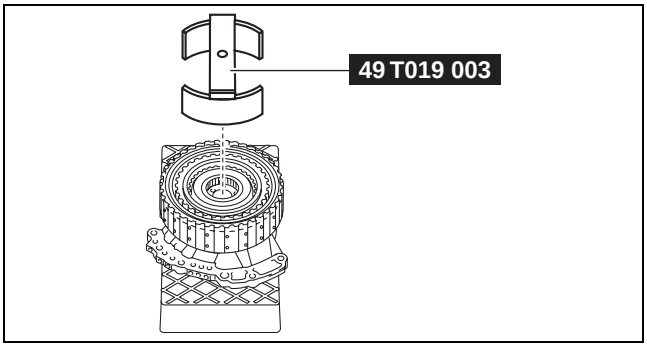


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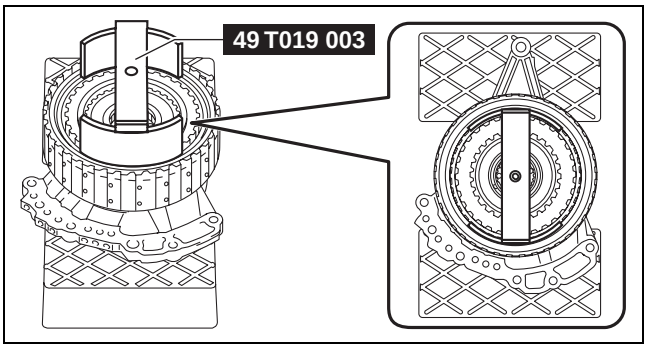


azzjjw00001081

5. Install the SST.



azzjjw00001082



azzjjw00001083

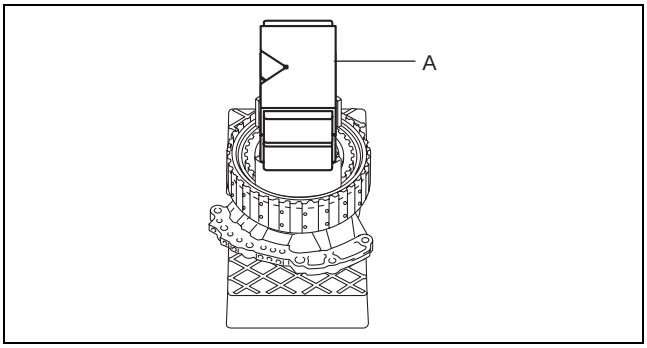
6. Place a 98—196 N {10.0—19.9 kgf, 23.0—44.0 lbf} weight on the SST using the following procedure:

Note
- Use a V-block as a weight.

(1) Measure the weight of the weight placed on the SST.
(2) Input the measured weight into the measurement/adjustment value input sheet.
(3) Place the measured weight on the SST.

A : Weight (V-block)

Caution
- **To reduce error during the low clutch clearance measurement, place the weight near the center of the SST.**



azzjjw00001084

7. Perform the following calculation to calculate the correction value for the low clutch clearance.

   Note
   - Because a wave spring is included in the low clutch, a correction value is required for the low clutch clearance according to the weight of the weight used during the low clutch clearance measurement.

   Correction value of low clutch clearance (weight of unit is N) = (A - 90 N) × 0.00157 mm {0.0000618 in}
   A: Weight of weight

   Note
   Example
   A: Weight of weight is 150 N
   Correction value of low clutch clearance = (150 N - 90 N) × 0.00157 mm {0.0000618 in} = 0.0942 mm {0.00371 in}

   Correction value of low clutch clearance (weight of unit is kgf) = (A - 9.18 kgf) × 0.01540 mm {0.0006063 in}
   A: Weight of weight

   Note
   Example
   A: Weight of weight is 15.30 kgf
   Correction value of low clutch clearance = (15.30 kgf - 9.18 kgf) × 0.01540 mm {0.0006063 in} = 0.0942 mm {0.00371 in}

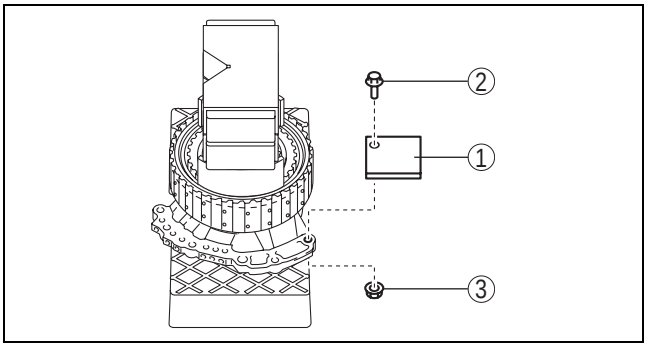
   Correction value of low clutch clearance (weight of unit is lbf) = (A - 20.23 lbf) × 0.00698 mm {0.0002748 in}
   A: Weight of weight

   Note
   Example
   A: Weight of weight is 33.72 lbf
   Correction value of low clutch clearance = (33.72 lbf - 20.23 lbf) × 0.00698 mm {0.0002748 in} = 0.0942 mm {0.00371 in}

8. Input the calculated correction value of the low clutch clearance into the measurement/adjustment value input sheet.

9. Set the measuring instrument to the oil pump using the following procedure:
   (1) Install an appropriate steel plate for securing the magnetic stand used in the procedure shown in the figure..

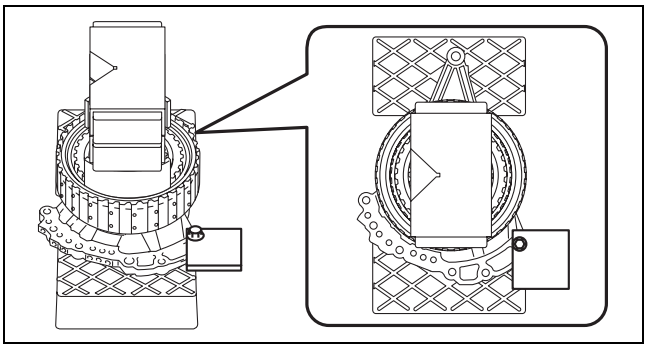
1	Steel plate (for securing magnetic stand)
2	Bolt (M8)
3	Nut (M8)



azzjjw00001085

Caution
- **If the bolt and nut are tightened with excessive force when installing the steel plate, the alignment surface of the oil pump with the transaxle case could be damaged. Tighten the bolt and nut so that the steel plate does not move during low clutch clearance measurement.**

Note
- When installing the steel plate to the oil pump, use an M8 bolt and nut.

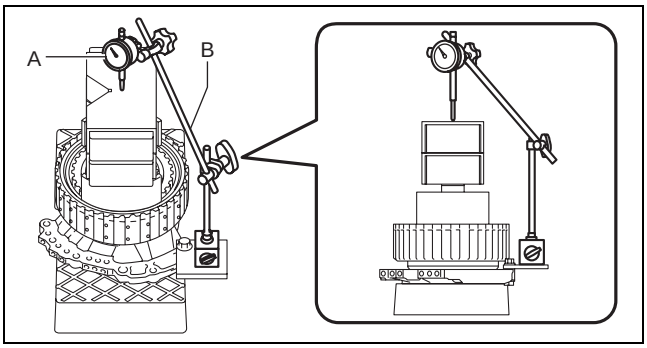


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Steel plate installation bolt tightening torque
15 N·m {1.5 kgf·m, 11 ft·lbf} or less (tighten so that steel plate does not move during low clutch clearance measurement)

   (2) Set the dial gauge and magnetic stand as shown in the figure.

A : Dial gauge
B : Magnetic stand

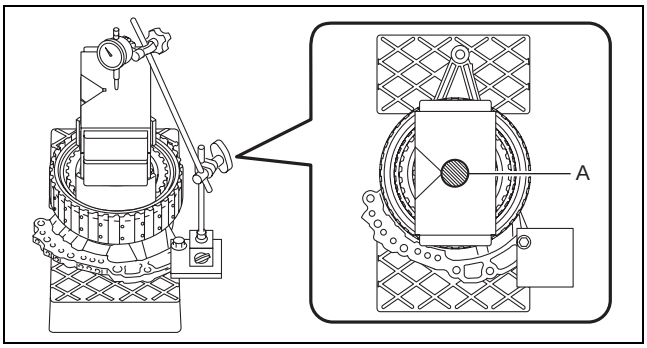


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Caution
- **To reduce error during the low clutch clearance measurement, set the dial gauge so that it is perpendicular to the alignment surface of the oil pump with the transaxle case.**

   (3) Set the dial gauge end near the center of the weight.

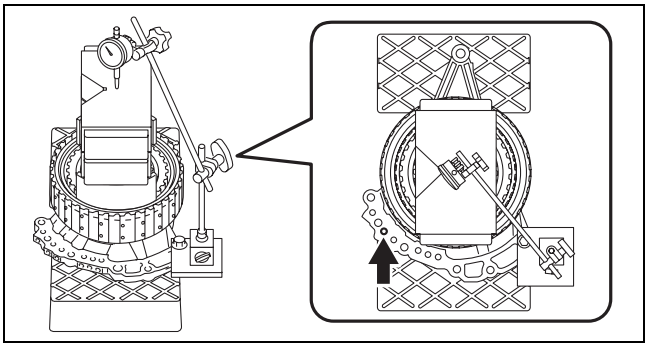
A : Area in which dial gauge end is set



azzjjw00001088

Caution
- **To reduce error during the low clutch clearance measurement, set the dial gauge end to within the area shown in the figure.**

10. Measure the low clutch clearance using the following procedure:
    (1) Blow compressed air into the oil passage shown in the figure and verify the operation condition of the low clutch piston (approx. 3 times).

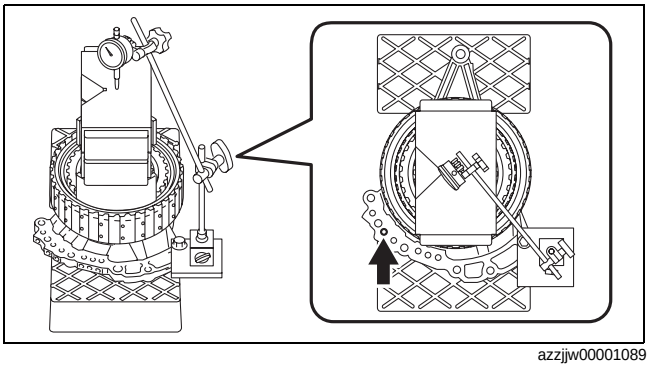

azzjjw00001089

Warning
- **Always wear protective eye wear when using the air compressor. Otherwise, ATF or dirt particles blown off by the air compressor could get into the eyes.**

Caution
- **To prevent damage to parts, always use an air compressor which is adjusted to the indicated pressure.**

Compressed air pressure
0.39—0.44 MPa {4.0—4.4 kgf/cm^2, 57—63 psi}

    (2) Blow compressed air into the oil passage shown in the figure and operate the low clutch piston to read the value when the dial gauge is stabilized.


azzjjw00001089

Warning
- **Always wear protective eye wear when using the air compressor. Otherwise, ATF or dirt particles blown off by the air compressor could get into the eyes.**

Caution
- **To prevent damage to parts, always use an air compressor which is adjusted to the indicated pressure.**

Compressed air pressure
0.39—0.44 MPa {4.0—4.4 kgf/cm^2, 57—63 psi}

    (3) Input the dial gauge value, which was read while the low clutch piston was operating, into the measurement/adjustment value input sheet.
    (4) Release the compressed air and read the dial gauge value without the low clutch piston operating.
    (5) Input the dial gauge value, which was read without the low clutch piston operating, into the measurement/adjustment value input sheet.
    (6) Perform the following calculation to calculate the low clutch clearance.
    Low clutch clearance = C - D - B
    B: Correction value of low clutch clearance
    C: Dial gauge value with low clutch piston operated
    D: Dial gauge value without low clutch piston operated

Note
Example
B: Correction value of low clutch clearance is 0.0942 mm {0.00371 in}
C: Dial gauge value with low clutch piston operated is 2.320 mm {0.09134 in}
D: Dial gauge value without low clutch piston operated is 0.595 mm {0.02343 in}
Low clutch clearance = 2.320 mm {0.09134 in} - 0.595 mm {0.02343 in} - 0.0942 mm {0.00371 in}
= 1.6308 mm {0.06420 in}

    (7) Input the calculated low clutch clearance into the measurement/adjustment value input sheet.

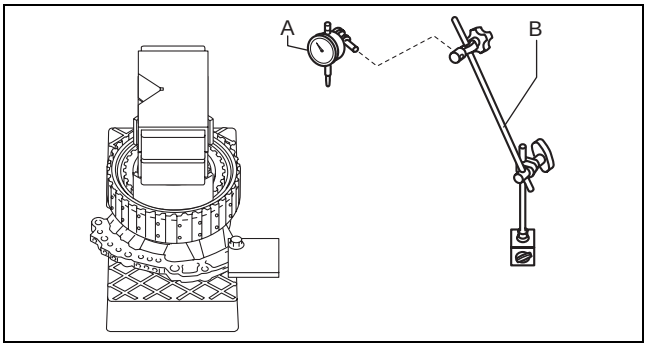
(8) Verify that the low clutch clearance satisfies the specification.

Specification
1.400—1.600 mm {0.05512—0.06299 in}

- If not within the specification, adjust the low clutch clearance. (See 05-17-335 Low Clutch Clearance Adjustment.)

11. Remove the dial gauge and magnetic stand.

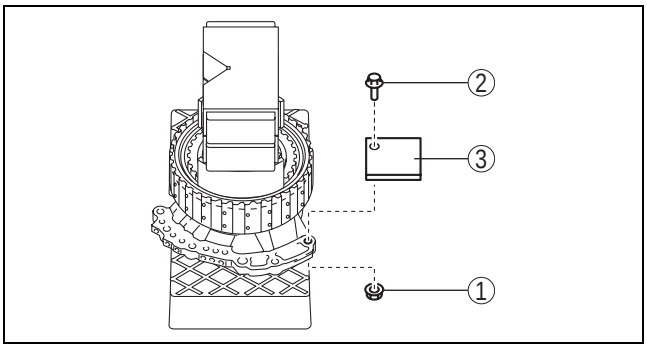
A : Dial gauge
B : Magnetic stand



azzjjw00001090

12. Remove the steel plate for securing the magnetic stand using the procedure shown in the figure.

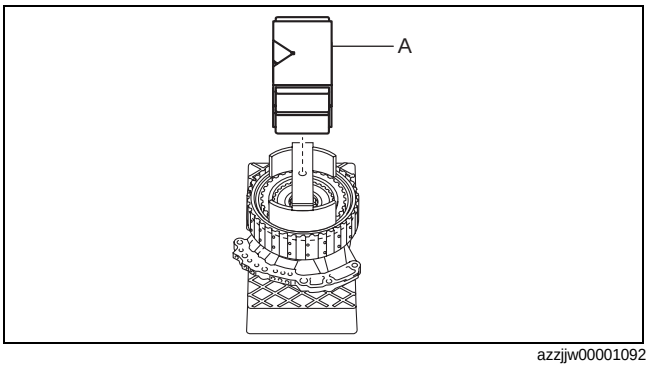
1	Nut (M8)
2	Bolt (M8)
3	Steel plate (for securing magnetic stand)



azzjjw00001091

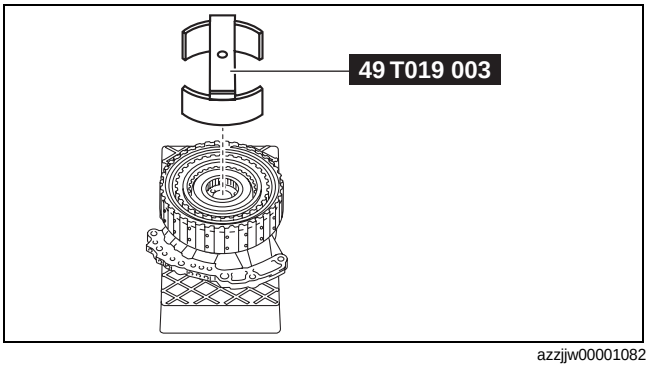
13. Remove the weight on the SST.

A : Weight (V-block)



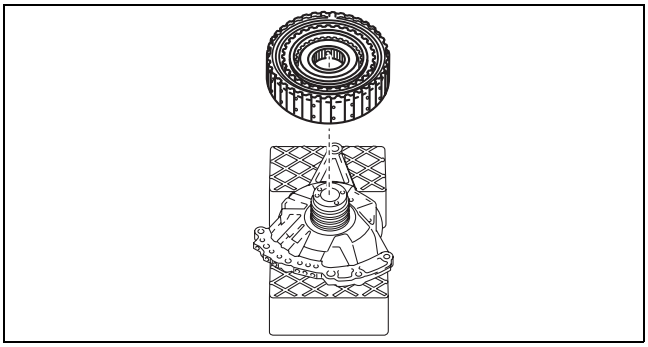
azzjjw00001092

14. Remove the SST.



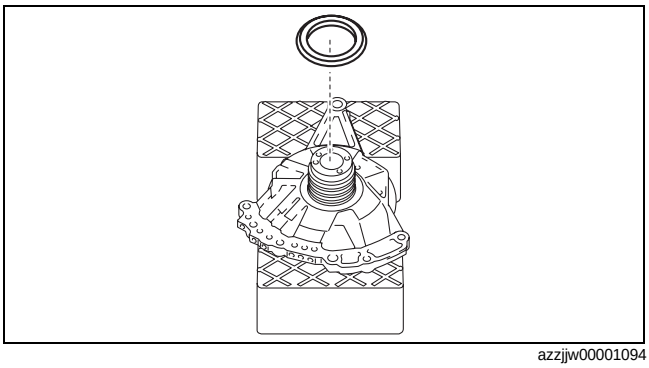
azzjjw00001082

15. Remove the clutch component.



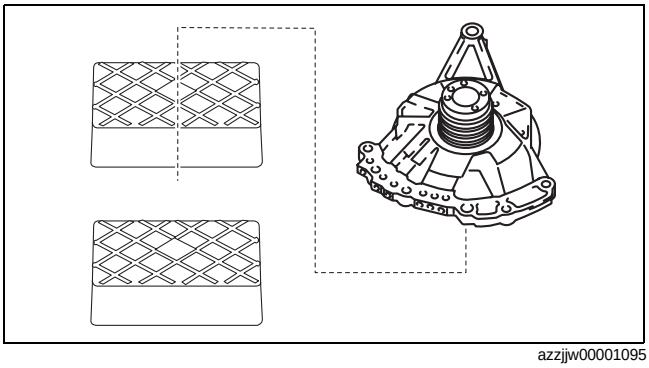
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16. Remove the thrust needle bearing.



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17. Take the oil pump off the rubber plates.

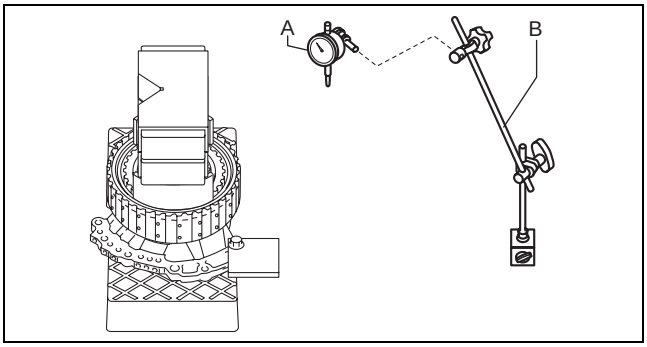


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Low Clutch Clearance Adjustment

1. Remove the dial gauge and magnetic stand.

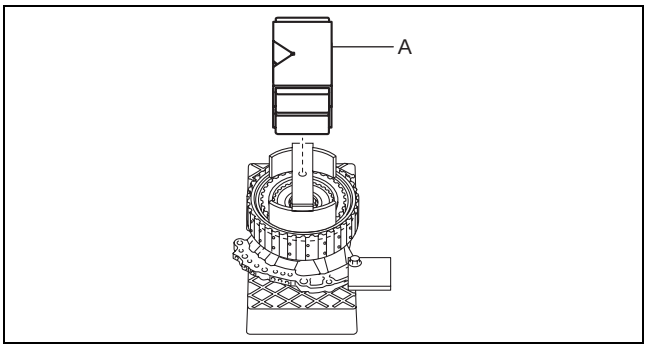
A : Dial gauge
B : Magnetic stand



azzjjw00001090

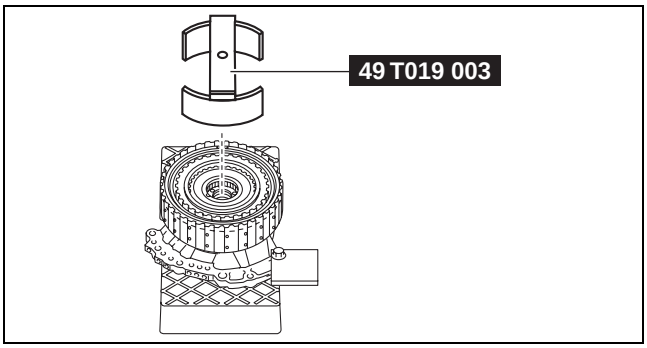
2. Remove the weight on the SST.

A : Weight (V-block)



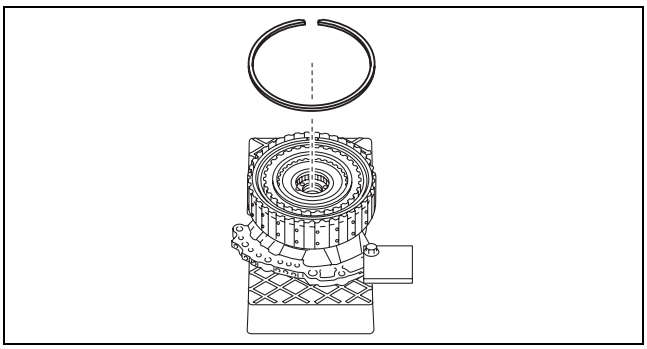
azzjjw00001096

3. Remove the SST.



azzjjw00001097

4. Remove the snap ring.



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5. Measure the thickness of the removed snap ring.

Note
- Recommended measuring instrument: Micrometer

6. Input the measured snap ring thickness into the measurement/adjustment value input sheet.

7. Select the appropriate snap ring from the following table:

Range*	Selected snap ring thickness
Exceeds 3.650 mm {0.14370 in}, 3.750 mm {0.14764 in} or less	2.2 mm {0.087 in}
Exceeds 3.550 mm {0.13976 in}, 3.650 mm {0.14370 in} or less	2.1 mm {0.083 in}
Exceeds 3.450 mm {0.13583 in}, 3.550 mm {0.13976 in} or less	2.0 mm {0.079 in}
Exceeds 3.350 mm {0.13189 in}, 3.450 mm {0.13583 in} or less	1.9 mm {0.075 in}
Exceeds 3.250 mm {0.12795 in}, 3.350 mm {0.13189 in} or less	1.8 mm {0.071 in}
Exceeds 3.150 mm {0.12402 in}, 3.250 mm {0.12795 in} or less	1.7 mm {0.067 in}
Exceeds 3.050 mm {0.12008 in}, 3.150 mm {0.12402 in} or less	1.6 mm {0.063 in}
Exceeds 2.950 mm {0.11614 in}, 3.050 mm {0.12008 in} or less	1.5 mm {0.059 in}
Exceeds 2.850 mm {0.11220 in}, 2.950 mm {0.11614 in} or less	1.4 mm {0.055 in}
Exceeds 2.750 mm {0.10827 in}, 2.850 mm {0.11220 in} or less	1.3 mm {0.051 in}

* : The range is the sum of the low clutch clearance and the thickness value of the removed snap ring.

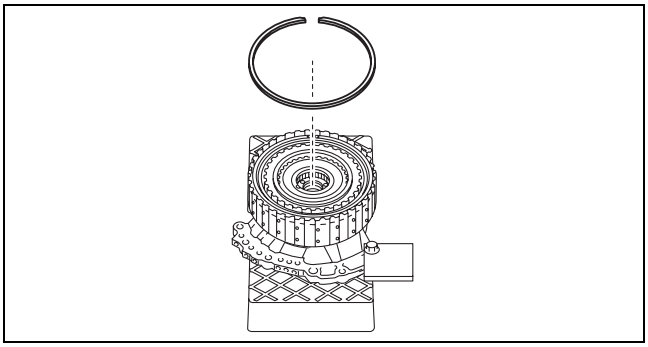
Range = E + H
E: Low clutch clearance
H: Thickness of removed snap ring

Note
Example
E: Low clutch clearance is 1.6308 mm {0.06420 in}
H: Thickness of removed snap ring is 1.705 mm {0.06713 in}
Range = 1.6308 mm {0.06420 in} + 1.705 mm {0.06713 in} = 3.3358 mm {0.13133 in}, the selected snap ring has a thickness of 1.8 mm {0.071 in}.

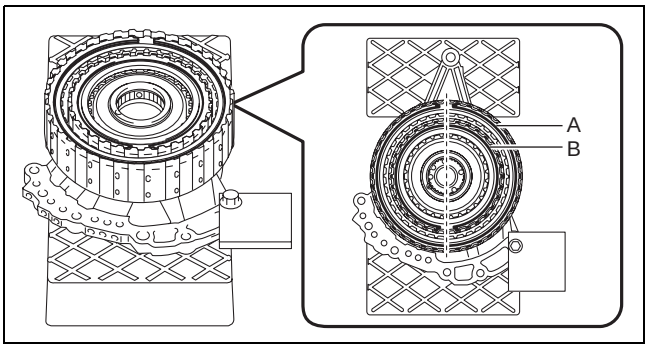
8. Assemble the selected snap ring to the position shown in the figure.

Caution
- **Assemble so that the end gap of the snap ring is positioned diagonally opposed to the end gap of the snap ring for the high clutch.**
- **After assembling the snap ring, verify that the snap ring is securely inserted into the bottom of the snap ring groove.**

Note
- Snap ring size: Outer diameter approx. 169.3 mm {6.665 in}

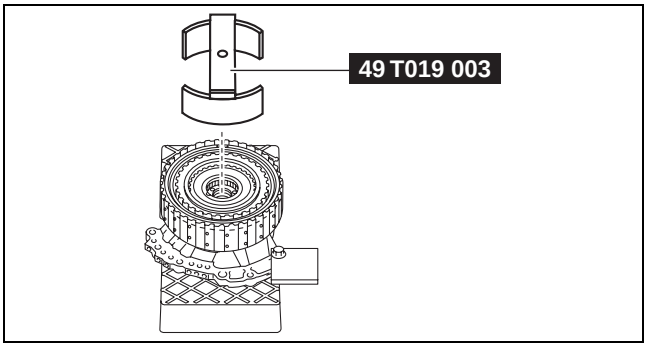

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A : Snap ring (low clutch)
B : Snap ring (high clutch)

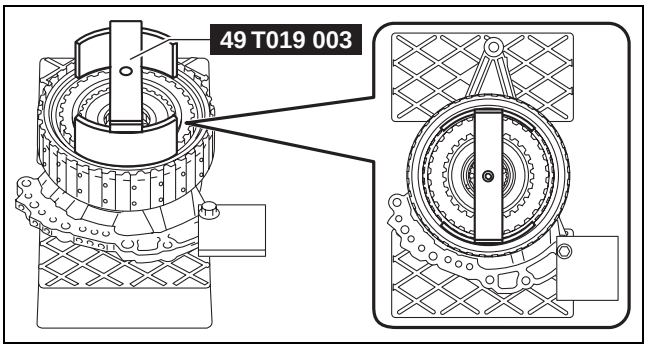


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9. Install the SST.



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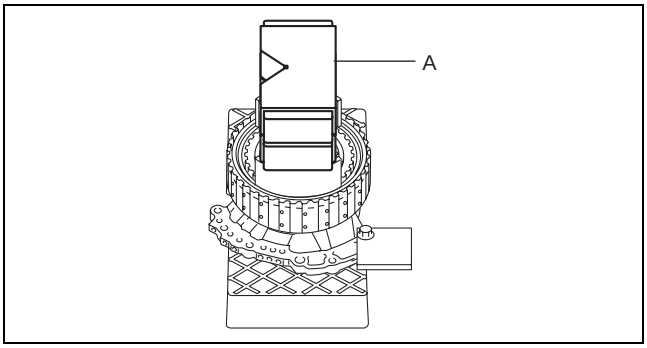
10. Place a 98—196 N {10.0—19.9 kgf, 23.0—44.0 lbf} weight on the SST using the following procedure:

Note
- Use a V-block as a weight.

(1) Measure the weight of the weight placed on the SST.
(2) Input the measured weight into the measurement/adjustment value input sheet.
(3) Place the measured weight on the SST.

A : Weight (V-block)

Caution
- **To reduce error during the low clutch clearance measurement, place the weight near the center of the SST.**



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11. Perform the following calculation to calculate the correction value for the low clutch clearance.

Note
- Because a wave spring is included in the low clutch, a correction value is required for the low clutch clearance according to the weight of the weight used during the low clutch clearance measurement.

Correction value of low clutch clearance (weight of unit is N) = (A - 90 N) × 0.00157 mm {0.0000618 in}
A: Weight of weight

Note
Example
A: Weight of weight is 150 N
Correction value of low clutch clearance = (150 N - 90 N) × 0.00157 mm {0.0000618 in} = 0.0942 mm {0.00371 in}

Correction value of low clutch clearance (weight of unit is kgf) = (A - 9.18 kgf) × 0.01540 mm {0.0006063 in}
A: Weight of weight

Note
Example
A: Weight of weight is 15.30 kgf
Correction value of low clutch clearance = (15.30 kgf - 9.18 kgf) × 0.01540 mm {0.0006063 in} = 0.0942 mm {0.00371 in}

Correction value of low clutch clearance (weight of unit is lbf) = (A - 20.23 lbf) × 0.00698 mm {0.0002748 in}
A: Weight of weight

Note
Example
A: Weight of weight is 33.72 lbf
Correction value of low clutch clearance = (33.72 lbf - 20.23 lbf) × 0.00698 mm {0.0002748 in} = 0.0942 mm {0.00371 in}

12. Perform the low clutch clearance measurement from Step 9 (2). (See 05-17-327 Low Clutch Clearance Measurement.)

R-3-5 BRAKE CLEARANCE MEASUREMENT/ADJUSTMENT

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Preparation Before Servicing

1. Print out the measurement/adjustment value input sheet. (See 05-17-295 MEASUREMENT/ADJUSTMENT VALUE INPUT SHEET.)

Note

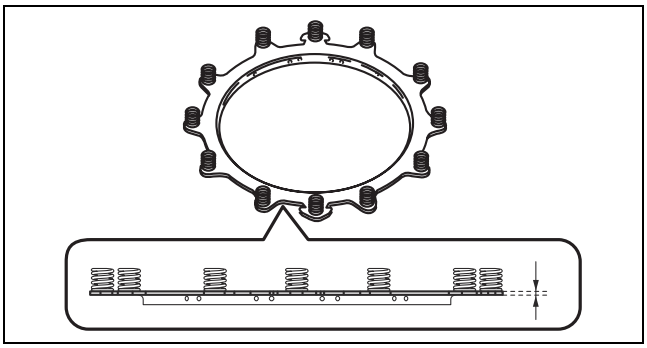
- When performing the measurement/adjustment, input the measured and calculated values into the measurement/adjustment value input sheet.
- When performing the other measurements/adjustments, if the measurement/adjustment value input sheet has been printed out, use the printed sheet.

R-3-5 Brake Clearance Measurement/Adjustment

1. Measure the retainer thickness of the springs and retainer component.

Note

- Recommended measuring instrument: Micrometer
- Springs and retainer component size: Inner diameter approx. 148.8 mm {5.858 in}



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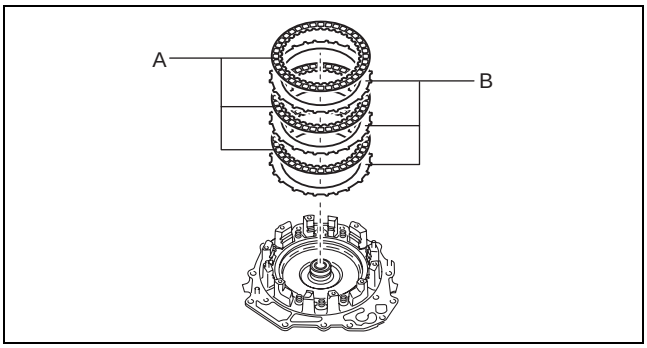
2. Input the measured retainer thickness of the springs and retainer component into the measurement/adjustment value input sheet.

3. Assemble the drive plates and driven plates.

A : Drive plate
B : Driven plate

Note

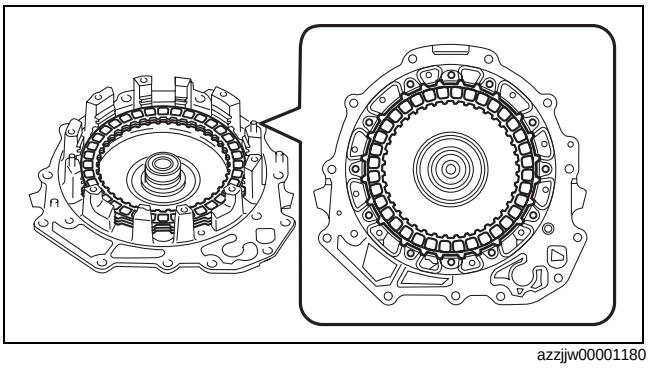
- Drive plate size: Outer diameter approx. 169.4 mm {6.669 in}
- Driven plate size: Inner diameter approx. 141.8 mm {5.583 in}



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Assembly order

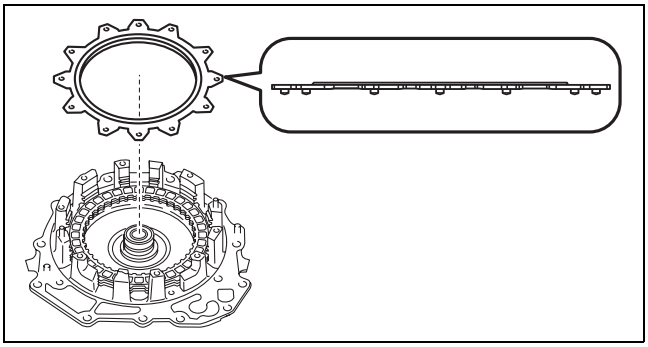
Driven plate—drive plate—driven plate—drive plate—driven plate—drive plate



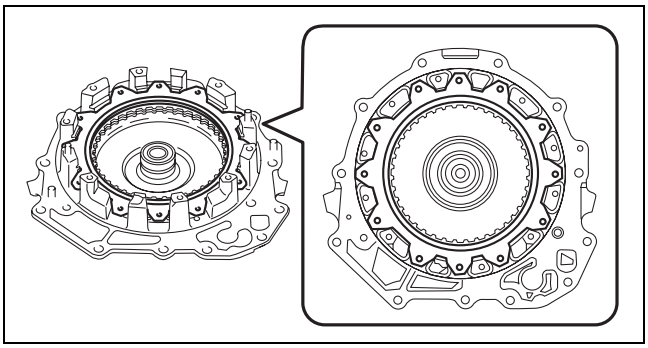
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4. Assemble the retaining plate.

Note
- Retaining plate size: Inner diameter approx. 141.8 mm {5.583 in}



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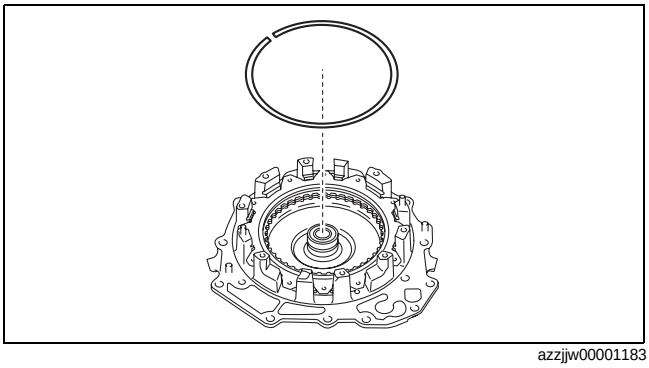


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5. Assemble the snap ring (FZ01 19 469) for the R-3-5 brake clearance measurement/adjustment to the position shown in the figure.

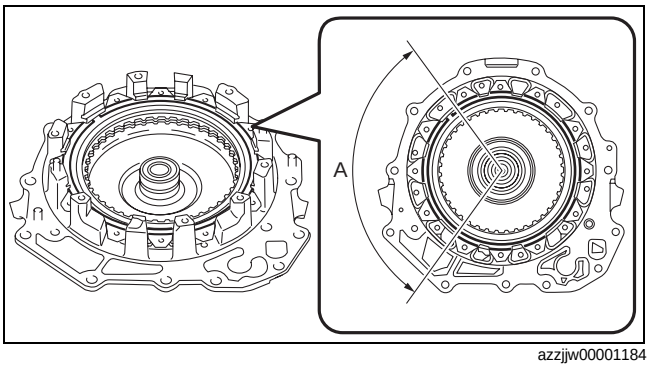
Caution
- **Assemble the snap ring so that the end gap of the snap ring is in the area shown in the figure.**
- **After assembling the snap ring, verify that the snap ring is securely inserted into the bottom of the snap ring groove.**

Note
- Snap ring size: Outer diameter approx. 186.2 mm {7.331 in}



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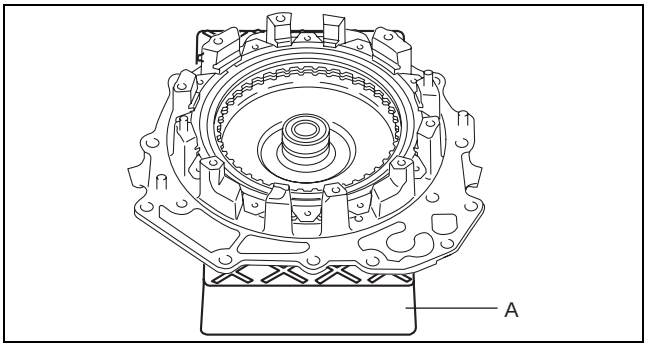
A : End gap of snap ring assembly area



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6. Set the end cover for the assembled part on the workbench as shown in the figure.

A : Rubber plate

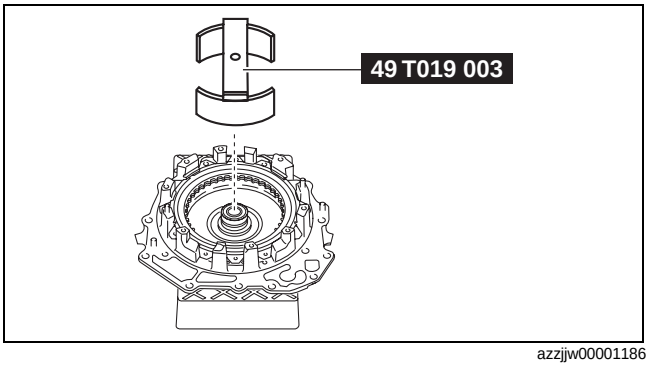


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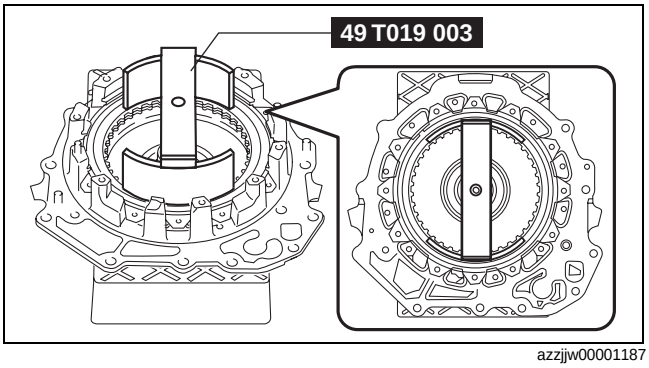
Caution

- **To reduce error during the R-3-5 brake clearance adjustment value measurement, use the rubber plates to adjust the alignment surface of the end cover with the transaxle case so that it is level.**

7. Install the SST.



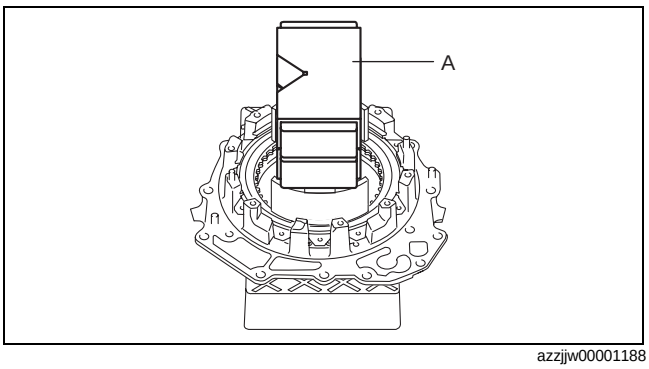
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azzjjw00001187

8. Place a 98—196 N {10.0—19.9 kgf, 23.0—44.0 lbf} weight on the SST.

A : Weight (V-block)



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Caution

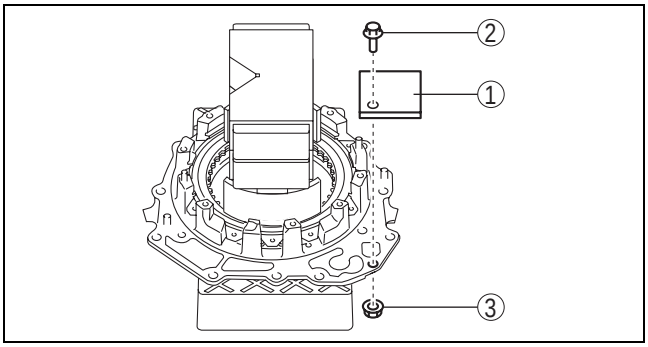
- **To reduce error during the R-3-5 brake clearance adjustment value measurement, place the weight near the center of the SST.**

Note

- Use a V-block as a weight.

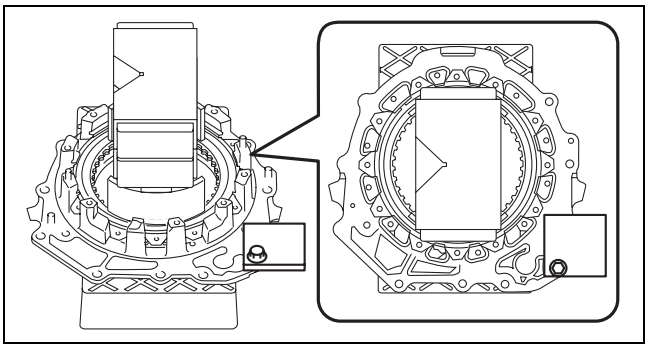
9. Set the measuring instrument to the end cover using the following procedure.
   (1) Install an appropriate steel plate for securing the magnetic stand used in the procedure shown in the figure..

1	Steel plate (for securing magnetic stand)
2	Bolt (M8)
3	Nut (M8)



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Caution
- **If the bolt and nut are tightened with excessive force when installing the steel plate, the alignment surface of the end cover with the transaxle case could be damaged. Tighten the bolt and nut so that the steel plate does not move during the R-3-5 brake clearance adjustment value measurement.**

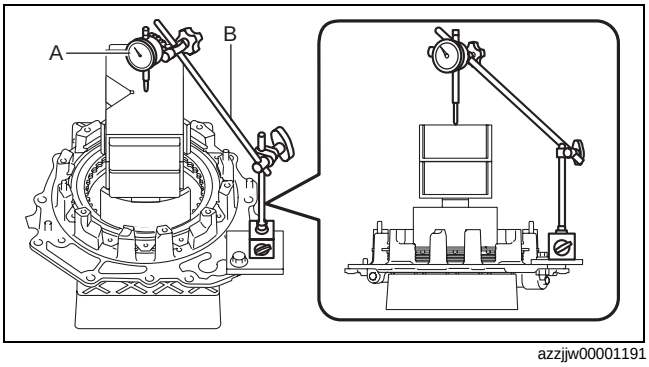

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Note
- When installing the steel plate to the end cover, use an M8 bolt and nut.

Steel plate installation bolt tightening torque
15 N·m {1.5 kgf·m, 11 ft·lbf} or less (tighten so that steel plate does not move during R-3-5 brake clearance adjustment value measurement)

   (2) Set the dial gauge and magnetic stand as shown in the figure.

A : Dial gauge
B : Magnetic stand

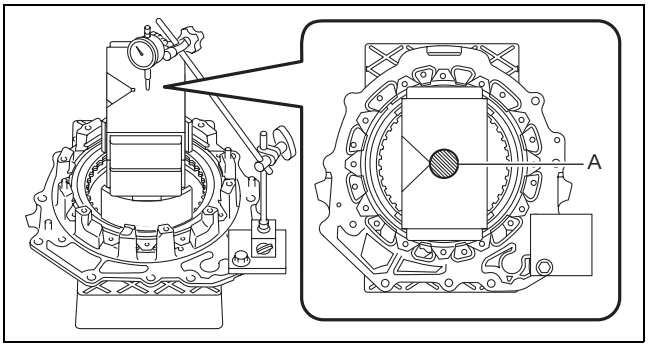


azzjjw00001191

Caution
- **To reduce error during the R-3-5 brake clearance adjustment value measurement, set the dial gauge so that the it is perpendicular to alignment surface of the end cover with the transaxle case.**

   (3) Set the dial gauge end near the center of the weight.

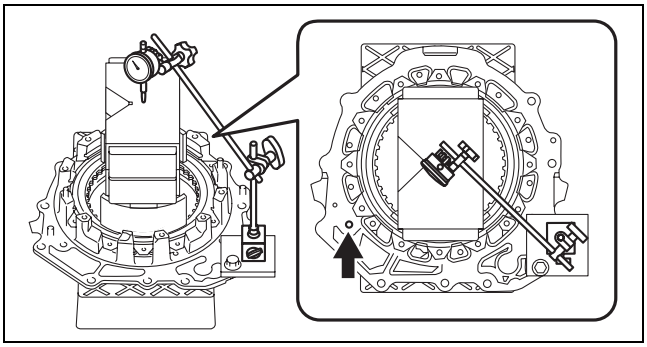
A : Area in which dial gauge end is set



azzjjw00001192

Caution
- **To reduce error during the R-3-5 brake clearance adjustment value measurement, set the dial gauge end to within the area shown in the figure.**

10. Measure the R-3-5 brake clearance adjustment value using the following procedure:
    (1) Blow compressed air into the oil passage shown in the figure and verify the operation condition of the R-3-5 brake piston (approx. 3 times).

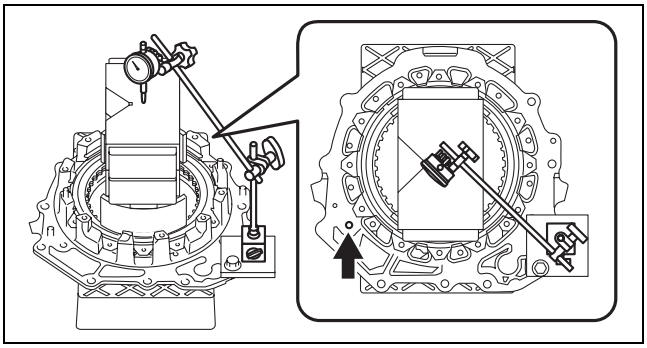

azzjjw00001193

Warning
- **Always wear protective eye wear when using the air compressor. Otherwise, ATF or dirt particles blown off by the air compressor could get into the eyes.**

Caution
- **To prevent damage to parts, always use an air compressor which is adjusted to the indicated pressure.**

Compressed air pressure
0.39—0.44 MPa {4.0—4.4 kgf/cm^2, 57—63 psi}

    (2) Blow compressed air into the oil passage shown in the figure and operate the R-3-5 brake piston to read the value when the dial gauge is stabilized.


azzjjw00001193

Warning
- **Always wear protective eye wear when using the air compressor. Otherwise, ATF or dirt particles blown off by the air compressor could get into the eyes.**

Caution
- **To prevent damage to parts, always use an air compressor which is adjusted to the indicated pressure.**

Compressed air pressure
0.39—0.44 MPa {4.0—4.4 kgf/cm^2, 57—63 psi}

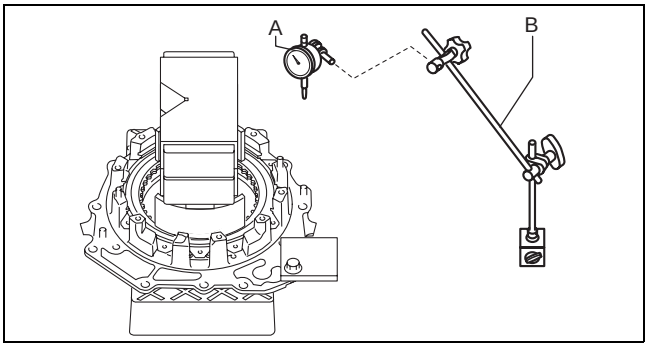
    (3) Input the dial gauge value, which was read while the R-3-5 brake piston was operating, into the measurement/adjustment value input sheet.
    (4) Release the compressed air and read the dial gauge value without the R-3-5 brake piston operating.
    (5) Input the dial gauge value, which was read without the R-3-5 brake piston operating, into the measurement/adjustment value input sheet.
    (6) Perform the following calculation to calculate the R-3-5 brake clearance adjustment value.
    R-3-5 brake clearance adjustment value = B - C
    B: Dial gauge value with R-3-5 brake piston operated
    C: Dial gauge value without R-3-5 brake piston operated

Note
Example
B: Dial gauge value with R-3-5 brake piston operating is 2.280 mm {0.08976 in}
C: Dial gauge value without R-3-5 brake piston operated is 0.205 mm {0.00807 in}
R-3-5 brake clearance adjustment value = 2.280 mm {0.08976 in} - 0.205 mm {0.00807 in} = 2.075 mm {0.08169 in}

    (7) Input the calculated R-3-5 brake clearance adjustment value into the measurement/adjustment value input sheet.

11. Remove the dial gauge and magnetic stand.

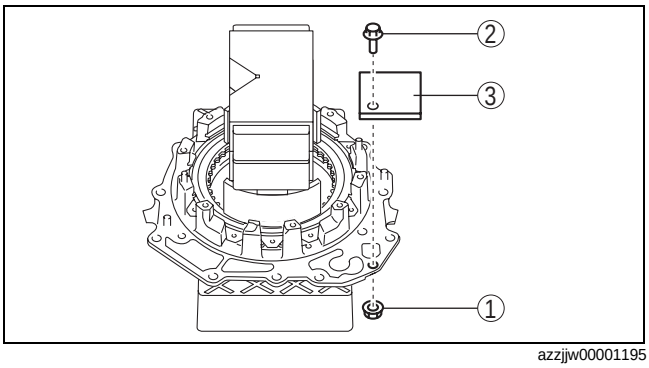
A : Dial gauge
B : Magnetic stand



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12. Remove the steel plate for securing the magnetic stand using the procedure shown in the figure.

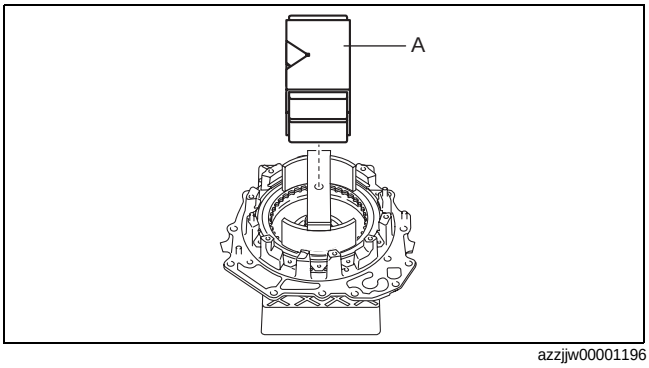
1	Nut (M8)
2	Bolt (M8)
3	Steel plate (for securing magnetic stand)



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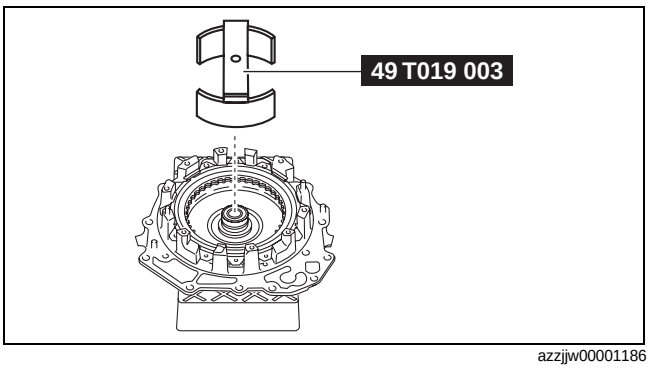
13. Remove the weight on the SST.

A : Weight (V-block)



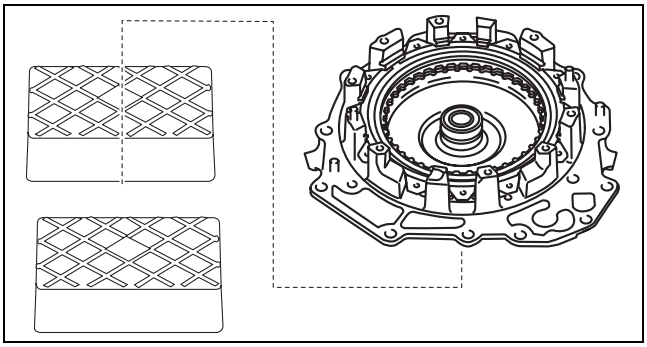
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14. Remove the SST.



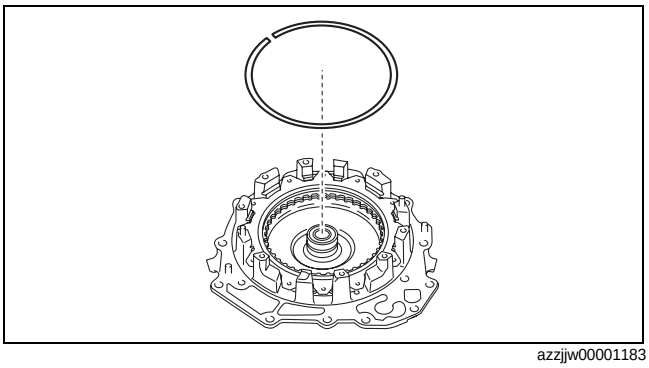
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15. Take the end cover off the rubber plates.



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16. Remove the snap ring (FZ01 19 469) for the R-3-5 brake clearance measurement/adjustment.



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17. Measure the thickness of the removed snap ring (FZ01 19 469) for the R-3-5 brake clearance measurement/adjustment.

Note
- Recommended measuring instrument: Micrometer

18. Input the measured snap ring (FZ01 19 469) thickness for the R-3-5 brake clearance measurement/adjustment into the measurement/adjustment value input sheet.

19. Select the appropriate snap ring from the following table:

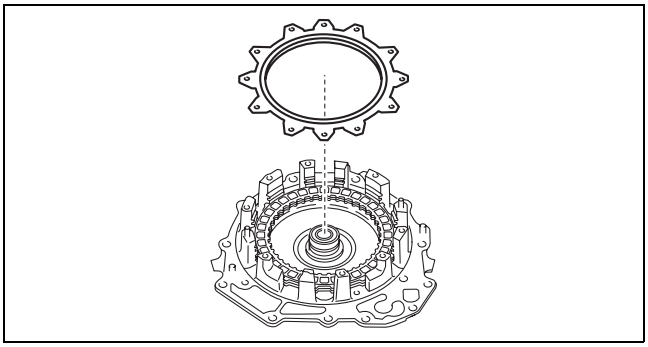
Range*	Selected snap ring thickness
Exceeds 3.830 mm {0.1508 in}, 3.930 mm {0.1547 in} or less	2.6 mm {0.102 in}
Exceeds 3.730 mm {0.1469 in}, 3.830 mm {0.1508 in} or less	2.5 mm {0.098 in}
Exceeds 3.630 mm {0.1429 in}, 3.730 mm {0.1469 in} or less	2.4 mm {0.094 in}
Exceeds 3.530 mm {0.1390 in}, 3.630 mm {0.1429 in} or less	2.3 mm {0.091 in}
Exceeds 3.430 mm {0.1350 in}, 3.530 mm {0.1390 in} or less	2.2 mm {0.087 in}
Exceeds 3.330 mm {0.1311 in}, 3.430 mm {0.1350 in} or less	2.1 mm {0.083 in}
Exceeds 3.230 mm {0.1272 in}, 3.330 mm {0.1311 in} or less	2.0 mm {0.079 in}
Exceeds 3.130 mm {0.1232 in}, 3.230 mm {0.1272 in} or less	1.9 mm {0.075 in}
Exceeds 3.030 mm {0.1193 in}, 3.130 mm {0.1232 in} or less	1.8 mm {0.071 in}
Exceeds 2.930 mm {0.1154 in}, 3.030 mm {0.1193 in} or less	1.7 mm {0.067 in}

* : The range is the thickness of the removed snap ring (FZ01 19 469) used for the R-3-5 brake clearance measurement/adjustment added to the R-3-5 brake clearance adjustment value, from which the retainer thickness of the springs and retainer component is subtracted.

Range = D + E - A
A: Retainer thickness of springs and retainer component
D: R-3-5 brake clearance adjustment value
E: Thickness of snap ring (FZ01 19 469) for R-3-5 brake clearance measurement/adjustment

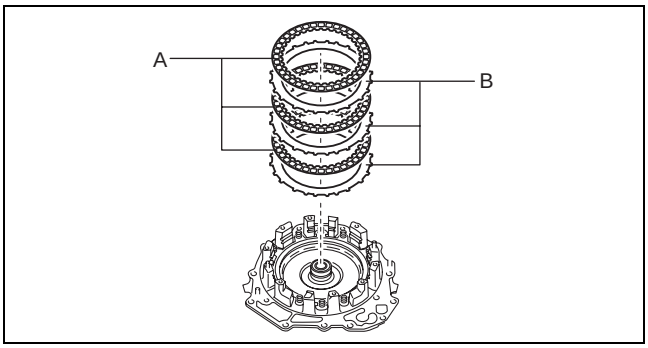
Note
Example
A: Retainer thickness of springs and retainer component is 1.225 mm {0.04823 in}
D: R-3-5 brake clearance adjustment value is 2.075 mm {0.08169 in}
E: Thickness of snap ring (FZ01 19 469) for R-3-5 brake clearance measurement/adjustment is 2.625 mm {0.10335 in}
Range = 2.075 mm {0.08169 in} + 2.625 mm {0.10335 in} - 1.225 mm {0.04823 in} = 3.475 mm {0.13681 in}, the selected snap ring has a thickness of 2.2 mm {0.087 in}.

20. Remove the retaining plate.



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21. Remove the drive plates and driven plates.
A : Drive plate
B : Driven plate



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2-6 BRAKE CLEARANCE MEASUREMENT/ADJUSTMENT

id051700664800

Preparation Before Servicing

1. Print out the measurement/adjustment value input sheet. (See 05-17-295 MEASUREMENT/ADJUSTMENT VALUE INPUT SHEET.)

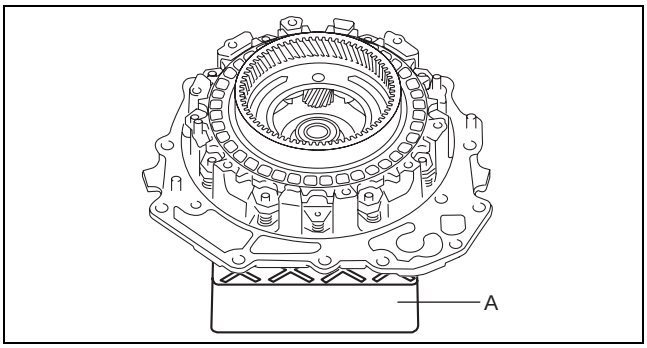
Note

- When performing the measurement/adjustment, input the measured and calculated values into the measurement/adjustment value input sheet.
- When performing the other measurements/adjustments, if the measurement/adjustment value input sheet has been printed out, use the printed sheet.

2-6 Brake Clearance Measurement

1. Set the end cover for the assembled part on the workbench as shown in the figure.

A : Rubber plate



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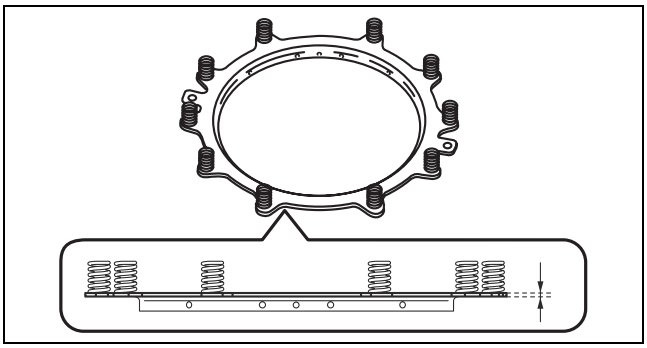
Caution

- **To reduce error during the 2-6 brake clearance measurement, use the rubber plates to adjust the alignment surface of the end cover with the transaxle case so that it is level.**

2. Measure the retainer thickness of the springs and retainer component.

Note

- Recommended measuring instrument: Micrometer
- Springs and retainer component size: Inner diameter approx. 150.6 mm {5.929 in}

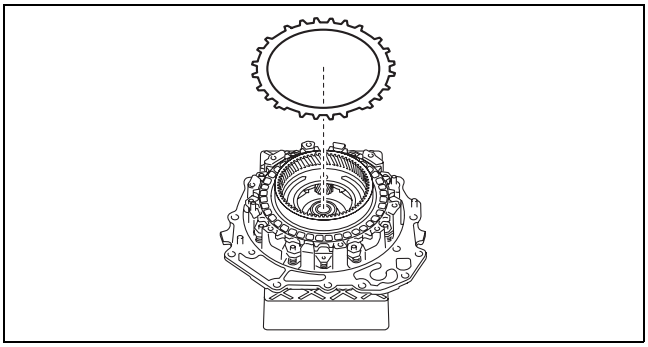


azzjjw00001169

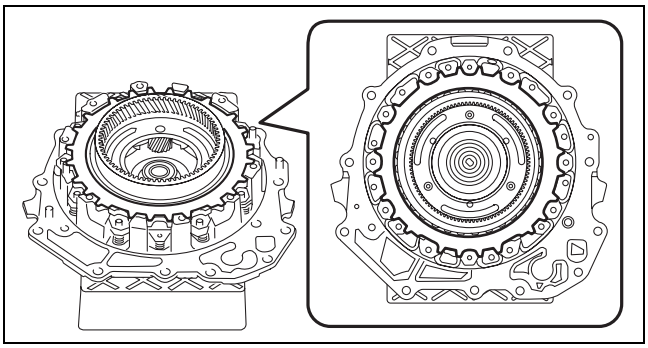
3. Input the measured retainer thickness of the springs and retainer component into the measurement/adjustment value input sheet.

4. Assemble the retaining plate.

Note
- Retaining plate size: Inner diameter approx. 148 mm {5.83 in}

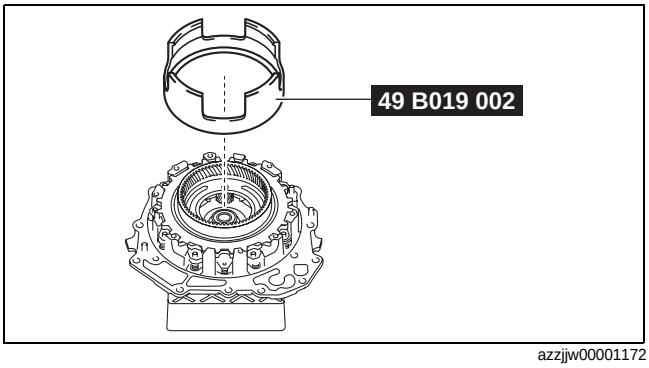


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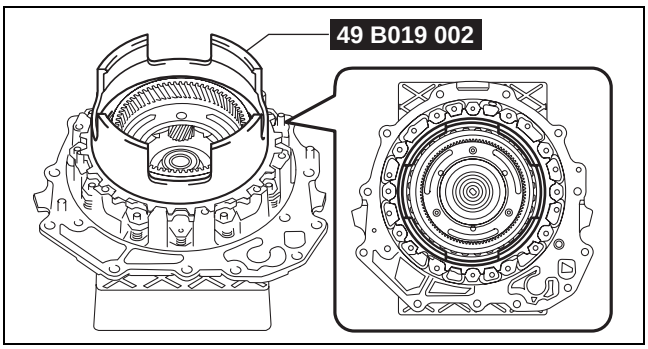


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5. Install the SST.



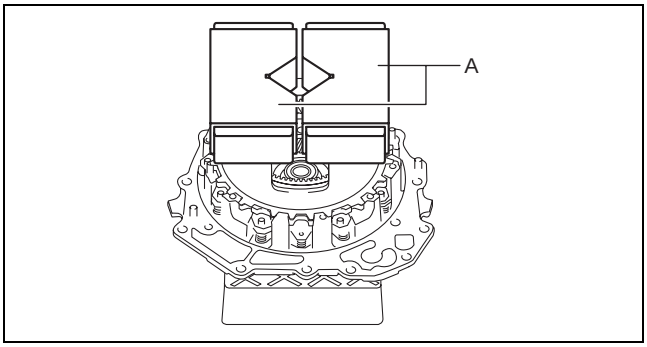
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6. Place a 98—196 N {10.0—19.9 kgf, 23.0—44.0 lbf} weight on the SST.

A : Weight (V-block)



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Caution

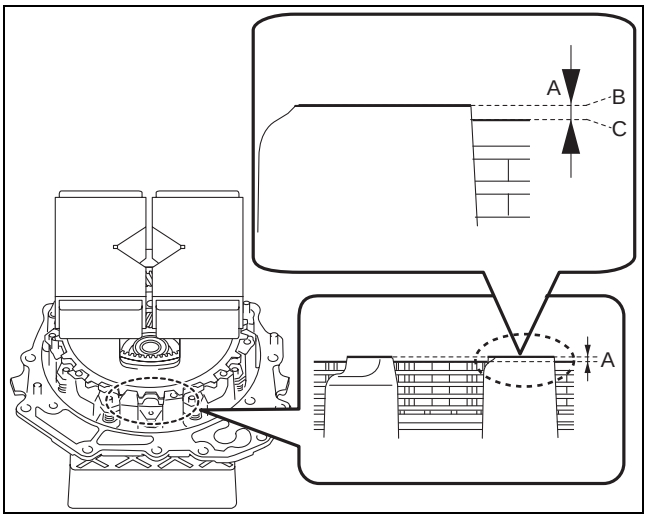
- **To reduce error during the 2-6 brake clearance measurement, place the weight near the center of the SST.**

Note

- Use a V-block as a weight.

7. Measure distance A shown in the figure in four locations (each separated by 90°) and calculate the average value of distance A.

A : Distance A
B : End cover end (alignment surface with brake housing)
C : Retaining plate end



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Note

- Recommended measuring instrument: Depth micrometer
- Measure the splines of the retaining plate using a depth micrometer.

8. Input the measured distance A and calculated distance A average value into the measurement/adjustment value input sheet.
9. Perform the following calculation to calculate the 2-6 brake clearance.
   2-6 brake clearance = C - A
   A: Retainer thickness of springs and retainer component
   C: Average value of distance A

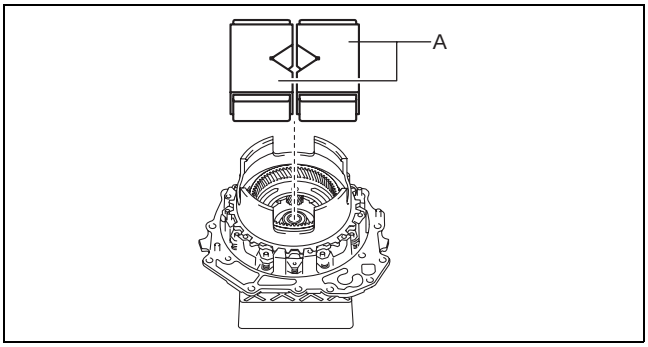
   Note
   Example
   A: Retainer thickness of springs and retainer component is 1.425 mm {0.05610 in}
   C: Average value of distance A is 2.665 mm {0.10492 in}
   2-6 brake clearance = 2.665 mm {0.10492 in} - 1.425 mm {0.05610 in} = 1.240 mm {0.04882 in}

10. Input the calculated 2-6 brake clearance into the measurement/adjustment value input sheet.
11. Verify that the 2-6 brake clearance satisfies the specification.

Specification
1.000—1.200 mm {0.03938—0.04724 in}

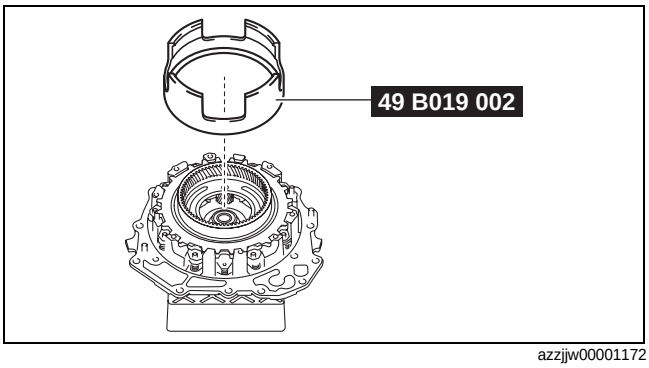
- If not within the specification, adjust the 2-6 brake clearance. (See 05-17-351 2-6 Brake Clearance Adjustment.)

12. Remove the weight on the SST.
A : Weight (V-block)



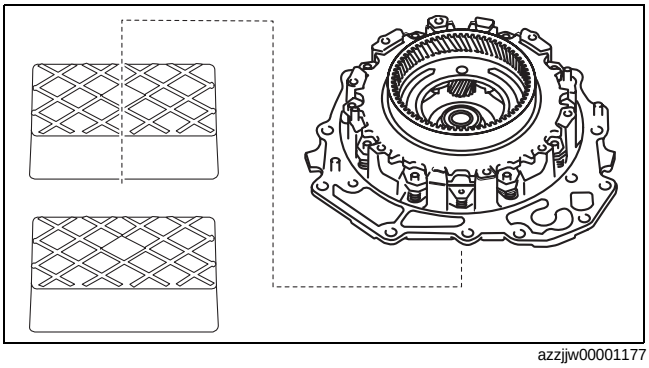
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13. Remove the SST.



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14. Take the end cover off the rubber plates.

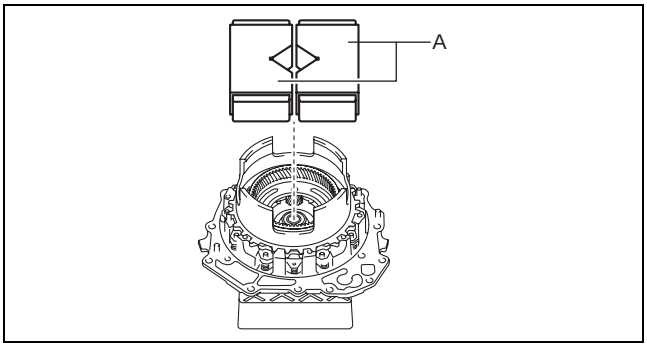


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2-6 Brake Clearance Adjustment

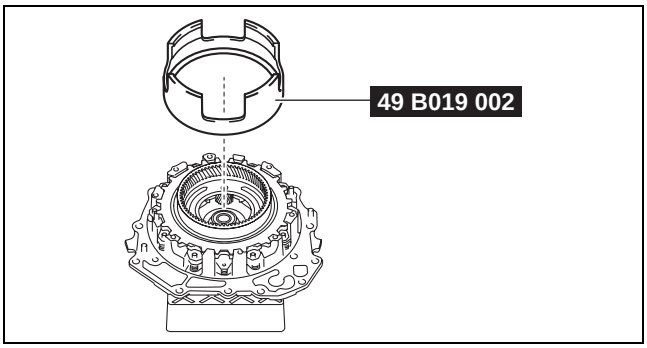
1. Remove the weight on the SST.

A : Weight (V-block)



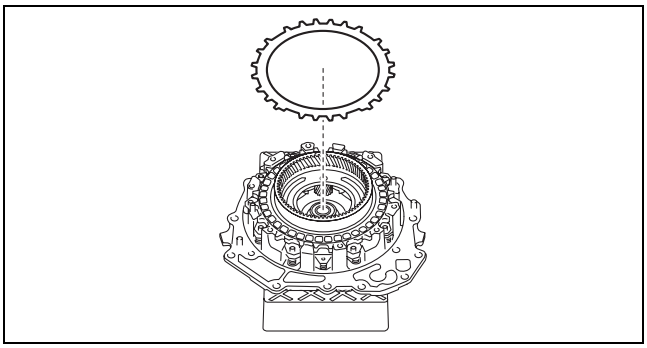
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2. Remove the SST.



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3. Remove the retaining plate.



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4. Measure the thickness of the removed retaining plate.

Note
- Recommended measuring instrument: Micrometer

5. Input the measured retaining plate thickness into the measurement/adjustment value input sheet.

6. Select the appropriate retaining plate from the following table:

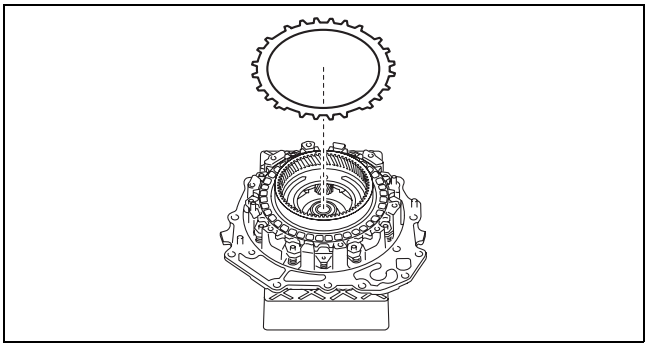
Range*	Selected retaining plate thickness
Exceeds 3.550 mm {0.1398 in}, 3.650 mm {0.1437 in} or less	2.5 mm {0.098 in}
Exceeds 3.450 mm {0.1358 in}, 3.550 mm {0.1398 in} or less	2.4 mm {0.094 in}
Exceeds 3.350 mm {0.1319 in}, 3.450 mm {0.1358 in} or less	2.3 mm {0.091 in}
Exceeds 3.250 mm {0.1280 in}, 3.350 mm {0.1319 in} or less	2.2 mm {0.087 in}
Exceeds 3.150 mm {0.1240 in}, 3.250 mm {0.1280 in} or less	2.1 mm {0.083 in}
Exceeds 3.050 mm {0.1201 in}, 3.150 mm {0.1240 in} or less	2.0 mm {0.079 in}
Exceeds 2.950 mm {0.1161 in}, 3.050 mm {0.1201 in} or less	1.9 mm {0.075 in}
Exceeds 2.850 mm {0.1122 in}, 2.950 mm {0.1161 in} or less	1.8 mm {0.071 in}
Exceeds 2.750 mm {0.1083 in}, 2.850 mm {0.1122 in} or less	1.7 mm {0.067 in}

* : The range is the sum of the 2-6 brake clearance and the thickness value of the removed retaining plate.

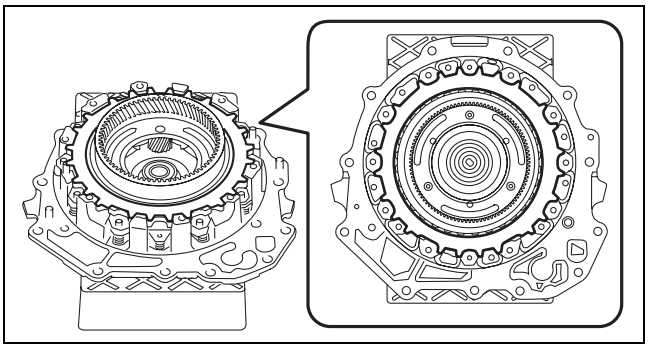
Range = D + G
D: 2-6 brake clearance
G: Thickness of removed retaining plate

Note
Example
D: 2-6 brake clearance is 1.240 mm {0.04882 in}
G: Thickness of removed retaining plate is 2.015 mm {0.07933 in}
Range = 1.240 mm {0.04882 in} + 2.015 mm {0.07933 in} = 3.255 mm {0.12815 in}, the selected retaining plate has a thickness of 2.2 mm {0.087 in}.

7. Assemble the selected retaining plate.



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8. Perform the 2-6 brake clearance measurement from Step 5. (See 05-17-347 2-6 Brake Clearance Measurement.)

LOW AND REVERSE BRAKE CLEARANCE MEASUREMENT/ADJUSTMENT

id051700664700

Preparation Before Servicing

1. Print out the measurement/adjustment value input sheet. (See 05-17-295 MEASUREMENT/ADJUSTMENT VALUE INPUT SHEET.)

Note

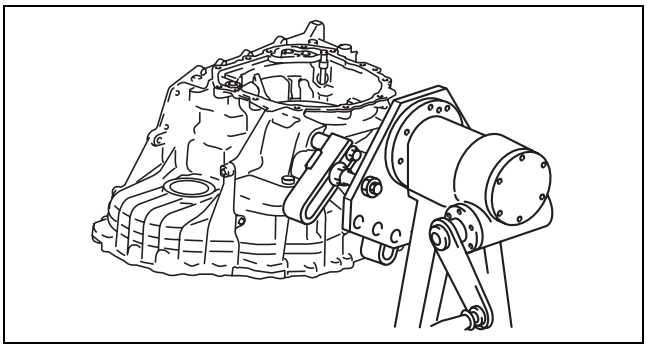
- When performing the measurement/adjustment, input the measured and calculated values into the measurement/adjustment value input sheet.
- When performing the other measurements/adjustments, if the measurement/adjustment value input sheet has been printed out, use the printed sheet.

Low and Reverse Brake Clearance Measurement

1. Rotate and adjust the rotation handle of the engine stand so that the end cover side is facing upward.

Caution

- **To reduce error during the low and reverse brake clearance measurement, adjust so that the alignment surface of the transaxle case with the end cover is level.**

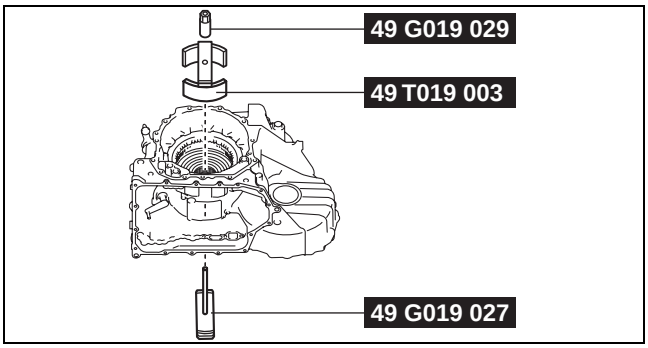


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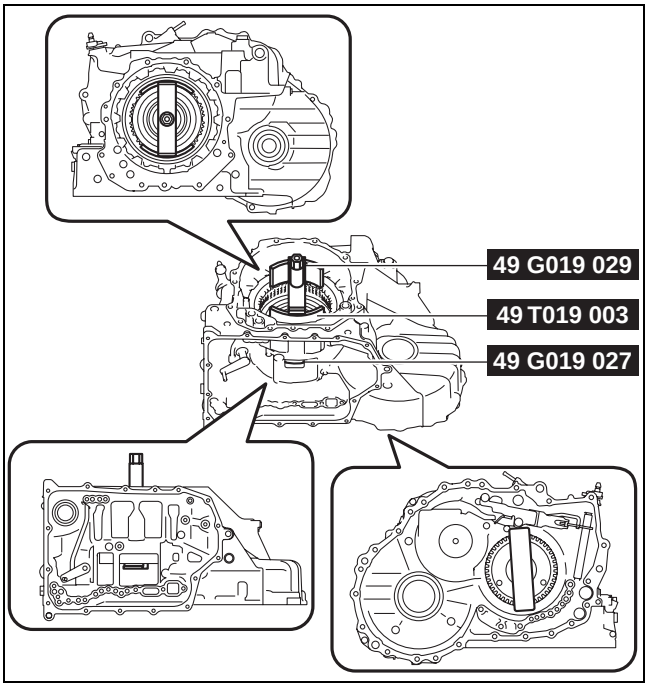
2. Assemble the snap ring using the following procedure:

Note
- Snap ring size: Outer diameter approx. 198.0 mm {7.795 in}

(1) Install the SSTs.



azzjjw00000735



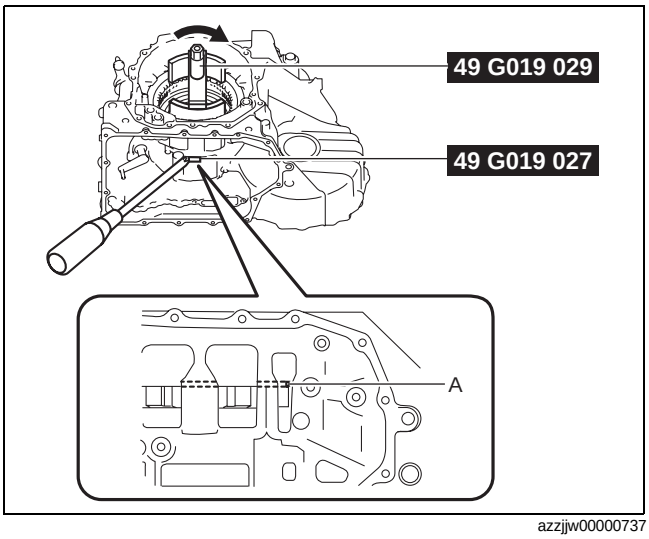
azzjjw00000736

(2) Tighten the SST (49 G019 029) until the snap ring groove of the transaxle case comes out.

A : Snap ring groove

Caution
- **If the SST (49 G019 029) is tightened with excessive force, surrounding parts could be damaged. Stop tightening the SST when the snap ring groove of the transaxle case comes out.**

Note
- Lock the SST (49 G019 027) against rotation using a flathead screwdriver and tighten the SST (49 G019 029).

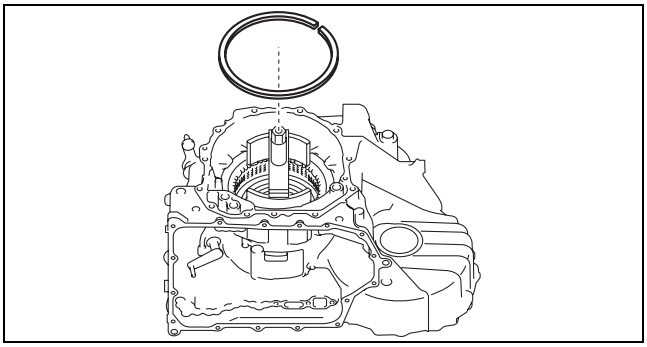


azzjjw00000737

(3) Assemble the snap ring to the position shown in the figure.

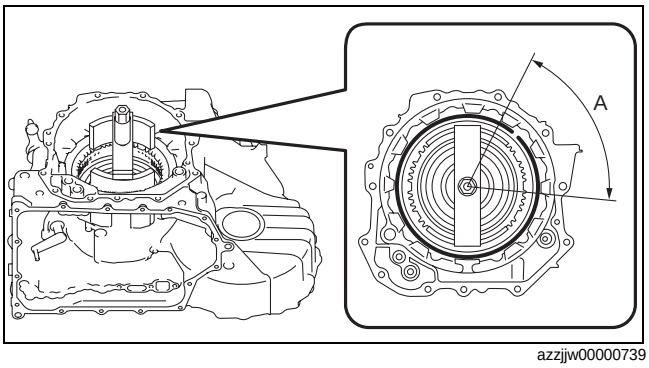
Caution

- **Assemble the snap ring so that the end gap of the snap ring is in the area shown in the figure.**
- **After assembling the snap ring, verify that the snap ring is securely inserted into the bottom of the snap ring groove.**



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A : End gap of snap ring assembly area

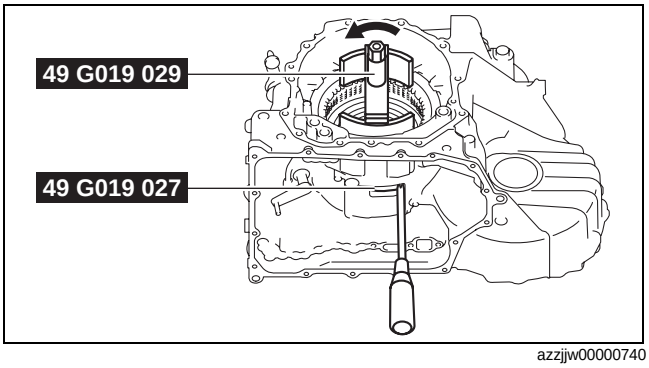


azzjjw00000739

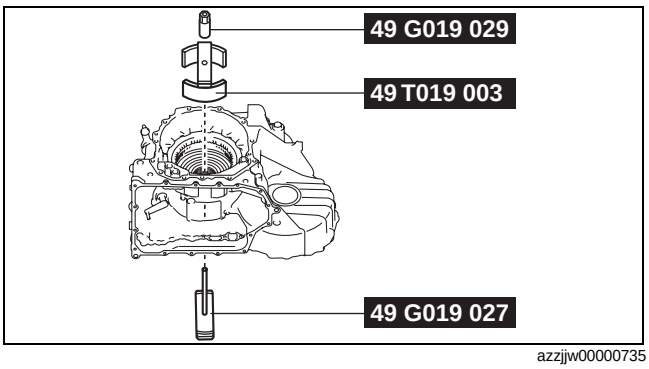
(4) Loosen the SST (49 G019 029) and remove the SSTs.

Note

- Lock the SST (49 G019 027) against rotation using a flathead screwdriver and loosen the SST (49 G019 029).



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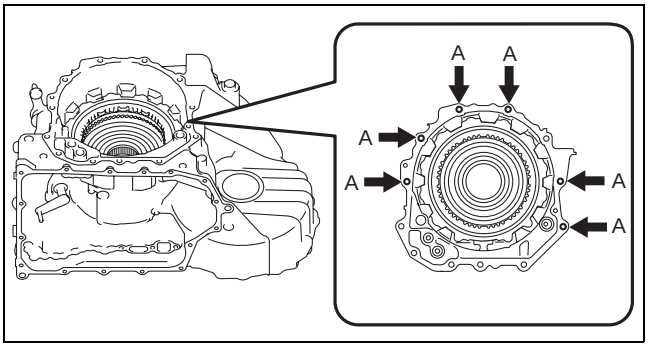
azzjjw00000735

3. Set the measuring instrument to the transaxle case using the following procedure.
   (1) Install the steel plate for securing the magnetic stand using the procedure shown in the figure.

Caution
- **If the bolt is tightened with excessive force when installing the steel plate, the alignment surface of the end cover with the transaxle case could be damaged. Tighten the bolt so that the steel plate does not move during low and reverse brake clearance measurement.**
- **To prevent damage to the parts, the bolt holes in the transaxle case which are used for securing the steel plate are the penetrated bolt holes shown in the figure.**

Note
- When installing the steel plate to the transaxle case, use a bolt (M8×1.25).
- Use a bolt length in which the bolt end comes out of the transaxle case bolt hole but does not contact the transaxle case.
- Because it is necessary to measure the low and reverse brake clearance in four locations (each separated by 90°), change the steel plate installation position to the area of the bolt installation position shown in the figure then install the steel plate to a position which facilitates measurement.

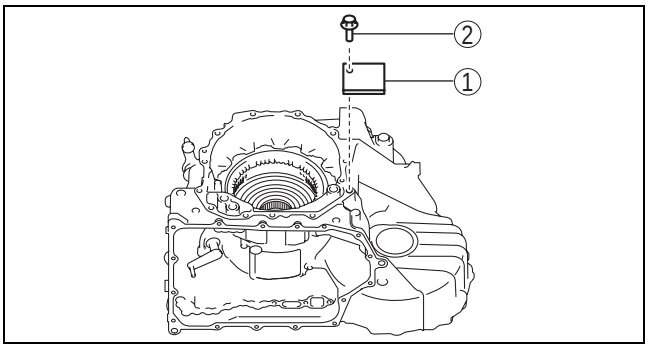
A : Bolt installation position for steel plate installation



azzjjw00000741

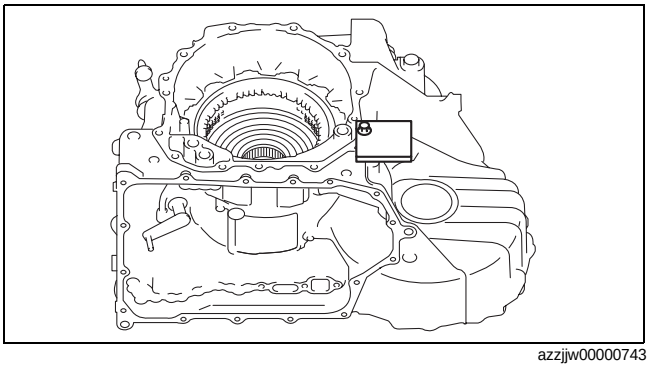
1	Steel plate (for securing magnetic stand)
2	Bolt (M8×1.25)*

* : Use a bolt length in which the bolt end comes out of the transaxle case bolt hole but does not contact the transaxle case.



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Steel plate installation bolt tightening torque
15 N·m {1.5 kgf·m, 11 ft·lbf} or less (tighten so that steel plate does not move during low and reverse brake clearance measurement)

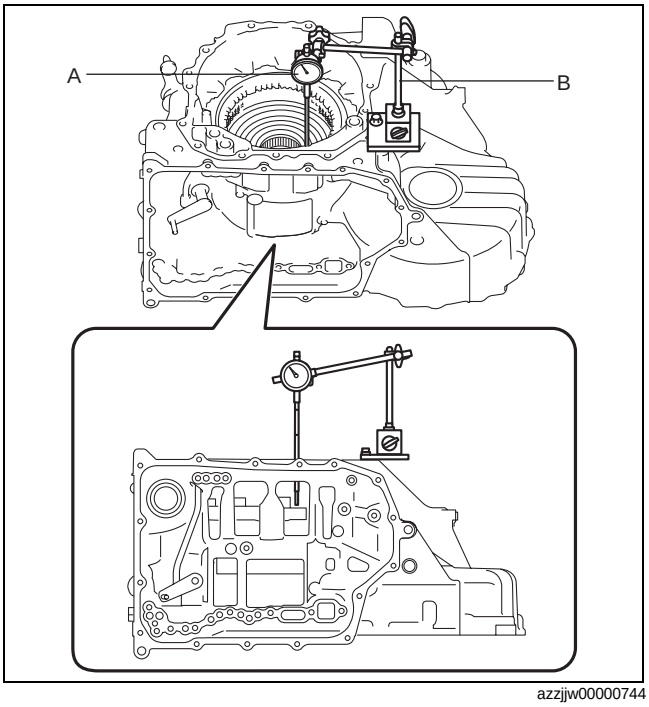

azzjjw00000743

(2) Set the dial gauge and magnetic stand as shown in the figure.

A : Dial gauge
B : Magnetic stand

Caution

- **To reduce error during the low and reverse brake clearance measurement, set the dial gauge so that it is perpendicular to the alignment surface of the transaxle case with the end cover.**



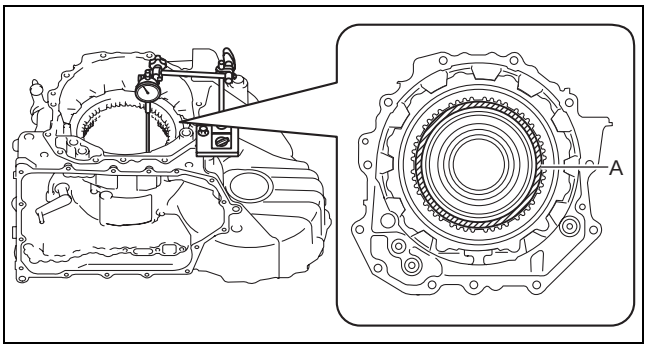
azzjjw00000744

(3) Set the dial gauge end to the low and reverse brake piston.

A : Area in which dial gauge end is set

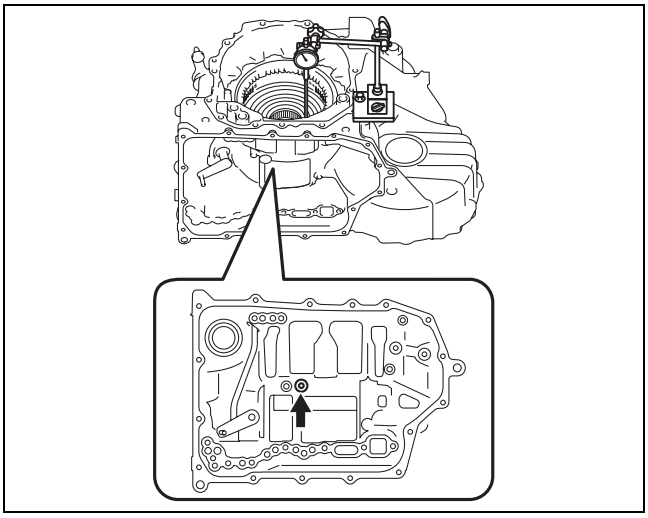
Note

- Measure the stroke amount of the low and reverse brake piston as the low and reverse brake clearance.



azzjjw00000745

4. Measure the low and reverse brake clearance using the following procedure:
   (1) Blow compressed air into the oil passage shown in the figure and verify the operation condition of the low and reverse brake (approx. 3 times).

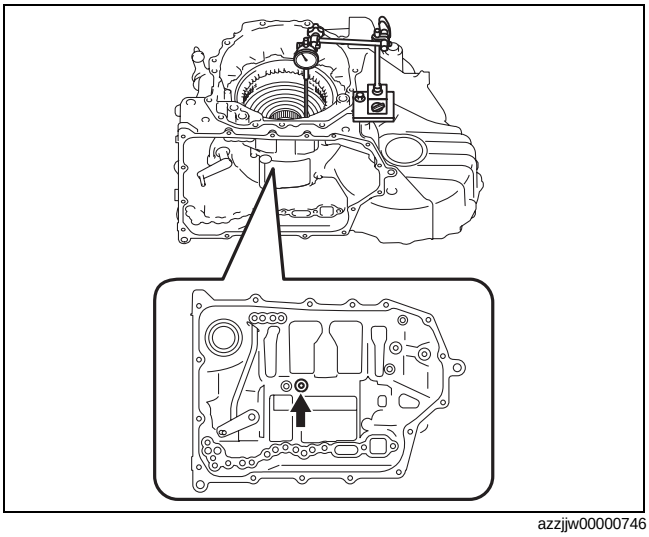

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Warning
- **Always wear protective eye wear when using the air compressor. Otherwise, ATF or dirt particles blown off by the air compressor could get into the eyes.**

Caution
- **To prevent damage to parts, always use an air compressor which is adjusted to the indicated pressure.**

Compressed air pressure
0.39—0.44 MPa {4.0—4.4 kgf/cm^2, 57—63 psi}

   (2) Blow compressed air into the oil passage shown in the figure and operate the low and reverse brake piston to read the value when the dial gauge is stabilized.


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Warning
- **Always wear protective eye wear when using the air compressor. Otherwise, ATF or dirt particles blown off by the air compressor could get into the eyes.**

Caution
- **To prevent damage to parts, always use an air compressor which is adjusted to the indicated pressure.**

Compressed air pressure
0.39—0.44 MPa {4.0—4.4 kgf/cm^2, 57—63 psi}

   (3) Input the dial gauge value, which was read while the low and reverse brake piston was operating, into the measurement/adjustment value input sheet.
   (4) Release the compressed air and read the dial gauge value without the low and reverse brake piston operating.
   (5) Input the dial gauge value, which was read without the low and reverse brake piston operating, into the measurement/adjustment value sheet.
   (6) Perform the following calculation to calculate the low and reverse brake clearance.
   Low and reverse brake clearance = A − B
   A: Dial gauge value with low and reverse brake piston operating
   B: Dial gauge value without low and reverse brake piston operating

Note
Example
A: Dial gauge value with low and reverse brake piston operating is 2.470 mm {0.09724 in}
B: Dial gauge value without low and reverse brake piston operating is 0.595 mm {0.02343 in}
Low and reverse brake clearance = 2.470 mm {0.09724 in} − 0.595 mm {0.02343 in} = 1.875 mm {0.07382 in}

   (7) Input the calculated low and reverse brake clearance into the measurement/adjustment value sheet.

(8) Measure the low and reverse brake clearance in four locations (each separated by 90°) and calculate the average value of the low and reverse brake clearance.

Note
- Change the set positions of the dial gauge and magnetic stand and measure the low and reverse brake clearance in four locations (each separated by 90°).

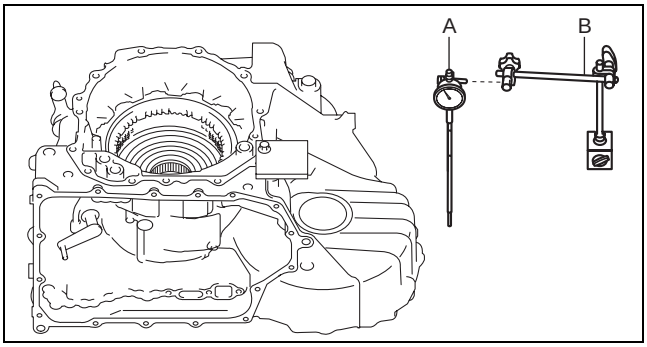
(9) Input the average value of the calculated low and reverse brake clearance into the measurement/ adjustment value sheet.
(10) Verify that the average value of the low and reverse brake clearance satisfies the specification.

Specification
1.650—1.850 mm {0.06497—0.07283 in}

- If not within the specification, adjust the low and reverse brake clearance. (See 05-17-360 Low and Reverse Brake Clearance Adjustment.)

5. Remove the dial gauge and magnetic stand.

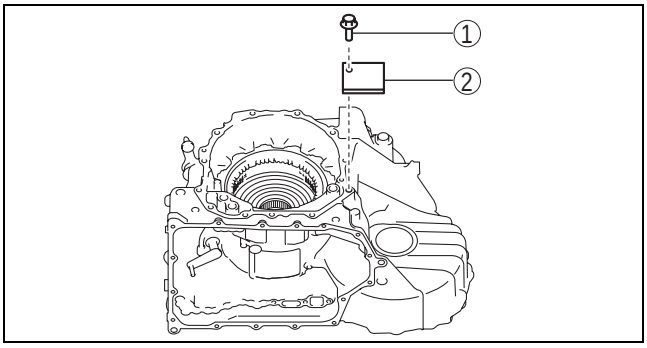
A : Dial gauge
B : Magnetic stand



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6. Remove the steel plate for securing the magnetic stand using the procedure shown in the figure.

1	Bolt
2	Steel plate (for securing magnetic stand)

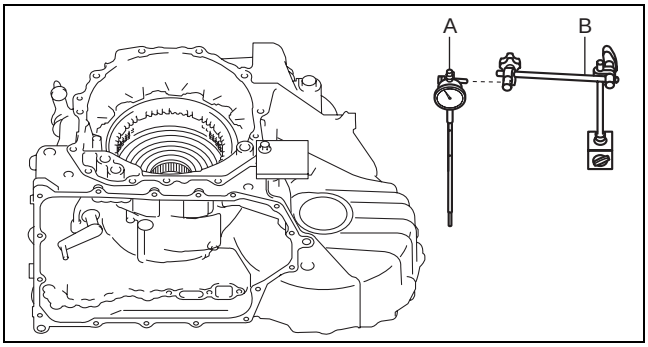


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Low and Reverse Brake Clearance Adjustment

1. Remove the dial gauge and magnetic stand.

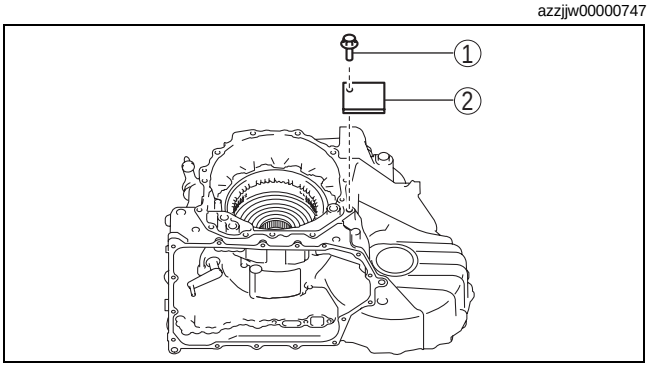
A : Dial gauge
B : Magnetic stand



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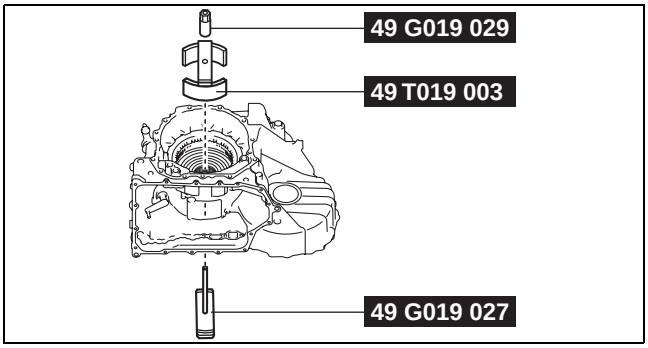
2. Remove the steel plate for securing the magnetic stand using the procedure shown in the figure.

1	Bolt
2	Steel plate (for securing magnetic stand)

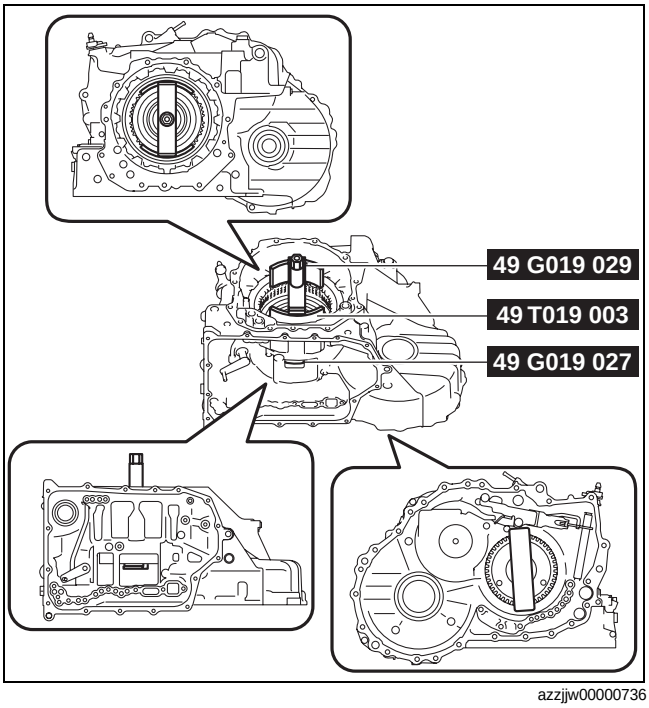


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3. Remove the snap ring using the following procedure:
   (1) Install the SSTs.



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(2) Tighten the SST (49 G019 029) until there is no longer any spring force from the springs and retainer component applied to the snap ring.

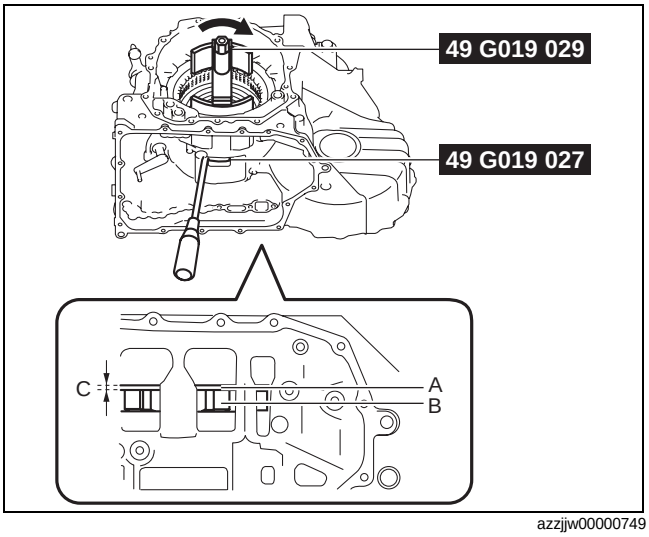
A : Snap ring
B : One-way clutch
C : Gap

Caution

- **If the SST (49 G019 029) is tightened with excessive force, surrounding parts could be damaged. Stop tightening if a gap appears between the snap ring and one-way clutch**

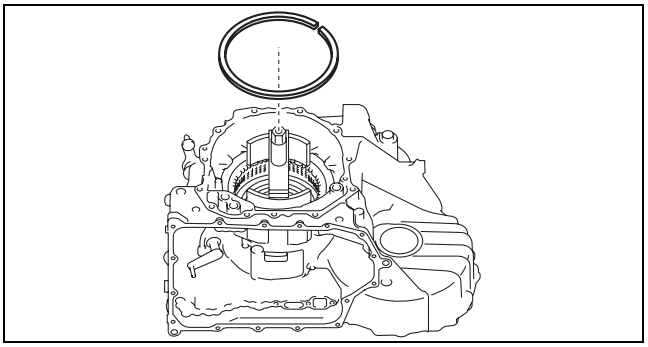
Note

- Lock the SST (49 G019 027) against rotation using a flathead screwdriver and tighten the SST (49 G019 029).



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(3) Remove the snap ring.



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4. Measure the thickness of the removed snap ring.

Note

- Recommended measuring instrument: Micrometer

5. Input the measured snap ring thickness into the measurement/adjustment value input sheet.

6. Select the appropriate snap ring from the following table:

Range*	Selected snap ring thickness
Exceeds 4.500 mm {0.1772 in}, 4.600 mm {0.1811 in} or less	2.8 mm {0.110 in}
Exceeds 4.400 mm {0.1732 in}, 4.500 mm {0.1772 in} or less	2.7 mm {0.106 in}
Exceeds 4.300 mm {0.1693 in}, 4.400 mm {0.1732 in} or less	2.6 mm {0.102 in}
Exceeds 4.200 mm {0.1654 in}, 4.300 mm {0.1693 in} or less	2.5 mm {0.098 in}
Exceeds 4.100 mm {0.1614 in}, 4.200 mm {0.1654 in} or less	2.4 mm {0.094 in}
Exceeds 4.000 mm {0.1575 in}, 4.100 mm {0.1614 in} or less	2.3 mm {0.091 in}
Exceeds 3.900 mm {0.1535 in}, 4.000 mm {0.1575 in} or less	2.2 mm {0.087 in}
Exceeds 3.800 mm {0.1496 in}, 3.900 mm {0.1535 in} or less	2.1 mm {0.083 in}
Exceeds 3.700 mm {0.1457 in}, 3.800 mm {0.1496 in} or less	2.0 mm {0.079 in}
Exceeds 3.600 mm {0.1417 in}, 3.700 mm {0.1457 in} or less	1.9 mm {0.075 in}
Exceeds 3.500 mm {0.1378 in}, 3.600 mm {0.1417 in} or less	1.8 mm {0.071 in}

* : The range is the sum of the average value of the low and reverse brake clearance and the thickness value of the removed snap ring.

Range = D + G
D: Average value of low and reverse brake clearance
G: Thickness of removed snap ring

Note
Example
D: Average value of low and reverse brake clearance is 1.879 mm {0.07398 in}
G: Thickness of removed snap ring is 2.305 mm {0.09075 in}
Range = 1.879 mm {0.07398 in} + 2.305 mm {0.09075 in} = 4.184 mm {0.16472 in}, the selected snap ring has a thickness of 2.4 mm {0.094 in}.

7. Assemble the selected snap ring using the following procedure:

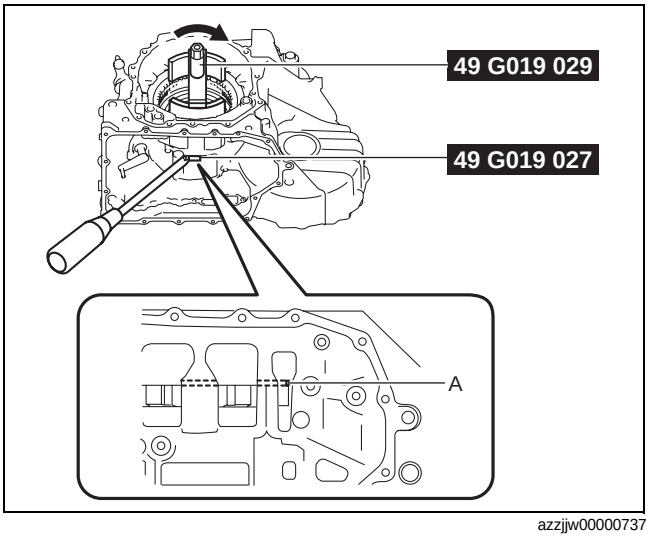
Note
- Snap ring size: Outer diameter approx. 198.0 mm {7.795 in}

(1) Tighten the SST (49 G019 029) until the snap ring groove of the transaxle case comes out.

A : Snap ring groove

Caution
- **If the SST (49 G019 029) is tightened with excessive force, surrounding parts could be damaged. Stop tightening the SST when the snap ring groove of the transaxle case comes out.**

Note
- Lock the SST (49 G019 027) against rotation using a flathead screwdriver and tighten the SST (49 G019 029).

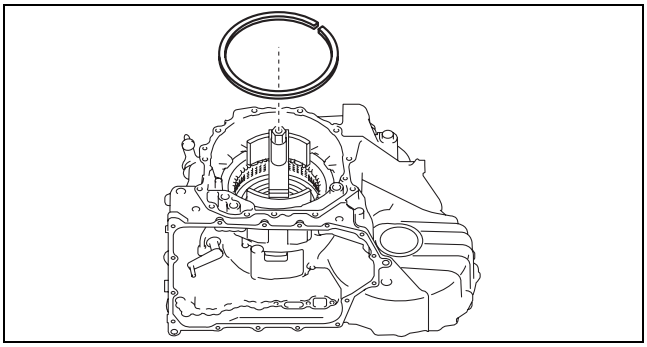


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(2) Assemble the snap ring to the position shown in the figure.

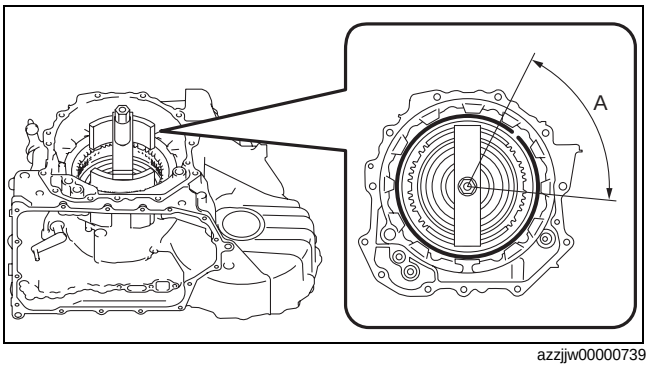
Caution

- **Assemble the snap ring so that the end gap of the snap ring is in the area shown in the figure.**
- **After assembling the snap ring, verify that the snap ring is securely inserted into the bottom of the snap ring groove.**



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A : End gap of snap ring assembly area

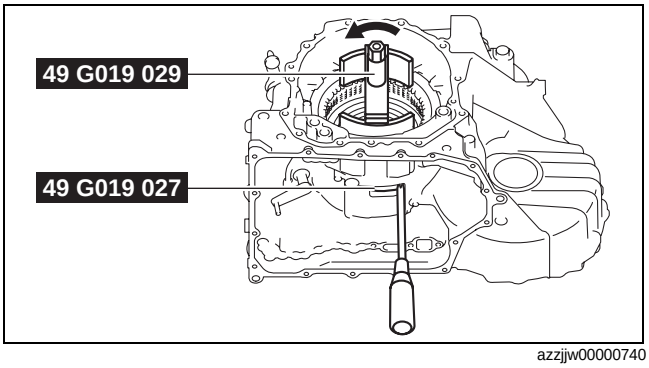


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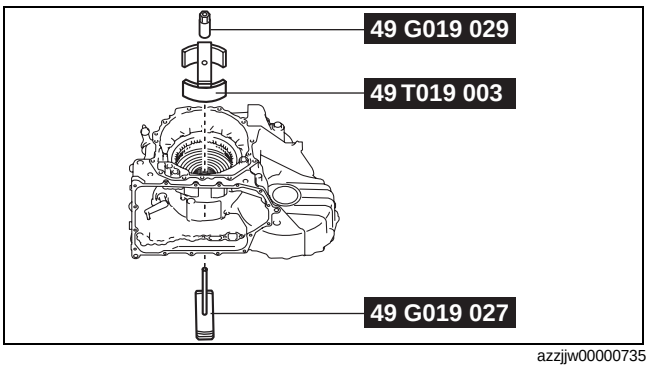
(3) Loosen the SST (49 G019 029) and remove the SSTs.

Note

- Lock the SST (49 G019 027) against rotation using a flathead screwdriver and loosen the SST (49 G019 029).



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8. Perform the low and reverse brake clearance measurement from Step 3. (See 05-17-353 Low and Reverse Brake Clearance Measurement.)

SECONDARY GEAR AND OUTPUT GEAR PRELOAD MEASUREMENT/ADJUSTMENT

id051700665000

Preparation Before Servicing

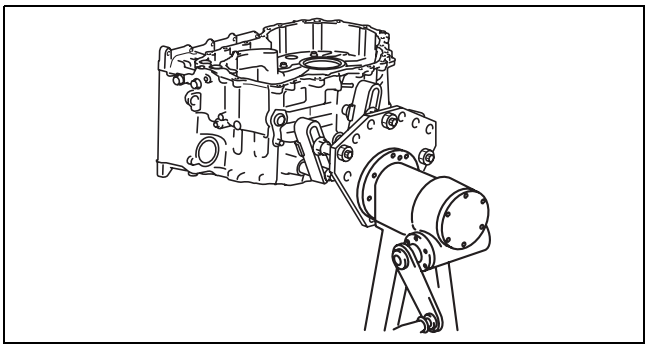
1. Print out the measurement/adjustment value input sheet. (See 05-17-295 MEASUREMENT/ADJUSTMENT VALUE INPUT SHEET.)

Note

- When performing the measurement/adjustment, input the measured and calculated values into the measurement/adjustment value input sheet.
- When performing the other measurements/adjustments, if the measurement/adjustment value input sheet has been printed out, use the printed sheet.

Secondary Gear and Output Gear Preload Measurement

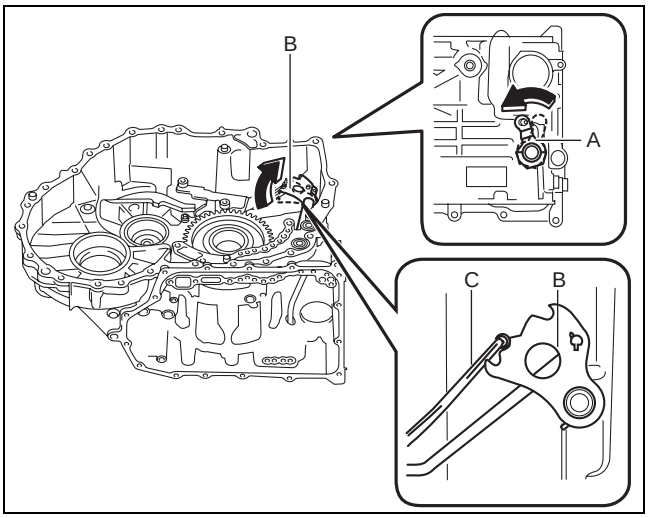
1. Rotate and adjust the rotation handle of the engine stand so that the converter housing side is facing upward.



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2. Rotate the parking shift lever component to the N position as shown in the figure.

A : Parking shift lever component
B : Manual plate component
C : Detent bracket component

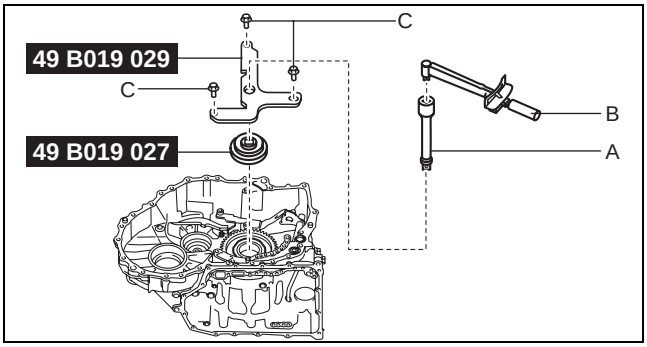


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3. Remove any remaining old sealant on the contact surfaces of the transaxle case and converter housing.

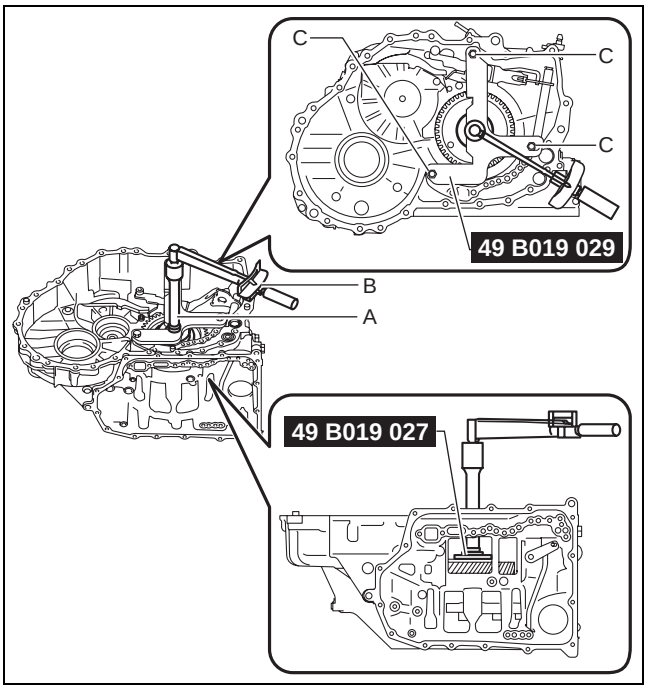
4. Measure the angular contact ball bearing preload using the following procedure:
   (1) Set the SSTs, extension bar, and torque wrench as shown in the figure.

A : Extension bar
B : Torque wrench
C : Bolt supplied with SST (49 B019 029) or M8×1.25, length to 18 mm {0.71 in}



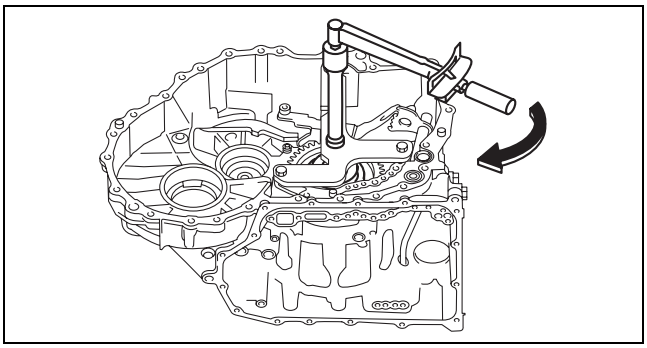
azzjjw00001577

A : Extension bar
B : Torque wrench
C : Bolt supplied with SST (49 B019 029) or M8×1.25, length to 18 mm {0.71 in}



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   (2) Rotate the locknut (primary gear) in the direction of the arrow shown in the figure using a torque wrench and measure the angular contact ball bearing preload.



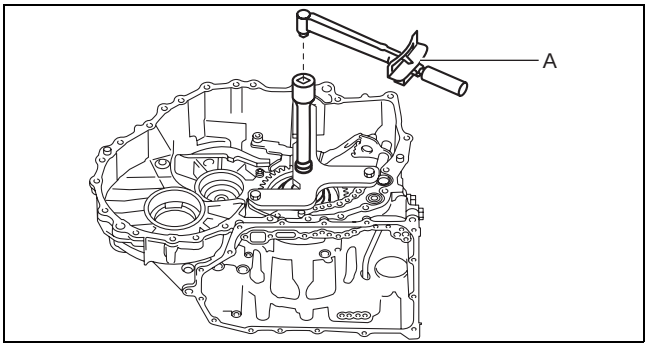
azzjjw00001579

Caution
- **After rotating the locknut (primary gear) approx. 10 times in the direction of the arrow shown in the figure, measure the angular contact ball bearing preload to engage the angular contact ball bearing.**
- **When the locknut (primary gear) is rotated at approx. 20 rpm (speed of one rotation for 3 s), measure the rotational torque as the angular contact ball bearing preload.**

   (3) Input the measured angular contact ball bearing preload into the measurement/adjustment value sheet.

(4) Remove the torque wrench.

A : Torque wrench



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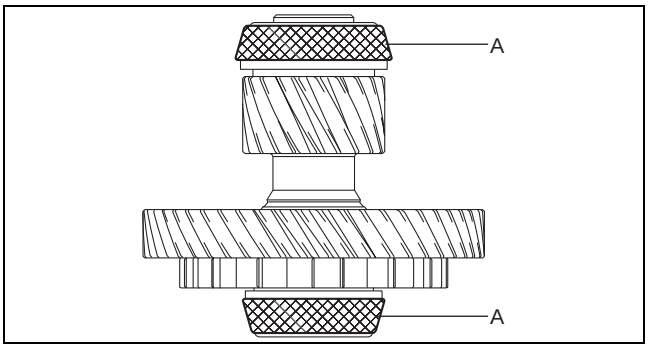
Note

- Because the SSTs and extension bar are used for secondary gear and output gear preload measurement/adjustment, do not remove them.

5. Assemble the secondary gear and output gear using the following procedure:

(1) Apply ATF (ATF FZ) to the taper roller bearing roller of the secondary gear and output gear.

A : ATF application area

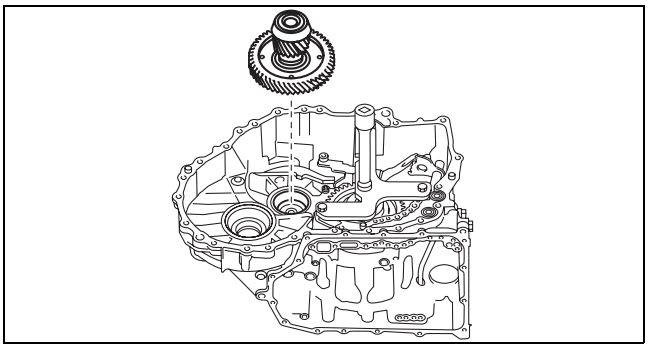


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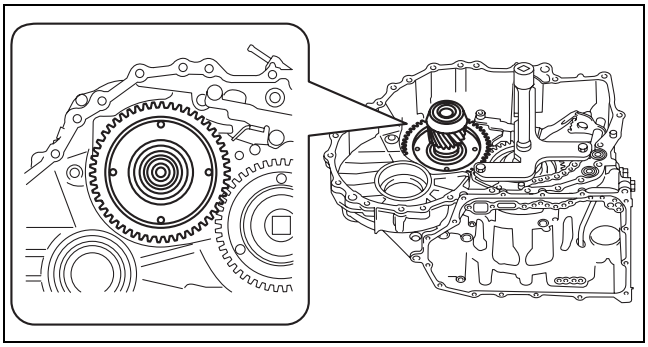
Caution

- **Accurately perform the procedure to reduce the error on the secondary gear and output gear preload measurement.**

(2) Assemble the secondary gear and output gear.



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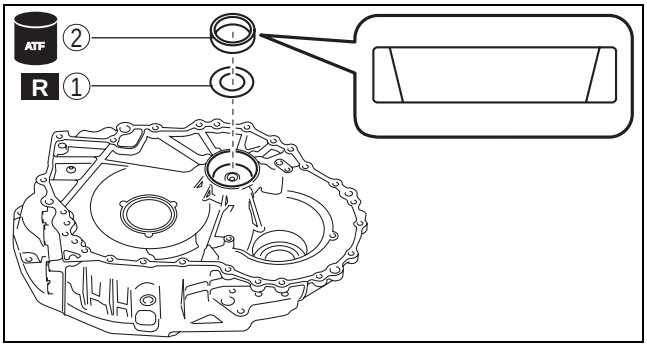
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6. Assemble the bearing race and a new shim with the same thickness as the removed shim to the converter housing using the following procedure:

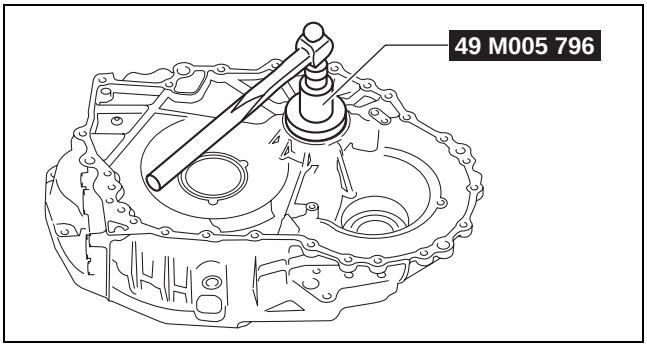
Caution
- **Always use a new shim. If a deformed shim is reused, it may cause a transaxle malfunction.**

(1) Apply ATF (ATF FZ) to the engagement area of the bearing race and converter housing.
(2) Assemble the bearing race and a new shim with the same thickness as the removed shim using the following procedure and the SST:

1	Shim (outer diameter approx. 74 mm {2.9 in}) (new shim with same thickness of removed shim)
2	Bearing race (outer diameter approx. 75 mm {3.0 in})



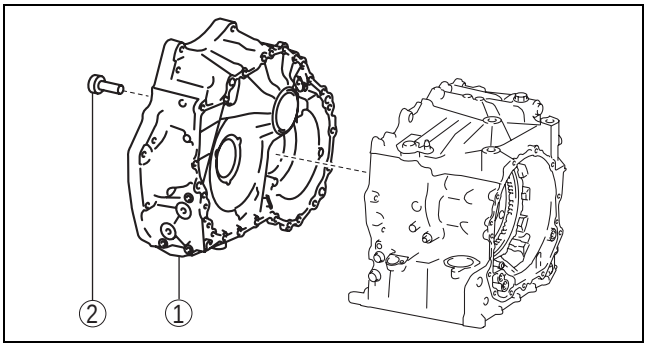
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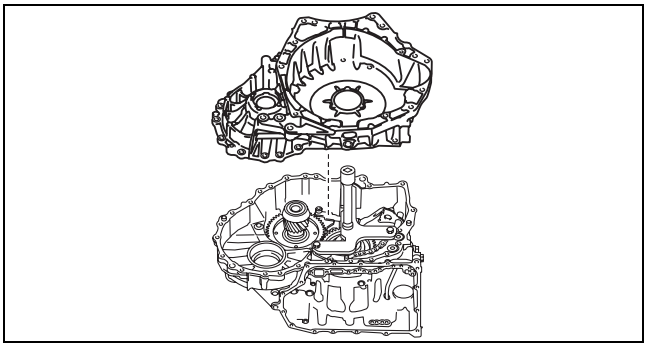
7. Assemble the converter housing using the following procedure:

1	Converter housing
2	24 bolts (M8×1.25 bolt, length to approx. 28 mm {1.1 in})



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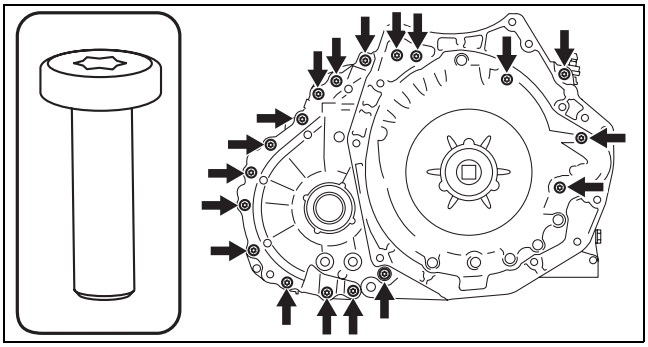
(1) Assemble the converter housing.



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(2) Assemble and temporarily tighten the bolts to the positions shown in the figure.

Note
- Bolt size: M8×1.25 bolt, length to approx. 28 mm {1.1 in}

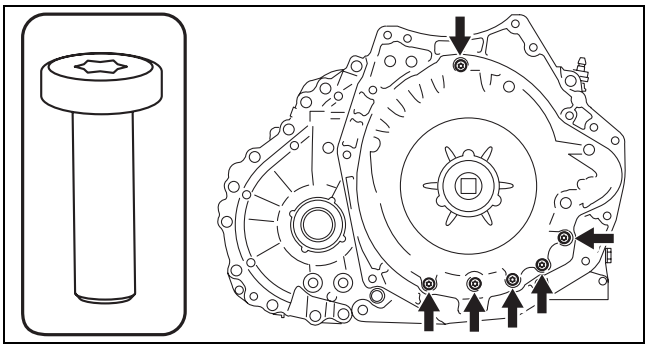


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(3) Assemble and temporarily tighten the bolts to the positions shown in the figure.

Caution
- **When performing the automatic transaxle assembly after the secondary gear and output gear preload measurement/ adjustment, use new bolts, otherwise ATF leakage could occur.**

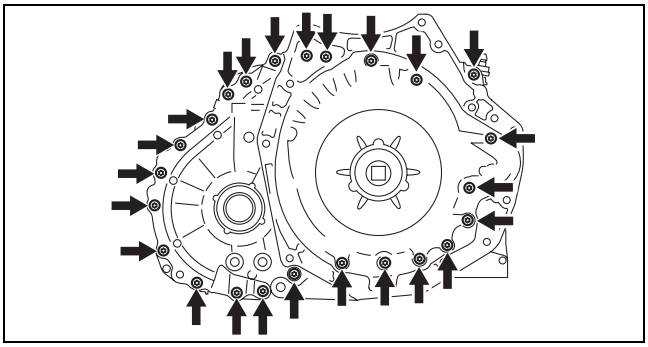
Note
- The bolts for the assembly are applied with sealant. However, the bolts are reused for removal after the secondary gear and output gear preload measurement/adjustment.
- Bolt size: M8×1.25 bolt, length to approx. 28 mm {1.1 in}



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(4) Tighten the bolts shown in the figure.

Tightening torque
19—25 N·m {2.0—2.5 kgf·m, 15—18 ft·lbf}



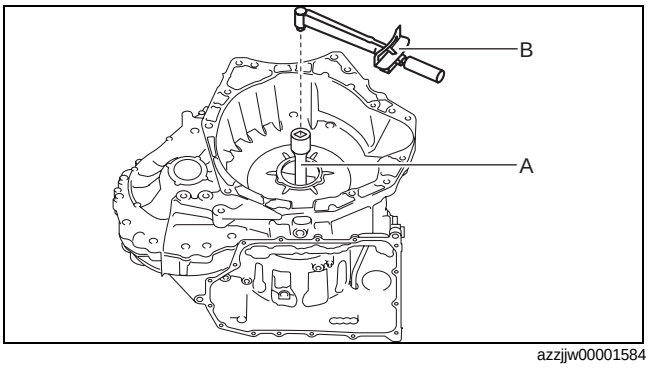
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8. Measure the total preload using the following procedure:

Note
- The total preload is the combined preload of the angular contact ball bearing preload and secondary gear and output gear preload.

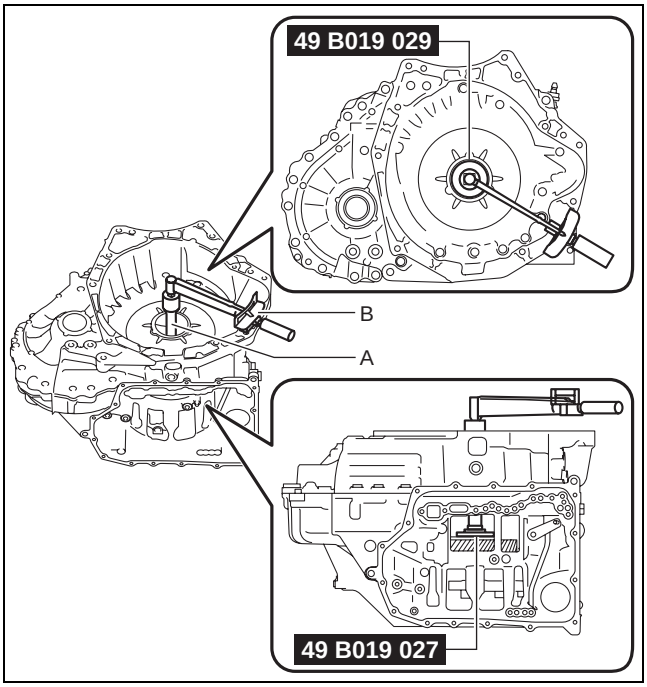
(1) Set the torque wrench to the extension bar as shown in the figure.

A : Extension bar
B : Torque wrench



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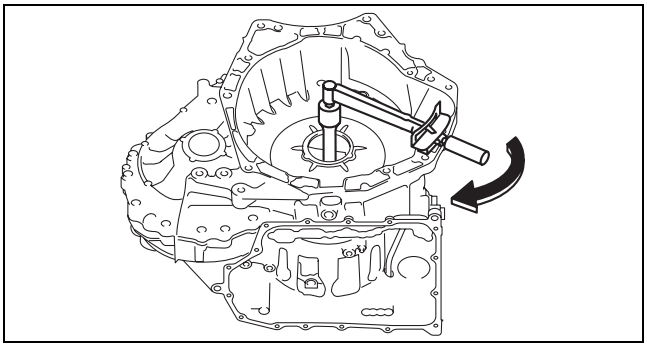
A : Extension bar
B : Torque wrench



azzjjw00001585

(2) Rotate the locknut (primary gear) in the direction of the arrow shown in the figure using a torque wrench and measure the total preload.

Caution
- **Measure the total preload after rotating the locknut (primary gear) approx. 10 times in the direction of the arrow shown in the figure to engage the taper roller bearing.**
- **When the locknut (primary gear) is rotated at approx. 20 rpm (speed of one rotation for 3 s), measure the rotational torque as the total preload.**

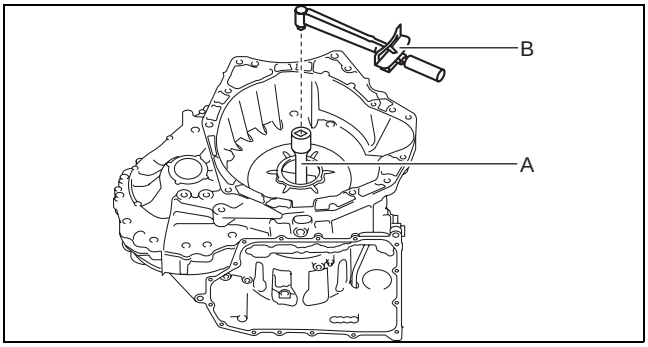


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(3) Input the measured total preload into the measurement/adjustment value sheet.

(4) Remove the torque wrench from the extension bar.

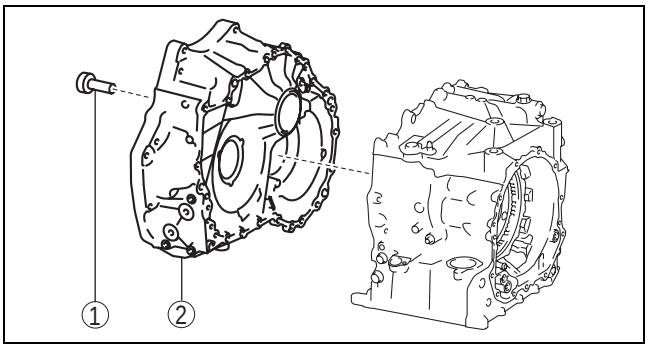
A : Extension bar
B : Torque wrench



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9. Remove the converter housing using the following procedure:

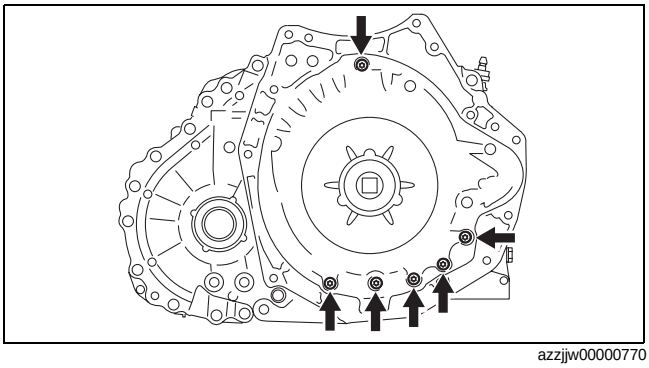
1	24 bolts
2	Converter housing



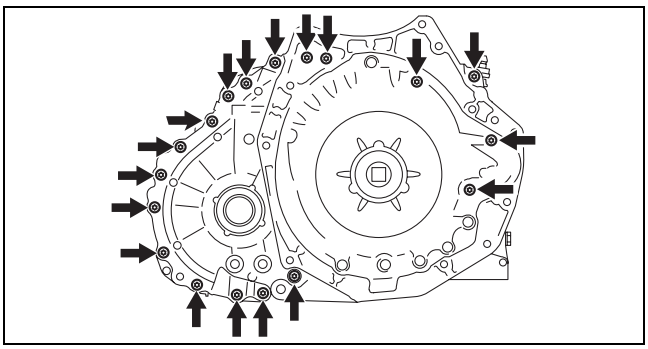
azzjjw00000769

(1) Remove the bolts shown in the figure.

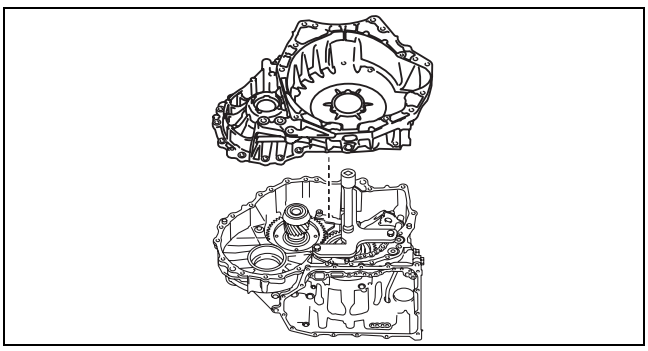
Caution
- **Sealant has been applied to the removed bolts. If the bolts are reused it could cause ATF leakage, therefore when performing the automatic transaxle assembly, use new bolts.**


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(2) Remove the bolts shown in the figure.


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(3) Remove the converter housing.


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10. Perform the following calculation to calculate the secondary gear and output gear preload.
    Secondary gear and output gear preload = B - A
    A: Angular contact ball bearing preload
    B: Total preload

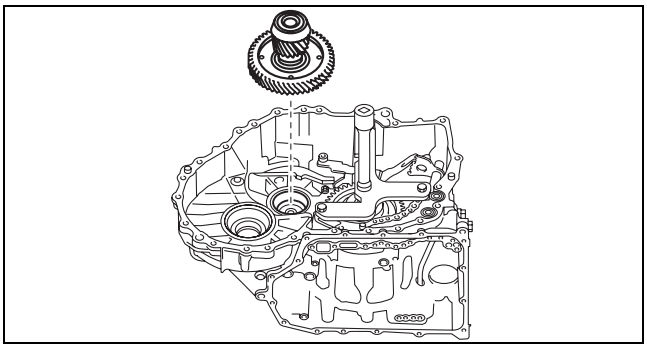
    Note
    Example
    A: Angular contact ball bearing preload is 1.2 N·m {12.2 kgf·cm, 10.6 in·lbf}
    B: Total preload is 3.7 N·m {37.7 kgf·cm, 32.7 in·lbf}
    Secondary gear and output gear preload = 3.7 N·m {37.7 kgf·cm, 32.7 in·lbf} - 1.2 N·m {12.2 kgf·cm, 10.6 in·lbf} = 2.5 N·m {25.5 kgf·cm, 22.1 in·lbf}

11. Input the calculated secondary gear and output gear preload into the measurement/adjustment value sheet.
12. Verify that the secondary gear and output gear preload satisfies the specification.

    Specification
    2.8—3.7 N·m {28.6—37.7 kgf·cm, 24.8—32.7 in·lbf}

    - If not within the specification, adjust the secondary gear and output gear preload. (See 05-17-372 Secondary Gear and Output Gear Preload Adjustment.)

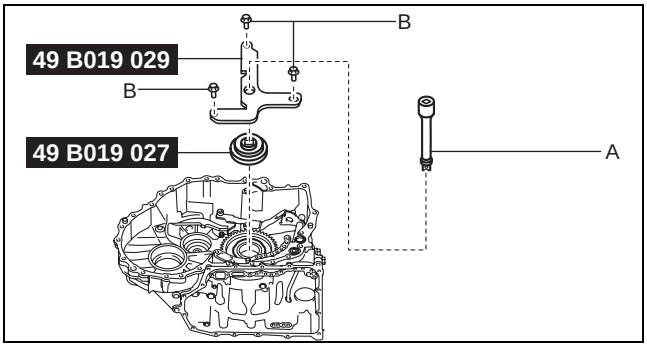
13. Remove the secondary gear and output gear.



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14. Remove the SST and extension bar.

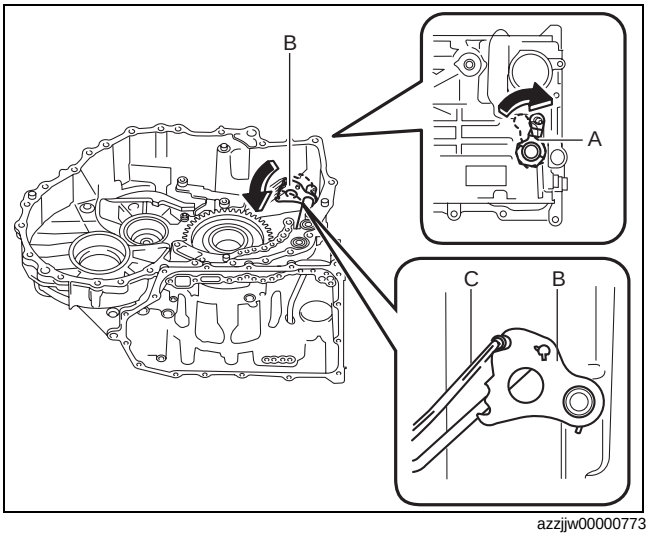
A : Extension bar
B : Bolt supplied with SST (49 B019 029) or M8×1.25, length to 18 mm {0.71 in}



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15. Rotate the parking shift lever component to the P position as shown in the figure.

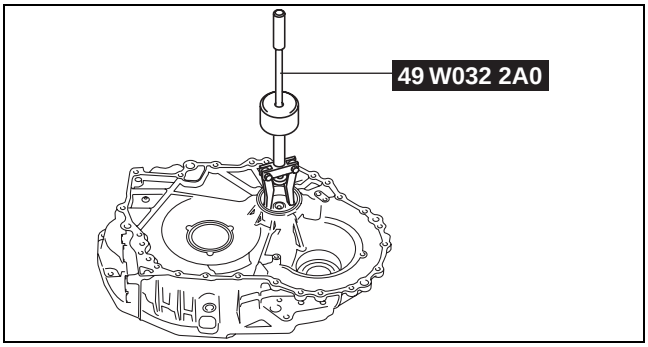
A : Parking shift lever component
B : Manual plate component
C : Detent bracket component



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Secondary Gear and Output Gear Preload Adjustment

1. Remove the bearing race and shim from the converter housing using the SST and procedure shown in the figure.

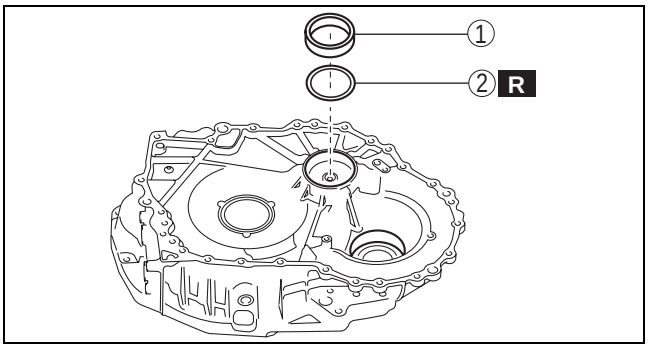


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Caution

- **Because the shim will deform when removing the bearing race, use a new shim when performing the shim assembly.**

1	Bearing race
2	Shim



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2. Measure the thickness of the removed shim.

Note

- Recommended measuring instrument: Micrometer

3. Input the measured shim thickness into the measurement/adjustment value sheet.
4. Perform the following calculation to calculate the preload gap.

Note

- The preload gap is the difference between the secondary gear and output gear preload and the median value of the secondary gear and output gear preload specification.

Preload gap = G - C
C: Secondary gear and output gear preload
G: Median value of secondary gear and output gear preload specification (3.25 N·m {33.1 kgf·cm, 28.7 in·lbf})

Note
Example
C: Secondary gear and output gear preload is 2.5 N·m {25.5 kgf·cm, 22.1 in·lbf}
Preload gap = 3.25 N·m {33.1 kgf·cm, 28.7 in·lbf} - 2.5 N·m {25.5 kgf·cm, 22.1 in·lbf} = 0.75 N·m {7.6 kgf·cm, 6.6 in·lbf}

5. Input the calculated preload gap into the measurement/adjustment value sheet.

6. Perform the following calculation to calculate the gap in the shim thickness.

   Note
   - The gap in the shim thickness is the difference between the removed shim thickness and the optimum shim thickness.
   - If the shim thickness is thickened 0.1 mm {0.00394 in}, the secondary gear and output gear preload increases approx. 1.6 N·m {16.3 kgf·cm, 14.1 in·lbf}.

   Shim thickness gap = H × 0.1 mm {0.00394 in} / 1.6 N·m {16.3 kgf·cm, 14.1 in·lbf}
   H: Preload gap

   Note
   Example
   H: Preload gap is 0.75 N·m {7.6 kgf·cm, 6.6 in·lbf}
   Shim thickness gap = 0.75 N·m {7.6 kgf·cm, 6.6 in·lbf} × 0.1 mm {0.00394 in} / 1.6 N·m {16.3 kgf·cm, 14.1 in·lbf} = 0.047 mm {0.00185 in}

7. Input the calculated shim thickness gap into the measurement/adjustment value sheet.
8. Perform the following calculation to calculate the optimum shim thickness.
   Optimum shim thickness = F + I
   F: Thickness of removed shim
   I: Shim thickness gap

   Note
   Example
   F: Thickness of removed shim is 0.855 mm {0.03366 in}
   I: Shim thickness gap is 0.047 mm {0.00185 in}
   Thickness of optimum shim = 0.855 mm {0.03366 in} + 0.047 mm {0.00185 in} = 0.902 mm {0.03551 in}

9. Input the calculated optimum shim thickness into the measurement/adjustment value sheet.
10. Select the nearest new shim for the calculated optimum shim thickness from the following table:

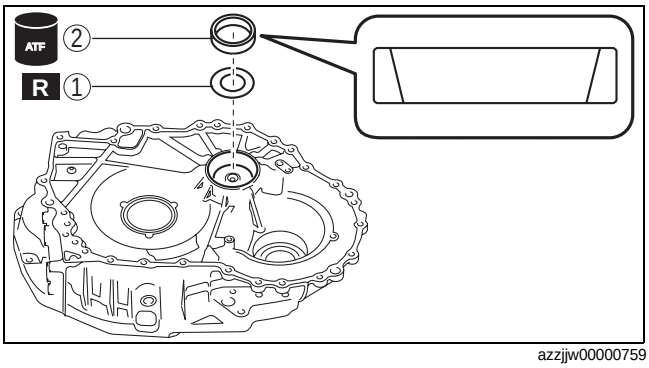
Selected shim thickness
1.45 mm {0.0571 in}
1.40 mm {0.0551 in}
1.35 mm {0.0531 in}
1.30 mm {0.0512 in}
1.25 mm {0.0492 in}
1.20 mm {0.0472 in}
1.15 mm {0.0453 in}
1.10 mm {0.0433 in}
1.05 mm {0.0413 in}
1.00 mm {0.0394 in}
0.95 mm {0.0374 in}
0.90 mm {0.0354 in}
0.85 mm {0.0335 in}
0.80 mm {0.0315 in}
0.75 mm {0.0295 in}
0.70 mm {0.0276 in}
0.65 mm {0.0256 in}
0.60 mm {0.0236 in}
0.55 mm {0.0217 in}
0.50 mm {0.0197 in}

11. Assemble the bearing race and selected new shim to the converter housing using the following procedure:

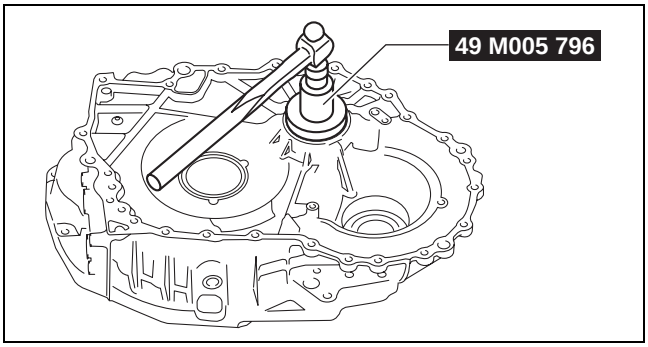
Caution
- **Always use a new shim. If a deformed shim is reused, it may cause a transaxle malfunction.**

(1) Apply ATF (ATF FZ) to the engagement area of the bearing race and converter housing.
(2) Assemble the bearing race and selected new shim using the following procedure and SST:

1	Shim (outer diameter approx. 74 mm {2.9 in}) (selected new shim)
2	Bearing race (outer diameter approx. 75 mm {3.0 in})



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12. Perform the secondary gear and output gear preload measurement from Step 7. (See 05-17-364 Secondary Gear and Output Gear Preload Measurement.)

RING GEAR AND DIFFERENTIAL PRELOAD MEASUREMENT/ADJUSTMENT

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Preparation Before Servicing

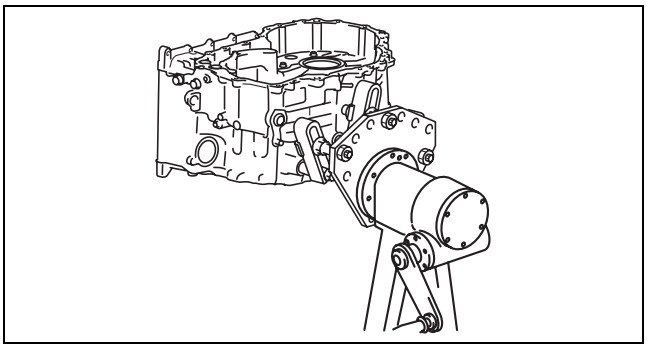
1. Print out the measurement/adjustment value input sheet. (See 05-17-295 MEASUREMENT/ADJUSTMENT VALUE INPUT SHEET.)

Note

- When performing the measurement/adjustment, input the measured and calculated values into the measurement/adjustment value input sheet.
- When performing the other measurements/adjustments, if the measurement/adjustment value input sheet has been printed out, use the printed sheet.

Ring Gear and Differential Preload Measurement

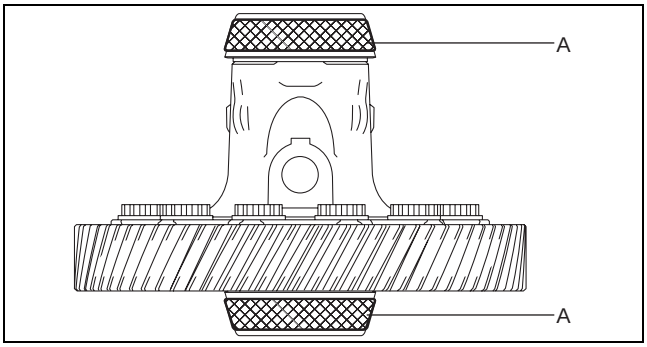
1. Rotate and adjust the rotation handle of the engine stand so that the converter housing side is facing upward.



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2. Remove any remaining old sealant on the contact surfaces of the transaxle case and converter housing.
3. Assemble the ring gear and differential.
   (1) Apply ATF (ATF FZ) to the roller area of the taper roller bearing of the ring gear and differential.

A : ATF application area

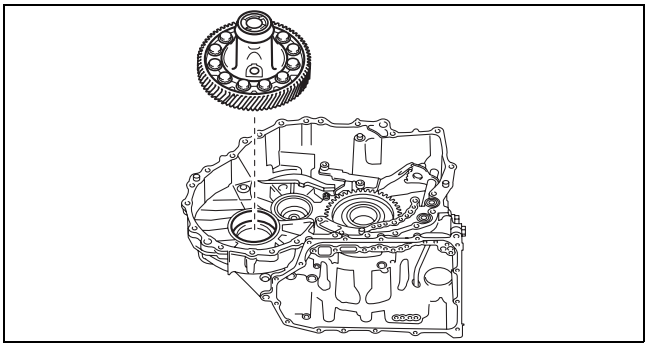


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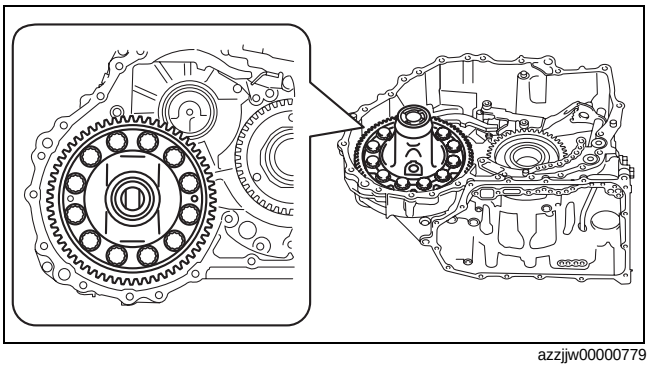
Caution

- **Accurately perform the procedure to reduce the error on the ring gear and differential preload measurement.**

(2) Assemble the ring gear and differential.



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4. Assemble the bearing race and a new shim with the same thickness as the removed shim to the converter housing using the following procedure:

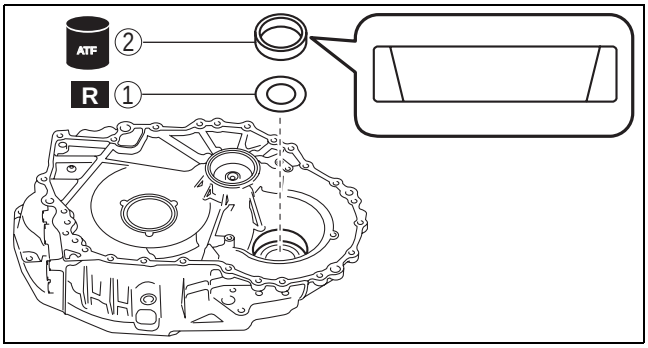
Caution

- **Always use a new shim. If a deformed shim is reused, it may cause a transaxle malfunction.**

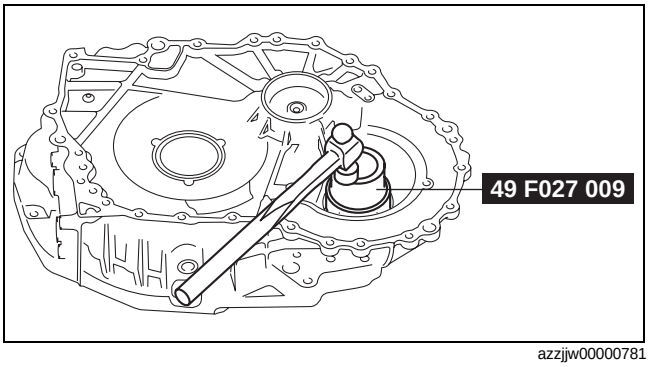
(1) Apply ATF (ATF FZ) to the engagement area of the bearing race and converter housing.

(2) Assemble the bearing race and a new shim with the same thickness as the removed shim using the following procedure and the SST:

1	Shim (outer diameter approx. 79 mm {3.1 in}) (new shim with same thickness of removed shim)
2	Bearing race (outer diameter approx. 80 mm {3.1 in})



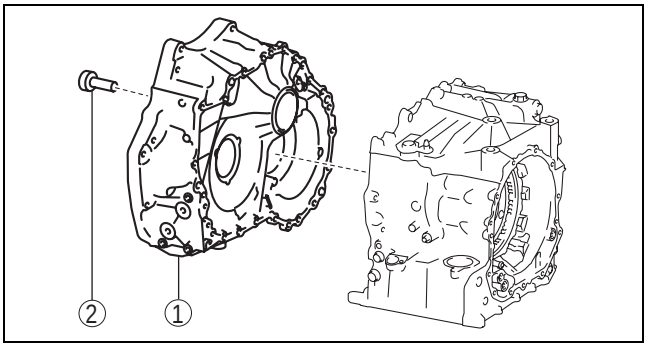
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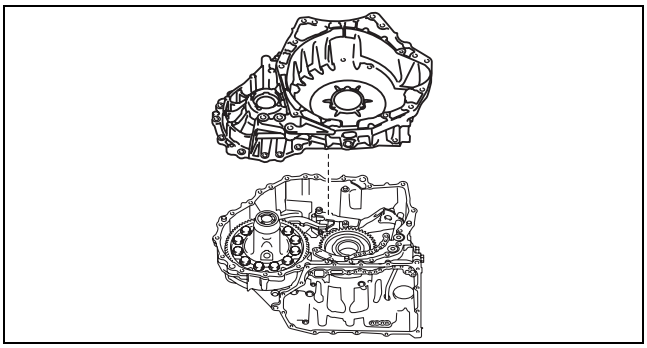
5. Assemble the converter housing using the following procedure:

1	Converter housing
2	24 bolts (M8×1.25 bolt, length to approx. 28 mm {1.1 in})



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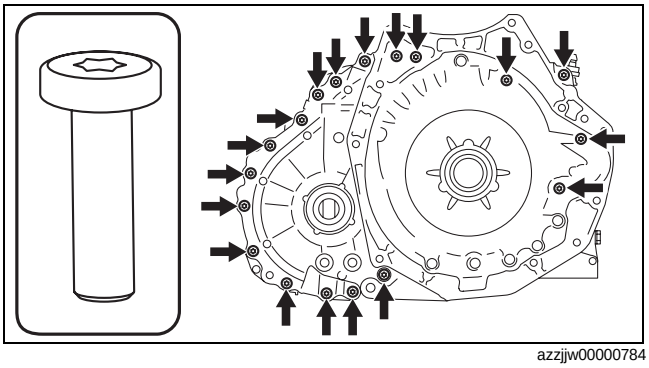
(1) Assemble the converter housing.



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(2) Assemble and temporarily tighten the bolts to the positions shown in the figure.

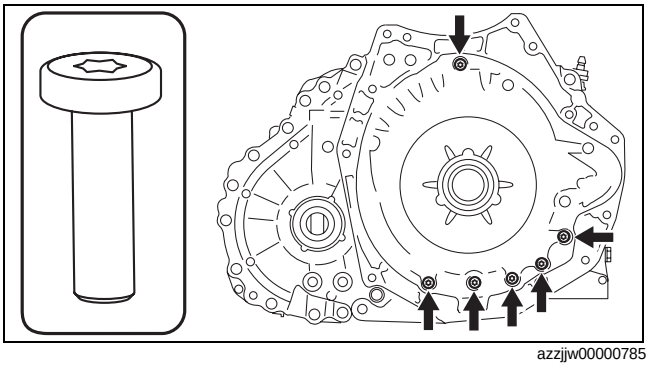
Note
- Bolt size: M8×1.25 bolt, length to approx. 28 mm {1.1 in}



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(3) Assemble and temporarily tighten the bolts to the positions shown in the figure.

Caution
- **When performing the automatic transaxle assembly after the ring gear and differential preload measurement/ adjustment, use new bolts, otherwise ATF leakage could occur.**

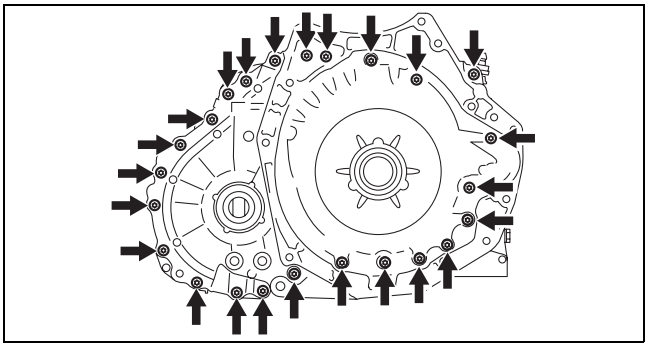


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Note
- The bolts for the assembly are applied with sealant. However, the bolts are reused for removal after the ring gear and differential preload measurement/adjustment.
- Bolt size: M8×1.25 bolt, length to approx. 28 mm {1.1 in}

(4) Tighten the bolts shown in the figure.

Tightening torque
19—25 N·m {2.0—2.5 kgf·m, 15—18 ft·lbf}

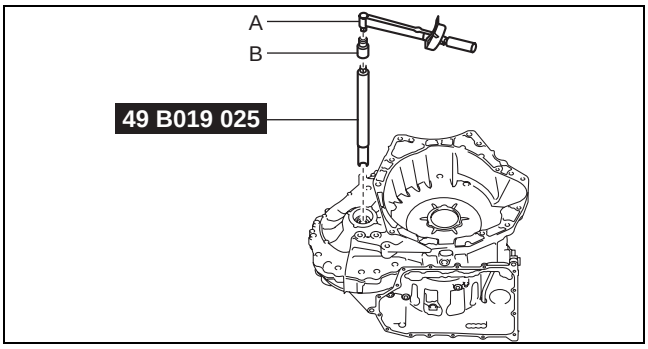


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6. Measure the ring gear and differential preload using the following procedure.
   (1) Set the SST, torque wrench, and socket (14 mm {9/16 in}) as shown in the figure.

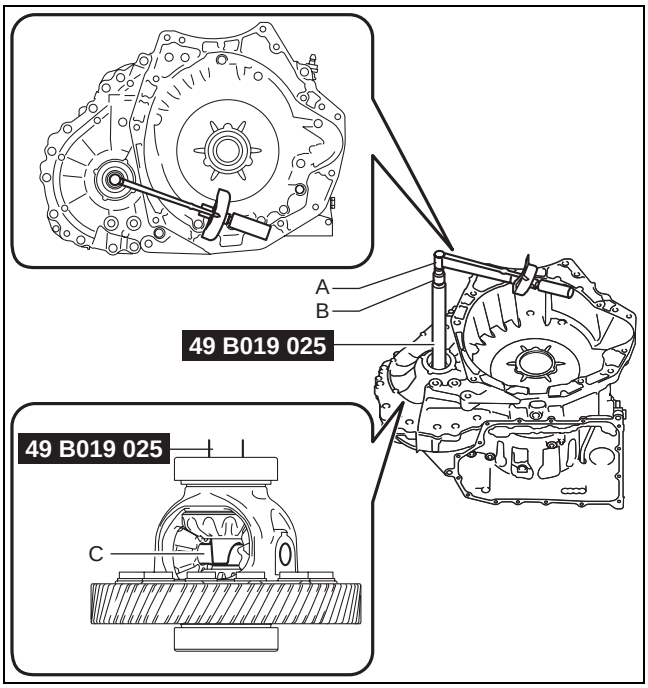
A : Torque wrench
B : Socket (14 mm {9/16 in})

Note
- Engage the groove on the end of the SST with the pinion shaft.



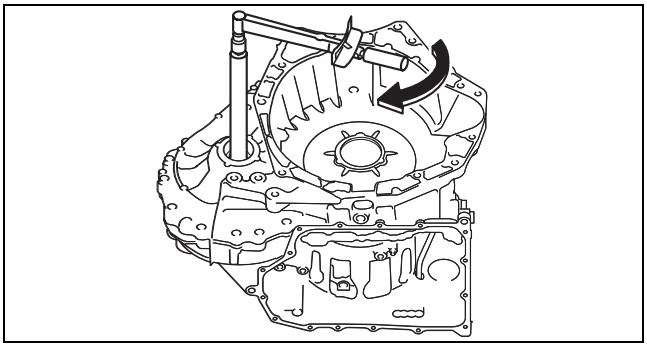
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A : Torque wrench
B : Socket (14 mm {9/16 in})
C : Pinion shaft



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(2) Rotate the ring gear and differential in the direction of the arrow shown in the figure using a torque wrench and measure the ring gear and differential preload.



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Caution

- **Measure the ring gear and differential preload after rotating the ring gear and differential approx. 10 times in the direction of the arrow shown in the figure to engage the taper roller bearing.**
- **When the ring gear and differential is rotated at approx. 20 rpm (speed of one rotation for 3 s), measure the rotational torque as a ring gear and differential preload.**

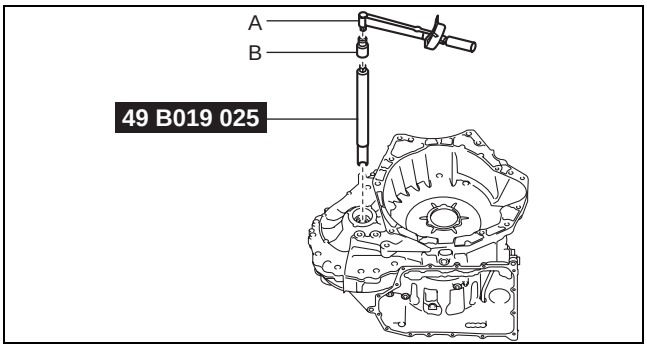
(3) Input the measured ring gear and differential preload into the measurement/adjustment value sheet.
(4) Verify that the ring gear and differential preload satisfies the specification.

Specification
2.8—4.1 N·m {28.6—41.8 kgf·cm, 24.8—36.2 in·lbf}

- If not within the specification, perform adjustment of the ring gear and differential preload. (See 05-17-381 Ring Gear and Differential Preload Adjustment.)

(5) Remove the SST, torque wrench, and socket (14 mm {9/16 in}).

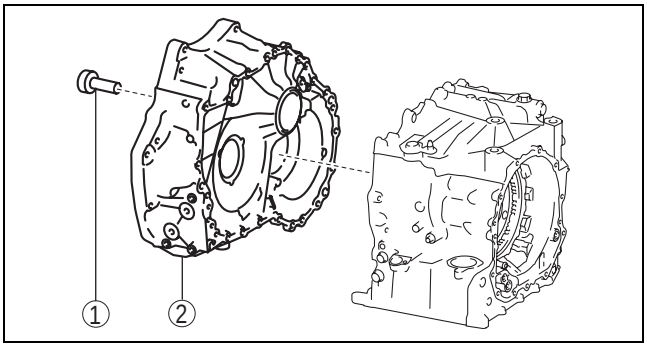
A : Torque wrench
B : Socket (14 mm {9/16 in})



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7. Remove the converter housing using the following procedure:

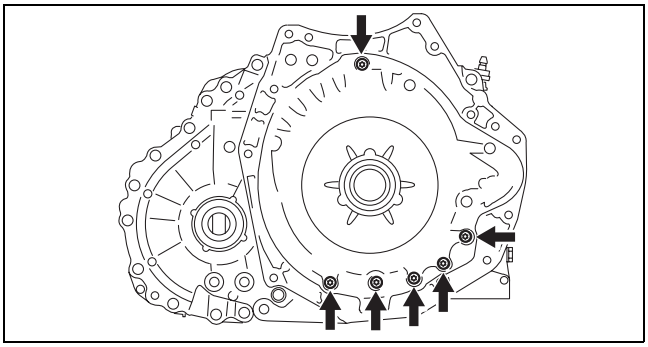
1	24 bolts
2	Converter housing



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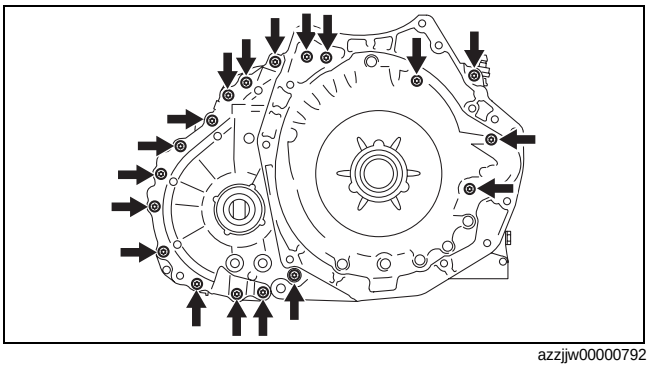
(1) Remove the bolts shown in the figure.

Caution
- **Sealant has been applied to the removed bolts. If the bolts are reused it could cause ATF leakage, therefore when performing the automatic transaxle assembly, use new bolts.**



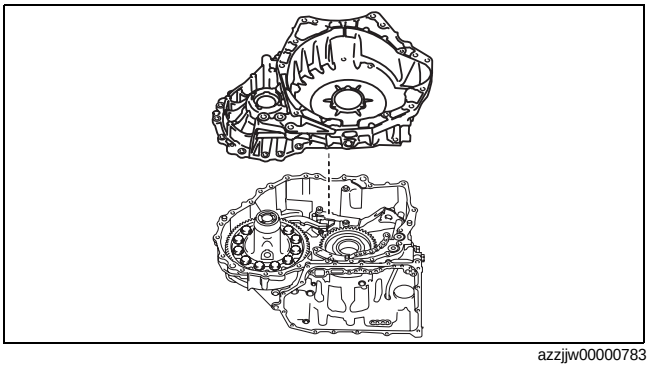
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(2) Remove the bolts shown in the figure.



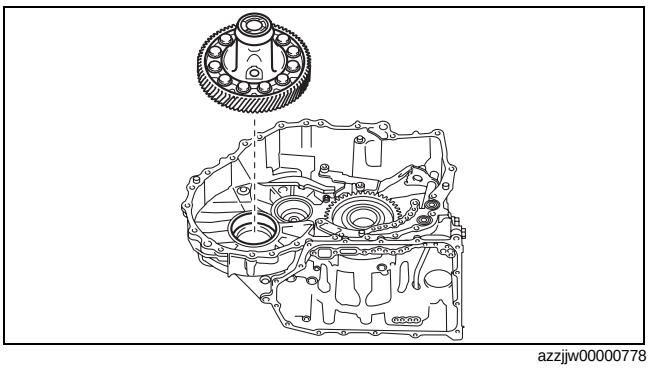
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(3) Remove the converter housing.



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8. Remove the ring gear and differential.

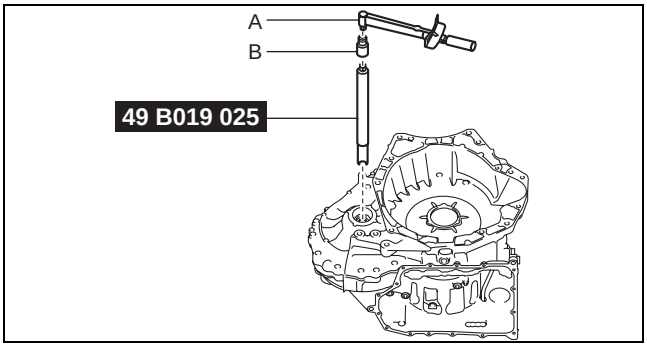


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Ring Gear and Differential Preload Adjustment

1. Remove the SST, torque wrench, and socket (14 mm {9/16 in}).

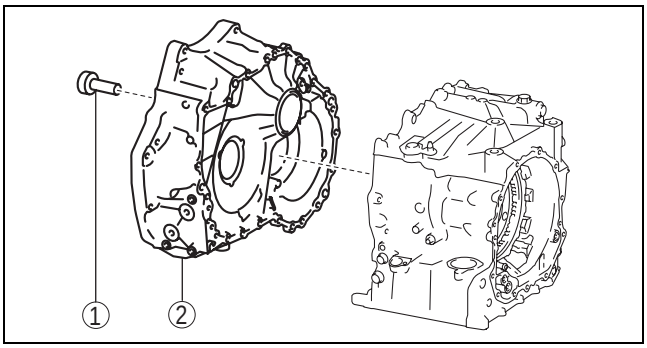
A : Torque wrench
B : Socket (14 mm {9/16 in})



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2. Remove the converter housing using the following procedure:

1	24 bolts
2	Converter housing

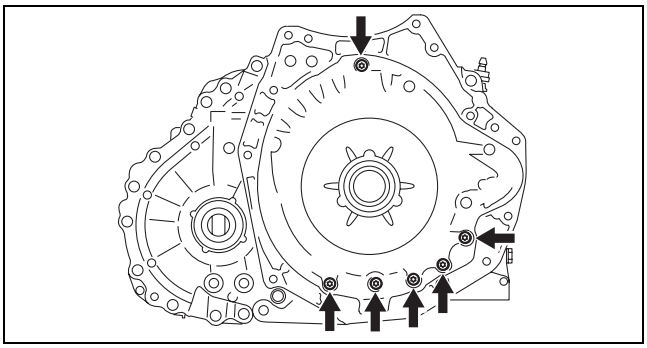


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(1) Remove the bolts shown in the figure.

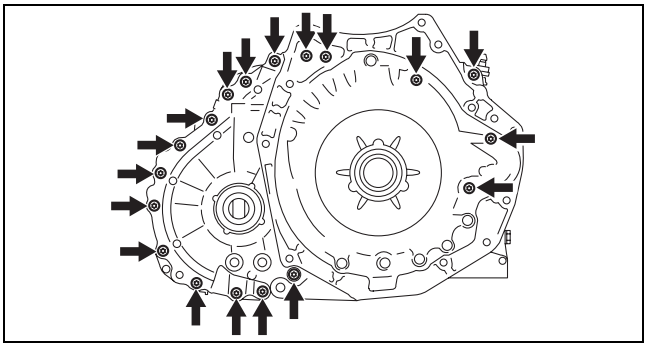
Caution

- **Sealant has been applied to the removed bolts. If the bolts are reused it could cause ATF leakage, therefore when performing the automatic transaxle assembly, use new bolts.**



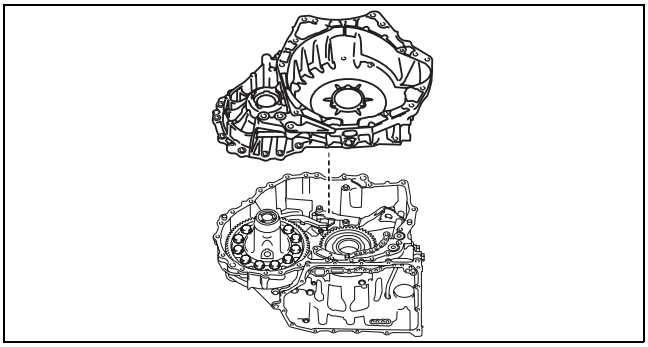
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(2) Remove the bolts shown in the figure.



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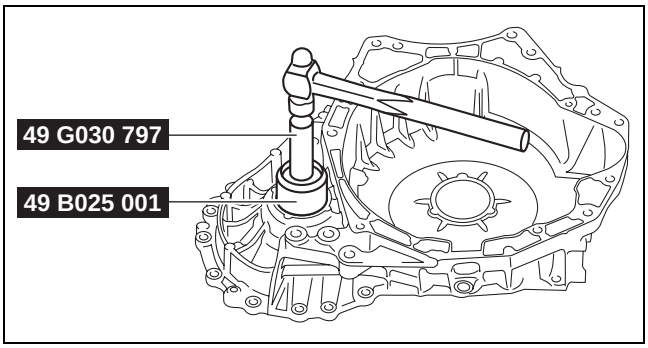
(3) Remove the converter housing.



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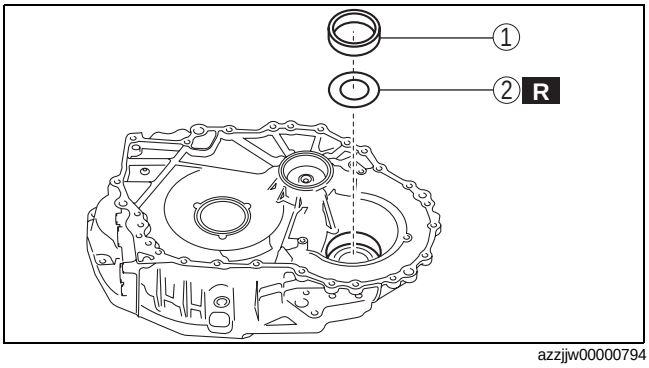
3. Remove the bearing race and shim from the converter housing using the SSTs and procedure shown in the figure.

Caution
- **Because the shim will deform when removing the bearing race, use a new shim when performing the shim assembly.**



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1	Bearing race
2	Shim



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4. Measure the thickness of the removed shim.

Note
- Recommended measuring instrument: Micrometer

5. Input the measured shim thickness into the measurement/adjustment value sheet.
6. Perform the following calculation to calculate the preload gap.

Note
- The preload gap is the difference between the ring gear and differential preload and the median value of the ring gear and differential preload specification.

Preload gap = E – A
A: Ring gear and differential preload
E: Median value of ring gear and differential preload specification (3.45 N·m {35.2 kgf·cm, 30.5 in·lbf})

Note
Example
A: Ring gear and differential preload is 2.5 N·m {25.5 kgf·cm, 22.1 in·lbf}
Preload gap = 3.45 N·m {35.2 kgf·cm, 30.5 in·lbf} - 2.5 N·m {25.5 kgf·cm, 22.1 in·lbf} = 0.95 N·m {9.7 kgf·cm, 8.4 in·lbf}

7. Input the calculated preload gap into the measurement/adjustment value sheet.

8. Perform the following calculation to calculate the gap in the shim thickness.

Note
- The gap in the shim thickness is the difference between the removed shim thickness and the optimum shim thickness.
- If the shim thickness is thickened 0.1 mm {0.00394 in}, the ring gear and differential preload increases approx. 1.5 N·m {15.3 kgf·cm, 13.3 in·lbf}.

Shim thickness gap = F × 0.1 mm {0.00394 in} / 1.5 N·m {15.3 kgf·cm, 13.3 in·lbf}
F: Preload gap

Note
Example
F: Preload gap is 0.95 N·m {9.7 kgf·cm, 8.4 in·lbf}
Shim thickness gap = 0.95 N·m {9.7 kgf·cm, 8.4 in·lbf} × 0.1 mm {0.00394 in} / 1.5 N·m {15.3 kgf·cm, 13.3 in·lbf} = 0.063 mm {0.00248 in}

9. Input the calculated shim thickness gap into the measurement/adjustment value sheet.
10. Perform the following calculation to calculate the optimum shim thickness.
Optimum shim thickness = D + G
D: Thickness of removed shim
G: Shim thickness gap

Note
Example
D: Thickness of removed shim is 0.905 mm {0.03563 in}
G: Shim thickness gap is 0.063 mm {0.00248 in}
Thickness of optimum shim = 0.905 mm {0.03563 in} + 0.063 mm {0.00248 in} = 0.968 mm {0.03811 in}

11. Input the calculated optimum shim thickness into the measurement/adjustment value sheet.
12. Select the nearest new shim for the calculated optimum shim thickness from the following table:

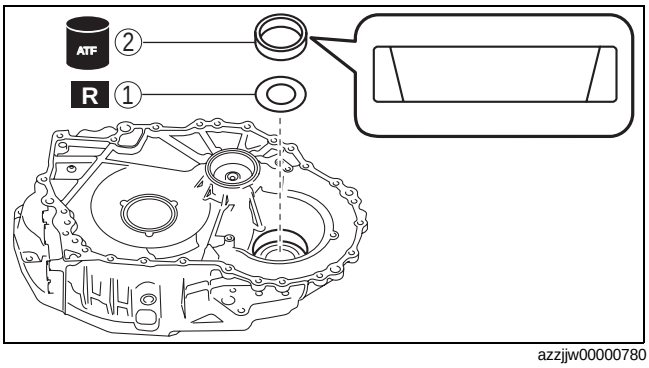
Selected shim thickness
1.55 mm {0.0610 in}
1.50 mm {0.0591 in}
1.45 mm {0.0571 in}
1.40 mm {0.0551 in}
1.35 mm {0.0531 in}
1.30 mm {0.0512 in}
1.25 mm {0.0492 in}
1.20 mm {0.0472 in}
1.15 mm {0.0453 in}
1.10 mm {0.0433 in}
1.05 mm {0.0413 in}
1.00 mm {0.0394 in}
0.95 mm {0.0374 in}
0.90 mm {0.0354 in}
0.85 mm {0.0335 in}
0.80 mm {0.0315 in}
0.75 mm {0.0295 in}
0.70 mm {0.0276 in}
0.65 mm {0.0256 in}
0.60 mm {0.0236 in}
0.55 mm {0.0217 in}

13. Assemble the bearing race and selected new shim to the converter housing using the following procedure:

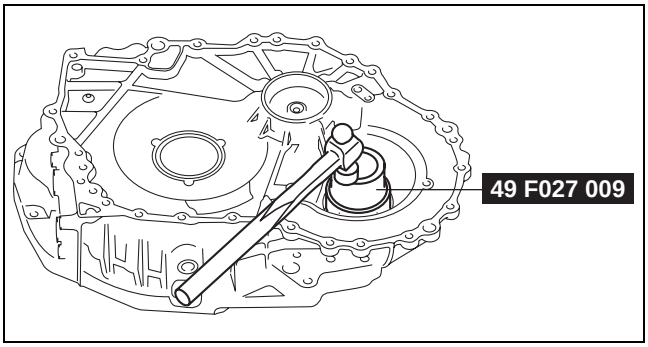
Caution
- **Always use a new shim. If a deformed shim is reused, it may cause a transaxle malfunction.**

(1) Apply ATF (ATF FZ) to the engagement area of the bearing race and converter housing.
(2) Assemble the bearing race and selected new shim using the following procedure and SST:

1	Shim (outer diameter approx. 79 mm {3.1 in}) (selected new shim)
2	Bearing race (outer diameter approx. 80 mm {3.1 in})



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14. Perform ring gear and differential preload measurement from Step 5. (See 05-17-375 Ring Gear and Differential Preload Measurement.)

TOTAL END PLAY MEASUREMENT/ADJUSTMENT

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Caution
- **The total end play is the play (gap) in the axial direction of each planetary gear.**
- **If the total end play adjustment is not performed, it may cause damage to the thrust needle bearing between each planetary gear or other parts. Accurately perform the following servicing.**

Preparation Before Servicing

1. Print out the measurement/adjustment value input sheet. (See 05-17-295 MEASUREMENT/ADJUSTMENT VALUE INPUT SHEET.)

Note
- When performing the measurement/adjustment, input the measured and calculated values into the measurement/adjustment value input sheet.
- When performing the other measurements/adjustments, if the measurement/adjustment value input sheet has been printed out, use the printed sheet.

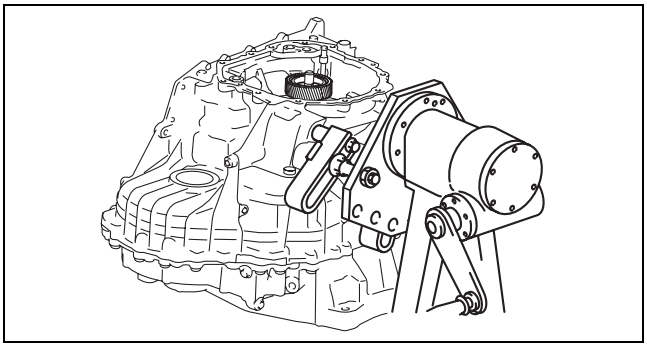
Total End Play Measurement/Adjustment

1. Rotate and adjust the rotation handle of the engine stand so that the end cover side is facing upward.

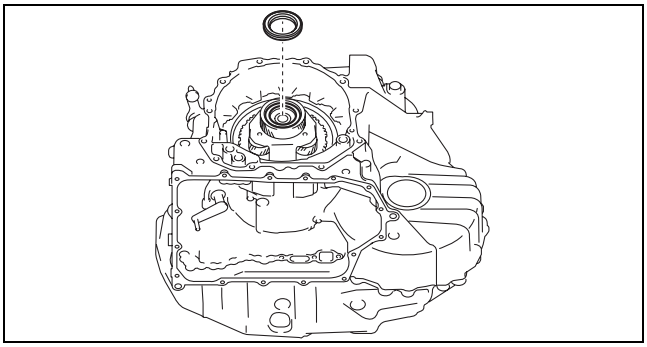
Caution
- **To reduce error during the total end play measurement, adjust so that the alignment surface of the transaxle case with the end cover is level.**

2. Remove any remaining old sealant on the contact surfaces of the transaxle case and end cover.

3. Assemble the shim (FZ01 19 2L1) for the total end play measurement/adjustment.



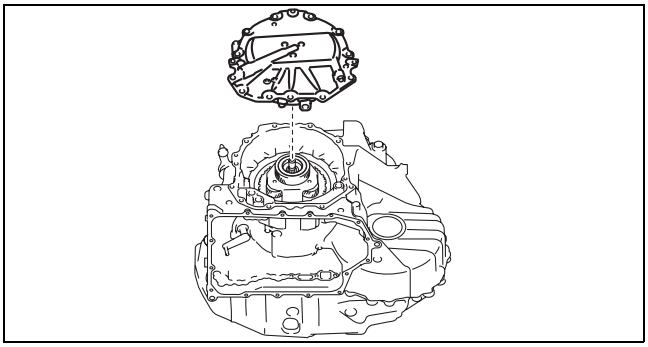
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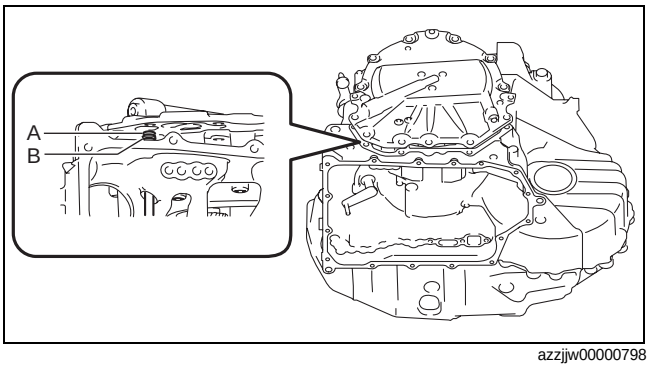
4. Assemble the end cover component.

Note
- Adjust the oil pipe and assemble the end cover component so that the oil pipe is assembled to the end cover oil passage.



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A : End cover oil passage
B : Oil pipe

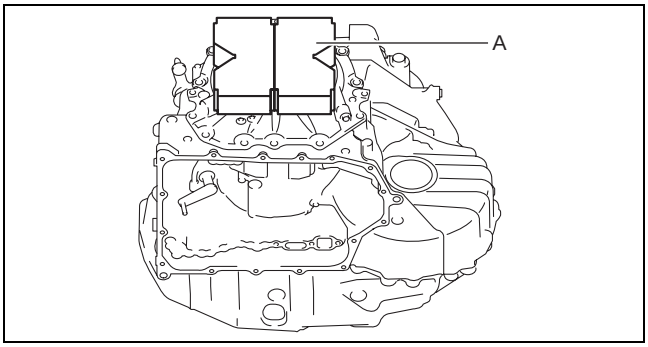


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5. Place a 98—196 N {10.0—19.9 kgf, 23.0—44.0 lbf} weight on the end cover.

A : Weight (V-block)

Note
- Use a V-block as a weight.
- To reduce error during the total end play measurement, place the weight near the center of the end cover.



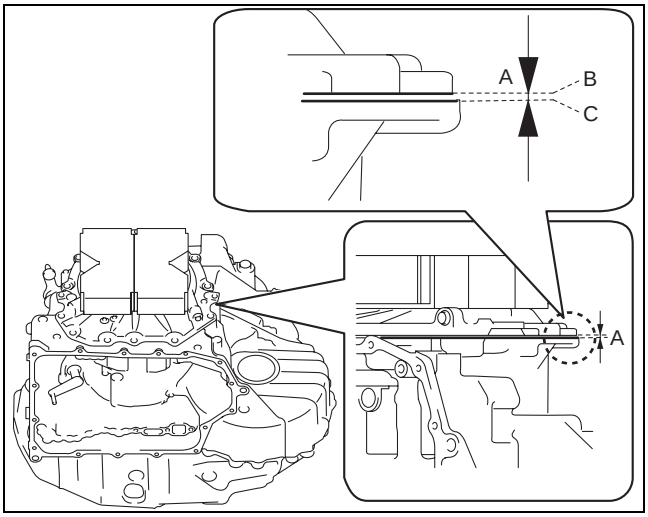
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6. Measure the total end play adjustment value using the following procedure:

Note
- The total end play adjustment value is the gap between the transaxle case and end cover with the shim (FZ01 19 2L1) for the total end play measurement/adjustment assembled.
- Recommended measuring instrument: Thickness gauge

(1) Measure the total end play adjustment value (gap between the transaxle case and end cover) in four locations (each separated by 90°) and calculate the average of the total end play adjustment value.

A : Total end play adjustment value
B : End cover end (alignment surface with transaxle case)
C : Transaxle case end (alignment surface with end cover)

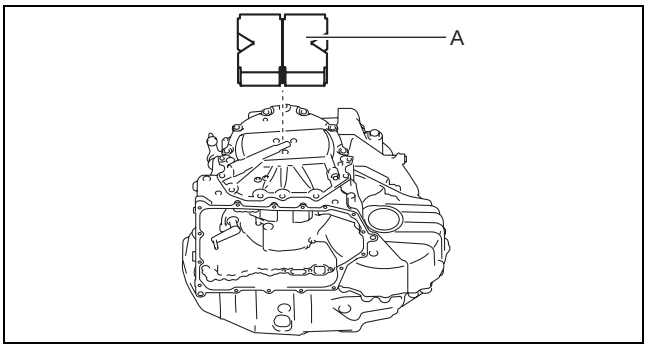


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(2) Input the measured total end play adjustment value and calculated average of the total end play adjustment value into the measurement/adjustment value sheet.

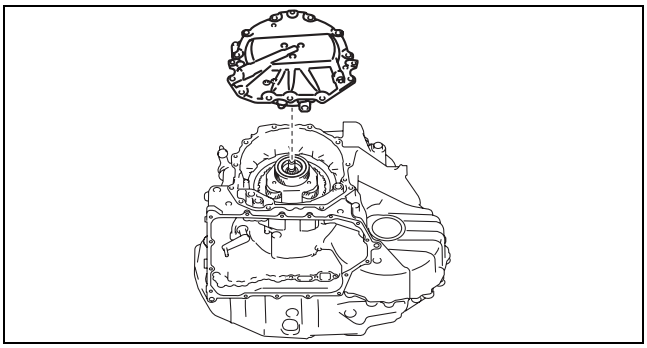
7. Remove the weight on the end cover.

A : Weight (V-block)



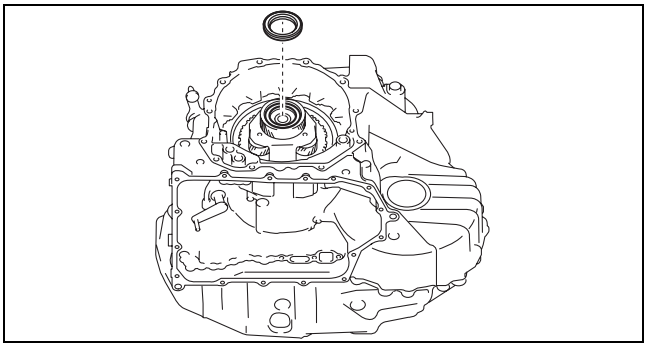
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8. Remove the end cover component.



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9. Remove the shim (FZ01 19 2L1) for the total end play measurement/adjustment.



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10. Measure the thickness of the removed shim (FZ01 19 2L1) for the total end play measurement/adjustment.

Note
- Recommended measuring instrument: Micrometer

11. Input the measured shim thickness into the measurement/adjustment value sheet.

12. Select the appropriate shim from the following table.

Range*	Selected shim thickness
Exceeds 3.545 mm {0.1396 in}, 3.645 mm {0.1435 in} or less	3.0 mm {0.118 in}
Exceeds 3.445 mm {0.1356 in}, 3.545 mm {0.1396 in} or less	2.9 mm {0.114 in}
Exceeds 3.345 mm {0.1317 in}, 3.445 mm {0.1356 in} or less	2.8 mm {0.110 in}
Exceeds 3.245 mm {0.1278 in}, 3.345 mm {0.1317 in} or less	2.7 mm {0.106 in}
Exceeds 3.145 mm {0.1238 in}, 3.245 mm {0.1278 in} or less	2.6 mm {0.102 in}
Exceeds 3.045 mm {0.1199 in}, 3.145 mm {0.1238 in} or less	2.5 mm {0.098 in}
Exceeds 2.945 mm {0.1159 in}, 3.045 mm {0.1199 in} or less	2.4 mm {0.094 in}
Exceeds 2.845 mm {0.1120 in}, 2.945 mm {0.1159 in} or less	2.3 mm {0.091 in}
Exceeds 2.745 mm {0.1081 in}, 2.845 mm {0.1120 in} or less	2.2 mm {0.087 in}
Exceeds 2.645 mm {0.1041 in}, 2.745 mm {0.1081 in} or less	2.1 mm {0.083 in}

* : The range is the average value of the total end play adjustment value and the added thickness value of the removed shim (FZ01 19 2L1) for the total end play measurement/adjustment.

Range = B + C
B: Average adjustment of total end play
C: Thickness of shim (FZ01 19 2L1) for total end play measurement/adjustment

Note
Example
B: If the average of total end play adjustment value is 0.115 mm {0.00453 in}
C: If the thickness of the shim (FZ01 19 2L1) for the total end play measurement/adjustment is 3.010 mm {0.11850 in}
Range = 0.115 mm {0.00453 in} + 3.010 mm {0.11850 in} = 3.125 mm {0.12303 in}, the selected shim has a thickness of 2.5 mm {0.098 in}.

05-50 TECHNICAL DATA

TECHNICAL DATA 05-50–1

TECHNICAL DATA

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Item		Specification	Comment
Gap between front planetary gear pinion washer and planetary carrier	Maximum:	0.879 mm {0.0346 in}	—
Gap between rear planetary gear pinion washer and planetary carrier	Maximum:	0.879 mm {0.0346 in}	—
Gap between reduction planetary gear pinion washer and planetary carrier	Maximum:	0.820 mm {0.0322 in}	—
Inner diameter of reduction planetary gear bush	Maximum:	35.095 mm {1.3816 in}	—
Inner diameter of differential journal	Maximum:	30.046 mm {1.1829 in}	—
Outer diameter of drive shaft (LH) journal	Minimum	29.959 mm {1.1795 in}	—
Outer diameter of joint shaft journal	Minimum	29.944 mm {1.1789 in}	—
Thickness of low clutch drive plate	Minimum	1.475 mm {0.05808 in}	Drive plate size: Outer diameter approx. 159.1 mm {6.264 in}
Thickness of high clutch drive plate	Minimum	1.375 mm {0.05414 in}	Drive plate size: Outer diameter approx. 116.8 mm {4.598 in}
Free length of high clutch springs and retainer component	Minimum	25.4 mm {1.01 in}	Springs and retainer component size: Outer diameter approx. 79.5 mm {3.13 in}
Thickness of low and reverse brake drive plate	Minimum	1.475 mm {0.05808 in}	Drive plate size: Outer diameter approx. 174.1 mm {6.854 in}
Thickness of 2-6 brake drive plate	Minimum	1.475 mm {0.05808 in}	Drive plate size: Outer diameter approx. 171.9 mm {6.768 in}
Thickness of R-3-5 brake drive plate	Minimum	1.635 mm {0.06438 in}	Drive plate size: Outer diameter approx. 169.4 mm {6.669 in}
Inner diameter of low clutch hub bush	Maximum:	31.270 mm {1.2311 in}	—
Inner diameter of high clutch hub bush	Maximum:	18.038 mm {0.71015 in}	—
Oil pump side clearance (inner rotor)	Maximum:	0.045 mm {0.0017 in}	—
Oil pump side clearance (outer rotor)	Maximum:	0.050 mm {0.0019 in}	—
Inner diameter of oil pump (oil pump cover) bush	Maximum:	44.006 mm {1.7325 in}	—
Low clutch clearance	Specification	1.400—1.600 mm {0.05512—0.06299 in}	—
High clutch clearance	Specification	1.300—1.500 mm {0.05119—0.05905 in}	—
Low and reverse brake clearance	Specification	1.650—1.850 mm {0.06497—0.07283 in}	—
2-6 brake clearance	Specification	1.000—1.200 mm {0.03938—0.04724 in}	—
R-3-5 brake clearance	Specification	1.000—1.200 mm {0.03938—0.04724 in}	—
Differential backlash	Specification	0.030—0.150 mm {0.0012—0.0059 in}	—
Secondary gear and output gear preload	Specification	2.8—3.7 N·m {28.6—37.7 kgf·cm, 24.8—32.7 in·lbf}	—
Ring gear and differential preload	Specification	2.8—4.1 N·m {28.6—41.8 kgf·cm, 24.8—36.2 in·lbf}	—
Total end play	Specification	0.520—0.670 mm {0.0205—0.0263 in}	—

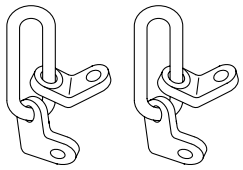
05-60 SERVICE TOOLS

SERVICE TOOLS 05-60–1

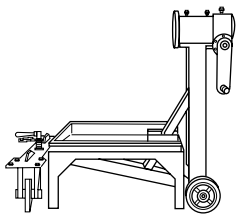
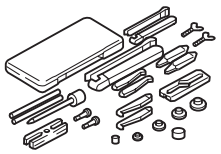
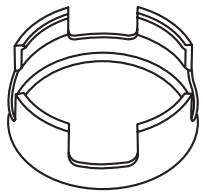
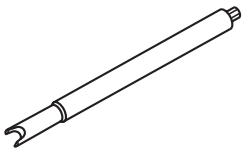
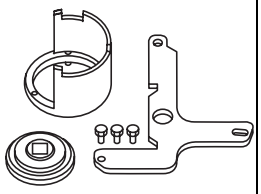
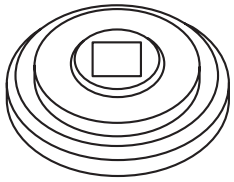
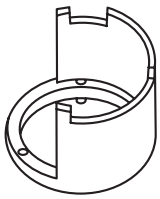
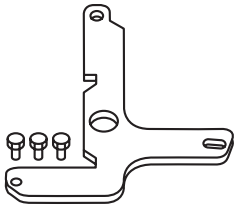
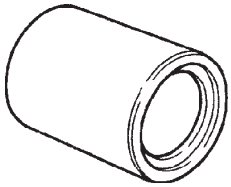
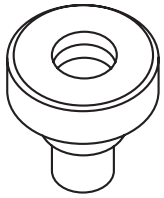
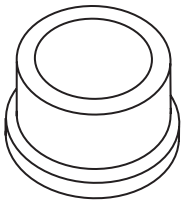
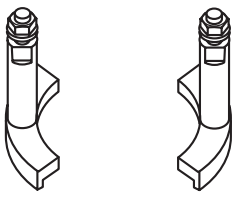
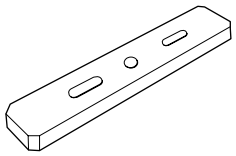
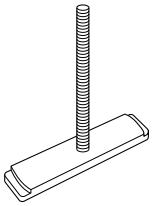
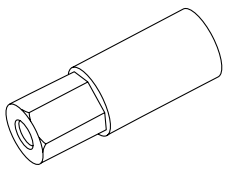
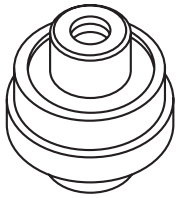
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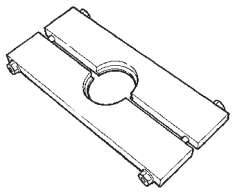
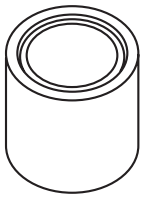
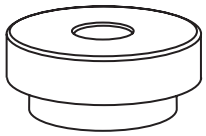
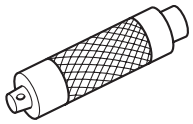
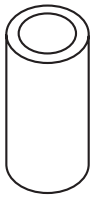
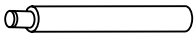
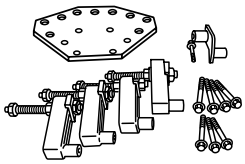
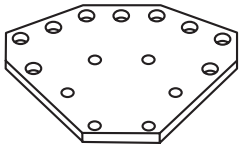
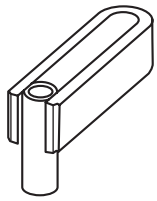
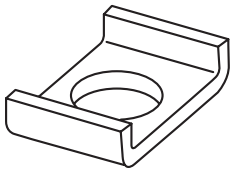
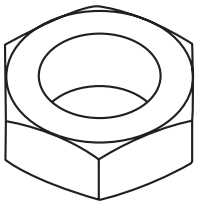
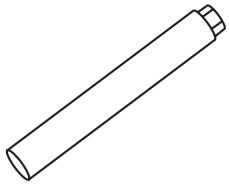
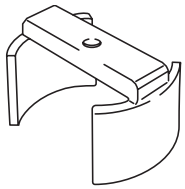
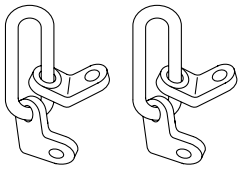
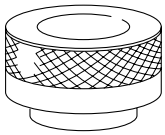
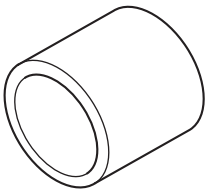
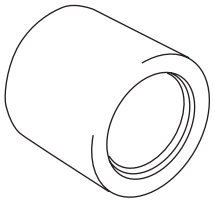
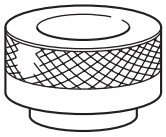
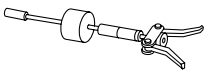
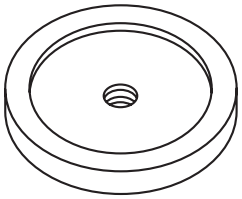
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Example of description
Ford manufactured **SSTs** are as follows: Mazda and Ford **SST** numbers can be referenced.

1:49 UN30 3050 2:303-050 Engine lifting bracket	

1: Mazda **SST** number
2: Ford **SST** number

1:49 0107 680A 2:– Engine stand 	1:49 0839 425C 2:– Bearing puller set 	1:49 B019 002 2:– Body 
1:49 B019 025 2:– Preload adopter (component part for 49 B019 0A3) 	1:49 B019 0A4 2:– Locknut wrench set 	1:49 B019 027 2:– Socket (component part for 49 B019 0A4) 
1:49 B019 028 2:– Holder (component part for 49 B019 0A4) 	1:49 B019 029 2:– Plate (component part for 49 B019 0A4) 	1:49 B025 001 2:– Body 
1:49 D034 201 2:– Dust boot installer 	1:49 F011 104 2:– Installer 	1:49 F027 005 2:– Attachment for 62 bearing (component part for 49 F027 0A1) 
1:49 F027 009 2:– Attachment for 68 and 77 bearing 	1:49 G019 025 2:– Body B 	1:49 G019 026 2:– Plate 
1:49 G019 027 2:– Attachment A 	1:49 G019 029 2:– Nut 	1:49 G026 102 2:– Bearing replacer 

1:49 G027 002 2:– Removing plate 	1:49 G028 201 2:– Support block 	1:49 G030 728 2:– Attachment B 
1:49 G030 797 2:– Handle 	1:49 G032 308 2:– Oil seal installer 	1:49 G033 102 2:– Handle 
1:49 L010 1A0 2:– Engine hanger set 	1:49 L010 101 2:– Plate (component part for 49 L010 1A0) 	1:49 L010 102 2:– Arm (component part for 49 L010 1A0) 
1:49 L010 103 2:– Hook (component part for 49 L010 1A0) 	1:49 L010 104 2:– Nut (component part for 49 L010 1A0) 	1:49 L010 105 2:– Bolt (component part for 49 L010 1A0) 
1:49 M005 796 2:– Body 	1:49 T019 003 2:– Body 	1:49 UN30 3050 2:303-050 Engine lifting bracket 
1:49 UB71 525 2:– Bearing installer 	1:49 U027 003 2:– Oil seal installer 	1:49 U034 204 2:– Dust boot installer 
1:49 V001 525 2:– Bearing installer 	1:49 W032 2A0 2:– Bearing remover set 	1:49 W033 105 2:– Oil seal installer 

WARNING

Servicing a vehicle can be dangerous. If you have not received service-related training, the risks of injury, property damage, and failure of servicing increase. The recommended servicing procedures for the vehicle in this workshop manual were developed with Mazda-trained technicians in mind. This manual may be useful to non-Mazda trained technicians, but a technician with our service-related training and experience will be at less risk when performing service operations. However, all users of this manual are expected to at least know general safety procedures.

This manual contains "Warnings" and "Cautions" applicable to risks not normally encountered in a general technician's experience. They should be followed to reduce the risk of injury and the risk that improper service or repair may damage the vehicle or render it unsafe. It is also important to understand that the "Warnings" and "Cautions" are not exhaustive. It is impossible to warn of all the hazardous consequences that might result from failure to follow the procedures.

The procedures recommended and described in this manual are effective methods of performing service and repair. Some require tools specifically designed for a specific purpose. Persons using procedures and tools which are not recommended by Mazda Motor Corporation must satisfy themselves thoroughly that neither personal safety nor safety of the vehicle will be jeopardized.

The contents of this manual, including drawings and specifications, are the latest available at the time of printing, and Mazda Motor Corporation reserves the right to change the vehicle designs and alter the contents of this manual without notice and without incurring obligation.

Parts should be replaced with genuine Mazda replacement parts or with parts which match the quality of genuine Mazda replacement parts. Persons using replacement parts of lesser quality than that of genuine Mazda replacement parts must satisfy themselves thoroughly that neither personal safety nor safety of the vehicle will be jeopardized.

Mazda Motor Corporation is not responsible for any problems which may arise from the use of this manual. The cause of such problems includes but is not limited to insufficient service-related training, use of improper tools, use of replacement parts of lesser quality than that of genuine Mazda replacement parts, or not being aware of any revision of this manual.

Manual Transaxle Workshop Manual C66M-R

FOREWORD

This manual explains the service points for the above-indicated automotive system. This manual covers all models with the above-indicated automotive system, not any one specific model.

In order to do these procedures safely, quickly, and correctly, you must first read this manual and any other relevant service materials carefully.

All the contents of this manual, including drawings and specifications, are the latest available at the time of printing.
As modifications affecting repair or maintenance occur, relevant information supplementary to this volume will be made available at Mazda dealers. This manual should be kept up-to-date.

Mazda Motor Corporation reserves the right to alter the specifications and contents of this manual without obligation or advance notice.

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Mazda Motor Corporation
HIROSHIMA, JAPAN

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PRINTED IN U.S.A., JANUARY 2012
Form No. 1A09–1U–12A
Part No. 9999–95–C66M–12

GENERAL INFORMATION

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HOW TO USE THIS MANUAL

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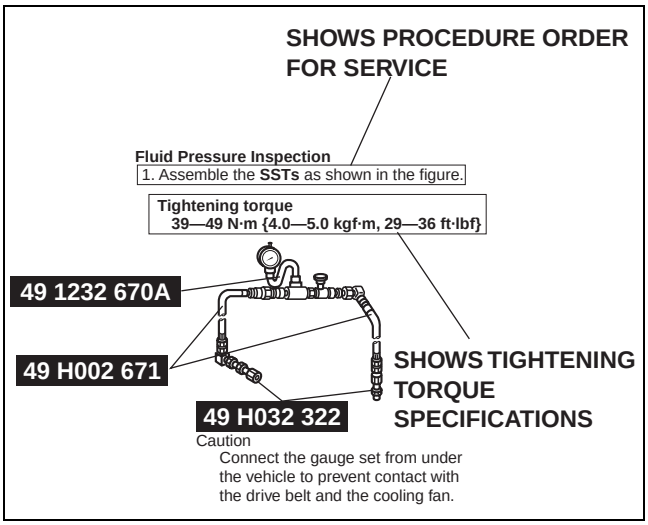
Range of Topics

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

Service Procedure

Inspection, adjustment

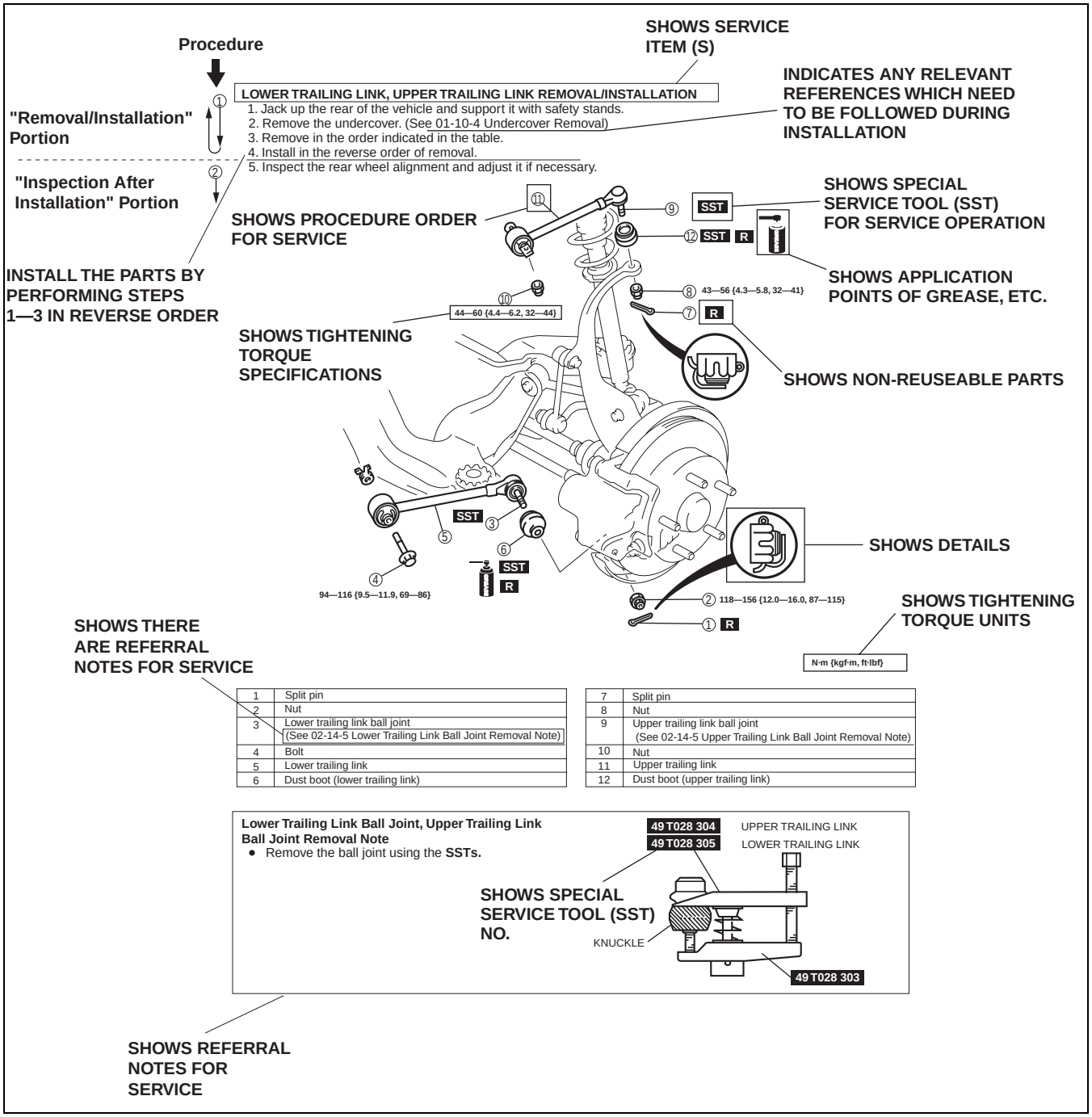
- Inspection and adjustment procedures are divided into steps. Important points regarding the location and contents of the procedures are explained in detail and shown in the illustrations.



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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.



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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
	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

id000000100400

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 From 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.

Number Of Digits For Converted Values

- The number digits for converted values is the same as the number of significant figures*1 of the SI unit.
- For the torque value, the number of significant figures is, in principle, is 2 digits, in consideration of market practicalities. However, if the number of decimal places at the upper and lower limits of the converted value differs, the one with least number of decimal places is used. In addition, if the integer part is 3 digits or more, the integer part becomes the significant number of figures.

*1 : The number of significant figures is the number of digits from the left-most non-zero digit to the right-most digit including 0. (Example: 0.12 is 2 digits, 41.0 is 3 digits)

Converted Value Rounding Off And Rounding Up/down

- If there is no tolerance in the SI unit value, after conversion, rounding off is to within the number of significant digits.
- If there is tolerance in the SI unit value and the figure after conversion indicates the upper limit, the number of digits is rounded down to within the number of significant figures. If it indicates the lower limit, they are rounded up to within the number of significant figures.
- Even if the SI unit value is the same, the converted value may differ based on whether that value is the upper or lower limit.

ABBREVIATIONS

id000000010100

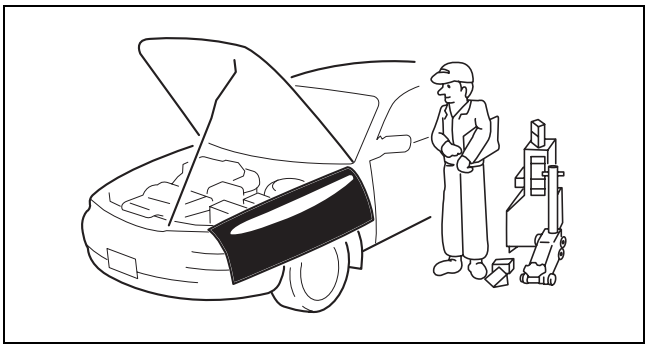
MTX	Manual Transaxle
SST	Special Service Tool

FUNDAMENTAL PROCEDURES

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Preparation of Tools and Measuring Equipment

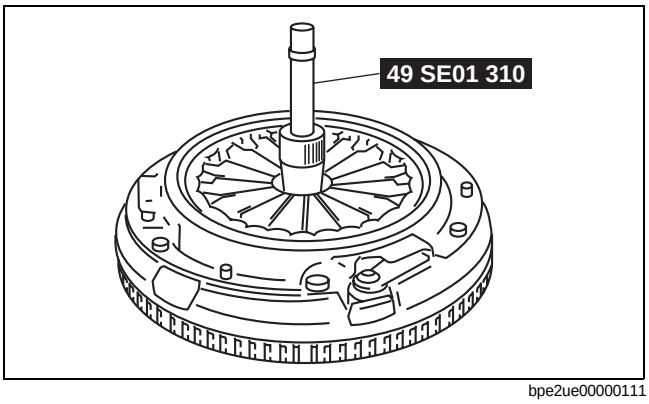
- Be sure that all necessary tools and measuring equipment are available before starting any work.



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Special Service Tools

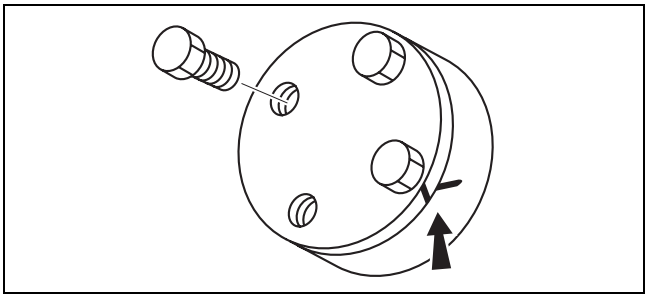
- Use special service tools or equivalent when they are required.



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Disassembly

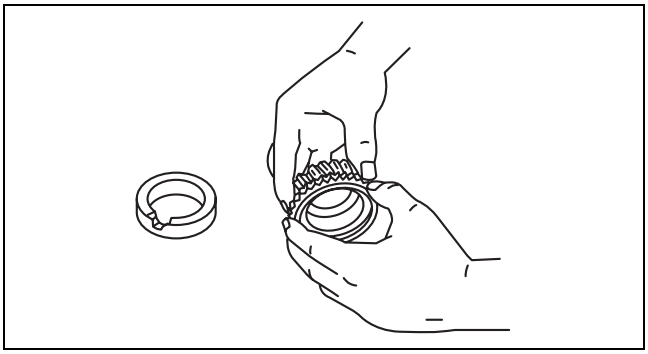
- If the disassembly procedure is complex, requiring many parts to be disassembled, all parts should be marked in a place that will not affect their performance or external appearance and identified so that reassembly can be performed easily and efficiently.



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Inspection During Removal, Disassembly

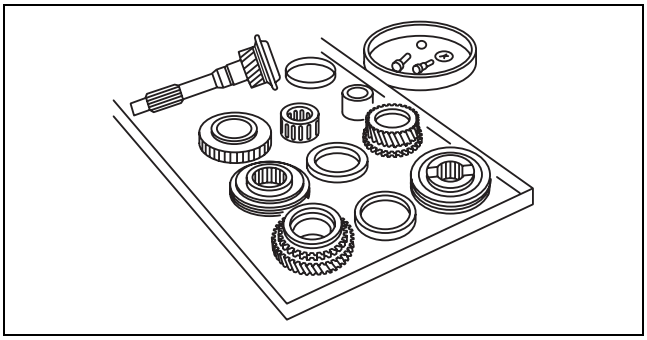
- When removed, each part should be carefully inspected for malfunction, deformation, damage and other problems.



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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.



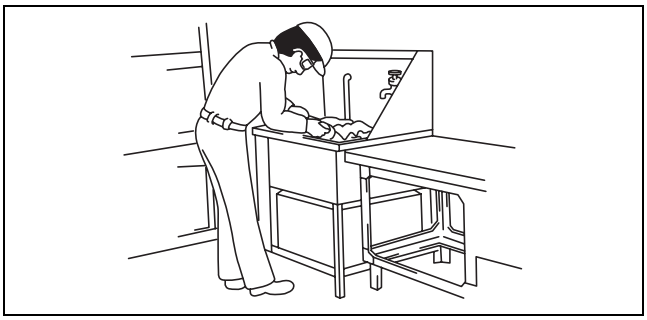
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Cleaning of Parts

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

Warning

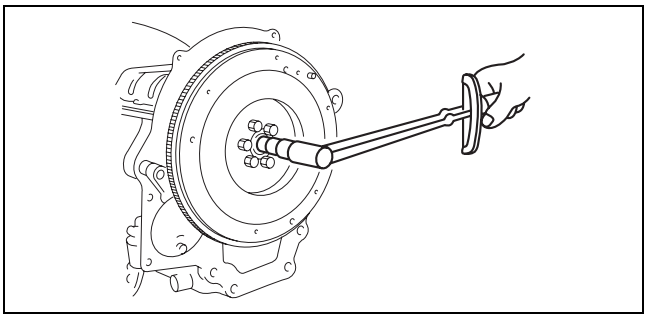
- **Using compressed air can cause dirt and other particles to fly out causing injury to the eyes. Wear protective eye wear whenever using compressed air.**



bpe2ue00000002

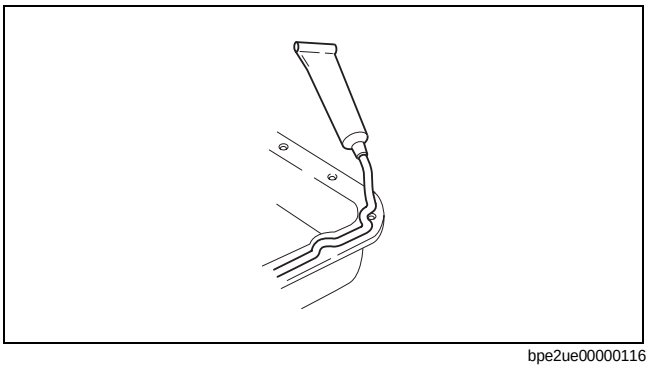
Reassembly

- 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



bpe2ue00000115

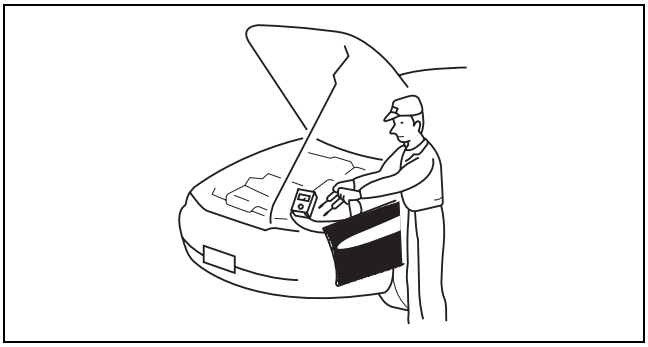
- Depending on location:
  - — Sealant and gaskets, or both, should be applied to specified locations. When sealant is applied, parts should be installed before sealant hardens to prevent leakage.
  - — Oil should be applied to the moving components of parts.
  - — Specified oil or grease should be applied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



bpe2ue00000116

Adjustment

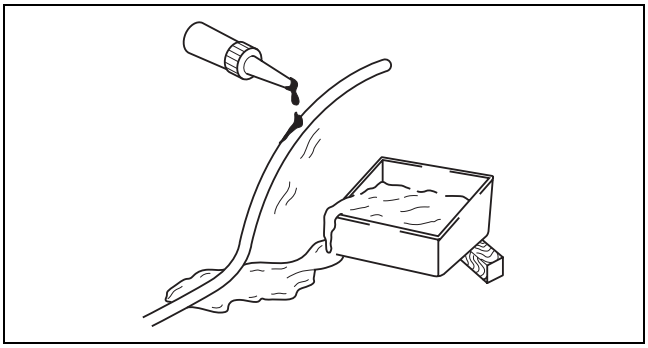
- Use suitable gauges and testers when making adjustments.



bpe2ue00000117

Rubber Parts and Tubing

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

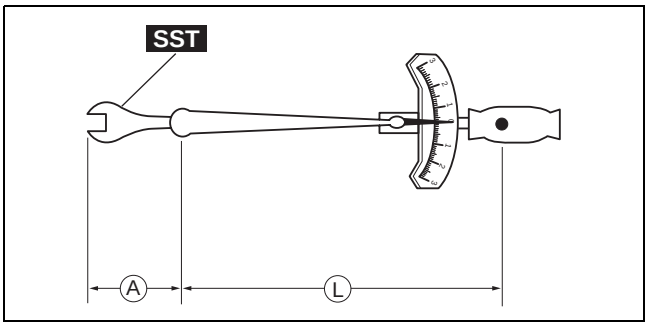


bpe2ue00000118

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)]

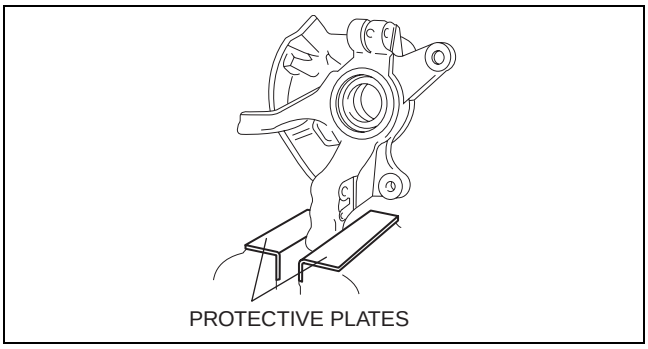


bpe2ue00000119

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

Vise

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



bpe2ue00000120

TRANSMISSION/TRANSAXLE

05
SECTION

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PRECAUTION

id051500168000

Warning
- **Always wear protective eye wear when using compressed air. Otherwise, dirt particles blown off by compressed air could get into the eyes.**

Service Caution
Disassembly
1. Clean the outside of the transaxle using steam and/or degreaser before disassembly.
2. To prevent dust penetration into the transaxle, perform the disassembly in a dust free environment.
3. Clean the disassembled parts using degreaser and dry them using compressed air.
4. Clean the oil holes and oil grooves using compressed air and verify that they are not plugged.
5. Always wear protective eye wear when using compressed air.
6. When disassembling a connecting part of a light-alloy part for the transaxle case, use a plastic hammer.
7. Organize and store the disassembled parts to protect them from dirt.
8. If using a vise, always secure the component using an aluminum plate to prevent component damage.
9. Disassemble while verifying damage, cracks, deformation, scratches, and the assembly condition of each part.

Cleaning
1. Thoroughly wash the exterior of the transaxle using steam or degreaser before disassembly.
2. Clean the removed parts using degreaser and dry them using compressed air. Clean the oil holes and oil passages using compressed air.

Assembly
1. Before assembly, verify that each part is clean and dried.
2. Apply a sufficient amount of the specified oil (SAE 75W-80, API service GL-4) to moving parts and sliding surfaces when performing assembly.
3. For parts such as gaskets, springs, or pins which are designated for replacement with every disassembly, always use a new part.
4. Clean off remaining silicone sealant before applying new silicone sealant.
5. After applying silicone sealant, install the transaxle case before the applied silicone sealant starts to harden, and wait for 30 min or more before adding oil.
6. When using a vise, always secure the component using an aluminum plate to prevent component damage.

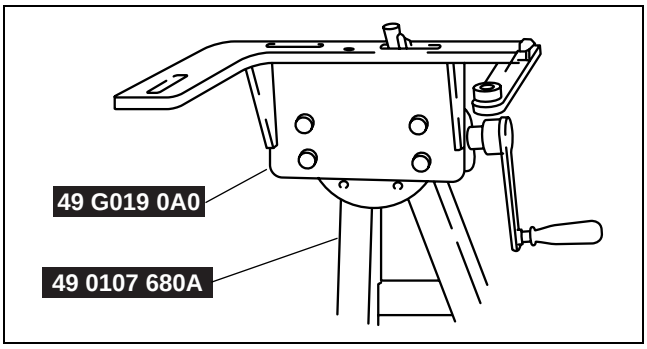
TRANSAXLE DISASSEMBLY

id051500168100

Step 1

1. Assemble the **SST (49 G019 0A0)** to the **SST (49 0107 680A)**.

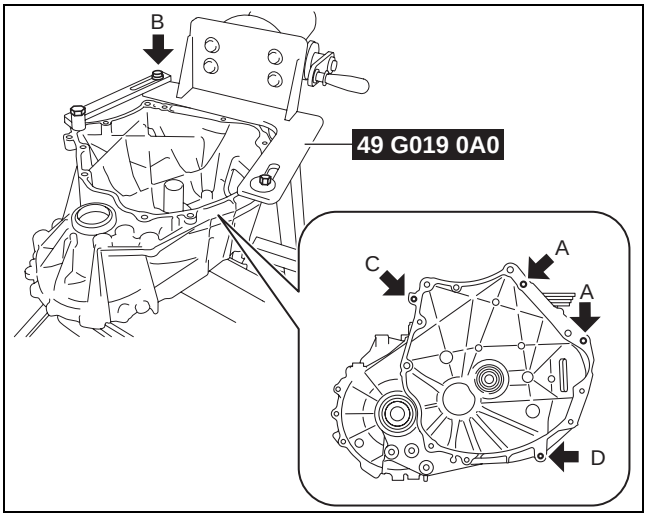
   Bolt used
   Part No.: 9YA02 A220 or M12×1.75 length 40 mm {1.6 in}
   Tightening torque
   88—118 N·m {9.0—12 kgf·m, 65—87 ft·lbf}



bc61um00000001

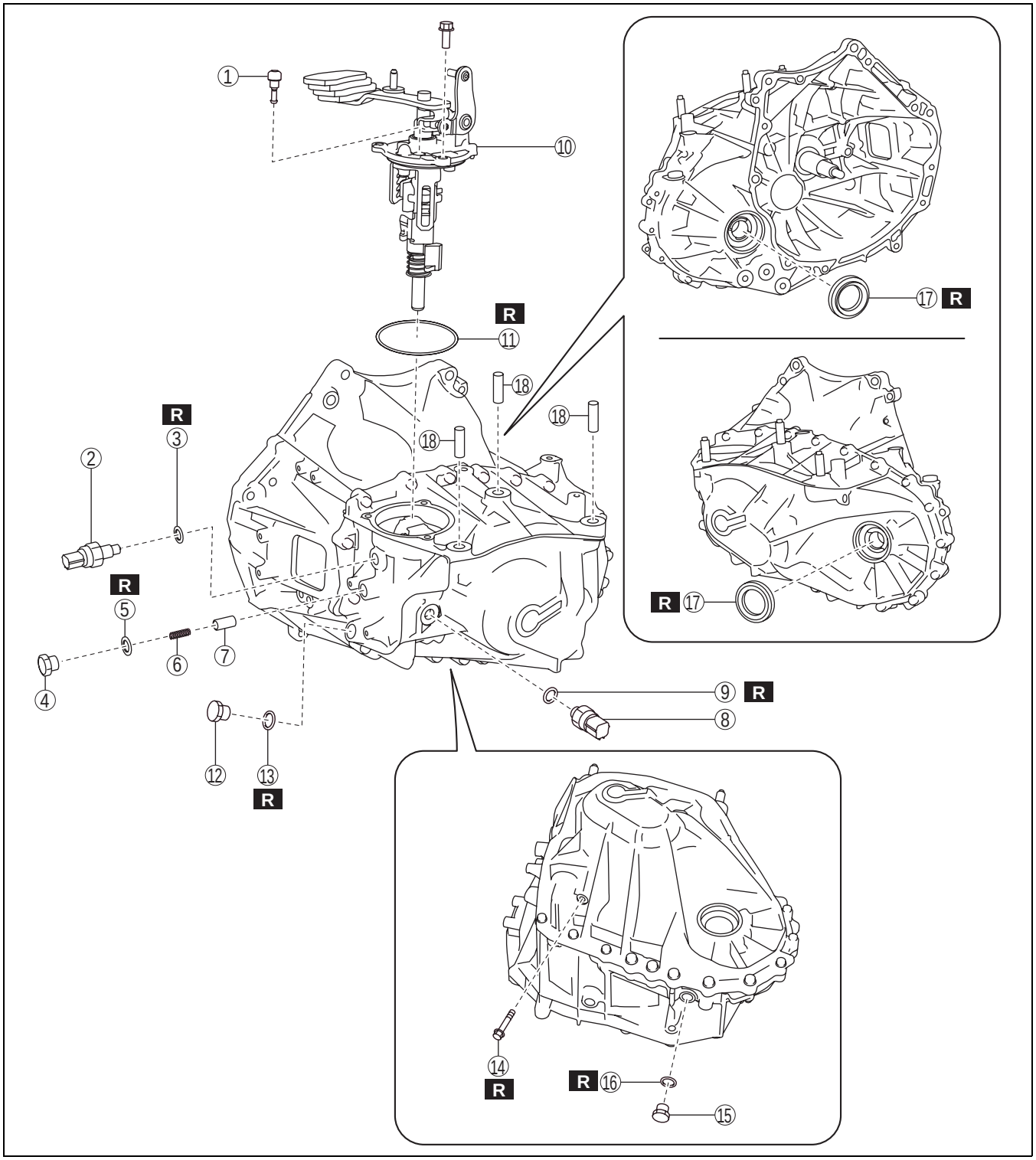
2. Assemble the MTX to the **SST**.

   Bolt A
   Part No.: 99450 1055 or M10×1.25 length 55 mm {2.2 in}, and nut (M10×1.25)
   Bolt A tightening torque
   38—52 N·m {3.9—5.3 kgf·m, 29—38 ft·lbf}
   Bolt B
   SST (49 G019 033 part of 49 G019 0A0)
   Bolt B tightening torque
   88—118 N·m {9.0—12 kgf·m, 65—87 ft·lbf}
   Bolt C
   Part No.: 9YA02 1080 or M10×1.5 length 55 mm {2.2 in}
   Bolt C tightening torque
   38—52 N·m {3.9—5.3 kgf·m, 29—38 ft·lbf}
   Bolt D
   Part No.: 99450 1030 or M10×1.25 length 30 mm {2.2 in}
   Bolt D tightening torque
   38—52 N·m {3.9—5.3 kgf·m, 29—38 ft·lbf}



bc61um00000126

3. Remove the parts around the MTX using the procedure shown in the figure.



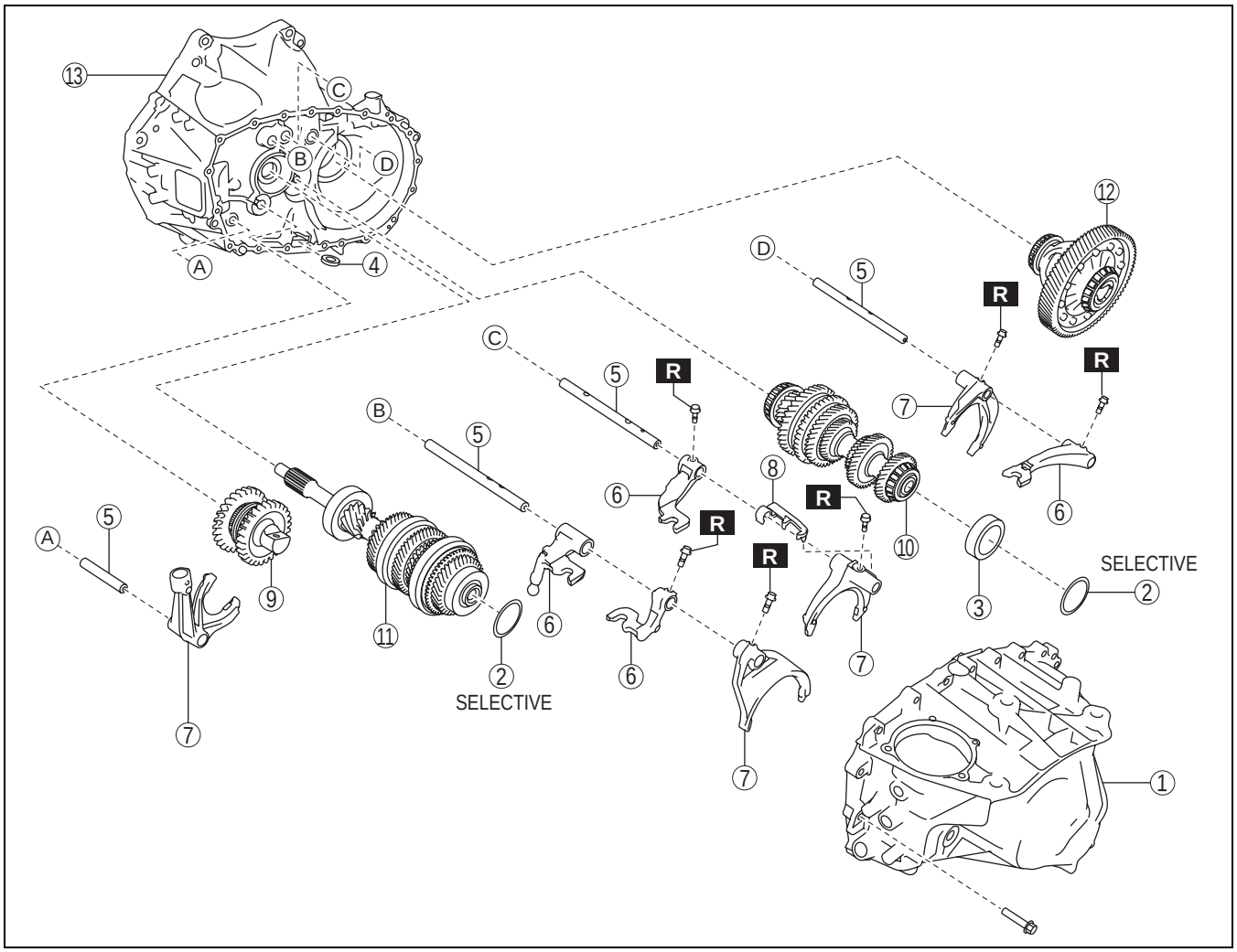
bc61um00000127

1	Breather
2	Neutral switch
3	Gasket
4	Plug
5	Gasket
6	Spring
7	Detent ball pin
8	Back-up light switch
9	Gasket

10	Shift control module
11	O-ring
12	Oil level plug
13	Gasket
14	Reverse gear shaft anchor bolt
15	Drain plug
16	Gasket
17	Oil seal
18	Stud bolt

Step 2

1. Disassemble the MTX in the order shown in the figure.



bc61um00000004

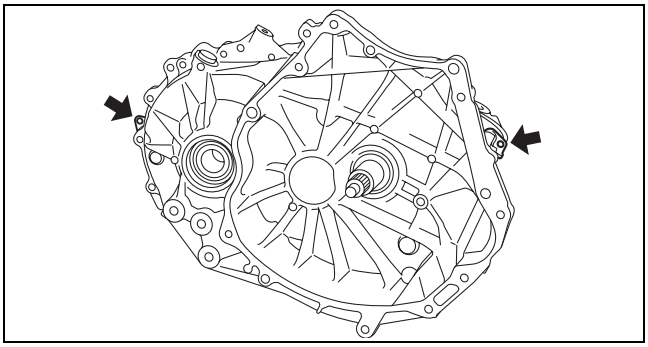
1	Transaxle case component (See 05-15-6 Transaxle case component removal note.)
2	Shim
3	Bearing outer race
4	Magnet
5	Shift rod
6	Shift rod end
7	Shift fork

8	Oil path
9	Reverse idler gear component
10	Primary shaft component (See 05-15-6 Primary shaft component, secondary shaft component removal note.)
11	Secondary shaft component (See 05-15-6 Primary shaft component, secondary shaft component removal note.)
12	Differential
13	Clutch housing component

2. Remove the silicone sealant of the transaxle case component and clutch housing component, and clean all the parts.

Transaxle case component removal note

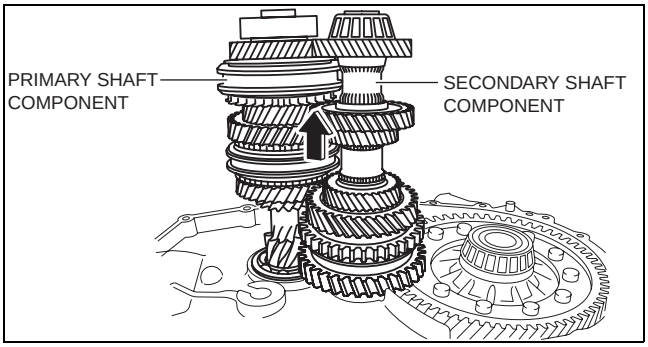
1. Tap the locations shown in the figure using a plastic hammer to remove the transaxle case component.



bc61um00000005

Primary shaft component, secondary shaft component removal note

1. Remove the primary shaft component and secondary shaft component as a single unit.

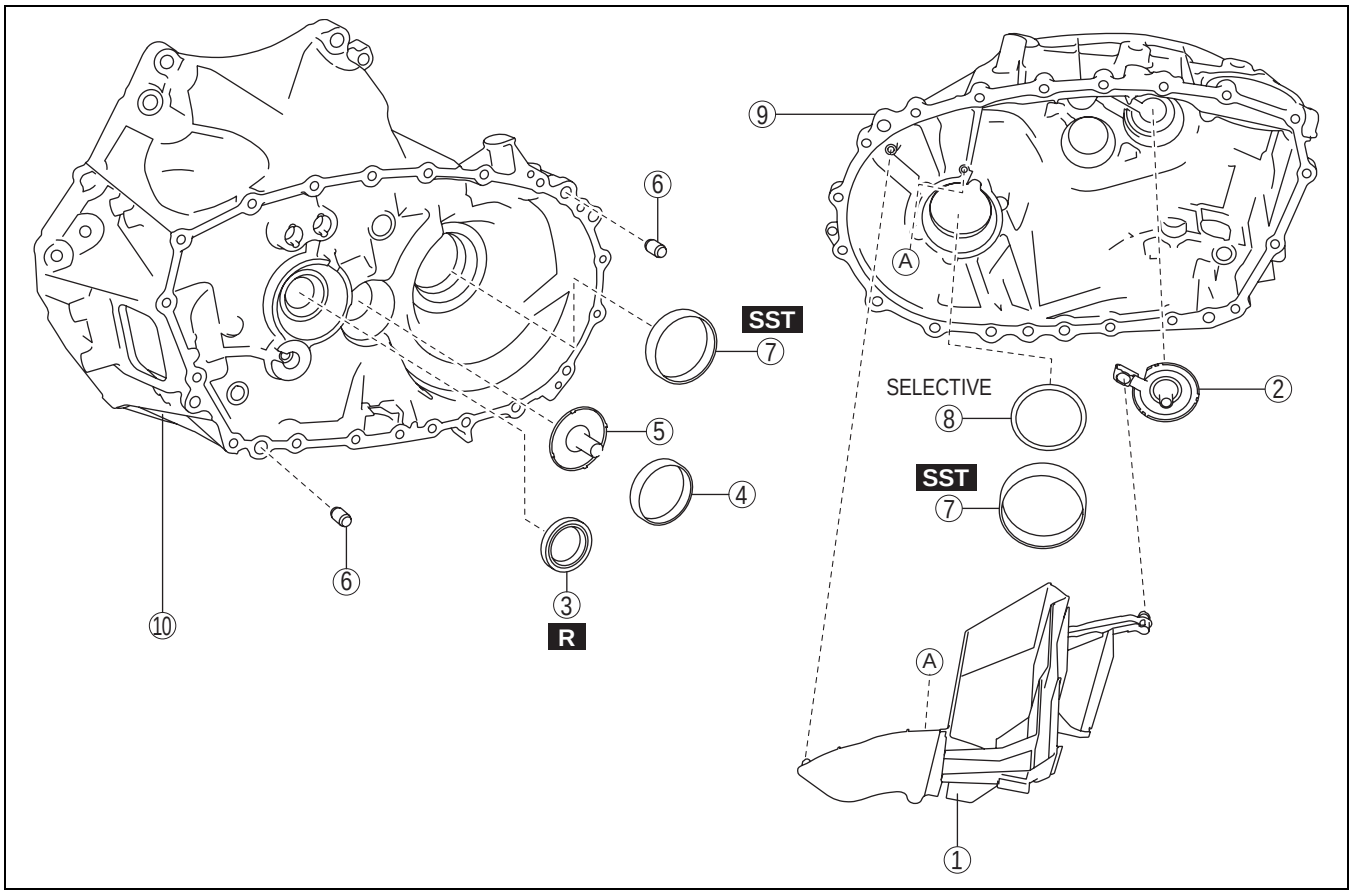


bc61um00000006

TRANSAXLE CASE AND CLUTCH HOUSING DISASSEMBLY

id051500168200

1. Disassemble the transaxle case component and clutch housing component in the order shown in the figure.

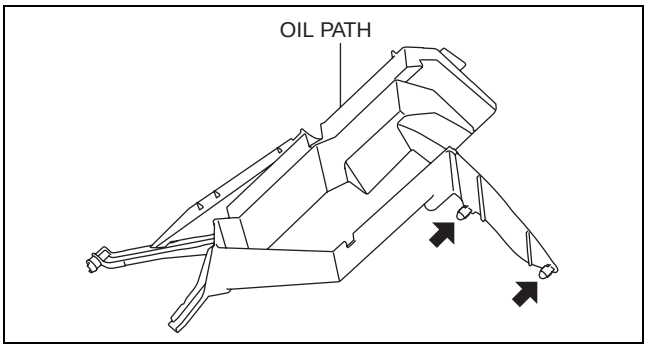


bc61um00000161

1	Oil path (See 05-15-7 Oil Path Removal Note.)
2	Funnel
3	Oil seal (See 05-15-7 Oil Seal Removal Note.)
4	Bearing outer race
5	Funnel
6	Dowel pin
7	Bearing outer race (differential) (See 05-15-7 Bearing Outer Race (Differential) Removal Note.)
8	Shim
9	Transaxle case
10	Clutch housing

Oil Path Removal Note

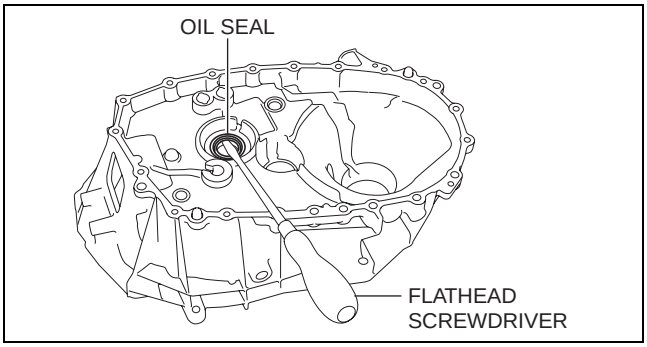
1. Remove the oil path.
2. As shown in the figure, verify that the oil path connection area is not broken.
   - If the oil path connection area is broken, replace the oil path.



bc61um00000167

Oil Seal Removal Note

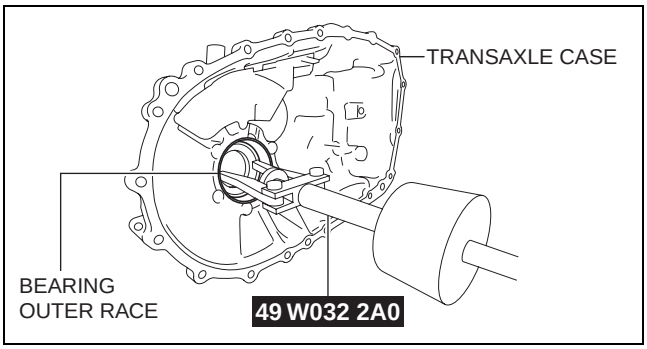
1. Remove the oil seal using a flathead screwdriver.



bc61um00000168

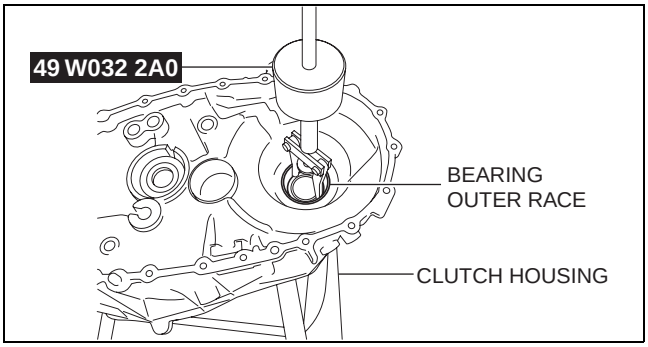
Bearing Outer Race (Differential) Removal Note

1. Remove the bearing outer race (differential) from the transaxle case using the **SST**.



bc61um00000008

2. Remove the bearing outer race (differential) from the clutch housing using the **SST**.

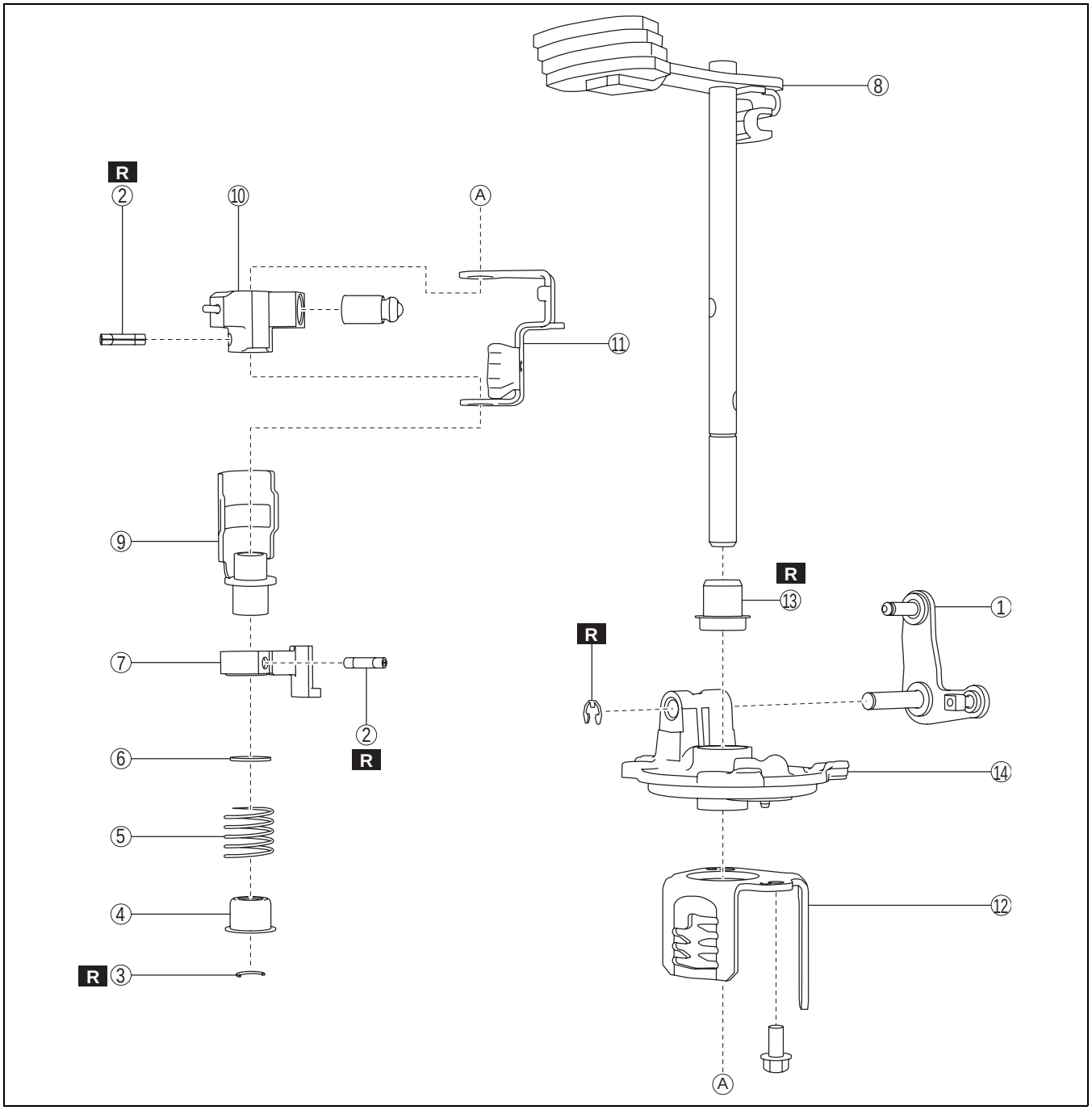


bc61um00000011

SHIFT CONTROL MODULE DISASSEMBLY

id051500170100

1. Disassemble the shift control module in the order shown in the figure.



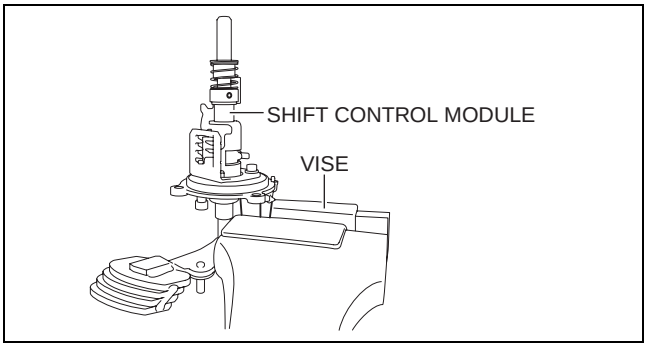
bc61um00000102

1	Select lever
2	Pin (See 05-15-9 Pin Removal Note.)
3	Clip (See 05-15-10 Clip Removal Note.)
4	Spring seat
5	Spring
6	Washer

7	Switch pin
8	Shift lever
9	Interlock sleeve
10	Control lever component
11	Holder plate
12	Guide plate
13	Oil seal
14	Control case

Pin Removal Note

1. Secure the shift control module in a vise.

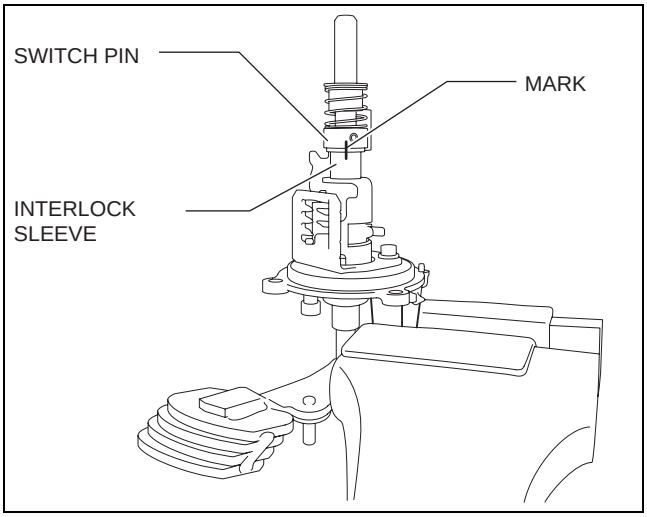


bc61um00000103

2. Mark the switch pin and interlock sleeve.

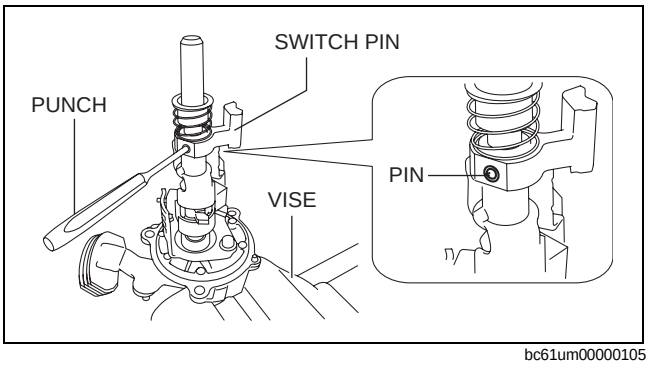
Note

- The switch pin has a particular installation direction.



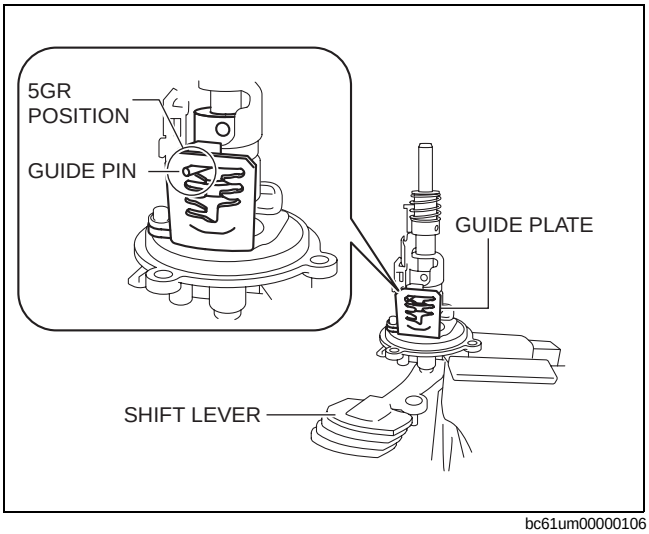
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3. Remove the pin (switch pin) using a punch.



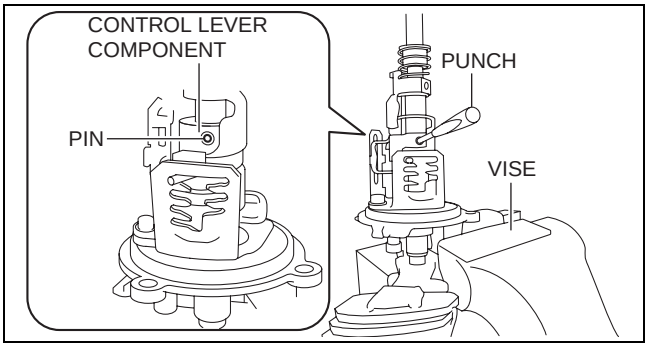
bc61um00000105

4. Move the shift lever to set the guide pin to the 5GR position of the guide plate.



bc61um00000106

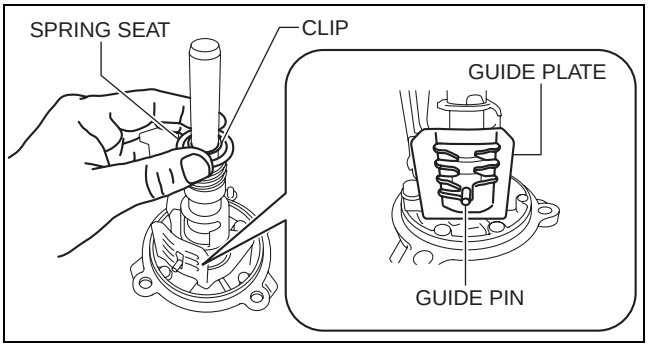
5. Remove the pin (control lever component) using a punch.



bc61um00000107

Clip Removal Note

1. Move the guide pin to the position shown in the figure for the guide plate.
2. Push down the spring seat by hand.
3. Detach the clip.

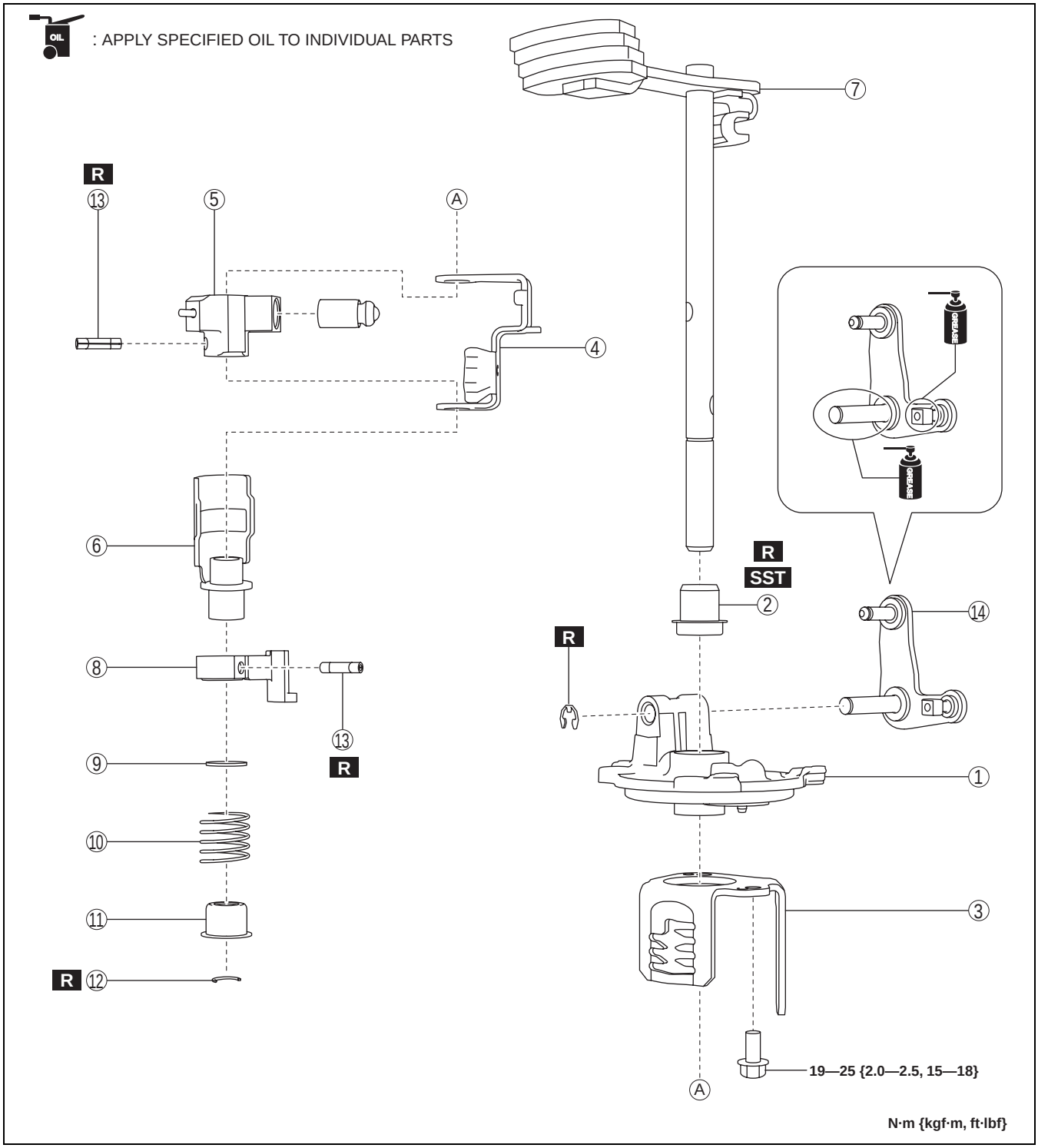


bc61um00000108

SHIFT CONTROL MODULE ASSEMBLY

id051500170200

1. Assemble the shift control module using the procedure shown in the figure.



bc61um00000109

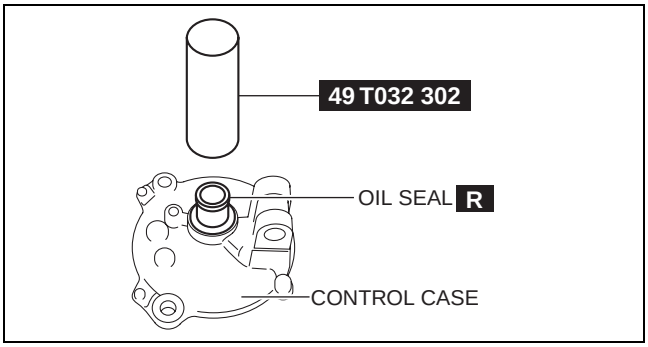
1	Control case
2	Oil seal (See 05-15-12 Oil Seal Assembly Note.)
3	Guide plate
4	Holder plate
5	Control lever component
6	Interlock sleeve
7	Shift lever

8	Switch pin
9	Washer
10	Spring
11	Spring seat
12	Clip (See 05-15-12 Clip Assembly Note.)
13	Pin (See 05-15-12 Pin Assembly Note.)

14	Selector lever

Oil Seal Assembly Note

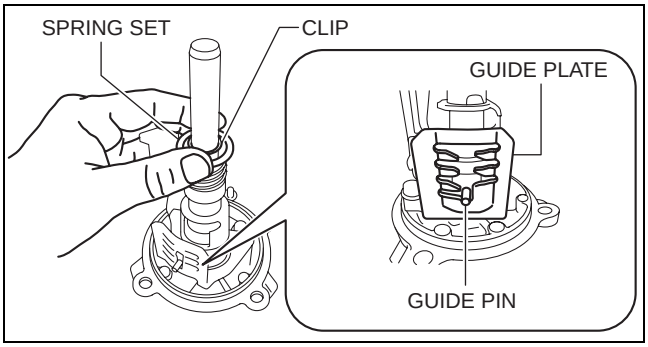
1. Assemble a new oil seal to the control case using the **SST**.



bc61um00000110

Clip Assembly Note

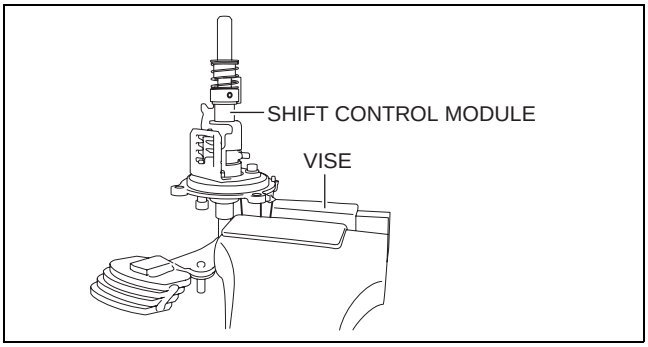
1. Move the guide pin to the position shown in the figure for the guide plate.
2. Push down the spring seat by hand.
3. Assemble the clip.



bc61um00000111

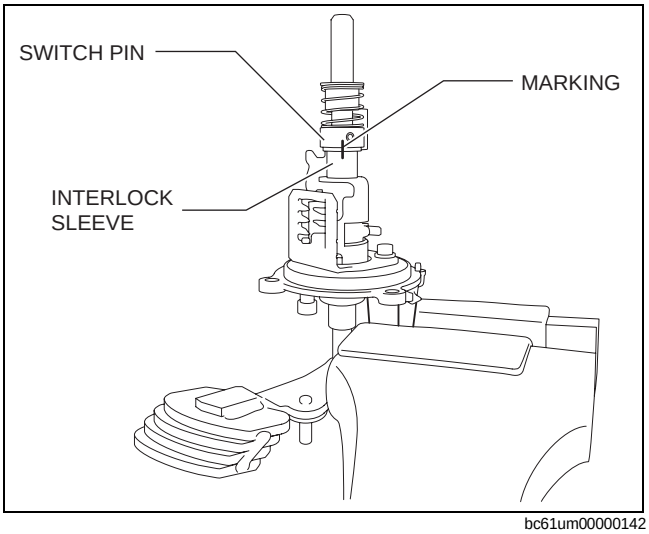
Pin Assembly Note

1. Secure the shift control module in a vise.



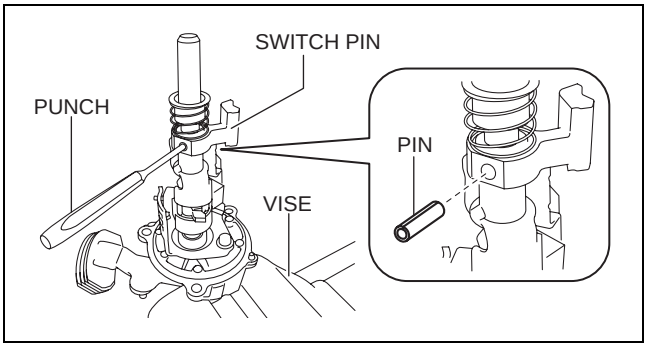
bc61um00000112

2. Align the switch pin and interlock sleeve markings.



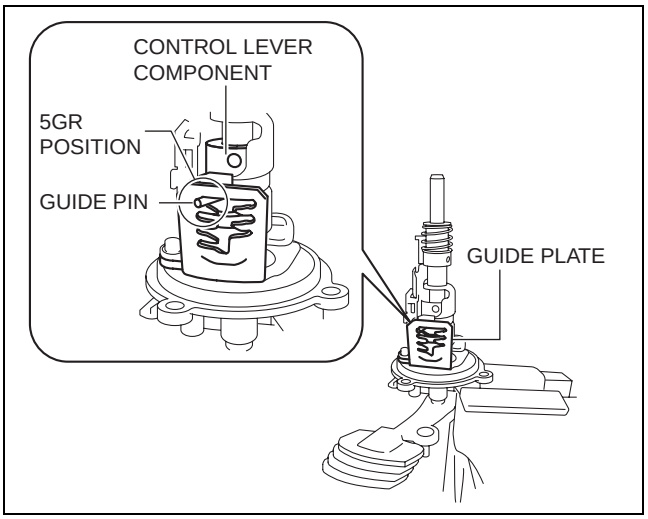
bc61um00000142

3. Assemble a new pin (switch pin) using a punch.



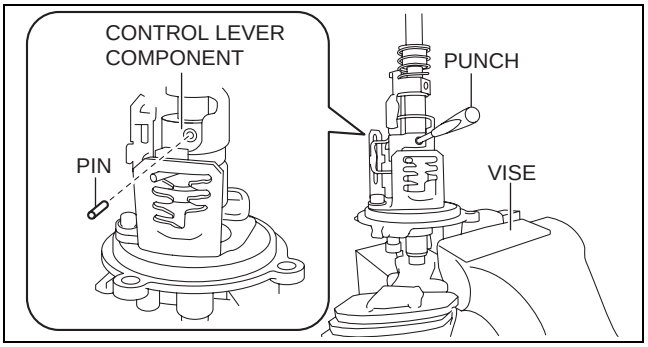
bc61um00000143

4. Move the control lever component to set the guide pin to the 5GR position of the guide plate.



bc61um00000144

5. Assemble a new pin (control lever component) using a punch.

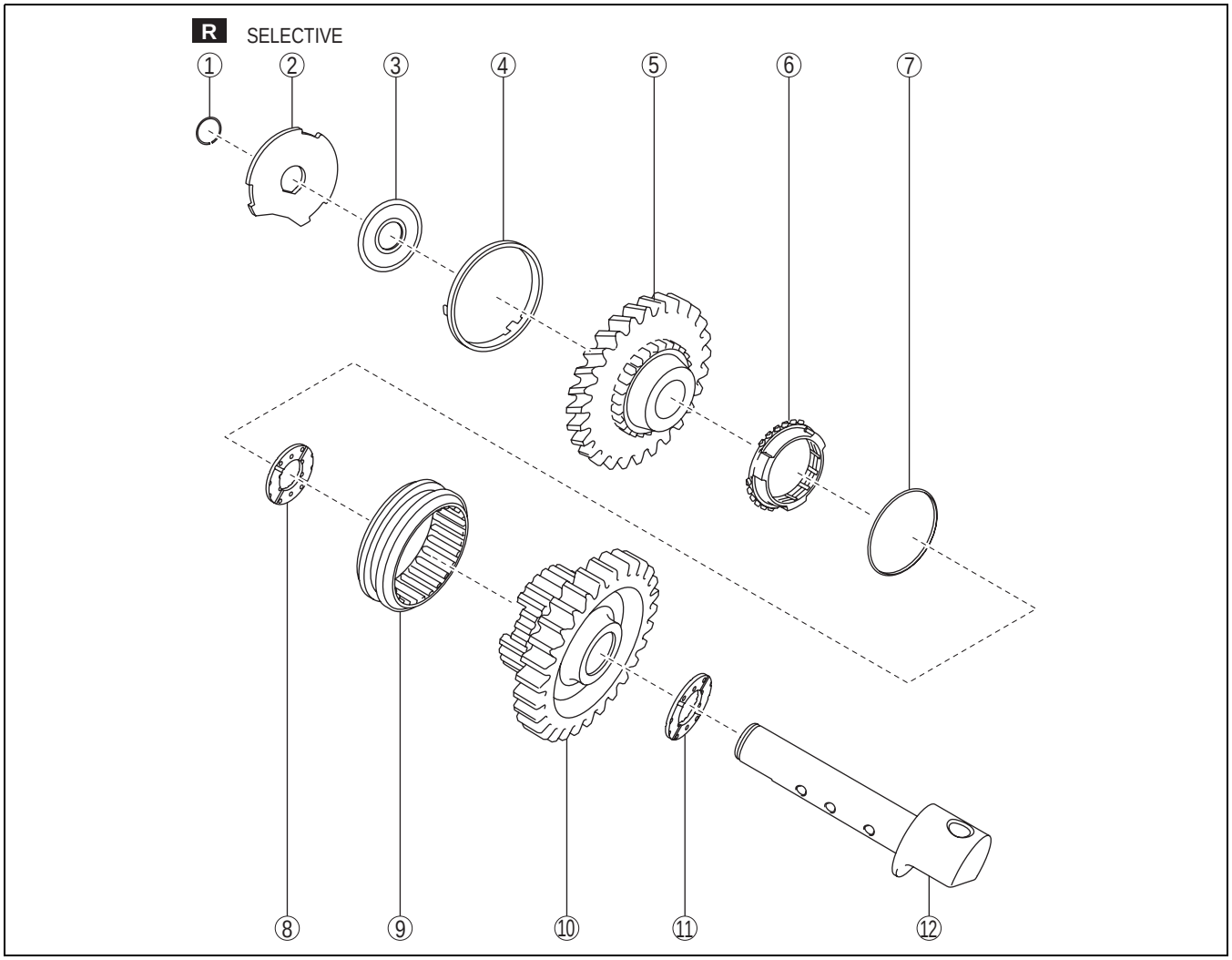


bc61um00000145

REVERSE IDLER GEAR COMPONENT DISASSEMBLY

id051500168300

1. Disassemble the reverse idler gear component in the order shown in the figure.



bc61um00000012

1	Clip
2	Shim
3	Needle bearing
4	Friction damper
5	Reverse idler gear
6	Synchronizer ring

7	Reverse synchronizer key spring
8	Thrust washer
9	Clutch hub sleeve
10	Reverse idler gear
11	Thrust washer
12	Reverse gear shaft

REVERSE IDLER GEAR COMPONENT INSPECTION

id051500168400

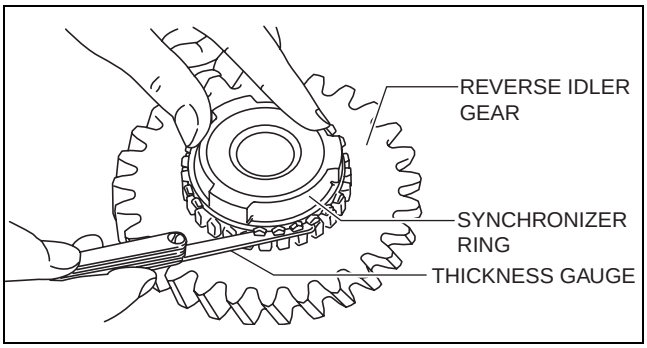
Reverse idler gear inspection

1. Inspect the gears for damage, wear, or loss.
   - If there is any malfunction, replace the reverse idler gear.
2. Inspect for damage and wear on the contact surface of the synchronizer ring.
   - If there is any malfunction, replace the reverse idler gear.

Synchronizer ring inspection

1. Inspect the teeth of the synchronizer ring for damage, wear, or loss.
   - If there is any malfunction, replace the synchronizer ring.
2. Inspect the taper surface for wear or loss.
   - If there is any malfunction, replace the synchronizer ring.
3. While holding the synchronizer ring and reverse idler gear with your fingers as shown in the figure, measure the clearance of the synchronizer ring and gear side surface around the entire circumference using a thickness gauge.
   - If it is less than the minimum specification, replace the synchronizer ring.

   Clearance between synchronizer ring and reverse idler gear side
   Specification: 0.95 mm {0.037 in}
   Minimum: 0.49 mm {0.019 in}

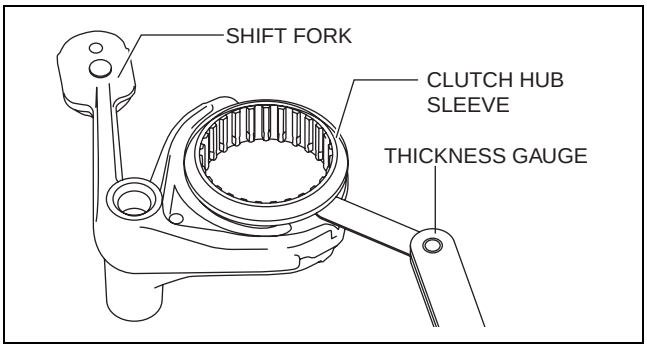


bc61um00000013

Clutch hub component inspection

1. Inspect the clutch hub sleeve and clutch hub operation.
   - If there is any malfunction, replace the malfunctioning part.
2. Inspect the spline for damage, wear or loss.
   - If there is any malfunction, replace the malfunctioning part.
3. While holding the clutch hub sleeve and shift fork together with your hand as shown in the figure, measure the clearance between the shift fork and clutch hub sleeve groove using a thickness gauge.
   - If it exceeds the maximum, replace the clutch hub sleeve and shift fork as a set.

   Clearance between shift fork and clutch hub sleeve groove
   Specification: 0.225 mm {0.00886 in}
   Maximum: 0.40 mm {0.016 in}

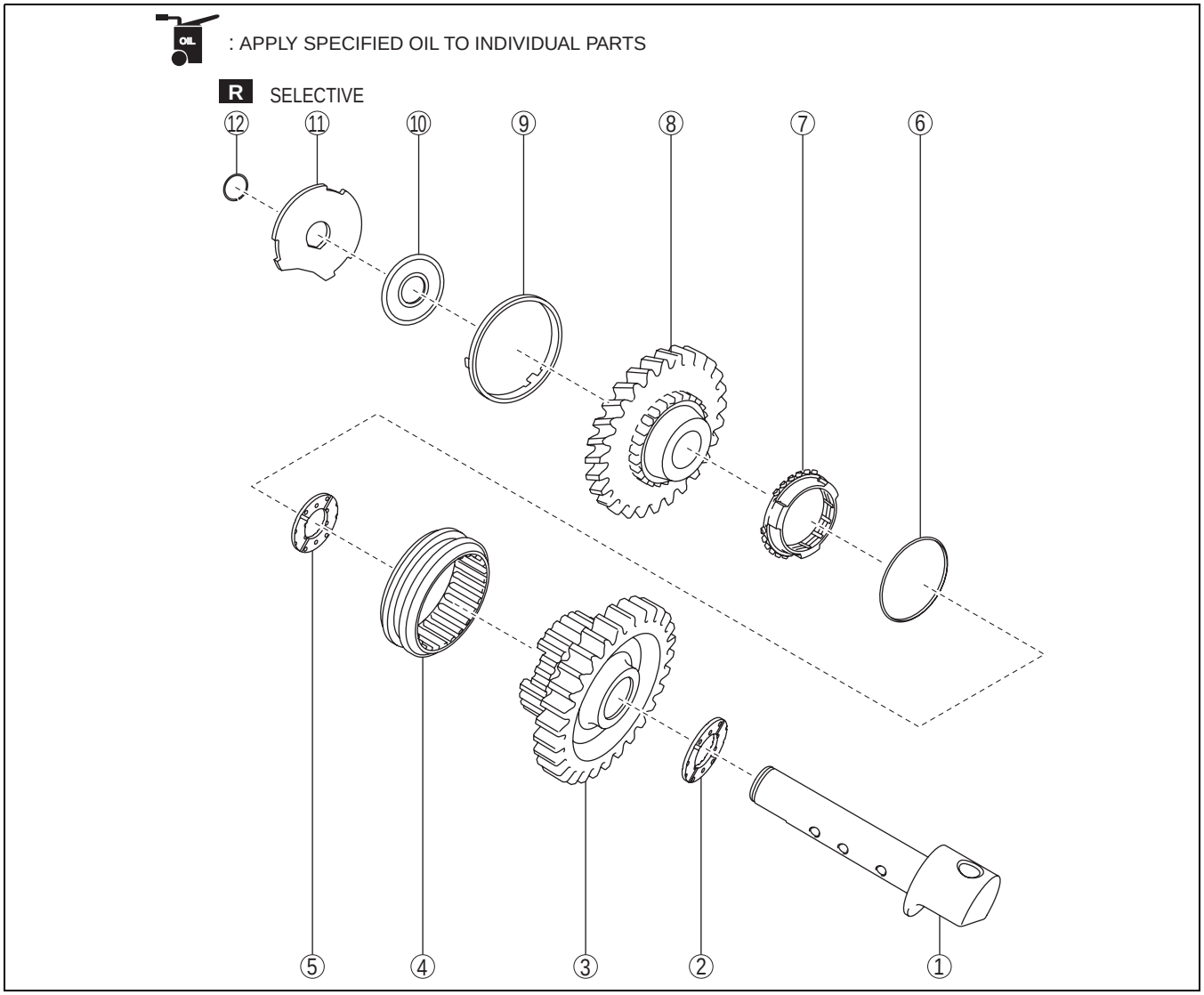


bc61um00000014

REVERSE IDLER GEAR COMPONENT ASSEMBLY

id051500168500

1. Assemble the reverse idler gear component in the order shown in the figure.



bc61um00000015

1	Reverse gear shaft
2	Thrust washer
3	Reverse idler gear
4	Clutch hub sleeve (See 05-15-17 Clutch Hub Sleeve Assembly Note.)
5	Thrust washer
6	Reverse synchronizer key spring

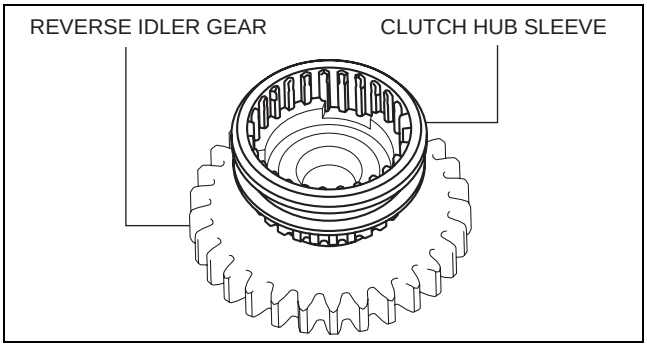
7	Synchronizer ring
8	Reverse idler gear
9	Friction damper
10	Needle bearing
11	Shim (See 05-15-17 Shim Assembly Note.)
12	Clip

Clutch Hub Sleeve Assembly Note

1. Assemble the clutch hub sleeve to the reverse idler gear.

Note

- The clutch hub sleeve can be assembled to only the specified position due to the shape of its spline. Therefore, it is necessary to find the position where the clutch hub sleeve can be assembled smoothly while gradually rotating the clutch hub sleeve in the rotation direction.

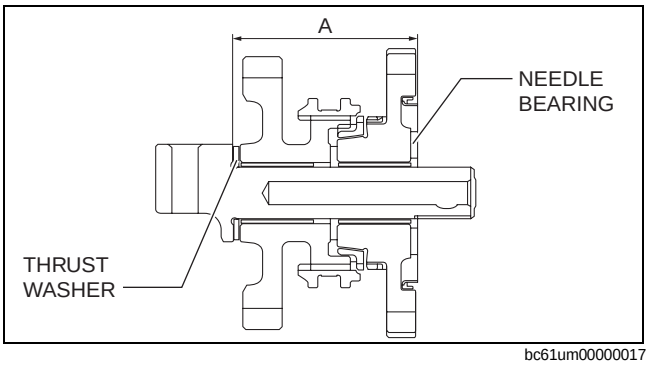


bc61um00000016

Shim Assembly Note

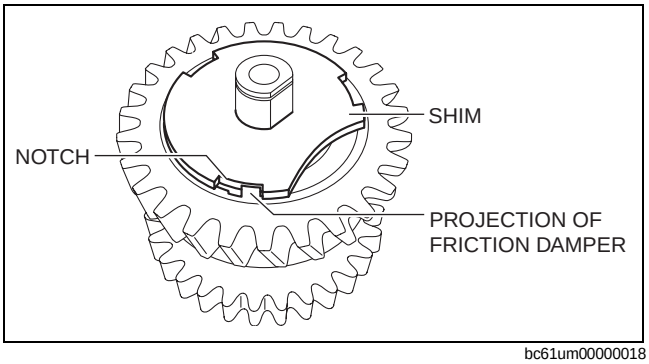
1. Measure distance A shown in the figure from the thrust washer to the needle bearing.
2. Select a shim of the appropriate thickness referring to the measured values in the table.

Distance A measured value		Appropriate shim thickness (mm {in})
Equal to or more (mm {in})	Less than (mm {in})	
56.495 {2.2242}	56.525 {2.2254}	3.150 {0.1240}
56.525 {2.2254}	56.575 {2.2274}	3.100 {0.1220}
56.575 {2.2274}	56.625 {2.2293}	3.050 {0.1201}
56.625 {2.2293}	56.675 {2.2313}	3.000 {0.1181}
56.675 {2.2313}	56.725 {2.2333}	2.950 {0.1161}
56.725 {2.2333}	56.775 {2.2352}	2.900 {0.1142}
56.775 {2.2352}	56.800 {2.2362}	2.850 {0.1122}



bc61um00000017

3. Assemble the selected shim.
   (1) Align the notch of the shim with the projection of the friction damper, and assemble the shim.



bc61um00000018

PRIMARY SHAFT COMPONENT PREINSPECTION

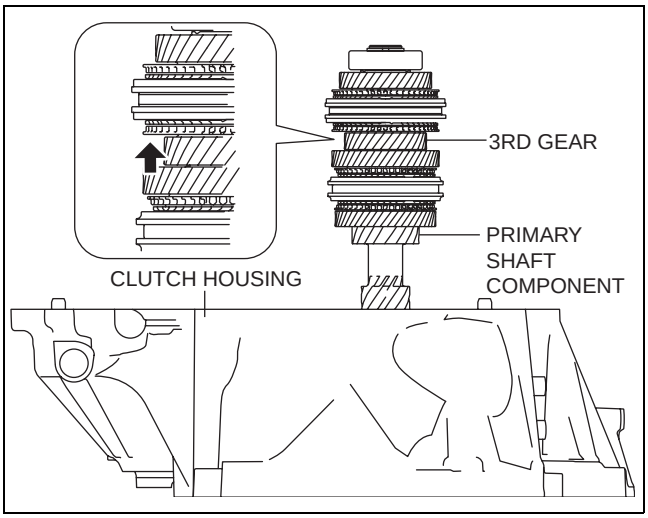
id051500168600

3rd Gear Thrust Clearance Inspection

1. Adjust the **SST (49 0107 680A)**, point the transaxle case assembly surface of the clutch housing upward, and then level it.
2. Assemble the primary shaft component to the clutch housing.
3. Set the dial gauge to the position of the arrow shown in the figure.
4. Hold the primary shaft component by hand.

Note
- To prevent error during the thrust clearance measurement, hold the primary shaft component by hand so that the primary shaft component does not move.

5. Move the 3rd gear in the axial direction and measure the 3rd gear thrust clearance.
   - If it exceeds the maximum specification, inspect the 3rd gear and surrounding parts for damage and wear and replace the malfunctioning part.

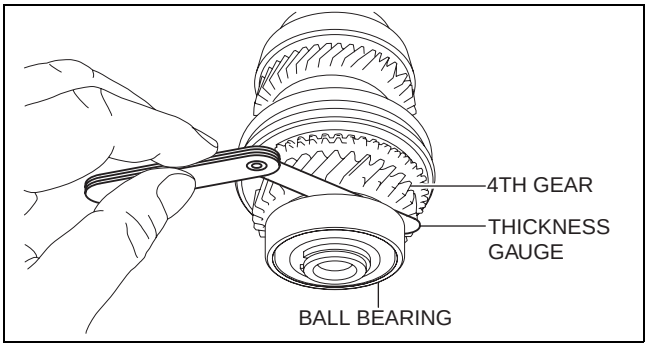


bc61um00000118

3rd gear thrust clearance
Specification: 0.257 mm {0.0101 in}
Maximum: 0.417 mm {0.0164 in}

4th Gear Thrust Clearance Inspection

1. Insert a thickness gauge into the clearance between the 4th gear and the ball bearing.
2. Rotate the thickness gauge one full rotation along the primary shaft and measure the 4th gear thrust clearance.
   - If it exceeds the maximum specification, inspect the 4th gear and surrounding parts for damage and wear and replace the malfunctioning part.



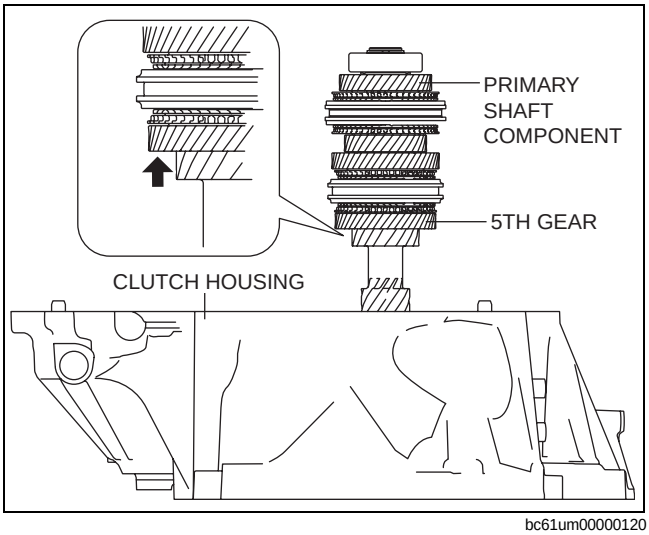
bc61um00000119

4th gear thrust clearance
Specification: 0.325 mm {0.0128 in}
Maximum: 0.489 mm {0.0193 in}

5th Gear Thrust Clearance Inspection

1. Adjust the **SST (49 0107 680A)**, point the transaxle case assembly surface of the clutch housing upward, and then level it.
2. Assemble the primary shaft component to the clutch housing.
3. Set the dial gauge to the position of the arrow shown in the figure.
4. Hold the primary shaft component by hand.

Note
- To prevent error during the thrust clearance measurement, hold the primary shaft component by hand so that the primary shaft component does not move.



bc61um00000120

5. Move the 5th gear in the axial direction and measure the 5th gear thrust clearance.
   - If it exceeds the maximum specification, inspect the 5th gear and surrounding parts for damage and wear and replace the malfunctioning part.

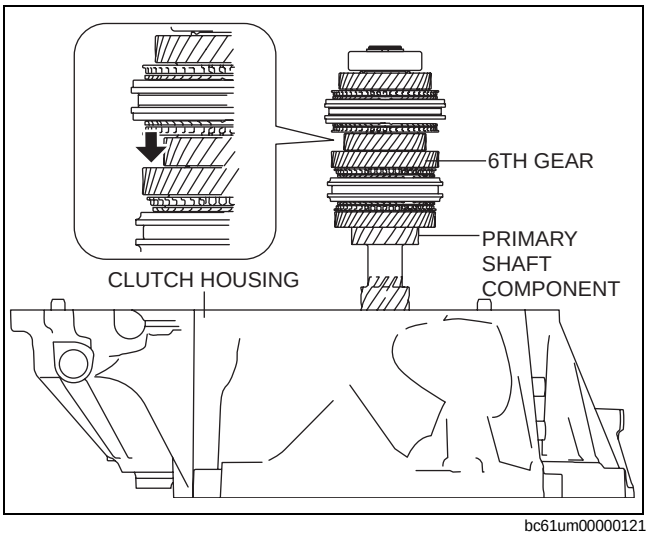
5th gear thrust clearance
Specification: 0.192 mm {0.00756 in}
Maximum: 0.324 mm {0.0128 in}

6th Gear Thrust Clearance Inspection

1. Adjust the **SST (49 0107 680A)**, point the transaxle case assembly surface of the clutch housing upward, and then level it.
2. Assemble the primary shaft component to the clutch housing.
3. Set the dial gauge to the position of the arrow shown in the figure.
4. Hold the primary shaft component by hand.

Note
- To prevent error during the thrust clearance measurement, hold the primary shaft component by hand so that the primary shaft component does not move.

5. Move the 6th gear in the axial direction and measure the 6th gear thrust clearance.
   - If it exceeds the maximum specification, inspect the 6th gear and surrounding parts for damage and wear and replace the malfunctioning part.



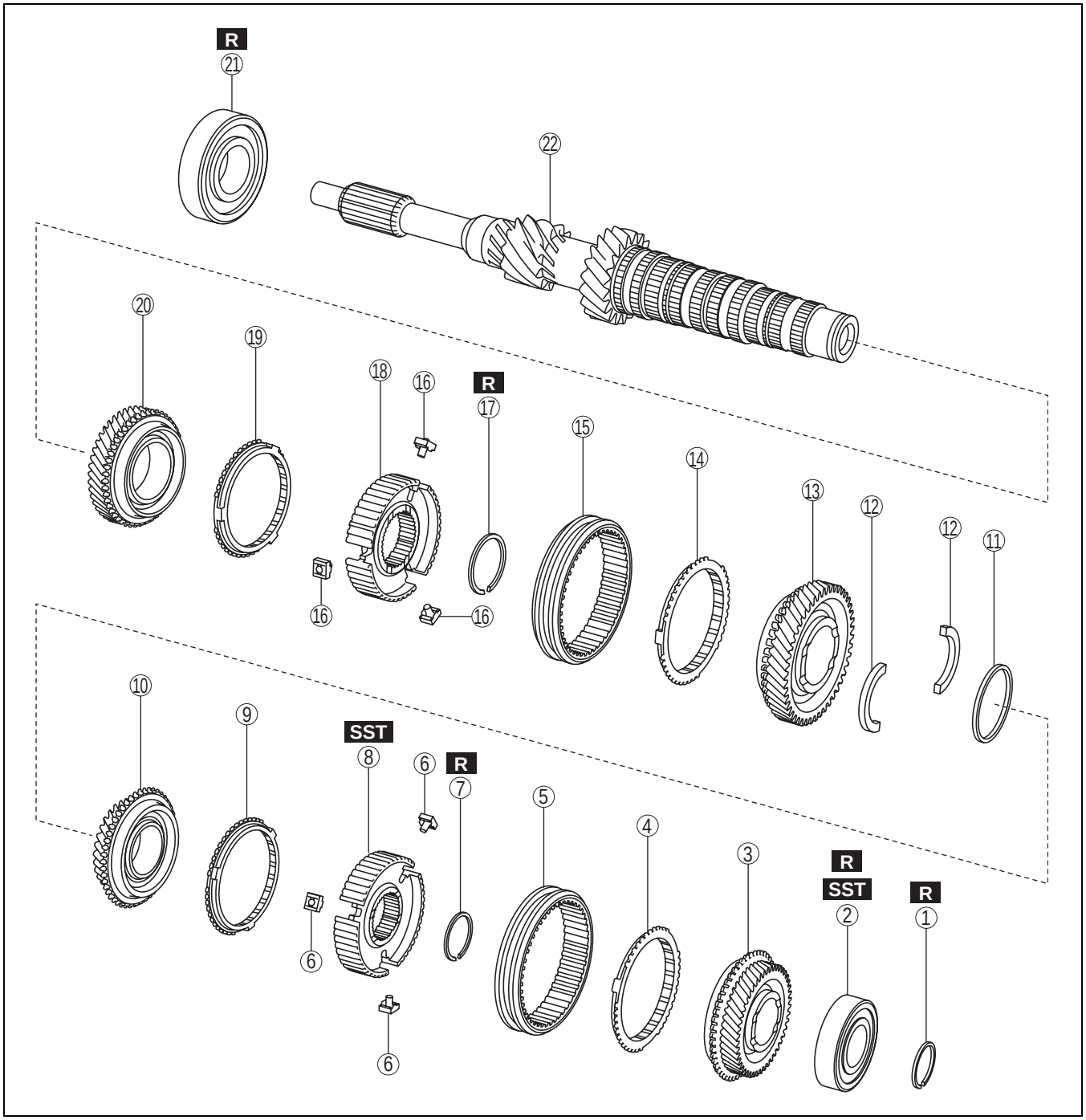
bc61um00000121

6th gear thrust clearance
Specification: 0.262 mm {0.0103 in}
Maximum: 0.398 mm {0.0157 in}

PRIMARY SHAFT COMPONENT DISASSEMBLY

id051500168700

1. Disassemble the primary shaft component as shown in the figure.



bc61um00000019

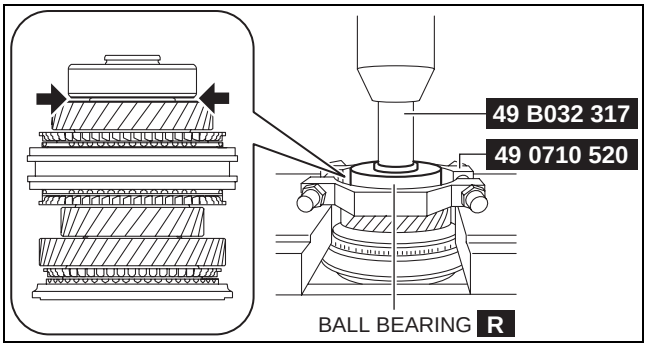
1	Clip
2	Ball bearing (See 05-15-21 Ball Bearing (Transaxle Case Side) Removal Note.)
3	4th gear
4	Synchronizer ring
5	Clutch hub sleeve
6	Synchronizer key
7	Clip
8	Clutch hub (3GR/4GR) (See 05-15-21 Clutch Hub (3GR/4GR) Removal Note.)

9	Synchronizer ring
10	3rd gear
11	Holder
12	Retaining ring
13	6th gear
14	Synchronizer ring
15	Clutch hub sleeve
16	Synchronizer key
17	Clip

18	Clutch hub (5GR/6GR) (See 05-15-21 Clutch Hub (5GR/6GR) Removal Note.)
19	Synchronizer ring
20	5th gear
21	Ball bearing (See 05-15-22 Ball Bearing (Clutch Housing Side) Removal Note.)
22	Primary shaft

Ball Bearing (Transaxle Case Side) Removal Note

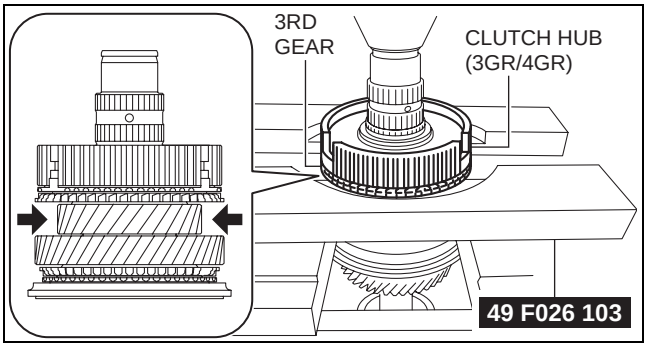
1. Set the primary shaft component and **SST**s in a press as shown in the figure.
2. Disassemble the ball bearing using the press.



bc61um00000128

Clutch Hub (3GR/4GR) Removal Note

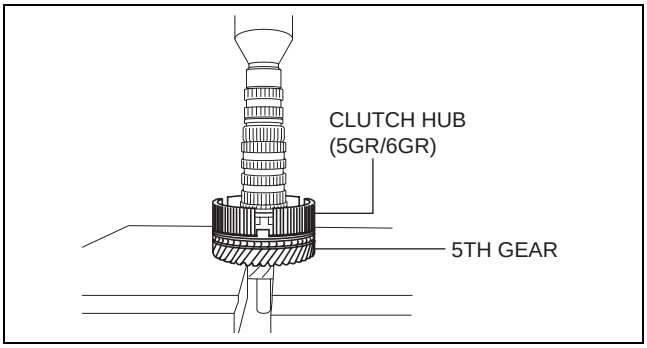
1. Set the primary shaft component and **SST** in a press as shown in the figure.
2. Remove from the clutch hub to the 3rd gear as a single unit using the press.



bc61um00000129

Clutch Hub (5GR/6GR) Removal Note

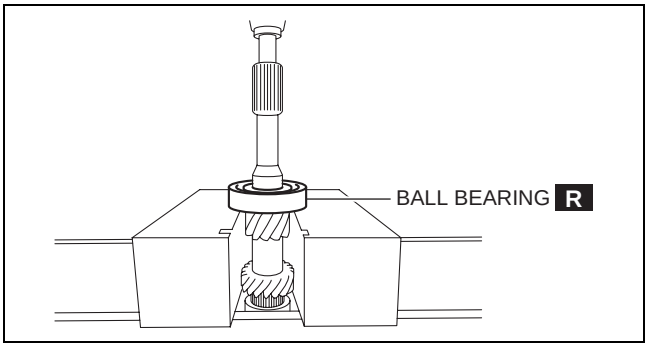
1. Set the primary shaft component in a press as shown in the figure.
2. Remove from the clutch hub to the 5th gear as a single unit using the press.



bc61um00000022

Ball Bearing (Clutch Housing Side) Removal Note

1. Set the primary shaft component in a press as shown in the figure.
2. Remove the ball bearing using the press.



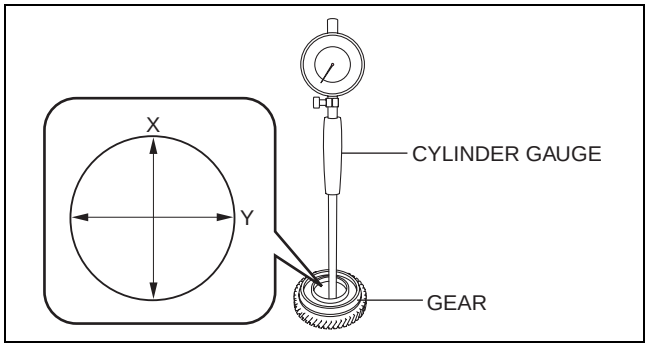
bc61um00000023

PRIMARY SHAFT COMPONENT INSPECTION

id051500168800

Gear Inspection

1. Inspect the gears for damage, wear, or loss.
   - If there is any malfunction, replace the gear.
2. Inspect the gears and synchronizer rings for damage and wear on contact surfaces.
   - If there is any malfunction, replace the gear.
3. Measure the inner diameter of the gear using a cylinder gauge in X and Y directions as shown in the figure.
   - If it exceeds the maximum specification, replace the gear.



bc61um00000024

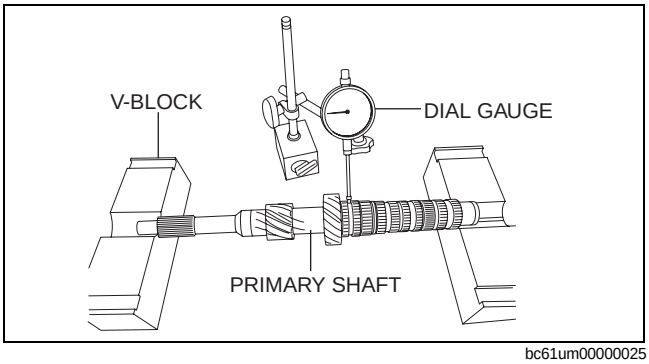
Inner diameter of gear

Measurement location	Specification (mm {in})	Maximum (mm {in})
3rd gear	37.01 {1.4571}	37.02 {1.4575}
4th gear	32.81 {1.2917}	32.82 {1.2921}
5th gear	42.01 {1.6539}	42.02 {1.6543}
6th gear	37.01 {1.4571}	37.02 {1.4575}

Primary Shaft Inspection

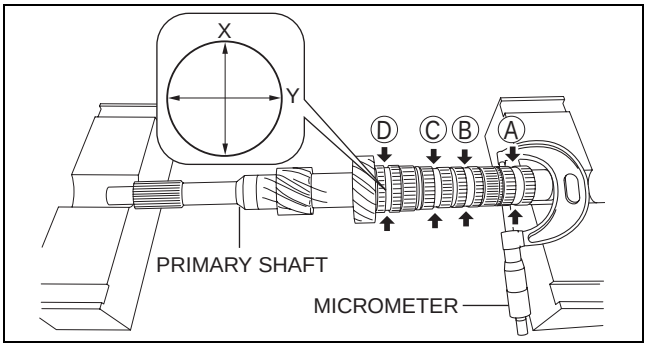
1. Inspect the spline for damage and wear.
   - If there is any malfunction, replace the primary shaft.
2. Inspect the gear area for damage, wear, and loss.
   - If there is any malfunction, replace the primary shaft.
3. Measure the lateral runout of the primary shaft.
   (1) Set the primary shaft on V-blocks so that the V-blocks support the primary shaft journal as shown in the figure.
   (2) Measure the lateral runout of the position shown in the figure for the primary shaft using a dial gauge.
      - If it exceeds the maximum specification, replace the primary shaft.

Lateral runout of primary shaft
Maximum: 0.05 mm {0.002 in}



bc61um00000025

4. Measure the outer diameter of the primary shaft using a micrometer. Measurement positions total eight and are in the X and Y directions, at four points (A, B, C, and D) as shown in the figure.
   - If it is less than the minimum specification, replace the primary shaft.



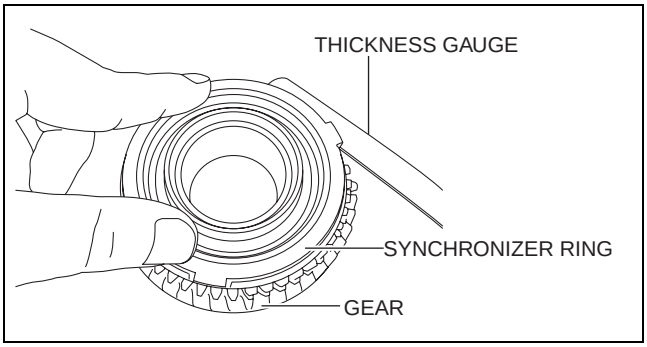
bc61um00000026

Outer diameter of primary shaft

Measurement location	Specification (mm {in})	Minimum (mm {in})
A: 4th gear assembly part	32.77 {1.2902}	32.76 {1.2898}
B: 3rd gear assembly part	36.97 {1.4555}	36.96 {1.4551}
C: 6th gear assembly part	36.97 {1.4555}	36.96 {1.4551}
D: 5th gear assembly part	41.97 {1.6524}	41.96 {1.652}

Synchronizer Ring Inspection

1. Inspect the teeth of the synchronizer ring for damage, wear, or loss.
   - If there is any malfunction, replace the synchronizer ring.
2. Inspect the taper surface for wear or loss.
   - If there is any malfunction, replace the synchronizer ring.
3. While holding the synchronizer ring and gear with your fingers as shown in the figure, measure the clearance of the synchronizer ring and gear side surface around the entire circumference using a thickness gauge.
   - If it is less than the minimum specification, replace the synchronizer ring.



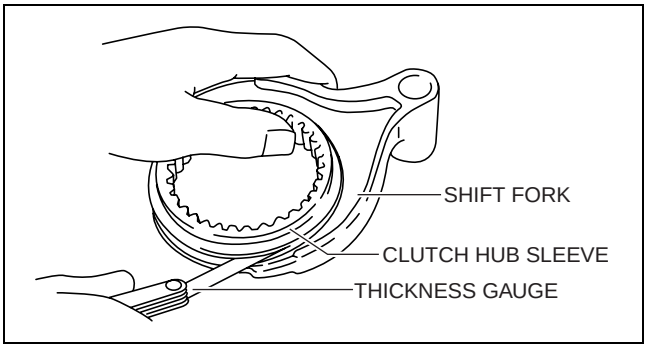
bc61um00000027

Clearance between synchronizer ring and gear

Measurement location	Specification (mm {in})	Minimum (mm {in})
Synchronizer ring (3GR)	0.97 {0.038}	0.32 {0.013}
Synchronizer ring (4GR)	1.05 {0.0413}	0.40 {0.016}
Synchronizer ring (5GR)	1.15 {0.0453}	0.50 {0.020}
Synchronizer ring (6GR)	1.15 {0.0453}	0.50 {0.020}

Clutch Hub Component Inspection

1. Inspect the clutch hub sleeve and clutch hub operation.
   - If there is any malfunction, replace the malfunctioning part.
2. Inspect the spline for damage, wear or loss.
   - If there is any malfunction, replace the malfunctioning part.
3. While holding the clutch hub sleeve and shift fork together with your hand as shown in the figure, measure the clearance between the shift fork and clutch hub sleeve groove using a thickness gauge.
   - If it exceeds the maximum, replace the clutch hub sleeve and shift fork as a set.



bc61um00000028

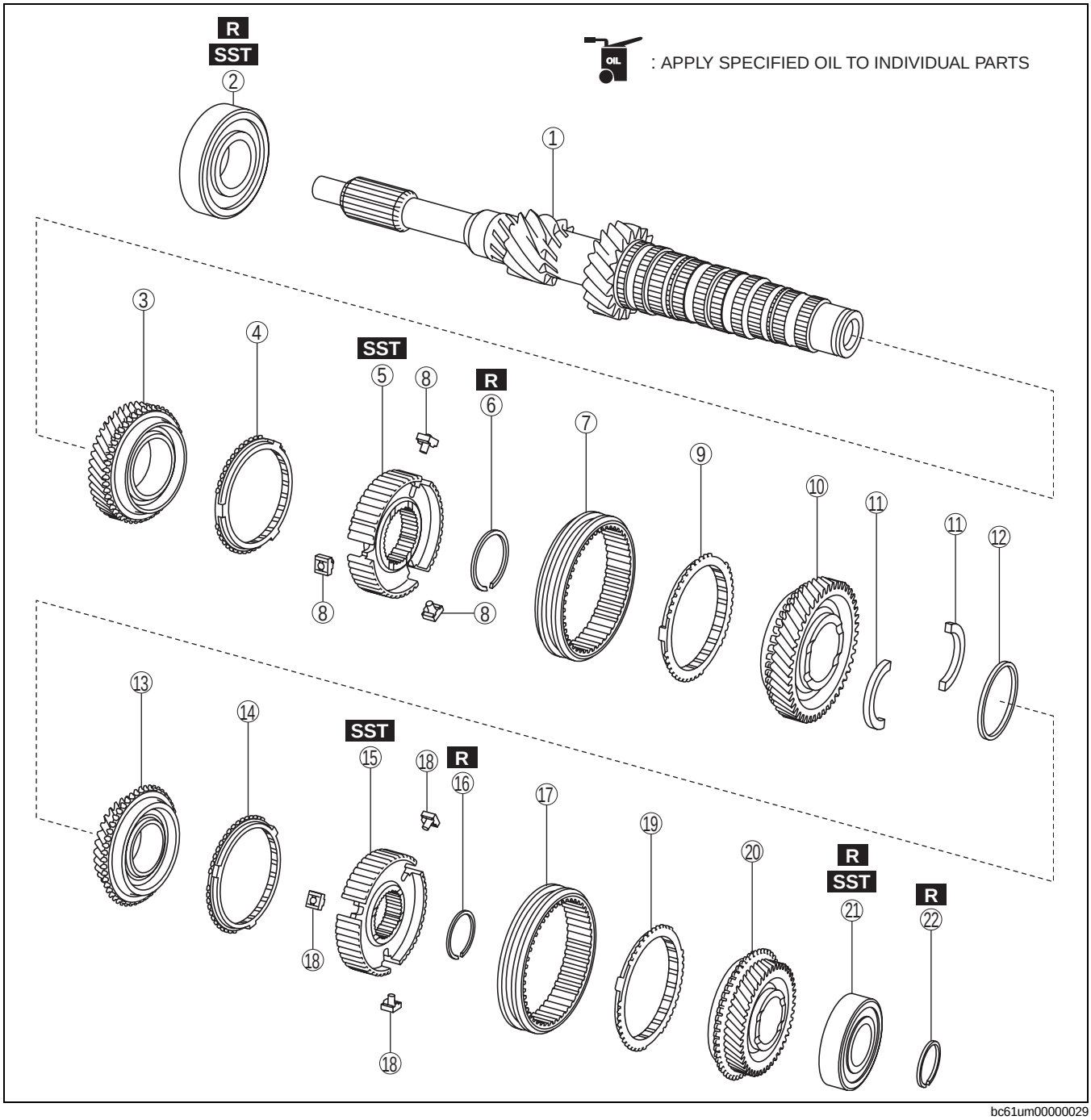
Clearance between shift fork and clutch hub sleeve groove

Measurement location	Specification (mm {in})	Maximum (mm {in})
Shift fork (3GR/4GR)	0.225 {0.00886}	0.40 {0.016}
Shift fork (5GR/6GR)	0.225 {0.00886}	0.40 {0.016}

PRIMARY SHAFT COMPONENT ASSEMBLY

id051500168900

1. Assemble the primary shaft component using the procedure shown in the figure.



bc61um00000029

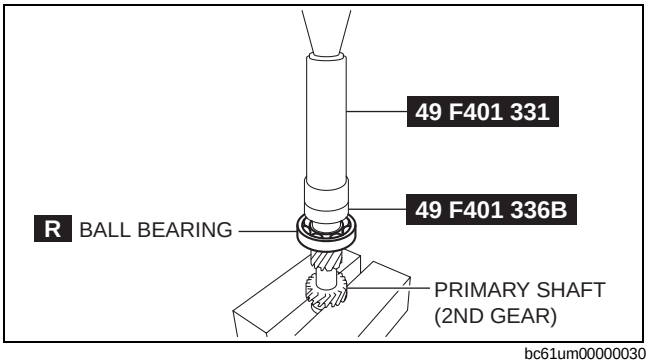
1	Primary shaft
2	Ball bearing (See 05-15-25 Ball Bearing (Clutch Housing Side) Assembly Note.)
3	5th gear
4	Synchronizer ring

5	Clutch hub (5GR/6GR) (See 05-15-25 Clutch Hub (5GR/6GR) Assembly Note.)
6	Clip
7	Clutch hub sleeve (See 05-15-25 Clutch Hub Sleeve Assembly Note.)

8	Synchronizer key (See 05-15-26 Synchronizer Key Assembly Note.)
9	Synchronizer ring (See 05-15-26 Synchronizer Ring Assembly Note.)
10	6th gear
11	Retaining ring
12	Holder
13	3rd gear
14	Synchronizer ring
15	Clutch hub (3GR/4GR) (See 05-15-27 Clutch Hub (3GR/4GR) Assembly Note.)
16	Clip
17	Clutch hub sleeve (See 05-15-25 Clutch Hub Sleeve Assembly Note.)
18	Synchronizer key (See 05-15-26 Synchronizer Key Assembly Note.)
19	Synchronizer ring (See 05-15-26 Synchronizer Ring Assembly Note.)
20	4th gear
21	Ball bearing (See 05-15-27 Ball Bearing (Transaxle Case Side) Assembly Note.)
22	Clip

Ball Bearing (Clutch Housing Side) Assembly Note

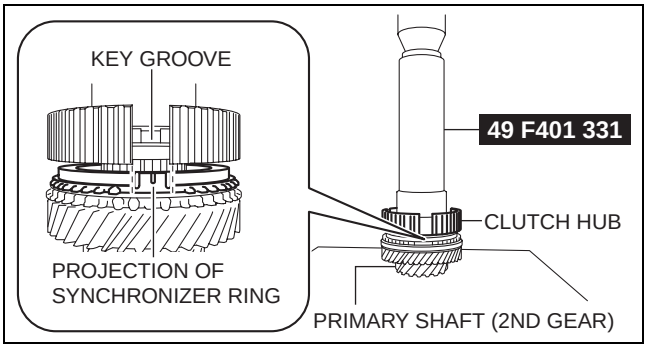
1. Set the primary shaft and new ball bearing, and the **SST**s in a press as shown in the figure.
2. Assemble the ball bearing using the press.



bc61um00000030

Clutch Hub (5GR/6GR) Assembly Note

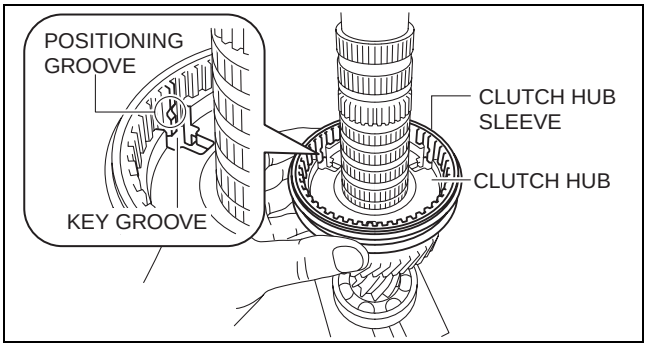
1. Set the primary shaft component and **SST** in a press as shown in the figure.
2. Align the projection of the synchronizer ring with the key groove of the clutch hub.
3. Assemble the clutch hub using the press.



bc61um00000031

Clutch Hub Sleeve Assembly Note

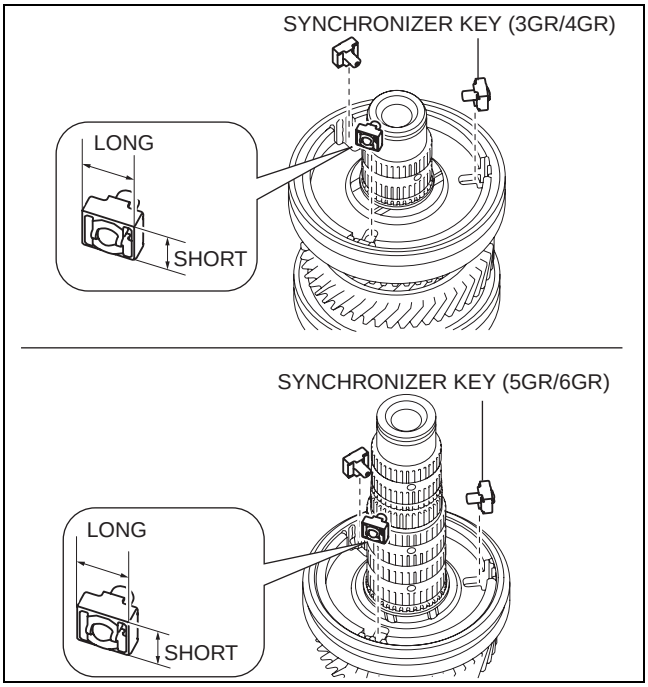
1. Align the positioning groove of the clutch hub sleeve so that it is lined up with the center of the key groove of the clutch hub, and assemble the clutch hub sleeve.



bc61um00000032

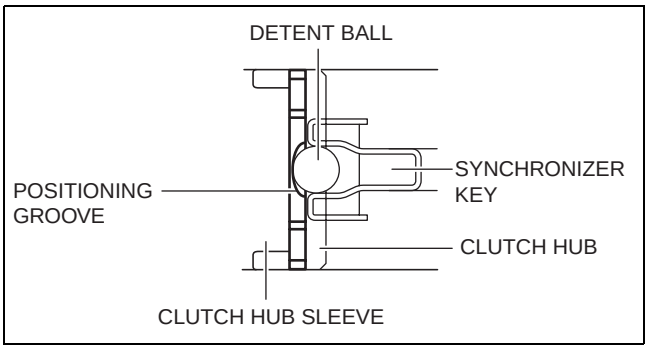
Synchronizer Key Assembly Note

1. Align with the direction of the synchronizer key as shown in the figure, and assemble the clutch hub.



bc61um00000033

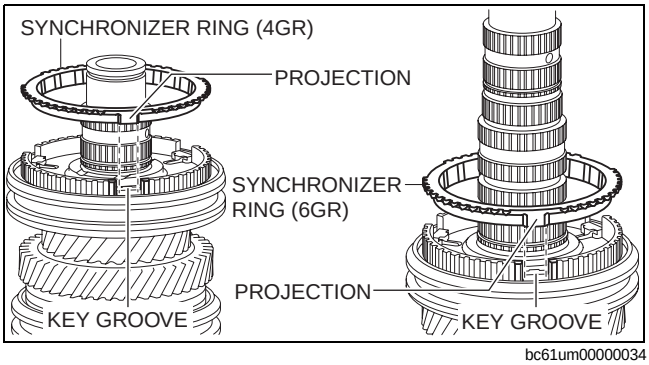
2. After the synchronizer key is assembled, verify that the detent ball of the synchronizer key is engaged with the positioning groove of the clutch hub sleeve.



bc61um00000130

Synchronizer Ring Assembly Note

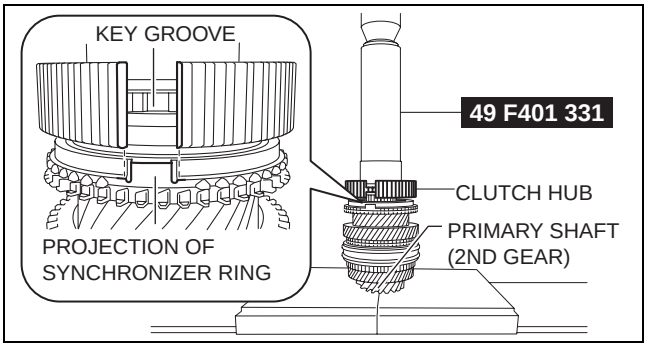
1. Align the projection of the synchronizer ring with the key groove of the clutch hub as shown in the figure, and assemble the synchronizer ring.



bc61um00000034

Clutch Hub (3GR/4GR) Assembly Note

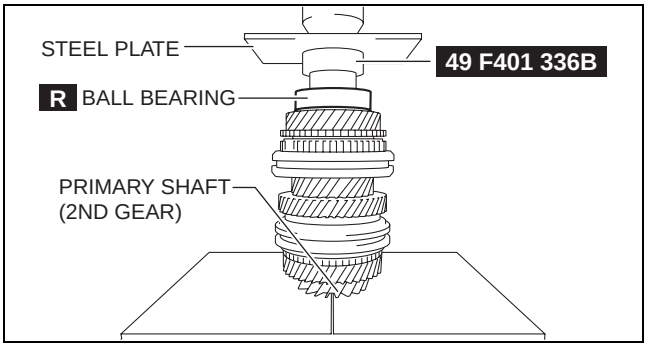
1. Set the primary shaft component and **SST** in a press as shown in the figure.
2. Align the projection of the synchronizer ring with the positioning groove of the clutch hub key.
3. Assemble the clutch hub using the press.



bc61um00000035

Ball Bearing (Transaxle Case Side) Assembly Note

1. Set the primary shaft component, new ball bearing, **SST**, and an appropriate steel plate in a press as shown in the figure.
2. Assemble the ball bearing using the press.



bc61um00000036

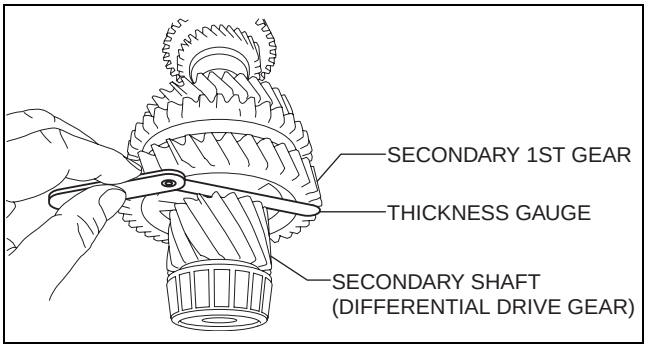
SECONDARY SHAFT COMPONENT PREINSPECTION

id051500169000

Secondary 1st Gear Thrust Clearance Inspection

1. Insert a thickness gauge into the clearance between the secondary 1st gear and the secondary shaft differential drive gear.
2. Route the thickness gauge one full rotation along the secondary shaft and measure the secondary 1st gear thrust clearance.
   - If it exceeds the maximum specification, inspect the secondary 1st gear and surrounding parts for damage and wear and replace the malfunctioning part.

Secondary 1st gear thrust clearance
Specification: 0.174 mm {0.00685 in}
Maximum: 0.291 mm {0.0115 in}

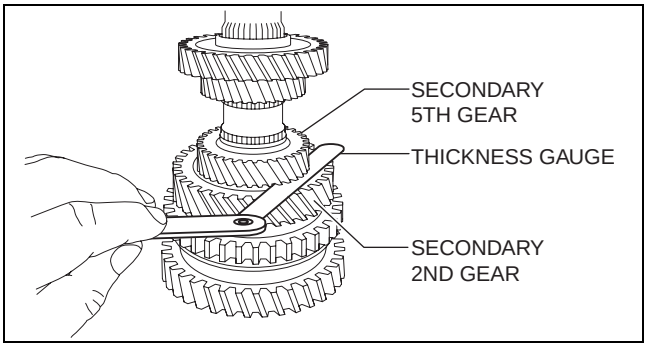


bc61um00000122

Secondary 2nd Gear Thrust Clearance Inspection

1. Insert the thickness gauge into the clearance between the secondary 2nd gear and the secondary 5th gear.
2. Route the thickness gauge one full rotation along the secondary shaft and measure the secondary 2nd gear thrust clearance.
   - If it exceeds the maximum specification, inspect the secondary 2nd gear and surrounding parts for damage and wear and replace the malfunctioning part.

Secondary 2nd gear thrust clearance
Specification: 0.174 mm {0.00685 in}
Maximum: 0.294 mm {0.0116 in}

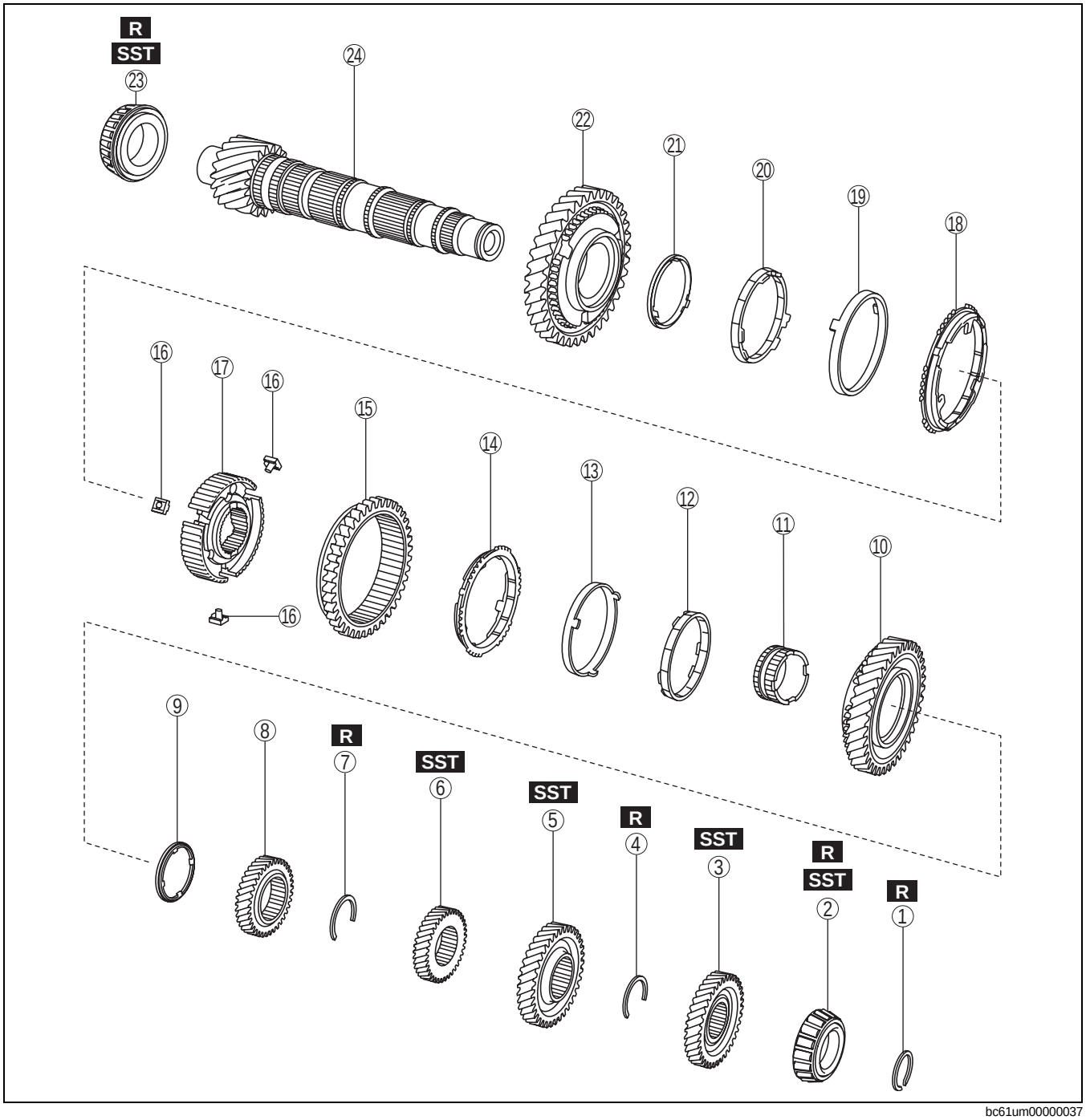


bc61um00000123

SECONDARY SHAFT COMPONENT DISASSEMBLY

id051500169100

1. Disassemble the secondary shaft component in the order shown in the figure.



bc61um00000037

1	Clip
2	Tapered roller bearing (See 05-15-29 Tapered Roller Bearing (Transaxle Case Side), Secondary 4th Gear Removal Note.)
3	Secondary 4th gear (See 05-15-29 Tapered Roller Bearing (Transaxle Case Side), Secondary 4th Gear Removal Note.)
4	Clip
5	Secondary 3rd gear (See 05-15-29 Secondary 3rd Gear, Secondary 6th Gear Removal Note.)

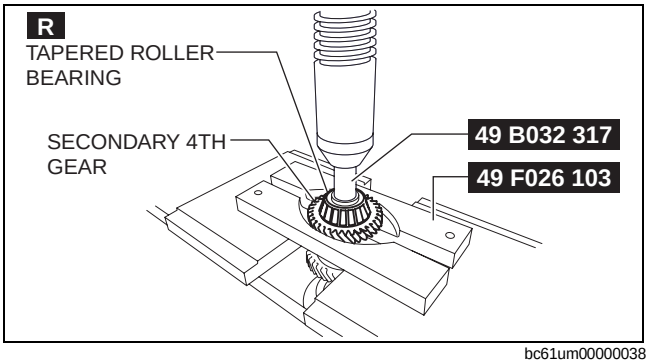
6	Secondary 6th gear (See 05-15-29 Secondary 3rd Gear, Secondary 6th Gear Removal Note.)
7	Clip
8	Secondary 5th gear (See 05-15-29 Secondary 5th Gear Removal Note.)
9	Friction damper
10	Secondary 2nd gear
11	Gear sleeve
12	Inner cone ring
13	Middle cone ring
14	Synchronizer ring

15	Clutch hub sleeve
16	Synchronizer key
17	Clutch hub
18	Synchronizer ring
19	Middle cone ring
20	Inner cone ring

21	Friction damper
22	Secondary 1st gear
23	Tapered roller bearing (See 05-15-30 Tapered Roller Bearing (Clutch Housing Side) Removal Note.)
24	Secondary shaft

Tapered Roller Bearing (Transaxle Case Side), Secondary 4th Gear Removal Note

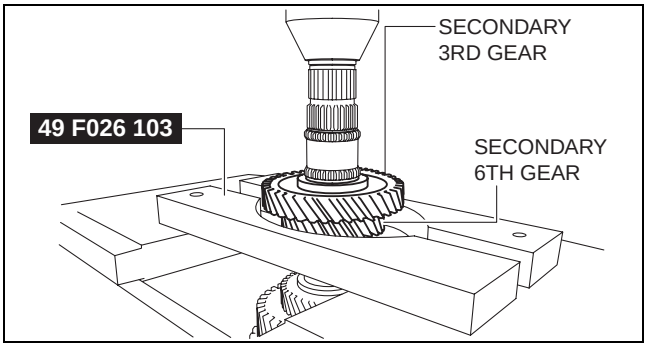
1. Set the **SST**s and secondary shaft component in a press.
2. Remove the tapered roller bearing and secondary 4th gear simultaneously using the press.



bc61um00000038

Secondary 3rd Gear, Secondary 6th Gear Removal Note

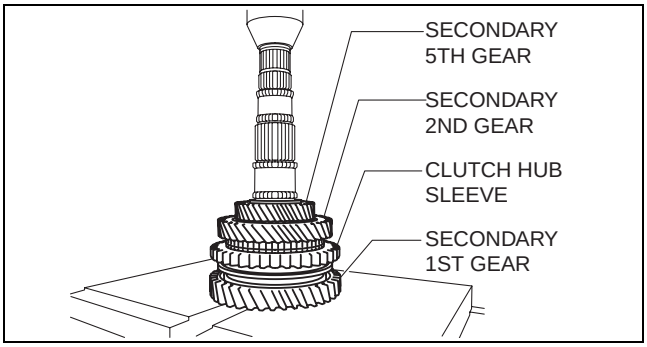
1. Set the **SST** and secondary shaft component in a press as shown in the figure.
2. Remove the secondary 3rd gear and secondary 6th gear using the press.



bc61um00000039

Secondary 5th Gear Removal Note

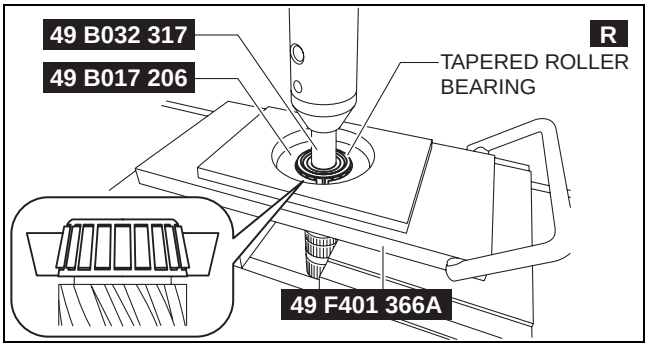
1. Set the secondary shaft component in a press as shown in the figure.
2. Remove all parts from the secondary 5th gear to the secondary 1st gear simultaneously using the press.



bc61um00000040

Tapered Roller Bearing (Clutch Housing Side) Removal Note

1. Set the **SST**s and secondary shaft component in a press as shown in the figure.
2. Remove the tapered roller bearing using the press.



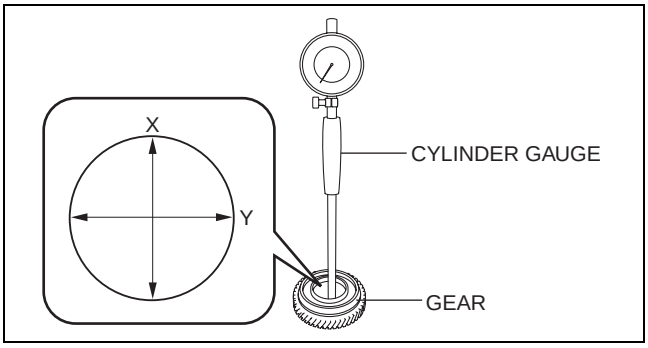
bc61um00000041

SECONDARY SHAFT COMPONENT INSPECTION

id051500169200

Gear Inspection

1. Inspect the gears for damage, wear, or loss.
   - If there is any malfunction, replace the gear.
2. Inspect the gears and synchronizer rings for damage and wear on contact surfaces.
   - If there is any malfunction, replace the gear.
3. Measure the inner diameter of the gear using a cylinder gauge in X and Y directions as shown in the figure.
   - If it exceeds the maximum specification, replace the gear.



bc61um00000024

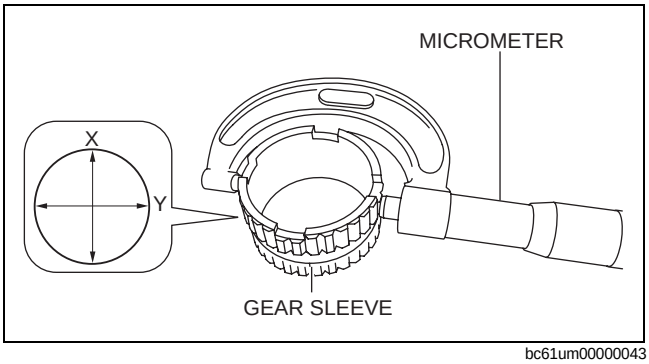
Inner diameter of gear

Measurement location	Specification (mm {in})	Maximum (mm {in})
Secondary 1st gear	41.512 {1.6343}	41.525 {1.6348}
Secondary 2nd gear	46.534 {1.8320}	46.544 {1.8324}

Gear sleeve inspection

1. Measure the outer diameter of the gear sleeve using the micrometer in X and Y directions as shown in the figure.
   - If is less than the minimum specification, replace the gear sleeve.

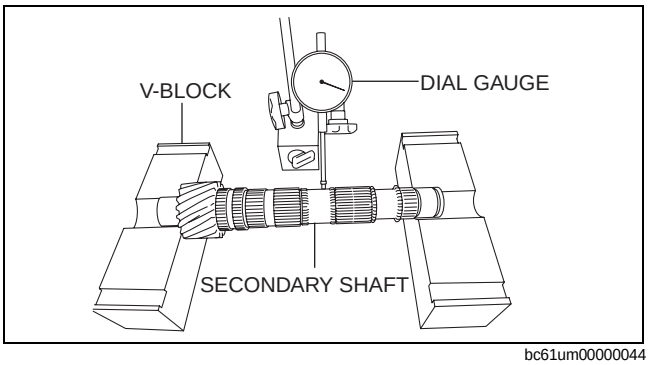
Outer diameter of gear sleeve
Specification: 46.444 mm {1.8285 in}
Minimum: 46.434 mm {1.8281 in}



bc61um00000043

Secondary Shaft Inspection

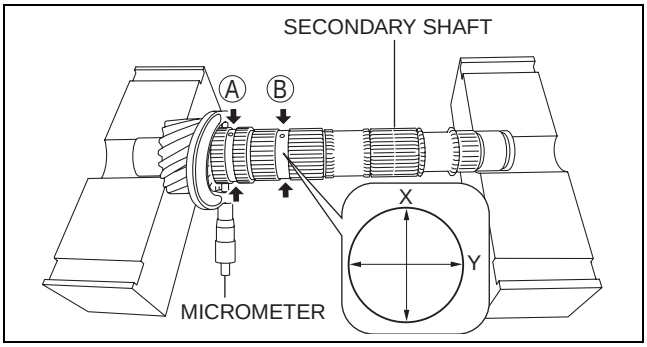
1. Inspect the spline for damage and wear.
   - If there is any malfunction, replace the secondary shaft.
2. Inspect the gear area for damage, wear, and loss.
   - If there is any malfunction, replace the secondary shaft.
3. Measure the lateral runout of the secondary shaft.
   (1) Set the secondary shaft on V-blocks so that the V-blocks support the secondary shaft journal as shown in the figure.
   (2) Measure the lateral runout of the secondary shaft at the position shown in the figure using a dial gauge.
      - If it exceeds the maximum specification, replace the secondary shaft.



bc61um00000044

Lateral runout of secondary shaft
Maximum: 0.05 mm {0.002 in}

4. Measure the outer diameter of the secondary shaft at the position shown in the figure using a micrometer. Measurement positions total four and are in the X and Y directions, at two points (A and B) as shown in the figure.
   - If is less than the minimum specification, replace the secondary shaft.



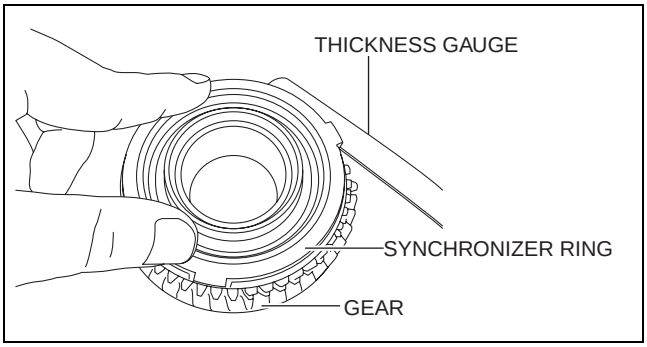
bc61um00000045

Outer diameter of secondary shaft

Measurement location	Specification (mm {in})	Minimum (mm {in})
A: Secondary 1st gear assembly part	41.457 {1.6322}	41.445 {1.6317}
B: Secondary 2nd gear assembly part	39.276 {1.5463}	39.266 {1.5459}

Synchronizer Ring Inspection

1. Inspect the teeth of the synchronizer ring for damage, wear, or loss.
   - If there is any malfunction, replace the synchronizer ring.
2. Inspect the taper surface for wear or loss.
   - If there is any malfunction, replace the synchronizer ring.
3. While holding the synchronizer ring and gear with your fingers as shown in the figure, measure the clearance of the synchronizer ring and gear side surface around the entire circumference using a thickness gauge.
   - If it is less than the minimum specification, replace the synchronizer ring.



bc61um00000027

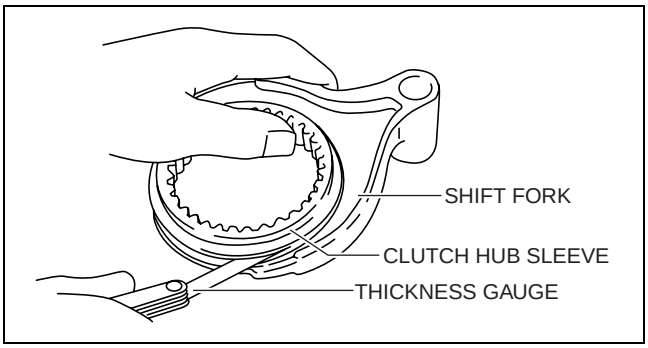
Clearance between synchronizer ring and gear

Measurement location	Specification (mm {in})	Minimum (mm {in})
Synchronizer ring (1GR)	0.94 {0.037}	0.55 {0.022}
Synchronizer ring (2GR)	0.94 {0.037}	0.55 {0.022}

Clutch Hub Component Inspection

1. Inspect the clutch hub sleeve and clutch hub operation.
   - If there is any malfunction, replace the malfunctioning part.
2. Inspect the spline for damage, wear or loss.
   - If there is any malfunction, replace the malfunctioning part.
3. While holding the clutch hub sleeve and shift fork together with your hand as shown in the figure, measure the clearance between the shift fork and clutch hub sleeve groove using a thickness gauge.
   - If it exceeds the maximum specification, replace the clutch hub sleeve and shift fork as a set.

   Clearance between shift fork and clutch hub sleeve groove
   Specification: 0.225 mm {0.00886 in}
   Maximum: 0.40 mm {0.016 in}

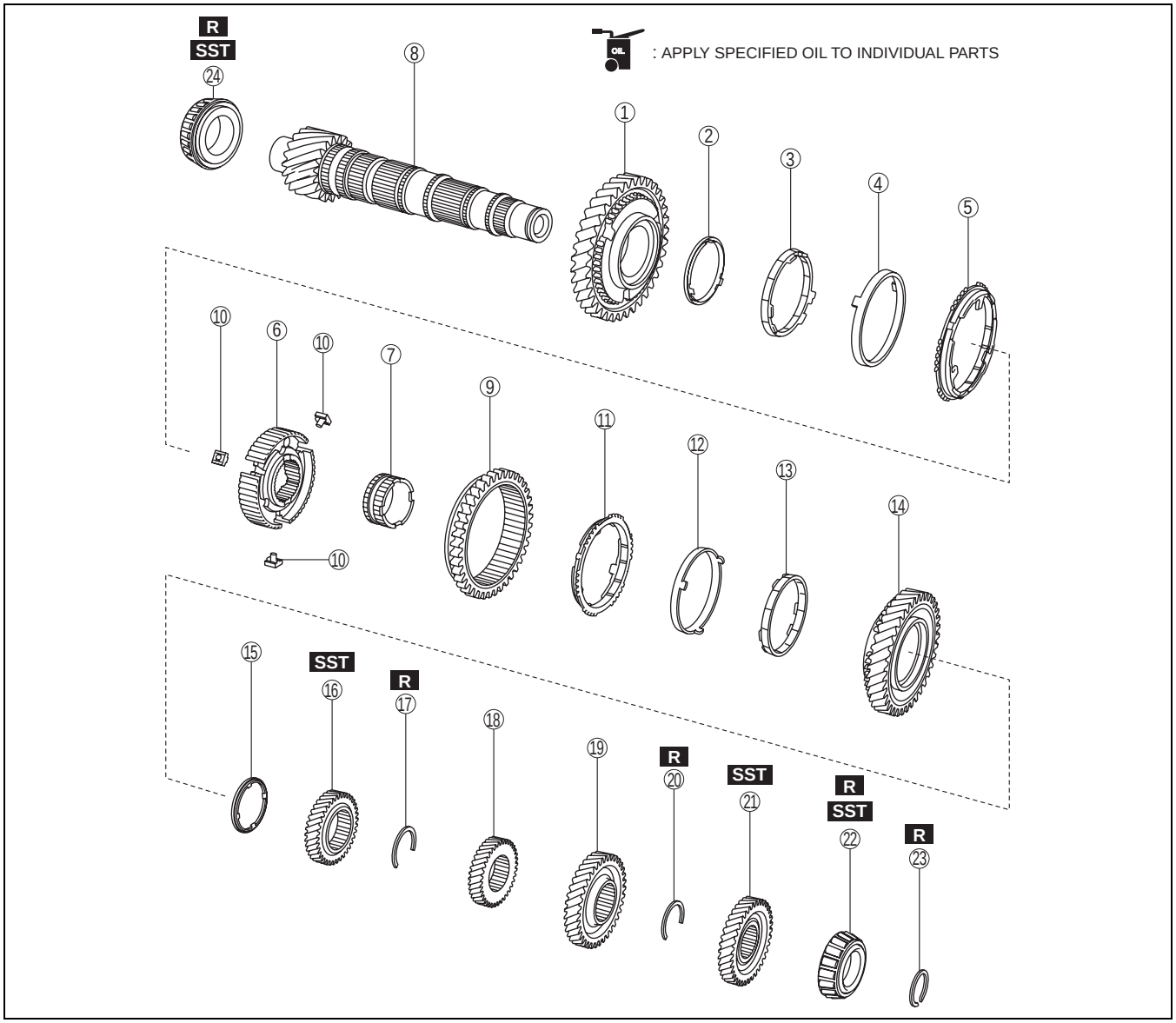


bc61um00000028

SECONDARY SHAFT COMPONENT ASSEMBLY

id051500169300

1. Assemble the secondary shaft component in the order shown in the figure.

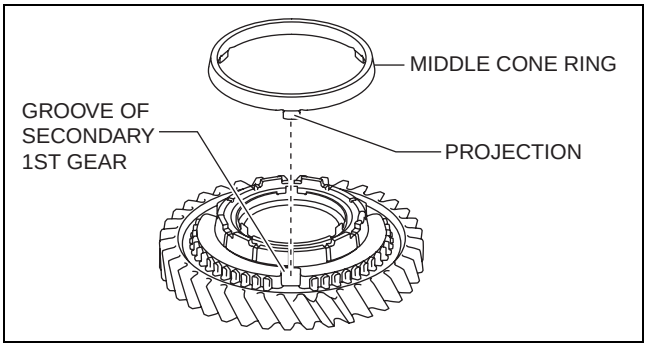


bc61um00000048

1	Secondary 1st gear
2	Friction damper
3	Inner cone ring
4	Middle cone ring (See 05-15-33 Middle Cone Ring Assembly Note.)
5	Synchronizer ring (See 05-15-34 Synchronizer Ring (Secondary 1st Gear) Assembly Note.)
6	Clutch hub (See 05-15-34 Clutch Hub Assembly Note.)
7	Gear sleeve (See 05-15-35 Gear Sleeve Assembly Note.)
8	Secondary shaft (See 05-15-35 Secondary Shaft Assembly Note.)
9	Clutch hub sleeve (See 05-15-36 Clutch Hub Sleeve Assembly Note.)
10	Synchronizer key (See 05-15-37 Synchronizer Key Assembly Note.)
11	Synchronizer ring (See 05-15-37 Synchronizer Ring (Secondary 2nd Gear) Assembly Note.)
12	Middle cone ring
13	Inner cone ring
14	Secondary 2nd gear (See 05-15-37 Secondary 2nd Gear Assembly Note.)
15	Friction damper (See 05-15-38 Friction Damper (Secondary 2nd Gear) Assembly Note.)
16	Secondary 5th gear (See 05-15-38 Secondary 5th Gear Assembly Note.)
17	Clip
18	Secondary 6th gear (See 05-15-39 Secondary 6th Gear and Secondary 3rd Gear Assembly Note.)
19	Secondary 3rd gear (See 05-15-39 Secondary 6th Gear and Secondary 3rd Gear Assembly Note.)
20	Clip
21	Secondary 4th gear (See 05-15-39 Secondary 4th Gear Assembly Note.)
22	Tapered roller bearing (See 05-15-39 Tapered Roller Bearing Assembly Note.)
23	Clip
24	Tapered roller bearing (See 05-15-39 Tapered Roller Bearing Assembly Note.)

Middle Cone Ring Assembly Note

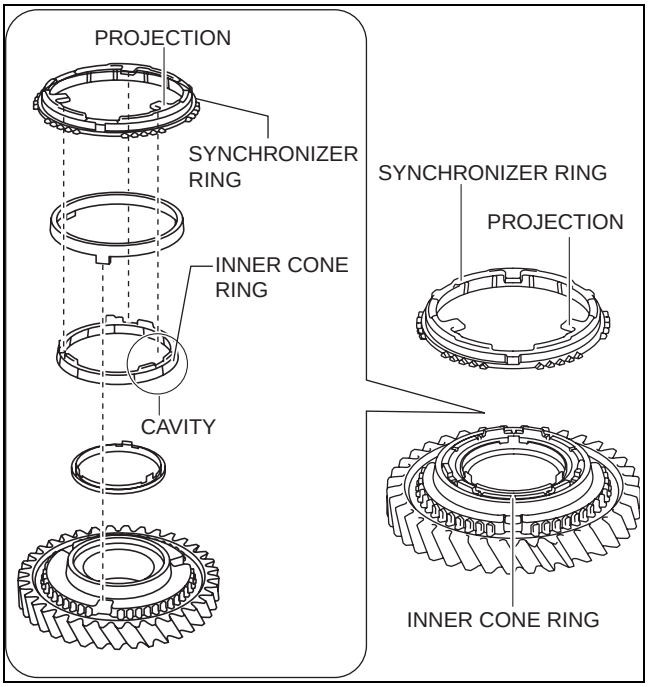
1. Assemble the middle cone ring so that the middle cone ring projection and the groove of the secondary 1st gear are engaged as shown in the figure.



bc61um00000169

Synchronizer Ring (Secondary 1st Gear) Assembly Note

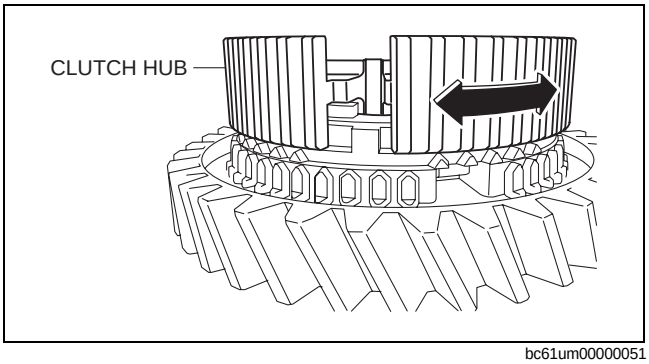
1. Assemble the synchronizer ring so that the synchronizer ring projection and the cavity of the inner cone ring are engaged as shown in the figure.
2. Verify that the ends of the inner cone ring, middle cone ring, and synchronizer ring are arranged in a flat plane.



bc61um00000170

Clutch Hub Assembly Note

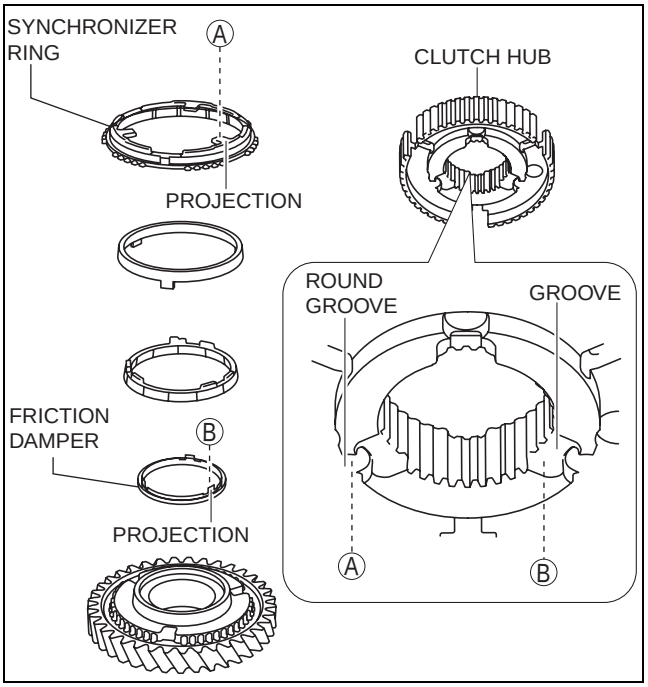
1. Assemble the clutch hub to the position shown in the figure while rotating the clutch hub in the rotation direction.



bc61um00000051

Caution

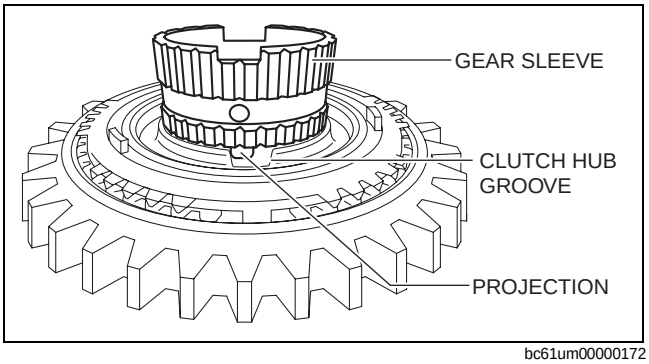
- **When assembling the clutch hub, it is necessary to engage the synchronizer ring projection, round groove of the clutch hub, and grooves of the friction damper and clutch hub. Therefore, rotate the clutch hub and engage it with each part.**



bc61um00000171

Gear Sleeve Assembly Note

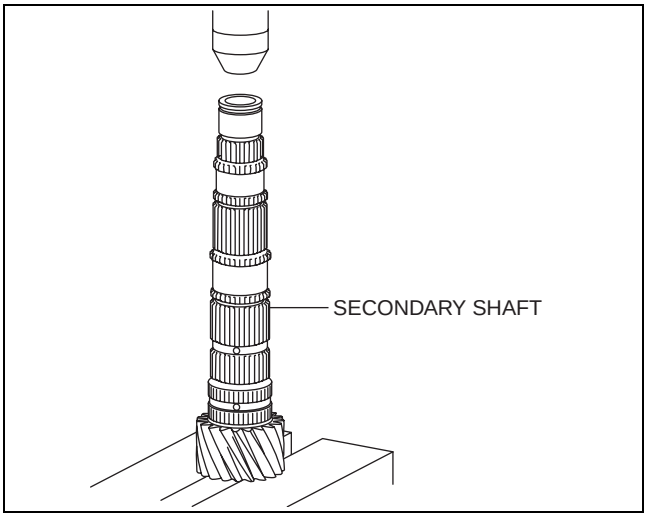
1. Assemble the gear sleeve so that the gear sleeve projection and clutch hub groove are engaged as shown in the figure.



bc61um00000172

Secondary Shaft Assembly Note

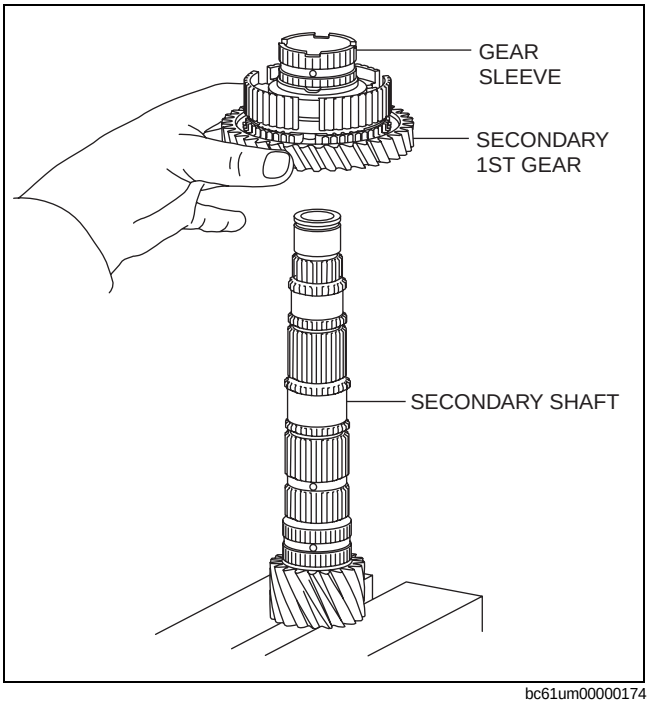
1. Set the secondary shaft in a press as shown in the figure.



bc61um00000173

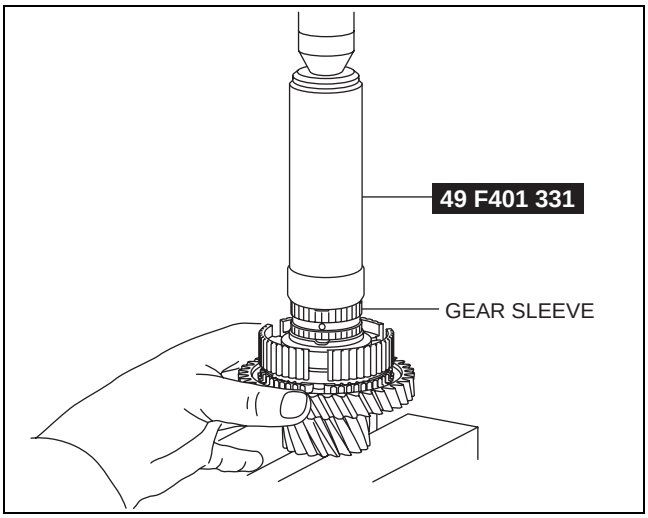
2. Set the secondary shaft with the parts from the secondary 1st gear to the gear sleeve as a single unit.

Caution
- **If you take your hand off the secondary 1st gear, it will fall off and the assembled parts will come apart. Therefore, until the assembled parts are press-fit to the secondary shaft, lift up and hold the secondary 1st gear so that each part does not come apart.**



bc61um00000174

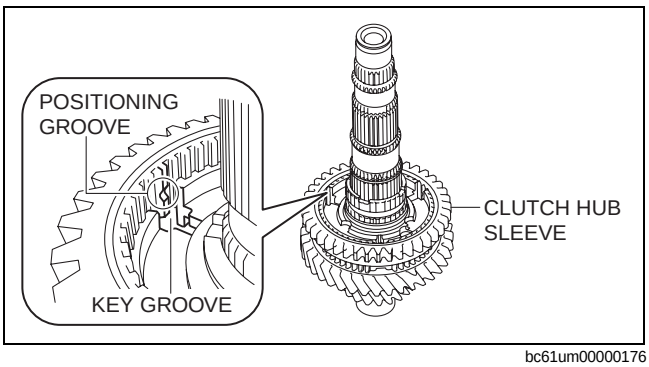
3. Set the gear sleeve to the **SST**.
4. Using a press, press-fit the parts from the secondary 1st gear to the gear sleeve to the secondary shaft.



bc61um00000175

Clutch Hub Sleeve Assembly Note

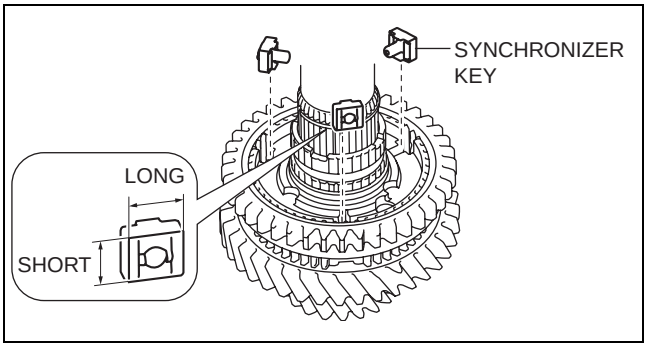
1. Align the positioning groove of the clutch hub sleeve with the center of the clutch hub key groove as shown in the figure, and assemble the clutch hub sleeve.



bc61um00000176

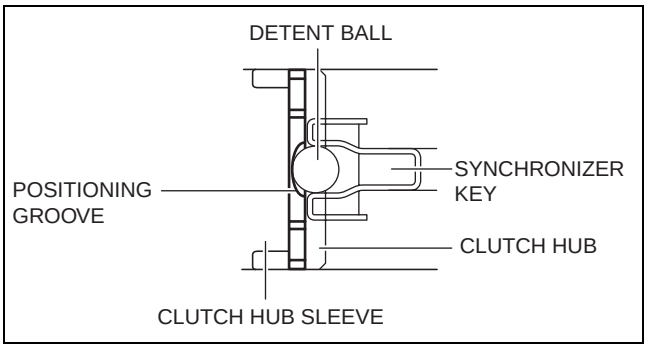
Synchronizer Key Assembly Note

1. Align with the direction of the synchronizer key as shown in the figure, and assemble the clutch hub.



bc61um00000177

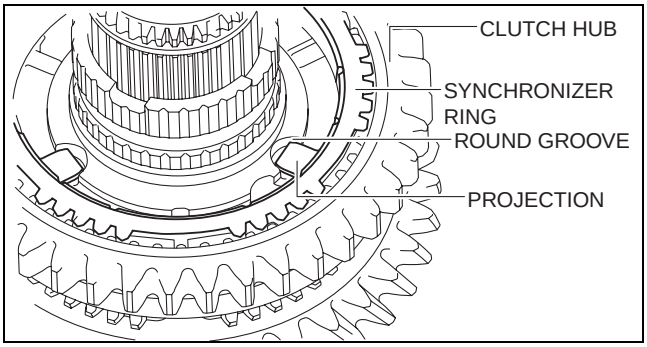
2. After the synchronizer key is assembled, verify that the detent ball of the synchronizer key is engaged with the positioning groove of the clutch hub sleeve.



bc61um00000131

Synchronizer Ring (Secondary 2nd Gear) Assembly Note

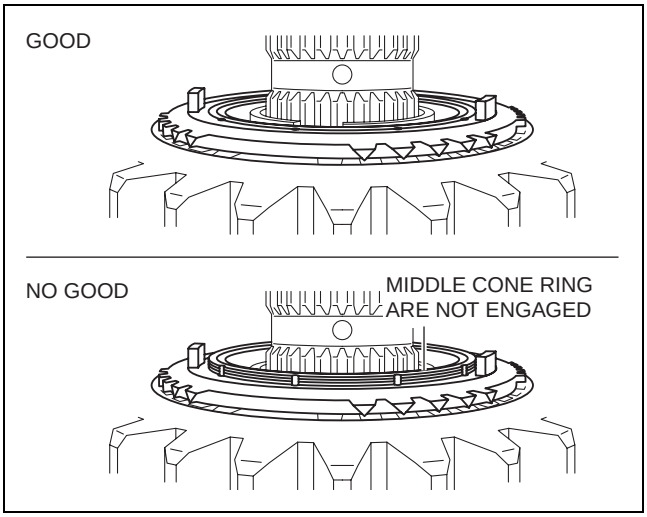
1. Assemble the synchronizer ring so that the synchronizer ring projection and round groove of the clutch hub are engaged as shown in the figure.



bc61um00000178

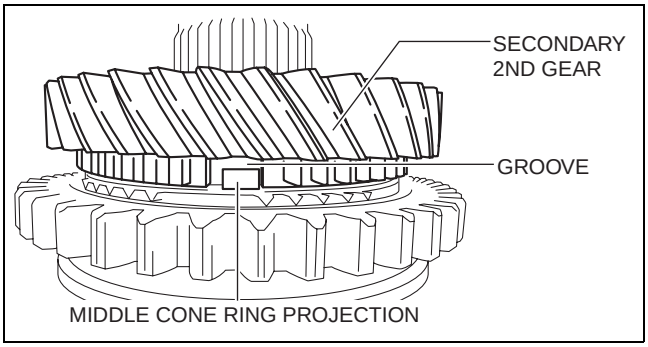
Secondary 2nd Gear Assembly Note

1. Verify that the ends of the inner cone ring, middle cone ring, and synchronizer ring are arranged in a flat plane.



bc61um00000056

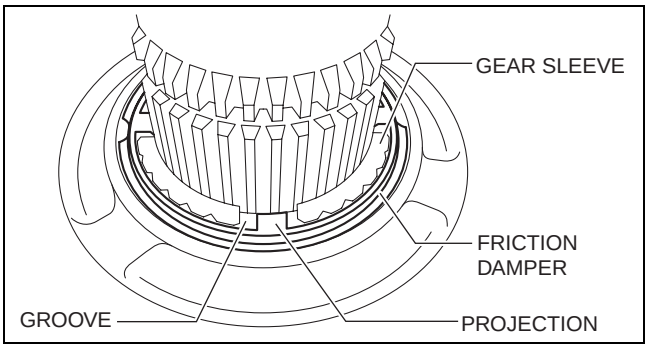
2. Assemble the secondary 2nd gear so that the groove of the secondary 2nd gear and middle cone ring projection are engaged as shown in the figure.



bc61um00000057

Friction Damper (Secondary 2nd Gear) Assembly Note

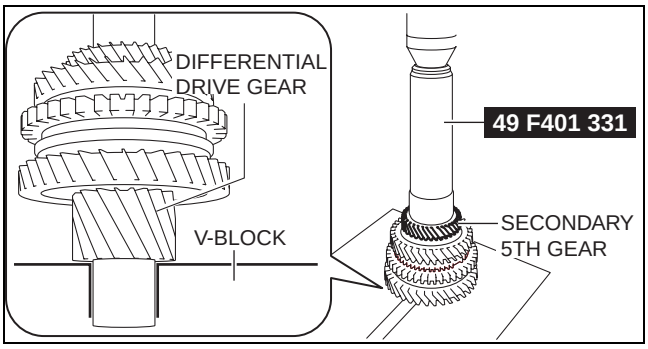
1. Assemble the friction damper so that the friction damper projection and the groove of the gear sleeve are engaged as shown in the figure.



bc61um00000058

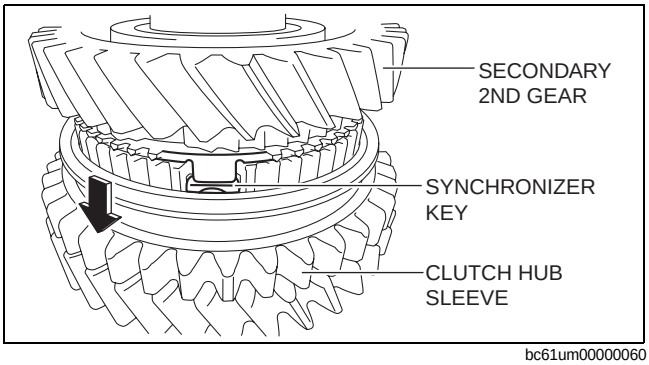
Secondary 5th Gear Assembly Note

1. Set the secondary shaft component, secondary 5th gear, and the **SST** in a press as shown in the figure.



bc61um00000059

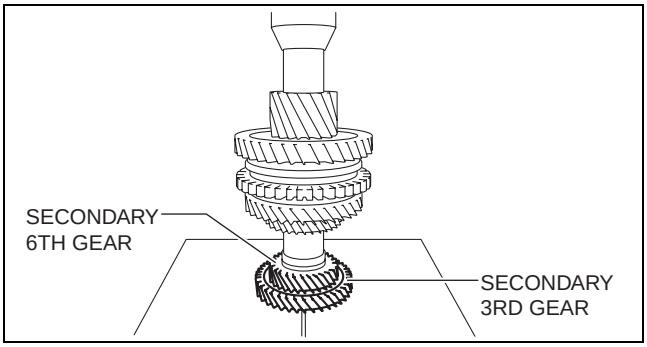
2. Move the clutch hub sleeve in the axial direction while pressing the secondary 2nd gear by hand so that it does not move, and verify that the synchronizer key is assembled correctly.
3. Assemble the secondary 5th gear using the press.



bc61um00000060

Secondary 6th Gear and Secondary 3rd Gear Assembly Note

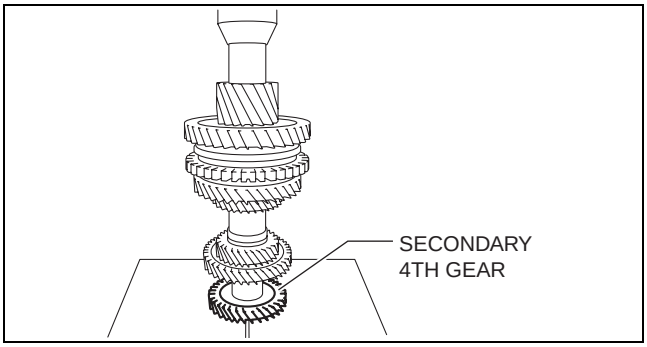
1. Set the secondary shaft component, secondary 6th gear, and secondary 3rd gear in a press as shown in the figure.
2. Assemble the secondary 6th gear and secondary 3rd gear using the press.



bc61um00000061

Secondary 4th Gear Assembly Note

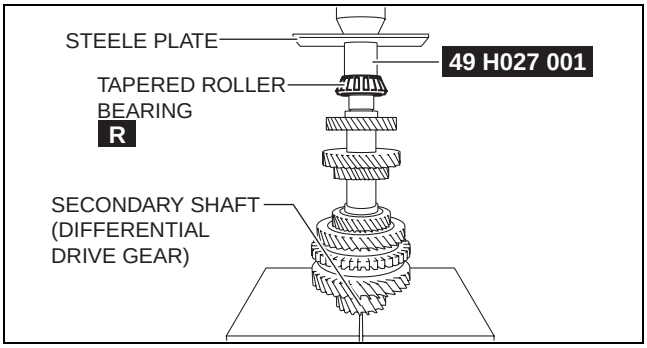
1. Set the secondary shaft component and secondary 4th gear in a press as shown in the figure.
2. Assemble the secondary 4th gear using the press.



bc61um00000062

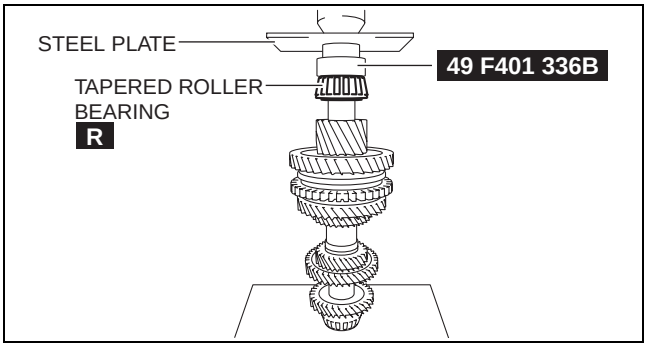
Tapered Roller Bearing Assembly Note

1. Set the secondary shaft component, new tapered roller bearing (transaxle case side), **SST**, and an appropriate steel plate in a press as shown in the figure.
2. Assemble the tapered roller bearing (transaxle case side) using the press.
3. Assemble a new clip.



bc61um00000063

4. Set the secondary shaft component, new tapered roller bearing (clutch housing side), **SST**, and an appropriate steel plate in a press as shown in the figure.
5. Assemble the tapered roller bearing (clutch housing side) using the press.

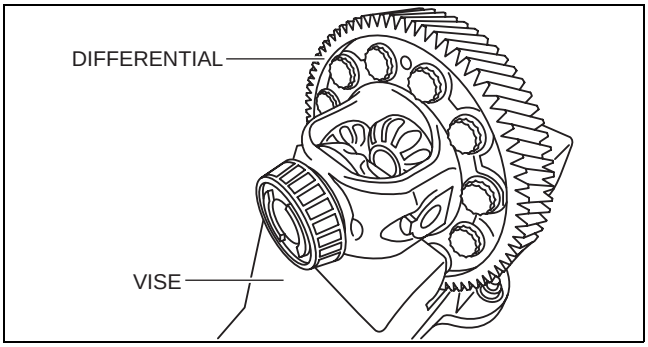


bc61um00000064

DIFFERENTIAL BACKLASH ADJUSTMENT

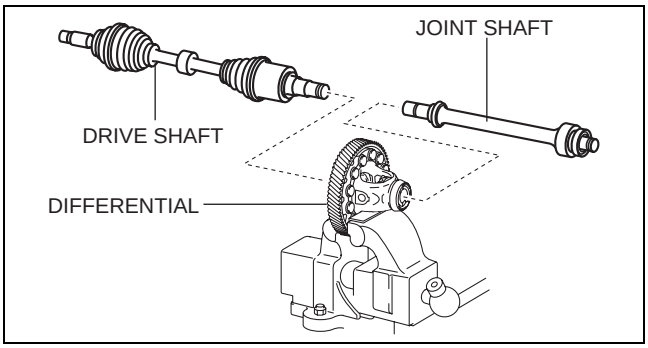
id051500169400

1. Secure the differential in a vice.



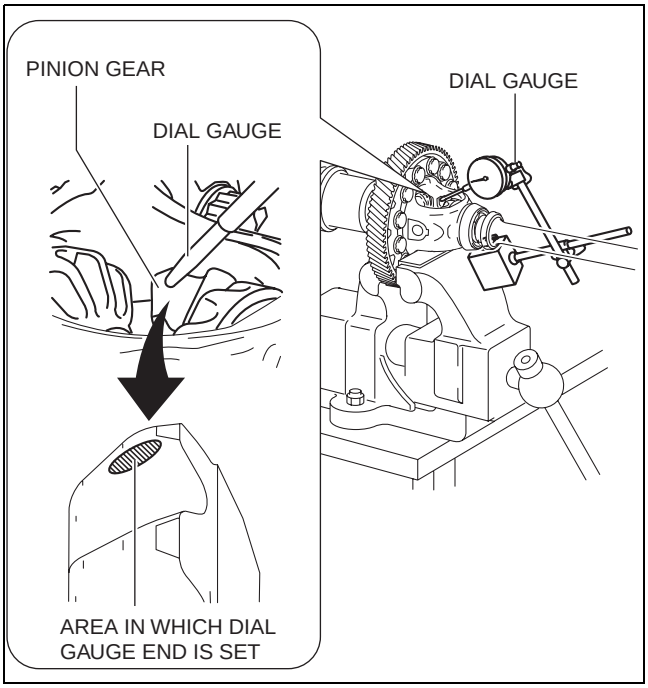
bc61um00000067

2. Assemble the drive shaft and the joint shaft to the differential.



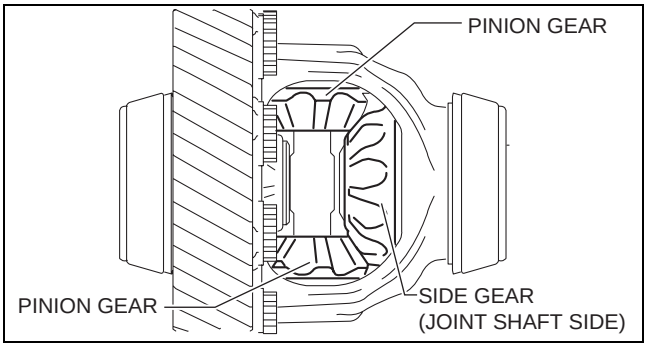
bc61um00000196

3. Set the dial gauge with the measuring probe attached perpendicularly to the area shown in the figure for the pinion gear.



bc61um00000195

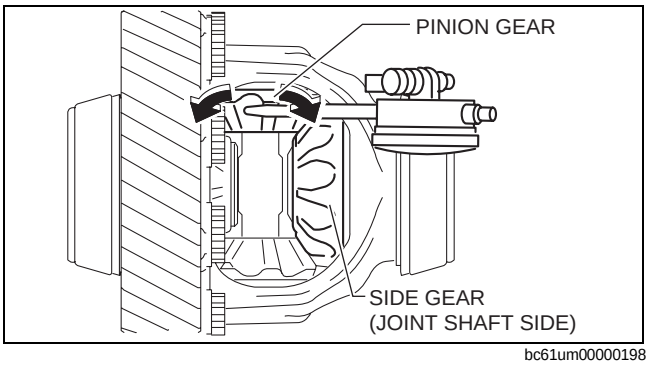
4. Measure the side gear on the joint shaft side and the pinion gear backlash using the following procedure:
   (1) Affix the side gear on the joint shaft side by hand.



bc61um00000197

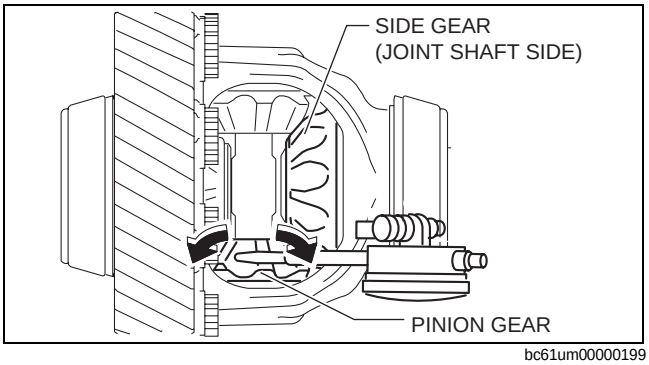
   (2) Measure the backlash by moving the pinion gear with the dial gauge that has been set and determine measured value A.

Caution
- **Because a difference occurs in the backlash measurement value if the secured side gear moves, move the pinion gear by hand so that the secured side gear does not move.**



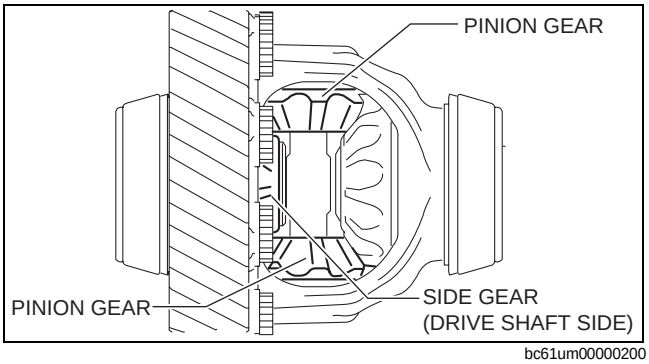
bc61um00000198

   (3) Measure the opposite of the pinion gear backlash in the same way as procedure 2 in Step 4 and determine measured value B.
   (4) Calculate the average value of measured values A and B using the following formula and determine the backlash measurement value on the joint shaft side of the pinion gear.
      - (Measured value A + measured value B)/2 = backlash measurement value on joint shaft side



bc61um00000199

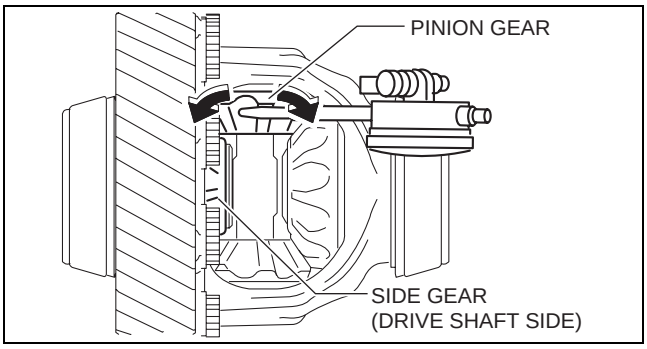
5. Measure the side gear on the drive shaft side and the pinion gear backlash using the following procedure:
   (1) Affix the side gear on the drive shaft side by hand.



bc61um00000200

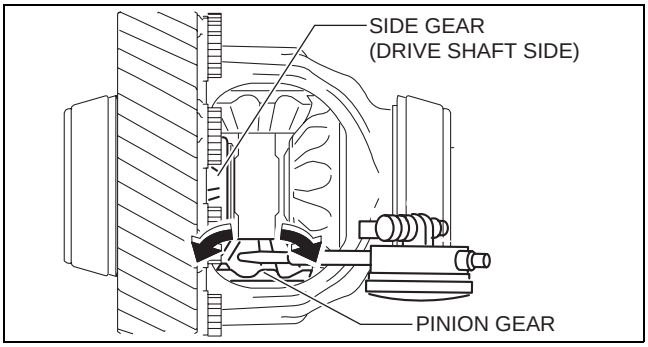
   (2) Measure the backlash by moving the pinion gear that the dial gauge has been set and determine measured value C.

Caution
- **Because a difference occurs in the backlash measurement value if the secured side gear moves, move the pinion gear by hand so that the secured side gear does not move.**



bc61um00000201

(3) Measure the opposite of the pinion gear backlash in the same way as procedure 2 in Step 5 and determine measured value D.
(4) Calculate the average value of measured values C and D using the following formula and determine the backlash measurement value on the drive shaft side of the pinion gear.
- (Measured value C + measured value D)/ 2 = backlash measurement value on drive shaft side



bc61um00000202

6. Verify that the backlash on the joint shaft and drive shaft sides is within the specification.

Differential pinion gear backlash
Specification: 0.05—0.15 mm {0.002—0.005 in}

- If the measured backlash for each is within the specification, the thrust washer thickness is the same as the removed one and there is no problem, therefore the "DIFFERENTIAL BACKLASH ADJUSUTMENT" procedure is finished.
- If not within the specification, perform "Thrust Washer Selection Calculation". (See 05-15-42 Thrust Washer Selection Calculation.)
- If it exceeds the specification even when a **0.95 mm {0.037 in}** thick thrust washer is used, replace the differential case.

Thrust Washer Selection Calculation

Note
- Perform the thrust washer selection calculation for each on the drive shaft and joint shaft sides.

1. Calculate the backlash gap by subtracting constant number A from backlash measurement value.
   - Constant number A = **0.090 mm {0.0035 in}**
   - Backlash measurement value - **0.090 mm {0.0035 in}** = backlash gap

   Calculation example
   - Backlash measurement value = 0.165 mm {0.00650 in}
   - **0.165 mm {0.00650 in}** - **0.090 mm {0.0035 in}** = **0.075 mm {0.0030 in}**
2. Calculate the thrust washer thickness gap by multiplying the backlash gap by constant number B.
   - Constant number B = **1.25 mm/mm {1.333 in/in}**
   - Backlash gap × **1.25 mm/mm {1.333 in/in}** = thrust washer thickness gap

   Calculation example
   - Backlash gap = **0.075 mm {0.0030 in}**
   - **0.075 mm {0.0030 in}** × **1.25 mm/mm {1.333 in/in}** = **0.094 mm {0.0037 in}**
3. Calculate the thrust washer thickness calculated value by adding the thrust washer thickness gap to the thickness of the thrust washer used in the measurement.
   - Thickness of thrust washer used in measurement + thrust washer thickness gap = thrust washer thickness calculated value

   Calculation example
   - Thickness of thrust washer used in measurement = **0.810 mm {0.8103 mm}**
   - Thrust washer thickness gap = **0.094 mm {0.0037 in}**
   - **0.810 mm {0.0319 in}** + **0.094 mm {0.0037 in}** = **0.904 mm {0.0356 in}**
4. Calculate the thrust washer thickness on the opposite side in the same way.
5. Based on each thrust washer thickness calculated value, select each thrust washer of the appropriate thickness.

Caution
- **Select the same thickness of the thrust washers on the drive shaft and joint shaft sides.However, if the measurement value cannot be adjusted within the specification, select the different thickness of the thrust washer.**

Thrust washer thickness calculated value		Appropriate thrust washer thickness (mm {in})
Equal to or more (mm {in})	Less than (mm {in})	
0.925 {0.0364}	1.025 {0.04035}	0.95 {0.037}
0.875 {0.0344}	0.925 {0.0364}	0.90 {0.035}
0.825 {0.0325}	0.875 {0.0344}	0.85 {0.033}
0.775 {0.0305}	0.825 {0.0325}	0.80 {0.031}
0.675 {0.0266}	0.775 {0.0305}	0.75 {0.030}

Selection example

- Because shim thickness calculated value **0.904 mm {0.0356 in}** applies to **0.875 mm {0.0344 in}** or more and less than **0.925 mm {0.0364 in}**, a shim of **0.90 mm {0.035 in}** thickness is selected.

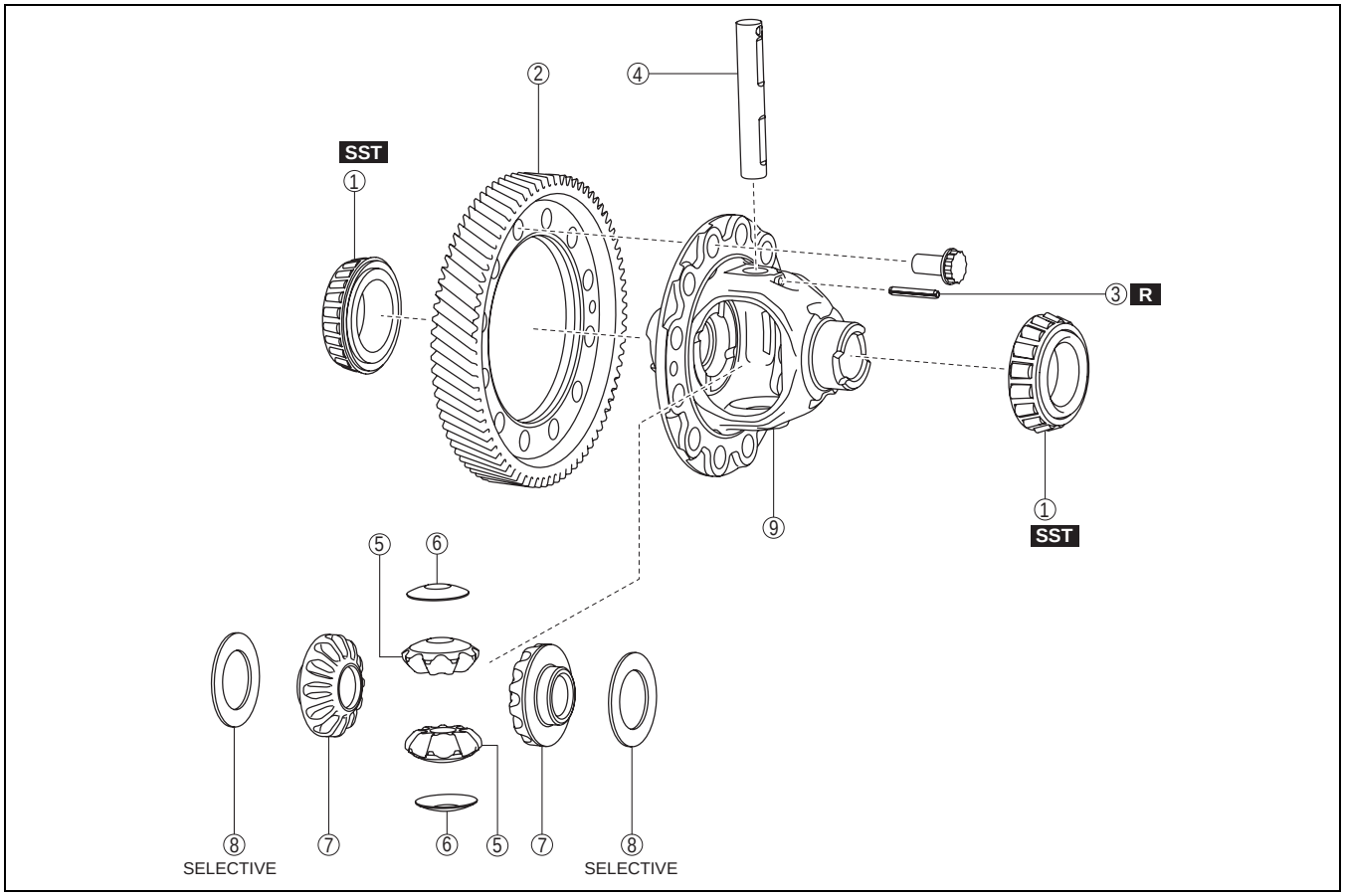
Note

- Constant number A, **0.090 mm {0.0035 in}** is the backlash median value of the specification.
- The backlash gap is the difference between the backlash median value of the specification and the backlash measurement value.
- Constant number B is the thrust washer thickness which varies each time the backlash changes by **1.0 mm {0.039 in}**.Because the thrust washer thickness changes **0.1 mm {0.004 in}** when the backlash changes **0.08 mm {0.003 in}**, the quotient is **1.25 mm/mm {1.333 in/in}**.
- The thrust washer thickness gap is the difference between the thickness of the thrust washer used in the measurement and the thickness of an appropriate thrust washer.In the formula to calculate the thrust washer thickness gap, the thrust washer thickness gap is calculated by multiplying the backlash gap with constant number B.

DIFFERENTIAL DISASSEMBLY

id051500169500

1. Perform the “DIFFERENTIAL BACKLASH ADJUSTMENT”.(See 05-15-40 DIFFERENTIAL BACKLASH ADJUSTMENT.)
2. Disassemble the differential in the order shown in the figure.

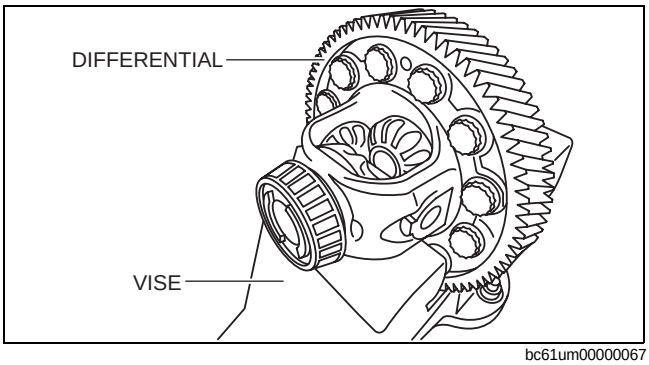


bc61um00000132

1	Tapered roller bearing (See 05-15-44 Tapered Roller Bearing Removal Note.)
2	Ring gear (See 05-15-44 Ring Gear Removal Note.)
3	Pin (See 05-15-45 Pin Removal Note.)
4	Pinion gear shaft
5	Pinion gear
6	Pinion gear shaft
7	Side gear
8	Thrust washer
9	Differential case

Tapered Roller Bearing Removal Note

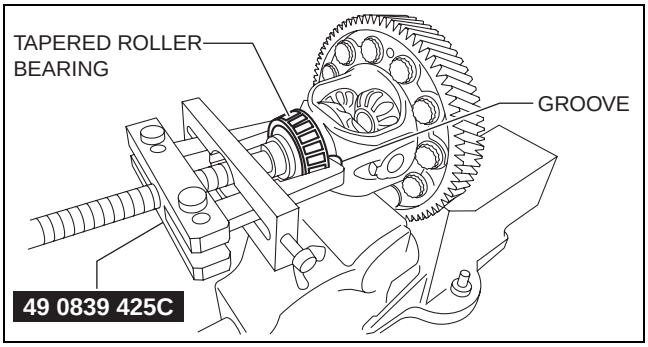
1. Secure the differential in a vice.



bc61um00000067

2. Remove the tapered roller bearing (clutch housing side) using the **SST**.

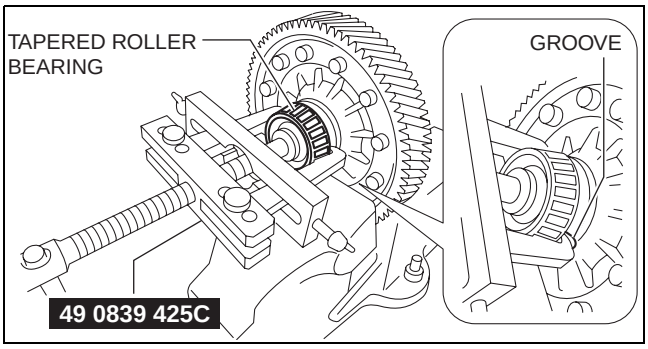
   Note
   - There is a groove in the differential case component for attaching the **SST** tab.



bc61um00000068

3. Using the **SST**, remove the tapered roller bearing (transaxle case side).

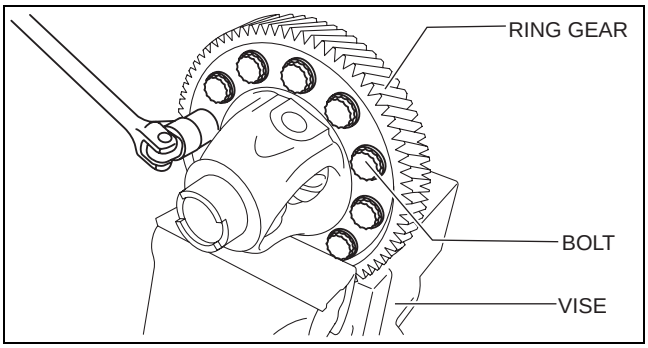
   Note
   - There is a groove in the differential case component for attaching the **SST** tab.



bc61um00000069

Ring Gear Removal Note

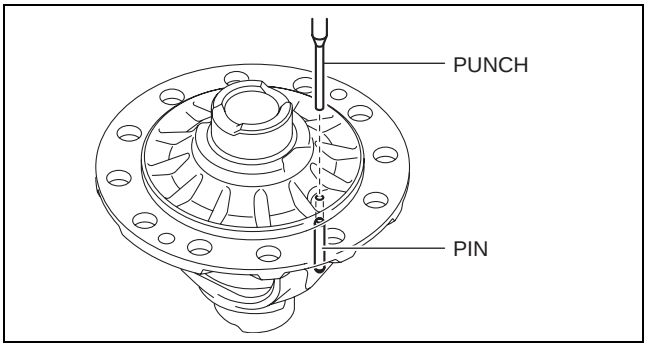
1. Secure the differential in a vice as shown in the figure.
2. Remove the ring gear bolts.
3. Tap the ring gear using a plastic hammer and remove the ring gear.



bc61um00000070

Pin Removal Note

1. Remove the pin using a punch.

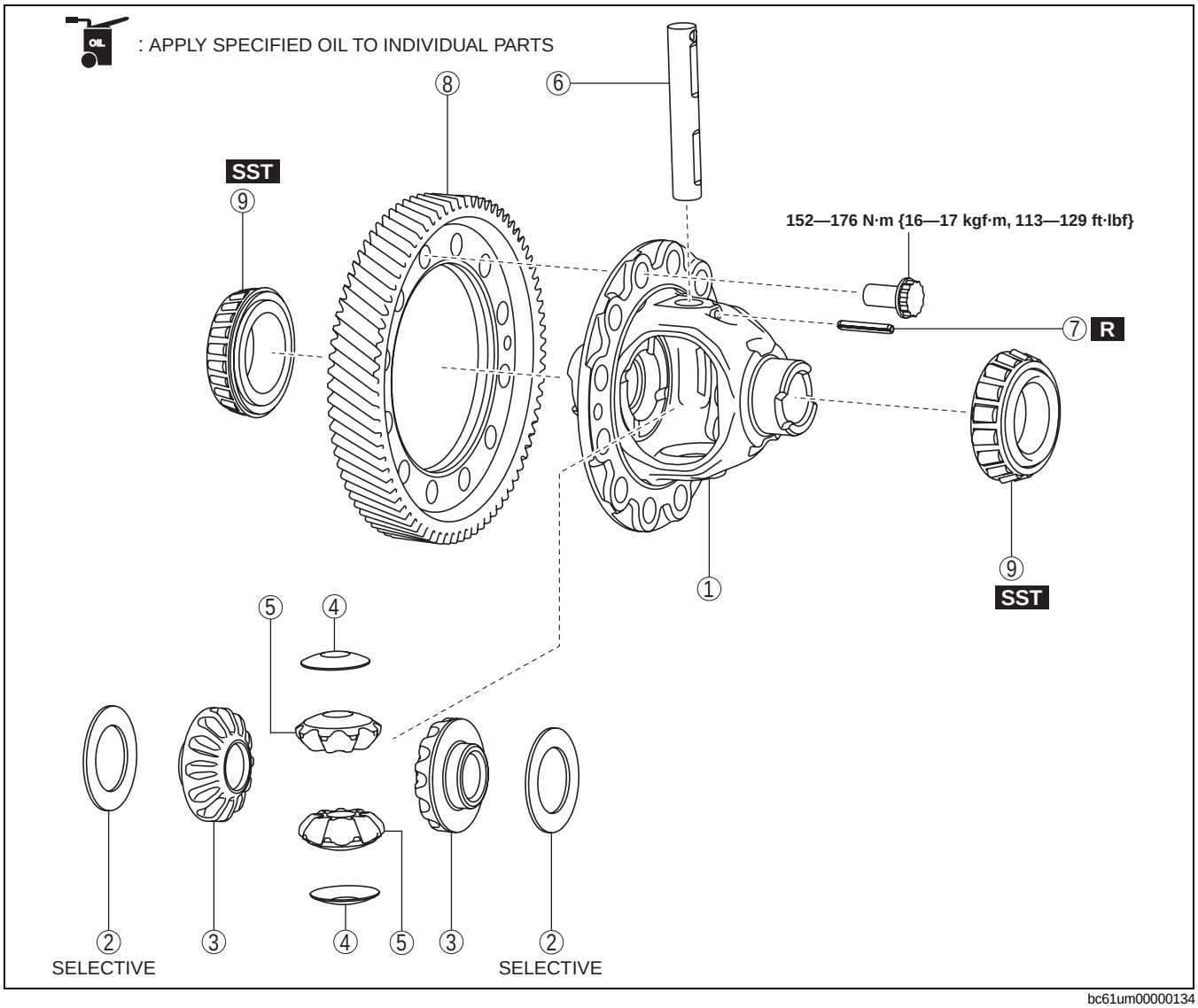


bc61um00000133

DIFFERENTIAL ASSEMBLY

id051500169600

1. Assemble the differential in the order shown in the figure.
2. Perform the “DIFFERENTIAL BACKLASH ADJUSTMENT”.(See 05-15-40 DIFFERENTIAL BACKLASH ADJUSTMENT.)



bc61um00000134

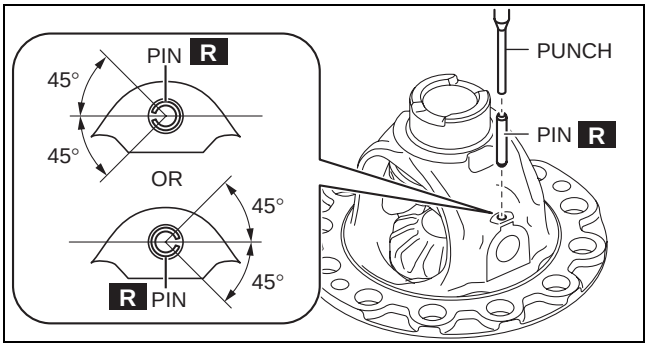
1	Differential case
2	Thrust washer
3	Side gear
4	Thrust washer
5	Pinion gear

6	Pinion gear shaft
7	Pin (See 05-15-46 Pin Assembly Note.)
8	Ring gear (See 05-15-46 Ring Gear Assembly Note.)

9	Tapered roller bearing (See 05-15-46 Ring Gear Assembly Note.)

Pin Assembly Note

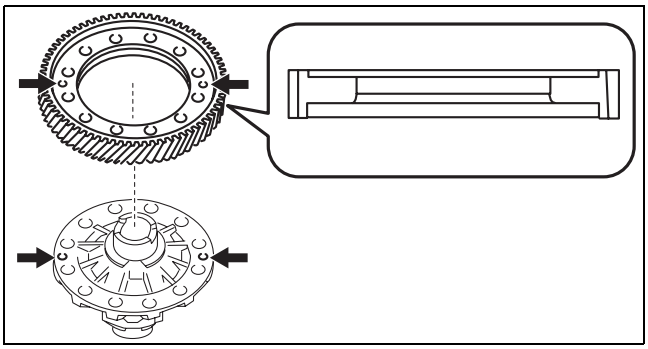
1. Install a new pin as shown in the figure to hold the pinion gear shaft.



bc61um00000135

Ring Gear Assembly Note

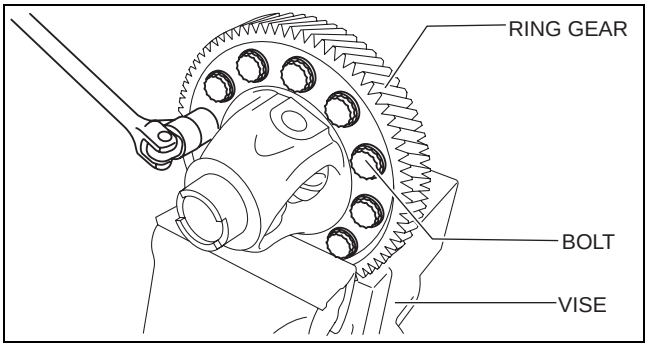
1. Assemble the ring gear so that the differential holes and ring gear holes shown in the figure are aligned.



azzjjw00001001

2. Secure the differential in a vice.
3. Install the ring gear by tightening the ring gear installation bolts in several passes.

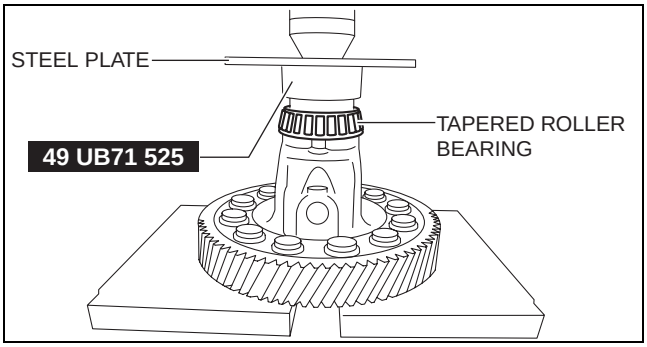
   Tightening torque
   152—176 N·m {16—17 kgf·m, 113—129 ft·lbf}



bc61um00000070

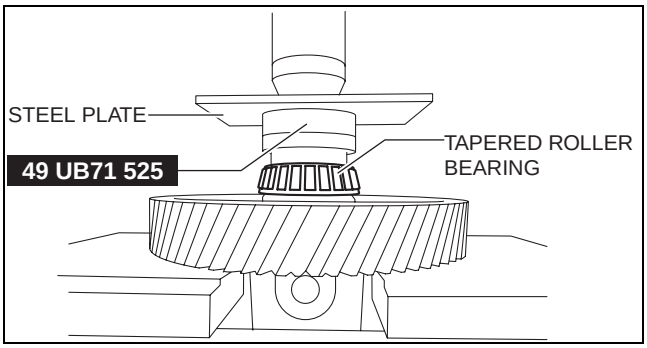
Tapered Roller Bearing Installation Note

1. Set the differential, the tapered roller bearing (clutch housing side), **SST**, and an appropriate steel plate in a press as shown in the figure.
2. Assemble the tapered roller bearing (clutch housing side) using the press.



bc61um00000074

3. Set the differential, the tapered roller bearing (transaxle case side), **SST**, and an appropriate steel plate to the press as shown in the figure.
4. Assemble the tapered roller bearing (transaxle case side) using the press.



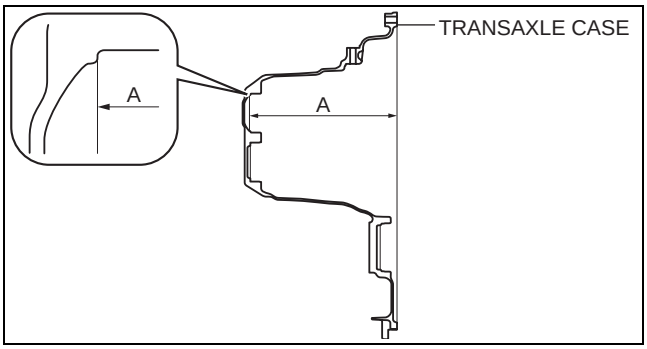
bc61um00000075

BEARING PRELOAD ADJUSTMENT

id051500169700

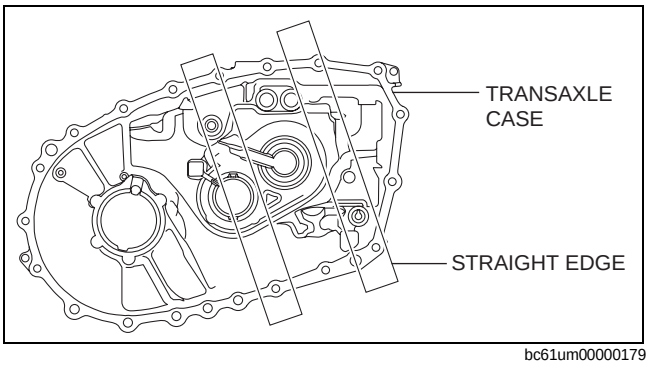
Primary Shaft Preload Adjustment

1. Measure the thickness of the straight edge which is used for measurements.
2. Measure distance A of the transaxle case using the following procedure.



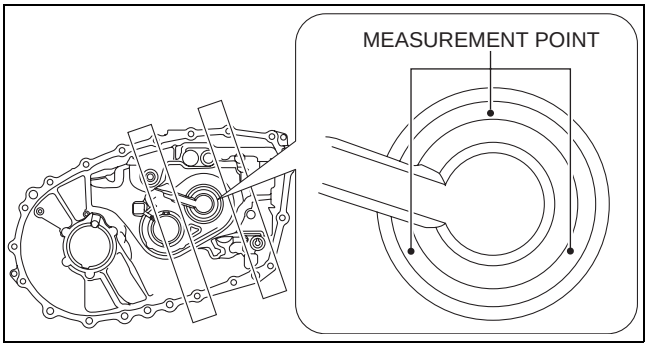
bc61um00000083

(1) Place two straight edges on the transaxle case as shown in the figure.



bc61um00000179

(2) Set up 3 measurement points of your choosing on the shim assembly area of the transaxle case as shown in the figure.
(3) Using a commercially available depth gauge, measure the distance to each measurement point from the straight edge.



bc61um00000180

Caution
- **When measuring the distance to the measurement point from the straight edge, do not allow the depth gauge head to contact the shim assembly area.**

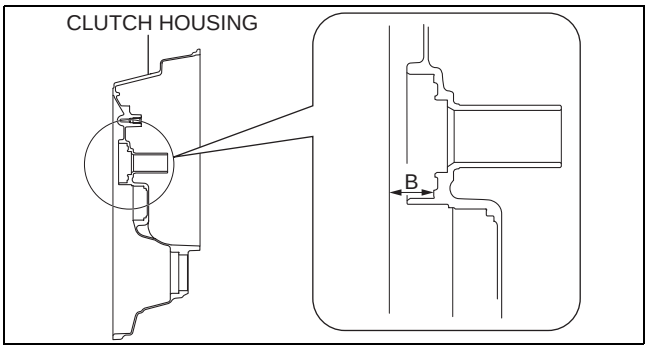
(4) Calculate the average value measured in Step 3 using the following formula.
- (Value of first measurement + value of second measurement + value of third measurement) / 3 = Average measured values.

Calculation example
- Value of first measurement = **224.380 mm {8.83386 in}**
- Value of second measurement = **224.381 mm {8.83390 in}**
- Value of third measurement = **224.379 mm {8.83382 in}**
- (**224.380 mm {8.83386 in}** + **224.381 mm {8.83390 in}** + **224.379 mm {8.83382 in}**) / 3 = **224.380 mm {8.83386 in}**

(5) Calculate distance A of the transaxle case using the following formula.
- Average of measured values - straight edge thickness = Distance A

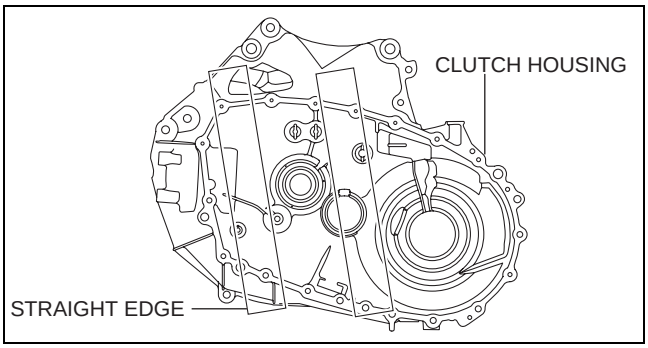
Calculation example
- Straight edge thickness = **5.000 mm {0.1969 in}**
- Average of measured values = **224.380 mm {8.83386 in}**
- **224.380 mm {8.83386 in}** - **5.000 mm {0.1969 in}** = **219.380 mm {8.63701 in}**

3. Measure distance B of the transaxle case using the following procedure.



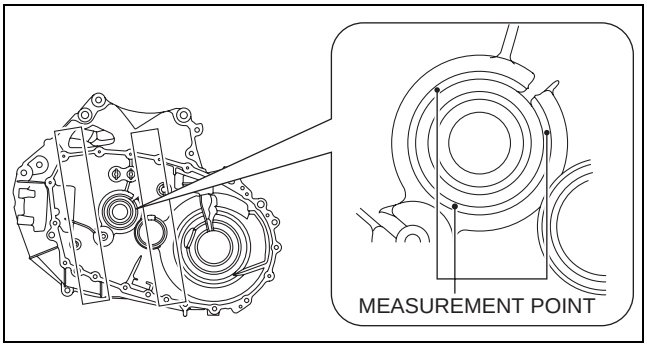
bc61um00000181

(1) Set two straight edges on the clutch housing as shown in the figure.



bc61um00000182

(2) Set up 3 measurement points of your choosing on the ball bearing assembly area of the clutch housing as shown in the figure.
(3) Using a commercially available depth gauge, measure the distance to each measurement point from the straight edge.



bc61um00000183

Caution
- **When measuring the distance to the measurement points from the straight edge, do not allow the depth gauge head to contact the ball bearing assembly area.**

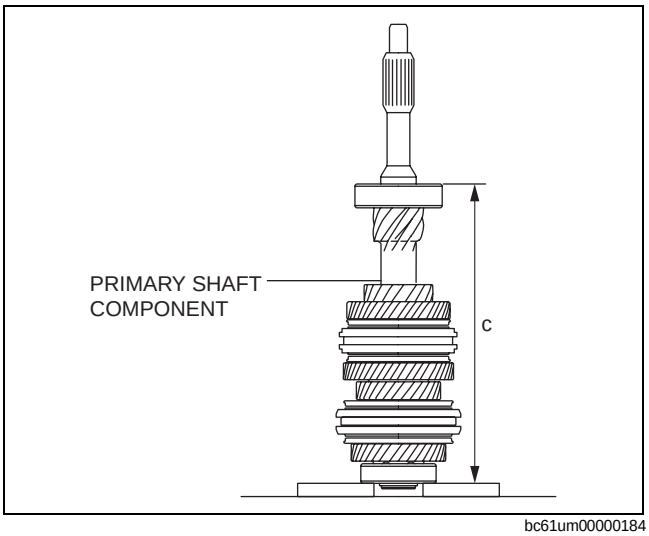
(4) Calculate the average value measured in Step 3 using the following formula.
- (Value of first measurement + value of second measurement + value of third measurement) / 3 = Average measured values.

Calculation example
- Value of first measurement = **30.575 mm {1.2037 in}**
- Value of second measurement = **30.577 mm {1.2038 in}**
- Value of third measurement = **30.577 mm {1.2038 in}**
- (**30.575 mm {1.2037 in}** + **30.577 mm {1.2038 in}** + **30.577 mm {1.2038 in}**) / 3 = **30.576 mm {1.2038 in}**

(5) Calculate distance B of the clutch housing using the following formula.
- Average of measured values - straight edge thickness = Distance B

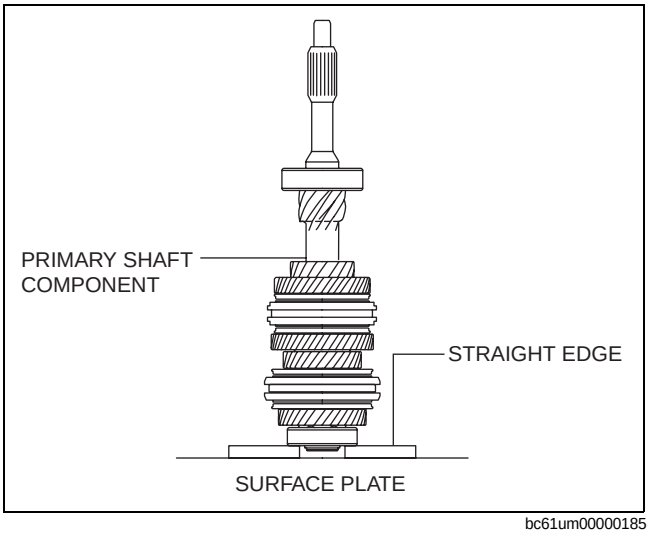
Calculation example
- Straight edge thickness = **5.000 mm {0.1969 in}**
- Average of measured values = **30.576 mm {1.2038 in}**
- **30.576 mm {1.2038 in}** - **5.000 mm {0.1969 in}** = **25.576 mm {1.0069 in}**

4. Measure distance C of the primary shaft component using the following procedure.



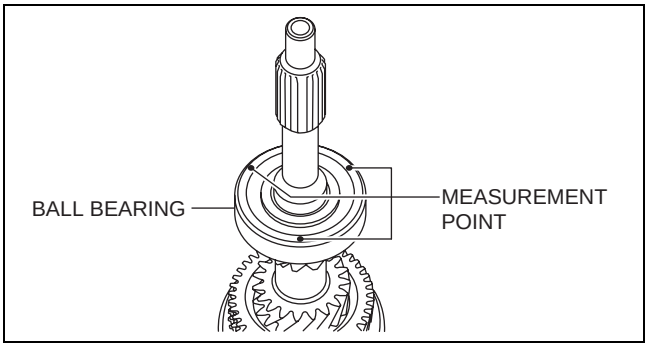
bc61um00000184

(1) Place two straight edges on the surface plate as shown in the figure and set the primary shaft component on top of them.



bc61um00000185

(2) Set up 3 measurement points of your choosing on the ball bearing as shown in the figure.
(3) Using a commercially available height gauge, measure the distance to each measurement point from the straight edge.
(4) Calculate the average of the value measured in Step 3 using the following formula, and use the average of the measured value for distance C of the primary shaft component.
   - (Value of first measurement + value of second measurement + value of third measurement) / 3 = Distance C



bc61um00000186

Calculation example
- Value of first measurement = **243.591 mm {9.59020 in}**
- Value of second measurement = **243.592 mm {9.59024 in}**
- Value of third measurement = **243.593 mm {9.59028 in}**
- (**243.591 mm {9.59020 in}** + **243.592 mm {9.59024 in}** + **243.593 mm {9.59028 in}**) / 3 = **243.592 mm {9.59024 in}**

5. Select the primary shaft shim using the following procedure.
   (1) Calculate the clearance (clearance D) between the transaxle case and the primary shaft component using the following formula.
      - Distance A + Distance B - Distance C = Clearance D

   Calculation example
   - Distance A = **219.380 mm {8.63701 in}**
   - Distance B = **25.576 mm {1.0069 in}**
   - Distance C = **243.592 mm {9.59024 in}**
   - **219.380 mm {8.63701 in}** + **25.576 mm {1.0069 in}** - **243.592 mm {9.59024 in}** = **1.364 mm {0.05370 in}**

(2) Based on the calculated clearance D, select a shim of the appropriate thickness from the following table.

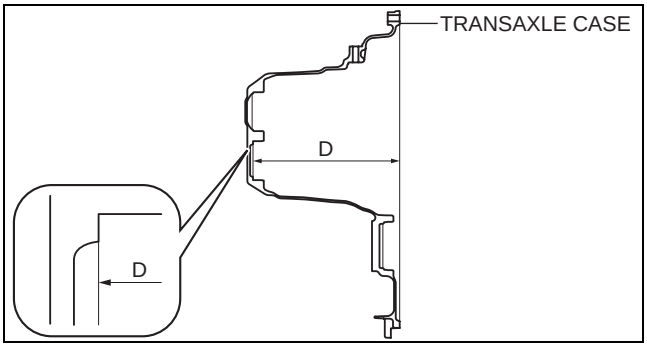
Clearance D measured value		Appropriate shim thickness (mm {in})
Equal to or more (mm {in})	Less than (mm {in})	
1.570 {0.06181}	1.610 {0.06339}	1.550 {0.06102}
1.520 {0.05984}	1.570 {0.06181}	1.500 {0.05906}
1.470 {0.05787}	1.520 {0.05984}	1.450 {0.05709}
1.420 {0.05591}	1.470 {0.05787}	1.400 {0.05512}
1.370 {0.05394}	1.420 {0.05591}	1.350 {0.05315}
1.320 {0.05197}	1.370 {0.05394}	1.300 {0.05118}
1.270 {0.050}	1.320 {0.05197}	1.250 {0.04921}
1.220 {0.04803}	1.270 {0.050}	1.200 {0.04724}
1.170 {0.04606}	1.220 {0.04803}	1.150 {0.04528}
1.120 {0.04409}	1.170 {0.04606}	1.100 {0.04331}
1.070 {0.04213}	1.120 {0.04409}	1.050 {0.04134}
1.020 {0.04016}	1.070 {0.04213}	1.000 {0.03937}
0.970 {0.0382}	1.020 {0.04016}	0.950 {0.0374}
0.920 {0.0362}	0.970 {0.0382}	0.900 {0.0354}
0.870 {0.0343}	0.920 {0.0362}	0.850 {0.0335}
0.820 {0.0323}	0.870 {0.0343}	0.800 {0.0315}
0.770 {0.0303}	0.820 {0.0323}	0.750 {0.0295}
0.720 {0.0283}	0.770 {0.0303}	0.700 {0.0276}
0.680 {0.0268}	0.720 {0.0283}	0.650 {0.0256}

Selection example

- Because clearance D **1.364 mm {0.05370 in}** applies to **1.320 mm {0.05197 in}** or more and less than **1.370 mm {0.05394 in}**, a shim of **1.300 {0.05118}** thickness is selected.

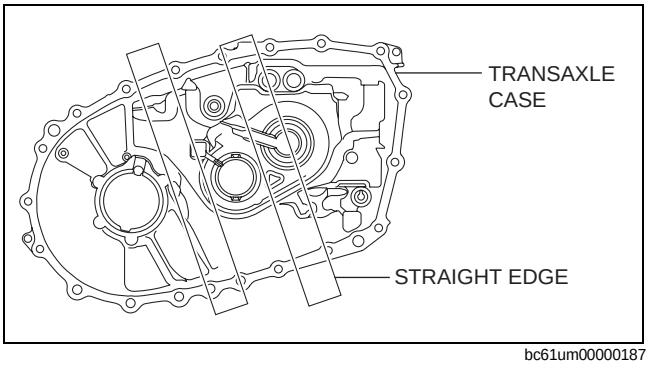
Secondary Shaft Preload Adjustment

1. Measure the thickness of the straight edge which is used for measurements.
2. Measure distance E of the transaxle case using the following procedure.



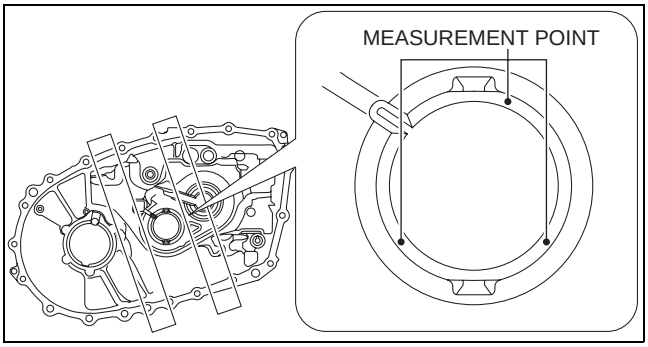
bc61um00000085

(1) Place two straight edges on the transaxle case as shown in the figure.



bc61um00000187

(2) Set up 3 measurement points of your choosing on the shim assembly area of the transaxle case as shown in the figure.
(3) Using a commercially available depth gauge, measure the distance to each measurement point from the straight edge.



bc61um00000188

Caution
- **When measuring the distance to the measurement point from the straight edge, do not allow the depth gauge head to contact the shim assembly area.**

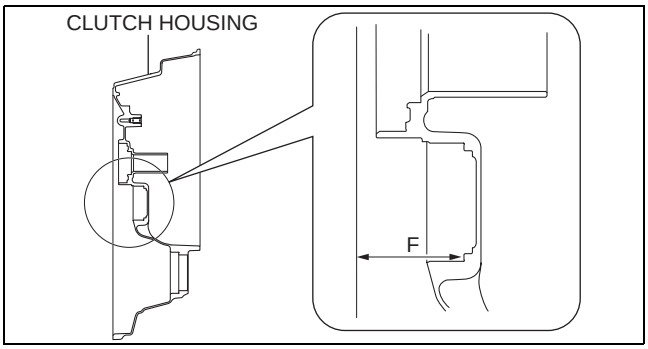
(4) Calculate the average value measured in Step 3 using the following formula.
- (Value of first measurement + value of second measurement + value of third measurement) / 3 = Average measured values.

Calculation example
- Value of first measurement = **223.223 mm {8.78831 in}**
- Value of second measurement = **223.219 mm {8.78815 in}**
- Value of third measurement = **223.222 mm {8.78827 in}**
- (**223.223 mm {8.78831 in}** + **223.219 mm {8.78815 in}** + **223.222 mm {8.78827 in}**) / 3 = **223.221 mm {8.78823 in}**

(5) Calculate distance E of the transaxle case using the following formula.
- Average of measured values - straight edge thickness = Distance E

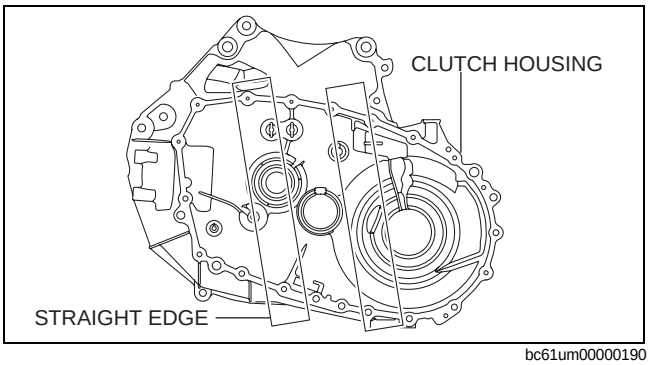
Calculation example
- Straight edge thickness = **5.000 mm {0.1969 in}**
- Average of measured values = **223.221 mm {8.78823 in}**
- **223.221 mm {8.78823 in}** - **5.000 mm {0.1969 in}** = **218.221 mm {8.59138 in}**

3. Measure distance F of the transaxle case using the following procedure.



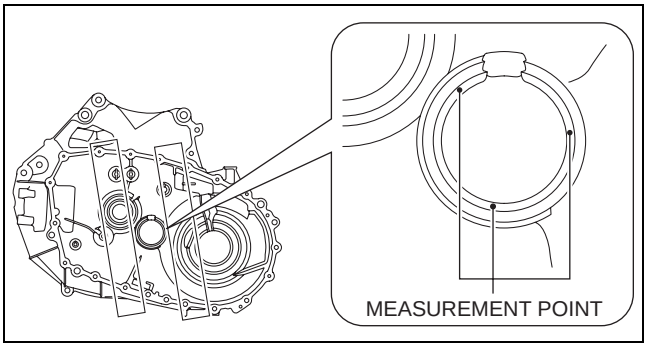
bc61um00000189

(1) Set two straight edges on the clutch housing as shown in the figure.



bc61um00000190

(2) Set up 3 measurement points of your choosing on the ball bearing assembly area of the clutch housing as shown in the figure.
(3) Using a commercially available depth gauge, measure the distance to each measurement point from the straight edge.



bc61um00000191

Caution
- **When measuring the distance to the measurement point from the straight edge, do not allow the depth gauge head to contact the bearing outer race assembly area.**

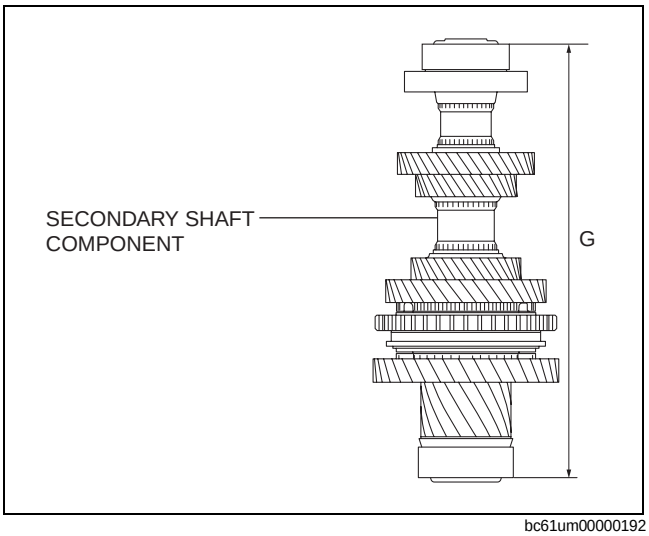
(4) Calculate the average value measured in Step 3 using the following formula.
- (Value of first measurement + value of second measurement + value of third measurement) / 3 = Average measured values.

Calculation example
- Value of first measurement = **61.154 mm {2.4076 in}**
- Value of second measurement = **61.153 mm {2.4076 in}**
- Value of third measurement = **61.153 mm {2.4076 in}**
- (**61.154 mm {2.4076 in}** + **61.153 mm {2.4076 in}** + **61.153 mm {2.4076 in}**) / 3 = **61.153 mm {2.4076 in}**

(5) Calculate distance F of the clutch housing using the following formula.
- Average of measured values - straight edge thickness = Distance F

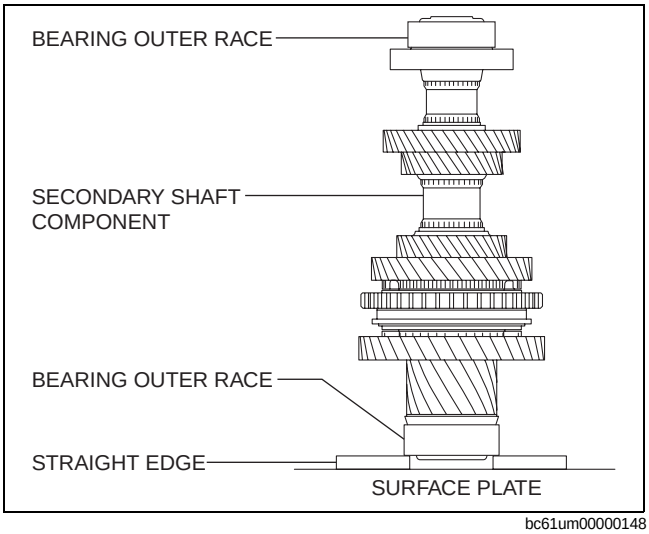
Calculation example
- Straight edge thickness = **5.000 mm {0.1969 in}**
- Average of measured values = **61.153 mm {2.4076 in}**
- **61.153 mm {2.4076 in}** - **5.000 mm {0.1969 in}** = **56.153 mm {2.2107 in}**

4. Measure distance G of the secondary shaft component using the following procedure.



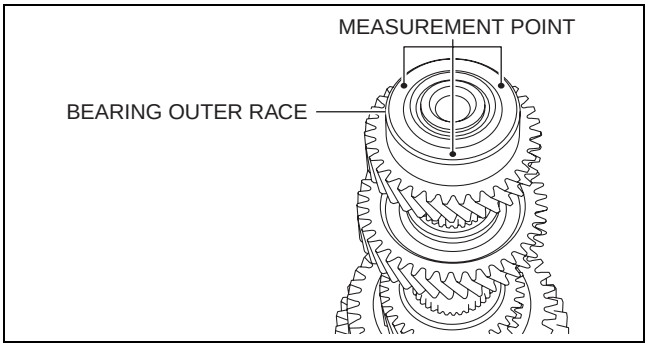
bc61um00000192

(1) Place two straight edges on the surface plate as shown in the figure and set the bearing outer race and secondary shaft component on top of them.
(2) Rotate the secondary shaft component to its rotational direction to engage the taper roller bearing and the bearing outer race assembled to the clutch housing smoothly.



bc61um00000148

(3) Set up 3 measurement points of your choosing on the bearing outer race as shown in the figure.
(4) Using a commercially available height gauge, measure the distance to each measurement point from the straight edge.
(5) Calculate the average of the value measured in Step 4 using the following formula, and use the average of the measured value for distance G of the secondary shaft component.
- (Value of first measurement + value of second measurement + value of third measurement) / 3 = Distance G



bc61um00000193

Calculation example
- Value of first measurement = **273.274 mm {10.7588 in}**
- Value of second measurement = **273.270 mm {10.7587 in}**
- Value of third measurement = **273.273 mm {10.7588 in}**
- (**273.274 mm {10.7588 in}** + **273.270 mm {10.7587 in}** + **273.273 mm {10.7588 in}**) / 3 = **273.272 mm {10.7587 in}**

5. Select the secondary shaft shim using the following procedure.
(1) Calculate the clearance (clearance H) between the transaxle case and the primary shaft component using the following formula.
- Distance E + Distance F - Distance G = Clearance H

Calculation example
- Distance E = **218.221 mm {8.59138 in}**
- Distance F = **56.153 mm {2.2107 in}**
- Distance G = **273.272 mm {10.7587 in}**
- **218.221 mm {8.59138 in}** + **56.153 mm {2.2107 in}** - **273.272 mm {10.7587 in}** = **1.102 mm {0.04339 in}**

(2) Based on the calculated clearance H, select a shim of the appropriate thickness from the following table.

Clearance H measured value		Appropriate shim thickness (mm {in})
Equal to or more (mm {in})	Less than (mm {in})	
1.331 {0.05240}	1.355 {0.05335}	1.500 {0.05906}
1.281 {0.05043}	1.331 {0.05240}	1.450 {0.05709}
1.231 {0.04846}	1.281 {0.05043}	1.400 {0.05512}
1.181 {0.04650}	1.231 {0.04846}	1.350 {0.05315}
1.131 {0.04453}	1.181 {0.04650}	1.300 {0.05118}
1.081 {0.04256}	1.131 {0.04453}	1.250 {0.04921}
1.031 {0.04059}	1.081 {0.04256}	1.200 {0.04724}
0.981 {0.0386}	1.031 {0.04059}	1.150 {0.04528}
0.931 {0.0367}	0.981 {0.0386}	1.100 {0.04331}
0.881 {0.0347}	0.931 {0.0367}	1.050 {0.04134}
0.831 {0.0327}	0.881 {0.0347}	1.000 {0.03937}
0.781 {0.0307}	0.831 {0.0327}	0.950 {0.0374}
0.731 {0.0288}	0.781 {0.0307}	0.900 {0.0354}
0.681 {0.0268}	0.731 {0.0288}	0.850 {0.0335}
0.631 {0.0248}	0.681 {0.0268}	0.800 {0.0315}
0.581 {0.0229}	0.631 {0.0248}	0.750 {0.0295}
0.531 {0.0209}	0.581 {0.0229}	0.700 {0.0276}
0.495 {0.0195}	0.531 {0.0209}	0.650 {0.0256}

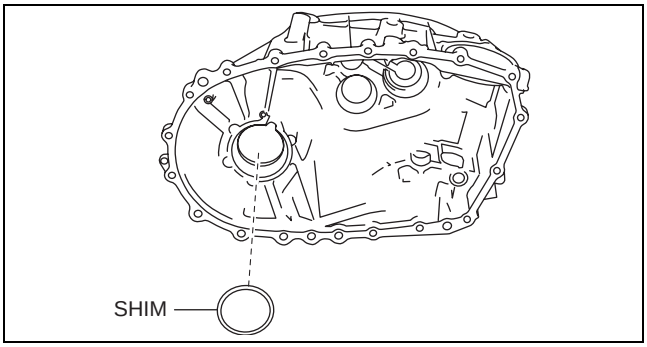
Selection example

- Because clearance H **1.102 mm {0.04339 in}** applies to **1.081 {0.04256}** or more and less than **1.131 {0.04453}**, a shim of **1.250 {0.04921}** thickness is selected.

Differential Preload Adjustment

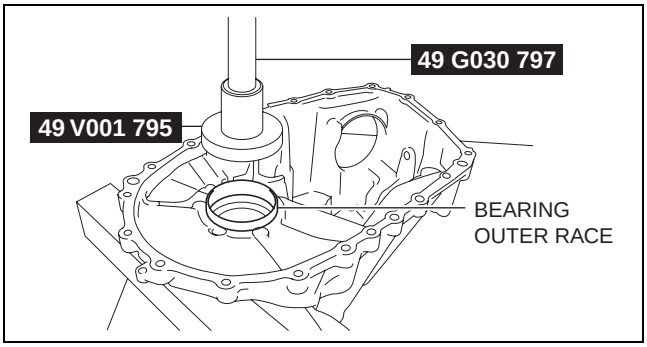
1. Assemble a new shim of the same thickness as the removed shim.

   Caution
   - **Preload cannot be measured accurately if the shim is reused. An used shim is deformed by the pressure applied during assembly.**



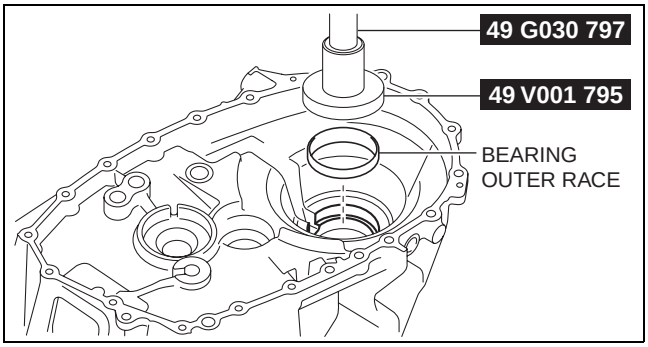
bc61um00000150

2. Assemble the bearing outer race to the transaxle case using the **SST**s.



bc61um00000149

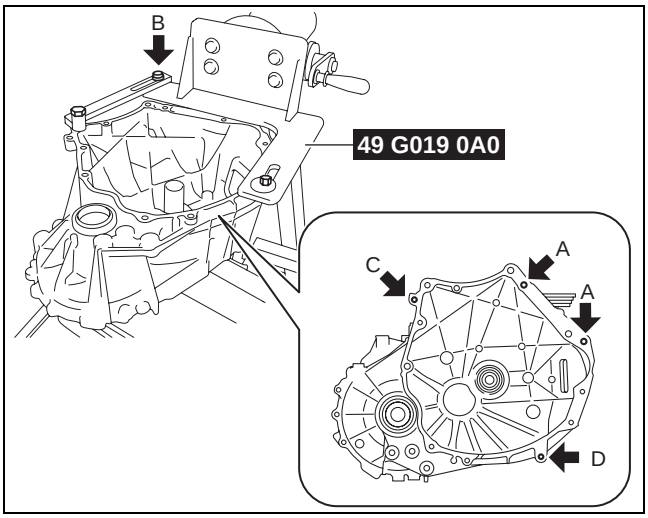
3. Assemble the bearing outer race to the clutch housing using the **SST**s.



bc61um00000151

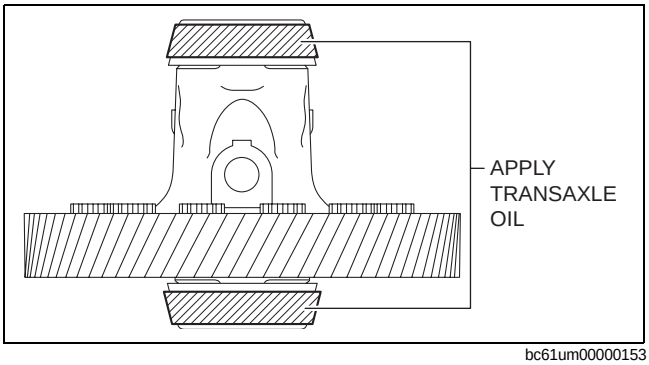
4. Assemble the **SST** to the clutch housing.

Bolt A
Part No.: 99450 1055 or M10×1.25 length 55 mm {2.2 in}, and nut (M10×1.25)
Bolt A tightening torque
38—52 N·m {3.9—5.3 kgf·m, 29—38 ft·lbf}
Bolt B
SST (49 G019 033 part of 49 G019 0A0)
Bolt B tightening torque
88—118 N·m {9.0—12 kgf·m, 65—87 ft·lbf}
Bolt C
Part No.: 9YA02 1080 or M10×1.5 length 55 mm {2.2 in}
Bolt C tightening torque
38—52 N·m {3.9—5.3 kgf·m, 29—38 ft·lbf}
Bolt D
Part No.: 99450 1030 or M10×1.25 length 30 mm {2.2 in}
Bolt D tightening torque
38—52 N·m {3.9—5.3 kgf·m, 29—38 ft·lbf}



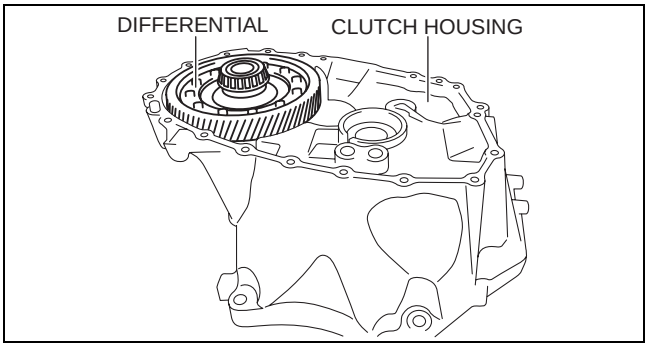
bc61um00000126

5. Apply transaxle oil to the roller area of the taper roller bearing on the differential.



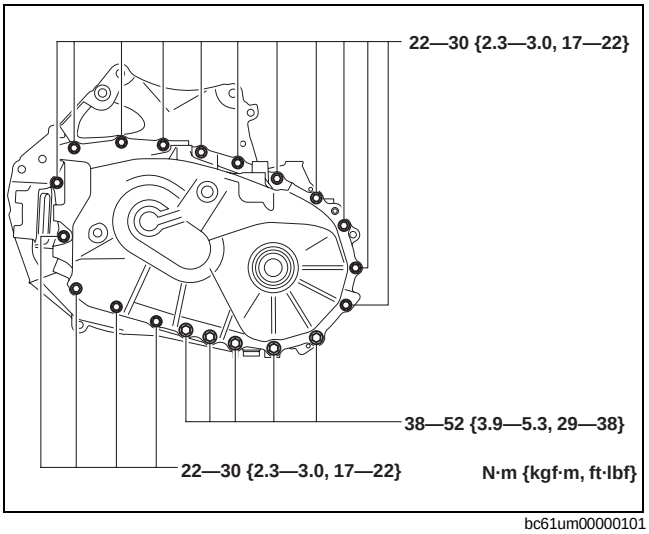
bc61um00000153

6. Assemble the differential to the clutch housing.



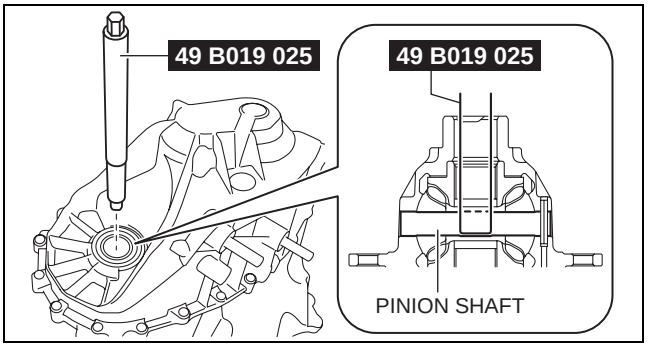
bc61um00000154

7. Assemble the transaxle case to the clutch housing.



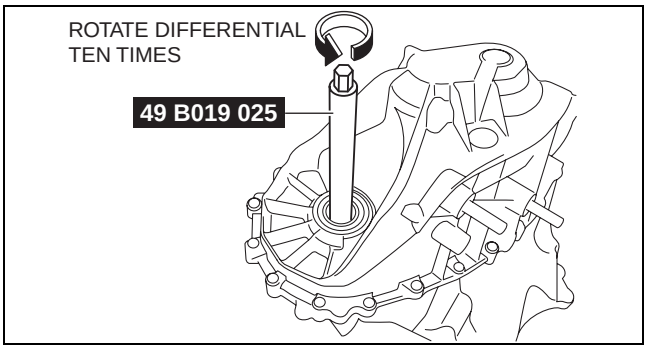
bc61um00000101

8. Set the **SST** so that its end engages the pinion shaft of the differential.



bc61um00000155

9. Rotate the differential ten times using the **SST** to engage the taper roller bearing and the bearing outer race smoothly.

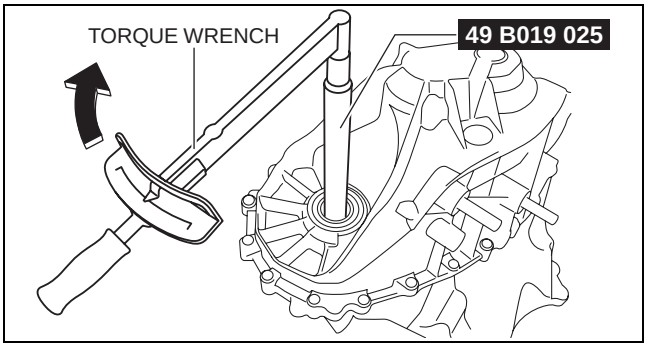


bc61um00000156

10. Measure the differential preload.

Standard preload
0.7—1.7 N·m {7.2—17 kgf·cm, 6.2—15 ft·lbf}

- If the measured preload is within the specification, the shim thickness is the same as the removed one and there is no problem, therefore the "Differential Preload Adjustment" procedure is finished.
- If not within the specification, perform "Shim selection calculation". (See 05-15-58 Shim selection calculation.)



bc61um00000157

Shim selection calculation

1. Calculate the preload gap by subtracting the measured preload value from constant number A.
   - Constant number A = **1.2 N·m {12 kgf·cm, 11 in·lbf}**
   - **1.2 N·m {12 kgf·cm, 11 in·lbf}** - measured preload value = preload gap

   Calculation example
   - Measured preload value = **2.5 N·m {25 kgf·cm, 22 in·lbf}**
   - **1.2 N·m {12 kgf·cm, 11 in·lbf}** - **2.5 N·m {25 kgf·cm, 22 in·lbf}** = **-1.3 N·m {13 kgf·cm, 12 in·lbf}**
2. Calculate the shim thickness gap by multiplying the preload gap by constant number B.
   - Constant number B = **0.083 mm/N·m {0.008 mm/kgf·cm, 0.0004 in/in·lbf}**
   - Preload gap x **0.083 mm/N·m {0.008 mm/kgf·cm, 0.0004 in/in·lbf}** = shim thickness gap

   Calculation example
   - Preload gap = **-1.3 N·m {-13 kgf·cm, -12 in·lbf}**
   - **-1.3 N·m {-13 kgf·cm, -12 in·lbf}** x **0.083 mm/N·m {0.008 mm/kgf·cm, 0.0004 in/in·lbf}** = **-0.108 mm {-0.00425 in}**
3. Calculate the shim thickness calculated value by adding the shim thickness gap to the thickness of the shim used in the measurement.
   - Shim thickness gap + thickness of shim used in measurement = shim thickness calculated value

   Calculation example
   - Shim thickness gap = **-0.108 mm {-0.00425 in}**
   - Thickness of shim used in measurement = **0.9000 mm {0.03543 in}**
   - **-0.108 mm {-0.00425 in}** + **0.9000 mm {0.03543 in}** = **0.792 mm {0.0312 in}**
4. Based on the shim thickness calculated value, select a shim of the appropriate thickness.

Shim thickness calculated value		Appropriate shim thickness (mm {in})
Equal to or more (mm {in})	Less than (mm {in})	
1.220 {0.04803}	1.260 {0.04961}	1.350 {0.05315}
1.170 {0.04606}	1.220 {0.04803}	1.300 {0.05118}
1.120 {0.04409}	1.170 {0.04606}	1.250 {0.04921}
1.070 {0.04213}	1.120 {0.04409}	1.200 {0.04724}
1.020 {0.04016}	1.070 {0.04213}	1.150 {0.04528}
0.970 {0.0382}	1.020 {0.04016}	1.100 {0.04331}
0.920 {0.0362}	0.970 {0.0382}	1.050 {0.04134}
0.870 {0.0343}	0.920 {0.0362}	1.000 {0.03937}
0.820 {0.0323}	0.870 {0.0343}	0.950 {0.0374}
0.770 {0.0303}	0.820 {0.0323}	0.900 {0.0354}
0.720 {0.0283}	0.770 {0.0303}	0.850 {0.0335}
0.670 {0.0264}	0.720 {0.0283}	0.800 {0.0315}
0.620 {0.0244}	0.670 {0.0264}	0.750 {0.0295}
0.570 {0.0224}	0.620 {0.0244}	0.700 {0.0276}
0.520 {0.0205}	0.570 {0.0224}	0.650 {0.0256}
0.470 {0.0185}	0.520 {0.0205}	0.600 {0.0236}
0.420 {0.0165}	0.470 {0.0185}	0.550 {0.0217}
0.390 {0.0154}	0.420 {0.0165}	0.50 {0.0197}

Selection example

- Because shim thickness calculated value **0.792 mm {0.0312 in}** applies to **0.775 mm {0.0305 in}** or more and less than **0.825 mm {0.0325 in}**, a shim of **0.800 mm {0.0315 in}** thickness is selected.

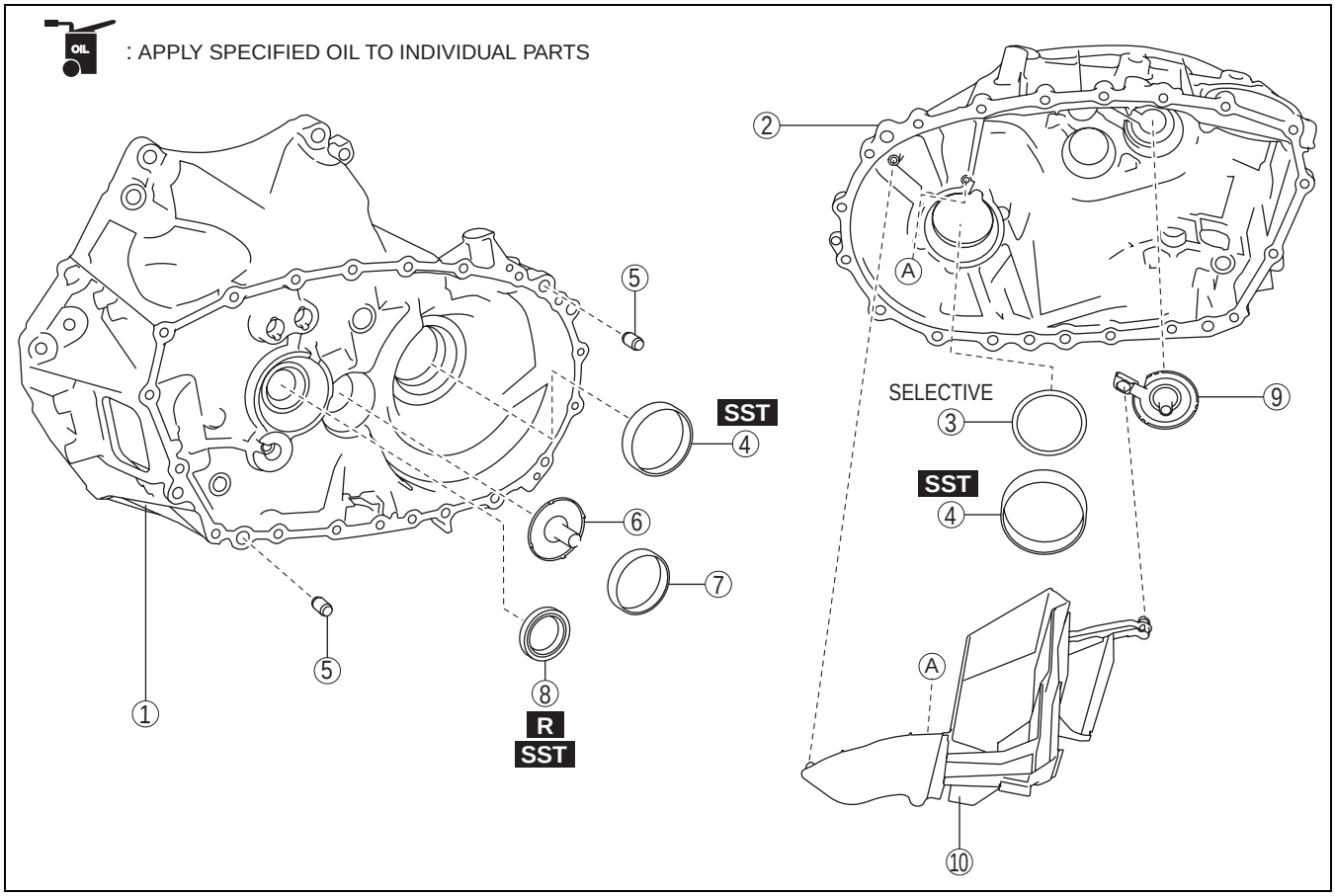
Note

- The preload gap is the difference between the central value of the standard preload value and the measured preload value.
- Constant number A, **1.2 N·m {12 kgf·cm, 11 in·lbf}** is the central value of the standard preload value.
- The shim thickness gap is the difference between the thickness of the removed shim and the thickness of an appropriate shim. In the formula to calculate the shim thickness gap, the shim thickness gap is calculated by multiplying the preload gap with constant number B.
- Constant number B is the shim thickness which varies each time the preload changes by **1.0 N·m {10 kgf·cm, 8.9 in·lbf}**. Because the shim thickness changes **0.1 mm {0.004 in}** when the preload changes **1.2 N·m {12 kgf·cm, 11 in·lbf}**, the quotient is **0.083 mm/N·m {0.008 mm/kgf·cm 0.0004 in/in·lbf}**.

TRANSAXLE CASE AND CLUTCH HOUSING ASSEMBLY

id051500169900

1. Perform the differential preload adjustment and select a shim of the appropriate thickness. (See BEARING PRELOAD ADJUSTMENT.)
2. Assemble the transaxle case component and clutch housing component in the order shown in the figure.



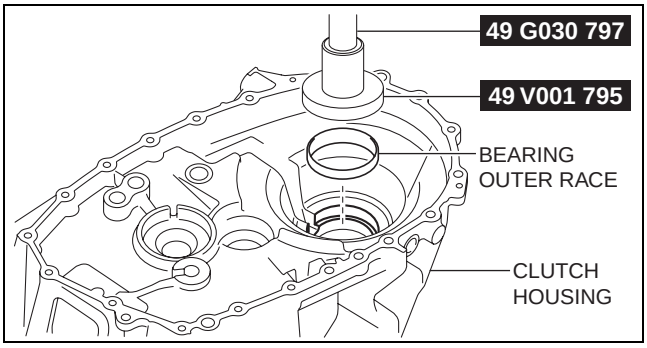
bc61um00000163

1	Clutch housing
2	Transaxle case
3	Shim
4	Bearing outer race (differential) (See 05-15-59 Bearing Outer Race (Differential) Assembly Note.)
5	Dowel pin

6	Funnel
7	Bearing outer race
8	Oil seal (See 05-15-60 Oil Seal Assembly Note.)
9	Funnel
10	Oil path

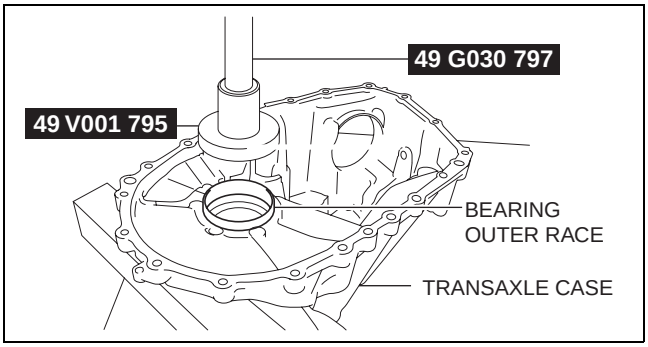
Bearing Outer Race (Differential) Assembly Note

1. Assemble the bearing outer race (differential) to the clutch housing using the **SST**s.



bc61um00000137

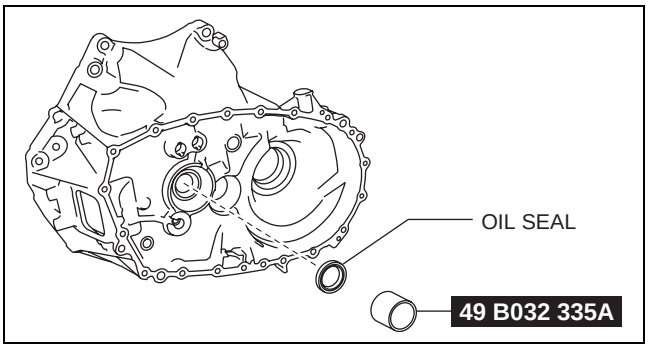
2. Assemble the bearing outer race (differential) to the transaxle case using the **SST**s.



bc61um00000078

Oil Seal Assembly Note

1. Assemble the oil seal using the **SST**.



bc61um00000164

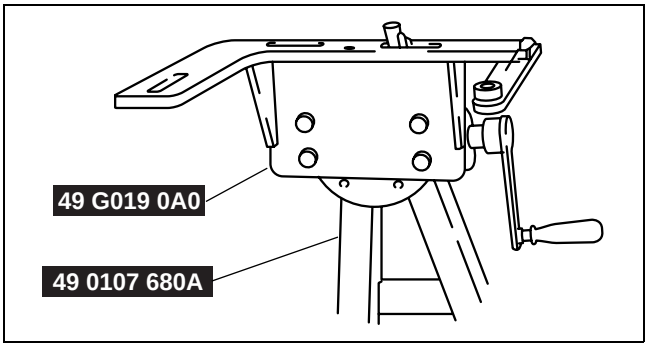
TRANSAXLE ASSEMBLY

id051500170000

Step 1

1. Perform the primary shaft and secondary shaft preload adjustment and select a shim of the appropriate thickness. (See BEARING PRELOAD ADJUSTMENT.)
2. Assemble the **SST (49 G019 0A0)** to the **SST (49 0107 680A)**.

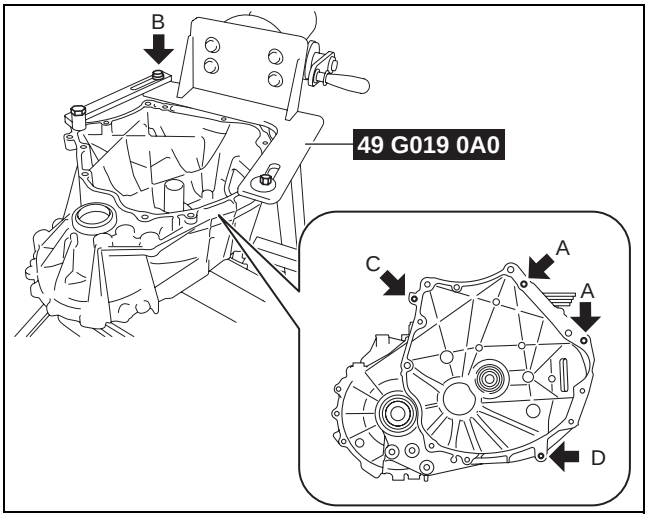
   Bolt used
   Part No.: 9YA02 A220 or M12×1.75 length 40 mm {1.6 in}
   Tightening torque
   88—118 N·m {9.0—12 kgf·m, 65—87 ft·lbf}



bc61um00000090

3. Assemble the clutch housing component to the **SST**.

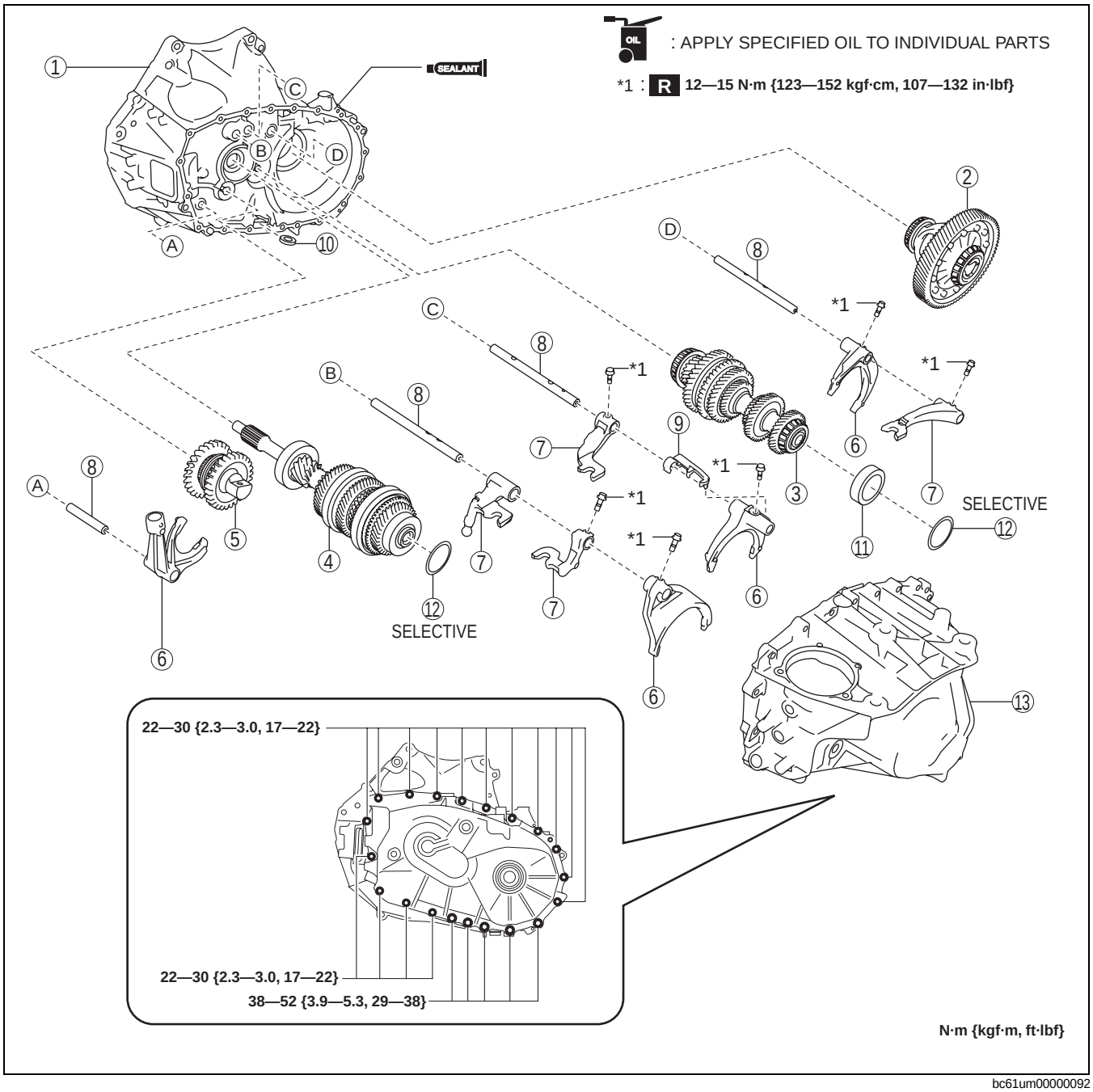
   Bolt A
   Part No.: 99450 1055 or M10×1.25 length 55 mm {2.2 in}, and nut (M10×1.25)
   Bolt A tightening torque
   38—52 N·m {3.9—5.3 kgf·m, 29—38 ft·lbf}
   Bolt B
   SST (49 G019 033 part of 49 G019 0A0)
   Bolt B tightening torque
   88—118 N·m {9.0—12 kgf·m, 65—87 ft·lbf}
   Bolt C
   Part No.: 9YA02 1080 or M10×1.5 length 55 mm {2.2 in}
   Bolt C tightening torque
   38—52 N·m {3.9—5.3 kgf·m, 29—38 ft·lbf}



bc61um00000126

Bolt D
Part No.: 99450 1030 or M10×1.25 length 30 mm {2.2 in}
Bolt D tightening torque
38—52 N·m {3.9—5.3 kgf·m, 29—38 ft·lbf}

4. Assemble the MTX in the order shown in the figure.



bc61um00000092

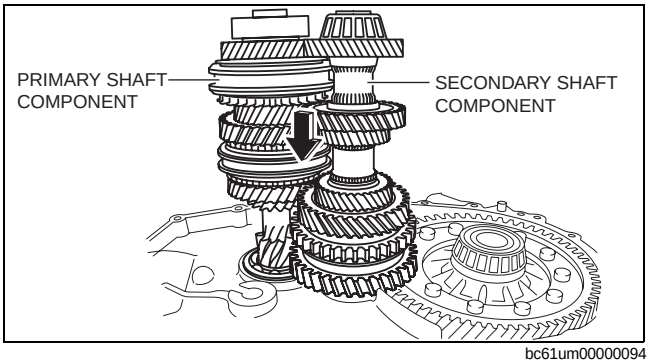
1	Clutch housing component
2	Differential
3	Secondary shaft component (See 05-15-62 Secondary shaft component and primary shaft component assembly note.)
4	Primary shaft component (See 05-15-62 Secondary shaft component and primary shaft component assembly note.)
5	Reverse idler gear component (See 05-15-62 Reverse idler gear component assembly note.)

6	Shift fork (See 05-15-63 Shift fork, shift rod end, and shift rod assembly note.)
7	Shift rod end (See 05-15-63 Shift fork, shift rod end, and shift rod assembly note.)
8	Shift rod (See 05-15-63 Shift fork, shift rod end, and shift rod assembly note.)
9	Oil path
10	Magnet

11	bearing outer race (See 05-15-65 Bearing outer race, shim, Transaxle case component assembly note.)
12	shim (See 05-15-65 Bearing outer race, shim, Transaxle case component assembly note.)
13	Transaxle case component (See 05-15-65 Bearing outer race, shim, Transaxle case component assembly note.)

Secondary shaft component and primary shaft component assembly note

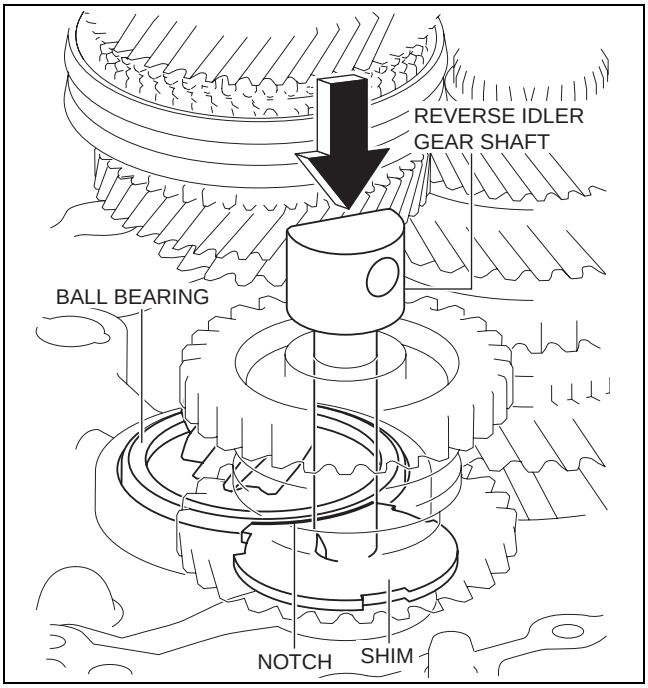
1. Assemble the secondary shaft component and primary shaft component to the clutch housing component as a single unit.
2. Shake the assembled parts and assemble each one completely.



bc61um00000094

Reverse idler gear component assembly note

1. Pull the reverse idler gear shaft and position it to the location shown in the figure.
2. Engage each gear while aligning the shim notch with the ball bearing of the primary shaft component.
3. Push the reverse idler gear shaft and assemble the reverse idler gear component.



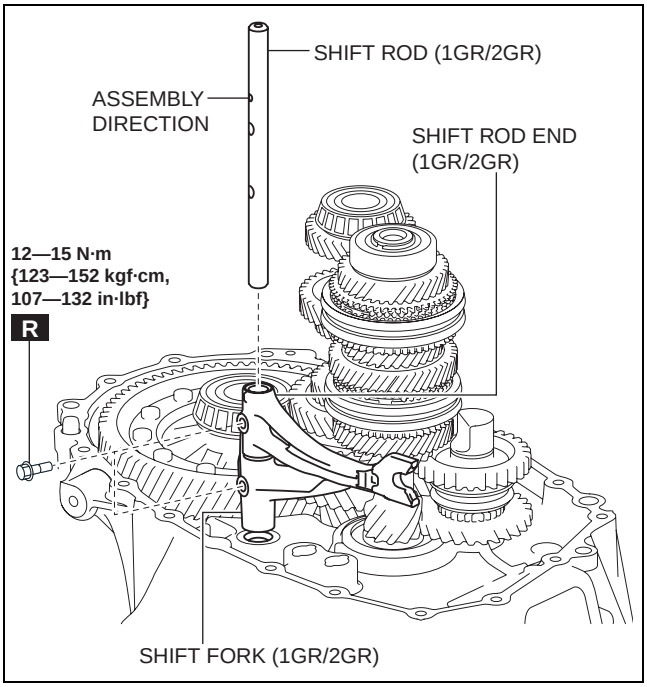
bc61um00000139

Shift fork, shift rod end, and shift rod assembly note

1. Assemble the shift fork (1GR/2GR), shift rod end (1GR/2GR), and shift rod (1GR/2GR) using the following procedure:
   (1) Assemble the shift fork to the clutch hub sleeve.
   (2) Verify the assembly direction of the shift rod.

   Note
   - Assemble the shift rod so that the pits used for verifying the assembly direction are facing the transaxle case side and the exterior side of the MTX.

   (3) Pass the shift rod through the assembly hole of the shift rod end.
   (4) Pass the shift rod through the assembly hole of the shift fork.
   (5) Assemble the shift rod to the clutch housing.
   (6) Tighten the assembly bolt and assemble the shift fork, shift rod end, and shift rod.

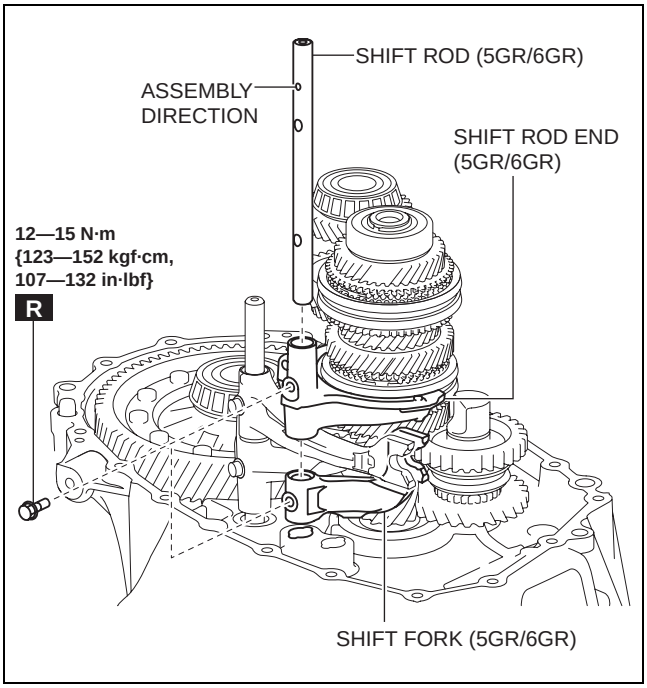


bc61um00000096

2. Assemble the shift fork (5GR/6GR), shift rod end (5GR/6GR), and shift rod (5GR/6GR) using the following procedure:
   (1) Assemble the shift fork to the clutch hub sleeve.
   (2) Verify the assembly direction of the shift rod.

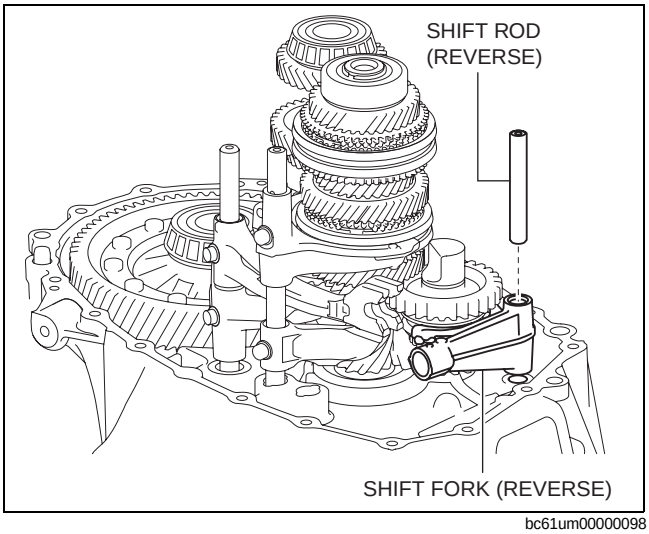
   Note
   - Assemble the shift rod so that the pits used for verifying the assembly direction are facing the transaxle case side and the exterior side of the MTX.

   (3) Pass the shift rod through the assembly hole of the shift fork.
   (4) Set the shift rod end to the position shown in the figure and pass the shift rod through the assembly hole of the shift rod end.
   (5) Assemble the shift rod to the clutch housing.
   (6) Tighten the assembly bolt and assemble the shift fork, shift rod end, and shift rod.



bc61um00000097

3. Assemble the shift fork (reverse) and shift rod (reverse) using the following procedure:
   (1) Assemble the shift fork to the clutch hub sleeve.
   (2) Assemble the shift rod.

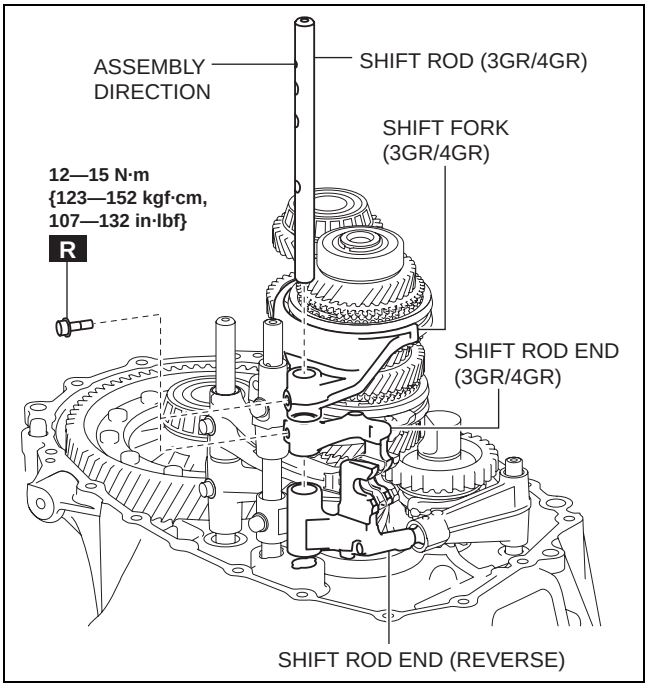


bc61um00000098

4. Assemble the shift fork (3GR/4GR), shift rod end (3GR/4GR), shift rod end (reverse), and shift rod (3GR/4GR) using the following procedure:
   (1) Assemble the shift fork to the clutch hub sleeve.
   (2) Verify the assembly direction of the shift rod.

   Note
   - Assemble the shift rod so that the pits used for verifying the assembly direction are facing the transaxle case side and the exterior side of the MTX.

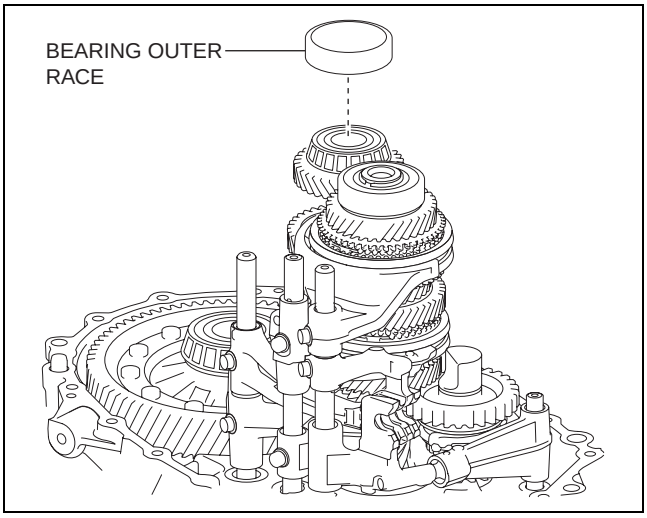
   (3) Pass the shift rod through the assembly hole of the shift fork.
   (4) Set the shift rod end (3GR/4GR) to the position shown in the figure and pass the shift rod through the assembly hole of the shift rod end (3GR/4GR).
   (5) Set the shift rod end (reverse) to the position shown in the figure and pass the shift rod through the assembly hole of the shift rod end (reverse).
   (6) Assemble the shift rod to the clutch housing.
   (7) Tighten the assembly bolt and assemble the shift fork, shift rod end, and shift rod.



bc61um00000099

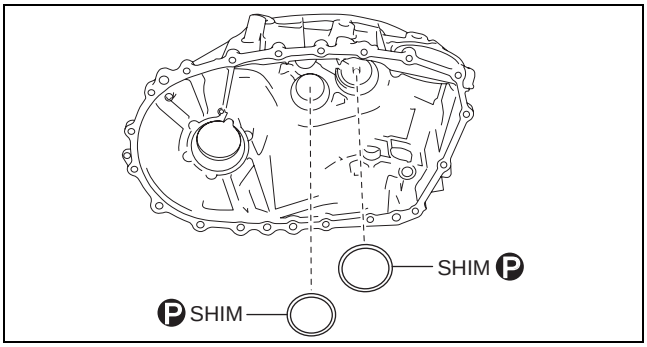
Bearing outer race, shim, Transaxle case component assembly note

1. Assemble the bearing outer race to the secondary shaft component.



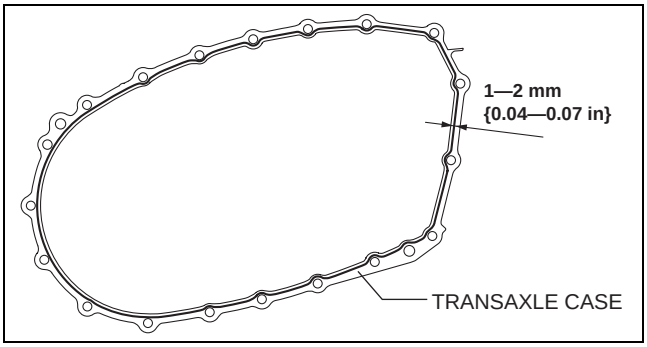
bc61um00000165

2. Assemble the shims.



bc61um00000166

3. Apply silicone sealant to the transaxle case component as shown in the figure.

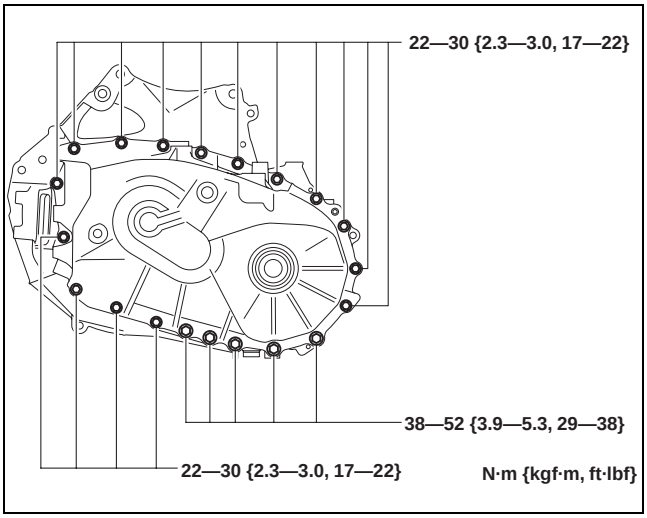


bc61um00000100

4. Assemble the transaxle case component.

Caution

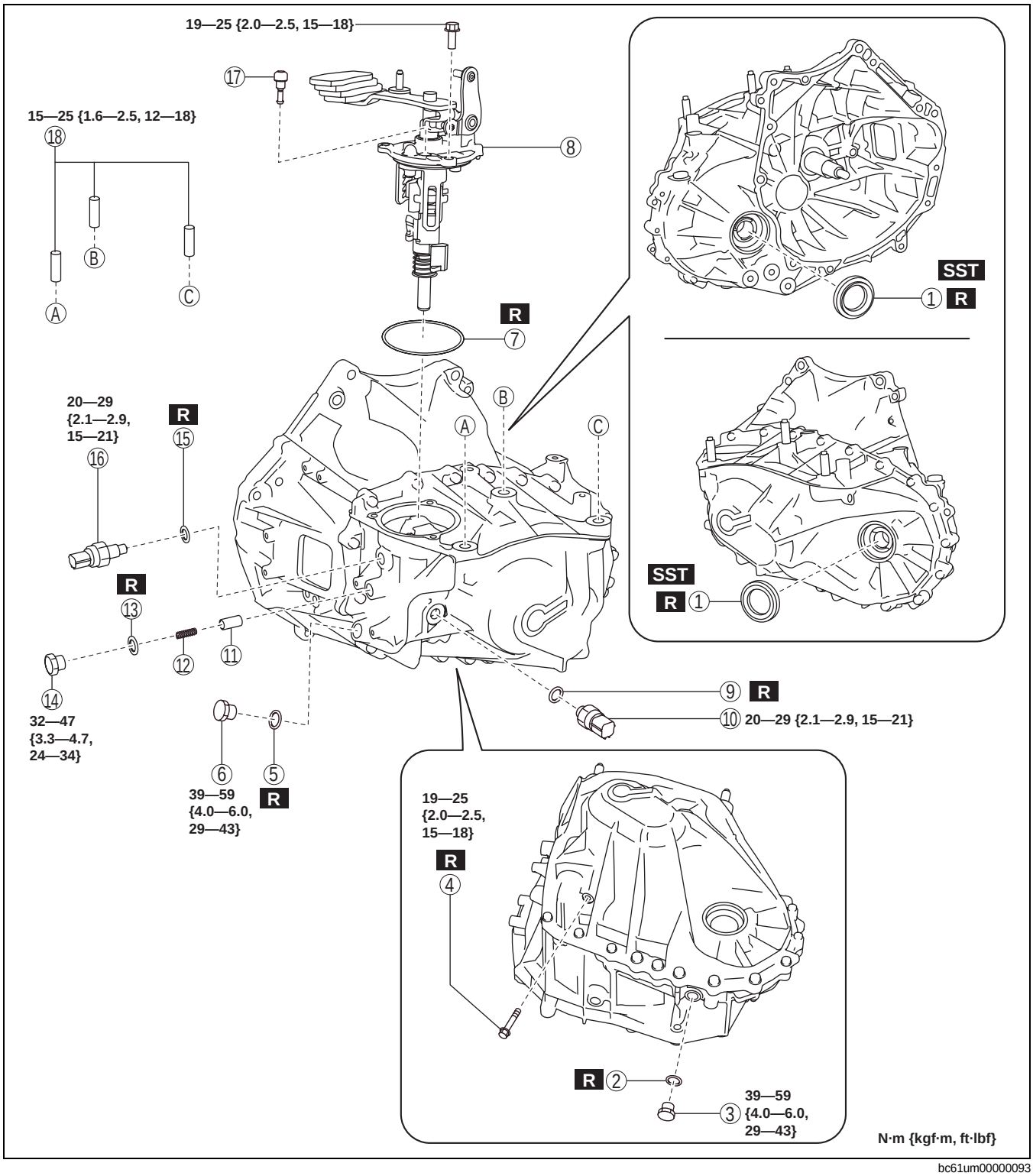
- **Assemble the transaxle case component before the applied silicone sealant starts to harden.**



bc61um00000101

Step 2

1. Assemble the parts around the MTX in the order shown in the figure.



bc61um00000093

1	Oil seal (See 05-15-65 Bearing outer race, shim, Transaxle case component assembly note.)
2	Gasket
3	Drain plug
4	Reverse gear shaft anchor bolt
5	Gasket
6	Oil level plug

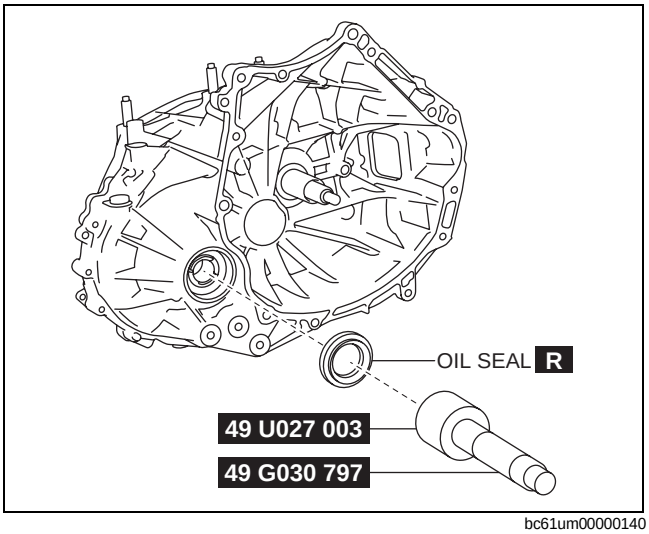
7	O-ring
8	Shift control module
9	Gasket
10	Back-up light switch
11	Detent ball pin
12	Spring
13	Gasket
14	Plug

15	Gasket
16	Neutral switch

17	Breather
18	Stud bolt

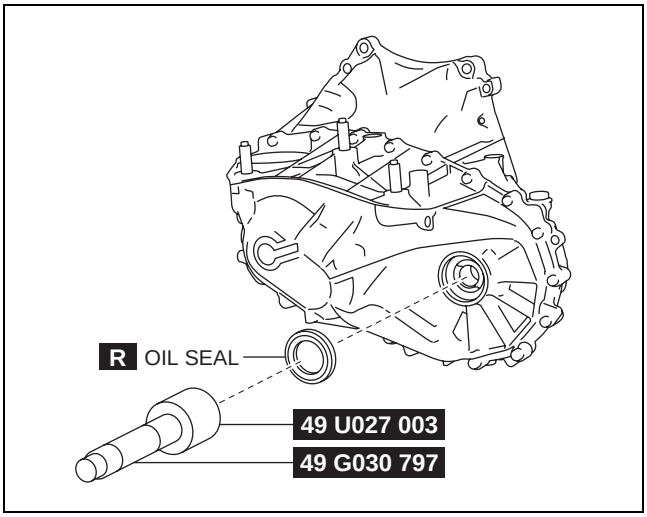
Oil seal assembly note

1. Assemble a new oil seal to the clutch housing using the **SST**s.



bc61um00000140

2. Assemble a new oil seal to the transaxle case using the **SST**s.



bc61um00000141

05-50 TECHNICAL DATA

TRANSMISSION/TRANSAXLE
TECHNICAL DATA 05-50–1
Manual Transaxle **05-50–1**
Gear Thrust Clearance **05-50–1**
Gear Inner Diameter **05-50–1**
Gear Sleeve Outer Diameter **05-50–1**
Gear Shaft Runout **05-50–1**
Gear Shaft Outer Diameter **05-50–2**
Synchronizer Clearance **05-50–2**
Shift Fork and Clutch
Hub Sleeve Clearance **05-50–2**
Bearing Preload **05-50–2**
Differential Gear Backlash **05-50–2**
Adjust Shim Size **05-50–3**

TRANSMISSION/TRANSAXLE TECHNICAL DATA

id055000800100

Manual Transaxle

Item		Specification
Manual transaxle oil	Grade	API service GL-4
	Viscosity	SAE 75W-80
	Capacity (approx. quantity)	1.65 L {1.74 US qt, 1.45 lmp qt}

Gear Thrust Clearance

Measurement location	Specification (mm {in})	Maximum (mm {in})
3rd gear	0.257 {0.0101}	0.417 {0.0164}
4th gear	0.325 {0.0128}	0.489 {0.0193}
5th gear	0.192 {0.00756}	0.324 {0.0128}
6th gear	0.262 {0.0103}	0.398 {0.0157}
Secondary 1st gear	0.174 {0.00685}	0.291 {0.0115}
Secondary 2nd gear	0.174 {0.00685}	0.294 {0.0116}

Gear Inner Diameter

Measurement location	Specification (mm {in})	Maximum (mm {in})
3rd gear	37.01 {1.4571}	37.02 {1.4575}
4th gear	32.81 {1.2917}	32.82 {1.2921}
5th gear	42.01 {1.6539}	42.02 {1.6543}
6th gear	37.01 {1.4571}	37.02 {1.4575}
Secondary 1st gear	41.512 {1.6343}	41.525 {1.6348}
Secondary 2nd gear	46.534 {1.8320}	46.544 {1.8324}

Gear Sleeve Outer Diameter

Specification (mm {in})	Minimum (mm {in})
46.444 {1.8285}	46.434 {1.8281}

Gear Shaft Runout

Measurement location	Maximum (mm {in})
Primary shaft	0.05 {0.002}
Secondary shaft	0.05 {0.002}

Gear Shaft Outer Diameter

Measurement location		Specification (mm {in})	Minimum (mm {in})
Primary shaft	3rd gear assembly part	36.97 {1.4555}	36.96 {1.4551}
	4th gear assembly part	32.77 {1.2902}	32.76 {1.2898}
	5th gear assembly part	41.97 {1.6524}	41.96 {1.652}
	6th gear assembly part	36.97 {1.4555}	36.96 {1.4551}
Secondary shaft	Secondary 1st gear assembly part	41.457 {1.6322}	41.445 {1.6317}
	Secondary 2nd gear assembly part	39.276 {1.5463}	39.266 {1.5459}

Synchronizer Clearance

Measurement location	Specification (mm {in})	Minimum (mm {in})
Synchronizer ring (1GR)	0.94 {0.037}	0.55 {0.022}
Synchronizer ring (2GR)	0.94 {0.037}	0.55 {0.022}
Synchronizer ring (3GR)	0.97 {0.038}	0.32 {0.013}
Synchronizer ring (4GR)	1.05 {0.0413}	0.40 {0.016}
Synchronizer ring (5GR)	1.15 {0.0453}	0.50 {0.020}
Synchronizer ring (6GR)	1.15 {0.0453}	0.50 {0.020}
Synchronizer ring (reverse)	0.95 {0.037}	0.49 {0.019}

Shift Fork and Clutch Hub Sleeve Clearance

Specification (mm {in})	Maximum (mm {in})
0.225 {0.00886}	0.40 {0.016}

Bearing Preload

Item	Specification (N·m {kgf·cm, in·lbf})
differential preload	0.7—1.7 {7.2—17, 6.2—15}

Differential Gear Backlash

Item	Specification (mm {in})
pinion gear backlash	0.05—0.15 {0.002—0.005}

Adjust Shim Size
Reverse idler gear (mm {in})

3.150 {0.1240}	3.100 {0.1220}	3.050 {0.1201}	2.950 {0.1161}
2.900 {0.1142}	2.850 {0.1122}	-	-

Primary shaft (mm {in})

1.550 {0.06102}	1.500 {0.05906}	1.450 {0.05709}	1.400 {0.05512}
1.350 {0.05315}	1.300 {0.05118}	1.250 {0.04921}	1.200 {0.04724}
1.150 {0.04528}	1.100 {0.04331}	1.050 {0.04134}	1.000 {0.03937}
0.950 {0.0374}	0.900 {0.0354}	0.850 {0.0335}	0.800 {0.0315}
0.750 {0.0295}	0.700 {0.0276}	0.650 {0.0256}	-

Secondary shaft (mm {in})

1.500 {0.05906}	1.450 {0.05709}	1.400 {0.05512}	1.350 {0.05315}
1.300 {0.05118}	1.250 {0.04921}	1.200 {0.04724}	1.150 {0.04528}
1.100 {0.04331}	1.050 {0.04134}	1.000 {0.03937}	0.950 {0.0374}
0.900 {0.0354}	0.850 {0.0335}	0.800 {0.0315}	0.750 {0.0295}
0.700 {0.0276}	-	-	-

Differential (mm {in})

1.350 {0.05315}	1.300 {0.05118}	1.250 {0.04921}	1.200 {0.04724}
1.150 {0.04528}	1.100 {0.04331}	1.050 {0.04134}	1.000 {0.03937}
0.950 {0.0374}	0.900 {0.0354}	0.850 {0.0335}	0.800 {0.0315}
0.750 {0.0295}	0.700 {0.0276}	0.650 {0.0256}	0.600 {0.0236}
0.550 {0.0217}	0.50 {0.0197}	-	-

Differential thrust washer size (mm {in})

0.95 {0.037}	0.90 {0.035}	0.85 {0.033}	0.80 {0.031}
0.75 {0.030}	-	-	-

05-60 SERVICE TOOLS

TRANSMISSION/TRANSAXLE SST. . . . 05-60–1
Example **05-60–1**
Manual Transaxle [C66M-R] **05-60–1**

TRANSMISSION/TRANSAXLE SST

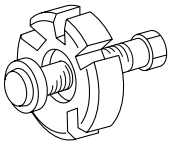
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1: Mazda SST number
2: Global SST number

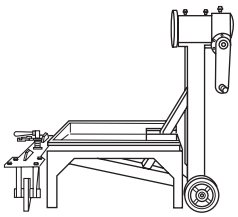
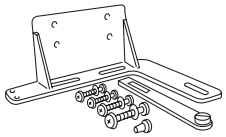
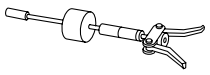
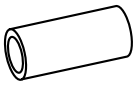
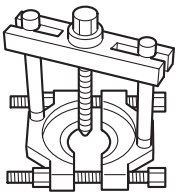
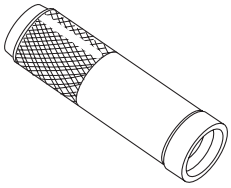
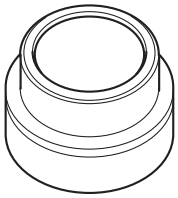
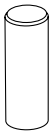
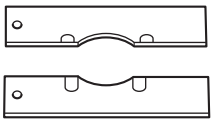
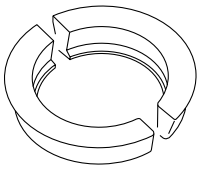
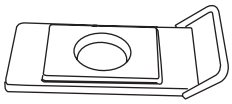
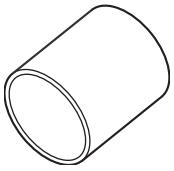
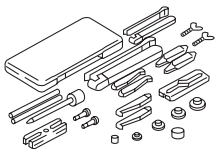
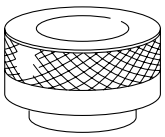
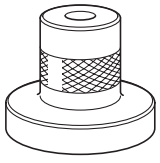
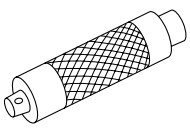
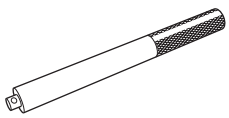
Example

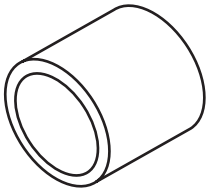
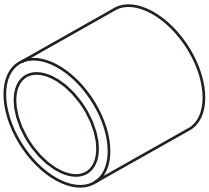
1:49 UN30 3009
2:303-009

Crankshaft damper remover



Manual Transaxle [C66M-R]

1:49 0107 680A 2: – Engine stand 	1:49 G019 0A0 2: – Transaxle hanger set 	1:49 W032 2A0 2: – Bearing remver set 
1:49 T032 302 2: – Bearing installer 	1:49 0710 520 2: – Bearing puller 	1:49 F401 331 2: – Bearing installer body 
1:49 F401 336B 2: – Attachment 	1:49 B032 317 2: – Bearing & oil seal remover 	1:49 F026 103 2: – Wheel hub puller 
1:49 B017 206 2: – Attachment F 	1:49 F401 366A 2: – Plate 	1:49 H027 001 2: – Collar 
1:49 0839 425C 2: – Bearing puller set 	1:49 UB71 525 2: – Bearing Installer 	1:49 V001 795 2: – Oil seal installer 
1:49 G030 797 2: – Handle 	1:49 F027 005 2: – Attachmentϕ62 	1:49 F027 003 2: – Handle 

1:49 U027 003 2: – Oil seal installer 	1:49 B032 335A 2: – Oil seal installer 	–