Manual Transaxle and Transfer Workshop Manual A26M-R A26MX-R

CONTENTS

PRINTED IN U.S.A., JULY 2006
Form No. 1898–1U–06G
Part No. 9999–95–A26M-07

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.

Mazda Motor Corporation
HIROSHIMA,JAPAN

GENERAL INFORMATION

00
SECTION

00-00 GENERAL INFORMATION

HOW TO USE THIS MANUAL

e6u000000000101

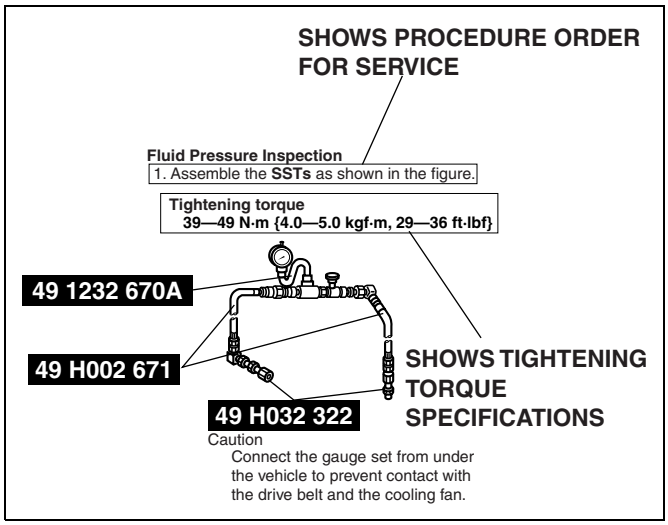
Range of Topics

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

Service Procedure

Inspection, adjustment

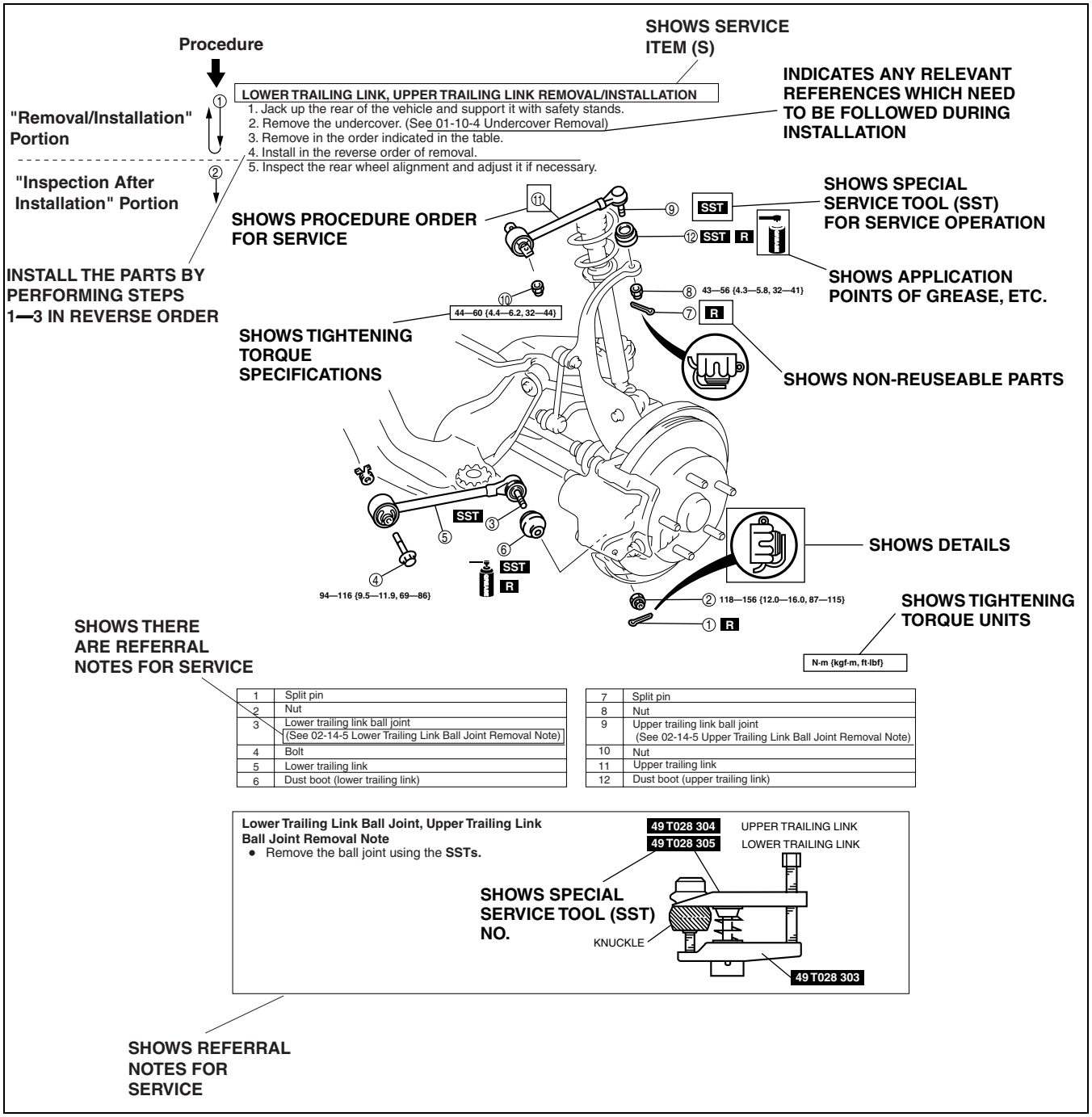
- Inspection and adjustment procedures are divided into steps. Important points regarding the location and contents of the procedures are explained in detail and shown in the illustrations.



wgiwxx0009e

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)

bhe0000w104

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

e6u000000000102

Electric current	A (ampere)
Electric power	W (watt)
Electric resistance	ohm
Electric voltage	V (volt)
Length	mm (millimeter)
	in (inch)
Negative pressure	kPa (kilo pascal)
	mmHg (millimeters of mercury)
	inHg (inches of mercury)
Positive pressure	kPa (kilo pascal)
	kgf/cm^2 (kilogram force per square centimeter)
	psi (pounds per square inch)
Number of revolutions	rpm (revolutions per minute)
Torque	N·m (Newton meter)
	kgf·m (kilogram force meter)
	kgf·cm (kilogram force centimeter)
	ft·lbf (foot pound force)
	in·lbf (inch pound force)
Volume	L (liter)
	US qt (U.S. quart)
	Imp qt (Imperial quart)
	ml (milliliter)
	cc (cubic centimeter)
	cu in (cubic inch)
	fl oz (fluid ounce)
Weight	g (gram)
	oz (ounce)

Conversion to SI Units (Système International d'Unités)

- All numerical values in this manual are based on SI units. Numbers shown in conventional units are converted from these values.

Rounding Off

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

Upper and Lower Limits

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

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

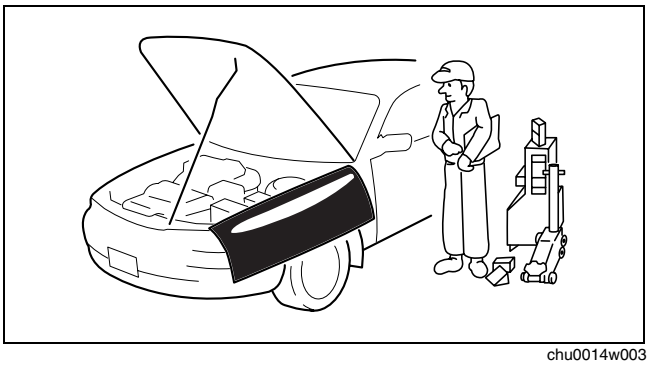
- The actual converted values for 2.7 kgf/cm^2 are 264 kPa and 38.4 psi. In the first specification, 2.7 is used as an upper limit, so the converted values are rounded down to 260 and 38. In the second specification, 2.7 is used as a lower limit, so the converted values are rounded up to 270 and 39.

FUNDAMENTAL PROCEDURES

e6u000000000103

Preparation of Tools and Measuring Equipment

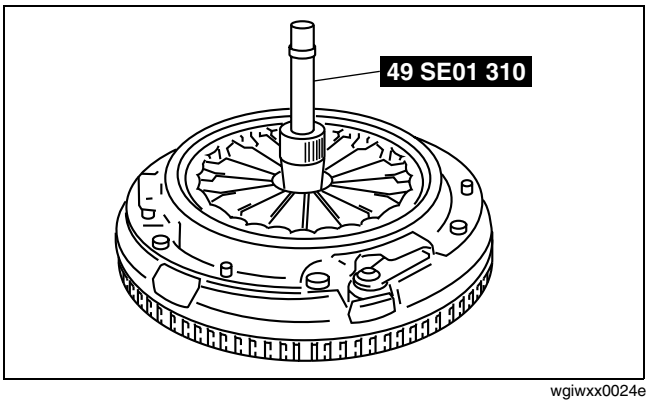
- Be sure that all necessary tools and measuring equipment are available before starting any work.



chu0014w003

Special Service Tools

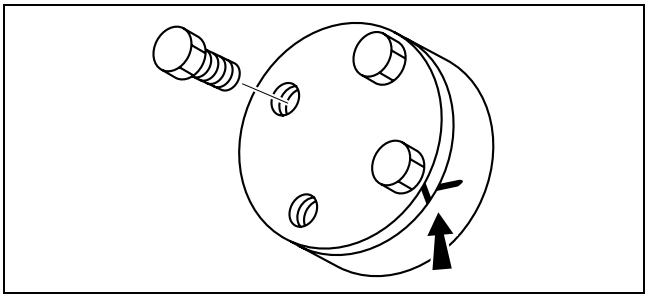
- Use special service tools or equivalent when they are required.



wgiwxx0024e

Disassembly

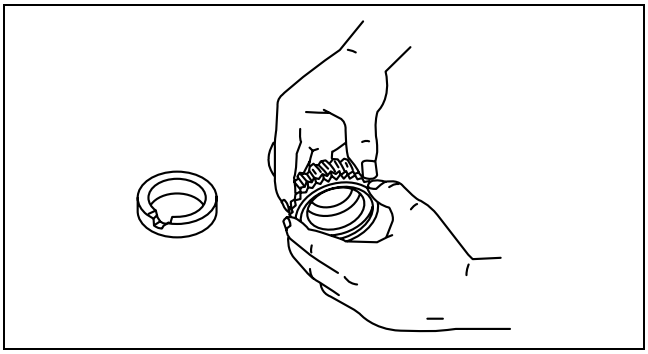
- If the disassembly procedure is complex, requiring many parts to be disassembled, all parts should be marked in a place that will not affect their performance or external appearance and identified so that reassembly can be performed easily and efficiently.



wgiwxx0027e

Inspection During Removal, Disassembly

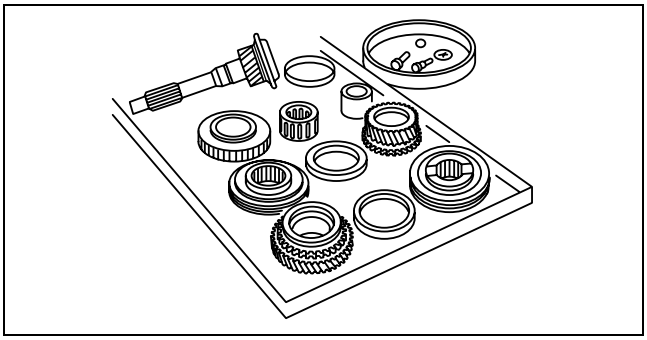
- When removed, each part should be carefully inspected for malfunction, deformation, damage and other problems.



wgiwxx0028e

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.



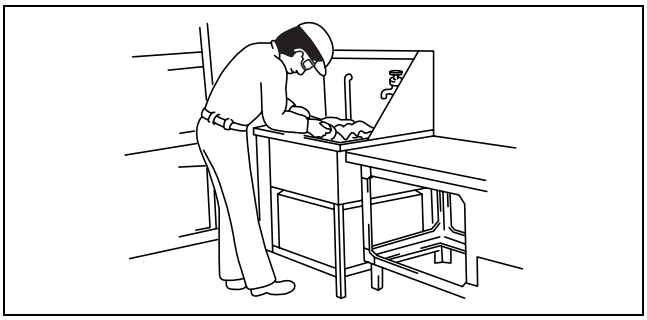
wgiwxx0029e

Cleaning of Parts

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

Warning

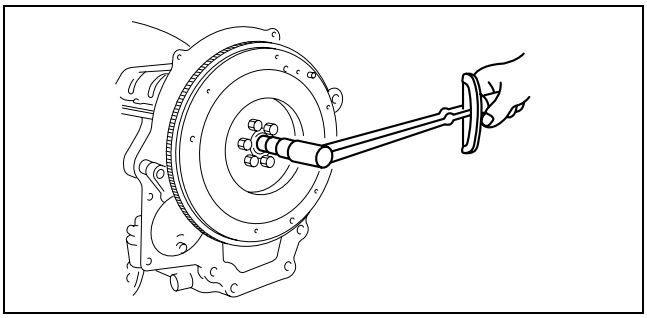
- **Using compressed air can cause dirt and other particles to fly out causing injury to the eyes. Wear protective eye wear whenever using compressed air.**



c5u0000w001

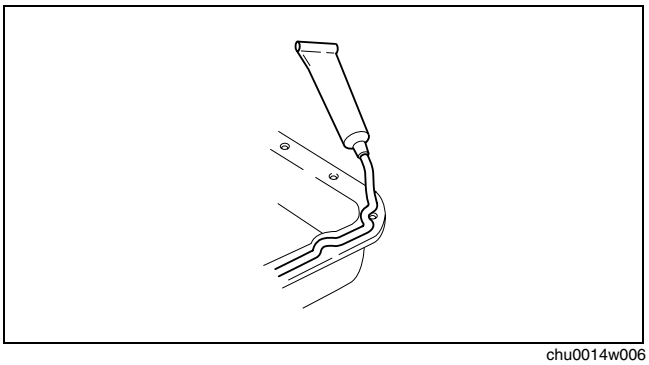
Reassembly

- 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



wgiwxx0031e

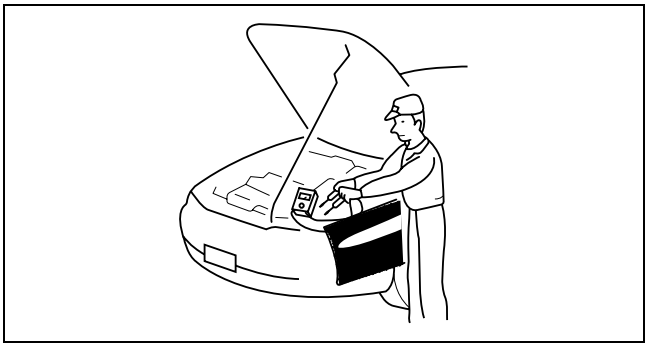
- Depending on location:
  - — Sealant and gaskets, or both, should be applied to specified locations. When sealant is applied, parts should be installed before sealant hardens to prevent leakage.
  - — Oil should be applied to the moving components of parts.
  - — Specified oil or grease should be applied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



chu0014w006

Adjustment

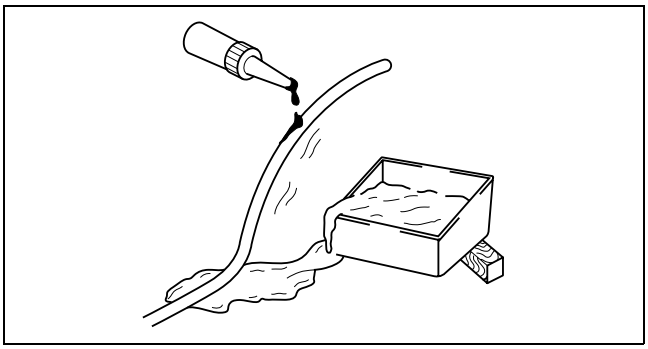
- Use suitable gauges and testers when making adjustments.



chu0014w005

Rubber Parts and Tubing

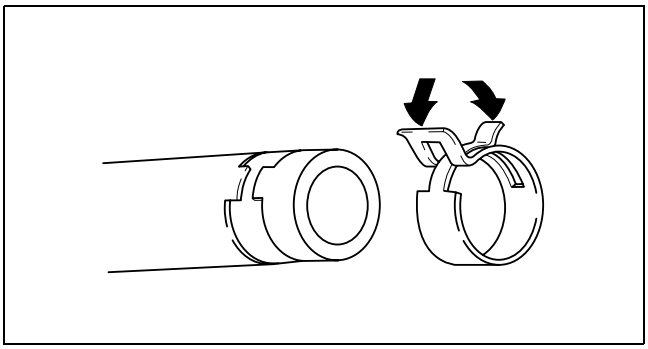
- Prevent gasoline or oil from getting on rubber parts or tubing.



wgiwxx0034e

Hose Clamps

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

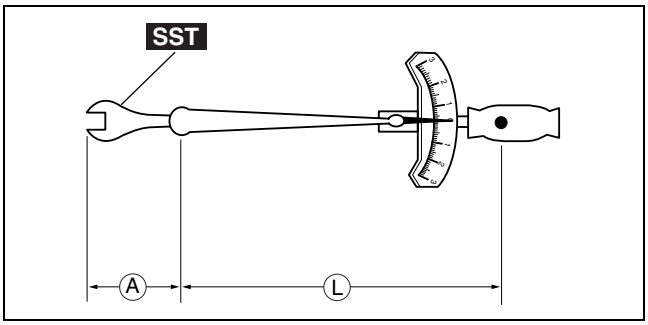


wgiwxx0035e

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)]

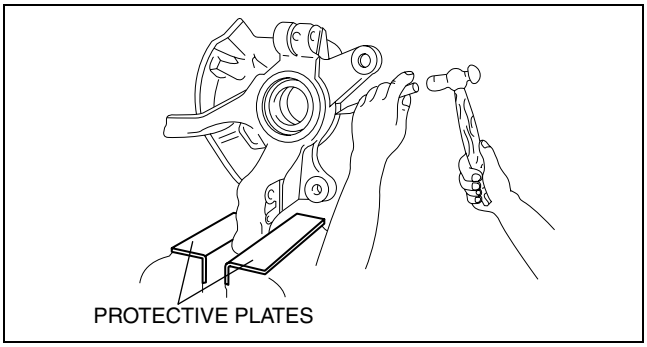


wgiwxx0036e

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.



chu0014w010

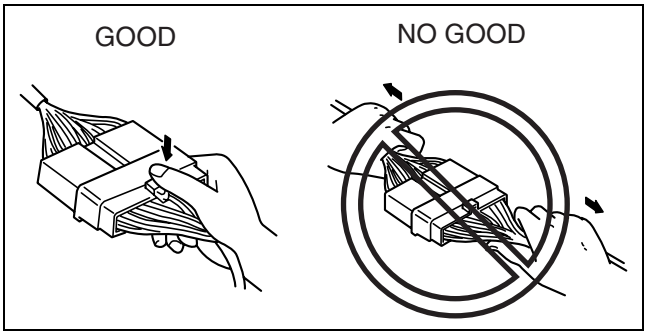
ELECTRICAL SYSTEM

e6u000000000104

Connectors

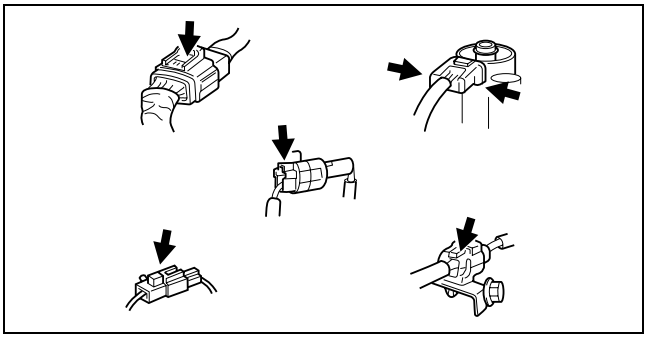
Disconnecting connectors

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



chu0000w014

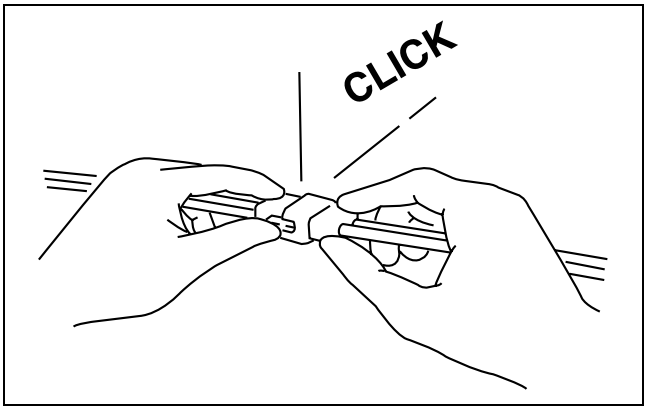
- Connectors can be disconnected by pressing or pulling the lock lever as shown.



wgiwxx0042e

Locking connector

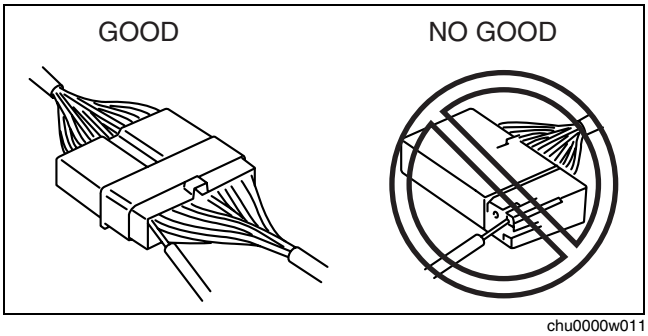
- When locking connectors, listen for a click indicating they are securely locked.



wgiwxx0043e

Inspection

- When a tester is used to inspect for continuity or measuring voltage, insert the tester probe from the wiring harness side.

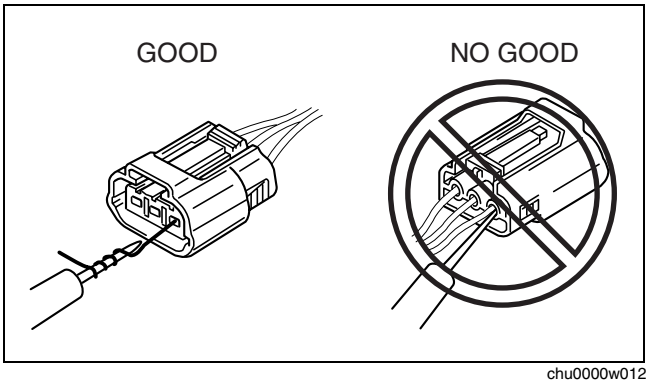


chu0000w011

- Inspect the terminals of waterproof connectors from the connector side since they cannot be accessed from the wiring harness side.

Caution

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



chu0000w012

SAE STANDARDS

e6u000000000105

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

SAE Standard		Previous Standard		Remark
Abbreviation	Name	Abbreviation	Name	
AP	Accelerator Pedal	—	Accelerator Pedal	
ACL	Air Cleaner	—	Air Cleaner	
A/C	Air Conditioning	—	Air Conditioning	
BARO	Barometric Pressure	—	Atmospheric Pressure	
B+	Battery Positive Voltage	Vb	Battery Voltage	
—	Brake Switch	—	Stoplight Switch	
—	Calibration Resistor	—	Corrected Resistance	#6
CMP sensor	Camshaft Position Sensor	—	Crank Angle Sensor	
CAC	Charge Air Cooler	—	Intercooler	
CLS	Closed Loop System	—	Feedback System	
CTP	Closed Throttle Position	—	Fully Closed	
CPP	Clutch Pedal Position	—	Idle Switch	
CIS	Continuous Fuel Injection System	—	Clutch Position	
CS sensor	Control Sleeve Sensor	CSP sensor	Control Sleeve Position Sensor	#6
CKP sensor	Crankshaft Position Sensor	—	Crank Angle Sensor 2	
DLC	Data Link Connector	—	Diagnosis Connector	
DTM	Diagnostic Test Mode	—	Test Mode	#1
DTC	Diagnostic Trouble Code(s)	—	Service Code(s)	
DI	Distributor Ignition	—	Spark Ignition	
DLI	Distributorless Ignition	—	Direct Ignition	
EI	Electronic Ignition	—	Electronic Spark Ignition	#2
ECT	Engine Coolant Temperature	—	Water Thermo	
EM	Engine Modification	—	Engine Modification	
—	Engine Speed Input Signal	—	Engine RPM Signal	
EVAP	Evaporative Emission	—	Evaporative Emission	
EGR	Exhaust Gas Recirculation	—	Exhaust Gas Recirculation	
FC	Fan Control	—	Fan Control	

SAE Standard		Previous Standard		Remark
Abbreviation	Name	Abbreviation	Name	
FF	Flexible Fuel	—	Flexible Fuel	
4GR	Fourth Gear	—	Overdrive	
—	Fuel Pump Relay	—	Circuit Opening Relay	#3
FSO solenoid	Fuel Shut Off Solenoid	FCV	Fuel Cut Valve	#6
GEN	Generator	—	Alternator	
GND	Ground	—	Ground/Earth	
HO2S	Heated Oxygen Sensor	—	Oxygen Sensor	With heater
IAC	Idle Air control	—	Idle Speed Control	
—	IDM Relay	—	Spill Valve Relay	#6
—	Incorrect Gear Ratio	—	—	
—	Injection Pump	FIP	Fuel Injection Pump	#6
—	Input/Turbine Speed Sensor	—	Pulse Generator	
IAT	Intake Air Temperature	—	Intake Air Thermo	
KS	Knock Sensor	—	Knock Sensor	
MIL	Malfunction Indicator Lamp	—	Malfunction Indicator Light	
MAP	Manifold Absolute Pressure	—	Intake Air Pressure	
MAF sensor	Mass Air Flow Sensor	—	Airflow Sensor	
MFL	Multiport Fuel Injection	—	Multiport Fuel Injection	
OBD	On-Board Diagnostic	—	Diagnosis/SelfDiagnosis	
OL	Open Loop	—	Open Loop	
—	Output Speed Sensor	—	Vehicle Speed Sensor 1	
OC	Oxidation Catalytic Converter	—	Catalytic Converter	
O2S	Oxygen Sensor	—	Oxygen Sensor	
PNP	Park/Neutral Position	—	Park/Neutral Range	
—	PCM Control Relay	—	Main Relay	#6
PSP	Power Steering Pressure	—	Power Steering Pressure	
PCM	Powertrain Control Module	ECU	Engine Control Unit	#4
—	Pressure Control Solenoid	—	Line Pressure Solenoid Valve	
PAIR	Pulsed Secondary Air Injection	—	Secondary Air Injection System	Pulsed injection
—	Pump Speed Sensor	—	NE Sensor	#6
AIR	Secondary Air Injection	—	Secondary Air Injection System	Injection with air pump
SAPV	Secondary Air Pulse Valve	—	Reed Valve	
SFI	Sequential Multipoint Fuel Injection	—	Sequential Fuel Injection	
—	Shift Solenoid A	—	12 Shift Solenoid Valve	
		—	Shift A Solenoid Valve	
—	Shift Solenoid B	—	23 Shift Solenoid Valve	
		—	Shift B Solenoid Valve	
—	Shift Solenoid C	—	34 Shift Solenoid Valve	
3GR	Third Gear	—	3rd Gear	
TWC	Three Way Catalytic Converter	—	Catalytic Converter	
TB	Throttle Body	—	Throttle Body	
TP sensor	Throttle Position Sensor	—	Throttle Sensor	
TCV	Timer Control Valve	TCV	Timing Control Valve	#6
TCC	Torque Converter Clutch	—	Lockup Position	
TCM	Transmission (Transaxle) Control Module	—	EC-AT Control Unit	
—	Transmission (Transaxle) Fluid Temperature Sensor	—	ATF Thermosensor	
TR	Transmission (Transaxle) Range	—	Inhibitor Position	
TC	Turbocharger	—	Turbocharger	

SAE Standard		Previous Standard		Remark
Abbreviation	Name	Abbreviation	Name	
VSS	Vehicle Speed Sensor	—	Vehicle Speed Sensor	
VR	Voltage Regulator	—	IC Regulator	
VAF sensor	Volume Air Flow Sensor	—	Air flow Sensor	
WUTWC	Warm Up Three Way Catalytic Converter	—	Catalytic Converter	#5
WOT	Wide Open Throttle	—	Fully Open	

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

ABBREVIATIONS

e6u000000000106

AWD	All-Wheel Drive
LH	Left Hand
RH	Right Hand
SST	Special Service Tools
2WD	2 Wheel Drive

DRIVELINE/AXLE

03
SECTION

03-16 TRANSFER

TRANSFER CLEANING

e6u031627500101

Cleaning Precautions

1. Clean the surface of the transfer using steam and cleaning fluids when disassembly.

   Warning
   - **Always wear safety glasses when using compressed air since the foreign material could be blown by the compression air and damage your eyes.**

2. Clean removed components with cleaning fluids and use compressed air to blow off the oil. Clean the oil holes and passages with compressed air.

TRANSFER DISASSEMBLY

e6u031627500102

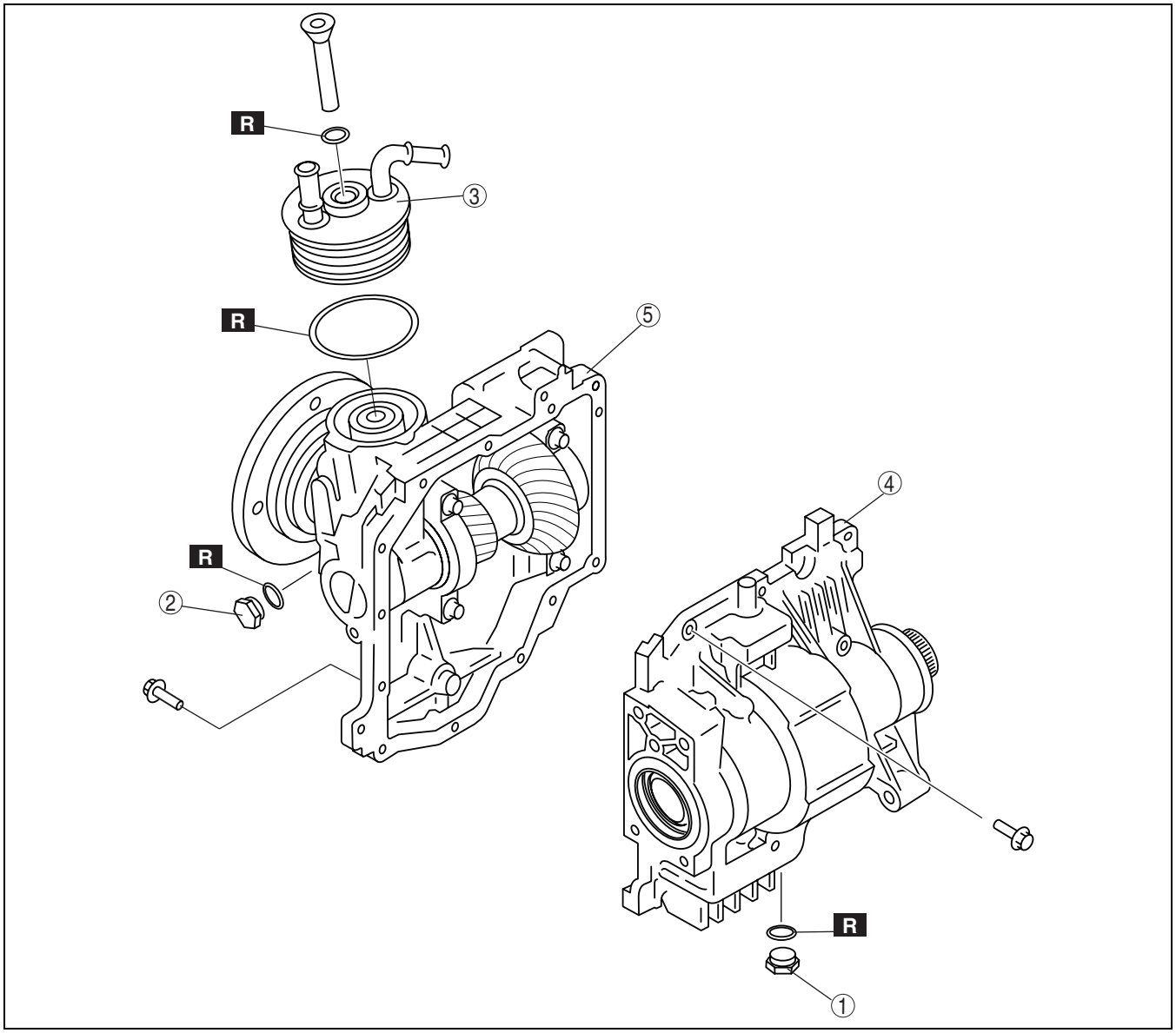
Before Service Precautions

- To prevent foreign material from entering the transfer, perform disassembly and servicing in a clean, dust-free environment.
- Inspect the each part while disassembling.

Warning

- **The engine stand is equipped with a self-lock mechanism. However, if the transfer is tilted, the self-lock mechanism could become inoperative. This could cause the transfer to rotate accidentally, resulting in injury. Therefore, make sure that the transfer is not tilted when it is on the engine stand. When turning the transfer, grasp the rotation handle firmly.**

Transfer Component Disassembly



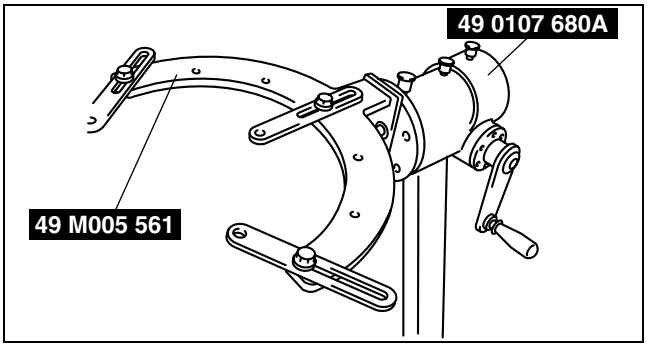
e6u316zmc100

1	Drain plug
2	Oil level plug
3	Oil cooler

4	Drive gear case component
5	Front carrier component

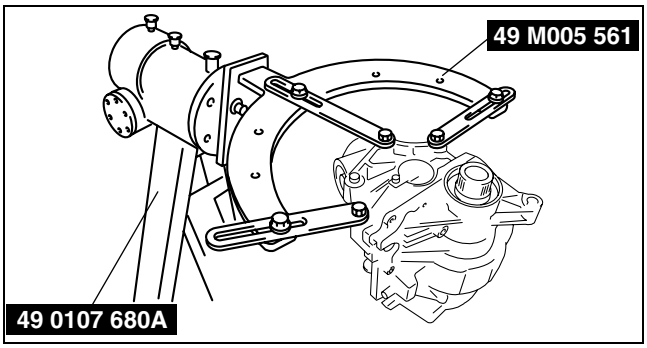
Transfer Component Disassembling Procedure

1. Assemble the **SSTs**.



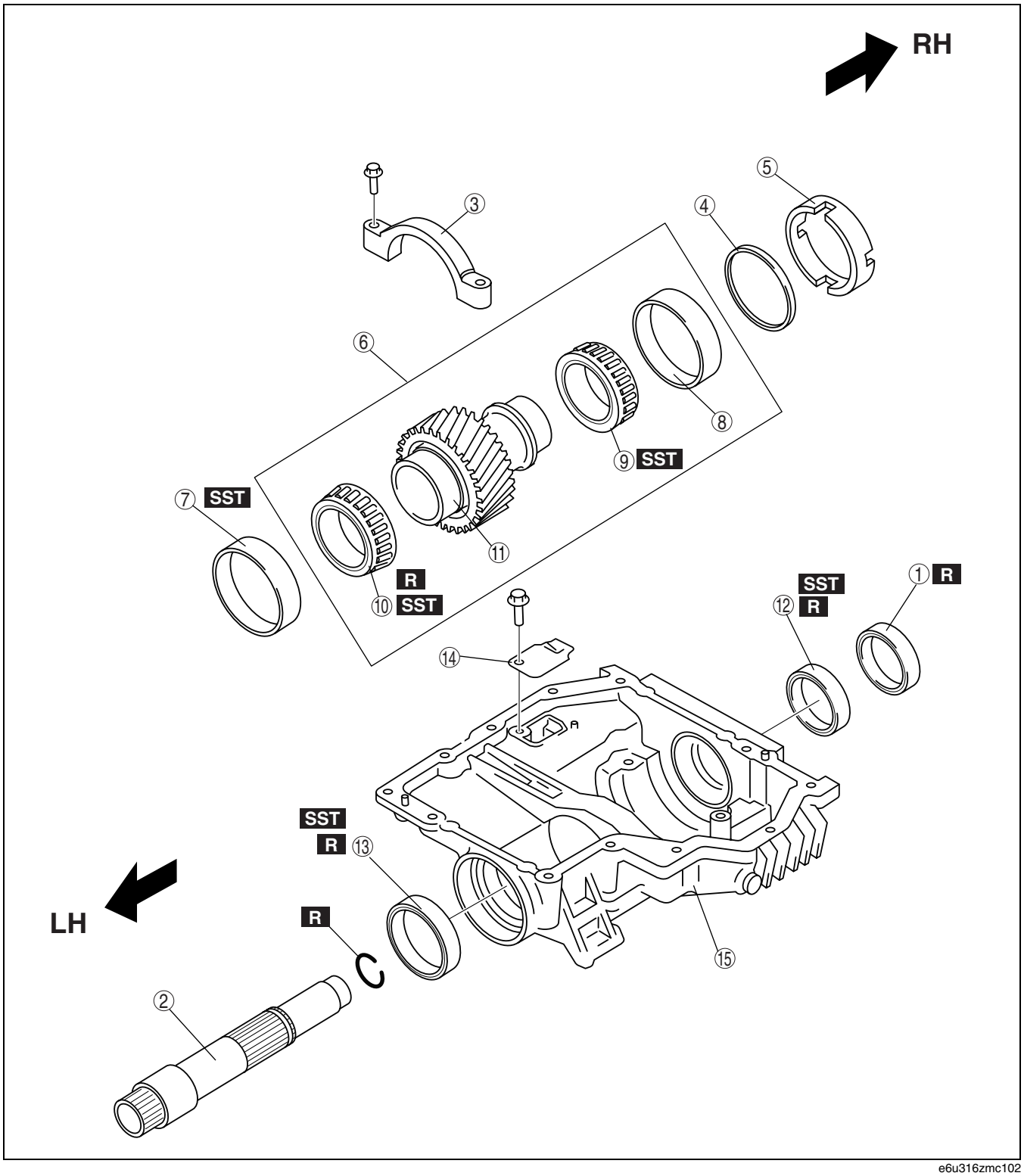
e6u316zmc014

2. Install the transfer component to the **SSTs**.
3. Remove the oil cooler.
4. Remove the drive gear case component.



e6u316zmc015

Drive Gear Case Component Disassembly



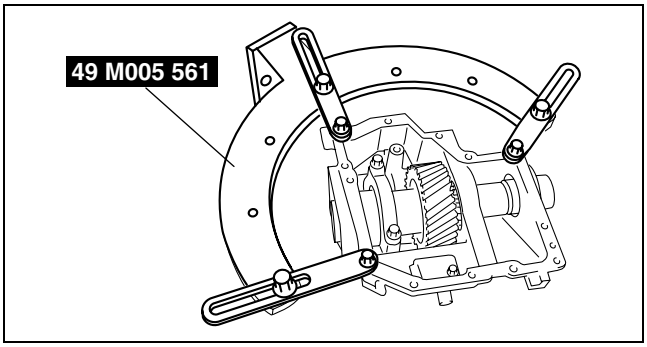
e6u316zmc102

1	Oil seal (RH outer)
2	Drive gear shaft
3	Bearing cap
4	Adjustment shim
5	Spacer
6	Drive gear component
7	Bearing outer race (LH)
8	Bearing outer race (RH)

9	Bearing (RH)
10	Bearing (LH)
11	Drive gear
12	Oil seal (RH inner)
13	Oil seal (LH)
14	Baffle plate
15	Drive gear case

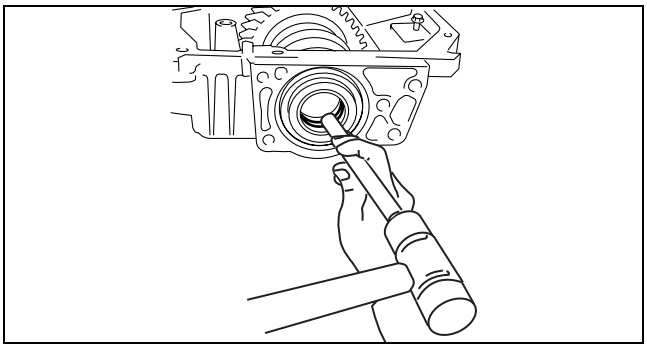
Drive Gear Case Component Disassembly Procedure

1. Install the drive gear case component to the **SST**.



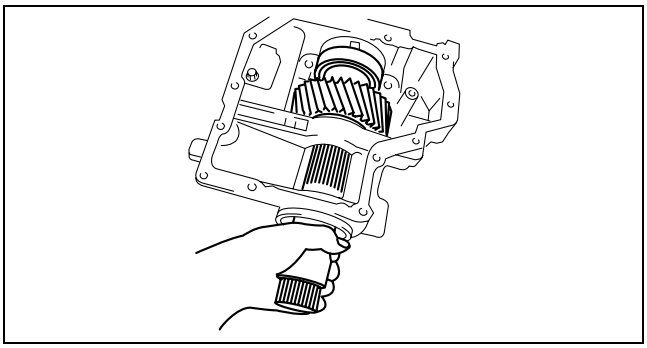
e6u316zmc001

2. Tap the drive gear shaft using a suittable rod and hammer.



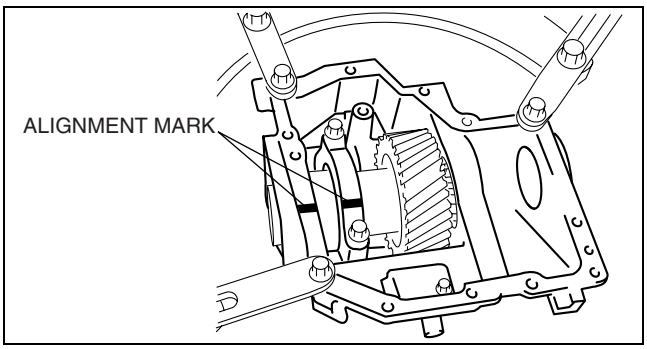
e6u316zmc065

3. Take out the drive gear shaft from the drive gear case.



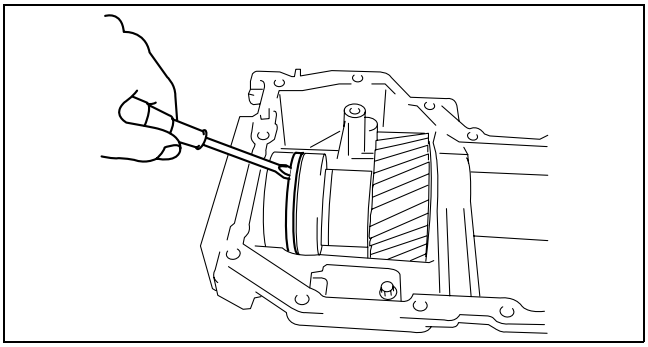
e6u316zmc004

4. Make alignment marks on the bearing cap and drive gear case.
5. Remove the bearing cap.



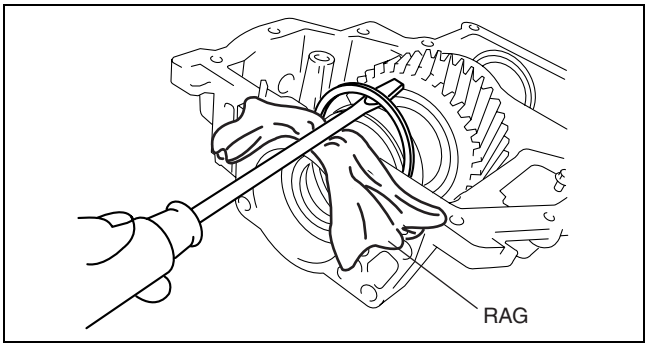
e6u316zmc005

6. Insert a flathead screwdriver into spacer notch and remove the adjustment shim.



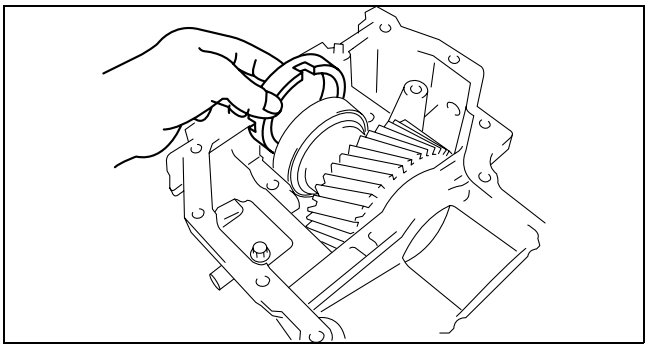
e6u316zmc006

Caution
- **Place a rag on the case to protect it from damage.**



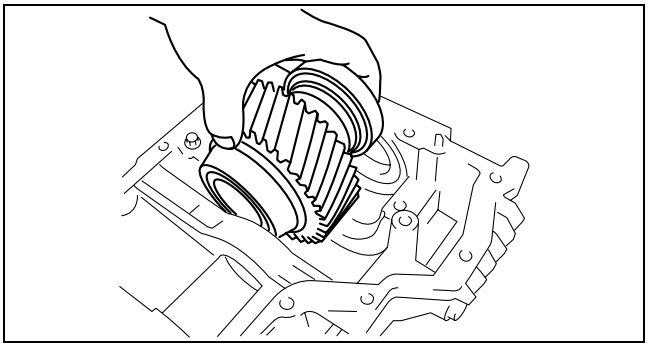
e6u316zmc007

7. Remove the spacer.



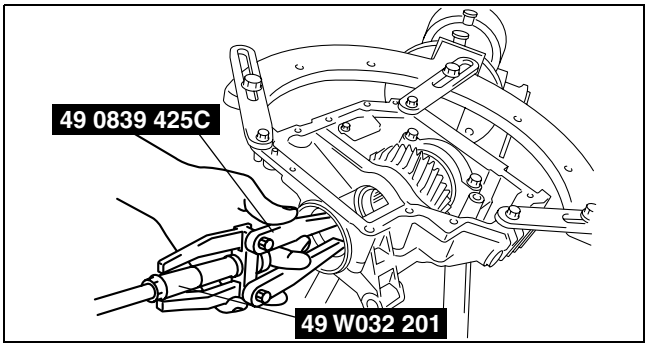
e6u316zmc008

8. Remove the drive gear component.



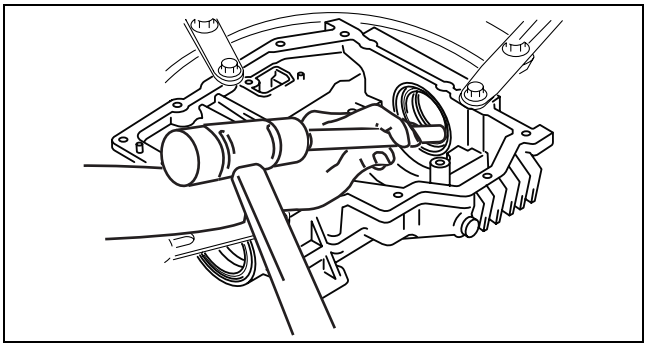
e6u316zmc009

9. Using the **SST**, remove the oil seal (LH).



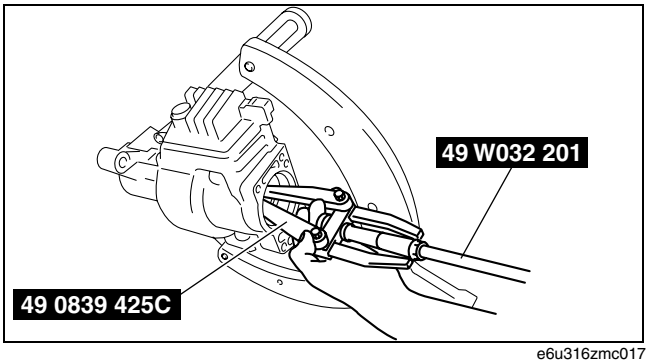
e6u316zmc016

10. Using a suitable rod and hammer, remove the oil seal (RH outer).



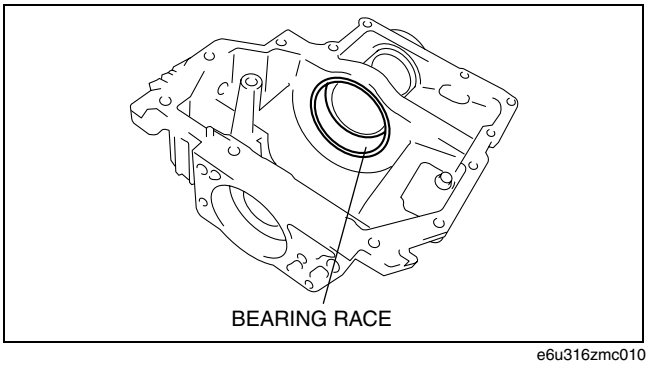
e6u316zmc062

11. Using the **SST**, remove the oil seal (RH inner).



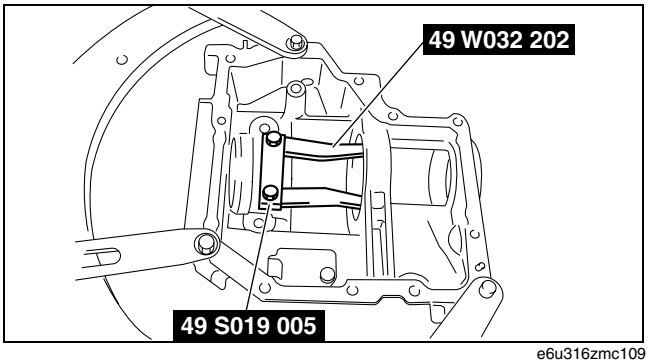
e6u316zmc017

12. Using the **SST**, remove the bearing outer race (LH).



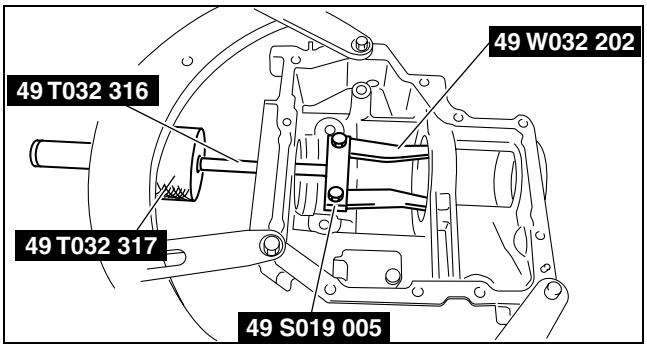
e6u316zmc010

(1) Install the **SSTs** (49 W032 202, 49 S019 005).



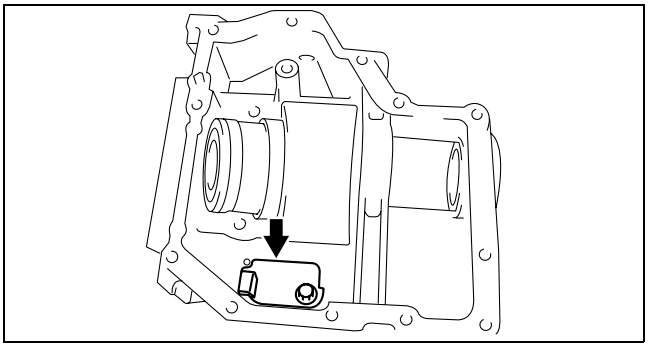
e6u316zmc109

(2) Connect the **SST** (49 T032 316, 49 T032 317) to the **SSTs** (49 W032 202, 49 S019 005).



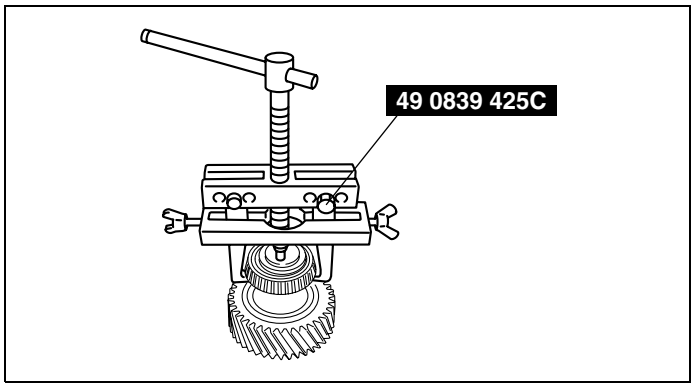
e6u316zmc018

13. Remove the baffle plate.



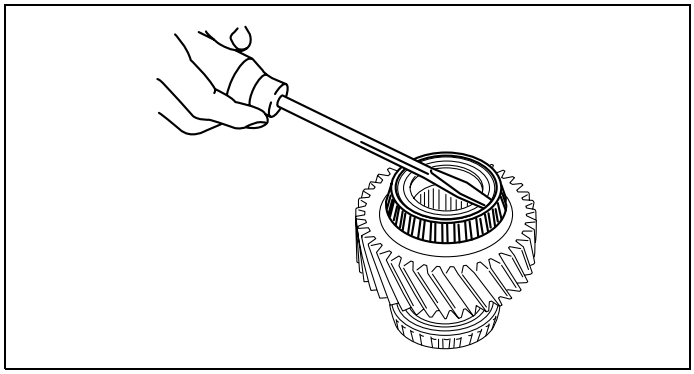
e6u316zmc107

14. Using the **SST**, remove the bearing (RH).



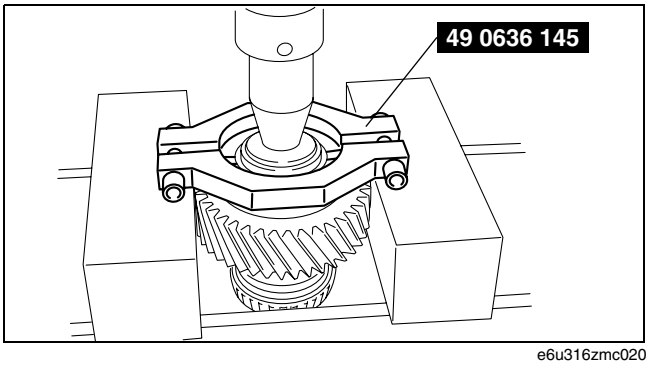
e6u316zmc021

15. Using a flathead screwdriver, deform the bearing roller guide (LH) and remove it.



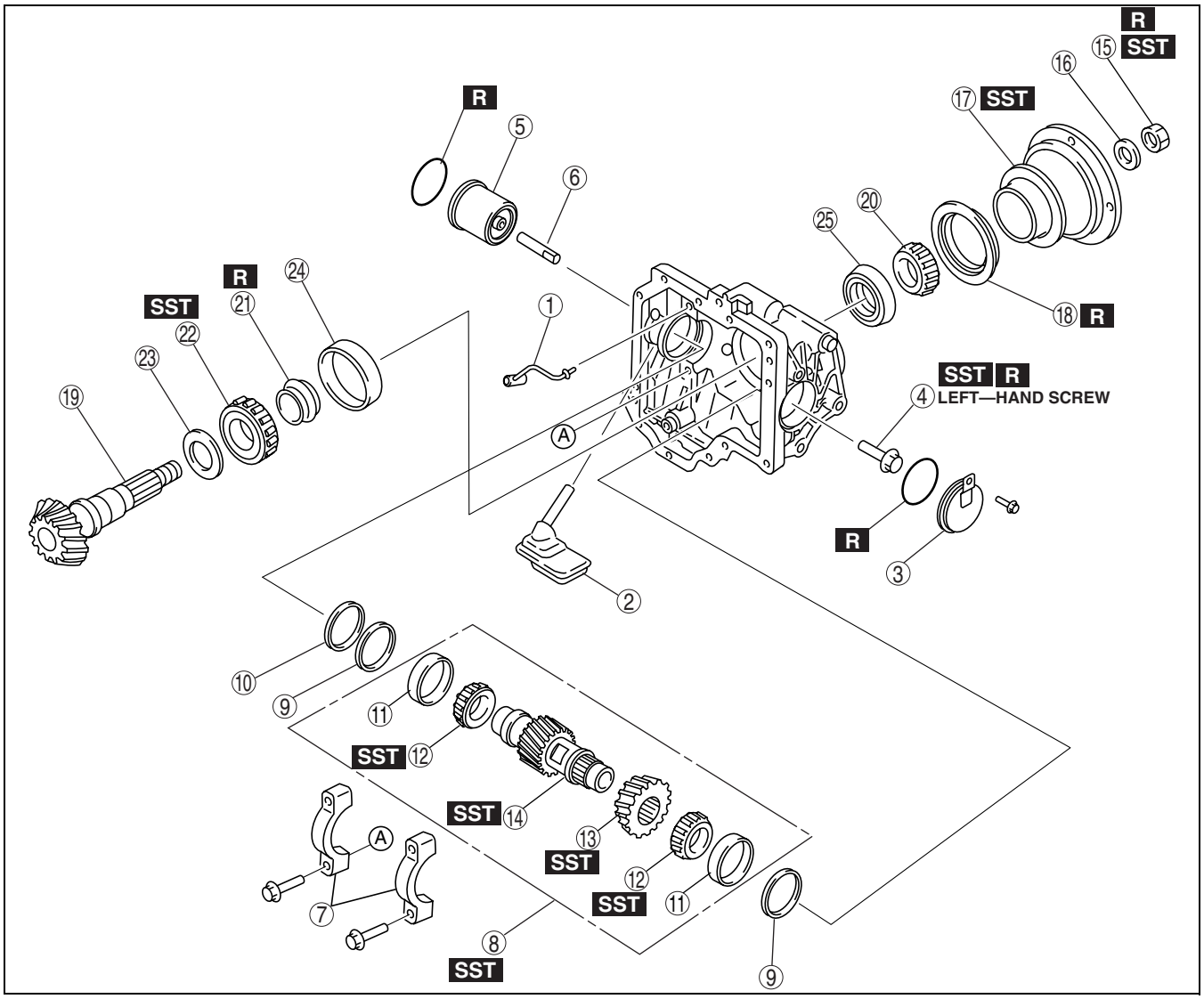
e6u316zmc019

16. Using the **SST**, remove the bearing inner race (LH).



e6u316zmc020

Front Carrier Component Disassembly



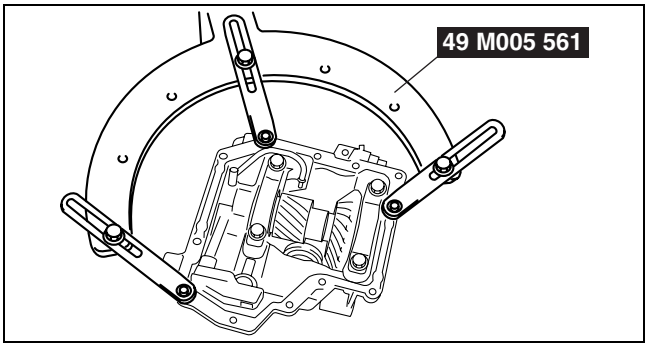
e6u316zmc103

1	Oil pipe
2	Oil strainer
3	Side cover
4	Ring gear lockbolt
5	Oil pump
6	Oil pump shaft
7	Bearing cap
8	Ring gear component
9	Adjustment shim
10	Spacer
11	Bearing outer race (side)
12	Bearing (side)
13	Ring gear

14	Ring gear shaft
15	Locknut
16	Washer
17	Companion flange
18	Oil seal
19	Drive pinion gear
20	Bearing (rear)
21	Distance piece
22	Bearing (front)
23	Spacer
24	Bearing outer race (front)
25	Bearing outer race (rear)

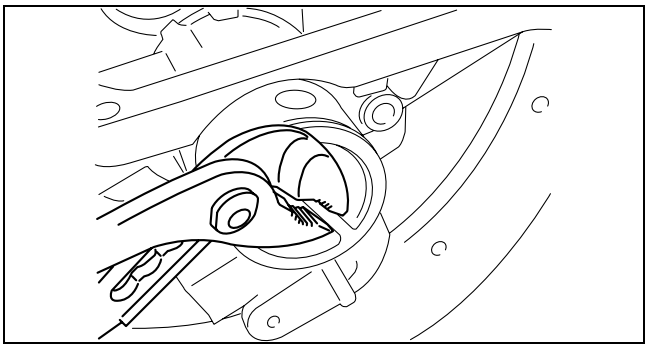
Front Carrier Component Disassembling Procedure

1. Install the front carrier component to the **SST**.
2. Remove the oil strainer.
3. Remove the oil pipe.
4. Remove the side cover.



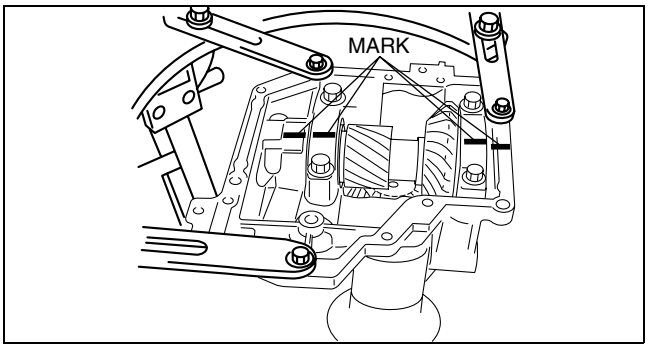
e6u316zmc022

5. Remove the oil pump by turning it using pliers as shown in the figure.
   - If the oil pump shaft remains in the gear shaft side, remove the oil pump shaft.



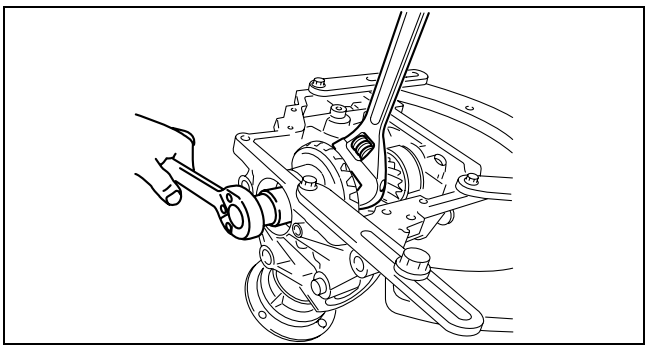
e6u316zmc024

6. Make alignment marks on the bearing caps and front carrier.
7. Remove the bearing caps.



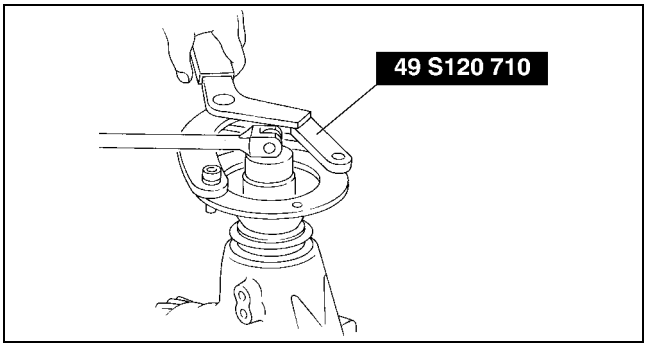
e6u316zmc112

8. Using a suitable wrench, secure the ring gear shaft, and remove the ring gear lockbolt.



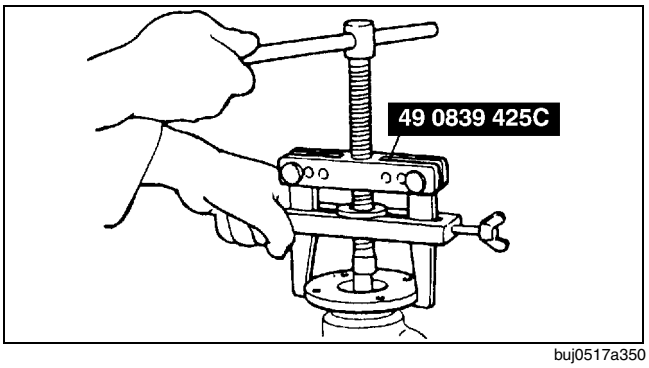
e6u316zmc023

9. Using the **SST**, secure the companion flange, and remove the locknut and washer.



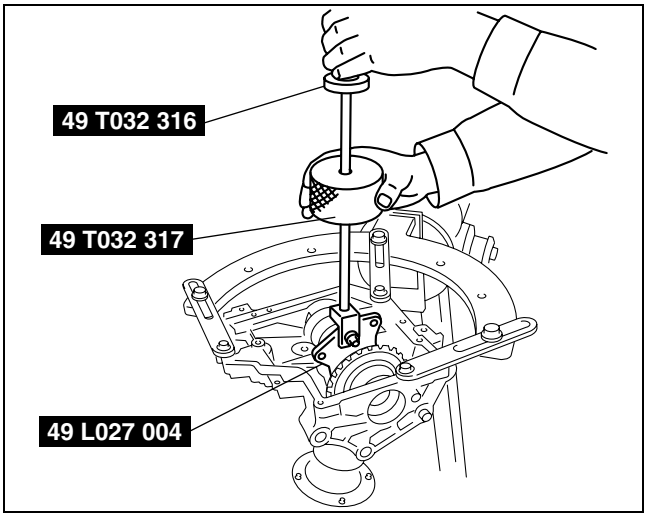
buj0517a349

10. Using the **SST**, remove the companion flange.



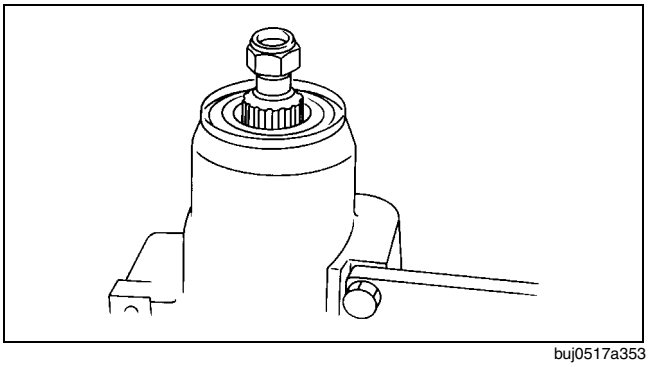
buj0517a350

11. Using the **SSTs**, remove the ring gear component.
12. Remove the adjustment shims and spacer.



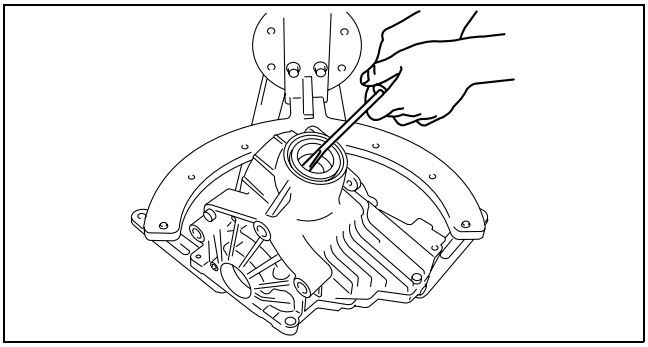
e6u316zmc026

13. Install an appropriate nut to the drive pinion to prevent the thread from being damaged.
14. Lightly tap the drive pinion using a copper hammer and remove the drive pinion gear.



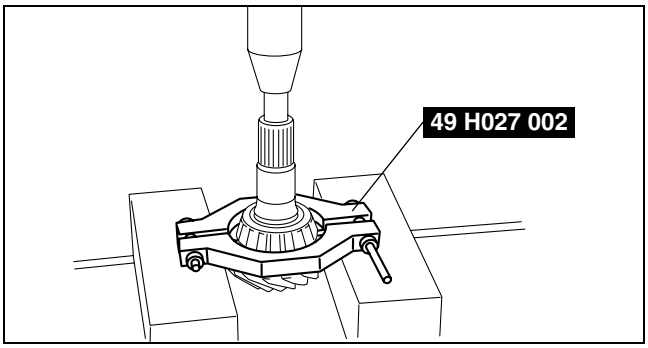
buj0517a353

15. Using a flathead screwdriver, remove the oil seal.
16. Remove the bearing (rear) and distance piece.



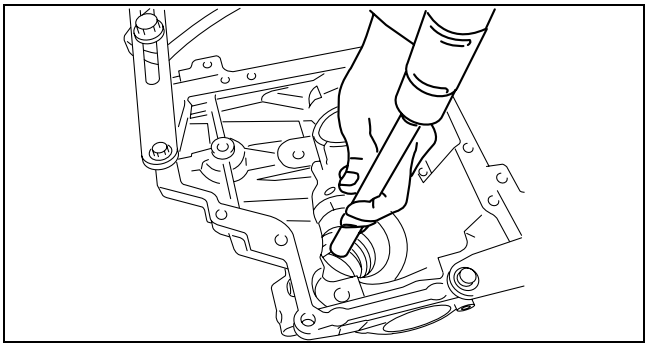
e6u316zmc027

17. Using the **SST**, remove the bearing (front).
18. Remove the spacer.

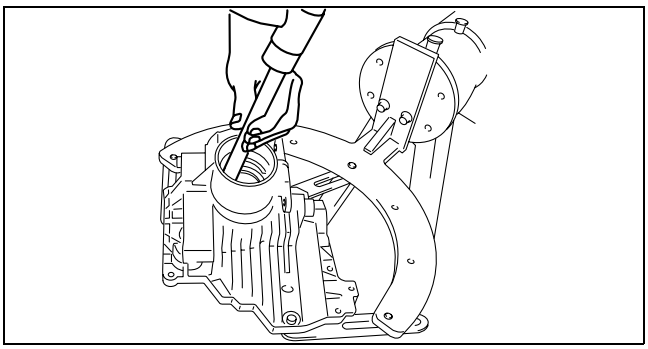


e6u316zmc028

19. Attach the brass stick to the notch, tap the race end lightly and evenly, then remove the bearing outer races.

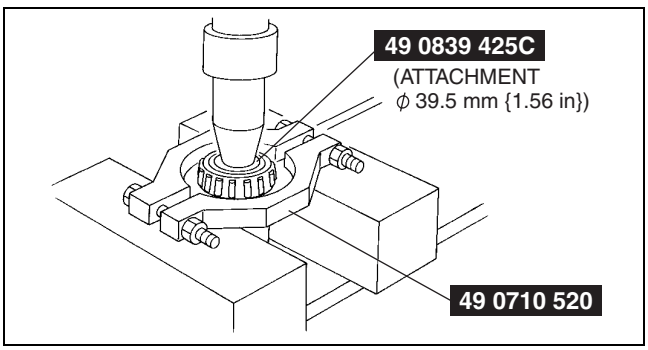


e6u316zmc029



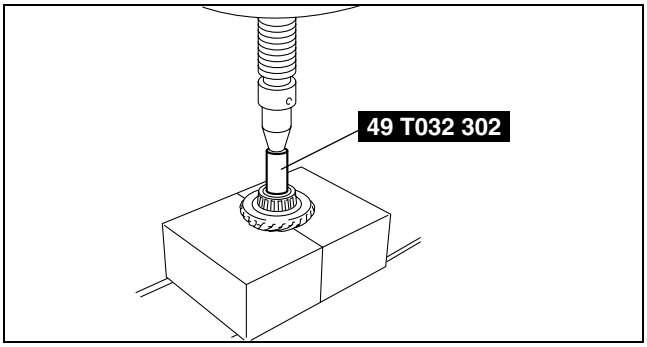
e6u316zmc030

20. Using the **SSTs**, remove the bearing (side) (opposite ring gear side).



e6u316zmc114

21. Using a **SST**, remove the bearing (side) (ring gear side) together with ring gear.



e6u316zmc031

TRANSFER ASSEMBLY

e6u031627500103

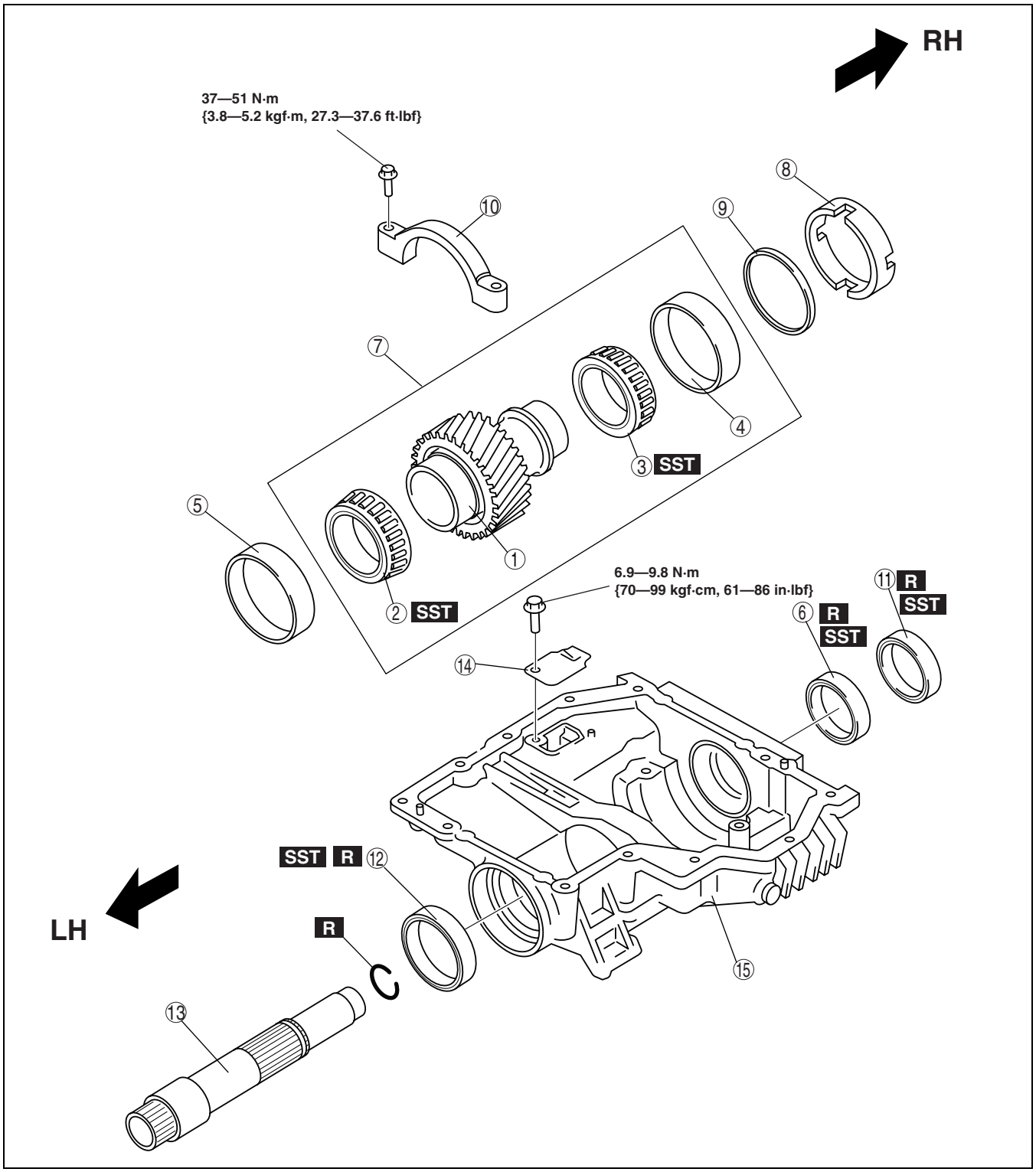
Before Service Precautions

- Assemble with bare hands or using vinyl gloves. To prevent foreign material from entering the transfer, do not use cotton work gloves or a rag.
- Apply sufficient gear oil to the sliding surfaces and O-rings, and be careful not to damage when assembling.
- Replace the transfer with a new one if the case alignment surface is damaged. Be careful not to damage it since it may cause oil leakage.
- When installing silicone sealant, clean off the old sealant adhering to the sealing area and clean the sealing area with cleaning fluids.
- After installing a seal, leave the parts alone for **2 h or more**. Do not add oil or operate the vehicle during this time.

Warning

- **The engine stand is equipped with a self-lock mechanism. However, if the transfer is tilted, the self-lock mechanism could become inoperative. This could cause the transfer to rotate accidentally, resulting in injury. Therefore, make sure that the transfer is not tilted when it is on the engine stand. When turning the transfer, grasp the rotation handle firmly.**

Drive Gear Case Component Assembly



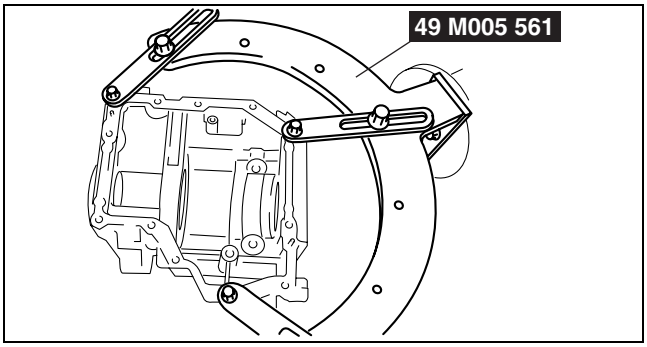
e6u316zmc106

1	Drive gear
2	Bearing (LH)
3	Bearing (RH)
4	Bearing outer race (RH)
5	Bearing outer race (LH)
6	Oil seal (RH inner)
7	Drive gear component
8	Spacer

9	Adjustment shim
10	Bearing cap
11	Oil seal (RH outer)
12	Oil seal (LH)
13	Drive gear shaft
14	Baffle plate
15	Drive gear case

Drive Gear Case Component Assembly Procedure

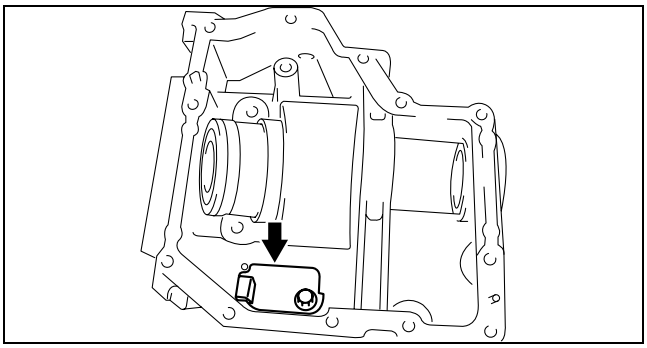
1. Install the drive gear case to the **SST**.



e6u316zmc033

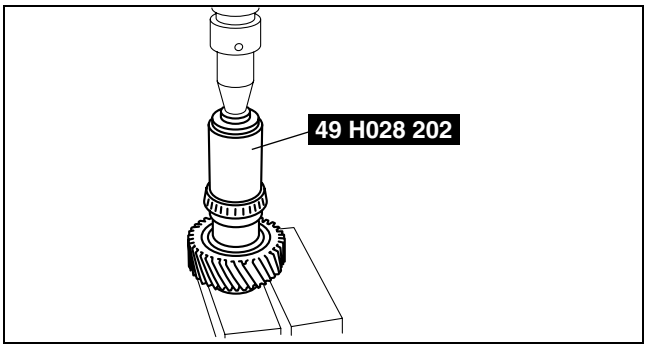
2. Install the baffle plate.

   Tightening torque
   6.9—9.8 N·m {70—99 kgf·cm, 61—86 in·lbf}



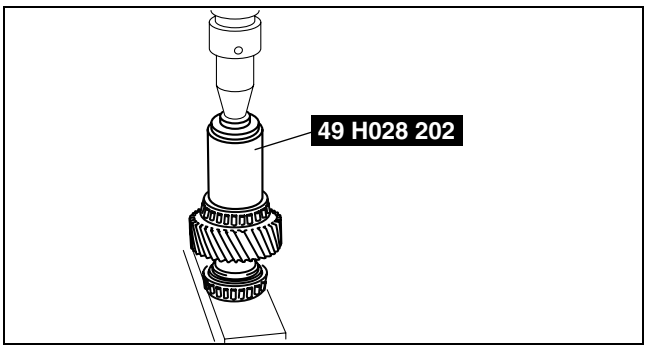
e6u316zmc034

3. Using a press, assemble the bearing (RH).



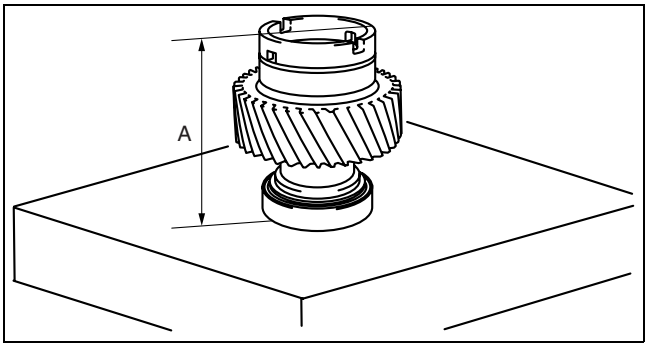
e6u316zmc035

4. Using a press, assemble the bearing (LH).
5. Temporarily assemble the bearing outer race (RH) and spacer to the drive gear.



e6u316zmc108

6. Place the drive gear component on the surface plate as shown in the figure, and measure the height using a vernier caliper or height gauge. This is dimension A.

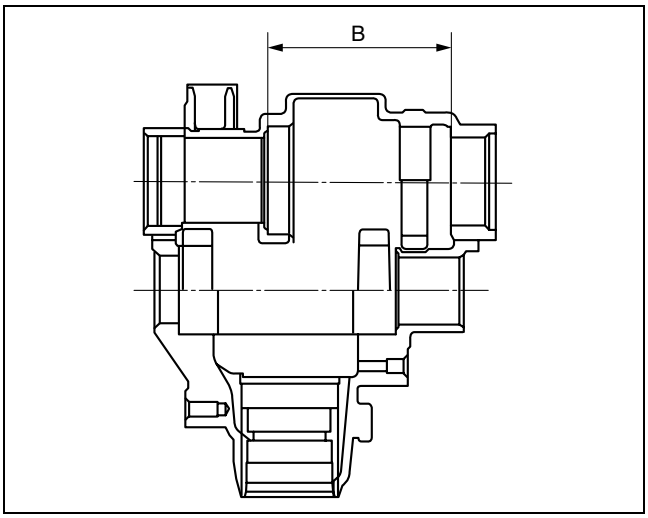


e6u316zmc036

7. Measure the width of the drive gear installation area in the drive gear case. This is dimension B.
8. The maximum and minimum thickness C of the adjustment shim can be expressed by the following formula:

   C = B - A - (0.01—0.03 mm {0.00039—0.00118 in})

9. If the thickness of the installed adjustment shim is within the C range, use the shim as it is.
10. If the thickness of the installed adjustment shim is not within the C range, select the appropriate adjustment shim from the table below and use it.

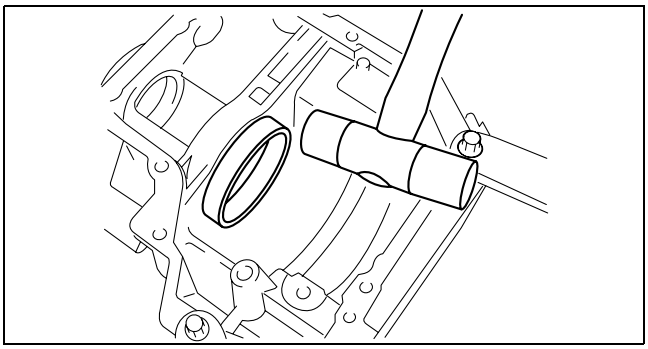


e6u316zmc044

Adjustment shim

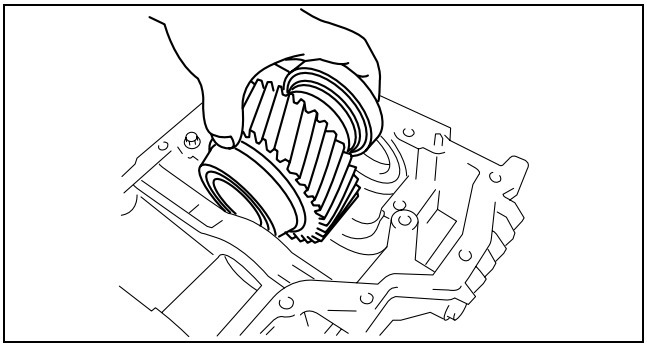
Identification mark	Thickness (mm {in})	Identification mark	Thickness (mm {in})
350	3.50 {0.1378}	420	4.20 {0.1654}
355	3.55 {0.1398}	425	4.25 {0.1673}
360	3.60 {0.1417}	430	4.30 {0.1693}
365	3.65 {0.1437}	435	4.35 {0.1713}
370	3.70 {0.1457}	440	4.40 {0.1732}
375	3.75 {0.1476}	445	4.45 {0. 1752}
380	3.80 {0.1496}	450	4.50 {0.1772}
385	3.85 {0.1516}	455	4.55 {0.1791}
390	3.90 {0.1535}	460	4.60 {0. 1811}
395	3.95 {0.1555}	—	—
400	4.00 {0.1575}	—	—
405	4.05 {0.1594}	—	—
410	4.10 {0.1614}	—	—
415	4.15 {0.1634}	—	—

11. Using the plastic hammer, install the bearing outer race (LH).



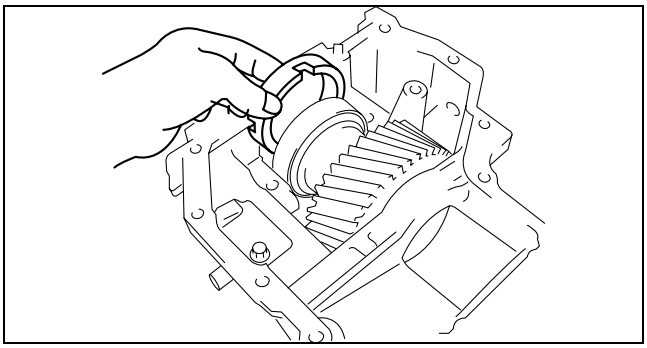
e6u316zmc037

12. Install the drive gear component.



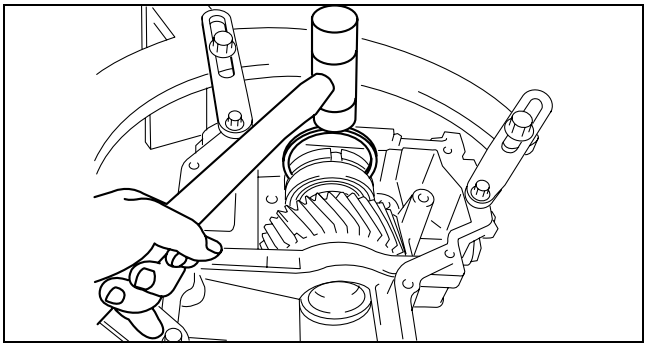
e6u316zmc009

13. Install the spacer with its notch facing the bearing, and also facing upward, as shown in the figure.



e6u316zmc008

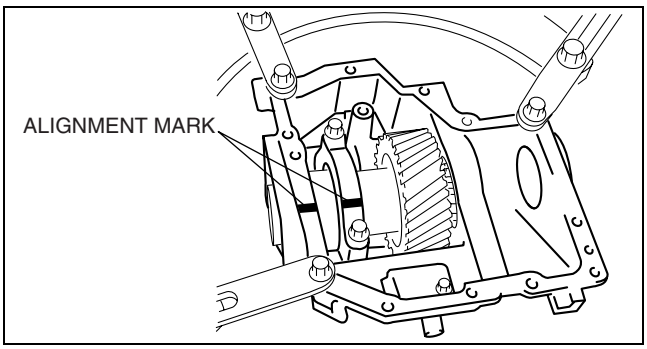
14. Using a plastic hammer, assemble the adjustment shim.



e6u316zmc040

15. Align the bearing cap alignment marks, assemble the bearing cap.

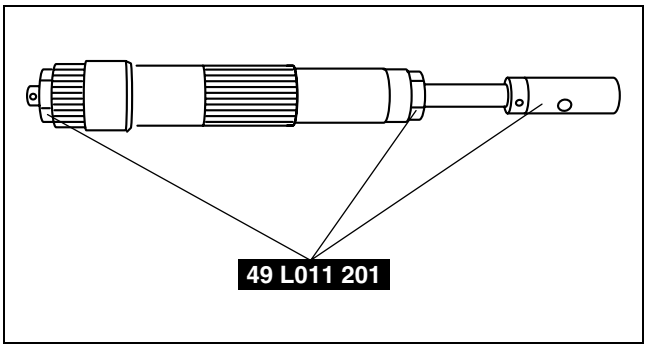
Tightening torque
37—51 N·m {3.8—5.2 kgf·m, 27.3—37.6 ft·lbf}



e6u316zmc005

16. Assemble the **SST** to the drive gear shaft, and hand-tighten the nut.

SST tightening torque
2.1 N·m {21 kgf·cm, 19 in·lbf}

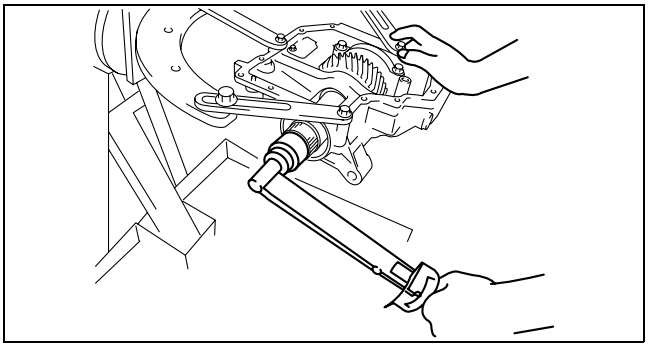


e6u316zmc042

17. Install the drive gear shaft with the **SST** assembled and verify that the preload is within the specification using the torque wrench as shown in the figure.

    Standard drive gear bearing preload
    0.6—2.1 N·m {6.2—21.4 kgf·cm, 5.4—18.5 in·lbf}

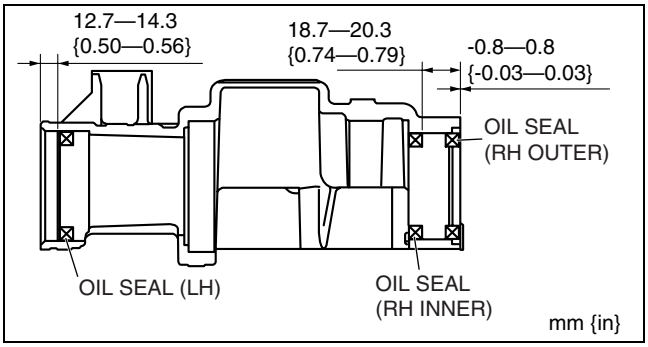
    - If the drive gear rotational torque is not within the specification, adjust it by selecting the proper spacer.


e6u316zmc043

18. Remove the drive gear shaft.
19. Using a press, install the oil seals.

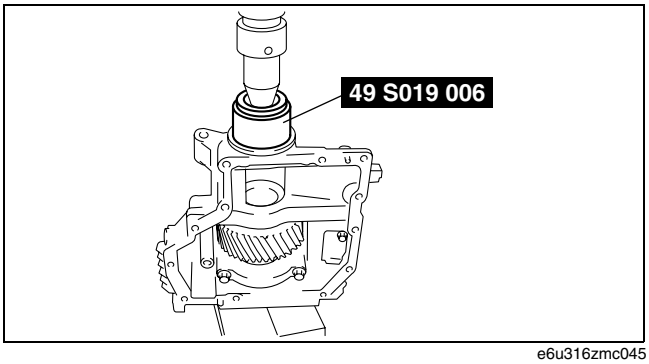
Note
- Mark the press-in depth of each oil seal to the SST and press fit oil seals to the specified position.

Oil seal installation lengths



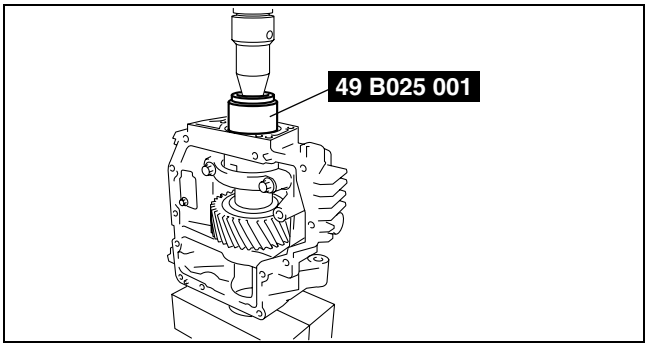
e6u316zmc110

LH



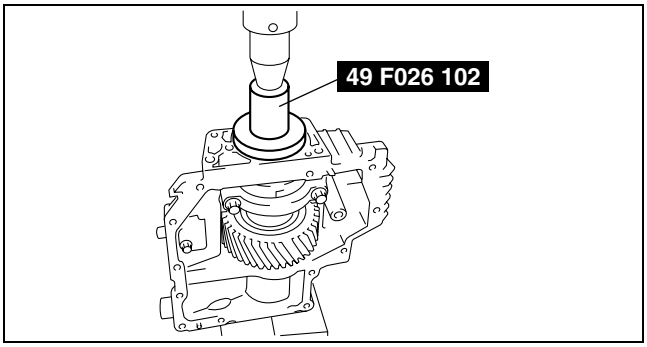
e6u316zmc045

RH inner



e6u316zmc046

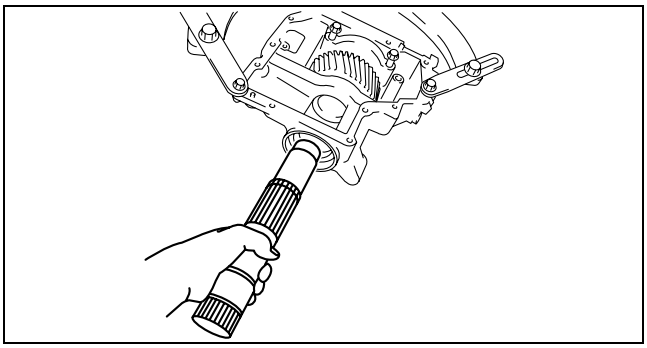
RH outer



e6u316zmc047

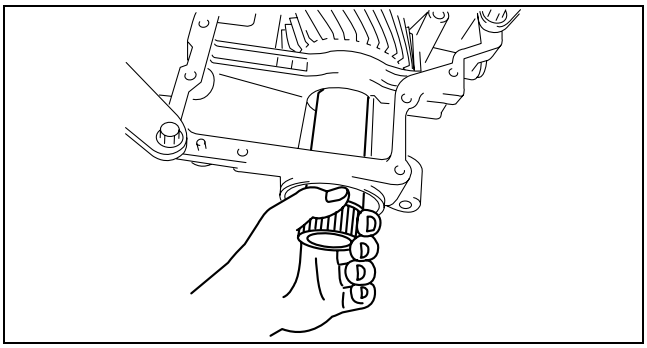
20. Install the C-ring to the drive gear shaft and insert the drive gear shaft until it is secured by the C-ring.

    Caution
    - **Be careful not to damage the oil seal when installing the drive gear shaft.**



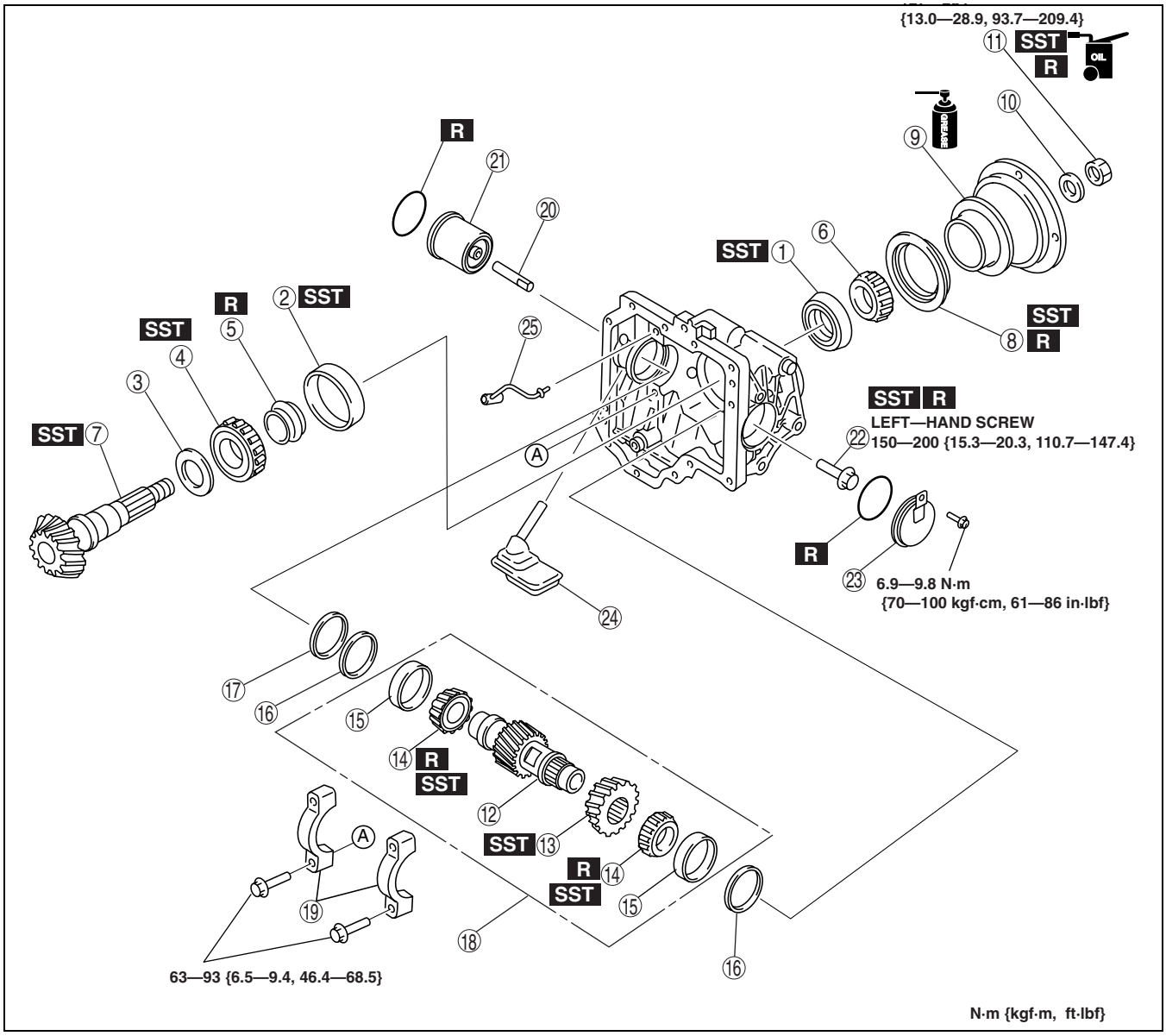
e6u316zmc048

21. Pull the drive gear shaft by hand and verify that the drive gear shaft is secured by the C-ring at the specified position.



e6u316zmc050

Front Carrier Component Assembly



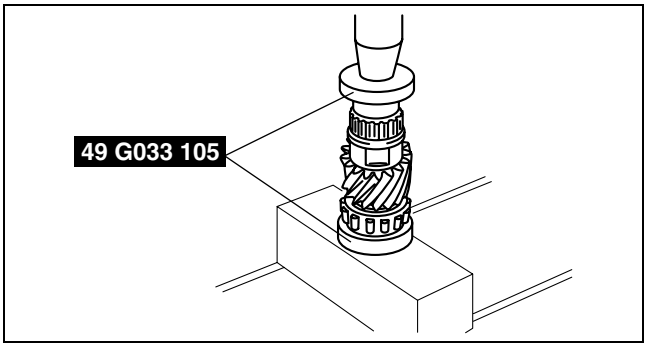
e6u316zmc104

1	Bearing outer race (rear)
2	Bearing outer race (front)
3	Spacer
4	Bearing (front)
5	Distance piece
6	Bearing (rear)
7	Drive pinion gear
8	Oil seal
9	Companion flange
10	Washer
11	Locknut
12	Ring gear shaft
13	Ring gear

14	Bearing (side)
15	Bearing outer race (side)
16	Adjustment shim
17	Spacer
18	Ring gear component
19	Bearing cap
20	Oil pump shaft
21	Oil pump
22	Ring gear lockbolt
23	Side cover
24	Oil strainer
25	Oil pipe

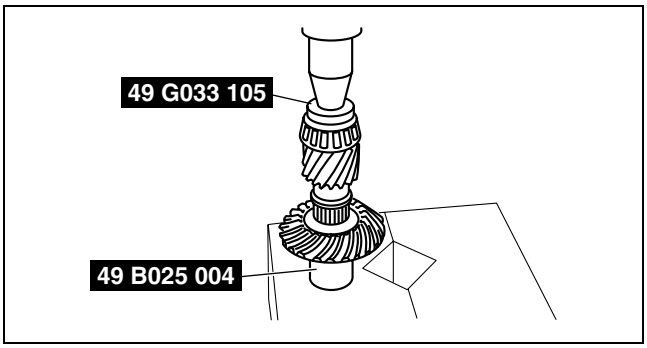
Front Carrier Component Assembly Procedure

1. Using a press, assemble the opposite ring gear side bearing (side) to the ring gear shaft.



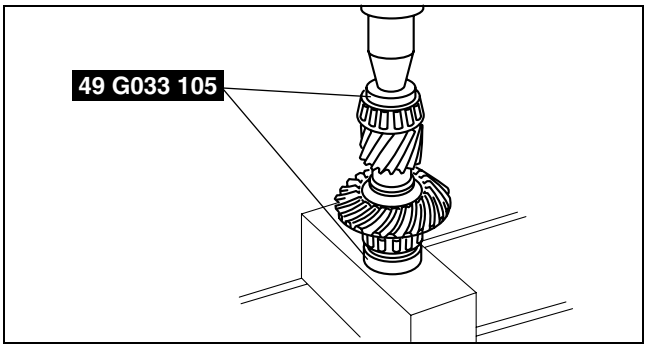
e6u316zmc051

2. Using a press, assemble the ring gear to the ring gear shaft



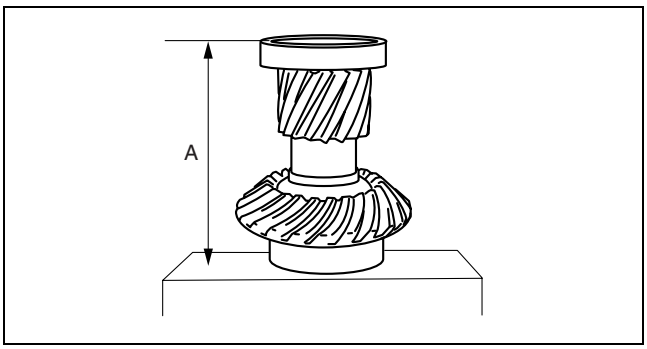
e6u316zmc052

3. Using a press, assemble the ring gear side bearing (side).
4. Temporarily assemble the bearing outer races (side).



e6u316zmc053

5. Place the ring gear component on the surface plate as shown in the figure, and measure the height using a vernier caliper or height gauge. This is dimension A.

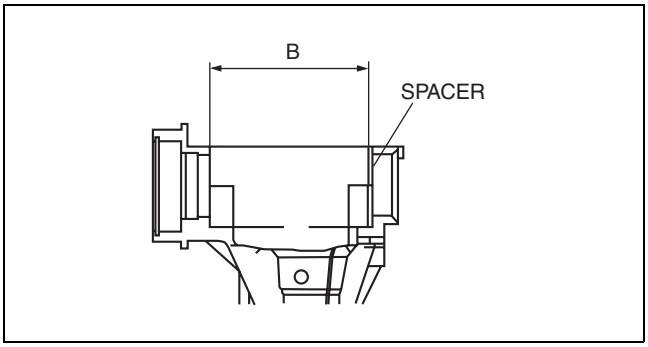


e6u316zmc054

6. Measure the width of the front carrier ring gear installation area with the spacer installed. This is dimension B.
7. The maximum and minimum total thickness C of the adjustment shims on both sides can be expressed by the following formula:

   C = B - A - (0.01—0.03 mm {0.00039—0.00118 in})

8. If the total thickness of the installed adjustment shims is within the C range, use the shims as they are.



bue517zab004

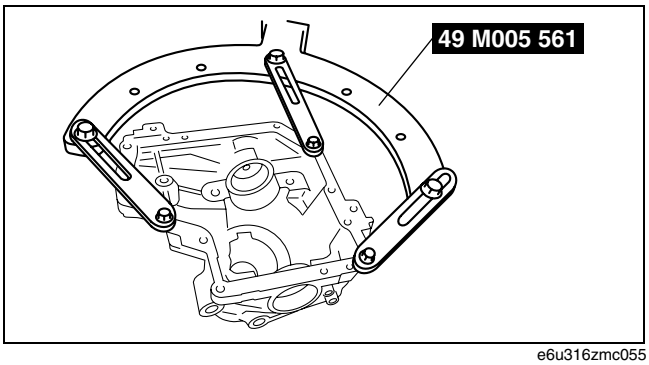
9. If the total thickness of the installed adjustment shims is not within the C range, select the appropriate number of adjustment shims from the table below and use them.

Adjustment shim

Identification mark	Thickness (mm {in})	Identification mark	Thickness (mm {in})
350	3.50 {0.1378}	410	4.10 {0.1614}
355	3.55 {0.1398}	415	4.15 {0.1634}
360	3.60 {0.1417}	420	4.20 {0.1654}
365	3.65 {0.1437}	425	4.25 {0.1673}
370	3.70 {0.1457}	430	4.30 {0.1693}
375	3.75 {0.1476}	435	4.35 {0.1713}
380	3.80 {0.1496}	440	4.40 {0.1732}
385	3.85 {0.1516}	445	4.45 {0.1752}
390	3.90 {0.1535}	450	4.50 {0.1772}
395	3.95 {0.1555}	455	4.55 {0.1791}
400	4.00 {0.1574}	460	4.60 {0.1811}
405	4.05 {0.1594}	—	—

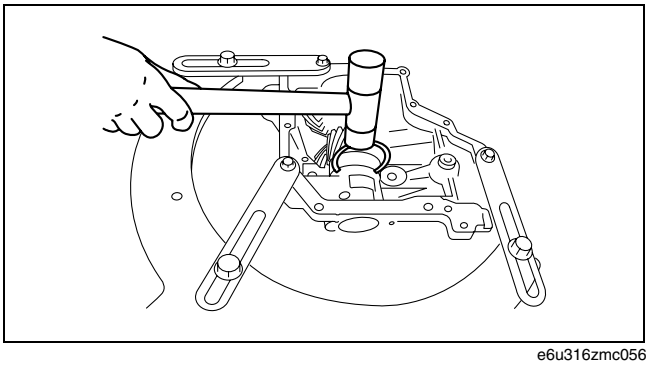
Note
- When reusing adjustment shims, do not mix up the left and right shims.
- Do not mix up the left and right side bearing races and spacers.

10. Install the front carrier to the **SST**.
11. Install the adjustment shim chosen for the front carrier ring gear side and spacer on opposite side.
12. Assemble the ring gear component to the front carrier.

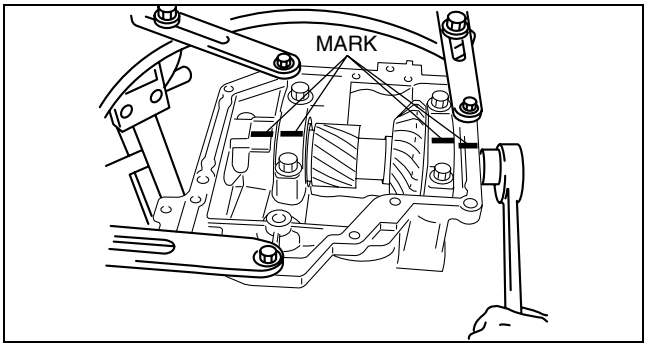


e6u316zmc055

13. Using the plastic hammer, assemble the selected adjustment shim in between the spacer and bearing race as shown in the figure.


e6u316zmc056

14. Align the alignment marks of the bearing caps, assemble the bearing caps, and tighten the bolts temporarily.



e6u316zmc025

Caution
- **Locking compound is applied to a new ring gear lockbolt. Reuse the old ring gear lock bolt when inspecting the preload.**

15. Install the ring gear lockbolt and inspect the ring gear bearing preload.

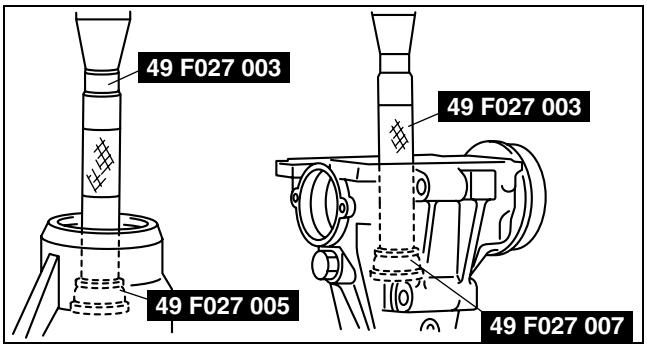
Standard ring gear bearing preload
0.6—2.1 N·m {6.2—21.4 kgf·cm, 5.4—18.5 in·lbf}

- If the rotational torque is not within the specification, select the suitable adjustment shim and reinstall so that the rotational torque is within the specification.

16. Follow the disassembling procedure in Step 11 to remove the ring gear component.

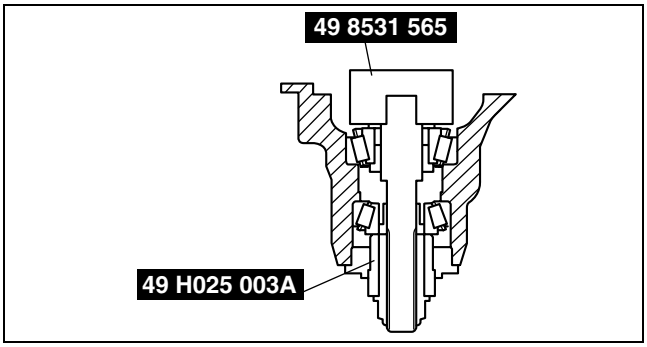
Note
- Identify the left and right side of the adjustment shim for reinstallation.

17. Using the **SSTs**, assemble the bearing outer races.



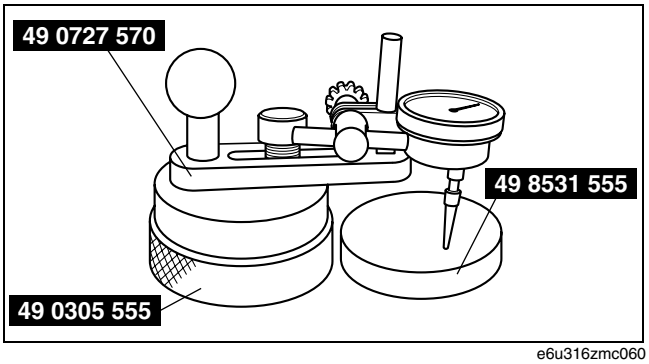
e6u316zmc058

18. Using the **SSTs**, adjust the drive pinion height as follows:
    (1) Install the **SSTs** to the removed spacer and bearing.
    (2) Assemble the spacer, bearing and **SSTs**. Using an O-ring, secure the **SST**.
    (3) Assemble the bearing, **SSTs**, washer, and nut.
    (4) Tighten the nut to the **SST** to where it can still be rotated by hand.



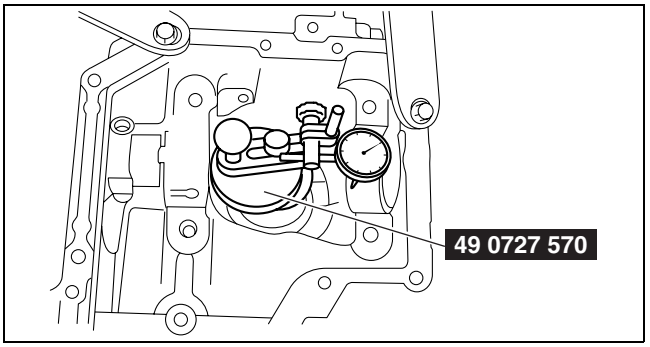
e6u316zmc059

    (5) Place the **SSTs** on the plate surface and set the dial gauge to “0”.



e6u316zmc060

(6) Position the **SST** (49 0727 570) on the driver pinion model.
(7) Attach the dial gauge head to where the carrier bearing outer race (side) is installed and measure the lowest position. Also, measure the value of where the side bearing outer race (side) is installed on the opposite side.
(8) Measure the average value between the values of both sides measured in Step 7. This value is the spacer thickness which determines the pinion height.



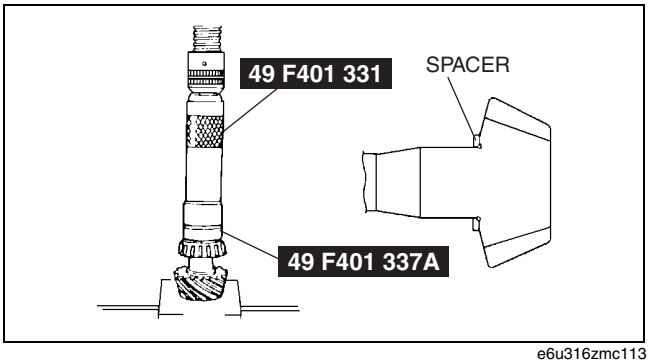
e6u316zmc061

Pinion height error factor within allowance limit
± 0.032 mm {± 0.00126 in}

Spacer

Identification mark	Thickness (mm {in})	Identification mark	Thickness (mm {in})
08	3.08 {0.1213}	29	3.29 {0.1295}
09	3.095 {0.1219}	30	3.305 {0.1301}
11	3.11 {0.1224}	32	3.32 {0.1307}
12	3.125 {0.1230}	33	3.335 {0.1313}
14	3.14 {0.1236}	35	3.35 {0.1319}
15	3.155 {0.1242}	36	3.365 {0.1325}
17	3.17 {0.1248}	38	3.38 {0.1331}
18	3.185 {0.1254}	39	3.395 {0.1335}
20	3.20 {0.1260}	41	3.41 {0.1343}
21	3.215 {0.1266}	42	3.425 {0.1348}
23	3.23 {0.1272}	44	3.44 {0.1354}
24	3.245 {0.1278}	45	3.455 {0.1360}
26	3.26 {0.1283}	47	3.47 {0.1366}
27	3.275 {0.1289}	—	—

19. Assemble the spacer selected for pinion height adjustment with the rounded off side facing the gears.
20. Using the **SST**, assemble the bearing (front) to the drive pinion gear.
21. Assemble a new distance piece to the drive pinion gear.
22. Assemble the drive pinion gear to the front carrier.
23. Install the bearing (rear), companion flange, washer, and new locknut to the drive pinion and temporarily tighten.
24. Rotate the companion flange by hand and seat the bearing.

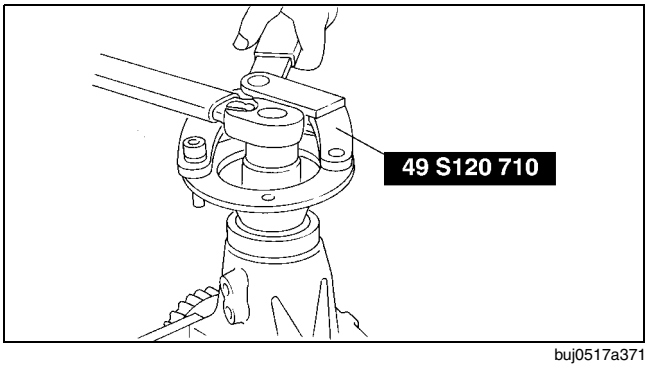


e6u316zmc113

25. Using the **SST**, tighten the locknut from the lower limit of the specified tightening torque and set to the preload value. Note the tightening torque when the specified preload value is obtained.

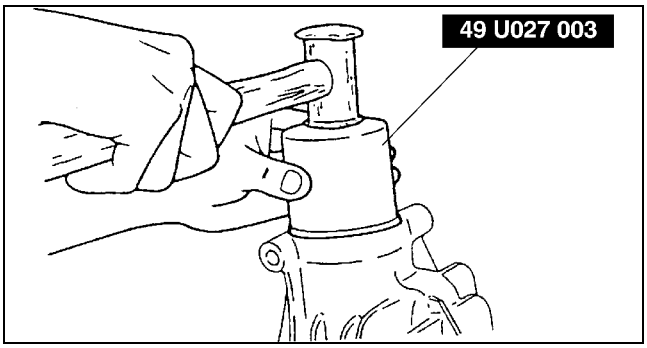
Tightening torque
127—284 N·m {13.0—28.9 kgf·m, 93.7—209.4 ft·lbf}

Drive pinion preload value
0.88—1.37 N·m {9.0—14.0 kgf·cm, 7.9—12.1 in·lbf}



buj0517a371

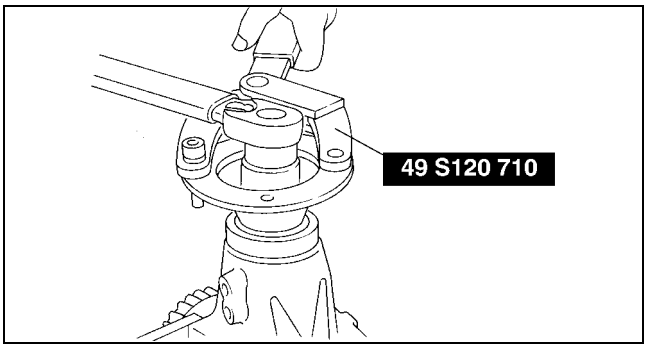
26. Remove the locknut, washer, and companion flange.
27. Apply oil to the lip area of a new oil seal.
28. Using the **SST**, assemble the oil seal.
29. Apply the grease to the bearing contact surface of the companion flange.
30. Assemble the companion flange.



buj0517a370

31. Using the **SST**, tighten the new locknut to the tightening torque noted when the preload was adjusted.
32. Reverify the preload.

Drive pinion preload value
0.88—1.37 N·m {9.0—14.0 kgf·cm, 7.9—12.1 in·lbf}

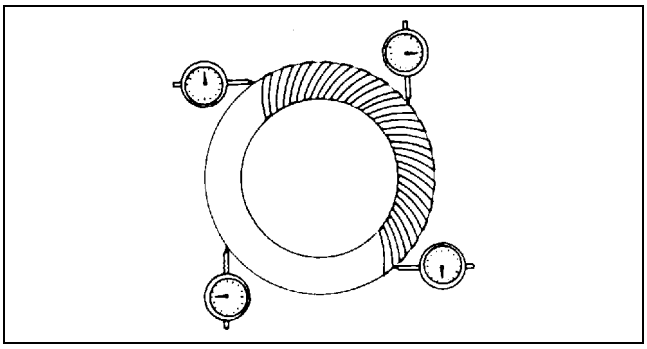


buj0517a371

33. Assemble the ring gear component following the procedure in Step 11 to 14.
34. Set the dial gauge with the measuring probe attached perpendicularly to the end of one of the ring gear teeth.
35. Secure the drive pinion and measure the backlash from when the ring gear is moved.

Standard drive pinion backlash
0.09—0.11 mm {0.0035—0.0043 in}

Caution
- **Perform the backlash measurement on the ring gear circumference at four points.**


buj0517a375

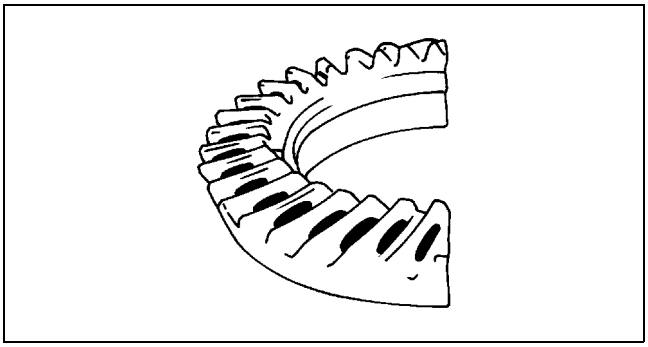
36. If the backlash is not within the specified range above, adjust it by sliding the ring gear in the shaft direction.

Note
- Slide the ring gear in the shaft direction by replacing the adjustment shim. If the right side adjustment shim is replaced with one that is 0.05 mm {0.002 in} thicker, the left side shim must be replaced with one that is 0.05 mm {0.002 in} thinner.

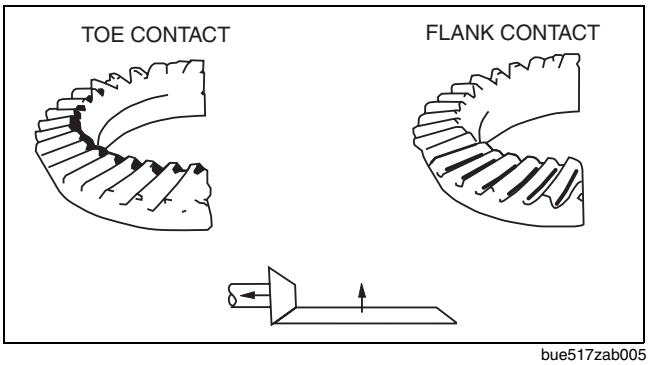
37. Tighten the bearing cap bolts.

Tightening torque
63—93 N·m {6.5—9.4 kgf·m, 46.4—68.5 ft·lbf}

38. Perform the drive pinion and ring gear tooth contact inspection.
    (1) Apply tooth marking compound evenly to both surfaces of the ring gear.
    (2) Rotate the ring gear back and forth several times.
    (3) Inspect for gear tooth contact at four points on the ring gear circumference and verify that the gear tooth contact indicated by the tooth marking compound is as indicated in the figure.
        - If the tooth contact points are normal, wipe off the marking compound.
        - If the tooth contact points are not normal, adjust the pinion height, then adjust the backlash.

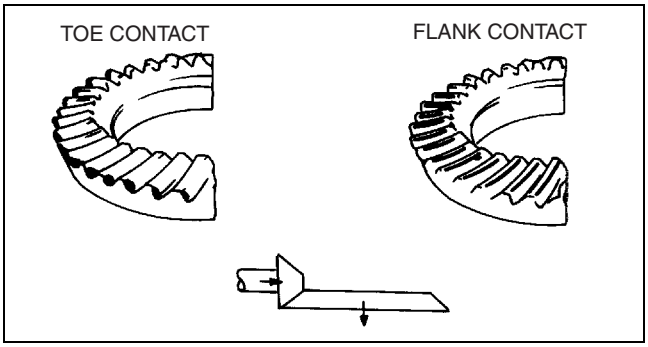

buj0517a376

    (4) If toe and flank contact is indicated as shown in the figure, replace the drive pinion spacer with a thinner one to maintain the drive pinion further away.



bue517zab005

    (5) If heal and face contact is indicated as shown in the figure, replace the drive pinion spacer with a thicker one to bring the drive pinion closer.



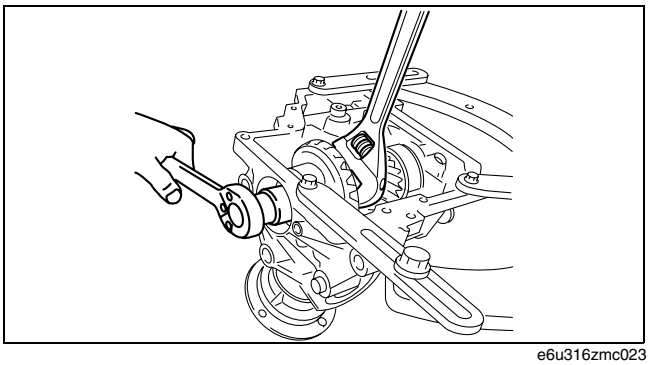
bue517zab006

39. Using a suitable wrench, secure the ring gear shaft and tighten the new ring gear lockbolt to the specified tightening torque.

Caution
- **Before installing the new ring gear lockbolt, remove the old thread-locking compound remaining on the thread of the ring gear shaft.**

Tightening torque
150—200 N·m {15.3—20.3 kgf·m, 110.7—147.4 ft·lbf}

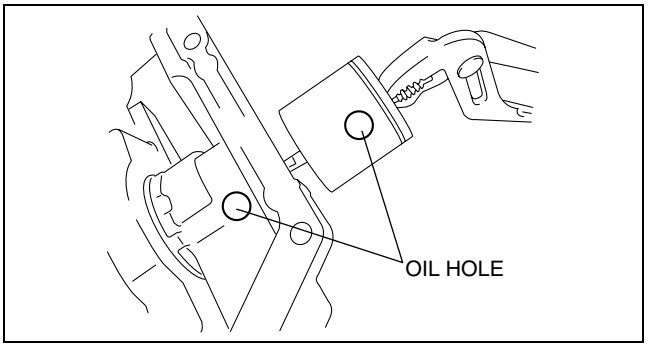
40. Align the cast hexagon of the oil pump shaft and assemble the oil pump and oil pump shaft.


e6u316zmc023

41. Align the oil holes of the oil pump and front carrier.
42. Assemble the oil strainer.
43. Assemble the oil pipe.
44. Apply oil to a new O-ring and assemble the side cover.
45. Assemble the side cover to the front carrier.

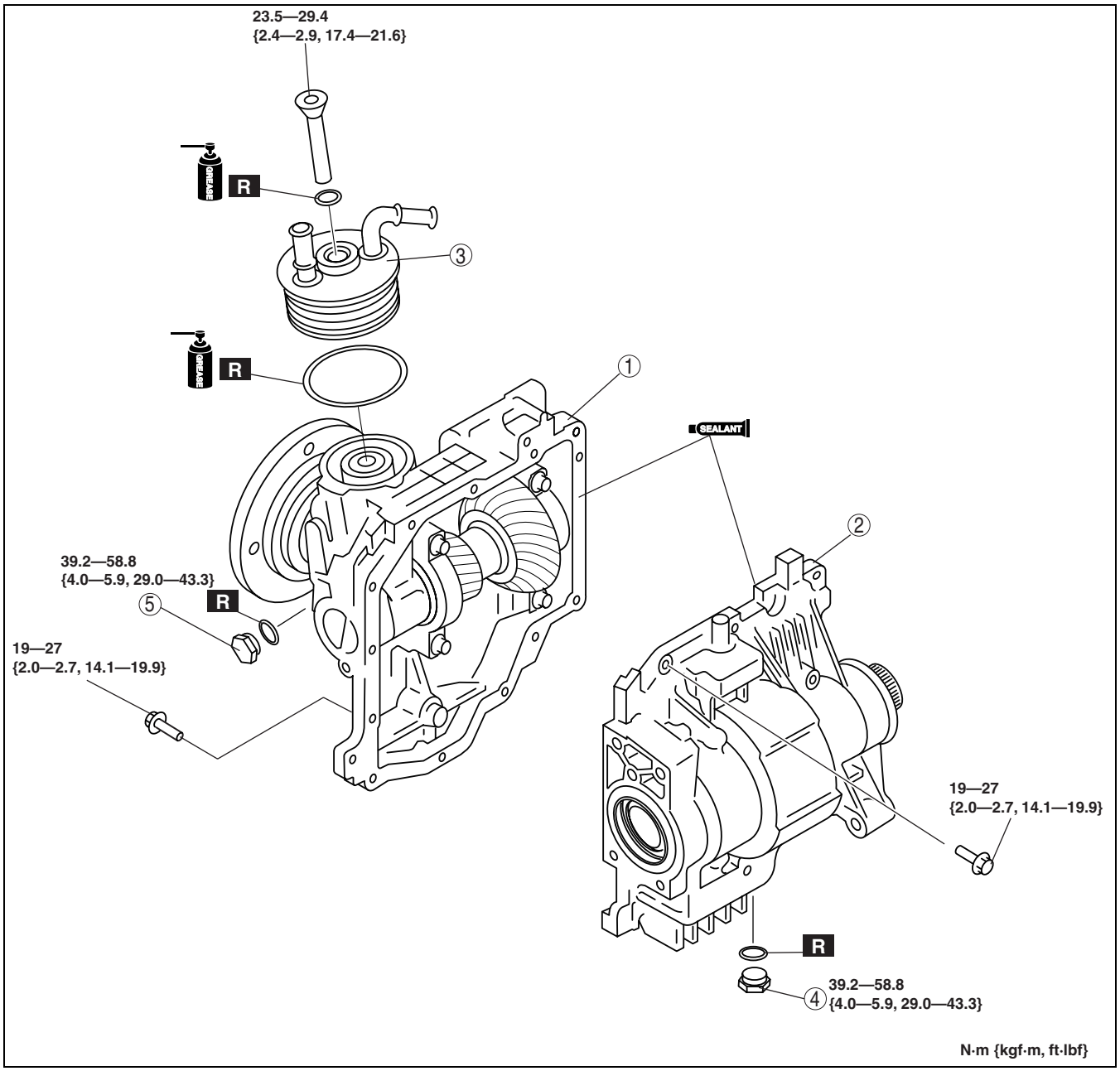
    Tightening torque
    6.9—9.8 N·m {70—100 kgf·cm, 61—86 in·lbf}

46. Remove the front carrier component from the **SST**.



e6u316zmc111

Transfer Component Assembly



e6u316zmc105

1	Front carrier component
2	Drive gear case component
3	Oil cooler

4	Drain plug
5	Oil level plug

Transfer Component Assembly Procedure

Note
- Before applying silicone sealant, completely clean off any old silicone sealant and remove any oil or grease.
- After applying silicone sealant, install the drive gear case within 10 min.
- After connecting the sealing area, leave it for 30 min. or more, then add transfer oil.

1. Clean the alignment surface of the front carrier and drive gear case, and lightly apply silicone sealant.
2. Assemble the transfer component.

Tightening torque
19—27 N·m {2.0—2.7 kgf·m, 14.1—19.9 ft·lbf}

3. Install the oil cooler.
4. Tighten the oil cooler installation bolt with a O-ring.

Tightening torque
23.5—29.4 N·m {2.4—2.9 kgf·m, 17.4—21.6 ft·lbf}

5. Tighten the drain plug with a new washer.

Tightening torque
39.2—58.8 N·m {4.0—5.9 kgf·m, 29.0—43.3 ft·lbf}

03-50 TECHNICAL DATA

TECHNICAL DATA

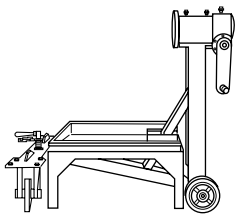
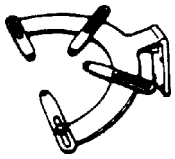
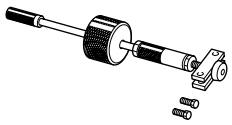
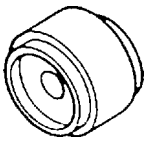
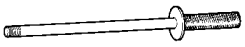
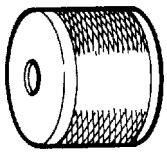
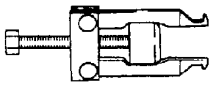
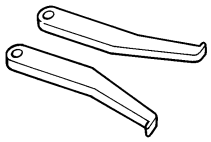
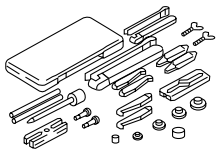
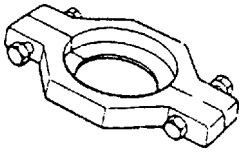
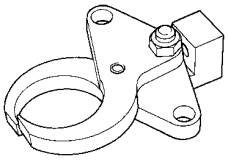
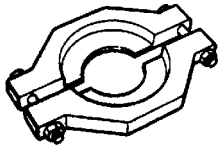
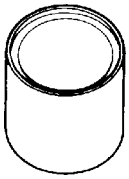
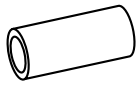
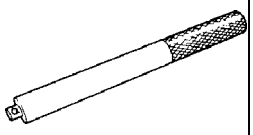
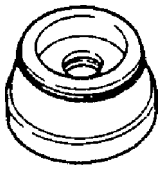
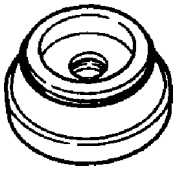
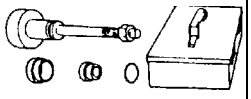
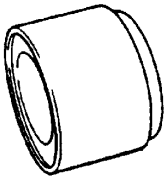
e6u035000000101

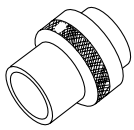
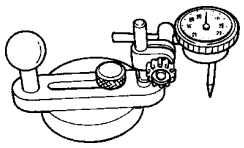
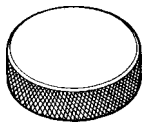
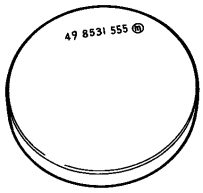
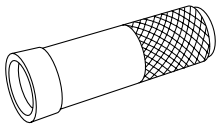
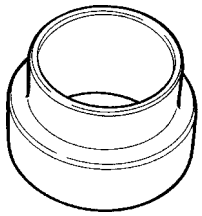
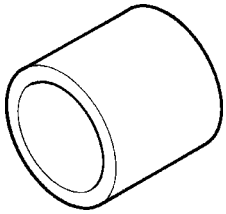
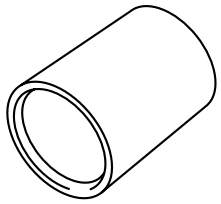
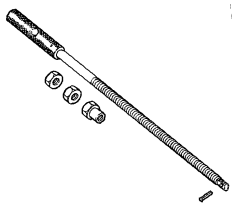
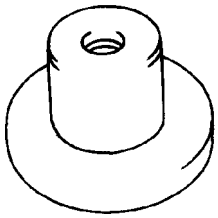
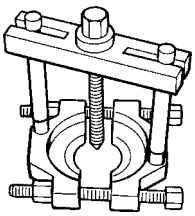
Item		Specification
Drive gear bearing preload	(N·m {kgf·cm, in·lbf})	0.6—2.1 {6.2—21.4, 5.4—18.5}
Ring gear bearing pleload	(N·m {kgf·cm, in·lbf})	0.6—2.1 {6.2—21.4, 5.4—18.5}
Drive pinion preload value	(N·m {kgf·cm, in·lbf})	0.88—1.37 {9.0—14.0, 7.9—12.1}
Drive pinion backlash	(mm {in})	0.09—0.11 {0.0035—0.0043}

03-60 SERVICE TOOLS

SERVICE TOOLS

e6u036000000101

49 0107 680A Engine stand 	49 M005 561 Differential carrier hanger 	49 W032 201 Body 
49 B025 001 (Dust Seal Installer) Body 	49 T032 316 Shaft 	49 T032 317 Weight 
49 S019 005 Oil seal puller 	49 W032 202 Attachment 	49 0839 425C Bearing puller set 
49 0636 145 Water pump pulley boss puller 	49 S120 710 Coupling flange holder 	49 L027 004 Gear case remover 
49 H027 002 Bearing remover 	49 B025 004 Dust seal installer 	49 T032 302 Bearing installer 
49 G033 105 Attachment 	49 F027 003 Handle 	49 F027 005 Attachment for 62 
49 F027 007 Attachment for 72 	49 8531 565 Drive pinion model 	49 S019 006 Oil seal installer 

49 H025 003A Bearing installer 	49 0727 570 Pinion hight gauge body 	49 0305 555 Block Gauge (20mm) 
49 8531 555 Block Gauge (11mm) 	49 F401 331 Body 	49 F401 337A Attachment C 
49 U027 003 Oil seal installer 	49 H028 202 Block L 	49 L011 201 Shaft 
49 F026 102 Bearing puller & installer 	49 0710 520 Bearing puller 	-

TRANSMISSION/TRANSAXLE

05
SECTION

05-15 MANUAL TRANSAXLE

PRECAUTION

e6u051500000101

1. Clean the transaxle exterior thoroughly using a steam cleaner or cleaning solvents before disassembly.

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

Caution
- **Cleaning sealed bearings using cleaning fluids or a steam cleaner can wash the grease out of the bearing.**

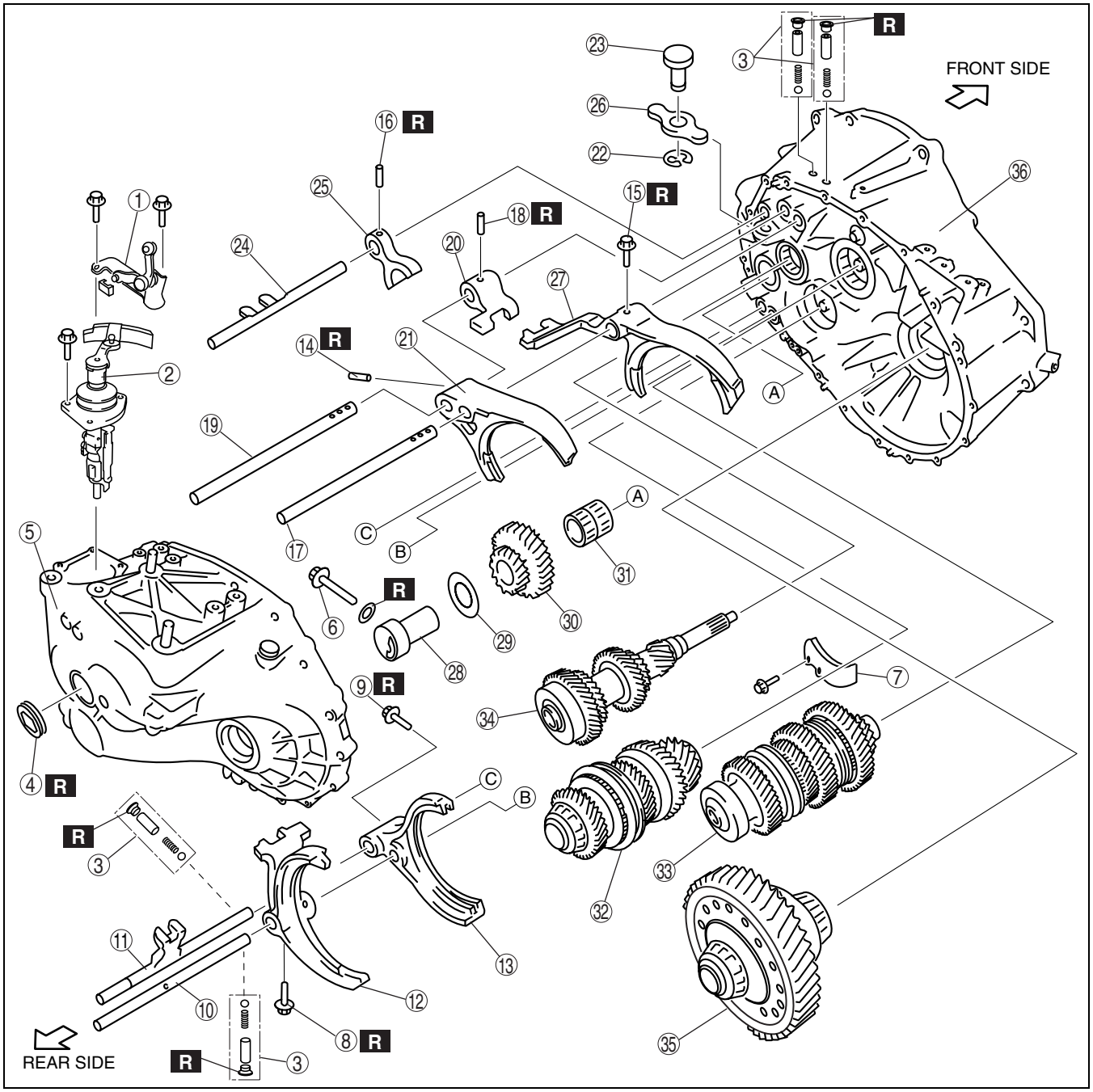
2. Clean the removed parts using cleaning solvent, and dry them using compressed air.
3. Clean out all holes and passages using compressed air, and check that there are no obstructions.
4. Make sure each part is cleaned before assembling.
5. Coat all movable parts with the specified oil.
6. Replace parts whenever required.
7. Remove old sealant from contact surfaces before applying new sealant.
8. Assemble the parts within **10 min** after applying sealant. Allow all sealant to cure at least **30 min** after assembly before filling the transaxle with transaxle oil.

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

CLUTCH HOUSING AND TRANSAXLE CASE COMPONENTS DISASSEMBLY

e6u051517011101

Disassembly Components



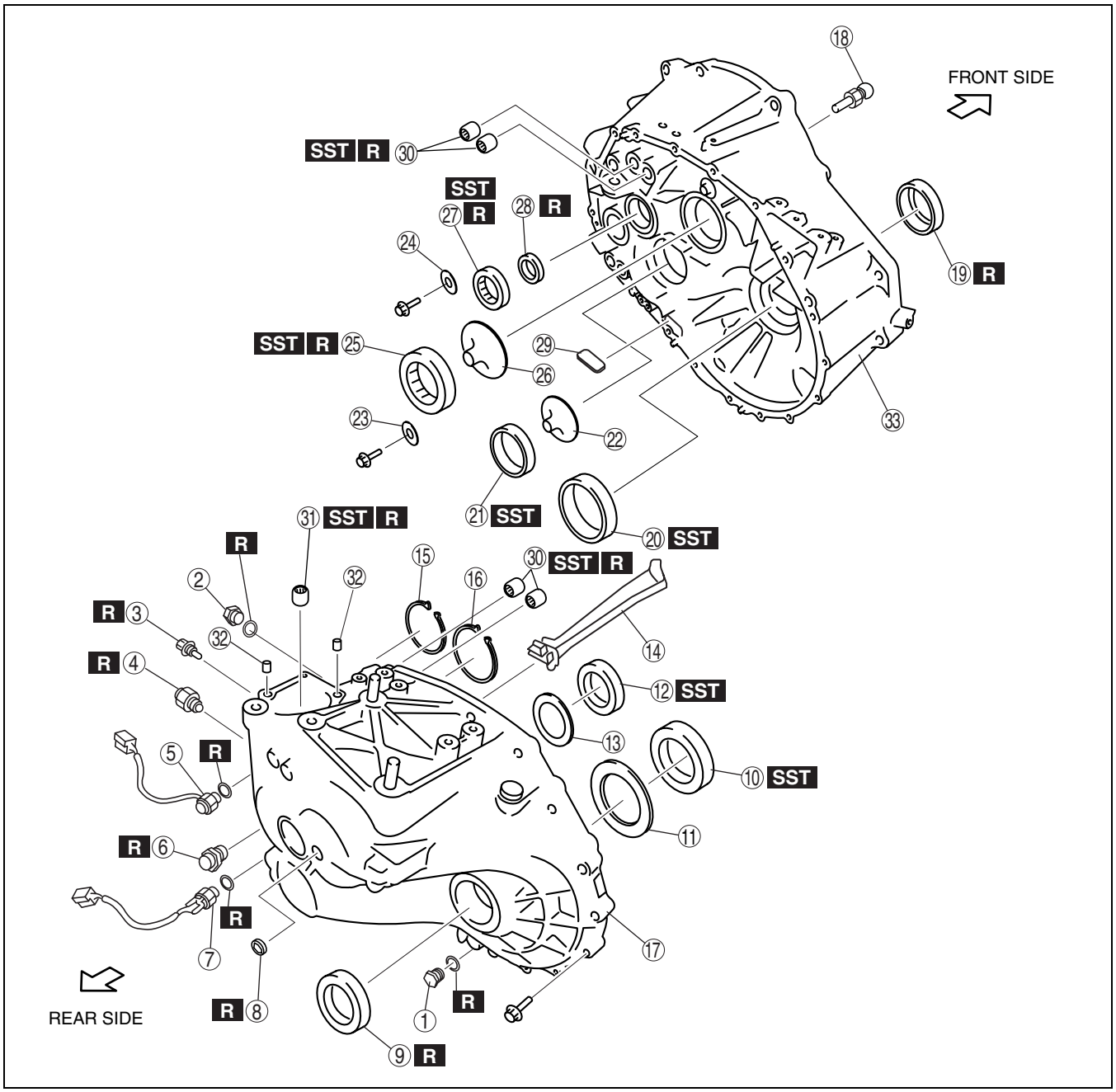
e6u515zmc001

1	Select lever set
2	Shift component
3	Sealing cap, spring seat, detent spring, detent ball
4	Sealing cap
5	Transaxle case
6	Reverse idler shaft retaining bolt
7	Baffle plate
8	Shift fork retaining bolt
9	Shift fork retaining bolt
10	5th/6th control rod
11	Reverse control rod
12	5th/6th shift fork

13	Reverse shift fork
14	Spring pin
15	Shift fork retaining bolt
16	Spring pin
17	1st/2nd control rod
18	Spring pin
19	3rd/4th control rod (B)
20	3rd/4th control rod end (B)
21	3rd/4th shift fork
22	Snap ring
23	Counter lever pivot
24	3rd/4th control rod (A)

25	3rd/4th control rod end (A)
26	Counter lever
27	1st/2nd shift fork
28	Reverse idler gear shaft
29	Thrust washer
30	Reverse idler gear

31	Needle bearing
32	Secondary shaft (No.2) component
33	Secondary shaft (No.1) component
34	Primary shaft component
35	Differential component
36	Clutch housing



e6u515zmc060

1	Drain plug
2	Oil level plug
3	Straight pin
4	Shift push pin
5	Back-up light switch
6	Select push pin
7	Neutral switch

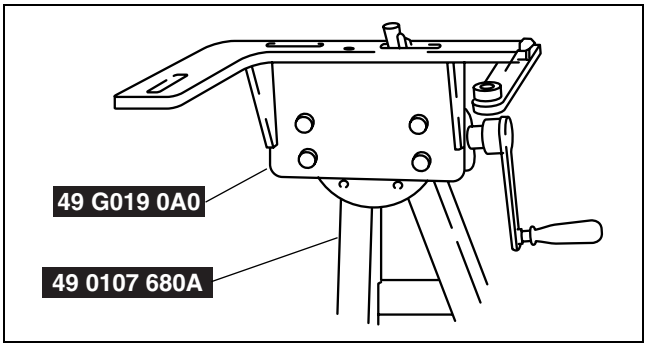
8	Sealing cap
9	Differential oil seal
10	Differential side bearing outer race
11	Adjust shim
12	Secondary shaft (No.2) rear bearing outer race
13	Adjust shim
14	Oil pass

15	Snap ring
16	Snap ring
17	Transaxle case
18	Pivot pin
19	Differential oil seal
20	Differential side bearing outer race
21	Secondary shaft (No.2) front bearing outer race
22	Oil funnel
23	Bearing cover
24	Bearing cover

25	Secondary shaft (No.1) front bearing
26	Oil funnel
27	Primary shaft front bearing
28	Primary shaft oil seal
29	Magnet
30	Control rod bearing
31	Shift lever shaft bearing
32	Tubular pin
33	Clutch housing

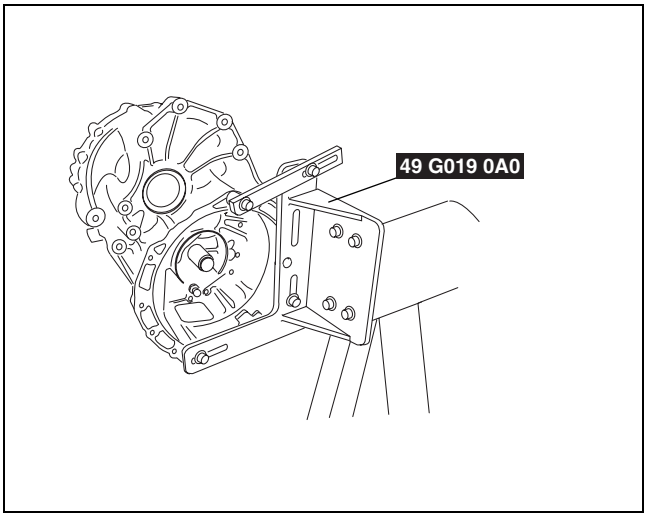
Disassembly Procedure

1. Assemble the **SST**.



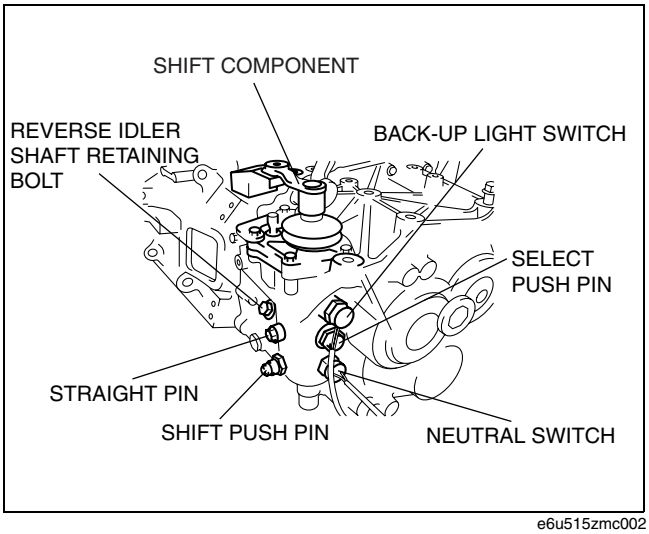
a6e5112m108

2. Lift the transaxle and mount it on the **SST**.
3. Remove the drain plug and the oil level plug.
4. Remove the neutral switch and back-up light switch.
5. Remove the reverse idler shaft retaining bolt.
6. Remove the straight pin.



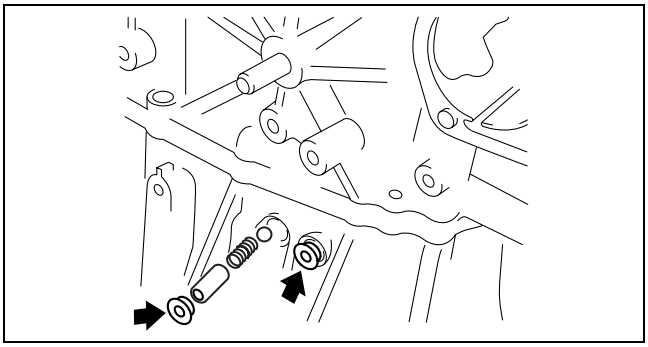
e6u515zmc141

7. Remove the shift push pin and select push pin.
8. Remove the select lever set and shift component.

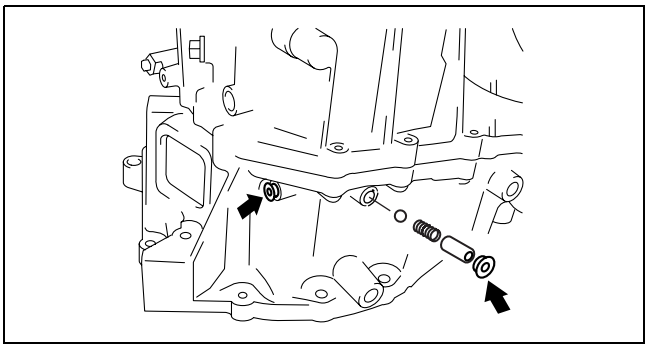


e6u515zmc002

9. Remove the sealing cap, detent spring seat, detent spring and detent ball as shown in the figure.



e6u515zmc003

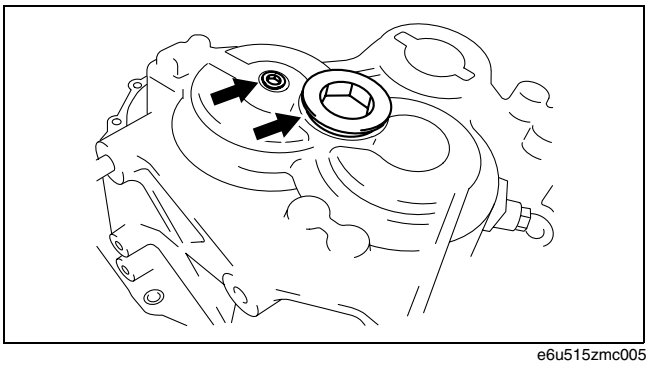


e6u515zmc004

10. Remove the sealing caps.

Note

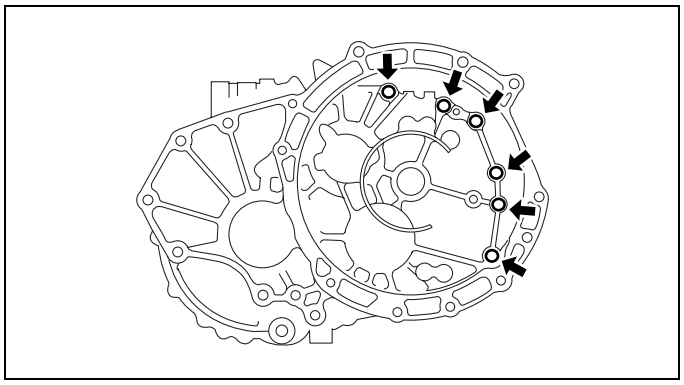
- The cast hexagon inner diameter of the plug is **27mm {1.063 in}**.



e6u515zmc005

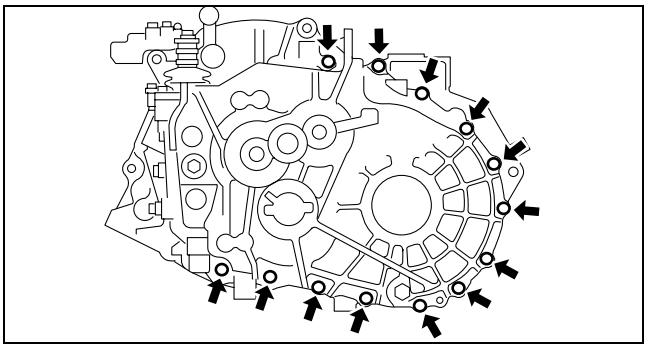
11. Remove the transaxle case fixing bolts.

Front side fixing bolts



e6u515zmc078

Rear side fixing bolts

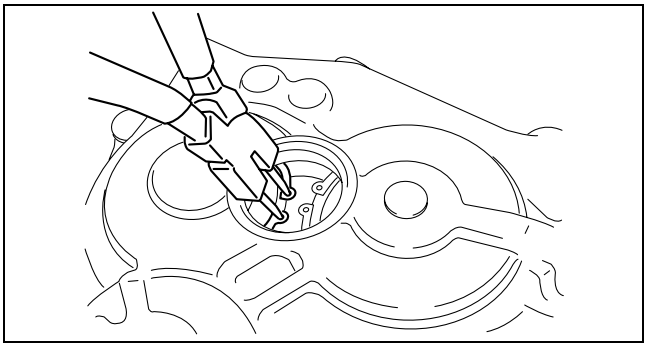


e6u515zmc079

12. Stretch the snap ring of the primary shaft rear bearing and secondary shaft (No.1) rear bearing at the sealing cap hole, and remove the transaxle case.

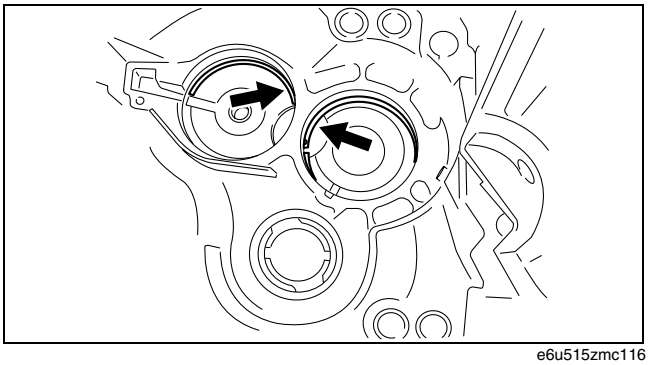
Note

- If the transaxle case is not removed, pull the primary shaft from the clutch housing side.



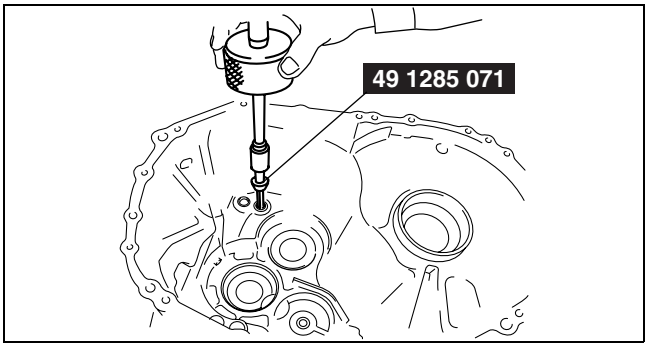
e6u515zmc006

13. Remove the snap rings.
14. Remove the oil pass.



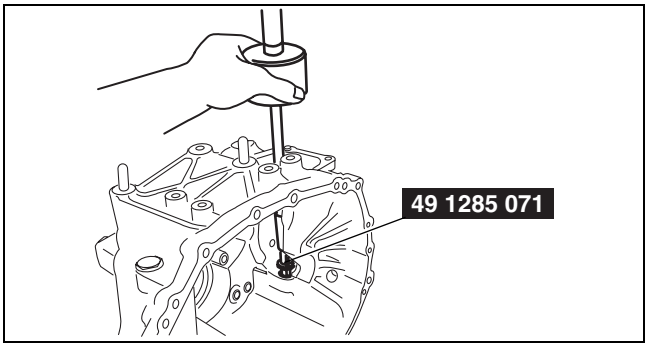
e6u515zmc116

15. Remove the control rod bearings from the transaxle case using the **SST**.



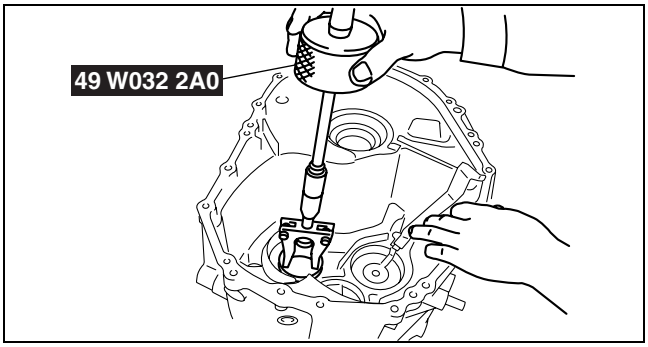
e6u515zmc135

16. Remove the shift lever shaft bearing from the transaxle case using the **SST**.



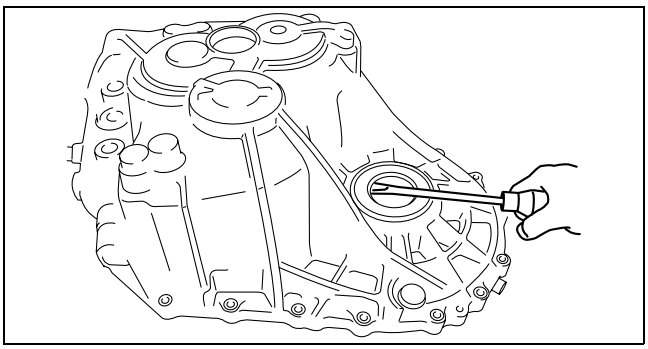
e6u515zmc167

17. Remove the secondary shaft (No.2) rear bearing outer race and bearing adjust shim from the transaxle case, using the **SST**.



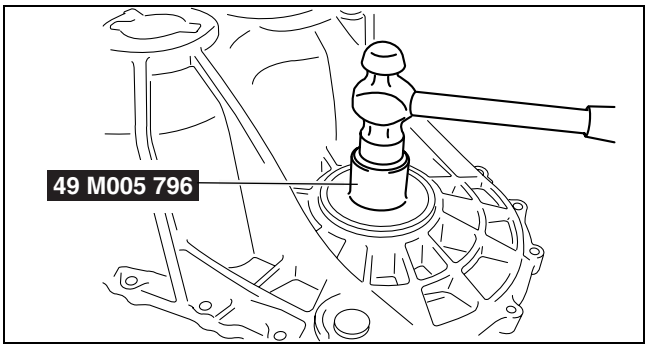
e6u515zmc007

18. Remove the differential oil seal from the transaxle case using a flathead screwdriver.



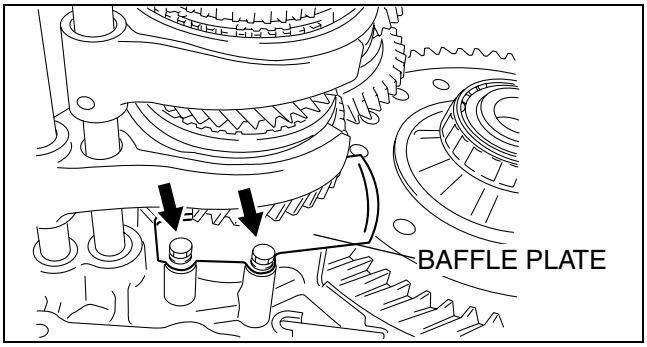
e6u515zmc008

19. Remove the differential side bearing outer race and adjust shim from the transaxle case using the **SST**.
20. Remove the magnet from the clutch housing.



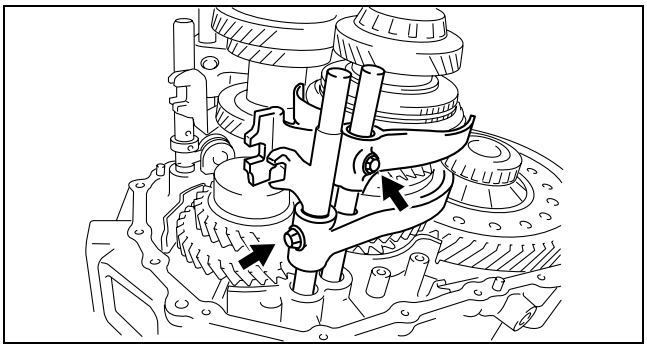
e6u515zmc009

21. Remove the baffle plate.



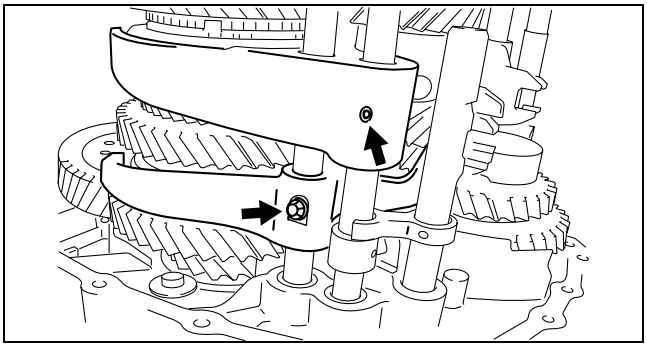
e6u515zmc010

22. Remove the 5th/6th shift fork retaining bolt and reverse shift fork retaining bolt.
23. Remove the reverse control rod.
24. Remove the 5th/6th control rod.
25. Remove the reverse shift fork and 5th/6th shift fork.
26. Remove the 3rd/4th shift fork spring pin using a pin punch.



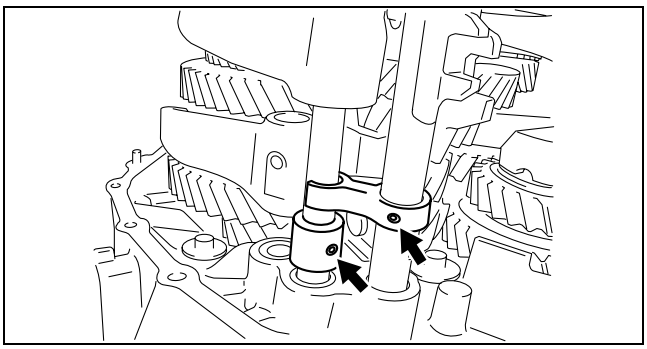
e6u515zmc012

27. Remove the 1st/2nd shift fork retaining bolt.
28. Remove the 1st/2nd control rod.



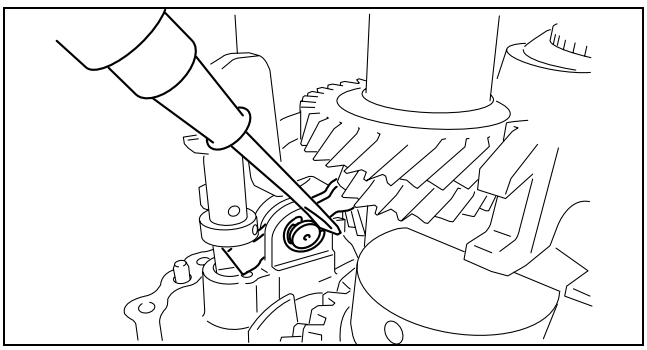
e6u515zmc014

29. Remove the 3rd/4th control rod end (A and B) spring pin using a pin punch.
30. Remove the 3rd/4th control rod (B), 3rd/4th control rod end (B), and 3rd/4th shift fork.



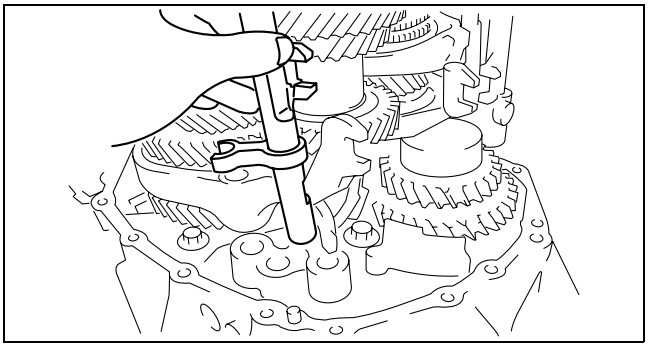
e6u515zmc015

31. Remove the snap ring using a flathead screwdriver, and remove the counter lever pivot.



e6u515zmc016

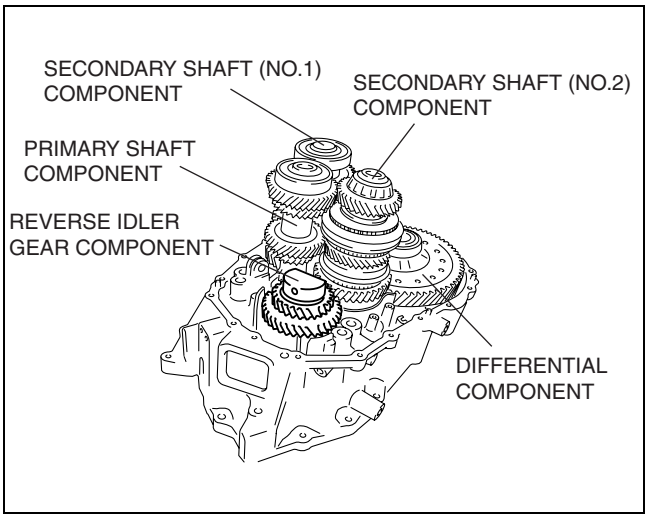
32. Remove the 3rd/4th control rod (A).
33. Remove the 1st/2nd shift fork.
34. Remove the counter lever.



e6u515zmc017

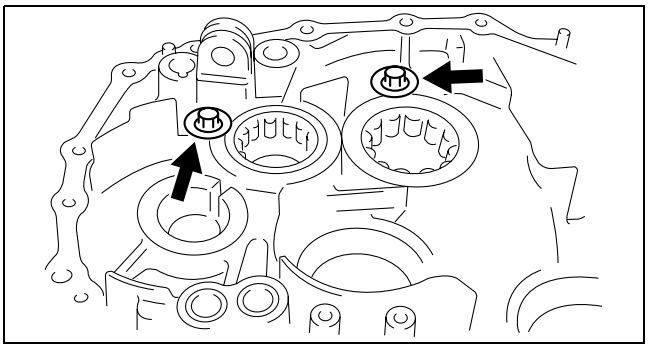
35. Remove each gear component.
    (1) Remove the reverse idler gear component.
    (2) Remove the secondary shaft (No.2) component.
    (3) Remove the primary shaft component and secondary shaft (No.1) component at the same time.
    (4) Remove the differential component.

    Caution
    - **The oil funnel in the clutch housing can be damaged when removing the secondary shafts component.**



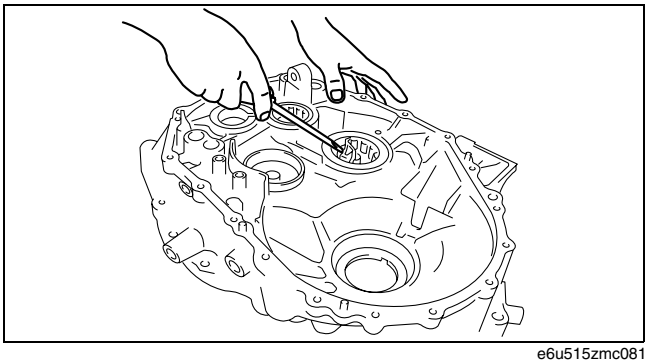
e6u515zmc058

36. Remove the primary shaft bearing cover and secondary shaft (No.1) bearing cover from the clutch housing.



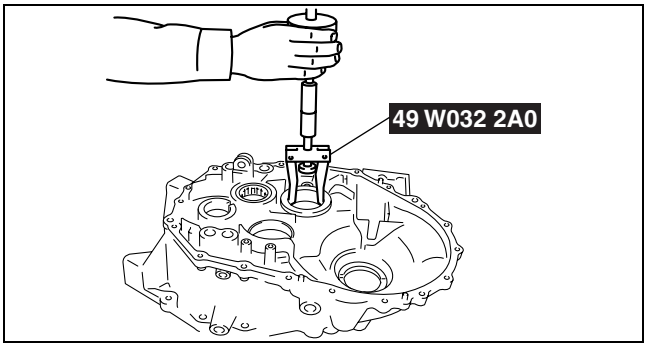
e6u515zmc080

37. Pry and remove the roller guide for the secondary shaft (No.1) front bearing using a flathead screwdriver as shown in the figure.



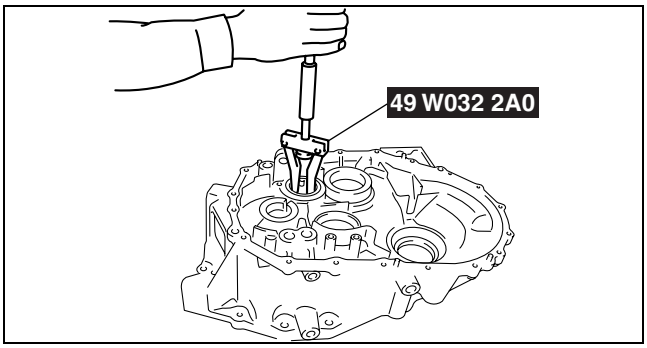
e6u515zmc081

38. Remove the secondary shaft (No.1) front bearing using the **SST**.
39. Remove the oil funnel of the secondary shaft (No.1).



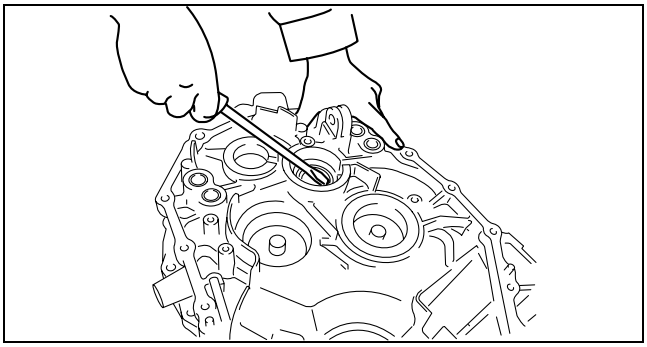
e6u515zmc082

40. Remove the primary shaft front bearing using the **SST**.

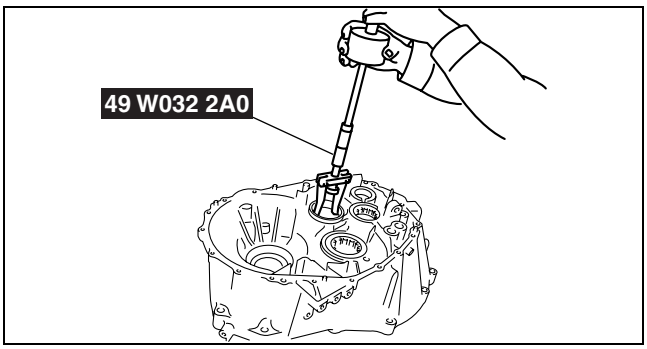


e6u515zmc083

41. Remove the primary shaft oil seal using a flathead screwdriver.


e6u515zmc084

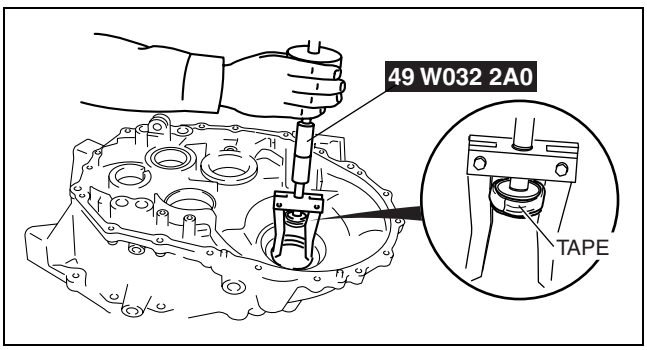
42. Remove the secondary shaft (No.2) front bearing outer race using the **SST**.
43. Remove the oil funnel of the secondary shaft (No.2).



e6u515zmc085

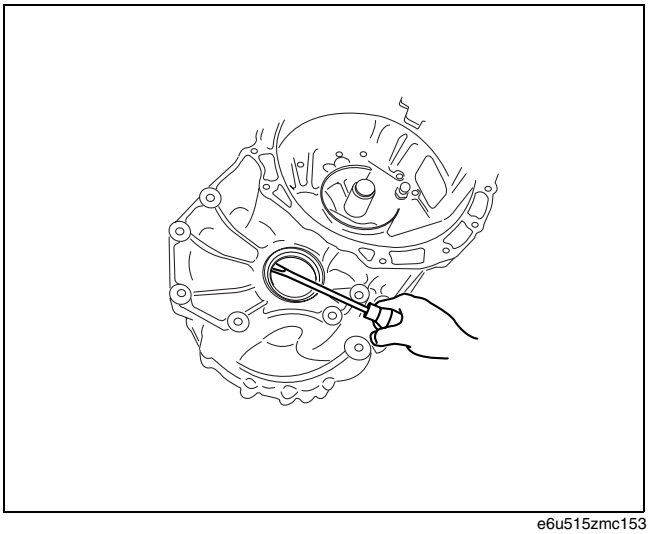
44. Remove the differential side bearing outer race from the clutch housing using the **SST**.

Note
- Wrap the **SST** with tape so that the **SST** tabs hook onto the bearing outer race as shown in the figure.



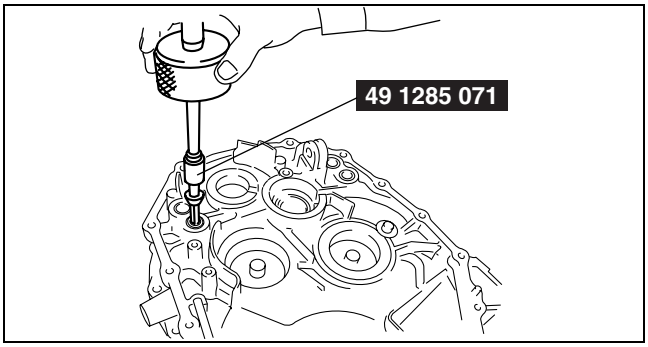
e6u515zmc152

45. Remove the differential oil seal from the clutch housing using a flathead screwdriver.



e6u515zmc153

46. Remove the control rod bearings, from the clutch housing.

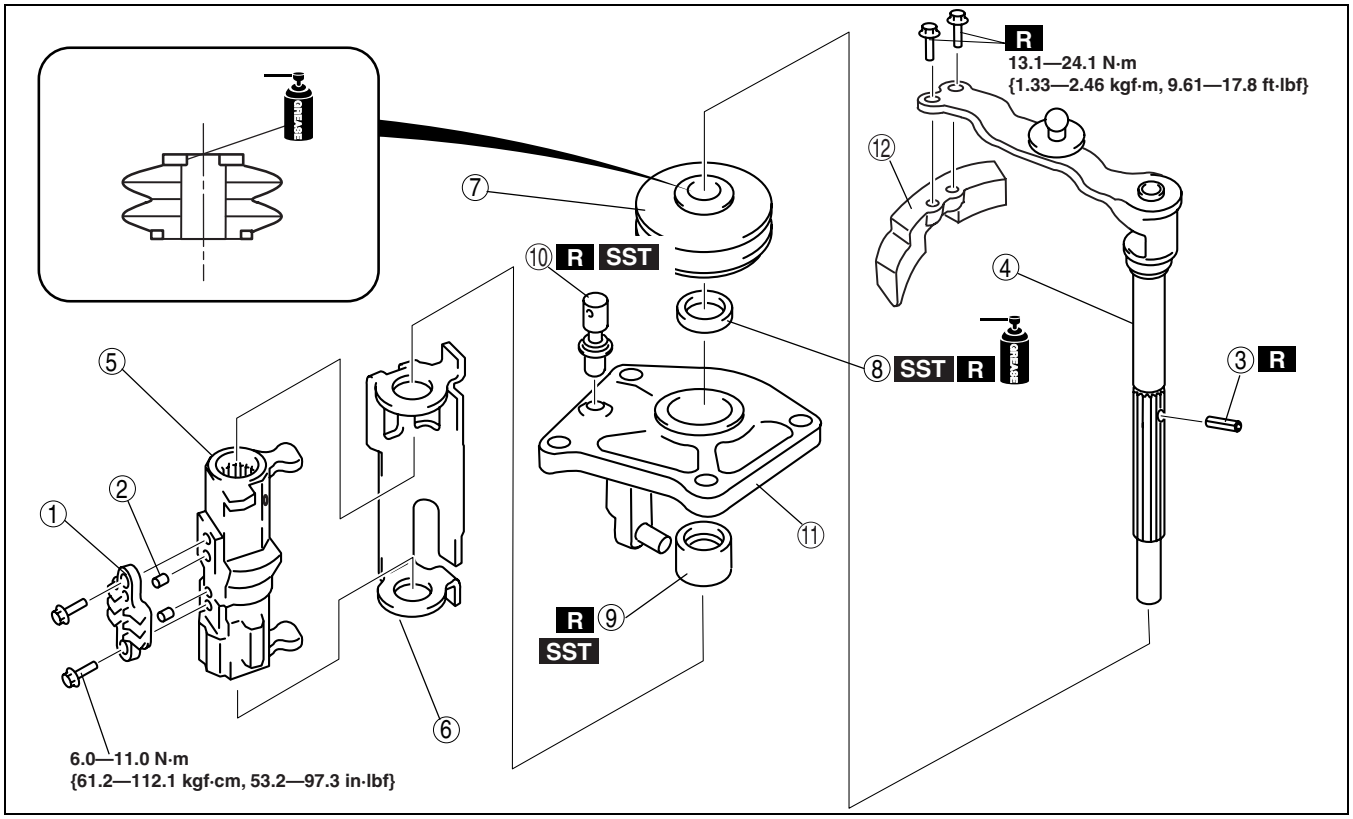


e6u515zmc151

SHIFT COMPONENT DISASSEMBLY/ASSEMBLY

e6u051517030101

1. Disassemble in the order shown in the figure.
2. Assemble in the reverse order of disassembly.

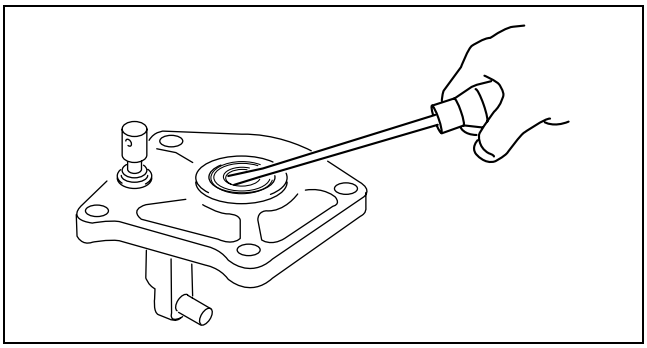


e6u515zmc076

1	Guide plate
2	knock pin
3	Spring pin (See 05-15-15 Spring Pin Assembly Note.)
4	Shift lever shaft
5	Shift lever inner
6	Inter lock sleeve
7	Boot
8	Oil seal (See 05-15-13 Shift Lever Shaft Oil Seal Disassembly Note.) (See 05-15-15 Shift Lever Shaft Oil Seal Assembly Note.)
9	Bearing (See 05-15-13 Shift Lever Shaft Bearing Disassembly Note.) (See 05-15-14 Shift Lever Shaft Bearing Assembly Note.)
10	Breather plug (See 05-15-13 Breather Plug Disassembly Note.) (See 05-15-14 Breather Plug Assembly Note.)
11	Control case
12	Damper

Shift Lever Shaft Oil Seal Disassembly Note

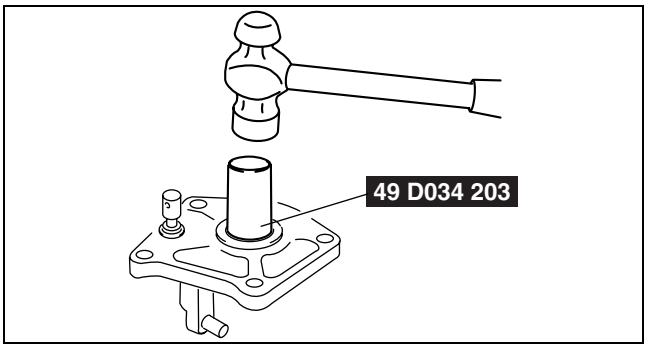
1. Remove the oil seal using a flathead screwdriver.



e6u515zmc142

Shift Lever Shaft Bearing Disassembly Note

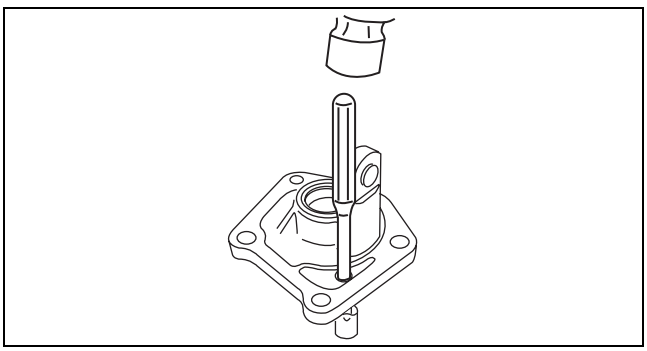
1. Remove the bearing using the **SST**.



e6u515zmc143

Breather Plug Disassembly Note

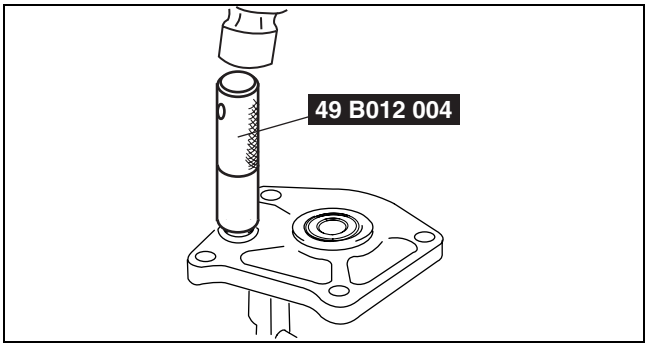
1. Remove the breather plug using a pin punch.



e6u515zmc170

Breather Plug Assembly Note

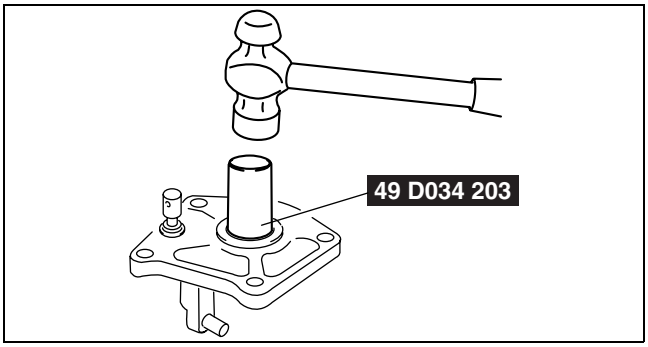
1. Install the breather plug using the **SST**.



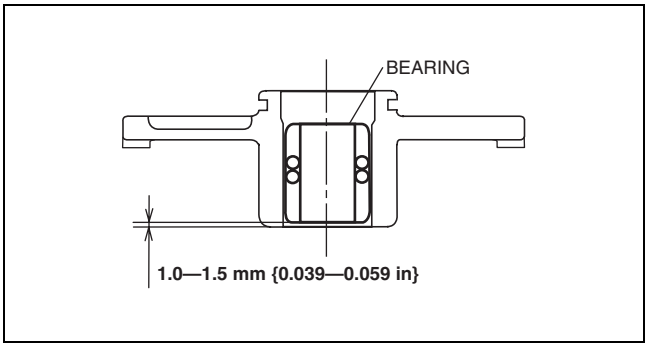
e6u515zmc171

Shift Lever Shaft Bearing Assembly Note

1. Install the bearing using the **SST**.



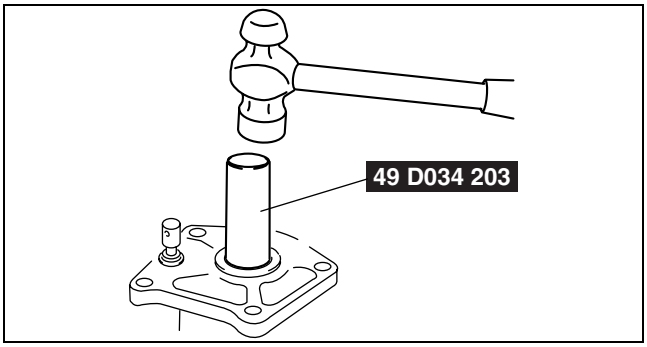
e6u515zmc143



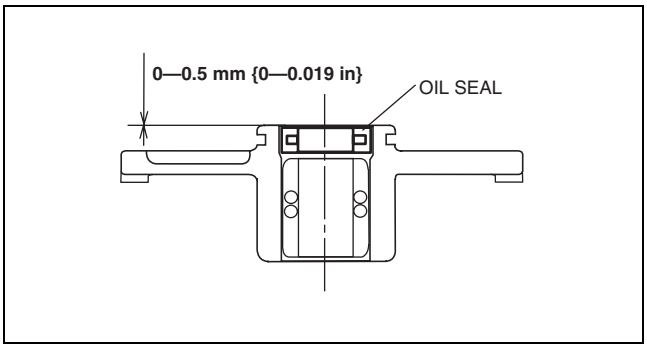
e6u515zmc145

Shift Lever Shaft Oil Seal Assembly Note

1. Install the oil seal using the **SST**.
   - Apply grease to the oil seal lip.



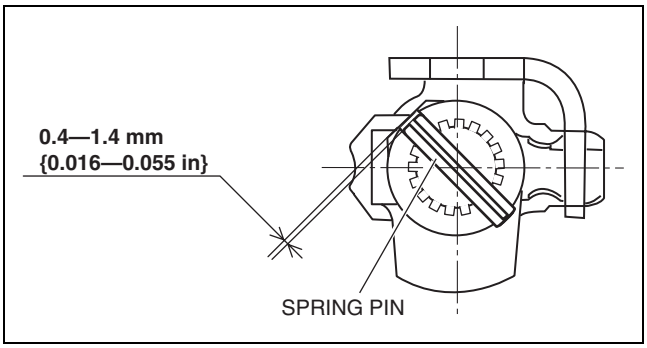
e6u515zmc144



e6u515zmc146

Spring Pin Assembly Note

1. Tap in a new spring pin shown in the figure.

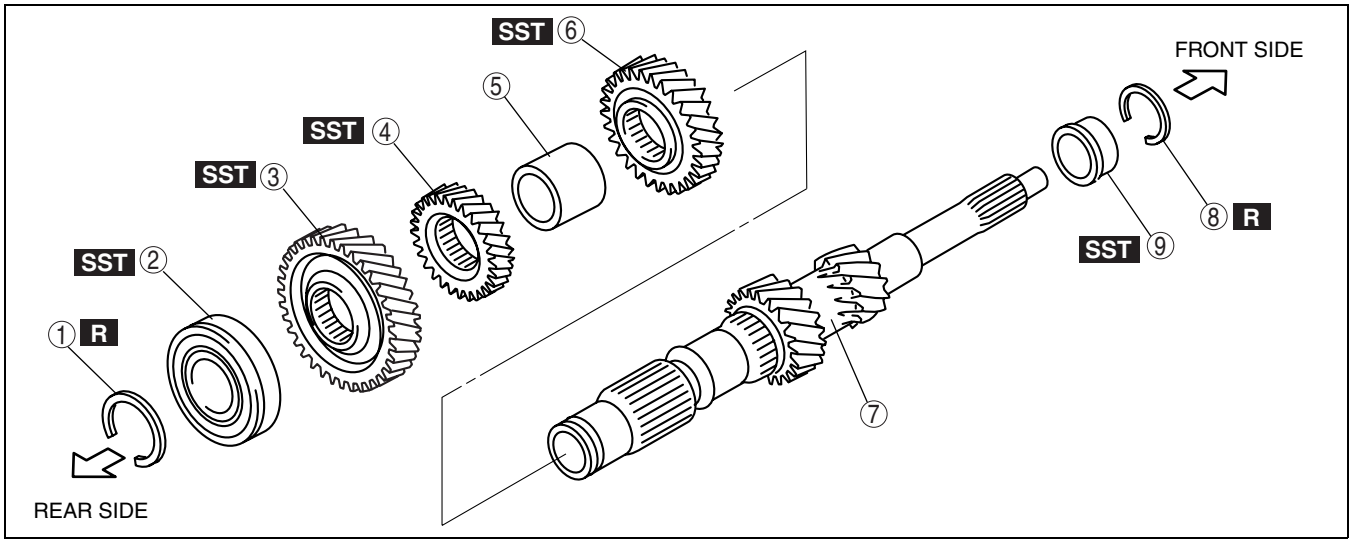


e6u515zmc175

PRIMARY SHAFT COMPONENTS DISASSEMBLY

e6u051517040102

1. Disassemble in the order shown in the figure.



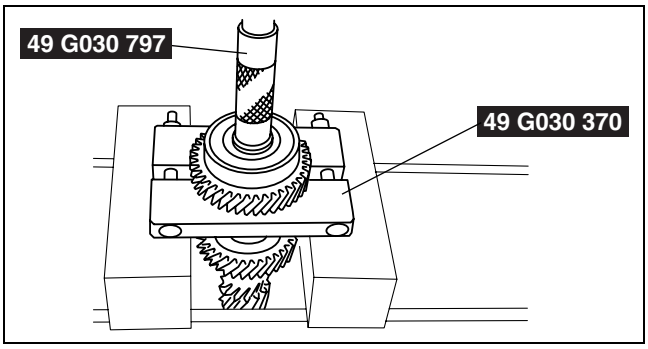
e6u515zmc018

1	Snap ring
2	Rear bearing (See 05-15-16 Rear Bearing and 6th Gear Disassembly Note.)
3	6th gear (See 05-15-16 Rear Bearing and 6th Gear Disassembly Note.)
4	3rd gear (See 05-15-16 3rd Gear Disassembly Note.)

5	Spacer
6	4th gear (See 05-15-17 4th Gear Disassembly Note.)
7	Primary shaft
8	Snap ring
9	Front bearing inner race (See 05-15-17 Front Bearing Inner Race Disassembly Note.)

Rear Bearing and 6th Gear Disassembly Note

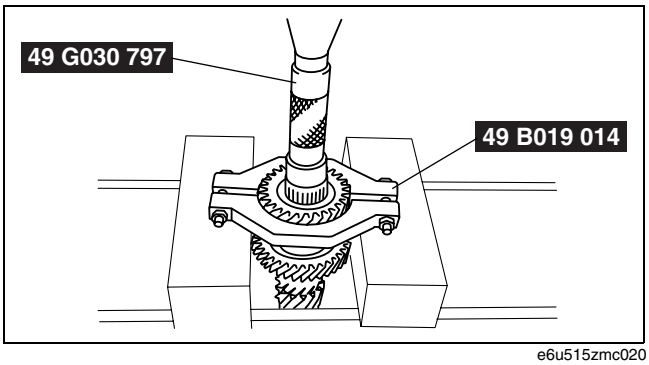
1. Remove the 6th gear and rear bearing at the same time using the **SSTs** and a press.



e6u515zmc019

3rd Gear Disassembly Note

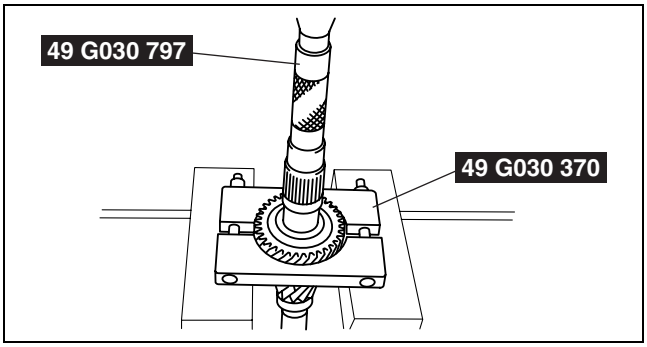
1. Remove the 3rd gear using the **SSTs** and a press.



e6u515zmc020

4th Gear Disassembly Note

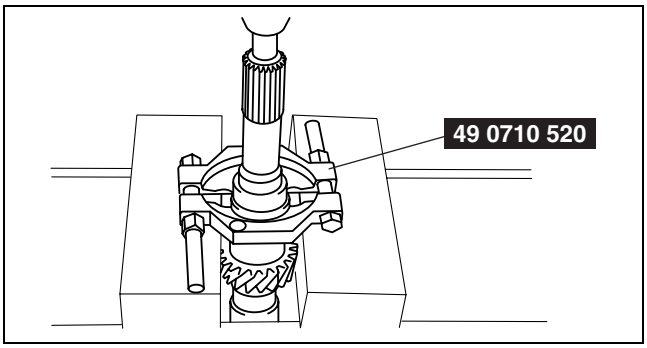
1. Remove the 4th gear using the **SSTs** and a press.



e6u515zmc021

Front Bearing Inner Race Disassembly Note

1. Remove the front bearing inner race using the **SST** and a press.



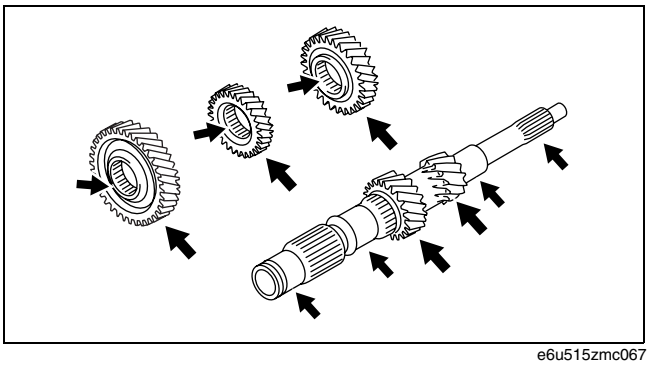
e6u515zmc022

PRIMARY SHAFT COMPONENTS INSPECTION

e6u051517040103

Primary Shaft and Gear Inspection

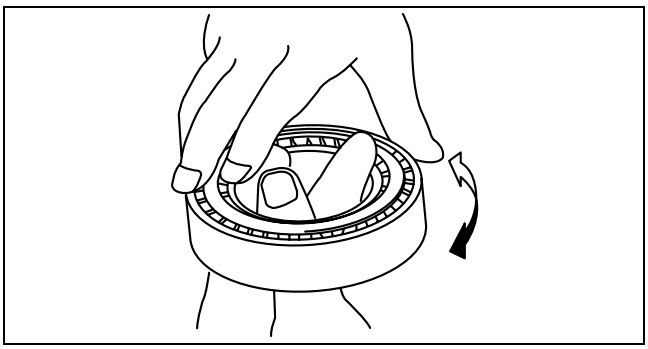
1. Inspect the shaft for damage, abnormal wear, dents, flaking, or bending.
   - If there is any malfunction, replace the shaft.
2. Inspect the gears for damage, abnormal wear, dents, flaking, or bending.
   - If there is any malfunction, replace the gear.



e6u515zmc067

Bearing Inspection

1. Verify that the bearing to rotates smoothly.
   - If there is any malfunction, replace the bearing.

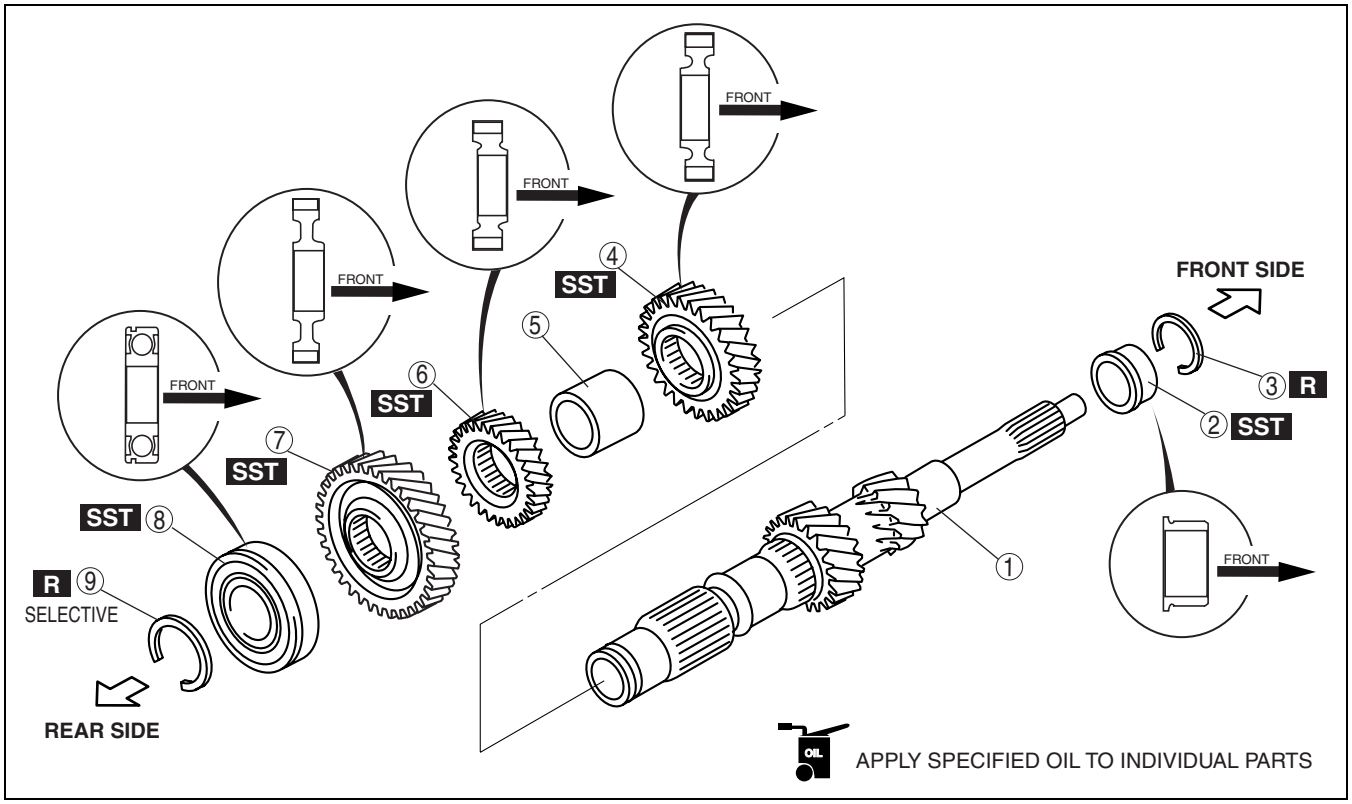


e6u515zmc097

PRIMARY SHAFT COMPONENTS ASSEMBLY

e6u051517040104

1. Assemble in the order shown in the figure.



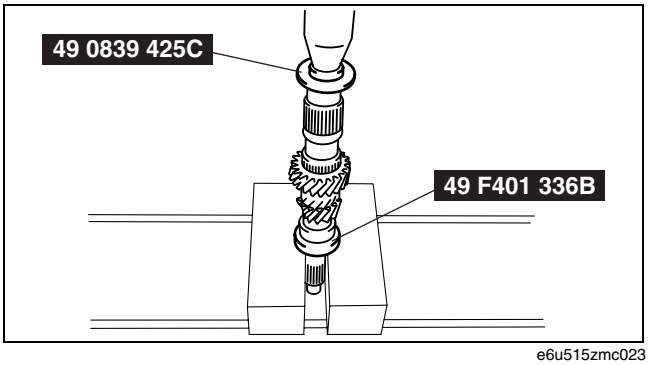
e6u515zmc057

1	Primary shaft
2	Front bearing inner race (See 05-15-19 Front Bearing Inner Race Assembly Note.)
3	Snap ring
4	4th gear (See 05-15-20 4th Gear Assembly Note.)
5	Spacer

6	3rd gear (See 05-15-20 3rd Gear Assembly Note.)
7	6th gear (See 05-15-20 6th Gear Assembly Note.)
8	Rear bearing (See 05-15-20 Rear Bearing Assembly Note.)
9	Snap ring (See 05-15-21 Rear Bearing Snap Ring Assembly Note.)

Front Bearing Inner Race Assembly Note

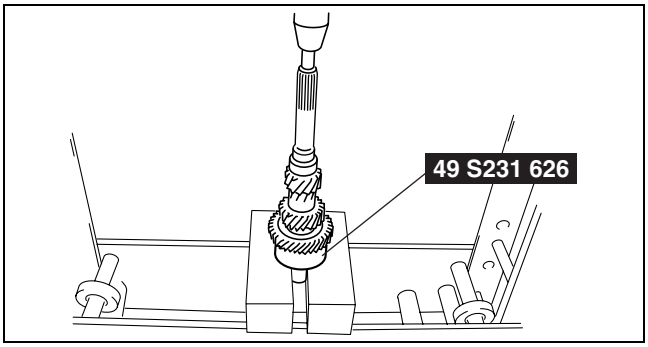
1. Assemble the front bearing inner race using the **SSTs** and a press.



e6u515zmc023

4th Gear Assembly Note

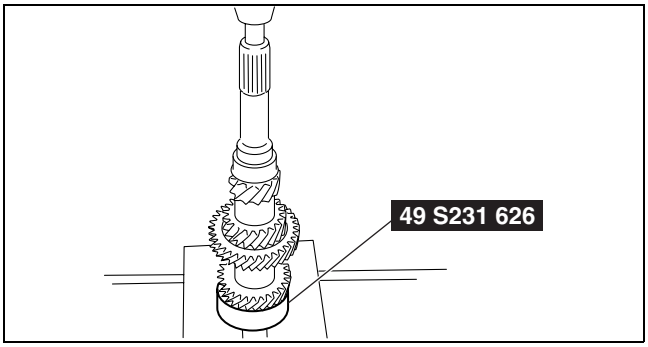
1. Install the 4th gear using the **SST** and a press.



e6u515zmc024

3rd Gear Assembly Note

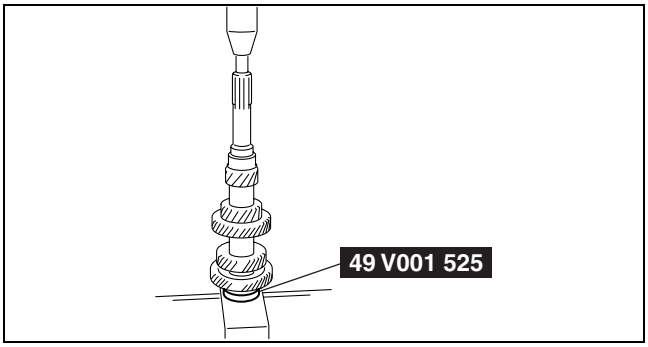
1. Install the 3rd gear using the **SST** and a press.



e6u515zmc087

6th Gear Assembly Note

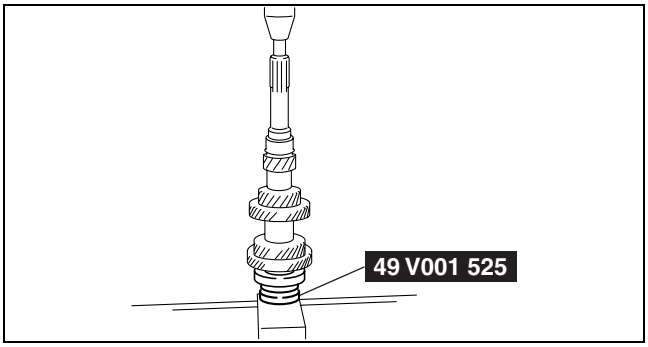
1. Install the 6th gear using the **SST** and a press.



e6u515zmc088

Rear Bearing Assembly Note

1. Install the rear bearing using the **SST** and a press.

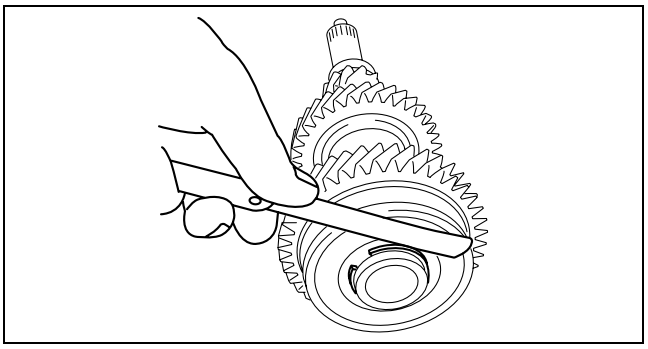


e6u515zmc089

Rear Bearing Snap Ring Assembly Note

1. Install a new snap ring to the primary shaft.
2. Measure the clearance between the snap ring and the rear bearing inner race.
   - If not within the specification, adjust it by selecting a proper snap ring from below.

Clearance between primary shaft rear bearing and snap ring
0.0—0.1 mm {0.0000—0.0039 in}



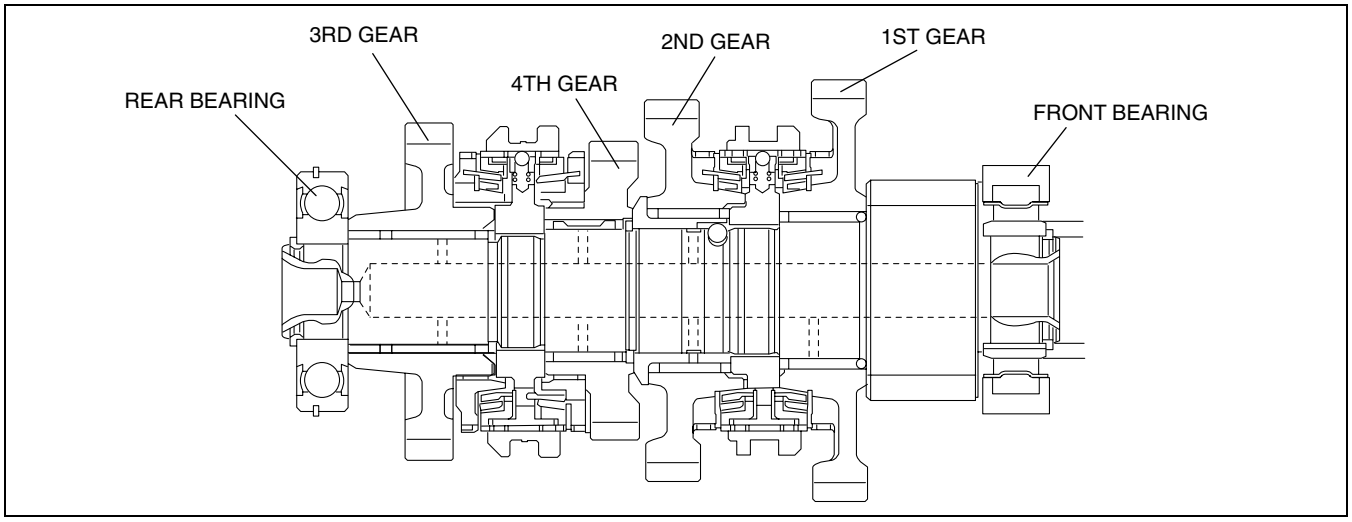
e6u515zmc090

Primary shaft rear bearing snap ring size

Identification mark	Thickness (mm {in})	Identification mark	Thickness (mm {in})
A	1.80 {0.071}	3	2.20 {0.087}
B	1.85 {0.073}	4	2.25 {0.089}
C	1.90 {0.075}	5	2.30 {0.091}
D	1.95 {0.077}	6	2.35 {0.093}
E	2.00 {0.079}	F	2.40 {0.094}
0	2.05 {0.081}	G	2.45 {0.096}
1	2.10 {0.083}	H	2.50 {0.098}
2	2.15 {0.085}	—	

SECONDARY SHAFT (NO.1) COMPONENTS PREINSPECTION

e6u051517040105



e6u515zmc091

Thrust Clearance Inspection

1. Measure the thrust clearance of each gear using a feeler gauge and a dial gauge.

Secondary shaft (NO.1) gear thrust clearance

(mm {in})

Gear	Thrust clearance
1st	0.10—0.35 {0.0039—0.0138}
2nd	0.11—0.46 {0.0044—0.0181}
3rd	0.11—0.54 {0.0044—0.0212}
4th	0.10—0.65 {0.0039—0.0255}

- If not within the specification, replace the malfunctioning parts.

Radial Clearance Inspection

1. Measure the radial clearance of each gear using a dial gauge.

Secondary shaft (NO.1) gear radial clearance

(mm {in})

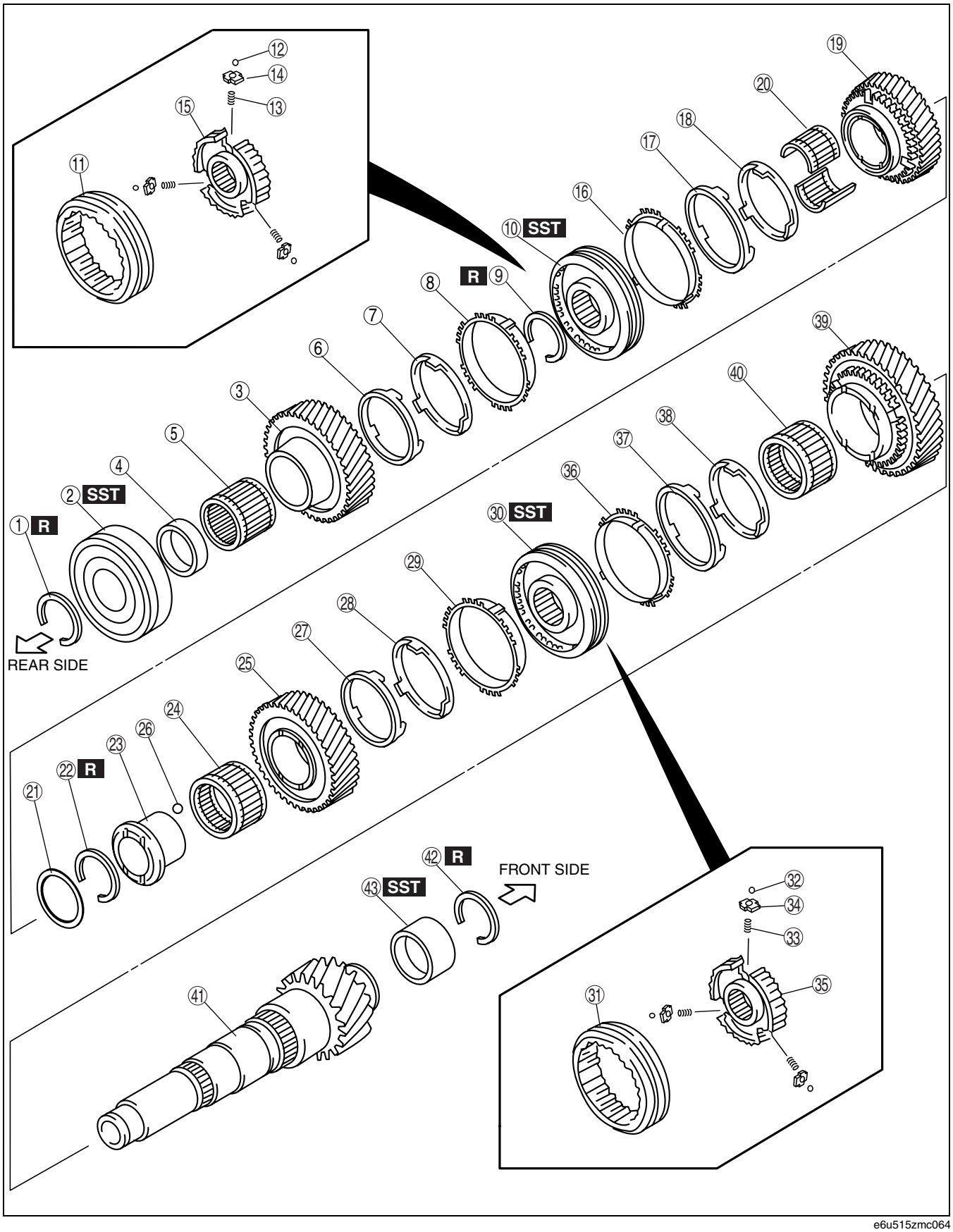
Gear	Radial clearance
1st	0.015—0.068 {0.00059—0.00267}
2nd	0.015—0.048 {0.00059—0.00188}
3rd	0.015—0.066 {0.00059—0.00259}
4th	0.015—0.066 {0.00059—0.00259}

- If not within the specification, replace the malfunctioning parts.

SECONDARY SHAFT (NO.1) COMPONENTS DISASSEMBLY

e6u051517040106

1. Disassemble in the order shown in the figure.



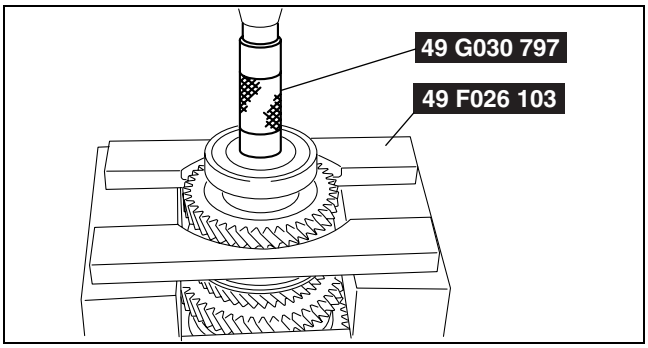
e6u515zmc064

1	Snap ring

2	Rear bearing (See 05-15-24 Rear Bearing and 3rd Gear Disassembly Note.)
3	3rd gear (See 05-15-24 Rear Bearing and 3rd Gear Disassembly Note.)
4	Spacer
5	3rd needle bearing
6	3rd inner ring
7	3rd middle ring
8	3rd synchronizer ring
9	Snap ring
10	3rd/4th clutch hub component (See 05-15-24 3rd/4th Clutch Hub Component and 4th Gear Disassembly Note.)
11	Clutch hub sleeve
12	Steel ball
13	Spring
14	Synchronizer key
15	Clutch hub
16	4th synchronizer ring
17	4th middle ring
18	4th inner ring
19	4th gear (See 05-15-24 3rd/4th Clutch Hub Component and 4th Gear Disassembly Note.)
20	4th needle bearing
21	Spacer
22	Snap ring
23	2nd bearing inner race
24	2nd needle bearing
25	2nd gear
26	Steel ball
27	2nd inner ring
28	2nd middle ring
29	2nd synchronizer ring
30	1st/2nd clutch hub component (See 05-15-25 1st/2nd Clutch Hub Component and 1st Gear Disassembly Note.)
31	Clutch hub sleeve
32	Steel ball
33	Spring
34	Synchronizer key
35	Clutch hub
36	1st synchronizer ring
37	1st middle ring
38	1st inner ring
39	1st gear (See 05-15-25 1st/2nd Clutch Hub Component and 1st Gear Disassembly Note.)
40	1st needle bearing
41	Secondary shaft (No.1)
42	Snap ring
43	Front bearing inner race (See 05-15-25 Front Bearing Inner Race Disassembly Note.)

Rear Bearing and 3rd Gear Disassembly Note

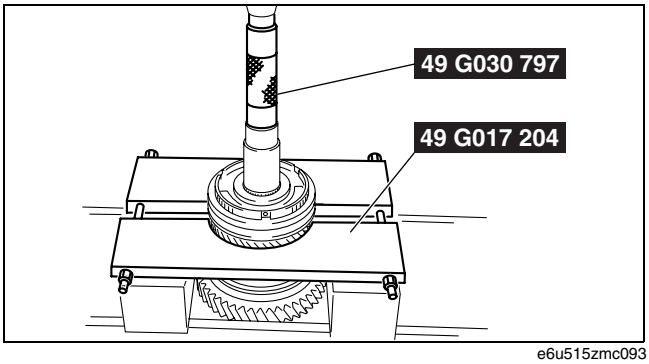
1. Remove the 3rd gear and rear bearing at the same time using the **SSTs**.



e6u515zmc092

3rd/4th Clutch Hub Component and 4th Gear Disassembly Note

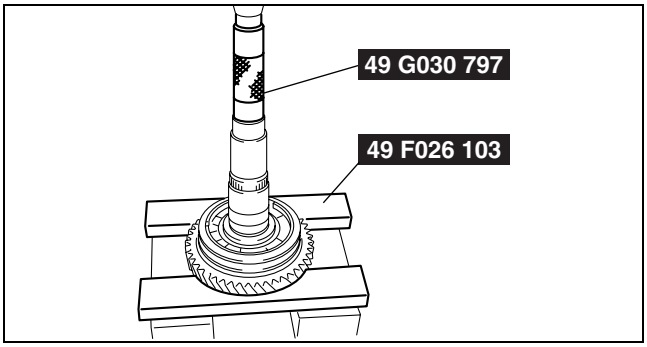
1. Remove the 4th gear and 3rd/4th clutch hub component at the same time using the **SSTs** and a press.



e6u515zmc093

1st/2nd Clutch Hub Component and 1st Gear Disassembly Note

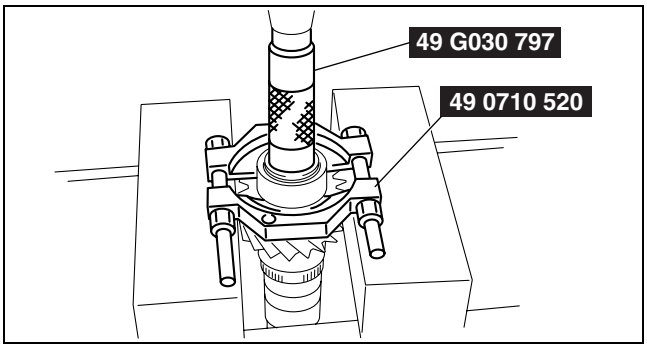
1. Remove the 1st gear and 1st/2nd clutch hub component at the same time using the **SSTs** and a press.



e6u515zmc094

Front Bearing Inner Race Disassembly Note

1. Remove the front bearing inner race using the **SSTs** and a press.



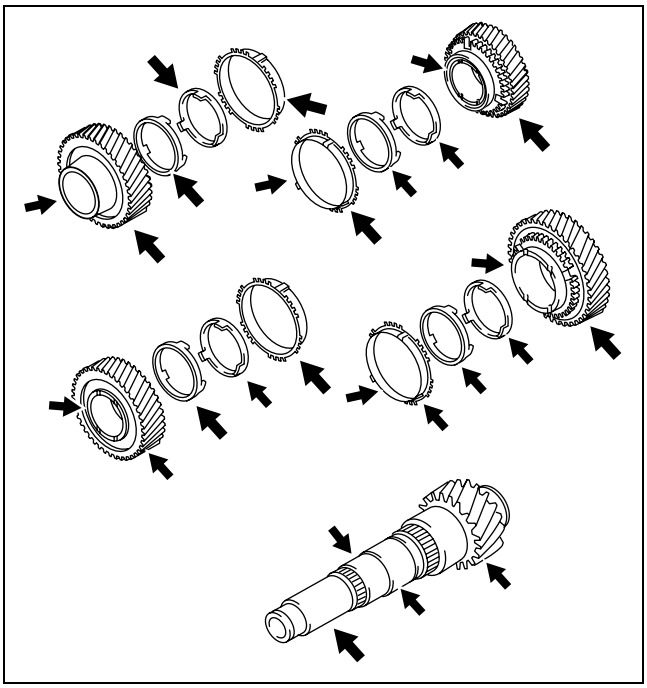
e6u515zmc095

SECONDARY SHAFT (NO.1) COMPONENTS INSPECTION

e6u051517040107

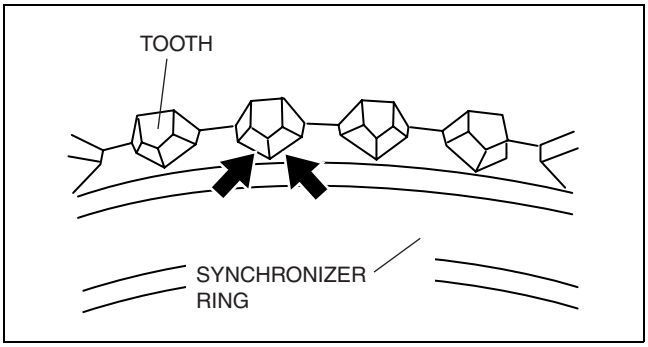
Synchronizer ring, Secondary Shaft (No.1) and Gear Inspection

1. Inspect the shaft for damage, abnormal wear, dents, flaking, or bending.
   - If there is any malfunction, replace the shaft.
2. Inspect the gears for damage, abnormal wear, dents, flaking, or bending.
   - If there is any malfunction, replace the gear.



e6u515zmc068

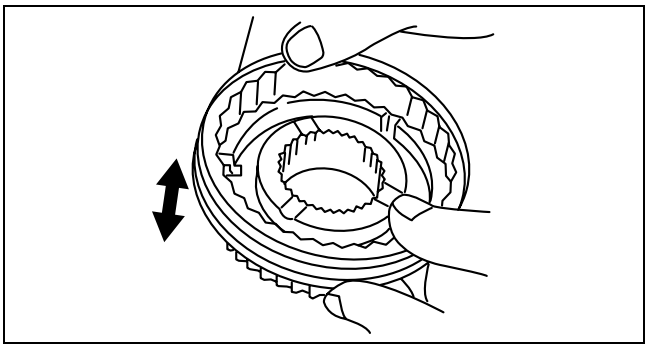
3. Inspect the synchronizer ring teeth and each rings for damage, abnormal wear, and cracks.
   - If there is a malfunction, replace the ring.
4. Inspect the tapered surface for abnormal wear and cracks.
   - If there is a malfunction, replace parts as necessary.
5. Inspect the oil passage for clogging.
   - If there is a malfunction, replace parts as necessary.



e6u515zmc069

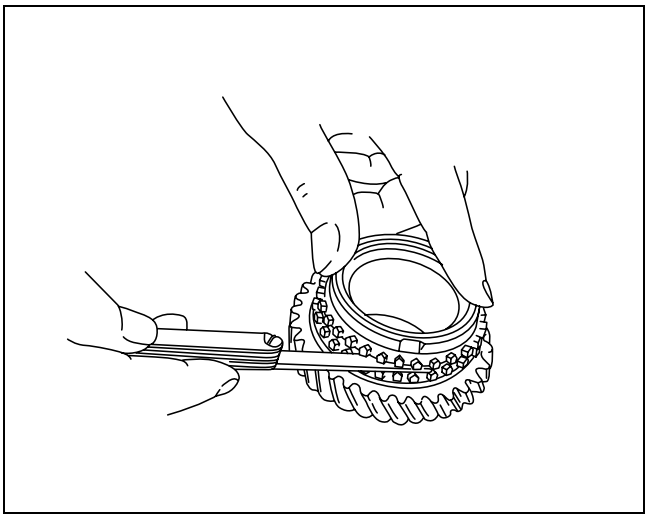
Clutch Hub Component Inspection

1. Verify that the clutch hub sleeve and clutch hub move smoothly.
   - If there is any malfunction, replace parts if necessary.


e6u515zmc096

Synchronizer Ring Clearance Inspection

1. Set the synchronizer ring evenly in the gear, and measure the clearance between the synchronizer ring and flank surface of the gear all around the circumference using a feeler gauge.


bhj0511m125

Synchronizer ring clearance

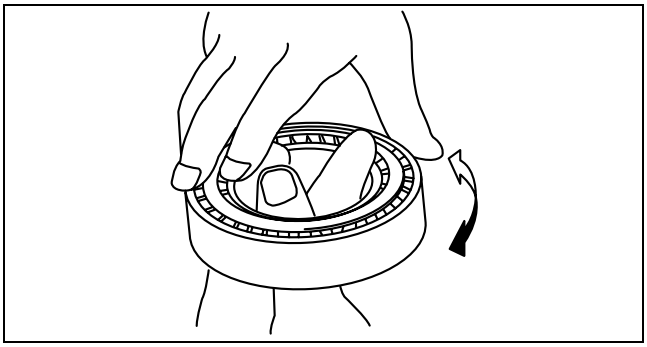
(mm {in})

Gear	Clearance
1st	0.98—1.82 {0.0386—0.0716}
2nd	1.08—1.92 {0.0426—0.0755}
3rd	1.00—2.00 {0.0394—0.0787}
4th	0.92—1.88 {0.0363—0.0740}

- If not within the specification, replace the synchronizer ring set.

Bearing Inspection

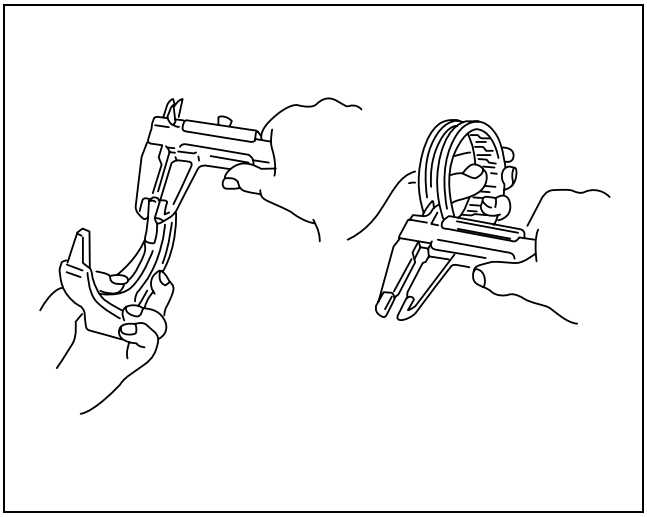
1. Verify that the bearing rotates smoothly.
   - If there is any malfunction, replace the bearing.



e6u515zmc097

Clutch Hub Sleeve and Shift Fork Inspection

1. Measure the shift fork thickness and the groove width of the clutch hub sleeve with a vernier caliper, and calculate the clearance.



bhj0511m128

Clutch hub sleeve and shift fork clearance

(mm {in})

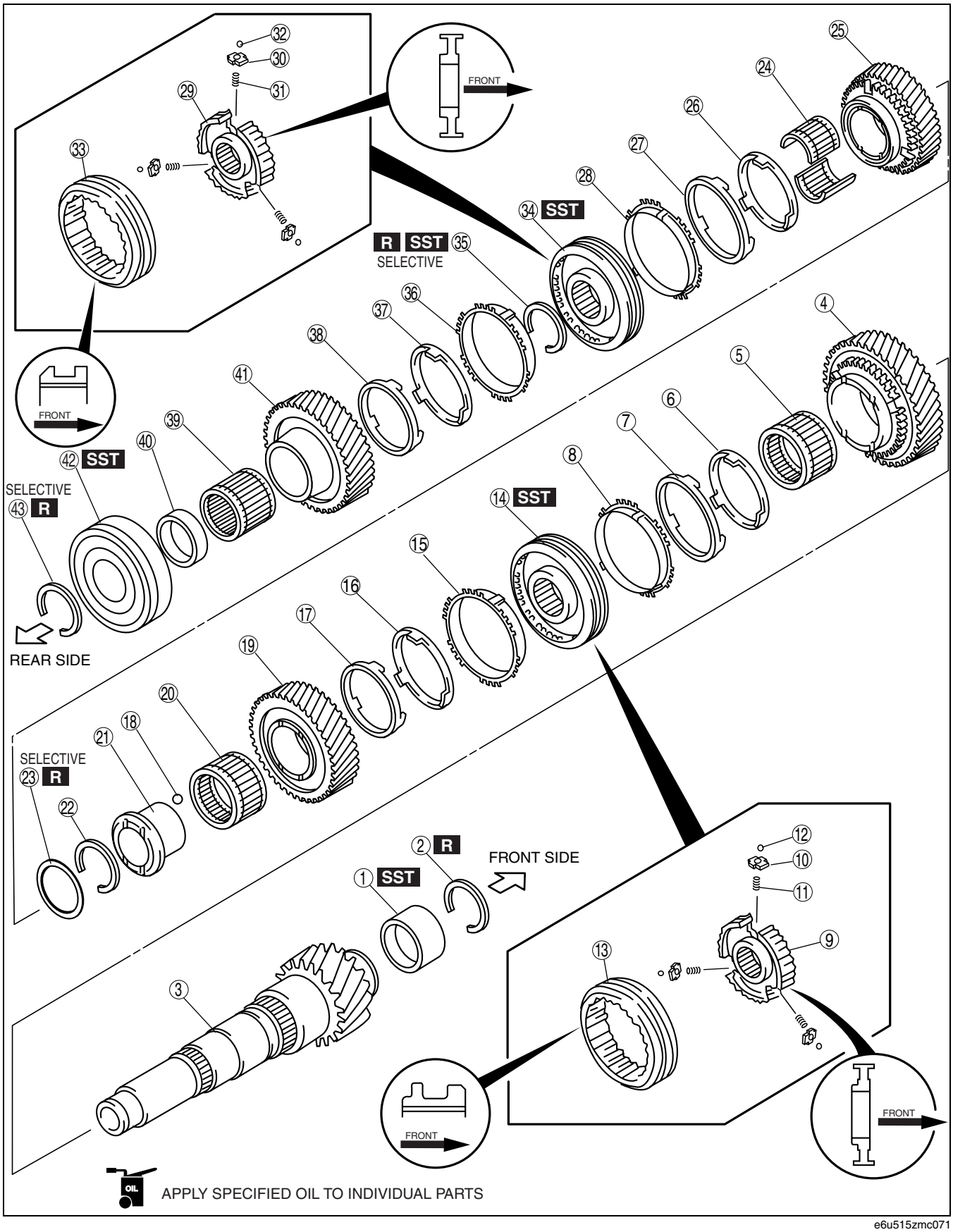
Gear	Clearance
1st/2nd	0.10—0.50 {0.0039—0.0196}
3rd/4th	

- If not within the specification, replace the clutch hub sleeve and shift fork.

SECONDARY SHAFT (NO.1) COMPONENTS ASSEMBLY

e6u051517040108

1. Assemble in the order shown in the figure.

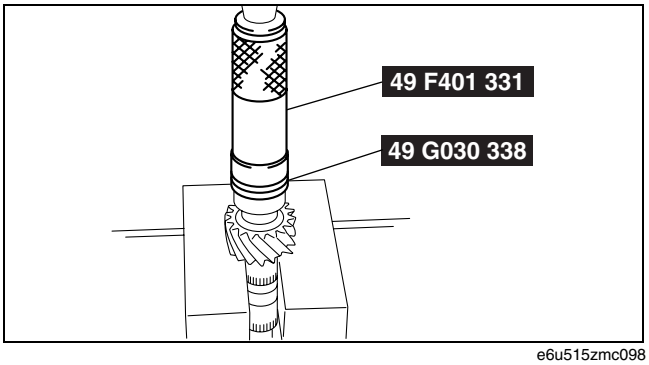


e6u515zmc071

1	Front bearing inner race (See 05-15-29 Front Bearing Inner Race Assembly Note.)
2	Snap ring
3	Secondary shaft (No.1)
4	1st gear (See 05-15-30 1st Gear, 1st Synchronizer Ring, 1st/2nd Clutch Hub Component Assembly Note.)
5	1st needle bearing
6	1st inner ring (See 05-15-30 1st Gear, 1st Synchronizer Ring, 1st/2nd Clutch Hub Component Assembly Note.)
7	1st middle ring (See 05-15-30 1st Gear, 1st Synchronizer Ring, 1st/2nd Clutch Hub Component Assembly Note.)
8	1st synchronizer ring (See 05-15-30 1st Gear, 1st Synchronizer Ring, 1st/2nd Clutch Hub Component Assembly Note.)
9	Clutch hub
10	Synchronizer key
11	Spring
12	Steel ball
13	Clutch hub sleeve
14	1st/2nd clutch hub component (See 05-15-30 1st Gear, 1st Synchronizer Ring, 1st/2nd Clutch Hub Component Assembly Note.)
15	2nd synchronizer ring (See 05-15-31 2nd Synchronizer Ring and 2nd Gear Assembly Note.)
16	2nd middle ring (See 05-15-31 2nd Synchronizer Ring and 2nd Gear Assembly Note.)
17	2nd inner ring (See 05-15-31 2nd Synchronizer Ring and 2nd Gear Assembly Note.)
18	Steel ball
19	2nd gear (See 05-15-31 2nd Synchronizer Ring and 2nd Gear Assembly Note.)
20	2nd needle bearing
21	2nd bearing inner race
22	Snap ring (See 05-15-31 2nd Bearing Inner Race Snap Ring Assembly Note.)
23	Spacer
24	4th needle bearing
25	4th gear (See 05-15-32 4th Gear, 4th Synchronizer Ring and 3rd/4th Clutch Hub Component Assembly Note.)
26	4th inner ring (See 05-15-32 4th Gear, 4th Synchronizer Ring and 3rd/4th Clutch Hub Component Assembly Note.)
27	4th middle ring (See 05-15-32 4th Gear, 4th Synchronizer Ring and 3rd/4th Clutch Hub Component Assembly Note.)
28	4th synchronizer ring (See 05-15-32 4th Gear, 4th Synchronizer Ring and 3rd/4th Clutch Hub Component Assembly Note.)
29	Clutch hub
30	Synchronizer key
31	Spring
32	Steel ball
33	Clutch hub sleeve
34	3rd/4th clutch hub component (See 05-15-32 4th Gear, 4th Synchronizer Ring and 3rd/4th Clutch Hub Component Assembly Note.)
35	Snap ring (See 05-15-33 3rd/4th Clutch Hub Snap Ring Assembly Note.)
36	3rd synchronizer ring (See 05-15-33 3rd Gear and 3rd Synchronizer Ring Assembly Note.)
37	3rd middle ring (See 05-15-33 3rd Gear and 3rd Synchronizer Ring Assembly Note.)
38	3rd inner ring (See 05-15-33 3rd Gear and 3rd Synchronizer Ring Assembly Note.)
39	3rd needle bearing
40	Spacer
41	3rd gear (See 05-15-33 3rd Gear and 3rd Synchronizer Ring Assembly Note.)
42	Rear bearing (See 05-15-33 Rear bearing Assembly Note.)
43	Snap ring (See 05-15-34 Rear Bearing Snap Ring Assembly Note.)

Front Bearing Inner Race Assembly Note

1. Install the front bearing inner race using the **SSTs** and a press.

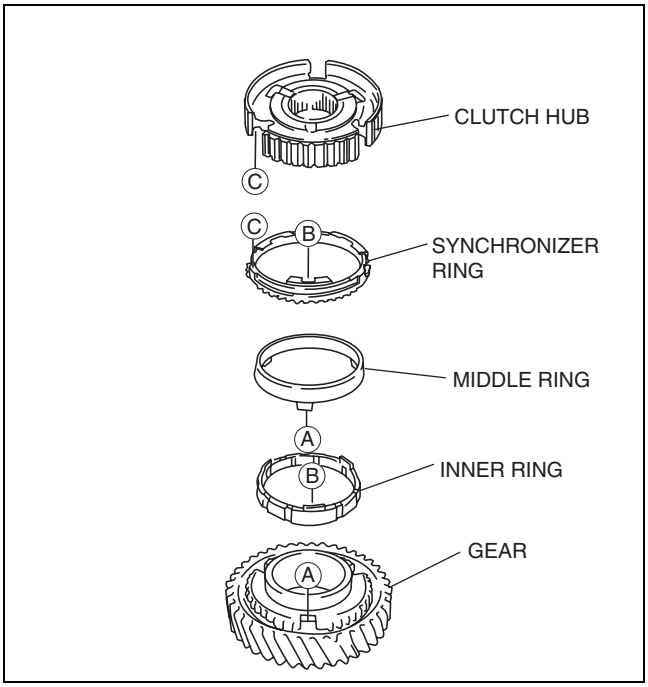


e6u515zmc098

1st Gear, 1st Synchronizer Ring, 1st/2nd Clutch Hub Component Assembly Note

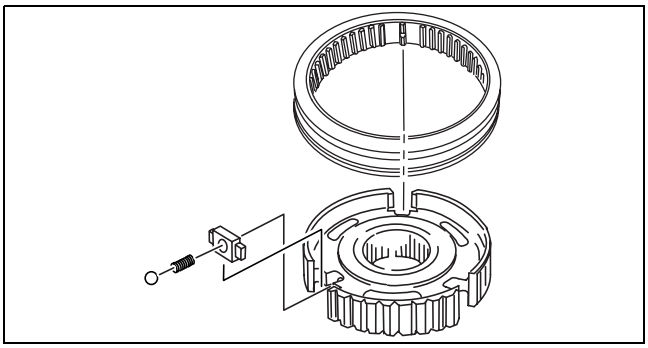
1. Place the 1st gear, 1st inner ring, 1st middle ring, 1st synchronizer ring, 1st/2nd clutch hub.

Caution
- **Align each clutch ring with the gear and clutch hub correctly.**



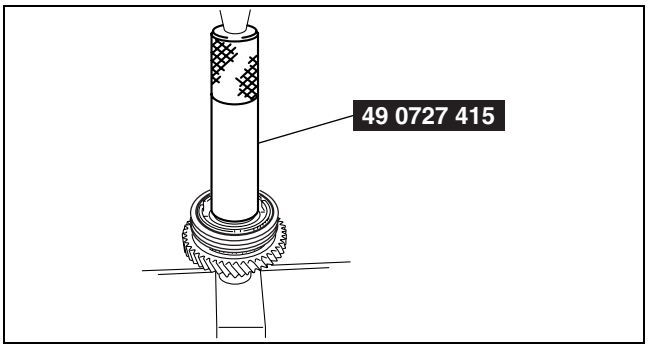
e6u515zmc061

2. Assemble the synchronizer key, spring, steel ball, and clutch hub sleeve as shown in the figure.



e6u515zmc132

3. Press fit the 1st/2nd clutch hub component using the **SST** and a press.



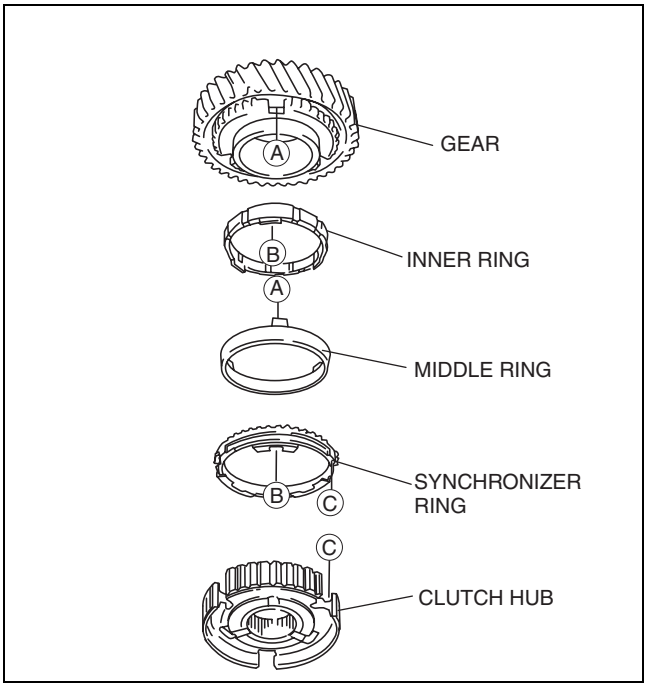
e6u515zmc099

2nd Synchronizer Ring and 2nd Gear Assembly Note

1. Place the 2nd synchronizer ring, 2nd middle ring, 2nd inner ring and 2nd gear.

Caution

- **Align each clutch ring with the gear and clutch hub correctly.**

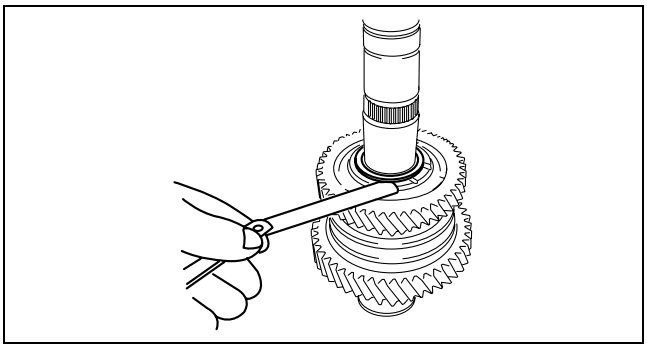


e6u515zmc077

2nd Bearing Inner Race Snap Ring Assembly Note

1. Install a new snap ring to the secondary shaft.
2. Measure the clearance between the 2nd inner race and the snap ring.
   - If not within the specification, adjust it by selecting a proper snap ring from below.

Clearance between secondary shaft (NO.1) 2nd bearing inner race and snap ring
0.0—0.1 mm {0.0000—0.0039 in}



e6u515zmc159

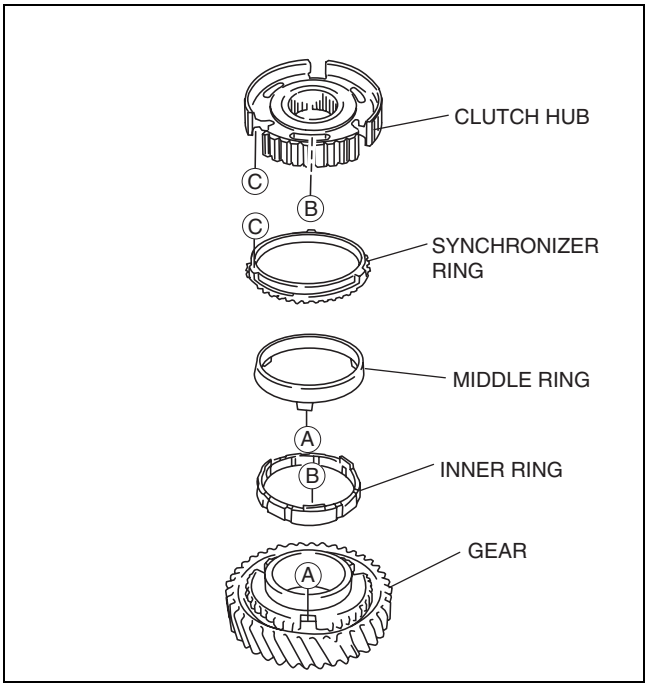
Secondary shaft (NO.1) 2nd bearing snap ring size

Identification mark	Thickness (mm {in})	Identification mark	Thickness (mm {in})
A	2.25 {0.089}	E	2.45 {0.096}
B	2.30 {0.091}	F	2.50 {0.098}
C	2.35 {0.093}	G	2.55 {0.100}
D	2.40 {0.094}	H	2.60 {0.102}

4th Gear, 4th Synchronizer Ring and 3rd/4th Clutch Hub Component Assembly Note

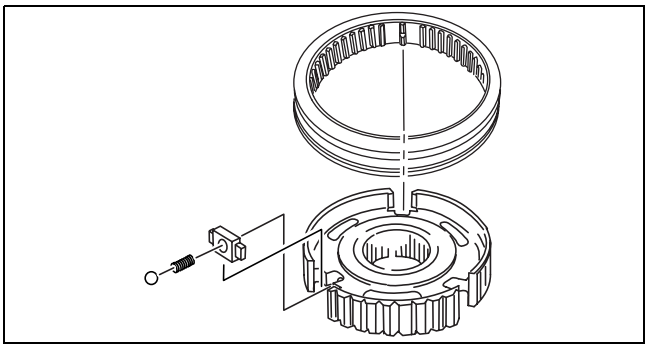
1. Place the 4th gear, 4th inner ring, 4th middle ring, 4th synchronizer ring and 3rd/4th clutch hub.

Caution
- **Align each clutch ring with the gear and clutch hub correctly.**



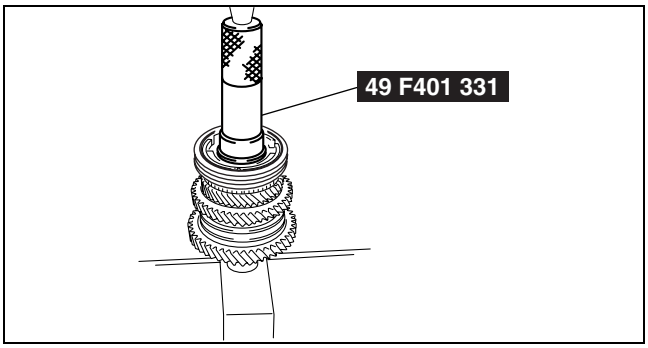
e6u515zmc130

2. Assemble the synchronizer key, spring, steel ball, and clutch hub sleeve as shown in the figure.



e6u515zmc132

3. Install the 3rd/4th clutch hub component using the **SST** and a press.

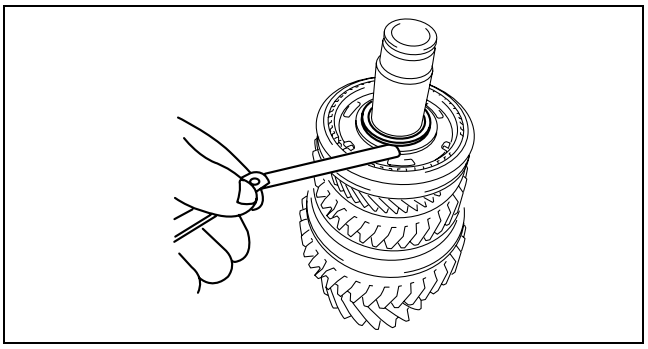


e6u515zmc100

3rd/4th Clutch Hub Snap Ring Assembly Note

1. Install a new snap ring to the secondary shaft.
2. Measure the clearance between the 3rd/4th clutch hub and the snap ring.
   - If not within the specification, adjust it by selecting a proper snap ring from below.

Clearance between 3rd/4th clutch hub and snap ring
0.0—0.1 mm {0.0000—0.0039 in}



e6u515zmc160

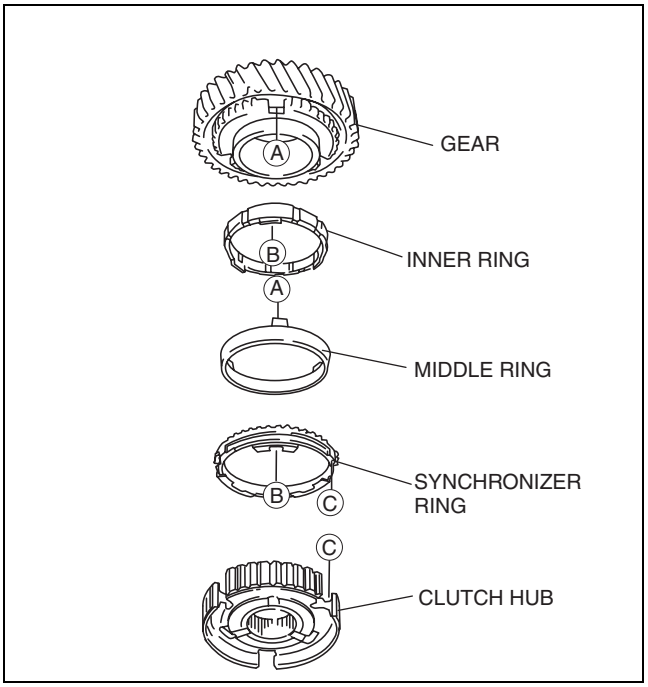
3rd/4th clutch hub snap ring size

Identification mark	Thickness (mm {in})	Identification mark	Thickness (mm {in})
1	2.25 {0.089}	4	2.40 {0.094}
2	2.30 {0.091}	5	2.45 {0.096}
3	2.35 {0.093}	6	2.50 {0.098}

3rd Gear and 3rd Synchronizer Ring Assembly Note

1. Place the 3rd synchronizer ring, 3rd middle ring, 3rd inner ring and 3rd gear.

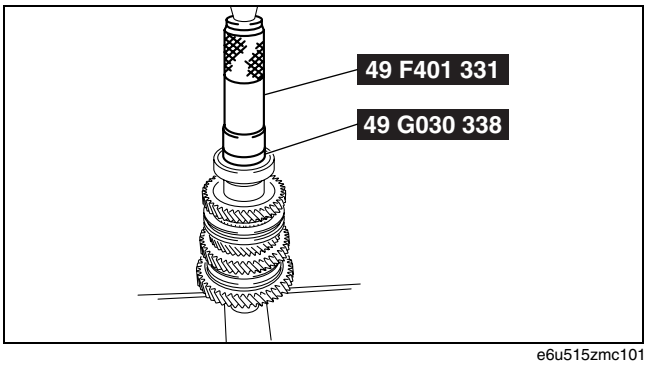
Caution
- **Align each clutch ring with the gear and clutch hub correctly.**



e6u515zmc077

Rear bearing Assembly Note

1. Install the rear bearing using the **SSTs** and a press.

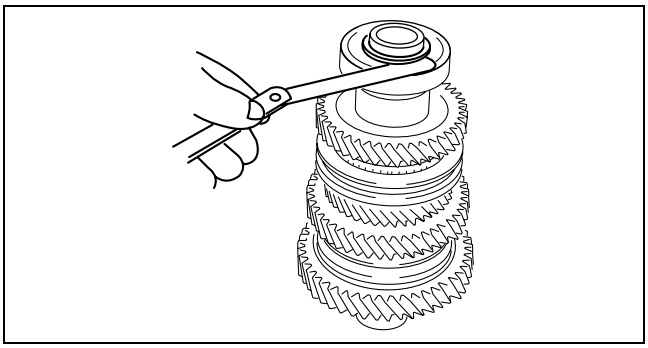


e6u515zmc101

Rear Bearing Snap Ring Assembly Note

1. Install a new snap ring to the secondary shaft.
2. Measure the clearance between the rear bearing inner race and the snap ring.
   - If not within the specification, adjust it by selecting a proper snap ring from below.

Clearance between secondary shaft (NO.1) rear bearing inner race and snap ring
0.0—0.1 mm {0.0000—0.0039 in}



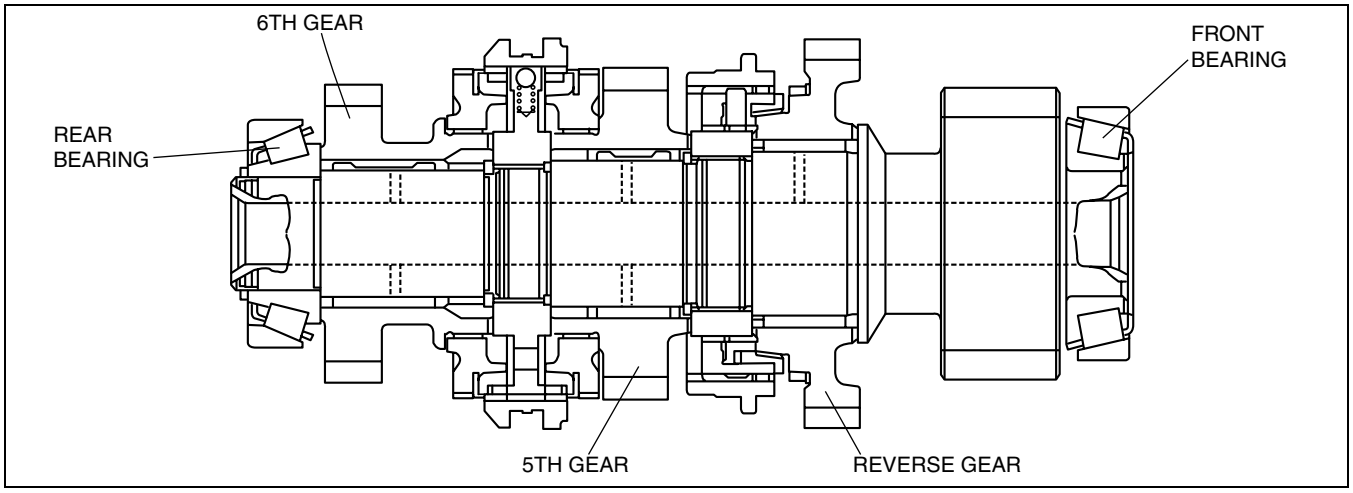
e6u515zmc161

Secondary shaft (NO.1) rear bearing inner race snap ring size

Identification mark	Thickness (mm {in})	Identification mark	Thickness (mm {in})
B	1.85 {0.073}	0	2.05 {0.081}
C	1.90 {0.075}	1	2.10 {0.083}
D	1.95 {0.077}	2	2.15 {0.085}
E	2.00 {0.079}	—	

SECONDARY SHAFT (NO.2) COMPONENTS PREINSPECTION

e6u051517040110



e6u515zmc147

Thrust Clearance Inspection

1. Measure the thrust clearance of each gear using a feeler gauge and a dial gauge.

Secondary shaft (NO.2) gear thrust clearance

(mm {in})

Gear	Thrust clearance
5th	0.10—0.55 {0.0039—0.0216}
6th	0.10—0.55 {0.0039—0.0216}
Reverse	0.11—0.34 {0.0043—0.0133}

- If not within the specification, replace the malfunctioning parts.

Radial Clearance Inspection

1. Measure the radial clearance of each gear using a dial gauge.

Secondary shaft (NO.2) gear radial clearance

(mm {in})

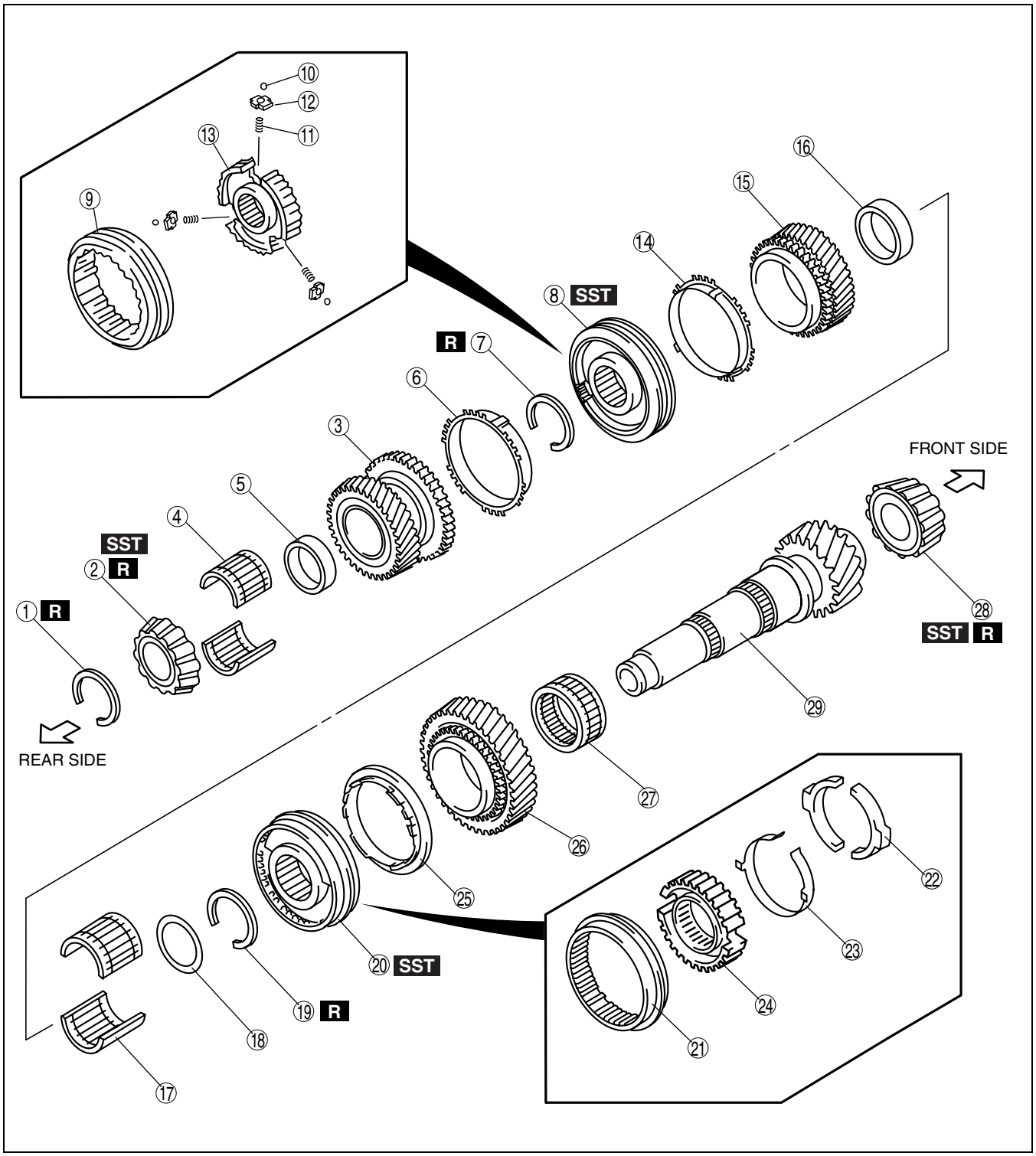
Gear	Radial clearance
5th	0.015—0.066 {0.00590—0.00259}
6th	0.015—0.066 {0.00590—0.00259}
Reverse	0.015—0.068 {0.00590—0.00267}

- If not within the specification, replace the malfunctioning parts.

SECONDARY SHAFT (NO.2) COMPONENTS DISASSEMBLY

e6u051517040111

1. Disassemble in the order shown in the figure.



e6u515zmc062

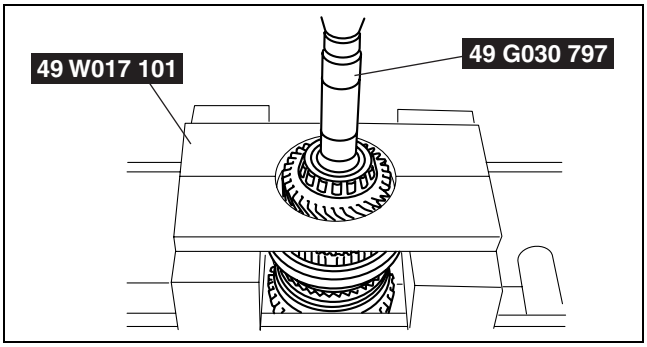
1	Snap ring
2	Rear bearing (See 05-15-37 Rear Bearing and 6th Gear Disassembly Note.)
3	6th gear (See 05-15-37 Rear Bearing and 6th Gear Disassembly Note.)
4	6th needle bearing

5	Spacer
6	6th synchronizer ring
7	Snap ring
8	5th/6th clutch hub component (See 05-15-37 5th Gear and 5th/6th Clutch Hub Disassembly Note.)
9	Clutch hub sleeve
10	Steel ball

11	Spring
12	Synchronizer key
13	Clutch hub
14	5th synchronizer ring
15	5th gear (See 05-15-37 5th Gear and 5th/6th Clutch Hub Disassembly Note.)
16	Spacer
17	5th needle bearing
18	Spacer
19	Snap ring
20	Reverse clutch hub component (See 05-15-37 Reverse Gear and Reverse Clutch Hub Disassembly Note.)
21	Clutch hub sleeve
22	Synchronizer key
23	Spring
24	Clutch hub
25	Reverse synchronizer ring
26	Reverse gear (See 05-15-37 Reverse Gear and Reverse Clutch Hub Disassembly Note.)
27	Reverse needle bearing
28	Front bearing (See 05-15-38 Front Bearing Disassembly Note.)
29	Secondary shaft (No.2)

Rear Bearing and 6th Gear Disassembly Note

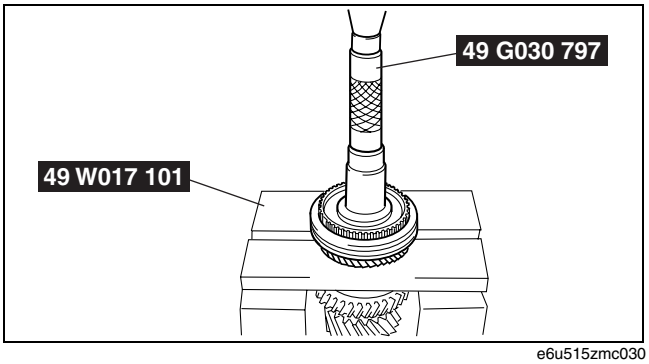
1. Using the **SST** and a press, remove the 6th gear and rear bearing at the same time.



e6u515zmc026

5th Gear and 5th/6th Clutch Hub Disassembly Note

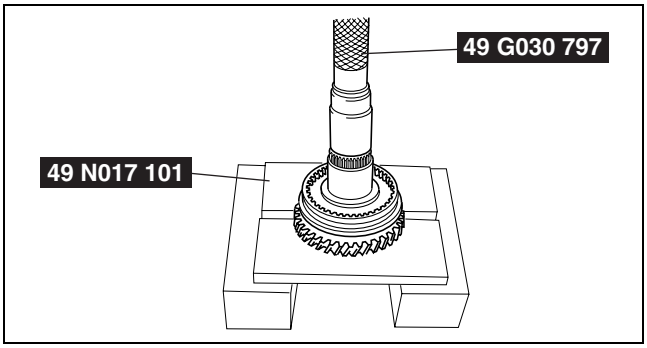
1. Using the **SST** and a press, remove the 5th gear and 5th/6th clutch hub at the same time.



e6u515zmc030

Reverse Gear and Reverse Clutch Hub Disassembly Note

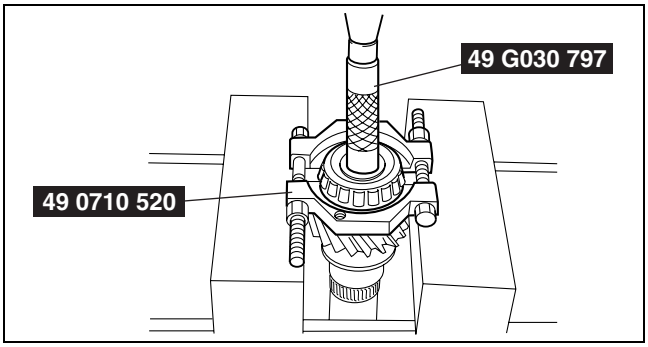
1. Using the **SST** and a press, remove the reverse gear and reverse clutch hub at the same time.



e6u515zmc032

Front Bearing Disassembly Note

1. Using the **SST** and a press, remove the front bearing.



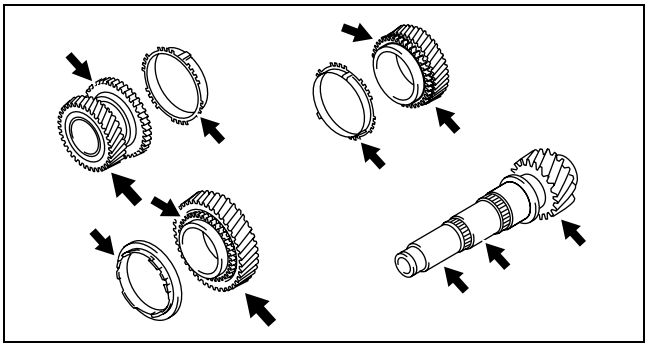
e6u515zmc034

SECONDARY SHAFT (NO.2) COMPONENTS INSPECTION

e6u051517040112

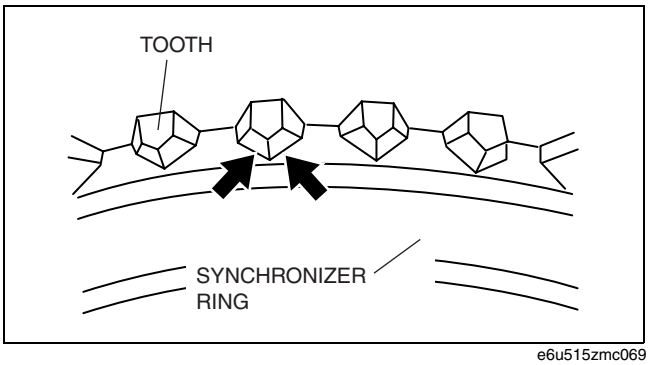
Synchronizer Ring, Secondary Shaft (No.2) and Gear Inspection

1. Inspect the shaft for damage, abnormal wear, dents, flaking, or bending.
   - If there is a malfunction, replace the shaft.
2. Inspect the gears for damage, abnormal wear, dents, flaking, or bending.
   - If there is any malfunction, replace the gear.
3. Inspect the oil passage for clogging.
   - If there is any malfunction, replace parts if necessary.
4. Inspect the tapered surface for abnormal wear and cracks.
   - If there is any malfunction, replace parts if necessary.



e6u515zmc070

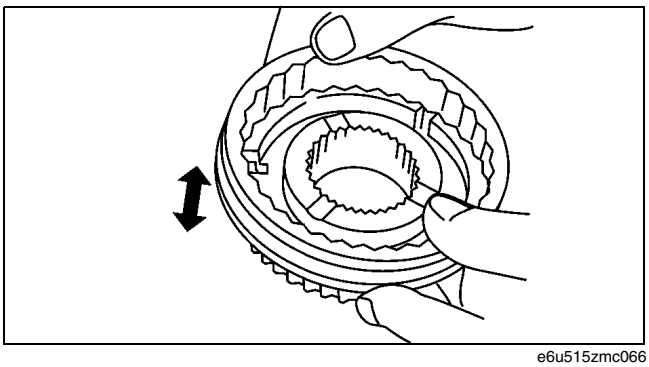
5. Inspect the synchronizer ring teeth and grooves for damage, abnormal wear, and cracks.
   - If there is any malfunction, replace the synchronizer ring.



e6u515zmc069

Clutch Hub Component Inspection

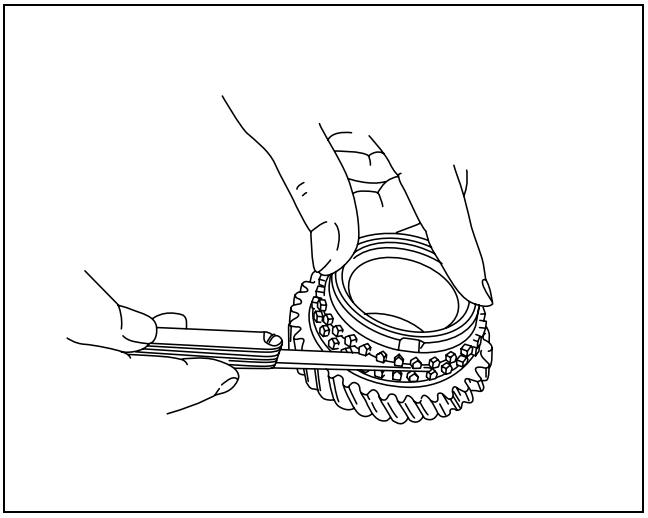
1. Verify that the clutch hub sleeve and clutch hub move smoothly.
   - If there is any malfunction, replace parts if necessary.



e6u515zmc066

Synchronizer Ring Clearance Inspection

1. Set the synchronizer ring evenly in the gear, and measure the clearance between the synchronizer ring and flank surface of the gear all around the circumference using a feeler gauge.



bhj0511m125

Synchronizer Ring clearance

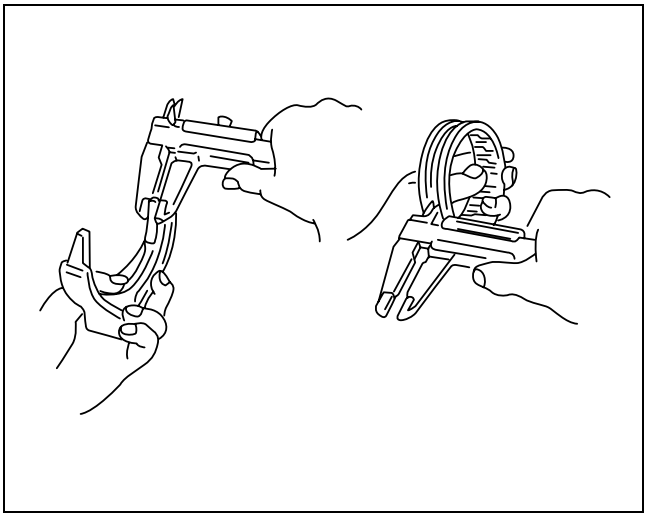
(mm {in})

Gear	Clearance
5th, 6th	0.80—1.60 {0.0315—0.0629}
Reverse	0.68—1.32 {0.0268—0.0519}

- If not within the specification, replace the synchronizer ring.

Clutch Hub Sleeve and Shift Fork Inspection

1. Measure the shift fork thickness (or groove width) and the groove width (or thickness) of the clutch hub sleeve with a vernier caliper, and calculate the clearance.



bhj0511m128

Clutch hub sleeve and shift fork clearance

(mm {in})

Gear	Clearance
5th/6th	0.10—1.50 {0.0039—0.0590}
Reverse	0.15—0.41 {0.0059—0.0161}

- If not within the specification, replace the clutch hub sleeve and shift fork.

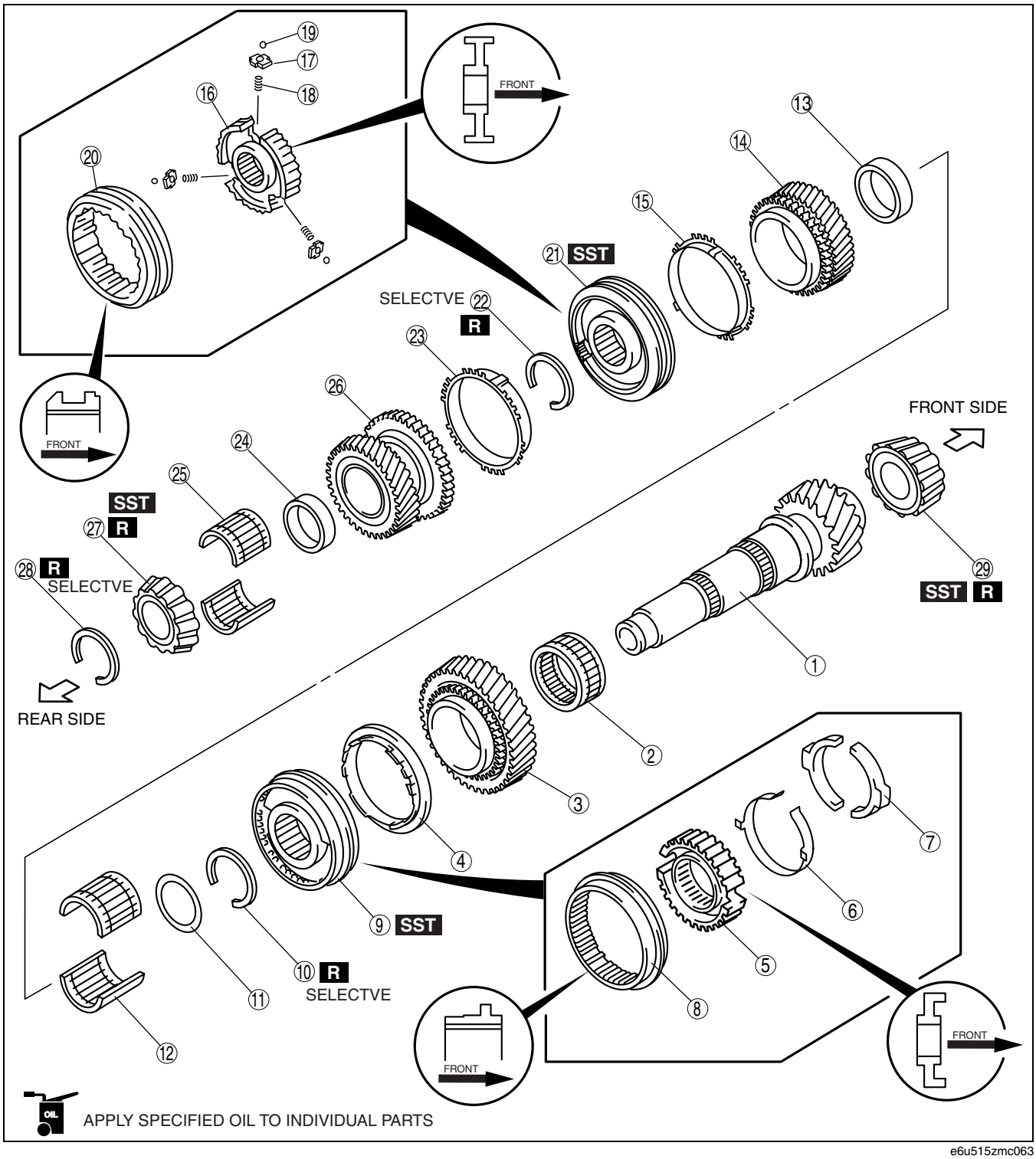
SECONDARY SHAFT (NO.2) COMPONENTS ASSEMBLY

e6u051517040113

Caution

- **Do not place the front bearing facing downward on a workbench after assembling the secondary shaft (NO.2) component. It may cause damage to the bearing roller guide.**

1. Assemble in the order shown in the figure.



e6u515zmc063

1	Secondary shaft (No.2)
2	Reverse needle bearing
3	Reverse gear
4	Reverse synchronizer ring

5	Clutch hub
6	Spring
7	Synchronizer key
8	Clutch hub sleeve

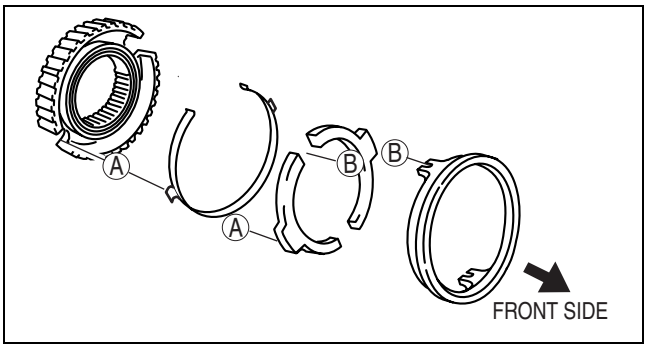
9	Reverse clutch hub component (See 05-15-41 Reverse Synchronizer Ring and Reverse Clutch Hub Component Assembly Note.)
10	Snap ring (See 05-15-42 Reverse Clutch Hub Snap Ring Assembly Note.)
11	Spacer
12	5th needle bearing
13	Spacer
14	5th gear
15	5th synchronizer ring
16	Clutch hub
17	Synchronizer key
18	Spring
19	Steel ball
20	Clutch hub sleeve

21	5th/6th clutch hub component (See 05-15-42 5th Synchronizer Ring and 5th/6th Clutch Hub Component Assembly Note.)
22	Snap ring (See 05-15-43 5th/6th Clutch Hub Snap Ring Assembly Note.)
23	6th synchronizer ring
24	Spacer
25	6th needle bearing
26	6th gear
27	Rear bearing (See 05-15-43 Rear Bearing Assembly Note.)
28	Snap ring (See 05-15-44 Rear Bearing Snap ring Assembly Note.)
29	Front bearing (See 05-15-44 Front Bearing Assembly Note.)

Reverse Synchronizer Ring and Reverse Clutch Hub Component Assembly Note

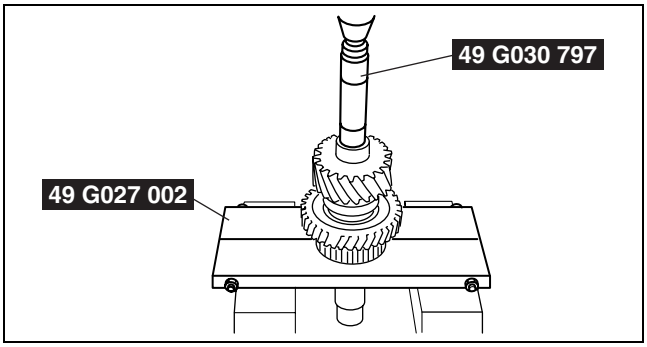
1. Assemble the reverse synchronizer ring, synchronizer key, key spring, and reverse clutch hub.

   Caution
   - **Verify that the synchronizer ring, key, spring, and clutch hub are properly positioned.**



e6u515zmc036

2. Using the **SST** and a press, install the reverse clutch hub component.

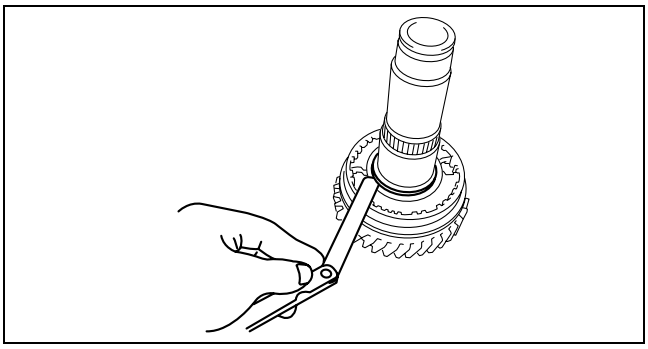


e6u515zmc037

Reverse Clutch Hub Snap Ring Assembly Note

1. Install a new snap ring.
2. Measure the clearance between the reverse clutch hub and snap ring.
   - If not within the specification, select a suitable snap ring from the table below so that the clearance is within the specification.

Clearance between reverse clutch hub and snap ring
0.0—0.1 mm {0.0000—0.0039 in}



e6u515zmc038

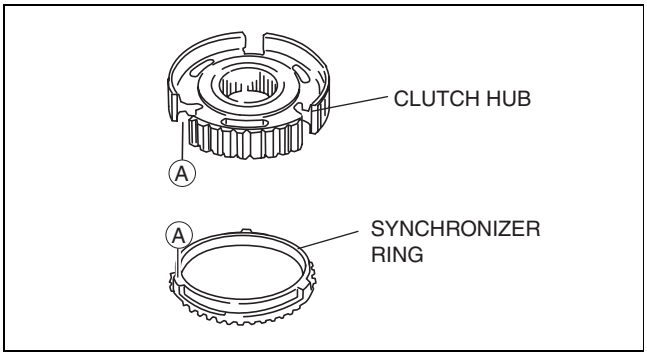
Reverse clutch hub snap ring size

Identification mark	Thickness (mm {in})	Identification mark	Thickness (mm {in})
A	2.25 {0.089}	E	2.45 {0.096}
B	2.30 {0.091}	F	2.50 {0.098}
C	2.35 {0.093}	G	2.55 {0.100}
D	2.40 {0.094}	H	2.60 {0.102}

5th Synchronizer Ring and 5th/6th Clutch Hub Component Assembly Note

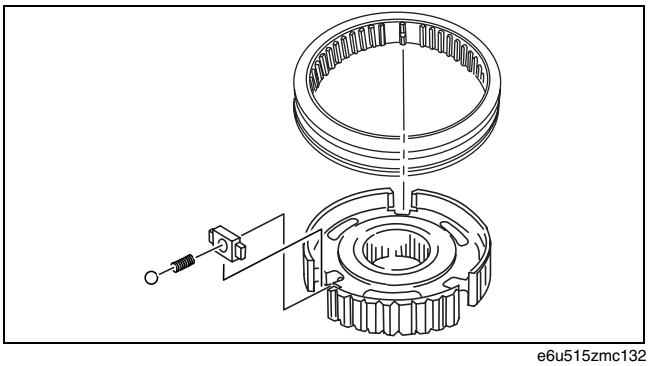
1. Install the 5th synchronizer ring and 5th/6th clutch hub.

Caution
- **Verify that the synchronizer ring and clutch hub are properly positioned.**



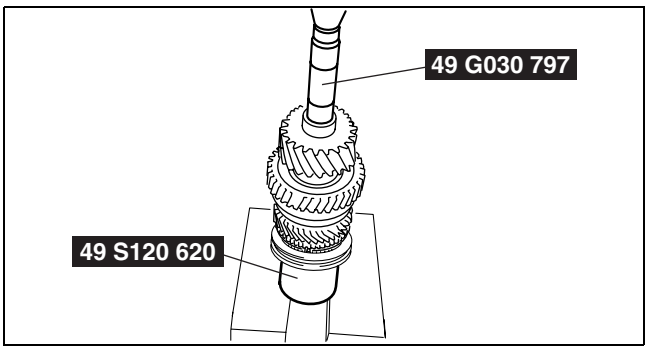
e6u515zmc139

2. Assemble the synchronizer key, spring, steel ball, and clutch hub sleeve as shown in the figure.



e6u515zmc132

3. Using the **SST** and a press, install the 5th/6th clutch hub component.

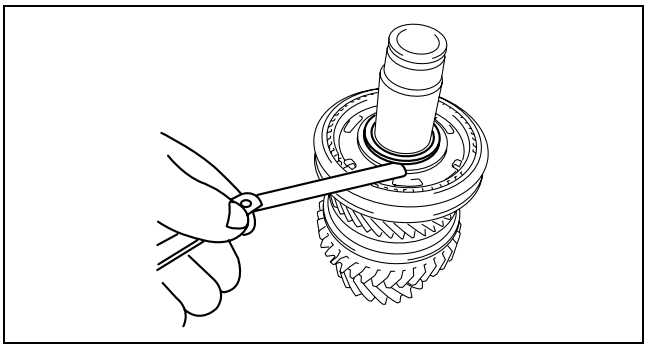


e6u515zmc039

5th/6th Clutch Hub Snap Ring Assembly Note

1. Install a new snap ring to the secondary shaft.
2. Measure the clearance between the snap ring and the 5th/6th clutch hub.
   - If not within the specification, adjust it by selecting a proper snap ring from below.

Clearance between 5th/6th clutch hub and snap ring
0.0—0.1 mm {0.0000—0.0039 in}



e6u515zmc040

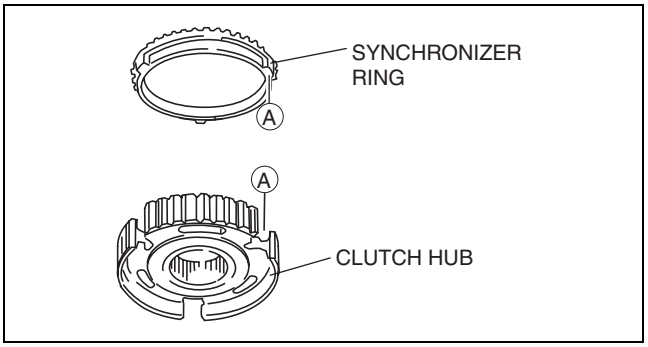
5th/6th clutch hub snap ring size

Identification mark	Thickness (mm {in})	Identification mark	Thickness (mm {in})
1	2.25 {0.089}	4	2.40 {0.094}
2	2.30 {0.091}	5	2.45 {0.096}
3	2.35 {0.093}	6	2.50 {0.098}

6th Synchronizer Ring Assembly Note

1. Place the 6th synchronizer ring.

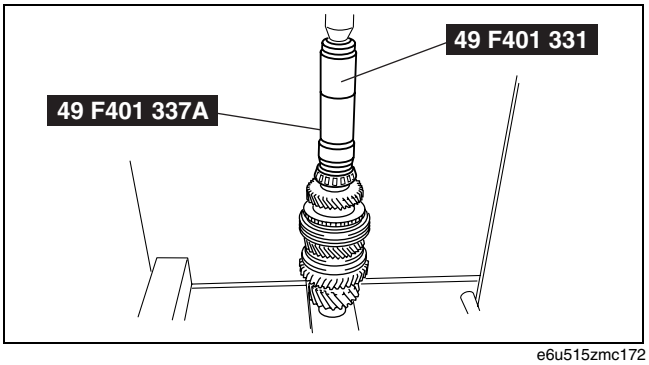
Caution
- **Verify that the synchronizer ring and clutch hub are properly positioned.**



e6u515zmc150

Rear Bearing Assembly Note

1. Install the **SSTs** and a press, and assemble the rear bearing.

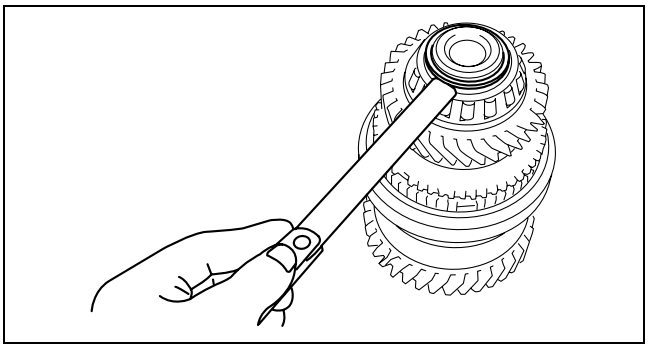


e6u515zmc172

Rear Bearing Snap ring Assembly Note

1. Install a new snap ring to the secondary shaft.
2. Measure the clearance between the snap ring and the rear bearing inner race.
   - If not within the specification, adjust it by selecting a proper snap ring from below.

Clearance between secondary shaft (NO.2) rear bearing inner race and snap ring
0.0—0.1 mm {0.0000—0.0039 in}



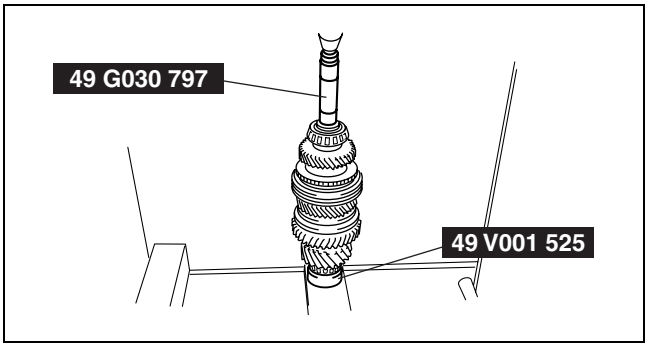
e6u515zmc042

Secondary shaft (NO.2) rear bearing inner race snap ring size

Identification mark	Thickness (mm {in})	Identification mark	Thickness (mm {in})
B	1.85 {0.073}	0	2.05 {0.081}
C	1.90 {0.075}	1	2.10 {0.083}
D	1.95 {0.077}	2	2.15 {0.085}
E	2.00 {0.079}	—	

Front Bearing Assembly Note

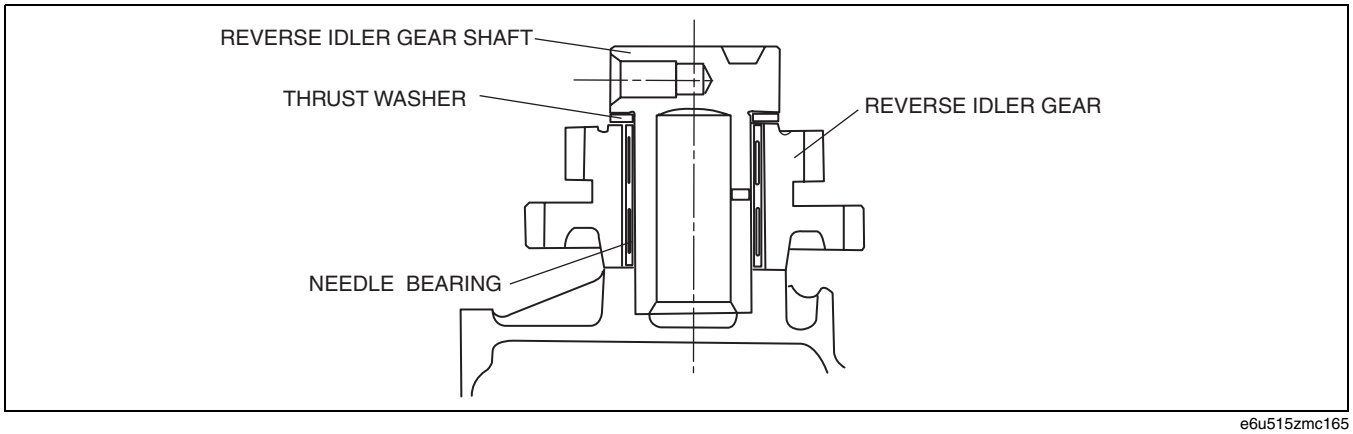
1. Using the **SST** and a press, install the front bearing.



e6u515zmc173

REVERSE IDLER GEAR SHAFT COMPONENTS INSPECTION

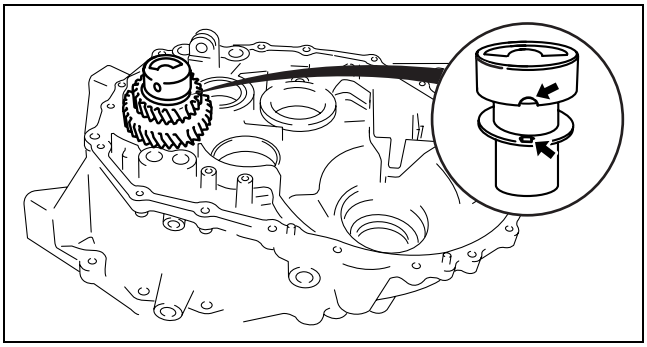
e6u051517040115



e6u515zmc165

Thrust and Radial Clearance Inspection

1. Align the thrust washer rotation lock projection and reverse idle gear shaft groove position as shown in the figure, and install the reverse idle gear shaft component to the clutch housing.
2. Measure the thrust clearance of the reverse idler gear using a dial gauge.



e6u515zmc166

Reverse idler gear thrust clearance

(mm {in})

Gear	Thrust clearance
Reverse idler gear	0.40—1.05 {0.0158—0.0413}

- If not within the specification, replace the malfunctioning parts.

3. Measure the radial clearance of the reverse idler gear using a dial gauge.

Reverse idler gear radial clearance

(mm {in})

Gear	Radial clearance
Reverse idler gear	0.015—0.048 {0.00059—0.00188}

- If not within the specification, replace the malfunctioning parts.

Reverse Idler Gear and Shaft Inspection

1. Inspect the shaft for damage, abnormal wear, dents, flaking, or bending.
   - If there is a malfunction, replace the shaft.
2. Inspect the gears for damage, abnormal wear, dents, flaking, or bending.
   - If there is a malfunction, replace the gear.

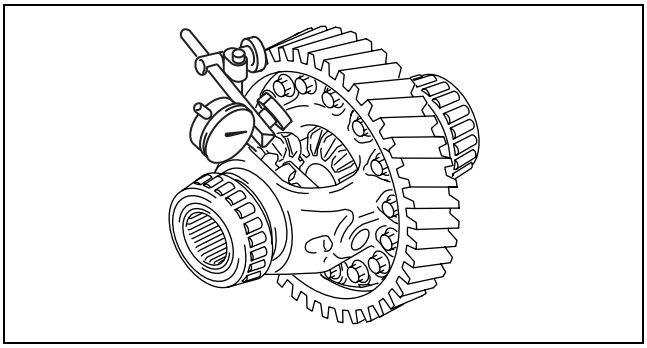
DIFFERENTIAL PREINSPECTION

e6u051527100101

Backlash Inspection

1. Measure the backlash of the side gear.
   - If not as specified, replace the differential gear case component.

   Differential side gear backlash standard
   0.05—0.20 mm {0.0019—0.0078 in}

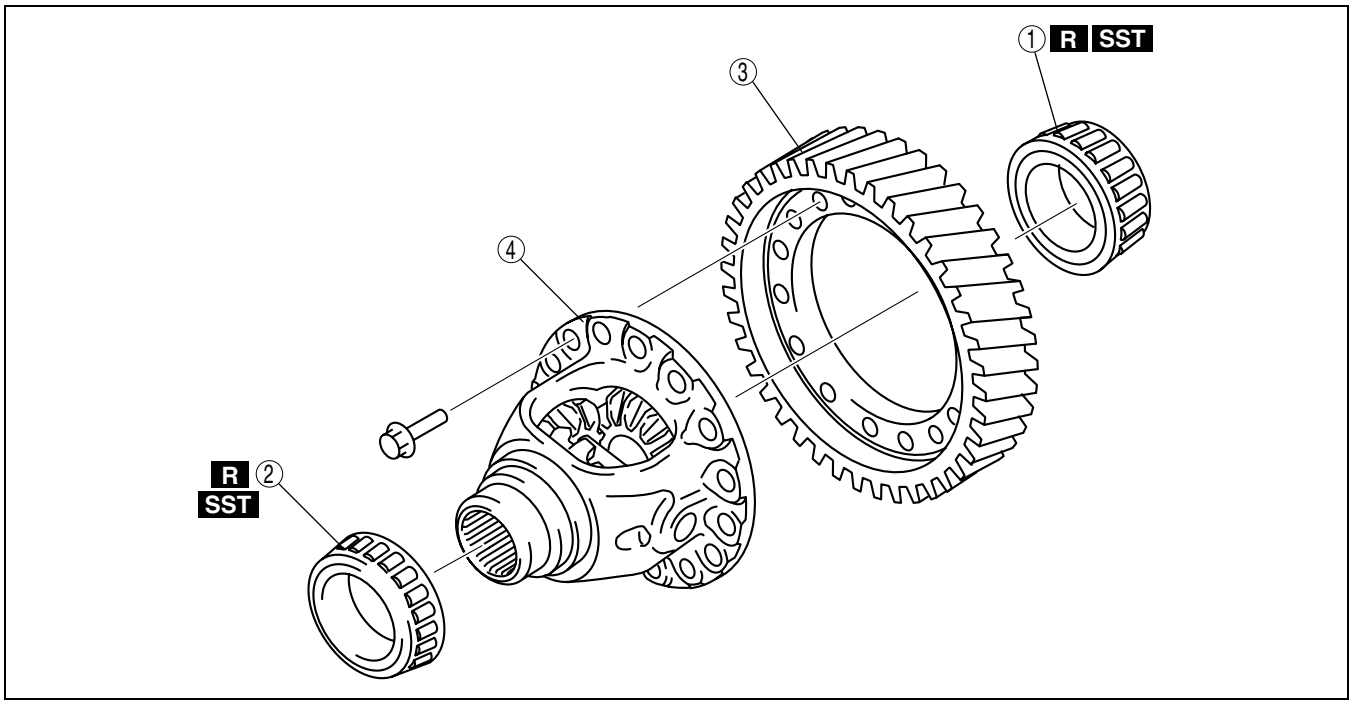


e6u515zmc133

DIFFERENTIAL DISASSEMBLY

e6u051527100102

1. Disassemble in the order shown in the figure.

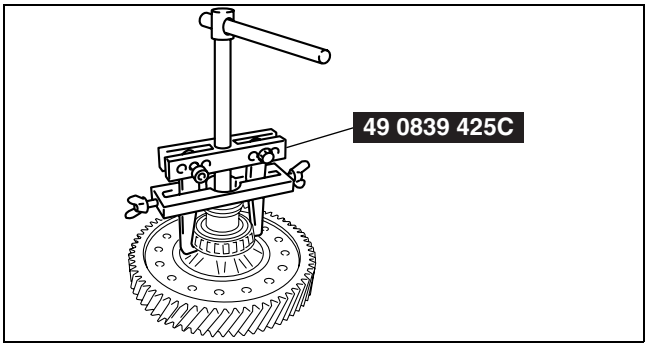


e6u515zmc075

1	Bearing (ring gear side) (See 05-15-46 Bearing (Ring Gear Side) Disassembly Note.)
2	Bearing (ring gear-opposite side) (See 05-15-47 Bearing (Ring Gear-Opposite Side) Disassembly Note (2WD).) (See 05-15-47 Bearing (Ring Gear-Opposite Side) Disassembly Note (AWD).)
3	Ring gear
4	Gear case component

Bearing (Ring Gear Side) Disassembly Note

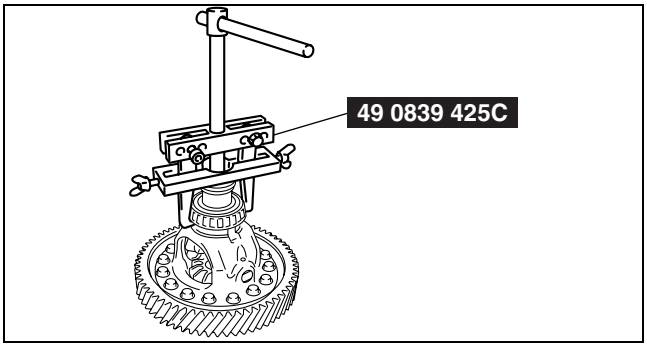
1. Remove the bearing using the **SST**.



e6u515zmc102

Bearing (Ring Gear-Opposite Side) Disassembly Note (2WD)

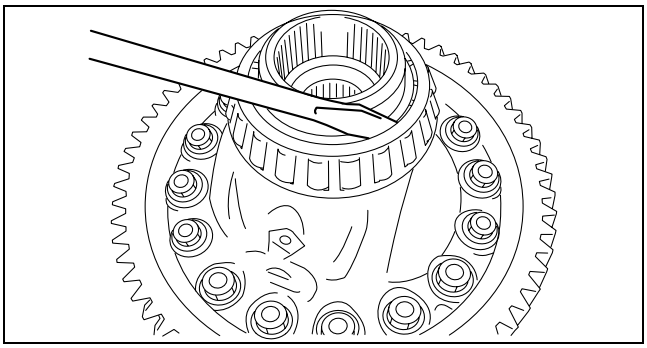
1. Remove the bearing using the **SST**.



dpe515bm1008

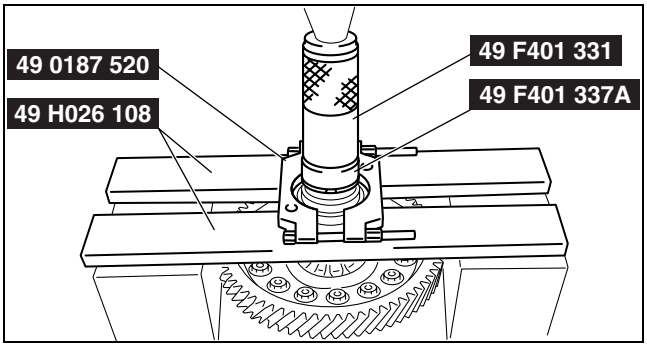
Bearing (Ring Gear-Opposite Side) Disassembly Note (AWD)

1. Remove the bearing roller guide by prying with a flathead screwdriver as shown in the figure.



e6u515zmc103

2. Remove the bearing inner race using the **SSTs**.



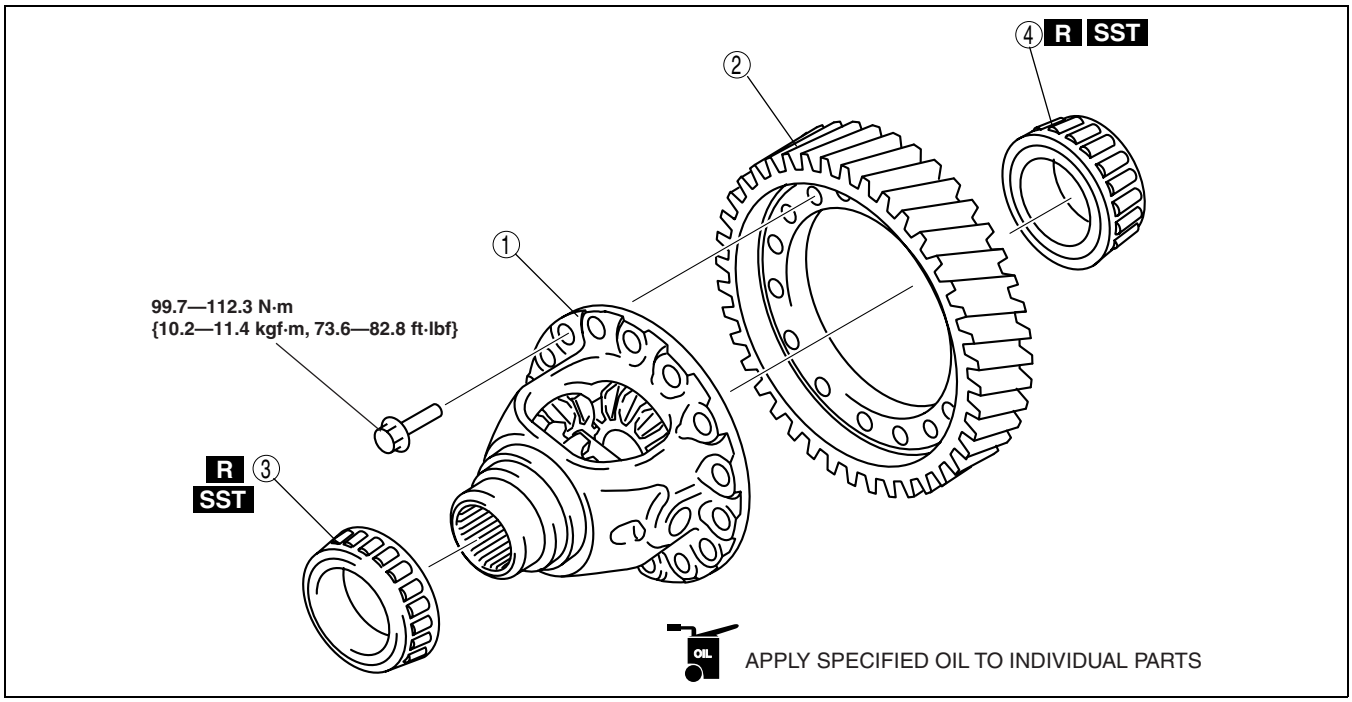
e6u515zmc104

DIFFERENTIAL ASSEMBLY

e6u051527100103

Caution
- **Do not place the bearing (ring gear side) facing downward on a workbench after assembling the differential component. It may cause damage to the bearing roller guide.**

1. Assemble in the order shown in the figure.



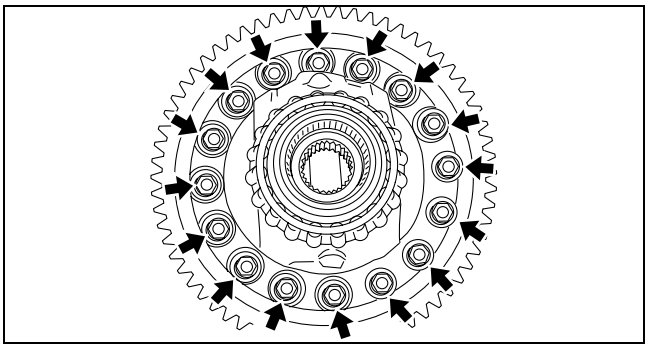
e6u515zmc134

1	Gear case component
2	Ring gear (See 05-15-48 Ring Gear Assembly Note.)
3	Bearing (ring gear-opposite side) (See 05-15-49 Bearing (Ring Gear-Opposite Side) Assembly Note.)
4	Bearing (ring gear side) (See 05-15-49 Bearing (Ring Gear Side) Assembly Note.)

Ring Gear Assembly Note

1. Assemble the gear case component and ring gear, and tighten the bolts in a criss-cross pattern in a few passes.

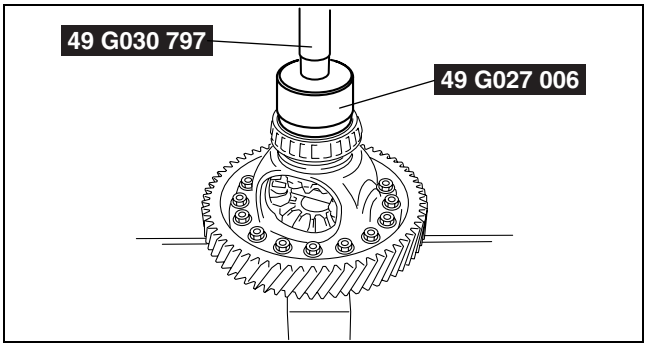
   Tightening torque
   99.7—112.3 N·m
   {10.2—11.4 kgf·m, 73.6—82.8 ft·lbf}



e6u515zmc105

Bearing (Ring Gear-Opposite Side) Assembly Note

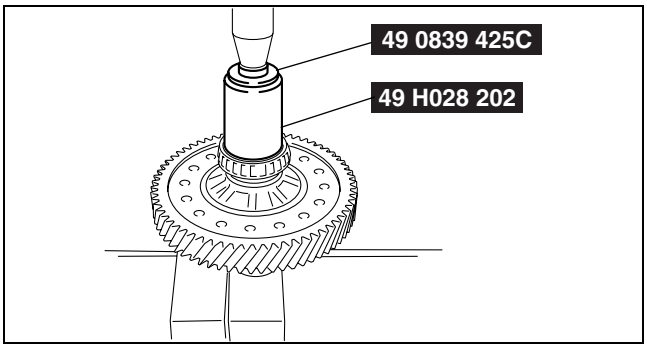
1. Install a new bearing using the **SSTs** and press.



e6u515zmc107

Bearing (Ring Gear Side) Assembly Note

1. Install a new bearing using the **SSTs** and press.

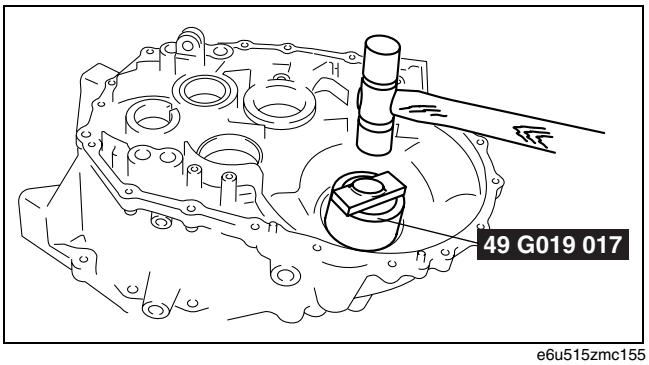


e6u515zmc106

DIFFERENTIAL SIDE BEARING PRELOAD ADJUSTMENT

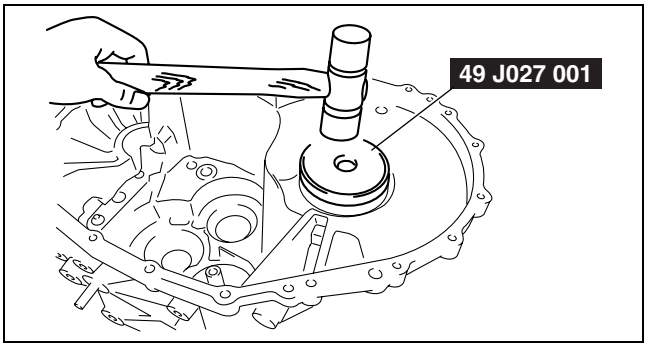
e6u051500000105

1. Install the bearing outer race into the clutch housing using the **SST**.



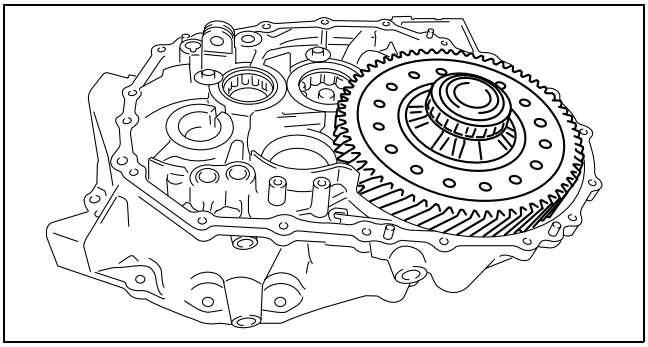
e6u515zmc155

2. Install the bearing outer race with the removed shim installed in the transaxle case using the **SST**.



e6u515zmc114

3. Set the differential component into the clutch housing.

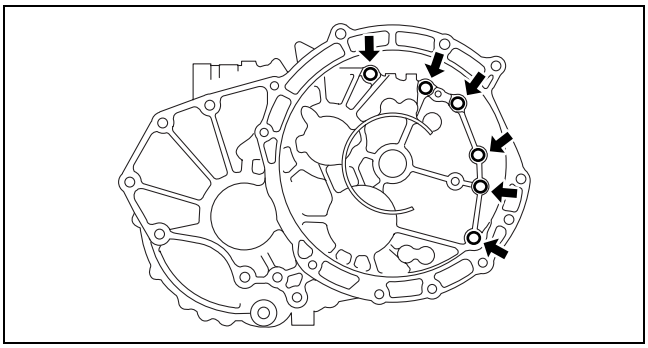


e6u515zmc043

4. Install the transaxle case and tighten the bolts.

Front side fixing bolts

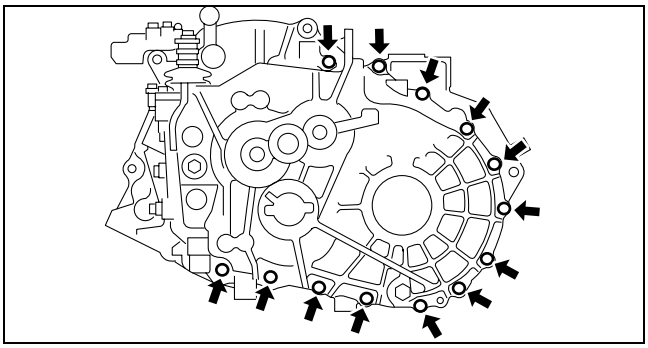
Tightening torque
23.6—35.2 N·m
{2.5—3.5 kgf·m, 17.5—25.9 ft·lbf}



e6u515zmc078

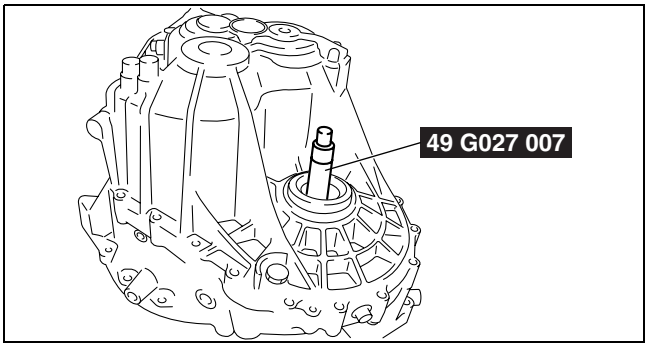
Rear side fixing bolts

Tightening torque
23.6—35.2 N·m
{2.5—3.5 kgf·m, 17.5—25.9 ft·lbf}



e6u515zmc079

5. Install the **SST** to the differential pinion shaft through the transaxle case.

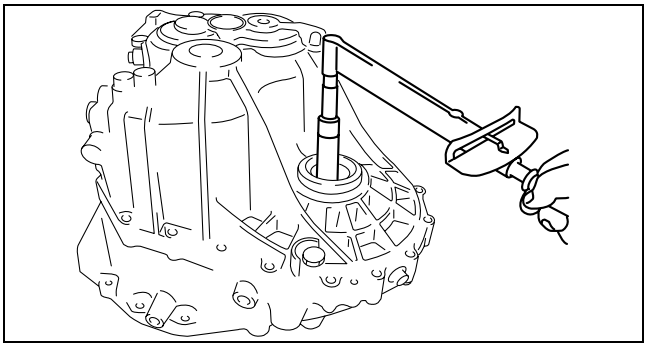


e6u515zmc124

6. Install the torque wrench to the **SST** and measure the initial rotational torque of the differential case.

   Initial rotational torque
   2WD: 1.00—2.49 N·m {10.2—25.3 kgf·cm, 8.9—22.0 in·lbf}
   AWD: 0.96—2.38 N·m {9.79—24.2 kgf·cm, 8.50—21.0 in·lbf}

   - If not within the specification, select a suitable shim and reinstall so that the rotational torque is within the specification.



e6u515zmc125

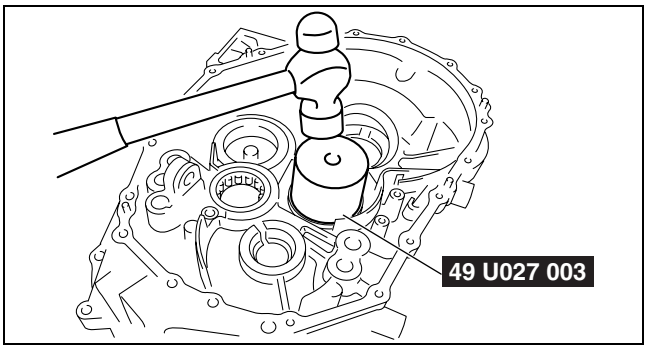
Differential side bearing adjustment shim thickness

Identification mark	Thickness (mm {in})	Identification mark	Thickness (mm {in})
0	2.00 {0.079}	9	2.45 {0.096}
1	2.05 {0.081}	A	2.50 {0.098}
2	2.10 {0.083}	B	2.55 {0.100}
3	2.15 {0.085}	C	2.60 {0.102}
4	2.20 {0.087}	D	2.65 {0.104}
5	2.25 {0.089}	E	2.70 {0.106}
6	2.30 {0.091}	F	2.75 {0.108}
7	2.35 {0.093}	G	2.80 {0.110}
8	2.40 {0.094}	H	2.85 {0.112}

SECONDARY SHAFT (NO.2) BEARING PRELOAD ADJUSTMENT

e6u051500000103

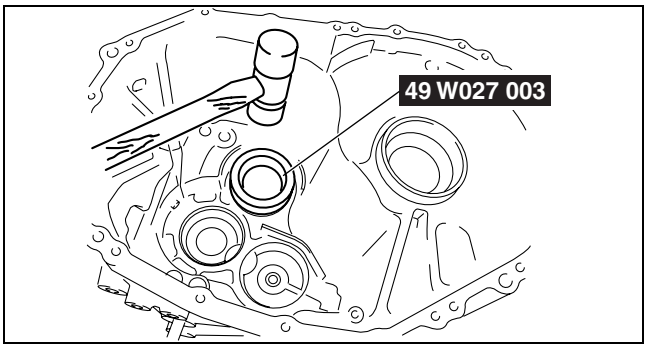
1. Install the secondary shaft (No.2) front bearing outer race into the clutch housing using the **SST**.



e6u515zmc112

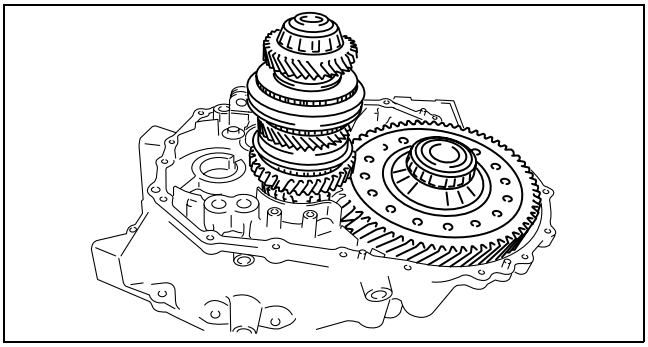
2. Install the secondary shaft (No.2) rear bearing outer race with the removed shim into the transaxle case using the **SST**.
3. Set the differential component into the clutch housing.

   Note
   - Use the shim and differential set selected in the differential side bearing preload adjustment.
     (See DIFFERENTIAL SIDE BEARING PRELOAD ADJUSTMENT.)



e6u515zmc115

4. Set the secondary shaft (No.2) component into the clutch housing.

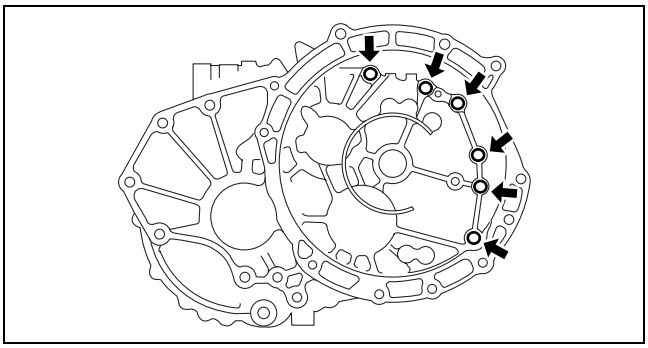


e6u515zmc136

5. Install the transaxle case and tighten the bolts.

Front side fixing bolts

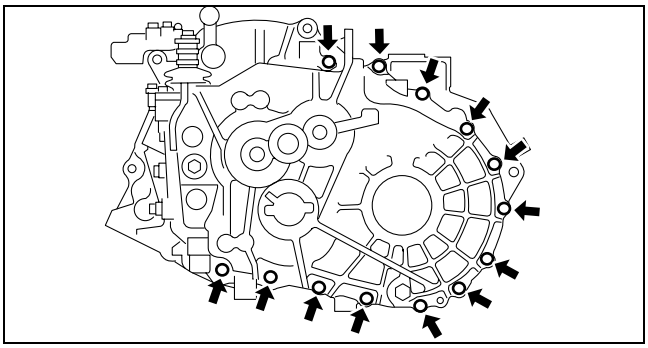
Tightening torque
23.6—35.2 N·m
{2.5—3.5 kgf·m, 17.5—25.9 ft·lbf}



e6u515zmc078

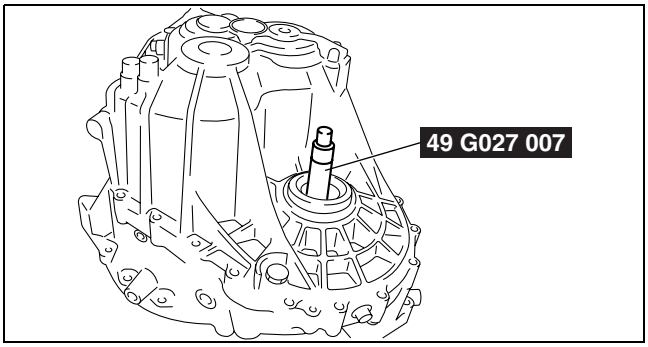
Rear side fixing bolts

Tightening torque
23.6—35.2 N·m
{2.5—3.5 kgf·m, 17.5—25.9 ft·lbf}



e6u515zmc079

6. Install the **SST** to the differential pinion shaft through the transaxle case.

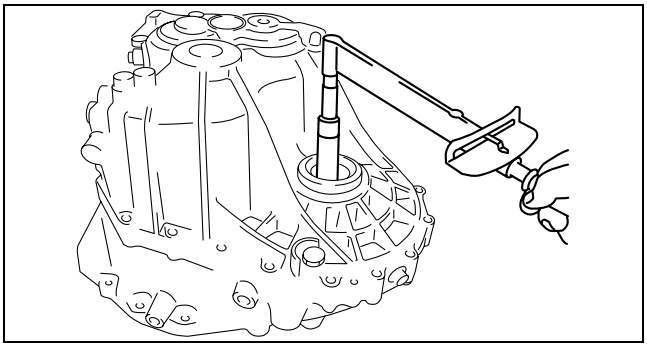


e6u515zmc124

7. Install the torque wrench to the **SST** and measure the initial rotational torque of the differential case.
8. The secondary shaft (No. 2) initial rotational torque indicated below is the value determined with the differential end play subtracted from the measured value.

Secondary shaft (No. 2) initial rotational torque
4.02—5.70 N·m {41.0—58.1 kgf·cm, 35.6—50.4 in·lbf}

- If not within the specification, select a suitable shim and reinstall so that the rotational torque is within the specification.


e6u515zmc125

Note
- Select only one adjustment shim.

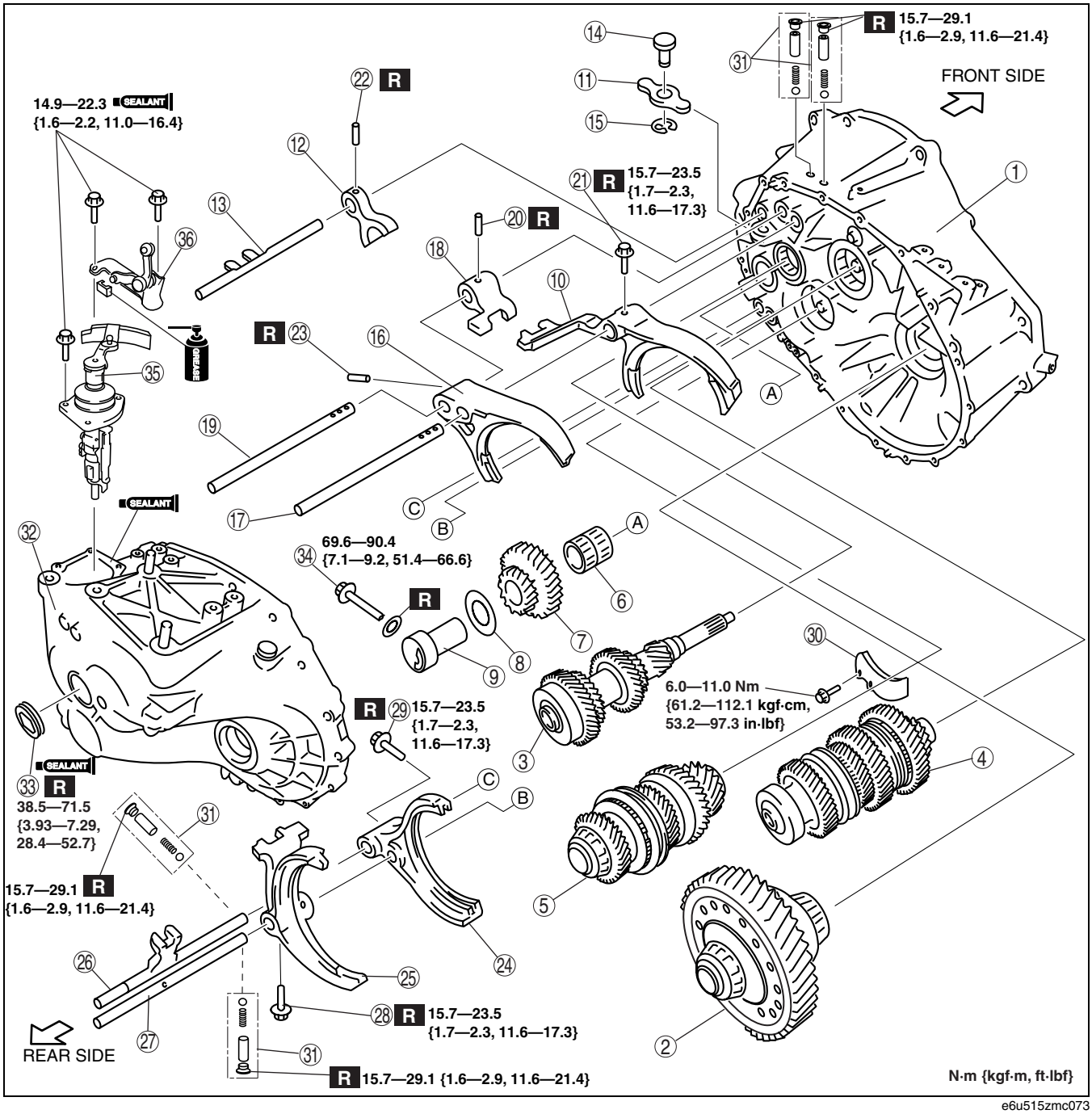
Secondary shaft (No. 2) bearing adjustment shim thickness

Identification mark	Thickness (mm {in})	Identification mark	Thickness (mm {in})
A	1.80 {0.071}	K	2.25 {0.089}
B	1.85 {0.073}	L	2.30 {0.091}
C	1.90 {0.075}	M	2.35 {0.093}
D	1.95 {0.077}	N	2.40 {0.094}
E	2.00 {0.079}	P	2.45 {0.096}
F	2.05 {0.081}	Q	2.50 {0.098}
G	2.10 {0.083}	R	2.55 {0.100}
H	2.15 {0.085}	S	2.60 {0.102}
J	2.20 {0.087}	T	2.65 {0.104}

CLUTCH HOUSING AND TRANSAXLE CASE COMPONENTS ASSEMBLY

e6u051517011102

Assembly Components



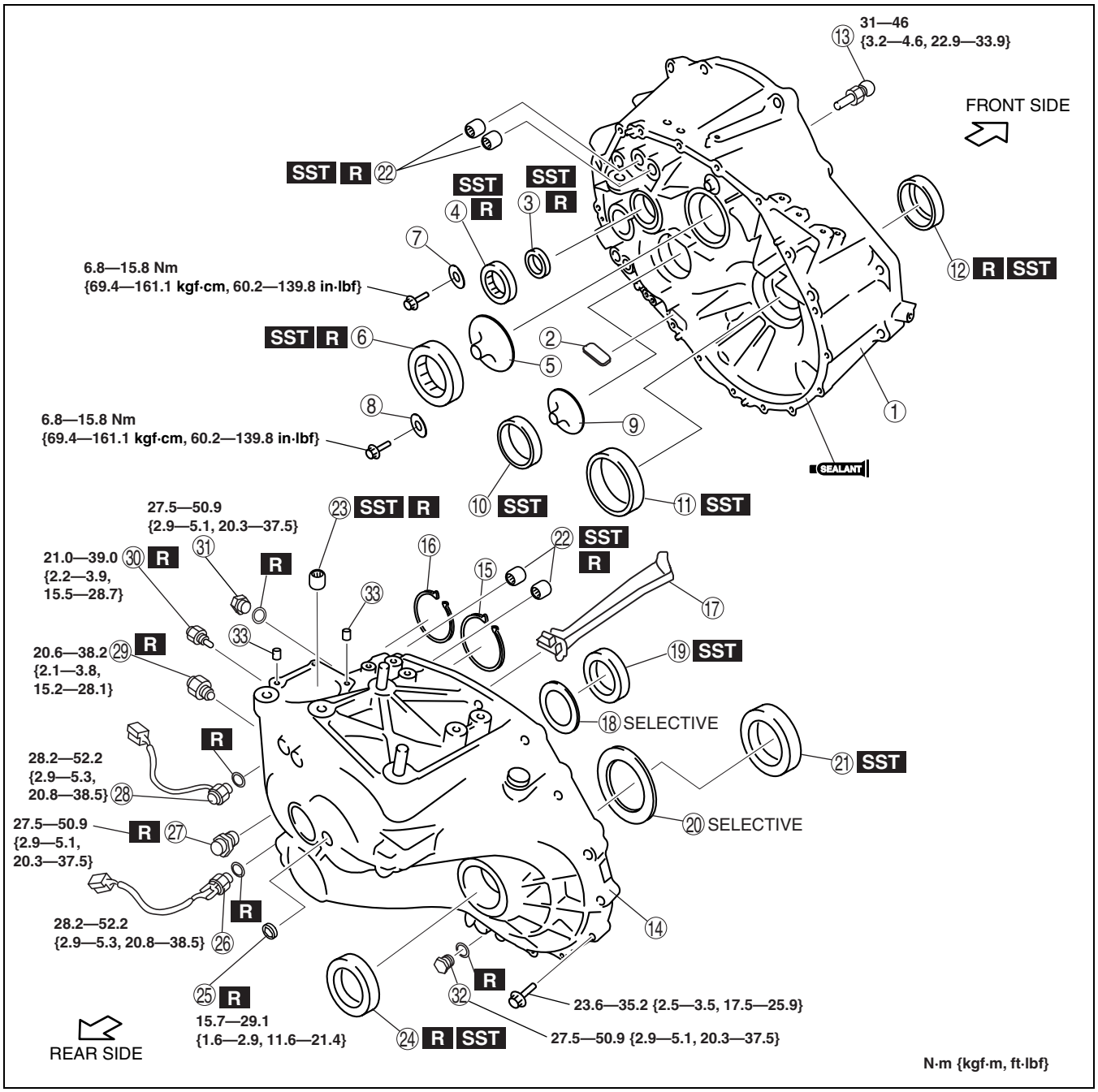
e6u515zmc073

1	Clutch housing
2	Differential component
3	Primary shaft component
4	Secondary shaft (No.1) component
5	Secondary shaft (No.2) component
6	Needle bearing
7	Reverse idler gear
8	Thrust washer
9	Reverse idler gear shaft
10	1st/2nd shift fork
11	Counter lever
12	3rd/4th control rod end (A)

13	3rd/4th control rod (A)
14	Counter lever pivot
15	Snap ring
16	3rd/4th shift fork
17	1st/2nd control rod
18	3rd/4th control rod end (B)
19	3rd/4th control rod (B)
20	Spring pin
21	Shift fork retaining bolt
22	Spring pin
23	Spring pin
24	Reverse shift fork

25	5th/6th shift fork
26	Reverse control rod
27	5th/6th control rod
28	Shift fork retaining bolt
29	Shift fork retaining bolt
30	Baffle plate

31	Sealing cap, spring seat, detent spring, detent ball
32	Transaxle case
33	Sealing cap
34	Reverse idler shaft retaining bolt
35	Shift component
36	Select lever set



e6u515zmc074

1	Clutch housing
2	Magnet
3	Primary shaft oil seal
4	Primary shaft front bearing
5	Oil funnel
6	Secondary shaft (No.1) front bearing
7	Bearing cover

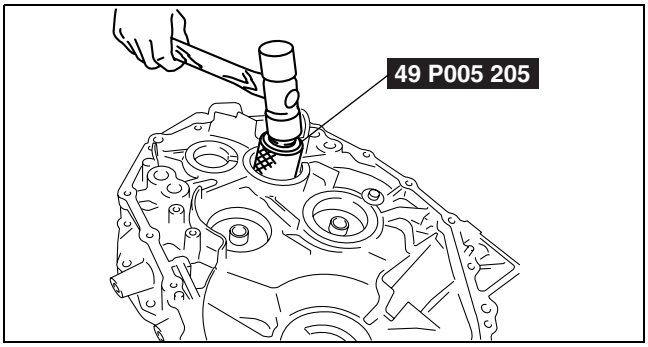
8	Bearing cover
9	Oil funnel
10	Secondary shaft (No.2) front bearing outer race
11	Differential side bearing outer race
12	Differential oil seal
13	Pivot pin
14	Transaxle case

15	Snap ring
16	Snap ring
17	Oil pass
18	Adjust shim
19	Secondary shaft (No.2) rear bearing outer race
20	Adjust shim
21	Differential side bearing outer race
22	Control rod bearing
23	Shift lever shaft bearing
24	Differential oil seal

25	Sealing cap
26	Neutral switch
27	Select push pin
28	Back-up light switch
29	Shift push pin
30	Straight pin
31	Oil level plug
32	Drain plug
33	Tubular pin

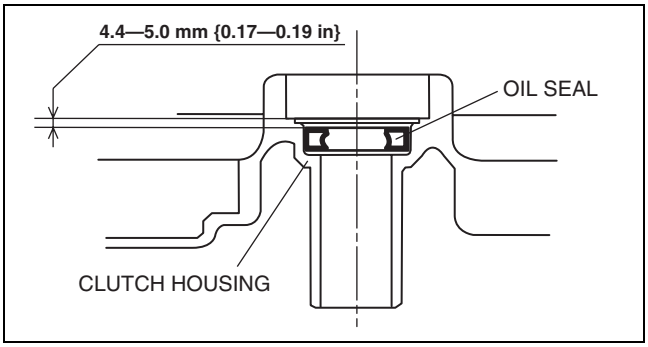
Assembly Procedure

1. Install a new primary shaft oil seal in the clutch housing using the **SST**.



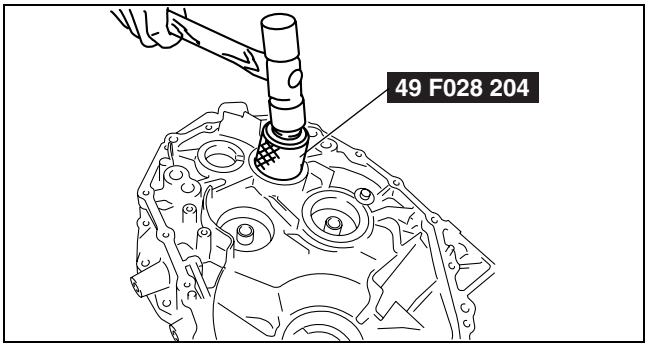
e6u515zmc108

Oil seal press-in depth
4.4—5.0 mm {0.17—0.19 in}



e6u515zmc154

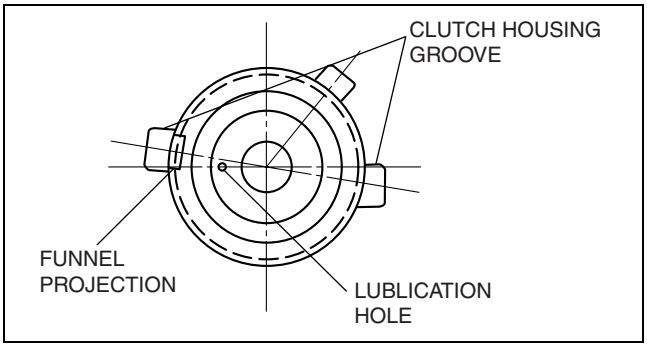
2. Install a new primary shaft front bearing using the **SST**.



e6u515zmc109

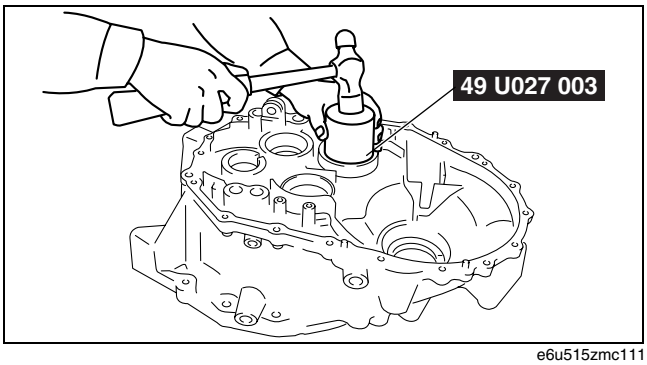
3. Install the oil funnel for in the secondary shaft (No.1 and No.2) to the clutch housing.

Note
- Align the clutch housing groove and the funnel projection, and insert.
- Lubrication hole can be positioned either on the left or right.



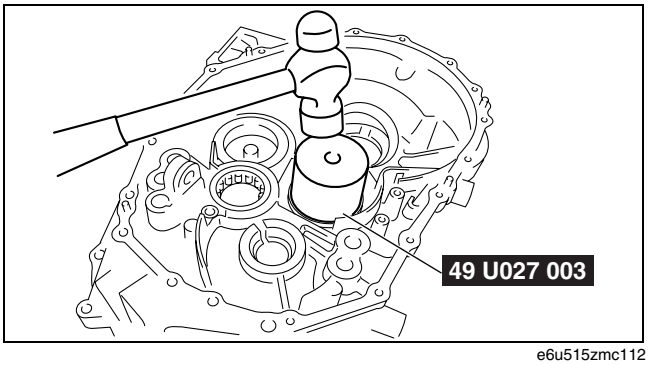
e6u515zmc110

4. Install a new secondary shaft (No.1) front bearing using the **SST**.



e6u515zmc111

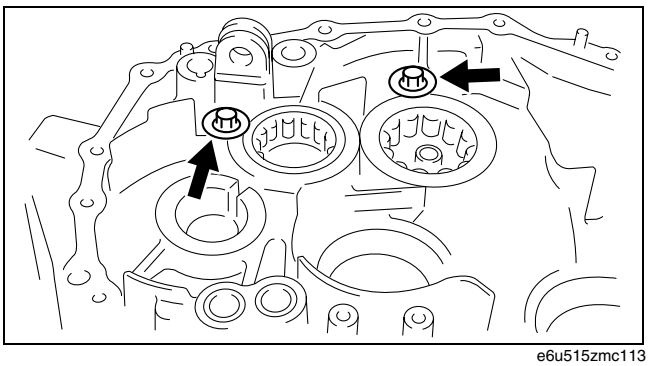
5. Install the secondary shaft (No.2) front bearing outer race using the **SST**.



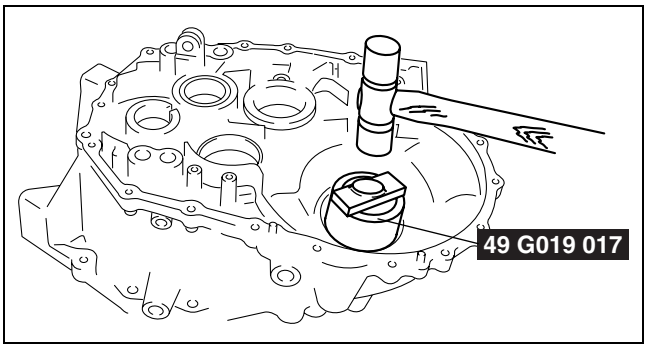
e6u515zmc112

6. Install the primary shaft bearing cover and secondary shaft (No.1) bearing cover.

Tightening torque
6.8—15.8 N·m
{69.4—161 kgf·cm, 60.2—139 in·lbf}


e6u515zmc113

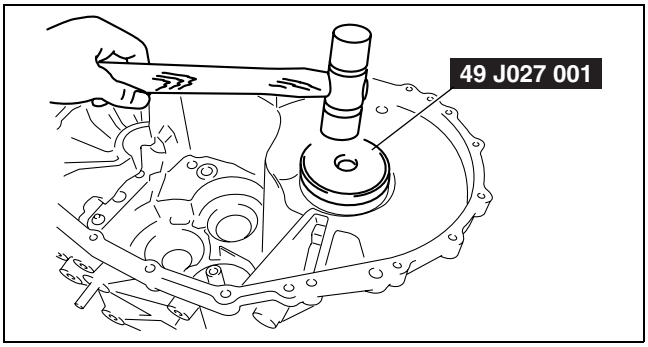
7. Install the differential side bearing outer race to the clutch housing using the **SST**.



e6u515zmc155

8. Install the differential side bearing outer race and adjust shim to the transaxle case using the **SST**.

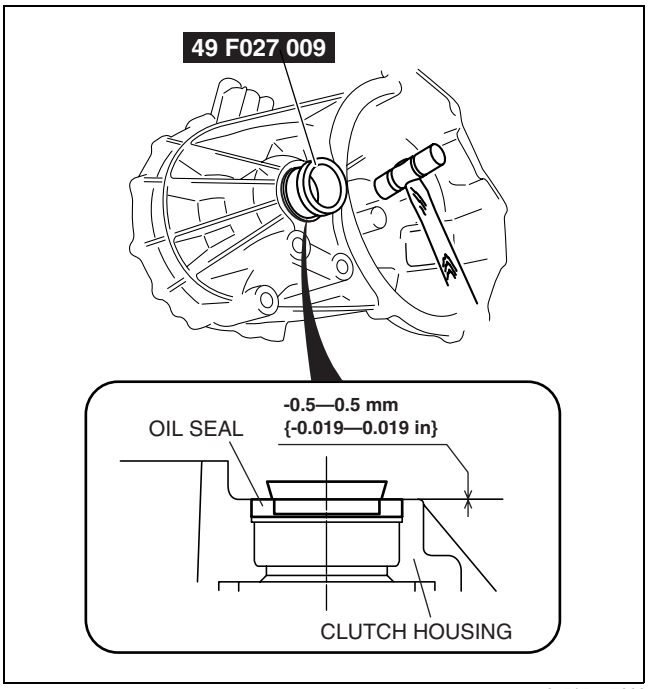
Note
- Use the adjust shim selected in the differential side bearing preload adjustment. (See DIFFERENTIAL SIDE BEARING PRELOAD ADJUSTMENT.)



e6u515zmc114

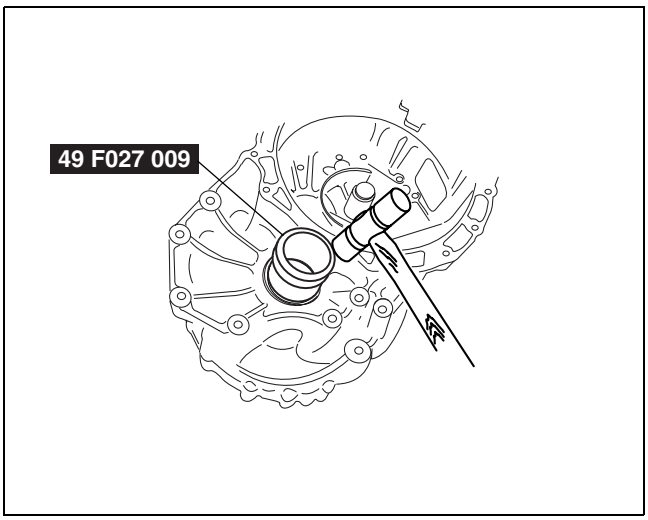
9. Install a new differential oil seal to the clutch housing using the **SST**.

2WD



e6u515zm7200

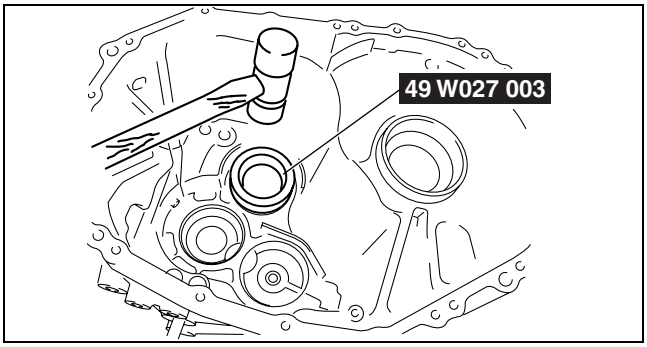
AWD



e6u515zmc158

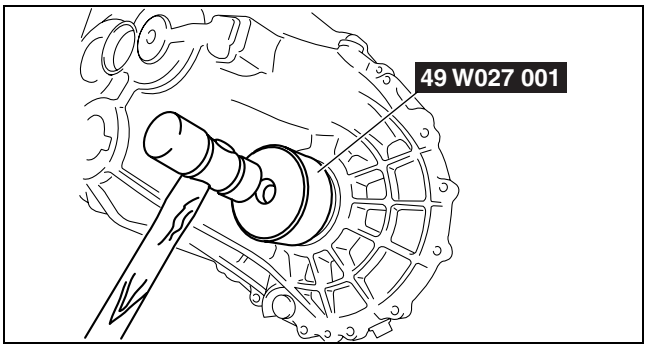
10. Install the secondary shaft (No. 2) rear bearing outer race and adjust shim to the transaxle case using the **SST**.

Note
- Use the adjust shim selected in the secondary shaft (No. 2) bearing preload adjustment.
(See SECONDARY SHAFT (NO.2) BEARING PRELOAD ADJUSTMENT.)



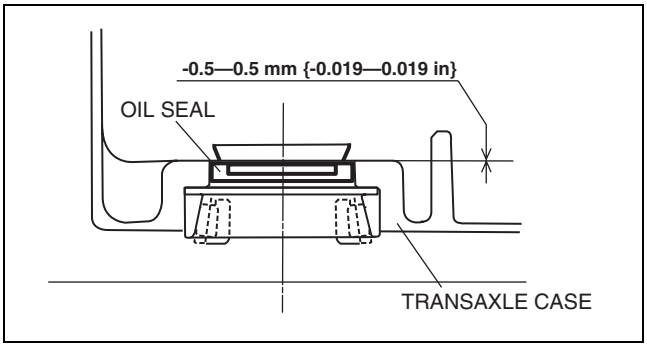
e6u515zmc115

11. Install a new differential oil seal to the transaxle case using the **SST**.



e6u515zmc117

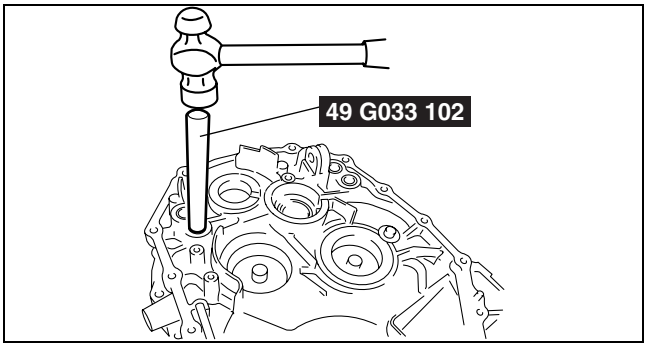
Oil seal press-in depth
-0.5—0.5 mm {-0.019—0.019 in}



e6u515zmc156

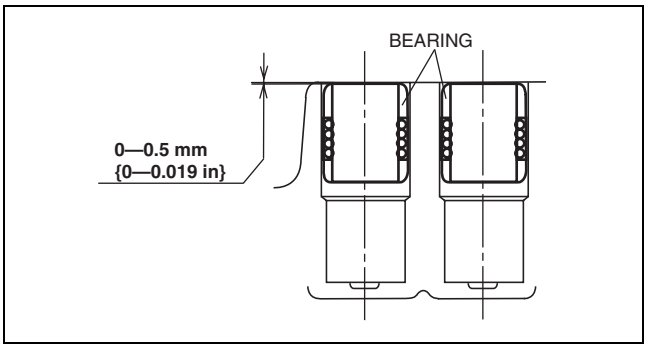
12. Install the new control rod bearings to the clutch housing and transaxle case using the **SST**.

Note
- Assembling direction can be either way.



e6u515zmc163

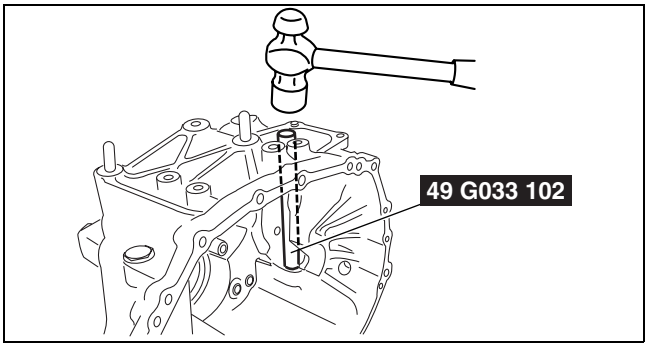
Bearing press-in depth
0—0.5 mm {0—0.019 in}



e6u515zmc164

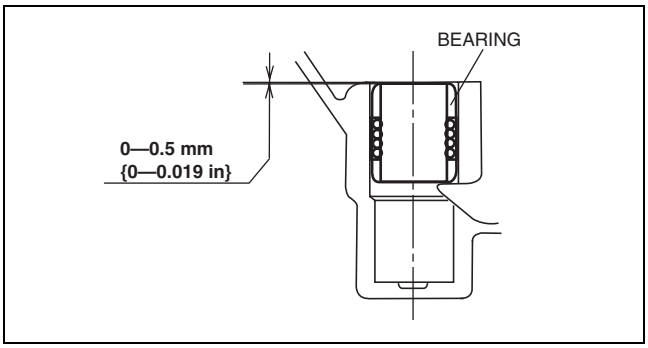
13. Install a new shift lever shaft bearing to the transaxle case using the **SST**.

Note
- Assembling direction can be either way.



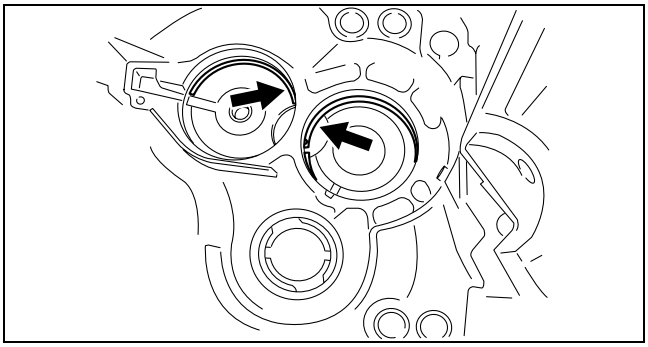
e6u515zmc168

Bearing press-in depth
0—0.5 mm {0—0.019 in}



e6u515zmc169

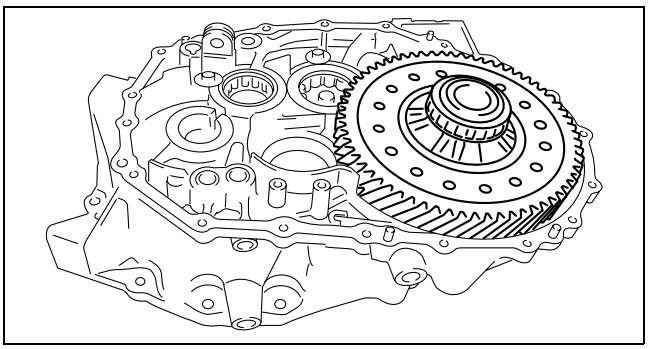
14. Install the snap rings to the transaxle case.
15. Install each gear component.



e6u515zmc116

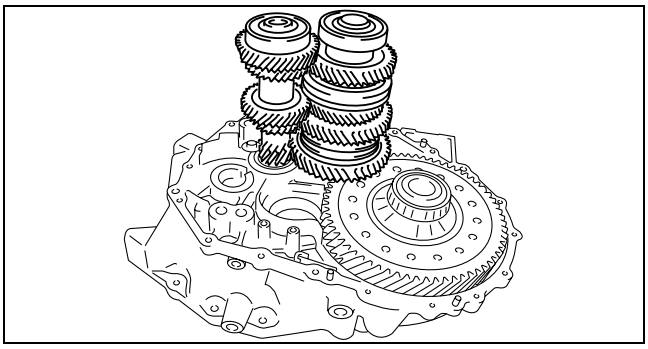
(1) Install the differential to the clutch housing.

Caution
- **Installing the primary shaft can damage the oil seal, reducing the performance of the transaxle. When installing the primary shaft to the clutch housing, be careful not to damage it.**



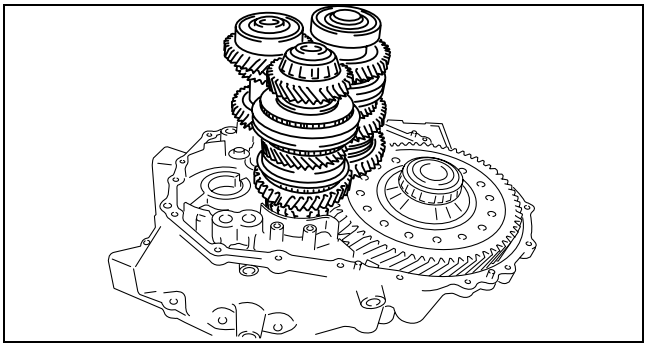
e6u515zmc043

(2) Install the primary shaft component and secondary shaft (No.1) component to the clutch housing at the same time.



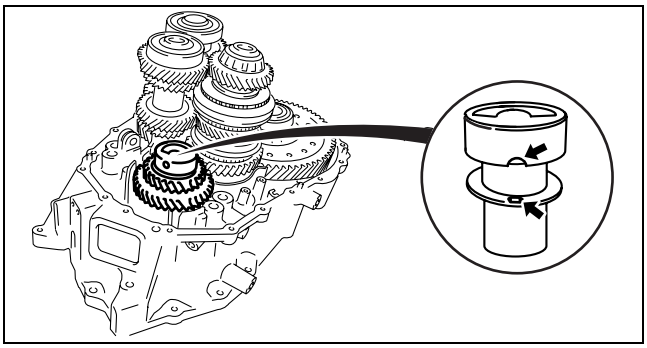
e6u515zmc044

(3) Install the secondary shaft (No.2) component.



e6u515zmc045

(4) Install the reverse idler gear, needle bearing, thrust washer, and reverse idler gear shaft.

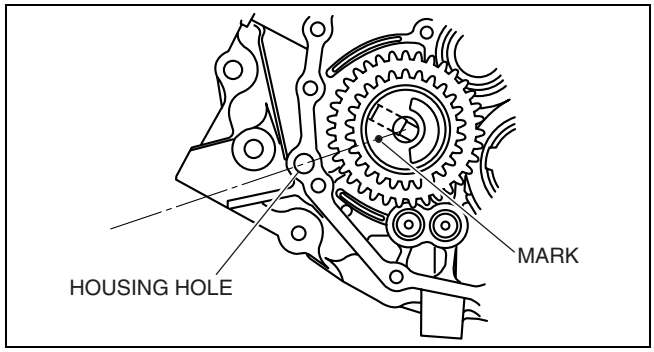


e6u515zmc046

Caution

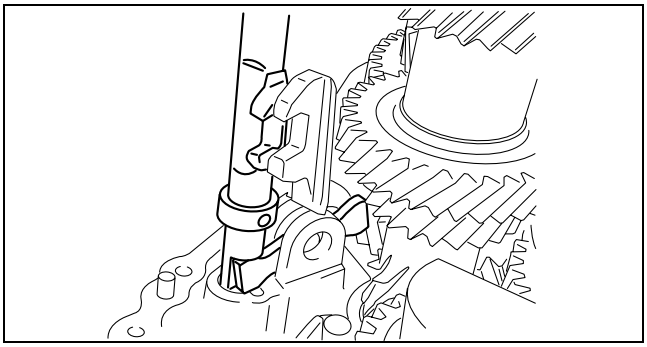
- **Align the thrust washer rotation lock projection and reverse idle gear shaft groove.**
- **Position the shaft direction as shown in the figure for the transaxle case assembly.**

16. Install the 1st/2nd shift fork.



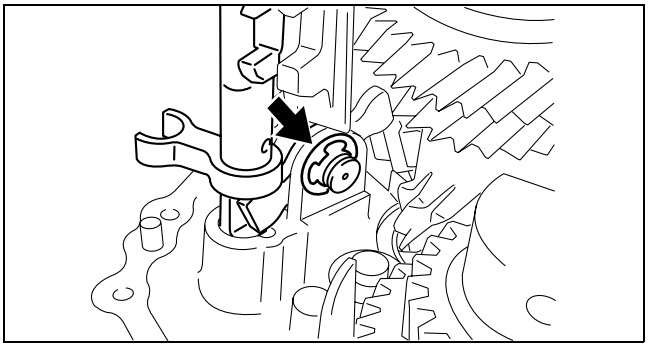
e6u515zmc119

17. Install the counter lever and 3rd/4th control rod (A).



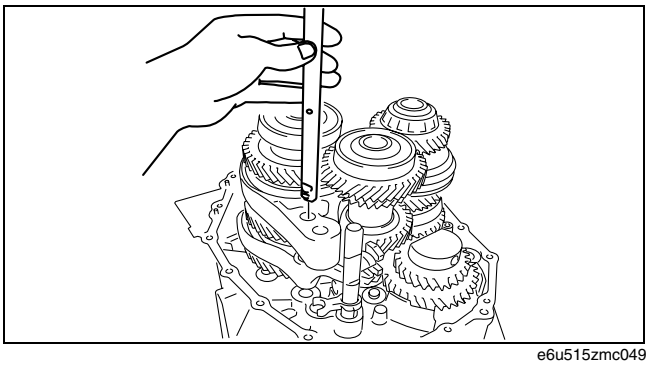
e6u515zmc047

18. Install the counter lever pivot and secure it with the snap ring.



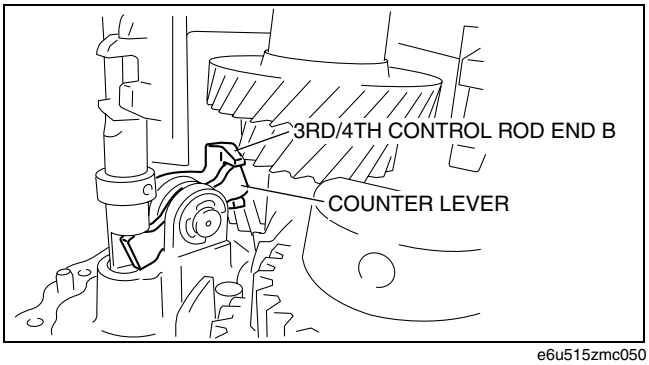
e6u515zmc048

19. Install the 3rd/4th shift fork and then install the 1st/2nd control rod ball groove in the direction shown in the figure.



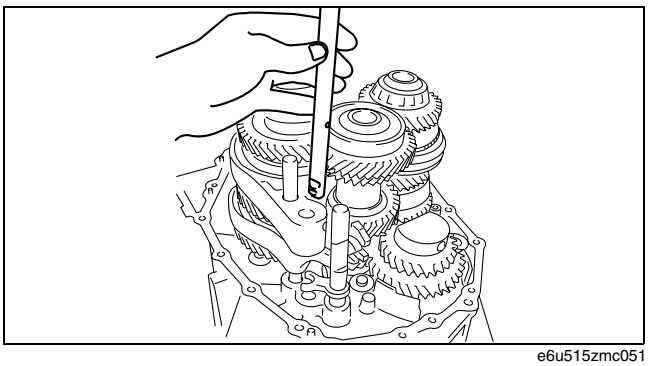
e6u515zmc049

20. Install 3rd/4th control rod end (B) so that it engages with the counter lever as shown in the figure.



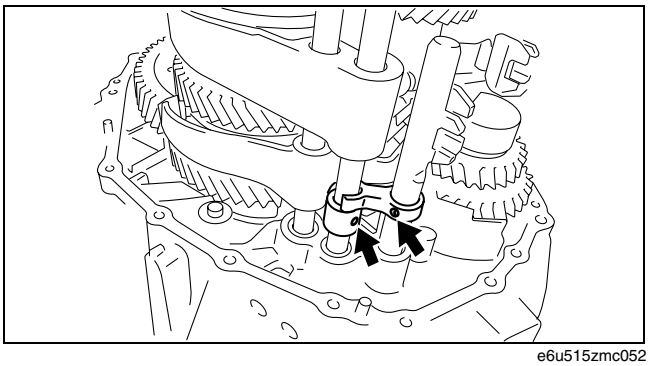
e6u515zmc050

21. Install the 3rd/4th control rod (B) ball groove in the direction shown in the figure.



e6u515zmc051

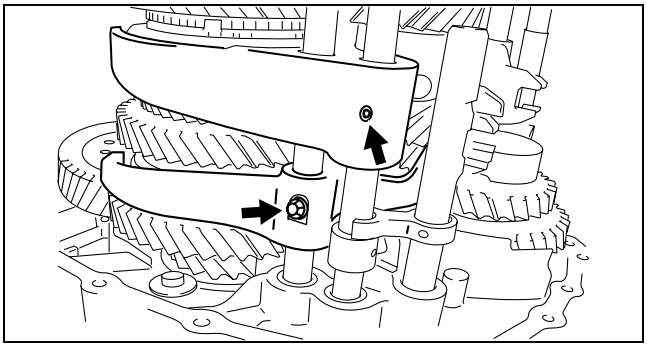
22. Tap in 3rd/4th control rod end (A and B) new spring pins shown in the figure.
23. Tap in 3rd/4th shift fork spring pin using a pin punch.



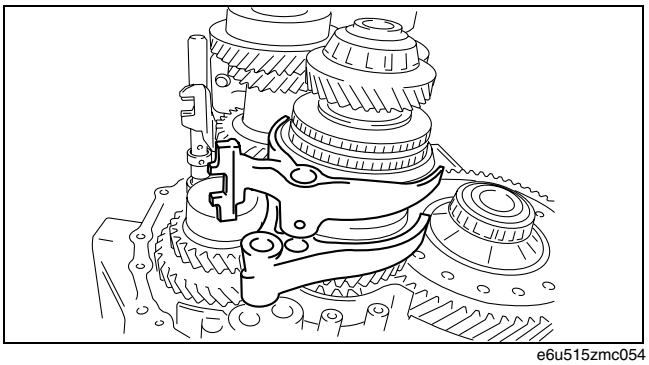
e6u515zmc052

24. Install the 1st/2nd shift fork retaining bolt.

Tightening torque
15.7—23.5 N·m
{1.7—2.3 kgf·m, 11.6—17.3 ft·lbf}

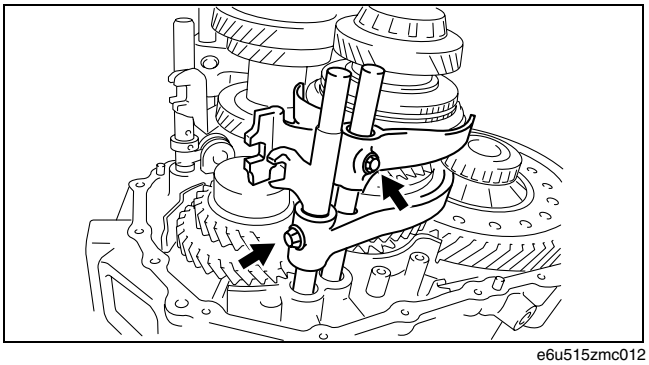

e6u515zmc014

25. Install the 5th/6th shift fork and reverse shift fork.
26. Install the 5th/6th control rod and reverse control rod being careful of the ball groove direction.


e6u515zmc054

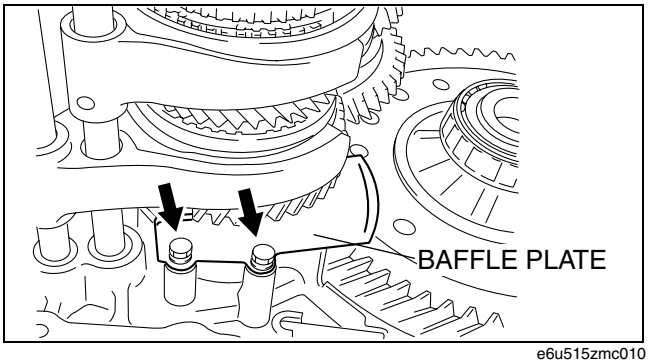
27. Install the reverse shift fork retaining bolt and 5th/6th shift fork retaining bolt.

Tightening torque
15.7—23.5 N·m
{1.7—2.3 kgf·m, 11.6—17.3 ft·lbf}


e6u515zmc012

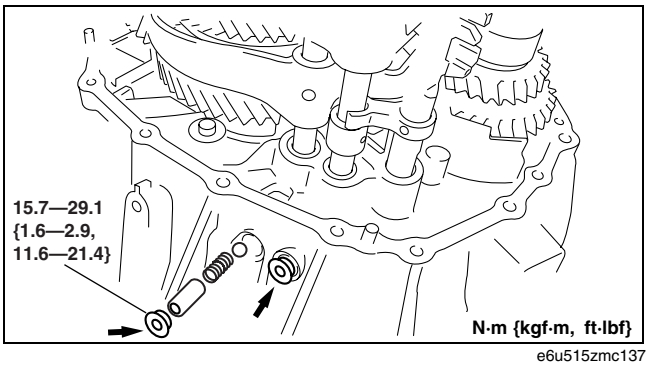
28. Install the baffle plate.

Tightening torque
6.0—11.0 N·m
{61.2—112.1 kgf·cm, 53.2—97.3 in·lbf}



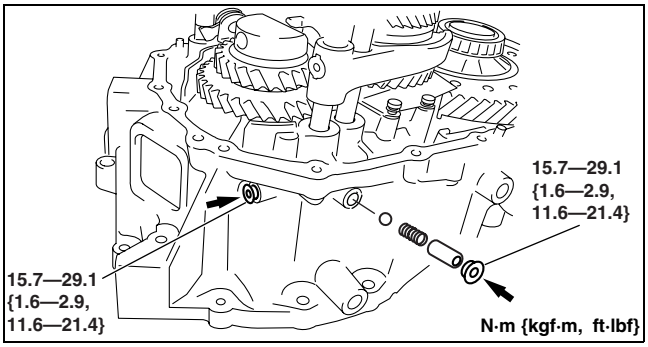
e6u515zmc010

29. Install the detent ball, detent spring, detent spring seat, and sealing cap to the clutch housing.



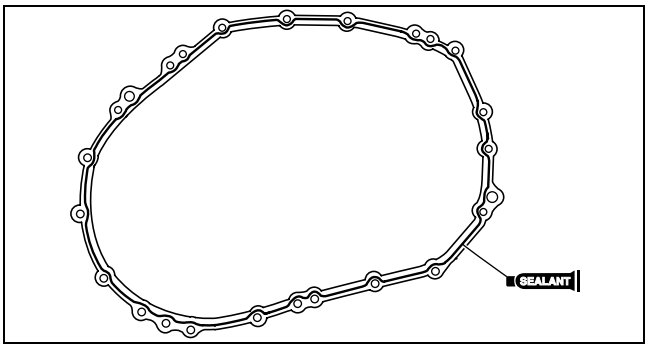
e6u515zmc137

30. Install the magnet to the clutch housing.
31. Install the oil pass to the transaxle case.
32. Install the transaxle case.



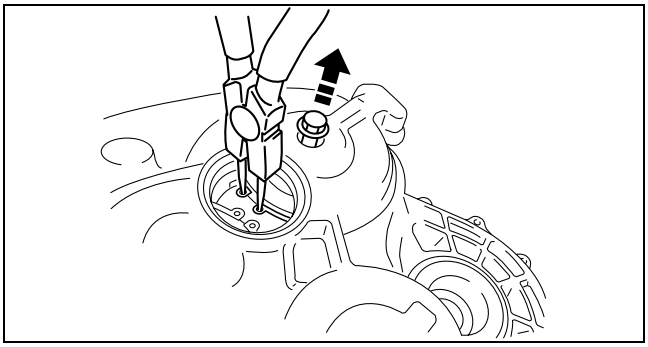
e6u515zmc138

(1) Apply a light coat of silicone sealant to the contact surfaces of the transaxle case and the clutch housing.
(2) Place the transaxle case on the clutch housing.
(3) Install the bolt (M8 x 1.25) to the secondary shaft (No. 1) through the sealing cap hole.

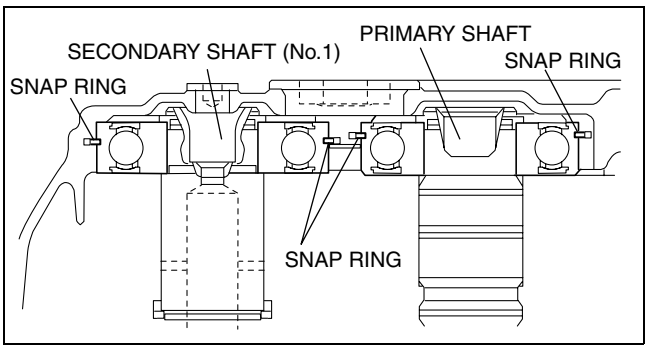


e6u515zmc120

(4) While pulling up the secondary shaft (No. 1) installation bolt, widen the snap ring, and then fix the snap ring into the secondary shaft bearing groove as shown in the figure.

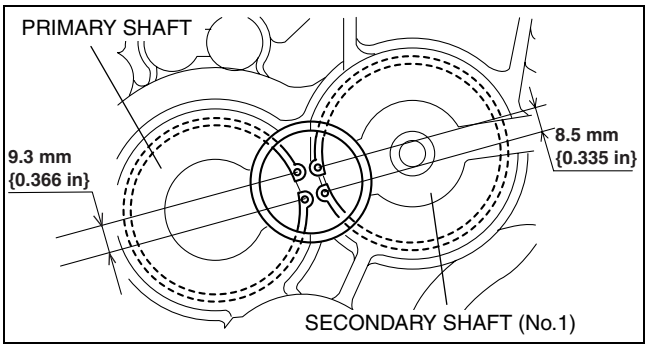

e6u515zmc121

(5) While pushing up the primary shaft from the clutch housing side, widen the snap ring (primary shaft side) and fix it into the primary shaft bearing groove.



e6u515zmc122

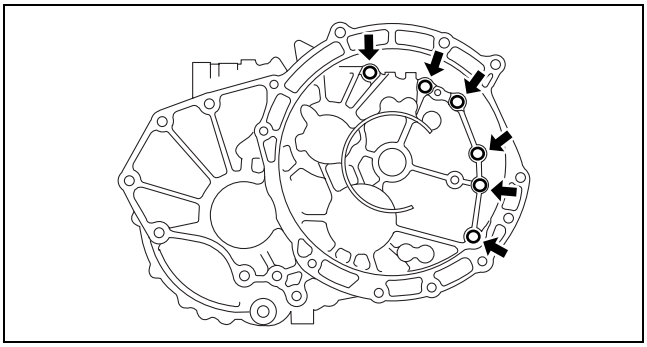
(6) Measure the center-to-center distance of the respective snap ring holes as shown in the figure and verify that the snap ring is properly installed in the bearing groove.
(7) Install the bolts to the transaxle case and clutch housing as shown in the figure.



e6u515zmc123

Front side fixing bolts

Tightening torque
23.6—35.2 N·m
{2.5—3.5 kgf·m, 17.5—25.9 ft·lbf}



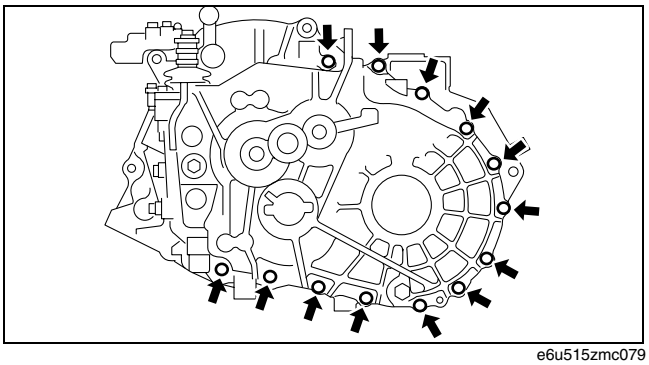
e6u515zmc078

Rear side fixing bolts

Tightening torque
23.6—35.2 N·m
{2.5—3.5 kgf·m, 17.5—25.9 ft·lbf}

33. Install the new sealing caps.

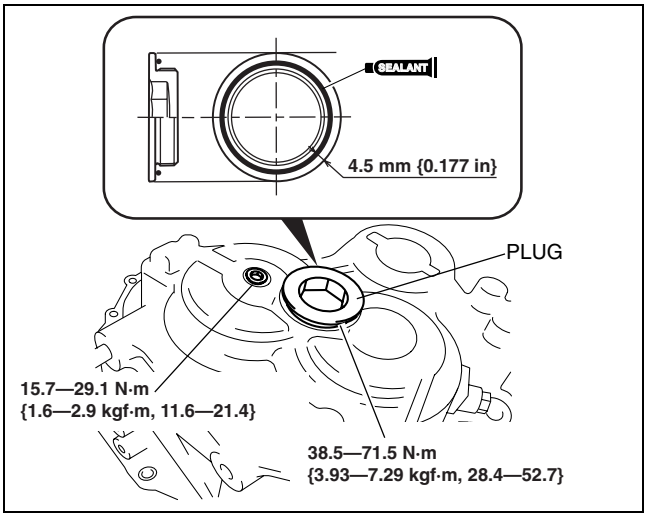
Note
- The cast hexagon inner diameter of the plug is **27mm {1.063 in}**.



e6u515zmc079

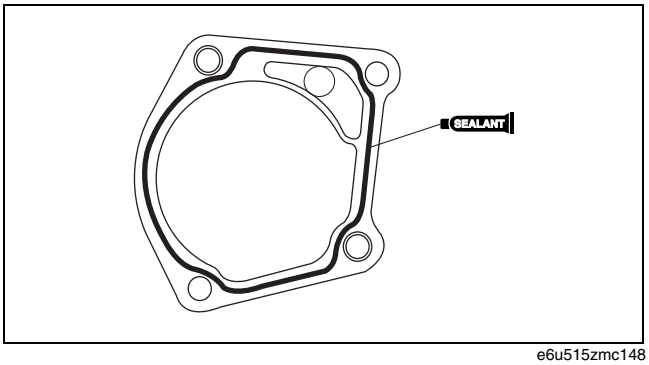
34. Install the reverse idler shaft retaining bolt with new packing.

Tightening torque
69.6—90.4 N·m
{7.1—9.2 kgf·m, 51.4—66.6 ft·lbf}



e6u515zmc149

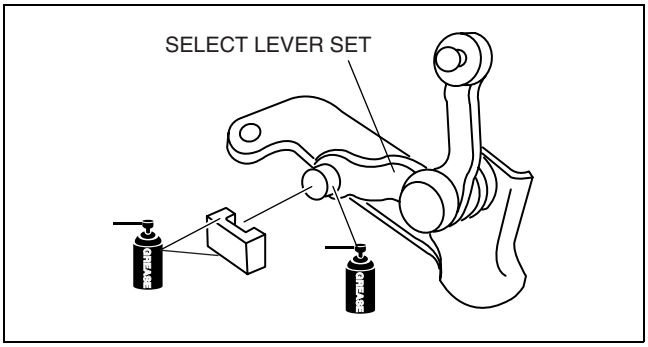
35. Apply a coat of silicone sealant to the contact surface of the shift control case and the transaxle case.



e6u515zmc148

36. Install the select lever set and the shift component to the transaxle case.

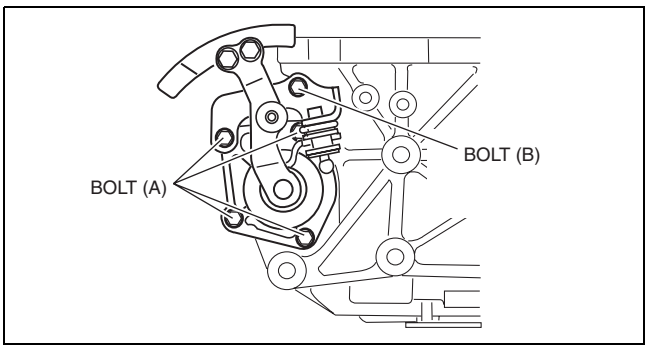
Caution
- **Apply grease to the positions shown in the figure.**



e6u515zmc157

Caution
- **Be aware that the stem lengths of bolt A and B shown in the figure are different.**

Tightening torque
14.9—22.3 N·m
{1.6—2.2 kgf·m, 11.0—16.4 ft·lbf}



e6u515zmc174

37. Install the neutral switch and back-up light switch with new packing.

Tightening torque
28.2—52.2 N·m
{2.9—5.3 kgf·m, 20.8—38.5 ft·lbf}

38. Install a new straight pin.

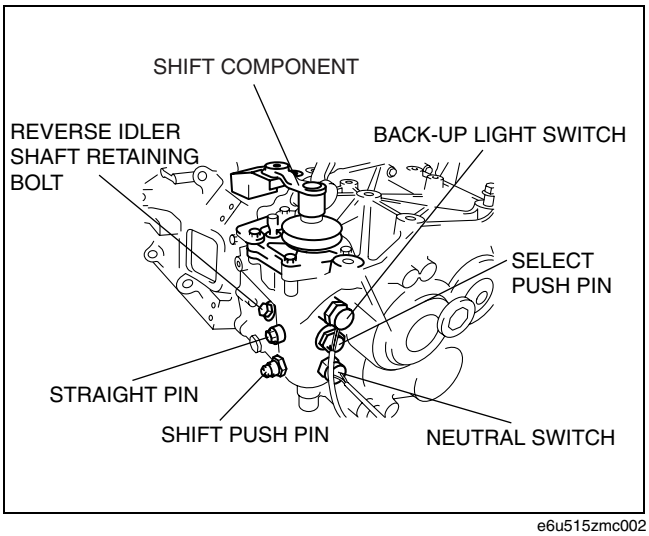
Tightening torque
21.0—39.0 N·m
{2.2—3.9 kgf·m, 15.5—28.7 ft·lbf}

39. Install a new shift push pin.

Tightening torque
20.6—38.2 N·m
{2.1—3.8 kgf·m, 15.2—28.1 ft·lbf}

40. Install a new select push pin.

Tightening torque
27.5—50.9 N·m
{2.9—5.1 kgf·m, 20.3—37.5 ft·lbf}



e6u515zmc002

41. Install new packing, a drain plug, and a oil level plug.

Tightening torque
27.5—50.9 N·m
{2.9—5.1 kgf·m, 20.3—37.5 ft·lbf}

05-50 TECHNICAL DATA

TECHNICAL DATA

e6u055000000102

Secondary shaft (NO.1) gear thrust clearance

(mm {in})

Gear	Thrust clearance
1st	0.10—0.35 {0.0039—0.0138}
2nd	0.11—0.46 {0.0044—0.0181}
3rd	0.11—0.54 {0.0044—0.0212}
4th	0.10—0.65 {0.0039—0.0255}

Secondary shaft (NO.1) gear radial clearance

(mm {in})

Gear	Radial clearance
1st	0.015—0.068 {0.00059—0.00267}
2nd	0.015—0.048 {0.00059—0.00188}
3rd	0.015—0.066 {0.00059—0.00259}
4th	0.015—0.066 {0.00059—0.00259}

Secondary shaft (NO.2) gear thrust clearance

(mm {in})

Gear	Thrust clearance
5th	0.10—0.55 {0.0039—0.0216}
6th	0.10—0.55 {0.0039—0.0216}
Reverse	0.11—0.34 {0.0043—0.0133}

Secondary shaft (NO.2) gear radial clearance

(mm {in})

Gear	Radial clearance
5th	0.015—0.066 {0.00590—0.00259}
6th	0.015—0.066 {0.00590—0.00259}
Reverse	0.015—0.068 {0.00590—0.00267}

Reverse idler gear thrust clearance

(mm {in})

Gear	Thrust clearance
Reverse idler gear	0.40—1.05 {0.0158—0.0413}

Reverse idler gear radial clearance

(mm {in})

Gear	Radial clearance
Reverse idler gear	0.015—0.048 {0.00059—0.00188}

Synchronizer ring clearance

(mm {in})

Gear	Clearance
1st	0.98—1.82 {0.0386—0.0716}
2nd	1.08—1.92 {0.0426—0.0755}
3rd	1.00—2.00 {0.0394—0.0787}
4th	0.92—1.88 {0.0363—0.0740}
5th, 6th	0.80—1.60 {0.0315—0.0629}
Reverse	0.68—1.32 {0.0268—0.0519}

Clutch hub sleeve and shift fork clearance

(mm {in})

Gear	Clearance
1st/2nd	0.10—0.50 {0.0039—0.0196}
3rd/4th	
5th/6th	0.10—1.50 {0.0039—0.0590}
Reverse	0.15—0.41 {0.0059—0.0161}

Primary shaft snap ring clearance

(mm {in})

Item	Specification
Clearance between primary shaft rear bearing and snap ring	0.0—0.1 {0.0000—0.0039}

Secondary shaft (NO.1) snap ring clearance

(mm {in})

Item	Specification
Clearance between 2nd bearing inner race and snap ring	0.0—0.1 {0.0000—0.0039}
Clearance between 3rd/4th clutch hub and snap ring	0.0—0.1 {0.0000—0.0039}
Clearance between rear bearing inner race and snap ring	0.0—0.1 {0.0000—0.0039}

Secondary shaft (NO.2) snap ring clearance

(mm {in})

Item	Specification
Clearance between reverse clutch hub and snap ring	0.0—0.1 {0.0000—0.0039}
Clearance between 5th/6th clutch hub and snap ring	0.0—0.1 {0.0000—0.0039}
Clearance between rear bearing inner race and snap ring	0.0—0.1 {0.0000—0.0039}

Gear backlash

(mm {in})

Item	Specification
Differential side gear backlash standard	0.05—0.20 {0.0019—0.0078}

Bearing rotational torque

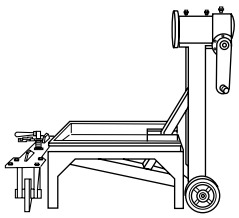
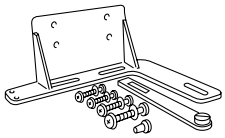
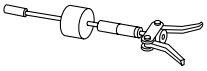
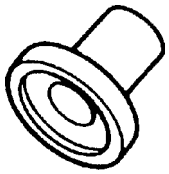
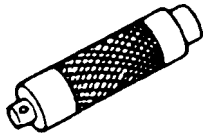
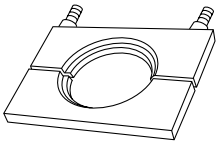
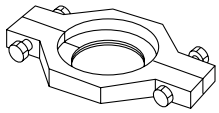
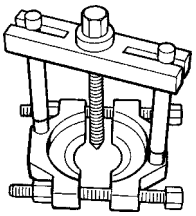
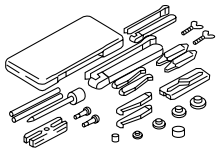
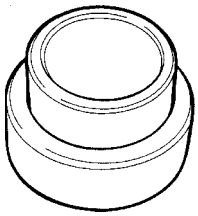
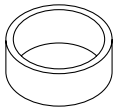
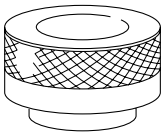
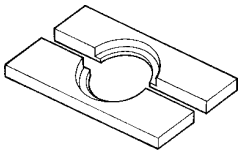
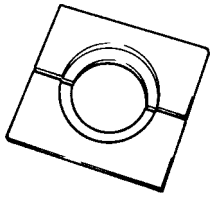
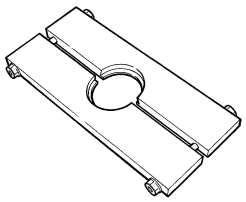
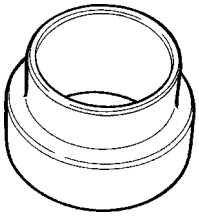
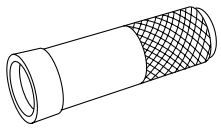
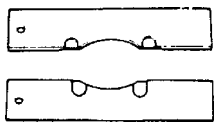
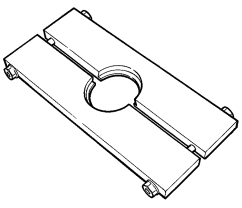
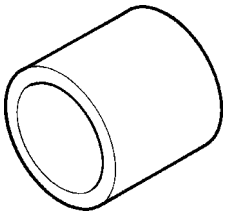
(N·m {kgf·cm, in·lbf})

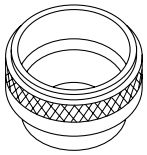
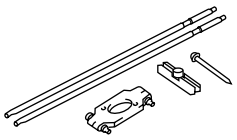
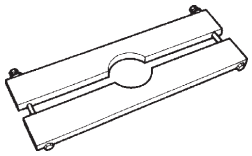
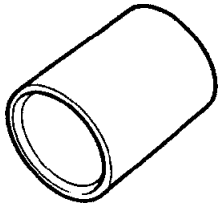
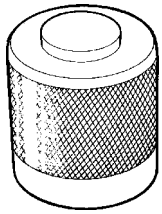
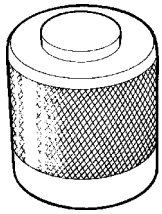
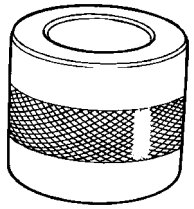
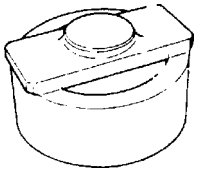
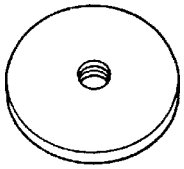
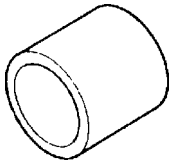
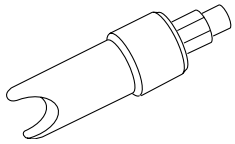
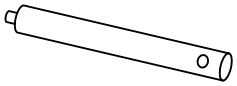
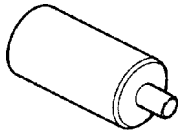
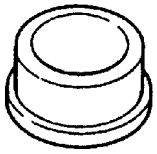
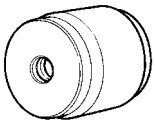
Item	Specification
Differential side bearing initial rotational torque	2WD: 1.00—2.49 {10.2—25.3, 8.9—22.0} AWD: 0.96—2.38 {9.79—24.2, 8.50—21.0}
Secondary shaft (NO.2) bearing initial rotational torque	4.02—5.70 {41.0—58.1, 35.6—50.4}

05-60 SERVICE TOOLS

SERVICE TOOLS

e6u056000000101

49 0107 680A Engine stand 	49 G019 0A0 Transaxle hanger set 	49 1285 071 Bearing puller 
49 W032 2A0 Bearing remover set 	49 M005 796 Body 	49 G030 797 Handle 
49 G030 370 Removing plate 	49 B019 014 Removing plate 	49 0710 520 Bearing puller 
49 0839 425C Bearing puller set 	49 F401 336B Attachment B 	49 S231 626 Support block 
49 V001 525 Bearing installer 	49 W017 101 Clutch hub remover 	49 N017 101 Plate 
49 G027 002 Removing plate 	49 F401 337A Attachment C 	49 F401 331 Body 
49 F026 103 Wheel hub puller 	49 G017 204 Remover 	49 U027 003 Oil seal installer 

49 G030 338 Attachment E 	49 0727 415 Bearing installer 	49 0187 520 Rear axle bearing puller 
49 H026 108 Removing plate 	49 H028 202 Block L 	49 G027 006 Installer 
49 P005 205 Oil seal installer 	49 F028 204 Bush installer 	49 S120 620 Bearing installer 
49 G019 017 Oil seal installer 	49 J027 001 Bearing installer 	49 W027 003 Bearing installer 
49 G027 007 Preload Adapter 	49 G033 102 Handle 	49 D034 203 Puller & installer 
49 F027 009 Attachment for 68&77 	49 W027 001 Body 	49 B012 004 Valve seal pusher