

HOW TO USE THIS MANUAL

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RANGE OF TOPICS

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

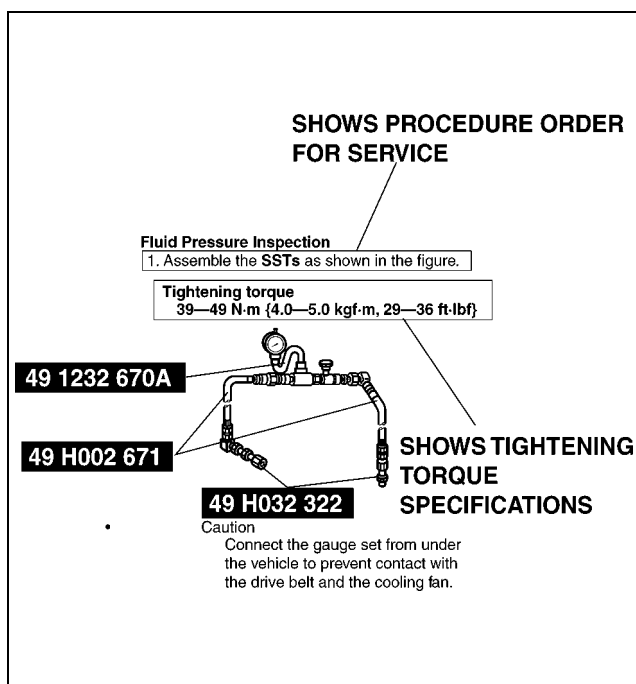
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SERVICING PROCEDURE

Inspection, Adjustment

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

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Repair Procedure

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

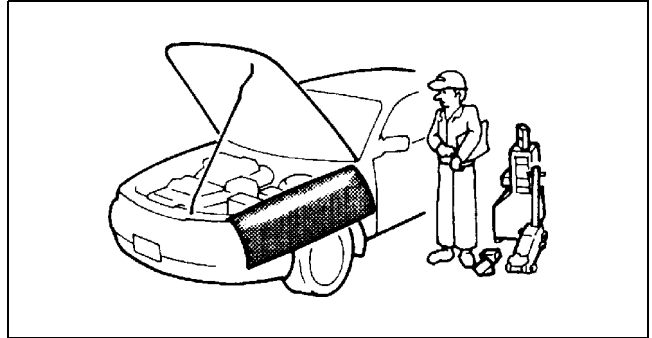
FUNDAMENTAL PROCEDURES

FUNDAMENTAL PROCEDURES

PREPARATION OF TOOLS AND MEASURING EQUIPMENT

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

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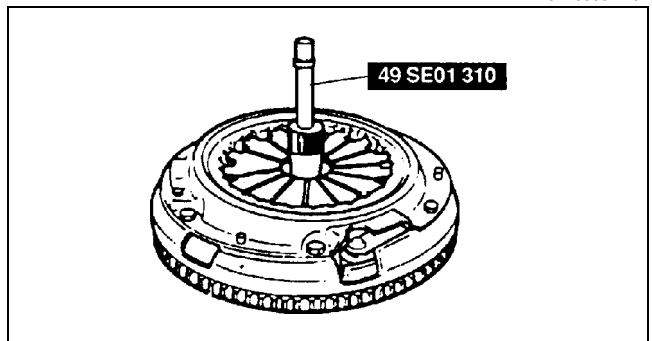


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SPECIAL SERVICE TOOLS

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

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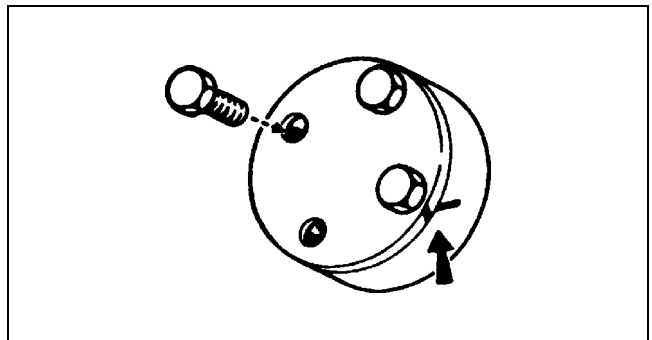


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DISASSEMBLY

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

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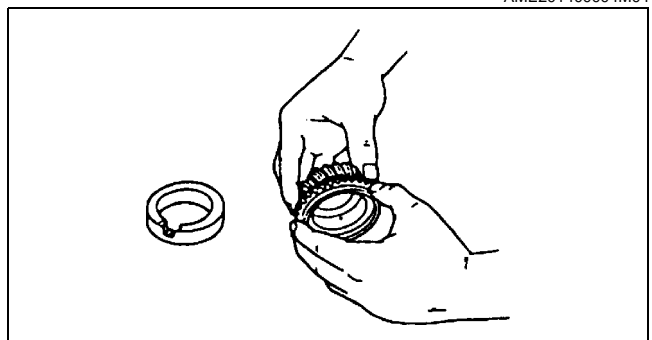


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INSPECTION DURING REMOVAL, DISASSEMBLY

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

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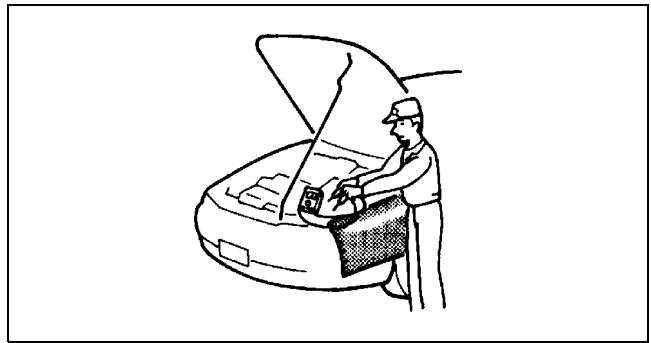
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FUNDAMENTAL PROCEDURES

ADJUSTMENT

- Use suitable gauges and/or testers when making adjustments.

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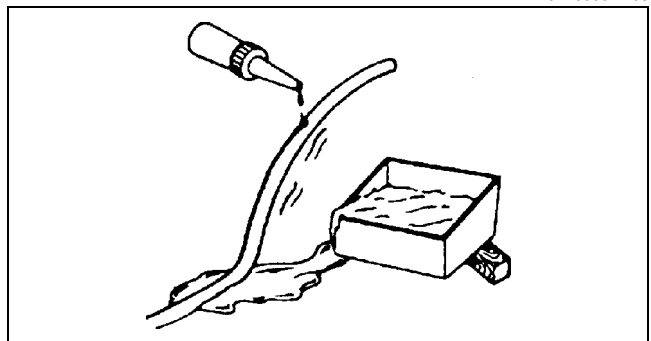


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RUBBER PARTS AND TUBING

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

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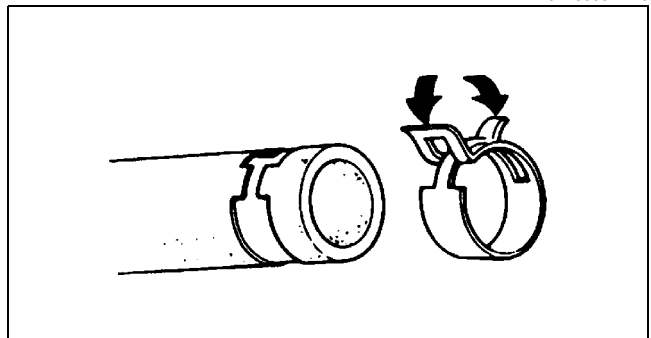


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HOSE CLAMPS

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

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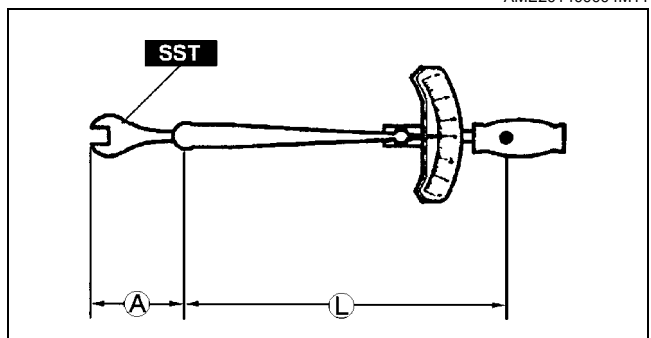


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TORQUE FORMULAS

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

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Torque Unit	Formula
N·m	$N \cdot m \times [L / (L + A)]$
kgf·m	$kgf \cdot m \times [L / (L + A)]$
kgf·cm	$kgf \cdot cm \times [L / (L + A)]$
ft·lbf	$ft \cdot lbf \times [L / (L + A)]$
in·lbf	$in \cdot lbf \times [L / (L + A)]$

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

NEW STANDARDS

NEW STANDARDS

NEW STANDARDS TABLE

AME202800020M01

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

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

MANUAL TRANSAXLE

MANUAL TRANSAXLE

PRECAUTION

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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. Use a plastic hammer when disassembling the transaxle case and other light alloy metal parts.
5. Make sure each part is cleaned before assembling.
6. Coat all movable parts with the specified oil.
7. Replace parts whenever required.
8. Remove old sealant from contact surfaces before applying new sealant.
9. Assemble the parts within **10 minutes** after applying sealant. Allow all sealant to cure at least **30 minutes** after assembly before filling the transaxle with transaxle oil.

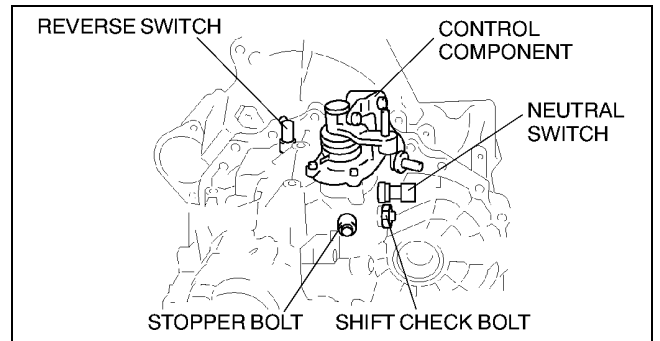
Warning

- **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.**

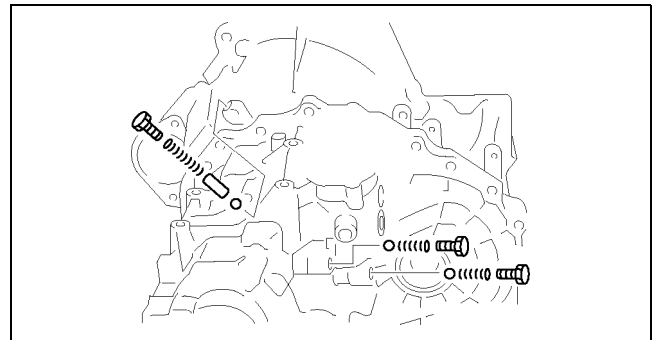
MANUAL TRANSAXLE

Disassembly Procedure

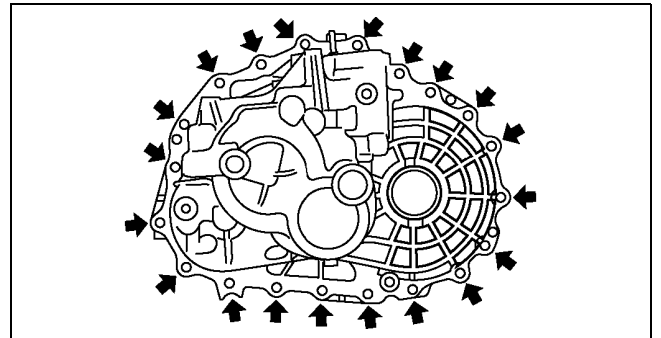
1. Remove the drain plug and the filler cap.
 2. Remove the neutral switch and reverse switch.
 3. Remove the shift check bolt and stopper bolt.
 4. Remove the shift control component.
5. Remove the check plugs, check springs, check balls, and shift check sleeve as shown in the figure.
6. Remove the transaxle case installation bolt.
 7. Remove the bore plug using screwdriver.
 8. Stretch the snap ring of the secondary shaft rear bearing at the bore plug hole, and remove the transaxle case.
 9. Remove the baffle plate and the oil pass.
 10. Remove the snap ring, secondary shaft adjust shim, primary shaft rear bearing adjust shim from the transaxle case.
11. Remove the differential side bearing outer race (transaxle case side) using the **SST**, and remove the adjust shim.



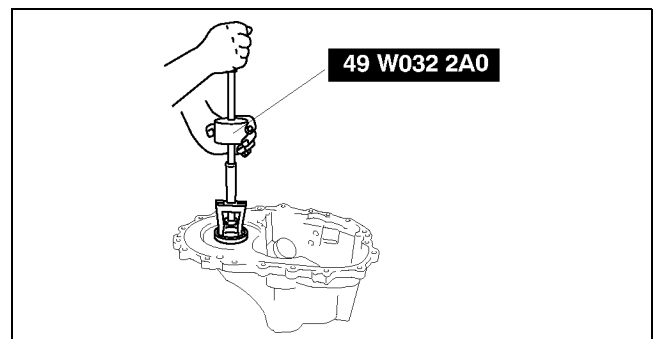
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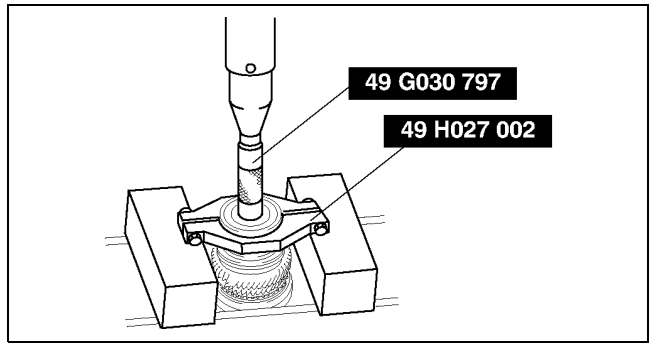
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MANUAL TRANSAXLE

Primary Shaft Rear Bearing Disassembly Note

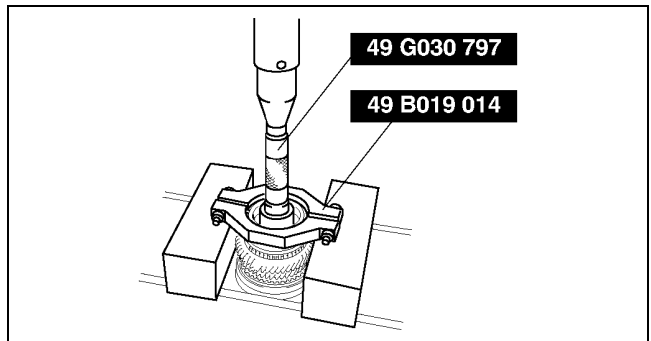
1. Remove the bearing using the **SSTs**.



AME5112M103

Primary Shaft Bearing Spacer and 5th Gear Stopper Disassembly Note

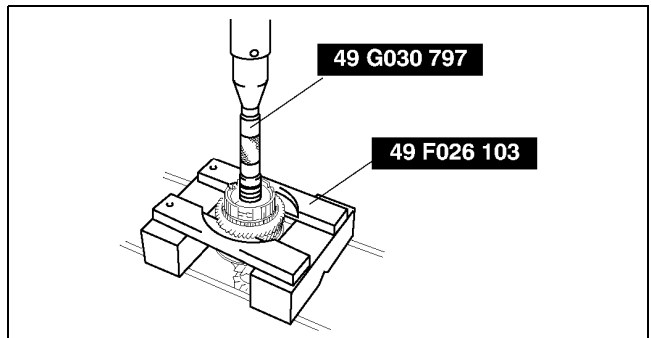
1. Remove the primary shaft bearing spacer and 5th gear stopper at the same time using the **SSTs**.



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5th Clutch Hub Set, 5th Synchronizer Ring and 5th Gear Disassembly Note

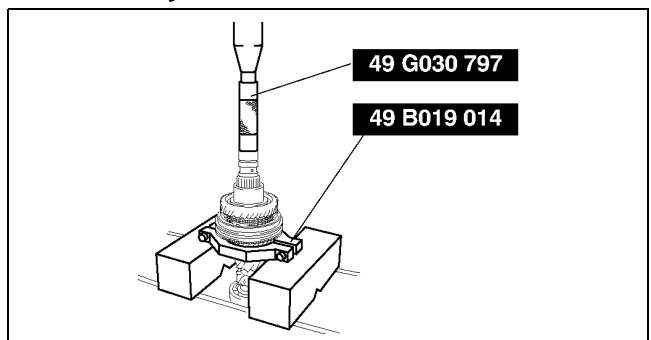
1. Remove the 5th clutch hub set, 5th synchronizer ring and 5th gear at the same time using the **SSTs**.



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5th Bushing, Thrust Washer, 4th Gear, 4th Needle Bearing, 4th Bushing, 4th Synchronizer Ring, 3rd/4th Clutch Hub Set, 3rd Synchronizer Ring and 3rd Gear Disassembly Note

1. Remove the 5th bushing, thrust washer, 4th gear, 4th needle bearing, 4th bushing, 4th synchronizer ring, 3rd/4th clutch hub set, 3rd synchronizer ring and 3rd gear at the same time using the **SSTs**.



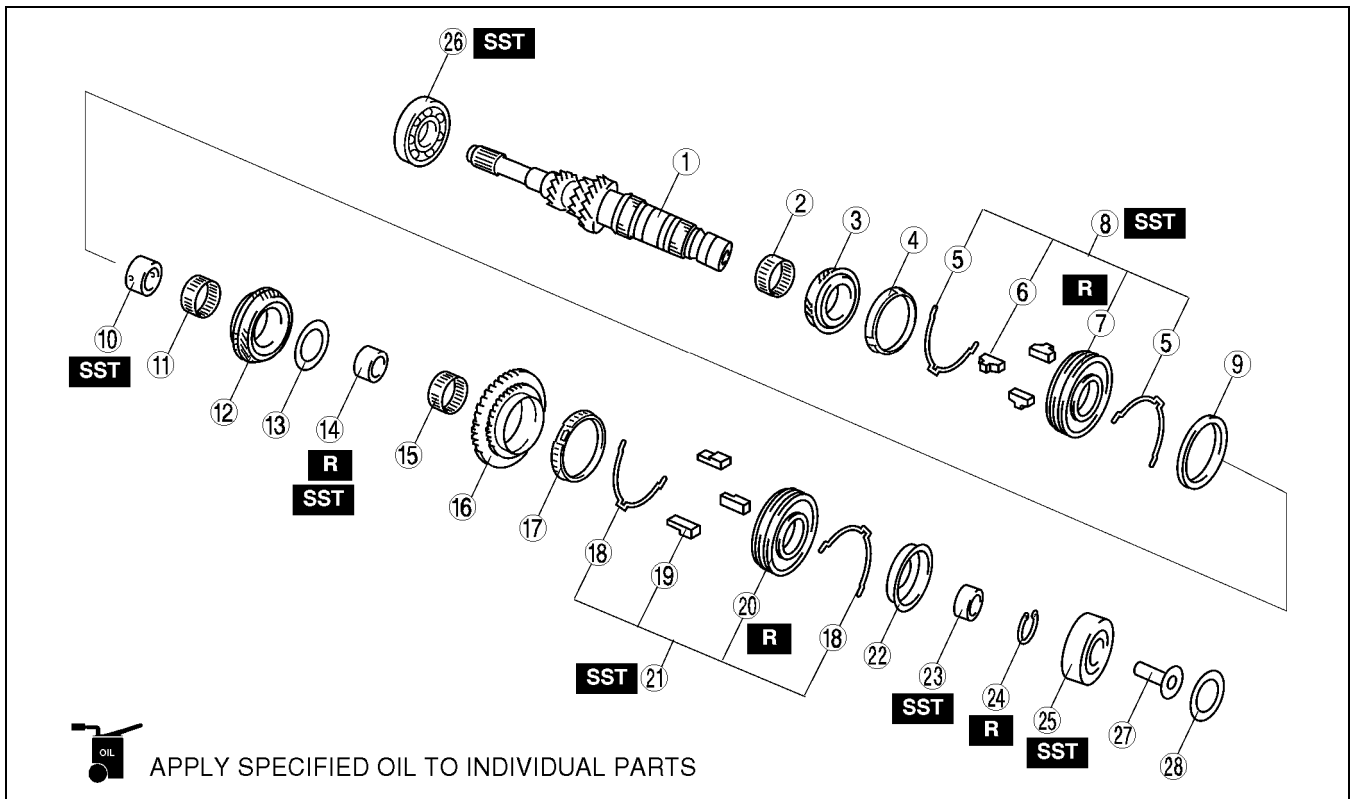
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PRIMARY SHAFT COMPONENTS ASSEMBLY

AME511217201M04

1. Assemble in the order shown in the figure.



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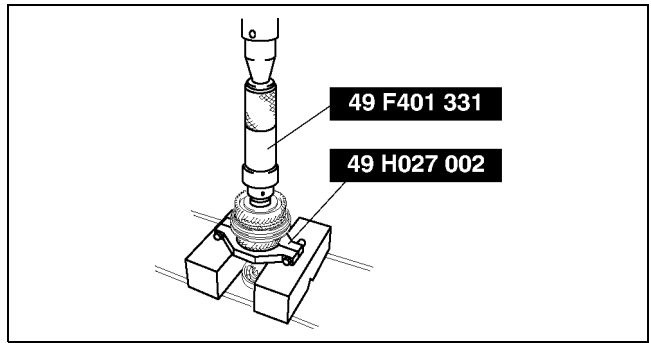
1	Primary shaft
2	3rd needle bearing
3	3rd gear
4	3rd synchronizer ring
5	3rd/4th synchronizer key spring (See J-14 3rd/4th Synchronizer Key Spring, 3rd/4th Synchronizer Key and 3rd/4th Clutch Hub and Sleeve Assembly Note)
6	3rd/4th synchronizer key
7	3rd/4th clutch hub and sleeve
8	3rd/4th clutch hub set (See J-14 3rd/4th Clutch Hub Set Assembly Note)
9	4th synchronizer ring
10	4th bushing (See J-15 4th Bushing Assembly Note)
11	4th needle bearing
12	4th gear
13	Primary shaft thrust washer (See J-15 Primary Shaft Thrust Washer Assembly Note)
14	5th bushing (See J-16 5th Bushing Assembly Note)
15	5th needle bearing

16	5th gear
17	5th synchronizer ring
18	5th synchronizer key spring (See J-16 5th Synchronizer Key Spring, 5th Synchronizer Key and 5th Clutch Hub and Sleeve Assembly Note)
19	5th synchronizer key
20	5th clutch hub and sleeve
21	5th clutch hub set (See J-17 5th Clutch Hub Set Assembly Note)
22	5th gear stopper
23	Primary shaft bearing spacer (See J-17 Primary Shaft Bearing Spacer Assembly Note)
24	Snap ring (See J-17 Snap Ring Assembly Note)
25	Primary shaft rear bearing (See J-18 Primary Shaft Rear Bearing Assembly Note)
26	Primary shaft front bearing (See J-18 Primary Shaft Front Bearing Assembly Note)
27	Oil channel
28	Primary shaft rear bearing adjust shim

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5th Bushing Assembly Note

1. Install a new 5th bushing using the SSTs.

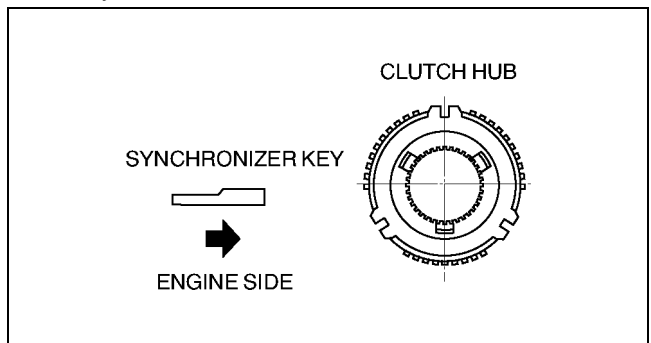


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5th Synchronizer Key Spring, 5th Synchronizer Key and 5th Clutch Hub and Sleeve Assembly Note

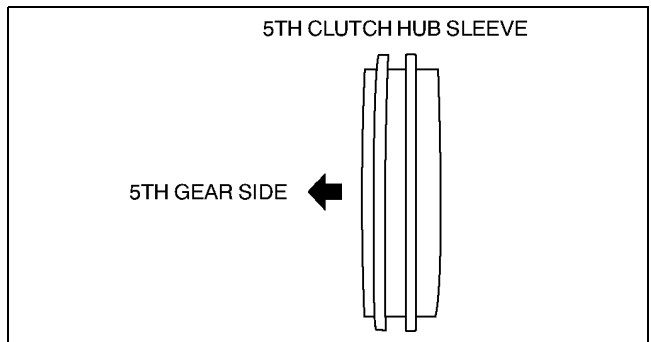
1. Assemble the 5th synchronizer key springs, 5th synchronizer key and 5th clutch hub to the 5th clutch sleeve.

- (1) Install a new 5th clutch hub in the direction as shown in the figure.



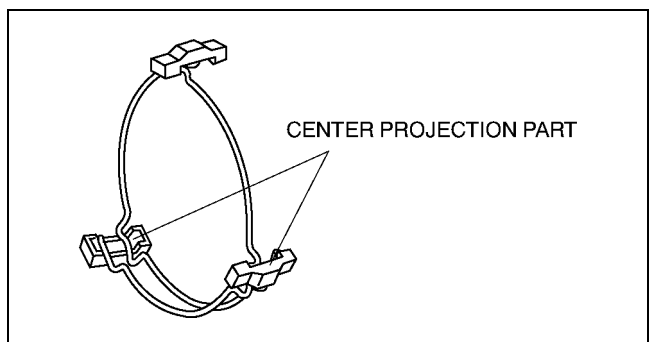
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- (2) Install a new 5th clutch sleeve in the direction as shown in the figure.



AME5112M052

- (3) Install center projection parts of 5th synchronizer key springs to different synchronizer keys on each side.

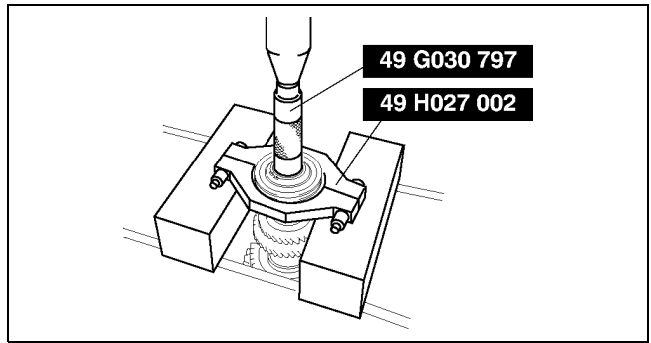


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MANUAL TRANSAXLE

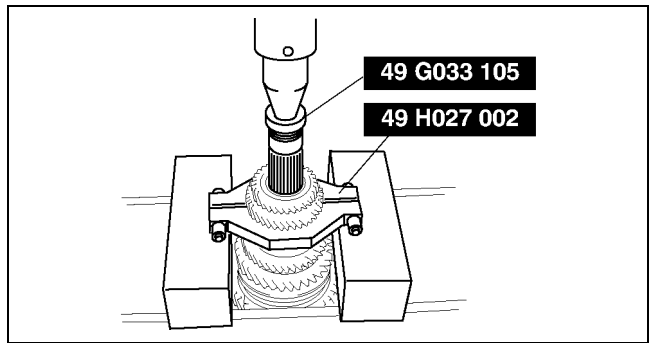
Secondary Shaft Rear Bearing Disassembly Note

1. Remove the secondary shaft rear bearing using the **SSTs**.



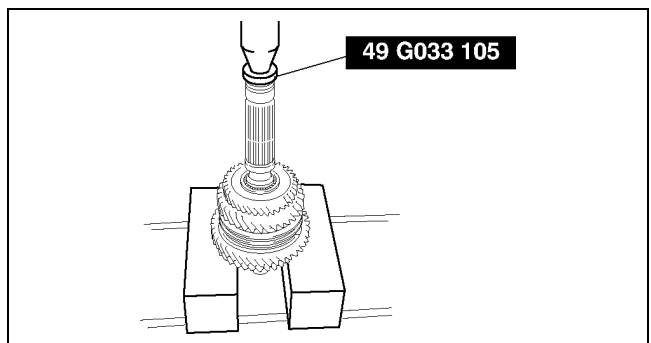
4th Gear and 5th Gear Disassembly Note

1. Remove the 4th gear and 5th gear at the same time using the **SSTs**.



3rd Gear, 2nd Gear, 2nd Needle Bearing, 2nd Bushing, 2nd Inner Synchronizer Component, 1st/2nd Clutch Hub Set, 1st Inner Synchronizer Component, 1st Needle Bearing, 1st Bushing, 1st Gear and Reverse Main Gear Disassembly Note

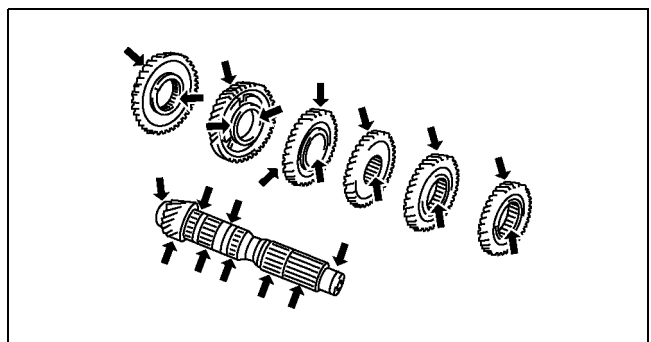
1. Remove the 3rd gear, 2nd gear, 2nd needle bearing, 2nd bushing, 2nd inner synchronizer component, 1st/2nd clutch hub set, 1st inner synchronizer component, 1st needle bearing, 1st bushing, 1st gear and reverse main gear at the same time using the **SST**.



SECONDARY SHAFT COMPONENTS INSPECTION

Secondary Shaft and Gear Inspection

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

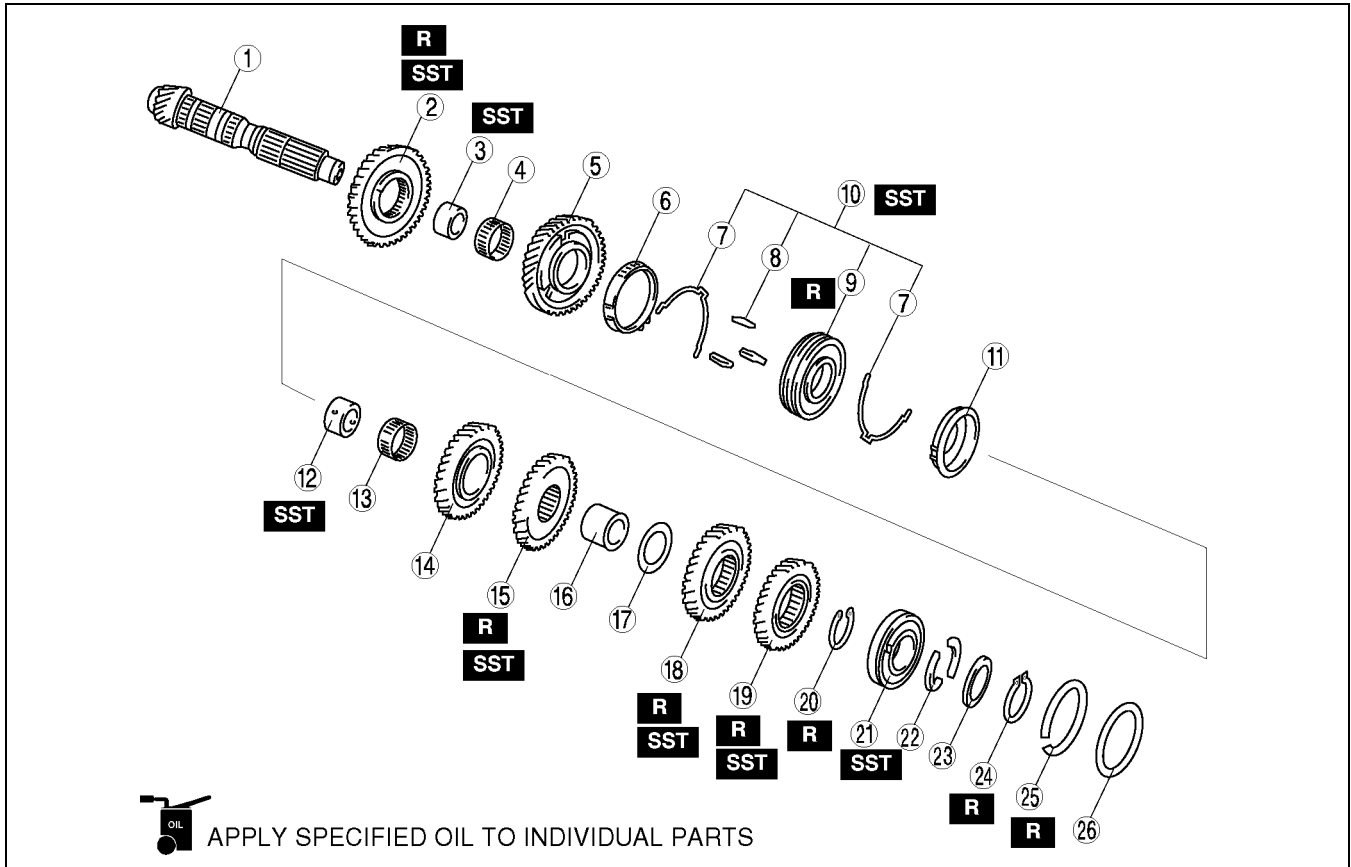


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SECONDARY SHAFT COMPONENTS ASSEMBLY

AME511217301M04

1. Assemble in the order shown in the figure.



AME5112M136

1	Secondary shaft
2	Reverse main gear (See J-25 Reverse Main Gear Assembly Note)
3	1st bushing (See J-25 1st Bushing Assembly Note)
4	1st needle bearing
5	1st gear
6	1st inner synchronizer component
7	Synchronizer key spring (See J-26 Synchronizer Key Spring, 1st/2nd Synchronizer Key and 1st/2nd Clutch Hub and Sleeve Assembly Note)
8	1st/2nd synchronizer key
9	1st/2nd clutch hub and sleeve
10	1st/2nd clutch hub set (See J-26 1st/2nd Clutch Hub Set Assembly Note)
11	2nd inner synchronizer component
12	2nd bushing (See J-27 2nd Bushing Assembly Note)
13	2nd needle bearing
14	2nd gear

15	3rd gear (See J-27 3rd Gear Assembly Note)
16	3rd/4th secondary shaft spacer
17	4th gear adjustment shim (See J-27 4th Gear Adjustment Shim Assembly Note)
18	4th gear (See J-28 4th Gear Assembly Note)
19	5th gear (See J-28 5th Gear Assembly Note)
20	5th gear Snap ring (See J-28 5th Gear Snap Ring Assembly Note)
21	Secondary shaft rear bearing (See J-28 Secondary Shaft Rear Bearing Assembly Note)
22	Secondary shaft C ring (See J-29 Secondary Shaft C Ring Assembly Note)
23	C ring holder
24	Snap ring
25	Snap ring
26	Secondary shaft rear bearing adjust shim

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Secondary Shaft C Ring Assembly Note

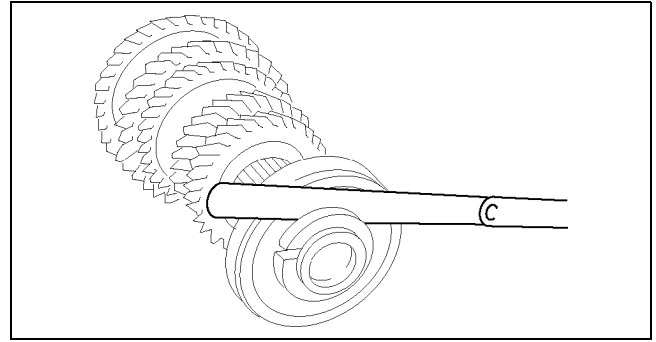
1. Install the secondary shaft C ring to the secondary shaft.
2. Measure the clearance between the secondary shaft C ring and the secondary shaft rear bearing.
 - If it is not within the specification, adjust it by selecting a proper C ring from below.

Clearance

0.00—0.06 mm {0.0000—0.0024 in}

Secondary shaft C ring size

Thickness (mm {in})	
2.535 {0.0998}	2.835 {0.1116}
2.565 {0.1010}	2.865 {0.1128}
2.595 {0.1022}	2.895 {0.1140}
2.625 {0.1033}	2.925 {0.1152}
2.655 {0.1045}	2.955 {0.1163}
2.685 {0.1057}	2.985 {0.1175}
2.715 {0.1069}	3.015 {0.1187}
2.745 {0.1081}	3.045 {0.1199}
2.775 {0.1093}	3.075 {0.1211}
2.805 {0.1104}	—

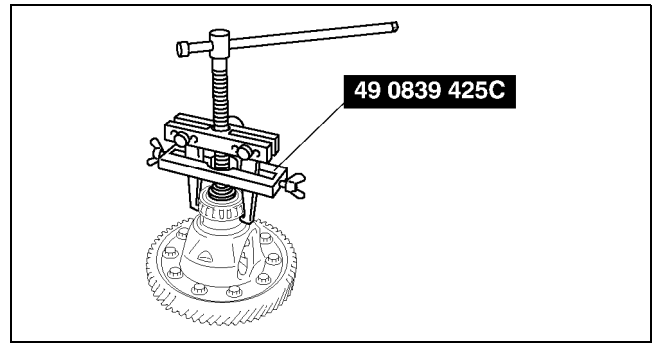


3. Inspect the 1st gear and 2nd gear end play. (See [J-18 SECONDARY SHAFT COMPONENTS PREINSPECTION.](#))

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Bearing (Ring Gear-Opposite Side) Disassembly Note

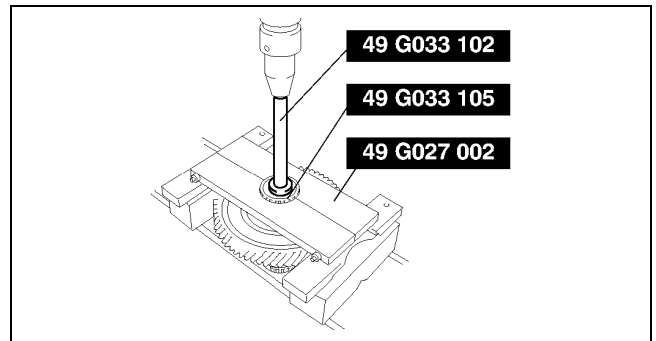
1. Remove the bearing using the SST.



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Bearing (Ring Gear Side) Disassembly Note

1. Remove the bearing using the SSTs.

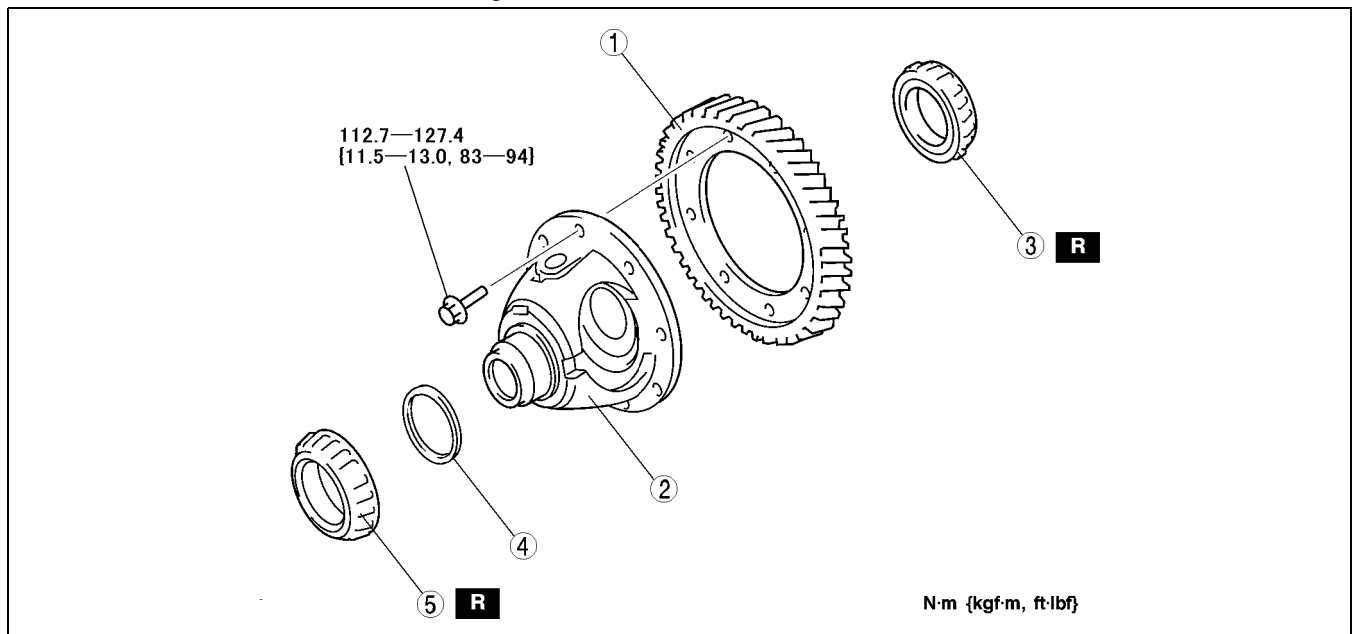


AME5112M134

DIFFERENTIAL ASSEMBLY

AME511227100M03

1. Assemble in the order shown in the figure.



AME5112M141

1	Ring gear (See J-34 Ring Gear Assembly Note)
2	Gear case component
3	Bearing (ring gear side) (See J-34 Bearing (Ring Gear Side) Assembly Note)

4	Spacer (See J-34 Spacer Assembly Note)
5	Bearing (ring gear-opposite side) (See J-34 Bearing (Ring Gear-Opposite Side) Assembly Note)

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DIFFERENTIAL SIDE BEARING PRELOAD ADJUSTMENT

AME511201029M05

Note

- Adjust the differential side bearing preload by measuring clearance L between the transaxle case and the differential side bearing outer race, and selecting a differential side bearing adjustment shim.
- Calculate dimension L for the adjustment shim thickness as defined below to adjust the differential side bearing preload to standard value.

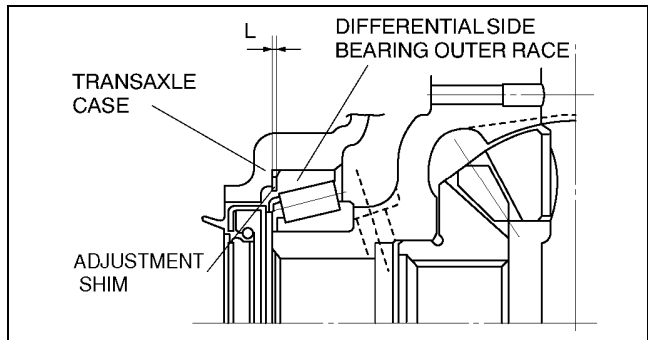
Standard value: 0.15—0.21 mm
{0.0059—0.0083 in}

Dimension L = (L1 + L2) + preload

L: adjustment shim thickness

L1: transaxle case contact face and adjustment shim installation surface dimension

L2: clutch housing contact face and differential side bearing contact face dimension



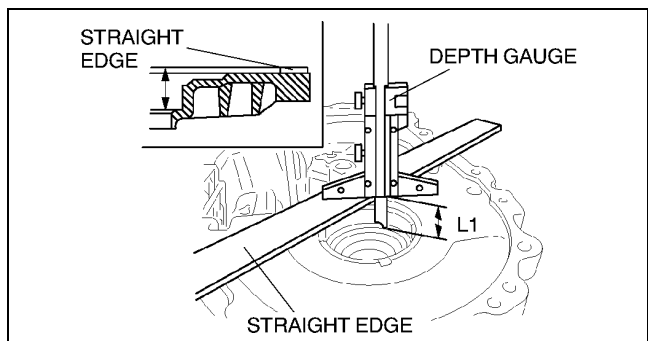
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Adjustment shim thickness

(mm {in})

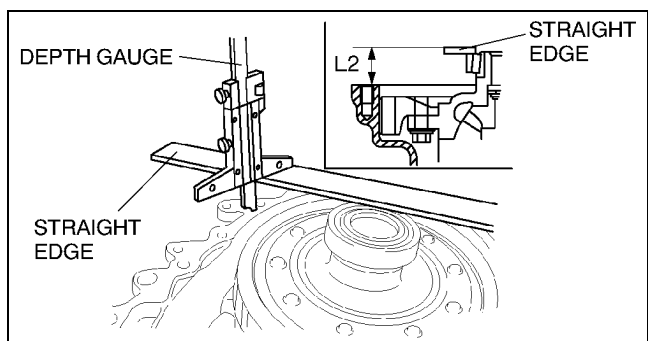
0.48 {0.019}	0.60 {0.024}	0.72 {0.028}	0.84 {0.033}
0.52 {0.020}	0.64 {0.025}	0.76 {0.030}	0.88 {0.035}
0.56 {0.022}	0.68 {0.027}	0.80 {0.031}	0.92 {0.036}

1. Measure dimension L1 between the clutch housing installation surface of the transaxle case and the adjustment shim installation surface using a depth gauge and straight edge.
2. Install the outer race to the ring gear side of the differential side bearing and, keeping the outer race level, lightly push it in and rotate the final gear 5 times or more.



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3. Verify dimension L2 between the differential side bearing outer race and the transaxle case installation surface of the clutch housing using a depth gauge and straight edge.



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Note

- Select up to 2 adjustment shims.

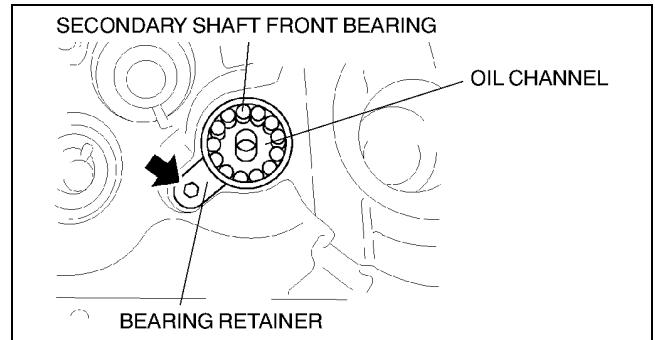
MANUAL TRANSAXLE

5. Install the bearing retainer with the stamp facing up.

Tightening torque

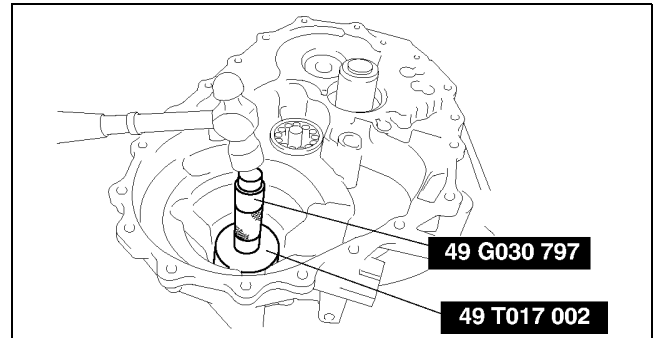
6.27—8.33 N·m

{0.64—0.85 kgf·m, 4.62—6.14 ft·lbf}

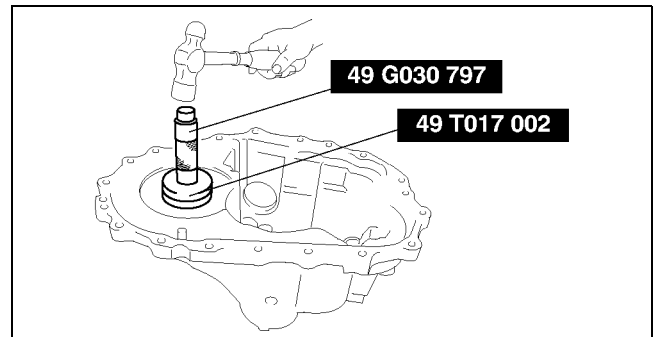


AME5112M020

6. Measure the differential preload, and install the differential side bearing outer race using the **SSTs**. (See [J-38 DIFFERENTIAL SIDE BEARING PRELOAD ADJUSTMENT](#).)



AME5112M021

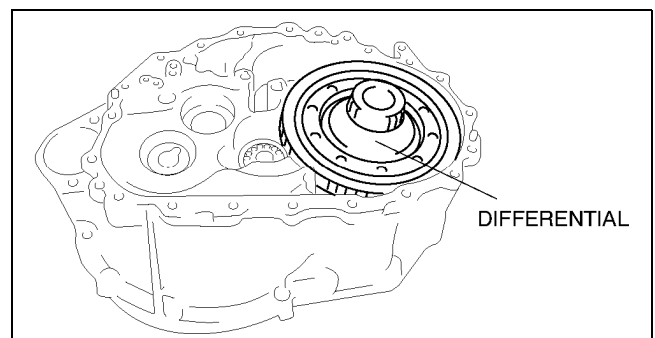


AME5112M038

7. Install the differential to the clutch housing.

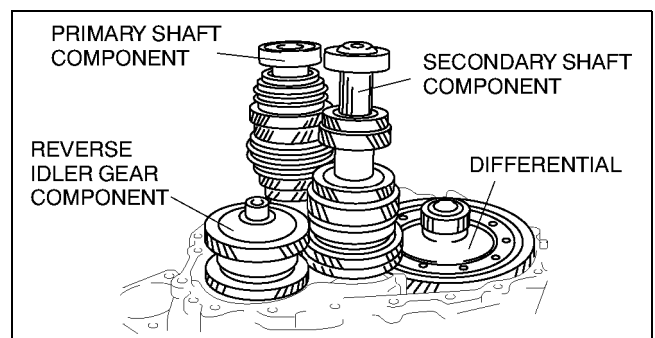
Caution

- 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.



AME5112M022

8. Install the primary shaft component, secondary shaft component, and reverse idler component to the clutch housing at the same time.



AME5112M014