

# Manual Transaxle Workshop Manual A65M-R

## FOREWORD

This manual explains the structure, operation, and service points for the above-indicated manual transaxle. In order to do these procedures safely, quickly, and correctly, you must first read this manual and any other relevant service materials carefully.

The information in this manual is current up to April, 2002. Any changes that occur after that time will not be reflected in this particular manual. Therefore, the contents of this manual may not exactly match the mechanism that you are currently servicing.

**Mazda Motor Corporation  
HIROSHIMA, JAPAN**

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## **WARNING**

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

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

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

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

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

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

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## HOW TO USE THIS MANUAL

### HOW TO USE THIS MANUAL

#### 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.

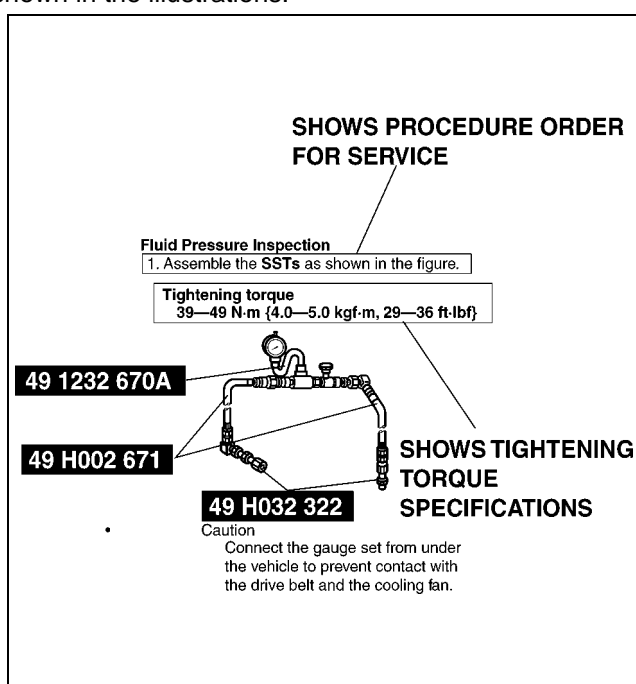
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#### SERVICING PROCEDURE

##### 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.

# HOW TO USE THIS MANUAL

3. Procedure steps are numbered and the part that is the main point of the 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.

**Procedure**

"Removal/Installation" Portion

"Inspection After Installation" Portion

INSTALL THE PARTS BY PERFORMING STEPS 1—3 IN REVERSE ORDER

SHOWS THERE ARE REFERRAL NOTES FOR SERVICE

SHOWS REFERRAL NOTES FOR SERVICE

**SHOWS SERVICE ITEM (S)**

**INDICATES ANY RELEVANT REFERENCES WHICH NEED TO BE FOLLOWED DURING INSTALLATION**

**SHOWS SPECIAL SERVICE TOOL(SST) FOR SERVICE OPERATION**

**SHOWS APPLICATION POINTS OF GREASE, ETC.**

**SHOWS EXPENDABLE PARTS**

**SHOWS DETAILS**

**SHOWS TIGHTENING TORQUE UNITS**

**SHOWS TIGHTENING TORQUE SPECIFICATIONS**

**SHOWS PROCEDURE ORDER FOR SERVICE**

**SHOWS TIGHTENING TORQUE SPECIFICATIONS**

**SHOWS TIGHTENING TORQUE UNITS**

**SHOWS SPECIAL SERVICE TOOL(SST) NO.**

**LOWER TRAILING LINK, UPPER TRAILING LINK REMOVAL/INSTALLATION**

1. Jack up the rear of the vehicle and support it with safety stands.
2. Remove the undercover. (See N-5 Undercover Removal)
3. Remove in the order indicated in the table.
4. Install in the reverse order of removal.
5. Inspect the rear wheel alignment and adjust it if necessary.

<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td>1</td><td>Split pin</td></tr> <tr><td>2</td><td>Nut</td></tr> <tr><td>3</td><td>Lower trailing link ball joint (See R-6 Lower Trailing Link Ball Joint Removal Note)</td></tr> <tr><td>4</td><td>Bolt</td></tr> <tr><td>5</td><td>Lower trailing link</td></tr> <tr><td>6</td><td>Dust boot (lower trailing link)</td></tr> </table>	1	Split pin	2	Nut	3	Lower trailing link ball joint (See R-6 Lower Trailing Link Ball Joint Removal Note)	4	Bolt	5	Lower trailing link	6	Dust boot (lower trailing link)	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td>7</td><td>Split pin</td></tr> <tr><td>8</td><td>Nut</td></tr> <tr><td>9</td><td>Upper trailing link ball joint (See R-6 Upper Trailing Link Ball Joint Removal Note)</td></tr> <tr><td>10</td><td>Nut</td></tr> <tr><td>11</td><td>Upper trailing link</td></tr> <tr><td>12</td><td>Dust boot (upper trailing link)</td></tr> </table>	7	Split pin	8	Nut	9	Upper trailing link ball joint (See R-6 Upper Trailing Link Ball Joint Removal Note)	10	Nut	11	Upper trailing link	12	Dust boot (upper trailing link)
1	Split pin																								
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10	Nut																								
11	Upper trailing link																								
12	Dust boot (upper trailing link)																								

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

- Remove the ball joint using the SSTs.

49 T028 304 UPPER TRAILING LINK  
49 T028 305 LOWER TRAILING LINK  
49 T028 303

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## SYMBOLS

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- 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

## HOW TO USE THIS MANUAL

Symbol	Meaning	Kind
	Apply grease	Appropriate grease
	Apply sealant	Appropriate sealant
	Apply petroleum jelly	Appropriate petroleum jelly
	Replace part	O-ring, gasket, etc.
	Use SST or equivalent	Appropriate tools

### ADVISORY MESSAGES

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- 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.

#### Specifications

- 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

UNITS
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## UNITS TABLE

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Electrical 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)
Number of revolutions	rpm (revolutions per minute)
Positive pressure	kPa (kilo pascal)
	kgf/cm <sup>2</sup> (kilogram force per square centimeter)
	psi (pounds per square inch)
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	N (Newton)
	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<sup>2</sup> in the following specifications:

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

- The actual converted values for 2.7 kgf/cm<sup>2</sup> are 265 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.

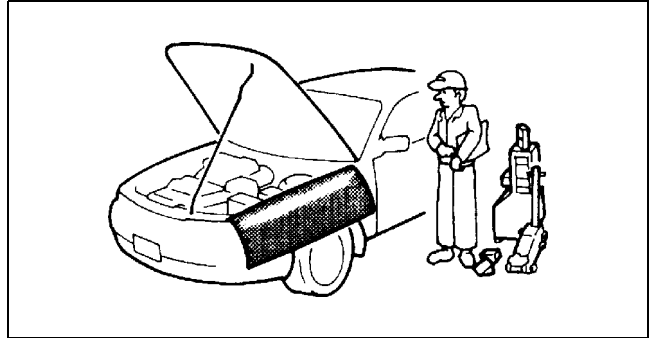
## FUNDAMENTAL PROCEDURES

### 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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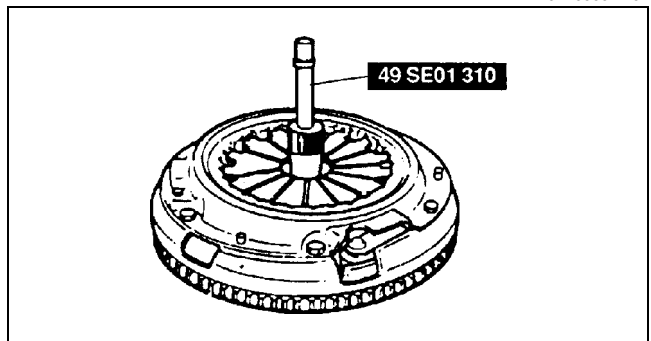


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#### SPECIAL SERVICE TOOLS

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

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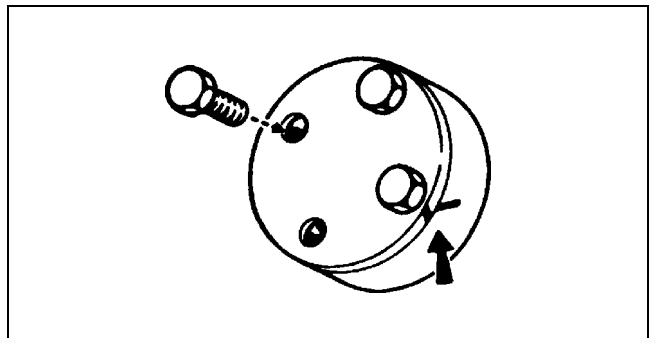


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#### DISASSEMBLY

- 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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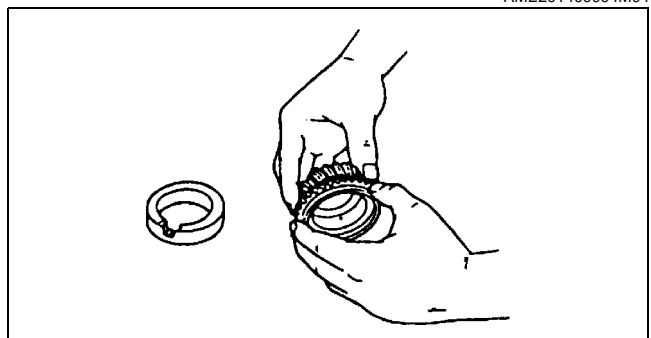


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#### INSPECTION DURING REMOVAL, DISASSEMBLY

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

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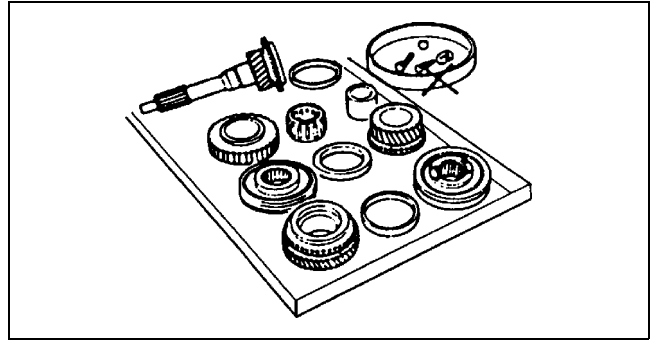


## FUNDAMENTAL PROCEDURES

### ARRANGEMENT OF PARTS

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

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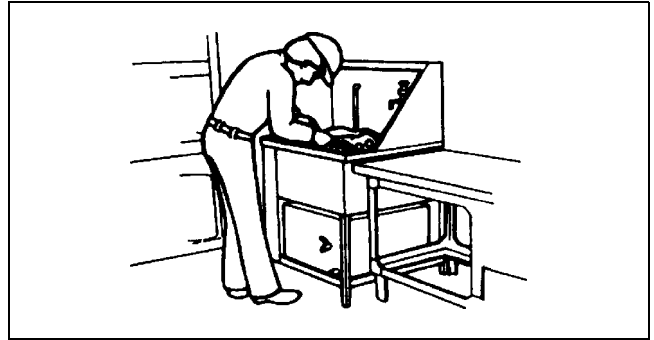
### CLEANING OF PARTS

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

#### Warning

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

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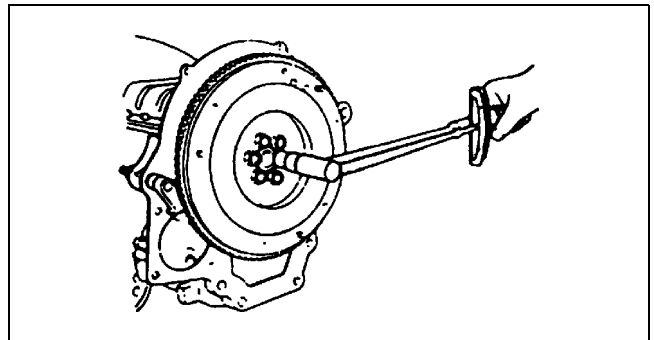


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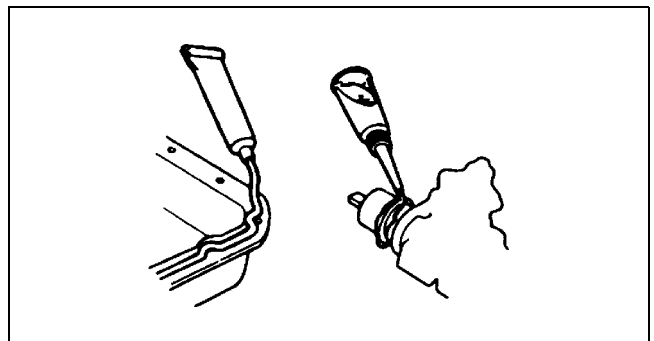
### REASSEMBLY

- Standard values, such as torques and certain adjustments, must be strictly observed in the reassembly of all parts.
- If removed, these parts should be replaced with new ones:
  - Oil seals
  - Gaskets
  - O-rings
  - Lockwashers
  - Cotter pins
  - Nylon nuts
- Depending on location:
  - Sealant and gaskets, or both, should be applied to specified locations. When sealant is applied, parts should be installed before sealant hardens to prevent leakage.
  - Oil should be applied to the moving components of parts.
  - Specified oil or grease should be applied at the prescribed locations (such as oil seals) before reassembly.

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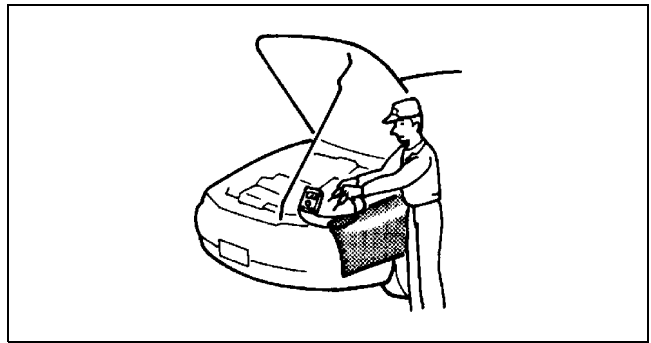
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## FUNDAMENTAL PROCEDURES

### ADJUSTMENT

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

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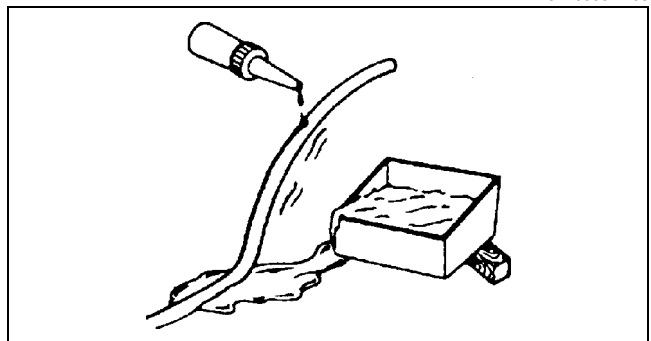


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### RUBBER PARTS AND TUBING

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

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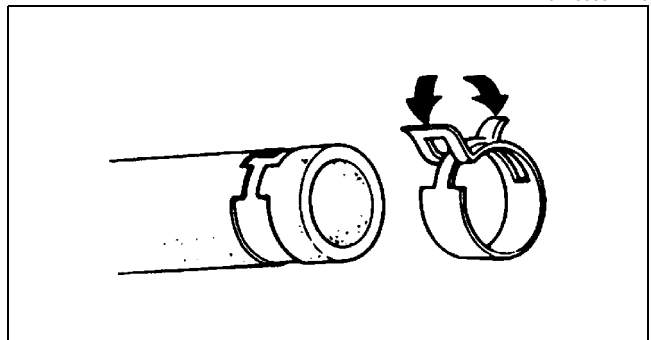


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### HOSE CLAMPS

- 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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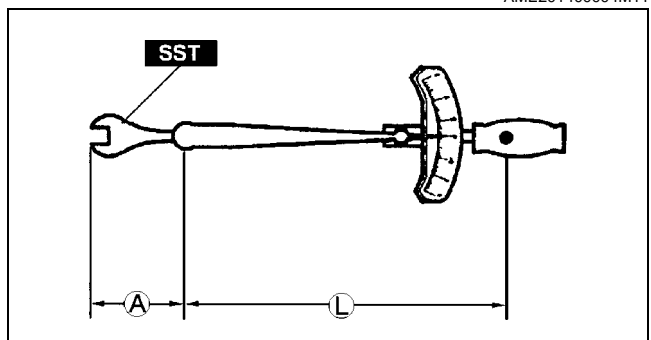


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### TORQUE FORMULAS

- 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	$in \cdot lbf \times [L / (L + A)]$

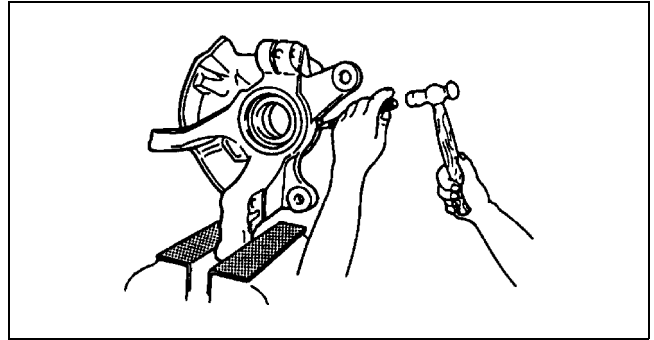
A : The length of the **SST** past the torque wrench drive  
 L : The length of the torque wrench

# FUNDAMENTAL PROCEDURES, ELECTRICAL SYSTEM

## WISE

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

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## ELECTRICAL SYSTEM

### CONNECTORS

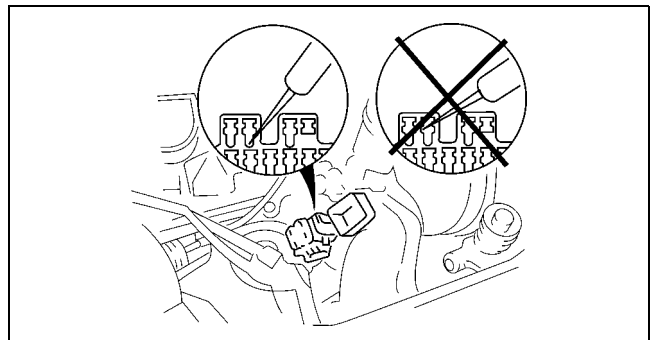
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#### Data Link Connector

- Insert the probe into the service hole when connecting a jumper wire to the data link connector.

#### Caution

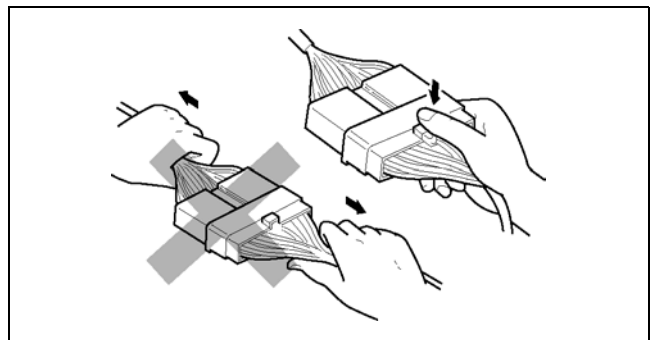
- Inserting a jumper wire probe into the data link connector terminal may damage the terminal.



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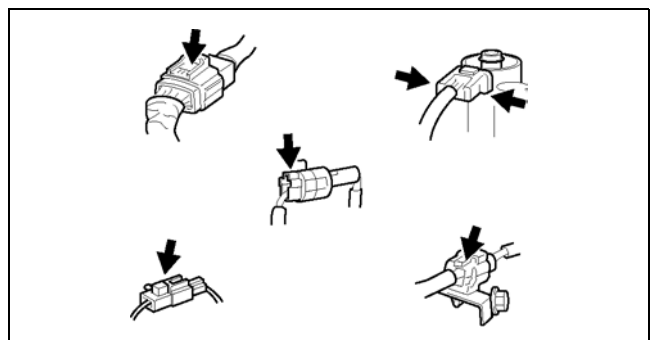
#### Disconnecting Connectors

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



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

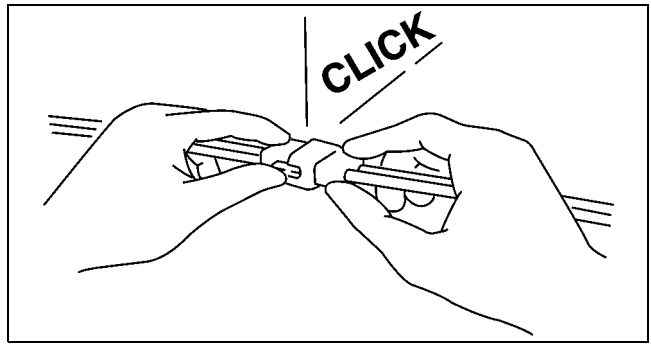


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## ELECTRICAL SYSTEM

### Locking Connector

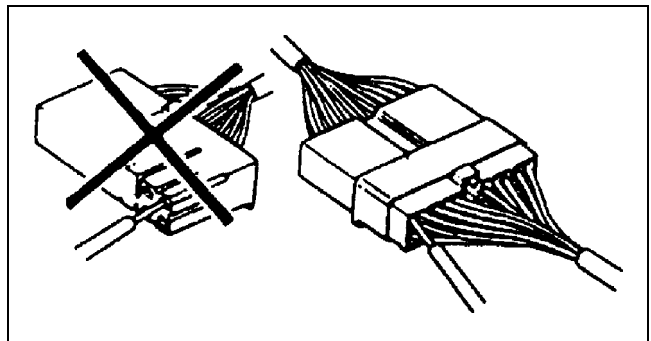
- When locking connectors, listen for a click indicating they are securely locked.



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### Inspection

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

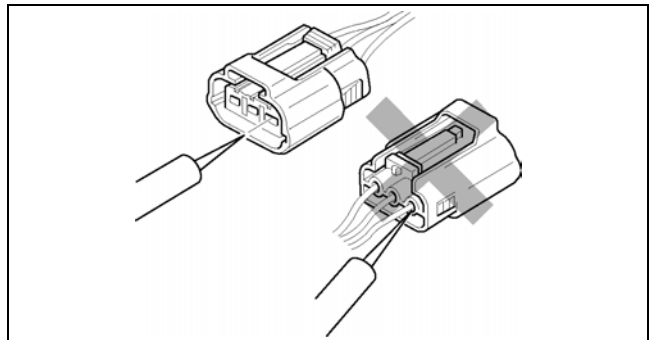


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- Inspect the terminals of waterproof connectors from the connector side since they cannot be accessed from the wiring harness side.

### Caution

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

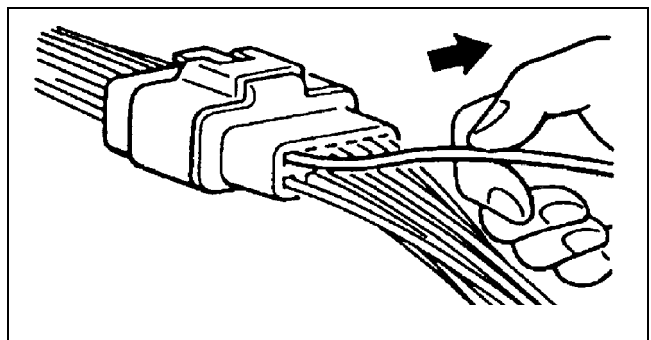


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### Terminals

#### Inspection

- Pull lightly on individual wires to verify that they are secured in the terminal.

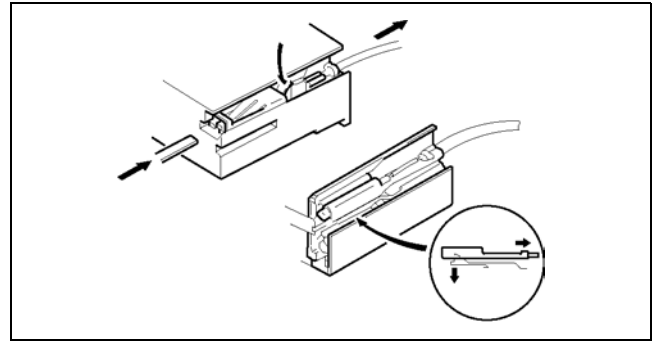


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# ELECTRICAL SYSTEM

## Replacement

- Use the appropriate tools to remove a terminal as shown. When installing a terminal, be sure to insert it until it locks securely.
- Insert a thin piece of metal from the terminal side of the connector and with the terminal locking tab pressed down, pull the terminal out from the connector.

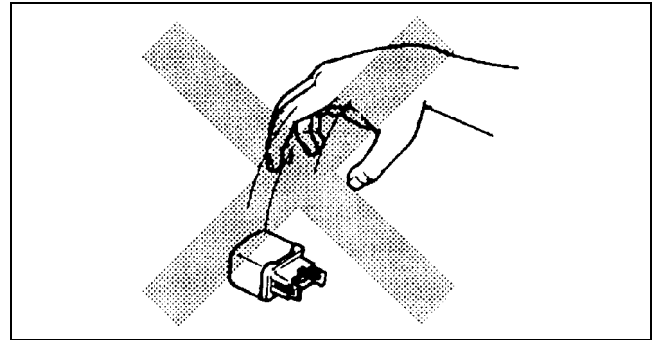


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## Sensors, Switches, and Relays

- Handle sensors, switches, and relays carefully. Do not drop them or strike them against other objects.



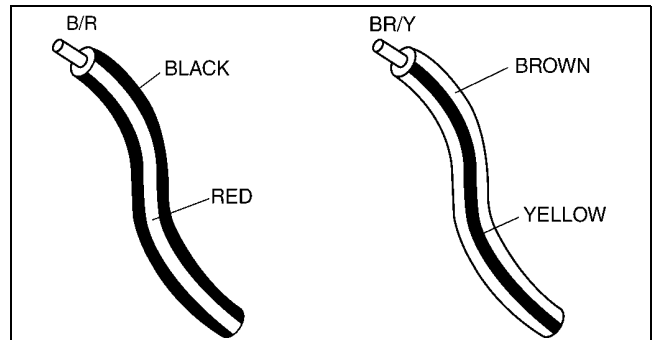
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## Wiring Harness

### Wiring color codes

- Two-color wires are indicated by a two-color code symbol.
- The first letter indicates the base color of the wire and the second the color of the stripe.

CODE	COLOR	CODE	COLOR
B	Black	O	Orange
BR	Brown	P	Pink
G	Green	R	Red
GY	Gray	V	Violet
L	Blue	W	White
LB	Light Blue	Y	Yellow
LG	Light Green		



X3U000WB7

## NEW STANDARDS

### NEW STANDARDS

#### NEW STANDARDS TABLE

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

New Standard		Previous Standard		Remark
Abbreviation	Name	Abbreviation	Name	
AP	Accelerator Pedal	—	Accelerator Pedal	
ACL	Air Cleaner	—	Air Cleaner	
A/C	Air Conditioning	—	Air Conditioning	
BARO	Barometric Pressure	—	Atmospheric Pressure	
B+	Battery Positive Voltage	V <sub>B</sub>	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	

## NEW STANDARDS

New Standard		Previous Standard		Remark
Abbreviation	Name	Abbreviation	Name	
—	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	—	1-2 Shift Solenoid Valve	
—		—	Shift A Solenoid Valve	
—	Shift Solenoid B	—	2-3 Shift Solenoid Valve	
—		—	Shift B Solenoid Valve	
—	Shift Solenoid C	—	3-4 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	—	ECAT Control Unit	
—	Transmission (Transaxle) Fluid Temperature Sensor	—	ATF Thermosensor	
TR	Transmission (Transaxle) Range	—	Inhibitor Position	
TC	Turbocharger	—	Turbocharger	
VSS	Vehicle Speed Sensor	—	Vehicle Speed Sensor	
VR	Voltage Regulator	—	IC Regulator	
VAF sensor	Volume Air Flow Sensor	—	Air flow Sensor	
WUTWC	Warm Up Three Way Catalytic Converter	—	Catalytic Converter	#5
WOT	Wide Open Throttle	—	Fully Open	

#1 : Diagnostic trouble codes depend on the diagnostic test mode

#2 : Controlled by the PCM

#3 : In some models, there is a fuel pump relay that controls pump speed. That relay is now called the fuel pump relay (speed).

#4 : Device that controls engine and powertrain

#5 : Directly connected to exhaust manifold

#6 : Part name of diesel engine

## ABBREVIATIONS

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### ABBREVIATIONS

#### ABBREVIATIONS TABLE

AME203000011M01

SST	Special service tool
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# OVERHAUL

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## MANUAL TRANSAXLE

### MANUAL TRANSAXLE

#### PRECAUTION

AME511201029M09

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

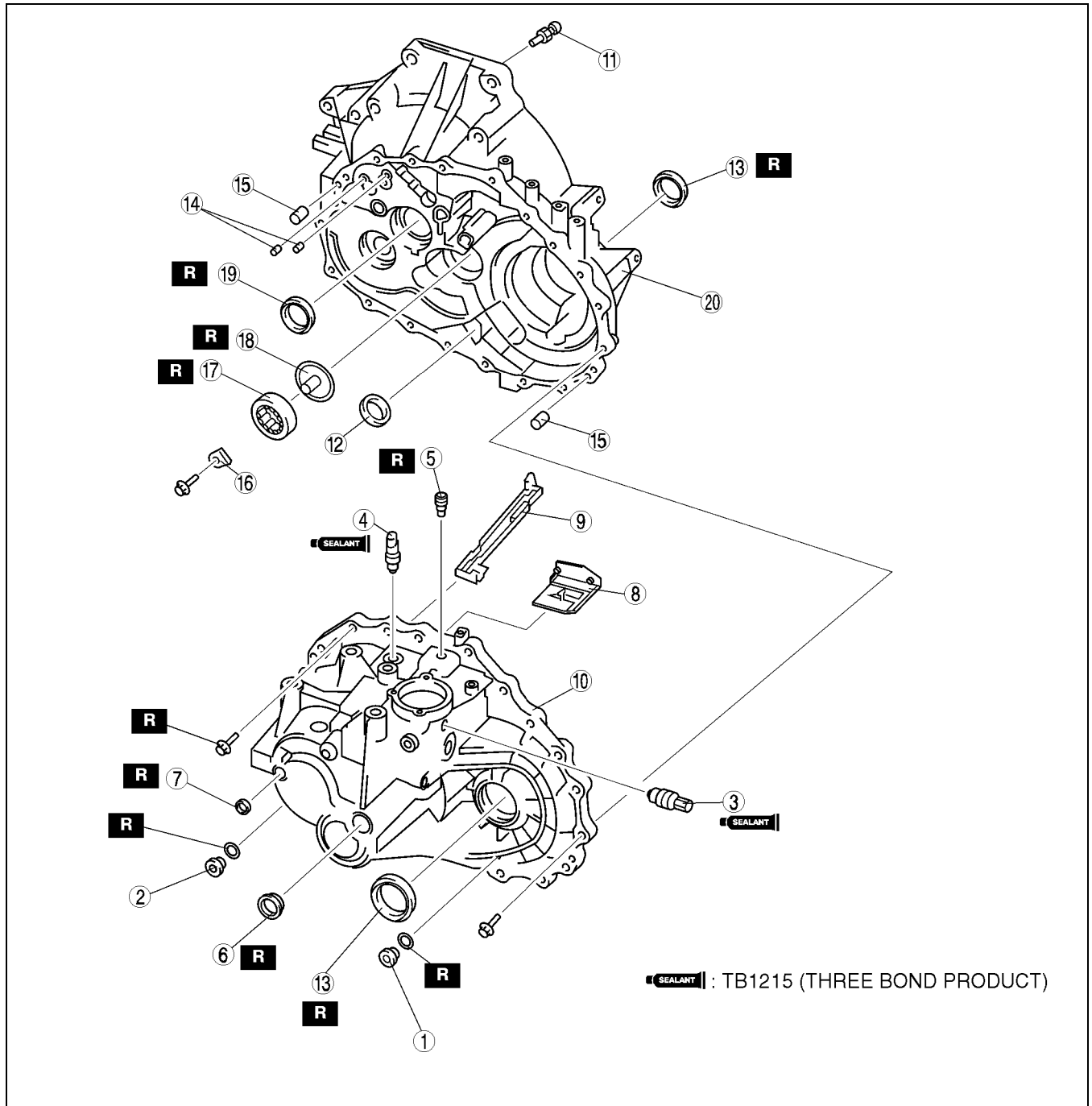
- **Although the stand has a self-locking brake system, there is a possibility that the brake may not hold when the transaxle is held in a lopsided position on the stand. This would cause the transaxle to turn suddenly, causing serious injury. Never keep the transaxle tilted to one side. Always hold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

# MANUAL TRANSAXLE

## CLUTCH HOUSING AND TRANSAXLE CASE COMPONENTS DISASSEMBLY

AME511217010M01

### Disassembly Components

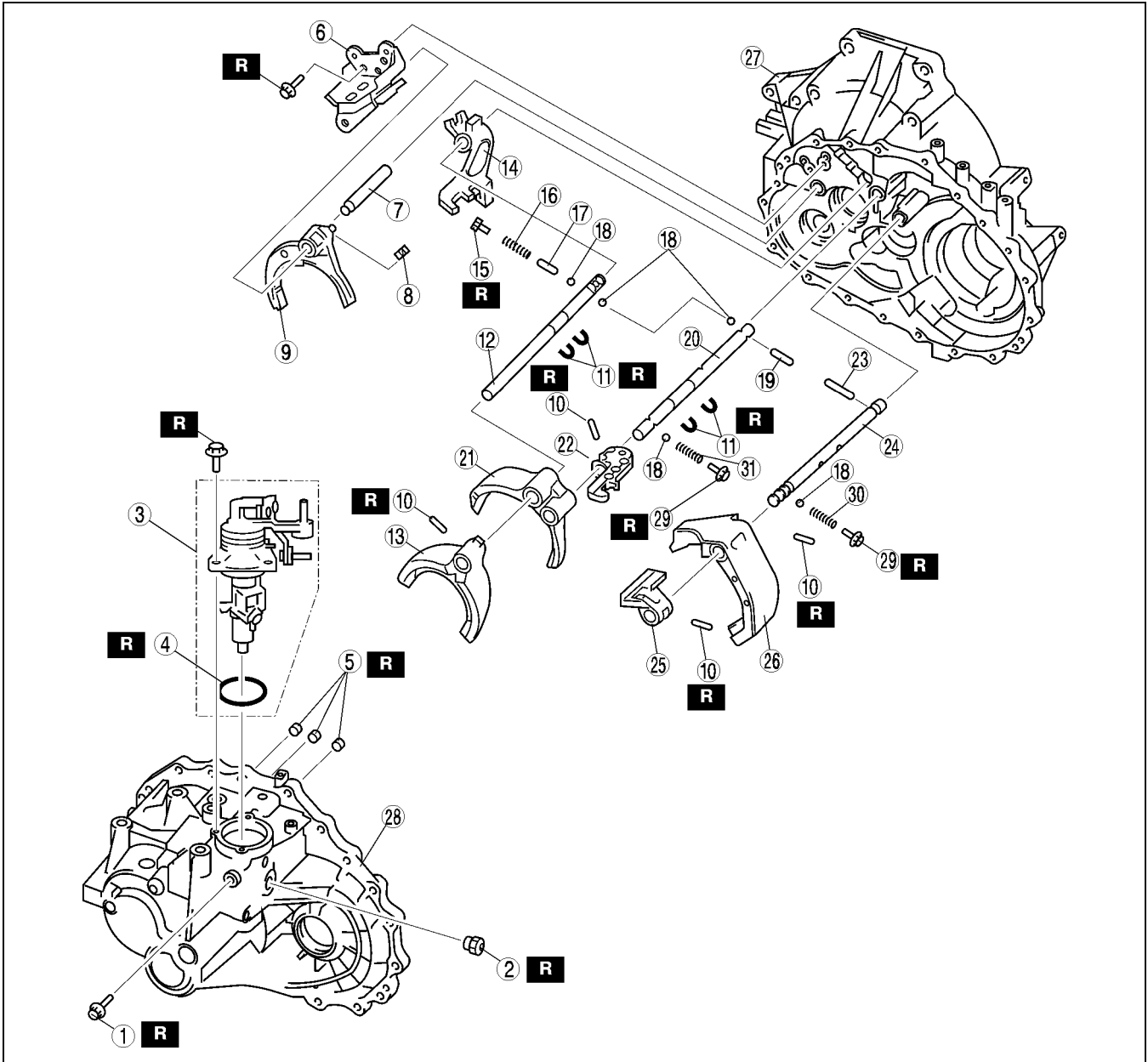


AME5112M004

1	Drain plug
2	Filler cap
3	Neutral switch
4	Reverse switch
5	Air-bleed plug
6	Bore plug
7	Welt plug
8	Baffle plate
9	Oil pass
10	Transaxle case

11	Pivot pin
12	Magnet
13	Differential oil seal
14	Knock pin
15	Dowel pin
16	Secondary shaft bearing retainer
17	Secondary shaft front bearing
18	Oil channel
19	Primary shaft oil seal
20	Clutch housing

# MANUAL TRANSAXLE



AME5112M097

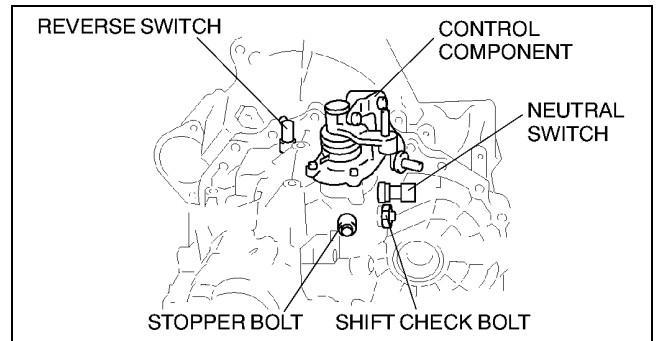
1	Stopper bolt
2	Shift check bolt
3	Shift control component
4	O ring
5	Rod bushing
6	Reverse lever component
7	Reverse fork rod
8	Cap
9	Reverse shift fork
10	Retaining pin
11	C ring
12	5th/Reverse fork rod
13	5th shift fork
14	5th/reverse bracket
15	Check plug (5th/reverse)
16	Check spring (5th/reverse)

17	Shift check sleeve (5th/reverse)
18	Check ball
19	Inter lock pin
20	3rd/4th fork rod
21	3rd/4th shift fork
22	3rd/4th bracket
23	Shift check sleeve (1st/2nd)
24	1st/2nd fork rod
25	1st/2nd bracket
26	1st/2nd shift fork
27	Clutch housing
28	Transaxle case
29	Check plug (1st/2nd, 3rd/4th)
30	Check spring (1st/2nd)
31	Check spring (3rd/4th)

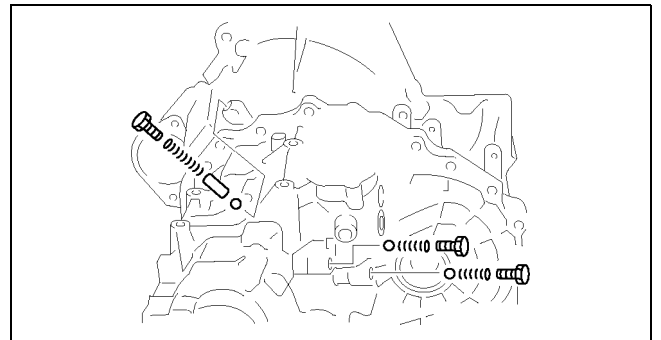
# MANUAL TRANSAXLE

## Disassembly Procedure

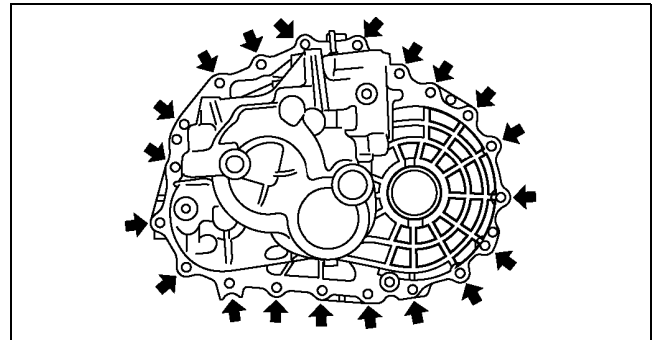
1. Remove the drain plug and the filler cap.
2. Remove the neutral switch and reverse switch.
3. Remove the shift check bolt and stopper bolt.
4. Remove the shift control component.



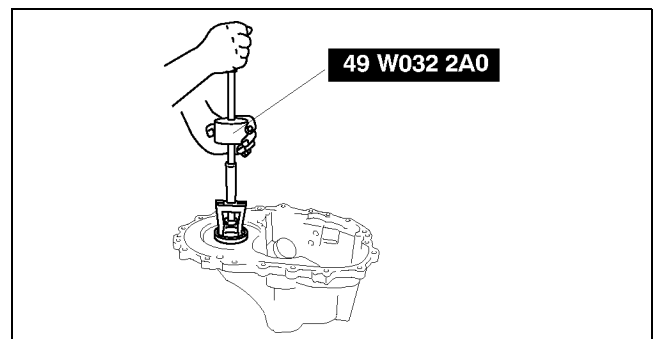
5. Remove the check plugs, check springs, check balls, and shift check sleeve as shown in the figure.



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.

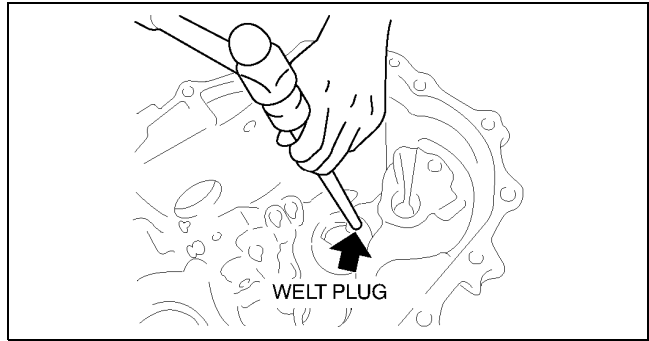


11. Remove the differential side bearing outer race (transaxle case side) using the SST, and remove the adjust shim.



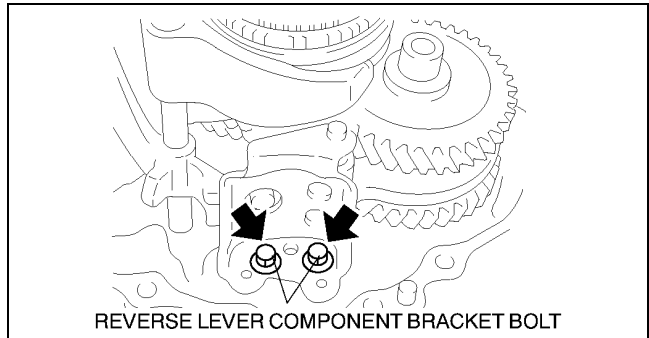
## MANUAL TRANSAXLE

12. Remove the welt plug using a fit stick.
13. Remove the differential oil seal (transaxle case side) using a screwdriver.
14. Remove the magnet from clutch housing.
15. Shift to 5th gear.



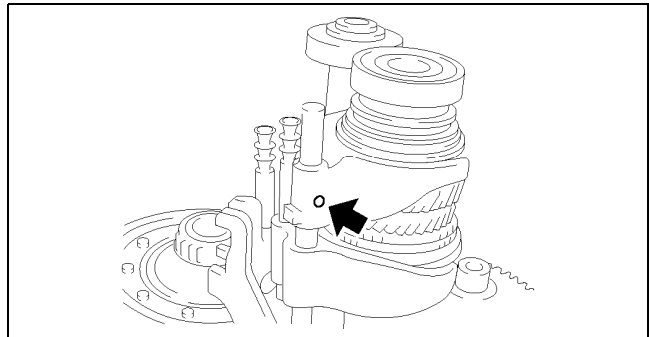
AME5112M008

16. Remove the reverse lever component bracket bolt.
17. Lift the reverse lever component, and remove it.
18. Remove the reverse fork rod.
19. Remove the reverse shift fork.



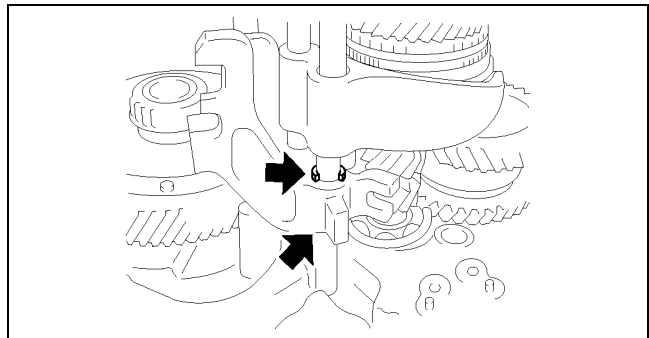
AME5112M009

20. Shift 3rd/4th fork rod to the 3rd gear, and remove the retaining pin of 5th shift fork using a pin punch.



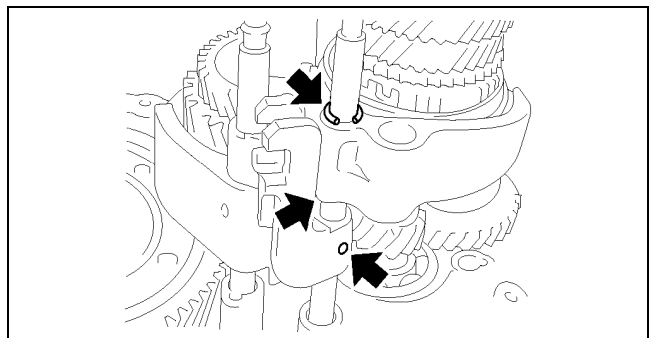
AME5112M010

21. Remove the C ring of the 5th/reverse bracket.
22. Remove the 5th/reverse fork rod, and remove the 5th shift fork and 5th/reverse bracket.
23. Remove the check balls and the interlock pin from the clutch housing.



AME5112M011

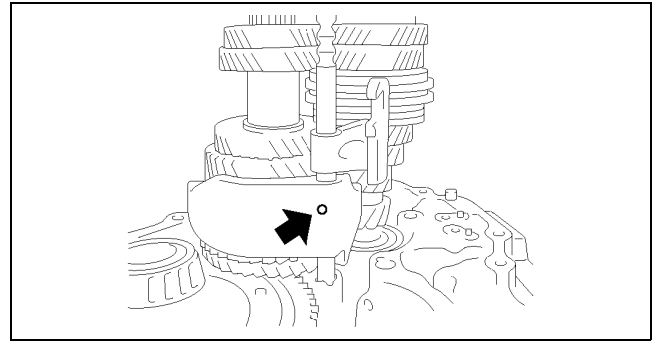
24. Remove the retaining pin of 3rd/4th fork rod bracket using a pin punch.
25. Remove the two C rings of the 3rd/4th shift fork.
26. Remove the 3rd/4th fork rod, and remove the 3rd/4th shift fork and 3rd/4th bracket.
27. Remove the shift check sleeve from the clutch housing.



AME5112M012

## MANUAL TRANSAXLE

28. Remove the retaining pin of 1st/2nd shift fork using a pin punch.
29. Remove the 1st/2nd fork rod and 1st/2nd bracket at a time.
30. Remove the 1st/2nd shift fork.
31. Remove the retaining pin of the 1st/2nd bracket using a pin punch, and remove the 1st/2nd bracket from the 1st/2nd fork rod.



AME5112M013

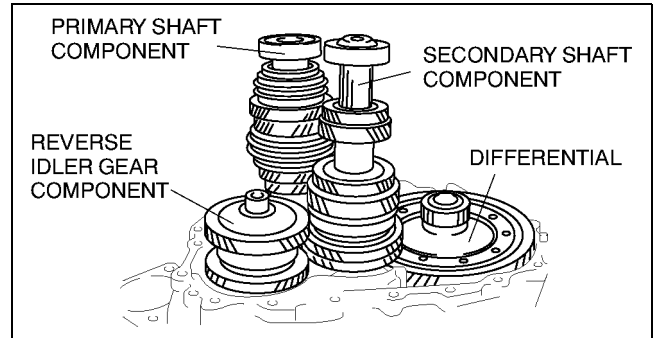
32. Remove each gear component.
  - (1) Tap the primary shaft using a plastic hammer.

### Caution

- The oil channel in the clutch housing can be damaged when removing the secondary shaft component. Remove the secondary shaft component to right above.

- (2) Remove the primary shaft component, secondary shaft component, and reverse idler gear component at the same time.
- (3) Remove the differential.

33. Remove the secondary shaft bearing retainer.



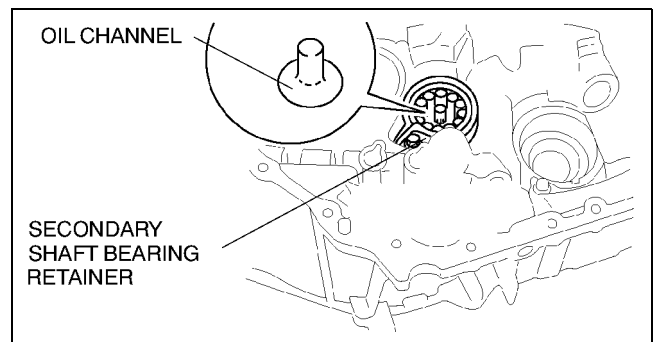
AME5112M014

### Warning

- Using a heat gun can will cause the clutch housing to heat up greatly. To prevent burns wear gloves whenever using a heat gun.

### Caution

- The clutch housing will be damaged if heated above 120 °C. Heat the clutch housing below 120 °C.



AME5112M015

### Note

- If the secondary shaft front bearing can't be removed easily, heat the clutch housing to about 100 °C using a heat gun and remove it.

34. Remove the secondary shaft front bearing using a screwdriver.
35. Remove the oil channel of the secondary shaft.
36. Remove the differential oil seal (clutch housing side) using a screwdriver.

### Warning

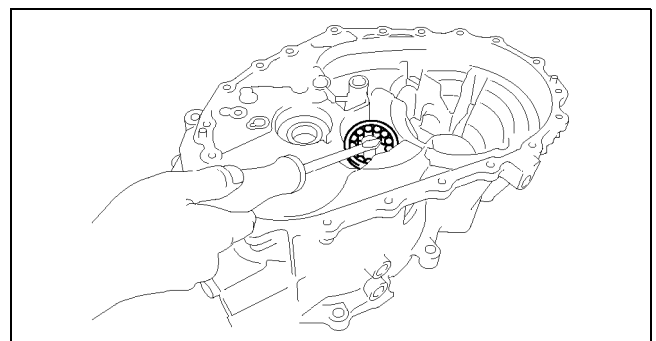
- Using a heat gun will cause the clutch housing to heat up greatly. To prevent burns wear gloves whenever using a heat gun.

### Caution

- The clutch housing will be damaged if heated above 120 °C. Heat the clutch housing below 120 °C.

### Note

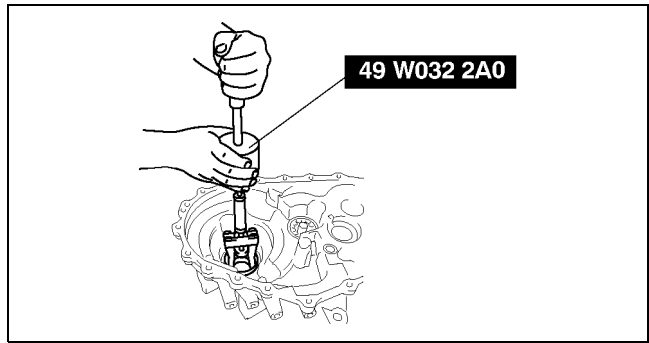
- If the differential side bearing outer race can't be removed easily, heat the clutch housing to about 100 °C using a heat gun and remove it.



AME5112M074

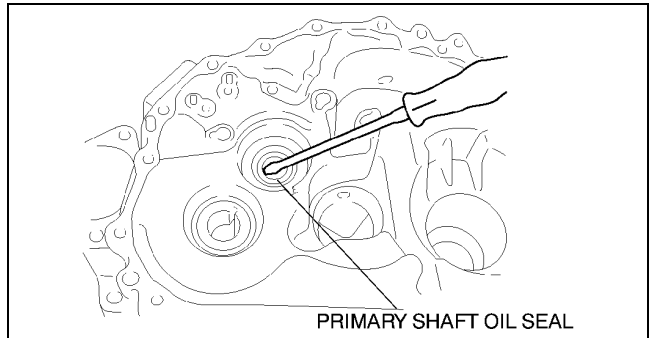
## MANUAL TRANSAXLE

37. Remove the differential side bearing outer race using the **SST**.



AME5112M102

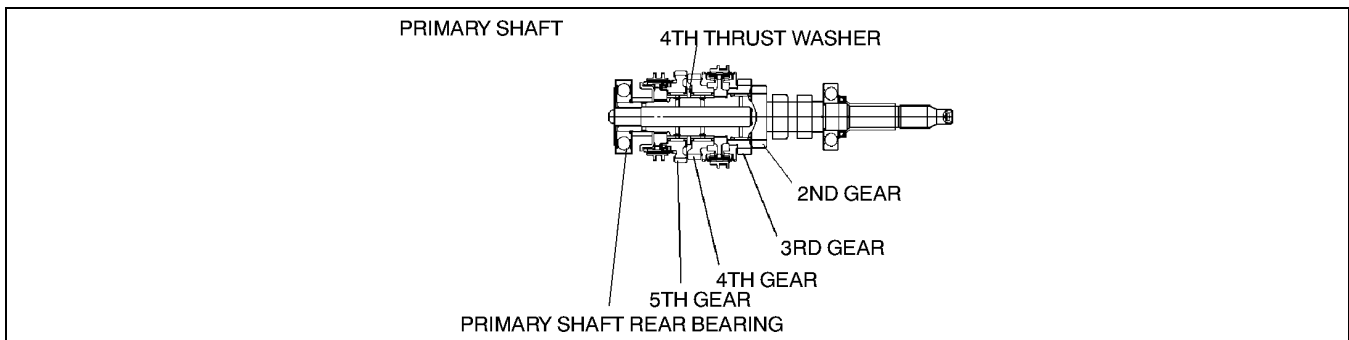
38. Remove the primary shaft oil seal using a screwdriver.



AME5112M016

### PRIMARY SHAFT COMPONENTS PREINSPECTION

AME511217201M01



AME5112M093

#### 3rd Gear Thrust Clearance

1. Measure the clearance between the 3rd gear and 2nd gear.
  - If not as specified, assemble the primary shaft component again.

##### Clearance

0.18—0.31 mm {0.0071—0.0122 in}

#### 5th Gear Thrust Clearance

1. Measure the clearance between 4th thrust washer and the 5th gear.
  - If not as specified, assemble the primary shaft component again.

##### Clearance

0.06—0.16 mm {0.0024—0.0063 in}

#### 4th Gear End Play

1. Remove the primary shaft rear bearing.
2. Set up the primary shaft component, and fix it.
3. Slide the 4th gear up and down, and measure the length of the movement.
  - If not as specified, assemble the primary shaft component again.

##### Length of the movement

0.20—0.30 mm {0.0078—0.0118 in}

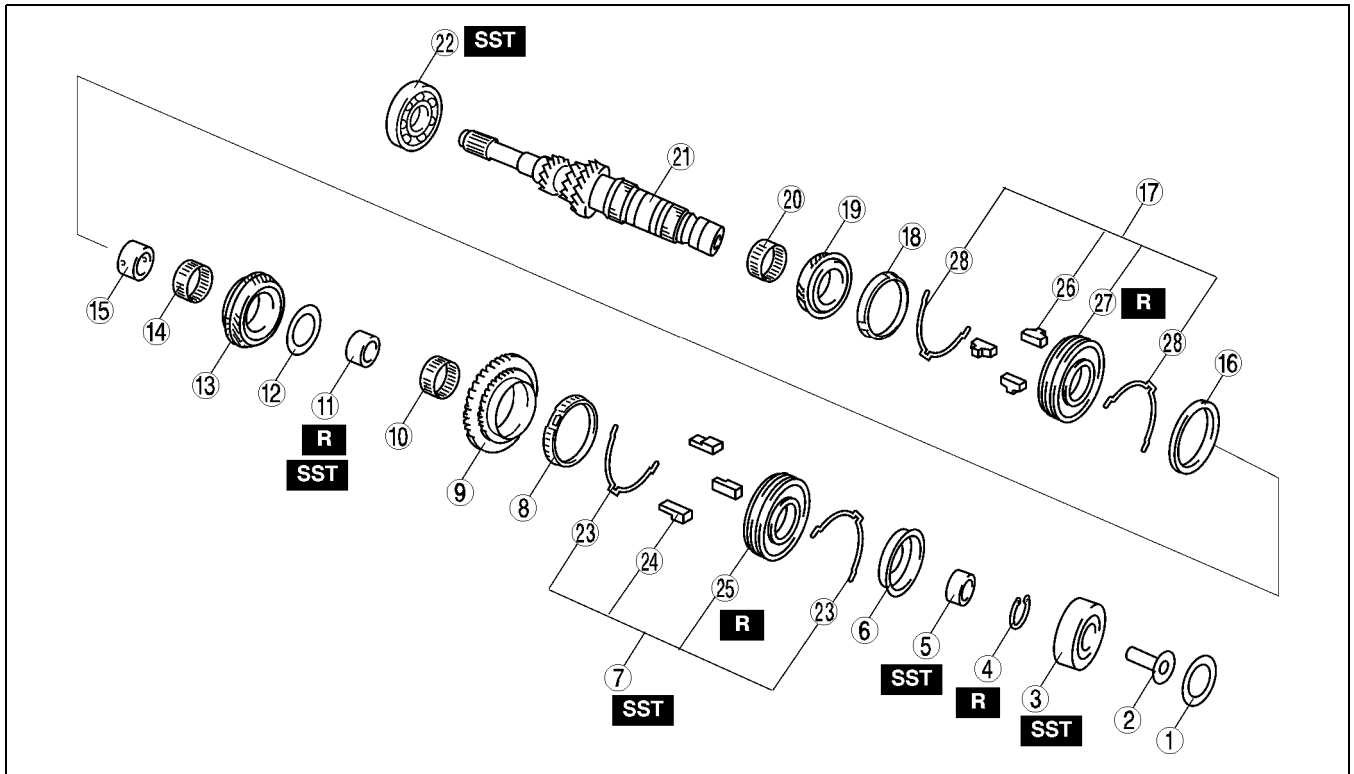


# MANUAL TRANSAXLE

## PRIMARY SHAFT COMPONENTS DISASSEMBLY

AME511217201M02

1. Disassemble in the order shown in the figure.



AME5112M095

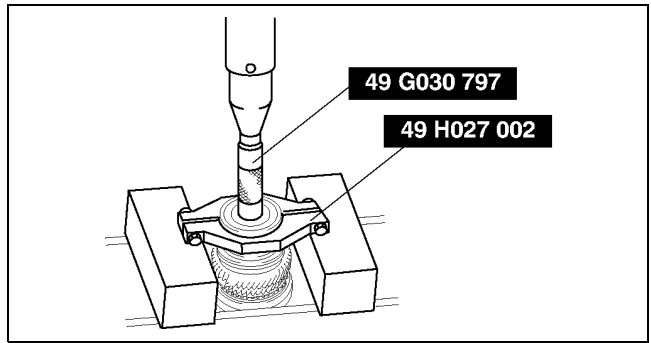
1	Primary shaft rear bearing adjust shim
2	Oil channel
3	Primary shaft rear bearing (See <a href="#">J-10 Primary Shaft Rear Bearing Disassembly Note</a> )
4	Snap ring
5	Primary shaft bearing spacer (See <a href="#">J-10 Primary Shaft Bearing Spacer and 5th Gear Stopper Disassembly Note</a> )
6	5th gear stopper
7	5th clutch hub set (See <a href="#">J-10 5th Clutch Hub Set, 5th Synchronizer Ring and 5th Gear Disassembly Note</a> )
8	5th synchronizer ring
9	5th gear
10	5th needle bearing
11	5th bushing (See <a href="#">J-10 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</a> )
12	Thrust washer
13	4th gear

14	4th needle bearing
15	4th bushing
16	4th synchronizer ring
17	3rd/4th clutch hub set
18	3rd synchronizer ring
19	3rd gear
20	3rd needle bearing
21	Primary shaft
22	Primary shaft front bearing (See <a href="#">J-11 Primary Shaft Front Bearing Disassembly Note</a> )
23	Synchronizer key spring (5th)
24	5th synchronizer key
25	5th clutch hub and sleeve
26	3rd/4th synchronizer key
27	3rd/4th clutch hub and sleeve
28	Synchronizer key spring (3rd/4th)

# MANUAL TRANSAXLE

## Primary Shaft Rear Bearing Disassembly Note

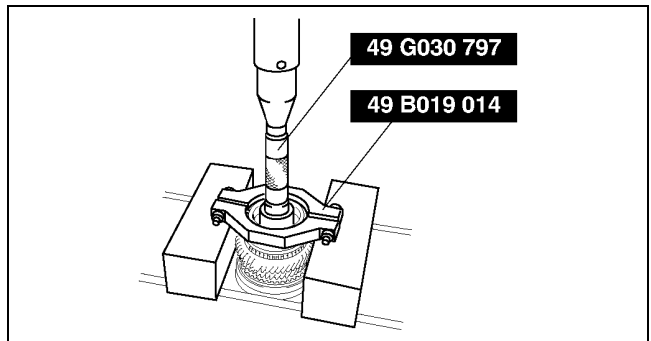
1. Remove the bearing using the **SSTs**.



AME5112M103

## Primary Shaft Bearing Spacer and 5th Gear Stopper Disassembly Note

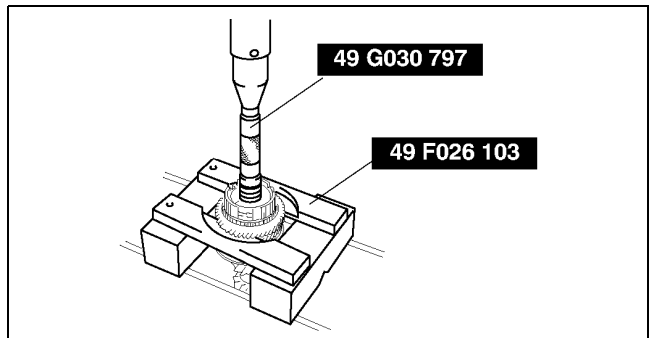
1. Remove the primary shaft bearing spacer and 5th gear stopper at the same time using the **SSTs**.



AME5112M106

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

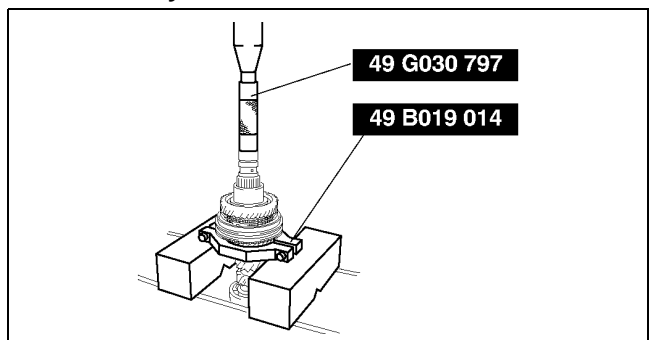
1. Remove the 5th clutch hub set, 5th synchronizer ring and 5th gear at the same time using the **SSTs**.



AME5112M108

## 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**.

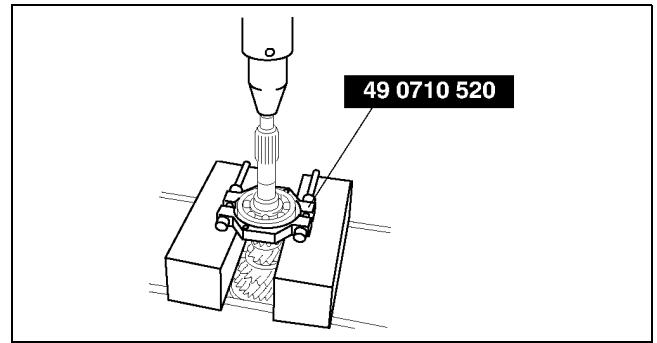


AME5112M109

# MANUAL TRANSAXLE

## Primary Shaft Front Bearing Disassembly Note

1. Remove the primary shaft front bearing using the SST.



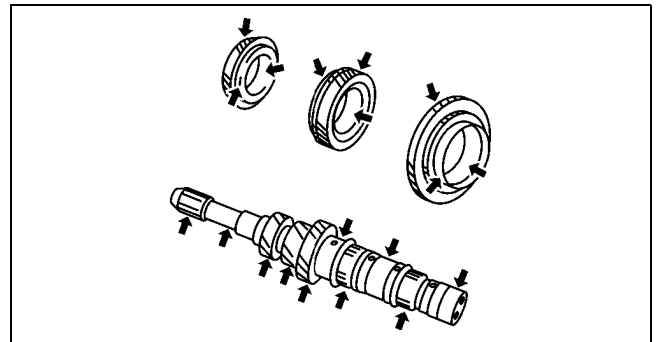
AME5112M107

## PRIMARY SHAFT COMPONENTS INSPECTION

AME511217201M03

### Primary Shaft and Gear Inspection

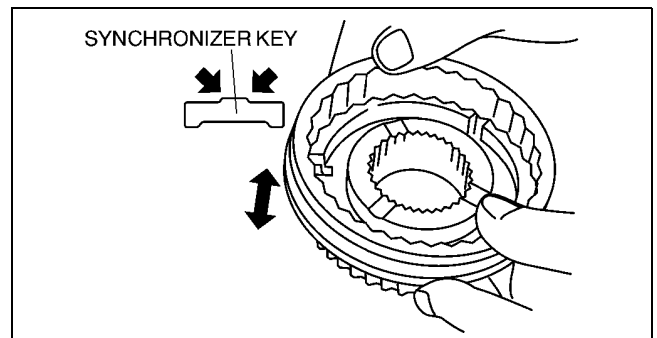
1. Inspect the shaft for damage, abnormal wear, dents, flaking, or bending.
  - If there is malfunction, replace the shaft.
2. Inspect the gears for damage, abnormal wear, dents, flaking, or bending.
  - If there is malfunction, replace the gear.
3. Inspect the oil passage for clogging.
  - If there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



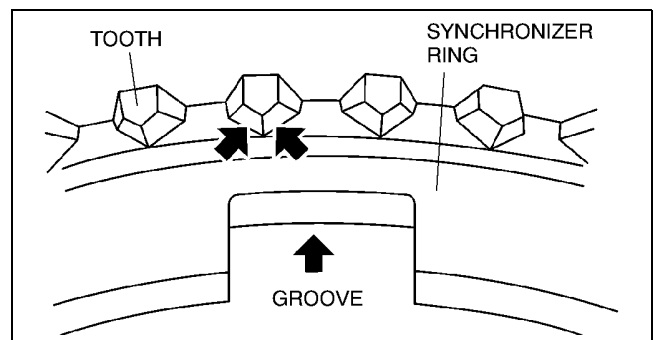
AME5112M044

### Synchronizer Ring and Clutch Hub Component Inspection

1. Inspect the clutch hub sleeve, clutch hub, and synchronizer key contact surface for damage and abnormal wear.
  - If there is malfunction, replace the part where necessary.
2. Verify that the clutch hub sleeve and clutch hub for move smoothly.
  - If there is malfunction, replace parts as necessary.
3. Inspect the synchronizer ring teeth and grooves for damage, abnormal wear, and cracks.
  - If there is malfunction, replace the synchronizer ring.
4. Inspect the tapered surface for abnormal wear and cracks.
  - If there is malfunction, replace parts as necessary.



AME5112M045



AME5112M046

## MANUAL TRANSAXLE

5. Measure the clearance between the synchronizer ring and the flank surface of the gear.
  - If not as specified, replace the synchronizer ring.

### Note

- Set the synchronizer ring squarely in the gear; then measure around the circumference.

### Standard clearance

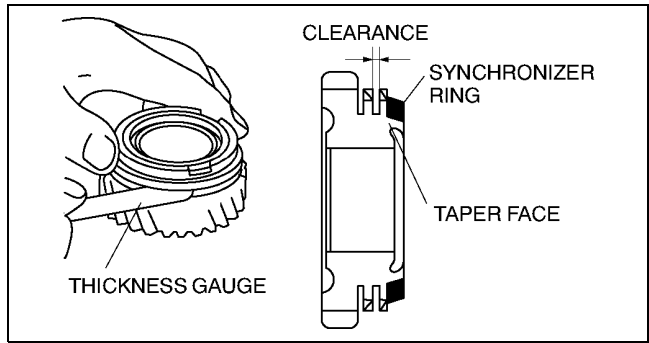
3rd: 0.90—1.45 mm {0.035—0.057 in}

4th: 0.90—1.45 mm {0.035—0.057 in}

5th: 0.95—1.40 mm {0.037—0.055 in}

### Minimum clearance

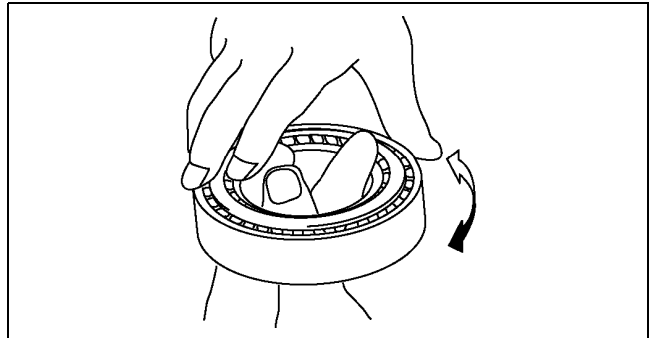
0.70 mm {0.028 in}



AME5112M070

### Bearing Inspection

1. Inspect the ball and the ball contact surface for damage and abnormal wear.
  - If there is malfunction, replace the bearing.
2. Verify that the bearing rotates smoothly.
  - If there is malfunction, replace the bearing.



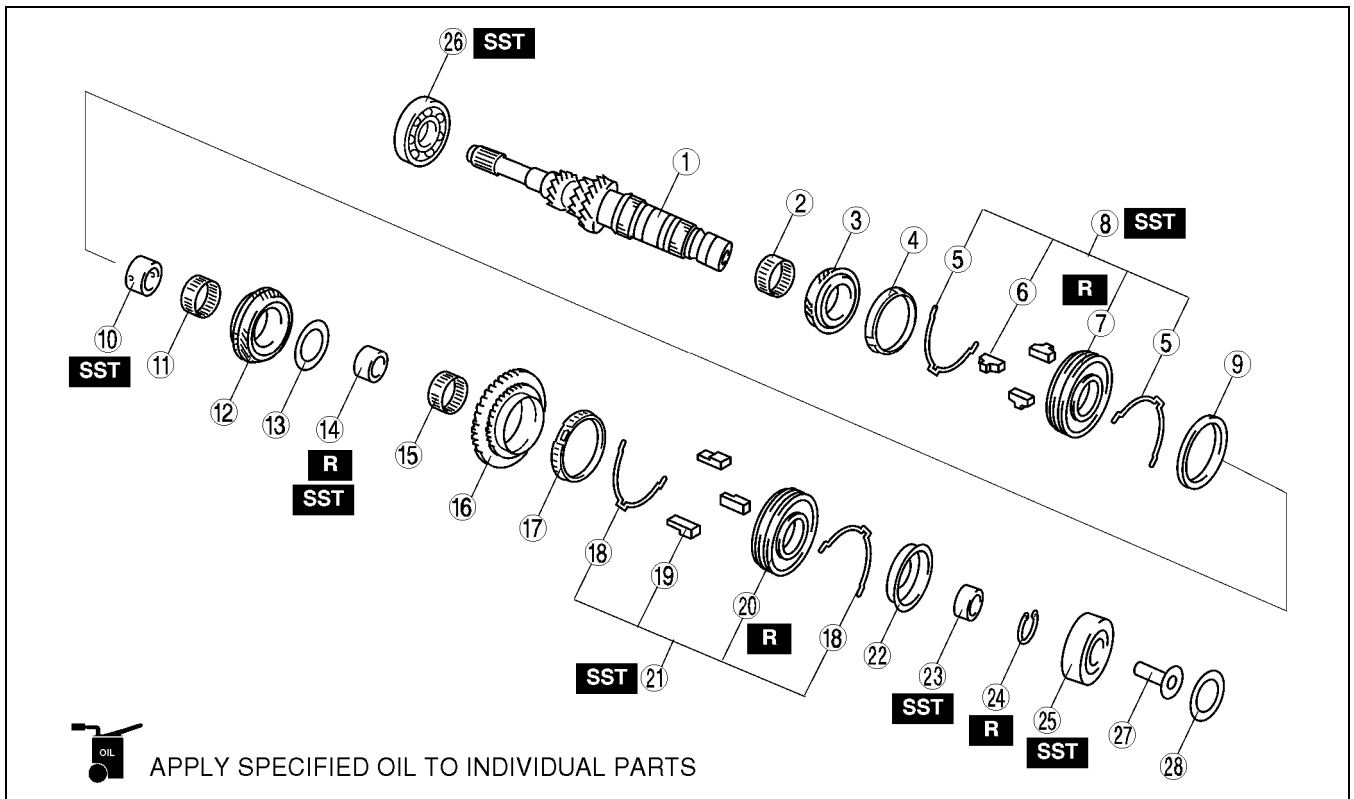
AME5112M072

# MANUAL TRANSAXLE

## PRIMARY SHAFT COMPONENTS ASSEMBLY

AME511217201M04

1. Assemble in the order shown in the figure.



AME5112M135

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

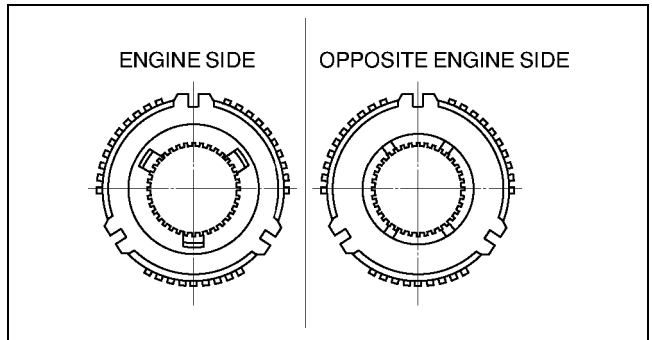
## MANUAL TRANSAXLE

### 3rd/4th Synchronizer Key Spring, 3rd/4th Synchronizer Key and 3rd/4th Clutch Hub and Sleeve Assembly

#### Note

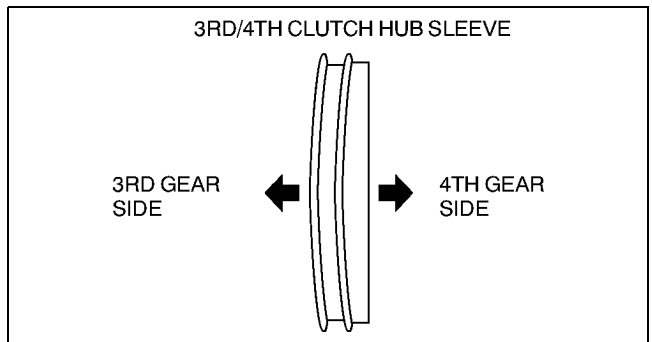
1. Install the 3rd/4th synchronizer key spring, 3rd/4th synchronizer key and 3rd/4th clutch hub to the 3rd/4th clutch sleeve.

- (1) Install a new 3rd/4th clutch hub in the direction as shown in the figure.



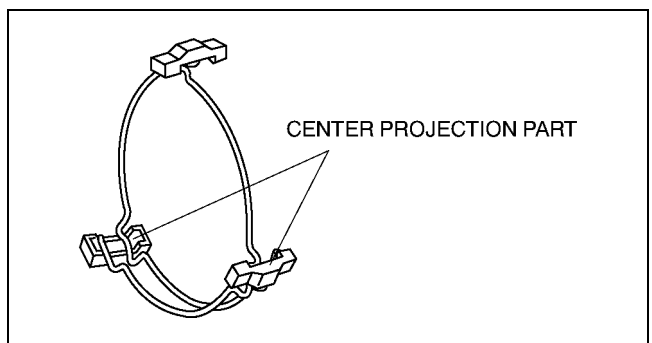
AME5112M047

- (2) Install a new 3rd/4th clutch sleeve in the direction as shown in the figure.



AME5112M048

- (3) Install center projection parts of 3rd/4th synchronizer key springs to different synchronizer keys on each side.



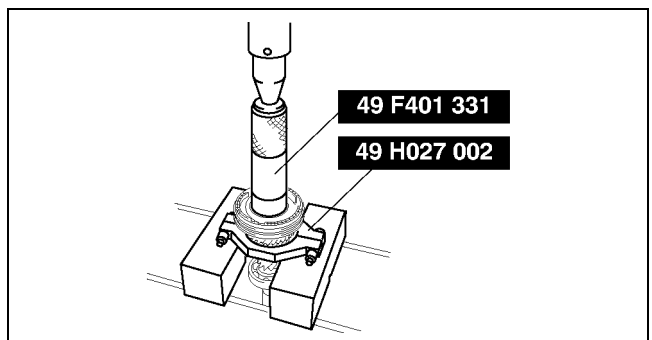
AME5112M049

### 3rd/4th Clutch Hub Set Assembly Note

#### Note

- Align the synchronizer ring grooves with the synchronizer key during assembly.

1. Install the 3rd/4th clutch hub set using the **SSTs**.

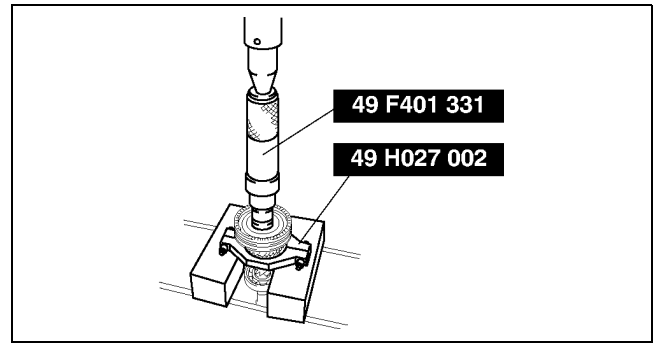


AME5112M110

# MANUAL TRANSAXLE

## 4th Bushing Assembly Note

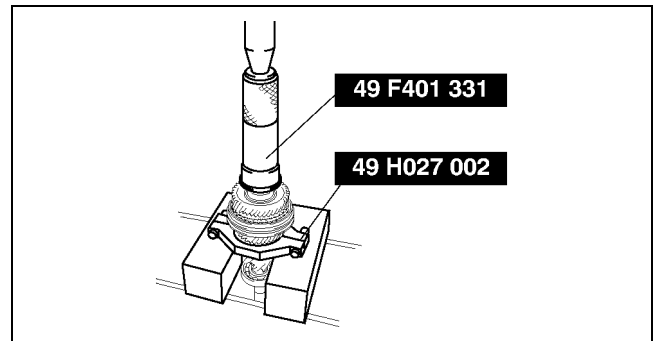
1. Install the 4th bushing using the SSTs.



AME5112M114

## Primary Shaft Thrust Washer Assembly Note

1. Install the primary shaft thrust washer using the SSTs.



AME5112M115

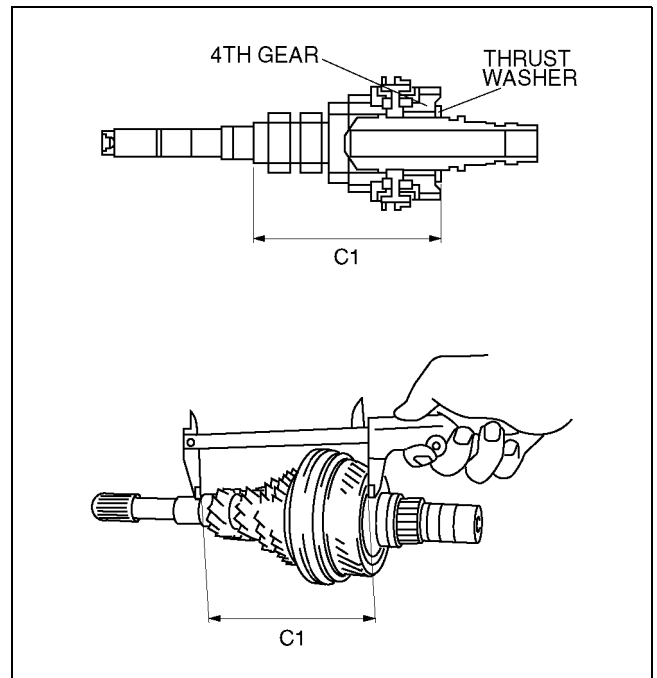
2. Measure length C1 as shown in the figure.
  - If it is not within the specification, adjust it by selecting a proper thrust washer from below.
  - Select only one thrust washer.

### Specification C1

154.7—154.8 mm {6.091—6.094 in}

### Primary shaft thrust washer size

Thickness (mm {in})	
3.84 {0.151}	4.02 {0.158}
3.90 {0.154}	4.08 {0.161}
3.96 {0.156}	4.14 {0.163}

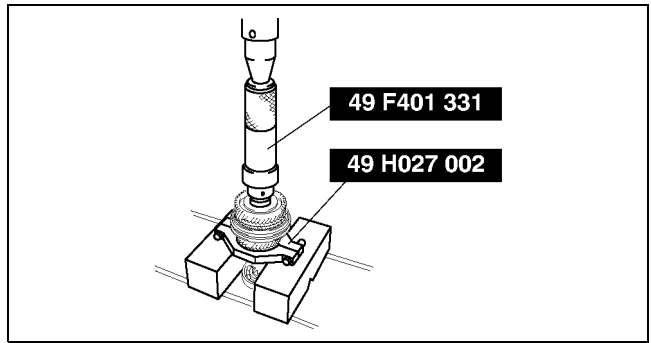


AME5112M050

# MANUAL TRANSAXLE

## 5th Bushing Assembly Note

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

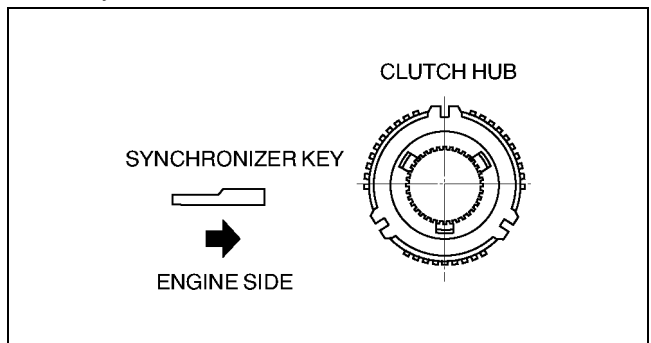


AME5112M116

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

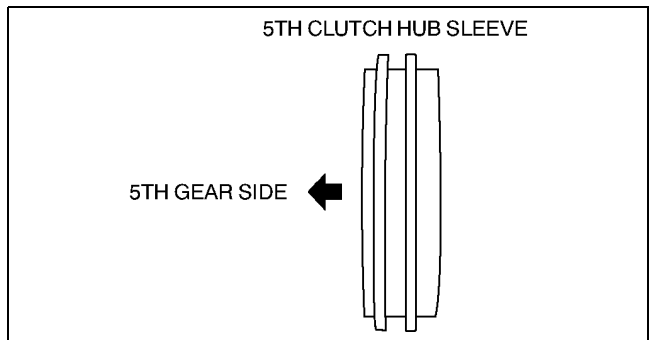
1. Assemble the 5th synchronizer key springs, 5th synchronizer key and 5th clutch hub to the 5th clutch sleeve.

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



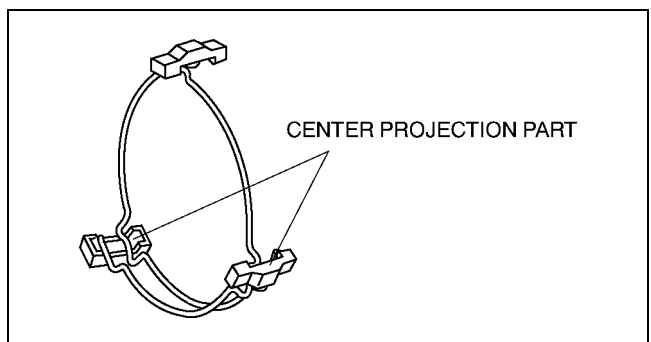
AME5112M051

- (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.



AME5112M049



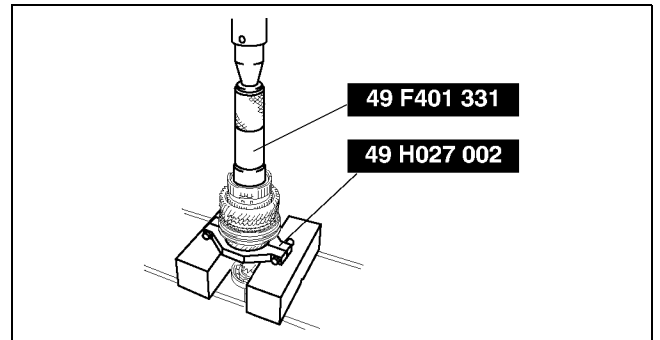
# MANUAL TRANSAXLE

## 5th Clutch Hub Set Assembly Note

### Note

- Align the synchronizer ring grooves with the synchronizer key during assembly.

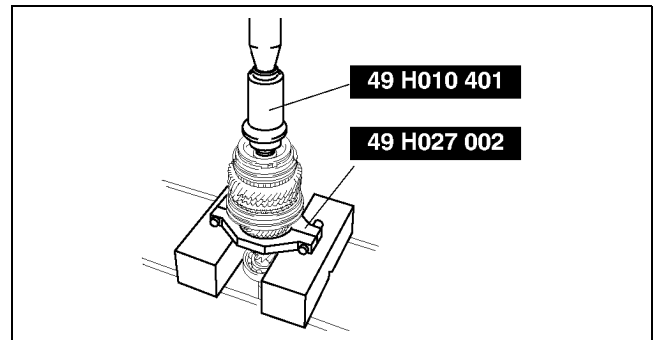
- Install the 5th clutch hub set using the **SSTs**.



AME5112M117

## Primary Shaft Bearing Spacer Assembly Note

- Install the primary shaft bearing spacer using the **SSTs**.



AME5112M118

## Snap Ring Assembly Note

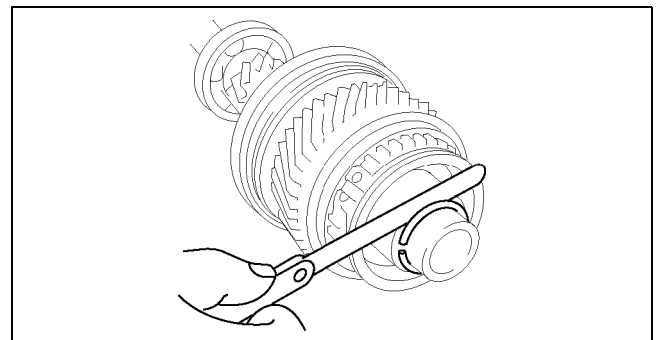
- Install a new snap ring to the primary shaft.
- Measure the clearance between the snap ring and the primary shaft bearing spacer.
  - If it is not within the specification, adjust it by selecting a proper snap ring from below.

### Clearance

**0.0—0.1 mm {0.0000—0.0039 in}**

### Snap ring size

Thickness (mm {in})	
1.71 {0.067}	2.01 {0.079}
1.76 {0.069}	2.06 {0.081}
1.81 {0.071}	2.11 {0.083}
1.86 {0.073}	2.16 {0.085}
1.91 {0.075}	2.21 {0.087}
1.96 {0.077}	2.26 {0.089}

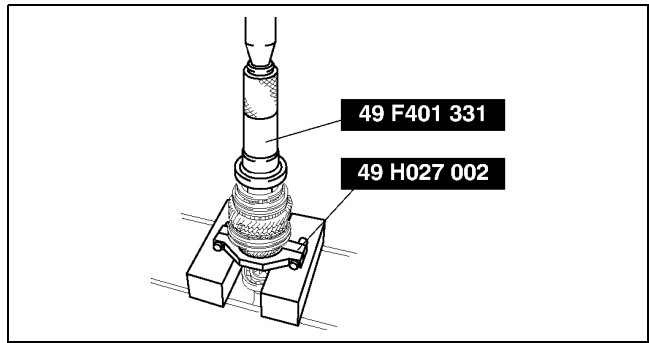


AME5112M053

# MANUAL TRANSAXLE

## Primary Shaft Rear Bearing Assembly Note

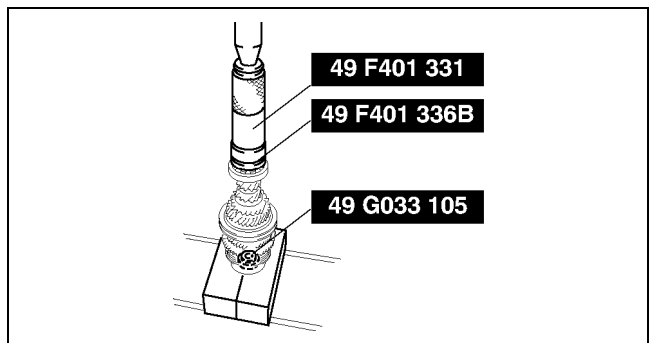
1. Place the primary shaft rear bearing with the brown side facing toward the 5th gear.
2. Install the primary shaft rear bearing using the SSTs.



AME5112M119

## Primary Shaft Front Bearing Assembly Note

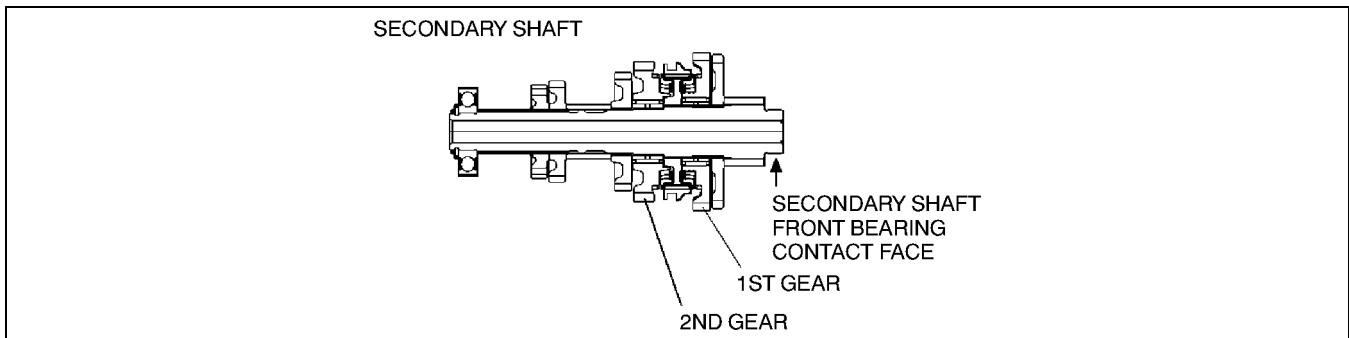
1. Install the primary shaft front bearing using the SSTs.
2. Inspect the 3rd gear and 5th gear thrust clearance and 4th gear end play. (See [J-8 PRIMARY SHAFT COMPONENTS PREINSPECTION](#).)



AME5112M120

## SECONDARY SHAFT COMPONENTS PREINSPECTION

AME511217301M01



AME5112M094

### 1st Gear End Play

1. Set up the secondary shaft component, and fix it.
2. Slide the 1st gear up and down, and measure the length of the movement.
  - If not as specified, assemble the secondary shaft component again.

#### Length of the movement

0.20—0.30 mm {0.0078—0.0118 in}

### 2nd Gear End Play

1. Set up the secondary shaft component, and fix it.
2. Slide the 2nd gear up and down, and measure the length of the movement.
  - If not as specified, assemble the secondary shaft component again.

#### Length of the movement

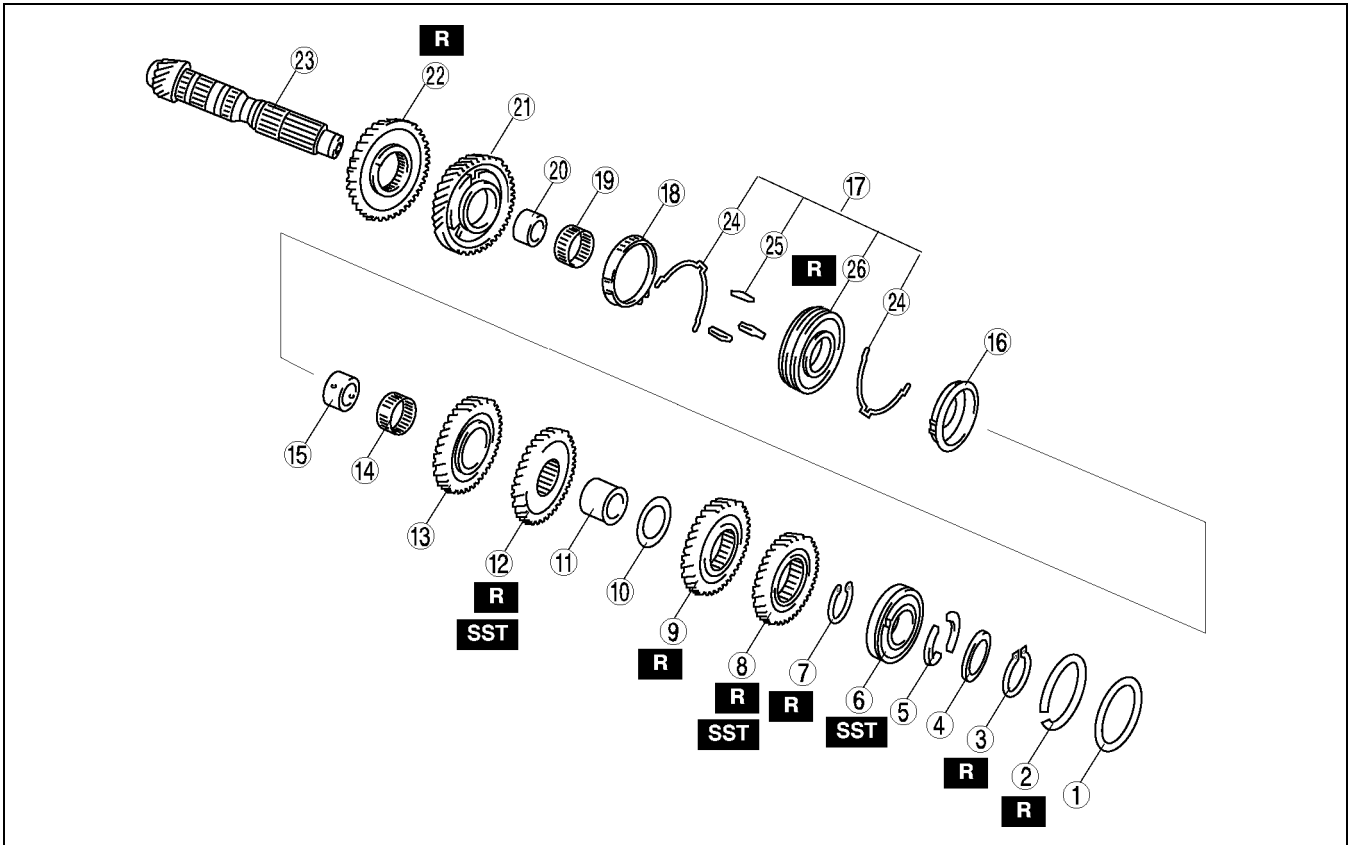
0.06—0.16 mm {0.0024—0.0063 in}

# MANUAL TRANSAXLE

## SECONDARY SHAFT COMPONENTS DISASSEMBLY

AME511217301M02

1. Disassemble in the order shown in the figure.



AME5112M096

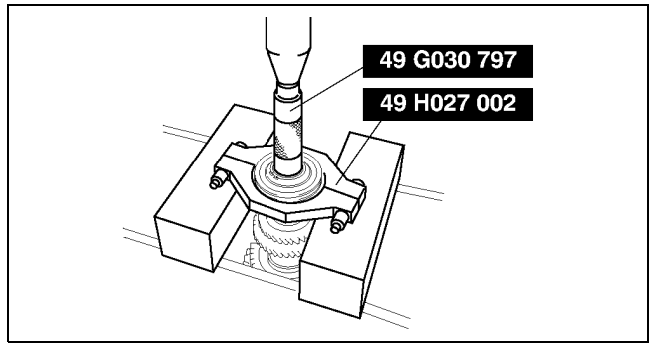
1	Secondary shaft rear bearing adjust shim
2	Snap ring
3	Snap ring
4	C ring holder
5	Secondary shaft C ring
6	Secondary shaft rear bearing (See <a href="#">J-20 Secondary Shaft Rear Bearing Disassembly Note</a> )
7	Snap ring
8	5th gear (See <a href="#">J-20 4th Gear and 5th Gear Disassembly Note</a> )
9	4th gear
10	4th gear adjustment shim
11	3rd/4th secondary shaft spacer
12	3rd gear (See <a href="#">J-20 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</a> )

13	2nd gear
14	2nd needle bearing
15	2nd bushing
16	2nd inner synchronizer component
17	1st/2nd clutch hub set
18	1st inner synchronizer component
19	1st needle bearing
20	1st bushing
21	1st gear
22	Reverse main gear
23	Secondary shaft
24	Synchronizer key spring
25	1st/2nd synchronizer key
26	1st/2nd clutch hub and sleeve

## MANUAL TRANSAXLE

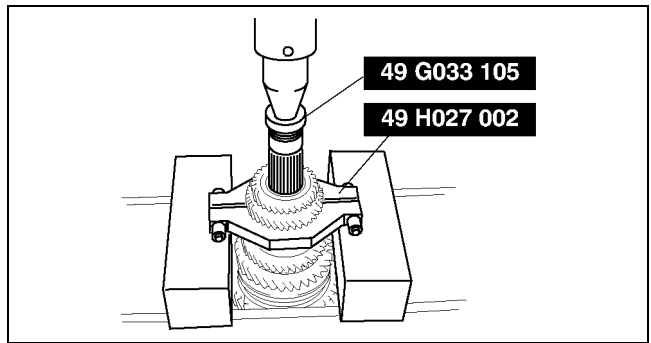
### Secondary Shaft Rear Bearing Disassembly Note

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



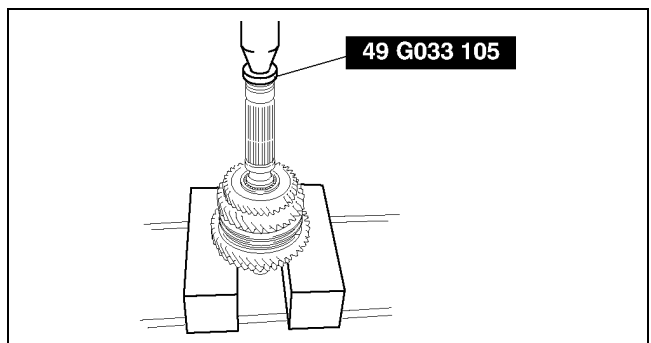
### 4th Gear and 5th Gear Disassembly Note

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

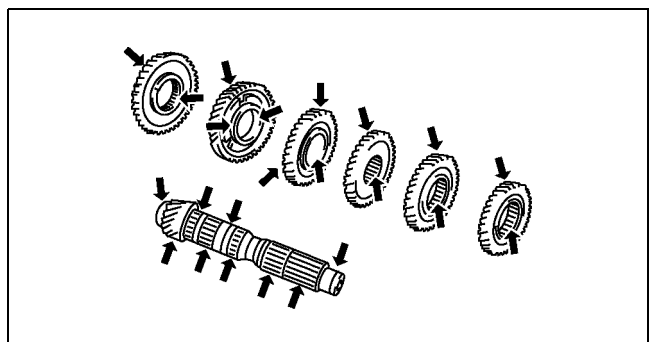
1. Remove the 3rd gear, 2nd gear, 2nd needle bearing, 2nd bushing, 2nd inner synchronizer component, 1st/2nd clutch hub set, 1st inner synchronizer component, 1st needle bearing, 1st bushing, 1st gear and reverse main gear at the same time using the **SST**.



## SECONDARY SHAFT COMPONENTS INSPECTION

### Secondary Shaft and Gear Inspection

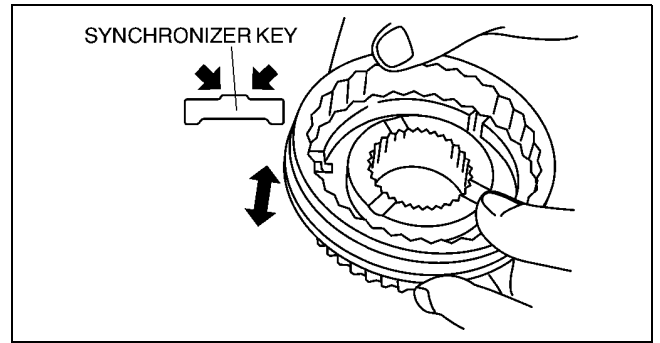
1. Inspect the shaft for damage, abnormal wear, dents, flaking, or bending.
  - If there is malfunction, replace the shaft.
2. Inspect the gears for damage, abnormal wear, dents, flaking, or bending.
  - If there is malfunction, replace the gear.
3. Inspect the oil passage for clogging.
  - If there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



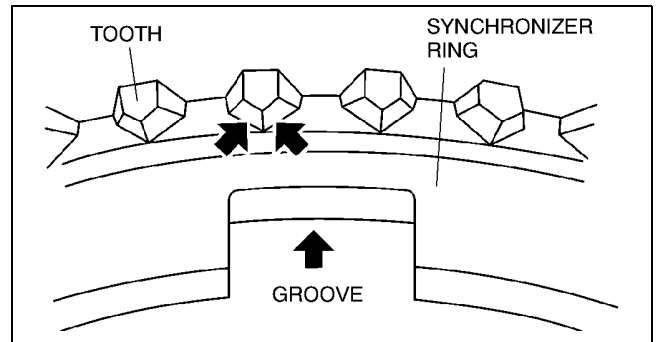
# MANUAL TRANSAXLE

## Synchronizer Ring and Clutch Hub Component Inspection

1. Inspect the clutch hub sleeve, clutch hub, and synchronizer key contact surface for damage and abnormal wear.
  - If there is malfunction, replace the part where necessary.
2. Verify that the clutch hub sleeve and clutch hub move smoothly.
  - If there is malfunction, replace parts as necessary.
3. Inspect the synchronizer ring teeth and grooves for damage, abnormal wear, and cracks.
  - If there is malfunction, replace the synchronizer ring.
4. Inspect the tapered surface for abnormal wear and cracks.
  - If there is malfunction, replace parts as necessary.



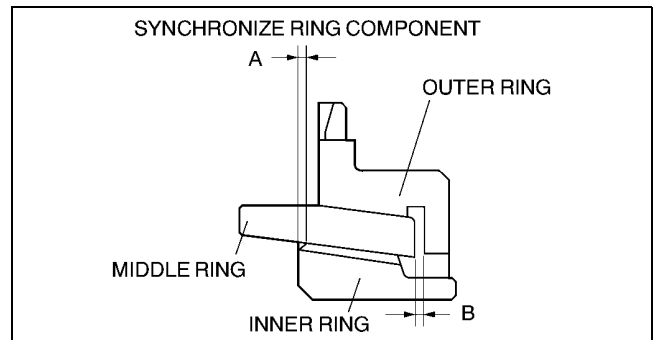
AME5112M045



AME5112M046

## Synchronizer Ring Clearance Inspection Synchronizer component (1st gear)

1. Measure the clearance of synchronizer component outer, middle and inner synchronizer rings.
  - If clearances A and B exceed the maximum, replace as a set.



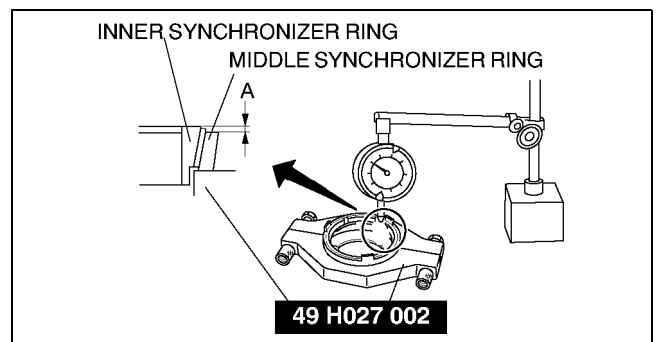
AME5112M059

- (1) Measure clearance A in two places or more and on opposite sides using a dial gauge, and calculate the average value.

### Clearance A

**Standard: 0.60—0.80 mm**  
**{0.0236—0.0315 in}**

**Maximum: 0.20 mm {0.0079 in} or less**



AME5112M129

## MANUAL TRANSAXLE

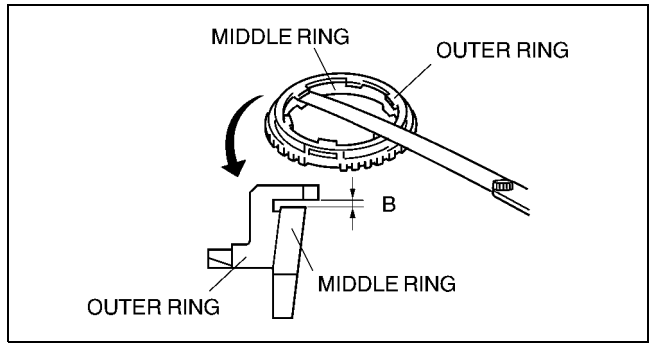
- (2) Measure clearance B in two places or more and on opposite sides using a feeler gauge, and calculate the average value.

### Clearance B

**Standard: 0.60—1.10 mm**

**{0.0236—0.0433 in}**

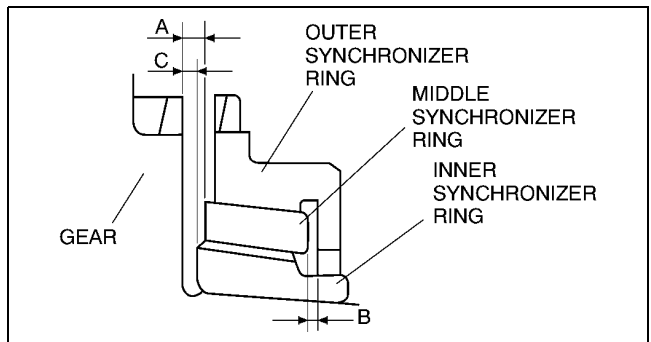
**Maximum: 0.20 mm {0.0079 in} or less**



AME5112M060

### Synchronizer component (2nd gear)

1. Inspect clearance of the synchronizer component outer, middle, and inner synchronizer rings.
- If the clearance A, B and C exceed the maximum, replace as a set.



AME5112M092

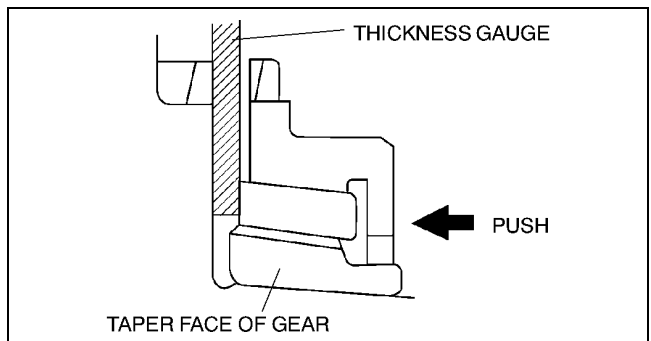
- (1) Measure clearance A in two places or more and on opposite sides using a feeler gauge while the synchronizer ring is manually press fit to the taper surface of the clutch gear, and calculate the average value.

### Clearance A

**Standard: 0.60—1.20 mm**

**{0.0236—0.0472 in}**

**Maximum: 0.30 mm {0.0118 in} or less**



AME5112M090

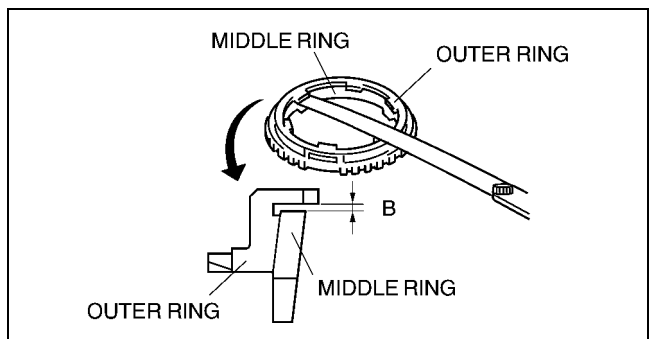
- (2) Measure clearance B in two places or more and on opposite sides with a feeler gauge, and calculate the average value.

### Clearance B

**Standard: 0.60—1.10 mm**

**{0.0236—0.0433 in}**

**Maximum: 0.20 mm {0.0079 in} or less**



AME5112M060

## MANUAL TRANSAXLE

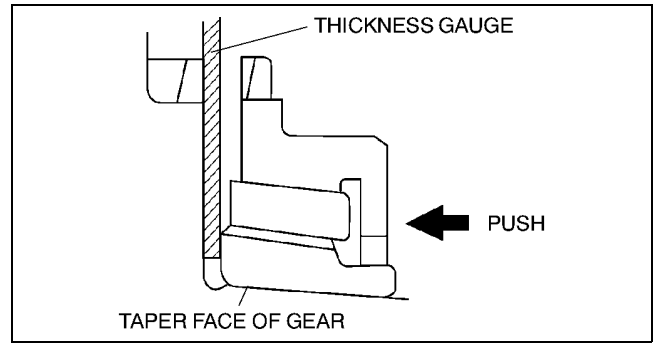
- (3) Measure clearance C in two places or more and on opposite sides with a feeler gauge while the synchronizer ring is manually press fit to the taper surface of the clutch gear, and calculate the average value.

### Clearance C

**Standard: 0.70—1.10 mm**

**{0.0276—0.0433 in}**

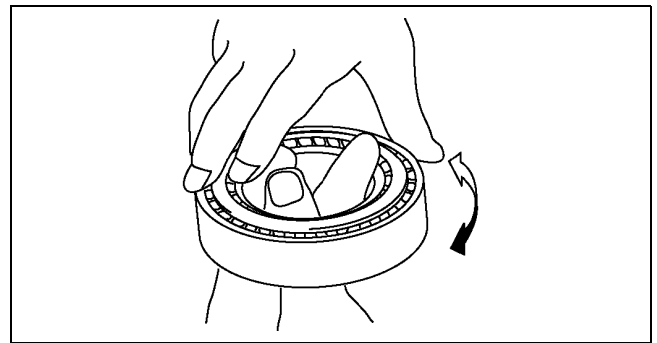
**Maximum: 0.30 mm {0.0118 in} or less**



AME5112M091

### Bearing Inspection

1. Inspect the ball and the ball contact surface for damage and abnormal wear.
  - If there is malfunction, replace the bearing.
2. Verify that the bearing rotates smoothly.
  - If there is malfunction, replace the bearing.



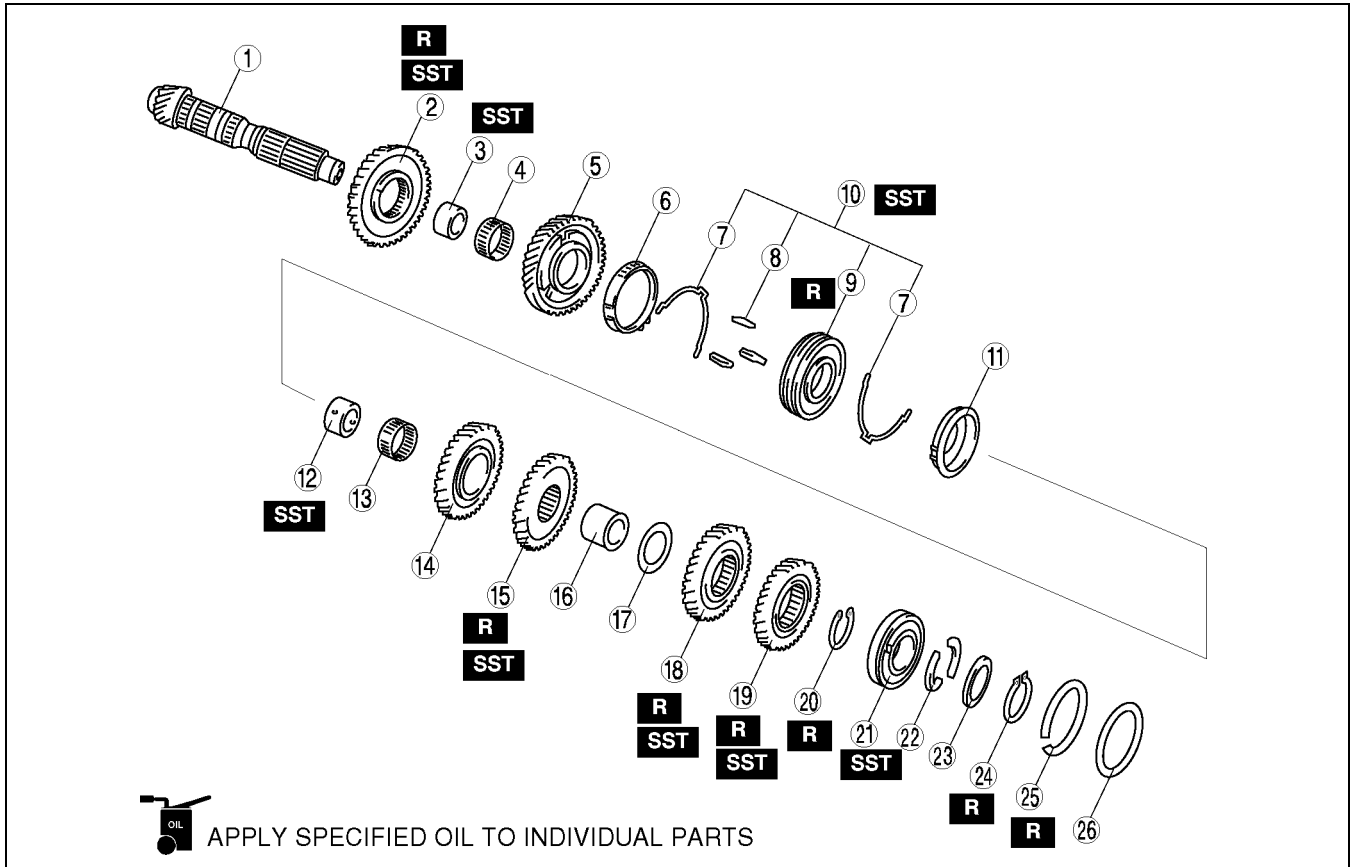
AME5112M072

# MANUAL TRANSAXLE

## SECONDARY SHAFT COMPONENTS ASSEMBLY

AME511217301M04

1. Assemble in the order shown in the figure.



AME5112M136

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

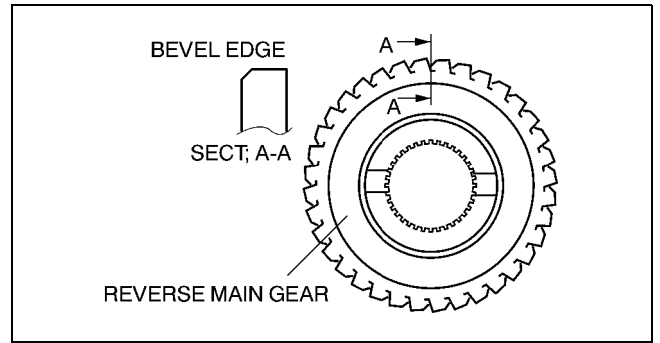
15	3rd gear (See <a href="#">J-27 3rd Gear Assembly Note</a> )
16	3rd/4th secondary shaft spacer
17	4th gear adjustment shim (See <a href="#">J-27 4th Gear Adjustment Shim Assembly Note</a> )
18	4th gear (See <a href="#">J-28 4th Gear Assembly Note</a> )
19	5th gear (See <a href="#">J-28 5th Gear Assembly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



# MANUAL TRANSAXLE

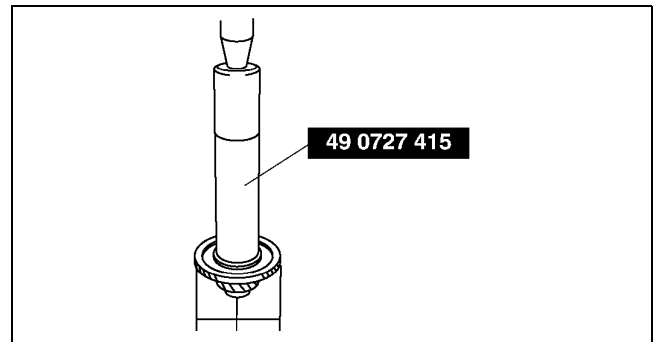
## Reverse Main Gear Assembly Note

1. Place a new reverse main gear with the bevel edge facing toward the engine.



AME5112M062

2. Install the reverse main gear using the **SST**.



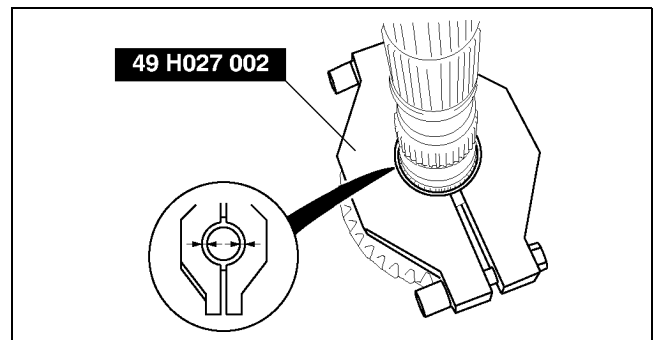
AME5112M133

## 1st Bushing Assembly Note

### Caution

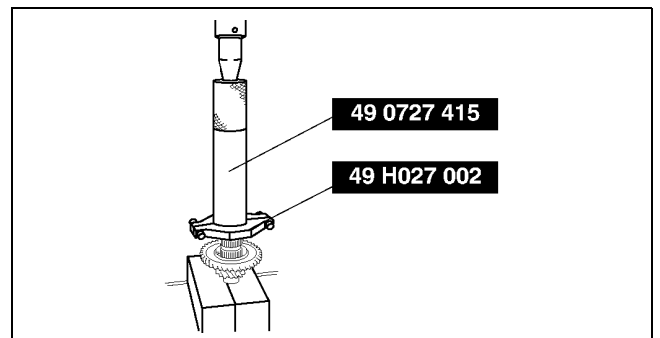
- The shaft can be damaged when installing the 1st bushing if the SST touches the secondary shaft. Install the SST to the shaft without touching the shaft.

1. Place the 1st bushing, and assemble the **SST** as shown in the figure.



AME5112M122

2. Install the 1st bushing using the **SSTs**.



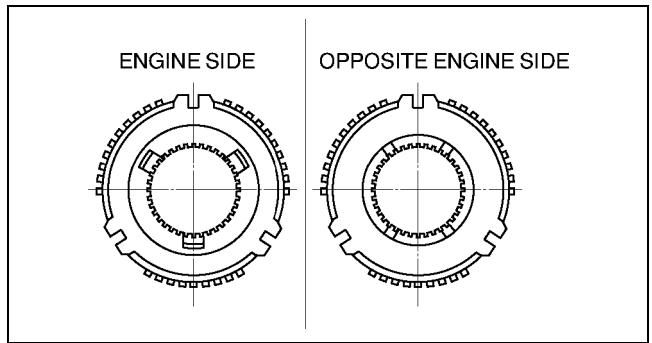
AME5112M121

# MANUAL TRANSAXLE

## Synchronizer Key Spring, 1st/2nd Synchronizer Key and 1st/2nd Clutch Hub and Sleeve Assembly Note

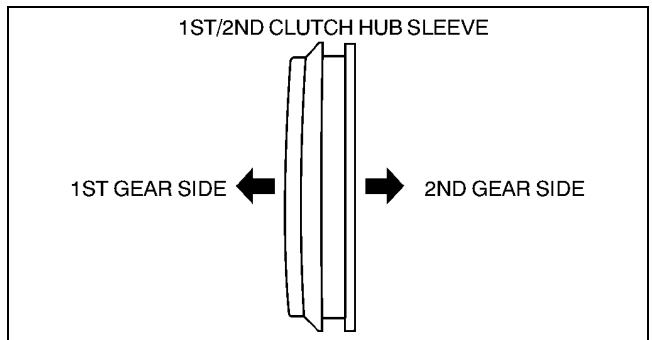
1. Install the synchronizer key spring, 1st/2nd synchronizer key and 1st/2nd clutch hub to the 1st/2nd clutch sleeve.

- (1) Install a new 1st/2nd clutch hub in the direction as shown in the figure.



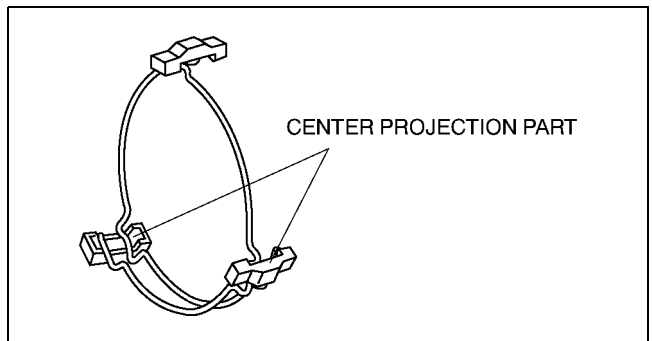
AME5112M047

- (2) Install the 1st/2nd clutch sleeve in the direction as shown in the figure.



AME5112M063

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



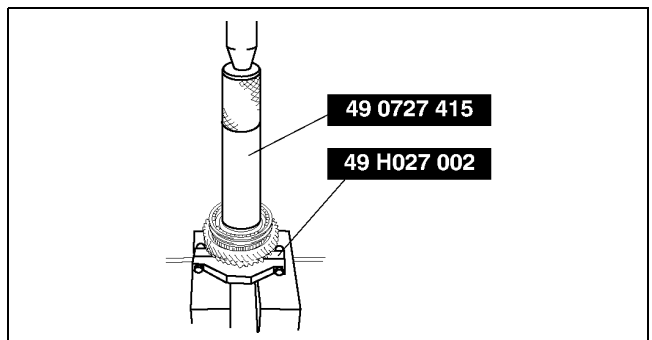
AME5112M049

## 1st/2nd Clutch Hub Set Assembly Note

### Note

- Align the synchronizer ring grooves with the synchronizer key during assembly.

1. Install the 1st/2nd clutch hub set using the **SSTs**.

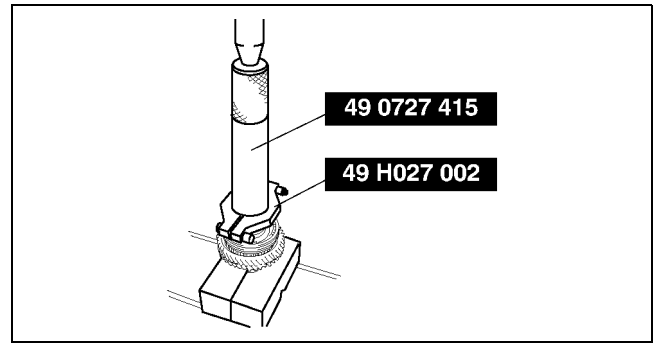


AME5112M123

# MANUAL TRANSAXLE

## 2nd Bushing Assembly Note

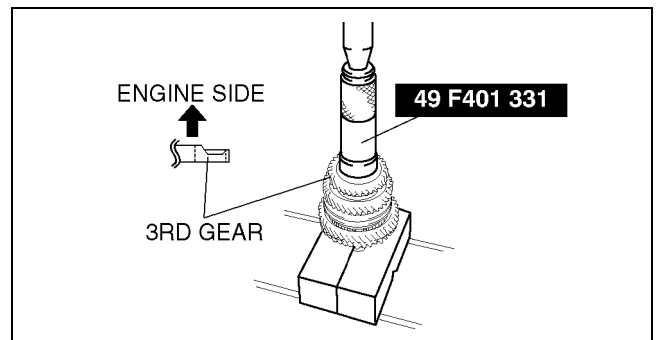
1. Install the 2nd bushing using the **SSTs**.



AME5112M124

## 3rd Gear Assembly Note

1. Place a new 3rd gear in the direction as shown in the figure.
2. Install the 3rd gear using the **SST**.



AME5112M125

## 4th Gear Adjustment Shim Assembly Note

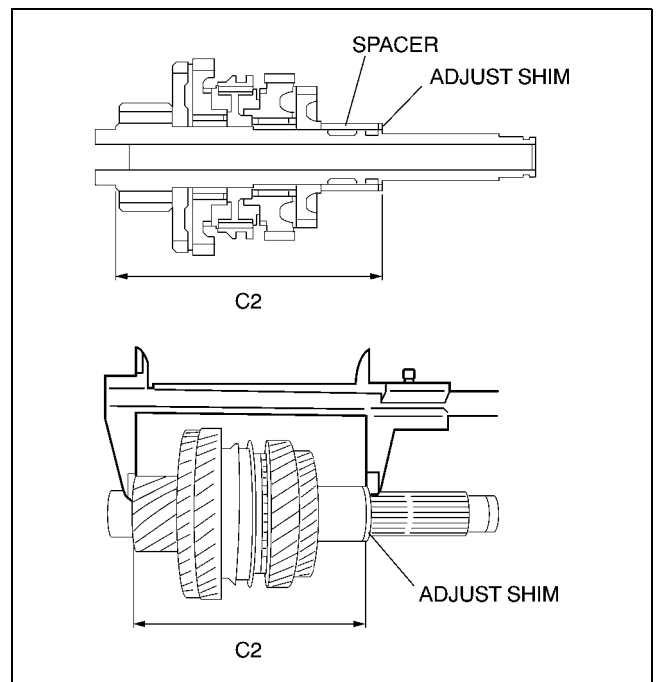
1. Install the 4th gear adjustment shim washer.
2. Measure length C2 as shown in the figure.
  - If it is not within the specification, adjust it by selecting a proper 4th gear adjustment shim from below.
  - Select only one 4th gear adjustment shim.

### Specification C2

173.85—173.95 mm {6.844—6.848 in}

### 4th gear adjustment shim size

Thickness (mm {in})	
0.52 {0.021}	0.84 {0.033}
0.60 {0.024}	0.92 {0.036}
0.68 {0.027}	1.00 {0.039}
0.76 {0.030}	1.08 {0.043}

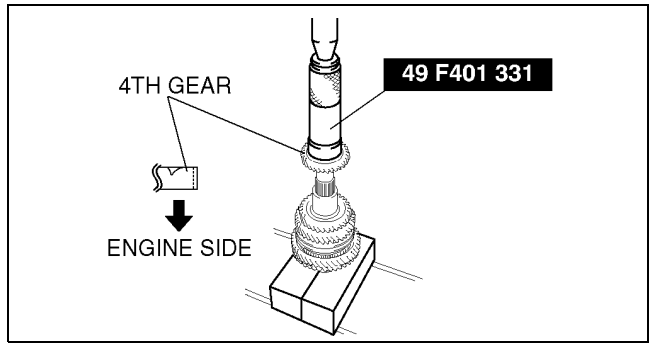


AME5112M064

# MANUAL TRANSAXLE

## 4th Gear Assembly Note

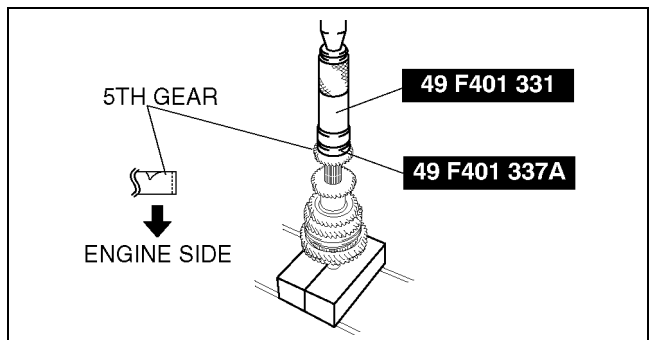
1. Place a new 4th gear in the direction as shown in the figure.
2. Install the 4th gear using the **SST**.



AME5112M126

## 5th Gear Assembly Note

1. Place a new 5th gear in the direction as shown in the figure.
2. Install the 5th gear using the **SSTs**.



AME5112M127

## 5th Gear Snap Ring Assembly Note

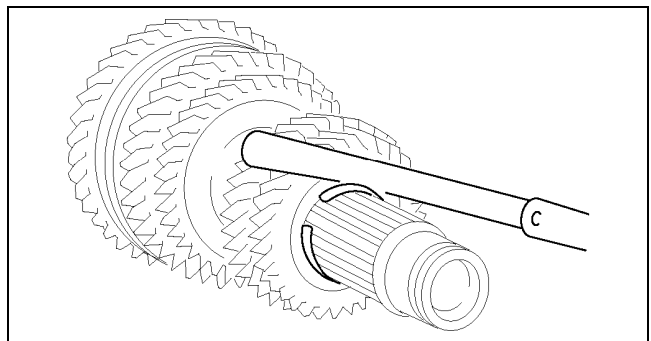
1. Install a new 5th gear snap ring to the secondary shaft.
2. Measure the clearance between the 5th gear snap ring and the 5th gear.
  - If it is not within the specification, adjust it by selecting a proper snap ring from below.

### Clearance

0.0—0.1 mm {0.0000—0.0039 in}

### 5th gear snap ring size

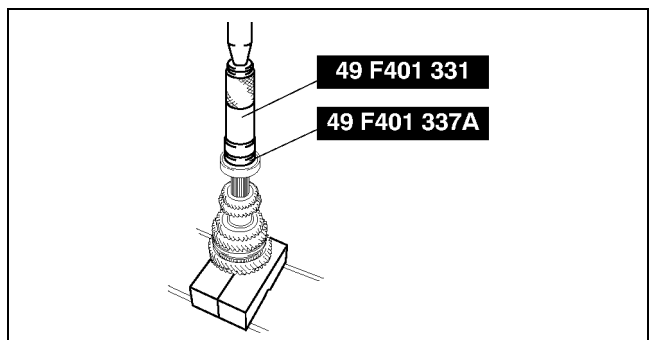
Thickness (mm {in})	
1.85 {0.073}	2.05 {0.081}
1.90 {0.075}	2.10 {0.083}
1.95 {0.077}	2.15 {0.085}
2.00 {0.079}	2.20 {0.087}



AME5112M065

## Secondary Shaft Rear Bearing Assembly Note

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



AME5112M128

## MANUAL TRANSAXLE

### Secondary Shaft C Ring Assembly Note

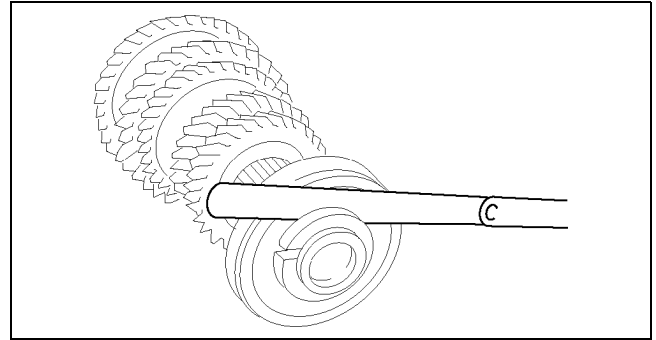
1. Install the secondary shaft C ring to the secondary shaft.
2. Measure the clearance between the secondary shaft C ring and the secondary shaft rear bearing.
  - If it is not within the specification, adjust it by selecting a proper C ring from below.

#### 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}	—



AME5112M066

J

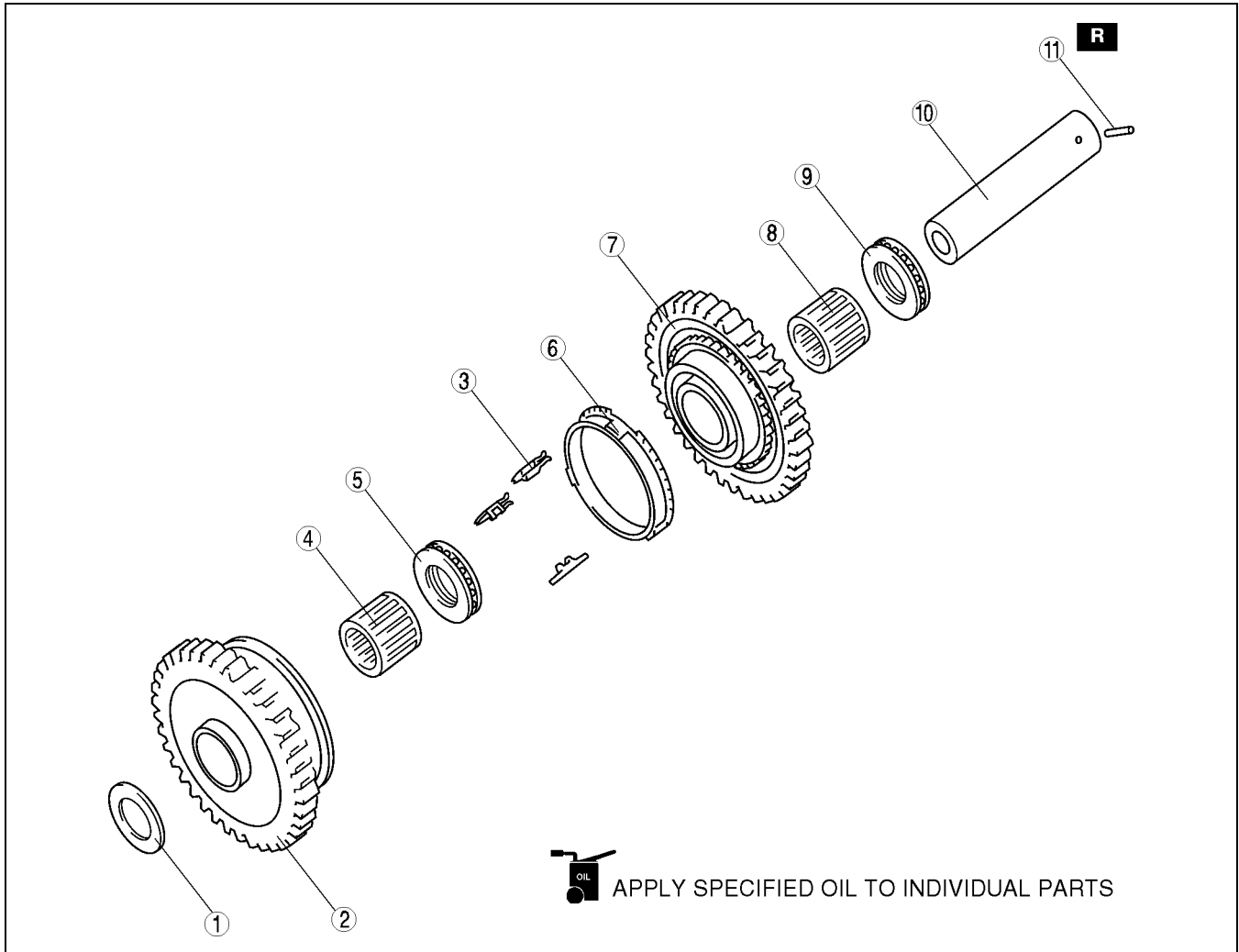
3. Inspect the 1st gear and 2nd gear end play. (See [J-18 SECONDARY SHAFT COMPONENTS PREINSPECTION.](#))

# MANUAL TRANSAXLE

## REVERSE IDLER SHAFT COMPONENTS DISASSEMBLY/ASSEMBLY

AME511217315M01

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



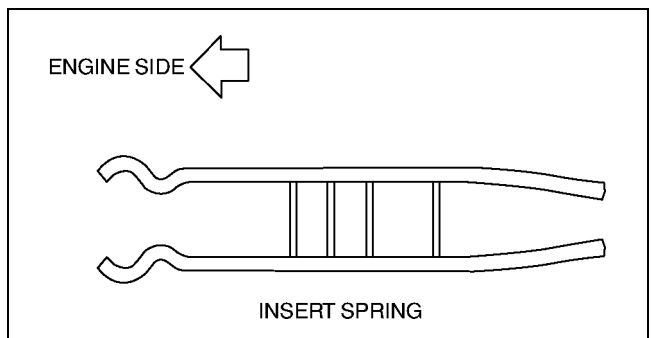
AME5112M005

1	Reverse idler adjust shim
2	Reverse idler rear gear and reverse coupling sleeve
3	Insert spring (See <a href="#">J-30 Insert Spring Assembly Note</a> )
4	Reverse idler needle bearing
5	Thrust needle bearing

6	Reverse synchronizer ring
7	Reverse idler front gear
8	Reverse idler needle bearing
9	Thrust needle bearing
10	Reverse idler shaft
11	Spring pin

### Insert Spring Assembly Note

1. Install the insert spring in the direction as shown in the figure.



AME5112M071

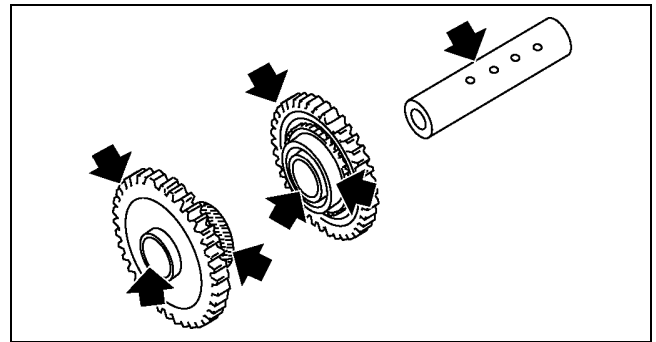
# MANUAL TRANSAXLE

## REVERSE IDLER SHAFT COMPONENTS INSPECTION

AME511217315M02

### Reverse idler shaft and gears Inspection

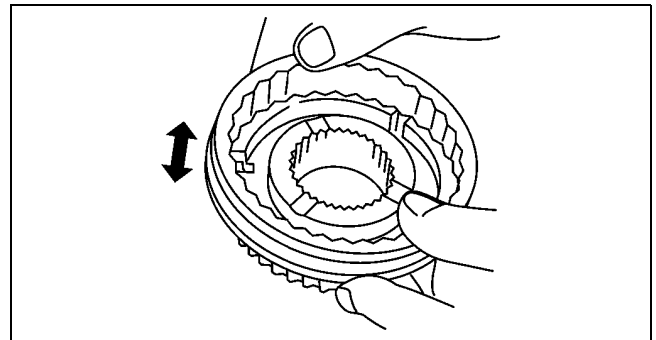
1. Inspect the shaft for damage, abnormal wear, dents, flaking, or bending.
  - If there is malfunction, replace the shaft.
2. Inspect the gears for damage, abnormal wear, dents, flaking, or bending.
  - If there is malfunction, replace the gear.



AME5112M068

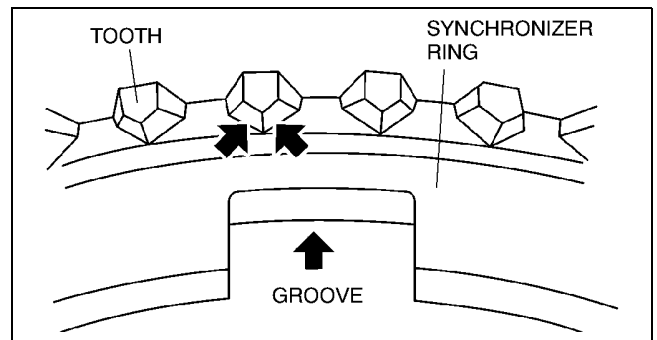
### Synchronizer Ring and Clutch Hub Component Inspection

1. Inspect the clutch hub sleeve, clutch hub, and insert spring contact surface for damage, abnormal wear, or bending.
  - If there is malfunction, replace the part where necessary.
2. Verify that the clutch hub sleeve and clutch hub move smoothly.
  - If there is malfunction, replace parts as necessary.



AME5112M139

3. Inspect the synchronizer ring teeth and grooves for damage, abnormal wear, and cracks.
  - If there is malfunction, replace the synchronizer ring.
4. Inspect the tapered surface for abnormal wear and cracks.
  - If there is malfunction, replace parts as necessary.



AME5112M046

5. Measure the clearance between the synchronizer ring and the flank surface of the gear.
  - If not as specified, replace the synchronizer ring.

#### Note

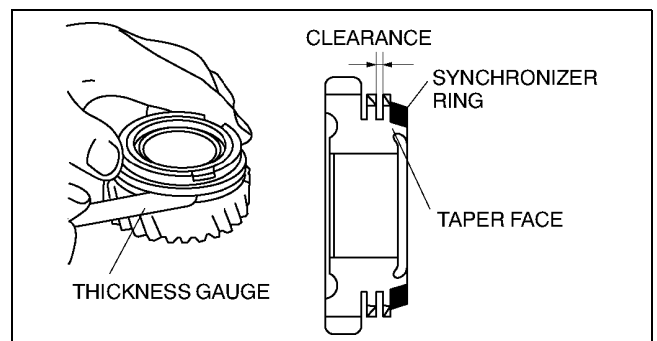
- Set the synchronizer ring squarely in the gear; then measure around the circumference.

#### Standard clearance

0.95—1.40 mm {0.037—0.055 in}

#### Minimum clearance

0.70 mm {0.028 in}

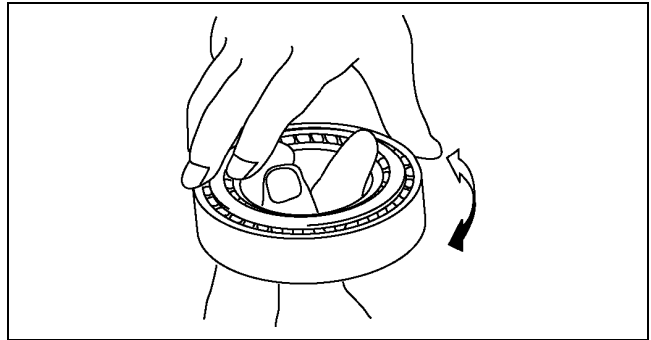


AME5112M070

# MANUAL TRANSAXLE

## Bearing Inspection

1. Inspect the ball and the ball contact surface for damage and abnormal wear.
  - If there is malfunction, replace the bearing.
2. Verify that the bearing rotates smoothly.
  - If there is malfunction, replace the bearing.



AME5112M072

## DIFFERENTIAL PREINSPECTION

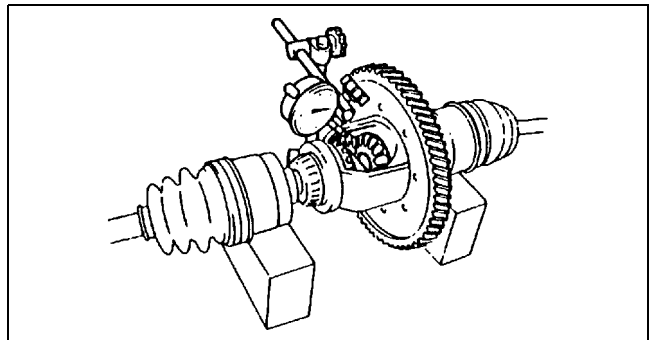
AME511227100M01

### Backlash Inspection

1. Measure the backlash of the side gear.
  - If not as specified, replace parts as necessary.

#### Standard

0.10—0.20 mm {0.0039—0.0079 in}

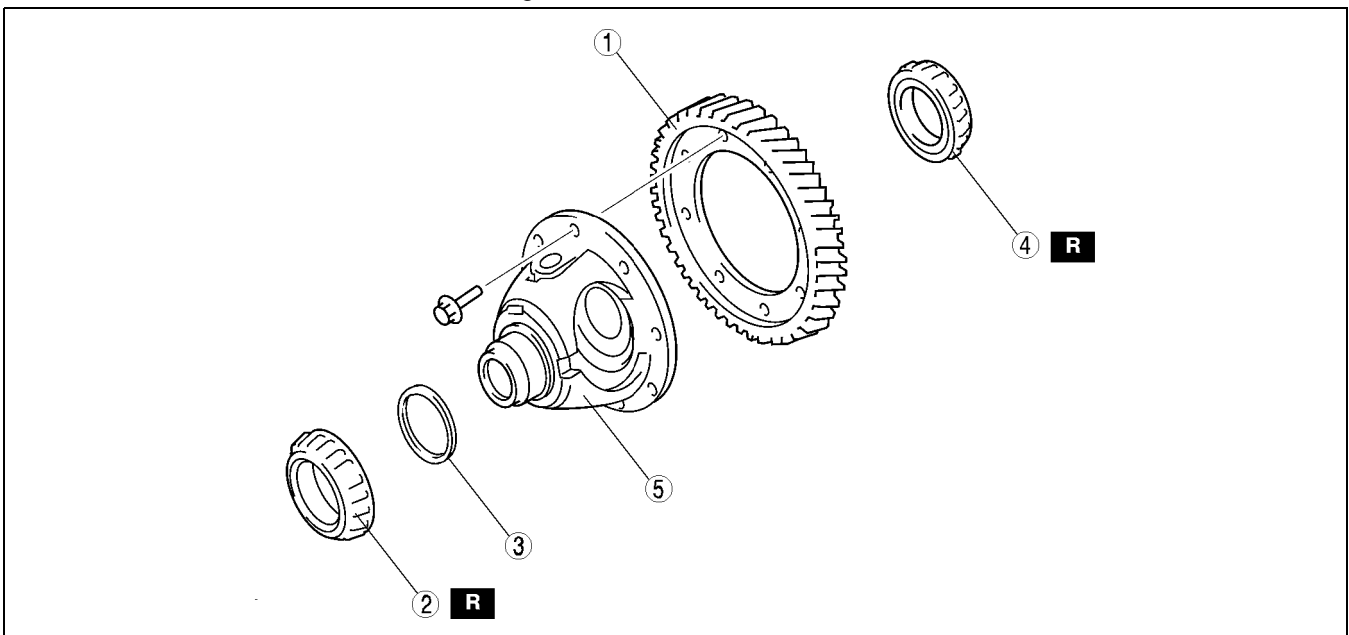


AME5112M140

## DIFFERENTIAL DISASSEMBLY

AME511227100M02

1. Disassemble in the order shown in the figure.



AME5112M006

1	Ring gear
2	Bearing (ring gear-opposite side) (See <a href="#">J-33 Bearing (Ring Gear-Opposite Side) Disassembly Note</a> )
3	Spacer

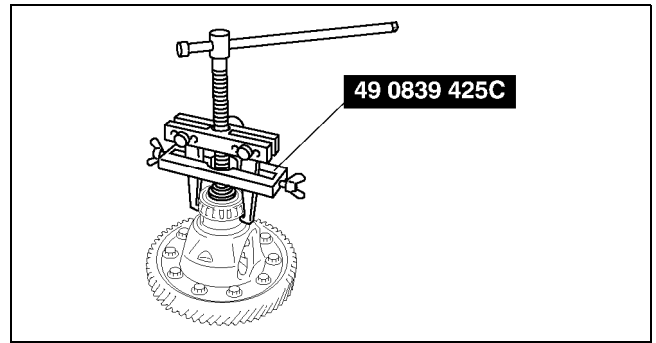
4	Bearing (ring gear side) (See <a href="#">J-33 Bearing (Ring Gear Side) Disassembly Note</a> )
5	Gear case component



# MANUAL TRANSAXLE

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

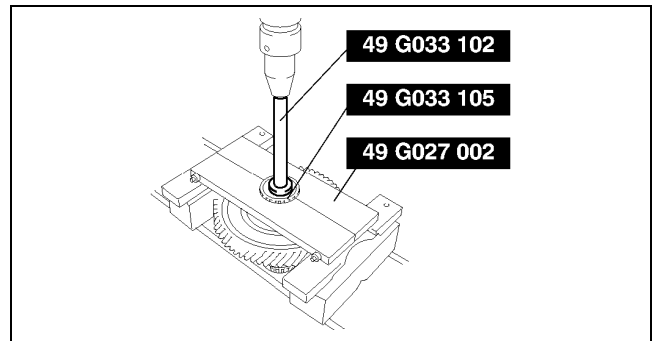
1. Remove the bearing using the SST.



AME5112M130

## Bearing (Ring Gear Side) Disassembly Note

1. Remove the bearing using the SSTs.

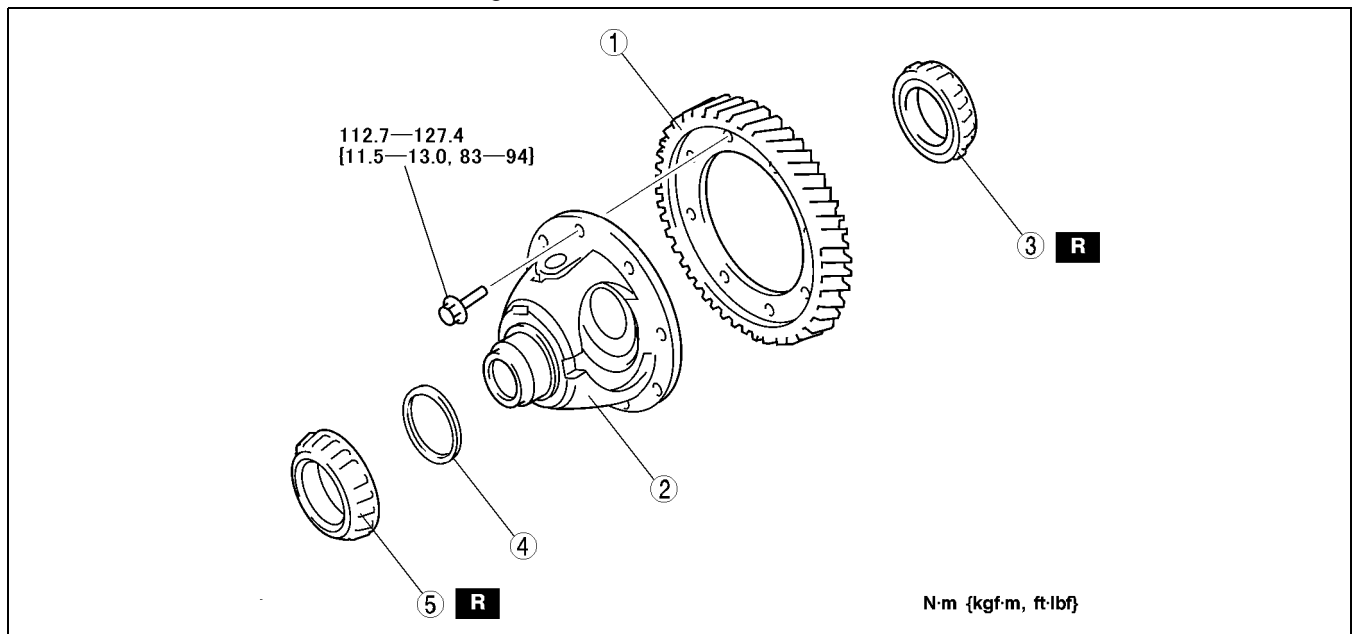


AME5112M134

## DIFFERENTIAL ASSEMBLY

AME511227100M03

1. Assemble in the order shown in the figure.



AME5112M141

1	Ring gear (See <a href="#">J-34 Ring Gear Assembly Note</a> )
2	Gear case component
3	Bearing (ring gear side) (See <a href="#">J-34 Bearing (Ring Gear Side) Assembly Note</a> )

4	Spacer (See <a href="#">J-34 Spacer Assembly Note</a> )
5	Bearing (ring gear-opposite side) (See <a href="#">J-34 Bearing (Ring Gear-Opposite Side) Assembly Note</a> )

# MANUAL TRANSAXLE

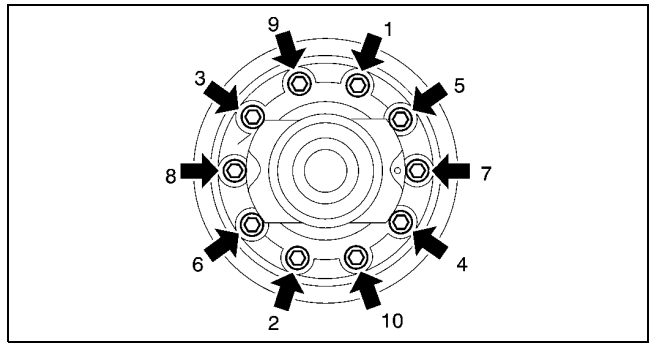
## Ring Gear Assembly Note

1. Install the gear case component, and tighten a bolt in the order shown in the figure.

### Tightening torque

112.7—127.4 N·m

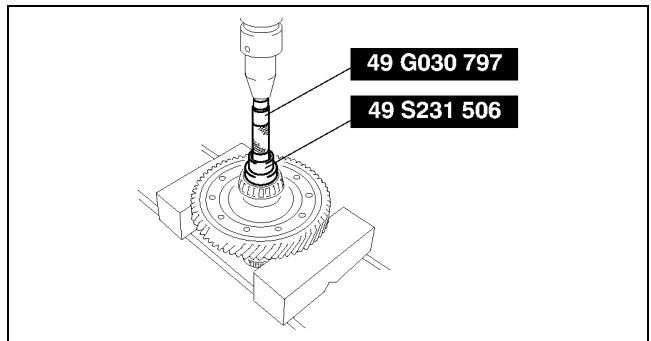
{11.5—13.0 kgf·m, 83—94 ft·lbf}



AME5112M075

## Bearing (Ring Gear Side) Assembly Note

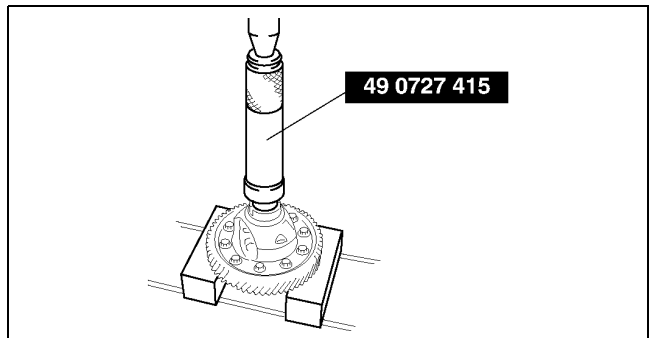
1. Install a new bearing using the SSTs.



AME5112M073

## Spacer Assembly Note

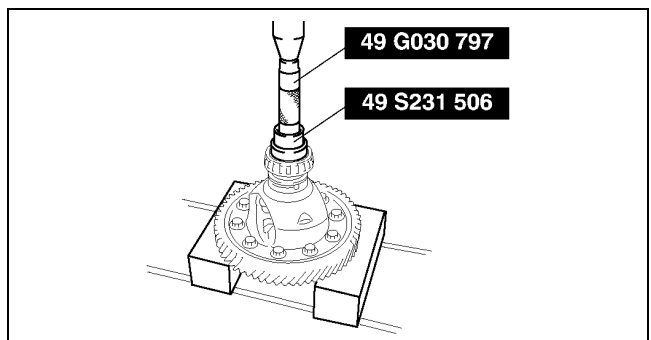
1. Install the spacer using the SST.



AME5112M131

## Bearing (Ring Gear-Opposite Side) Assembly Note

1. Install a new bearing using the SSTs.



AME5112M132

# MANUAL TRANSAXLE

## PRIMARY SHAFT END PLAY ADJUSTMENT

AME511201029M07

### Note

- Adjust the primary shaft end play by measuring the clearance between the transaxle case and the primary shaft rear bearing, and selecting a primary shaft bearing adjustment shim.
- Calculate adjustment shim thickness O as defined below to adjust the primary shaft bearing end play to standard value.

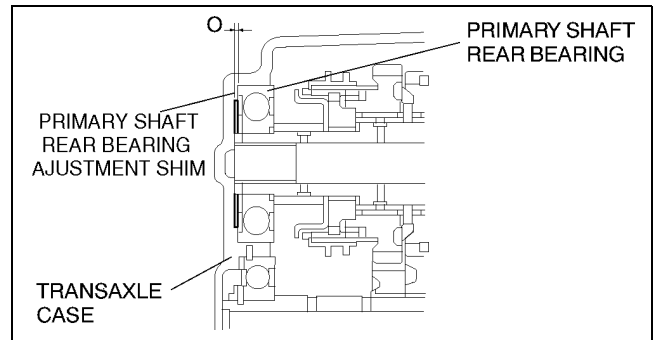
**Standard value: 0.00—0.06 mm**  
{0.0000—0.0024 in}

**Dimension O = (O1 - O2) + end play**

**O:** adjustment shim thickness

**O1:** transaxle case contact face and adjustment shim installation surface dimension

**O2:** clutch housing contact face and primary shaft rear bearing contact face dimension



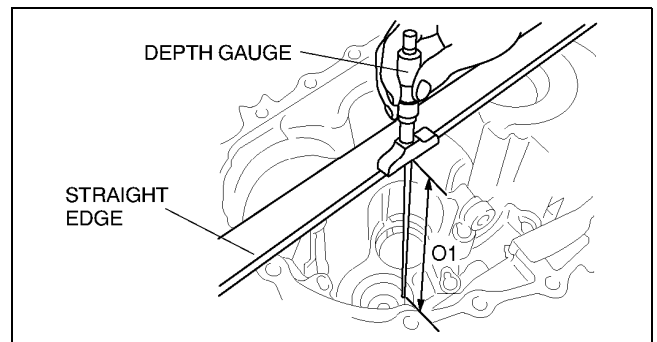
AME5112M030

### Adjustment shim thickness

(mm {in})

0.40 {0.016}	0.76 {0.030}	1.12 {0.044}	1.48 {0.058}
0.44 {0.017}	0.80 {0.031}	1.16 {0.046}	1.52 {0.060}
0.48 {0.019}	0.84 {0.033}	1.20 {0.047}	1.56 {0.061}
0.52 {0.020}	0.88 {0.035}	1.24 {0.049}	1.60 {0.063}
0.56 {0.022}	0.92 {0.036}	1.28 {0.050}	1.64 {0.065}
0.60 {0.024}	0.96 {0.038}	1.32 {0.052}	1.68 {0.066}
0.64 {0.025}	1.00 {0.039}	1.36 {0.054}	1.72 {0.068}
0.68 {0.027}	1.04 {0.041}	1.40 {0.055}	—
0.72 {0.028}	1.08 {0.043}	1.44 {0.057}	—

1. Measure dimension O1 for the clutch housing installation surface of the transaxle case and the adjustment shim installation surface using a depth gauge and straight edge.



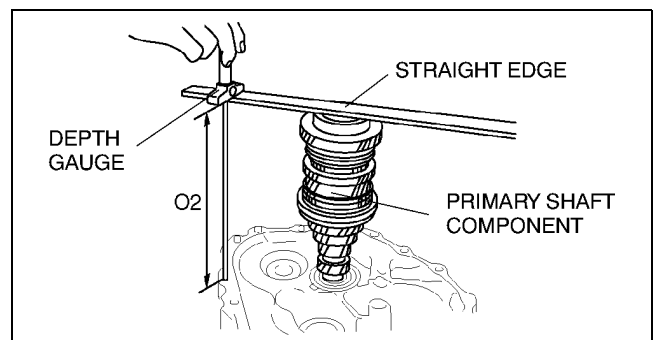
AME5112M031

2. Measure dimension O2 for the transaxle case installation surface of the clutch housing and the primary shaft rear bearing contact face using a depth gauge and straight edge.

### Note

- Select only one adjustment shim.

3. Install the selected primary shaft rear bearing adjustment shim in the primary shaft component.



AME5112M032

# MANUAL TRANSAXLE

## SECONDARY SHAFT END PLAY ADJUSTMENT

AME511201029M08

### Note

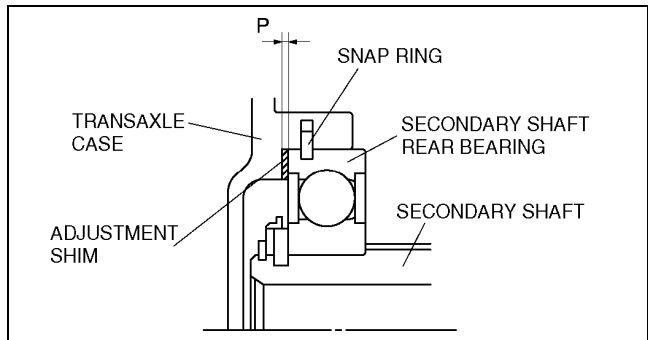
- Adjust the secondary shaft end play by measuring clearance M between the transaxle case and the secondary shaft rear bearing, and selecting a secondary shaft bearing adjustment shim.
- Calculate adjustment shim thickness P as defined below to adjust the secondary shaft bearing end play to standard value.

**Standard value: 0.00—0.06 mm**  
**{0.0000—0.0024 in}**

**Dimension P = M + end play**

**P: adjustment shim thickness**

**M: transaxle case contact face and secondary shaft rear bearing contact**



AME5112M033

### Adjustment shim thickness

(mm {in})

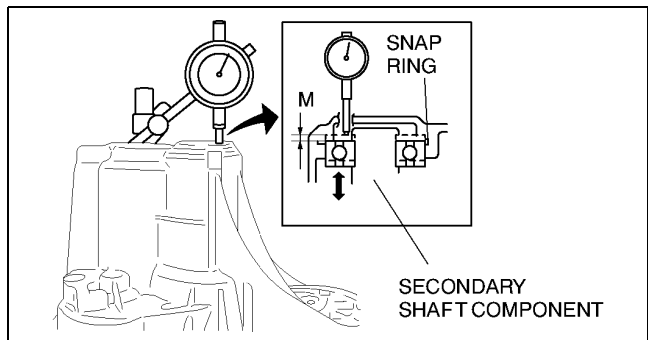
0.40 {0.016}	0.64 {0.025}	0.84 {0.033}	1.04 {0.041}
0.48 {0.019}	0.68 {0.027}	0.88 {0.035}	1.08 {0.043}
0.52 {0.020}	0.72 {0.028}	0.92 {0.036}	—
0.56 {0.022}	0.76 {0.030}	0.96 {0.038}	—
0.60 {0.024}	0.80 {0.031}	1.00 {0.039}	—

1. Install the secondary shaft component to the clutch housing.
2. Install the snap ring to the transaxle case.
3. Attach the transaxle case to the clutch housing, and temporarily install installation bolts. Temporarily attach the snap ring to the secondary shaft rear bearing.
4. Set a dial gauge to the secondary shaft rear bearing through the snap ring installation hole.
5. While expanding the snap ring, lift the secondary shaft component through the control component installation hole until it contacts the transaxle case.
6. Release the secondary shaft component so that it moves back down and the snap ring resets to the secondary shaft rear bearing. Dimension M is the measured distance that the secondary shaft component moves.

### Note

- Select only one adjustment shim.

7. Install the selected primary shaft rear bearing adjustment shim in the primary shaft component.



AME5112M034

# MANUAL TRANSAXLE

## REVERSE IDLER GEAR END PLAY ADJUSTMENT

AME511201029M06

### Note

- Adjust the reverse idler gear end play by measuring the clearance between the transaxle case and a reverse idler gear (rear), and selecting a reverse idler gear adjustment shim.
- Calculate dimension Q for the adjustment shim thickness as defined below to adjust the reverse idler gear end play to standard value.

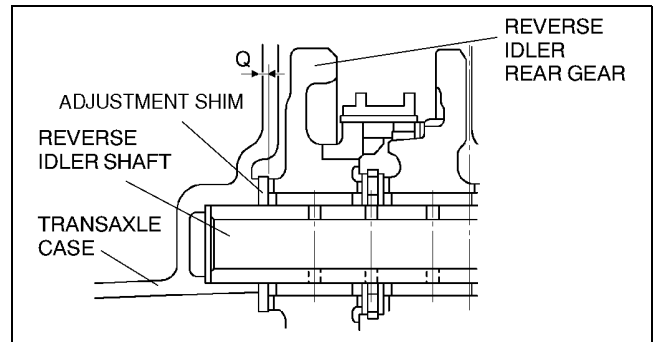
**Standard value: 0.04—0.10 mm**  
{0.0016—0.0039 in}

**Dimension Q = (Q1 + Q2) + end play**

**Q: adjustment shim thickness**

**Q1: transaxle case contact face and adjustment shim installation surface dimension**

**Q2: clutch housing contact face and reverse idler gear (rear) contact face dimension**



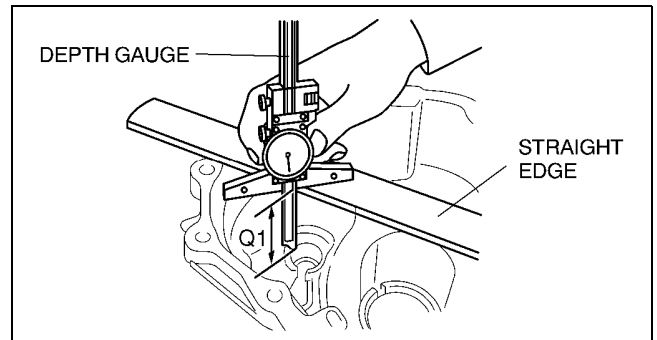
AME5112M039

### Adjustment shim thickness

(mm {in})

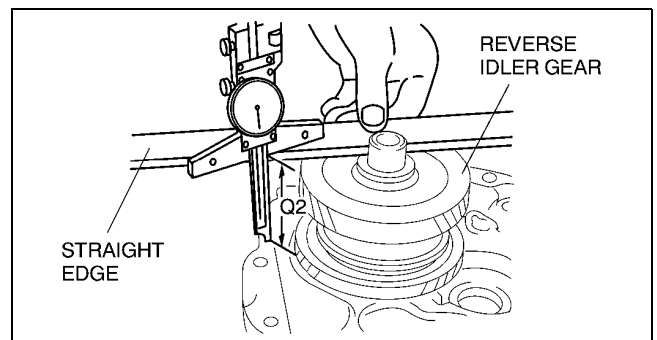
1.76 {0.069}	2.00 {0.007}	2.24 {0.088}	2.48 {0.098}
1.80 {0.070}	2.04 {0.080}	2.28 {0.090}	2.52 {0.099}
1.84 {0.072}	2.08 {0.082}	2.32 {0.091}	2.56 {0.101}
1.88 {0.074}	2.12 {0.083}	2.36 {0.093}	2.60 {0.102}
1.92 {0.076}	2.16 {0.085}	2.40 {0.094}	2.64 {0.104}
1.96 {0.077}	2.20 {0.087}	2.44 {0.096}	—

1. Measure dimension Q1 between clutch housing installation surface of the transaxle case and adjustment shim installation surface using a depth gauge and straight edge.



AME5112M040

2. Measure dimension Q2 between the transaxle case installation surface of the clutch housing and the reverse idler gear (rear) contact face using a depth gauge and straight edge.



AME5112M041

### Note

- Select only one adjustment shim.
3. Install the selected reverse idler gear adjustment shim in the reverse idler gear component.

# MANUAL TRANSAXLE

## 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.

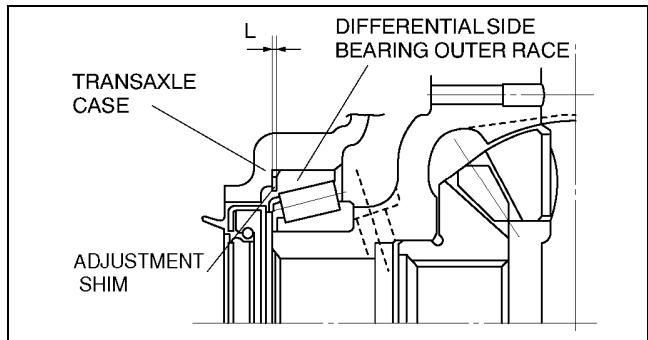
**Standard value: 0.15—0.21 mm**  
{0.0059—0.0083 in}

**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**



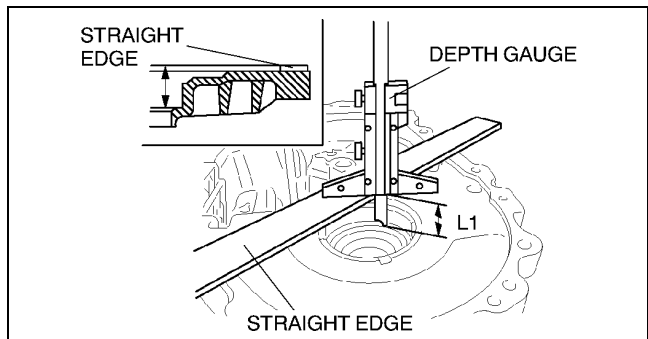
AME5112M035

### Adjustment shim thickness

(mm {in})

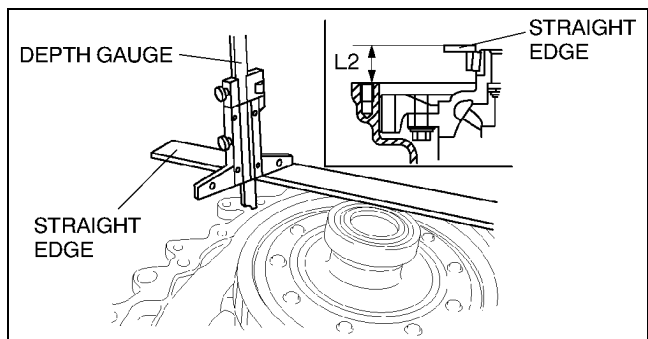
0.48 {0.019}	0.60 {0.024}	0.72 {0.028}	0.84 {0.033}
0.52 {0.020}	0.64 {0.025}	0.76 {0.030}	0.88 {0.035}
0.56 {0.022}	0.68 {0.027}	0.80 {0.031}	0.92 {0.036}

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.



AME5112M036

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.



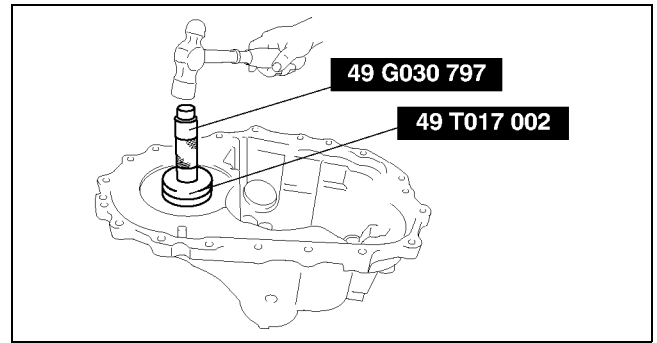
AME5112M037

### Note

- Select up to 2 adjustment shims.

## MANUAL TRANSAXLE

4. Install selected adjustment shim, and install the differential side bearing outer race using the **SSTs**.



AME5112M038

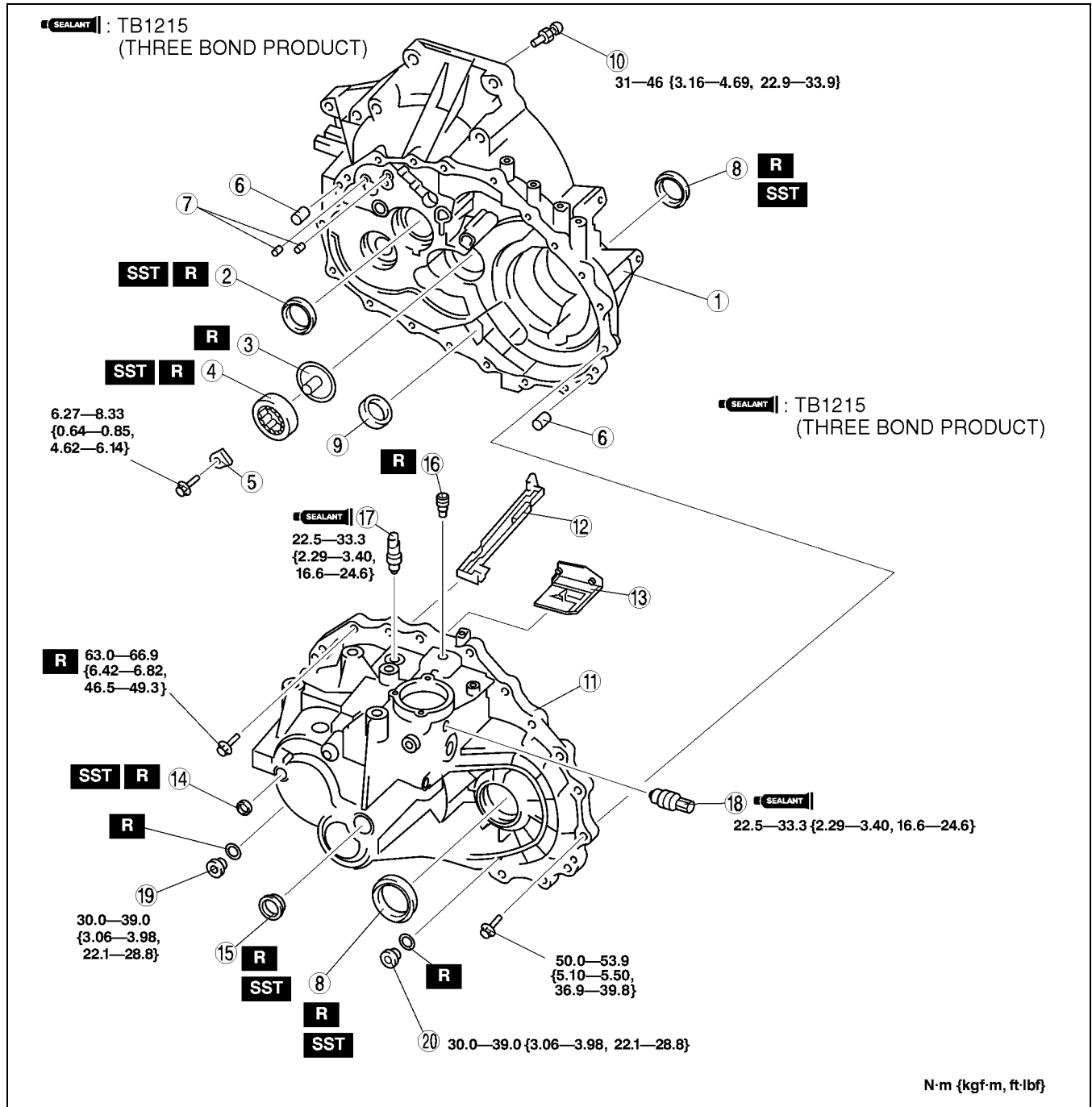
J

# MANUAL TRANSAXLE

## CLUTCH HOUSING AND TRANSAXLE CASE COMPONENTS ASSEMBLY

AME511217010M05

### Assembly Components



AME5112M137

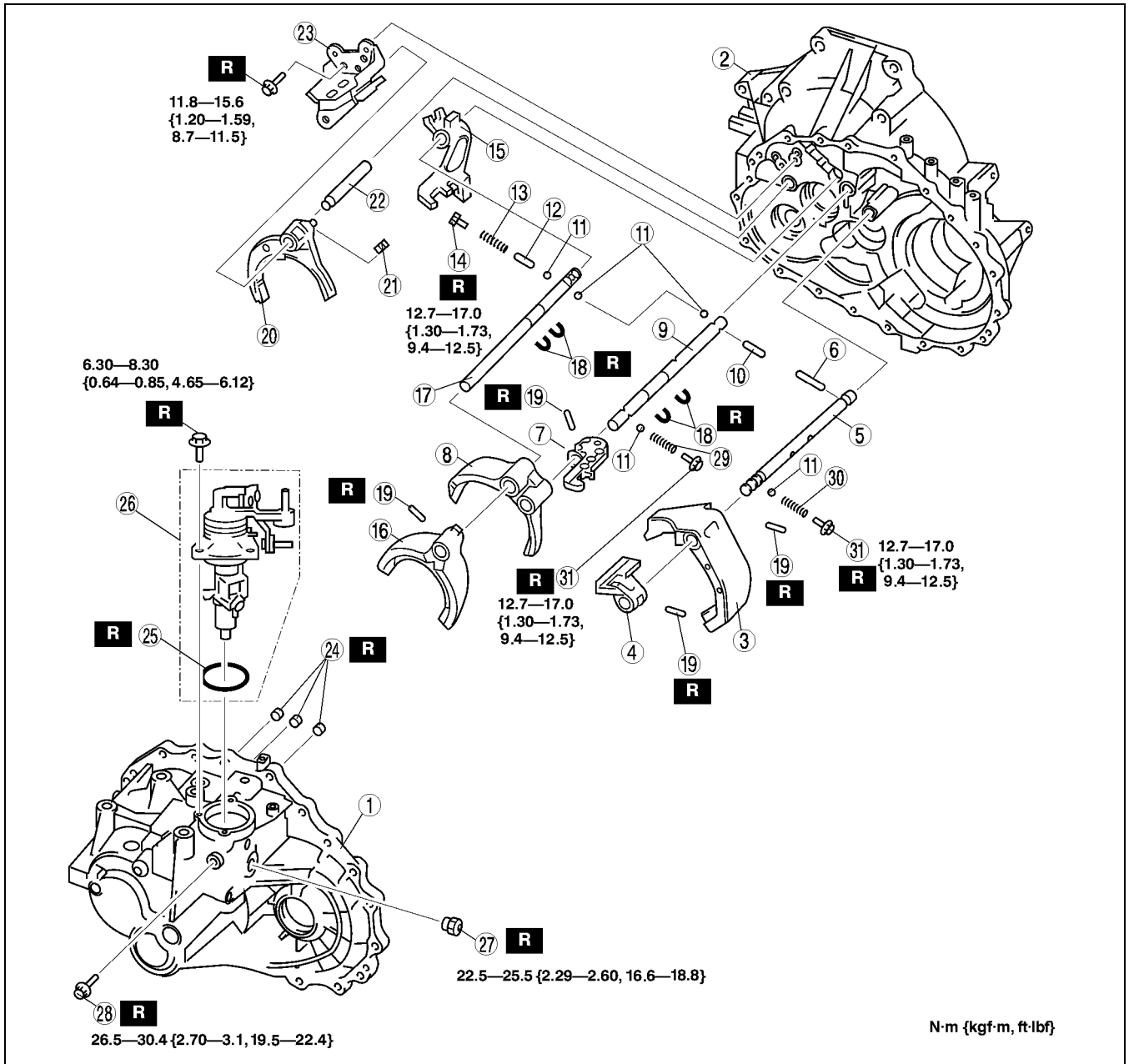
1	Clutch housing
2	Primary shaft oil seal
3	Oil channel
4	Secondary shaft front bearing
5	Secondary shaft bearing retainer
6	Dowel pin
7	Knock pin
8	Differential oil seal
9	Magnet
10	Pivot pin

11	Transaxle case
12	Oil pass
13	Baffle plate
14	Welt plug
15	Bore plug
16	Air-bleed plug
17	Reverse switch
18	Neutral switch
19	Filler cap
20	Drain plug



# MANUAL TRANSAXLE

J



AME5112M138

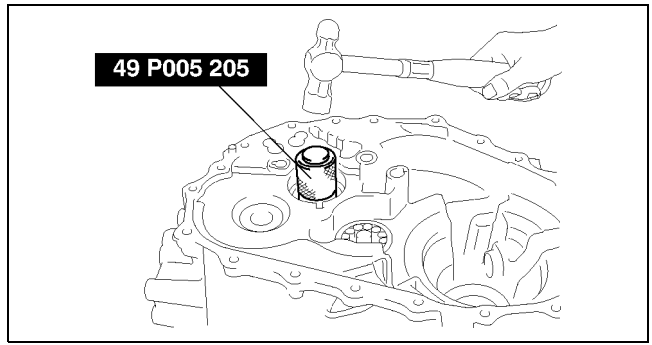
1	Transaxle case
2	Clutch housing
3	1st/2nd shift fork
4	1st/2nd bracket
5	1st/2nd fork rod
6	Shift check sleeve (1st/2nd)
7	3rd/4th bracket
8	3rd/4th shift fork
9	3rd/4th fork rod
10	Inter lock pin
11	Check ball
12	Shift check sleeve (5th/reverse)
13	Check spring (5th/reverse)
14	Check plug (5th/reverse)
15	5th/reverse bracket
16	5th shift fork

17	5th/Reverse fork rod
18	C ring
19	Retaining pin
20	Reverse shift fork
21	Cap
22	Reverse fork rod
23	Reverse lever component
24	Rod bushing
25	O ring
26	Shift control component
27	Shift check bolt
28	Stopper bolt
29	Check spring (3rd/4th)
30	Check spring (1st/2nd)
31	Check plug (1st/2nd, 3rd/4th)

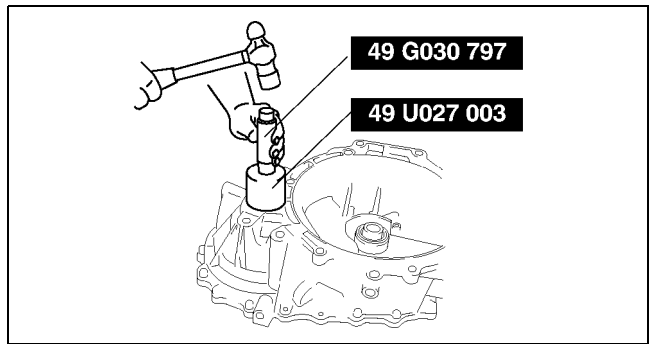
# MANUAL TRANSAXLE

## Assembly Procedure

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



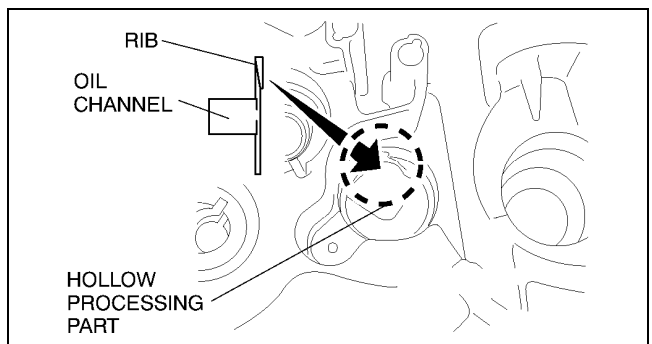
2. Install a new differential oil seal (clutch housing side) using the **SSTs** so that the seal is flush with the housing surface.



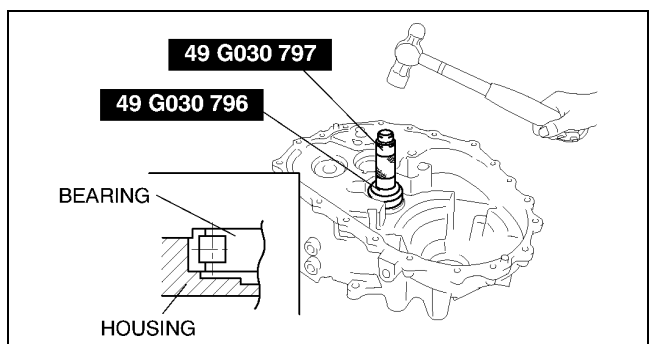
3. Install a new oil channel in the secondary shaft.

### Note

- When installing the oil channel, set the rib part of the oil channel to the hollow processing part of the clutch housing.



4. Install a new secondary shaft front bearing using the **SSTs** as shown in the figure.



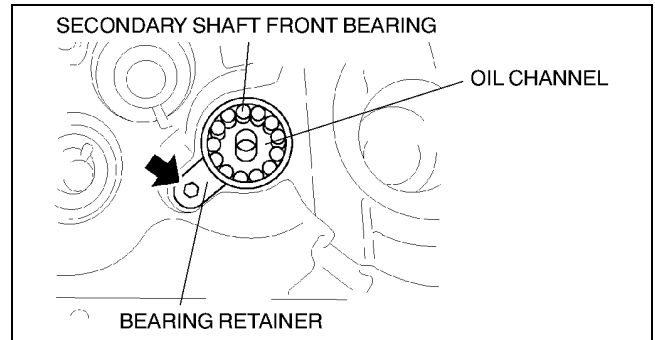
## MANUAL TRANSAXLE

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

**Tightening torque**

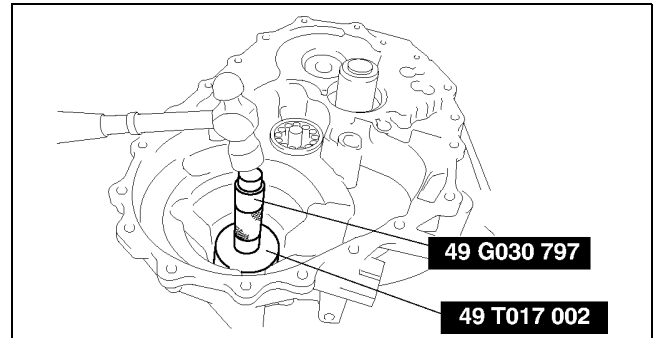
6.27—8.33 N·m

{0.64—0.85 kgf·m, 4.62—6.14 ft·lbf}

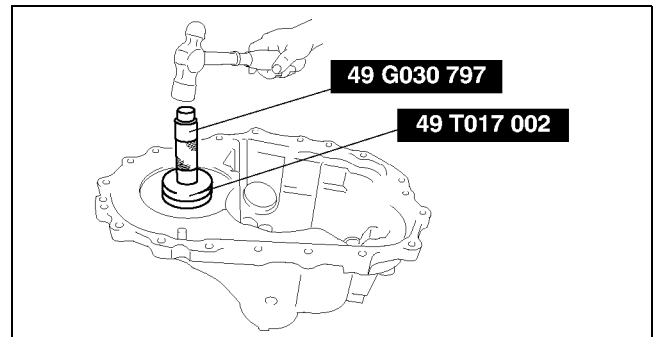


AME5112M020

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

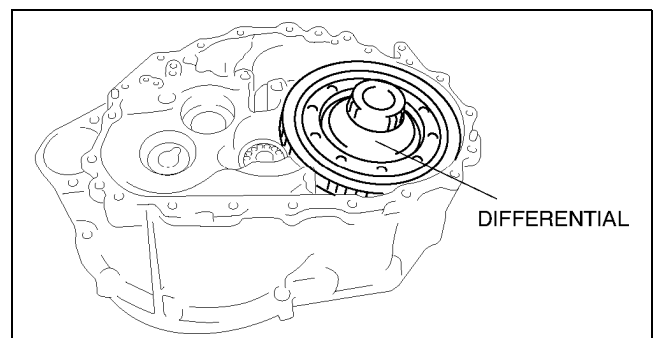


AME5112M038

7. Install the differential to the clutch housing.

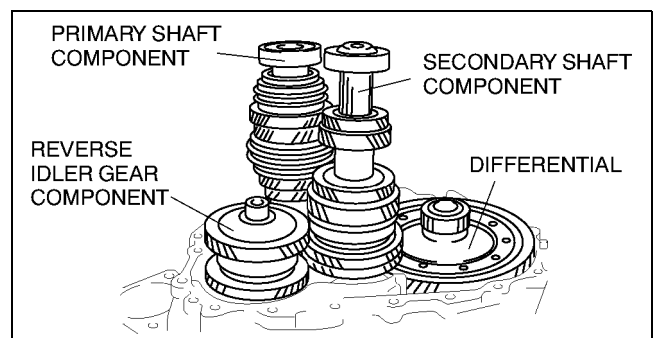
**Caution**

- 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

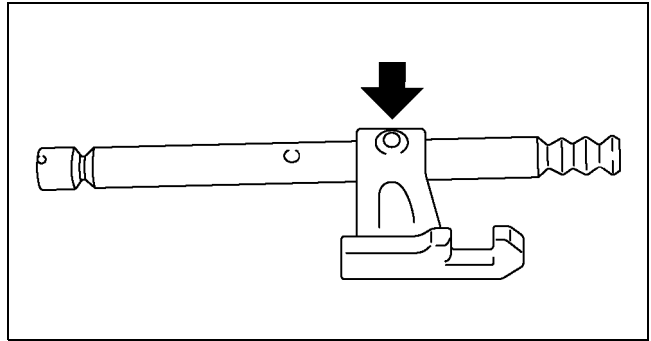
8. Install the primary shaft component, secondary shaft component, and reverse idler component to the clutch housing at the same time.



AME5112M014

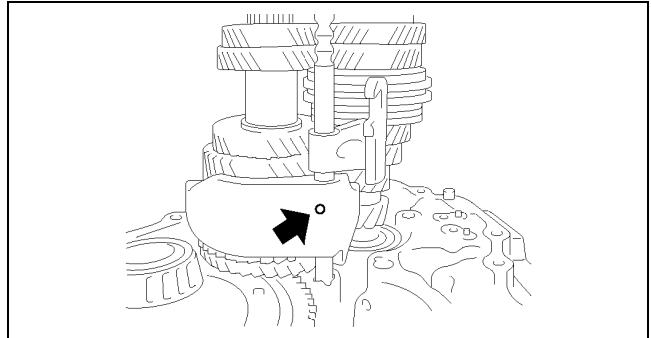
## MANUAL TRANSAXLE

9. Install the 1st /2nd bracket to the 1st/2nd fork rod, and install a new retaining pin.



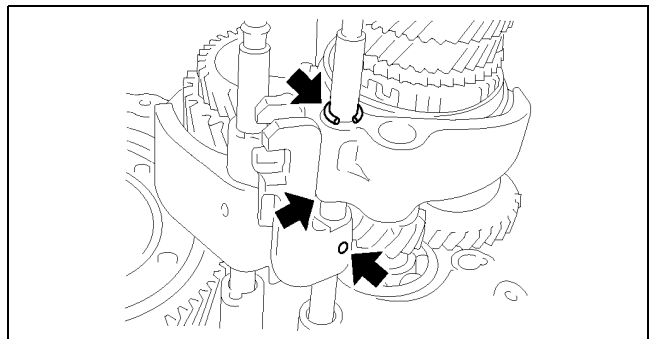
AME5112M023

10. Install the 1st/2nd fork rod and 1st/2nd shift fork to the clutch housing, and install a new retaining pin.  
11. Install the shift check sleeve.  
12. Install the interlock pin to the 3rd/4th fork rod.  
13. Install the 3rd/4th bracket, 3rd/4th shift fork, and 3rd/4th fork rod to the clutch housing.



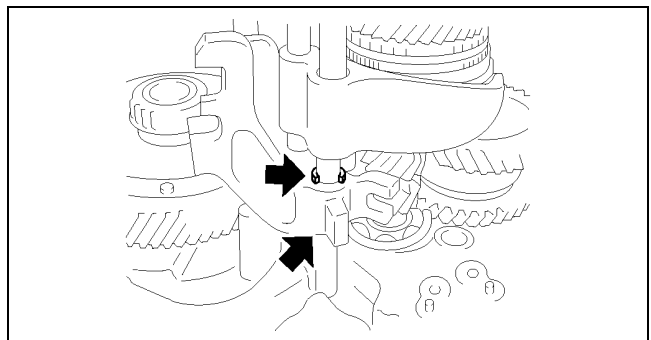
AME5112M013

14. Install a new C ring to the 3rd/4th shift fork.  
15. Install a new retaining pin to the 3rd/4th bracket.  
16. Install two check balls.  
17. Install the 5th/reverse bracket, 5th shift fork, and 5th/reverse fork rod.



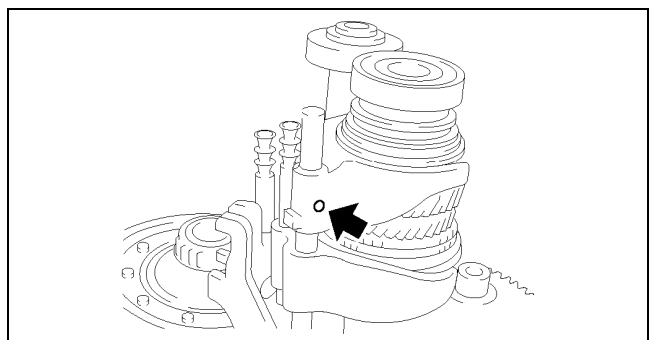
AME5112M012

18. Install a new C ring to the 5th/reverse fork rod.  
19. Install a new retaining pin to the 5th shift fork.  
20. Install the reverse shift fork and reverse fork rod.



AME5112M011

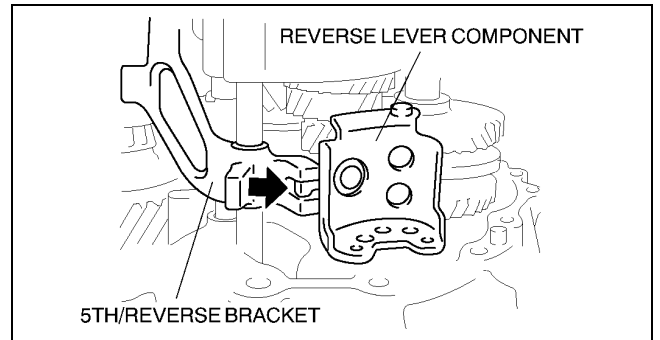
21. Install the reverse lever component.  
(1) Install the cap to the cam part of the reverse lever component, and the reverse lever component to the reverse shift fork.



AME5112M010

## MANUAL TRANSAXLE

- (2) Lift the reverse shift fork, and install the cam part of the reverse lever component to the 5th/reverse bracket.



AME5112M024

- (3) Install a new reverse lever component installation bolt.

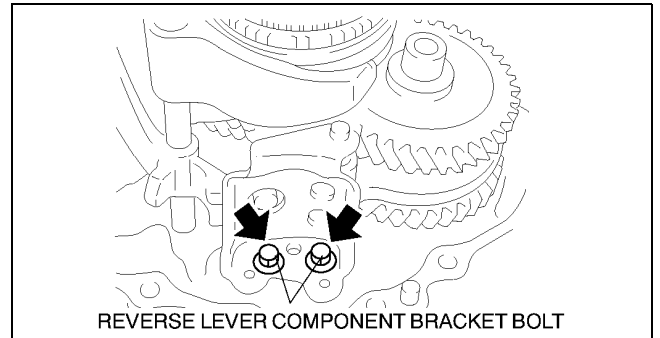
### Tightening torque

11.8—15.6 N·m

{1.20—1.59 kgf·m, 8.7—11.5 ft·lbf}

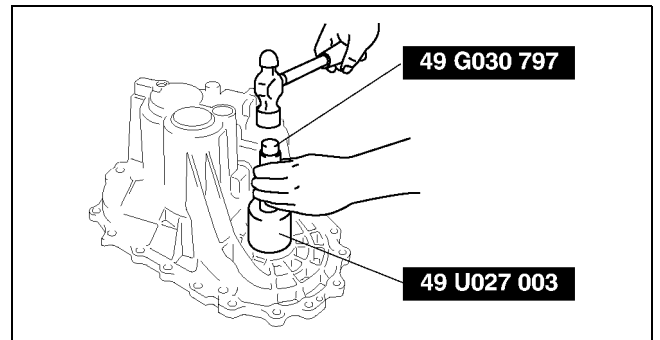
### Note

- When install the check ball, keep the check ball from dropping into the mold groove of the hole.



AME5112M009

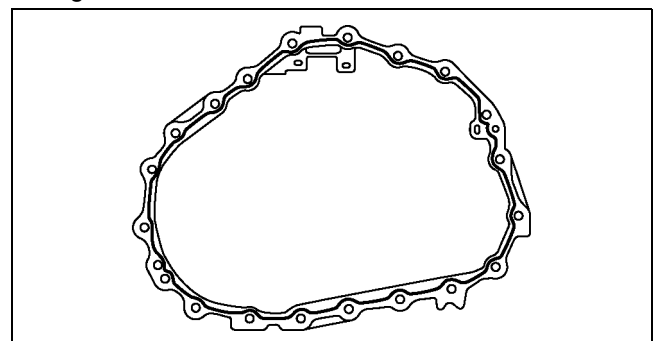
22. Install the check ball, the shift check sleeve (5th/reverse), the check spring (5th/reverse), and a new check plug (5th/reverse).
23. Install the magnet to the clutch housing.
24. Install a new differential oil seal to the transaxle case using the **SSTs** so that the seal is flush with the case surface.
25. Adjust the primary shaft end play. (See [J-35 PRIMARY SHAFT END PLAY ADJUSTMENT.](#))
26. Install the primary shaft adjustment shim to the primary shaft.
27. Install the baffle plate and oil pass.
28. Install the transaxle case.
  - (1) Adjust the secondary shaft end play. (See [J-36 SECONDARY SHAFT END PLAY ADJUSTMENT.](#))
  - (2) Install the secondary shaft rear bearing adjustment shim to the transaxle case.
  - (3) Install a new snap ring of the secondary shaft rear bearing to the transaxle case.
  - (4) Apply a light coat of silicone sealant to the contact surfaces of the transaxle case and the clutch housing.



AME5112M104

### Sealant

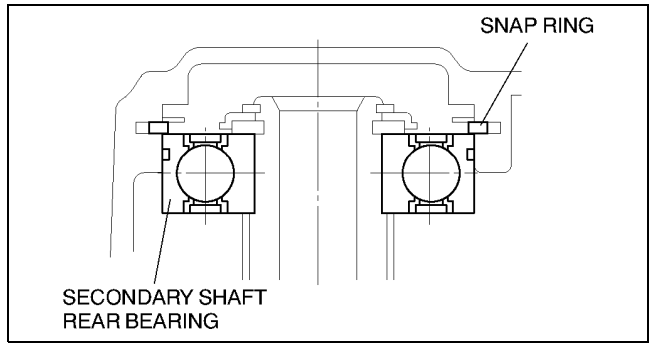
Three Bond product: TB1215



AME5112M025

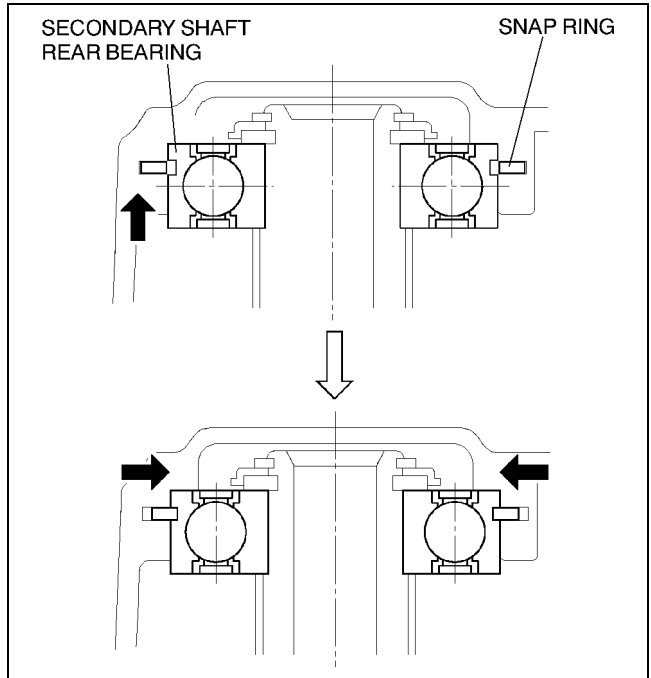
# MANUAL TRANSAXLE

- (5) Place the transaxle case to the clutch housing.



AME5112M026

- (6) Stretch the snap ring at the bore plug hole while lifting the secondary shaft at the control component installation hole.  
 (7) Install the snap ring to the groove of the secondary shaft rear bearing.

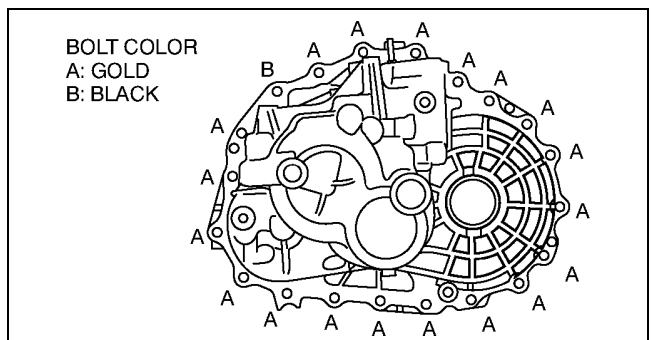


AME5112M100

- (8) Install the A bolt and a new B bolt to the transaxle case as shown in the figure.

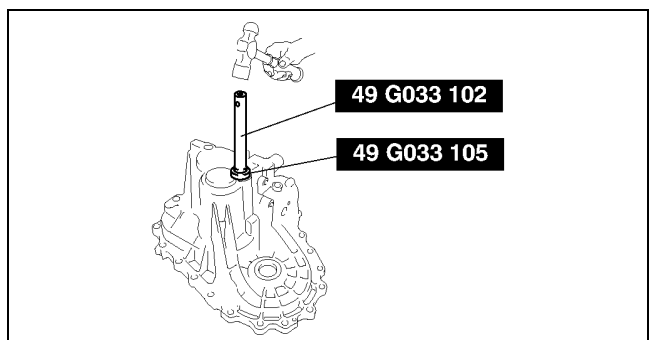
**Tightening torque**

- A: 50.0—53.9 N·m**  
 {5.1—5.5 kgf·m, 36.9—39.8 ft·lbf}  
**B: 63.0—66.9 N·m**  
 {6.4—6.8 kgf·m, 46.5—49.3 ft·lbf}



AME5112M027

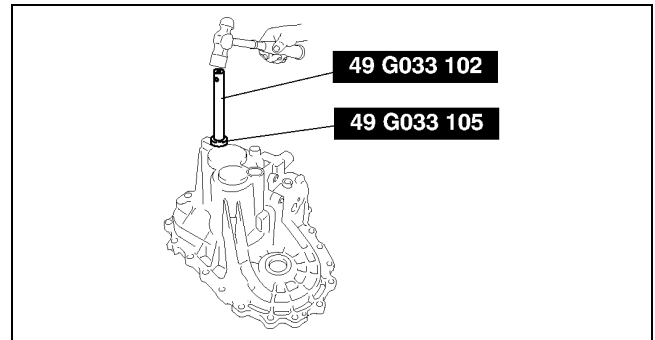
29. Install a new bore plug using the **SSTs**.



AME5112M028

## MANUAL TRANSAXLE

30. Install a new welt plug using the SSTs.



AME5112M029

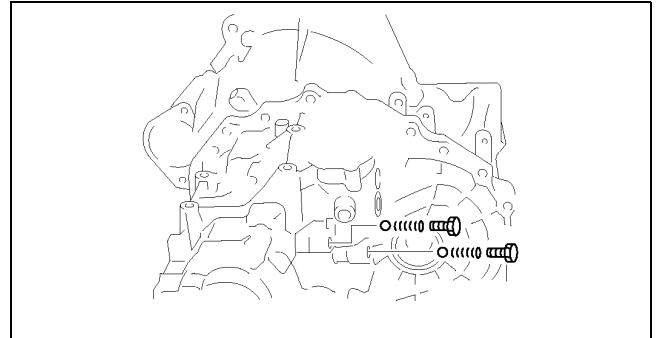
31. Install the shift check sleeve, the check balls, check springs, and a new check ball plugs as shown in the figure.

**Tightening torque**

**12.7—17.0 N·m**

**{1.30—1.73 kgf·m, 9.4—12.5 ft·lbf}**

32. Install a new O ring to the control component.



AME5112M099

33. Install the control component.

**Tightening torque**

**6.30—8.30 N·m**

**{0.64—0.85 kgf·m, 4.65—6.12 ft·lbf}**

34. Install a new shift check bolt.

**Tightening torque**

**22.5—25.5 N·m**

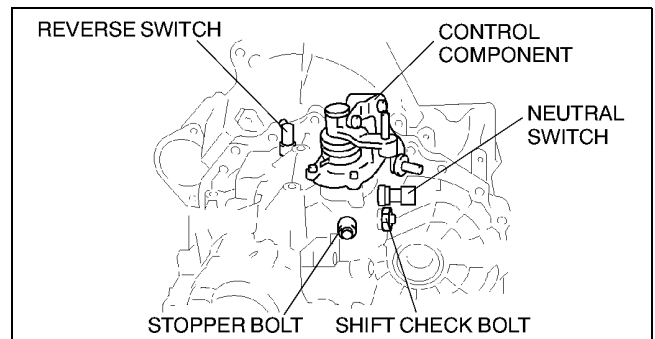
**{2.29—2.60 kgf·m, 16.6—18.8 ft·lbf}**

35. Install a new stopper bolt.

**Tightening torque**

**26.5—30.4 N·m**

**{2.70—3.10 kgf·m, 19.5—22.4 ft·lbf}**



AME5112M098

36. Apply a light coat of silicone sealant to the screw of the neutral switch, and install it to the transaxle case.

**Sealant**

**Three Bond product: TB1215**

**Tightening torque**

**22.5—33.3 N·m {2.29—3.40 kgf·m, 16.6—24.6 ft·lbf}**

37. Apply a light coat of silicone sealant to the screw of the reverse switch, and install it to the transaxle case.

**Sealant**

**Three Bond product: TB1215**

**Tightening torque**

**22.5—33.3 N·m {2.29—3.40 kgf·m, 16.6—24.6 ft·lbf}**

38. Install a new drain plug.

**Tightening torque**

**30.0—39.0 N·m {3.06—3.98 kgf·m, 22.1—28.8 ft·lbf}**

39. Install a new gasket to the filler cap, and Install it to the transaxle case.

**Tightening torque**

**30.0—39.0 N·m {3.06—3.98 kgf·m, 22.1—28.8 ft·lbf}**

# TECHNICAL DATA

TECHNICAL DATA .....	TD-2
MANUAL TRANSAXLE .....	TD-2

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## TECHNICAL DATA

### TECHNICAL DATA

#### MANUAL TRANSAXLE

AME931001029M01

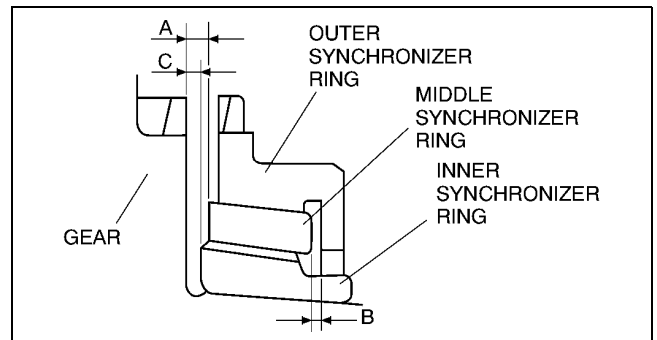
Item		Specification	
Transaxle type		A65M-R	
Gear clearance	1st gear	End play (mm {in})	0.20—0.30 {0.0078—0.0118}
	2nd gear	End play (mm {in})	0.06—0.16 {0.0024—0.0063}
	3rd gear	Thrust clearance (mm {in})	0.18—0.31 {0.0071—0.0122}
	4th gear	End play (mm {in})	0.20—0.30 {0.0078—0.0118}
	5th gear	Thrust clearance (mm {in})	0.06—0.16 {0.0024—0.0063}
Synchronizer ring	1st gear	Clearance B* <sup>1</sup> (mm {in})	0.60—1.10 {0.0236—0.0433}
		Clearance C* <sup>1</sup> (mm {in})	0.60—0.80 {0.0236—0.0315}
	2nd gear	Clearance A* <sup>1</sup> (mm {in})	0.60—1.20 {0.0236—0.0472}
		Clearance B* <sup>1</sup> (mm {in})	0.60—1.10 {0.0236—0.0433}
		Clearance C* <sup>1</sup> (mm {in})	0.70—1.10 {0.0276—0.0433}
	3rd gear	Clearance (mm {in})	0.90—1.45 {0.035—0.057}
	4th gear	Clearance (mm {in})	0.90—1.45 {0.035—0.057}
	5th gear	Clearance (mm {in})	0.95—1.40 {0.037—0.055}
Reverse idler gear	Clearance (mm {in})	0.95—1.40 {0.037—0.055}	
Primary shaft	End play (mm {in})		0.00—0.06 {0.0000—0.0024}
	Adjustment shim thickness (mm {in})		0.40 {0.016}, 0.44 {0.017}, 0.48 {0.019}, 0.52 {0.020}, 0.56 {0.022}, 0.60 {0.024}, 0.64 {0.025}, 0.68 {0.027}, 0.72 {0.028}, 0.76 {0.030}, 0.80 {0.031}, 0.84 {0.033}, 0.88 {0.035}, 0.92 {0.036}, 0.96 {0.038}, 1.00 {0.039}, 1.04 {0.041}, 1.08 {0.043}, 1.12 {0.044}, 1.16 {0.046}, 1.20 {0.047}, 1.24 {0.049}, 1.28 {0.050}, 1.32 {0.052}, 1.36 {0.054}, 1.40 {0.055}, 1.44 {0.057}, 1.48 {0.058}, 1.52 {0.060}, 1.56 {0.061}, 1.60 {0.063}, 1.64 {0.065}, 1.68 {0.66}, 1.72 {0.68}
Secondary shaft	End play (mm {in})		0.00—0.06 {0.0000—0.0024}
	Adjustment shim thickness (mm {in})		0.40 {0.016}, 0.48 {0.019}, 0.52 {0.020}, 0.56 {0.022}, 0.60 {0.024}, 0.64 {0.025}, 0.68 {0.027}, 0.72 {0.028}, 0.76 {0.030}, 0.80 {0.031}, 0.84 {0.033}, 0.88 {0.035}, 0.92 {0.036}, 0.96 {0.038}, 1.00 {0.039}, 1.04 {0.041}, 1.08 {0.043}
Reverse idler gear	End play (mm {in})		0.04—0.10 {0.0016—0.0039}
	Adjustment shim thickness (mm {in})		1.76 {0.069}, 1.80 {0.070}, 1.84 {0.072}, 1.88 {0.074}, 1.92 {0.076}, 1.96 {0.077}, 2.00 {0.078}, 2.04 {0.080}, 2.08 {0.082}, 2.12 {0.083}, 2.16 {0.085}, 2.20 {0.087}, 2.24 {0.088}, 2.28 {0.090}, 2.32 {0.091}, 2.36 {0.093}, 2.40 {0.094}, 2.44 {0.096}, 2.48 {0.098}, 2.52 {0.099}, 2.56 {0.101}, 2.60 {0.102}, 2.64 {0.104}
Primary shaft thrust washer	Thickness (mm {in})		3.84 {0.151}, 3.90 {0.154}, 3.96 {0.156}, 4.02 {0.158}, 4.08 {0.161}, 4.14 {0.163}
Primary shaft snap ring	Thickness (mm {in})		1.71 {0.067}, 1.76 {0.069}, 1.81 {0.071}, 1.86 {0.073}, 1.91 {0.075}, 1.96 {0.077}, 2.01 {0.079}, 2.06 {0.081}, 2.11 {0.083}, 2.16 {0.085}, 2.21 {0.087}, 2.26 {0.089}
4th gear adjustment shim	Thickness (mm {in})		0.52 {0.021}, 0.60 {0.024}, 0.68 {0.027}, 0.76 {0.030}, 0.84 {0.033}, 0.92 {0.036}, 1.00 {0.039}, 1.08 {0.043}

## TECHNICAL DATA

Item		Specification
5th gear snap ring	Thickness (mm {in})	1.85 {0.073}, 1.90 {0.075}, 1.95 {0.077}, 2.00 {0.079}, 2.05 {0.081}, 2.10 {0.083}, 2.15 {0.085}, 2.20 {0.087}
Secondary shaft C ring	Thickness (mm {in})	2.535 {0.0998}, 2.565 {0.1010}, 2.595 {0.1022}, 2.625 {0.1033}, 2.655 {0.1045}, 2.685 {0.1057}, 2.715 {0.1069}, 2.745 {0.1081}, 2.775 {0.1093}, 2.805 {0.1104}, 2.835 {0.1116}, 2.865 {0.1128}, 2.895 {0.1140}, 2.925 {0.1152}, 2.955 {0.1163}, 2.985 {0.1175}, 3.015 {0.1187}, 3.045 {0.1199}, 3.075 {0.1211}
Differential	Preload (mm {in})	0.15—0.21 {0.0059—0.0083}
	Adjustment shim thickness (mm {in})	0.48 {0.019}, 0.52 {0.020}, 0.56 {0.022}, 0.60 {0.024}, 0.64 {0.025}, 0.68 {0.027}, 0.72 {0.028}, 0.76 {0.030}, 0.80 {0.031}, 0.84 {0.033}, 0.88 {0.035}, 0.92 {0.036}
	Backlash of side gear and pinion gear (mm {in})	0.10—0.20 {0.0039—0.0079}

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\*1 : Measure the clearance A, B or C as shown in the figure.



AME5112M092

# SPECIAL TOOLS

SPECIAL TOOLS .....	ST-2
MANUAL TRANSAXLE .....	ST-2

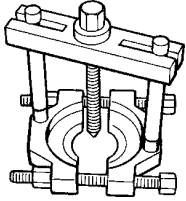
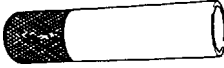
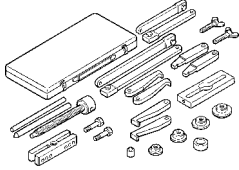
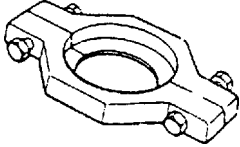
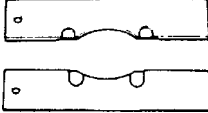
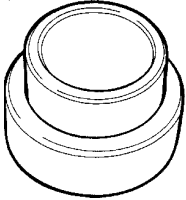
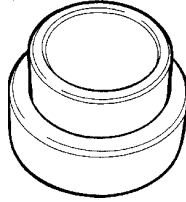
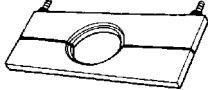
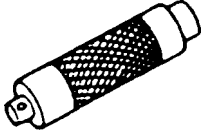
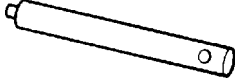

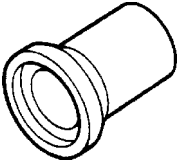
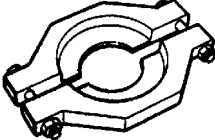
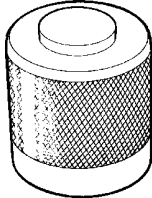

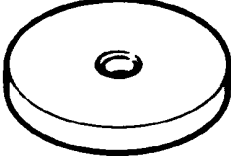
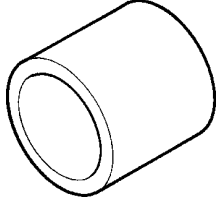
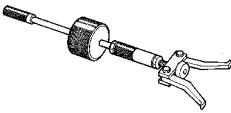
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## SPECIAL TOOLS

### SPECIAL TOOLS

#### MANUAL TRANSAXLE

AME941001029M01

<p>49 0710 520</p> <p>Bearing puller</p>		<p>49 0727 415</p> <p>Bearing installer</p>	
<p>49 0839 425C</p> <p>Bearing puller set</p>			
<p>498 B019 014</p> <p>Removing plate</p>		<p>49 F026 103</p> <p>Wheel hub puller</p>	
<p>49 F401 336B</p> <p>Attachment B</p>		<p>49 F401 337A</p> <p>Attachment C</p>	
<p>49 G027 002</p> <p>Bearing remover</p>			
<p>49 G030 797</p> <p>Handle</p>		<p>49 G033 102</p> <p>Handle</p>	
<p>49 G033 105</p> <p>Attachment</p>			
<p>49 H010 401</p> <p>Oil seal installer</p>		<p>49 H027 002</p> <p>Bearing remover</p>	
<p>49 P005 205</p> <p>Oil seal installer</p>			
<p>49 S231 506</p> <p>Body</p>		<p>49 T017 002</p> <p>Bearing installer</p>	
<p>49 U027 003</p> <p>Oil seal installer</p>			
<p>49 W032 2A0</p> <p>Bearing remover set</p>		<p>49 G030 796</p> <p>Body</p>	