

**GROUP 25**

**PROPELLER SHAFT**

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# GENERAL DESCRIPTION

M1251000100142

3 way split 4-joint type propeller shaft with center bearing, with the following features is utilized:

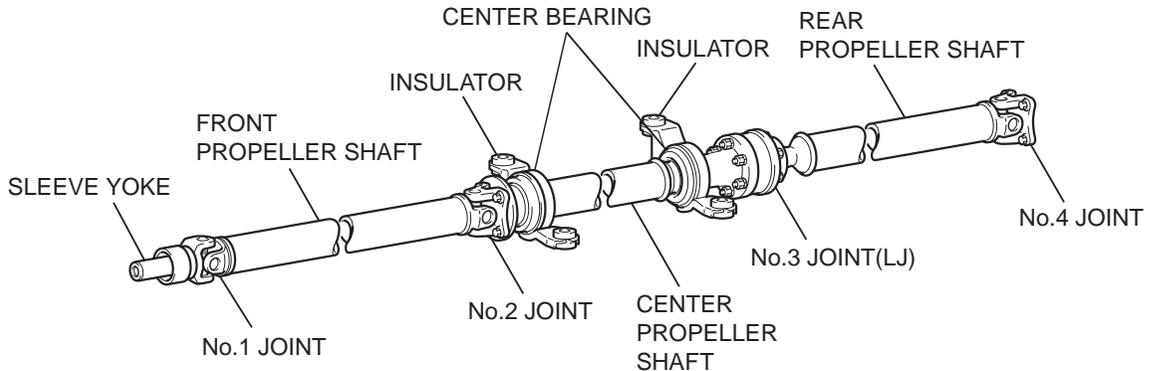
- The No.3 joint incorporates LJ, which is light and compact.
- An insulator is located at the center bearing to vehicle body joint, reducing vibration.

- For environmental protection, a lead-free grease is used on LJ and center bearing.

**NOTE:**

- *LJ: Löbro Joint*

## CONSTRUCTION DIAGRAM



AC211158 AB

# PROPELLER SHAFT DIAGNOSIS

## INTRODUCTION TO PROPELLER SHAFT DIAGNOSIS

M1251001800111

If an abnormal noise is heard from the propeller shaft while driving, some parts of the propeller shaft may be worn or damaged, or some mounting bolts may be loose.

## PROPELLER SHAFT DIAGNOSTIC TROUBLESHOOTING STRATEGY

M1251001900129

Use these steps to plan your diagnostic strategy. If you follow them carefully, you will be sure that you have exhausted all of the possible ways to find a propeller shaft fault.

1. Gather information from the customer.

2. Verify that the condition described by the customer exists.
3. Find the malfunction by following the Symptom Chart.
4. Verify malfunction is eliminated.

## SYMPTOM CHART

M1251002000107

SYMPTOM	INSPECTION PROCEDURE	REFERENCE PAGE
Noise at start	1	P.25-3
Noise and vibration at high speed	2	P.25-3

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## SYMPTOM PROCEDURES

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### INSPECTION PROCEDURE 1: Noise at Start

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#### DIAGNOSIS

**STEP 1. Check if the propeller shaft and differential companion flange connecting nuts and the center bearing mounting nuts are loose.**

Connecting nuts tightening torque:  $32 \pm 2$  N·m ( $24 \pm 1$  ft·lb)

Mounting nuts tightening torque:  $30 \pm 4$  N·m ( $22 \pm 3$  ft·lb)

**Q: Are the connecting nuts and mounting nuts tightened to the specified torque?**

**YES :** Go to Step 2.

**NO :** Tighten the connecting nuts and mounting nuts to the specified torque. Then go to Step 3.

**STEP 2. Check the sleeve yoke's spline of front propeller shaft for wear.**

**Q: Is wear apparent?**

**YES :** Replace the propeller shaft. Then go to Step 3.

**NO :** Go to Step 3.

**STEP 3. Retest the system.**

**Q: Is the abnormal noise eliminated?**

**YES :** The procedure is complete.

**NO :** Recheck from Step 1.

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### INSPECTION PROCEDURE 2: Noise and Vibration at High Speed

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#### DIAGNOSIS

**STEP 1. Check the propeller shaft run-out.**

1. Remove the propeller shaft. (Refer to [P.25-4.](#))

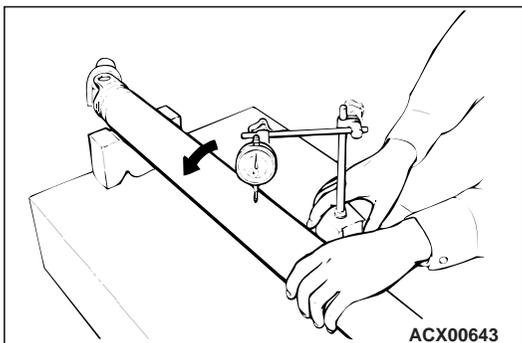
2. Measure the propeller shaft runout.

**Limit: 0.5 mm (0.02 inch)**

**Q: Is the measured value within the limit?**

**YES :** Go to Step 2.

**NO :** Replace the propeller shaft. Then go to Step 2.



**STEP 2. Retest the system.**

**Q: Is the abnormal noise eliminated?**

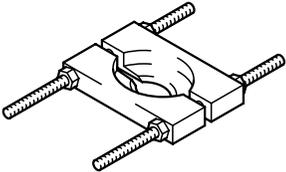
**YES :** The procedure is complete.

**NO :** Recheck from Step 1.

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**SPECIAL TOOL**

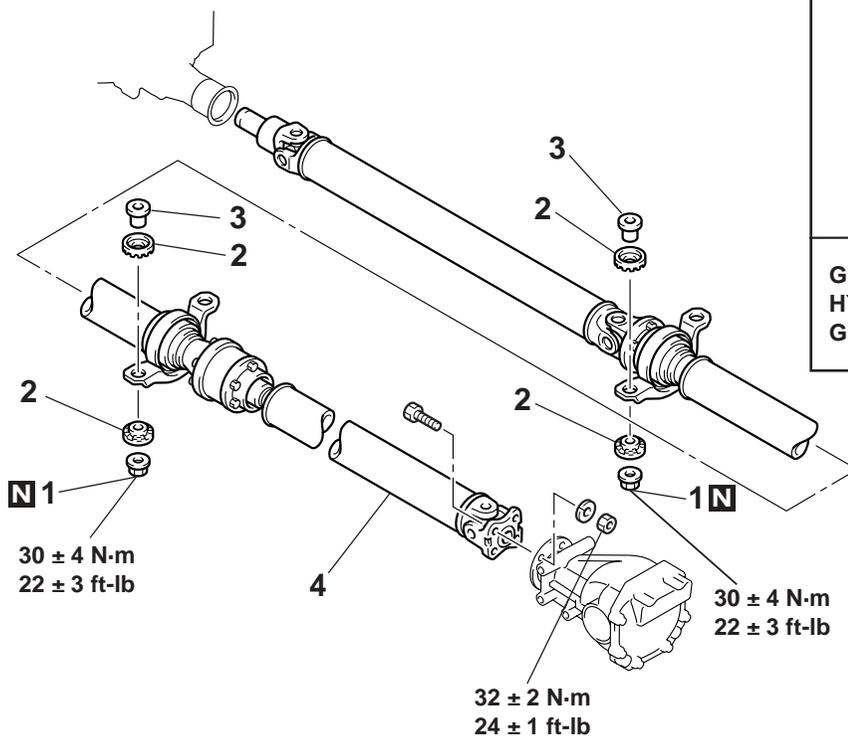
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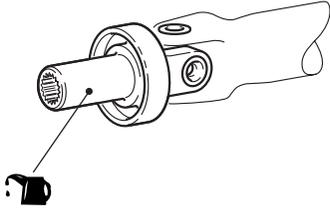
TOOL	TOOL NUMBER AND NAME	SUPERSESION	APPLICATION
	MD998801 Bearing remover	-	Removal of the center bearing assembly

**PROPELLER SHAFT**

**REMOVAL AND INSTALLATION**

M1251001000193





**GEAR OIL:**  
HYPOID GEAR OIL API CLASSIFICATION  
GL-5 OR HIGHER SAE VISCOSITY No.90

**REMOVAL STEPS**

1. SELF LOCKING NUT
2. INSULATOR

**REMOVAL STEPS (Continued)**

3. SPACER
4. PROPELLER SHAFT ASSEMBLY

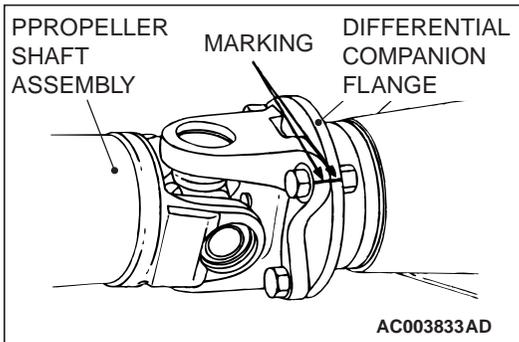
<<A>> >>A<<

AC211529AB

## REMOVAL SERVICE POINT

### <<A>> PROPELLER SHAFT ASSEMBLY REMOVAL

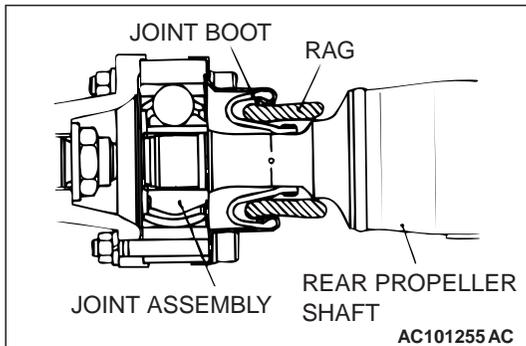
1. Make mating marks on the differential companion flange and the propeller shaft assembly.



#### **⚠ CAUTION**

Be careful not to bend the joint portion when removing the propeller shaft because this will damage to the joint boot.

2. Insert a rag so as to avoid boot damage, and remove the propeller shaft assembly in a straight and level manner.

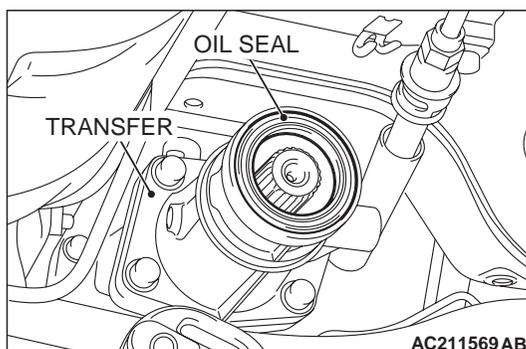


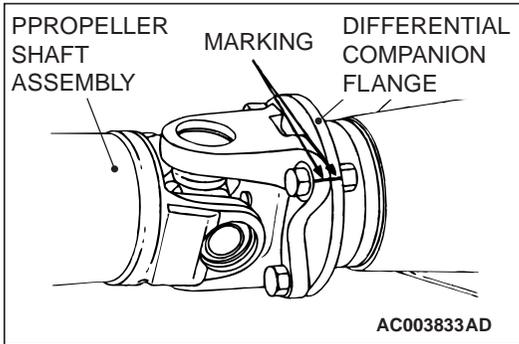
## INSTALLATION SERVICE POINT

### >>A<< PROPELLER SHAFT ASSEMBLY INSTALLATION

#### **⚠ CAUTION**

- Do not damage the oil seal lips on the transfer case.
- Remove oil and grease from the threads of the mounting bolts and nuts before tightening, or they will loosen.
- Be careful not to bend the joint portion when removing the propeller shaft, because this will damage the joint boot.





If reusing the propeller shaft, align the mating marks of differential companion flange and propeller shaft assembly to install.

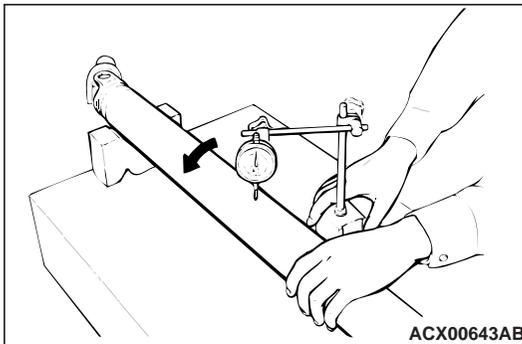
## INSPECTION

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- Check the sleeve yoke and flange yoke for wear, damage or cracks.
- Check the propeller shaft for bends, twisting or damage.
- Check the universal joint for smooth operation in all directions.
- Check the center bearing for smooth movement.

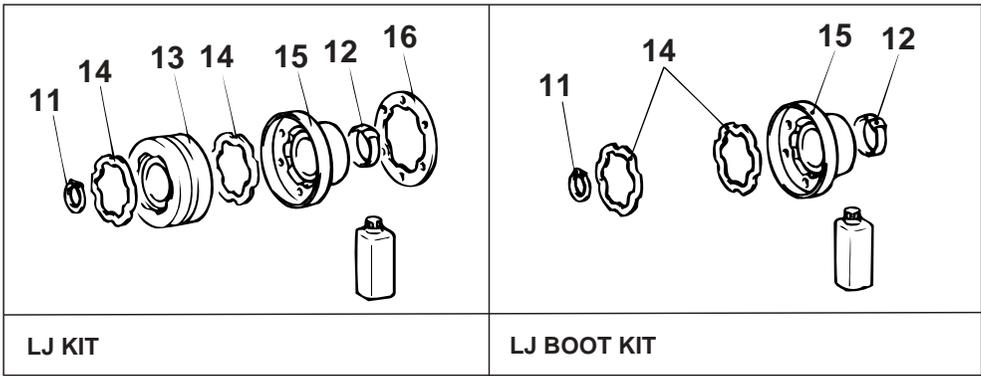
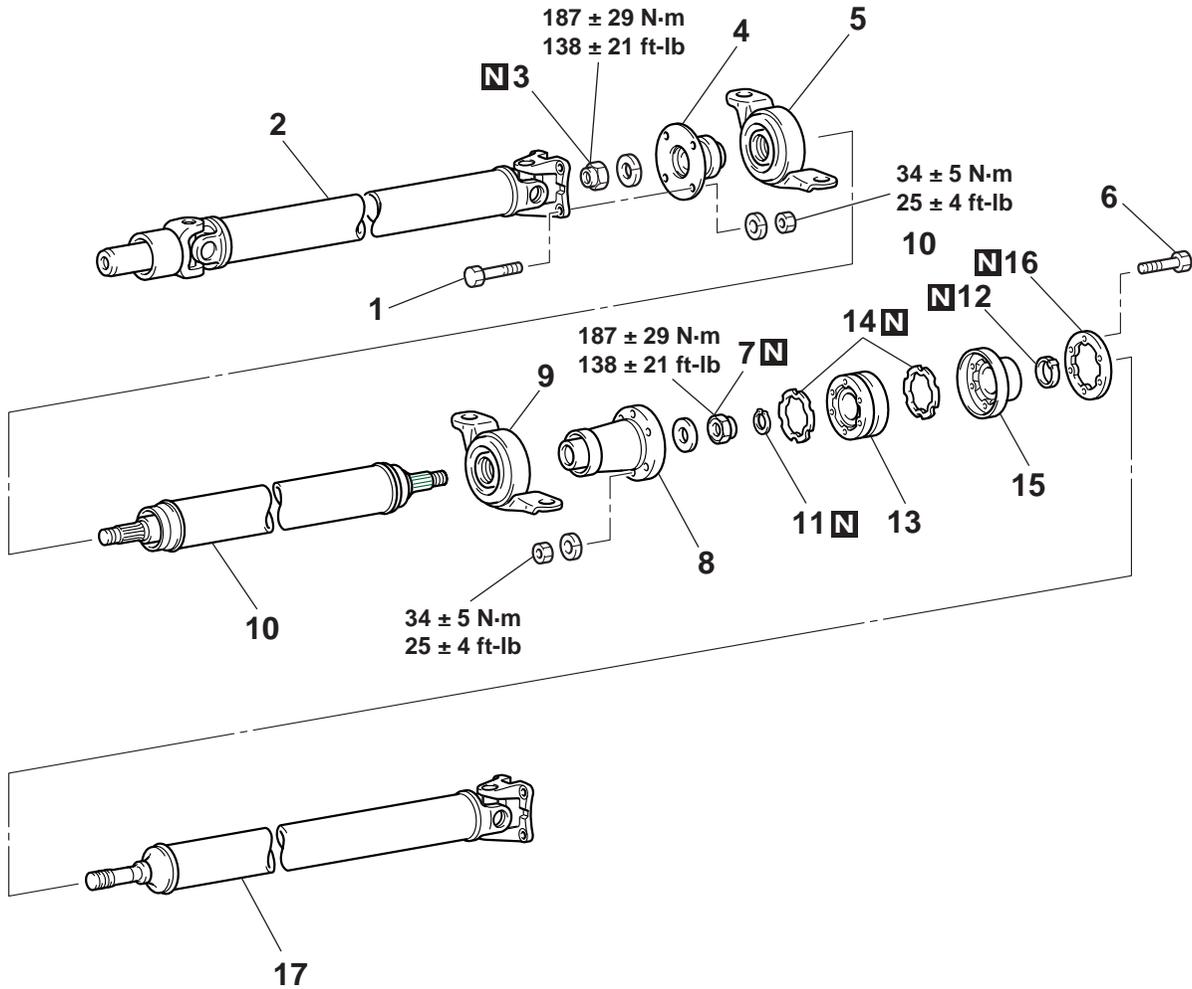
## PROPELLER SHAFT RUNOUT

Limit: 0.5 mm (0.02 inch)



DISASSEMBLY AND ASSEMBLY

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**DISASSEMBLY STEPS**

- 1. BOLT
- 2. FRONT PROPELLER SHAFT ASSEMBLY
- 3. SELF LOCKING NUT
- 4. COMPANION FLANGE
- 5. CENTER BEARING ASSEMBLY
- 6. BOLT
- 7. SELF LOCKING NUT

**DISASSEMBLY STEPS**

- 8. COMPANION FLANGE
- 9. CENTER BEARING ASSEMBLY
- 10. CENTER PROPELLER SHAFT
- 11. SNAP RING
- 12. BOOT BAND
- 13. LJ ASSEMBLY
- 14. RUBBER PACKING
- 15. LJ BOOT

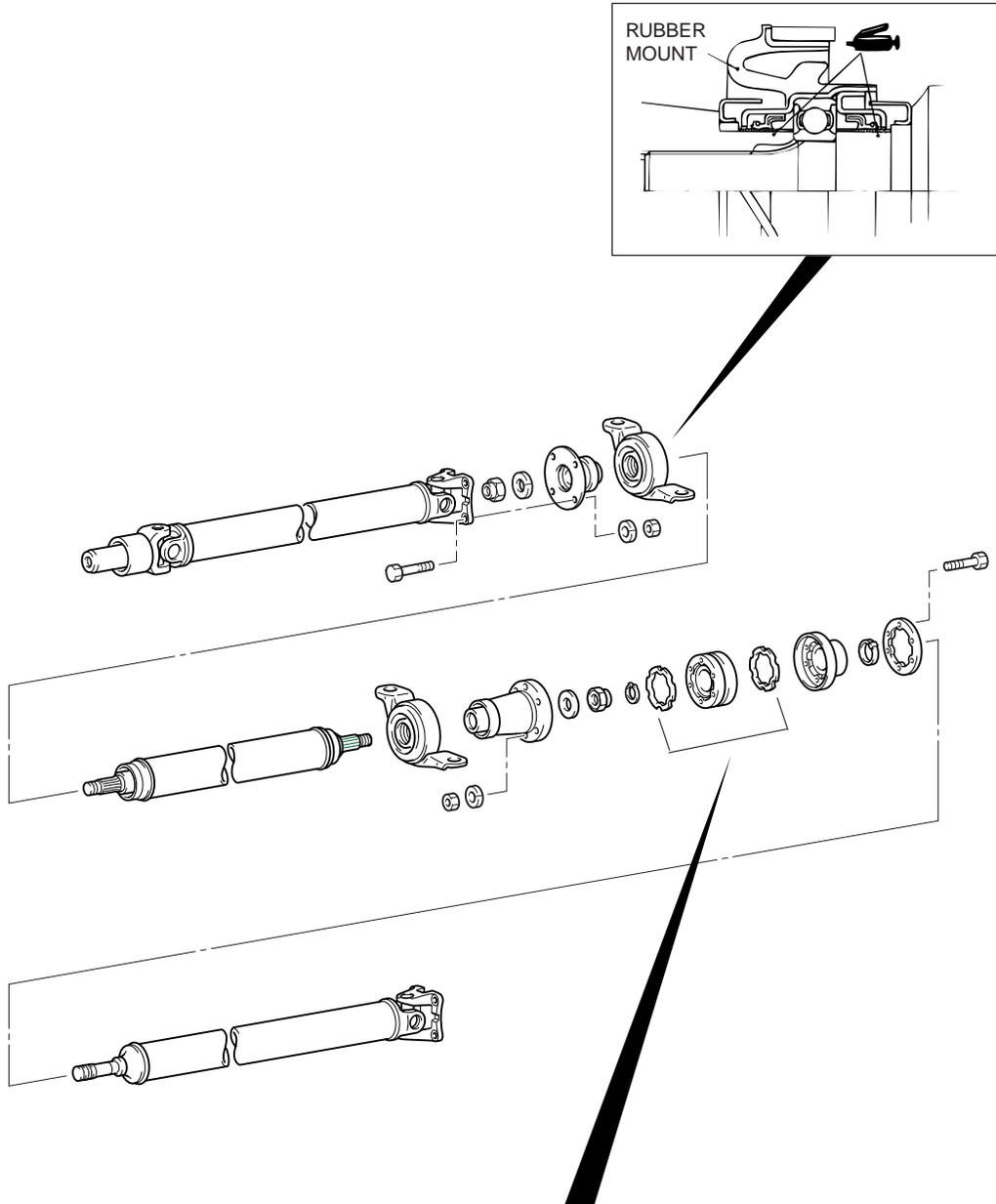
**DISASSEMBLY STEPS**

- 16. WASHER
- 17. REAR PROPELLER SHAFT

**Required Special Tool:**

- MD998801: Bearing Remover

**LUBRICATION AND ADHESIVE POINTS**

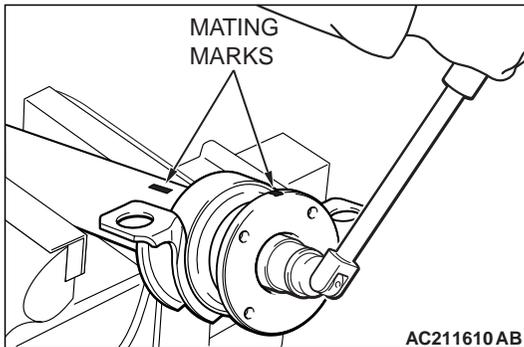


<p><b>GREASE: REPAIR KIT GREASE</b> <b>AMOUNT USED: 75 ± 5 g (2.6 ± 0.1 oz)</b></p>	<p><b>ADHESIVE:</b> <b>3M™ STUD LOCKING 8730,</b> <b>8731 OR EQUIVALENT</b></p>

## DISASSEMBLY SERVICE POINTS

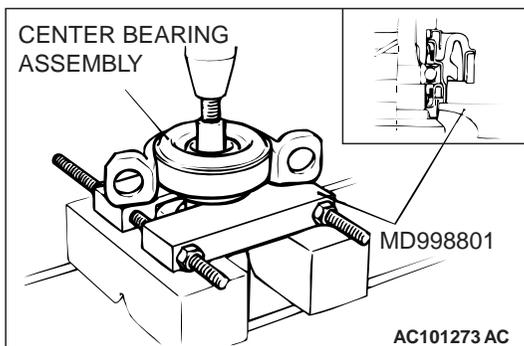
### <<A>> COMPANION FLANGE REMOVAL

Make mating marks on the companion flange and center propeller shaft. Then, remove the companion flange.



### <<B>> CENTER BEARING ASSEMBLY REMOVAL

Use special tool MD998801 to remove the center bearing assembly.

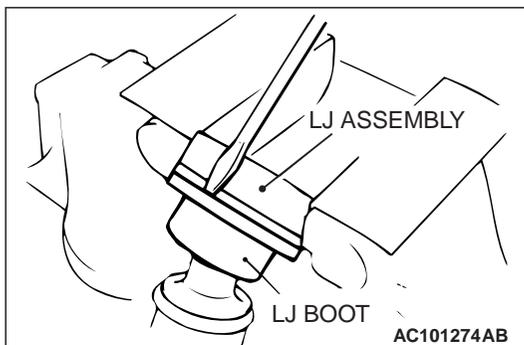


### <<C>> BOLT REMOVAL

Make mating marks on the rear propeller shaft, LJ assembly and companion flange. Then, remove the bolt.

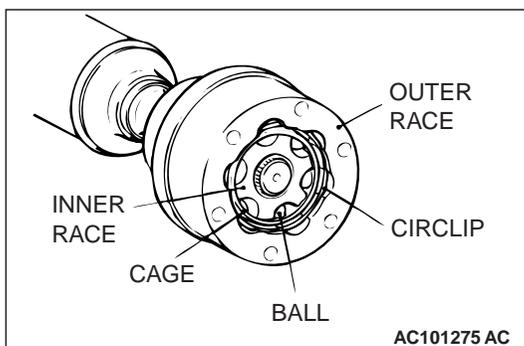
### <<D>> LJ ASSEMBLY REMOVAL

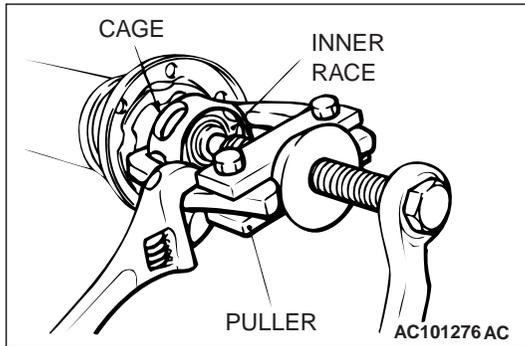
1. Remove the LJ boot from the LJ assembly.



2. Mark the mating marks in outer race, cage and inner race, then remove the circlip, outer race and ball.

*NOTE: Ensure the installation position of ball and keep the ball in order to refer in installation.*





3. Using puller (general service tool), remove the inner race and cage from the center propeller shaft assembly.
4. Wipe out grease on the outer race, inner race, cage and ball then clean.

#### <<E>> LJ BOOT REMOVAL

If LJ boot will be reused, tape the spline part of the center propeller shaft in order to remove the boot.

### ASSEMBLY SERVICE POINTS

#### >>A<< LJ BOOT INSTALLATION

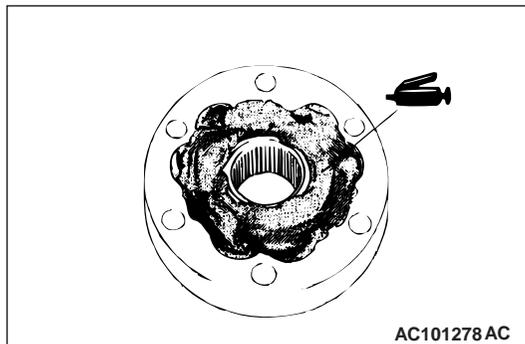
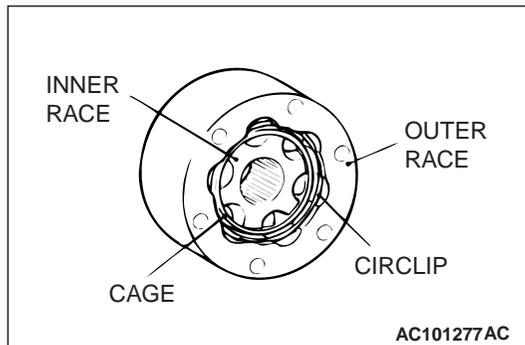
1. Install the boot band.
2. After taping the spline part of the center propeller shaft, install the LJ boot.

#### >>B<< LJ ASSEMBLY INSTALLATION

1. Lubricate the specific grease to ball moving part of the outer race and inner race.

**Specified grease: Repair kit grease**

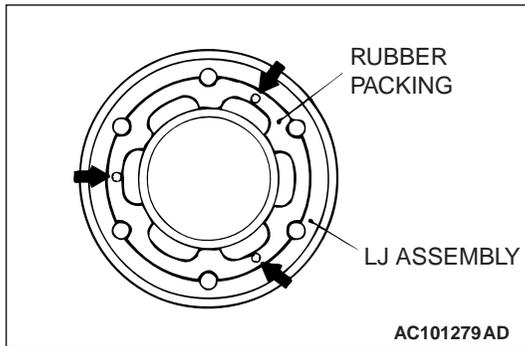
2. Assemble the LJ in the following step.
  - (1) Suit the mating marks and install the outer race, cage, ball and inner race.
  - (2) Install the circlip.



3. Fill the specified grease evenly in LJ assembly.

**Specified grease: Repair kit grease**

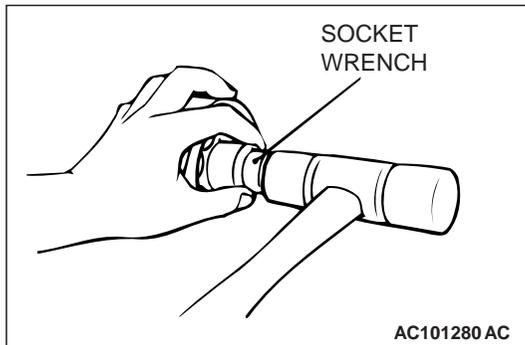
**Amount to use: 75 ± 5 g (2.6 ± 0.1 ounces)**



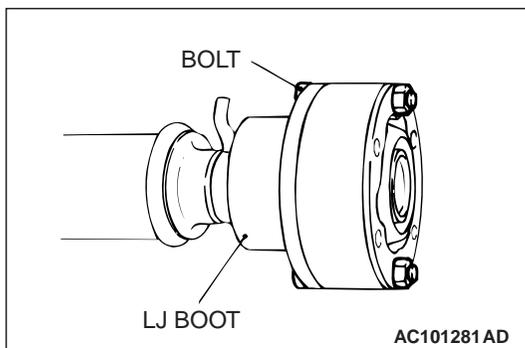
4. Apply a little specific sealant to the surface which has groove (for packing) of LJ assembly (allows shown in the illustration), fix the rubber packing.

**Specified sealant: 3M™ stud locking 8730, 8731 or equivalent**

5. Install the surface which has groove (for packing) of LJ assembly to LJ boot side.



6. Align the mating marks of LJ assembly and center propeller shaft, then punch the LJ assembly to center propeller shaft using socket wrench.



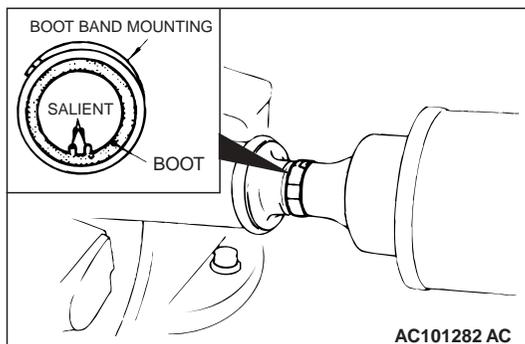
7. Aligned the position of bolt holes of LJ boot and LJ assembly, install the LJ boot to LJ assembly.

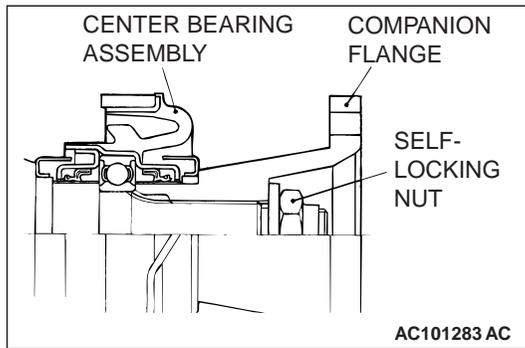
8. Fix the rubber packing of companion flange side in a similar to step 4.

### >>C<< BOOT BAND INSTALLATION

#### **⚠ CAUTION**

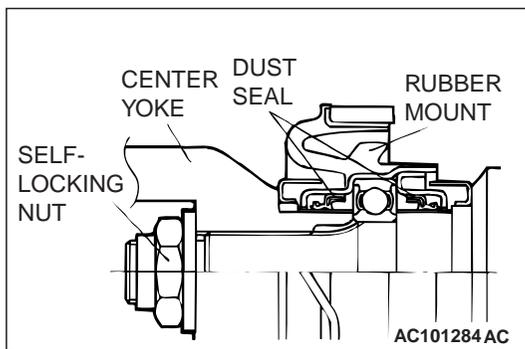
- Tighten the boot part in opposite direction of convex part for bleeding the boot.
- If there is grease in the convex part, wipe out the grease in order to bleed the boot.





### >>D<< CENTER BEARING ASSEMBLY/COMPANION FLANGE/SELF LOCKING NUT INSTALLATION

1. Install the center bearing assembly to the center propeller shaft in the direction shown as the illustration.
2. After aligning the mating marks of the companion flange and center propeller shaft, install them.
3. Tightening the self locking nut, press fit the center bearing assembly using companion flange.



### >>E<< CENTER BEARING ASSEMBLY/COMPANION FLANGE/SELF LOCKING NUT INSTALLATION

1. Install the center bearing assembly to the center propeller shaft in the direction shown as the illustration.
2. After aligning the mating marks of the companion flange and center propeller shaft, install them.
3. Tightening the self locking nut, press fit the center bearing assembly using companion flange.

## SPECIFICATIONS

### FASTENER TIGHTENING SPECIFICATIONS

M1251001600117

ITEM	SPECIFICATION
Center bearing assembly nut	30 ± 4 N·m (22 ± 3 ft-lb)
Companion flange to front propeller shaft connecting nut	34 ± 5 N·m (25 ± 4 ft-lb)
Companion flange, LJ assembly, LJ boot and washer connecting nut	34 ± 5 N·m (25 ± 4 ft-lb)
Propeller shaft and differential companion flange connecting nut	32 ± 2 N·m (24 ± 1 ft-lb)
Self locking nut (companion flange to front and center propeller shaft connection)	187 ± 29 N·m (138 ± 21 ft-lb)

### GENERAL SPECIFICATIONS

M1251000200127

ITEM	SPECIFICATION		
Propeller shaft	Type	3 way split 4-joint type propeller shaft	
	Length* × Outside diameter mm (in)	Front	608.5 x 65 (24.0 x 2.56)
		Center	551 x 65 (21.7 x 2.56)
		Rear	750.5 x 65 (29.5 x 2.56)
Universal joint	Type	No.1	Cross type (cauking method)
		No.2	Cross type (cauking method)
		No.3	Constant velocity type (LJ)
		No.4	Cross type (cauking method)
	Cross type joint	Bearing	Non-lubrication type needle roller bearing
		Journal diameter mm (in)	16.3 (0.64)

NOTE: \*: The propeller shaft length indicates the length between the center points of each joint.

### SERVICE SPECIFICATION

M1251000300168

ITEM	STANDARD VALUE	LIMIT
Propeller shaft run-out mm (in)	–	0.5 (0.02)

### LUBRICANTS

M1251000400187

ITEM	SPECIFIED LUBRICANT	QUANTITY
Front propeller shaft sleeve yoke	Hypoid gear oil API classification GL-5 or higher SAE viscosity 90	As required
LJ assembly	Repair kit greases	75 ± 5 g (2.6 ± 0.1 oz)

### SEALANT

M1251000500087

ITEM	SPECIFIED SEALANT	QUANTITY
LJ assembly rubber packing	3M™ Stud Locking 8730, 8731 or equivalent	As required

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## NOTES