GROUP 25 INDEX

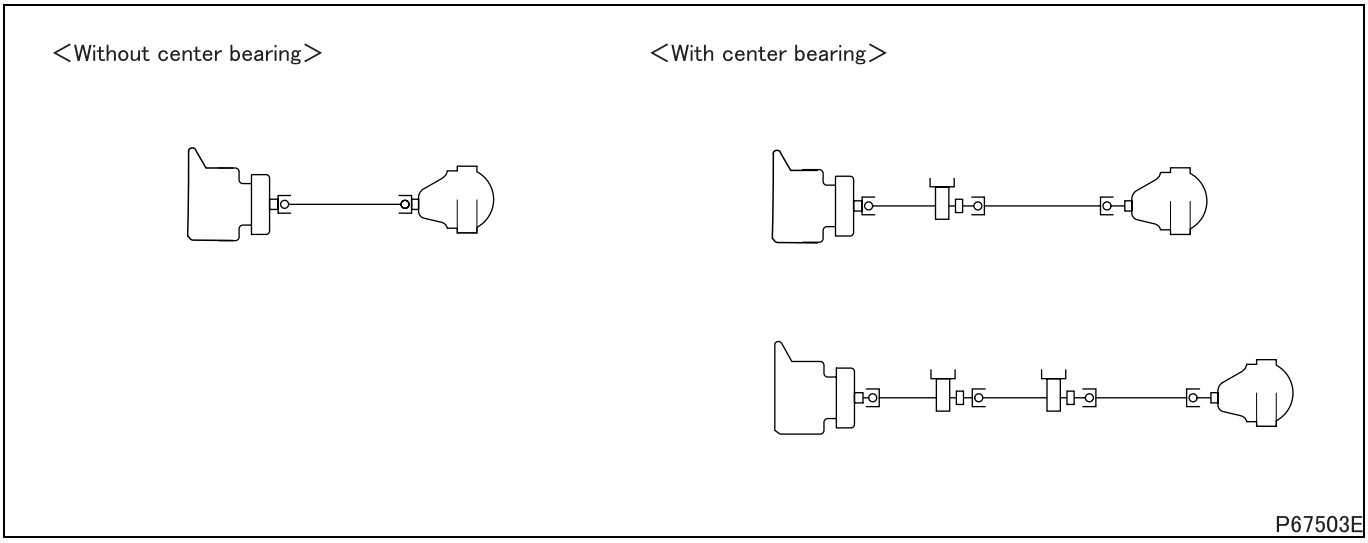
SPECIFICATIONS / STRUCTURE AND OPERATION

SPECIFICATIONS

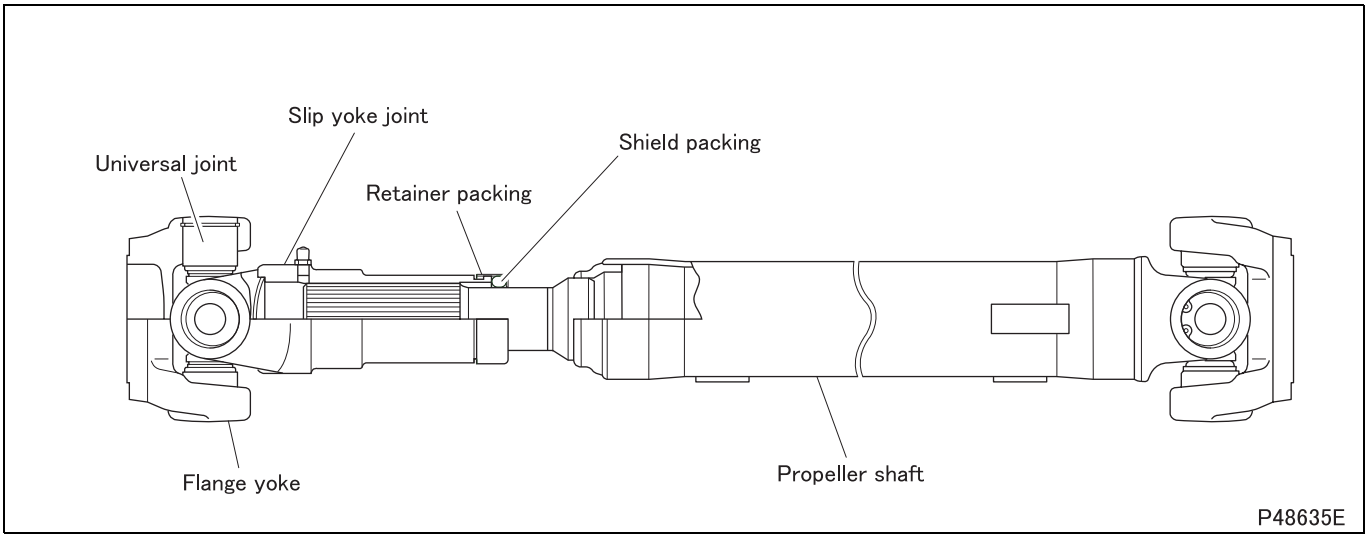
Item		Specifications
Propeller shaft (driveshaft)	Model	P3

STRUCTURE AND OPERATION

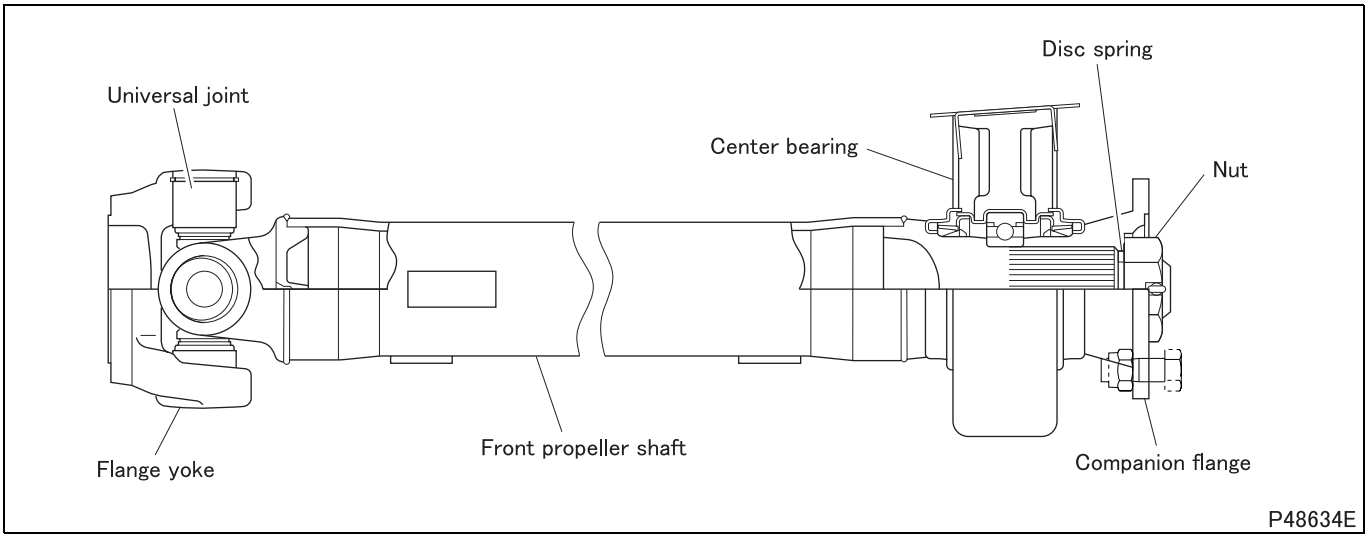
1. Configuration of Propeller Shaft (Driveshaft) Connection



2. Propeller Shaft <Without Center (Midship) Bearing>



3. Propeller Shaft <With Center (Midship) Bearing>

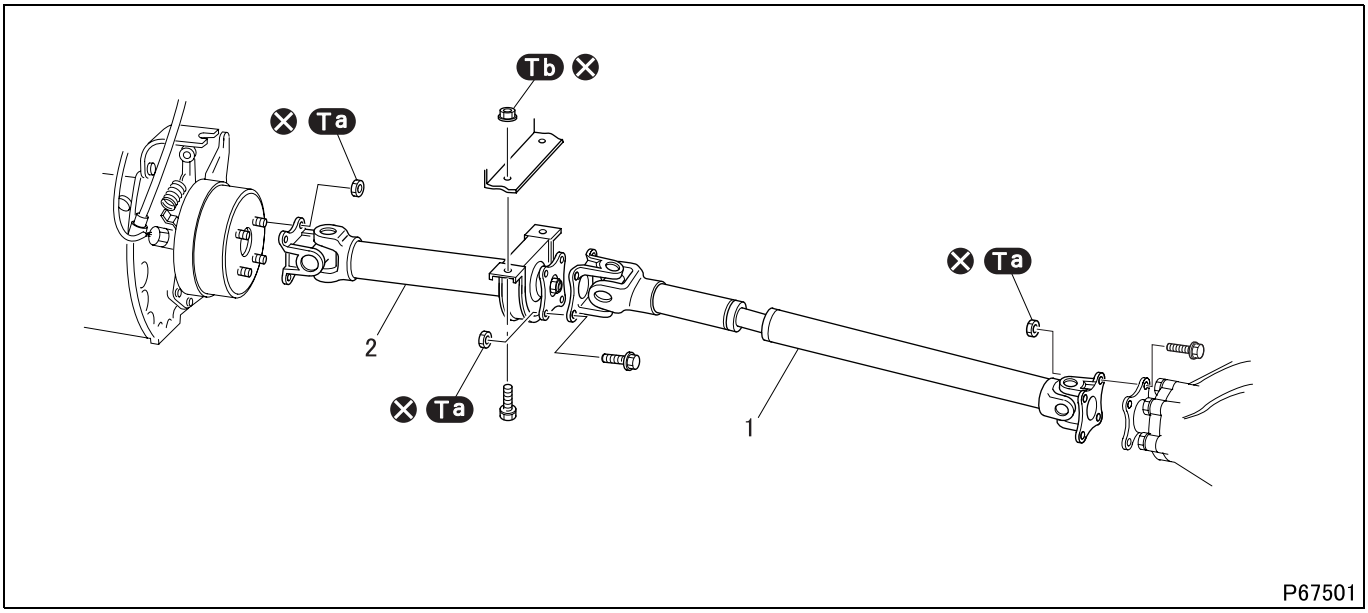


TROUBLESHOOTING

Symptoms / Possible causes		Propeller shaft vibrates		Abnormal noise from propeller shaft	
		Vibration at high speed	Vibration at low speed	Abnormal noise at acceleration from zero or at coasting	Abnormal noise at normal running
Wrong combination of flange yoke directions		O			
Slip yoke joint	Insufficient grease				O
	Excessive play at spline		O	O	
Universal joint	Excessive clearance in axial direction of spider shaft		O		O
	Insufficient grease on needle bearing				O
	Worn out needle bearing	O		O	O
Center bearing	Insufficient grease				O
	Seizure, wear or improper rotation	O			O
	Deteriorated or deformed cushion rubber			O	
	Loose hanger mounting bolt			O	
Propeller shaft	Loose mounting bolts	O		O	
	Bent	O			
	Dynamic balance improper	O			
T/M in high speed gear			O		

M E M O

REMOVAL AND INSTALLATION OF PROPELLER SHAFT <BETWEEN T/M AND REAR AXLE>



● Removal sequence

1 Propeller shaft <Without center (midship) bearing> (see later section)
2 Propeller shaft <With center (midship) bearing> (see later section)

⊗: Non-reusable parts

CAUTION ⚠

- **Chock the tires fore and aft to prevent the vehicle from moving.**
- **Do not remove the chocks until the entire operation is completed.**

● Installation sequence

Follow the removal sequence in reverse.

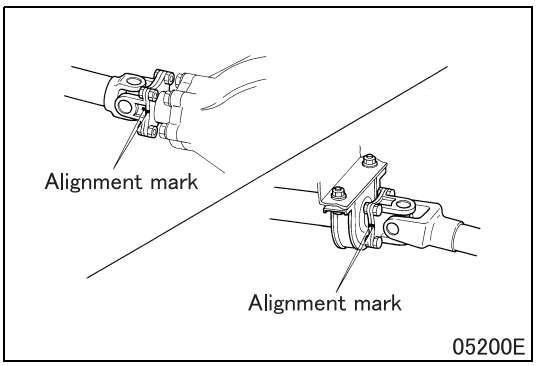
Service standards

Location	Maintenance item	Standard value	Limit	Remedy
1	Permissible amount of imbalance for propeller shaft <Without center bearing>	10 g (0.35 oz} max./3000 rpm (periphery of pipe portion of shaft)	–	Adjust
2	Permissible amount of imbalance for propeller shaft <With center bearing>	5 g (0.18 oz} max./3000 rpm (periphery of pipe portion of shaft)	–	Adjust

Torque: N·m (lbf·ft)

ID	Fastener	Value	Remarks
Ta	Nut (propeller shaft mounting)	100 to 120 (74 to 89)	–
Tb	Nut (front propeller shaft bracket mounting)	47 to 65 (35 to 48)	–

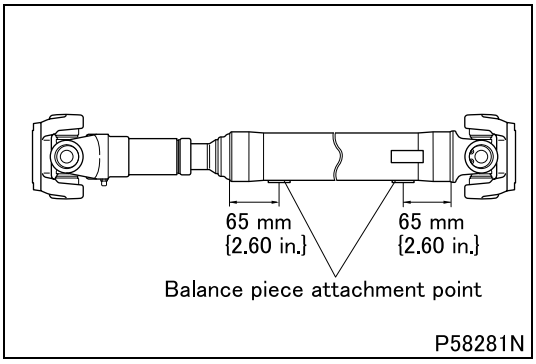
◆Work before removal◆



■ Alignment mark: Propeller shaft

- Before removing the U-joints, make alignment marks on the end yokes for ease of installation.

◆Inspection procedure◆



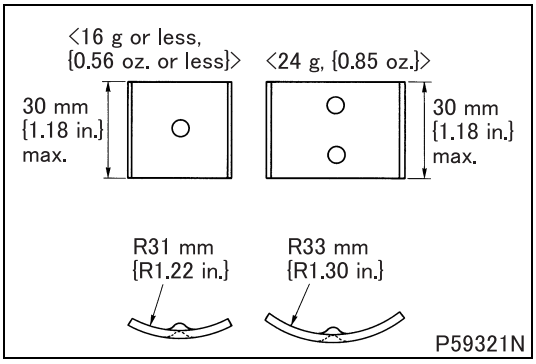
■ Inspection: Propeller shaft <Without center bearing>

[Inspection]

- Measure the amount of dynamic balance on a balancing machine.
- If the measured value exceeds the standard value, make adjustment as follows.

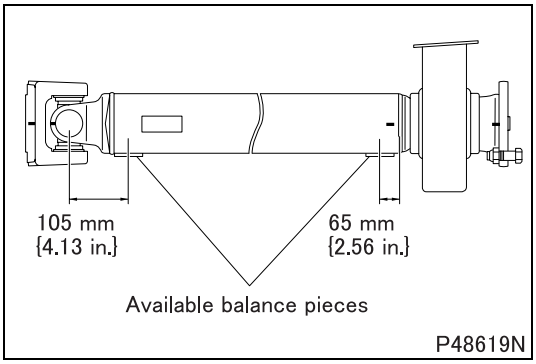
[Adjustment]

- Attach appropriate balance pieces (shims) at the illustrated points to reduce the imbalance to within the standard range.
- Maximum allowance for one point is 3.53 oz (100 g).
- Use a combination that keeps the number of balance pieces to a minimum.



Available balance pieces (shims)

Mass
2 g (0.07 oz)
4 g (0.14 oz)
6 g (0.21 oz)
8 g (0.28 oz)
10 g (0.35 oz)
12 g (0.42 oz)
16 g (0.56 oz)
24 g (0.85 oz)



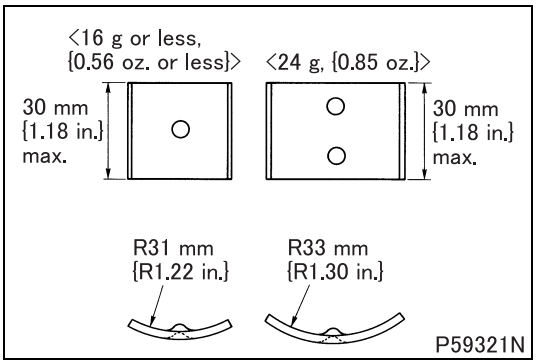
■ **Inspection: Propeller shaft <With center bearing>**

[Inspection]

- Measure the amount of dynamic balance on a balancing machine.
- If the measured value exceeds the standard value, make adjustment as follows.

[Adjustment]

- Attach appropriate balance pieces (shims) at the illustrated points to reduce the imbalance to within the standard range.
- Maximum allowance for one point is 100 g {3.53 oz}.
- Use a combination that keeps the number of balance pieces to a minimum.



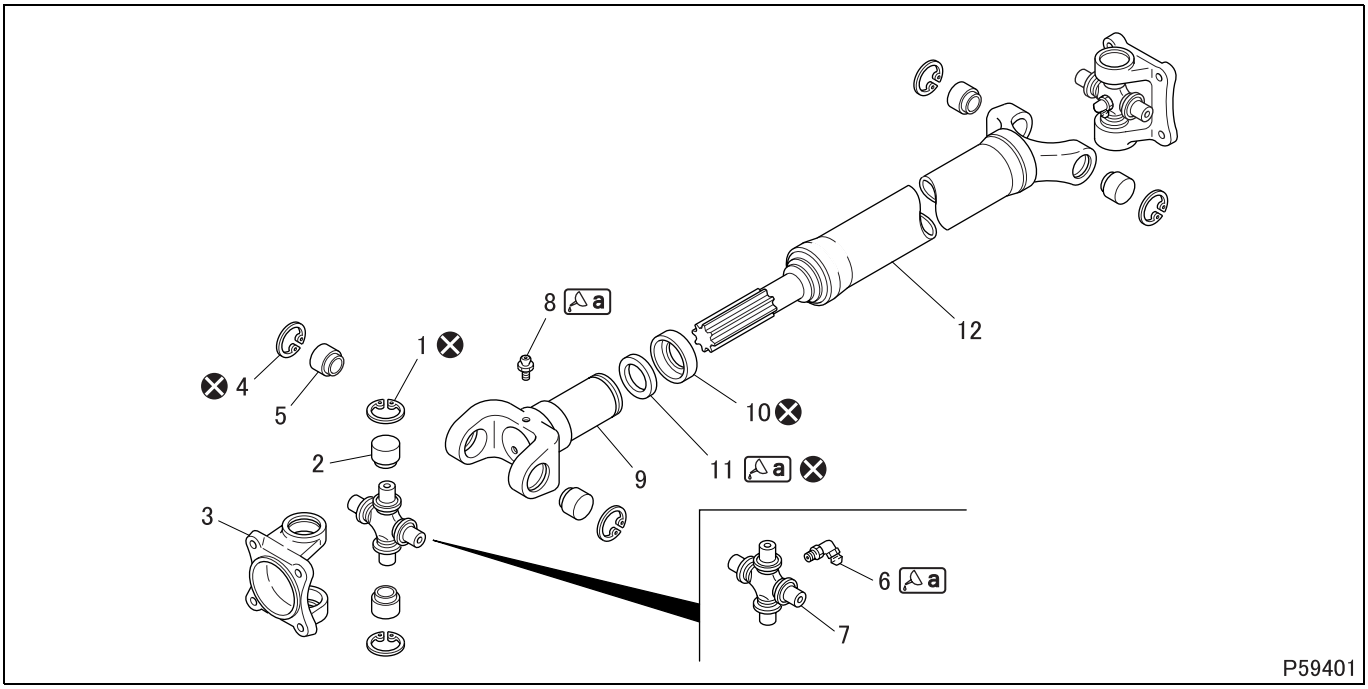
Available balance pieces (shims)

Mass
2 g (0.07 oz)
4 g (0.14 oz)
6 g (0.21 oz)
8 g (0.28 oz)
10 g (0.35 oz)
12 g (0.42 oz)
16 g (0.56 oz)
24 g (0.85 oz)

M E M O

PROPELLER SHAFT

<Without center bearing>



● Disassembly sequence

1 Snap ring
2 Needle bearing
3 Flange yoke
4 Snap ring
5 Needle bearing
6 Grease fitting
7 Spider
8 Grease fitting
9 Slip yoke joint
10 Retainer packing
11 Shield packing
12 Propeller shaft (driveshaft)

⊗: Non-reusable parts

● Assembly sequence

Follow the disassembly sequence in reverse, excepting:
12→10→11→9

Repair kit: Universal joint spider kit

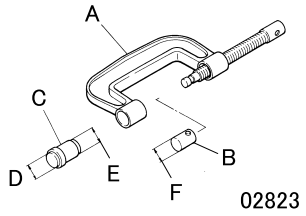
Service standards: mm (in)

Location	Maintenance item	Standard value	Limit	Remedy
–	Axial clearance of spider	0 to 0.06 (0 to 0.0024)	–	Adjust
2, 3	Clearance between needle bearing and flange yoke	0.008 to –0.033 (0.00031 to –0.0013) "–" means interference	0.1 (0.004)	Replace
2, 5, 6	Play between needle bearing and spider	0.01 to 0.06 (0.0004 to 0.0024)	0.1 (0.004)	Replace
5, 9	Clearance between needle bearing and slip joint	0.008 to –0.033 (0.00031 to –0.0013) "–" means interference	0.1 (0.004)	Replace
9, 12	Play in direction of rotation between the slip yoke joint and the propeller shaft spline	0.01 to 0.09 (0.00039 to 0.0035)	0.3 (0.012)	Replace
	Play in the opposite direction between the slip yoke joint and the propeller shaft spline	0.02 to 0.16 (0.0008 to 0.0063)	0.3 (0.012)	Replace
12	Bend of propeller shaft	–	0.4 (0.016)	Correct or replace

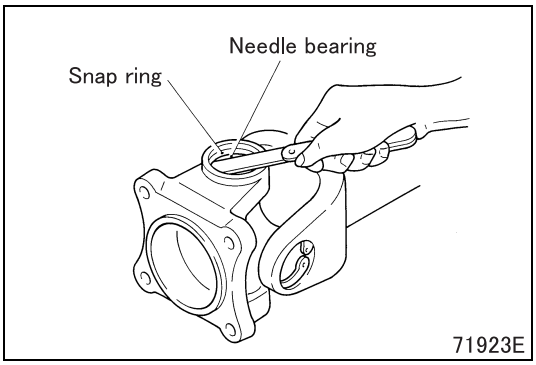
Lubricant and/or sealant

ID	Points of application	Specified lubricant and/or sealant	Quantity
a	Supply through grease fitting	Wheel bearing grease [NGLI No. 2 (Li soap)]	As required
	Lips of shield packing		

Special tools: mm (in)

ID	Tool name and shape	Part No.	Application
a	Universal joint tool set **A:** Yoke assembly **B:** Push rod **C:** Guide **D** ϕ29 {1.14}, **E** ϕ29 {1.14}, **F** ϕ27.7 {1.09} 	MB999024 A: MB999025 B: MB999026 C: MB999010	Removal and installation of needle bearing

◆Work before removal◆

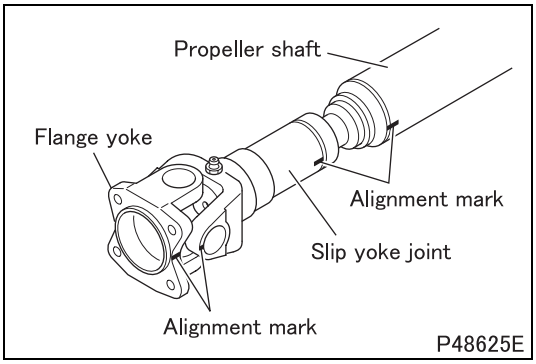


■ Inspection: Axial clearance of spider

- Press down on the needle bearing, and measure clearance between the snap ring and the needle bearing.
- If the measured value exceeds the standard value, correct by changing the snap ring thickness.
  To adjust, use snap rings for both ends with the same thickness. If necessary, use the table below to select the best combination of snap rings.

Table of snap rings (solid line indicates best combination)

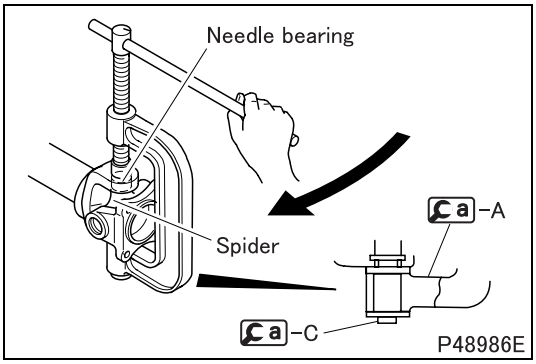
Thickness	Identification color	Combination	Thickness	Identification color
0.059 in (1.49 mm)	None		0.059 in (1.49 mm)	None
0.060 in (1.52mm)	Black		0.060 in (1.52mm)	Black
0.061 in (1.55 mm)	Blue		0.061 in (1.55 mm)	Blue
0.062 in (1.58 mm)	Yellow		0.062 in (1.58 mm)	Yellow
0.063 in (1.61 mm)	Purple		0.063 in (1.61 mm)	Purple
0.065 in (1.64 mm)	None		0.065 in (1.64 mm)	None
0.066 in (1.67 mm)	Black		0.066 in (1.67 mm)	Black
0.067 in (1.70 mm)	Blue		0.067 in (1.70 mm)	Blue



■ **Alignment mark: Propeller shaft**

- For ease of installation, make alignment marks on the flange yoke, slip yoke joint, and propeller shaft.

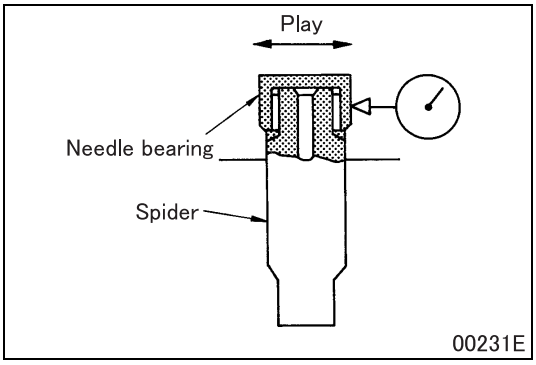
◆Removal procedure◆



■ **Removal: Needle bearing**

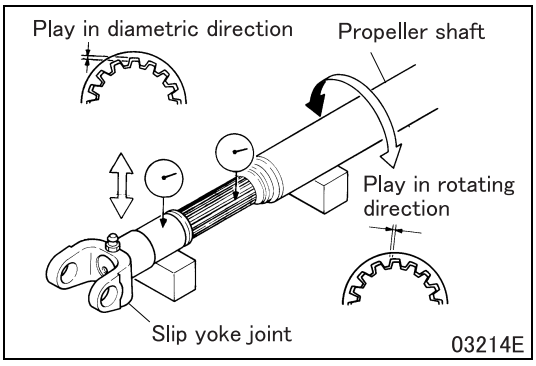
- Fit the needle bearing guide Ca **-C** into the yoke assembly Ca **-A** from outside.
- Applying the needle bearing guide Ca **-C** to the spider, operate the yoke assembly Ca **-A** to force out the spider and remove the needle bearing.

◆Inspection procedure◆



■ **Inspection: Clearance between needle bearing and spider**

- If the clearance is above the limit, replace the needle bearing out of the universal joint spider kit.

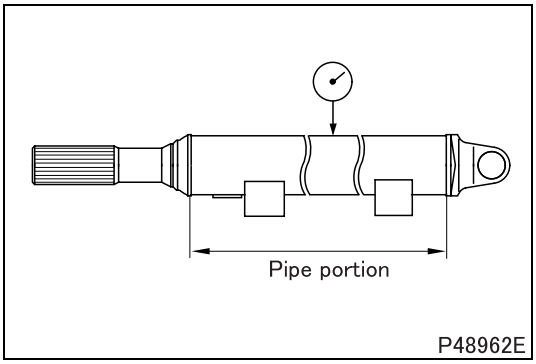


■ **Inspection: Play between slip yoke joint and propeller shaft spline**

- Check the following, and if the measurement is higher than the limit, replace the faulty part.

(1) Play of spline in the direction of rotation

(2) Play of spline in the opposite direction



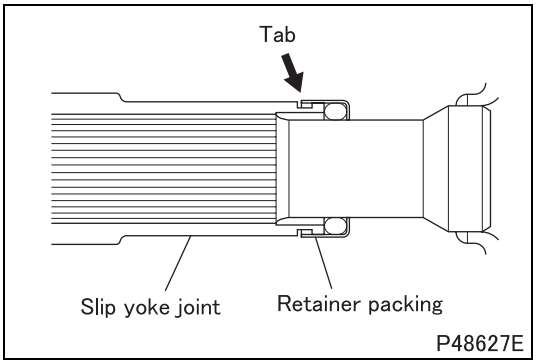
■ **Inspection: Bend in propeller shaft**

- Measure the bend in the propeller shaft at the center of its pipe portion.
- If the measurement is higher than the limit, correct the bend with a press or replace the propeller shaft.

NOTE

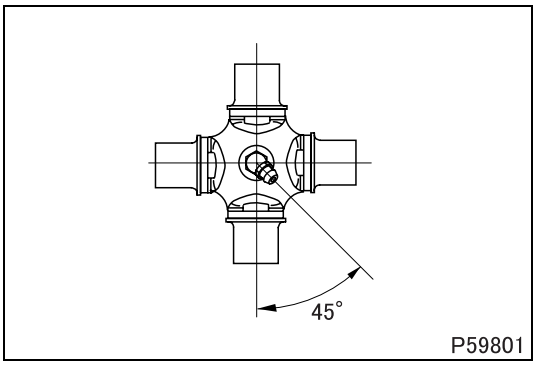
- **To measure the bend in the propeller shaft, turn it fully once and read the dial gauge indicator. The bend is one-half of the indicated value.**
- **Check the propeller shaft for cracks in the welded area after using a press to correct the bend. If cracks are found, replace the propeller shaft.**

◆Installation procedure◆



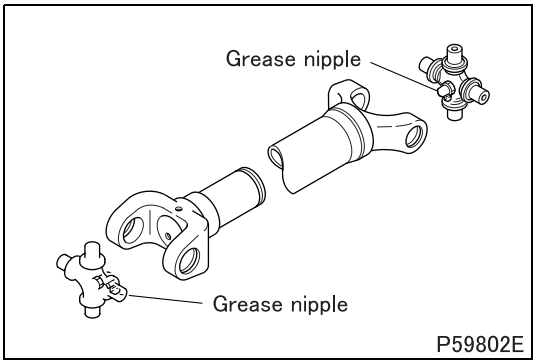
■ **Installation: Retainer packing**

- Hold the retainer packing against the slip yoke joint and caulk the tabs (at eight places).

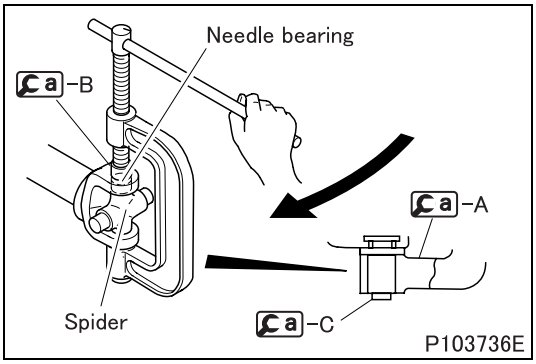


■ **Installation: Spider**

- Install the grease fitting on the spider at the angle shown in the illustration.



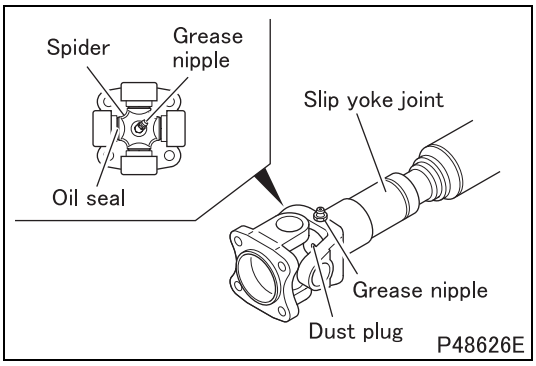
- Install the spiders on the both ends of propeller shaft. so that the direction of grease fittings must be the same.



■ **Installation: Needle bearing**

- Fit the needle bearing guide Ca**-C** into the yoke assembly Ca**-A** from inside.
- Operating the yoke assembly Ca**-A**, install the needle bearing.

◆Work after installation◆



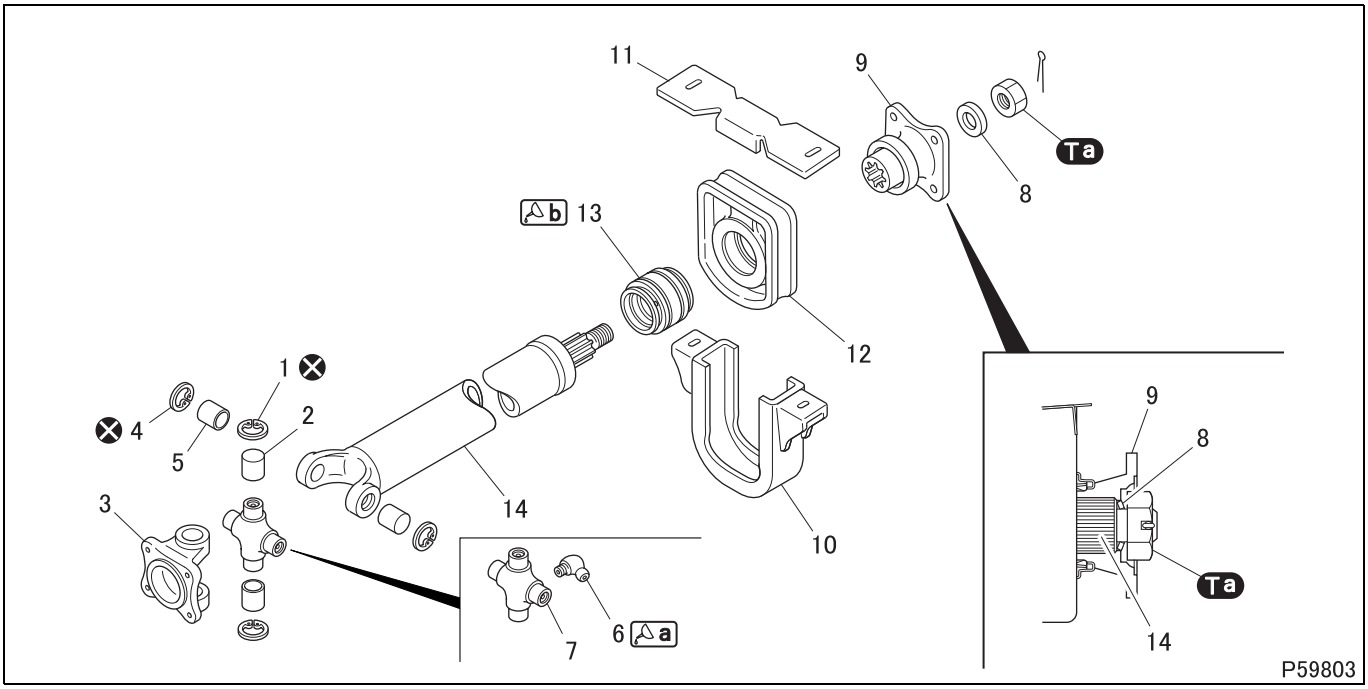
■ **Lubrication: Grease fittings**

- Add grease through the grease fitting until clean grease overflows from the oil seal of the spider.
- Add grease through the grease fitting until clean grease overflows from the hole in the dust plug of the slip yoke joint.

M E M O

PROPELLER SHAFT

<With center (midship) bearing>



● Disassembly sequence

1 Snap ring, spider
2 Needle bearing
3 Flange yoke
4 Snap ring, end yoke
5 Needle bearing
6 Grease fitting
7 Spider
8 Washer
9 Companion flange
10 Center bearing bracket
11 Center bearing hanger
12 Center bearing housing
13 Center (midship) bearing
14 Propeller shaft (driveshaft)

⊗: Non-reusable parts

● Assembly sequence

Follow the disassembly sequence in reverse.

Repair kit: Universal joint spider kit

Service standards: mm (in)

Location	Maintenance item	Standard value	Limit	Remedy
–	Axial clearance of spider	0 to 0.06 {0 to 0.0024}	–	Adjust
2, 3	Clearance between needle bearing and flange yoke	0.008 to –0.033 {0.00031 to –0.0013} "–" means interference.	0.1 {0.0039}	Replace
2, 5, 6	Play between needle bearing and spider	0.01 to 0.06 {0.00039 to 0.0024}	0.1 {0.0039}	Replace
5, 14	Clearance between needle bearing and propeller shaft	0.008 to –0.033 {0.00031 to –0.0013} "–" means interference.	0.1 {0.0039}	Replace
14	Bend of propeller shaft	–	0.4 {0.016}	Correct or replace

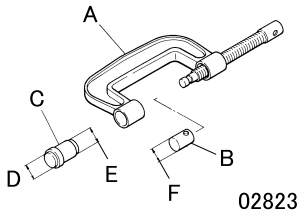
Torque: N·m (lbf·ft)

ID	Fastener	Value	Remarks
Ta	Nut (companion flange mounting)	290 to 390 (215 to 285)	–

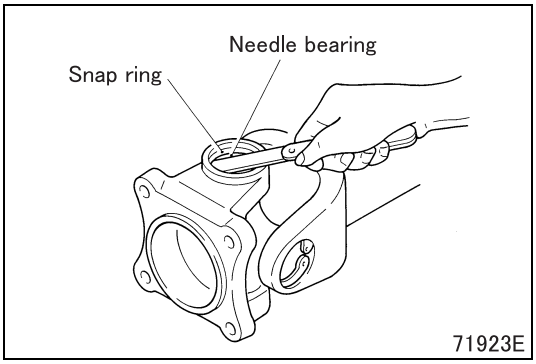
Lubricant and/or sealant

ID	Points of application	Specified lubricant and/or sealant	Quantity
a	Supply through grease fitting	Wheel bearing grease [NLGI No. 2 (Li soap)]	As required
b	Fill space in center bearing housing	Heat-resisting grease [NLGI No. 3]	70 to 100% of space capacity: 0.71 to 1.0 oz (20 to 29 g)
	Lips of the center bearing seal		As required

Special tools: mm (in)

ID	Tool name and shape	Part No.	Application
a	Universal joint tool set **A:** Yoke assembly **B:** Push rod **C:** Guide D: ϕ29 {1.14}, E: ϕ29 {1.14}, F: ϕ27.7 {1.09} 	MB999024 A: MB999025 B: MB999026 C: MB999010	Removal and installation of needle bearing

◆Work before removal◆

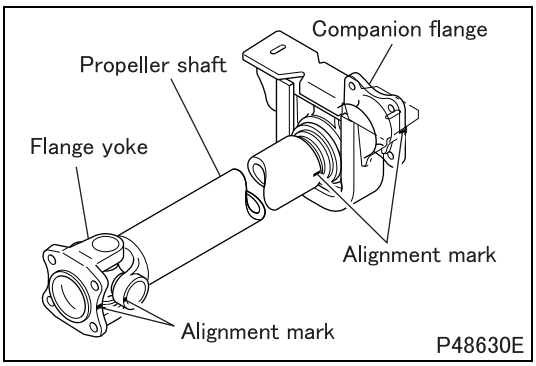


■ Inspection: Axial clearance of spider

- Press down on the needle bearing, and measure clearance between the snap ring and the needle bearing.
- If the measured value exceeds the standard value, correct by changing the snap ring thickness.
  To adjust, use snap rings for both ends with the same thickness. If necessary, use the table below to select the best combination of snap rings.

Table of snap rings (solid line indicates best combination).

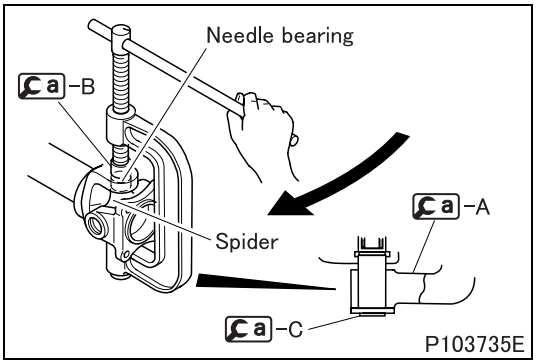
Thickness	Identification color	Combination	Thickness	Identification color
0.059 in (1.49 mm)	None		0.059 in (1.49 mm)	None
0.060 in (1.52mm)	Black		0.060 in (1.52mm)	Black
0.061 in (1.55 mm)	Blue		0.061 in (1.55 mm)	Blue
0.062 in (1.58 mm)	Yellow		0.062 in (1.58 mm)	Yellow
0.063 in (1.61 mm)	Purple		0.063 in (1.61 mm)	Purple
0.065 in (1.64 mm)	None		0.065 in (1.64 mm)	None
0.066 in (1.67 mm)	Black		0.066 in (1.67 mm)	Black
0.067 in (1.70 mm)	Blue		0.067 in (1.70 mm)	Blue



■ **Alignment mark: Propeller shaft**

- For ease of installation, make alignment marks on the flange yoke, companion flange and propeller shaft.

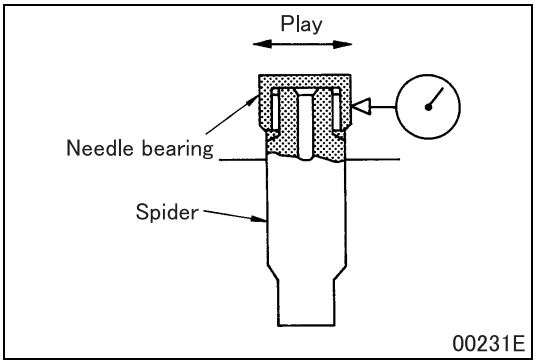
◆Removal procedure◆



■ **Removal: Needle bearing**

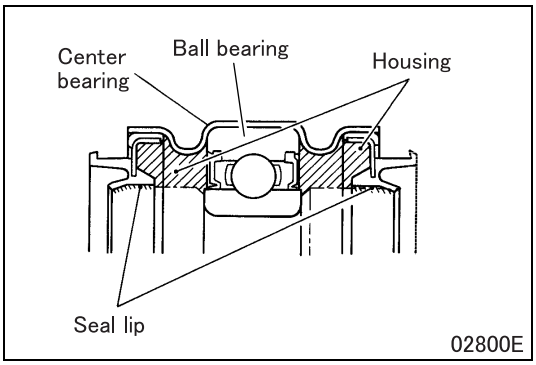
- Fit the needle bearing guide Ca **-C** into the yoke assembly Ca **-A** from outside.
- Applying the needle bearing guide Ca **-C** to the spider, operate the yoke assembly Ca **-A** to force out the spider and remove the needle bearing.

◆Inspection procedure◆



■ **Inspection: Clearance between needle bearing and spider**

- If the clearance is above the limit, replace the needle bearing out of the universal joint spider kit.

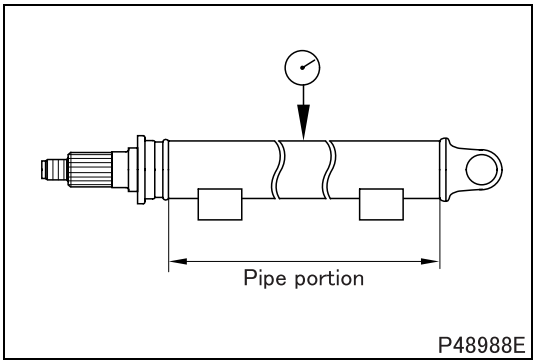


■ **Inspection: Center (midship) bearing**

- Check the bearing every 31,070 miles (50 000 km) or at the nearest regular maintenance interval. If excessive grease outflow is evident, pack grease into the center bearing housing up to 70 to 100% of capacity: 0.71 to 1.02 oz (20 to 29 g).
- Apply grease to the lips of the bearing seal.

NOTE

- **The ball bearing portion of the center bearing is provided with an oil seal and requires no lubrication.**



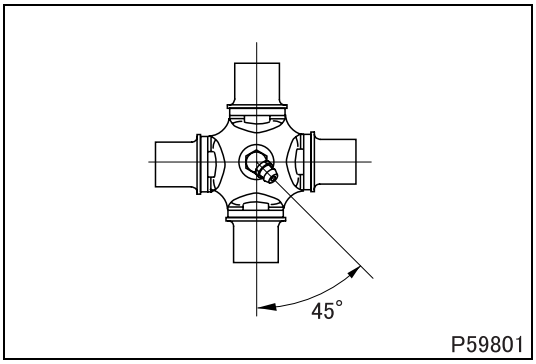
■ **Inspection: Bend in propeller shaft**

- Measure the bend in the propeller shaft at the center of its pipe portion.
- If the measurement is higher than the limit, correct the bend with a press or replace the propeller shaft.

NOTE

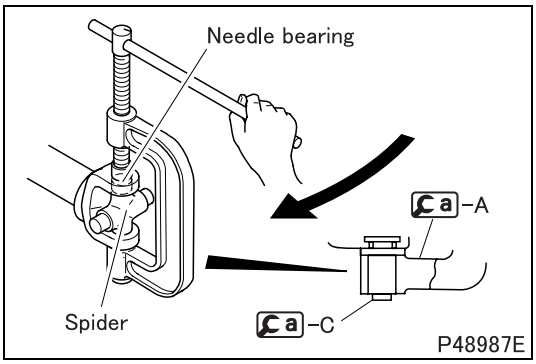
- **To measure the bend in the propeller shaft, turn it fully once and read the dial gauge indicator. The bend is one-half of the indicated value.**
- **Check the propeller shaft for cracks in the welded area after using a press to correct the bend. If cracks are found, replace the propeller shaft.**

◆Installation procedure◆



■ **Inspection: grease fitting**

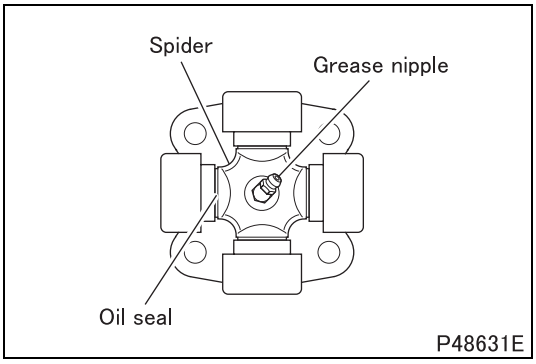
- Install the grease fitting on the spider at the angle shown in the illustration.



■**Installation: Needle bearing**

- Fit the needle bearing guide a **-C** into the yoke assembly a **-A** from inside.
- Operating the yoke assembly a **-A**, install the needle bearing.

◆Work after installation◆



■ **Lubrication: grease fitting**

- Add grease through the grease fitting until clean grease overflows from the oil seal of the spider.