PROPELLER SHAFT

PRECAUTION

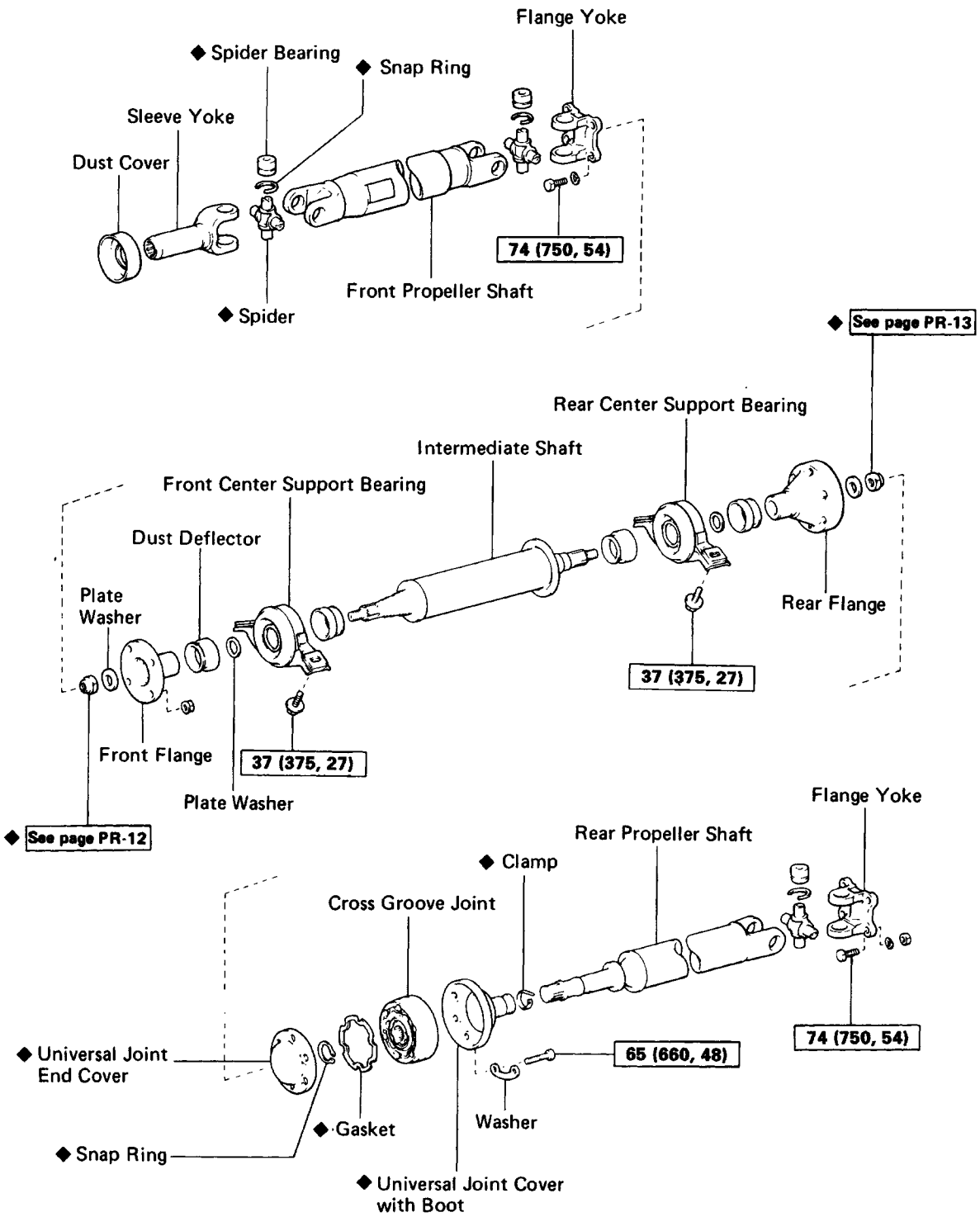
Be careful not to grip the propeller shaft tube too tightly in the vise as this will cause deformation.

TROUBLESHOOTING

Problem	Possible cause	Remedy	Page
Noise	Sleeve yoke spline worn	Replace sleeve yoke	PR–4
	Center support bearing worn	Replace center support bearing	PR–4
	Spider bearing worn or stuck	Replace spider bearing	PR–9
Vibration	Propeller and intermediate shafts runout	Replace shafts	PR–4
	Propeller shafts imbalance	Balance propeller shafts	PR–7
	Front flange runout	Replace front flange	PR–6
	Rear flange runout	Replace rear flange	PR–8
	Cross groove joint stuck or damaged	Replace cross groove joint	
	Transfer extension housing rear bushing worn	Replace bushing	
	Sleeve yoke spline stuck	Replace sleeve yoke	PR–4

PROPELLER SHAFT

COMPONENTS

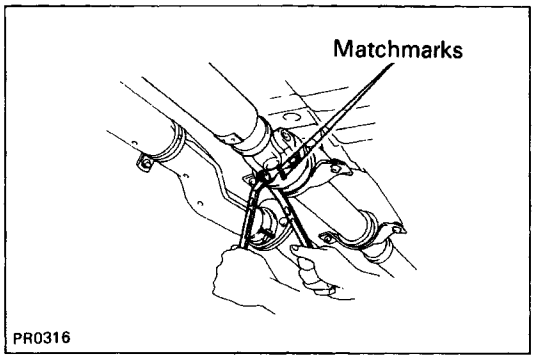


N·m (kgf·cm, ft·lbf) : Specified torque

◆ Non-reusable part

PR0173

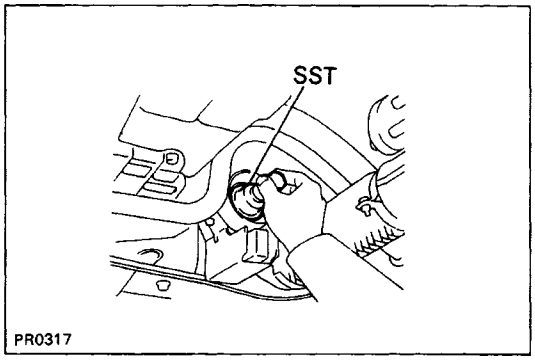
REMOVAL OF PROPELLER SHAFT



1. DISCONNECT FRONT PROPELLER SHAFT

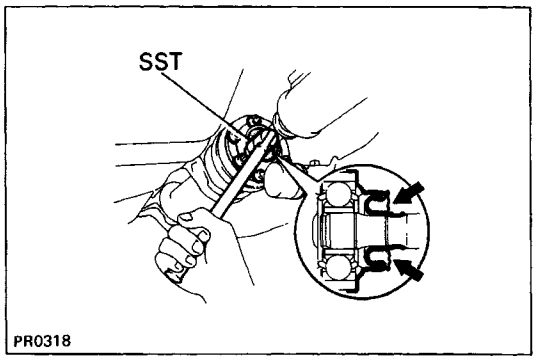
(a) Place the matchmarks on the both flanges.

(b) Remove the four bolts, washers and nuts.



(c) Pull the yoke from the transfer.

(d) Insert SST in the transfer to prevent oil leakage.
SST 09325–20010

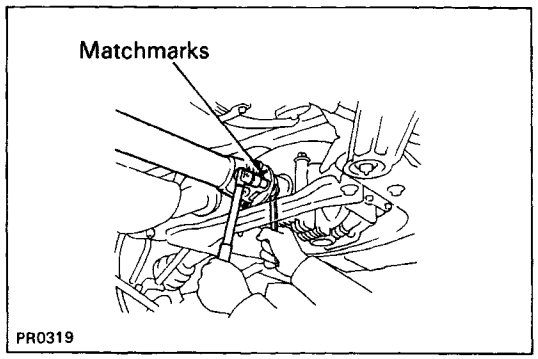


2. LOOSEN CROSS GROOVE JOINT SET BOLT

(a) Depress the brake pedal and hold it.

(b) Using a SST, loosen the cross groove joint set bolts 1/2 turn.
SST 09923–00020

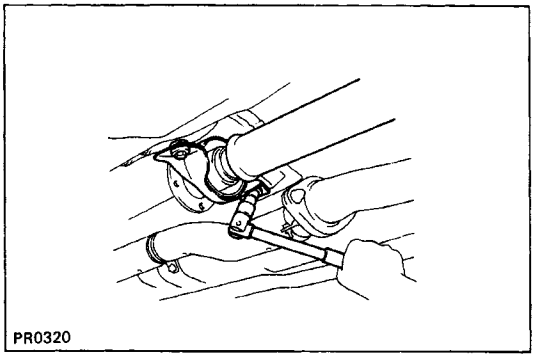
HINT: Put a piece of cloth or an equivalent into the inside of the universal joint cover so that the boot would not be touched to the inside of the universal joint cover.



3. REMOVE INTERMEDIATE SHAFT AND REAR PROPELLER SHAFT

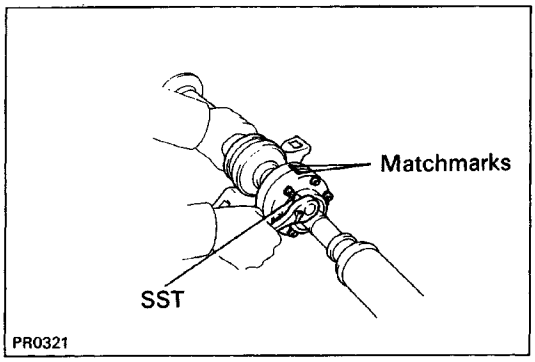
(a) Place the matchmarks on the both flanges.

(b) Remove the bolts, nuts and washers.



(c) Remove the two bolts, front center support bearing and washers.

(d) Remove rear center support bearing and washers.



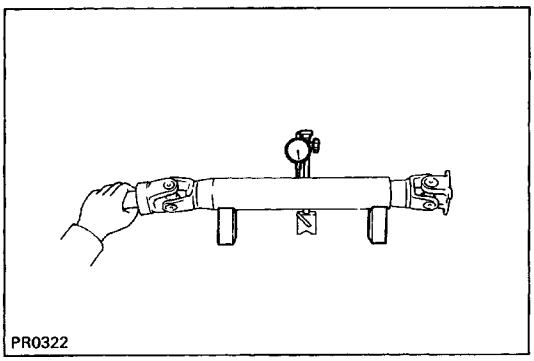
4. SEPARATE INTERMEDIATE SHAFT AND REAR PROPELLER SHAFT

(a) Place the matchmarks on the joint and flange.

HINT: Do not place the matchmarks with a punch.

(b) Using SST, remove the six bolts and three washers to separate intermediate shaft and rear propeller shaft.

SST 09923–00020

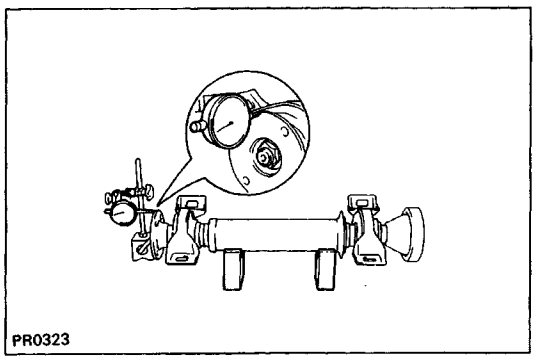


INSPECTION OF PROPELLER SHAFT

1. INSPECT PROPELLER AND INTERMEDIATE SHAFTS RUNOUT

If shaft runout is greater than maximum, replace the shaft.

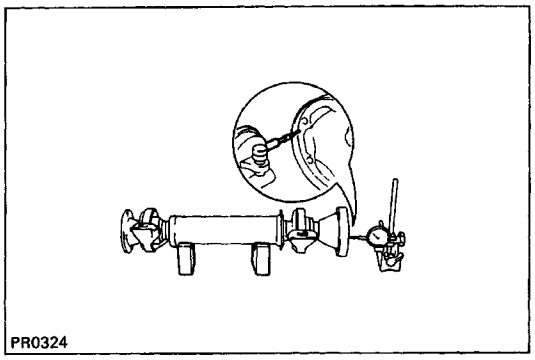
Maximum runout: 0.8 mm (0.031 in.)



2. INSPECT INTERMEDIATE SHAFT FLANGE RUNOUT

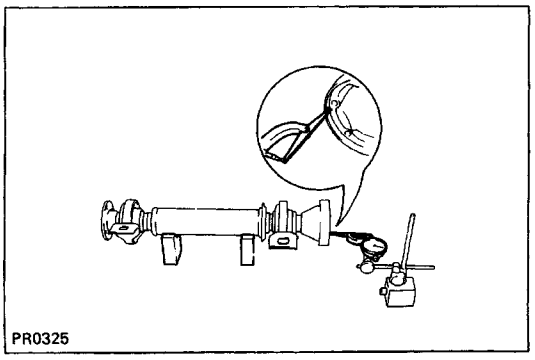
(a) Inspect the front side of intermediate shaft flange runout.

Maximum runout: 0.1 mm I0.004 in.)



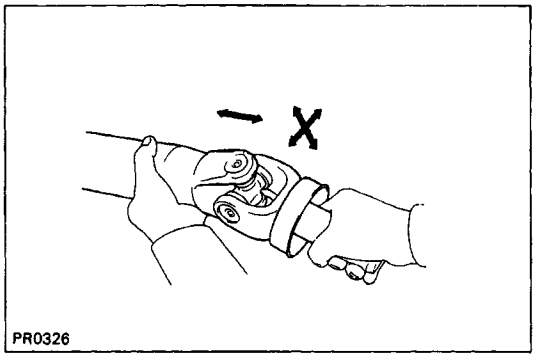
(b) Inspect the rear side of intermediate shaft flange runout in horizontal direction.

Maximum runout: 0.1 mm (0.004 in.)



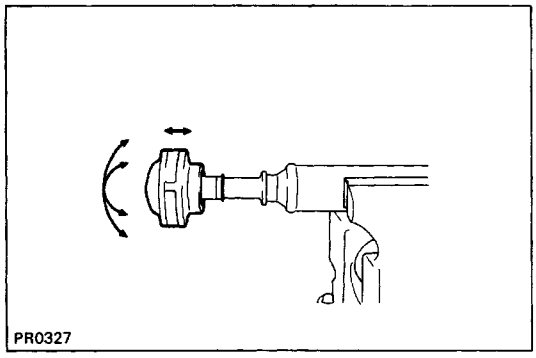
(c) Inspect the rear side of intermediate shaft flange runout in vertical direction.

Maximum runout: 0.1 mm (0.004 in.)



3. INSPECT SPIDER BEARINGS

Check the spider bearing axial play by turning the flange while holding the shaft tightly.

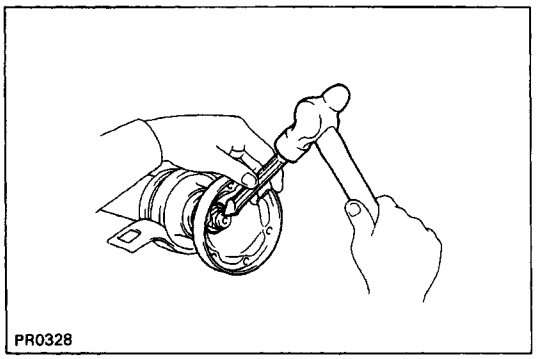


4. INSPECT CROSS GROOVE JOINT

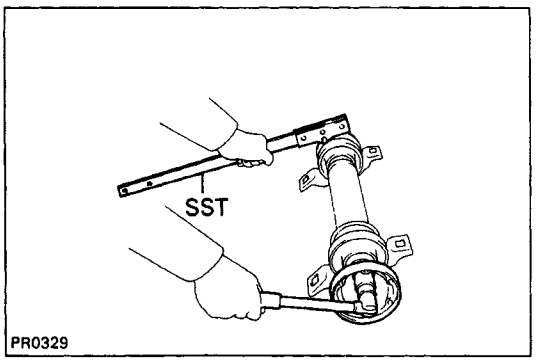
Check the joint smooth play by turning the joint in directions as shown. And check the crack or damage or grease leakage of boot. If problem is found, replace the joint.

DISASSEMBLY OF PROPELLER SHAFT

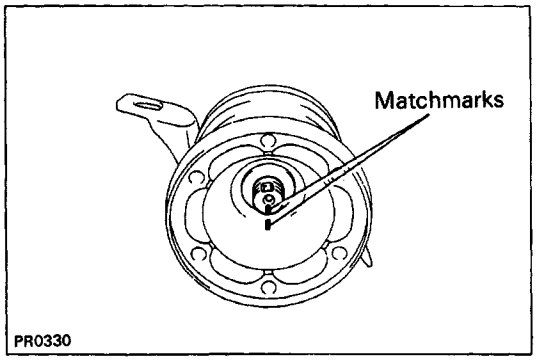
1. REMOVE REAR CENTER SUPPORT BEARING



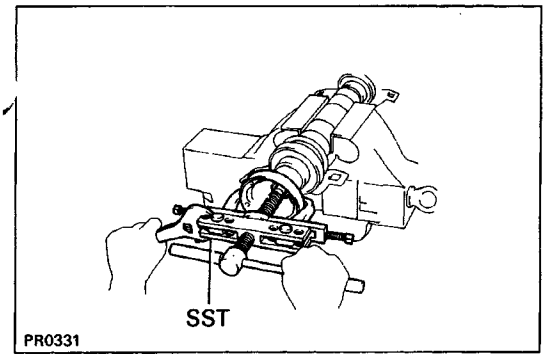
(a) Using a hammer and chisel, loosen the staked part of the nut.



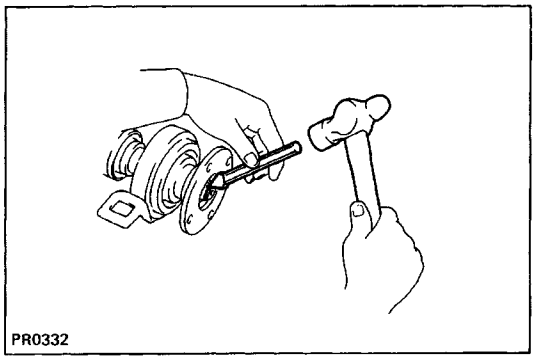
(b) Using SST to hold the front flange, remove the nut and plate washer.
SST 09330–00021



(c) Place the matchmarks on the rear flange and shaft.

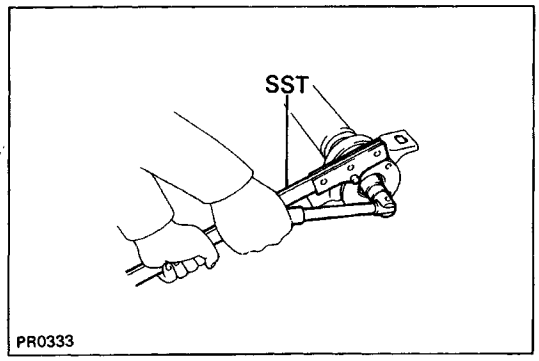


(d) Using SST, remove the rear flange.
SST 09950–20017
(e) Remove the rear center support bearing and plate washer.

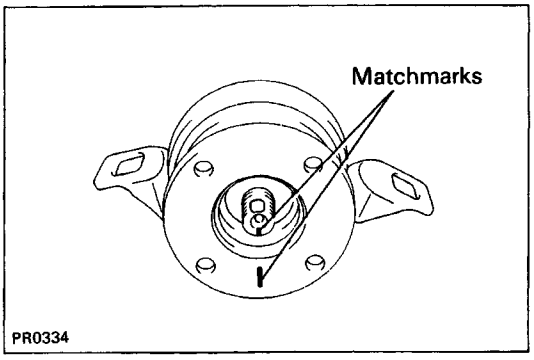


2. REMOVE FRONT CENTER SUPPORT BEARING

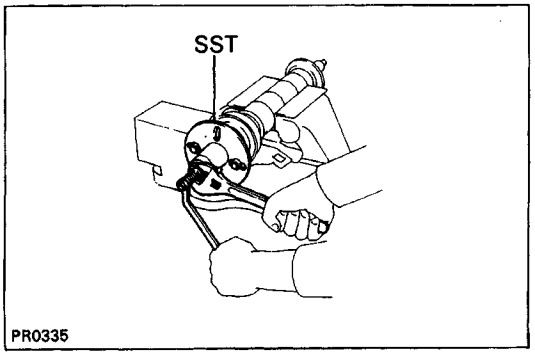
(a) Using a hammer and chisel, loosen the staked part of the nut.



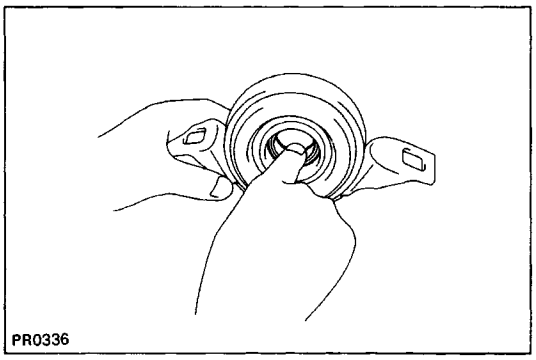
(b) Using SST to hold the flange, remove the nut and plate washer.
SST 09330–00021



(c) Place the matchmarks on the flange and the shaft.



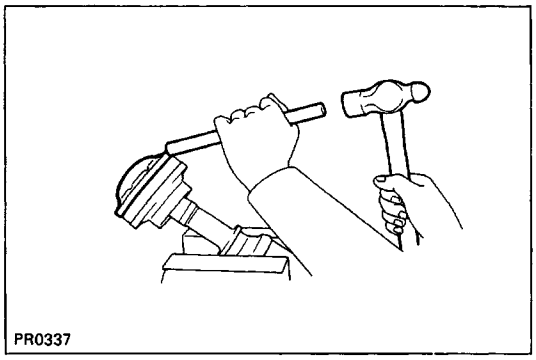
(d) Using SST, remove the flange.
SST 09557–22022 (09557–22050)
(e) Remove the front center support bearing and plate washer.


PR0336

3. INSPECT CENTER SUPPORT BEARING

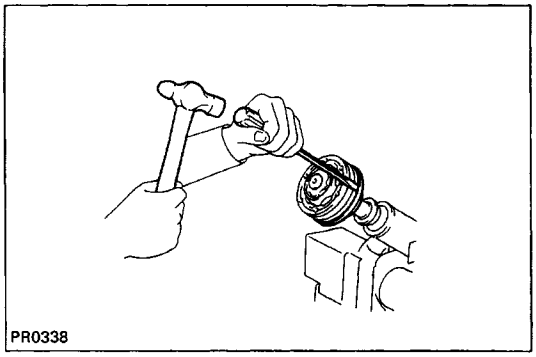
(a) Turning the bearing by hand while applying force in the rotation direction. Check the bearing smooth play.

(b) Check that there are no cracks and no damages about both seals.

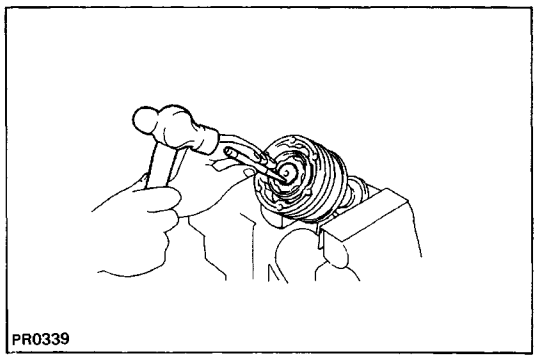

PR0337

4. REMOVE CROSS GROOVE JOINT

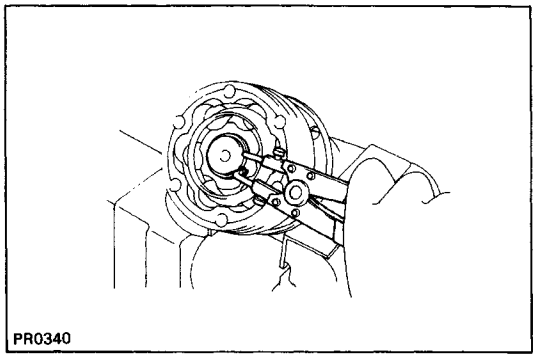
(a) Using a hammer and brass bar, remove the joint end cover.


PR0338

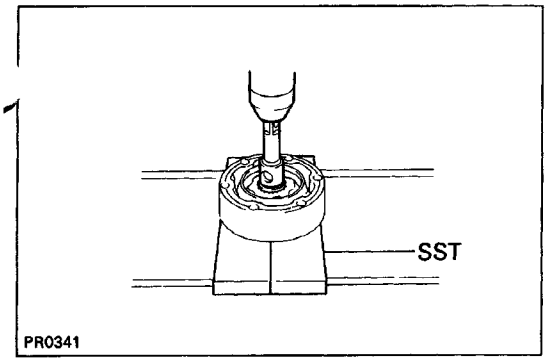
(b) Using a hammer and screwdriver, remove the cover.


PR0339

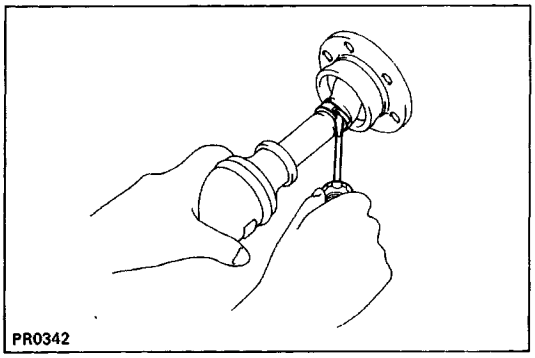
(c) Place the matchmarks on the inner race and shaft.


PR0340

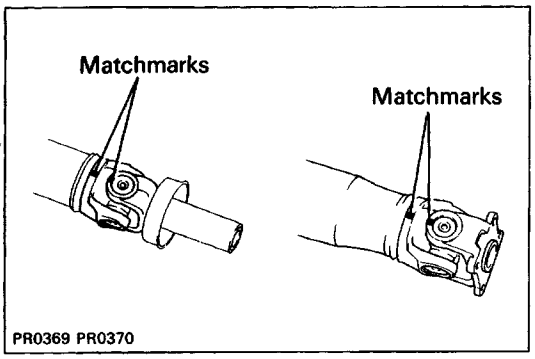
(d) Using snap ring pliers, remove the snap ring.



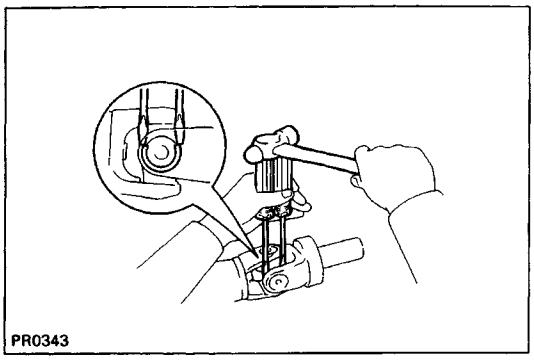
(e) Using SST, extension bar and press, remove the cross groove joint.
SST 09527–21011
(f) Remove the joint end cover gasket.



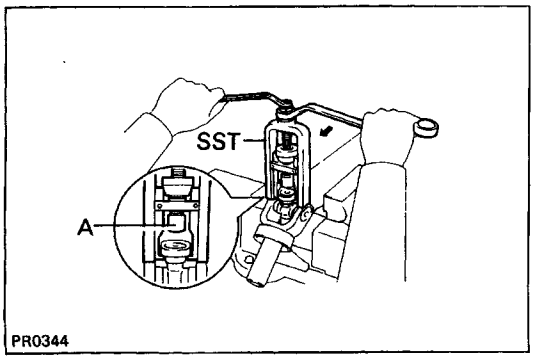
5. REMOVE UNIVERSAL JOINT COVER WITH BOOT
Remove the clamp and the universal joint cover with boot.



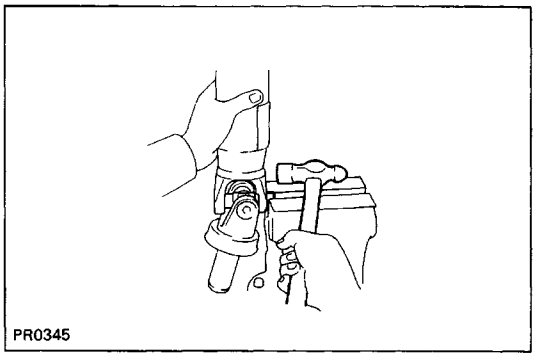
REPLACEMENT OF SPIDER BEARING
1. REMOVE SNAP RINGS
(a) Place matchmarks on shaft and flange or yoke.



(b) Slightly tap in the bearing outer races.
(c) Using two screwdrivers, remove the four snap rings from the grooves.

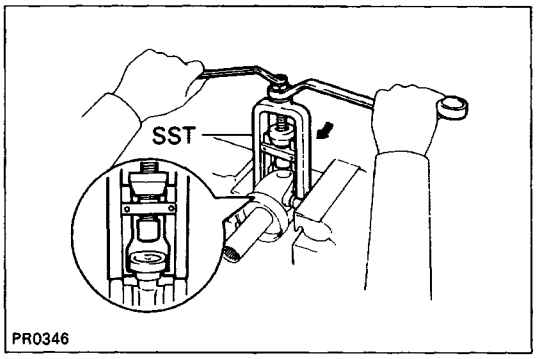


2. REMOVE SPIDER BEARINGS
(a) Using SST, push out the bearing from the shaft.
SST 09332–25010
HINT: Sufficiently raise the part indicated by A so that it dose not come into contact with the bearing.


PR0345

(b) Clamp the bearing outer race in a vise and tap off the shaft with a hammer.

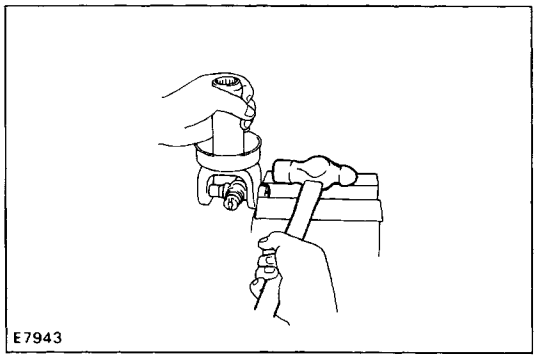
HINT: Remove the bearing on the opposite side in the same procedure.



PR0346

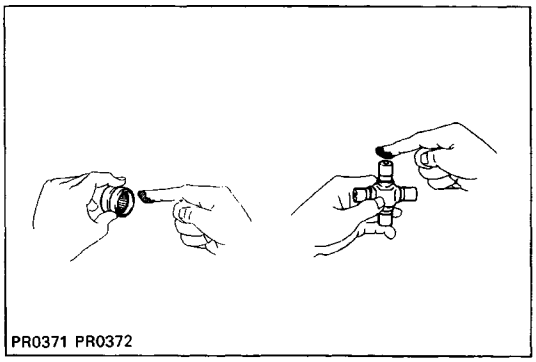
(c) Install the two removed bearing outer races to the spider.

(d) Using SST, push out the bearing from the yoke.
SST 09332–25010


E7943

(e) Clamp the bearing outer race in a vise and tap off the yoke with a hammer.

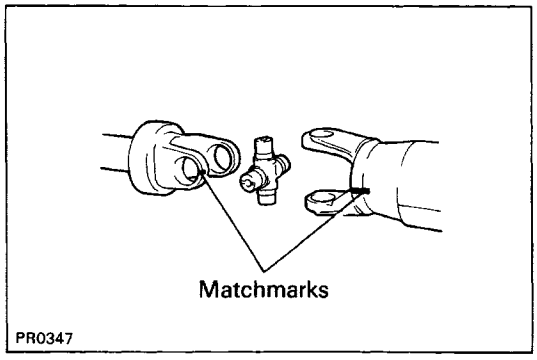
HINT: Remove the bearing on the opposite side in the same procedure.


PR0371 PR0372

3. INSTALL SPIDER BEARINGS

(a) Apply MP grease to the new spider and bearings.

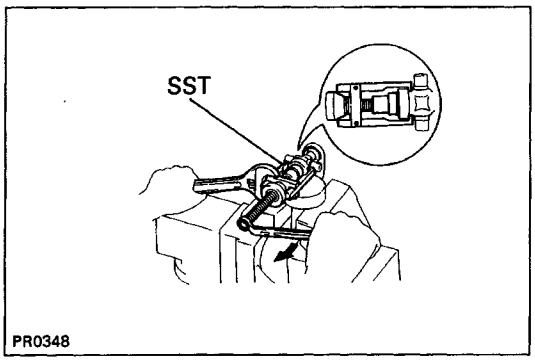
HINT: Be careful not to apply too much grease.



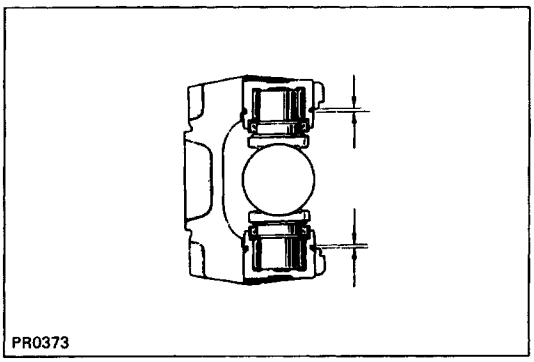
PR0347

(b) Align the matchmarks on the yoke and shaft.

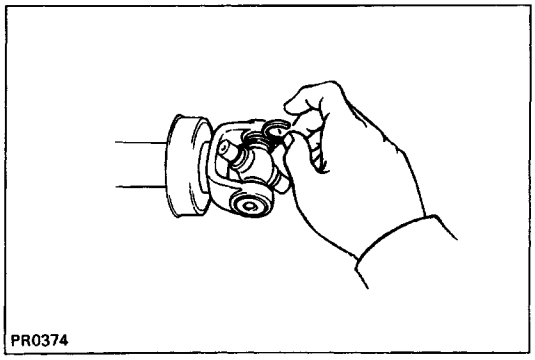
(c) Fit a new spider into the yoke.



(d) Using SST, install new bearings on the spider.
SST 09332–25010



HINT: Adjust both bearings so that the snap ring grooves are at maximum and equal width.

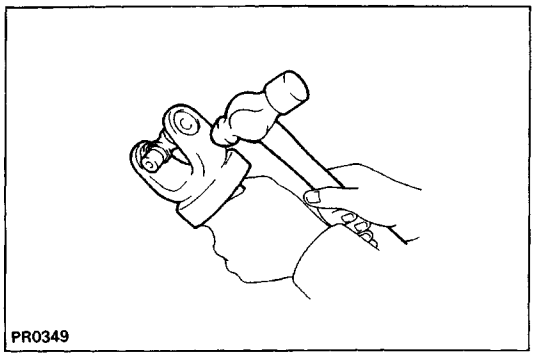


4. INSTALL SNAP RINGS

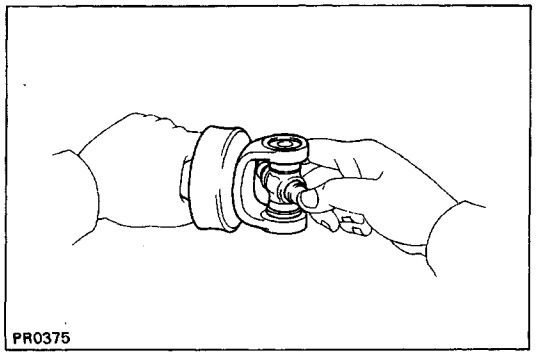
(a) Install two snap rings of equal thickness which will allow 0 – 0.05 mm (0 – 0.0020 in.) axial play.

HINT: Do not reuse the snap ring.

Color	Thickness mm (in.)
–	1.475 – 1.525 (0.0581 – 0.0600)
Brown	1.525 – 1.575 (0.0600 – 0.0620)
Blue	1.575 – 1.625 (0.0620 – 0.0640)



(b) Using a hammer, tap the yoke until there is no clearance between the bearing outer race and snap ring.



5. CHECK SPIDER BEARING

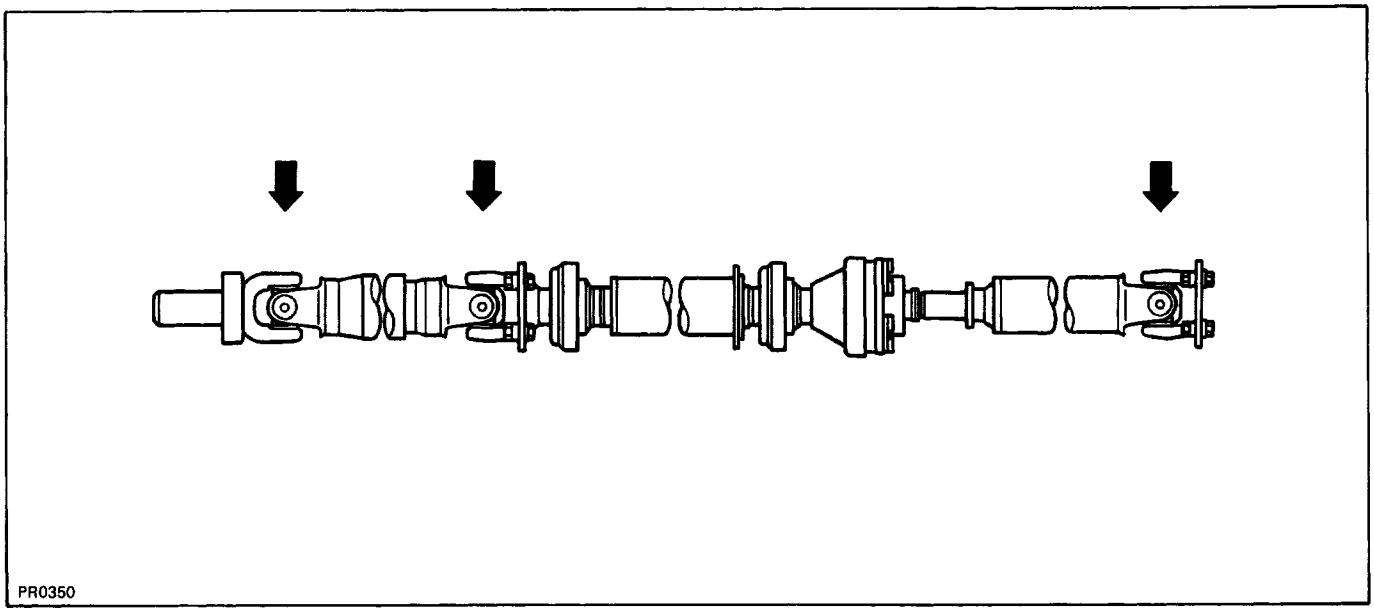
(a) Check that the spider bearing moves smoothly.

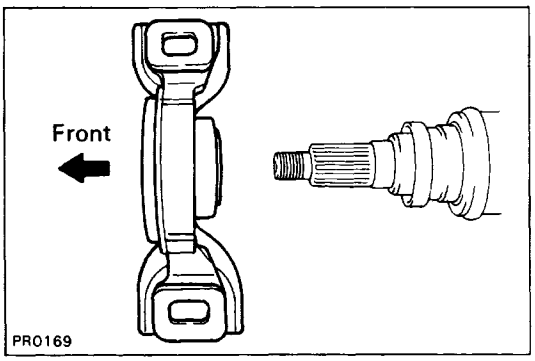
(b) Check the spider bearing axial play.

HINT: Install new spider bearings on the shaft side in the procedure described above.

ASSEMBLY OF PROPELLER SHAFT

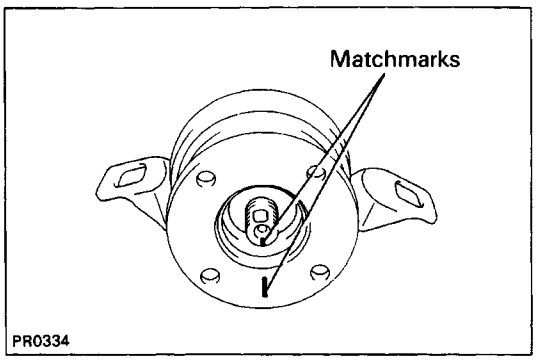
HINT: If replacing or disassembling propeller shaft parts, reassemble them as shown in the figure below.





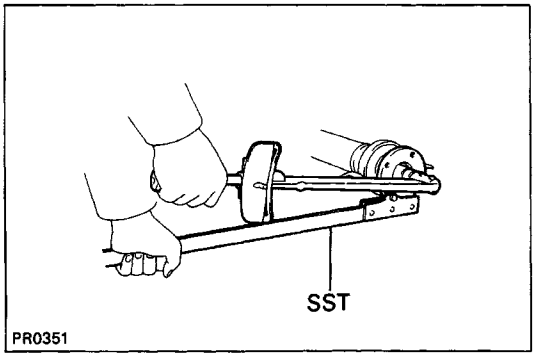
1. INSTALL FRONT CENTER SUPPORT BEARING

(a) Set the front center support bearing on the intermediate shaft as shown.



(b) Install the plate washer to the intermediate shaft.

(c) Align the matchmarks on the flange and shaft and place the flange on the shaft.



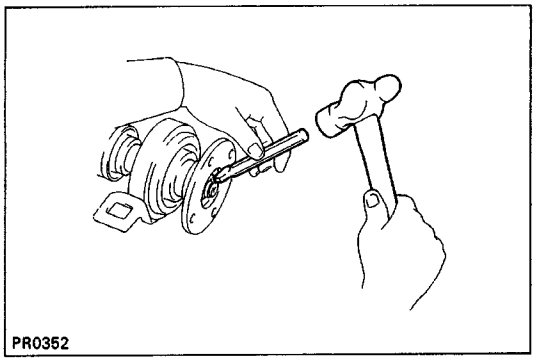
(d) Using SST to hold the flange, press the bearing into position by tightening down a new nut and washer.
SST 09330–00021

Torque: 181 N–m (1,850 kgf–cm, 134 ft–lbf)

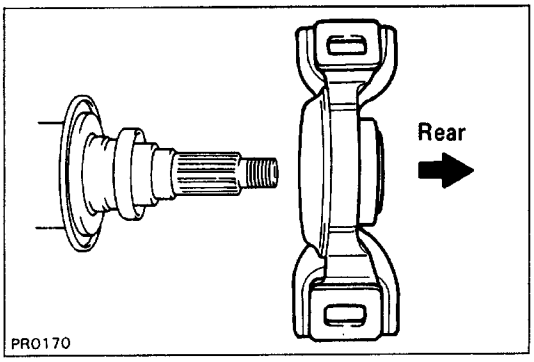
(e) Loosen the nut.

(f) Torque the nut again.

Torque: 69 N–m (700 kgf–cm, 51 ft–lbf)

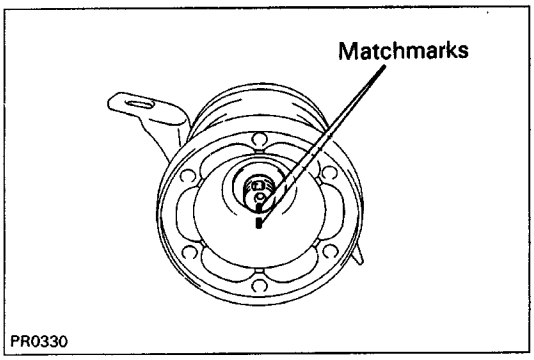


Using a hammer and chisel, stake the nut.



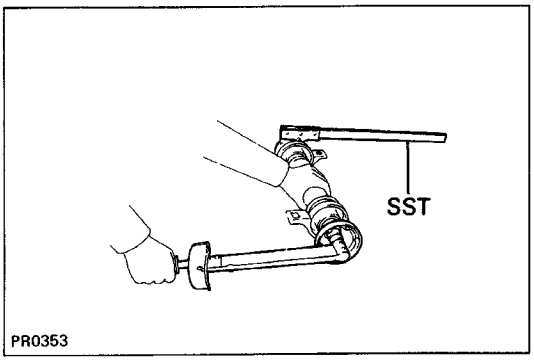
2. INSTALL REAR CENTER SUPPORT BEARING

(a) Set the rear center support bearing on the intermediate shaft as shown.



(b) Install the plate washer to the intermediate shaft.

(c) Align the matchmarks on the flange and shaft and place the flange on the shaft.



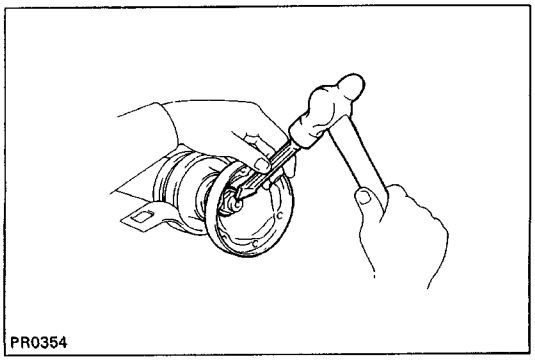
(d) Using SST to hold the flange, press the bearing into
position by tightening down a new nut and washer.
SST 09330–00021

Torque: 181 N–m (1,850 kgf–cm, 134 ft–lbf)

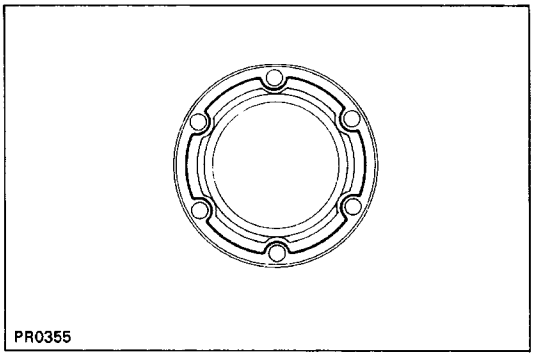
(e) Loosen the nut.

(f) Torque the nut again.

Torque: 69 N–m (700 kgf–cm, 51 ft–lbf)



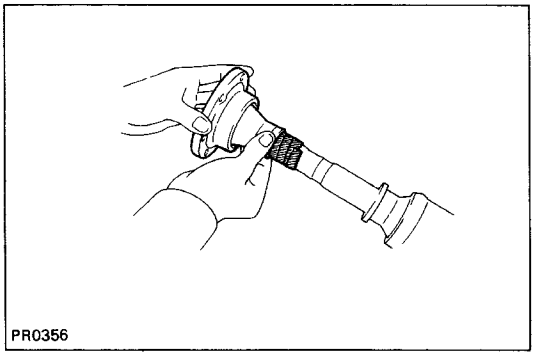
Using a hammer and chisel, stake the nut.


PR0355

3. INSTALL UNIVERSAL JOINT COVER WITH BOOT

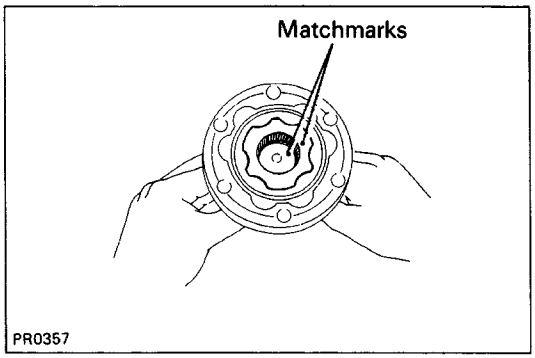
(a) Apply sealant to the new joint cover with boot as shown in the illustration.
Sealant: Part No.08828–00801

HINT: The diameter of sealant along the bolt hole keeps 1.0 mm – 1.8 mm (0.0394 in. – 0.0709 in.).


PR0356

(b) Apply the adhesive tape from the top of shaft to the spline to prevent damaging the boot.

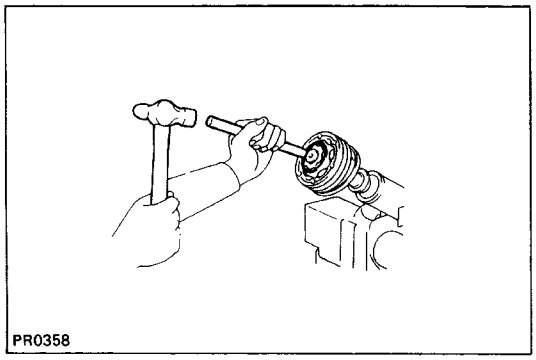
(c) Install the universal joint cover with boot to the shaft.



PR0357

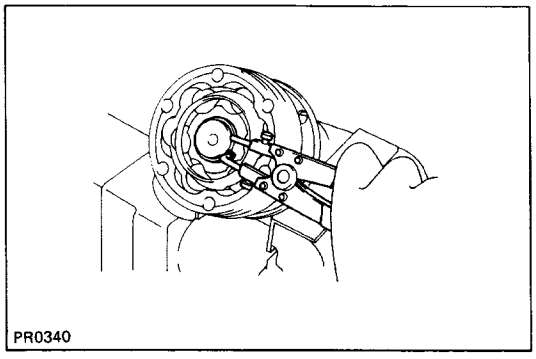
4. INSTALL CROSS GROOVE JOINT

(a) Align the matchmarks on the shaft and the inner race.

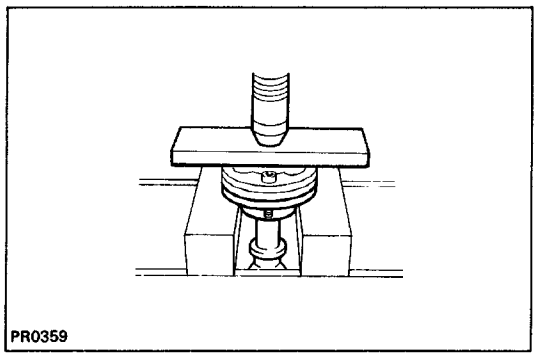

PR0358

(b) Using a hammer and brass bar, tap the cross groove joint.

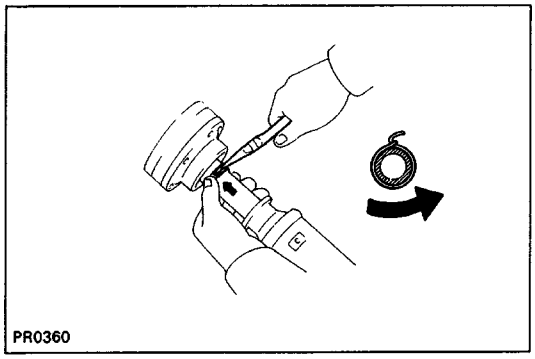
HINT: Be sure to put the brass bar on the inner race.


PR0340

(c) Using snap ring pliers, install the new snap ring.

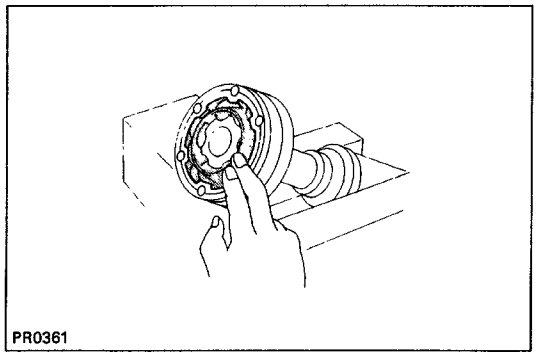

PR0359

(d) Pass the bolt through to align the both bolt holes, then using a press and steel plate, press the universal joint cover with boot.


PR0360

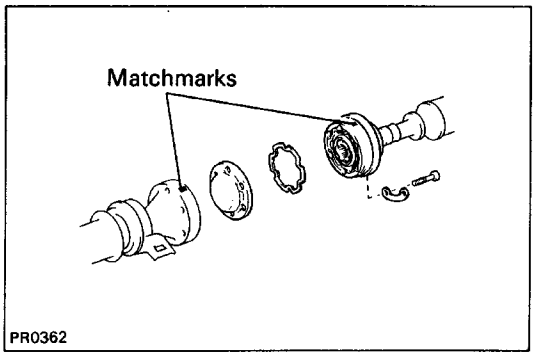
(e) Install a new boot clamp.

HINT: Bend the clamp in opposite direction of shaft turning.


PR0361

(f) Fill the grease into the joint.

Grease capacity: 110 g (0.24 lb)



PR0362

5. INSTALL JOINT END COVER

(a) Remove the backing paper from a new gasket, then attach the gasket.

(b) Install the joint end cover.

(c) Align the matchmarks and install the universal joint flange to the cross groove joint.

(d) Tighten the six bolts and three washers to press the joint end cover.

HINT: Tighten the bolts gradually and equally to prevent damaging the end cover.

(e) Remove the six bolts and three washers and separate the universal joint flange from the cross groove joint.

6. INSPECT CROSS GROOVE JOINT

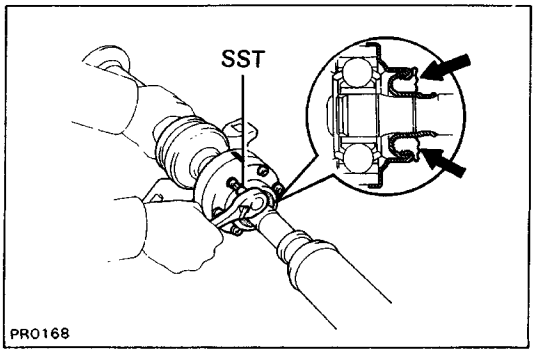
(See step 4 on page PR–6)

7. CONNECT INTERMEDIATE SHAFT WITH REAR PROPELLER SHAFT

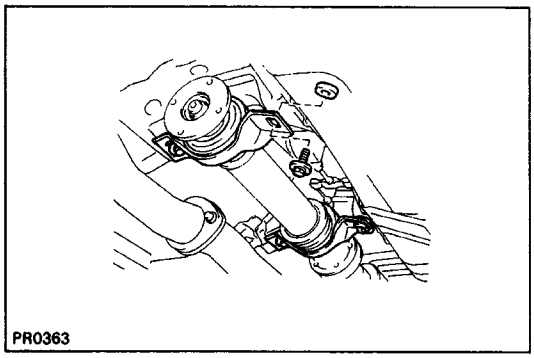
Using SST, tighten the six bolts and three washers temporarily.

SST 09923–00020

HINT: Put a piece of cloth or an equivalent into the inside of the universal joint cover.

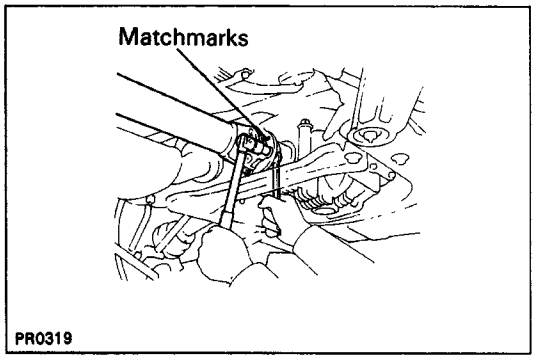


PR0168


PR0363

INSTALLATION OF PROPELLER SHAFT

1. INSTALL CENTER SUPPORT BEARING TEMPORARILY



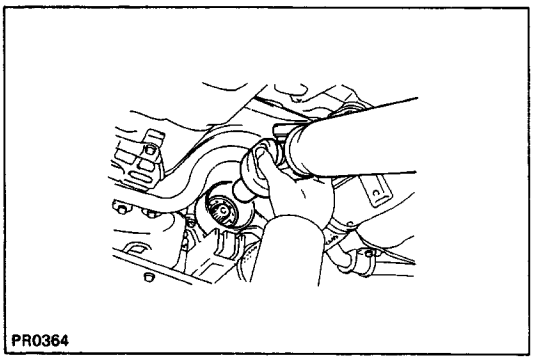
PR0319

2. INSTALL REAR PROPELLER SHAFT

(a) Align the matchmarks on the flanges and connect the shaft with the four bolts, washers and nuts.

(b) Torque the bolts and nuts.

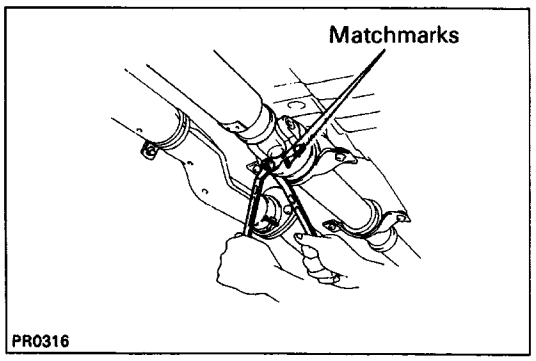
Torque: 74 N–m (750 kgf–cm, 54 ft–lbf)


PR0364

3. INSTALL FRONT PROPELLER SHAFT

(a) Remove SST from the transfer.
SST 09325–20010

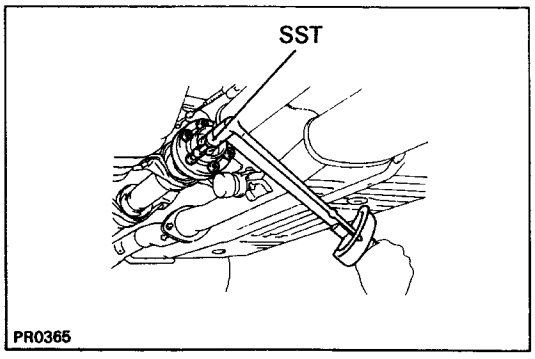
(b) Insert the yoke into the transfer.



PR0316

(c) Align the matchmarks on the both flanges, then install the bolts, washers and nuts.

Torque: 74 N–m (750 kgf–cm, 54 ft–lbf)



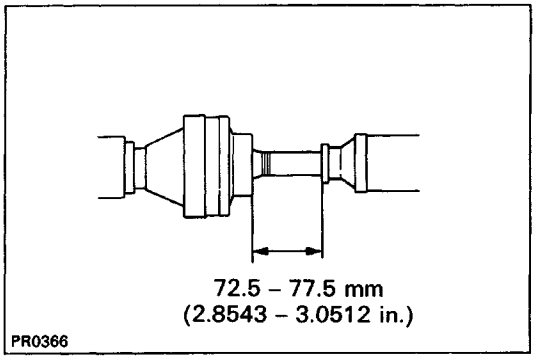
PR0365

4. TIGHTEN CROSS GROOVE JOINT SET BOLT

(a) Depress the brake pedal and hold it.

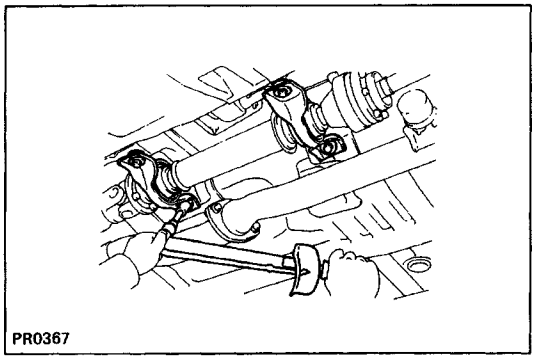
(b) Using a SST, tighten the cross groove joint set bolts.
SST 09923–00020

Torque: 65 N–m (660 kgf–cm, 48 ft–lbf)



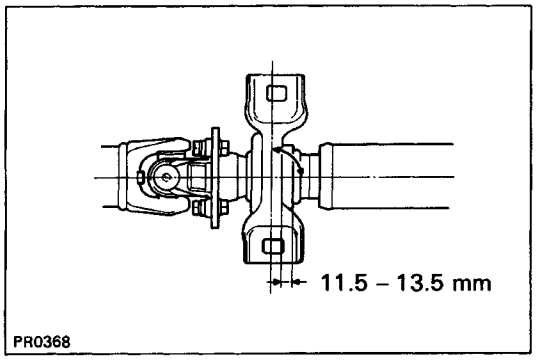
5. INSTALL CENTER SUPPORT BEARING

(a) With a vehicle unladen condition, adjust the intervals between the rear side of cover and the shaft as shown in the illustration.



(b) With the same condition, adjust the intervals between the rear side of center bearing housing and the rear side of cushion at 11.5 – 13.5 mm (0.4528 in.– 0. 5315 in.) as shown in the illustration below, then torque the bolts.

Torque: 37 N–m (375 kgf–cm, 27 ft–lbf)



(c) Check that the center line of the bracket is at right angles at the shaft axial direction.