

This file is available for free download at <http://www.iluvmyrx7.com>

This file was not scanned to deprive Mazda of any money - it was scanned due to the rareness of the original manuals and the overwhelming need of the RX-7 owner to have this information so that they can accurately troubleshoot problems. Perhaps if Mazda's dealerships could support the Rotary Engine it wouldn't be so necessary for the owners to do so.



Many thanks to Lenny Terris for scanning this.

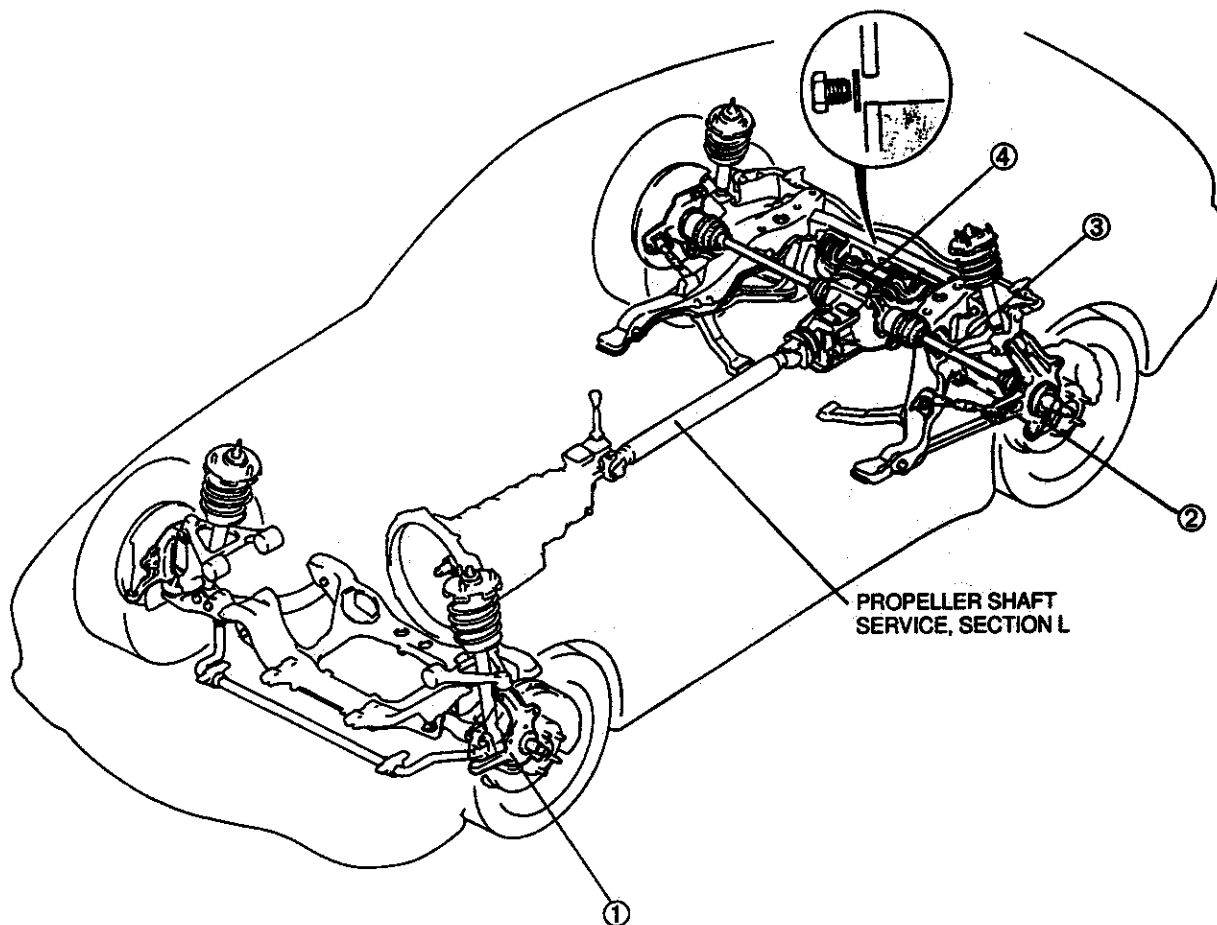
FRONT AND REAR AXLES

INDEX	M - 2
OUTLINE	M - 3
SPECIFICATIONS	M - 3
TROUBLESHOOTING GUIDE	M - 3
FRONT AXLE	M - 4
PREPARATION	M - 4
WHEEL HUB / STEERING KNUCKLE ...	M - 4
REAR AXLE	M - 9
PREPARATION	M - 9
WHEEL HUB	M - 9
DRIVE SHAFT	M -14
PREPARATION	M -14
DRIVE SHAFT	M -14
DIFFERENTIAL	M -22
PREPARATION	M -22
DIFFERENTIAL OIL	M -23
OIL SEAL	M -24
DIFFERENTIAL (TORQUE SENSING LSD)	M -27

INDEX

SPECIFIED OIL
TYPE

ABOVE -18°C (0°F): API GL-4 OR GL-5, SAE 90
 BELOW -18°C (0°F): API GL-4 OR GL-5, SAE 80
 CAPACITY: 1.30 L (1.38 US qt, 1.14 Imp qt)



1. Front axle
 - Preinspection page M- 4
 - Removal / Inspection /
Installation page M- 5
 - Disassembly / Inspection /
Assembly page M- 7
2. Rear axle
 - Preinspection page M- 9
 - Removal / Inspection /
Installation page M-10
 - Disassembly / Inspection /
Assembly page M-12

3. Drive shaft
 - Preinspection page M-14
 - Removal / Installation page M-15
 - Overhaul page M-18
4. Differential
 - Differential oil page M-23
 - Oil seal page M-24
 - Removal / Installation page M-27
 - Disassembly / Inspection page M-30
 - Assembly page M-34

OUTLINE

SPECIFICATION

Item		Engine / Transmission	13B	
			MT	AT
Front axle				
Bearing type		Unitized angular ball bearing		
Rear axle				
Bearing type		Unitized angular ball bearing		
Drive shaft				
Type		Constant velocity (tripod) joint		
Length (between centers of joints)		mm {in}	484.2 {19.06}	
Diameter		mm {in}	29.0 {1.14}	
Differential				
Type		Torque sensing LSD		
Reduction gear		Hypoid gear		
Differential gear		Worm gear		
Reduction ratio			4.100	3.909
Number of teeth	Ring gear		41	43
	Drive pinion gear		10	11
Ring gear size		mm {in}	204.2 {8.038}	
Oil	Grade	API service GL-4 or GL-5		
	Viscosity	Above-18°C (0°F): SAE 90 Below-18°C (0°F): SAE 80		
	Capacity	L {US qt, Imp qt}	1.30 {1.38, 1.14}	

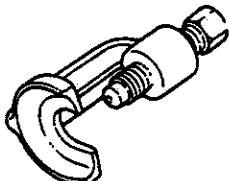
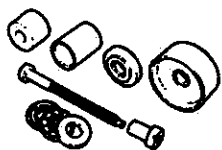

M

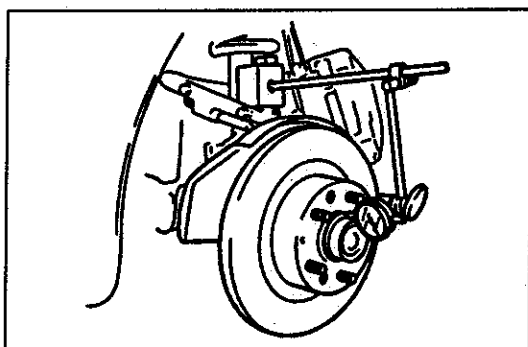
TROUBLESHOOTING GUIDE

Problem	Possible Cause	Action	Page
Front axle			
Steering wheel vibration	Worn or damaged wheel bearing	Replace	M-5
Pulls or one-sided braking	Worn or damaged wheel bearing	Replace	M-5
Rear axle			
Abnormal noise	Worn or damaged wheel bearing	Replace	M-12
	Bent drive shaft	Replace	M-15
	Worn drive shaft spline	Replace	M-15
Differential			
Abnormal noise	Insufficient differential oil	Add oil	M-23
	Incorrect differential oil	Replace	M-23
	Worn or damaged side bearing	Replace	M-30
	Worn or damaged ring gear	Replace	M-30
	Worn or damaged drive pinion bearing	Replace	M-30
	Worn or damaged gear in LSD assembly	Replace gear case	M-30
	Worn side gear spline	Replace	M-30
	Improperly adjusted drive pinion gear preload	Adjust	M-38
	Improperly adjusted ring gear backlash	Adjust	M-39
	Poor contact of ring gear teeth	Adjust	M-41
Heat buildup	Insufficient differential oil	Add oil	M-23
	Insufficient drive pinion gear backlash	Adjust	M-39
	Excessive bearing preload	Adjust	M-38
Oil leakage	Excessive differential oil	Remove oil	M-23
	Worn or damaged oil seal	Replace	M-24
	Loose differential carrier	Tighten or repair	M-30
No differential operation	Misassembled or damaged	Repair or replace	M-30

FRONT AXLE

PREPARATION
SST

<p>49 0118 850C</p> <p>Puller, ball joint</p> 	<p>For removal of ball joint</p>	<p>49 H028 2A0</p> <p>Replacer set, rubber bushing</p> 	<p>For installation of ABS sensor rotor</p>
<p>49 H028 204</p> <p>Attachment (Part of 49 H028 2A0)</p> 	<p>For installation of ABS sensor rotor</p>		



WHEEL HUB / STEERING KNUCKLE

Preinspection

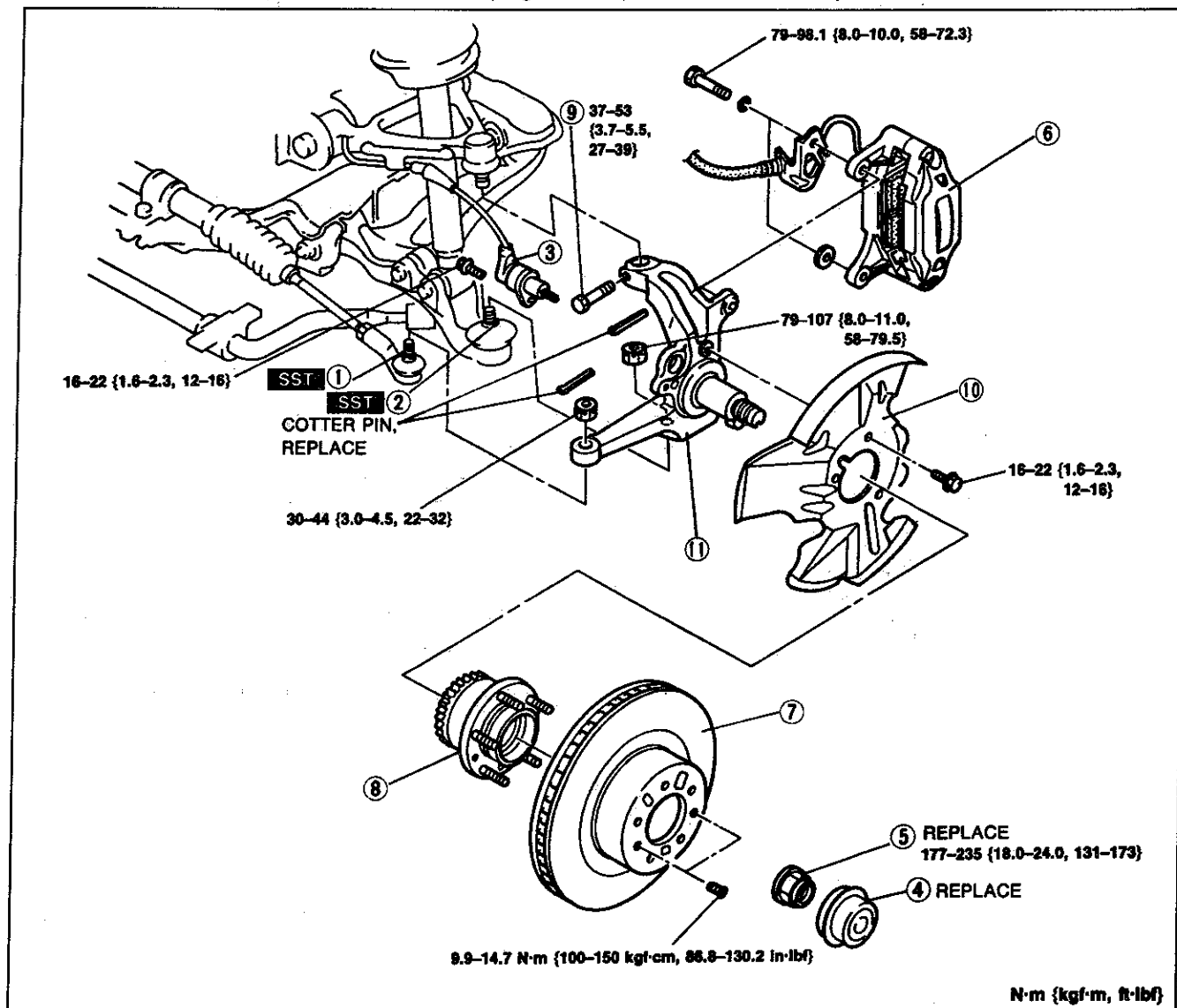
Wheel bearing play

1. Position a dial indicator against the wheel hub.
2. Push and pull the wheel hub by hand in the axial direction and measure the wheel bearing play.
3. If the bearing play exceeds specification, check and adjust the wheel hub nut torque or replace the wheel hub assembly, if necessary.

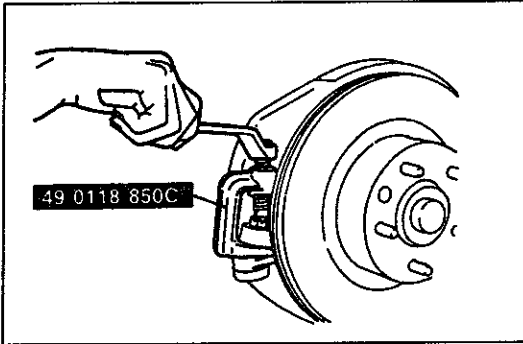
Wheel bearing play: 0.05 mm {0.002 in} max.

Removal / Inspection / Installation

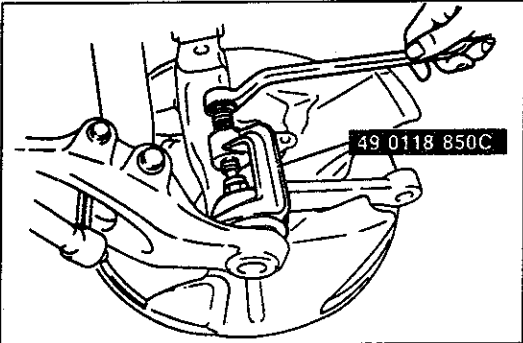
1. Jack up the front of the vehicle and support it on safety stands.
2. Remove the wheel.
3. Remove in the order shown in the figure, referring to **Removal Note**.
4. Inspect all parts and repair or replace as necessary.
5. Install in the reverse order of removal, referring to **Installation Note**.
6. Install the wheel. (Tightening torque: 89–117 N·m {9.0–12.0 kgf·m, 65–86 in·lbf})
7. After installation, check the front wheel alignment. (Refer to section R.)



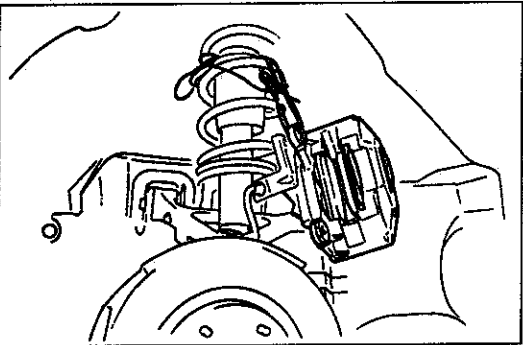
- | | |
|------------------------------------|-----------|
| 1. Tie rod end ball joint | |
| Removal Note | page M-6 |
| Service | Section N |
| 2. Lower arm ball joint | |
| Removal Note | page M-6 |
| Service | Section R |
| 3. ABS wheel-speed sensor | |
| Service | Section P |
| 4. Hub cap | |
| 5. Wheel hub nut | |
| Installation Note | page M-6 |
| 6. Brake caliper assembly | |
| Removal Note | page M-6 |
| Service | Section P |
| 7. Disc plate | |
| Service | Section P |
| 8. Wheel hub assembly | |
| Inspect for cracks and damage | |
| Inspect bearing for rough rotation | |
| Disassembly / Inspection / | |
| Installation | page M-7 |
| 9. Bolt (upper arm) | |
| 10. Dust cover | |
| Inspect for cracks and damage | |
| 11. Steering knuckle | |
| Inspect for cracks and damage | |

**Removal note****Tie rod end ball joint**

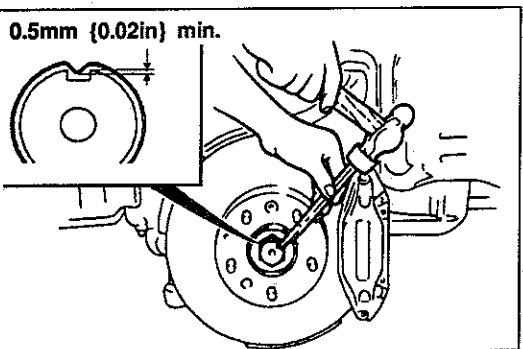
1. Loosen the tie rod end nut until it is flush with the end of the stud.
2. With the nut protecting the tie rod end stud, separate the tie rod end from the steering knuckle by using the **SST**.

**Lower arm ball joint**

1. Loosen the nut until it is flush with the end of the stud.
2. With the nut protecting the ball joint stud, separate the ball joint from the knuckle by using the **SST**.

**Brake caliper assembly**

Hang the brake caliper assembly out of the way as shown in the figure.

**Installation note****Wheel hub nut**

1. Install a new hub nut and stake it as shown.

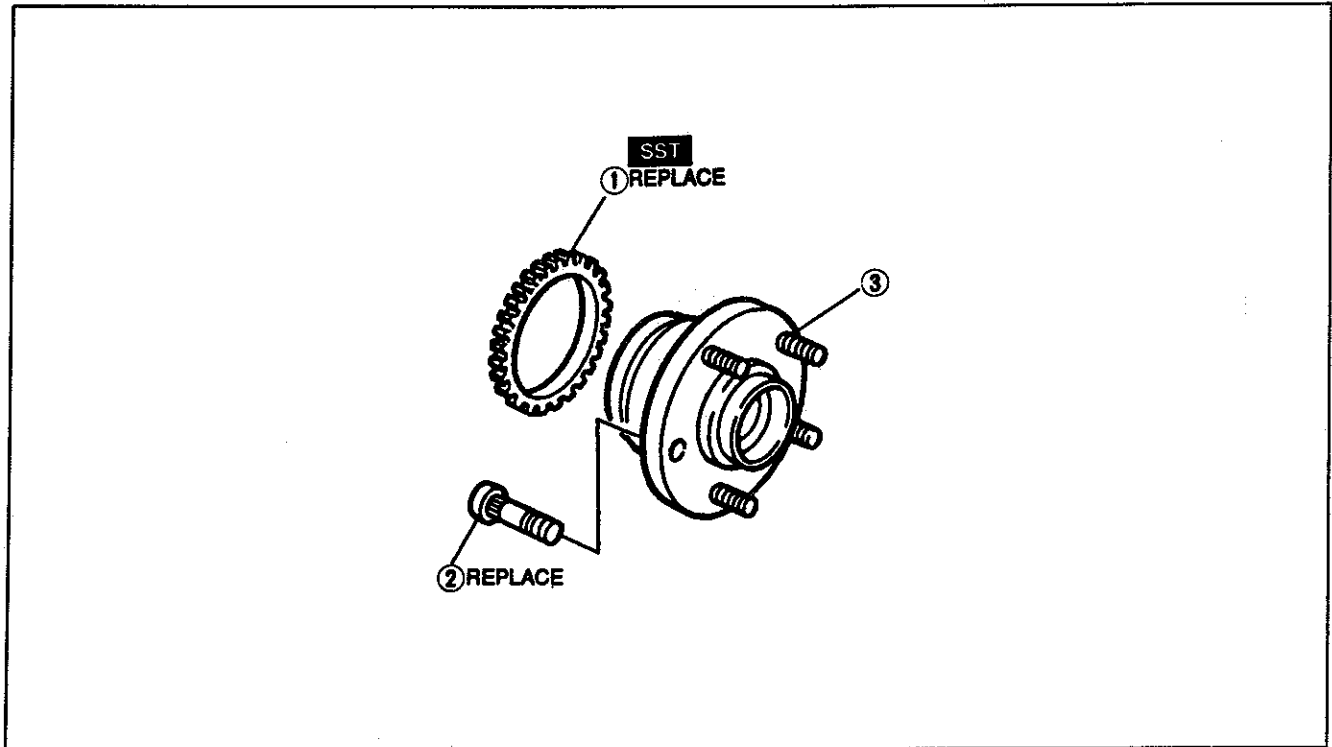
Tightening torque:

177-235 N·m{18.0-24.0 kgf·m, 131-173 ft·lbf}

2. Measure the wheel bearing play. (Refer to page M-4.)

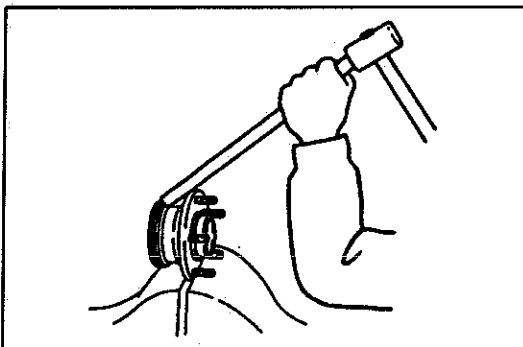
Disassembly / Inspection / Assembly

1. Disassemble in the order shown in the figure, referring to **Disassembly Note**.
2. Inspect all parts and repair or replace as necessary.
3. Assemble in the reverse order of disassembly, referring to **Assembly Note**.



1. ABS sensor rotor
Disassembly Note below
Assembly Note page M-8
2. Hub bolt
Disassembly Note below
Assembly Note page M-8

3. Wheel hub
Inspect bearing for rough rotation
(Not repairable, replace hub assembly)

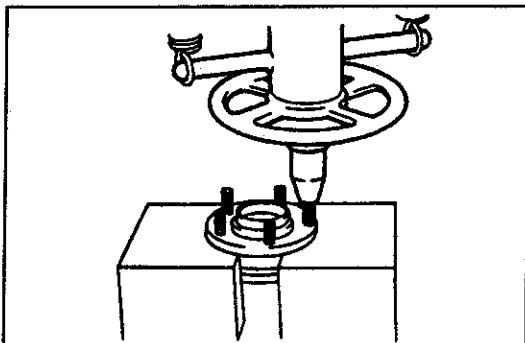


**Disassembly note
ABS sensor rotor**

Note

- The sensor rotor does not need to be removed unless you are replacing it.

Remove the sensor rotor by using a brass bar and a hammer.

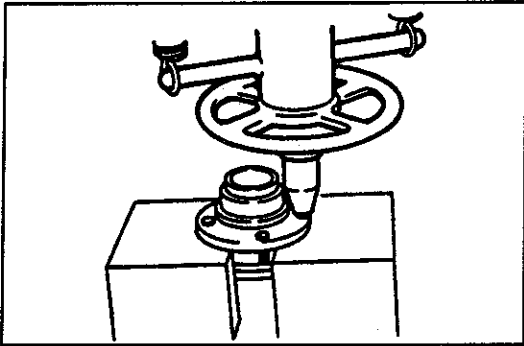


Hub bolt

Note

- The hub bolts do not need to be removed unless you are replacing them.

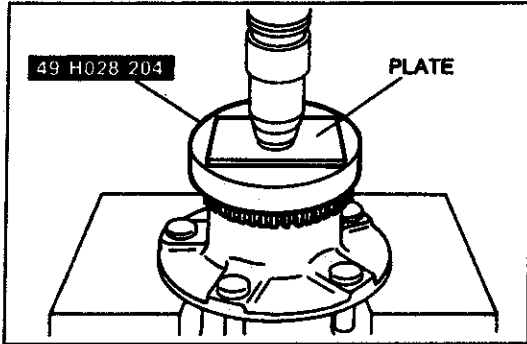
Remove the hub bolts by using a press.



Assembly note

Hub bolt

Press in new hub bolts.

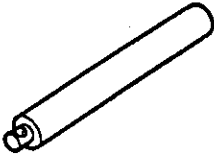
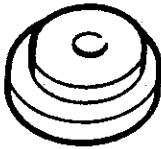
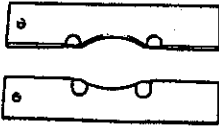
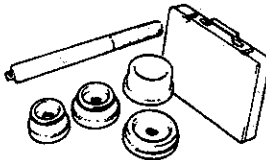
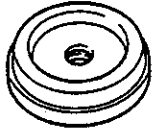
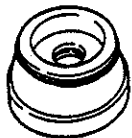
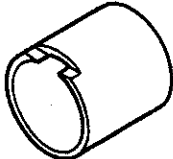


ABS sensor rotor

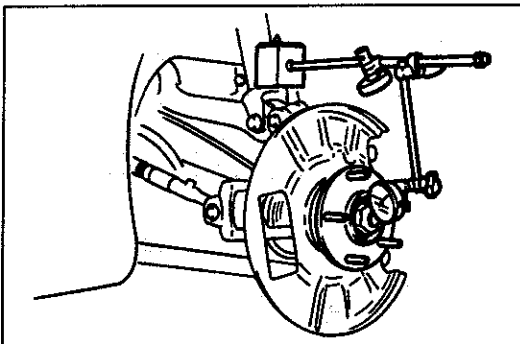
Press on the new sensor rotor by using the SST.

REAR AXLE

PREPARATION SST

49 G033 102 Handle 	For removal of axle flange	49 G033 105 Attachment 	For removal of axle flange
49 F026 103 Plate, removing 	For removal of axle flange	49 F027 0A1 Installer set, bearing 	For removal of wheel bearing and installation of axle flange
49 F027 004 Attachment (Part of 49 F027 0A1) 	For installation of wheel bearing	49 F027 005 Attachment (part of 49 F027 0A1) 	For removal of wheel bearing and installation of axle flange
49 H034 201 Block, support 	For installation of wheel bearing		

M



WHEEL HUB

Preinspection

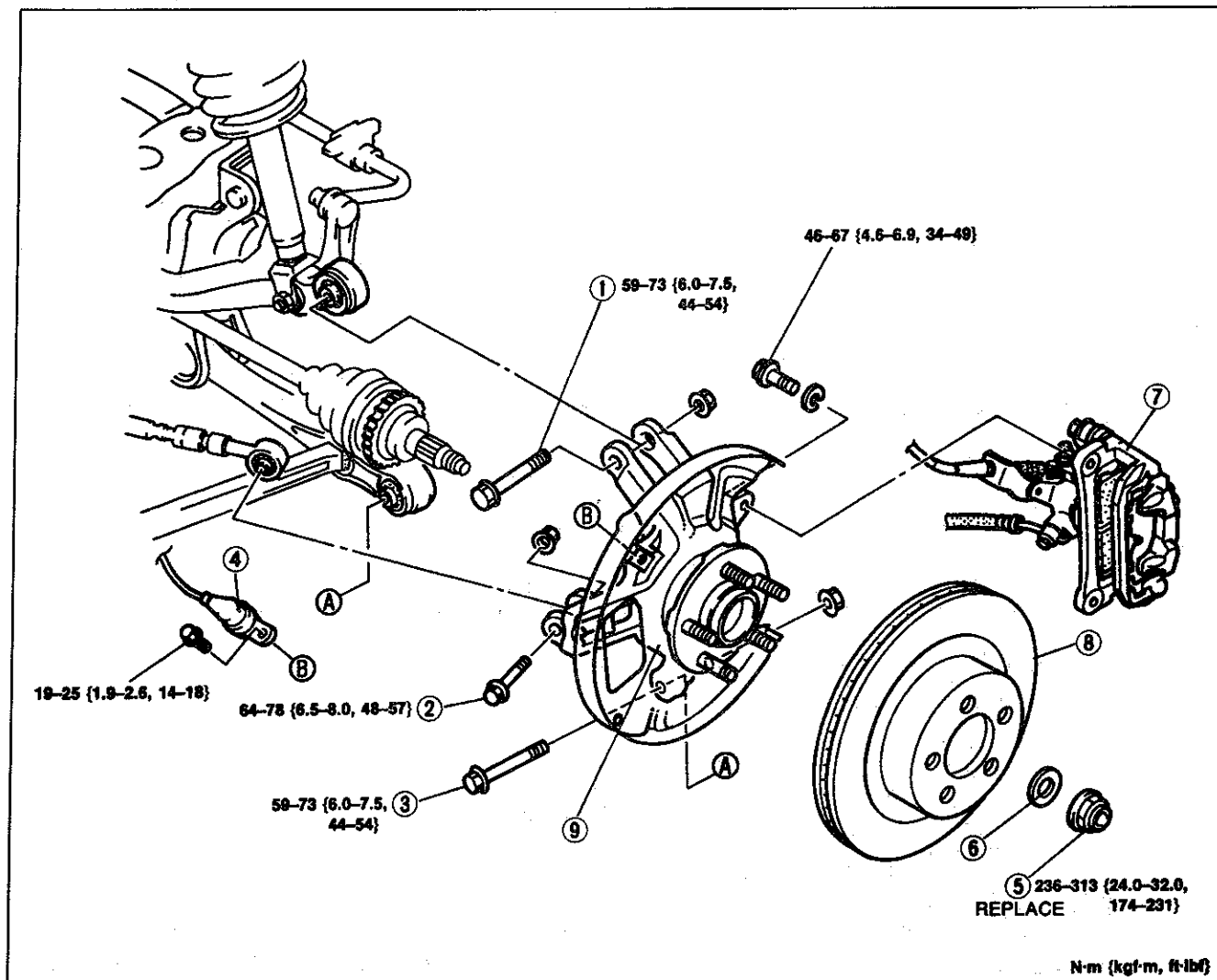
Wheel bearing play

1. Position a dial indicator against the wheel hub.
2. Push and pull the wheel hub by hand in the axial direction and measure the wheel bearing play.
3. If the bearing play exceeds specification, check and adjust the wheel hub nut torque or replace the wheel bearing, if necessary.

Wheel bearing play: 0.05 mm {0.002 in} max.

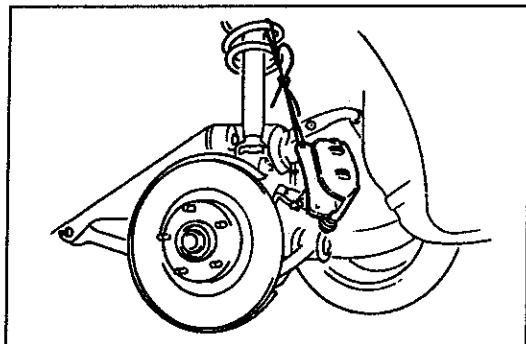
Removal / Inspection / Installation

1. Jack up the rear of the vehicle and support it on safety stands.
2. Remove the wheel.
3. Remove in the order shown in the figure, referring to **Removal Note**.
4. Inspect all parts and repair or replace as necessary.
5. Install in the reverse order of removal, referring to **Installation Note**.
6. Install the wheel. (Tightening torque: 89–117 N·m {9.0–12.0 kgf·m, 65–86 ft·lbf})
7. After installation, check the rear wheel alignment. (Refer to section R.)



1. Bolt (upper arm)
2. Bolt (toe control link)
3. Bolt (l-arm)
4. ABS wheel-speed sensor
Service Section P
5. Wheel hub nut
Installation Note page M-11
6. Washer

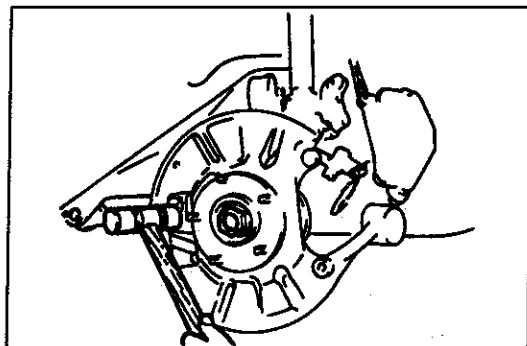
7. Brake caliper assembly
Removal Note page M-11
Service Section P
8. Disc plate
Service Section P
9. Rear hub support assembly
Removal Note page M-11
Disassembly / Inspection /
Assembly page M-12



Removal note

Brake caliper assembly

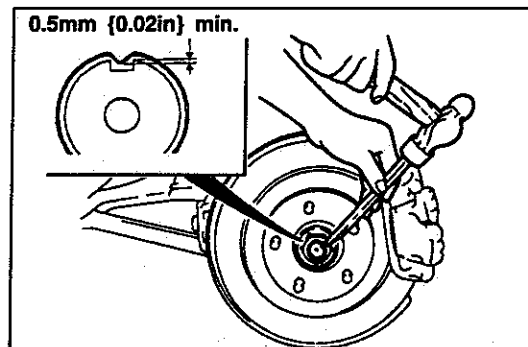
Hang the brake caliper assembly as shown in the figure.



Rear hub support assembly

Note

- If the drive shaft will not come out of the wheel hub easily, install a discarded nut onto the drive shaft so that the nut is flush with the end of the drive shaft. Tap the nut with a copper hammer to loosen the drive shaft from the wheel hub.



Installation note

Wheel hub nut

1. Install a new hub nut and stake it as shown.

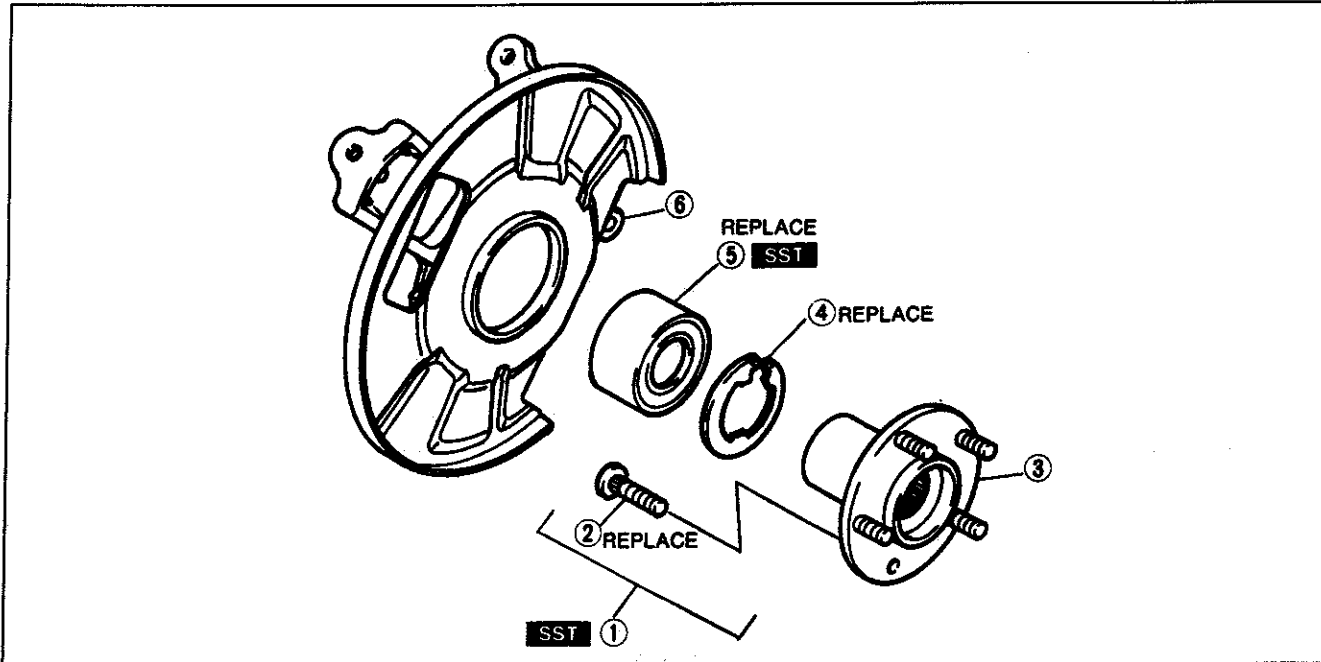
Tightening torque:

236–313 N·m{24.0–32.0 kgf·m, 174–231 ft·lbf}

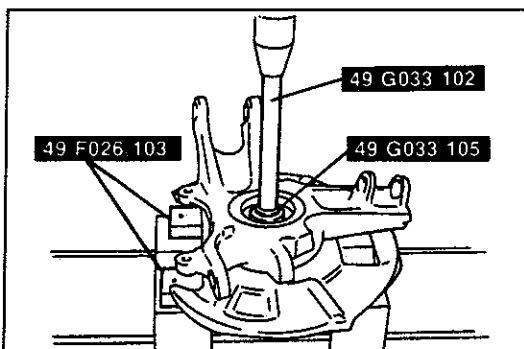
2. Check the wheel bearing play. (Refer to page M-9.)

Disassembly / Inspection / Assembly

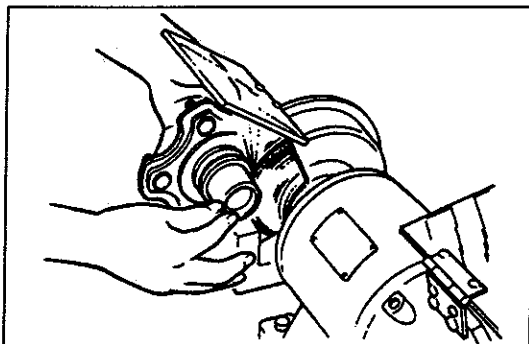
1. Disassemble in the order shown in the figure, referring to **Disassembly Note**.
2. Inspect all parts and repair or replace as necessary.
3. Assemble in the reverse order of disassembly, referring to **Assembly Note**.



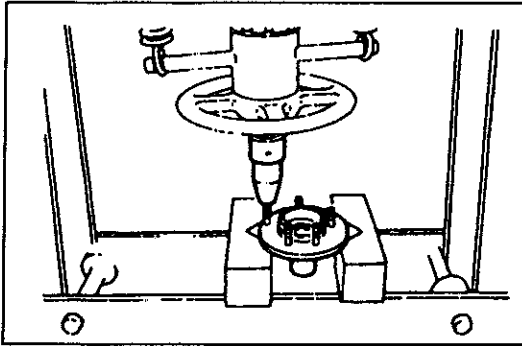
- | | |
|--|--|
| <ol style="list-style-type: none"> 1. Axle flange assembly
Disassembly Note below
Assembly Note page M-13 2. Hub bolt
Disassembly Note page M-13
Assembly Note page M-13 | <ol style="list-style-type: none"> 3. Axle flange
Inspect for cracks and damage 4. Retaining ring 5. Wheel bearing
Disassembly Note page M-13
Assembly Note page M-13 6. Rear hub support assembly
Inspect for cracks and damage |
|--|--|

**Disassembly note**
Axle flange assembly

1. Remove the axle flange assembly by using the SST.



2. Grind a section of the bearing race until approx. 0.5 mm {0.02 in} thickness remains.
3. Cut the race by using a chisel and remove it.

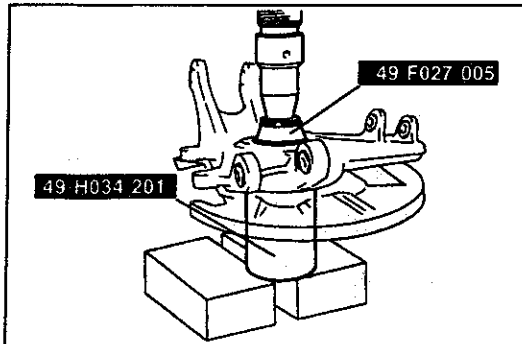


Hub bolt

Note

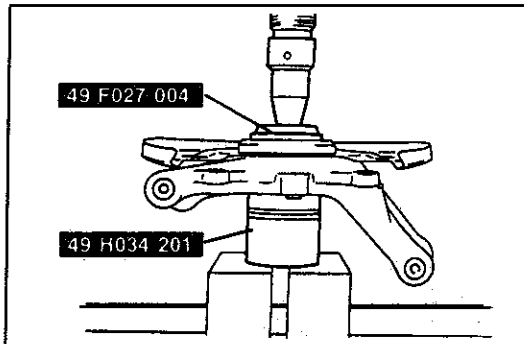
- The hub bolts do not need to be removed unless you are replacing them.

Remove the hub bolts by using a press.



Wheel bearing

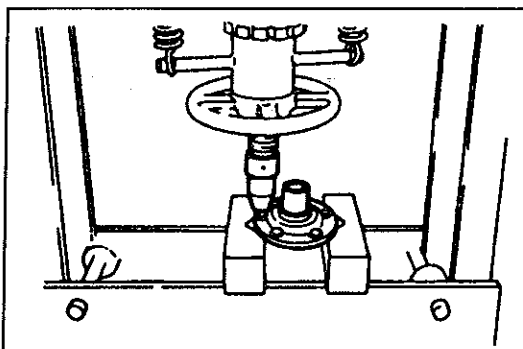
Remove the wheel bearing by using the SST.



Assembly note

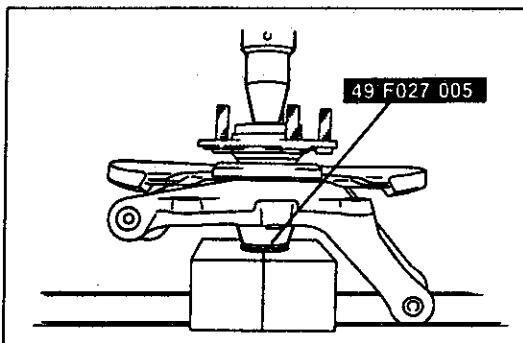
Wheel bearing

Install the new wheel bearing by using the SST.



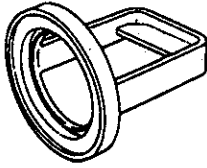
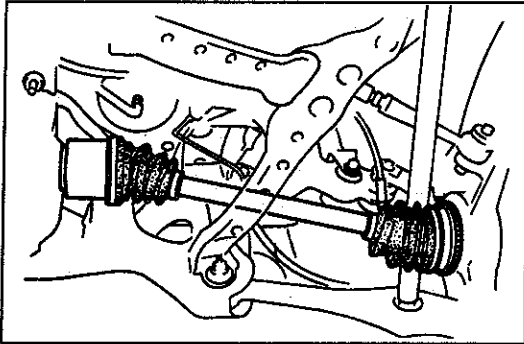
Hub bolt

Press in new hub bolts.



Axle flange assembly

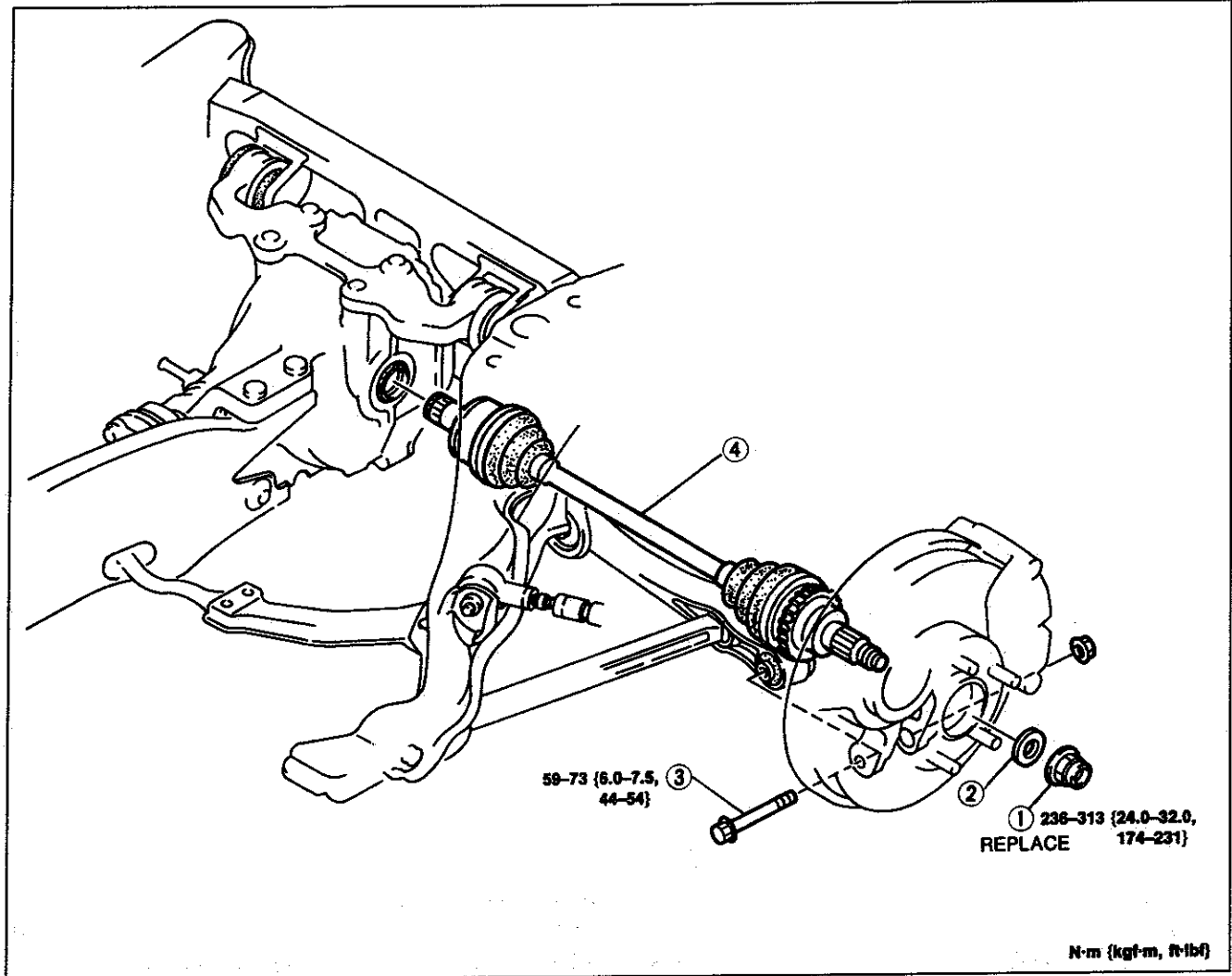
Install the axle flange assembly by using the SST.

DRIVE SHAFT**PREPARATION****49 F026 104**Installer,
sensor rotorFor installation
of ABS sensor
rotor**DRIVE SHAFT
(TRIPOD JOINT)
Preinspection
Drive shaft**

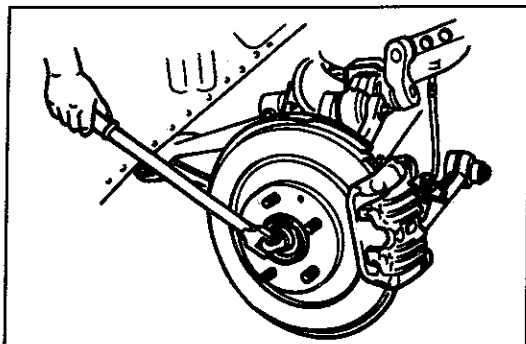
1. Check the dust boot on the drive shaft for cracks, damage, grease leakage, and a loose boot band.
2. Check the drive shaft for bending, cracks, and wear of the joints and splines.
3. Repair or replace the drive shaft as necessary.

Removal / Installation

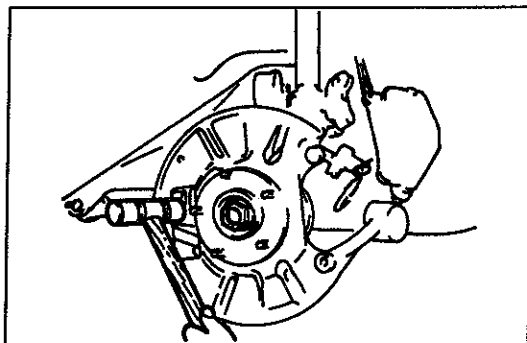
1. Jack up the rear of the vehicle and support it on safety stands.
2. Remove the wheel.
3. Remove in the order shown in the figure, referring to **Removal Note**.
4. Install in the reverse order of removal, referring to **Installation Note**.
5. Install the wheel. (Tightening torque: 89–117 N·m {9.0–12.0 kgf·m, 65–86 ft·lbf})
6. Check the rear wheel alignment. (Refer to section R.)



- | | | | |
|-------------------|-----------------|-------------------|-----------------|
| 1. Wheel hub nut | | 4. Drive shaft | |
| Removal Note | page M-16 | Removal Note | page M-16 |
| Installation Note | page M-17 | Installation Note | page M-16 |
| 2. Washer | | Overhaul | page M-18 |
| 3. Bolt (l-arm) | | | |

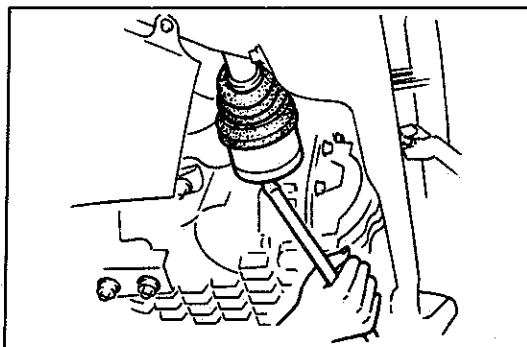
**Removal note****Wheel hub nut**

1. Raise the staked portion of the hub nut by using a chisel.
2. Lock the hub by applying the parking brakes.
3. Remove the hub nut.

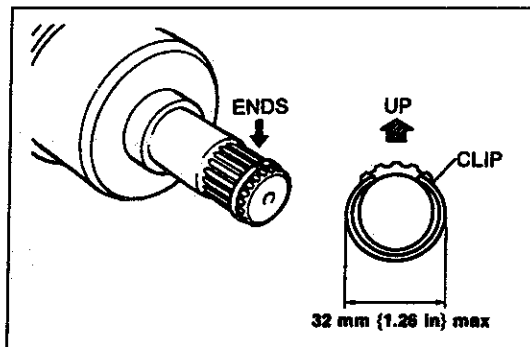
**Drive shaft****Note**

- If the drive shaft will not come out of the rear hub support easily, install a discarded nut onto the drive shaft so that the nut is flush with the end of the drive shaft. Tap the nut with a copper hammer to loosen the drive shaft from the wheel hub.

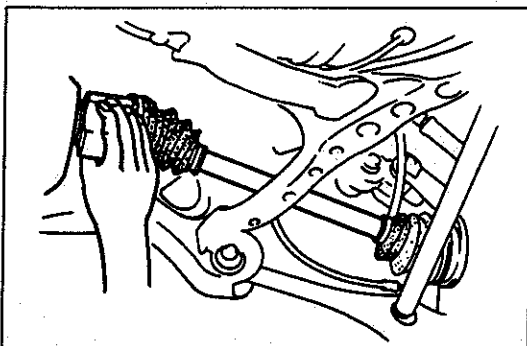
1. Pull the rear hub support from the drive shaft.



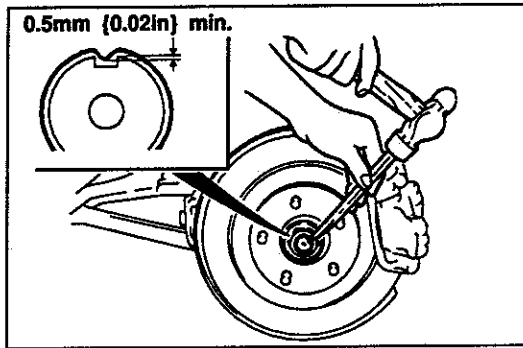
2. Remove the drive shaft from the differential by using a pry bar.

**Installation note****Drive shaft**

1. Install a new clip onto the drive shaft.
2. Measure the outer diameter of the clip after installing, and replace the clip if it exceeds the specification.



3. With the ends of the clip facing upward, push the drive shaft into the differential. Then pull outward, on the drive shaft to verify that it is securely held by the clip.

**Wheel hub nut**

1. Install a new hub nut and stake it as shown.

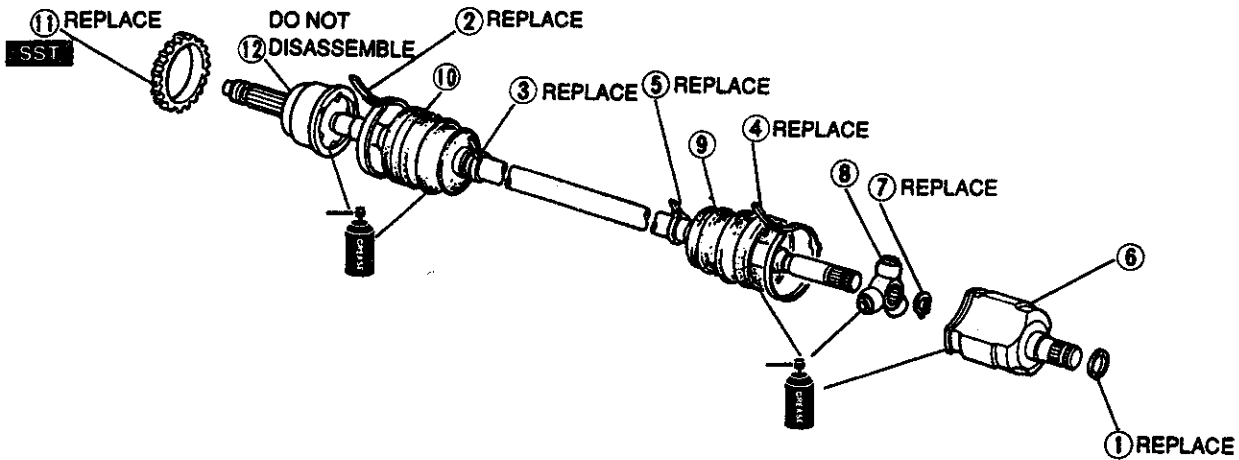
Tightening torque:

236–313 N·m {24.0–32.0 kgf·m, 174–231 ft·lbf}

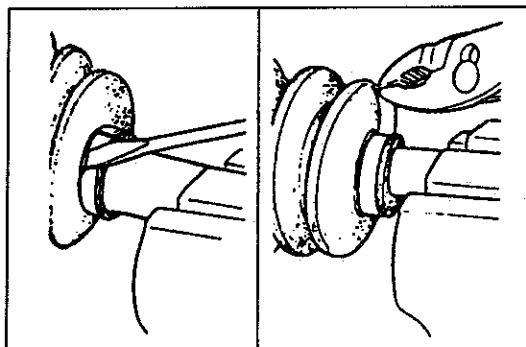
2. Check the wheel bearing play. (Refer to page M-9.)

Overhaul

1. Disassemble in the order shown in the figure, referring to **Disassembly Note**.
2. Inspect all parts and repair or replace as necessary.
3. Verify that all parts are free of dust, dirt, and other foreign material immediately before reassembly.
4. Assemble in the reverse order of disassembly, referring to **Assembly Note**.



1. Clip
2. Boot band
 - Disassembly Note below
 - Assembly Note page M-21
3. Boot band
 - Disassembly Note below
 - Assembly Note page M-21
4. Boot band
 - Disassembly Note below
 - Assembly Note page M-21
5. Boot band
 - Disassembly Note below
 - Assembly Note page M-21
6. Outer ring
 - Disassembly Note below
 - Inspect inside bore for wear, corrosion, and scoring
 - Assembly Note page M-21
7. Snap ring
 - Disassembly Note below
 - Assembly Note page M-21
8. Tripod joint
 - Disassembly Note below
 - Inspect for wear and damage
 - Assembly Note page M-21
9. Boot
 - Disassembly Note page M-20
 - Inspect for damage
 - Assembly Note page M-20
10. Boot
 - Disassembly Note page M-20
 - Inspect for damage
 - Assembly Note page M-20
11. ABS sensor rotor
 - Disassembly Note page M-20
 - Assembly Note page M-20
12. Shaft and ball joint assembly
 - Inspect splines for damage and wear
 - Inspect wheel-side joint for excessive play and rough rotation.

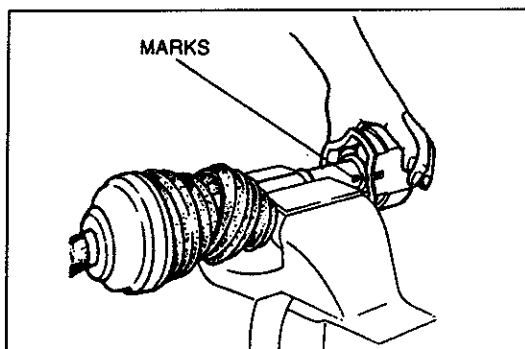


Disassembly note Boot band

Note

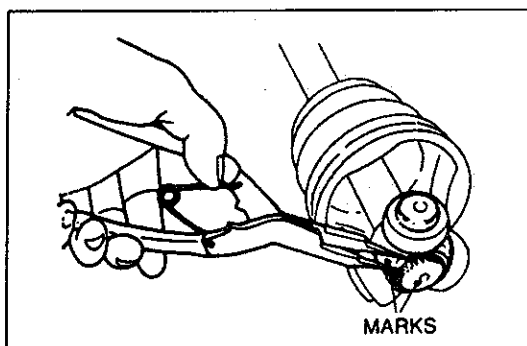
- The wheel-side boot band does not need to be removed unless you are replacing the boot.

1. Pry up the locking tabs of the boot band by using a screwdriver.
2. Remove the band by using pliers.



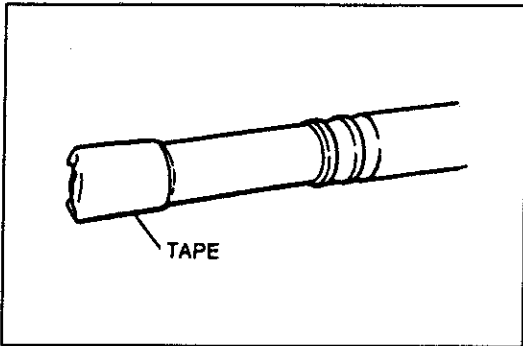
Outer ring

Mark the outer ring and the shaft for proper reassembly.



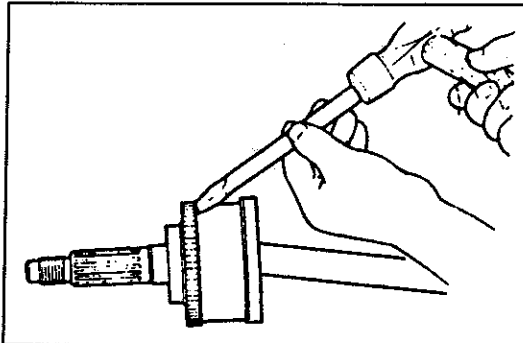
Snap ring / Tripod joint

1. Mark the shaft and tripod joint for proper reassembly.
2. Remove the snap ring by using snap-ring pliers.
3. Drive the tripod joint from the shaft by using a bar and a hammer.

**Boot****Note**

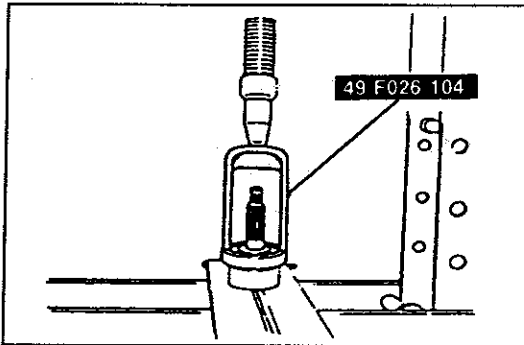
- The wheel-side boot does not need to be removed unless you are replacing it.

Wrap the splines of the shaft with tape to prevent damaging the boot.

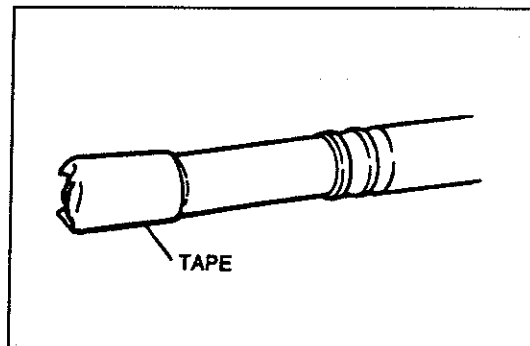
**ABS sensor rotor****Note**

- The sensor rotor does not need to be removed unless you are replacing it.

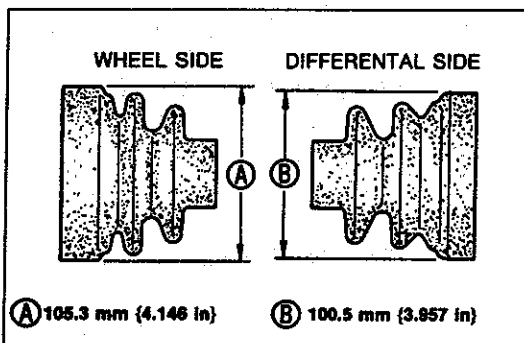
Tap the sensor rotor off the drive shaft by using a chisel and a hammer.

**Assembly note**
ABS sensor rotor

Set a new sensor rotor on the drive shaft and press it on by using the SST.

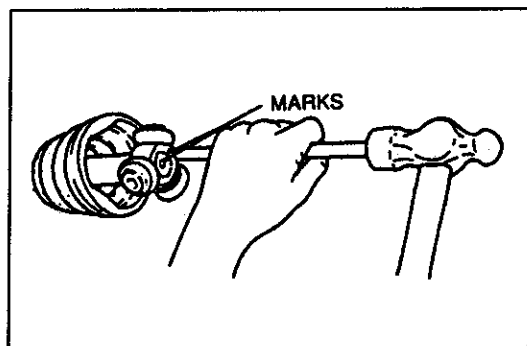
**Boot**

1. Wrap the differential-side splines with tape.



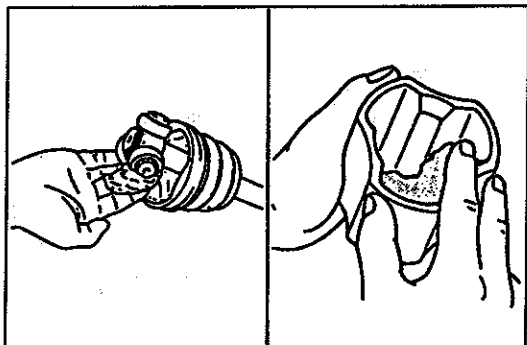
2. Install the wheel-side and differential-side boots, noting the shape and size of each one.
3. Fill the boot with the specified grease (supplied in the boot kit).

Grease amount: 100–120 g (3.53–4.23 oz)



Tripod joint / Snap ring

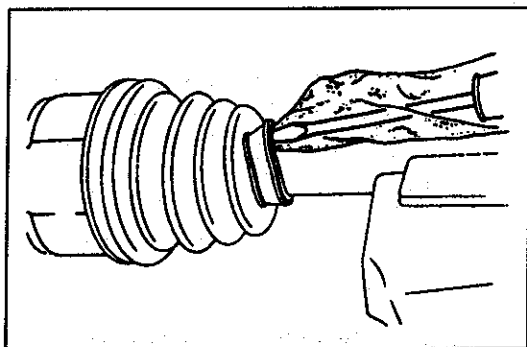
1. Align the marks and install the tripod joint by using a bar and a hammer.
2. Install a new snap ring by using snap-ring pliers.



Outer ring

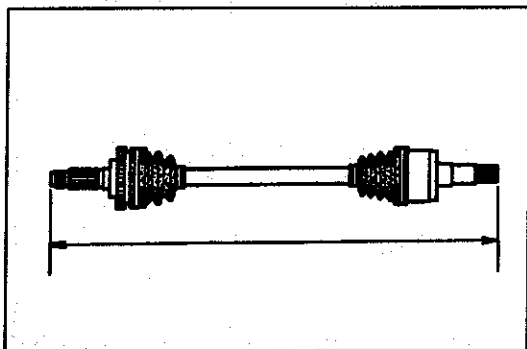
Fill the outer ring and differential-side boot with the specified grease (Supplied in the boot kit).

Grease amount: 170–190 g (6.01–6.70 oz)



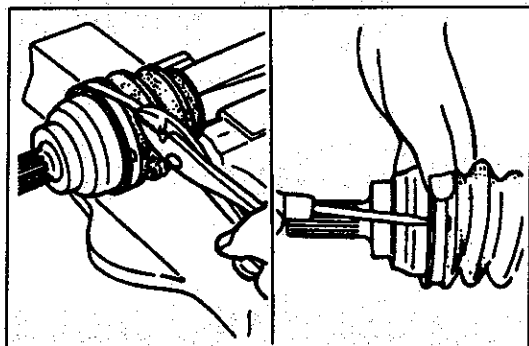
Boot band

1. Install the boot.
2. Carefully lift up the small end of the boot to release any trapped air.
3. Verify that the boot is not dented or twisted.



4. Measure the length of drive shaft.

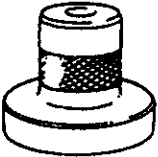

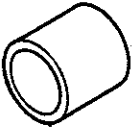

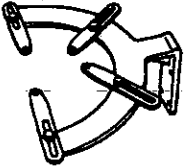
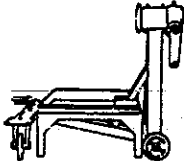
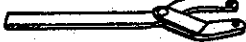
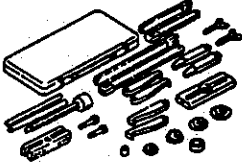
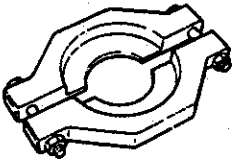
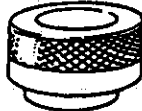
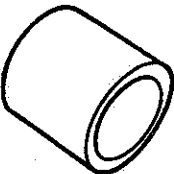
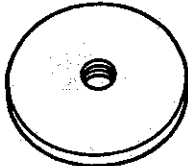
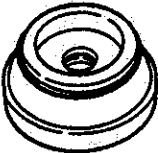

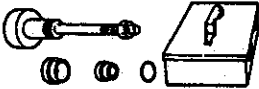
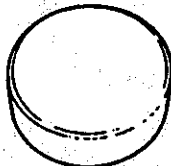
Drive shaft length: 791.2–801.2 mm {31.15–31.54 in}

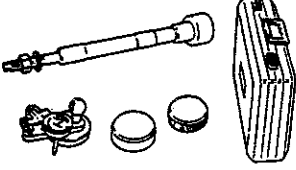
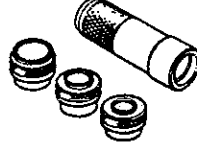
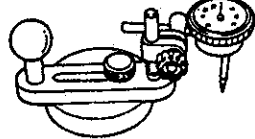

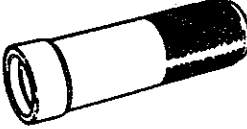


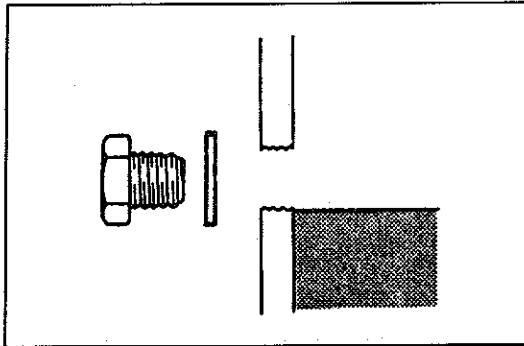
5. Fold the new boot band back by pulling on the end with pliers.
6. Lock the end of the boot band by bending the locking tabs.

DIFFERENTIAL

PREPARATION
SST

49 V001 795 Installer, oil seal		For installation of oil seal (companion flange)	49 B001 795 Installer, oil seal		For installation of oil seal (side bearing)
49 U027 003 Installer, oil seal		For installation of oil seal (side bearing)	49 B001 797 Handle (Part of 49 B001 795)		For installation of oil seal (side bearing)
49 M005 561 Hanger, differential carrier		For disassembly / assembly of differential	49 0107 680A Stand, engine		For disassembly / assembly of differential
49 S120 710 Holder, coupling flange		For removal / installation of companion flange nut	49 0839 425C Puller set, bearing		For Removal of companion flange and side bearing
49 H027 002 Remover, bearing		For removal of rear bearing	49 UB71 525 Installer, bearing		For installation of side bearing
49 J027 002 Collar		For adjustment of pinion height	49 J027 001 Installer, bearing		For installation of rear bearing race
49 F027 007 Attachment ϕ 72		For installation of front bearing race	49 8531 567 Collar A (Part of 49 8531 565)		For adjustment of pinion height
49 8531 565 Pinion model		For adjustment of pinion height	49 0660 555 Gauge block (Part of 49 F027 0A0)		For adjustment of pinion height

<p>49 F027 0A0</p> <p>Gauge set, pinion height adjustment</p> 	<p>For adjustment of pinion height</p>	<p>49 F401 330B</p> <p>Installer set, bearing</p> 	<p>For installation of rear bearing</p>
<p>49 0727 570</p> <p>Gauge body, pinion height (Part of 49 F027 0A0)</p> 	<p>For adjustment of pinion height</p>	<p>49 G030 338</p> <p>Attachment E</p> 	<p>For installation of rear bearing</p>
<p>49 F401 331</p> <p>Body (Part of 49 F401 330B)</p> 	<p>For installation of rear bearing</p>		



DIFFERENTIAL OIL

Inspection

1. On level ground, jack up the vehicle and support it evenly on safety stands.
2. Remove the filler plug.
3. Verify that the oil is at the bottom of the filler plug hole. If it is low, add the specified oil.
4. Install a new washer and the filler plug.

Tightening torque:

40–53 N·m{4.0–5.5 kgf·m, 29–39 ft·lbf}

Replacement

1. Remove the filler and drain plugs.
2. Drain the differential oil into a suitable container.
3. Wipe the plugs clean.
4. Install a new washer and the drain plug.

Tightening torque:

40–53 N·m{4.0–5.5 kgf·m, 29–39 ft·lbf}

5. Add the specified oil from the filler plug hole until it reaches the bottom of the hole.

Specified oil

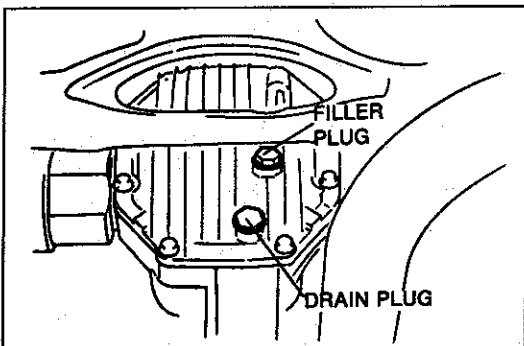
Type

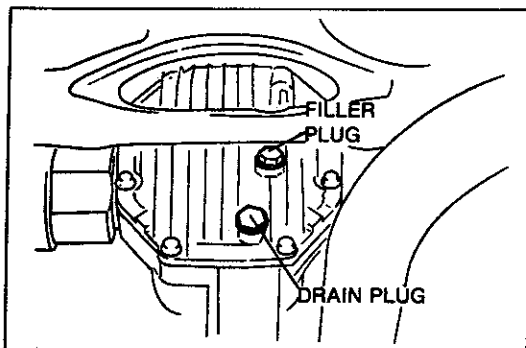
Above – 18°C {0°F}: API GL-4 or GL-5, SAE 90
Below – 18°C {0°F}: API GL-4 or GL-5, SAE 80
Capacity: 1.30 L {1.38 US qt, 1.14 Imp qt}

6. Install a new washer and the filler plug.

Tightening torque:

40–53 N·m{4.0–5.5 kgf·m, 29–39 ft·lbf}



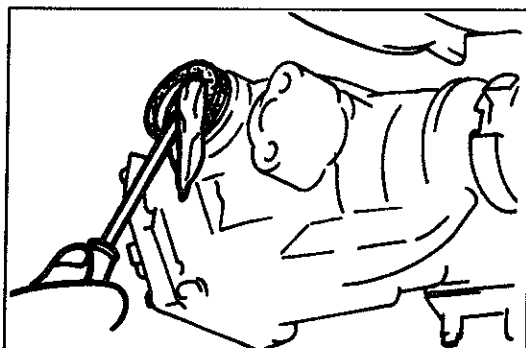
**OIL SEAL****Replacement****Oil seal (side bearing)**

1. Remove the filler and drain plugs.
2. Drain the differential oil into a suitable container.
3. Wipe the plugs clean.
4. Install a new washer and the drain plug.

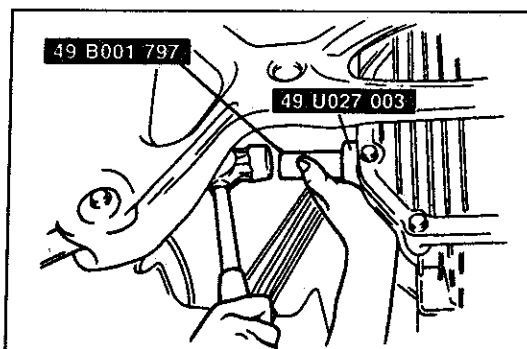
Tightening torque:

40–53 N·m{4.0–5.5 kgf·m, 29–39 ft·lbf}

5. Remove the drive shaft. (Refer to page M-15.)
6. Remove the clip from the drive shaft.
7. Remove the oil seal by using a cloth-wrapped screwdriver.



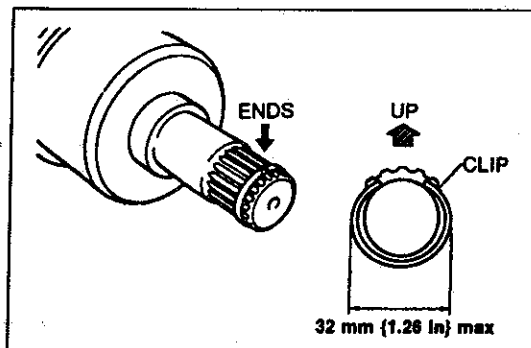
8. Apply clean differential oil to the lip of a new oil seal.
9. Install the oil seal by using the SST.



10. Install a new clip onto the drive shaft.
11. Measure the outer diameter of the clip after installing, and replace the clip if it exceeds the specification.

Caution

- The sharp edges of the drive shaft snap ring can slice or puncture the oil seal. Be careful when installing the drive shaft to the transmission.



12. Install the drive shaft with the ends of the clip facing upward.
13. Verify that the drive shaft is seated into the side gear by pulling it outward by hand. It should not come out.
14. Add the specified oil through the filler plug hole until it reaches the bottom of the hole.

Specified oil**Type**

Above – 18°C {0°F}: API GL-4 or GL-5, SAE 90

Below – 18°C {0°F}: API GL-4 or GL-5, SAE 80

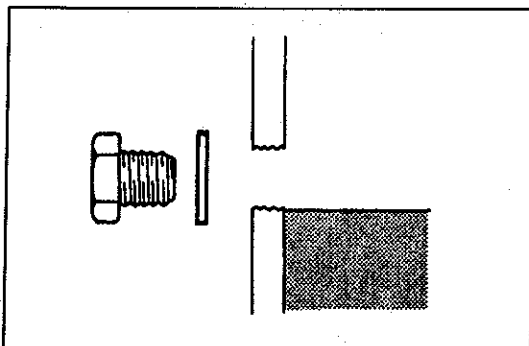
Capacity: 1.30 L {1.38 US qt, 1.14 Imp qt}

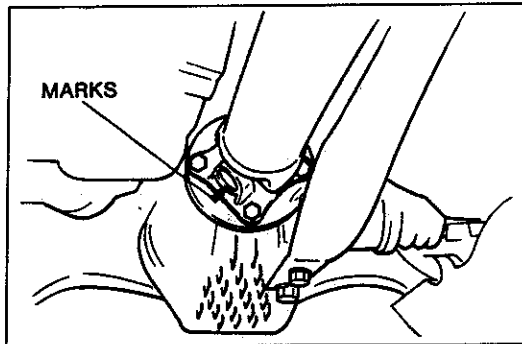
15. Install a new washer and the filler plug.

Tightening torque:

40–53 N·m{4.0–5.5 kgf·m, 29–39 ft·lbf}

16. Check for oil leakage.

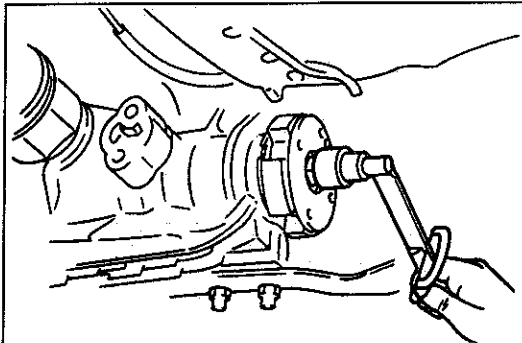


**Oil seal (companion flange)**

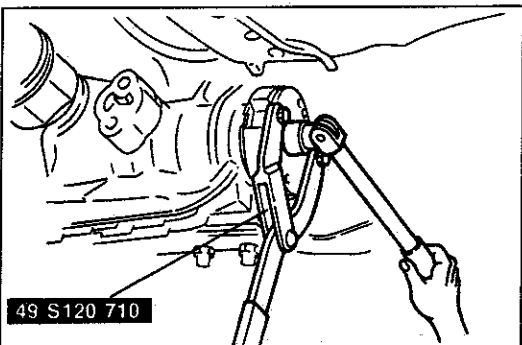
1. Remove the filler and drain plugs.
2. Drain the differential oil into a suitable container.
3. Wipe the plugs clean.
4. Install a new washer and the drain plug.

Tightening torque:

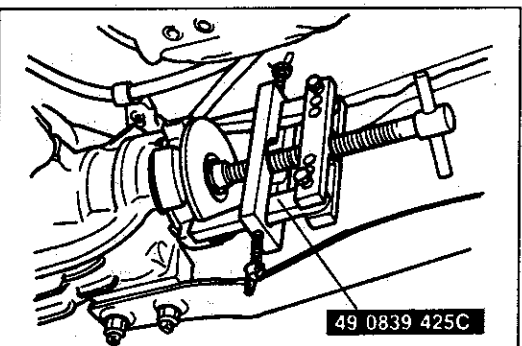
40–53 N·m{4.0–5.5 kgf·m, 29–39 ft·lbf}



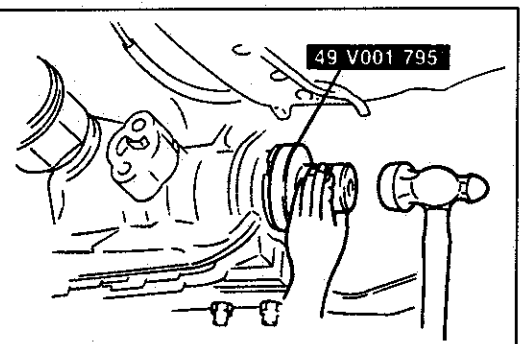
5. Mark the propeller shaft and differential companion flange for proper reinstallation.
6. Remove the nuts and bolts and remove the propeller shaft.
7. Measure and record the rotation starting torque of the drive pinion.



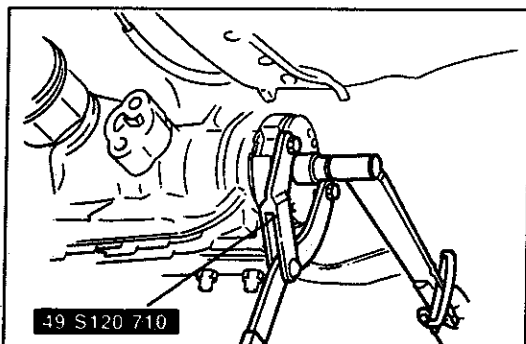
8. Using the SST to hold the companion flange, remove the nut.



9. Use the SST to remove the companion flange.
10. Remove the oil seal by using a screwdriver.



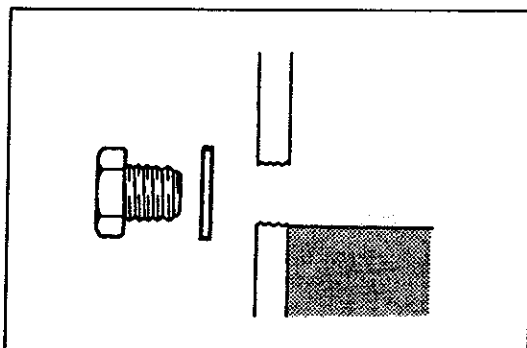
11. Apply clean differential oil to the lip of the new oil seal.
12. Install the oil seal by using the SST.



13. Using the SST, hold the companion flange and tighten the new companion flange nut to the specified torque.

Tightening torque:

128–284 N·m {13.0–29.0 kgf·m, 94.1–209 ft·lbf}



14. Loosen the nut. Retighten it to get the starting torque recorded in Step 7.

15. Add the specified oil through the filler plug hole until it reaches the bottom of the hole.

Specified oil

Type

Above – 18°C {0°F}: API GL-4 or GL-5, SAE 90

Below – 18°C {0°F}: API GL-4 or GL-5, SAE 80

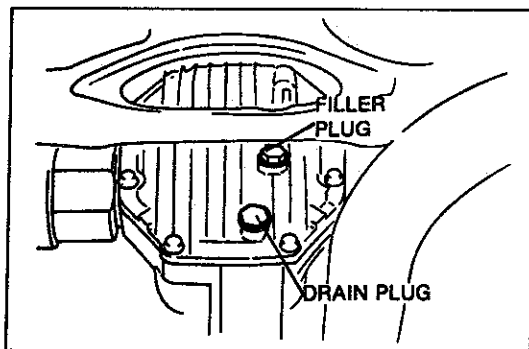
Capacity: 1.30 L {1.38 US qt, 1.14 Imp qt}

16. Install a new washer and the filler plug.

Tightening torque:

40–53 N·m {4.0–5.5 kgf·m, 29–39 ft·lbf}

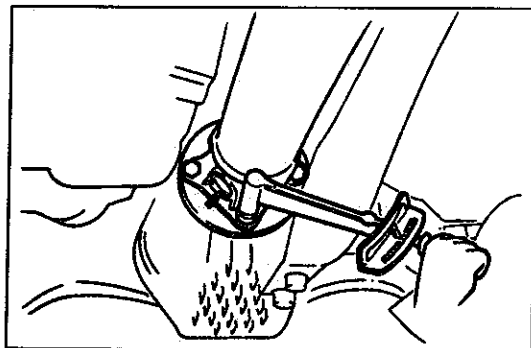
17. Check for oil leakage.



18. Align the marks and install the propeller shaft.

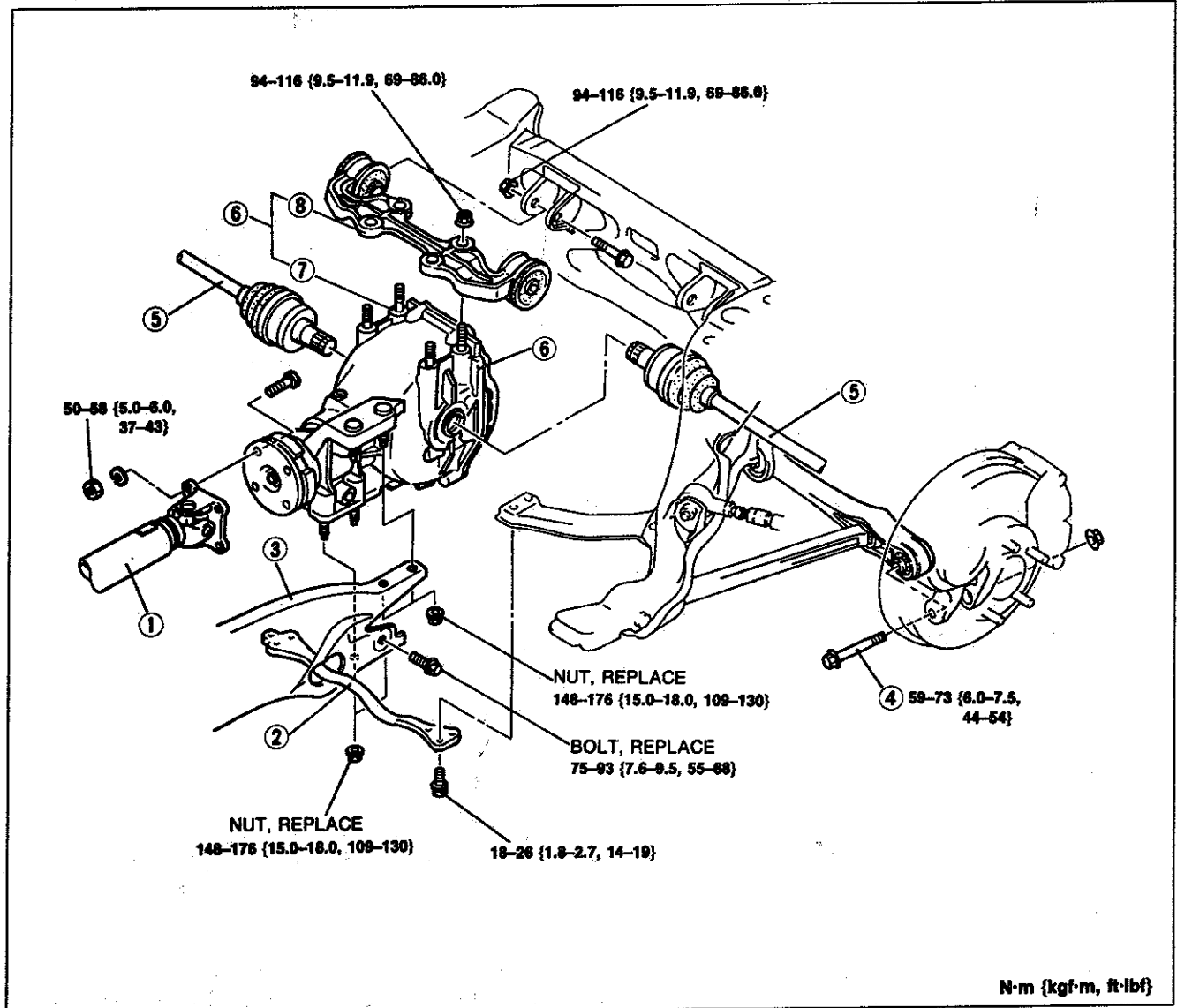
Tightening torque:

50–58 N·m {5.0–6.0 kgf·m, 37–43 ft·lbf}

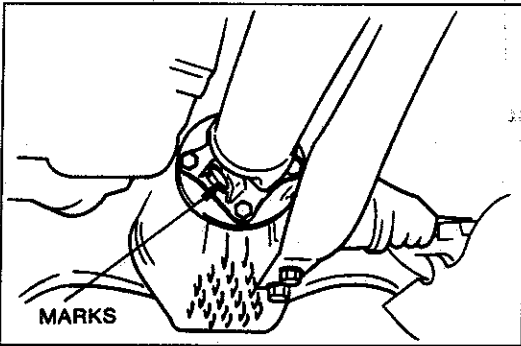


DIFFERENTIAL (TORQUE SENSING LSD)**Removal / Installation**

1. Remove the exhaust pipe. (Refer to section F.)
2. Remove in the order shown in the figure, referring to **Removal Note**.
3. Install in the reverse order of removal, referring to **Installation Note**.
4. After installation, check the rear wheel alignment. (Refer to section R.)
5. Refill the differential with the specified type and amount of oil. (Refer to page M-23.)
6. Install the exhaust pipe. (Refer to section F.)

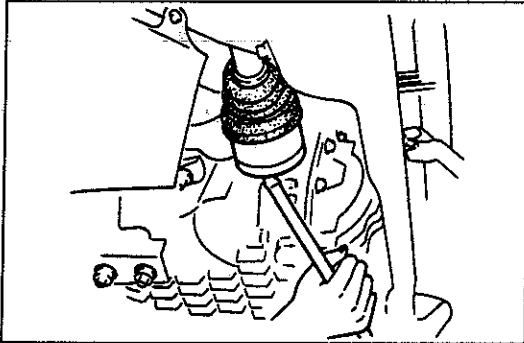


- | | | | |
|---------------------------------|-----------|-------------------------------------|-----------|
| 1. Propeller shaft | | 5. Drive shaft | |
| Removal Note | page M-28 | Removal Note | page M-28 |
| Service | Section L | Installation Note | page M-28 |
| Installation Note | page M-29 | 6. Differential assembly | |
| 2. Tunnel reinforcement bracket | | Removal Note | page M-28 |
| 3. Power plant flame | | 7. Differential | |
| Service | Section J | Disassembly / Inspection / | |
| 4. Bolt (l-arm) | | Assembly | page M-30 |
| | | 8. Differential mount | |
| | | Inspect bushing for wear and damage | |



Removal note Propeller shaft

1. Mark the propeller shaft and differential companion flange for proper reassembly.
2. Remove the nuts and bolts and remove the propeller shaft.



Drive shaft

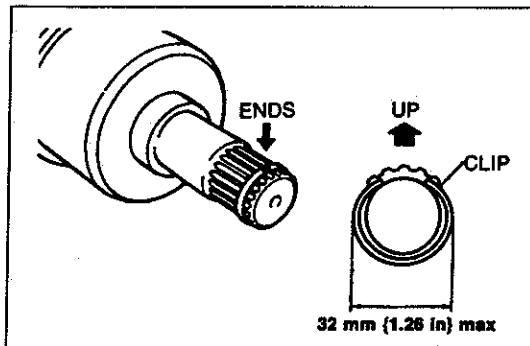
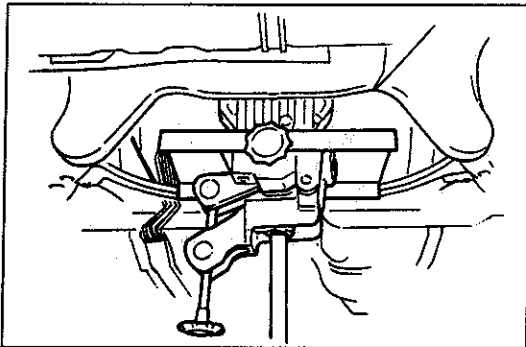
Caution

- The sharp edges of the drive shaft snap ring can slice or puncture the oil seal. Be careful when removing the drive shaft from the transmission.

1. Remove the drive shaft from the differential by using a pry bar.
2. Pull outward on the rear hub support and disc plate to disconnect the drive shaft from the differential.

Differential assembly

1. Support the differential on a jack.
2. Remove the differential.



Installation note

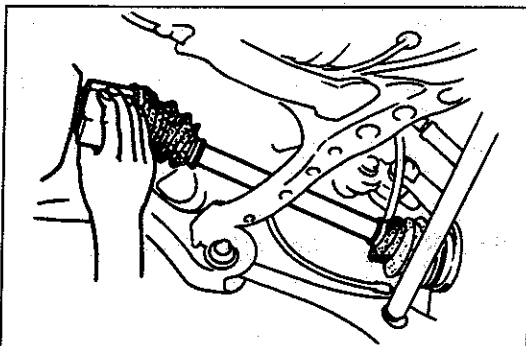
Drive shaft

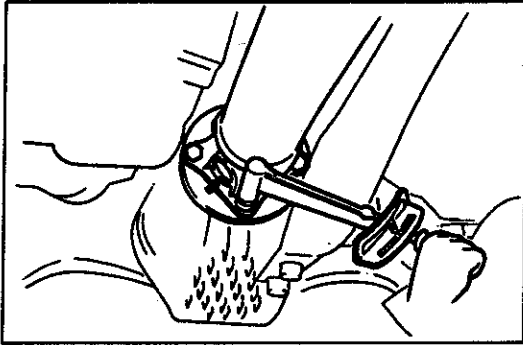
1. Install a new clip onto the drive shaft.
2. Measure the outer diameter of the clip after installing, and replace the clip if it exceeds the specification.

Caution

- The sharp edges of the drive shaft snap ring can slice or puncture the oil seal. Be careful when installing the drive shaft to the transmission.

3. With the ends of the clip facing upward, push the drive shaft into the differential.
4. After installation, pull outward on the tripod joint outer ring and verify that the drive shaft is securely held by the clip.



**Propeller shaft**

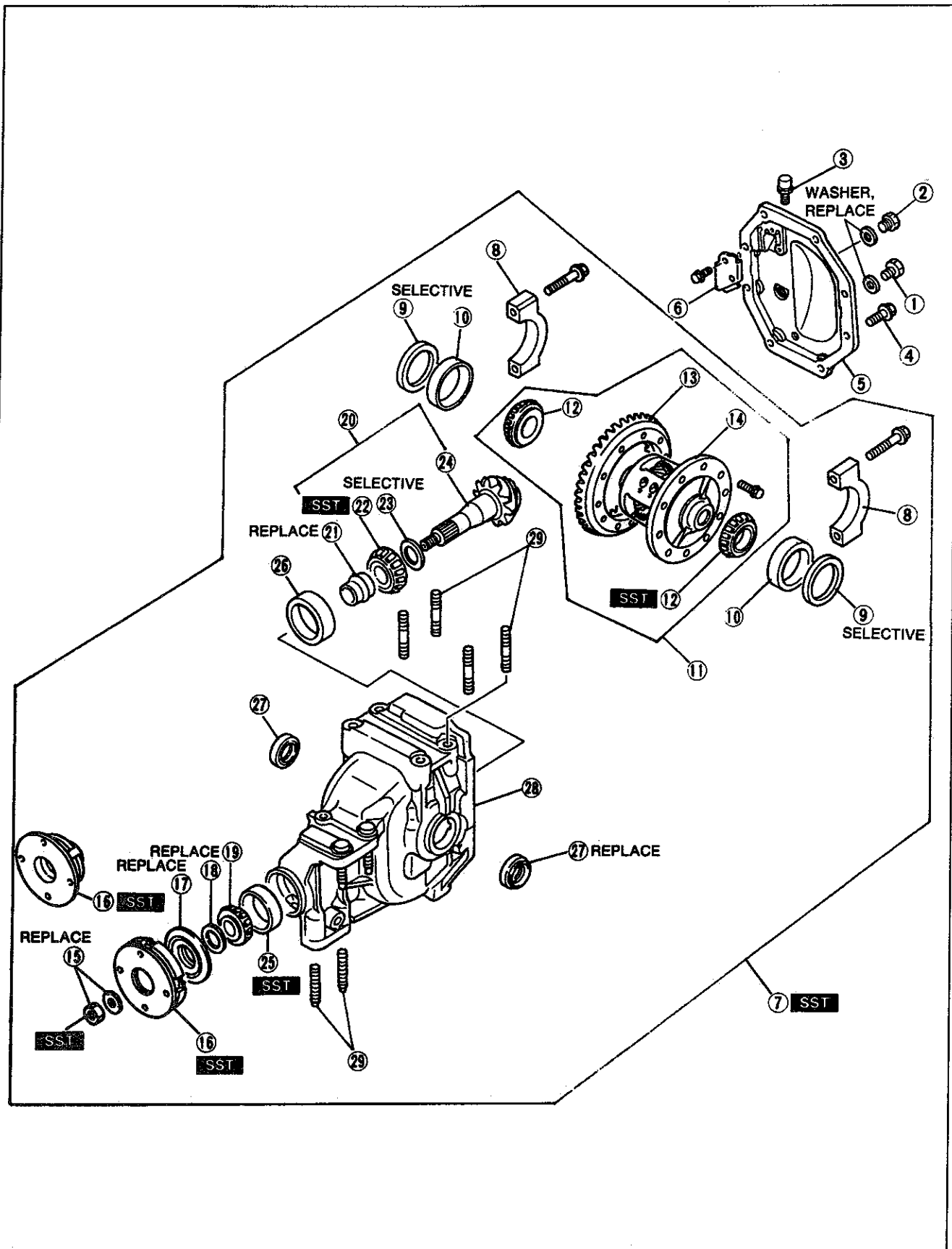
Align the marks and install the propeller shaft.

Tightening torque:

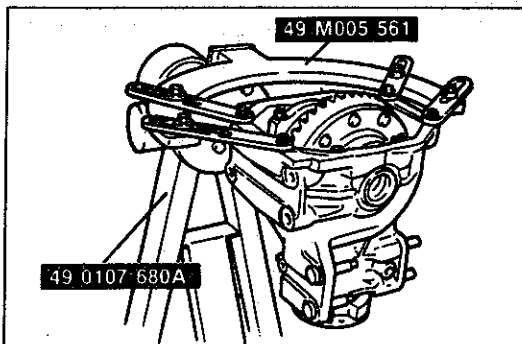
50–58 N·m {5.0–6.0 kgf·m, 37–43 ft·lbf}

Disassembly / Inspection

1. Disassemble in the order shown in the figure, referring to **Disassembly Note**.
2. Inspect all parts and repair or replace as necessary.



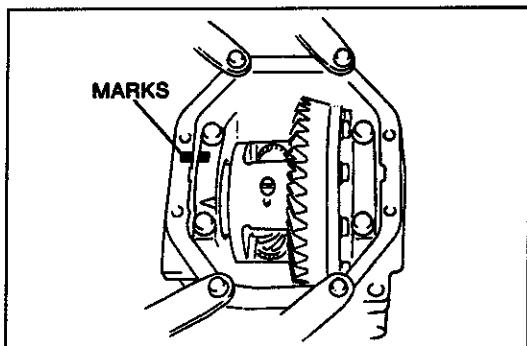
1. Drain plug
2. Filler plug
3. Breather
Inspect for clogging
4. Carrier bolt
5. Rear cover
6. Baffle
7. Differential gear assembly
Disassembly Note below
8. Bearing cap
Disassembly Note page M-32
9. Adjustment shim
Disassembly Note page M-32
10. Side bearing race
Disassembly Note page M-32
Inspect for cracks and damage
11. Gear case assembly
12. Side bearing
Disassembly Note page M-32
Inspect for damage and rough rotation
13. Ring gear
Inspect gear teeth for wear and cracks
14. Gear case (Torsen LSD assembly)
Inspect gear teeth for wear and cracks
Inspect housing for cracks and damage
15. Companion flange nut and washer
Disassembly Note page M-32
16. Companion flange
Disassembly Note page M-33
17. Oil seal (companion flange)
18. Spacer
19. Front bearing
Inspect for damage and rough rotation
20. Drive pinion assembly
Disassembly Note page M-33
21. Collapsible spacer
22. Rear bearing
Disassembly Note page M-33
Inspect for damage and rough rotation
23. Spacer
24. Drive pinion
Inspect splines for wear and damage
Inspect gear teeth for wear and cracks
25. Front bearing race
Disassembly Note page M-33
Inspect for cracks and damage
26. Rear bearing race
Disassembly Note page M-33
Inspect for cracks and damage
27. Oil seal (side bearing)
28. Differential carrier
Inspect for cracks and damage
29. Stud



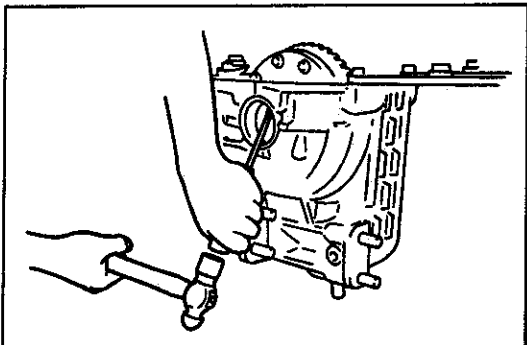
Disassembly note

Differential gear assembly

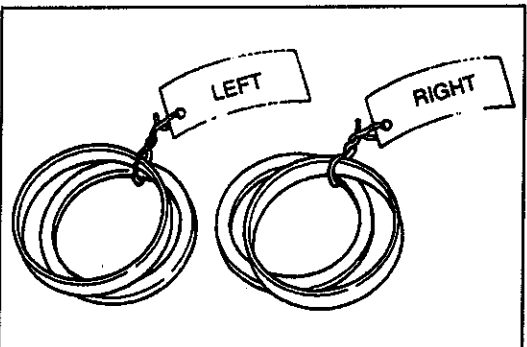
Mount the differential gear assembly on the SSTs.

**Bearing cap**

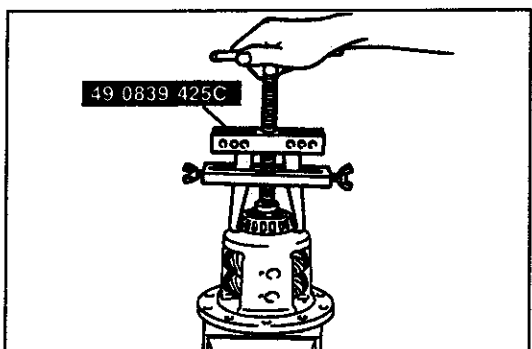
1. Mark the bearing caps and differential carrier for proper reassembly.
2. Remove the bearing caps.

**Adjustment shim and side bearing race**

1. Remove the adjustment shim, without prying against the side bearing races.
2. Remove the gear case assembly, the side bearing races, and the other adjustment shim.



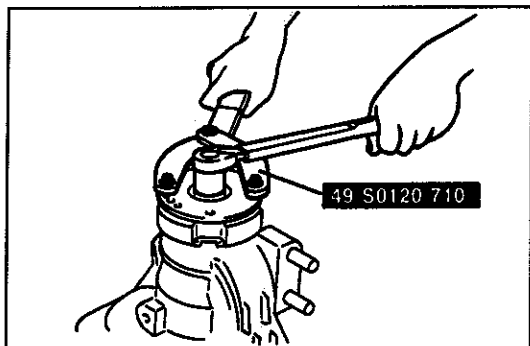
3. Tag the right and left adjustment shims and side bearing races for proper reassembly.

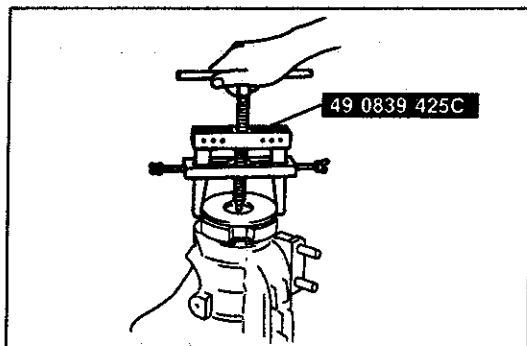
**Side bearing**

1. Mark the left and right side bearings for proper reassembly.
2. Remove the side bearings from the gear case by using the SST.

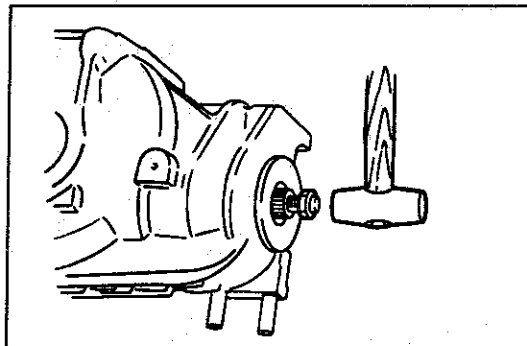
Companion flange nut

Hold the companion flange by using the SST and remove the nut.

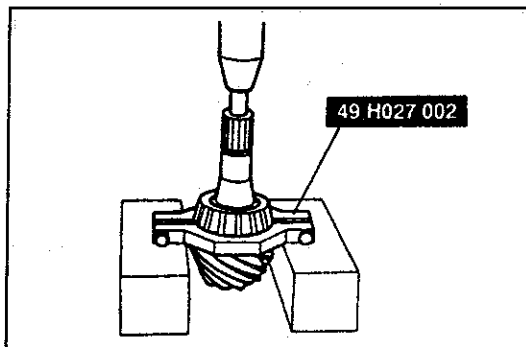


**Companion flange**

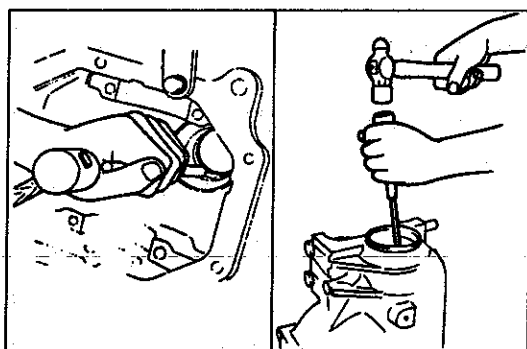
Remove the companion flange by using the SST.

**Drive pinion assembly**

1. Turn a used nut onto the drive pinion until it is about flush with the end of the shaft.
2. Tap the nut by using a brass hammer to drive the pinion assembly out of the differential carrier.

**Rear bearing**

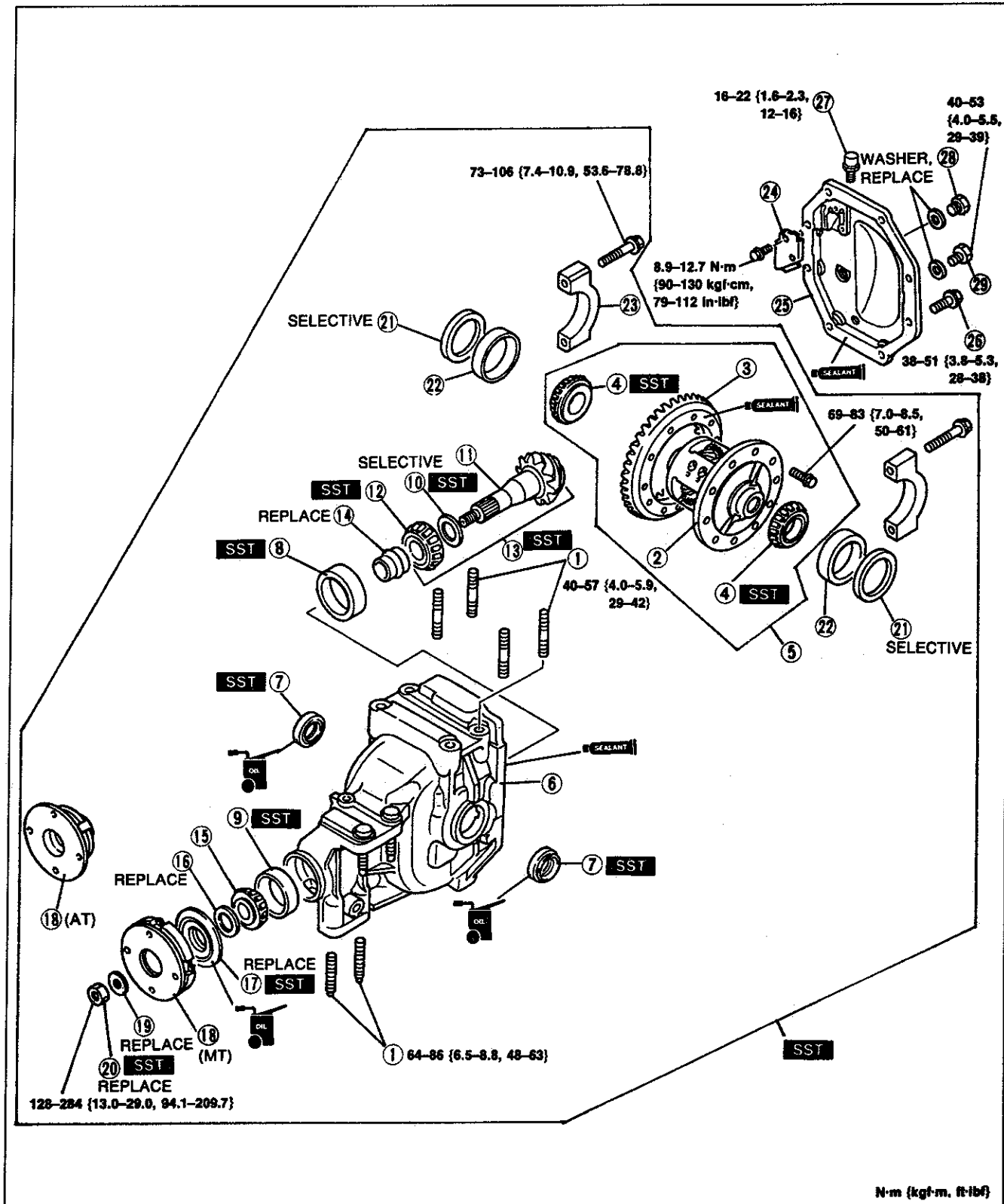
While supporting the drive pinion, remove the rear bearing by using the SST.

**Front bearing race and rear bearing race**

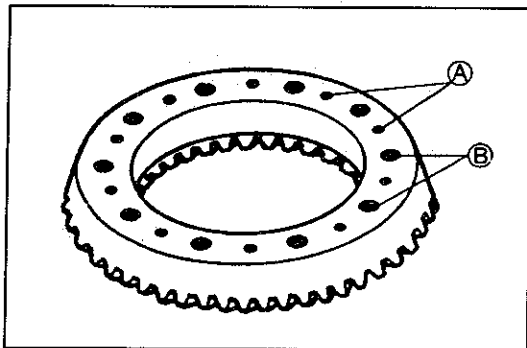
Remove the bearing races by alternately tapping the sides of the races at the grooves in the differential carrier.

Assembly

Assemble in the other shown in the figure, referring to **Assembly Note**. When installing the rear cover, install it within 10 minutes after applying sealant. Allow the sealant to set at least 30 minutes after installation before filling the differential with the specified oil.



- | | |
|---|--|
| <ol style="list-style-type: none"> 1. Stud 2. Gear case (Torsen LSD assembly) 3. Ring gear
 Assembly Note page M-35 4. Side bearing
 Assembly Note page M-35 5. Gear case assembly 6. Differential carrier 7. Oil seal (side gear)
 Assembly Note page M-35 8. Rear bearing race
 Assembly Note page M-36 9. Front bearing race
 Assembly Note page M-36 10. Spacer
 Assembly Note page M-36 11. Drive pinion 12. Rear bearing
 Assembly Note page M-37 13. Drive pinion assembly
 Assembly Note page M-38 | <ol style="list-style-type: none"> 14. Collapsible spacer 15. Front bearing 16. Spacer 17. Oil seal (companion flange)
 Assembly Note page M-38 18. Companion flange
 Assembly Note page M-38 19. Washer 20. Companion flange nut
 Assembly Note page M-39 21. Adjustment shim
 Assembly Note page M-39 22. Side bearing race 23. Bearing cap
 Assembly Note page M-40 24. Baffle 25. Rear cover 26. Carrier bolt 27. Breather 28. Filler plug 29. Drain plug |
|---|--|



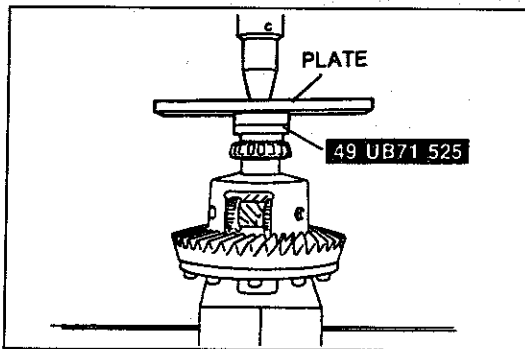
Assembly note

Ring gear

1. Apply about 0.04 cm³ {0.0024 cu in} of thread locking compound to each of the bolt threads A and points B.
2. Install the ring gear onto the gear case.

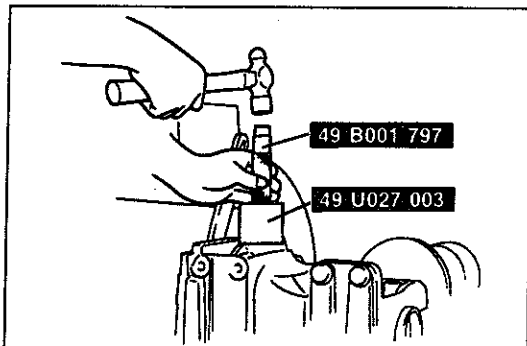
Tightening torque:

69-83 N·m{7.0-8.5 kgf·m, 50-61 ft·lbf}



Side bearing

Press the side bearings on by using the SST.

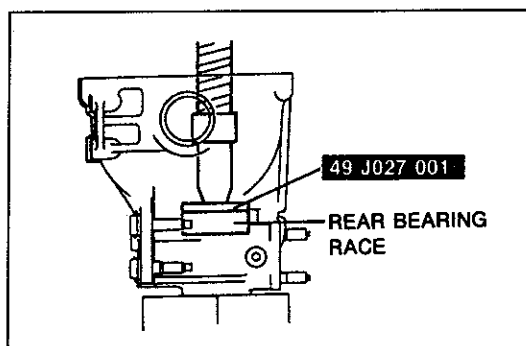


Oil seal

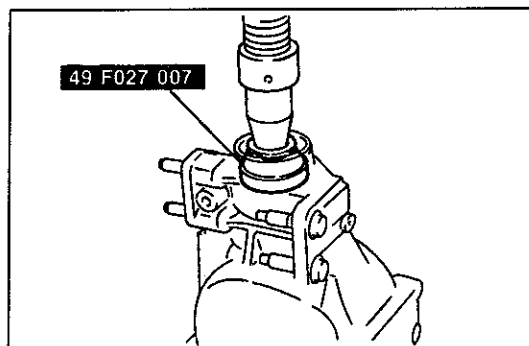
1. Apply differential oil to the lips of the new seals.
2. Install the seals by using the SST.

Rear bearing race

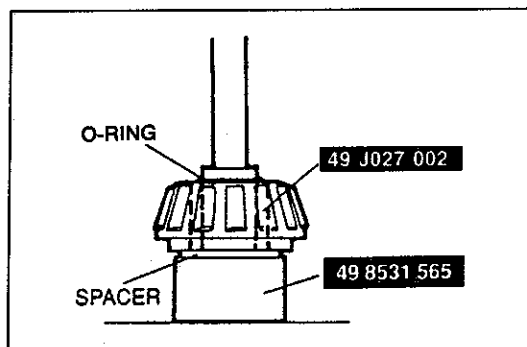
Install the rear bearing race by using the SST.

**Front bearing race**

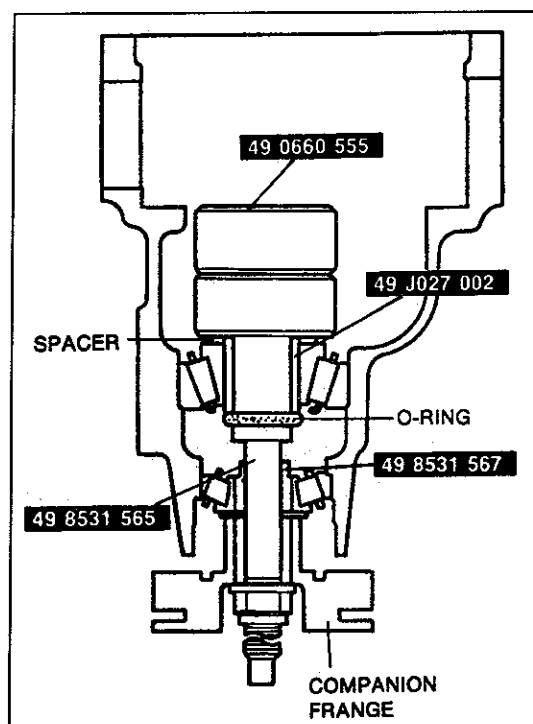
Install the front bearing race by using SST.

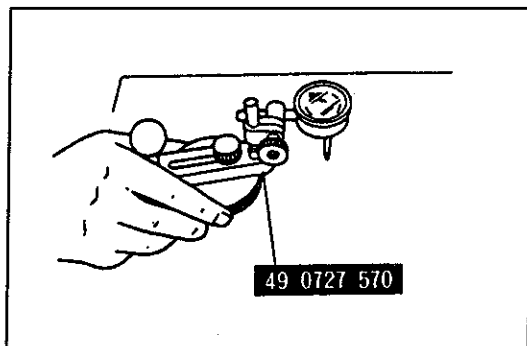
**Spacer (adjustment of pinion height)**

1. Install the previously-removed spacer onto the SST so that the beveled side of the spacer faces the drive pinion. Then install the rear bearing and O-ring onto the SST/spacer as shown in the figure.
2. Install this assembly into the differential carrier.

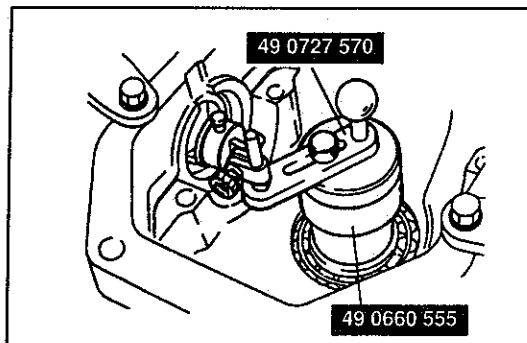


3. Install the SST (collar), front bearing, companion flange, washer and nut.
4. Tighten the nut just enough so that the companion flange can still be turned by hand.
5. Place the SST (gauge block) atop the SST (pinion model).

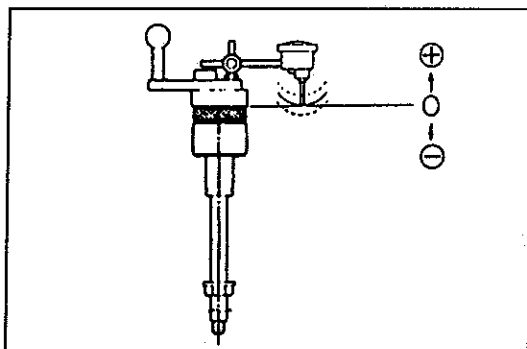




6. Place the SST on a surface plate and set the dial indicator to Zero.



7. Set the SST (gauge body) atop the SST (gauge block).
8. Place the feeler of the dial indicator so that it contacts the side bearing saddle in the carrier. Measure the lowest position on the left and right sides of the carrier.

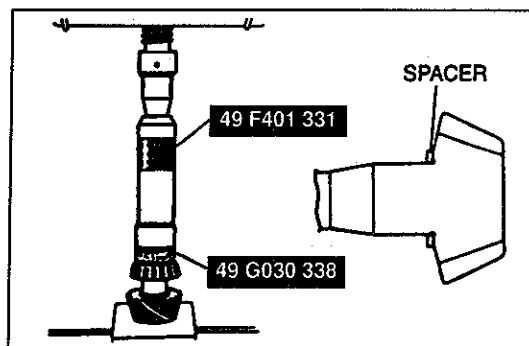


9. Add the two (left and right) values obtained in Step 8 and divide the total by 2.

Specification : 0 mm {0 in}

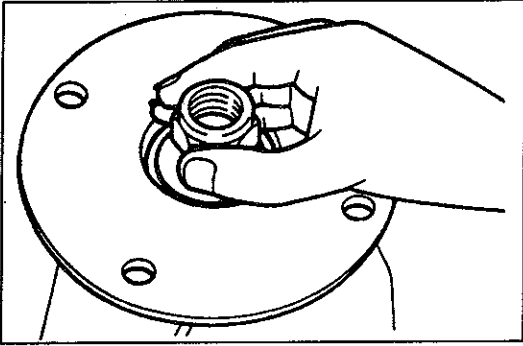
Mark	Thickness	Mark	Thickness
08	3.08 mm {0.1213 in}	29	3.29 mm {0.1295 in}
11	3.11 mm {0.1224 in}	32	3.32 mm {0.1307 in}
14	3.14 mm {0.1236 in}	35	3.35 mm {0.1319 in}
17	3.17 mm {0.1248 in}	38	3.38 mm {0.1331 in}
20	3.20 mm {0.1260 in}	41	3.41 mm {0.1343 in}
23	3.23 mm {0.1271 in}	44	3.44 mm {0.1354 in}
26	3.26 mm {0.1283 in}	47	3.47 mm {0.1366 in}

10. If not within specification, adjust the pinion height by using a spacer chosen from the table.



Rear bearing

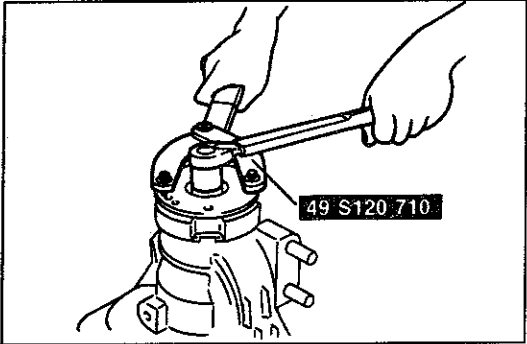
1. Install the spacer, selected in the procedure above, with the beveled side facing the drive pinion.
2. Press the spacer onto the drive pinion until the force required starts to increase sharply.
3. Press on the spacer and rear bearing by using the SST.



Drive pinion assembly (adjustment of drive pinion preload)

Perform the following procedure without the companion flange oil seal installed.

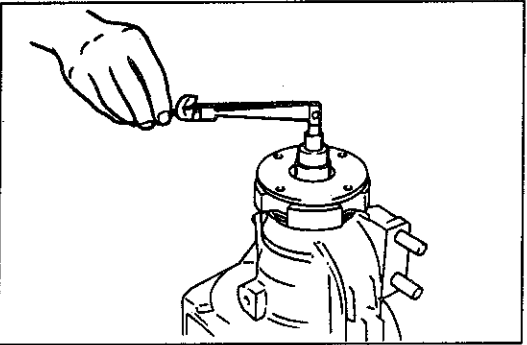
1. Apply a light coat of grease to the end face of the companion flange.
2. Install the drive pinion assembly in the differential carrier.



3. Install a new collapsible spacer, front bearing, new front spacer, companion flange, and new washer.
4. Temporarily tighten the new companion flange nut.
5. Hold the companion flange by using the SST and tighten the nut.

Tightening torque: 128 N·m{13 kgf·m, 94.1 ft·lbf}

6. Turn the companion flange several turns by hand to seat the bearings.



7. Measure the drive pinion preload.
8. Adjust the preload by tightening the nut; then record the required tightening torque.

Drive pinion preload:

1.3–1.8 N·m{13–18 kgf·cm, 12–15 in·lbf}

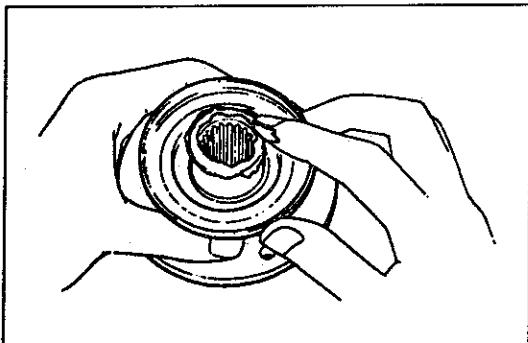
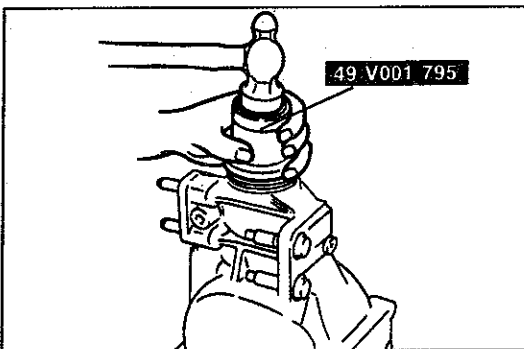
Tightening torque:

128–284 N·m{13.0–29.0 kgf·m, 94.1–209.7 ft·lbf}

9. If the specified preload is not obtained after tightening the nut to the maximum torque, replace the collapsible spacer with a new one.
10. Remove the nut, washer, and companion flange.

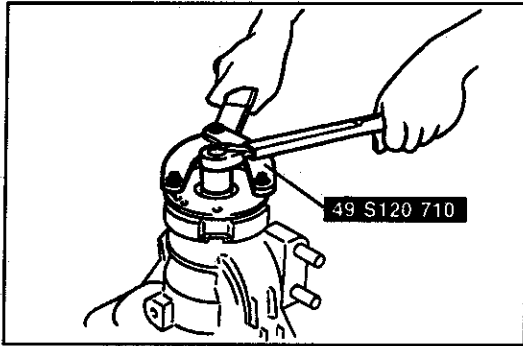
Oil seal (companion flange)

1. Apply clean differential oil to the lip of the new oil seal.
2. Install the oil seal by using the SST.



Companion flange

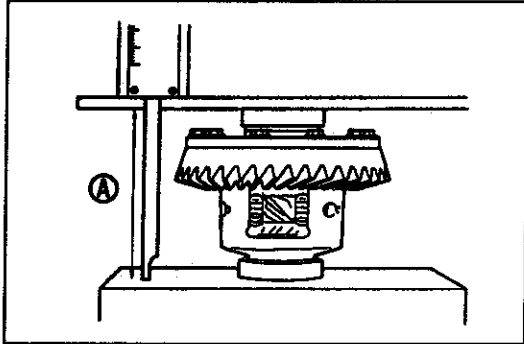
Apply a light coat of grease to the end face of the companion flange.

**Companion flange nut**

1. Using the SST, hold the companion flange and tighten the nut to the tightening torque recorded in "adjustment of drive pinion preload."
2. Verify that the drive pinion preload is within specification.

Drive pinion preload:

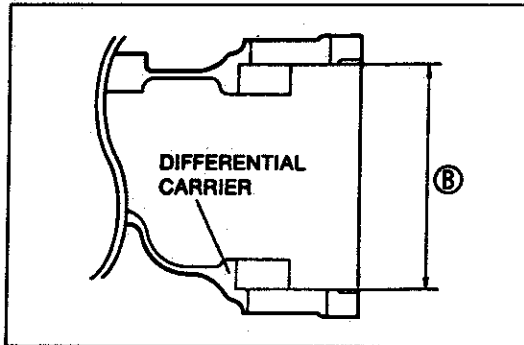
1.3–1.8 N·m {13–18 kgf·cm, 12–15 in·lb}

**Adjustment shims (adjustment of ring gear backlash)**

1. Install the bearing races and measure the side bearing and gear case assembly height A as shown.

Standard height:

158.4–159.6 mm {6.24–6.28 in}



2. Measure the width B of the inside of the differential carrier as shown.

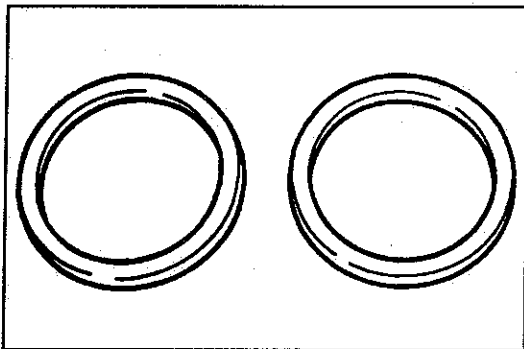
Standard width:

170.9–171.1 mm {6.729–6.736 in}

3. The right and left total adjustment shims thickness C is determined by the following.

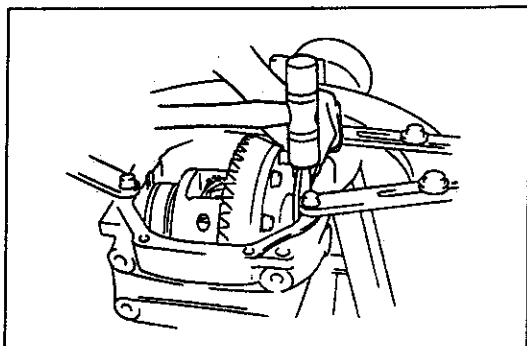
$$C \text{ mm} = B - A \text{ mm} + (0.01 - 0.03 \text{ mm})$$

$$C \text{ in} = B - A \text{ in} + (0.0004 - 0.0012 \text{ in})$$

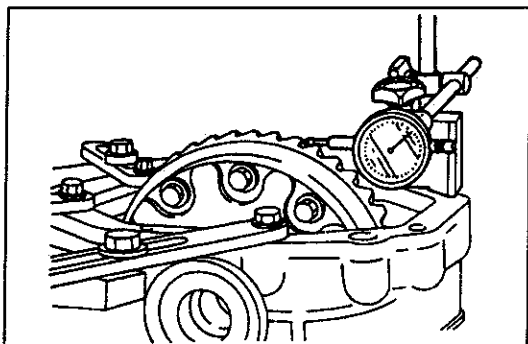


4. If C is equal to the total thickness of the removed right and left adjustment shims, reuse them.
5. If C is not equal to the removed shims, or when the shims are to be replaced, select and use the shims from the following table. Use adjustment shims of the same thickness for both sides.

Identification mark	Thickness	Identification mark	Thickness
550	5.50 mm {0.2165 in}	605	6.05 mm {0.2382 in}
560	5.60 mm {0.2205 in}	610	6.10 mm {0.2402 in}
565	5.65 mm {0.2224 in}	615	6.15 mm {0.2421 in}
570	5.70 mm {0.2244 in}	620	6.20 mm {0.2441 in}
575	5.75 mm {0.2264 in}	625	6.25 mm {0.2461 in}
580	5.80 mm {0.2283 in}	630	6.30 mm {0.2480 in}
585	5.85 mm {0.2303 in}	635	6.35 mm {0.2500 in}
590	5.90 mm {0.2323 in}	640	6.40 mm {0.2520 in}
595	5.95 mm {0.2343 in}	650	6.50 mm {0.2559 in}
600	6.00 mm {0.2362 in}	—	—

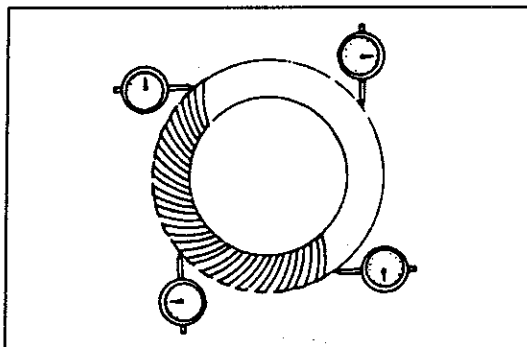


6. Install the right and left side bearing race into the differential carrier, in exactly the same positions they were in at disassembly. Then install the gear case assembly and adjustment shim(s), making sure not to interchange the adjustment shim(s) if they are being reused.
7. Tap the other side adjustment shim(s) in by using a plastic hammer.
8. Install the bearing caps and loosely tighten the bolts.



9. Mark the ring gear at four points at approx. 90 degrees intervals. Mount a dial indicator to the carrier so that the feeler comes into contact at a right angle with one of the ring gear teeth at a point marked.
10. Measure the ring gear backlash.

Standard backlash:
0.09–0.11 mm {0.0035–0.0043 in}



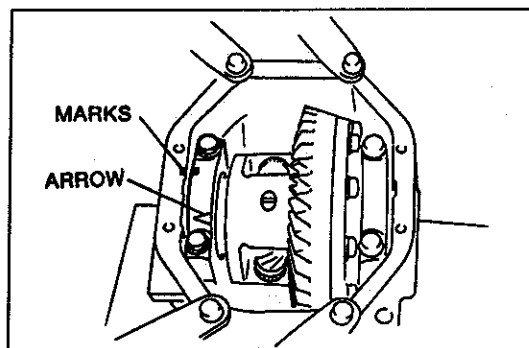
11. Measure the backlash at the three other marked points, and verify that the minimum backlash is more than 0.05 mm {0.002 in} and the difference between the maximum and minimum is less than 0.07 mm {0.0028 in}.
12. If the backlash is not within specification, adjust it by inserting appropriate adjustment shim at both sides of the carrier. If replacing the adjustment shim on one side with a thinner shim, replace the shim on the other side with an equally thicker shim.

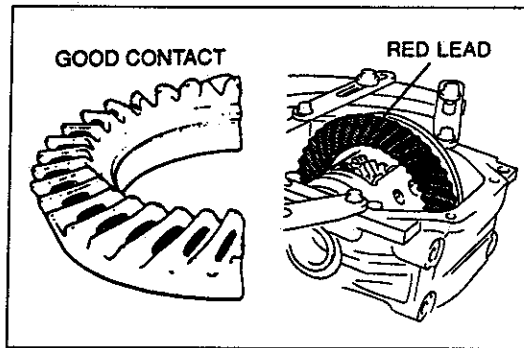
Bearing caps

1. Align the marks made on the right and left bearing caps and the differential case.
2. Tighten the bolts to the specified torque.
3. Check the drive pinion and ring gear tooth contact (page M-41)

Tightening torque:

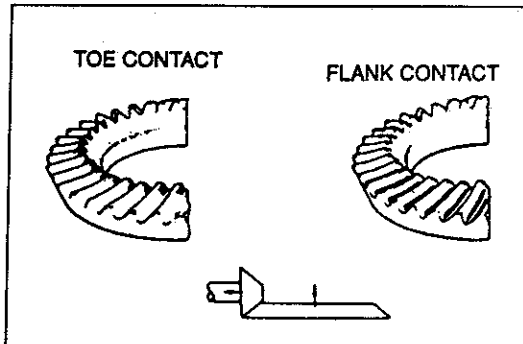
73–106 N·m {7.4–10.9 kgf·cm, 53.6–78.8 ft·lbf}





Inspection and adjustment of tooth contact

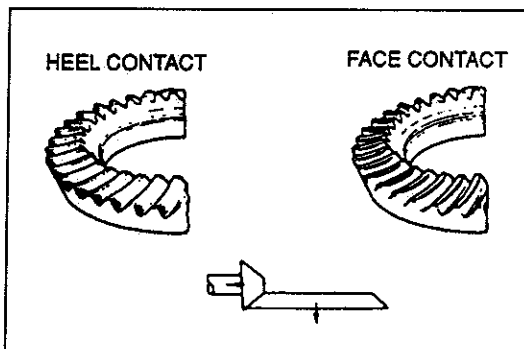
1. Coat both surfaces of 6–8 teeth of the ring gear with a uniformly thin coat of red lead.
2. While moving the ring gear back and forth by hand, rotate the drive pinion several times and check the tooth contact.
3. If the tooth contact is good, wipe off the red lead.



4. If it is not good, readjust the pinion height, and then adjust the backlash.

(1) Toe and flank contact

Replace the spacer with a thinner one to move the drive pinion outward.



(2) Heel and face contact

Replace the spacer with a thicker one to bring the drive pinion inward.