

# 1989 Mazda RX-7 Factory Service Manual

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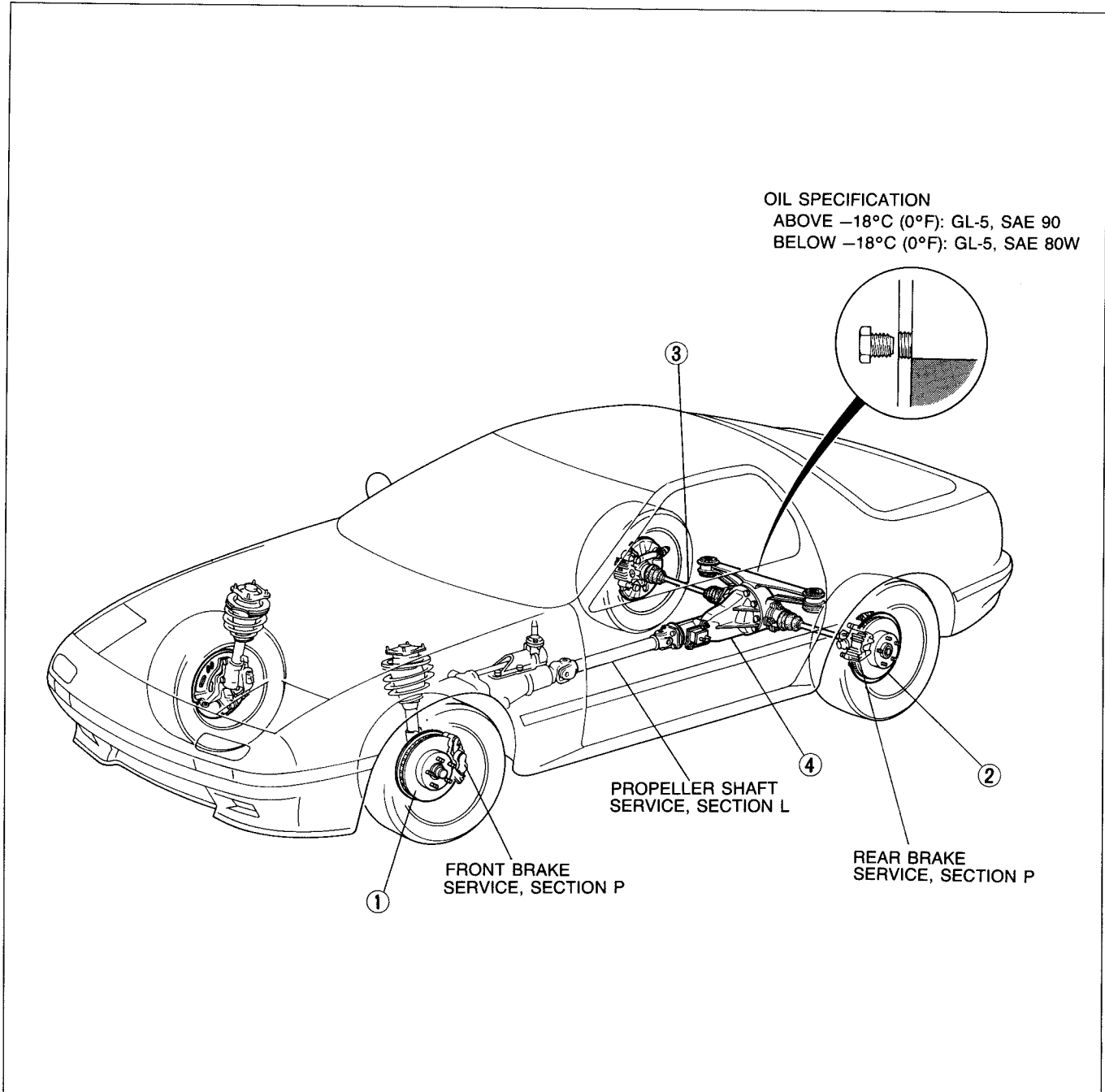
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# FRONT AND REAR AXLE

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# OUTLINE

## SPECIFICATIONS

Item		Turbo model	Non-Turbo model		
<b>Front axle</b>					
Bearing play axial direction		mm (in)	0 (0)		
Bearing preload	Pull scale reading	N (kg, lb)	3.9—9.8 (0.4—1.0, 0.9—2.2)		
<b>Rear axle</b>					
Bearing end play		mm (in)	0.1 (0.004)		
<b>Differential</b>					
Reduction gear		Hypoid gear			
Differential gear		Straight bevel gear			
Reduction ratio		M/T	4.100		
		A/T	—		
Number of teeth		Hypoid gear			
		Straight bevel gear			
		Ring gear	M/T	41	4.100, 4.300 (Viscous L.S.D.)
		A/T	—	4.100 (Convertible), 3.909	
Drive pinion gear		M/T	41	41, 43 (Viscous L.S.D.)	
		A/T	—	41 (Convertible), 43	
Differential oil		Standard			
		Viscous L.S.D.			
Differential (Standard)		Grade	API GL-5		
		Viscosity	Above -18°C (0°F)	SAE 90	
Viscous L.S.D.		Below -18°C (0°F)	SAE 80W		
		Amount	liters (US qt, Imp qt)	1.3 (1.4, 1.1)	
Differential (Standard)		Grade	API GL-5		
		Viscosity	Above -18°C (0°F)	SAE 90	
Viscous L.S.D.		Below -18°C (0°F)	SAE 80W		
		Amount	liters (US qt, Imp qt)	1.4 (1.5, 1.2)	1.3 (1.4, 1.1)
<b>Driveshaft</b>					
Type		Constant velocity joint			
Length	mm (in)	Turbo	637.5 (25.10)		
		Non-Turbo	646.0 (25.43)		

Viscous L.S.D.: Viscous Limited Slip Differential

97U0MX-003

## TROUBLESHOOTING GUIDE

### FRONT AXLE

Problem	Possible Cause	Action	Page
<b>Steering wheel vibration</b>	Improperly adjusted wheel bearing	Adjust	M- 6
	Worn or damaged wheel bearing	Replace	M- 8
<b>Pulls or one-sided braking</b>	Improperly adjusted wheel bearing	Adjust	M- 6
	Worn or damaged wheel bearing	Replace	M- 8
<b>Excessive steering wheel play</b>	Improperly adjusted wheel bearing	Adjust	M- 6

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### REAR AXLE

Problem	Possible Cause	Action	Page
<b>Abnormal noise</b>	Bent bearing housing	Replace	—
	Bent driveshaft	Replace	M-14
	Worn or damaged wheel bearing	Replace	M-12
	Worn driveshaft spline	Replace	M-14

97U0MX-005

# M TROUBLESHOOTING GUIDE

## DIFFERENTIAL (STANDARD)

Problem	Possible Cause	Action	Page
<b>Abnormal noise</b>	Insufficient differential oil	Add oil	M-18
	Incorrect differential oil	Replace	M-18
	Improperly adjusted ring gear backlash	Adjust	M-34
	Poor contact of ring gear teeth	Adjust	M-34
	Worn or damaged side bearing	Replace	M-24
	Worn or damaged ring gear	Replace	M-24
	Worn or damaged drive pinion bearing	Replace	M-24
	Worn or damaged pinion and side gear	Replace	M-24
	Seized side gear and case	Replace	M-24
	Worn side gear spline	Replace	M-24
	Worn pinion shaft	Replace	M-24
	Loose companion flange nut	Tighten	M-33
	Worn thrust washer	Replace	M-34
	Improperly adjusted side gear preload	Adjust	M-34
Improperly adjusted drive pinion gear preload	Adjust	M-34	
<b>Heat buildup</b>	Insufficient differential oil	Add oil	M-18
	Insufficient gear backlash	Adjust	M-34
	Excessive bearing preload	Adjust	M-33
<b>Oil leakage</b>	Excessive differential oil	Remove oil	M-18
	Loose differential carrier	Tighten or repair	M-36
	Worn or damaged oil seal	Replace	M-18,19
<b>No differential operation</b>	Misassembled	Repair	M-24

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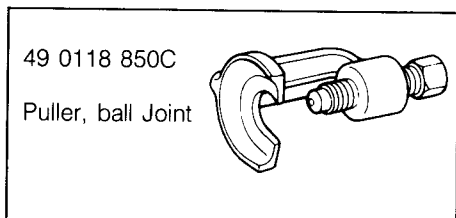
## VISCOUS LIMITED SLIP DIFFERENTIAL

Problem	Possible Cause	Action	Page
<b>Abnormal noise</b>	Insufficient differential oil	Add oil	M-18
	Incorrect differential oil	Replace	M-18
	Improperly adjusted ring gear backlash	Adjust	M-34
	Poor contact of ring gear teeth	Adjust	M-34
	Worn or damaged viscous limited slip differential oil seal	Replace	M-26
	Worn or damaged ring gear	Replace	M-24,26
	Worn or damaged drive pinion bearing	Replace	M-24,26
	Loose companion flange nut	Tighten	M-33
	Worn thrust washer	Replace	M-34
	<b>Heat buildup</b>	Insufficient differential oil	Add oil
Excessive bearing preload		Adjust	M-33
<b>Oil leakage</b>	Excessive differential oil	Remove oil	M-18
	Loose differential carrier	Tighten or repair	M-36
	Worn or damaged oil seal	Replace	M-18,19
<b>No differential operation</b>	Misassembled	Repair	M-24,26

97U0MX-007

# FRONT AXLE

## PREPARATION SST



49 0118 850C  
Puller, ball Joint

97U0MX-008

### DISC BRAKE TYPE

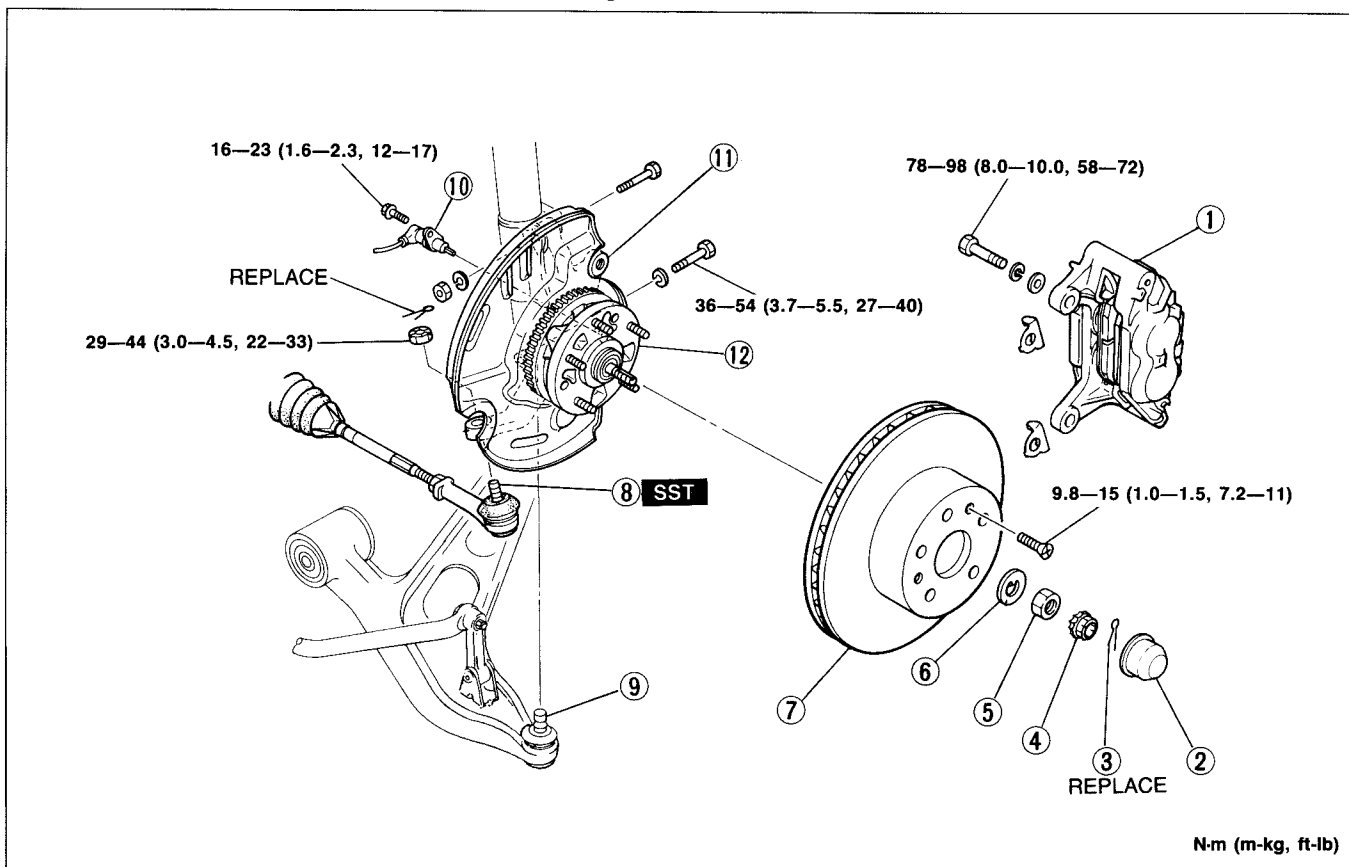
#### Inspection, Removal and Installation

Inspect wheel bearing play, referring to **Inspection**.

Remove in the order shown in the figure, referring to **Removal Note**.

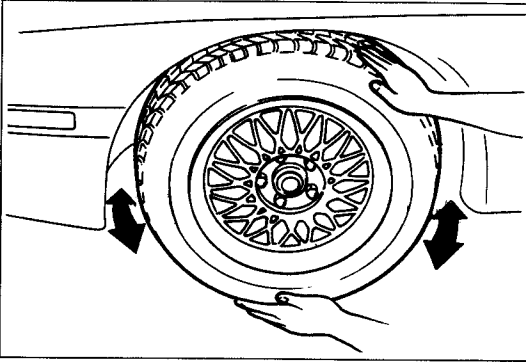
Inspect all parts, repair or replace as necessary.

Install in the reverse order of removal, referring to **Installation Note**.

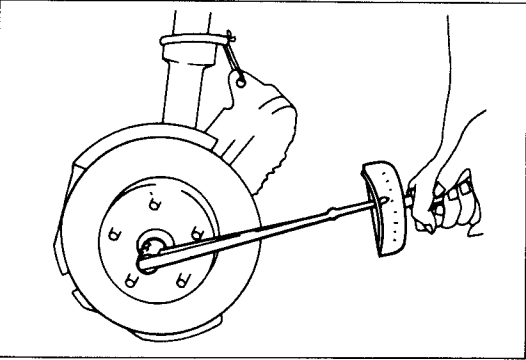


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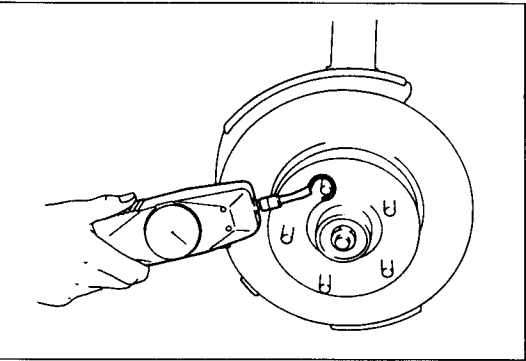
- |   |  |
|---|--|
| 1. Caliper<br>Service ..... Section P         | 9. Lower arm ball joint  |
| 2. Hub cap                                    | 10. Speed sensor<br>Installation note..... page M-7  |
| 3. Cotter pin                                 | 11. Knuckle spindle<br>Inspect the knuckle spindle for cracks or<br>damage<br>Disassembly, Inspection and<br>Assembly ..... page M-8 |
| 4. Set cover                                  |  |
| 5. Hub nut<br>Installation note..... page M-7 | 12. Wheel hub assembly<br>Inspect for cracks or damage<br>Disassembly, Inspection and<br>Assembly ..... page M-8                     |
| 6. Washer                                     |  |
| 7. Disc plate<br>Service ..... Section P      |  |
| 8. Tie-rod end<br>Removal note..... page M-6  |  |



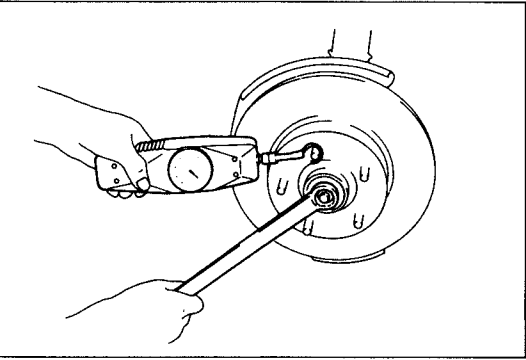
97U0MX-010



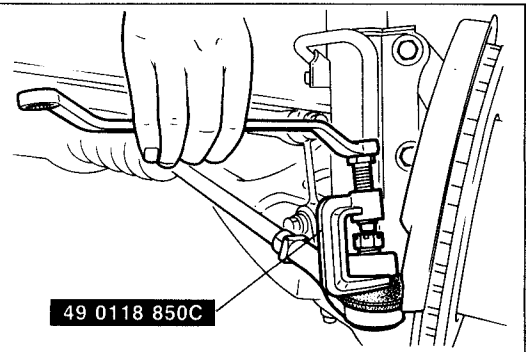
97U0MX-011



97U0MX-012



67U09X-009



49 0118 850C

9MU0MX-009

## Inspection

### Wheel bearing play

1. Jack up the vehicle and support it with safety stands. Check if there is noticeable bearing play with the hands held at the top and bottom of the tire.

**Wheel bearing play: 0mm (0 in)**

2. Check whether the tire rotates smoothly when rotated, and whether there is a rough feeling or abnormal noise from the bearing.
3. Replace the wheel bearing or adjust the wheel bearing preload, if necessary.

## Adjustment

1. Remove the wheel and tire.
2. Remove the disc brake caliper assembly, and suspend it with a rope.
3. Remove the hubcap, cotter pin, and set cover.
4. Loosen the locknut.
5. Tighten the locknut and turn the hub 2 or 3 times to seat the bearing.

## Tightening torque:

**20—29 N·m (2.0—3.0 m·kg, 14—22 ft·lb)**

6. Loosen the locknut until it can be turned by hand.
7. Attach a pull scale to a hub bolt and measure the frictional force.

8. Tighten the locknut until the reading (initial turning torque) reaches the specified amount. Insert set cover, and secure with a cotter pin.

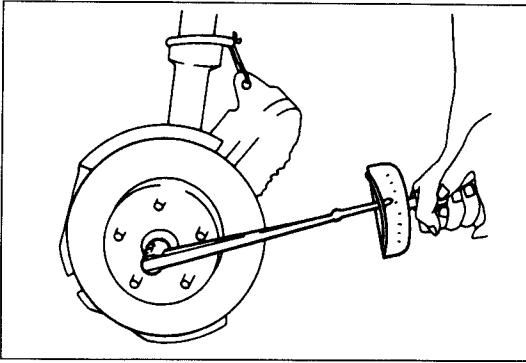
## Preload: Frictional force plus

**3.9—9.8 N (0.4—1.0 kg, 0.9—2.2 lb)**

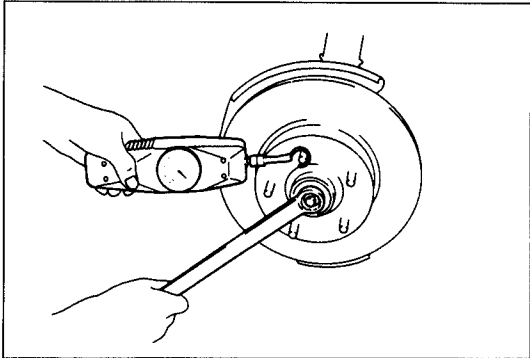
## Removal note

### Tie-rod end

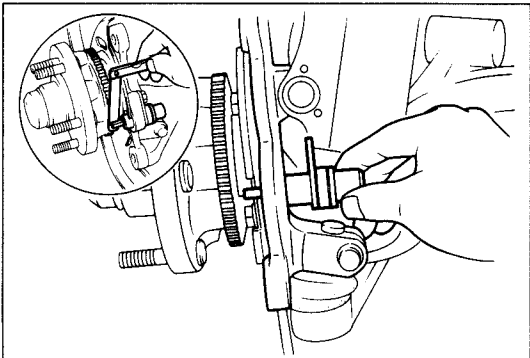
Loosen the nut and disconnect the tie-rod end with the **SST**.



97U0MX-013



97U0MX-014



97U0MX-015

**Installation note****Hub nut**

Install the hub nut and adjust the bearing preload.

1. Tighten the nut and then turn the hub and plate 2 or 3 times to seat the bearing.

**Tightening torque:**

**20—29 N·m (2.0—3.0 m·kg, 14—22 ft·lb)**

2. Loosen the nut until it can be turned by hand.

3. Attach a pull scale to a hub bolt and measure the frictional force.

4. Tighten the locknut until the reading (initial turning torque) reaches the specified amount. Then insert the set cover, and secure with a new cotter pin.

**Preload: Frictional force plus**

**3.9—9.8 N (0.4—1.0 kg, 0.9—2.2 lb)**

**Speed sensor**

Install the speed sensor, and check the clearance between the sensor rotor and speed sensor.

**Standard clearance: 0.4—1.0mm (0.016—0.039 in)**



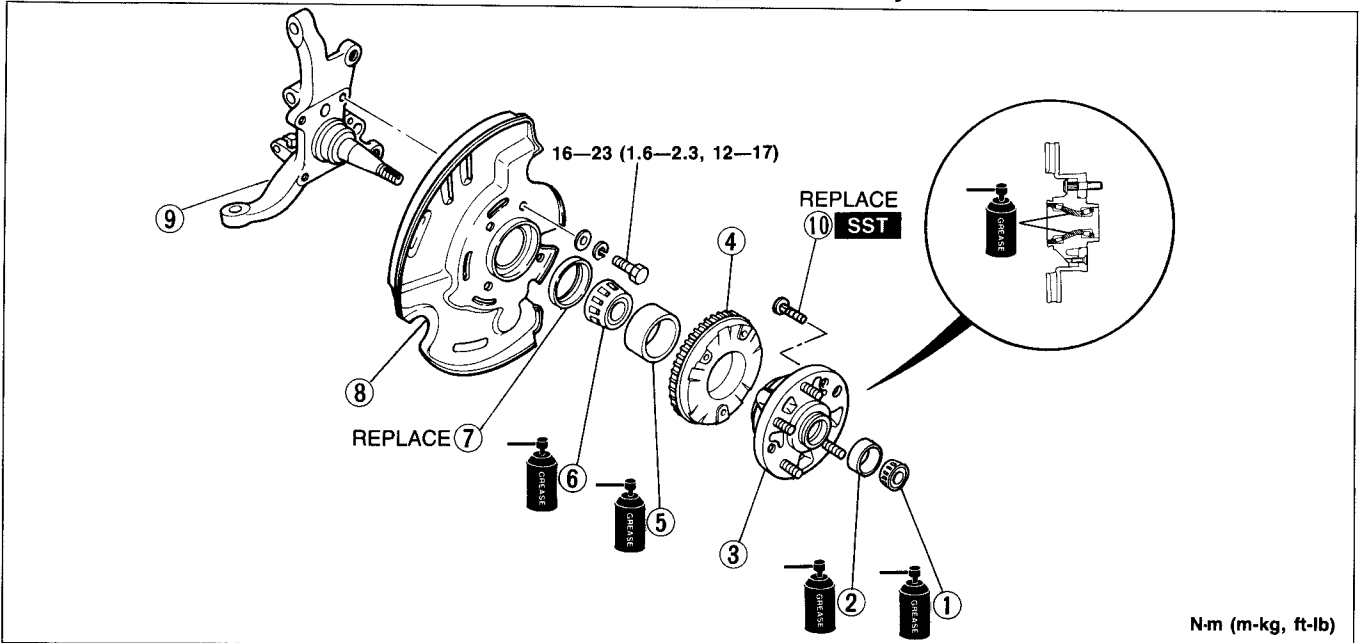
# M FRONT AXLE

## Disassembly, Inspection and Assembly

Disassemble in the order shown in the figure, referring to **Disassembly Note**.

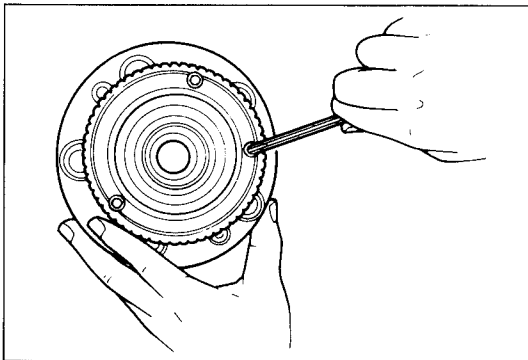
Inspect all parts, repair or replace as necessary.

Assemble in the reverse order of disassembly, referring to **Assembly Note**.



97U0MX-016

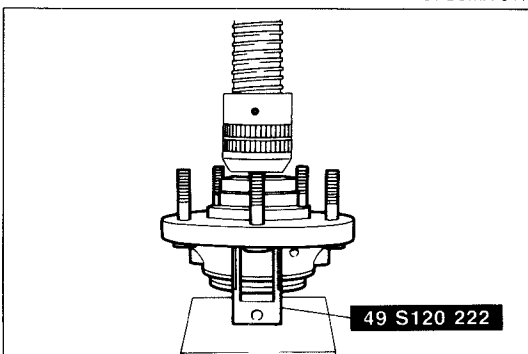
- |                                 |                                  |
|---------------------------------|----------------------------------|
| 1. Bearing (Inner)              | 7. Oil seal                      |
| 2. Bearing (Outer)              | Assembly note ..... page M-9     |
| 3. Wheel hub                    | 8. Dust cover                    |
| Assembly note ..... page M-9    | Inspect for damage or distortion |
| 4. Sensor rotor (ABS)           | 9. Knuckle spindle               |
| Disassembly note ..... page M-8 | 10. Hub bolt                     |
| 5. Bearing (Outer)              | Disassembly note ..... page M-8  |
| 6. Bearing (Inner)              |                                  |
| Assembly note ..... page M-9    |                                  |
| Inspection ..... page M-9       |                                  |



97U0MX-017

### Disassembly note Sensor rotor (ABS)

1. Remove the sensor rotor with an allen wrench.



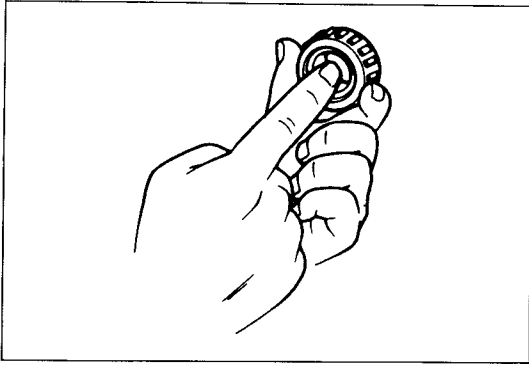
97U0MX-018

### Hub bolt

#### Caution

- Do not remove the hub bolts unless necessary.
- Do not reuse the removed hub bolts.
- Hub bolt replacement of the aluminum hub can be done only once.  
If a second replacement is necessary, replace the hub assembly.

2. Remove the hub bolts with the **SST**.



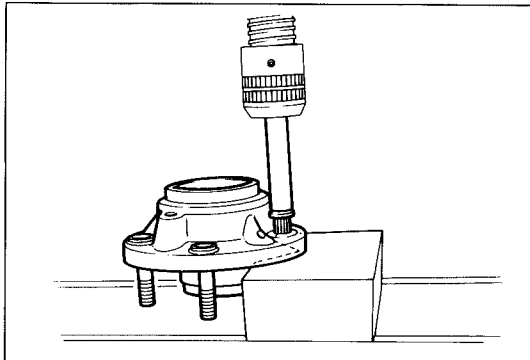
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### Inspection

Check as described below, replace parts if necessary. Check the bearings for wear, damage or seizure.

### Caution

**If replacement is necessary, replace the inner bearing, outer bearing and front hub.**

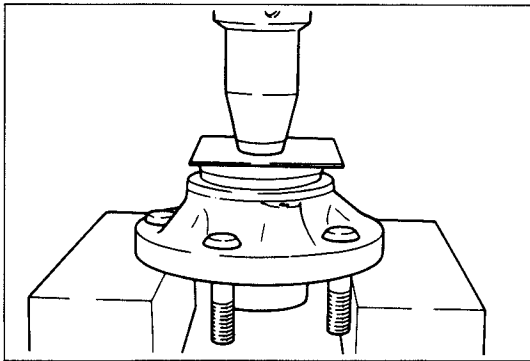


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### Assembly note

#### Wheel hub

Install the hub bolts with a press.



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### Oil seal, Bearing (inner)

1. Pack the bearing cone and roller assemblies with wheel bearing lithium based grease.

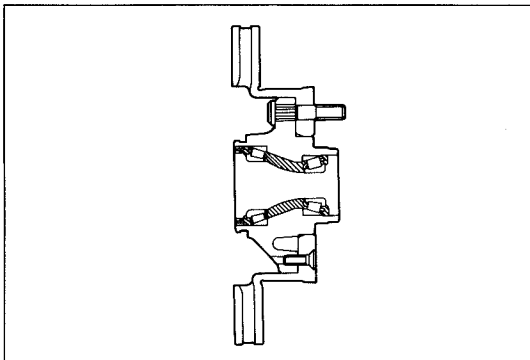
### Caution

**Install the oil seal so that it is flush with the hub.**

2. After inserting the inner bearing in the hub, use a suitable plate to press or drive in the new oil seal.

3. Apply lithium based grease to the oil seal lip.

4. Apply lithium based grease to the shaded areas as shown in the figure.

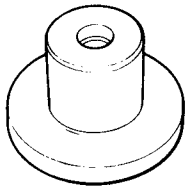
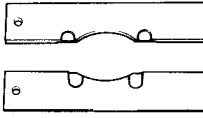
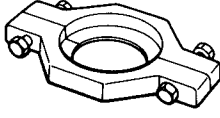
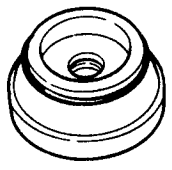
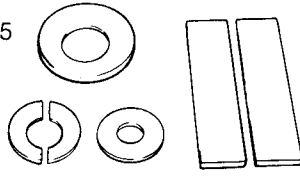
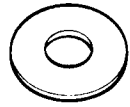


97U0MX-022

# M REAR AXLE

## REAR AXLE

### PREPARATION SST

<p>49 F026 102 Installer, bearing</p> 	<p>49 F026 103 Puller, wheel hub</p> 	<p>49 0636 145 Puller, fan pulley boss</p> 
<p>49 F027 007 Attachment for bearing <math>\phi 72</math></p> 	<p>49 0259 745 Separator, bearing</p> 	<p>49 0259 748 Attachment, bearing separator</p> 

97U0MX-023

### DISC BRAKE TYPE

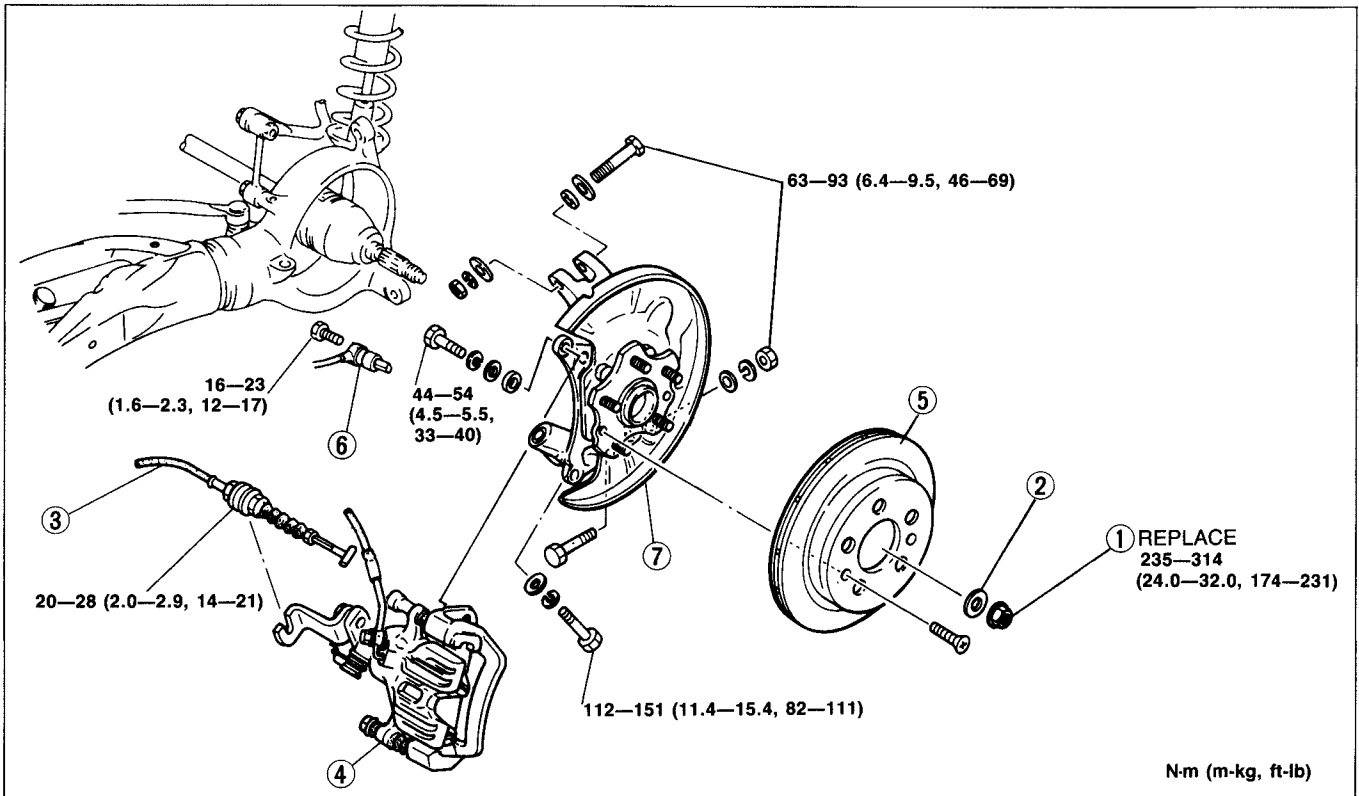
#### Inspection, Removal and Installation

Inspect wheel bearing play, referring to **Inspection**.

Remove in the order shown in the figure, referring to **Removal Note**.

Inspect all parts, repair or replace as necessary.

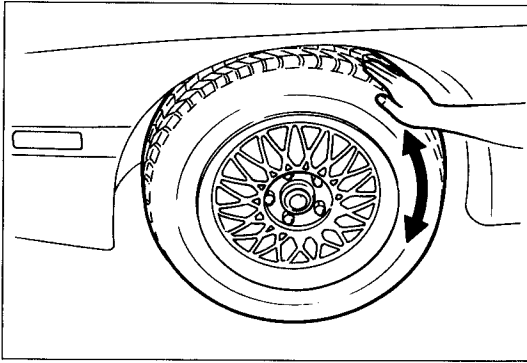
Install in the reverse order of removal.



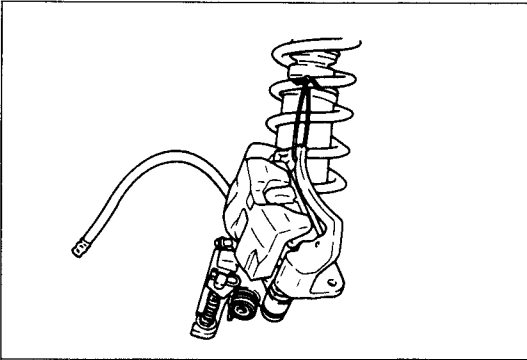
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1. Locknut
2. Washer
3. Parking brake cable
4. Brake caliper assembly  
Service..... Section M
5. Disc plate  
Service..... Section M

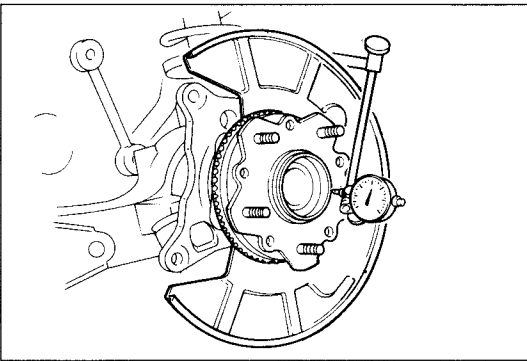
6. Speed sensor (ABS)  
Installation note..... page M-11
7. Triaxial floating hub assembly  
Inspect for cracks or damage  
Disassembly, Inspection and  
Assembly ..... page M-12



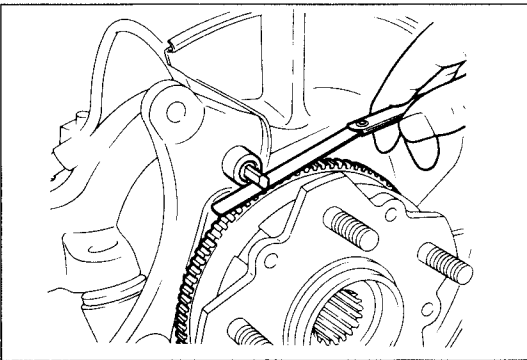
97U0MX-025



97U0MX-026



97U0MX-027



97U0MX-028

## Inspection

### Wheel bearing play

1. Jack up the rear of the vehicle and support it with safety stands.
2. Check that there is no abnormal noise and that the tire rotates smoothly when rotated by hand.

3. After removing the wheel, remove the brake caliper assembly, and suspend it with a rope.

4. Attach a dial gauge to the wheel hub. Then push and pull the wheel hub by hand in the axial direction, and measure the bearing play of the wheel bearing.  
If the bearing play exceeds the specification, replace the wheel bearing.

**Maximum wheel bearing play: 0.1mm (0.004 in)**

## Installation note

### Speed sensor (ABS)

Measure the clearance between the speed sensor and the sensor rotor (ABS).

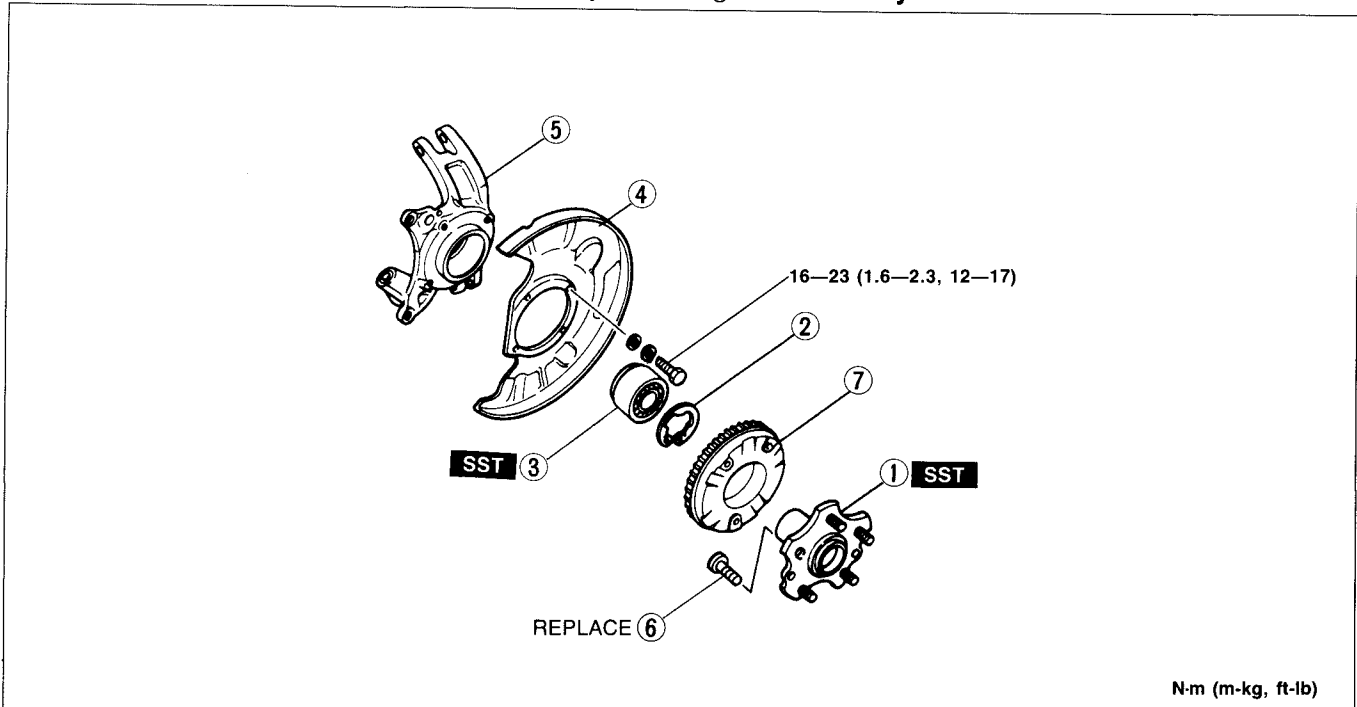
**Standard clearance:  
0.4—1.0mm (0.016—0.039 in)**

## Disassembly, Inspection and Assembly

Disassemble in the order shown in the figure, referring to **Disassembly Note**.

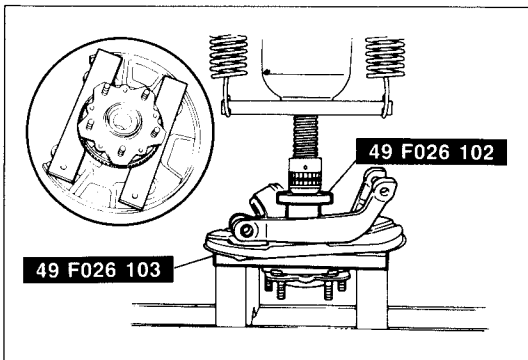
Inspect all parts, repair or replace as necessary.

Assemble in the reverse order of disassembly, referring to **Assembly Note**.



97U0MX-029

- |  |   |
|--|---|
| <p>1. Wheel hub<br/>             Disassembly note ..... page M-12<br/>             Inspect for cracks or damage<br/>             Assembly note ..... page M-13</p> <p>2. Retaining ring</p> <p>3. Wheel bearing<br/>             Disassembly note ..... page M-12<br/>             Assembly note ..... page M-13</p> | <p>4. Dust cover<br/>             Inspect for damage or distortion</p> <p>5. Toe control hub<br/>             Inspect for cracks or damage</p> <p>6. Hub bolt<br/>             Disassembly note ..... page M-13<br/>             Assembly note ..... page M-13</p> <p>7. Sensor rotor (ABS)</p> |
|--|---|

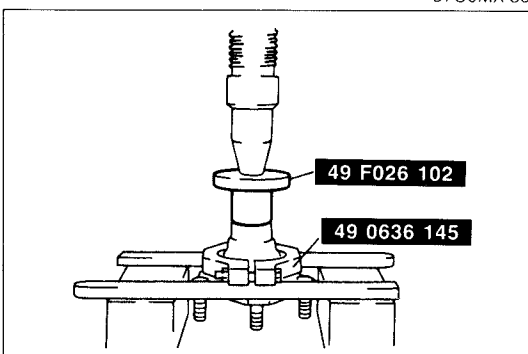


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### Disassembly note

#### Wheel hub

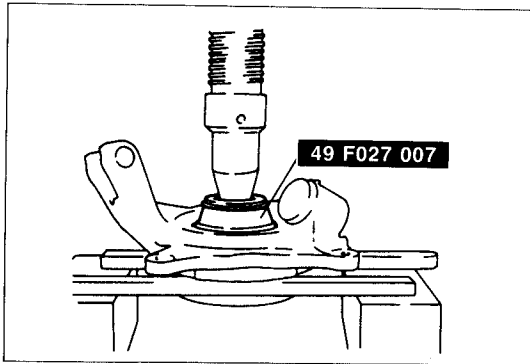
1. Loosen the dust cover.
2. Press the wheel hub with the **SST** to remove it.
3. Remove the sensor rotor (ABS).



97U0MX-031

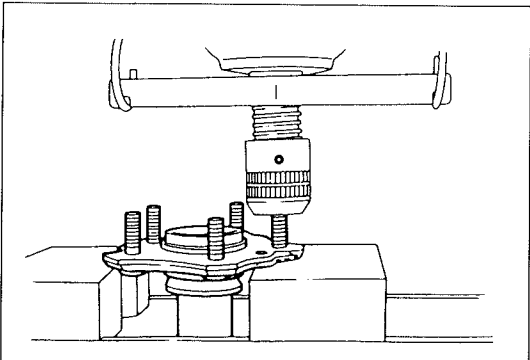
#### Wheel bearing

1. Press the wheel hub with the **SST** and remove the wheel bearing inner race.



97U0MX-032

2. Remove the retaining ring from the toe control hub using snap ring pliers.
3. Remove the wheel bearing outer race with the **SST**.



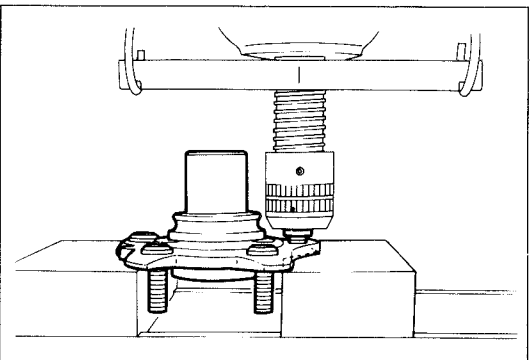
97U0MX-033

### Hub bolt

#### Caution

- a) Do not remove the hub bolts unless necessary.
- b) Do not reuse the hub bolts.

Replace the hub bolts using a press, if necessary.

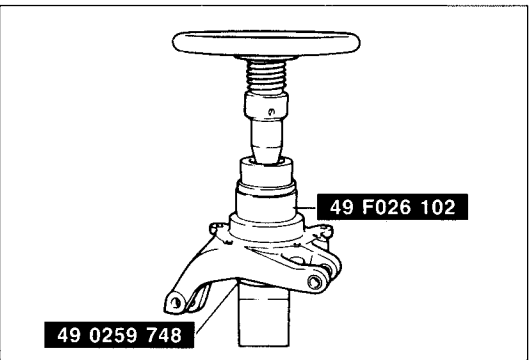


97U0MX-034

### Assembly note

#### Hub bolt

Install the new hub bolts with a press.



97U0MX-035

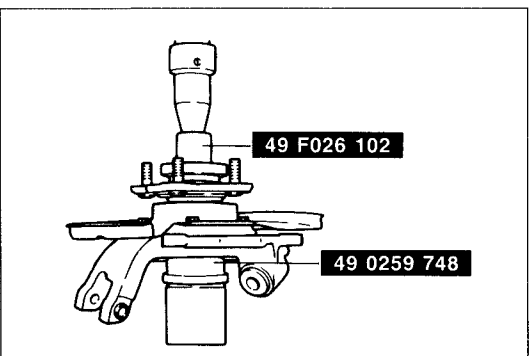
### Wheel bearing

1. Press the wheel bearing into the toe control hub with the **SST**.
2. Install the retaining ring using snap-ring pliers.
3. Install the dust cover.

#### Tightening torque:

**16—23 N·m (1.6—2.3 m·kg, 12—17 ft·lb)**

4. Install the sensor rotor (ABS).



97U0MX-036

### Wheel hub

1. Press the wheel hub in with the **SST**.

## DRIVESHAFT

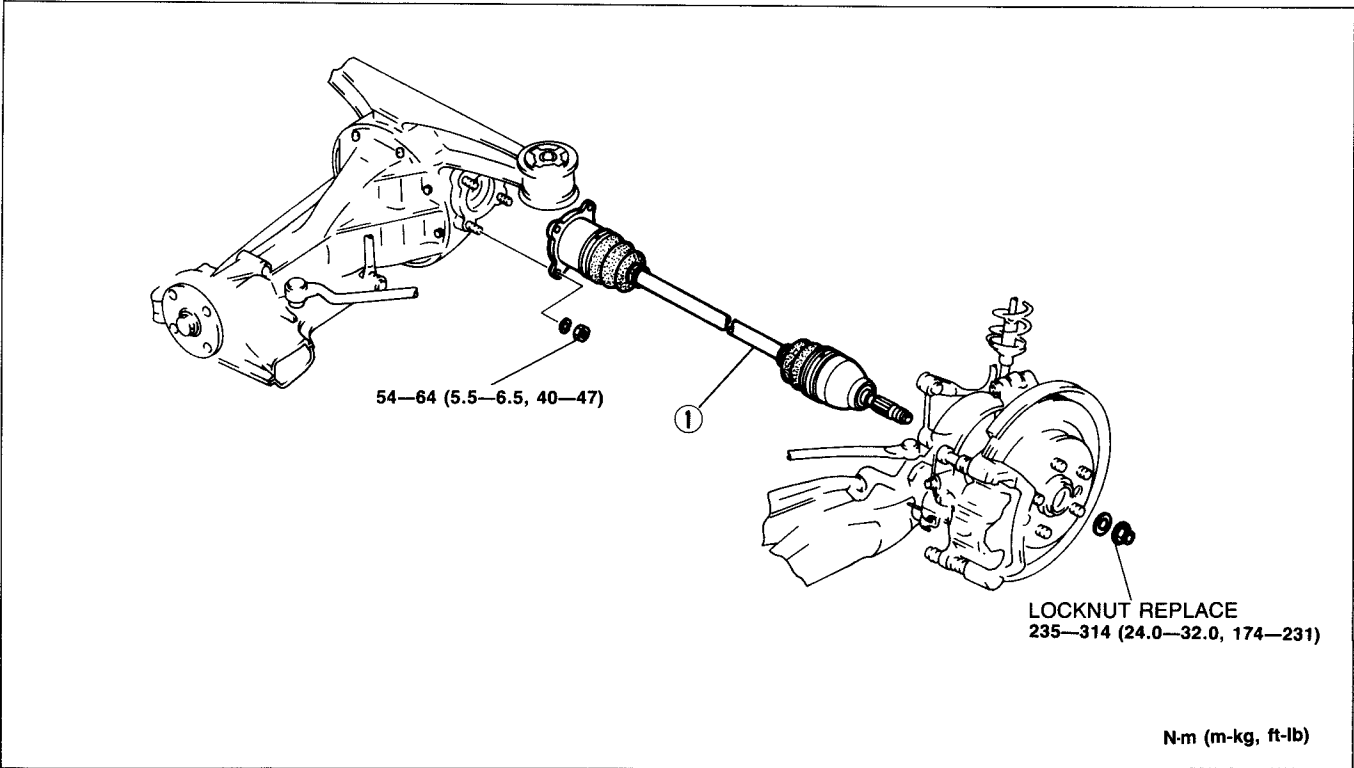
### DOUBLE OFFSET JOINT

#### Inspection, Removal and Installation

Inspect the driveshaft, referring to **Inspection**.

Remove in the order shown in the figure, referring to **Removal Note**.

Install in the reverse order of removal.

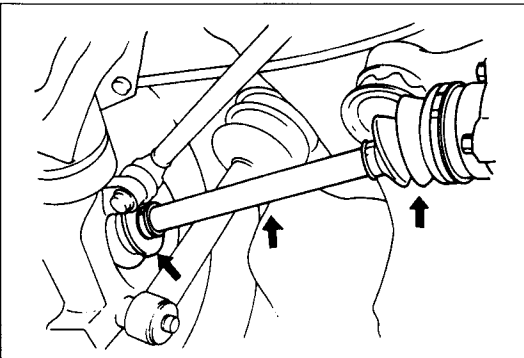


97U0MX-037

#### 1. Driveshaft

Removal note ..... page M-14

Disassembly, Inspection and Assembly.... page M-15

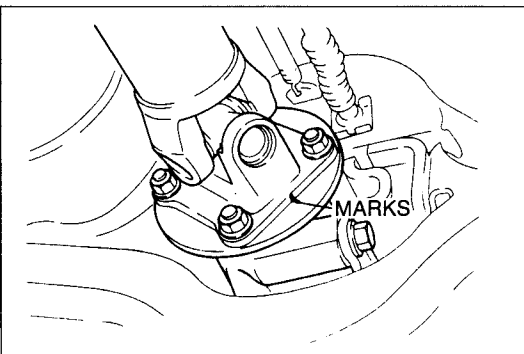


97U0MX-038

#### Inspection Driveshaft

1. Check the dust boot on the driveshaft for cracks, damage, leaking grease, or a loose boot band.
2. Check the driveshaft for bending or cracking, or for wear of joints or splines.

Replace the driveshaft if necessary.



97U0MX-039

#### Removal note Driveshaft

Before removing the driveshaft, put mating marks on the driveshaft and output shaft.

## Disassembly, Inspection and Assembly

Disassemble in the order shown in the figure, referring to **Disassembly Note**.

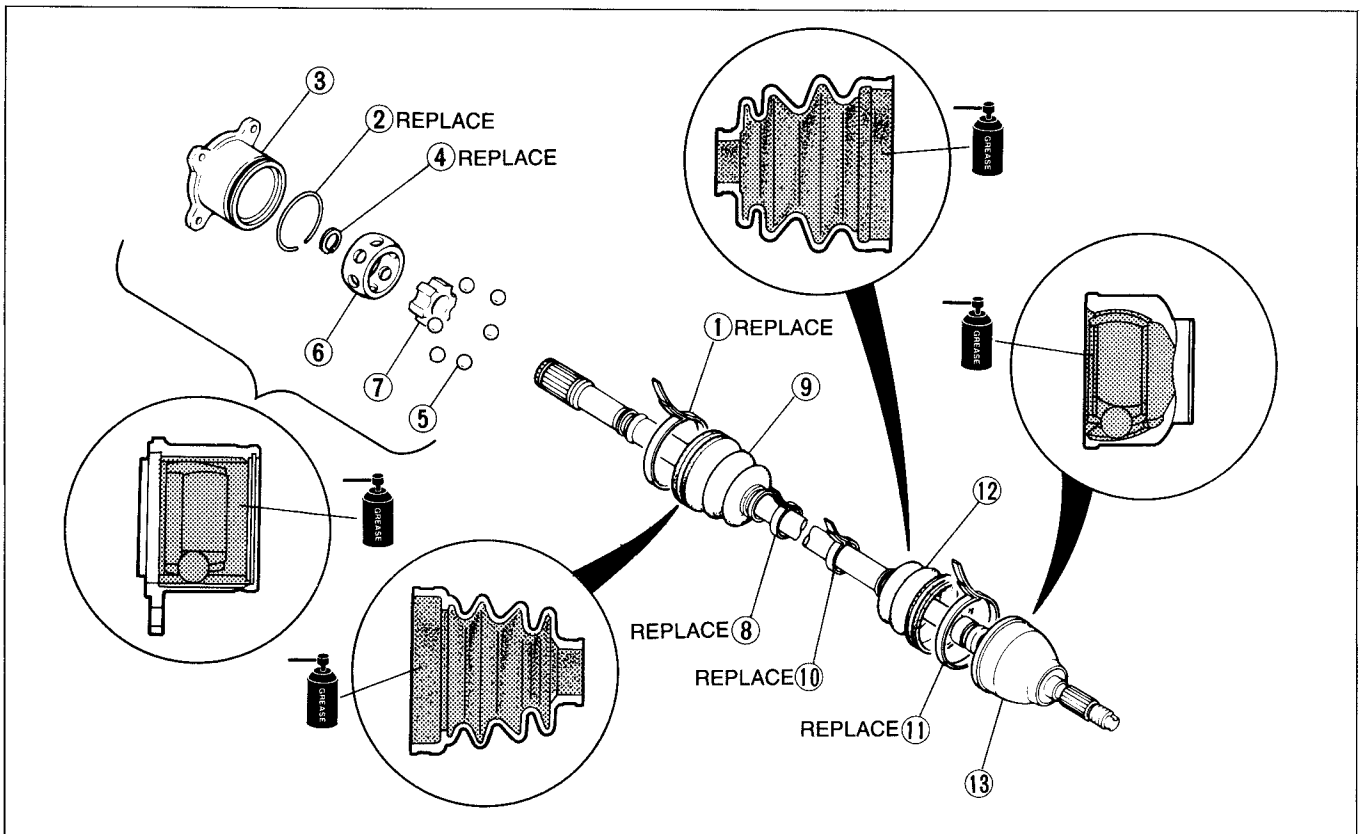
Inspect all parts, repair or replace as necessary.

Assemble in the reverse order of removal, referring to **Assembly Note**.

### Caution

- a) Secure the driveshaft in a vise with protective material (such as copper plates) on the vise jaws.
- b) Be careful that dust or other foreign material does not enter the ball joint while the work is being performed.
- c) Do not disassemble the wheel side ball joint.
- d) Do not wash the ball joint unless it is being disassembled.

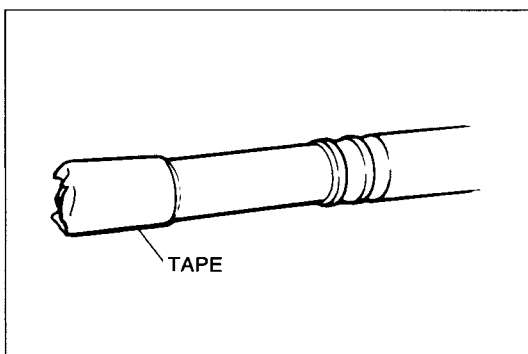
97U0MX-040



97U0MX-041

- 1. Boot band
- 2. Clip
- 3. Outer ring
- 4. Snap ring
- 5. Balls
- 6. Inner ring
- 7. Cage
- 8. Boot band

- 9. Boot  
Disassembly note ..... page M-15  
Assembly note ..... page M-16
- 10. Boot band
- 11. Boot band
- 12. Boot
- 13. Shaft and ball joint assembly



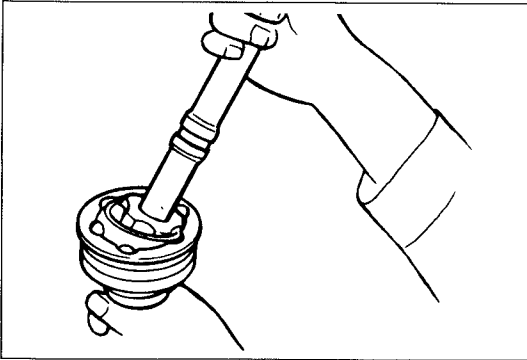
97U0MX-042

### Disassembly note

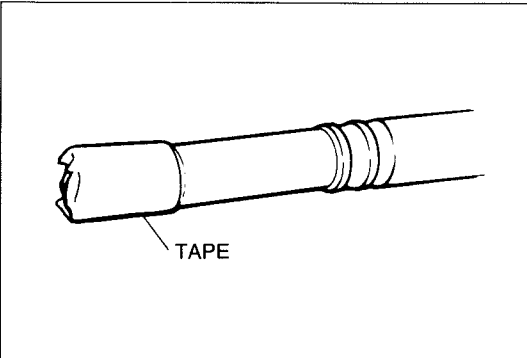
#### Boot

Wrap the splines of the shaft with tape to prevent damage to the boot. Remove the boot.

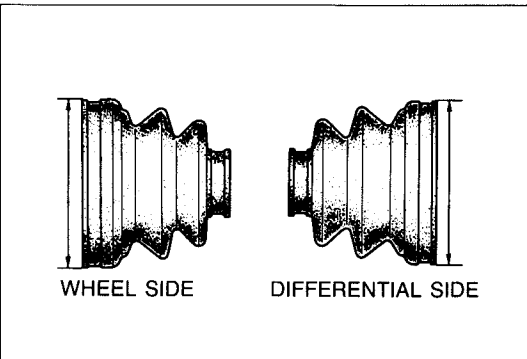




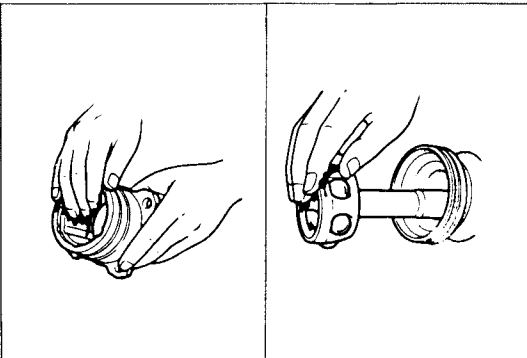
97U0MX-043



97U0MX-044



97U0MX-045



97U0MX-046

## Inspection

Check as described below, replace parts if necessary.

1. Check the shaft for bending, twisting, and damage.
2. Check the shaft splines for wear.
3. Check the joint on the differential side for wear, excessive play, corrosion, and damage.
4. Check the joint on the wheel side for excessive play, wear, corrosion, and damage.

## Assembly note

### Boot

1. Wrap the splines of the wheel side of the shaft with tape and install the boot and a new boot band.

## Caution

The wheel side and differential side boots are different, as shown in the figure.

	Wheel side	Differential side
Turbo model	101mm (3.98 in)	100mm (3.94 in)
Non-Turbo model	98.5mm (3.88 in)	95.5mm (3.76 in)

## Caution

Do not use any other than the specified grease.

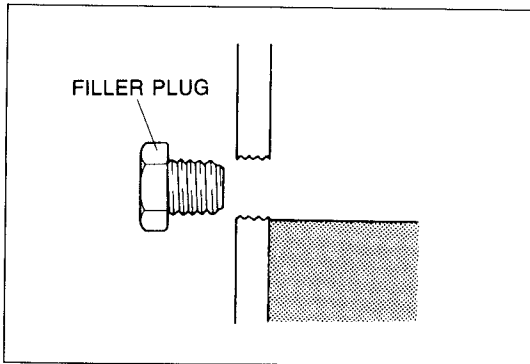
2. Apply molybdenum disulfide grease to the joint.

**Quantity: Differential side 115 g (4.06 oz)**  
**Wheel side 120 g (4.24 oz)**

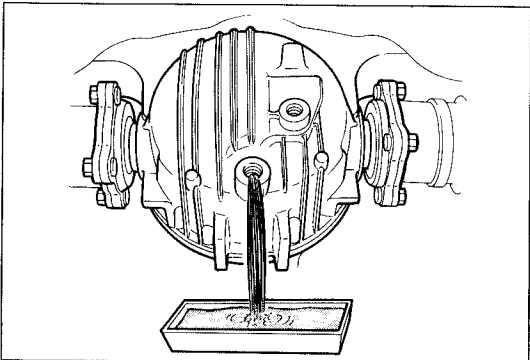
**DIFFERENTIAL**

**PREPARATION  
SST**

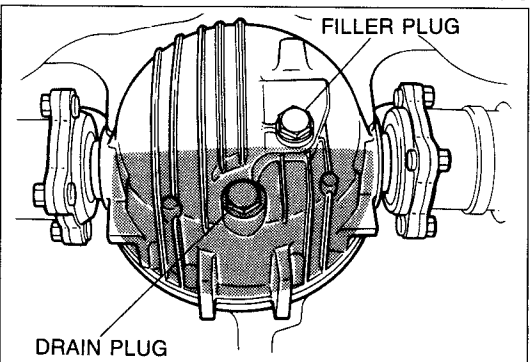
<p>49 0107 680A Engine stand</p> 	<p>49 0305 555 Gauge block (Part of 49 F027 0A0) Non-Turbo model</p> 	<p>49 F027 009 Attachment 68 &amp; 77 (Part of 49 F027 0A1)</p> 
<p>49 M005 561 Hanger, differential carrier</p> 	<p>49 0660 555 Gauge block (Part of 49 F027 0A0) Turbo model</p> 	<p>49 G030 338 Attachment E</p> 
<p>49 S120 710 Holder, coupling, flange</p> 	<p>49 0727 570 Gauge body, pinion height (Part of 49 F027 0A0)</p> 	<p>49 F401 331 Body (Part of 49 D017 2A1)</p> 
<p>49 0636 145 Puller, fan pulley boss</p> 	<p>49 F027 001 Model, drive pinion (Part of 49 F027 0A0)</p> 	<p>49 UB71 525 Installer, bearing</p> 
<p>49 1243 465A Wrench, mainshaft locknut</p> 	<p>49 F027 0A1 Installer set, bearing</p> 	<p>49 0259 720 Wrench, differential side bearing adjust nut</p> 
<p>49 V001 795 Installer, oil seal</p> 	<p>49 F027 003 Handle (Part of 49 F027 0A1)</p> 	<p>49 F028 2A0 Puller &amp; Installer set, rubber bushing</p> 
<p>49 0839 425C Puller set, bearing</p> 	<p>49 F027 004 Attachment 80 (Part of 49 F027 0A1)</p> 	<p>49 F028 206 Mount rubber installer (Part of 49 F028 2A0)</p> 
<p>49 F027 0A0 Gauge set, pinion height adjust</p> 	<p>49 F027 005 Attachment 62 (Part of 49 F027 0A1)</p> 	<p>49 D017 2A1 Installer set, bearing</p> 



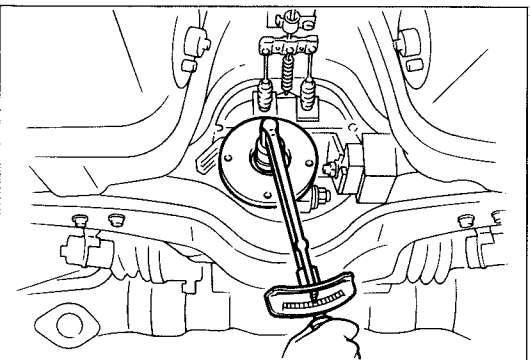
9MU0MX-033



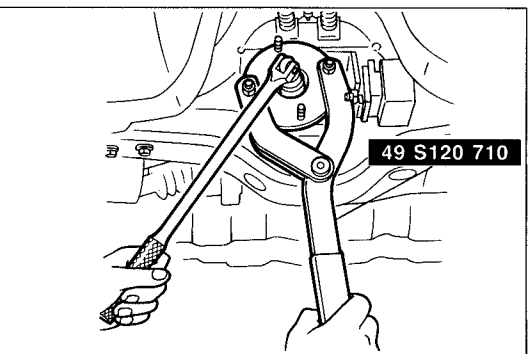
97U0MX-048



97U0MX-049



97U0MX-050



9MU0MX-036

## DIFFERENTIAL OIL

### Inspection

1. Remove the filler plug.
2. Verify that the oil is at the bottom of the filler plug hole. If it is low, add the specified oil.
3. Install the filler plug.

### Tightening torque:

**39—54 N·m (4.0—5.5 m·kg, 29—40 ft·lb)**

### Replacement

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

### Tightening torque:

**39—54 N·m (4.0—5.5 m·kg, 29—40 ft·lb)**

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

### Specified oil

#### Type:

**Above -18°C (0°F): GL-5, SAE 90**

**Below -18°C (0°F): GL-5, SAE 80W**

#### Capacity:

**Turbo 1.4 liters (1.5 US qt, 1.2 Imp qt)**

**Non-Turbo 1.3 liters (1.4 US qt, 1.1 Imp qt)**

6. Install the filler plug.

### Tightening torque:

**39—54 N·m (4.0—5.5 m·kg, 29—40 ft·lb)**

## OIL SEAL (COMPANION FLANGE)

### Replacement

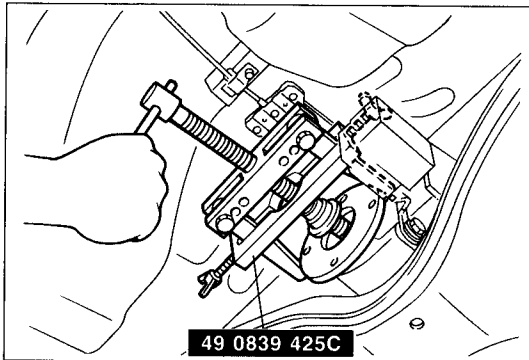
1. Jack up the vehicle and support it with safety stands.
2. Drain the differential oil.
3. Remove the propeller shaft. (Refer to Section L.)

### Note

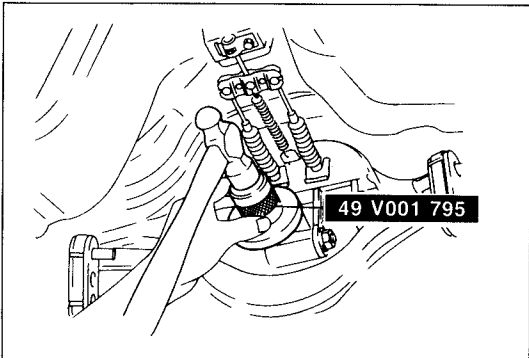
- **Make a notation of the starting torque. At the time of installation tighten the locknut to this value.**
- **Mark the propeller shaft and the companion flange for proper reassembly.**

4. Before loosening the flange locknut, measure and record the rotation starting torque of the drive pinion (within range of the drive pinion and ring gear backlash).

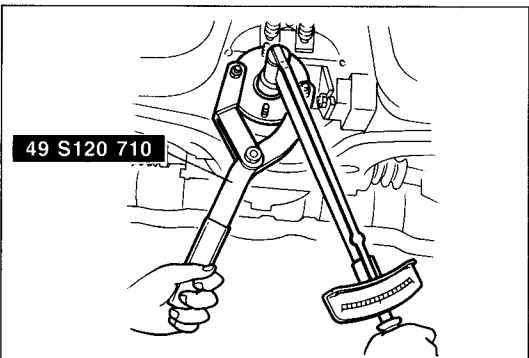
5. Hold the companion flange with the **SST** and remove the locknut.



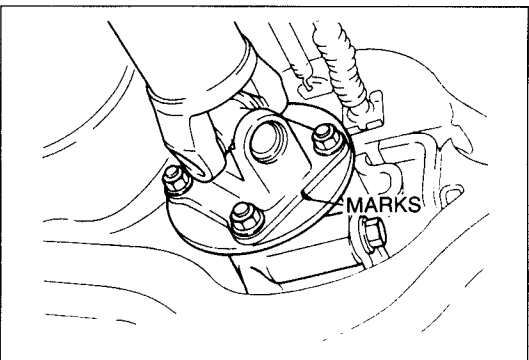
97U0MX-037



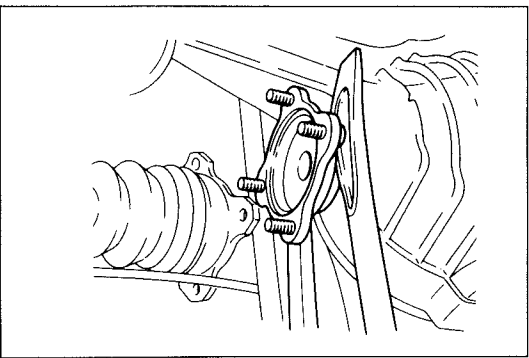
97U0MX-051



97U0MX-052



97U0MX-053



97U0MX-054

6. Remove the companion flange with the **SST**.
7. Remove the oil seal.

8. Apply lithium-base grease to the new oil seal lip and install it with the **SST**.

9. Install and tighten a new locknut using the **SST** to get the starting torque recorded in Step 4.

10. Install the propeller shaft. (Refer to Section L.)
11. Add the specified oil through the oil filler plug hole. (Refer to page M-18.)

## OIL SEAL (OUTPUT SHAFT) Replacement

1. Jack up the vehicle and support it with safety stands.
2. Drain the differential gear oil.

### Note

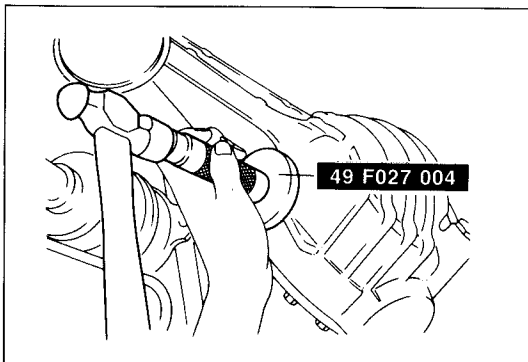
**Make the driveshaft and output shaft flanges for proper reassembly.**

3. Separate the driveshaft from the differential, and suspend it as shown in the figure.

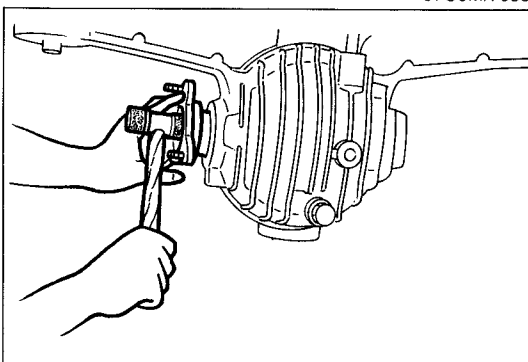
### Note

**Use caution during the removal operation, because the shaft may suddenly drop.**

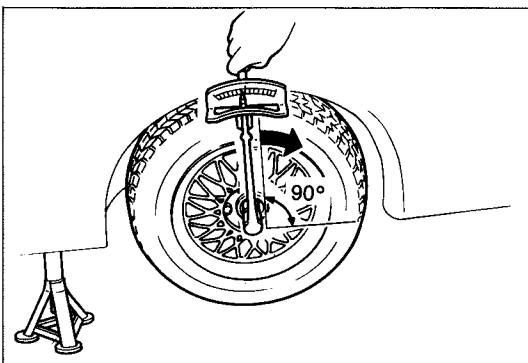
4. Remove the output shaft with two pry bars as shown in the figure.
5. Remove the oil seal.



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97U0MX-056



97U0MX-057

8. Apply lithium-base grease to the new oil seal lip and install it with the **SST**.

9. Install the output shaft into the side gears by lightly tapping with a plastic hammer.

10. Verify that the output shaft is hooked into the side gears by pulling it by hand.

## OPERATION INSPECTION

### Viscous Limited Slip Differential

1. Turn off the engine and shift the transmission into reverse.
2. Block the front wheels with wheel chocks.
3. Jack up the rear wheels and support the vehicle with a jack stands.
4. Release the parking brake.
5. Measure the time it takes to turn the wheel 90° while applying the specified torque.

**Specified torque: 39 N-m (4.0 m-kp, 29 ft-lb)**

**Specified time: 4.0 sec. min.**

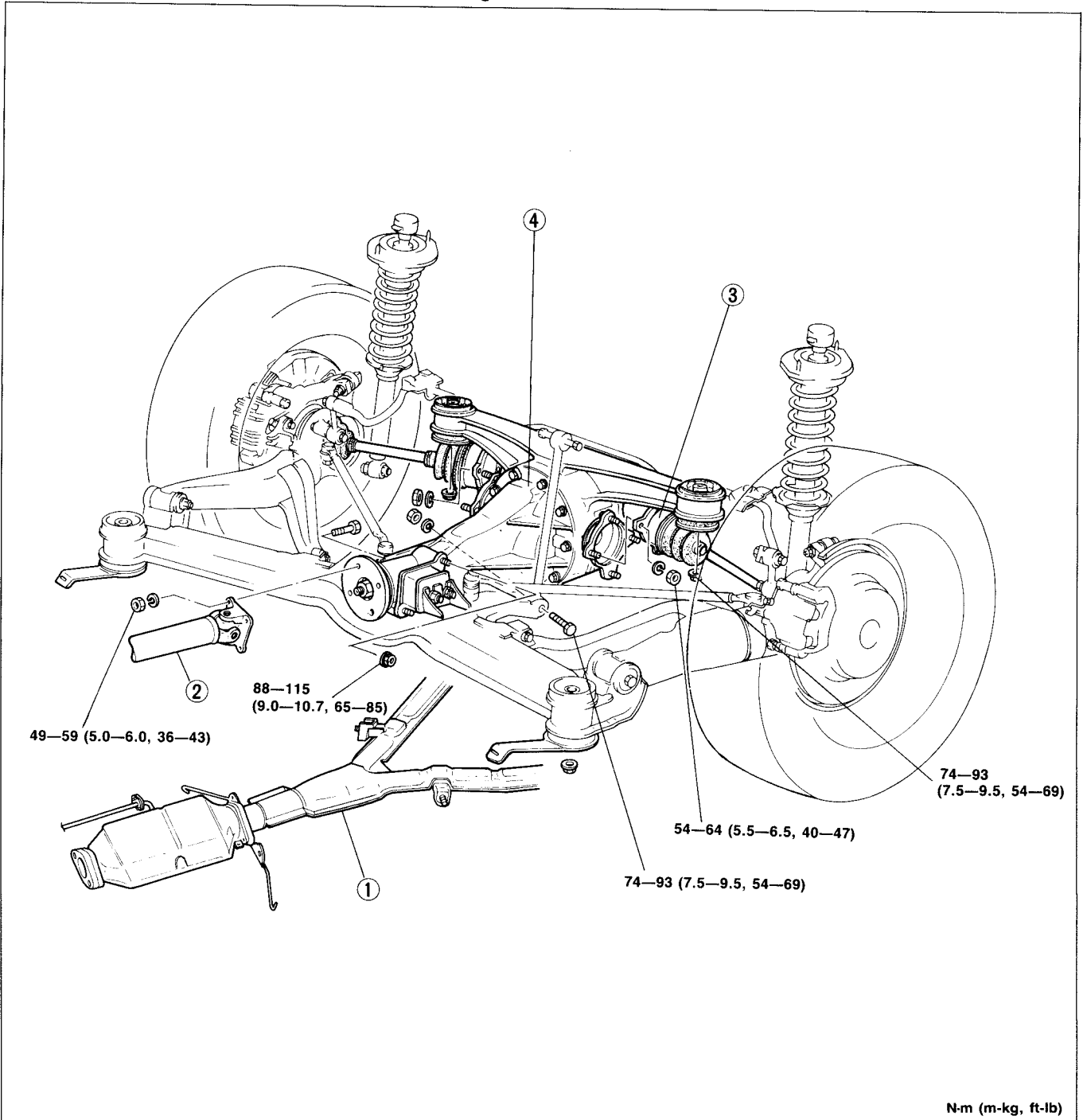
6. If not as specified, replace the viscous limited slip differential and fill the differential with new specified oil. (Refer to page M-18, 24, 26.)

## DIFFERENTIAL (STANDARD), VISCOUS LIMITED SLIP DIFFERENTIAL (VISCOUS L.S.D.) Removal and Installation

**Note**

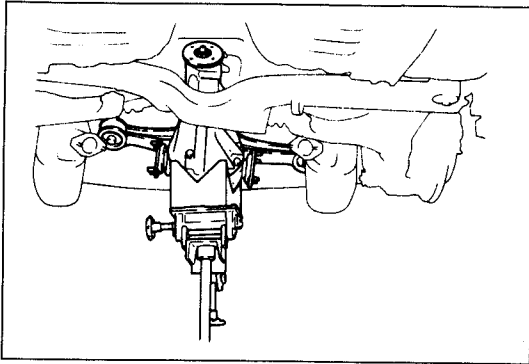
**Drain the differential oil before removal.**

Remove in the order shown in the figure, referring to **Removal Note**.  
Install in the reverse order of removal, referring to **Installation Note**.

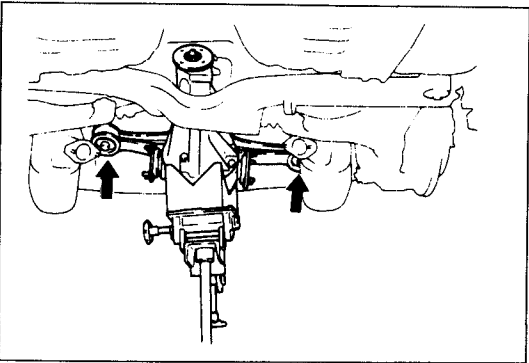


97U0MX-058

- |  |   |
|--|---|
| <p>1. Exhaust pipe<br/>Removal ..... Section L<br/>Installation..... Section L</p> <p>2. Propeller shaft<br/>Removal ..... Section L<br/>Installation..... Section L</p> | <p>3. Driveshaft<br/>Removal..... page M-14<br/>Installation ..... page M-14</p> <p>4. Differential (Standard), Viscous L.S.D.<br/>Disassembly, Inspection and<br/>Assembly ..... page M-24</p> |
|--|---|



97UOMX-059



97UOMX-060

## Disassembly note

### Differential assembly

1. Remove the mounting nut from the left side of the differential member and let the member hang down.
2. Disconnect the sublink assembly.
3. Support the differential assembly with a jack, and remove the differential assembly.

## Assembly note

### Differential assembly

1. Support the differential assembly with a jack, and install it.
2. Connect the sublink assembly.
3. Install the mounting nut on the left side of the differential member.

## Tightening torque:

**74—93 N·m (7.5—9.5 m·kg, 54—69 ft·lb)**

MEMO

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# M DIFFERENTIAL

## Disassembly, Inspection, and Assembly

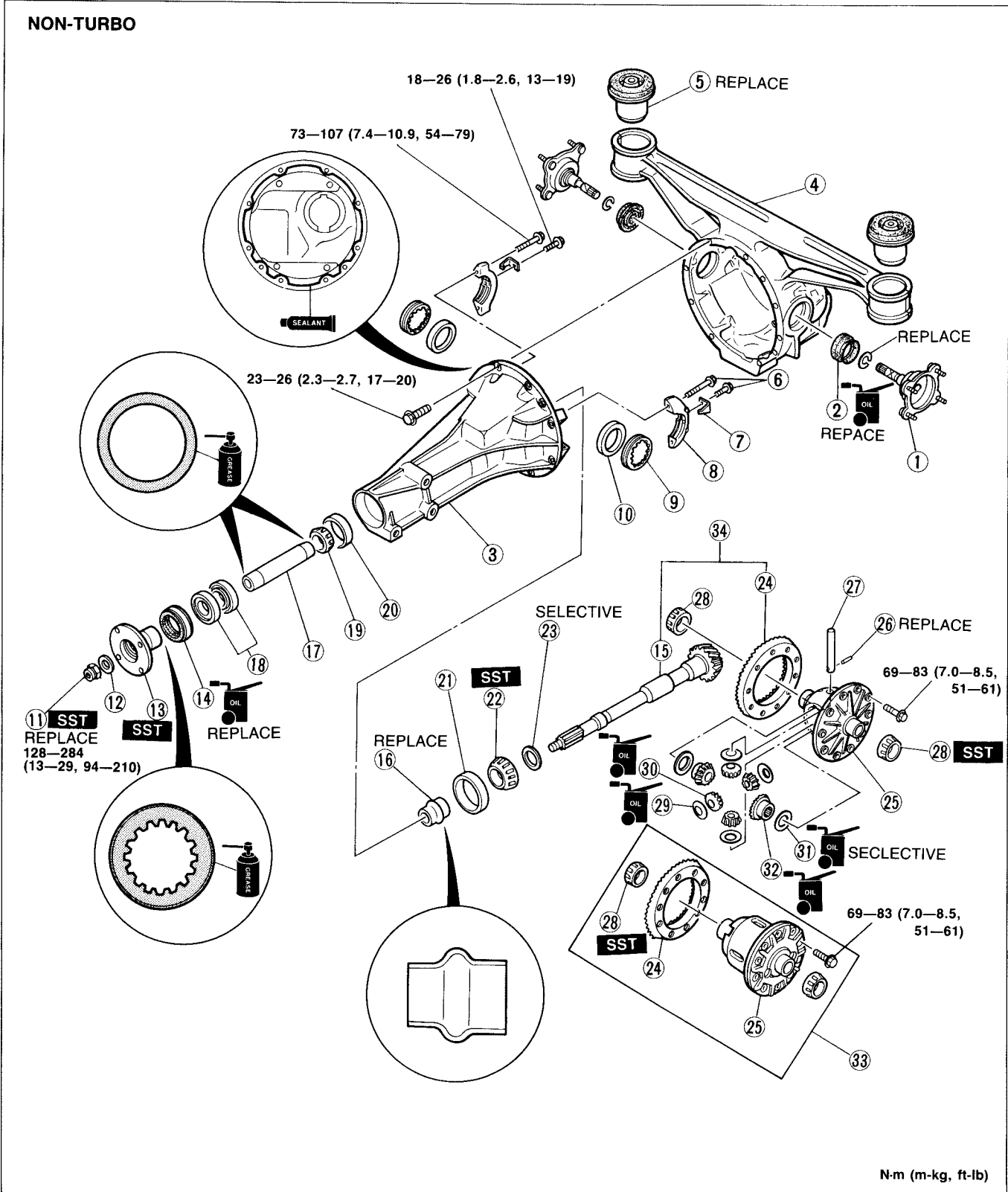
### Caution

Install the differential carrier within 10 min. after applying sealant. Allow the sealant to set at least 30 min. after installation before filling the differential with the specified oil.

Disassemble in the order shown in the figure, referring to **Disassembly Note**.

Inspect all parts and repair or replace as necessary.

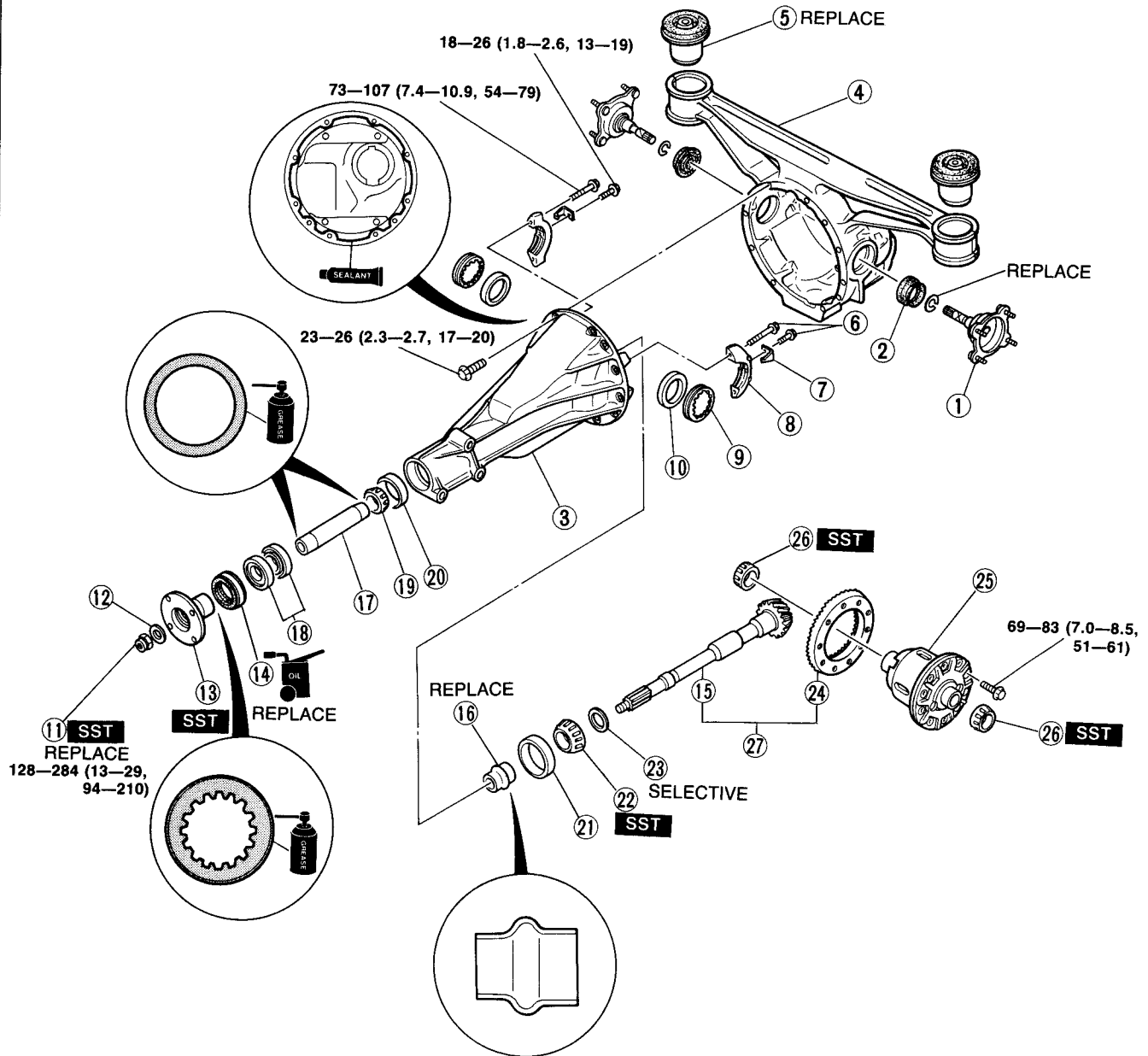
Assemble in the reverse order of disassembly, referring to **Assembly Note**.



1. Output shaft
  - Disassembly note ..... page M-28
  - Assembly note ..... page M-36
2. Oil seal (Output shaft)
  - Assembly note ..... page M-36
3. Differential carrier
  - Disassembly note ..... page M-28
  - Assembly note ..... page M-36
4. Differential case
  - Disassembly note ..... page M-28
5. Differential mounting rubber
  - Disassembly note ..... page M-28
  - Assembly note ..... page M-36
6. Bolt
7. Lock plate
8. Bearing cap
9. Adjusting screw
10. Bearing outer race
11. Locknut
12. Washer
13. Companion flange
  - Disassembly note ..... page M-29
  - Inspect splines for wear or damage
  - Assembly note ..... page M-33
14. Oil seal
  - Assembly note ..... page M-33
15. Drive pinion
  - Disassembly note ..... page M-29
  - Inspect splines for wear or damage
16. Collapsible spacer
  - Inspection ..... page M-30
17. Long collar
18. Ball bearings
  - Disassembly note ..... page M-29
  - Inspect for damage or rough rotation
19. Bearing inner race (Center bearing)
  - Disassembly note ..... page M-29
  - Inspect for damage or rough rotation
  - Assembly note ..... page M-32
20. Bearing outer race (Center bearing)
  - Disassembly note ..... page M-31
  - Assembly note ..... page M-29
21. Bearing outer race (Rear bearing)
  - Disassembly note ..... page M-29
  - Assembly note ..... page M-30
22. Bearing inner race (Rear bearing)
  - Disassembly note ..... page M-30
  - Inspect for damage or rough rotation
  - Assembly note ..... page M-32
23. Spacer
24. Ring gear
  - Inspect teeth for wear or damage
  - Assembly note ..... page M-34
25. Gear case (Standard)
26. Knock pin
  - Disassembly note ..... page M-30
  - Assembly note ..... page M-34
27. Pinion shaft
28. Bearing inner races (Side bearing)
  - Disassembly note ..... page M-30
  - Inspect for damage or rough rotation
  - Assembly note ..... page M-32
29. Thrust washer
  - Assembly note ..... page M-34
30. Pinion gears
  - Inspect teeth for wear or damage
  - Assembly note ..... page M-34
31. Thrust washer
  - Assembly note ..... page M-34
32. Side gear
  - Inspect teeth for wear or damage
  - Assembly note ..... page M-34
33. Viscous L.S.D.
34. Final gear set

97U0MX-063

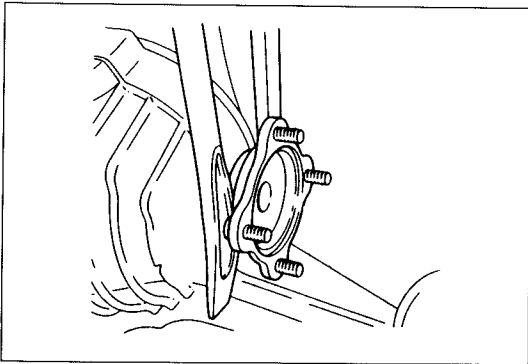
## TURBO



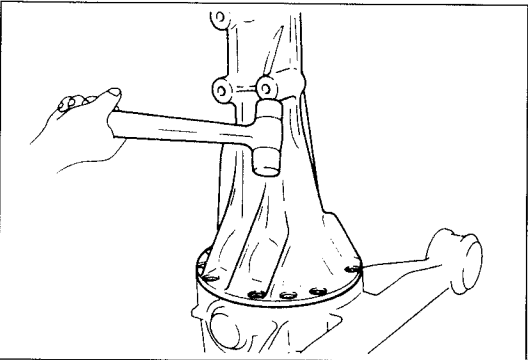
N-m (m-kg, ft-lb)

97U0MX-064

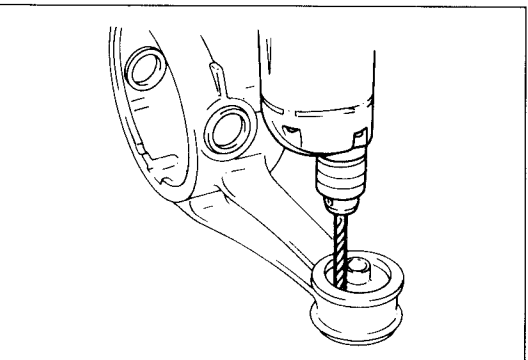
<p>1. Output shaft              Disassembly note ..... page M-28              Assembly note ..... page M-36</p> <p>2. Oil seal (Output shaft)              Assembly note ..... page M-36</p> <p>3. Differential carrier              Disassembly note ..... page M-28              Assembly note ..... page M-36</p> <p>4. Differential case              Disassembly note ..... page M-28</p> <p>5. Differential mounting rubber              Disassembly note ..... page M-28              Assembly note ..... page M-36</p> <p>6. Bolt</p> <p>7. Lock plate</p> <p>8. Bearing cap</p> <p>9. Adjusting screw</p> <p>10. Bearing outer race</p> <p>11. Locknut</p> <p>12. Washer</p> <p>13. Companion flange              Disassembly note ..... page M-29              Inspect splines for wear or damage              Assembly note ..... page M-33</p> <p>14. Oil seal              Assembly note ..... page M-33</p> <p>15. Drive pinion              Disassembly note ..... page M-29              Inspect splines for wear or damage</p>	<p>16. Collapsible spacer              Inspection ..... page M-30</p> <p>17. Long collar</p> <p>18. Ball bearings              Disassembly note ..... page M-29              Inspect for damage or rough rotation</p> <p>19. Bearing inner race (Center bearing)              Disassembly note ..... page M-29              Inspect for damage or rough rotation              Assembly note ..... page M-32</p> <p>20. Bearing outer race (Center bearing)              Disassembly note ..... page M-31              Assembly note ..... page M-29</p> <p>21. Bearing outer race (Rear bearing)              Disassembly note ..... page M-29              Assembly note ..... page M-30</p> <p>22. Bearing inner race (Rear bearing)              Disassembly note ..... page M-30              Inspect for damage or rough rotation              Assembly note ..... page M-32</p> <p>23. Spacer</p> <p>24. Ring gear              Inspect teeth for wear or damage              Assembly note ..... page M-34</p> <p>25. Viscous L.S.D.</p> <p>26. Bearing inner races (Side bearing)              Disassembly note ..... page M-30              Inspect for damage or rough rotation              Assembly note ..... page M-32</p> <p>27. Final gear set</p>
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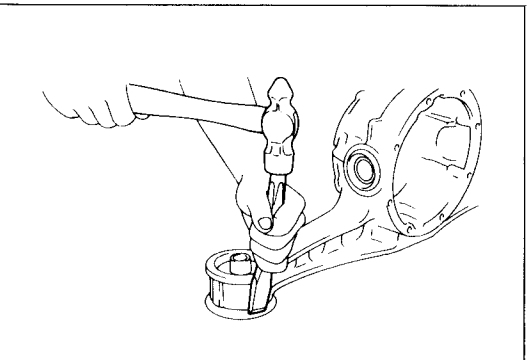
97U0MX-066



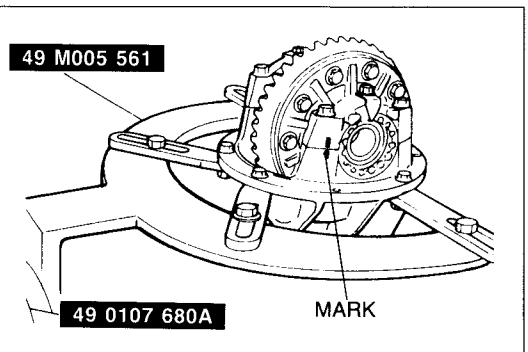
97U0MX-067



97U0MX-068



97U0MX-069



97U0MX-070

## Disassembly note

### Output shaft

Remove the output shaft with two pry bars as shown in the figure.

## Differential case

### Caution

**Do not strike the aluminum alloy differential case.**

Strike the differential carrier with a copper hammer to separate it from the case.

## Differential mounting rubber

1. Drill holes around the differential mounting rubber.

### Note

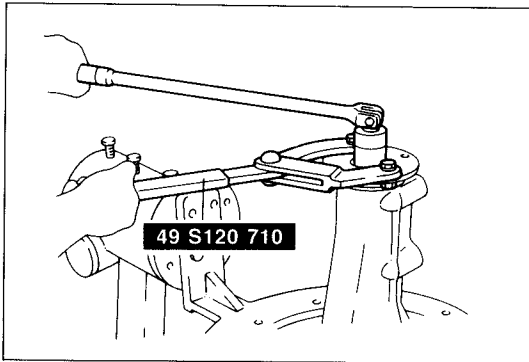
**Use a new mounting rubber when reassembling.**

2. Hit the edge of the differential mounting rubber to remove it.

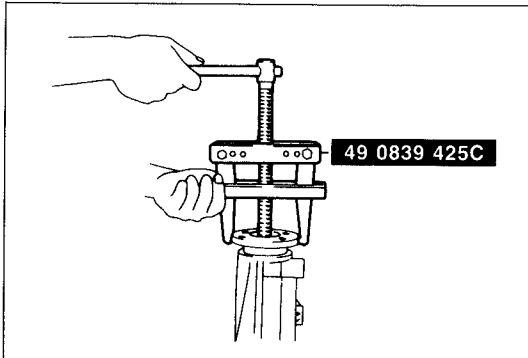
## Differential carrier

1. Mount the differential carrier on the **SST**.

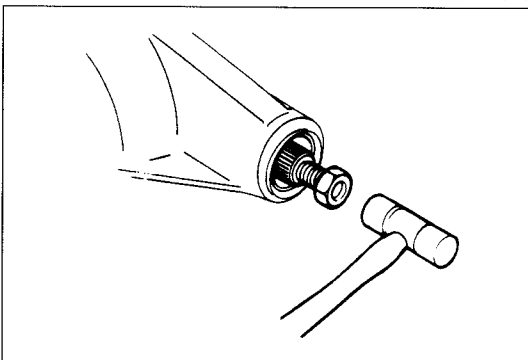
2. Mark one bearing cap and the carrier.



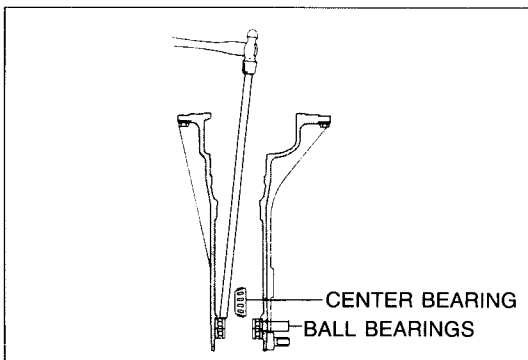
97U0MX-071



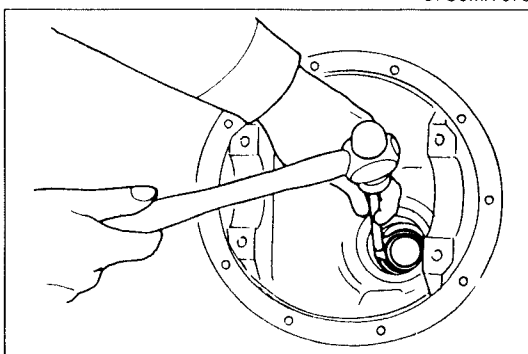
9MU0MX-046



97U0MX-072



97U0MX-073



97U0MX-074

## Companion flange

1. Hold the companion flange with the **SST**, and remove the locknut.
2. Remove the companion flange with the **SST**.

## Drive pinion

Push out the drive pinion by attaching a miscellaneous locknut to the drive pinion and tapping it with a copper hammer.

## Ball bearings, Bearing inner race (Center bearing)

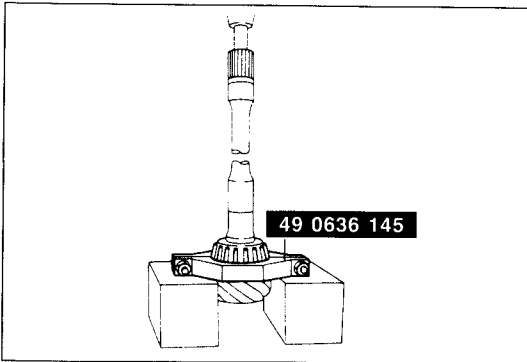
Drive out the ball bearings with a brass drift and hammer. Remove the center bearing.

## Bearing outer race (Center bearing), (Rear bearing)

### Note

**For proper reassembly, identify the bearing outer races.**

Remove the bearing outer races by using the two grooves in the carrier and alternately tapping the sides of the races.



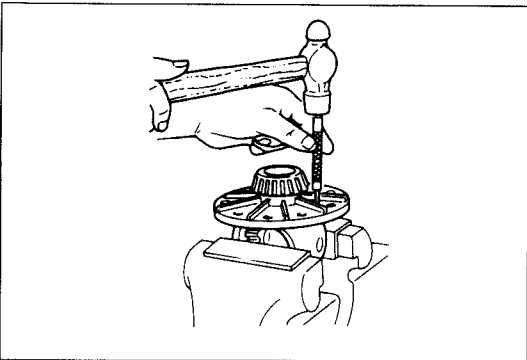
97U0MX-075

## Bearing inner race (Rear bearing)

### Note

Support the drive pinion by hand so that it will not fall.

Remove the rear bearing with the **SST**.



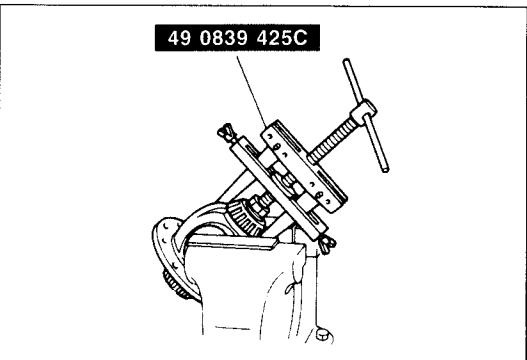
9MU0MX-076

## Knock pin

### Note

Tap out toward the ring gear side.

Secure the gear case in a vise and remove the knock pin.



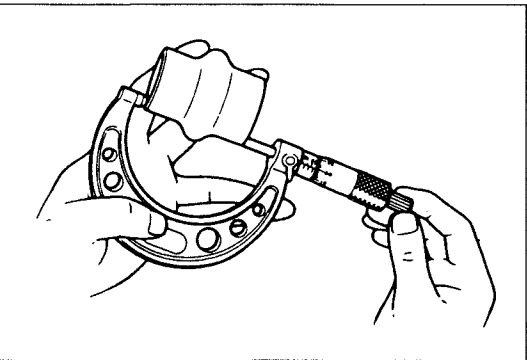
97U0MX-076

## Bearing inner races (Side bearing)

### Note

Identify the bearings so that they can later be reinstalled in the same position.

Remove the side bearings from the gear case with the **SST**.



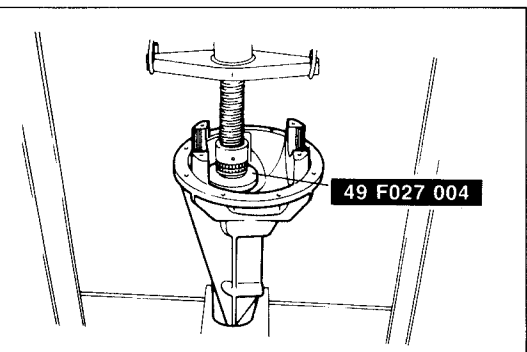
97U0MX-077

## Collapsible spacer

### Note

There are two type of collapsible spacer are used for RX-7 models.

Non-Turbo: 48.85—49.15mm (1.923—1.935 in)  
Turbo : 56.85—57.15mm (2.238—2.250 in)

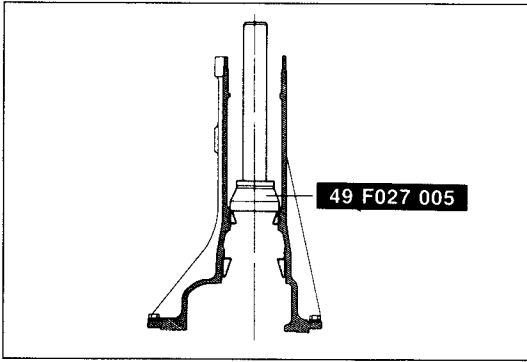


97U0MX-078

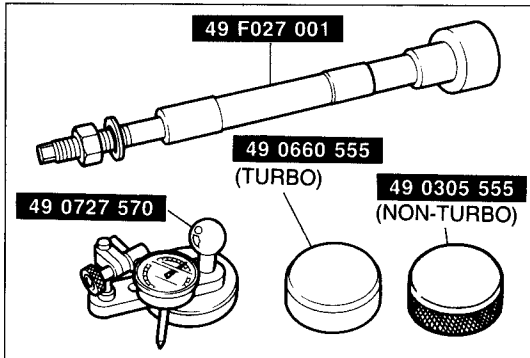
## Assembly note

### Adjustment of pinion height

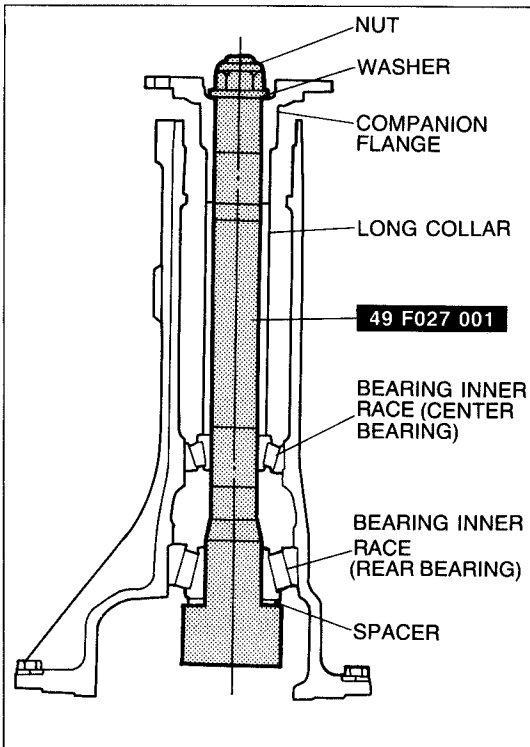
1. Make certain that the differential bearing support bores are free of dirt and burrs.
2. Install the bearing outer race (rear bearing) with the **SST**.



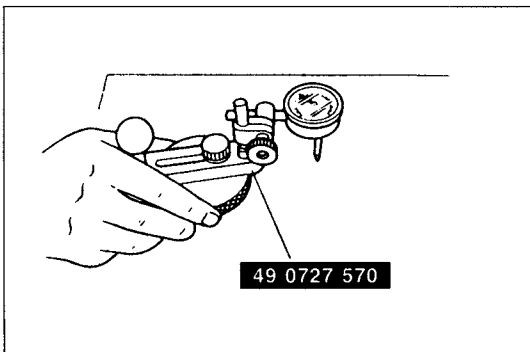
97U0MX-079



97U0MX-080



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97U0MX-082

3. Install the bearing outer race (center bearing) with the **SST**.

4. Adjust the drive pinion height as follows with the **SST**.

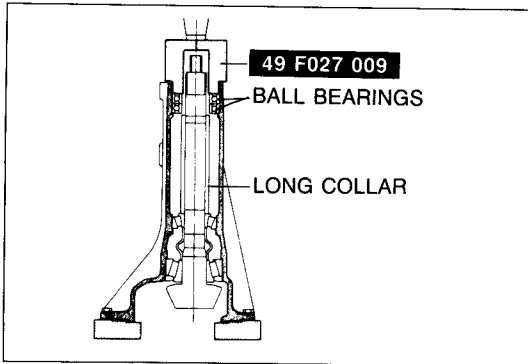
### Note

**Use the spacer that was removed.**

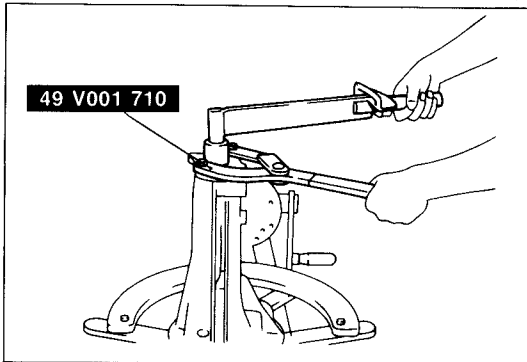
- Install the bearing inner race (rear bearing), spacer and **SST**.
- Install the bearing inner race (center bearing), long collar, companion flange, washer, and nut.
- Tighten the nut just enough so that the **SST** can be turned by hand.

d) Place the **SST** on a surface plate and set the dial indicator to "Zero".

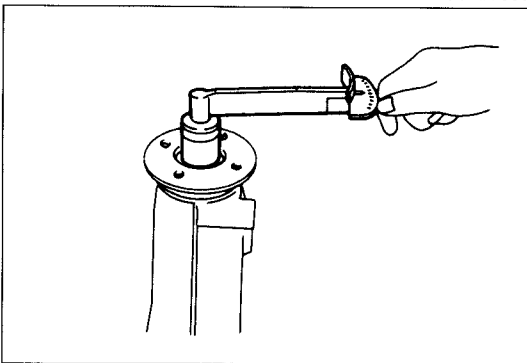




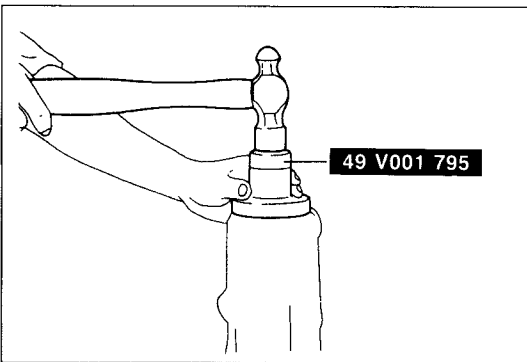
97U0MX-088



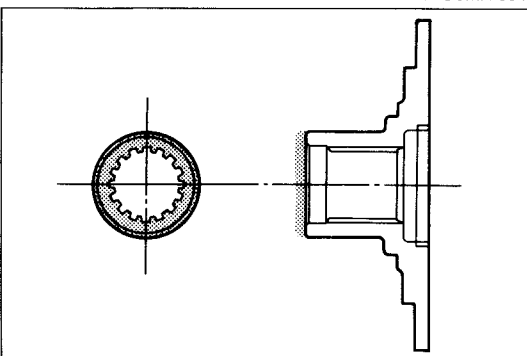
97U0MX-089



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5. Apply a light coat of grease to the ends of the long collar. Install the spacer.
6. Support the differential carrier, and press the ball bearing on with the **SST**.

**Press force: 2,000—3,000 kg (2—3 ton)**

**Caution**

**Do not install the oil seal.**

7. Install the companion flange, and tighten the locknut.

**Tightening torque: 128 N-m (13 m-kg, 94 ft-lb)**

8. Turn the companion flange by hand to seat the bearing.
9. Measure the drive pinion preload. Adjust the preload by tightening the locknut.

**Preload:**

**1.3—1.8 N-m (13—18 cm-kg, 11.3—15.6 in-lb)**

**Tightening torque:**

**128—284 N-m (13—29 m-kg, 94—210 ft-lb)**

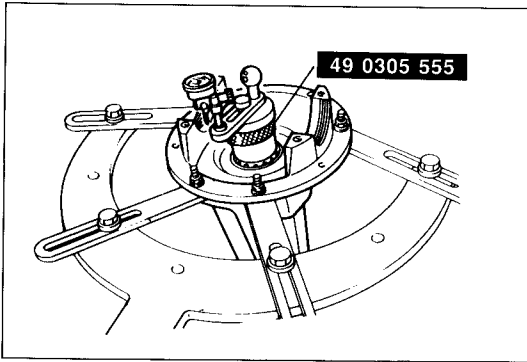
If the specified preload cannot be obtained, replace the collapsible spacer with a new one and check again.

10. Remove the nut, washer and companion flange.
11. Tap a new oil seal into the differential carrier with the **SST**.

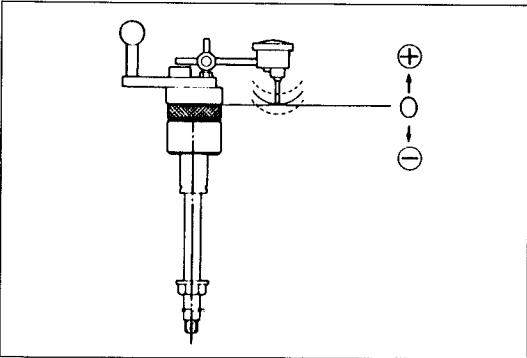
12. Apply a light coat of grease to the end face of the companion flange.
13. Install the companion flange and tighten it to the specified torque.

**Tightening torque:**

**128—284 N-m (13—29 m-kg, 94—210 ft-lb)**



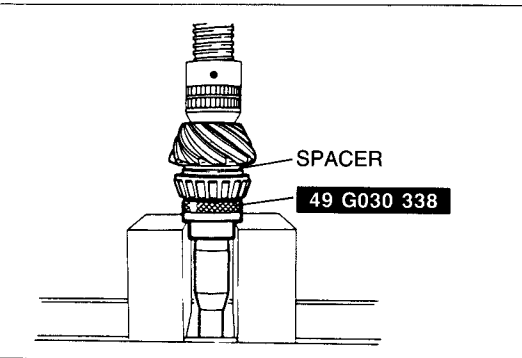
97U0MX-083



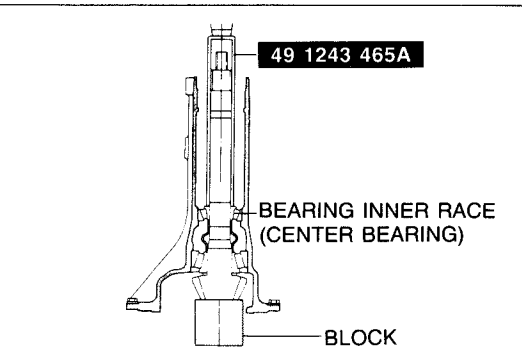
97U0MX-084

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

97U0MX-085



97U0MX-086



97U0MX-087

- e) Place the **SST** atop the drive pinion model. Set the gauge body atop the gauge block.
- f) Place the feeler of the dial indicator so that it contacts where the bearing inner races (side bearing) is installed in the carrier. Measure the lowest position on the left and right sides of the carrier.

- g) Add the two (left and right) values obtained in Step f, and divide the total by 2.

**Specification: 0mm (0 in)**

- h) If it is not within specification, adjust the pinion height by selection of a spacer.

**Note**

**Spacers are available in increments of 0.03mm. Select the spacer thickness that is closest to that necessary.**

**Adjustment of drive pinion preload**

1. Install the spacer.

**Note**

- a) Press on until the force required suddenly increases.
- b) Install the spacer selected for the pinion height adjustment, being careful that the installation direction is correct.

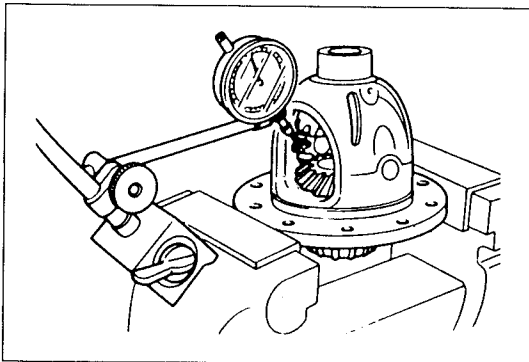
2. Press the bearing inner race (rear bearing) on with the **SST**.

**Caution**

**Do not press to more than 1,000 kg (1 ton), because the collapsible spacer will bend.**

3. Install the drive pinion assembly and the collapsible spacer.
4. Press the bearing inner race (center bearing) on with the **SST**.

**Press fore: 1,000 kg (1 ton)**



97U0MX-093

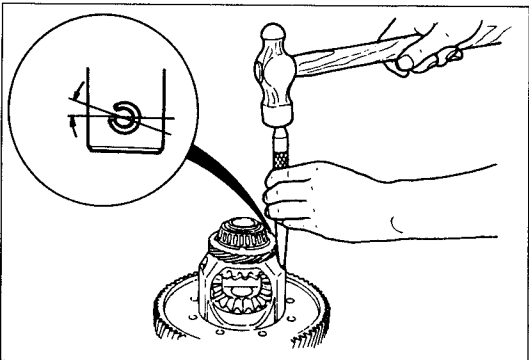
## Adjustment of side gear and pinion gear backlash (Standard)

1. Check the backlash of the side gears and pinion gears. Adjust by inserting the proper thickness thrust washer at both sides.

**Standard backlash: 0—0.1mm (0—0.004 in)**

## Thrust washer thickness:

Identification mark	Thickness
0	2.00mm (0.0787 in)
05	2.05mm (0.0807 in)
1	2.10mm (0.0827 in)
15	2.15mm (0.0846 in)
2	2.20mm (0.0866 in)



97U0MX-094

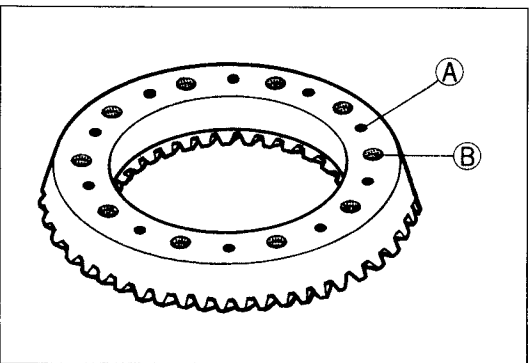
2. Install the knock pin to secure the pinion shaft. Stake the pin with a punch to prevent it from coming out of the case.

## Adjustment of drive pinion and ring gear backlash

### Note

**Apply approx. 0.04 cc (0.0024 cu in) of compound at each point.**

1. Apply thread-locking compound to points (A) and (B) around the gear back face.
2. Mount the ring gear onto the gear case.

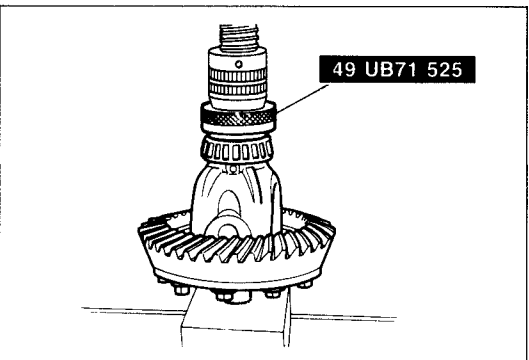


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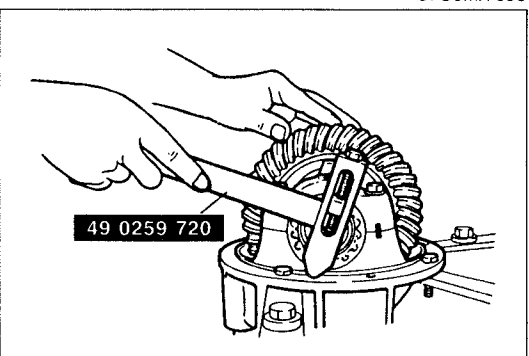
### Tightening torque:

**69—83 N·m (7.0—8.5 m·kg, 51—61 ft·lb)**

3. Press the bearing inner race (side gear) on with the **SST**.

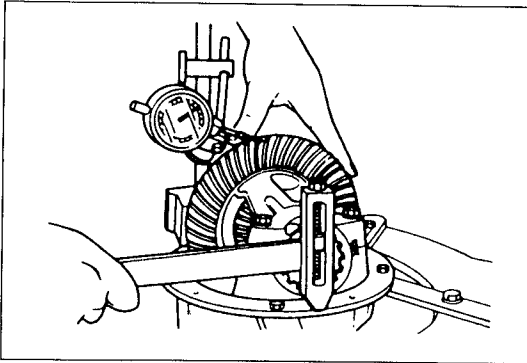


97U0MX-096

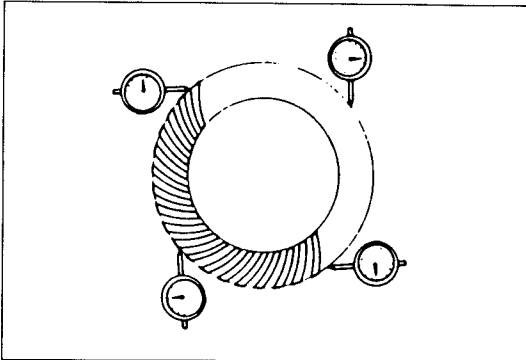


97U0MX-102

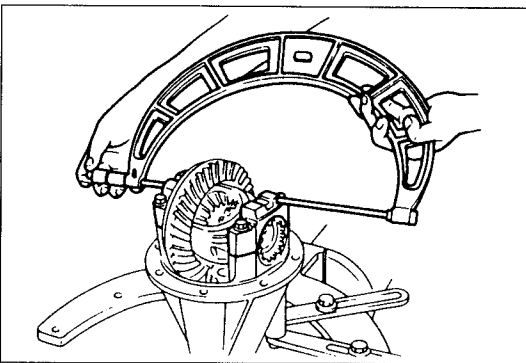
4. Install the differential gear assembly in the carrier.
5. Note the identification marks on the adjusters, and install the adjusters to their respective sides.
6. Install the differential bearing caps, making sure that the identification mark on the cap corresponds with the one on the carrier.



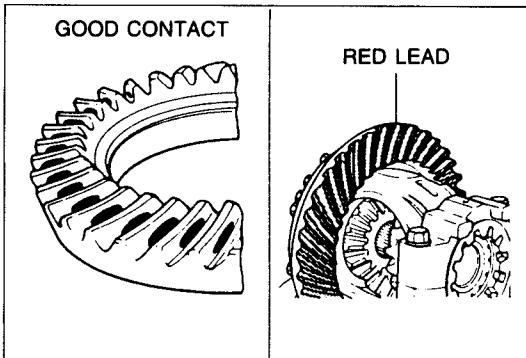
97U0MX-103



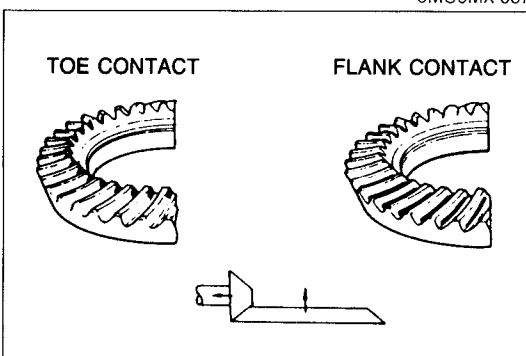
97U0MX-104



97U0MX-097



9MU0MX-067



63G09X-385

7. Mark the ring gear at four points at approx. **90°** 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.
8. Turn both bearing adjusters equally with the **SST** until the backlash is **0.09—0.11mm (0.0035—0.0043 in)**.

9. Check the backlash at the three other marked points, and make sure the minimum backlash is above **0.05mm (0.0020 in)** and the difference between the maximum and minimum is less than **0.07mm (0.0028 in)**.

10. Tighten the adjusters equally until the distance between the pilot sections on the bearing caps is as specified.

**Specified distance:**

**Non-Turbo 185.43—185.59mm (7.300—7.303 in)**  
**Turbo 204.43—204.50mm (8.048—8.051 in)**

**Note**

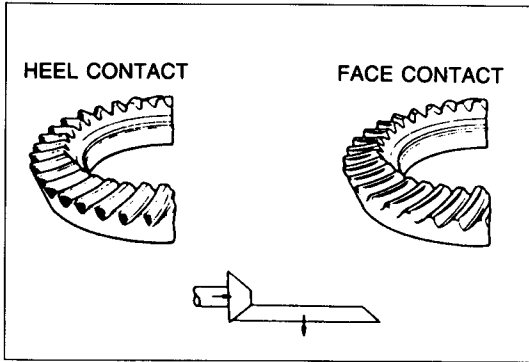
**When adjusting the differential bearing preload, be careful not to affect the backlash of the drive pinion and ring gear.**

**Inspection and adjustment of teeth contact**

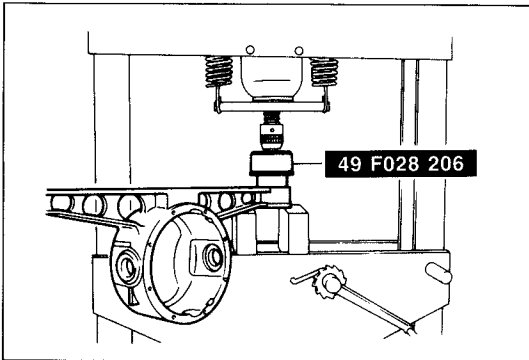
1. Coat both surfaces of 6—8 teeth of the ring gear with a uniformly thin coat of red lead.
2. While moving the ring gear back and forth by hand, rotate the drive pinion several times and check the tooth contact.
3. If the tooth contact is good, wipe off the red lead.
4. If it is not good, adjust the 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.



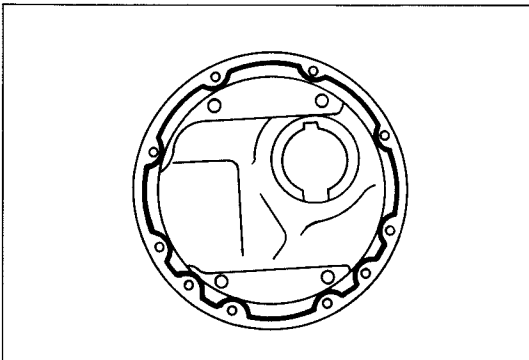
### Differential mounting rubber

#### Note

Install the mounting rubber with the voids in front and rear directions.

Press in the new differential mounting rubber with the **SST**.

**Press force: 2,000 kg (2 tons)**

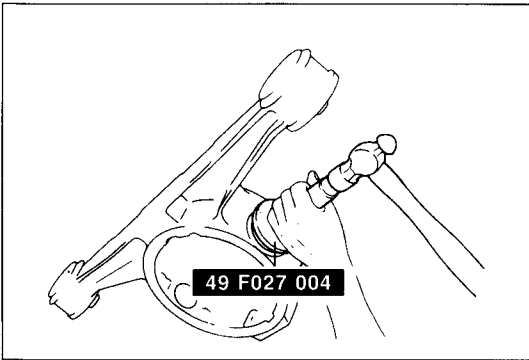


### Differential carrier

1. Apply sealant to the housing face.
2. Tighten the bolts.

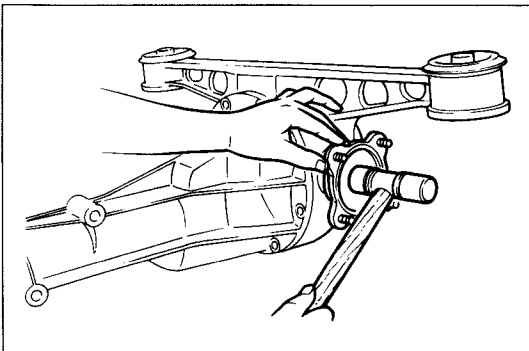
#### Tightening torque:

**23—26 N·m (2.3—2.7 m·kg, 10—20 ft·lb)**



### Oil seal (Output shaft)

Apply lithium-base grease to the new oil seal lip and install it with the **SST**.



### Output shaft

1. Install the new clip.
2. Install the output shaft into the side gears by lightly tapping with a plastic hammer.
3. Verify that the output shafts are hooked into the side gears by pulling them by hand.