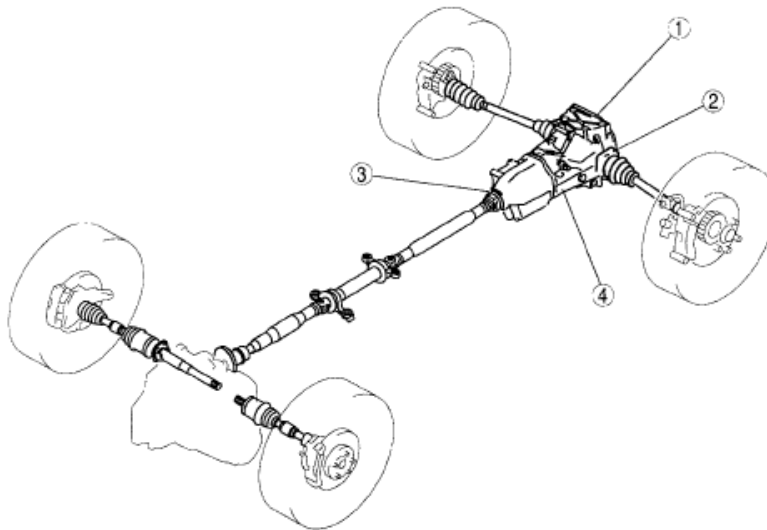


2008 DRIVELINE/AXLES

Differential - Mazda CX-9

REAR DIFFERENTIAL LOCATION INDEX



ac9uuw00001405

1	Differential oil (See 03-14-2 DIFFERENTIAL OIL INSPECTION) (See 03-14-2 DIFFERENTIAL OIL REPLACEMENT)
2	Oil seal (side gear) (See 03-14-2 OIL SEAL (SIDE GEAR) REPLACEMENT)

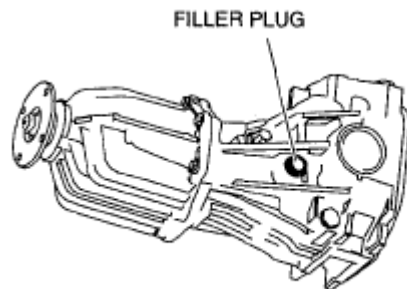
3	Oil seal (companion flange) (See 03-14-3 OIL SEAL (COMPANION FLANGE) REPLACEMENT)
4	Rear differential (See 03-14-5 REAR DIFFERENTIAL REMOVAL/ INSTALLATION) (See 03-14-8 REAR DIFFERENTIAL DISASSEMBLY) (See 03-14-11 REAR DIFFERENTIAL ASSEMBLY)

Fig. 1: Identifying Rear Differential Components

Courtesy of MAZDA MOTORS CORP.

DIFFERENTIAL OIL INSPECTION

1. Place the vehicle on level ground.
2. Remove the filler plug and washer.
3. Verify that the oil is at the brim of the filler plug hole.
4. If it is low, add the specified oil.
5. Install a new washer and the filler plug, and tighten.



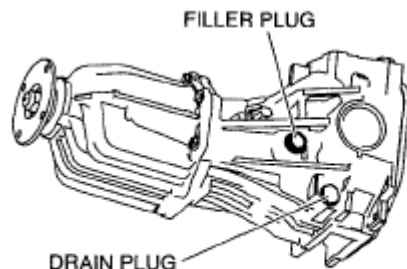
ac9uuw00001461

Fig. 2: Identifying Filler Plug & Washer
Courtesy of MAZDA MOTORS CORP.

Tightening torque 39.2-53.9 N.m {4.0-5.4 kgf.m, 29.0-39.7 ft.lbf}

DIFFERENTIAL OIL REPLACEMENT

1. Place the vehicle on level ground.
2. Remove the filler plug.
3. Remove the drain plug and drain the differential oil into a container.
4. Install a new washer and the drain plug, and tighten.



ac9uuw00001462

Fig. 3: Identifying Filler Plug & Drain Plug
Courtesy of MAZDA MOTORS CORP.

Tightening torque 39.2-53.9 N.m {4.0-5.4 kgf.m, 29.0-39.7 ft.lbf}

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

Rear differential oil

Specified oil grade: API service GL-5

Specified oil viscosity: SAE 80W-90

Capacity (approximate quantity): 1.0 L {1.1 US qt, 0.9 Imp qt}

6. After filling with differential oil, perform oil level inspection.
7. Install a new washer and the drain plug, and tighten.

Tightening torque 39.2-53.9 N.m {4.0-5.4 kgf.m, 29.0-39.7 ft.lbf}

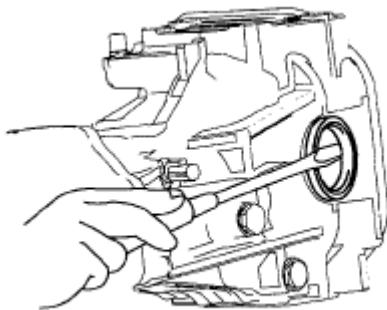
OIL SEAL (SIDE GEAR) REPLACEMENT

1. Remove the drain plug and the drain differential oil into a container.
2. Install a new washer and the drain plug, and tighten.
3. Remove the rear lateral link. (See REAR LATERAL LINK REMOVAL/INSTALLATION .)
4. Remove the rear coil spring. (See REAR COIL SPRING REMOVAL/INSTALLATION .)
5. Remove the rear lower arm. (See REAR LOWER ARM REMOVAL/INSTALLATION .)
6. Remove the rear trailing link and rear wheel hub component. (See WHEEL HUB COMPONENT REMOVAL/INSTALLATION [AWD] .)
7. Remove the rear drive shaft. (See REAR DRIVE SHAFT REMOVAL/INSTALLATION .)
8. Remove the clip from the drive shaft.

CAUTION:

- Wrap the end of a screwdriver with cloth to prevent scratches to the inside of the differential casing.

9. Remove the oil seal from the differential casing using a screwdriver.
10. Apply differential oil to the new oil seal lip.



ac9uuw00002076

Fig. 4: Removing Oil Seal
Courtesy of MAZDA MOTORS CORP.

11. Install the new oil seal to the differential carrier using the SSTs.

Substitution SST

- 49 G030 796

Outer diameter: 56-60 mm {2.21-2.36 in}

Inner diameter: 49.8 mm {2.0 in} or more

Inner depth: 8.7 mm {0.34 in} or more

12. After installing the new clip onto the drive shaft, insert the drive shaft into the differential. (See **REAR DRIVE SHAFT REMOVAL/INSTALLATION** .)
13. Verify that the drive shaft cannot be pulled out.
14. Install in the reverse order of removal.
15. Add the specified differential oil.
16. After adding the oil, perform an oil level inspection. (See **DIFFERENTIAL OIL INSPECTION**.)
17. Install a new washer and the oil filler plug, and tighten.

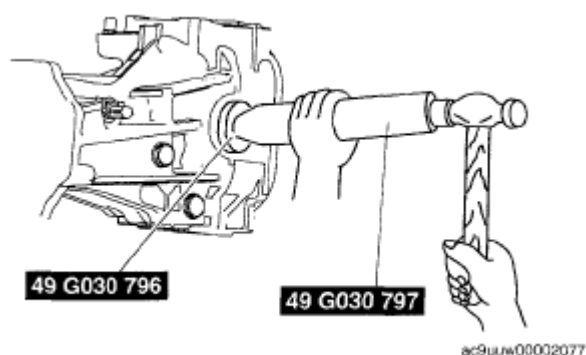


Fig. 5: Installing Washer & Oil Filler Plug
Courtesy of MAZDA MOTORS CORP.

Tightening torque 39.2-53.9 N.m {4.0-5.4 kgf.m, 29.0-39.7 ft.lbf}

18. Inspect the rear wheel alignment and adjust it if necessary. (See **REAR WHEEL ALIGNMENT [AWD]** .)

OIL SEAL (COMPANION FLANGE) REPLACEMENT

1. Drain the differential oil into a container.
2. Remove the presilencer installation nuts. (Middle pipe side) (See **EXHAUST SYSTEM REMOVAL/INSTALLATION [MZI-3.7]** .)
3. Disconnect the hanger rubber as shown in the figure.
4. Suspend the presilencer using a cable.
5. Remove the presilencer insulator.
6. Remove the propeller shaft. (See **PROPELLER SHAFT REMOVAL/INSTALLATION** .)

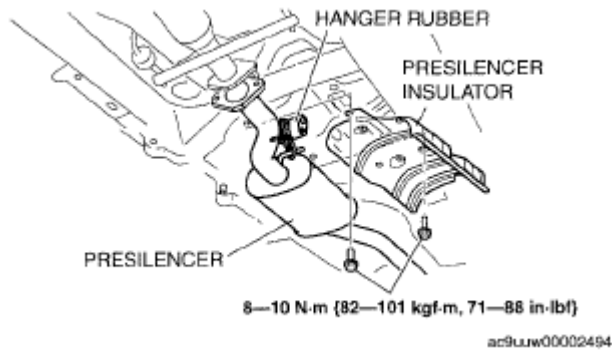


Fig. 6: Identifying Hanger Rubber, Presilencer Insulator & Torque Specifications
Courtesy of MAZDA MOTORS CORP.

7. Remove the locknut using the SST and a pipe.
8. Support the differential using a jack.

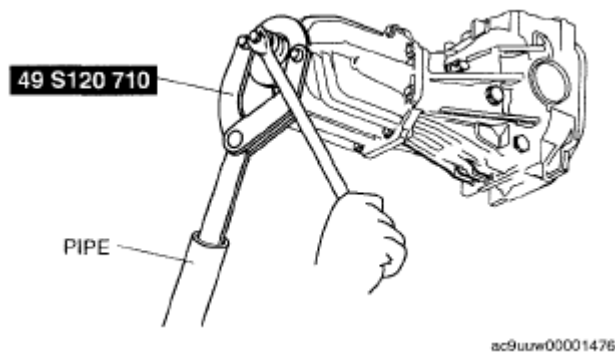


Fig. 7: Removing Locknut
Courtesy of MAZDA MOTORS CORP.

9. After removing the front side of the differential mount, gradually lower the jack and tilt the front side of the differential downward.

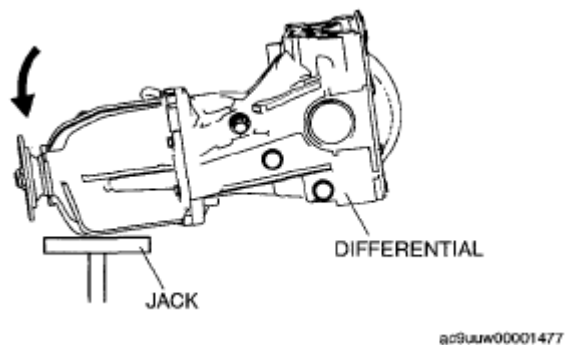


Fig. 8: Jack & Tilt Front Side Of Differential Downward
Courtesy of MAZDA MOTORS CORP.

10. Pull the companion flange off using the SST.
11. Remove the oil seal from the differential carrier using a screwdriver or similar tool.
12. Apply differential oil to the new oil seal lip.

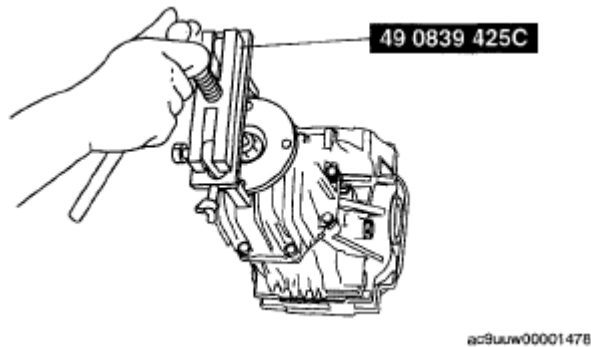


Fig. 9: Removing Oil Seal From Differential Carrier
Courtesy of MAZDA MOTORS CORP.

13. Install the new oil seal to the differential carrier using the SST.

Substitution SST

- **49 W011 102**

Outer diameter: 66 mm {2.60 in} or more

Inner diameter: 54-60 mm {2.13-2.36 in} or more

Inner depth: 17.5 mm {0.69 in} or more

14. Install the companion flange to the drive pinion.
15. Jack up the differential and install the front side of the differential mount.

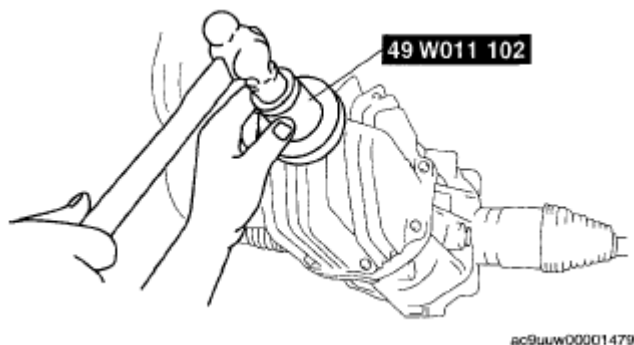


Fig. 10: Installing Oil Seal To Differential Carrier
Courtesy of MAZDA MOTORS CORP.

Tightening torque 63-85 N.m {6.5-8.6 kgf.m, 47-62 ft.lbf}

16. Install the washer and a new locknut.
17. Tighten the locknut to the specified torque using the SST and a pipe.

Tightening torque 167-226 N.m {17.1-23.0 kgf.m, 124-166 ft.lbf}

18. Install the propeller shaft. (See PROPELLER SHAFT REMOVAL/INSTALLATION .)
19. Add the specified differential oil from the filler plug. (See DIFFERENTIAL OIL REPLACEMENT.)

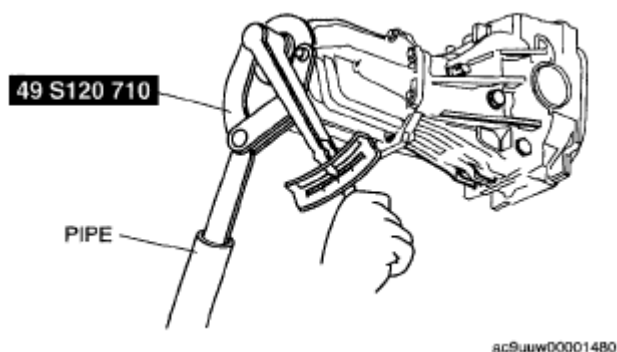


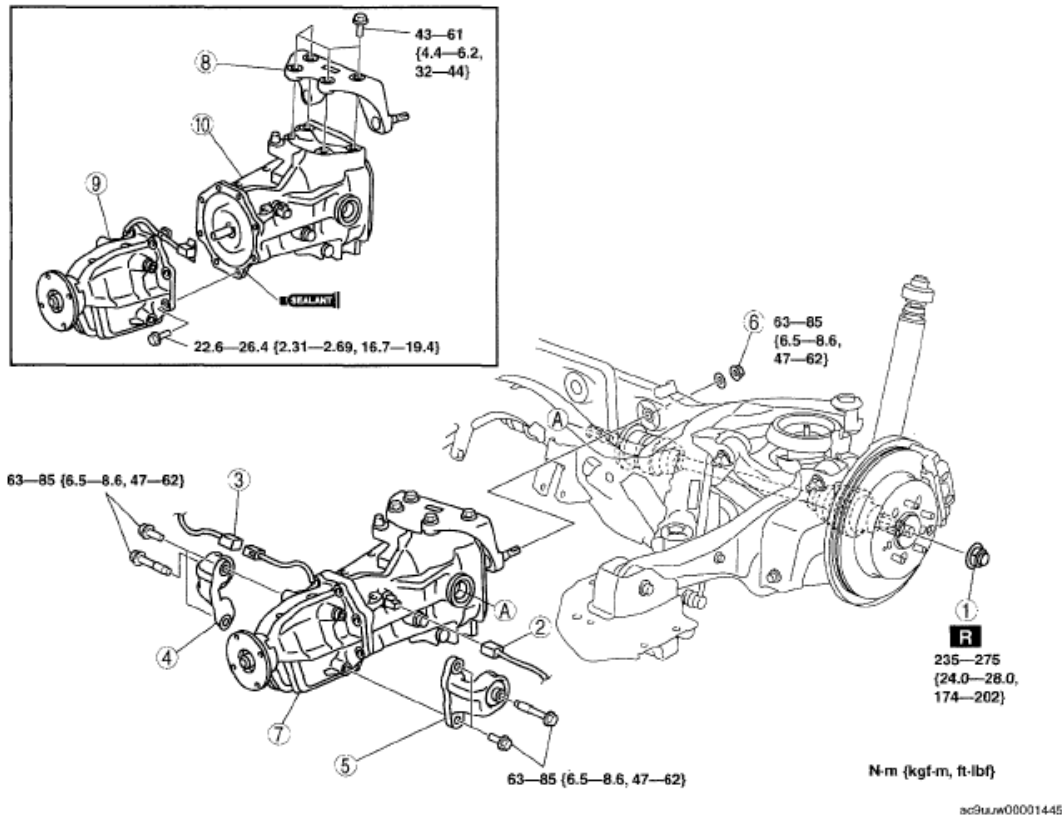
Fig. 11: Tightening Locknut
Courtesy of MAZDA MOTORS CORP.

REAR DIFFERENTIAL REMOVAL/INSTALLATION

1. Drain the rear differential oil into a container.
2. Remove the under guard (LH). (See CHARCOAL CANISTER, CANISTER VENT (CV) SOLENOID VALVE, AIR FILTER COMPONENT REMOVAL/INSTALLATION [MZI-3.7] .)
3. Remove the presilencer. (See EXHAUST SYSTEM REMOVAL/INSTALLATION [MZI-3.7] .)
4. Remove the presilencer insulator. (See REFRIGERANT LINE REMOVAL/INSTALLATION .)
5. Remove the propeller shaft. (See PROPELLER SHAFT REMOVAL/INSTALLATION .)
6. Remove in the order indicated in the table.
7. Install in the reverse order of removal.
8. Add the specified rear differential oil. (See DIFFERENTIAL OIL REPLACEMENT.)
9. Inspect the rear wheel alignment and adjust it if necessary. (See REAR WHEEL ALIGNMENT [AWD] .)

2008 Mazda CX-9 Grand Touring

2008 DRIVELINE/AXLES Differential - Mazda CX-9



1	Locknut (See 03-14-6 Locknut Removal Note.) (See 03-12-3 WHEEL HUB COMPONENT REMOVAL/INSTALLATION [AWD].)
2	Differential oil temperature sensor connector
3	AWD solenoid connector
4	Front differential mounting rubber (RH) (See 03-14-6 Rear Differential Component Removal Note.)
5	Front differential mounting rubber (LH) (See 03-14-6 Rear Differential Component Removal Note.)

6	Nut
7	Rear differential component (See 03-14-6 Rear Differential Component Removal Note.) (See 03-14-7 Rear Differential Component installation Note.)
8	Rear differential mounting rubber
9	Coupling component (See 03-19-4 COUPLING COMPONENT REMOVAL/INSTALLATION)
10	Rear differential

Fig. 12: Identifying Rear Differential Components & Torque Specifications
Courtesy of MAZDA MOTORS CORP.

LOCKNUT REMOVAL NOTE

1. Lock the hub by applying the brakes.
2. Knock the crimped portion of the locknut outward using a small chisel and a hammer.
3. Loosen the locknut.
4. Temporarily tighten the locknut.

CAUTION:

- Do not remove the locknut when lowering the rear differential. Otherwise, the rear drive shaft could fall and cause injury, or damage the part.

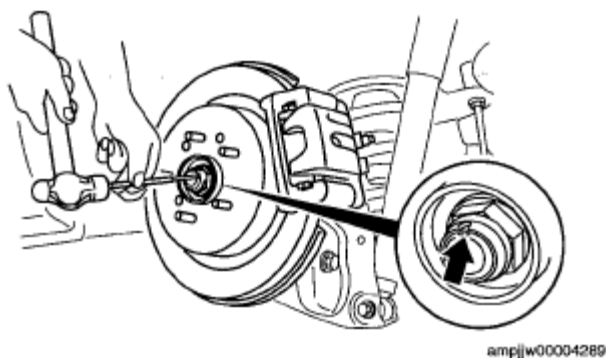


Fig. 13: Loosening Locknut
Courtesy of MAZDA MOTORS CORP.

REAR DIFFERENTIAL COMPONENT REMOVAL NOTE

1. Detach clips as shown in the figure.

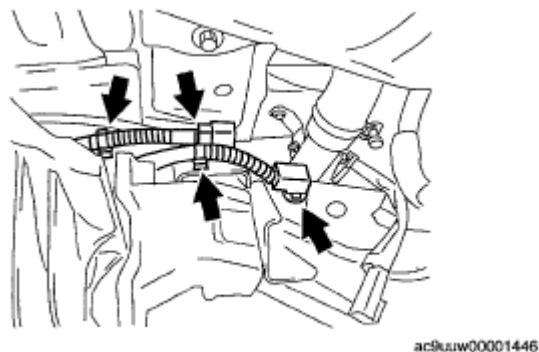
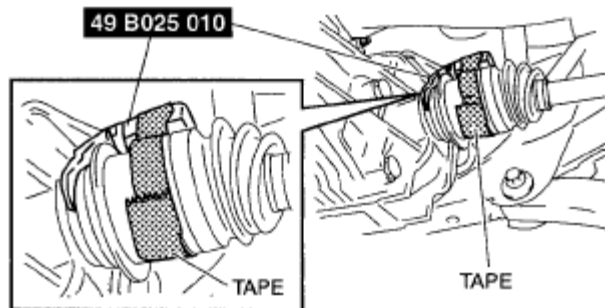


Fig. 14: Locating Clips
Courtesy of MAZDA MOTORS CORP.

2. Position the SST on the driveshaft and secure the SST with tape as shown in the figure.

CAUTION:

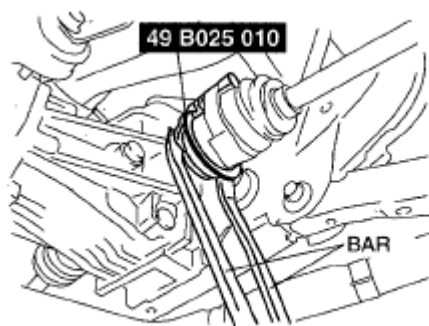
- Always secure the SST using tape because the SST may fall off during the operation and cause injury.



ac9uuw00001531

Fig. 15: Securing SST With Tape
Courtesy of MAZDA MOTORS CORP.

3. Disconnect the rear drive shaft from the rear differential side using the SST and two bars.



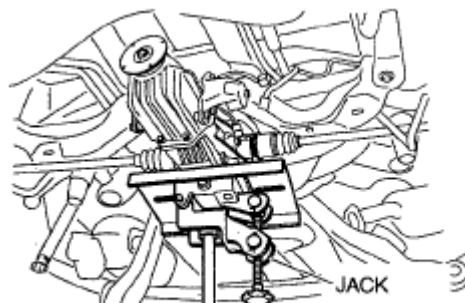
ac9uuw00001532

Fig. 16: Disconnecting Rear Drive Shaft From Rear Differential Side
Courtesy of MAZDA MOTORS CORP.

4. Support the rear differential using a jack.

CAUTION:

- When lowering the rear differential, be careful not to damage the rear differential oil seal, rear drive shaft, and surrounding parts.

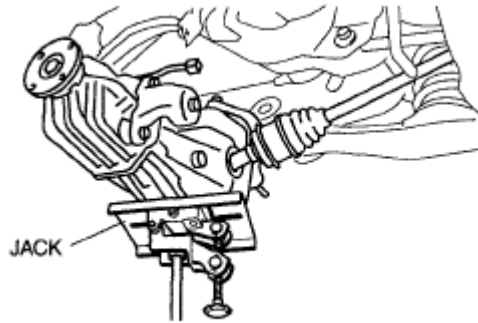


ac9uuw00001446

Fig. 17: Supporting Rear Differential

Courtesy of MAZDA MOTORS CORP.

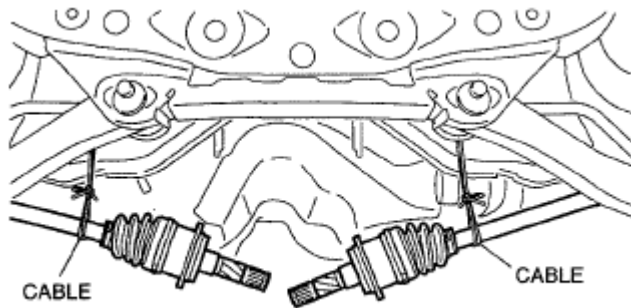
5. Remove the rear drive shaft from the rear differential while lowering the rear differential gradually.



ac8uuw00001449

Fig. 18: Removing Rear Drive Shaft From Rear Differential
Courtesy of MAZDA MOTORS CORP.

6. Suspend the drive shaft using a cable.



ac8uuw00001723

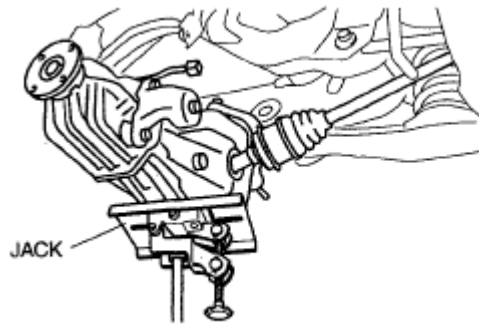
Fig. 19: Identifying Drive Shaft
Courtesy of MAZDA MOTORS CORP.

REAR DIFFERENTIAL COMPONENT INSTALLATION NOTE

CAUTION:

- When raising the rear differential, be careful not to damage the rear differential oil seal, rear drive shaft, and surrounding parts.

1. Install the rear drive shaft to the rear differential while raising the rear differential gradually.
2. Jack up the rear drive shaft until it is horizontal and engage the rear drive shaft (differential side) and rear differential by tapping the wheel side.



ac9uuw00001449

Fig. 20: Jacking Up Rear Drive Shaft
Courtesy of MAZDA MOTORS CORP.

REAR DIFFERENTIAL DISASSEMBLY

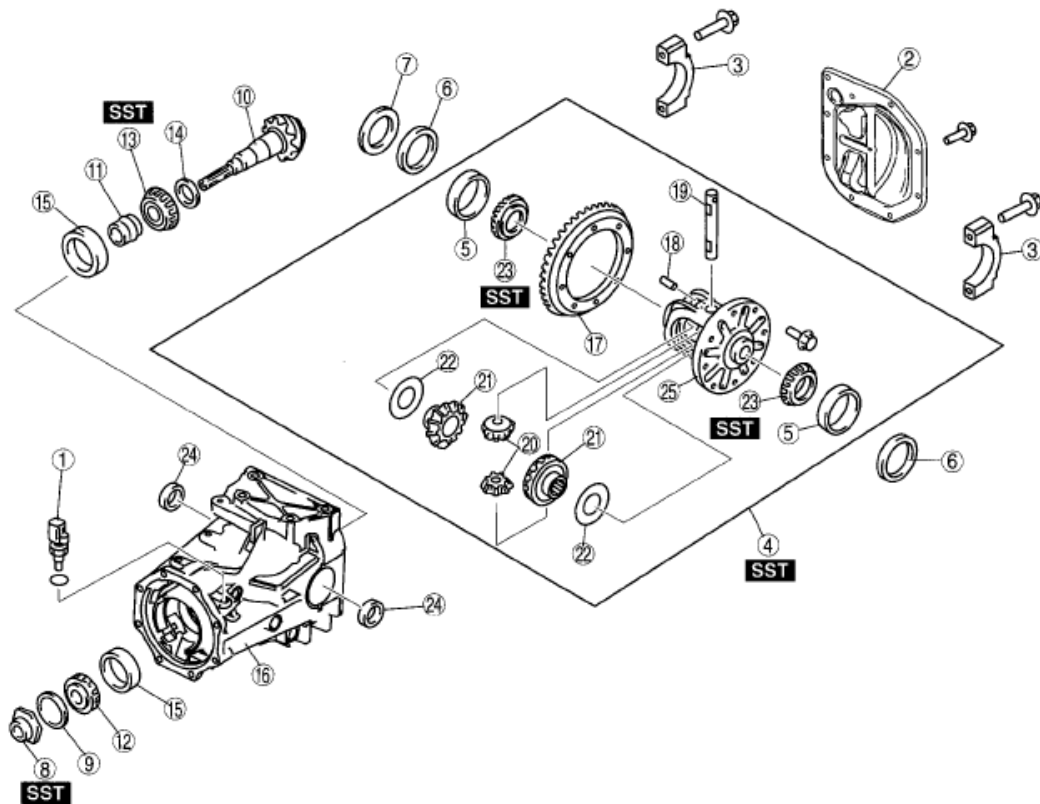
WARNING:

- The engine stand is equipped with a self-lock mechanism, however, if the rear differential is in a tilted condition, the self-lock mechanism could become inoperative. If the rear differential unexpectedly rotates it could cause injury, therefore do not maintain the rear differential in a tilted condition. When turning the rear differential, grasp the rotation handle firmly.

1. Disassemble in the order indicated in the table.

2008 Mazda CX-9 Grand Touring

2008 DRIVELINE/AXLES Differential - Mazda CX-9



BCXUJW00001405

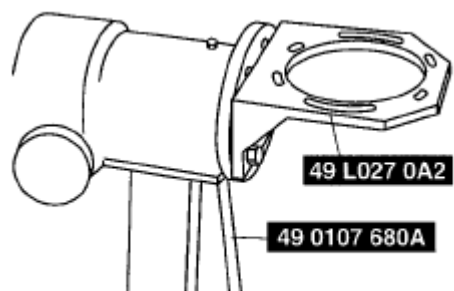
1	Differential oil temperature sensor
2	Rear cover (See 03-14-9 Rear Cover Disassembly Note)
3	Bearing cap (See 03-14-9 Bearing Cap Disassembly Note)
4	Rear differential component (See 03-14-9 Rear Differential Component Disassembly Note)
5	Side bearing outer race
6	Adjusting shim
7	Spacer
8	Locknut (See 03-14-10 Locknut Disassembly Note)
9	Washer
10	Drive pinion (See 03-14-10 Drive Pinion Disassembly Note)
11	Collapsible spacer

12	Bearing inner race (front bearing)
13	Bearing inner race (rear bearing) (See 03-14-10 Bearing Inner Race (Rear Bearing) Disassembly Note)
14	Spacer
15	Bearing outer race (See 03-14-10 Bearing Outer Race Disassembly Note)
16	Differential carrier
17	Ring gear (See 03-14-11 Ring Gear Disassembly Note)
18	Knock pin
19	Pinion shaft
20	Pinion gear
21	Side gear
22	Thrust washer
23	Side bearing inner race (See 03-14-11 Side Bearing Inner Race Disassembly Note)
24	Oil seal
25	Gear case

Fig. 21: View Of Rear Differential Components
Courtesy of MAZDA MOTORS CORP.

REAR COVER DISASSEMBLY NOTE

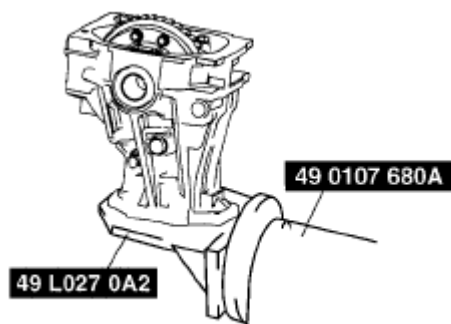
1. Install the SSTs to the engine stand.



acxuuw00001406

Fig. 22: Identifying SSTs To Engine Stand
Courtesy of MAZDA MOTORS CORP.

2. Install the rear differential to the SSTs.
3. Remove the rear cover using an oil seal cutter.

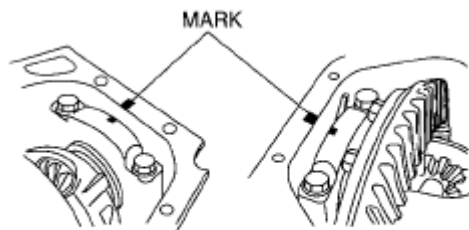


acxuuw00001407

Fig. 23: Identifying SST
Courtesy of MAZDA MOTORS CORP.

BEARING CAP DISASSEMBLY NOTE

1. Place alignment marks on the bearing cap and carrier.

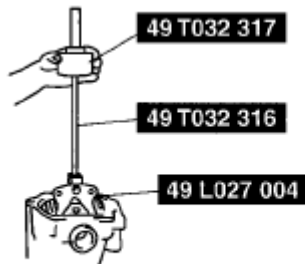


acxuuw00001408

Fig. 24: Identifying Alignment Marks On Bearing Cap & Carrier
Courtesy of MAZDA MOTORS CORP.

REAR DIFFERENTIAL COMPONENT DISASSEMBLY NOTE

1. Remove the rear differential component using the SSTs.
2. Mark or otherwise distinguish between the removed left and right adjusting shims, spacers and side bearing outer races so that they are not mixed up at the time of reassembly.

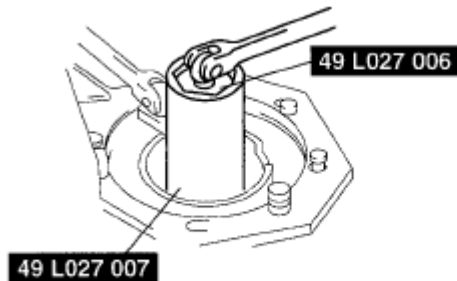


acxuuw00001409

Fig. 25: Removing Rear Differential Component
Courtesy of MAZDA MOTORS CORP.

LOCKNUT DISASSEMBLY NOTE

1. Remove the locknut using the SSTs.

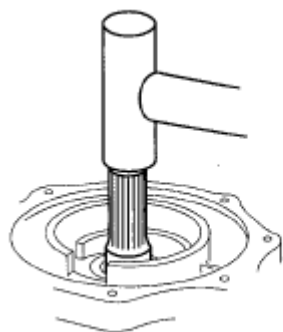


acxuuw00001410

Fig. 26: Removing Locknut
Courtesy of MAZDA MOTORS CORP.

DRIVE PINION DISASSEMBLY NOTE

1. Remove the drive pinion by lightly tapping with a copper hammer.

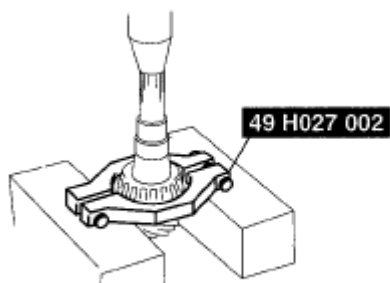


8CXUW00001411

Fig. 27: Removing Drive Pinion
Courtesy of MAZDA MOTORS CORP.

BEARING INNER RACE (REAR BEARING) DISASSEMBLY NOTE

1. Remove the bearing inner races (rear bearing) using the SST and a press.

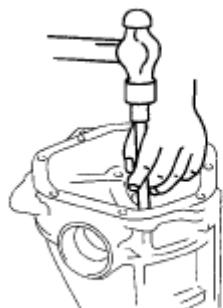


8CXUW00001412

Fig. 28: Removing Bearing Inner Races
Courtesy of MAZDA MOTORS CORP.

BEARING OUTER RACE DISASSEMBLY NOTE

1. Remove the bearing outer races using the 2 grooves in the carrier and alternately tapping the sides of the races with a brass bar.

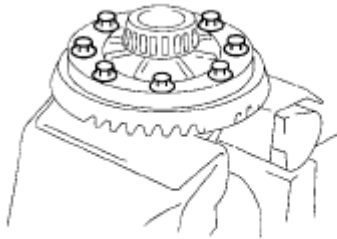


8CXUW00001413

Fig. 29: Removing Bearing Outer Races
Courtesy of MAZDA MOTORS CORP.

RING GEAR DISASSEMBLY NOTE

1. Secure the gear case in a vice and remove the bolts.
2. Lightly tap around the ring gear using a plastic hammer to remove the ring gear from the gear case.



8CXUW00001414

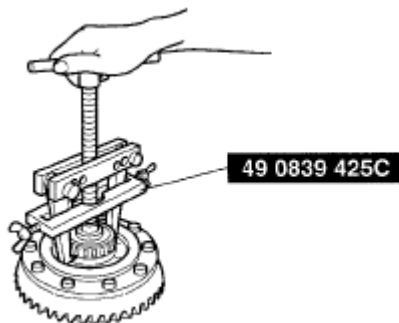
Fig. 30: Identifying Gear Case Bolts
Courtesy of MAZDA MOTORS CORP.

SIDE BEARING INNER RACE DISASSEMBLY NOTE

NOTE:

- Mark or otherwise distinguish between the left and right side bearings so that they are not mixed up at the time of reassembly.

1. Remove the side bearing inner races from the gear case using the SST and a press.



8CXUW00001415

Fig. 31: Removing Side Bearing Inner Races From Gear Case
Courtesy of MAZDA MOTORS CORP.

REAR DIFFERENTIAL ASSEMBLY

WARNING:

- The engine stand is equipped with a self-lock mechanism, however, if the rear differential is in a tilted condition, the self-lock mechanism

2008 Mazda CX-9 Grand Touring

2008 DRIVELINE/AXLES Differential - Mazda CX-9

could become inoperative. If the rear differential unexpectedly rotates it could cause injury, therefore do not maintain the rear differential in a tilted condition. When turning the rear differential, grasp the rotation handle firmly.

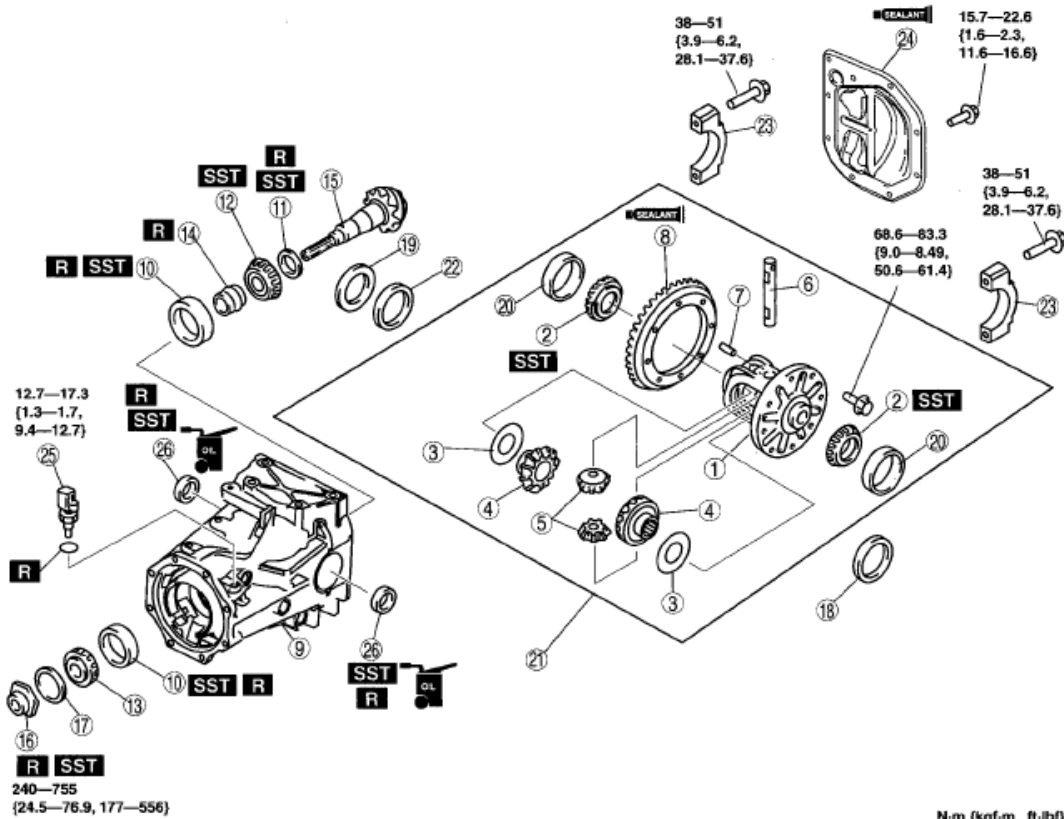
NOTE:

- **Clean away the old sealant before applying the new sealant.**
- **Install the rear cover 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.**

1. Assemble in the order indicated in the table.

2008 Mazda CX-9 Grand Touring

2008 DRIVELINE/AXLES Differential - Mazda CX-9



N-m (kgf-m, ft-lbf)

RCXUJW00002352

1	Gear case
2	Side bearing inner race (See 03-14-13 Side Bearing Inner Race Assembly Note)
3	Thrust washer (See 03-14-13 Thrust washer Assembly Note)
4	Side gear
5	Pinion gear
6	Pinion shaft
7	Knock pin
8	Ring gear (See 03-14-13 Ring Gear Assembly Note)
9	Differential carrier
10	Bearing outer race (See 03-14-14 Bearing Outer Race Assembly Note)
11	Spacer (See 03-14-14 Spacer, Bearing Inner Race Assembly Note)
12	Bearing inner race (rear bearing) (See 03-14-14 Spacer, Bearing Inner Race Assembly Note)

13	Bearing inner race (front bearing) (See 03-14-14 Spacer, Bearing Inner Race Assembly Note)
14	Collapsible spacer
15	Drive pinion
16	Locknut (See 03-14-16 Locknut Assembly Note)
17	Washer
18	Adjusting shim (L) (See 03-14-17 Adjusting Shim Assembly Note)
19	Spacer
20	Side bearing outer race
21	Rear differential component
22	Adjusting shim (R)
23	Bearing cap (See 03-14-18 Bearing Cap Assembly Note)
24	Rear cover (See 03-14-19 Rear Cover Assembly Note)
25	Differential oil temperature sensor
26	Oil seal (See 03-14-19 Oil Seal Assembly Note)

Fig. 32: View Of Rear Differential Components & Torque Specifications
Courtesy of MAZDA MOTORS CORP.

SIDE BEARING INNER RACE ASSEMBLY NOTE

CAUTION: • Do not mix up the left and right side bearing inner races.

1. Press the side bearing inner races into the gear case using the SSTs.

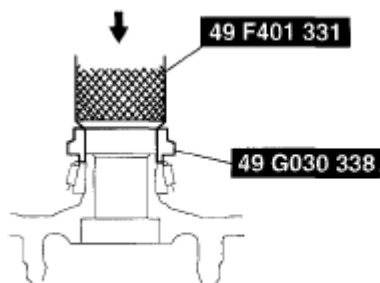
Substitution SST

- **49 G030 338**

Outer diameter: 43-45 mm {1.70-1.77 in}

Inner diameter: 41 mm {1.61 in} or more

Inner depth: 3 mm {0.12 in} or more

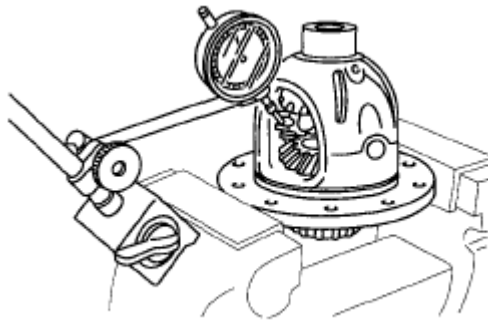


acxuuw00001417

Fig. 33: Pressing Side Bearing Inner Races Into Gear Case
Courtesy of MAZDA MOTORS CORP.

THRUST WASHER ASSEMBLY NOTE

1. Assemble the side gears, thrust washers and pinion gears to the gear case, then assemble the knock pin.
2. After assembling the knock pin, make a crimp so that the pin will not come out of the gear case.
3. Set a dial gauge to the pinion gear as indicated in the figure.
4. Secure one of the side gears.
5. Move the pinion gear and measure the backlash at the end of the pinion gear.
 - If the backlash exceeds the standard, use the thrust washers to adjust.



acxuuw00001418

Fig. 34: Setting Dial Gauge To Pinion Gear
 Courtesy of MAZDA MOTORS CORP.

Rear differential backlash of pinion gear and side gear 0.1 mm {0.004 in} or less

Thrust washer thickness

THRUST WASHER THICKNESS SPECIFICATION

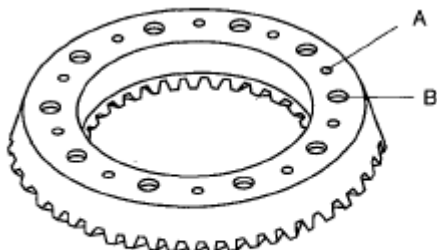
Identification mark	Thickness
0	2.0 mm {0.079 in}
1	2.1 mm {0.083 in}
2	2.2 mm {0.086 in}
05	2.05 mm {0.081 in}
15	2.15 mm {0.084 in}

RING GEAR ASSEMBLY NOTE

CAUTION:

- The differential gear and ring gear could be damaged if the ring gear is installed with old thread-locking compound remaining on the bolt threads. Before installing the ring gear, completely remove the old thread-locking compound from the bolt threads.

1. Apply a small amount of thread-locking compound to each of points A on the back of the ring gear, and bolt thread areas B (around the entire ring).



acxuuw00001419

Fig. 35: Identifying Thread-Locking Compound
Courtesy of MAZDA MOTORS CORP.

Application amount

Back of ring gear:

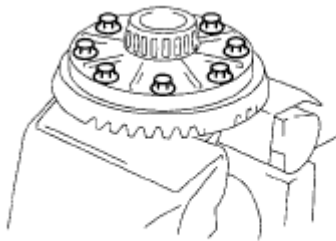
Approx. 0.4 ml {0.4 cc, 0.02 cu in}

Ring gear bolt thread points:

Approx. 0.4 ml {0.4 cc, 0.02 cu in} (0.04 ml {0.04 cc, 0.002 cu in} to each point)

2. Align the marks placed on the ring gear case at the time of disassembly and tighten the bolts in diagonal order.

Tightening torque 68.6-83.3 N.m {7.00-8.49 kgf.m, 50.6-61.4 ft.lbf}



accuuw00001420

Fig. 36: Identifying Ring Gear Case
Courtesy of MAZDA MOTORS CORP.

BEARING OUTER RACE ASSEMBLY NOTE

1. Press in the bearing outer race using the **SSTs** and a press.

Substitution SST

- **49 F027 007**

Outer diameter: 70.8-71.0 mm {2.78-2.79 in}

Plate thickness: 1 mm {0.04 in} or more

- **49 F027 004**

Outer diameter: 78.5-79.0 mm {3.10-3.11 in}

Plate thickness: 1 mm {0.04 in} or more

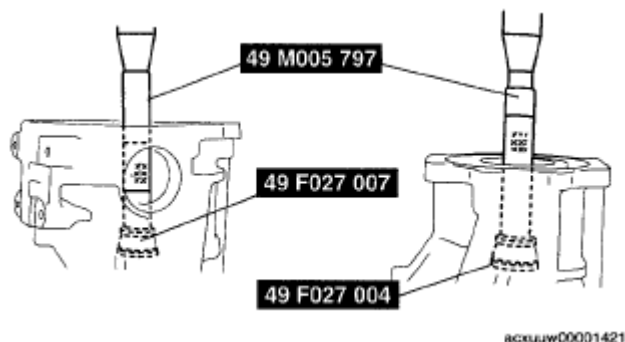


Fig. 37: Pressing Bearing Outer Race
Courtesy of MAZDA MOTORS CORP.

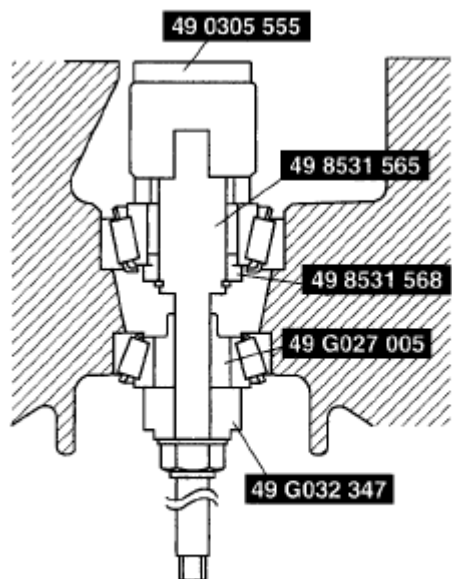
SPACER, BEARING INNER RACE ASSEMBLY NOTE

Pinion height adjustment

NOTE:

- Use the same spacer.
- Install the spacer with the chamfer on the SST side.

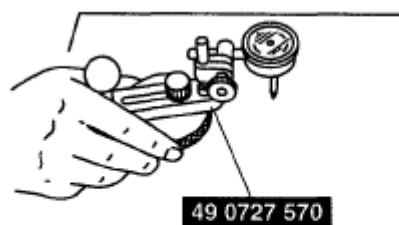
1. Assemble the spacer, the bearing inner race (rear bearing), and the SST O-ring to the SST (49 8531 565) as shown in the figure.
2. Insert the set assembled in Step 1 to the differential gear from the rear.
3. Assemble the bearing inner race (front bearing), SST (49 G027 005), companion flange, washer, and locknut from the front of the differential gear.
4. Tighten the locknut to the extent that the SST (49 8531 565) can be turned by hand.
5. Place the SST (49 0305 555) on top of the SST (49 8531 565).



acxuuw00001422

Fig. 38: Identifying SST
Courtesy of MAZDA MOTORS CORP.

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



acxuuw00001423

Fig. 39: Placing SST On Surface Plate
Courtesy of MAZDA MOTORS CORP.

7. Set the SST as shown in the figure.
8. Place the measuring probe of the dial indicator so that it contacts the place where the side bearing is installed in the carrier. Then measure the left and right side of the lower position.

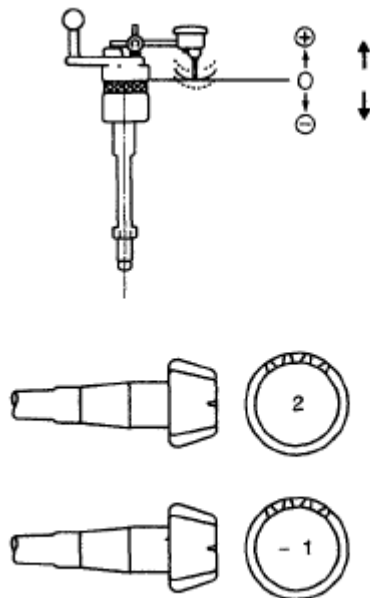


8CXUJW00001424

Fig. 40: Measuring Probe Of Dial Indicator
 Courtesy of MAZDA MOTORS CORP.

9. Add the two (left and right) values obtained by the measurements taken in Step 8 and then divide the total by 2. From this result, subtract the result obtained by dividing the number inscribed on the end surface of the drive pinion by 100. (If there is no figure inscribed, use 0.) This is the pinion height adjustment value.

Rear differential pinion height -0.032-0.032 mm {-0.0012-0.0012 in}



8CXUJW00001425

Fig. 41: [Identifying Rear Differential Pinion Height]
 Courtesy of MAZDA MOTORS CORP.

NOTE:

- For example, the measured results obtained at Step 8 and 9 are 0.06 mm {0.003 in} and 0.04 mm {0.002 in}, and the figure inscribed on the end of the drive pinion is 2: $((0.06 \text{ mm } \{0.003 \text{ in}\} + 0.04 \text{ mm } \{0.002 \text{ in}\}) / 2) - (2/100) = 0.03 \text{ mm } \{0.001 \text{ in}\}$ (pinion height adjustment value)

2008 Mazda CX-9 Grand Touring

2008 DRIVELINE/AXLES Differential - Mazda CX-9

Replace with a spacer 0.03 mm {0.001 in} thicker than the currently used one. Spacer thickness is set at 0.015 mm {0.0006 in} increments, therefore select the closest spacer thickness and assemble.

- Install the spacer with the chamfer on the SST side.

Spacer thickness

SPACER THICKNESS SPECIFICATION

Identification mark	Thickness (mm {in})	Identification mark	Thickness (mm {in})
08	3.08 {0.1213}	29	3.29 {0.1295}
09	3.095 {0.1219}	30	3.305 {0.1301}
11	3.11 {0.1224}	32	3.32 {0.1307}
12	3.125 {0.1230}	33	3.335 {0.1313}
14	3.14 {0.1236}	35	3.35 {0.1319}
15	3.155 {0.1242}	36	3.365 {0.1325}
17	3.17 {0.1248}	38	3.38 {0.1331}
18	3.185 {0.1254}	39	3.395 {0.1337}
20	3.20 {0.1260}	41	3.41 {0.1343}
21	3.215 {0.1266}	42	3.425 {0.1348}
23	3.23 {0.1272}	44	3.44 {0.1354}
24	3.245 {0.1278}	45	3.455 {0.1360}
26	3.26 {0.1283}	47	3.47 {0.1366}
27	3.275 {0.1289}	-	-

10. Assemble the spacer selected for the pinion height adjustment to the drive pinion.
11. Press the bearing inner race (rear bearing) into the drive pinion using the SSTs and a press.

Substitution SST

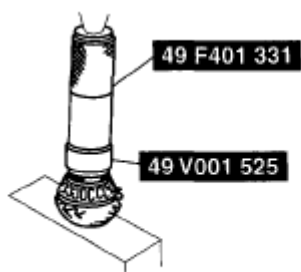
- 49 V001 525

Outer diameter: 37.2-50.3 mm {1.47-1.98 in}

Inner diameter: 35.2 mm {1.39 in} or more

Inner depth: 134.3 mm {5.29 in} or more

Plate thickness: 1 mm {0.04 in} or more



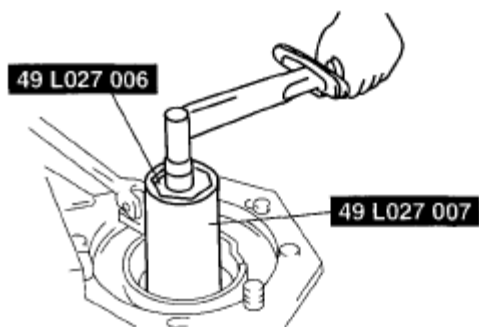
acxuw00001426

Fig. 42: Pressing Bearing Inner Race
Courtesy of MAZDA MOTORS CORP.

LOCKNUT ASSEMBLY NOTE

Drive pinion preload adjustment

1. Apply differential oil to a new locknut.
2. Assemble a new collapsible spacer, bearing inner race (front bearing), spacer and locknut to the drive pinion, and temporarily tighten the locknut.
3. Turn the serrated part of the drive pinion by hand to seat the bearing.
4. Tighten the locknut temporarily tightened in Step 1 from the lower limit of the specified tightening torque using the **SSTs** , and make this the specified preload.
 - If the specified preload cannot be obtained within the specified tightening torque, replace the collapsible spacer and inspect again.



acxuw00001427

Fig. 43: Tightening Drive Pinion Lock Nut
Courtesy of MAZDA MOTORS CORP.

Tightening torque 240-755 N.m {24.5-76.9 kgf.m, 177-556 ft.lbf}

Rear differential drive pinion preload 1.3-1.8 N.m {13.3-18.2 kgf.cm, 11.5-15.9 in.lbf}

5. Crimp the locknut using a chisel and hammer.

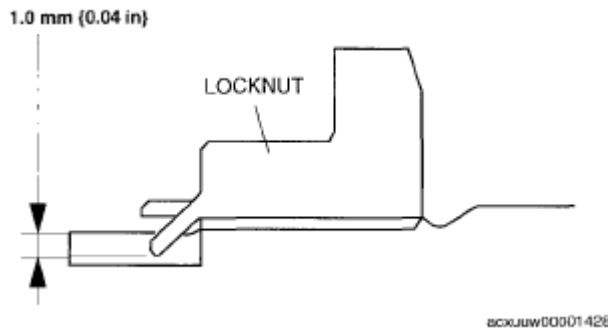


Fig. 44: Crimping Locknut
 Courtesy of MAZDA MOTORS CORP.

ADJUSTING SHIM ASSEMBLY NOTE

1. Assemble the differential carrier to the **SSTs**.
2. Assemble the spacer to the differential carrier.
3. Stack the side bearing outer race and gear case component on the surface plate as indicated in the figure, and measure the height using a caliper and a ruler. This is value A.

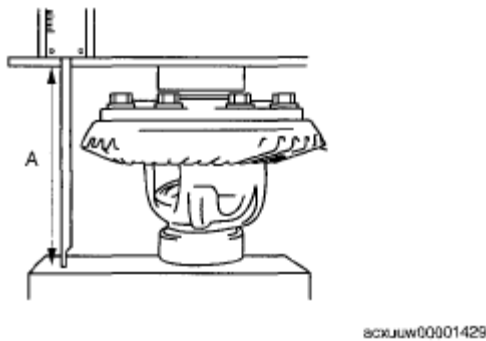


Fig. 45: Measuring Height Using Caliper & Ruler
 Courtesy of MAZDA MOTORS CORP.

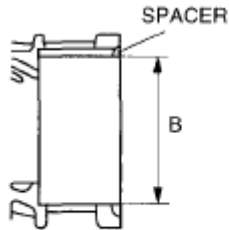
4. Measure the width of the installed differential in the differential carrier with the spacer installed.
 This is value B.
5. The combined thickness of the left and right adjusting shims is obtained by the following formula.

$$C_1 = B - A + 0.15 \text{ mm } \{0.006 \text{ in}\}$$

$$C_2 = B - A + 0.44 \text{ mm } \{0.017 \text{ in}\}$$

6. If the combined thickness of the previously installed adjusting shims is between C1 and C2, use the shims as they are.

7. If the combined thickness of the previously installed adjusting shims is not between C1 and C2, or if the adjusting shims have to be replaced, select two appropriate adjusting shims from the table below.



8cx9uw00001430

Fig. 46: Measuring Width Of Installed Differential
 Courtesy of MAZDA MOTORS CORP.

Adjusting shim thickness

ADJUSTING SHIM THICKNESS SPECIFICATION

Identification mark	Thickness (mm {in})	Identification mark	Thickness (mm {in})
350	3.50 {0.137}	410	4.10 {0.161}
355	3.55 {0.139}	415	4.15 {0.163}
360	3.60 {0.141}	420	4.20 {0.165}
365	3.65 {0.143}	425	4.25 {0.167}
370	3.70 {0.145}	430	4.30 {0.169}
375	3.75 {0.147}	435	4.35 {0.171}
380	3.80 {0.149}	440	4.40 {0.173}
385	3.85 {0.151}	445	4.45 {0.175}
390	3.90 {0.153}	450	4.50 {0.177}
395	3.95 {0.155}	455	4.55 {0.179}
400	4.00 {0.157}	460	4.60 {0.181}
405	4.05 {0.159}	-	-

CAUTION:

- If adjusting shims are to be reused, do not mix up the left and right shims.
- Do not mix up the left and right side bearing outer races and spacers.

8. Assemble the selected adjusting shims to the differential carrier ring gear side, and the spacer to the opposite side.
9. Assemble the differential and bearing outer race to the differential carrier.
10. Tap the selected adjusting shim between the spacer and the bearing race with a plastic hammer as shown in the figure.
11. Align the bearing cap alignment marks to assemble the bearing cap, and temporarily tighten the bolts.

12. Place the dial indicator so that the measuring probe contacts the top surface of one of the ring gear teeth perpendicularly.
13. Secure the drive pinion and measure the backlash from when the ring gear moved.

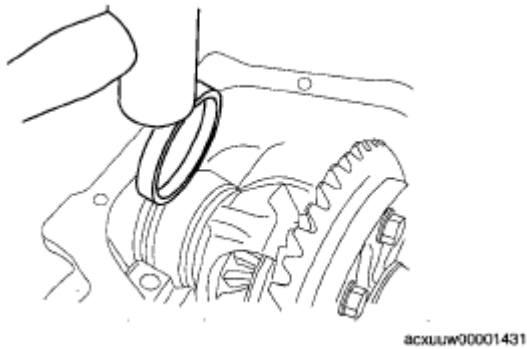


Fig. 47: Tapping Adjusting Shim Between Spacer & Bearing Race
Courtesy of MAZDA MOTORS CORP.

Rear differential backlash of drive pinion and ring gear

Standard: 0.09-0.11 mm {0.003-0.004 in}

Minimum value: 0.05 mm {0.002 in}

NOTE:

- Measure the backlash at 4 locations around the ring gear. Make sure one of the 4 locations is within specification, and the minimum value for the 4 locations is *0.5 mm {0.002 in}* or less.

14. If the backlash is not within the specification, adjust the gear case component by moving it in the axial direction.

NOTE:

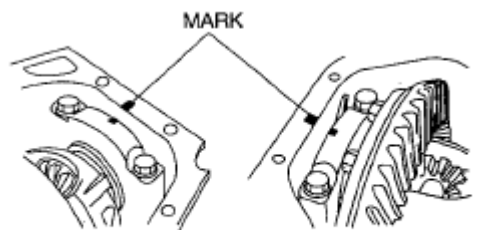
- When moving the gear case component in the axial direction, replace the adjusting shims. If the adjusting shim on the right side is replaced with one that is *0.05 mm {0.002 in}* thicker, replace the one on the left with one that is *0.05 mm {0.002 in}* thinner.

BEARING CAP ASSEMBLY NOTE

1. Align the bearing cap alignment marks to assemble the bearing cap.

Tightening torque 38-51 N.m {3.9-5.2 kgf.m, 28.1-37.0 ft.lbf}

2. Inspect the drive pinion and ring gear teeth contact points.



8cxuuw00001432

Fig. 48: Aligning Bearing Cap Alignment Marks
 Courtesy of MAZDA MOTORS CORP.

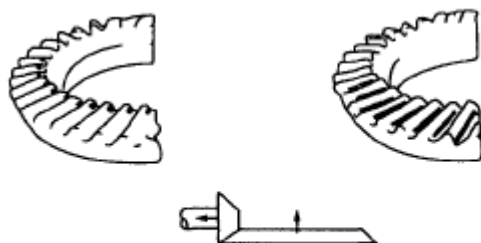
1. Coat both surfaces of the ring gear uniformly with a thin red lead coating.
2. While rotating the ring gear back and forth by hand, rotate the drive pinion several times and inspect the tooth contact.
3. Inspect the tooth contacts in four locations around the ring gear, and check that the tooth contacts showing the red lead coating are the same as the pattern indicated in the figure.
 - If the tooth contact is good, wipe off the red lead coating.
 - If it is not good, adjust the pinion height, then adjust the backlash.



8cxuuw00001433

Fig. 49: Inspecting Tooth Contacts
 Courtesy of MAZDA MOTORS CORP.

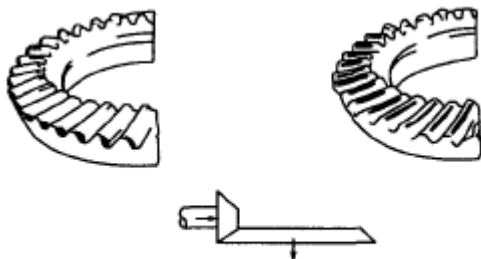
4. If toe and flank contact appears as shown in the figure, replace the spacer with a thinner one, and move the drive pinion outward.



8cxuuw00001434

Fig. 50: Identifying Toe & Flank Contact
Courtesy of MAZDA MOTORS CORP.

5. If heel and face contact appears as indicated in the figure, replace the spacer with a thicker one and move the drive the pinion inward.



8CXUW00001435

Fig. 51: Identifying Heel & Face Contact
Courtesy of MAZDA MOTORS CORP.

REAR COVER ASSEMBLY NOTE

CAUTION:

- Clean away the old sealant before applying the new sealant.
- Install the rear differential 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.

1. Clean the alignment surface of the carrier and rear cover, and apply a thin coat of sealant.
2. Install the rear cover.

Tightening torque 15.7-22.6 N.m {1.6-2.3 kgf.m, 11.6-16.6 ft.lbf}

OIL SEAL ASSEMBLY NOTE

1. Apply differential oil to the new oil seal lip.
2. Assemble the oil seal using the SSTs.

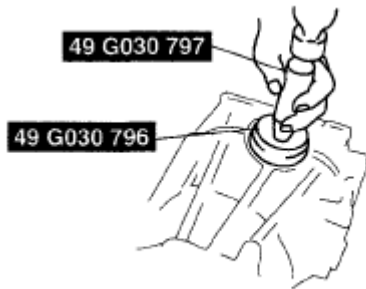
Substitution SST

- **49 G030 796**

Outer diameter: 56-60 mm {2.21-2.36 in}

Inner diameter: 49.8 mm {1.96 in} or more

Inner depth: 8.7 mm {0.34 in} or more



8CX9JAW00001436

Fig. 52: Assembling Oil Seal
Courtesy of MAZDA MOTORS CORP.