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## CLUTCH Article Text

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#### ARTICLE BEGINNING

1983 Clutch

Mazda - RWD GLC Wagon, RX-7, B2000 Pickup, B2200 Pickup

#### **DESCRIPTION**

The clutch assembly for all models is a single plate, dry disc, diaphragm spring type. The clutch release system used on the RX7 and B2000 and B2200 Pickups is hydraulic, using a firewall-mounted master cylinder and a slave cylinder attached to the clutch housing.

The GLC Wagon clutch assembly has a mechanical release system consisting of clutch pedal, cable, release lever and release bearing. On all models, release bearing is prelubricated and sealed.

#### **REMOVAL & INSTALLATION**

#### **CLUTCH ASSEMBLY**

#### Removal

- 1) Disconnect negative battery cable. Place shift lever in Neutral. Remove shift knob. Remove console box (if equipped). Remove shift lever dust boot, lever and related components. On RX7, remove air cleaner. On GLC Wagon, remove 2 upper clutch housing mount bolts.
- 2) On all models, raise and support vehicle. Drain transmission. Remove drive shaft. Remove under covers. Remove any interfering exhaust components. On all except GLC Wagon, remove clutch slave cylinder and set aside without removing fluid line.
- 3) On all models, remove starter, speedometer cable and related electrical connections. Place jack under rear end of engine. Protect oil pan with wood block. Position jack under transmission. Remove transmission-to-engine mount bolts.
- 4) If equipped, remove transmission-to-crossmember bolts, crossmember-to-frame bolts and crossmember. Slide transmission back until input shaft is cleared and remove from vehicle.
- 5) Install flywheel holding tool (49 0118 271A for GLC Wagon and B2000 Pickup, 49 E301 060 for B2200 Pickup and 49 1881 060 for RX7). Index mark pressure plate-to-flywheel.
- 6) Install clutch assembly alignment tool (49 SE01 310 for all models). Loosen pressure plate mounting bolts evenly, in a diagonal pattern. Separate clutch disc and pressure plate. Remove release bearing and fork. See Fig. 1.

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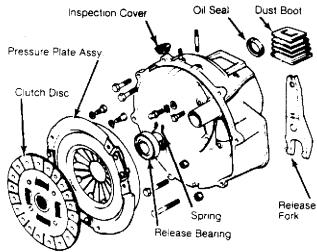


Fig. 1: Exploded View of RWD Clutch Assembly Check clutch disc and flywheel for excessive wear, cracks or damage and release bearing for noise or roughness.

#### Inspection

- 1) Check disc for loose rivets, worn springs or oil contamination. Minimum lining height above rivet heads is .012" (.30 mm). On RX7, minimum disc free thickness is .276" (7 mm).
- 2) Inspect flywheel and pressure plate friction surfaces for burns, scoring or grooves. Friction surface warpage limit is .002" (.05 mm). Resurface or replace flywheel and/or pressure plate as necessary. If flywheel ring gear is replaced, ensure chamfer on teeth faces engine.
- 3) On RX7, inspect pressure plate diaphragm spring fingers for excessive wear or out of alignment. Maximum out of alignment limit is .039" (1 mm). Finger groove wear limit is .039" (1 mm).
- 4) Mount clutch disc on input shaft. Check runout using dial indicator. Maximum runout is .039" (1 mm). Check disc hub and input shaft splines for excessive wear. Hub must slide smoothly on input shaft splines.

#### Installation

- 1) Lightly coat input shaft splines and release bearing contact areas with molybdenum grease. Use clutch alignment tool to center clutch assembly. Clutch cover and flywheel "O" alignment marks must be aligned at installation.
- 2) Tighten pressure plate bolts evenly, in diagonal pattern. To complete installation, reverse removal procedure.

#### **RELEASE BEARING & FORK**

#### Removal & Installation

- 1) With clutch assembly removed, detach release bearing and fork. On GLC Wagon, loosen and remove bolt attaching release shaft to transmission. Slide bearing off bearing cover. Remove shaft from clutch housing.
  - 2) On all models, check release bearing by turning by hand

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in thrust direction. Replace if bearing feels rough or noisy. Inspect release fork for cracks or bends. Replace if necessary.

3) Lightly apply molybdenum grease to clutch component contact areas and sliding surfaces. To complete installation, reverse removal procedures.

#### **CLUTCH MASTER CYLINDER**

Removal & Installation (Except GLC Wagon)
Disconnect hydraulic line and mount nuts from master
cylinder. Unhook clutch pedal from push rod. Remove cylinder. To
install, reverse removal procedure and bleed hydraulic system.

#### **CLUTCH SLAVE CYLINDER**

Removal & Installation (Except GLC Wagon)

Raise and support vehicle. Disconnect fluid hose and plug. Remove slave cylinder-to-clutch housing mount nuts. Detach cylinder. To install, reverse removal procedure and bleed hydraulic system.

#### **CLUTCH CABLE**

Removal & Installation (GLC Wagon)

- 1) Loosen clutch release cable lock nuts at stop ring on engine side of firewall. Pull inner cable toward clutch pedal. Disconnect inner cable from pedal assembly.
- 2) Pull and remove cable through stop ring from engine side of firewall. Disconnect inner cable at release lever. Remove retaining clip, pull outer cable and remove from clutch housing bracket. See Fig. 2.

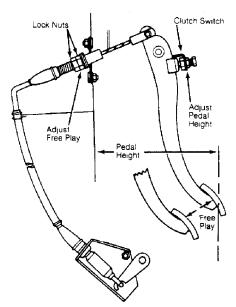


Fig. 2: GLC Wagon Clutch Cable Assembly After installation, adjust the clutch cable to specification.

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3) Inspect for damage to stop ring, cable ends and inner and outer cable. Check cable function. Before installing, apply molybdenum grease to bushings, pedal hook and roller. To complete installation, reverse removal procedure. Adjust cable for proper pedal free play.

#### PILOT BEARING

Removal & Installation (RX7)

With clutch components removed, check pilot bearing for roughness, looseness and any damage. If necessary, remove bearing and oil seal with puller tool (49 1285 071). To install new bearing, use installer tool (49 0823 072A). Apply multipurpose grease to bearing and install oil seal.

Removal & Installation (All Other Models)

Pilot bearing is pressed into flywheel. To replace, install flywheel holding tool and remove flywheel. Using arbor press and driver, press old bearing out. Press new bearing in until it is flush with flywheel surface. Lubricate with multipurpose grease. Install flywheel and holder. Tighten mount bolts evenly, in a diagonal pattern.

#### **FLYWHEEL**

Removal & Installation (RX7)

- 1) With clutch assembly removed, lock flywheel in position using holding tool. Loosen and remove lock nut with box wrench (49 0820 035). Remove flywheel using puller tool (49 0823 300A). Turn tool handle and lightly tap puller head. Once lock nut is loose, do not drop flywheel.
- 2) Inspect rear oil seal for leakage and replace as necessary. Before installing flywheel, apply sealer to surface of lock nut that contacts flywheel and install. Tighten lock nut to specification. To complete install, reverse removal procedure.

#### **OVERHAUL**

#### **CLUTCH MASTER CYLINDER**

NOTE: Master cylinders used on B2000 & B2200 Pickup have a different external appearance, but procedures are the same.

Disassembly (Except GLC Wagon)

- 1) Remove reservoir cap assembly. Drain brake fluid. On RX7, remove reservoir connector bolt and reservoir. On B2000 & B2200 Pickups, remove hydraulic line adapter, washer, 1-way valve, spring and pin.
- 2) Remove piston stop ring, washer and piston assembly. Separate piston, cups and return spring. See Fig. 3. Clean parts in denatured alcohol or brake fluid. Blow dry with compressed air.
- 3) Check all parts for wear, damage or deformation. Standard piston-to-cylinder bore clearance is .001-.004" (.032-.102 mm). If

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clearance exceeds .006" (.15 mm), replace defective part. Coat all components with clean brake fluid before assembly.

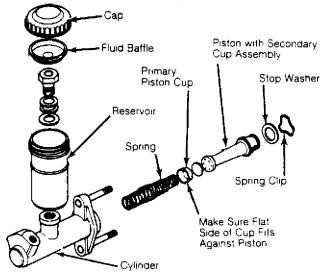


Fig. 3: Exploded View of Clutch Master Cylinder B2000 & B2200 master cylinder external appearance is slightly different.

#### Reassembly

- 1) Install primary cup with flat side against piston. Ensure compensating port is open. To complete assembly, reverse disassembly procedure. After assembly, fill reservoir with clean brake fluid.
- 2) Bench bleed master cylinder by holding finger over outlet port and operating piston with screwdriver. Pump piston until air is ejected at outlet port and fluid pressure is felt. Install master cylinder and bleed hydraulic system.

#### CLUTCH SLAVE CYLINDER

Disassembly (Except GLC Wagon)

With slave cylinder removed, detach dust boot and release rod. Remove piston and cup assembly from cylinder, using compressed air if required. Remove spring, bleeder screw and valve. See Fig. 4.

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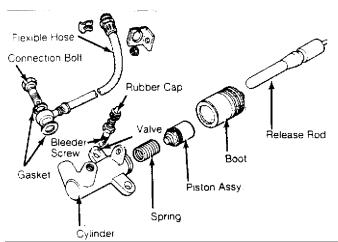


Fig. 4: Exploded View of Clutch Slave Cylinder Inspect clutch hydraulic components for leakage and repair or replace as necessary.

#### Reassembly

- 1) Wash parts in clean brake fluid or denatured alcohol. Blow dry with compressed air. Check all parts for wear or damage. Standard piston-to-slave cylinder bore is .0016-.0049" (.040-.125 mm). If cylinder bore-to-piston clearance exceeds .006" (.15 mm), replace piston and/or cylinder.
- 2) Before assembly, coat pistons and cups with clean hydraulic fluid. To complete reassembly, reverse disassembly procedure.

#### **ADJUSTMENTS**

#### **CLUTCH PEDAL HEIGHT**

- 1) On RX7 and Pickup, measure distance from center of upper surface of pedal pad-to-dash insulator. To adjust height, loosen lock nut. Turn stopper bolt. Tighten lock nut after adjustment is made. See Fig. 5.
- 2) On GLC Wagon, loosen clutch switch lock nut. Rotate switch until correct height is obtained. Tighten lock nut. Standard pedal height is 7.48-7.68" (190-195 mm).

#### **CLUTCH PEDAL FREE PLAY**

1) On RX7 and Pickups, adjust clutch pedal free play, measured at pedal pad, to .02-.12" (0.6-3.0 mm). Loosen lock nut and turn pedal stopper bolt to specification. Tighten lock nut. See Fig. 5.

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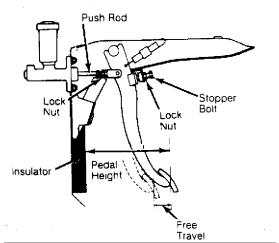


Fig. 5: Clutch Adjustment Locations (Except GLC Wagon) Check clutch pedal for proper height and free play.

2) On GLC Wagon, clutch pedal free play is .39-.59" (10-15 mm). Adjust by setting release cable clearance at engine side of firewall. Loosen lock nut, pull outer cable and turn adjusting nut until clearance is .06-.09" (1.5-2.3 mm). Tighten lock nut. Check pedal free play. See Fig. 2.

#### CLUTCH PEDAL HEIGHT SPECIFICATIONS

#### 

## **TORQUE SPECIFICATIONS**

## TOROUE SPECIFICATIONS TABLE

## 

Application	Ft. Lbs. (N.m)
Flywheel-to-Crankshaft	
В2000	112-118 (155-163)
B2200	95-137 (131-190)
GLC Wagon	60-65 (83-90)
Flywheel-to-Eccentric Shaft	
RX7 Rotary Engine	289-362 (393-492)
Pressure Plate-to-Flywheel	13-20 (18-27)

#### **END OF ARTICLE**

# DRIVE AXLE Article Text

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#### **ARTICLE BEGINNING**

1983 Drive Axles MAZDA

GLC Wagon, RX7, B2000 Pickup, B2200 Diesel Pickup

#### **DESCRIPTION**

Axle housing is banjo type with removable differential carrier and semi-floating drive axles. Ring and pinion are hypoid type, in which centerline of pinion is set below centerline of ring gear.

Differential case may be either 2 pinion or 4 pinion design. The drive axles are retained in housing by ball bearings and bearing retainers at axle housing outer ends. A clutch pack limited slip unit is available on RX7 models.

#### **AXLE RATIO & IDENTIFICATION**

All Mazda models use one basic type of rear axle assembly. Any differences in Removal & Installation or Overhaul procedures will be noted where they occur.

Axle ratio on GLC Wagon (automatic), B2200 Pickup and RX7 is 3.909:1. B2000 Pickup is 3.307:1 and GLC Wagon (manual) is 3.727:1. To determine axle ratio, divide number of ring gear teeth by number of pinion teeth.

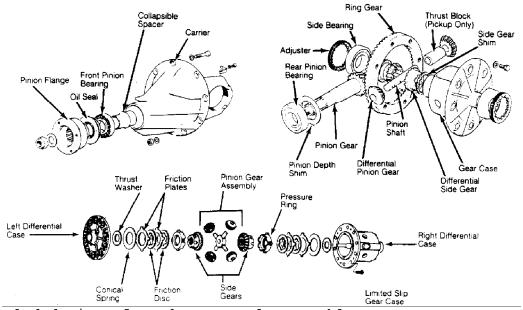


Fig. 1: Exploded View of Mazda Rear Axle Assembly

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#### **AXLE SHAFTS & BEARINGS**

#### Removal

- 1) Raise and support vehicle. Remove wheel. Remove brake drum and brake shoes. Disconnect and plug hydraulic line from wheel cylinder. Disconnect parking brake cable.
- 2) From inboard side of backing plate, remove 4 nuts from axle housing through bolts. Pull drive axle, backing plate, bearing housing (Pickups) and shims (if equipped) from axle housing with drive axle puller (49 0223 630B). Remove oil seal from axle housing.
- 3) On Pickup models, flatten locking tabs of lock washer. Loosen lock nut with spanner wrench. Remove lock nut and washer.
- 4) Using bearing pullers (49 8531 746 & 49 0259 747), remove bearing and housing assembly from drive axle. Remove backing plate. Remove bearing and oil seal from housing.

#### Installation

1) Install backing plate and spacer on shaft with chamfered edge of spacer must face drive axle flange. Using bearing attachment, (49 0259 748) press bearing onto shaft until seated. Press new bearing collar onto shaft without any lubricant.

CAUTION: Do not press bearing and collar onto shaft at the same time. If bearing collar is installed with less than 2.7 tons pressure (2,451 kg), replace bearing collar.

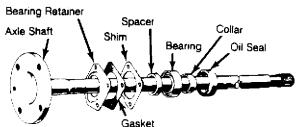


Fig. 2: Exploded View of Axle Shaft Assembly for All Models Except Pickups
Chamfered edge of spacer must face drive axle flange.

- 2) Apply a light coat of grease to oil seal and install oil seal in housing. Temporarily mount drive axle and backing plate on axle housing with mounting nuts.
- 3) Install dial indicator on backing plate and check drive axle end play. End play should be .002-.006" (.05-.15 mm) on Pickups and 0-.004" (0-.1 mm) on all other models.
- 4) On Pickup models only, if both drive axles were removed, the end play of each shaft must be measured separately. The end play for first drive axle installed should be .026-.033" (.65-.85 mm).
- 5) The end play for the second drive axle installed should be set to normal end play clearance of .002-.006" (.05-.15 mm).
- 6) After installing correct shim pack, install and tighten all attaching bolts and nuts. Install brake shoes and drum. Connect hydraulic lines to wheel cylinders, adjust brakes and bleed hydraulic

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system.

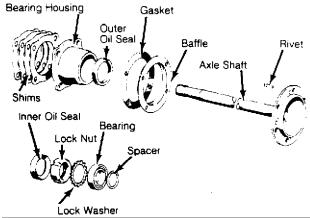


Fig. 3: Exploded View of Axle Shaft Assembly for Pickups If both drive axles were removed, the end play of each shaft must be measured separately.

#### DIFFERENTIAL CARRIER

#### Removal

- 1) Raise and support vehicle with jack stands. Remove drain plug and drain rear axle lubricant. Remove drive axles.
- 2) Mark drive shaft and pinion flange for reassembly reference. Disconnect drive shaft. Remove carrier attaching nuts and withdraw carrier from axle housing.

#### Installation

To install, reverse removal procedure. Make sure to refill axle with lubricant.

#### **OVERHAUL**

#### DISASSEMBLY

- 1) Mount carrier in a repair stand. Punch identification marks on side bearing supports of carrier, differential bearing caps and side bearing adjusters. Remove adjuster lock plates, loosen bearing cap attaching nuts or bolts, and slightly back off adjusters to relieve preload.
- 2) Remove bearing caps and adjusters, then withdraw differential assembly from carrier, making sure side bearing races remain with their respective bearings.
- 3) Using puller, (49 0839 425C) remove side bearings from gear case. Straighten lock tabs, remove ring gear attaching bolts, and separate ring gear from gear case.
- 4) On limited slip differentials, gradually loosen attaching screws until distance between left and right half of differential case is about 0.12" (3 mm). Then carefully separate differential halves. Remove following parts: Thrust washer, conical spring,

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friction plate, friction disc, pressure ring, side gear, pinion gear and spider. Keep parts in order for reassembly. See Fig. 1.

- 5) On conventional differentials, drive out differential pinion shaft lock pin with a punch and remove pinion shaft. Rotate pinion gears 90% and remove gears, thrust washer, thrust block (if equipped) and differential side gears.
- 6) Remove pinion nut and pinion flange. Remove drive pinion and rear bearing assembly, adjusting shims (if equipped), spacer and bearing collar (if used). Remove front oil seal and withdraw front pinion bearing.
- 7) Using a press, remove rear bearing from drive pinion, then lift off pinion adjusting shim. If necessary for replacement, use a drift punch and remove pinion bearing races from carrier.
- 8) Inspect all parts for chipped or worn teeth, damaged bearing journals, cracks, flaking or any damage. Replace defective parts as necessary.

NOTE: It may be necessary to tap end of pinion with a soft hammer to remove from carrier.

#### REASSEMBLY & ADJUSTMENT

Case Assembly

- 1) Install a thrust washer on each differential side gear and install into case. Through openings in gear case, insert pinion gears exactly  $180 \, \sigma$  opposite each other. Rotate pinion gears  $90 \, \sigma$  so holes in gears line up with pinion shaft holes in gear case. Insert pinion shaft through case and pinion gears.
- 2) On limited slip differential, install parts in the following order: Thrust washer, conical spring, friction plate, friction disc, friction plate, friction disc and pressure ring. See Fig. 1.
- 3) Check backlash between side gears and pinion gears. Backlash should be less than .008" (.2 mm) on Pickups and less than .004" (.1 mm) on all other models. If not, install selective thrust washers to bring backlash within specifications.

NOTE: Always use same thickness thrust washer for both side gears.

- 4) If equipped with thrust block, remove pinion shaft, install thrust block and reinstall pinion shaft. On all models, install lock pin into case to secure pinion shaft. Using a punch, stake lock pin hole to prevent pin from working loose.
- 5) On all models, mount ring gear on case, then install and tighten ring gear attaching bolts. If removed, install differential side bearings.

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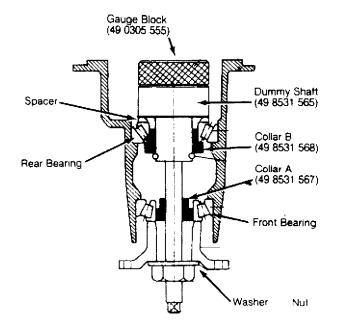


Fig. 4: Dummy Pinion Shaft and Gauge Block
Never use collapsible spacer when checking pinion depth.

#### Drive Pinion Depth

- 1) Make sure differential bearing bores are free of dirt and burrs. Install front and rear bearing races, then spacer and rear bearing. Install collar "B" (49 8531 568) on dummy drive pinion (49 8531 565) and secure them with "O" ring. See Fig. 4.
- 2) Install front bearing, collar "A"  $(49\ 8531\ 567)$ , companion flange and washer. Tighten nut so that drive pinion turns freely.
- 3) Install dial indicator on gauge body (49 0727 570), place gauge body on a surface plate and preload indicator. When preloaded, turn outer ring of dial indicator to zero.
- 4) Place gauge block (49 0305 555) on pinion and position indicator assembly on block so button of indicator contacts lowest portion of differential bearing support bore.

NOTE: DO NOT install collapsible spacer.

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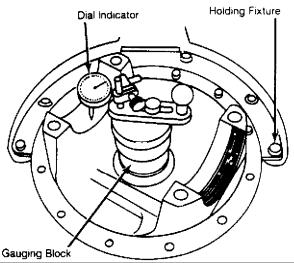


Fig. 5: Measuring Drive Pinion Installed Height
The use of a dial indicator, pinion gauge set and gauge block are
required for this procedure.

- 5) Record the amount the indicator moves in a "+" (plus) or "-" (minus) direction from zero. Remove gauging assembly and pinion from carrier. Check rear face of pinion for the machining correction figure.
- 6) If pinion is marked "+" (plus), SUBTRACT amount specified on pinion from dial indicator reading; if marked "-" (minus), ADD amount to indicator reading.

NOTE: Figures on pinion are hundredth millimeters.

7) Select correct pinion depth adjusting shim to be used for reassembly by adding or subtracting the amount determined in steps 3) through 5) from the thickness of the original pinion depth shim used during gauging process. Position correct shim (from chart) on pinion and install pinion bearing.

## PINION DEPTH ADJUSTING SHIMS

## 

Identification Mark	Thickness In. (mm)
08	.121 (3.08)
11	
14	` ,
17	
20	
23	
26	.128 (3.26)
29	
32	
35	
38	.133 (3.38)

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																										(3.47	
4	14																								.135	(3.44	)
4	1	•																							.134	(3.41)	)

#### Pinion Bearing Preload

- 1) Install collapsible spacer onto drive pinion assembly and install in carrier. Place front bearing in position on pinion. Hold pinion fully forward and drive pinion bearing over pinion until seated.
- 2) Apply grease to pinion oil seal lip and install seal into carrier. Install flange on pinion by tapping with soft hammer. Install pinion washer and nut.
- 3) Before tightening nut (when pinion preload is zero), check oil seal drag using a torque wrench. Tighten pinion nut to initial torque specifications as shown in chart.

#### INITIAL PINION NUT TOROUE

#### 

GLC Wagon 87-130 (118-176)
Pickups 145-253 (197-343)
All Others 94-130 (127-176)
ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ

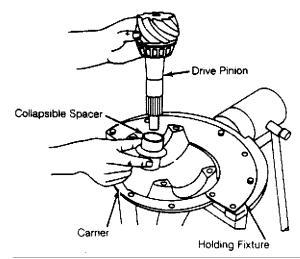


Fig. 6: Installing Drive Pinion Bearing Collapsible Spacer If preload specifications are exceeded, collapsible spacer must be replaced.

4) With nut tightened to initial torque value, check preload using a torque wrench mounted on pinion nut. If preload is not as specified in specification table, continue tightening nut and checking preload until specified preload is obtained.

CAUTION: Preload builds quickly. Nuts should be tightened a little at a time and preload checked after each slight amount of

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tightening.

Backlash & Side Bearing Preload

- 1) Place differential case assembly into carrier making sure index marks on ring and pinion gears are aligned. See Fig. 7. Install bearing adjusters and bearing caps, then tighten bearing cap nuts or bolts finger tight.
- 2) Turn adjusters with a spanner wrench until bearing end play is eliminated and some backlash exists between ring gear and pinion. Slightly tighten one bearing cap nut or bolt on each side of carrier and measure backlash.
- 3) Mount a dial indicator to carrier flange so button of indicator contacts one of the ring gear teeth at a right angle. Check backlash between ring and pinion gears.
- 4) Using the spanner wrench, turn both bearing adjusters equally until backlash is as specified in Axle Assembly Specifications.
- 5) Differential bearing preload (case spread) is obtained by tightening both bearing adjusters equally. Tighten adjusters until distance between pilot sections of side bearing caps is 6.5133-6.5158" (165.437-165.50 mm) on GLC Wagon, 7.3004-7.3033" (185.43-185.50 mm) on RX7 or 8.485-8.0513" (204.428-204.50 mm) on Pickups.

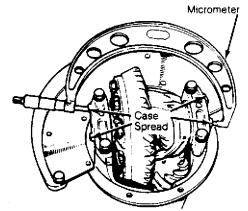


Fig. 7: Adjusting Differential Bearing Preload (Case Spread) When adjusting side bearing preload, care must be taken not to affect the ring and pinion gear backlash.

#### AXLE ASSEMBLY SPECIFICATIONS

#### 

)

Pinion Bearing Preload (1)
GLC Wagon 2.6-6.1 (.2968)
Pickups 11.3-15.6 (1.27-1.76)
All Others 7.8-12.2 (.88-1.37)
Side Bearing Preload
GLC Wagon 4-9 (.45-1.01)
Pickups 4-13 (.45-1.47)

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	. 5-18 (.56-2.03)
	In. (mm)
Ring & Pinion Backlash  GLC Wagon	750083 (.1921)
Pickups	• ,
	Qts. (L)
Oil Capacity GLC Pickups RX7	1.4 (1.3)
(1) - Without oil seal installed.	
TORQUE SPECIFICATIONS	
TORQUE SPECIFICATIONS TABLE	*****

**END OF ARTICLE**