AMERICAN MOTORS – FRONT

American Motors (Eagle)

DESCRIPTION

Eagle 4-wheel drive models use same semi-floating rear axle as used in 2-wheel drive AMC models. However, Eagle is equipped with a unique new front axle which is engine mounted. This axle is equipped with half-shafts for use with the independent front suspension used on Eagle models. The half-shafts transfer torque to front wheels through an integral and unique hub assembly that is mounted in the steering knuckle. The half-shafts use Rzeppa joints at the outboard ends and tripot design joints at the inboard ends. The shafts are connected to the front axle shafts by flanges. Ring gear diameter for all models is 7 9/16". Axle ratio and number of teeth are stamped on a tag which is on differential cover.

Eagles may be equipped with optional Select Drive system. Select Drive consists of a dash mounted switch, vacuum-actuated front axle disconnect and vacuum-actuated shift lever in transfer case. See *American Motors Model 119 Transfer Case in this section*. Select Drive provides drive train selection appropriate for road conditions. Selection of "2-WD" activates vacuum operated disconnect which disconnects right half shaft from axle shaft by moving spline clutch coupling. Selection of "4-WD" moves spline clutch coupling to engage right half shaft with axle shaft to deliver driving torque to front wheels. See *Fig. 1*.

REMOVAL & INSTALLATION

HUBS & BEARINGS

NOTE – *Eagle models have a unique front axle hub and bearing assembly. The assembly is sealed and does not require lubrication or periodic maintenance. The hub has ball bearings which seat in races machined directly into the hub. There are darkened areas surrounding the bearing race areas of the hub. These darkened areas are from heat treatment process, are normal and should not be mistaken for a problem condition. See Fig. 2.*

Removal – 1) Raise and support front of vehicle. Remove wheel, caliper and rotor. Remove bolts attaching axle shaft flange to half-shaft, remove cotter pin, nut lock and axle hub nut. Remove half-shaft.

2) Remove steering arm from steering knuckle, remove caliper anchor plate from steering knuckle. Remove 3 torx head bolts retaining hub assembly using suitable tool (J-25359). Remove hub assembly from steering knuckle.

3) Press hub out of hub and bearing carrier. Remove splash shield, bearings, hub spacer, steering knuckle pin seal, hub seal, carrier "O" ring and bearing spacer (if equipped). Remove outer bearing races.

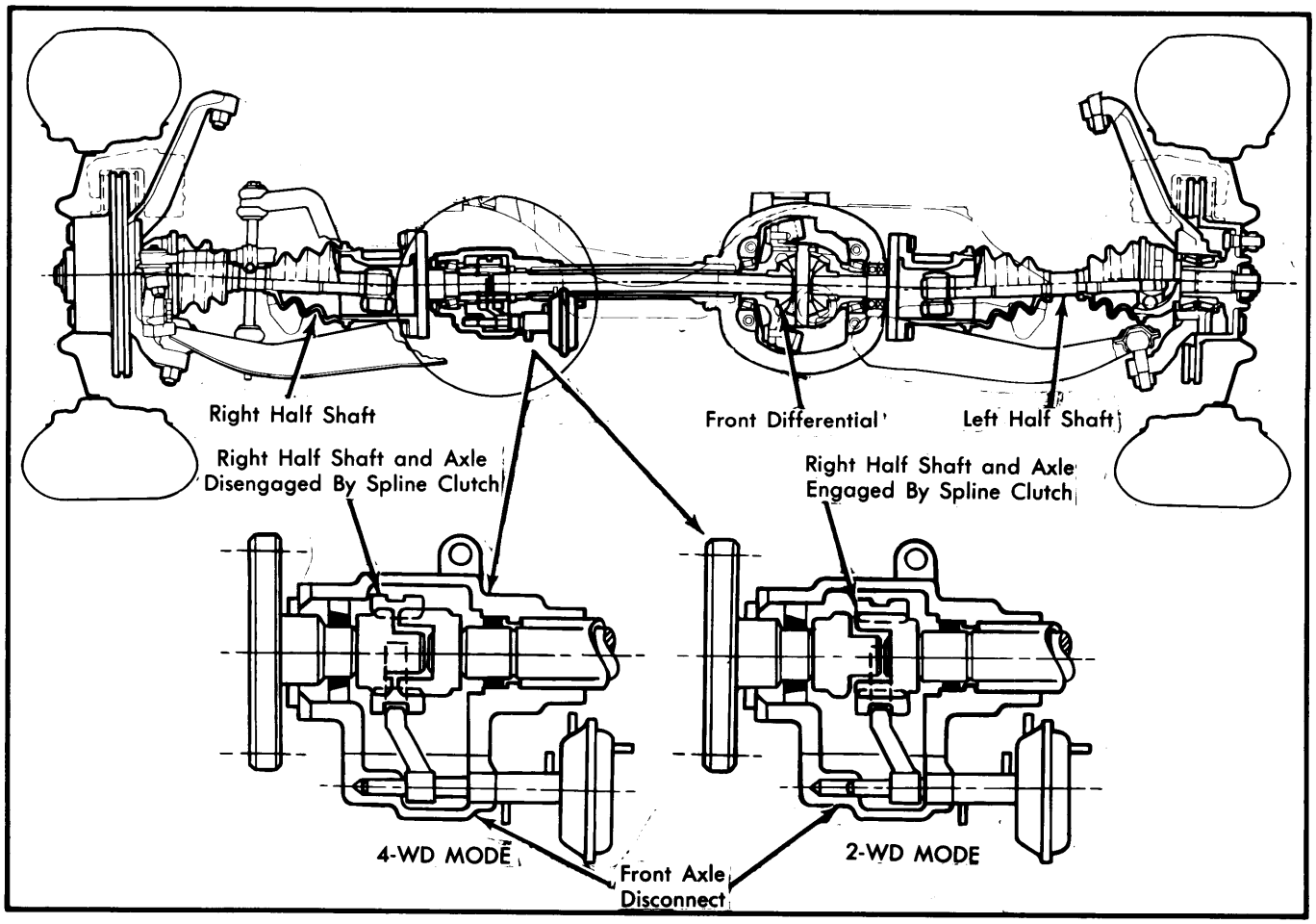

Fig. 1 Exploded View of Eagle Select Drive System with Exploded View of Front Axle Disconnect

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NOTE – *If hub contains tapered bearings, internal components may be serviced or replaced. If hub contains ball bearings, internal components cannot be serviced. Hub must be replaced if internal damage is evident.*

Installation – 1) Fill cavities in steering knuckle pin, hub and bearing carrier and lip-type seals with lithium base grease. Pack bearings with same lubricant and install bearings and spacer (if equipped). Install hub seal. Press hub through bearings and install hub spacer on hub shaft. Install steering knuckle pin inner seal.

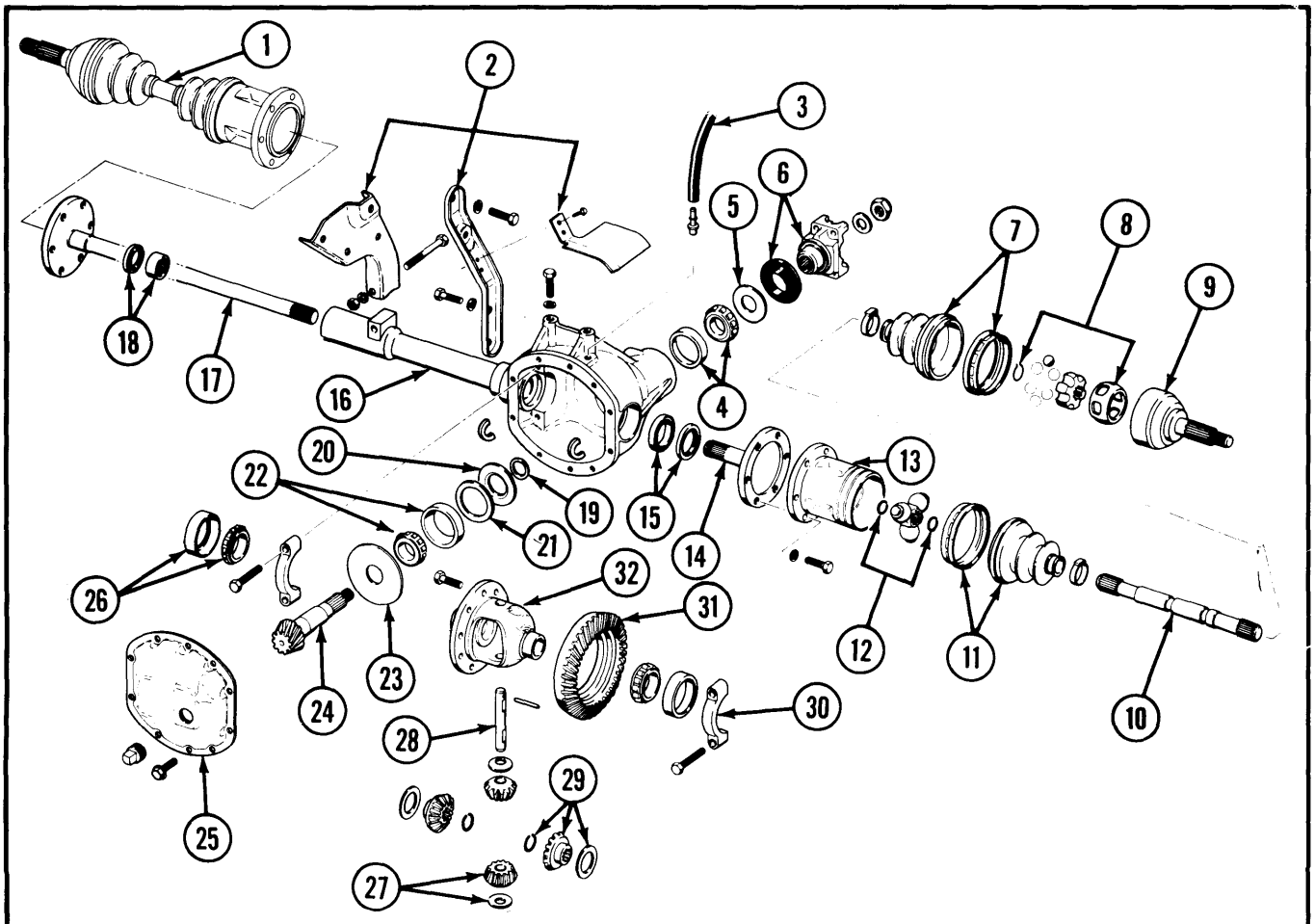
2) Install splash shield on hub and bearing carrier, then install "O" ring. Install carrier assembly in steering knuckle pin and tighten attaching bolts. Partially fill hub cavity of steering knuckle with chassis lubricant and install hub assembly. Tighten hub torx head bolts. Install caliper anchor plate and tighten retaining bolts.

3) Install steering arm bolts and tighten. Install half-shaft. Install axle flange-to-shaft bolts and install hub nut. Tighten half-shaft-to-flange bolts. Tighten hub nut. Install nut lock and cotter pin. Install rotor, caliper and wheel.

AXLE SHAFTS & BEARINGS

Removal – 1) Remove axle assembly. See *Axle Removal section*. Remove axle housing cover, remove "C" clips that retain axle shafts in differential and remove axle shafts.

2) Remove axle shaft seal using screwdriver. Remove needle bearings using suitable tool (J-29173 and J-2619-1). Remove ball bearings using brass punch and hammer.



1 – Half-Shaft Assembly
2 – Axle Mounting Brackets
3 – Vent Hose
4 – Pinion and Front Bearing Cup
5 – Washer
6 – Yoke and Seal
7 – Outer Boot and Retainer
8 – Rzeppa Joint Assembly
9 – Spindle
10 – Half-Shaft
11 – Inner Boot and Retainer
12 – Tri-Pot Joint Assembly
13 – Tri-Pot Housing
14 – Axle Shaft (Short)
15 – Ball Bearing and Seal
16 – Axle Housing
17 – Axle Shaft (Long)
18 – Needle Bearing and Seal
19 – Preload Shim
20 – Washer
21 – Depth Shim
22 – Pinion Rear Bearing and Cup
23 – Slinger
24 – Pinion Gear
25 – Cover
26 – Differential Bearing and Cup
27 – Differential Pinion and Thrust Washer
28 – Pinion Mate Shaft
29 – Side Gear, Thrust Washer and Lock Ring
30 – Bearing Cap
31 – Ring Gear
32 – Differential Case

Fig. 2 Exploded View of Eagle Front Axle Assembly – Without Optional Select Drive

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NOTE – *Two different style axle shaft bearings are used on the Eagle front axle. The left side uses a ball bearing, the right side uses a needle bearing.*

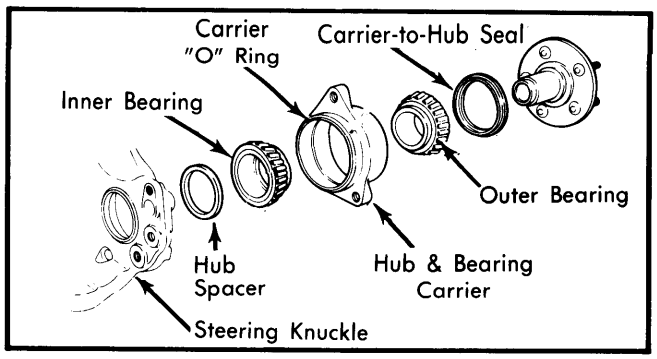

Fig. 3 Exploded View of Eagle Axle Hub Assembly

Installation – 1) Install needle bearings using a suitable tool (J-29153). Install ball bearings using a suitable tool (J-29154). Install axle shaft seals using suitable tool (J-29152 on right side, J-29154 on left side).

2) Install axle shafts in housing. Install "C" clips and housing cover. Fill axle with 2.5 pints of SAE 85W-90 gear lubricant. Reverse removal procedure to complete installation.

YOKE & PINION OIL SEAL

Removal – Raise vehicle, mark propeller shaft and yoke for reassembly reference. Remove propeller shaft. Remove pinion nut and washer, then remove yoke and pinion seal.

Installation – Install pinion seal using seal driver tool (J-25104). Install yoke, pinion washer and nut. Tighten pinion nut. Align reference marks on yoke and propeller shaft. Install and tighten attaching bolts.

FRONT AXLE ASSEMBLY

Removal – 1) Raise and support front of vehicle. Install half-shaft boot protectors (J-28712) on boots. Remove half-shafts and tie to vehicle underbody.

2) Mark propeller shaft and yoke for reassembly. Support axle assembly on hydraulic jack. Remove axle mounting bolts, partially lower axle assembly to disconnect vent hose. Lower and remove axle assembly.

NOTE – *Do not apply any weight to hub assembly when half-shafts are not securely attached to axle shaft flanges.*

Installation – Support axle assembly on hydraulic jack. Partially raise axle assembly to allow installation of vent hose. Raise axle into position. Install and tighten mounting bolts. Connect propeller shaft to yoke using reference marks as an aligning point. Install half-shafts and tighten bolts.

OVERHAUL

DISASSEMBLY

1) Remove axle assembly as previously described. Remove axle housing cover, mark bearing caps for reassembly reference. Loosen bearing cap bolts, install axle spreader tool J-24385-01 and adapters J-24161. Mount dial indicator on axle housing with stylus contacting one side of housing.

2) Spread housing no more than .020". Remove dial indicator, bearing caps and differential assembly by prying out of housing with a bar. Remove spreader tool.

NOTE – *Spreader tool must be removed after differential assembly is removed from housing to prevent housing from remaining set.*

3) Mount differential in vise, remove and discard ring gear attaching bolts. Remove ring gear, use brass hammer to tap gear off case. Remove pinion mate shaft lock pin using small pin punch. Remove pinion mate shaft and thrust block, rotate pinion gears until gears are aligned with case opening and remove pinion gears, side gears and thrust washers. Remove differential side bearings with puller. Remove and discard preload shims (if used).

4) Remove pinion nut, dust cap and yoke. Tap yoke end of gear with rawhide mallet to drive pinion out of rear bearing and housing. Assemble bearing remover set J-25100 on bearing and gear, remove bearing from gear. Assemble bearing set J-25100 on bearing case and remove bearing from case.

NOTE – *Pinion bearing preload adjusting shims may remain on pinion shaft, stick to front bearing or fall out. Collect, tag and retain preload adjusting shims for reassembly.*

5) Remove pinion rear bearing cup by tapping out of housing with brass punch. Remove pinion depth shims and retain for reassembly. Repeat procedure for front bearing cup.

INSPECTION

Clean all parts in solvent, allow all bearings to air dry. Dry all other parts with compressed air. Inspect all parts for damage or wear and replace as necessary.

REASSEMBLY

Drive Pinion – 1) Measure thickness of pinion depth shim removed during disassembly. Record pinion depth variance numbers etched on old and new pinion gears. Refer to pinion variance chart and determine amount to be added or subtracted from original shim to arrive at starter shim thickness.

2) Install pinion front bearing cup in housing bore. Install starter shim in rear bearing bore. Center shim to prevent tipping bearing cup and install shim with chamfer (if equipped) facing housing bore. Install original oil slinger on pinion.

3) Ensure slinger is seated against pinion head, then install rear bearing. Install pinion gear in housing. Install pinion front bearing, pinion yoke, washer and old pinion nut. Tighten nut only enough to remove free play.

NOTE – *A new nut, pinion seal, slinger or dust cap are not installed at this time. Pinion will be removed after depth measurement.*

Differential Case – 1) Install differential side bearings onto case with bearing driver and installer. Install thrust washers on side gears (oil pocket side toward gear). Install gears into

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bores in differential case. Install thrust washers behind pinion gears. Mesh gears with side gears so holes are opposite each other and in line.

2) Roll gears around until pinion gear holes are aligned with shaft holes in case. Measure any existing clearance between differential side gears and case, using 2 feeler gauges on opposite sides of 1 gear. Clearance should not exceed .006". If clearance exceeds .006", replace differential case. Install lock pin.

ADJUSTMENTS

Drive Pinion Depth – 1) Note pinion depth variance marked on pinion gear. If number is preceded by a plus (+) sign, add that amount (in thousands) to standard setting for axle model being overhauled. If number is preceded by a minus (–) sign, subtract that amount (in thousands) from standard setting.

2) Assemble gauge arbor J-5223-4 and discs J-5223-26. Install arbor and discs in differential bearing cup bores. Install bearing caps and tighten. Install gauge block J-5223-20. Position block so plunger is directly under arbor J-5223-4

NOTE – *Do not tighten bearing caps to specification.*

3) Assemble bolt J-5223-29 and clamp J-5223-24 and mount tools on axle housing. *See Fig. 4.* Extend clamp bolt until it presses against gauge block. Align gauge block plunger with center of gauge arbor and tighten clamp bolt until it presses against block with enough force to prevent block from moving.

4) Loosen gauge block thumbscrew and release plunger. When plunger contacts arbor tool, tighten thumbscrew to lock plunger in position. Remove clamp and bolt from axle housing, remove gauge block and measure distance from end of anvil to end of plunger. This dimension represents measured pinion depth. *See Fig. 5.*

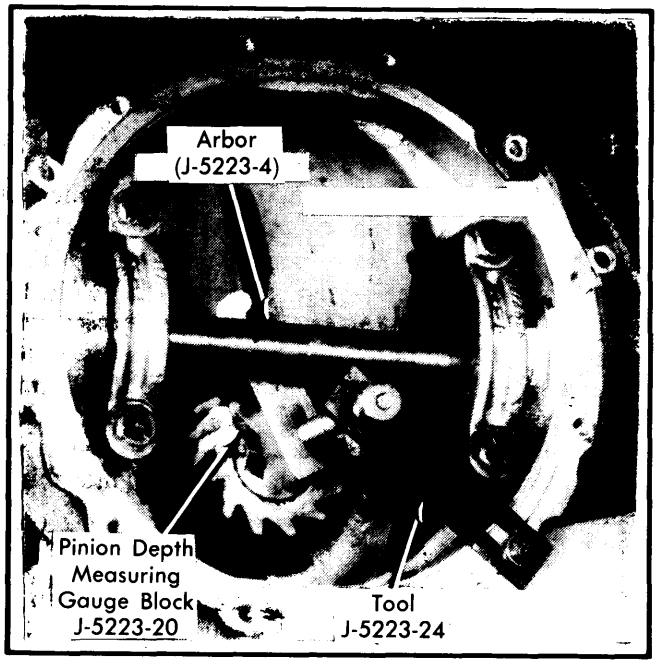

Fig. 4 Measuring Drive Pinion Depth

5) Remove bearing caps and remove arbor tool. Remove pinion gear, rear bearing cup and depth shim from axle housing. Measure thickness of depth shim, add this dimension to measured pinion depth obtained previously. From this total, subtract desired pinion depth. Result represents shim thickness required to adjust pinion depth.

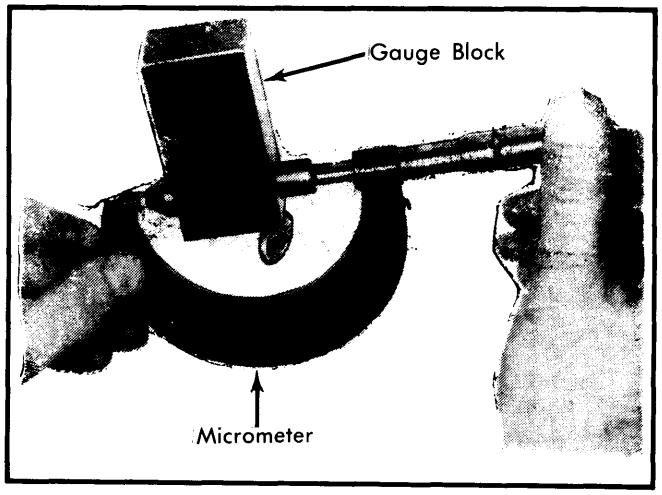

Fig. 5 Measuring Gauge Block

Pinion Bearing Preload – 1) Install preload shims on pinion. Install pinion gear, front bearing, oil slinger, yoke, washer and old pinion nut. Tighten nut to 260 ft. lbs. Using an INCH lb. torque wrench, measure torque required to turn pinion. Add shims to decrease preload; subtract shims to increase preload.

2) Remove pinion nut, washer and yoke. Install new oil seal with seat driver tool (J-25104). Install yoke and pinion washer. Install NEW pinion nut and tighten to 210 ft. lbs.

Differential Bearing Preload – 1) Place outer bearing races on bearings and install differential into housing. Install bearing caps and tighten securely (not to specification). Hold ring gear in contact with pinion gear. Using a screwdriver, pry differential outer bearing races toward center of case.

2) Insert various thickness feeler gauges between each outer bearing race and axle housing until ring gear backlash is .001-.002" with feeler gauges installed at both sides of differential at same time. Assemble shim pack that will provide desired backlash. Insert shims between bearing outer races and housing. Recheck backlash. When correct backlash is obtained, remove, tag and retain shims.

3) Remove differential case from housing. Add an additional .015" shim to drive tooth side of ring gear shim pack. Remove differential bearings. Install preselected shim packs to appropriate sides of differential case and reinstall bearings.

Ring Gear Backlash – 1) Mount spreader and spread housing no more than .020". Lubricate differential bearings with axle lubricant and install bearing outer races on bearings. Install differential in housing, remove spreader. Ring and pinion gear teeth must mesh completely. Install bearing caps, apply sealing compound to bearing cap bolts and tighten bolts.

2) Mount dial indicator on housing and measure ring gear backlash at 2 points. Backlash should be .005-.010". If backlash is not to specification, add or subtract shims from 1

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bearing shim pack to opposite bearing shim pack. Alternate shims from side-to-side, do not change total thickness of shims.

NOTE – *Altering the position of a .005" shim will change backlash approximately .003".*

3) Reposition dial indicator to back side of ring gear and measure ring gear runout. If runout exceeds .006", case may be distorted, there may be dirt between case and gear or ring gear bolts are loose. Check and correct as necessary. Remove dial indicator, install axle shaft, housing cover and fill axle with 2.5 pints of SAE 85W-90 gear lubricant.

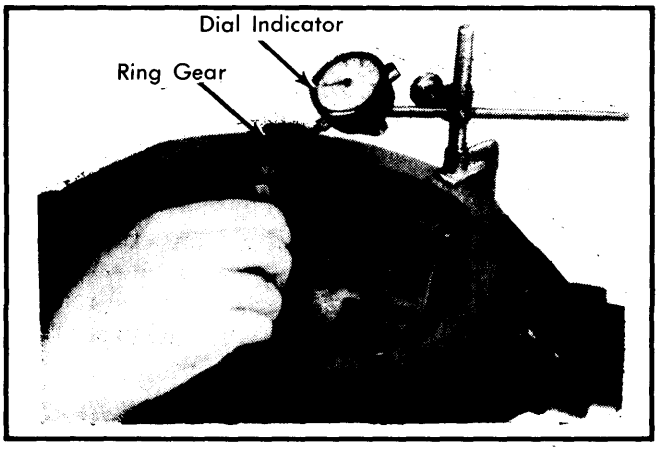

Fig. 6 Measuring Ring Gear Backlash

AXLE ASSEMBLY SPECIFICATIONS

Application	Specifications
Pinion Bearing Preload	
New Bearings	20-40 INCH Lbs.
Old Bearings	15-25 INCH Lbs.
Differential Bearing Preload	.15"
Ring Gear Backlash	.005-.010"
Gear-to-Case Clearance	.000-.006"

TIGHTENING SPECIFICATIONS

Application	Ft. Lbs.
Housing Cover	20
Differential Bearing Cap Bolts	40
Ring Gear-to-Case Bolts	55
Pinion Nut	210
Universal Joint Bolts	17
Axle Mounting Bolts	50
Axle Shaft-to-Half-Shaft	45
Axle Torx Head Bolts	75
Axle Hub Nut	180
Caliper Plate Bolts	100

PINION VARIANCE CHART

Old Pinion Marking	New Pinion Marking								
	–4	–3	–2	–1	0	+1	+2	+3	+4
+4	+0.008	+0.007	+0.006	+0.005	+0.004	+0.003	+0.002	+0.001	0
+3	+0.007	+0.006	+0.005	+0.004	+0.003	+0.002	+0.001	0	–0.001
+2	+0.006	+0.005	+0.004	+0.003	+0.002	+0.001	0	–0.001	–0.002
+1	+0.005	+0.004	+0.003	+0.002	+0.001	0	–0.001	–0.002	–0.003
0	+0.004	+0.003	+0.002	+0.001	0	–0.001	–0.002	–0.003	–0.004
–1	+0.003	+0.002	+0.001	0	–0.001	–0.002	–0.003	–0.004	–0.005
–2	+0.002	+0.001	0	–0.001	–0.002	–0.003	–0.004	–0.005	–0.006
–3	+0.001	0	–0.001	–0.002	–0.003	–0.004	–0.005	–0.006	–0.007
–4	0	–0.001	–0.002	–0.003	–0.004	–0.005	–0.006	–0.007	–0.008