

## AMERICAN MOTORS – FRONT

### American Motors (Eagle)

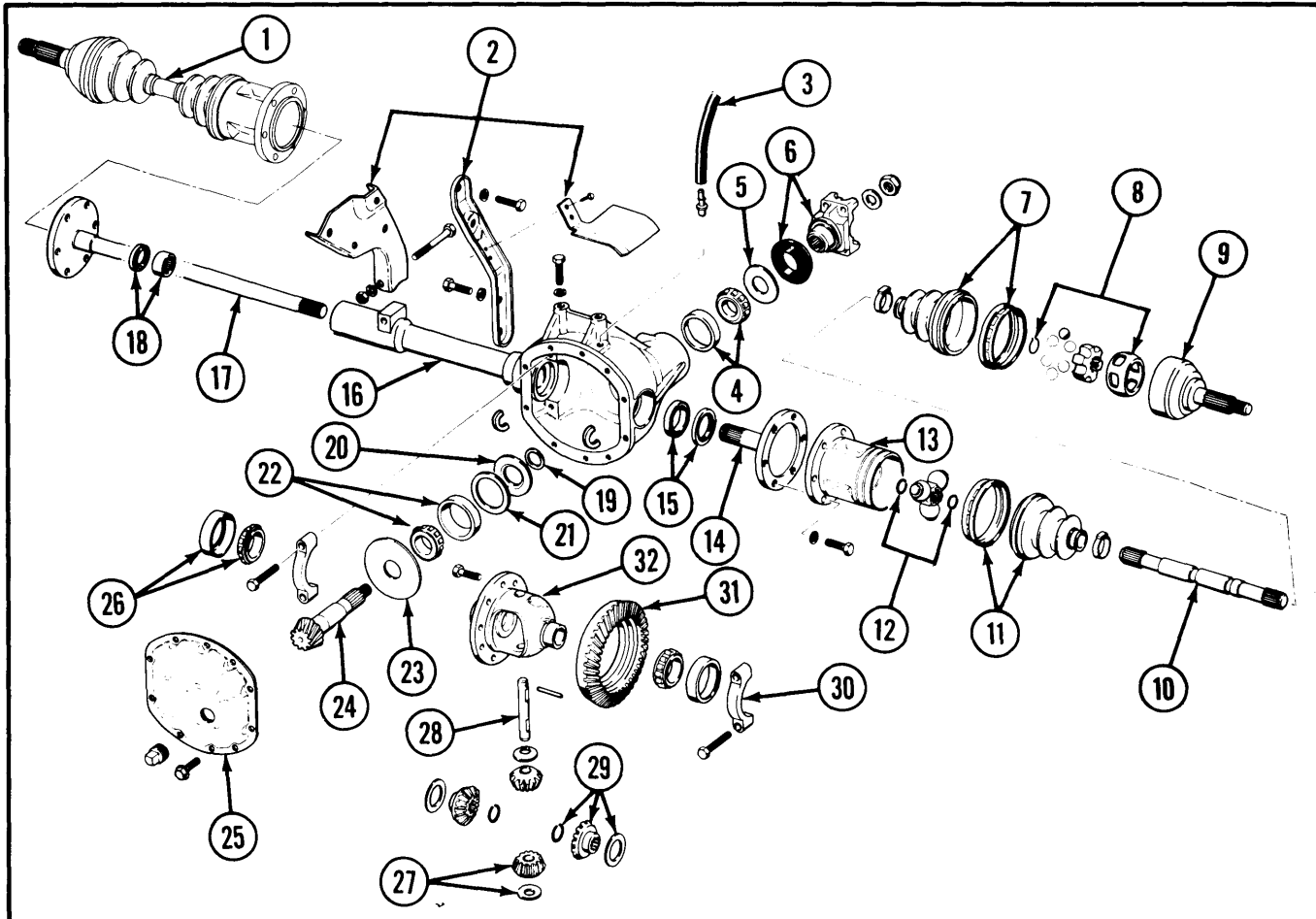
#### DESCRIPTION

Eagle 4-wheel drive models use the same semi-floating rear axle used in 2-wheel drive AMC models. However, the 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 the 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 tri-pot 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<sup>9</sup>/<sub>16</sub>".

#### Axle Ratio Identification

Axle Code	Axle Ratio	No. of Teeth (Pinion/Ring Gear)
F .....	3.08:1 .....	13/40
A .....	3.54:1 .....	11/39



- 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. 1 Eagle Front Axle Assembly**

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## REMOVAL &amp; INSTALLATION

## HUBS &amp; 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.

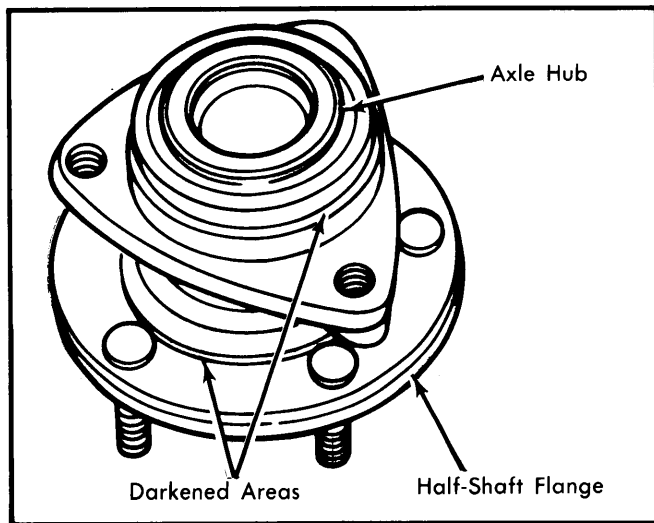


Fig. 2 Eagle Axle Hub Assembly

**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.

**Installation** – 1) Partially fill hub cavity of steering knuckle with chassis lubricant and install hub assembly. Tighten hub torx head bolts to specifications. Install caliper anchor plate and plate retaining bolts, tighten bolts to specifications.

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

## AXLE SHAFTS &amp; 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.

**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.

**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 gear lubricant. Reverse removal procedure to complete installation.

## YOKE &amp; PINION OIL SEAL

**Removal** – 1) Raise vehicle, mark propeller shaft and yoke for reassembly reference. Remove propeller shaft.

2) Remove pinion nut and washer, remove yoke and pinion seal.

**Installation** – 1) Install pinion seal using suitable tool (J-25104). Install yoke, pinion washer and nut. Tighten nut to specifications.

2) Align reference marks on yoke and propeller shaft. Install attaching bolts and tighten to specifications.

## 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.

**Installation** – 1) Support axle assembly on hydraulic jack. Partially raise axle assembly to allow installation of vent hose. Raise axle into position and install mounting bolts. Tighten mounting bolts to specifications.

2) Connect propeller shaft to yoke using reference marks as an aligning point. Install half-shafts and tighten bolts to specifications.

## 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.

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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 and thrust washers. Remove side gears and thrust washers.

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.

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. Install rear bearing cup in housing bore. Install oil slinger on pinion gear, install rear bearing on pinion. 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** – Do not install the pinion seal, slinger, or dust cap at this time.

**Drive Pinion Bearing Preload – 1)** Install collapsible spacer and front bearing on drive pinion. Install oil seal rear yoke and nut. Using suitable tools, tighten pinion nut only enough to remove bearing end play.

2) Gradually tighten nut to collapse spacer and preload bearings. Using an INCH lb. torque wrench, measure torque required to turn drive pinion. If preload torque is less than desired, tighten pinion nut slightly and recheck preload.

**CAUTION** – Do not exceed preload torque. Do not back off nut to lessen preload. If preload torque is exceeded, replace collapsible spacer and adjust preload to correct torque.

**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

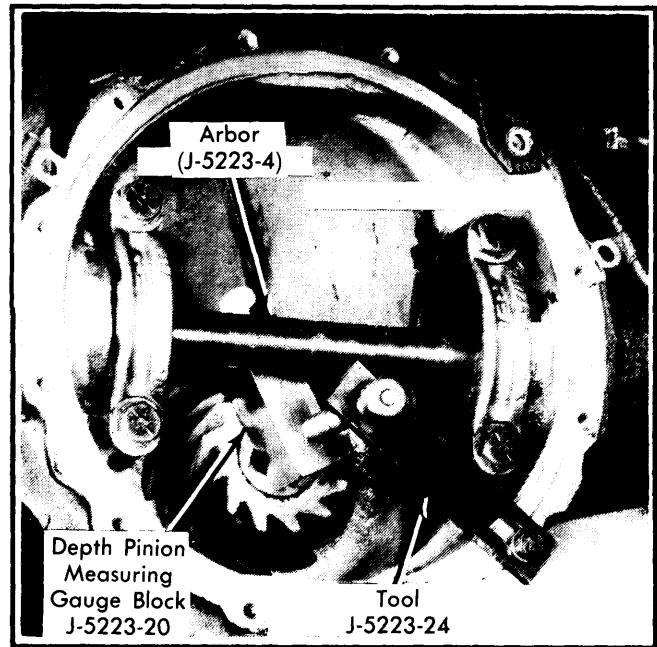


Fig. 3 Drive Pinion Depth Measurement

### PINION VARIANCE CHART

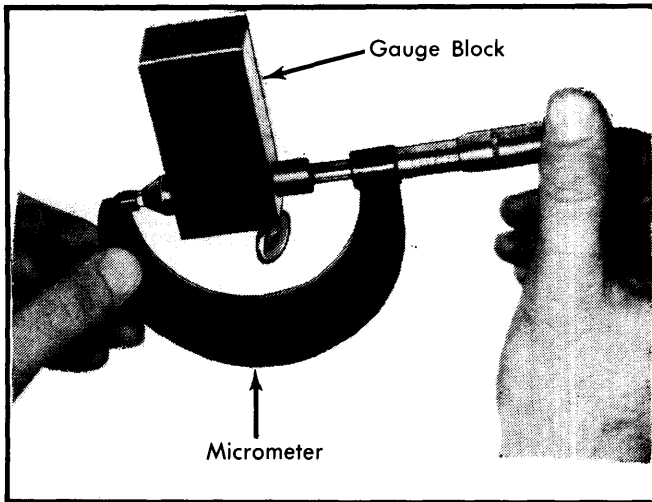
Old Pinion Marking	New Pinion Marking								
	-4	-3	-2	-1	0	+1	+2	+3	+4
+4	+0.008	+0.007	+0.006	+0.005	+0.004	+0.003	+0.002	+0.001	0
+3	+0.007	+0.006	+0.005	+0.004	+0.003	+0.002	+0.001	0	-0.001
+2	+0.006	+0.005	+0.004	+0.003	+0.002	+0.001	0	-0.001	-0.002
+1	+0.005	+0.004	+0.003	+0.002	+0.001	0	-0.001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

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3) Assemble bolt J-5223-29 and clamp J-5223-24 and mount tools on axle housing. See Fig. 3. 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. 4.

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.



**Assembling Differential Carrier – 1)** Install thrust washers on side gears and install gears in case. Install thrust washers on differential pinion gears and install gears in case. Install thrust block and pinion mate shaft pin in case. Position differential case on end.

2) Tap differential case lightly on flat surface to settle gears into position in case. Measure clearance between case and side gears. Clearance between gears and case must be zero to .006". If clearance exceeds .006" disassemble case and install shims between gears and case to reduce clearance.

**Backlash Adjustment – 1)** Install differential in axle housing, install bearing caps and tighten bolts. Hold ring gear in contact with pinion gear and pry bearing cups towards center of case.

2) Insert various thickness feeler gauges between each bearing cup and housing until proper ring gear backlash is achieved. Assemble shim pack that will provide desired backlash. Remove differential, install shim packs on appropriate sides of differential case and install bearings.

3) Mount spreader tool and spread housing no more than .020". Lubricate differential bearings with axle lubricant and install bearing cups on bearings. Install differential in housing, remove spreader tool. Install bearing caps, apply sealing compound to bearing cap bolts. Tighten bolts to specifications.

4) Recheck ring gear backlash and adjust if necessary. After all adjustments have been made, make a gear tooth pattern check to make sure of proper assembly. Install axle shafts, housing cover and fill axle with 2.5 pints of SAE 85W-90 gear lubricant.

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 .....	15