GENERAL MOTORS 8 ½" & 8 ⅞" RING GEAR

Chevrolet & GMC
All 10 Series
G20
K20 (Front Only)

NOTE – *SERIES IDENTIFICATION – The vehicle series numbers used in this article have been abbreviated for common reference to both Chevrolet and GMC models. Chevrolet models use numerical designations as listed; GMC models are identified as follows: 10 = 1500; 20 = 2500; 30 = 3500.*

NOTE – *DRIVE AXLE USAGE – The General Motors 8 ½" ring gear drive axle is used as the front drive axle on K10 and K20 models. These models may also be equipped with a Dana/Spicer model front drive axle. See appropriate article in this section.*

DESCRIPTION

The axle assembly is the hypoid gear type with integral carrier housing. It is used on light duty vehicles with semi-floating axles. The pinion bearing preload adjustment is made with a collapsible spacer. The differential side bearing preload adjustment and the drive pinion depth adjustment are made by shims. A removeable ten bolt housing cover permits inspection and minor servicing of differential without removal from vehicle. Service procedures are the same for both size assemblies, except for some tightening specifications and special tool numbers.

AXLE RATIO & IDENTIFICATION

General Motors uses several types of axles in its vehicles. The 8 ½" and 8 ⅞" axles can be distinguished from the others by the configuration of its housing cover (see illustration) and the number of attaching bolts. To determine drive axle ratio, refer to Drive Axle Ratio Identification in this Section.

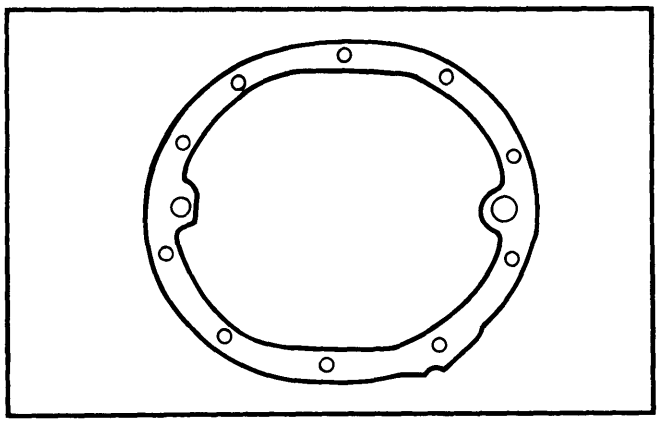

Fig. 1 8 ½" and 8 ⅞" Ring Gear Housing Cover Gasket for Axle Identification Purposes

REMOVAL & INSTALLATION

AXLE SHAFTS & BEARINGS (FRONT DRIVE AXLE)

Removal – 1) Raise vehicle and position on safety stands. Remove locking hub on part time four-wheel drive models. See *Dana/Spicer Internal Locking Hub in this Section.*

2) Remove disc brake caliper. If equipped with "Full Time" four-wheel drive, remove cap from center of hub, then remove snap ring, drive gear and pressure spring.

3) On all models, remove lock nut, washer and adjusting nut from spindle. Slide off hub and rotor assembly. Outer wheel bearing and retainer will come off with hub.

4) Remove inner bearing, cone and seal from hub using a brass drift punch. Remove inner and outer bearing cups with a brass drift punch. Remove spindle. Carefully pull axle shaft assembly out through hole in steering knuckle.

Installation – 1) Install axle shaft assembly in housing. Care must be taken not to damage seal. Install thrust washer with chamfered end toward slinger on axle.

2) Install spindle and tighten bolts to specification. Install inner and outer bearing cones in hub using suitable drivers. Lubricate cones and bearings with suitable lubricant.

3) Install inner bearing in cone. Install new seal. Install outer bearing and retainer in hub. Place rotor and hub assembly on spindle.

4) Adjust wheel bearings. *See Wheel Bearing Adjustment in WHEEL ALIGNMENT Section.* Install locking hub if equipped with part time four-wheel drive.

5) Install pressure spring, drive gear, snap ring and grease cap if equipped wtth "Full-Time" four wheel drive. Install disc brake caliper, and wheel and tire. Lower vehicle.

AXLE SHAFTS & BEARINGS (REAR DRIVE AXLE)

Removal – 1) Raise vehicle. Remove wheel and tire, and brake drum. Drain lubricant from drive axle. Remove housing cover. Remove differential pinion shaft lock screw.

NOTE – *On vehicles equipped with 8 ½" ring gear and Eaton positive traction differential, proceed to step* **3**). *On all remaining models proceed as follows:*

2) Remove differential pinion shaft. Push flanged end of axle shaft toward center of vehicle. Remove "C" lock from splined end of axle shaft and remove axle shaft.

3) On vehicles with 8 ⅞" ring gear and Eaton positive traction differential, remove pinion shaft lock screw. Partly withdraw pinion shaft.

4) Rotate differential case until pinion shaft touches edge of housing. *See Fig. 2.*

5) Reach into case with screwdriver and rotate "C" lock until open end points directly inward. When "C" lock is correctly positioned, axle shaft can be pushed inward, allowing "C" lock to be removed. Remove axle shaft.

CAUTION – *Do not hammer on axle shaft. It should slide easily when "C" lock is correctly positioned.*

6) With Axle shaft removed on all models, insert a suitable bearing removal tool (J-23698) into axle housing. Position tool behind bearing. Attach a slide hammer to tool and remove bearing and seal.

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Installation – 1) Install bearing using a suitable bearing installer tool (J-23690). Install bearing until it bottoms against housing.

2) Install seal using a suitable seal installer tool (J-21128). This tool will install the seal flush with outer edge of axle tube.

3) Slide axle shaft into position. Make sure axle shaft splines do not damage oil seal lip. Install "C" lock on button end of axle shaft. Push shaft outward so that shaft lock seats differential side gear counterbore.

NOTE – *On models with Eaton positive traction differential, make sure "C" lock is correctly positioned in thrust block. See Fig. 3.*

4) Install differential pinion shaft in case and pinion gears. Install pinion shaft lock screw. Install a new gasket and cover. Fill axle with correct amount of lubricant. Install brake drum, wheel and tire. Lower vehicle.

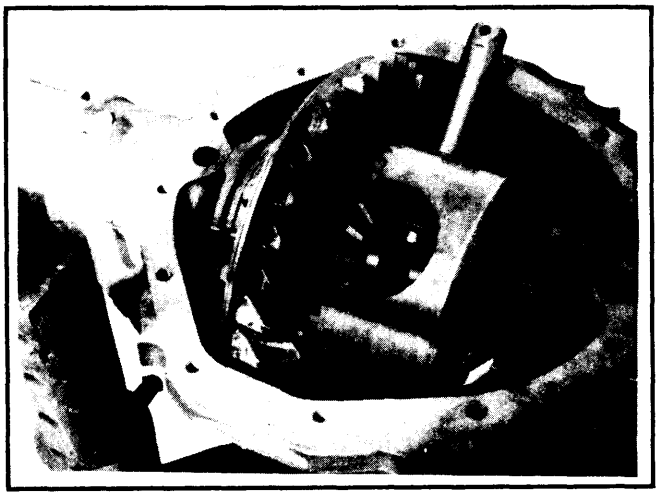

Fig. 2 Positioning Case for Axle Removal

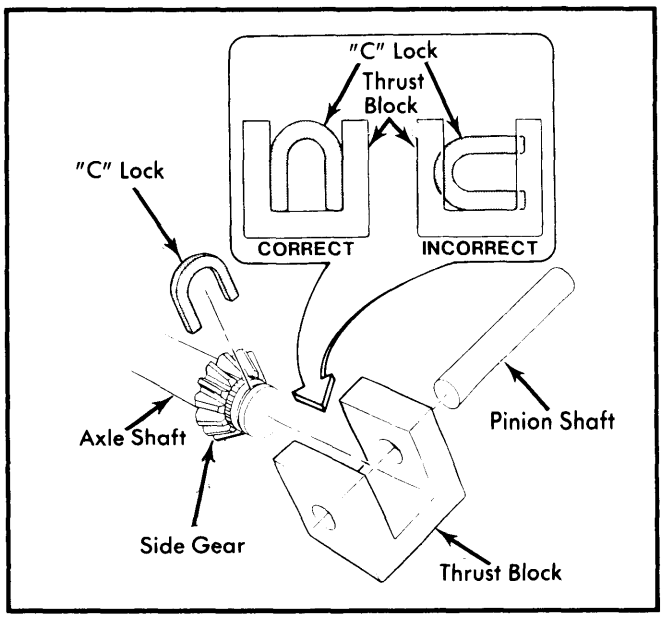

Fig. 3 View Showing Correct Positioning of "C" Lock for Removal

PINION FLANGE & SEAL

1) Raise rear of vehicle and allow axle assembly to hang free. Disconnect rear universal joint and tie propeller shaft out of way. Note and record pinion bearing preload by rotating pinion shaft through several revolutions using an INCH lb. torque wrench, then mark relationship of pinion flange and shaft for reassembly. Count the number of exposed threads on pinion shaft. Hold yoke with a suitable holding tool (J-8614-11) and remove self-locking nut. Remove yoke using a suitable puller. Pry old seal out of housing.

2) Pack seal lip cavity with lithium-base extreme pressure lubricant. Place seal in bore. Using suitable gauge plate (J-22804-1) and seal driver (J-21057) drive seal into place. Make sure seal is square in carrier. Pack cavity between end of pinion splines and pinion flange with a non-hardening sealer.

3) Using a suitable installation tool (J-8614-11) install flange on pinion shaft. Install washer and nut. Install nut in original position taking note of scribe marks and number of exposed threads. Measure pinion preload. Tighten nut in small increments until preload exceeds original figure by 1-5 INCH Lbs. Install propeller shaft and lower vehicle.

CAUTION – *Do not attempt to hammer flange onto pinion shaft, as it will damage ring gear and pinion.*

AXLE ASSEMBLY (FRONT DRIVE AXLE)

Removal – 1) Disconnect propeller shaft from differential flange. Raise front of vehicle until weight is removed from front springs. Position safety stands behind front springs.

2) Disconnect connecting rod from steering arm. Disconnect brake hose from frame fitting. Cover all fitting openings to prevent contamination.

3) Disconnect shock absorbers from axle brackets. Disconnect vent tube at differential housing. Remove "U" bolt nuts. Separate axle from springs and roll out from under vehicle.

Installation – To install axle assembly, reverse removal procedure. Bleed brake system.

AXLE ASSEMBLY (REAR DRIVE AXLE)

Removal – 1) Raise vehicle. Raise axle until tension is released from springs and shock absorbers. Disconnect propeller shaft from flange. Tie propeller shaft out of way.

2) Disconnect lower shock absorber mounts. Disconnect vent hose at from vent connector. Disconnect brake hose at connector on axle housing.

3) Remove rear brake drums. Disconnect parking brake cable at actuating levers and at flange plate. Remove "U" bolt nuts, washers, spacers and clamp plates. Lower axle assembly and remove from vehicle.

Installation – To install axle assembly, reverse removal procedure. Bleed brake system.

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OVERHAUL

DISASSEMBLY

NOTE – *Check and record ring gear backlash and pinion bearing preload before disassembly. If steering knuckle removal is required on front drive axle models, see 4-Wheel Drive Steering Knuckles in this Section.*

Remove axle shafts, differential pinions, side gears and thrust washers. Mark side bearing caps for reassembly reference, remove caps and pry differential case from housing. Remove differential bearing cups and shims and place with correct bearing cap. Remove ring gear from case. Remove pinion nut, pinion flange and seal as previously outlined. Thread pinion nut half way on to shaft. Temporarily install differential cover with two bolts. Tap end of pinion, against nut, with a soft drift and hammer. Care must be taken not to damage pinion bearings. Remove front pinion bearing. Remove cover and remove drive pinion. Discard oil seal, pinion nut and collapsible spacer.

REASSEMBLY & ADJUSTMENT

Case Assembly – Install ring gear squarely (use guide pins if necessary) onto case and tighten ring gear bolts evenly and alternately. Install side gears, differential pinions and thrust washers into case. Install differential pinion shaft and lock screw and tighten lock screw.

Drive Pinion Depth & Bearing Preload – 1) Drive pinion rear bearing shim thickness must be determined whenever a new axle housing, ring and pinion set, or pinion bearings are installed. Shim pack thickness is determined by using suitable gauging tool set (J-21777).

2) If removed, install pinion bearing cups into housing, then place lubricated pinion bearings into cups. Position gauge plate (J-21777-29 for 8½" or J-21777-36 for 8⅞") and rear pinion bearing pilot on preload stud, then install through rear pinion bearing, front pinion bearing, and front pinion bearing disc (J-21777-42). Install hex nut until snug, then rotate bearings to insure proper seating. Hold preload stud stationary with a wrench on flats, then tighten hex nut until 20 INCH lbs. are required to rotate bearings.

3) Mount side bearing gauging discs (J-21777-45) on ends of arbor, then place arbor into carrier making sure discs are properly seated. Install side bearing caps and bolts, then tighten bolts to avoid movement. Position dial indicator on mounting post of arbor, with contact button resting on top surface of plunger. Preload dial indicator ½ revolution, then tighten in this position.

4) Place plunger onto gauging area of gauge plate. Rock plunger rod slowly back and forth across gauging area until dial indicator reads greatest deflection, then set indicator to zero. Repeat rocking action several times to verify setting. Once zero reading is obtained, swing plunger until it is removed from gauging area. Dial indicator will now read required pinion shim thickness for a "nominal pinion". Record this reading.

5) Check drive pinion for painted or stamped markings on pinion stem, or a stamped code number on small end of pinion gear. If marking is found to be plus or minus number (for example, +2 or −5) add or subtract that many thousandths from indicator reading. This will then be thickness of rear pinion bearing shim pack. NOTE – *If no markings are found on pinion, use dial indicator reading as shim thickness.*

6) Remove bearing caps and gauging tool from housing. Place selected shim pack on pinion gear, then install lubricated pinion bearing onto pinion gear shaft using suitable press.

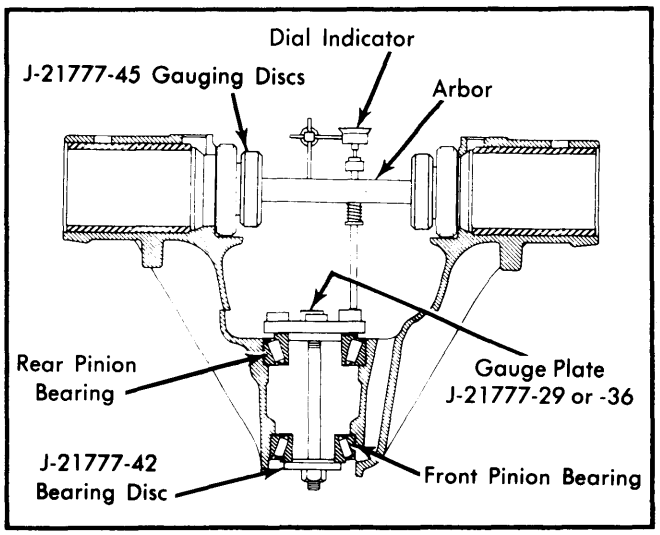

Fig. 4 Sectional View Showing Use of Pinion Depth Tool Set J-21777)

7) Install a new collapsible spacer over pinion gear shaft, then position pinion assembly in housing. While holding pinion forward, carefully drive front pinion bearing onto pinion gear shaft until a few threads are exposed. Install seal, pinion flange, washer and nut, and tighten until all end play is removed. Rotate pinion several times to seat bearings, then check preload using an INCH lb. torque wrench. Continue tightening nut and checking preload until specified preload is obtained. CAUTION – *Do not back off nut to lessen preload. If preload is exceeded, a new collapsible spacer must be installed and nut retightened until proper preload is obtained.*

Side Bearing Preload – Install differential assembly into housing. If original bearings and differential case are reused, use a shim pack .002" thicker (each side) than original shim pack. NOTE – *Always replace production shims with .170" service spacer and appropriate additional shims.* If new parts are being installed, determine correct preload as follows: Select two shims whose total thickness will permit a feeler gauge at least .010" thick to be inserted between shim and cup and install these shims between right bearing cup and carrier cup seat. Loosely install left bearing cap. With left bearing cup and differential case against left cup seat, measure distance between right side shims and cup seat (insert progressively larger feeler gauges until there is a snug, not tight, fit). Add .008" to total of both shim pack and feeler gauge thickness. This is total shim pack necessary for correct bearing preload. Divide shims equally between both sides and install. With bearing caps in place, tighten bolts alternately and evenly.

Backlash & Final Assembly – Check backlash at four locations around ring gear, using a dial indicator mounted to axle housing. Variation should not exceed .001". If backlash is

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not within specifications, adjust side bearing shims as necessary. **CAUTION** – *Total shim pack thickness must not be changed. If a shim is removed from one side, the same thickness shim must be added to other side.* After adjustment is completed, make a tooth contact pattern test and make any necessary corrections. Install axle shafts, wheels and housing cover.

TIGHTENING SPECIFICATIONS

Application	Ft. Lbs.
Ring Gear-to-Differential Case	90
Side Bearing Cap	60
Pinion Shaft Lock Bolt	20-25
Housing Cover	20

AXLE ASSEMBLY SPECIFICATIONS

Application	Specification
Ring Gear Backlash	
Preferred	.005-.008"
Suitable	.003-.010"
Side Bearing Preload	.008"
Pinion Bearing Preload	
Used Bearings	10-15 INCH Lbs.
New Bearings	20-25 INCH Lbs.

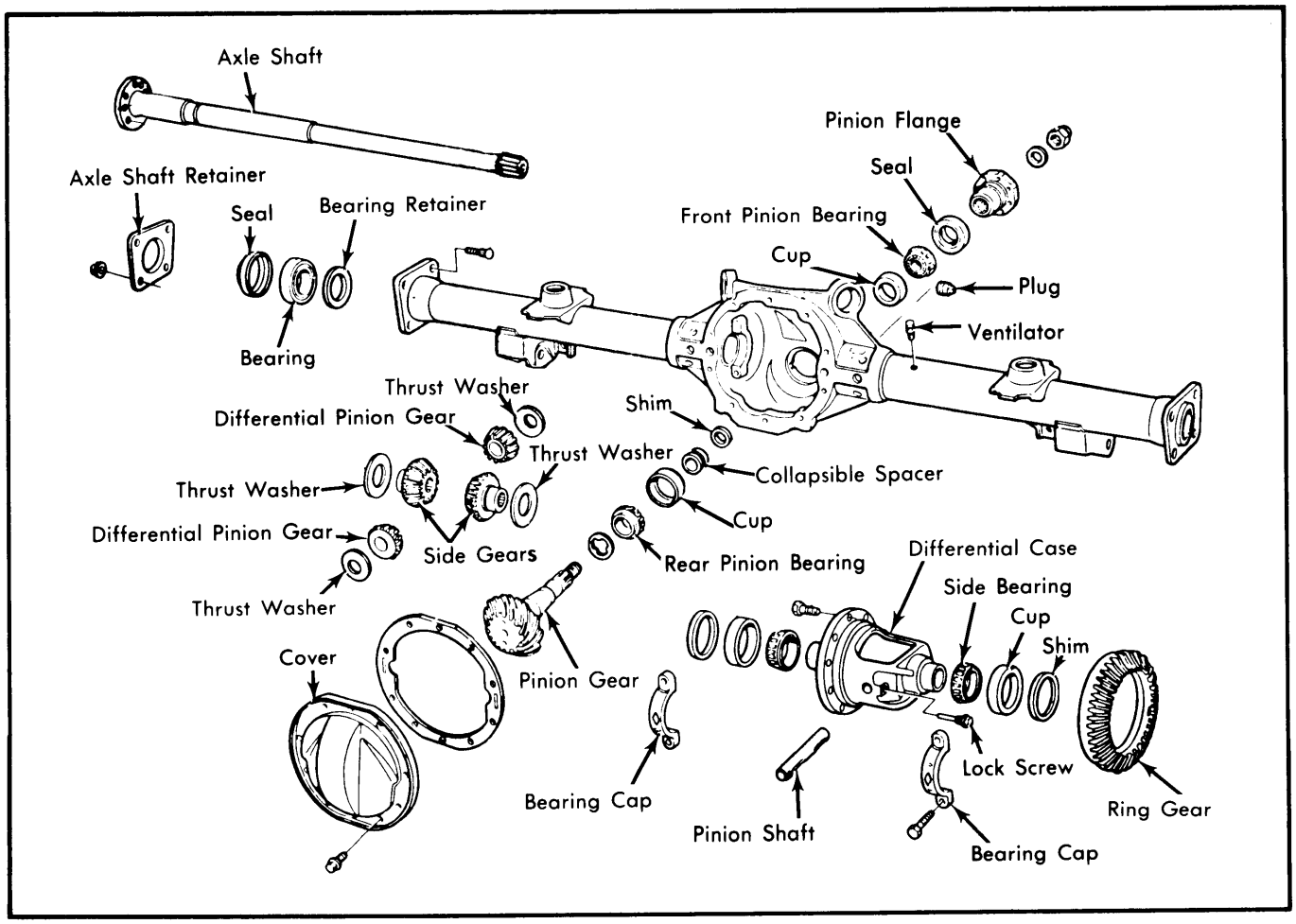

Fig. 5 Exploded View of General Motors 8 ½" and 8 ⅞" Ring Gear Axle Assembly