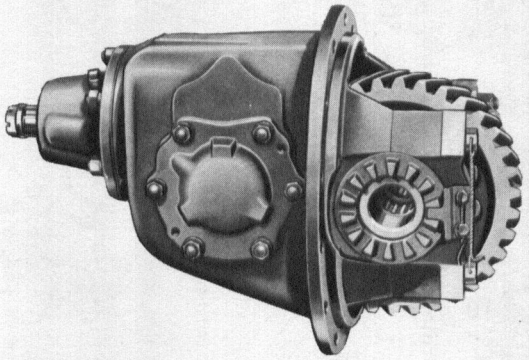
Field Maintenance Manual No. 6

# Double-Reduction Drive Unit

Front - Mounted Type



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**...where science gets down to business**

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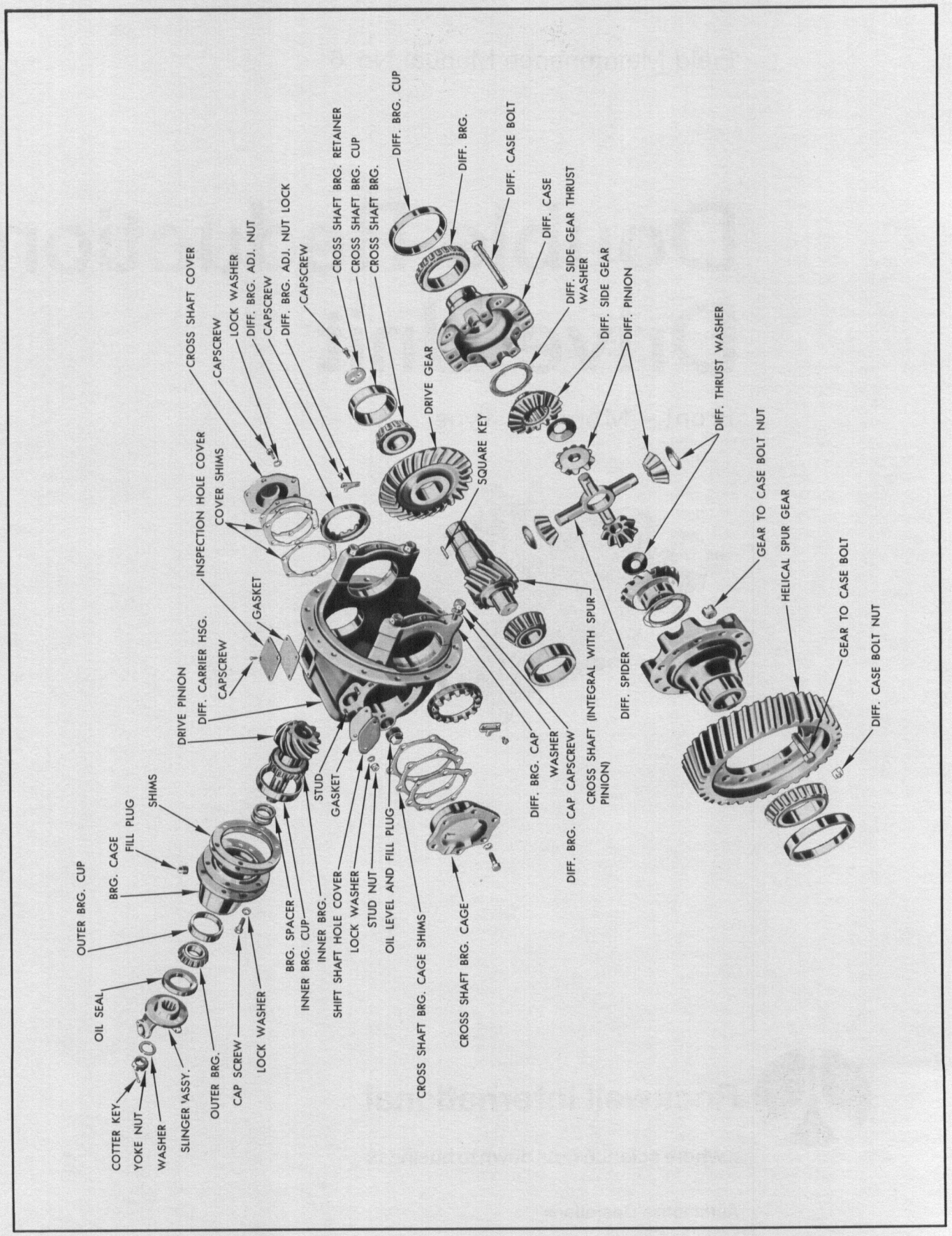
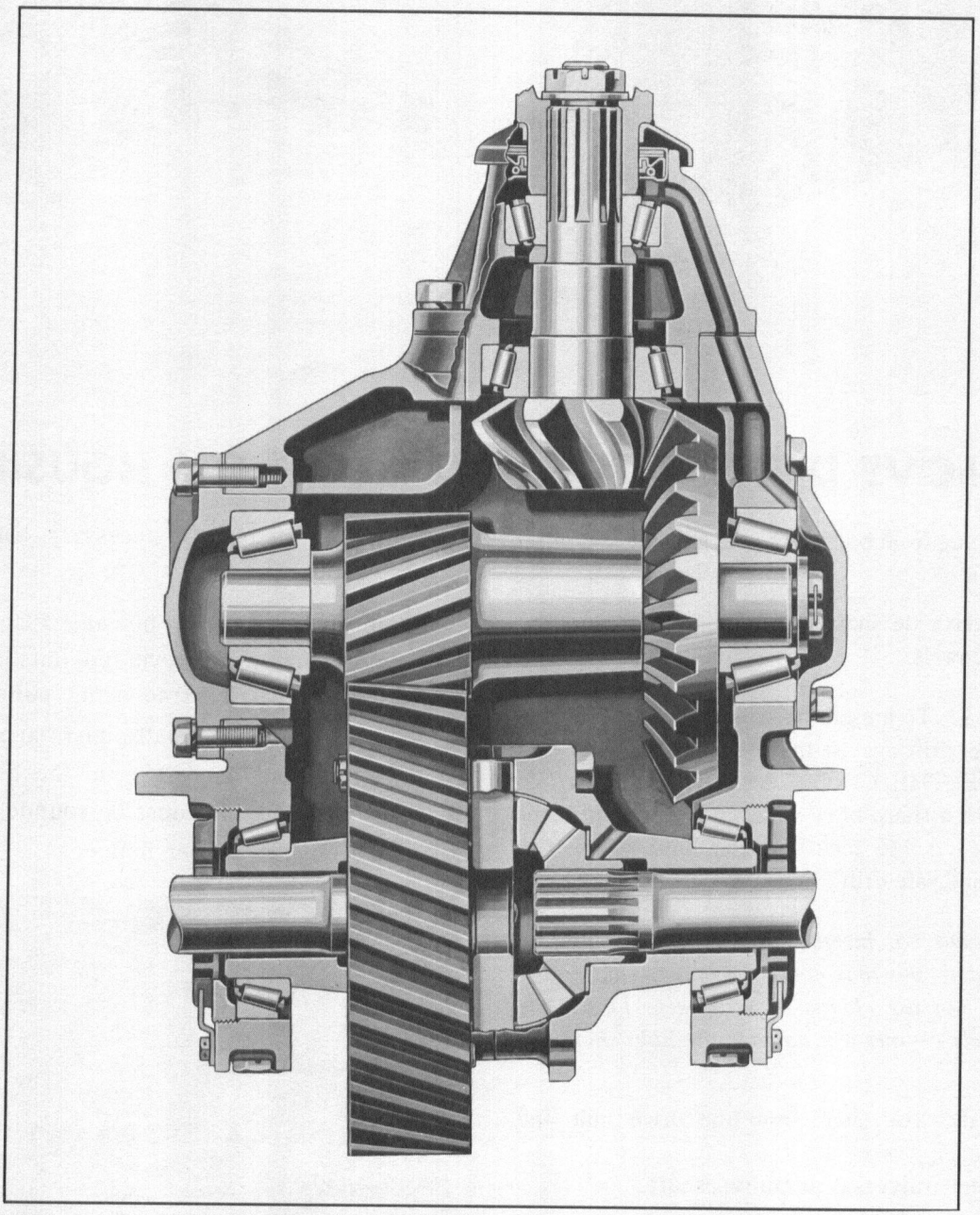
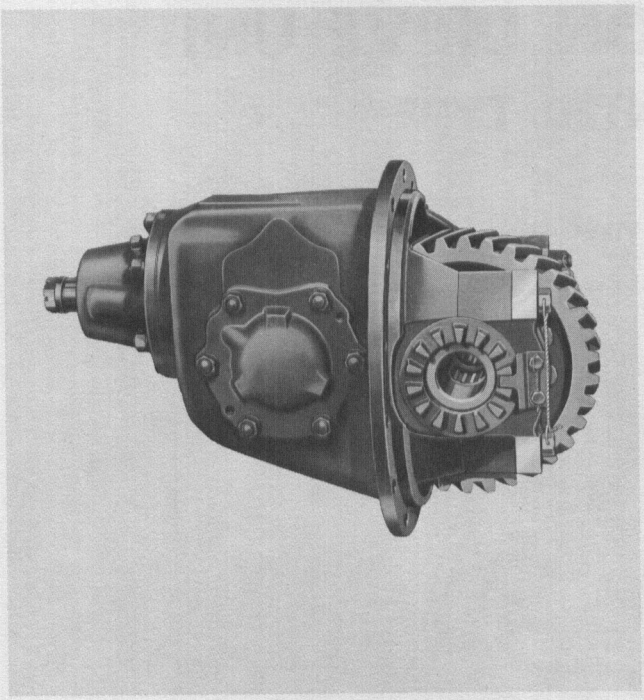

COTTER KEY
YOKE NUT
WASHER
SLINGER YASSY.
OUTER BRG.
CAP SCREW
LOCK WASHER
OIL SEAL
OUTER BRG. CUP
BRG. CAGE
FILL PLUG
SHIMS
BRG. SPACER
INNER BRG. CUP
INNER BRG.
STUD
SHIFT SHAFT HOLE COVER
GASKET
LOCK WASHER
STUD NUT
OIL LEVEL AND FILL PLUG
CROSS SHAFT BRG. CAGE SHIMS
CROSS SHAFT BRG. CAGE
DRIVE PINION
DIFF. CARRIER HSG.
CAPSCREW
GASKET
INSPECTION HOLE COVER
COVER SHIMS
CROSS SHAFT COVER
CAPSCREW
LOCK WASHER
DIFF. BRG. ADJ. NUT
CAPSCREW
DIFF. BRG. ADJ. NUT LOCK
CAPSCREW
CROSS SHAFT BRG. RETAINER
CROSS SHAFT BRG. CUP
CROSS SHAFT BRG.
DIFF. BRG. CUP
DRIVE GEAR
DIFF. BRG.
DIFF. CASE BOLT
DIFF. CASE
DIFF. SIDE GEAR THRUST WASHER
DIFF. SIDE GEAR
DIFF. PINION
DIFF. THRUST WASHER
SQUARE KEY
DIFF. BRG. CAP
WASHER
DIFF. BRG. CAP CAPSCREW
CROSS SHAFT (INTEGRAL WITH SPUR PINION)
DIFF. SPIDER
GEAR TO CASE BOLT NUT
HELICAL SPUR GEAR
GEAR TO CASE BOLT
DIFF. CASE BOLT NUT

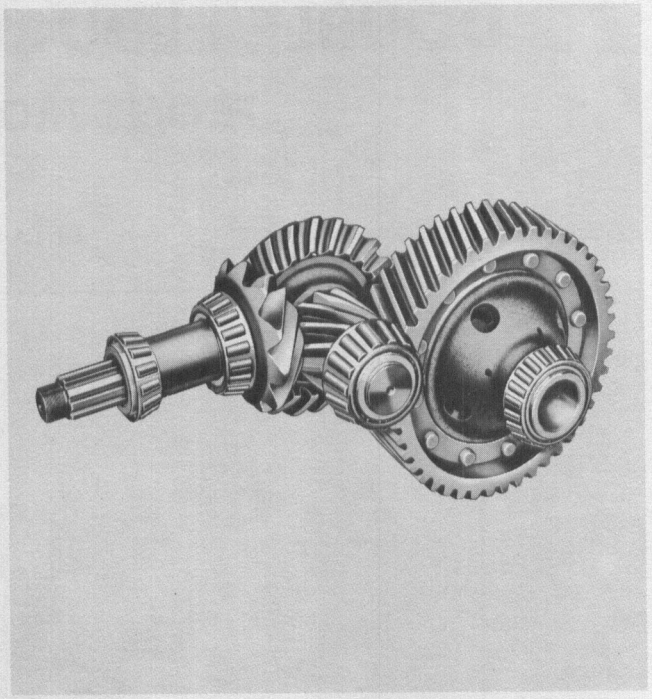
# DOUBLE-REDUCTION DRIVE UNIT
## FRONT-MOUNTED TYPE

CUTAWAY VIEW



The Rockwell Double-Reduction Final Drive employs a heavy-duty spiral bevel or hypoid pinion and gear for the first reduction and wide-faced helical spur pinion and gear for the second reduction. Both gear sets are mounted on Timken tapered roller bearings. Teeth on the helical gears are inclined across the face providing tooth contact overlap and reducing gear tooth loading. Double-Reduction Final Drives are available in a wide range of gear ratios and sizes to cover most operating conditions.





# REMOVE DIFFERENTIAL CARRIER FROM HOUSING

A. Remove plug from bottom of axle housing and drain lubricant.

B. Remove the axle shaft stud nuts, lockwashers and tapered dowels.

IMPORTANT: To loosen the dowels, hold a 1½ inch diameter brass drift against the center of the axle shaft head, INSIDE THE CIRCULAR DRIVING LUGS. Strike the drift a sharp blow with a 5 to 6 pound hammer or sledge. A 1½ inch diameter brass hammer is an excellent and safe drift.

*CAUTION: Do not hit the circular driving lugs on the shaft head — this may cause the lugs to shatter and splinter. Do not use chisels or wedges to loosen the shaft or dowels — this will damage the hub, shaft and oil seal.*

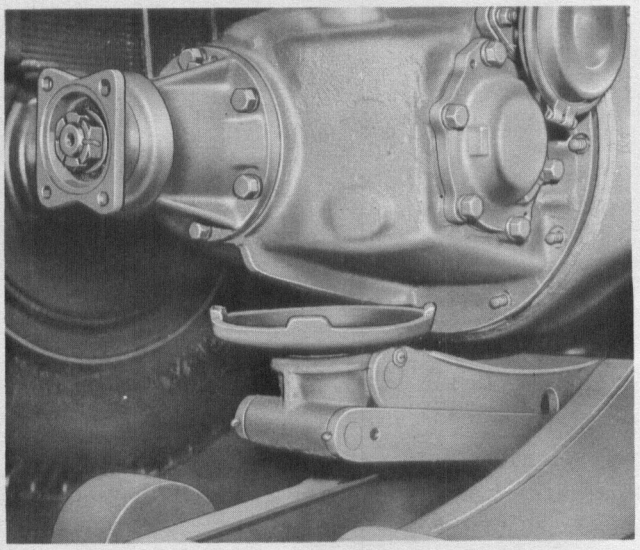
C. Remove the axle shaft from the drive unit and housing.

D. Disconnect universal at pinion shaft.

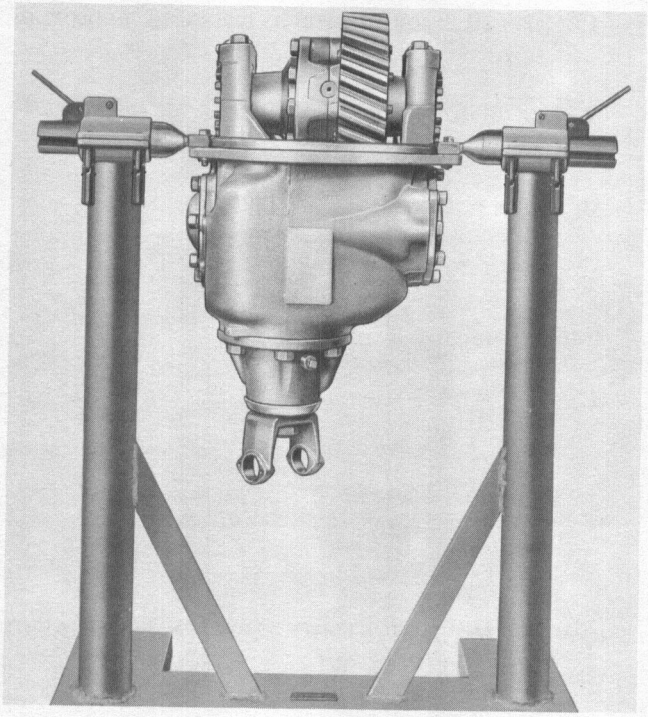
E. Remove carrier to housing stud nuts and washers. Loosen two top nuts and leave on studs to prevent carrier from falling.

F. Break carrier loose from axle housing with rawhide mallet and remove taper dowels. Dowels must be removed. If necessary, back out studs as required.

G. Remove carrier from housing. Place roller jack under carrier. Remove top nuts and washers and work carrier free using puller screws in holes provided. A small pinch bar may be used to straighten the carrier in the housing bore. However, the end must be rounded to prevent indenting the carrier flange.



# DISASSEMBLE CARRIER

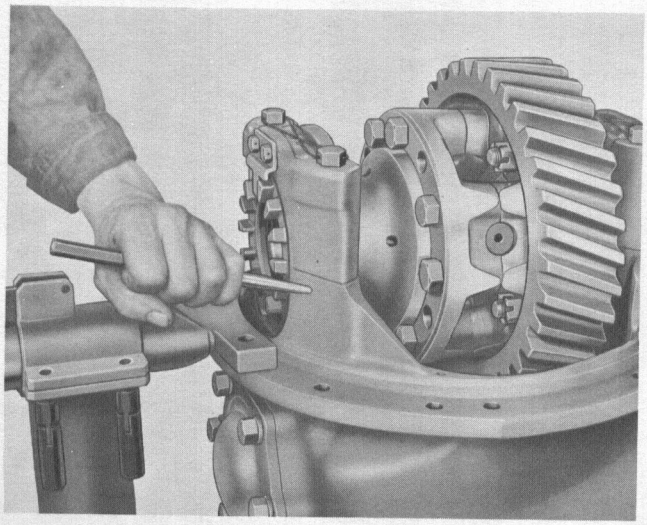


CARRIER IN REPAIR STAND, TOOL NO. 3-11546

Place carrier in a suitable holding fixture as illustrated. Prints of carrier repair stand are available upon request.

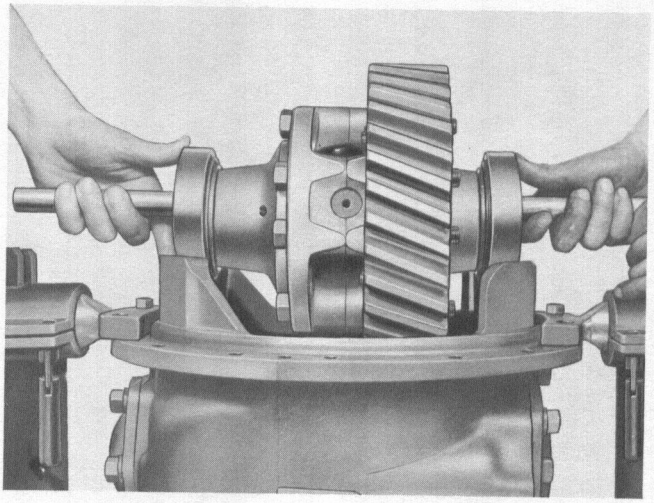
## REMOVE DIFFERENTIAL AND GEAR ASSEMBLY

A. Cut lock wire. Remove cap screws and adjusting nut locks.



B. Center-punch one differential carrier leg and bearing cap to identify for proper reassembling.

C. Remove bearing cap stud nuts or cap screws, bearing caps and adjusting nuts.

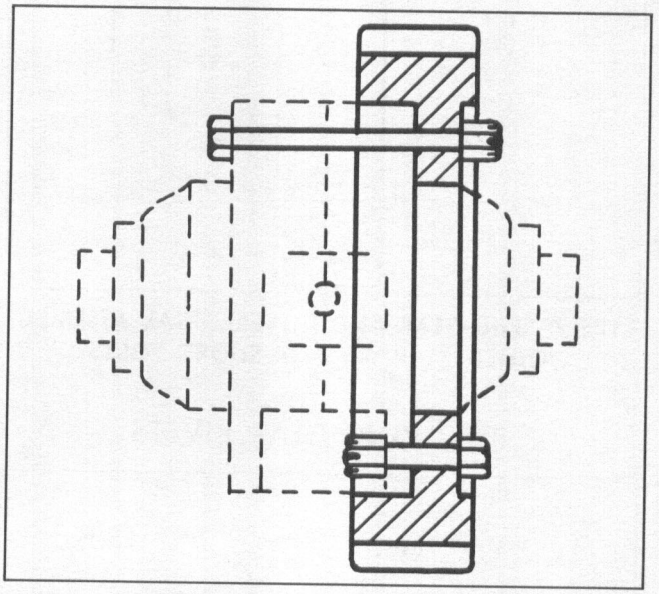


D. Lift out differential and gear assembly.

On the herringbone gear type, remove the leg cap stud nuts, leg caps, bearing retaining ring and differential assembly.

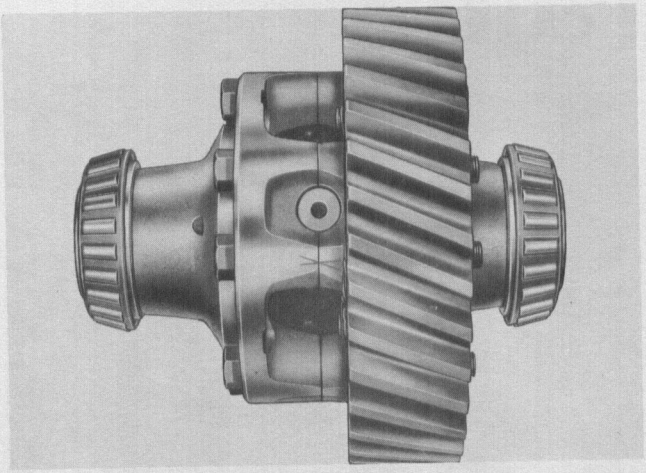
## DISASSEMBLE DIFFERENTIAL CASE AND GEAR ASSEMBLY

Spur gear mounting in Rockwell Double-Reduction Axles is of two types.



TYPE 1. SPUR GEAR AND DIFFERENTIAL ASSEMBLY JOINED BY LONG AND SHORT BOLTS

A. If original identification marks are not clear, center-punch case halves for correct alignment on reassembling.

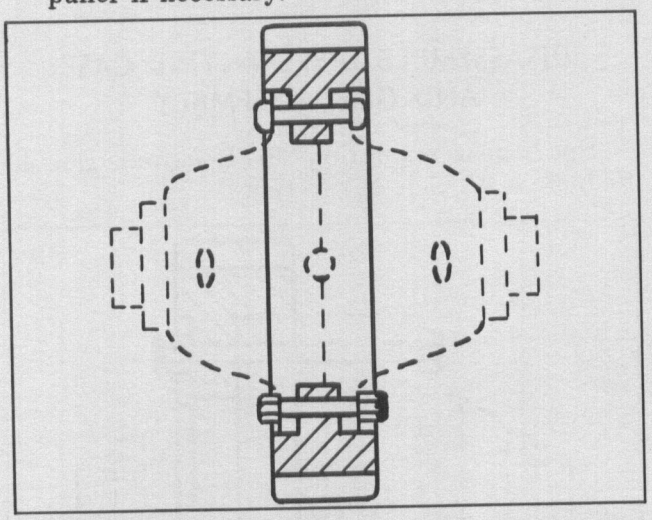


B. Cut lock wire, remove long bolts and separate case halves.

C. Remove spider, pinions, side gears and thrust washers.

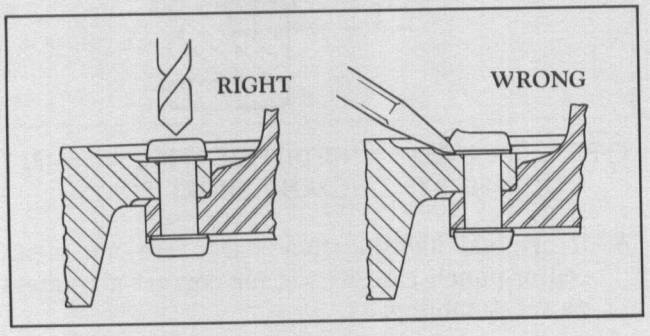
D. Remove short bolts and separate gear from case half.

E. Remove differential bearings with a suitable puller if necessary.



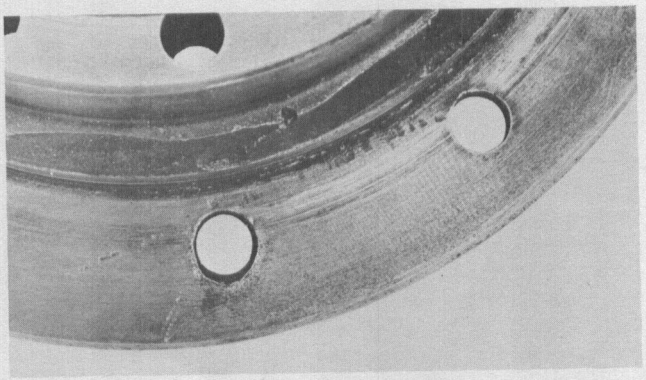
TYPE 2. SPUR GEAR AND DIFFERENTIAL ASSEMBLY JOINED BY RIVETS OR SHORT BOLTS

## REMOVING GEAR RIVETS




A. If necessary, remove rivets or bolts and separate gear and case halves.

1. Carefully center-punch rivets in center of head.
2. Use drill $^{1}/_{32}$" smaller than body of rivet to drill through head.
3. Press out rivets.

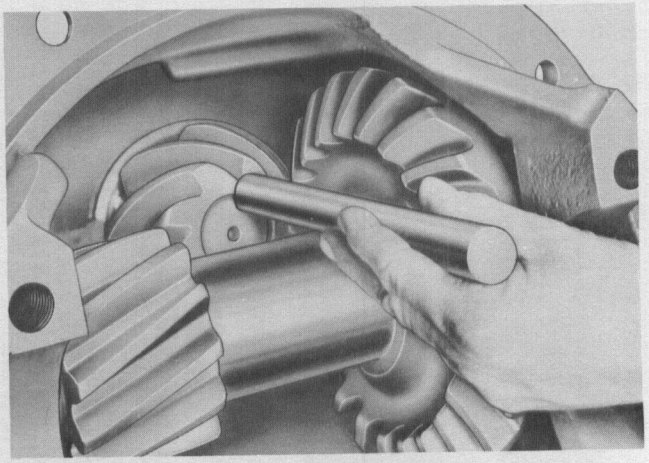


SHOWING HOW RIVET HOLES WERE ELONGATED WHEN RIVETS WERE CHISELED OUT

B. Remove spider, pinions, side gears and thrust washers.

## REMOVE PINION AND CAGE ASSEMBLY

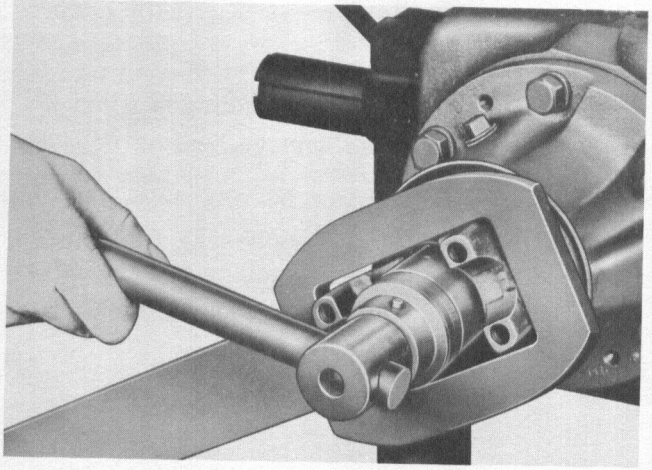
A. Remove pinion cage stud nuts or cap screws and lock washers. Lift out cage assembly.



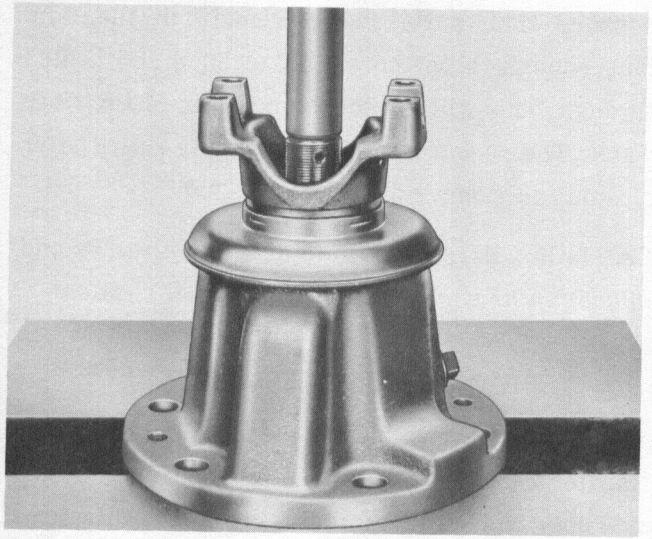
*If cage is not free, tap loose using soft drift on inner face of pinion or use puller screws in holes provided.*

B. Wire shim pack together to keep intact to facilitate adjustment on reassembly.

## DISASSEMBLE PINION AND CAGE ASSEMBLY



A. Place pinion cage over carrier studs or secure with three cap screws. Hold flange and remove pinion shaft nut. (Flange or yoke may be locked in a suitable fixture.)



B. Press pinion shaft out of flange or yoke and cage.

C. Remove adjusting spacers or shims.

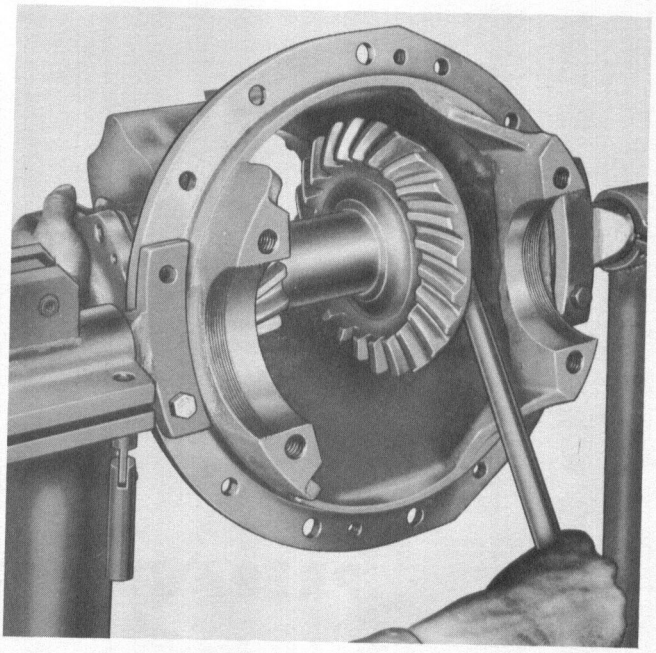
D. If necessary to renew the pinion or rear bearing, remove bearing with suitable puller.

E. Press front bearing and pinion shaft oil seal from cage.

On assemblies where a bearing cover is used, remove seal assembly from cover.

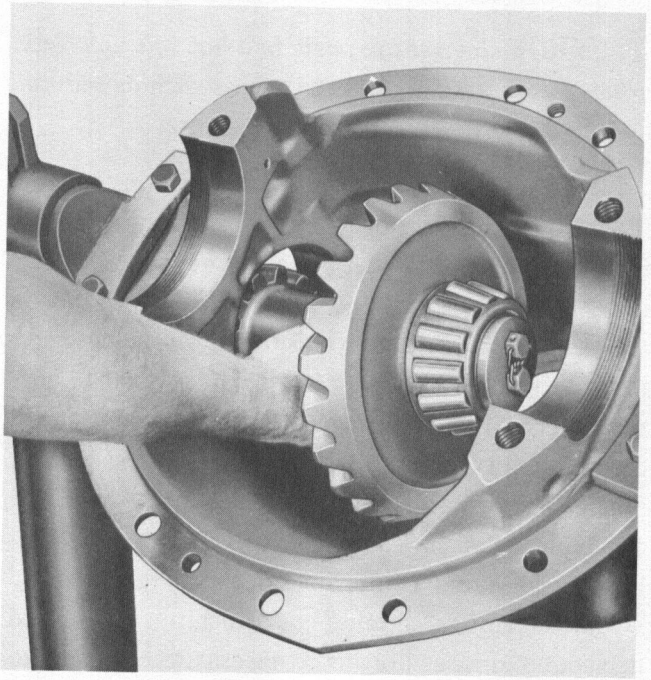
## REMOVE CROSS SHAFT ASSEMBLY

A. Remove stud nuts or cap screws and lock washers from cross shaft bearing cage (side opposite bevel gear).



B. Force off bearing cage with a small pinch bar between the back of the gear and the carrier housing. (Puller screw holes are also provided.)

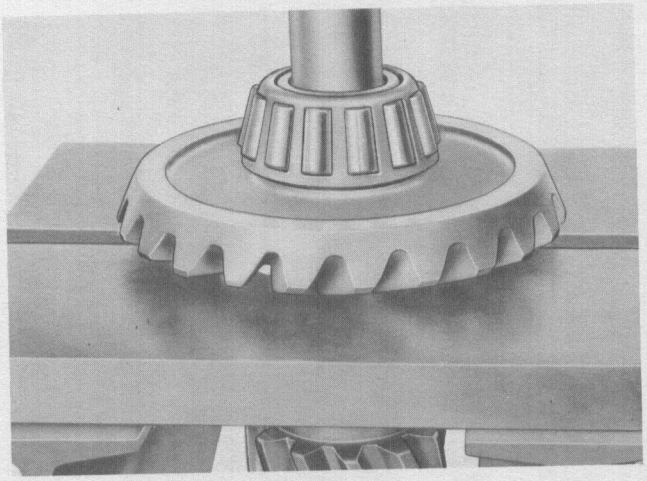
C. Wire shim pack together. The shim pack should remain intact to facilitate adjustment on reassembly.



D. Thread out cross shaft assembly.

## DISASSEMBLE CROSS SHAFT

A. Cut lock wire, remove cap screws and bearing retainer plate from gear end of cross shaft.



B. Press shaft from gear and bearing.

C. If necessary to replace bearing, remove bearing from opposite end of cross shaft with suitable puller.

Care should be used in handling bearings not to drop or otherwise damage bearing or cage.

D. If necessary to replace bearing cups, remove cross shaft bearing cover or cage (bevel gear side). Wire shim pack together to keep intact to facilitate adjustment on reassembling.

E. Remove cups with suitable puller.

# PREPARE FOR REASSEMBLY

## CLEAN

Parts having ground and polished surfaces such as gears, bearings, shafts and collars, should be cleaned in a suitable solvent such as kerosene or diesel fuel oil.

GASOLINE SHOULD BE AVOIDED.

*Do NOT clean these parts in a hot solution tank or with water and alkaline solutions such as sodium hydroxide, orthosilicates or phosphates.*

We do NOT recommend steam cleaning assembled drive units after they have been removed from the housing. When this method of cleaning is used, water is trapped in the cored passage of the castings and in the close clearances between parts as well as on the parts. This can lead to corrosion (rust) of critical parts of the assembly and the possibility of circulating rust particles in the lubricant. Premature failure of bearings, gears and other parts can be caused by this practice. Assembled drive units cannot be properly cleaned by steam cleaning, dipping or slushing. Complete drive unit disassembly is a necessary requisite to thorough cleaning.

### ROUGH PARTS

Rough parts such as differential carrier castings, cast brackets and some brake parts may be cleaned in hot solution tanks with mild alkali solutions providing these parts are not ground or polished. The parts should remain in the tank long enough to be thoroughly cleaned and heated through. This will aid the evaporation of the rinse water. The parts should be thoroughly rinsed after cleaning to remove all traces of alkali.

CAUTION: *Exercise care to avoid skin rashes and inhalation of vapors when using alkali cleaners.*

### COMPLETE ASSEMBLIES

Completely assembled axles, torque dividers and transfer cases may be steam cleaned on the outside only, to facilitate initial removal and disassembly, providing all openings are closed. Breathers, vented shift units, and all other openings should be tightly covered or closed to prevent the possibility of water entering the assembly.

### DRYING

Parts should be thoroughly dried immediately after cleaning. Use soft, clean, lintless absorbent paper towels or wiping rags free of abrasive material such as lapping compound, metal filings or contaminated oil. Bearings should never be dried by spinning with compressed air.

## CORROSION PREVENTION

Parts that have been cleaned, dried, inspected and are to be immediately reassembled should be coated with light oil to prevent corrosion. If these parts are to be stored for any length of time, they should be treated with a good RUST PREVENTIVE and wrapped in special paper or other material designed to prevent corrosion.

## INSPECT

It is impossible to overstress the importance of careful and thorough inspection of drive unit parts prior to reassembly. Thorough visual inspection for indications of wear or stress, and the replacement of such parts as are necessary will eliminate costly and avoidable drive unit failure.

A. Inspect all bearings, cups and cones, including those not removed from parts of the drive unit, and replace if rollers or cups are worn, pitted or damaged in any way. Remove parts needing replacement with a suitable puller or in a press with sleeves. Avoid the use of drifts and hammers. They may easily mutilate or distort component parts.

B. Inspect hypoid gears for wear or damage. Gears which are worn, ridged, pitted or scored should be replaced. When necessary to replace either the pinion or gear of hypoid set, the entire gear set should be replaced.

C. Inspect the differential assembly for the following:

1. Pitted, scored or worn thrust surfaces of differential case halves, thrust washers, spider trunnions and differential gears. Thrust washers must be replaced in sets. The use of a combination of old and new washers will result in premature failure.
2. Wear or damage to the differential pinion and side gear teeth. Always replace differential pinions and side gears in sets.

D. Inspect axle shafts for signs of torsional fractures or other indications of impending failure.

E. Inspect spur pinion for wear or damage to teeth.

F. Inspect cross shaft for wear or damage to teeth.

## REPAIR

A. Replace all worn or damaged parts. Hex nuts with rounded corners, all lock washers, oil seals and gaskets should be replaced at the time of overhaul.

Use only genuine Rockwell replacement parts for satisfactory service. For example, using gaskets of foreign material generally leads to mechanical trouble due to variations in thickness and the inability of certain materials to withstand compression, oil, etc.

B. Remove nicks, mars and burrs from machined or ground surfaces. Threads must be clean and free to obtain accurate adjustment and correct torque. A fine mill file or India stone is suitable for this purpose. Studs must be tight prior to reassembling the parts.

C. All Rockwell bronze bushed differential pinions should be ball burnished after bushing installation. Install the bushing with a small stepped drift. The small O.D. should be .010″ smaller than the bushing burnished I.D. and 1½ times bushing length. Always install bushings so end is even with the I.D. chamfer or about 1/16″ below the spherical surface.

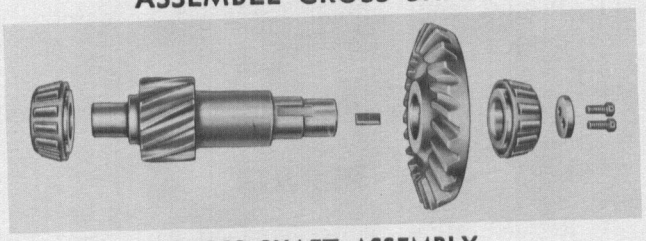
D. When assembling component parts use a press where possible.

E. Tighten all the nuts to the correct torque. (See torque limits following service instructions.) Use soft iron locking wire to prevent possibility of wire breakage.

F. The burrs, caused by lock washers, at the spot face of stud holes of cages and covers should be removed to assure easy reassembly of these parts.

# REASSEMBLE CARRIER

## ASSEMBLE CROSS SHAFT

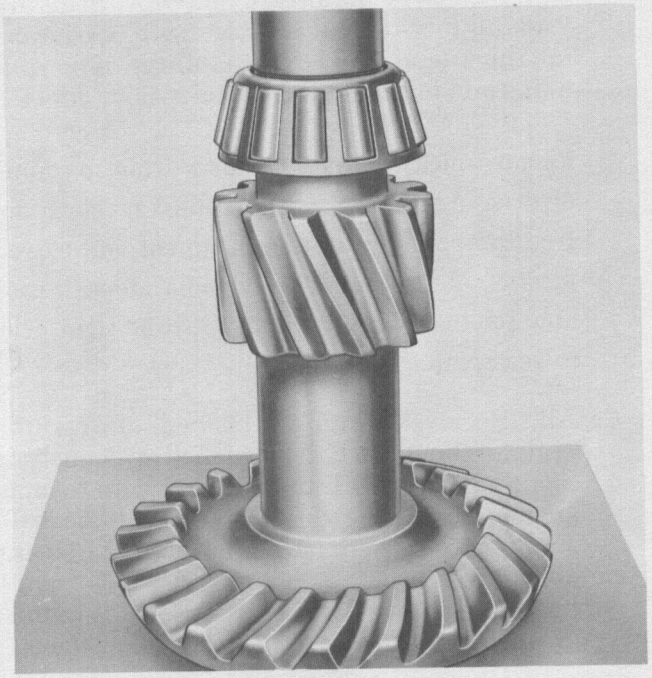


CROSS SHAFT ASSEMBLY

A. Insert key and start shaft into bevel gear in line with keyway or splines.

B. Press shaft squarely into bevel gear. Gear must be firmly against cross shaft shoulder. (Install cap screws where used.)

*To facilitate installation, bevel gear may be heated in oil from 200 to 250 degrees F.*



C. Press bearing firmly against the cross shaft shoulder on spur gear end.

D. Install bearing retaining plate and cap screws on bevel gear end. Tighten to correct torque and lock with soft wire.

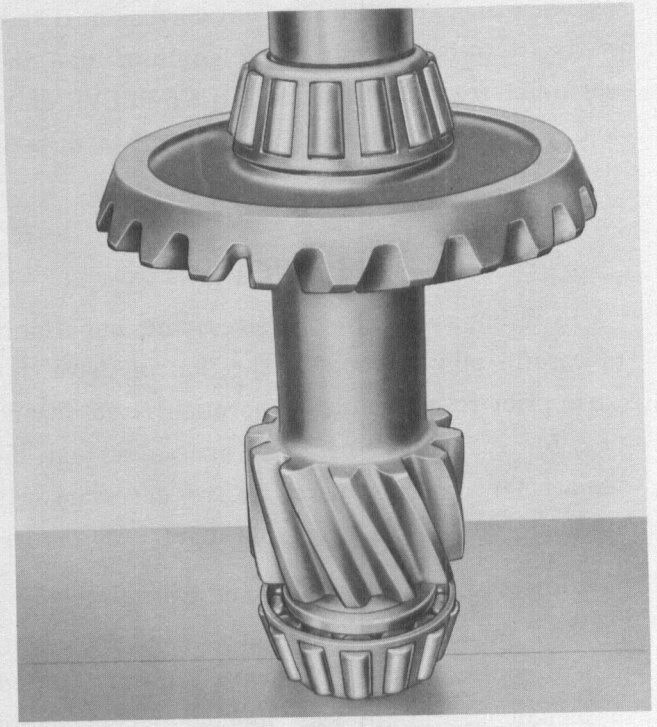
## INSTALL CROSS SHAFT ASSEMBLY

A. Lubricate cross shaft bearings and cups with LIGHT MACHINE OIL.

B. If the bearing cover or the cage on the bevel gear side has been removed, replace using the correct shim pack. Tighten stud nuts or cap screws to the correct torque.

If cover has not been removed, retighten stud nuts or cap screws to the correct torque.

C. Ease cross shaft assembly past differential bearing supports and position in bearing cup.

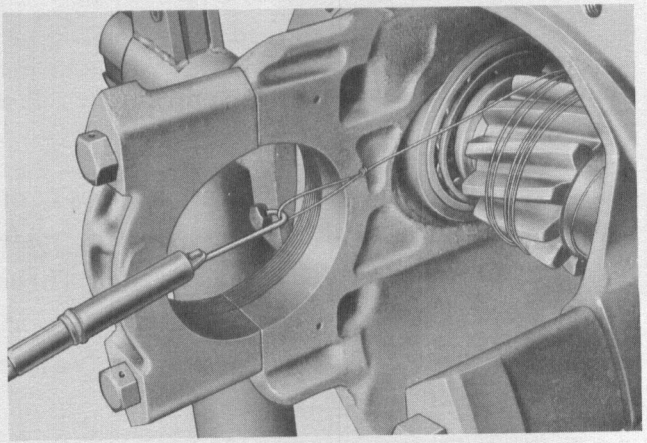


D. Press bearing firmly against the bevel gear using a suitable sleeve.

E. Install correct shim pack and start cross shaft bearing cage into carrier housing.

F. Tap bearing cage into position with soft mallet. Install lock washers and stud nuts or cap screws and tighten to the correct torque.

G. Rotate assembly several revolutions before checking bearing preload to assure full bearing contact.



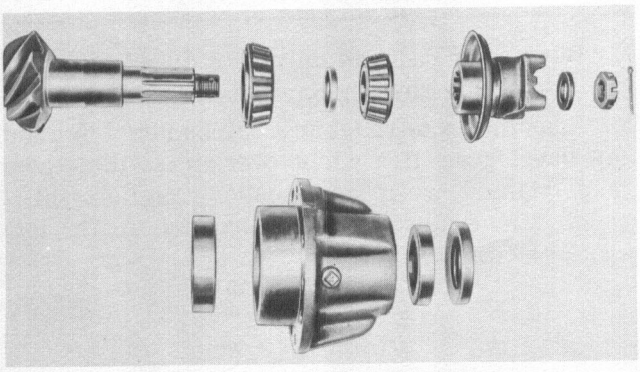
H. Check cross shaft bearing preload torque. Wrap soft wire around pinion and pull on a horizontal line with pound scale.

*Example: Assuming spur gear diameter to be 4", the radius would equal 2". Five pounds pull on the scale would equal 10 pound-inches bearing preload torque.*

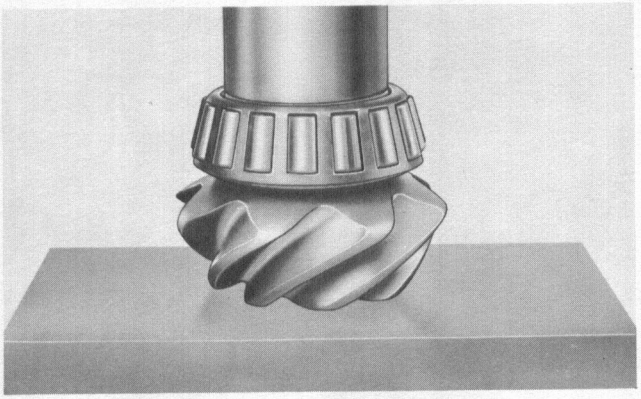
*Use rotating, not starting torque.*

I. To obtain the correct preload torque of 5 to 15 pound-inches, add or remove shims from pack under bearing cage on the side opposite bevel gear.

## ASSEMBLE BEVEL PINION AND CAGE ASSEMBLY



BEVEL PINION AND CAGE ASSEMBLY



A. Press rear bearing squarely and firmly against pinion gear shoulder.

B. Press bearing cups squarely and firmly against pinion cage shoulder.

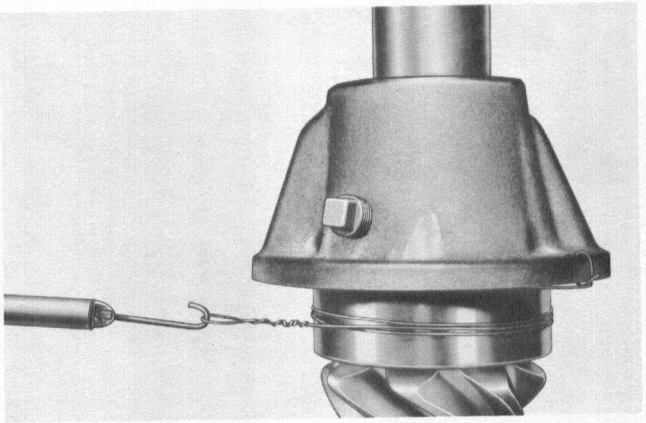
C. Lubricate bearing and cups with light machine oil.

D. Insert pinion and bearing assembly in pinion cage.

E. Install selective spacer over pinion shaft with the bevel side toward the pinion shaft shoulder.

F. Press front bearing squarely and firmly against the selective spacer with a suitable sleeve.

G. *Rotate cage several revolutions to assure normal bearing contact.*



H. *While in press under pressure,* check pinion bearing preload torque. Wrap soft wire around pinion cage and pull on horizontal line with a pound scale.

If a press is not available, the preload may be checked with the flange or yoke installed and the nut tightened to the correct torque.

The correct pressures or torques for checking pinion bearing preload are as follows:

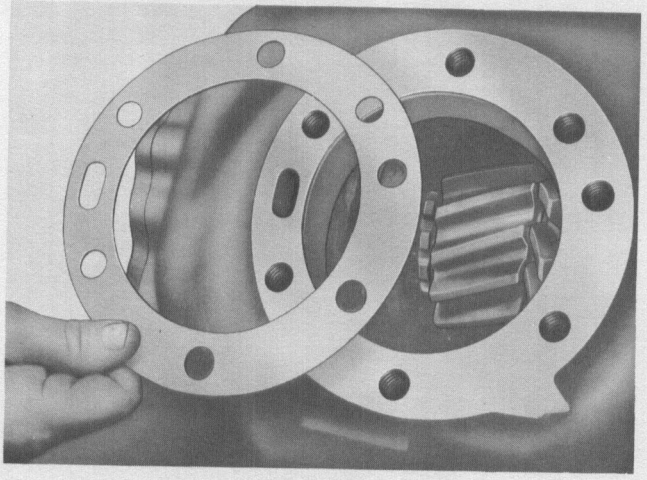
| PINION SHAFT THREAD SIZE | PRESSURE REQUIRED TO OBTAIN CORRECT PRELOAD | NUT TORQUE REQUIRED TO OBTAIN CORRECT PRELOAD |
|---|---|---|
| 1" x 20 | 6 tons | 300- 400 lb. ft. |
| 1¼" x 18 | 11 tons | 700- 900 lb. ft. |
| 1½" x 12 | 14 tons | 800-1100 lb. ft. |
| 1½" x 18 | 14 tons | 800-1100 lb. ft. |
| 1¾" x 12 | 14 tons | 800-1100 lb. ft. |

*Example: Assuming pinion cage diameter to be 6", the radius would be 3". Four pounds pull on scale would equal 12 pound-inches bearing preload torque.*

*Use rotating torque—not starting torque.* It rotating torque is not within 5 to 15 pound-inches, use thinner spacer to increase or thicker spacer to decrease bearing preload.

I. Install pinion shaft oil seal. Coat outer edge of seal body with non-hardening sealing compound and press seal firmly against cage or cover shoulder. Install bearing cover where used with cap screws.

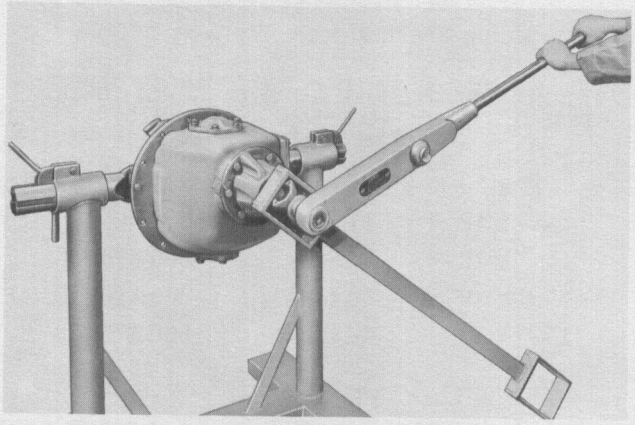
J. Press flange or yoke firmly against pinion forward bearing.



*The oil passage holes in the carrier housing, gasket, shim pack and pinion bearing cage must be aligned.*

K. Install correct shim pack.

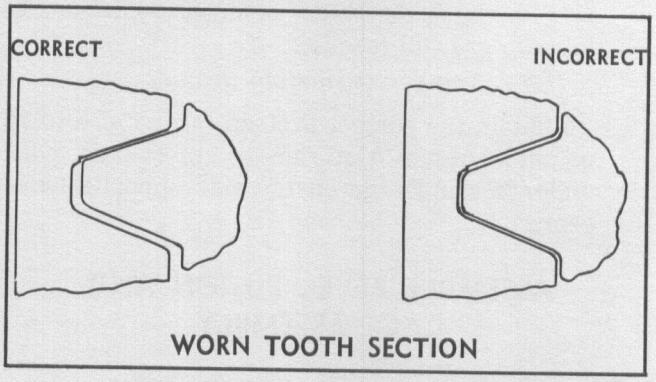
L. Install pinion cage assembly, lock washers and stud nuts or cap screws. Tighten to the correct torque.



M. Place pinion and cage assembly over carrier studs or secure with cap screws. Hold flange and *tighten pinion shaft nut to the correct torque.*

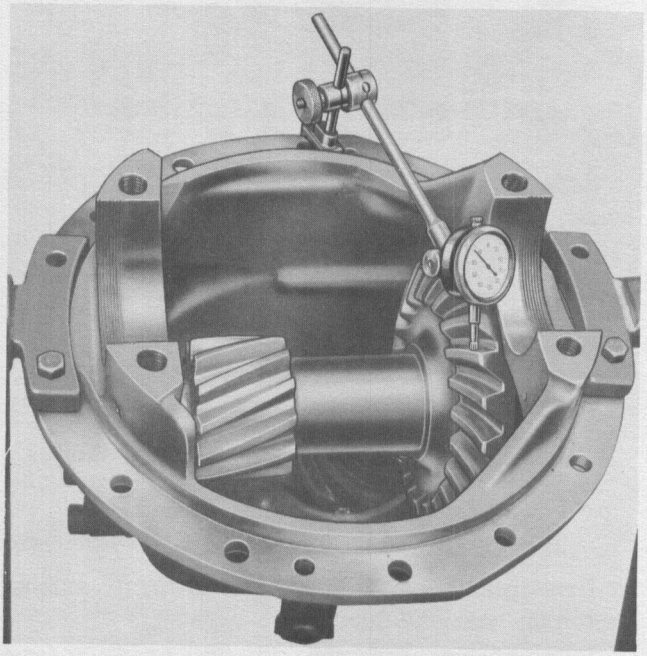
## RE-CHECK BACKLASH
### (USED GEAR SETS)

Generally, if original gears are being re-installed in assembly, red leading of teeth will not indicate the same contact as new gears and can be misleading. Gears that have been in service for long periods form running contacts due to wear of teeth. Therefore, the thickness of the original shim pack plus approximately 0.015″ additional shim stock should be maintained to check gear lash. In the event that gear lash is in excess of maximum tolerance, as stated under gear adjustment, reduce gear lash, only in the amount that will avoid overlap of the worn tooth section.




Bevel gear lash can only be reduced to a point of maintaining smooth rotation of bevel gears.

Smoothness or roughness can be noted by rotating bevel gear. If a slight overlap, as illustrated, takes place at worn tooth section, rotation will be rough. Generally with the original gears, tone should be satisfactory.



DIAL INDICATOR USED TO DETERMINE GEAR LASH

## GEAR ADJUSTMENT FOR CORRECT TOOTH CONTACT
### (NEWER GEARS)

Checking tooth contact is accomplished by means of oiled red lead applied lightly to the bevel gear teeth. When the pinion is rotated, the red lead is squeezed away by the contact of the teeth, leaving bare areas the exact size, shape and location of the contacts.

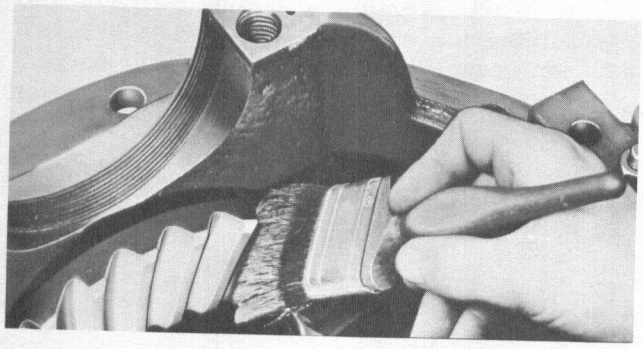
# HYPOID GEAR BACKLASH ADJUSTMENT

(NEWER GEAR SETS)

A. Adjust hypoid gear backlash to the correct specifications of .020″ to .026″ (regardless of what markings might be etched on the gear set) by transposing cross shaft bearing cage or cover shims.

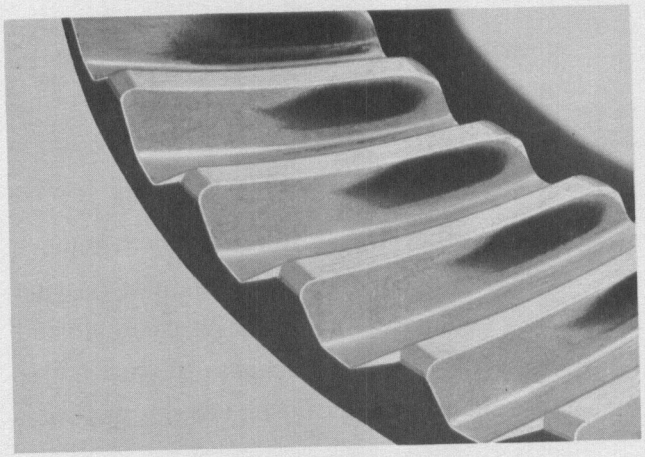
1. To move bevel gear away from pinion, remove shims from pack under cross shaft bearing cage on the side opposite bevel gear and add shims of equal thickness to pack under cross shaft bearing cover or cage on the bevel gear side. Shims should be transposed in this manner to maintain the established preload.

2. To move bevel gear toward pinion, remove shims from pack under cross shaft bearing cover or the cage on the bevel gear side and add shims of equal thickness to pack under cross shaft bearing cage on the side opposite.



Sharper impressions may be obtained by applying a small amount of resistance to the gear with a flat steel bar and using a wrench to rotate the pinion. When making adjustments, check the drive side of the bevel gear teeth. Coast side contact should be automatically correct when drive side contact is correct. As a rule, coating about twelve teeth is sufficient for checking purposes.

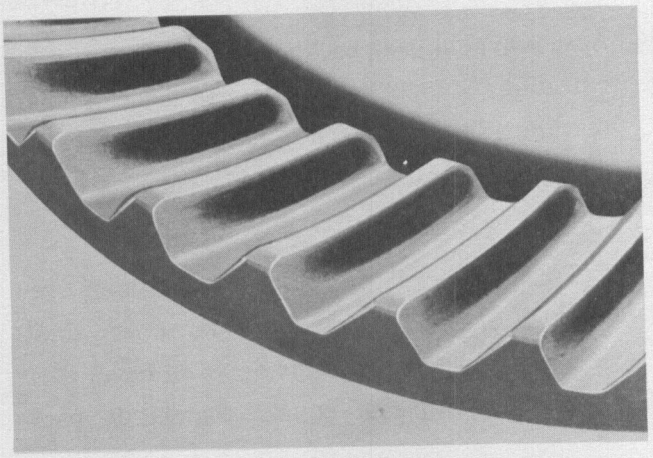
## CORRECT TOOTH CONTACT ASSURES LONGER GEAR LIFE



SATISFACTORY TOOTH CONTACT
(GEARS UNLOADED)

With adjustments properly made (pinion at correct depth and backlash set at .010") the above contacts will be procured. The area of contact favors the toe and is centered between the top and bottom of the tooth.

The hand rolled pattern shown at left (gears unloaded), will result in a pattern centered in the length of the tooth when the gears are under load, shown at right. The loaded pattern will be almost full length and the top of pattern will approach the top of the gear tooth.

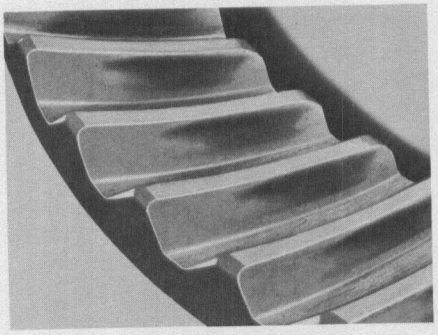


SATISFACTORY TOOTH CONTACT
(GEARS LOADED)

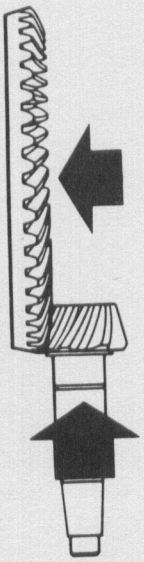
The pattern on the coast side of teeth will appear the same width as the drive side shown above; however, the over-all length will be centered between the toe and heel of gear tooth. *After the correct contacts shown above have been established with a backlash of .010", open the backlash to measure between .020"-.026".*

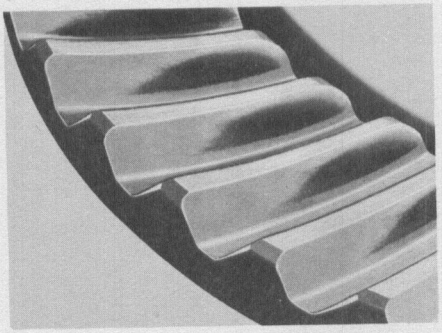
Set used hypoid gear to have the tooth contacts to match wear patterns. Hand rolled patterns of used gears will be smaller in area and should be at the toe end of wear patterns.

## INCORRECT TOOTH CONTACT

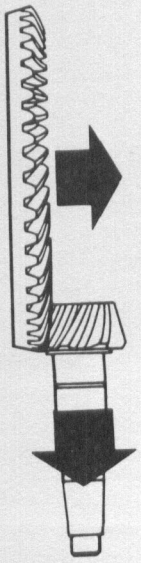


A high contact indicates pinion is too far out. Set the pinion to the correct depth by removing shims under the pinion cage. Slight outward movement of hypoid gear may be necessary to maintain correct backlash.

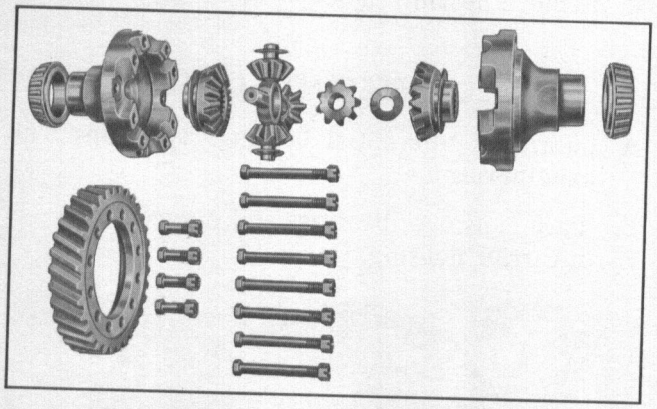




A low contact indicates pinion is too deep. Set the pinion to the correct depth by adding shims under the pinion cage. Slight inward movement of the hypoid gear may be necessary to maintain correct backlash.



## ASSEMBLE DIFFERENTIAL AND SPUR GEAR ASSEMBLY



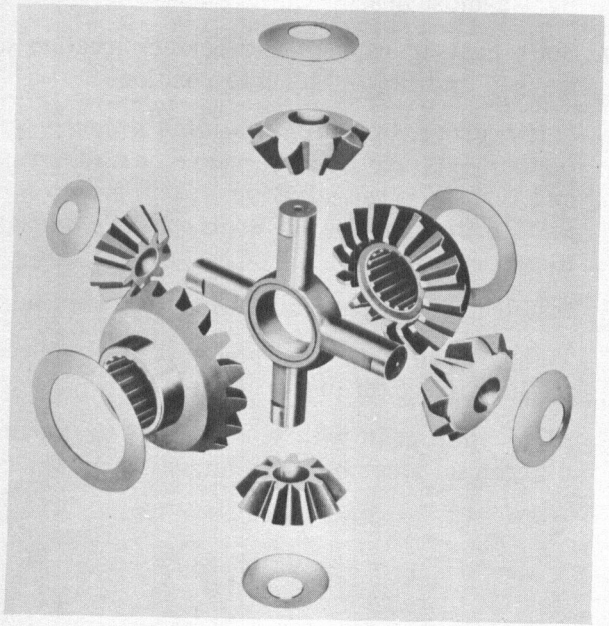
DIFFERENTIAL AND GEAR ASSEMBLY

*When new spur gears or a new differential case is installed, the differential case holes must be line-reamed with the gear in order to assemble using correct size bolts or rivets.*

### TYPE 1. ASSEMBLY USING LONG AND SHORT BOLTS

A. Join spur gear to either differential case half with short bolts.

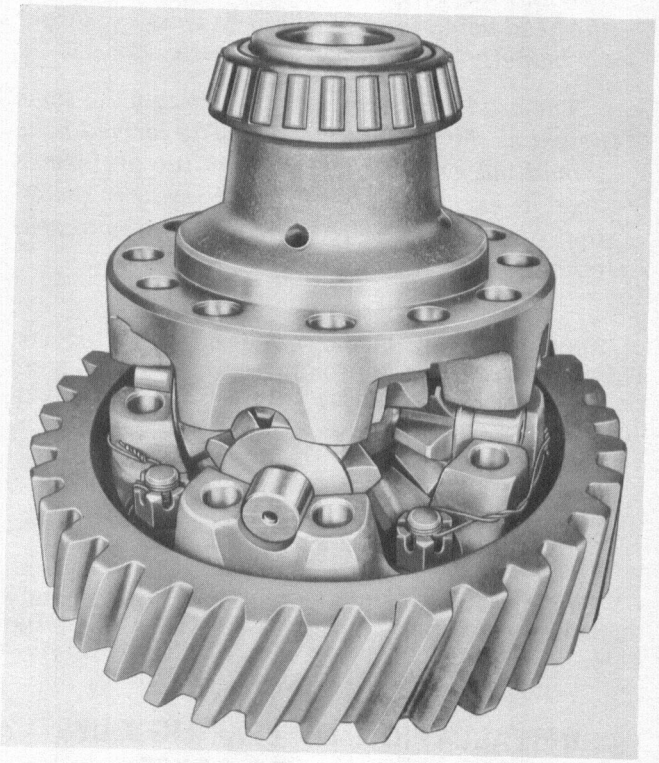
B. Lubricate differential case inner walls and all component parts with axle lubricant.



DIFFERENTIAL PINION AND SIDE GEAR ASSEMBLY

C. Install thrust washer and side gear in one of the case halves. Place spider with pinions and thrust washers in position. Install component side gear and thrust washer.

D. Align mating marks, position component case half and draw assembly together with four long bolts equally spaced.



E. Check assembly for free rotation of differential gears and correct if necessary.

F. Install remaining bolts and tighten to the correct torque.

G. Install lock wire.

H. Press differential bearings squarely and firmly on differential case halves.

### TYPE 2. ASSEMBLY USING RIVETS OR SHORT BOLTS

A. Lubricate differential case inner walls and all component parts with axle lubricant.

B. Install thrust washer and side gear in one of the differential case halves.

C. Position spur gear on case half.

D. Place spider with pinions and thrust washers in position and install component side gear and thrust washer.

E. Align mating marks and position component case half.

F. Draw either bolted or riveted assemblies together with four bolts equally spaced and check for free rotation of differential gears.

G. Install remaining bolts or rivet assembly together as required.

Rivets, where used, should not be heated but should be upset cold.

*When the correct rivet and rivet set is used, the head being formed will be at least ⅛" larger in diameter than the rivet hole.*

*The head will then be approximately the same height as the preformed head. The formed head should not exceed $^{1}/_{16}$" less than the preformed head as excessive pressure will result in distortion of the case holes and result in spur gear eccentricity.*

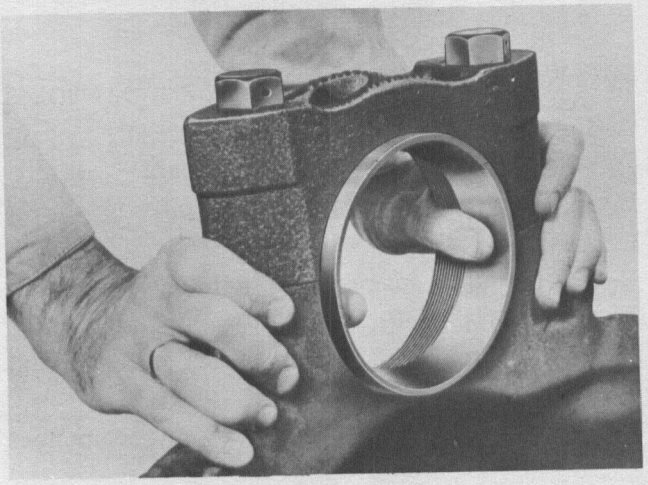
Tonnage required for squeezing cold rivets. These pressures are approximate for annealed steel rivets and pressure can be adjusted to suit individual working conditions.

| DIAMETER OR RIVET | TONNAGE REQUIRED |
|---|---|
| 7/16" | 22 |
| 1/2" | 30 |
| 9/16" | 36 |
| 5/8" | 45 |

Final pressure should be held for approximately one minute to make sure the rivet has filled the hole.

## INSTALLATION OF BEARING CUPS IN CARRIER LEG BORES

A. Temporarily install the bearing cups, threaded adjusting rings where employed, and bearing caps. Tighten the cap screws to the proper torque.



B. The bearing cups must be of a hand push fit in the bores, otherwise the bores must be reworked with a scraper or some emery cloth until a hand push fit is obtained. Use a blued bearing cup as a gauge and check the fits as work progresses.

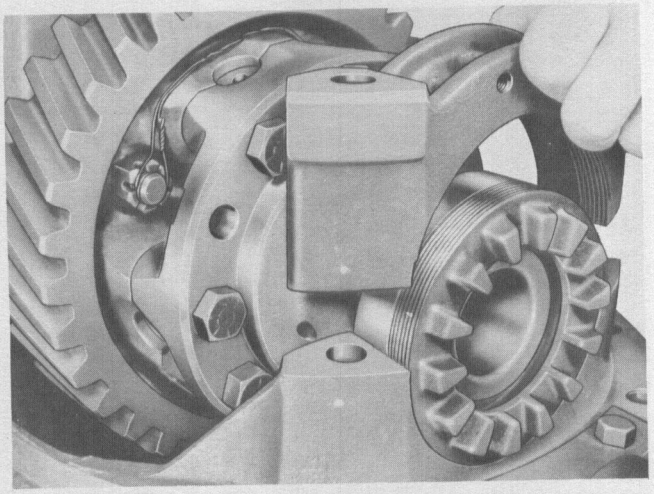
This applies to all three types of carrier leg bores.

C. Remove bearing caps.

## INSTALL DIFFERENTIAL ASSEMBLY

A. Lubricate differential bearings and cups with axle lubricant.

B. Place cups over bearings and position assembly in carrier housing.



C. Insert bearing adjusting nuts and turn hand-tight against bearing cups.

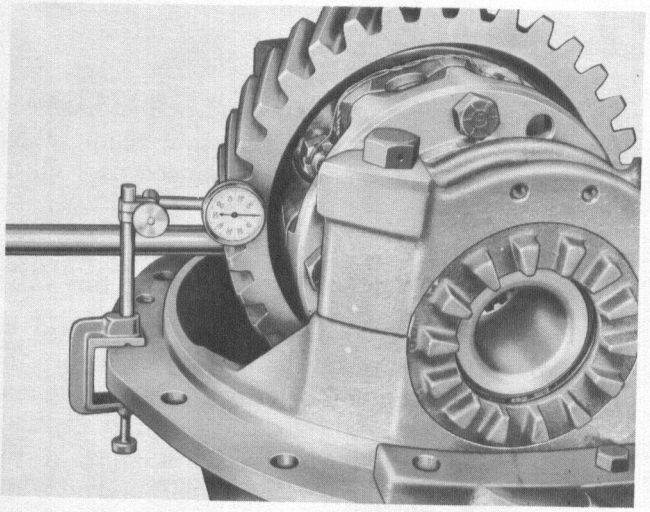
D. Start bearing caps in the correct location as marked and tap lightly into position.

*If bearing caps do not position properly, adjusting nuts are cross threaded. Remove caps and reposition the adjusting nuts. Forcing caps into position will result in irreparable damage to carrier housing.*

E. Install flat washers where used, and stud nuts.

F. Tighten stud nuts or cap screws if employed, to the correct torque.

G. Align spur gear with spur pinion by moving differential assembly with adjusting nuts.



H. Using dial indicator at side face of spur gear, adjust differential assembly to .000 end play in the differential bearings.

I. *Rotate assembly several revolutions to assure normal bearing contact.*

J. Tighten adjusting nuts one notch each from .000 end play to secure the correct differential bearing preload.

K. Tighten bearing cap stud nuts to the correct torque.

L. Install adjusting nut locks and cap screws. Tighten to the correct torque and install lock wire.

### PREPARATION FOR STORAGE

In the event the carrier is a spare and may not be immediately installed, all gears and bearings should be thoroughly oiled and the carrier placed in a dustproof container.

## INSTALL CARRIER IN HOUSING

A. Install new gasket on axle housing flange.

B. Roll carrier into position on roller jack. Start carrier into housing with *four flat washers and nuts equally spaced. Do not drive carrier in housing with the use of a steel hammer at the carrier stud flange. The flange may easily be distorted and cause severe oil leakage.*

C. *Install lock washers and stud nuts on any studs under carrier housing offsets. It is impossible to start these nuts after carrier is drawn into housing.*

D. Tighten the four nuts over flat washers alternately to draw carrier squarely into axle housing.

E. Remove nuts and flat washers. Install taper dowels, lock washers and stud nuts. Tighten to the correct torque.

F. Connect universal at pinion shaft.

G. Install axle shafts.

# LUBRICATION

Proper lubrication of the drive units is extremely important. Our "Standard" recommended lubricant is Rockwell Specification O-65, SAE 140 viscosity, multipurpose gear lubricant. Unusual operating conditions such as extremes in climatic temperatures may require lubricants of "Optional" viscosities. Refer to Field Maintenance Manual No. 1, "Lubrication," for detailed information.

Since Rockwell lubricant specifications are periodically revised, always refer to Field Maintenance Manual No. 1 for current complete lubricant specifications and applications.

A. Remove pipe plug in pinion cage and add one pint of *specified lubricant.*

B. Fill axle housing to the correct level with *specified lubricant.*

C. Lubricate universal joint.

D. Jack up *both* rear wheels and operate vehicle in *high* transmission gear at approximately 25 to 30 miles per hour for *five minutes* to assure satisfactory lubrication of all parts of the carrier assembly.

*Do not operate with one wheel jacked up. Operation in this manner will result in overheating the differential spider with resultant galling or shearing of the spider pins.*

*Both wheel brakes should be free to allow both wheels to rotate at approximately the same speed.*

## REGULAR AXLE SERVICE

Refer to Field Maintenance Manual No. 1, "Lubrication," for recommended service interval.

Completely drain the lubricant while the unit is warm. Flush well with clean flushing oil and thoroughly drain.

Some newer model axles have a smaller tapped and plugged hole located near and below the housing lubricant level hole. This smaller hole has been provided for the use of a lubricant temperature indicator only and should not be used as a fill or level hole.

## NEW AND RECONDITIONED AXLE SERVICE

The original rear axle lubricant should be drained at the end of the drive-away or before the maximum of 3,000 miles prior to placing the vehicle in regular service. Drain the lubricant initially used in the assembly following reconditioning at the same interval. Completely drain the lubricant while the unit is warm. Flush well with clean flushing oil and thoroughly drain.

Do not drive new vehicles and rebuilt units with new replacement gears for extended periods at any one constant speed, either fast or slow, during the first 500 miles. Also, avoid full-throttle starts and full-throttle acceleration in lower transmission gears.

Fill axle housings to bottom of level hole with specified lubricant with the vehicle level.

## MAGNETIC DRAIN PLUGS

Magnetic drain plugs perform the vital function of trapping small metallic particles that circulate in the lubricant, through the gears and bearings, causing rapid wear and premature failure. The magnet must be strong enough to firmly hold the particles under service conditions. We recommend plugs with elements having a minimum pick-up capacity of 2 pounds of low carbon steel in plate or flat bar form. See Plug section in Field Maintenance Manual No. 1, page 6.

Spare clean plugs should be kept on hand for replacement at regular intervals. The change schedule can easily be established by periodic plug examination.

# TORQUE SPECIFICATIONS

These torque specifications supersede all previous specifications for this series of drive units and should be used accordingly.

## WRENCH TORQUE FOR PINION SHAFT NUTS

| DIAMETER OR SIZE | THREADS PER INCH | TORQUE—LB. FT. | |
|---|---|---|---|
| | | MIN. | MAX. |
| 7/8" | 20 | 175 | 250 |
| 1" | 20 | 300 | 400 |
| 1 1/4" | 18 | 700 | 900 |
| 1 1/2" | 12 | 800 | 1100 |
| 1 1/2" | 18 | 800 | 1100 |
| 1 3/4" | 12 | 800 | 1100 |

## DIFFERENTIAL BEARING CAP CAP SCREWS OR STUD NUTS

### (Earlier Axle Models Without Hardened Washers)

| CAP SCREW OR STUD NUT DIAMETER | CAP SCREW OR COARSE STUD THREAD | STUD NUT OR FINE THREAD | TORQUE—LB. FT. | |
|---|---|---|---|---|
| | | | MIN. | MAX. |
| 5/8" | 11 | 18 | 130 | 170 |
| 3/4" | 10 | 16 | 230 | 300 |
| 7/8" | 9 | 14 | 345 | 440 |
| 7/8" | 14 | 14 | 380 | 485 |
| 1" | 14 | 14 | 380 | 485 |

## DIFFERENTIAL BEARING CAP CAP SCREWS OR STUD NUTS

### (Later Axle Models Employing Hardened Washers)

| CAP SCREW OR STUD NUT DIAMETER | CAP SCREW OR COARSE STUD THREAD | STUD NUT OR FINE THREAD | TORQUE—LB. FT. | |
|---|---|---|---|---|
| | | | MIN. | MAX. |
| 5/8" | 11 | 18 | 160 | 205 |
| 3/4" | 10 | 16 | 290 | 370 |
| 7/8" | 9 | 14 | 470 | 595 |
| 7/8" | 14 | 14 | 510 | 655 |
| 1" | 14 | 14 | 580 | 745 |

# TORQUE SPECIFICATIONS

## WRENCH TORQUE FOR CAP SCREWS OR STUD NUTS

| Location | Diameter | Threads Per Inch | Torque Lb. Ft. Min.-Max. |
|---|---|---|---|
| Carrier to Housing | 7/16" | 14 | 53-67 |
| | 7/16" | 20 | 53-67 |
| | 1/2" | 13 | 81-104 |
| | 1/2" | 20 | 81-104 |
| | 5/8" | 11 | 160-205 |
| | 5/8" | 18 | 160-205 |
| Pinion Cage | 3/8" | 16 | 33-43 |
| | 7/16" | 14 | 53-67 |
| | 7/16" | 20 | 53-67 |
| | 1/2" | 13 | 81-104 |
| | 1/2" | 20 | 81-104 |
| | 9/16" | 12 | 116-149 |
| | 9/16" | 18 | 116-149 |
| | 5/8" | 11 | 160-205 |
| Cross Shaft Bearing Cage and Cover | 1/2" | 13 | 81-104 |
| | 1/2" | 20 | 81-104 |
| | 9/16" | 12 | 116-149 |
| | 9/16" | 18 | 116-149 |
| | 5/8" | 11 | 160-205 |
| Cross Shaft Bearing Lock | 7/16" | 14 | 42-54 |
| | 9/16" | 12 | 94-120 |
| Differential Bolts | 3/8" | 16 | 33-43 |
| | 7/16" | 14 | 53-67 |
| | 1/2" | 20 | 92-118 |
| | 9/16" | 18 | 130-167 |
| | 5/8" | 18 | 185-235 |
| | 3/4" | 16 | 320-415 |
| Adjusting Nut Lock | 5/16" | 18 | 16-20 |
| Inspection Cover | 3/8" | 16 | 27-35 |
| Shift Unit (Mounting) | 3/8" | 16 | 27-35 |
| Shift Unit Lock Nut, Set Screw and Clamp Screw | 3/8" | 24 | 31-39 |
| | 7/16" | 20 | 31-39 |
| Shift Unit Travel Limiting Screws | 1/2" | 13 | 55-60 |
| | 5/8" | 11 | 30-35 |

Torques given apply to parts coated with machine oil; for dry (or "as received") parts increase torques 10%; for parts coated with multi-purpose gear oil decrease torques 10%. Nuts on studs to use same torque as for driving the stud.



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