SECTION VI

SOLID AXLES

SECTION VI SOLID AXLES

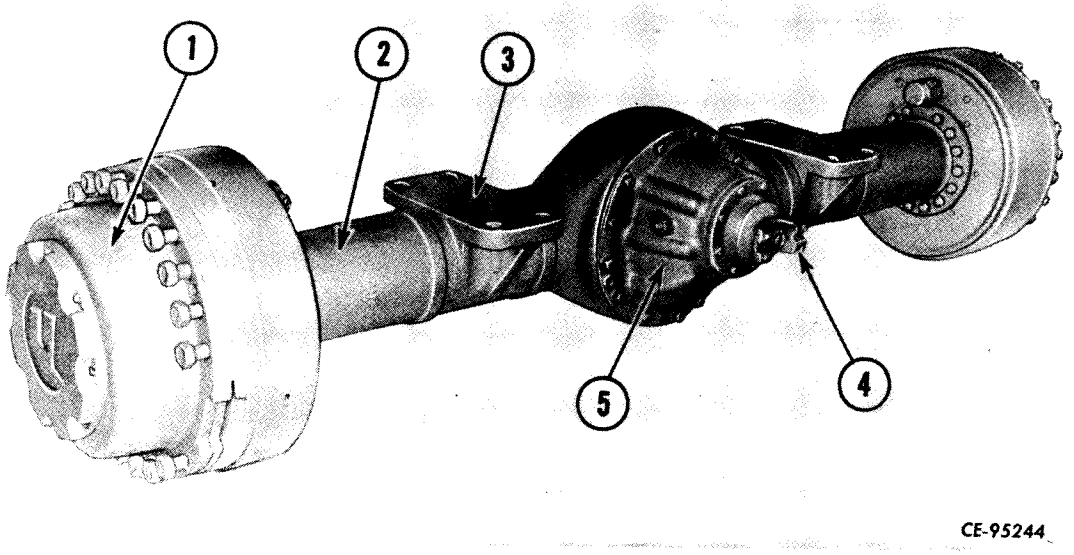

Figure 6-1
Solid Axle - Front.

1. Planetary carrier.
2. Axle housing.
3. Mounting pad.
4. Input yoke.
5. Differential assembly.

DESCRIPTION

The axle assemblies accomplish three main functions; transmit the out-going twisting force (torque) at 90° to the left and right of its input direction, increase the input torque through reduction gearing, and provide a means of securing the wheels and at the same time support the tractor. To each of these main functions several secondary requirements are added suggesting a complex piece of machinery. In reality, each axle uses a minimum of parts to carry out its many functions. Simplicity of design increases reliability and provides easy servicing.

Both axles are full floating, double reduction type. The axles are rigidly attached to their supporting members; the front main frame in the case of the front axle and an oscillating cradle called a bolster for the rear. By allowing the rear axle to oscillate, the tractor is assured great stability in rough terrain.

The first gear reduction takes place in the differential; the second in the planetaries. Each wheel revolves on two tapered roller bearings mounted on the axle spindle. The axles are full floating in that none of the weight is supported by, or transmitted to, the axle shafts. All weight on the axle is supported by the wheels, bearings and axle housing.

All components of the axle assemblies are identical with the exception of the housings. The front axle assembly employs a one piece, welded axle housing. The rear uses a three piece housing; two outer axle housings, flange bolted to a center axle bowl. Should necessity require the removal of both axle assemblies, they must be installed in their original positions; the welded one piece housing in the front and the bolted three piece axle in the rear.

The differential assemblies are rigidly mounted; one on the forward side of the rear axle housing and one on the rear side of the front axle housing. The differentials are connected by splined yokes to the yokes on the propeller shafts from the transmission.

The basic differential consists of a hypoid ring gear, pinion gear and spider gear assembly. The differential and spider gear assembly rotate on tapered roller bearings. The pinion is straddle

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GENERAL INFORMATION

DESCRIPTION - Continued

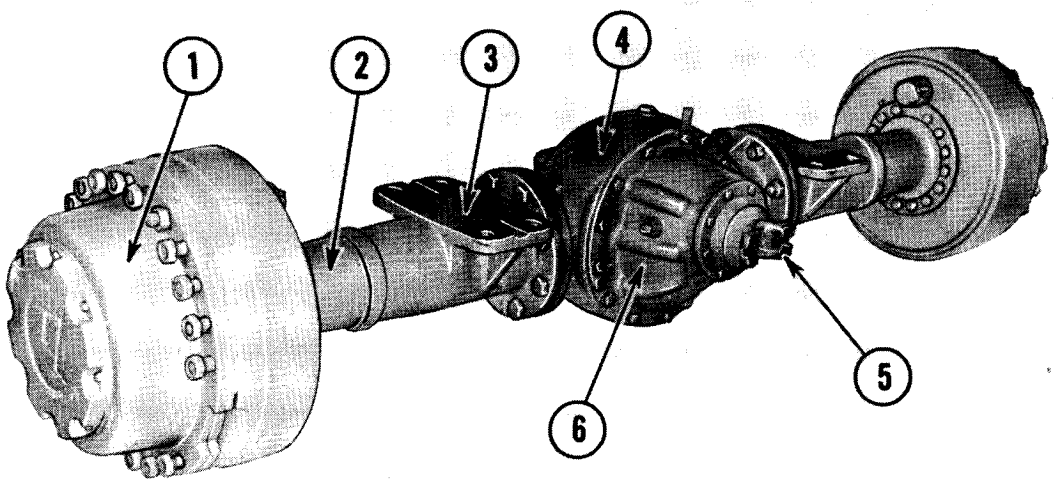

Figure 6-2
Solid Axle - Rear.

1. Planetary carrier.
2. Axle housing.
3. Mounting pad.
4. Axle bowl.
5. Input yoke.
6. Differential assembly.

mounted, having two tapered roller bearings in front of the pinion teeth to take the forward and reverse thrust and a straight roller bearing behind the pinion teeth to carry the radial load.

Three functions of the differential are: transmitting torque from the propeller shaft to the axle shafts; producing the first torque multiplication in the double reduction axles, and allowing one drive wheel to rotate at a different speed than opposite wheel.

PREVENTIVE MAINTENANCE

LUBRICANT

Quantities and recommended lubricant are listed under "SERVICE INFORMATION" in this section.

OIL CHANGE INTERVALS

Axle lubricant should be changed at regular intervals of 1000 hours. Drain while assembly is warm to allow contaminates to flow out with the draining lubricant. Refill the assembly with the specified lubricant. Check the lubricant level after each 100 hours of operation.

LEVEL CHECK

Check the level of the lubricant in the differentials at the oil level plug (1, Fig. 6-4 and 6-5).

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GENERAL INFORMATION

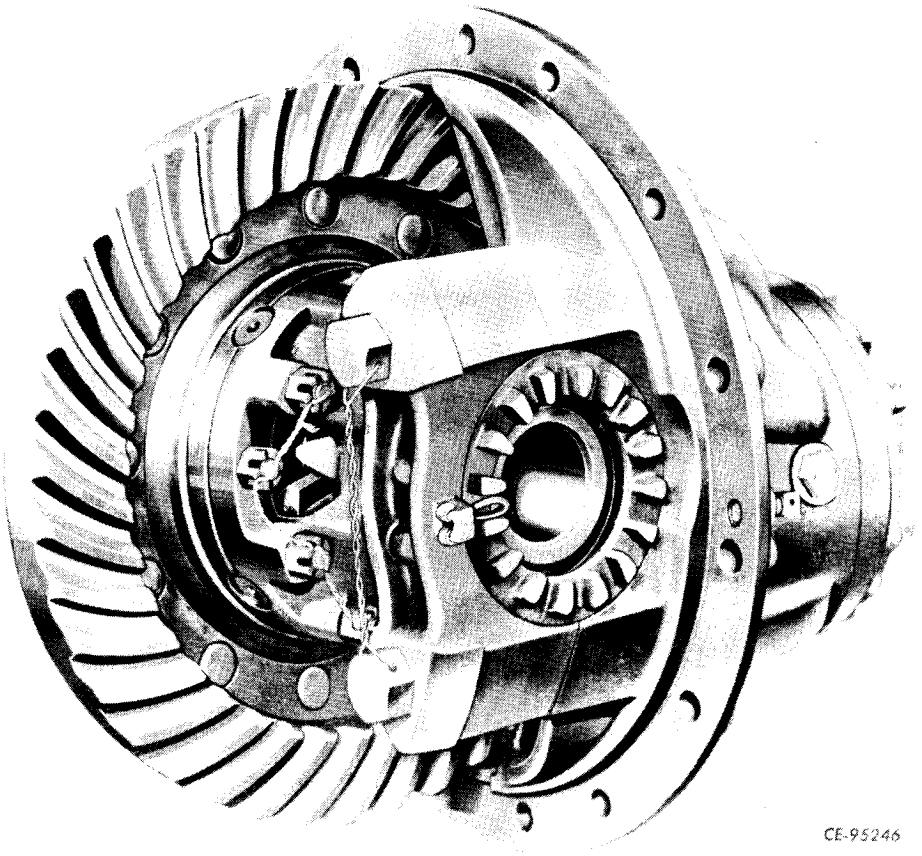

Figure 6-3
Differential Assembly.

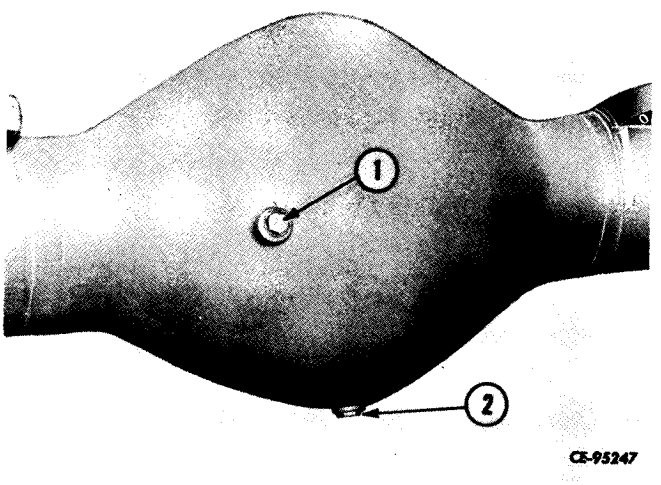

Figure 6-4
Lubricant Plugs - Front Axle.

1. Level plug. 2. Drain plug.

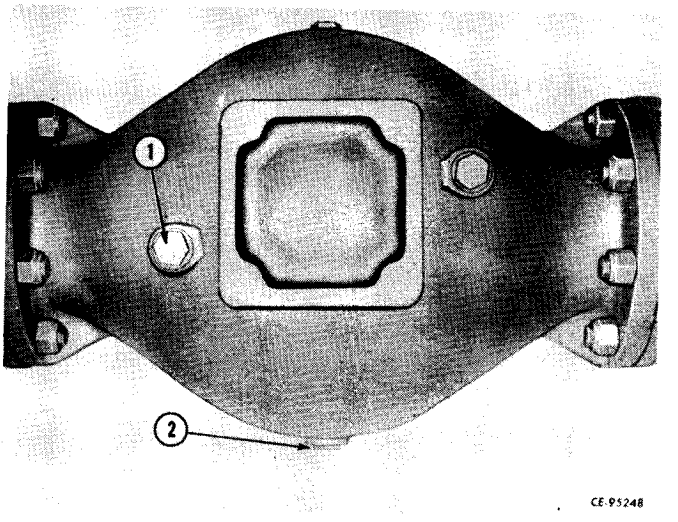

Figure 6-5
Lubricant Plugs - Rear Axle.

1. Level plug. 2. Drain plug.

GENERAL INFORMATION

PREVENTIVE MAINTENANCE - Continued

LEVEL CHECK - Continued

The lubricant should be even with the level of the plug hole.

NOTE: Be sure the machine is on level ground before checking the lubricant level.

Prior to checking the level of the lubricant in each planetary hub, rotate the wheel until the "Oil Level" mark on the planetary cover is horizontal and below the centerline of the wheel and hub assembly. The lubricant should be even with the level of the plug hole (1, Fig. 6-6).

BRAKE ADJUSTMENT

Refer to Section 13, "BRAKE SYSTEM" for correct adjustment procedure.

DIFFERENTIAL ADJUSTMENT

The differential gears should be checked for backlash and correct tooth patterns after overhaul. If differential trouble is suspected, check these adjustments before overhaul to determine whether adjustment will correct the trouble. Refer to "DIFFERENTIAL DISASSEMBLY AND ASSEMBLY" for correct adjustment procedure.

AXLE DISASSEMBLY AND ASSEMBLY

DISASSEMBLY PREPARATION

Axle disassembly preparation should include:

Installing safety bar with tractor in straight ahead position.

Removing wheels and tires.

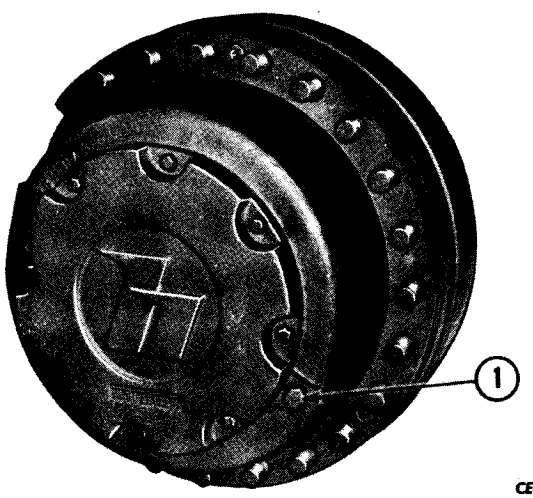

Figure 6-6

Disconnecting drive shaft and brake lines at the axle.

Removing the axle from the tractor.

Using plain steam (no caustic soda) to clean the exterior of the axle.

Preparing a clean work area of sufficient size.

Providing a suitable hoist and sling to lift component parts.

Support the axle assembly with the axle bowl drain plug facing down.

Drain the planetary hubs by rotating them until the drain filler plugs (1, Fig. 6-6) are at the bottom. Remove the plugs and "O"-rings and drain the lubricant.

DISASSEMBLY

Remove the cap screws (1, Fig. 6-7) and sealing washers (2) that secure the planetary cover (4) to the carrier assembly (3). Remove the planetary cover and discard its gasket. Discard sealing washers.

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AXLE DISASSEMBLY AND ASSEMBLY

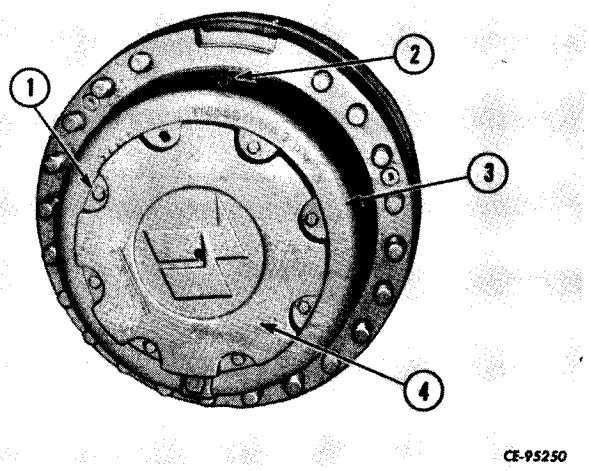

Figure 6-7

Thread the axle removal tool (1, Fig. 6-8) (refer to "SPECIAL TOOLS" under "SERVICE INFORMATION") in the tapped pilot hole in the axle shaft. Remove the shaft from the housing.

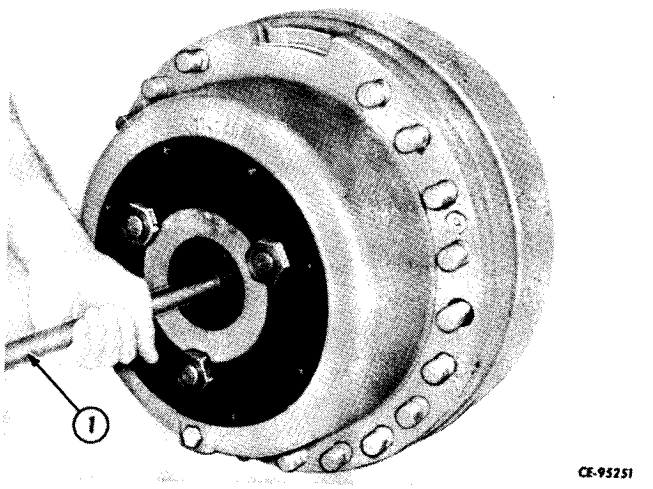

Figure 6-8

Using a socket head screw key remove the flat head cap screws (2, Fig. 6-9) that secure the planetary carrier (3) to the wheel hub (1).

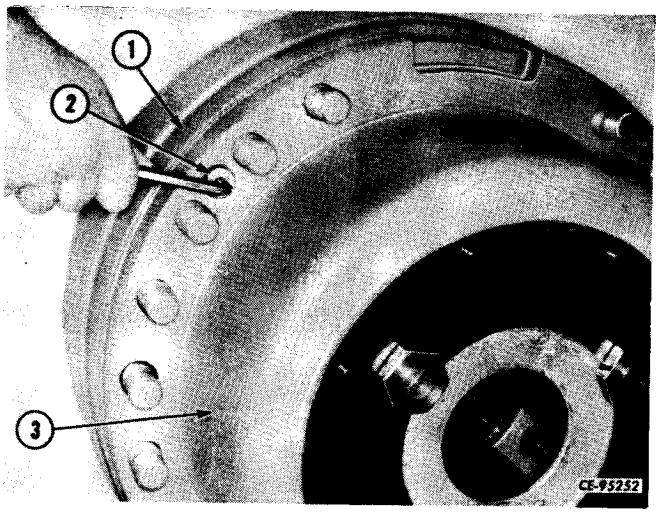

Figure 6-9

Using hoist with a suitable sling, remove the planetary carrier assembly (1, Fig. 6-10).

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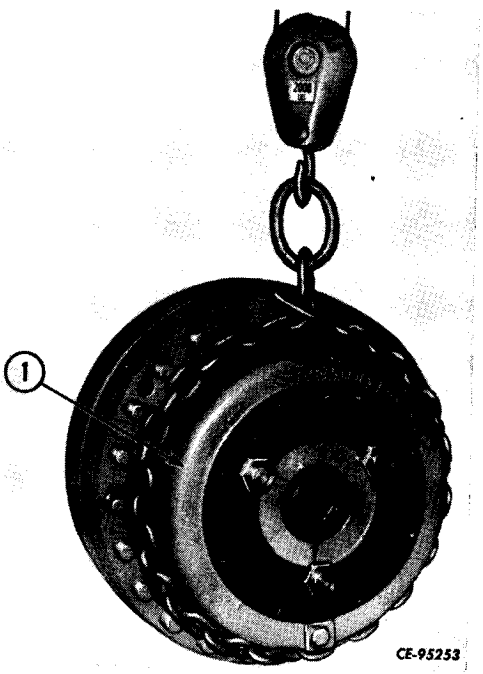

Figure 6-10

AXLE DISASSEMBLY AND ASSEMBLY

DISASSEMBLY - Continued

For carrier assembly overhaul, refer to "PLANETARY DISASSEMBLY AND ASSEMBLY."

Remove the seal ring (1, Fig. 6-11) from the wheel hub shoulder. Remove the retainer cap screws, retainer (2) and shim pack (1). Tie shim pack together and tag to indicate which side of the axle assembly they were removed from. Clean all sealant from retainer cap screws.

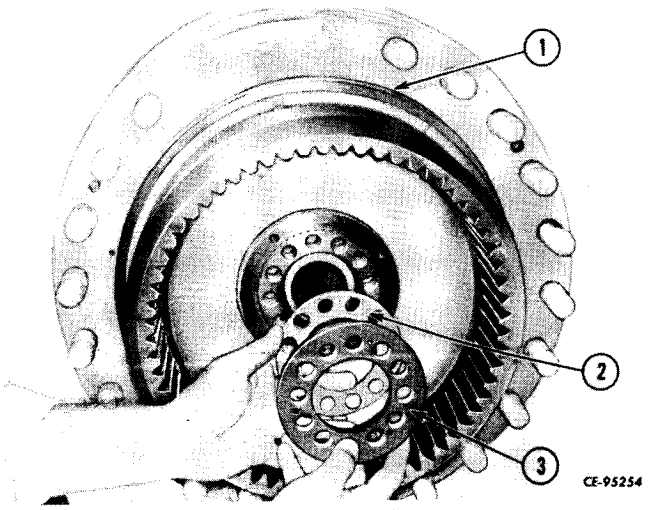

Figure 6-11

Using a hoist and sling remove the ring gear and hub assembly (2, Fig. 6-12) from the axle housing splines.

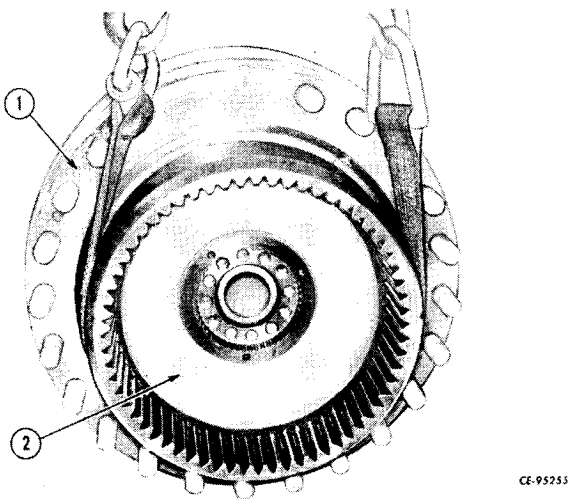

Figure 6-12

In some cases it may be necessary to pry the ring gear and hub assembly from the axle splines. Use a pair of suitable pry bars, placed opposite each other, between wheel hub (1) and ring gear assembly (2).

NOTE: Do not damage bearing cage, bearing race, or seal surfaces with pry bars.

For ring gear and hub overhaul refer to "PLANETARY DISASSEMBLY AND ASSEMBLY."

Attach the hub and drum lifting tool (1, Fig. 6-13) (refer to "SPECIAL TOOLS" under "SERVICE INFORMATION") to one of the wheel studs. Lift off the wheel hub (3) and brake drum (2) as an assembly. Do not allow the brake drum to pull free of the hub and fall. (Under most circumstances these two items will be snug fitting.)

Refer to "WHEEL HUB DISASSEMBLY AND ASSEMBLY" for overhaul procedures.

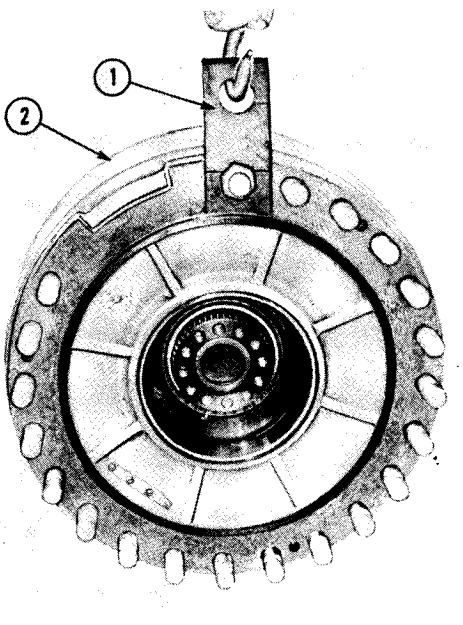

Figure 6-13

AXLE DISASSEMBLY AND ASSEMBLY

Remove the cap screws (1, Fig. 6-14) and hex nuts that secure the brake spider to the axle housing. Remove the brake assembly.

Refer to Section 13, "BRAKE SYSTEM" for brake overhaul procedures.

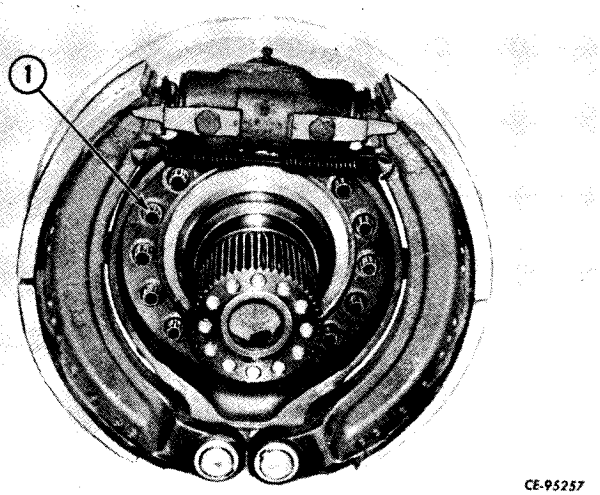

Figure 6-14

Remove and discard the axle seal (2, Fig. 6-15) from the housing bore.

Remove the seal retainer (1) from the housing hub.

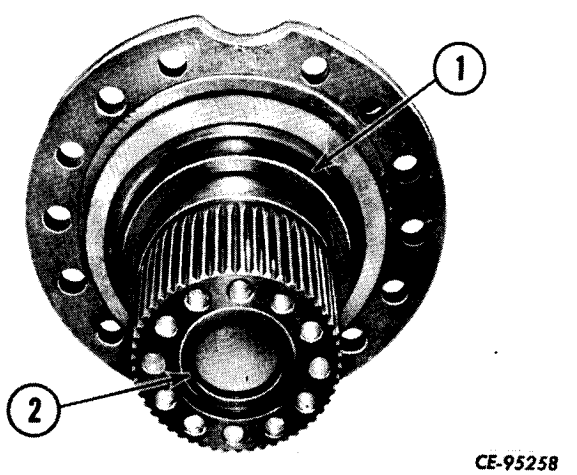

Figure 6-15

Remove and discard the "O"-ring (1, Fig. 6-16) from the seal retainer. Check the polished surfaces and ring groove of the retainer for nicks, dents or burrs. Replace retainer if damage is beyond repair.

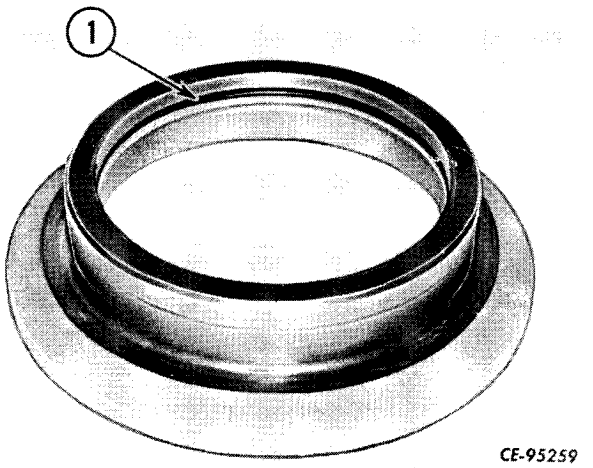

Figure 6-16

Remove the drain plug (2, Fig. 6-4 and 6-5) from the axle bowl and drain the lubricant. When the housing is completely drained rotate the housing until the differential yoke is in a vertical position.

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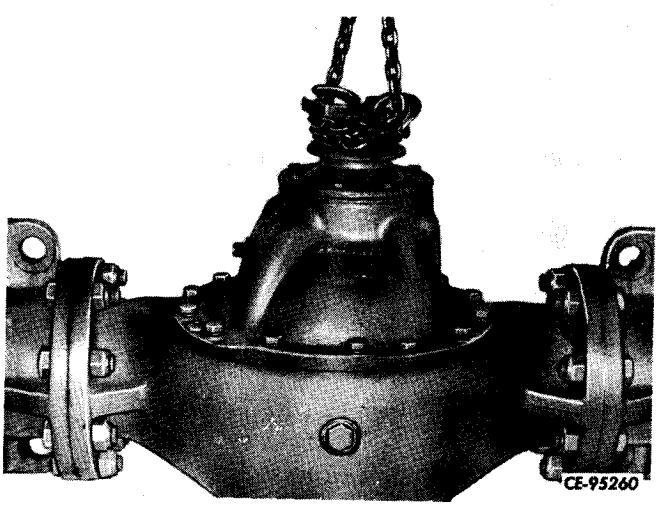

Figure 6-17

AXLE DISASSEMBLY AND ASSEMBLY

DISASSEMBLY - Continued

To remove the differential assembly the following steps must be taken:

a. One at a time, using an acetylene torch, heat the axle housing in the area of each screw bore. Sufficient heat will liquify the plastic gasket material and allow the cap screw to be removed with a reasonable amount of effort.

As each screw bore is heated, apply approximately 200 lbs. of torque in a counterclockwise direction to the cap screw (1, Fig. 6-17). When the bore is heated sufficiently the cap screw will begin to turn out.

b. Place a chain sling about the input yoke and using a suitable hoist, exert an upward pressure on the differential assembly.

Again, using the acetylene torch, heat the entire flange of the differential carrier to liquify the plastic sealant and free the differential assembly.

NOTE: Both axle shafts must be removed before the differential assembly can be pulled from the housing.

In some cases it may be necessary to pry the heated units apart.

Refer to "DIFFERENTIAL DISASSEMBLY AND ASSEMBLY" for procedures.

REAR AXLE

If a section of the axle housing requires removal, index the two pieces to be separated with a felt marker or two punch marks (1, Fig. 6-18) to insure correct assembly.

Remove the cap screws and hex nuts (2) that secure the axle housing to the differential housing. Separate the two housings and discard the "O"-ring seal.

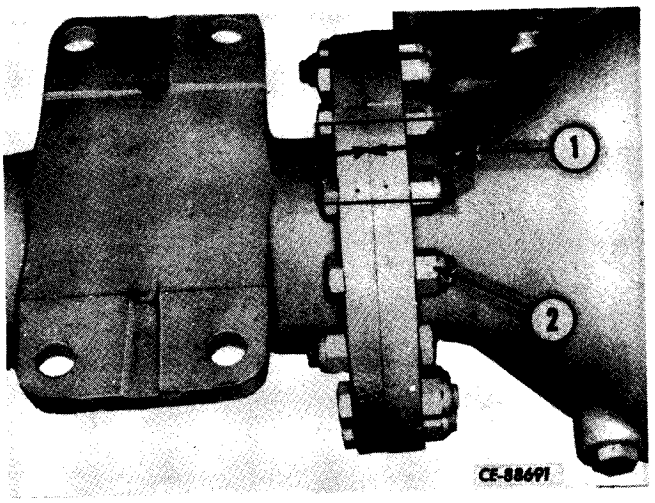

Figure 6-18

CLEANING AND INSPECTION

CLEANING

Clean all parts thoroughly. Rough parts such as casting or all metal parts without finished, ground or polished surfaces may be cleaned in a hot solution of mild alkali. Parts should remain in the tank until thoroughly clean and heated through.

◆ WARNING: EXERCISE CARE TO AVOID SKIN RASHES, FIRE HAZARDS AND INHALATION OF VAPORS WHEN USING SOLVENT TYPE CLEANERS.

Clean other parts with a solvent type cleaner excluding gasoline.

Flush out axle housing being sure it is completely clean. Be sure all flaked metal deposits and dirt are removed from the corners. Cover the differential opening with a plastic cover when housing is clean and dry.

◆ WARNING: EXERCISE CARE TO AVOID SKIN RASHES, FIRE HAZARDS AND INHALATION OF VAPORS WHEN USING SOLVENT TYPE CLEANERS.

AXLE DISASSEMBLY AND ASSEMBLY

Dry parts thoroughly with soft, clean absorbent paper towel or abrasive free cloth.

CAUTION: NEVER dry bearings by spinning with compressed air.

INSPECTION

Inspect all bearings, cups and cones, including those not removed from the axle. Replace any parts that are worn, pitted or damaged in any way. Remove parts needing replacement with a puller or press, using suitable arbors. Avoid the use of drifts or hammers.

Inspect all gears and splines for wear or damage. Replace all parts that are scored, pitted, ridged or worn.

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

Coat parts that are to be assembled immediately with light oil to prevent corrosion. If parts are to be stored for any length of time or if they are not to be assembled immediately, coat them with a good grade of rust preventive and wrap in paper, treated to prevent corrosion.

Replace all seals, gaskets, "O"-rings and retaining rings.

Assemble the following tools and supplies.

Torque wrench - 500 ft. lb. capacity.
Torque multiplier - 4-to-1.
Loctite Plastic Gasket, or equivalent.
Axle shaft tool - Refer to Section 6, under "SPECIAL TOOLS."

NOTE: Special Torque, Pressure, etc. recommendations are listed on a single page in Section 6. This simplifies revision when necessary. To eliminate constant referral, blank spaces are provided at points where special information is required. These may be filled in by the manual holder, in pencil, and revised when necessary.

ASSEMBLY

REAR AXLE

Install new "O"-ring (2, Fig. 6-19) in position on axle housing (1) boss. Align the identification marks (1, Fig. 6-18) on the two housings (1, 3) and secure with cap screws and hex nuts (nuts face in toward differential). Tighten hex nuts to recommended torque (refer to "SPECIAL TORQUES").

Torque: _____

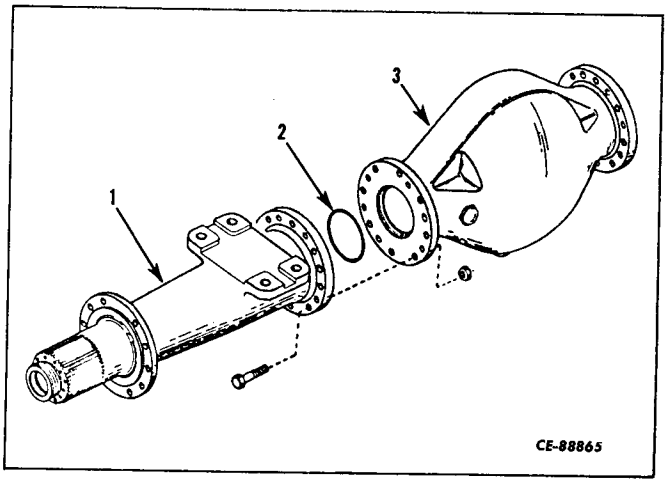

Figure 6-19

ALL UNITS

Be sure the mating surfaces of the differential carrier and axle housing are absolutely clean and free of nicks or burrs.

Coat the differential mounting face of the axle housing with "LOCTITE PLASTIC GASKET." Apply a light coating of plastic gasket to the threads of the retaining cap screws (1, Fig. 6-20). With the axle housing blocked securely

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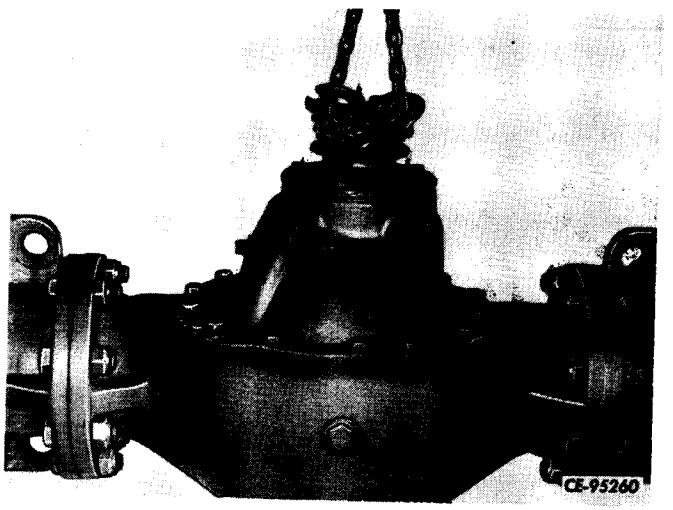

Figure 6-20

AXLE DISASSEMBLY AND ASSEMBLY

ASSEMBLY - Continued

ALL UNITS - Continued

lift the differential into position on the axle housing, being sure the holes are correctly aligned.

NOTE: Follow the manufacturers instructions for application and curing time for "LOCTITE PLASTIC GASKET."

Install cap screws (1) and lock washers, tightening gradually and evenly around the circumference of the carrier flange. Tighten cap screws to recommended torque (refer to "SPECIAL TORQUES").

Torque: _____

Install a new "O"-ring seal (1, Fig. 6-16) in the groove of the seal retainer (1, Fig. 6-21). Grease the seal surface of the axle hub and the "O"-ring. Push the retainer (1) into position being sure it contacts the axle housing flange about its entire circumference.

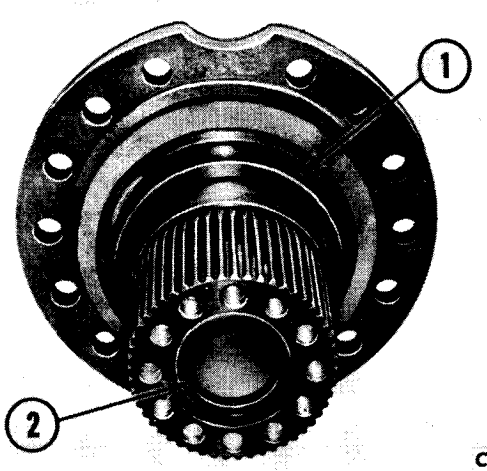

Figure 6-21

Inspect the end surface of the axle spindle for nicks, burrs or other irregularities. If necessary, file surface until it is flat and smooth. File carefully to prevent a wavy surface. Entire surface must be at 90° to centerline of axle bore.

Coat O. D. of a new axle seal (2) with "Mar-Seal" or equivalent sealant and using a suitable driver, install seal in axle bore with lip facing in. This seal must bottom in its bore.

Position the brake assembly on the axle housing and secure the spider, the axle flange with cap screws (1, Fig. 6-22) and nuts. Tighten the nuts to the recommended torque (refer to "SPECIAL TORQUES").

Torque: _____

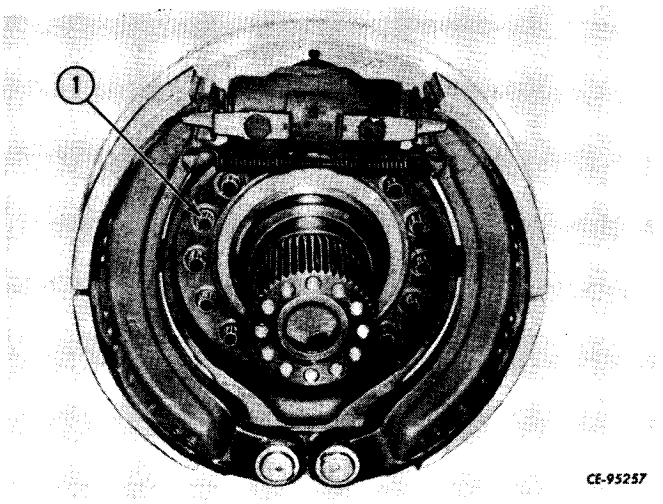

Figure 6-22

Using the special lifting tool (1, Fig. 6-23), position the wheel hub/brake drum assembly on the axle spindle.

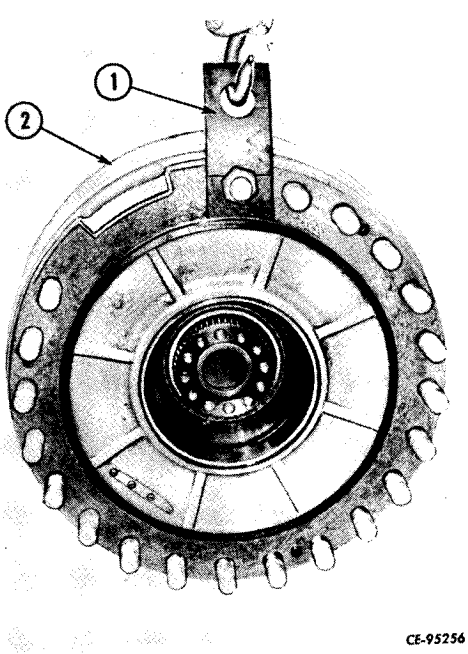

Figure 6-23

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AXLE DISASSEMBLY AND ASSEMBLY

Start the ring gear and hub assembly (2, Fig. 6-24) on the axle spindle splines. Place a 4" x 4" wooden block across the ring gear and using a sledge or heavy mallet, drive the ring gear and hub assembly on the spindle until it bottoms in the wheel hub (1) bearing cup.

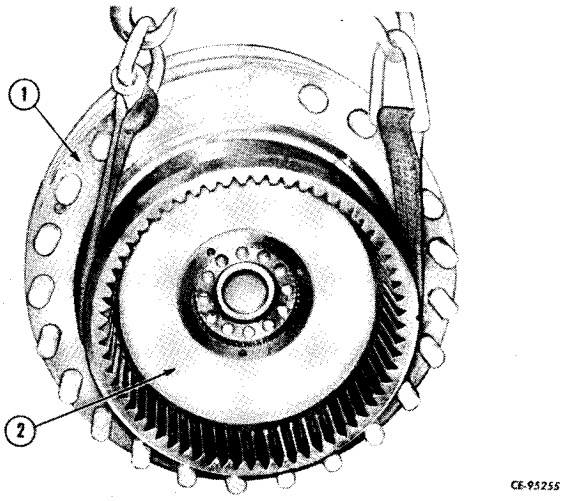

Figure 6-24

Position the retainer (3, Fig. 6-11) against the ring gear hub WITHOUT shims. Secure the retainer with three equally spaced cap screws. Tighten the cap screws evenly to the recommended preliminary torque (refer to "SPECIAL TORQUES") WHILE ROTATING THE WHEEL HUB.

Preliminary Torque:_____

Carefully measure the gap as shown in Fig. 6-25. Measure shims individaully to obtain a shim pack thickness equal to the gap. To this shim pack add the recommended additional shims (refer to "TOLERANCES").

Additional Shim Pack:_____

The total shim pack should equal the measured gap plus the required additional shims or as close as possible to this dimension on the plus side.

Remove the retainer and install the entire shim pack. Install the retainer and secure with all cap screws. Coat the threads of each cap screw with "LOCTITE PLASTIC GASKET" before installation. Tighten the cap screws to the

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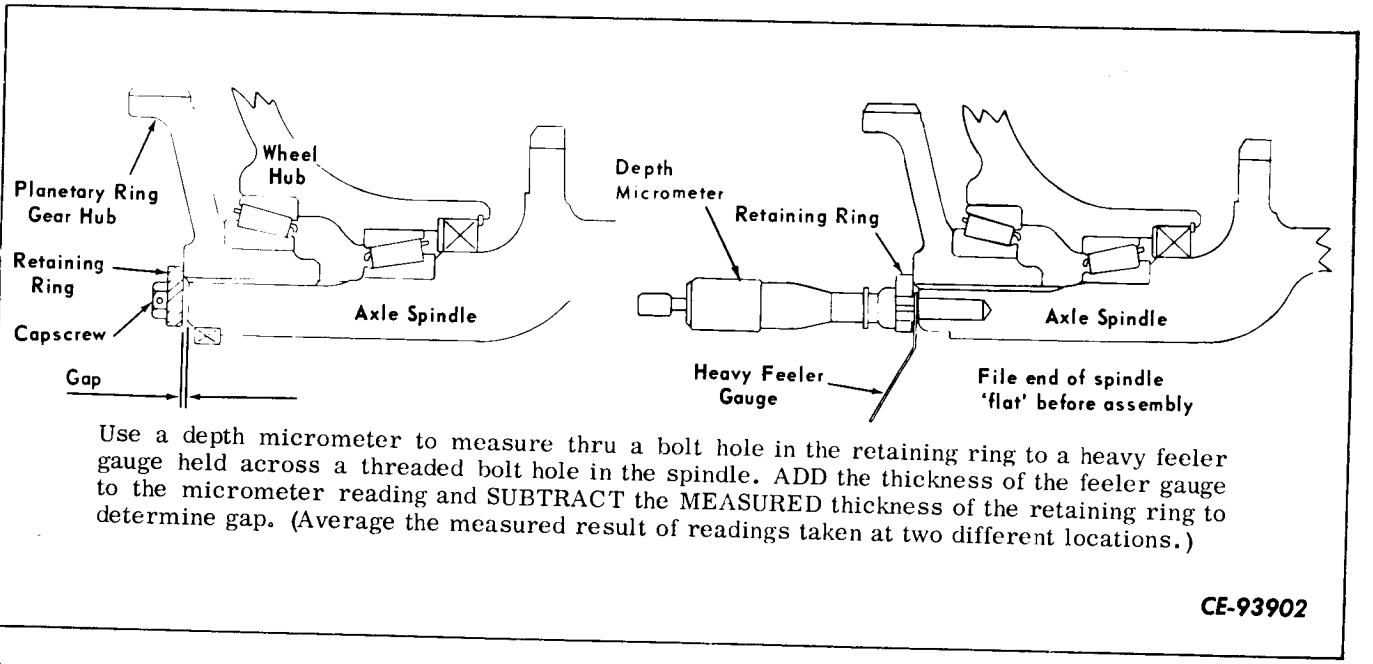

Figure 6-25
Shimming Procedure.

AXLE DISASSEMBLY AND ASSEMBLY

ASSEMBLY - Continued

ALL UNITS - Continued

recommended final torque (refer to "SPECIAL TORQUES") WHILE ROTATING THE WHEEL HUB.

Final Torque:_____

Lubricate a new seal ring (1, Fig. 6-11) with grease and install on wheel hub shoulder. Be sure there are no twists in seal ring.

Using a suitable sling and hoist, position the planetary carrier assembly (1, Fig. 6-26) on the axle. As carrier is installed planet gear teeth must mesh with ring gear teeth; large cut-out in carrier must be in alignment with cut-out in wheel hub.

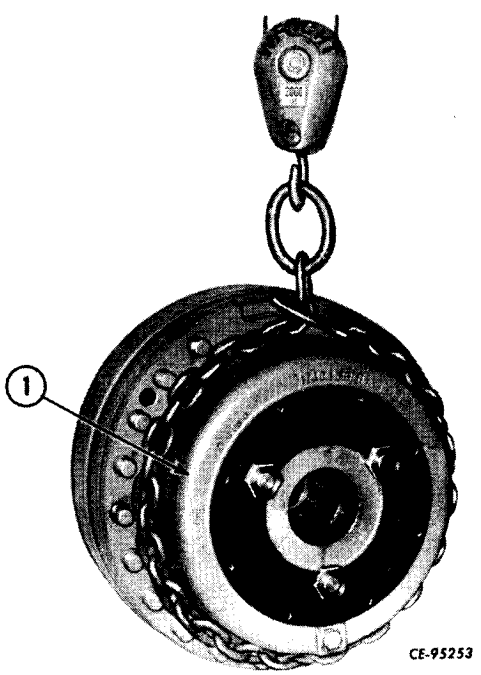

Figure 6-26

Be sure carrier assembly (3, Fig. 6-27) is flush against wheel hub (1). Install the flat head cap screws (2) to secure the two assemblies and tighten cap screws to recommended torque (refer to "SPECIAL TORQUES").

Torque:_____

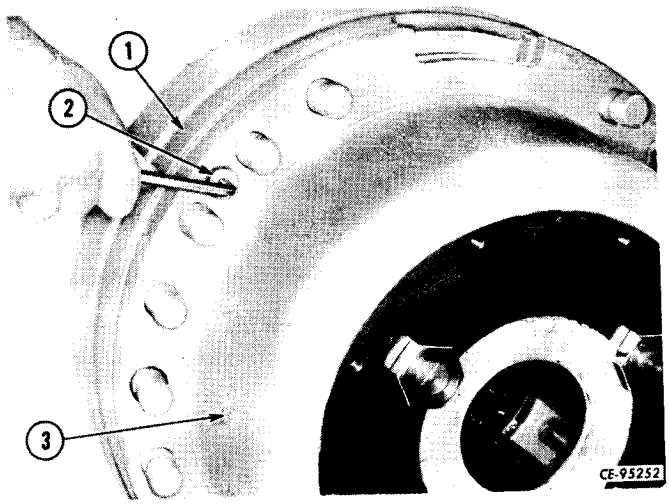

Figure 6-27

Using the axle removal and installation tool (1, Fig. 6-28) (refer to "SPECIAL TOOLS") install the axle in the housing.

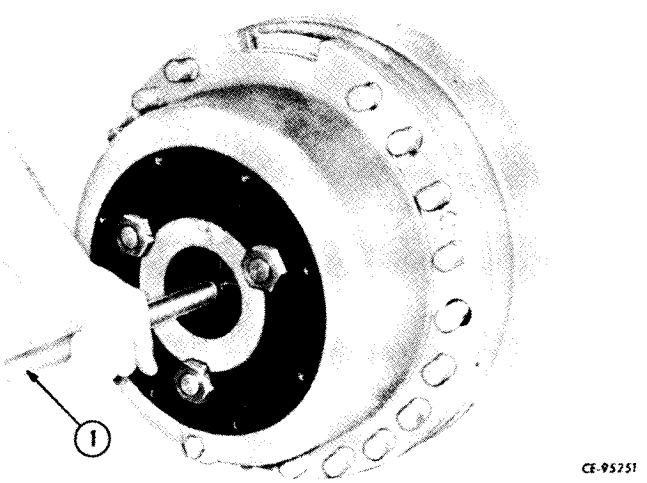

Figure 6-28

Using the tool as a lever, raise the inner end of the axle shaft to engage the differential side gear splines. As the sun gear end of the shaft enters the planetary assembly align the shaft gear teeth with the planet gear teeth.

Carefully inspect the thrust button (1, Fig. 6-29) in the planetary cover for excessive wear. Replace unit if required.

Position a new gasket on the planetary cover being careful to align the cap screw holes. Position cover and gasket assembly on planetary

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AXLE DISASSEMBLY AND ASSEMBLY

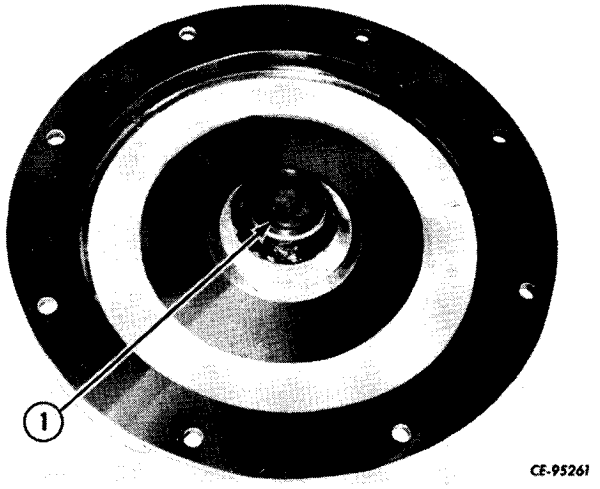

Figure 6-29

carrier; align cap screw holes and secure with cap screws and new sealing washers. Tighten cap screws to recommended torque (refer to "SPECIAL TORQUES").

Torque: _____

Rotate planetary hub until "Oil Level" line is horizontal (Fig. 6-30). Remove the drain and fill plug (1) and "O"-ring. Discard "O"-ring. Fill planetary hub to level of plug hole with recommended lubricant (refer to "LUBRICANTS AND CAPACITIES"). Install plug with new "O"-ring. Tighten plug securely.

Rotate the axle until the differential input is horizontal. Install drain plug (2, Fig. 6-31, FRONT AXLE; 2, Fig. 6-32, REAR AXLE) with new "O"-ring in axle bowl and tighten securely. Remove the level/fill plug (1, Fig. 6-31, FRONT AXLE; 1, Fig. 6-32, REAR AXLE) and "O"-ring and discard "O"-ring. Fill axle bowl to the level of the plug hole with recommended lubricant (refer to "LUBRICANTS AND CAPACITIES").

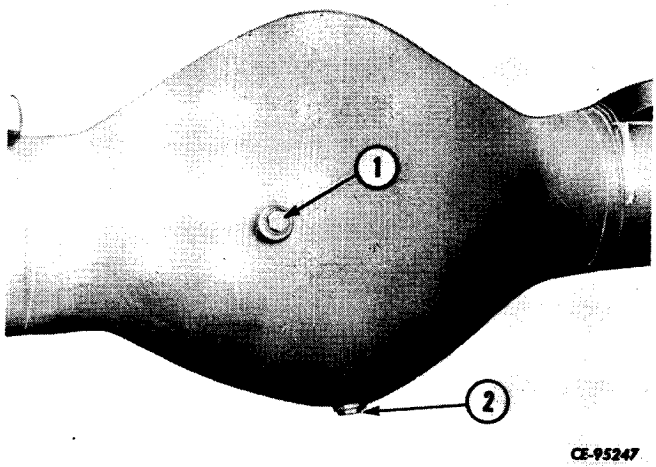

Figure 6-31

Install a new "O"-ring on the level plug and install the plug assembly in housing. Tighten plug securely.

After mounting axle in tractor with wheels and tines installed, adjust each brake assembly (refer to Section 13, "BRAKE SYSTEM").

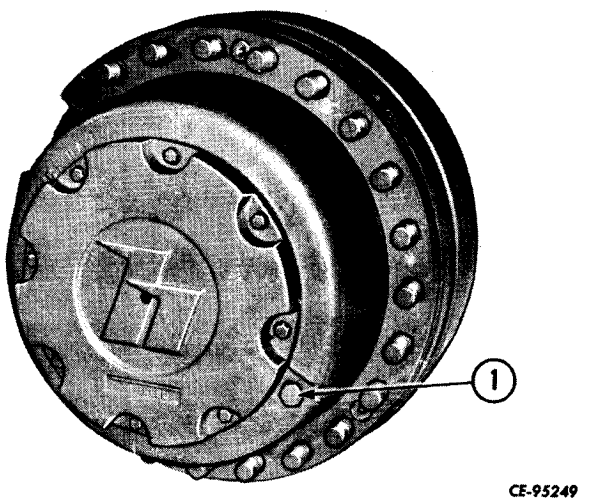

Figure 6-30

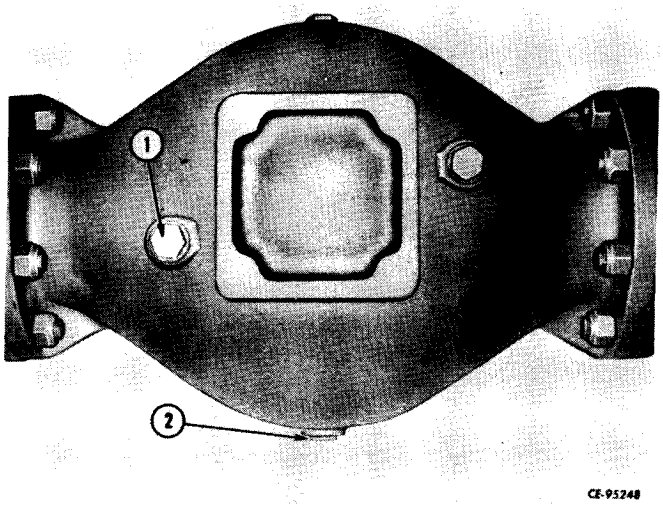

Figure 6-32

DIFFERENTIAL DISASSEMBLY AND ASSEMBLY

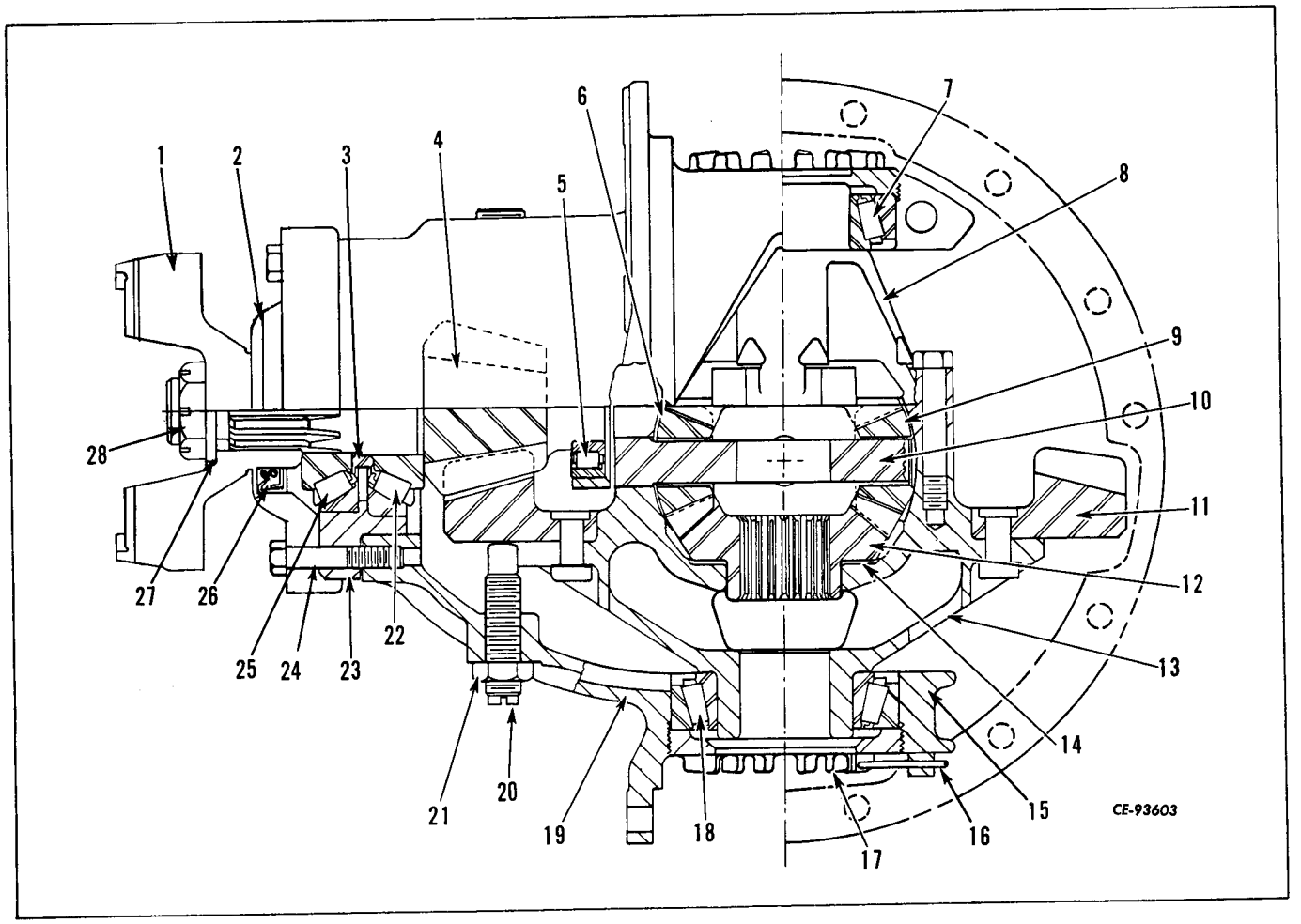

Figure 6-33
Typical Differential - Cross Section.

1. Input yoke.
2. Bearing cover.
3. Spacer.
4. Pinion gear and shaft.
5. Pinion pilot bearing.
6. Differential pinion gear thrust washer.
7. Ring gear thrust bearing.
8. Differential case - plain half.
9. Differential pinion gear.
10. Differential spider.
11. Ring gear.
12. Differential side gear.
13. Differential case - flanged half.
14. Side gear thrust washer.
15. Bearing cap.
16. Cotter pin.
17. Adjusting nut.
18. Ring gear thrust bearing.
19. Differential carrier.
20. Thrust screw.
21. Jam nut.
22. Inner pinion thrust bearing.
23. Pinion bearing cage.
24. Retaining cap screw.
25. Outer pinion thrust bearing.
26. Seal.
27. Flat washer.
28. Pinion nut.

DIFFERENTIAL DISASSEMBLY AND ASSEMBLY

DISASSEMBLY PREPARATION

Remove the differential assembly from the axle (refer to "AXLE DISASSEMBLY AND ASSEMBLY"). Differential disassembly preparation should include:

a. Using plain steam (no caustic soda), clean the outside of the differential housing thoroughly.

b. Preparing a clean work area.

c. Gathering the following tools and equipment:

A differential holding fixture (refer to "SERVICE INFORMATION" under "SPECIAL TOOLS").

A shop press.

A hoist of sufficient capacity.

DISASSEMBLY

Place differential assembly in a suitable holding fixture (refer to "SERVICE INFORMATION" under "SPECIAL TOOLS").

If initial inspection indicates that drive gears will not be replaced, record the backlash of the ring gear and pinion before disassembly. This measurement will be used during assembly.

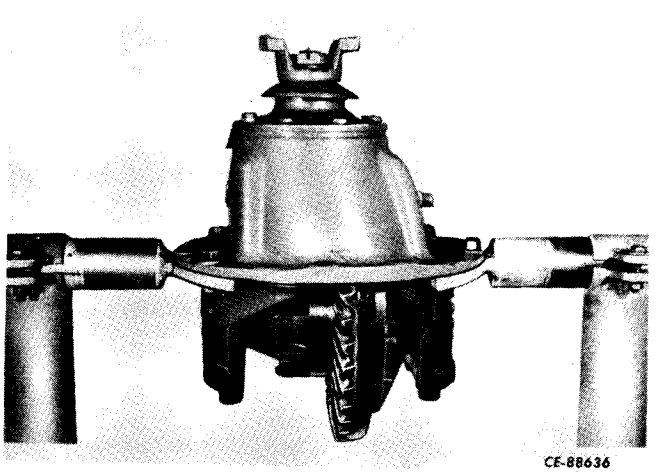

Figure 6-34

To measure backlash, position dial indicator as shown in Fig. 6-35. Secure the yoke and rotate ring gear back and forth. The indicated movement is the backlash (clearance) between the teeth. A predetermined amount of backlash is necessary and should not be altered to any great extent.

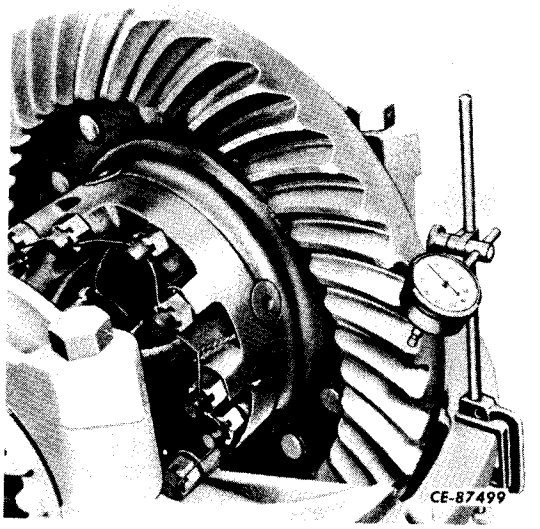

Figure 6-35

The bearing caps (3, Fig. 6-36) and carrier housing legs (4) are marked at the factory to assure correct assembly. If the original identification marks are not clear, mark one bearing

(Continued on next page)

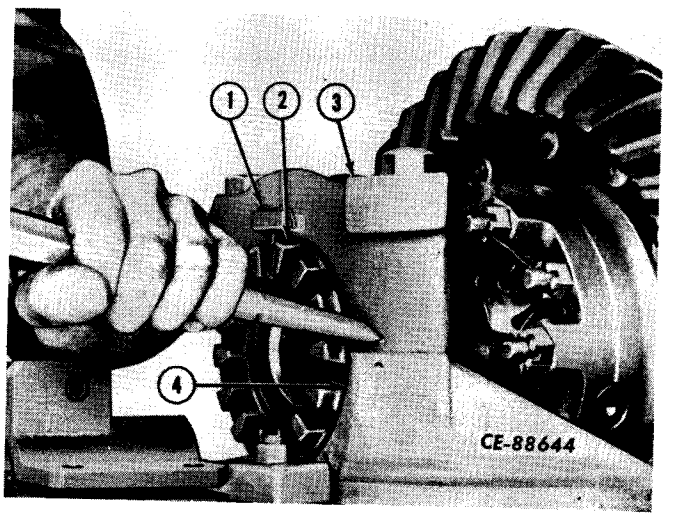

Figure 6-36

DIFFERENTIAL DISASSEMBLY AND ASSEMBLY

DISASSEMBLY - Continued

cap and carrier leg with a center punch or chisel to identify for correct assembly. Remove the cotter pins (1) that secure the adjusting nuts (2).

Remove the lock wire and bearing cap bolts that secure the bearing caps (1, Fig. 6-37) to the carrier housing.

Tap the bearing caps with a fiber hammer to loosen and remove them from the carrier bearings. Remove the bearing adjusting nuts (2).

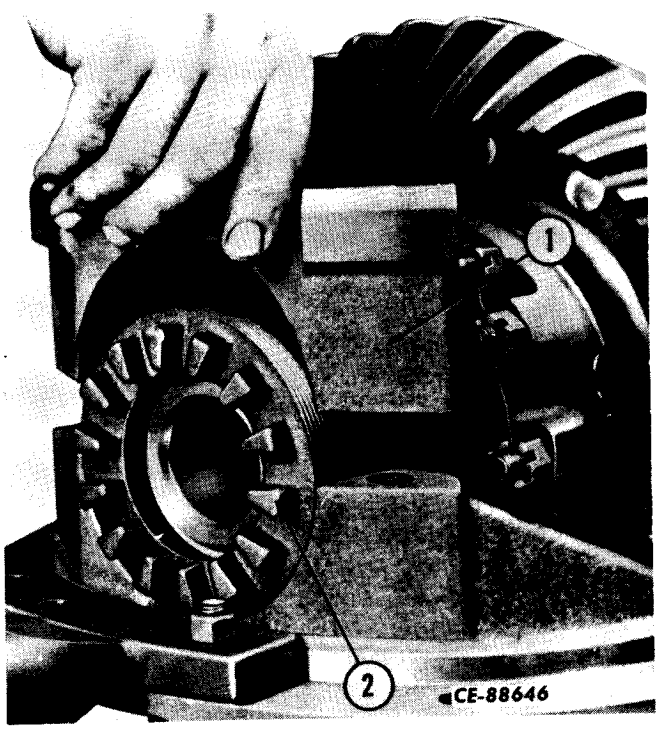

Figure 6-37

Loosen the jam nut (2, Fig. 6-38) and back off the thrust adjusting screw (1).

Lift the differential assembly just high enough to remove the carrier bearing cups. Tag the cups to identify them for correct assembly. As the differential is lifted out of the carrier housing (Fig. 6-39), tip it slightly to allow the ring gear to clear the pinion shaft bearing boss.

Remove the thrust block from the carrier housing.

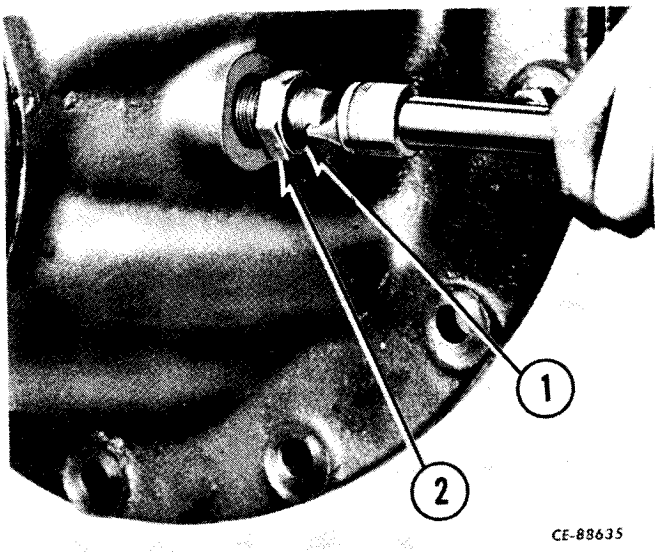

Figure 6-38

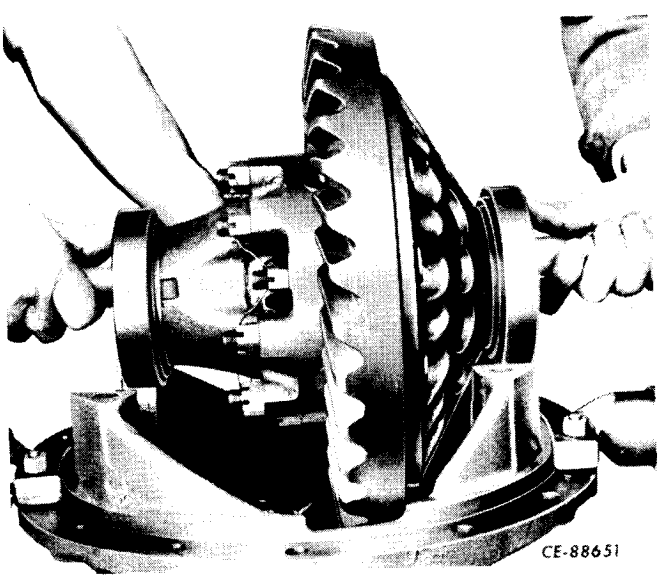

Figure 6-39

If original identification marks are not clear, mark the differential case halves with a punch or chisel to insure correct alignment during assembly (4, Fig. 6-40).

Cut the lock wire; remove hex nuts and cap screws (1) that secure the case halves (2, 3) and lift the plain half (2) from the flanged half (3). If a side gear comes off with the plain case half be sure it does not fall.

DIFFERENTIAL DISASSEMBLY AND ASSEMBLY

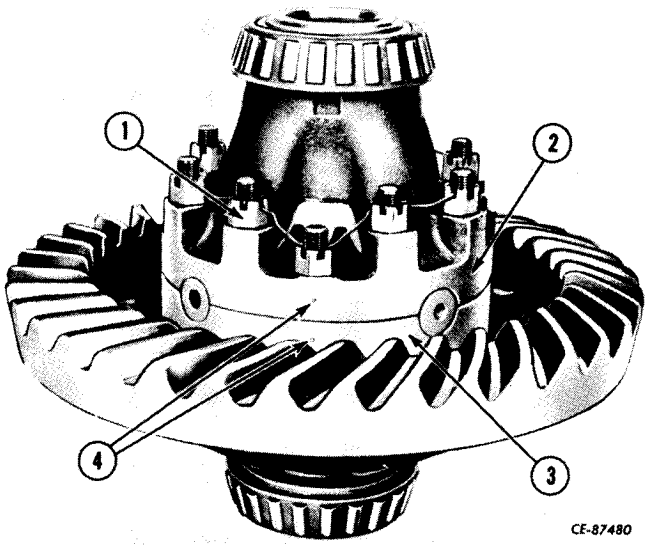

Figure 6-40

Remove the spider (1, Fig. 6-41) with spider gears (2) and thrust washers (3). The spider may be installed four ways and need not be marked before removal. Remove the remaining side gear (4) and thrust washer (5).

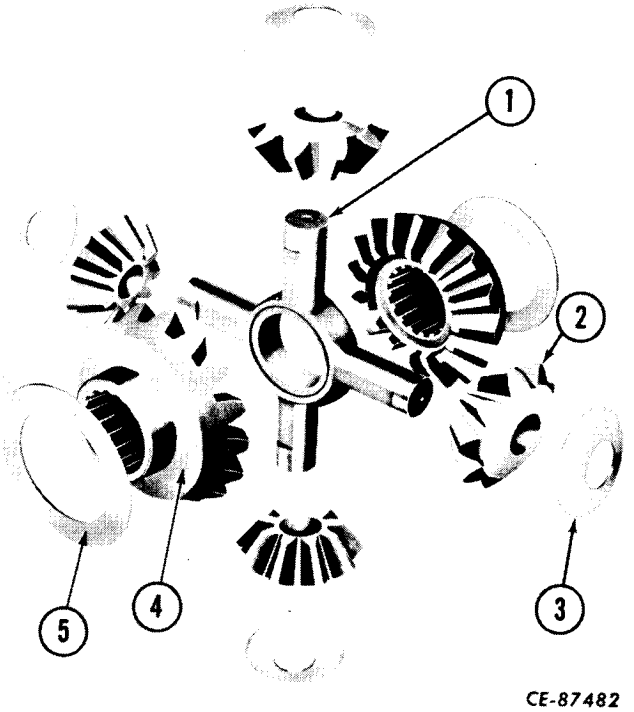

Figure 6-41

If removal of the ring gear is required, carefully center punch the rivets in the center of the head. Use a drill bit 1/32 inch smaller. Than the body of the rivet to drill through the head (Fig. 6-42). Press out the rivets and separate the gear from the case.

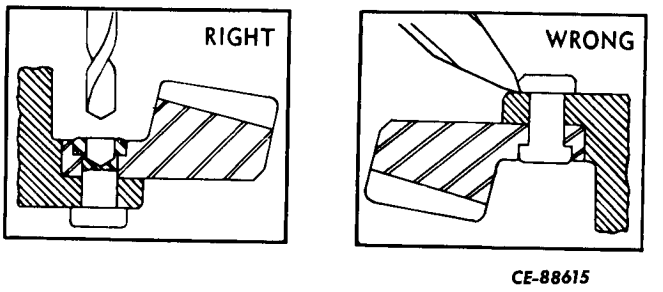

Figure 6-42

If replacement is required remove differential bearings, using a suitable bearing puller or a shop press (Fig. 6-43). Be sure force is exerted on the inner race, not the bearing cage.

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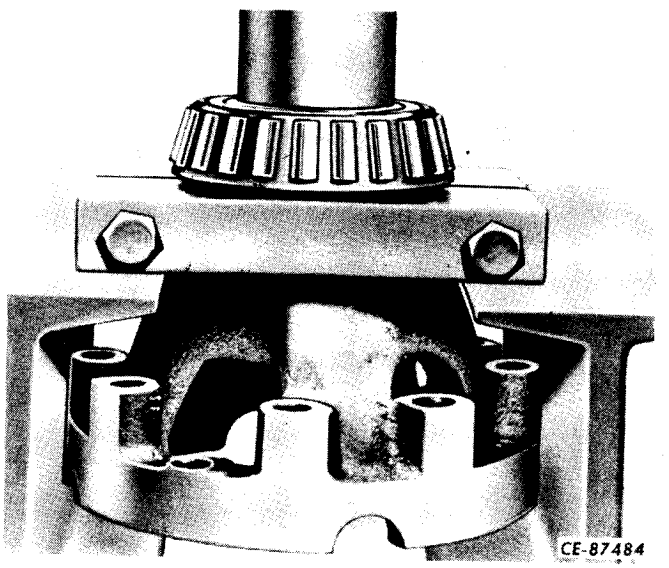

Figure 6-43

DIFFERENTIAL DISASSEMBLY AND ASSEMBLY

DISASSEMBLY - Continued

Hold the input yoke (1, Fig. 6-44) and remove the cotter pin (where used) (3) and hex nut (2). With a suitable puller, remove the input yoke (1) and flat washer.

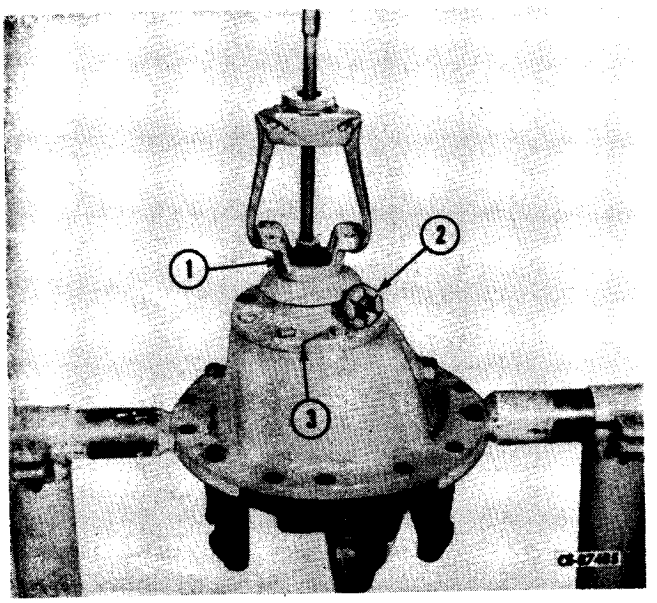

Figure 6-44

Remove the cap screws that secure the bearing cage (23, Fig. 6-33) to the carrier housing. Remove the bearing cover and oil seal assembly (2, 26, Fig. 6-33). Install three jack screws (2, Fig. 6-45) in the tapped holes provided in the bearing cage. Rotating jack screws evenly, remove cage assembly. Wire the shim pack (3) together to prevent loss.

NOTE: If the pinion bearing assembly is to be reused it will be necessary to retain the same relationship between the cups and cones because of the established wear pattern. Proper parts identification should be made during disassembly.

Support the bearing cage (3, Fig. 6-46) and press the pinion shaft (1) from the pinion outer thrust bearing (2). The bearing cups may be pressed out of the bearing cage, if necessary.

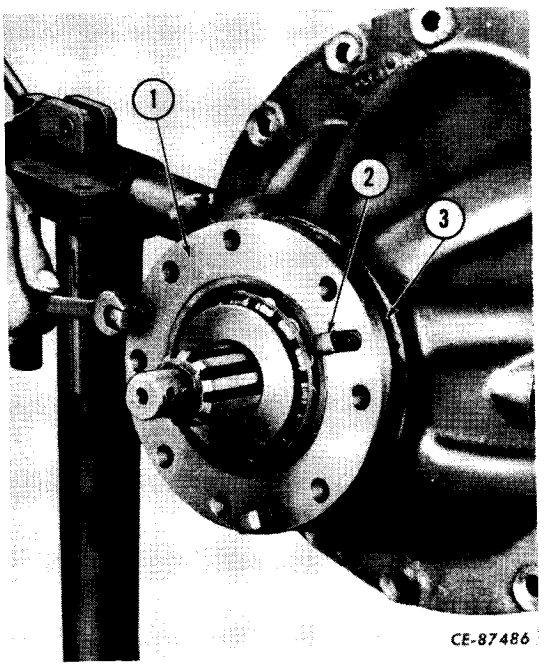

Figure 6-45

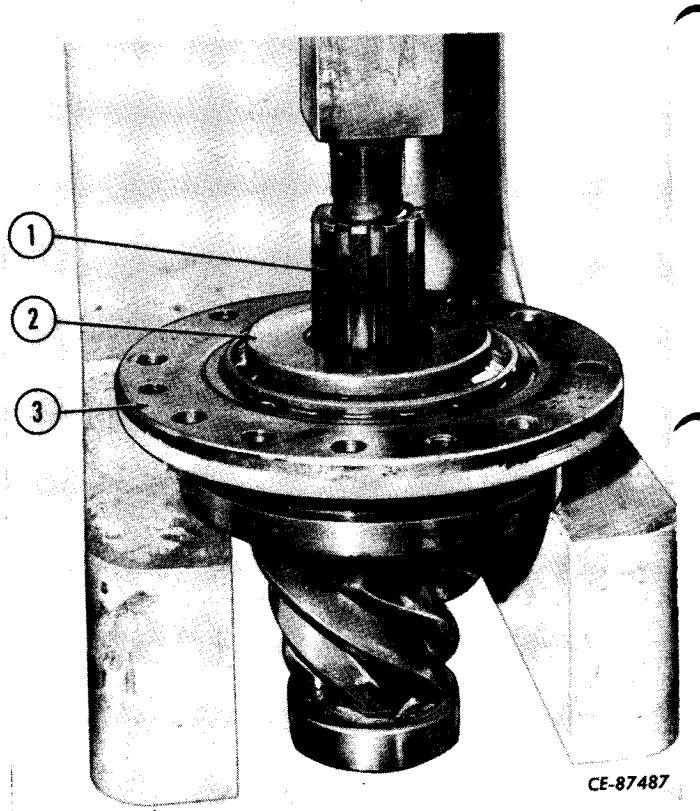

Figure 6-46

DIFFERENTIAL DISASSEMBLY AND ASSEMBLY

Using a suitable adapter press the inner thrust bearing (2, Fig. 6-47) from the pinion shaft (1).

Remove the snap ring (4) that retains the pinion shaft pilot bearing (3).

Using a suitable adapter, press the pilot bearing from the shaft.

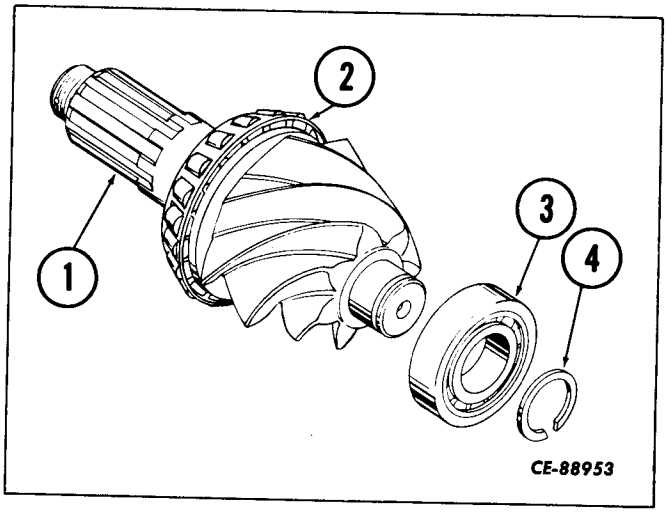

Figure 6-47

CLEAN, INSPECT AND REPAIR

CLEANING

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

NOTE: DO NOT USE GASOLINE
DO NOT USE A HOT SOLUTION TANK
DO NOT USE WATER AND ALKALINE SOLUTIONS
(Sodium hydroxide, orthosilicates or phosphates)

Steam cleaning assembled drive units after their removal from the axle housing is not recommended. Water trapped in these assemblies promotes corrosion of critical parts. This rust can be deposited in the lubricant causing premature failures.

Complete disassembly is necessary for thorough cleaning.

Rough parts such as differential castings may be cleaned in a hot solution of mild alkali providing these parts are not ground and polished. Parts should remain in the tank long enough to be thoroughly cleaned and heated through. This will aid the evaporation of the rinse water. Parts should be thoroughly rinsed to remove all traces of alkali.

◆ WARNING: EXERCISE CARE TO AVOID SKIN RASHES AND INHALATION OF VAPORS WHEN USING ALKALI CLEANERS.

Parts should be thoroughly dried immediately after cleaning. Use soft, clean, lintless, absorbent paper towels or rags, free of abrasive material. Bearings should never be dried by spinning with compressed air.

Parts that have been cleaned, dried and inspected and are to be assembled immediately should be coated with light oil to prevent corrosion. If 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.

INSPECTION

Careful inspection procedures will determine the success of the overhaul operation. A careful selection of reusable parts will eliminate the expense of down time in the near future.

Inspect all bearing cups and cones, including those not removed from parts of the drive unit. Replace these items if cups or rollers are worn, pitted or damaged in any way. Remove parts to be replaced with a suitable puller or press. Do not use drifts or hammers. They may easily damage or distort component parts.

Inspect hypoid gears for wear or damage. Worn, ridged, pitted or scored gears should be replaced. When it becomes necessary to replace either the ring or pinion gear, both gears must be replaced with a matched set.

(Continued on next page)

DIFFERENTIAL DISASSEMBLY AND ASSEMBLY

CLEAN, INSPECT AND REPAIR - Continued

INSPECTION - Continued

Inspect differential case halves, thrust washers, spider trunnions and differential gears for pitted, scored or worn thrust surfaces. Thrust washers must be replaced in sets.

Inspect differential pinion gears and side gear teeth for wear or damage. Pinion and side gears must be replaced in sets.

REPAIR

Replace all worn parts including hex nuts with rounded corners.

Replace all seals, gaskets and lock washers.

Remove nicks, mars and/or burrs from machined or ground surfaces using a mill file or India stone. All threads must be clean and free to obtain accurate adjustment and correct torque.

Where possible, use a press when assembling component parts.

Tighten all nuts to specified torque. Use a soft iron locking wire to eliminate wire breakage.

The burrs caused by lock washers at the spot surface of stud holes of gages and covers, should be removed to assure easy assembly.

NOTE: Special Torque, Pressure etc. recommendations are listed under "SERVICE INFORMATION." This simplifies revision when necessary. To eliminate constant referral, blank spaces are provided at points where special information is required. These may be filled in by the manual holder, in pencil, and revised when necessary.

ASSEMBLY

If new bearing cups (1, Fig. 6-48) are to be installed, press the cups firmly against pinion bearing cage (2) shoulders.

Lubricate bearing cups and cones with light machine oil.

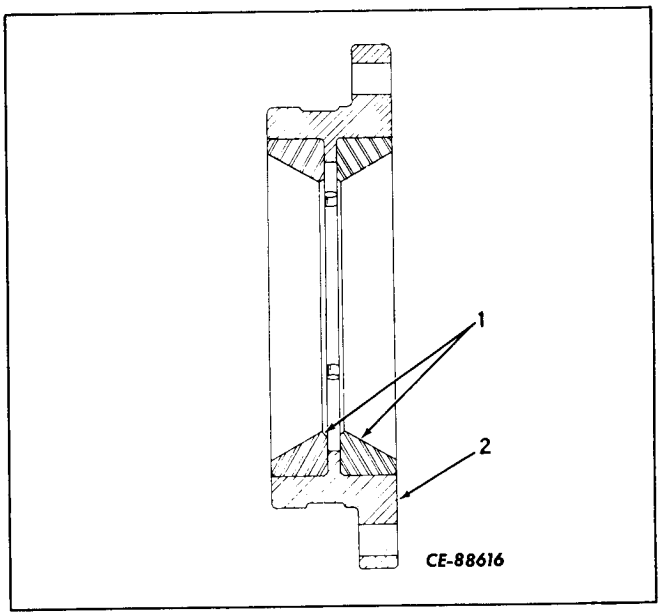

Figure 6-48

Press inner thrust bearing (2, Fig. 6-49) on pinion shaft (3). Be sure bearing cone bottoms on gear shoulder.

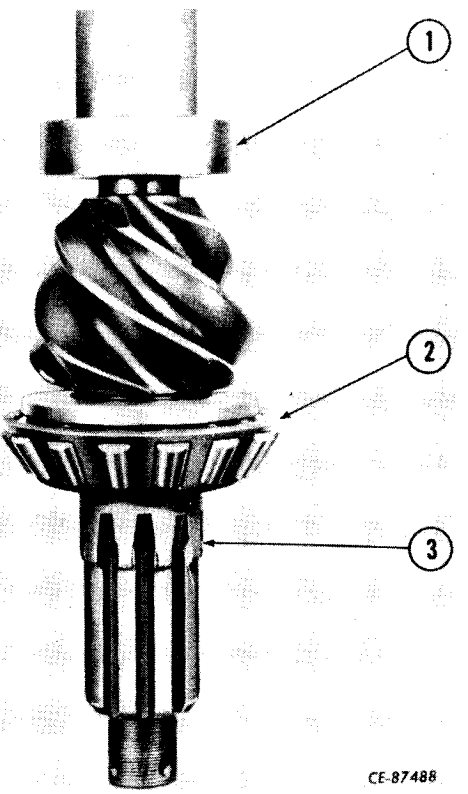

Figure 6-49

DIFFERENTIAL DISASSEMBLY AND ASSEMBLY

Press pilot bearing (1) on pinion shaft. Install the retaining snap ring. Be sure snap ring bottoms in groove in pinion shaft.

Install spacer (5, Fig. 6-50) on pinion shaft and place entire assembly in bearing cage (4).

Press outer thrust bearing (3) on the pinion shaft. Be sure the bearing bottoms on the spacer (5) and the spacer is flush against inner thrust bearing race (6).

Rotate cage (4) several revolutions to assure normal bearing contact.

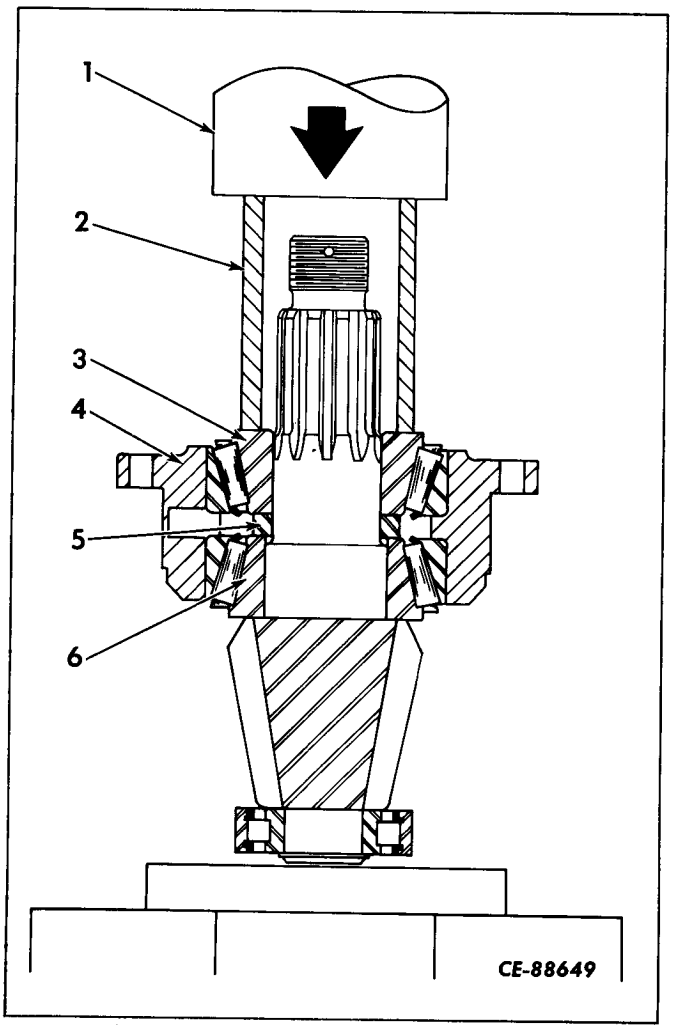

Figure 6-50

1. Press ram.
2. Suitable sleeve.
3. Outer thrust bearing.
4. Bearing cage.
5. Spacer.
6. Inner thrust bearing.

With cage and pinion assembly in press (Fig. 6-50) check bearing preload torque (refer to "SERVICE INFORMATION" under "TOLERANCES" for correct press tonnage). If press is not available, the pinion nut may be tightened to the recommended torque (refer to "SPECIAL TORQUES" under "SERVICE INFORMATION") and preload checked.

If assembly is checked in press, refer to "TOLERANCES" under "SERVICE INFORMATION" for correct press tonnage.

Press Tonnage: _____

Pinion Nut Torque: _____

Wrap soft iron wire around cage (Fig. 6-51) and pull in a horizontal line using a pound scale. Read the indicated rotating torque.

NOTE: Use rotating torque, not starting torque.

If torque is not within recommended limitations (refer to "TOLERANCES" under "SERVICE INFORMATION"), install a thinner spacer to increase or thicker spacer to decrease preload.

Preload Torque Limits: _____

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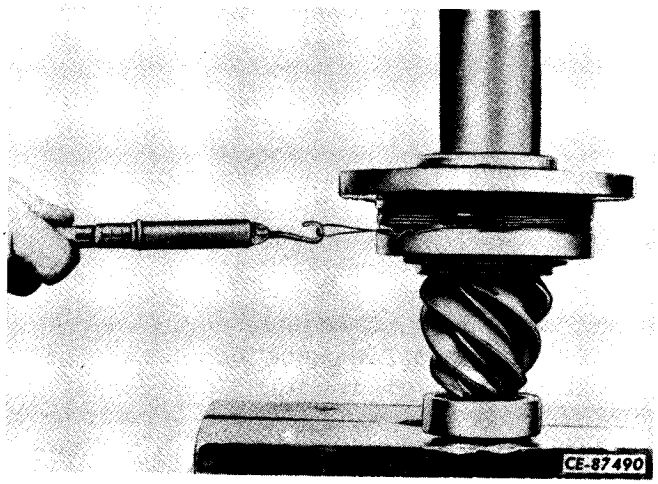

Figure 6-51

DIFFERENTIAL DISASSEMBLY AND ASSEMBLY

ASSEMBLY - Continued

As an example, let us assume the pinion cage diameter is 7 inches. The radius would be 3.5 inches and with 4 pounds of pull the preload torque would be 14 pound inches (3.5 x 4 = 14).

Press the yoke (1, Fig. 6-33) against the outer pinion thrust bearing and install flat washer and pinion shaft nut.

Install the pinion and cage assembly on differential carrier and secure with retaining cap screws. Cap screws need only be snugged up.

Holding the yoke with a suitable tool (Fig. 6-52), tighten the shaft nut to the correct torque (refer to "SPECIAL TORQUES" under "SERVICE INFORMATION").

Torque: _____

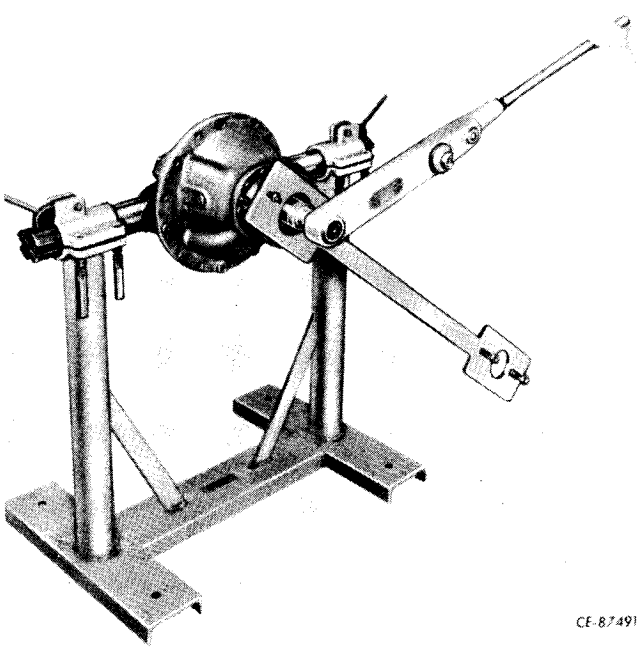

Figure 6-52

Remove the pinion and cage assembly from the differential carrier. Recheck the pinion bearing preload torque. If the rotating torque is not within the recommended limitations (refer to "TOLERANCES" under "SERVICE INFORMATION") repeat the adjusting procedure.

Hold the pinion yoke and remove the shaft nut, washer and yoke.

Lubricate the pinion shaft oil seal (1, Fig. 6-53). Coat the OD of the seal body with a non-hardening sealing compound. Install the seal in the pinion bearing cover (adapter) (2) using a suitable driver. Be sure lip of seal is toward pinion cage. Seal body must bottom on shoulder of bearing cover.

Install a new gasket on bearing cage assembly. Place bearing cover (adapter) (2) on cage.

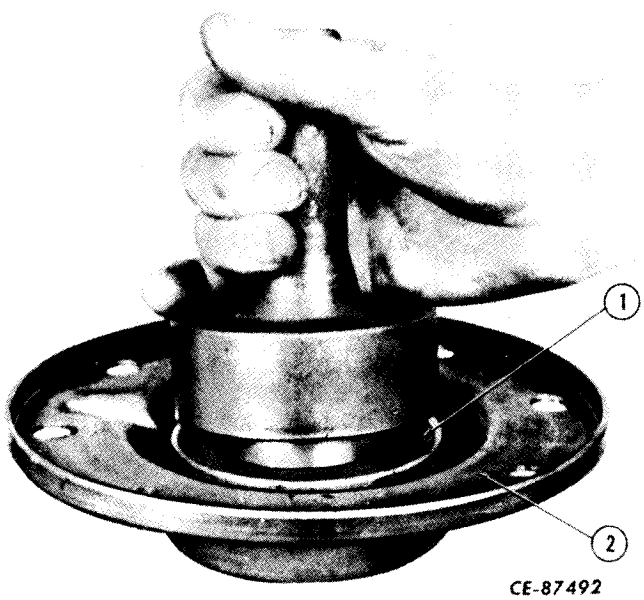

Figure 6-53

Press input yoke on pinion shaft and against outer thrust bearing.

Install the flat washer (27, Fig. 6-33) and pinion nut (28, Fig. 6-33). Tighten nut to recommended torque (refer to "SPECIAL TORQUES" under "SERVICE INFORMATION").

Torque: _____

Install cotter pin.

NOTE: Do not back off nut to align cotter pin holes.

DIFFERENTIAL DISASSEMBLY AND ASSEMBLY

Install shim pack (2, Fig. 6-54), removed during disassembly, between the bearing cage (1) and the carrier (3).

NOTE: Locate thin shims on outside of pack for best sealing ability.

Tap pinion and cage assembly in position with a soft mallet.

Install cage/cover retaining cap screws and tighten to the recommended torque (refer to "SPECIAL TORQUES" under "SERVICE INFORMATION").

Torque: _____

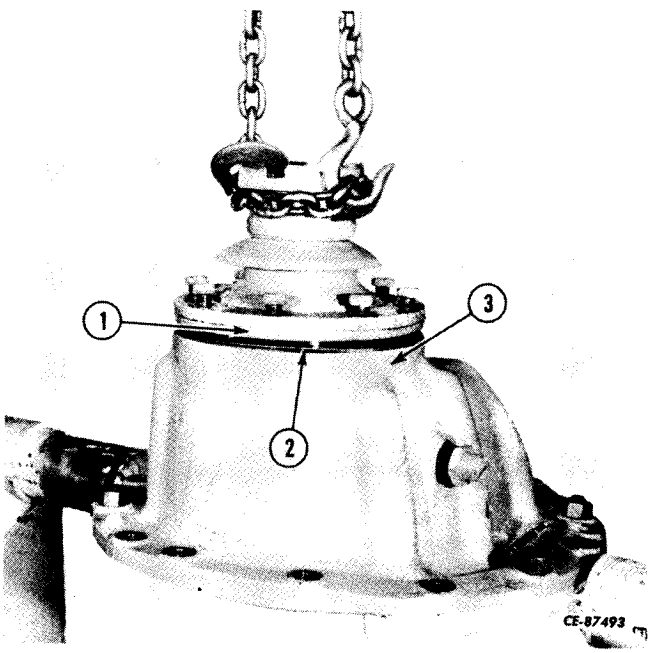

Figure 6-54

Rivet ring gear to case half with new rivets.

If a new gear or case is to be used, the rivet holes in the gear and case should be checked for alignment and line reamed if necessary. The gear must be tight on the case pilot and riveted flush with the differential case flange. Check with a .002" feeler gauge.

Rivets 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 1/8" larger in diameter than the rivet hole.

The head will be approximately the same height as the preformed head. Excessive pressure will cause distortion of the case holes and result in gear eccentricity. Refer to "TOLERANCES" under "SERVICE INFORMATION" for recommended press tonnage.

Press Tonnage: _____

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

Position thrust washer (3, Fig. 6-55) and side gear (2) in ring gear and case half assembly (1) after lubricating parts with new axle lubricant (refer to "LUBRICANTS AND CAPACITIES" under "SERVICE INFORMATION").

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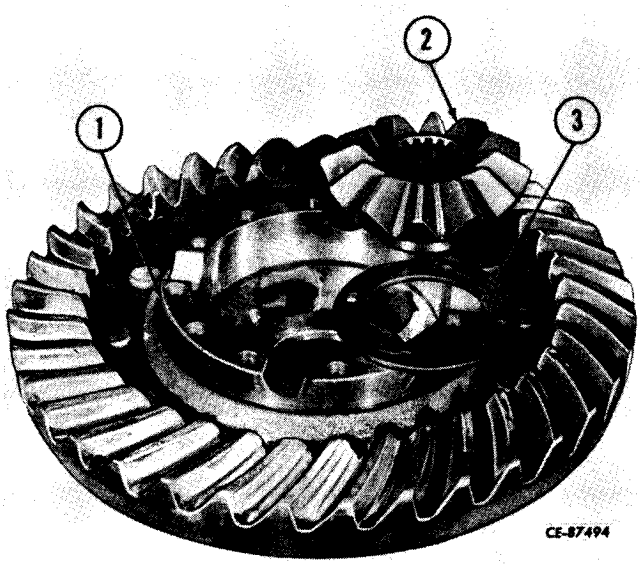

Figure 6-55

DIFFERENTIAL DISASSEMBLY AND ASSEMBLY

ASSEMBLY - Continued

Lubricate spider (6, Fig. 6-56), pinion gears (2) and thrust washers (5) with new axle lubricant.

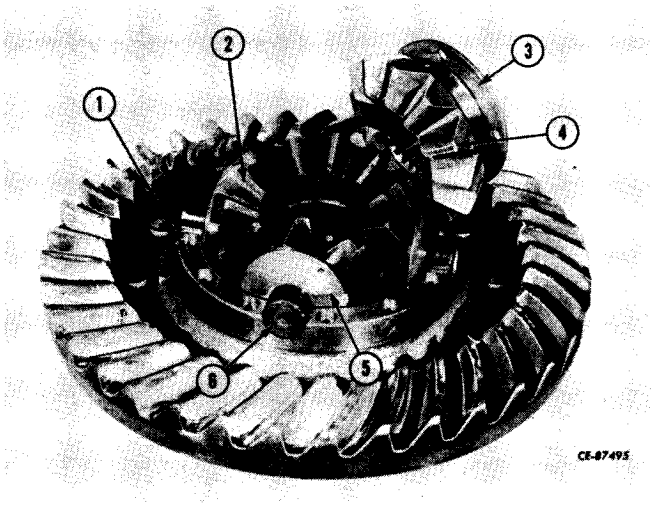

Figure 6-56

Place spider, pinion gears and thrust washers in position in case half (1).

Install remaining side gear (4) and thrust washer (3) after lubricating with new axle lubricant.

Align mating marks (1, Fig. 6-57) on case halves and secure assembly with four equally spaced cap screws and hex nuts.

Check assembly for free rotation of differential gears. Correct if necessary.

Install remaining cap screws and hex nuts. Tighten all differential case cap screws to recommended torque (refer to "SPECIAL TORQUES" under "SERVICE INFORMATION").

Torque: _____

Lock wire case retaining cap screws.

If ring gear thrust bearings (7, 18, Fig. 6-33) were removed, press new bearings squarely on case halves being sure they bottom on case shoulders. Use a suitable sleeve and press only on bearing inner race.

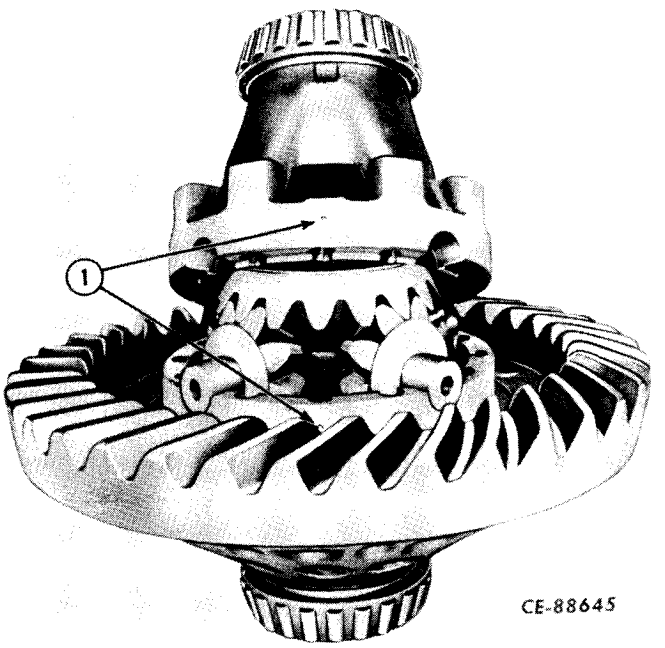

Figure 6-57

Lubricate bearings with new axle lubricant.

If the differential assembly will not be installed in the axle housing immediately, cover the complete assembly with a plastic cover to eliminate the entrance of dirt.

Temporarily install bearing cups (1, Fig. 6-58) and bearing caps (3). Tighten bearing cap

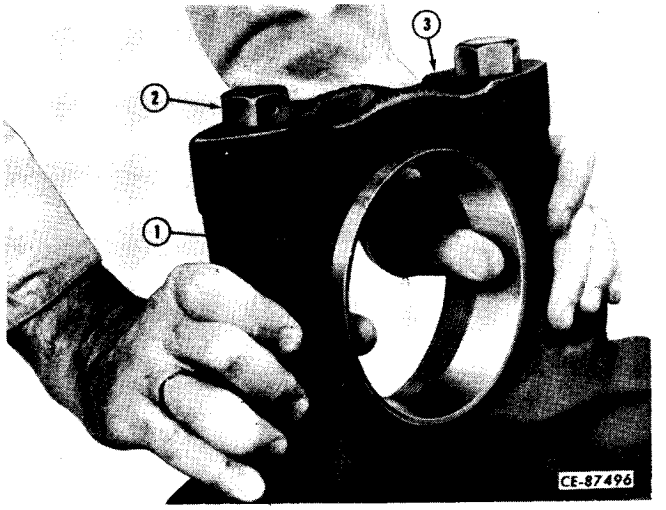

Figure 6-58

DIFFERENTIAL DISASSEMBLY AND ASSEMBLY

retaining cap screws (2) to recommended torque (refer to "SPECIAL TORQUES" under "SERVICE INFORMATION").

Torque:_____

NOTE: Observe reference punch marks (Fig. 6-36) when installing bearing caps.

The bearing cups (1, Fig. 6-58) must be a hand push fit in their respective bores. If cups are too tight, bores must be reworked with emery cloth until a push fit is obtained. Use a blued bearing cup as a gauge and check the fit often. When cups fit properly, remove the bearing caps.

Coat the differential bearing cones and cups with new axle lubricant.

Place bearing cups over differential bearing cones and position differential assembly in carrier (Fig. 6-59).

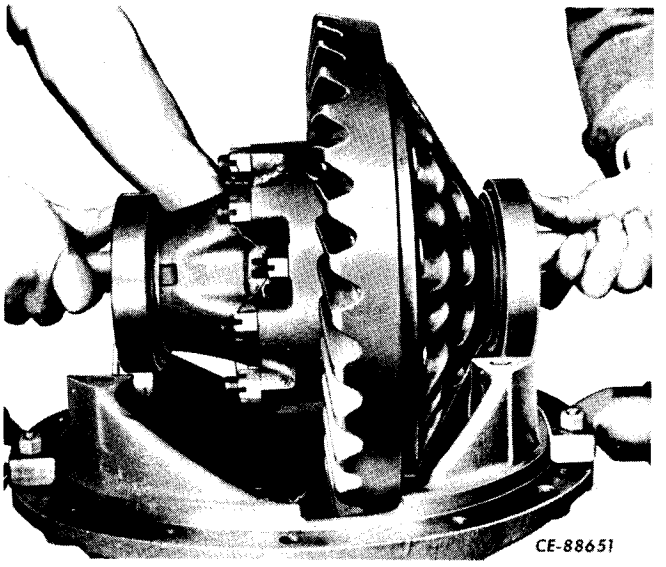

Figure 6-59

Install bearing adjusting nuts (2, Fig. 6-60). Hand turn them against bearing cups.

Install bearing caps (1) on their respective sides (refer to identification marks, Fig. 6-36) and tap lightly into position.

If caps do not position properly, adjusting nuts may be cross threaded. Remove caps and reposition the adjusting nuts.

NOTE: Do not force caps into position.

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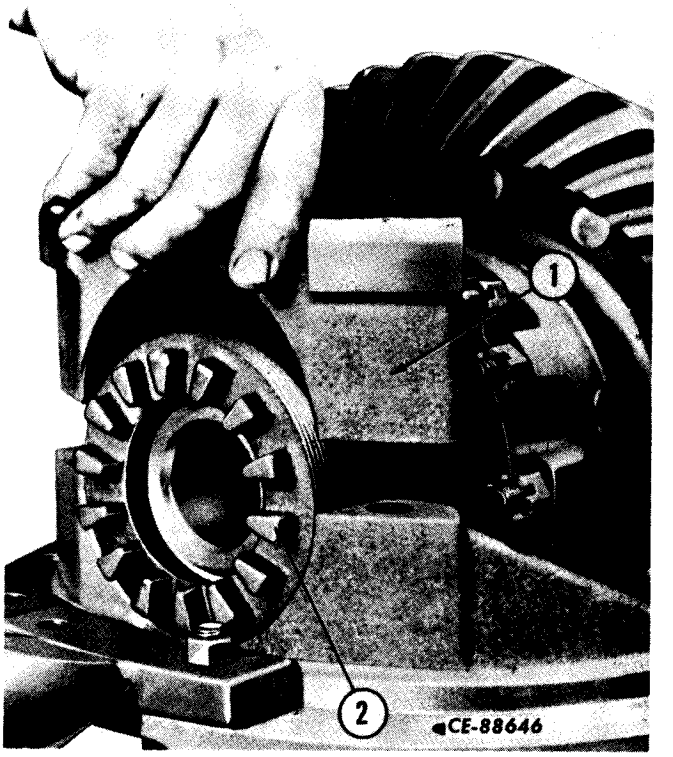

Figure 6-60

DIFFERENTIAL DISASSEMBLY AND ASSEMBLY

ASSEMBLY - Continued

Install flat washers (2, Fig. 6-61) and cap screws (1). Tighten cap screws to recommended torque (refer to "SPECIAL TORQUES" under "SERVICE INFORMATION").

Torque: _____

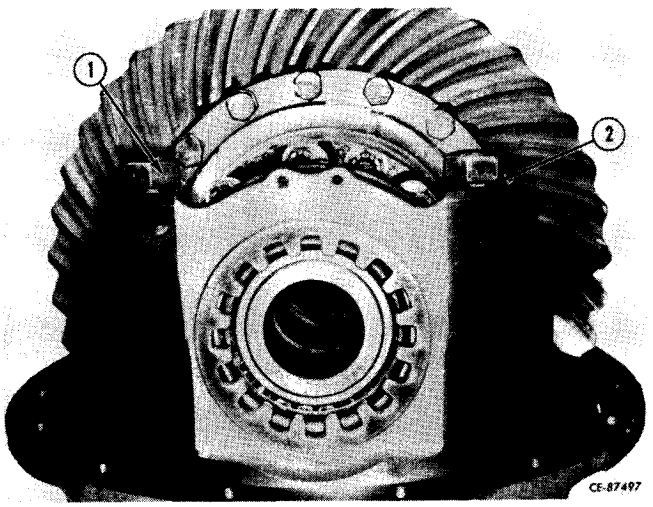

Figure 6-61

Using a dial indicator on the back face of the ring gear (Fig. 6-62) loosen the bearing adjusting nut on the side opposite the gear teeth just enough to notice end play on the indicator.

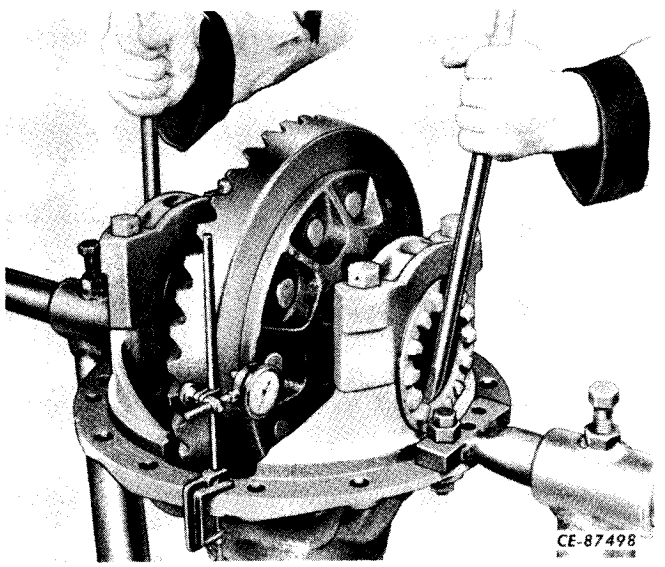

Figure 6-62

Tighten the same adjusting nut just sufficient to obtain .000 end play.

Check ring gear for runout. If runout exceeds recommended maximum (refer to "TOLERANCES" under "SERVICE INFORMATION"), remove differential and determine cause.

Max. Runout: _____

From the .000 end play setting, tighten the adjusting nuts one notch each to preload the differential bearings.

If ring and pinion gears were not replaced, the backlash dimension (Fig. 6-63) recorded before disassembly should be used.

If gear set was replaced the recommended backlash setting for new gears (refer to "TOLERANCES" under "SERVICE INFORMATION") should be adhered to.

Initial Backlash - New Gears: _____

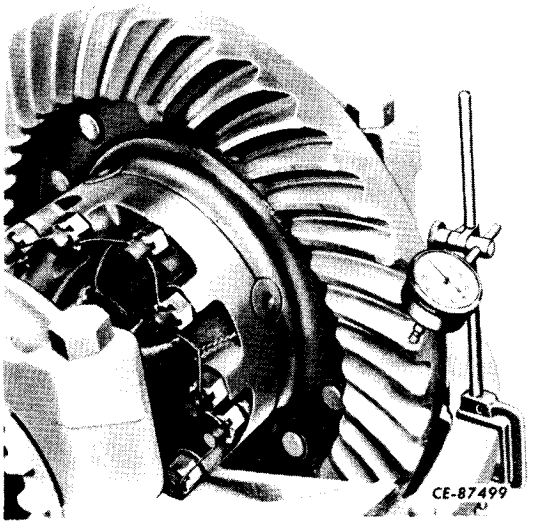

Figure 6-63

Backlash is adjusted by backing off one lock ring and advancing the opposite ring the same amount.

Apply oiled red lead (Fig. 6-64) to the ring gear teeth. When the pinion is rotated the red lead

DIFFERENTIAL DISASSEMBLY AND ASSEMBLY

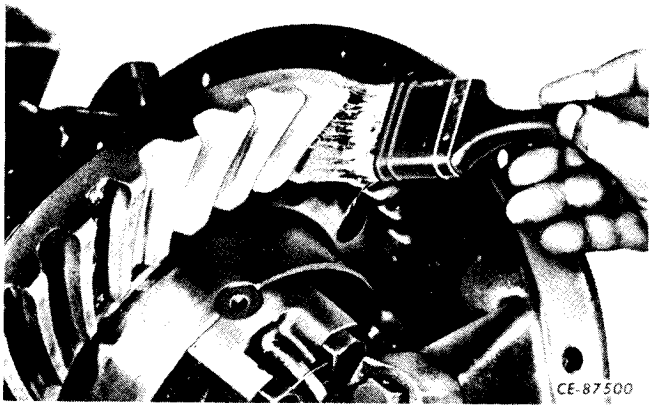

Figure 6-64

is squeezed away by the contact of the teeth leaving an imprint the exact size, shape and location as the contact.

Sharper impressions may be obtained by applying a small amount of resistance to the ring gear with a steel bar and using a wrench to rotate the pinion. When marking adjustments, check the drive side of the ring gear teeth. Coating approximately 12 teeth is sufficient to check tooth contact.

After a satisfactory tooth contact is obtained, especially in relation to the top and bottom of the tooth, the backlash may be altered within recommended limits (refer to "TOLERANCES" under "SERVICE INFORMATION") to obtain a better contact position relative to the length of the tooth.

Backlash Alteration Limits: _____

A high backlash setting can be used to keep the contact from starting too close to the toe. A low backlash setting can be used to keep the contact from starting too far away from the toe.

After establishing correct tooth contact, install adjusting nut locks (2, Fig. 6-65). Lock wire bearing cap retaining cap screw (1).

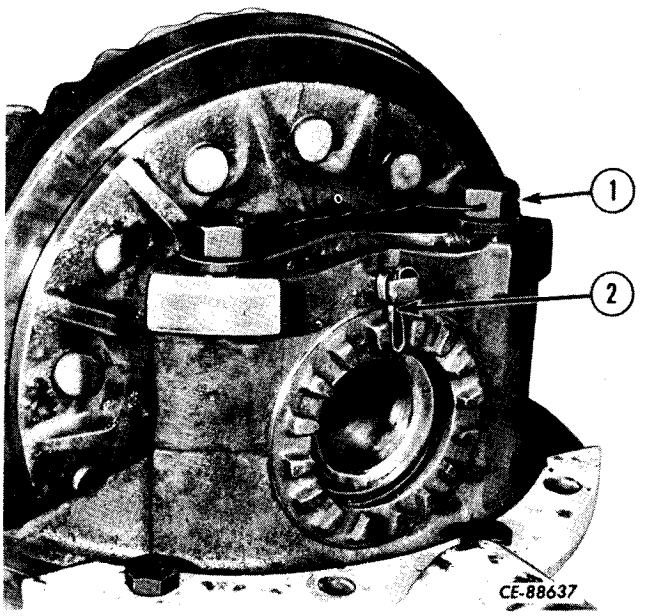

Figure 6-65

With adjustments properly made, the contacts shown in Fig. 6-66 will be obtained. The area of contact favors the toe and is centered between the top and bottom of the tooth.

(Continued on next page)

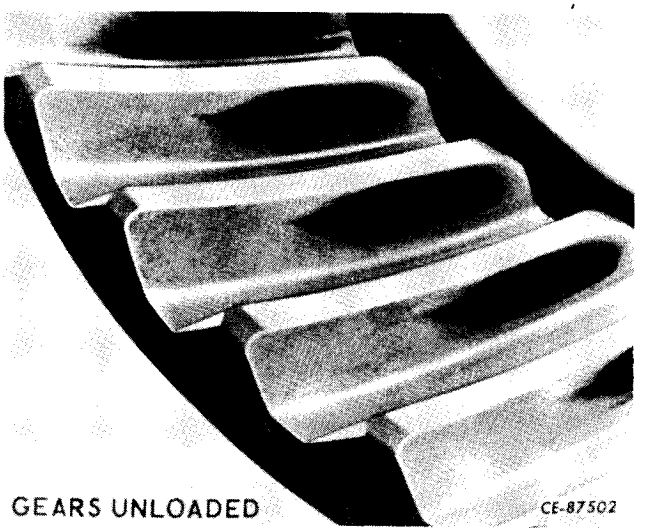

Figure 6-66

DIFFERENTIAL DISASSEMBLY AND ASSEMBLY

ASSEMBLY - Continued

The hand rolled pattern shown in Fig. 6-67 will result in a pattern centered in the length of the tooth when the gears are under load. The loaded pattern will be almost full length and the top of the pattern will approach the top of the gear tooth.

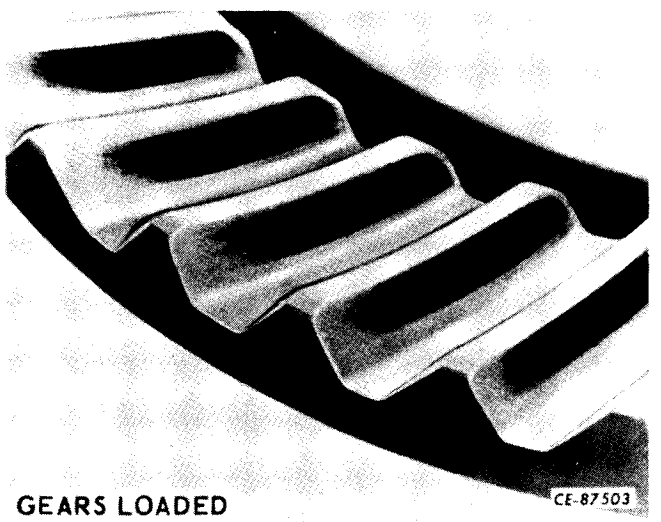

Figure 6-67

The pattern on the coast side of the teeth will appear the same width as the drive side; however the over-all length will be centered between the toe and heel of the gear tooth.

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

A high contact (Fig. 6-68) indicates the pinion is too far out. Set the pinion to the correct depth by removing shims under the pinion cage. A slight outward movement of the ring gear may be necessary to maintain correct backlash.

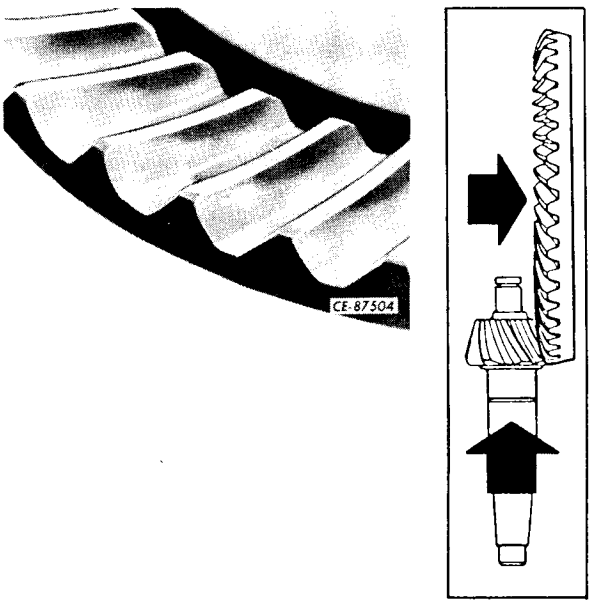

Figure 6-68

A low contact (Fig. 6-69) indicates the pinion is too deep. Set the pinion to the correct depth by adding shims under the pinion cage. Slight inward movement of the ring gear may be necessary to maintain correct backlash.

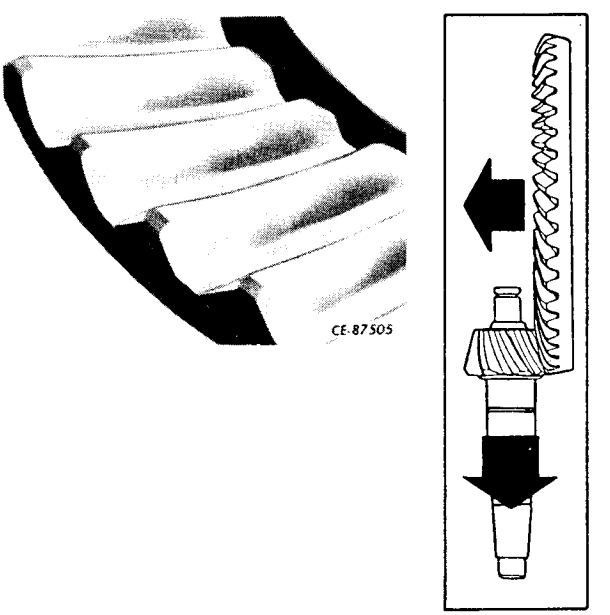

Figure 6-69

DIFFERENTIAL DISASSEMBLY AND ASSEMBLY

Remove carrier from the holding fixture. Position the assembly with the back face of the ring gear upward.

Inspect thrust screw (20, Fig. 6-33) for excessive wear and scoring. Replace screw if in doubt.

Install thrust screw (20, Fig. 6-33) and jam nut (21). Tighten adjusting screw sufficiently to locate it firmly against back face of hypoid gear.

Back off the adjusting screw until the recommended clearance (refer to "TOLERANCES" under "SERVICE INFORMATION") is obtained.

Thrust Screw Clearance:_____

Hold adjusting screw and tighten the jam nut securely.

Recheck the thrust screw-to-ring gear clearance for a full rotation of the ring gear.

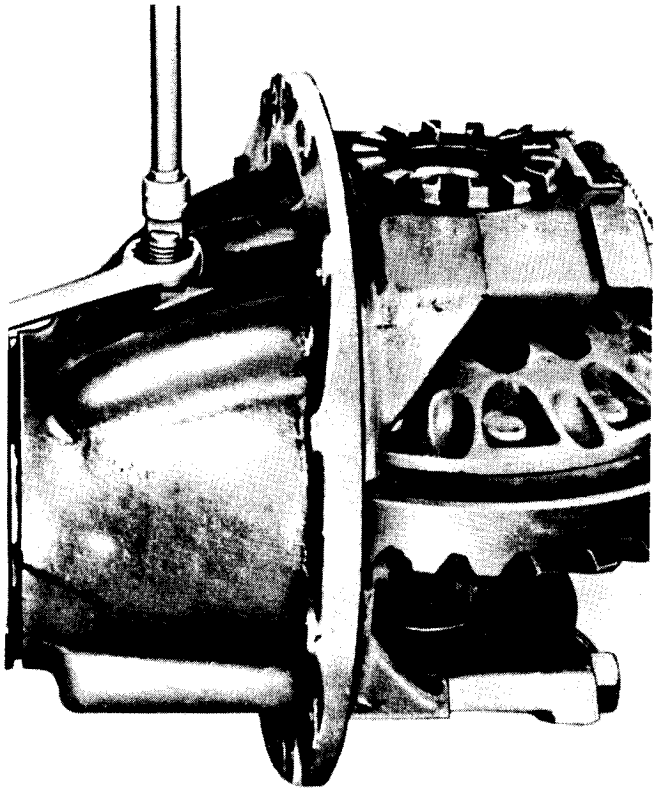

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Figure 6-70

PLANETARY DISASSEMBLY AND ASSEMBLY

DISASSEMBLY PREPARATION

Disassembly preparation should include:

a. Removing planetary assemblies from the axle (refer to "AXLE DISASSEMBLY AND ASSEMBLY").

b. Preparing a clean work area of sufficient size.

c. Cleaning the outside of the planetary carrier assembly with solvent (no caustic soda).

d. Secure the following equipment:

Work bench
Suitable hoist
Hydraulic press

A quantity of dry ice, sufficient to chill the ring gear hubs, will be required if hub bearing cones are removed.

SOLID AXLES

PLANETARY DISASSEMBLY AND ASSEMBLY

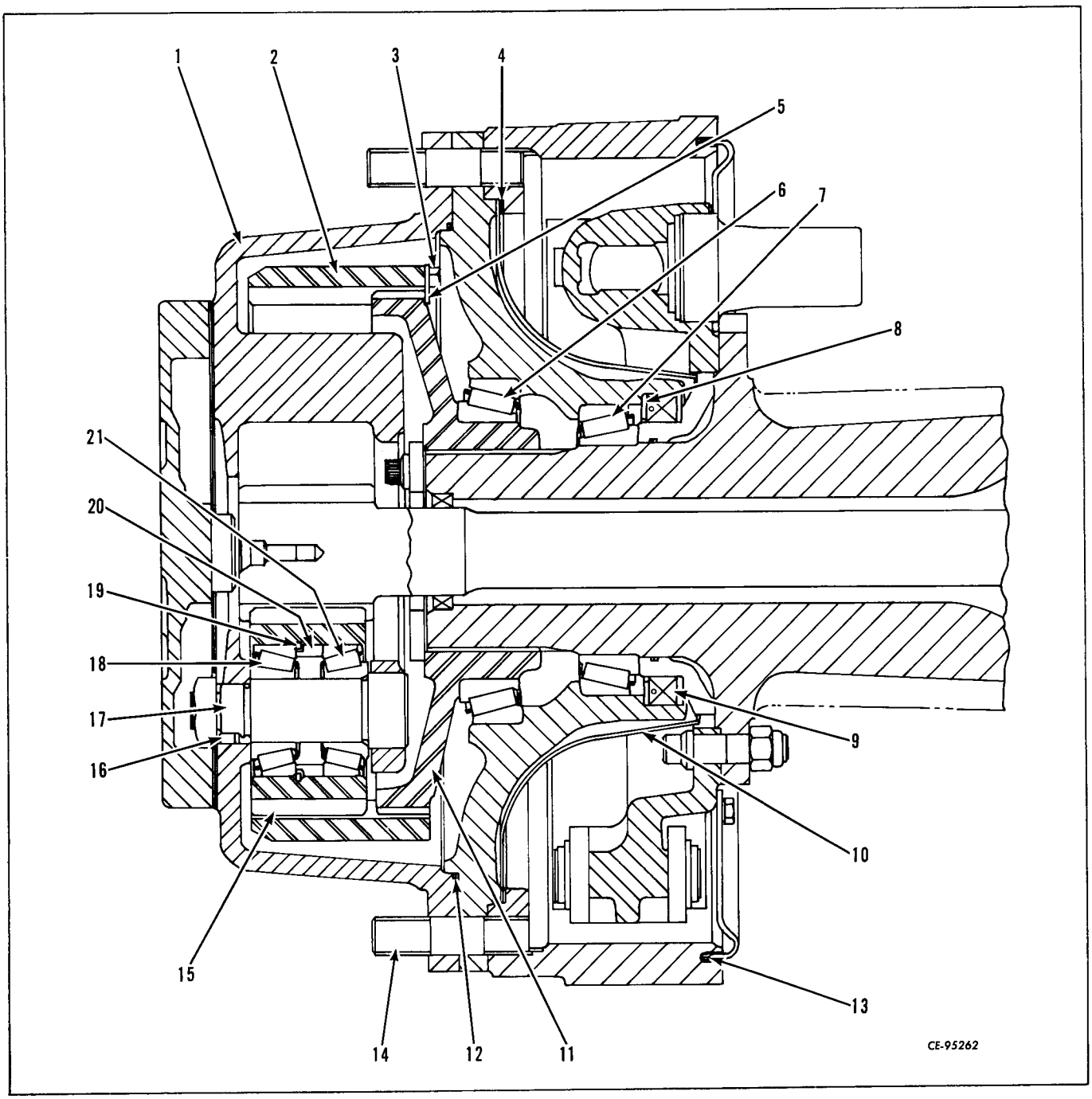

Figure 6-71
Planetary Assembly - Cross Section.

1. Planetary carrier.
2. Ring gear.
3. Cap screw.
4. Seal ring.
5. Lock plate.
6. Outer wheel hub bearing.
7. Inner wheel hub bearing.
8. Spacer.
9. Oil seal (o = seal spring).
10. Scavenger.
11. Ring gear hub.
12. Seal ring.
13. Felt brake drum seal.
14. Wheel stud.
15. Pinion gear.
16. Dowel pin.
17. Planetary pinion shaft.
18. Pinion bearing.
19. Retaining ring.
20. Spacer.
21. Pinion bearing.

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PLANETARY DISASSEMBLY AND ASSEMBLY

CARRIER

DISASSEMBLY

Remove the hex nuts (2, Fig. 6-72) from the planetary pinion shafts (1).

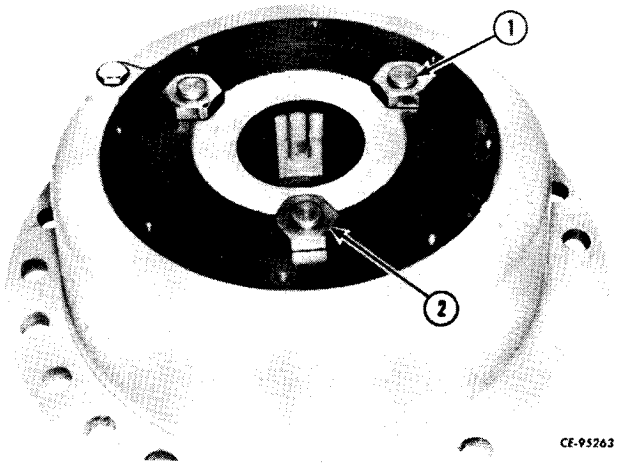

Figure 6-72

Press the planetary pinion shafts (3, Fig. 6-73) from the planetary carrier (1) using a hydraulic press. Exert the pressure on the small end of the pinion shafts.

NOTE: Do not lose dowel pins (4) as pinion shafts are removed.

After pressing all pinion shafts from the carrier the assembled pinion gears and bearings (2) may be removed.

Inspect the pinion bearings (1, 2, 6, 7, Fig. 6-74). Check for smooth, free rotation. If the bearings do not operate properly, remove the bearing cups (2, 7), spacer (5) and snap ring (3) from the pinion gears.

NOTE: Bearing cones and cups must be replaced together.

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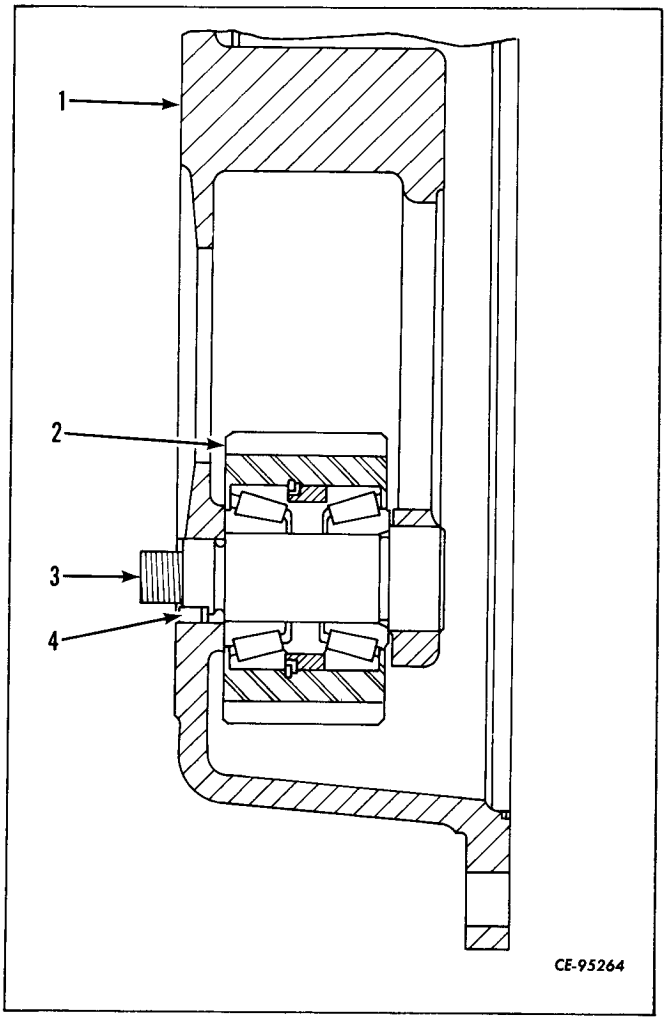


Figure 6-73

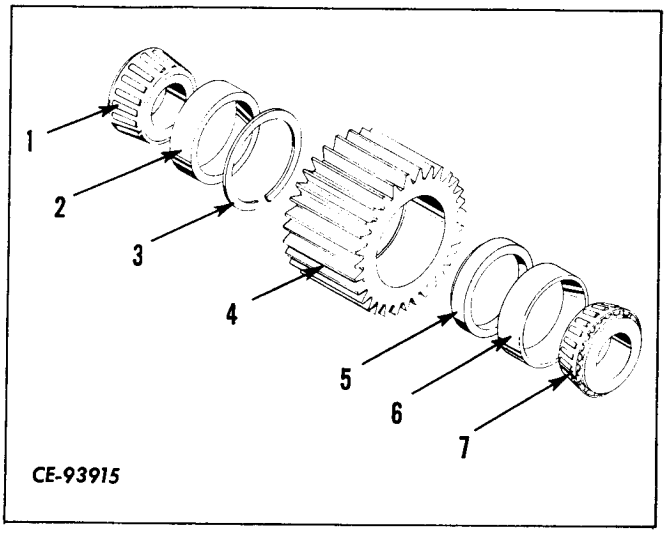


Figure 6-74

PLANETARY DISASSEMBLY AND ASSEMBLY

CARRIER - Continued

CLEANING AND INSPECTION

Clean all parts thoroughly in solvent. Dry parts with compressed air.

CAUTION: NEVER dry bearings by spinning with compressed air.

Inspect all bearings, cups and cones, including those not removed.

Inspection of pinions for wear or damage. Pinions showing wear or damage should be replaced.

Inspection of pinion shafts for wear or ridging.

Replace all snap rings, gaskets, "O"-rings and sealing washers.

Parts to be assembled immediately should be dipped in light oil to prevent corrosion. Parts to be stored should be coated with a good grade of rust preventive and wrapped in treated paper.

NOTE: Special Torque, Pressure etc. recommendations are listed under "SERVICE INFORMATION." This simplifies revision when necessary. To eliminate constant referral, blank spaces are provided at points where special information is required. These may be filled in by the manual holder, in pencil, and revised when necessary.

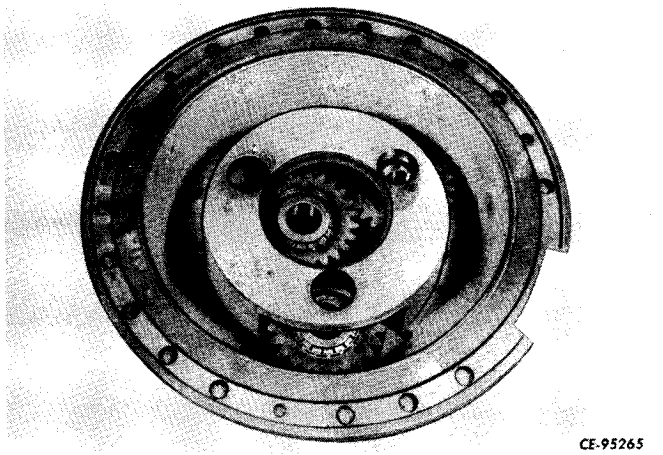
ASSEMBLY

Install a new snap ring (3, Fig. 6-74) in the groove in the pinion bore.

Install spacer (5) against snap ring. Press in bearing cups (2, 6).

Install bearing cones (1, 7) in cups with spacer (5) between cones.

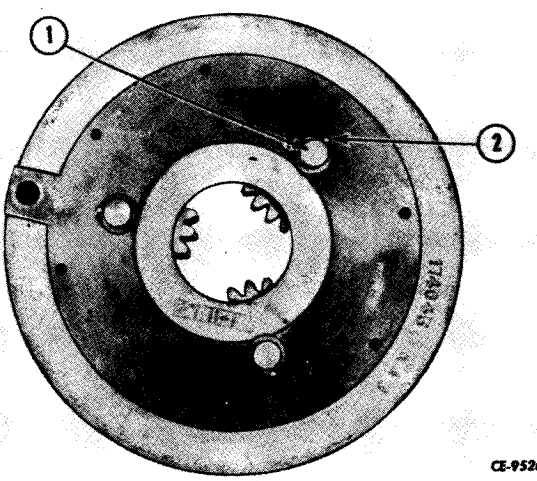
Slide the assembled pinions (Fig. 6-75) into the carrier in their approximate positions. All three must be installed before any shafts are installed. Align the holes of the pinion bearings and planetary carrier.



CE-95265

Figure 6-75

Pack the pinion shafts in dry ice to shrink them for easier installation. With the assembled pinions in position, install the pinion shafts (1, Fig. 6-76), aligning the dowel holes, and drive the shafts into position. Install the dowels (2) and drive into position against the shoulder of the shaft.



CE-95266

Figure 6-76

Install pinion nuts (1, Fig. 6-77) and tighten to recommended torque (refer to "SPECIAL TORQUES").

Torque: _____

Position the nut to fit inside the ID of the gasket (2) to provide clearance to install the cover.

PLANETARY DISASSEMBLY AND ASSEMBLY

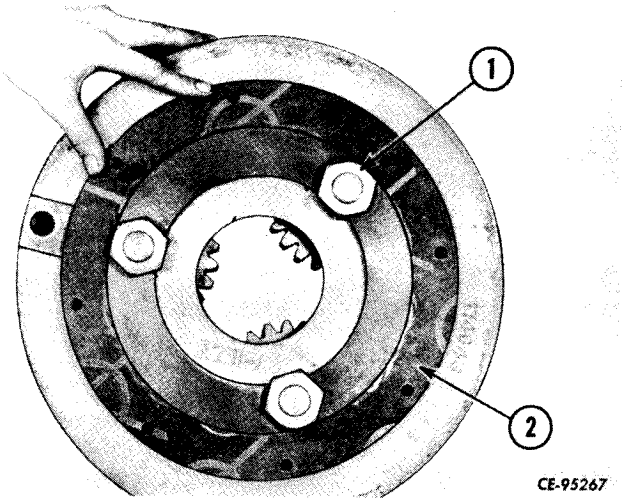


Figure 6-77

NOTE: In order to correctly position the nut, it may be necessary to vary the torque above or below that specified.

RING GEAR AND HUB

DISASSEMBLY

Remove the cap screws (4, Fig. 6-78) and lock plates (3) that secure the ring gear (1) to the ring gear hub (2). Remove the ring gear.

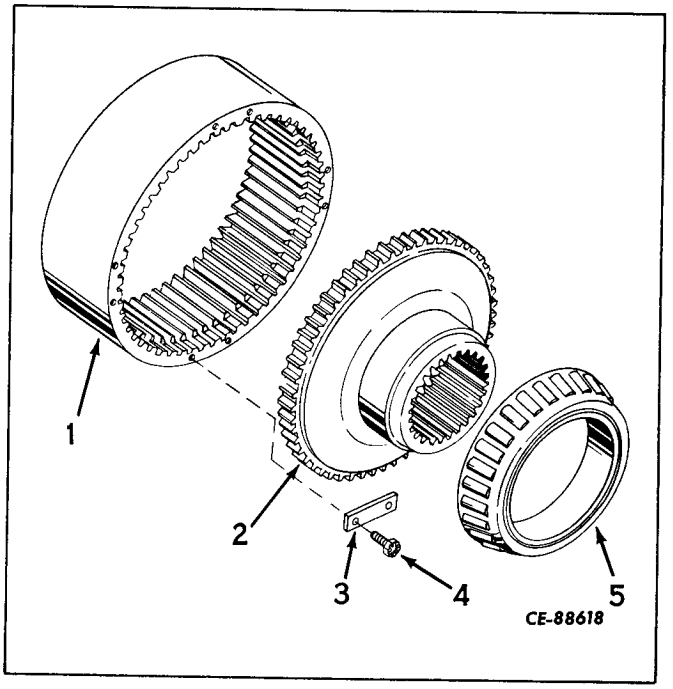


Figure 6-78

Using a suitable puller, remove the bearing cone (5) from the ring gear hub.

Wash all parts in fresh cleaning solvent. Inspect parts and replace if worn or damaged in any way.

ASSEMBLY

Chill ring gear hub (2, Fig. 6-78) in dry ice for 30 minutes. Install bearing cone (5) against shoulder of hub.

Position ring gear (1) on hub. Secure assembly with lock plates (3) and cap screws (4). Tighten cap screws to recommended torque (refer to "SPECIAL TORQUES" under "SERVICE INFORMATION").

Torque: _____

WHEEL HUB AND BEARING

DISASSEMBLY

Remove the seal (6, Fig. 6-79) and spacer (5) from the hub. Discard the oil seal.

Remove the bearing cone (4) from the hub. Mark the bearing cup and cone so the pair can be rematched if they are reused. Examine the bearing cone and cups for wear or damage. Check the rollers for flat or worn spots.

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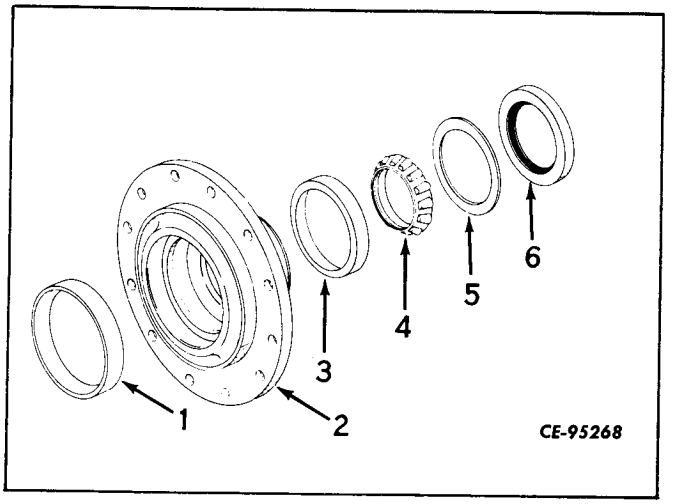

Figure 6-79

PLANETARY DISASSEMBLY AND ASSEMBLY

WHEEL HUB AND BEARING - Continued

DISASSEMBLY - Continued

Wash all parts in fresh cleaning solvent. Dry with compressed air.

CAUTION: NEVER dry bearings by spinning with compressed air.

Dip cones in light oil and check for wear, flat spots or damage. If cups or cones are damaged or worn, replace complete bearing. Remove damaged bearing cup(s) (1 and/or 3) by pressing from hub.

ASSEMBLY

If bearing cups (1, 3, Fig. 6-79) were removed from the hub (2), press new cups in the hub. Lubricate the bearing cone (4) with new axle lubricant (refer to "LUBRICANTS AND CAPACITIES" under "SERVICE INFORMATION") and install it in the bearing cup (3) in the hub.

Install the spacer (5) against the hub shoulder.

Coat the OD of a new seal (6) with mar-seal or equivalent sealant. Press new seal in hub against spacer.

BRAKE DRUM

DISASSEMBLY

If the scavenger (3, Fig. 6-80) is damaged and requires replacement, drive it from the drum assembly with a heavy mallet. Remove the seal ring (4, Fig. 6-71) that lies between the scavenger and the brake drum. Discard seal and scavenger.

Remove the felt seal (1, Fig. 6-80) from its groove in the brake drum (2). Discard the seal.

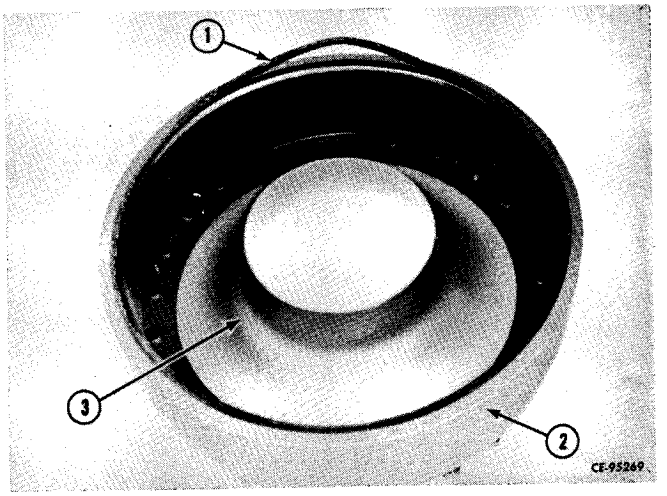

Figure 6-80

If any wheel studs are damaged, replace them. In addition, replace the studs on either side of the damaged stud. If approximately half of the studs are damaged, replace all of the studs on that drum.

ASSEMBLY

Replace the necessary wheel studs as described above.

Install a new seal (4, Fig. 6-71) on the drum shoulder of the drum. Position a new scavenger (3, Fig. 6-80) on the drum and tap edges lightly to start scavenger into bore. Position a hardwood block across the FULL DIAMETER of the scavenger and using a mallet drive the scavenger into position. Rotate the block while striking it with the mallet. Be sure the scavenger is seated around its entire circumference against the drum shoulder.

Install a new drum seal (1, Fig. 6-80) in the drum groove. Do not damage or distort the seal during installation. Seal must not be twisted during installation.

TROUBLE SHOOTING

Noise and vibration, originating in the transmission, drive shafts or tires is often attributed to an axle. The source of noise should be investigated before deciding that the cause is in the axle.

Axle noise may be isolated within the axle by jacking up the tractor so the tires clear the ground. If the noise is in one axle, disconnect the drive shaft of the opposite axle at the transmission. Now the noise may be isolated with only the noisy axle turning. Run the engine at a moderate speed with the transmission in first gear. Both wheels must be off the ground to prevent damage to the differential.

CAUTION: If a failure should occur in the differential, the tractor must not be operated under its own power. If the tractor must be moved, disconnect the drive shaft at the transmission, or remove the drive shaft completely. Drain both planetary hubs of the noisy axle, remove the planetary covers and pull the axle shafts to prevent further damage. When shafts are removed, install planetary covers and fill hubs before moving tractor. The tractor may be driven a short distance with one axle if the drive shaft and axle shafts are removed from the noisy axle or differential.

TROUBLE SHOOTING CHART

COMPLAINT	PROBABLE CAUSE	REMEDY
	AXLE	
Noise.	1. Incorrect lubricant, or level too low.	1. Check level; fill with correct grade and type of lubricant.
	2. Wheel bearings scored or damaged.	2. Replace bearings.
	3. Wheel bearings improperly adjusted.	3. Adjust wheel bearings.
	4. Sun gear teeth excessively worn or damaged.	4. Replace axle shaft.
Loss of lubricant.	1. Lubricant level too high.	1. Drain to correct level.
	2. Lubricant foams excessively.	2. Drain and fill with correct type and viscosity of oil.
	3. Lubricant leaks at planetary cover.	3. Tighten cap screws or replace gasket.
	4. Worn or broken oil seal on axle spindle housing (oil leak from behind wheel into brake compartment).	4. Replace spindle oil seal.
	5. Worn or broken drive axle oil seal (oil level in differential rises).	5. Replace axle shaft oil seal.

(Continued on next page)

TROUBLE SHOOTING

TROUBLE SHOOTING CHART - Continued

COMPLAINT	PROBABLE CAUSE	REMEDY
	DIFFERENTIAL	
Noise when turning.	1. Worn spider gears or side gears.	1. Replace gears.
Loss of lubricant.	1. Worn drive pinion oil seal. 2. Scored or worn differential drive yoke.	1. Replace oil seal. 2. Replace drive yoke and drive pinion oil seal.
Differential overheats.	1. Incorrect lubricant or level too low. 2. Pinion or ring gear bearing worn. 3. Gear teeth excessively worn or damaged. 4. Unmatched pinion and ring gear.	1. Check level; fill with correct grade and type of lubricant. Check differential housing for leaks. 2. Replace worn bearings. 3. Replace gears. 4. Replace with a new matched pinion and ring gear.
Noise when driving.	1. Incorrect lubricant or level too low. 2. Pinion and ring gear adjustment too tight.	1. Check level; fill with correct grade and type of lubricant. Check differential housing for leaks. 2. Readjust pinion and ring gear backlash.
Noise when coasting.	1. Pinion or ring gear bearings damaged. 2. Pinion and ring gear adjustment too loose.	1. Replace bearings. 2. Readjust pinion and ring gear backlash.
NOTE: The following problems can be checked when the differential has been removed and disassembled.		
Side gear broken at hub.	1. Misaligned or bent drive axle.	1. Replace damaged gears. Check drive axle for alignment and examine other gears and bearings for possible damage and replace as needed.

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TROUBLE SHOOTING

COMPLAINT	PROBABLE CAUSE	REMEDY
Side gear broken at hub (Con't).	2. Worn thrust washers.	2. Replaced damaged gears. Examine other gears and bearings for possible damage. Replace all thrust washers.
Gears scored.	1. Incorrect lubricant or level too low.	1. Replace scored gears. Inspect all gears and bearing for possible damage. Clean out housing and fill with correct grade and type of lubricant.
	2. Excessive wheel spinning.	2. Replace scored gears. Inspect all gears, pinion bores and shafts for scoring. Inspect bearings for possible damage and replace as needed.
Pinion and/or ring gear tooth breakage.	1. Improper pinion and ring gear adjustment (backlash). 2. Excessive shock loading of gears.	1. Replace gears with new matched set. 2. Inspect remaining parts for possible damage and replace as needed.
PLANETARY		
Noise.	1. Planetary gears or ring gear teeth worn, chipped or broken. 2. Bearings in planetary gears worn or broken.	1. Replace planetary gears or ring and pinion gears. 2. Replace gear shafts and bearings.
BRAKES		
Brakes drag.	1. Brakes incorrectly adjusted. 2. Return springs broken. 3. Wedge return spring broken.	1. Adjust brakes. 2. Replace springs. 3. Replace spring.

SOLID AXLES

SERVICE INFORMATION

SPECIFICATIONS

AXLE

Overall Length	109-1/2"
Track - With Standard Wheels	92"
Approximate Weight	Front - 2600 lbs.
	Rear - 2550 lbs.

RATIOS

Differential	6.167
Planetary	5.2
Total	32.07

BRAKES

Diameter of Brake Drum	20.25"
Width of Brake Shoes	4"
Brake Cylinder Diameter	1.75"

LUBRICANTS AND CAPACITIES

	CAPACITY	LUBRICANT		
Differential (each)	36 pts.	IH-135H EP OR MIL-L-2105B	GL-5	Above 32° --- 140 Below 32° --- 90
Planetaries (each)	6-1/2 pts.			

TOLERANCES

Additional shim pack; planetary ring gear hub retainer-to-axle housing spindle	.005"
Press tonnage - differential pinion cage preload test	11 tons
Preload torque limits - differential pinion cage	5-15 lbs. in.
Press tonnage - rivets; ring gear-to-flanged case	45 ton
Ring gear runout - maximum	.008"
Initial backlash - new ring and pinion gear set	.010"
Backlash alteration limits - permissible during adjustment	.005"-.015"
Thrust screw clearance	.010"-.015" (1/4 turn of adjusting screw)

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SERVICE INFORMATION

SPECIAL TORQUES

(Threads lubricated with oil or grease)

Axle housing-to-axle bowl cap screws	430-450 lbs. ft.
Differential mounting cap screws	160-180 lbs. ft.
Brake spider-to-axle flange nuts	175-180 lbs. ft.
Ring gear hub retainer cap screws:	
Preliminary torque	30 lbs. ft.
Final torque	200 lbs. ft.
Planetary carrier-to-wheel hub, flat head cap screws	80-90 lbs. ft.
Planetary cover-to-carrier cap screws	33-37 lbs. ft.
Axle mounting cap screws	3500 lbs. ft.
Differential:	
Pinion nut torque	700-900 lbs. ft.
Pinion cage/cover retaining cap screws	81-104 lbs. ft.
Case half retaining cap screws	92-118 lbs. ft.
Bearing cap bolts	470-500 lbs. ft.
Planetary pinion shaft retaining nuts	300 lbs. ft.
Planetary ring gear-to-ring gear hub retaining cap screws	33-37 lbs. ft.
Wheel lug nuts	*900 lbs. ft.

*Wheel lug nuts must be torqued dry.

BRAKE ADJUSTMENT

Refer to Section 13, "BRAKE SYSTEM."

SPECIAL TOOLS

AXLE REMOVAL AND INSTALLATION TOOL

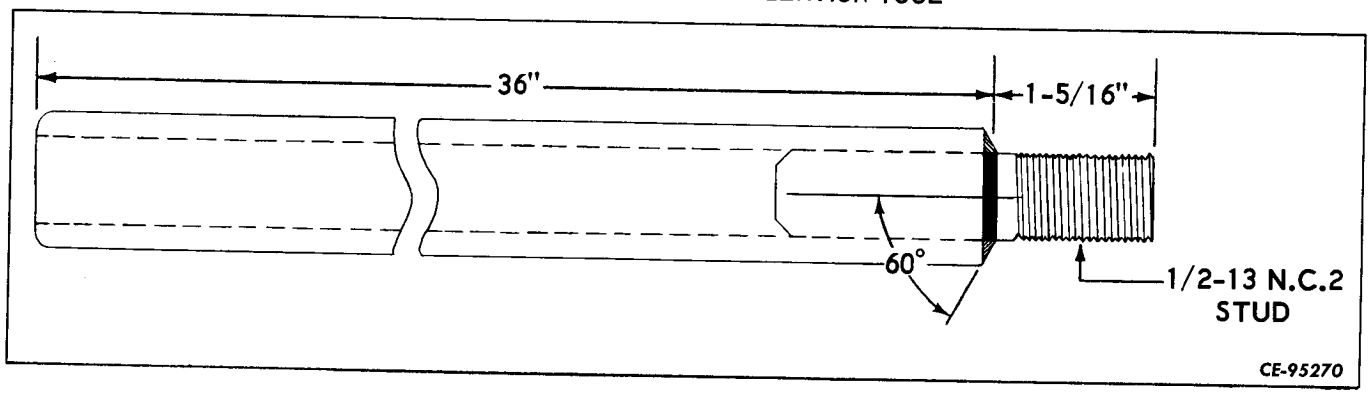

Figure 6-81

(Continued on next page)

SPECIAL TOOLS - Continued

DIFFERENTIAL HOLDING FIXTURE

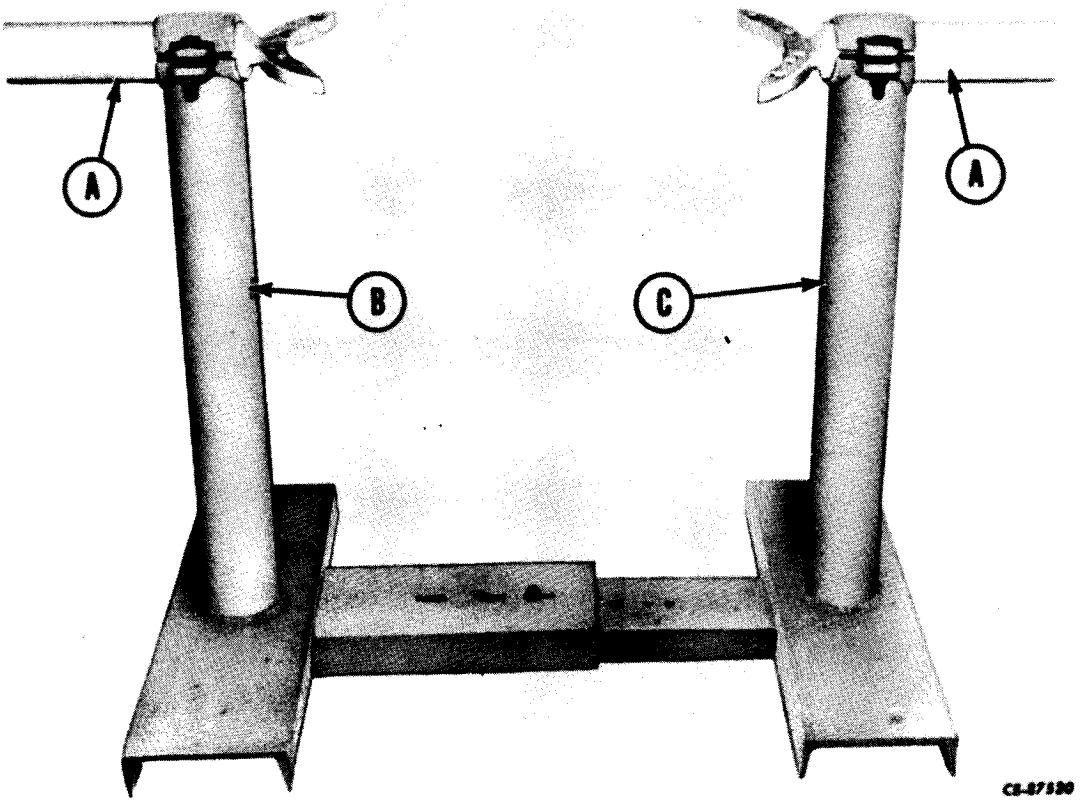

Figure 6-82
Assembled Differential Holding Fixture.

A. Swivel weldment (Fig. 6-83).
B. Stand weldment - left hand (Fig. 6-84).
C. Stand weldment - right hand (Fig. 6-85).

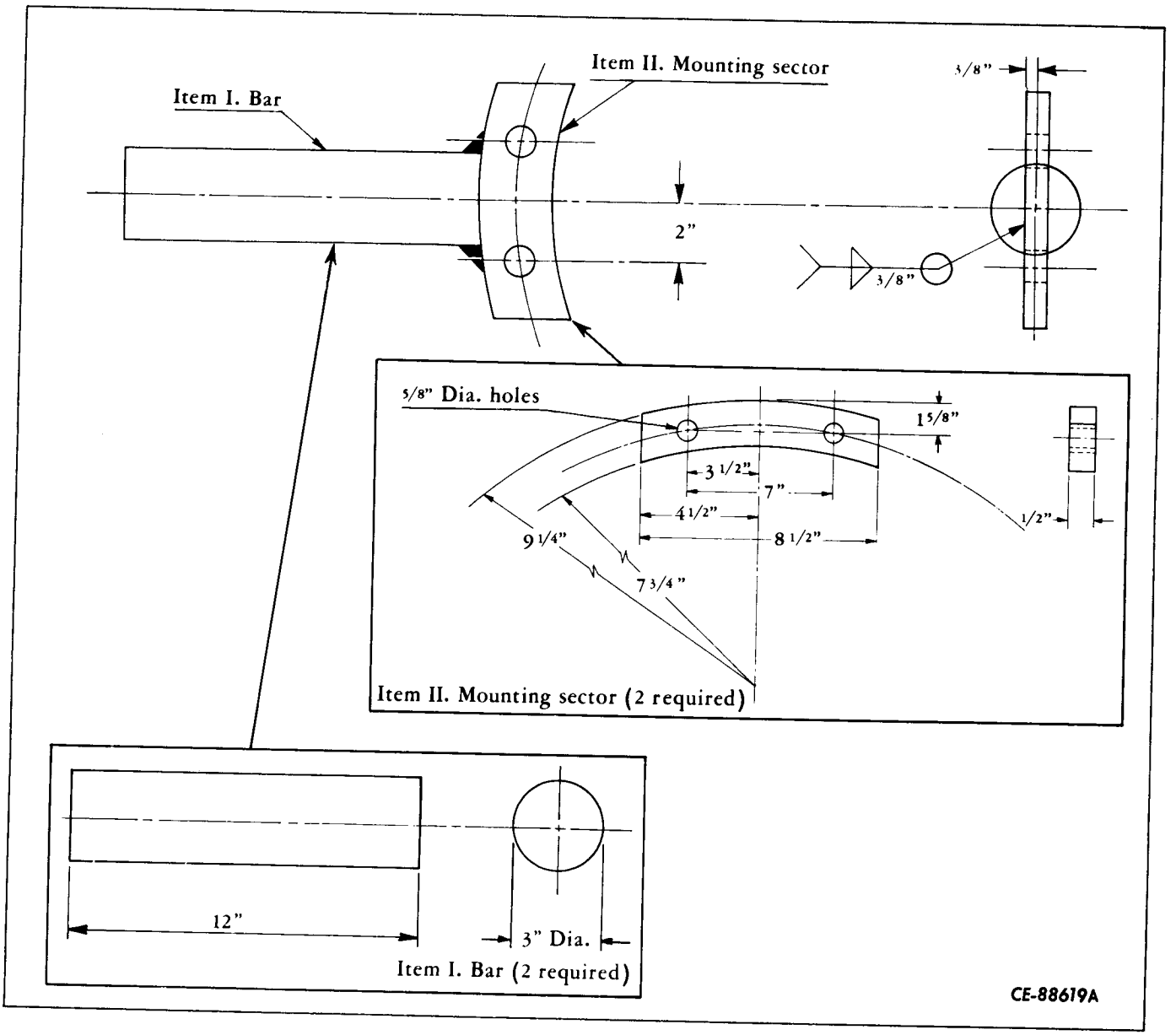

Figure 6-83
A. Swivel Weldment (2 Required).

SERVICE INFORMATION

SPECIAL TOOLS - Continued

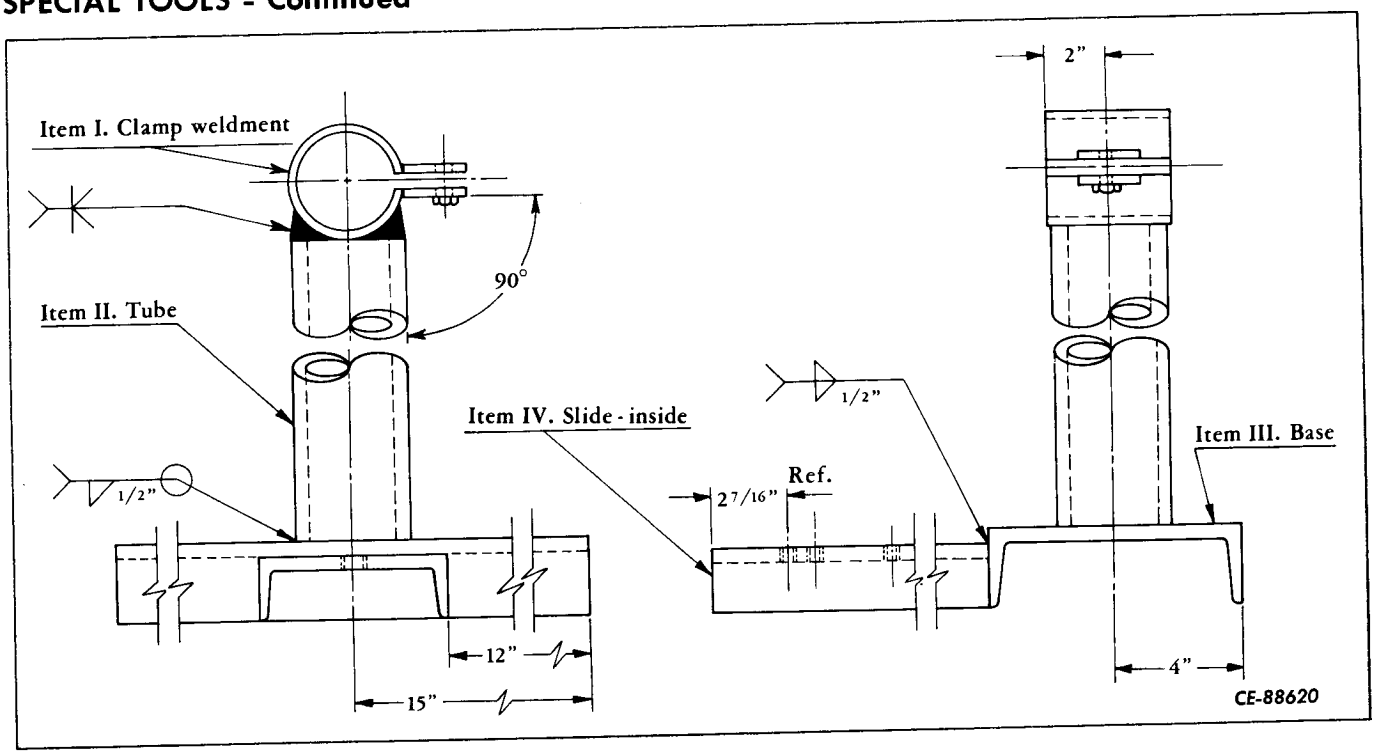

Figure 6-84
B. Stand Weldment Assembly - Left Hand (1 Required).
(Details Shown in Figures 6-86, 6-87, 6-88 and 6-90.)

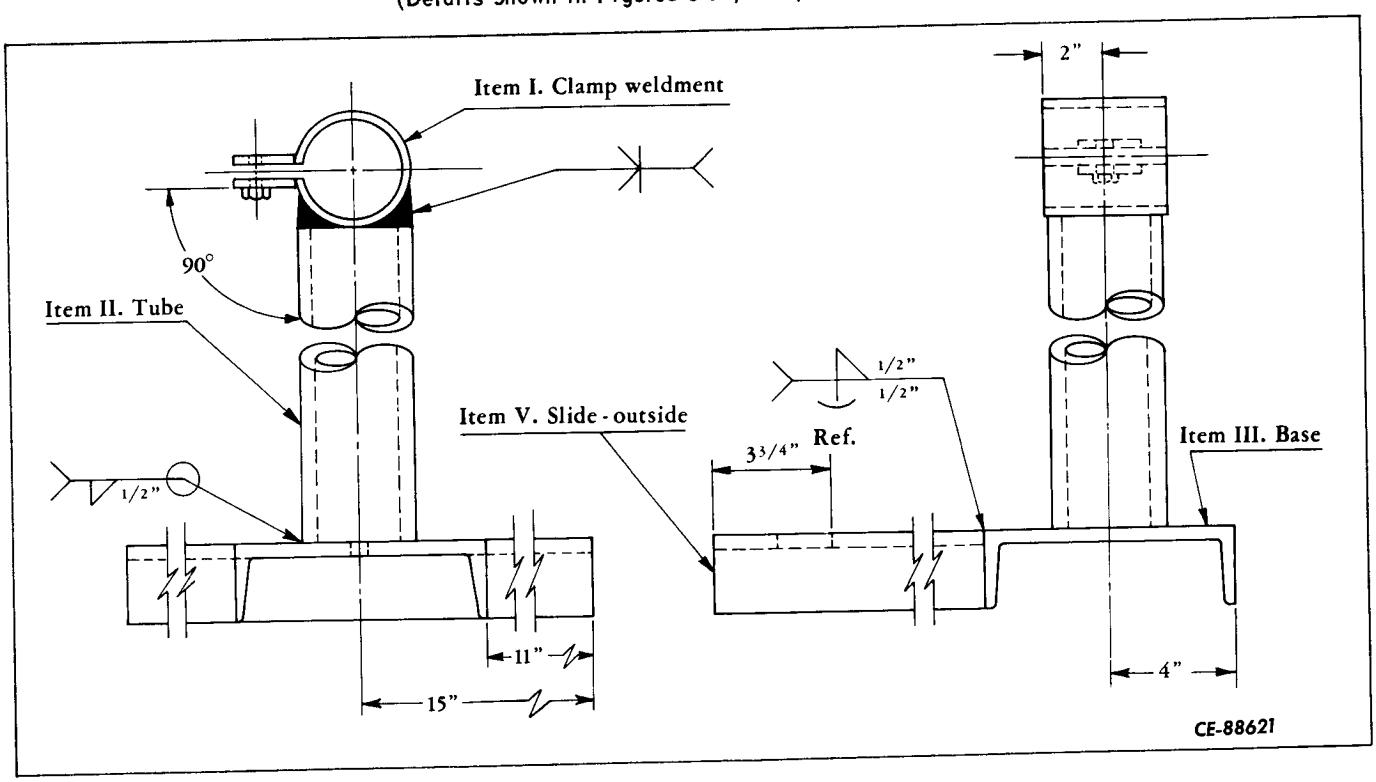

Figure 6-85
C. Stand Weldment Assembly - Right Hand (1 Required).
(Details Shown in Figures 6-86, 6-87, 6-88 and 6-89.)

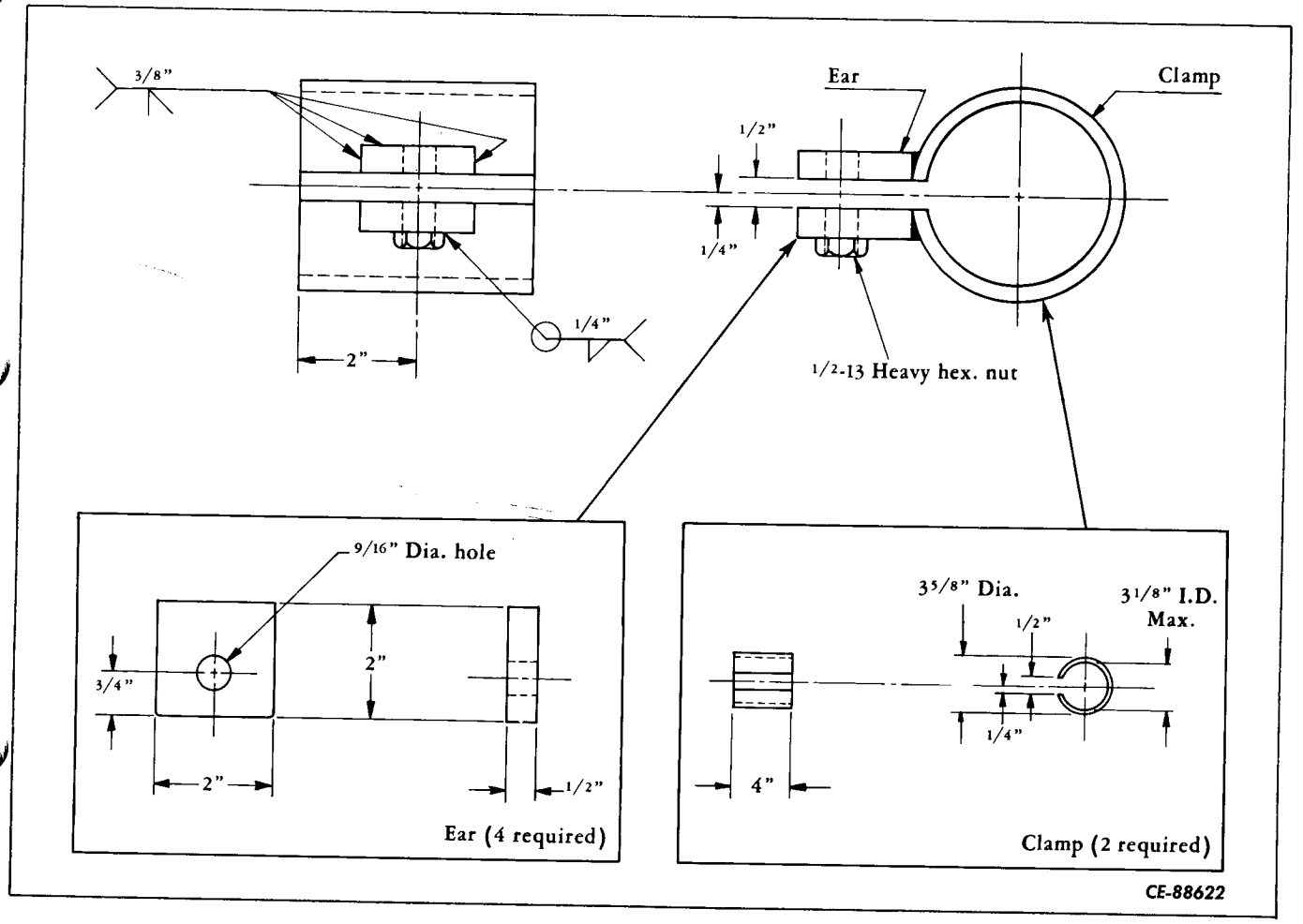

Figure 6-86
Item I. Clamp Assembly (2 Required).

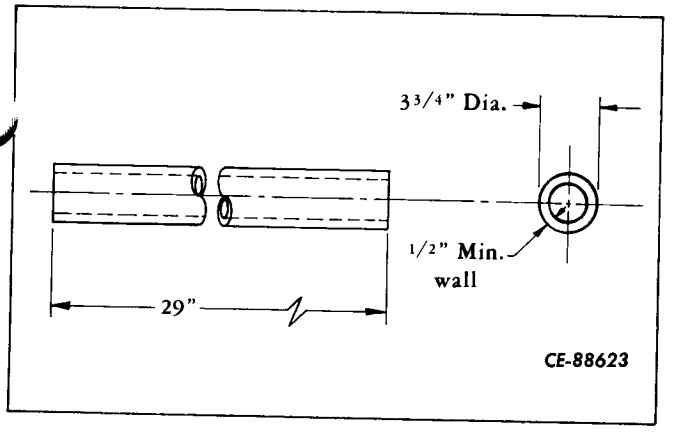

Figure 6-87
Item II. Tube (2 Required).

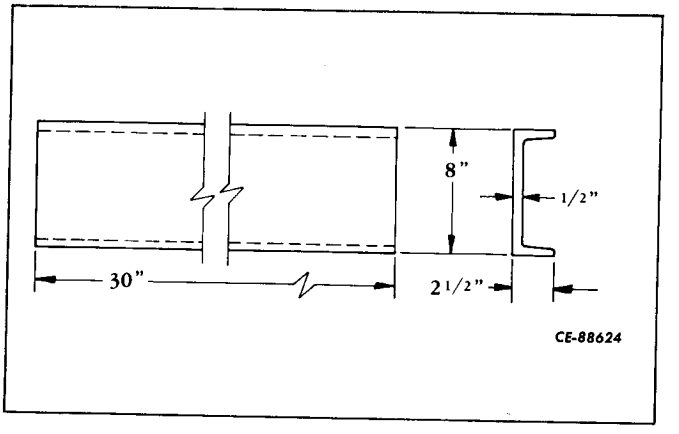

Figure 6-88
Item III. Base (2 Required).

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SPECIAL TOOLS - Continued

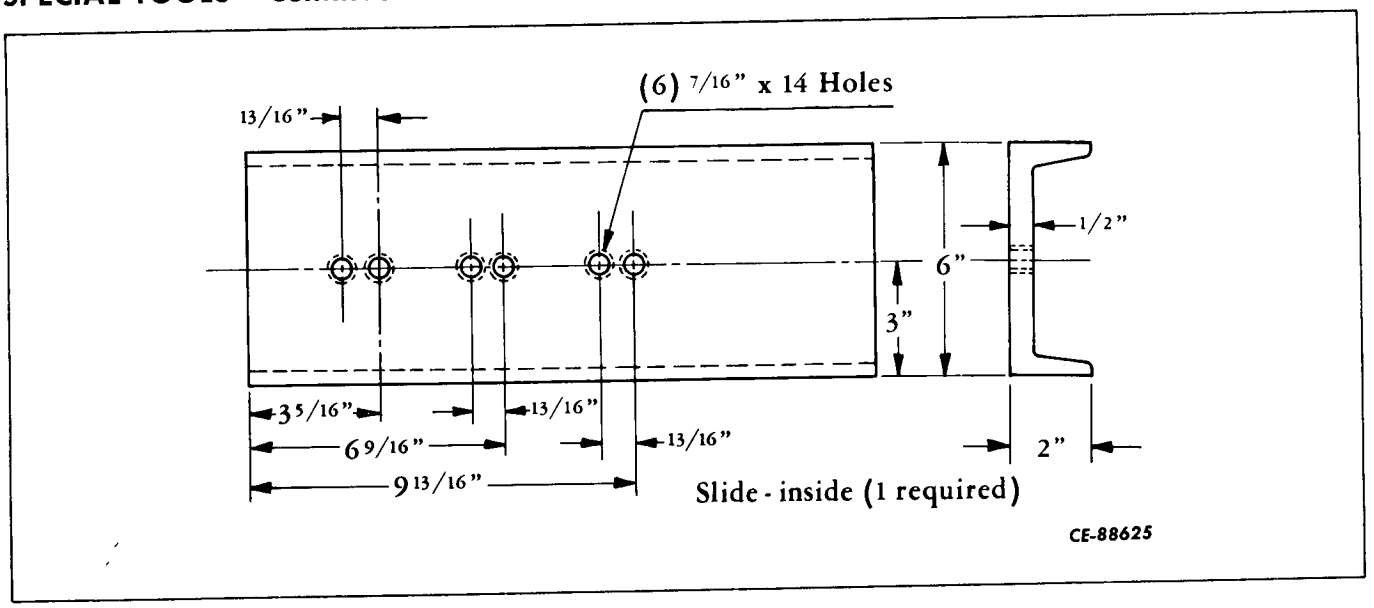

Figure 6-89
Item IV. Slide-Stand Weldment (Right Hand).

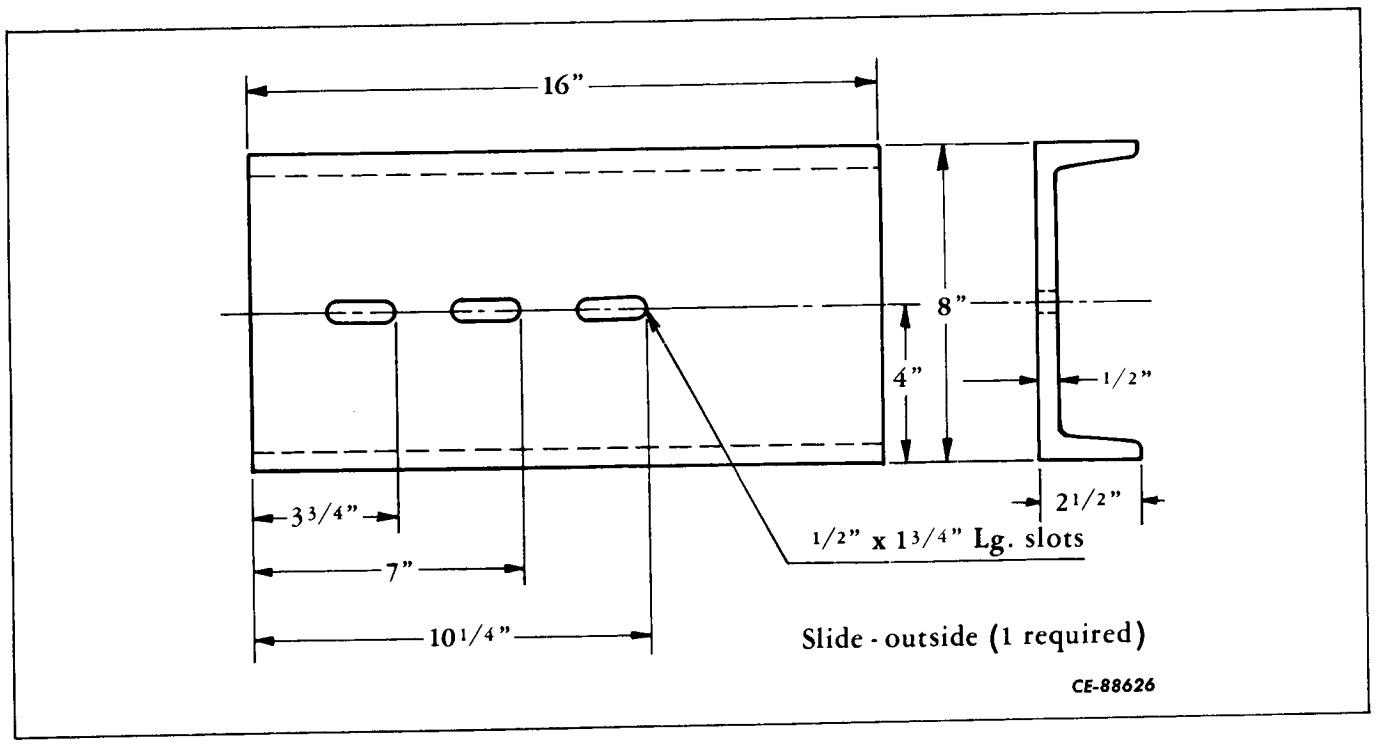

Figure 6-90
Item V. Slide-Stand Weldment (Left Hand).

SERVICE INFORMATION

WHEEL HUB - BRAKE DRUM LIFTING TOOL

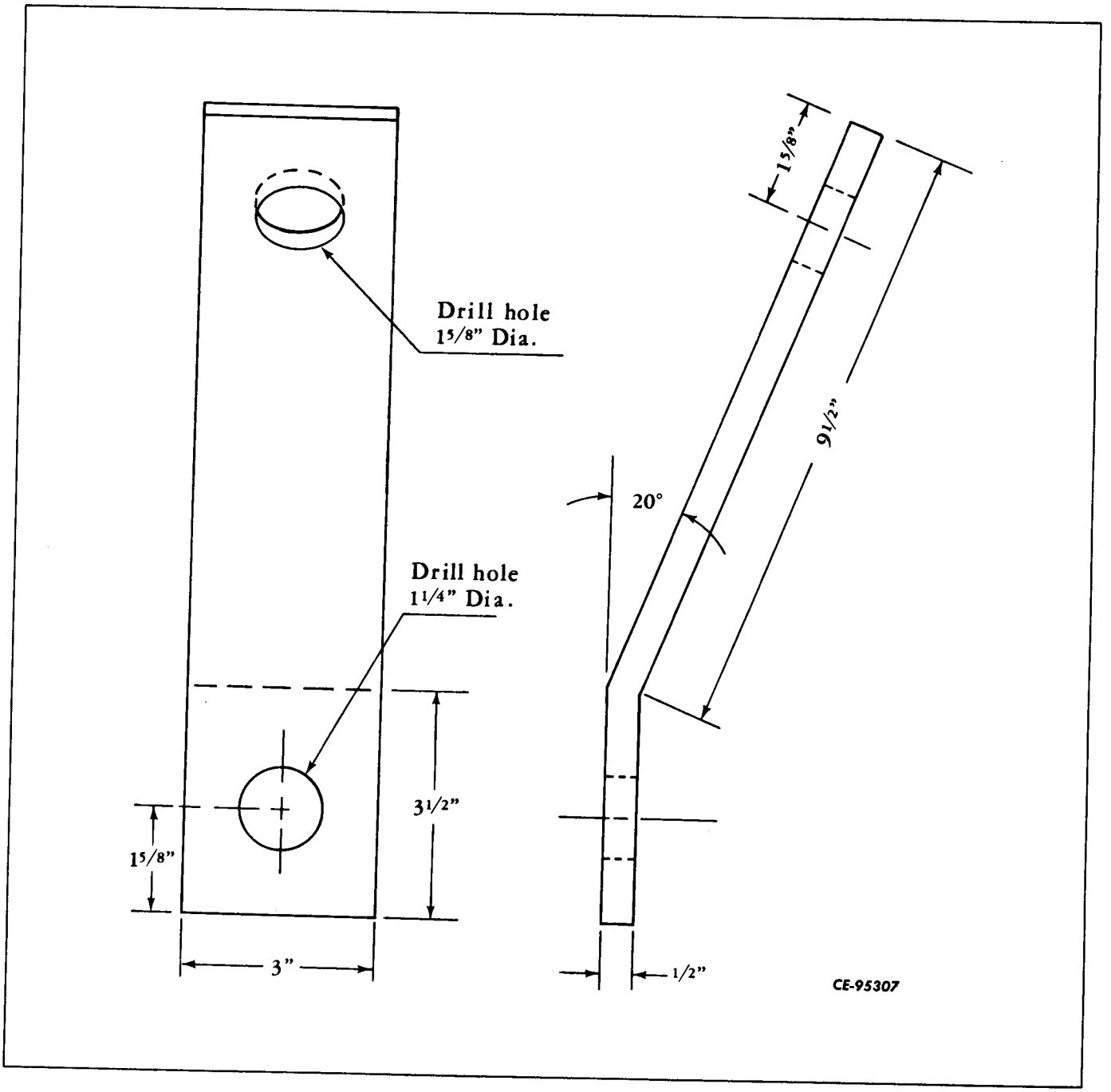

Figure 6-91

SERVICE BULLETIN REFERENCE

NUMBER	DATE	SUBJECT	CHANGES