

Shop Manual

150A 150FA

CRANE

SERIAL NUMBERS

150A -09695 - 10827

150FA -09695 - 10827

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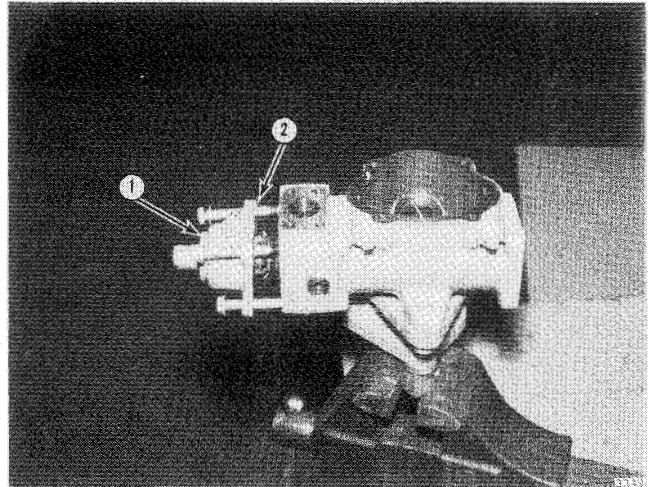


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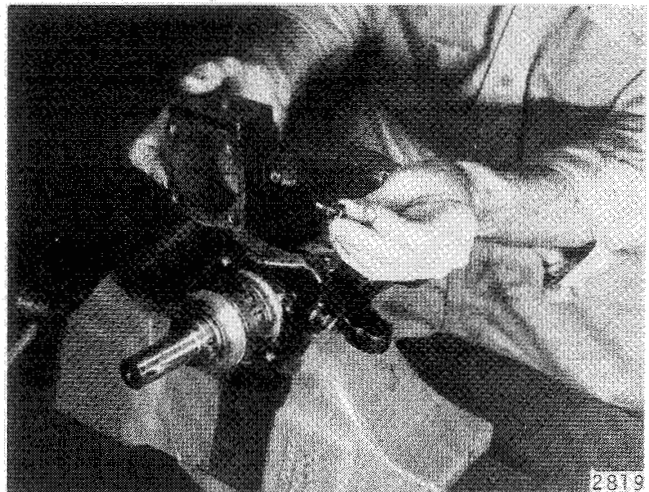
18

On models with two-piece (separate upper cover and actuator) actuator housing, remove cover (1) and gasket (2).



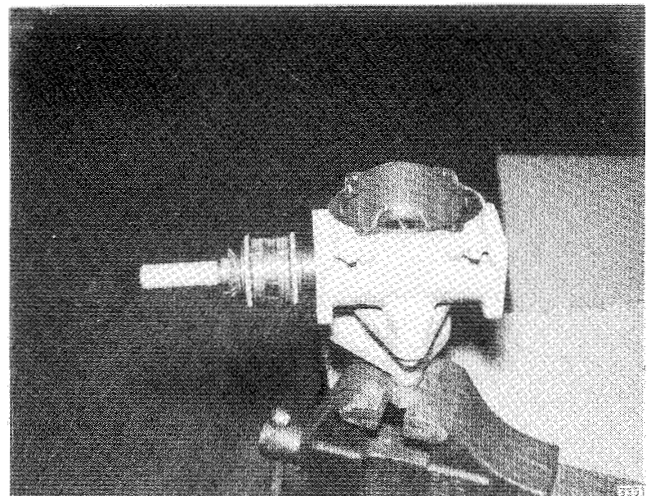
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Remove actuator retainer screw and washer, then remove actuator housing and gasket.



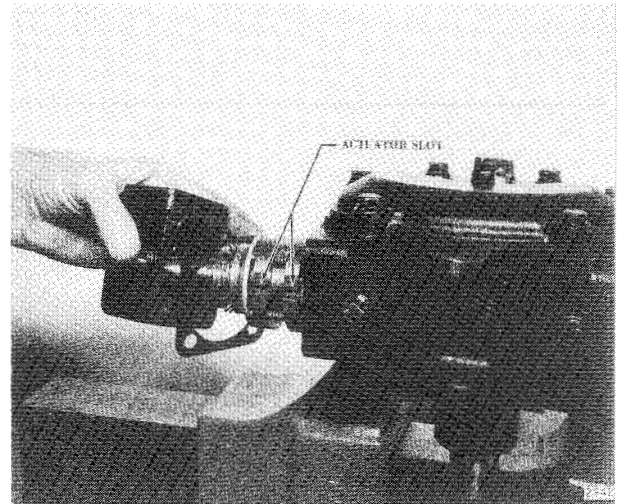
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Remove cam and actuator assembly.



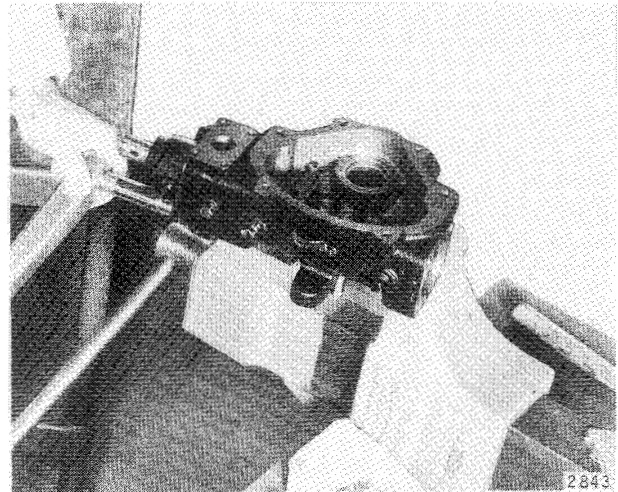
48

Position gasket and actuator housing. Be certain that slot in actuator is horizontal to take retainer screw.



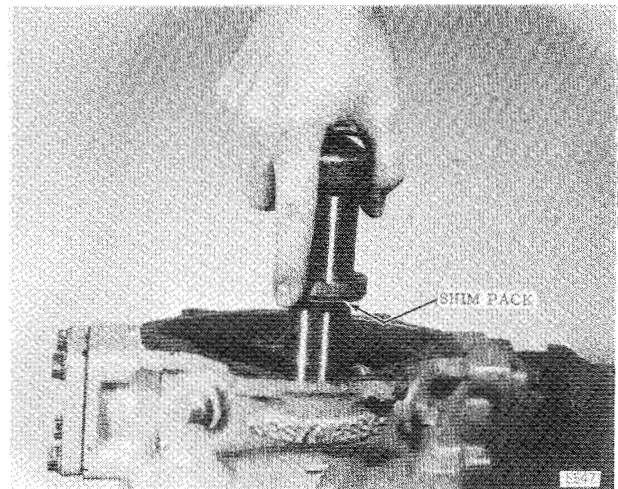
49

Install gasket, retainer washer, retainer screw and cover. Use care not to damage seal in cover during installation. Torque cap screws to 25 foot-pounds.



50

On previous models with shim adjusted lever shaft, if shaft has been removed from case, install shim pack on lever shaft and lower shaft into place in case.



SHOP MANUAL

FILE A

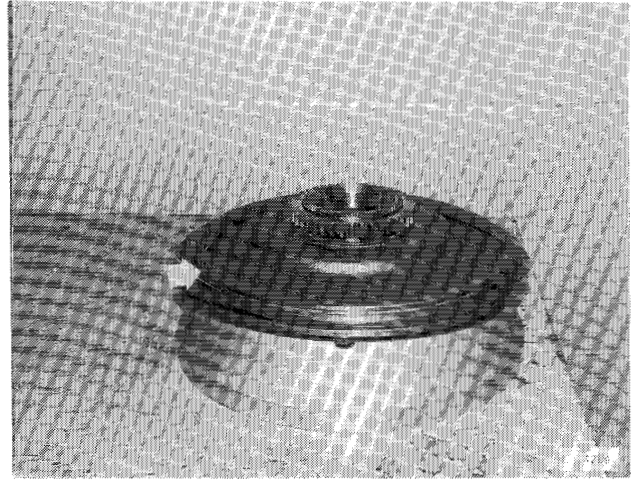
SECTION 1.20

TROUBLE SHOOTING (Cont'd)

<u>TROUBLE</u>	<u>CAUSE</u>	<u>REMEDY</u>
<u>Lost Motion at Steering Wheel</u>	1. Loose ball socket connections or other linkage connections.	Tighten
	2. Loose thrust bearing adjustment	Adjust.
	3. Excessive back lash of taper stud in cam groove.	Adjust.
	4. Steering wheel loose.	Tighten wheel nut.
	5. Pitman arm loose on lever shaft.	Tighten lever shaft nut.
<u>Noise</u>	1. Pump belt out of adjustment.	Adjust.
	2. Low level of hydraulic oil.	Check for leaks; maintain proper level of oil.
	3. Air in system.	Check all connections for tightness. Operate several minutes to bleed from system.
	4. Dirt and sludge in pump.	Drain system and clean.
	5. Pump worn.	Refer to Hydraulic Trouble Shooting,

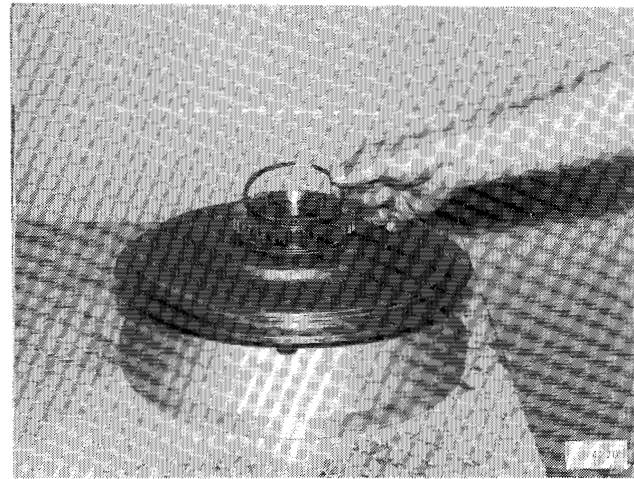
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Remove oil baffle "o" ring and discard



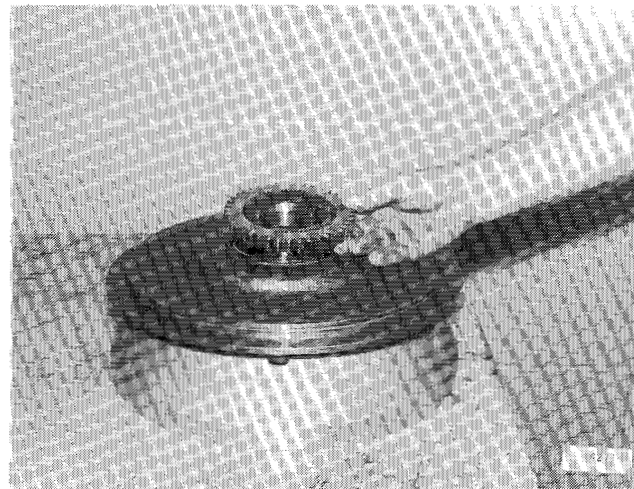
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Remove impeller gear retaining ring.



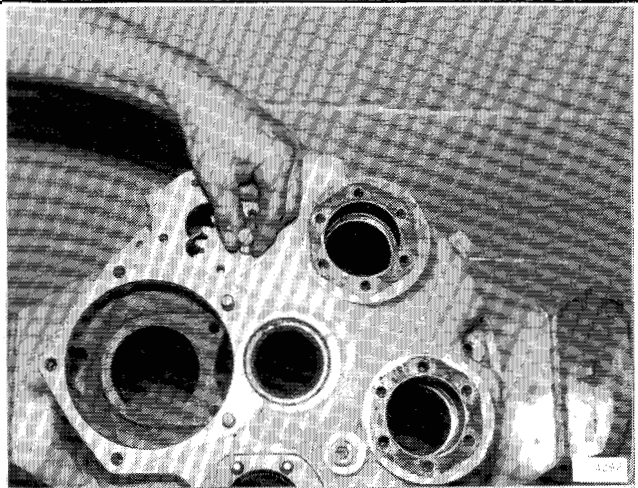
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Remove impeller gear.



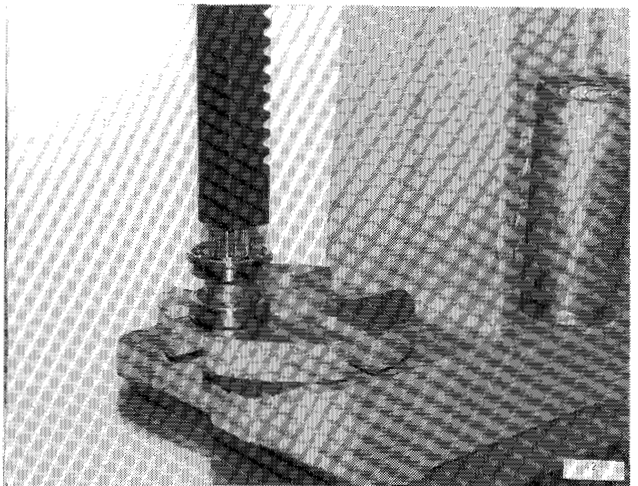
49

Install "o" ring on idler shaft and lubricate. Insert shaft in gear - press into case. Do not damage "o" ring.



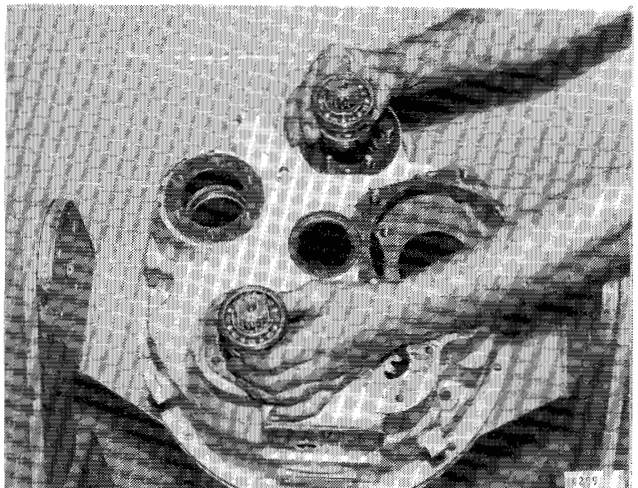
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Install bearing locating ring on charging pump drive shaft if previously removed. Press bearings and spacer on charging pump drive shaft. Bearing must seat against locating ring. Repeat these steps to assemble hydraulic pump drive shaft assembly



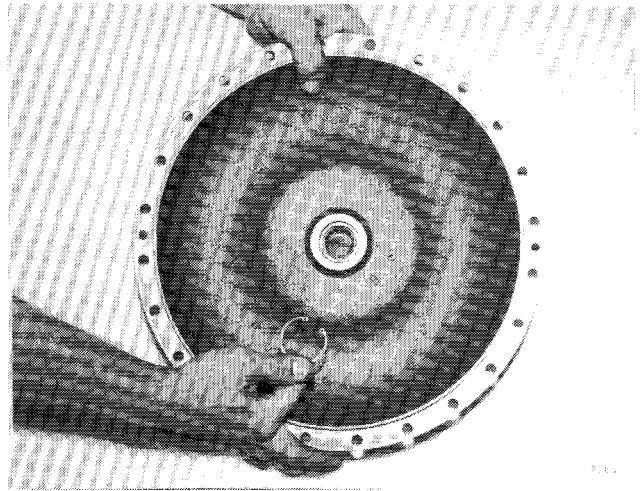
51

Install both pump drive shafts in housing.



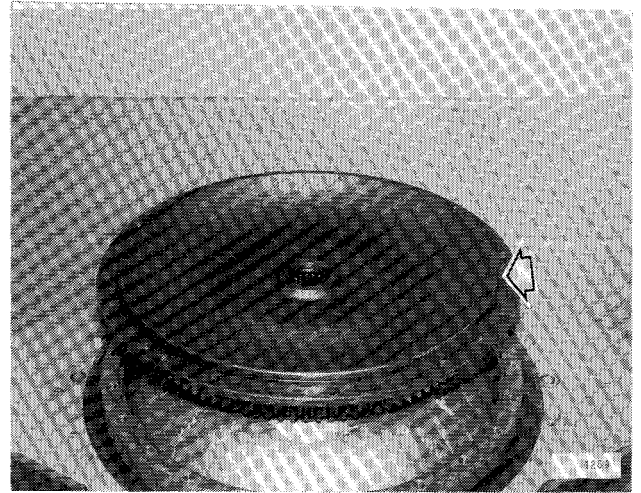
79

Install roller bearing and retaining ring in impeller cover if previously removed. Install impeller cover sleeve if previously removed.



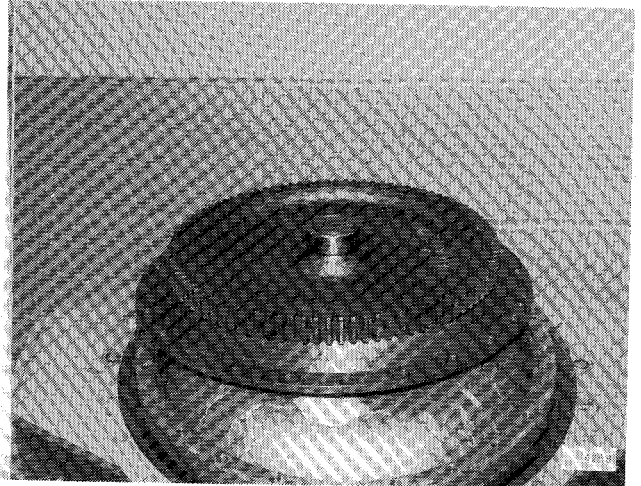
80

Lubricate and install "o" ring (arrow) on impeller cover.



81

Position impeller cover and install capscrews. Use care not to damage "o" ring. Torque capscrews 25 to 30 foot pounds.



MATERIAL LIFT
 GRADER
 PLANER
 ROLLER
 CRANE

SHOP MANUAL

C-07.00
R3/C4

TRANSMISSION (MODEL 2420)

APPLICABLE MODELS

SERIAL NUMBERS

GRADERS

T-400A	01001 thru 02110
T-500A & L	02602 thru 07994
T-600B (IH engine only)	03855 thru 03866

CRANES

90A thru 125A	02006 thru 08769
125FA	07990 thru 08769
150A	02832 thru 08623
150FA	07305 thru 08623

CAUTION

ALL COMPONENTS MUST BE PROPERLY SUPPORTED DURING DISASSEMBLY AND REASSEMBLY.

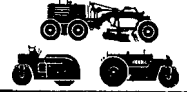
ALL JACKING, HOISTING AND GENERAL WORKSHOP EQUIPMENT REQUIRED FOR THIS OPERATION MUST BE IN GOOD WORKING ORDER.

EXTREME CAUTION TO BE OBSERVED AT ALL TIMES TO PREVENT INJURY.

SAFE WORKSHOP PRACTICES ARE A MUST.

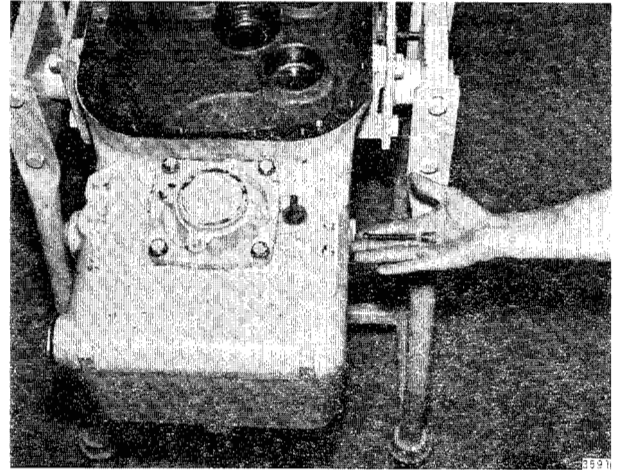
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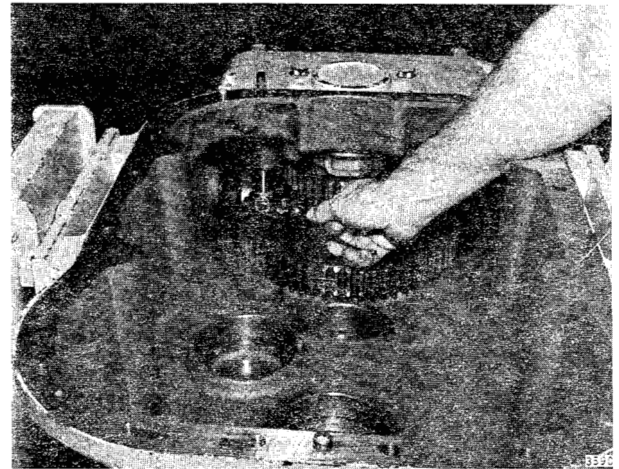
19

Remove high and low shift, detent plug, spring and ball.



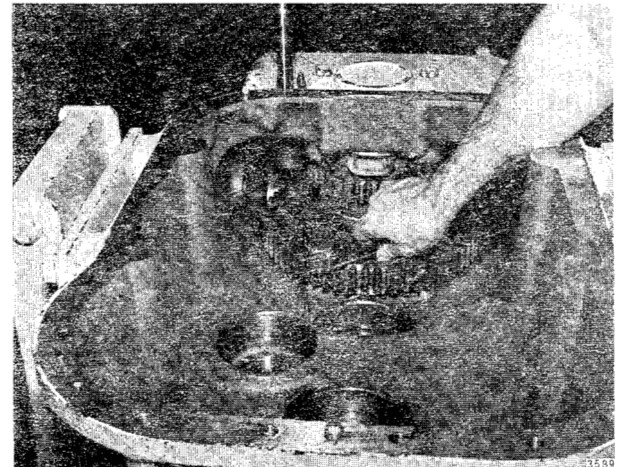
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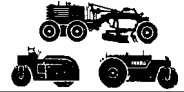
Cut tie wire and remove lock screw from high low shift fork.



21

Remove shift rail and fork.





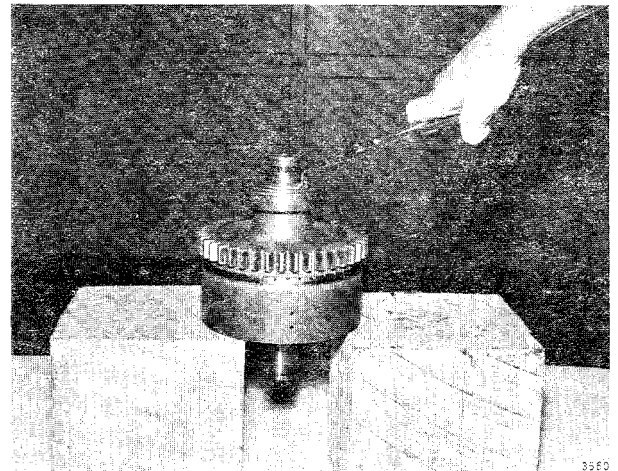
49

If clutch shaft sealing rings were not previously removed, remove and discard.



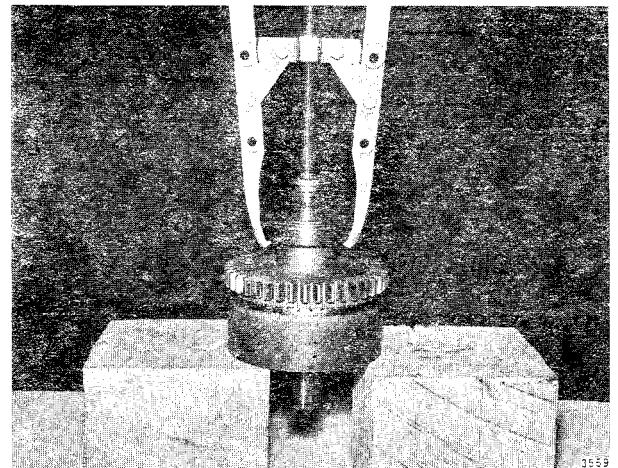
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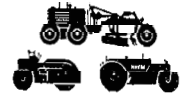
Remove clutch shaft bearing snap ring.



51

Remove clutch shaft bearing.

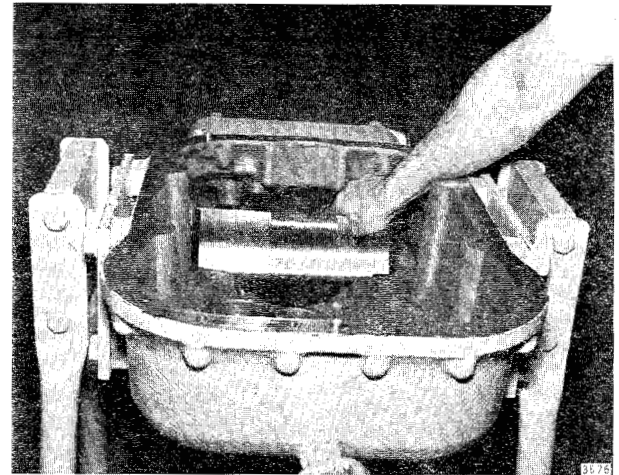




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Install oil baffle plate in case.

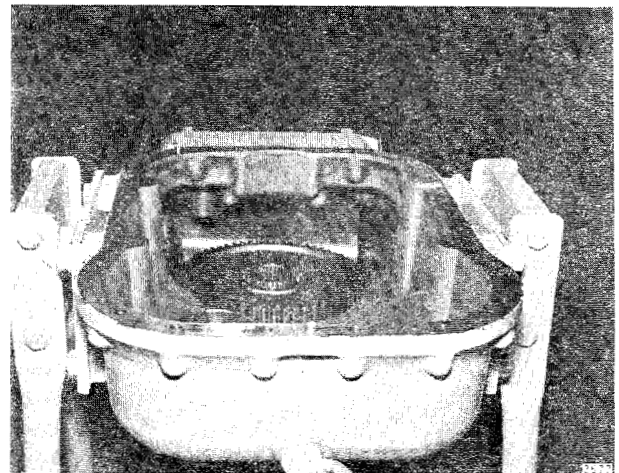
Check to make certain that plate is hooked in proper position.



80

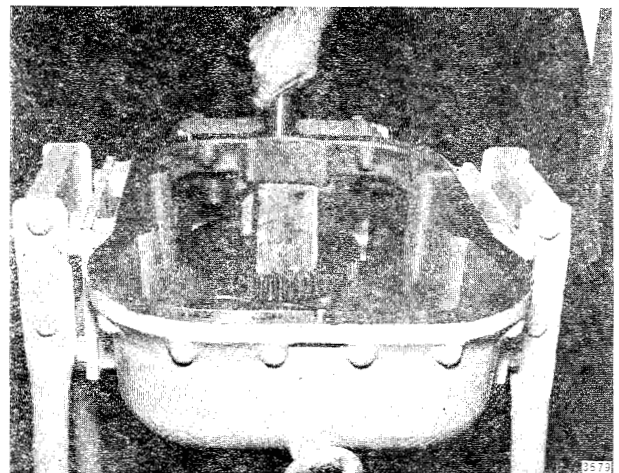
Place low gear in case.

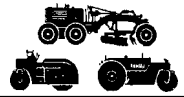
NOTE: If new bearings have been installed in either low or high gears, bearings must be recessed from .015" to .025" below edges of gears.



81

Block gear and insert shaft through case and gear.

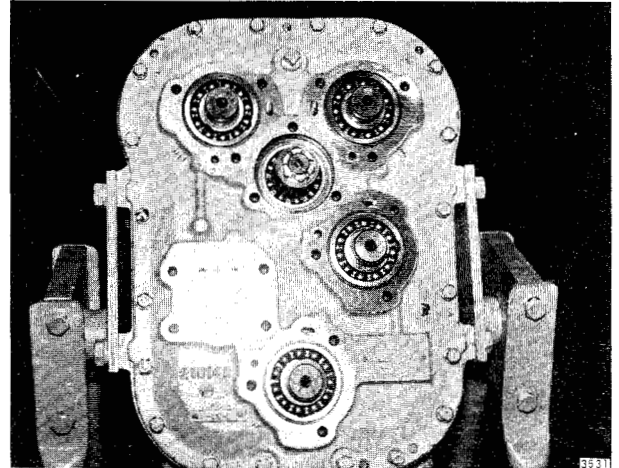




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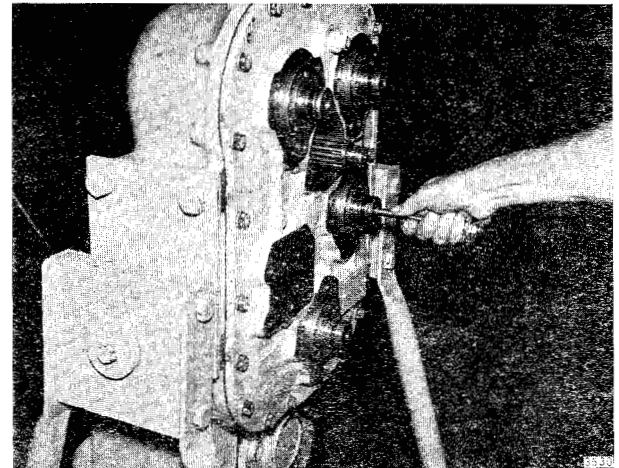
Install cover retaining capscrews and tighten evenly all around.

Make sure input shaft bearing is not binding in cover.



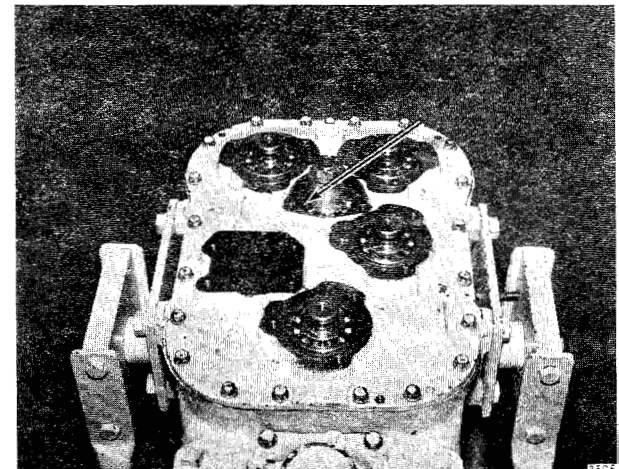
110

Screw 7/16" x 20 bolt into each clutch shaft and pull outward until bearing locating ring grooves are clear of case.



111

Install locating rings on all bearings including input shaft.



SPECIFICATIONS

<u>Item</u>	<u>Description</u>
Oil Capacity - initial fill (less external circuits)	8 1/2 U.S. Gals.
With all circuits incl. filter	DD 4-53 36 U.S. Qts. Deutz F6L-912 40 U.S. Qts.
Converter out temperature	250° Max.
Main Pressure (full throttle)	165-195 PSI
Lubrication Pressure (full throttle)	15-30 PSI
Converter out Pressure (stall)	40 PSI min.
Converter out Pressure (full throttle) (no-load)	65 PSI max.

CRANE ENGINE SPEEDS

MODEL	ENGINE	LOW IDLE	HIGH IDLE ±50	STALL f75
150 A	DD 4-53	750	2900	2000
150 A	Deutz F6L-912	750	2815	1875

F. VEHICLE TRAVELS IN NEUTRAL WHEN ENGINE IS ACCELERATED

<u>Cause</u>	<u>Remedy</u>
1. Selector linkage out of adjustment	Adjust linkage.
2. Clutch failed (won't release)	Overhaul transmission.

G. VEHICLE LACKS POWER AND ACCELERATION AT LOW SPEED

<u>Cause</u>	<u>Remedy</u>
1. Low main pressure	Refer to <u>A</u> .
2. Low clutch apply pressure	Refer to <u>C</u> .
3. Turbine freewheel clutch failed	Overhaul transmission.
4. Engine malfunction	Check engine.
5. Aerated oil	Refer to <u>D</u> .

H. STALL SPEED TOO HIGH

<u>Cause</u>	<u>Remedy</u>
1. Clutch slipping	Overhaul transmission.
2. Low main pressure	Refer to <u>A</u> .

I. STALL SPEED TOO LOW

<u>Cause</u>	<u>Remedy</u>
1. Engine not producing full power	Tune or repair engine.
2. Torque converter failed	Rebuild torque converter.

Remove transfer drive gear (3) by releasing snap ring (1) and sliding transfer drive gear off low-range planet carrier (2).

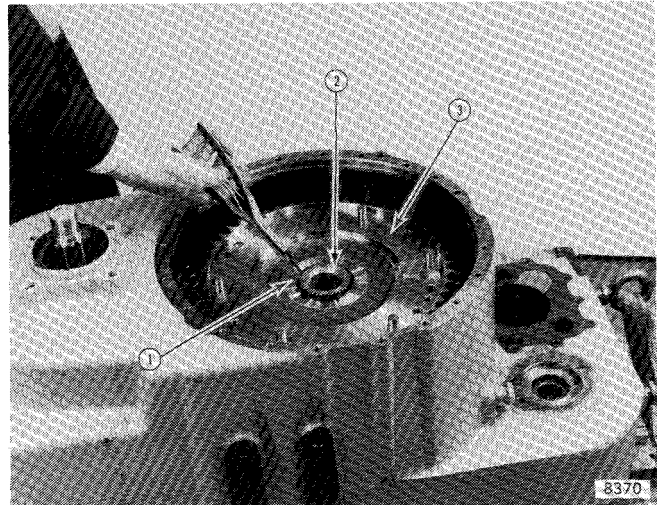


Figure 23

NOTE: Before removing low-range piston housing (2) replace two of the ten self-locking capscrews (1) that retain the Low-range piston housing with two 3/8"-16 x 2 1/2" capscrews (removed from the control valve assembly). Install these capscrews (1) to restrain the spring pressure.

Remove remaining eight capscrews and loosen restraining capscrews evenly. Remove low-range piston (2) as an assembly.

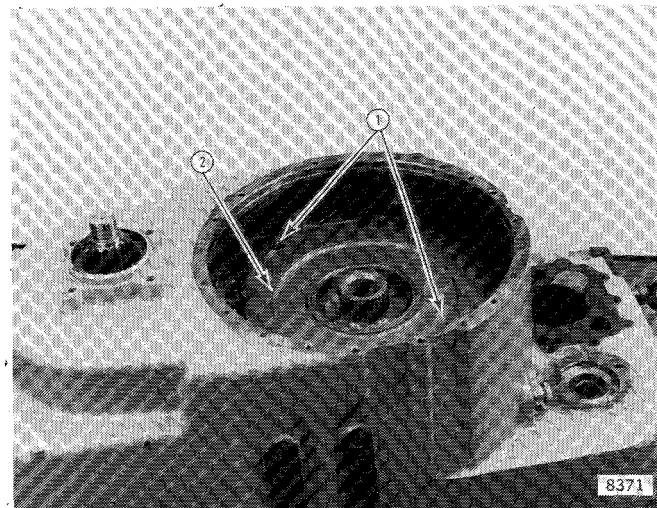


Figure 24

Remove the twelve piston return springs (1) and guide pins. Remove the low-range planetary carrier (2) with low range ring gear (3), four clutch plates (4) and the attached reverse-range ring gear as a unit.

Remove the remaining four low-range clutch plates.

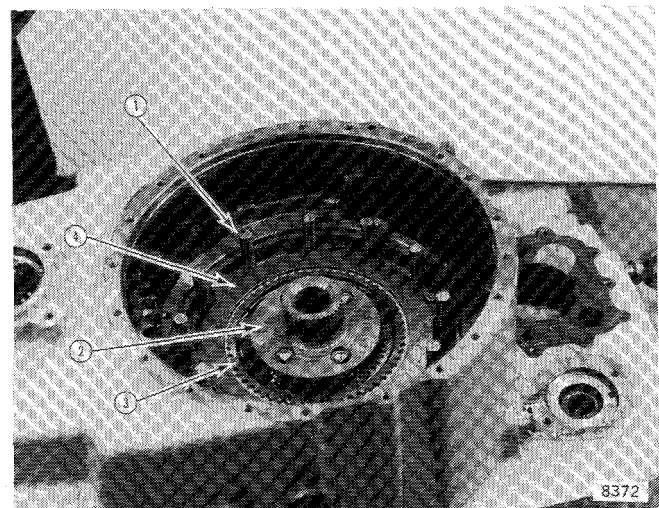


Figure 25

Install second turbine (3) and bearing into first turbine support (4).

Install first turbine (2) into the first turbine support (4) and index the V-groove marks (1).

Drive the six roll pins outward until they are flush with, to 0.030" below the outer surface of the first turbine support (4).

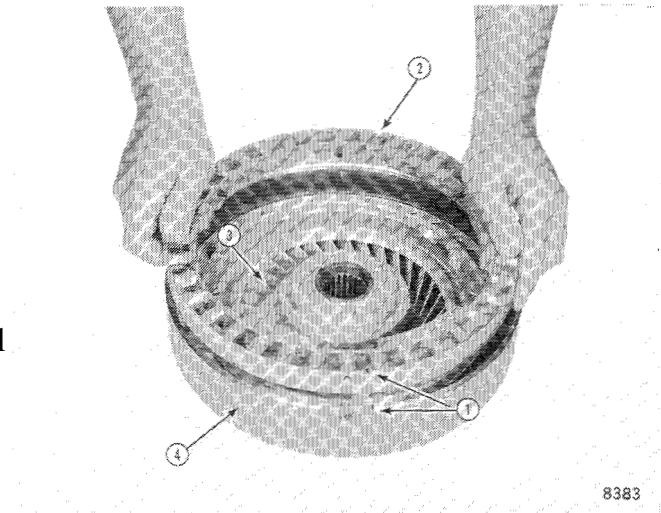


Figure 36

TORQUE CONVERTER PUMP

Disassembly

Straighten ears of the six lock-plates and remove the twelve cap-screws (2) that attach the pump retainer plate (3) and input accessory drive gear (5) to the converter pump (4). Remove the lock-plates, cap-screws, pump, retainer plate, accessory drive gear, bearing and gasket.

Inspect the twenty-four "special" bolts (6) and remove any defective bolts by pressing them from the pump flange.

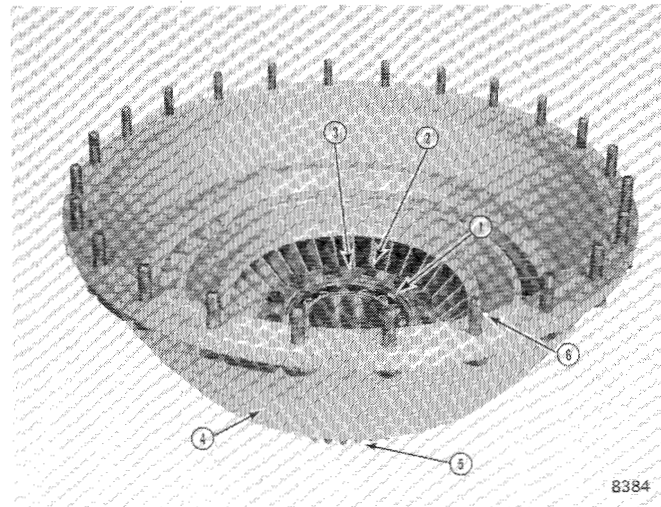


Figure 37

Assembly

If any of the special bolts (6) were removed from the pump (4) install their replacements.

Install the "double-row" ball bearing, loading notch (1) upward, into the input accessory drive gear. Position gasket onto the accessory drive gear and align holes.

Install converter pump onto the drive gear, bearing and gasket aligning the bolt holes in the pump with those in the gasket.

Install pump retainer (3) six lock-plates and twelve 1/4"-28 x 1 1/4" cap-screws. Cross tighten and torque cap-screws to 10 - 12 FT. LBS. Bend lock-plate ears against cap-screw heads.

8. Support the spindle and swage it securely at both ends, with an octagon punch. (Refer Fig. 49) The pinion must rotate freely after assembly.
9. Install remaining three pinion assemblies in the same manner.

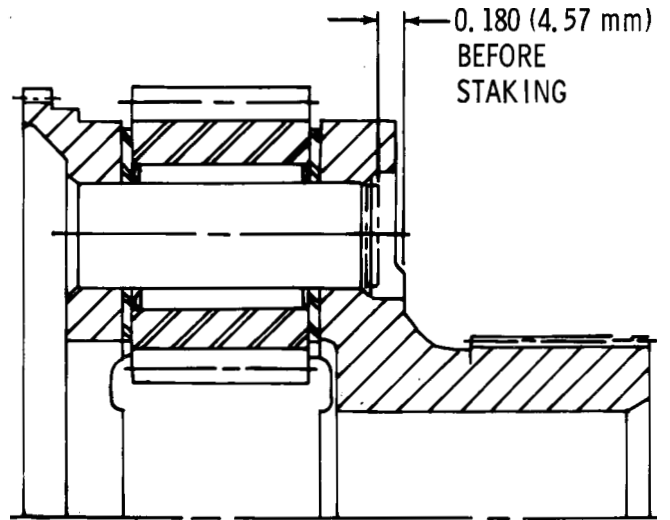
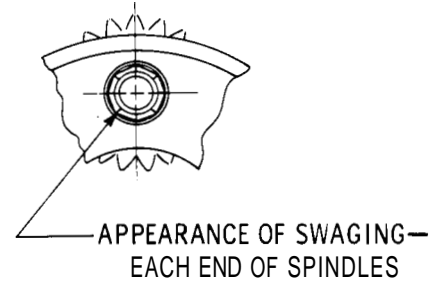


Figure 49

Fig. 50 illustrates swaging tool and spindle end after swaging.

NOTE: *It is important that the correct tool be used to swage spindles, to ensure they are positively locked in the carrier assembly.*



HI CARB, HI CHROME, NITRIDE, ROCK "C" 62-63

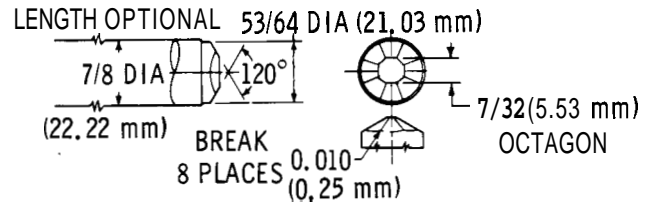


Figure 50



IF CHILLED SPINDLES WERE USED TO REBUILD CARRIER AND CARRIER WILL NOT BE INSTALLED INTO THE TRANSMISSION IN THE NEAR FUTURE APPLY COATING OF OIL OVER CARRIER ASSEMBLY TO PREVENT RUST.

It should be noted at this time, that after a transmission has been operated and is disassembled for some reason, the "break-away" torque of the subject nut will be less than the original assembly torque requirement. However, this factor does not imply that the tube was loose or had been installed improperly at initial assembly.

This occurs as a result of normal shrink and seating due to compression and temperature, which is considered in initial design.

Install freewheel clutch assembly (2)

If bearing (4) was removed from second-turbine drive gear (1) install a new bearing.

Install new step-joint seal ring (3) in its groove.

Install the front thrust race, flange first onto bottom (rear) of drive gear (1).

Install the second-turbine drive gear (1) and assembled parts onto first-turbine drive gear.

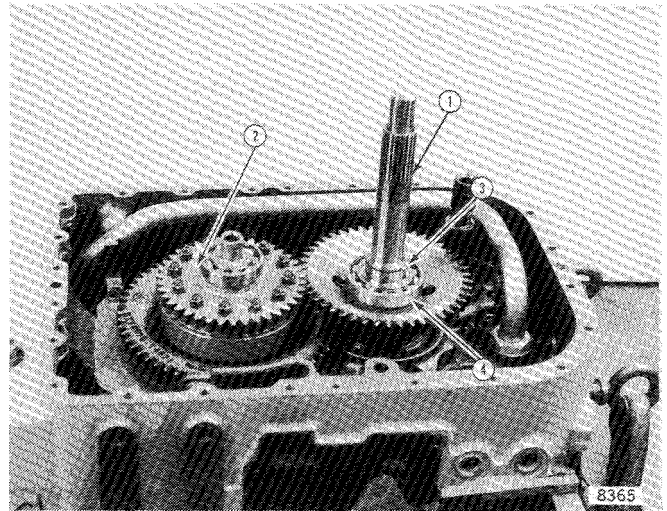


Figure 64

Install new gasket onto converter housing splitline, using oil soluble grease.

Attach sling to housing and while lowering housing onto transmission housing guide the accessory driven gear past the second-turbine drive gear.

Seat converter housing (make sure both dowels in place). Install the twenty-four capscrews, flat washers and lockwashers.

NOTE: *Cross tighten and torque to 42-50 FT. LBS.*

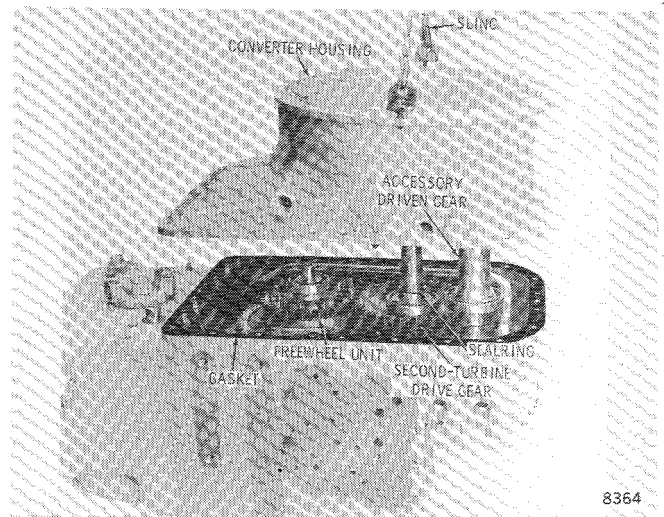
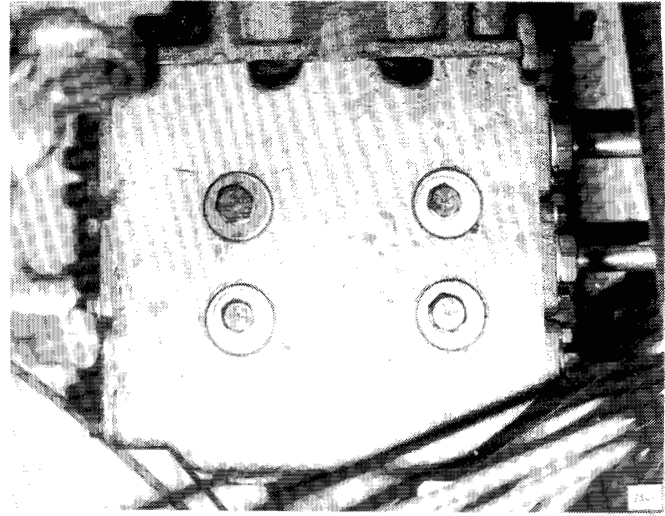


Figure 65

1

If manifold is removed from under the unit, it *must* be supported in some manner prior to removing cap screws. There are four (4) cap screws which hold manifold to adaptor plate, two (2) 9/16" cap screws (smaller head) and two (2) 5/8" cap screws (larger head). Obtain two (2) continuous thread rods either 9/16"-12 or 5/8"-11 and remove two (2) of the corresponding cap screws. Install threaded rod. Install a nut and large flat washer and run them against manifold. Remove remaining cap screws. Lower the manifold by backing off nuts.

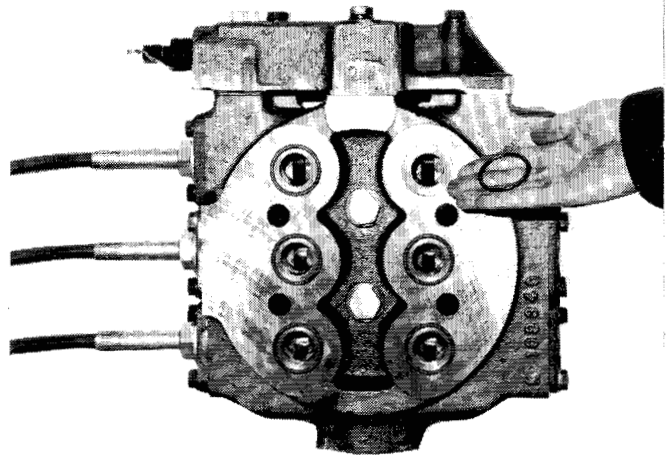


CAUTION

USE EXTREME CARE WHEN LOWERING THE MANIFOLD WHEN UNDER THE UNIT.

2

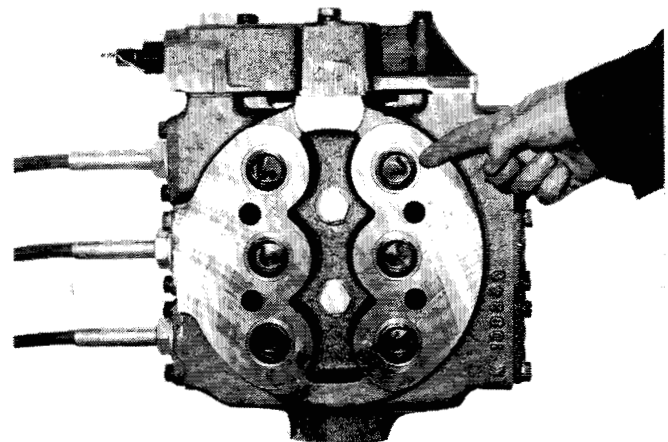
After removing manifold from crane, remove six (6) sealing O-rings from manifold.



3

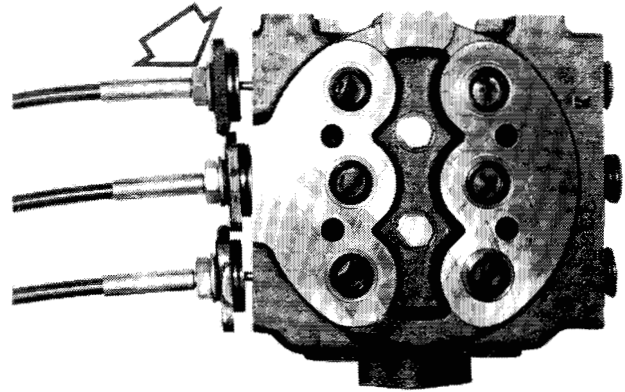
Plug all ports and supply lines with plastic caps or tape to keep foreign matter from entering manifold or hydraulic system.

NOTE: CLEANLINESS IS A MUST. *If foreign matter is allowed to enter the system, hydraulic system life will be shortened.*



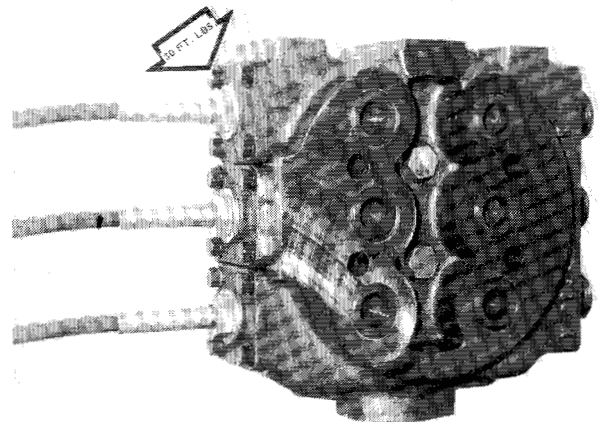
31

Install mounting cap jam nut and flat washer on mounting cap.



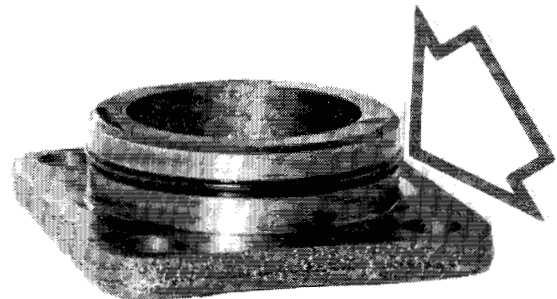
32

Install mounting cap to manifold block by four (4) 3/8" cap screws and lock washers. Torque cap screws to 30 ft-lb (dry). Tighten mounting cap jam nut.



33

Coat a new O-ring with hydraulic oil and install on end cap.



7440

Apply clamp-style pliers (1) with taped jaws to hold internal cable (2); use open-end wrench to disconnect valve stem (3).

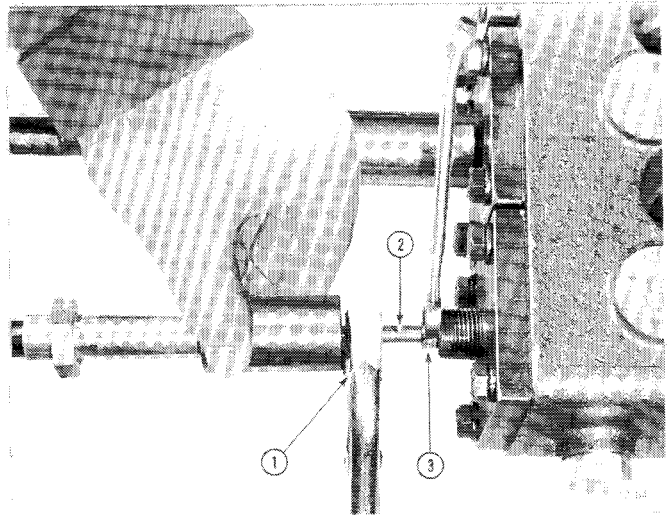


Figure 5



USE TRANSMISSION JACK OR OTHER SUITABLE LIFTING DEVICE CAPABLE OF LIFTING AND SUPPORTING A MINIMUM OF 500 POUNDS TO SUPPORT AND LOWER THE MANIFOLD.

Position transmission jack under primary manifold (1) and remove four capscrews with lockwashers (2) from manifold. Carefully lower manifold and remove six O-rings from top of manifold. Plug manifold and rotary joint openings. Transfer manifold to clean work area for disassembly.

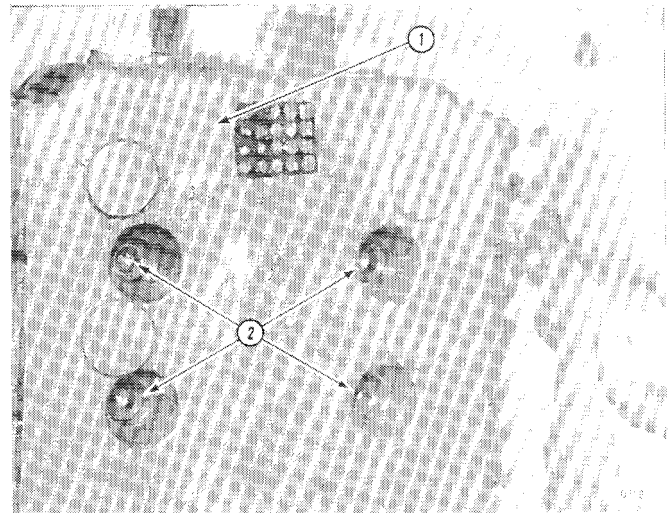


Figure 6

After internal cable connector is tightened (see previous photograph) secure cable anchor sleeve (2) against end cap; use pipe wrench with taped jaws to ensure tight fit. Install locknut (1). Tighten and torque (standard) capscrews. Install remaining control cables in same manner.

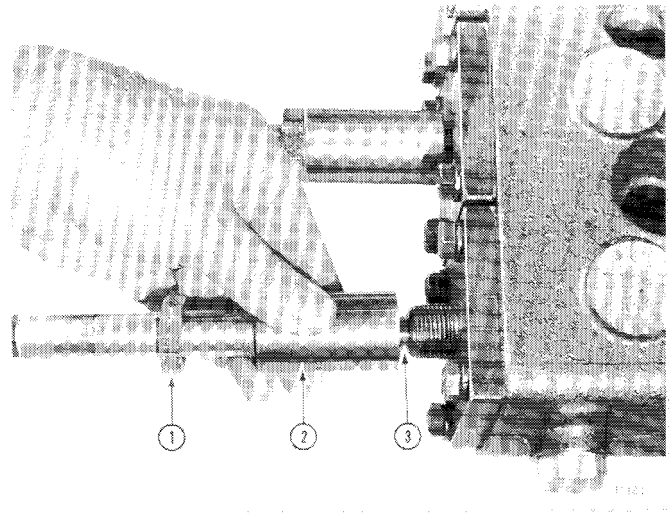


Figure 23

Remove cap from, and place new O-ring into end of, outlet tube (3). Position end of tube against outlet port of primary manifold (4) and locate two split flanges (2) around end tube; insert four capscrews with lockwashers (1) through split flanges into manifold body and tighten capscrews. Be careful not to pinch O-ring. Torque capscrews per General Torque Values Chart provided in front of this Manual.

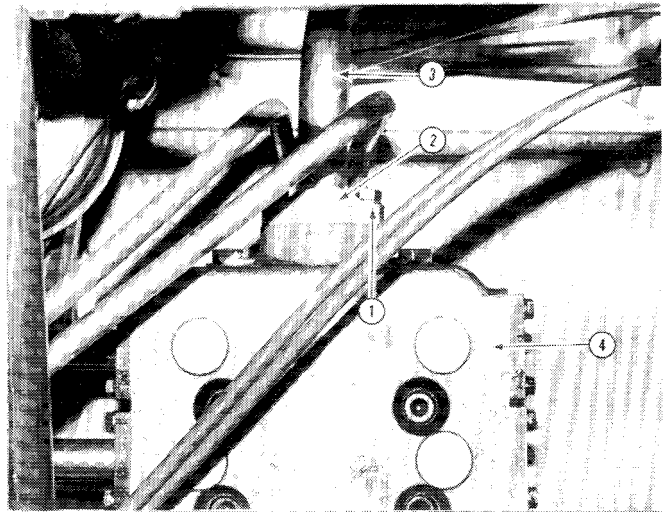


Figure 24

Remove two capscrews (1). Remove top valve cover (2). Remove seal ring from groove in cover and set aside for inspection.

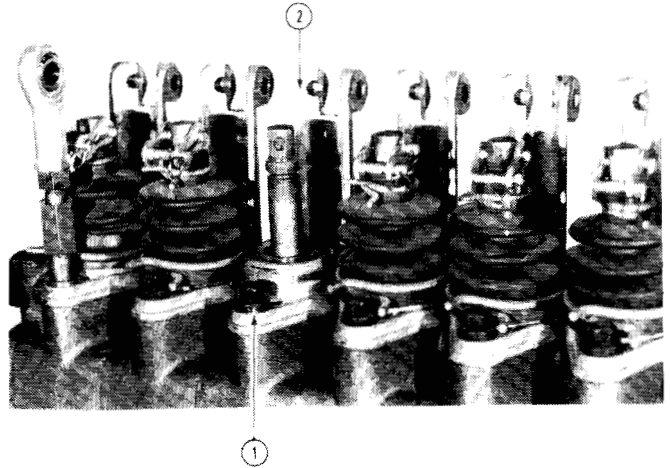


Figure 17

Tag each spool (1) and matching valve body (2) before removing spool. Remove spool and lay on clean, lint-free cloth for further disassembly.

NOTE: *Spools are matched with valve bodies at factory for 0.0002 to 0.0004 inch clearances and are not interchangeable.*

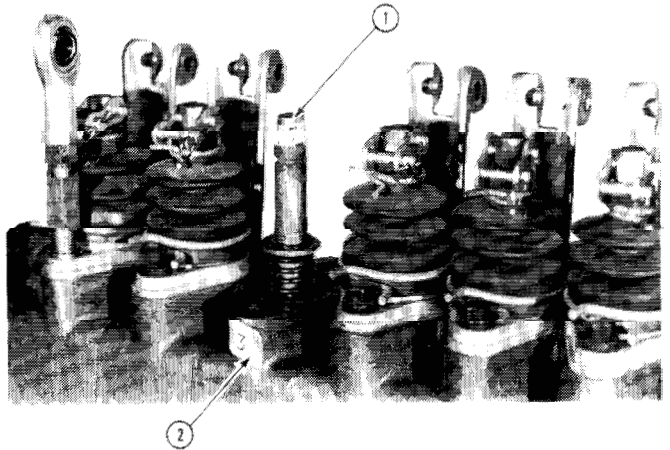


Figure 18



USE CARE NOT TO SCRATCH OR DAMAGE SPOOL LANDS AND GROOVES OR VALVE BORE DURING DISASSEMBLY,

SHOP MANUAL

E-3.10
R1/C2

HYDRAULIC CRANE CYLINDERS

APPLICABLE MODEL/S

80, 90, 100, 110, 125, 90A, 100A,
 125A, 125F, 125FA, 125P, 140F,
 150A, 150FA, 150P and 150T

SERIAL NUMBER/%

Serial Number ranges
 are given by cylinder.

CAUTION

- ALL** COMPONENTS MUST BE PROPERLY SUPPORTED DURING DISASSEMBLY AND REASSEMBLY.
- ALL** JACKING, HOISTING AND GENERAL WORKSHOP EQUIPMENT REQUIRED FOR THIS OPERATION MUST BE IN GOOD WORKING ORDER.
- EXTREME** CAUTION TO BE OBSERVED AT ALL TIMES TO PREVENT INJURY.
- SAFE** WORKSHOP PRACTICES ARE A MUST.

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OUTRIGGER CYLINDERS

Serial No. 1011 & Up

1. An inspection for worn packing or internal scoring can be done without removing cylinder from crane.
2. Remove set screws (3) and plugs (4). Using spanner wrench AH-78678 (found in tool kit), loosen clamp ring (2) and remove. Pull piston rod assembly from cylinder (17).
3. Remove nut (15), piston (14), packing (12), O-ring (13) and plate (11). Remove O-rings (9) and (10), head (8), gland (6). Remove wiper (5) from gland.

Assembly

Carefully inspect all components for serviceability. Lubricate packings with hydraulic oil.

1. Install ~~new~~ wiper (5) in gland (6). Install on piston rod (1). On rod install packing (7), head (8), rings (9) and (10), plate (11) and ring (13). Install ~~new~~ packing (12) on piston (14), install on rod. Install nut (15) and torque to 700 ft-lb. lubricated. Insert rod assembly in cylinder (17) (lubricate thoroughly). Install clamping ring (2) and tighten, insert plugs (4) and set screws (3) and tighten.
2. Operate and check for leaks.

HOIST & WINCH BRAKE CYLINDER

Serial No. 2832 - 7620

Remove cylinder from crane.

1. Remove boot clamp (4) and remove push rod assembly (1, 2 and 3). Remove boot clamp (6) and boot (5). Remove retaining ring (7) and piston (8).
2. Remove retaining ring (14) and remove cap (13). From cap, remove back-up washer (12) and O-ring (11). From piston (8) remove "U" cup (9).

Carefully inspect all parts for serviceability. Cylinder barrel and piston should not be scored. Lubricate all seals, cups and O-rings before assembly.

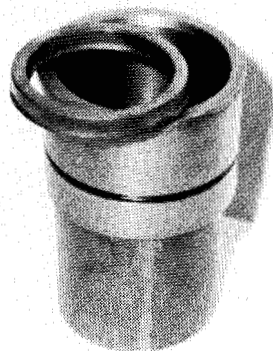
Assembly:

1. Install new back-up washer (12) and O-ring (11) on cap (13), install in barrel and install retaining ring (14).
2. Install new "U" cup (9) on piston (8), install in cylinder barrel and install retaining ring (7).
3. Before installing push rod assembly (1, 2 and 3), check length of rod from back of jam nut (where nut touches rod end), total length should be exactly 2 11/16 inches long. This will be the proper length and no further adjustment should be required.
4. Install push rod assembly (1, 2 and 3) thru boot (5) and into piston (8). Install boot clamp (6). Notice there is a very small hole that could be covered by the boot and clamp. This is a drain hole; check to determine this hole is uncovered. Install boot clamp (4).

Re-assemble on crane and tension spring to apply brake firmly. Operate crane, check performance.

4

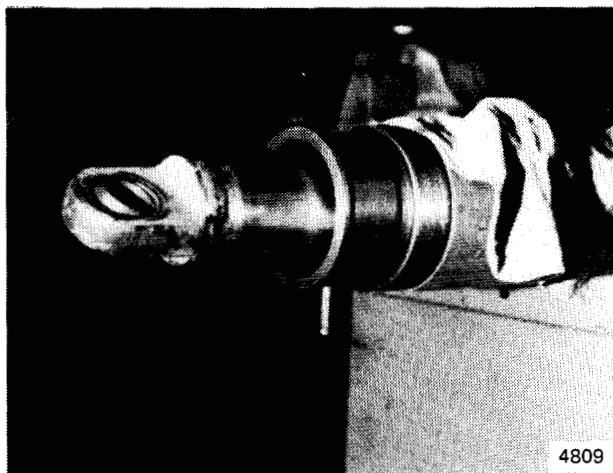
The seal packing and cylinder head with the large chamfer are necessary to complete the installation.



4808

5

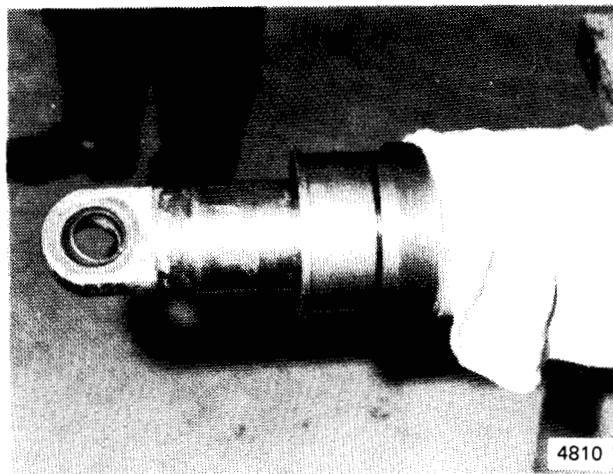
Remove plugs and setscrews from clamp ring. Remove cylinder head clamp ring from the cylinder with the spanner wrench provided in the tool kit. If a dual crowd cylinder (4 section power boom) remove 1/8" pipe plug from piston rod. Remove the rod packing gland. If the cylinder head must have the large chamfer added, remove the cylinder head.



4809

6

Inspect O-ring on cylinder head and replace if required. Reinstall cylinder head.



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SHOP MANUAL

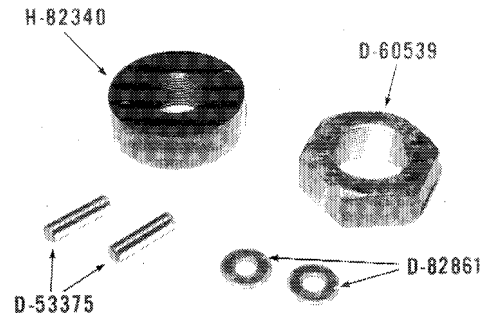
FILE E
SECTION 3.12

DISASSEMBLY

1

A piston rod nut tool will be needed. It is suggested that a tool be made up from these standard GALION parts:

- One (1) H-82340 nut
- One (1) D-60539 nut
- Two (2) D-53375 pin (1/2" dia. x 2" lg. hardened)
- Two (2) D-82861 washer (1/2" flat)



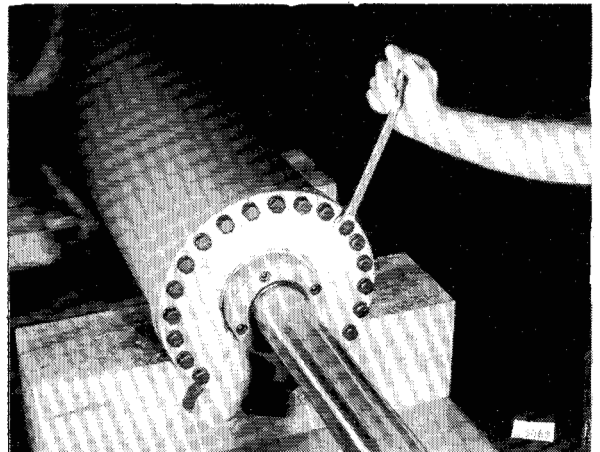
2

Weld together as shown. Pins should protrude 1 1/8" from nut surface.



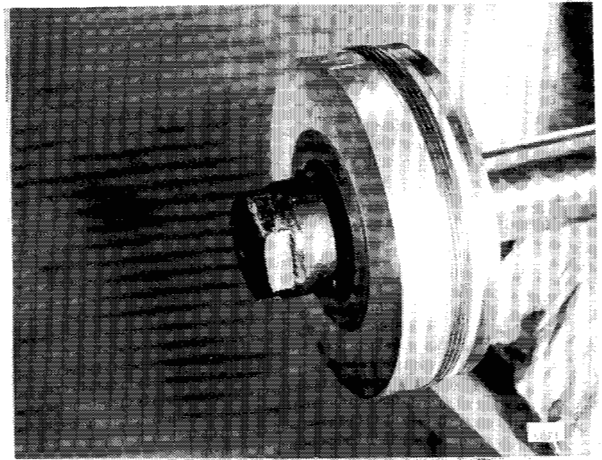
3

Place cylinder assembly in suitable cradle or fixture. Remove twenty-two (22) cap screws and lock washers that retain head to barrel.



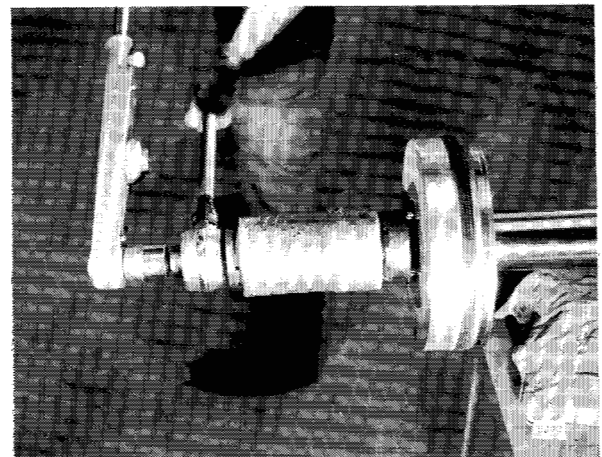
31

Reinstall rod nut tool on rod nut.



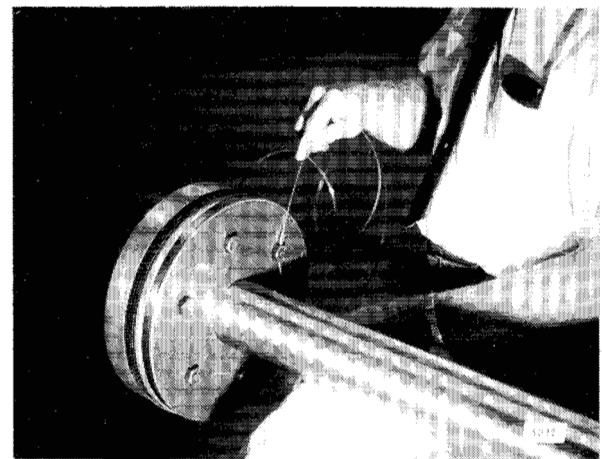
32

Using torque wrench and multiplier, torque rod nut to 2000 ft-lb.



33

Install lockwire on six (6) piston - to - piston plate cap screws.

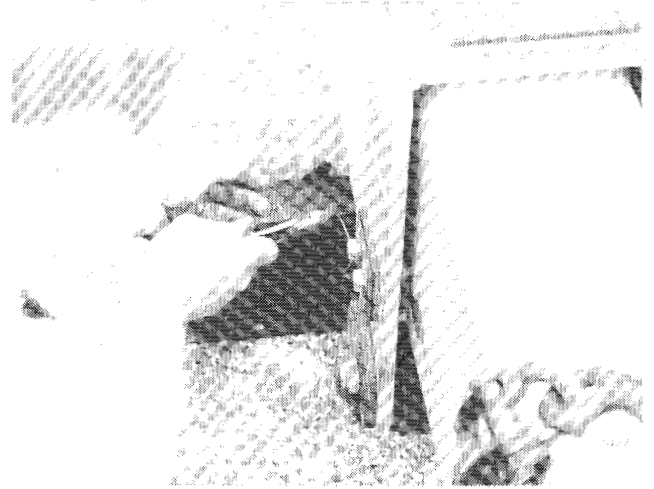


SHOP MANUAL

FILE E
SECTION 3.13

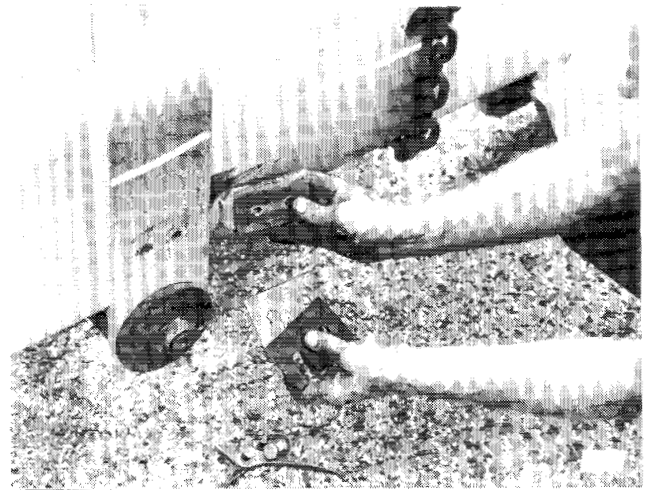
13

At front of third extension, cut tie wires, remove four (4) cap screws and flatwashers.



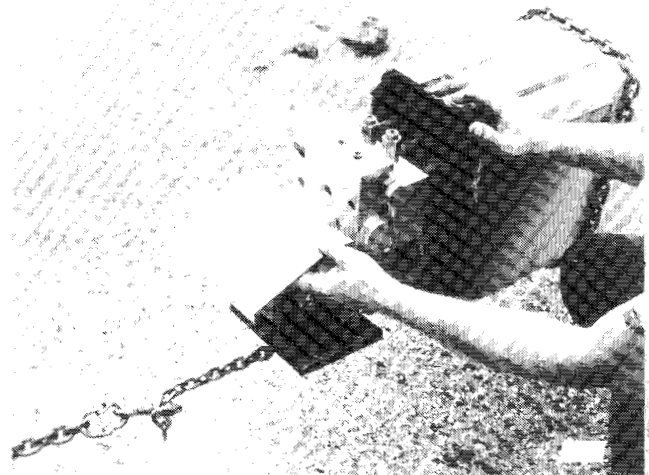
14

Remove wear plates and spacers from both sides of boom.



15

If hose guard assembly has not previously been removed, loosen nut on cylinder anchor weldment pin, and remove hose guard assembly.



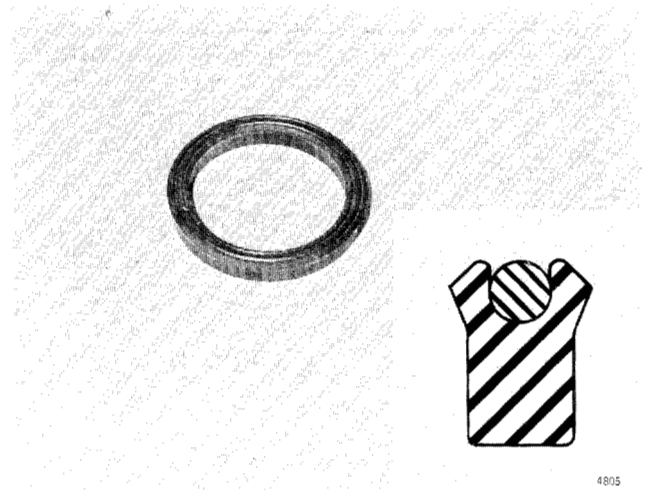
REASSEMBLY OF DUAL CROWD CYLINDER

Prior to reassembly of cylinder, it is mandatory that all component parts be thoroughly cleaned and carefully inspected for damage.

It is suggested that all seals, packings, wipers, O-rings and back-up rings be renewed.

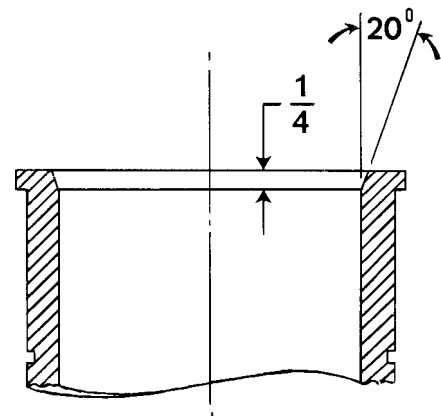
42

Note orientation of the polyurethane one-piece seal packing. One side is plain. The other side has lips with an O-ring between.



43

If the cylinder head does not have the large chamfer shown, machine the chamfer to these specifications.



INSTALLATION OF DUAL CROWD CYLINDER IN CRANE

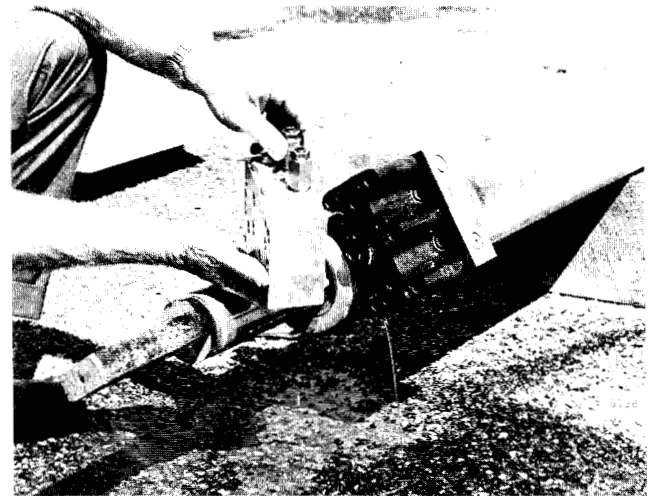
71

Position cylinder assembly so that valve end is adjacent to right front outrigger of crane. Connect hoses and cycle valve to purge air out of cylinder assembly. When cylinders extend and retract smoothly, completely extend and retract cylinders to effect the relief valve setting. If any irregularities are observed, do not proceed until problem is diagnosed and rectified.



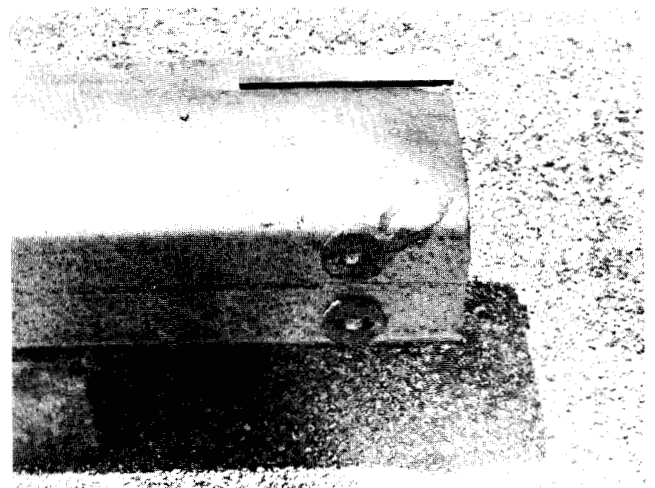
72

Leave piston rods extended no more than six (6) inches at each end. Detach hoses and remove flow divider valve.



73

Inspect rollers on fourth boom extension. Replace if required. Inspect wear plates and replace if required.



Shop Manual

E-10.10

C2

HYDRAULIC WINCH MOTOR (COMMERCIAL SHEARING)

APPLICABLE MODELS

90, 100, 110 & 125
 90A, 100A, 110A & 125A
 125F
 125FA
 140F
 150A
 150FA
 150P, 150T
 200FA

SERIAL NUMBERS

05304 thru 08774 except
 05330, 05335 & 05340
 05325 thru 08774 except 05328
 07247 thru 08774
 07990 thru 08774
 07571 thru 08774
 04765 & Up
 07305 & Up
 01045 & Up
 09401 & Up

CAUTION

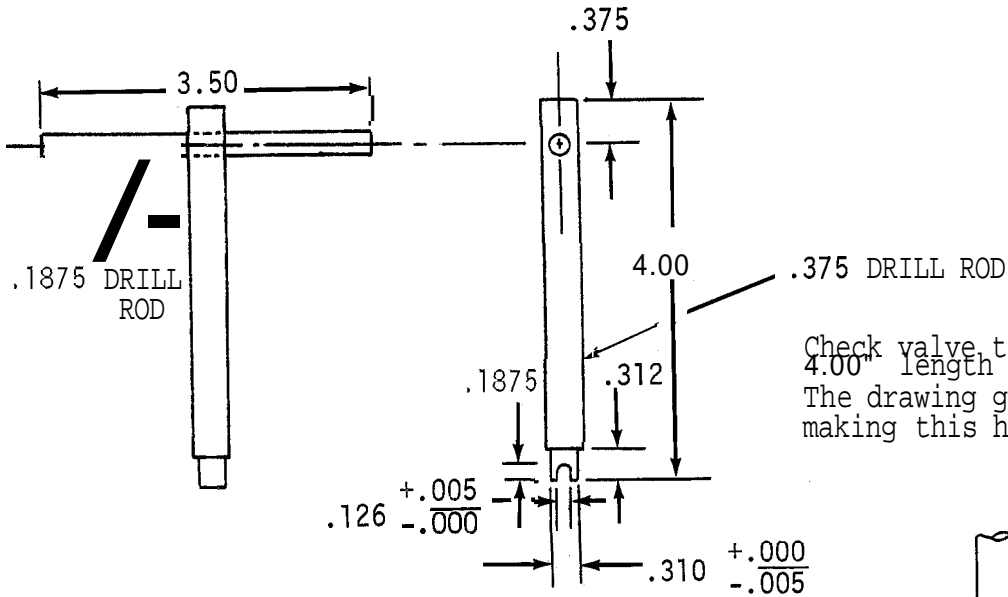
- ALL** COMPONENTS MUST BE PROPERLY SUPPORTED DURING DISASSEMBLY AND ASSEMBLY.
- ALL** JACKING, HOISTING, AND GENERAL WORKSHOP EQUIPMENT REQUIRED FOR THIS OPERATION MUST BE IN GOOD WORKING ORDER.
- EXTREME** CAUTION TO BE OBSERVED AT ALL TIMES TO PREVENT INJURY.
- SAFE** WORKSHOP PRACTICES ARE A MUST.

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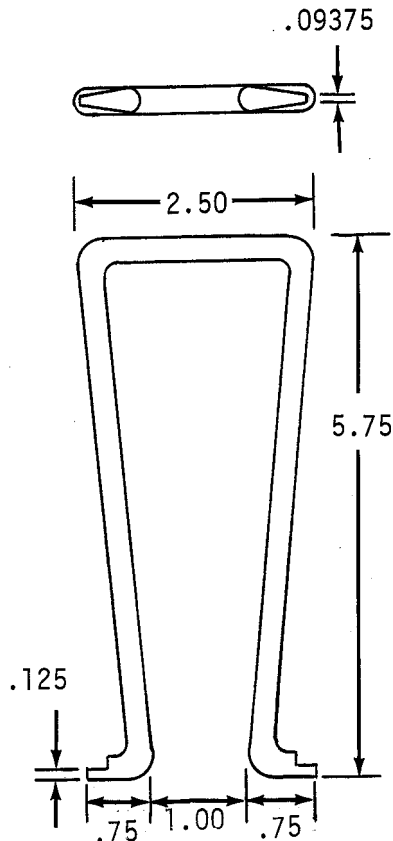
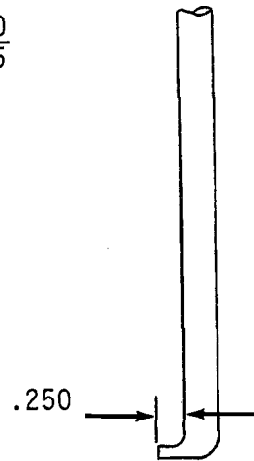
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SPECIAL TOOLS



Seal removal tool-can be easily made from an old screwdriver. Heat the tip and bend as shown. Grind off the tip to fit the notch behind the shaft seal.



Seal retainer tool-it is bent from a piece of .250" drill rod about 14.00" long. The ends are ground to fit the holes in the seal retainer. Dimensions are a guide and are not critical.

Remove six pocket seals (1) from thrust plate (2) and seal (3) from gear housing (4).

Remove gear housing (4) from shaft end cover (5).

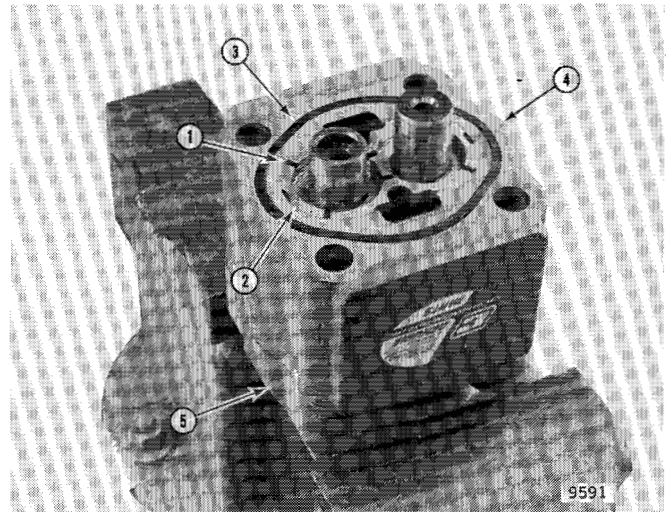


Figure 4

Remove six pocket seals (1) from thrust plate (2) and seal (3) from gear housing (4).

Use soft face hammer and tap gear shafts (5 and 6) on the other end to remove thrust plate (2) and gears from gear housing (4). Remove remaining thrust plate from gear housing.

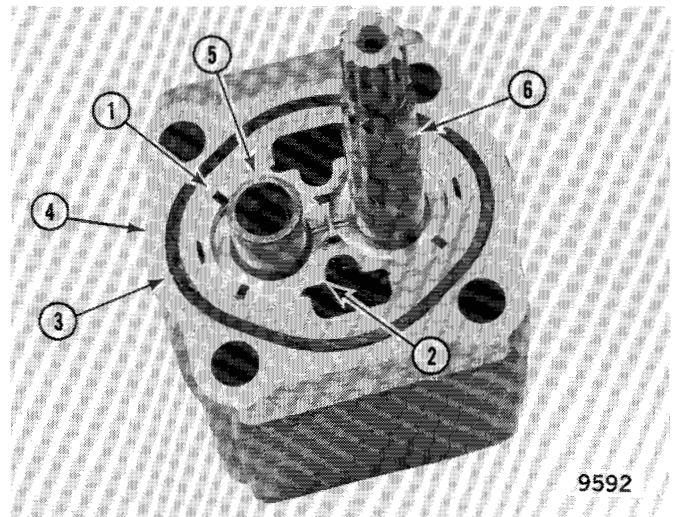


Figure 5

Remove two bearings (1) and ring seal (2) from shaft end cover (3) if replacement is necessary.

Use special tool (see special tools section of this manual for manufacturing of tool) and remove two check valve assemblies (4) from shaft end cover (3).

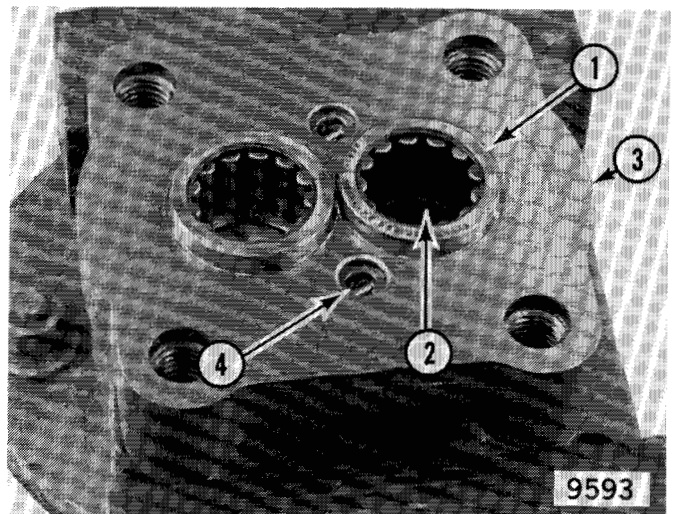
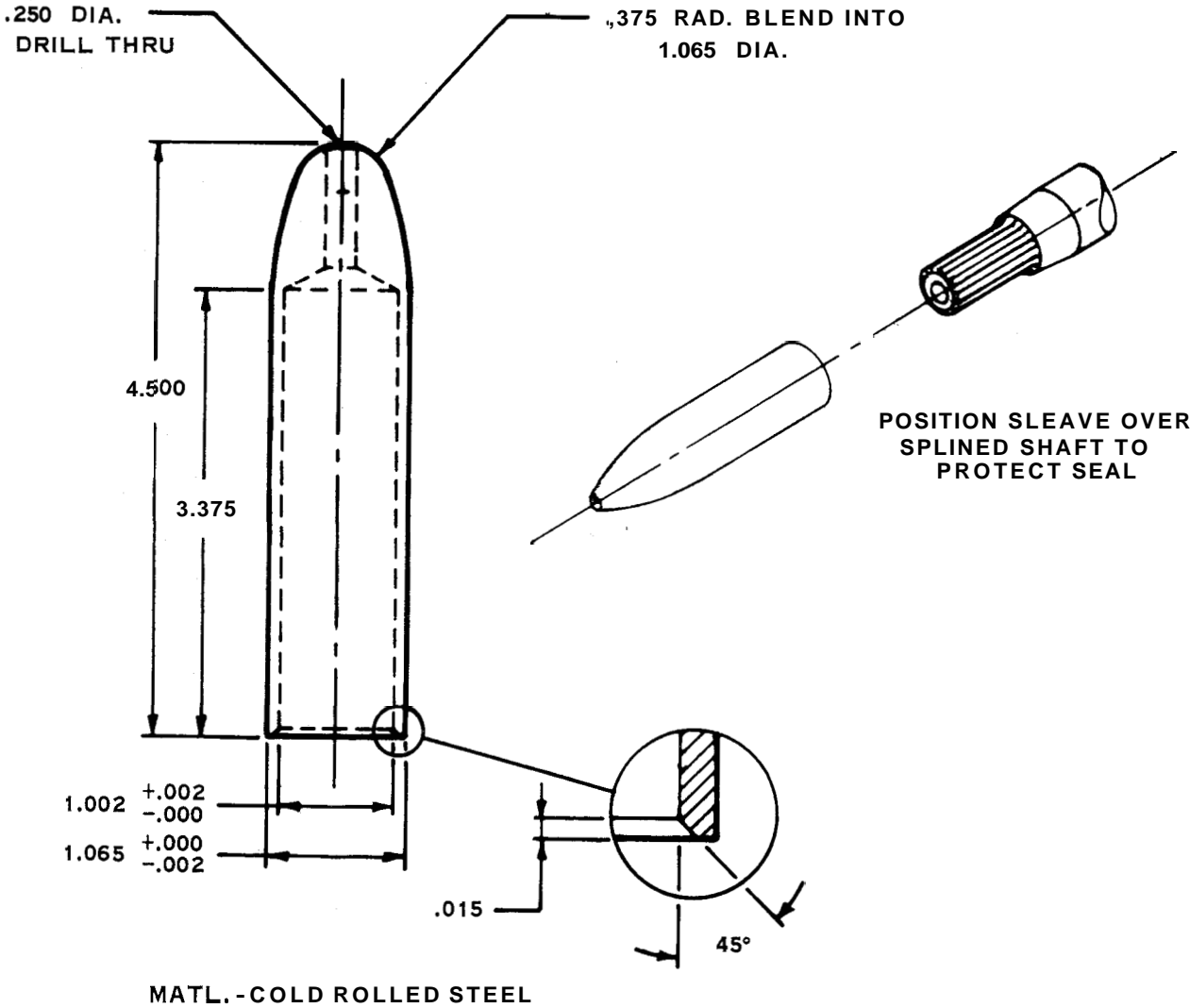


Figure 6

SPECIAL TOOLS

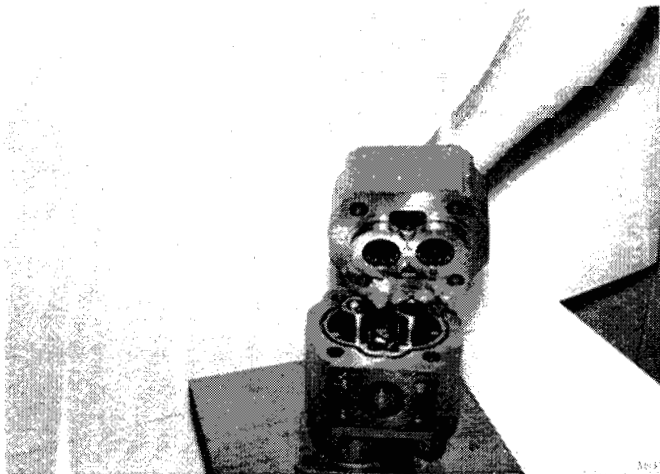
The special steel sleeve is used to insert the drive shaft through the oil seal without damage and can be made from bar stock.



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SECTION: 12.01

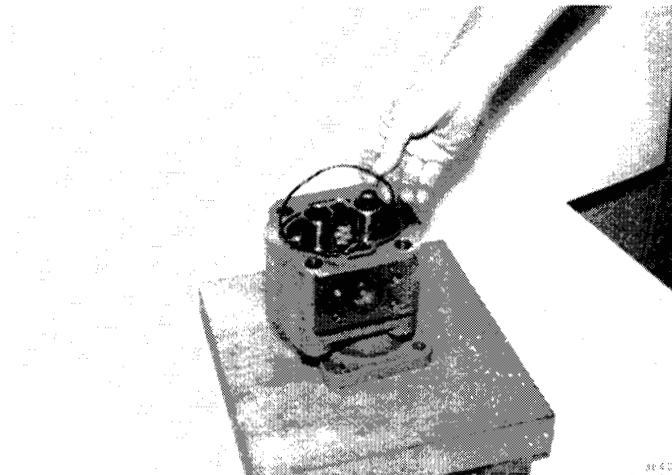
13

Remove bearing carrier.



14

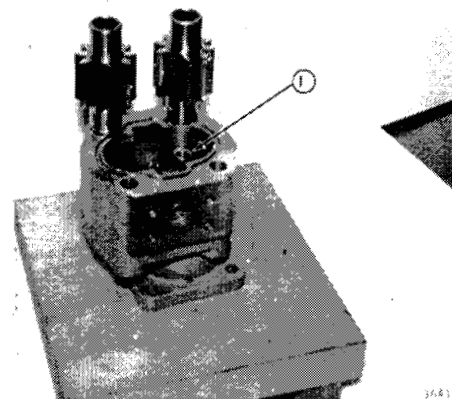
Remove "O" ring gasket.



15

Remove drive and driven gear.

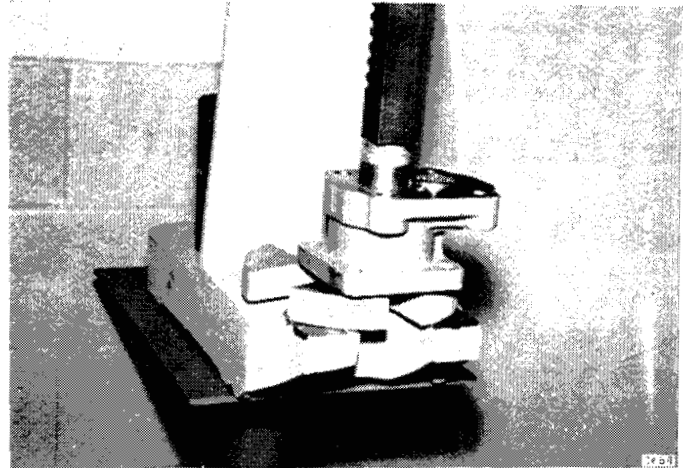
Keep these gears together--they are a matched set.



FILE: _____E
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42

Press bearing in shaft end cover.



43

Install drive shaft assembly in shaft end cover.

Install retainer ring in shaft end cover.

Screw in only part way--DO NOT TIGHTEN.



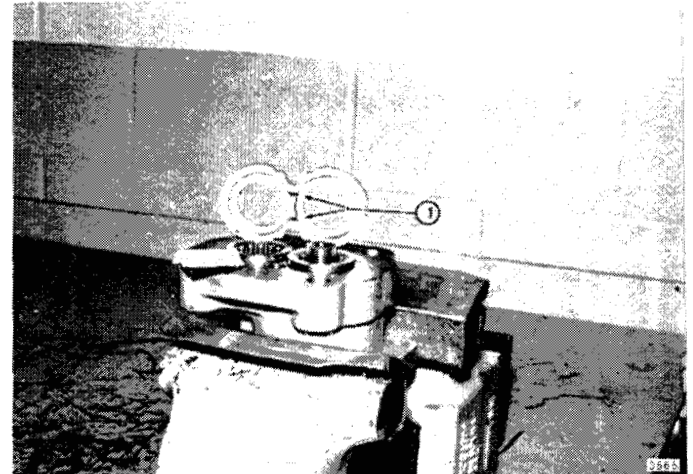
44

With heavy grease secure pocket seals (1) in thrust plate.

With razor blade trim excess of each seal from bearing recess in thrust plate.

Install thrust plate over bearings and tap into place.

Stop 1/32" above face of shaft end cover.



INTRODUCTION

The counterbalance valve assembly is part of the swing circuit. The major components in the swing circuit besides the control valve include a Counterbalance Valve Assembly, a brake cylinder and an external gear type swing motor.

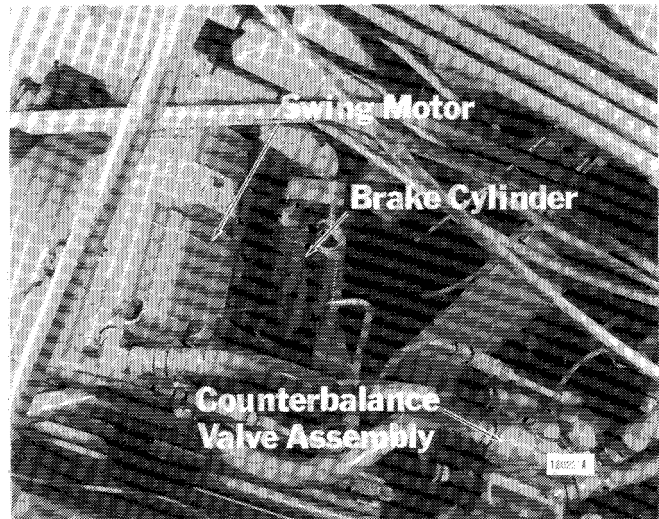


Figure 1

A closer look at the circuit shows that within the Counterbalance Valve Assembly there are two counterbalance valves, two cross-line relief valves and two check valves. There are also two external check valves and a 1 GPM flow regulator in the brake release line.

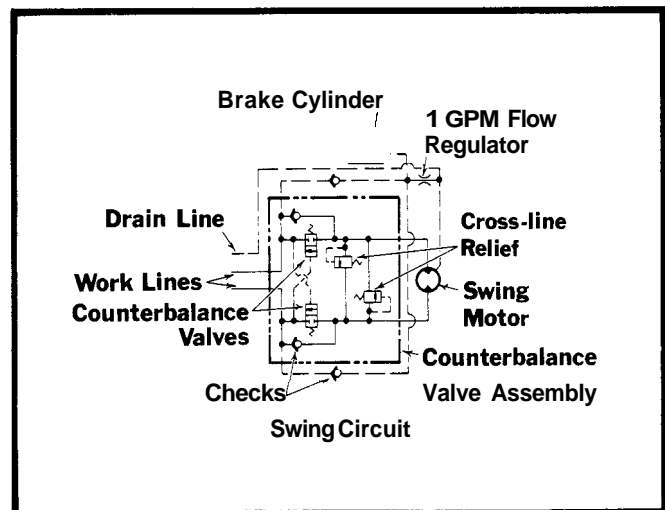


Figure 2

Install two setscrews (2) which are used to lock the relief valve seat in valve assembly (3). Install two machine screws (1) that lock setscrews in place.

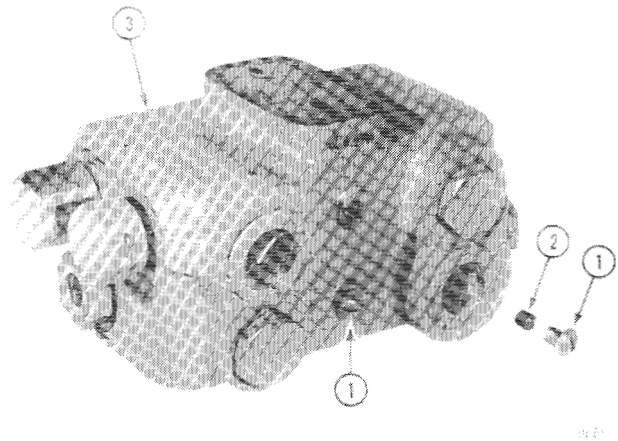


Figure 23

Install four elbow fittings (2 and 4) and two straight fittings (3) in the valve assembly (6) and tighten four locknuts (1 and 4). Install two safety wires (7).

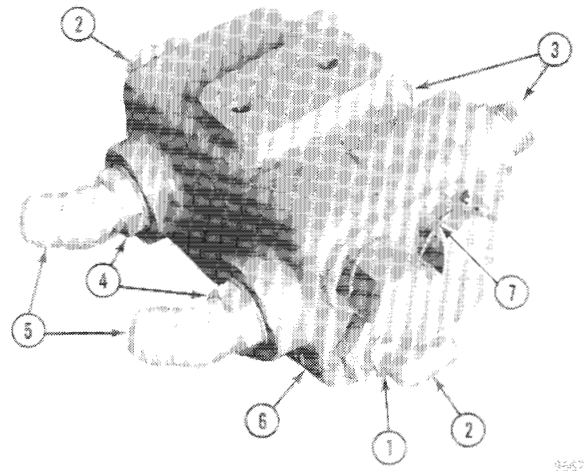


Figure 24

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SECTION II

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30 GPM CIRCUIT -----	6
30 GPM CONTROLS SLOW OR LACKING IN POWER WHEN 50 GPM AND FRONT STEERING CIRCUITS ARE NORMAL. -----	7 - 8
FRONT STEERING SLOW, HARD OR STOPPED WHEN 30 AND 50 GPM SYSTEMS ARE FUNCTIONING PROPERLY. -----	8 - 9
RAPID WARMUP OF HYDRAULIC SYSTEM. -----	10

SHOP MANUAL

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- (2) Position a 2" steel bar between the front axle stop and the axle on the left hand side of the crane. Start engine, turn steering to extreme left and hold against the 2" steel bar. Increase engine speed to maximum and observe pressure reading. Refer to the hydraulic system pressure chart and engine speed chart for correct pressure and speed. (See index.)

NOTE: Pressures can also be checked from the right hand side by reversing all procedures to the right hand side.

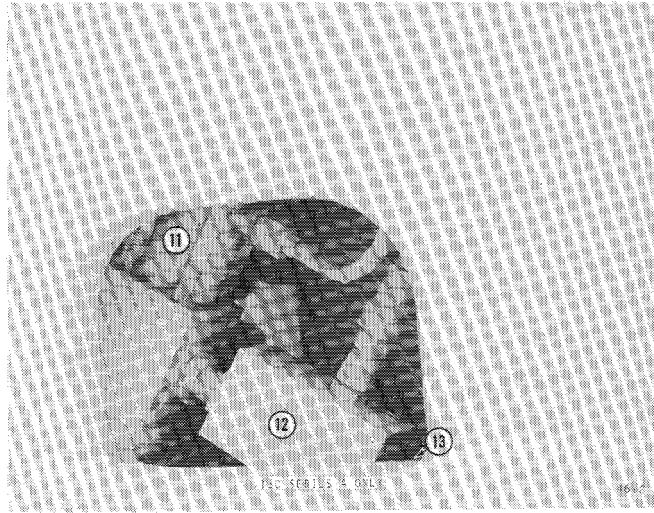
- (3) If the pressure reading is low, remove the steering maximum pressure regulating valve. (This valve is located in the front side of the flow regulator-diverter valve assembly which is mounted to the lower inside edge of the hydraulic tank.)
- (4) Observe the cartridge for foreign material holding spool off its seat.
- (5) Clean cartridge by inserting proper size rod or tool in end of valve, depressing spool so that foreign material can be flushed with solvent or compressed air.
- (6) Reinstall cleaned cartridge into flow regulator-diverter valve assembly. Test for correct pressure.
- (7) If pressure is still below the required reading, replace the relief valve assembly.

B. Flow regulator honed assembly spool plugged or sticking.

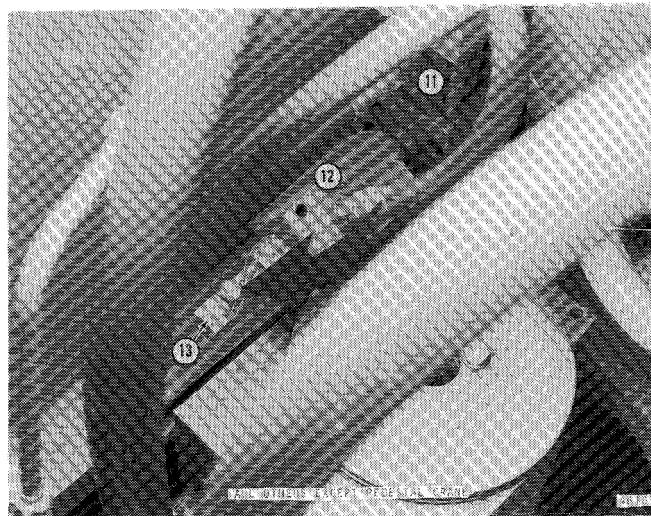
- (1) Remove the tube that comes from the hydraulic pump (30 GPM) at the point where it connects to the flow regulator-diverter valve assembly.
 - (a) Check the opening of the tube or the valve body for a large piece of loose foreign material that could possibly plug the 11 GPM orifice hole in the honed assembly spool. The foreign material could be lodged in the orifice hole itself. Remove foreign material and replace tube.
- (2) If no foreign material is present as described in 1-a above, the honed assembly spool is sticking.
 - (a) Remove the flow regulator diverter valve assembly. Remove the four (4) cap screws holding the spring housing plate. Remove plate, cap, O-ring and spring. Remove the honed assembly spool and determine that it is free in the sleeve. Also check the brass rivet in the head end of spool and make certain that it has not loosened or is missing completely. Effect repairs as necessary.

SHOP MANUAL

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11. Overcenter Check Valve
12. Surge Relief Valve Body
13. Surge Relief Valve Cartridge
(PRESET & SEALED -
DO NOT ADJUST)



SHOP MANUAL

FILE E
SECTION 15

- B. If the crowd cylinders continually get out of phase more than normal, it could be caused by binding of boom sections.

(1) Lubricate all boom extension surfaces that contact wear plates .

- C. If the crowd cylinders continually get out of phase more than normal or if one cylinder always extends completely before the other cylinder starts to move, the flow divider phasing valve spool or relief valves are not functioning properly.

THREE SECTION POWER BOOM phasing valve assembly is located under the counterweight support plate.

FOUR SECTION POWER BOOM phasing valve assembly is mounted on the rear of the inside dual crowd cylinder. ~~When~~ all boom sections are retracted, it will then allow access to the flow divider phasing valve just ahead of the winch.

- (1) Remove the large hex head plugs located on both ends of the valve assembly.
- (a) Remove the two spools and spring from the valve body. Check for scoring of spools and/or scoring of bore in valve body. Remove scoring with crocus cloth only. If scoring cannot be removed, replace entire valve assembly.
- (b) Check to see if the spring between the two spools has jumped over the spring seat on one spool. Decrease spring inner diameter to proper size so that spring fits seat correctly.
- (2) Remove both relief valve cartridges located on both ends of the valve assembly.
- (a) Inspect valve(s) for foreign material holding spool(s) open or damaged valve seats.
- (b) Remove foreign material if possible. If valve(s) are damaged, replace entire valve(s).

CAUTION: DO NOT CHANGE THE PRESSURE SETTINGS ON THESE RELIEF VALVES. THEY ARE PRESET AND MAY NOT BE RESET IN THE FIELD.

INSIDE CROWD CYLINDER CANNOT BE RETRACTED CAUSED BY BROKEN OIL SUPPLY LINE ON A THREE SECTION POWER BOOM.

- A. Retract hose broken between flow divider phasing valve and base end of crowd cylinder.

- (1) With the manifold control valves in neutral , outriggers down, boom fully elevated and boom crowded out, loosen the oil supply line tube nut at the hose leading from the winch brake cylinder. If the winch brake cylinder relieves itself and no more oil flows from the line, the problem is that the 1 gallon per minute flow regulator is plugged. This 1 GPM flow regulator is located at the other end of the winch brake cylinder oil supply line at the winch motor adaptor plate.
 - (a) Remove the 1 GPM flow regulator and clean. If the regulator cannot be cleaned, replace it. Note: Install 1 GPM flow regulator so that the end marked "In" faces the hydraulic winch motor.
- (2) If the winch brake cylinder relieves itself when the oil supply line tube nut is loosened, but oil continues to flow from the loosened tube, the problem is a crowd cylinder overcenter check valve is stuck open. To determine which crowd cylinder overcenter check valve is leaking (if the crane is equipped with more than one crowd cylinder) observe the boom extensions and determine which one is drifting in. This can be double checked by the following procedure:

With the outriggers down, boom fully elevated, crowd cylinders extended and engine shut off, move the manifold crowd control lever to the retract position and observe the boom extensions. The extension that drifts in this condition is the one that has the overcenter check valve stuck open.

- (a) Lower the boom, retract all crowd cylinders and remove the defective overcenter check valve. Clean valve if possible and reinstall, but if the valve seat is damaged, the entire valve must be replaced.
- (3) If the oil supply line tube nut is loosened and no oil under pressure drains from the loosened line and the brake cylinder push rod is still holding the brake off (rod cannot be freely rotated) the problem may be the winch brake cylinder push rod is adjusted too long.

REAR STEERING CYLINDERS DRIFT.

- A. One or both rear steering cylinders leaking internally.
- (1) With the rear wheels steered straight and engine shut off, activate the rear steering manifold control lever in both directions to relieve the hydraulic pressure.
 - (2) Remove access cover to hydraulic manifold on the front of the operator's platform.
 - (3) Disconnect the rear steering oil supply tubes at the hydraulic manifold and cap both tubes.
 - (4) Start engine, (do not activate rear steering manifold control), and road test crane.
 - (5) If the rear wheels drift, one or both of the rear steering cylinders are leaking internally.
 - (a) Repair or replace cylinders as necessary.
 - (6) If the rear wheels do not drift in Step 5, the manifold control valve is leaking internally.
 - (a) Replace complete rear steering manifold control valve.

Prior to removal of winch assembly from crane, all wire rope cable should be removed from the cable drum. Unspool cable onto reel in the same direction as was on the drum to prevent kinking and evident destruction of cable. Store reel of cable in a dry place to retard rust.

It is not necessary to remove entire winch assembly from crane if problems are noticed in the brake area. It will be necessary to remove winch (or counterweight) if winch drum is noticed to be out of round and/or excessive noise is noticed because of gear tooth wear. Confined working space and safety also require winch removal.

For ease of illustrating purposes, the winch assembly in this section has been removed from the crane.

REMOVAL OF WINCH ASSEMBLY FROM CRANE

Disconnect and plug hoses to and from rotary joint.

Disconnect and plug tube from crowd cylinder.

With suitable hoist attached to winch, remove three cap-screws, lock washers and hex nuts holding winch assembly to base end of boom.

CAREFULLY LIFT WINCH ASSEMBLY FROM CRANE.

With winch assembly removed and located in a proper working area, remove drain plug in bottom of gear case cover and drain approximately 2.50 U. S. gallons of oil.

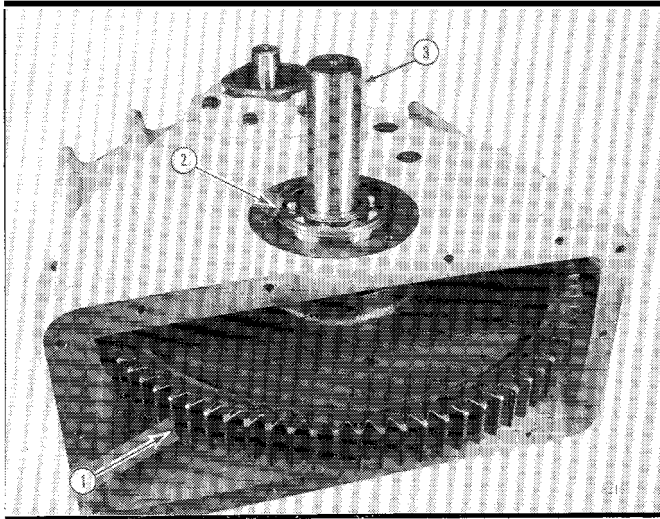


Figure 25

Reposition winch assembly. Install snap ring (1) on pinion gear shaft (2).

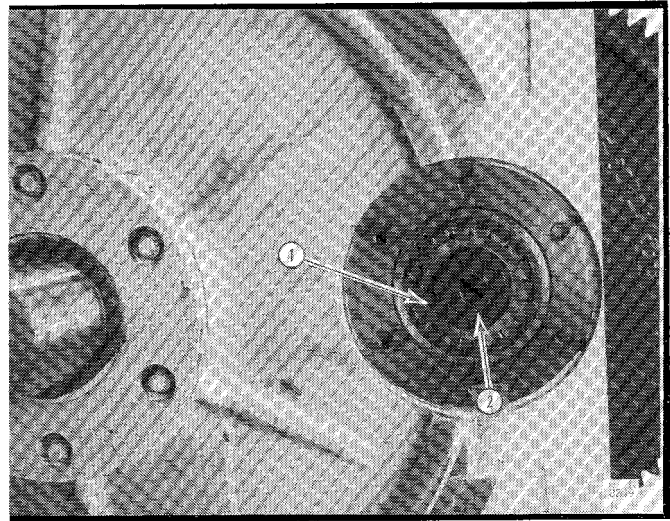


Figure 26

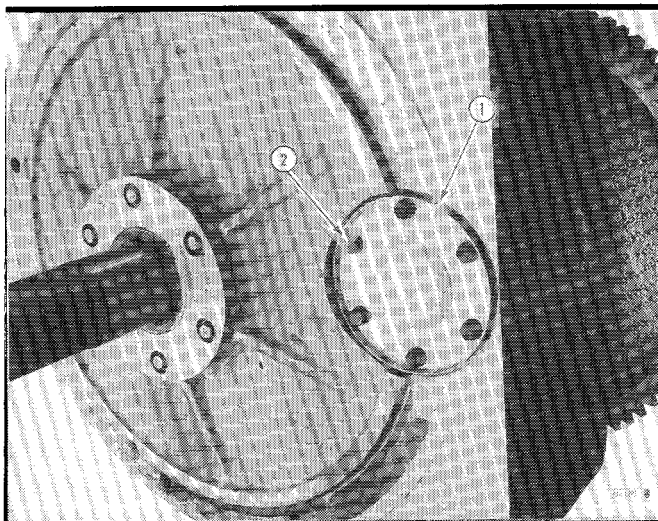


Figure 27

Install pinion gear shaft gasket and cap (1).

Install six lock washers and torque cap screws (2).

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The Galion Hydraulic Crane, equipped with the four-section power boom, utilizes a rotary spring motor and trolley system to maintain tension on the hydraulic hoses supplying oil to the dual crowd cylinder.

Two different styles of spring motors have been installed, Proper identification is important since the arrangement of components is somewhat different.

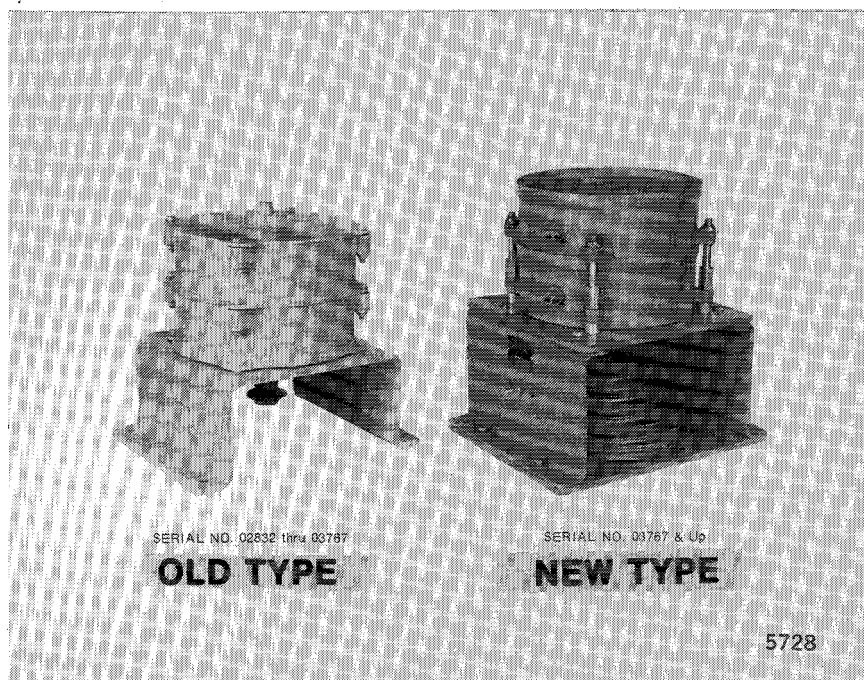


Figure 1

The new type spring motor is being installed on new cranes. This new spring motor has spring tension indicators which will indicate a broken spring when the following test is conducted:

Put all outriggers to the ground. Fully extend the boom horizontally over the front of the machine. If a motor spring is broken, the indicator will extend from the top of the case. If a spring is functioning correctly the indicator will fall.

Changeover from the previous spring motor to the new type spring motor requires these items:

- (1) Threaded studs to secure spring motor to boom, originally 3/8-16 UNC x 1" long, must be 3/8-16 UNC x 1 3/4" long.
- (2) D-82864 flat washer and D-53985 lock nut that retain cable drum to spring motor shaft must be replaced with D-85044 flat washer and D-57988 lock nut.

C1

Remove nut from spring anchor cap screw.

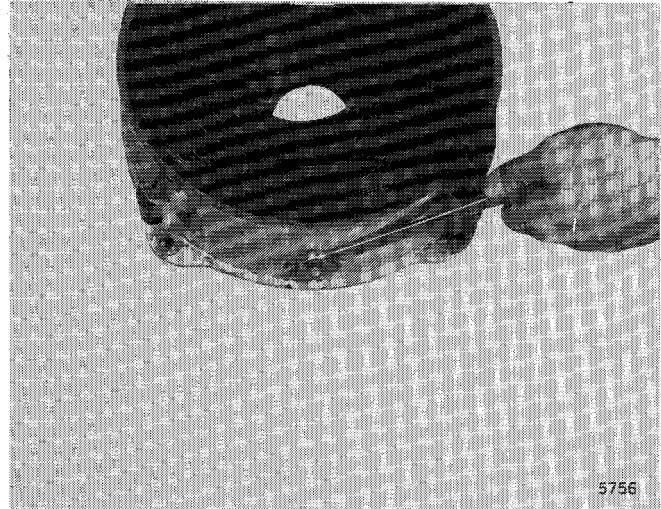


Figure 29

Secure rope of at least 20' length to inner end of spring.

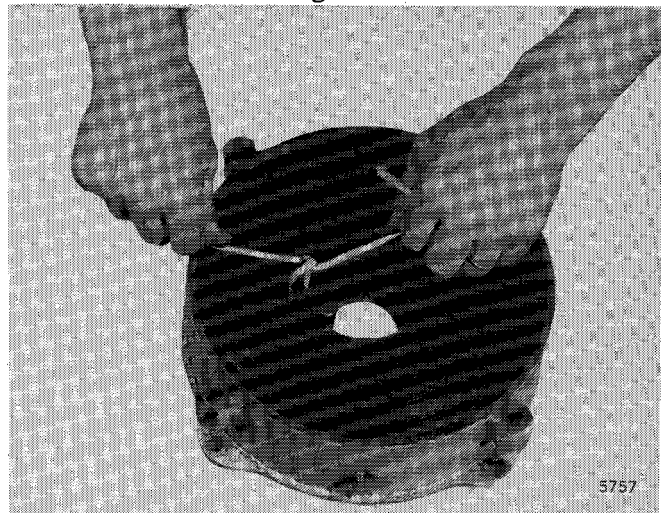


Figure 30

Secure spring housing in vise or other suitable fixture. Standing at a safe distance, yank spring from housing by pulling on rope.

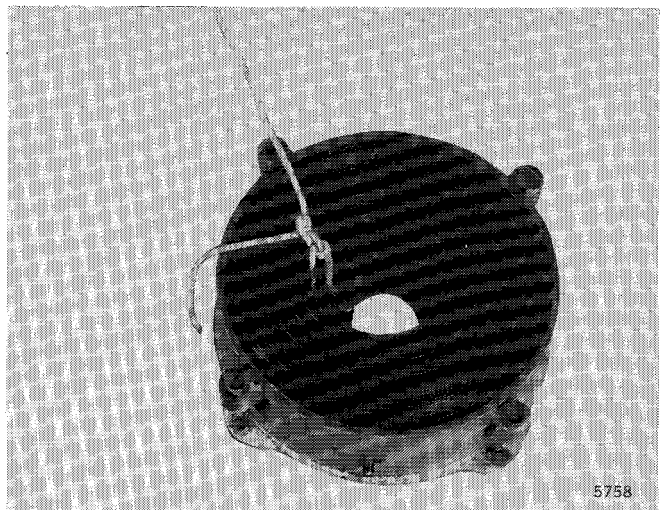


Figure 31

R1

Instal 1 spring cover.

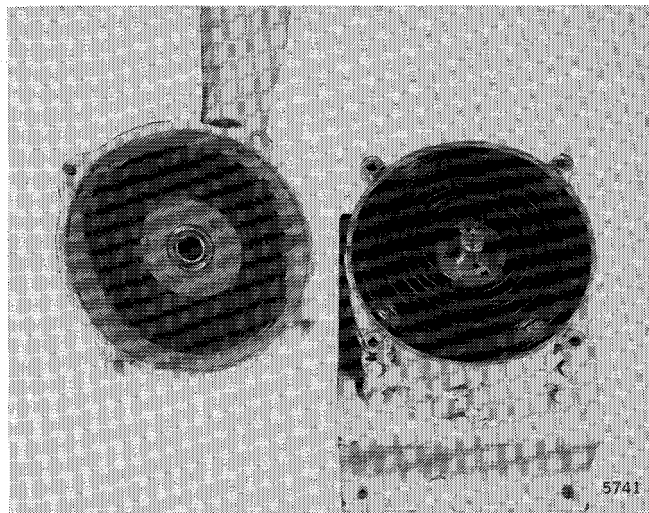


Figure 59

Install four cap screws, nuts and washers to retain spring cover to outer housing.

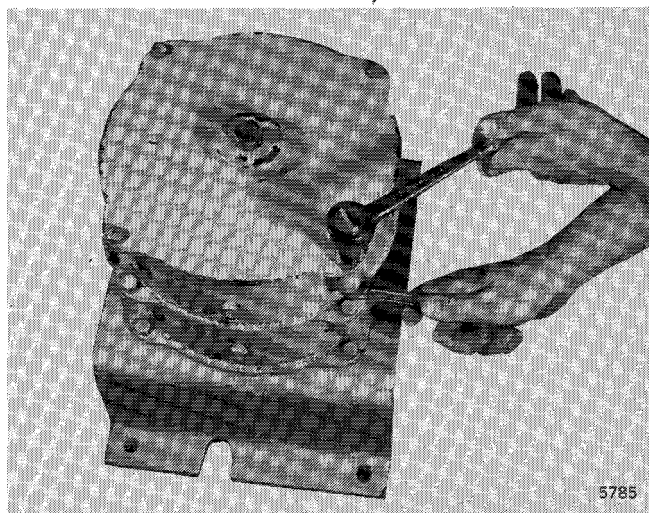


Figure 60

Install woodruff key in shaft. This key is designated a #15 woodruff key.

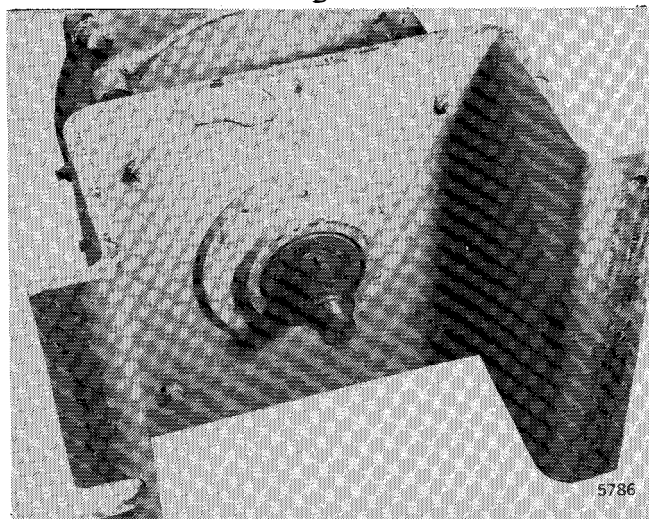


Figure 61

R1

Use allen wrench to loosen set screws in shaft collar.

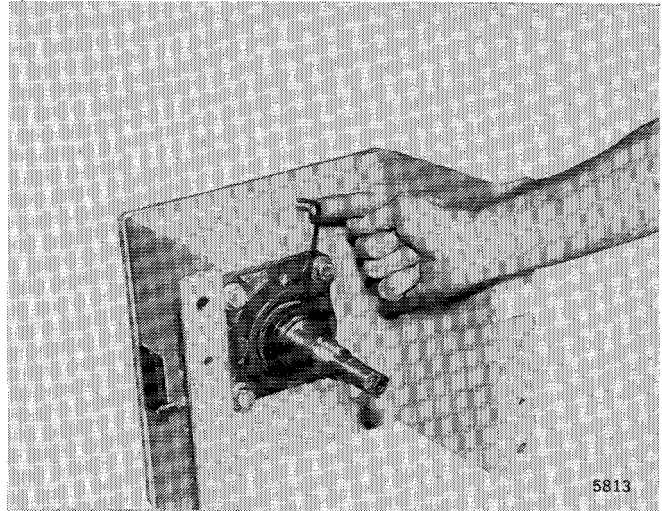


Figure 89

Remove collar from shaft.

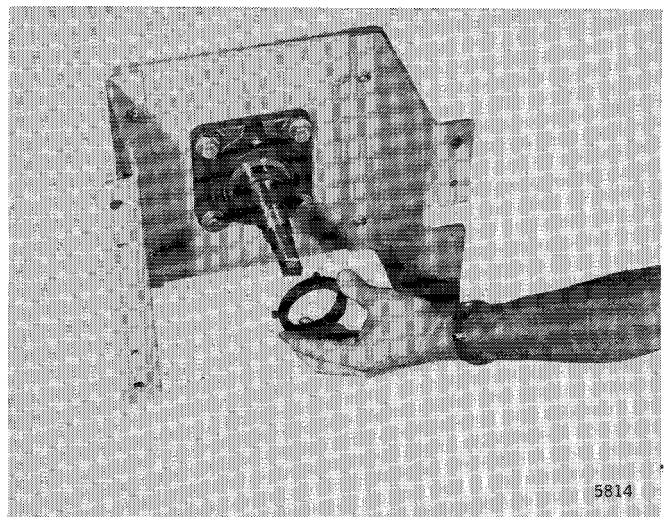


Figure 90

Remove shaft from bearing.

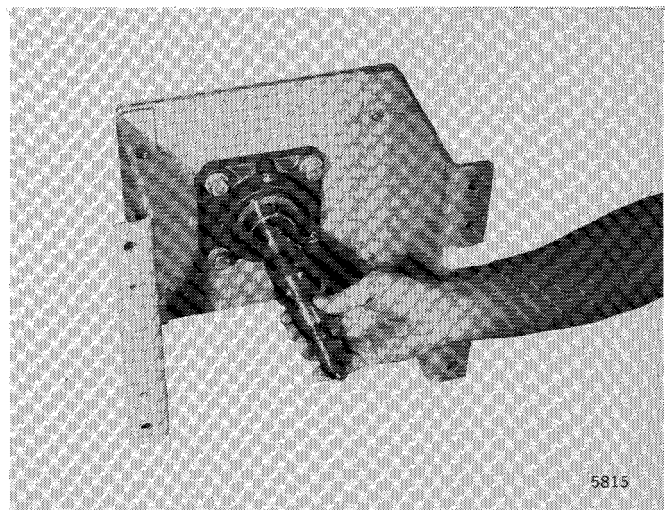


Figure 91

R1

SHOP MANUAL

G-06.00

c 2

**PLANETARY DRIVE AXLE
(CLARK SERIES DS-12152)**

APPLICABLE MODEL/S

90 thru 125
 90A thru 125A
 125F
 125FA
 140F
 150A
 150FA

SERIAL NUMBER/S

04824 thru 08774
 04777 thru 08774
 07247 thru 08774
 07990 thru 08774
 07571 thru 08774
 04759 thru 08090
 07305 thru 08090

CAUTION

- ALL** COMPONENTS MUST BE PROPERLY SUPPORTED DURING DISASSEMBLY AND REASSEMBLY.
- ALL** JACKING, HOISTING AND GENERAL WORKSHOP EQUIPMENT REQUIRED FOR THIS OPERATION MUST BE IN GOOD WORKING ORDER.
- EXTREME** CAUTION TO BE OBSERVED AT ALL TIMES TO PREVENT INJURY.
- SAFE** WORKSHOP PRACTICES ARE A MUST.

<u>CONTENTS</u>	<u>PAGE</u>
General Torque Values	Back of Cover
Special Tools	1
Description	2
Removal of Axle from Crane	3
Dissassembly	8
Cleaning and Inspection	22
Reassembly	24
Installation of Axle to Crane	38
Tooth Contact Sheet	44

Match mark planet carrier and hub assemblies. Remove five capscrews and lockwashers (1), five nuts (2) five dowels (3) and slide planet carrier assembly (4) from hub (5). Remove drain and level plug (6) from hub.

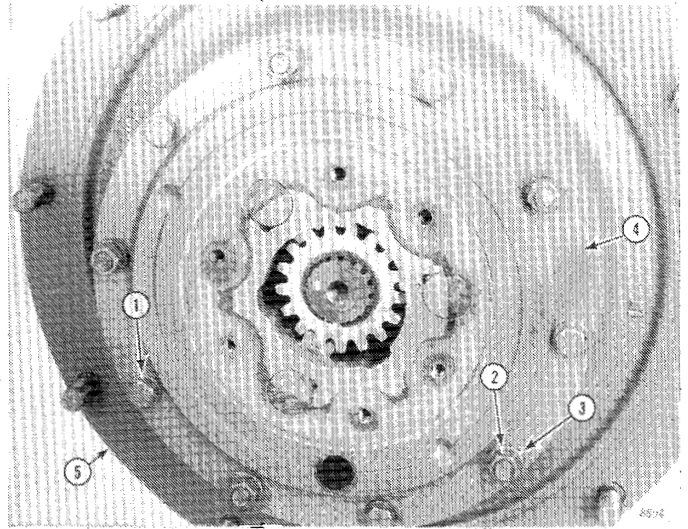
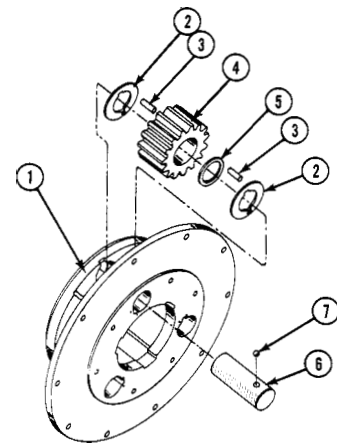


Figure 16

Using a suitable drift, drive pinion shaft (6) with lock ball (7) out thru the front of planet spider (1). Remove pinion (4) and two thrust washers (2) from spider (1). Remove fifty eight needle bearings (3) and spacer (5) from pinion (4).



8695

Figure 17

Remove retaining ring (1) and sun gear (2) from axle shaft (3).

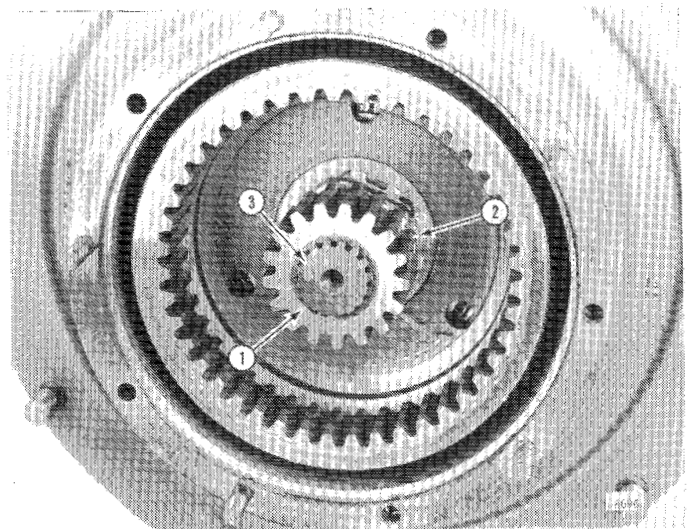


Figure 18

Lift side gear (1) and side gear thrust washer (2) out of case half (3).

NOTE: *Remove remaining side gear and thrust washer from remaining ease half.*

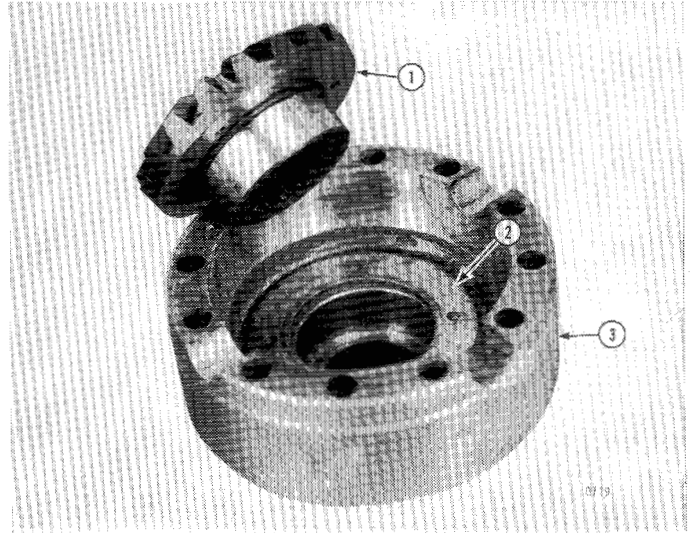


Figure 46

Remove twelve nuts and bolts (1) and ring gear (2) from case half (3) only if replacement is necessary.

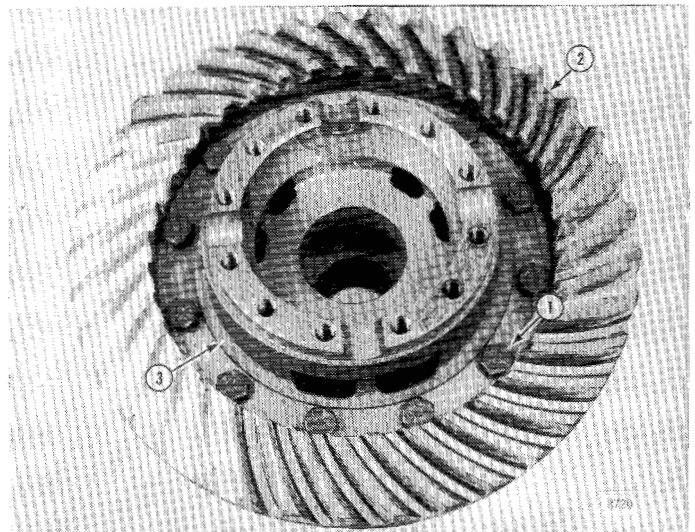


Figure 47

Remove cotter pin (1), nut (2) and flange coupling (3) from pinion shaft (4).

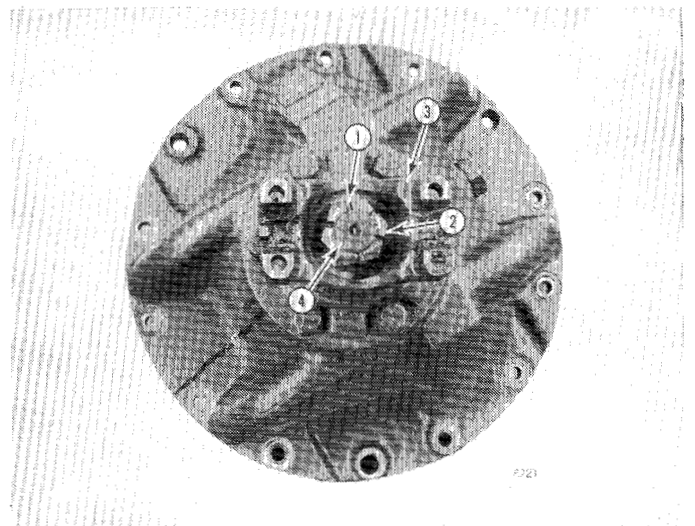


Figure 48

Using a suitable drift or press install grease retainer (3), bearing sleeve (2) and upper trunion bushing (1) in the axle housing (4).

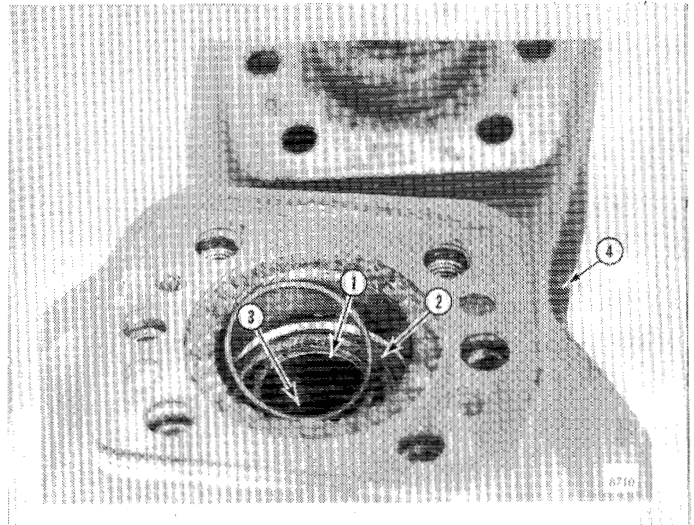


Figure 68

Lift spindle support into position at the end of the axle (2), lifting top of spindle support (1) away from axle and locating bottom of spindle support (1) on bottom of bearing (3) and then locating top of support in place on axle.

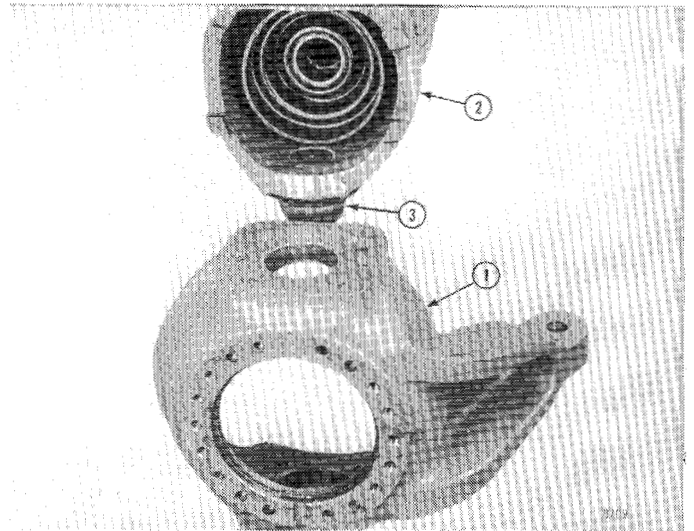


Figure 69

Install bearing cone in lower trunion (2) only if removed during disassembly. Position shims (3) and lower trunion (2) on spindle support (4) and install six cap-screws and lockwashers (1).

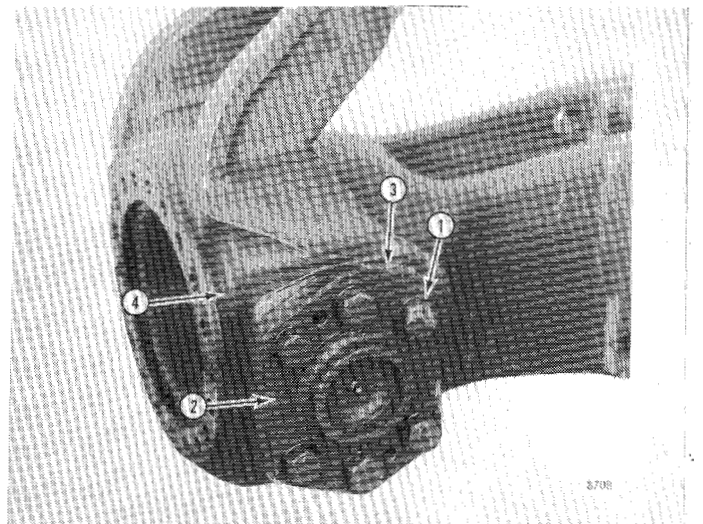


Figure 70

Using a suitable sling and boom, lift wheel assembly (2) into position on hub assembly (3) and install ten stud nuts (1).

NOTE: Using suitable torque wrench (4) tighten nuts (1) to 300 ft. lbs. torque.



BE EXTREMELY CAREFUL WHILE INSTALLING WHEEL ASSEMBLY. MINIMUM WHEEL WEIGHT is 480 LBS.

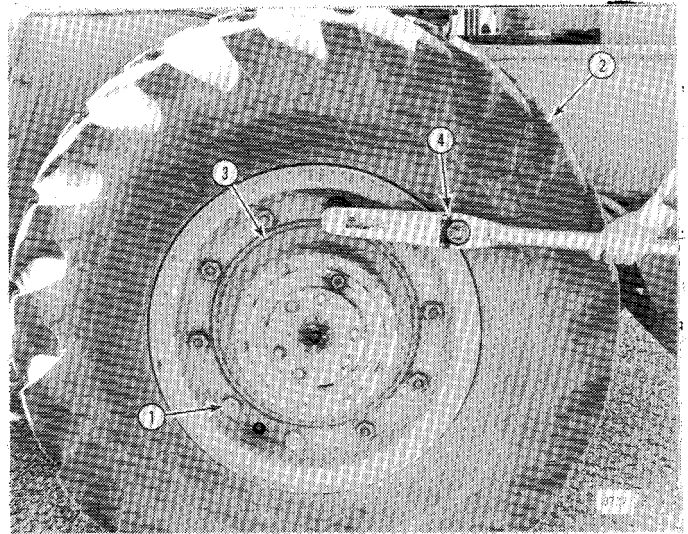


Figure 93

Lower rear outriggers (1) to lift rear of crane off wooden blocking (2). Remove wooden blocking (2) and skid (3) out from under the crane. Raise outriggers to stowed position.

NOTE: Bleed brakes, refer to Fig. 103.

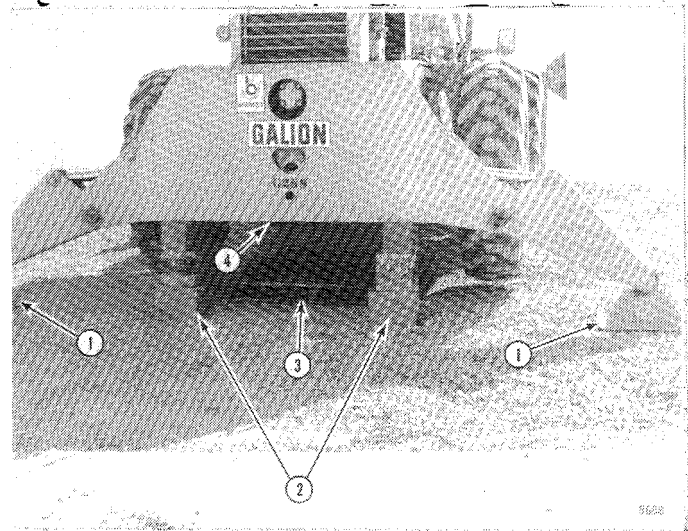


Figure 94

FRONT AXLE INSTALLATION

Swing crane boom 90° off center (to the side) of crane. Lower boom to 0° elevation and retract boom as far as possible. Attach chain (1) to skid and axle (2). Crowd boom out to pull axle assembly into position under crane.

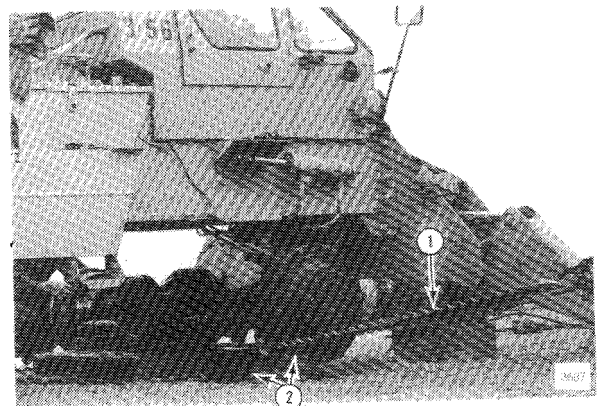
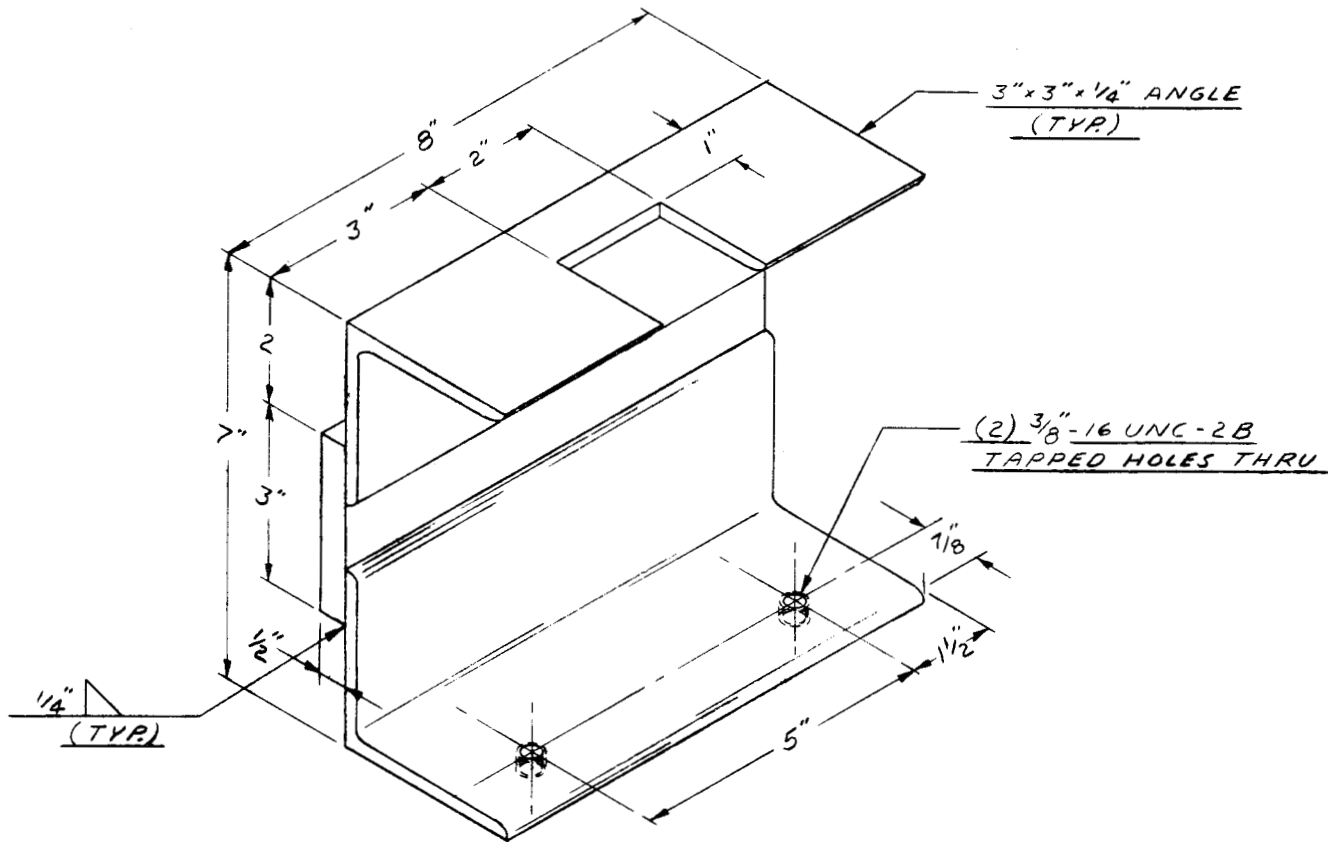


Figure 95

SHOP MANUAL

FILE 6
SECTION 7



23. Using a suitable lifting strap (1) remove hub and drum (2) from axle assembly (3).

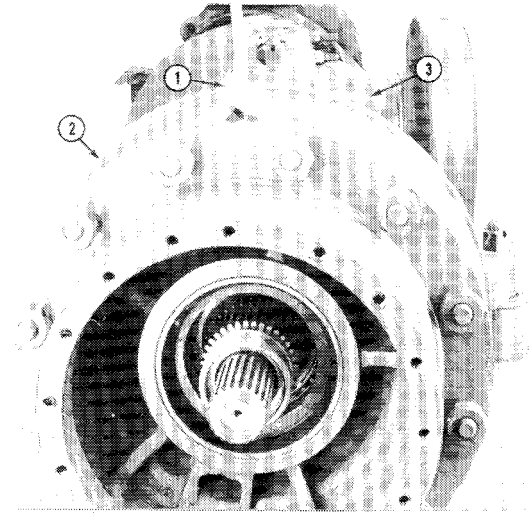


Figure 23

24. Remove cotter pin (1), nut (2) and drag-link (3) from spindle support (4). Remove four capscrews and lockwashers (5) and two dust guards (6) from axle assembly.

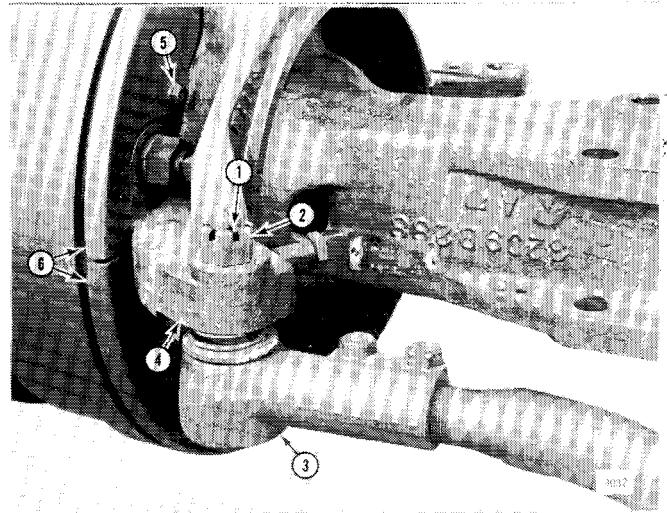


Figure 24

25. Using extreme care, remove spring (1) from brake shoe assemblies (4). Remove retaining rings (2) and link (3) from the two brake shoe pins (5). Remove brake shoes (4) from pins (5).

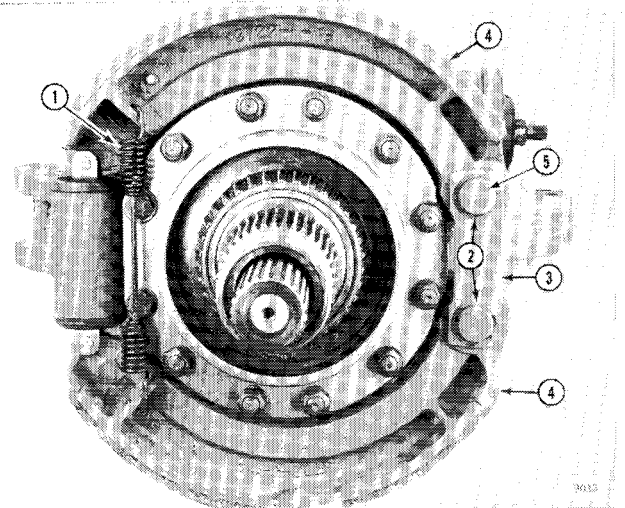


Figure 25

CLEANING AND INSPECTION

- A. Clean all parts thoroughly using solvent type cleaning fluid. It is recommended that parts be immersed in cleaning fluid and moved up and down slowly until all oil lubricant and foreign material is dissolved and parts are thoroughly clean.



CAUTION

CARE SHOULD BE EXERCISED TO AVOID SKIN RASHES, FIRE HAZARDS AND INHALATION OF VAPORS WHEN USING SOLVENT TYPE CLEANERS.

- B. Remove bearings from cleaning fluid and strike flat against a block of wood to dislodge solidified particles of lubricant. Immerse again in cleaning fluid to flush out particles. Repeat above operation until bearings are thoroughly clean. Dry bearings using moisture free compressed air. Be careful to direct air stream across bearing to avoid spinning. Do not spin bearings when drying. Bearings may be rotated slowly by hand to facilitate drying process.
- C. Clean interior and exterior of housings, bearing caps, etc., thoroughly. Cast parts may be cleaned in hot solution tanks with mild alkali solutions providing these parts do not have ground or polished surfaces. Parts should remain in solution long enough to be thoroughly cleaned and heated. This will aid the evaporation of cleaning solution and rinse water. Parts cleaned in solution tanks must be thoroughly rinsed with clean water to remove all traces of alkali. Cast parts may also be cleaned with a steam cleaner.



CAUTION

CARE SHOULD BE EXERCISED TO AVOID INHALATION OF VAPORS AND SKIN RASHES WHEN USING ALKALI CLEANERS.

- D. All parts cleaned must be thoroughly dried immediately by using moisture free compressed air or soft lintless absorbent wiping rags free of abrasive materials such as metal filings, contaminated oil or lapping compound.
- E. Carefully inspect all bearing rollers, cages and cups for wear, chipping or nicks to determine condition. Do not replace a bearing cone or cup individually without replacing the mating cup or cone at the same time. After inspection, dip bearings in EP 80 or EP 90 and wrap in clean lintless cloth or paper to protect them until installed.
- F. Replacement of oil seals, O-rings, gaskets and snap rings are more economical to replace when unit is disassembled than premature failure, refer to Parts Book for part number of replacement items. Be extremely careful when installing seal, to avoid cutting or scratching. Lubricate all O-rings and seals before assembly.

76. Press bearing sleeve (1) on steering arm (2). Position ball stud (3) in steering arm and install nut and cotter pin. Place shims (4) on steering arm.

NOTE: *Check disassembly procedures for correct thickness of shims.*

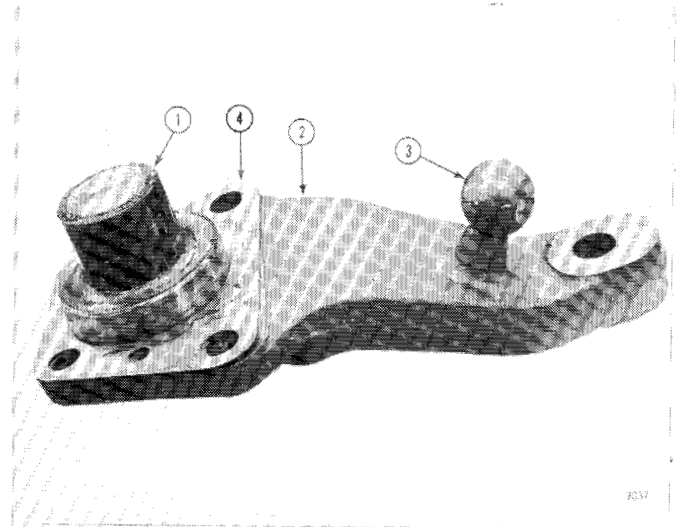


Figure 76

77. Determine the amount of shims required by adjusting steering knuckle to .005" - .013" endplay, using shims located under the upper and lower bearing caps. The size of both shimpacks should be equalized to center the steering knuckle relative to the drive shaft.

Position steering arm (2) with shims (3) on steering knuckle (4) and install two (3/4" - 10NC x 2 1/4" lg - Gr.#8) capscrews and lockwashers (1) and two (7/8" - 14NF x 2" lg. - Gr.#8) capscrews (6). Install grease fitting (5) if removed during disassembly.

Apply light coat of grease to and install bushing; then install seal (A).

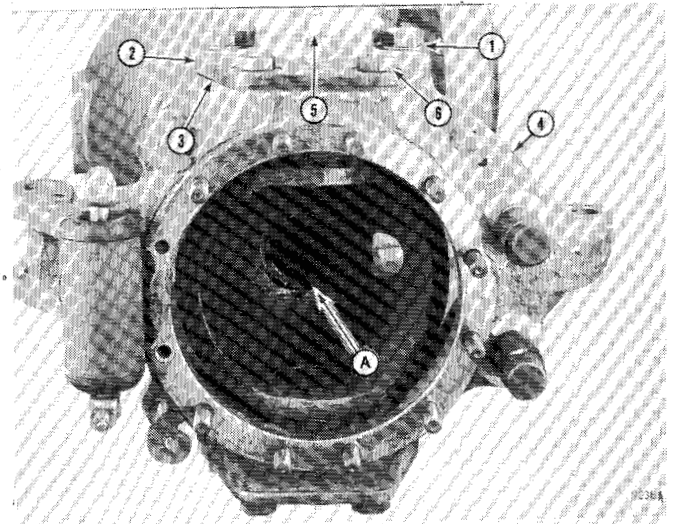


Figure 77

78. Using extreme care slide axle assembly (1) into axle housing (2). Rotate axle slightly to align axle shaft splines with the splines in cap and carrier assembly.

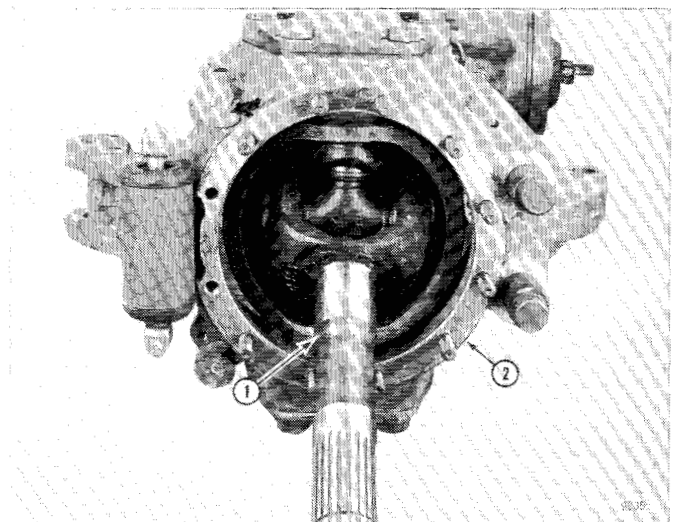


Figure 78

REAR STEER ADJUSTMENT

101. Start crane engine and move rear steer control lever until rear wheels are straight ahead. Loosen bolts (1) and move bracket (2) until roller (3) is against micro switch (4) depressing it just enough to make contact. The rear steer (red) light (5) in instrument panel (6) will go out when switch is properly depressed. Tighten bolts (1) and recheck steering for proper operation.

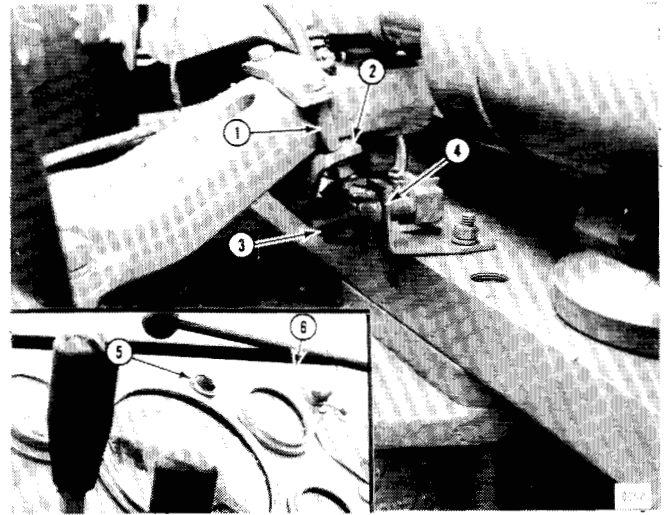


Figure 101

SPECIAL TOOLS

ADAPTOR BAR

Shown here are manufacturing details for the adaptor bar used to get proper rolling torque on the planetary carrier assembly.

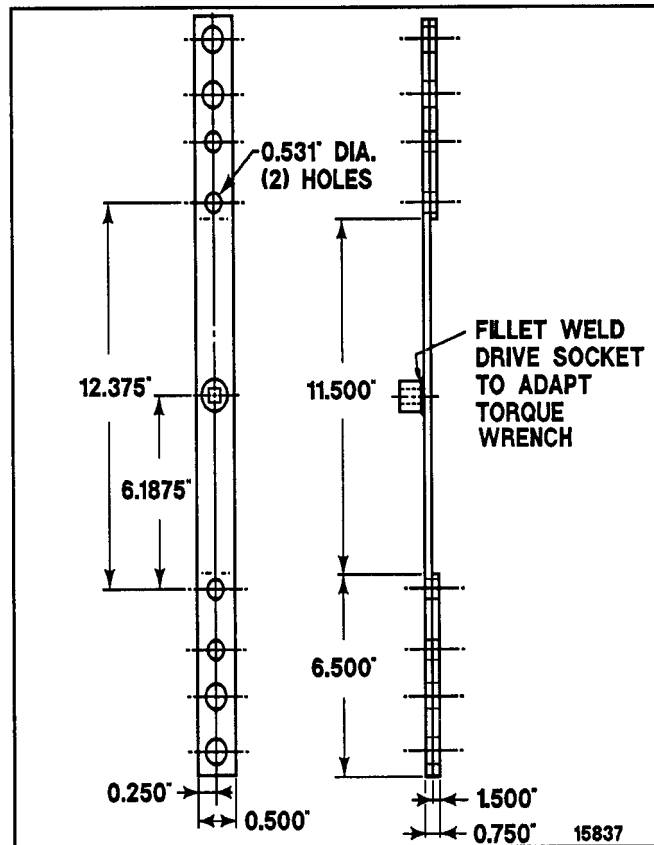


Figure 1 MANUFACTURING DETAILS FOR ADAPTOR BAR

Figure 2, shows how the adaptor bar is used to set rolling torque by bolting it to the cup and stud assembly hub. Bolts used for planet carrier assembly can be used to secure bar into position.

A dial indicator torque wrench must be used to show rolling torque. **DO NOT USE** a clicker (over-center-snap) type torque wrench.

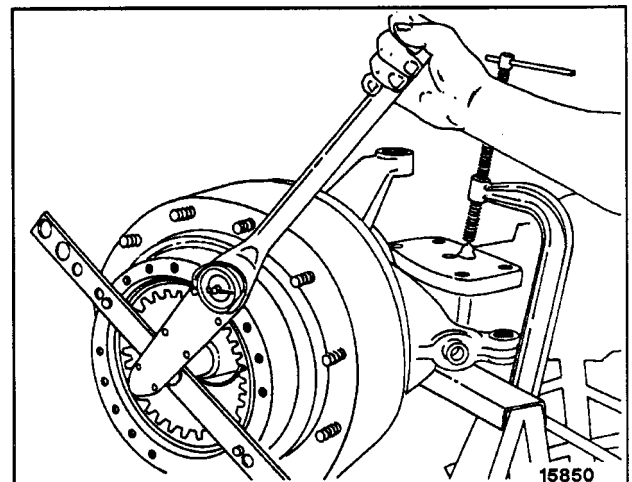


Figure 2 INSTALLATION AND APPLICATION OF ADAPTOR BAR

AXLE TRUNNION BUSHING DRIVER

Shown here are manufacturing details for the axle trunnion bushing driver **used** to install axle trunnion bushings.

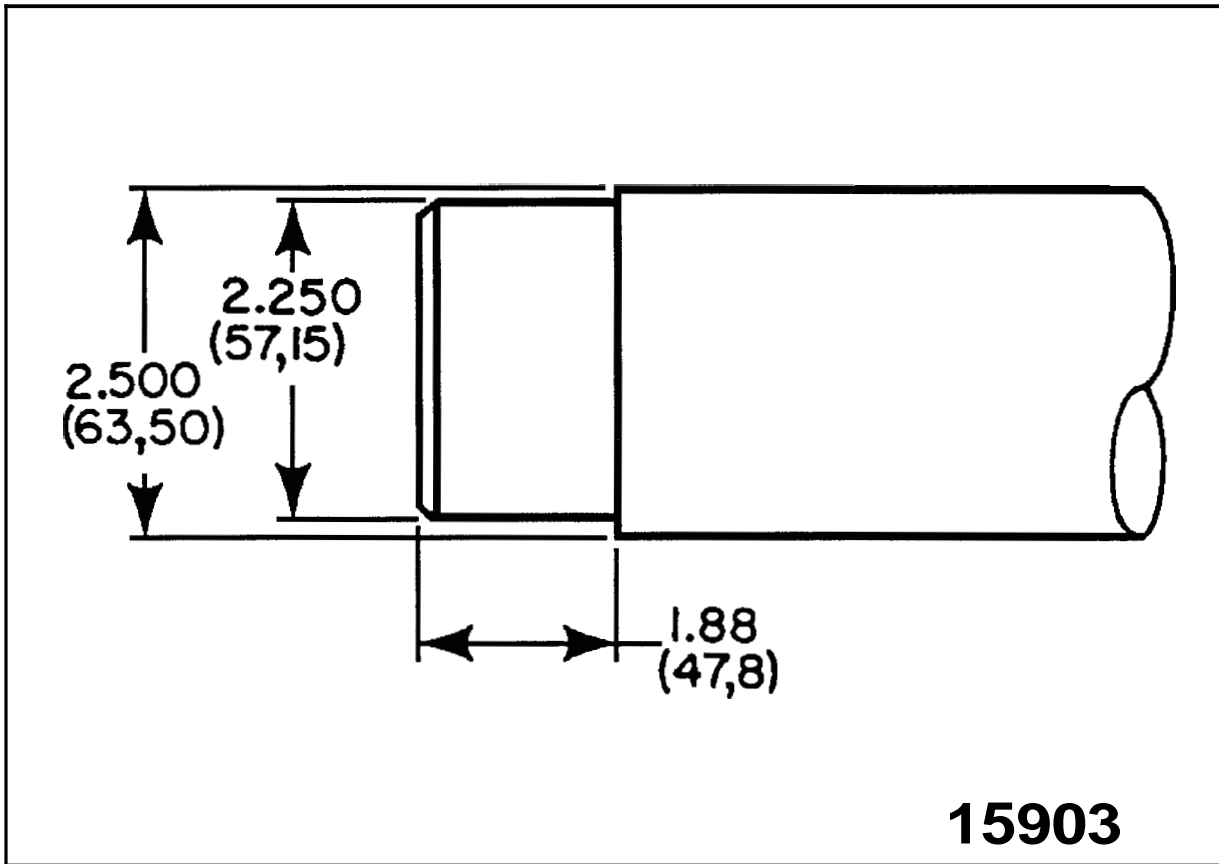


Figure 20 MANUFACTURING DETAILS FOR AXLE TRUNNION BUSHING DRIVER

Figure 21, shows axle trunnion bushing driver being **used** to install axle trunnion bushings.

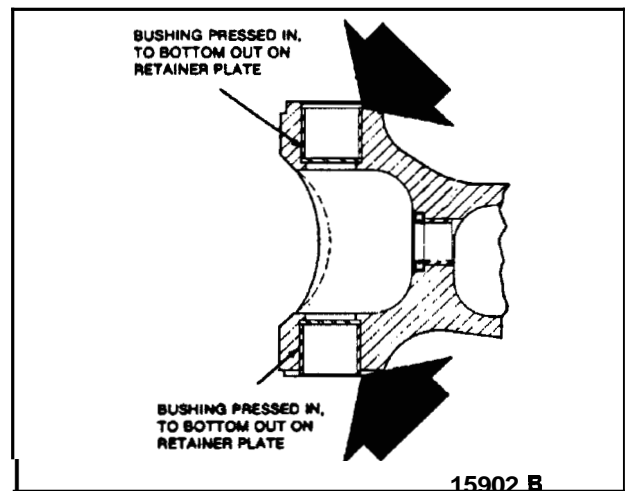


Figure 21 APPLICATION OF AXLE TRUNNION BUSHING

FRONT AXLE REMOVAL

1. Remove self-locking nut and retaining washer (1, Figure 31), and steering cylinder rod end (2) from pin (3). Secure steering cylinder to side of frame to prevent interference with axle removal. Repeat this procedure for steering cylinder on other side of unit.
2. Remove cotter pin (4), adjusting plug (5), spring and bearing half from drag link (6). Remove drag link from ball stud.

NOTE: On later model cranes equipped with orbitrol steering the drag link was eliminated.

3. Disconnect brake line tube (7) from connector (8) and brake assembly wheel cylinder. Remove hex nut, lock washer and flat washer (9), securing bracket (10) to steering arm. Plug and cap wheel cylinder, brake tube and brake hose to prevent contamination from entering brake system. Secure brake hose and bracket to frame to prevent interference with axle removal. Repeat this procedure for brake line assembly on other side of unit.

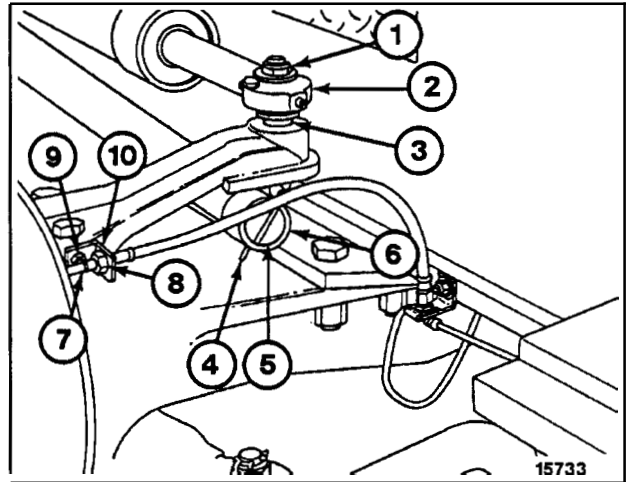


Figure 31

4. Remove two hex nuts, lock washers and U-bolt holding parking brake cable sheath to bracket. Remove cotter pin and pin (1, Figure 32) from parking brake cable clevis (2) and parking brake lever (3).
5. Remove mounting hardware securing brake line hose and tubing bracket (4) to differential housing. Install mounting hardware once bracket is free.
6. Remove nuts and lock washers securing drive shaft (5) to front axle input flange (6).

NOTE: Once drive shaft is removed, install hex nuts *on* input flange to protect threads and prevent parking brake drum from coming *off* during removal process.

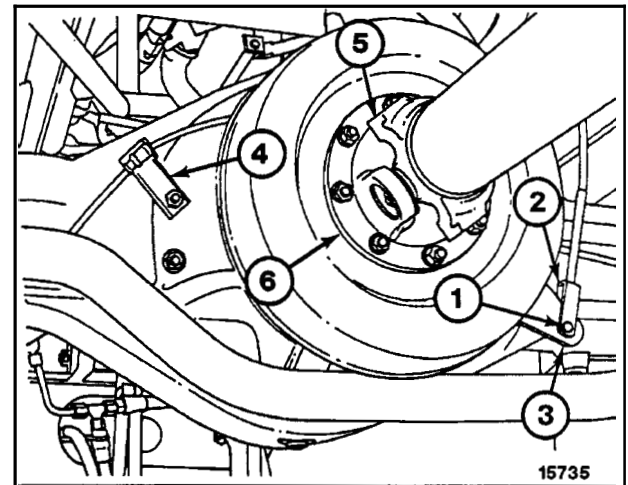


Figure 32

7. Remove four nuts and lock washers (1, Figure 33), two U-bolts (2) and drive shaft (3) from front output flange of transmission.



WARNING! Completely remove drive shaft to eliminate possible injury if transmission is bumped into gear.

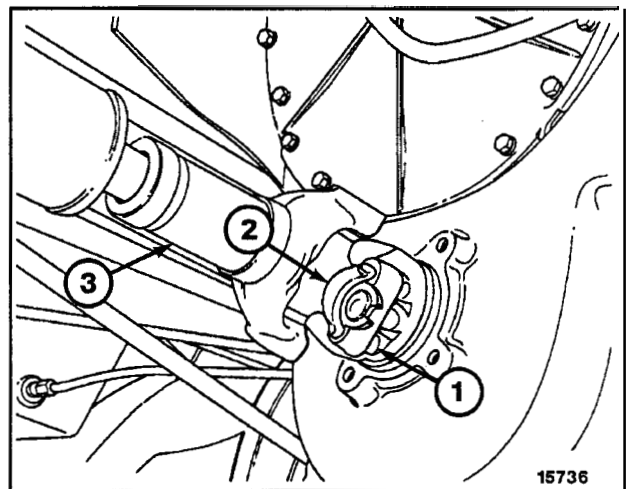


Figure 33

CLEANING AND INSPECTION

Some of the following information may not apply to the particular component that you are servicing.

All parts must be clean to permit an effective inspection. During assembly, it is very important that no dirt or foreign material enters unit being assembled. Even minute particles can cause malfunction of close fitting parts such as thrust bearing, matched parts, etc.

1. Clean all metal parts thoroughly using a suitable cleaning fluid. It is recommended that parts be immersed in cleaning fluid and moved up and down slowly until all oils, lubricants, and/or foreign materials are dissolved and parts are thoroughly clean.



WARNING! Care should be exercised to avoid inhalation of vapors, exposure to skin and creating fire hazards when using solvent type cleaners.

2. For bearings that can be removed, soak them in a suitable cleaning fluid for a minute or two, then remove bearings from cleaning fluid and strike flat against a block of wood to dislodge solidified particles of lubricant. Immerse again in cleaning fluid to flush out particles. Repeat above operation until bearings are thoroughly clean. To dry bearings, use moisture-free compressed air. Be careful to direct air stream across bearing to avoid spinning bearings that are not lubricated. **DO NOT SPIN BEARINGS WHEN DRYING;** bearings may be rotated slowly by hand to facilitate drying process.
3. Carefully inspect all bearing rollers, cages and cups for wear, chipping or nicks to determine condition. **Do not** replace a bearing cone or cup individually without replacing mating cup or cone at same time. After inspection, dip bearings in light weight oil and wrap in clean lintless cloth or paper to protect them until installation.

For those bearings that are to be inspected in place; inspect bearings for roughness of rotation, scoring, pitting, cracked or chipped races. If any of these defects are found, replace bearings. Also inspect defective bearing housing and/or shaft for grooved, galled or burred conditions that indicate bearing has been turning in its housing or on its shaft.

4. It is more economical to replace oil seals, O-rings, sealing rings, gaskets and snap rings when unit is disassembled than waiting for premature failures; refer to latest Micro Fiche and/or Parts Book for replacement items. Be extremely careful when installing sealing members, to avoid cutting or scratching. Curling under of any seal lip will seriously impair its efficiency. Apply a thin coat of Loctite #120 to outer diameter, of metal casing, on oil seals to assure an oil tight fit into retainer. Use extreme care not to get Loctite on lips of oil seals. If this happens, that portion of seal will become brittle and allow leakage.

When replacing lip type seals, make sure spring loaded side is towards oil to be sealed.

5. If available, use magna-flux or similar process for checking for cracks that are not visible to the eye. Examine teeth on all gears carefully for wear, pitting, chipping, nicks, cracks or scores. Replace all gears showing cracks or spots where case hardening has worn through. Small nicks may be removed with suitable hone. Inspect shafts and quills to make certain they have not been sprung, bent, or splines twisted, and that shafts are true.

NOTE: Spline wear is not considered detrimental except where it affects tightness of splined parts.

Inspect thrust washers for distortion, scores, burs, and wear. Replace thrust washer if defective or worn.

32. Bend tabs on lock washer (5, Figure 71) to prevent loosening of hub retaining nut.

NOTE: If double hub retaining nut arrangement is used with a lock washer located between is used bend tabs over both nuts as shown in Figure 72.

33. Install thrust washer (3, Figure 71), sun gear (2) and retaining ring (1) on axle shaft (4).

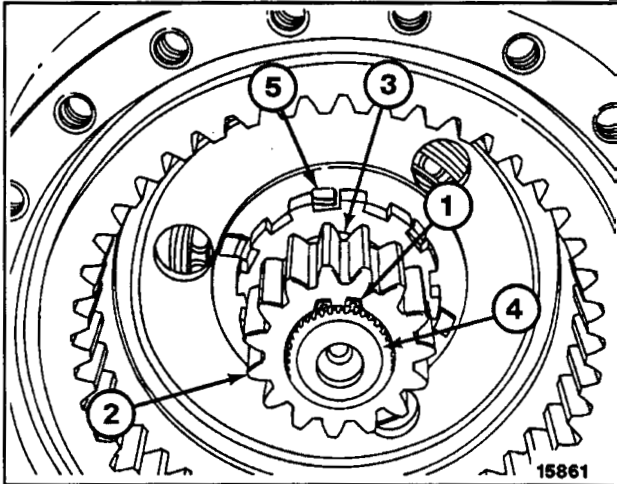


Figure 71

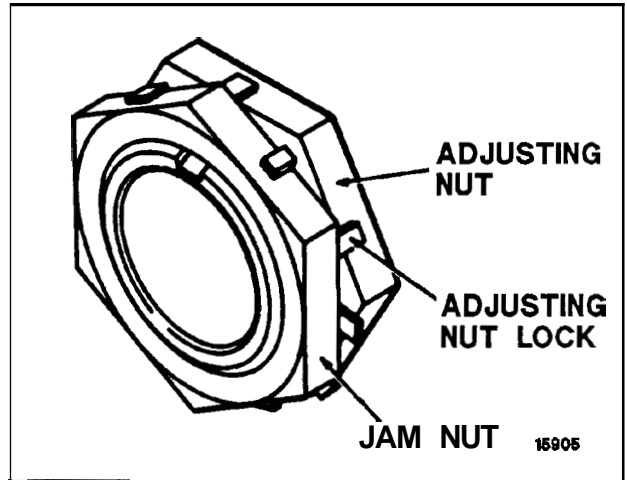


Figure 72

34. Coat mating surface of hub and stud assembly and planetary carrier (2, Figure 73) with Loctite #515.

NOTE: See appropriate "Planetary Carrier Assembly" section for axle being serviced for disassembly and reassembly instructions.

35. Align holes and position planetary carrier on axle.

NOTE: Once planetary gears are engaged on sun gear and internal ring gear the input flange on axle can be rotated to help align holes.

36. Apply Loctite 271 to bolts (1). Install washers and bolts to secure carrier to axle. Tighten bolts from 90 - 100 lbf ft (122.0 - 135.6 N·m).

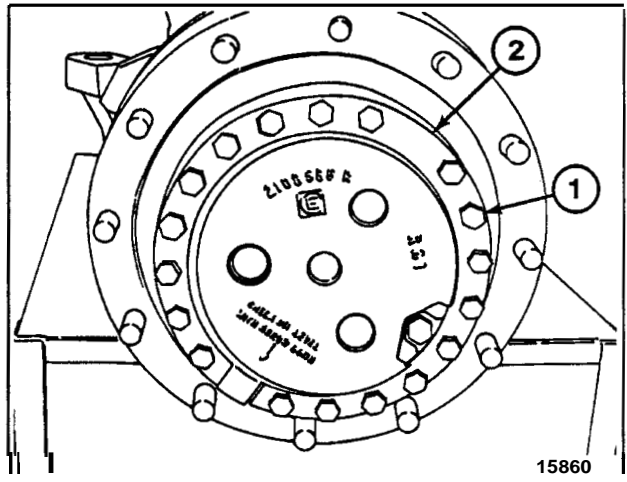


Figure 73

- Attach three differential carrier support plates and legs (1, Figure 85) to carrier housing (2).

NOTE: Refer to "Special Tools" section of this manual for manufacturing details of plates and legs.

- Match mark carrier caps (3) to carrier housing.
- Remove adjusting nut retaining bolt and lock washer (4) from each cap.
- Remove two bolts and plain washers (5) that hold each cap in place. Remove both caps.
- Loosen adjusting nuts (6) and remove differential assembly (7) and adjusting nuts from carrier housing. Be careful not to drop bearing cups on each end of differential assembly.

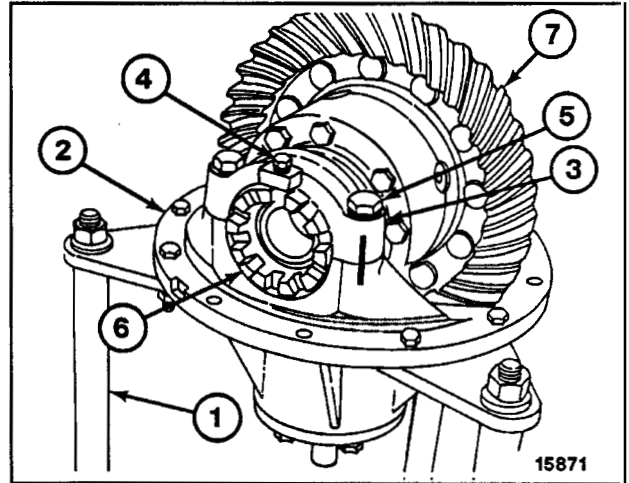


Figure 85

- Using a suitable puller remove bearing cones (1 and 2, Figure 86) from differential assembly halves.
- Match mark flanged case half (3), differential spider (4), and plain case half (5) as shown with a diagonal match mark. This style of match mark will ensure that differential is properly reassembled.
- Remove bolts and plain washers (6) holding case halves together. Remove plain case half.

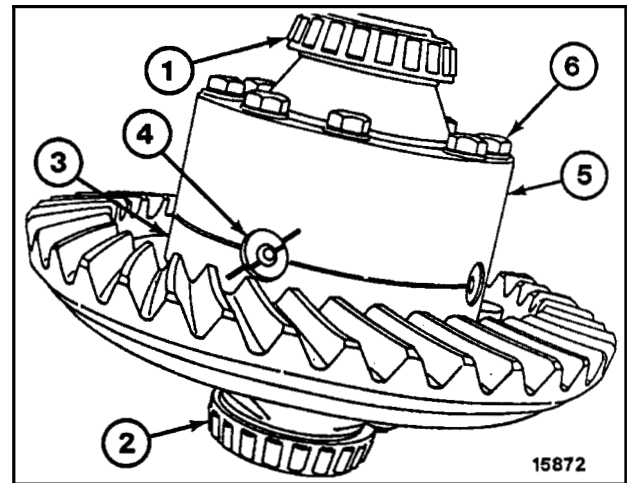


Figure 86

- Remove bronze colored side gear thrust washer (1, Figure 87) and side gear (2) from bevel side pinion gears (3). Remove thrust washer (1) from side gear if necessary.
- Remove differential spider (4) and bevel side pinion gears (3) with pinion thrust washers (5) from flanged case half. Remove thrust washers and bevel gears from spider if replacement is necessary.
- Remove remaining differential side gear and thrust washer from flanged case half.
- Remove hex nuts, ring gear bolts (6) and ring gear (7) from flanged case half.

NOTE: If ring gear is replaced, pinion gear must also be replaced, since they are a matched set.

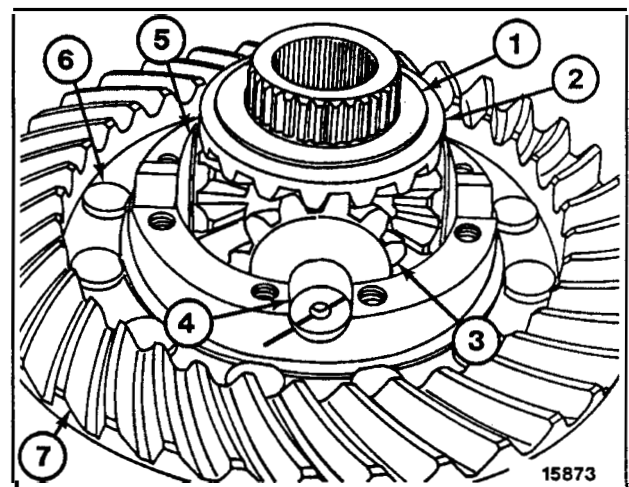


Figure 87

17. Insert a 3/8" Dia. threaded rod 18" Long (1, Figure 109) through differential assembly. Install a 3" O.D. washer on each end of threaded rod with appropriate hex nuts (2). Tighten hex nuts and washers against differential case halves (3 and 4). This rod will retain spring pressure exerted by No-Spin springs.
18. Match mark flanged case half (4), differential spider (5), and plain case half (3) as shown with a diagonal match mark. This style of match mark will ensure that differential is properly reassembled.
19. Remove bolts and plain washers (6) holding case halves together.
20. Once bolts are removed, slowly unscrew hex nuts on threaded rod to allow case halves to separate and allow No-Spin springs to expand.

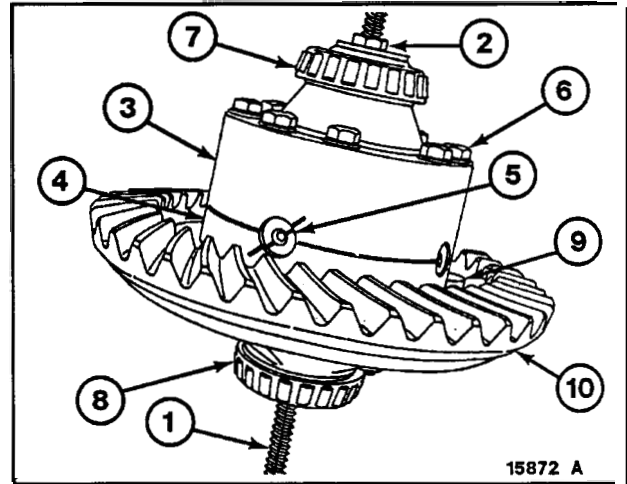


Figure 109

21. Remove threaded rod and No-Spin parts (1 thru 8, Figure 110) in order shown from between case halves

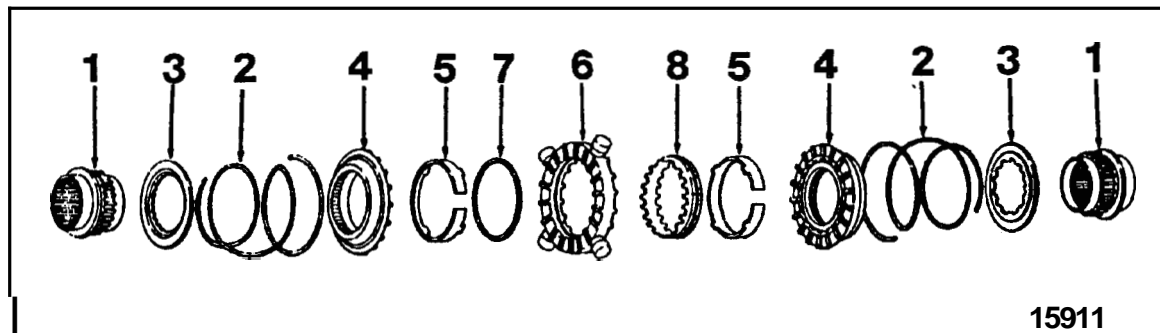


Figure 110

LEGEND FOR No-SPIN ASSEMBLY

- | | |
|--------------------|--------------------|
| 1. SIDE GEAR | 5. HOLDOUT RING |
| 2. SPRING | 6. SPIDER ASSEMBLY |
| 3. SPRING RETAINER | 7. RETAINER RING |
| 4. CLUTCH ASSEMBLY | 8. CENTER CAM |

22. Using a suitable puller remove bearing cones (7 and 8, Figure 109) from differential assembly halves.
23. Remove hex nuts, ring gear bolts (9) and ring gear (10) from flanged case half.

NOTE: If ring gear is replaced, pinion gear must also be replaced since they are a matched set.

INSTALLATION

FRONT AXLE INSTALLATION

1. Using a fork lift or other similar device, position axle assembly (1, Figure 132) under crane.

NOTE: If a 2 Ton (7.87 Mg) lifting device and/or fork lift is not available, use crane to position axle under frame. Lower boom to 0" elevation and fully retract it. Swing boom about 90° to side opposite that axle is laying] and attach chains to skid and axle. Slowly extend boom and drag axle assembly under unit. Crane boom can rise to a point where hook block is directly over center line of axle. With hook block over centerline of axle and crane, hoist axle into position against frame.

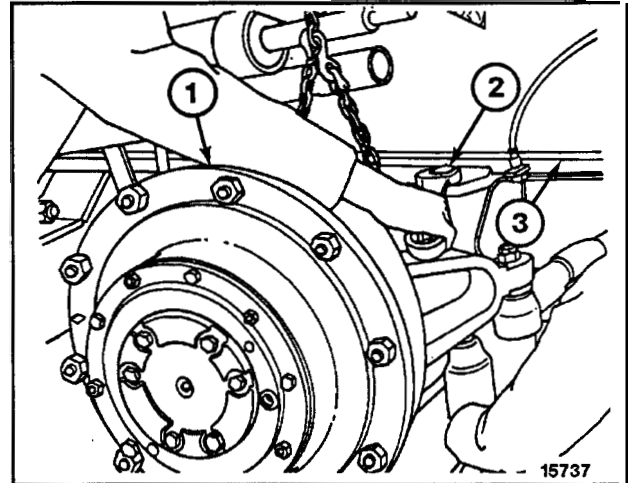


Figure 132

2. With lifting chains and spreader properly set up, attach chains to 2 Ton (1.81 Mg) lifting device and axle assembly. Slowly raise axle into position against frame.
3. Install eight bolts and self-locking nuts (2) that secure axle assembly to frame (3). Tighten bolts to 510 lbf ft (691.5 N·m).

NOTE: There are electrical wiring harnesses that are located in frame. Use care when installing bolts not to pinch these wires with axle mounting bolt tab. An access hole is located inside frame to reach bolts and wiring.

4. Position front drive shaft (3, Figure 133) against front output flange of transmission. Secure in place with two U-bolts (2) and four lock washers and nuts (1).

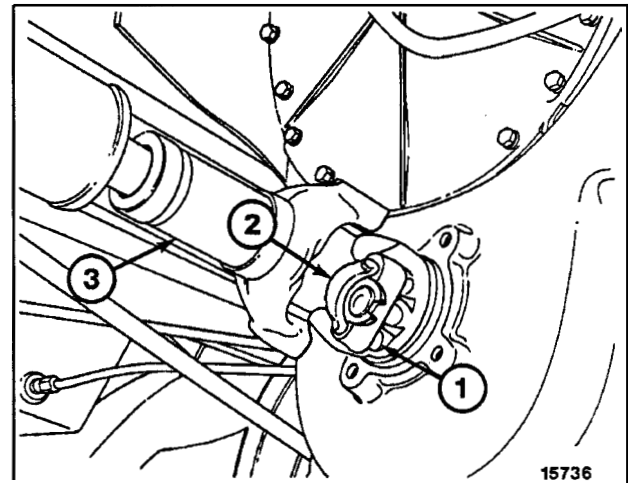


Figure 133

BURNISHING PROCEDURE (FRONT AND REAR AXLES)

New linings (brake shoes) may require “burnishing” to achieve desired performance. Also when brake lines are bled it is important to get rid of brake fluid that may have gotten into linings and brake drum. The following steps should be used to ensure proper burnishing.

1. Fully extend front outriggers (1, Figure 148) in down position as far as possible. Place wooden blocking (2) under front outrigger frame as shown in Figure 148. Raise outriggers until frame is resting solidly on blocking. Outrigger pads must remain in contact with ground. Repeat this procedure for rear outrigger.



WARNING! All four tires must clear ground once crane is resting on front **and** rear blocking.



WARNING! Leave enough room in front of and behind crane to stop in case it is knocked **off** blocking.

2. Using FIRST GEAR (or low range) apply enough brake line pressure to slip all four wheels against engine torque (near maximum).



WARNING! Do not allow brake drum outside temperatures to exceed **300°F (149°C)** or **350°F (177°C)**.

3. Allow drums to cool down to **150°F (66°C)** or **200°F (93°C)** before repeating. The number of cycles should be based on achieving an acceptable performance level. It is estimated that at least five cycles will be required to show marked brake improvement.



WARNING! Improper burnishing could result in “glazing.” Since maximum temperature limits are somewhat critical, and difficult to determine, extreme care must be exercised.

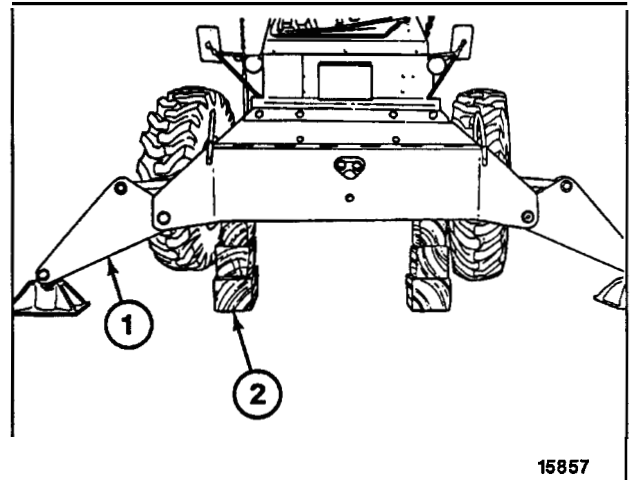


Figure 148

CRANE (Cont'd.)

COMPONENT	MACHINE MODEL	TABLE
STEERING GEAR (Cont'd.)	90A thru 125A	C or D
	125 F	C or D
	125 FA	C or D
	140 F	C or D
	150 A	C or D
	150 FA	C or D
SWING DRIVE GEAR CASE	80	B or D
	90 thru 125	B
	90A thru 125A	B, C, D
	125 F	C or D
	125 FA	C or D
	125 P	6
	140 F	C or D
	150 A	C or D
	150 FA	C or D
	150 P & T	C
	180 S	C or D
	200 FA	C or D
220 A	C or D	
220 S	C or D	
SWING DRIVE PINION	ALL	F
THROTTLE ACTUATOR CYLINDER AND RESERVOIR	180 S	M
	220 A	M
TRANSFER CASE	80	D
TRANSMISSION	80	B or D
	90 thru 125	B
	90A thru 125A	B or D

TABLE N

MULTI-PURPOSE LITHIUM BASE GREASE

LUBRICATION CHART CODE: **MPG**

TYPE: SAE 5310

TYPICAL PROPERTIES: TEST

Penetration	D217
Unworked	275
Worked 60 strokes	270
Worked 10,000	Less than 5% raise
Dropping Point	380°F minimum
Water Resistance	Excellent
ASTM Oxidation	Negative D942
Texture	Buttery & Smooth
Soap Base	Lithium
Base Oil, Pour	-10
Viscosity, SUS @ 210°F (99°C)	78
Viscosity Index	95
Oxidation Inhibited	Yes
Coordinating Research Council Test	
Wheel Bearing	Passes
Wheel Bearing Overpacked	Passes

Sources:



Sun  Company	Sunfleet HP Grease
Mobil  Corporation	Mobilgrease 77
Texaco	Multifak EP 2
Shell	Alvania EP-2

TABLE O

HYDRAULIC BRAKE FLUID


LUBRICATION CHART CODE: **BF**

TYPE: SAE 7 OR -3

TYPICAL PROPERTIES:

Flash Point	
Cleveland Open Cup	270°F (132°C)
Color	Light Straw

Sources:

Wagner - Lockheed	21 B
Mobil  Corporation , , , , ,	Mobil Super Heavy Duty Brake Fluid

Uses:

TO BE USED IN ALL BRAKE SYSTEMS

HYDRAULIC POWER MASTER CYLINDER

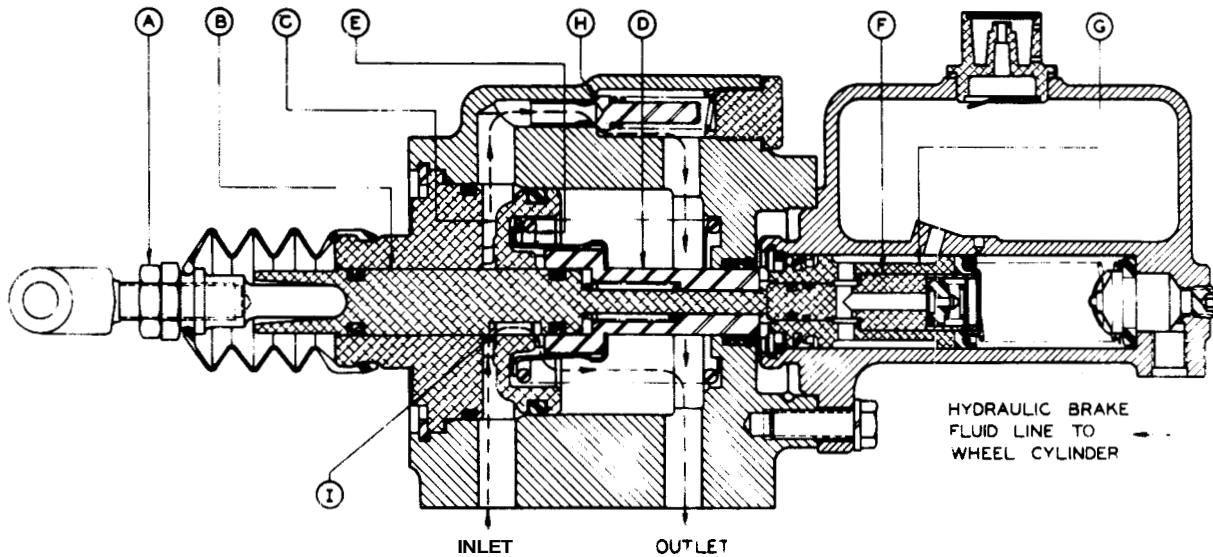


Fig. 2

POWER FUNCTION

In the relaxed or non-applied position, the return spring (E) holds the connector (D), and the power piston (C) butted against the end cap as shown in the drawing.

Fluid flows through the unit as indicated by the arrows. During an application, the force and movement initiated at the pedal is transmitted through the push rod (A) to the valve piston (B) moving it to the right.

The return spring (E) holds the connector (D) and the power piston (C) stationary.

The first movement of the valve piston (B) reduces the area of by-pass port (I) creating a flow restriction and a corresponding back pressure. All movement of valve piston (B) is transmitted directly to the reaction piston (F).

The back pressure exists only on the inlet side of the power piston (C) and produces a force on the face of the power piston. This force overcomes the return spring (E) and moves the power piston (C), connector (D), and master cylinder piston (G) to the right closing the master cylinder port hole and creating line pressure.

The line pressure, acting on the face of the small reaction piston (F), creates a force which is transmitted directly through the valve piston to the pedal linkage providing operator feel. Additional application force at the pedal produces a correspondingly higher line pressure.

When the back pressure developed on the inlet side of the power piston exceeds the normal system pressure by 180 psi, the relief valve (H) unseats and permits fluid to by-pass the power piston as indicated by upper arrow.

MANUAL FUNCTION

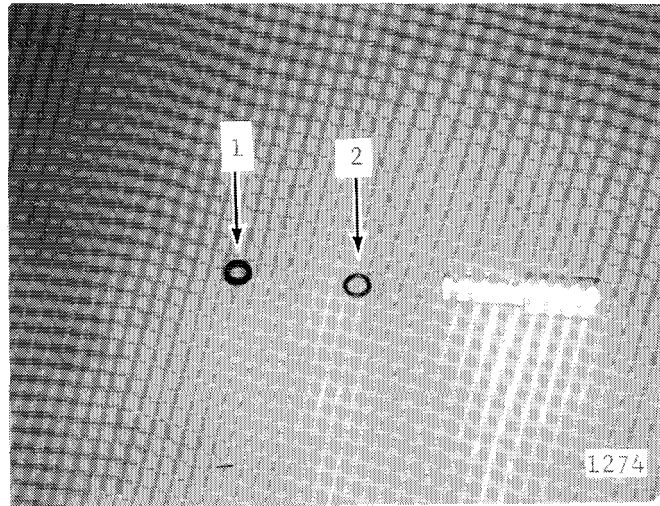
For manual operation of the unit, the pedal force and movement is transmitted to the valve piston (B). After the valve piston moves to the right 5/32" (while the return spring (E) holds the connector (D) stationary), it bottoms in the connector (D) and carries it through the remainder of the motion.

The valve piston and connector, moving as a single piece, serve as a push rod to actuate the master cylinder piston (G) and the reaction piston (F) which, in turn, closes off the master cylinder port hole and develops line pressure.

NOTE: Figure 2 is a cross-sectional drawing of the old style cylinder; however, the function of the new style is the same.

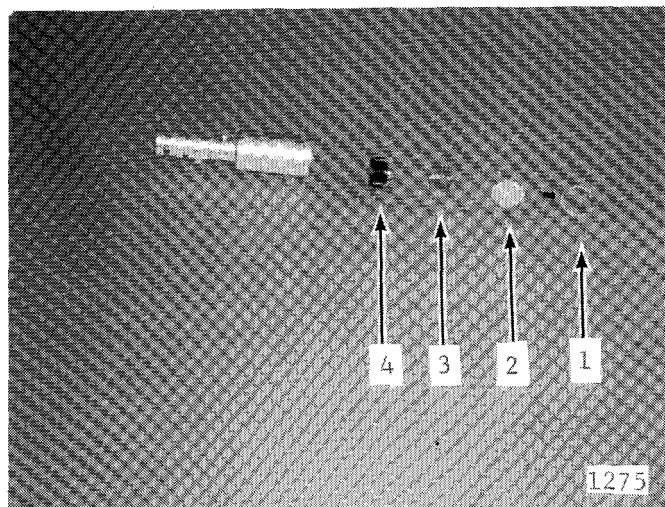
27

Remove vee block packing (1) and O-ring (2) from reaction piston.



28

Remove retainer ring (1) retainer (2), spring (3) and check valve (4) from reaction piston.



ASSEMBLY OF MASTER CYLINDER - Old style

Clean, inspect, and assemble master cylinder in a dust free area. Lubricate all components prior to assembly with approved brake fluid.

Dow-Corning Silicon Grease #33 may be used as an alternate lubricant during assembly.

DO NOT USE MINERAL OIL OF ANY TYPE AS A LUBRICANT IN THE MASTER CYLINDER PORTION OF THIS UNIT.



- MATERIAL LIFT
- GRADER
- PLANER
- ROLLER
- CRANE

SHOP MANUAL

K-6
R 2

DELCO MORaine HYDRAULIC MASTER BRAKE CYLINDER

APPLICABLE MODEL/S

SERIAL NUMBER/S

150A with Rockwell Axles Only

02832 thru 08339

150F Series A with Rockwell Axles Only

07305 thru 08339

CAUTION

- ALL** COMPONENTS MUST BE PROPERLY SUPPORTED DURING DISASSEMBLY AND REASSEMBLY.
- ALL** JACKING, HOISTING AND GENERAL WORKSHOP EQUIPMENT REQUIRED FOR THIS OPERATION MUST BE IN GOOD WORKING ORDER.
- EXTREME** CAUTION TO BE OBSERVED AT ALL TIMES TO PREVENT INJURY.
- SAFE** WORKSHOP PRACTICES ARE A MUST.

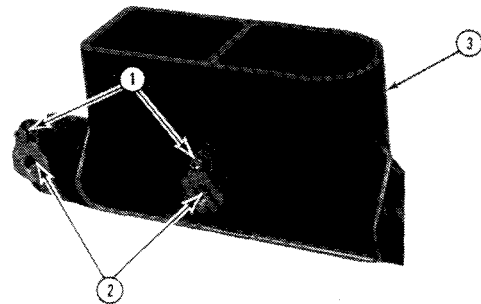
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REASSEMBLY

The following procedure is only one method of obtaining a complete reassembly of the master brake cylinder and power head assembly.

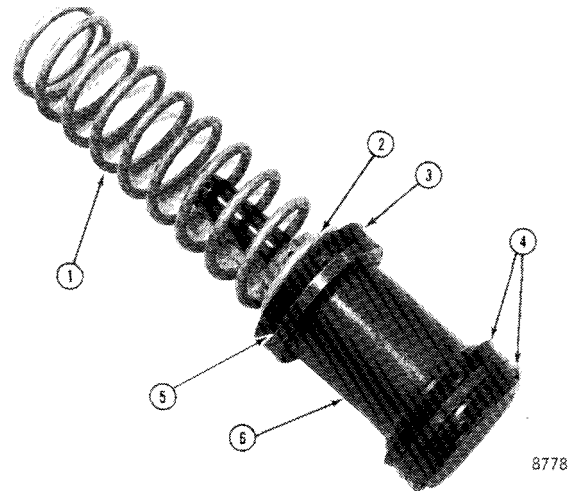
Install tube fitting inserts (2) and bleeders (1) in master cylinder (3) if removed during disassembly.



8779

Figure 9

Install protector seal (6), seal (3), spring retainer (2), spring (1) and two seals (4) on secondary piston (5). Position piston assembly in master cylinder.



8778

Figure 10

BURNISHING

New linings (brake shoes) may require "burnishing" to achieve desired performance. Also when brake lines are bled it is important to get rid of brake fluid that may have gotten into linings and brake drum. The following steps should be used to ensure proper burnishing.

1. Position crane up on outriggers (1) with all four wheels off the ground. Place blocking (2) under outrigger frame (3). Leave sufficient room in front of and behind crane to stop in case it should accidentally be knocked off blocking.
2. Using FIRST GEAR (or low range) apply enough brake line pressure to slip all four wheels against the engine torque (near maximum).

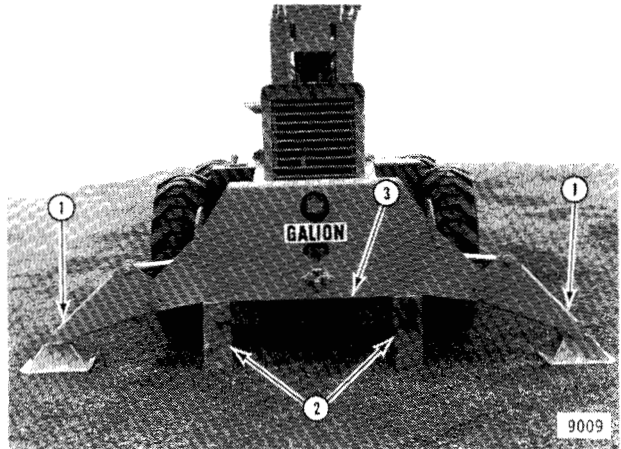


Figure 24



DO NOT ALLOW OUTSIDE DRUM TEMPERATURES TO EXCEED 300° TO 350°F.

3. Allow drums to cool from 150" to 200°F before repeating. The number of cycles should be based on achieving an acceptable performance level. It is estimated that at least five cycles would be required to show marked brake improvement.



IMPROPER BURNISHING COULD RESULT IN "GLAZING". SINCE THE MAXIMUM TEMPERATURE LIMITS ARE SOMEWHAT CRITICAL, AND DIFFICULT TO DETERMINE, EXTREME CARE MUST BE EXERCISED.

DISASSEMBLY

The following procedure is only one method of obtaining a disassembly of the master brake cylinder.

Remove four capscrews and lock washers (1, Figure 5) and separate master cylinder (2) from power booster assembly (3). Remove gasket.

NOTE: Remove plugs and caps and drain brake fluid and hydraulic oil as much as possible.

NOTE: See appropriate shop manual for servicing the Delco-Moraine Power Booster Assembly.

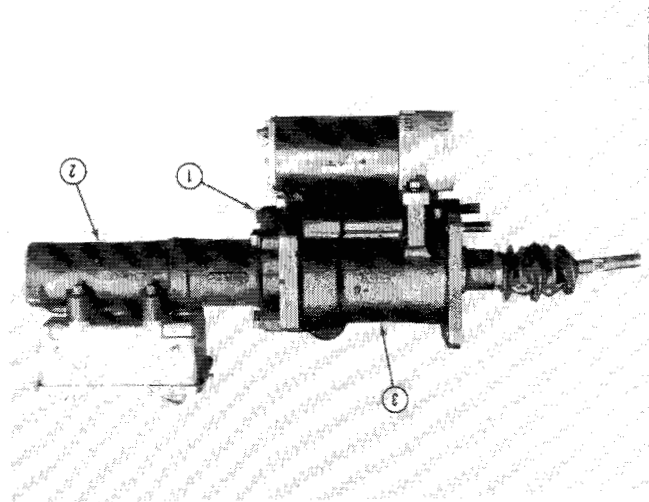


Figure 5

Swing bail wires (1 and 2, Figure 6) to the side. Remove reservoir cover (3) from reservoir (4). Drain brake fluid from reservoir.

Remove gasket (5) from cover.

Remove four capscrews (6) and reservoir from body (7).

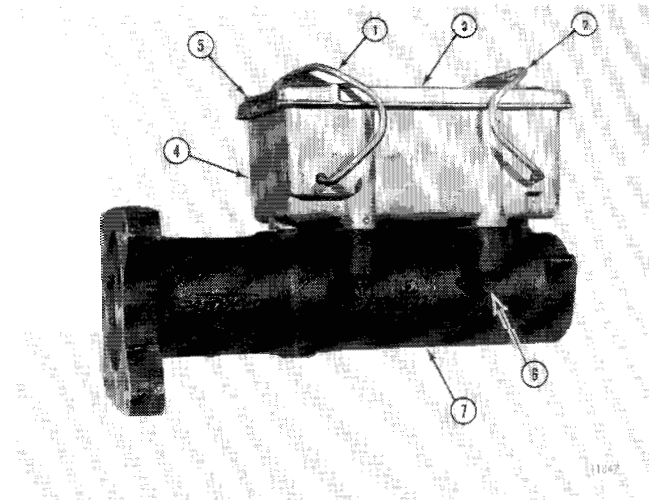


Figure 6

BLEEDING PROCEDURE - 180S AND 220S

Any time that the brake lines or cylinders have maintenance performed involving replacement of/or repairing lines, shoes, cylinders, axles, etc., the system stands a chance of being exposed to the atmosphere. The following procedure must be followed to ensure proper bleeding.

1. Fully extend outrigger jack cylinder (1, Figure 22) and position 30 In. (762.00 mm) of blocking (2) under outrigger box (3) as shown. Lower crane, till outrigger box is resting on blocking. Leave sufficient room in front of and behind crane to stop in case it should accidentally be knocked off blocking.
2. Place transmission in neutral and set parking brake.

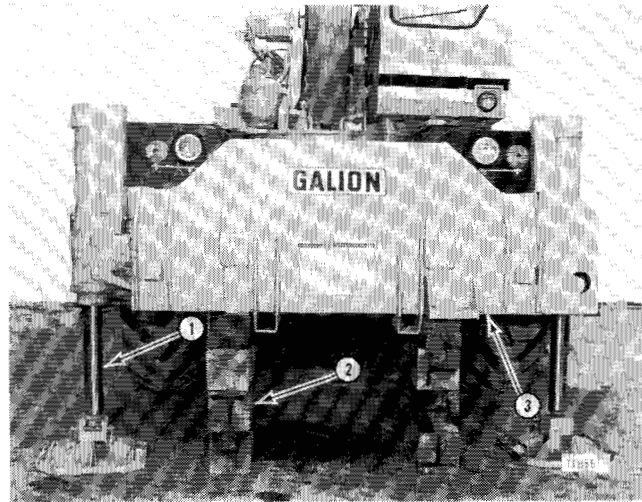


Figure 22

3. Swing bail wires (1 and 2, Figure 23) to the side and remove reservoir cover (3) from the master brake cylinder (4).
4. Position gasket and adaptor plate on master brake cylinder using the U-bolts to hold it in place. Connect bleeder ball to adaptor plate.

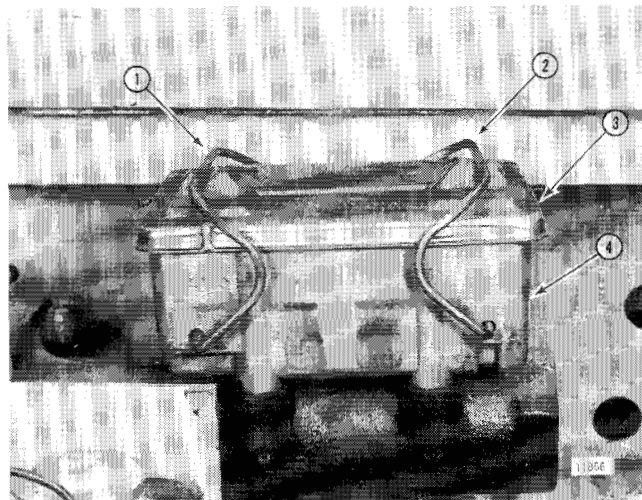


Figure 23

NOTE: Refer to "Special Tools" section of this manual for the manufacturing of adaptor plate, gasket and U-bolts, and installation. Be sure bleeder ball is full.

5. With valve on bleeder ball closed bring pressure in ball up to 15 PSI (0.10 MPa). Open valve on bleeder ball.

SHOP MANUAL

K-07.00
R1/C2

MINNESOTA BRAKE VALVE

APPLICABLE MODELS	SERIAL NUMBERS
T-400-A	01746 thru 02110
T-500-A	07740 thru 07994
T-500-L	07740 thru 07994
T-600-B	02497 thru 02535
T-500-C	07995 thru 10739
T-500-M	07995 thru 10487
T-600-C	02536 thru 03099
RP-30/42	01001 thru 01123
80	07324 thru 08356
90 thru 125	07324 thru 08339
90-A thru 125-A	07324 thru 08339
125-F	07324 thru 08339
125-FA	07990 thru 08339
140-F	07571 thru 08339
150-A	07324 thru 08339
150-FA	07324 thru 08339
200-FA	09401 thru 08339
220-A	07113 thru 08339

CAUTION

- ALL** COMPONENTS MUST BE PROPERLY SUPPORTED DURING DISASSEMBLY AND REASSEMBLY.
- ALL** JACKING, HOISTING AND GENERAL WORKSHOP EQUIPMENT REQUIRED FOR THIS OPERATION MUST BE IN GOOD WORKING ORDER.
- EXTREME** CAUTION TO BE OBSERVED AT ALL TIMES TO PREVENT INJURY.
- SAFE** WORKSHOP PRACTICES ARE A MUST.

CONTENTS ON BACK OF COVER

REASSEMBLY OF POWER ASSIST SECTION

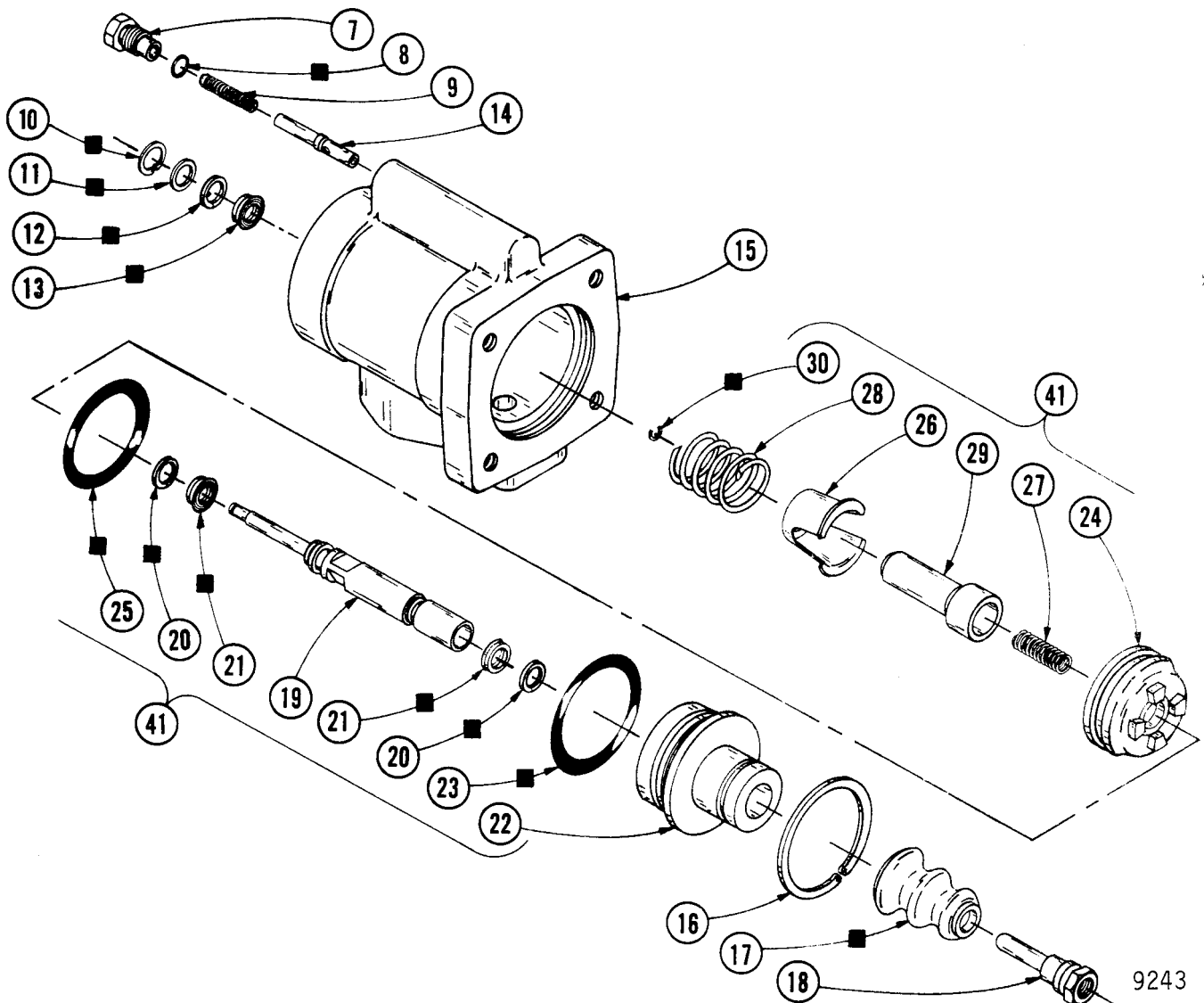


Figure 12

Clean all parts thoroughly before reassembly.

Install valve stem (14) and spring (9) in housing. Install O-ring (8) or copper ring (7).

NOTE: *If an O-ring was found on plug replace with an O-ring. If a copper ring was found on plug replace with a copper ring.*

Install V-cup seal (13), back-up ring (12), washer (11) and snap ring (10). Lubricate V-ring seals (21) with brake fluid and install on valve piston (19). Note direction of seals. Lubricate O-ring (25) with brake fluid and install on power piston (24). Install power piston on valve piston. Note direction of pistons.

PROBLEM	POSSIBLE CAUSE	CORRECTION
Excessive pump noise (gurgle, chatter, etc.)	Trapped air in pump.	<p>Depress brake pedal lightly with the engine off for thirty seconds and release. Recheck and should the problem persist, repeat above procedure after a three minute waiting period.</p> <p>NOTE: <i>This noise will diminish upon a continued use of the brakes under normal driving conditions.</i></p>
Inoperative pump	Low or no voltage at motor connection of wiring harness.	Check condition of battery and battery terminals. Correct an abnormally low battery condition and/or clean battery terminals if necessary.
		Check electrical leads at battery terminal of starter or ignition bus bar - not corroded or loose.
		Check voltage to ignition side of relay coil.
		Check voltage at battery connection to relay.
		Check voltage at E.H. pump.
	Non-functioning motor.	Check electrical connection between motor lead wire and wiring harness. If loose, corroded, or disconnected, clean and secure connection.
Check grounding of pump housing to booster. The pump housing must be securely bolted to the booster to properly ground the motor.		
Replace E.H. pump.		
E.H. pump operates but no boost.	Missing relief valve and/or spring	Install proper parts

SERVICING

The following procedures are only one method of obtaining a removal, disassembly, cleaning and inspection, reassembly, and installation of the Delco-Moraine Power Booster Assembly.

Park unit on a level surface and place blocking in front of and behind each tire. Set parking brake and turn ignition key off.

Remove plug (1, Figure 24) spring and relief valve from power booster (2). Remove O-ring from plug if necessary.

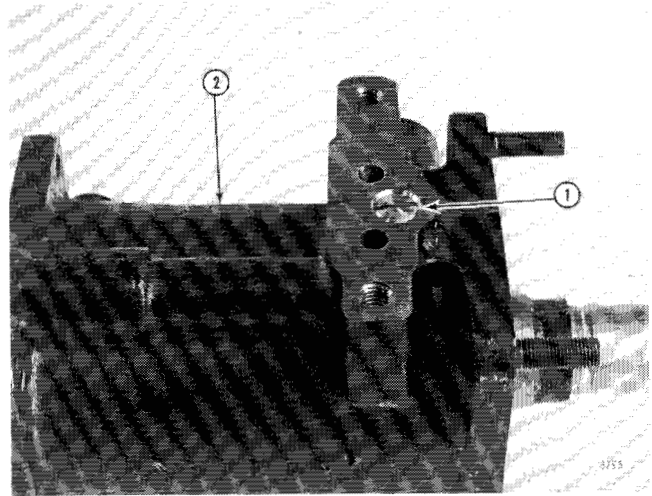


Figure 24

Remove retainer plug (1, Figure 25) and O-ring from power booster (2) if necessary.

NOTE: *If removal is necessary bend a piece of welding wire into a "U" shape and feed through the internal port to push plug out from behind.*

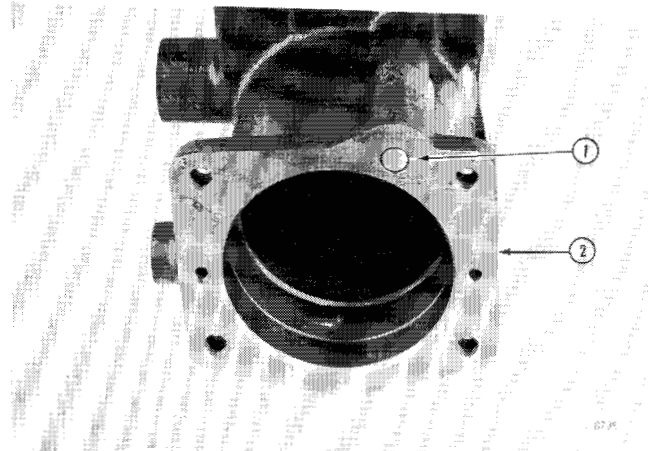


Figure 25

DISASSEMBLY OF 148399

Remove piston rod (1, Figure 51) from power booster assembly (2).

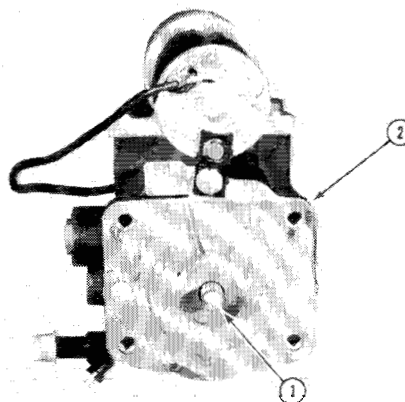


Figure 51



POSITION POWER BOOSTER ASSEMBLY (1, Figure 52) AS SHOWN IN ARBOR PRESS. APPLY SLIGHT PRESSURE AGAINST CAP (2).

Remove two flat head screws (3) from power booster assembly (1). Release arbor press slowly to relieve spring tension.

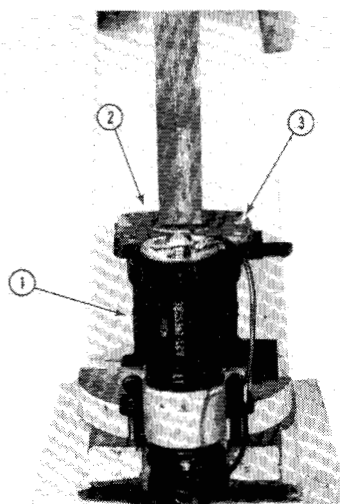


Figure 52

Remove cap (1, Figure 53) support plate (2) seal (3) expander (4) and spring (5) from power booster assembly (6).

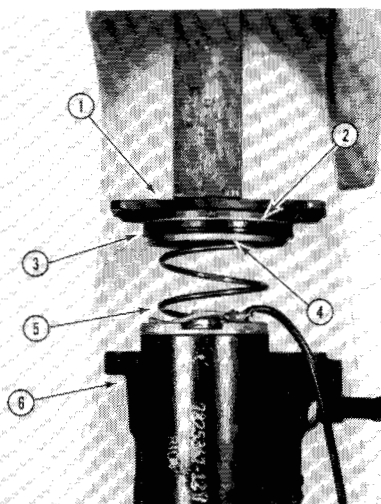


Figure 53

Slide piston rod (1, Figure 78) in power booster assembly (2). Swing grounding bracket (3) out of the way,

NOTE: Use "PistonRod Gauge" shown in special tool section of this manual to select correct piston rod.

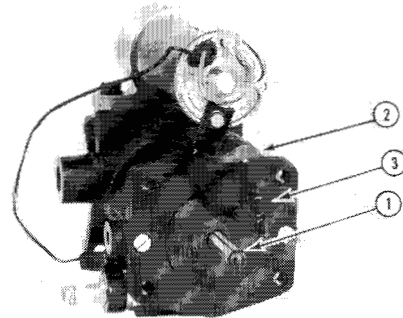


Figure 78

Position master cylinder (3, Figure 79) against power booster assembly (4). Swing grounding bracket (2) back in place and install four capscrews and lock washers (1) in power booster assembly (4).

NOTE: Torque capscrews from 99 to 135 In. Lbs. (11 - 15 Nm).

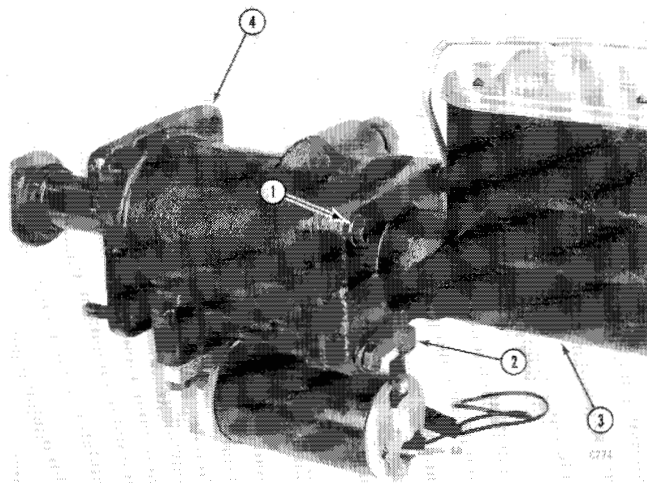


Figure 79

Position master cylinder (3, Figure 106) against power booster assembly (4). Swing grounding bracket (2) back in place and install four capscrews and lock washers (1) in power booster assembly (4).

NOTE: *Torque capscrews from 99 to 135 In. Lbs. (11 - 15 Nm).*

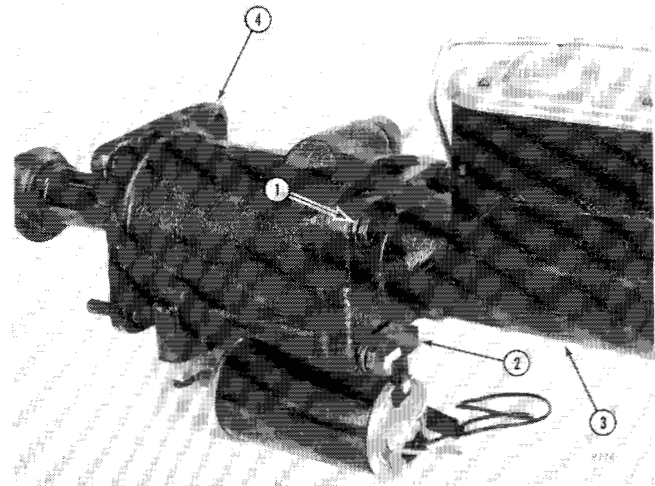


Figure 106

REASSEMBLY OF 148399

Install O-ring and retainer plug (3, Figure 107) in power booster (2) if removed at disassembly.

Position relief valve and spring (1) in power booster.

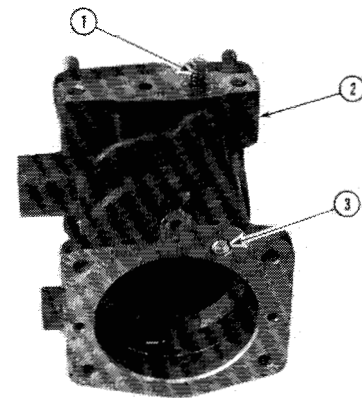


Figure 107

Install two O-ring (1, Figure 108) on pump (2).

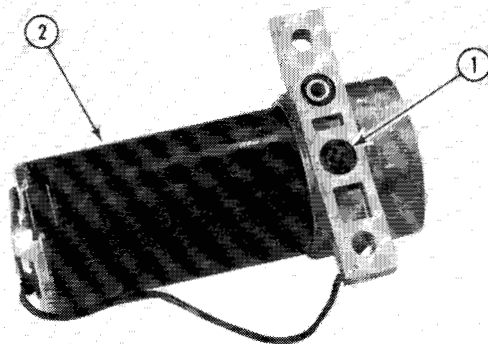


Figure 108

BLEEDING

6. After brake shoes are centered, anchor pins locked and a .005" (0.127 mm) clearance maintained, back eccentric cam off on all upper brake shoes as far as possible. This helps to reduce the air pocket in the wheel cylinder due to its mounting in a vertical position.

7. Swing bail wire (3, Figure 125) to one side and remove cover (1) from master brake cylinder (2).

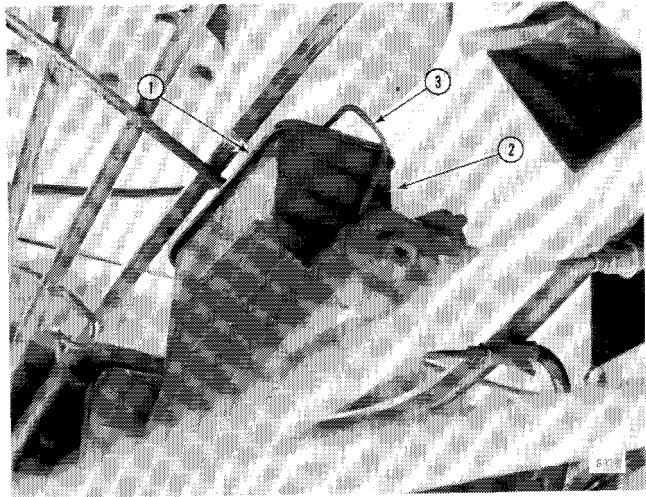


Figure 125

8. Position adaptor (1, Figure 126) on master cylinder (2) and attach bleeder ball hose (3) to adaptor. See special tools in this manual for manufacturing of adaptor.

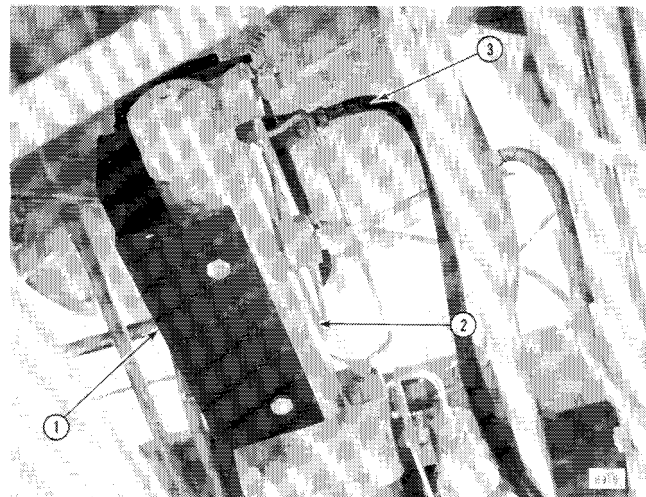
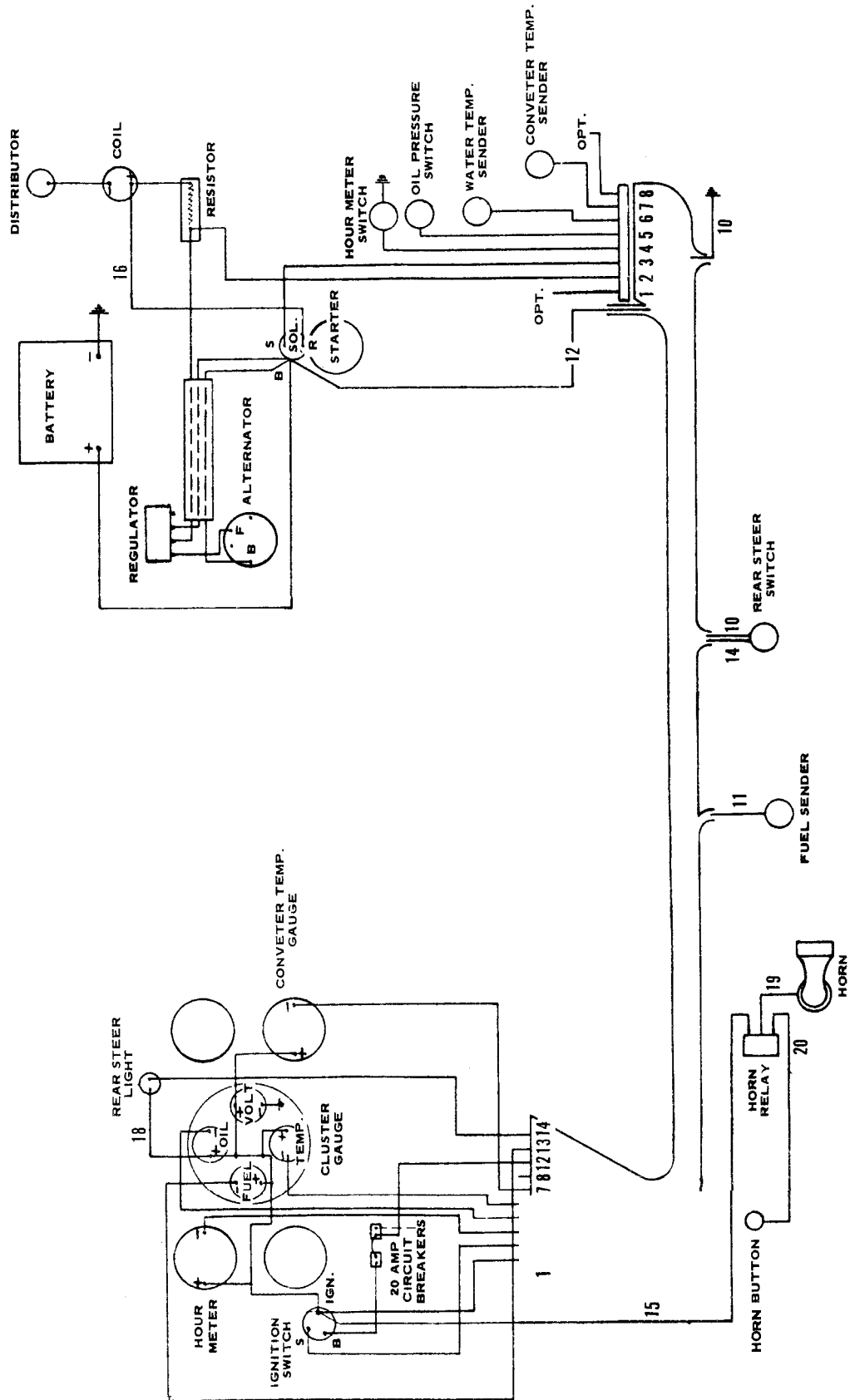


Figure 126

9. With valve on bleeder ball closed, bring pressure in ball up to 15 PSI (0.10 MPa). Open valve on bleeder ball.

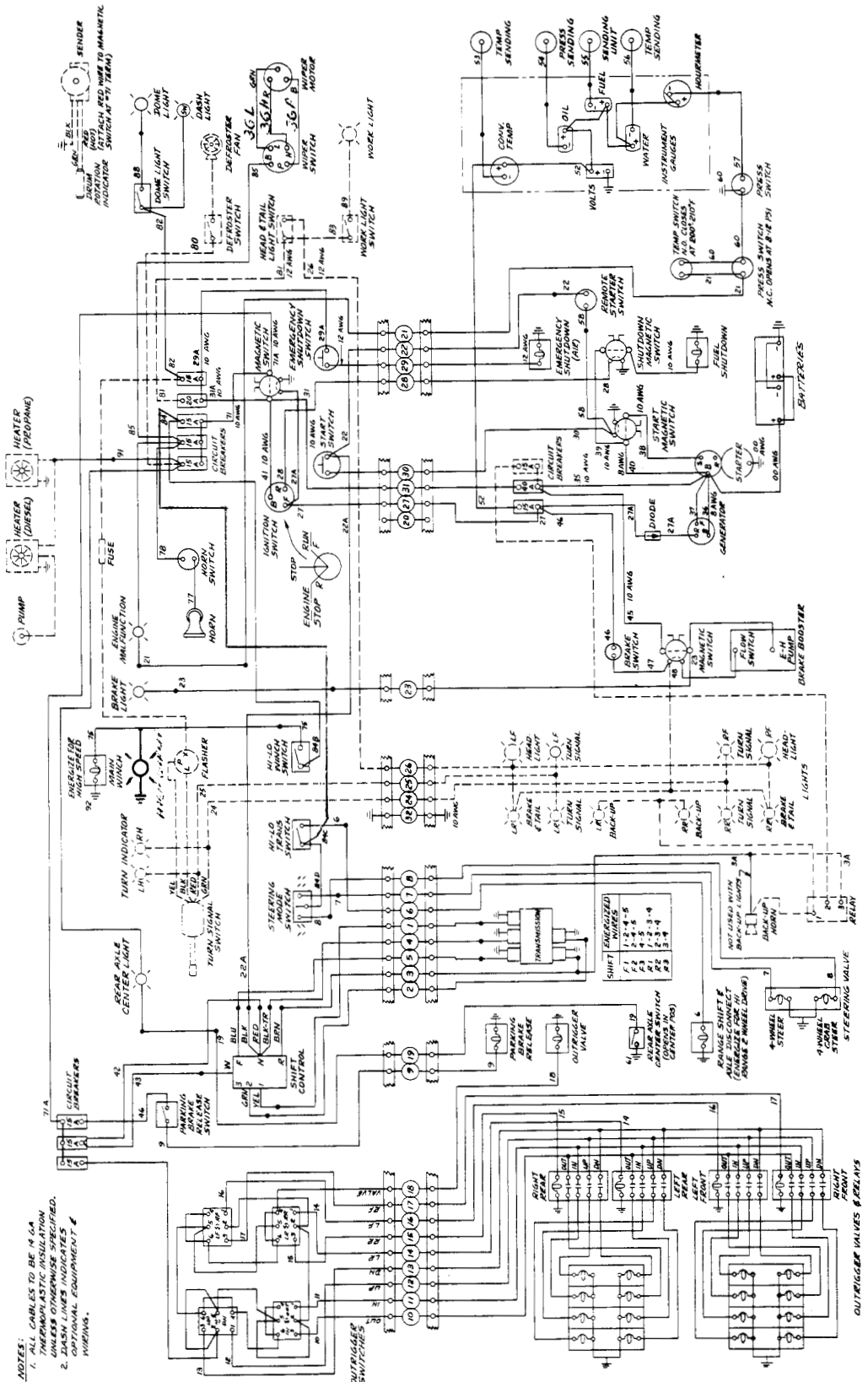
IH UB-264

NO. 92962



DD 6V-53N

NO. 138253



NOTES:
 1. ALL CABLES TO BE IN GA
 1. THERMOPLASTIC INSULATION
 UNLESS OTHERWISE SPECIFIED.
 2. OPTIONAL EQUIPMENT &
 WIRING.

If the magnetic switch (1) is suspected, replace it with a new or known working switch from matching equipment. Carefully identify all leads (2) and terminals (3) before removal to insure correct replacement.

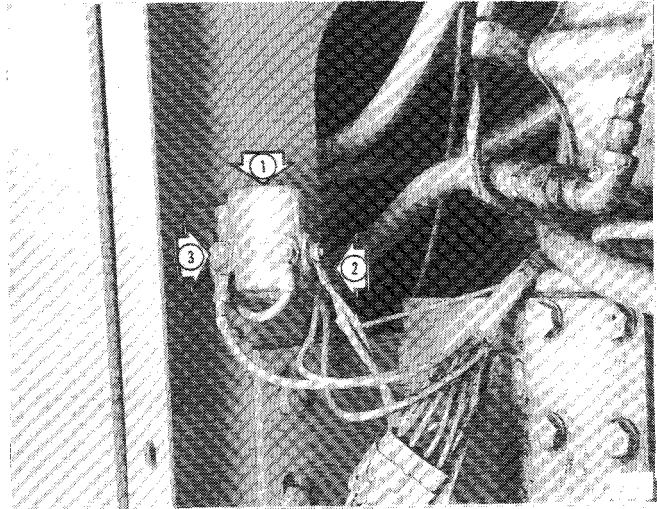


Figure 5



CAUTION

DO NOT JUMPER OR SHORT OUT CRANKING MOTOR, SOLENOID, OR MAGNETIC SWITCH TO CHECK OPERATION OF THESE COMPONENTS. JUMPERING/SHORTING BYPASSES SAFETY DEVICES AND EQUIPMENT.

If equipment uses same style cranking motor (1) as that shown in Figure 6, remove rear plate to inspect brushes (2) and commutator (3). Check brushes for wear, pitting or other signs of damage. If brushes are worn beyond half of their original length (compare with new brush), replacement is recommended. Replace brushes in sets for equal wear and service periods. If commutator is worn excessively, dirty, out of round or if it is has high insulation, the cranking motor should be removed and serviced by a qualified technician. While being serviced it should also be checked for shorts, opens, and/or grounds.

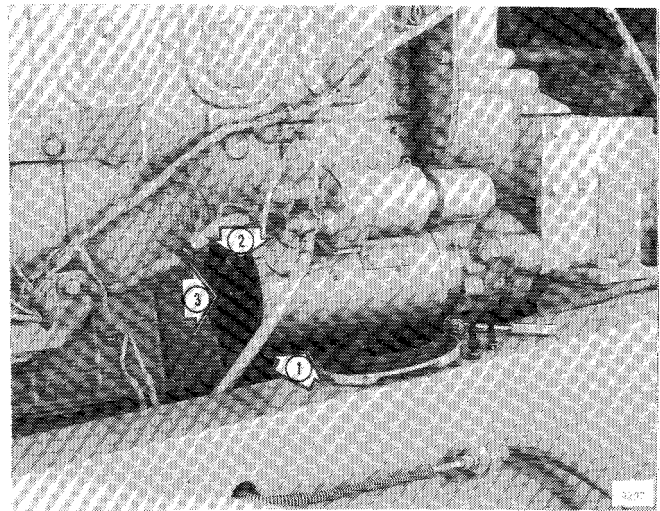


Figure 6

PRELIMINARY CHECKS

Prior to removal of the alternator, check the BATT-GEN meter (if equipped with cluster gauge) or the BATT-CHG meter. Do not start engine but do turn key switch ON and observe meter indications. Dial pointer should be in the green zone, between 12 and 12.9 volts. If pointer indicates less than 12 volts, the battery is undercharged and a complete battery check is required.



IF BATTERY ACID IS SPLASHED ON FACE OR IN EYES, WASH OUT IMMEDIATELY WITH PLENTY OF CLEAN WATER AND SEEK MEDICAL AID. IF ACID IS SPILLED ON HANDS, SKIN, OR OTHER EXPOSED AREAS, WASH IMMEDIATELY WITH SOAP AND CLEAN WATER. ACID SPILLED ON CLOTHING CAN BE NEUTRALIZED WITH DILUTED AMMONIA WATER OR WATER SOLUTION OF BAKING SODA.

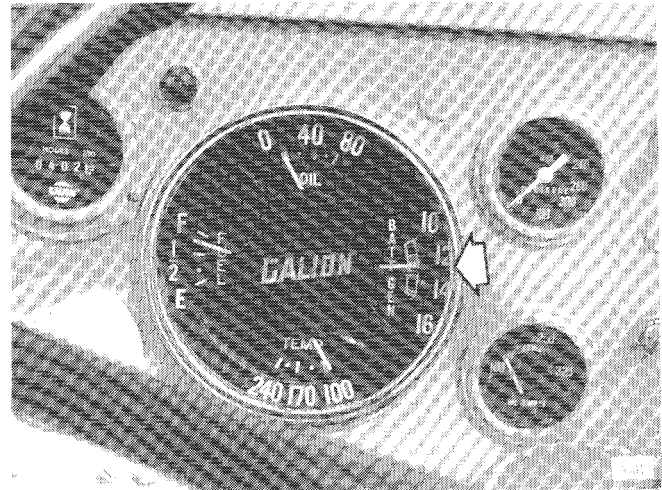


Figure 1

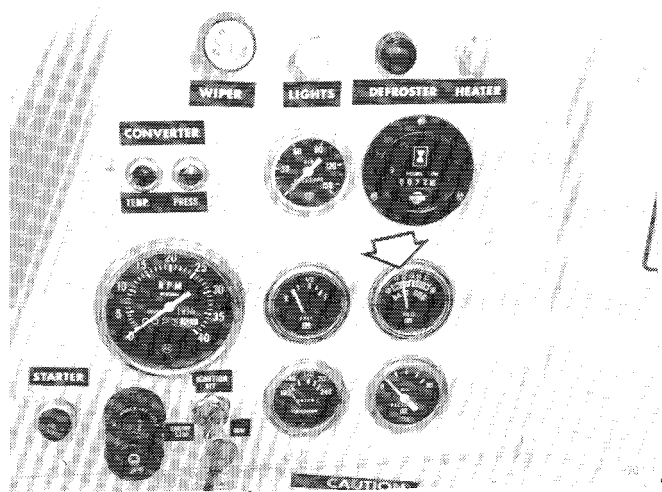


Figure 2

To check battery, use hydrometer to test specific gravity of each cell. (Hydrometer should have built-in temperature compensator or scale.) If specific gravity readings are below 1.230, recharge battery. If readings indicate a variation of more than 0.050 between cells, replacement of the battery is recommended.

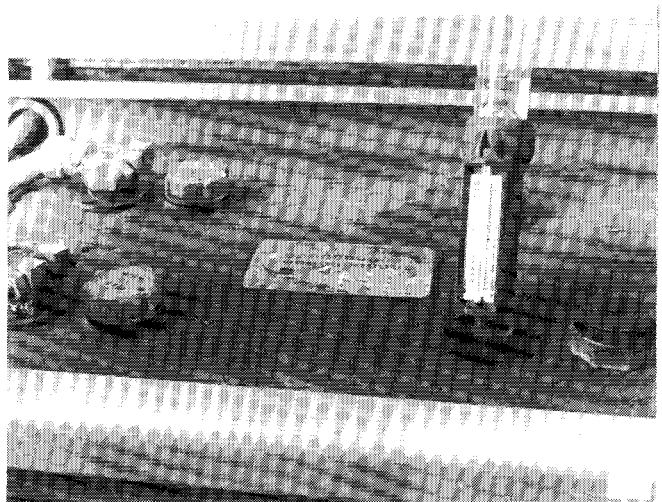


Figure 3

DISASSEMBLY

Before starting disassembly, the hook block is to be rested on the ground. The following procedure will reduce chances of "bird caging" the wire rope when removing/changing hook blocks or replacing/lubricating the wire rope.

Raise boom head block approximately 3 feet (914.40 mm) above the fully depressed position. Using the hoist control, lower the hook block until it just touches the ground. Lower the boom until the hook block is resting on the ground and wire rope is slack.

Remove cable anchor wedge (1). Climb into operator's cab and hoist cable onto winch drum until all cable is free of hook block.

With suitable hoist position hook block on work bench as illustrated. Remove two lock nuts and two 1 - 14 x 12 1/4" cap-screws.

Remove weights either side of hook block side plates.

NOTE: Care must be taken to observe the position of the side weights in the hook block assembly to insure re-assembly of these weights in exactly the same positions as originally found.

Remove hook assembly.

Remove two 3/4 - 10 and one 1 1/4 - 12 lock nuts on either side of sheave assembly.

Remove side plate (1) and sheave assembly (2).

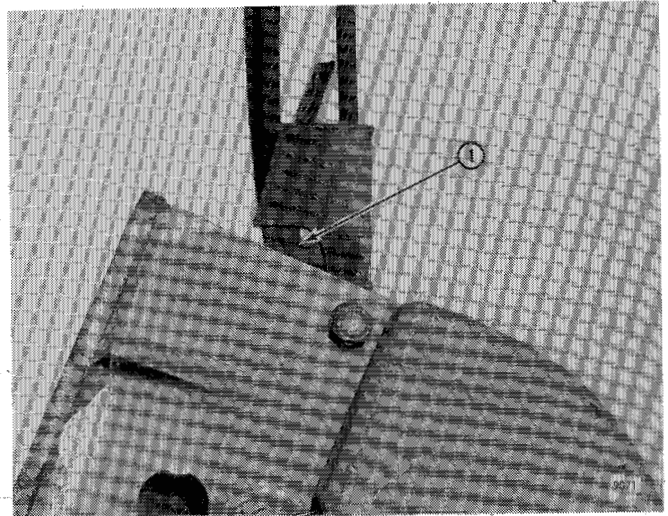


Figure 1

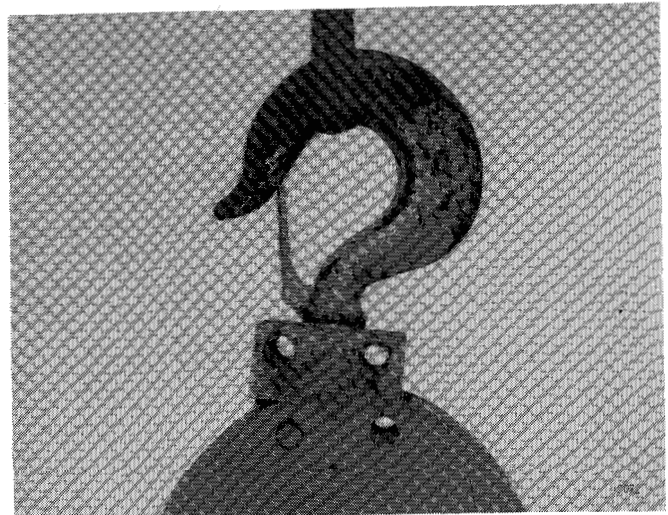


Figure 2

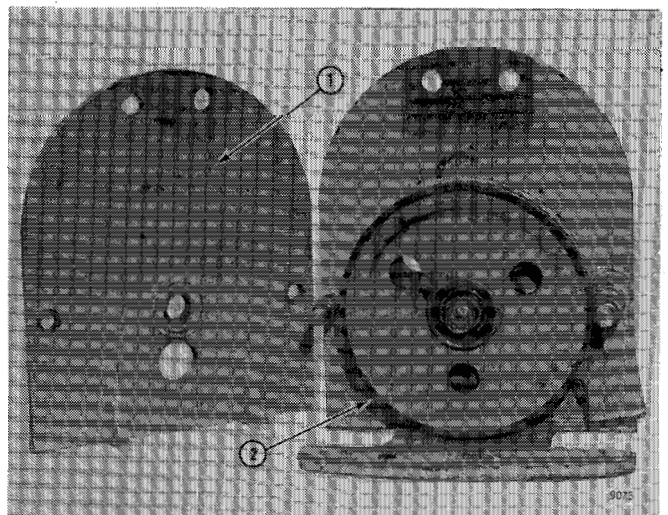
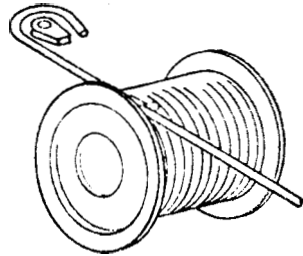
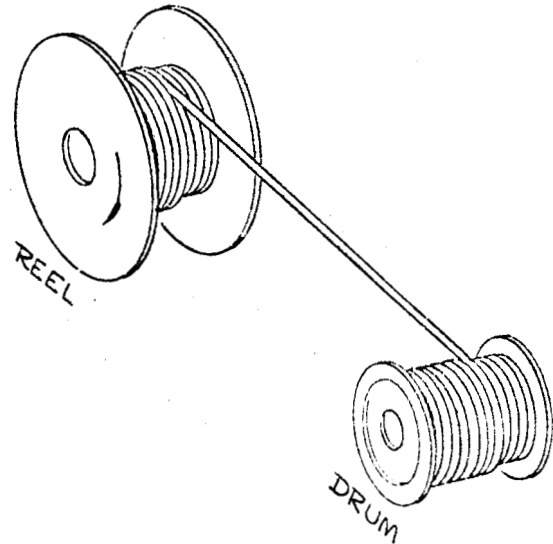


Figure 3

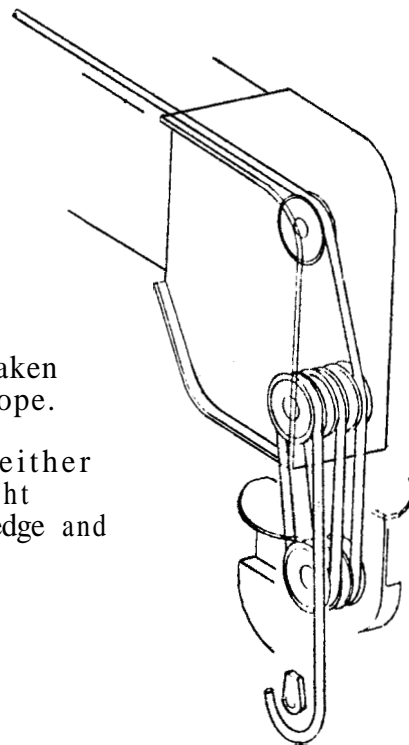
WIRE ROPE REPLACEMENT

A wire rope can be permanently damaged even before it has gone into operation. Unwinding from a reel the wrong way can put destructive kinks and doglegs in the rope. If reel can be set on jacks, unwind from topline of reel as illustrated. If wire rope is supplied in a coil, uncoil by rolling it slowly like a wheel, leaving behind a trail of straight rope. Uncoiling by laying coil flat and pulling off top gives hard-to-handle, kinky rope.



When replacing wire rope, extreme care must be taken not to put kinks or unnecessary bends into the rope.

As illustrated above, when installing wedges in either hook block or winch drum, the rope must be brought back straight and turned, not twisted, around wedge and inserted into slot.



MODEL 220S

SERIAL NUMBERS 07724 AND UP

MAIN HOIST

<u>PART NUMBER</u>	<u>SIZE AND LENGTH</u>	<u>APPLICATION</u>
126075	9/16" x 500'	Standard

AUXILIARY HOIST

<u>PART NUMBER</u>	<u>SIZE AND LENGTH</u>	<u>APPLICATION</u>
142246	9/16" x 300'	Auxiliary hoist without jib
141521	9/16" x 350'	Auxiliary hoist with jib

MODEL 400S

SERIAL NUMBERS 07113 THRU 07118

MAIN HOIST

<u>PART NUMBER</u>	<u>SIZE AND LENGTH</u>	<u>APPLICATION</u>
113591	3/4" x 700'	Standard

MODEL 125P

SERIAL NUMBERS 01001 AND UP

MAIN HOIST

<u>PART NUMBER</u>	<u>SIZE AND LENGTH</u>	<u>APPLICATION</u>
63749	1/2" x 245'	Two section power boom
78238	1/2" x 330'	Three section power boom
84220	1/2" x 400'	Four section power boom
75042	1/2" x 500'	Optional for four section power boom

MODEL 150P AND 150T

SERIAL NUMBERS 01001 AND UP

MAIN HOIST

<u>PART NUMBER</u>	<u>SIZE AND LENGTH</u>	<u>APPLICATION</u>
89346	9/16" x 330'	Three section power boom
89347	9/16" x 450'	Four section power boom
89348	9/16" x 500'	Optional for four section power boom

AUXILIARY HOIST

<u>PART NUMBER</u>	<u>SIZE AND LENGTH</u>	<u>APPLICATION</u>
89345	9/16" x 245'	Standard

(CONT'D. NEXT PAGE)

Some general guidelines for wire rope replacement using steel sheaves are the following.

1. **In running rope**, six randomly distributed broken wires in one lay or three broken wires in one strand in one lay.
2. **One outer wire broken** at the point of contact with the core of the rope which has worked its way out of the rope structure and protrudes or loops out from the rope structure. Additional inspection of this section is required.
3. **Wear of one-third** of the original diameter of outside individual wires.
4. **Kinking, crushing, birdcaging**, or any other damage resulting in distortion of the rope structure.
5. **Evidence** of any heat damage from any cause.
6. **Reduction** from nominal diameter of more than:
 - a. 1/64 In. (0.4 mm) for diameters up to and including 5/16 In. (8.0 mm).
 - b. 1/32 In. (0.8 mm) for diameters 3/8 In. (9.5 mm), to and including 1/2 In. (13.0 mm).
 - c. 3/64 In. (1.2 mm) for diameters 9/16 In. (14.5 mm), to and including 3/4 In. (19.6 mm).
 - d. 1/16 In. (1.6 mm) for diameters 7/8 In. (22.0 mm), to and including 1-1/8 In. (29.0 mm).
 - e. 3/32 In. (2.4 mm) for diameters 1-1/4 In. (32.0 mm), to and including 1-1/2 In. (38.0 mm).
7. **In standing ropes**, more than two broken wires in one lay in sections beyond end connections or more than one broken wire at an end connection.
8. **When** evidence of core failure in rotative resistant ropes is recognized by a **lengthening of the lay** and a localized reduction in diameter.
9. **Inspect** sheave grooves for excessive wear.

Certain sections of wire rope often get more wear than others.

Rope on a **drum** with two or more layers will wear at the point where the rope starts each successive layer, and also at the point where they are dead-ended.

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