DEPARTMENT OF THE ARMY
TECHNICAL MANUAL

DEPARTMENT OF THE AIR
FORCE TECHNICAL ORDER

TM 9-8029-3
TO 19-75AAD-17

ORDNANCE MAINTENANCE

WRECKER CRANE REAR MOUNTED

WINCH AND WRECKER POWER TRAIN FOR 5-TON 6x6 MEDIUM WRECKER TRUCK M62

DEPARTMENTS OF THE ARMY AND THE AIR FORCE
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WASHINGTON 25, D. C., *17 February 1954*.

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WRECKER CRANE, REAR MOUNTED WINCH, AND WRECKER POWER TRAIN FOR 5-TON 6 x 6 MEDIUM WRECKER TRUCK M62

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CHAPTER 1

INTRODUCTION

Section I. GENERAL

1. Scope

a. This manual is published for the use of personnel responsible for field and depot maintenance of this materiel. It contains information on maintenance which is beyond the scope of the tools, equipment, or supplies normally available to using organizations. This manual does not contain information which is intended primarily for the using organization, since such information is available to ordnance maintenance personnel in the pertinent operator's technical manuals or field manuals.

b. This manual contains a description of and procedure for removal, disassembly, inspection, repair, rebuild, and assembly of the wrecker crane, rear mounted winch, and wrecker crane power train for the 5-ton 6 x 6 medium wrecker truck M62 (figs. 1 and 2). The appendix contains a list of current references, including supply manuals, technical manuals, and other available publications applicable to the materiel.

c. TM 9–837 contains operating and lubricating instructions for the materiel and contains all maintenance operations allocated to using organizations in performing maintenance work within their scope.

d. This first edition is being published in advance of complete technical review of all concerned. Any errors or omissions will be brought to the attention of the Chief of Ordnance, Washington 25, D. C., ATTN: ORDFM-Pub.

2. Field and Depot Maintenance Allocation

The publication of instructions for complete disassembly and rebuild is not to be construed as authority for the performance by field maintenance units of those functions which are restricted to depot shops and arsenals. In general, the prescribed maintenance responsibilities will be reflected in the allocation of maintenance parts listed in the appropriate columns of the current ORD 8 supply manual pertaining to this vehicle. Instructions for depot maintenance are to be used by maintenance companies in the field only when the tactical situation makes the repair functions imperative. Supply of parts listed in the depot guide column of ORD 8 supply manuals will be

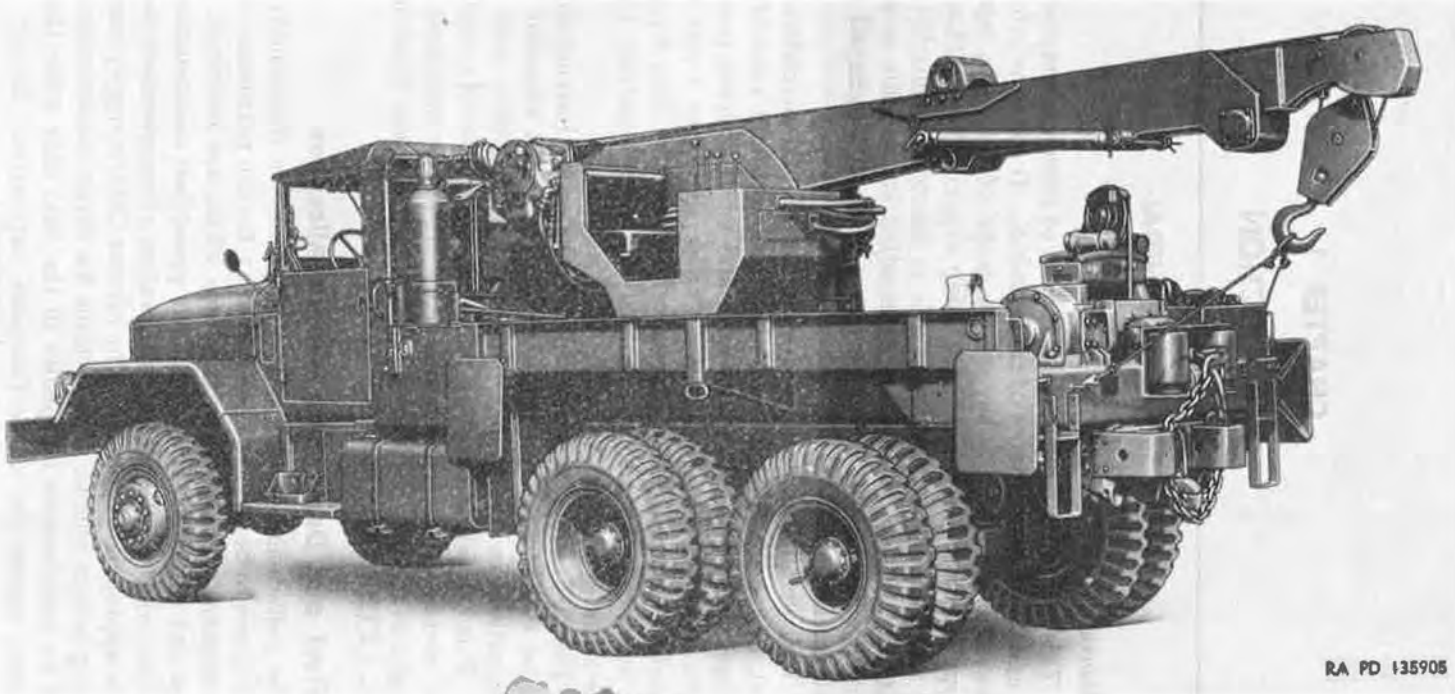


Figure 1. Medium wrecker truck M62—left rear view.

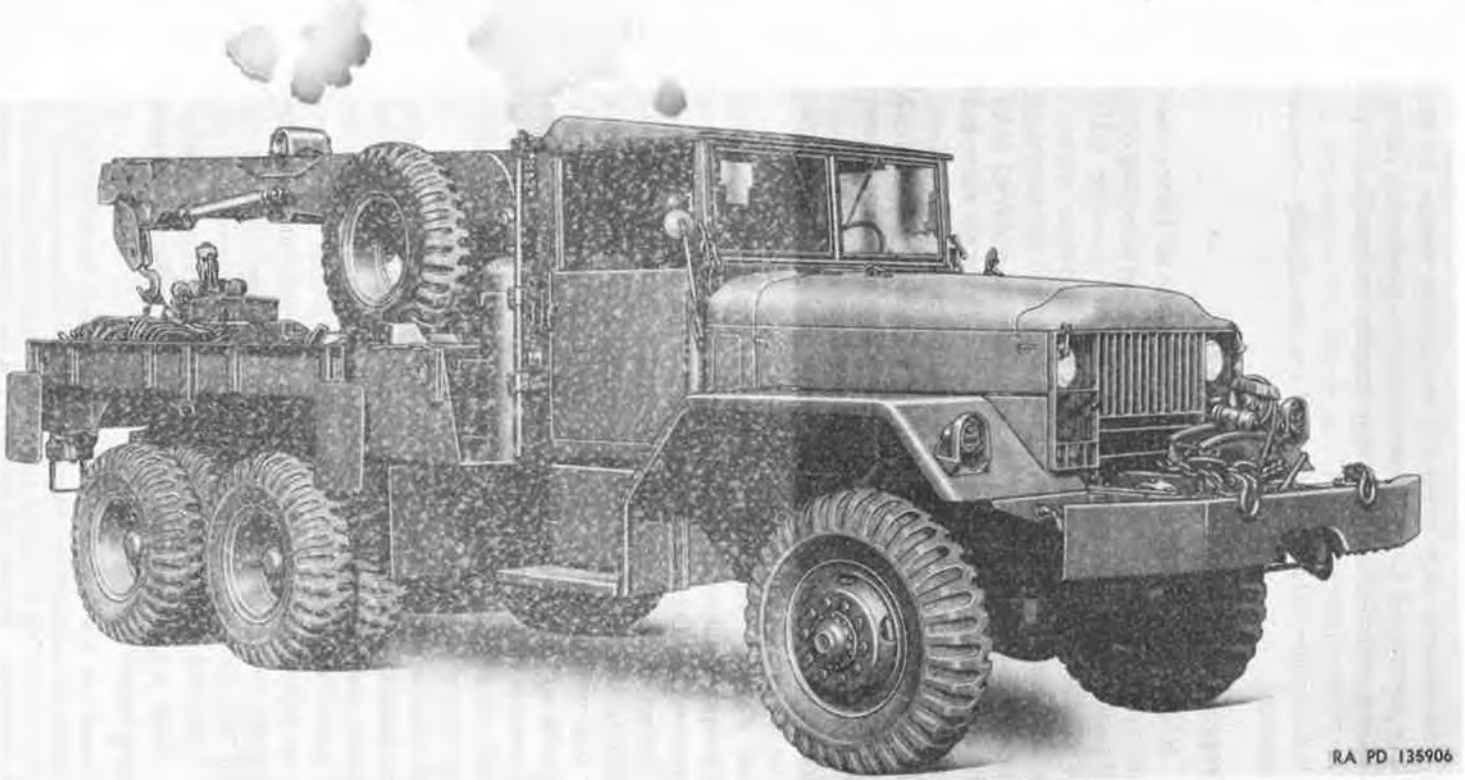


Figure 2. Medium wrecker truck M62—right front view.

made to field maintenance only when the emergency nature of the maintenance to be performed has been certified by a responsible officer of the requisitioning organization and upon express authorization by the chief of the service concerned. Those operations which can be performed as "emergency field maintenance" are specifically covered as such in this manual.

3. Forms, Records, and Reports

a. General. Responsibility for the proper execution of forms, records, and reports rests upon the officers of all units maintaining this equipment. However, the value of accurate records must be fully appreciated by all persons responsible for their compilation, maintenance, and use. Records, reports, and authorized forms are normally utilized to indicate the type, quantity, and condition of materiel to be inspected, to be repaired, or to be used in repair. Properly executed forms convey authorization and serve as records for repair or replacement of materiel in the hands of troops and for delivery of materiel requiring further repair to ordnance shops in arsenals, depots, etc. The forms, records, and reports establish the work required, the progress of the work within the shops, and the status of the materiel upon completion of its repair.

b. Authorized Forms. The forms generally applicable to units maintaining this equipment are listed in the appendix. No forms other than those approved for the Department of the Army will be used. For complete listing of all forms, refer to SR 310–20–6. Additional forms applicable to the using personnel are listed in the operator's manual. For instructions on use of these forms, refer to FM 9–10.

c. Field Reports of Accidents. The reports necessary to comply with the requirements of the Army safety program are prescribed in detail in SR 385–10–40. These reports are required whenever accidents involving injury to personnel or damage to materiel occur.

d. Report of unsatisfactory equipment or materials. Any suggestions for improvement in design and maintenance of equipment and spare parts, safety and efficiency of operation, or pertaining to the application of prescribed petroleum fuels, lubricants, and/or preserving materials, or technical inaccuracies noted in Department of the Army publications, will be reported through technical channels as described in SR 700–45–5 to the Chief of Ordnance, Washington 25, D. C., ATTN: ORDFM, using DA Form 468, Unsatisfactory Equipment Report. Such suggestions are encouraged in order that other organizations may benefit.

Note. Do not report all failures that occur. Report only REPEATED or RECURRENT failures or malfunctions which indicate unsatisfactory design of materiel. However, reports will always be made in the event that exceptionally costly equipment is involved. See also SR 700–45–5 and the printed instructions DA Form 468.

Section II. DESCRIPTION AND DATA

4. Description

a. General. This manual is written specifically for the wrecker crane, rear mounted winch, and wrecker crane power train for the 5-ton 6 x 6 medium wrecker truck M62 (figs. 1 and 2). This wrecker equipment is mounted on a six-wheeled drive truck and the hydraulic system is powered by the truck engine. Refer to paragraph 73 for detailed description of the wrecker crane assembly.

b. Lift Cylinder (fig. 8). The lift cylinder assembly, used to lower and raise the shipper and boom assembly, is of heavy steel construction. Threaded connections for hydraulic lines are located, one at the base of the cylinder, and one at the lift cylinder head for operation of the life cylinder. O-ring gaskets are used throughout to seal the assembly.

c. Swivel Valve With Cable Assembly (fig. 11). The swivel valve is a finely machined and fitted unit, mounted on the top of the pivot post and provides a means of transmitting the hydraulic oil to the various units. This valve permits 360° rotation of the wrecker crane assembly. The swivel valve consists of an inner hub and oil seal body which are held together by a swivel valve guide and sealed at the top by a cap and gasket.

d. Swing Motor (fig. 15). The swing motor is of the piston and cylinder type. Each swing motor cylinder consists of a body, piston, and a control valve spool. The valve chamber is integral with the cylinder body. Each swing motor cylinder body is mounted to the base plate by a cylinder mounting pivot pin. The piston rods are interlocked and are installed on the drive pinion crank when the swing motor is mounted on the base plate.

e. Control Valve Bank Assembly (fig. 3). The control valve bank assembly is located in the crane operator's compartment. This assembly consists of four separate control valves, bolted together to form a single unit. Each valve controls one of the four functions of the wrecker crane which are lifting or lowering the boom, winding or unwinding the hoist drum, extending or retracting the boom, and swinging the boom to the left or right. Each valve is spring loaded and will return to neutral position after use.

f. Hydraulic Vane-Type Motor (fig. 3). The hydraulic vane-type motor is mounted directly to the gear case of the hoist drum and may be operated in either direction without damage. The hydraulic balance design divides the oil pressure through two inlet ports diametrically opposite each other and out through the two outlet ports that are also diametrically opposite. This construction eliminates bearing loads resulting from pressure, a major cause of wear. The hydraulic motor is a compact means of changing fluid pressure to rotory mechanical power for turning the hoist drum. A lubricating oil film throughout all moving parts is continuously maintained.

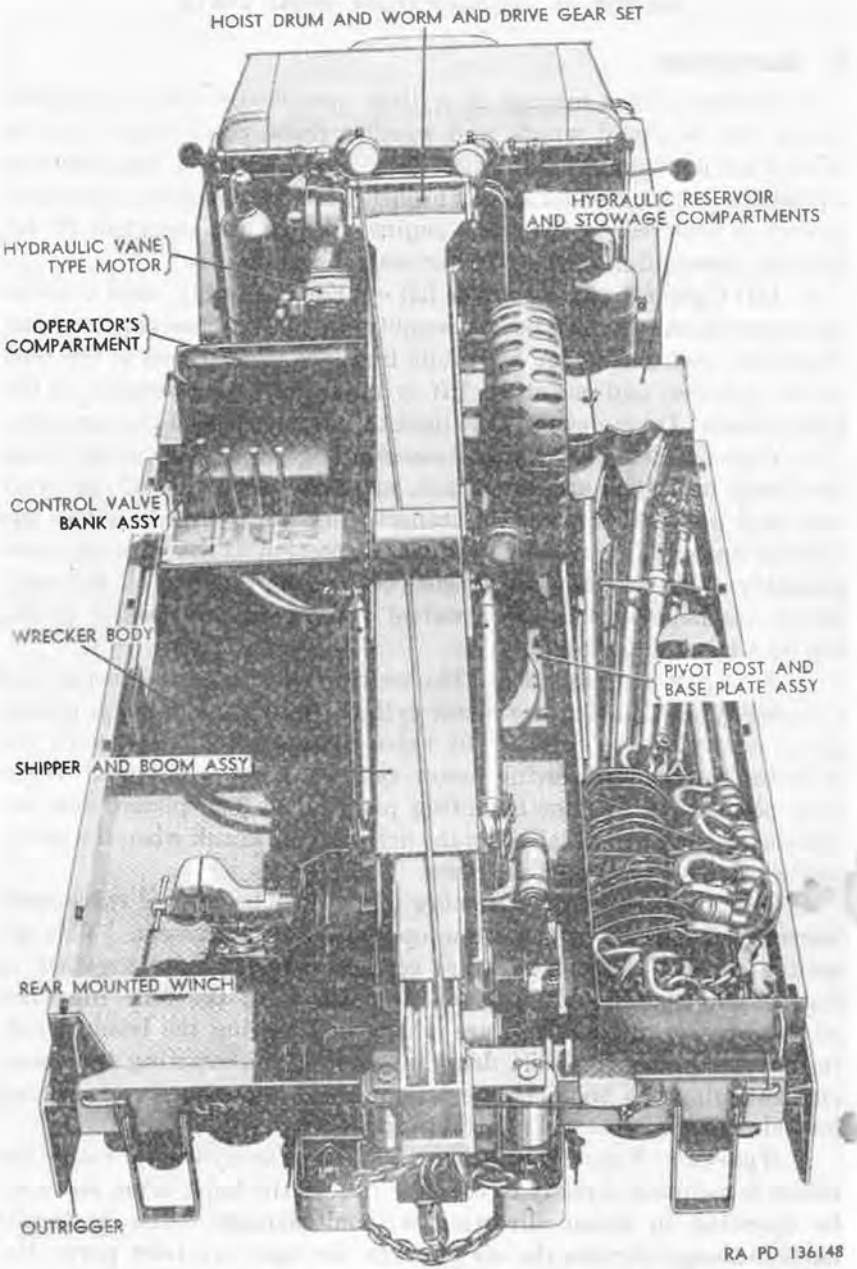


Figure 3. Medium wrecker M62—top view.

g. Hydraulic Vane Type Pump (figs. 3 and 30). The hydraulic vane-type pump is flanged directly to the power divider. The pump is of the balanced vane type having a constant rate of delivery per revolution. The slotted rotor is driven by a splined shaft and a vane in each slot slides radially as the rotor revolves. Centrifugal force and fluid pressure cause the vanes to follow the inside cam contour of the hardened and ground pump ring, which is so shaped that two opposing pump chambers are formed between the body and pressure plate. Inlet flow is received through a port connection in the body, passes around the rotor by vane action through ports in the pressure plate, and out the port connection of the cover. The hydraulic pump is driven by the truck power plant at 1500 rpm governed speed.

h. Hoist Drum and Worm and Drive Gear Set (fig. 3). The hoist drum and worm and drive gear set is mounted on the rear of the shipper assembly and is powered by the hydraulic vane-type motor. The worm and drive gear set is of hourglass construction. With reasonable care and proper lubrication there will be little reason to disassemble this unit.

i. Pivot Post and Base Plate Assembly (fig. 3). The pivot post and base plate assembly are two separate units assembled together to support and provide axis for rotation of the wrecker crane. The base plate consists of a pivot post support, drive pinion, drive pinion idler gear, drive pinion crank, and bearings. The pivot post includes a shipper support stop plate and a large ring gear welded to its base. The pivot post rotates on two tapered roller bearings and is powered by the swing motor. The swing motor is connected to the drive pinion crank to turn the drive pinion. The drive pinion idler gear engages with the drive pinion and transmits power to the ring gear on the pivot post.

j. Shipper and Boom Assembly (fig. 3). The shipper and boom assembly consists of a shipper, boom, and boom cylinder. The shipper is mounted to the shipper support and is elevated or lowered by the lift cylinder. The boom is located within the shipper and can be extended or retracted as operation requires. The boom cylinder is approximately eight feet in length and is used to extend or retract the boom.

k. Wrecker Body and Outriggers (fig. 3). A large safety tread platform surrounding the revolving structure is identified as the wrecker body. Grips and steps are located at each end of the body. Tool and stowage boxes are built into the rear of the wrecker body on each side. Rear winch cable guide roller brackets are welded to the rear of the wrecker body. There are four outriggers located one at each corner of the wrecker body. They are of the screw jack type and sufficient leverage can be obtained to effectively counterbalance the loads. The outrigger assembly frame construction takes all the down load, thus eliminating twisting strains on the truck chassis.

l. Rear Mounted Winch (M62 Only) (fig. 3). The rear mounted winch is powered from the power divider and has a direct maximum pulling capacity of 45,000 pounds on the first layer of cable. The winch is equipped with a level wind and cable tensioner to assure proper winding of the cable. An adjustable automatic brake is provided on the winch drive worm for holding purposes.

m. Wrecker Power Train.

(1) *Power-take-off* (fig. 84). The power-take-off for the M62 wrecker truck is mounted directly to the rear of the transfer input shaft and supplies power to the power divider. It is a constant drive type and incorporates its own lubricating system.

(2) *Power divider* (fig. 86). The power divider mounted under the hydraulic reservoir, consists of case, covers, input shaft, pump output shaft, rear winch output shaft, shifter shafts, gears, bearing assemblies, and seals. The input shaft receives power from the power-take-off mounted on the rear of the transfer case and makes it available, at operator's selection, to the pump output shaft on the rear winch output shaft.

(3) *Drive sprocket bearing assembly* (fig. 99). The drive sprocket bearing assembly attached to the chassis frame side rail, supports the winch drive line and transmits power to the rear mounted winch. The bearing assembly consists of a housing, drive sprocket shaft, drive sprocket, two bearing caps, and bearings.

(4) *Pillow block* (fig. 102). The pillow block is secured to the base plate and consists of a sealed bearing and housing. It provides a support for the rear mounted winch drive shaft.

n. Miscellaneous Units.

(1) *Restrictor valves assembly* (fig. 71). The restrictor valves are simple in structure and each valve consists of a body, seat, and head. One valve is located in the return line of the lift cylinder and the other in the return line of the hydraulic vane type motor. The valves restrict the flow of oil in the return line and thereby control dropping speed of the load.

(2) *Relief valve* (fig. 72). The relief valve is located near the hydraulic vane type pump at the hydraulic reservoir. The valve is set at 1,200 psi for the protection of the hydraulic working parts and at any time the pressure in the system reaches or exceeds 1,200 psi, the relief valve reroutes the oil and returns it to the oil reservoir.

(3) *Hydraulic hose.* The hydraulic hose, used on the wrecker crane, are of double wire braid and double rayon braid,

rubber coated construction. Hose are assembled at the factory with swedged-on couplings.

(4) *Hydraulic reservoir and stowage compartments* (fig. 3). The hydraulic reservoir consists of heavy gage sheet metal formed and welded together to make the oil storage tank. Covered stowage compartments are located on each side of the hydraulic reservoir.

5. Wrecker Crane Nomenclature

In this manual, the terms *left* and *right* and *front* and *rear* are used with respect to the operator sitting in the operator's compartment of the wrecker crane. For the truck chassis nomenclature, refer to TM 9–837.

6. Data

a. Wrecker Crane.

Manufacturer	Austin-Western
Manufacturer's number	AWR-HCF 1830
Type	Hydraulic
Powered	Truck power plant

Capacity (safe load chart):

Radius:	*W/Outriggers*	*W/Outriggers*
10 feet	10, 000	6, 700
11 feet	8, 400	5, 800
12 feet	7, 150	5, 100
13 feet	6, 300	4, 600
14 feet	5, 600	4, 150
15 feet	5, 000	3, 800
16 feet	4, 550	3, 500
17 feet	4, 250	3, 200
18 feet	4, 000	3, 000

(Maximum capacity with boom retracted and boom supported to frame—20,000 pounds at 10-foot radius with all outriggers down and 3-part line. 20,000 pounds at 15-foot radius with boom jacks to ground, 3-part line and rear outriggers up.)

b. Rear Mounted Winch.

Manufacturer	Gar Wood
Model	GW–ESA716K
Ordnance number	7409980
Type	Horizontal drum
Powered	Truck power plant
Capacity	45,000 lb

c. Wrecker Power Train. For detailed data on the components of the power train, refer to paragraph 128.

CHAPTER 2

PARTS, SPECIAL TOOLS, AND EQUIPMENT FOR FIELD AND DEPOT MAINTENANCE

7. General

Tools and equipment and maintenance parts over and above those available to the using organization are supplied to ordnance field maintenance units and depot shops for maintaining, repairing, and/or rebuilding the materiel.

8. Parts

Maintenance parts are listed in Department of the Army Supply Manual ORD 8 SNL G–744 which is the authority for requisitioning replacements. Parts not listed in the ORD 8 manual, but required by depot shops in rebuild operations, may be requisitioned from the listing in the corresponding ORD 9 manual and will be supplied if available. Requisitions for ORD 9 parts will contain a complete justification of requirements.

9. Common Tools and Equipment

Standard and commonly used tools and equipment having general application to this materiel are authorized for issue by T/A and T/O & E.

10. Special Tools and Equipment

No special tools other than standard automotive equipment are required to perform the operations described in this manual.

CHAPTER 3

TROUBLESHOOTING

Section I. GENERAL

11. Purpose

Note. Information in this chapter is for use of ordnance maintenance personnel in conjunction with and as a supplement to the troubleshooting section in the pertinent operator's manual. It provides the continuation of instructions where a remedy in the operator's manual refers to ordnance maintenance personnel for corrective action.

Operation of a deadlined vehicle without a preliminary examination can cause further damage to a disabled component and possible injury to personnel. By careful inspection and troubleshooting such damage and injury can be avoided and, in addition, the causes of faulty operation of a vehicle or component can often be determined without extensive disassembly.

12. General Instructions and Procedures

This chapter contains inspection and troubleshooting procedures to be performed while a disabled component is still mounted in the vehicle and after it has been removed.

a. The inspections made while the component is mounted in the vehicle are, for the most part, visual and are to be performed before attempting to operate the vehicle. The object of these inspections is to avoid possible damage or injury and also to determine the condition of and, when possible, what is wrong with the defective component.

b. The troubleshooting performed while the component is mounted in the vehicle is that which is beyond the normal scope of using organization. Check the troubleshooting section of TM 9–837, then proceed as outlined in this chapter. These troubleshooting operations are used to determine if the fault can be remedied without removing the component from the vehicle and also, when subsequent removal is necessary, to indicate when repair can be made without complete disassembly of the component.

Note. Thoroughly check for oil leakage of each component while mounted in the vehicle as all units operate under 1,200 psi during normal operation. This pressure cannot be applied after removal.

c. Inspection, after the component is removed from the vehicle, is performed to verify the diagnosis made when the component was in

the vehicle, to uncover further defects, or to determine faults if the component alone is received by the ordnance establishment. This inspection is particularly important in the last case because it is often the only means of determining the trouble without completely disassembling the component.

Section II. LIFT CYLINDER

13. Troubleshooting Before Removal or Operation

a. General. Do not operate the wrecker crane prior to completing the procedures given in this paragraph. Refer to paragraph 12*a* for the purpose of these inspections.

b. Detailed Procedure.

(1) *Inspect for oil leakage.* Visually inspect all gasket joints, oil seals, and fittings for evidence of oil leakage. Leakage at gasket joints may be caused by loose mounting bolts or defective gaskets. Tighten all mounting bolts where leakage has occurred. If mounting bolts are tight and leakage continues, install new gasket (par. 77). When possible, replace gaskets without removing unit from the vehicle.

(2) *Inspect for damaged castings.* Visually inspect the cylinder and head for damaged or cracked castings. Replace all damaged castings (par. 77).

c. Further Procedure. If these inspections do not disclose the fault, and the wrecker crane is operable, proceed as specified in paragraph 14.

14. Troubleshooting Before Removal and During Operation

a. General. If the inspections in paragraph 13 do not reveal causes of failure, and the wrecker crane is operable, then troubleshoot it. Refer to paragraph 12*b* for the purpose and scope of these troubleshooting procedures.

b. Detailed Procedure.

(1) *Boom will not raise.* Start the wrecker crane in operation and pull the boom control valve to UP position. Should the boom fail to raise, check oil level in reservoir and for oil leakage at connectors. If no leakage is evident, reservoir contains proper oil level, and pump is delivering proper pressure (par. 11), replace lift cylinder (pars. 53 and 65).

(2) *Scored or damaged piston rod.* Place the boom in the extreme UP position and note any damaged or scored condition of the piston rod. If damage is evident, replace (par. 77).

(3) *Piston rod bushings worn.* Replace bushings (par. 77).

c. Further Procedure. If these troubleshooting procedures do not disclose the fault, proceed as specified in paragraph 15.

15. Troubleshooting After Removal and Before Operation

a. General. After the lift cylinder has been removed from the wrecker crane or if it has been received already removed, further inspection is necessary. Refer to paragraph 12*c* for purpose and scope of these procedures.

b. Detailed Procedure.

(1) *Piston rod bushings worn.* Replace bushings (par. 77).

(2) *Piston rod scored.* Replace (par. 77).

(3) *Cracked cylinder or casting.* Replace defective component (par. 77).

(4) *Defective gaskets or packing.* Disassemble and replace defective gaskets and packing (par. 77).

(5) *Evidence of internal damage.* Rebuild the lift cyclinder assembly (par. 77).

Section III. SWIVEL VALVE

16. Troubleshooting Before Removal or Operation

a. General. Do not operate the wrecker crane prior to completing the procedures given in this paragraph. Refer to paragraph 12*a* for the purpose of these inspections.

b. Detailed Procedure.

(1) *Inspect for oil leakage.* Visually inspect for oil leakage (par. 13*b*).

(2) *Inspect for damaged castings.* Visually inspect swivel valve body and inner hub for cracks or other damage. Note any defective threads at hydraulic line connections. If damage is evident, replace (pars. 54 and 66).

c. Further Procedures. If these inspections do not disclose the fault, and the wrecker is operable, proceed as specified in paragraph 17.

17. Troubleshooting Before Removal and During Operation

a. General. If the inspections in paragraph 16 do not reveal causes of failure, and the wrecker crane is operable, then troubleshoot it. Refer to paragraph 12*b* for the purpose and scope of these troubleshooting procedures.

b. Detailed Procedure.

(1) *Inspect for oil leakage.* With the wrecker crane in operation and the hydraulic system at operating pressures, inspect all hose connections and gasket joints. Tighten connections or replace damaged connections and gaskets as required (par. 80).

(2) *Defective castings.* Replace swivel valve body and inner hub (par. 80).

c. Further Procedures. If these troubleshooting procedures do not disclose the fault, proceed as specified in paragraph 18.

18. Troubleshooting After Removal and Before Operation

a. General. After the swivel valve has been removed from the wrecker crane or if it has been received already removed, further inspection is necessary. Refer to paragraph 12*c* for purpose and scope of these procedures.

b. Detailed Procedure.

(1) *Inspect for oil leakage.* With the swivel valve removed, leakage inspections are limited as the unit operates under 1,200 psi in the system. Tighten hose connections and swivel valve cap.

(2) *Excessively worn or damaged inner hub.* Replace swivel valve body and inner hub (par. 80).

(3) *Damaged swivel valve body.* Replace swivel valve body and inner hub (par. 80).

Section IV. SWING MOTOR

19. Troubleshooting Before Removal or Operation

a. General. Do not operate the wrecker crane prior to completing the procedures given in this paragraph. Refer to paragraph 12*a* for the purpose of these inspections.

b. Detailed Procedure.

(1) *Inspect for oil leakage.* See paragraph 13*b*.

(2) *Damaged or cracked components.* Inspect for damaged or cracked swing motor body. For cracked bodies, damaged or scored piston rods, the swing motor must be rebuilt (par. 84).

c. Further Procedures. If these inspections do not disclose the fault, and the wrecker crane is operable, proceed as specified in paragraph 20.

20. Troubleshooting Before Removal and During Operation

a. General. If the inspections in paragraph 19 do not reveal causes of failure, and the wrecker crane is operable, then troubleshoot it. Refer to paragraph 12*b* for the purpose and scope of these troubleshooting procedures.

b. Detailed Procedure.

(1) *Inspect for oil leakage.* Start the wrecker crane and operate the swing motor. Inspect for leakage at piston rods and hydraulic line connections. If leakage is still evident after tightening, replace gaskets (par. 84).

(2) *Damaged motor bodies and scored piston rods.* Inspect piston rods for scored condition while swing motor is in

operation. Note any irregularities of operation. Replace damaged components (par. 84).

(3) *Sticking control valve spool.* Revolve the pivot post of the wrecker crane and note if control valve actuating lever of the swing motor is in constant contact with roller on base plate. If this lever does not contact roller at all times, remove spool (par. 84) and check for dirt or burs.

(4) *Irregularity of operation.* Swing motor out of timing. Time swing motor (TM 9–837).

c. Further Procedure. If these troubleshooting procedures do not disclose the fault, proceed as specified in paragraph 21.

21. Troubleshooting After Removal and Before Operation

a. General. After the swing motor has been removed from the wrecker crane or if it has been received already removed, further inspection is necessary. Refer to paragraph 12*c* for purpose and scope of these procedures.

b. Detailed Procedure.

(1) *Inspect for oil leakage.* With the swing motor removed, oil leakage inspection is limited. See paragraph 13*b*.

(2) *Defective castings and covers.* Thoroughly inspect covers and bodies for cracks or damaged screw threads. Defective units must be replaced (par. 85).

(3) *Scored piston rods.* Replace piston rods (par. 85).

(4) *Sticking control valve spool.* Disassemble and check for dirt or burs (par. 85).

Section V. CONTROL VALVE BANK

22. Troubleshooting Before Removal or Operation

a. General. Do not operate the wrecker crane prior to completing the procedures given in this paragraph. Refer to paragraph 12*a* for the purpose of these inspections.

b. Detailed Procedure.

(1) *Inspect for oil leakage.* Visually inspect all hydraulic flexible line connections, gaskets, and castings for evidence of oil leakage.

(2) *Control valve spool sticking.* Operate each control valve and note any sticking or irregularities in their operation. Generally a binding condition in any of the control valves may be removed by backing off one turn the hex head cap screw and hex nut which holds the control valve front cover to the control valve body. If binding condition still persists, re-

move the sticking spool and inspect for displaced chevron seals, dirt, burs, or scored condition. Damaged spool requires replacement of body and spool (par. 88).

(3) *Control valve body.* Inspect control valve body for cracks, defective threads, and sealing between bodies. Replace valve body and spool if either is found defective (par. 88).

c. Further Procedure. If these inspections do not disclose the fault, and the wrecker crane is operable, proceed as specified in paragraph 23.

23. Troubleshooting Before Removal and During Operation

a. General. If the inspections in paragraph 22 do not reveal causes of failure, and the wrecker crane is operable, then troubleshoot it. Refer to paragraph 12*b* for the purpose and scope of these troubleshooting procedures.

b. Detailed Procedure.

(1) *Inspect for oil leakage.* If the visual inspections (par. 13*b*) do not reveal leakage, start the wrecker crane and operate each control lever of the control valve bank. Thorough inspection must be made at this time while the system is under full pressure. If any leaks are evident, after operating all four control valves, remove control valve spool from any defective unit and replace damaged seals or gaskets (par. 88).

(2) *Defective valve bodies and spools.* Inspect in same manner as (1) above and if found defective the control valve bank must be rebuilt (par. 88).

c. Further Procedure. If these troubleshooting procedures do not disclose the fault, proceed as specified in paragraph 24.

24. Troubleshooting After Removal and Before Operation

a. General. After the control valve bank has been removed from the vehicle or if it has been received already removed, further inspection is necessary. Refer to paragraph 12*c* for purpose and scope of these procedures.

b. Detailed Procedures.

(1) *Oil leakage.* After thorough cleaning of the complete control valve bank, inspect all gasket joints and seals for damage or evidence of leakage. Replace any defective seals and gaskets (par. 89).

(2) *Control valve bodies and spools.* Check each spool for scored condition or burs at edges. Replace body and spools in pairs if damage is evident (par. 89). Inspect threads at hydraulic line connections and general condition of each component.

Section VI. HYDRAULIC VANE TYPE MOTOR

25. Troubleshooting Before Removal or Operation

a. General. Do not operate the wrecker crane prior to completing the procedures given in this paragraph. Refer to paragraph 12*a* for purpose of these inspections.

b. Detailed Procedures.

(1) *Inspect for oil leakage.* Visually inspect the hydraulic vane-type motor for evidence of oil leakage around motor housing and flexible lines. Tighten any connections or mounting bolts found leaking (par. 91).

(2) *Inspect for defective castings.* Visually inspect cover, cam ring, and body for defective castings or damaged threads. Defective components must be replaced (par. 91).

c. Further Procedures. If these inspections do not disclose the fault, and the wrecker crane is operable, proceed as specified in paragraph 26.

26. Troubleshooting Before Removal and During Operation

a. General. If the inspections in paragraph 25 do not reveal causes of failure and the wrecker crane is operable, then troubleshoot it. Refer to paragraph 12*b* for purpose and scope of these troubleshooting procedures.

b. Detailed Procedures.

(1) *Oil leakage.* Operate the hydraulic vane type motor under full load and watch for oil leakage at connectors, lines, and body gaskets. Defective gaskets must be replaced (par. 91).

(2) *Inspect cover, cam ring, and body.* During operation, check for evidence of cracks in castings and leaks around fittings. Defective components must be replaced (par. 91).

(3) *Motor will not turn.* This may be due to dirt, seized components, or other internal damage. Rebuild motor (par. 91).

c. Further Procedure. If these troubleshooting procedures do not disclose the fault, proceed as specified in paragraph 27.

27. Troubleshooting After Removal and Before Operation

a. General. After the hydraulic vane-type motor has been removed from the wrecker crane or if it has been received already removed, further inspection is necessary. Refer to paragraph 12*c* for purpose and scope of these procedures.

b. Detailed Procedure.

(1) *Motor will not turn.* Rebuild hydraulic vane type motor (par. 91).

(2) *Damaged motor body, cover, or cam ring.* Thoroughly clean the complete assembly and inspect screw threads at line con-

nections. Replace any defective or damaged components (par. 92).

(3) *Drive shaft loose in pump.* Loose drive shaft may be due to worn bearings. Install new bearings (par. 93). If any other irregularities are noted while turning the drive shaft, motor must be disassembled (par. 91) to locate the cause.

(4) *Inspection after disassembly of hydraulic motor.* Check the condition of the cam ring. The internal contour must be smooth. Any distortion or roughness on this surface will require replacement of the ring. Revolve bearings and if any indication of roughness is present, replace bearings. Pay particular attention to sealing edges of oil seal. Replace any damaged seals (par. 91).

Section VII. HYDRAULIC VANE-TYPE PUMP

28. Troubleshooting Before Removal or Operation

a. General. Do not operate the wrecker crane prior to completing the procedures given in this paragraph. Refer to paragraph 12*a* for purpose of these inspections.

b. Detailed Procedure. Inspect the hydraulic vane-type pump in the same manner as described in paragraph 25*b* hydraulic vane-type motor.

c. Further Procedure. If these inspections do not disclose the fault, and the wrecker crane is operable, proceed as specified in paragraph 29.

29. Troubleshooting Before Removal and During Operation

a. General. If the inspections in paragraph 28 do not reveal causes of failure, and the wrecker crane is operable, then troubleshoot it. Refer to paragraph 12*b* for purpose and scope of these troubleshooting procedures.

b. Detailed Procedure.

(1) *Inspect for oil leakage.* See paragraph 25*b*.

(2) *Pump will not turn.* Adjust pump control linkage (see TM 9–837).

(3) *Pump speed erratic.* Shift linkage at governor 3-way valve out of adjustment. Adjust linkage (TM 9–837).

(4) *Noisy hydraulic pump (cavitation).* Check oil level in reservoir and make certain oil supply valve is open.

c. Further Procedure. If these troubleshooting procedures do not disclose the fault, proceed as specified in paragraph 30.

30. Troubleshooting After Removal and Before Operation

a. General. After the hydraulic vane-type pump has been removed from the wrecker crane or if it has been received already removed,

further inspection is necessary. Refer to paragraph 12*c* for purpose and scope of these procedures.

b. Detailed Procedure. Troubleshoot the hydraulic pump in the same manner as prescribed for the hydraulic vane-type motor (par. 27*b*).

Section VIII. HOIST DRUM AND WORM AND DRIVE GEAR SET

31. Troubleshooting Before Removal or Operation

a. General. Do not operate the wrecker crane prior to completing the procedures given in this paragraph. Refer to paragraph 12*a* for the purpose of these inspections.

b. Detailed Procedure.

(1) *Inspect for lubricant leakage.* Check the gear case for lubricant leakage at gasket joints. Tighten all mounting bolts and if leakage is still evident, install new gaskets (par. 99).

(2) *Inspect cable drum and mountings.* Visually inspect drum mounting to shipper. Also check for any defects in the drum and whether cable properly follows cable grooves. Any defective components must be replaced or rebuilt (par. 97).

c. Further Procedures. If these inspections do not disclose the fault, and the vehicle is operable, proceed as specified in paragraph 32.

32. Troubleshooting Before Removal and During Operation

a. General. If the inspections in paragraph 31 do not reveal cause of failure and the wrecker crane is operable, then troubleshoot it. Refer to paragraph 12*b* for the purpose and scope of these troubleshooting procedures.

b. Detailed Procedure.

(1) *Hoist drum will not turn.* Prepare the wrecker crane for operation and operate the hoist control lever to UP or DOWN position. If the drum does not turn, check hydraulic system.

(2) *Hoist drum turns and cable slips.* Remove cable from drum and tighten hoist cable wedge in drum.

(3) *Noisy worm and gear.* Gear noise is usually due to lack of lubricant. Check lubricant level. If the gear case has proper lubricant level and noise is still present, rebuild hoist drum and worm and drive gear set (par. 97).

c. Further Procedure. If these troubleshooting procedures do not disclose the fault, proceed as specified in paragraph 33.

33. Troubleshooting After Removal and Before Operation

a. General. After the hoist drum and worm and drive gear set has been removed from the wrecker crane or if it has been received already removed, further inspection is necessary. Refer to paragraph 12*c* for purpose and scope of these procedures.

b. Detailed Procedure.

(1) *Inspect gear case and hoist drum.* Thoroughly clean the gear case, drum housing and drum, and inspect for cracked or damaged castings. Cracked castings must be replaced (par. 98).

(2) *Excessive wear at worm.* Turn the worm and note any excessive clearance or faulty alinement between worm and drive gear. Adjust worm and drive gear set (par. 100).

(3) *Loose or worn bearings.* Install new bearings (par. 98).

(4) *Lubricant leakage at hoist drum hub.* Install new seal (par. 99).

Section IX. BASE PLATE AND PIVOT POST ASSEMBLY

34. Troubleshooting Before Removal or Operation

a. General. Do not operate the wrecker crane prior to completing the procedures given in this paragraph. Refer to paragraph 12*a* for the purpose of these inspections.

b. Detailed Procedure. Troubleshooting of the base plate and pivot post assembly before operation is limited to visual inspection of the components. Check for defective weld, cracked posts, or support plates. Check for proper lubrication of the ring gear. Repair broken welds if inspection warrants.

c. Further Procedure. If these inspections do not disclose the fault, and the wrecker crane is operable, proceed as specified in paragraph 35.

35. Troubleshooting Before Removal and During Operation

a. General. If the inspections in paragraph 34 do not reveal causes of failure and the wrecker crane is operable, start the wrecker crane and continue to troubleshoot it. Refer to paragraph 12*b* for the purpose and scope of these troubleshooting procedures.

b. Detailed Procedure.

(1) *Excessive end play in pivot post.* With the wrecker crane in operation, swing the boom to the right and left. Excessive looseness in pivot post will require adjustment of pivot post bearings (par. 104).

(2) *Shipper supports loose at pivot post.* Tighten shipper support bolts (par. 146).

(3) *Inspection of ring gear, pivot bearings, drive pinion, and idler gear.* Any irregularities noticed during operation pertaining to the internal parts will require disassembly for further inspection (par. 102).

c. Further Procedure. If these troubleshooting procedures do not disclose the fault, proceed as specified in paragraph 36.

36. Troubleshooting After Removal and Before Operation

a. General. After the base plate and pivot post assembly has been removed from the truck or if it has been received already removed, further inspection is necessary. Refer to paragraph 12*c* for the purpose and scope of these procedures.

b. Detailed Procedures.

(1) *Bearings and cups.* Inspect bearing cups for pitted, scratched, or scored condition. Replace any defective bearings and cups (par. 102).

(2) *Drive pinion, idler gear, and ring gear.* Inspect drive pinion, idler gear, and ring gear for broken, cracked, or chipped teeth. Replace defective gears (par. 102).

(3) *Base plate and pivot post.* Inspect base plate for defective welds or cracks. Minor defects can be repaired by welding. Also check pivot posts for cracks or other defects and replace as inspection warrants (par. 102).

Section X. SHIPPER AND BOOM ASSEMBLY

37. Troubleshooting Before Removal or Operation

a. General. Do not operate the wrecker crane prior to completing the procedures given in this paragraph. Refer to paragraph 12*a* for the purpose of these inspections.

b. Detailed Procedures.

(1) *Oil leakage.* Inspect the boom cylinder for oil leakage paying particular attention to the hydraulic line connections.

(2) *Boom.* Check boom for cracked welds or bent condition. Defective welds can be repaired by welding. Replace boom if damage is excessive (par. 105).

(3) *Rollers.* Inspect the boom rollers for worn or damaged condition. Replace defective rollers (par. 105).

(4) *Pivot shafts and pins.* Inspect the pivot shafts and pins for excessive wear and replace if inspection warrants (par. 106).

c. Further Procedures. If these inspections do not disclose the fault and the wrecker crane is operable, proceed as specified in paragraph 38.

38. Troubleshooting Before Removal and During Operation

a. General. If the inspections in paragraph 37 do not reveal causes of failure and the wrecker crane is operable, start the wrecker crane and continue to troubleshoot it. Refer to paragraph 12*b* for the purpose and scope of these troubleshooting procedures.

b. Detailed Procedures.

(1) *Boom will not extend or retract.* Operate the crowd control lever to EXTEND and RETRACT positions. If boom does not respond, check oil level in the hydraulic system (TM 9–837). Note any binding of the boom in the shipper. Bent boom or shipper must be replaced (par. 106).

(2) *Excessive looseness at boom rollers.* Inspect the boom rollers for free turning or defective bearings. Replace defective parts (par. 106).

(3) *Boom will not respond to control valve.* The shipper and boom must be disassembled (par. 105) and further inspection is necessary.

c. Further Procedure. If these troubleshooting procedures do not disclose the fault, proceed as specified in paragraph 39.

39. Troubleshooting After Removal and Before Operation

a. General. After the shipper and boom assembly has been removed from the wrecker crane, or if it has been received already removed, further inspection is necessary. Refer to paragraph 12*c* for purpose and scope of these procedures.

b. Detailed Procedures.

(1) *Boom cylinder.* Inspect the boom cylinder and piston rod for nicks, scratches, or scoring. Check the cylinder head seals and gaskets for evidence of leakage. Inspect piston cups for worn condition, and the piston for looseness on end of piston rod. Also note any broken welds. Replace or repair damaged components (par. 106).

(2) *Boom rollers.* Inspect boom rollers for wear or damaged bearings. Pitted or worn bearings must be replaced (par. 106).

(3) *Boom.* Turn the boom sheaves and note condition of needle bearings. Replace defective bearings and sheaves (par. 106). Broken welds on the boom may be repaired by welding.

(4) *Shipper.* Inspect shipper pivot shaft bushings for wear or scoring. Replace damaged bushings. Examine rear bottom roller for excessive wear and replace damaged bearings or worn shaft (par. 106). Examine hoist drum and worm and drive gear mounting brackets on the rear for broken welds. Repair by welding.

Section XI. WRECKER BODY, OUTRIGGERS, AND OIL RESERVOIR

40. Troubleshooting Before Removal or Operation

a. General. Do not operate the vehicle prior to completing the procedures given in this paragraph. Refer to paragraph 12*a* for the purpose of these inspections.

b. Detailed Procedures.

(1) *Oil leakage.* Inspect the oil reservoir for leakage at welds. Minor cracks at welds can be repaired.

(2) *Wrecker body and outriggers.* Inspect the wrecker body and outriggers for damaged or bent condition. Minor damage may be repaired. Any extensive damage will require replacement of the damaged components.

c. Further Procedures. If these inspections do not disclose the fault, and the wrecker crane is operable, proceed as specified in paragraph 41.

41. Troubleshooting Before Removal and During Operation

a. General. If the inspections in the preceding paragraph do not reveal causes of failure and the wrecker crane is operable, then troubleshoot it. Refer to paragraph 12*b* for the purpose and scope of these troubleshooting procedures.

b. Detailed Procedure. Visually inspect the wrecker body, outriggers, and oil reservoir during operation and note any distortion or damaged welds not revealed before operation. Repair or replace damaged components as inspection warrants.

c. Further Procedures. If these troubleshooting procedures do not disclose the fault, proceed as specified in paragraph 42.

42. Troubleshooting After Removal and Before Operation

a. General. After the wrecker body, outriggers, and oil reservoir have been removed from the vehicle, or if they have been received already removed, further inspection is necessary. Refer to paragraph 12*c* for purpose and scope of these procedures.

b. Detailed Procedures. After thoroughly cleaning the complete assemblies, further troubleshooting is limited to visual inspection of the components. Check closely for damage not revealed during procedures covered in paragraphs 40 and 41. Repair minor broken welds and straighten bent sheet metal. Major damage to any component will require replacement of the component (par. 109).

Section XII. REAR MOUNTED WINCH

43. Troubleshooting Before Removal or Operation

a. General. Do not operate the rear mounted winch prior to completing the procedure given in this paragraph. Refer to paragraph 12*a* for the purpose of these inspections.

b. Detailed Procedure. Troubleshooting before removal or operation is limited to visual inspection of the complete assembly. Check the mounting bolts, alinement, and general condition of the winch assembly. Replace any damaged components.

c. Further Procedure. If these inspections do not disclose the fault, and the rear mounted winch is operable, proceed as specified in paragraph 44.

44. Troubleshooting Before Removal and During Operation

a. General. If the inspections in the preceding paragraph do not reveal causes of failure and the rear mounted winch is operable, then troubleshoot it. Refer to paragraph 12*b* for the purpose and scope of these troubleshooting procedures.

b. Detailed Procedure.

(1) *Winch drum will not turn.*

(*a*) *Shift linkage out of adjustment.* Adjust linkage (TM 9–837).

(*b*) *Shear pin failure.* Inspect shear pin at drive worm sprocket. Replace broken shear pin (TM 9–837).

(2) *Noisy operation.* Check lubricant level (TM 9–837).

(3) *Excessive heat of brake case.* Adjust automatic brake (TM 9–837).

(4) *Winch fails to hold load.* This condition is caused by the automatic brake lining becoming excessively worn or in need of adjustment. Adjust brake (TM 9–837) or replace brake band assembly. (TM 9–1837B).

(5) *Broken drive chain.* Replace broken link (TM 9–837).

c. Further Procedures. If these troubleshooting procedures do not disclose the fault, proceed as specified in paragraph 45.

45. Troubleshooting After Removal and Before Operation

a. General. After the rear mounted winch has been removed from the vehicle or if it has been received already removed, further inspection is necessary. Refer to paragraph 12*c* for purpose and scope of these procedures.

b. Detailed Procedure.

(1) *Oil leakage at gear case.* Replace gaskets.

(2) *Drive worm will not turn.* Disassemble and replace defective components (par. 121).

(3) *Drum turns on drum shaft.* Disassemble and replace drum.

(4) *Miscellaneous inspections.* Inspect the rear mounted winch after it has been removed, paying particular attention to cracked or damaged castings. Make sure bearings are free in level wind rollers. Rebuild the assembly as inspection indicates (par. 119).

Section XIII. WRECKER POWER TRAIN

46. Troubleshooting Before Removal or Operation

a. General. Do not operate the vehicle prior to completing the procedures given in this paragraph. Refer to paragraph 12*a* for the purpose of these inspections.

b. Detailed Procedure.

(1) *Power divider.* Inspect the power divider for oil leakage. Visually inspect gasket joints and seals on power divider. Tighten all mounting bolts and, if leakage continues, disassemble and replace gaskets or seals (par. 133).

(2) *Drive sprocket bearing assembly.* Visually inspect the bearing assembly for general overall condition. If evidence of excessively worn bearings is found, replace damaged components (par. 136).

(3) *Pillow block.* Visually inspect the pillow block for cracked castings and general overall condition. Repair or replace defective parts.

(4) *Drive shafts.* Check the universal joints on the drive shafts. Repair or replace defective drive shafts.

c. Further Procedure. If these inspections do not disclose the fault, and the vehicle is operable, proceed as specified in paragraph 47.

47. Troubleshooting Before Removal and During Operation

a. General If the inspections in paragraph 46 do not disclose causes of failure, and the vehicle is operable, then troubleshoot it. Refer to paragraph 12*b* for the purpose and scope of these troubleshooting procedures.

b. Detailed Procedure.

(1) *Drive line will not turn.* Shift linkage out of adjustment. Adjust linkage (TM 9–837).

(2) *Pump speed erratic.* Adjust governor at power divider. (TM 9–837).

(3) *Noisy drive line.* Check lubricant level in power divider. (See lubrication chart.) Also inspect universal joint journal bearings for looseness or worn condition. Replace as inspection indicates.

(4) *Lubricant leakage.* After operation inspect gasket joints and seals for leakage. Replace leaking seals and gaskets (par. 133).

(5) *High temperature in pillow block or drive sprocket bearing assembly.* High temperature is usually an indication of lack of lubricant. (See lubrication chart TM 9–837.)

c. Further Procedure. If these troubleshooting procedures do not disclose the fault, proceed as specified in paragraph 48.

48. Troubleshooting After Removal and Before Operation

a. General. After the power divider, drive sprocket bearing assembly, drive shafts, and pillow block have been removed from the vehicle, or if they have been received already removed, further inspection is necessary. Refer to paragraph 12*c* for purpose and scope of these procedures.

b. Detailed Procedure.

(1) *Power divider.*

(*a*) *Lubricant leakage.* Inspect gasket joints and seals for damage and lubricant leakage and replace as required (par. 133).

(*b*) *Internal defects.* Shift the power divider into the various ranges and turn by hand. Note any roughness, such as scored shafts, loose bearings, burred or chipped gear teeth. Any defects noted on internal parts during inspection will require disassembly and rebuild of the power divider (par. 133).

(2) *Drive shafts.* Inspect drive shafts for bent condition. Also note universal joints bearing journals for excessive wear. Replace damaged components.

(3) *Pillow block.* Inspect bearing in pillow block for free rotation. If bearing binds, replace (par. 139). Also inspect for cracked castings or broken condition. If defects are noted, replace (par. 139).

(4) *Drive sprocket bearing assembly.*

(*a*) *Housing.* Inspect housing for cracks or breaks. Replace if any are detected (par. 137).

(*b*) *Shaft.* Inspect shaft for cracks or damaged splines. Replace if inspection warrants (par. 137).

(*c*) *Bearings.* Rotate shaft and check for scored or seized condition of bearings. Defective bearings must be replaced (par. 136).

(*d*) *Oil seals.* Inspect oil seal contact material to see that it is pliable and shows no evidence of burning. Replace defective seals (par. 136).

CHAPTER 4

REMOVAL AND INSTALLATION OF MAJOR COMPONENTS

Section I. DISASSEMBLY OF THE WRECKER CRANE INTO MAJOR COMPONENTS

49. General

a. This section contains information for the guidance of personnel performing major rebuild work on the 5-ton 6 x 6 wrecker truck M62. It provides an assembly line procedure for the disassembly of the hydraulic crane into its major components. It designates what constitutes a major component, identifies the points of connection between major components, and states briefly what must be done. TM 9–837 covers detailed instructions for removal of major components.

b. Before cleaning or washing, inspect the entire wrecker crane and rear winch for cracks, leaks, and loose or shifted parts or assemblies as these will be more evident if surfaces are soiled or dusty. Make notes of any defects for later use in rebuild operations.

c. To drain the hydraulic system, it will be necessary to not only drain the hydraulic oil tank by removing the drain plug, but the oil also must be removed from all the hydraulic lines and cylinders. To accomplish this, disconnect the hydraulic hose attached to each cylinder and then by means of an overhead crane or a set of chain blocks, extend and retract each cylinder individually and allow the oil to pour out of the cylinder openings. In addition, all hydraulic lines should be disconnected at their lowest point and drained completely. Temporarily replace all connections to prevent entry of foreign matter such as dust and dirt.

50. Hydraulic Vane-Type Motor Removal

(fig. 4)

a. General. Attach a suitable chain hoist to the hydraulic vane-type motor. The approximate weight of the motor is 150 pounds. Keep oil pans handy while disconnecting motor lines.

b. Removal. Remove drain plug from gear housing and drain lubricant. Disconnect two hydraulic motor lines and one oil return line at swivel nuts. Remove four safety nuts securing hydraulic motor to gear case and pull motor free from drum drive coupling. Refer to TM 9–837 for detailed removal instructions.

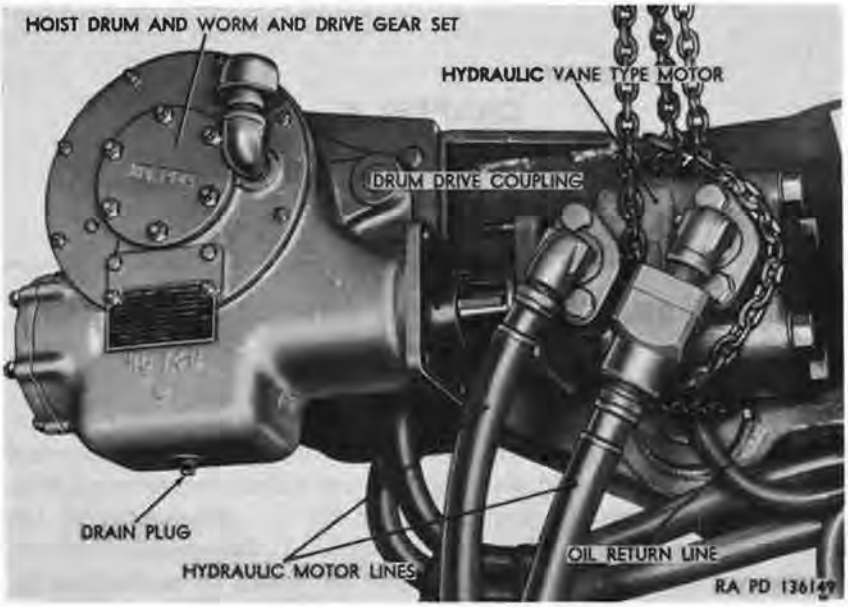


Figure 4. Hydraulic vane-type motor removal.

51. Hoist Drum and Worm and Drive Gear Set Removal

a. General. Overhead hoisting equipment with a capacity of 600 pounds must be used to remove the hoist drum and worm and drive gear set (fig. 4). Add an additional 150 pounds if the hydraulic vane-type motor is removed with the assembly.

b. Removal. Unwind hoist cable and drive out cable anchor pin from drum. Remove three cap screws and lockwashers on the right side and three hex head bolts and safety nuts from left side of shipper. Lift the assembly from the vehicle. Detailed removal instructions are covered in TM 9-837.

52. Shipper and Boom Assembly Removal

a. General. The approximate weight of the shipper and boom assembly is 2,150 pounds and suitable hoisting equipment must be available for removal.

b. Removal. Attach chain to boom and shipper as a safety measure to keep boom from rolling out of shipper. Attach a chain sling to shipper and boom assembly and lift the assembly to expose the lift cylinder pivot shaft. Remove the pivot shaft and lower shipper and boom assembly to the normal horizontal position.

Note. Boom lift control valve must be held in the DOWN position to permit oil in lift cylinder to bypass while lowering the assembly.

Disconnect boom cylinder flexible lines. Remove shipper pivot shaft and lift the complete assembly from the vehicle. Detailed illustra-

tions and instructions for removal of the shipper and boom assembly are covered in TM 9–837.

53. Lift Cylinder Removal

a. General. The lift cylinder, located between the shipper support plates, weighs approximately 265 pounds. Attach suitable hoisting equipment to lift the assembly from the vehicle.

b. Removal. Disconnect two lift cylinder hydraulic lines at swivel nuts located directly behind the operator's compartment. Remove elbows and hydraulic lines from the lift cylinder. Remove cotter pin from lift cylinder anchor shaft and drive out shaft. Raise the cylinder assembly from the vehicle. Refer to TM 9–837 for complete and illustrated removal instructions of the lift cylinder assembly.

54. Swivel Valve Assembly Removal

a. General. The swivel valve assembly with hydraulic lines weighs approximately 120 pounds. Place identification tags on all the hydraulic lines and connections to facilitate assembly.

b. Removal.

(1) Disconnect flood light cable at junction block under the base plate and at flood light.

(2) Disconnect oil return line at hydraulic vane type motor and four hydraulic lines and one oil return line at control valve bank.

(3) Loosen two hex nuts and slide swivel valve lock plates out of grooves in inner hub.

(4) Disconnect two hydraulic lines at hydraulic junction block and oil bypass line and oil supply line at relief valve. Also disconnect oil return line at reservoir and remove line clamp at relief valve.

(5) Attach chain hoist and pull swivel valve assembly with hydraulic lines from pivot post support.

(6) Refer to TM 9–837 for detailed instructions with illustrations for removal of the swivel valve assembly.

55. Swing Motor Removal

a. General. Rotate the pivot post until the boom is projecting over the right side of the truck and the operator's compartment is out of the way of the swing motor. Place identification tags on all hydraulic lines and connections to facilitate assembly.

b. Removal.

(1) Remove eight cap screws and lockwashers and lift off swing motor cover.

(2) Disconnect four hydraulic lines at swing motor swivel nuts.

(3) Cut locking wire and remove two cap screws from retaining plate securing swing motor piston rods to drive pinion crank.

(4) Loosen lock nut and setscrew securing each pivot pin to base plate and drive out pins.
(5) Lift the swing motor off the drive pinion crank.
(6) Refer to TM 9–837 for detailed instructions on removal of the swing motor.

56. Control Valve Bank Assembly Removal

a. General. Place identification tags on all hydraulic lines to facilitate assembly. Swivel nuts are provided on all the connecting lines at the control valve bank.

b. Removal. Remove four cap screws with lockwashers securing control panel to operator's compartment. Disconnect all hydraulic lines at swivel nuts, which have been provided for ease of disassembly. Remove four cap screws and safety nuts securing control valve bank to operator's compartment and lift off the assembly. Detailed removal instructions are covered in TM 9–837.

57. Pivot Post and Base Plate Assembly Removal

a. General. The combined weight of the base plate, pivot post assembly, and shipper support is approximately 3,500 pounds. Place a chain under operator's compartment and between shipper support plates and attach to suitable hoisting equipment.

b. Removal.

(1) Remove eight cap screws and lockwashers and four cap screws and safety nuts securing rear floor boards to wrecker body. Remove yoke pins from winch control shift lever and hydraulic pump control shift lever and tilt rear floor board up to permit access to base plate U bolts.
(2) Remove six safety nuts and two cap screws and lockwashers from each side of base plate.
(3) Separate universal joints on rear winch drive shaft at drive sprocket bearing assembly and pillow block. Remove yoke pins at relay levers from rear winch and hydraulic pump shift rods.
(4) Lift the base plate and pivot post assembly from the vehicle.
(5) Detailed removal instructions and illustrated disconnect points are covered in TM 9–837.

58. Rear Winch Removal (M62 Only)

a. General. The approximate weight of the rear winch assembly is 1,700 pounds. The rear winch can be removed with the wrecker crane. The chain and hook must be removed from end of the cable to permit clearance through cable guide rollers mounted on the wrecker body.

b. Removal.

(1) Separate drive chain at master link.

(2) Remove cotter pin and yoke pin at cable tensioner.

(3) Remove four hex head bolts, nuts, and lockwashers, located two on each end of winch assembly. Remove chain and hook from end of cable and lift the rear winch assembly from the vehicle.

(4) Detailed removal instructions are covered in TM 9–837.

59. Wrecker Body With Outriggers Removal

(fig. 5)

a. General. The approximate weight of the wrecker body with outriggers is approximately 2,100 pounds. Attach a chain sling around the outriggers at each corner of the wrecker body as shown in figure 5 to remove the assembly from the truck.

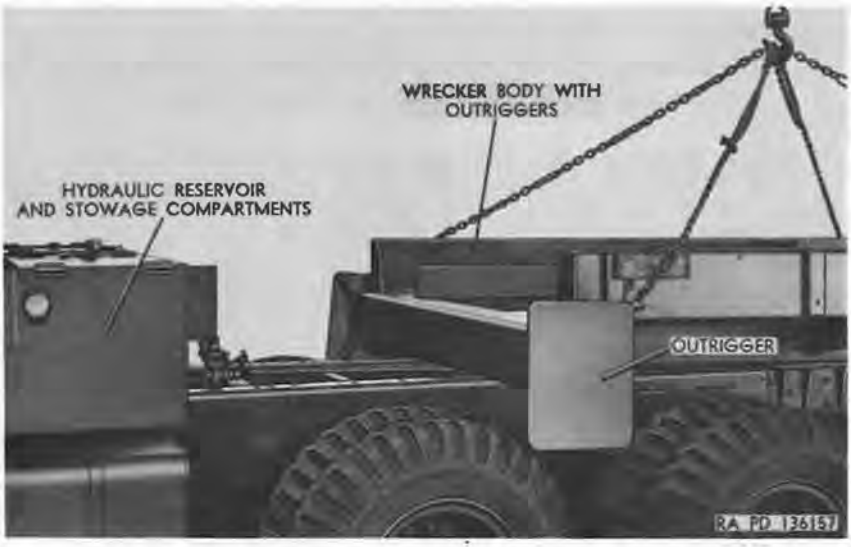


Figure 5. Lifting of wrecker body with outriggers from the truck.

b. Removal.

(1) Remove six hex head bolts and safety nuts securing hydraulic vane-type pump and rear winch relay shift levers to wrecker body.

(2) Loosen hose clamps and turn hydraulic return line 45° to permit removal of the wrecker body.

(3) Remove four safety nuts from U bolts at front end of wrecker body and ten safety nuts, located five on each side at rear mounting bracket.

(4) Separate three taillight connectors on the left side and two on the right side. Remove two cable clamps on each side securing cables to wrecker body.

(5) Lift the wrecker body with outriggers straight up to clear hydraulic return line at reservoir and remove from the vehicle.

(6) Detailed illustrations on disconnect points and removal are covered in TM 9–837.

60. Hydraulic Reservoir and Stowage Compartments With Power Divider, Hydraulic Vane-Type Pump, and Relief Valve Removal

(fig. 6)

a. General. The hydraulic reservoir and stowage compartments with power divider, hydraulic vane-type pump, and relief valve attached can be removed as an assembly after wrecker body is removed. Detailed instruction on removal of the individual components is covered in TM 9–837.

b. Removal.

(1) Disconnect power divider shift linkage located one at the front and two at the rear of the power divider.

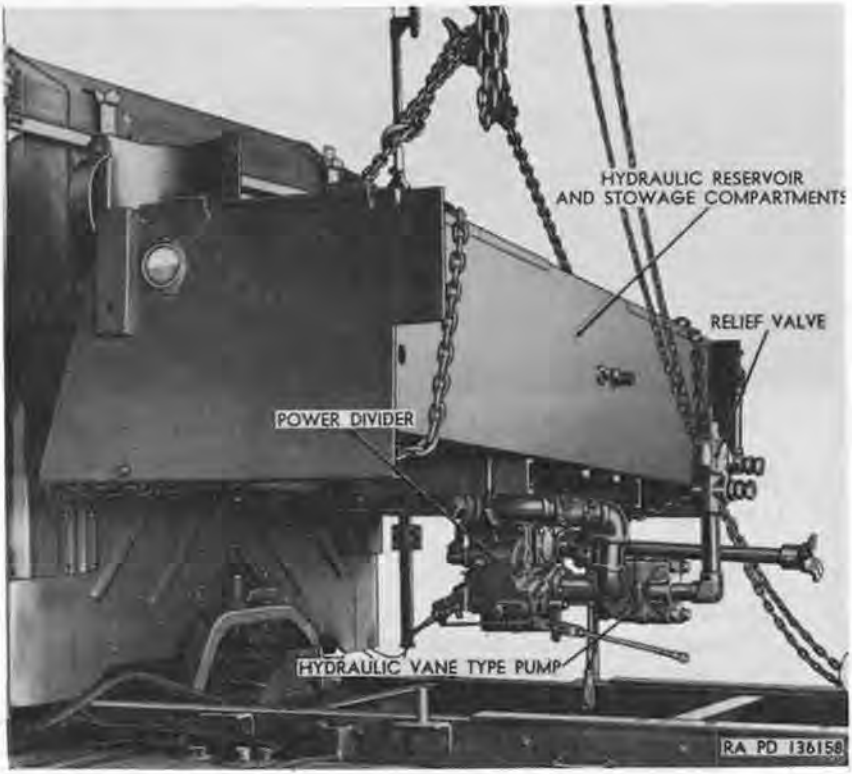


Figure 6. Lifting of hydraulic reservoir and stowage compartments with power divider, hydraulic vane-type pump, and relief valve attached, from the truck.

(2) Separate drive shaft universal joint between power divider and transfer power-take-off at power divider.
(3) Place identification tags on governor air lines and disconnect hydraulic pump governor lines.
(4) Remove four safety nuts, located two on each side at frame side rail, securing hydraulic reservoir and stowage compartments to chassis frame.
(5) Attach a chain sling to the hydraulic reservoir and stowage compartments with power divider, hydraulic vane-type pump, and relief valve and lift the complete assembly from the truck.

Section II. ASSEMBLY OF WRECKER CRANE FROM MAJOR COMPONENTS

61. General

This section provides an assembly line procedure for assembling the wrecker crane from its major components. Detailed illustrations and instructions for installation are covered in TM 9–837.

Note. Extra precautions must be used to tighten hose connections as outlined in TM 9–837 to avoid oil leaks at connections.

62. Installation of the Hydraulic Reservoir and Stowage Compartments, With Power Divider, and Hydraulic Vane-Type Pump Attached

(fig. 6)

a. Position chain sling on hydraulic reservoir assembly as shown in figure 6. Lift the assembly into position on the vehicle, making certain spacers are alined with bolts and brackets. Install four 5/8–18NF–2 safety nuts, located two on each side at frame side rail, and secure the assembly to the vehicle.

b. Assemble drive shaft universal joint between transfer case power-take-off and power divider.

c. Assemble power divider shift linkage at front end of power divider.

d. Assemble air lines, previously identified, to hydraulic vane-type pump governor valve at front of power divider.

63. Installation of Wrecker Body and Outriggers

(fig. 5)

a. Attach a chain sling to each corner of the wrecker body and lift the assembly with outriggers into position on the truck chassis.

Note. Special precautions must be taken to protect the relief valve and hydraulic reservoir when lowering wrecker body onto truck.

b. Aline holes at rear mounting bracket and install ten 5/8–18NF–2 safety nuts, located five on each side, to 5/8–18NF–2 x 1–1½ rear mounting bolts.

c. Install four 1–14NF–3 safety nuts on **U** bolts at front end of wrecker body.

d. Position hydraulic vane type pump and rear winch relay levers at front of wrecker body and secure with six 3/8–24NF–3 x 1¼ hex head bolts and 3/8–24NF–3 safety nuts. Assemble the two rear power divider shift links to relay levers.

e. Turn the hydraulic return line 45° and secure to hydraulic reservoir with hose clamps.

f. Thread tail light cables through wrecker body and secure with two cable clamps on each side of body. Assemble three tail light connectors on the left side and two on the right side.

64. Installation of Pivot Post and Base Plate Assembly

a. With the rear winch drive shaft and two power divider shift rods in position under the base plate, lower the pivot post and base plate assembly into position on the wrecker body.

b. Install six 1–14NF–3 safety nuts on **U** bolts and two 1–14NF–3 x 2¾ cap screws and 1 inch lock washers on each side of base plate, securing wrecker crane to vehicle.

c. Assemble rear winch drive shaft universal joints at pillow block and at drive sprocket bearing assembly.

d. Position rear floor board in wrecker body and secure with eight 5/16–24NF–3 x 5/8 cap screws and lock washers and four 5/16–24NF–3 x 5/8 cap screws and 5/16–24NF–3 safety nuts.

e. Install yoke pins at winch shift lever and hydraulic pump control shift lever for connecting shift levers to shift rods. Install yoke pins at hydraulic pump and winch relay levers.

f. Assemble hydraulic pump and rear winch shift rods to relay levers.

65. Installation of Lift Cylinder

a. Attach a chain hoist and place the lift cylinder assembly into position between plates of the shipper support.

b. Install lift cylinder anchor shaft through shipper support and base of cylinder and secure with 3/16 x 3 cotter pin.

c. Install elbows and hydraulic lines to lift cylinder and connect the two lift cylinder hydraulic lines at swivel nuts directly behind the operator's compartment.

Note. Tighten hydraulic couplings as outlined in TM 9–837.

66. Installation of the Swivel Valve Assembly

a. Attach a chain hoist to the swivel valve assembly with hydraulic lines attached and enter hydraulic lines through the center of pivot post.

b. Connect hydraulic oil bypass line and hydraulic oil supply line at relief valve. Also connect hydraulic oil return line at hydraulic reservoir and secure line with clamp at relief valve.

c. Connect two hydraulic lines, previously identified, at hydraulic junction block under the base plate.

d. Assemble flood light cable at junction block under the base plate.

e. Slide the swivel valve lock plates, located to the front and rear, into groove on inner hub of swivel valve. Tighten two 5/8–18NF–3 hex nuts locking swivel valve to pivot post assembly.

f. Assemble flood light cable at junction block.

g. Connect hydraulic motor return line at bracket inside of operator's compartment with hose clamp.

67. Installation of Control Valve Bank Assembly

a. Position control valve bank assembly on spacers in the operator's compartment.

b. Install four 5/8–18NF–3 x 2½ cap screws and 5/8–18NF–3 safety nuts to secure control valve bank assembly to operator's compartment.

c. Connect all hydraulic lines to control valve bank and tighten connections as outlined in TM 9–837.

d. Position control panel over control valve bank and secure to operator's compartment with four ¼–20NC x ½ cap screws with lockwashers.

68. Installation of Swing Motor

a. Place the swing motor into position on the base plate with the piston rod ends over the drive pinion crank. Install retaining plate and two special cap screws to secure swing motor piston rods to drive pinion crank. Install locking wire.

b. Install pivot pin through bracket and base of motor and tighten special set screw to hold pin in bracket. Tighten 7/16–14NC–2 lock nut on set screw.

c. Connect the four hydraulic lines, two to each swing motor cylinder, as identified during disassembly and tighten connections as outlined in TM 9–837.

d. Swing motor must be timed and adjusted after assembly. Complete instructions on adjustment and timing of the swing motor are covered in TM 9–837.

e. Position swing motor cover over motor and fasten to wrecker body with eight 5/16–24NF x 5/8 cap screws and 5/16-inch lock washers.

69. Installation of Shipper and Boom Assembly

a. Attach a chain sling and lift the shipper and boom assembly into position between plates of shipper support.

Caution: Secure boom to shipper at once to keep boom from sliding out of shipper and cause the assembly to overbalance.

b. Aline shipper with shipper support plates and install pivot shaft. Secure shaft to support plates with ½–20NF–3 x 5½ hex head bolt and ½–20NF–3 safety nut.

c. Aline shipper with the lift cylinder piston rod and install lift cylinder pivot shaft. Raise the shipper and boom assembly to extend the piston rod. Tighten ½–13NC–3 x 2 set screw to secure pivot shaft to piston rod and lock with ½–13NC–3 lock nut.

Note. Lift cylinder control valve must be held in the UP position while raising, and in the DOWN position while lowering to permit oil in the system to bypass from one side of cylinder to the other.

d. Connect the two boom cylinder hydraulic lines to swivel nuts at rear of operator's compartment. Tighten as described in TM 9–837.

70. Installation of Hoist Drum and Worm and Drive Gear Set

(fig. 4)

a. Position hoist drum and worm and drive gear set on end of shipper and secure with three 1–14NF–3 x 1¾ cap screws and 1-inch lockwashers on the right side and three 1–14NF–3 x 2¾ hex head bolts and 1–14NF–3 safety nuts on the left side.

b. Thread hoist cable through boom sheave and under upper roller assembly. Insert cable through hoist drum and secure cable to drum with cable anchor pin.

71. Installation of Hydraulic Vane-Type Motor

(fig. 4)

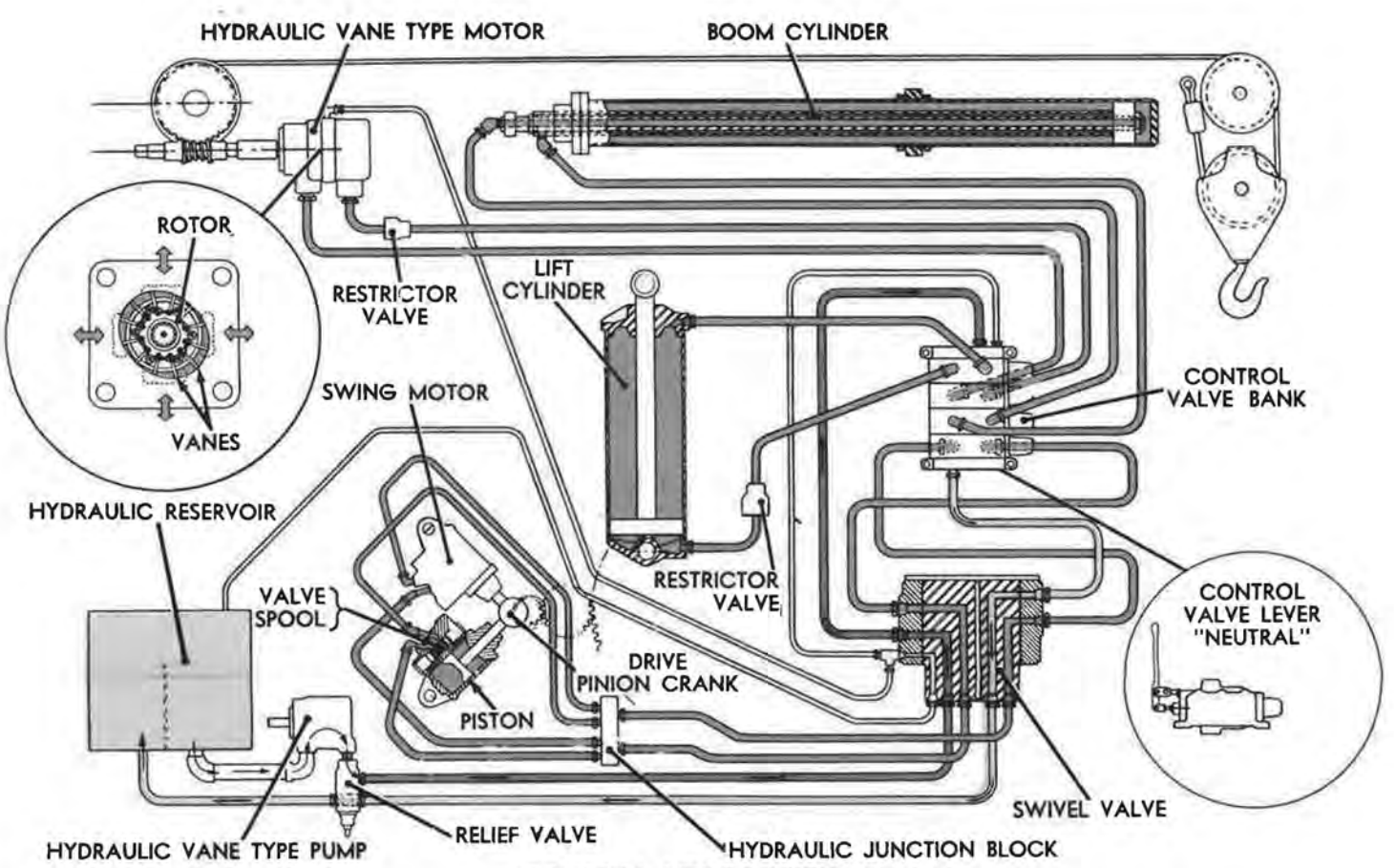
a. Attach a chain hoist to the hydraulic vane-type motor and aline key in shaft with the drum drive coupling.

b. Push the hydraulic vane-type motor into position and secure with four ⅝–18NF–3 safety nuts to the drum and gear housing.

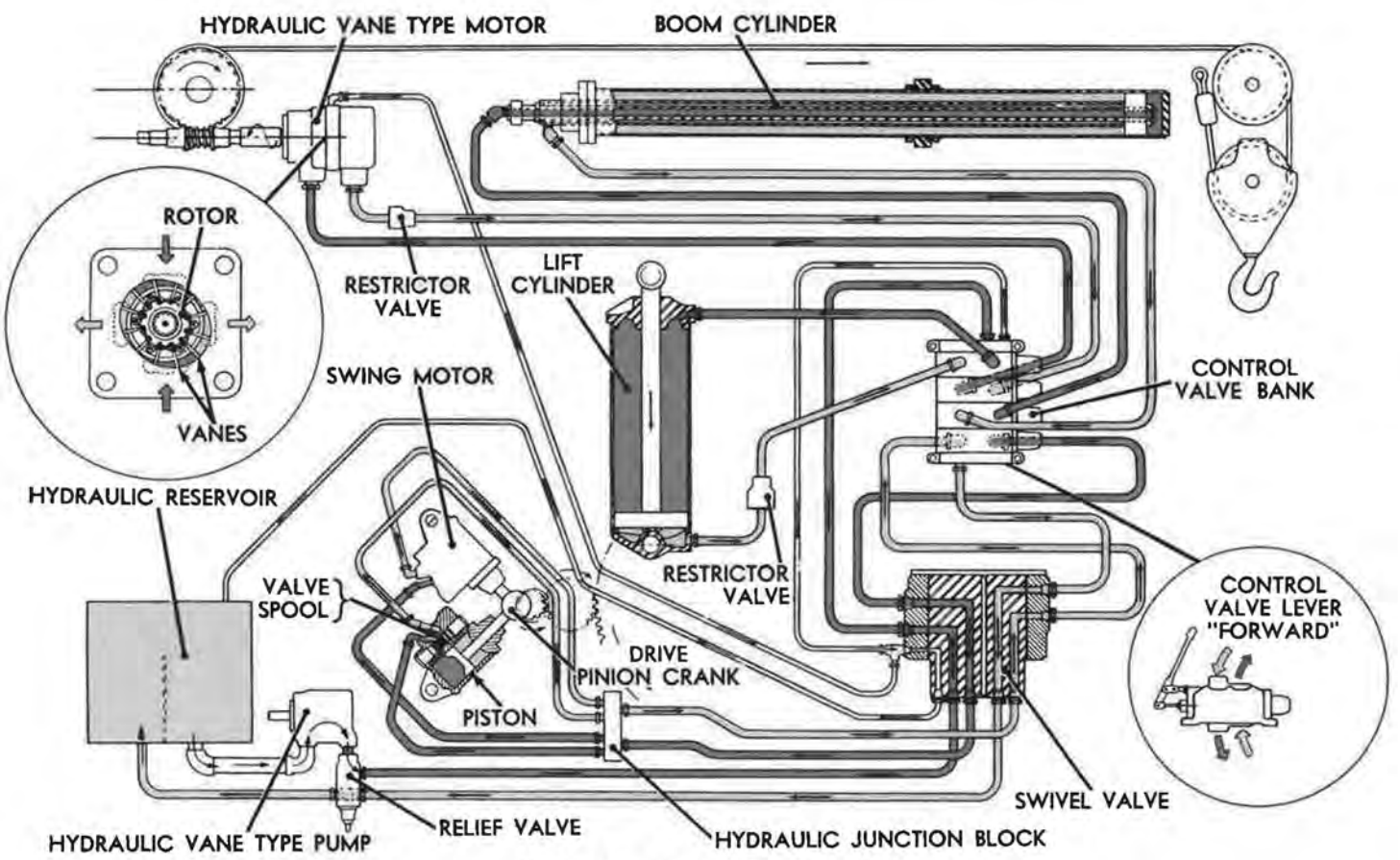
c. Connect hydraulic oil motor return line at motor and two hydraulic motor lines at rear of operator's compartment. Tighten couplings as outlined in TM 9–837.

72. Inspection and Lubrication

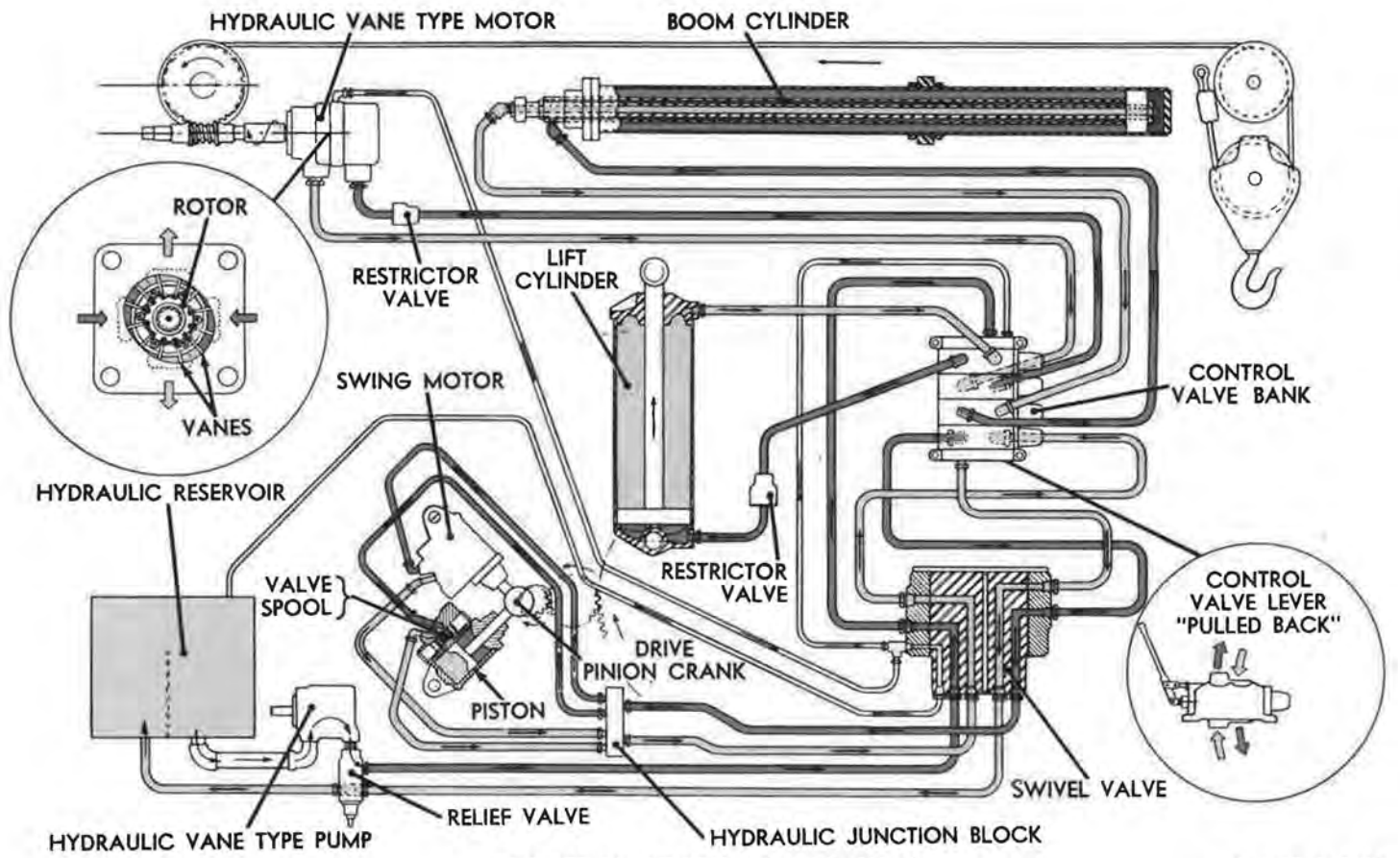
Perform a technical inspection as prescribed in AR 700–105, using DA Form 461, and as outlined in TM 9–837 for the 6,000 mile or 6 months organizational maintenance service. Fill the hydraulic reservoir and lubricate the wrecker crane as shown in TM 9–837.



CONTROL LEVERS NEUTRAL



CONTROL LEVERS FORWARD



CONTROL LEVERS PULLED BACK

RA PD 203497

LEGEND

PRESSURE LINE	BY-PASS LINE
RETURN LINE	STATIC OIL

Figure 7. Hydraulic system flow diagram (see color guide attached)

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CHAPTER 5

WRECKER CRANE

Section I. DESCRIPTION AND DATA

73. Description and Operation

a. General. The wrecker crane consists of that part of the wrecker unit which is mounted above the truck chassis with the exception of the rear mounted winch. The various functions of the wrecker crane are dependent on all of the hydraulic and mechanical units which are built into the crane. A flow diagram showing what happens at each function of the crane, when the control valve levers are in their different positions is shown in figure 7. The power for the wrecker crane is supplied by truck power plant to the hydraulic vane-type pump. This pump forces fluid under pressure through the swivel valve to each of the units. The control of the various functions is in the control valve bank. From here the fluid is directed under high pressure to operate any of the following: the lift cylinder for raising or lowering the boom, the boom cylinder for extending or retracting the boom, the swing motor for revolving the crane, and the hydraulic vane-type motor for winding or unwinding the hoist. A special cone-type worm and drive gear transmits the power for turning the hoist drum.

b. Control Valve Bank Assembly (fig. 7). The control of the pressure, which actuates the four hydraulic functions of the wrecker crane, is grouped into the control valve bank assembly (fig. 21). This bank of four separate valves is bolted together to form a single unit. Each valve controls one of the various functions according to the operators selection. Although the valves are not interchangeable each valve is alike in construction and operation. Inside of each control valve is a control valve spool which slides back and forth and is operated by a control valve lever. Each valve lever has three positions—"forward", "neutral", and "pulled back". When the four valve levers are in their neutral position, all of the oil pressure in the hydraulic system passes through the complete valve bank and returns to the reservoir. If one valve lever is moved to its "forward" position, fluid pressure is directed through that one control valve and on through a line to the unit which the valve controls. This pressure causes the unit to function. The circuit of oil pressure is completed through another line from the con-

trolled unit back to the control valve. When the valve lever is moved to the "pulled back" position, the pressure through the lines to the controlled unit is reversed and the action of the unit is reversed. Each valve operates in the same manner and any two valves may be operated simultaneously.

c. Swivel Valve. The swivel valve (figs. 7 and 11) is a cylindrical shaped unit composed principally of the swivel valve body and an inner hub. The inner hub extends downward from the valve body and is secured to the pivot post support cap by two swivel valve hub locking plates. This locks the inner hub in place and when turning of the pivot post occurs, the valve body will revolve around the inner hub. Both valve body and inner hub are provided with threaded openings to which hydraulic lines are connected. The threaded openings on the valve body are spaced so that they lead to individual channels around the inside circumference of the valve body. Each threaded opening in the inner hub extends into the interior of the hub to a slotted port. With the unit assembled these ports match with their corresponding channel in the body and provide a continuous passage for the hydraulic oil at all times. A threaded connection is also provided on the valve body for the return of any oil bypass between the inner hub and the valve body. This oil is returned to the hydraulic reservoir.

d. Swing Motor (fig. 7). The swing motor (fig. 15) is of the piston and cylinder type. It is composed of two cylinder assemblies, each consisting of two internal moving parts, the piston and control valve spool. Each cylinder of the swing motor is mounted to the base plate by a clevis type pivot. Piston rods are interlocked and are installed on a drive pinion crank. When pressure is applied, the hydraulic oil enters the valve chambers of both cylinder assemblies. The control valve levers on the swing motor operate by a cam type action with rollers that are mounted to the base plate. These levers, coupled with the valve actuating levers give movement to the control valve spools. Inlet and outlet channels from the valve chamber open into the cylinders on both sides of the piston. This provides for pressure on one or the other side of each piston at all times. Cylinder assemblies are timed so that when pressure is applied it extends one piston and rod and simultaneously retracts the other. Pressure enters the valve chamber of the right cylinder and forces piston and rod to an extended position. At this same time, the control valve lever on the left cylinder has moved its control valve spool so that hydraulic oil pressure is retracting the left piston and rod. This movement rotates drive pinion crank 180°. When the left piston and rod is completely retracted and the right piston and rod is completely extended, each control valve lever again moves, by cam action, its control valve spool rerouting the pressure of the hydraulic oil to the opposite side of each

piston. This rerouted pressure will extend left piston and rod and retract right piston and rod, again rotating drive pinion crank 180°. This action completes one cycle and will continue to turn the drive pinion crank as long as pressure is applied. To reverse the rotation of the drive pinion crank it is only necessary to reverse the flow of pressure through the main pressure lines. This is accomplished by the operator's selection of the appropriate lever in the control valve bank.

e. Hydraulic Vane-Type Pump. The source of pressure for the hydraulic system is the hydraulic vane-type pump (figs. 7 and 30). Oil from the reservoir flows to the pump, and rotation of the slotted rotor, which is driven by the truck engine, forces the oil by vane action into the hydraulic system. The pump delivers oil at the 1,200 psi pressure required for operating the various units. A vane in each slot of the rotor slides radially as the rotor revolves. Centrifugal force and fluid pressure force the vanes outward causing them to follow the inside cam contour of the pump ring. The pump ring is shaped so that two opposing pumping chambers are formed between the pump body and the pressure plate. In brief, the flow of oil is received through the inlet connection in the pump body, passes around the engine powered rotor, continues through ports in the pressure plate, and finally leaves at high pressure through the outlet connection in the cover.

f. Hydraulic Vane-Type Motor (fig. 7). The hydraulic vane-type motor (fig. 26) is constructed to permit rotation of the drive shaft in either direction at the selection of the operator. The drive shaft is driven by a rotor which is rotated by oil pressure directed behind the vanes. The direction of rotation is dependent on the direction of the flow of oil through the motor. The oil is circulated through the unit from the two external ports which are connected to the manually controlled valve in the valve bank assembly that controls the direction of the flow of oil through the unit. Rotation of the rotor in either direction is accomplished by hydraulic pressure passing from two internal inlet ports into two diametrically opposite areas behind the vanes of the rotor. This pressure turns the rotor approximately 90° before the oil is discharged from the areas through two diametrically opposite outlet ports on the opposite side of the rotor and returns to the hydraulic system through the external port. The vanes of the rotor are held in contact with the cam ring by preloaded rocking beams (one beam on each side of rotor for each pair of vanes at 90° to each other). The unit is provided with two shuttle valves to introduce fluid pressure from whichever port is the inlet to the space behind the pressure plate to maintain proper axial running clearances.

74. Data

a. Control Valve Bank.

Manufacturer	Austin Western
Manufacturer's number	AWR–HCU310B
Ordnance number	8330173

b. Swivel Valve.

Manufacturer	Austin Western
Manufacturer's number	AWR–HCU242
Ordnance number	7409923

c. Lift Cylinder.

Manufacturer	Austin Western
Manufacturer's number	AWR–HCU349
Ordnance number	*

d. Boom Cylinder.

Manufacturer	Austin Western
Manufacturer's number	AWR–HCU350
Ordnance number	*

e. Swing Motor.

Manufacturer	Austin Western
Manufacturer's number	AWR–HCU244
Ordnance number	7409871

f. Hydraulic Vane-Type Pump.

Manufacturer	Vickers Incorporated
Manufacturer's number	VKR–V–430–36–10–11
Ordnance number	7409847
Type	Vane type constant delivery
Capacity	40 GPM

g. Hydraulic Vane-Type Motor.

Manufacturer	Vickers Incorporated
Manufacturer's number	VKR–M2–540–150–6FC–11
Ordnance number	7409635
Type	Balanced vane type

h. Worm and Drive Gear Set.

Manufacturer	Austin Western
Manufacturer's number	AWR–HCF1496
Ordnance number	7409659
Ratio	50 to 1

*Numbers to be furnished when available.

Section II. DISASSEMBLY OF WRECKER CRANE INTO SUBASSEMBLIES

75. General

Because the various units of the wrecker crane and power train are so closely related and interconnected, it is not practical to remove the wrecker crane as a single unit. For this reason the disassembly and

subsequent assembly recommended for the wrecker crane, follows closely the procedures used for the original assembly.

76. Major Assemblies

The disassembly of the wrecker crane into subassemblies is covered in paragraphs 49 through 72. The major subassemblies of the wrecker crane consist of the lift cylinder, swivel valve, swing motor, control valve bank, hydraulic vane-type motor, hydraulic vane-type pump, hoist drum and worm and drive gear set, pivot post and base plate, shipper and boom, wrecker body with outriggers, and miscellaneous units. For complete and detailed instructions on removal and installation of the major components, refer to TM 9–837.

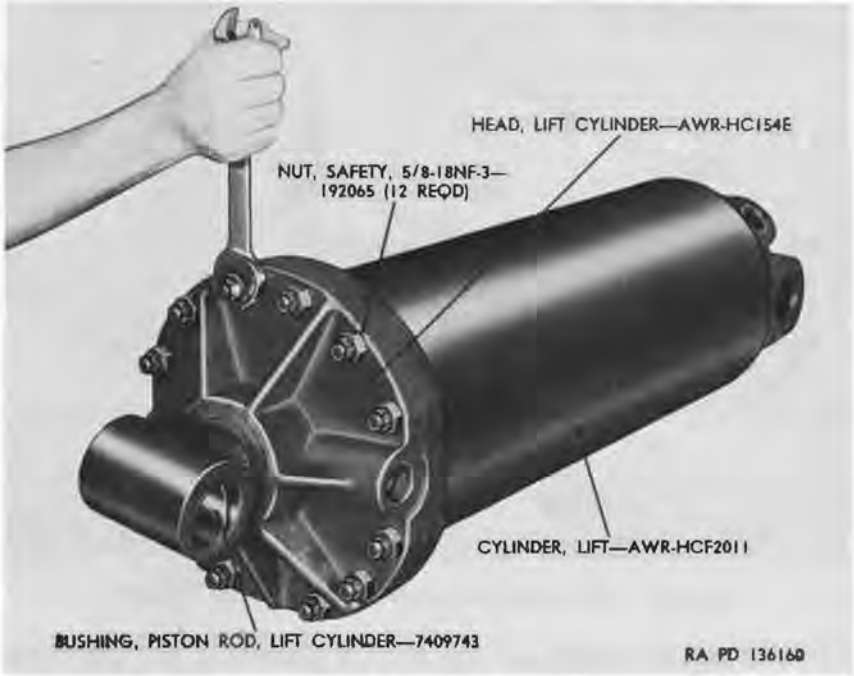

Figure 8. Lift cylinder assembly.

Section III. REBUILD OF LIFT CYLINDER ASSEMBLY

77. Disassembly (Depot Maintenance)

(fig. 10)

a. General. It will not be necessary to disassemble the lift cylinder assembly (fig. 8) unless it is known to be defective. If disassembly is necessary, extreme care must be exercised to avoid damage to the highly polished surfaces of the cylinder assembly. Do not remove oil seal or bushings unless inspection (par. 78) reveals that replacement is necessary.

b. Remove Lift Cylinder Piston and Rod.

(1) Remove 12 safety nuts (D) and remove lift cylinder head (E) with piston and rod from lift cylinder (Q).

(2) Insert screwdriver or similar tapered tool under piston outer O ring gasket (L) and remove gasket from lift cylinder piston (fig. 9).

Note. Care must be exercised to avoid damage to O ring gasket and piston during this removal operation.

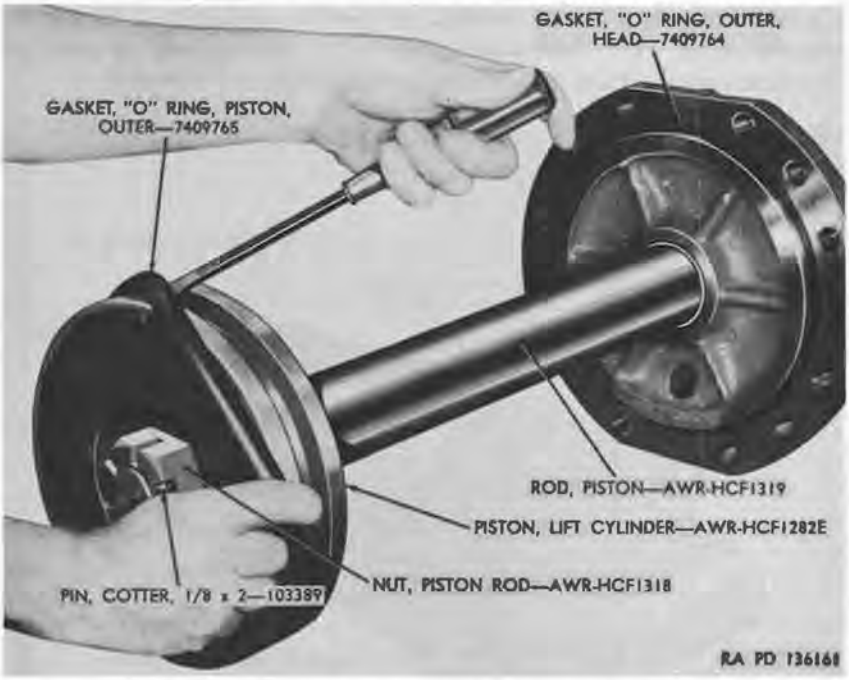

Figure 9. Removing O ring gasket from lift cylinder piston.

(3) Remove cotter pin (fig. 9) and piston rod nut (M) from stub end of piston rod (V). Slide lift cylinder piston (K) from rod.

(4) Use a small screwdriver or similar tapered tool and remove piston inner O ring gasket (J) from the inner diameter of piston.

(5) To remove lift cylinder piston rod bushings (A), use suitable adapter and press out both bushings.

c. Disassemble Lift Cylinder Head.

(1) Remove head outer O ring gasket (H) from lift cylinder head (E).

(2) Using a small screwdriver, remove O ring type packing (C) from inner diameter of lift cylinder head.

(3) To remove lift cylinder head seal (B), use a pinch bar and pry out seal.

Note. This seal will be damaged during removal. Make sure replacement seal is available before removing.

(4) A split-type bushing is used for the inner diameter of the lift cylinder head. Use a small chisel to collapse bushing and remove with a pair of vise grip pliers.

Note. Before removing bushing, be certain replacement bushing is available.

d. Cleaning. Clean all parts in volatile mineral spirits or dry cleaning solvent. Blow dry with compressed air. Apply a coat of light engine oil to the highly polished surfaces to prevent rust.

78. Inspection and Repair (Depot Maintenance)

a. O Ring Gaskets. Inspect O ring gaskets for cuts, scratches, or indications of wear. Replace damaged gaskets.

b. Bushings. Inspect bushings for excessive wear. Replace bushings if worn.

c. Piston and Rod. Inspect piston and rod for scratches, nicks, or burs. Remove scratches with a soapstone or fine mill file. Replace if scratches are still evident or damaged beyond repair.

d. Cylinder and Cylinder Head. Inspect cylinder for scratches and nicks. Remove with a soapstone or fine mill file. If scratches and nicks are still evident, replace. Inspect cylinder head for cracked or broken condition. Replace as inspection warrants.

e. Oil Seal. The metal cased oil seal normally is a long life part. Inspect the thin, feathered edge which contacts piston rod to make sure it is intact. Replace seal if defects are found.

79. Assembly (Depot Maintenance)

(fig. 10)

a. Assemble Lift Cylinder Head.

(1) Position lift cylinder head (E) in press with machined surface side up and press head bushing (U) into head.

(2) Turn lift cylinder head over and position head seal (B). Use a suitable adapter and press seal into head.

(3) Install O ring type packing (C) into lift cylinder head. Install head outer O ring gasket (H) on outer diameter of lift cylinder head.

b. Install Lift Cylinder Piston and Rod.

(1) Position piston rod (V) in press and press piston rod bushings (A) in to piston rod, one from each side.

(2) Install piston inner O ring gasket (J) into inner diameter of lift cylinder piston (K).

(3) Slide lift cylinder head (E) onto piston rod (V) so that machined surface side of head is toward piston end of rod.

(4) Slide lift cylinder piston (K) on end of piston rod (V) and install piston rod nut (M). Insert new 1/8 x 2 cotter pin (N) to secure nut.

(5) Install piston outer O ring gasket (L) on outer diameter of lift cylinder piston (K).

(6) Apply a cost of light oil to wall of lift cylinder (Q) and to piston outer O ring gasket (L). Insert lift cylinder piston with piston rod in cylinder and aline holes in lift cylinder

Figure 10. Lift cylinder—exploded view.

head (E) with studs (P) in cylinder. Install twelve 5/8-18NF-3 safety nuts (D) and tighten according to torque specifications (par. 146).

Section IV. REBUILD OF SWIVEL VALVE

80. Disassembly (Depot Maintenance)

(fig. 14)

a. General. Although the swivel valve (fig. 11) is one of the most essential units furnished with the wrecker crane, it is one of the most

simple units in construction. Self-lubricated by the oil which it helps to deliver, this unit will require very little servicing. If grit or dirt is kept from entering the hydraulic system, the swivel valve will last the life of the crane. For this reason, when disassembling the unit, take special care to prevent the entrance of dirt or foreign matter and to protect the finished surfaces from any nicks or burs.

Warning: When disassembling the swivel valve, handle parts carefully to avoid possible personal harm. The accidental sliding of the sharply machined edges together might easily cause a painful injury.

b. Procedure.

(1) Remove two cap screws and lockwashers and lift off collector cap (fig. 12) and collector cap gasket (Z). The collector cap (C) enables electric current to pass through the swivel

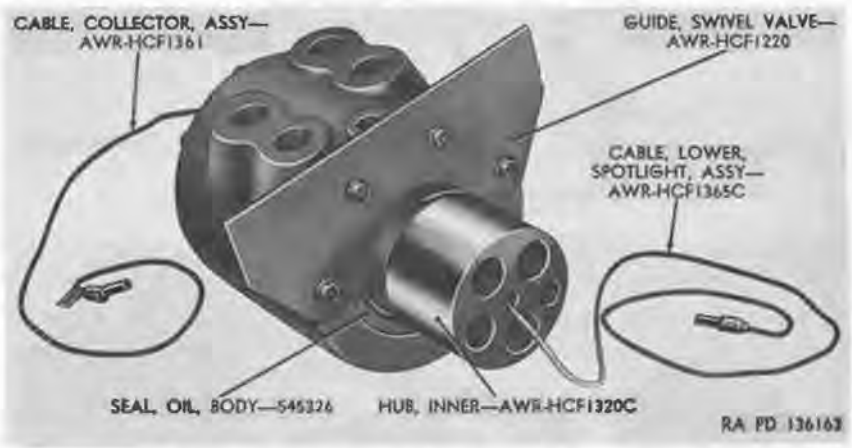

Figure 11. Swivel valve with cable assembly.

valve to the spotlight mounted on crane. When cap is removed, it will then be possible to remove spotlight lower cable assembly (fig. 11) by threading up through the inner hub (L) of the swivel valve. If collector cap is defective, remove collector cable assembly (fig. 11).

(2) Remove eight hex head cap screws with washer (F) and lift off swivel valve cap (fig. 13) and gasket (K). Also remove four hex head cap screws or washer (Q) and swivel valve guide (fig. 11) from base of swivel valve. With these parts removed, the inner hub (fig. 13) may be removed. The inner hub (L) must be removed from the top of the swivel valve, since the openings in the inner hub will cut against the body oil seal (fig. 11) in the base of the swivel valve body (N) if the hub is removed from the bottom.

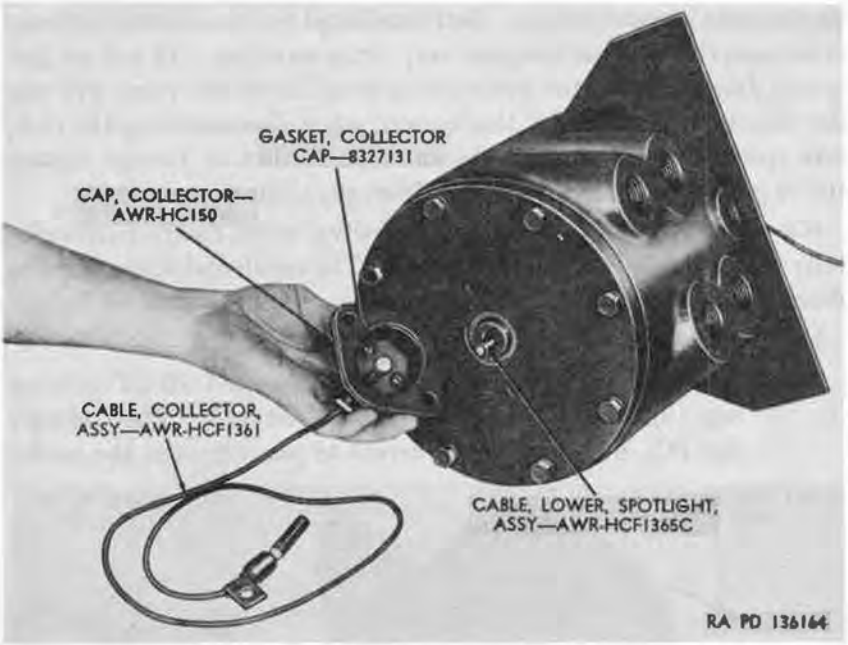

Figure 12. Removing collector cap from swivel valve.

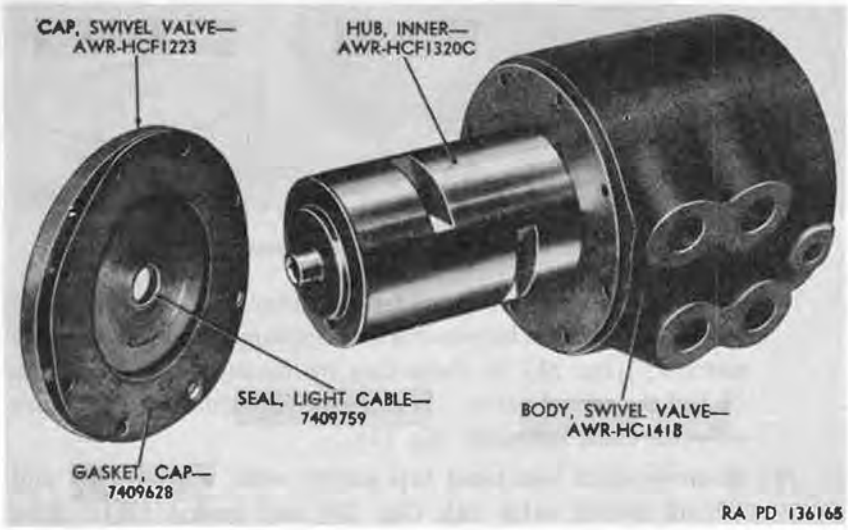

Figure 13. Cap and inner hub removed from swivel valve body.

81. Cleaning, Inspection, and Repair (Depot Maintenance)

a. Cleaning. Normally the various parts of the swivel valve will require little cleaning since they are continually bathed in oil. If cleaning is required, these parts may be cleaned by immersing them in clean dry-cleaning solvent or volatile mineral spirits. These are

precision parts and extra care must be practiced in handling. Metal to metal contact must be avoided and every precaution possible taken to protect the machined surfaces. If parts are not to be assembled immediately, apply a thin coat of oil and protect from dust and dirt.

b. Inspection and Repair. When inspecting these parts look particularly for nicks or burs on the finely machined surfaces of the swivel valve body and the inner hub. If these defects are not serious a soap stone or fine mill file may be used to remove them. Parts having deep nicks or burs must be replaced. For checking wear between swivel valve body and inner hub, refer to repair and rebuild standards (par. 145*a*). Inspect the screw threads in both the swivel valve body and the base of the inner hub for cross threading. If threads cannot be repaired, the parts must be replaced. Inspect the oil seal thoroughly and if frayed or worn, replace. Make sure swivel valve cap is not

Figure 14. Swivel valve assembly—exploded view.

cracked or damaged in any way. Check the electrical cable and replace if frayed or worn. Electrical connections in connector cap must be clean and bright.

Note. The swivel valve body and inner hub are matched parts. If either part must be replaced, the matching part must also be replaced.

82. Assembly (Depot Maintenance)

(fig. 14)

The assembly of the swivel valve must be accomplished with the same attention and care to protecting the various parts as was pointed out in the disassembly procedure. Keep hands and clothes free of dirt or grit while assembling and give strict attention to person safety. Place swivel valve body (N), top down on a bench, and if body oil seal (R) has been removed (par. 80), install new body oil seal. Insert inner hub (L), large end first, into swivel valve body. Place swivel valve guide (P) into groove provided around inner hub and secure guide to swivel valve body with four 3/8–16NC–2 x 3/4 hex-head cap screws with washer (Q). Turn assembly unit over and place swivel valve cap gasket (K) and swivel cap on top of swivel valve body. Secure with eight 3/8–16NC–2 x 1 1/8 hex-head cap screws with washer (F). Tighten to torque specifications (par. 146). Insert spring cup (U), light cable spring (V), and light cable seal (W) into center of swivel valve cap (H). Thread spotlight lower cable assembly (J) down through these installed parts so that contact end will rest against light cable spring (V). Install male connector shell (T), terminal connector bushing (M), and terminal connector grommet (S) to opposite end of spotlight lower wire with terminal assembly. If collector cap (C) has been disassembled, insert collector cable assembly (AA) through collector cap opening and secure to collector cap insulator (E) with collector contact screw (X), 1/4-inch internal-teeth lockwasher (Y), and 1/4–20NC–3 collector contact nut (D). Secure insulator to collector cap with two No. 10–24NC–2 x 1/2 screws (G). Place collector cap gasket (Z) and collector cap assembly in position on swivel valve cap and secure with two 5/16–18NC–2 x 3/4 hex-head cap screws (B).

Section V. REBUILD OF SWING MOTOR

83. Separating Cylinder Assemblies of Swing Motor (Depot Maintenance)

a. General. The cylinder assemblies of the swing motor (fig. 15) are removed from the base plate as one assembly. Separation procedure of the cylinder assemblies is described in (*b*) below. Disassembly procedures for both cylinder assemblies are identical; however, only the right cylinder disassembly is illustrated.

b. Separation of Cylinder Assemblies. Position piston rod ends of cylinder assemblies in press. Support cylinder assemblies with rod ends in line with ram on press. Use suitable adapter and press sleeve and bushing (fig. 15) from yoke end of piston rod.

Warning: The shape and weight of each cylinder assembly makes it difficult to handle. Extreme care must be exercised when separating cylinder assemblies to avoid serious injury to personnel. Use suitable adapter and press bushing from sleeve.

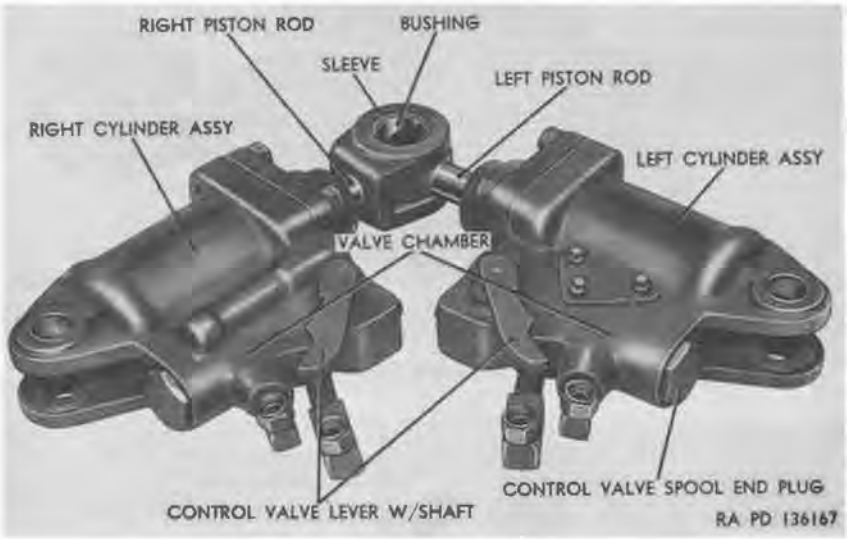

Figure 15. Swing motor—bottom view.

84. Disassembly of Right Cylinder Assembly (Depot Maintenance)

a. Valve Assembly (fig. 20).

(1) Remove control valve spool end plug (S), gasket (R), and control valve spool spring (Q) from right cylinder body (M). Remove control valve spool (fig. 16) from valve chamber in right cylinder body.

(2) Remove actuating lever adjusting screw end plug (fig. 17), gasket (GG), and pipe plug (HH) from valve chamber in right cylinder body.

(3) Use a thin wall socket wrench and remove cap screw (NN) and lockwasher (MM) from valve actuating lever (KK).

(4) Before removal of right control valve lever with shaft (LL), shaft must be marked with right cylinder body (M) to facilitate alining serrations for proper reassembly of shaft to valve actuating lever (KK). Position valve actuating lever in a vertical position and mark shaft with body. Tap shaft with

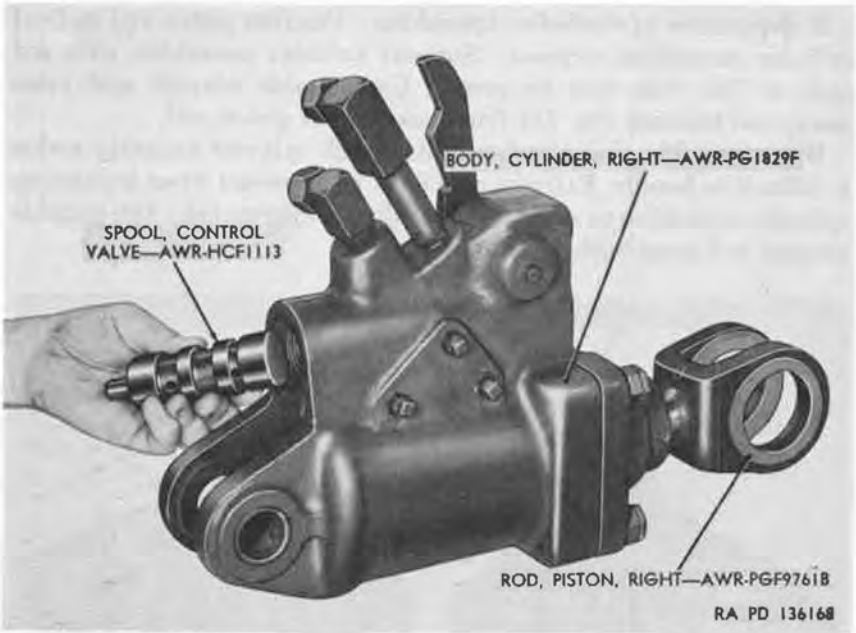

Figure 16. Removing control valve spool.

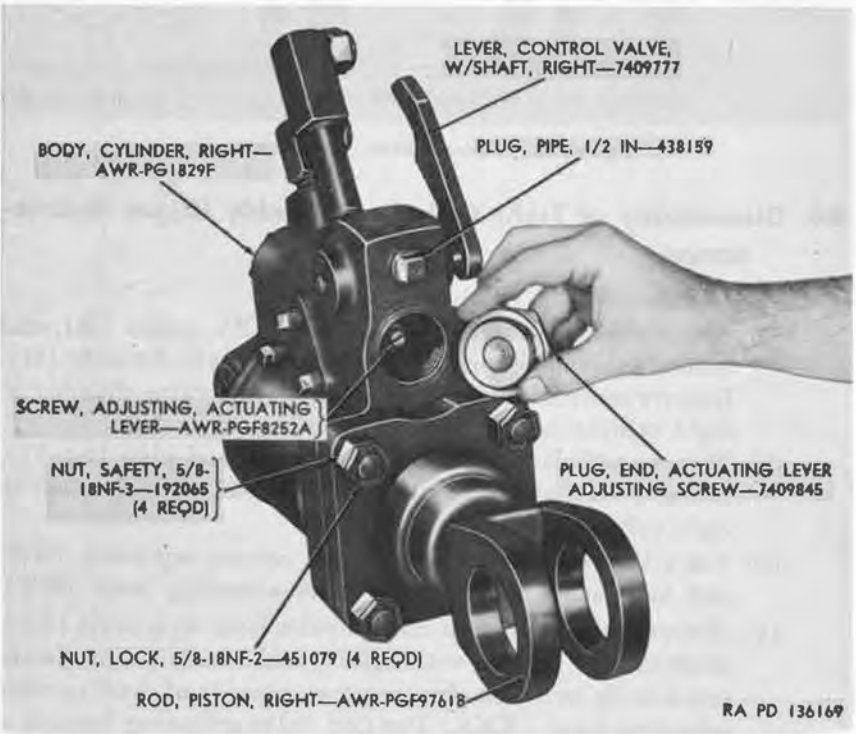

Figure 17. Removing actuating lever adjusting screw end plug.

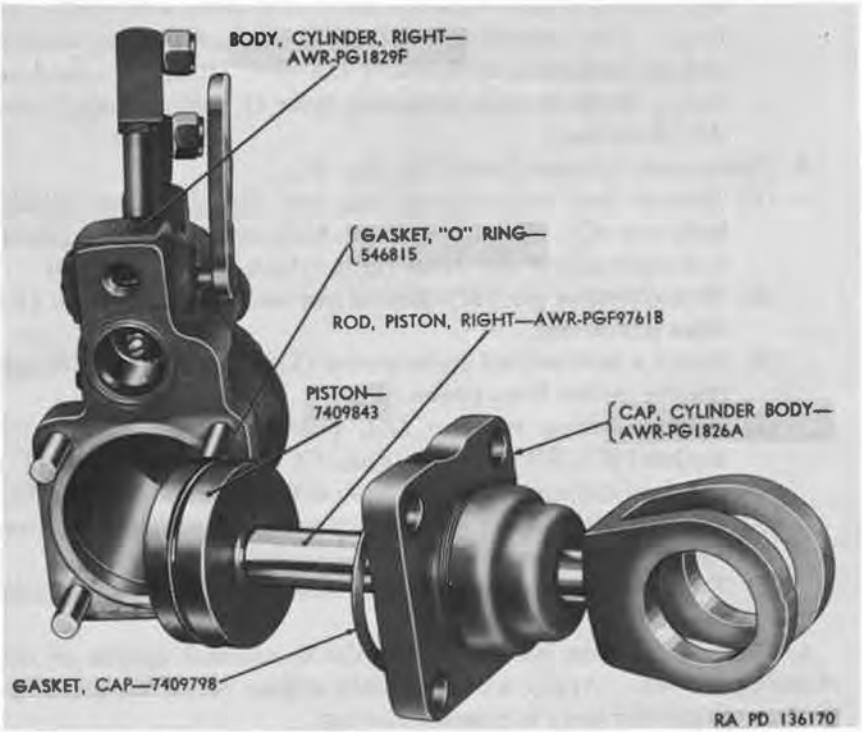

Figure 18. Piston and rod removed from right cylinder body.

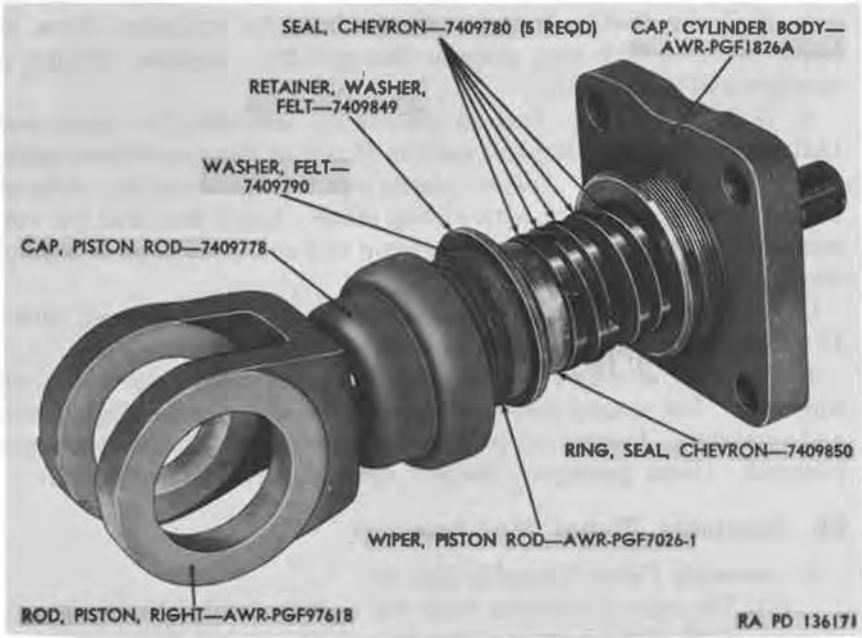

Figure 19. Piston rod and cylinder body cap assembly.

a soft hammer and remove control valve lever with shaft from body. This operation will permit valve actuating lever to rest at the bottom of the valve chamber. Remove lever from body. Remove valve actuating lever O ring gaskets (J and JJ) from body.

b. Piston and Cylinder Body Cap (fig. 20).

(1) Remove four lock nuts and hex nuts (fig. 17) from cylinder body cap (C). Remove cylinder body cap, cap gasket, piston, and right piston rod from right cylinder body (fig. 18).

(2) Remove cotter pin (H), slotted hex nut (G), and piston (F), from piston rod.

(3) Insert a tapered tool under piston O ring gasket (fig. 18) and remove gasket from piston (F).

(4) Remove piston rod cap (Z), piston rod wiper (X), felt washer (W), felt washer retainer (V), chevron seal ring (U), and five chevron seals (T) from cylinder body cap (fig. 19).

(5) Use suitable adapter and press pivot pin bushings (N) from right cylinder body (M).

(6) Follow same procedure for disassembling left cylinder assembly.

c. Cleaning. Clean all parts in volatile mineral spirits or dry cleaning solvent. Apply a coat of light engine oil to the machined surface of cylinder body to prevent rusting.

85. Inspection and Repair (Depot Maintenance)

a. Cylinder Body. Inspect cylinder bore for scratches, nicks, or burs. Remove with soap stone or fine mill file. Replace cylinder if damage is beyond repair.

b. O Ring Gaskets. Inspect gaskets for scratches, flat spots, and indications of wear. Replace gaskets if any of these conditions exist.

c. Piston and Rod. Inspect piston and rod for scratches, nicks or burs. Remove scratches with a soap stone. Use a fine mill file and remove nicks and burs. Replace piston and rod if damage is beyond repair.

d. Chevron Seals. Inspect chevron seals for scratches and nicks. If either of these conditions are found, replace seals.

e. Control Valve Spool. Inspect control valve spool for nicks and scratches. Use a soap stone or fine mill file and remove slight nicks and scratches. Inspect oil passages in spool to see that they are not plugged. Clean passages. Inspect spool for evidence of wear.

86. Assembly (Depot Maintenance)

a. Assemble Valve Assembly (fig. 20).

(1) The bore in cylinder body for right control valve lever with shaft (LL) is recessed for installation of two O ring gaskets.

Install valve actuating lever O ring gasket (JJ) on lever side of right cylinder body (M) and valve actuating lever O ring gasket (J) in recess on opposite side of cylinder body.

(2) Position valve actuating lever (KK) in position in valve chamber of right cylinder body (M). Insert shaft of right control valve lever with shaft (LL) in cylinder body and aline alining mark (par. 84*a* (4)) on shaft of right control valve lever with alining mark on cylinder body. Press right control valve lever with shaft (LL) into cylinder body. Install ¼–28NF–3 cap screw (NN) and ¼-inch lockwasher (MM) on valve actuating lever (KK) to secure lever to shaft. Install ⅜–24NF–2 actuating lever adjusting screw jam nut (QQ) on ⅜–24NF–2 x 1 actuating lever adjusting screw (PP) and install on actuating lever. Install actuating lever adjusting screw end plug (FF), gasket (GG), and ½-inch pipe plug (HH) in cylinder body.

(3) Install control valve spool (P) in valve chamber of right cylinder body (M). Insert control valve spool spring (Q) in cylinder body and secure with control valve spool end plug gasket (R) and end plug (S).

b. Install Piston and Rod Assembly.

(1) Position piston rod wiper spring (Y) on piston rod wiper (X). Install piston rod cap (Z), piston rod wiper (X), felt washer (W), felt washer retainer (V), chevron seal ring (U), five chevron seals (T) and cylinder body cap (C) on right piston rod (AA). Install piston rod cap on cylinder body cap.

(2) Position piston (F) on right piston rod (AA) and install 1–14NF–2 slotted hex nut (G). Insert new 1¾ x ⅛ cotter pin (H) in end of rod to secure nut.

(3) Install piston O ring gasket (E) on outer diameter of piston (F).

(4) Install four ⅝–11NC–5 (¾) x ⅝–18NF–3 (1) x 2 9/16 studs (K) in right cylinder body (M). Position cap gasket (D) in cylinder body. Apply a coat of light engine oil to the outer surface of piston (F) and piston O ring gasket (E). Insert piston in cylinder body and install four ⅝–18NF–3 hex nuts (B) and ⅝–18NF–2 lock nuts (A) to secure cylinder body cap (C) to cylinder body.

(5) Use suitable adapter and press pivot pin bushings (N) into right cylinder body (M).

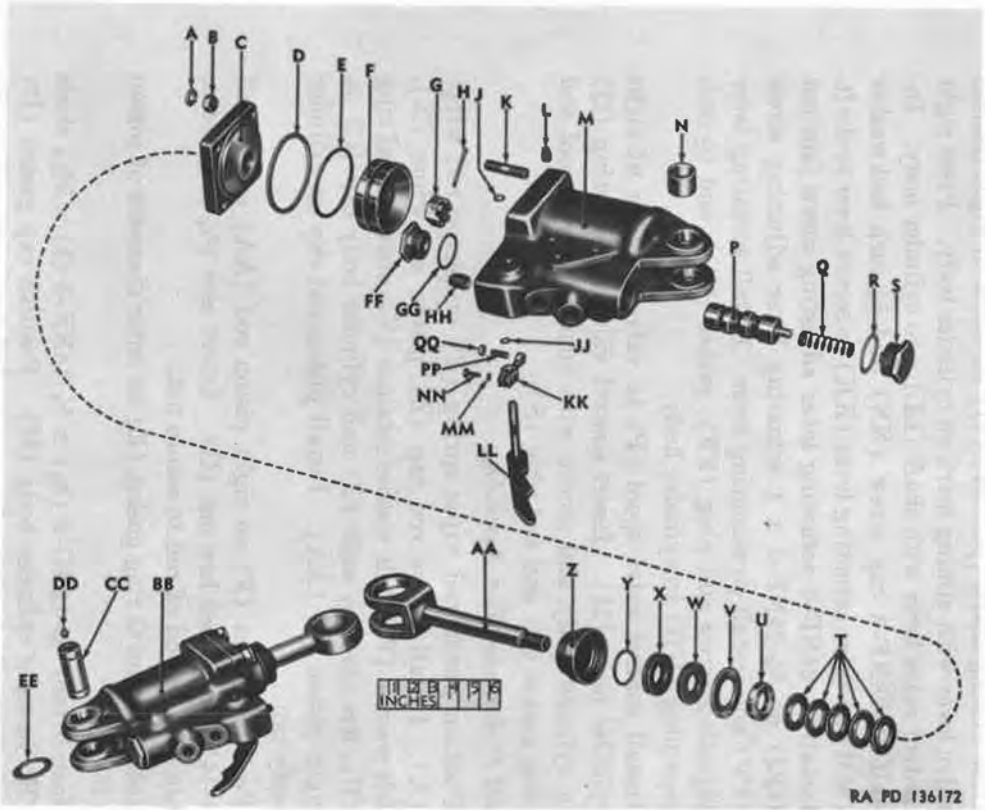

Figure 20. Swing motor—right cylinder assembly exploded.

A—Nut, lock, 5/8–18NF–2—451079 (4 req D)
B—Nut, safety, 5/8–18NF–3—192065 (4 req D)
C—Cap, cylinder body—AWR–PG1826A
D—Gasket, cap—7409798
E—Gasket, O ring, piston—546815
F—Piston—7409843
G—Nut, hex, slotted, 1–14NF–2—125411
H—Pin, cotter, 1¾ x ⅛—103388
J—Gasket, O ring, valve actuating lever, 5/8 in.—501221
K—Stud, cylinder, 5/8–11NC–5 (¾) x 5/8–18NF–3 (1) x 2 9/16—AWR–PGF9769B
L—Plug, pipe, ¼ in.—444574
M—Body, cylinder, right—AWR–PG1829F
N—Bushing, pivot pin—7409746
P—Spool, control valve—AWR–HCF1113
Q—Spring, control valve spool—7409651
R—Gasket, plug, end, control valve spool—7409799
S—Plug, end, control valve spool—7409844
T—Seal, chevron—7409780 (5 req D)
U—Ring, chevron seal—7409850
V—Retainer, felt washer—7409849
W—Washer, felt—7409790
X—Wiper, piston rod—AWR–PGF7026–1
Y—Spring, piston rod wiper—AWR–PGF7026–2
Z—Cap, piston rod—7409778
AA—Rod, piston, right—AWR–PGF9761B
BB—Cylinder, assy—AWR–PGU2084
CC—Pin, pivot, mounting, cylinder—7409838
DD—Fitting, lubricating—504208
EE—Shim, mounting, cylinder—AWR–PGF8248
FF—Plug, end, actuating lever adjusting screw—7409845
GG—Gasket, plug, end, actuating lever adjusting screw—7409799
HH—Plug, pipe, ½ in.—438159
JJ—Gasket, O ring, valve actuating lever, 11/16 in.—501460
KK—Lever, valve actuating—7409781
LL—Lever, control valve, w/shaft, right—7409777
MM—Washer, lock, ¼ in.—120380
NN—Screw, cap, ¼–28NF–3—181567
PP—Screw, adjusting, actuating lever, 3/8–24NF–2 x 1—AWR–PGF8252A
QQ—Nut, jam, actuating lever adjusting screw, 3/8–24NF–2—AWR–AW 726003

Figure 20—Continued.

87. Connect Cylinder Assemblies

(fig. 15)

a. Use suitable adapter and press bushing into sleeve.

b. Position pin end of left piston rod in clevis end of right piston rod. Press sleeve with bushing into ends of piston rods to connect cylinder assemblies together.

Section VI. REBUILD OF CONTROL VALVE BANK ASSEMBLY

88. Disassembly (Depot Maintenance)

(fig. 25)

a. General. The control valve bank assembly (fig. 21) has been most carefully assembled and with reasonable care, will require a minimum of servicing. The oil seals in the valve spool end may be replaced if damaged, but these ordinarily will need little attention or replacement. Any accumulation of dirt around the ends of the spool must be removed, however, since this dirt might cut out the seal. In the assembly of the valve bank carefully selected and precompressed gaskets are used. The tie rods used to bolt the separate valves together are set with a special torque wrench setting. An 85 pound-feet torque is used for the two center rods and a 120 pound-feet torque is used for the four end rods. Therefore, unless the same procedures and conditions of original manufacture can be duplicated, the rebuild of this unit should not be attempted. If facilities are available, disassembly is as follows:

(1) *Disassemble control valve bank assembly.* Remove six hex nuts and lockwashers from end of control valve bank assembly and remove control valve bank end cover (fig. 22). Separate valve bank into individual control valves.

(2) *Disassemble individual control valve.*

(*a*) Remove four cap screws (UU) and washers and lift off control valve end cover (TT) and gasket (fig. 23).

(*b*) Compress spring slightly and remove horseshoe-type washer (fig. 23), spacer, spring, and plain washer from rear end of (swing) control valve spool.

(*c*) Remove cotter pins from the two lever retaining pins and take off control valve lever (P) and linkage from front end of control valve. Remove cap screw (H) beneath control valve spool and eye bolt (R) above control valve spool, and take off control valve spool, front cover (F).

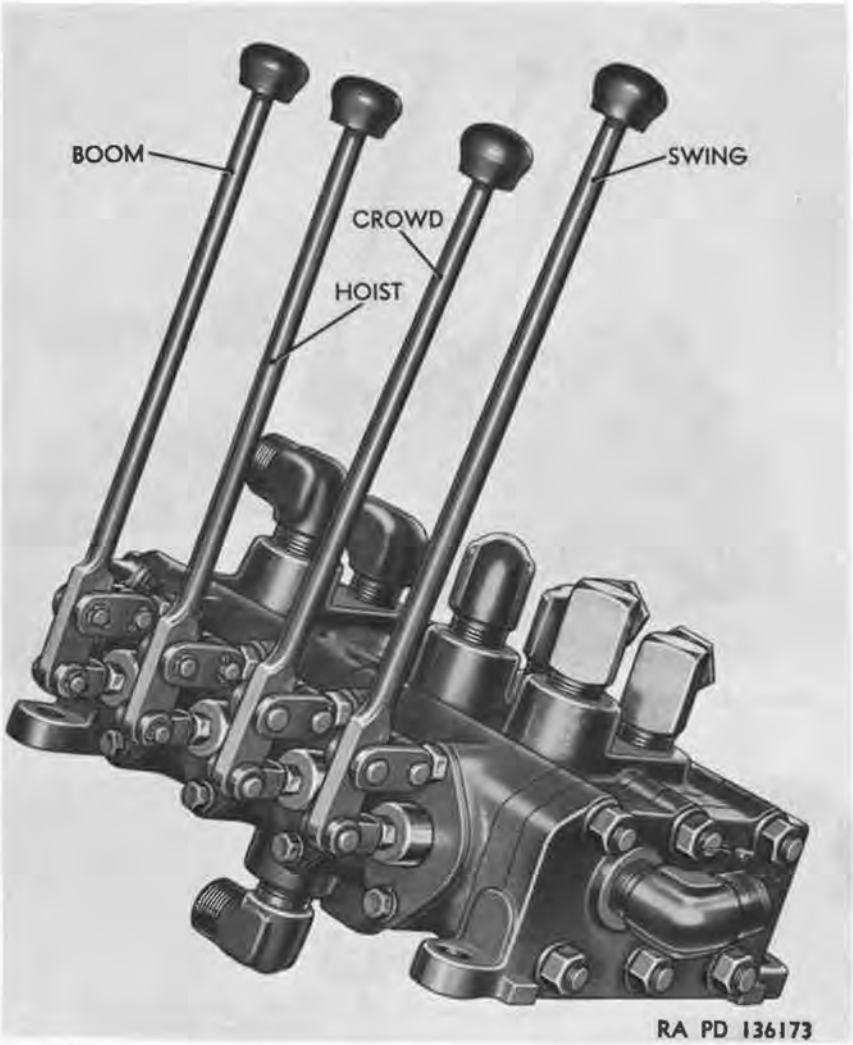

Figure 21. Control valve bank assembly.

(*d*) Slide control valve spool together with adapter ring (Z), chevron ring (AA), and three chevron seals (E), out through front end of control valve body (fig. 24).

(*e*) Remove control valve spool yoke (fig. 24) and locking nut (Y) from end of (swing) control valve spool (D).

(*f*) Disassemble each control valve as described in (*a*) through (*e*) above.

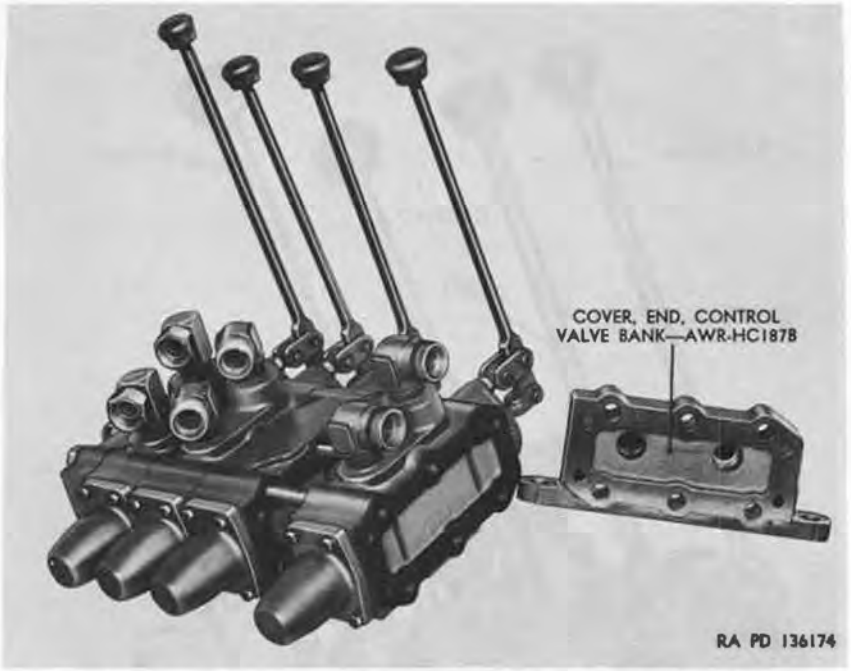

Figure 22. Control valve bank end cover separated from control valve bank assembly.

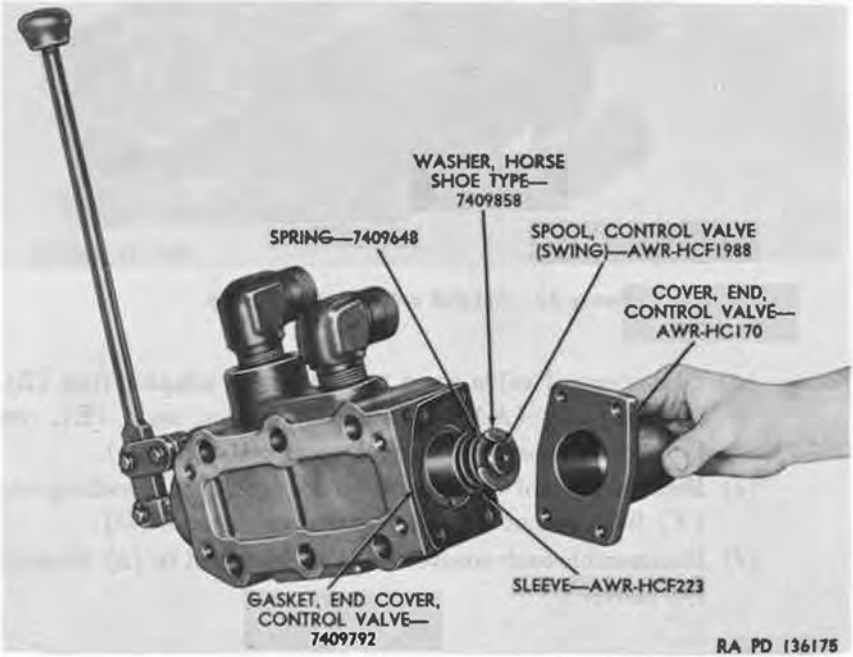

Figure 23. Removing control valve end cover.

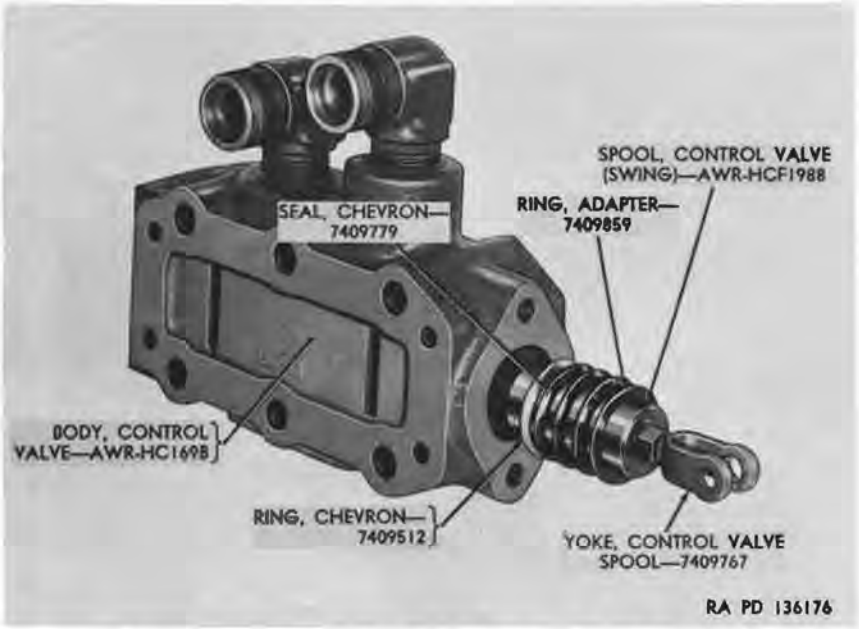

Figure 24. Control valve spool and chevron seals removed.

89. Cleaning, Inspection, and Repair (Depot Maintenance)

a. Cleaning. Like the other parts of the hydraulic system, the control valve bank assembly must be treated with the utmost care. A clearance of 0.0002 to 0.0004-inch exists between the control valve spool and the control valve body. When handling the control valve spool, be sure to prevent scratches, nicks, or burs. Immerse parts in clean dry-cleaning solvent or volatile mineral spirits and wash away any accumulation of dirt. Note particularly the chamber into which the control valve spool slides and be sure all oil passageways are open.

b. Inspection and Repair. Examine the control valve spool closely to be sure there are no scratches, nicks, or burs. Slight defects may be removed with a fine mill file or soapstone, but if spool is of questionable service, it must be replaced. Refer to paragraph 145*b* for repair and rebuild standards. Examine the control valve body for cracks or nicks and burs on machined surfaces. Cracked or damaged control valve body must be replaced.

Note. Control valve spool and control valve body must be replaced in matched sets.

90. Assembly (Depot Maintenance)

(fig. 25)

a. General. Before beginning the assembly of the control valve bank assembly, be sure that all parts are free of any grit which could possibly enter the assembled parts.

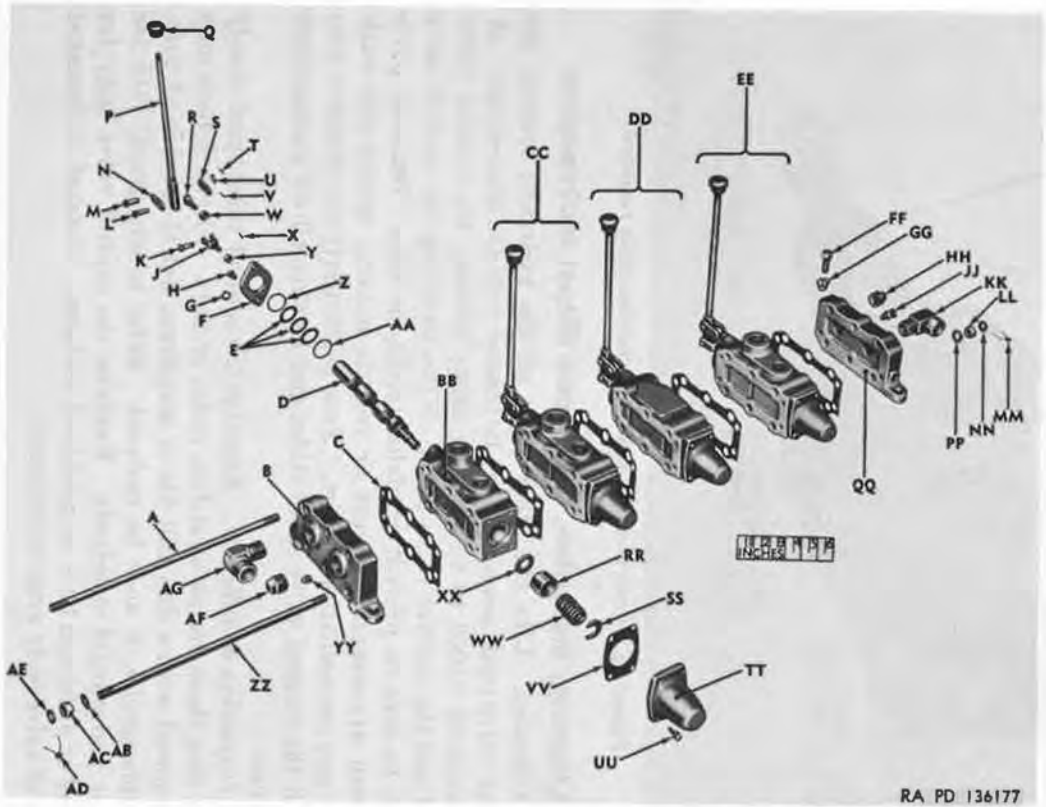

Figure 25. Control valve bank assembly—exploded view.

A—Rod, tie, valve body—AWR-HCF2119 (5 reqd)
B—Cover, end, control valve bank—AWR-HC187B
C—Gasket, control valve body—AWR-HCF211A
D—Spool, control valve (swing)—AWR-HCF1988
E—Seal, chevron—7409779 (3 reqd)
F—Cover, front, control valve spool—AWR-HCF583A
G—Washer, lock, 7/16 std—AWR-AW778012
H—Screw, cap, hex hd, 7/16-14NC-3 x 5/8—122223
J—Yoke, control valve spool—7409767
K—Pin, rod end, 7/16 x 1 15/64—138085
L—Pin, rod end, 7/16 x 1 15/64—138085
M—Pin, rod end, 7/16 x 1 15/64—138085
N—Link, control valve—7409634
P—Lever, control valve—AWR-HCF1990
Q—Ball, control valve lever—7409732
R—Bolt, eye, special—7409740
S—Link, control valve—7409634
T—Pin, cotter, 3/32 x 3/4—121222
U—Washer, plain, 1/2 id, 1 1/4 od—106264
V—Pin, cotter, 3/32 x 3/4—121222
W—Nut, locking, 7/16-14NC-2—7409636
X—Pin, cotter, 3/32 x 3/4—121222
Y—Nut, locking, 7/16-20NF-2—218585
Z—Ring, adapter—7409859
AA—Ring, chevron—7409512
BB—Body, control valve—AWR-HC169B
CC—Valve, control, assy (crowd)—AWR-HCUS9302
DD—Valve, control, assy (hoist)—AWR-HCUS9302
EE—Valve, control, assy (boom)—AWR-HCUS9301
FF—Bolt, 5/8-18NF-3 x 2 1/2—181779
GG—Nut, safety, 5/8-18NF-3—503331
HH—Plug, pipe, 1 in.—444598
JJ—Adapter, bypass line—8327141
KK—Elbow, 90 deg—9409179
LL—Nut, hex, 5/8-18NF-2—426754 (6 reqd)
MM—Seal, wire—AWR-PGF9372
NN—Palnut, 5/8-18NF-2—107826 (5 reqd)
PP—Washer, plain, 21/32 id, 1 13/16 od, 1/8 thk—AWR-HCF375A
QQ—Cover, end, control valve bank—AWR-HC187B
RR—Sleeve—AWR-HCF223
SS—Washer, horse shoe type—7409858
TT—Cover, end, control valve—AWR-HC170
UU—Screw, cap, 5/16-18NC-3 x 7/8—192414 (4 reqd)
VV—Gasket, end cover, control valve—7409792
WW—Spring—7409648
XX—Washer, control valve spring—7409857
YY—Plug, pipe, 1/4 in.—444574
ZZ—Rod, tie, valve body (drilled)—AWRHCF2123
AB—Washer, tie rod—AWR-HCF375A (12 reqd)
AC—Nut, hex, 5/8-18NF-2—426754 (6 reqd)
AD—Seal, wire—AWR-PGF9372
AE—Palnut, 5/8-18NF-2—107826 (5 reqd)
AF—Plug, pipe, 1 in.—444598
AG—Elbow, 90 deg, end cover—8327157

Figure 25—Continued.

b. Assemble Hydraulic Control Valve. Turn control valve spool yoke (J) and 7/16–20NF–2 locking nut (Y) into end of control valve (swing) spool (D). Tighten securely. Insert control valve spool into control valve body (BB) and push through until just enough space is left on spool to arrange three chevron seals (E), adapter ring (Z), and chevron ring (AA), as shown in figure 24. Completely push spool into place in body, install control valve spool front cover (F), and secure with 7/16–14NC–3 x 5/8 hex-head cap screw (H), special eye bolt (R), and one 7/16–14NC–2 locking nut (W). Assemble control valve lever (P) to control valve spool yoke and eye bolt and secure in place with three 7/16 x 1 15/64 rod end pins (K, L, and M), two control valve links (N and S) and three new 3/32 x 3/4 cotter pins (T, V, and X). Place control valve spring washer (XX), sleeve (RR), and spring (WW) on end of control valve spool which extends out the rear end of control valve body. Compress spring sufficiently to secure spool, and associated parts, with horse shoe type washer (SS). Install control valve end cover (TT) and gasket (VV), and secure with four 5/16–18NC–3 x 7/8 cap screws (UU). Tighten to torque specifications (par. 146*a*). Each of the four control valves are assembled in like manner. Control valve bodies and spools, are not interchangeable and must be kept in the same position in the valve bank for the function they are to control. Be sure to note the function of whichever control valve must be replaced and order these parts accordingly.

c. Assemble Control Valve Bank Assembly (fig. 25). The assembling of the control valve bank assembly will likewise require special attention so as to position control valves in the same position in the valve bank from which they were removed. When these units were originally assembled, pre-compressed gaskets were used and to accomplish this in the field the following steps must be taken. Place control valve body gasket (C) between each control valve and the control valve bank end covers (B and QQ). Insert the five valve body tie rods (A) and one drilled valve body tie rod (ZZ) through the complete assembly and secure tie rods at each end with twelve tie rod washers (AB) and 5/8–18NF–2 hex nuts (AC and LL). Alternatively tighten nuts on ends of tie rods so that control valve bank assembly will be drawn up as evenly as possible. Set tie rods with an 85 pound-feet torque wrench setting for two center rods and a 120 pound-feet torque for the four end rods. Allow valve bank to set overnight and then check nuts to see if nuts are still at previous torque setting. Install five 5/8–18NF–2 palnuts (AE and NN) to each end of tie rods and wire seals (AD and MM) to ends of drilled valve body tie rod (ZZ). If the two 1-inch pipe plugs (HH and AF) were removed, coat each with a hardening type sealing compound (Litharge or Permatex No. 1) and install into valve bank end covers.

Section VII. REBUILD OF HYDRAULIC VANE-TYPE MOTOR

91. Disassembly (Depot Maintenance)

(fig. 29)

Begin the disassembly of the hydraulic vane-type motor (fig. 26) by removing the four hex-head cap screws (A) and plain washers (B) to release the cover. As soon as the cover (C) is removed, the pressure plate, spring washer (D), and two O ring gaskets (X) will also be removed. Remove the two shuttle valve retaining pins (W) to remove the two shuttle valve ball seats (E) and the two

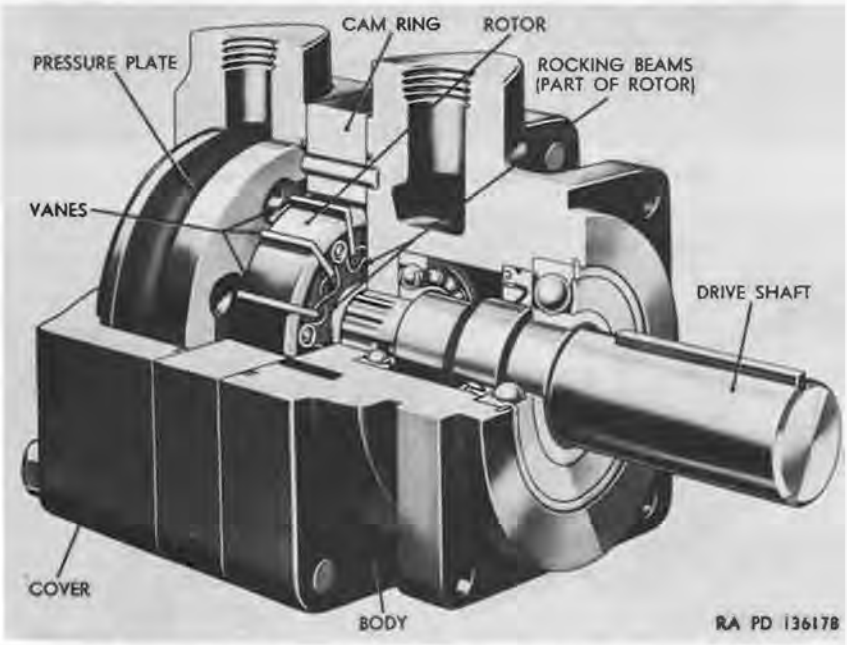

Figure 26. Hydraulic vane-type motor (cutaway view).

shuttle valve balls (V) from the pressure plate (F). Lift off the cam ring (fig. 27), locating pins (J), rotor, and vanes from the body and drive shaft assembly. Do not remove rocking beams, pins, or bushings from rotor since these are riveted in place. To remove the drive shaft and ball bearing assemblies from the body, first remove snap ring (fig. 28). Tap on exposed or splined end of drive shaft with soft hammer to remove drive shaft (M) and ball bearing assembly (N) from the body (fig. 28). Use a suitable flat surfaced tool and tap out oil seal (L) by tapping from the inside. Check the relative position of this oil seal before removal so that it can be replaced by a new one at reassembly. The ball bearing assembly (R) at inner recess of body (K) may now be removed.

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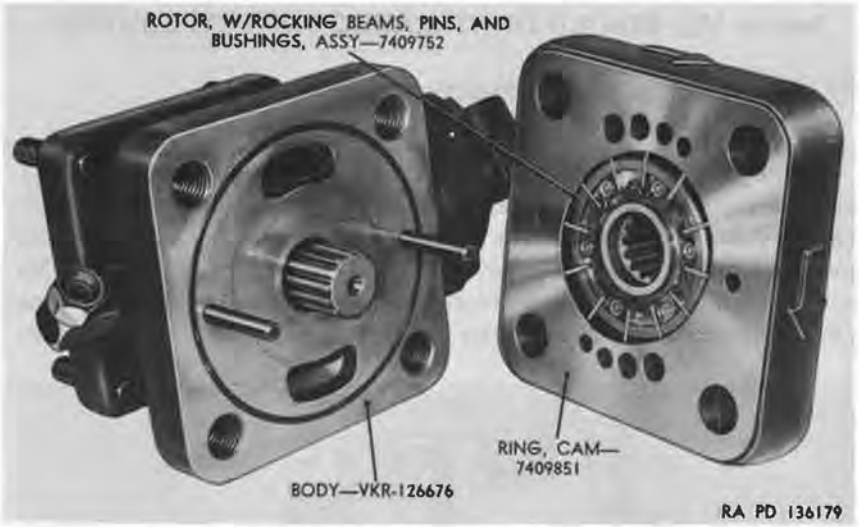


Figure 27. Cam ring and rotor separated from body.

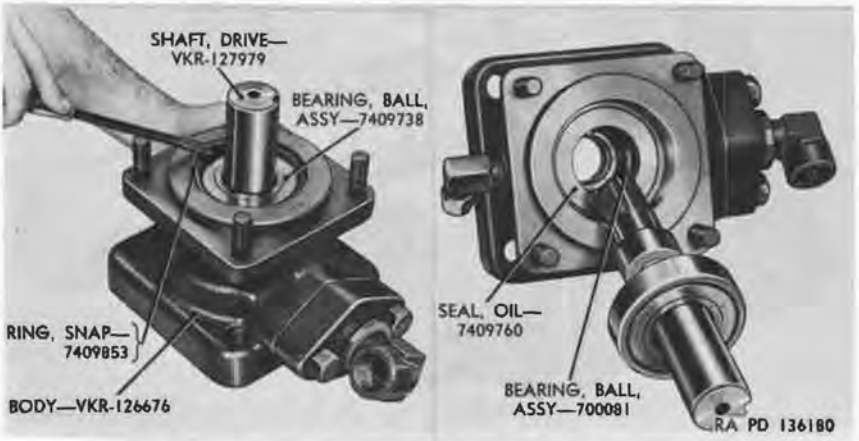


Figure 28. Removing drive shaft and bearing.

92. Cleaning, Inspection, and Repair (Depot Maintenance)

a. Cleaning. Immerse all parts except the sealed ball bearing assembly in clean dry-cleaning solvent or volatile mineral spirits. Soak long enough to loosen all old lubricant and particularly to make sure oil passageways are not plugged. Blow dry with compressed air and protect from any dust or dirt.

Note. Handle all parts carefully to avoid any nicks or burs on machined surfaces.

b. Inspection and Repair. Inspect the condition of both ball bearing assemblies. The larger of the two is permanently sealed and requires no further lubrication whereas the smaller is lubricated by

the hydraulic fluid. Check for wear by slowly rotating each bearing under load. If any indication of roughness exists, the bearing should be replaced. Check the condition of the cam ring. The internal contour of this part must be smooth and if distortion or roughness exists on this surface, the cam ring must be replaced. Vanes must be free of nicks or burs and if cam ring is replaced, vanes must also be replaced. Check the condition of the shuttle valve balls and their seats. If these show evidence of wear (damaged or pitted surface on the balls or worn face of the seat), replace with new parts. New oil seal and O ring gaskets must be used at assembly.

93. Assembly (Depot Maintenance)

(fig. 29)

a. General. Special care must be taken to avoid nicks and burs when assembling the hydraulic vane-type motor. Avoid the entrance of any grit or dirt into the assembled unit. Add a small amount of No. 10W engine oil into motor and temporarily seal openings until motor is once again mounted on the vehicle.

b. Procedure. Use a flat surfaced tool and press ball bearing assembly (R) into body (K). Make sure pressure is applied to outer race and that bearing is squarely seated. Similarly press oil seal (L) into body noting that the three small oil holes located on the face of the seal and adjacent to the seal inside diameter will face toward the inside of the motor when installed. Press ball bearing assembly (N) onto drive shaft (M) making sure that pressure is applied to inner race only. Install bearing and drive shaft assembly into body and insert snap ring (P). Insert locating pins (J) and new O ring gasket (S), into face of body. Place twelve vanes (T) into rotor assembly (H) and note that radius end of vanes will contact the cam ring (G). Slide rotor and vanes into cam ring and engage ends of rocking beams on both sides of rotor with inner ends of vanes so that all vanes will be held outward against the cam ring. Aline and install cam ring, rotor, and vanes assembly to locating pins on body (fig. 27). Make sure that rotation arrows on cam ring have not been changed. Insert two shuttle valve balls (V) and two shuttle valve ball seats (E) into pressure plate (F) and secure in place with two shuttle valve retaining pins (W). Place spring washer (D) and O ring gasket (X) on pressure plate (F). Install in cover (C) and aline cover to the assembled body and cam ring. Secure cover with four 1–8NC2 x 7¼ hex-head cap screws (A) and 1$^{1}/_{64}$ ID x 1¾ OD plain washers (B). Tighten cap screws to torque specifications prescribed in paragraph 146.

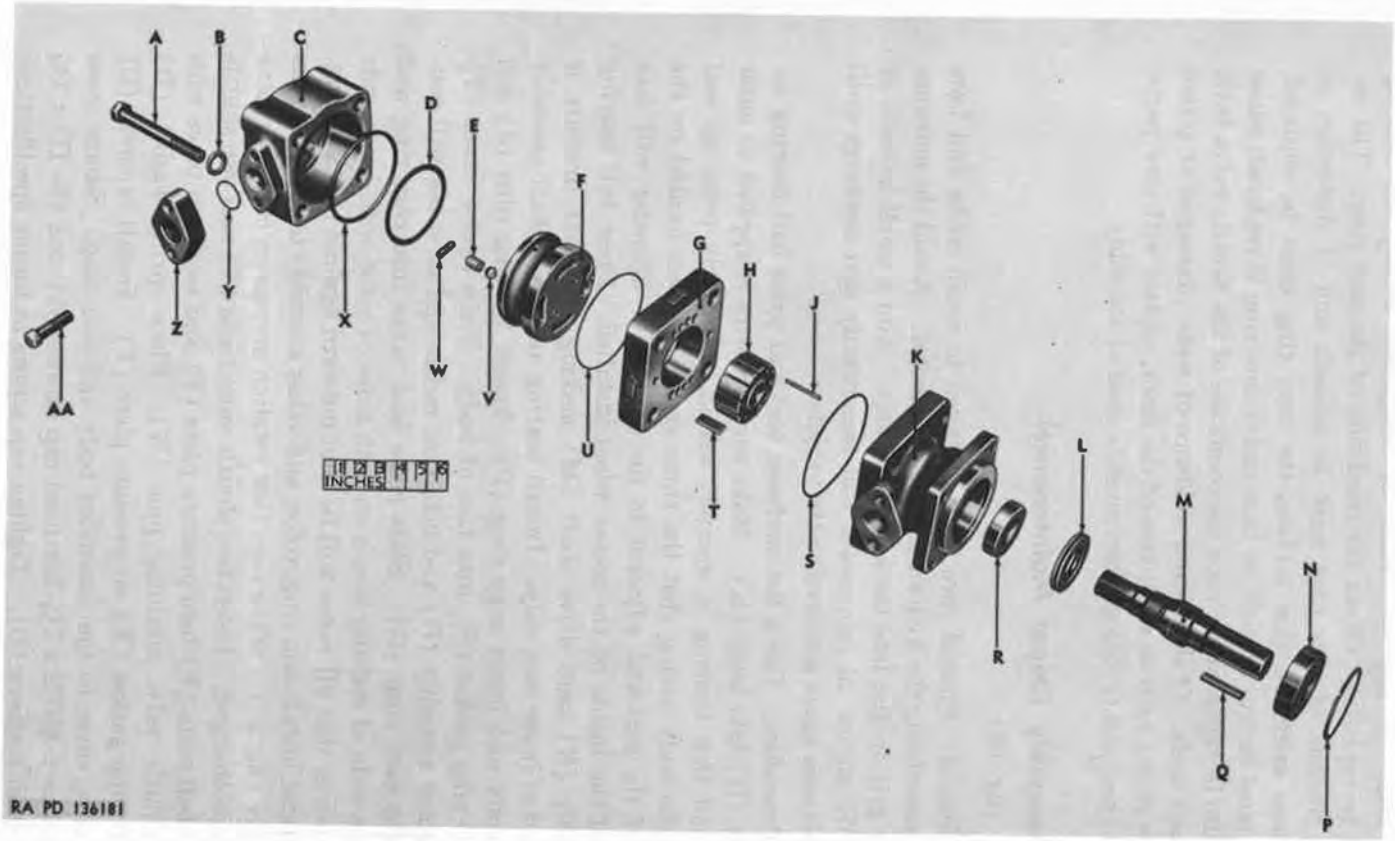


Figure 29. Hydraulic vane-type motor—exploded view.

A—Screw, cap, hex-hd, 1-8NC-2 x 7¼—7409741 (4 reqd)
B—Washer, plain, 1$^{1}/_{64}$ id, 1¾ od—IHC-118125R1
C—Cover—VKR-137281
D—Washer, spring—7409852
E—Seat, ball, shuttle valve—VKR-137329 (2 reqd)
F—Plate, pressure—VKR-137328
G—Ring, cam—7409851
H—Rotor, with rocking beams, pins, and bushing, assy—7409752
J—Pin, locating—7409839 (2 reqd)
K—Body—VKR-126676
L—Seal, oil—7409760
M—Shaft, drive—VKR-127979
N—Bearing, ball, assy—7409738
P—Ring, snap—7409853
Q—Key, ⅜ sq x 2¼—542691
R—Bearing, ball, assy—700081
S—Gasket, O ring—546895
T—Vane—7409855 (12 reqd)
U—Gasket, O ring—546895
V—Ball, shuttle valve—104925 (2 reqd)
W—Pin, retaining, shuttle valve—VKR-25589 (2 reqd)
X—Gasket, O ring—VKR-85725
Y—Gasket, O ring—546860 (2 reqd)
Z—Flange—VKR-115764 (2 reqd)
AA—Screw, cap, hex hd, ¾-10NC-3 x 2½—180325 (4 reqd)

Figure 29—Continued.

Section VIII. REBUILD OF HYDRAULIC VAN-TYPE PUMP

94. Disassembly (Depot Maintenance)

Disassembly of the hydraulic vane type pump (fig. 33) is accomplished by removing the four cap screws (A) and plain washers (T) that hold the pump cover in place. This will release the pump cover (B), the pressure plate (C), O ring gaskets, and the pump ring (fig. 31). Discard O ring gaskets (R). In addition to the cap screws, the pump ring is held in place by two locating pins (F) which are a slip fit in the pump ring and pump body. Make a note of the relative position of the rotor (E), vanes (Q), and pump ring (D) so

Figure 30. Hydraulic vane-type pump.

that they may be returned to this same location upon assembly. To remove pump shaft from pump body, remove the snap ring that holds the outer bearing assembly in place and tap on the splined or rotor end of the pump shaft, or stand the splined end on a soft block and press downward on the unit. The outer bearing assembly and pump shaft (fig. 32) will be removed by this action. The outer bearing assembly (H) is a press fit and to remove from pump shaft (L) use an arbor press. The oil seal is pressed in place and removal will cause its destruction. The small inner bearing assembly (G) is a very close fit into the pump body (N). Its removal is accomplished by tapping with a drift punch from the pump ring side of the body.

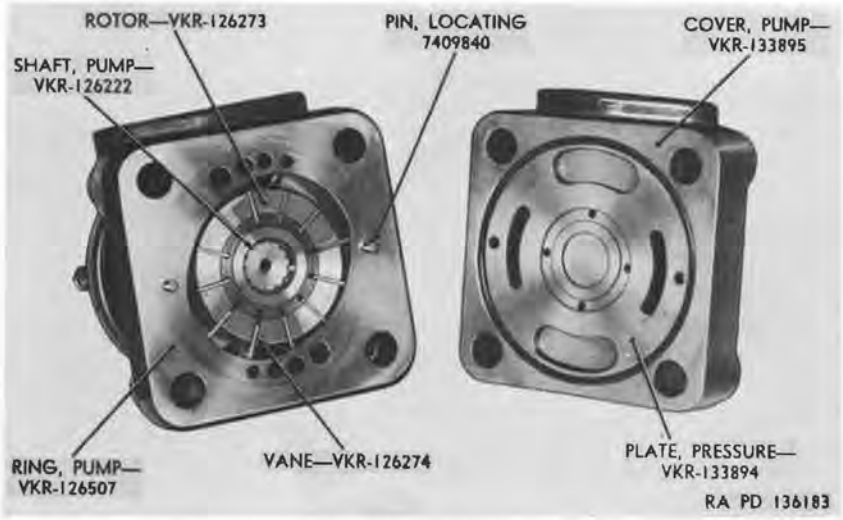


Figure 31. Hydraulic pump with cover removed.

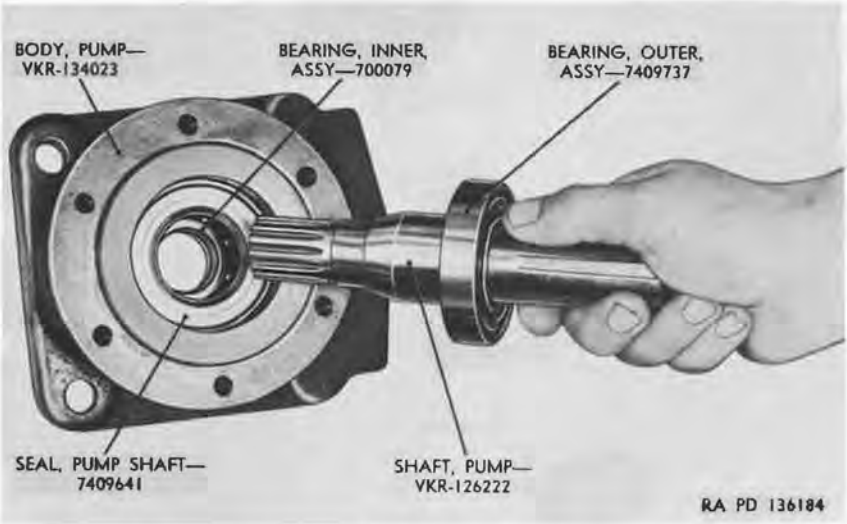


Figure 32. Pump shaft and outer bearing removed.

95. Cleaning, Inspection, and Repair (Depot Maintenance)

a. Cleaning. Immerse all parts except the sealed ball bearing assembly in clean dry-cleaning solvent or volatile mineral spirits. Soak long enough to loosen all old lubricant, and make sure oil passageways are not plugged. Blow dry with compressed air and protect from any dust or dirt.

Note. Handle all parts carefully to avoid any nicks or burs on machined surfaces.

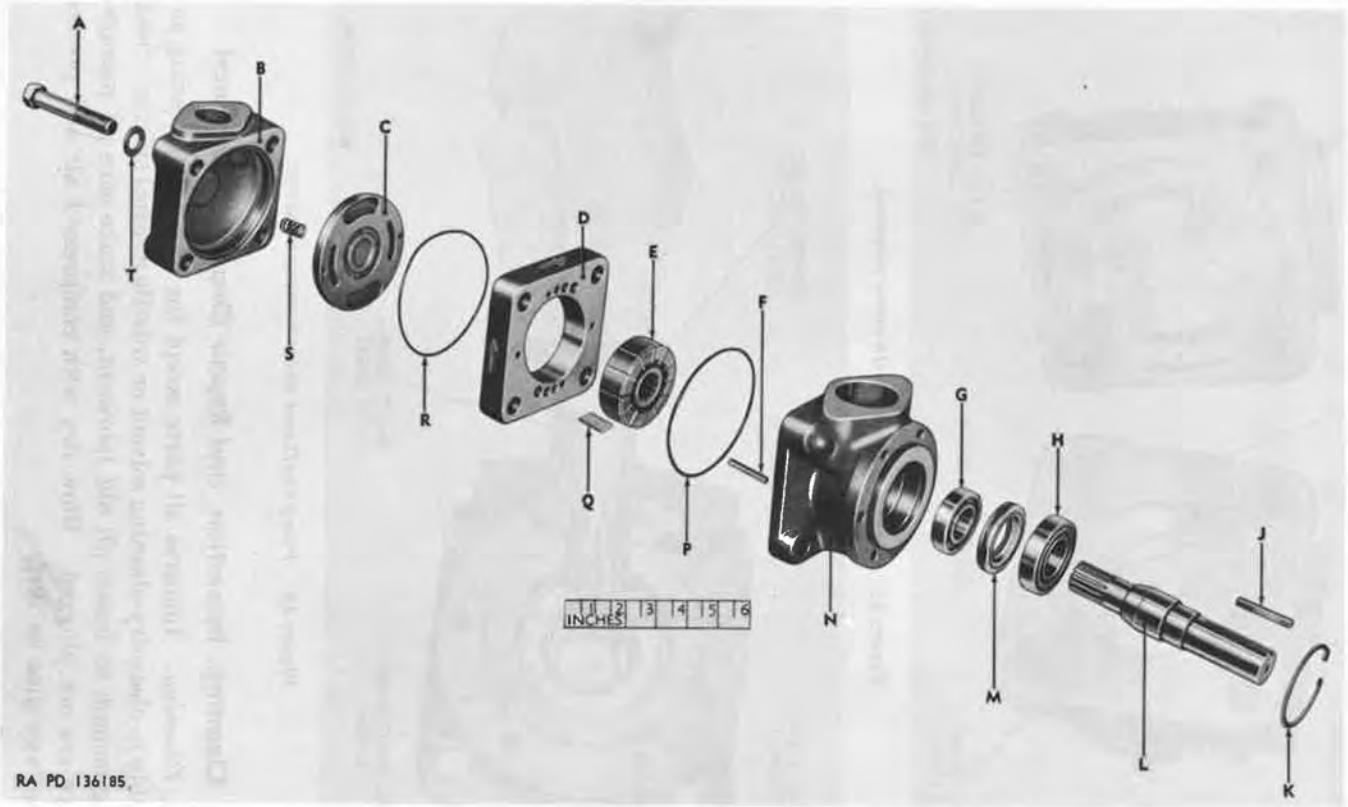


Figure 33. Hydraulic vane-type pump—exploded view.

A—Screw, cap, hex hd, ¾–10NC–3 x 4½—180335 (4 reqd)
B—Cover, pump—VKR–133895
C—Plate, pressure—VKR–133894
D—Ring, pump—VKR–126507
E—Rotor—VKR–126273
F—Pin, locating—7409840 (2 reqd)
G—Bearing, inner, assy—700079
H—Bearing, outer, assy—7409737
J—Key, square, ¼ x ¼ x 2—505753
K—Ring, snap—7409854
L—Shaft, pump—VKR–126222
M—Seal, pump shaft—7409641
N—Body, pump—VKR–134023
P—Gasket, O ring—546887
Q—Vane—VKR–126274
R—Gasket, O ring—546887
S—Spring—VKR–125978
T—Washer, plain 49/64 ID, 1 5/16 OD—VKR–51912 (4 reqd)

Figure 33—Continued.

b. Inspection and Repair. Examine each part carefully to make sure there are no cracks. Check the machined surfaces to be certain there are no nicks or burs. The oil seal must have no frayed edges and lips must seal around shaft firmly. Except for the replacing of defective parts, few repairs can be performed on this unit. Slight nicks, burs, or scratches may be removed with fine mill file, soap stone, or crocus cloth.

96. Assembly (Depot Maintenance)

(fig. 33)

a. General. The same attention to avoiding nicks and burs must be practiced while assembling the hydraulic vane-type pump as was practiced for the disassembly. Take special care to avoid the entrance of any grit or dirt into the assembled unit and as soon as assembly is completed, add a slight amount of No. 10W engine oil (OE) into unit. Seal openings until hydraulic vane-type pump is again mounted on the vehicle.

b. Procedure. Install inner bearing assembly (G) into pump body (N) and make sure it is firmly seated. Insert pump shaft seal (M) and solidly seat with an adapter that contacts only the outside diameter of the seal. Also make certain the sealing lip of the seal will face the outer bearing assembly (H). Press the outer bearing assembly onto pump shaft (L). Make sure that pressure is applied to the inner race only when pressing bearing onto shaft. Insert two locating pins (F) and new O ring gasket (P) into face of pump body. Place pump ring (D), vanes (Q), and rotor (E) onto pump body. Make certain the pump ring, vanes, and rotor are correctly assembled in relation to each other for the desired rotation. Also note that the radius edge of the vanes face the pump ring. Install pressure plate (C) into the pump cover (B) and at the same time place spring (S) between pressure plate and pump cover. Make sure the spring is retained in correct location and install new O ring gasket (R) into recess in pump cover around pressure plate and place cover on pump body. Secure pump cover to pump body with four $\frac{3}{4}$–10NC–3 x $4\frac{1}{2}$ hex-head cap screws (A) and $\frac{49}{64}$ ID, $1\frac{5}{16}$ OD plain washers (T). Tighten cap screws as prescribed in torque specifications (par. 146).

Section IX. REBUILD OF HOIST DRUM AND WORM AND DRIVE GEAR SET

97. Disassembly (Depot Maintenance)

(fig. 41)

a. General. No special tools beyond normal maintenance shop facilities are required for disassembling the hoist drum and worm and drive gear set (fig. 34). An overhead crane will be of great help in this operation.

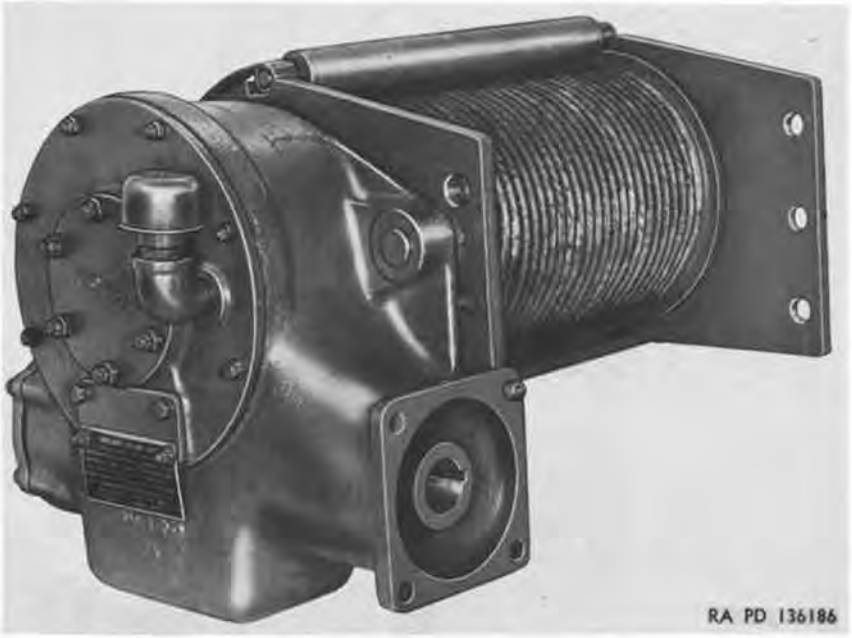


Figure 34. Hoist drum and worm and drive gear set.

Caution: These are heavy parts and more than ordinary care should be exercised to avoid personal injury that might be caused by careless handling.

b. Remove Drum Bearing Cap (fig. 35). Remove four safety nuts and lift off drum bearing cap and drum bearing cap gasket from side of drum housing.

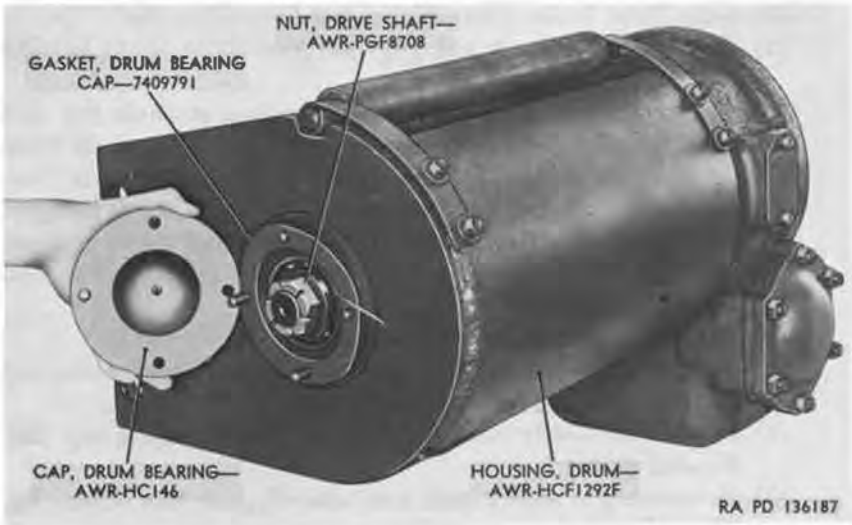


Figure 35. Drum bearing cap removed.

Figure 36. Separating hoist drum from worm and drive gear set.

c. Separate Hoist Drum From Worm and Drive Gear Set.

(1) Remove drive shaft nut (fig. 35) and drive shaft bearing washer.

(2) Fasten chain hoist around drum housing at shaft end and raise housing from ground sufficiently to loosen shaft from drum and housing. If some difficulty is encountered in freeing shaft from drum, tap on end of shaft with a soft hammer and raise drum and housing from worm and drive gear set (fig. 36). Hoist drum will roll out of drum housing as soon as shaft is clear.

d. Disassemble Worm and Drive Gear Set.

(1) Remove six safety nuts (C) and take off gear case bearing cap (D), gasket (E), and shims (fig. 37).

(2) Remove six safety nuts and take off worm bearing cap (fig. 37) and gasket.

(3) Remove eight safety nuts and take off gear case cover (fig. 38) and gasket.

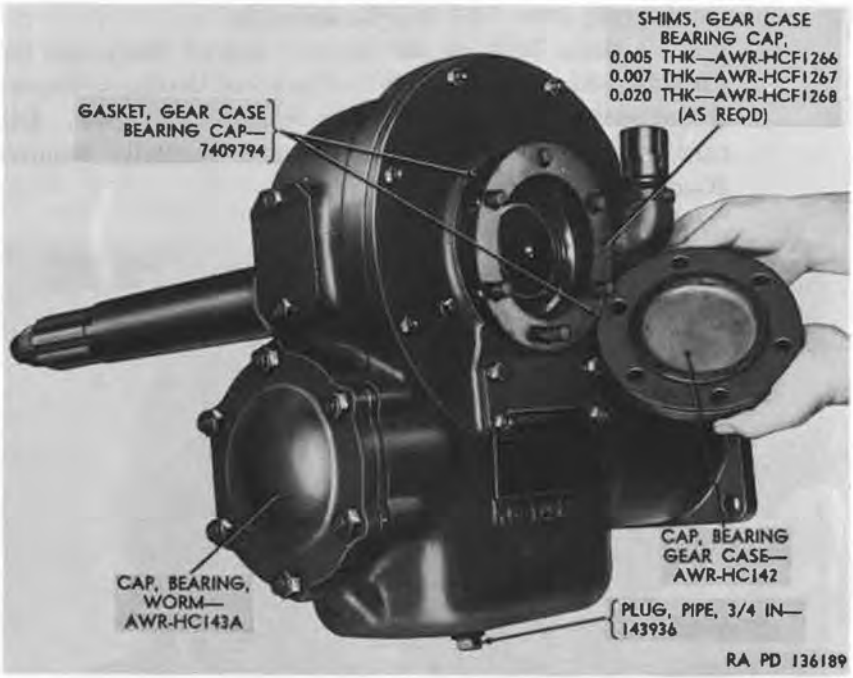


Figure 37. Gear case bearing cap removed.

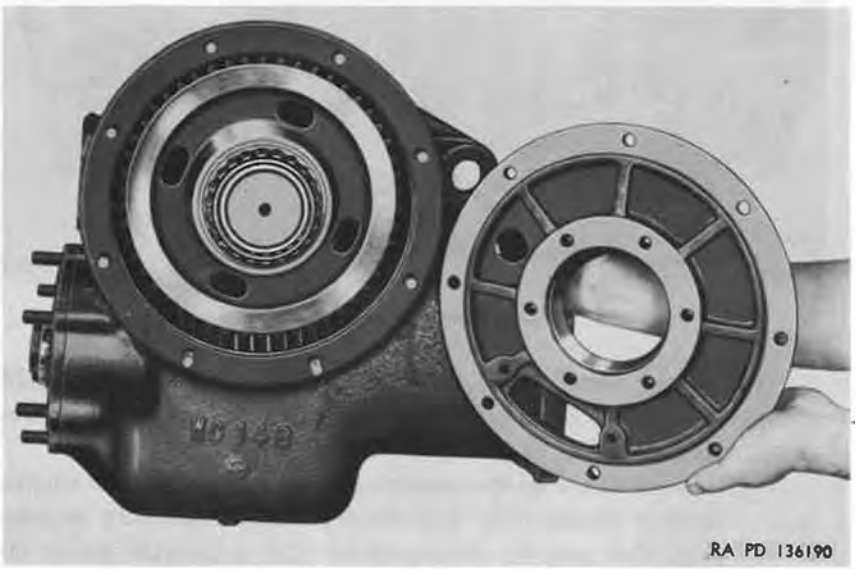


Figure 38. Gear case cover and worm bearing cap removed.

(4) Lift out drive gear (M), shaft (AX), spacers (AW and AY), and bearing cones (AV and L) assembly.

(5) Place a brass drift on the forward end of worm and tap the drift with a hammer to drive the worm, bearings, slingers, shims, gasket, and cage assembly from the gear case. Discard gaskets. Figure 39 shows worm partially removed from case.

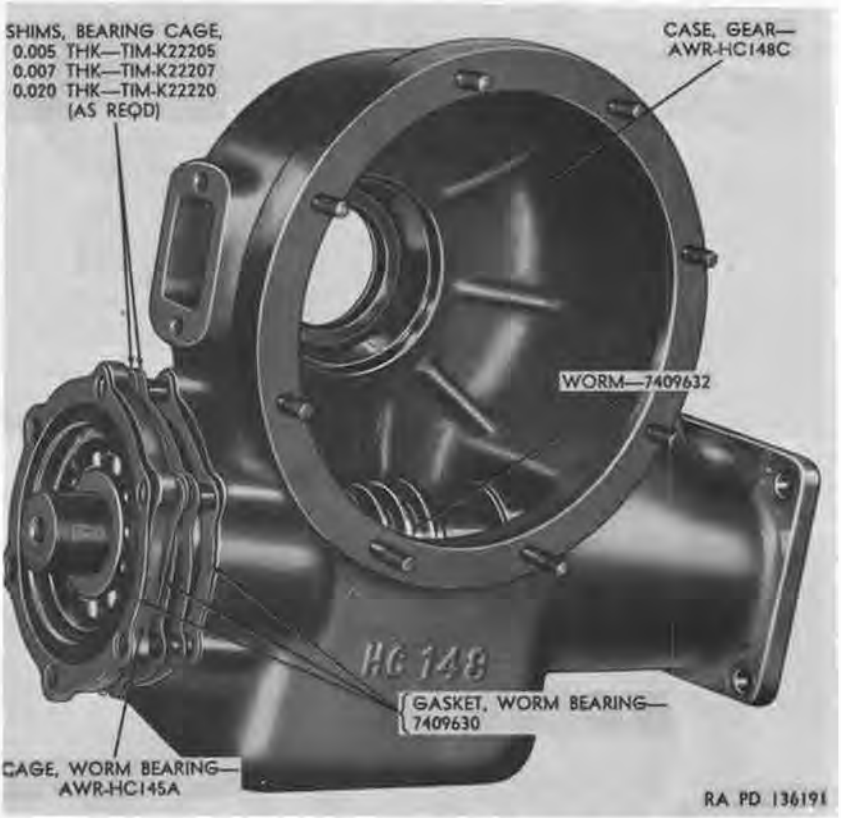


Figure 39. Worm partially removed from gear case.

(6) Mount worm (AL), bearings, slingers, and cage assembly in an arbor press and press worm, slinger, and bearings from worm bearing cage (fig. 40).

(7) The condition of the remaining parts will determine whether further disassembly is necessary. If disassembly is necessary, this may be accomplished with a suitable puller and adapter.

(8) No special cleaning is required other than to soak all parts in dry-cleaning solvent or volatile mineral spirits. Be sure

bearings are free of all old lubricant to facilitate inspection. Blow dry with compressed air.

Caution: Never spin bearings with compressed air since damage to the finely machined surfaces will result.

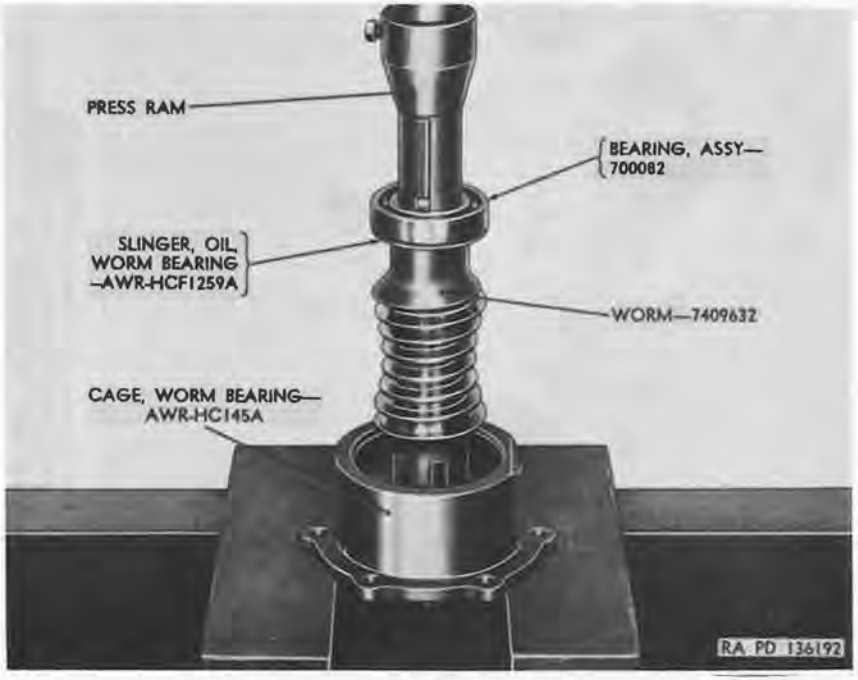


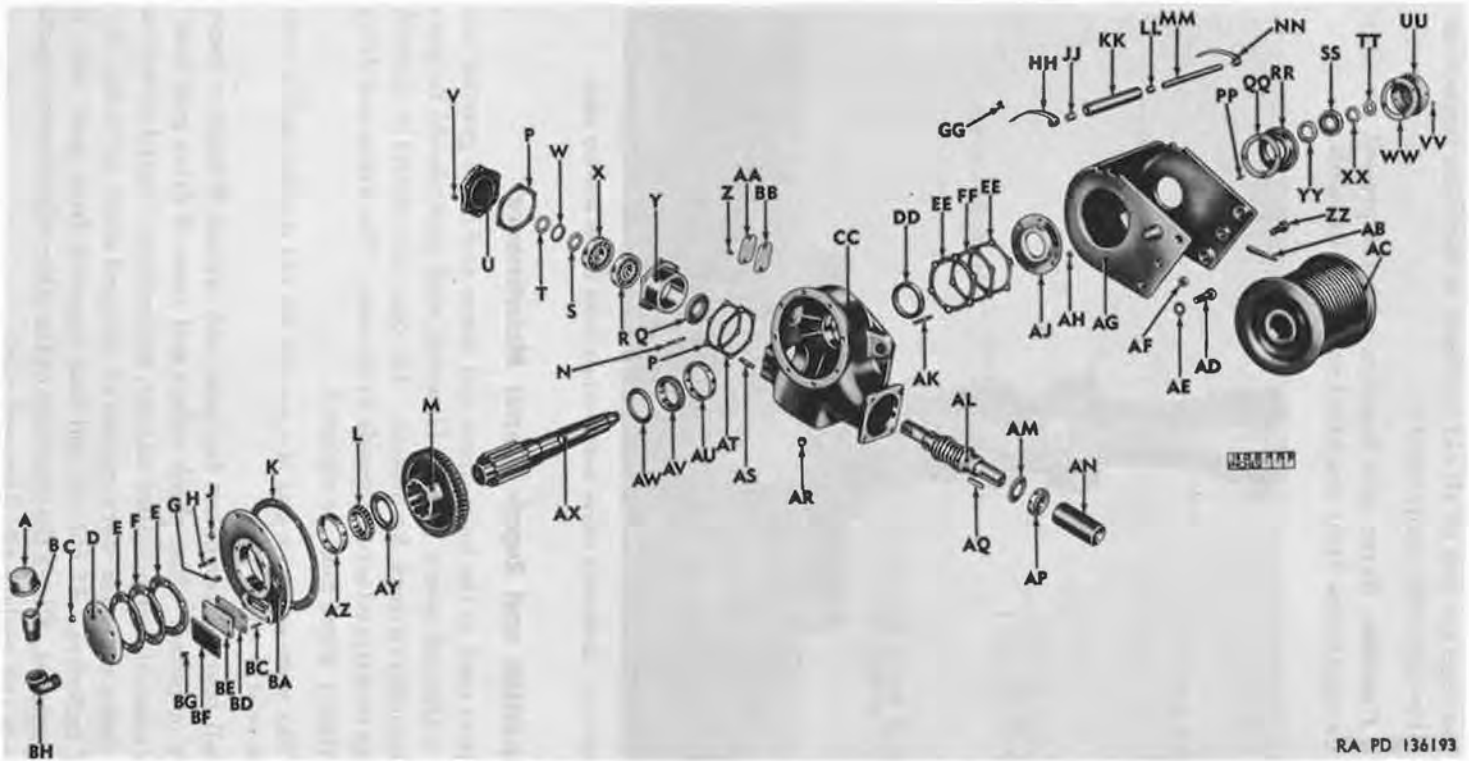
Figure 40. Removing worm and bearings from worm bearing cage.

98. Inspection and Repair (Depot Maintenance)

The parts used in the hoist drum and worm and drive gear set are built to withstand severe usage. However, each part should be gone over thoroughly to check for defects. The gear case should be checked for cracks or stripped screw threads in the case. The worm and drive gear if visibly worn, must be replaced.

Note. The worm and drive gear is a matched set and if either part is worn both parts must be replaced.

Check ball bearing assemblies for wear and replace if balls or races are worn or pitted. Also check rollers and races of drive gear bearing cone assemblies in a similar manner, and replace if found defective. Inspect drive shaft for worn splines or stripped screw threads. Replace if defective. If old oil seal was removed from gear case, it must be replaced. Check the condition of the other miscellaneous parts for defects and replace any damaged part.



A—Cap, breather, filler tube—AWR–PGF9374B
B—Tube, filler, gear case—AWR–HCF1712A
C—Nut, safety, ½–20NF–3—503323 (6 reqd)

D—Cap, bearing, gear case—AWR–HC142
E—Gasket, gear case bearing cap—7409794
F—Shims, gear case bearing cap—AWR–HCF1266 (as reqd)

G—Plug, pipe, sq-hd, ¼ in.—143933
H—Stud, ½–13NC–5 (⅝) x ½–20NF–3 (15/16) x 1 15/16—AWR–HCF1350 (6 reqd)
J—Nut, safety, ⅜–24NF–3—503351 (8 reqd)
K—Gasket, gear case cover—7409629
L—Cone, bearing, drive gear—705065
M—Gear, drive—7409631
N—Stud, gear case cover, ⅜–16NC–5 (½) x ⅜–24NF–3 (¾) x 1 7/16—AWR–HCF1338 (6 reqd)
P—Gasket, worm bearing—7409630
Q—Slinger, oil, worm bearing—AWR–HCF1259A
R—Bearing, worm, assy—701365
S—Nut, lock, special—AWR–AW310010
T—Nut, lock, special—AWR–AW310010
U—Cap, worm bearing—AWR–HC143A
V—Nut, safety, ½–20NF–3—503323 (6 reqd)
W—Washer, lock, special—AWR–AW309010
X—Bearing, worm, assy—701365
Y—Cage, worm bearing—AWR–HC145A
Z—Screw, cap, assy, ⅜–24NF x ⅞—AWR–917151
AA—Cover, inspection hole—AWR–HCF1305
BB—Gasket, inspection hole cover—7409796
CC—Case, gear—AWR–HC148C
DD—Seal, drive shaft bearing—500190
EE—Gasket, drive gear bearing—7409793
FF—Shims, drive gear bearing—TIM–K22005 (as reqd)
GG—Screw, hex-hd, machine, ⅜-24 x ⅝—IHC-16995R1 (reqd)
HH—Spring, cable guide, right hand—AWR–HCF1398
JJ—Bushing, cable guide—AWR–HCF1236A
KK—Roller, cable guide—AWR–HCF1235B
LL—Bushing, cable guide—AWR–HCF1236A
MM–Shaft, cable guide—AWR–HCF1234
NN—Spring, cable guide, left hand—AWR–HCF1399A
PP—Stud, ⅜–16NC–5 (½) x ⅜–24NF–3 (¾) x 1¾—AWR–HCF1341 (4 reqd)
QQ—Gasket, drum bearing cap—7409791
RR—Cage, bearing, drum—AWR–HC147
SS—Bearing, assy—7409733
TT—Nut, drive shaft—AWR–PGF8708
UU—Cap, drum bearing—AWR–HC146
VV—Nut, safety, ⅜–24NF–3—503351 (4 reqd)
WW—Gasket, drum bearing cap—7409791
XX—Washer, drive shaft bearing—AWR–PGF8706B
YY—Spacer, drive shaft bearing—AWR–HCF1271
ZZ—Screw, cap, hex-hd, 1–14NF–3 x 2¾—AWR–742937
AB—Wedge, cable—7409864
AC—Drum, hoist—AWR–HC160A
AD—Screw, cap, hex hd, 1–14NF–3 x 1¾—AWR–742933
AE—Washer, lock, 1 in.—AWR–778021
AF—Nut, safety, 1–14NF–3—AWR–914010
AG—Housing, drum—AWR–HCF1292F
AH—Nut, safety, ½–20NF–3—503323 (6 reqd)
AJ—Cage, drive shaft bearing seal—AWR–HC144B
AK—Stud, ½–13NC–5 (⅝) x ½–20NF–3 (⅞) x 1 3/16—AWR–HCF1340 (6 reqd)
AL—Worm—7409632
AM—Slinger, oil—AWR–HCF1321
AN—Coupling, drum drive—AWR–HCF1261C
AP—Bearing, assy—700082
AV—Cone, bearing—7409786
AW—Spacer, driver gear bearing, left hand—AWR–HCF1322
AQ—Key, cable drum drive coupling—542691
AR—Plug, pipe, sq-hd, ¾ in.—143936
AS—Stud, worm bearing cage, ½–13NC–5 (⅝) x ½–20NF–3 (15/16) x 2¼—AWR–HCF1264 (6 reqd)
AT—Shim, bearing cage—TIM–K22205
AU—Cup, bearing, drive gear—712719
AX—Shaft, drive—7409644
AY—Spacer, drive gear bearing, right hand—AWR–HCF1276B
AZ—Cup, bearing, drive gear—706652
BA—Cover, gear case—AWR–HC149B
BC—Stud, inspection hole cover ⅜–16NC–5 (½) x ⅜–24NF–3 (¾) x 1 15/16—AWR–HCF1339 (2 reqd)
BD—Gasket, inspection hole cover—7409795
BE—Cover, inspection hole—AWR–HCF1304
BF—Plate, drum case lubricant—AWR–HCF1838A
BG—Screw, cap, assy, ⅜–16NC–3 x ¾—451976 (2 reqd)
BH—Elbow, street, 90°—108687

Figure 41. Hoist drum and worm and drive gear set—exploded view.

99. Assembly (Depot Maintenance)

(fig. 41)

a. General. The assembly of this unit will require the same attention to avoiding personal injury or damage to parts as was pointed out in the disassembly. Be particularly careful to avoid the entrance of dirt into the assembly. The use of No. 10 SAE engine oil (OE) on sliding fits and screw threads will greatly facilitate assembly.

b. Install Bearings and Worm in Worm Bearing Cage. Place worm bearing assemblies (R and X) back to back on arbor press so that inner race will be supported. Place worm bearing oil slinger (Q) on top of bearings with recessed side toward bearing. Insert splined end of worm (AL) into slinger and bearings and press worm into place. Install special lock nut (S) flat side down on worm and tighten securely. Lock in place with special lock washer (W) and special lock nut (T) flat side up. Similarly mount bearing assembly (AP) in press with oil slinger (AM) on top and insert keyed end of worm (AL) into slinger and bearing. Press shaft into place. Support worm bearing cage (Y), flanged side up, on arbor press and insert worm and bearings assembly, keyed end down, into cage. Use an adapter to press on the outside race of worm bearing assembly (X) and press assembly into cage.

c. Install Worm, Bearings, and Cage Assembly into Gear Case. If ½–13NC–5 (⅝) x ½–20NF–3 (15/16) x 2¼ worm bearing cage studs (AS) were removed from gear case (CC), make sure all six studs are securely in place. Position bearing cage shim (AT) and new worm bearing gasket (P) over worm bearing cage (Y) and install worm, bearings, and worm bearing cage into gear case. Aline worm bearing cage with stud in gear case and tap into place. Use new worm bearing gasket (P) and install worm bearing cap (U). Secure with six ½–20NF–3 safety nuts (V). Tighten to torque specifications (par. 146).

d. Install Drive Gear Shaft and Bearing Cone Assembly into Gear Case. If drive gear bearing cup (AU) has been removed, install cup by tapping into place with soft hammer until seated securely in the gear case. If drive gear (M) has been removed from drive shaft (AX), press shaft into gear, noting that gear will be returned to the same position from which it was removed. Be careful not to bur splines. Place left hand drive gear bearing spacer (AW) and bearing cone (AV) onto shaft and install into gear case. Place right hand drive gear bearing spacer (AY) and drive gear bearing cone (L) on end of shaft. If drive gear bearing cup (AZ) has been removed from gear case cover (BA), install cup. Likewise, if gear case cover studs have been removed from gear case, install six ⅜–16NC–5 (½) x ⅜–24NF–3 (¾) x 1 1/16 gear case cover studs (N) around upper circumference of gear case drive gear opening and two

3/8–16NC–5 (1/2) x 3/8–24NF–3 (3/4) x 1 15/16 inspection hole cover studs (BC) into two lower stud holes. Aline new gear case cover gasket (K) and gear case cover (BA) on gear case and secure with six 3/8–24NF–3 safety nuts (J). Allow two safety nuts (J) and inspection hole cover (BE) to remain disassembled until final adjustment has been made (par. 100). Insert six 1/2–13NC–5 (5/8) x 1/2–20NF–3 (15/16) x 1 15/16 studs (H) into gear case cover (BA) and turn down tight. Install new gear case bearing cap gaskets (E), gear case bearing cap shims (F), and gear case bearing cap (D) and secure to gear case cover with six 1/2–20NF–3 safety nuts (C). Install 90° street elbow (BH) into gear case cover (BA), gear case filler tube (B), and filler tube breather cap (A). Assemble drive shaft bearing seal (DD), drive shaft bearing seal cage (AJ), new drive gear bearing gasket (EE), and drive gear bearing shims (FF). If studs (AK) were removed from gear case, install six 1/2–13NC–5 (5/8) x 1/2–20NF–3 (7/8) x 13/16 studs (AK) and tighten securely. Install drive shaft bearing seal cage (AJ), to gear case with six 1/2–20NF–3 safety nuts (AH). Tighten nuts securely.

e. Install Hoist Drum and Drum Housing. Place hoist drum (AC) into drum housing (AG) and secure in position by inserting drive shaft (AX) end of the assembled worm and drive gear set through the drum and housing. If the four 3/8–16NC–5 (1/2) x 3/8–24NF–3 (3/4) x 1 3/4 studs (PP) were removed from drum housing be sure these are securely in place and install new drum bearing cage gasket (QQ). If bearing assembly (SS) has been removed, use an arbor press to position bearing in drum bearing cage (RR). Position bearing so that sealed side will face toward drum when installed and also be sure that pressure is applied to outer race while installing in cage. Install drive shaft bearing spacer (YY), flat side down on end of drive shaft, and aline bearing and cage assembly on studs. Place drive shaft bearing washer (XX) and drive shaft nut (TT) on end of drive shaft and draw down until secure. Install new drum bearing cap gasket (WW) and drum bearing cap (UU) and secure with four 3/8–24NF–3 safety nuts (VV). Install 3/4-inch square-head pipe plug (AR) in gear case (CC). Refer to TM 9–837 for correct lubricant and capacity.

100. Adjustment of Worm and Drive Gear Set (Depot Maintenance)

a. General. The worm and drive gear set has been adjusted at the factory and should require adjusting only after rebuilding. For this reason, special care should be taken to retain the same tooth contact as established at original manufacture, whenever the worm and drive gear set is rebuilt. The two adjustments which affect tooth contact are end position of the worm and side position of the gear. As a

general rule the shim pack removed at disassembly, when used intact in the assembly, will provide the correct tooth contact.

b. Method of Checking Adjustment (fig. 41). As soon as worm and drive gear set have been assembled in the gear case to the correct relative position, the adjustment for tooth contact is checked as follows:

(1) Lightly paint both sides of teeth of drive gear (M) with Prussian blue. Usually, coating about five to six teeth is sufficient for checking purposes. When the worm (AL) is rotated the Prussian blue is squeezed away by the contact of the teeth, leaving bare areas the exact size, shape, and location of the contacts. Sharper contact readings can be obtained by applying a small amount of resistance to the drive shaft (AX) when rotating the worm. Rotate the worm by hand in the direction it will run when under full load, letting the blued teeth pass through the worm threads several times. Worm threads should now show a bearing reading on the drive side for approximately three-quarters of the length of the worm thread. Center of threads should be as near to dead center of gear as possible.

(2) Rotate the worm again, but mesh this time with the unblued teeth of the drive gear. The gear teeth should now indicate a bearing reading in the center of each tooth and covering approximately one-half of the tooth width looking from the rear on the drive side. The coat side of the threads and teeth should also show very nearly the same reading as the drive side when similarly checked by reversing the rotation.

c. Procedure for Making Adjustment (fig. 41). If the worm and drive gear set is not correctly alined, it should be adjusted by removing or adding shims. This is done in the following manner:

(1) If the worm is out of end position (not centered under axis of drive gear), bearing cage shims (AT) should be added or removed as necessary between the worm bearing cage (Y) and the gear case (CC).

(2) If the drive gear is out of side position, shims (F or FF) should be added on one side and an equal amount removed on the other side so that the drive gear will be centered directly over the worm when meshed.

(3) Shim or gasket thickness between the bearing cap (D) and the gear case (CC) should be such that drive gear bearing cones (L and AV) are given a light preload. Preload should be 0.005 to 0.001 inch on each bearing.

d. Run In. After a short run under full load, recheck the adjustment using the procedures as outlined in *b* above. Worm and drive

gear set adjustment will be correct if a bearing reading shows for approximately three-quarters of the width of the drive gear teeth and the full length of the worm thread.

Section X. REBUILD OF PIVOT POST AND BASE PLATE

101. Disassembly (Depot Maintenance)

a. General. Due to the excessive weight of the pivot post and base plate, an overhead hoist must be provided to aid in disassembly. The base plate should be positioned on blocks approximately eight inches from floor to give access to underneath side.

Warning: Extreme care must be exercised during disassembly to avoid serious injury to personnel.

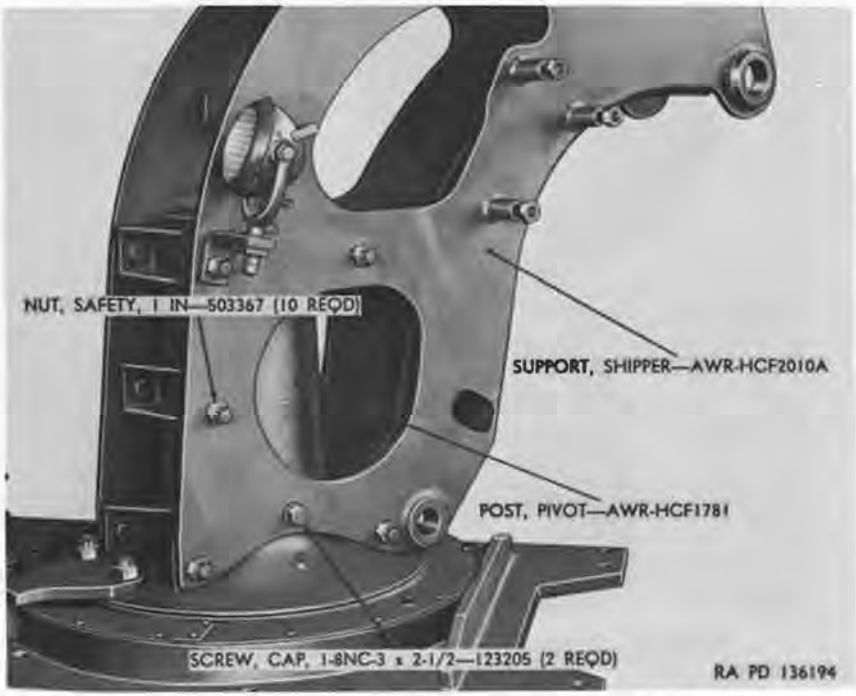


Figure 42. Disconnect points for shipper support removal.

b. Remove Pivot Post and Shipper Support.

(1) Remove ten safety nuts and cap screws and two cap screws and lockwashers from shipper support (fig. 42). Remove support from pivot post.

(2) Remove two hex nuts, external-teeth lockwashers, plain washers, and locking plates, and six safety nuts which secure pivot post support cap. Remove pivot post support cap and spacing shims (fig. 43). Keep shim pack intact for assembly.

(3) Remove 18 cap screws with washers. Remove pivot post gear shield and gear shield felt from base plate (fig. 44).

(4) Attach chain hoist to pivot post and lift high enough to permit removal of bearing cone. Remove bearing cone (fig. 45). Continue lifting pivot post until it is free from pivot post support (fig. 46).

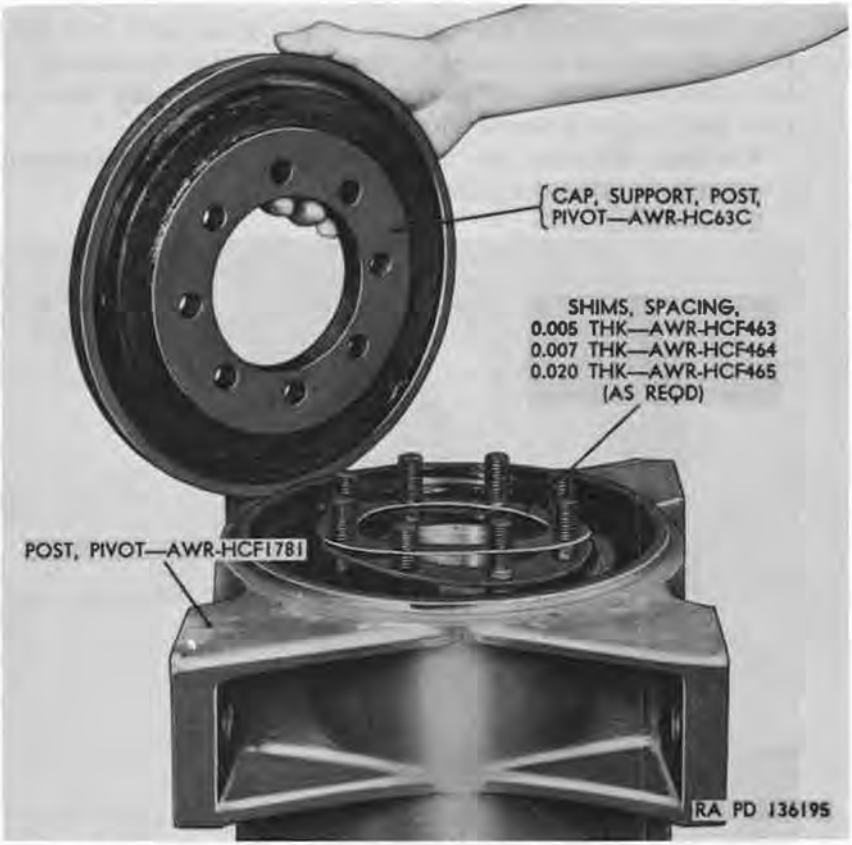


Figure 43. Removing pivot post support cap and spacing shims.

(5) It is unnecessary to remove bearing cup in base of pivot post unless inspection (par. 102) warrants replacement. If inspection reveals replacement is needed, remove two lubricating fittings on base of pivot post. The tapped holes for fittings are in line with bearing cup. Insert a drift punch (fig. 47) in each hole and tap alternately until cup is removed.

(6) It is unnecessary to remove bearing cup in swivel valve end of pivot post unless inspection (par. 102) warrants replacement. If inspection reveals replacement of cup is needed, use suitable puller and remove bearing cup from pivot post.

e. Removal of Drive Pinion and Pivot Post Support (fig. 51).

(1) Remove 13 safety nuts and three hex nuts securing pivot post support to base plate. Attach an overhead hoist to pivot post support and remove from base plate.

(2) Remove two cap screws (X) securing retaining plate (V) and spacer shims (R, S, T, and U) to drive pinion idler gear shaft and four cap screws and lockwashers securing drive pinion lower bearing cover and gasket to base plate. Remove two cap

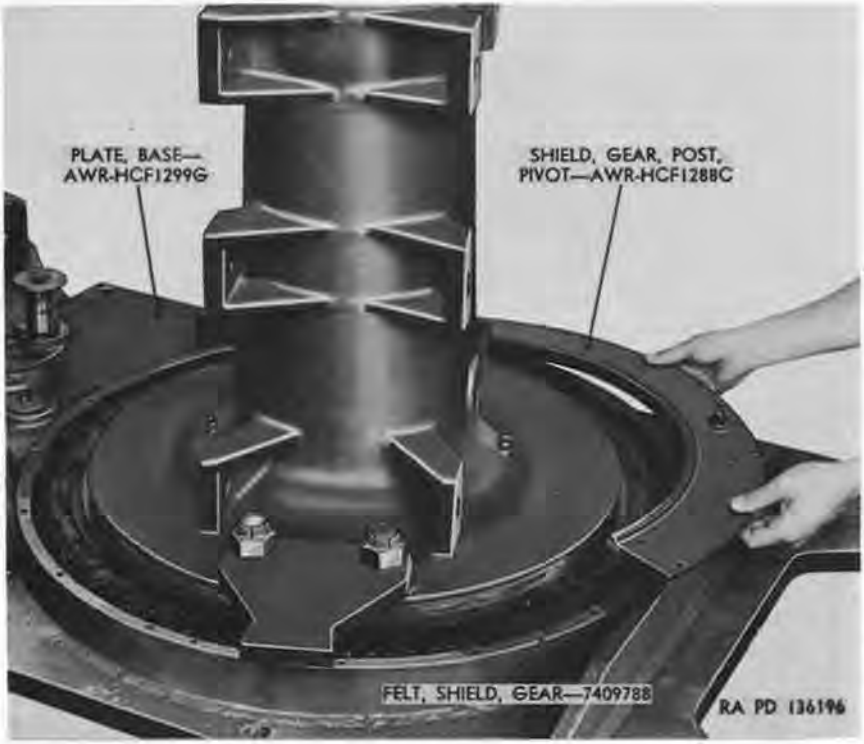


Figure 44. Removing pivot post gear shield from base plate.

screws securing drive pinion adjusting plate and spacing shims to drive pinion (fig. 48). Remove plate and shims.

(3) Remove four cap screws and lockwashers from idler gear housing cover. Remove idler gear housing cover, gasket, and felt. Remove drive pinion, drive pinion crank, and bearing cone. Also remove drive pinion idler gear shaft, drive pinion idler gear, and bearing cone assembly from base plate (fig. 49).

(4) Support drive pinion crank in arbor press and press drive pinion from drive pinion crank. Remove bearing cone from

drive pinion crank. It is not necessary to remove bearing cups from base plate unless inspection (par. 102) reveals replacement is required.

(5) Remove bearing cone (C and P) from each side of drive pinion idler gear (L). It is not necessary to remove bearing cups (D and N) in drive pinion idler gear unless inspection (par. 102) warrants replacement of gear or cups. If inspection reveals replacement of cups or gear is necessary, remove two cups and snap rings from gear.

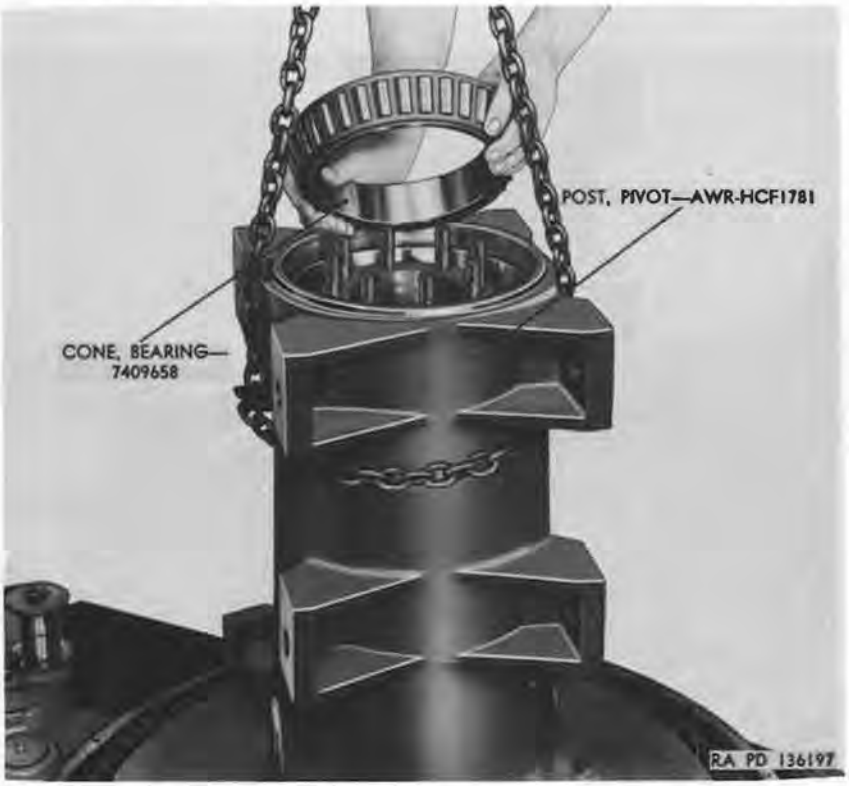


Figure 45. Removing bearing cone from pivot post.

d. Cleaning. Due to the heavy gear lubricant which is used to lubricate the drive pinion, drive pinion idler gear and welded on ring gear at base of the pivot post, steam clean all parts to remove all old lubricant.

102. Inspection and Repair (Depot Maintenance)

a. Base Plate. Inspect base plate for defective welds or cracks. Minor weld failures can be repaired by rewelding. If other cracks are evident, replace base plate.

b. Pivot Post. Inspect ring gear on base of pivot post for broken,

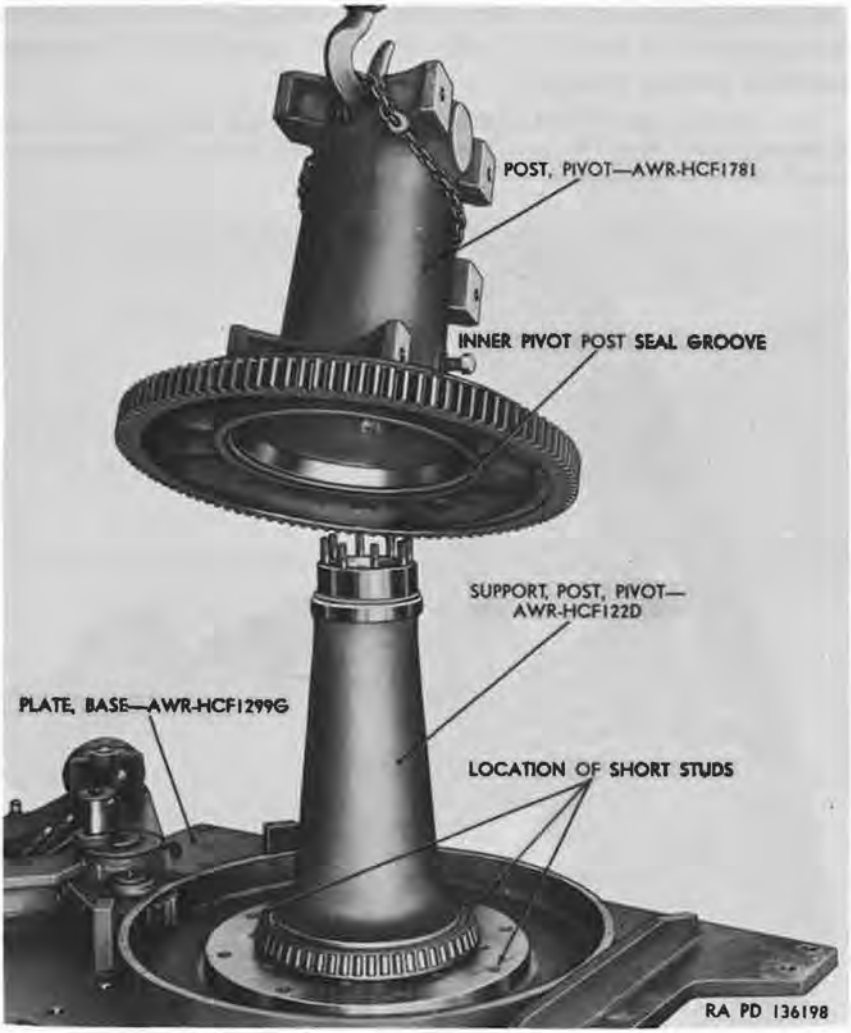


Figure 46. Removing pivot post from base plate.

cracked, or chipped teeth. Replace pivot post if any of these conditions are found.

c. Bearings and Cups. Inspect bearings and cups for pitted, scratched, or scored condition. Replace bearing or cup if any of these conditions exist.

d. Drive Pinion and Idler Gear. Inspect drive pinion and idler gear for broken, cracked, or chipped teeth. Replace defective gears.

103. Assembly (Depot Maintenance)

(fig. 51)

a. General. Before proceeding with the final assembly of the base plate and pivot post assembly, bearing adjustments must be made

individually and without gear contact of mating part as outlined in paragraph 104. Use shim packs as therein prescribed to maintain specified bearing preloads.

Note. Bearing adjustments require temporary assembly and removal of the adjusted parts. Pack all tapered roller bearings with artillery and automotive grease before final assembly.

Figure 47. Removing bearing cup from base of pivot post.

b. Install Drive Pinion Idler Gear (fig. 51).

(1) Install drive pinion idler gear bearing snap rings (**K** and **M**) on inner diameter of drive pinion idler gear (**L**). If bearing cups were removed (par. 101), press bearing cups (D and N) in drive pinion idler gear (L). Position bearing cones (C and P) in cups.

(2) Install spacing washer (Q) in the bore for idler gear shaft, located in base plate (J, fig. 50). Position drive pinion idler gear (L), with bearing assemblies, in gear housing of base plate (J, fig. 50) and insert drive pinion idler gear shaft (B)

as shown in figure 49. Aline bore of idler gear with shaft and install shaft through gear in base plate.

(3) Aline spacing shims (R, S, T, and U), as established in paragraph 104, with retaining plate (V) and insert two 3/8–24NF–3 x 3/4 cap screws (X) through shims and plate. On the under side of base plate (J, fig. 50), aline retaining plate with dowel pin (W) and secure to drive pinion idler

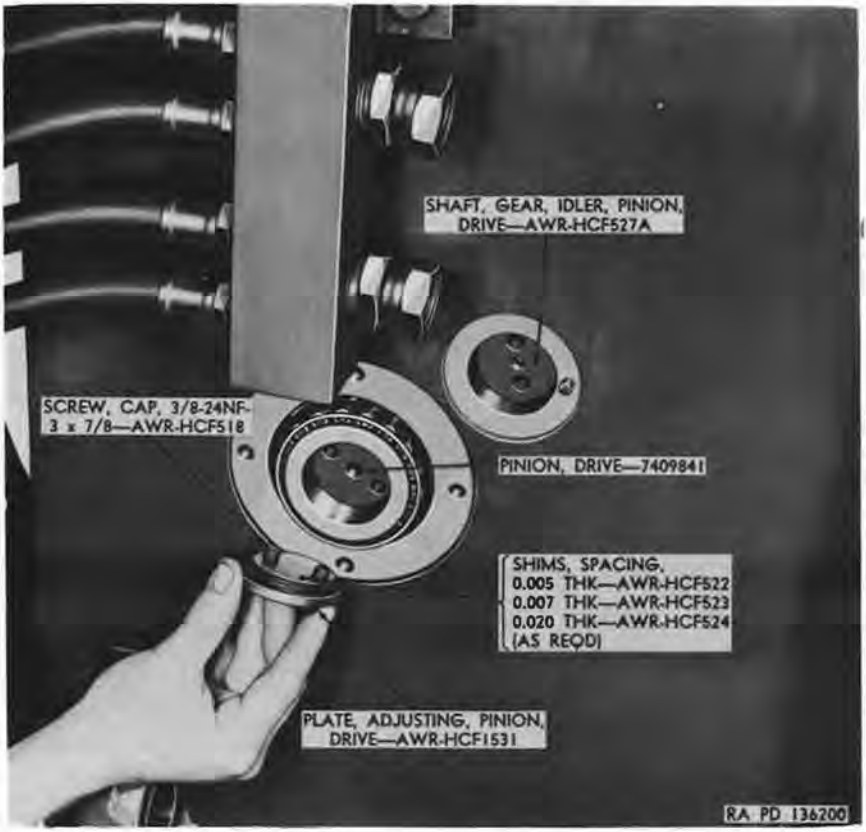


Figure 48. Removing drive pinion adjusting plate and spacing shims.

gear shaft (B) with two 3/8–24NF–3 x 3/4 cap screws (X). Install lubricating fitting (A) on upper end of idler gear shaft.

c. Install Drive Pinion and Crank (fig. 51).

(1) If inspection revealed that replacement of bearing cups (LL and JJ) was necessary, install new bearing cup in bore for drive pinion on top and bottom side of base plate (J, fig. 50).

(2) Install upper bearing cone (MM) on drive pinion crank (NN). Install 3/8 x 2 Woodruff key (XX) on drive pinion (KK). Aline pinion and key with key way on drive pinion

crank and press these parts together. Position and aline drive pinion retaining plate (QQ) on drive pinion crank and secure to drive pinion with two special cap screws (RR).

(3) Position drive pinion (KK) with drive pinion crank (NN) in base plate (J, fig. 50). Install bearing cone (HH) from under side of base plate on drive pinion. Aline spacing shims (EE, FF, and GG), as established in paragraph 104, with drive pinion adjusting plate (DD). Insert two 3/4–24NF–3 x 7/8 cap screws (CC) through shims and adjusting plate and secure to drive pinion.

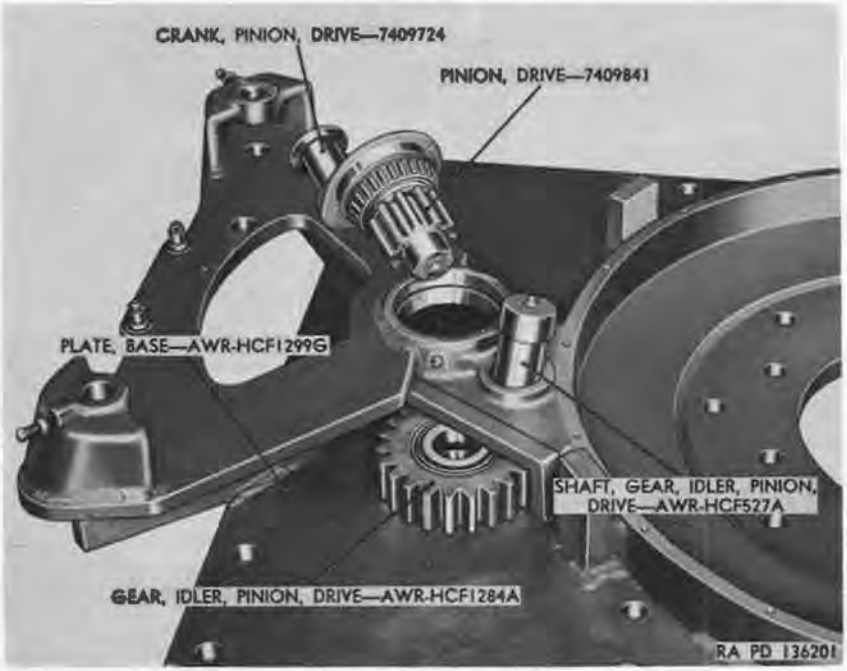


Figure 49. Pivot post drive pinion and drive pinion idler gear removed

d. Install Pivot Post Support and Pivot Post (fig. 50).

(1) There are 16 studs installed in the pivot post support to mount it to the base plate. Three of these studs are slightly shorter than the others in order to provide clearance. For installation position of short mounting studs, refer to figure 46.

(2) Install thirteen 1–8NC–5 (1 1/8) x 1–14NF–3 (1 11/16) x 3 3/4 mounting studs (AC) and three 1–8NC–5 (1 1/8) x 1–14NF–3 (1) x 3 1/16 mounting studs (N) on bottom side of pivot post support (P). Attach an overhead hoist to pivot post support and position on base plate (J). Install thirteen 1–14NF–3 safety nuts (AE) on long mounting studs and three 1–14NF–3

hex nuts (K) on short mounting studs. Tighten accordingly to torque specification table paragraph 146.

(3) Install bearing cone (R) at base of pivot post support (P). Position bearing cup (S) in pivot post (BB). Tap cup lightly around edges with a soft hammer until it is seated in pivot post. Make sure cup does not become cocked. Install bearing cup (CC) in swivel valve end of pivot post in same manner. Install inner pivot post seal (T) in groove (fig. 46) in base of pivot post. Install eight 5/8–11NC–5 (3/4) x 5/8–18NF–3 (1 1/16) x 2 1/2 stud (Q) in swivel valve end of pivot post support for securing pivot post support cap.

(4) Attach an overhead hoist to pivot post (BB) and position over pivot post support (P). Lower pivot post until it is about 4 inches from being seated. While suspended over pivot post support, tilt pivot post enough to engage its ring gear teeth with drive pinion idler gear (L, fig. 51). Continue lowering pivot post until seated on bearing cone (R).

(5) Position and install bearing cone (DD) in swivel valve end of pivot post (BB). Aline spacing shims (EE, FF, and GG) with pivot post support cap (PP). Position cap with shims, as adjusted in paragraph 104, on studs (Q). Install two swivel valve hub locking plates (NN), 21/32 ID, 1 15/16 OD plain washers (MM), 11/16-inch external-teeth lockwasher (LL), 5/8–18NF–3 hex nuts (KK), and six 5/8–18NF–3 safety nuts (JJ) to secure cap. Install two lubricating fittings (HH).

(6) Position shipper support (QQ) on pivot post (BB) and secure with ten special cap screws (RR) and 1–14NF–3 safety nuts (SS) and two 1–8NC–3 x 2 1/4 cap screws (Z) and 1-inch medium lockwashers (AA).

(7) Position gear shield felt (U and AB) and pivot post gear shield (V and ZZ) on base plate (J). Install eighteen 5/16–24NF x 5/8 cap screws with washers (W) to secure shields.

Note. Prepack ring gear with artillery and automotive grease before assembling pivot post gear shields to base plate.

104. Adjustment of Drive Pinion, Idler Gear, and Pivot Post Bearings (Depot Maintenance)

a. General. Bearing adjustments must be made individually without drag or gear contact with mating part. Pivot post seals must be removed to establish a proper preload adjustment.

Note. Keep all shim packs intact for final assembly.

b. Drive Pinion Idler Gear (fig. 51).

(1) Assemble drive pinion idler gear (L) with bearings in housing of base plate as outlined in paragraph 103*b*. Adjust

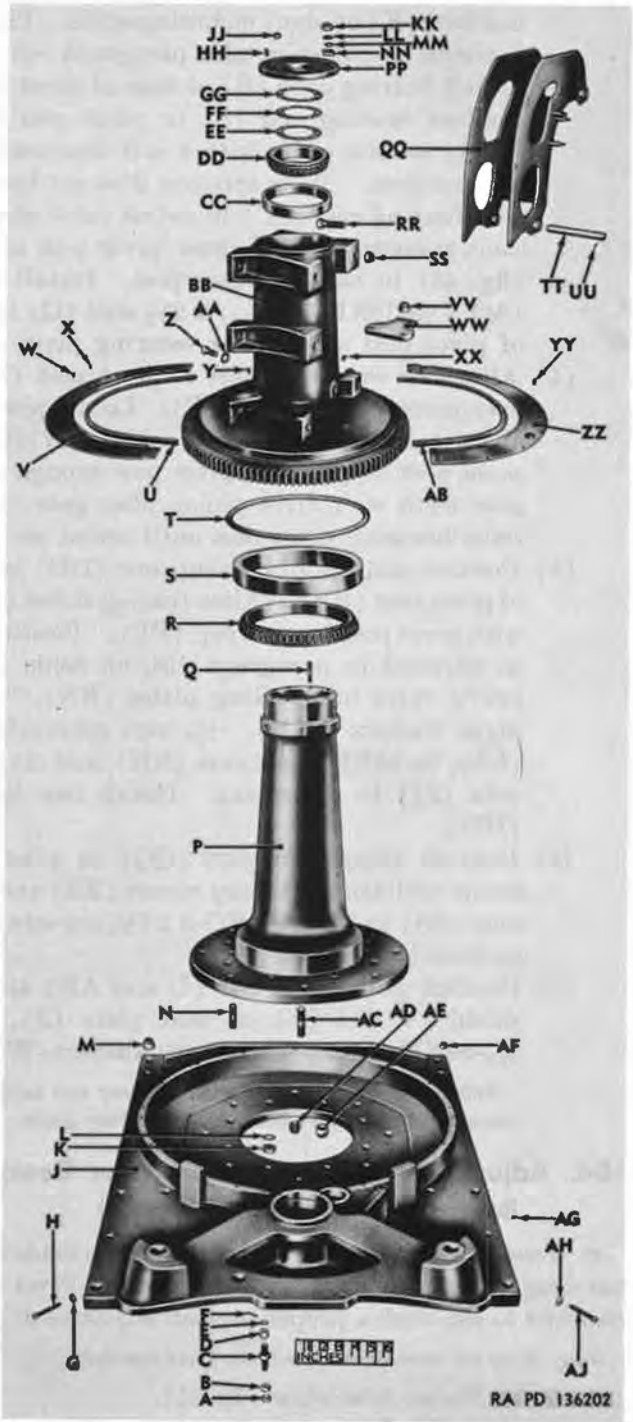


Figure 50. Pivot post and base plate—exploded view.

A—Nut, jam, ½ x 20NF-2—124934
B—Nut, hex, ½ x 20NF-3—120371
C—Pin—AWR-PGF9619
D—Roller—7409750
E—Washer—AWR-PGF8731
F—Pin, Cotter, ⅛ x ¾—177923
G—Nut, jam, 7/16-14NC-2—124834
H—Screw, set, special—AWR-AW758058
J—Plate, base—AWR-HCF1299G
K—Nut, hex, 1-14NF-3—AWR AW726011 (3 reqd)
L—Washer—AWR-AW771010
M—Nut, safety, 1-14NF-3—503367 (6 reqd)
N—Stud, mounting, 1-8NC-5 (1⅛) x 1-14NF-3 (1) x 3 1/16—AWR-HCF1324B (3 reqd)
P—Support, post, pivot—AWR-HCF122D
Q—Stud, ⅝-11NC-5 (¾) x ⅝-18NF-3 (1 1/16) x 2½—AWR-HCF1328 (8 reqd)
R—Cone, bearing—7409657
S—Cup, bearing—7409785
T—Seal, post, pivot, inner—7409787
U—Felt, shield, gear—7409788
V—Shield, gear, post, pivot—AWR-HCF1288C
W—Screw, cap, w/washer, 5/16-24NF x ⅝—AWR-AW917134 (18 reqd)
X—Fitting, lubricating—504208
Y—Fitting, lubricating—504208
Z—Screw, cap, 1-8NC-3 x 2¼—123205 (2 reqd)
AA—Washer, lock, med, 1 in.—131048 (2 reqd)
BB—Post, pivot—AWR-HCF1781
CC—Cup, bearing—706935
DD—Cone, bearing—7409658
EE—Shim, spacing, 0.005 thk—AWR-HCF463
FF—Shim, spacing, 0.007 thk—AWR-HCF464
GG—Shim, spacing, 0.020 thk—AWR-HCF465
HH—Fitting, lubricating—504208 (2 reqd)
JJ—Nut, safety, ⅝-18NF-3—503331
KK—Nut, hex, ⅝-18NF-3—117053 (2 reqd)
LL—Washer, ext teeth, 1 1/16 in.—116043 (2 reqd)
MM—Washer, plain, 21/32 id, 1 5/16 od—103345 (2 reqd)
NN—Plate, locking, swivel valve hub—AWR-HCF481A (2 reqd)
PP—Cap, support, post, pivot—AWR-HC63C
QQ—Support, shipper—AWR-HCF2010A
RR—Screw, cap, special—AWR-HCF1551A (10 reqd)
SS—Nut, safety, 1-14NF-3—503367 (10 reqd)
TT—Shaft, anchor, lift cylinder—AWR-HCF1316A
UU—Pin, cotter, 3/16 x 3—103415
VV—Nut, safety, 1¼-12NF-3—503409
WW—Plate, stop—AWR-HCF1311
XX—Fitting, lubricating—504208
YY—Fitting, lubricating—504208
ZZ—Shield, gear, post, pivot—AWR-HCF1288C
AB—Felt, shield, gear—7409788
AC—Stud, mounting, 1-8NC-5 (1⅛) x 1-14NF-3 (1 11/16) x 3¾—AWR-HCF1323B (13 reqd)
AD—Plug, pipe, sq-hd, 1 in.—444598
AE—Nut, safety, 1-14NF-3—503367 (13 reqd)
AF—Nut, safety, 1-14NF-3—503367 (6 reqd)
AG—Fitting, lubricating—504208
AH—Nut, jam, 7/16-14NC-2—124834
AJ—Screw, set, special—AWR-AW758058

Figure 50—Continued.

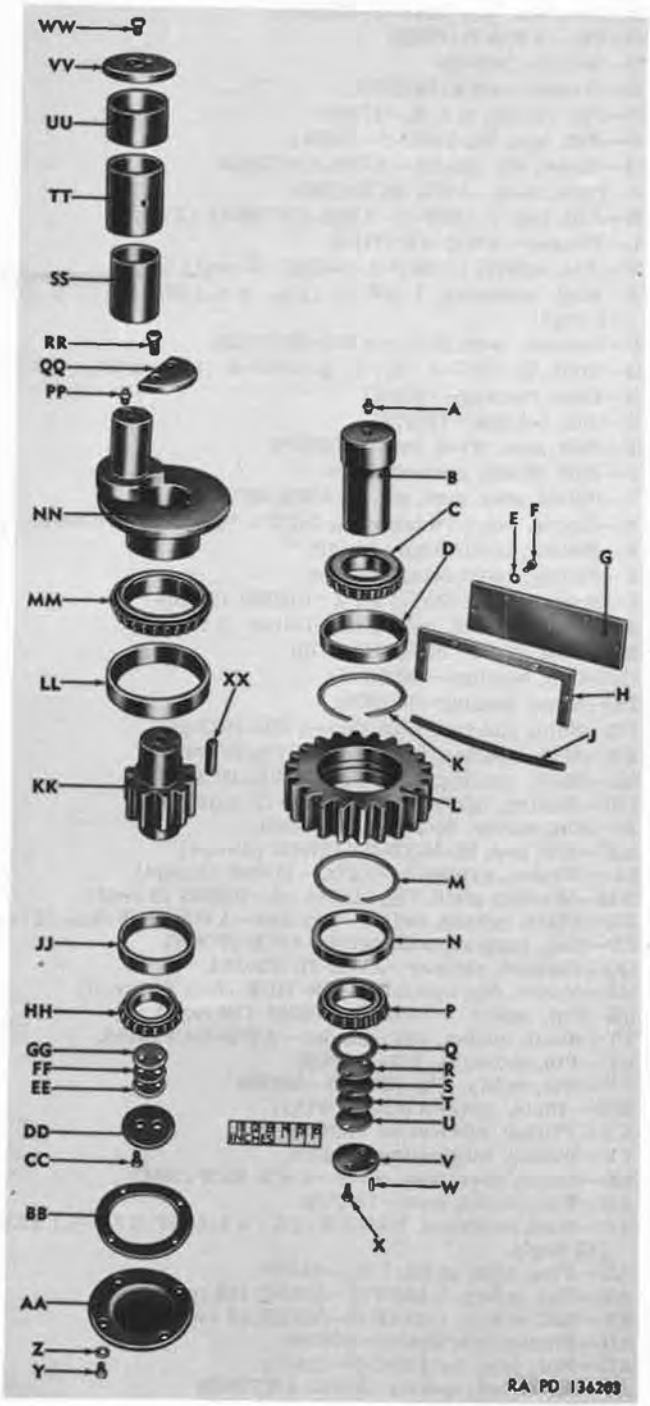


Figure 51. Drive pinion and idler gear—exploded view.

bearings by removing or adding spacing shims (R, S, T, and U) until a very slight drag is felt when the idler gear is revolved.

(2) Remove the idler gear assembly and keep the shim pack intact for final assembly.

A—Fitting, lubricating—504208
B—Shaft, gear, idler, pinion, drive—AWR-HCF527A
C—Cone, bearing—705051
D—Cup, bearing—706649
E—Washer, lock, ⅜ in.—120382
F—Screw, cap, ⅜-24NF-3 x ¾—AWR-HCF518
G—Cover, housing, gear, idler—AWR-HCF1359
H—Gasket, cover, housing, gear, idler—AWR-HCF1301
J—Felt, cover, housing, gear, idler—AWR-HCF1360
K—Ring, snap, bearing, gear, idler, pinion, drive—AWR-PGF8439A
L—Gear, idler, pinion, drive—AWR-HCF1284A
M—Ring, snap, bearing, gear, idler, pinion, drive—AWR-PGF8439A
N—Cup, bearing—706649
P—Cone, bearing—705051
Q—Washer, spacing—AWR-HCF562
R—Shim, spacing, 0.005 thk—AWR-HCF522
S—Shim, spacing, 0.007 thk—AWR-HCF523
T—Shim, spacing, 0.007 thk—AWR-HCF523
U—Shim, spacing, 0.020 thk—AWR-HCF524
V—Plate, retaining—AWR-HCF544
W—Pin, dowel—AWR-HCF553
X—Screw, cap, ⅜-24NF-3 x ¾—AWR-HCF518
Y—Screw, cap, ⅜-24NF-3 x 1—AWR-AW91715
Z—Washer, lock, ⅜ in.—120382
AA—Cover, bearing, lower, pinion, drive—AWR-HC152A
BB—Gasket, cover, bearing, lower, pinion, drive—AWR-BRF976
CC—Screw, cap, ⅜-24NF-3 x ¾—AWR-HCF518
DD—Plate, adjusting, pinion, drive—AWR-HCF1531
EE—Shim, spacing, 0.005 thk—AWR-HCF1533
FF—Shim, spacing, 0.007 thk—AWR-HCF1534
GG—Shim, spacing, 0.020 thk—AWR-HCF1532
HH—Cone, bearing—705051
JJ—Cup, bearing—706649
KK—Pinion, drive—7409841
LL—Cup, bearing—7376263
MM—Cone, bearing—7409786
NN—Crank, pinion, drive—7409724
PP—Fitting, lubricating—504208
QQ—Plate, retaining, pinion, drive—AWR-HCF520A
RR—Screw, cap, ⅜-24NF-3 x ⅞—AWR-HCF518
SS—Bushing—7409656
TT—Bushing—7409747
UU—Bushing—7409199
VV—Plate, retaining—AWR-PGF8243A
WW—Screw, special—AWR-ASF3784
XX—Key, Woodruff, ⅜ x 2—AWR-PGF5523

Figure 51—Continued.

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c. Drive Pinion and Crank (fig. 51).

(1) Assemble drive pinion (KK) and drive pinion crank (NN) with bearings in housing of base plate as described in paragraph 103*c*. Adjust bearings by removing or adding spacing shims (EE, FF, and GG) until a very slight drag is felt when the drive pinion is revolved.

(2) Removal of the drive pinion and crank, after the adjustment, is not required.

d. Pivot Post and Support (fig. 50).

(1) *General.* The pivot post bearings must be adjusted with the drive pinion idler gear removed from the base plate. The pivot post gear shields (V and ZZ), gear shield felt (U and AB), and inner pivot post seal (T) must not be assembled to avoid drag for bearing preload adjustment.

(2) *Assembly.* Assemble pivot post and bearings to pivot post support as outlined in paragraph 103*d*, omitting inner pivot post seal (T).

(3) *Adjustment.* Attach a rope to one of the large studs, used for mounting the stop plate (WW), and feed rope down into the gear shield felt groove of the pivot post (BB). Attach a scale to the rope. Adjust bearings by removing or adding spacing shims (EE, FF, and GG) under the pivot post support cap (PP), until a 12 to 15 pound pull is required on the scale to turn the pivot post.

(4) *Removal.* The pivot post must then be removed for installation of the inner pivot post seal (T). Keep the shim pack intact for final assembly.

e. Final Assembly. After all adjustments are made and size of shim packs are determined, assemble as described in paragraph 103.

Section XI. REBUILD OF SHIPPER AND BOOM ASSEMBLY

105. Disassembly of Boom and Shipper Assembly (Depot Maintenance)

a. Removing Boom From Shipper.

(1) Remove 45° elbow with hose assembly from end of piston rod. Bend lip on piston rod lock plate (fig. 52) from piston rod nut and remove both nuts and plate.

(2) Pull boom from shipper only far enough to attach a chain sling. Attach chain to an overhead hoist and remove boom from shipper (fig. 53).

Caution: When extending boom from shipper to attach chain, boom must be supported at sheave end to prevent tilting which could cause serious injury to personnel.

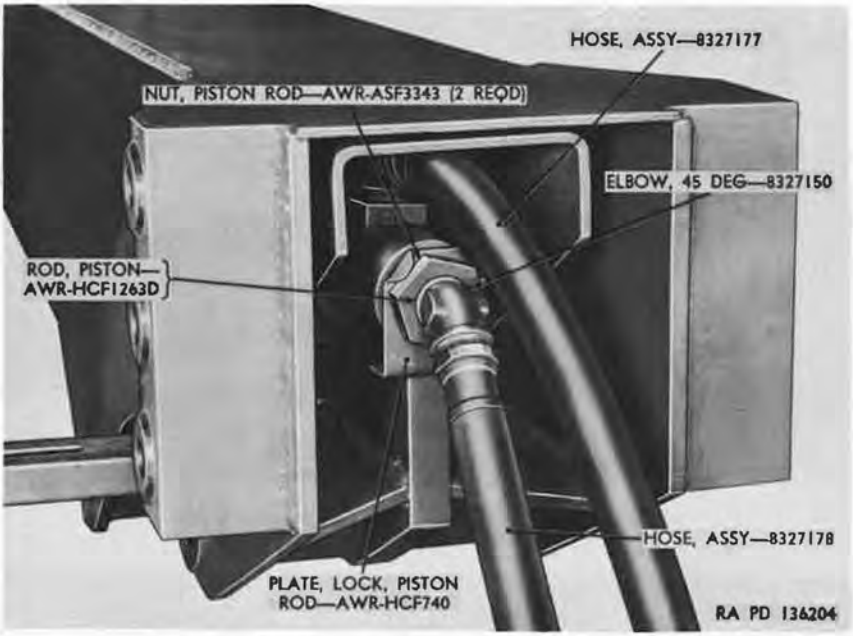


Figure 52. Disconnect points for boom removal.

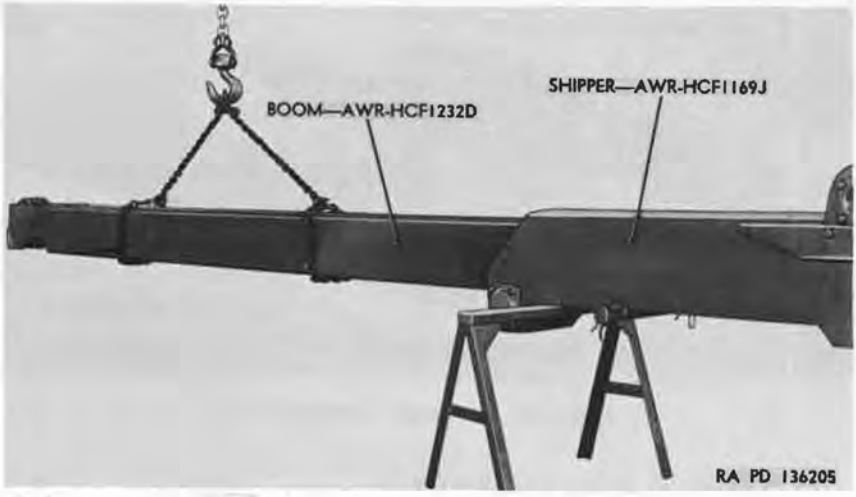


Figure 53. Removing boom from shipper.

b. Removing Boom Cylinder From Boom (fig. 54).

(1) Remove cotter pins from cylinder collar pins and remove pins.

(2) Attach a chain to support boom cylinder. Remove boom cylinder from boom.

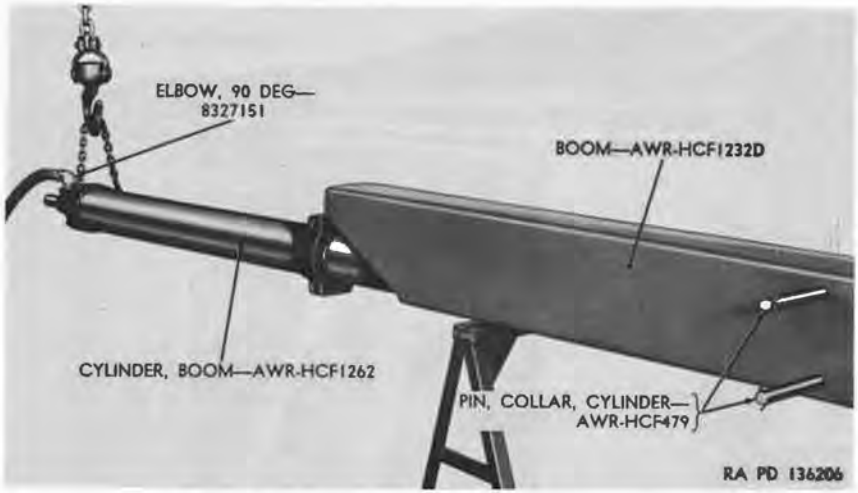


Figure 54. Removing boom cylinder from boom.

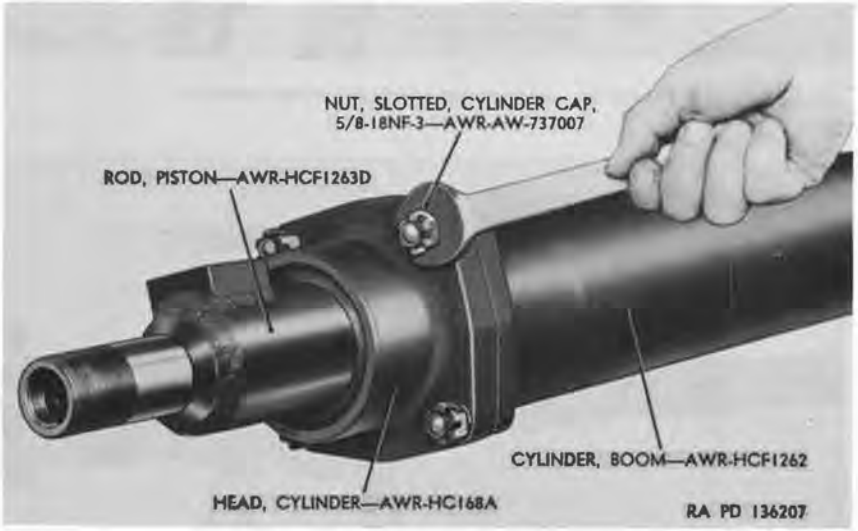


Figure 55. Removing cylinder head.

c. Disassembly of Boom Cylinder.

(1) Remove cotter pins and four slotted nuts from cylinder head (fig. 55) and separate piston rod with cylinder head from boom cylinder.

(2) Remove two piston nuts, piston rod cup spreaders, piston rod cups, and one piston rod cup spacer (fig. 56) from piston rod.

(3) Slide cylinder head to piston end of piston rod and remove cylinder head snap ring, washer, piston rod leather wiper,

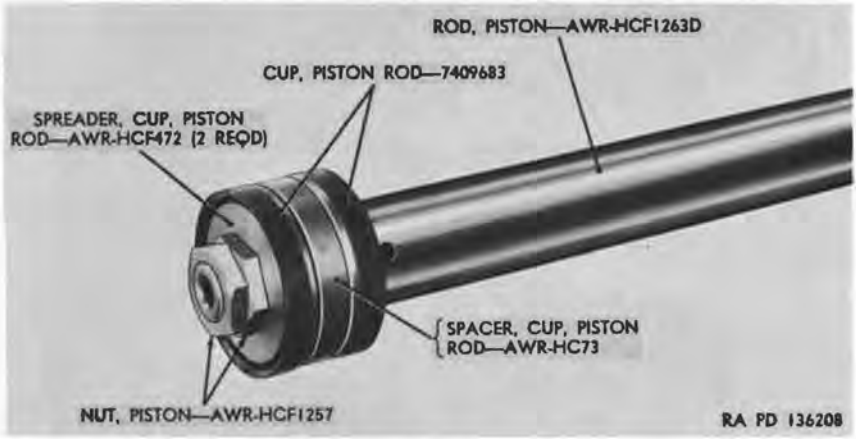


Figure 56. Piston assembly.

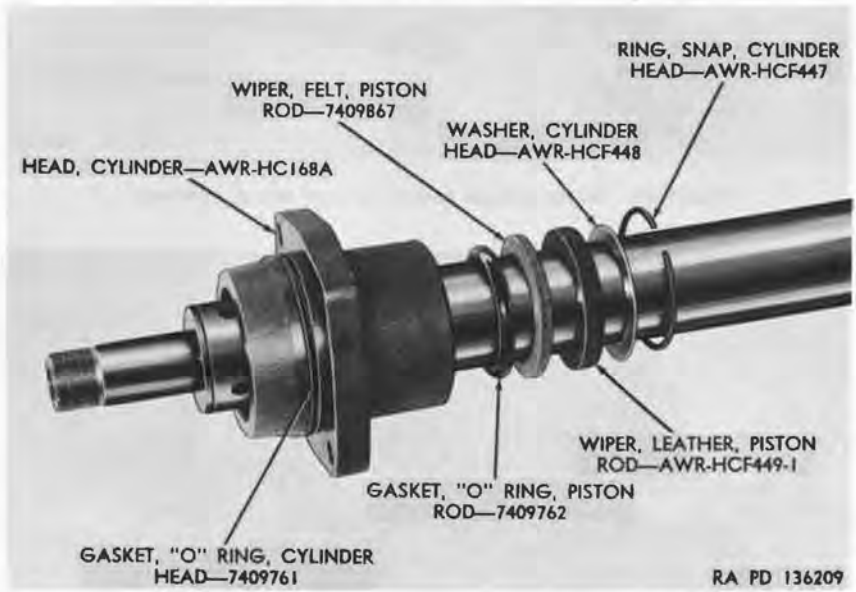


Figure 57. Cylinder head and seal assembly.

felt wiper, and O ring gasket from cylinder head (fig. 57). Remove cylinder head O ring gasket (fig. 57) from cylinder head.

d. Disassembly of Shipper.

(1) Remove four cap screws and lockwashers from each front bottom roller cap. Remove front bottom roller cap and shims from each side of shipper (fig. 58).

Note. Keep each shim pack intact to facilitate final assembly.

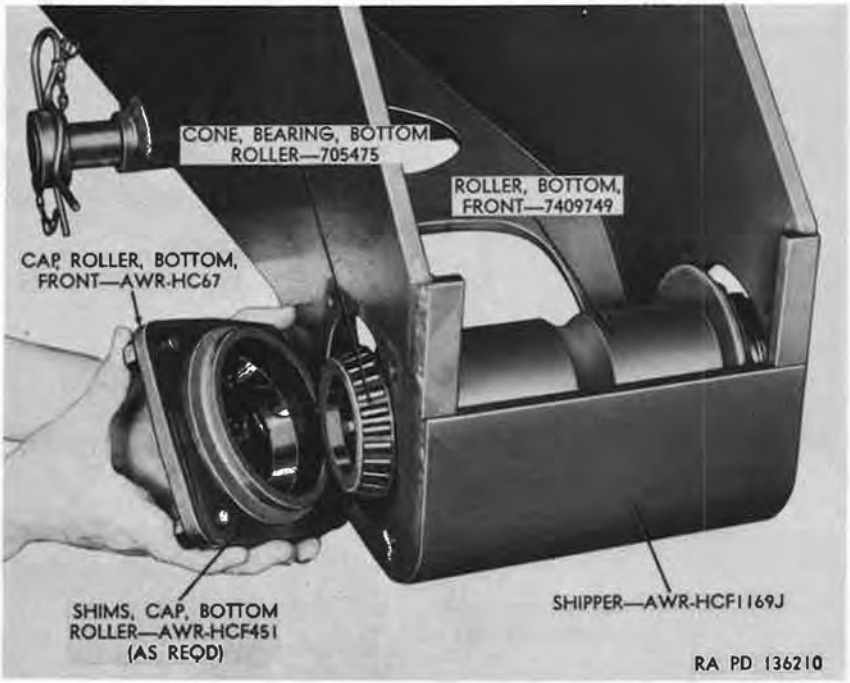


Figure 58. Front bottom roller cap and shims removed.

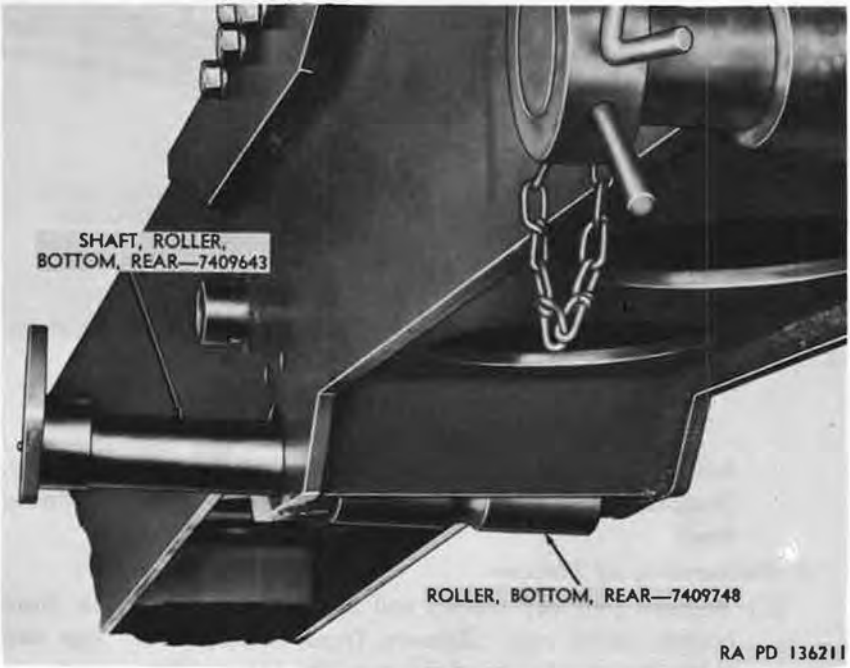


Figure 59. Rear bottom roller and shaft partially removed.

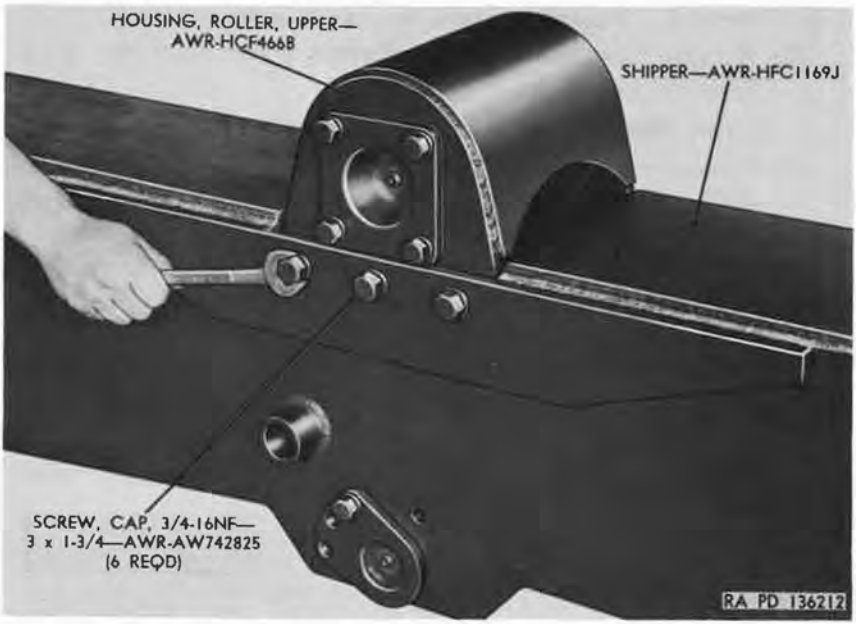


Figure 60. Removing upper roller housing assembly.

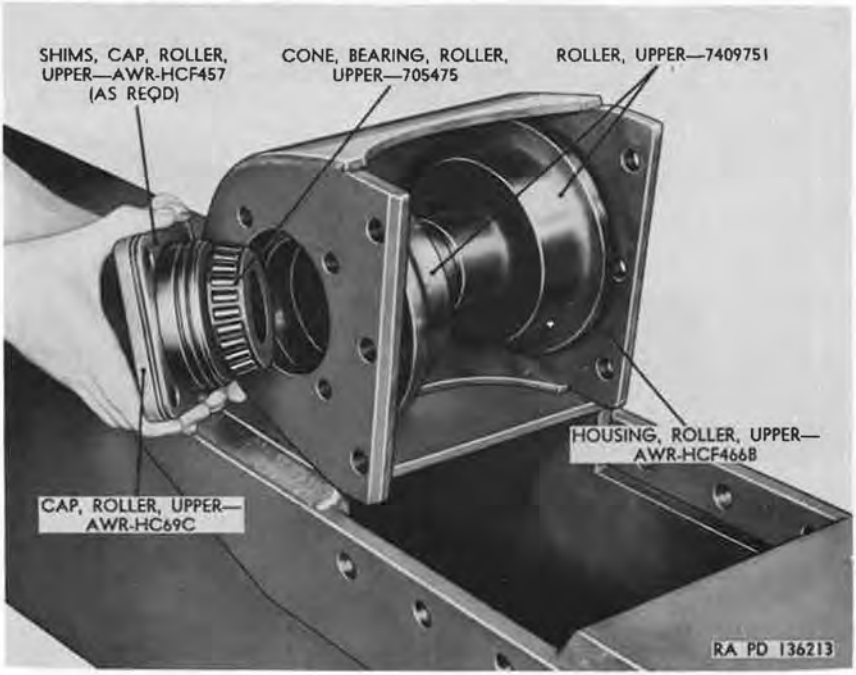


Figure 61. Removing upper roller cap, shims, and bearing.

(2) Install puller on front bottom roller bearing cone and remove bearing. Remove opposite bearing in same manner.

(3) Remove front bottom roller (fig. 58) with collars and shims from shipper.

Note. Keep each shim pack intact to facilitate final assembly.

(4) Remove cap screw and lockwasher from rear bottom roller shaft. Remove shaft and rear bottom roller (fig. 59) from shipper.

(5) Do not remove rear bottom roller bushings unless inspection (par. 106) warrants replacement. To remove, use suitable adapter and press bushing from roller.

(6) Remove three cap screws and lockwashers on each side of upper roller housing (fig. 60) and remove housing assembly from shipper.

(7) Remove four cap screws and lockwashers from upper roller

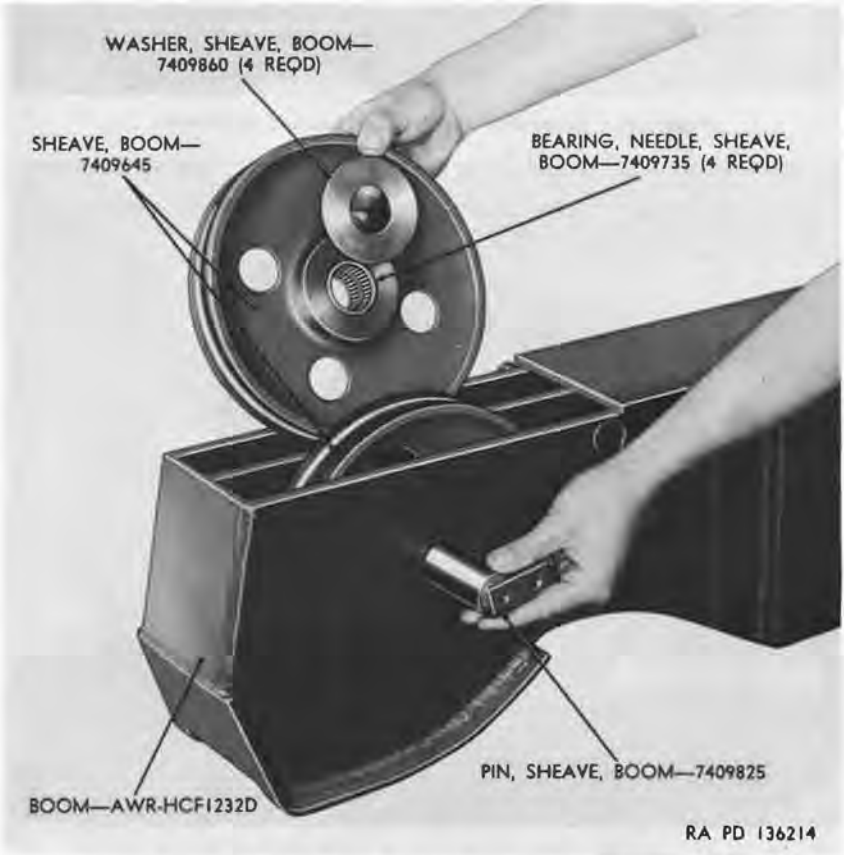


Figure 62. Removing boom sheave pin, sheaves, and bearings.

cap. Remove upper roller cap, shims, and bearing cone from upper roller housing (fig. 61). Remove opposite cap and bearing in same manner.

Note. Keep each bearing shim pack intact to facilitate final assembly.

(8) Remove upper rollers (fig. 61) and upper roller pin from housing. Slide upper rollers and upper roller shims from pin. Do not remove upper roller bearing cap from roller unless inspection (par. 106) warrants replacement.

Note. Keep each shim pack intact to facilitate assembly.

(9) Use suitable adapter and remove shipper pivot shaft bushings (CC and DD, fig. 64) from shipper if inspection warrants replacement.

e. Disassembly of Boom and Crane Block Sheave (fig. 66).

(1) Remove cap screw and lockwasher securing boom sheave pin to boom. Remove two boom sheaves, four needle bearings (E, F, J and K), and washers (B, C, G and L) from boom (fig. 62).

(2) Remove pin clip (R), and drive boom cable anchor pin (S) from boom.

(3) Remove pin clips (Z) and crane block cable anchor pin (EE) from crane block. Remove tapping screw (BB) and block washer, crane block sheave pin (AA), crane block sheave (FF), crane block sheave bearings (V and W) and sheave washers (X and GG) from crane block.

f. Cleaning. Use a stiff bristle brush and clean all parts with volatile mineral spirits or dry-cleaning solvent. Rinse bearings in clean volatile mineral spirits and cover bearings to protect from dirt.

106. Inspection and Repair (Depot Maintenance)

a. Bearings. Inspect bearings for pitted, scored, or scratched condition. Replace any defective bearings.

b. Rollers. Inspect rollers for worn or damaged condition. Replace worn or damaged rollers.

c. Boom. Inspect boom for cracked welds or bent condition. In general, defective welds can be repaired by welding. If not, replace boom.

d. Pin Assemblies. Inspect pins for worn condition and replace defective pins.

e. Cylinder. Inspect bore of cylinder for scratches or scoring. Replace damaged cylinder.

f. Piston Rod. Inspect piston rod for nicks or scratches. Remove

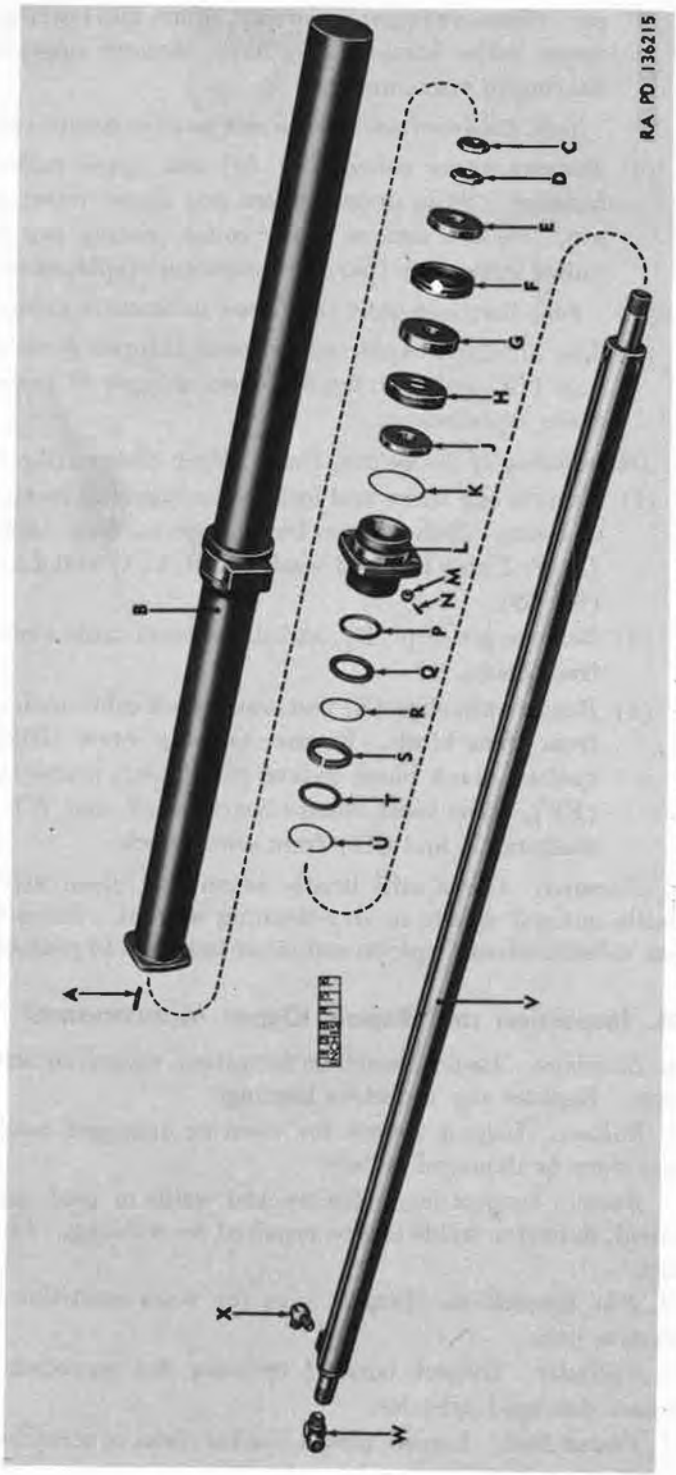


Figure 63. Boom cylinder assembly—exploded view.

A—Stud, cylinder head, 5/8–11NC–5 (3/4) x 5/8–18NF–3 (7/8) x 2 9/16—AWR–HCF1544 (4 reqd)
B—Cylinder, boom—AWR–HCF1262
C—Nut, piston rod—AWR–HCF1257
D—Nut, piston rod—AWR–HCF1257
E—Spreader, cup, piston rod—AWR–HCF472
F—Cup, piston rod—7409683
G—Spacer, cup, piston rod—AWR–HC73
H—Cup, piston rod—7409683
J—Spreader, cup, piston rod—AWR–HCF472
K—Gasket, O ring, cylinder head—7409761
L—Head, cylinder—AWR–HC168A
M—Nut, slotted, cylinder cap, 5/8–18NF–3—AWR–AW737007 (4 reqd)
N—Pin, cotter, 5/32 x 1 1/4—137218
P—Gasket, O ring, piston rod—7409762
Q—Wiper, felt, piston rod—7409867
R—Spring, wiper, piston rod—AWR–HCF449–2
S—Wiper, leather, piston rod—AWR–HCF449–1
T—Washer, cylinder head—AWR–HCF448
U—Ring, snap, cylinder head—AWR–HCF447
V—Rod, piston—AWR–HCF1263D
W—Elbow, 45 degree—8327150
X—Elbow, 90 degree—8327151

Figure 63—Continued.

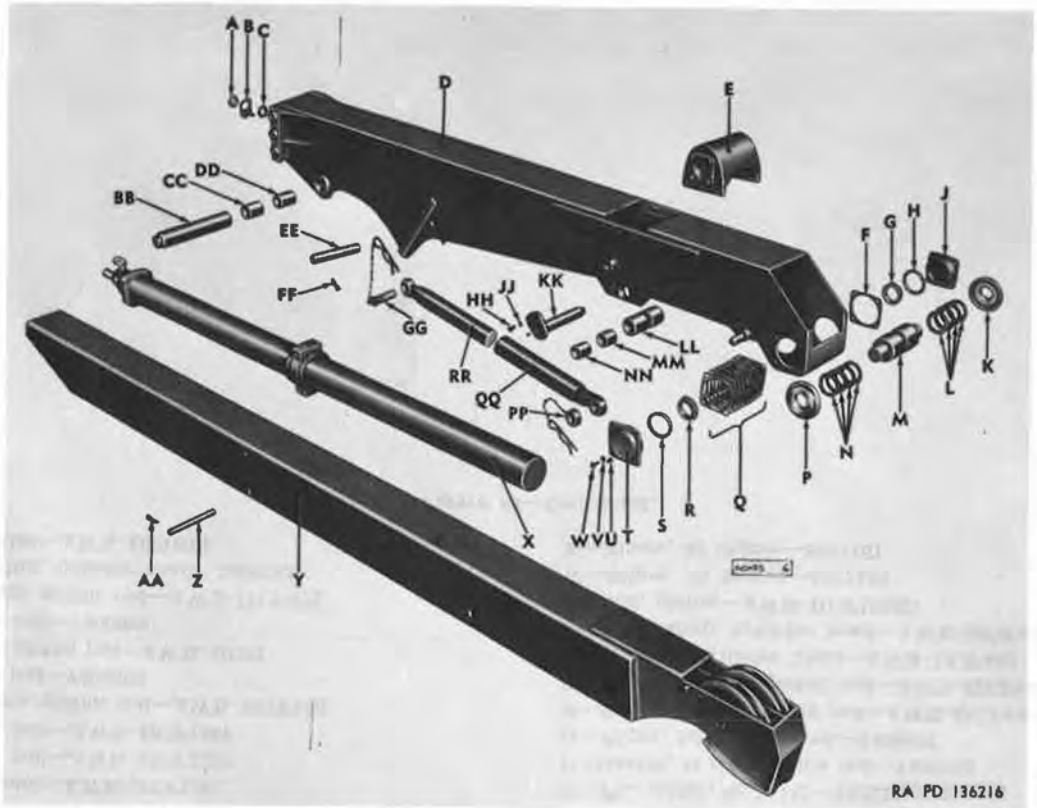


Figure 64. Shipper and boom assembly—exploded view.

A—Nut, piston rod—AWR-ASF3343
B—Plate, lock, piston rod—AWR-HCF740
C—Nut, piston rod—AWR-ASF3343
D—Shipper—AWR-HCF1169J
E—Housing, roller, upper—AWR-HCU234
F—Shims, cap, bottom roller—AWR-HCF452 (as reqd)
G—Cone, bearing, bottom roller—705475
H—Cup, bearing, bottom roller—706875
J—Cap, roller, bottom, front—AWR-HC67
K—Collar, roller, bottom, front—AWR-HCF469C
L—Shim, collar, bottom roller—AWR-HCF1287
M—Roller, bottom, front—7409749
N—Shim, collar, bottom roller—AWR-HCF1287
P—Collar, roller, bottom, front—AWR-HCF469C
Q—Shims, cap, bottom roller—AWR-HCF451 (as reqd)
R—Cone, bearing, bottom roller—705475
S—Cup, bearing, bottom roller—706875
T—Cap, roller, bottom, front—AWR-HC67
U—Fitting, lubricating—504208
V—Washer, lock, ½ in.—AWR-AW778013
W—Screw, cap, ½-20NF-3 x 1—AWR-AW742630
X—Cylinder, boom—AWR-HCU308
Y—Boom, AWR-HCF1232D
Z—Pin, collar, cylinder—AWR-HCF479 (2 reqd)
AA—Pin, cotter, 5/16 x 1½—103409
BB—Pin, pivot, shipper—7409837
CC—Bushing, shaft, pivot, shipper—7409745
DD—Bushing, shaft, pivot, shipper—7409745
EE—Shaft, pivot, lift cylinder—AWR-HCF904
FF—Screw, set, sq-hd, ½-13NC-3 x 2—544490
GG—Pin, brace, shipper—7409829
HH—Screw, cap, 5/8-18NF-3 x 1¼—181576
JJ—Washer, lock, 5/8 in.—121574
KK—Shaft, roller, bottom, rear—7409643
LL—Roller, bottom, rear—7409748
MM—Bushing, roller, bottom, rear—7409744
NN—Bushing, roller, bottom, rear—7409744
PP—Collar, pin, brace, shipper—7409718
QQ—Brace, shipper, female—AWR-HCF1994
RR—Brace, shipper, male—AWR-HCF1993
SS—Fitting, lubricating—504208

Figure 64—Continued.

slight nicks or scratches with a soap stone or fine mill file. Replace piston rod if distorted or damaged.

g. Shipper. Inspect shipper for cracked welds or bent condition. Defective welds can be repaired by welding. Replace shipper if bent, twisted, or damaged.

107. Assembly (Depot Maintenance)

a. Boom Cylinder Assembly (fig. 63).

(1) Install piston rod wiper spring (R) on leather wiper (S).

(2) Position piston rod O ring gasket (P), felt wiper (Q), leather wiper (S), and cylinder head washer (T) in cylinder head (L). Secure with cylinder head snap ring (U). Position cylinder head O ring gasket (K) on cylinder head.

(3) Slide cylinder head (L) on piston rod (V). Assemble piston rod cup spreaders (E and J), cups (F and H), and cup spacer (G) on piston rod as shown in figure 56. Secure with piston rod nuts (D and C).

(4) Install four 5/8–11NC–5 (3/4) x 5/8–18NF–3 (7/8) x 2 9/16 cylinder head studs (A) in boom cylinder (B). Apply a coat of light engine oil to piston and install piston and piston rod assembly in boom cylinder. Secure cylinder head (L) to boom cylinder with four 5/8–18NF–3 cylinder cap slotted nuts (M) and lock with new 5/32 x 1 1/4 cotter pins (N).

b. Assemble Shipper.

(1) *Assemble front and rear bottom rollers* (fig. 64).

(*a*) Position bottom roller collar shims (L and N) and front bottom roller collars (K and P) on front bottom roller (M). Position roller with collar and shims in end of shipper (D) and install bottom roller bearing cones (G and R) on each end of roller as shown in figure 58.

(*b*) Use suitable adapter and press bottom roller bearing cup (H) in front bottom roller cap (J). Install bottom roller bearing cup (S) in front bottom roller cap (T) in the same manner.

(*c*) Position bottom roller cap shims (Q) as removed, and front bottom roller cap (T) on shipper (D) and secure with four 1/2–20NF–3 x 1 cap screws (W) and 1/2-inch lockwashers (V). Follow same procedure for installing bottom roller cap shims (F) and front bottom roller cap (J).

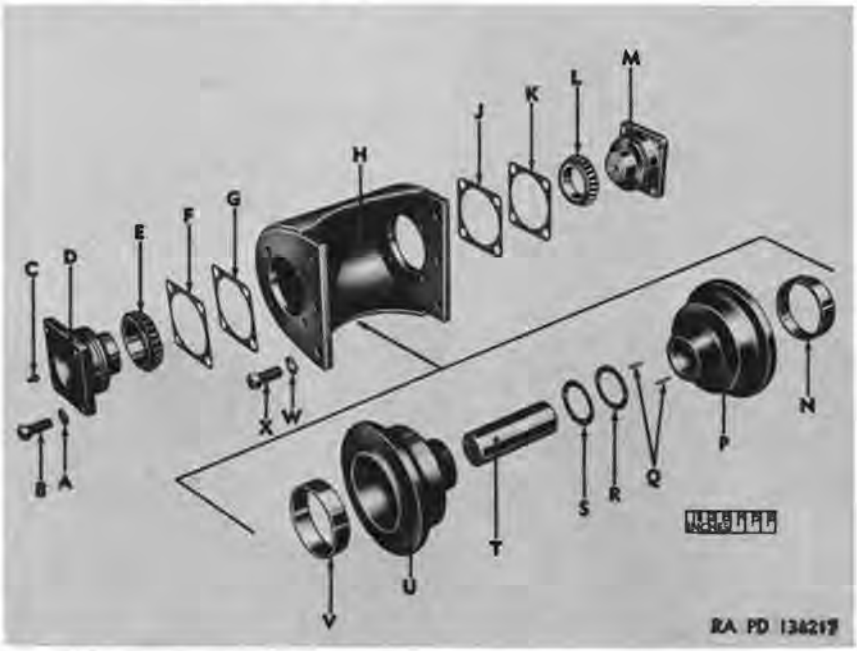
(*d*) If bushings were removed, press rear bottom roller bushing (MM and NN) in each end of rear bottom roller (LL). Position roller in shipper (D) and secure with rear bot-

tom roller shaft (KK). Secure shaft with 5/8–18NF–3 x 1¼ cap screws (HH) and 5/8-inch lockwashers (JJ).

(*e*) Use suitable adapter and install shipper pivot shaft bushings (CC and DD) in each side of shipper (D).

(2) *Assemble upper roller* (fig. 65).

(*a*) Use suitable adapter and press upper roller bearing cup (V) in upper roller (U) and upper roller bearing cup (N) in upper roller (P).



A—Washer, lock, 5/8 in.—AWR–AW778015
B—Screw, cap, 5/8–18NF–3 x 1¼—AWR–AW742786
C—Fitting, lubricating—504208
D—Cap, roller, upper—AWR–HC69C
E—Cone, bearing, roller, upper—705475
F—Shim, cap, roller, upper—AWR–HCF457 (as reqd)
G—Shim, cap, roller, upper—AWR–HCF458 (as reqd)
H—Housing, roller, upper—AWR–HCF466B
J—Shim, roller, upper—AWR–HCF458
K—Shim, roller, upper—AWR–HCF457
L—Cone, bearing, roller, upper—705475
M—Cap, roller, upper—AWR–HC69C
N—Cup, bearing, roller, upper—706875
P—Roller, upper—7409751
Q—Pin, dowel, roller, upper—AWR–HCF550
R—Shim, spacing, roller, upper—AWR–HCF495
S—Shim, spacing, roller, upper—AWR–HCF495
T—Shaft, roller, upper—AWR–HCF496
U—Roller, upper—7409751
V—Cup, bearing, roller, upper—706875
W—Washer, lock, ¾ in.—AWR–AW778017
X—Screw, cap, ¾–16NF–3 x 1¾—AWR–AW742825

Figure 65. Upper roller assembly—exploded view.

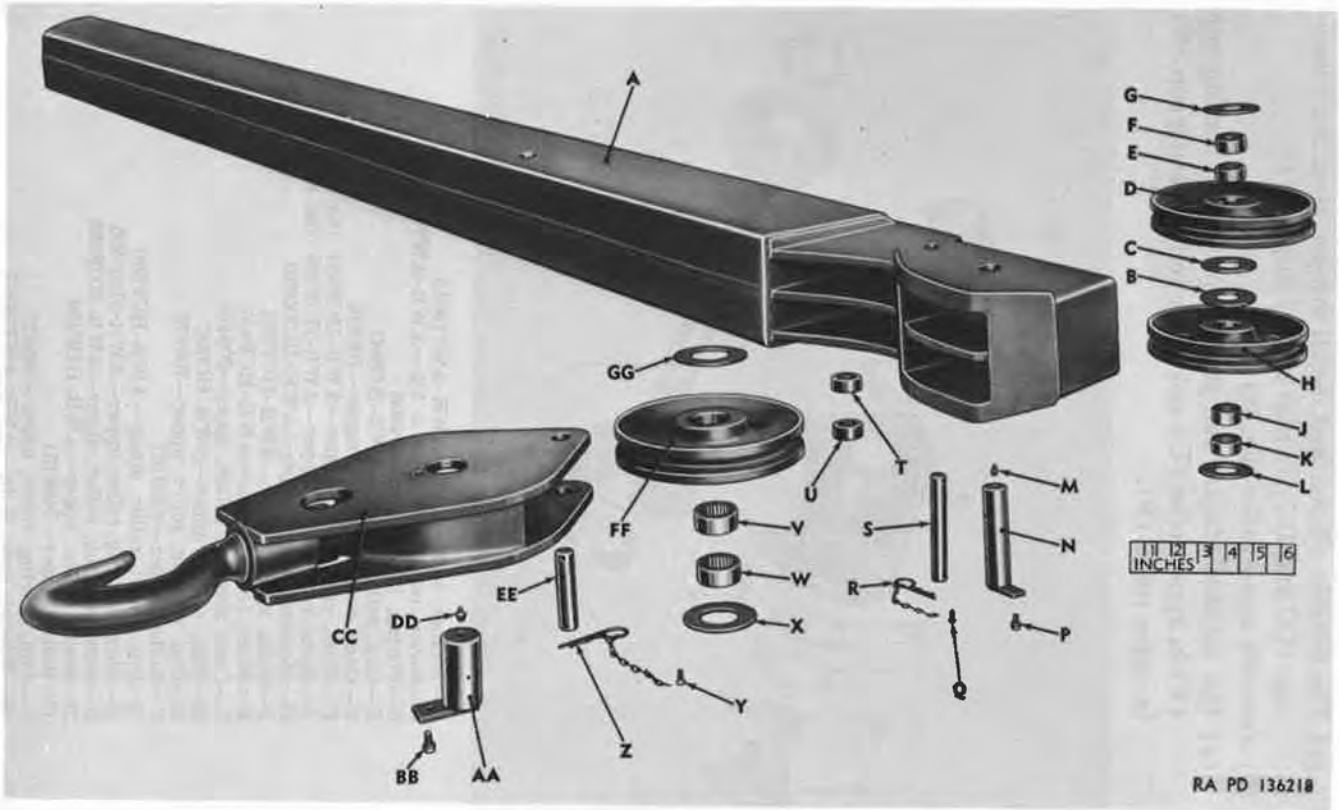


Figure 66. Boom and crane block sheaves—exploded view.

A—Boom—AWR–HCF1232D
B—Washer, sheave, boom—7409860
C—Washer, sheave, boom—7409860
D—Sheave, boom—7409645
E—Bearing, needle, sheave, boom—7409735
F—Bearing, needle, sheave, boom—7409735
G—Washer, sheave, boom—7409860
H—Sheave, boom—7409645
J—Bearing, needle, sheave, boom—7409735
K—Bearing, needle, sheave, boom—7409735
L—Washer, sheave, boom—7409860
M—Fitting, lubricating—504208
N—Pin, sheave, boom—7409825
P—Bolt, hex hd, w/washer, ⅜–24NF–2 x ¾—9409113
Q—Screw, tapping, hex hd, ¼–20NC–2 x ½—171026
R—Clip, pin—7409515 (2 reqd)
S—Pin, anchor, cable, boom—AWR–HCF1785
T—Spacer, sheave, boom—AWR–HCF1784
U—Spacer, sheave, boom—AWR–HCF1784
V—Bearing, sheave, crane block—7409736
W—Bearing, sheave, crane block—7409736
X—Washer, sheave, crane block—7409861
Y—Screw, tapping, ¼–20NC–2 x ½—171026
Z—Clip, pin—7409515 (2 reqd)
AA—Pin, sheave, crane block—7409828
BB—Screw, tapping, ¼–20NC–2 x ½—171026
CC—Block, crane—7409689
DD—Fitting, lubricating—504208
EE—Pin, anchor, cable, crane block—7409826
FF—Sheave, crane block—7409646
GG—Washer, sheave, crane block—7409861

Figure 66—Continued.

(*b*) Install upper roller dowel pins (Q) in upper roller (P) and position spacing shims (S and R) on dowel pins. Install upper rollers (P and U) on shaft (T). Aline dowel pin holes in upper roller (U) with dowel pins on roller (P) and butt end of rollers together.

(*c*) Place upper rollers (U and P) assembled on shaft (T) into upper roller housing (H). Position upper roller cap shims (F and G), bearing cone (E), and cap (D), and secure to housing with four 5/8–18NF–3 x 1¼ cap screws (B) and 5/8-inch lockwashers (A). Assemble upper roller cap (M), bearing cone (L), and shims (J and K) in same manner as described for opposite cap and bearing. Secure upper roller housing (H) on shipper with four ¾–16NF–3 x 1¾ cap screws (X) and ¾-inch lockwashers (W). Lubricate according to lubrication instructions (TM 9–837).

c. Assembly Boom and Crane Block Sheave (fig. 66).

(1) Install boom sheave needle bearings (E and F) in sheave (D) and needle bearings (J and K) in sheave boom (H). Position boom sheaves with bearings in end of boom (A). Position boom sheave washers (B, C, G, and L) on each side of sheaves. Install boom sheave pin (N) in boom through sheaves. Secure pin with 3/8–24NF–2 x ¾ hex head bolt with washer (P). Install boom cable anchor pin (S) in boom (A) and secure each end of pin with pin clip (R).

(2) Install crane block sheave bearings (V and W) in crane block sheave (FF). Place sheave with bearing in crane block (CC). Position crane block sheave washers (X and GG) on each side of sheave in block. Install crane block sheave pin (AA) in block through sheave. Secure pin with ¼–20NC–2 x ½ tapping screw (BB) and block washer. Install crane block cable anchor pin (EE) in block and secure pin on each end with pin clip (Z).

d. Install Boom Cylinder in Boom.

(1) Install hose assembly (fig. 52) with 90° elbow (fig. 54) on side of piston rod as hose cannot be installed after cylinder is anchored in boom.

(2) Support boom cylinder with a chain hoist and position in boom (fig. 54). Anchor cylinder by installing cylinder collar pins (fig. 54) through collar on cylinder. Secure pins with two new cotter pins.

e. Install Boom in Shipper.

(1) Attach boom with a chain sling. Pick up boom with an overhead hoist and insert end of boom in shipper (fig. 53). Slide boom into shipper until boom cylinder is seated against cylinder anchor in shipper.

(2) Install piston rod nut, lock plate, and nut (fig. 52) on end of piston rod assembly and tighten securely. Bend lip on lock plate to secure nut.

Section XII. REBUILD OF WRECKER BODY AND OUTRIGGERS

108. Disassembly (Field and Depot Maintenance)

a. General. The wrecker body is of all welded steel construction and disassembly is limited to removal of the four outrigger assemblies (fig. 68) and the upper, lower, and vertical cable guide rollers (fig. 67). Replacement of the wrecker body necessitates removal of the complete wrecker crane and rear mounted winch. For complete and detailed instructions on removal of the wrecker body, refer to TM 9–837.

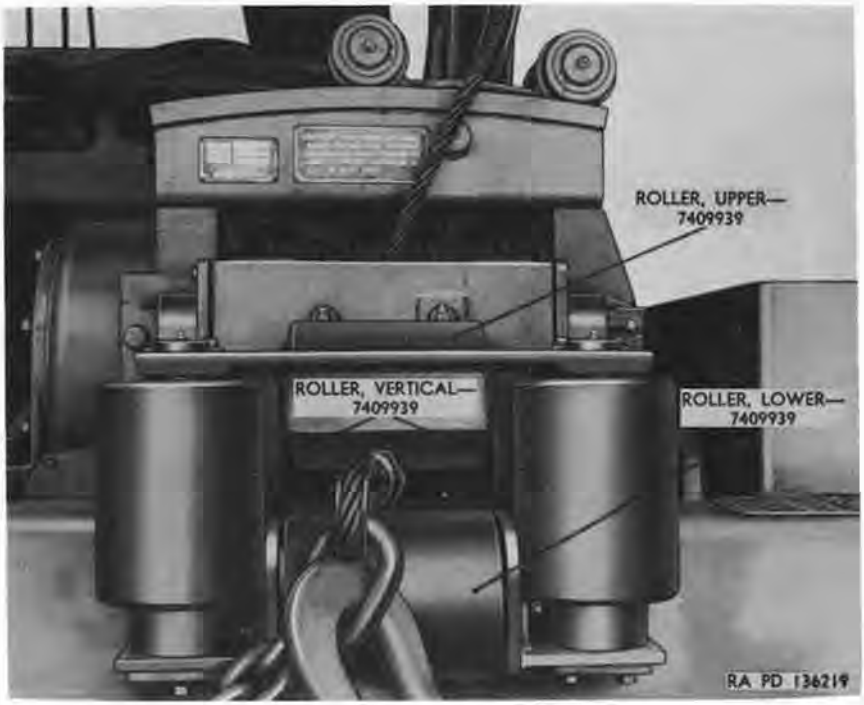


Figure 67. Rear winch cable guide rollers.

b. Outriggers (fig. 68).

(1) Remove two cap screws and lockwashers from outrigger stop and remove stop.

(2) Remove outrigger pin and remove the outrigger assembly.

Caution: With outrigger stop removed, the complete outrigger assembly must be supported during removal operation.

(3) Proceed in the same manner as outlined in (1) and (2) above and remove the other three outrigger assemblies.

c. Cable Guide Rollers.

(1) *Upper roller* (fig. 69). Remove two cap screws (A) and lockwashers (B) from keeper plate (C) and remove plate. Drive roller shaft (E) out and lift roller (G) with bearings, felt washers (D and J), and roller thrust washers (K and M) from mounting bracket.

(2) *Vertical rollers* (fig. 70). Remove two cap screws (B) and lockwashers (C) from keeper plate (D) at upper end of roller shaft (E). Use a pinch bar and pull shaft from the roller assembly. Remove roller assembly with roller thrust washers (G and N), felt washers (H and M), and roller bearing assemblies (J and L). Remove two cap screws (S) and

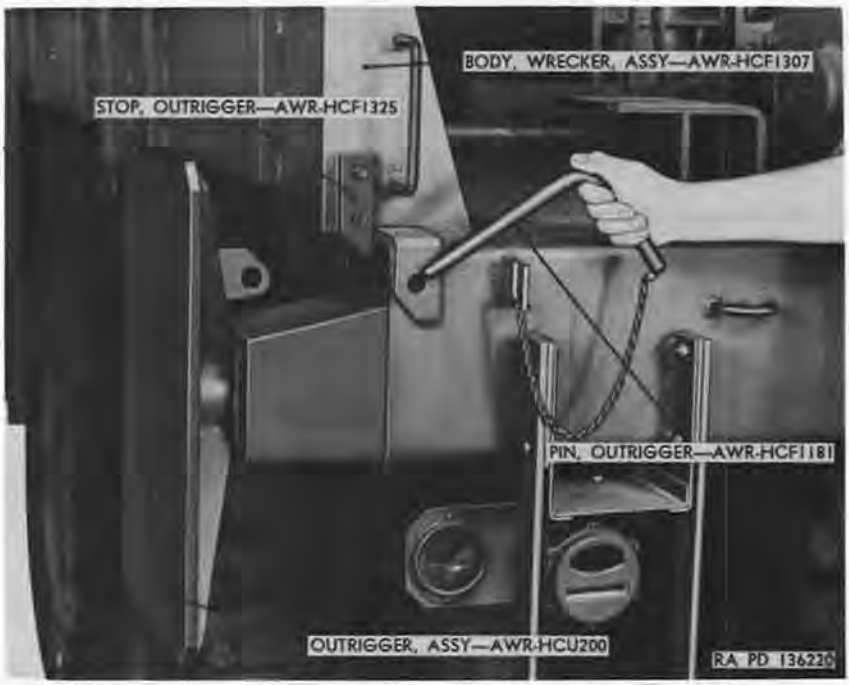


Figure 68. Removing outrigger assembly.

lockwashers (R) from filler plate (Q) and remove roller shaft spacer (P). Remove both vertical rollers in the same manner.

(3) *Lower roller* (fig. 69).

Note. The two vertical rollers must be removed before lower roller (fig. 67) can be removed.

Remove two cap screws (A) and lockwashers (B) from keeper plate (C) and remove lower roller shaft (E). Lift out roller (G) with roller bearing assemblies (F and H), felt washers (D and J), and roller thrust washer (K).

109. Cleaning, Inspection, and Repair (Field and Depot Maintenance)

a. Cleaning. Clean outriggers with volatile mineral spirits or dry cleaning solvent, paying particular attention to the screw jacks. Clean cable guide rollers, bearings, and thrust washers. Clean wrecker body thoroughly.

b. Inspection.

(1) *Outriggers.* Inspect outriggers for defective threads on screw jacks. Check for bent or damaged condition of components. Pay particular attention to welds and note for cracks or damage.

(2) *Cable guide rollers.* Inspect cable guide rollers for defective welds or damaged bores. Check thrust washers for scoring and wear. Place roller bearing assemblies on roller shafts and make sure they turn free and are not scored.

(3) *Wrecker body.* Inspect condition of all welds, paying particular attention to the cable guide roller brackets at the rear. Also inspect outrigger tubes for cracked welds or other damage.

c. Repair.

(1) *Outriggers.* Repairs are limited to welding and depending on extent of damage, straightening or replacing bent components.

(2) *Cable guide rollers.* Repairs consist chiefly of replacing the damaged components. The rollers can be welded if cracks are evident in the old welds.

(3) *Wrecker body.* Limited damage to wrecker body can be repaired by straightening or welding. Extensive damage to the body will require replacement of the complete assembly.

110. Assembly (Field and Depot Maintenance)

a. Wrecker Body. Installation of the wrecker body on the vehicle is covered in detail in TM 9–837.

b. Outriggers (fig. 68). Attach suitable hoisting equipment and

lift outrigger assembly into wrecker body outrigger tube. Position outrigger stop on body and secure with two cap screws and lockwashers. Secure outrigger assembly to body with outrigger pin.

c. Cable Guide Rollers.

(1) *Lower roller* (fig. 69). Position roller bearing assemblies (F and H) in each end of roller (G). Place felt washers (D and J) and roller thrust washers (M and K) on each end of roller. Place the roller assembly in bracket at rear of wrecker body and install lower roller shaft (E). Position keeper plate (C) in slot of shaft and secure with two 3/8–24NF–3 x 3/4 cap screws (A) and 3/8-inch lockwashers (B).

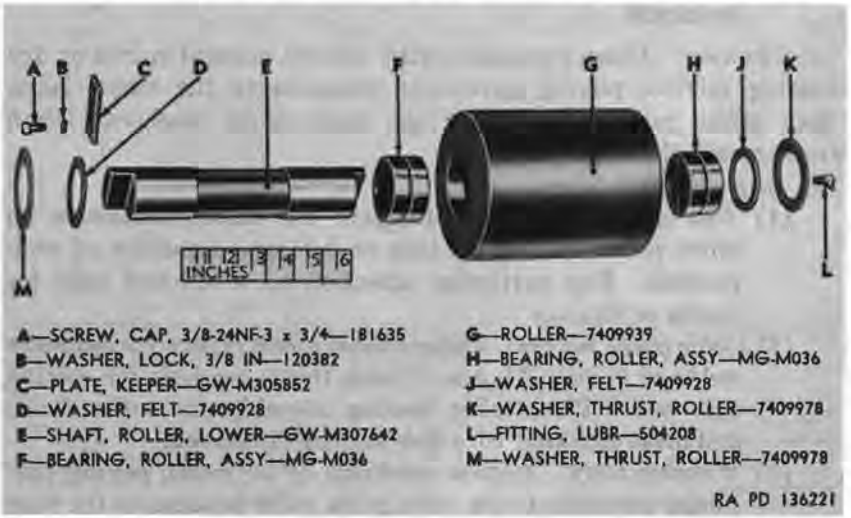


Figure 69. Lower cable guide roller—exploded view.

(2) *Upper roller.* Assemble upper roller in the same manner as the lower roller (1) above, with the exception of using roller shaft (E, fig. 70) in place of roller shaft (E, fig. 69).

(3) *Vertical rollers* (fig. 70). Position roller shaft spacer (P) on bracket and secure with filler plate (Q), two 5/8-inch lockwashers (R), and 5/8–18NC–2 x 1 3/8 cap screws (S). Assemble roller bearing assemblies (J and L), felt washers (H and M), and roller thrust washers (G and N) in roller (K). Position the roller assembly in the wrecker body roller bracket and install roller shaft (E). Secure shaft with keeper plate (D), two 3/8-inch lockwashers (C) and 3/8–24NF–3 x 3/4 cap screws (B). The left and right vertical rollers are assembled in the same manner.

Section XIII. REBUILD OF MISCELLANEOUS UNITS

111. General

This section covers units that are necessary to the operation of the wrecker crane assembly, but are small and contain very few moving parts. Disassembly is not necessary if units are working properly. However, if not working properly then disassemble unit as described. If disassembled, care must be taken to avoid dirt or dust from entering unit.

112. Rebuild of Restrictor Valve Assembly (Depot Maintenance) (fig. 71)

a. Disassembly. Remove four cap screws and washers from restrictor valve head and remove head and restrictor valve seat from body. Remove restrictor valve head O ring gasket from head. Clean parts in volatile mineral spirits or dry-cleaning solvent. Blow dry with compressed air.

b. Inspection and Repair.

(1) *Body and head.* Inspect threads in body and head for damage. Replace if threads are damaged.

(2) *O ring gasket.* Inspect O ring gasket for scratches and cuts. Replace defective gasket.

(3) *Seat.* Inspect seat for free movement in body. Replace seat if not free.

c. Assembly. Install restrictor valve seat (fig. 71) in body. Position restrictor valve head O ring gasket in head and secure head to body with four $\frac{3}{8}$–24NF–3 x $1\frac{1}{4}$ socket head cap screws and external-teeth lockwashers.

113. Rebuild of Relief Valve Assembly (Depot Maintenance) (fig. 73)

a. Disassembly.

(1) *General.* The relief valve setting is made at the factory and if valve is disassembled, a pressure gage must be used to reset valve.

Note. If a pressure gage is not available, do not attempt to disassemble this unit.

If facilities are available, disassembly is as follows.

(2) *Disassemble relief valve.*

(*a*) Remove cap nut (A), lock nut (B), and adjusting setscrew (C) from relief valve retainer (D).

(*b*) Remove relief valve retainer (D), O ring packing (E), spring seat (F), guide spring (G), and relief valve plunger (H) from relief valve body (K).

Figure 70. Vertical cable guide roller—exploded view.

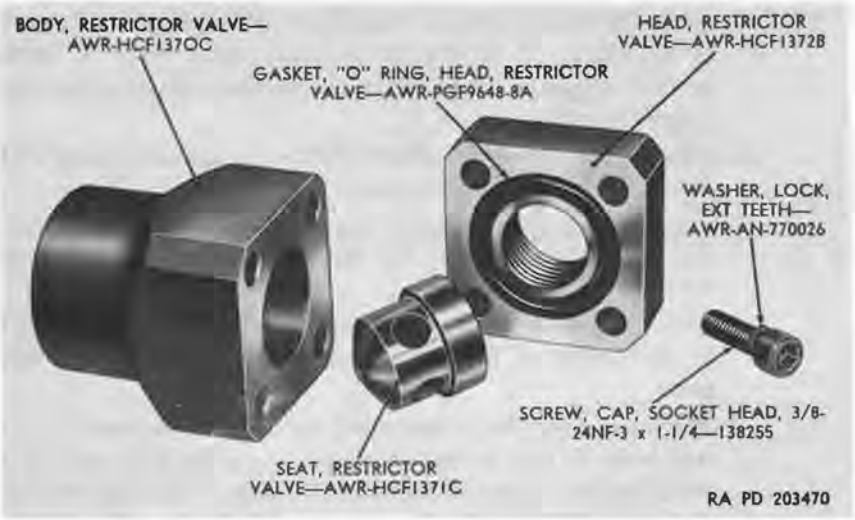


Figure 71. Restrictor valve assembly.

(*c*) Remove machine screw (N), gasket (M), and setscrew (L), and slide plunger sleeve (J) from relief valve body (K).

(*d*) Clean all parts in volatile mineral spirits or dry-cleaning solvent. Blow dry with compressed air.

b. Inspection and Repair.

(1) *Body.* Inspect body for cracks and damaged threads. If inspection warrants replacement of body, replace with a new relief valve assembly.

(2) *Plunger, sleeve, and spring.* Inspect plunger and sleeve for nicks or scratches. Remove slight nicks and scratches with a soap stone or fine mill file. Inspect spring for broken condition. If inspection warrants replacement of any of these parts, obtain relief valve repair kit 8327028.

c. Assembly of Relief Valve.

(1) *Assembly.*

(*a*) Position plunger sleeve (J) in relief valve body (K). Secure with setscrew (L), gasket (M), and machine screw (N).

(*b*) Place relief valve plunger (H), guide spring (G), and spring seat (F) in relief valve body (K). Position O ring packing (E) on relief valve retainer (D) and install on body.

(*c*) Install 3/8–24NF–3 adjusting setscrew (C) in retainer and secure with 3/8–24NF–3 lock nut (B) and cap nut (A).

(2) *Adjusting relief valve.*

(*a*) Adjustment of the relief valve can best be made after in-

stallation on the vehicle unless suitable testing equipment is available. A hydraulic pressure gage with a 1,200 pounds minimum capacity must be used when adjusting the relief valve.

(*b*) Remove pipe plug in elbow at hoist hydraulic motor and install hydraulic pressure gage.

Note. The pipe plug was put in the elbow specifically for the purpose of checking pressure and can be read from the operator's compartment.

(*c*) Lower the cable hook a considerable distance so there will be no danger of fouling the sheave block with the boom point.

(*d*) With the boom fully retracted, hold the boom crowd control lever in the retracted position. This will open the relief valve. Then at the same time, hold the cable hoist

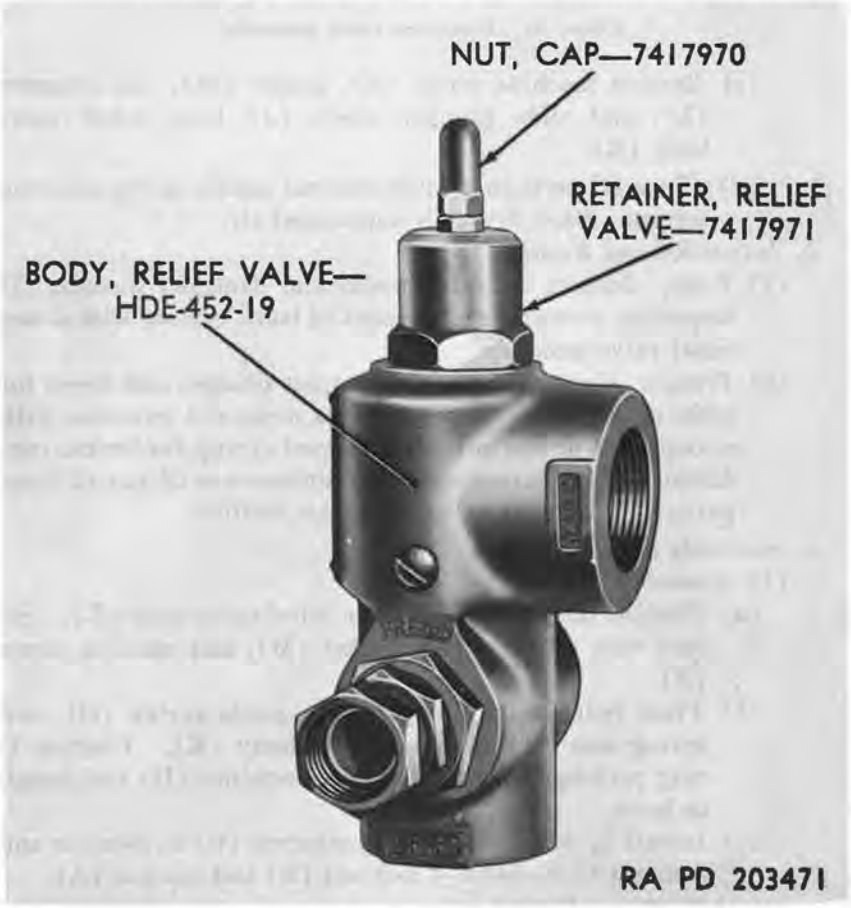


Figure 72. Relief valve assembly.

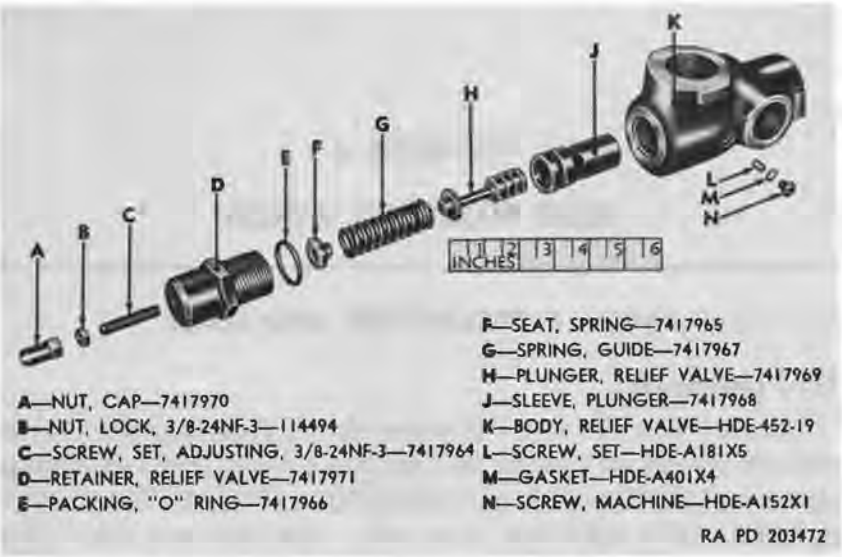


Figure 73. Relief valve assembly—exploded view.

control lever in the UP position. The reading on the gage will be the pressure at which the relief valve is cracking.

(*e*) To adjust the pressure up or down, remove cap nut (A) on top of relief valve and loosen lock nut (B). Using a screwdriver, turn adjusting setscrew (C) to the right to raise the pressure and to the left to lower the pressure. Pressure should be set at 1,200 psi. After the desired pressure is obtained, tighten lock nut (B), being careful the adjusting setscrew (C) does not move out of adjustment and replace cap nut (A).

Note. Care should be taken that lock nut and cap are tight so there will be no chance for these parts to loosen during operation.

114. Hydraulic Hose (Field Maintenance)

The hydraulic hose, used on the crane assembly, are of double rayon braid, and double wire braid rubber coated construction. The hose are amply strong to withstand pressures encountered. Hose are assembled at the factory with swedged on couplings and if leaks do occur, new hose assemblies must be used.

115. Hydraulic Oil Reservoir (Field and Depot Maintenance)

The hydraulic reservoir (fig. 3) consists of heavy gage sheet metal formed and welded together. Covered stowage compartments are located on each side of the reservoir. The reservoir will require little maintenance, and since there is little disassembly to this unit, repair is limited to welding.

CHAPTER 6

REAR MOUNTED WINCH

Section I. DESCRIPTION AND DATA

116. Description

The rear mounted winch is power driven from a power divider mounted behind the transfer case and has a direct maximum pulling capacity of 45,000 pounds on the first layer of cable. The winch is equipped with a cable level wind and a cable tensioner (fig. 74) to assure proper winding of cable. The winch is worm geared and power must be used when paying out cable. An adjustable automatic brake is provided on the winch drive worm for holding purposes. Controls for operating the winch are mounted on the body directly behind the winch. For operating instructions, refer to TM 9-837.

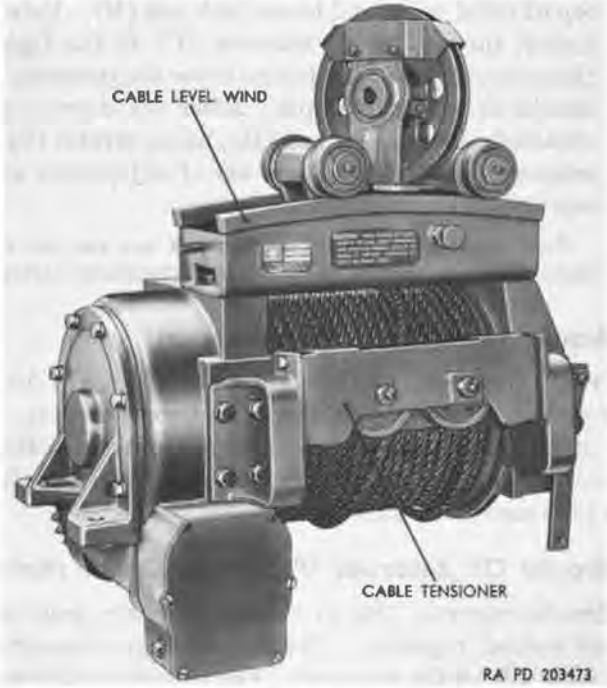


Figure 74. Rear mounted winch.

117. Data

Manufacturer	Gar Wood
Model	GW–ESA716K
Ordnance number	7409980
Manufacturer's number	GW–M305895
Type	Horizontal drum
Capacity	45,000 lb.

Section II. DISASSEMBLY OF WINCH

118. Preparation for Disassembly (Depot Maintenance)

Remove drain plug from gear case and drain lubricant. It is not necessary to remove wire rope assembly from drum unless inspection warrants replacement. If wire rope is not removed, an overhead means of lifting the assembly must be used to facilitate disassembly.

119. Cable Tensioner and Level Wind (Depot Maintenance)

a. Remove and Disassemble Level Wind (fig. 79).

(1) Remove four cap screws (DD), lockwashers (MM), and lift level wind assembly from winch.

(2) Loosen four jam nuts (NN) and turn setscrews (PP) in trolley frame (AJ). Remove trolley frame from trolley track (EE).

(3) Remove four cap screws (B) and lockwashers (A) securing cable guard (AZ). Remove cable guard.

(4) Use suitable snap ring pliers and remove two snap rings (K and AR) from swivel sheave shaft (J). Remove shaft with dowel pin (H) and, at the same time, remove swivel sheave (AY), two swivel sheave bearing spacers (F and AW), and plain washers (E and AX) from swivel sheave frame (AQ). Remove swivel sheave sleeve (D) and needle bearing (C) from bore of sheave.

(5) Loosen safety nut (AV) and remove nut, plain washer (AU), and felt washer (AT) from upper end of swivel sheave frame shaft (AS). Lift up on swivel sheave frame shaft (AS) and remove from trolley frame (AJ). Loosen safety nut (AK) on lower end of shaft and remove nut and shaft from bottom side of trolley frame. Remove inner and outer swivel sheave thrust bearing ball race (AN and AL) and swivel sheave thrust bearing balls (AM) from trolley.

Note. It is not necessary to remove needle bearing (AP) from swivel sheave frame (AQ) unless inspection (par. 123) warrants replacement of bearing.

(6) Remove lubricating fittings (T and YY), snap rings (S and ZZ), and plain washers (R and AB) from ends of trolley axle (AH). Slide trolley wheels (P and AD) and plain

washers (L and AG) from trolley axle. Remove felt washers (M and Q) and needle bearing (N) from trolley wheel (P). Remove felt washers (AC and AF) and needle bearing (AE) from trolley wheel (AD). Remove trolley axle (AH) from trolley frame (AJ). Remove trolley axle (CC) in same manner as trolley axle (AH).

b. Remove and Disassemble Cable Tensioner (fig. 78).

(1) Remove four hex head capscrews (A) and lockwashers (FF) at gear case end and four hex head cap screws (A), lockwashers (FF), and two hex nuts (DD) at end frame and remove tensioner assembly.

(2) Remove cotter pin (N) from pin (P) and cotter pin (Q) from pin (R). Remove pins and tension sheave lever (M).

(3) Remove two hex head capscrews (L), lockwashers (FF), and hex nuts (DD) from right tension frame bracket (K) and likewise for removing left tension frame bracket (B).

(4) Remove cotter pin (J) and lubricating fittings (D and F) from tension sheave pins (E and G). Remove tension sheave pin (G), plain washers (S and X), and tension sheave adjusting frame (H) from tension sheave frame (C). Remove felt washers (W and T) and needle bearing (V) from tension sheave (U). Remove tension sheave (BB) in same manner as tension sheave (U).

c. Remove Tension Channel. Remove four hex head capscrews, lockwashers, and one hex nut and remove tension channel.

120. End Frame Assembly (Depot Maintenance)

(fig. 75)

a. Support drum and wire rope with a chain hoist and lift off end frame.

b. Remove plain thrust washer and slide end frame bearing sleeve and bushing type bearing from end frame.

Note. Do not remove oil seal unless inspection warrants replacement.

If inspection (par. 123) warrants replacement of bearing, use suitable adapter and press bearing from sleeve.

121. Gear Case Assembly (Depot Maintenance)

a. Remove Drum and Wire Rope Assembly (fig. 76). Turn gear case on end with drum in a vertical position. Attach a chain around drum and wire rope. With the use of an overhead hoist, lift up on drum. Use a wooden block on end of drum shaft and tap until drum is free on shaft. Remove drum from shaft.

b. Drum Shaft Keys (fig. 76). Remove two square keys and plain thrust washers from drum shaft.

c. Removal of Sprocket and Drive Worm Bearing Cap (fig. 76). Drive out shear pin from sprocket and remove sprocket from drive worm. Remove four hex head capscrews and lockwashers from drive worm bearing cap. Remove cap and gasket.

Note. Do not remove oil seal in drive worm bearing cap unless inspection (par. 123) warrants replacement.

d. Gear Case Cover (fig. 77).

(1) Remove six capscrews and lockwashers and two machine screws from gear case cover. Remove gear case cover and gasket.

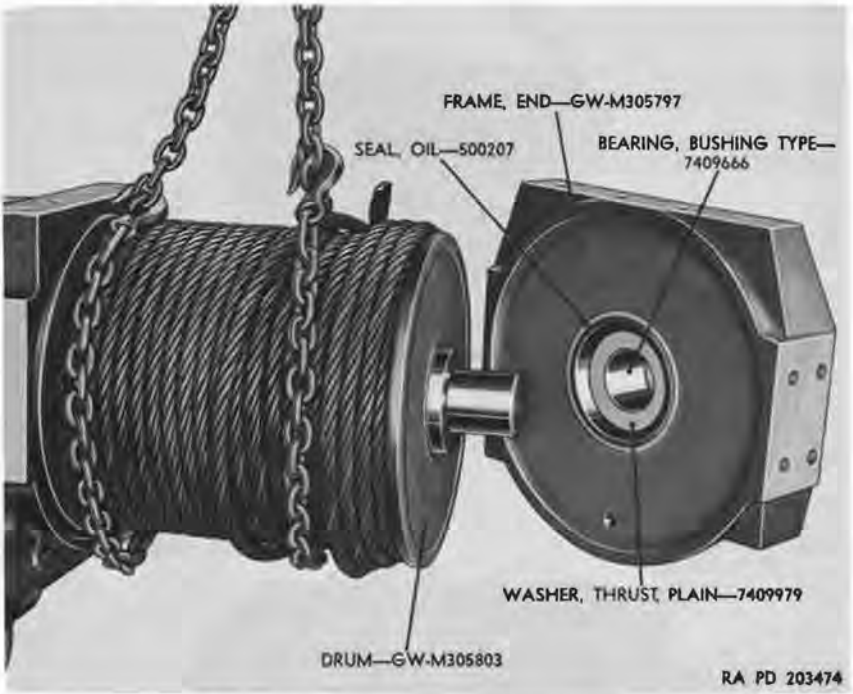


Figure 75. Removing end frame assembly.

(2) A bushing-type bearing is used in gear case cover. Do not remove bearing unless inspection (par. 123) warrants replacement. To remove, collapse bearing and remove from gear case cover.

Note. Make sure replacement bearing is available before removing as damage to bearing will occur during removal.

e. Automatic Brake and Gear Case Assembly. The gear case assembly is identical in construction with that of the front winch assembly. For complete and detailed disassembly procedure of automatic brake and gear case assembly, refer to TM 9-1837B.

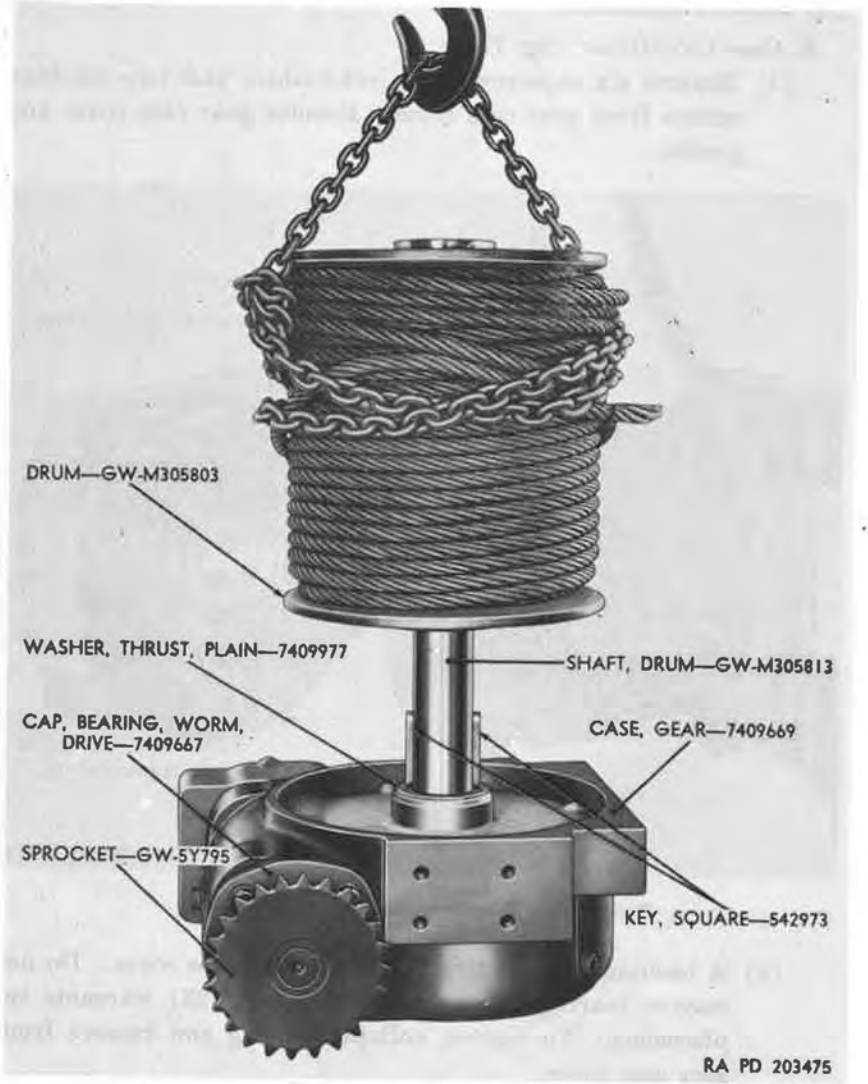


Figure 76. Removing drum assembly from drum shaft.

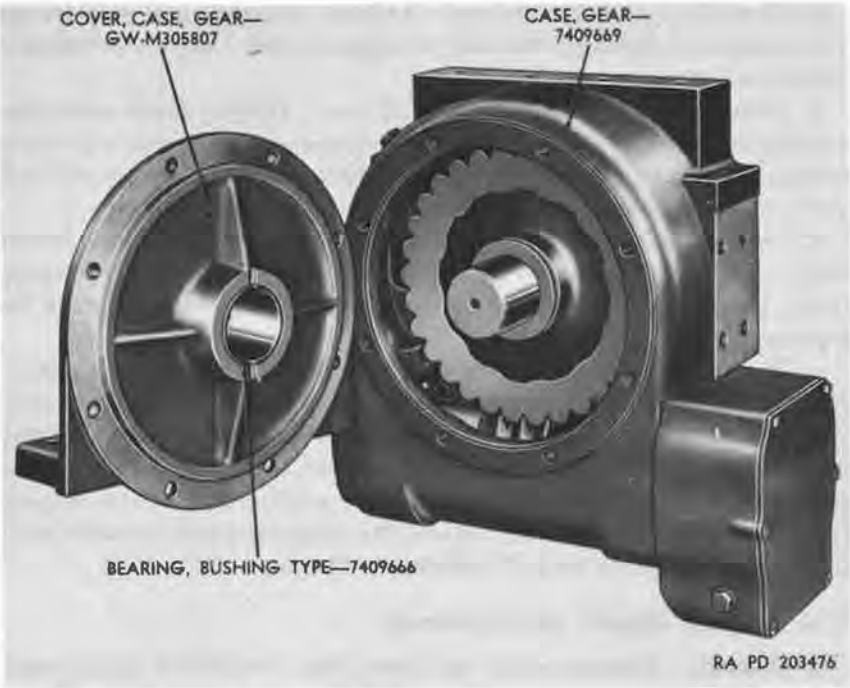


Figure 77. Gear case cover removed.

Section III. CLEANING, INSPECTION, AND REPAIR

122. Cleaning (Depot Maintenance)

a. Clean all metal parts in volatile mineral spirits or dry cleaning solvent. Use a stiff brush to remove accumulation of dirt or hardened lubricant. Be sure all oil and lubricant passages are open and clean. Keep brake band and lining dry.

b. Blow ball bearings dry with compressed air.

Note. Do not spin bearings with the compressed air. Turn bearings slowly with fingers as air is directed at right angles to bearing assembly.

If the bearings are not thoroughly clean after this operation, place them in a pan of clean volatile mineral spirits or dry cleaning solvent and allow them to remain there until all solid particles are loosened and lubricant dissolved.

123. Inspection (Depot Maintenance)

a. Bearings. Inspect each ball bearing for rough or scored balls. Replace if balls are damaged. Apply engine oil to acceptable bearing assemblies and cover to protect against dust and dirt. Inspect bore of all bushing-type bearings and replace if scored or excessively worn as outlined in repair and rebuild standards (par. 144).

286730 O—54——9

b. Gear Case and End Frame. Inspect gear case and end frame for cracks and damaged threads in tapped holes. Repair or replace defective parts.

c. Drum Shaft, Gear, and Drive Worm. Inspect drum shaft for scoring and excessive wear. Inspect drum shaft gear teeth and drive worm. If any of the teeth are broken, chipped, or badly scored, and drive worm is damaged, the worm or gear must be replaced.

d. Drive Worm Brake. Inspect brake surface of drive worm brake disk. If surface is scored or rough, it must be replaced. Inspect brake band assembly. If lining is oil soaked, or worn, it must be replaced.

e. Wire Rope. Inspect wire rope for broken or frayed strands. Inspect clamp chain and hook for damage. Replace defective parts.

f. Oil Seals. Metal cased oil seals normally are long life parts and may be reused if in good condition. Inspect seal contact material to make sure it is pliable and shows no evidence of burning. Also inspect the thin featheredge which contacts the rotating parts to make sure it is intact. Replace seals if defects are found.

124. Repair (Depot Maintenance)

a. General. Remove nicks and burs from machined gasket surfaces. Pay particular attention to oil seal contact surfaces. Use a fine mill file to repair surfaces.

b. Drive Worm Brake Lining. Remove old lining and rivets. Install rivets at each end of band first, then alternately, until all rivets are installed.

c. Drum Shaft and Gear. To install new drum shaft gear, support gear at hub and position drum shaft in gear. Be sure keys in shaft are properly seated and alined with keyway in gear hub. Press shaft through gear until keys have entered gear hub.

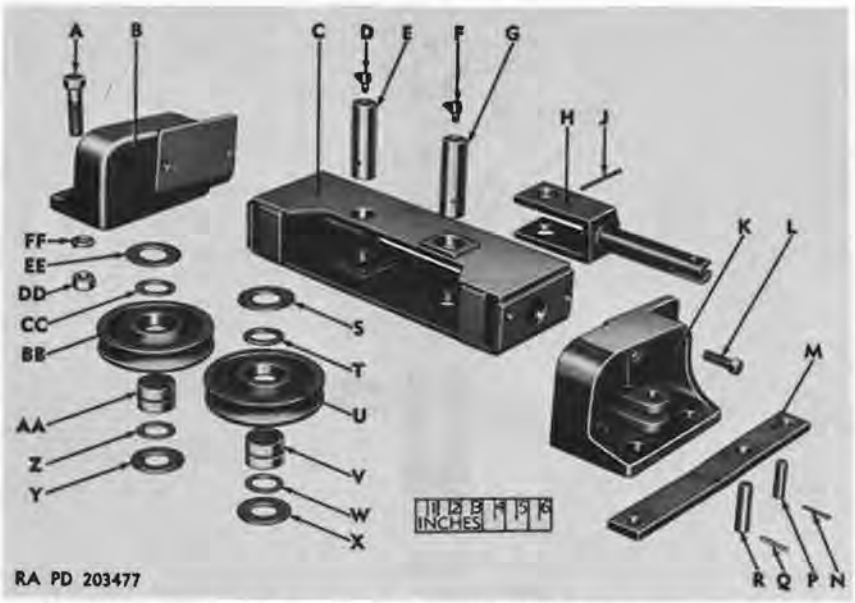
Section IV. ASSEMBLY OF WINCH

125. Cable Tensioner and Level Wind (Depot Maintenance)

a. Assemble Cable Tensioner (fig. 78).

(1) Install needle bearing (V) in tension sheave (U). Position felt washers (T and W) on each side of bearing.

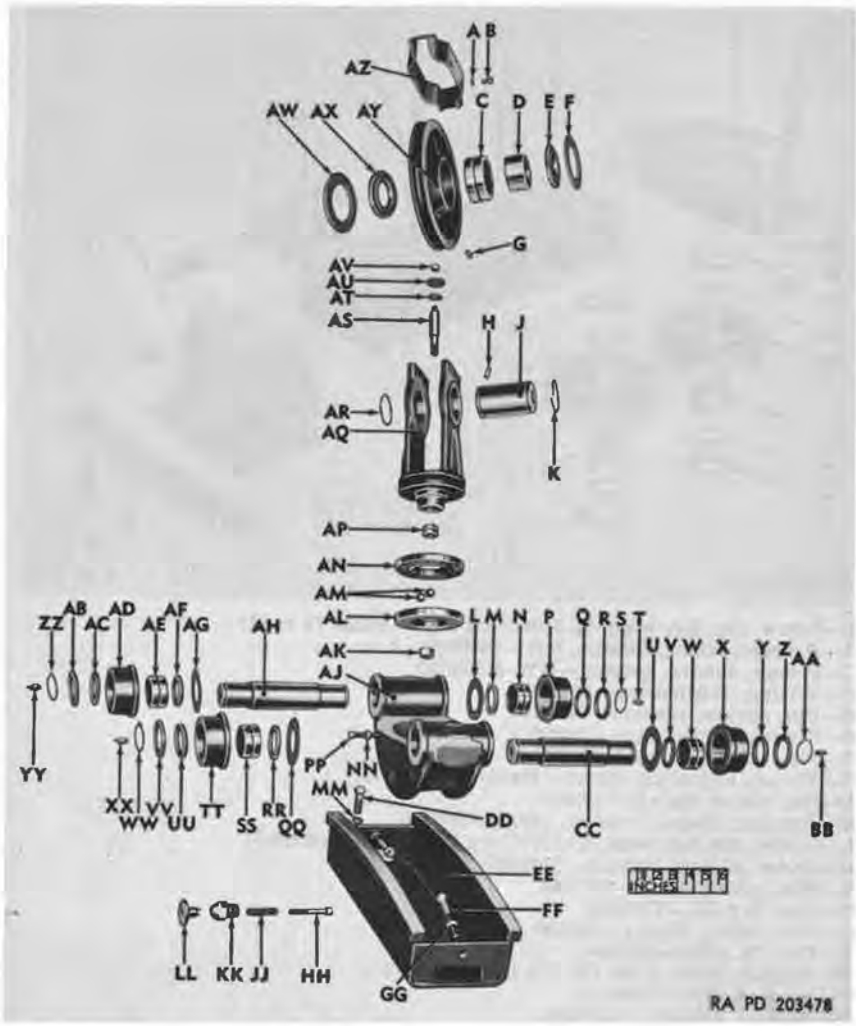
(2) Position lever end of tension sheave adjusting frame (H) in end of tension sheave frame (C). Also position tension sheave (U) and 1.260 ID, 2½ OD plain washers (S and X) in tension sheave frame. Secure tension sheave (U) and tension sheave adjusting frame (H) with tension sheave pin (G) and install new $\frac{3}{16}$ x 3 cotter pin (J) in tension sheave pin. Assemble tension sheave (BB) in same manner as tension sheave (U).



A—Screw, cap, hex-head, ¾–10NC–2 x 2¼—180323 (8 reqd)
B—Bracket, frame, tension, left—7409668
C—Frame, sheave, tension—GW–M305820
D—Fitting, lubricating—504208
E—Pin, sheave, tension—7409945
F—Fitting, lubricating—504208
G—Pin, sheave, tension—7409945
H—Frame, adjusting, sheave, tension—7409930
J—Pin, cotter, 3/16 x 3—103415
K—Bracket, frame, tension, right—7409665
L—Screw, cap, hex head, ¾–10NC–2 x 2¼—181700 (4 reqd)
M—Lever, sheave, tension—7409935
N—Pin, cotter, ⅛ x 1—137185
P—Pin, ½ x 1¾—7409982
Q—Pin, cotter, 5/32 x 1—120169
R—Pin, ⅝ x 2¼—7409981
S—Washer, plain, 1.260 ID, 2½ OD—7409975
T—Washer, felt—7409929
U—Sheave, tension—7409948
V—Bearing, needle—707728
W—Washer, felt—7409929
X—Washer, plain, 1.260 ID, 2½ OD—7409975
Y—Washer, plain, 1.260 ID, 2½ OD—7409975
Z—Washer, felt—7409929
AA—Bearing, needle—707728
BB—Sheave, tension—7409948
CC—Washer, felt—7409929
DD—Nut, hex, ¾–10NC–2—220086
EE—Washer, plain, 1.260 ID, 2½ OD—7409975
FF—Washer, lock, ¾ in.—131046

Figure 78. Cable tensioner—exploded view.

(3) Position right tension frame bracket (K) on end of tension sheave frame (C) and secure with two ¾–10NC–2 x 2¼ hex head capscrews (L), ¾-inch lockwashers (FF) and ¾–10NC–2 hex nuts (DD). Position left tension frame bracket (B) and secure in same manner.



A—Washer, lock, ⅜ in.—120382
B—Screw, cap, ⅜–24NF–3 x ¾—182716 (4 reqd)
C—Bearing, needle—MG–M052
D—Sleeve, sheave, swivel—MG–M144
E—Washer, plain, 2.755 ID, 4.21875 OD—GW–M307568
F—Spacer, bearing, sheave, swivel—7409953
G—Fitting, lubricating—587305
H—Pin, dowel, ⅜ x ¾—141240
J—Shaft, sheave, swivel—7409951
K—Ring, snap—7409898
L—Washer, plain, 2.010 ID, 3.750 OD—7409958
M—Washer, felt—7409959
N—Bearing, needle—707725
P—Wheel, trolley—7409960
Q—Washer, felt—7409959
R—Washer, plain, 2.03125 ID, 2.875 OD—7409962

Figure 79. Cable level wind—exploded view.

S—Ring, snap—7409961
T—Fitting, lubricating—587305
U—Washer, plain, 2.010 ID, 3.750 OD—7409958
V—Washer, felt—7409959
W—Bearing, needle—707725
X—Wheel, trolley—7409960
Y—Washer, felt—7409959
Z—Washer, plain, 2.03125 ID, 2.875 OD—7409962
AA—Ring, snap—7409961
BB—Fitting, lubricating—587305
CC—Axle, trolley—7409882
DD—Screw, cap, ⅝–11NC–3 x 1¾—180272 (4 reqd)
EE—Track, trolley—GW–M305844
FF—Bolt, hex-head, ⅝–11NC–2 x 4¼—7417084 (2 reqd)
GG—Nut, jam, ⅝–11NC–2—427347
HH—Poppet, lock, frame, trolley—7409895
JJ—Spring, compression—7538706
KK—Nut, poppet, lock, frame, trolley—7409894
LL—Knob, poppet, lock, frame, trolley—7538705
MM—Washer, lock, ⅝ in.—121574
NN—Nut, jam, ½–13NC–2—426895 (4 reqd)
PP—Screw, set, ½–13NC–3 x 2½—113038 (4 reqd)
QQ—Washer, plain, 2.010 ID, 3.750 OD—7409958
RR—Washer, felt—7409959
SS—Bearing, needle—707725
TT—Wheel, trolley—7409960
UU—Washer, felt—7409959
VV—Washer, plain, 2.03125 ID, 2.875 OD—7409962
WW—Ring, snap—7409961
XX—Fitting, lubricating—587305
YY—Fitting, lubricating—587305
ZZ—Ring, snap—7409961
AB—Washer, plain, 2.03125 ID, 2.875 OD—7409962
AC—Washer, felt—7409959
AD—Wheel, trolley—7409960
AE—Bearing, needle—707725
AF—Washer, felt—7409959
AG—Washer, plain, 2.010 ID, 3.750 OD—7409958
AH—Axle, trolley—7409882
AJ—Frame, trolley—7409891
AK—Nut, safety, ¾–16NF–3—503335
AL—Race, ball, bearing, thrust, sheave, swivel, outer—7409897
AM—Ball, bearing, thrust, sheave, swivel—104923 (45 reqd)
AN—Race, ball, bearing, thrust, sheave, swivel, inner—7409896
AP—Bearing, needle—7409886
AQ—Frame, sheave, swivel—7409892
AR—Ring, snap—7409898
AS—Shaft, frame, sheave, swivel—7409950
AT—Washer, felt—7409956
AU—Washer, plain, 0.53125 ID, 1.750 OD—7409955
AV—Nut, safety, ½–20NF–3—503323
AW—Spacer, bearing, sheave, swivel—7409953
AX—Washer, plain, 2.755 ID, 4.21875 OD—GW–M307568
AY—Sheave, swivel—GW–M307580
AZ—Guard, cable—7409893

Figure 79—Continued.

(4) Position tension sheave lever (M) to right tension frame bracket (K) and install $\frac{5}{8}$ x $2\frac{1}{4}$ pin (R) to secure in place. Install new $\frac{5}{32}$ x 1 cotter pins (Q) at each end of pin (R). Insert $\frac{1}{2}$ x $1\frac{3}{4}$ pin (P) which connects tension sheave lever (M) to tension sheave adjusting frame (H) and secure pin with two new $\frac{1}{8}$ x 1 cotter pins (N).

b. Assemble Level Wind (fig. 79).

(1) Position trolley axle (AH) in trolley frame (AJ). Install needle bearing (AE), with felt washers (AC and AF) on each side of bearing in trolley wheel (AD). Position 2.010 ID, 3.750 OD plain washer (AG), trolley wheel with bearing and felt washers, and 2.03125 ID, 2.875 OD plain washer (AB) on end of trolley axle (AH). Install snap ring (ZZ) to secure wheel on axle. Install needle bearing (N), with felt washers (M and Q) on each side of bearing in trolley wheel (X). Position 2.010 ID, 3.750 OD plain washer (L), trolley wheel with bearing and felt washers, and 2.03125 ID, 2.875 OD plain washer (R) on opposite end of trolley axle (AH). Install snap ring (S) to secure wheel in axle. Follow same procedure for installing trolley axle (CC).

(2) Install outer swivel sheave thrust bearing ball race (AL) in trolley frame (AJ). Position 45 swivel sheave thrust bearing balls (AM) on outer race and install inner swivel sheave thrust bearing ball race (AN) over bearing balls. Install swivel sheave frame shaft (AS) in trolley frame and secure at lower end with $\frac{3}{4}$–16NF–3 safety nut (AK). If needle bearing (AP) was removed (par. 123), install new bearing in swivel sheave frame (AQ). Position swivel sheave frame over swivel sheave frame shaft (AS), in trolley frame (AJ) and install felt washer (AT), 0.53125 ID, 1.750 OD plain washer (AU), and $\frac{1}{2}$–20NF–3 safety nut (AV).

(3) Install swivel sheave sleeve (D) in needle bearing (C). Install bearing in swivel sheave (AY). Position and aline sheave in swivel sheave frame (AQ). At the same time, position 2.755 ID, 4.21875 OD plain washers (E and AX) and swivel sheave bearing spacer (F and AW) on each side of swivel sheave (AY) in swivel sheave frame. Install swivel sheave shaft (J) in frame through sheave. Install snap rings (K and AR), one at each end of shaft. Position swivel sheave cable guard (AZ) and secure with four $\frac{3}{8}$–24NF–3 x $\frac{3}{4}$ cap screws (B) and $\frac{3}{8}$-inch lockwashers (A).

126. Gear Case Assembly (Depot Maintenance)

(fig. 80)

a. Install Drum Shaft Gear (AM) and Drive Worm (P).

(1) Install two 3/4 x 3 3/4 square keys (T and NN) in drum shaft (V). Position 3.015 ID, 4.500 OD plain thrust washer (AL) and drum shaft gear (AM) on shaft. Aline keyways in gear with keys and press shaft into the gear.

(2) If bushing type bearing (R) was removed (par. 123*a*) from gear case (Q), press new bearing into place. Position drum shaft (V) with gear in case. After shaft and gear are positioned in case, slide 3.015 ID, 4.500 OD plain thrust washer (S) onto end of shaft and next to case. Install two 3/4 x 3 3/4 square keys (U and MM) in shaft.

(3) Install ball bearing (N) on sprocket end of drive worm (P). Slide drive worm into gear case (Q) and while sliding worm into case, enmesh drive worm threads with drum shaft gear (AM) and tap bearing into position. If oil seal (M) was removed (par. 123*f*), install new oil seal in drive worm bearing cap (F).

(4) Position drive worm bearing cap gasket (E) and drive worm bearing cap (F) to gear case (Q). Secure cap with four 3/4–10NC–2 x 2 3/4 cap screws (H) and 3/4-inch lock washers (G). Install sprocket (L) on end of drive worm and secure with shear pin (J) and new 1/8 x 1 cotter pin (K).

(5) Install ball bearing (QQ) on opposite end of drive worm (P). If oil seal (RR) was removed (par. 123*f*), install new seal in drive worm brake case (SS). Position drive worm brake case gasket (PP) and brake case to gear case (Q) and secure with four 3/4–10NC–2 x 2 1/4 cap screws (AH) and 3/4-inch lockwashers (AJ). Position 7/16 x 2 1/4 square key (AK) in drive worm and aline keyways of drive worm brake disk (TT) with the key. Install brake disk on drive worm. Secure disk with bearing retaining washer (UU), 1/2–20NF–2 x 1 1/4 cap screw (WW) and 1/2-inch lockwasher (VV).

(6) Position drive worm brake band (XX) over drive worm brake disk (TT) and install compression spring (AC). Place 1 7/32 ID, 1 1/16 OD plain washer (ZZ) on 1/2–20NF–2A x 5 1/2 cap screw (YY). Place O ring gasket (AB) on cap screw and install screw through drive worm brake case (SS), compression spring (AC), and lugs on drive worm brake band (XX). Tighten screw sufficiently to hold brake band. Position drive worm brake case cover (AE) with gasket (AG) to drive worm brake case. Install two 5/16–18NC–2 x 5/8 hex-head screws with external-teeth lockwashers (AD)

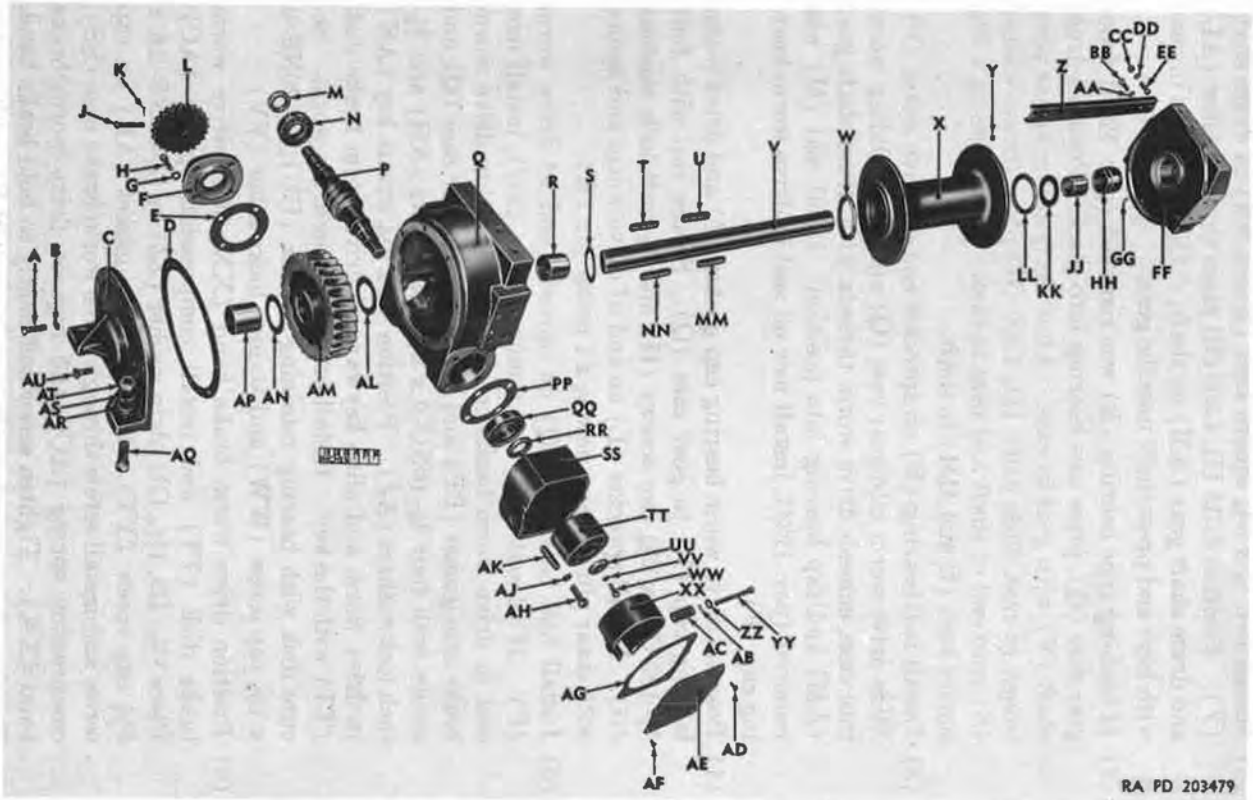


Figure 80. Rear mounted winch—exploded view.

A—Screw, cap, 5/8–11NC–3 x 2—180279 (6 reqd)
B—Washer, lock, 5/8 in.—121574
C—Cover, case, gear—GW–M305807
D—Gasket, cover, case, gear—7409933
E—Gasket, cap, bearing, worm, drive—7409931
F—Cap, bearing, worm, drive—7409667
G—Washer, lock, 3/4 in.—131046 (4 reqd)
H—Screw, cap, 3/4–10NC–2 x 2 3/4—429773 (4 reqd)
J—Pin, shear—8330478
K—Pin, cotter, 1/8 x 1—137185
L—Sprocket—GW–5Y795
M—Seal, oil—7409940
N—Bearing, ball—MRC–7312
P—Worm, drive—GW–M305791
Q—Case, gear—7409669
R—Bearing, bushing type, 3.002 ID, 3.250 OD—7409666
S—Washer, thrust, plain, 3.015 ID, 4.500 OD—7409977
T—Key, square, 3/4 x 3 3/4—542973
U—Key, square, 3/4 x 3 3/4—542973
V—Shaft, drum—GW–M305813
W—Seal, oil—500207
X—Drum—GW–M305803
Y—Screw, set, hex socket, 3/4–10NC–3 x 3/4—139230
Z—Channel, tension—7409671
AA—Washer, lock, 3/4 in.—131046
BB—Screw, cap, 3/4–10NC–2 x 2—180321 (3 reqd)
CC—Nut, hex, 3/4–10NC–2—220086
DD—Washer, lock, 3/4 in.—131046
EE—Screw, cap, 3/4–10NC–2 x 2—180321
FF—Frame, end—GW–M305797
GG—Pin, Dowel, 5/8 x 1 1/4—113248
HH—Sleeve, bearing, frame, end—GW–M305782
JJ—Bearing, bushing type, 3.002 ID, 3.250 OD—7409666
KK—Washer, thrust, plain, 3.015 ID, 5.000 OD—7409979
LL—Seal, oil—500207
MM—Key, square, 3/4 x 3 3/4—542973
NN—Key, square, 3/4 x 3 3/4—542973
PP—Gasket, case, brake, worm, drive—7409931
QQ—Bearing, ball—MCR–7312
RR—Seal, oil—7409941
SS—Case, brake, worm, drive—GW–305806
TT—Disk, brake, worm, drive—7409925
UU—Washer, retaining, bearing—GW–12Y1027
VV—Washer, lock, 1/2 in.—120384
WW—Screw, cap, 1/2–20NF–2 x 1 1/4—181698
XX—Band, brake, worm, drive—7409663
YY—Screw, cap, 1/2–20NF–2A x 5 1/2—191769
ZZ—Washer, plain, 17/32 ID, 1 1/16 OD—120396
AB—Gasket, O ring—501460
AC—Spring, compression—5416501
AD—Screw, hex-head, w/external teeth lock washer, 5/16–18NC–2 x 5/8—187527 (2 reqd)
AE—Cover, case, brake, worm, drive—7409673
AF—Screw, flat head, w/external teeth lock washer, 5/16–18NC x 5/8—GW–105855 (4 reqd)
AG—Gasket, cover, case, brake, worm, drive—7409932
AH—Screw, cap, 3/4–10NC–2 x 2 1/4—122909 (4 reqd)
AJ—Washer, lock, 3/4 in.—131046
AK—Key, square, 7/16 x 2 1/4—7409926
AL—Washer, thrust, plain, 3.015 ID, 4.500 OD—7409977
AM—Gear, shaft, drum—7409934
AN—Washer, thrust, plain, 3.015 ID, 4.500 OD—7409977
AP—Bearing, bushing type, 3.002 ID, 3.250 OD—7409666
AQ—Screw, cap, 1–14NF–2 x 3 1/4—179034 (4 reqd)
AR—Washer, mounting—7409983 (4 reqd)
AS—Washer, lock, 1 in.—131048 (4 reqd)
AT—Nut, hex, 1–14NF–2—124657 (4 reqd)
AU—Screw, machine, 5/8–11NC–2 x 1 1/2—544471 (2 reqd)

Figure 80—Continued.

and four 5/16–18NC x 5/8 flat-head screws with external-teeth lockwashers (AF) to secure cover.

(7) If bushing-type bearing (AP) was removed (par. 123*a*) from gear case cover (C), press in new bearing. Install 3.015 ID, 4.500 OD plain thrust washer (AL) on gear end of drum shaft (V). Position gear case cover (C) and gasket (D). Install six 5/8–11NC–3 x 2 cap screws (A) and 5/8-inch lockwashers (B) and two 5/8–11NC–2 x 1½ machine screws (AU) securing cover.

b. Install Drum and End Frame.

(1) If oil seals (W and LL) were removed (par. 123*f*), install new seal in end of drum (X) and end frame (FF). Install 5/8 x 1¼ dowel pin (GG) in bore of end frame (FF). If bushing type bearing (JJ) was removed from end frame bearing sleeve (HH), press new bearing into sleeve.

(2) Position drum (X) on drum shaft (V) and aline keyways in bore of drum with ¾ x 3¾ square keys (U and MM) on shaft. Aline and install end frame bearing sleeve (HH) with 5/8 x 1¼ dowel pin (GG), previously installed ((1) above), in end frame (FF).

(3) Position 3.015 ID, 5.000 OD plain thrust washer (KK) on drum shaft (V) and install end frame (FF). Position tension channel (Z) and secure with ¾–10NC–2 x 2 cap screw (EE), ¾–10NC–2 hex nut (CC), ¾-inch lockwasher (DD), and three ¾–10NC–2 x 2 cap screws (BB) and ¾-inch lockwashers (AA).

(4) Position cable tensioner assembly on front of winch and install eight ¾–10NC–2 x 2¼ cap screws (A, fig. 78), ¾-inch lockwashers (FF, fig. 78) and two ¾–10NC–2 hex nuts (DD, fig. 78) to secure in place.

(5) Position level wind on winch and secure with four 5/8–11NC–3 x 1¾ cap screws (DD, fig. 79) and 5/8-inch lockwashers (MM, fig. 79).

CHAPTER 7

POWER TRAIN

Section I. DESCRIPTION AND DATA

127. Description

The power train consists of those units which are mounted beneath the wrecker crane and transmit driving torque to the wrecker crane and rear mounted winch. Initially the power is taken from the truck's own transfer by means of a flange mounted power-take-off. Power is then transmitted to the power divider where it can be used for driving either the crane or rear mounted winch. Drive shafts and universal joints are used between the various units. For information regarding rebuild of drive shaft and universal joints refer to TM 9–1837B. A drive sprocket and chain is used in the drive line to the rear mounted winch. The large drive shaft is supported by a drive sprocket bearing assembly and pillow block.

128. Data

a. Power-take-off.

Manufacture	Timken Detroit Axle Co
Manufacturer's number	TD–P138A

b. Power Divider.

Manufacturer	Gar Wood Industries Inc
Manufacturer's number	GW–M306098
Ordnance number	7413950

c. Pillow Block.

Manufacturer	Stephens-Adamson Mfg Co
Manufacturer's number	SAH–NP24
Ordnance number	7409905

d. Drive Sprocket Bearing Assembly.

Manufacturer	Gar Wood Industries Inc
Manufacturer's number	GW–M305897
Ordnance number	7409904

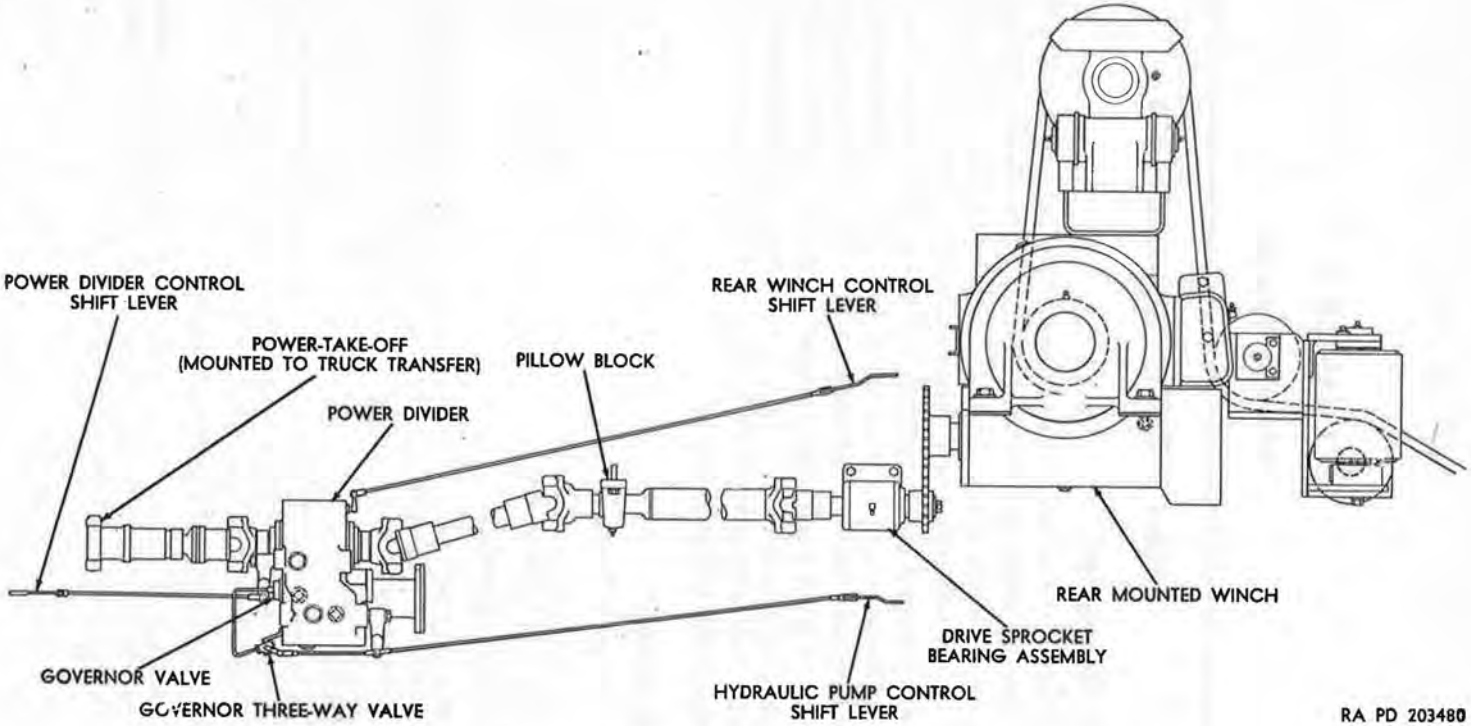


Figure 81. Schematic diagram of power train.

Section II. REBUILD OF POWER-TAKE-OFF (M62)

129. Disassembly (Depot Maintenance)

((fig. 84)

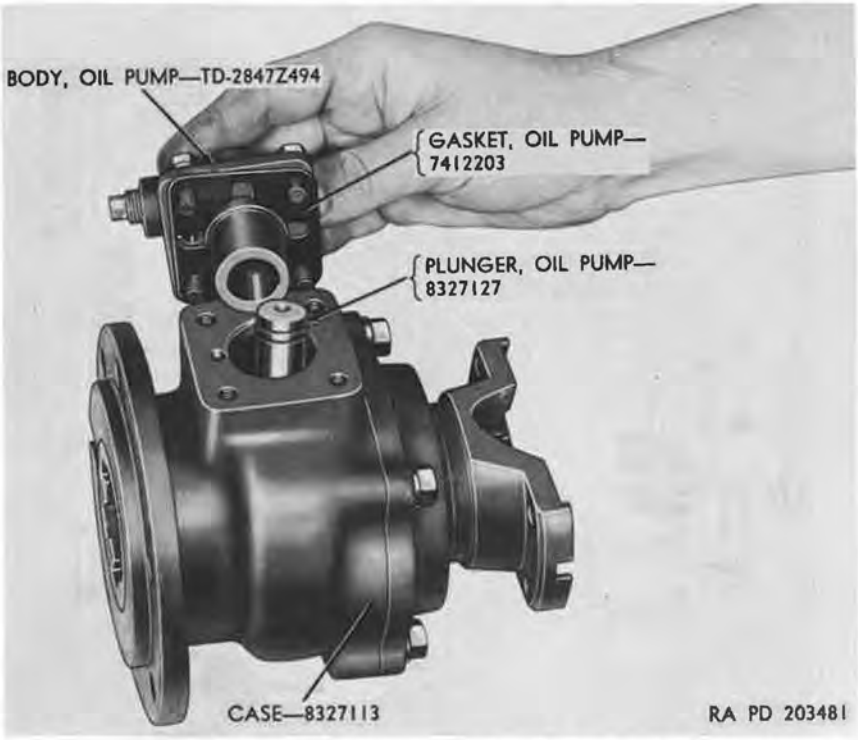


Figure 82. Removing power-take-off oil pump body.

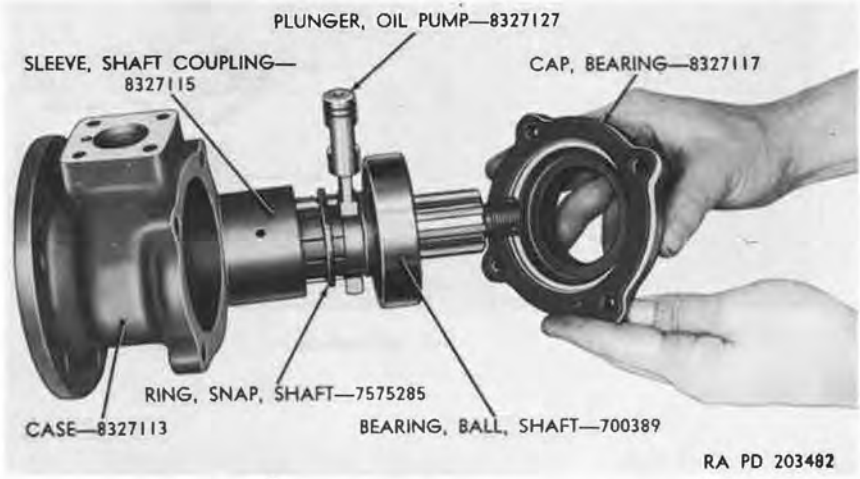


Figure 83. Power-take-off case components removed.

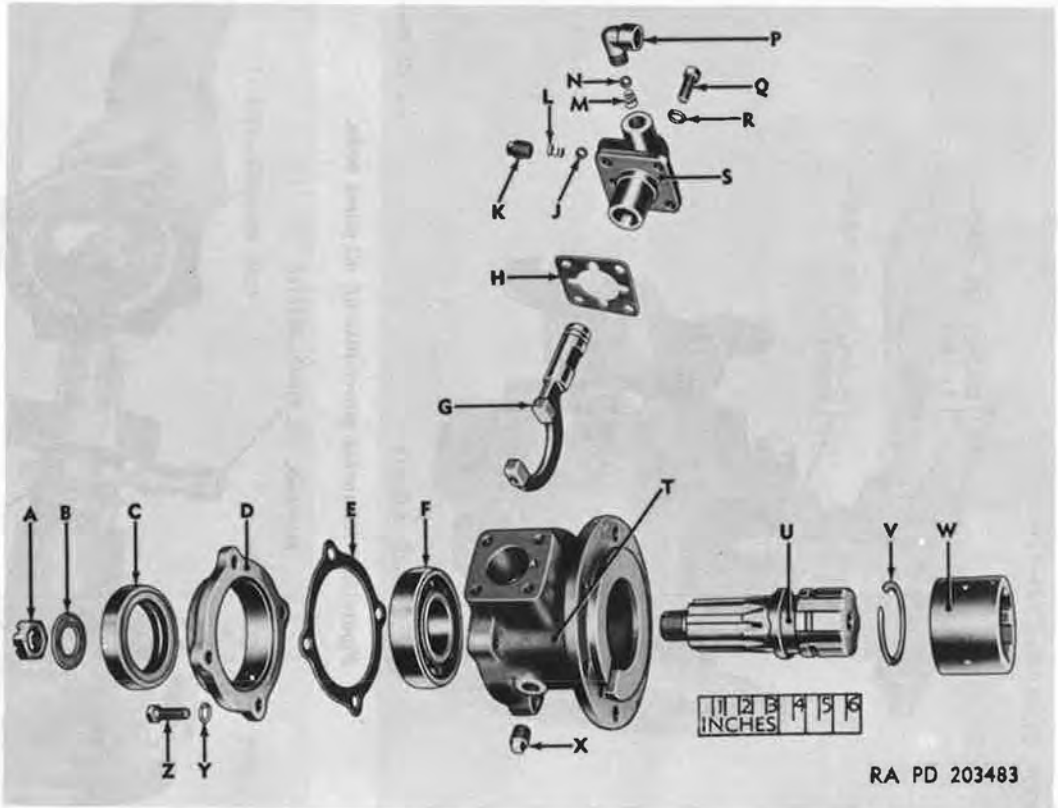


Figure 84. Power-take-off (M62)—exploded view.

A—Nut, shaft, 7/8–14NC–3—8327119
B—Washer, flange, 29/32 ID x 1¾ OD (⅛ thk)—8327120
C—Seal, oil, assy—8327116
D—Cap, bearing—8327117
E—Gasket, cap, bearing—8327118
F—Bearing, ball, shaft—700389
G—Plunger, oil pump—8327127
H—Gasket, oil pump—7412203
J—Ball, check, outlet—104920
K—Plug, outlet ball—112578
L—Spring, outlet ball—TD–2858X102
M—Spring, inlet ball—7413283
N—Ball, check, inlet—104920
P—Elbow, 90 degree—8328016
Q—Bolt, hex-hd, 5/16–18NC–3 x 7/8–180087 (4 reqd)
R—Washer, lock, med, 5/16-in.—120214 (4 reqd)
S—Body, oil pump—TD–2847Z494
T—Case—8327113
U—Shaft—8327114
V—Ring, snap, shaft—7575285
W—Sleeve, shaft coupling—8327115
X—Plug, pipe, case, sq-hd, ¼ in.—117244
Y—Washer, lock, med, 3/8 in.—120382
Z—Bolt, hex hd, 3/8–16NC–3 x 1⅛—445552

Figure 84—Continued.

a. Remove four hex head bolts (Q) and medium lockwashers (R) and lift the oil pump body (S) from the case (fig. 82).

b. Remove 90° elbow (P) releasing inlet check ball (N) and inlet ball spring (M).

c. Remove outlet ball plug (K) releasing outlet ball spring (L) and outlet check ball (J).

d. Remove shaft nut (A) and flange washer (B) and remove companion flange.

Note. Shaft nut should be loosened before removal of the power-take-off from transfer case.

e. Remove four hex head bolts (Z), medium lockwashers (Y), and remove bearing cap (fig. 83).

f. Remove oil pump plunger (G) from cam on shaft (U) and pull shaft assembly from case (fig. 83).

g. Press shaft ball bearing (F) from shaft (U) and remove shaft snap ring (fig. 83).

h. If inspection (par. 130) warrants replacement, press oil seal assembly (C) from bearing cap (D).

i. Clean all parts thoroughly with volatile mineral spirits or dry cleaning solvent.

130. Inspection and Repair (Depot Maintenance)

a. Inspection. Check oil pump body and plunger for evidence of wear and scoring. Place oil pump plunger in body and check for smoothness of operation. Inspect splines on shaft and shaft coupling sleeve for excessive wear. Inspect oil seal for worn or feathered edges. Check case for cracks or damaged bolt holes.

b. Repair. Repairs are limited and for the most part will require replacement of the defective component. Small nicks and burs may be removed with a fine mill file. Defective oil seals are replaced by removing the old seal assembly and pressing a new seal into the bearing cap.

131. Assembly (Depot Maintenance)

(fig. 84)

a. If the oil seal assembly (C) was removed from the bearing cap (D), press new seal into cap.

b. Press the shaft ball bearing (F) on shaft (U) making certain the inner hub of bearing is supported during this operation.

c. Install shaft snap ring (V) on shaft (U) and position shaft coupling sleeve (W) on shaft.

d. Position oil pump plunger (G) in case (T) and place shaft with

bearing assembly in case. Place oil pump plunger (G) on cam groove in shaft (U).

e. Position new bearing cap gasket (E) on case (T) and aline holes with bearing cap (D). Install four 3/8–16 NC–3 x 1 1/8 hex-head bolts (Z) and 3/8-inch medium lockwashers (Y) and tighten securely. Loosely assemble 7/8–14NC–3 shaft nut (A) and 2 29/32 ID x 1 3/4 OD (1/8 thk) flange washer (B). Tighten nut securely after installing companion flange.

f. Place outlet check ball (J) and outlet ball spring (L) in oil pump body (S) and secure with outlet ball plug (K).

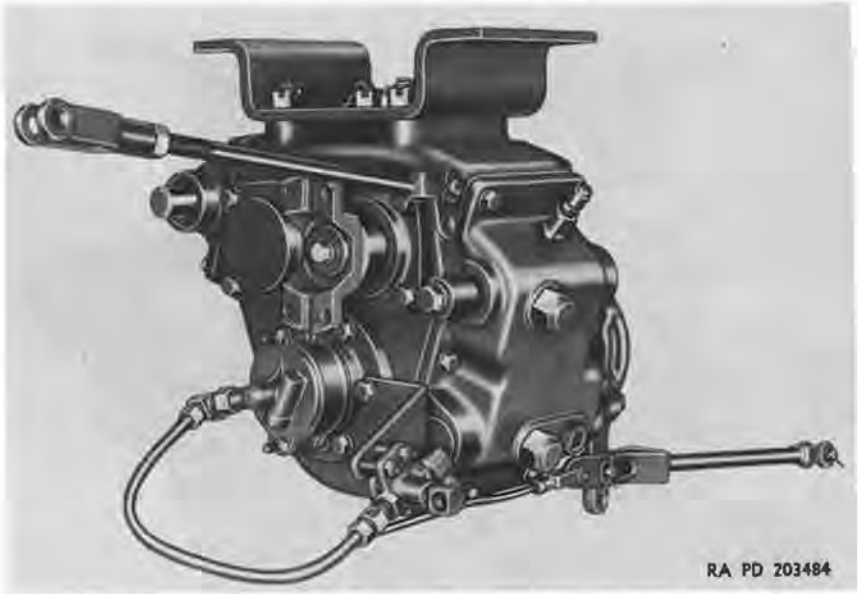


Figure 85. Power divider with levers and governor assembly attached—left front view.

g. Install inlet ball spring (M) and inlet check ball (N) in oil pump body (S) and secure with 90° elbow (P).

h. Position oil pump gasket (H) on case (T) and position oil pump body assembly over plunger (G) and onto case.

i. Install four 5/16–18NC–3 x 7/8 hex head bolts (Q) and 5/16-inch medium lockwashers (R) and tighten securely.

j. Refer to TM 9–837 for installation of power-take-off to the transfer case.

Warning: Be sure to fill power-take-off case (T) with correct lubricant to 1/4-inch square-head pipe plug (X) level for the initial lubrication.

Section III. REBUILD OF POWER DIVIDER

132. General

Special instructions for engaging the power divider in the 5-ton wrecker M62 are covered fully in the operator's manual TM 9–837. These should be followed whenever the wrecker crane is to be operated. In brief, the power divider is engaged by a hand lever in the truck cab through linkage to the input shifter shaft. The winch output shaft and the pump output shaft are controlled by means of linkage between hand levers mounted on the rear of the crane body and shifter shafts on the power divider.

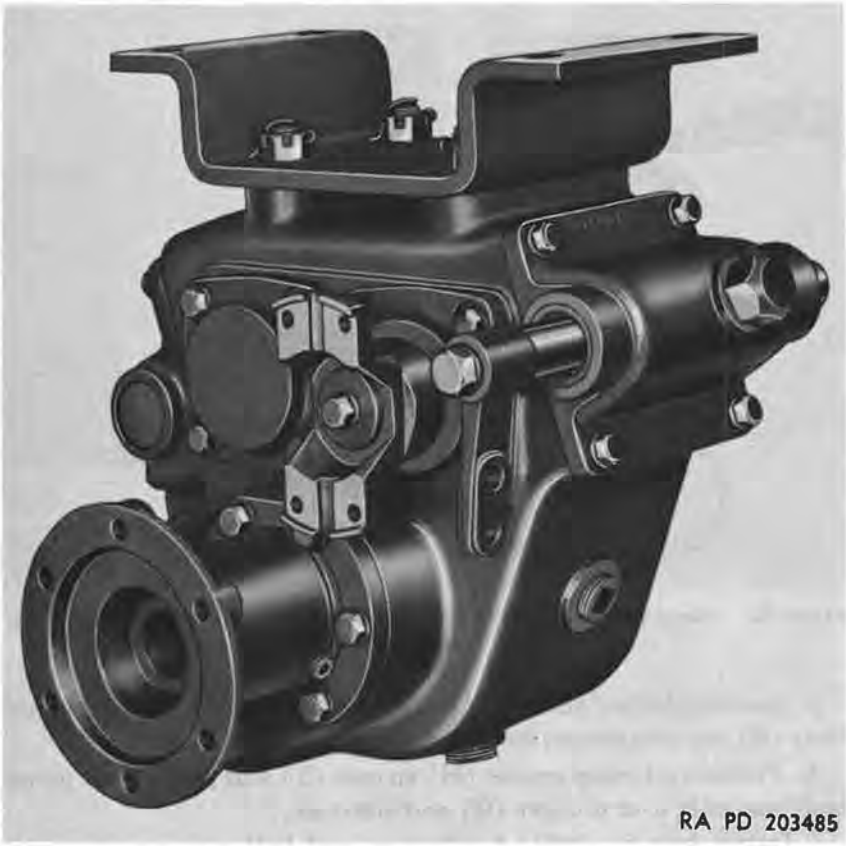


Figure 86. Power divider—right rear view.

133. Disassembly (Depot Maintenance)

a. General. Thorough inspection of the power divider after removal from the vehicle will reveal the condition of the unit. Check particularly for leaks around covers, caps, or seals. Before disassembly, clean all outside surfaces with volatile mineral spirits or dry-cleaning solvent.

b. Remove Hydraulic Pump Adapter and Coupling (fig. 87).

(1) Take out six hex head cap screws and lockwashers.

(2) Remove square socket pipe plug from top side of hydraulic pump adapter to provide access to setscrew beneath plug (fig. 87).

(3) Remove the setscrew from the coupling.

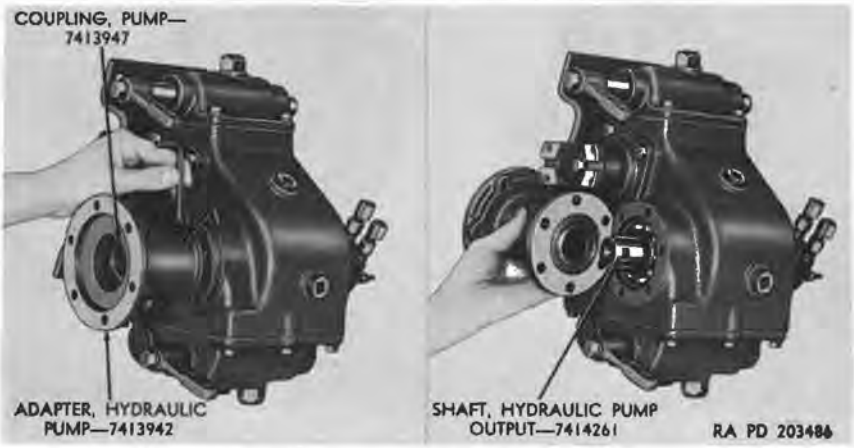


Figure 87. Hydraulic pump adapter and coupling removal.

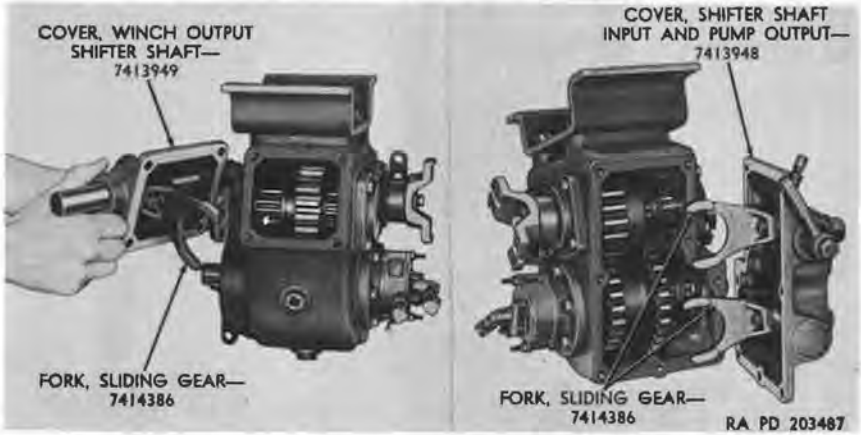


Figure 88. Case covers and shifter shafts removed.

(4) Slide hydraulic pump adapter and pump coupling from pump output shaft.

(5) Remove pump coupling from hydraulic pump adapter.

c. Remove and Disassemble Case Covers.

(1) Remove four hex-head capscrews and take off winch output shifter shaft cover (fig. 88) and cover gasket.

(2) Remove hex head capscrew which fastens sliding gear fork (M, fig. 95) to winch output shifter shaft (Q, fig. 95).

Remove poppet ball spring retainer (E, fig. 95) and take out poppet ball compression spring (F, fig. 95) and shifter shaft poppet ball (G, fig. 95).

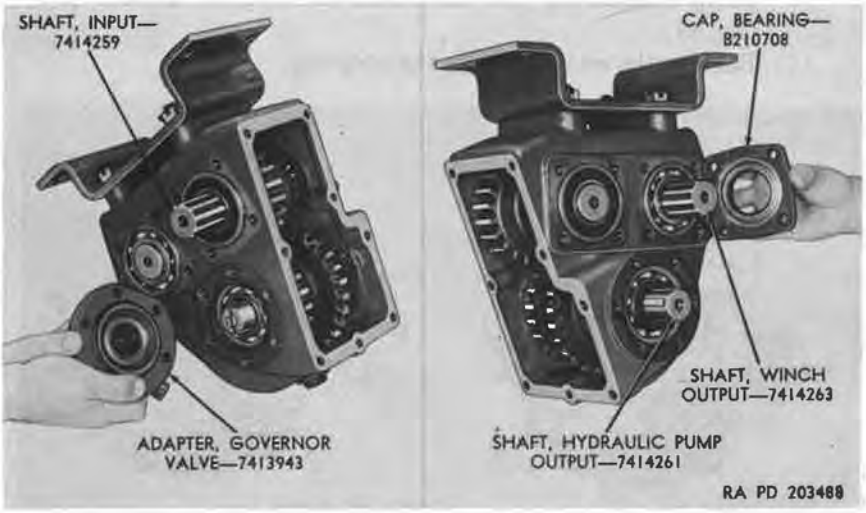


Figure 89. Bearing covers and caps removed.

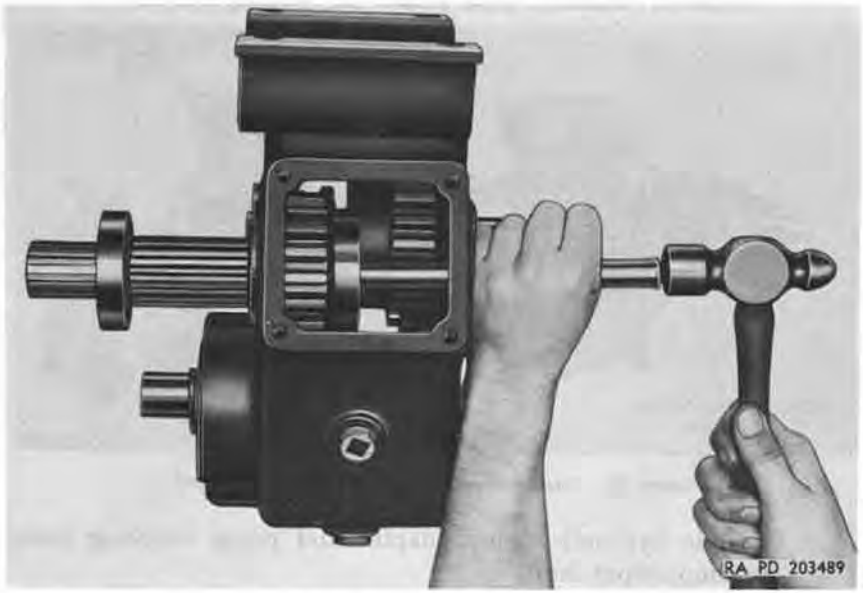


Figure 90. Removing winch output shaft and bearings.

(3) Slide out winch output shifter shaft from cover.

(4) The removal (fig. 88) and disassembly of the input and pump output shifter shaft cover is essentially the same as for the winch output shifter shaft ((1) through (3) above).

d. Remove Bearing Covers and Caps (fig. 89). Remove hex-head capscrews, lockwashers, bearing covers, and bearing caps and discard gaskets.

e. Remove Shaft and Bearing (fig. 90).

(1) Use a brass drift and tap on forward end of winch output shaft to drive shaft and ball bearing assembly to the rear.

(2) Continue tapping on end of shaft until shaft is also free of ball bearing assembly on front end of shaft.

(3) The other ball bearing assembly remaining on shaft is removed by placing shaft and bearing assembly in an arbor press. Position bearing so that inner race will be supported and then press out shaft.

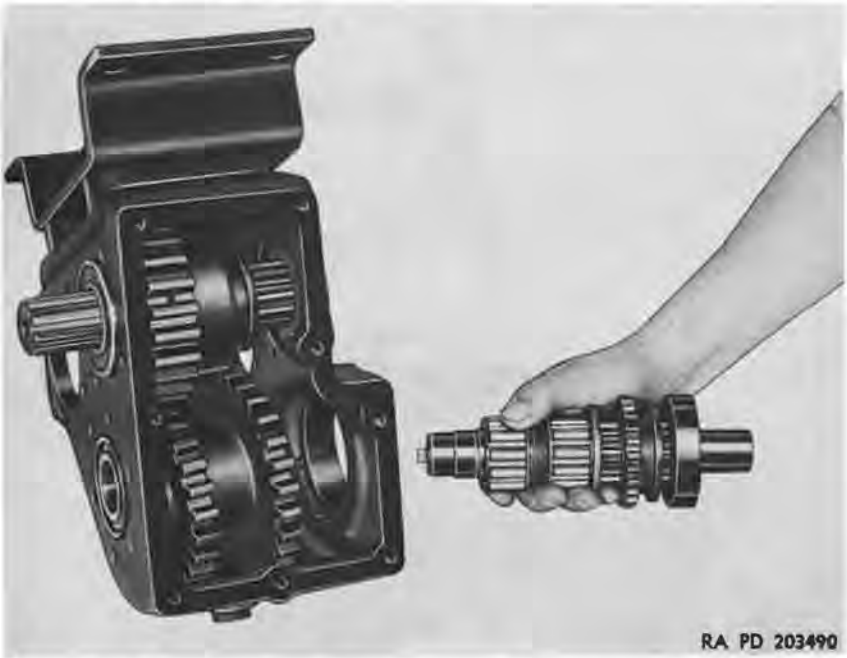


Figure 91. Pump output shaft and bearings removed.

f. Remove Pump Output Shaft and Bearing (fig. 91).

(1) In a similar manner to *e* above, drive pump output shaft to rear to remove from case.

(2) Remove ball bearing assembly from pump output shaft as in *e*(3) above.

g. Remove Input Shaft (fig. 92).

(1) Turn power divider case on its side and block up so that input shaft may be tapped out to rear with brass drift and hammer.

(2) Support the input shaft gear inside of case and tap input shaft out of bearings, gears, and case.

(3) Remove ball bearing assembly from input shaft as in *e*(3) above.

h. Cleaning. No specialized cleaning is required for these parts other than to immerse them in volatile mineral spirits or dry-cleaning solvent. Soak long enough to remove all old lubricant then blow dry with compressed air. Keep parts protected from dust or dirt.

134. Inspection and Repair (Depot Maintenance)

a. Inspection.

(1) *Bearings.* Inspect bearings assemblies for scored spots, chips, or cracks. Replace if worn or damaged in any way.

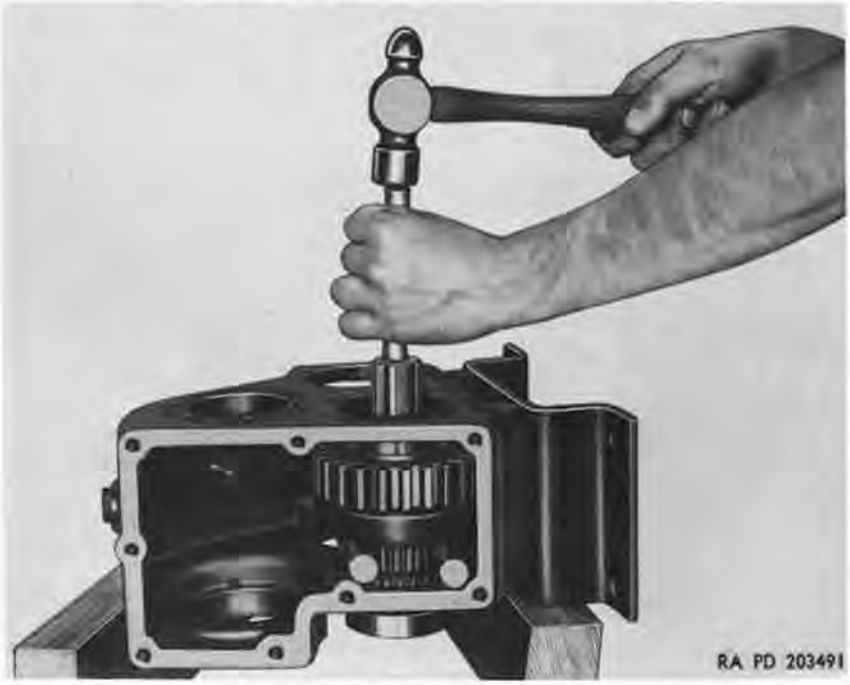


Figure 92. Removing input shaft.

(2) *Gears.* Inspect gear teeth and internal splines of sliding gears for chipped places, galled spots, or excessive wear. If any defects are noted, parts must be replaced.

(3) *Case and covers.* Carefully inspect case and covers for cracks, warpage, or stripped screw threads. If damaged in this manner, parts must be replaced.

(4) *Shafts.* Inspect shaft splines for twists, chips, or wear. If any evidence of wear or damage exists, parts must be replaced.

(5) *Shifter shafts and forks.* Make sure that sliding gear forks fit securely on the shifter shafts and that shafts and forks are not cracked or broken.

(6) *Oil seals.* Inspection of oil seals in the shifter shaft covers and bearing caps may be accomplished without complete removal. However, make sure that lips of seals are not worn or frayed, and that they contact firmly around the shafts. If seals are removed, they must be replaced.

b. Repair. Repairs to the power divider will for the most part be a matter of replacing defective parts, and using new gaskets and seals. However, slight nicks or burs may be removed from the various parts with a fine mill file or soap stone. Damage beyond this will necessitate part replacement.

135. Assembly (Depot Maintenance)

a. General. All moving parts such as gears, shafts, and bearings must be prelubricated at assembly with seasonal grade gear oil (GO). This will prevent the possibility of scoring before lubricant in the case is circulated to all parts. Refer to operator's manual TM 9–837 or lubrication chart for TM 9–837 for lubrication recommendations. Take special care to prevent the entry of dirt into the finished assembly.

b. Install Input Shaft (fig. 93).

(1) Press needle bearing assembly (AS) into bore of input shaft gear (U).

(2) Use a soft hammer and tap ball bearing assembly (AT) into front end of power divider case (RR) at input shaft opening.

(3) Hold input shaft gear, with input shaft thrust washers (V and AR) on each side, inside of case and insert input shaft (W), splined end first, through bore of input shaft gear and thrust washers and into previously installed bearing.

(4) Slide input shaft sliding clutch (X) and ball bearing assembly (Y) onto shaft and use soft hammer to tap bearing into place in case.

c. Install Pump Output Shaft (fig. 93).

(1) Use a soft hammer and tap ball bearing assembly (ZZ) into front of power divider case at pump output shaft opening.

(2) Place thrust washer (UU) on hydraulic pump output shaft (QQ) and press roller bearing assembly (VV), bearing spacer (XX), and roller bearing assembly (YY) onto shaft and next to thrust washer.

(3) Hold drive gear (WW) with thrust washer (AG) on front side of gear, inside of case and insert hydraulic pump output shaft with bearings on shaft through bore of gear and thrust washer and into bearing.

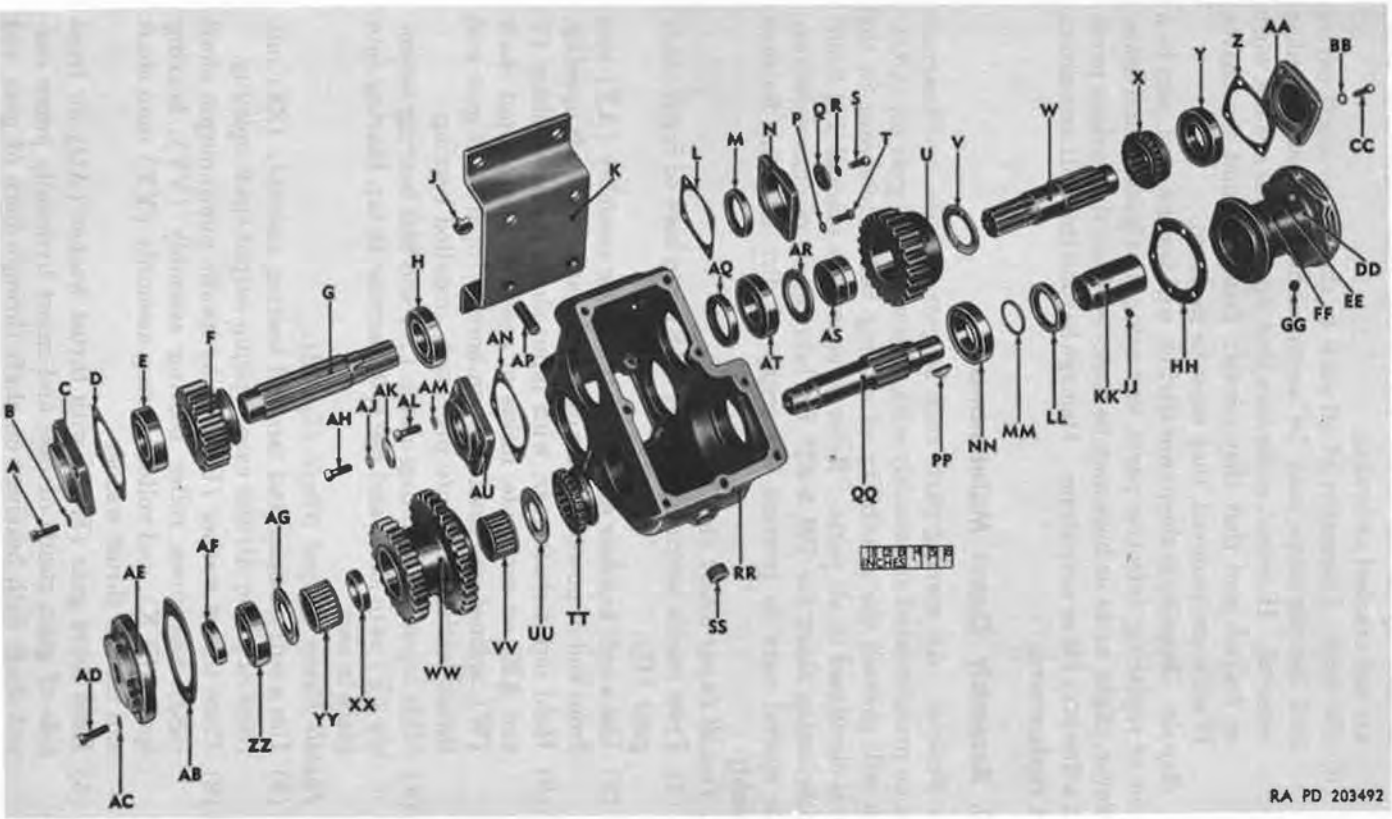


Figure 93. Power divider with mounting bracket assembly—exploded view

A—Screw, cap, hex-head, 3/8–16NC–3 x 1—180122 (4 reqd)
B—Washer, lock, med, 3/8 in.—120382 (4 reqd)
C—Cover, bearing—B210670
D—Gasket, bearing cover—B201691
E—Bearing, ball, assy—700081
F—Gear, sliding, winch output shaft—7414256
G—Shaft, winch output—7414263
H—Bearing, ball, assy—700081
J—Nut, slotted, 5/8–18NF—GW–105769 (4 reqd)
K—Bracket—GW–M307601
L—Gasket, bearing cover—B201691
M—Seal, oil—500097
N—Cap, bearing—B210708
P—Washer, lock, med, 3/8 in.—120382 (4 reqd)
Q—Washer, plain, 13/32 ID x 1 1/2 OD (3/16 thk)—A277972
R—Washer, lock, med, 3/8 in.—120382
S—Screw, cap, hex-head, 3/8–24NF–3 x 1—181637
T—Screw, cap, hex-head, 3/8–16NC–3 x 1—180122 (4 reqd)
U—Gear, input shaft—7414254
V—Washer, thrust, input shaft—7414267
W—Shaft, input—7414259
X—Clutch, sliding, input shaft—7413946
Y—Bearing, ball, assy—ND–99508
Z—Gasket, bearing cover—B201691
AA—Cover, bearing—B210670
BB—Washer, lock, med, 3/8-in.—120382 (4 reqd)
CC—Screw, cap, hex-head, 3/8–16NC–3 x 1—180122
DD—Adapter, hydraulic pump—7413942
EE—Screw, cap, hex-head, 3/8–16NC–3 x 1 1/4—180124 (6 reqd)
FF—Washer, lock, med, 3/8-in.—120382
GG—Plug, pipe, square socket, headless, 1/4 in.—GW–105751
HH—Gasket, adapter—7414252
JJ—Screw, set, hex socket 3/8–16NC–3 x 7/16—139064
KK—Coupling, pump—7413947
LL—Seal, oil—500097
MM—Seal, static, pump coupling—GW–M307809
NN—Bearing, ball, assy—700081
PP—Key, Woodruff, 1/4 x 1 1/4—108626
QQ—Shaft, hydraulic pump output—7414261
RR—Case, power divider—7413945
SS—Plug, pipe, 3/4 in.—143952
TT—Clutch, sliding—7413946
UU—Washer, thrust—7414266
VV—Bearing, roller, assy—7414273
WW—Gear, drive—7414255
XX—Spacer, bearing—7414265
YY—Bearing, roller, assy—7414273
ZZ—Bearing, ball, assy—700080
AB—Gasket, governor valve adapter—7414252
AC—Washer, lock, med, 3/8 in.—120382 (6 reqd)
AD—Screw, cap, hex-head, 3/8–16NC–3 x 1—180122 (6 reqd)
AE—Adapter, governor valve—7413943
AF—Seal, oil—500036
AG—Washer, thrust—7414266
AH—Screw, cap, hex-head, 3/8–24NF–3 x 1—181637
AJ—Washer, lock, med, 3/8 in.—120382
AK—Washer, plain—A277972
AL—Screw, cap, hex-head, 3/8–16NC–3 x 1—180122 (4 reqd)
AM—Washer, lock, med, 3/8 in.—120382 (4 reqd)
AN—Gasket, bearing cap—B201691
AP—Stud, 5/8–11NC–2 (13/16) x 5/8–18NF (15/16) x 2—GW–M307619
AQ—Seal, oil—500097
AR—Washer, thrust, input shaft—7414267
AS—Bearing, needle, assy—709494
AT—Bearing, ball, assy—ND–99508
AU—Cap, bearing—B210708

Figure 93—Continued.

(4) Place sliding clutch (TT) and ball bearing assembly (NN) onto rear end of shaft and tap bearing into position in case.

d. Install Winch Output Shaft (fig. 93).

(1) Tap ball bearing assembly (H) into rear of power divider case at winch output shaft opening.

(2) Hold winch output shaft sliding gear (F) inside of case and insert winch output shaft (G), splined end first through bore of gear and into bearing.

(3) Slide ball bearing assembly (E) onto shaft and tap into place in case.

e. Install Bearing Covers and Caps (fig. 93). Bearing covers (C and AA), governor valve adapter (AE), and bearing caps (N and AU) are all assembled in a similar manner. Oil seals (M, AF, AQ, and LL), if removed (par. 134), must be inserted in bearing caps before installing on shafts. Maintain end play of 0.010 minimum to 0.033 maximum when installing bearing caps. Use new bearing cover gaskets (D, L, and Z), bearing cap gasket (AN), governor valve adapter gasket (AB), and adapter gasket (HH) when assembling and if necessary, use additional gaskets to secure the correct end play. Also pack space between bearing cap (AU) and ball bearing assembly (AT) with grease (GAA) to prelubricate this point.

f. Assemble and Install Input and Pump Output Shifter Shafts and Cover (fig. 94).

(1) If shifter shaft oil seals (E and T) were removed (par. 134), install new seals in the input and pump output shifter shaft cover (J).

(2) Slide input shifter shaft (D) and hydraulic pump output shifter shaft (U) into cover taking care not to damage seals.

(3) Secure shifter shafts in cover with shifter shaft poppet balls (BB and HH), poppet ball compression springs (DD and KK), and poppet ball spring retainers (FF and JJ).

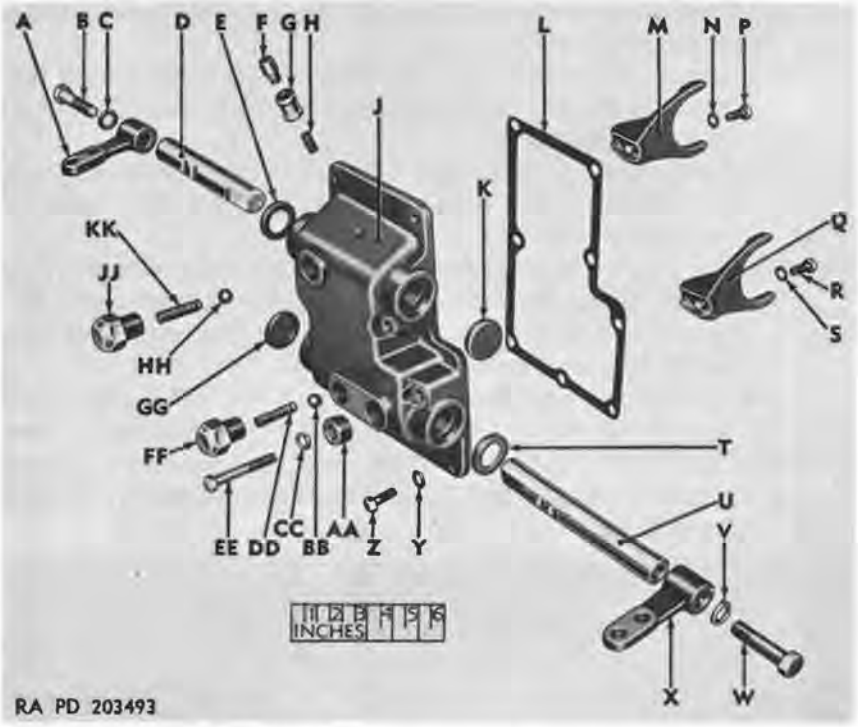
(4) Fasten sliding gear forks (M and Q) to shifter shafts with 3/8–24NF–3 x 7/8 hex-head capscrews (P and R) and 3/8-inch external-teeth lockwashers (N and S).

(5) Install dust plugs (K and GG).

(6) Use a new shifter shaft cover gasket (L) and secure assembled input and pump output shifter shaft cover (J) to power divider case (RR, fig. 93) with two 3/8–16NC–3 x 2 1/2 hex-head capscrews (EE), six 3/8–16NC–3 x 1 1/4 hex-head cap screws (Z) and eight 3/8-inch medium lockwashers (Y and CC).

g. Assemble and Install Winch Output Shifter Shaft Cover (fig. 95).

(1) Install new shifter shaft oil seals (H and P) into winch output shifter shaft cover (N) if inspection (par. 134) revealed that replacement was necessary.

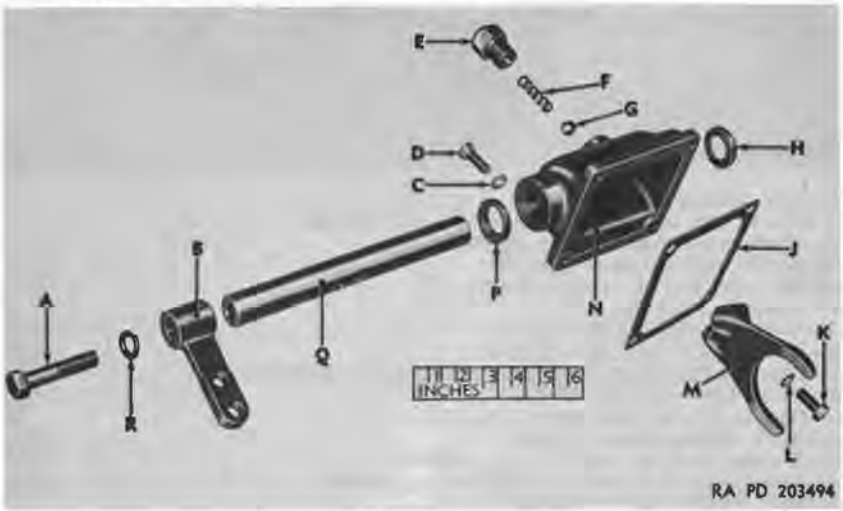


A—Arm, shifter shaft—7413944
B—Screw, cap, hex-head, ½–20 NF–3 x 2¼—181707
C—Washer, lock, med, ½ in.—120384
D—Shaft, shifter, input—7414260
E—Seal, oil, shifter shaft—7414275
F—Vent, air—5196397
G—Coupling, pipe, ⅛ in—105408
H—Nipple, pipe, ⅛ x 1¾—121211
J—Cover, shifter shaft, input and pump output—7413948
K—Plug, dust—7414258
L—Gasket, shifter shaft cover—7414251
M—Fork, sliding gear—7414386
N—Washer, lock, ext-teeth, ⅜ in.—138489
P—Screw, cap, hex-head, ⅜–24 NF–3 x ⅞—181636
Q—Fork, sliding gear—7414386
R—Screw, cap, hex-head, ⅜–24 NF–3 x ⅞—181636
S—Washer, lock, ext-teeth, ⅜ in.—138489
T—Seal, oil, shifter shaft—7414275
U—Shaft, shifter, hydraulic pump output—7414262
V—Washer, lock. med., ½ in.—120384
W—Screw, cap, hex-head, ½–20 NF–3 x 2¼—181707
X—Arm, shifter shaft—7413944
Y—Washer, lock, med, ⅜ in—120382
Z—Screw, cap, hex-head, ⅜–16 NC–3 x 1¼—180124 (6 reqd)
AA—Plug, pipe, ¾ in.—143952
BB—Ball, poppet, shifter shaft—145657
CC—Washer, lock, med, ⅜ in.—120382
DD—Spring, compression, poppet ball—5277984
EE—Screw, cap, hex-head, ⅜–16 NC–3 x 2½—180134 (2 reqd)
FF—Retainer, poppet ball spring—A416517
GG—Plug, dust—7414258
HH—Ball, poppet, shifter shaft—145657
JJ—Retainer, poppet ball spring—A416517
KK—Spring, compression, poppet ball—5277984

Figure 94. Input and pump output shifter shafts and cover—exploded view.

(2) Slide winch output shifter shaft (Q) through oil seals taking special care to protect seal.
(3) Secure shifter shaft in cover with shifter shaft poppet ball (G), poppet ball compression spring (F), and poppet ball spring retainer (E).
(4) Fasten sliding gear fork (M) to shifter shaft with one 3/8–24NF–3 x 7/8 hex-head capscrew (K) and 3/8-inch external-teeth lockwasher (L).
(5) Use a new cover gasket (J) and secure assembled winch output shifter shaft cover (N) to power divider case (RR, fig. 93) with four 3/8–16NC–3 x 1¼ hex head capscrews (D) and 3/8-inch medium lockwasher (C).

h. Install Shifter Shaft Arms (figs. 94 and 95). If shifter shaft arms (A and X, fig. 94, and B, fig. 95) were removed, secure these to shifter shaft with ½–20NF–3 x 2¼ hex-head capscrews (B and W, fig. 94, and A, fig. 95) and ½-inch medium lockwashers (C and V, fig. 94, and R, fig. 95).



A—Screw, cap, hex-head, ½–20NF–3 x 2¼—181707
B—Arm, shifter shaft—7413944
C—Washer, lock, med, 3/8 in.—120382 (4 reqd)
D—Screw, cap, hex-head, 3/8–16NC–3 x 1¼—180124 (4 reqd)
E—Retainer, poppet ball spring—A416517
F—Spring, compression, poppet ball—5277984
G—Ball, poppet, shifter shaft—145657
H—Seal, oil, shifter shaft—7414275
J—Gasket, cover—7414253
K—Screw, cap, hex-head, 3/8–24NF–3 x 7/8—181636
L—Washer, lock, ext-teeth, 3/8 in.—138489
M—Fork, sliding gear—7414386
N—Cover, winch output shifter shaft—7413949
P—Seal, oil, shifter shaft—7414275
Q—Shaft, shifter, winch output—7414264
R—Washer, lock, med, ½ in.—120384

Figure 95. Winch output shifter shaft and cover—Exploded view.

i. Install Hydraulic Pump Adapter and Coupling (fig. 93).

(1) Insert pump coupling (KK) into hydraulic pump adapter (DD).

(2) Use a new adapter gasket (HH) and slide hydraulic pump adapter and pump coupling over hydraulic pump output shaft (QQ) and up to power divider case.

(3) Locate opening in coupling through opening in adapter and secure coupling to hydraulic pump output shaft with $\frac{3}{8}$–16NC–3 x $\frac{7}{16}$ hex socket setscrew (JJ).

(4) Install $\frac{1}{4}$-inch headless square socket pipe plug (GG) into opening in hydraulic pump adapter.

(5) Secure hydraulic pump adapter to power divider case with six $\frac{3}{8}$–16NC–3 x $1\frac{1}{4}$ hex-head capscrews (EE) and $\frac{3}{8}$-inch medium lockwashers (FF).

j. Refer to TM 9–837 for instructions for installing the power divider on the vehicle.

Warning: Be sure that drain and fill plugs are tight and lubricant is at specified level as prescribed in lubrication chart for TM 9–837 before initial operation.

Section IV. REBUILD OF DRIVE SPROCKET BEARING ASSEMBLY

136. Disassembly of Drive Sprocket Bearing Assembly (Depot Maintenance)

a. Make a note of relative position of sprocket end of shaft with bearing housing so that shaft may be returned to this same position at reassembly.

b. Remove capscrew, lockwashers, plain washer, and drive sprocket (fig. 96) from drive sprocket shaft.

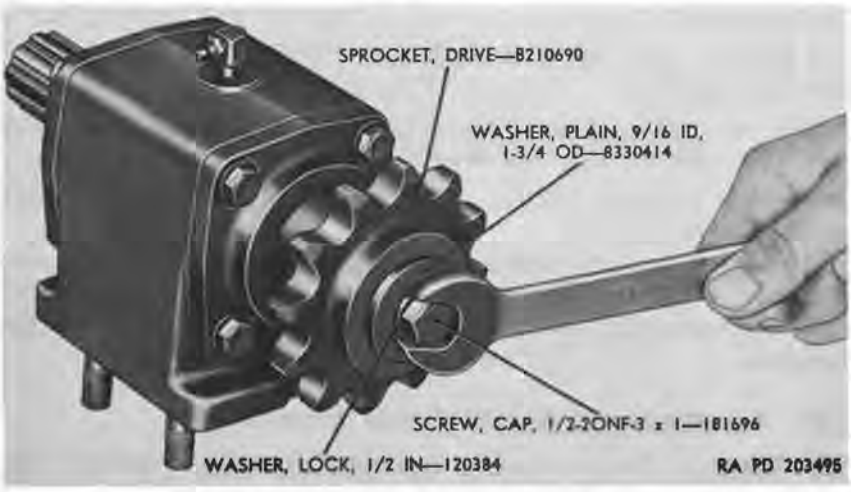


Figure 96. Removing drive sprocket.

c. Remove four capscrews and lockwashers from bearing cap. Remove bearing cap, spacer, oil seal, and cap gasket from bearing housing (fig. 97).

Note. It is not necessary to remove bearing oil seal from bearing cap unless inspection (par. 137) warrants replacement.

To remove, drive out seal using suitable removing tool. Repeat same procedure for removing opposite bearing cap from housing.

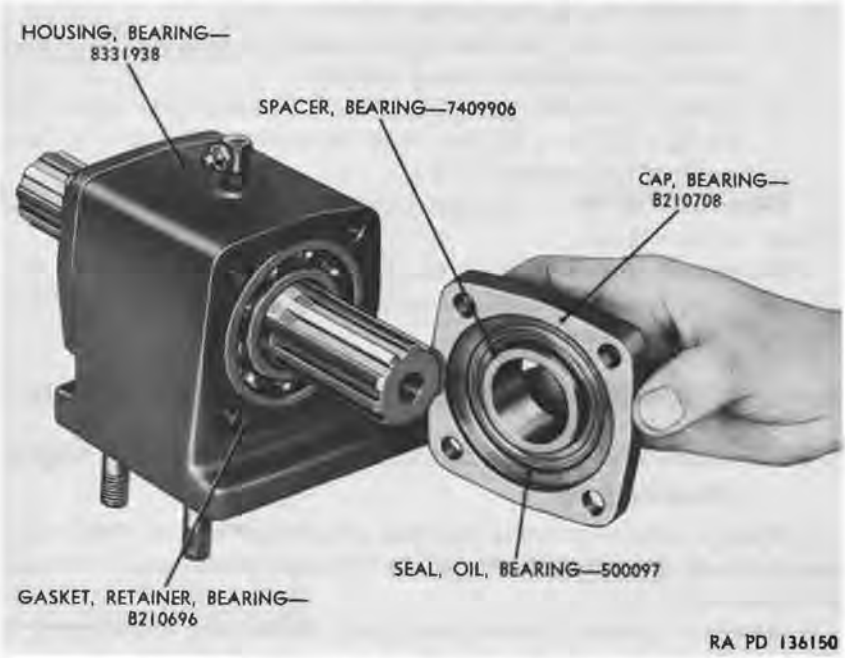


Figure 97. Removing bearing cap, oil seal, and spacer.

d. Remove drive sprocket shaft with ball bearings from bearing housing (fig. 98).

Note. It is not necessary to remove bearings from shaft unless inspection (par. 137) warrants replacement of bearings or shaft.

To remove bearings, position shaft and bearings in press and press shaft from bearings.

e. Clean all parts in volatile mineral spirits or dry-cleaning solvent. Blow dry with compressed air. Rinse bearings in clean volatile mineral spirits and wrap in a cloth to protect the bearings from foreign particles.

137. Inspection and Repair (Depot Maintenance)

a. Housing. Inspect bearing housing for cracks or breaks. Replace bearing housing if cracks or breaks are detected.

b. Shaft. Inspect drive sprocket shaft for damaged splines or cracks. Replace drive sprocket shaft if these conditions are found.

c. Bearings. Inspect bearings for seized or scored condition. Replace damaged bearings.

d. Oil Seals. Inspect oil seal contact material to make sure it is pliable and shows no evidence of burning. Inspect the thin featheredge which contacts rotating part to make sure it is intact. Replace seal if defects are found.

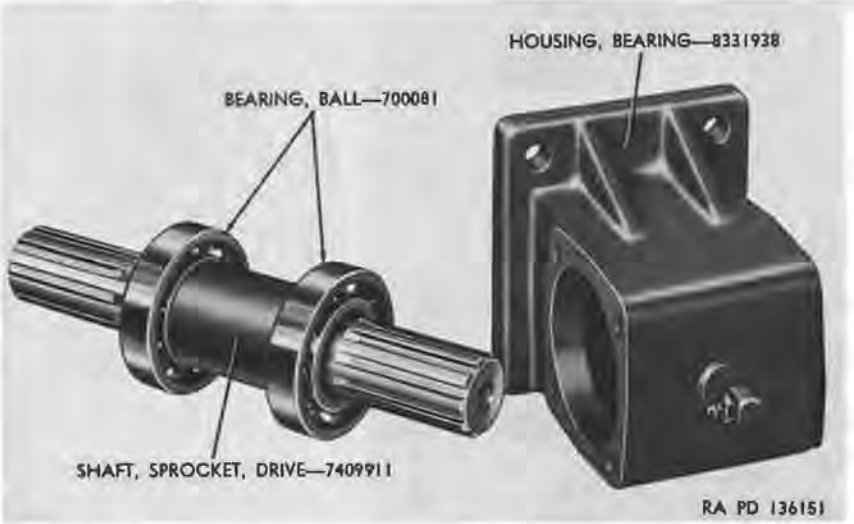


Figure 98. Removal of drive sprocket shaft and bearings from bearing housing.

138. Assembly (Depot Maintenance)

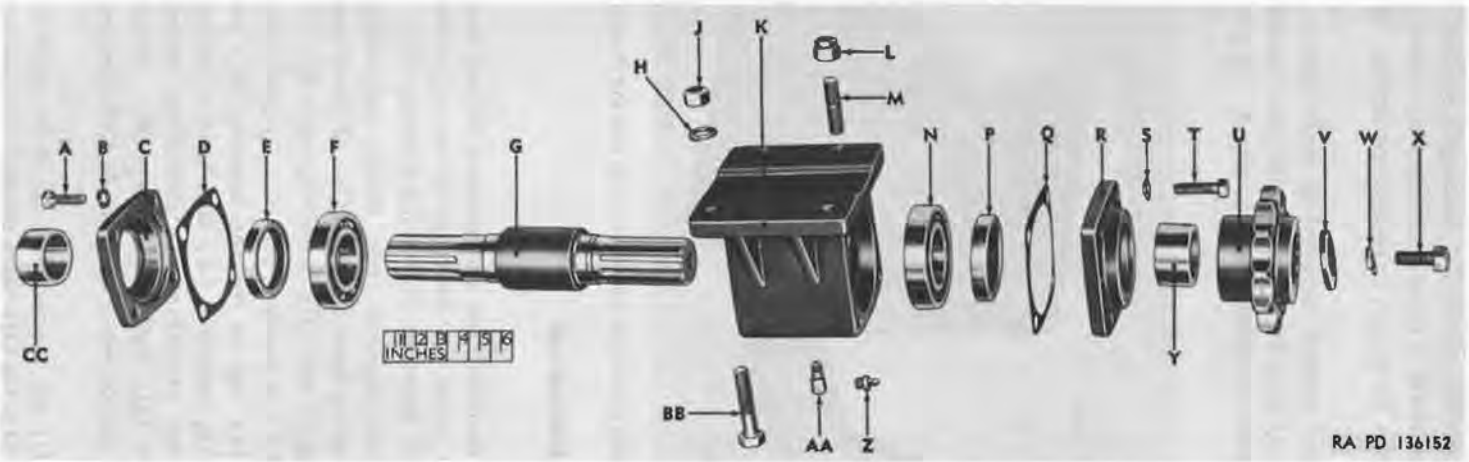
(fig. 99).

a. If inspection (par. 137*c*) revealed that replacement of ball bearings (F and N) was necessary, press new bearings on drive sprocket shaft (G). Position shaft with bearings in bearing housing (K).

b. If bearing oil seal (E) was removed (par. 137*d*), use suitable adapter and install new oil seal in bearing cap (C). Follow same procedure for installing bearing oil seal (P) in bearing cap (R).

c. Position bearing spacer (CC) in bearing cap (C). Install bearing cap gasket (D) and bearing cap on bearing housing (K) and secure with four 3/8–16NC–3 x 1¼ capscrew (A) and 3/8-inch medium lockwashers (B). Follow same procedure for installing bearing spacer (Y), bearing cap gasket (Q), and bearing cap (R). Secure with four 3/8–16NC–3 x 1¼ capscrews (T) and 3/8-inch medium lockwashers (S).

d. Install drive sprocket (U) on tapped end of drive sprocket shaft (G) and secure with 9/16 ID x 1¾ OD plain washer (V), ½-inch



A—Screw, cap, ⅜–16NC–3 x 1¼—180124 (4 reqd)
B—Washer, lock, med, ⅜ in.—120382 (4 reqd)
C—Cap, bearing—B210708
D—Gasket, cap, bearing—B210696
E—Seal, oil, bearing—500097
F—Bearing, ball—700081
G—Shaft, sprocket, drive—7409911
H—Washer, lock, med, ½ in.—120384
J—Nut, hex, ½–20NF–2—120371
K—Housing, bearing—8331938
L—Nut, safety, ½–20NF—GW–105685
M—Stud, ½–13NC x 2¼—GW–105822
N—Bearing, ball—700081
P—Seal, oil, bearing—500097
Q—Gasket, cap, bearing—B210696
R—Cap, bearing—B210708
S—Washer, lock, med, ⅜ in.—120382 (4 reqd)
T—Screw, cap, ⅜–16NC–3 x 1¼—180124 (4 reqd)
U—Sprocket, drive—B210690
V—Washer, plain, 9/16 ID, 1¾ OD—8330414
W—Washer, lock, med, ½ in.—120384
X—Screw, cap, ½–20NF–3 x 1—181696
Y—Spacer, bearing—7409906
Z—Fitting, lubricating—504208
AA—Elbow—504202
BB—Screw, cap, ½–20NF–3 x 2¼—181707
CC—Spacer, bearing—7409906

Figure 99. Drive sprocket bearing assembly—exploded view.

medium lockwasher (W) and ½–20NF–3 x 1 capscrew (X). Tighten to torque specifications (par. 146).

e. Lubricate the drive sprocket bearing assembly according to instructions in TM 9–837.

Section V. REBUILD OF PILLOW BLOCK

139. Disassembly of Pillow Block (Field Maintenance)

a. Remove Lubricating Valve and Locking Pin. Loosen and remove lubricating valve and adapter from pillow block housing (fig. 100). Invert pillow block to remove locking pin.

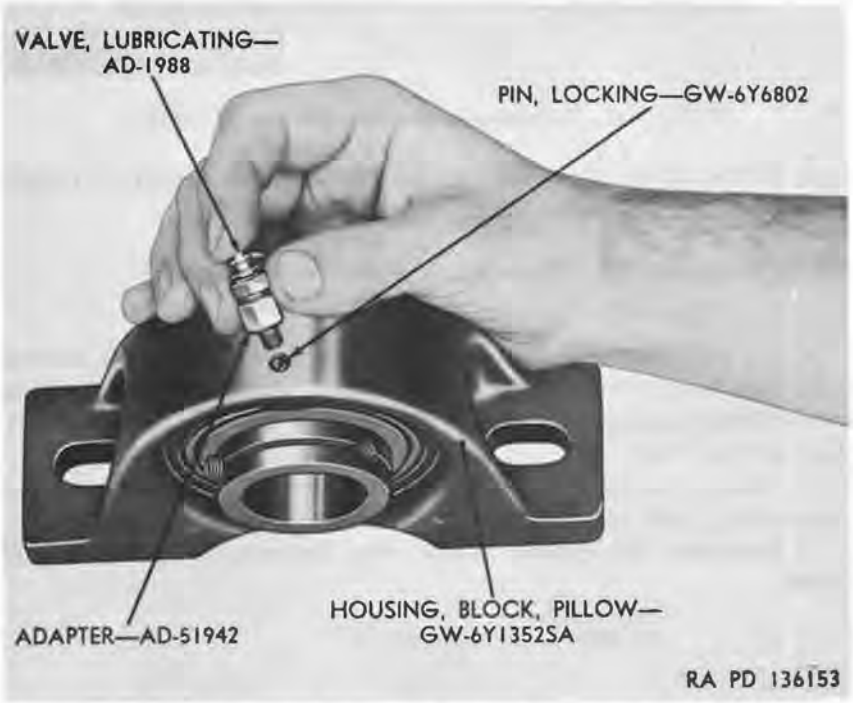


Figure 100. Removing lubricating valve, adapter, and locking pin.

b. Remove Pillow Block Bearing. Rotate pillow block bearing in pillow block housing one half turn. Turn bearing to a horizontal position as shown in figure 101 and remove from housing.

c. Cleaning. Clean bearing and housing in volatile mineral spirits or dry-cleaning solvent and blow dry with compressed air.

140. Inspection and Repair (Field Maintenance)

a. Bearing. Inspect bearing for free rotation. If bearing binds or does not rotate freely, replace bearing.

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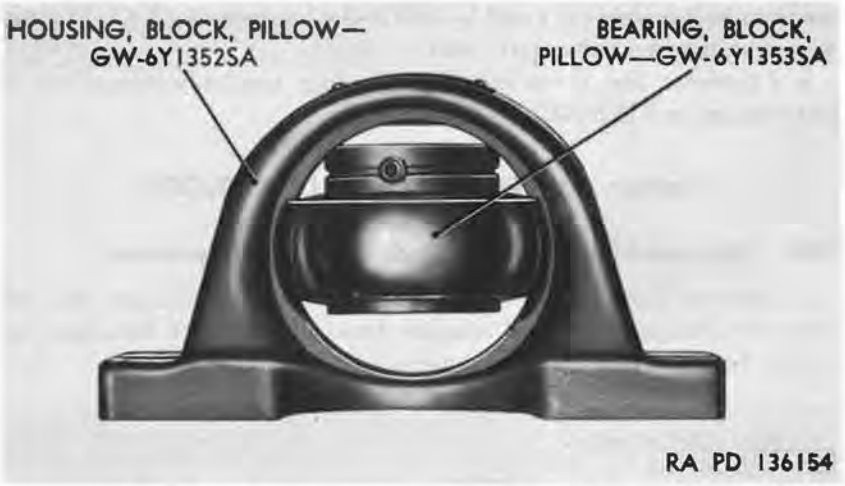

Figure 101. Positioning pillow block bearing for removal.

b. Pillow Block Housing. Inspect housing for cracks or broken condition. If defects are found, replace housing.

141. Assembly of Pillow Block (Field Maintenance)

(Fig. 102).

a. Install Bearing in Pillow Block. Position pillow block bearing (A) in a horizontal position as shown in figure 101 and install in pillow block housing (F). Turn bearing to a vertical position and rotate one-half turn.

b. Install Locking Pin. Insert locking pin (E), adapter (D), and lubricating valve (C) in pillow block housing (F).

c. Lubricate the Pillow Block. See instructions given in TM 9–837.

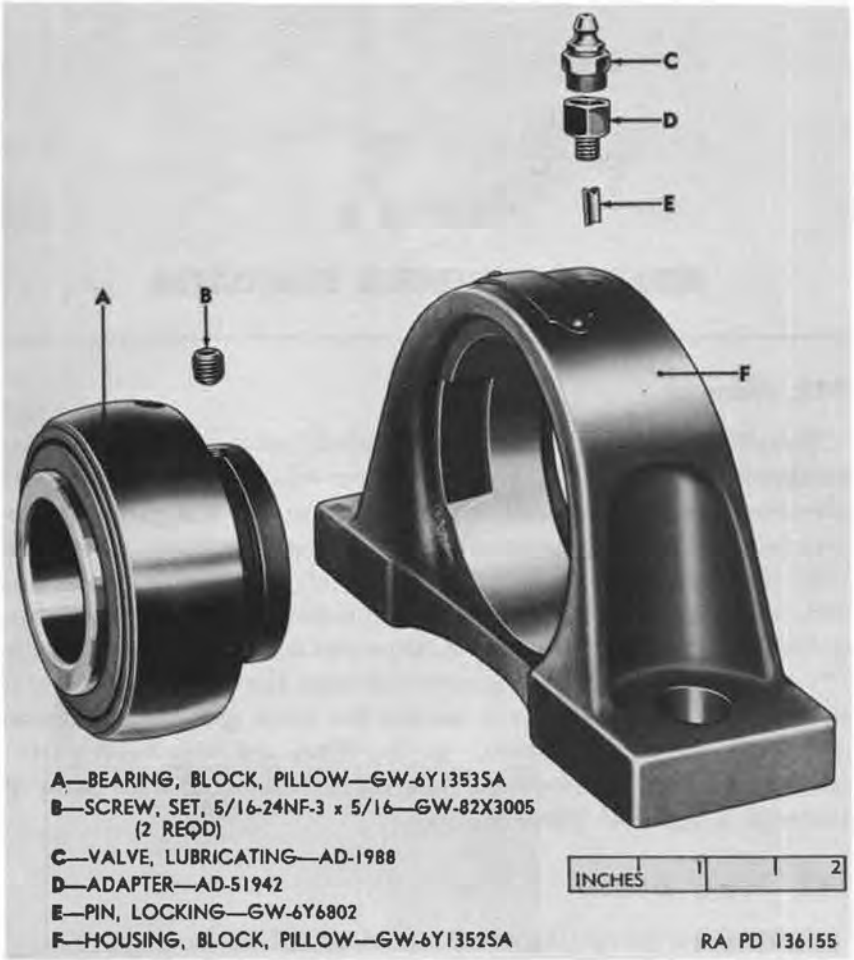

Figure 102. Pillow block—exploded view.

CHAPTER 8

REPAIR AND REBUILD STANDARDS

142. General

The repair and rebuild standards included herein give the minimum, maximum, and key clearances of new or rebuilt parts. They also give wear limits which indicate that point to which a part or parts may be worn before replacement, in order to receive maximum service with minimum replacement. Normally, all parts which have not been worn beyond the dimensions shown in the "Wear Limits" column or damaged from corrosion will be approved for service. An asterisk (*) in the "Wear Limits" column indicates that the part or parts should be replaced when worn beyond the limits given in the "Sizes and fits of new parts" column. In the "Sizes and fits of new parts" column, the letter L indicates a loose fit (clearance) and the letter T indicates a tight fit (interference).

143. Power Divider

a. Input and Pump Output Shifter Shaft and Cover.

Fig. No	*Ref letter*	*Point of measurement*	*Sizes and fits of new parts*	*W*
94	DD	Compression spring (pump output shifter shaft).	Free length 1 21/32 in. compressed to 1 in. = 38 lb.	
	KK	Compression spring (input shifter shaft).	Free length 1 21/32 in. compressed to 1 in. = 38 lb.	

b. Winch Output Shifter Shaft and Cover.

95	F	Compression spring (winch output shifter shaft).	Free length 1 21/32 in. compressed to 1 in. = 38 lb.	

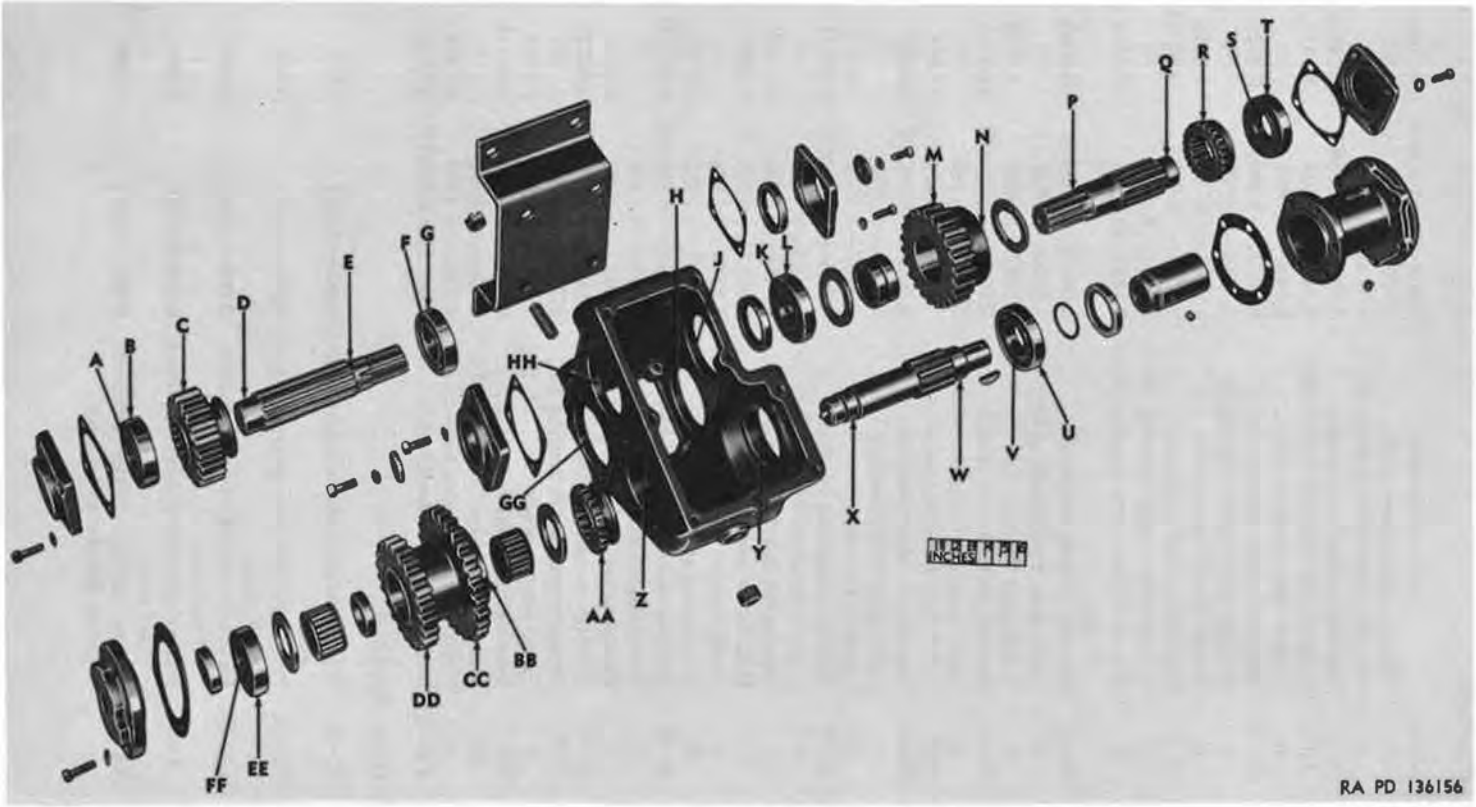

Figure 103. Power divider shafts and gears tolerances.

c. Bearings.

Fig. No	Ref letter	Point of measurement	Sizes and fits of new parts	Wear limits
103	D	Winch output gear shaft	1.5747–1.5752	1.5732
	A	Winch output gear bearing ID	1.5744—1.5748	(*)
	D–A	Bearing to shaft clearance	0.0001L—0.0008T	0.0011L
	GG	Output gear bearing bore in case	3.1495—3.1503	3.1513
	B	Output gear bearing OD	3.1491—3.1496	(*)
	GG–B	Bearing to case clearance	0.0012L—0.0001T	0.0022
	F	Winch output gear bearing ID	1.5744—1.5748	(*)
	E	Winch output gear shaft	1.5747—1.5752	1.5737
	F–E	Bearing to shaft clearance	0.0001L—0.008T	0.0011L
	G	Winch output gear bearing OD	3.1491—3.1496	(*)
	H	Winch output gear bearing bore in case.	3.1495—3.1503	3.1513
	H–G	Bearing to case clearance	0.0012L—0.0001T	0.0022
	K	Input gear shaft bearing ID	1.5743—1.5748	(*)
	P	Input gear shaft	1.5747—1.5752	1.5737
	K–P	Bearing clearance on shaft	0.0001L—0.0009T	0.0011L
	L	Input gear shaft bearing OD	3.1491—3.1496	(*)
	HH	Input gear bearing bore in case	3.1495—3.1503	3.1513
	HH–L	Bearing to case clearance	0.0012L—0.0001T	0.0022
	S	Input gear shaft bearing ID	1.5743—1.5748	(*)
	Q	Input gear shaft	1.5757—1.5752	1.5732
	S–Q	Bearing clearance on shaft	0.0001L—0.0009T	0.0011L
	T	Input gear shaft bearing OD	3.1491—3.1496	(*)
	J	Input gear bearing bore in case	3.1495—3.1503	3.1513
	T–J	Bearing to case clearance	0.0012L—0.0001T	0.0022
	V	Pump output shaft bearing ID	1.5744—1.5748	(*)
	W	Pump output shaft	1.5747—1.5752	1.5732
	V–W	Bearing clearance on shaft	0.0001L—0.0008T	0.0011L
	U	Pump output shaft bearing OD	3.1491—3.1496	(*)
	Y	Pump output bearing bore in case	3.1495—3.1503	3.1513
	U–Y	Bearing to case clearance	0.0012L—0.0001T	0.0022L
	FF	Pump output shaft bearing ID	1.3775—1.3780	(*)
	X	Pump output shaft	1.3779—1.3784	1.3764
	FF–X	Bearing fit on shaft	0.0001L—0.0009T	0.0011L
	EE	Pump output shaft bearing OD	2.8341—2.8346	(*)
	Z	Pump output bearing bore in case	2.8345—2.8353	2.8363
	EE–Z	Bearing to case clearance	0.0012L—0.0001T	0.0022

d. Gear Backlash.

103	C–M	Winch output gear to input shaft gear.	0.006—0.010	0.035
	DD–M	Power divider drive gear to input shaft gear.	0.006—0.010	0.035
	CC–C	Power divider drive gear to winch output gear.	0.006—0.010	0.035
	N–R	Input shaft sliding clutch to input shaft gear.	0.006—0.010	0.035
	AA–BB	Power divider sliding clutch to power divider drive gear.	0.006—0.010	0.035

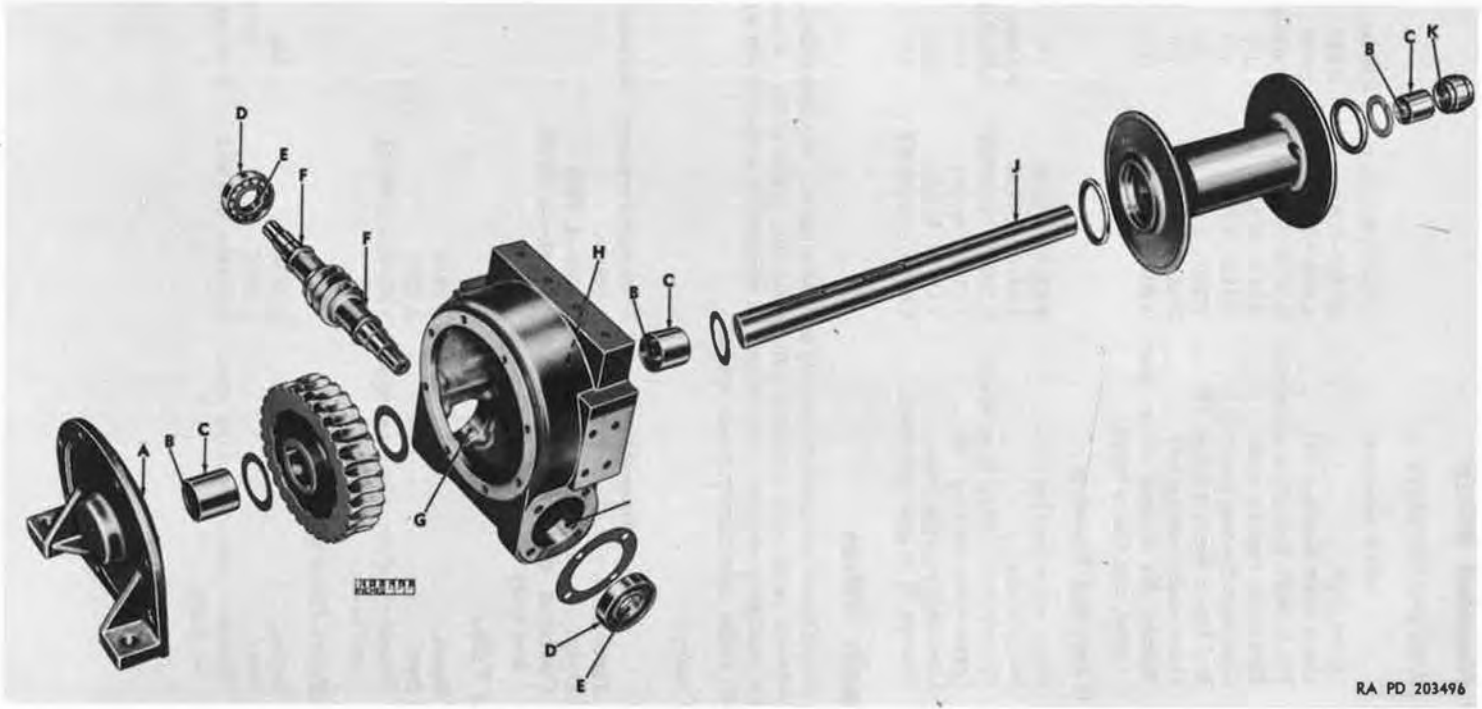

Figure 104. Rear mounted winch tolerances.

144. Rear Mounted Winch

a. Drum Shaft and Bearings.

Fig. No	Ref. letter	Point of measurement	Sizes and fits of new parts	Wear limits
104	J	Drum shaft	2.998—3.000	2.983
	B	Drum shaft bearings ID	3.002—3.005	3.020
	B–J	Drum shaft to bearing clearance	0.002L—0.007L	0. 020L
	A	End cover bearing bore	3.250—3.251	(*)
	H	Gear case bearing bore	3.250—3.251	(*)
	K	End frame bearing sleeve ID	3.250—3.251	(*)
	C	Drum shaft bearing OD	3.256—3.258	(*)
	A, H, K–C	Bearing fits in end cover, gear case, and sleeve bores.	0.005T—0.008T	(*)

b. Drive Worm and Bearings.

104	E	Drive worm bearing ID	2.3616—2.3622	(*)
	F	Drive worm	2.3615—2.3625	2.3595
	E–F	Drive worm bearing fit on worm	0.0007L—0.0009T	0.0017L
	D	Drive worm bearing OD	5.1173—5.1181	(*)
	G	Gear case bearing bore	5.1179—5.1191	5.1201
	G–D	Bearing fit in gear case bore	0.0018L—0.0002T	(*)

145. Hydraulic Valves

Note. Parts shown below are available only in matching pairs. For this reason the clearance between parts after matching will be the only limits given. Wear between parts is negligible and parts should only be replaced if scored or cut by abrasives which might enter the hydraulic system.

a. Swivel valve.

Fig. No	Ref letter	Point of measurement	Sizes and fits of new parts	Wear limits
14	L	Inner hub	4. 750	
	N	Body	4. 750—4. 7503	
	N–L	Clearance after matching hub and body.	0. 0005L—0. 0006L	

b. Control Valve.

25	D	Spool	1. 3755	
	BB	Body	1. 3757	
	BB–D	Clearance after matching spool and body.	0.0004L—0.0007L	

c. Swing Motor Control Valve.

20	P	Spool	1. 3755	1. 3740
	M	Body	1. 3757	1. 3772
	M–P	Clearance after matching spool to body.	0.0004L—0.0007L	0. 0010L

146. Torque Specifications Table

Fig. No.	Ref. letter	Size and thread	Location and application	Recommended torque (lb-ft)
25	VV	5/16–18	Control valve end cover to body	10–15
50	W	5/16–24	Pivot post gear shield to base plate	10–15
14	F	3/8–16	Swivel valve cap to body	15–20
41	J	3/8–24	Drive gear case cover to housing	20–25
41	VV	3/8–24	Drum bearing cage and cap to drum housing	20–25
51	F	3/8–24	Idler gear housing cover to base plate	20–25
41	V	1/2–20	Worm bearing cap to drive gear case	60–80
		5/8–18	Truck body to frame V-bolt	100–150
50	KK	5/8–18	Swivel valve hub locking plate to pivot post support cap.	100–150
10	D	5/8–18	Lift cylinder head to body	100–150
50	JJ	5/8–18	Pivot post support cap to pivot post support	100–150
		5/8–18	Hydraulic vane type motor to drive gear case nut.	100–150
33	A	3/4–10	Hydraulic vane type pump head to body	140–160
29	A	1–8	Hydraulic vane type motor cover to body	240–260
50	AE	1–14	Pivot post support to base plate	300–350
50	SS	1–14	Shipper support to pivot post	300–350
50	VV	1 1/4–12	Pivot post stop	350–400
b. Rear Mounted Winch.				
79	B	3/8–24	Sheave guard to swivel frame	20–25
80	WW	1/2–20	Brake drum to end of worm	60–80
79	DD	5/8–11	Level wind assembly to winch	80–100
80	A	5/8–11	Cover to gear case	80–100
80	AH	3/4–10	Brake case to gear case	150–180
80	BB	3/4–10	Tension channel to frame	150–180
78	A	3/4–10	Tensioner bracket to frame end	150–180
		3/4–16	Swivel shaft to trolley frame	170–200
80	AT	1–14	Winch to body	250–300
c. Power Train.				
93	S, AH	3/8–24	Yokes to shafts on power divider	20–25
99	X	1/2–20	Drive sprocket to drive sprocket shaft	50–60
94	B, W	1/2–20	Arm to shifter shaft on power divider	50–60
		1/2–20	Pillow block mounting	50–60
99	J, L	1/2–20	Drive sprocket bearing mounting	50–60
93	J	5/8–18	Power divider to mounting bracket	100–150

APPENDIX

REFERENCES

1. Publication Indexes

Special Regulations in the 310–20-series; SR 110–1–1; ORD 1; FM 21–8; and SB 9–1 should be consulted frequently for latest changes or revisions of references given in this appendix and for new publications relating to materiel covered in this manual.

2. Supply Manuals

The following manuals of the Department of the Army Supply Manual pertain to this materiel:

a. Destruction To Prevent Enemy Use.

Land Mines and Components Demolition Explosives and Related Items and Ammunition for Simulated Artillery, Booby Traps, Hand Grenade, and Land Mine Fire ---------- ORD 3 SNL R–7

b. Repair and Rebuild.

Antifriction Bearings and Related Items ---------- ORD 5 SNL H–12
Cleaners, Preservatives, Lubricants, Recoil Fluids, Special Oils, and Related Maintenance Materials ---------- ORD 3 SNL K–1
Electrical Fittings ---------- ORD 5 SNL H–4
Items of Soldering, Metallizing, Brazing, and Welding Materials: Gases and Related Items ---------- ORD 3 SNL K–2
Lubricating Equipment, Accessories and Related Dispensers ---- ORD (*) SNL K–3
Lubricating Fittings, Oil Filters, and Oil Filter Elements ---- ORD 5 SNL H–16
Major Items and Major Combinations of Group G ---------- ORD 3 SNL G–1
Miscellaneous Hardware ---------- ORD 5 SNL H–2
Oil Seals ---------- ORD 5 SNL H–13
Pipe and Hose Fittings ---------- ORD 5 SNL H–6
Standard Hardware ---------- ORD 5 SNL H–1

c. Vehicle.

Truck, 5-Ton, 6 x 6 Medium Wrecker, M62 ---------- ORD (*) SNL G–744

(*) See ORD 1, for published manuals of the ordnance section of the Department of the Army Supply Manual.

3. Forms

The following forms pertain to this materiel:

DA Form 9–1, Materiel Inspection Tag.
DA Form 9–3, Processing Record for Shipment and Storage of Vehicles and Boxed Engines (Tag)
DA Form 9–4, Vehicular Storage and Servicing Record (Card)
DA Form 9–68, Spot Check Inspection for Wheeled and Half-Track Vehicles
DA Form 9–71, Locator and Inventory Control Card
DA Form 9–72, Ordnance Stock Record
DA Form 9–76, Request for Work Order
DA Form 9–77, Job Order Register
DA Form 9–78, Job Order
DA Form 9–79, Parts Requisition
DA Form 9–80, Job Order File
DA Form 9–81, Exchange Part or Unit Identification Tag
DA Form 446, Issue Slip
DA Form 447, Turn-in Slip
DA Form 460, Preventive Maintenance Roster
DA Form 461, Preventive Maintenance Service and Inspection for Wheeled and Half-Track Vehicles
DA Form 461–5, Limited Technical Inspection
DA Form 468, Unsatisfactory Equipment Report
DA Form 478, Organizational Equipment File
DA Form 811, Work Request and Job Order
DA Form 811,–1, Work Request and Hand Receipt
DA Form 866, Consolidation of Parts
DA Form 865, Work Order
DA Form 867, Status of Modification Work Order
DD Form 6, Report of Damaged or Improper Shipment
DD Form 317, Preventive Maintenance Service Due (Sticker)

4. Other Publications

The following explanatory publications contain information pertinent to this materiel and associated equipment:

a. Camouflage.

Camouflage, Basic Principles	FM 5–20
Camouflage of Vehicles	FM 5–20B

b. Decontamination.

Decontamination	TM 3–220
Defense Against Chemical Attack	FM 21–40

c. Destruction to Prevent Enemy Use.

Explosives and Demolitions	FM 5–25
Ordnance Service in the Field	FM 9–5

(*) See ORD 1, for published manuals of the ordnance section of the Department of the Army Supply Manual.

d. General.

Cooling Systems: Vehicles and Powered Ground Equipment ---- TM 9–2858
Inspection of Ordnance Material in the Hands of Troops ---- TM 9–1100
Military Vehicles ---- TM 9–2800
Ordnance Service in the Field ---- FM 9–5
Precautions in Handling Gasoline ---- AR 850–20
Principles of Automotive Vehicles ---- TM 9–2700
Accident Reporting ---- SR 385–10–40
Prevention of Motor Vehicle Accidents ---- SR 385–155–1
Storage Batteries: Lead-Acid Type ---- TM 9–2857
Motor Vehicles ---- AR 700–105
Unsatisfactory Equipment Report ---- SR 700–45–5

e. Repair and Rebuild.

Abrasives, Cleaning, Preserving, Sealing, Adhesive, and Related Materials Issued for Ordnance Materiel ---- TM 9–850
Uneconomically Repairable Ordnance Vehicles ---- SR 755–105–5
Hand, Measuring, and Power Tools ---- TM 10–590
Instruction Guide: Care and Maintenance of Ball and Roller Bearings ---- TM 37–265
Lubrication ---- TM 9–2835
Maintenance and Care of Hand Tools ---- TM 9–867
Maintenance and Care of Pneumatic Tires and Rubber Treads ---- TM 31–200
Maintenance Responsibilities and Shop Operations ---- AR 750–5
Modification of Ordnance Materiel ---- SB 9–38
Ordnance Maintenance and General Supply in the Field ---- FM 9–10
Ordnance Maintenance: Carburetors and Governors (Holley) ---- TM 9–1826D
Ordnance Maintenance: Electrical Equipment (Delco Remy) ---- TM 9–1825A
Ordnance Maintenance: Electrical Equipment (Bendix Scintilla) ---- TM 9–1825E
Ordnance Maintenance: Engine (Continental Model R–6602) and Clutch (Rockford Model 15TT) ---- TM 9–1837A
Ordnance Maintenance: Fuel Pumps ---- TM 9–1828A
Brake and Miscellaneous Equipment (Wagner Lockheed) ---- TM 9–1827C
Ordnance Maintenance: Power Brake Systems (Bendix Westinghouse) ---- TM 9–1827A
Ordnance Maintenance: Power Train for 5-Ton 6 x 6 Cargo Trucks ---- TM 9–1837B
Ordnance Maintenance: Speedometer, Tachometers, and Recorders ---- TM 9–1829A
Ordnance Maintenance: Vehicular Maintenance Equipment, Grinding, Boring, Valve Reseating Machines, and Lathes ---- TM 9–1834A
Painting Instructions for Field Use ---- TM 9–2851
Preparation of Ordnance Materiel for Deep-Water Fording ---- TM 9–2853
Preventive Maintenance of Electric Motors and Generators ---- TM 55–405
Tactical Motor Vehicle Inspection and Preventive Maintenance: Lubrication of Wheel Bearings ---- TM 9–2810
Wheeled and Half-Track Vehicles, Trailers, and Towed Artillery: Lubrication of Wheel Bearings ---- TB 9–2835–12

f. Operation.

5-Ton, 6 x 6, Cargo Truck M41, M54, and M55 Cargo Van Truck M64; Chassis Truck M40, M61, M63, and M139; Dump Truck M51; Medium Wrecker Truck M62; Tractor Truck M52; and Tractor Wrecker M246 ---------- TM 9-837

g. Shipment and Standby or Long-Term Storage.

Army Shipping Document ---------- TM 38-705
Instruction Guide, Ordnance Packaging and Shipping (Posts, Camps, and Stations) ---------- TM 9-2854
Marking of Oversea Supply ---------- SR 746-30-5
Military Standard—Marking of Shipments ---------- *MIL-STD-129
Ordnance Storage and Shipment Chart—Group G, Major Items, and Major Combinations of Group G ---------- TB-9-OSSC-G
Processing of Motor Vehicles and Related Unboxed Material for Shipment and Storage ---------- SB 9-4
Preservation, Packaging, and Packing of Military Supplies and Equipment ---------- TM 38-230
Protection of Ordnance General Supplies in Open Storage ---- TB ORD 379
Report of Damaged or Improper Shipment ---------- SR 745-45-5
Standards for Oversea Shipments and Domestic Issue of Ordnance Materiel Other than Ammunition and Army Aircraft ------ TB ORD 385

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