

**TRUCK, DUMP, HEAVY, MC3 – MACK  
MEDIUM AND HEAVY GRADE REPAIR**

This instruction is authorised for use by command of the Chief of Army. It provides direction, mandatory controls and procedures for the operation, maintenance and support of equipment. Personnel are to carry out any action required by this instruction in accordance with EMEI General A 001.

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## GENERAL

### INTRODUCTION

1. This EMEI contains the Medium and Heavy Grade Repair procedures for the Truck, Dump, Heavy, MC3 – Mack. For further information on the basic truck, refer to the relevant EMEI.

### ASSOCIATED PUBLICATIONS

2. Reference may be necessary to the latest version of the following documents:
- a. [Defence Road Transport Instructions \(DRTI\)](#);
  - b. SCES 11659 – Truck, Dump, Heavy, MC3 – Mack;
  - c. SCES 11661 – Truck, Dump Winch, Heavy, MC3 – Mack;
  - d. [EMEI Vehicle A 291-1](#) – Tyres and Tubes – Care and Maintenance of B Vehicles;
  - e. [EMEI Vehicle A 291-5](#) – Tyres and Tubes – General Service B Vehicles Tyre Guide;
  - f. [EMEI Vehicle G 700](#) – Truck, Cargo, Heavy, MC3 – Mack – Data Summary;
  - g. [EMEI Vehicle G 730](#) – Truck, Dump, Heavy, MC3 Mack – Data Summary;
  - h. [EMEI Vehicle G 732](#) – Truck, Dump, Heavy, MC3 - Mack – Technical Description;
  - i. [EMEI Vehicle H 733](#) – Truck, Dump, Heavy, MC3 - Mack – Light Grade Repair;
  - j. [EMEI Workshop E 410](#) – Occupational Health and Safety Instruction – Asbestos – General Instruction;
  - k. Repair Parts Scale 02165;
  - l. [Defence Safety Manual \(SAFETYMAN\)](#);
  - m. [Material Safety Data Sheets \(MSDS\)](#) – Product Information Sheets; and
  - n. [Technical Regulation of Army Material Manual \(TRAMM\)](#).

### AUTHORISED PERSONNEL

3. Repairs are to be carried out by the following technical tradespersons:
- a. Vehicle Mechanic ECN 229-2,
  - b. Fitter Armament ECN 146-2,
  - c. Metalsmith ECN 235-2, and
  - d. civil equivalents qualified in accordance with the requirements of the TRAMM.

## SAFETY PRECAUTIONS

### WARNING

Before working on the hydraulic system, ensure that the system is not under pressure by lowering the dump body, disengaging the PTO and shutting down the engine.

Before working on the hydraulic system, ensure that the hydraulic fluid is sufficiently cool to avoid burns.

Before working on the air system ensure that the pressure is released by draining the brake system secondary reservoir.

Personnel working on this equipment are to adhere to all industrial safety standards, work practices and equipment operating and maintenance instructions relating to the equipment.

### CAUTION

It is vitally important that dirt and other foreign matter are not allowed to enter the hydraulic system during repairs. Dirt or fluid other than clean hydraulic fluid in the system will cause almost immediate failure. Plug or protect openings to prevent dirt entering the system. Use plastic plugs or covers only for this purpose. Do not use cloth or paper as plugs or covers.

## DETAIL

### GENERAL INSTRUCTIONS

4. Use only authorised replacement parts and components.
5. Replacement hardware, tubing, hose fittings etc. should be of equivalent size, type, length and strength to the original equipment.
6. All fittings are to have dry, clean threads unless otherwise specified. When specified, thread sealants are to be applied to dry, clean, oil free threads.
7. Replace any item that has stripped threads or damaged parts.

### IDENTIFICATION NUMBERS

8. The location of the identification numbers of major components are listed in Table 1.

**Table 1 Identification Numbers Locations**

Serial	Component	Location
1	Dump body	Left-hand side, lower rail, above fuel tank
2	Hoist	Main post, lower outer sleeve

### SPECIAL TOOLS AND GAUGES

9. Special tools and gauges required to complete Medium and Heavy Grade Repairs are listed in Table 2.

**Table 2 Special Tool Identification**

Serial	Item Name	Use	Para No
1	Pressure gauge, 70 000 kPa (10 000 psi)	Test hydraulic system pressure	28
2	Flow meter 45 l/min. (10 gal/min.)	Test hydraulic system flow	28
3	Pressure gauge, 15 000 kPa (2 175 psi)	Test hoist control valve	38
4	Gauge calibration test set	Test load indicator gauge	39

**MECHANICAL SYSTEM**

**Power Take-off (PTO) – Hydraulic Pump**

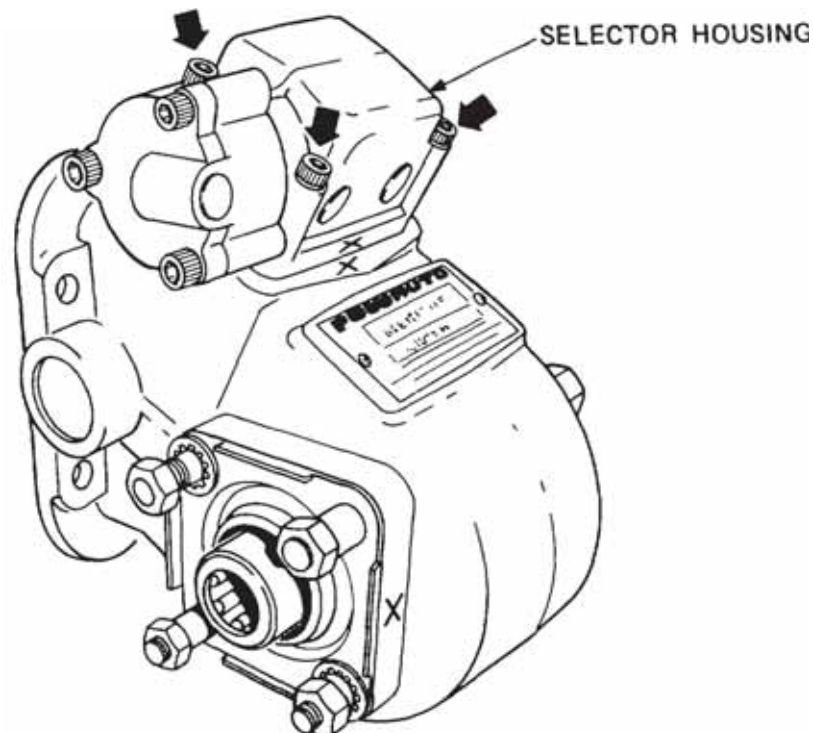
**WARNING**

**Both the PTO and adapter housings are very brittle and easily damaged unless handled carefully.**

**10. Removal.** Remove the PTO and hydraulic pump assembly as detailed in EMEI Vehicle G 733 – Light Grade Repair.

**11. Disassembly.** Disassemble the hydraulic pump (Figure 1) as follows:

- a. Match mark the pump, the selector housing and the PTO housing to ensure their correct positioning during reassembly.



**Figure 1 Socket-head Bolt Location**

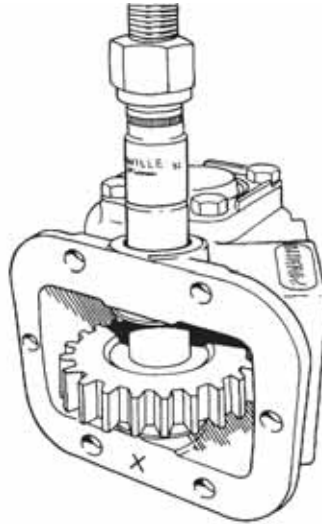
- b. Remove the four nuts and washers securing the pump to the PTO and remove the pump.
- c. Remove the four socket-head bolts securing the selector housing to the PTO and remove the selector housing.
- d. Remove a welsh plug from one end of the idler shaft.

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- e. Remove the circlip (furthestmost from the end of the idler shaft that the welsh plug was removed) and slide it along the shaft. Install the PTO housing in a press and remove the idler shaft using the press and a suitable adapter (Figure 2).

**NOTE**

As the shaft is pressed out of the housing, it will cause the gear, thrust washer and circlip to slide along the shaft and will also remove the other welsh plug and a roller bearing.



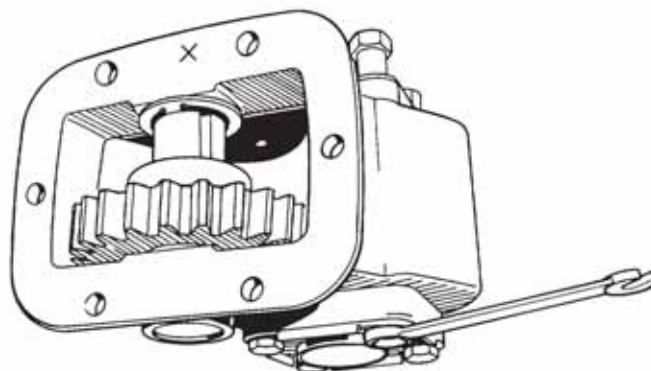
**Figure 2 Removing Idler Shaft**

- f. Lift the second circlip from the groove and continue to press the shaft out until the circlips, the thrust washers and the gear can be removed.

**NOTE**

When the gear is removed from the shaft a steel ball will drop out of an indent within the gear bore. This ball acts as a key, locking the gear and shaft together but still allowing the gear to move lengthways along the shaft.

- g. To remove the remaining needle roller bearing from the housing, press the shaft back in the opposite direction.
- h. Remove the four bolts (Figure 3) securing the drive shaft bearing cover plate to the housing and remove the cover plate and gasket.



**Figure 3 Removing the Bearing Cover Plate**

- i. Remove the circlip from the groove in the drive shaft and slide it along the shaft, then remove the bearing cups by hand.

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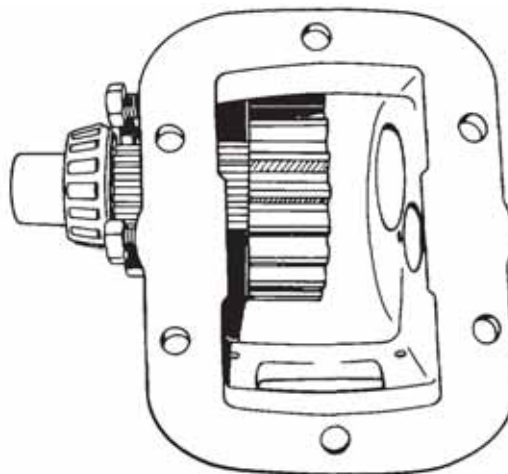
- j. Remove the bearing cone from the shaft at the end opposite the output using a suitable puller. Ensure that the puller is pulling against the inner race and not the cage.
- k. Slide the gear and circlip off the shaft while withdrawing the shaft, complete with the other bearing, from the housing.
- l. Position the drive shaft in a press then press the remaining bearing off the shaft.

**12. Cleaning and Inspection.** Clean and inspect the components as follows:

- a. Clean all parts thoroughly with a suitable cleaning agent then allow them to dry. Ensure that all gasket residues are removed.
- b. Inspect the housing for damage or cracking. Replace it as necessary.
- c. Check the gears for cracked, chipped or worn teeth. Check the splines in the drive gear bore for wear. Replace gears as necessary.
- d. Check the idler shaft bearing surfaces for pitting or wear. Also check the channel in the idler shaft for wear. Replace the idler shaft as necessary.
- e. Check the internal and external splines on the drive shaft for wear. Replace the drive shaft as necessary.
- f. Check the condition of the bearings. Replace them as necessary.

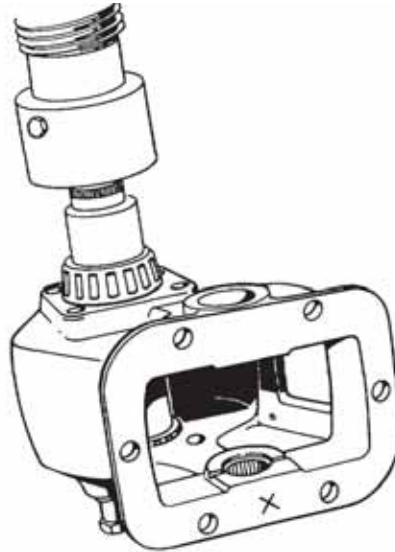
**13. Reassembly.** Reassemble the hydraulic pump as follows:

- a. Place the drive shaft in a press, position the bearing on the output end of the shaft with the taper facing away from the splines, then press the bearing onto the shaft until it butts firmly against the shoulder. Remove the shaft from the press.
- b. Install a circlip onto the drive shaft then position the shaft partially in the housing, ensuring that the output end of the shaft is on the correct side of the housing. Install the drive gear in the housing and align it with the drive shaft. Feed the drive shaft into the housing and through the drive gear (Figure 4).



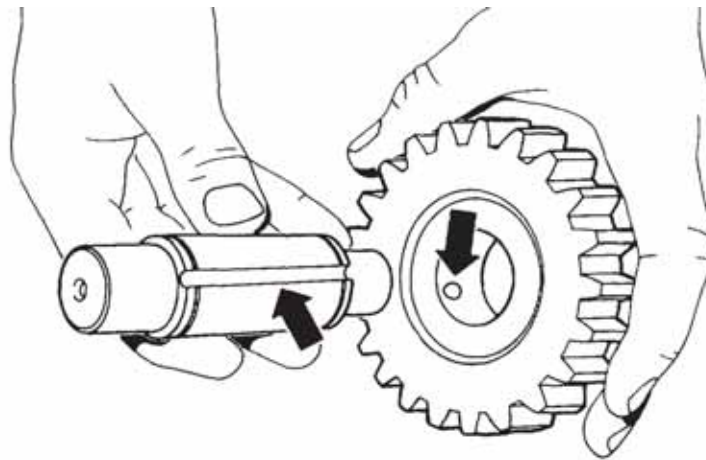
**Figure 4 Installing Drive Shaft and Gear**

- c. Place the housing and shaft in a press. Position a bearing, with the taper facing away from the splines, on the drive shaft at the end opposite the output, then press the bearing onto the shaft (Figure 5), until it butts firmly against the shoulder. Remove the housing from the press.



**Figure 5 Installing the Drive Shaft Bearing**

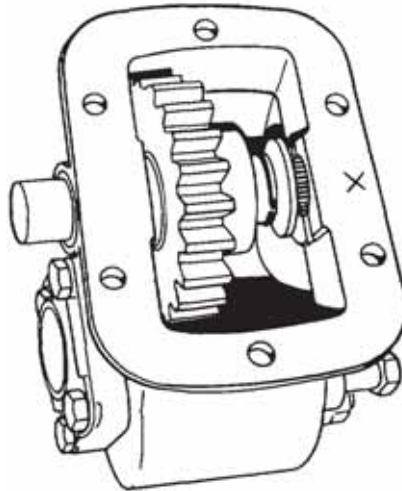
- d. Lubricate the bearings with OEP-220 then install the bearing cups into the housing.
- e. Install the bearing cover and gaskets. Install the cover retaining bolts and tighten them to between 34 N.m and 38 N.m (25 lbf.ft to 28 lbf.ft).
- f. Position the idler shaft partially into the housing. Install a thrust washer and a circlip onto the shaft.
- g. Insert the steel ball into the detent in the idler gear then position the idler gear in the housing. Align the channel in the idler shaft with the steel ball in the idler gear as shown in Figure 6, then push the idler shaft further into the housing and into the idler gear (Figure 7).



**Figure 6 Channel and Steel Ball**

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**Figure 7 Installing Idler Shaft and Gear**

- h.** Install the second circlip into the groove on the idler shaft then position the thrust washer on the shaft.
- i.** Push the idler shaft into the housing, butting the thrust washer against the housing. Position the first thrust washer against the housing and insert the first circlip into the groove in the idler shaft.
- j.** Lubricate then press the needle roller bearings into the housing on both ends of the idler shaft, then install the welsh plugs.
- k.** Lubricate the gears and bearings of the PTO liberally with clean OEP-220, then place a protective cover over the PTO and set it aside.

#### **Air Operated Selector**

- 14. Disassembly.** Disassemble the selector as follows:

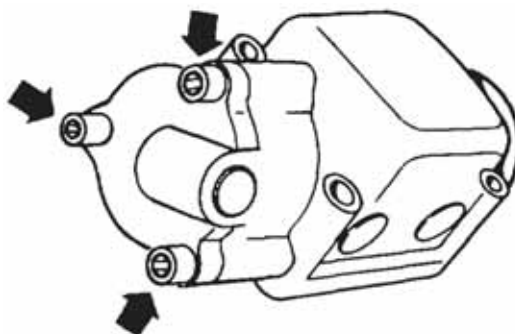
#### **WARNING**

**Before removing the selector housing air inlet cover, ensure that the circlip used to retain the selector fork to the piston is in place. The selector fork, if properly retained, will prevent the piston flying out of the cylinder under spring pressure, causing possible injury, when the air inlet cover is removed.**

#### **NOTE**

Spring pressure will cause the piston to protrude from the housing when the cover is removed.

- a.** Remove the three socket-head bolts from the air inlet cover (Figure 8), and remove the cover. Discard the O ring.



**Figure 8 Air Inlet Cover Retaining Bolts**

- b. Push the piston into the cylinder bore by hand and remove the circlip (Figure 9) retaining the selector fork to the piston from its groove.

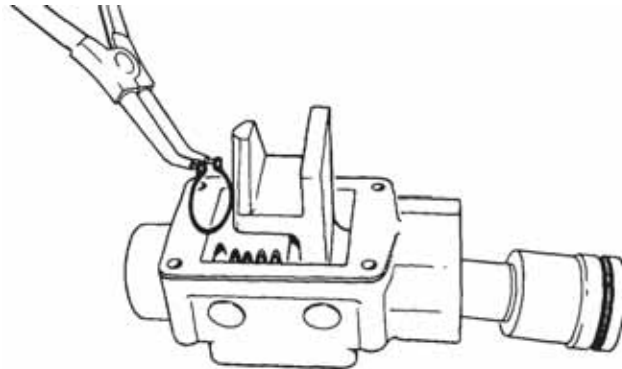


Figure 9 Removing Circlip

- c. Release the pressure on the piston allowing the piston to move up the bore. Feed the circlip and selector fork off as the piston and return spring are removed.
- d. Remove the selector fork and circlip from the housing, taking note as to which way the step in the fork is facing. Discard the circlip.
- e. Remove and discard the piston O ring (Figure 10).

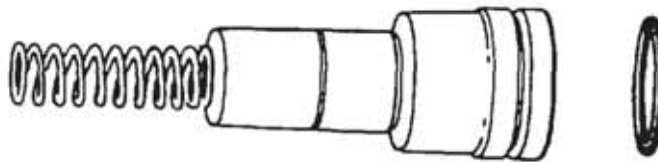


Figure 10 Piston and O Ring

15. **Cleaning and Inspection.** Clean and inspect the components as follows:

- a. Clean all parts with a suitable cleaning agent and allow them to dry.
- b. Inspect the housing cylinder bore and piston for excessive wear or scoring. Replace parts as necessary.
- c. Inspect the selector fork for damage or wear and replace it if necessary.
- d. Check the return spring for breaks, cracking or wear. Replace the spring as necessary.

16. **Reassembly.** Reassemble the selector as follows (Figure 9):

- a. Install a new O ring onto the piston. Lubricate the O ring with suitable rubber grease, then install the return spring into the bore of the piston.
- b. Insert the piston partially into the cylinder bore, then position the selector fork and circlip onto the piston, ensuring that the step in the fork is facing the correct way.
- c. Push the piston into the bore while feeding the selector fork and circlip onto the piston. Ensure that the circlip is correctly seated in the groove.
- d. Insert a new O ring in the groove on the air inlet cover, then install the cover onto the housing.
- e. Fit the retaining bolts and tighten them to between 9 N.m and 13 N.m (7lbf.ft to 10 lbf.ft).
- f. Assemble the selector housing and a new gasket onto the PTO housing, aligning the match marks and ensuring that the selector fork is correctly located over the idler gear.
- g. Install the four socket-head bolts and tighten them to between 34 N.m and 38 N.m (25lbf.ft and 28 lbf.ft).

**Adapter Housing**

17. **Disassembly.** Disassemble the adapter housing as follows:

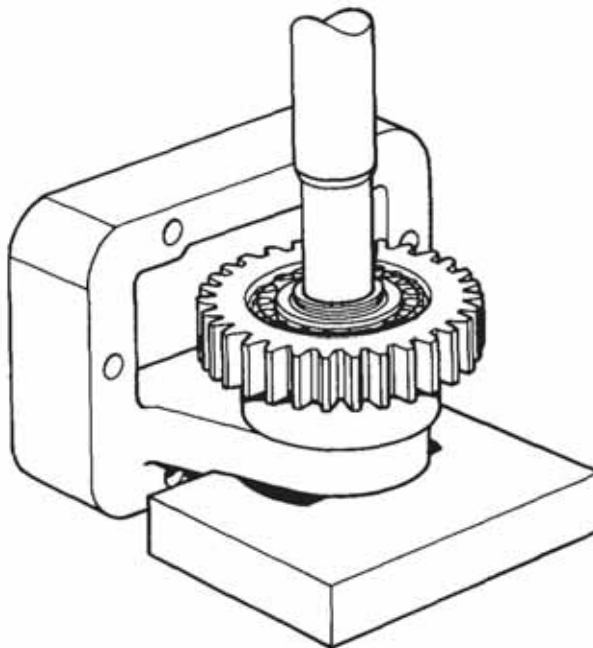
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- a. Place the adapter housing in a soft-jawed vice and, using a C-spanner, remove the bearing retaining collar.

**NOTE**

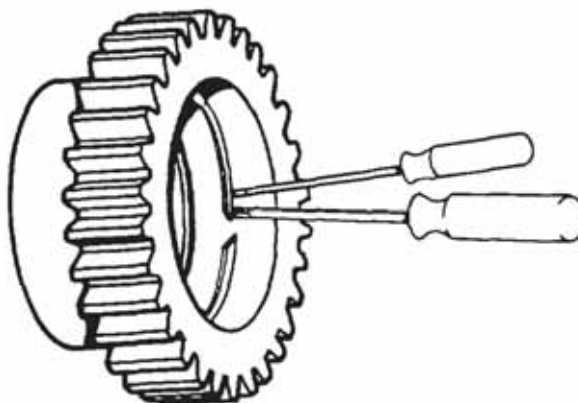
The collar will be firm on the thread due to the locking indentations.

- b. Suitably support the adapter housing on a press (Figure 11), and then press the shaft through the gear until there is sufficient space to remove the gear.



**Figure 11 Pressing the Shaft from the Housing**

- c. Remove the bearing cones and spacers from the assembly.
- d. Using a soft drift and hammer, remove the bearing cups from the gear.
- e. Remove the snap ring from the gear (Figure 12) if damage is evident.



**Figure 12 Removing the Snap Ring**

- 18. Cleaning and Inspection.** Clean and inspect the components as follows:
- a. Clean all parts thoroughly with a suitable cleaning agent and ensure that all gasket residues are removed.
  - b. Inspect the gear for worn or damaged teeth. Replace as necessary.
  - c. Check the bearings for wear or damage. Replace as necessary.

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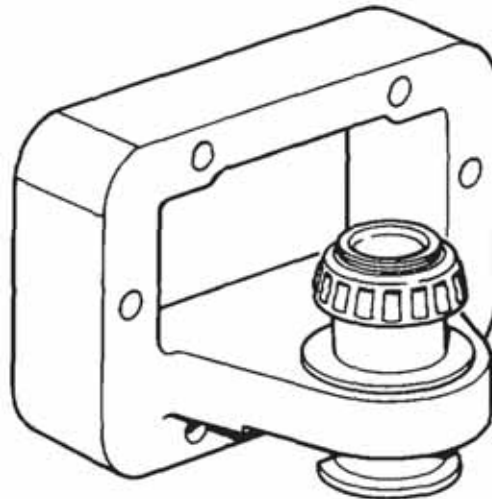
- d. Check the shaft for wear or damage. Replace as necessary.
- e. Check the thickness of the bearing-to-housing spacer, 2.99 mm (0.118 in); the bearing cone spacer, 3.55 mm (0.140 in) and the snap ring, 3.96 mm (0.156 in). Replace if worn or damaged.

**NOTE**

The snap ring provides the correct bearing cup spacing.

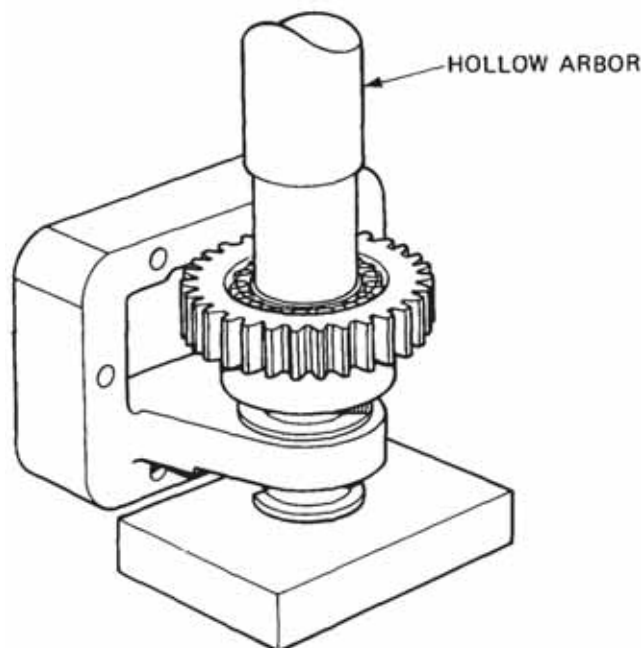
**19. Reassembly.** Reassemble the adapter housing as follows:

- a. Install the snap ring (if removed), then press the bearing cups into the gear. Ensure that the bearing cups butt firmly against the snap ring.
- b. Position the bearing-to-housing spacer and the inner bearing on the shaft (Figure 13).



**Figure 13 Positioning the Bearing and Spacer**

- c. Place the adapter housing and shaft in the press, then position the gear, the spacer and the outer bearing cone on the shaft and press the bearings and gear onto the shaft. Ensure that the flat on the shaft flange is correctly aligned and that the bearings are seated firmly against the spacers (Figure 14).



**Figure 14 Installing the Shaft, Gear and Bearings**

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- d. Install the new retaining collar and tighten it securely. Stake the retaining collar to the shaft, using a staking chisel and hammer.
- e. Lubricate the bearings with OEP-220 oil, and then check that the gear revolves freely and without undue noise.

**20. Determine Backlash.** Determine the amount of backlash in accordance with EMEI Vehicle G 733 – Light Grade Repair and ensure the measurements are within tolerance. Correct as necessary.

**21. Installation.** Install the PTO and hydraulic pump in accordance with EMEI Vehicle G 733 – Light Grade Repair.

## DUMP BODY

**22. Removal.** Remove the dump body as follows:

- a. Remove the two rear eye-bolts from their stowed positions (Figure 15), then remove the lynch pin and washer from each blanking plug. Remove the blanking plugs and install the eye-bolts.
- b. Attach suitable overhead lifting equipment with a minimum safe working load of 750 kg to the four lifting eye-bolts in the body floor. Take up any slack in the sling.
- c. Disconnect the air line connector from the tailgate lock air chamber. Plug the air line and air chamber with suitable plastic plugs.
- d. Remove the convoy light from the mounting bracket and disconnect the tail light wiring from the junction box.
- e. Remove the zip clamps to release the tail light harness.
- f. Remove the nut and bolt from one side of the body pivot shaft shown in Figure 15, then drive the body pivot shaft out of the pivot brackets using a hammer and suitable drift. Discard the nut.
- g. In the case of a dump winch, support the lower winch roller when removing the shaft, taking care not to damage the roller bushes.

### NOTE

Access to the hoist head is gained through the inspection hole located on the front of the dump body, toward the top of the hoistwell.

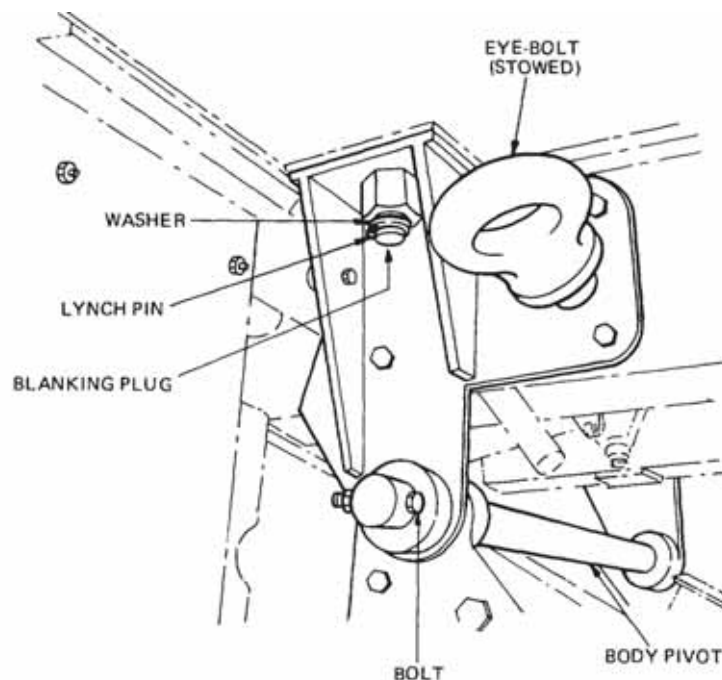
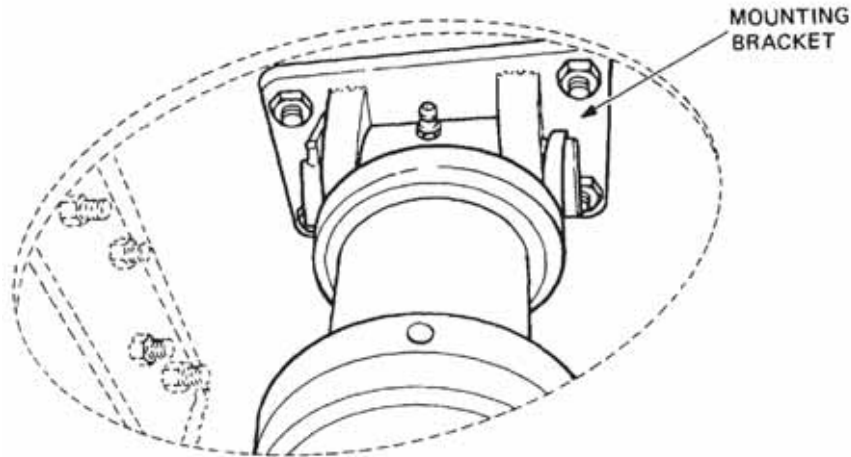


Figure 15 Eye-bolts, Blanking Plugs and Body Pivot

**WARNING**

Ensure that the hydraulic hoist is securely supported with a timber wedge to prevent it falling, possibly causing damage or injury, as the dump body is being raised from the vehicle.

- h. Remove the four nuts and bolts securing the hoist-head mounting bracket to the body (Figure 16). Discard the nuts.



**Figure 16 Hoist Head Mounting Bracket Location**

- i. Manually release the body lock then carefully raise the dump body until it is clear of the top of the hoist. Move the body away from the truck and place it on suitable stands.

**23. Installation.** Install the dump body as follows:

**WARNING**

Ensure that the hydraulic hoist is securely supported with a timber wedge to prevent it falling, possibly causing damage or injury, as the dump body is lowered into position.

- a. Attach suitable overhead lifting equipment with a minimum safe working load of 750 kg to the four lifting eye-bolts in the body floor. Raise the dump body and position it over the sub-frame with the tailgate to the rear of the truck.
- b. Carefully lower the dump body onto the sub-frame, ensuring correct alignment at the hoist head and pivot brackets.

**NOTE**

Access to the hoist head is gained through the inspection hole located on the front of the dump body, toward the top of the hoistwell.

- c. Secure the hoist-head mounting bracket to the dump body with four bolts and new locknuts. Tighten to between 95 N.m and 105 N.m (69 lbf.ft to 76 lbf.ft), then remove the hoist support.
- d. Insert the body pivot through the pivot brackets and secure with the retaining bolt and a new locknut. Tighten to between 95 N.m and 105 N.m (69 lbf.ft to 76 lbf.ft).
- e. Reconnect the tail light wiring at the junction box and fasten the harness with zip clamps.
- f. Secure the convoy light to the convoy light mounting bracket.

- g. Remove the plastic plugs from the tailgate lock air chamber and the air line. Connect the air line to the air chamber.
- h. Remove the overhead lifting equipment and remove the wedge from the hoist base.
- i. Remove the two rear eye-bolts from the dump body and install the blanking plugs. Secure each blanking plug with a washer and lynch pin.
- j. Install the two eye-bolts in the eye-bolt stowage holes.
- k. Lubricate the body pivot with XG-274 through the grease nipple at each end of the pivot shaft. Also grease the two roller bushes.
- l. Start the engine, engage the PTO and operate the hoist up and down several times checking for correct operation.
- m. Lower the hoist, disengage the PTO and switch off the engine.

## HYDRAULIC SYSTEM

### Hydraulic Pump

- 24. **Removal.** Remove the hydraulic pump in accordance with EMEI Vehicle G 733 – Light Grade Repair.
- 25. **Disassembly.** Disassemble the hydraulic pump as follows(Figure 17):
  - a. Match mark the front and rear covers to the body of the pump, and then remove the nine nuts and washers which secure the front cover, body and rear cover together.
  - b. Remove the front cover then remove the two seals and the circlip from the cover. Discard both seals.

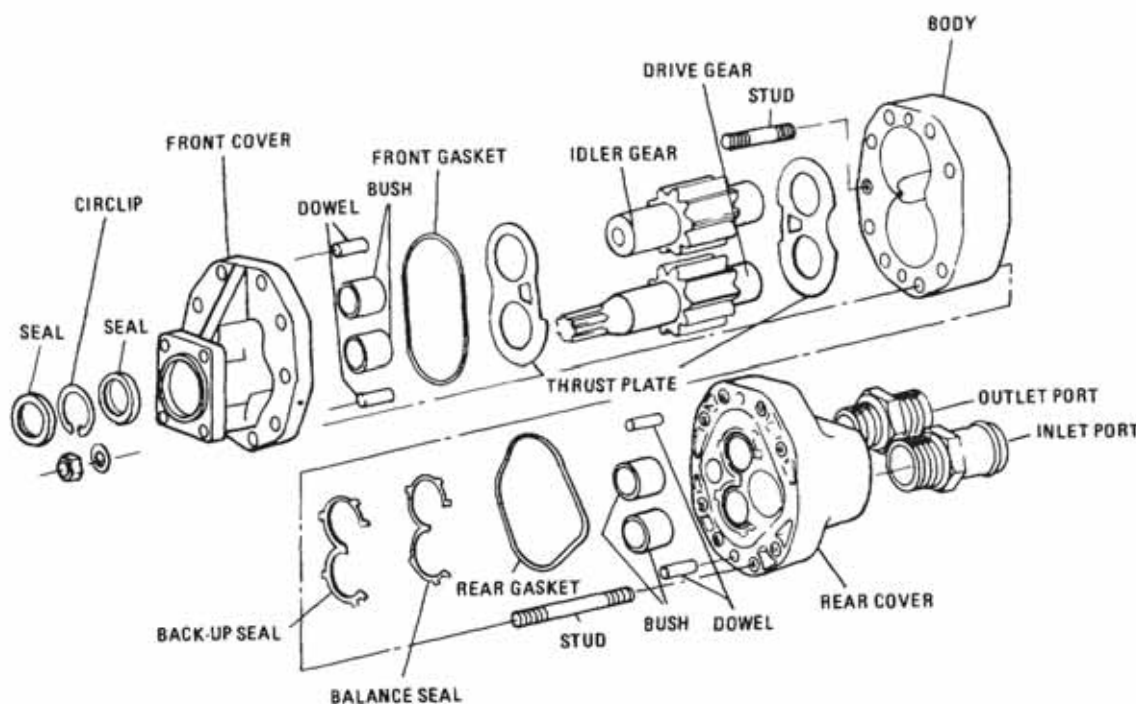


Figure 17 Hydraulic Pump – Exploded View

- c. Remove and discard the front gasket and thrust plate.
- d. Remove the drive gear and idler gear.
- e. Remove and discard the rear thrust plate, then slide the body away from the rear cover.
- f. Remove and discard the back-up seal, balance seal and rear gasket.
- g. If necessary, the dowels may be driven out of the front and rear covers and the studs removed from the body and rear cover.

- h. Using a suitable bush puller, remove the two bushes from the front cover then remove the two bushes from the rear cover.

**26. Cleaning and Inspection.** Clean and inspect the components as follows:

- a. Clean all components using a recommended cleaning agent. Ensure that no gasket residue is left on the front cover, body or rear cover.
- b. Check the sealing surfaces of the front cover, body and rear cover for nicks, burrs and scoring. Replace as necessary.
- c. Check the bushes for nicks, burrs and scoring as well as elongation. Replace as necessary.
- d. Check the gear teeth and shaft of the idler gear for damage or signs of excessive wear. Replace if necessary.
- e. Check the gear teeth, shaft and splines of the drive gear for damage or signs of excessive wear. Replace if necessary.
- f. Check the inlet and outlet port connectors for fractures or damage. Replace as necessary.
- g. Check the studs and dowels for damage or signs of excessive wear. Replace as necessary.

**27. Reassembly.** Reassemble the hydraulic pump as follows (Figure 17):

**NOTE**

Always use new seals and gaskets during reassembly.

- a. Lubricate the four bushes with hydraulic fluid (OM-65), then press two bushes into the housings in the rear cover and two into the housings in the front cover using a suitable adapter and press.
- b. Install any dowels removed during the disassembly procedure.
- c. Install any studs removed during the disassembly procedure, ensuring that the single short stud is installed into the pump body, while the eight long studs are installed into the rear cover.
- d. Install the rear gasket, balance seal and back-up seal respectively in the grooves provided in the rear cover.
- e. Slide the body over the studs and onto the rear cover.
- f. Install the new rear thrust plate into the body so that the bronze face is toward the gears.

**NOTE**

Ensure the window in the rear thrust plate is positioned as shown in Figure 17.

- g. Lubricate the idler gear and drive gear with hydraulic fluid (OM-65) then install the gears in their respective bushes in the rear cover.
- h. Lubricate the sealing surfaces of the two seals then install the seals and circlip into the front cover.
- i. Fit the front gasket into the groove in the front cover.
- j. Install the new front thrust plate into the front cover so that the bronze face is toward the gears.

**NOTE**

Ensure the window in the front thrust plate is positioned as shown in Figure 17.

- k. Fit the front cover assembly to the body and rear cover assembly, carefully aligning the two gears with their mounting bushes and the securing studs with the mounting holes in the front cover.
- l. Fit the nine washers and nuts to the studs, and tighten them to between 55 N.m and 65 N.m (40 lbf.ft and 50 lbf.ft).

**28. Installation and Testing.** Install and test the hydraulic pump as follows:

- a. Clean the mounting faces on the pump and PTO. Position a new gasket on the PTO and install the pump. Install the retaining nuts and washers. Tighten the nuts to between 34 N.m and 38 N.m (25 lbf.ft to 28 lbf.ft).



- b.** Remove the plastic plugs and install the hoses. Securely tighten the pressure hose connection and the supply hose screw clamp.
- c.** Install a 70 000 kPa (10 000 psi) pressure gauge (Table 2, Item 1) and a 45 L/min (10 gal/min) flow meter (Table 2, Item 2) in series with the hydraulic line between the hydraulic pump and the hoist control valve.
- d.** Tighten all connections.
- e.** Start the truck engine and set the engine speed to 1 000 rpm. Engage the PTO.
- f.** Operate for approximately ten minutes and check that during this period that the pressure indicated does not exceed a maximum pressure of 19 000 kPa (2 760 psi), and the flow rate is approximately 30 L/min. (6.6 gal/min.). Check for any leaks around the pump.
- g.** If the pressure or flow rate is incorrect, check the hoist control valve and hydraulic pump.
- h.** Release the throttle, disengage the PTO and shut down the engine.

**WARNING**

**Before disconnecting the pressure and flow meters from the hydraulic system, ensure that the system is not under pressure by lowering the dump body, disengaging the PTO and shutting down the engine.**

**Ensure also that the hydraulic fluid is sufficiently cool to avoid burns.**

- i.** Remove the hydraulic line input from the test meters then remove the meters. Connect the hydraulic line and tighten securely. Check for leaks and rectify as necessary.
- j.** Check the fluid level in the oil reservoir. If necessary, top up with OM-65.

### **Hydraulic Hoist**

- 29. Removal.** Remove the hydraulic hoist as follows:

**WARNING**

**Before working on the hydraulic system, ensure that the system is not under pressure by lowering the dump body, disengaging the PTO and shutting down the engine.**

**Before working on the hydraulic system, ensure that the hydraulic fluid is sufficiently cool to avoid burns.**

**NOTE**

Overhead lifting equipment with a minimum safe working load of 150 kg will be required to remove the hoist from the truck.

- a.** Clean the area around the hydraulic hose at the base of the hoist and allow it to dry.
- b.** Place a suitable receptacle directly beneath the hoist, then disconnect the hydraulic hose from the base of the hoist and allow the oil to drain out. Blank off the hose and the port in the cylinder with suitable plastic plugs.

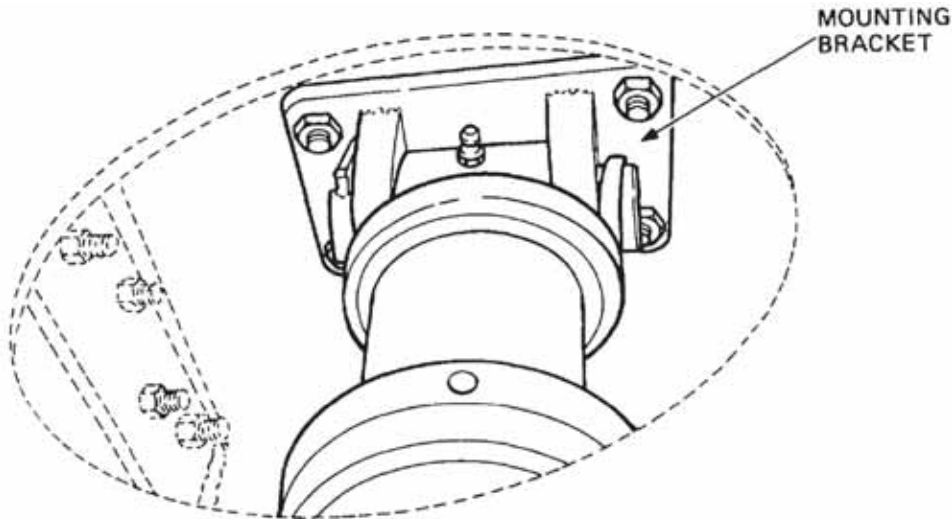
**NOTE**

Access to the hoist head is gained through the inspection hole located on the front of the dump body, toward the top of the hoistwell.

- c.** Remove the nuts and bolts securing the hoist-head mounting bracket to the body (Figure 18). Discard the nuts.

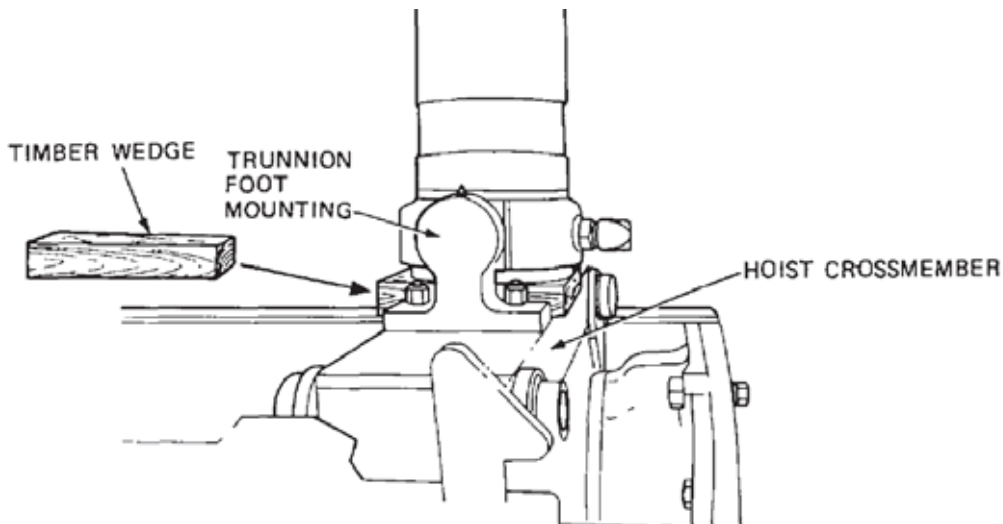
**CAUTION**

Suitably support the hydraulic hoist to prevent it falling, possibly causing damage, as the dump body is raised.



**Figure 18 Hoist Head Mounting Bracket Location**

- d. Attach a suitable sling to the eye-bolts located either side of the hoistwell in the dump body and to the overhead lifting equipment.
- e. Raise the dump body until it clears the top of the hoist. Install suitable chocks or supports to hold the dump body in position and ensure that the safety post is erected.
- f. Remove the lifting equipment from the dump body then attach it to the hoist and take up the slack.
- g. Remove the two nuts and bolts securing one of the trunnion foot mountings to the hoist crossmember (Figure 19). Remove the mounting while ensuring that the hoist does not slip from the remaining mounting and swing free.



**Figure 19 Mounting Location**

- h. Remove the hoist from the remaining mounting and lift it clear of the truck, then place it on a workbench.

**30. Disassembly.** Disassemble the hydraulic hoist as follows(Figure 20):

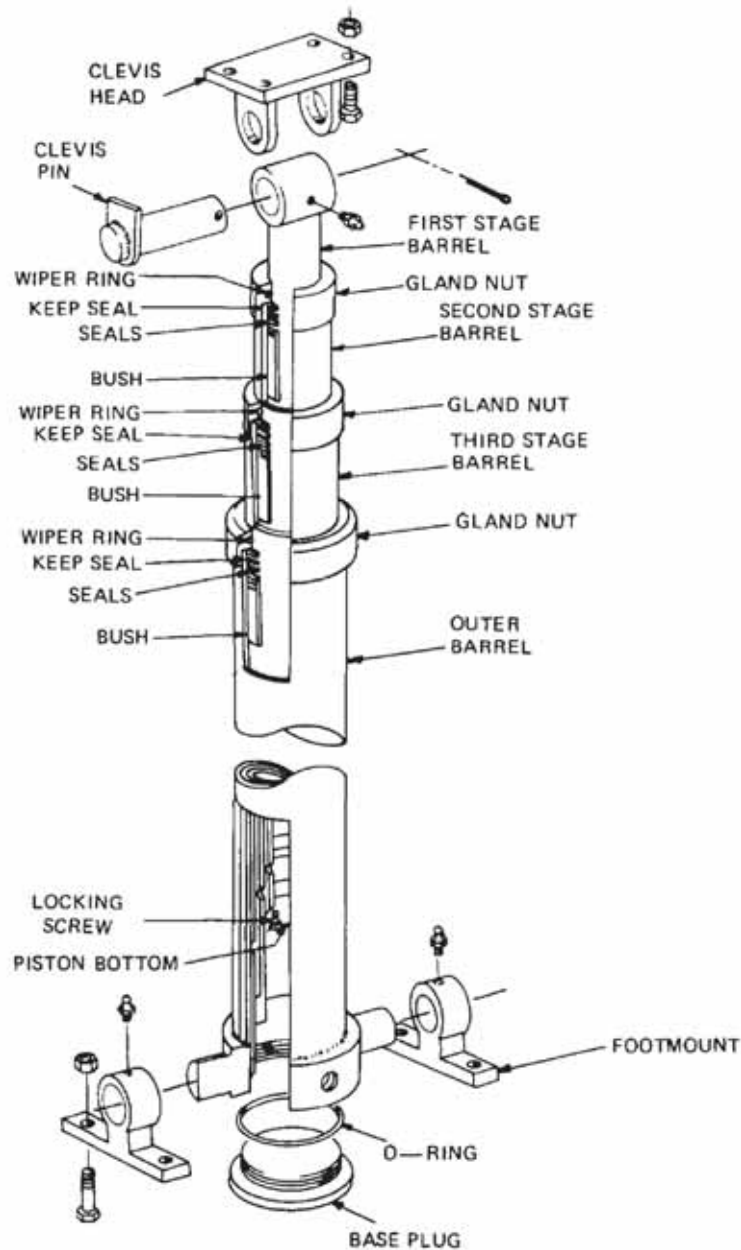
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- a. Remove all grub screws securing the aluminium gland nuts to the barrels.

**NOTE**

All threads on the hoist are right-hand, turn them anticlockwise to remove.

- b. Remove the base plug from the bottom of the hoist and discard the O ring.



**Figure 20 Hydraulic Hoist – Exploded View**

- c. Remove the hex head locking screw from the piston, then remove the dowel pin using a magnet or air blast.
- d. Unscrew the piston bottom and remove it from the first stage (inner) barrel.

**NOTE**

Should the barrel turn when removing the piston bottom, tighten the gland nut on the second stage barrel, locking the barrel and preventing it from turning. Slacken the gland nut off once the piston bottom is removed.

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- e. Remove the first stage (inner) barrel from the top end of the hoist by pulling on the hoist-head mounting bracket.
- f. Remove the small gland nut then withdraw the second stage barrel from the bottom end of the hoist. Repeat this procedure for the remaining gland nuts and third stage barrel.

**31. Cleaning and Inspection.** Clean and inspect the components as follows:

- a. Clean all parts in a suitable cleaning solution and allow them to dry.
- b. Inspect the barrels and bronze bushes for scratches, nicks, grooving or excessive wear. Replace parts as necessary.
- c. Check the trunnions at the base of the hoist for wear or damage. If replacement is necessary, replace the outer barrel assembly. Also check the condition of the foot mountings and replace if worn or damaged.
- d. Remove and discard the V-seals and adapters from the barrels.
- e. Remove and discard the wiper rings from the gland nuts, also check the gland nuts for wear or damage and replace as necessary.
- f. Check the condition of the clevis joint and pin on the hoist-head. Replace parts as necessary.

**32. Reassembly.** Reassemble the hydraulic hoist as follows (Figure 22):

- a. Lightly lubricate the new V-seals and adapters with OM-65 and install into the barrels.
- b. Lightly lubricate the new wiper rings with OM-65, and then install them into the gland nuts.



**Do not tighten the gland nuts down, as this will cause the V-seals to expand outwards, making it difficult to install the barrels without damaging the seals.**

- c. Install the third stage barrel into the bottom of the outer barrel while taking care not to damage the V-seals, then install the large gland nut onto the outer barrel.
- d. Install the second stage barrel into the bottom end of the third stage barrel while taking care not to damage the V-seals, then install the gland nut onto the third stage barrel.
- e. Position the gland nut on the second stage barrel, then install the first stage (inner) barrel into the top of the second stage barrel, taking care not to damage the V-seals.
- f. Install the piston bottom into the first stage (inner) barrel. Align the dowel pin holes in both the piston and the barrel, install the dowel pin and secure in place with the socket head grub screw.

**NOTE**

Should the barrel turn when installing the piston bottom, tighten the gland nut on the second stage barrel, locking the barrel and preventing it from turning. Slacken the gland nut off once the piston bottom is installed.

Before installing the base plug, invert the hoist and fill the barrels with clean fresh hydraulic fluid (OM-65).

- g. Install a new O ring onto the base plug, then install the base plug into the bottom the hoist.
- h. Tighten the gland nuts down so that a slight amount of drag is felt as each piston is moved in turn in and out of the bores. Install new nylon plugs into the grubscrew holes then install and tighten the grubscrews to prevent the gland nuts from coming loose.

**33. Installation.** Install the hydraulic hoist as follows:

- a. Position the overhead lifting equipment above the hoist. Attach the sling to the hoist and take up the slack in the sling.
- b. Lift the hoist into position on the truck, ensuring that the hose fitting is toward the front. Coat the trunnions on the base of the hoist with XG-274 grease, then position a trunnion in the fixed foot

mounting. Slide the removed foot mounting onto the other trunnion, align the mounting bolt holes, install the bolts and nuts and tighten them to between 95 N.m and 105 N.m (69 lbf.ft and 76 lbf.ft). Install the timber wedge between the hoist base and the crossmember.

- c. Apply thread sealing tape to the threads on the hose connection, then remove the plastic plugs and reconnect the hose to the hoist and tighten the connection securely.
- d. Remove the lifting equipment and reposition on the dump body. Raise the body slightly, remove the chocks or supports from beneath the dump body, then stow the safety post.
- e. Slowly lower the dump body while guiding the hoist into the hoistwell. Align the bolt holes in the hoist-head mounting bracket with those in the dump body, then install the bolts and new nuts and tighten them to between 95 N.m and 105 N.m (69 lbf.ft and 76 lbf.ft). Remove the lifting equipment and the wedge.
- f. Check that the hydraulic oil reservoir has sufficient fluid to operate the hoist. If necessary top up with OM-65.
- g. Start the engine, engage the PTO and operate the hoist up and down several times to bleed air from the system and to check for leaks.
- h. Lower the hoist, disengage the PTO and shut down the engine. Check the fluid level in the hydraulic oil reservoir and if necessary top it up with OM-65.

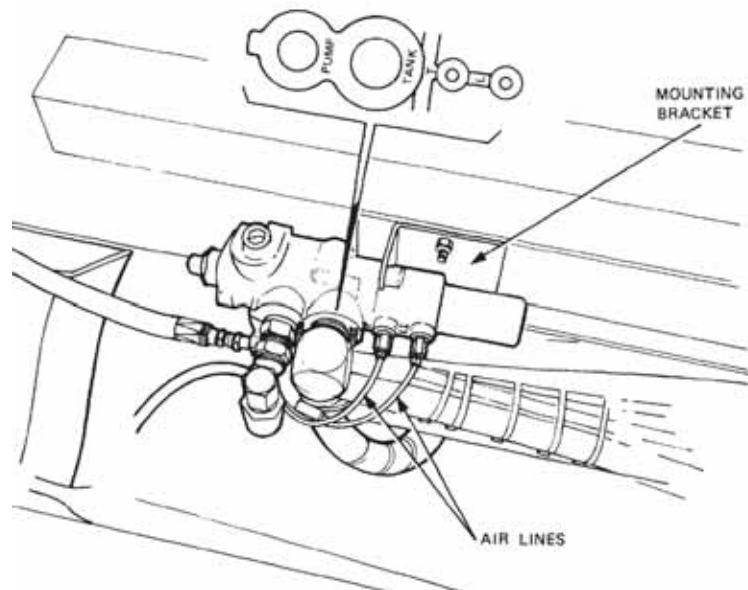
**Hoist Control Valve**

**34. Removal.** Remove the hoist control valve as follows:

**NOTE**

Removal of the tread plate located between the tool box and the spare wheel will facilitate removal of the hoist control valve.

- a. Disengage the PTO and shut down the engine. Release the pressure from the hydraulic system.
- b. Drain the air from the brake system secondary reservoir then close the drain valve.
- c. Clean the hoist control valve and surrounding area then allow it to dry.
- d. Tag the two air lines with a T or L as indicated on the valve body to ensure correct connection on installation (Figure 21).



**Figure 21 Hoist Control Valve Removal**

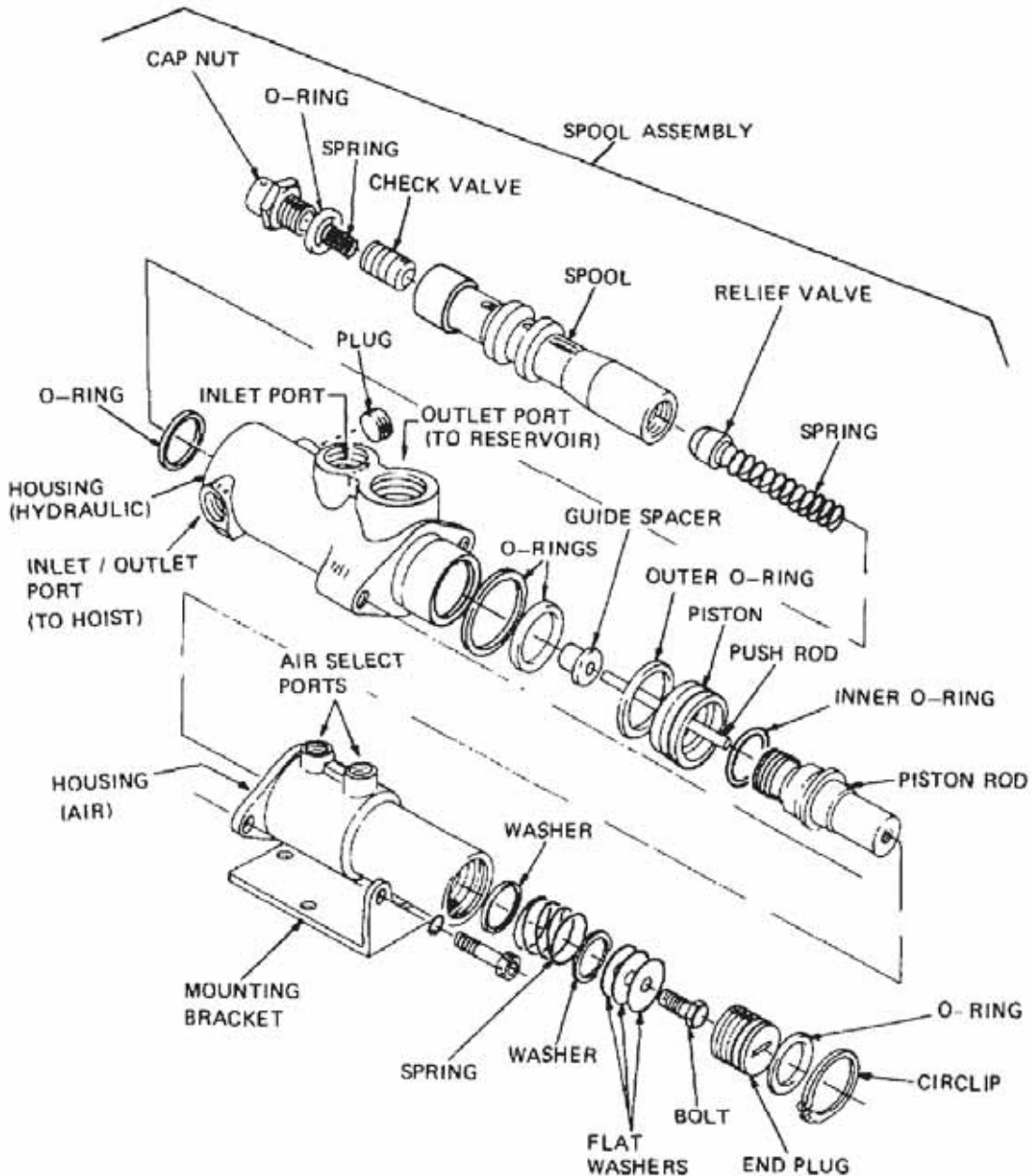
- e. Disconnect the two air lines and plug both the lines and valve body ports with suitable plastic plugs.

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- f. Place a suitable receptacle directly beneath the control valve then disconnect the hydraulic hoses. Plug the hoses and valve body ports with suitable plastic plugs.
- g. Remove the two nuts, bolts and associated washers securing the valve mounting bracket to the sub-frame box section. Remove the valve and mounting bracket assembly.

**35. Disassembly.** Disassemble the hoist control valve as follows (Figure 22):

- a. Remove the circlip and end plug from the valve (air) housing. Remove the O ring from the end plug and discard the O ring.



**Figure 22 Hoist Control Valve – Exploded View**

- b. While holding the cap nut with a suitable spanner, remove the bolt from the piston rod head. Remove the flat washers, the spring and its two supporting washers.
- c. Remove the two bolts securing the mounting bracket and the two sections of the valve housing together. Separate the two housing sections and discard the O ring.

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- d. While holding the cap nut with a suitable spanner, unscrew the piston rod from the spool. Remove the piston rod, the piston, the push rod and guide spacer. Remove and discard the inner and outer O rings from the piston.
- e. Withdraw the complete spool assembly from the cap nut end of the housing.
- f. Shake out the spring and relief valve.
- g. While holding the spool in a soft-jawed vice, remove the cap nut and O ring. Discard the O ring.
- h. Remove the spring and check valve from the spool.
- i. Remove the O ring from the internal groove in each end of the valve (hydraulic) housing. Discard the O rings.

**36. Cleaning And Inspection.** Clean and inspect the components as follows:

- a. Clean all components using a recommended cleaning agent, paying particular attention to the check valve, the relief valve and the spool.
- b. Inspect all components for pitting, nicks, burrs, scratches and excessive wear. Replace as necessary.

**37. Reassembly.** Reassemble the hoist control valve as follows (Figure 22):

**NOTE**

Lightly lubricate all components with hydraulic fluid (OM-65) before reassembly.

- a. Install a new O ring in the internal groove in each end of the valve (hydraulic) housing, then install a new O ring on the outside of the same housing.
- b. Fit the cap nut with a new O ring then install the check valve, the spring and the cap nut into the spool.
- c. Insert the relief valve and spring into the other end of the spool, then insert the complete spool assembly into the valve (hydraulic) housing orientated as shown in Figure 22.
- d. Insert the guide spacer into the spring in the housing then insert the push rod into the guide spacer.
- e. Fit new inner and outer O rings to the piston then slide the piston onto the piston rod. Screw the piston rod assembly into the spool.
- f. Secure the two valve housing sections and the mounting bracket with the two retaining bolts. Ensure that the housings and mounting bracket are correctly orientated.
- g. Install the bottom washer, the spring, the top washer and the flat washers onto the piston rod then secure them with the retaining bolt. Hold the cap nut with a suitable spanner and tighten the retaining bolt.
- h. Fit the end plug with a new O ring then install the end plug and circlip.

**38. Installation.** Install the hoist control valve as follows (Figure 21):

- a. Position the hoist control valve on the sub-frame, orientated as shown. Install the two bolts from within the sub-frame box section and tighten the nuts to between 38 N.m and 42 N.m (28 lbf.ft to 31 lbf.ft).
- b. Remove the plastic plugs and connect the hydraulic hoses and air lines to the appropriate ports, ensuring that the air lines are connected as tagged.
- c. Remove the blanking plug from the unused inlet/outlet port and install a 15 000 kPa (2 175 psi) pressure gauge (Table 2, Item 3).
- d. Start the engine, allow air pressure to build up, engage the PTO and operate the hoist up and down several times to ensure correct hoist operation. Check for air and hydraulic leaks and rectify as necessary.
- e. Raise the hoist to maximum extension and check that the pressure gauge indicates approximately 12 060 kPa (1 750 psi). If the pressure is incorrect, it may be adjusted by the removal or addition of the flat washers fitted to the piston rod tail. Removal or addition of one washer will respectively raise or lower the relief valve pressure by approximately 1 000 kPa (145 psi).

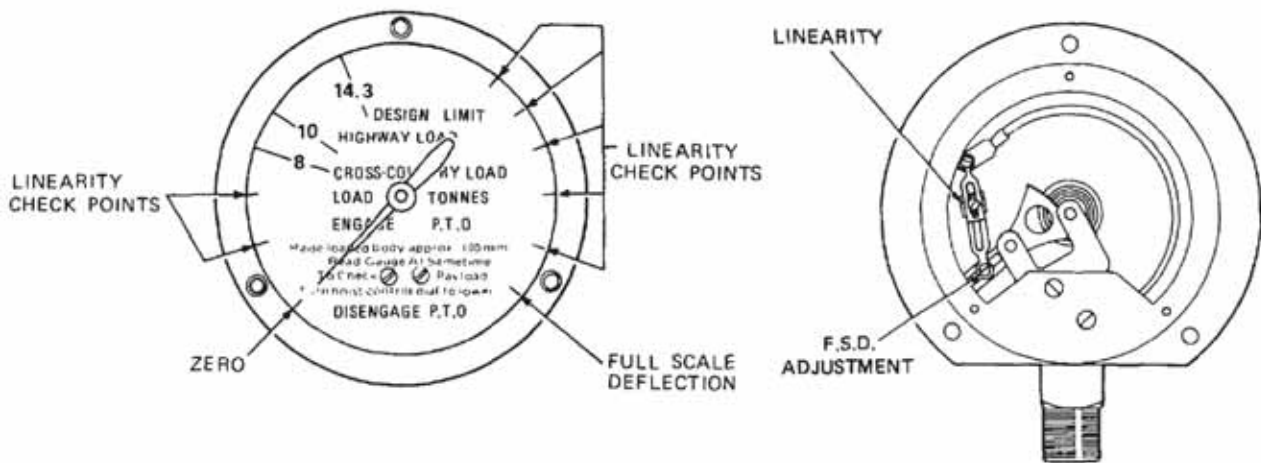
**NOTE**

The hoist must be lowered before attempting adjustment.

- f. To check the adjustment, raise the hoist to maximum extension and verify that the pressure gauge indicates approximately 12 060 kPa (1 750 psi).
- g. Disengage the PTO, lower the hoist, and shut down the engine. Release the pressure from the hydraulic system.
- h. Remove the pressure gauge and install the blanking plug. Start the engine and operate the hoist and check for leaks. Rectify as necessary.
- i. Lower the hoist, disengage the PTO and shut down the engine.
- j. Check the fluid level in the oil reservoir. If necessary, top it up with OM-65.

**Load Indicator Gauge.**

39. **Calibration.** Calibrate the load indicator gauge as follows (Figure 23):



**Figure 23 Gauge Calibration**

- a. Remove the gauge in accordance with EMEI Vehicle G 733 – Light Grade Repair.
- b. Remove the rear inspection cover, the front glass and the bezel.

**NOTE**

The gauge is to be calibrated against a known standard.

- c. Check that the gauge is zeroed. If not, remove the indicator from the gauge and reposition it to zero.
- d. Fit the gauge to the calibration test set and apply hydraulic fluid at a pressure of 12 000 kPa (1 740 psi). Verify that the gauge indicates full scale deflection (FSD). Adjust as necessary.
- e. Reduce the pressure in steps of 1 000 kPa (145 psi) and verify the gauge linearity against the check points indicated on the gauge face. Adjust as necessary.

**NOTE**

FSD and linearity adjustments interact. Verify the FSD adjustment if the linearity is adjusted.

- f. Install the front glass and bezel and the rear inspection plate.
- g. Install the gauge in accordance with EMEI Vehicle G 733 – Light Grade Repair.

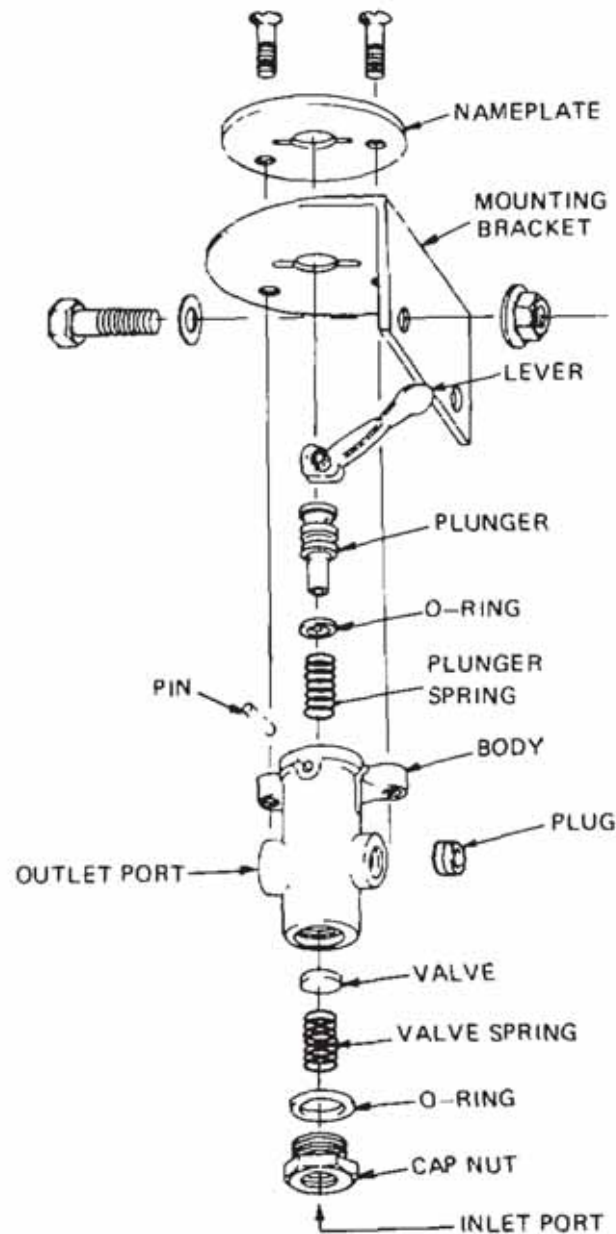
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**AIR SYSTEM**

**Tailgate Lock Valve**

40. **Disassembly.** Disassemble the tailgate lock valve as follows (Figure 24):
- a. Remove the valve in accordance with EMEI Vehicle G 733 – Light Grade Repair.
  - b. Tap out the pin from the valve body using a hammer and pin punch.
  - c. Remove the lever, the plunger and the plunger spring. Remove the O ring from the plunger and discard the O ring.



**Figure 24 Tailgate Lock Valve – Exploded View**

- d. Hold the valve body in a soft jawed vice and remove the cap nut.
- e. Remove the valve body from the vice then shake out the valve spring and valve.
- f. Remove the O ring from the cap nut and discard the O ring.

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41. **Cleaning and Inspection.** Clean and inspect the components as follows:
- Clean all components with white spirit.
  - Inspect all components for nicks, burrs and signs of excessive wear. Replace as necessary.
42. **Reassembly.** Reassemble the tailgate lock valve as follows (Figure 24):
- Lightly coat a new O ring with rubber grease then fit the O ring to the cap nut.
  - Install the valve and valve spring in the valve body inlet port then install the cap nut.
  - Lightly coat a new O ring with rubber grease then fit the O ring to the plunger.
  - Install the plunger spring and the plunger into the valve body. Place the lever on top of the plunger and secure it in position with the pin.
  - Install the valve in accordance with EMEI Vehicle G 733 – Light Grade Repair.

### Pressure Protection Valve

43. **Disassembly.** Disassemble the pressure protection valve as follows (Figure 25):
- Remove the valve in accordance with EMEI Vehicle G 733 – Light Grade Repair.
  - Cut and remove the lockwire, then slacken off the locknut.
  - Remove the adjusting cap then shake components free of the valve body. Separate all components, removing the O rings from the plug and the piston. Discard the O rings and the valve.
  - Remove the locknut from the valve body.

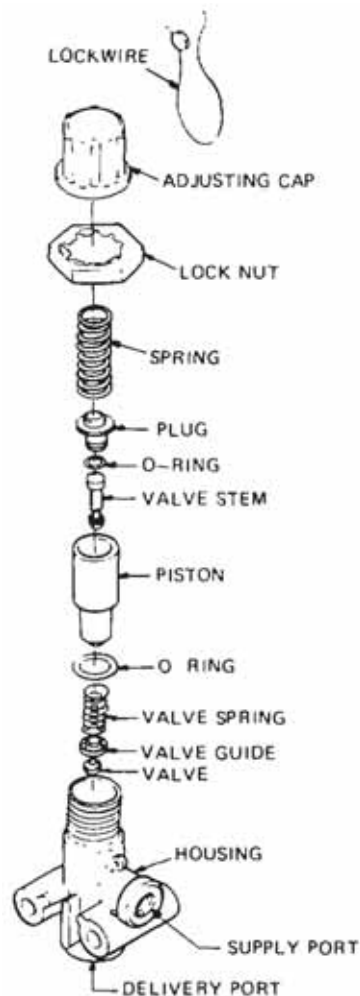


Figure 25 Pressure Protection Valve – Exploded View

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44. **Cleaning and Inspection.** Clean and inspect the components as follows:
- a. Clean all components with white spirit.
  - b. Inspect all components for nicks, burrs and signs of excessive wear. Replace as necessary.
45. **Reassembly.** Reassemble the pressure protection valve as follows (Figure 25):
- a. Insert the valve stem into the piston so that the valve stem protrudes through the bottom of the piston. Hold the stem with a screwdriver or other suitable object.
  - b. Slide the valve spring and the valve guide onto the valve stem then fit a new valve to the stem.
  - c. Lightly coat a new O ring with rubber grease then fit the O ring to the plug.
  - d. Fit the plug and the spring into the piston.
  - e. Lightly coat a new O ring with rubber grease then fit the O ring to the piston.
  - f. Fit the locknut to the valve body and screw on nearly to the bottom of the thread.
  - g. Install the complete piston assembly into the valve body.
  - h. Fit the adjusting cap and screw on two complete turns.
  - i. Connect a regulated air supply, with a maximum available pressure of 690 kPa (100 psi), to the support port.
  - j. Gradually increase the air pressure until 450 kPa (65 psi) is attained, at which point no air should flow from the delivery port.
  - k. Turn the adjusting cap clockwise until air flows from the delivery port. Hold the adjusting cap and tighten the locknut against it.
  - l. Lockwire the adjusting cap to the valve body utilizing a lead seal.
  - m. Install the valve as detailed In accordance with EMEI Vehicle G 733 – Light Grade Repair.

#### **Poppet Valve**

46. **Disassembly.** Disassemble the poppet valve as follows (Figure 26):
- a. Remove the valve in accordance with EMEI Vehicle G 733 – Light Grade Repair.
  - b. Remove the locknut from the operating head then unscrew the top mount.
  - c. Remove the cup seal, the support button and the spring. Discard the cup seal.
  - d. Remove the gland and the washer. Discard the washer.
  - e. Shake out the stem and the cup seal. Discard the cup seal.
  - f. Remove the plug, the washer, the spring and the valve seat. Discard the washer.
47. **Cleaning and Inspection.** Clean and inspect the components as follows:
- a. Clean all components with white spirit.
  - b. Inspect all components for nicks, burrs and signs of excessive wear. Replace as necessary.

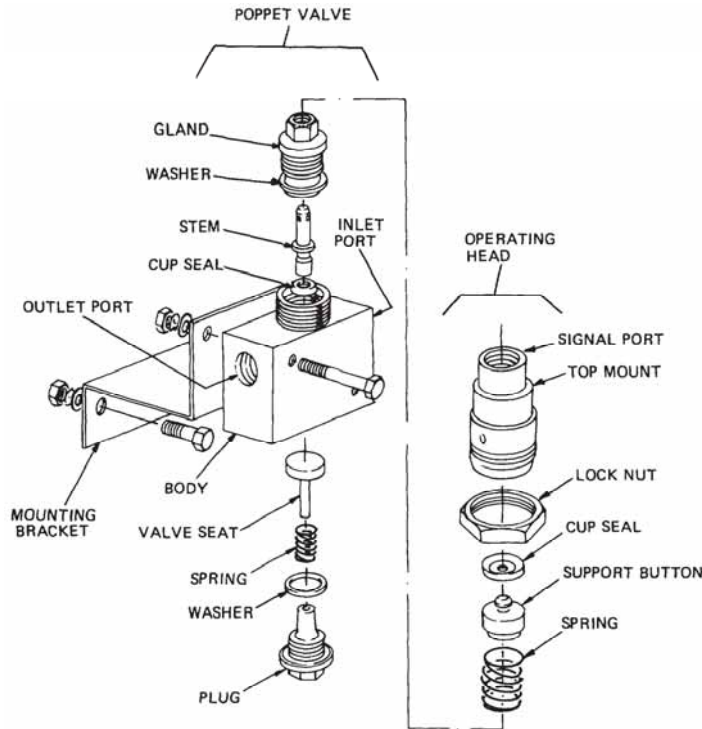


Figure 26 Poppet Valve – Exploded View

48. **Reassembly.** Reassemble the poppet valve as follows (Figure 26):
- Fit the plug with a new washer then fit the spring and the valve seat to the plug. Install the plug assembly in the valve body.
  - Fit the gland with a new washer. Install a new cup seal, the stem and the gland in the valve body.
  - Assemble a new cup seal, the support button and the spring in the top mount, and then fit the assembly to the valve.
  - Lock the operating head in position with the locknut.
  - Install the valve in accordance with EMEI Vehicle G 733 – Light Grade Repair.
49. **Fault Finding.** Fault symptoms and their subsequent corrective actions are detailed in Table 3.

Table 3 Hoist System Fault Finding

Serial	Symptom	Probable Cause	Action
1	No fluid flow – no pressure	Fluid level in reservoir too low	Top up with OM-65
		Pump not receiving fluid	Check for blocked pump supply hose, clean or replace as necessary. Clean the reservoir breather vent then check the fluid level in the reservoir. Top up if necessary with OM 65
		Power take-off to pump spline connection damaged	If the pump only is damaged, replace. If the PTO is damaged, repair as necessary
2	No movement	Mechanical binding	Locate and rectify

END

Distribution List: **VEH G 26.0 – Code 3** (Maint Level)  
(Sponsor: LV SPO Hvy B Vehicles)  
(Authority ECO LVSP0 037/08)

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