TRUCK, DUMP, MEDIUM, WINCH, MC2 - UNIMOG

TECHNICAL DESCRIPTION

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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Introduction

1. This EMEI describes the technical system and details of the Truck Dump Medium Winch, MC2 - Unimog.

2. The dump system allows for the pneumatic/hydraulic hoisting and lowering operations of the truck body and also the pneumatic operation of the tailgate hinge mechanism. The system also incorporates a safety bar which mechanically supports the truck body when it is raised for chassis or sub-frame maintenance. Both pneumatic operations of the dump system are controlled from associated levers mounted on an air switch inside the cabin.

Associated Publications

3. Reference may be necessary to the latest issue of the following documents:

a. EMEI Vehicle G 630 ..... Data Summary

b. EMEI Vehicle G 633 ..... Light Grade Repair

c. EMEI Vehicle G 634 ..... Medium Grade Repair

d. EMEI Vehicle G 634-1 ..... Heavy Grade Repair

e. EMEI Vehicle G 637-1 ..... Modification Instruction

f. EMEI Vehicle G 639 ..... Servicing Instruction

g. EMEI Vehicle G 639-1 ..... Miscellaneous Instruction

h. SCES 11758

i. RPS 02158

j. EMEI Vehicle G 600 ..... Data Summary

k. EMEI Vehicle G 602 ..... Technical Description

l. EMEI Vehicle G 603 ..... Light Grade Repair

m. EMEI Vehicle G 604 ..... Medium Grade Repair

n. EMEI Vehicle G 604-1 ..... Heavy Grade Repair

o. EMEI Vehicle G 609 ..... Servicing Instruction

Dump System

4. The dump system interconnections, shown in Figure 1 contain the following components:

a. an hydraulic oil reservoir with an integral screen filter;

b. an hydraulic pump driven by two V-section belts on the engine crankshaft pulley to supply oil under pressure to the system;

c. a pneumatically operated hoist valve to control oil flow to the hoist cylinder;

d. a hydraulic hoist cylinder with three stage telescopic extension tubes to raise the truck body;

e. a pneumatic switch in the cabin which incorporates the control levers for the body hoist/hold/lower operation and the tailgate cylinder operation; and

f. a gauge to indicate the load limitations of the dump system for highway, cross-country and the truck design load.

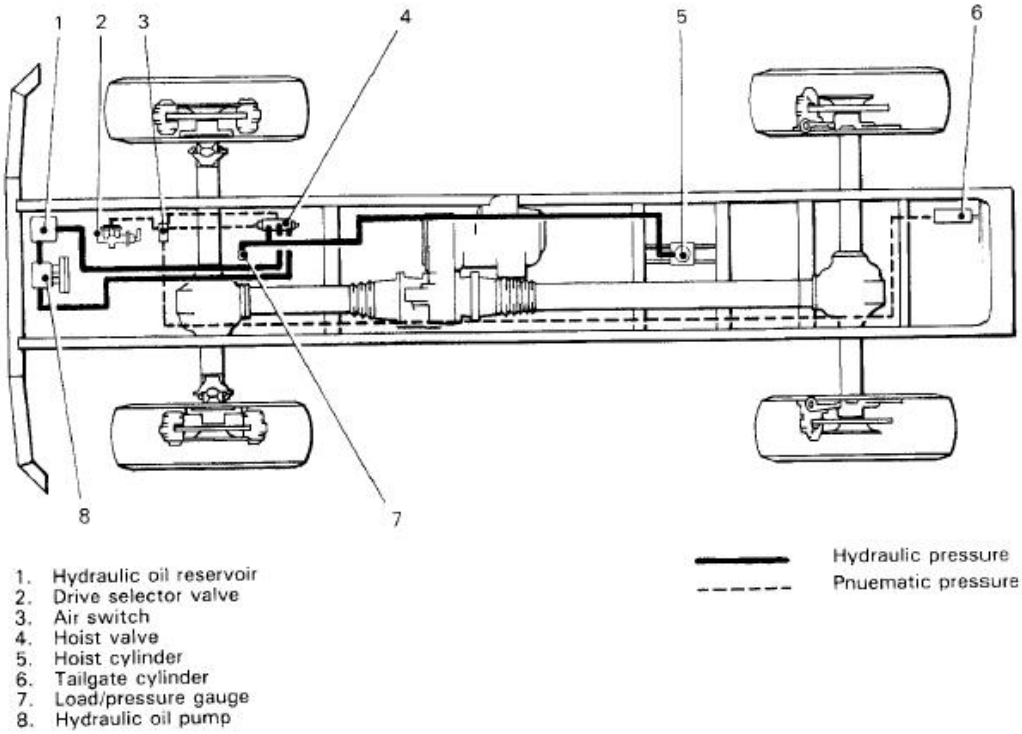


Figure 1 Dump System Interconnection

5. A functional diagram of the dump system is shown in Figure 2 Dump System Functional Diagram.

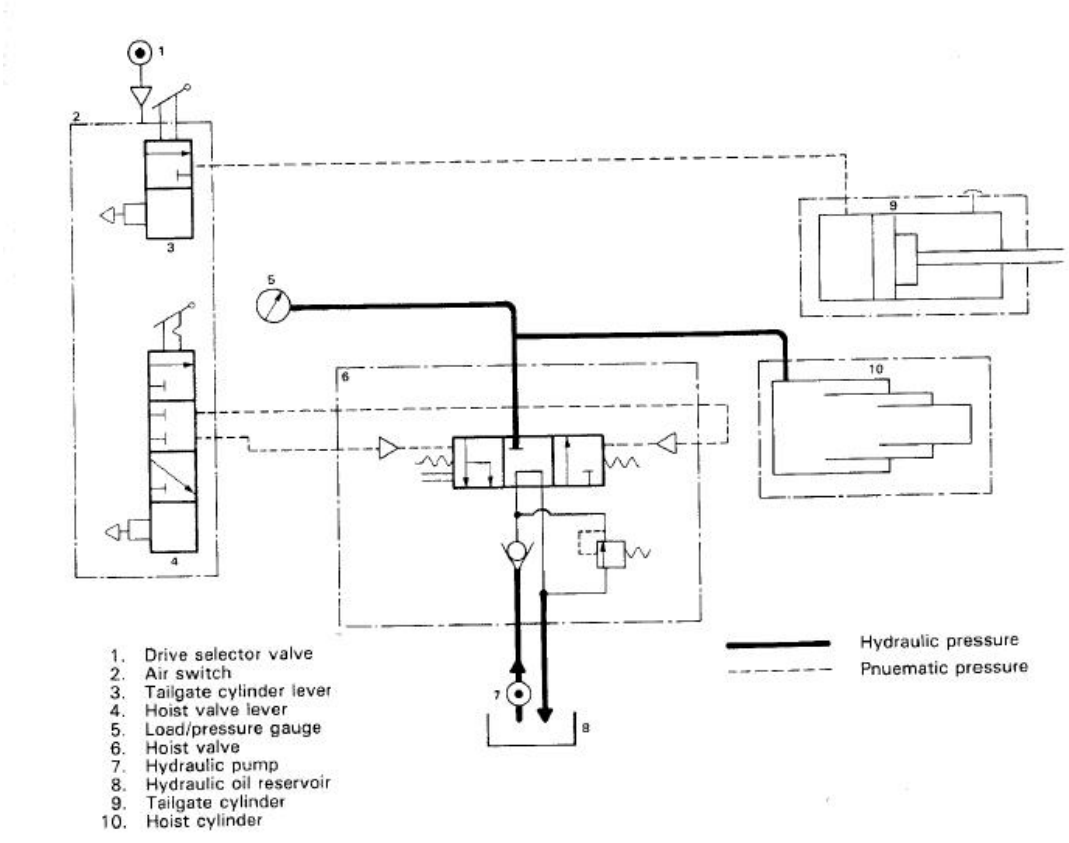
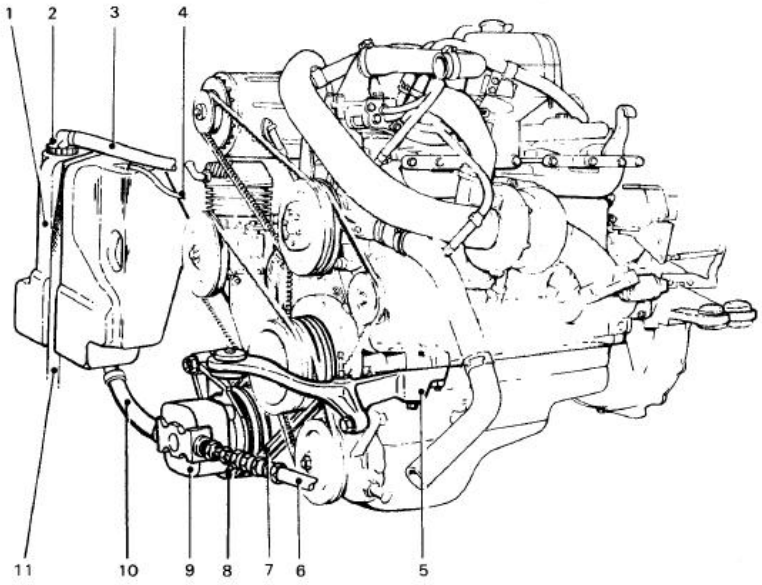


Figure 2 Dump System Functional Diagram

Hydraulic Oil Reservoir

6. The hydraulic oil reservoir (Figure 3) is retained in position by a metal strap and rubber insert on the right-hand side of the engine compartment. The strap is secured at the lower section to a bracket welded to the chassis cross-member and at the top to the right-hand side mud apron. The reservoir has a capacity of 35 litres of OM-33 hydraulic oil with arrows to indicate the oil level. It incorporates an outlet hose to the hydraulic oil pump, a vent tube connected between the crankcase breather and the steering pump oil reservoir via a tee-piece and a return hose from the hoist valve. The return hose is connected to a screw type filler assembly, and filter element and bowl which are housed within the reservoir. An expansion type drain plug at the reservoir base is secured by two adjustable circular clips.



1. Oil reservoir
2. Filler cap and filter assembly
3. Oil return hose
4. Vent tube
5. Front engine support
6. Oil pressure (supply) hose
7. Pump drive belts
8. Pump mounting bracket
9. Oil pump
10. Oil inlet hose
11. Clamp strap

NOTE: Sump guard removed for clarity.

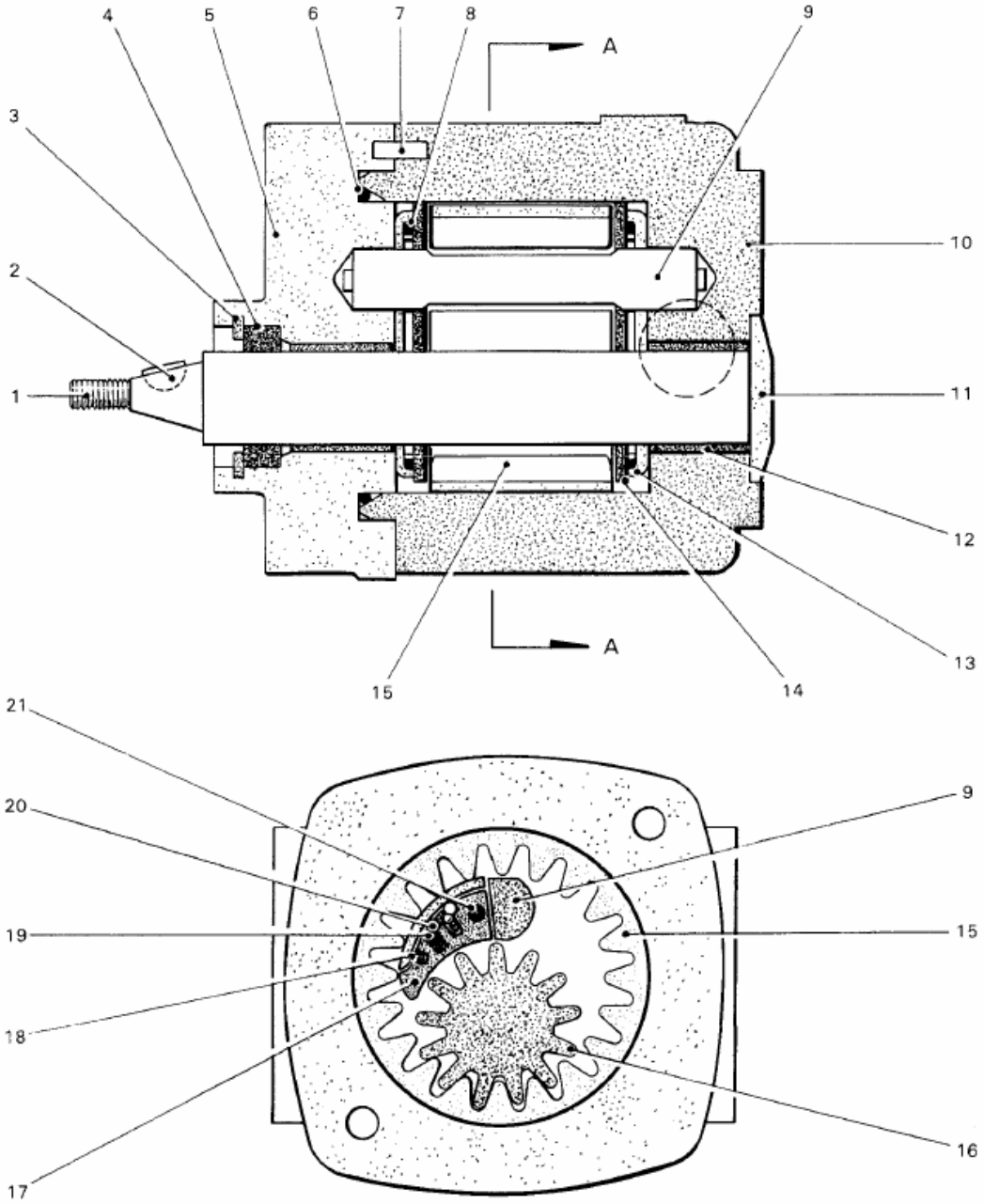
Figure 3 Oil Reservoir, Pump and Drive Belt Arrangement

Hydraulic Oil Pump

7. The hydraulic oil pump (Figure 4) is a internal gear type which delivers oil at a constant pressure to the hoist valve (Para 10) when the engine is running. The pump shaft is keyed to a dual pulley and the complete assembly is mounted on a bracket attached to the front engine support (Figure 3). The pulley is driven by two V-section belts aligned to the engine crankshaft pulley. An adjustable screw and nut assembly is attached to the pump mounting bracket for V-belt tensioning.

8. The pump drive shaft pinion drives the internal ring gear in the eccentric mode. A crescent-shaped spring-loaded sealing segment fills the space located at the extremes of the crescent between the pinion gear and ring gear. The spaces between the high points of the gears change in volume and thus create an oil pumping action to discharge oil through the holes in the ring gear and to the outlet port. This pressurised oil is piped to the hoist valve.

9. The pump drive shaft rotates in self-lubricating copper bushes located in the pump body and the assembly is sealed by a gasket and circlip at the drive end and by a metal expansion disc at the non-drive end. The internal ring gear and shaft pinion are enclosed by thrust plates held by a flat-sided positioning pin and seal and seal springs. A steel rod is located through the thrust plates to prevent backwards movement of the sealing segment if the pump rotation is reversed. The oil pump, drive pulley and mounting bracket must be removed as a complete assembly from the front engine support.



1. Pump drive shaft
2. Woodruff key
3. Circlip
4. Gasket
5. Pump cover
6. O-ring
7. Alignment peg
8. Seal
9. Positioning pin
10. Pump body
11. Expansion disc
12. Copper bush
13. Thrust plate
14. Seal spring
15. Internal ring gear
16. Pump drive shaft pinion
17. Sealing segment
18. Springs
19. Balls
20. Segment pins
21. Steel rod

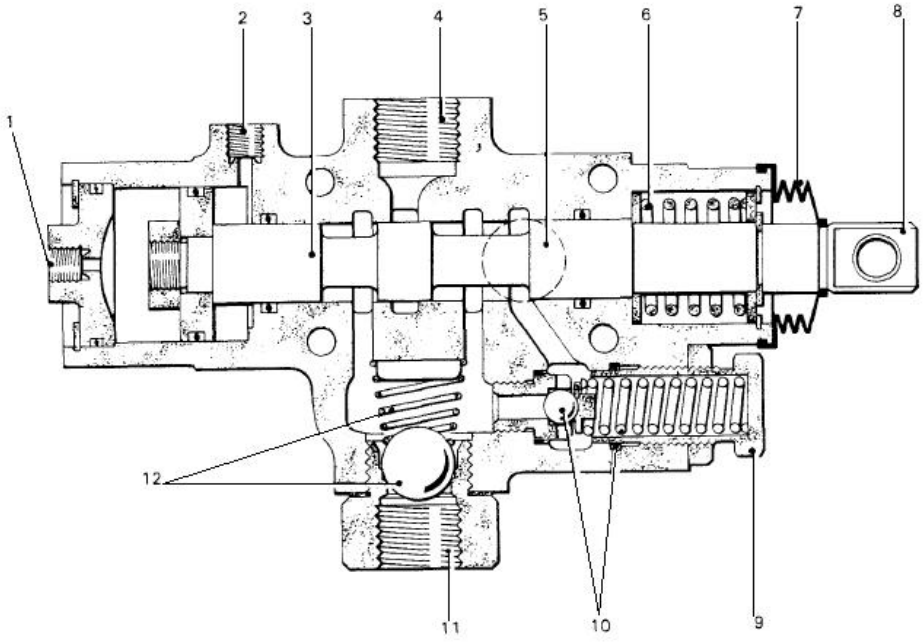
Figure 4 Hydraulic Oil Pump

Hoist Valve

10. The hoist valve (Figure 5) is a unidirectional hydraulic valve controlled by a two-way pneumatic actuation. The valve provides oil pressure to raise the hoist cylinder and also to indicate the truck body load on a pressure gauge in the cabin (Para 19).

11. The air inlet ports (Item 1 and 2) are supplied from a three position lever (HOIST - HOLD - LOWER) in the cabin and the oil pressure inlet port (Item 11) from the oil pump. When in the 'HOIST' position, air is applied to the inlet port (Item 2), forcing the piston assembly (Item 3) to extend the return spring (Item 6) and uncover the outlet port (Item 4). Thus, oil under pressure, is forced continuously through the oil inlet port (Item 11) and the non-return valve (Item 12) to the hoist cylinder and pressure gauge.

12. If the oil pressure increases above the set point of the adjustment screw (Item 9), pressure will force the regulator assembly (Item 10) to permit the oil flow through the return port (Item 5) to the oil reservoir (Para 6). In the 'HOLD' position, air is removed from the inlet port (Item 2) and the return spring (Item 6) retracts to allow the piston to fully seal the oil valve outlet and retain the hoist cylinder rams in an intermediate position. Oil is then pumped through the pressure regulator to the reservoir. Air supply to the inlet port (Item 1) (LOWER) uncovers the oil outlet port and the truck body weight compresses the cylinder rams and forces the oil back through the valve. The non-return valve (Item 12) ensures that return oil is directed via the pressure regulator to the reservoir to control the rate of descent of the truck body. In the event of air failure, a manual lever connection (Item 8) enables the truck body to be lowered, however the manual lever is not provided as part of the CES.



Note: Valve shown in lower control position

1. Air inlet port (lower control)
2. Air inlet port (hoist control)
3. Piston assembly
4. Oil outlet port
5. Oil return port
6. Piston return spring
7. Rubber boot
8. Manual lever connection
9. Pressure adjustment screw
10. Pressure regulator assembly
11. Oil inlet port
12. Non-return valve

Figure 5 Hoist Valve

Hoist Cylinder

13. The hoist cylinder (Figure 6) receives pressurised oil from the hoist valve (Para 10) to extend the three-stage ram unit and tilt the truck body. The ram unit consists of three extension tubes telescoped inside each other, with replaceable rubber fabric wiper seals supported by ram nuts, and oil seals and retainer bushes fitted to each tube. Incorporated in each ram nut at the head of each tube are wiper seals to prevent entry of foreign matter. The top of the ram unit terminates in a ball socket and joint, which is bolted to the underside of the truck body, to allow for universal rotation. A trunnion arm is welded to the outer shell of the base tube which is secured by U-brackets to a box section cradle unit on the chassis sub-frame. Each U-bracket and the ball socket and joint is fitted with a grease nipple.

14. When the oil pressure is reduced, the truck's body weight forces the oil back through the hoist valve port to the hydraulic reservoir via the return hose. The individual seals can be serviced at the top end of the ram without disturbing other seals or nuts. Ram extension tubes can be removed either through the top or the bottom of the base tube.

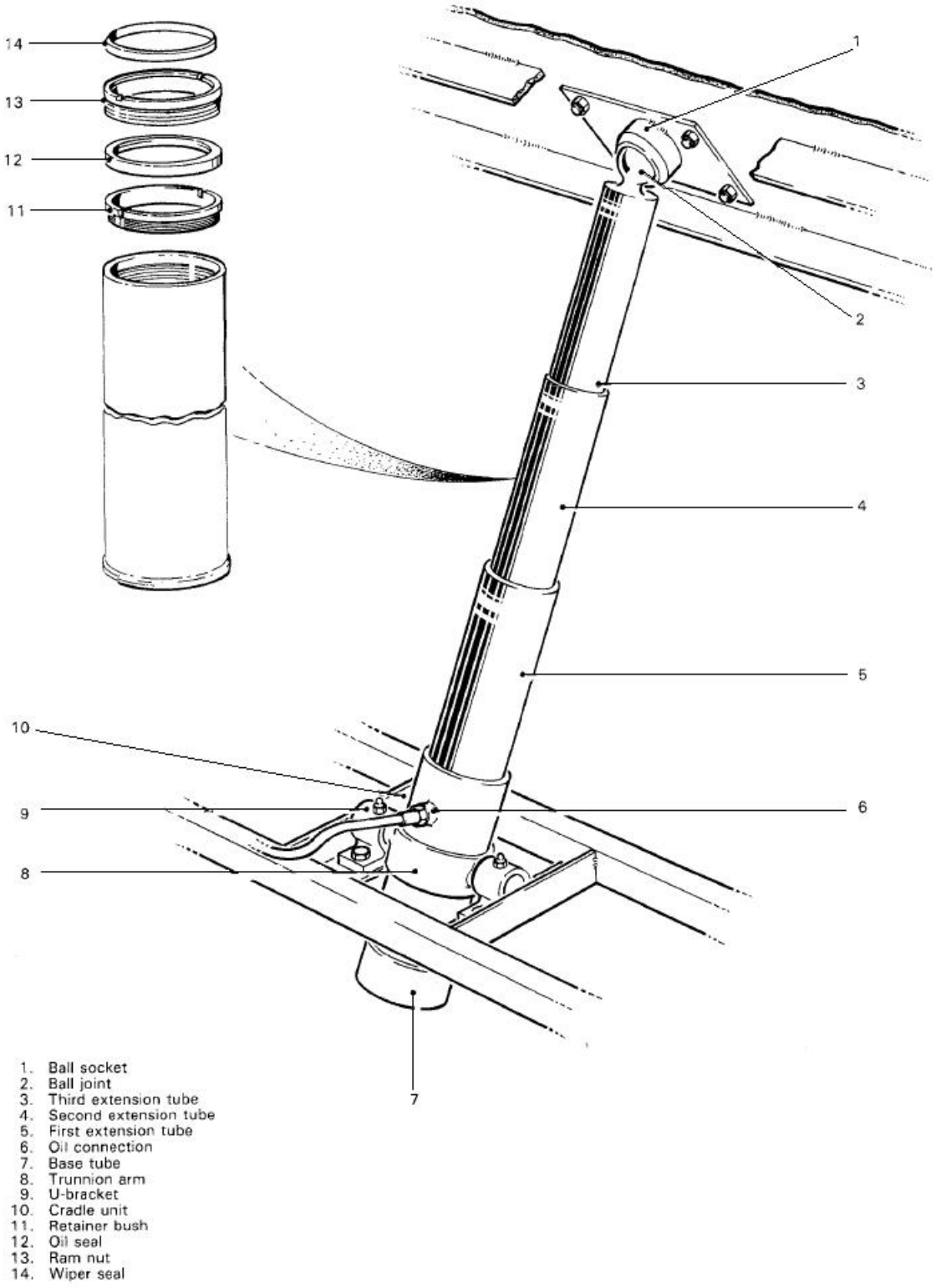
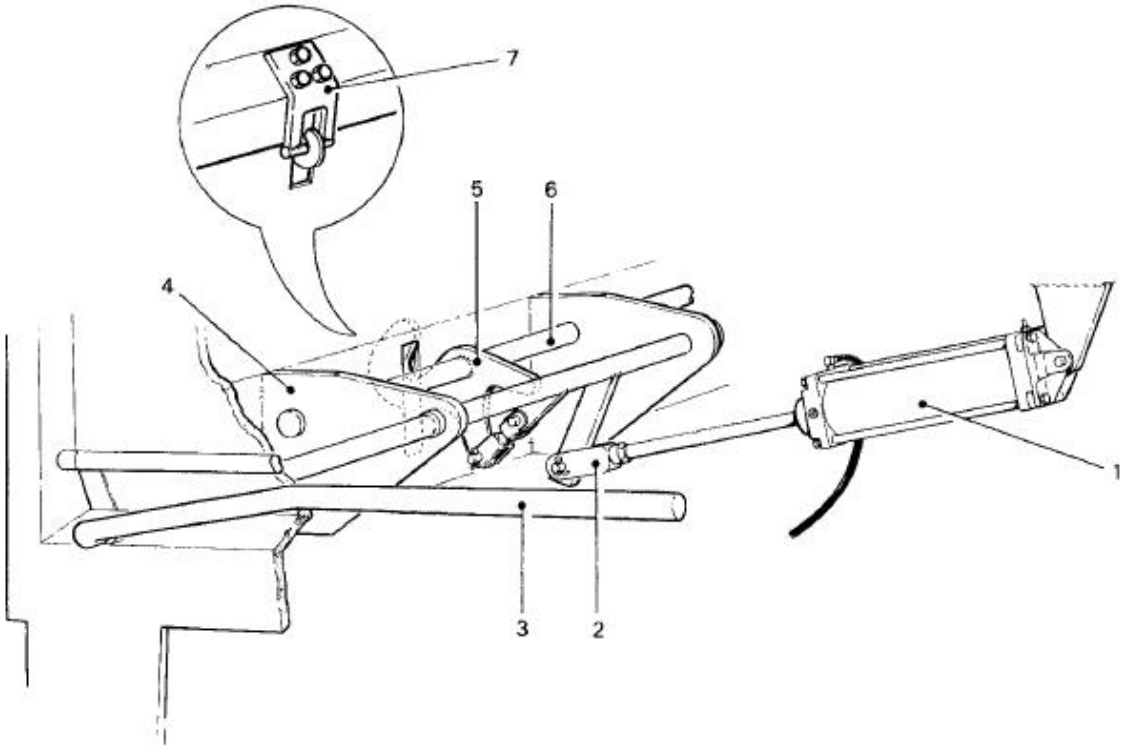


Figure 6 Hoist Cylinder

Tailgate Mechanism

15. The tailgate mechanism (Figure 7) ensures a positive lock is applied to the tailgate to prevent it opening by load pressure. The mechanism comprises a tubular steel lock lever connected by push-rod and cross-shaft to two steel hooks which engage around brackets bolted to the tailgate assembly. The cross-shaft is supported by two bearing plates. The piston shaft of a pneumatic cylinder (Para 17) connects by clevis to the lock lever.

16. When the tailgate control lever on the air switch (Para 18) is moved upwards, force is applied directly to the mechanism via the cylinder piston to retain the lock lever closed.

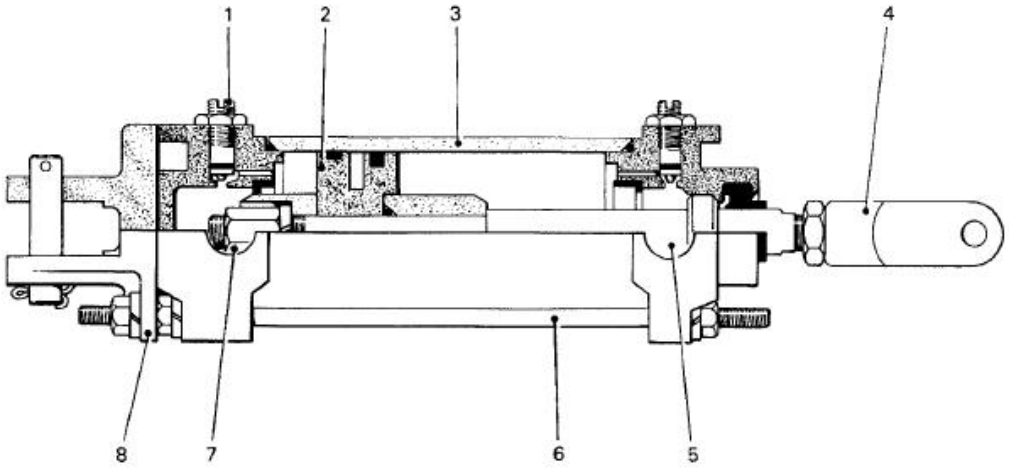


1. Tailgate cylinder
2. Push rod assembly
3. Tailgate lock lever
4. Bearing plate
5. Tailgate hook
6. Cross shaft
7. Tailgate mechanism bracket

Figure 7 Tailgate Mechanism

Tailgate Cylinder

17. The tailgate cylinder (Figure 8) is attached by a clevis and split pin arrangement to a bracket on the underside of the truck body and by clevis to the tailgate mechanism. The double-acting air cylinder converts a pneumatic input into a linear output. When air pressure is applied to the inlet port, the piston is driven along the cylinder extending the piston rod to retain the tailgate lock lever in the closed position. When pressure is removed, upwards movement of the lock lever (tailgate release) mechanically forces the piston along the cylinder which simultaneously draws air through the breather port to pressurise the cylinder.

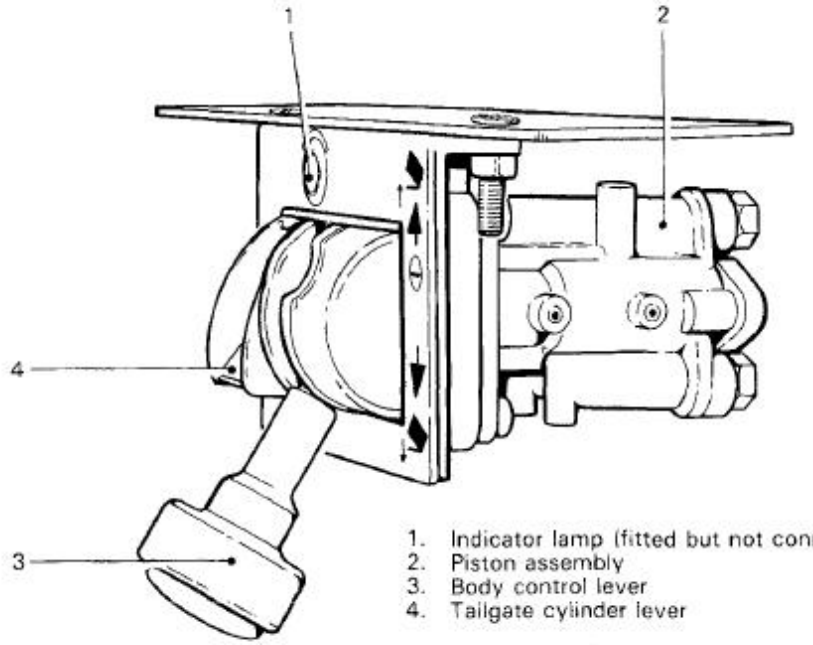


1. Cushion needle
2. Piston
3. Cylinder
4. Clevis
5. Air breather port
6. Tie rod
7. Air inlet port
8. Tailgate mechanism bracket

Figure 8 Tailgate Cylinder

Air Switch

18. The air switch is mounted on a bracket attached to the dashboard in the cabin above the clutch and footbrake pedals (Figure 9). The switch contains the body control lever and the tailgate cylinder lever. The levers are each connected to associated pistons in the switch which pressurise or vent the air lines to the hoist valve (Para 10) and the tailgate cylinder (Para 17). The air supply to the switch is received from a tapping on the drive selector valve in the auxiliary pneumatic devices (Ref EMEI Vehicle G 602).



1. Indicator lamp (fitted but not connected)
2. Piston assembly
3. Body control lever
4. Tailgate cylinder lever

Figure 9 Air Switch

Load/Pressure Gauge

CAUTION

When the truck body is loaded and raised between 50 mm and 100 mm, the gauge must not indicate above the marks. Failure to comply will overload the hydraulic system and prevent the body from being tilted until the load is reduced.

19. The load/pressure gauge is mounted on a bracket in the cabin to the left of the driver's seat. It is marked to indicate the highway and cross-country load limit and also the design limit of the truck body. Supply pressure to the gauge is taken from the hoist valve (Para 10).

Dump System Operation

20. The dump system is controlled from the air switch in conjunction with the procedures listed on the operation plate mounted in the cabin (Figure 10).

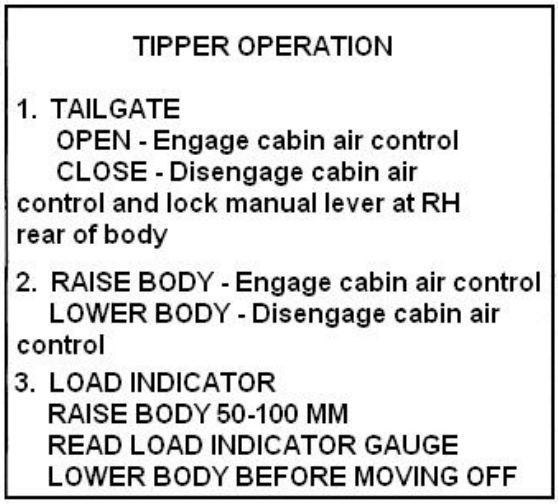


Figure 10 Operation Plate

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