TECHNICAL MANUAL
USER HANDBOOK

TRUCK MEDIUM MC2 UNIMOG – ALL TYPES

Authorised for use in the
Australian Defence Force by
Director, Land Systems Program
Office

(Mr B.Jones)
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NOTES TO READER

1. This manual is for all users of the following Truck, Medium, MC2, Unimog (Unimog) truck variants:
   
   a. Cargo - NSN 2320-66-112-8974, SIGC 2320-0045;
   b. Cargo with twist locks – NSN 2320-66-128-3146, SIGC 2320-0051;
   c. Cargo with winch – NSN 2320-66-112-8975, SIGC 2320-0044;
   e. Cargo with crane – NSN 2320-66-112-8976, SIGC 2320-0046;
   f. Cargo with crane and twist locks – NSN 2320-66-131-4558, SIGC 2320-0046; and
   g. Dump with winch – NSN 2320-66-112-8977, SIGC 2320-0048;
   h. TPA without winch – NSN 2320-66-135-3112, SIGC 2320-0121 (cab/chassis only); and
   i. TPA with winch – NSN 2320-66-136-3157, SIGC 2320-0121 (cab/chassis only).

2. It contains the equipment related information required to:
   
   a. operate;
   b. store;
   c. transport;
   d. service; and
   e. conduct basic fault-finding.

WARNINGS, CAUTIONS AND NOTES

3. Warnings, Cautions and Notes are used throughout this manual to ensure that actions undertaken by the reader are carried out correctly and with due consideration of occupational health and safety risks. An overview of the content of Warnings, Cautions and Notes is provided below.
A warning precedes an operating procedure or maintenance practice, which if not correctly followed, could result in personal injury or loss of life.

A caution precedes an operating procedure or maintenance practice, which if not strictly observed, could result in damage to or destruction of the equipment, or corruption of data.

NOTE

A note precedes or follows an operating procedure or maintenance practice or condition, which requires highlighting.

4. It is mandatory that readers observe all warnings, cautions and notes when completing actions associated with this manual.

ASSOCIATED PUBLICATIONS

5. Electrical and Mechanical Engineering Instructions (EMEI):
   

b. Vehicle G 600 – Data Summary (cargo);

c. Vehicle G 602 – Technical Description (cargo);

d. Vehicle G 609 – Servicing Instruction (cargo);

e. Vehicle G 620 – Data Summary (cargo with crane);

f. Vehicle G 622 – Technical Description (cargo with crane);

g. Vehicle G 629 – Servicing Instruction (cargo with crane);

h. Vehicle G 630 – Data Summary (dump);

i. Vehicle G 632 – Technical Description (dump);

j. Vehicle G 639 – Servicing Instruction (dump); and

k. Workshop E 410 – Asbestos.
6. Complete Equipment Schedules (CES):
   a. 11753 – Cargo;
   b. 11755 – Cargo with winch;
   c. 11756 – Cargo with crane;
   d. 11758 – Dump;
   e. 12072 – Cargo with twist locks; and
   f. 12073 – Cargo with winch and twist locks.

7. Repair Parts Scales (RPS):
   a. 02155 – Cargo;
   b. 02156 – Cargo with winch;
   c. 02157 – Cargo with crane;
   d. 02158 – Dump;
   e. 02202 – Cargo with twist locks;
   f. 02204 – Cargo with winch and twist locks; and
   g. 02205 – Cargo with crane and twist locks.

8. Integrated Logistic Support Instructions (ILSI):
   a. ALI MM 10-11 – Truck Medium 4 Tonne MC2 GS (Unimog) Fleet of Trucks
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SECTION 1 – GENERAL DESCRIPTION

CHAPTER 1

DATA SUMMARY

NOTE
Specifications common to all variants are contained in the cargo section of the data summary. Specifications specific to a particular variant are contained in that variant’s section of the data summary.

CARGO

1. Dimensions:
   a. Height:
      (1) Laden................................................................. 3010 mm
      (2) Unladen ............................................................ 3130 mm
   b. Height Reduced (canopy, canopy frame and hatch cover removed):
      (1) Laden................................................................. 2580 mm
      (2) Unladen ............................................................ 2615 mm
   c. Length................................................................. 6545 mm
   d. Width ................................................................. 2490 mm
   e. Shipping Volume:
      (1) Overall .............................................................50.3 m³
      (2) Height Reduced ................................................ 42.9 m³
   f. Wheelbase ..........................................................3850 mm
   g. Ground Clearance ............................................... 460 mm
   h. Pintle Hook Height (Laden) .....................................705 mm
   i. Track Width ....................................................... 1840 mm
   j. Internal Tray Dimensions:
      (1) Length .............................................................4050 mm
(2) Width ................................................................. 2375 mm
(3) Height ................................................................. 500 mm

2. Mass:

When towing a trailer, the gross towed mass shall not exceed the gross vehicle mass.

a. Unladen:
   (1) Front Axle ......................................................... 3810 kg
   (2) Rear Axle ........................................................... 2790 kg
   (3) Total ................................................................. 6600 kg

b. Maximum Loading:
   (1) Front Axle ......................................................... 5300 kg
   (2) Rear Axle ........................................................... 7000 kg
   (3) Total ................................................................. 12 000 kg

c. Recommended Gross Combination Mass:
   (1) Highway ............................................................. 24 000 kg
   (2) Cross-country ..................................................... 19 000 kg

3. Bridge Classification:

a. Unladen ................................................................. 7

b. Laden ................................................................. 12

c. Laden (With Trailer) ............................................... 21

4. Performance:

a. Fording Depth .......................................................... 1200 mm

b. Turning Circle (Between Walls) ................................ 16.8 m

c. Angle of Approach ................................................... 41°

d. Angle of Departure ................................................... 33°
e. Maximum Gradient ................................................................. 60%
f. Fuel Consumption ........................................... Approximately 25 L/100 km
g. Range .............................................................................. Approximately 600 Km

5. Wheels and Tyres:
   a. Wheels ............................................................................. 8.50x20, 10 stud
   b. Tyres .............................................................................. 12.00x20 R 18 with tubes
   c. Tyre Pressures:
      (1) Highway:
         (a) Front ........................................................................ 550 kPa
         (b) Rear .......................................................................... 825 kPa
      (2) Cross-country:
         (a) Front ........................................................................ 550 kPa
         (b) Rear .......................................................................... 700 kPa
      (3) Sand:
         (a) Front ........................................................................ 400 kPa
         (b) Rear .......................................................................... 400 kPa

6. Fuel and Lubricants:
   a. Fuel:
      (1) Type ............................................................................. diesel
      (2) Capacity ........................................................................ 160 L
   b. Cooling System:
      (1) Capacity ........................................................................ 20 L
      (2) Coolant (100% Total Fill) .............................................. PGXL
   c. Engine Crankcase:
      (1) Type ............................................................................. OMD-115
      (2) Capacity (Maximum) ................................................... 15 L
d. Main Transmission:
   (1) Type....................................................................... OMD-115
   (2) Capacity....................................................................... 10.5 L

e. Front Axle:
   (1) Type......................................................................... OEP-220
   (2) Capacity......................................................................... 2.5 L

f. Front Wheel Hub Drives:
   (1) Type............................................................................... OEP-220
   (2) Capacity......................................................................... 0.6 L each

g. Rear Axle:
   (1) Type......................................................................... OEP-220
   (2) Capacity......................................................................... 2.5 L

h. Rear Axle Hub Drives:
   (1) Type............................................................................... OEP 220
   (2) Capacity......................................................................... 0.6 L each

i. Steering System:
   (1) Type............................................................................... OX-47 (grade 10)
   (2) Capacity......................................................................... 2.25 L

j. Brake System:
   (1) Type............................................................................... OX(AUST)-8
   (2) Capacity......................................................................... 1.0 L

k. Clutch System:
   (1) Type............................................................................... OX(AUST)-8
   (2) Capacity......................................................................... 0.2 L

l. Grease Nipples:
   (1) Type............................................................................... XG-274
7. Engine:
   a. Make ................................................................. Mercedes-Benz
   b. Model ................................................................. OM 353.939
   c. No of Cylinders ..................................................... 6 in line
   d. Displacement .......................................................... 5.675 L
   e. Turbocharger ........................................................ Honeywell Garrett
   f. Bore Diameter .......................................................... 97 mm
   g. Stroke Length .......................................................... 128 mm
   h. Compression Ratio .................................................. 16.0:1
   i. Compression Pressure (minimum) .................................. 2 MPa
   j. DIN Output (minimum) ........................................... 124 kW at 2800 rpm
   k. Torque Output ....................................................... 520 N.m. at 1800 rpm
   l. Firing Order .............................................................. 1-5-3-6-2-4
   m. Valve Type ............................................................. OHV (mechanical tappets)
   n. Coolant Temperature ............................................... 80°C to 90°C
   o. Oil Pressure:
      (1) Normal ............................................................. 200 kPa to 500 kPa
      (2) Hot Low Idle ...................................................... 60 kPa (minimum)
   p. Idle Speed .............................................................. 700 rpm
   q. Governed Speed ...................................................... 2800 rpm
   r. Valve Clearance (Cold):
      (1) Inlet ............................................................... 0.25 mm
      (2) Outlet ............................................................... 0.40 mm

8. Clutch:
   a. Type ................................................................. Hydraulically operated single plate dry clutch
9. Main Transmission:
   a. Type ................................................................. UG 3/40-8/13.01 GPA
   b. Manufacturer ............................................................. Mercedes-Benz
   c. Ratios:
      (1) Forward .................. 13.01/9.02/5.96/4.38/2.97/2.06/1.36/1.00:1
      (2) Reverse ................. 12.06/8.74/5.78/4.24/2.88/2.00/1.32/0.97:1
   d. Shift Mechanism ........... manual with synchromesh
   e. Transfer Case ................ engaged by pneumatically operated clutch

10. Front Axle:
   a. Type ............................................................................. AU 3/1 S-5.3
   b. Manufacturer ............................................................. Mercedes-Benz
   c. Ratios:
      (1) Overall ................................................................. 6.38:1
      (2) Differential ........................................................... 2.18:1
      (3) Wheel Hub Drives .................................................... 2.92:1

11. Rear Axle:
   a. Type ............................................................................. HU 3/1 S-6.5
   b. Manufacturer ............................................................. Mercedes-Benz
   c. Ratios:
      (1) Overall ................................................................. 6.38:1
      (2) Differential ........................................................... 2.18:1
      (3) Wheel Hub Drives .................................................... 2.92:1

12. Brakes:
   a. Parking Brake:
      (1) .................................................... spring activated on rear wheels
      (2) .................................................... pneumatically released
b. Foot Brake:
   (1) ................................................................. hydraulically operated disc
   (2) ................................................................. pneumatically controlled
   (3) Front ................................................................. dual caliper
   (4) Rear ................................................................. single caliper

c. Operating Pressures:
   (1) Pneumatic ........................................ 950 kPa maximum without trailer
   (2) Hydraulic ................................................ 15 MPa maximum

d. Trailer Brake System:
   (1) Type ................................................................. dual line air
   (2) Operating Pressure ........................................ 730 kPa

13. Steering System:
   a. Type ................................................................. LS3B
   b. Manufacturer .......................................................... Mercedes-Benz
   c. Design ................ hydraulically assisted, reticulating-ball nut system
   d. Ratio ................................................................. 19.33:1

14. Electrical System:
   a. Voltage ................................................................. 24V DC
   b. Generator .......................................................... EDE 28V/100A
   c. Number of Batteries .................................................. 2
   d. Battery Capacity ..................................................... 55 Ah
   e. Polarity ............................................................... negative earth

15. Trailer Facilities:
   a. Socket Type .......................................................... NATO 12-pin
   b. Pintle Hook .......................................................... fully rotating
   c. Brakes ............................................................... dual line pneumatic
   d. Trailer Safety Chain Mounts .................................. 12.5 T SWL each
16. Accessories:
   a. Horn ........................................................... 24V electrically operated
   b. Windscreen Wipers................................. 24V, 2 speed, self parking
   c. Windscreen Washer ......................................................... 24V, 4 jets
   d. Heater/Demister .......................... 3-speed fan, engine coolant heated
   e. Fire Extinguisher................................................ 1.5 kg dry chemical

CARGO WITH WINCH

17. Dimensions:
   a. Length ................................................................................. 6940 mm
   b. Shipping Volume:
      (1) Overall ................................................................. 54.1 m³
      (2) Height Reduced ......................................................... 45.2 m³

18. Mass:
   a. Unladen:
      (1) Front Axle................................................................. 4060 kg
      (2) Rear Axle.................................................................. 2740 kg
      (3) Total........................................................................... 6800 kg

19. Performance:
   a. Angle of Approach............................................................. 39°

20. Fuels and Lubricants:
   a. PTO Transmission:
      (1) Type................................................................. OMD-115
      (2) Capacity................................................................. 5.75 L
   b. Winch Case
      (1) Type................................................................. OEP-220
      (2) Capacity................................................................. 2.0 L
21. PTO Transmission:
   a. Manufacturer ............................................................ Mercedes-Benz
   b. Model................................................................. SA35737
   c. Ratio ................................................................. 4.32:1
   d. Output Speed:
      (1) At 2340 rpm Engine Speed .........................540 rpm
      (2) At 2800 rpm engine speed.........................658 rpm
   e. Shift Mechanism........................................... manually engaged

22. Winch:
   a. Model...............................................................F64M1 SW05
   b. Manufacturer .................................................... Werner and Co
   c. Line Pull ......................................................... 62 kN (maximum)
   d. Cable Length ................................................... 30 m
   e. Cable Diameter ................................................ 14 mm

CARGO WITH CRANE

23. Dimensions:
   a. Length............................................................... 6580 mm
   b. Width............................................................... 2465 mm
   c. Height:
      (1) Laden........................................................... 3040 mm
      (2) Unladen ........................................................ 3140 mm
   d. Height Reduced (canopy, canopy frame and hatch cover removed):
      (1) Laden........................................................... 2600 mm
      (2) Unladen ........................................................ 2700 mm
   e. Ground Clearance.............................................. 500 mm
   f. Pintle Hook Height:
      (1) Laden........................................................... 740 mm
(2) Unladen ................................................................. 830 mm

g. Internal Tray dimensions:
(1) Length ................................................................. 3350 mm
(2) Width ................................................................. 2350 mm
(3) Height ................................................................. 570 mm

24. Crane:
a. Make ................................................................. Palfinger
b. Model ................................................................. PK4600A/24
c. Maximum Lifting Capacity (10° main boom angle):
   (1) 3.3 m ............................................................... 1350 kg
   (2) 4.2 m ............................................................... 1050 kg
   (3) 5.1 m ............................................................... 860 kg
d. Power Source .............................................. belt-driven hydraulic pump

25. Fuels and Lubricants:
a. Hydraulic Oil Reservoir:
   (1) Type ............................................................... OM-33
   (2) Capacity ........................................................... 35 L

DUMP

26. Dimensions:
a. Length ............................................................... 6370 mm
b. Width (Mirrors Extended) .................................... 2780 mm
c. Width (Mirrors Stowed) ....................................... 2340 mm
d. Height:
   (1) Laden ............................................................... 3435 mm
   (2) Unladen ............................................................ 3460 mm
e. Height Reduced:
   (1) Laden ............................................................... 2645 mm
(2) Unladen ................................................................. 2670 mm
f. Pintle Hook Height .................................................... 720 mm
g. Internal Tray Dimensions:
   (1) Length .................................................................. 3300 mm
   (2) Width ................................................................... 1900 mm
   (3) Height ................................................................. 570 mm

27. Fuels and Lubricants:
   a. Hydraulic Oil Reservoir:
      (1) Type ................................................................. OM-33
      (2) Capacity .......................................................... 35 L

28. Manufacturer’s Details:
    DaimlerChrysler
    Lexia Place
    MULGRAVE VICTORIA 3170
    Telephone: 03-95656318

29. Point of Contact
    Medium/Heavy B Vehicles Section
    LVSP, DMO
    Victoria Barracks
    SOUTHBANK VICTORIA 3006
    Telephone: 03 92827632
    Faxsimile: 03 92826085
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SECTION 1

CHAPTER 2

EQUIPMENT DESCRIPTION

GENERAL

1. **All Types.** The Truck, Cargo, Medium; Truck, Cargo, Medium with Winch; Truck Cargo with Crane and Truck, Dump MC2 - Unimog (Unimog) as depicted in Figure 2-1 to 2-4 are four wheel drive trucks used to transport stores, personnel and aggregate on sealed, second class roads and under limited cross-country conditions. The Unimog forms the basis of Army second line transport and a significant part of Army third line transport. The truck carries a five tonne load.

2. **Cargo Variants.** The cargo body is fitted with removable dropsides and tailgate. Removable fold-down seats are fitted along the right and left-hand sides of the truck. All cargo variants are being progressively fitted with twist locks as they go through rebuild.

3. **Dump.** The dump body is fitted with a pneumatic/hydraulic dump control and tailgate release mechanism. The dump system contains an hydraulic oil reservoir which is located on the right-hand side of the engine compartment. The reservoir supplies a pump which is driven by dual belts from the engine crankshaft. The pump supplies an pneumatic/hydraulic hoist valve which provides fluid under pressure to operate the hoist cylinder beneath the truck body. A pressure/load gauge, mounted in the cabin to the left of the driver’s seat, displays the operating pressure. A safety support, located on the chassis sub-frame, must be raised and locked to mechanically support the raised body if personnel are required to work on the chassis or sub-frame.

4. **Crane.** The crane is secured to the chassis between the cabin and the truck body. The spare wheel is secured to a bracket fitted internally on the head board.

5. **TPA Variants.** These variants are cargo variants with twist locks fitted with a refuelling assembly secured to the tray by the twist locks. They have a battery isolation switch and a different exhaust system. Refer to the basic information of the cargo variants for information on these variants.
DATA PLATES

6. Data plates are fitted to the truck as follows:

a. Chassis Number - on the outside of the chassis rail just forward of the front wheel;

b. Engine Number – on the upper front surface of the rocker cover and on the right hand side of the engine;

c. Body Number – inside the cabin on the right hand side adjacent to the top of the driver’s seat;

d. Transmission Number – on the rear face of the transmission;

e. Axle Number – on the face opposite to where the propeller shaft enters the differential housing;

f. Weight Label – inside the cabin;

g. Servicing Data – inside the cabin;

h. Winch Instructions – inside the passenger door;

i. Crane Safe Working Load Limits – on the crane;

j. Crane Safe Operating Instructions – in the cabin;

k. Dump Operation – in the cabin;

l. Safety Support Stay Operation – chassis rail near the safety support stay handle; and

m. Centre of Gravity – left hand chassis rail, behind the cab.
Figure 2-1  Cargo
Figure 2-2  Cargo with Winch
Figure 2-3  Cargo with Crane
ENGINE

7. **General.** The engine (ref Figure 2-5) is a 5.675 litre, six cylinder, exhaust turbocharged, direct injected, four-stroke, PGXL cooled, diesel, compression-ignition engine. Power output is 124 kW at 2800 rpm. The turbocharger is bolted to the exhaust manifold and uses exhaust gas to boost the engine performance. The front of the engine is supported on a cross-member between two chassis rails. The rear of the engine is supported on each side by mountings secured to the chassis rails.

8. **Lubrication.** The pressure feed system consists of a gear-type oil pump with a built in pressure relief valve. The pump is driven from the engine crankshaft. Oil under pressure is fed through a filter and an engine mounted oil cooler before being delivered to the main bearings, camshaft assembly, piston assemblies and valve lifters. The timing gears, air compressor, injection pump and turbocharger are lubricated from the same supply.

9. **Oil Filters.** Early build trucks are fitted with dual oil filters externally mounted on the left-hand side of the crankcase casting. Later vehicles are fitted with one larger oil filter mounted in the same position.

10. **Oil Cooler.** The labyrinth-type oil cooler is mounted on the left-hand side of the crankcase casting.

11. **Air Cleaner.** The air cleaner outlet is connected to the turbocharger inlet. The air cleaner contains an element which must be cleaned and/or replaced at specified intervals.

12. **Smoke Control.** The smoke control devices comply with Australian Design Rule 28.

13. **Engine Cooling.** The engine is cooled by a thermo-syphon system, assisted by a coolant pump and fan. The fan and coolant pump are driven by belts from the crankshaft pulley. The expansion tank is fitted with a pressure cap which operates at 170 kPa. The truck heater utilises coolant from the engine cooling system.

FUEL SYSTEM

14. **General.** The fuel system comprises a 160-litre fuel tank, a fuel pump with a precleaner, two-stage fuel filters and an injection pump delivering fuel to direct-injection nozzles mounted in the cylinder head. The fuel is delivered into the injectors at a pressure of approximately 20 MPa. Excess fuel delivered by the fuel pump is returned, via the relief valve, to the fuel tank.
Figure 2-5  Engine

1. Generator
2. Air intake line
3. Coolant manifold
4. Coolant line
5. Vent line
6. Filler cap
7. Expansion tank
8. Retaining bracket
9. Cab heating lines
10. Lifting bracket
11. Manifold clamps
12. Exhaust manifold
13. Throttle linkage
14. Engine brake
15. Engine rear mountings
16. Clutch bell housing
17. Starter motor
18. Engine brake manifold
19. Turbocharger
20. Oil return line
21. Coolant line
22. Sump
23. Power steering pump
24. Vibration damper
25. Crankshaft pulley
26. Engine front mounting
27. Jockey pulley
28. Water pump
29. Air compressor
TRANSMISSION

15. General. The manually-shifted main transmission comprises a four-speed gearbox with a forward/reverse change, together with a set of planetary gears. The planetary gear set is automatically engaged and disengaged pneumatically to allow the selection of a total of eight forward or eight reverse ratios. The main transmission has a transfer case mounted to one side; a pneumatically-operated dog clutch enables four-wheel drive or two-wheel drive to be selected.

16. Clutch. The clutch is hydraulically actuated by a slave cylinder connected to the master cylinder which is fitted to the clutch pedal. For variants fitted with a winch, a power take-off (PTO) transmission housing fitted between the engine and main transmission contains the clutch assembly and PTO gear train.

17. Four-wheel Drive and Differential Locks. The trucks are fitted with selectable four-wheel drive. Front and rear differential locks ensure power is divided equally to each wheel when extremely difficult terrain is encountered.

DRIVE LINES AND AXLES

18. General. The front and rear drive lines consist of torque tubes and drive shafts connected to the differential pinion, and by universal joints connected to the transfer case output flanges.

CHASSIS

19. General. The chassis (ref Figure 2-6) consists of two channel rails and seven cross-members.

SUSPENSION

20. General. The suspension consists of coil springs and double-acting telescopic shock absorbers on both front and rear axles (ref Figure 2-6). Transverse rods ensure lateral stability of the axles. The axles are also fitted with torsion stabilizer bars.

STEERING SYSTEM

21. The steering system (ref Figure 2-7) uses an hydraulically-boosted recirculating-ball and nut steering box. The Pitman arm output from the steering box controls both front wheels via an interconnecting drag link and tie-rod assembly.
Figure 2-6  Chassis and Suspension

1. Shock absorber
2. Coil spring
3. Torsion bar
4. Transverse rod

Figure 2-7  Steering

1. Tie rod
2. Steering box
3. Hydraulic pump
4. Drag link
BRAKESYSTEM

22. General. The front wheels are fitted with two sets of calliper disc brakes, and the rear wheels are fitted with a single set of calliper disc brakes. The callipers are hydraulically operated by a dual brake master cylinder, one master cylinder operates the rear callipers, and the other master cylinder operates the two sets of front callipers. If a malfunction occurs in one brake system, the remaining system provides sufficient braking effort to enable the truck to be safely driven to a suitable servicing location.

23. Engine Brake. The engine exhaust manifold is fitted with a pneumatically-operated engine brake which restricts exhaust gas flow, so retarding the engine. The control for this brake is a foot-operated valve fitted in the floor in front of the driver’s seat.

24. Footbrake. The footbrake pedal is connected to a pneumatic valve which directs compressed air, at a variable pressure, to the dual brake master cylinder. This variable pressure is also applied to a trailer brake control valve, so that the truck and trailer brakes are applied simultaneously.

25. Parking Brake. The rear callipers are fitted with mechanical over-rides operated by spring-retracted pneumatic cylinders. These over-rides provide a parking brake. The parking brake is released by operating the parking brake control valve mounted adjacent to the left-hand side of the driver’s seat. The system is fail-safe; the parking brake cannot be released unless there is a pressure of at least 600 kPa in the compressed air tanks.

26. Trailer Brake. The trailer brake lever applies a pneumatic signal to the trailer brake control valve, proportional to the position of the brake lever. Only the trailer brakes are applied.

CONTROLS

27. Accelerator Pedal. The accelerator pedal (ref Figure 2-8) controls the setting of the fuel delivery mechanism on the fuel injection pump. An integral governor on the injection pump controls the idle and maximum engine speeds.

28. Hand Throttle. The hand throttle (ref Figure 2-8) enables a constant engine speed to be set or the engine to be shut-down. When not in use, it must be placed in the idle detent position. To set the engine to a particular rpm, the throttle lever is pushed downwards until the tachometer indicates the desired rpm. The hand throttle is to be used for setting a constant engine speed when negotiating very rough terrain, or operating the winch. It is not to be used to set the cruising speed on highways. To shut down the engine, move the hand throttle to the fully up position (shut–down detent).
29. **Clutch Pedal.** The clutch pedal (ref Figure 2-8) operates the main transmission clutch when changing gears.

30. **Footbrake Pedal.** The footbrake pedal (ref Figure 2-8) operates the disc brakes on each wheel and the trailer brakes.

31. **Trailer Brake Lever.** The trailer brake lever (ref Figure 2-9) applies the trailer brakes without applying the truck brakes.

32. **Fwd/Rev Selector Lever.** The Fwd/Rev selector lever (ref Figure 2-9) selects either forward or reverse drive direction.

33. **Gear Selector Lever.** The gear selector lever (ref Figure 2-9) selects the desired gear ratio. The eight available ratios are shifted on a 2 x 4 principle. When changing from fourth to fifth gear, a pneumatic control automatically disengages the auxiliary planetary gear group in the transmission. The planetary group automatically engages when changing from fifth to fourth gear. The neutral positions between the individual ratios for example 1 and 2 or 5 and 6 are provided with detents to prevent inadvertent gear selection, for example shifting from seventh to fourth. The gate position indicator at the centre of the dashboard indicates the position of the selector lever within the gear gate (ref Figure 2-11). All gear shifts, including forward and reverse selection, are fully synchronised.
Figure 2-9  Control Levers (Without Winch)

1. Hand brake
2. Trailer brake
3. Fwd/rev lever
4. Gear shift lever

Figure 2-10  Control Levers (With Winch)

1. Hand brake
2. Trailer brake
3. PTO-select lever
4. Fwd/rev lever
5. Gear shift lever
34. **Parking Brake Lever.** The parking brake lever (ref Figure 2-12) is located to the rear and right of the gear change lever. The parking brakes can be released by lifting and pushing the parking brake lever forwards. The parking brake indicator light will then go out, provided that the air pressure is above 600 kPa. A check-system (ref Figure 2-12) is incorporated in the parking brake circuit. The check-system is used only when towing a trailer and is activated by moving the parking brake lever to position 0, depressing firmly and moving it backwards. This action releases the trailer brakes, allowing the driver to check that the truck brakes alone will hold the combination on a gradient when parked. The parking brake lever automatically returns to position 0 when released.

![Figure 2-11 Gear Position Indicator](image1)

![Figure 2-12 Parking Brake Lever](image2)
35. **PTO Select Lever.** The PTO select lever (ref Figure 2-10) engages the drive from the PTO transmission to the winch. The winch may be used in a winch-and-drive mode or a winch-only mode.

36. **Steering Wheel.** The single spoke steering wheel operates the hydraulically-boosted steering box.

37. **Transfer Case and Differential Lock Control.** Transfer case and differential lock control is provided by a three-position pneumatic selector switch mounted at the top right-hand side of the instrument panel (ref Figure 2-13). The first position (0) selects two-wheel drive. The second position (I) allows power to be delivered to all four wheels. When the selector switch is in this position, the 4WD indicator light on the instrument panel illuminates. In the third position (II), the front and rear differentials are mechanically locked to provide maximum traction and the differential lock indicator light on the instrument panel illuminates. This selector switch can be operated when the truck is in motion. When four-wheel drive or differential lock is selected, the truck transmission and axles are pressurised to prevent the ingress of water during fording.

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**Figure 2-13  Drive Selector Switch**
ELECTRICAL SYSTEM

38. The electrical system is a 24 V DC negative earth circuit. The batteries are mounted on the right-hand chassis behind the cabin in an enclosed lockable carrier.

39. Generator. The generator supplies power to internally fitted rectifying diodes, solid-state regulator and radio interference suppression circuits. The generator is bolted to the upper right-hand side of the engine and is driven by a belt from the coolant pump pulley; it is cooled by a fan attached to its rotor shaft.

40. Circuit Breakers. Two main circuit breaker panels (ref Figure 2-14) are fitted to the top of the dashboard immediately forward of the steering wheel. Most of the circuit breakers are rated at 8A. However, the heater/ventilating fan, the blinker/flasher indicator, shift sequence indicator and black-out lighting supply line circuit breakers are rated at 12 A.

41. Starter Motor. The starter motor has an integral positive, pre-engaged drive operated by a solenoid. The starting circuit includes the ignition/start key-operated switch and the starter solenoid.

42. Windscreen Wipers. The windscreen wipers are driven by a three-brush, two-speed, self-parking electric motor mounted under the dashboard. The wipers are controlled by the combination switch mounted on the steering column.

Figure 2-14  Circuit Breakers
43. **Windscreen Washers.** The windscreen washer tank and electric pump assembly is mounted at the front of the engine compartment on the right-hand side. A switch, mounted on the left-hand side of the instrument panel, controls the pump operation.

44. **Horn.** An electric horn is mounted inside the front of the engine compartment. The horn is sounded by depressing the button on the end of the combination switch which is mounted on the steering column.

**LIGHTING SYSTEM**

45. **Normal Lights.** The normal exterior lighting consists of two headlights, turn indicators, two front markers, two clearance lights mounted on the external mirrors, two double-filament rear tail/brake lights, two reversing lights and two rear clearance lights (the right-hand rear marker illuminates the license plate). The turn indicator lights are also used as hazard warning lights.

46. **Black-out Lights.** The black-out exterior lighting consists of a reduced headlight, two masked front markers, two masked rear markers, a convoy cross light and two masked brake lights.

47. **Cab Lights.** A dome light provides interior lighting for the driver’s cabin. A trouble light on a flexible lead is also provided.

48. **Map Light.** A map light is fitted to the glove box door. The light illuminates when the cover over the light is opened.

**SWITCHES**

49. **Ignition Switch.** The key-operated ignition switch has three positions; OFF, ON and START. The ignition key cannot be removed in any position. When rotating the ignition key from the ON position to the START position, the starter motor is energised. As soon as the engine fires, the key must be released to allow it to return to the ON position. If the engine does not start immediately, release the key and wait before repeating the starting procedure (ref Sect 2 Chap 4 Para 3)

50. **Accessories.** All electrically-powered accessories function when the ignition switch is in the ON position.

51. **Combination Switch.** The combination switch (ref Figure 2-15) is mounted on either side of the steering column and performs the following functions:
   
   a. turn indicator control,
   
   b. headlight control,
52. **Turn Indicator Control.** The self-cancelling turn indicators operate only when the ignition is switched ON. It is moved towards the intended change of direction. Slight pressure in either direction allows the indicators to be operated. The indicators can be cancelled by either manually moving the lever to the central/neutral position or by the automatic cancelling function. The steering wheel must be rotated up to one full turn before the turn indicator cancels automatically from the normal turn position.

53. **Headlight Control.** Switch on the headlights with the light switch. To select high beam, move the lever away from the steering wheel, the reverse movement cancels high beam and selects low beam. The turn indicators can still be operated with high beam selected.

54. **Horn Control.** To operate the horn, depress the button on the end of the combination switch.
55. **Windscreen Wiper Control.** To start the windscreen wipers, push the combination switch towards the steering column; to stop the windscreen wipers, push the switch again. The windscreen wipers are self-parking. A two-position rocker switch on the combination switch enables the selection of a slow speed (position I) or a higher speed (position II).

56. **Windscreen Washer Control.** A windscreen washer control switch on the top left-hand side of the instrument panel enables the windscreen washer pump to be turned on or off. Four jets of water are directed towards the windscreen when the washer is operating.

57. **Main/Masked Light Switch.** The main/ masked light switch on the left-hand side of the instrument panel has seven positions:

   a. Position 0: all lights off.
   b. Position Tag (Day): the switch detent can be released in this position.
   c. Position 1: the front and rear marker lights, and the clearance lights are turned on.
   d. Position 2: the headlights, the front and rear marker lights, and the clearance lights are turned on.
   e. Position S1: the masked front and rear marker lights, and the convoy cross light are turned on.
   f. Position S2: this position is not used.
   g. Position S3: the reduced headlight, the masked front and rear marker lights and the convoy cross light are turned on.

Normal brake lights are available in positions Tag 1. and 2. The masked brake lights are available in position S1and S3.

58. **Hazard Lights Switch.** This switch provides simultaneous flashing of both front and rear turn indicator lights.

59. **Door Switch.** Opening the driver’s door operates the dome light to provide illumination in the cabin.

**INSTRUMENT PANEL**

Gauges

60. **Speedometer.** The speedometer is calibrated from 0 to 100 km/h. An odometer is also included.
61. Tachometer. The tachometer is calibrated from 300 rpm to 3500 rpm. Maximum continuous engine speed must be limited to 2800 rpm. The engine is governed at 2850 rpm.

62. Dual Pressure Gauge. The dual pressure gauges indicate the compressed-air pressure in each compressed-air tank. If either gauge shows less than 12 bar and the low air light is not illuminated, a malfunction has occurred. This problem should be investigated immediately.

63. Coolant Temperature Gauge. The coolant temperature gauge indicates the temperature of the coolant in the cooling system. Generally, the gauge should indicate a temperature of 80°C to 90°C. When the truck is first started, the temperature will be much lower. If the temperature reaches 100°C during a long uninterrupted drive on a highway or freeway, the engine revolutions should be increased, if not at the maximum 2800 rpm, for a short distance by changing to a lower gear ratio. If this does not affect the coolant temperature, the truck should be stopped well clear of the road to investigate the reason for the high coolant temperature. The engine should be run at a fast idle for 2 or 3 minutes before stopping it.

**WARNING**

Do not remove the coolant expansion tank filler cap whilst the engine is hot.

Allow the engine to cool before adding more coolant to the coolant expansion tank.

64. Fuel Gauge. The fuel gauge is calibrated in four divisions from 0 to 1/1. Each division represents approximately 40 litres of fuel. The pointer position is influenced by acceleration, braking and when the truck is not on level ground. For this reason, to get an accurate reading on the fuel gauge, the fuel level should only be checked when the truck is stationary on a level surface.

64. Oil Pressure Gauge. The oil pressure gauge is calibrated from 1 bar to 5 bar. At a hot, low idle, the pressure gauge should show a minimum of 0.6 bar. When driving, the oil pressure can vary from 2 bar to 5 bar.
Warning Lights

65. Low Air.

Do not drive the truck if the low air light is illuminated.

The low air warning light illuminates whenever the compressed-air pressure in either air tank is below 1.2 MPa. The truck is not to be driven if this light is illuminated. For a short time after the engine is started, this light will remain illuminated. As soon as the air compressor has achieved a pressure of 1.2 MPa in the air tanks, the light will be extinguished.

66. Low Coolant Level. The low coolant warning light illuminates when the coolant level in the cooling system reaches a pre-determined level. If this light illuminates the truck should be stopped as soon as practical, the engine allowed to cool and the coolant level topped up. The engine should then be started and the cooling system inspected for leaks. Any leaks are to be repaired. If the light illuminates after the inspection the truck is to be checked as soon as possible by a qualified mechanic.

67. Low Oil Pressure. The low oil pressure light illuminates when the ignition key is turned to the ON position or when the oil pressure falls below a pre-determined level. The light may stay illuminated for a short period after the engine is started but will extinguish when oil pressure is built up. If this light illuminates during normal operation the truck is to be checked by a qualified mechanic.

68. High Temperature Light. The high temperature light illuminates when the coolant temperature reaches a pre-determined level. When this light illuminates the truck is to be checked by a qualified mechanic.

Audible Alarms

69. Warning Buzzer. A warning buzzer sounds whenever the low coolant level light, the low oil pressure light or the high temperature light illuminates. The buzzer mutes when all the lights are extinguished.
70. Differential Pressure Light.

Drive the truck with caution when the differential pressure light is illuminated. Reduced brake efficiency will be experienced. The truck is to be checked as soon as possible by a qualified vehicle mechanic.

The differential pressure light illuminates when there is a difference in pressure between the two hydraulic brake circuits. The truck should be driven with caution to allow for reduced brake efficiency, and checked as soon as possible by a qualified truck mechanic.

71. Brake Pad Wear Lights. When a brake pad has worn to a pre-determined thickness, an electrical circuit is completed. This circuit illuminates one of the brake pad wear warning lights. Indicators are provided for front and rear brake pads. The truck can still be operated normally without taking any extra safety precautions. However, the truck should be fitted with new disc brake pads by a qualified mechanic as soon as possible.

Indicator Lights

72. Turning Signal. The turning signal indicator light flashes synchronously with the turn indicator lights on the truck.

73. Turning Signal (Trailer). The turning signal indicator light for the trailer flashes synchronously with the turn indicator lights on a trailer being towed.

74. High Beam. The high beam indicator light illuminates when the high beam lights are turned on or flashed.

75. Four-wheel Drive. The four-wheel drive indicator light is illuminated when four-wheel drive is selected.

76. Differential Lock. The differential lock indicator light is illuminated when the differential locks are engaged.

77. Parking Brake.

Do not drive the truck with the parking brake light illuminated.
The parking brake indicator light illuminates when the parking brake is engaged. The truck must not be driven if this light is illuminated. When the parking brake indicator light illuminates, a bulb check circuit illuminates the differential pressure and brake pad wear warning lights. All the lights should extinguish when the parking brake is released.

78. Instrument Light Switch and Dimmer Control. The instrument light control knob located on the instrument panel, between the speedometer and tachometer, is a dual function knob. It switches on and controls the intensity of the instrument lights. Rotating the knob in a clock-wise direction switches on and brightens the instrument lights. Rotating the knob in an anticlock-wise direction dims and switches off the instrument lights.

79. Instrument Panel Bulb Replacement. The instrument cluster bulbs are bayonet types and are replaced from the rear of the instrument panel. The remainder of the bulbs are replaced from the front after removing the lens assemblies. When replacing any bulb, the glass of the bulb must not be touched with fingers, as any grease or dirt tends to reduce the effectiveness of the bulb.

Audible Alarms

80. Warning Buzzer. Whenever the

HEATING AND VENTILATION

81. The heating and ventilation system (ref Figure 2-16) draws fresh air in from outside the truck or recirculates air in the cabin.

82. The heating system utilises heat from the engine coolant system. The amount of heat can be varied to achieve the desired air temperature.
1. Heater: left — cold  
   right — heat
2. Venting leg room: left — open  
   right — closed
3. Blower speed control
4. Regulation of nozzles: down — open  
   up — closed
5. Venting nozzles
6. Venting or heating windsren  
   and windows: left — open  
   right — closed.
7. Venting or heating  
   leg room: left — open  
   right — closed
8. Cabin heating: down — closed  
   up — open

**Figure 2-16** Heating and Venting Controls

**CAUTION**

Due to the high current load, do not operate the fan at high speed when the engine is running slowly.

83. A three-speed fan is provided to allow the driver to obtain adequate ventilation in the cabin. Optimum ventilation is obtained by selecting fresh air and opening one side window approximately 10 mm. When the engine is running slowly, the fan should not be set to maximum speed because of the high current load.

84. Air can be directed towards the floor, the driver’s and/or passenger’s faces, towards the windscreen and side windows to assist defrosting (ref Figure 2-17).
85. The cabin and cargo body are made of steel; the cargo body has a laminated plywood tray. The canopy, canopy bows, side panels and tail board may be removed to convert the cargo body to a flat-bed. Cargo tie-down rings are provided in the floor of the cargo body; truck tie-down points are located at the front, centre and rear of the chassis. The body is mounted on the chassis with anti-vibration mountings.

86. The dump body is constructed from aluminium.

87. The crane variant is fitted with a shortened tray to allow for the fitting of the crane immediately behind the cab.

88. The cabin can be tilted forwards to provide access to the engine/transmission area. This operation is to be carried out only by a qualified mechanic.

Windows

89. The side windows, which are fitted in the doors, can be opened with a winding handle. The windscreen and rear cabin windows cannot be opened.

Observation Hatch

90. An observation hatch in the cabin roof above the passenger's seat can be opened towards the right after releasing the two twist-lock catches on the roof of the cabin.
Seats

91. An individual seat is provided for the driver and a double seat for the passengers. The back rest of the driver's seat is adjustable forwards and backwards, as is the whole seat. The front and rear of the driver's seat squab are adjustable up and down. When adjusting the seat position, the truck should be stationary. The rear of the passenger's seat may be folded forward to create a platform for the observer.

Seat Belts

92. The driver and the left-hand side passenger are provided with inertial-reel lap/sash seat belts and the right-hand side passenger with a lap belt. The belts must not be twisted or too loose and must be worn at all times when the truck is in motion. When the belt latch tongue is pushed into the lock mechanism, it should be pushed in firmly until a click is heard.

ACCESSORIES

Mirrors

93. The external rear-vision mirror may be adjusted by moderate hand force. If the mirrors are too loose or too tight, the fault must be reported and rectified by a qualified truck mechanic.

Fire Extinguisher

94. A 1.5 kg dry chemical powder fire extinguisher is fitted beside the driver's seat. Instructions for use are printed on the body of the extinguisher.

TOOLS

95. The truck tools are stored in lockers on the left-hand side of the chassis. The tools provided are listed in Table 2-1.

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<th>Serial</th>
<th>Description</th>
<th>Quantity</th>
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<tr>
<td>1</td>
<td>Wrench 8 mm X 10 mm</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Wrench 10 mm X 13 mm</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Wrench 12 mm X 14 mm</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>Wrench 13 mm X 15 mm</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>Wrench 17 mm X 19 mm</td>
<td>1</td>
</tr>
</tbody>
</table>
Table 2-1  Tools (continued)

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<th>Serial</th>
<th>Description</th>
<th>Quantity</th>
</tr>
</thead>
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<td>Wrench 22 mm X 24 mm</td>
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</tr>
<tr>
<td>7</td>
<td>Wrench 27 mm X 32 mm</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>Double-ring spanner 17 mm X 19 mm</td>
<td>1</td>
</tr>
<tr>
<td>9</td>
<td>Spanner 30 mm</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>Three-piece screwdriver</td>
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<tr>
<td>11</td>
<td>14 mm Allen-key L-shaped</td>
<td>1</td>
</tr>
<tr>
<td>12</td>
<td>Combination pliers</td>
<td>1</td>
</tr>
<tr>
<td>13</td>
<td>Wheel wrench 27/30 mm</td>
<td>1</td>
</tr>
<tr>
<td>14</td>
<td>Bar torque for wheel wrench</td>
<td>1</td>
</tr>
<tr>
<td>15</td>
<td>Budget key socket</td>
<td>1</td>
</tr>
<tr>
<td>16</td>
<td>Hammer</td>
<td>1</td>
</tr>
<tr>
<td>17</td>
<td>High-pressure grease gun</td>
<td>1</td>
</tr>
<tr>
<td>18</td>
<td>Tool roll</td>
<td>1</td>
</tr>
<tr>
<td>19</td>
<td>Wheel chock</td>
<td>1</td>
</tr>
<tr>
<td>20</td>
<td>Hydraulic jack</td>
<td>1</td>
</tr>
<tr>
<td>21</td>
<td>Base plate for jack</td>
<td>1</td>
</tr>
<tr>
<td>22</td>
<td>17 mm Allen-key</td>
<td>1</td>
</tr>
</tbody>
</table>

WINCH

96. The PTO transmission drives the winch (ref Figure 2-18) through a manually-actuated dog-clutch. When the dog-clutch is engaged, drive is applied through an overload safety device to the worm drive and the worm drive turns the winch drum. A fairlead device ensures that the cable is wound evenly onto the drum when winching in. The fairlead device is driven by a triplex chain on the right-hand side of the winch. The overload safety device operates at 62 kN (6.2 tonnes). If the overload device operates, removal of the winch access plate uncovers the worm shaft used to release rope tension. A manually controlled friction brake holds the winch drum in position when not in use.
97. **General.** The crane is secured to the chassis between the cabin and the truck body (ref Figure 2-19). The crane consists of an inner and outer boom and two extension boom assemblies connected in-line and mounted on a vertical support column. The booms may be operated individually or simultaneously by double-acting hydraulic cylinders mounted between each assembly.

98. The crane may be operated to lift or lower the inner boom and the outer boom; to extend and retract the extension booms, and to slew, clock-wise or anti-clockwise through an arc of $210^\circ$.

99. The crane is stabilised by two hydraulically operated legs which extend horizontally, one from each side of the crane mounting. The legs are controlled independently of the crane.
Figure 2-19  Crane, General Arrangement

1. Crane control levers
2. Inner boom
3. Outer boom
4. Boom extension cylinders
5. Boom extension
6. Crane hooks
7. Outer boom cylinder
8. Inner boom cylinder
9. Slew cylinder
10. LH stabiliser shut-off valve lever
11. LH stabiliser (RH identical)
12. Crane support column
13. Stabilisers common control lever
100. The hydraulic pressure required to operate the crane cylinders and stabilisers is supplied by an internally-geared type pump which is bracket-mounted to the front engine support. The pump is driven by a belt from the engine crankshaft pulley. Hydraulic oil is gravity fed from a reservoir to the pump and is pumped under pressure to a solenoid-controlled diverter valve and direction control valves to the crane and stabiliser cylinders. The electrical solenoid is actuated by a micro-switch attached to the engine clutch pedal and engaged when a single-pole toggled-switch is operated. The switch is mounted on the right-hand side of the passenger’s seat with a label detailing the pump engage operation.

101. **Crane Lifting Capacity.** The crane lifting capacity at various radii (safe working load limits) is shown on a label fixed to the main support (ref Figure 2-20). A warning sign for safe crane operation is located on the cabin instrument panel.

102. **Crane Control Levers.** The crane control levers (ref Figure 2-21) are accessible through the observation hatch. The controls consist of four levers; slew, inner boom, outer boom and boom extension. A label fixed on the cabin roof near the levers indicates each lever operation.

103. **Stabiliser Control Levers.** The left-hand and right-hand stabilisers may be raised or lowered simultaneously, from either side of the truck, using a common rod-type lever labelled JACK-RAISE-LOWER (ref Figure 2-22). The stabilisers operate individually when the associated shut-off valve lever is set to OPEN. Both shut-off valve levers must always be in the CLOSE position when the stabilisers are stowed. Each stabiliser is secured into its extension housing by a locking bolt lever, and retained in the vertical operational position or the 45° stowed position by a locking bolt.
Figure 2-20  Safe Working Load Limits

Figure 2-21  Crane Control Levers
Figure 2-22  Stabiliser Control Levers

1. Stabilisers common control lever
2. Shut-off valve lever
3. Stabiliser ram locking bolt lever
4. Extension housing locking bolt lever

NOTE: LHS shown
RHS identical
DUMP

104. General. The dump system contains a hydraulic oil reservoir which is located on the right-hand side of the engine compartment. The reservoir supplies a pump which is driven by dual belts from the engine crankshaft.

105. The pump supplies a pneumatic/hydraulic hoist valve which provides fluid under pressure to operate the hoist cylinder beneath the truck body. A pressure/load gauge mounted in the cabin to the left of the driver’s seat, displays the operating pressure.

106. Body Control Lever. The dump body hoist, hold and lower movements are controlled from a three-position lever mounted above the footbrake and clutch pedals in the cabin (ref Figure 2-23). The air supply to the lever is taken from a connection on the drive selector switch. The body is hoisted or lowered by moving the lever in the direction of the arrow. The hold position is achieved by placing the lever in the detent denoted by the bar. This prevents any inadvertent movement of the body by the positive detent of the lever. The hold selection permits the dump body movement to be stopped at any position.

107. Tailgate Control Lever. The tailgate control lever is located to the left of the body control lever (ref Figure 2-23). Up or down movement of the lever actuates a pneumatic cylinder which locks or releases the tailgate mechanism.

Figure 2-23  Dump System Control Levers
108. **Safety Support Stay.**

**WARNING**

Ensure the body is supported on the safety support stay prior to working on the chassis or sub-frame with the body raised.

A safety support stay, located on the chassis sub-frame, must be raised and locked to mechanically support the raised body if personnel are required to work on the chassis or sub-frame with the body raised (ref Figure 2-24).

109. **Tailgate Lock Lever.** The tailgate lock lever is mounted on the dump body to the right-hand side of the tailgate (ref Figure 2-24). In the down position it locks the tailgate mechanism securely against the body to prevent the tailgate opening under the pressure of the load. The lever must be in the up position before operating the tailgate control lever.
1. Tailgate lock lever
2. Tailgate mechanism
3. Pneumatic cylinder
4. Body safety support

NOTE: Body shown raised

Figure 2-24  Tailgate Lock Mechanism and safety Support
SECTION 2 – OPERATING INSTRUCTIONS

CHAPTER 1

PRECAUTIONS BEFORE USE

WARNING LIGHTS

1. Observe all warning lights.

WARNING

Do not drive the truck if a brake warning light on the low air pressure warning light is illuminated or the low air warning alarm is activated. These warning lights indicate that the braking system will not function correctly.
SECTION 2
CHAPTER 2
PREPARATION

FORDING
1. Prior to fording, select four-wheel drive. This will ensure the truck transmission and axles are pressurised to prevent the ingress of water.
Blank Page
The original swivel head jacks fitted as CES were assessed as not fit for purpose. The jacks were recalled, modified with a fixed concave head and returned to service under the same NSN. Some of the jacks missed the recall and are possibly still in service. Before raising the truck ensure the correct jack is used. Figure 3-1 shows the jack originally fitted to the truck and the correctly modified jack. Using the incorrect jack could allow the truck to fall off the jack resulting in serious injury or death.
When changing a wheel on a truck supported by a bottle jack, do not place any part of your body under the truck, or between the wheel and the wheel arch. Failure to comply may result in serious injury or death.

Ensure the dump body is supported on the safety support stay prior to working on the chassis or sub-frame with the body raised.

New exhaust gaskets and brake pads supplied by Daimler Chrysler are asbestos free. Older gaskets and brake pads fitted to trucks may contain asbestos. If any doubt exists as to whether the parts contain asbestos or not, the procedures described in EMEI workshop E 410 shall be complied with.

Do not drive the truck if a warning light is illuminated or a warning alarm is audible.

Do not drive the truck with damaged or incorrectly inflated tyres (refer to EMEI Vehicle A 291-5 for the correct tyre pressures).
SECTION 2
CHAPTER 4
OPERATING INSTRUCTIONS

NORMAL OPERATION

FIRST PARADE SERVICE
1. Ensure that all steps of the first parade service have been performed before the first engine start of the day. Details of first parade servicing are given in Sect 3 Chap 1 Para 3 to 17.

BEFORE STARTING
2. Ensure that any loose fittings on the rear tray are secured. If a load is to be carried ensure that it is securely tied down to prevent it shifting.

STARTING THE ENGINE (HOT OR COLD)
3. Start the engine as follows:
   a. Select neutral on the main transmission.
   b. Select two-wheel drive on the drive selector switch.
   c. Ensure the parking brake is applied.
   d. Position the hand throttle in the engine idle detent.

   CAUTION
   Do not operate the starter motor for more than 15 seconds. If the engine does not start in this time, allow 30 seconds for the starter motor to cool and the battery to recover.

   If the engine fails to start at the third attempt, abandon the start procedure and report the fault.
   e. Turn the key to the on position.
   f. Ensure the alarm sounds and the low oil, low coolant and high temperature lights illuminate.
g. Turn the key to the start position.

NOTE
Release the key as soon as the engine starts.

h. Ensure the alarm mutes and the low oil, low coolant and high temperature lights extinguish.

i. When the engine is running, allow the air pressure to build up to a minimum of 12 bar (7 bar in an emergency).

j. Check that only the parking brake, differential pressure and the brake pad wear warning lights are illuminated.

STOPPING THE ENGINE

4. Stop the engine as follows:

CAUTION
Do not stop the engine when the coolant temperature is higher than 90°C. Keep the engine running at 1200 – 1500 rpm for approximately two minutes to allow the coolant temperature to drop below 90°C.

a. Move the hand throttle to the engine shut down position.

b. Turn the ignition key to the off position.

CAUTION
Do not leave the truck in gear.

c. Select neutral on the main transmission.

d. Ensure the parking brake is applied.
DRIVING PROCEDURE

**WARNING**

The truck must not be driven if a brake warning light or a low air pressure warning light is illuminated or low air pressure alarm sounds. These warning devices indicate that the brake system is not functioning correctly.

**CAUTION**

To prevent the engine overspeeding when moving off with the truck empty, engage third or fourth gear depending upon the grade.

Do not operate the forward/reverse selector lever whilst the truck is in motion, except in an emergency condition such as rocking the truck when stuck in mud or sand.

Always select four-wheel drive before fording.

5. **Normal Conditions.**
   
   a. Depress the clutch, and engage the desired gear.
   
   b. Steadily depress the accelerator and simultaneously release the clutch and parking brake.
   
   c. Check that the parking brake, the differential pressure and brake pad wear warning lights extinguish.

6. **Slippery Road Conditions and Rough Terrain.** When operating on slippery roads or over rough terrain, observe the following:
   
   a. The drive selector switch can be changed when the truck is in motion. However, the change must not be attempted if any wheel is slipping.
   
   b. When using the four-wheel drive mode, the differential locks can be engaged if one or more wheels tend to slip due to poor ground conditions.
c. When the four-wheel drive and differential lock functions are engaged, two separate indicating lamps on the instrument panel light up.

d. Driving on firm surfaces with the differential locks engaged is not allowed, since the differentials will not operate when negotiating bends. Severe loads will be imposed on the tyres and the drive line components.

e. Tyre pressures will need to be adjusted in accordance with EMEI Vehicle A 291-5 to suit the operating conditions.

7. Driving

a. Upwards and downwards gear changes should be made to keep the engine operating in the 1500 to 2000 rpm range.

b. When driving down long grades the braking effect of the engine should be employed by shifting to a lower gear.

c. To engage reverse, stop the truck, declutch, shift the Fwd/Rev selector to Rev and then accelerate normally after engaging the clutch.

d. All eight main transmission ratios can be used in reverse.

e. When changing gears, operate the accelerator to match the engine speed to the truck speed and the transmission ratio to be used.

f. Shift gears smartly and smoothly. Do not ride the clutch as this causes undue wear on the clutch throw-out bearing.

8. Braking

a. To brake the truck, release the accelerator and progressively apply the brakes.

b. The brakes may be applied in three ways:
   (1) by applying the footbrake;
   (2) by applying the trailer brake when towing a trailer; and
   (3) by applying the engine brake.

c. When stationary, apply the parking brake and then release all other brakes. The engine then may be shutdown if required.

9. Towing
a. When connecting a trailer, ensure that the trailer towing eye is correctly seated in the towing pintle.

b. Ensure that the pintle locking device is fully closed and that the pintle safety pin is inserted and secured.

c. Secure the trailer safety chains (if fitted) to the truck’s 12.5 tonne safety chain mounts.

**NOTE**

If the truck doesn’t have the 12.5 tonne safety chain mounts, modify the vehicle in accordance with EMEI Vehicle G 167-26.

d. Connect the two trailer brake lines and ensure that there is no leakage at the couplings.

e. Connect the trailer NATO plug to the truck and check the trailer lights.

f. Release the trailer parking brake before moving off.

**EMERGENCY PROCEDURES**

**BRAKE FAILURE**

10. If a brake warning device is actuated when the brakes are applied or if braking effectiveness is in doubt, the truck must be stopped immediately and the cause investigated. With a partial failure of the system, it is still possible to bring the truck to rest by applying the footbrake, although the stopping distance will be increased. The engine may be used to assist braking by selection of a lower gear ratio or by actuating the engine brake.

**FIRE**

11. If a fire occurs carry out the following:

   a. Stop the truck immediately.

   b. Shut down the engine.

   c. Switch off all electrics.

   d. Evacuate all personnel.

   e. Attempt to quell the fire with the fire extinguisher provided.
12. The fire extinguisher is located beside the driver’s seat. Operating instructions for the extinguisher are printed on the extinguisher.

13. After successfully extinguishing the fire, observe the following:
   a. allow any fumes to dissipate prior to re-entering the truck; and
   b. report the occurrence of the fire so that the cause can be determined.

**BREAKDOWN PROCEDURES**

**WHEEL CHANGING**

14. Wheel changing is carried out as follows:

   **WARNING**

   When changing a wheel on a vehicle supported by a bottle jack, do not place any part of your body under the vehicle, or between the wheel and the wheel arch. Failure to comply may result in serious injury or death.

   Avoid harsh braking or steering manoeuvres if a tyre deflates.

   a. If a tyre deflates, stop the truck as soon as possible; avoid harsh braking or steering manoeuvres.
   b. If possible, bring the truck to rest on a hard level surface well clear of the road.
   c. Turn on the hazard warning lights if conditions allow.
   d. Apply the parking brake.
   e. Stop the engine.
   f. Remove any passengers from the truck.
   g. Chock the opposite side front wheel in front of the wheel if on a flat surface, or on any downhill side of the front wheel if on a sloping surface (ref Figure 4-1).
NOTE

The jack and operating handle are located in the cabin. The wheel brace is located in the tool locker on the left-hand side of the truck.

h. Place the base plate under the outboard end of the axle tube of the wheel to be replaced (ref Figure 4-2).
i. Place the wood block on top of the base plate (ref Figure 4-3).

Figure 4-3   Wood Block

The original swivel head jacks fitted as CES were assessed as not fit for purpose. The jacks were recalled, modified with a fixed concave head and returned to service under the same NSN. Some of the jacks missed the recall and are possibly still in service. Before raising the truck ensure the correct jack is used. Figure 4-4 shows the jack originally fitted to the truck and the correctly modified jack. Using the incorrect jack could allow the truck to fall off the jack resulting in serious injury or death.
j. Place the jack under the outboard end of the axle tube adjacent to the faulty wheel (ref Figure 4-5).

k. Remove any dirt or debris from around the wheel nuts.
l. Loosen the wheel nuts approximately half a turn.

m. For all variants other than the cargo with crane, remove the spare wheel as follows:

(1) Disengage the spare wheel winch locking pawl to enable the winch cable to free-spool.

(2) Draw the rope out of the lifting gear located above the spare wheel.

(3) Attach the hook at the end of the rope to the attachment point beneath the spare wheel carrier (ref Figure 4-6).

Figure 4-6   Rope in Position

(4) Unscrew and remove the three bolts holding the spare wheel on the carrier.

(5) Position the rope around the wheel slightly off-centre towards the rear of the truck (ref Figure 4-6).

CAUTION

Hold the wheel steady to ensure it does not slip off the rope.

(6) Fit the crank handle and slowly lower the wheel to the ground holding the wheel steady so that it does not slip off the rope (ref Figure 4-7).
NOTE
As the spare wheel is being lowered, it will make contact with the passenger steps. It is important to minimise the amount the spare wheel pivots from contact with the step as too much contact will lead to the spare wheel slipping from the cable. Rocking the spare wheel will assist in lowering the spare wheel past the step.

Figure 4-7   Lowering the Spare Wheel

(7) Roll the spare wheel off the rope.

n. For the cargo with crane, remove the spare wheel as follows:
(1) Remove the three nuts securing the wheel to the bracket on the cargo body.
(2) Roll the wheel to the centre of the cargo body.
(3) Attach a suitable capacity lifting sling to the wheel.
(4) Attach the lifting sling to the crane.

CAUTION

When lifting the spare wheel do not damage the canopy bows or guard rails.
(5) Lift the spare wheel clear of the truck and position it on the ground in a convenient position.

(6) Remove the lifting sling from the wheel.

\(\text{o.} \) Raise the truck until the wheel is clear of the ground.

\(\text{p.} \) Undo the wheel nuts and remove the unserviceable wheel.

\(\text{q.} \) Clean the wheel nuts and stud threads.

\[\text{CAUTION}\]

Do not damage the stud threads.

\(\text{r.} \) Fit the spare wheel on to the wheel studs (ref Figure 4-8).

**NOTE**

It may be necessary to lever the wheel on using the jack handle or a bar (ref Figure 4-8).

**Figure 4-8** Levering on the Spare Wheel

\(\text{s.} \) Refit the wheel nuts with their bevelled ends inwards.
Tighten the nuts in an opposite pattern.

t. Tighten the nuts evenly around the wheel.

u. Lower the truck to the ground.

v. Tighten the wheel nuts to 400 N.m.

w. For all variants other than the cargo with crane variant, stow the spare wheel as follows:

(1) Place the unserviceable wheel over the rope with the contact surface of the wheel rim facing inwards.

(2) Centre the rope over the wheel (refer to Figure 4-9).

Figure 4-9  Rope Centred over the Wheel
Steady the wheel so that it does not slip off the rope.

(3) Engage the spare wheel winch pawl to activate the rachet mechanism.

(4) Raise the wheel by turning the crank handle.

(5) Align the bolt holes in the wheel rim with the securing holes on the carrier.

(6) Secure the wheel with the three bolts.

(7) Disengage the spare wheel winch locking pawl to enable the winch cable to free spool.

(8) Slacken off the rope and detach it from the hook beneath the carrier.

(9) Wind up the rope until it is completely home and secure the hook.

(10) Engage the locking pawl on the spare wheel winch.

(11) Remove and stow the crank handle.

x. For the cargo with crane variant, stow the spare wheel as follows:

(1) Attach a suitable capacity lifting sling to the wheel.

(2) Attach the lifting sling to the crane.

When lifting the spare wheel do not damage the canopy bows or guard rails.

(3) Lift the spare wheel to the cargo body.

(4) Remove the lifting sling.

(5) Roll the wheel to the bracket on the cargo body.

(6) Secure the wheel to the bracket with the three bolts.

(7) Stow the crane.
y. Check that the new tyre is inflated to the correct pressure in accordance with EMEI Truck A291-5.

z. Stow the jack, operating handle and wheel brace.

aa. Remove and stow the chock.

bb. Report the occurrence so that the necessary repair action to the defective tyre can be taken.

cc. Check the wheel nuts after one hour’s operation.

TOWING THE TRUCK

15. When towing the truck observe the following:

Braking efficiency is jeopardised if the truck is towed or coasted with the engine not operating.

The truck may be towed only with a rigid towing bar or frame.

The maximum towing speed is 40 km/h.

a. Position the gear selector lever in neutral.

b. Select Fwd on the Fwd/Rev shift lever.

c. Select two-wheel drive.

d. When towing over long distances observe the following:

   (1) Remove the engine-to-transmission drive shaft and secure it in the truck;

   (2) engage forward drive;

   (3) engage eighth gear;

   (4) ensure that the planetary gear shift lever on the side of the transmission is in the high range position (forward); and

   (5) release the spring-loaded brakes.
NOTE

If the truck’s air pressure is low, this can be done manually with a suitable lever.

e. If the truck has a faulty axle, raise the defective axle until the wheels are clear of the ground prior to towing.

f. To maintain the parking brake in the released position for towing operation, it is necessary to provide an auxiliary air supply from the towing truck.

g. If the truck is to be towed with all wheels on the ground and without the engine running, the hydraulic power steering system will not operate. Manual steering forces will be considerably higher than normal.

If the truck is to be towed with the rear wheels on the ground and the engine not operating, the parking brake system must be mechanically released.

h. Mechanically release the parking brake as follows:
   (1) Chock the wheels.
   (2) Move the parking brake latches towards the wheels using a hammer or tyre lever (ref Figure 4-10).

NOTE

The mechanical release mechanism will disengage with an audible click.

(3) Tie the latch in place with suitable cordage.
Before removing the towing bar after towing the truck, chock the wheels to prevent the truck from moving.

TIE DOWN AND LIFTING FACILITIES

CARGO TIE-DOWN POINTS

16. Tie-down points are provided in the floor of the cargo body for securing the load (ref Figure 4-11 and 4-12). The tie-down points have a nominal load rating of one tonne.
Figure 4-11  Cargo Tie-down Points and Twist Locks

Figure 4-12  Cargo with Crane Tie-down Points and Twist Locks
TWIST LOCKS

17. Twist locks are provided on rebuilt trucks to secure loads (ref Figure 4-11 and 4-12). Operate the twist locks as follows:

a. Pull the twist lock handle through 90°.
b. Push the twist lock vertically as far as it will go.
c. Place the container over the twist lock.
d. Rotate the twist lock through 90°.
e. Pull the twist lock down to engage the container.
f. Rotate the twist lock to secure the container.

TRUCK TIE-DOWN POINTS

18. Six truck tie-down points are located on the cargo variants. Four tie-down points are located on the crane variants (ref Figures 4-13 and 4-14).

Figure 4-13  Truck Tie-down and Lifting Points (Cargo)
TRUCK LIFTING POINTS

19. Four lifting points are located on the chassis (ref Figures 4-13 and 4-14).

NOTE

Before attaching the rear lifting slings, it is necessary to remove the two rectangular plates in the floor of the cargo body.

CARGO VARIANTS BODY CONFIGURATIONS

20. The cargo variants body configuration is able to be changed as follows:

   a. conversion to an open cargo configuration;
   b. conversion to a drop-side configuration; and
   c. conversion to a flat-bed configuration.

CONVERSION TO AN OPEN CARGO CONFIGURATION

21. Convert the body to an open cargo configuration by removing the canopy and frame as follows:
a. Release all the canopy securing ropes.
b. Remove, fold and store the canopy.
c. Remove the canopy rails from the canopy bows.
d. Remove the retaining pin from the rail storage space under the body (ref Figure 4-15).
e. Stow the canopy rails in the storage space.
f. Refit and secure the retaining pin.

CONVERSION TO A DROP-SIDE CONFIGURATION

22. Convert the body to the dropside configuration as follows:
   a. Remove the canopy and frame (ref paragraph 21).
   b. Release the leather retaining straps and lower the seats.
   c. Remove the nuts and bolts which secure the seat hooks to the sides of the body.

![Canopy Rail Stowage](image-url)
d. Lift out and store the seats.

CONVERSION TO A FLAT-BED CONFIGURATION

23. Convert the truck body to a flat-bed configuration as follows:

a. Remove the canopy and frame (ref paragraph 21).
b. Remove the seats (ref paragraph 22).
c. Release the tailboard latches.
d. Lower the tailboard to the horizontal position.
e. Slide the tailboard to the right.
f. Remove and store the tailboard.
g. Repeat paragraph c. to f. for each dropside assembly.
h. Remove the panel support uprights from the tray.

WINCH

WINCHING

24. To use the winch, proceed as follows:

When using the winch for self-recovery, the angle of pull shall not exceed 15° to the left or the right.

When pulling at 15°, the load on the winch shall not exceed 40 kN (4 t).

a. Turn the friction brake control on the right-hand side of the winch (viewed in the direction of travel) anticlockwise and pay out the winch rope.
b. Remove the safety clip from the clutch knob on the left-hand side of the winch.
c. Push the knob all the way in.
d. Depress the driving clutch and engage the PTO select lever by moving it to the rear.
e. Winch in using the driving clutch to control the winch.

f. To use the winch-and-drive mode, select and engage a gear on the main transmission with the PTO select lever engaged.

g. When winching is completed, winch in while maintaining tension on the winch rope.

h. Engage the friction brake by turning the brake control knob clockwise.

i. Pull out the winch clutch knob.

j. Insert the safety clip.

OVERLOAD SAFETY DEVICE

25. The overload safety device stops the winch if the load exceeds 62 kN (6.2 t). To restart the winch proceed as follows:

a. With tension off the rope, disengage and engage the PTO select lever.

b. With tension on the rope, drive the truck forward or, if it is not possible to drive, remove the winch front access cover, attach the wheel wrench to the nut at the front of the worm drive and turn the wrench clockwise.

CHANGING THE WINCH ROPE

26. Change the winch rope as follows:

Do not operate the winch with the rope disconnected. If the winch is operated without the rope, the timing of the winch will have to be reset. Resetting the timing of the winch is a Light Grade Repair action.

a. Release the friction brake on the right-hand side of the winch by turning the control anticlockwise.

b. Pull out the clutch knob on the left-hand side of the winch and insert the safety clip.

c. Reel the rope off the winch drum.
d. Rotate the drum until the rope anchor pocket in the drum is accessible through the cutaway portion at the top of the winch.

e. Release the anchor wedge and remove it from the pocket.

f. Remove the cable from the wedge and from the winch.

g. Guide the end of the new rope through the fairlead and winding mechanism.

h. Insert the rope into the anchor pocket, leaving sufficient rope at the end for one or two turns around the wedge.

i. Insert the wedge into the anchor pocket over the rope and wind one or two turns of the rope around the wedge.

j. Ensure that the end of the cable or the turns around the wedge do not protrude above the anchor pocket.

k. Clamp the rope by giving it several sharp tugs.

l. Slowly winch in the rope, ensuring that it feeds evenly onto the drum.

**CRANE OPERATION**

**PREPARATION FOR USE**

27. Prepare the truck and crane for use as follows (ref Figure 4-17)

[WARNING]

When operating on sloping ground, position the truck to face up or down the slope. Chock all wheels to prevent the truck moving.

a. Position the truck so that the crane is within reach of the stores.

b. Check that the ground below the stabiliser position is firm.

c. Apply the parking brake.

d. Place the transmission is in neutral.

e. Check that both stabiliser shut-off valve levers (8) are in the CLOSED position.
f. Lower the passenger’s seat backrest for use as the crane operator’s platform.

g. Open the cupola cover.

h. Start the engine.

i. Set the engine speed to 1400 rpm using the hand throttle.

j. Engage the crane pump and wait for the red indicator light to illuminate on the instrument panel.
Figure 4-17  Stabiliser Arrangement

NOTE: LHS stabiliser shown lowered
RHS stabiliser identical

1. Spotlight support rod
2. Common control lever
3. Extension housing
4. Stabiliser cylinder
5. Stabiliser ram
6. Footplate
7. Stabiliser handle
8. Shut-off valve lever
9. Extension housing locking bolt
10. Stabiliser ram locking bolt
LOWERING THE STABILISERS

28. Lower the stabilisers as follows (ref Figure 4-17):

WARNING

Before operating the stabiliser and crane controls read the DANGER notice on the instrument panel.

NOTE

If the ground under the stabilisers is of doubtful firmness or stability, lower the stabiliser on the side of the softer ground first. This saves time should it become necessary to resite the truck to gain sufficient stability. It may be necessary to reinforce the ground by laying steel mesh or sand bags under the stabiliser foot plates.

a. Select the right-hand or left-hand stabiliser as appropriate for lowering.

b. Remove the stabiliser ram locking bolt (10) and the extension housing locking bolt (9) from the extension housing.

c. Rotate the stabiliser cylinder (4), ram (5) and footplate (6) vertically until the footplate is pointing down.

d. Insert the locking bolt (10).

e. Using the handle (7), pull the stabiliser from the extension housing to its fullest extent.

f. Insert the locking bolt (9) to lock the stabiliser in position.

g. Set the shutoff valve lever (8) to the OPEN position.

NOTE

The first stabiliser operated raises the truck chassis approximately 75 mm. The second stabiliser is raised to level the truck.

h. Lower the stabiliser to the ground by setting the common control lever (2) to the LOWER position.

i. Set the shut-off valve lever to the CLOSE position.
j. Ensure that the oil lines are clear of the ground and are free from obstruction.

k. Repeat paragraphs a. to j. for the other stabiliser.

UNSTOWING THE CRANE

29. Unstow the crane and prepare it for use as follows (ref Figure 2-20):

Do not operate the crane unless both stabiliser legs have been lowered and the feet are in firm contact with the ground.

a. Assume the crane operator’s position by standing on the lowered passenger’s seat backrest.

Do not drag the load along the ground by the crane hook.

Do not jerk the control levers, use a smooth movement.

b. Move the outer boom control lever to OUT and hold it in that position until the outer boom is raised clear of the stowage lug on the crane support column.

c. Return the lever to neutral.

d. Move the inner boom control lever to RAISE and hold it in that position until the boom is raised at an angle of approximately 45°.

e. Return the lever to neutral.

f. Move the boom extension control lever to OUT as required.

OVERLOAD PROTECTION

30. The crane hydraulic system is protected against overload by a hydraulic pressure sensing valve and blocking cylinders located in the control lever circuits. If an overload condition is reached, the sensing valve bypasses oil to the blocking cylinders which neutralise any further operation, by forcing the control lever to the centre position against the operator’s hand pressure. The operator must then reduce
the load/radius by lifting the inner boom, lowering the outer boom or retracting the boom extensions. Under extreme emergency conditions only, the operator can bypass the overload by hand operation of the overload reset valve located near the control levers (ref Figure 2-21).

LOADING THE CRANE

31. Load the crane as follows:

a. Adjust the height of the booms so that the crane may be slewed in the desired direction without contacting any obstructions.

b. Slew the crane so that the booms are aligned directly above the load to be moved.

c. Set the inner boom angle to 10° above the horizontal for maximum lift.

Ensure that the maximum safe working load for the various radii is not exceeded. Refer to the SAFE WORKING LOAD placard (ref Figure 2-19).

d. Select the appropriate hook position on the boom for the load.

e. Use the control levers to position the hook over the sling around the load.

f. Attach the hook to the load.

g. Ensure that the safety catch on the hook is fully closed and secure.

h. Take the load up gently by raising the appropriate boom until the load is clear of any obstructions before slewing the crane.

Slew the crane smoothly and gradually to prevent the load swinging.
UNLOADING THE CRANE

32. Unload the crane as follows:

Ensure that the load is completely stable and is on firm standing before releasing the hook.

a. Use the appropriate boom and slewing controls to lower the load gently and accurately into place.

b. Open the safety catch on the hook and release the hook from the load.

c. Raise the appropriate boom until the crane is clear of the load and any obstruction before slewing the crane.

STOWING THE CRANE

33. Stow the crane as follows:

a. Slew the crane until the booms are on the passenger side of the truck and aligned above the space between the cabin and the truck bed.

b. Retract the boom extension to the limit of its travel.

c. Hold the boom extension control lever in the IN position for a few seconds to complete the retraction.

d. Raise the inner boom to an approximate angle of 45°.

e. Close up the outer boom.

f. Lower the main boom until the stowing boss engages the stowing lug on the crane support column.

g. Close the cupola cover.

h. Return the passenger’s seat to the normal position.

RETRACTING THE STABILISER

34. Retract the stabilisers as follows (ref Figure 4-17):
If the ground under the road wheels is of doubtful firmness, retract the stabiliser on the side of the firmer ground first.

Do not move the truck until both stabilisers are fully retracted and stowed.

a. Set the selected shut-off valve lever (8) to the OPEN position.
b. Set the JACK common control lever (2) to RAISE.
c. Ensure that the leg retracts fully.
d. Set the shut-off valve lever to the CLOSE position
e. Use the handle (7) to push in the stabiliser.
f. Pull out the locking bolt (9).
g. Push the stabiliser in fully and insert the locking bolt.

NOTE

The normal stowage position is for the left-hand stabiliser leg and footplate to face towards the rear of the truck and the right-hand stabiliser and footplate to face towards the front of the truck.

h. Pull out the locking bolt (10).
i. Rotate the stabiliser to approximately 45°.
j. Insert the locking bolt to lock the stabiliser in position.
k. Repeat paragraphs a. to j. for the other stabiliser.
l. Select the crane pump switch to OFF.
m. Shut down the engine.

OPERATING IN DARKNESS

NOTE

If the operational situation prevents the use of lights, use an assistant to call the boom extension and slewing instructions.
35. If there are no lighting restrictions proceed as follows:
   a. Mount the floodlight on the post secured to the left-hand side of the cabin (ref Figure 4-17(1)).
   b. Switch on the floodlight and point it so that it illuminates the working area.

DUMP SYSTEM OPERATION

SAFE LOAD INDICATION

36. Test that the load is within limits as follows:

   NOTE
   The hoist movement may be stopped at any position by placing the body control lever to the hold position (ref Figure 2-23).

   a. Start the engine.
   b. Hoist and hold the loaded body between 50 and 100 mm above the horizontal.
   c. Read the load markings on the gauge to the left of the driver’s seat.
   d. Ensure that the limit mark is not exceeded.
   e. Lower the body before moving off.

LOAD DISCHARGE

37. Discharge the load as follows:
   a. Move the manual tailgate lock lever fully upwards (ref Figure 2-24).
   b. Move the tailgate control lever in the cabin to the down position (ref Figure 2-23).
   c. Move the body control lever to the up position (ref Figure 2-23).
d. Ensure that the body extends to its fully hoisted position.

e. Move the body control lever to the hold position.

To prevent damage to the hydraulics do not lower a fully loaded body except in an emergency.

f. Allow the load to tip from the truck.

g. Move the body control lever to the down position.

h. Allow the body to lower to the chassis.

i. Move the body control lever to the hold position.

j. Move the tailgate control lever in the cabin to the up position.

k. Move the tailgate lock lever fully downwards.

**TAILGATE LOCK**

38. Lock the tailgate as follows:

a. Move the tailgate lock lever in the cabin to the up position (ref Figure 2-23).

b. Manually operate the tailgate lock lever down to its full extent (ref Figure 2-24).
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SECTION 2
CHAPTER 5

PACKAGING, HANDLING, STORAGE AND TRANSPORTATION

STORAGE

1. Trucks are to be stored in accordance with the following EMEI:
   a. Vehicle A 139-1 – Preparation of Trucks for Periods of Non-use (One to Twelve Months); and
   b. Vehicle A 203-3 – Preservation of Trucks and Major Unit Assemblies.

PREPARATION FOR SEA TRANSPORTATION

2. Trucks are to be prepared for sea transportation in accordance with EMEI Vehicle A 201-2 – A and GS B Vehicles - Preparation for Shipment by Sea.
SECTION 3 – OPERATOR SERVICING

CHAPTER 1

SERVICING

INSPECTION INTERVALS

INTRODUCTION

1. The operator is to service the truck as follows:
   a. first parade servicing;
   b. halt parade servicing;
   c. last parade servicing; and
   d. as detailed in EMEI Vehicle G 609.

2. This User Handbook only details the first, halt and last parade servicing.

FIRST PARADE SERVICING

3. **Engine.** Check the engine oil level and top up as necessary.

4. **Radiator.** Check the coolant level and top up as necessary.

5. **Windscreen Washer.** Check the water level and top up as necessary.

6. **Fuel.** Check the fuel level and refuel if necessary.

7. **Security.** Check that the spare wheel is securely mounted and that external lockers are locked. Check that all stores and loads are securely fastened to the truck.

8. **Truck Serviceability.** Inspect the truck for any damage, and loose or missing parts.

9. **Tyres.** Check the tyre pressures and inspect the treads and side walls for signs of damage. Refer to EMEI Vehicle A 291-5 for the correct tyre pressures.

10. **Leakage.** Check under the truck for any signs of coolant, oil or fuel leaks.

11. **Crane.** Check that the crane is correctly stowed. Check the oil level in the reservoir and top up if necessary. Check all hoses for leaks and security (tighten any connections if necessary).
12. **Dump.** Check the hydraulic oil reservoir and top up if necessary. Check all hoses for leaks and security (tighten any connections if necessary).

13. **Air-pressure Check.** Start the engine. Check that the air pressure warning lamp extinguishes and the warning alarm mutes.

14. **Accessories.** Check the following accessories for the correct operation:
   
a. headlights,
   
b. horn,
   
c. indicator lights,
   
d. hazard warning lights,
   
e. crane spotlight, and
   
f. windscreen washers.

15. **Brakes.** Allow the truck to move forwards slowly and check that the foot brake works. Stop the truck and check that the parking brake operates correctly.

16. **Steering.** Whilst moving slowly, check that the steering is free and responsive without any undue slackness or sponginess.

17. **General.** Check all lashings, tie downs and canopy security. Report all defects or damage.

**HALT PARADE SERVICING**

18. **General.** Halt parade servicing shall be carried out after each four hours of continuous operation. The servicing may be carried out at shorter intervals during scheduled stops.

19. **Engine.** Check the engine oil level and top up as necessary.

   ![Warning Sign]

   **WARNING**

   Do not remove the coolant expansion tank filler cap while the engine is hot.

20. **Radiator.** Check the coolant level and top up as necessary.

21. **Fuel.** Check the fuel level and refuel if necessary.
22. **Tyres.** Check the tyre pressures and inspect the treads and sidewalls for signs of damage.

**LAST PARADE SERVICING**

23. **Fuel.** Fill the fuel tank.

24. **Engine.** Check the oil level and top up as necessary.

![WARNING]

**Do not remove the coolant expansion tank filler cap while the engine is hot.**

25. **Radiator.** Check the coolant level and top up as necessary.

26. **Parking.** Ensure the truck is correctly parked with the parking brake engaged, the transmission in neutral and the Fwd/Rev selector in the Fwd position.

27. **Crane.** Ensure the crane controls are at neutral and that the crane and stabilisers are correctly stowed.

28. **General.** Ensure the truck is left in a clean condition. Report any service due. Report any malfunctions or damage. Ensure the truck is locked.

**LUBRICANTS**

29. Table 3-1 lists the lubricants to be used during operator servicing.

**Table 3-1  Approved Lubricants**

<table>
<thead>
<tr>
<th>Serial</th>
<th>Location</th>
<th>Description</th>
<th>Army Designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Engine</td>
<td>Engine oil SAE 30</td>
<td>OMD-115</td>
</tr>
<tr>
<td>2</td>
<td>Transmission</td>
<td>Engine oil SAE 30</td>
<td>OMD-115</td>
</tr>
<tr>
<td>3</td>
<td>Front and rear differentials</td>
<td>Gear oil SAE 90</td>
<td>OEP-220</td>
</tr>
<tr>
<td>4</td>
<td>Front and rear hub drives</td>
<td>Gear oil SAE 90</td>
<td>OEP-220</td>
</tr>
<tr>
<td>5</td>
<td>Power steering system</td>
<td>Automatic transmission fluid</td>
<td>OX-47 Grade 10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Type TF</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Hydraulic brakes and clutch</td>
<td>All-seam brake fluid</td>
<td>OX(AUST)-8</td>
</tr>
<tr>
<td>7</td>
<td>Coolant system</td>
<td>Water corrosion inhibitor</td>
<td>PGXL</td>
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</table>
### Table 3-1  Approved Lubricants (continued)

<table>
<thead>
<tr>
<th>Serial</th>
<th>Location</th>
<th>Description</th>
<th>Army Designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>Fuel tank</td>
<td>Diesel fuel</td>
<td>Automotive distillate</td>
</tr>
<tr>
<td>9</td>
<td>All grease points</td>
<td>All-season multi-purpose grease</td>
<td>XG-274</td>
</tr>
<tr>
<td>10</td>
<td>Battery terminals</td>
<td>Petrolatum technical Vaseline</td>
<td>PX-7</td>
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<tr>
<td>11</td>
<td>Crane/Dump Hydraulic system</td>
<td>Hydraulic oil</td>
<td>OM-33</td>
</tr>
</tbody>
</table>
SECTION 3
CHAPTER 2

FAULT FINDING

1. Before submitting the truck for repairs, ensure the following items have been checked:

   a. the batteries are fully charged;
   b. all electrical connections are clean and secure;
   c. the starter motor is in good condition;
   d. the correct fuel is in the fuel tank;
   e. lubricating oil and hydraulic oil is at the correct level;
   f. there is no restriction in the air intake system;
   g. the air filter is not clogged;
   h. the engine coolant is at the correct level, belts correctly tensioned and the radiator fins are clean.
   i. all fuel and hydraulic line connections are tight; and
   j. all the gauges, indicating lights, warning lights and alarms are operative.
SECTION 4 – WARRANTY

CHAPTER 1

WARRANTY PROVISIONS AND CLAIMS

1. The warranty on the Unimog has expired.
## LIST OF ABBREVIATIONS

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>CES</td>
<td>Complete Equipment Schedule</td>
</tr>
<tr>
<td>EMEI</td>
<td>Electrical and Mechanical Engineering Instruction</td>
</tr>
<tr>
<td>ILSI</td>
<td>Integrated logistic Support Instruction</td>
</tr>
<tr>
<td>PTO</td>
<td>Power Take-off</td>
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<tr>
<td>RPS</td>
<td>Repair Parts Scale</td>
</tr>
<tr>
<td>Unimog</td>
<td>Truck Medium MC2 – Unimog – All Types</td>
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