

TRUCK, GENERAL MAINTENANCE, LIGHT, WINCH, MC2 - LAND ROVER 110 6 X 6

TECHNICAL DESCRIPTION

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

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INTRODUCTION

1. This EMEI contains the technical description of the maintenance module and ancillary equipment fitted to the Truck, General Maintenance, Light, Winch, MC2. All relevant weights, dimensions and performance figures are detailed in the data summary EMEI Vehicle G 240. Except for the 24 volt alternator, the mechanical characteristics of the general maintenance vehicle are the same as the Truck, Cargo, Light, Winch, MC2, therefore, when further information relating to the mechanical functions of this vehicle are required, refer to EMEI Vehicle G 202.
2. The general maintenance module is designed to provide a self-contained repair facility for two tradesmen. Repair equipment and supplies are stowed in drawers, stowage bins, lockers or racks within the module, which can be readily detached or installed (as an assembly) on the vehicle chassis.

Associated Publications

3. Reference may be necessary to the latest issue of the following documents:
 - a. [EMEI Vehicle A 029](#) – Servicing of B Vehicles;
 - b. [EMEI Vehicle G 202](#) – Technical Description – Truck, Cargo Light and Truck, Cargo Light, Winch, MC2 – Land Rover 110 6 X 6;
 - c. [EMEI Vehicle G 240](#) – Data Summary – Truck, General Maintenance, Light, Winch, MC2;
 - d. [EMEI Vehicle G 243](#) – Unit Repair – Truck, General Maintenance, Light, Winch, MC2;
 - e. [EMEI Vehicle G 244-1](#) – Medium and Heavy Repair – Truck, General Maintenance, Light, Winch, MC2; and
 - f. Repair Parts Scale 02209.

Identification Numbers

4. Table 1 contains the locations of Identification Numbers on the sub-assemblies.

Table 1 Location of Identification Numbers

Identification Number Type	Location
Chassis No	Right-hand side of chassis, forward of the spring mounting turret
Chassis name plate	Left-hand seat box, in the cab
Engine	Left-hand side of engine block
Injection pump identification	Side of the pump
Transmission and transfer case	Rear of transfer case
Air compressor	Front outer mounting point
Maintenance Module	Right-hand rear

DETAILED DESCRIPTION

GENERAL MAINTENANCE MODULE

Construction

5. The module consists of a welded Galvabond steel tube frame which is covered by a fibreglass outer skin bonded to the frame. The inner panelling consists of two fibreglass shells which are positioned in the module and secured to the frame to form a fibreglass (urethane foam) sandwich.

Rear Door

6. The full width rear door is constructed in the same manner as the module, using a Galvabond steel tube frame with fibreglass outer skin and inner panelling. Four heavy duty hinges secure the door, at the top, to the module, enabling the door to be opened upward to provide unhindered access to the module. A gutter, near the top of the rear door, seals the gap between the door and the module (Figure 1), enabling the door to provide a sheltered area for external repair work.

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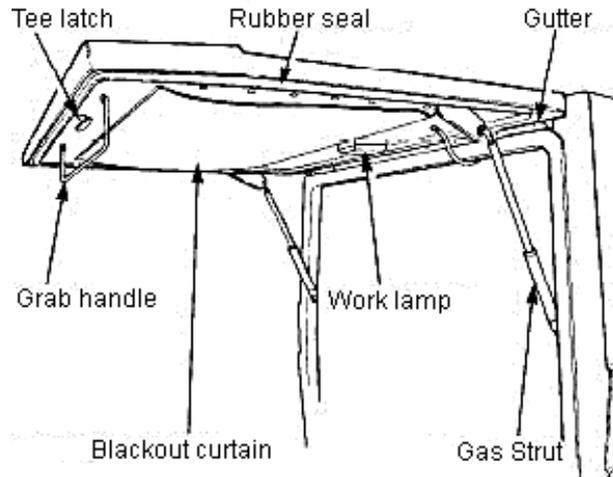
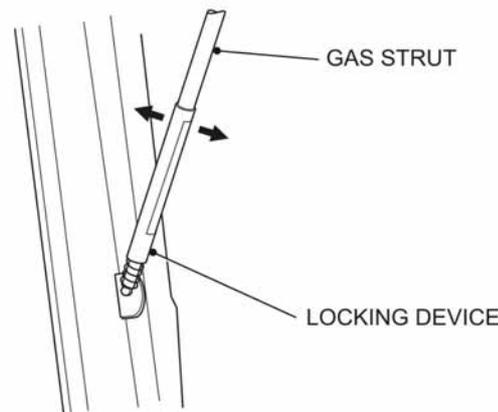


Figure 1 Module Rear Door

7. Two gas struts are utilised to assist with the opening and closing of the rear door. The struts are positioned on either side of the door with the lower ends of the struts secured to the inside of the door jamb and the upper ends attached to brackets on the door. The struts incorporate a locking device, which must be used when the door is fully open to prevent accidental closure of the door. The strut lock is operated by opening the door fully and moving the strut cover off-centre, which engages the lock with the end of the strut (Figure 2).



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Figure 2 Strut Locking Device

8. The door is fitted with a large tinted acrylic plastic window that can be pushed out to provide an emergency exit when required. A blackout curtain is fitted to the inside of the door with the edges of the curtain secured to the door by press studs. When not in use, zippers which are incorporated in the curtain, can be unzipped and the curtain rolled up and strapped in place.

9. A rubber seal, fixed to the inside edge of the door, not only seals the door opening against the ingress of dust and moisture into the module when the door is closed, but also provides a cushioning effect, preventing contact with the door and module.

10. A slam-latch located on either side of the door, and aligned with striker plates located on either side of the door jamb, secure the door in the closed position. Tee-latches, connected by linkages to the slam-latches and centrally positioned both internally and externally on the door, provide a means of opening the door from inside or outside the module. The external tee-latch is key lockable. Opening and closing the door is assisted by means of a fixed position grab-handle on the outside of the door, and a pivoting grab-handle on the inside.

Rear Step

11. A double hinged rear step (Figure 3) assists with access into the module. The step is a galvanized steel structure which can be folded up when not in use. When in the up position, the step folds into the foot well.

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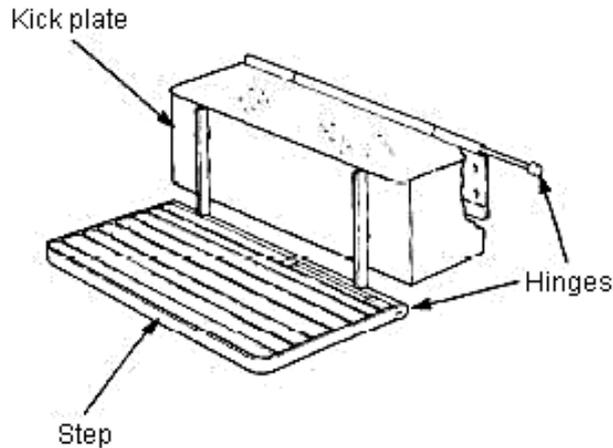


Figure 3 Rear Step

Stepped Floor

12. The floor of the module is constructed of plywood and on two levels, i.e. a foot well is located centrally between two side platforms and runs the length of the module. The foot well is approximately 300 mm below the level of the platforms and is covered with aluminium tread plate. Six flush fitting tie-down rings are installed in the foot well. The side platforms are each fitted with two Unistrut tracks, which are used in conjunction with retaining plates to secure the work benches and bin pack storage frames in position. Zinc plated sheet metal is used to protect the plywood on the platforms.

13. Protective Coating. On some vehicles, an elastomeric polyurethane coating has been applied to the floor. This prevents the ingress of foreign matter and helps with sound deadening. The coating also incorporates a 16 grit aluminium aggregate which increases the coating's anti-slip properties.

Side Doors

14. The lift-up doors (Figure 4), incorporated in the sides of the module, are constructed of a welded Galvabond steel tube frame with a fibreglass outer skin bonded to the frame, and fibreglass panelling secured to the inside of the frame. Three heavy duty hinges secure each door (at the top) to the module frame.

15. A rubber seal is fixed to the inside edge of the doors to provide a cushion preventing door-to-module contact and effectively sealing the side openings against the ingress of dust and moisture, when the doors are closed.

16. Steel locking rods are incorporated in each door and engage in locking slots in the module walls when the doors are in the closed position. Over-centre locking levers mounted centrally on the outside of each door are manually operated to open the doors. Two heavy duty gas struts assist with the opening and closing of each side door. The lower ends of the struts are secured to brackets inside the door jambs and the upper ends are secured to brackets on the doors. As the struts are lockable they are to be locked to prevent accidental closure of the doors when fully opened. A pivoting D-type grab handle is fitted centrally at the inside bottom of the doors, to assist with closing.

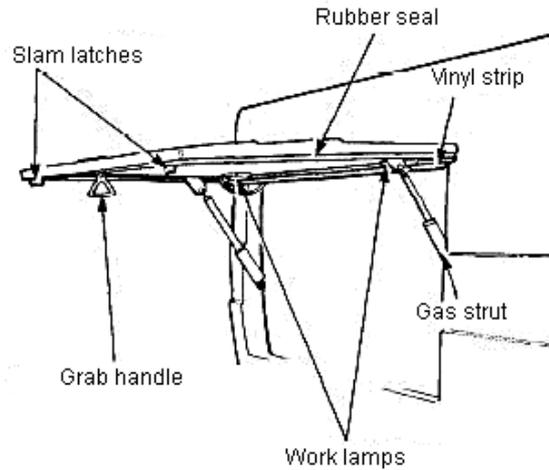


Figure 4 Module Side Door

17. A vinyl strip (running the length of the door) is secured between the inside upper edge of the door and the inside upper edge of the door jamb on both sides of the module. This is used to prevent rain from running down between the door and the module, helping to make a dry external work area when the side doors are open. Two 24-volt work lights, fitted to the inside top of each door, provide illumination for the external work area.

Work Benches

18. The work benches are constructed of a welded square tube steel frame with sheet metal secured to and bracing the frame to form the top, ends and drawer supports. The benches are located across the front and down the left-hand side of the module. The side bench can also be located on the right-hand platform of the module if required. Retaining plates, fitted to the Unistrut tracks in the platforms on both sides of the module, secure the benches in position.

19. The side bench houses six shallow and six deep drawers, which are suspended on runners. The drawer runners are aligned and welded to the drawer supports. Automatic locking devices enable each drawer to be locked in the closed position for travelling purposes. The base of each drawer is lined with shock absorbing/sound deadening material to help prevent damage occurring to fragile parts and to minimize noise made by tools and equipment when in transit. A bracket fitted to the top of the side bench provides for the fitting of the vice, when required. The centre front bench section houses one shallow gasket drawer that is mounted and locked in the same manner as the side bench drawers.

First Aid Locker

20. A first aid locker is attached to the front wall inside the module. The locker is a pressed metal two-door container. Both doors are secured to the locker by means of piano type hinges, with the upper door swinging outward and to the left, and the lower door swinging outward and down.

21. To access the first aid locker, the over-the-centre lever type latch, on the top right-hand side of the locker, must be released. This allows the upper door and the lower door, which is held in the closed position by the upper door, to be opened.

Fold-down Bench

22. The fold-down bench is installed on the left-hand side of the module and is only accessible by raising the side door. The bench is constructed from galvanized sheet metal, which is pressed and welded into shape. A mounting bracket is secured to the top surface at the right-hand side of the bench, for the fitting of an engineers vice, when required. Support arms are welded to both ends of the bench. The arms are constructed of galvanized steel plate, with the free end of the arms attached by pivot pins to brackets, which are secured by retaining plates to the Unistrut tracks on the left-hand side platform. The bench support mounts are fitted with insulating material which isolates the bench from the module enabling welding tasks to be carried out using the bench as a platform.

23. The bench is secured in the stowed position by a spring loaded locking mechanism on the left-hand bench support and a screw clamp on the right-hand bench support. A short safety chain is affixed to the left-hand bench support and is attached to a bull horn ring on the bench. If the bench locking mechanisms are inadvertently released when the bench is in the stowed position (vertical), the attached safety chain will prevent its fall. The bench is unlocked by releasing the right-hand screw clamp, operating the left-hand locking mechanism and releasing the safety

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chain. Spring loaded retaining plates, which are manually applied, lock the bench in the working position when it is lowered. The level of the bench in the working position can be adjusted using two adjusting bolts mounted on the bench support bases.

Publication Lockers

24. Two lockers are provided for the storage of manuals and documentation. The lockers are constructed of fibreglass and are part of the interior wall panel mould. Hinged doors are fitted to the front of the lockers and Gravelly locks secure the doors in the closed position (Figure 5).

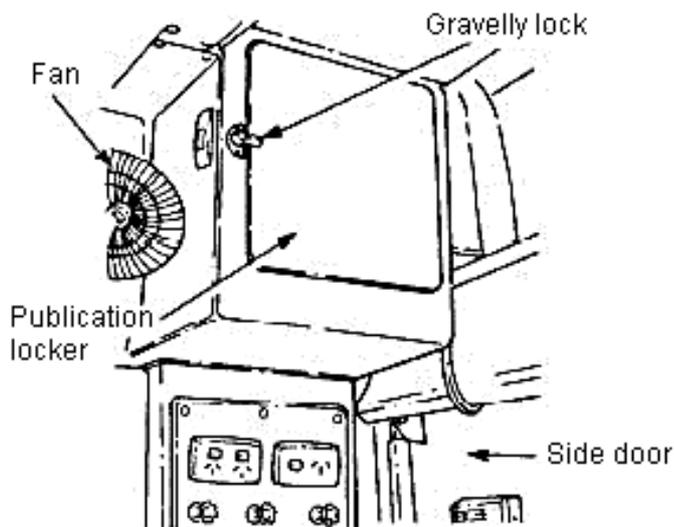


Figure 5 Publication Locker – Right Hand Side

Parts Bin Stowage Frames

25. The parts bin stowage frames (Figure 6) are constructed of angle iron and mild steel plate, which is pressed into various shapes for added strength. The components, with the exception of the two front angle-iron uprights, are welded together to form a frame. The two front uprights are each secured to the frame by three hinges that are welded to the uprights and bracing at the sides of the frame. The hinges allow the front angles to swing outward, permitting bin packs to be stowed in the frame. The angles can be closed to secure bin packs in place. The front uprights are held in the closed position by means of a mild steel rod which extends from a pivot hole on the left-hand front upright to a lug on the right-hand front upright. The stowage frames can be installed on either the right-hand or left-hand platforms, depending on the side bench configuration, and are secured to the guide rails by retaining plates.

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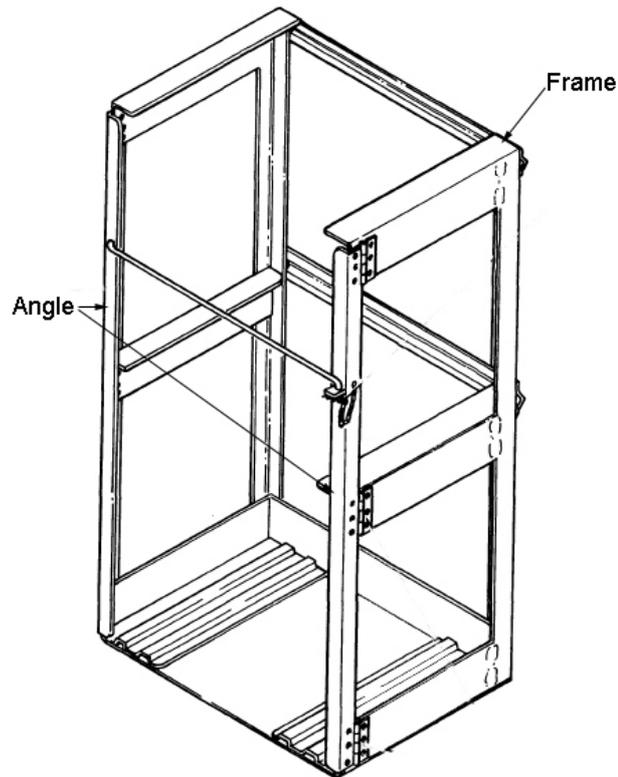


Figure 6 Parts Bin Storage Frame

Stowage Basket

26. The stowage basket, as shown in Figure 7, consists of a square tube steel frame welded to form three open compartments and a lifting bracket. The basket provides stowage for the oxyacetylene welding equipment. Brackets are welded to the frame to locate and secure the oxygen and acetylene bottles in position within the basket.

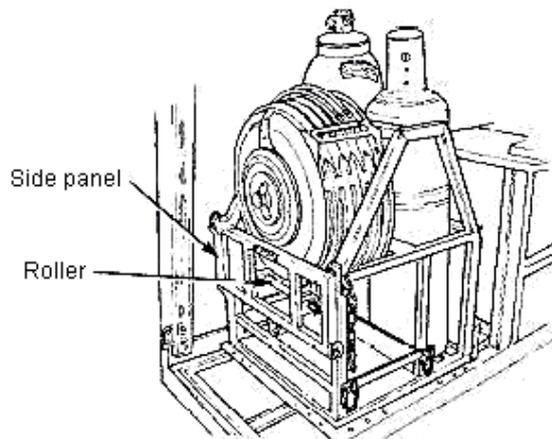


Figure 7 Stowage Basket

27. The oxygen and acetylene hoses are stored on a hose reel that is fitted to the basket. The side panel adjacent to the hose reel is pivoted at the bottom and secured at the top by a fixed pin and a removable R-clip. A roller assembly fitted to the inside of the drop-down side panel serves to protect the hoses from kinks or damage and to guide the hoses on and off the reel. The basket is normally located on the left-hand side platform and secured to the platform's Unistrut tracks by means of retaining plates.

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Vents

28. Two air inlet vents are installed in the roof of the module, above the front work bench. The vents are a flap type, which are opened manually by opening the filter screens in the module ceiling and reaching through to push the hinged flaps up. The filter screens are hinged to the ceiling and secured in the closed position by Grevally type locks.

29. Two exhaust vents are located on the roof toward the rear of the module, with the air outlets facing rearward. Air flow through the exhaust vents is controlled by rotating the shutters, located on the ceiling below the exhaust vents (Figure 8).

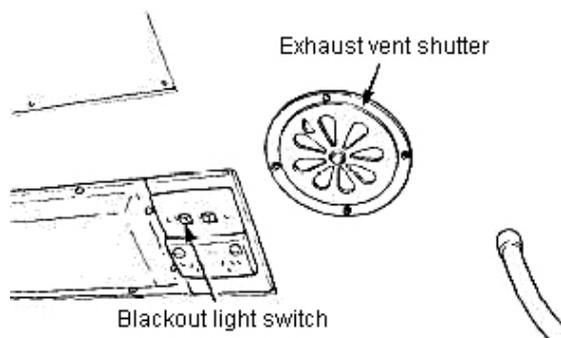


Figure 8 Exhaust Vent Shutter

ELECTRICAL SYSTEM

Power Sources

30. Although the vehicle cab and chassis utilises a 12-volt electrical system for engine starting and vehicle lighting, the maintenance module (apart from the high-level lights on the rear door) is equipped with 24 and 240-volt electrical systems. The 24 V supply is provided from batteries. They are charged by means of an alternator driven by the engine or when external power is connected to the module via the module's integral battery charger. The 240 V system supply is sourced from either a generator unit or a 240 V mains supply.

Alternator

31. A Bosch 28 V – 55 A alternator is used to maintain the batteries for the 24 V system at the correct level of charge when an external power source is not connected. The alternator is mounted on the left-hand side of the vehicle engine, below the 12 V alternator, and driven by the engine via a single Vee-belt.

32. The alternator comprises front and rear covers, a stator, a rotor, slip rings, a diode rectifier and a transistor regulator and brush assembly. The stator is composed of three windings that are wound on the inside of a laminated core. The field coil is wound onto the rotor that rotates within the stator (Figure 9) with each end of the field core winding connected to a slip ring. The stator windings are connected, via the diode rectifier, to the alternator output terminal.

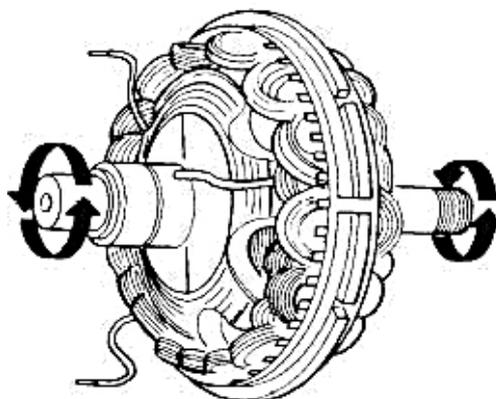


Figure 9 Rotor and Stator Assembly

33. When the ignition is turned ON (Figure 10), battery voltage is applied, via the ignition switch, charge indicator lamp, terminal D+, carbon brush and the inner slip ring. The other end of the rotor winding is connected via a

transistor and terminal DF to earth. The current flow through the rotor winding (field coil) creates a magnetic field around the rotor. However, a current is not generated while the rotor is stationary. When the engine is started and both the rotor and magnetic field are rotated (by the Vee-belt), magnetic flux cuts across the stationary stator windings, causing alternating current to flow in the stator windings and from there to the diode rectifiers. Because the current can only flow in one direction through the diodes, the alternating current, which flows back and forth, now flows in one direction only and becomes a direct current (DC) which is used to charge the batteries as well as provide the current for the module's 24 V electrical system.

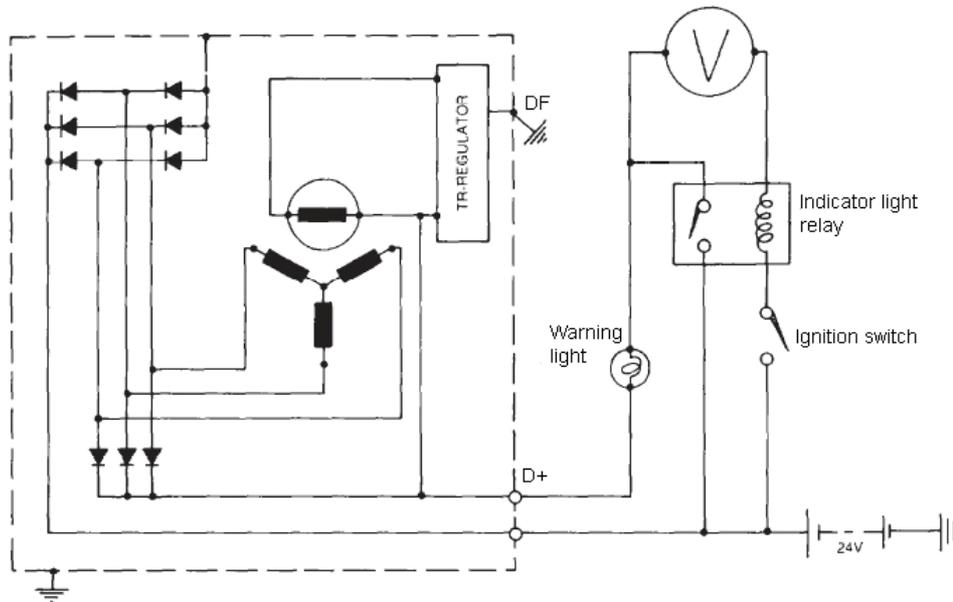


Figure 10 Rotor and Magnetic Field

Electrical Wiring

34. The maintenance module is equipped with a combination of a wiring harness and individual electrical wiring. A 12-volt harness is provided to the high level stop/tail, turn indicator and reversing lights. Individual wiring provides power to the 12 and 24 V output terminals, the work lights, internal blackout lights and fan as detailed in EMEI Vehicle G 243. A multi-wire 240 V 16 A circuit carries power to the fan assisted heater and the power outlet sockets.

35. The wiring is housed within flexible conduit which is installed behind the interior panelling of the module. Removable panels provide access to the wiring for maintenance purposes.

36. A 24 V voltmeter is incorporated in the vehicle's dashboard and the module circuit breaker panel, to indicate the state of charge of the module's batteries and the charge rate of the 24 V alternator, when the engine is running.

Transformer

37. A 240 V to 24 V step-down transformer is incorporated in the module to enable the module's 24 V system to operate off 240 V and 415 V mains supply; thus allowing the module's 24 V auxiliary system to be saved for emergency use.

Battery Charger

38. An ARLEC battery charger (Model PS 924) is hard wired into the module (Ref EMEI Vehicle G 244). The PS 924 is a three voltage charger using an integral multi-tapped transformer. The battery charger is protected by electronic and thermal circuit breakers. The electronic cut-out circuitry is permanently connected to the 12 V tap. An override switch disables the circuit breaker to enable initial charging of severely discharged batteries. When the external 240 V power supply is connected to the module the battery charger maintains the charge of the module batteries.

Power Inlet Sockets

39. Three power inlet sockets are located in the right hand rear corner of the module, behind a lockable flap. These sockets (Figure 11) accept 240 V single phase and 415 V three phase power from mains or field generators. The

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front 240 V socket connects power to the module heater and the general purpose outlet whilst the rear one connects power to the battery charger. When a 415 V external power source is connected to the 415 V power socket, power is supplied to all 240-volt fittings in the module. An earth spike connection is also provided.

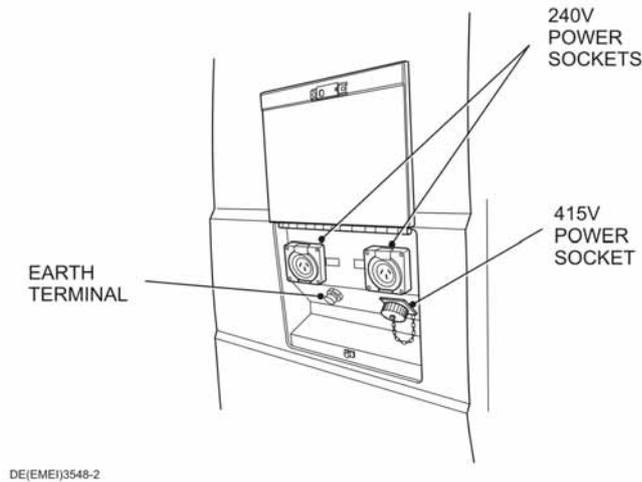


Figure 11 Power Inlet Sockets

Batteries

40. Two 12 V - 93 Ah batteries are installed in a battery box located on the left-hand side of the vehicle chassis behind the cab. The batteries are connected in series to provide the 24 V auxiliary power, when a generator or mains supply is not readily available.

Power Outlet Sockets

41. Single (15 A) and double (10 A) switched power sockets are provided in the module for the use of power tools and welding equipment. One of each type of socket is located on either side of the front wall of the module, above the work bench, and a double switched (10 A) power socket is located on the ceiling at the right-hand rear of the module. A power socket is also provided for the battery charger. The socket is located on the inner front wall of the module underneath the work bench.

Circuit Breaker and Power Selection Panel

42. A circuit breaker and power selection panel is located on the inside front wall of the module on the left-hand side (Figure 12) to provide protection for the module's 24 V and 240 V electrical circuits.

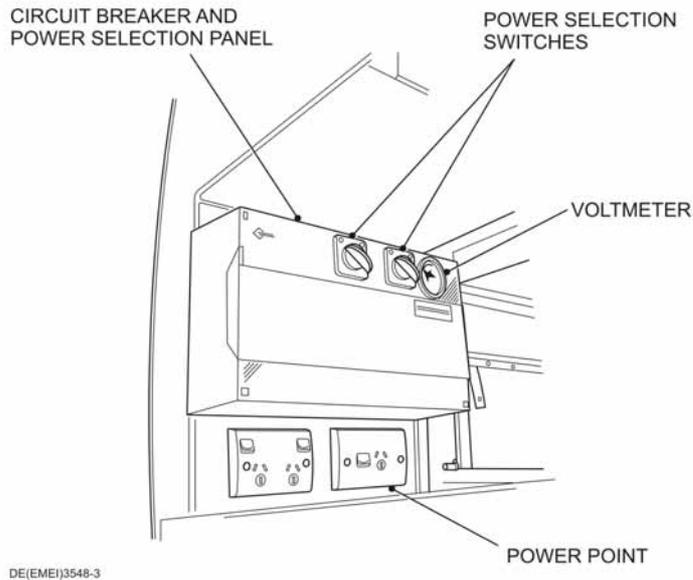


Figure 12 Circuit Breaker and Power Selection Panel

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Lighting and Switches

43. The interior of the module is equipped with four, double tube, 24 V fluorescent lights. The lights are individually switched and flush mounted in the ceiling and positioned above the side platforms of the module. Double light switches positioned on either side of the module, between the two light fittings, provides individual switches for the lights. Each of the four light units is covered by a diffuser which is secured to the light fitting by ten screws. The diffusers not only spread the light evenly throughout the module, but also serve to protect the fluorescent tubes from damage.

Work Station Lighting

44. Six fluorescent lights are incorporated in the module, with two fitted to each side door, one on the rear door and one positioned above the front bench. The lights operate on the 24 V system and each light is individually switched by means of a switch located in the base of each light unit.

Blackout Lighting

45. Two incandescent red lights are installed on the ceiling of the module, with one light mounted centrally on each side. A ceiling mounted switch (Figure 8), located at the right-hand rear of the module, controls the blackout lights. When the blackout lights are switched ON, current flow to the fluorescent and the work station lights is cut, ensuring that none of the module's white lights are operating in the blackout mode.

High Level Lights

46. Mounted toward the top on the exterior of the rear door are six high level lights, which are arranged in two groups of three (Figure 13). Power for the lights is derived from the vehicle's 12 V system. The lights operate in conjunction with the vehicle's stop/tail, turn indicator and reversing lights.

47. The light units are 108 mm (4.25 in.) in diameter and utilize festoon type 18 Watt globes. A separate 5 Watt festoon type globe is incorporated in the stop/tail light assemblies for light illumination. The reversing lights are fitted with a clear lens, the stop/tail lights with a red lens, and the turn indicator lights with an amber lens.

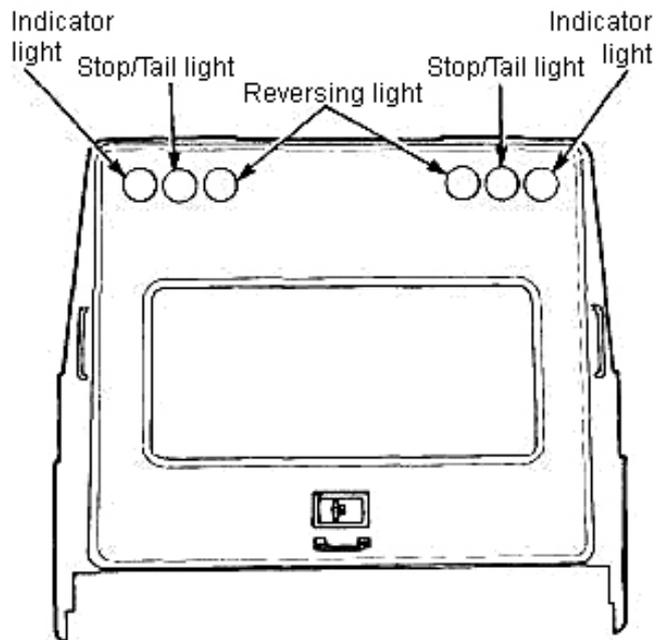


Figure 13 High Level Lights Location

48. The globe wattage, voltage and quantity for internal, external and military lighting are listed in Table 2.

Table 2 Globe Wattage

Serial	Light	Qty	Wattage	Volts
1	High level stop lights	2	18	12
2	High level tail lights	2	5	12
3	High level turn indicator lights	2	18	12
4	High level reverse lights	2	18	12
5	Fluorescent light tubes	8	18	24
6	Work lights (including side door lights)	6	18	24
7	Module blackout lights	2	18	24

Battery Isolation Switch

49. A key operated isolation switch is mounted on the left-hand mudguard in the engine compartment. The switch is incorporated into both the 24 V and 12 V electrical circuits. When operated the switch isolates the charging and starting circuits enabling electrical welding tasks to be carried out at the module work stations.

HEATING AND VENTILATION

Fan Assisted Heater

50. The fan assisted heater is a 240-volt tangential type, which is mounted on a bracket assembly located on the front left-hand side of the foot well (Figure 14).

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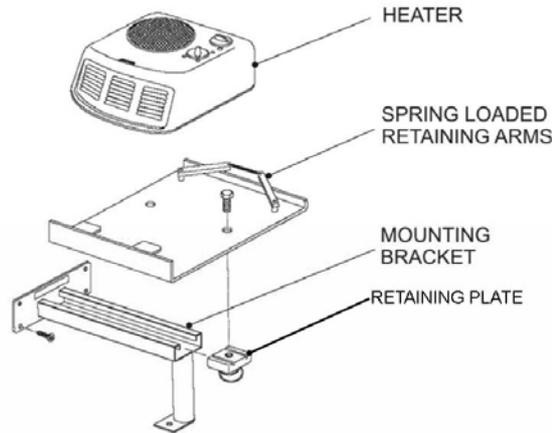


Figure 14 Fan Heater

51. The heater uses electric coil type elements that generate heat in accordance with the current flow through the element. A rotary type control knob located on the top surface of the heater provides either a 1000 W or 2000 W setting which controls the current flow through the heating element. The greater the current flow, the higher the temperature of the elements. The heat generated by the element is distributed throughout the module by a two-speed fan incorporated in the heater assembly. Air continues to circulate through the heater until the heater and fan are turned OFF.

Fan

52. A 24 V fan (Figure 5) is installed in the module above the front work bench. The fan is a single speed, three blade type with the fan blades housed within a wire grille. The rocker type ON/OFF switch is mounted on the wall of the publication locker adjacent to the fan.

END

Distribution List: **VEH G 20.3 – Code 1** (Maint Level)
(Sponsor: LV SPO, Lt B Vehicles)
(Authority: TRAMM)