TECHNICAL MANUAL

USER HANDBOOK

Truck, Light, Target Sensor Vehicle, MC2 - Land Rover 6x6

2320-66-156-2528
SIGC: 2320-0110

Publication Sponsor: LVSPSO
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Authorised for use in the
Australian Defence Force by (B. Jones)
Director, Land Vehicle Systems DAAR
Program Office LVSP0
SYNOPSIS

The Target Sensor Vehicle, Light, FFR, Winch is a six wheeled Army vehicle designed specifically for military use. The vehicle is based on the land Rover 110 Series commercial vehicle, but with an extended chassis and an additional axle. The truck is a constant four wheel drive, with selective drive for negotiating difficult terrain. Vehicle slinging, tie-down and recovery points are incorporated in the chassis. The cargo area features a flat floor and the necessary storage compartments required for the Fire Unit vehicle to carry out the requirements of the RBS 70 missile system.

The vehicle has a range of approximately 600 km on first class roads, and 480 km on second class roads. Cross country ranges vary depending on terrain. The rated gross vehicle mass (GVM) and gross combined mass (GCM) for both highway and cross country conditions is 5.6 tonne and 7.1 tonne respectively. The laden vehicle has the capability to tow a single axle trailer with a gross weight of 1.5 tonne.
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NOTES TO READER

1. This manual is for all users of the Truck, Light, Target Sensor Vehicle, MC2 - Land Rover 6x6. It contains the equipment related information required to:
   a. operate;
   b. store;
   c. transport;
   d. service;
   e. conduct basic fault-finding; and
   f. manage warranty issues.

WARNINGS, CAUTIONS AND NOTES

2. 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.

**WARNING**

A warning precedes an operating procedure or maintenance practice, which if not correctly followed, could result in personal injury or loss of life.

**CAUTION**

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.

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

ASSOCIATED PUBLICATIONS

4. Electrical and Mechanical Engineering Instructions (EMEI):
   a. EMEI Vehicle A 291-5 - General Service B Trucks Tyre Guide;
   b. EMEI Vehicle G299-7 - Radio Installation - Miscellaneous Instruction;
   c. EMEI Vehicle G 400 – Data Summary;
   d. EMEI Vehicle G 402 – Technical Description ;
   e. EMEI Vehicle G 4083 – Light Repair;
   f. EMEI Vehicle G 404-1 – Medium Repair;
   g. EMEI Vehicle G 404-2 – Heavy Repair;
   h. EMEI Vehicle G 409 – Servicing Instruction;
   i. EMEI Workshop E 410 - Asbestos

5. Complete Equipment Schedules (CES):
   a. 10863 - RBS 70 TSV.

6. Repair Parts Scales (RPS):
   a. 02263-01-01 - RBS 70 TSV.

7. Integrated Logistic Support Instructions (ILSI):
   a. ALI MM 10-29 - Land Rover 110 4x4 and 6x6 (All variants).
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### DATA SUMMARY

**NOTE**

Throughout this manual all references to left hand (LH) and right hand (RH) are as viewed from the rear of the vehicle looking forward.

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<tr>
<td>Manufacturer</td>
<td>Isuzu</td>
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<tr>
<td>Type</td>
<td>4BD1 TRB-G series, line, overhead valve four cycle direct injection diesel engine</td>
</tr>
<tr>
<td>Displacement</td>
<td>3,856 litres</td>
</tr>
<tr>
<td>Bore</td>
<td>102 mm</td>
</tr>
<tr>
<td>Stroke</td>
<td>118 mm</td>
</tr>
<tr>
<td>Compression ratio</td>
<td>17:1</td>
</tr>
<tr>
<td>Firing order</td>
<td>1 - 3 - 4 - 2</td>
</tr>
<tr>
<td>Power</td>
<td>90 kW @ 3000 rpm</td>
</tr>
<tr>
<td>Maximum torque</td>
<td>314 Nm @ 2200 rpm</td>
</tr>
<tr>
<td>No load maximum</td>
<td>3600 ± 100 rpm</td>
</tr>
<tr>
<td>Engine idle speed</td>
<td>650 ± 20 rpm</td>
</tr>
<tr>
<td>Oil capacity</td>
<td>8.5 litres including filters</td>
</tr>
<tr>
<td>Oil filters</td>
<td>External, full flow, spin on</td>
</tr>
<tr>
<td>Oil pressure</td>
<td>390-581 kPa @ 2400 rpm</td>
</tr>
<tr>
<td>Oil cooler</td>
<td>Water cooled, plate and tube type</td>
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Engine dry weight
   With 24 volt alternator  350 kg
   Without 24 volt alternator  322.5 kg

Turbocharger
   Water cooled, Garret, model ATD-T25

2. **Cooling system**

   Type
   Pressurised spill return system with thermostat control, pump and fan assisted

   Capacity
   12.8 litres

   Thermostat
   Downward opening wax element type incorporating a by-pass shut off valve. Opening temperature 82°C

   Coolant
   Water with 12% Nalcool Maximum inhibitor

3. **Engine accessory drive**

   12 Volt System

   Type
   Single Vee-belt

   Tension
   Approximately 10-15 mm deflection, midway along the longest span using moderate thumb force

   24 volt system

   Type
   Single Vee-belt

   Tension
   Approximately 10-15 mm deflection, midway along the longest span using moderate thumb force

4. **Fuel system**

   Fuel pump
   Diesel Kiki (Bosch) in-line Type A model 550k with automatic timer

   Governor
   RLD-K mechanical
Transfer pump
- KE mechanical with gauze intake filter

Injectors
- Four-hole spray type

Main filter
- Inlet manifold mounted, spin-in type

Sedimenters
- Two chassis mounted CAV SS type sedimenters are connected in parallel

Fuel tanks
- Two, 62 litre tanks connected in parallel and independent of each other, tank selection by dash mounted switch

5. Engine starter
- Manufacturer: Mitsubishi
- Type: Waterproof, gear reduction (electric powered)

6. Clutch
- Manufacturer: Repco/Isuzu
- Type: Hydraulically operated single dry plate and diaphragm spring
- Free travel (pedal): 6 mm minimum

7. Transmission
- Manufacturer: Land Rover
- Type: Model LT95A, four forward, one reverse, synchromesh on all forward gears. Incorporates an integral transfer case
- Ratios:
  - First Gear: 4.069:1
  - Second Gear: 2.448:1
  - Third Gear: 1.505:1
  - Fourth Gear: 1.000:1
  - Reverse Gear: 3.664:1
8. Transfer case  
Manufacturer: Land Rover  
Type: High and low gear ratios operating on the main transmission output. The front and intermediate axles are permanently engaged via a differential in the transfer case. The rear axle is automatically engaged when the transfer case differential is locked for traversing difficult terrain.  
Ratio  
High range: 0.996:1  
Low range: 3.321:1  

9. Power take-off (PTO)  
Manufacturer: Land Rover  
Type: Variable speed, chain drive, integral with the transfer case, and incorporates a torque limiter  

10. Winch  
Manufacturer: Winch Industries  
Type: Thomas T9000M  
Ratio: 45:1  

Maximum cable pull  
First layer on drum: 4077 kg  
Second layer on drum: 3488 kg  
Third layer on drum: 3048 kg  
Fourth layer on drum: 2707 kg  
Fifth layer on drum (partial): 2434 kg  

Winch rope  
Type: Right hand ordinary lay with an independent wire rope core  
Diameter: 11 mm  
Length: 45 metres  
Minimum breaking force: 76.3 kN
11. Front axle

Manufacturer: Land Rover

Type: Fully floating spiral bevel steerable drive axle with enclosed outboard constant velocity joints and four pinion differential

Ratio: 4.7:1

Track: 1698 mm

Design load rating: 1900 kg

12. Rear axle

Manufacturer: GKN

Type: Salisbury fully floating hypoid bevel drive, four pinion differential

Ratio: 4.7:1

Track: 1698 mm

Design load rating: 2050 kg

13. Propeller shafts

Type - Front: An open shaft, incorporating a Hookes type universal joint at either end. Variations in the length of the shaft is achieved by employing a splined sliding joint between the two universal joints

Type - Intermediate: An open shaft, Incorporating a Hookes type universal joint at either end. Variations in the length of the shaft is achieved by employing a splined sliding joint between the two universal joints

Type - Rear: A two piece open shaft incorporating a Hookes type universal joint at
either end. The centre section of the shaft is mounted via the a bearing to the chassis frame and the articulation of the rear section of the shaft is achieved through the use of a double Hookes joint, and a splined sliding joint.

14. Front suspension

Type

Radius arms with Panhard rod located live axle with vertically mounted double acting telescopic shock absorbers mounted inside single rate coil springs

Design load rating

1900 kg

15. Rear suspension

Type

Consists of two live axles located by four semi-elliptic springs. These springs are so mounted that the ends between the axles overlap each other and are articulated by a load sharing rocker beam connected to the chassis. Axle bump and rebound travel is controlled by chassis mounted pads and cables. Suspension dampening is by four hydraulic shock absorbers

Design load rating

4100 kg

16. Steering

Manufacturer

Adwest

Type

Power assisted variable ratio worm and roller type utilizing a gear driven pump, mounted on the engine and a remote hydraulic reservoir
Turning circle
   Between kerbs  16.8 metres (nominal)
   Between walls  17.2 metres (nominal)

17. Brakes
Type
   Hydraulic split system with front and rear disc brakes, foot pedal actuated
Parking brake
   Cable operated, transmission mounted drum brake
Warning devices
   Dash mounted globes indicating front brake pad lining depth (actuated at 3 mm thickness) a failed hydraulic circuit, and parking brake applied

18. Chassis
Type
   Hot dipped galvanized welded box section steel with welded box section
Wheelbase
   Front to intermediate axle  3040 mm
   Front to rear axle  3940 mm

19. Wheels and tyres
Rim type and size
   Ventilated disc, 6F x 16
Tyre size
   7.50-R-16LT 10 ply Olympic Steeltrek with 105 pattern
Tyre pressure (cold)
   Highway:
      front 350 kPa (50 psi)
      intermediate 300 kPa (44 psi)
      rear 300 kPa (44 psi)
   Cross-country:
      front 275 kPa (40 psi)
      intermediate 200 kPa (29 psi)
      rear 200 kPa (29 psi)
Sand:
- front 225 kPa (33 psi)
- intermediate 150 kPa (22 psi)
- rear 150 kPa (22 psi)

20. Electrical system

Type
- The vehicle is fitted with both 12 volt and 24 volt electrical systems

12 volt system
- 12 volt negative earth

Battery
- 12 volt cold cranking performance of approximately 410 amps, located in the engine compartment

Alternator
- Hitachi, 12 volt — 70 amp

24 volt system
- 24 volt negative earth

Batteries
- Two 12 volt, 93 ah deep cycle batteries located in a box on the left hand side of the chassis

Alternator
- EDE designed 24 volt 100 amp

Battery Guard 2000
- Provides battery discharge safety device

21. Lighting, external

Location, quantity and wattage

Headlights, high/low
- Front of vehicle, 2 off, 60/55 watt Halogen

Park lights
- Front of vehicle, 2 off, 5 watt

Stop and tail lights
- Rear of vehicle, 2 off, 21/6 watt

Turn indicator lights
- Each corner of vehicle, 4 off, 21 watt

Side indicating lights
- Front mudguards, 2 off, 4 watt

Reverse lights
- Rear of vehicle, 2 off, 10 watt

22. Lighting, internal

Location, quantity and wattage

Dome light
- Roof of cab, 1 off, 21 watt
TSV Module Storage System Lights
Module canopy, 18 off (9 white, 9 blue, 12 volt, 0.4 watt

Map light
Left hand side of instrument panel, 1 off, 5 watt halogen

Instrument lights - except
Speedo
Instrument panel, 3 off, 2 watt

Speedometer light
Instrument panel, 2 off, 3 watt

Warning lights - except
Low fuel
Instrument panel, 10 off, 1.2 watt

Low fuel light
Instrument panel, 1 off, 3 watt

Hazard switch warning light
Dashboard, 1 off, 0.6 watt

Ammeter
Dashboard, 1 off, 2 watt

Hourmeter
Dashboard, 1 off, 2 watt

23. Lighting, military

Location, quantity and wattage
Front and rear of vehicle, 4 off, replaceable module
Rear of vehicle, 1 off, 2 watt
Front of vehicle, 2 off, 18 watt
Couplings are provided at the rear of the vehicle to accept NATO and civilian trailer connections

24. Fuses

Located inside the cab, centre console, behind protective panel

Headlights 4 off, 8 amp
Park lights 10 amp
Horn, dome light 10 amp
Hazard lights 10 amps
Reverse lights
Windscreen wiper, washer 12 amp
Fan 10 amp
Spare 8 amp
Stop lights, instruments, turn indicators 10 amp
Blackout lights 8 amp
Reduced headlights 8 amp
Located under bonnet, near brake master cylinder/booster
Stop/start control motor 10 amp
Located in the distribution box
Outlet circuit breaker 100amp
Auxiliary 2 amp
External generator in 150 amp
External battery in 150 amp
Vehicle batteries (FFR) 150 amp

25. Performance
Gradeability (Cross-country laden) both directions 60 per cent gradient (31 degree slope)
Range of operation 600 km (first class roads) approx.
480 km (second class roads) approx.
Fuel consumption 22 litres per 100 km (highway laden)
27 litres per 100 km (second class laden) fuel tank capacity 62 litres

26. Troop carrying capacity
Fully kitted
RBS 70 configuration 2 (Including driver)
27. **Tray body load area**

Width
- Floor level 2080 mm
- Between seats 1055 mm

Length
- Floor level 3180 mm

28. **Dimensions**

Overall length 6001 mm
Wheelbase 3040 mm

Overall width
- Over mirrors 2430 mm
- Reduced 2072 mm

Overall height
- Laden 2480 mm

Canopy (Fitted)
- Unladen 2550 mm

Cut down height
- Laden 2050 mm
- Unladen 2080 mm

Track
- Front 1698 mm
- Rear 1698 mm

Cargo tray
- Length 3192 mm
- Width 2128 mm

Height of cargo tray from ground
- Laden 1019 mm
- Unladen 1109 mm

Rear axle to rear of vehicle overhang 1234 mm

Towing pintle height
- Laden 640 mm
- Unladen 710 mm
Mass (Unladen)
  Front axle  1660 kg
  Intermediate axle  1100 kg
  Rear axle  1000 kg
  Total axle  3940 kg

29. Capacities

<table>
<thead>
<tr>
<th>Equipment</th>
<th>DEF(AUST)</th>
<th>METRIC (litres)</th>
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<tbody>
<tr>
<td>Engine system (including filters)</td>
<td>OMD-115</td>
<td>8.5</td>
</tr>
<tr>
<td>Cooling system (including inhibitor)</td>
<td></td>
<td>12.8</td>
</tr>
<tr>
<td>Transmission</td>
<td>OMD-115</td>
<td>2.7</td>
</tr>
<tr>
<td>Transfer case (without PTO)</td>
<td>OMD-115</td>
<td>3.2</td>
</tr>
<tr>
<td>Transfer case (with PTO)</td>
<td>OMD-115</td>
<td>5.9</td>
</tr>
<tr>
<td>Front axle</td>
<td>OEP-220</td>
<td>1.7</td>
</tr>
<tr>
<td>Intermediate axle</td>
<td>OEP-220</td>
<td>2.3</td>
</tr>
<tr>
<td>Rear axle</td>
<td>OEP-220</td>
<td>2.6</td>
</tr>
<tr>
<td>Winch</td>
<td>OEP-220</td>
<td>2.1</td>
</tr>
<tr>
<td>Swivel pin housing (each)</td>
<td>MolyTex Grease EP00 - Sachet</td>
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<tr>
<td>Steering box (including reservoir)</td>
<td>OX 46</td>
<td>1.25</td>
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<tr>
<td>Fuel tank -</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Right hand</td>
<td>62</td>
<td></td>
</tr>
<tr>
<td>Left hand</td>
<td>62</td>
<td></td>
</tr>
</tbody>
</table>

NOTE

See EMEI VEH G 209 for list of approved lubricants.

30. Fording Depth

Unprepared vehicle  500 mm

Limiting features
  (over 500 mm)  Cooling fan
Prepared vehicle No facility available, as for unprepared vehicle

31. Bridge classification

Sole unladen 6

32. Ground clearance

Unladen 215 mm
Limiting feature Rear differential housing

33. Transportability

Railway loading gauges (Local authorities must be consulted)

<table>
<thead>
<tr>
<th>Rail Authority</th>
<th>Gauge</th>
<th>Maximum Rolling Stock height</th>
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<tbody>
<tr>
<td>Commonwealth</td>
<td>1435 mm</td>
<td>2532 mm</td>
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<tr>
<td>Commonwealth</td>
<td>1067 mm</td>
<td>2532 mm</td>
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<tr>
<td>New South Wales</td>
<td>1435 mm</td>
<td>2182 mm</td>
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<tr>
<td>Queensland</td>
<td>1067 mm</td>
<td>1806 mm</td>
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<tr>
<td>South Australia</td>
<td>1600 mm</td>
<td>2075 mm</td>
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<td>South Australia</td>
<td>1435 mm</td>
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<tr>
<td>South Australia</td>
<td>1067 mm</td>
<td>1761 mm</td>
</tr>
<tr>
<td>Tasmania</td>
<td>1067 mm</td>
<td>1992 mm</td>
</tr>
<tr>
<td>Victoria</td>
<td>1600 mm</td>
<td>2182 mm</td>
</tr>
<tr>
<td>Victoria</td>
<td>1435 mm</td>
<td>2182 mm</td>
</tr>
<tr>
<td>Western Australia</td>
<td>1435 mm</td>
<td>2532 mm</td>
</tr>
<tr>
<td>Western Australia</td>
<td>1067 mm</td>
<td>1973 mm</td>
</tr>
</tbody>
</table>
34. Slinging and Tie-down points are illustrated in Fig. 1-1.

![Figure 1-1 Slinging and Tie-down Points](image)

35. Approach and departure angles.

<table>
<thead>
<tr>
<th></th>
<th>Unladen</th>
<th>laden</th>
</tr>
</thead>
<tbody>
<tr>
<td>Approach angle</td>
<td>45 degrees</td>
<td>41 degrees</td>
</tr>
<tr>
<td>Limiting feature</td>
<td>Tie-down points</td>
<td></td>
</tr>
<tr>
<td>Departure angle</td>
<td>33 degrees</td>
<td>30 degrees</td>
</tr>
<tr>
<td>Limiting feature</td>
<td>Bottom edge of tow hook frame</td>
<td></td>
</tr>
<tr>
<td>Ramp breakover angle</td>
<td>148 degrees</td>
<td>152 degrees</td>
</tr>
<tr>
<td>Limiting feature</td>
<td>Chassis rail</td>
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</tr>
</tbody>
</table>
SECTION 1
CHAPTER 2
EQUIPMENT DESCRIPTION

Introduction

1. The truck, target sensor, light, FFR, winch, MC2 has been designed specifically for military use to transport the RBS70 Radar and computer equipment plus associated support equipment. Specifically, the equipment includes the Receive/Transmit Assembly, Pedestal and Side Lobe Canceller Antennas, IFF, TacR Computer and Target Sensor Radar Antenna.

2. This User Manual has been developed for the Target Sensor Vehicle (TSV) for the RBS70 system. This User Manual does not provide information for the Fire Unit Vehicle (FUV) part of the RBS70 system.

Operational and Logistical Concept

3. This vehicle provides the general wheeled support in an air defence role as a fire unit vehicle for first line tasks. The purpose of the TSV is to be a specialised, comfortable, self-contained, rapid deployment vehicle to provide Ground Based Air Defence capability to ADF units.

Engine

4. The vehicle is fitted with an Isuzu 3.9 litre 4BDITRB-G turbocharged, four cylinder diesel engine which produces 90 kW of power at 3000 rpm and 314 Nm of torque at 2200 rpm.

Transmission

5. The transmission is a heavy duty four-speed all-synchromesh transmission with an integral two-speed transfer case. Clutch and gear operations are manual and are without power assistance.

Transfer Case and Power Take-off (PTO)

6. The transfer case, which is cast as part of the main transmission, provides high and low gear ratios, and four or six wheel drive capabilities. It has an integral differential fitted to prevent wind up in the drive lines during normal on road conditions and which can be locked to provide a positive drive between the front and rear axles. During off road use, the locking of this differential, by operating a dash
mounted switch, automatically engages the vehicle in six wheel drive, it is imperative
that this differential is locked, when crossing difficult terrain, or when conditions
may lead to a loss of traction. A high speed range and a low speed range in the
transfer case can be selected by operating a floor mounted lever. The selection of a
speed range will not influence the four or six wheel drive mode.

7. The parking brake operates a single drum brake which is mounted on the rear
output shaft of the transfer case,

8. The transfer case also incorporates a chain-driven PTO with torque limiter,
which provides the drive for the front mounted winch.

Winch

9. A Thomas T9000M winch is fitted to the front of the vehicle between the
chassis rails and below the grille. Drive for the winch comes from the PTO via the
torque limiter and a two-piece propeller shaft. The winch has a reduction ratio of
45:1 and is fitted with 45 metres of 11 mm diameter wire rope.

10. There are two dog-clutches in the winch drive line, one in the PTO and the
other at the winch. The PTO dog-clutch is cable actuated from within the cab while
the winch dog-clutch, which allows free-spooling of the cable, is lever-operated at
the winch.

Steerable Front Drive Axle

11. The vehicle is fitted with a steerable front drive axle, comprising a differential
carrier assembly and axles, driving through constant velocity joints to steerable drive
ends fitted with hydraulically operated disc brakes.

Front Suspension

12. The front suspension utilizes radius arms, a Panhard rod, vertically mounted
double acting telescopic shock absorbers and single rate coil springs. Bump stops are
provided to limit the upward travel of the suspension, while the shock absorbers limit
the downward travel of the axle.

Rear axles

13. The rear axles are Salisbury type, fully floating hypoid bevel drive axles with
offset four pinion differentials.
Rear Suspension

14. Dual rate semi-elliptic leaf springs linked via shackles to a rubber bushed load sharing rocker beam. Axle movement is controlled by four long travel telescopic shock absorbers and steel cable rebound straps.

Service Brakes

15. The vehicle is fitted with a dual circuit hydraulic brake system consisting of two completely separate circuits. The primary circuit supplies the rear disc brakes and the secondary circuit supplies the front disc brakes.

16. Brake pad wear indicators are fitted to the front left hand calliper and will actuate a brake circuit warning light on the dashboard when brake pad lining thickness is reduced to approximately 3 mm. In addition, the warning light will illuminate if fluid loss occurs from either the primary or secondary brake circuit.

Parking Brake

17. A single drum brake is mounted on the intermediate axle output shaft of the transfer case. This brake, which is mechanically operated by the parking brake lever in the cab, is completely independent of the foot operated hydraulic brake system.

Instruments, Electrical Accessories and Controls (see Fig. 2-30)

18. Ventilator Control (Fig. 2-30 items 1 and 15). Two ventilators are provided in the windscreen frame, which may be opened independently by pushing the appropriate control lever downward.

19. Normal, Blackout and Reduced Lighting Switch (Fig. 2-30 item 2). This three position switch, located on the fascia panel, controls the vehicle lighting as follows:

a. In the NORMAL or left position, all vehicle lighting operates via the usual controls. Both the white and blue lights in the module operate in this mode.

b. In the BLACKOUT or mid position, all of the NORMAL lighting, with the exception of dash instruments, warning and map reading lights, are switched off. In this mode, the blackout stop lights will function when the brakes are applied, and the blackout marker lights at the front and rear of the vehicle are illuminated. The convoy light also operates in this mode. The three blue lights on the passenger’s side of the module can also be operated.
c. In the REDUCED or right position, the reduced head lights are utilized in addition to the blackout lighting. The dash instrument lights, map reading light and module courtesy lights can also be used. The three blue lights on the passenger’s side of the module can also be operated.

20. Auxiliary Power Socket (Fig. 2-30 item 3). A 2-pin socket is fitted in the dash as a power supply for the vehicle trouble light lead.

21. Panel Light Dimmer Control (Fig. 2-30 item 4). The instrument panel light intensity can be adjusted by the dimmer control, which functions irrespective of which of the three modes of lighting is selected. The switch also has an ON-OFF control.

22. Heater Fan Control Switch (Fig. 2-30 item 5). A three position rocker switch controls the heater fan as follows:

   a. With the switch in the off position the heating and ventilation system is inoperative.

   b. Low speed or high speed fan operation is provided when the switch is moved down to the first or second stop respectively. Air will be forced into the vehicle then ducted and heated as determined by the air distribution and heat control levers. The fan motor will only operate with the engine running or with the ignition on.

23. Air Temperature Control (Fig. 2-30 item 6). The temperature control lever controls the temperature of the air from the heater unit. Moving the lever up in the direction of the blue arrow will cut off the heat; while moving the lever down toward the red arrow will increase the heat (see Fig. 1-4). Action is progressive between the two settings.

24. Air Distribution Control (Fig. 2-30 item 7). The air distribution control lever controls the direction of air flow as follows (see Fig. 2-1):

   a. With the lever in the lower position, all air is directed to the windscreen via the demister vents.

   b. With the lever in the mid position, air is directed to the foot level vents as well as the windscreen.

   c. With the lever in the upper position, the air is directed to the foot level vents although a certain amount of air will continue to pass through the demister vents to the windscreen.
25. **Fuel Switch (Fig. 2-30 item 8).** A two position toggle switch is located on the dash, which when operated determines from which tank fuel will be drawn.

26. **Transfer Case Control Switch (Fig. 2-30 item 9).** The transfer case is fitted with a differential which allows the vehicle to be operated on road without transmission wind-up. The differential is lockable, to provide positive drive to the axles when necessary, and is controlled by a dash mounted two position switch. The switch should be pushed in for on road use and pulled out when traction is difficult, thereby providing positive six wheel drive. When changing vehicle wheels the switch must be pulled out (refer to the warning on page 56).

27. **Hourmeter (Fig. 2-30 item 10).** An hourmeter is fitted to the dashboard console to record the engine running hours, which provides an indication of the charging time for the communications system batteries.

28. **Ammeter (Fig. 2-30 item 11).** An ammeter is fitted to the dashboard console to monitor the charge rate of the communications system batteries.

29. **PTO Warning Light (Fig. 2-30 item 12).** With the PTO control in the engaged position the PTO warning light is illuminated.

30. **Combination Switch (Fig. 2-30 item 13).** The combination switch has six positions and provides control over the headlights, turn indicators and the horn. The combination switch functions are not available during blackout conditions; i.e. switch operates as follows (see Fig. 2-2):
a. With the switch in the central position (A), the headlights will be dipped.

b. With the switch pushed away from the driver (B), the headlights will be on high beam.

c. Pulling the switch toward the driver (C), will flash the headlights. This operation can be achieved at any time, irrespective of other switch positions.

d. Pushing the switch knob inward (D), will operate the horn.

e. With the switch in the upper position (E), the right hand turn indicators will flash.

f. With the switch in the lower position (F), the left hand Indicators will flash.

Figure 2-2   Combination Switch Operation

31. Speedometer and Odometer (Fig. 2-30 item 14). The speedometer indicates the road speed in kilometres per hour and the total distance travelled. A trip meter is incorporated in the speedometer together with its associated reset button.

32. Fuel Gauge (Fig. 2-30 item 16). One fuel gauge services both the left and right hand mounted fuel tanks. The approximate contents of each tank can be assessed by operating a dual purpose dash mounted switch - fuel will only be drawn from the tank indicated.

33. Warning Light Cluster (Fig. 2-30 item 17). The warning lights provide a visual indication that a fault has occurred in one or more of the systems represented by the warning lights.
NOTE

A hinged flap is fitted to provide a blackout mode for the warning light cluster.

a. The oil pressure warning light (Fig. 2-3 item 2) indicates when the oil pressure is insufficient for safe engine operation. The light should illuminate when the ignition is turned on and extinguish once normal engine oil pressure is established. If this light illuminates during normal running, the vehicle should be stopped immediately and the cause determined.

b. The Ignition warning light (Fig. 2-3 item 3) indicates a malfunction in the battery charging circuit. The light should illuminate when the ignition is turned on and extinguish once the engine is running.

c. The brake circuit warning light (Fig. 2-3 item 4) indicates that leakage has occurred from either the front or rear brake circuit. In this case, the light will illuminate when the foot brake is applied. In addition, a brake pad wear indicator is fitted to the front left hand calliper and will actuate the light when the brake pad lining thickness is reduced to approximately 3 mm. Normally, the light will illuminate momentarily when the ignition is turned on to the start position, then extinguish when returned to the on position. If the light illuminates during normal running, the vehicle should be stopped immediately and the cause determined.

d. The turn indicator warning light (Fig. 2-3 item 5) flashes when the turn indicator lights are functioning. Both arrows will flash as the turn indicator is operated by the switch on the steering column. If the light does not flash, there may be a blown globe in the warning light or one of the turn indicators.

e. The high beam warning light (Fig. 2-3 item 6) illuminates when the headlight high beam has been selected. The light also illuminates when the headlight flasher is used.

f. The low fuel warning light (Fig. 2-3 item 7) illuminates when there is approximately nine litres of fuel left in either fuel tank and will remain illuminated until the fuel supply is replenished. When cornering, the light may flash intermittently before the fuel reaches the nine litre level.
g. Both the differential lock warning light (Fig. 2-3 item 8) and the six wheel drive light (Fig. 2-3 item 1) will illuminate when the transfer case differential lock is engaged. Operation of the differential lock is necessary when traction to one or more wheels is likely to be lost.

h. The parking brake warning light (Fig. 2-3 item 12) will illuminate if the parking brake is applied while the ignition is on.

i. The trailer warning light (Fig. 2-3 item 13) provides an indication that the turn indicators on a towed trailer are functioning correctly. The light will flash simultaneously with the vehicle turn indicator warning light when a trailer is connected to the vehicle’s NATO socket. When no trailer is used, the light will flash, momentarily each time the combination switch is moved up or down. In addition, the trailer warning light will flash when the hazard warning switch is activated.

j. The park light warning light (Fig. 2-3 item 15) indicates when the park lights have been switched on.

k. The cold start warning light (Fig. 2-3 item 17) illuminates when the starter switch is in the glow plugs on position.
Figure 2-3  Warning Lights

34.  Coolant Temperature Gauge (Fig. 2-30 item 18). Under normal running conditions, the temperature gauge needle should be within the green band. When operating in high ambient temperatures, with heavy loads or on steep grades at high altitudes, the operating temperature could rise. However, if the needle rises into the red band, the vehicle should be stopped and the cause determined.

35.  Voltmeter (Fig. 2-30 item 19). The voltmeter measures the vehicle system voltage. With the engine running above idle speed, the needle should be within the green band (12.14 volts). A reading above this in the high red band, which continues after approximately ten minutes, is too high and should be investigated. Similarly, a reading in the low red band which continues after approximately ten minutes, with no electrical load switched on, is too low and should also be investigated.
36. **Windscreen Washer and Wiper Switch (Fig. 2-30 item 20).** The windscreen washer and wiper switch is a five position switch, which only operates when the ignition is on. Switch operation is as follows (see Fig. 2-4):

![Figure 2-4 Windscreen Washer and Wiper Control](image)

- **a.** With the switch in the upper position (A), fast wiper action is achieved.
- **b.** With the switch in the second position (B), slow wiper action is achieved.
- **c.** With the switch in the third position (C), the wipers are off.
- **d.** With the switch in the lower position (D), the wipers will operate at the slow speed until the switch is released.
- **e.** Pushing the switch knob inward (E) will activate the windscreen washer, which, will spray water on the windscreen until the knob is released. This can be achieved with the switch on or off.

37. **Cab Dome Light Switch (Fig. 2-30 item 21).** The cab dome light switch is a two position rocker action switch. Pressing the lower section of the switch turns the dome light on and pressing the upper section of the switch turns the dome light off (see Fig. 1-8). The dome light will not function during blackout conditions.

38. **Hazard Warning Switch (Fig. 2-30 item 22).** The hazard warning switch is a two position rocker action switch. By pressing the lower section of the switch, both the left and right hand turn indicators, together with the side repeaters, flash simultaneously. A globe in the switch also illuminates to indicate that the switch is on. In addition, the trailer warning light will flash when the hazard warning switch is activated. Pressing the upper section of the switch turns the hazard warning lights off. The hazard warning lights will not function during blackout conditions.
39. **Battery Guard Reset Switch.** The vehicle is fitted with a battery guard to prevent the battery from being discharged if the TSV Module Storage System LED courtesy lights are inadvertently left on. The battery guard constantly monitors the voltage level on the battery to determine the level of charge. When the voltage drops below 12.0 volts for approximately 4 minutes and the ignition is off, it will automatically disconnect the battery from the vehicle’s electrical system. If the ignition switch is turned on, the system will not disconnect the battery under any circumstances.

![Warning](image)

**WARNING**

The battery guard is a battery charge saving device, used to automatically isolate the battery in the event of a low charge condition while the ignition is in the OFF state. Power from the battery is connected directly to the disconnect solenoid, without any circuit protection. Inadvertent shorts of the battery cable could result in damage and/or injury.

40. To reconnect the battery, the driver needs to press the battery guard reset switch (see Fig. 2-5). The system will then allow the driver 4 minutes to start the vehicle before the battery disconnects again.

![Diagram](image)

**Figure 2-5** Hazard Warning, Cab Dome Light and Battery Guard Reset Switch

41. **Hand Throttle (Fig. 2-30 item 23).** The hand throttle control can be used to override the accelerator pedal to set engine speed. To utilize the hand throttle, first set the engine speed with the accelerator then pull out the hand throttle and turn the control to lock it in position. The accelerator will override the hand throttle setting when increasing the engine speed. However, when the accelerator is released, the
engine will return to the speed set by the hand throttle. To release the hand throttle, turn the knob and push the control fully down to the closed position.

42. **Bonnet Release (Fig. 2-30 item 24).** The bonnet release handle is located to the right of the steering column and by pulling the handle the bonnet catch will release. From the front of the vehicle, lift the safety catch lever and raise the bonnet. Pull the support stay forward to secure the bonnet in the open position. The bonnet safety catch is illustrated in Fig. 2-6.

![Figure 2-6 Bonnet Safety Catch](image)

43. **Accelerator Pedal (Fig. 2-30 item 25).** The accelerator pedal controls the engine speed via the accelerator cable. Depress the pedal to increase engine speed.

44. **Foot Brake Pedal (Fig. 2-30 item 26).** The foot brake pedal controls the application of the service brakes to all six wheels. Depress the pedal progressively to apply increased braking pressure.

45. **Starter Switch (Fig. 2-30 item 27).** The starter switch is a four position switch, providing control over the ignition, glow plugs and starter motor. The switch is turned clockwise to activate the vehicle electrical system.

46. **Main Lighting Switch (Fig. 2-30 item 28).** The main lighting switch is a three position switch, providing control over the lighting as follows (see Fig. 2-7):
Figure 2-7  Main Lighting Switch

a. With the switch pulled toward the driver, all lights will be off.

b. With the switch in the centre position, the park lights will be illuminated.

c. With the switch pushed away from the driver, both the main and park lights will be illuminated.

47. The main lighting switch will not function during blackout conditions.

48. **Clutch Pedal (Fig. 2-30 item 29).** Depress the clutch pedal to disengage the clutch.

49. **Cigar Lighter (Fig. 2-30 item 30).** Push the lighter in to operate. The lighter will automatically return to the normal position when ready for use.

50. **Parking Brake Lever (Fig. 2-30 item 31).** The parking, brake is applied by pulling the lever up. To release the brake, pull the lever slightly up, depress the release button and push the lever down. Application of the parking brake will illuminate a warning light on the instrument panel.

51. **Winch/PTO Control (Fig. 2-30 item 32).** The winch/PTO control is a push-pull cable which provides control over the PTO dog-clutch for winch drive. Lift the control lever to engage the dog-clutch or depress the lever to disengage the dog clutch. With the PTO control in the engaged position the PTO warning light (see Fig. 2-26 item 12) is illuminated,

52. **Gear Lever (Fig. 2-30 item 33).** The gear lever is used to manually change the gear ratios in the transmission. The gear change pattern is illustrated in Fig. 2-8.
53. **Transfer Case Shift Lever (Fig. 2-30 item 34).** The transfer case shift lever provides the manual selection of high or low gear ratios as required. The ratio shift pattern is illustrated in Fig. 2-9.

![Gear Change Pattern](image1)

**Figure 2-8** Gear Change Pattern

**CAUTION**

To prevent damage to high/low range gears, only change the range when the vehicle is stationary. Select the required range and **MAINTAIN EFFORT** on the lever until the vehicle is in motion.

![Transfer Case Shift Pattern](image2)

**Figure 2-9** Transfer Case Shift Pattern

54. **Fuse Box (Fig. 2-30 item 35).** Removing the fuse box cover allows access to the fuses. The location of each fuse is provided by the decals as shown in Fig. 2-10.
55. The stop/start control motor is protected by a 1 amp fuse located under the bonnet to the sides of the brake master cylinder.

56. **Radio Speaker Bracket (Fig. 2-30 item 36).** Mounted on the dash panel is a bracket to allow for the fitting of a remote radio speaker.

57. **Map Reading Light (Fig. 2-30 item 37).** The map reading light switch is located on the end of the light unit. The light can only be utilized when the ignition is on.

58. **TSV Module Storage System Light Switch.** The switch for the TSV Module Storage System LED courtesy lights is located at the left hand side of the entry to the centre walkway at the rear of the vehicle. It is a three position switch: off, blue or white light.

59. **Cabin Seating (Fig. 2-11).** The cabin seating is adjustable as illustrated in Fig. 2-11. The centre seat backrest is used as an observation stand and is held in the lowered position by latches.
Body and Chassis Fittings

60. **Vehicle Body Construction.** The chassis frame is an all welded construction type, consisting of box section, steel runners and cross members. The frame is hot dipped galvanized to prevent the formation of rust. One cross member is detachable to simplify servicing. The cab consists of pressed aluminium and fibreglass panels that form the engine compartment bolted to a galvanized steel frame.

61. The TSV Module Storage System is fabricated from welded, aluminium extrusions with drawers and lockers for stowing all the components of the RBS 70 missile system. The module includes a canopy comprising a hard roof (Fig 2-12) and soft sides made from Barracuda material. The soft sides cover the left and right hand sides and rear of the vehicle. The soft sides on left and right hand sides of the vehicle are both split into two parts. The soft sides are joined with zips and secured to hooks on the base of the module with shock cords.
62. **Rear Window (Fig. 2-13).** A sliding window is fitted to the rear of the cab.

![Figure 2-13  Rear Window](image)

63. **Roof Hatch (Fig. 2-14).** A roof hatch is fitted to the roof panel to provide an observation hatch. On the floor directly under the roof hatch and between the driver’s and passenger’s seats is a pad of a slip resistant material.

![Figure 2-14  Roof Hatch](image)

64. **Rear Side Windows (Fig. 2-15).** Rear side windows are fitted to the cabin to provide ventilation. They may be locked in either the open or closed position by an over-centre catch.
65. **Jerrican Stowage.** Two jerricans can be stowed, in carriers, on the right hand side of the vehicle behind the cab.

66. **Rifle and Machine Gun Clips and Butt Boxes.** There are facilities to mount two rifles and a Minimi Light Support Weapon (LSW) machine gun between the seats in the cabin.
Figure 2-16  Cabin Layout with Rifles, Communications Backpack and Minimi

67. **Communications Radio Stack.** The radio stack is stowed in the rear compartment on the passengers side of the vehicle.

68. **Fire Extinguisher.** A 1.5 kg Dry Chemical Fire Extinguisher is fitted on the rear bulkhead behind the cabin seats.

69. **De-ditching Tools.** The de-ditching tools are mounted in brackets fitted to the bonnet. The tools comprise one axe, one shovel and one pick with handle.

70. **Spare Wheel Stowage.** The spare wheel is stowed under the vehicle behind the rear axle and is secured by a chain. The wheel is lowered from the stowed position by using the wheel brace to operate a winch drive (see Fig. 2-17) situated behind the left hand rear mudguard. The spare wheel is positively locked in the travelling position by a brake in the winch mechanism. When raising the spare
wheel, an additional resistance to movement of the wheel brace indicates the spare is correctly stowed. The spare wheel can be lowered by rotating the wheel brace in a counter clockwise direction.

![Figure 2-17  Spare Wheel Lowering](image)

**Figure 2-17  Spare Wheel Lowering**

71. **Electrical Trailer Connection Sockets.** A 12-pin NATO trailer connection socket is fitted to the rear of the left hand chassis rail. A supplementary, 7-pin, Utilux connection is fitted to the rear of the right hand chassis rail. Although this is wired in a conventional manner, it is not intended for use with trailers.

72. **Towing Pintle.** A removable towing pintle is secured to a towing frame at the rear of the vehicle.

73. **Seat Belts.** Inertia reel lap/sash seat belts are fitted to the outer cabin seats. The centre seat has a lap belt only fitted.

74. **Rear Vision Mirrors.** The external rear vision mirrors are hinged to fold back (inward) when knocked or bumped, thus reducing damage during cross country operations.

75. **Distribution Box (Fig. 2-18).** A power distribution box is fitted behind the passenger seat in the cabin of the vehicle. Connections and controls are as follows:

- **a.** A 100 amp ON/OFF circuit breaker.
- **b.** Two 24 volt outlets.
- **c.** An external battery inlet.
- **d.** An external generator inlet.
- **e.** An auxiliary 24 volt outlet, together with a 2 amp fuse.
f. A voltmeter to monitor battery condition and

g. Three internal 150 amp fuses.

F1 F2 F3

F1 - EXTERNAL GENERATOR IN
F2 - EXTERNAL BATTERY IN
F3 - VEHICLE BATTERIES (FFR)

Figure 2-18  Distribution Box

76. TSV Module Storage System Lights. The TSV Module Storage System is fitted with blue and white LED courtesy lights in nine places on the canopy hard roof: Three each on the left and right hand sides, one centre front, one in the middle and one centre rear. The lights are controlled though the Blackout Selector Switch fitted on the dashboard and the TSV Module Storage System Light Switch fitted at the rear of the module (see Fig. 2-19 and Table 2-1).
Figure 2-19  TSV Lighting Circuit

Table 2-1  TSV Lighting Logic

<table>
<thead>
<tr>
<th>Blackout Selector Switch Position</th>
<th>Module Lighting Switch Position</th>
<th>Blue Lights</th>
<th>White Lights</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td></td>
<td>Pass. Side</td>
<td>Centre</td>
</tr>
<tr>
<td>Up</td>
<td></td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>Centre</td>
<td></td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>Down</td>
<td></td>
<td>ON</td>
<td>ON</td>
</tr>
<tr>
<td>Reduced</td>
<td></td>
<td>Pass. Side</td>
<td>Centre</td>
</tr>
<tr>
<td>Up</td>
<td></td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>Centre</td>
<td></td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>Down</td>
<td></td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>Blackout</td>
<td></td>
<td>Pass. Side</td>
<td>Centre</td>
</tr>
<tr>
<td>Up</td>
<td></td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>Centre</td>
<td></td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>Down</td>
<td></td>
<td>OFF</td>
<td>OFF</td>
</tr>
</tbody>
</table>
77. **Battery Box.** Two batteries are housed in a box forward of the left hand rear mudguard and are accessed through a lift up lid. A label detailing battery replacement procedure (see Fig. 2-20) is affixed to the inside of the lid.

---

**Figure 2-20 Battery Replacement Label**

78. **Antenna Mount.** Fitted to the vehicle right hand front mudguard is an antenna base to accept a VHF vehicle antenna.

79. **Radio Installation.** The cabin is equipped with a radio distribution box located in a vertical position behind the passenger seat. Provision has been provided for mounting a voice-configured radio backpack in the cabin to the rear wall between the Minimi mount and the driver’s side Austeyr mount (see Fig. 2-21). The backpack can be restrained by the two horizontal strap assemblies, made from 25mm webbing and clips.
80. Vehicle Nomenclature Plate (Fig. 2-22). The vehicle manufacturer’s identification number is stamped on a plate that is riveted to the passenger’s seat box. The identification number is also stamped on the right hand side of the chassis, forward of the spring mounting turret.
81. **Servicing Data Plate (Fig. 2-23).** The vehicle servicing data plate is riveted to the passenger’s seat box, adjacent to the vehicle nomenclature plate.

![Servicing Data Plate](image)

**Figure 2-23  Servicing Data and Tyre Pressure Plate**

82. **Shipping Data Plate (Fig. 2-24).** A shipping data plate is riveted to the passenger’s seat base just below the servicing data plate.

![Shipping Data Plate](image)

**Figure 2-24  Shipping Data Plate**

83. **Towing and Dyno Test Data Plate (Fig. 2-25).** The towing and dyno test plate is riveted to the driver’s seat box. See Section 2 Chapter 4 para 16 for propeller shaft removal precautions.
TOWING AND DYNO TEST DATA

FLAT AND LIFT TOWING - DISTANCE UNDER 200 KM
- SET GEARBOX AND TRANSFER CASE IN NEUTRAL.
- SET TRANSFER BOX CONTROL SWITCH IN "ON-ROAD" POSITION.
- ENSURE DIFF LOCK & 6WD WARNING LIGHTS ARE NOT ILLUMINATED.

FOR DISTANCE OVER 200 KM
- REMOVE PROPELLER SHAFTS AND REPEAT ABOVE.

DYNO TEST ON FRONT AXLE
- REMOVE PROPELLER SHAFTS FROM BOTH REAR AXLES.
- SET TRANSFER BOX CONTROL SWITCH IN "CROSS COUNTRY".
- ENSURE DIFF LOCK WARNING LIGHT IS ILLUMINATED.

Figure 2-25  Towing and Dyno Test Data Plate

84. Jacking Plate (Fig. 2-25). A jacking plate is fitted to the stowage area lid as well as to the jack itself.

JACKING PROCEDURE

DUE TO THE FITMENT OF A TRANSMISSION HANDBRAKE TO THIS VEHICLE, THE JACKING PROCEDURE MUST BE FOLLOWED BEFORE JACKING ANY WHEEL CLEAR OF THE GROUND

1. APPLY HANDBRAKE.
2. ENGAGE DIFFERENTIAL LOCK (WARNING LIGHT WILL ILLUMINATE).
3. SELECT FIRST GEAR - LOW RANGE.
4. CHOCK BOTH SIDES OF WHEEL FURTHEST FROM WHEEL BEING RAISED.
5. SLACKEN WHEEL NUTS (5).
6. FRONT WHEELS: POSITION JACK UNDER AXLE CASING IMMEDIATELY BELOW ROAD SPRING BETWEEN END FLANGE AND SUSPENSION BRACKET. REAR WHEELS: POSITION JACK UNDER AXLE CASING IMMEDIATELY BELOW ROAD SPRING NEAR DAMPER.
7. REPLACE WHEEL AND TIGHTEN NUTS.
8. LOWER VEHICLE.
9. TORQUE NUTS: 100-115 Nm (75 - 85 lb ft).
10. DISENGAGE DIFFERENTIAL LOCK BEFORE MOVING OFF.

Figure 2-26  Jacking Procedure Plate
85. **Winch Operation Decal (Fig. 2-27).** A winch operation decal is affixed to the fuse box lid.

![Winch Operating Instructions](image)

**WINCH OPERATING INSTRUCTIONS**

1. **SWITCH ENGINE OFF.**
2. **SET WINCH DOG CLUTCH LEVER VERTICAL (DOG CLUTCH DISENGAGED) AND REEL OUT CABLE.**
3. **ATTACH CABLE TO SELECTED ANCHOR POINT.**
4. **PUSH DOG CLUTCH LEVER OUTBOARD, TURNING WINCH DRUM BY HAND TO ENSURE DOG CLUTCH HAS ENGAGED.**
5. **SET TRANSFER CASE CONTROL LEVER IN ITS NEUTRAL POSITION.**
6. **START ENGINE, DEPRESS CLUTCH PEDAL AND SELECT A LOW FORWARD GEAR.**
7. **LIFT UP WINCH PTO LEVER IN SEATBASE TO ENGAGE WINCH DRIVE. FASCIA WARNING LIGHT WILL INDICATE PTO ENGAGED.**
8. **RELEASE CLUTCH PEDAL TO WIND IN WINCH CABLE.**
9. **DEPRESS CLUTCH PEDAL TO STOP WINCH.**
10. **SELECT NEUTRAL GEAR IN GEARBOX AND PUSH DOWN PTO CONTROL TO DISENGAGE WINCH.**
11. **DRIVE VEHICLE FORWARD TO SLACKEN CABLE.**
12. **DISENGAGE WINCH DOG CLUTCH BY SETTING DOG CLUTCH LEVER VERTICALLY.**

**Figure 2-27  Winch Operation Decal**

86. **Centre of Gravity (C of G) Designation Plate.** A “C of G” plate designating the longitudinal point of balance of the unladen vehicle is fitted to the left hand sill panel. See Section 1, Chapter 1, Fig. 1-1 for C of G dimensions.

87. **CAPO label (Fig. 2-28).** A CAPO label describing the module mounted on the vehicle can be found on the headboard of the module.

![CAPO Label](image)

**Figure 2-28  CAPO Label**

88. **Working Load Limit Plates (Fig. 2-29).** Working Load Limit (WLL) plates are mounted with all tie down fittings. The plate provides information on the WLL for each tie down fitting. The tie down fittings on the canopy has the information painted alongside each tie down fitting.
89. **Unit/Formation Signs.** Four unit/formation sign holders are fitted to the vehicle. Two are riveted just below the headlights and the other two are riveted to brackets on the rear cross member.

90. **Bridge Classification Sign.** Due to the size and weight of this vehicle, no bridge classification sign is fitted.

91. **Camouflage Net Lashing Points.** Lashing points are provided on each side of the vehicle and the roof, for securing camouflage equipment.

**NOTE**

These lashing points are not to be subjected to high tension loadings.
Figure 2-30 Instruments, Electrical Accessories and Controls

1. Ventilator control
2. Lighting control
3. Auxiliary power
4. Panel light dimmer control
5. Heater fan control
6. Air temperature control
7. Air distribution control
8. Fuel switch
9. Transfer case control
10. Hourmeter
11. Ammeter
12. PTO warning light
13. Combination switch
14. Speedometer
15. Ventilator control
16. Fuel gauge
17. Warning light cluster
18. Temperature gauge
19. Voltmeter
20. Windscreen washer and wiper switch
21. Cab dome light switch
22. Hazard warning switch
23. Hand throttle
24. Bonnet release
25. Accelerator pedal
26. Brake pedal
27. Starter switch
28. Main lighting switch
29. Clutch pedal
30. Cigar lighter
31. Parking brake lever
32. Winch/PTO control
33. Gear lever
34. Transfer case shift lever
35. Fuse box
36. Radio speaker bracket
37. Map reading light
SECTION 2 – OPERATING INSTRUCTIONS

CHAPTER 1

PRECAUTIONS BEFORE USE

INTRODUCTION

1. Prior to using the vehicle, the following module precautions are to be carried out:

   a. Check all webbing straps for tightness.

   b. Check that all latches are correctly engaged.

   c. Ensure that shot bolt is closed and anti-luce latches are in the locked position on the under tray stowage module.

   d. Ensure that all weapons are secured in the brackets in the cabin.

   e. Ensure that the canopy sides are closed and secure.
SECTION 2
CHAPTER 2
PREPARATION

GENERAL

Before Starting

1. Carry out a first parade service as detailed in Section 3 Chapter 1.

Before Starting the Engine

2. Ensure that the parking brake is applied. Depress the clutch fully to disengage the clutch then move the gear lever to neutral.

TSV Module Stowage System

3. Before moving the vehicle the following steps are to be taken:
   a. Ensure that all equipment is correctly stowed and secured.
   b. Ensure that all doors are closed and secured.
   c. Ensure that fold down frame for the Pedestal and Side Lobe Canceller Antennas stowage is secured in the locked position.
   d. Ensure that the generator storage drawers are closed and secured.
   e. Ensure that the under tray stowage module is closed and secured.
   f. Ensure that all items in the General Stowage Areas are secured.
   g. Turn off the TSV Module Storage System LED courtesy lights.
   h. Close the canopy soft sides.
   i. Ensure that the rifles and Minimi are correctly stowed and secured.
   j. Ensure that the radio backpack in the cabin (if fitted) is correctly stowed and secured.
SECTION 2
CHAPTER 3
SAFETY PRECAUTIONS

INTRODUCTION

1. Safety and other precautions that must be observed during equipment assembly, installation, connection, operation and dismantling of items pertaining to the module described in this manual are to be strictly adhered to.
SECTION 2
CHAPTER 4

OPERATING INSTRUCTIONS

GENERAL

1. Proper operation determines the service life and operating economy of the vehicle. This includes, careful driving, normal road speeds, reasonable rates of acceleration and braking and changing gears in a manner to avoid shock loading and labouring.

Starting the Engine

CAUTION

Do not accelerate the engine immediately after starting, otherwise damage to the turbocharger will result through lack of lubrication.

NOTE

The glow plugs need only be used to start the engine when the vehicle is operating continually in low ambient temperatures (below 5°C), and then for no longer than five seconds.

2. Depress the accelerator pedal approximately half way and hold the pedal in this position while turning the ignition switch clockwise to start the engine. As the switch is turned to the first position (see Fig. 4-1), the oil pressure, battery charge and parking brake warning lights will illuminate. In the next switch position the glow plug light illuminates, but do not hold the switch in this position unless cold operating conditions are experienced. Turn the switch fully to engage the starter motor, then release the switch and return the accelerator pedal to the idle position once the engine has started. All warning lights except the parking brake light should now be extinguished.
NOTE
Do not operate the starter motor continuously for longer than ten seconds without a pause.

Figure 4-1    Starter Switch Positions

Moving the Vehicle
3. The procedure for moving the vehicle is as follows:
   a. With the engine operating, disengage the clutch by pushing the pedal to the floor. Select high ratio or low ratio on the transfer case shift lever, depending on the vehicle load and terrain.

   NOTE
   Changing from high to low or low to high ratio should only be attempted when the vehicle is stationary. Should difficulty be encountered when engaging high or low ratio, do not force the lever. With the engine running, engage a gear, with the main gear lever and release the clutch momentarily, then return the main gear lever to neutral and try the transfer case shift lever again.

   b. Select first gear on the gear lever then release the parking brake. If the parking brake warning light does not extinguish, do not attempt to move the vehicle.
c. Engage the clutch smoothly by releasing the clutch pedal and simultaneously depressing the accelerator pedal the amount necessary for the engine to move the load.

NOTE

Never allow the foot to RIDE the clutch pedal with the clutch engaged. This causes premature clutch wear.

d. As the vehicle gains speed, continue changing gear until cruising speed is achieved and the transmission is in the highest gear possible without labouring the engine.

Good Driving Habits

4. Engine Temperature. Allow the engine to reach normal operating temperature before engaging in high speeds or hauling heavy loads.

WARNING

Should the engine become overheated, park the vehicle in a safe working area and allow the engine to cool before attempting repairs to, or refilling of the cooling system.

5. Instruments. Glance at the instruments frequently. If a fault is indicated, assess the corrective action required and stop the vehicle as necessary.

6. Clutch. To avoid damage, engage the clutch with a smooth action. Do not RIDE the clutch.

7. Gear Changing. Ensure than the correct gear is selected for the terrain, vehicle load and speed.

8. Braking. Avoid Sudden Stops. When stopping on slippery surfaces, smoothly apply and release the brakes alternately, to prevent skidding. When slowing to a halt, leave the clutch engaged as long as possible to utilize the engine braking effect. Before descending steep slopes, select first gear, low ratio with the differential locked to provide maximum engine braking.

9. Stopping the Engine. Allow the engine to return to the normal idle speed before turning the ignition off.
Before shutting down the engine, allow the engine to idle for several minutes to allow turbocharger temperature to stabilise and the rotational speed of the turbine to slow down, otherwise damage to the turbocharger will result through lack of lubrication.

10. Parking. Use the parking brake when parking the vehicle. Check frequently to ensure that the brake is adjusted to lock and hold the vehicle when parked. Do not use the parking brake when the vehicle is in motion, except in an emergency. When parking on an incline, leave the vehicle in gear.

11. Fording. The maximum advisable fording depth is 500 mm. When fording is to be undertaken, ensure that the flywheel housing drain plug is securely fitted, (see. Fig. 4-2). If deep water is anticipated, loosen the fanbelt to prevent damage to the fan or radiator, and saturation of the electrical system. Avoid excessive speed.

Figure 4-2  Flywheel Housing Drain

12. Once the crossing has been accomplished, drain the flywheel housing and tighten the fanbelt. Ensure that the brakes are dry and fully effective before proceeding.
NOTE

After fording, check the oil in the engine, transmission, transfer case and swivel pin housing for signs of water contamination. Change contaminated oils as soon as possible.

13. **Cross-country Driving.** The transfer case differential lock should be utilized for cross-country driving, i.e., off formed roads and tracks. When activated, the differential lock warning light will illuminate indicating that the dog-clutch in the transfer case is fully engaged. Although the differential lock can be engaged while the vehicle is moving, no power should be applied to the transmission during this operation.

![WARNING]

Because of the excellent rough terrain characteristics of this vehicle, drivers are cautioned to maintain a safe speed for the conditions encountered, especially when towing a trailer or utilizing tyre chains.

NOTE

The mobility of this vehicle is greatly enhanced if correct tyre pressures are maintained, and in extreme conditions, tyre chains are used.

NOTE

Under some conditions, a slight delay may be experienced before the warning light illuminates. This is due to the time required for the dog-clutch to align with its mating splines and become fully engaged.

14. On reaching normal road conditions, the differential lock must be disengaged

NOTE

Under some conditions, a slight delay may be experienced before the warning light extinguishes after the switch is pushed in. If the warning light does not extinguish, this indicates that the dog-clutch is not fully disengaged. This is usually due to transmission wind-up
which jams the dog-clutch. If the warning light does not extinguish within 100 metres of the switch being pushed in, the vehicle should be stopped and reversed a few metres to unwind the transmission. The warning light should now extinguish. If not, do not continue as serious damage may occur.

**Changing a Wheel**

15. To replace a flat tyre with the spare wheel, proceed as follows:

   a. Remove the hydraulic jack, handle and jack base plate, from the stowage bin.

   b. Engage the differential lock and check that the differential lock warning light illuminates.

   **NOTE**

   If the vehicle has been stationary prior to changing the wheel, the differential lock may not engage when selected. In this case, it will be necessary to start the engine, engage a gear and release the clutch sufficiently to allow slight movement of the gears, until the warning light is illuminated. Switch off the engine.

   c. Ensure that the parking brake is applied and that the wheels are chocked.

   **WARNING**

   The parking brake acts on the transmission, not the rear wheels. The differential lock must be engaged and the wheels chocked to enable the vehicle to be raised safely.

   **WARNING**

   The Vehicle Jack is to only used to support the vehicle to change a tyre. The vehicle is not to be left on the vehicle jack without a tyre fitted for a prolonged period.
WARNING

The vehicle jack is not to be used to perform vehicle maintenance. The vehicle is to be supported by a Vehicle Support Stand prior to maintenance tasks being performed.

d.  Engage first gear in the transmission and low range in the transfer case.

e.  Position the jack under the vehicle as follows:

(1) Front Wheel. Position the jack so that when raised, it will engage with the front axle casing immediately below the coil spring, where it will locate between the flange at the end of the axle casing and the large bracket to which the front suspension members are mounted (see Fig. 4-3);

![Figure 4-3 Jack Position - Front Wheels](image)

(2) Rear Wheel. Position the jack so that when raised, it will contact the axle tube between the spring and the shock absorber bracket (see Fig. 4-4).
f. Before raising the vehicle, lower the spare wheel to the ground and remove it from under the vehicle, then using the wheel brace, initially slacken the nuts on the wheel to be removed.

g. Jack up the appropriate corner of the vehicle. When the wheel is clear of the ground, remove the wheel nuts and lift off the wheel.

h. Ensure that the wheel nuts and studs are clean then fit the spare wheel and secure with the wheel nuts. Tighten the wheel nuts.

i. Lower the vehicle to the ground and torque the wheel nuts to 100-115 Nm (75-85 lb ft) in the correct sequence (diagonally opposite). Use hand pressure only. Do not use foot pressure or extension tubes as this could overstress the wheel studs.

j. Remove the jack and the wheel chocks then disengage the differential lock.

**Towing the Vehicle**

16. The following precautions must be taken before this vehicle is towed:

   a. Set the transmission and transfer case to neutral.

   b. Set the transfer case control switch to the on-road position.

   c. Ensure that the differential lock warning light is extinguished. If the warning light fails to extinguish, both the front and rear propeller shafts are to be removed.
d. When the front propeller shaft is to be removed, the flange mounting bolts must be secured with nuts or wire to prevent damage to the transmission casing.

e. Welded to the bulbar and the rear crossmember are two towing eyes which are used as fixed mounting points to allow for the attachment of an A frame to facilitate vehicle recovery.

f. Refer to Section 1 Chapter 2 para. 84 for towing distance restrictions.

**Canopy Soft Sides**

17. To close the canopy soft sides (see Fig. 4-5):

   a. Release the securing straps and roll down the covers.
   
   b. Close all the zips.
   
   c. Attach the shock cords to the securing points at the base of the module.

![Figure 4-5 Canopy Soft Sides Open](image)

**Battery Replacement - FFR**

18. To replace the communication batteries, proceed as follows:

   a. Stop the engine and ensure that the parking brake is applied.
   
   b. Set the master switch on the power distribution box to the OFF position and disconnect any external power source.
   
   c. Slide the battery box out from the chassis.
d. Remove the nuts and washers securing the lid to the battery box, and remove the lid.

e. Remove the bridging cable which interconnects the batteries.

f. Disconnect the negative and positive terminals respectively. Insulate each terminal as it is disconnected to prevent possible sparking.

g. Remove the battery retaining frame, then remove the batteries.

h. Install the new batteries and secure in position with the retaining frame. See Section 1 Chapter 2 para. 78 for the battery connection diagram.

i. Connect the positive and negative terminals respectively, then connect the battery bridging cable between the remaining positive and negative terminals.

j. Position the lid on the battery box and secure in position with the washers and nuts.

k. Slide the battery box towards the chassis and lock the sliding frame in position.

l. Reset the power switch at the distribution box.

**Battery Guard Reset**

19. To reset the battery guard: press the battery guard reset switch fitted on the right hand side of the dashboard (see Fig. 4-6).

![Figure 4-6 Battery Guard Reset Switch](image-url)
Winch Operation

20. The following precautions must be observed:

WARNING

Always wear industrial gloves when handling steel wire rope. Do not use the hands to guide the rope on or off the drum when winching.

a. The winch rope must be lubricated regularly and used correctly to maintain the rope in a serviceable and easy to handle condition.

b. The winch rope should be wound tightly and evenly on the winch drum, otherwise pressure on the top layer will force the rope down between the lower layers, causing entanglements and serious damage could result.

c. Do not continue winching if a kink is noticed in the winch rope. Release the tension and remove the kink.

d. The winch rope should not be looped around a load or anchor point. Chain should be used for this purpose.

e. The winch rope should not be paid out under power except when circumstances offer no alternative.

f. Do not disengage the winch dog-clutch under load.

g. Do not leave less than four wraps of winch rope on the drum.

h. Do not travel with the winch engaged.

i. Do not use the winch rope for towing under any circumstances.

21. To release the winch rope manually:

a. Ensure that the engine is switched OFF, then set the winch dog-clutch lever to the vertical position (see Fig. 4-7) to disengage the dog-clutch. Reel out the winch rope as required.

NOTE

Do not leave less than four wraps of winch rope on the drum.
22. Attach the winch rope to the selected anchor point.

**NOTE**

The winch rope should not be looped around a load or anchor point. Use suitable chains for this purpose.

23. To winch out under power:

   a. Push the winch dog-clutch lever outward, while turning the winch drum by hand to ensure that the winch dog-clutch has engaged.

   b. Place the transfer case control lever to the neutral position, then start the engine.

**NOTE**

Ensure that a load is always applied to the winch rope when winching out.

   c. Depress the clutch pedal and select reverse gear, then pull up the winch/PTO control in the seat base (see Fig. 4-8) to engage the winch drive. Increase engine speed to approximately 1300 rpm then slowly release the clutch pedal to begin winding out the winch rope.
d. To stop the winch during operating procedures, depress the clutch pedal. The worm gearing will ensure that the winch load is held until winching is resumed.

24. Attach the winch rope to the selected anchor point.

**NOTE**

The winch rope should not be looped around a load or anchor point. Use suitable chains for this purpose.

25. To winch in:

a. Push the winch dog-clutch lever outward, while turning the winch drum by hand to ensure that the winch dog-clutch has engaged.

b. Place the transfer case control lever to the neutral position, then start the engine.
NOTE

Ensure that a load is always applied to the winch rope when winching in.

c. Depress the clutch pedal and select a low forward gear, then pull up the winch/PTO control in the seat base (see Fig. 4-8) to engage the winch drive. Increase engine speed to approximately 1300 rpm then slowly release the clutch pedal to begin winding in the winch rope.

d. To stop the winch during operating procedures, depress the clutch pedal. The worm gearing will ensure that the winch load is held until winching is resumed.

NOTE

The winch oil will overheat and rapidly lose its lubricating properties if the winch is used continuously at its maximum capacity. Under these circumstances, time should be allowed for the winch lubricant to cool before resuming winching. The maximum allowable temperature of the winch oil is 120°C, but operation below 100°C is preferable.

An automatically re-setting torque limiter is incorporated in the winch power takeoff. This is pre-set to release at an input torque corresponding to the rated capacity of the winch, and will be indicated by a loud rattling sound from the transmission area. When this occurs, winching should immediately be stopped and the means found to reduce the winch rope load, for instance by relocating the rope anchor point. Extensive use of the power take-off with the torque limiter continuously released will cause excessive wear of the torque limiter, and will not assist in the winch operation.

26. On completion of the winching task:

a. Depress the clutch pedal to stop the winch and allow the engine to idle.

b. Place the transmission in neutral and push down the winch/PTO control to disengage the winch drive.

c. Drive the vehicle forward to slacken the winch rope and remove the winch rope from the anchor point. Winch the remaining rope in under light load, ensuring that the winch rope is correctly rolled, then secure
the chain to the front of the vehicle by means of a small rope or other similar light tether means of attachment

**NOTE**

Ensure that the chain or winch rope is not secured directly to the vehicle as severe vehicle damage will occur if the winch is inadvertently engaged.

d. Disengage the winch dog-clutch by turning the dog-clutch lever to the vertical position.
SECTION 2
CHAPTER 5
PACKAGING, HANDLING, STORAGE AND TRANSPORTATION

PACKAGING
1. There are no specific packaging requirements for the TSV Module.

HANDLING
2. The TSV Module makes use of self-lifting and self-supporting doors as well as sliding trays for equipment and load handling where necessary for Occupational Health and Safety (OH&S) and manual handling compliance.

STORAGE
3. The vehicle is to be stored to protect it from the climatic conditions derived from DEF(AUST)5681.

TRANSPORTATION
4. Transportation of the vehicle by air is to be in accordance with DEF(AUST)9009 and ARMY(AUST)6434.
5. Transportation of the vehicle by rail and sea is to be in accordance with ARMY(AUST)6434.
SECTION 3 – OPERATOR SERVICING

CHAPTER 1

SERVICING

First Parade Servicing

1. Before moving off with a loaded or unloaded vehicle, carry out the inspections, checks and tests as laid down in this section. Inspect for damage, security and serviceability.

2. Check the wheels and tyres for the following:
   a. Loose wheel nuts.
   b. Correct tyre pressure (see page 7).
   c. Cuts, weak spots, uneven wear, exposed cords, or clogged tyres.

3. Check the following fittings:
   a. All cabin and body fittings.
   b. Spare wheel.
   c. Stowage space, doors and lids.
   d. Windscrenn, driving mirrors, door windows, hinges catches and latches for security.
   e. Check light lenses, driving mirrors and windscreens and clean.
   f. Tow hook, coupling and security.
   g. Winch rope security.

4. Check the stowed items as follows:
   a. Completeness of equipment and correct stowage.
   b. For loose items in cabin or rear section.
   c. De-ditching tools.
   d. Fire extinguisher fully charged and correctly stowed.
5. Check the fuel, lubricants and coolant as follows:
   a. Fuel level in tank. Replenish as necessary.
   b. Check jerrican and refill if necessary.
   c. Engine oil level using dipstick. Top-up as necessary.
   d. Coolant level in radiator expansion tank. Top-up if necessary.
   e. Water can in stowage. Top-up if necessary.
   f. For fuel, lubricant and coolant leaks. Examine major assemblies and the ground below the vehicle for evidence.

Start the Vehicle
6. Start the vehicle as detailed in Section 2 Chapter 4 and check the following:
   a. Voltmeter Any irregular reading indicates battery or charging system requires checking.
   b. Horn Check operation of the horn.
   c. Lights Check operation of all lights.
   d. Windshield wipers/washers Check operation. Add water, if needed.
   e. Parking brake Check release, holding ability and application.
   f. Clutch pedal Check for free travel.
   g. Seat adjustment Ensure that seat is correctly adjusted.

Electrical
7. Check the following:
   a. Battery Check electrolyte level - fill to 10 mm above plates. Check that the terminals are clean and tight.
   b. Lights Switch off all lights not required.

Moving Off and Running
8. Check the following:
   a. Load - make a final check of the security of load and lashings, if applicable.
b. Moving off - release the parking brake. DO NOT move off if the parking brake warning light remains illuminated. Check correct operation of steering and brakes.

c. Keep a running check on all instruments.

d. Check the fuel level, coolant temperature, warning lights, charging rate and speedometer at intervals.

Halts on the March

9. At halts on the march check that:
   a. The cargo and lashings are secure, if applicable.
   b. No tyre is soft, punctured or overheated.
   c. Wheel hubs or brake drums are not overheated.
   d. There are no oil, fuel or coolant leaks.

10. At halts or after approximately four hours running:
   a. Check tyre pressures. If low, inflate. If high, check later when tyres are cold, before deflating.
   b. Ensure that all wheel nuts are secure.
   c. Test all lights (especially if there is a possibility that they will be required).
   d. Check generally for loose bolts or fittings. Tighten as necessary.
   e. Ensure security of stowed items.
   f. Inspect for security and correct operation any parts on which recent repairs or adjustments have been carried out.

Last Parade Servicing

11. Carry out the following:
   a. Clean the vehicle.
   b. Carry out “halt on the march” servicing.
   c. Draw fuel and lubricants, as required and top-up fuel tanks, engine oil and radiator expansion tank coolant. If operating under very dusty conditions, the air cleaner should be removed and cleaned.
d. If vehicle has been subjected to deep water crossings during daily exercise, the lubricants in the swivel pin housings, front, intermediate and rear axles, transmission and transfer case, should be checked for signs of water contamination. If any traces of water are found, the oil should be drained and replenished with correct type as soon as possible.

e. Check radiator core for insects, mud, etc., clean as required with compressed air or water.

f. Complete documentation.

g. Close the doors and windows.

Opening Bonnet for Servicing Access

12. To open the bonnet, proceed as follows:
   a. Pull the bonnet release handle.
   b. Release the safety catch at the front of the bonnet.
   c. Lift the bonnet up and pull the support stay forward.

   **WARNING**

   Ensure that the bonnet support stay is properly locked before releasing the bonnet.

13. To close the bonnet, proceed as follows:
   a. Hold the bonnet open and push the support stay back.
   b. Gently lower the bonnet then push the bonnet down firmly to lock in position. Do not allow the bonnet to drop from the open position.

Radiator Coolant

14. Normal cooling system replenishment is via the expansion tank. However, in the event of excessive coolant loss or drainage, the following radiator filling procedure is to be adopted:
   a. Remove the expansion tank pressure cap and move the heater controls to the highest temperature position.
b. Remove the brass filler plug from the thermostat housing (see Fig. 1-1).

c. Using coolant with a mixture concentration of 12% Nalcool Maximum, top-up the system through the filler hole, then replace the plug.

d. With the pressure cap removed, run the engine for a minimum of two minutes.

e. Stop the engine and remove the plug from the thermostat housing. Top-up as required, then install and tighten the plug securely.

f. Fill the expansion tank to the correct level and install the cap.

g. Run the engine and check for leaks.

![Figure 1-1 Thermostat Housing](image)

**Bleeding the Fuel System**

15. To bleed the fuel system, proceed as follows:
   
a. Loosen the screw cap on the transfer pump and operate the primer.

b. Loosen the overflow valve on the fuel filter adapter (see Fig. 1-2) and continue operating the primer until a solid stream of fuel flows from the valve.

c. Tighten the overflow valve and continue operating the primer. Loosen the air bleed screw on the fuel injection pump and continue operating the primer until a solid stream of fuel flows from the air bleed screw. Tighten the air bleed screw.
d. Secure the primer screw cap and start the engine. Ensure that the engine runs smoothly.

Figure 1-2  Bleeding the Fuel System

16. **Periodical Maintenance.** The following periodical maintenance is to be carried out:

a. To ensure that the vehicle is correctly maintained and prepared for operational tasks, it is necessary to carry out regular maintenance.

b. Daily and Fortnightly Servicing in accordance with Tables 1-1 and 1-2 is to be carried out by operators and is the responsibility of owner units.

c. Initial service should be carried out after the vehicle has been in service for a period of three months, or having travelled 1600 km, whichever occurs first. The service is the responsibility of JRA Limited and will be carried out by arrangement with any Land Rover franchised Dealer at no charge to the Army, except for the cost of replacement lubricants and filters. Alternatively this service can be carried out by an Army tradesman in accordance with Table 1-3, should it not be convenient for the vehicle to be returned to the authorised Land Rover Dealer at that time.
d. Minor and Major Servicing is to be carried out by RAEME with assistance from operators working under RAEME supervision in accordance with Tables 1-4 and 1-5. The unit is responsible for ensuring that the vehicle is serviced at the following intervals.

(1) **Minor Service.** This is to be carried out every 12 months or 10 000 km of operation, whichever occurs first.

(2) **Major Service.** This is to be carried out every 24 months or 20 000 km of operation, whichever occurs first.

(3) Alternate Major Service. This is to be carried out every 48 months or 40 000 km of operation, whichever occurs first.

**Special Requirements**

17. During the early life of a vehicle the working parts settle down, with the result that various clearances and adjustments need to be corrected. Operators should report problems for rectification at the earliest opportunity.

18. The Initial Service includes a warranty inspection which must be reported to Land Rover Australia in accordance with EMEI VEHICLE A 119-22.

**Table 1-1 Daily Tasks**

<table>
<thead>
<tr>
<th>The following operations are to be performed by the driver:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Check engine oil level, top-up if necessary.</td>
</tr>
<tr>
<td>2. Check coolant level, top-up if necessary.</td>
</tr>
<tr>
<td>3. Check power steering reservoir, top-up if necessary.</td>
</tr>
<tr>
<td>4. Check tyres and wheels. Inflate tyres if necessary, inspect wheel nuts for evidence of looseness.</td>
</tr>
<tr>
<td>5. Check for fuel, oil and coolant leaks.</td>
</tr>
<tr>
<td>6. Check fuel supply and operation of fuel gauge.</td>
</tr>
<tr>
<td>7. Check voltmeter reading. With switch on and engine off, indicates battery condition. With engine running, reading indicates condition of charging system.</td>
</tr>
<tr>
<td>8. Check operation of horn.</td>
</tr>
<tr>
<td>9. Check all lights for correct operation and report any defects.</td>
</tr>
</tbody>
</table>
### Table 1-1  Daily Tasks (Contd)

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>10.</td>
<td>Check operation of footbrake, parking brake and clutch.</td>
</tr>
<tr>
<td>11.</td>
<td>Check coolant temperature gauge reading.</td>
</tr>
<tr>
<td>12.</td>
<td>Check operation of windscreen wipers and washers, top-up washer reservoir if required.</td>
</tr>
<tr>
<td>13.</td>
<td>Check air cleaner restriction gauge reading. If locked in “red” position, the air cleaner elements must be changed. Under dusty conditions, remove and clean elements.</td>
</tr>
<tr>
<td>14.</td>
<td>Check seats and seat belts for operation and security.</td>
</tr>
<tr>
<td>15.</td>
<td>Check driving mirrors, door windows, catches and latches.</td>
</tr>
<tr>
<td>16.</td>
<td>Check winch rope is properly secured.</td>
</tr>
</tbody>
</table>

### Table 1-2  Fortnightly Tasks

The following operations are to be performed by the driver:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Check condition and tension of fanbelts. Approx. 10-15 mm deflection on longest span using moderate thumb pressure for the 12 volt alternator and approx. 5-10 mm for the 24 volt alternator fan belts.</td>
</tr>
<tr>
<td>2.</td>
<td>Battery. Check level of electrolyte, top-up if necessary, examine terminals for cleanliness and security. Check for leaks and security, clean outside of battery if required. Also check FFR batteries, if fitted.</td>
</tr>
<tr>
<td>3.</td>
<td>Check oil level in front axle, top-up if necessary.</td>
</tr>
<tr>
<td>4.</td>
<td>Check oil level in intermediate axle, top-up if necessary.</td>
</tr>
<tr>
<td>5.</td>
<td>Check oil level in rear axle, top-up if necessary.</td>
</tr>
<tr>
<td>6.</td>
<td>Check oil level in transmission, top-up if necessary.</td>
</tr>
<tr>
<td>7.</td>
<td>Check oil level in transfer case, top-up if necessary.</td>
</tr>
<tr>
<td>8.</td>
<td>Check radiator external condition for restriction, clean if required.</td>
</tr>
<tr>
<td>9.</td>
<td>If operating in dusty conditions remove air cleaner elements and clean.</td>
</tr>
</tbody>
</table>
Table 1-2  Fortnightly Tasks (Contd)

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>10.</td>
<td>Check operation of hand throttle and stop control.</td>
</tr>
<tr>
<td>11.</td>
<td>Check operation of differential lock control.</td>
</tr>
<tr>
<td>12.</td>
<td>Check operation of transfer case control.</td>
</tr>
<tr>
<td>13.</td>
<td>Check condition of wheel rims, tyres and valve stems.</td>
</tr>
<tr>
<td>14.</td>
<td>Check wheel nuts are torqued correctly.</td>
</tr>
<tr>
<td>15.</td>
<td>Check operation and security of spare wheel carrier.</td>
</tr>
<tr>
<td>16.</td>
<td>Check security of fuel tanks and lines.</td>
</tr>
<tr>
<td>17.</td>
<td>Check fuel, oil and coolant systems for leaks.</td>
</tr>
<tr>
<td>18.</td>
<td>Drain water from sedimenters.</td>
</tr>
<tr>
<td>19.</td>
<td>Check winch rope is properly secured.</td>
</tr>
</tbody>
</table>

Table 1-3  Initial Servicing

The following operations are to be performed by the driver:

1. Start and warm up the engine.
2. Stop the engine, drain engine oil and refill.
3. Remove and replace oil filters.
4. Drain and refill transmission.
5. Drain and refill transfer case.
6. Drain and refill front axle.
7. Drain and refill intermediate axle.
8. Drain and refill rear axle.
9. Lubricate propeller shafts.
10. Lubricate winch propeller shafts and support bearings.
11. Lubricate winch dog-clutch.
12. Lubricate winch rope.
Table 1-3  Initial Servicing (Contd)

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>13.</td>
<td>Lubricate pintle hook.</td>
</tr>
<tr>
<td>14.</td>
<td>Lubricate fanbelt jockey pulley.</td>
</tr>
<tr>
<td>15.</td>
<td>Lubricate access door hinges.</td>
</tr>
<tr>
<td>16.</td>
<td>Check oil level in winch gearbox, top-up if necessary.</td>
</tr>
<tr>
<td>17.</td>
<td>Check battery electrolyte level (10 mm above plates) and security of terminals.</td>
</tr>
<tr>
<td>18.</td>
<td>Check all fuel and oil lines and unions for leaks.</td>
</tr>
<tr>
<td>19.</td>
<td>Retorque all wheel nuts to correct specifications.</td>
</tr>
<tr>
<td>20.</td>
<td>Check tyres and wheels, inflate if necessary. Inspect rims for damage.</td>
</tr>
<tr>
<td>21.</td>
<td>Check operation of all lights and gauges.</td>
</tr>
<tr>
<td>22.</td>
<td>Check for loose electrical connections.</td>
</tr>
<tr>
<td>23.</td>
<td>Check operation of foot brake, parking brake and clutch.</td>
</tr>
<tr>
<td>24.</td>
<td>Check exhaust systems for leaks, damage and security.</td>
</tr>
</tbody>
</table>

The following operations are to be performed by a Qualified Vehicle Mechanic.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>25.</td>
<td>Retorque inlet and exhaust manifolds.</td>
</tr>
<tr>
<td>27.</td>
<td>Check torque of radiator mounting bolts, tighten as required.</td>
</tr>
<tr>
<td>28.</td>
<td>Tighten all propeller shaft coupling drive bolts.</td>
</tr>
<tr>
<td>29.</td>
<td>Replace primary fuel filter and bleed system.</td>
</tr>
<tr>
<td>30.</td>
<td>Road Test. Carry out a road test on steering and brake system. Note all faults and rectify as necessary.</td>
</tr>
</tbody>
</table>
Table 1-4  Minor Servicing

<table>
<thead>
<tr>
<th></th>
<th>The following operations are to be performed by the driver under supervision:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Start and warm up engine.</td>
</tr>
<tr>
<td>2.</td>
<td>Stop engine, drain engine oil and refill.</td>
</tr>
<tr>
<td>3.</td>
<td>Remove and replace oil filters.</td>
</tr>
<tr>
<td>4.</td>
<td>Check condition of engine mountings.</td>
</tr>
<tr>
<td>5.</td>
<td>Check engine hand throttle and stop control for connections and operation.</td>
</tr>
<tr>
<td>6.</td>
<td>Check all lights and gauges for correct operation, report defects.</td>
</tr>
<tr>
<td>7.</td>
<td>Check condition of radiator shroud and fins. Clean fins as necessary.</td>
</tr>
<tr>
<td>8.</td>
<td>Retorque radiator hose connections.</td>
</tr>
<tr>
<td>9.</td>
<td>Check operation of footbrake, parking brake and clutch.</td>
</tr>
<tr>
<td>10.</td>
<td>Check operation of windscreen wipers and washers.</td>
</tr>
<tr>
<td>11.</td>
<td>Check condition of windscreen wiper blades.</td>
</tr>
<tr>
<td>12.</td>
<td>Check battery electrolyte level (10 mm above plates) and security of terminals on all batteries. Check battery for cleanliness and security.</td>
</tr>
<tr>
<td>14.</td>
<td>Check tyres and wheels, inflate if necessary. Inspect rims for damage.</td>
</tr>
<tr>
<td>15.</td>
<td>Drain fuel sedimenters,</td>
</tr>
<tr>
<td>17.</td>
<td>Check air cleaner, remove, clean and install. If indicator shows “red” replace elements.</td>
</tr>
<tr>
<td>18.</td>
<td>Check exhaust system for leaks, damage and security.</td>
</tr>
<tr>
<td>19.</td>
<td>Check front shock absorbers for leaks, damage and security.</td>
</tr>
</tbody>
</table>
### Table 1-4  Minor Servicing (Contd)

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>20.</td>
<td>Inspect front and rear springs for damage.</td>
</tr>
<tr>
<td>21.</td>
<td>Check oil level in front axle, top-up if necessary.</td>
</tr>
<tr>
<td>22.</td>
<td>Check oil level in intermediate axle, top-up if necessary.</td>
</tr>
<tr>
<td>23.</td>
<td>Check oil level in rear axle, top-up if necessary.</td>
</tr>
<tr>
<td>24.</td>
<td>Check oil level in transmission, top-up if necessary.</td>
</tr>
<tr>
<td>25.</td>
<td>Check oil level in transfer case, top-up if necessary.</td>
</tr>
<tr>
<td>26.</td>
<td>Check oil level in winch gearbox, top-up if necessary.</td>
</tr>
<tr>
<td>27.</td>
<td>Check brake, fuel and clutch pipes for chafing, leaks or corrosion.</td>
</tr>
<tr>
<td>28.</td>
<td>Check condition of fanbelts.</td>
</tr>
<tr>
<td>29.</td>
<td>Check radiator coolant, top-up if necessary.</td>
</tr>
<tr>
<td>30.</td>
<td>Check brake servo hose for security and condition.</td>
</tr>
<tr>
<td>31.</td>
<td>Check steering damper for leaks.</td>
</tr>
<tr>
<td>32.</td>
<td>Check brake fluid reservoir, top-up if necessary.</td>
</tr>
<tr>
<td>33.</td>
<td>Check clutch fluid reservoir, top-up if necessary.</td>
</tr>
<tr>
<td>34.</td>
<td>Lubricate pintle hook.</td>
</tr>
<tr>
<td>35.</td>
<td>Lubricate parking brake mechanical linkage.</td>
</tr>
<tr>
<td>36.</td>
<td>Lubricate accelerator control linkage and pedal pivot.</td>
</tr>
<tr>
<td>37.</td>
<td>Lubricate all hinges.</td>
</tr>
<tr>
<td>38.</td>
<td>Lubricate propeller shaft and universal joints.</td>
</tr>
<tr>
<td>39.</td>
<td>Lubricate winch propeller shaft, universal joints and support bearing.</td>
</tr>
<tr>
<td>40.</td>
<td>Lubricate winch dog-clutch.</td>
</tr>
<tr>
<td>41.</td>
<td>Lubricate winch rope.</td>
</tr>
<tr>
<td>42.</td>
<td>Lubricate fanbelt jockey pulley.</td>
</tr>
<tr>
<td>43.</td>
<td>Lubricate access door hinges.</td>
</tr>
</tbody>
</table>
### Table 1-4  Minor Servicing (Contd)

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>44.</td>
<td>Check operation of spare wheel carrier.</td>
</tr>
<tr>
<td>45.</td>
<td>Check security of additional equipment.</td>
</tr>
<tr>
<td>46.</td>
<td>Check driving mirrors, door windows, hinges, catches and latches.</td>
</tr>
</tbody>
</table>

The following operations are to be performed by a Qualified Vehicle Mechanic:

<p>| | |</p>
<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>47.</td>
<td>Inspect front brake pads for wear, callipers for leaks and the condition of the discs.</td>
</tr>
<tr>
<td>48.</td>
<td>Inspect the rear brake pads and discs for wear.</td>
</tr>
<tr>
<td>49.</td>
<td>Inspect wheel cylinders for fluid leaks.</td>
</tr>
<tr>
<td>50.</td>
<td>Adjust parking brake.</td>
</tr>
<tr>
<td>51.</td>
<td>Check condition and security of steering unit, joints and boots.</td>
</tr>
<tr>
<td>52.</td>
<td>Clean fuel pump strainer.</td>
</tr>
<tr>
<td>53.</td>
<td>Check and adjust fanbelt if necessary.</td>
</tr>
<tr>
<td>54.</td>
<td>Check and adjust engine idle.</td>
</tr>
<tr>
<td>55.</td>
<td>Check and adjust steering box.</td>
</tr>
<tr>
<td>56.</td>
<td>Check and adjust headlights.</td>
</tr>
<tr>
<td>57.</td>
<td>Check front wheel alignment.</td>
</tr>
<tr>
<td>58.</td>
<td>Drain and refill cooling system.  Coolant to be changed at 10 000 km, then every two years.</td>
</tr>
<tr>
<td>59.</td>
<td>Check nuts and bolts of Under Tray assembly and bolts securing overall Tray to Chassis beams.</td>
</tr>
</tbody>
</table>
The following operations are to be performed by the driver under supervision:

<table>
<thead>
<tr>
<th></th>
<th>The following operations are to be performed by the driver under supervision:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Start and warm up engine.</td>
</tr>
<tr>
<td>2</td>
<td>Stop engine, drain engine oil and refill.</td>
</tr>
<tr>
<td>3</td>
<td>Remove and replace oil filters.</td>
</tr>
<tr>
<td>4</td>
<td>Check condition of engine mountings.</td>
</tr>
<tr>
<td>5</td>
<td>Check engine hand throttle and stop control for connections and operation.</td>
</tr>
<tr>
<td>6</td>
<td>Check all lights and gauges for correct operation, report defects.</td>
</tr>
<tr>
<td>7</td>
<td>Check condition of radiator shroud and fins. Clean fins as necessary.</td>
</tr>
<tr>
<td>8</td>
<td>Retorque radiator hose connections.</td>
</tr>
<tr>
<td>9</td>
<td>Check operation of foot brake, hand brake and clutch.</td>
</tr>
<tr>
<td>10</td>
<td>Check operation of windscreen wipers and washers.</td>
</tr>
<tr>
<td>11</td>
<td>Check condition of windscreen wiper blades.</td>
</tr>
<tr>
<td>12</td>
<td>Check battery electrolyte level (10 mm above plates) and security of terminals on all batteries. Check for cleanliness and security.</td>
</tr>
<tr>
<td>13</td>
<td>Check for oil, fuel and coolant leaks. Report any defects.</td>
</tr>
<tr>
<td>14</td>
<td>Check tyres and wheels, inflate if necessary. Inspect rims for damage.</td>
</tr>
<tr>
<td>15</td>
<td>Drain fuel sedimenters.</td>
</tr>
<tr>
<td>16</td>
<td>Check air cleaners, remove, clean, and install. Fit new elements if indicators show &quot;red&quot;.</td>
</tr>
<tr>
<td>17</td>
<td>Check exhaust system for leaks, damage and security.</td>
</tr>
<tr>
<td>18</td>
<td>Check front shock absorbers for leaks, damage and security.</td>
</tr>
<tr>
<td>19</td>
<td>Check front and rear springs for damage.</td>
</tr>
<tr>
<td>*20</td>
<td>Drain and refill front axle.</td>
</tr>
<tr>
<td></td>
<td>Major Servicing (Contd)</td>
</tr>
<tr>
<td>---</td>
<td>-------------------------</td>
</tr>
<tr>
<td>22.</td>
<td>Drain and refill rear axle.</td>
</tr>
<tr>
<td>23.</td>
<td>Drain and refill transmission.</td>
</tr>
<tr>
<td>24.</td>
<td>Drain and refill transfer case.</td>
</tr>
<tr>
<td>25.</td>
<td>Drain and refill winch gearbox.</td>
</tr>
<tr>
<td>26.</td>
<td>Check brake, fuel and clutch pipes for chafing, leaks or corrosion.</td>
</tr>
<tr>
<td>27.</td>
<td>Check condition of fanbelts.</td>
</tr>
<tr>
<td>28.</td>
<td>Check radiator coolant, top-up if necessary.</td>
</tr>
<tr>
<td>29.</td>
<td>Check brake servo hose for security and condition.</td>
</tr>
<tr>
<td>30.</td>
<td>Check steering damper for leaks.</td>
</tr>
<tr>
<td>31.</td>
<td>Check steering reservoir level, top-up if necessary.</td>
</tr>
<tr>
<td>32.</td>
<td>Check brake fluid reservoir, top-up if necessary.</td>
</tr>
<tr>
<td>33.</td>
<td>Renew brake servo filter.</td>
</tr>
<tr>
<td>34.</td>
<td>Check clutch fluid reservoir, top-up if necessary.</td>
</tr>
<tr>
<td>35.</td>
<td>Lubricate pintle hook.</td>
</tr>
<tr>
<td>36.</td>
<td>Lubricate parking brake mechanical linkage.</td>
</tr>
<tr>
<td>37.</td>
<td>Lubricate accelerator control linkage and pedal pivot.</td>
</tr>
<tr>
<td>38.</td>
<td>Lubricate all hinges.</td>
</tr>
<tr>
<td>39.</td>
<td>Lubricate propeller shaft and universal joints.</td>
</tr>
<tr>
<td>40.</td>
<td>Lubricate winch propeller shaft, universal joints and support bearings.</td>
</tr>
<tr>
<td>41.</td>
<td>Lubricate winch dog-clutch.</td>
</tr>
<tr>
<td>42.</td>
<td>Lubricate winch rope.</td>
</tr>
<tr>
<td>43.</td>
<td>Lubricate fanbelt jockey pulley.</td>
</tr>
<tr>
<td>44.</td>
<td>Lubricate access door hinges.</td>
</tr>
</tbody>
</table>
**Table 1-5  Major Servicing (Contd)**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>45.</td>
<td>Check propeller shaft coupling bolts.</td>
</tr>
<tr>
<td>46.</td>
<td>Check operation of spare wheel carrier.</td>
</tr>
<tr>
<td>47.</td>
<td>Check security of additional equipment.</td>
</tr>
<tr>
<td>48.</td>
<td>Check driving mirrors, door windows, hinges, catches and latches</td>
</tr>
<tr>
<td>*</td>
<td>Every second major service (40 000 km).</td>
</tr>
</tbody>
</table>

The following operations are to be performed by a Qualified Vehicle Mechanic:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>49.</td>
<td>Inspect front brake pads for wear, callipers for leaks and the condition of the discs.</td>
</tr>
<tr>
<td>50.</td>
<td>Inspect the rear brake pads and discs for wear.</td>
</tr>
<tr>
<td>51.</td>
<td>Inspect wheel cylinders for fluid leaks.</td>
</tr>
<tr>
<td>52.</td>
<td>Check and adjust wheel bearings.</td>
</tr>
<tr>
<td>53.</td>
<td>Adjust parking brake.</td>
</tr>
<tr>
<td>54.</td>
<td>Check condition and security of steering unit, joints and boots.</td>
</tr>
<tr>
<td>55.</td>
<td>Clean fuel pump strainer.</td>
</tr>
<tr>
<td>56.</td>
<td>Check and adjust fanbelts, if necessary.</td>
</tr>
<tr>
<td>57.</td>
<td>Clean and spray test fuel injectors.</td>
</tr>
<tr>
<td>58.</td>
<td>Clean and test glow plugs.</td>
</tr>
<tr>
<td>59.</td>
<td>Check engine compression.</td>
</tr>
<tr>
<td>60.</td>
<td>Clean engine breather filter.</td>
</tr>
<tr>
<td>61.</td>
<td>Check and adjust engine idle.</td>
</tr>
<tr>
<td>62.</td>
<td>Check and adjust steering box.</td>
</tr>
<tr>
<td>63.</td>
<td>Check front wheel alignment.</td>
</tr>
<tr>
<td>64.</td>
<td>Check nuts and bolts of Under Tray assembly and bolts securing overall Tray to Chassis beams.</td>
</tr>
</tbody>
</table>
## Tyre Pressure (Cold)

**Highway:**
- front: 350 kPa (50 psi)
- intermediate: 300 kPa (44 psi)
- rear: 300 kPa (44 psi)

**Cross country:**
- front: 275 kPa (40 psi)
- intermediate: 200 kPa (29 psi)
- rear: 200 kPa (29 psi)

**Sand:**
- front: 225 kPa (33 psi)
- intermediate: 150 kPa (22 psi)
- rear: 150 kPa (22 psi)
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SECTION 3
CHAPTER 2
LUBRICATION

GENERAL

1. Table 2-1 details the lubricants required for vehicle servicing. However, refer to EMEI VEH G 209 for the approved list of lubricants and servicing instructions.

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Lubricant</th>
<th>Capacity (litres)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine (including filters)</td>
<td>OMD-115</td>
<td>8.5</td>
</tr>
<tr>
<td>Transmission</td>
<td>OMD-115</td>
<td>2.7</td>
</tr>
<tr>
<td>Transfer Case (without PTO)</td>
<td>OMD-115</td>
<td>3.2</td>
</tr>
<tr>
<td>Transfer Case (with PTO)</td>
<td>OMD-115</td>
<td>5.8</td>
</tr>
<tr>
<td>Front Axle</td>
<td>OEP-220</td>
<td>1.7</td>
</tr>
<tr>
<td>Intermediate Axle</td>
<td>OEP-220</td>
<td>2.3</td>
</tr>
<tr>
<td>Rear Axle</td>
<td>OEP-220</td>
<td>2.7</td>
</tr>
<tr>
<td>Swivel Pin Housings</td>
<td>MolyTex Grease</td>
<td></td>
</tr>
<tr>
<td>Brake Master Cylinder</td>
<td>OX (Aust) 8</td>
<td>Fill to level</td>
</tr>
<tr>
<td>Clutch Master Cylinder</td>
<td>OX (Aust) 8</td>
<td>Fill to level</td>
</tr>
<tr>
<td>Steering Box (including reservoir)</td>
<td>OX 46</td>
<td>1.25</td>
</tr>
<tr>
<td>Winch</td>
<td>OEP-220</td>
<td>2.1</td>
</tr>
<tr>
<td>Winch Rope</td>
<td>Rocol Wire Rope Lube</td>
<td>As required</td>
</tr>
<tr>
<td>Chassis Lubrication</td>
<td>XG-274</td>
<td>As required</td>
</tr>
<tr>
<td>Wheel Bearings</td>
<td>XG-274</td>
<td>As required</td>
</tr>
<tr>
<td>Fanbelt Jockey Pulley</td>
<td>XG-274</td>
<td>As required</td>
</tr>
</tbody>
</table>

2. Fig. 2-1 illustrates the location of various lubrication and oil drainage/refill points around the vehicle.

NOTE

Run the engine or drive the vehicle as appropriate to warm oils before draining.
Figure 2-1  Lubrication and Oil Drain/Refill Points

1. POWER STEERING RESERVOIR
2. RIGHT HAND SWIVEL PIN HOUSING DRAIN PLUG
3. RIGHT HAND SWIVEL PIN HOUSING FILL PLUG
4. FRONT PROPELLER SHAFT GREASE NIPPLES
5. TRANSFER CASE DRAIN PLUG
6. INTERMEDIATE PROPELLER SHAFT GREASE NIPPLES
7. INTERMEDIATE AXLE DRAIN PLUG
8. INTERMEDIATE AXLE FILL PLUG
9. REAR AXLE DRAIN PLUG
10. REAR AXLE FILL PLUG
11. PINTLE
12. REAR PROPELLER SHAFT
13. TRANSFER CASE FILL PLUG
14. TRANSMISSION FILL PLUG
15. TRANSMISSION DRAIN PLUG
16. FRONT AXLE DRAIN PLUG
17. LEFT HAND SWIVEL PIN HOUSING FILL PLUG
18. LEFT HAND SWIVEL PIN HOUSING DRAIN PLUG
19. FRONT AXLE FILL PLUG

3. Fig. 2-2 illustrates the location of lubrication and oil drainage/refill points on the winch and watch drive line.

Figure 2-2  Winch and Winch Drive Line

1. WINCH GREASE POINTS
2. WINCH DRAIN AND FILL PLUGS
3. UNIVERSAL JOINT GREASE NIPPLE
4. PILLOW BLOCK BEARING GREASE NIPPLE
5. UNIVERSAL JOINT GREASE NIPPLE
6. SLIP JOINT GREASE NIPPLE
7. UNIVERSAL JOINT GREASE NIPPLE
Engine Oil and Oil Filter Change Procedure

4. Run the engine until the engine coolant reaches normal operating temperature then shut down the engine. Remove the engine oil pan drain plug (see Fig. 2-3) and drain the oil into a suitable receptacle before the engine cools. Fit a new sealing washer on the drain plug and install the drain plug.

5. Unscrew each oil filter cartridge counter-clockwise, using a suitable oil filter removing tool if necessary (see Fig. 2-4). Apply a film of clean engine oil on the rubber seal of each new filter cartridge and install each filter. After the filter seal contacts the adapter, tighten the filter a further half a turn by hand only.

6. Fill the engine with the correct quantity of the recommended lubricant. Do not overfill. Check the level on the dipstick, then run the engine for about five minutes. Stop the engine and check the oil level on the dipstick. Add additional oil as required and check for leaks at the filters.

Figure 2-3 Engine - Right Hand Side
Transmission

7. The transmission drain plug is located on the left hand side of the transmission. Behind the drain plug is a filter which should be washed in clean fuel each time the transmission oil is drained. Allow the filter to dry completely before installing. Remove and wash the magnetic plug and remove all metallic particles. Install the plug.

8. The transmission fill plug is adjacent to the drain plug (see Fig. 2-5). Fill the transmission with the recommended lubricant to the bottom of the fill hole.
Transfer Case

9. The transfer case drain plug is located in the bottom of the PTO housing (see Fig. 2-6). The plug should be cleaned each time the transfer case oil is drained. Use a new sealing washer on installation.

10. The transfer case fill plug is located on the rear of the housing (see Fig. 2-6). Fill the transfer case with the recommended lubricant to the bottom of the fill hole.

11. Ensure that the transfer case breather is not restricted.

![Figure 2-6 Transfer Case Drain and Fill Plugs](image)

Intermediate Axle

12. The drain plug is located on the bottom of the housing, while the fill plug is located on the rear cover (see Fig. 2-7). Fill the differential with the recommended lubricant to the bottom of the fill hole.

![Figure 2-7 Intermediate Axle Drain and Fill Plugs](image)
Rear Axle

13. The drain plug is located on the bottom of the housing, while the fill plug is located on the rear cover (see Fig. 2-8). Fill the differential with the recommended lubricant to the bottom of the fill hole.

14. Ensure that the rear axle breather is not restricted.

![Figure 2-8 Rear Axle Drain and Fill Plugs](image)

Front Axle

15. The drain plug is located on the bottom of the housing, while the fill plug is located on the front of the housing. Fill the differential with the recommended lubricant to the bottom of the fill hole.

16. Ensure that the front axle breather is not restricted.

Steering Reservoir/Box

17. The steering reservoir/box are filled by removing the cap on top of the reservoir and filling the reservoir to the prescribed mark on the dipstick. No drain plug is fitted.

Swivel Pin Housings

18. The location of the drain plug and the fill plug is shown in Fig. 2-9. All swivel pin housings are filled with MolyTex lifelong grease. One EP00 sachet is used on each side and there is no need to replace or refill during normal service operation.
Propeller Shafts

19. The propeller shafts are each fitted with a grease nipple (see Fig. 2-1 items 4 and 6) and lubrication is required each service.

![Swivel Pin Housing Drain and Fill Plugs](image)

Figure 2-9  Swivel Pin Housing Drain and Fill Plugs

Towing Pintle

20. The towing pintle is fitted with one grease nipple and lubrication is required each service.

Fuel Filter

21. Place a suitable container beneath the fuel filter, then, using a suitable filter-removing tool; remove the filter (see Fig. 2-10). Remove the filter rubber seal from the cover. Smear clean fuel on the rubber seal of a new filter and install the new filter on the cover. Tighten the filter by hand until the rubber seal touches the cover face, then tighten a further half a turn. Bleed the fuel system as detailed in Section 3 Chapter 1.
Fuel Sedimenters

22. Two fuel sedimenters, are located on the cabin rear cross member forward of the rear spring mounting. A drain plug is fitted to allow the contents to be drained (see Fig. 2-11). Bleed the fuel system as detailed in Section 3 Chapter 1.

Air Cleaner

23. The air cleaner elements will require cleaning or replacement when the signal indicator shows red. To clean or replace the air cleaner elements, proceed as follows:

   a. Remove the hose clamps securing the air inlet and outlet hoses to the air cleaner housing (see Fig. 2-12) then remove the two wing nuts from
the clamp bolts. Carefully lift the air cleaner out of the mounting brackets.

![Air Cleaner Removal Diagram](image)

**Figure 2-12  Air Cleaner Removal**

b. Remove the wing nuts securing the end cover and elements.

c. Wipe out the air cleaner housing with a clean damp cloth. Remove and clean the dust valve (see Fig. 2-13).

![Air Cleaner Elements Diagram](image)

**Figure 2-13  Air Cleaner Elements**

d. Clean or discard the primary element. If the element is to be cleaned, this can be achieved with compressed air or washing with a non-
sudsing general purpose detergent (see EMEI VEH A 591-1). If washing, ensure that the element is dry before installing. Do not clean the safety element.

e. Install and secure the new or cleaned element, then secure the end cover.

f. Install the air cleaner assembly and connect the air inlet and outlet hoses. Secure the hose clamps and tighten the wing nuts.

g. Depress the reset button on the signal indicator to enable the red signal to be released.

Brake Reservoir

24. Check the fluid level in the brake reservoir against the level marked on the reservoir. If necessary, remove the reservoir top and top-up with clean brake fluid OX (Aust) 8. See Fig. 2-14 for reservoir location.

Clutch Reservoir

25. Remove the reservoir cap and check that the fluid level in the clutch reservoir is up to the bottom of the filler neck. If necessary, top-up with clean brake fluid OX (Aust) 8. See Fig. 2-15 for reservoir location.
Winch

26. Remove the winch gearbox fill plug (see Fig. 2-16) and check that the oil level is up to the bottom of the fill plug. Top-up if necessary.

27. The winch drive line is fitted with three grease nipples which require lubrication each service.
Always wear industrial gloves when handling steel wire rope. Do not use the hands to guide the rope on or off the drum when winching.

28. The winch rope should be pulled out, checked, cleaned and greased at every service. Ensure that a load is maintained on the winch rope when rewinding.

29. To drain the winch gearbox, remove the fill plug, then remove the drain plug which is located on the bottom of the gearbox housing. Drain the oil into a suitable container, then clean and install the drain plug. Top-up the gearbox with clean oil to the bottom of the fill plug hole, then install the fill plug.

30. Ensure that the winch breather is not restricted.

Fanbelt Jockey Pulley

31. The 24 volt alternator fanbelt jockey pulley is fitted with one grease nipple and requires lubrication at each service (see Fig. 2-17).
Figure 2-17   Jockey Pulley Lubrication
SECTION 3
CHAPTER 3
FAULT FINDING

INTRODUCTION
1. This Chapter provides information on the fault finding for equipment fitted in the TSV Module.

Table 3-1  TSV Module Fault Finding

<table>
<thead>
<tr>
<th>Fault</th>
<th>Cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. White lights in module</td>
<td>a. Switch in cabin not set to NORMAL.</td>
<td>Set switch in cabin to the NORMAL position.</td>
</tr>
<tr>
<td>do not turn on.</td>
<td>b. Switch at rear of module not set to Up</td>
<td>Set switch at rear of module to the UP position.</td>
</tr>
<tr>
<td></td>
<td>position.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>c. Battery isolated by Battery Guard 2000</td>
<td>Press Battery Guard 2000 Reset Switch and start engine to charge battery.</td>
</tr>
<tr>
<td></td>
<td>d. Loose battery connections.</td>
<td>Check and tighten battery connections.</td>
</tr>
<tr>
<td></td>
<td>e. Wiring harness to lights damaged.</td>
<td>Check wiring harness and repair as necessary.</td>
</tr>
<tr>
<td>2. Blue lights in module</td>
<td>a. Switch in cabin not set to NORMAL.</td>
<td>Set switch in cabin to the NORMAL position.</td>
</tr>
<tr>
<td>do not turn on.</td>
<td>b. Switch at rear of module not set to</td>
<td>Set switch at rear of module to the Down position.</td>
</tr>
<tr>
<td></td>
<td>Down position.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>c. Battery isolated by Battery Guard 2000</td>
<td>Press Battery Guard 2000 Reset Switch and start engine to charge battery.</td>
</tr>
<tr>
<td></td>
<td>d. Contacts 4-12 on relay BR or RR not</td>
<td>Check relays.</td>
</tr>
<tr>
<td></td>
<td>closed.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>e. Loose battery Connections.</td>
<td>Check and tighten battery connections.</td>
</tr>
</tbody>
</table>
### Table 3-1  TSV Module Fault Finding (Contd)

<table>
<thead>
<tr>
<th>Fault</th>
<th>Cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Blue lights in module do not turn on (Contd).</td>
<td>f. Wiring harness to lights damaged.</td>
<td>Check wiring harness and repair as necessary.</td>
</tr>
<tr>
<td>6. Under Tray Stowage drawer is difficult to open and close.</td>
<td>a. Front roller(s) in chassis rail damaged</td>
<td>Replace roller(s).</td>
</tr>
<tr>
<td></td>
<td>b. Roller(s) on tray damaged.</td>
<td>Replace roller(s).</td>
</tr>
<tr>
<td></td>
<td>c. Tray twisted or sides damaged.</td>
<td>Remove tray, repair or replace tray.</td>
</tr>
</tbody>
</table>
SECTION 3
CHAPTER 4
CONSUMABLES

GENERAL

1. There are no special consumable requirements for the module.
SECTION 4 – WARRANTY

CHAPTER 1

WARRANTY PROVISIONS AND CLAIMS

WARRANTY PROVISIONS

1. The Contractor (Varley) accepts responsibility for Warranty in respect to the Module (except GFM) for a period of 12 months from the time of Acceptance of the Supplies.

Special Provisions

2. The warranty shall not apply where failure or defect arises from:

   a. The Commonwealth’s negligent or wilful damage of the Module or to the extent that the damage did not arise from normal use.

   b. The Module not being maintained in accordance with User Handbook or EMEI manuals.

   c. The fitting of non-genuine parts, and where it is mutually agreed as a contributing factor.

   d. The use of equipment not normally or reasonably associated with the operation of the Module.

   e. Modules that have been altered in form or function without consultation and approval of the Contractor.

   f. Any part or parts of which the specification has been altered by the Commonwealth without the Contractor's approval,

   g. The consequences of the supplies having been repaired by a non-approved repairer. For the purpose of this clause, approved repairer shall include Army vehicle maintenance personnel.

Application of Warranty

3. The Contractor, unless the Commonwealth Representative otherwise allows, shall meet all costs of, and incidental to, the performance of remedial work, including any packing, freight (not exceeding the freight cost between the Contract delivery point and the Contractor’s nominated repair facility and return), disassembly and re-assembly costs.
SECTION 5 – TSV MODULE STOWAGE SYSTEM

CHAPTER 1

GENERAL DESCRIPTION

INTRODUCTION

1. The role of the Target Sensor Vehicle (TSV) variant of the Land Rover 6x6 is to the radar and computers of the RBS 70 short-range anti-aircraft missile system. Custom compartments have been designed for stowing each component of the missile system.

GENERAL DESCRIPTION

2. The TSV Stowage rack System Assembly comprises stowage modules on the left and right hand sides of the vehicle and an under tray stowage module.

Figure 1-1  TSV Left Hand Side Module
Equipment Stowed in the TSV Stowage Rack System Assembly.

Fig. 1-3 and Fig. 1-4 illustrate the stowages on the passenger side module and the driver’s side module respectively. The following lists all equipment carried in the two modules:

a. Target Sensor radar Antenna (accessible from right hand side).
b. Barracuda Camouflage Nets x 2 (box on both sides).
c. Computer at the Radar (TaCR) (accessible on left hand side).
d. 3 Water Jerricans (accessible on left hand side).
e. TAC Box (accessible on left hand side).
f. Receive/Transmit Assembly (accessible on left hand side).
g. Radio Shack (accessible on left hand side).
h. Identification Friend or Foe (IFF) unit (accessible on left hand side).
i. 4 Fuel Jerricans (accessible on left hand side).
j. Rations & MLS (accessible on left hand side).
k. Cable Reel and Operators Console (accessible on rear of vehicle).
l. Pedestal and Side Lobe C canceller Antenna (accessible on right hand side).
m. Generators and Fuel Jerricans (accessible on left right side).
n. Cable Bag x 2 (accessible on left right side).
o. Battery and Power Distribution Boxes (accessible on left right side).

Figure 1-3  TSV Left Hand Side Module
4. **Under Tray Stowage Module.** The under tray stowage module is located at the rear of the vehicle (see Fig. 1-5). It provides stowage for camouflage net poles, fire rake, Clark Masts and Omni Directional Antennas. Webbing straps are provided to secure all items in the tray, as well as, brackets for the Clark masts.

5. The under tray stowage module is mounted on rollers and can be pulled out to approximately half its length to provide access to the contents (see Fig. 1-6).
6. A spring loaded shot bolt and two anti-luce fittings are provided to lock the module in the closed position (see Fig. 1-7). A hinged flap at the rear of the tray provides a safety guard for personnel closing the tray. The tray can be pulled out to allow for the hinged flap to be used as a document desk.

7. Pedestal and Side Lobe Canceller Antennas. The stowage for the Pedestal and Side Lobe Canceller Antennas is located on the right hand side of the vehicle (see Fig. 1-8). It comprises a tray and fold down frame fitted with nylon slides to help protect the case from damage. The fold down frame will support the end of the storage case when slid out of the tray. This will assist in access to the carry handle on the end of the storage case.
8. **Generators and Jerricans.** The Generators and jerricans are stowed on slide out trays on the right hand side of the vehicle. The trays allow the generators and jerricans to be slid out clear of the vehicle so that the handles on each side can be accessed for a two person lift. The trays can be locked in both the extended and retracted positions.

9. **Cable Reel and Operators Console.** The Cable Reel and Operator’s Console is located at the left hand rear side of the vehicle (see Fig. 1-9). It is located on a frame, with top and bottom rollers. The top rollers are each held in position with two knurled fasteners. The Cable Reel is manually driven and can be free spooled to enable cable deployment from the rear of the vehicle. The Cable Reel can be removed or installed without the use of tools by loosening the knurled fasteners moving the top rollers. The cable reeling mechanism allows the Operator’s Console to be removed from centre of the cable reel.

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**Figure 1-8  Pedestal Assembly on Fold Down Frame and Generators**

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10. Receive/Transmit Assembly. The RX/TX Assembly is stowed on a slide out tray on the left hand side of the vehicle. The tray allows the RX/TX Assembly to be slid out clear of the vehicle so that the handles on each side can be accessed for a two person lift. The tray can be locked in both the extended and retracted positions.

OPERATING INSTRUCTIONS

Stowing and Removing Equipment

**WARNING**

Some of the RBS 70 Missile System components are heavy and may require a two or more person lift.
CAUTION

If not secured properly equipment can move during transit and be damaged or fall out of its compartment when the door is opened.

11. Care should be taken by the driver and passenger to minimise the risk of danger to both personnel and equipment by correctly stowing the equipment using the restraining devices provided.

Removing the Target Sensor Radar Antenna

12. The Target Sensor Radar Antenna is located behind the cargo tray headboard and is removed from the right hand side of the vehicle. To remove the Target Sensor Radar Antenna container:
   a. Remove the webbing straps from the container.
   b. Slide the container out of the stowage.

Stowing the Target Sensor Radar Antenna

13. To stow the Target Sensor Radar Antenna container:
   a. Slide the container into the stowage.
   b. Secure the container in position using the webbing straps

Removing the Pedestal and Side Lobe Canceller Antenna

14. The Pedestal and Side Lobe Canceller Antenna container is large and heavy requiring two people to lift. To remove the pedestal and Side Lobe Canceller Antenna container:
   a. Unlock the fold down frame by pulling the mini shot bolts towards each other using the connecting wire. Lower the fold down frame (see Fig. 1-10).
   b. Remove the webbing straps.
   c. Use the carry handle on the end of the container to slide the container out of the stowage. When the carry handle at the other end of the container can be reached safely by the second person, remove the container from the vehicle.
Stowing the Pedestal and Side Lobe Canceller Antenna

15. The Pedestal and Side Lobe Canceller Antenna container is large and heavy requiring two people to lift. To stow the pedestal and Side Lobe Canceller Antenna container:

   a. Unlock the fold down frame by pulling the mini shot bolts towards each other using the connecting wire. Lower the fold down frame (see Fig. 1-10).

   b. Lift one end of the container up onto the fold down frame.

   c. Push the container into the stowage.

   d. Secure the container in position using the webbing straps.

   e. Raise the fold down frame and ensure the two slam latches are engaged.

![Figure 1-10 Pedestal and Side Lobe Canceller Antenna Stowage](image)

Removing the Generators and Jerricans

16. Two generators and jerricans are stowed on the right hand side of the vehicle. To remove a generator and jerrican:

   a. Pull the shot bolt out and slide the tray partially out (see Fig. 1-11). Release the shot bolt and pull the tray to the fully extended position. The shot bolt will re-engage and lock in this position.

   b. Remove the webbing straps from the generator.

   c. Remove the generator from the tray.
d. Remove the webbing strap from the jerrican and remove it from the tray.

e. Close the compartment door ensuring the latch is pushed in to lock the door.

f. Reach underneath the tray and pull the shot bolt out and start to slide the tray in. Release the shot bolt and push the tray to the stowed position. The shot bolt will re-engage once the tray is in the stowed position and lock in this position.

Figure 1-11 Generator Shot Bolt (Stowed Position)

Stowing the Generators and Jerricans

17. To stow a generator and jerrican:

a. Pull the shot bolt out and slide the tray partially out. Release the shot bolt and pull the tray to the fully extended position. The shot bolt will re-engage and lock in this position.

b. Place the jerrican on the tray and secure using the webbing strap.

c. Place the generator on the tray and secure using webbing straps.

d. Reach underneath the tray and pull the shot bolt out and start to slide the tray in. Release the shot bolt and push the tray to the stowed position. The shot bolt will re-engage once the tray is in the stowed position and lock in this position.

Removing the RX/TX Assembly

18. The RX/TX Assembly is stowed on the left hand side of the vehicle. To remove the RX/TX assembly:
a. Pull the shot bolt out and slide the tray partially out. Release the shot bolt and pull the tray to the fully extended position. The shot bolt will re-engage and lock in this position.

b. Remove the webbing strap.

c. Remove the RX/TX Assembly from the tray.

d. Reach underneath the tray and pull the shot bolt out and start to slide the tray in. Release the shot bolt and push the tray to the stowed position. The shot bolt will re-engage once the tray is in the stowed position and lock in this position.

**Stowing the RX/TX Assembly**

19. To stow the RX/TX Assembly:

   a. Pull the shot bolt out and slide the tray partially out. Release the shot bolt and pull the tray to the fully extended position. The shot bolt will re-engage and lock in this position.

   b. Place the RX/TX Assembly onto the tray.

   c. Secure using the webbing straps.

   d. Reach underneath the tray and pull the shot bolt out and start to slide the tray in. Release the shot bolt and push the tray to the stowed position. The shot bolt will re-engage once the tray is in the stowed position and lock in this position.

**Removing the Cable Reel**

20. To remove the Cable Reel from the vehicle.

   a. Check that the External Access cable is disconnected from the side of the Cable Reel.

   b. Release the tension on each of the top rollers by unscrewing the knurled fasteners (see Fig. 1-12).

   c. Lift each of the rollers upwards and forward following the metal track in the mounting bracket. Retighten the knurled fasteners.

   d. Lift the Cable Reel off the fixed bottom rollers and remove from vehicle.
Stowing the Cable Reel

21. To stow the Cable Reel on the vehicle:
   a. Ensure that the movable top roller is located in the forward position of its metal track.
   b. Place the Cable Reel onto the fixed bottom rollers.
   c. Check that the Cable Reel is sitting correctly on all of the four bottom rollers.
   d. Release the tension on each of the top rollers by unscrewing the knurled fasteners.
   e. Lift each of the top rollers upwards then backwards following the metal track in the mounting bracket to rest against the Cable Reel. Retighten the knurled fasteners.
   f. Check the Cable Reel is locked in position.

NOTE

The cable is to be fed back onto the Cable Reel to ensure that when all cable is on the Cable Reel, it can sited on the vehicle without difficulty.

Removing Equipment from the Under Tray Stowage Module

22. To remove equipment from the under tray stowage module:
   a. Move the anti-luce fittings to the horizontal position (unlock position).
b. Pull the spring bolt out and rotate the bolt 90 degrees to lock in the open position (see Fig. 1-13).

c. Pull the tray out to its fully extended position and open the hinged safety flap.

d. Remove webbing straps from the equipment to be removed.

e. Remove the equipment.

![Diagram of locking devices](image)

**Figure 1-13  Under Tray Stowage Locking Devices (Left Hand Side)**

**WARNING**

Care is to be taken when closing the tray to ensure hands and fingers are not caught between the tray and the vehicle.

f. Close the hinge safety flap and push the tray into the vehicle to its stowed position (see Fig. 1-14).

g. Rotate the spring bolt through 90 degrees and then release it to lock the tray in position.

h. Move the anti-luce fittings to the vertical position (lock position).
Stowing Equipment into the Under Tray Stowage Module

23. To stow equipment into the under tray stowage module:
   a. Move the anti-luce fittings to the horizontal position (unlock position).
   b. Pull the spring bolt out and rotate the bolt 90 degrees to lock in the open position.
   c. Pull the tray out to its fully extended position and open the hinged safety flap.
   d. Stow the equipment in its stowage compartment.
   e. Secure in place using the webbing straps.

**WARNING**

Care is to be taken when closing the tray to ensure hands and fingers are not caught between the tray and the vehicle.
f. Close the hinged safety flap and push the tray into the vehicle to its stowed position.

g. Rotate the spring bolt through 90 degrees and then release it to lock the tray in position.

h. Move the anti-luce fittings to the vertical position (lock position).

**Opening Under Tray Stowage for use as Document Desk**

24. To open the under tray stowage for use as a document desk:

a. Move the anti-luce fittings to the horizontal position (unlock position).

b. Pull the spring bolt out and rotate the bolt 90 degrees to lock in the open position.

c. Pull the tray out until the shot bolt is clear of the locking piece.

d. Rotate the shot bolt 90 degrees so that the shot bolt rubs on the tray.

e. Pull the tray out until the shot bolt slides into the lock.

**Closing Under Tray Stowage after use as Document Desk**

25. To close the under tray stowage after use as a document desk:

a. Pull the spring bolt out and rotate the bolt 90 degrees to lock in the open position.

b. Push the tray into the vehicle to its stowed position.

c. Rotate the spring bolt through 90 degrees and then release it to lock the tray in position.

d. Move the anti-luce fittings to the vertical position (lock position).

**Removing Jerricans**

26. To remove jerricans from the stowage racks:

a. Remove the webbing straps.

b. Lift the jerrican and slide out of the stowage rack.

**Stowing Jerricans**

27. All jerricans are stowed with the nozzle facing upwards. To stow the jerricans:
a. Lift the jerrican into the rack ensuring the carrying handle and nozzle is facing upwards.

b. Secure in place using the webbing straps.

Removing Ancillary Equipment

28. To remove ancillary equipment from the vehicle:
   a. Remove the webbing straps.
   b. Lift the equipment from the vehicle.

Stowing Ancillary Equipment

29. To stow ancillary equipment onto the vehicle:
   a. Lift the equipment onto the vehicle.
   b. Secure in position using the webbing straps.
# LIST OF ABBREVIATIONS

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Definition</th>
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<tbody>
<tr>
<td>BORC</td>
<td>Thermal imager replacement for the COND.</td>
</tr>
<tr>
<td>CNR</td>
<td>Combat Network Radio.</td>
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<td>Fig</td>
<td>Figure</td>
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<tr>
<td>FUV</td>
<td>Fire Unit Vehicle.</td>
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<tr>
<td>IFF</td>
<td>Identification Friend or Foe.</td>
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<tr>
<td>LSW</td>
<td>Light Support Weapon.</td>
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<tr>
<td>OH&amp;S</td>
<td>Occupational Health and Safety</td>
</tr>
<tr>
<td>TaCCS</td>
<td>Tactical Command and Control System.</td>
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<tr>
<td>TSV</td>
<td>Target Sensor Vehicle.</td>
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<tr>
<td>VHF</td>
<td>Very High Frequency.</td>
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