Registry of Ex Military Land Rovers

7610-66-128-5938

AUSTRALIAN ARMY

TECHNICAL MANUAL

USER HANDBOOK

TRUCK, SURVEILLANCE, LIGHTWEIGHT, WINCH, MC2

2320-66-128-4230
(LIABILITY CODE No. 73260/01)
Specification Army (Aust) 6484
Headquarters Logistic Command
1990

(D.M.M. Francis)
Major General
Assistant Chief of the
General Staff
Materiel — Army

Issued by Command
of the Chief of the
General Staff

AMENDMENT RECORD

Amendment No.	Actioned by: Signature and Date

SYNOPSIS

The Truck, Surveillance, Lightweight, Winch, MC2 is a 4 x 4 wheeled Army version of the Land Rover 110 Series commercial vehicle with constant four wheel drive. Chassis modifications are incorporated for helicopter slinging, shipping tie-down and vehicle recovery points. In addition, to increase the military payload, heavier duty front and rear axles, higher rate springs and a revised transfer case gearing have been incorporated.

Other additions include an engine-mounted air compressor, a 50 litre auxiliary fuel tank, power steering, accommodation for two spare wheels and tyres, plus storage area for special equipment, rations and vehicle spares. Special brackets mounted externally on the canopy bows provide stowage for a boat and camouflage nets.

The vehicle has a range of approximately 950 km on first class roads, and 750 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 3.6 tonne and 4.5 tonne respectively.

WARNING

69/99

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.

76

WARNING

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

—

WARNING

This vehicle is painted in polyurethane paint. Precautions should be taken prior to carrying out repairs which include painting, sanding, scraping or welding. For safety precautions refer to Introduction Into Service Instruction, Materiel Management Policy Statement, Painting Policy for Vehicles and Equipment or relevant EMEI.

LIST OF CONTENTS

LIST OF ILLUSTRATIONS

Fig. No.	Title	Page No.

LIST OF TABLES

ASSOCIATED PUBLICATIONS

1. Standing Orders for Vehicle Operation and Servicing

2. Australian Army Books:
   TGM 120 Record Book for Service Equipment — Army

3. Complete Equipment Schedules (CES):
   (a) SCES 12109
   (b) Equipment Kit SCES 12036
   } Truck, Surveillance, Light-weight, Winch, MC2

4. Block Scale 2406/31 Issue 1 — Special Tools for RAEME – B Vehicles – Truck Utility and Truck Light MC2 (Land Rover Model 110)

5. EMEI VEH A 029 — Servicing of B Vehicles

6. EMEI VEH A 119-22 — Repair of Vehicles Under Warranty Agreement — Policy Instruction

7. EMEI VEH G 130 — Data Summary (Truck, Surveillance, Lightweight, Winch, MC2)

8. EMEI VEH G 102 — Technical Description (Truck, Utility, MC2)

9. EMEI VEH G 132 — Technical Description (Truck, Surveillance, Lightweight, Winch, MC2)

10. EMEI VEH G 103 — Unit Repair (Truck, Utility, MC2)

11. EMEI VEH G 133 — Unit Repair (Truck, Surveillance, Lightweight, Winch, MC2)

12. EMEI VEH G 104 — Field Repair (Truck, Utility, MC2)

13. EMEI VEH G 104-1 — Base Repair (Truck, Utility, MC2)

14. EMEI VEH G 134-1 — Field and Base Repair (Truck, Surveillance, Lightweight, Winch, MC2)

15. EMEI VEH G 139 — Servicing Instruction

16. Repair Parts Scale 02207

FRONTISPIECE

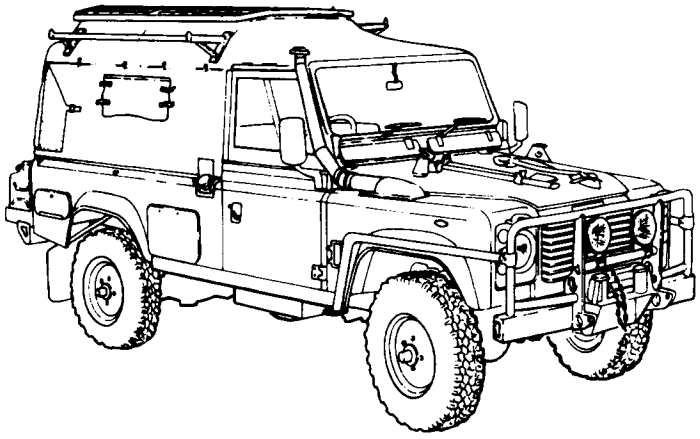


Figure 1-1 Truck, Surveillance, Lightweight, Winch, MC2 — front view

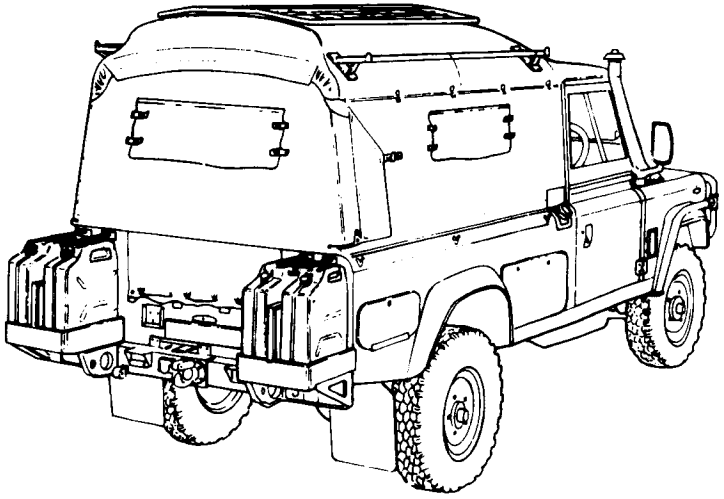


Figure 1-2 Truck, Surveillance, Lightweight, Winch, MC2 — rear view

MAINTENANCE SUPPLY ITEM (MSI)

IDENTIFICATION

Table 1-1 Location of identification numbers on MSI's

Chassis — Right hand side of the chassis, forward of the spring mounting turret

Chassis nameplate — Left hand seat box, in the cab

Engine — Left hand side of the engine block

Injection pump identification — Side of the pump

Transmission and transfer case — Rear of the transfer case

Rear axle — Adjacent to the axle breather

CHAPTER 1

GENERAL DESCRIPTION

SECTION 1 — DATA SUMMARY

SECTION 2 — SHIPPING AND TRANSPORTATION DATA

SECTION 3 — EQUIPMENT DESCRIPTION

SECTION 1
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.

Truck Model No.	Land Rover 110

1. Engine

Manufacturer	Isuzu
Type	4BD1 series naturally aspirated water cooled, four-cylinder in-line, overhead valve four-cycle diesel with direct injection
Displacement	3.856 litres
Bore	102 mm
Stroke	118 mm
Compression ratio	17:1
Firing order	1 - 3 - 4 - 2
Power	66 kW @ 3200 rpm
Maximum torque	245 Nm @ 1900 rpm
Engine operating range (ideal)	1000 to 3200 rpm
No load maximum	3200 rpm
Engine idle speed	580 ± 25 rpm
Oil capacity	8.5 litre including filter
Oil filters	External, full flow, spin on
Oil pressure	390-580 kPa @ 2400 rpm
Oil cooler	Water cooled, plate and tube type

Engine weight, dry (including air compressor)	331 kg

2. Cooling system

Type	Pressurised spill return system with thermostat control, pump and fan assisted
Capacity	12.5 litres
Thermostat	Downward opening wax element type incorporating a by-pass shut off valve. Opening temperature 82°C
Coolant	Water with 5% Alfloc 2001 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 pressure

4. Fuel system

Fuel pump	Diesel Kiki (Bosch) in-line Type A model DH100 with automatic timer
Governor	RLD-K mechanical
Transfer pump	KS mechanical with gauze intake filter
Injectors	Four-hole spray type nozzle
Main filter	Inlet manifold mounted, spin-on type
Sedimenters	Two chassis mounted CAV SS type sedimenters are connected in parallel

Fuel tanks	Two tanks, one of 62 litre capacity, plus an auxiliary tank of 50 litre capacity, 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. Air compressor

Manufacturer	Applied Power Australia Pty Ltd
Type	Two cylinder, belt driven unit

7. Clutch

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

8. 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

9. Transfer case

Manufacturer	Land Rover
Type	High and low gear ratios operating on

	the main transmission output. The front and rear drive are permanently engaged via a differential in the transfer case. The differential is lockable for traversing difficult terrain
Ratios	High range 1.123:1 Low-range 3.321:1

10. Power take-off (PTO)

Manufacturer	Land Rover
Type	Variable speed, chain drive, integral with the transfer case, and incorporates a torque limiter

11. Winch

Manufacturer	Winch Industries
Type	Thomas T8000M
Ratio	50:1
Maximum cable pull	
First layer on drum	3636 kg
Second layer on drum	3024 kg
Third layer on drum	2589 kg
Fourth layer on drum	2263 kg
Winch rope	
Type	Right hand ordinary lay with an independent wire rope core
Diameter	10 mm
Length	45 metres
Minimum breaking force	63.1 kN
Oil capacity	1.3 litres

12. Front axle

Manufacturer	Land Rover

Type	Fully floating spiral bevel steerable drive axle with enclosed outboard constant velocity joints and four pinion differential
Ratio	3.54:1
Track	1498 mm
Design load rating	1500 kg

13. Rear axle

Manufacturer	GKN/Salisbury
Type	Salisbury 8HA, fully floating hypoid bevel drive, four pinion differential
Ratio	3.54:1
Track	1498 mm
Design load rating	2100 kg

14. Propeller shafts

Type	Single Hookes universal needle roller joints. Repco 1310 sliding section on front gaitered, rear shaft open.

15. 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	1500 kg

16. Rear suspension

Type	Trailing arms and an upper centrally mounted A-frame located axle, with vertically mounted dual coil springs

	damped by double acting telescopic shock absorbers
Design load rating	2100 kg

17. 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
Lock to lock	3.5 turns
Turning circle	
Between kerbs	13.0 metres (nominal)
Between walls	13.7 metres (nominal)

18. 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 brake lining depth (actuated at 3 mm thickness) a failed hydraulic circuit, and parking brake applied

19. Chassis

Type	Hot dipped galvanized welded box section steel with welded box section crossmembers
Wheelbase	2794 mm

20. Wheels and tyres

Rim type and size	Split rims, 16 x 6.00G SDC
Tyre size	7.50-16LT 8 ply Olympic Track Grip or Goodyear Custom Extra Grip

Tyre pressure (cold)	Highway: front 250 kPa (36 psi) rear 375 kPa (54 psi) Cross-country: front 200 kPa (29 psi) rear 275 kPa (40 psi) Sand: front 150 kPa (22 psi) rear 225 kPa (33 psi)
21. Electrical system	
Type	The vehicle is fitted with a 12 volt vehicle and a 12 volt auxiliary electrical system
12 volt system	12 volt negative earth
Batteries	2 off, 12 volt cold cranking performance of approximately 560 amps, located in the battery compartment on the left hand side of the cargo body, forward of the rear wheel
Alternator	Hitachi, 12 volt — 70 amp
22. Lighting, external	**Location, quantity and wattage**
Headlights, high/low	Front of vehicle, 2 off, 60/55 watt Halogen
Driving lights	Lucas, 2 off, 100 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 indicator lights	Front mudguards, 2 off, 4 watt
Reverse lights	Rear of vehicle, 2 off, 10 watt
Number plate lights	Rear of vehicle, 2 off, 4 watt
23. Lighting, internal	**Location, quantity and wattage**
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
Trip meter	Dashboard, LED display

24. Lighting, military	**Location, quantity and wattage**
Blackout lights	Front and rear of vehicle 4 off, replaceable module
Convoy light	Rear of vehicle,1 off, 2 watt
Reduced headlights	Front of vehicle, 2 off, 18 watt
Ancillary circuit	A coupling is provided at the rear of the vehicle to accept a NATO trailer connector

25. Fuses Located inside the cab, centre console, behind protective panel	**Rating (continuous)**
Headlights	4 off, 8 amp
Park lights	2.5 amp
Horn, dome light	10 amp
Hazard lights	10 amp
Reverse lights	10 amp
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

26. Performance

Gradeability (cross-country laden) Both directions	60 per cent gradient (31 degree slope)
Range of operation	950 km (first class roads) approx. 750 km (second class roads) approx.
Fuel consumption	12 litres per 100 km (highway laden) 15 litres per 100 km (second class laden) Fuel tank capacity (including auxiliary) 115 litres

27. Troop carrying capacity 3 (including driver)

28. Tray body load area

Width — Floor level	915 mm
Length — Floor level	890 mm

SECTION 2
SHIPPING AND TRANSPORTATION DATA

29. Dimensions

Overall length		4950 mm
Wheelbase		2794 mm
Overall width — Over mirrors		2058 mm
— Reduced		1880 mm
Overall height — Laden	approx.	2200 mm
— Unladen		2300 mm
Cut down height — Laden	approx.	1500 mm
— Unladen		1600 mm
Track — Front		1498 mm
— Rear		1498 mm
Cargo tray		
Length — Internal		1835 mm
Width — Internal		1440 mm
Height of body sides (from tray)		265 mm
Height of cargo tray from ground		
— Laden	approx.	770 mm
— Unladen		870 mm
Rear axle to rear of vehicle/overhang		1300 mm
Towing pintle height — Laden	approx.	610 mm
— Unladen		710 mm
Mass (Laden)		
— Front		1500 kg
— Rear		2100 kg
— Total		3600 kg

30. Capacities

Equipment	DEF (AUST) 206	METRIC (litres)
Engine system (including filter)	OMD-115	8.5
Cooling system (including inhibitor)		12.5
Transmission	OMD-115	2.7
Transfer case (with PTO)	OMD-115	5.8
Front axle	OEP-220	1.7
Rear axle	OEP-220	2.3
Winch	OEP-220	1.3
Swivel pin housing (each)	OEP-220	0.35
Steering box (including reservoir)	OX 46	1.25
Fuel tank — Right hand	Diesel	62
— Left hand	Diesel	50

NOTE

See EMEI VEH G 139 for list of approved lubricants.

31. Fording depth

Unprepared vehicle	1000 mm still water only
Limiting features (over 500 mm)	Cooling fan, 12 volt alternator
Prepared vehicle	No facility available, as for unprepared vehicle

32. Bridge classification

Solo unladen	4

33. Ground clearance

Unladen	215 mm
Limiting feature	Rear differential housings

34. Transportability

Railway loading gauges (Local authorities must be consulted)

Rail authority	Gauge	Maximum rolling stock height
Commonwealth	1435 mm	2532 mm
Commonwealth	1067 mm	2532 mm
New South Wales	1435 mm	2182 mm
Queensland	1067 mm	1806 mm
South Australia	1600 mm	2075 mm
South Australia	1435 mm	2075 mm
South Australia	1067 mm	1761 mm
Tasmania	1067 mm	1992 mm
Victoria	1600 mm	2182 mm
Victoria	1435 mm	2182 mm
Western Australia	1435 mm	2532 mm
Western Australia	1067 mm	1973 mm

35. Slinging and tie-down points are illustrated in Fig. 1-3.

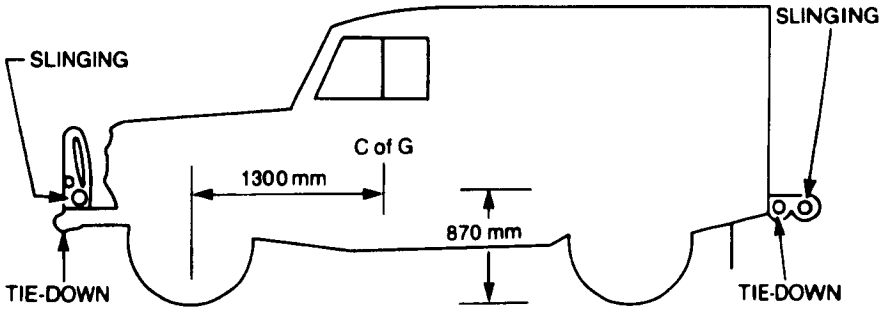


Figure 1-3 Slinging and tie-down points

36. Approach and departure angles

Approach angle	— Unladen	45 degrees
	— Laden	41 degrees
	— Limiting feature	Emergency towing lugs
Departure angle	— Unladen	33 degrees
	— Laden	25 degrees
	— Limiting feature	Helicopter lifting brackets
Ramp breakover angle	— Unladen	148 degrees
	— Laden	154 degrees
	— Limiting feature	Chassis rail

SECTION 3
EQUIPMENT DESCRIPTION

Introduction

37. The truck, surveillance, lightweight, winch, MC2 is based on the Land Rover 110 commercial vehicle with modifications to meet operational requirements. The vehicle incorporates a main transmission and integral transfer case, with gearing designed to enable the vehicle to negotiate any terrain or gradient that will allow wheel traction. In practice, this is limited to a 60 per cent gradient. The vehicle is fitted with a 3.9 litre Isuzu diesel engine and utilizes permanent four-wheel drive.

Operational and logistic concepts

38. This vehicle provides the general wheeled support for surveillance operations and can be fitted with communications equipment. The vehicle can be utilized to transport up to 1.2 tonne of special equipment, vehicle spares, crew rations and three fully-kitted troops, including the driver, up to a total mass of 3600 kg.

Engine

39. The vehicle is fitted with an Isuzu 4BD1 naturally aspirated four cylinder diesel engine, which produces 66 kW of power at 3200 rpm and 245 Nm of torque at 1900 rpm.

Transmission

40. 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)

41. The transfer case, which is cast as part of the main transmission, provides high and low gear ratios for on and off road driving. The low ratio is used for low speed operations, while the high ratio is used for driving at higher speeds. A differential within the transfer case prevents wind-up between the front and rear axles. However, for extreme driving conditions or where traction is difficult, the differential must be locked by means of the driver-operated switch, located on the dashboard, to give the vehicle positive all-wheel drive.

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

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

Winch

44. A Thomas T8000M 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 three-piece propeller shaft. The winch has a reduction ratio of 50:1 and is fitted with 45 metres of 10 mm diameter wire rope.

45. 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

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

Front suspension

47. 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

48. The heavy duty rear axle is a Salisbury type, fully floating hypoid bevel drive axle with an offset four pinion differential.

Rear suspension

49. The rear suspension utilizes long travel dual coil springs, radius arms and an A-frame location arm with double-acting telescopic shock absorbers. Bump stops are provided to limit the upward travel of the suspension, while the shock absorbers limit the downward travel of the axle.

Service brakes

50. The vehicle is fitted with a dual circuit hydraulic brake system consisting of two completely separate circuits. The primary circuit sup-

plies the rear disc brakes and the secondary circuit supplies the front disc brakes.

51. Brake pad wear indicators are fitted to the front left hand caliper and will actuate a brake circuit warning light on the dashboard when brake pad 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

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

Instruments, electrical accessories and controls (see Fig. 1-25)

53. Ventilator control (Fig. 1-25 items 1 and 8)

Two ventilators are provided in the windscreen frame, which may be opened independently by pushing the appropriate control lever downward.

54. Normal, blackout and reduced lighting switch (Fig. 1-25 item 2).

This four 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.

b. In the BLACKOUT LIGHTS or top 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.

c. In the REDUCED or right position, the reduced headlights are utilized in addition to the blackout lighting. The dash instrument lights and map reading light can also be used.

d. In the FULL BLACKOUT or bottom position, the complete vehicle lighting system is inoperable (including warning lights).

55. Trip meter (Fig. 1-25 Item 3)

A trip meter with an LED display is provided to assist in accurate map reading. The trip meter will not operate under blackout conditions.

56. Transfer case control switch (Fig. 1-25 Item 4)

The transfer case is fitted with a differential which allows the vehicle to be operated on-road without transmission wind-up. This differential is controlled by a dash mounted two-position switch. This switch should be pushed in for on-road use and pulled out when traction is difficult, thereby providing positive all-wheel drive. When changing vehicle wheels the switch must be pulled out (refer to warning on page 59).

57. Panel light dimmer control (Fig. 1-25 Item 5)

The instrument panel and trip meter light intensity can be adjusted by the dimmer control, which functions in all lighting modes except full blackout. The switch also has an ON-OFF control.

58. Fuel switch (Fig. 1-25 Item 6)

A two-position toggle switch is located on the dash, which when operated determines from which tank fuel will be drawn.

59. Driving light switch (Fig. 1-25 Item 7)

A two position rocker switch is located on the dash for control of the driving lights. With the switch in the on position, and the headlights on high beam, the driving lights will operate. When the headlights are dipped to low beam the driving lights will extinguish.

60. Main and auxiliary battery switch (Fig. 1-25 Item 9)

A spring loaded two position toggle switch is located on the vehicle dashboard. The switch is used to ascertain the voltage of the main and auxiliary batteries. In the normal (or main battery) position, main battery voltage will register on the voltmeter. When the switch is pushed to the right, the auxiliary battery voltage will register on the voltmeter.

61. Heater fan control (Fig. 1-25 Item 10)

A three-position switch controls the heater fan as follows:

a. When the lever is in the upper position (see Fig. 1-4) the heating and ventilation system is inoperative.

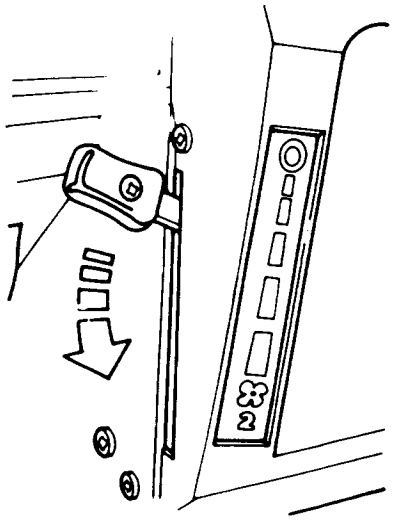


Figure 1-4 Heater fan control

b. When the lever is mid-way, air is forced into the vehicle by its forward movement and then ducted and heated as determined by the air distribution and heat control levers. As this is a forced air system, it is inoperative when the vehicle is stationary.

c. Low speed or high speed fan operation is provided when the lever 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 the ignition on.

62. Combination switch (Fig. 1-25 item 11)

The combination switch has six positions and provides control over the headlights, turn indicators and the horn. The switch operates as follows (see Fig. 1-5):

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 turn indicators will flash.

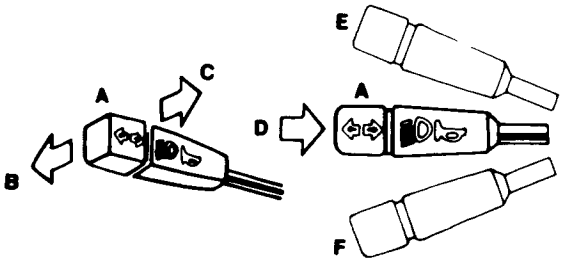


Figure 1-5 Combination switch operation

63. The combination switch functions are not available during blackout conditions.

64. Speedometer and odometer (Fig. 1-25 Item 12)

The speedometer indicates the road speed in kilometers per hour and the total distance travelled. A trip meter is incorporated in the speedometer together with its associated reset button.

65. Fuel gauge (Fig. 1-25 Item 13)

The fuel gauge indicates the approximate contents of the fuel tank.

66. Warning light cluster (Fig. 1-25 Item 14)

The warning lights provide a visual indication that a fault has occurred in one or more of the systems represented by the warning lights. A hinged flap is provided to cover the light cluster during blackout conditions.

a. The oil pressure warning light (Fig. 1-6 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. 1-6 item 3) indicates a mal-

function 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. 1-6 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 caliper and will actuate the light when the pad thickness is reduced to approximately 3 mm. Normally, the light will illuminate momentarily when the ignition is turned on, then extinguish. If the light illuminates during normal running, the vehicle should be stopped immediately and the cause determined.

d. The turn indicator warning light (Fig. 1-6 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. 1-6 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. 1-6 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. The differential lock warning light (Fig. 1-6 item 8) illuminates when the transfer case control switch is operated to lock the differential. This is necessary when traction to one or more wheels is likely to be lost.

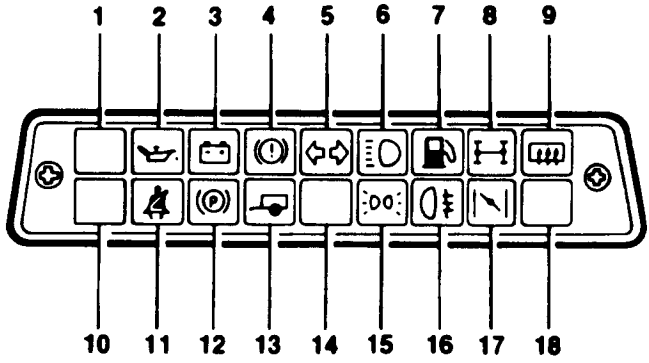
h. The parking brake warning light (Fig. 1-6 item 12) will illuminate if the parking brake is applied while the ignition is on.

i. The trailer warning light (Fig. 1-6 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. 1-6 item 15) indicates when the park lights have been switched on.

k. The cold start warning light (Fig. 1-6 item 17) illuminates when the starter switch is in the glow plugs on position.



1.	Not used	Red
2.	Oil pressure	Red
3.	Ignition	Red
4.	Brake circuit	Red
5.	Turn indicators	Green
6.	High beam	Blue
7.	Low fuel	Amber
8.	Differential lock	Amber
9.	Not used	Amber
10.	Not used	Red
11.	Not used	Red
12.	Parking brake	Red
13.	Trailer	Green
14.	Not used	Green
15.	Park lights on	Green
16.	Not used	Amber
17.	Cold start (glow plugs)	Amber
18.	Not used	Amber

Figure 1-6 Warning lights

67. Coolant temperature gauge (Fig. 1-25 item 15)

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.

68. Voltmeter (Fig. 1-25 item 16)

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.

69. Air temperature control (Fig. 1-25 item 17)

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. 1-7). Action is progressive between the two settings.

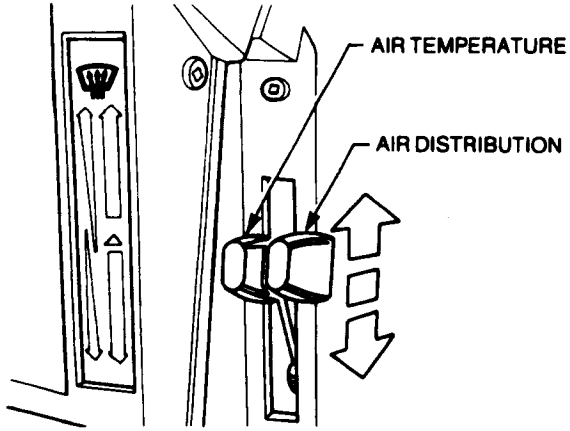


Figure 1-7 Air temperature and distribution controls

70. Air distribution control (Fig. 1-25 item 18)

The air distribution control lever controls the direction of air flow as follows (see Fig. 1-7):

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

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

c. With the lever in the lower 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.

71. Windscreen washer and wiper switch (Fig. 1-25 Item 19)

The windscreen washer and wiper switch is a five-position switch, which only operates when the ignition is on. Switch operation is as follows (Fig. 1-8):

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.

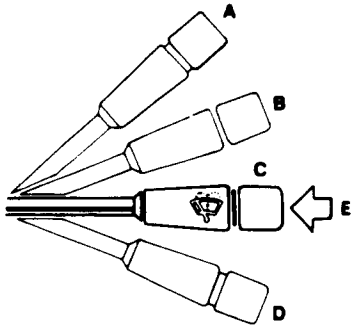


Figure 1-8 Windscreen washer and wiper control

72. Hazard warning switch (Fig. 1-25 Item 20)

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 (see Fig. 1-9). Hazard warning lights will not function during blackout conditions.

73. Cab dome light switch (Fig. 1-25 Item 20)

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. 1-9). The dome light will not function during blackout conditions.

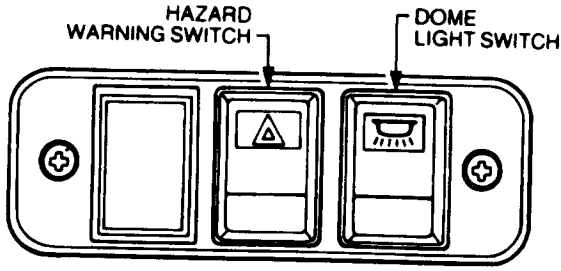


Figure 1-9 Hazard warning and cab dome light switches

74. Hand throttle (Fig. 1-25 item 21)

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.

75. Accelerator pedal (Fig. 1-25 item 22)

The accelerator pedal controls the engine speed via the accelerator cable. Depress the pedal to increase engine speed.

76. Foot brake pedal (Fig. 1-25 item 23)

The foot brake pedal controls the application of the service brakes to all four wheels. Depress the pedal progressively to apply increased braking pressure.

77. Starter switch (Fig. 1-25 item 24)

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.

78. Main lighting switch (Fig. 1-25 item 25)

The main lighting switch is a three-position switch, providing control over the lighting as follows (see Fig. 1-10).

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.

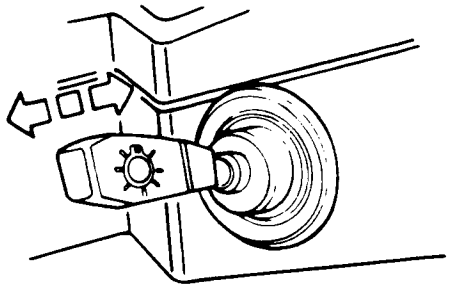


Figure 1-10 Main lighting switch

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

80. Winch/PTO control (Fig. 1-25 Item 26)

The winch/PTO control is a push-pull cable which provides control over the PTO dog-clutch for winch drive. Pull the control handle out to engage the dog-clutch or push the handle in to disengage the dog-clutch.

81. Clutch pedal (Fig. 1-25 Item 27)

Depress the clutch pedal to disengage the clutch.

82. Bonnet release (Fig. 1-25 Item 28)

The bonnet release is located to the left 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. 1-11.

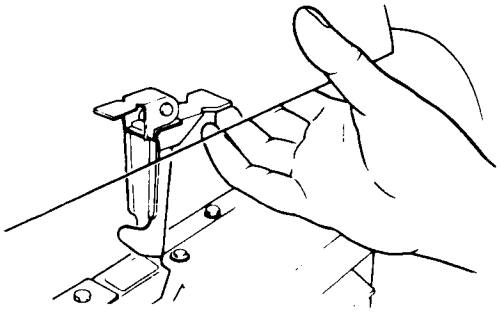


Figure 1-11 Bonnet safety catch

83. Parking brake lever (Fig. 1-25 item 29)

The parking brake is applied by pulling the lever back. To release the brake, pull the lever slightly back, depress the release button and push the lever down. Application of the parking brake will illuminate a warning light on the instrument panel.

84. Gear lever (Fig. 1-25 item 30)

The gear lever is used to manually change the gear ratios in the transmission. The gear change pattern is illustrated in Fig. 1-12.

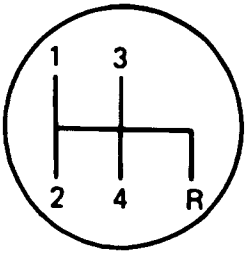


Figure 1-12 Gear change pattern

85. Transfer case shift lever (Fig. 1-25 item 31)

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. 1-13.

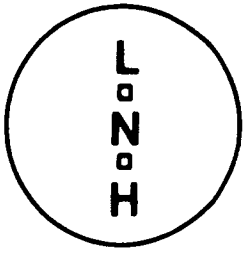


Figure 1-13 Transfer case shift pattern

86. Fuse box (Fig. 1-25 item 32)

Removing the fuse box cover allows access to the fuses. The location of each fuse is provided by the decals as shown in Fig. 1-14.

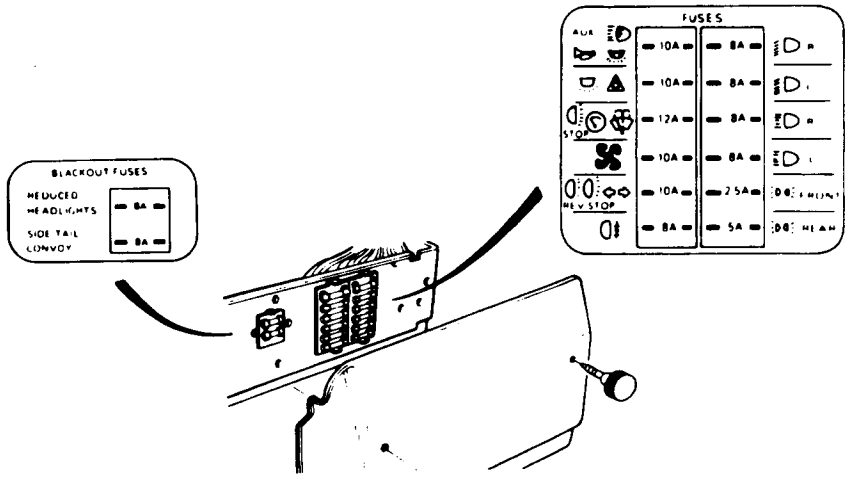


Figure 1-14 Fuses

87. The stop/start control motor is protected by a 10 amp fuse located under the bonnet to the side of the brake master cylinder.

88. Auxiliary power sockets (Fig. 1-25 Item 33)

A 2-pin socket is fitted in the dash adjacent to the vehicles additional trip meter as a power supply for the vehicle trouble light lead. A cigar lighter power supply is fitted to the bulkhead behind the cabin seats to supply power for vehicle accessories e.g. 12 volt refrigerator.

89. Map reading light (Fig. 1-25 Item 34)

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.

90. Cabin seating (Fig. 1-15)

The cabin seating is adjustable as illustrated in Fig. 1-15.

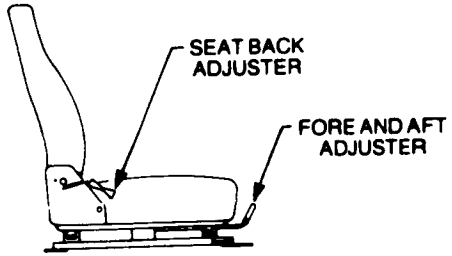


Figure 1-15 Seat adjustment

Body and Chassis Fittings

91. Vehicle body construction

The frame consists of two parallel steel box-section chassis rails held in position by five crossmembers. The frame is galvanized to prevent the formation of rust. The body consists of pressed aluminium panels which make up the engine compartment, the cabin and the rear cargo bay. Two roll bars are fitted over the tray area and these also act as support bows for the canvas canopy. A single seat with a head restraint and rake adjustment is fitted to a frame in the rear compartment. The rear seat is adjusted by moving the seat and frame assembly fore and aft.

92. Stowage

A stowage bin is provided in each side of the rear body section, behind the rear wheels. These bins are lockable and keys are located in canvas pockets secured to the left and right hand corners of the heelboard panel of the seat box. A removable stowage bin is located forward of the right hand rear wheel for the stowage of CES, rations or vehicle spare parts. The bin is fully dust and water-proofed. Two removeable toolboxes are provided in the cargo area (see Fig. 1-17) one on either side of the vehicle. The toolbox lids are able to be removed and hinge positions changed to allow access from inside or outside the vehicle.

93. Footwell vents

A footwell vent is fitted to the right and left hand wing panels to allow fresh air circulation around the driver's and passenger's legs.

94. Jerrican stowage

Four jerricans can be stowed at the rear of the vehicle, two on each side of the tailgate, and are secured by metal clamps and wing nuts. Additional jerrican and oil can stowage is provided at the rear of the cab area for four jerricans and two four litre oil cans.

95. Rifle clips and butt boxes

Facilities for mounting two rifles are provided between the two seats in the cabin.

96. Fire extinguisher

A 1.5 kg BCF fire extinguisher is fitted on the cabin rear bulkhead, between the cabin seats.

97. 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.

98. Spare wheel stowage

Three spare wheels are provided with this vehicle. One 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. 1-16) situated behind the left hand rear mudguard. This wheel is positively locked in the travelling position by a brake in the winch mechanism. When raising the wheel, an additional resistance to movement of the wheelbrace indicates the spare is correctly stowed. The spare wheel can be lowered by rotating the wheel brace in a counter-clockwise direction. Two additional spare wheels are located in the rear compartment on either side of the observers seat (see Fig. 1-17).

99. Electrical trailer connection socket

A 12-pin NATO trailer connection socket is fitted to the rear of the vehicle to the left of the towing pintle.

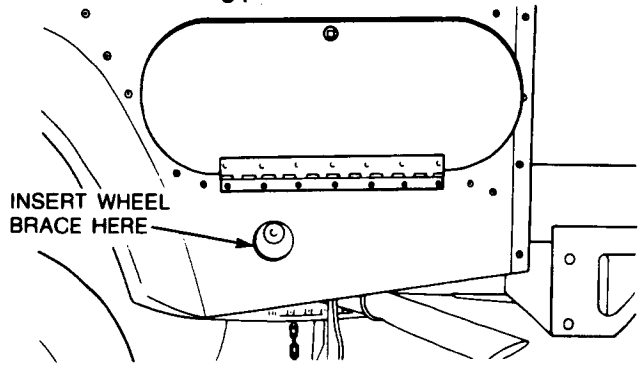


Figure 1-16 Spare wheel lowering

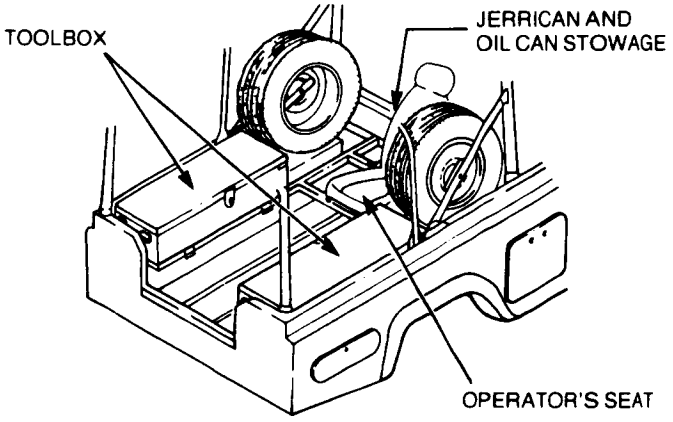


Figure 1-17 Additional spare wheel location

100. Towing pintle

An approved towing pintle is fitted to the rear of the vehicle.

101. Seat belts

Inertia reel seat belts are fitted for the cabin seats. The upper anchorage point for the inertia seat belts is located on the B door pillar. A retractable lap seat belt is provided in the rear compartment for the observer.

102. 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.

103. Battery box

Two batteries on a slide out tray are housed in the battery compartment on the left hand side of the cargo body, forward of the rear wheel. A label detailing battery replacement procedures (see Fig. 1-18) is affixed to the inside of the lid. One battery supplies power for the vehicle's electrical system and the other battery supplies power for the vehicle's accessories. Battery charging is controlled automatically by the battery isolator switch. Keys located on the left and right hand corners of the heel board panel of the seat box enable the battery compartment to be accessed.

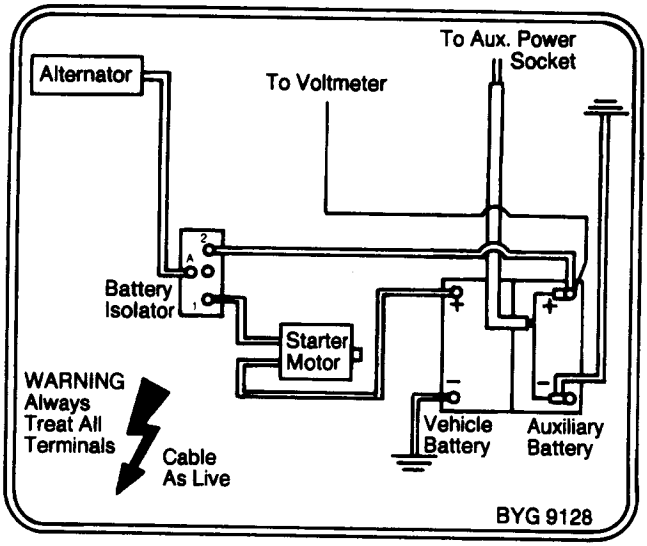


Figure 1-18 Battery replacement label

104. Vehicle nomenclature plate (Fig. 1-19)

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.

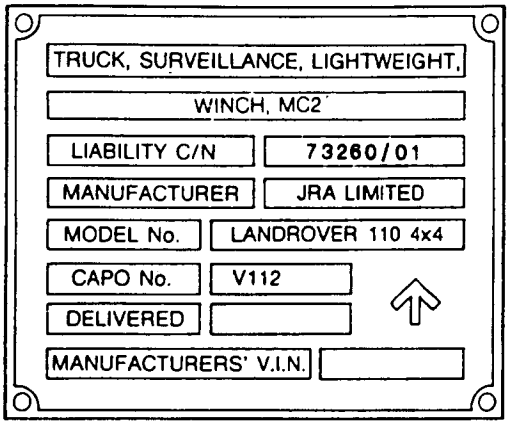


Figure 1-19 Vehicle nomenclature plate

105. Servicing data plate (Fig. 1-20)

The vehicle servicing data plate is riveted to the passenger's seat box, adjacent to the vehicle nomenclature plate.

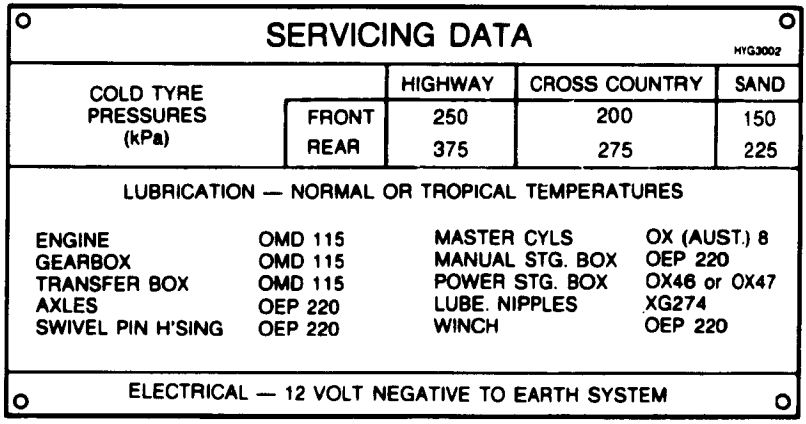


Figure 1-20 Servicing data and tyre pressure plate

106. Shipping data plate (Fig. 1-21)

A shipping data plate is riveted to the passenger's seat base just below the servicing date plate.

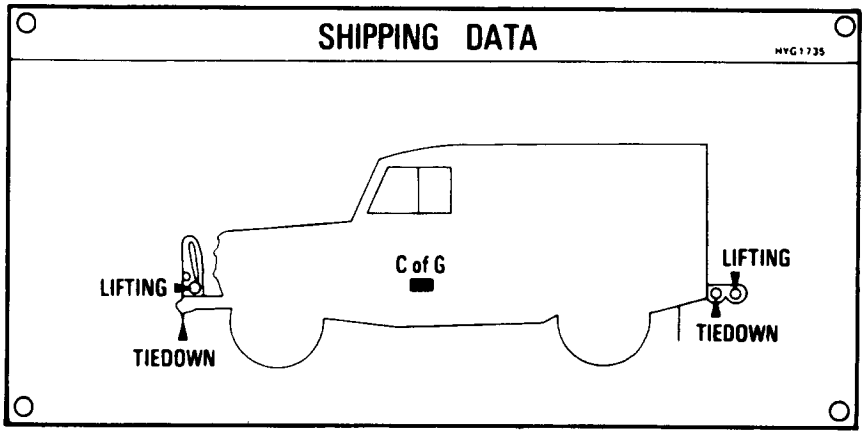


Figure 1-21 Shipping data plate

107. Towing and dyno test data plate (Fig. 1-22)

The towing and dyno test plate is riveted to the driver's seat box. See para. 237 for propeller shaft removal precautions.

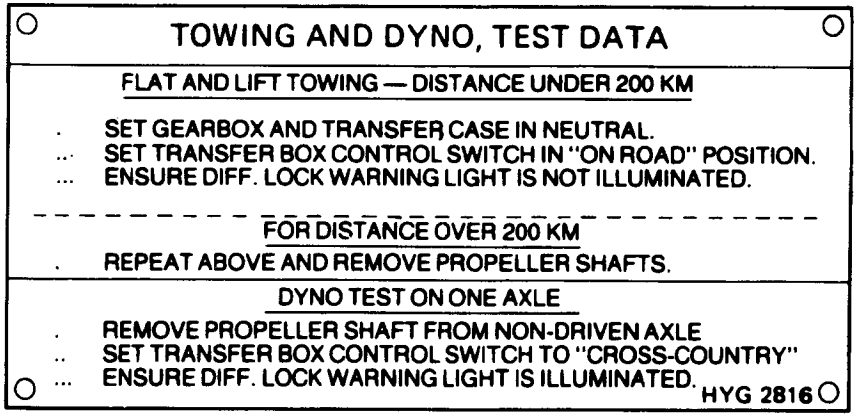


Figure 1-22 Towing and dyno test data plate

108. Jacking plate (Fig. 1-23)

A jacking plate is fitted to the stowage area lid as well as to the jack itself.

JACKING PROCEDURE

HYG 1764

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 1ST 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 1-23 Jacking procedure plate

109. Winch operation decal (Fig. 1-24)

A winch operation decal is affixed to the fuse box lid.

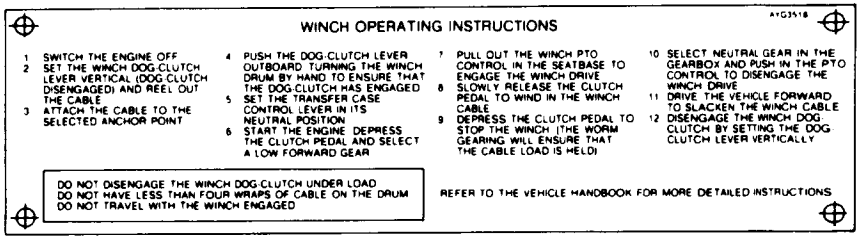


Figure 1-24 Winch operation decal

110. 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 Fig. 1-3 for C of G dimensions.

111. 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 the rear of the body.

112. Bridge classification sign

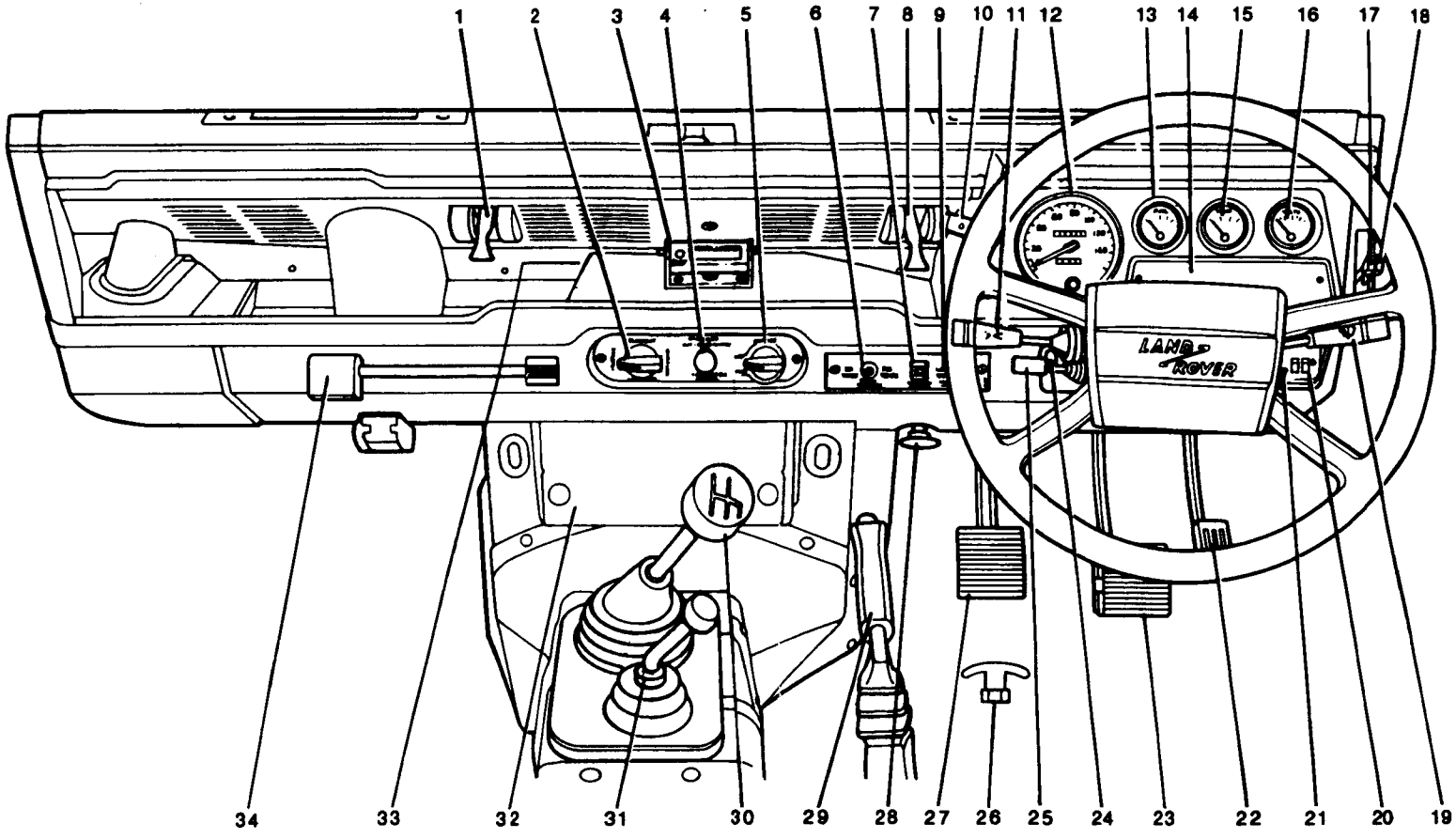
Due to the size and weight of this vehicle, no bridge classification sign is fitted.

113. Camouflage lashing points

Three lashing points are provided on each side of the rear body for securing camouflage equipment.

NOTE

These lashing points are not to be subjected to high tension loadings.



1. Ventilator control
2. Lighting control
3. Trip meter
4. Transfer case control
5. Panel light dimmer control
6. Fuel switch
7. Driving light switch
8. Ventilator control
9. Main and auxiliary battery switch
10. Heater fan control
11. Combination switch
12. Speedometer
13. Fuel gauge
14. Warning light cluster
15. Coolant temperature gauge
16. Voltmeter
17. Air temperature control
18. Air distribution control
19. Windscreen washer and wiper switch
20. Hazard warning and interior lighting switches
21. Hand throttle
22. Accelerator pedal
23. Foot brake pedal
24. Starter switch
25. Main lighting switch
26. Winch/PTO control
27. Clutch pedal
28. Bonnet release
29. Parking brake lever
30. Gear lever
31. Transfer case shift lever
32. Fuse box
33. Auxiliary power socket
34. Map reading light

Figure 1-25 Instruments, electrical accessories and controls

CHAPTER 2

OPERATING INSTRUCTIONS

SECTION 1 — WARRANTY AND REPAIR

SECTION 2 — VEHICLE OPERATION

SECTION 1
WARRANTY AND REPAIR

Warranty provisions

201. The Contractor (JRA Limited) accepts responsibility for warranty in respect to the whole vehicle (except GFE items other than the mounting of such items) for a period of 12 months or 20 000 km, whichever occurs first from the time of issue of vehicle to user unit. Where vehicles are delivered to supply depots for extended storage, the depot becomes the user unit.

202. Where a vehicle is delivered into storage, provision is made for the warranty to be suspended for up to two years. Should the vehicle enter service during the two year period, then a pro-rata warranty applies in accordance with Table 2-1.

Table 2-1 Pro-rata warranty

Time of Withdrawal from Storage (measured from day of delivery into storage)	Period of Warranty after Withdrawal from Storage (whichever expires first)	
	Distance (km)	Time (mths)
First day of 1st month — last day of 3rd month	20 000	11
First day of 4th month — last day of 6th month	18 000	10
First day of 7th month — last day of 9th month	16 000	9
First day of 10th month — last day of 12th month	14 000	8
First day of 13th month — last day of 15th month	12 000	7
First day of 16th month — last day of 18th month	10 000	6
First day of 19th month — last day of 21st month	8 000	5
First day of 22nd month — last day of 24th month	6 000	4*
First day of 25th month — last day of 27th month	3 000	3*

***NOTE**: The warranty finally expires after twenty-seven (27) months irrespective of any outstanding distance or time pro-rata warranty.

Special provisions

203. The warranty shall not apply where failure arises from:

a. Vehicle not being maintained in accordance with User Handbook or EMEI manuals.

b. EMEI storage procedures not being effectively applied.

c. Misuse or neglect.

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

e. The use of equipment not normally or reasonably associated with the operation of the supplies.

f. Supplies that have been altered in form or function without consultation with and approval of the Contractor.

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

h. Any part or parts from which the identification marks or numbers have been altered or removed by the Commonwealth.

i. Repairs which involved or resulted from either directly or indirectly the use of non-genuine parts.

j. Incorrect tuning, adjustments or maintenance operations which are associated with periodic servicing requirements.

k. Parts or equipment which have not been supplied by the Contractor or by a supplier approved by the Contractor and any problems which may arise, either directly or indirectly from the fitment of such equipment.

l. 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

204. The application of the warranty will be by repair or replacement of the defective component at no cost to the Commonwealth.

205. Provision is made for warranty repairs to be carried out by JRA Limited authorised Land Rover dealers and a list of such dealers is included in this publication.

206. However, if for reasons of distance, location etc., it is not practical to have the necessary repairs carried out by a JRA Limited authorised Land Rover dealer, then an Army tradesman is approved to carry out the repair. This procedure should be adopted in the case of emergency or essential repairs only (e.g. for safety, prevention of further damage or an operational requirement).

207. In such circumstances, JRA Limited will reimburse the Army for parts used at cost and labour at standard repair times and the prevailing Land Rover dealer warranty hourly labour rate.

208. The information required to be documented by the Army unit in such circumstances is:

a. Identify the vehicle by chassis and or Army registration number.

b. Date vehicle entered service (if known).

c. Current odometer reading.

d. Nature of failure (brief explanation).

e. Nature of repair necessary.

f. Parts replaced by designation and part number.

g. Time taken or Standard Repair Time (SRT) and operation number (refer to EMEI VEH A 119-22).

h. If parts were procured through a Land Rover dealer, then documentation identifying purchase and price paid.

i. JRA Authority Number (if applicable).

209. The procedure for submitting a claim to JRA Limited to obtain reimbursement is defined in EMEI VEH A 119-22.

Prior consultation

210. Where a vehicle is presented to an authorised JRA Limited Land Rover dealer for warranty repairs, the Army need not be concerned as the dealer has adequate authority to deal with most situations and the necessary procedure to obtain authority in the case of major repairs.

211. In circumstances where the Army are themselves undertaking a warranty repair, this may proceed without authority provided the estimated total material and labour cost is less than $500. If the cost is estimated to be in excess of $500, then the appropriate JRA Limited State Office listed in Table 2-2 should be contacted for authority and guidance.

212. The person making the contact should have the following information available:

a. Vehicle chassis and Army registration number.

b. Date in service (if known).

c. Current odometer reading.

d. Knowledge of the problem encountered.

Continuance of warranty following a warranty repair

213. Any supplies corrected or furnished by way of replacement under warranty claim, whether it be an initial equipment supply or replacement part, will enjoy the balance of any existing warranty.

Warranty on replacement parts and MSI's

214. Except when fitted in the execution of a warranty repair,

replacement parts and MSI's enjoy the same warranty as the vehicle and in general terms as applicable the same special provisions apply (see para. 203).

Pre expiration warranty checks

215. Vehicles are to be inspected by RAEME Technical Support personnel prior to expiry date of the warranty. Refer EMEI VEH A 119-22.

Table 2-2 JRA State Offices

JRA State Offices	Telephone	Telex	Facsimile
N.S.W Cnr. Heathcote Rd. and Church St., LIVERPOOL NSW 2170	(02) 600 1333	25375	(02) 602 1759
VIC. (TAS.) Level 1, Southgate 10 Jamieson St., CHELTENHAM VIC 3192	(03) 581 5600	—	(03) 581 5660
QLD. Cnr St Pauls Terr. and Brunswick St., FORTITUDE VALLEY QLD 4006	(07) 854 1599	42311	(07) 52 3776
S.A. (N.T.) 164 Fullerton Rd., DULWICH S.A. 5065	(08) 332 7799	—	(08) 364 0456
W.A. 6 Glassford Rd., KEWDALE W.A. 6105	(09) 353 1499	—	(09) 353 1498

List of agents

216. Table 2-3 details the Land Rover dealers throughout Australia and their repair level capability. This list was correct at the time of printing. A list of current Land Rover dealers is available from JRA State Offices.

Table 2-3 Land Rover dealers

Agent	Repair Level
Queensland (1 MD)	
Ayr General Engineering Co (077- 83 2393) 28 Queen Street Ayr QLD 4807	Unit
Brisbane (Newstead) Austral Motors (07-253 9427) 145 Breakfast Creek Road PO Box 199 Fortitude Valley Newstead QLD 4006	Base
Bundaberg Alan Powell Jaguar Rover (071- 72 9666) 26 Bourbong Street Bundaberg QLD 4670	Field
Burketown Nowland Engineering (011- 077- 45 5107 via exchange) Gregory Street Burketown QLD 4830	Field
Caloundra Pacific Jaguar Rover (071- 91 1344) 32 Bowman road Caloundra QLD 4551	Base
Cairns John Broadley Jaguar Rover (070- 31 3000) 94 McLeod Street Cairns QLD 4870	Base
Cooktown Peninsula Auto Services (070-69 5327) 10 Boundary Street Cooktown QLD 4871 Phil Witheridge (Prop.)	Field

Table 2-3 Land Rover dealers (cont'd)

Agent	Repair Level
Cunnamaulla Casey-Gemac (074-55 1688) 25 John St Cunnamulla QLD 4490	Unit
Goondiwindi Jack Rose's Garage (076-71 1194) 4 Moffit Street Goondiwindi QLD 4390	Unit
Gympie Gympie Carworld (071- 82 2822) 109-113 River Road Gympie QLD 4570	Field
Ipswich Don Faulkner Motors Pty Ltd (07-281 2744) Cnr Warwick and Churchill roads Ipswich QLD 4305	Base
Mackay Roberts Motors (079- 57 2144) 85 Gordon Street Mackay QLD 4740	Base
Maryborough Jack Casey Motor Centre (071- 21 2545) 103 Lennox Street Maryborough QLD 4650	Base
Mount Isa Ian Brien Ford (077- 43 4622) 59 West Street Mount Isa QLD 4825 Newstead QLD 4006	Base

Table 2-3 Land Rover dealers (cont'd)

Agent	Repair Level
Normanton Top Service Station (077- 45 1261 STD) (077- 40 7777 via exchange) Landsborough Street Normanton QLD 4890	Field
Southport Southport Motors (075- 32 1833) 187 Nerang Road Southport QLD 4215	Base
Stanthorpe McCosker Motors (076- 81 1202) 127 High Street Stanthorpe QLD 4380	Unit
Toowoomba Alan Flohr Jaguar Rover (076- 34 3233) Cnr James and Anzac Avenues Toowoomba QLD 4350	Base
Townsville Tony Ireland Townsville (077- 71 6855) 87 Charters Towers Road Townsville QLD 4810	Base
Weipa Weipa Mobil Service Centre (070- 69 7277) Boundary Road Weipa QLD 4874	Field
Winton Winton Motors (074- 57 1477) 21 Oondooroo Street Winton QLD 4735	Unit

Table 2-3 Land Rover dealers (cont'd)

Agent	Repair Level
New South Wales (2 MD)	
Albury Albury Motors Pty Ltd (060- 21 2188) 478 Olive Street Albury NSW 2640	Base
Annangrove John E Davis Motor Works (02-679 1179) 225 Annangrove Road Annangrove NSW 2156	Field
Arncliffe Purnell Motors (02- 59 0241) 139 Princes Highway Arncliffe NSW 2205	Base
Artarmon New Rowley Motors (02- 436 0857-0987) 393 Pacific Highway Artarmon NSW 2064	Base
Bathurst Bathurst Prestige Cars (063- 31 3422) 124-132 Russell Street Bathurst NSW 2795	Unit
Bombala Lomas' Garage (064- 58 3311) 80-86 Maybe Street Bombala NSW 2553	Field
Bowral Reynolds Motors Bowral Pty Ltd (048- 61 2444) 252 Bong Bong Street Bowral NSW 2576	Unit

Table 2-3 Land Rover dealers (cont'd)

Agent	Repair Level
Broken Hill Williams Motors (080- 88 7868) 80-82 Oxide Street Broken Hill NSW 2880	Field
Carlton Lindsay Johnstone (02- 546 3211) 57 Planthurst Road Carlton NSW 2218	Base
Casino Capitol Car Sales (066- 62 1477) Centre Street Casino NSW 2470	Unit
Coffs Harbour Autocare (066- 52 1422) 115 High Street Coffs Harbour NSW 2450	Field
Dorrigo Doust and Fitzgerald (066-57 2116) 14-16 Cudgery Street Dorrigo NSW 2453	Field
Dubbo Dubbo City Jaguar (068- 82 1511) 3-5 Bourke Street Dubbo North NSW 2830	Unit
Dungog Modern Motors (049- 92 1486) 282 Dowling Street Dungog NSW 2420	Field
Gloucester Gloucester Machinery Co P/L (065-58 1510) 19 Denison Street Gloucester NSW 2422	Field

Table 2-3 Land Rover dealers (cont'd)

Agent	Repair Level
Homebush Asquith and Johnstone Pty Ltd (02- 764 1777) 145 Parramatta Road Homebush NSW 2140	Base
Hurstville Arthur Garthon Motors (02-588 5000) 71A Forest Road Hurstville NSW 2220	Base
Inverell T & T Machinery Pty Ltd (067-22 2936) 79-85 Ring Street Inverell NSW 2360	Field
Lismore John Chant Car Sales (066-21 2601) Cnr Balina and Brewster Streets Lismore NSW 2480	Field
Maitland George White Motors (049-33 5233) 317-323 High Street Maitland NSW 2320	Base
Moorebank Wrendco Automotive Repairs (02- 600 6537) 8 Seton Road Moorebank NSW 2170	Base
Nowra Tory Classic Cars (044- 21 0922) Kinghorn Street Nowra NSW 2541	Field
Singleton R. and E. Teasdale Pty Ltd (065- 72 1655) 64 George Street Singleton NSW 2330	Field

Table 2-3 Land Rover dealers (cont'd)

Agent	Repair Level
Sydney (City) City Automobiles (02- 33 0678) 123-129 William Street Sydney NSW 2000	Base
Taree Manning Valley Motors (065- 52 1088) 8-16 Victoria Street Taree NSW 2430	Base
Tamworth Tamworth Prestige (067- 65 3000) Cnr In and Hercules Streets Tamworth NSW 2340	Base
Toronto Triggs Motors (049- 59 2122) 36-44 Victory Parade Toronto NSW 2283	Base
Wagga Wagga Jupiter Motors Pty Ltd (069- 21 6555) 20 Edward Street Wagga Wagga NSW 2650	Field
Wauchope Wauchope Motors (065- 85 3766) 85 High Street Wauchope NSW 2446	Field
Wollongong Compass Car Centre (042- 29 8433) Princes Highway North Wollongong NSW 2500	Base

Table 2-3 Land Rover dealers (cont'd)

Agent	Repair Level
Victoria (3 MD)	
Bairnsdale J J Dwyer Garage (051- 52 3094) 46-56 Nicholson Street Bairnsdale VIC 3141	Base
Ballarat Gordon Motors Pty Ltd (053- 39 5022) 1041-1043 Howitt Street Wendouree VIC 3355	Base
Brighton Lane Jaguar Rover (03- 557 2875) 771 Nepean Highway Brighton VIC 3187	Base
Corryong Mildren and Coysh Pty Ltd (060- 76 1151) White Street Corryong VIC 3707	Field
Frankston Stewart Webster (03- 781 2022) 130 Dandenong Road Frankston VIC 3199	Base
Geelong Peck and Stokes Motors (052- 21 2111) 31-37 Gordon Avenue Geelong VIC 3220	Unit
Malvern ULR Sales and Service P/L (03- 822 0211) 1339 High Street Malvern VIC 3144	Base

Table 2-3 Land Rover dealers (cont'd)

Agent	Repair Level
Mansfield Berry and O'Halloran (057- 75 2375) 125 High Street Mansfield VIC 3722	Field
Mildura Syd Mills Motors (050- 23 0261) 19-29 Orange Avenue Mildura VIC 3500	Field
Morwell Massaro Motors (051- 34 1422) 497 Princes Highway Morwell VIC 3840	Field
Nunawading Whitehorse Motors Pty Ltd (03- 878 6677) 296 Whitehorse Road Nunawading VIC 3131	Base
Shepparton McPherson Motors (058-21 9400) 69 Benalla Road Shepparton VIC 3630	Field
South Yarra Kellow-Falkiner Motors (03- 266 2501) 93 Commercial Road South Yarra VIC 3141	Base
Wendouree Gordon Motors (Ballarat) P/L (053-38 1335) 1041-1043 Howitt Street Wendouree VIC 3355	Field

Table 2-3 Land Rover dealers (cont'd)

Agent	Repair Level
South Australia (4 MD)	
Bordertown Inglis Motors (087- 52 1577) 90 South Terrace Road Bordertown SA 5268	Field
Kingscote Nepean Motors Ltd (084- 82 2162) Kingscote Terrace Kingscote SA 5223	Unit
Millicent Mac Ford (087- 33 2022) 44 Mount Gambier Road Millicent SA 5280	Base
Port Lincoln H V Motors (086- 82 1600) 80 Mortlock Terrace Port Lincoln SA 5606	Unit
Walkerville Prestige Car Sales (08- 269 2922) 130-134 North East Road Walkerville SA 5081	Base
Western Australia (5 MD)	
Broome BP Shinju Motors (091-92 1250) Walcott Street Broome WA 6725	Field
Bunbury Wallace Motors Pty Ltd (097- 21 4588) 72 Spencer Street Bunbury WA 6230	Base

Table 2-3 Land Rover dealers (cont'd)

Agent	Repair Level
Carnarvon Dellbar Motors (099- 41 1397) 60 Robinson Street Carnarvon WA 6701	Field
Derby Kimwest Motors (091- 91 1647) 44 Clarendon Street Derby WA 6728	Field
Esperance Ratten and Slater (090- 71 0100) Cnr Norseman and Sheldon Road Esperance WA 6450	Field
Katanning P. L. Bolto and Co. (098- 21 1566) 71 Clive Street Katanning WA 6317	Field
Kununurra Norwest Diesel Service (091- 68 1195) Lot 219 Bloodwood Drive Kununurra WA 6743	Field
Manjimup Manjimup All Wheel Drive (097- 71 1535) Franklin Street Manjimup WA 6258	Field
Osborne park Alf Barbagallo (09-444 5999) 354 Scarborough Beach Road Osborne Park WA 6017	Field
South Hedland N and L Mechanical (091- 72 2623) Lot 3780 Carlindie Way, Wedgefield South Hedland WA 6722	Field

Table 2-3 Land Rover dealers (cont'd)

Agent	Repair Level
Wyndham Branco BP Motors (091- 61 1305) Great Northern Highway Wyndham WA 6740	Unit
Tasmania (6 MD)	
Hobart Terry Hickey Autos Pty Ltd (002- 34 9122) 167-171 Argyle Street Hobart TAS 7000	Base
Launceston Launceston Rover/Peugeot (003- 31 6633) Cnr. Wellington and Frederick Streets Launceston TAS 7250	Base
Northern Territory (7 MD)	
Alice Springs Sutton Motors (089- 52 1334) 13 Smith Street Alice Springs NT 0870	Field
Darwin Port Darwin Motors Pty Ltd (089- 81 9444) 15 Stuart Highway Darwin NT 0800	Base
Katherine Katherine Toyota (089- 72 1788) 1 Katherine Terrace Katherine NT 0850	Unit
Australian Capital Territory	
National Capital Motors (062-51 2600) Josephson Street Belconnen ACT 2617	Base

SECTION 2
VEHICLE OPERATION

217. General

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. Additional care must be taken when carrying a boat on the overhead roof racks.

218. Before starting

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

219. Before starting the engine

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

220. Starting the engine

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.

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. 2-1), 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.

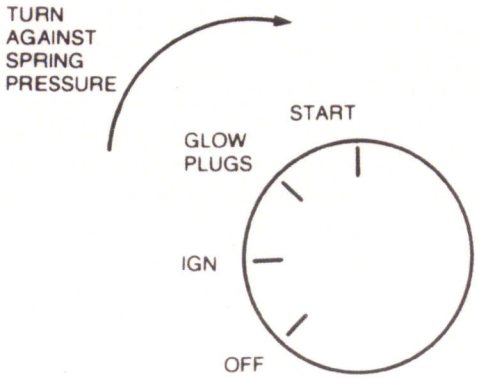


Figure 2-1 Starter switch positions

221. Moving the vehicle

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 no 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

222. 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.

223. Instruments

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

224. Clutch

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

225. Gear changing

Ensure that the correct gear is selected for the terrain, vehicle load and speed.

226. 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.

227. Stopping the engine

Allow the engine to return to the normal idle speed before turning the ignition off.

228. 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.

229. Fording

The maximum advisable fording depth is 1 metre in still water only. When fording is to be undertaken, ensure that the flywheel housing drain plug is securely fitted (see Fig. 2-2). 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, and caution should be observed. As soon as practicable after fording in salt water, hose and wash away salt, sand and silt deposits from the vehicle with fresh water.

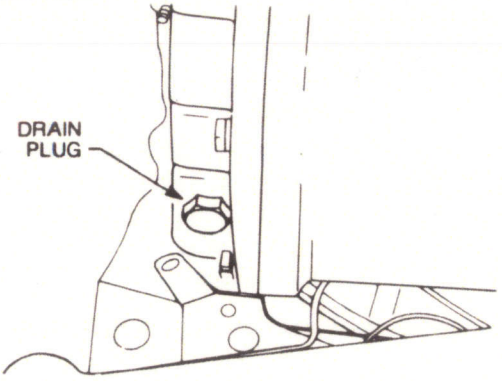


Figure 2-2 Flywheel housing drain

230. 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.

231. Cross-country driving

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.

The transfer case differential lock should be utilized for cross-country driving, ie. 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.

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.

232. 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

233. 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.

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. 2-3).

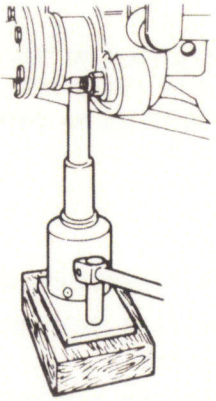


Figure 2-3 Jack position — front wheels

(2) Rear wheel. Position the jack so that when raised, it will engage with the rear axle casing immediately below the coil spring and as close as possible to the shock absorber mounting bracket (see Fig. 2-4).

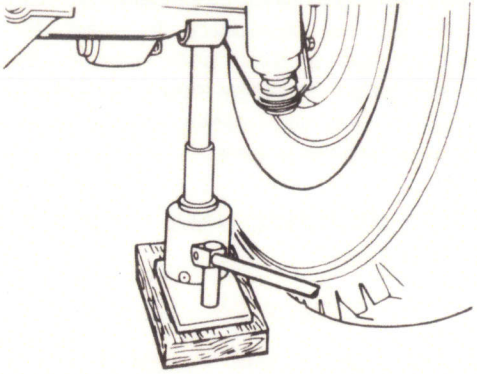


Figure 2-4 Jack position — rear wheels

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.

High lift jack

NOTE

Jacking apertures for the high lift jack are located at the front of the vehicle in the bullbar box section, and at the rear of the vehicle in the ends of the bumper bar.

234. To operate the high lift jack, proceed as follows:

a. Remove the R-clip and clevis pin from the jack stowage bracket at the rear of the brushguard and remove the jack from the bracket.

b. Place the jack on a base plate, then position the jack lifting tongue in the appropriate jacking aperture and insert the safety pin and retaining clip (see Fig. 2-5).

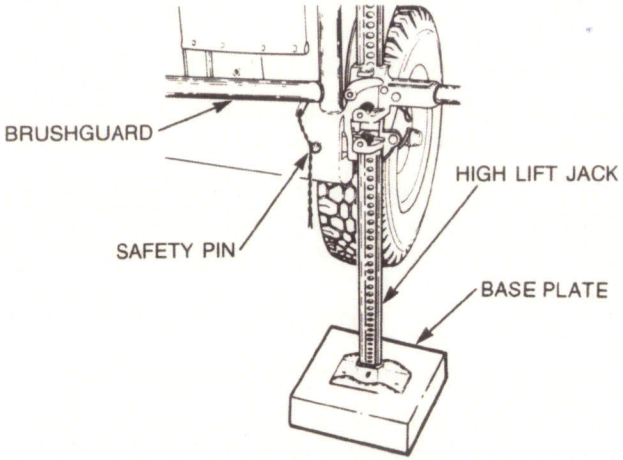


Figure 2-5 High lift jacking position

WARNING

When lowering the vehicle operate the jack from below the level of the handle to avoid personal injury.

NOTE

The jacking mechanism can be moved along the operating rack in a free wheel mode if no weight is applied on the jacking tongue. The movement can only be in the same direction as indicated by the directional lever on the jacking mechanism.

c. Move the directional lever on the jack to either the up or down mode, depending on requirement, and pump the operating lever to raise or lower the vehicle.

Tyre/tube replacement (split rim)

NOTE

Place a matchmark on the rim opposite the split in the lock ring to assist with obtaining correct wheel balance on reassembly of the wheel.

235. To replace a tyre or tube proceed as follows:

a. Remove the valve core to completely deflate the tyre (if not already flat).

b. Place the wheel on the ground with the lock ring uppermost, then using a sliding bead breaker positioned between the side ring and the tyre, break the bead.

NOTE

Take care not to distort the lock ring on removal.

c. Insert the tapered end of a tyre lever into the prying notch near the split in the lock ring and lever the lock ring from the rim and side ring (see Fig. 2-6).

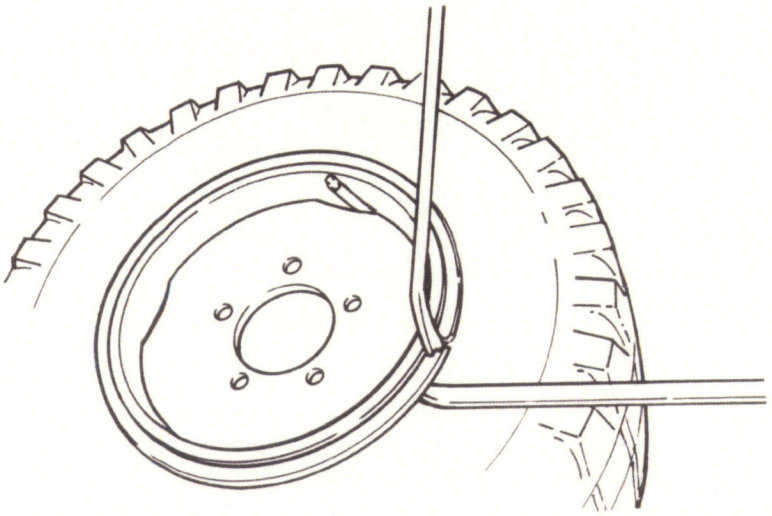


Figure 2-6 Lock ring removal

d. Remove the side ring, then turn the wheel over and using a sliding bead breaker positioned between the rim and the tyre, break the bead.

e. Remove the tyre from the rim.

f. Remove the tube and rubber flap from the tyre.

g. Inspect the rim, side ring and lock ring for excessive rust, cracking or distortion. Replace components as required.

h. Install the tube and rubber flap in the tyre and partially inflate the tube until it is almost rounded out.

i. Place the rim on the ground with the removable flange side uppermost, then lubricate the tyre beads with a soap solution.

j. Position the tyre over the rim, align the valve with the rim valve slot and place the tyre on the rim.

k. Position the side ring on the rim, then stand on the ring to position it below the rim groove (see Fig. 2-7).

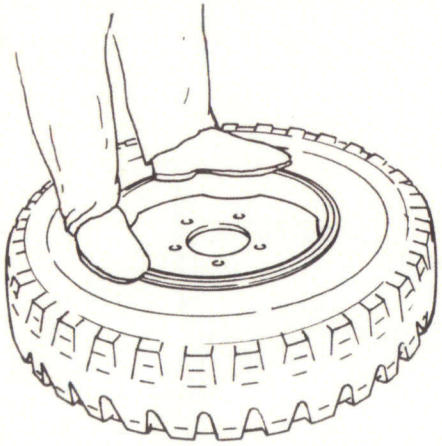


Figure 2-7 Side ring installation

NOTE

Ensure that the lock ring is assembled with the split opposite the matchmark on the rim.

l. Snap one end of the lock ring into the groove and progressively walk the lock ring into place.

WARNING

The wheel assembly must be placed in a cage, or if a cage is not available, beneath a vehicle.

m. Place the wheel assembly in a cage (see Fig. 2-8), or place the wheel beneath a vehicle (see Fig. 2-9) and partially inflate the tyre.

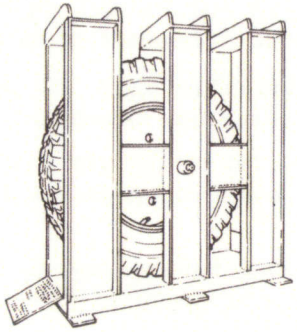


Figure 2-8 Tyre inflation — safety cage

Figure 2-9 Tyre inflation — beneath vehicle

WARNING

Do not hammer the lock ring or side ring when the tyre is inflated.

n. Check that the beads, side ring and lock ring are securely seated, then inflate the tyre to the required pressure.

Canopy

236. To fit a canopy to the vehicle proceed as follows:

a. Ensure that the four latches above the windscreen are in the released position (see Fig. 2-10).

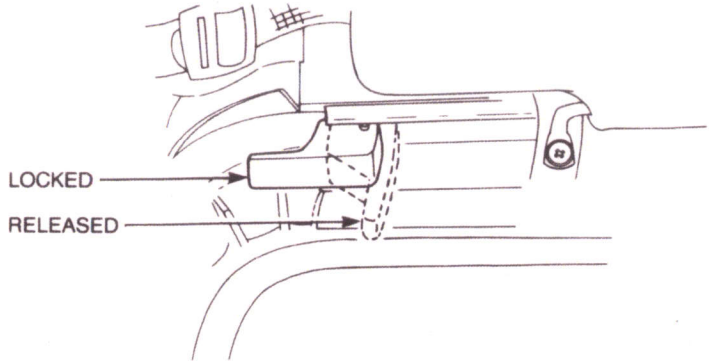


Figure 2-10 Canopy retaining latches

b. Position the canopy over the cabin then insert the canopy leading edge between the windscreen frame and the clamping frame. Lightly clamp the canopy in each corner with the vehicle body.

c. Roll the canopy back over the frame and align the canopy with the vehicle body.

d. Secure the canopy leading edge with the four latches.

e. Starting at the front of the canopy, secure all straps in the cabin area.

f. Secure all straps in the cargo area starting with the B-pillar, then secure the lower edge of the canopy to the body panel hooks using the rope.

g. Pull the canopy around the rear canopy bow and the ropes to the rear tie hooks.

h. Secure the two straps adjacent to the tailgate and lightly tension.

Windscreen lowering

237. To lower the windscreen proceed as follows:

a. Remove the wiper blades and arms. These are held onto the wiper motor shafts by spring clips.

b. Remove the nut and washer from the captive bolt at the top of the windscreen on each side.

c. Loosen the clamps at the bottom of the windscreen, then lower the windscreen onto the brackets on the bonnet.

d. Secure the windscreen to the brackets with the straps provided.

Towing the vehicle

238. 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 bullbar 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.

Battery replacement

239. To replace the main and auxiliary batteries, proceed as follows:

a. Stop the engine and ensure that the parking brake is applied.

b. Open the battery box lid using the budget key supplied, then unlock the sliding frame and slide the battery box out from the chassis.

c. Disconnect both negative battery terminals, then disconnect both positive terminals.

d. Remove the battery retaining frame and remove the batteries.

e. Install the new batteries and secure in position with the retaining frame. See para. 103 for the battery connection diagram.

f. Connect the positive battery terminals, then connect the negative terminals.

g. Slide the battery box towards the chassis and lock the sliding frame in position, then close the battery box lid.

Compressor operation

240. To operate the compressor proceed as follows:

WARNING

Ensure that the engine is turned off prior to engaging the compressor drive.

a. Depress the pin on the front of the clutch (see Fig. 2-11), then rotate the clutch head until the pin locates in one of the four drive slots in the drive pulley.

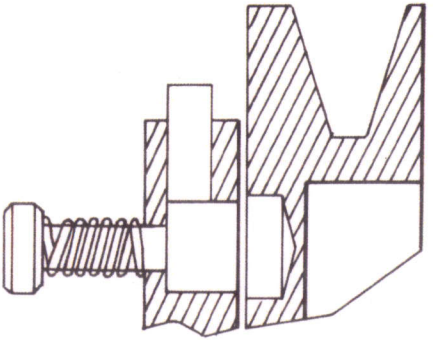


Figure 2-11 Air compressor drive

b. Start the engine and set the engine idle speed to 1000 rpm with the hand throttle.

c. Connect the air hose to the compressor outlet and carry out the required task.

WARNING

Stop the engine prior to disengaging the compressor drive.

NOTE

A centrifugal clutch is incorporated in the compressor drive that will disengage the drive if the engine is over revved. Manual dis-engagement of the drive is the preferred method.

d. Stop the engine and disengage the drive pin by raising the lever on the front of the compressor. The drive pin will return to a neutral position thereby disconnecting the compressor clutch to the drive pulley.

Winch operation

241. 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 a full layer 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.

242. 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 to disengage the dog-clutch (see Fig. 2-12). Reel out the winch rope as required.

NOTE

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

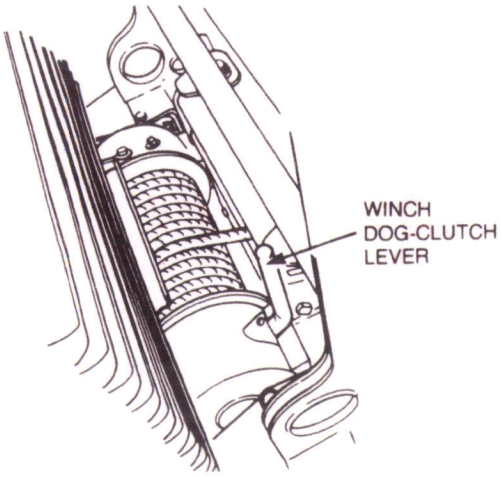


Figure 2-12 Winch dog-clutch operation

243. 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.

244. 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 out the winch/PTO control in the seat base (see Fig. 2-13) 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.

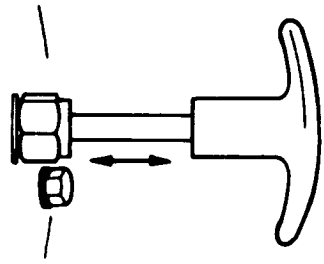


Figure 2-13 Winch/PTO control operation

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.

245. 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.

246. 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 out the winch/PTO control in the seat base (see Fig. 2-13) 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

1. 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.
2. An automatically re-setting torque limiter is incorporated in the winch power take-off. 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.

247. 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 in 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.

d. Disengage the winch dog-clutch by turning the dog-clutch lever to the vertical position.

e. On return to unit lines clean and grease the winch rope.

CHAPTER 3

OPERATOR SERVICING

SECTION 1 — SERVICING

SECTION 2 — LUBRICATION

SECTION 1
SERVICING

First parade servicing

301. 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.

302. Check the wheels and tyres for the following:

a. Loose wheel nuts.

b. Correct tyre pressure (see page 88).

c. Cuts, weak spots, uneven wear, exposed cords, or clogged tyres.

303. Check the following fittings:

a. All cabin and body fittings.

b. Spare wheel.

c. Stowage space, doors and lids.

d. Windscreen, 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.

304. 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.

305. Check the fuel, lubricants and coolant as follows:

a. Fuel level in tanks. 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

306. Start the vehicle as detailed in Chapter 2 Section 2 and check the following:

a.	Voltmeter	Any irregular readings 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

307. Check the following:

a.	Batteries	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

308. 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

309. 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.

310. 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

311. 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 oil 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 and lace-up canopy flaps.

Opening bonnet for servicing access

312. 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.

313. 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

314. 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. 3-1).

c. Using coolant with a mixture concentration of 5% Alfloc 2001, 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.

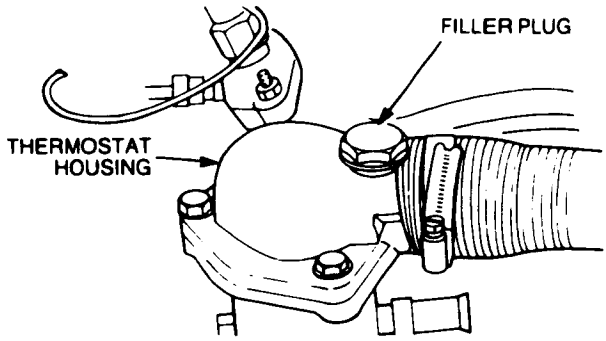


Figure 3-1 Thermostat housing

Bleeding the fuel system

315. 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. 3-2) 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.

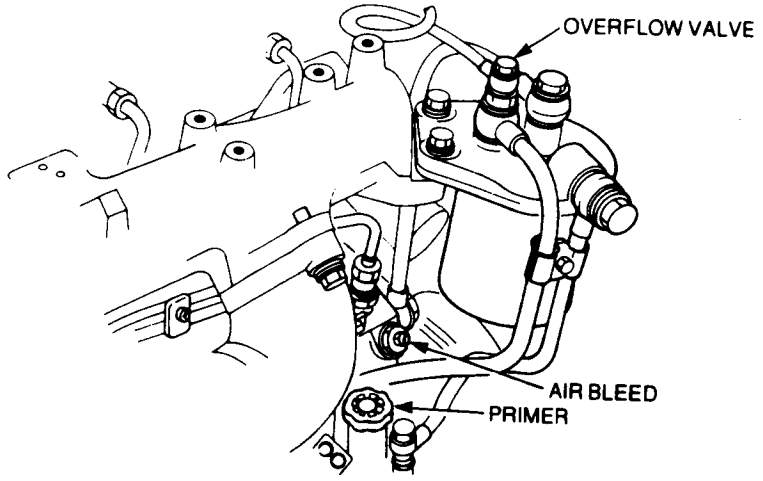


Figure 3-2 Bleeding the fuel system

316. Periodical maintenance

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 3-1 and 3-2 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 3-3, 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 3-4 and 3-5. 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 six months or 10 000 km of operation, whichever occurs first.

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

Special requirements

317. 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.

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

Table 3-1 Daily tasks

The following operations are to be performed by the driver:

1. Check engine oil level, top-up if necessary.
2. Check coolant level, top-up if necessary.
3. Check power steering reservoir, top-up if necessary.
4. Check tyres and wheels. Inflate tyres if necessary, inspect wheel nuts for evidence of looseness.
5. Check for fuel, oil and coolant leaks.

Table 3-1 Daily tasks (cont'd)

6. Check fuel supply and operation of fuel gauge.
7. Check voltmeter reading. With switch on and engine off, indicates battery condition. With engine running, reading indicates condition of charging system.
8. Check operation of horn.
9. Check all lights for correct operation and report any defects.
10. Check operation of footbrake, parking brake and clutch.
11. Check coolant temperature gauge reading.
12. Check operation of windscreen wipers and washers, top-up washer reservoir if required.
13. 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.
14. Check seats and seat belts for operation and security.
15. Check driving mirrors, door windows, catches and latches.
16. Check winch rope is properly secured.

Table 3-2 Fortnightly tasks

The following operations are to be performed by the driver:

1. 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. 7-12 mm for the air compressor fanbelts.
2. Batteries. Check level of electrolyte, top-up if necessary, examine terminals for cleanliness and security. Check for leaks and security, clean outside of batteries if required.
3. Check radiator external condition for restriction, clean if required.
4. If operating in dusty conditions, remove air cleaner elements and clean.
5. Check operation of hand throttle and stop control.
6. Check operation of differential lock control.

Table 3-2 Fortnightly tasks (cont'd)

7. Check operation of transfer case control.
8. Check condition of wheel rims, tyres and valve stems.
9. Check wheel nuts are torqued correctly.
10. Check operation and security of spare wheel carrier.
11. Check security of fuel tanks and lines.
12. Check fuel, oil and coolant systems for leaks.
13. Drain water from sedimenters.
14. Check winch rope is properly secured.
15. Check operation of air compressor.

Table 3-3 Initial servicing

The following operations are to be performed by the driver under supervision:

1. Start and warm up the engine.
2. Stop the engine, drain engine oil and refill.
3. Remove and replace oil filter.
4. Drain and refill transmission.
5. Drain and refill transfer case.
6. Drain and refill front axle.
7. Drain and refill rear axle.
8. Drain and refill swivel pin housings.
9. Lubricate propeller shafts and universal joints.
10. Lubricate winch propeller shafts and support bearings.
11. Lubricate winch dog-clutch.
12. Lubricate winch rope.
13. Lubricate pintle hook.
14. Check oil level in winch gearbox, top-up if necessary.
15. Check battery electrolyte level (10 mm above plates) and security of terminals.

Table 3-3 Initial servicing (cont'd)

16. Check all fuel and oil lines and unions for leaks.
17. Retorque all wheel nuts to correct specifications.
18. Check tyres and wheels, inflate if necessary. Inspect rims for damage.
19. Check operation of all lights and gauges.
20. Check for loose electrical connections.
21. Check operation of foot brake, parking brake and clutch.
22. Check exhaust systems for leaks, damage and security.

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

23. Retorque inlet and exhaust manifolds.
24. Check and adjust fanbelt tension. Retorque alternator mounting bolts.
25. Check torque of radiator mounting bolts, tighten as required.
26. Tighten all propeller shaft coupling drive bolts.
27. Replace primary fuel filter and bleed system.
28. Road Test. Carry out a road test on steering and brake system. Note all faults and rectify as necessary.

Table 3-4 Minor servicing

The following operations are to be performed by the driver under supervision:

1. Start and warm up engine.
2. Stop engine, drain engine oil and refill.
3. Remove and replace oil filter.
4. Check condition of engine mountings.
5. Check engine hand throttle and stop control for connections and operation.
6. Check all lights and gauges for correct operation, report defects.

Table 3-4 Minor servicing (cont'd)

7. Check condition of radiator shroud and fins. Clean fins as necessary.
8. Retorque radiator hose connections.
9. Check operation of footbrake, parking brake and clutch.
10. Check operation of windscreen wipers and washers.
11. Check condition of windscreen wiper blades.
12. Check battery electrolyte level (10 mm above plates) and security of terminals on all batteries. Check battery for cleanliness and security.
13. Check for oil, fuel and coolant leaks. Report any defects.
14. Check tyres and wheels, inflate if necessary. Inspect rims for damage.
15. Drain fuel sedimenters.
16. Drain flywheel housing.
17. Check air cleaner, remove, clean and install. If indicator shows "red" replace elements.
18. Check exhaust system for leaks, damage and security.
19. Check front shock absorbers for leaks, damage and security.
20. Inspect front and rear springs for damage.
21. Check oil level in front axle, top-up if necessary.
22. Check oil level in rear axle, top-up if necessary.
23. Check oil level in transmission, top-up if necessary.
24. Check oil level in transfer case, top-up if necessary.
25. Check oil level in swivel pin housings, top-up if necessary.
26. Check oil level in winch gearbox, top-up if necessary.
27. Check brake, fuel and clutch pipes for chafing, leaks or corrosion.
28. Check condition of fanbelts.
29. Check radiator coolant, top-up if necessary.
30. Check brake servo hose for security and condition.
31. Check steering damper for leaks.

Table 3-4 Minor servicing (cont'd)

32. Check brake fluid reservoir, top-up if necessary.
33. Check clutch fluid reservoir, top-up if necessary.
34. Lubricate pintle hook.
35. Lubricate parking brake mechanical linkage.
36. Lubricate accelerator control linkage and pedal pivot.
37. Lubricate all hinges and mirror arms.
38. Lubricate propeller shafts and universal joints.
39. Lubricate winch propeller shafts and support bearings.
40. Lubricate winch dog-clutch.
41. Lubricate winch rope.
42. Check operation of spare wheel carrier.
43. Check security of additional equipment.
44. Check driving mirrors, door windows, hinges, catches and latches.

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

45. Inspect front and rear brake pads for wear, calipers for leaks and the condition of the discs.
46. Adjust parking brake.
47. Check condition and security of steering unit, joints and boots.
48. Clean fuel pump strainer.
49. Check and adjust fanbelt if necessary.
50. Check and adjust engine idle.
51. Check and adjust steering box.
52. Check and adjust headlights.
53. Check front wheel alignment.
*54. Drain and refill cooling system.

* Coolant to be changed at 10 000 km, then every two years.

Table 3-5 Major servicing

NOTE

Servicing of the air compressor is only required after a major overhaul.

The following operations are to be performed by the driver under supervision:

1. Start and warm up engine.
2. Stop engine, drain engine oil and refill.
3. Remove and replace oil filter.
4. Check condition of engine mountings.
5. Check engine hand throttle and stop control for connections and operation.
6. Check all lights and gauges for correct operation, report defects.
7. Check condition of radiator shroud and fins. Clean fins as necessary.
8. Retorque radiator hose connections.
9. Check operation of foot brake, hand brake and clutch.
10. Check operation of windscreen wipers and washers.
11. Check condition of windscreen wiper blades.
12. Check battery electrolyte level (10 mm above plates) and security of terminals on all batteries. Check for cleanliness and security.
13. Check for oil, fuel and coolant leaks. Report any defects.
14. Check tyres and wheels, inflate if necessary. Inspect rims for damage.
15. Drain fuel sedimenters.
16. Replace fuel filter.
17. Check air cleaners, remove, clean, and install. Fit new elements if indicators show "red".
18. Check exhaust system for leaks, damage and security.

Table 3-5 Major servicing (cont'd)

19. Check front and rear shock absorbers for leaks, damage and security.
20. Check front and rear springs for damage.
*21. Drain and refill front axle.
*22. Drain and refill rear axle.
*23. Drain and refill swivel pin housings.
*24. Drain and refill transmission.
*25. Drain and refill transfer case.
*26. Drain and refill winch gearbox.
27. Check brake, fuel and clutch pipes for chafing, leaks or corrosion.
28. Check condition of fanbelts.
29. Check radiator coolant, top-up if necessary.
30. Check brake servo hose for security and condition.
31. Check steering damper for leaks.
32. Check power steering reservoir level, top-up if necessary.
†33. Drain, refill and bleed the brake system at six monthly intervals in tropical environments.
*34. Renew brake servo filter.
†35. Drain, refill and bleed the clutch system at six monthly intervals in tropical environments.
36. Lubricate pintle hook.
37. Lubricate parking brake mechanical linkage.
38. Lubricate accelerator control linkage and pedal pivot.
39. Lubricate all hinges.
40. Lubricate propeller shafts and universal joints.
41. Lubricate winch propeller shafts and support bearings.
42. Lubricate winch dog-clutch.
43. Lubricate winch rope.
44. Check propeller shaft coupling bolts.
45. Check operation of spare wheel carrier.

Table 3-5 Major servicing (cont'd)

46. Check security of additional equipment.
47. Check driving mirrors, door windows, hinges, catches and latches.

* Every second major service (40 000 km).

† To be carried out North of the Tropic of Capricorn.

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

48. Inspect front and rear brake pads for wear, calipers for leaks and the condition of the discs.
49. Adjust parking brake.
50. Check condition and security of steering unit, joints and boots.
51. Clean fuel pump strainer.
52. Check and adjust fanbelts, if necessary.
*53. Inspect fuel injectors and injection pump.
54. Test glow plugs.
55. Clean engine breather filter.
56. Check and adjust engine idle.
57. Check and adjust steering box.
58. Check front wheel alignment.
59. Adjust valve clearances.
60. Inspect front radius arm and panhard rod bushes.
61. Inspect rear top link ball joint.
62. Inspect swivel pin housing bushes.
63. Clean, dismantle and inspect front and rear hub bearings.
64. Inspect propeller shaft universal joints and sliding joints.
65. Check roll bar security.
66. Check seat belt operation.

* Clean and spray test injectors at 60,000 km.

Tyre pressure (cold)

Highway: front	250 kPa (36 psi)
rear	375 kPa (54 psi)
Cross-country: front	200 kPa (29 psi)
rear	275 kPa (40 psi)
Sand: front	150 kPa (22 psi)
rear	225 kPa (33 psi)

SECTION 2
LUBRICATION

319. Table 3-6 details the lubricants required for vehicle servicing. However, refer to EMEI VEH G 139 for the approved list of lubricants and servicing instructions.

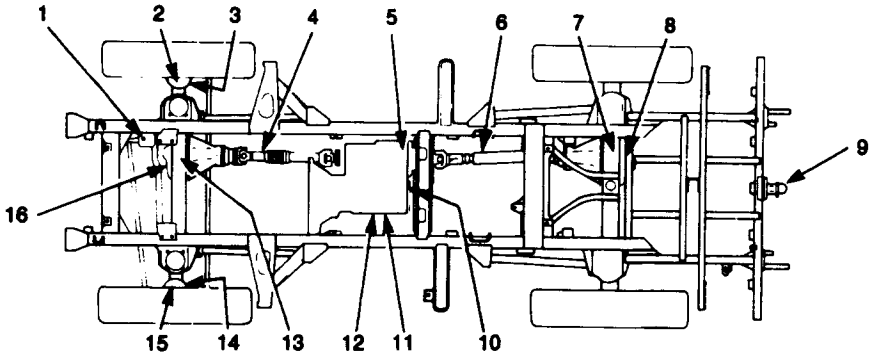
Table 3-6 List of Lubricants

Equipment	Lubricant	Capacity (litres)
Engine (including filter)	OMD-115	8.5
Transmission	OMD-115	2.7
Transfer Case (with PTO)	OMD-115	5.8
Front Axle	OEP-220	1.7
Rear Axle	OEP-220	2.7
Swivel Pin Housings	OEP-220	0.35 (each)
Brake Master Cylinder	OX (Aust) 8	Fill to level
Clutch Master Cylinder	OX (Aust) 8	Fill to level
Steering Box (including reservoir)	OX 46	1.25
Winch	OEP-220	1.3
Winch Rope	ZX-8	As required
Chassis Lubrication	XG-274	As required
Wheel Bearings	XG-274	As required

320. Fig. 3-3 illustrates the location of various lubrication and oil drainage/refill points around the vehicle.

NOTE

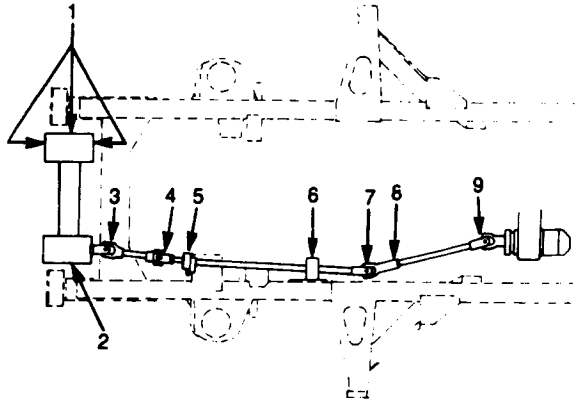
Run the engine or drive the vehicle as appropriate to warm oils before draining.



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 nipple
5. Transfer case drain plug
6. Rear propeller shaft grease nipple
7. Rear axle drain plug
8. Rear axle fill plug
9. Pintle
10. Transfer case fill plug
11. Transmission fill plug
12. Transmission drain plug
13. Front axle drain plug
14. Left hand swivel pin housing fill plug
15. Left hand swivel pin housing drain plug
16. Front axle fill plug

Figure 3-3 Lubrication and oil drain/refill points

321. Fig. 3-4 illustrates the location of lubrication and oil drainage/refill points on the winch and winch drive line.



1. Winch grease points
2. Winch drain and fill plugs
3. Universal joint grease nipple
4. Universal joint grease nipple
5. Drop block bearing grease nipple
6. Pillow block bearing grease nipple
7. Universal joint grease nipple
8. Slip joint grease nipple
9. Universal joint grease nipple

Figure 3-4 Winch and winch drive line

Engine oil and oil filter change procedure

322. 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. 3-5) and drain the oil into a suitable receptacle before the engine cools. Remove the drain plug from the oil filter adapter (see Fig. 3-5) and drain the oil into a suitable receptacle. Fit new sealing washers to both drain plugs and install the drain plugs in their respective positions.

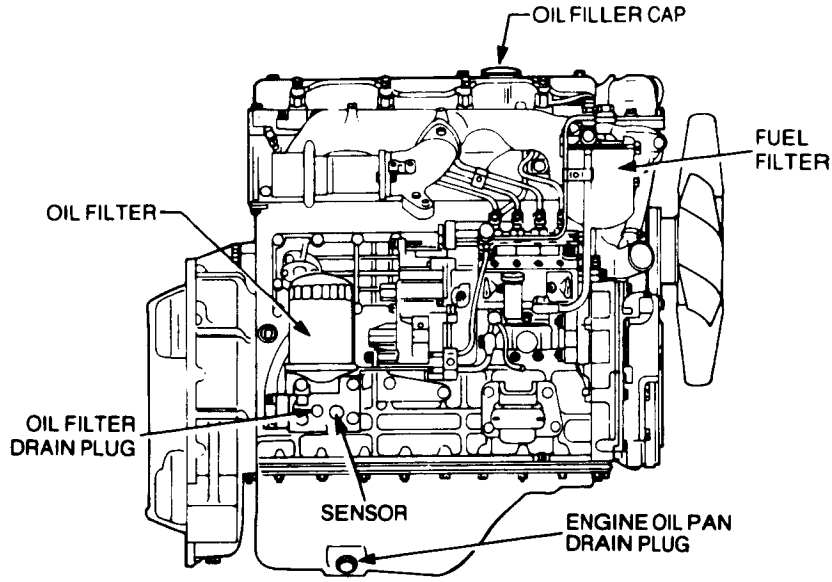


Figure 3-5 Engine — right hand side

323. Unscrew the oil filter cartridge counter-clockwise, using a suitable oil filter removing tool if necessary (see Fig. 3-6). Apply a film of clean engine oil on the rubber seal of the new filter cartridge and install the filter. After the filter seal contacts the adapter, tighten the filter a further half a turn by hand only.

324. 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.

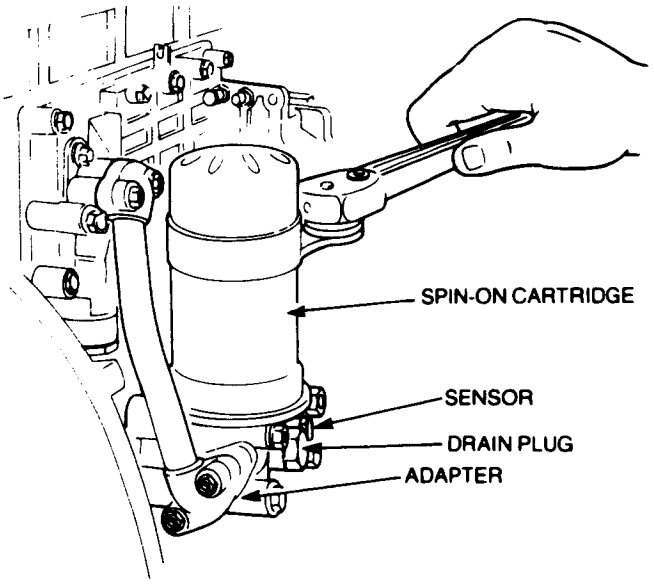


Figure 3-6 Oil filter removal

Transmission

325. 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.

326. The transmission fill plug is adjacent to the drain plug (see Fig. 3-7). Fill the transmission with the recommended lubricant to the bottom of the fill hole.

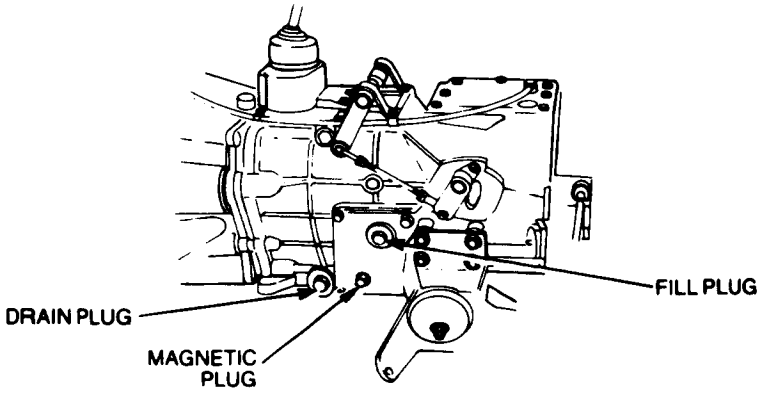


Figure 3-7 Transmission drain and fill plugs

Transfer case

327. The transfer case drain plug is located in the bottom of the PTO housing (see Fig. 3-8). The plug should be cleaned each time the transfer case oil is drained. Use a new sealing washer on installation.

328. The transfer case fill plug is located on the rear of the housing (see Fig. 3-8). Fill the transfer case with the recommended lubricant to the bottom of the fill hole.

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

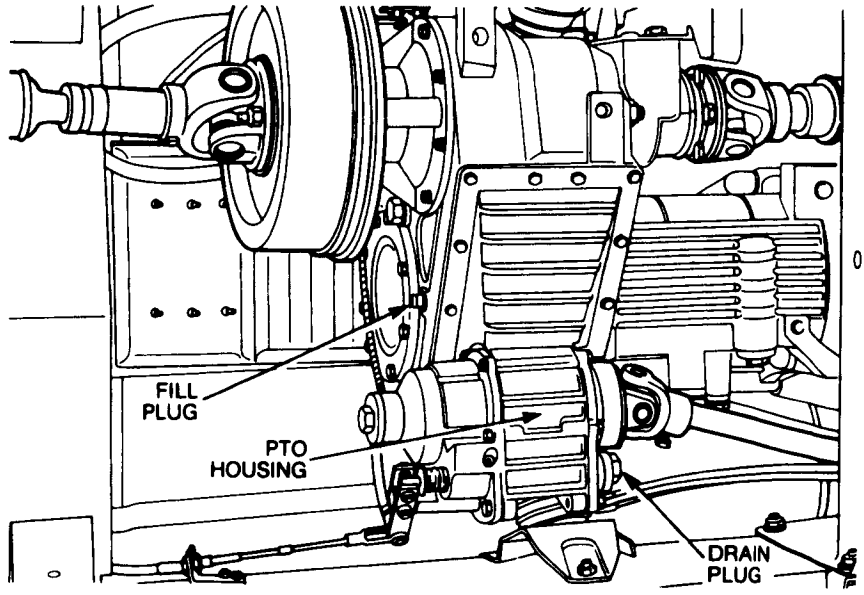


Figure 3-8 Transfer case drain and fill plugs

Rear axle

330. The drain plug is located on the bottom of the housing, while the fill plug is located on the rear cover (see Fig. 3-9). Fill the differential with the recommended lubricant to the bottom of the fill hole.

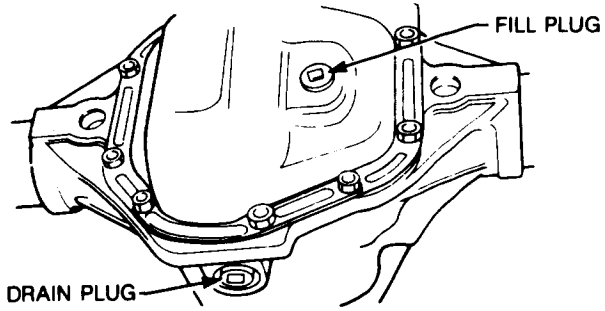


Figure 3-9 Rear axle drain and fill plugs

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

Front axle

332. 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.

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

Steering reservoir/box

334. 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

335. The location of the drain plug and the fill plug is shown in Fig. 3-10. To drain the swivel pin housing, remove both the fill and drain plugs and drain the oil into a suitable receptacle. Fill the swivel pin housing with the recommended lubricant to the bottom of the fill plug.

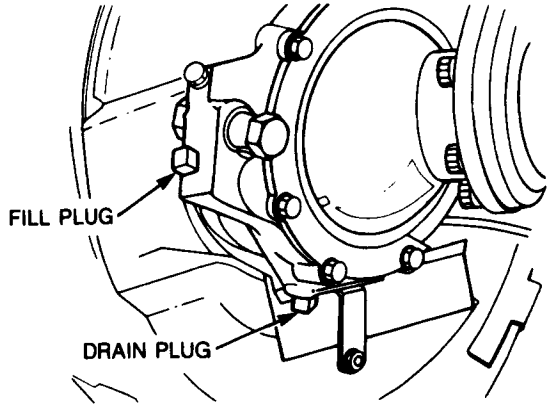


Figure 3-10 Swivel pin housing drain and fill plugs

Propeller shafts

336. The propeller shafts are each fitted with a grease nipple (see Fig. 3-3 items 4 and 6) and lubrication is required each service.

Towing pintle

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

Fuel filter

338. Place a suitable container beneath the fuel filter, then, using a suitable filter-removing tool, remove the filter (see Fig. 3-11). 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 Chapter 3 Section 1.

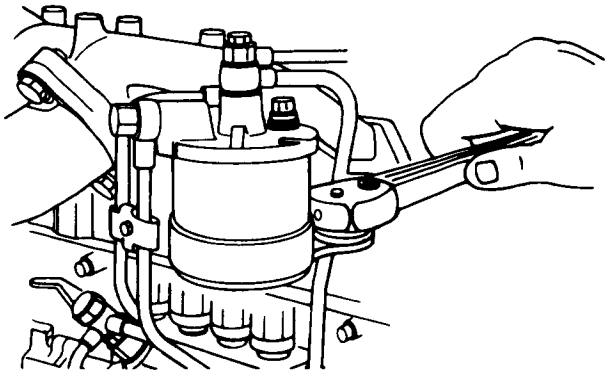


Figure 3-11 Fuel filter

Fuel sedimenters

339. Two fuel sedimenters, are located on the cabin rear crossmember forward of the rear spring mounting. A drain plug is fitted to allow the contents to be drained (see Fig. 3-12). Bleed the fuel system as detailed in Chapter 3 Section 1.

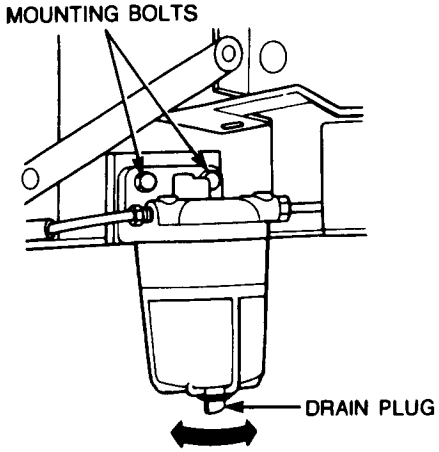


Figure 3-12 Fuel sedimenters

Air cleaner

340. 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. 3-13) then remove the two wing nuts from the clamp bolts. Carefully lift the air cleaner out of the mounting brackets.

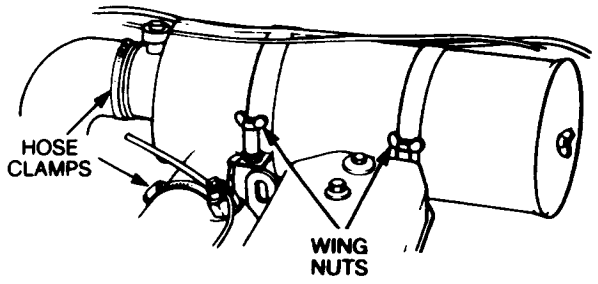


Figure 3-13 Air cleaner removal

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. 3-14).

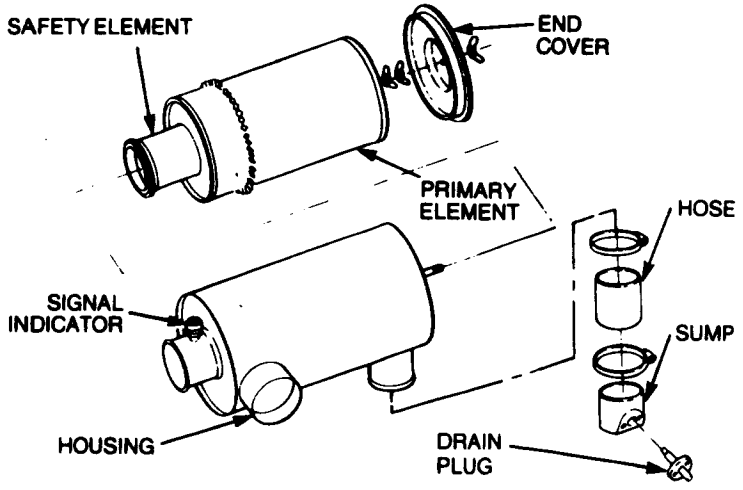


Figure 3-14 Air cleaner elements

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. To empty the dust from the dust sump remove the plug from the sump.

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

341. 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. 3-15 for reservoir location.

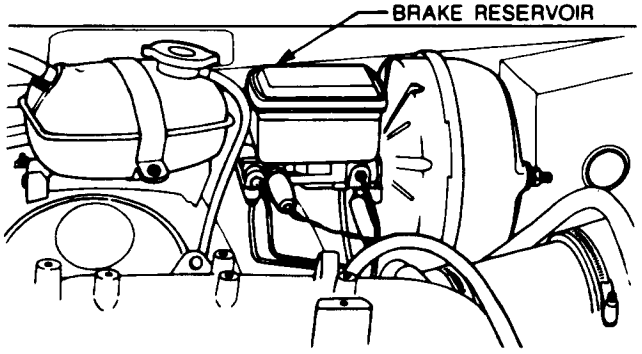


Figure 3-15 Brake reservoir

Clutch reservoir

342. 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. 3-16 for reservoir location.

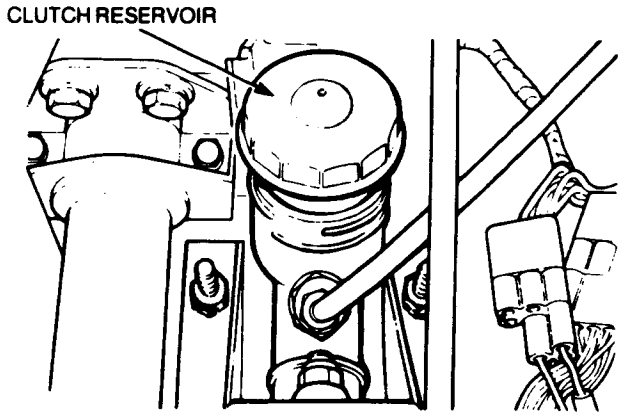


Figure 3-16 Clutch reservoir

Winch

343. Remove the winch gearbox fill plug (see Fig. 3-17) and check that the oil level is up to the bottom of the fill plug. Top-up if necessary.

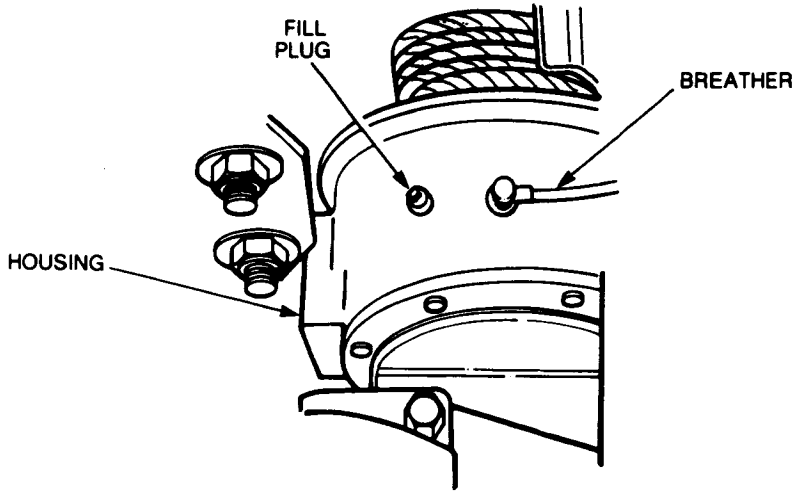


Figure 3-17 Winch fill plug

344. The winch drive line is fitted with seven grease nipples which require lubrication each service.

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.

345. 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.

346. 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.

347. Ensure that the winch breather is not restricted.

SIMPLEX COMPLETE EQUIPMENT SCHEDULE 12109
TRUCK, SURVEILLANCE, LIGHTWEIGHT, WINCH, MC2 — LAND ROVER 110
LIABILITY CODE 73260/01

ITEMS SUPPLIED/ISSUED WITH TRUCK

PART 1— Principal Items

NIL

PART 2A — Items Essential to Operation of Equipment

Item No.	NATO Stock No.	Designation	Unit of Issue	Quantity per sub-assembly	Quantity per equip-ment	Expend-ability classi-fication	Foot-note
1	5120-66-048-8548	Baseplate, Jack, Wooden, 12 in. x 12 in. x 2 in.			1	X	
2	NIC	Battery, Storage, 12V, 15 Plate, 93 Amp/hr, 343 mm Lg x 173 mm W x 245 mm H (Exide Cycle X Plus, CX4)			2	N	
3	8115-66-022-0114	Box, Small Parts, Plastic, 4-1/2 in. Lg x 2-1/2 in. W x 2-3/4 in. H, W/Lid			1	N	
4	7530-66-107-1001	Book, Record, TGM 120, Record Book for Service Equipment			1	X	B
5	4010-66-021-7290	Chain Assembly, Single Leg, W/Hook, Oblong Link and Removable Joining Links, Chain Size 3/8 in. Gauge by Approx. 5 ft. 3 in. Free Length			1	N	

Item No.	NATO Stock No.	Designation	Unit of Issue	Quantity per sub-assembly	Quantity per equip-ment	Expend-ability classi-fication	Foot-note
6	2990-66-115-4636	Pipe, Exhaust, Flexible Extension, 51 mm ID x 3 m Lg, Galvanized			1	N	
7	4210-66-089-8751	Extinguisher, Fire, Vaporizing Liquid, Bromochlorodifluoromethane, 1.50 kg Capacity, Stored Pressure, Regulated Discharge Type			1	N	
8	NIC	Gauge, Tyre Pressure, Self Contained, Portable Bar Type			1	X	
9	2610-66-010-7864	Inner Tube, Pneumatic Tyre, Light Truck, 7.50 16, TR15 Valve			1	N	A
10	5120-66-012-6101	Jack, Hydraulic, Hand, Double Lift, 7-1/2 in. Closed H, 17 in. Extended, 5 Ton W/Handle			1	N	
11	5120-66-014-0251	Pliers, Combination Side Cutting, W/Pipe Grip and Serrated Jaws, Insulated, 6 in. Nom. Lg			1	N	
12	4320-00-852-9036	Pump, Inflating, Manual, Hand Operated, Single Action, W/30 in. Lg Hose and Adapter			1	X	
13	5140-66-067-5483	Roll, Tools and Accessories, Cloth Coated Nylon, 2 Pockets, 14 Loops, 690 mm Lg x 380 mm W, W/2 Flaps			1	X	
14	5120-66-024-7832	Screwdriver, Crosstip, Cellulose Acetate Handle, Phillips No. 3 x 150 mm Lg Blade			1	X	
15	5120-66-026-0206	Screwdriver, Flat Tip, Cellulose Acetate Handle, 8 mm W Tip x 150 mm Lg Blade			1	N	
16	NIC	Tyre, Pneumatic, Light Truck, Tubed 7.50 R 16 LT, 8 Ply			1	N	A

Item No.	NATO Stock No.	Designation	Unit of Issue	Quantity per sub-assembly	Quantity per equip-ment	Expend-ability classi-fication	Foot-note
17	NIC	Wheel Chocks			2	N	
18	NIC	Wheel, Pneumatic Type, 6.00G SDC x 16			1	N	A
19	5120-66-013-6747	Wrench, Open End, Adjustable, 250 mm Nom Size			1	X	
20	5120-66-016-1257	Wrench, Open End, Fixed, Double Ended, 15 Degree Offset, 1/2 in. and 9/16 in. A/F			1	N	
21	5120-66-016-0098	Wrench, Ring, Bi-Hexagon, Double Offset, Double Ended, 1/2 in. and 9/16 in. A/F			1	X	
22	NIC	Wrench, Socket, Wheelnut, 4 Way Type 15/16 in. and 1-1/16 in. x 16 in. Nom. Lg O/A			1	N	
		Part 2B — Optional Equipment — To Be Demanded Separately					
23	NIC	Equipment Kit, Vehicular, Truck, Lightweight, MC2, 4 x 4, 4 Cylinder Diesel Engine, Manual Transmission, 12V Electrical System, Land Rover Model 110 Series (SCES 12036)			1	N	

Footnotes

A. Spare.

B. Individual pages to be demanded as per User Catalogue for Stationery Supplies (FORMS).

SIMPLEX COMPLETE EQUIPMENT SCHEDULE 12036
EQUIPMENT KIT

ITEMS REQUIRED TO MAKE UP THE EQUIPMENT KIT

PART 1— Principal Items

NIL

PART 2A — Items Essential to Operation of Equipment

Item No.	NATO Stock No.	Designation	Unit of Issue	Quantity per sub-assembly	Quantity per equip-ment	Expend-ability classi-fication	Foot-note
1	5110-66-011-0377	Axe, Single Bit, 2 kg, 820 mm Lg			1	X	
2	7240-66-021-5710	Can, Dispensing, Funnel Top, Tin Plate, 1 pint Capacity, W/O Handle			1	X	
3	7240-99-802-2405	Can, Gasoline, Military, Steel, 4-1/2 gallon			2	N	
4	8110-66-016-0717	Can, Screw Cap, Oil, Rect Shape, 5 Litre			1	N	
5	7240-66-054-8602	Can, Water, Military, Plastic, 22 Litre			2	X	
6	2640-00-060-3550	Cap, Pneumatic Valve, Brass, Sealing and Deflating, 5/16 in. Unif Int Thd			5	X	
7	4010-66-086-8463	Chain Assembly, Single Leg, Alloy Steel, 9/32 in. Dia Oblong Link One End, Latch Hook Other End 3.75 m Lg, 3136 lb. Swl	AY		1	N	
8	5120-66-012-6821	Handle, Mattock-Pick, 5 lb. Pick			1	X	
9	5340-66-025-0498	Holder Key, Steel, 3/4 in. ID			2	X	
10	5970-66-018-8475	Insulation Tape, Electrical, Black, 18 mm W x 33 m Lg			1	X	

Item No.	NATO Stock No.	Designation	Unit of Issue	Quantity per sub-assembly	Quantity per equip-ment	Expend-ability classi-fication	Foot-note
11	6240-66-022-3583	Lamp, Incandescent, 12V, 21/6 W, Double Contact Bayonet Candelabra Indexing (Bay 15D)			2	X	
12	6240-66-010-8161	Lamp, Incandescent, 12V, 21 W, Single Contact Bayonet Candelabra Base, 'S' Shape, Clear			2	X	
13	6240-66-013-8678	Lamp, Incandescent, 12V, 6 W, Single Contact Bayonet (BA 9S) Base, 'S' Shape, Clear			2	X	
14	6240-66-010-7460	Lamp, Incandescent, 12V, 5 W, Single Contact Bayonet Candelabra Base, 'G' Shape, Clear			3	X	A
15	6230-99-942-7876	Light, Extension, C/W Cable and Plug, W/O Globe			1	N	
16	5340-66-020-2790	Padlock, Brass, Solid Case, Steel Shackle, 45 mm W, 19 mm Shackle Clearance			2	X	
17	5120-66-012-6893	Pick, Digging, W/O Handle, 5 lb.			1	X	
18	4030-66-123-1450	Shackle, Dee, Alloy Steel, Quality Grade S, 19 mm Nom Size, C/W Metric Thd Collard Eye Pin, 4.7 Tonne Wll, Zinc Coated			2	X	
19	5120-66-093-8563	Shovel, Hand, GS, Rd Point Blade, Plastic D-Handle, Black or Dark Green, 35-1/2 in. Lg O/A			1	X	
20	9905-66-018-3897	Sign, Warning, Portable, Motor Vehicle			3	X	
21	9905-66-048-0206	Tag, Marker, Brass, Rd, 1-1/4 in. Dia.			2	X	
22	2640-00-050-1229	Valve Core, Pneumatic Tyre			5	X	
24	7240-66-063-2338	Filler Neck, Pourer, Goose Neck Type, Jerrican			1		

Item No.	NATO Stock No.	Designation	Unit of Issue	Quantity per sub-assembly	Quantity per equip-ment	Expend-ability classi-fication	Foot-note

Part 2B — Optional Equipment — To Be Demanded Separately

NIL

Footnotes

A. Qty. 1 for Light Extension, two spare.

INDEX

A

B

C

D

E

F

G

H

I

J

K

L

M

N

O

P

Q

R

S

T

U

V

W