TRUCK, SURVEILLANCE, LIGHTWEIGHT, W/WINCH, W/SIDE STOWAGE, W/REAR SEAT, MC2 – LANDROVER 110 4X4

TECHNICAL DESCRIPTION

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

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Introduction

1. This EMEI contains the Technical Description of the Truck, Surveillance, Lightweight, W/Winch, W/Side Stowage, W/Rear Seat, MC2 – Landrover 110 4x4. All relevant weights, dimensions and performance figures are detailed in the Data Summary EMEI Vehicle G 090. The vehicle has been modified to incorporate heavy duty front and rear axles with higher spring rates, revised transfer case gearing, an engine-mounted air compressor, increased capacity fuel tanks, power steering and accommodation for two spare wheels. Storage areas have been added for special equipment, rations and vehicle spares. The mechanical characteristics of the remaining components are the same as the Truck, Cargo, Lightweight, Winch, MC2, therefore, for further information relating to mechanical functions of this vehicle, refer to EMEI Vehicle G 102.

Associated Publications

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

a. Defence Road Transport Instructions;

b. Complete Equipment Schedules (CES):

(1) SCES TBA; and

(2) Maintenance Kit SCES 12142;

c. EMEI Vehicle A 291-5 – General Service B Vehicle Tyre Guide – Operating Instructions;

d. EMEI Vehicle G 090 – Truck, Surveillance, Lightweight, W/Winch, W/Side Stowage, W/Rear Seat, MC2, Land Rover 110 4×4 – Data Summary;

e. EMEI Vehicle G 093 – Truck, Surveillance, Lightweight, W/Winch, W/Side Stowage, W/Rear Seat, MC2, Land Rover 110 4×4 – Light Grade Repair;

f. EMEI Vehicle G 094 – Truck, Surveillance, Lightweight, W/Winch, W/Side Stowage, W/Rear Seat, MC2, Land Rover 110 4×4 – Medium and Heavy Grade Repair;

g. EMEI Vehicle G 098-1 – Truck, Surveillance, Lightweight, W/Winch, W/Side Stowage, W/Rear Seat, MC2, Land Rover 110 4×4 – Inspection for Useability;

h. EMEI Vehicle G 102 – Truck, Utility, Lightweight and Truck, Utility, Lightweight, Winch, MC2 - Land Rover 110 4X4 – Technical Description;

i. EMEI Vehicle G 103 – Truck, Utility, Lightweight, MC2, Land Rover 110 and Truck, Utility, Lightweight , W/Winch, MC2, Land Rover 110 – Light Grade Repair;

j. EMEI Vehicle G 104-1 – Truck, Utility, Lightweight, MC2, Land Rover 110 and Truck, Utility Lightweight, W/Winch, MC2, Land Rover 110 – Medium Grade Repair;

k. EMEI Vehicle G 104-2 Truck, Utility, Lightweight, MC2, Land Rover 110 and Truck, Utility Lightweight, W/Winch, MC2, Land Rover 110 – Heavy Grade Repair;

l. EMEI Workshop D 701 – Repair Policy for Equipment Painted in Polyurethane Paint;

m. EMEI Workshop E 404 – Hazardous Substances – Chemical (HAZCHEM);

n. EMEI Workshop E 410 – Occupational Health and Safety – Asbestos – General Instruction;

o. GM 120 – Record Book for Service Equipment – Army;

p. Material Safety Data Sheets (MSDS);

q. Repair Parts Scale (RPS) 02188 (base vehicle);

r. RPS 02290; and

s. Current version of the Technical Regulation of Army Materiel Manual (TRAMM) (available from DTR-A website http://intranet.defence.gov.au/armyweb/Sites/DTRA).

Location of Identification Numbers

3. The locations of identification numbers on the vehicle are described in Table 1.

Table 1 Location of Identification Numbers

Serial	Ident	Location
1	Chassis No	Right-hand side of the chassis, forward of the spring mounting turret
2	Chassis nameplate	Left-hand seat box, in the cabin
3	Engine No	Left-hand side of the engine block
4	Injection pump identification	Side of the pump
5	Transmission and transfer case	Rear of the transfer case
6	Torque limiter	On the rear end of the drive plate
7	Front axle No	Adjacent to the axle breather
8	Rear axle No	Adjacent to the axle breather
9	Rollover protection	Front, lower centre of the front bar

GENERAL INFORMATION

Air Cleaner

4. A Donaldson Duralife air cleaner is utilised for the filtering of the air used in the engine's combustion process. The air cleaner assembly is mounted on the rear of the engine and held in position by two metal bands.

Fuel System

5. The vehicle is equipped with two fuel tanks; a 62 litre main tank and a 50 litre auxiliary tank located under the driver and passenger seats respectively. The system also incorporates low pressure fuel pipes/hoses, a motor driven fuel change over valve, two CAV chassis mounted sedimenters, a Diesel Kiki fuel transfer (supply) pump, an Isuzu main fuel filter, a Diesel Kiki fuel injection pump, high pressure fuel pipes and Diesel Kiki injectors.

Air Compressor

6. An ARB electric compressor is fitted to the right-hand side of the engine bay and is used for the inflation of tyres. The compressor has the capability of delivering air at a rate of 61.6 litres per second and a maximum pressure of 690 kPa.

Transfer Case

7. The transfer case is combined with a Land Rover Model LT95A transmission and provides high and low ratio gear ratios for on and off road driving. The high range transfer case gears have a ratio of 1.123:1 to provide increased torque output during high range operation.

Front Axle

8. The vehicle is fitted with a heavy duty steerable front drive axle with a load rating of 1500 kg. A bevel type differential with a ratio of 3.54:1 transmits drive via enclosed constant velocity joints to the front wheels.

Rear Suspension

9. Long travel single rate coil springs, with coil assist spring inserts, are utilized on the rear axle. Two double-acting shock absorbers are fitted to the rear axle to dampen spring rebound, while chassis mounted pads control axle bump. The rear suspension has a design load limit of 2100 kg.

Brakes

10. The brake system is hydraulically operated, using Lockheed disc brakes at the front and rear wheels. A pedal actuated PBR tandem master cylinder, with pressure differential and servo (vacuum) assistance, applies the pressure required to operate the brakes. Brake hydraulic fluid is stored in a reservoir on top of the master cylinder.

Steering

11. An Adwest Varamatic power assisted, variable ratio, worm and roller type steering box is used for the vehicle steering. The steering box is mounted on the chassis rail and connected to the front wheel steering knuckles by means of a drag link (cross rod) and a track rod. A steering damper, connected between the drag link and the chassis, absorbs road shock feedback transmitted by the front wheels. A three-piece steering column connects the steering wheel to the steering box for driver control. A gear-driven pump, mounted on and driven by the engine, pumps fluid under high pressure to assist with the rotation of the sector shaft. The high pressure fluid acts against and moves a rack, which in turn, pushes against a gear on the sector shaft, rotating the sector shaft in accordance with the direction that the steering wheel is turned.

Electrical System

12. The vehicle utilizes a 12-volt electrical system for engine starting and vehicle lighting. The electrical system incorporates two 12-volt 93 A.h. batteries; a main vehicle battery and an auxiliary battery. A transistorised battery isolator, incorporated in the electrical system, ensures that if either battery discharges the other battery will not be affected. An auxiliary power outlet socket is located in a box on the bulkhead of the cargo area. A fuse incorporated in the box protects the outlet circuit.

Brushguard

13. A lightweight brushguard is fitted to the front of the vehicle. The brushguard has mountings for the winch and driving lights. Side bars, from the outer edge of the brushguard to the front cross member behind the front wheels, protect the wheels and wheel arch.

Driving Lights

14. The vehicle is equipped with two 12-volt 100 Watt driving lights. The lights are fitted with single filament quartz halogen bulbs and are secured by their mounting bolts to brackets on the brush guard.

Wheels

15. The wheel assembly (Figure 1) comprises a 6F X 16, 5-stud, ventilated Sankey-Benson disc wheel with a split rim. Refer to EMEI Vehicle A 291-5 for the correct tubes, tyres and tyre pressures.

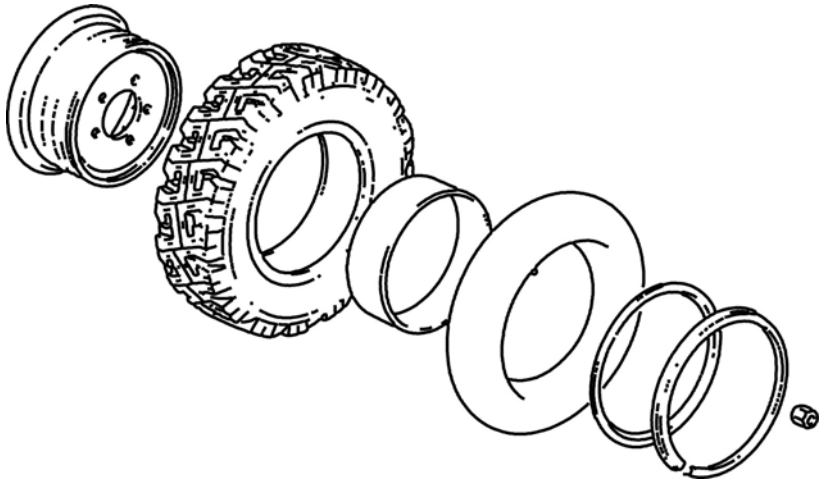


Figure 1 Tyre, Tube and Split Rim

Rollover Protection Structure (ROPS)

16. The ROPS consists of a lower and upper assembly. The lower assembly consists of bracing plates and supports built into the cargo tray. The upper assembly consist of a tubular frame at the front and a bow at the rear. The upper assembly is bolted to the cargo tray. A camouflage net stowage frame assembly is bolted to the front frame.

Rear Cargo Area

17. The vehicle rear cargo area contains a rearward facing seat, storage bins, side stowage baskets mounted on the outside of the vehicle, an under-tray bin assembly and cargo restraints for packs, ammunition and cam poles. A spare

wheel carrier is mounted on the rear of the vehicle. Due to the additional width of the side stowage baskets, 6x6 mirror arms are used to extend the mirrors for clear rear-view vision.

DETAILED DESCRIPTION

Air Cleaner

18. Air Cleaner Type. A Donaldson Duralife air cleaner is utilised for the filtering of the air used in the engine's combustion process. The air cleaner assembly is mounted on the rear of the engine and held in position by two metal bands. Incorporated within the air cleaner assembly's housing are two elements, the primary element and the safety element. The primary or main element is a dry type paper element with a perforated metal surround and a plastic fin assembly fitted to one end. When the element is installed, the fin assembly is positioned toward the air inlet port in the housing.

19. Air Cleaner Components. An exploded view of the air cleaner assembly and its components, including hoses and mountings, is shown in Figure 2.

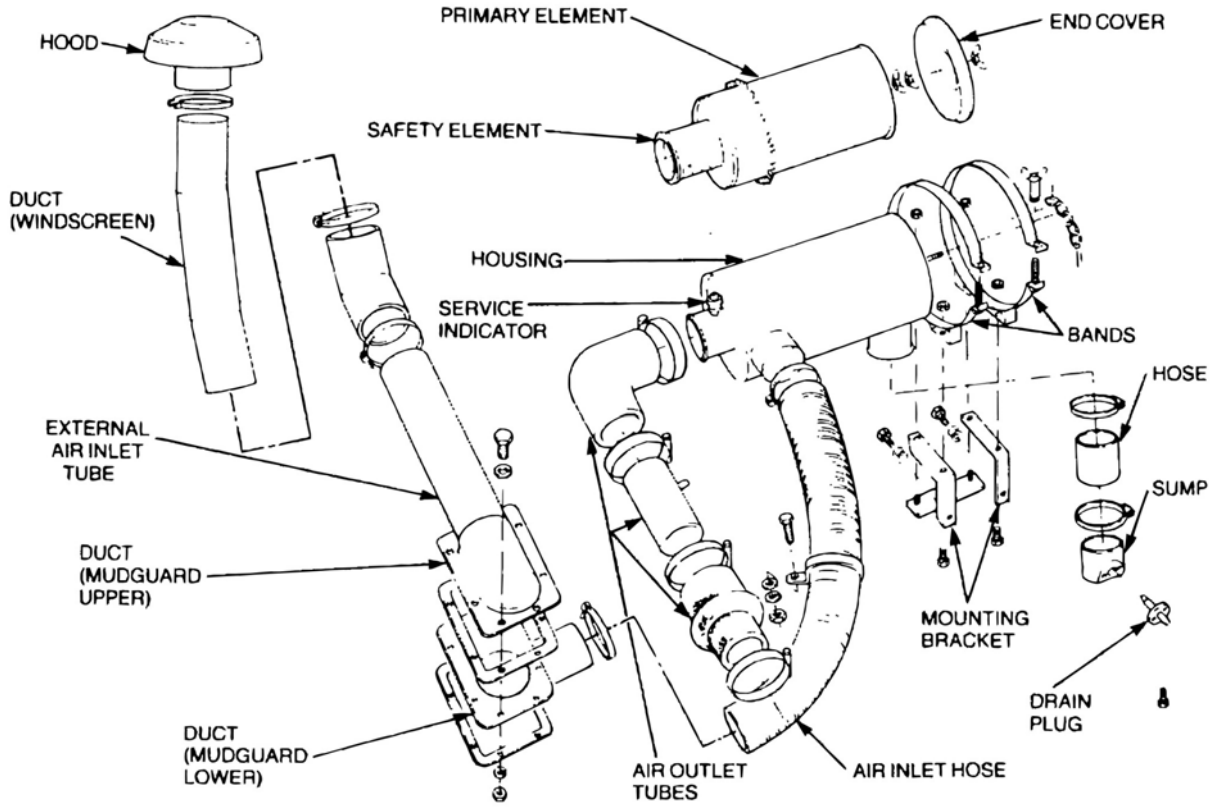


Figure 2 Air Cleaner Assembly – Exploded View

20. Operation. Air is drawn through the snorkel located on the right-hand front mudguard, through a screen and into the air cleaner housing via the inlet hose. As the air flows into the housing, it passes between the primary filter fins which induce a cyclonic twist to the air. This twisting action causes the heavier dust particles to be thrown outward by centrifugal force, eventually falling to the bottom of the housing. The air then passes through the primary filter element media, which extracts finer dust particles. Clean air then flows to the engine's air inlet manifold, via the safety element, which is installed as a precautionary measure should the primary filter become damaged.

21. Service Indicator. A service indicator (Figure 3) is incorporated on the air cleaner housing to give a visual indication of air cleaner restriction. When the red float is clearly visible through the window of the indicator, the air cleaner requires servicing. When the air cleaners have been serviced, the service indicator can be reset by pressing the button on the top of the indicator.

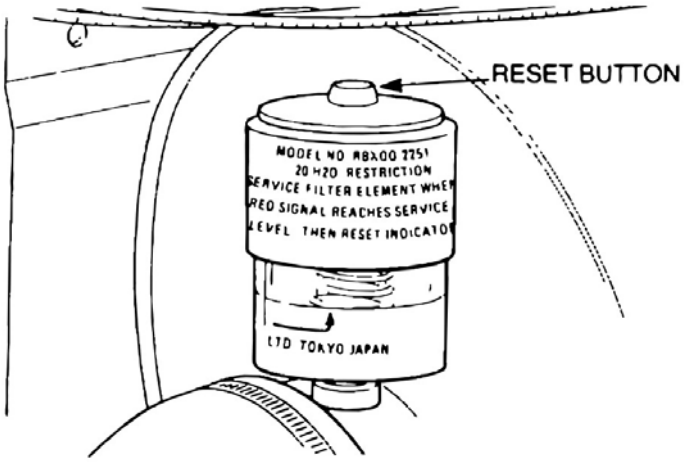


Figure 3 Air Cleaner Service Indicator

Fuel System

22. Fuel System Description. As depicted in Figure 4, an outlet pipe, fitted to the top of each fuel tank, allows the transfer pump to draw fuel from the fuel tank selected by the changeover switch on the dashboard. This switch controls the fuel changeover valve. When the transfer pump is operating, fuel drawn from the selected tank flows, via fuel lines, to a sedimenter (one for each tank) where water and large particles of contaminants are separated from the fuel. Fuel lines carry the fuel from the sedimenter to the fuel tank changeover valve, and from the changeover valve to the transfer pump where it passes through a fine mesh filter (strainer) before entering the pump. The transfer pump provides fuel at a pressure from 176 to 245 kPa to the main fuel filter. The filtered fuel is then supplied to the injection pump where it is pumped under high pressure, approximately 18 000 kPa, to the injectors via high pressure fuel lines.

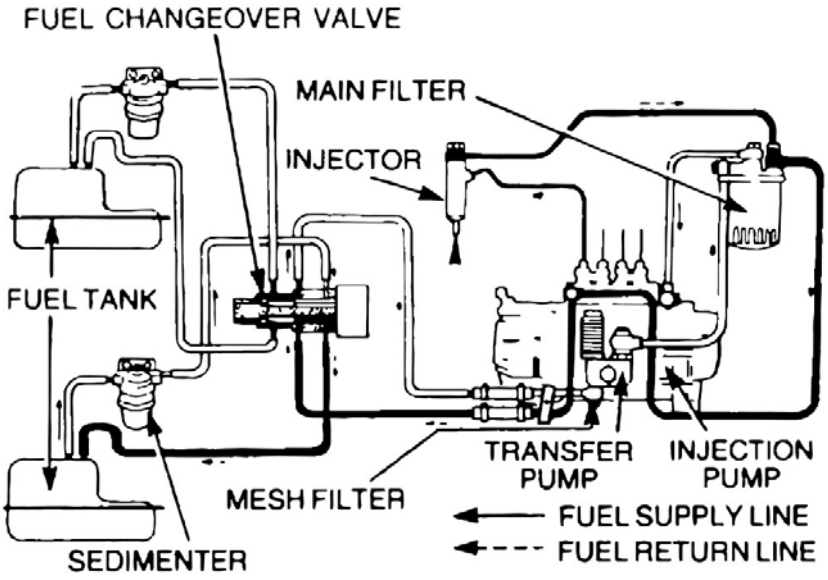


Figure 4 Fuel System

23. Fuel Tank Construction. The fuel tanks, mounted below the seat base assembly on both sides of the vehicle, are made from pressed steel and constructed in two sections which are then spot welded together. Prior to the joining of the two sections, a baffle plate is welded to the inside of the tank to prevent fuel surge during vehicle operation. At the front of each tank is a single point rubber mount which bolts to a detachable mounting bracket on the chassis rail. At the rear of each tank, a rigid mounting bracket, welded to the fuel tank seam, is secured by bolts, nuts and spacers to the body mounting bracket.

24. Fuel Gauge Sender Unit. A fuel gauge sender unit is installed in the top of each fuel tank. The sender unit comprises a float mounted on an arm which is connected to a rheostat (variable resistor). The rheostat is connected by electrical wiring to the fuel gauge. An electric current flows through the fuel gauge to the rheostat and then to earth. The amount of current flow through the gauge determines the position of the gauge pointer. The current flow is controlled by the amount of resistance created by the position of the float arm on the rheostat. The higher the float and arm are in the fuel tank, the less the amount of resistance created by the rheostat, thus allowing more current to flow through the gauge, causing the gauge pointer to react accordingly.

25. Fuel Tank Selection. When either fuel tank is selected by operating the two-position switch on the dashboard, current is supplied to the fuel tank changeover valve. The motor in the changeover valve is caused to move and open ports to allow fuel from the tank selected to flow to the engine, while the ports for the other tank are closed off. The fuel return from the injectors and injector pump also flows through ports in the changeover valve en route to the fuel tank in use. When the fuel tank changeover switch is moved to select the fuel tank, a current also flows to the fuel gauge sender unit on the tank selected, while the current on the fuel gauge unit on the other fuel tank is cut. This method enables both fuel tanks to utilize the one fuel gauge. The low fuel warning device operates on the tank selected and utilizes the one warning light.

26. Fuel Return Line and Fuel Low Level Sensor. Incorporated with the fuel gauge sender unit is a fuel return pipe and a low fuel level sensor. The fuel return pipe allows overflow fuel from the injection pump and injectors to be returned to the fuel tank. The fuel low level sensor, attached to the fuel return pipe, causes a warning light to illuminate when the fuel level in the tank is below approximately nine litres.

27. Sedimenters. Two CAV SS type sedimenters (Figure 5) are incorporated in the fuel lines, between the fuel tanks and the transfer pump, to trap any water or heavy contaminants that may be in the fuel. A drain plug, in the bottom of each sedimenter housing, allows any water or contaminants to be drained off. The right-hand sedimenter is mounted on the chassis rail behind the fuel tank and the left-hand sedimenter is mounted inboard of the left-hand chassis rail behind the transmission.

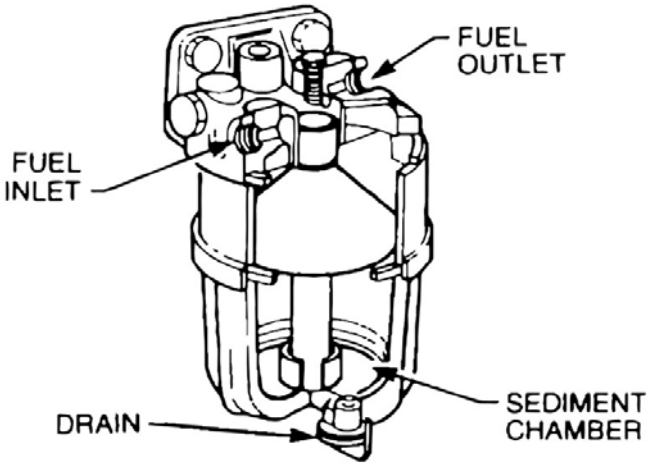


Figure 5 Fuel Sedimenter

Air Compressor

28. An ARB CKMA12 air compressor (Figure 6) is fitted to the driver's side of the engine bay. Air is drawn from the outlet of the air cleaner by the compressor and the outlet is located on the passenger's side of the firewall.

Figure 6 Air Compressor

29. Wiring. Power is taken from the positive terminal of the starter motor and fed through a 40 amp fuse (Figure 7) mounted on the passenger side wheel well in the engine bay. Power is fed to the relay mounted on the driver side wheel well and to the on/off switch mounted on the dash next to the steering wheel. When the on/off switch is on, and the air pressure is below 490 kPa, power is applied through the pressure switch to the relay, which will energise and provide power to the compressor motor. When the air pressure reaches 690 kPa, the pressure switch will open the circuit and the compressor will stop. Moving the on/off switch to the off position will also open the circuit and stop the compressor.

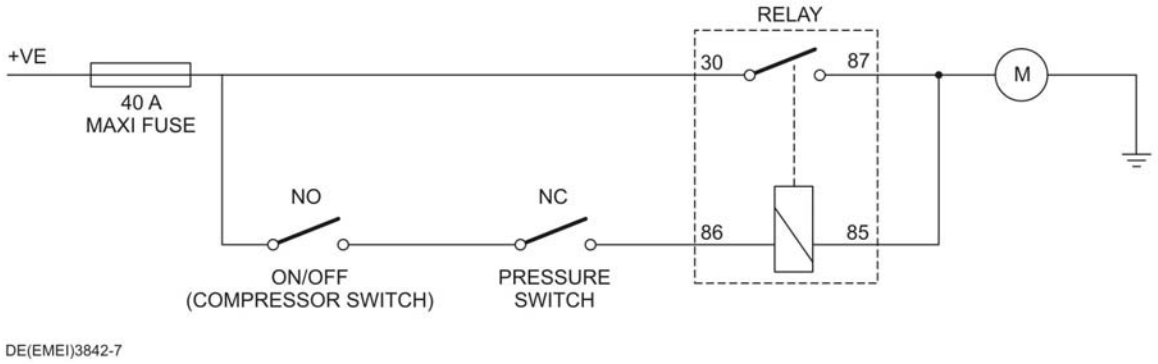
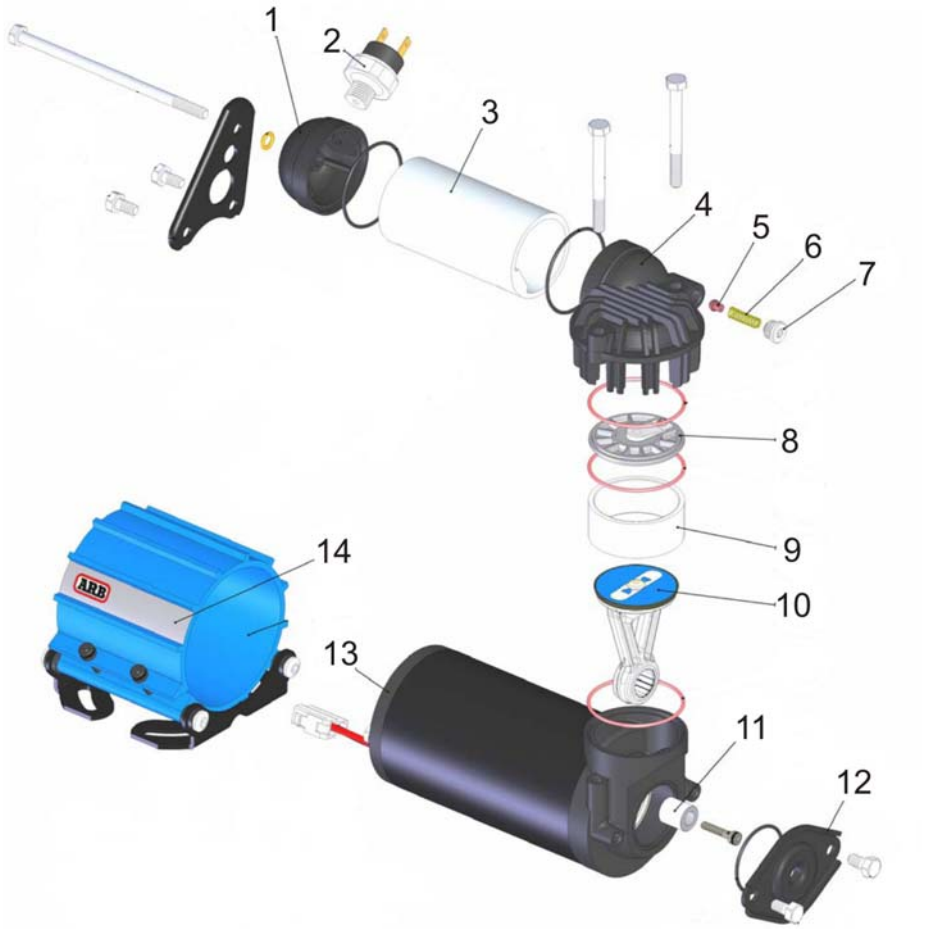


Figure 7 Air Compressor Wiring

30. Compressor Operation. When power is applied to the motor assembly (Figure 8, Item 13), the offset crankshaft (Item 11) rotates and moves the piston assembly (Item 10) up and down the barrel (Item 9). Air is drawn into the compressor through the air filter flange (Item 12) from the engine air filter. On the down stroke of the piston assembly (Item 10), air flows through the piston one way valve. On the upward stroke of the piston, air, which is trapped in the barrel, is forced through the valve plate assembly (Item 8) and into the compressor head assembly (Item 4) and the manifold tube (Item 3). The valve plate assembly stops the air in the manifold tube from flowing back into the barrel. Compressed air is delivered from the manifold cap (Item 1) to the pressure switch (Item 2) and the outlet port (Figure 6).

31. Safety Valve. If the pressure in the compressor exceeds 1 250 kPa, the air applied to the safety valve poppet (Figure 8, Item 5) will overcome the pressure applied by the safety valve spring (Item 6) and allow the air to escape through the safety valve fitting (Item 7) until the spring pressure overcomes the air pressure.

32. Mounting. The mount assembly (Figure 8, Item 14) is bolted to the air compressor bracket on the driver's side wheel well. The mount assembly clamps around the motor assembly holding the compressor in place.



1	Manifold cap	6	Safety valve spring	11	Axle
2	Pressure switch	7	Safety valve fitting	12	Air filter flange
3	Manifold tube	8	Valve plate assembly	13	Motor assembly
4	Compressor head assembly	9	Barrel	14	Mount assembly
5	Safety valve poppet	10	Piston assembly		

Figure 8 Air Compressor – Exploded View

Transfer Case

33. The transfer case enables drive from the transmission to be directed to both the front and rear axles simultaneously, and also provides two extra gear ratios, a low and a high, effectively giving the vehicle a total of eight forward gears and two reverse gears. The low ratio, when selected, is used where low speed and high torque output is required, while the high ratio is used for normal driving.

34. Power Transmission. The main shaft transfer gear and the intermediate shaft central input gear are in constant mesh with each other allowing drive from the transfer gear to be transmitted directly to the central input gear. As the central input gear is supported on the intermediate shaft by two tapered roller bearings, drive from the input gear cannot be transmitted to the intermediate shaft. However, a sliding dog clutch, incorporated with the central input gear and moved by a selector lever and fork enables the drive to be transmitted to either the high or low gear ratio intermediate gears. Although both of these gears are each supported by two tapered roller bearings on the intermediate shaft, they are both in constant mesh with gears on the differential assembly (Figure 9). So, when either the high or low ratio gear is engaged with the central input gear, via the sliding dog clutch, drive can be transmitted from the central input gear to the differential, then out to the front and rear axles.

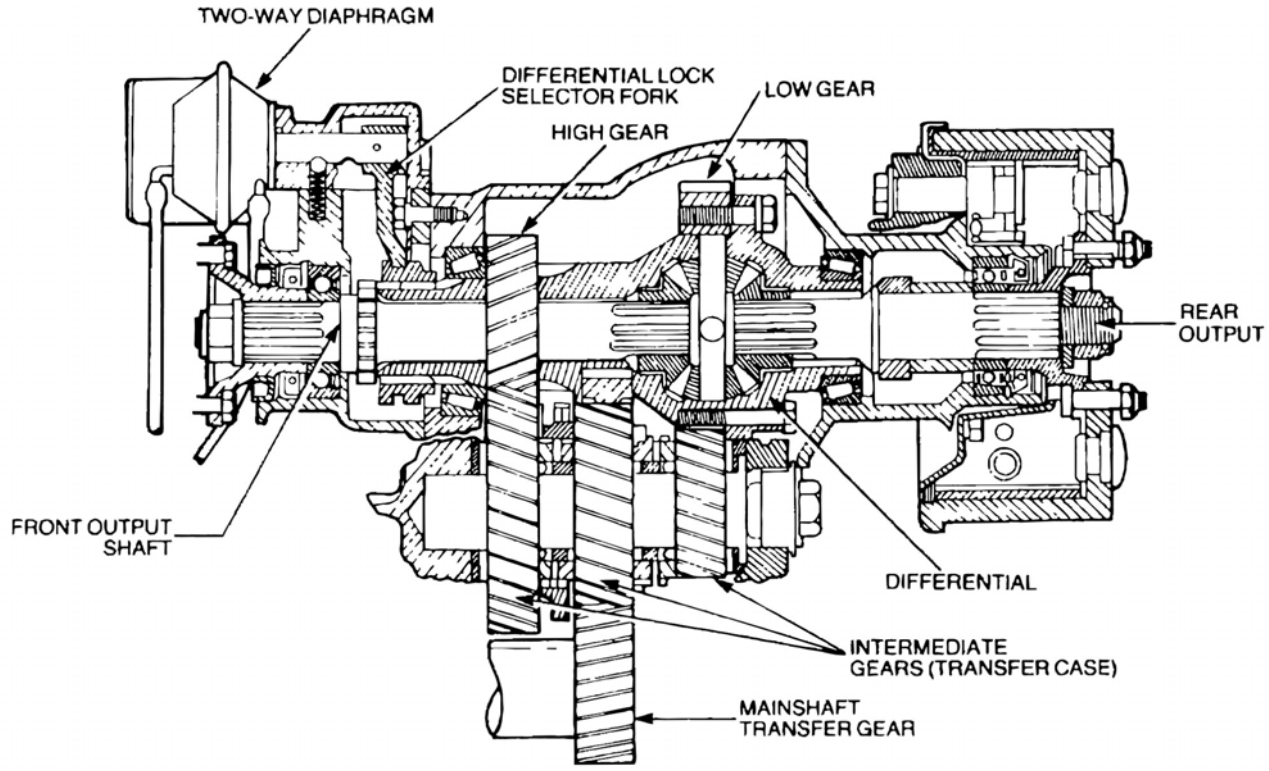


Figure 9 Transfer Case and Differential – Sectional View

35. Differential. The two piece differential case, mounted on two tapered roller bearings in the transfer case, operates in the same manner as a drive axle differential. The differential casing carries two driven gears, the smaller gear being the high ratio and the larger gear the low ratio. The casing also houses four bevel pinion gears and thrust washers, two side gears and one cross shaft (Figure 9). The six gears are installed as a matched set. Front and rear output shafts are installed in the differential and engage with the splines in the side gears. As the differential casing revolves so do the output shafts, transmitting the drive to the front and rear axles. The rear output shaft carries the speedometer drive gear, while the front output shaft carries a dog clutch. This dog clutch is utilized when positive all-wheel drive is required.

36. Differential Lock. By operating the differential lock control switch on the dashboard, vacuum is supplied to the forward side of a two way diaphragm on the transmission, while the rear side of the diaphragm is vented to the atmosphere, via the control switch. The vacuum causes deflection of the diaphragm which moves the selector mechanism locking the front output shaft (via the dog clutch) to the differential casing. In so doing, the differential action between the front and rear output shafts is now locked out and positive drive to both output shafts is now provided.

37. When positive drive is no longer necessary and the switch is turned off, the forward side of the vacuum chamber diaphragm is vented to the atmosphere while vacuum is applied to the rear side of the diaphragm. The deflection of the diaphragm causes the selector mechanism to move and disengage the dog clutch from the differential casing, unlocking the front output shaft from the differential casing and allowing the differential to resume normal operation.

Front Axle

38. The steerable front drive axle (Figure 10) comprises a differential assembly, two axles (half shafts) and two steerable drive-ends (Figure 11). The differential is housed in a removable carrier and comprises a crownwheel and pinion, side gears, four planetary bevel gears and a shaft, which locates the planetary bevel gears and also forms the axis about which the planetary gears rotate. The axle shafts comprise an inner shaft splined at both ends with a constant velocity joint and stub axle fitted to one end. Steerable drive-ends are flange-fitted and bolted to the axle housing. These drive-ends enclose the Birfield constant velocity joints and provide the fulcrum about which the front hubs and wheels can be turned. A flange which is spline-fitted to the end of the stub axle and bolted to the wheel hub, transmits the drive from the differential to the hub and wheel. The hub is supported on two tapered roller bearings and held in position on the steerable drive-end yoke spindle by an adjusting nut and a locknut.

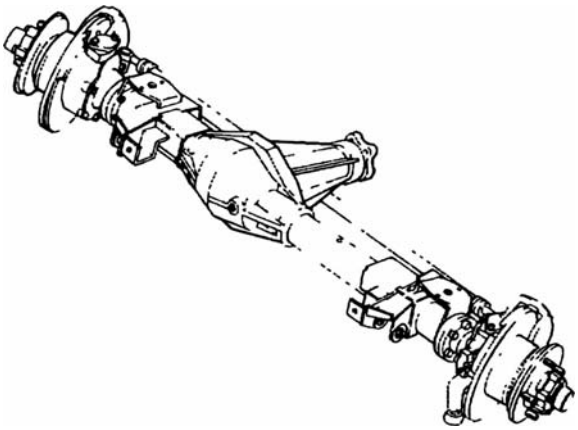


Figure 10 Front Axle Assembly

39. Steerable Drive-end. Figure 11 illustrates a sectional view of the steerable drive-end.

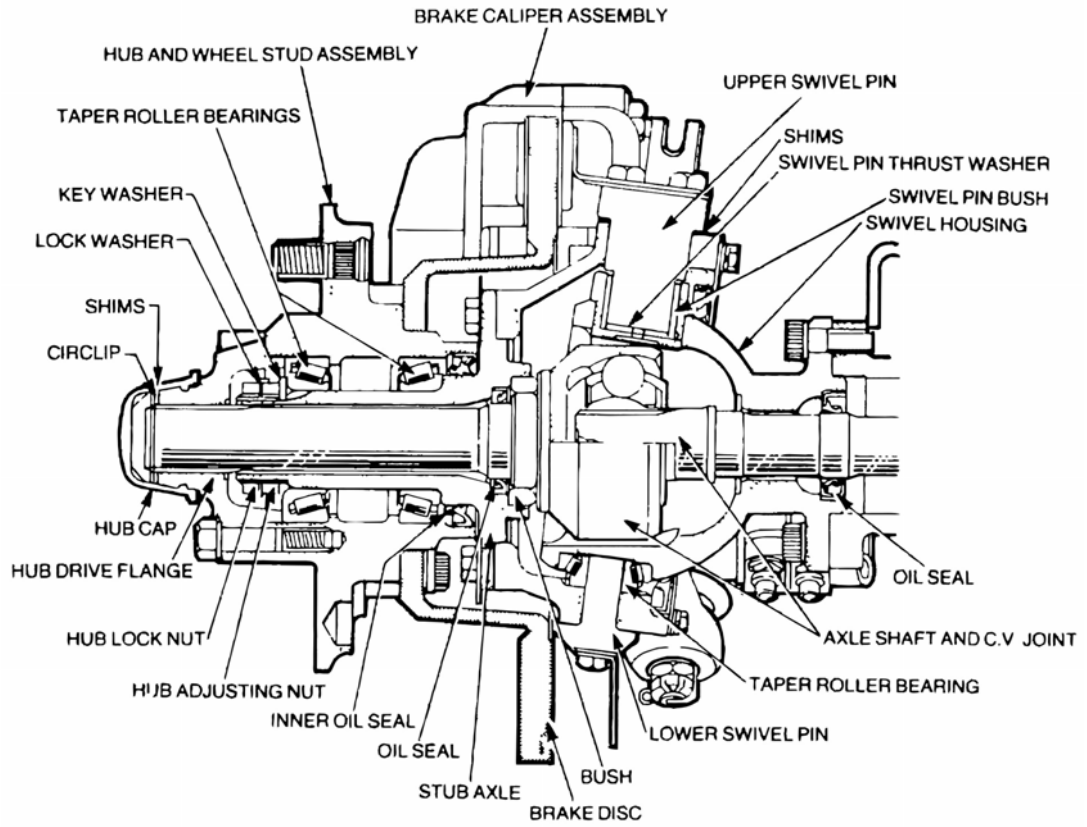
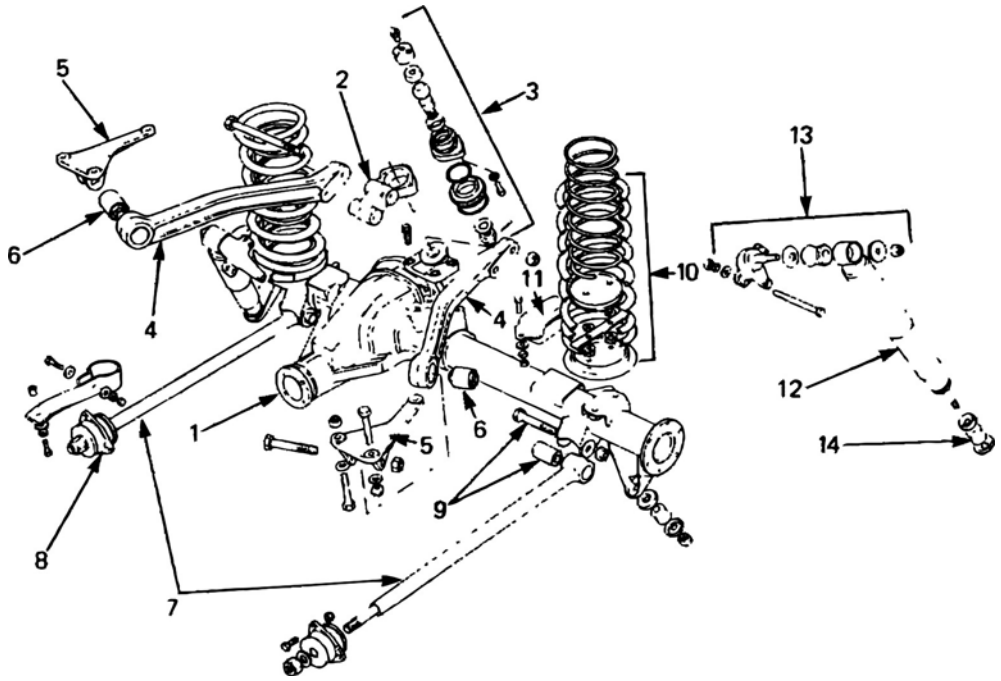


Figure 11 Steerable Drive-end – Sectional View

Rear Suspension

40. The rear suspension comprises two lower links, an A-frame upper link, two coil springs, two coil assist spring inserts and two shock absorbers (Figure 12). The lower links are rubber bushed to both the axle housing and the chassis. The upper A-frame link is mounted at one end of the axle by means of a fulcrum bracket and a ball joint. The other ends are rubber bushed to brackets which are secured to the chassis. Both the upper and the lower links limit the fore and aft movement of the axle. The upper link also limits the sideway movement of the axle. As with the front suspension, the coil springs are positioned between the axle and the chassis to provide a smooth ride and keep the wheels in contact with the ground over various terrains. The two double acting shock absorbers are rubber bushed to both the axle housing and the mounting bracket on the chassis and are utilized to absorb shock loads, dampen the spring rebound and limit the downward movement of the axle. Two rubber bump-stops are secured to the chassis above the axle housing to prevent the axle housing making direct contact with the chassis during maximum vertical lift of the axle.



1	Salisbury axle casing	8	Lower link flexible bush assembly
2	Fulcrum bracket	9	Lower link bush and bolt assembly
3	Fulcrum bracket ball joint assembly	10	Coil spring assembly
4	Suspension top links	11	Bump stop
5	Top link mounting brackets	12	Shock absorber
6	Top link bushes	13	Shock absorber top bush assembly
7	Lower links	14	Shock absorber lower bush assembly

Figure 12 Rear Suspension

Rear Brakes

41. The service brakes for the rear wheels are disc type, which utilize hydraulically operated Lockheed callipers. Each calliper contains two pairs of opposing pistons with each pair of pistons butting against a brake pad. The brake discs are bolted to the rear axle hubs and are straddled by the brake calliper assemblies, which in turn are securely bolted to the rear axle housing.

42. When the brakes are applied, the brake fluid forced into the rear brake circuits causes the pistons to expand out from the callipers pushing the pads toward each other and effectively clamping the brake discs between the pads. This action slows or stops (depending on the amount of brake application) the rotation of the brake discs, effectively slowing or stopping the motion of the vehicle.

43. Figure 13 illustrates the various components of the rear wheel disc brake assembly.

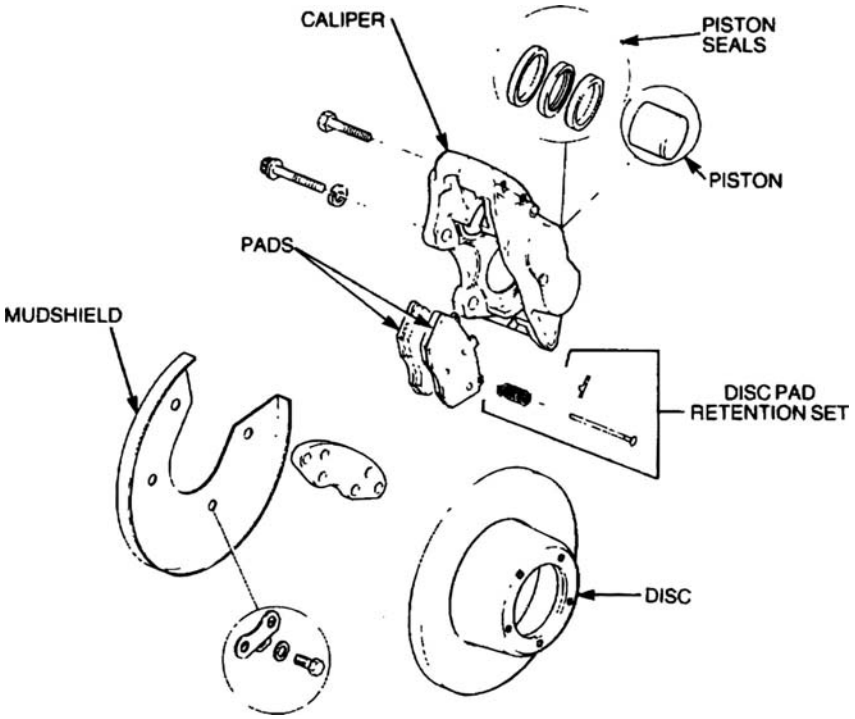


Figure 13 Rear Disc Brake Assembly – Exploded View

Steering

44. Steering Shaft. The steering wheel is connected to the power steering box by a three-piece shaft. The upper section of the shaft (to which the steering wheel is secured) is housed within the steering column and supported by means of a roller bearing at the top of the column and a ball bearing at the bottom. In turn, the upper end of the steering column is mounted by means of a rod to the bulkhead, while the lower end is secured to a bracket on the firewall by means of a U-shape clamp, which is positioned over the ball bearing (Figure 14).

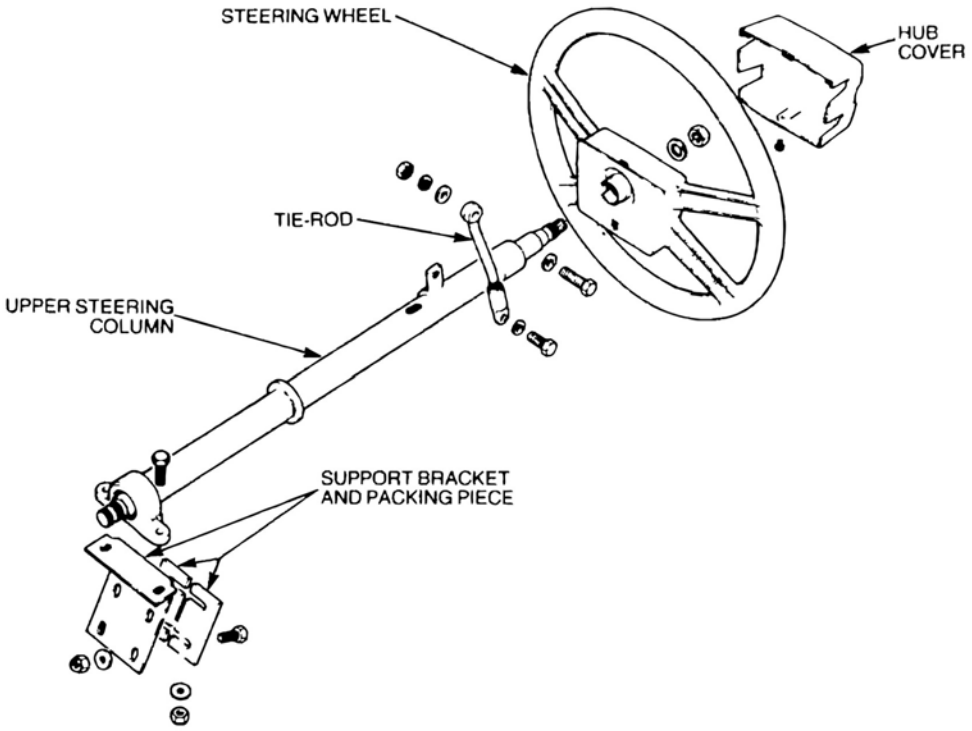


Figure 14 Steering Wheel, Column and Upper Shaft Assembly

45. The lower section of the steering shaft comprises two shafts (coupling shafts) which are held together by a reinforced coupling (Figure 15). The coupling allows the lower section of the steering shaft to collapse in the event of a frontal accident, thus preventing the steering column from being pushed back into the cabin. The lower section is connected to the upper shaft and the steering box by universal joints, giving the steering wheel direct control of the steering box.

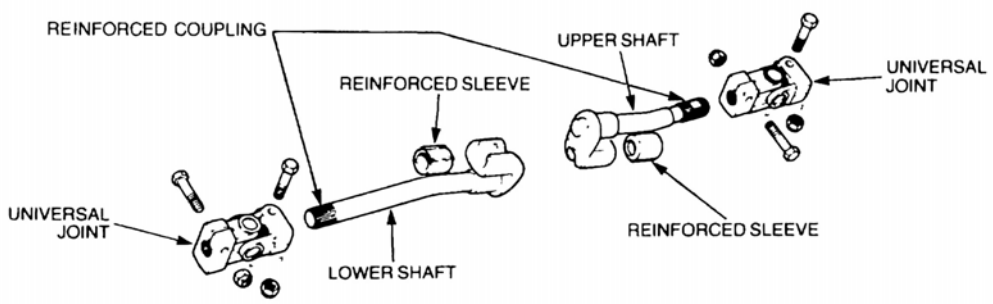
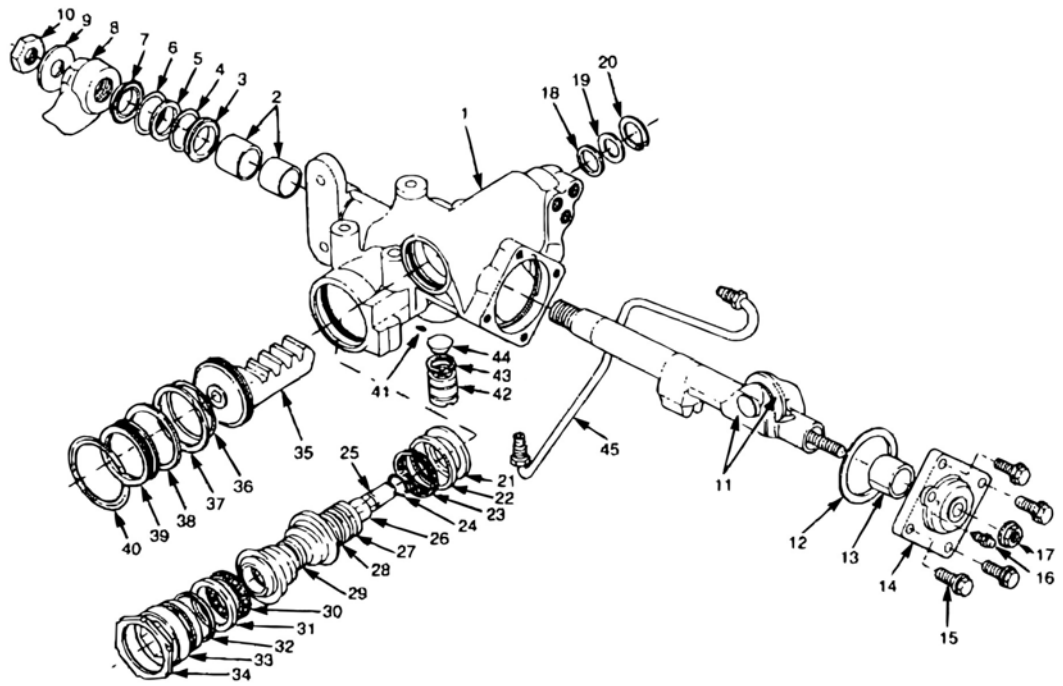


Figure 15 Steering Shaft (Lower Section) and Coupling – Exploded View

46. Steering Box. The steering box is a variable ratio, power assisted worm and roller type (Figure 16) which is secured by bolts and locking plates to the right hand chassis rail. As the steering wheel is turned, movement is transmitted to the wormshaft (Item 29) in the steering box via the steering shafts. The variable ratio of the steering gear is provided by the variable pitch of the hour-glass shaped worm.



1	Housing	16	Bleed screw	31	Bearing track
2	Housing bushes	17	Locknut	32	Seal
3	Seal	18	Rotor seal	33	Worm adjusting screw
4	Back-up washer	19	Seal washer	34	Lock nut
5	Back-up seal	20	Circlip	35	Piston
6	Circlip	21	Shims	36	Piston O ring
7	Seal	22	Bearing track	37	Piston Teflon seal
8	Drop-arm	23	Bearing case and balls	38	Cylinder cover seal
9	Tab washer	24	Circlip	39	Cylinder cover
10	Sector shaft nut	25	Seal torsion bar	40	Cylinder cover retainer
11	Sector shaft and follower assembly	26	Rotor	41	Screw
12	Seal	27	Teflon springs	42	Rack adjusting screw
13	Bush	28	Stop-off rings	43	Rack adjusting screw seal
14	Cover plate	29	Worm	44	Rack Pad
15	Self locking screws	30	Bearing cage and balls	45	Fluid line

Figure 16 Steering Box Assembly – Exploded View

47. Power Assistance. Power assistance is provided by means of a piston and toothed rack assembly (Item 35) located in the steering box housing. The teeth of the rack are meshed with a gear segment on the sector shaft (Item 11) which rotates in accordance with the movement of both the steering wheel and the rack. Power steering fluid is pumped to one side or the other of the rack piston as directed by the rotary valve on the steering box input shaft and accumulates in the piston chamber where it increases in pressure. The pressurised fluid acts against the piston causing the piston and rack to move and act against the gear segment on the sector shaft. This action does not turn the sector shaft but lessens the effort required by the driver to turn the sector shaft, which in turn steers the front wheels.

48. When the steering wheel is turned off centre, the rotary valve on the wormshaft moves to open ports and direct fluid to one side of the rack piston, causing the rack to move and assist the steering effort. As the rotary valve opens ports to direct fluid to the piston, it also opens ports to allow the fluid on the non-pressurized side of the piston to flow to the pump and be recycled. When the steering wheel is turned in the opposite direction, the rotary valve moves to reverse the direction of fluid flow to and from the steering box, causing the fluid to act on the opposite side of the piston and move the piston and rack in the opposite direction.

49. Power Steering Fluid. The fluid used in the power steering system is stored in a reservoir located on the right-hand side of the engine compartment. The fluid is drawn from the storage reservoir into a pump, which is mounted on the engine and gear-driven by means of the engine's timing gears. The fluid is pumped to a rotary valve located on the end of the wormshaft in the steering box. With the steering in the straight ahead position, the fluid flows through ports in the valve back to the steering pump, where it is reused.

50. Steering Linkages and Damper. As illustrated in Figure 17, a drop arm is secured to the splined portion of the sector shaft which protrudes from the bottom of the steering box and transmits the sector shaft movement to the left-hand front wheel via the drag link. One end of the drag link is connected to the ball joint on the drop arm, while the ball joint end of the drag link is connected to the steering arm on the front of the left-hand steerable drive-end. A track rod, with ball joints at both ends, connects the right-hand steerable drive-end with the left-hand steerable drive-end causing the wheel on the right-hand side to turn in unison with the left wheel. A steering damper is installed between the drag link and the chassis to dampen or absorb any shock loads which may occur while the vehicle is negotiating a turn.

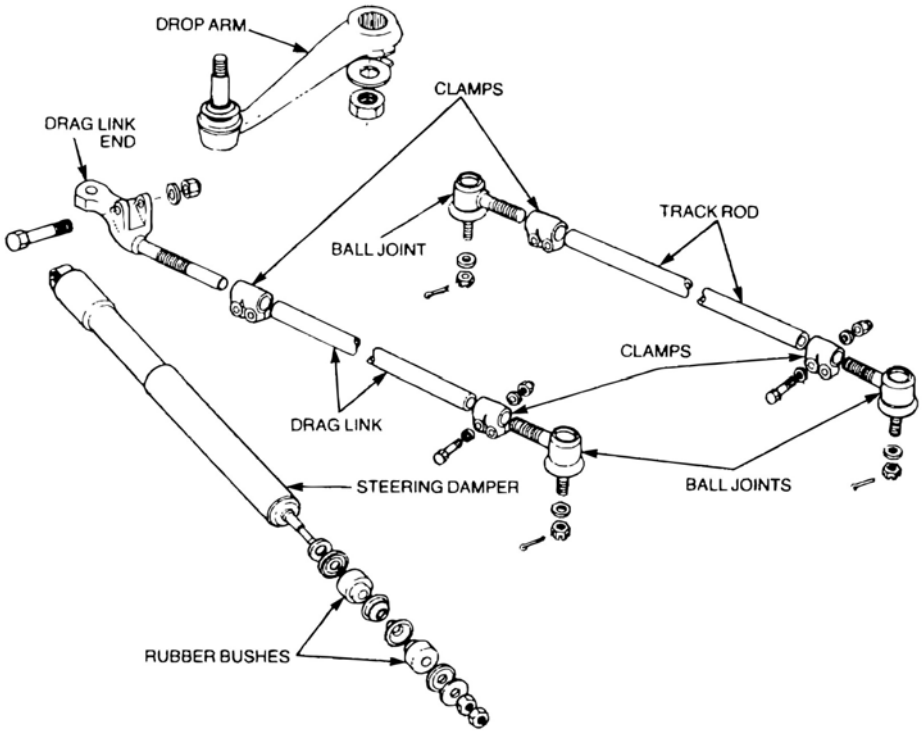


Figure 17 Drop Arm, Steering Linkages and Steering Damper

Electrical Wiring

51. Cable Colours. Table 2 lists the cable colour codes used in the wiring diagrams. The last letter of the colour code denotes the tracer colour.

Table 2 Cable Colour Codes

Serial	Code	Colour	Serial	Code	Colour
1	B	Black	7	P	Purple
2	G	Green	8	R	Red
3	K	Pink	9	S	Slate
4	L	Light	10	U	Blue
5	N	Brown	11	W	White
6	O	Orange	12	Y	Yellow

52. Engine Circuit. An auxiliary battery is fitted to the Truck, Surveillance, Lightweight. The battery isolator (Figure 18) ensures that if the auxiliary battery is flat, the vehicle battery is still able to start the vehicle. The addition of a voltage meter and switch allows the operator to monitor the state of the batteries. The auxiliary output is protected by a 10-amp fuse.

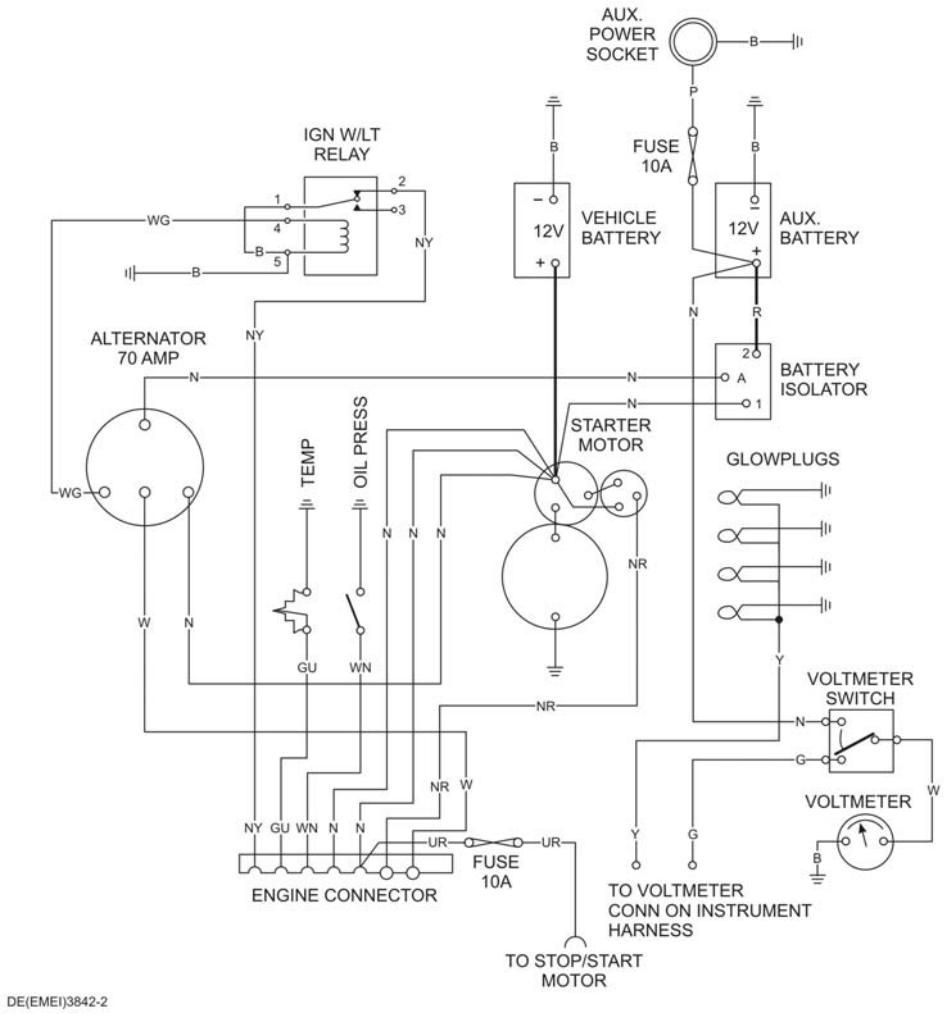


Figure 18 Engine Circuit

53. Fuel Tank Circuit. When the toggle switch is moved to the left-hand tank position, power is applied to the fuel changeover motorised valve and the fuel supply and the fuel gauge sense wire are switched over to the left-hand tank. At the same time, power is applied to the low fuel relay which switches the low fuel warning light sense to the left-hand tank. When the toggle switch is moved to the right-hand tank, the power is removed from the fuel changeover motorised valve and the low fuel relay and the fuel supply, fuel gauge sense and low fuel warning light sense are switched back to the right-hand tank. Figure 19 shows the toggle switch in the right-hand tank position.

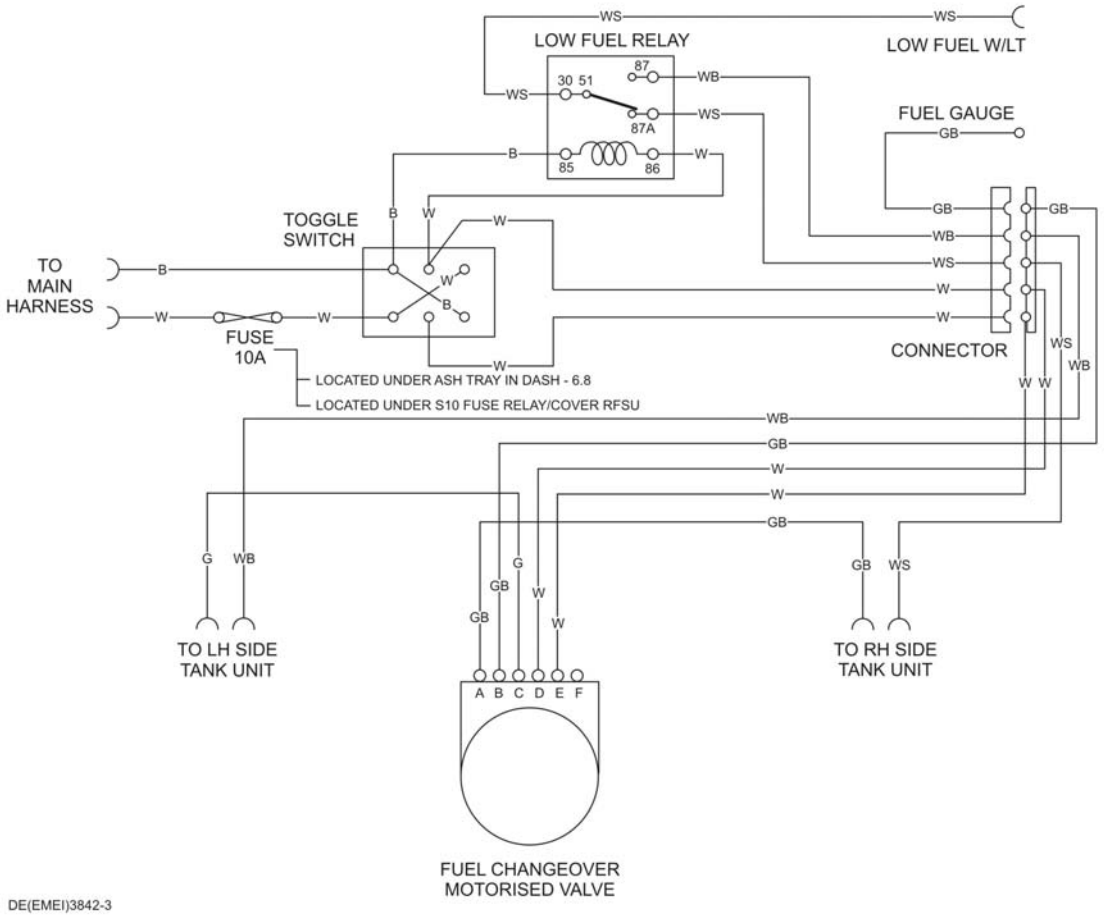


Figure 19 Fuel Tank Circuit

54. NATO Socket. Figure 20 details the wiring, function and pins of the NATO trailer socket connections.

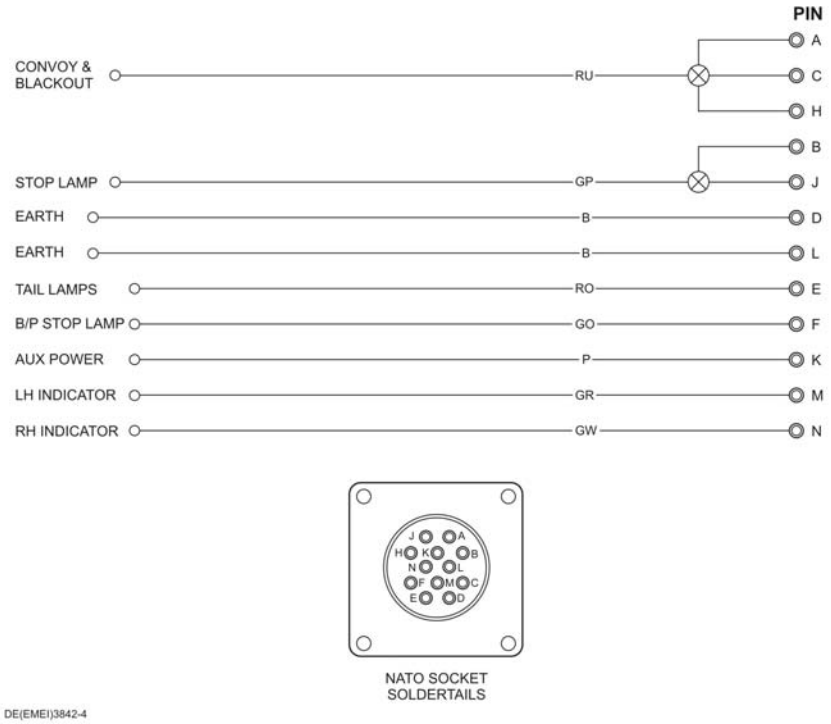


Figure 20 NATO Socket

55. Lighting Systems. The lighting system circuit (Figure 21), switches power to the different lighting circuits depending on the mode. Normal mode allows power to the hazard lights, blinkers, parking, brake, warning, dash instruments, map and headlights. In the blackout mode, power is applied to the blackout stop lights, blackout marker lights, convoy light, dash instruments, warning lights and map light. The reduced mode provides power to the same circuits as blackout mode with the addition of the reduced headlights. The full blackout cuts power to all lighting circuits including warning lights. The instrument illumination rheostat adjusts the current through the instrumentation lamps which will vary the brightness.

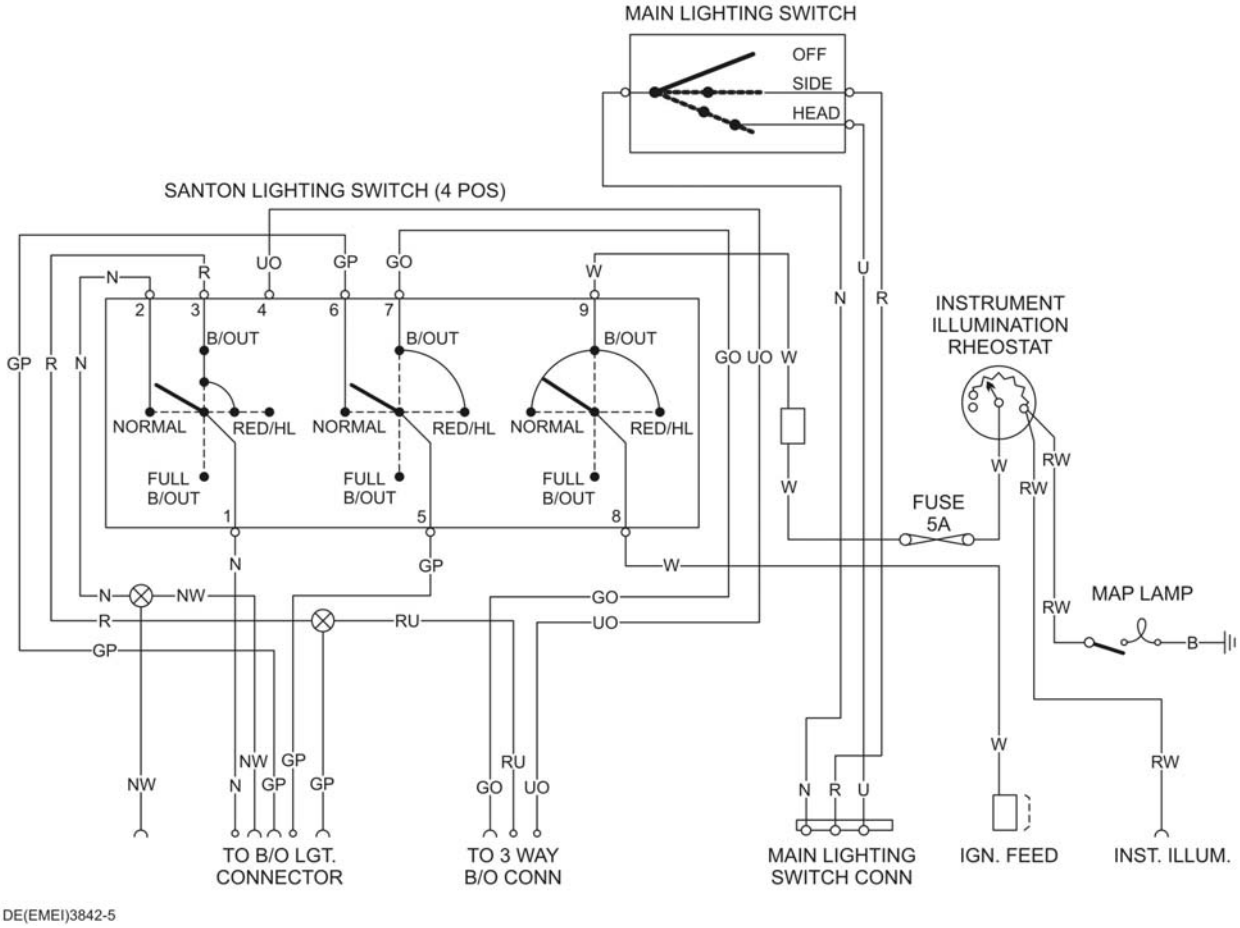


Figure 21 Lighting System

56. Driving Lights. The driving lights are operated by a two-position rocker switch located on the dashboard in conjunction with the vehicle high beam headlights. When the driving light switch is ON and the vehicle headlights are on high beam the driving lights operate. When the vehicle headlights are OFF, or on low beam, the driving lights are OFF.

57. The driving lamp relay (Figure 22) controls the current flow to the driving lights. The dash-mounted rocker switch provides the earth path for the relay. When the headlights are on high beam, and the driving light switch is closed, current will flow through the relay and energise it. Current will flow from the battery feed on the starter motor solenoid, through the relay and to the driving lamps. If the headlights are switched to low beam or the driving light switch is opened, the relay will de-energise and current flow to the driving lamps will cease. Each driving lamp and wiring is protected by a 30-amp fuse in the driving lamp relay.

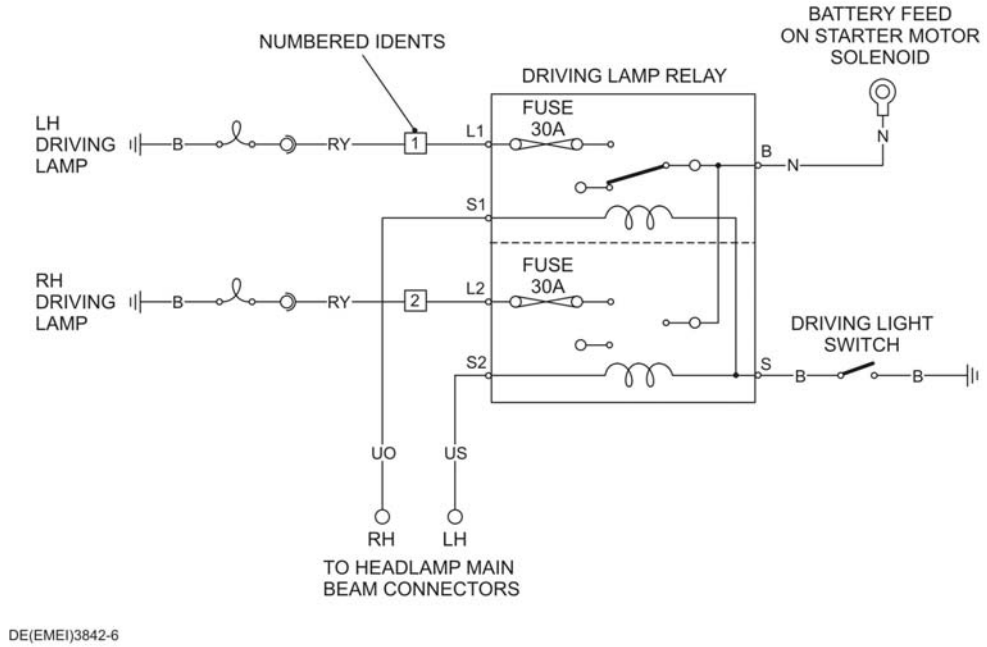


Figure 22 Driving Light Wiring Circuit

Rear Body

58. Lower Body. The rear body (Figure 23) consists of eight pressed aluminium panels. The panels are riveted together to form the rear lower body. A galvanized steel capping is riveted to the top of the lower panels, strengthening the lower panels and providing mounting positions for the roll cage. The tailboard is a fixed panel which has been cut down for ease of entry into the cargo area. The rear body is secured to the chassis by four mounting brackets and is also secured by bolts to the rear crossmember.

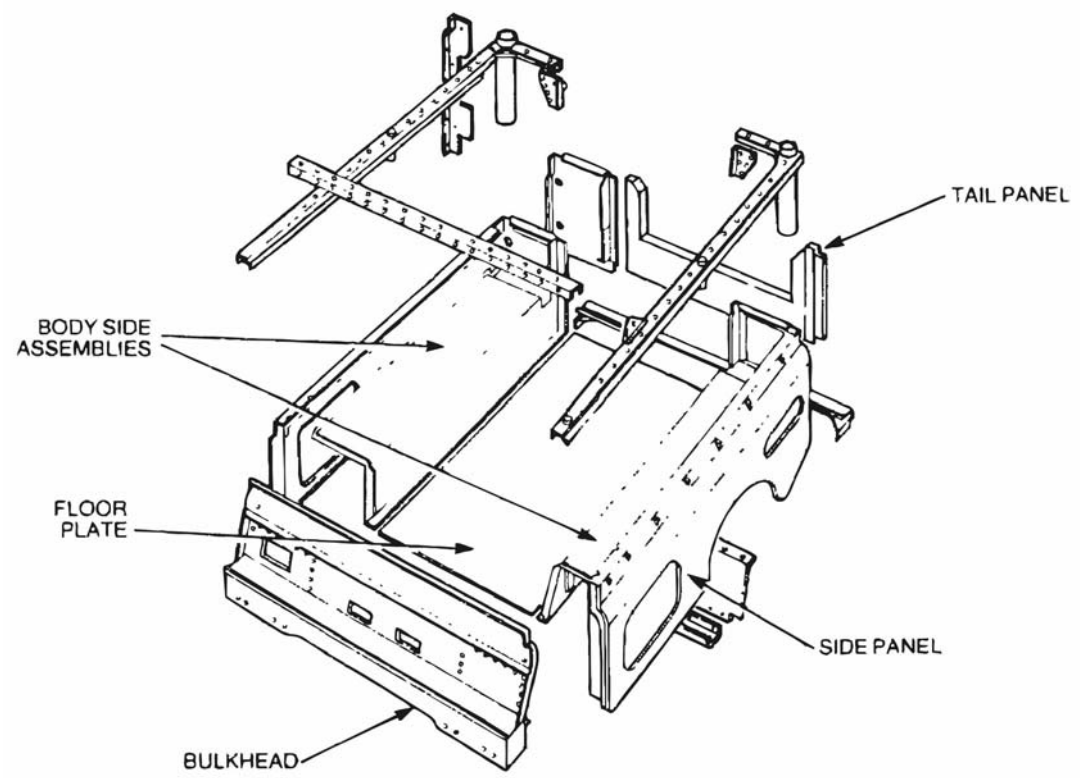


Figure 23 Rear Body – Exploded View

59. The lower body is strengthened by plates and braces to support the upper roll over protection bars, bin assemblies, cages, rear seat, cargo and personnel restraint systems.

60. Roll Bars. The removable roll bars (Figure 24) are provided and, when installed in their respective mountings, help to protect the occupants of the vehicle in the event of vehicle rollover. The roll bars are also utilised as bows for the canvas canopy which, when installed, protects both the occupants and cargo from the elements. The camouflage stowage frame is also secured to the top of the roll bars. Bolts retain the roll bars in their mountings and facilitate the removal of the roll bars when necessary. Hoodsticks are mounted between the rear and middle roll bars and between the front roll bar and door pillars to provide support and to keep the canopy tight.

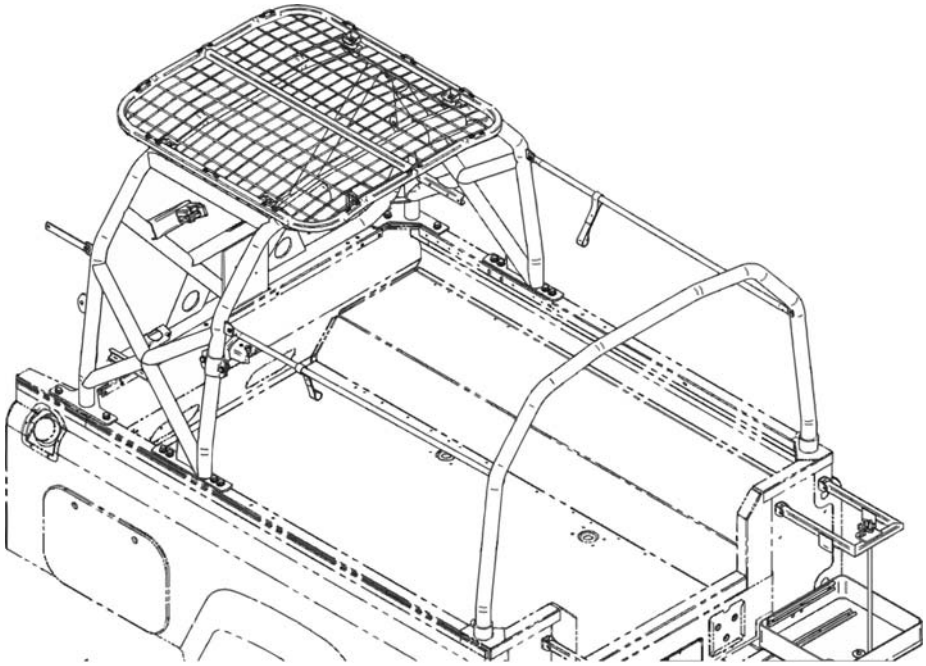


Figure 24 Rollover Protection Bars

61. The camouflage net stowage frame is mounted on top of the canopy (when fitted) to the upper rollover bars. A strap assembly (Figure 25) is provided to secure the camouflage net.

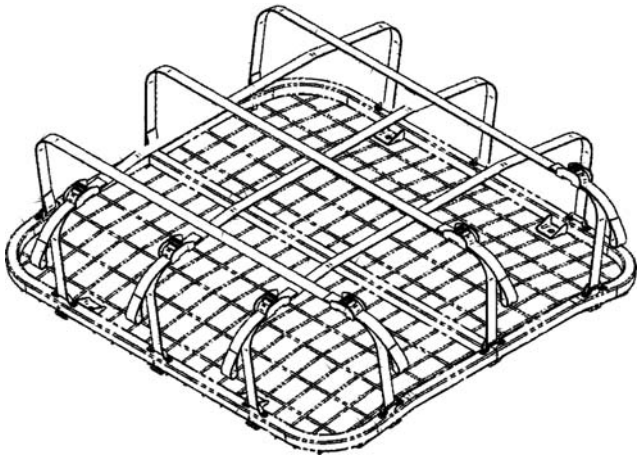


Figure 25 Camouflage Net Stowage Frame

62. Toolbox and Arch Trim. A toolbox and wheel arch trim are incorporated on each side of the rear body (Figure 26). The toolbox, located to the rear of the wheel arch, is equipped with a hinged lockable lid and provides storage for the hydraulic jack and the vehicle tool kit. A wheel arch trim is positioned over each wheel arch and secured to the side panels by plastic rivets.

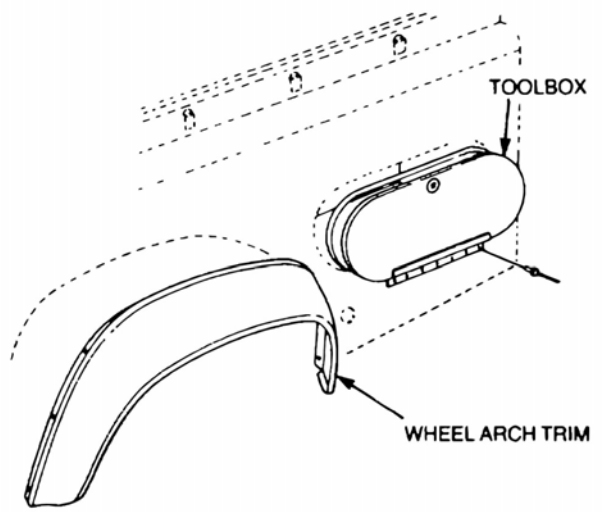
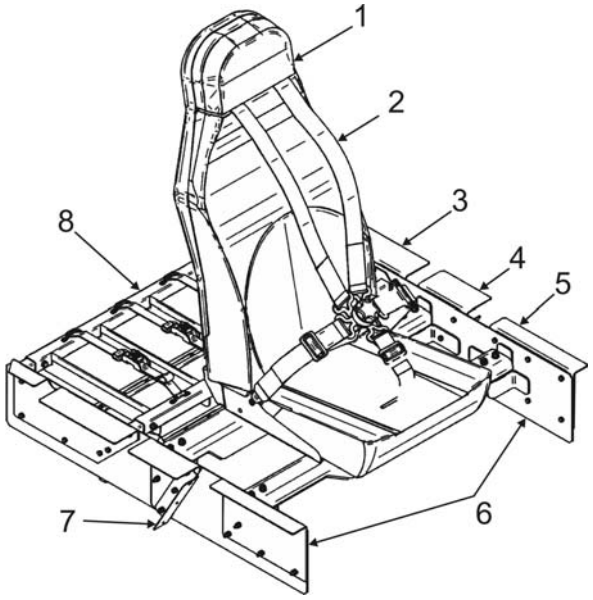


Figure 26 Toolbox and Wheel Arch Trim – Left Side

63. Seat Assembly. A Jany seat type 801 (Figure 27, Item 1) is fitted to a frame located at the front of the cargo area facing the rear of the vehicle. The seat is cushioned, covered with a camouflage cover and is fitted with a head restraint and five-point seat belt (Item 2). An ammunition stowage assembly (Item 8) is fitted between the seat and the bulkhead. Additional reinforcement plates and brackets (Items 3 to 7) in the rear tray and under the rear tray skin support the seat and ammunition stowage assembly.



1	Jany seat	5	Rear reinforcement plate
2	Five-point harness	6	Support assembly
3	Front reinforcement plate	7	Wheel well/mud deflector support
4	Mid front reinforcement plate	8	Ammunition storage assembly

Figure 27 Rear Seat and Ammunition Stowage Assembly

64. Bin Assemblies. Bin assemblies (Figure 28) are mounted on the left and right-hand of the cargo tray. Each bin assembly consists of a lidded bin, jerrican holder and pack storage area. Each bin has a drain plug mounted in the bottom. The lid opens outward, has a stay to hold the lid open and latches on the front to secure it. Personnel protectors are fitted to the corners of the lid to reduce injury from impacts. Brackets are provided for weapon storage.

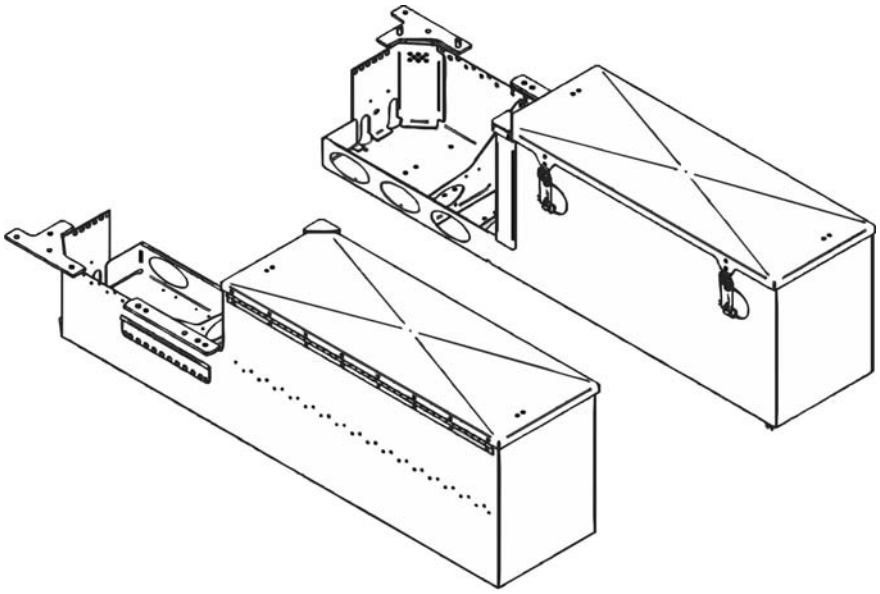


Figure 28 Bin Assemblies

65. Side Stowage Baskets. Stowage baskets (Figure 29) are fitted to the outer left and right-hand sides of the rear tray. The right side basket has brackets and straps for jerrican storage and a lockable retaining cable to secure the jerricans. The left side basket has a single strap and has a dedicated stowage area, fitted with a padlock, for securing the high-lift jack. Each basket has a maximum capacity of 60 kg.

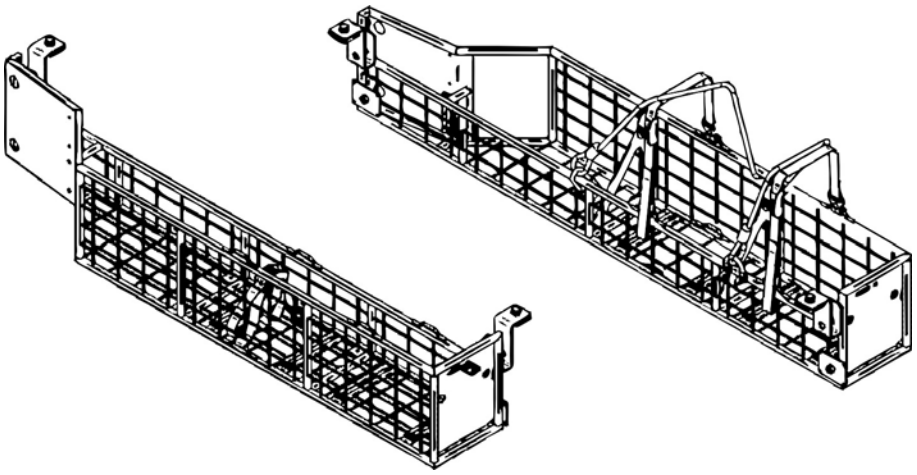


Figure 29 Side Stowage Baskets

66. Under Tray Bin Assembly. The under tray bin assembly (Figure 30) can carry two jerricans and is secured under the rear body similar to a spare wheel on other variants. The under tray bin assembly is winched up under the rear body by placing the chain through the centre of the under tray bin assembly and using the wheel brace on the winch drive behind the left-hand rear wheel. The winch mechanism contains a brake that positively locks the under tray bin assembly in place. Four locating brackets align the under tray bin assembly with the chassis. Straps are provided to secure the jerricans.

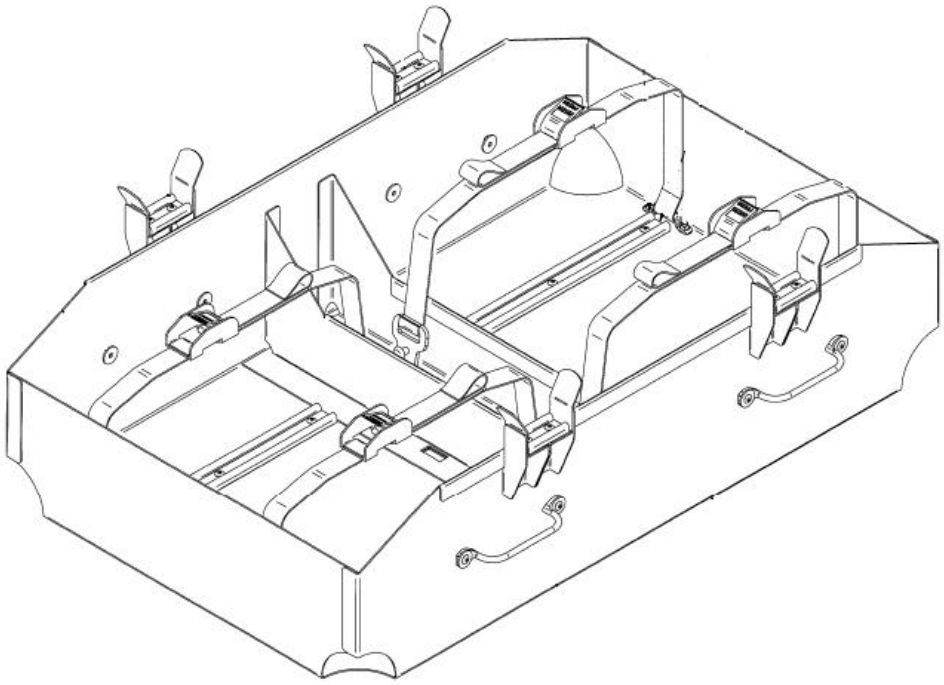
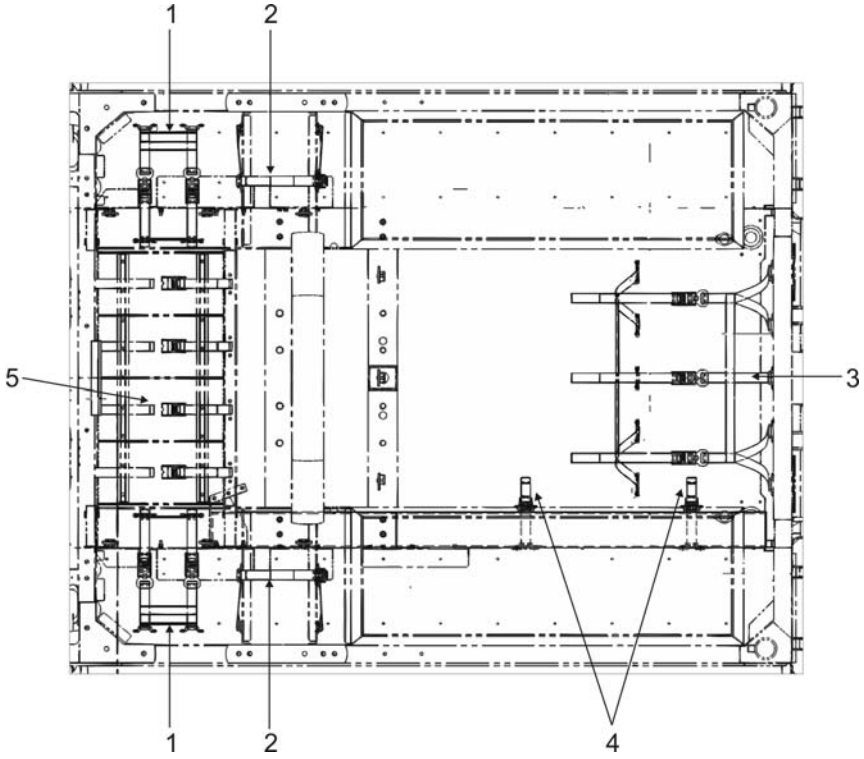


Figure 30 Under Tray Bin Assembly

67. Cargo Restraint System. The cargo restraint system in the rear body consists of strap assemblies for packs (Figure 30, Items 1 and 3), jerrican straps (Items 2), cam pole straps (Items 4), a long pole retainer bracket located under the seat and ammunition stowage straps (Items 5).



1 Strap assembly front pack
2 Strap assembly jerrican
3 Strap assembly rear pack
4 Strap assembly camouflage poles
5 Strap assembly ammunition

Figure 31 Cargo Restraints

68. Non-slip Flooring. The floor of the rear tray, between the steel tread strips, is coated with AS-75 non-slip coating.

69. Spare Wheel Carrier. The spare wheel carrier assembly (Figure 32) is mounted on the rear left of the vehicle. The carrier has the capacity of two wheels and secures them by a strap assembly and with a lockable cable. The strap assembly has protective covers to prevent chaffing of the straps. The carrier can be configured with either one or two spare wheels. The registration plate and light are mounted on the rear of the carrier.

Figure 32 Spare Wheel Carrier

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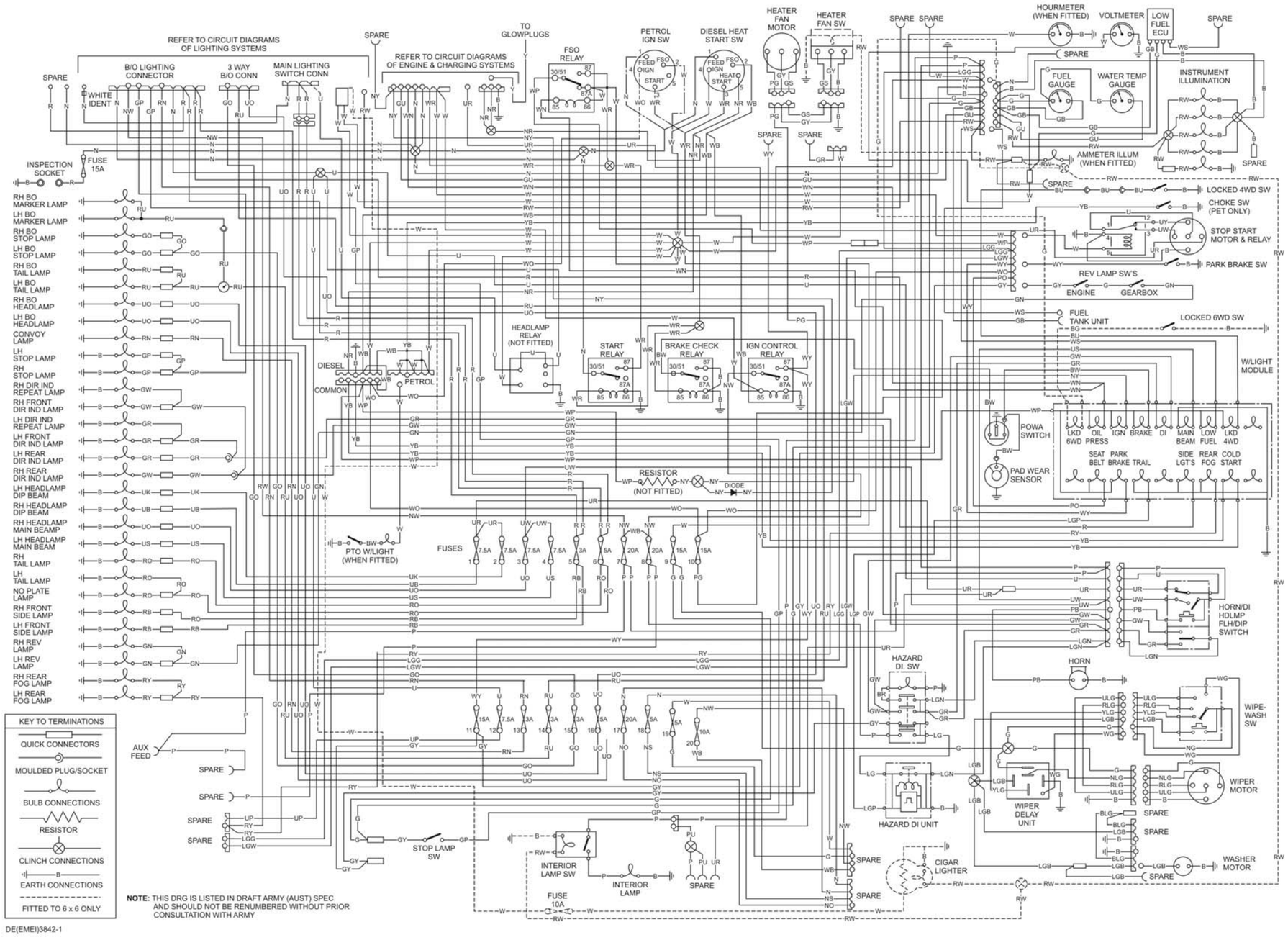

Figure 33 Main Wiring Diagram

END

Distribution List: **VEH G 16.7 – Code 1** (Maint Level)
(Sponsor: CGSV SPO, Lt B Vehicles)
(Authority: DAC 085/07 and 021/08)