TRUCK, SURVEILLANCE, LIGHTWEIGHT, WINCH, MC2 - LAND ROVER 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, Winch, MC2. All relevant weights, dimensions and performance figures are detailed in the Data Summary EMEI Vehicle G 130. 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 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 12109 – Truck, Surveillance, Lightweight, Winch, MC2; and

(2) SCES 12036/1 – Equipment Kit, Truck, Surveillance, Lightweight, Winch, MC2;

c. Block Scale 2406/31 – Special Tools for RAEME – B Vehicles – Truck Utility and Truck Light, MC2 (Land Rover Model 110);

d. EMEI Vehicle A 029 – Servicing of B Vehicles, Trailers, Stationary Equipment, Auxiliary and Small Engines;

e. EMEI Vehicle A 291-5 – Tyres and Tubes –Australian Defence Force B Vehicle Tyre Guide;

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

g. EMEI Vehicle G 103 – Truck, Utility, Lightweight and Truck, Utility, Lightweight, Winch, MC2 - Land Rover 110 4X4 – Light Grade Repair;

h. EMEI Vehicle G 104-1 – Truck, Utility, Lightweight and Truck, Utility, Lightweight, Winch, MC2 - Land Rover 110 4X4 – Medium Grade Repair;

i. EMEI Vehicle G 104-2 – Truck, Utility, Lightweight and Truck, Utility, Lightweight, Winch, MC2 - Land Rover 110 4X4 – Heavy Grade Repair;

j. EMEI Vehicle G 130 – Truck, Surveillance, Lightweight, Winch, MC2 - Land Rover 110 4X4 – Data Summary;

k. EMEI Vehicle G 133 – Truck, Surveillance, Lightweight, Winch, MC2 - Land Rover 110 4X4 – Light Grade Repair;

l. EMEI Vehicle G 134 – Truck, Surveillance, Lightweight, Winch, MC2 - Land Rover 110 4X4 – Medium and Heavy Grade Repairs;

m. EMEI Vehicle G 139 – Truck, Surveillance, Lightweight, Winch, MC2 - Land Rover 110 4X4 – Servicing Instruction; and

n. Repair Parts Scale 02207.

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

Table 1 Location of Identification Numbers (Continued)

Serial	Ident	Location
5	Transmission and transfer case	Rear of the transfer case
6	Torque limiter	On 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	Air compressor	Front outer mounting point

GENERAL INFORMATION

Air Cleaner

4. A Donaldson Duralife air cleaner is utilized 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 changeover 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. A Magnum twin-cylinder air compressor is installed on the left-hand side of the engine. Drive for the compressor comes from the alternator by means of a single Vee-belt to a manually actuated, pin-type, drive clutch. The compressor has the capability of delivering air at a rate of 2.6 litres per second at a factory set pressure of 517 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. The transmission is interchangeable with the Model LT95A transmission fitted to the Truck, Lightweight, MC2 - Land Rover 110 family of vehicles. The only difference being the latter transmission is fitted with 0.996:1 high ratio transfer case gears.

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.

Driving Lights

13. The vehicle is equipped with two Lucas 12 Volt 100 Watt driving lights. The lights are 184 mm in diameter, with clear lenses and are fitted with single filament quartz halogen bulbs. The lights are secured by their mounting bolts to brackets on the brush guard.

Wheels

14. The wheel assembly (Figure 1) is comprised of 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.

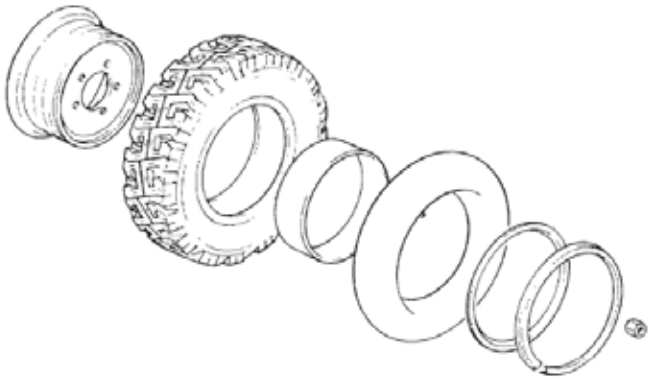


Figure 1 Tyre, Tube and Split Rim

DETAILED DESCRIPTION

Air Cleaner

15. Air Cleaner Type. A Donaldson Duralife air cleaner is utilized 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.

16. 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.

17. Service Indicator. A service indicator (Figure 2) 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.

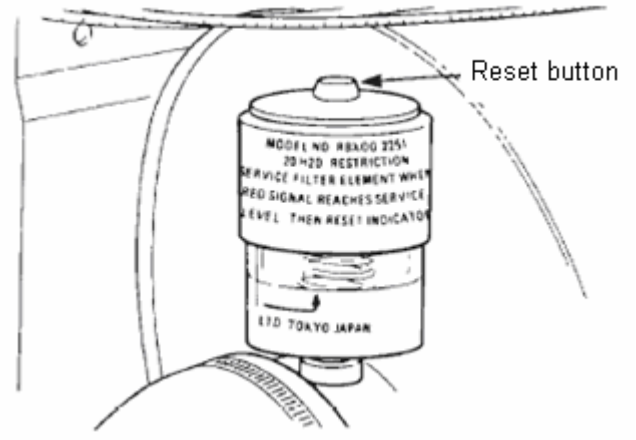


Figure 2 Air Cleaner Service Indicator

18. Air Cleaner Components. An exploded view of the air cleaner assembly and its components, including hoses and mountings, is shown in Figure 3.

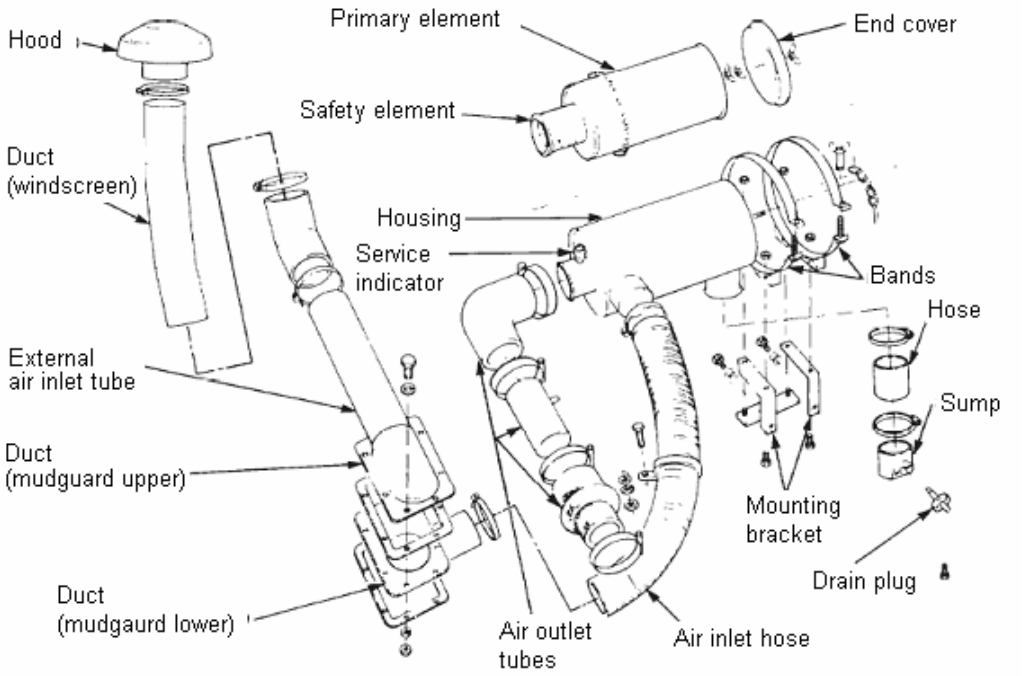


Figure 3 Air Cleaner Assembly - Exploded View

Fuel System

19. 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 of 176-245 kPa to the 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.

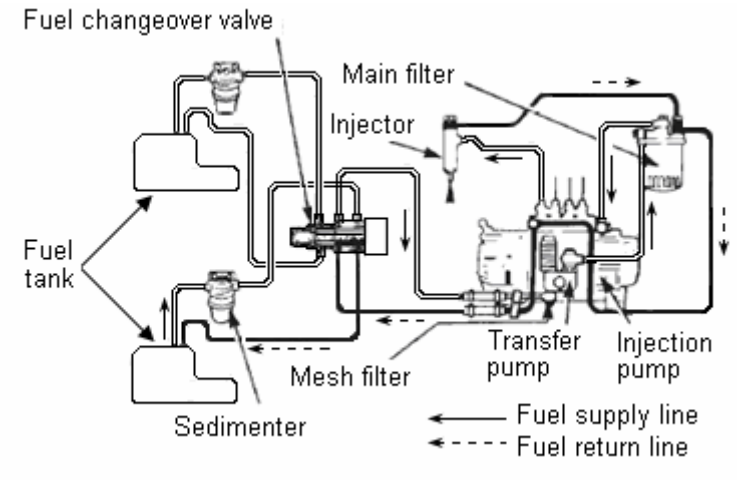


Figure 4 Fuel System

20. 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.

21. 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.

22. 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.

23. Fuel Return Line and 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.

24. 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.

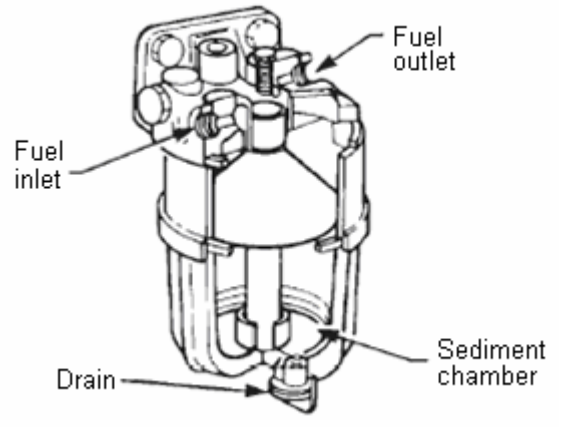


Figure 5 Fuel Sedimenter

Air Compressor

25. Construction. The Magnum air compressor is constructed of machined aluminium alloy with the cylinders positioned to form a 90° Vee configuration. Figure 6 illustrates the various components of the air compressor.

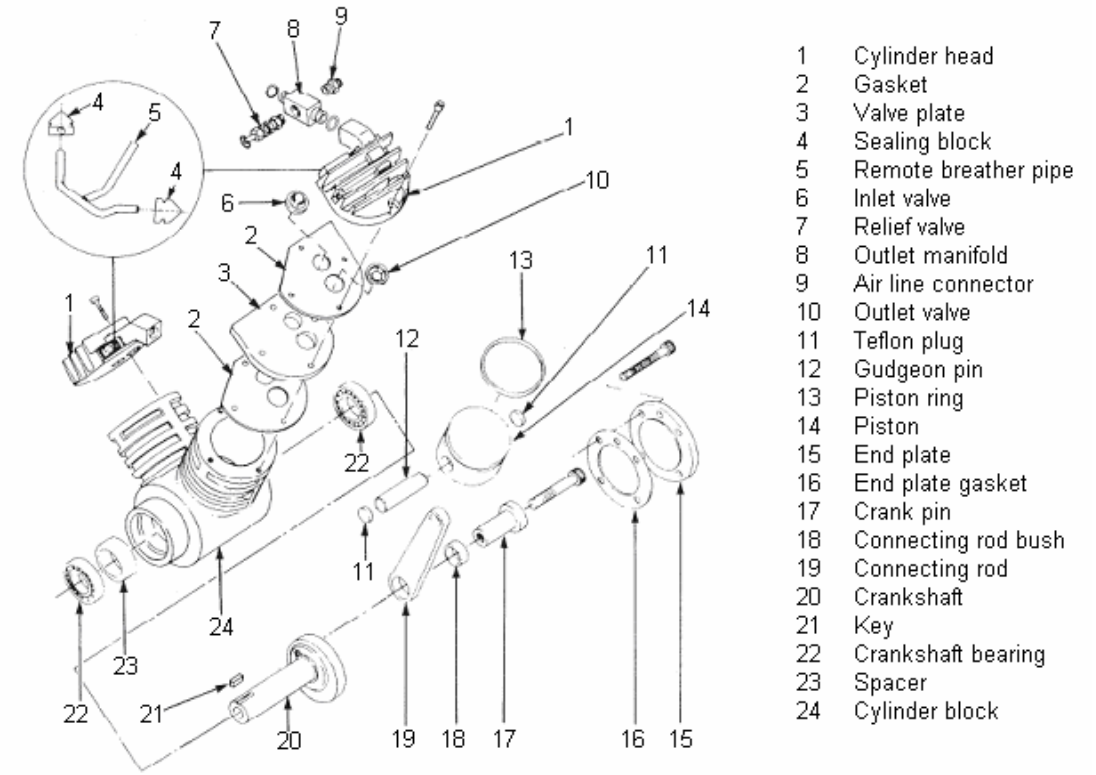


Figure 6 Air Compressor Exploded View

26. Pistons. The pistons are constructed of aluminium alloy and machine finished to provide a working clearance within the cylinder bores. A groove is machined into the outer circumference of the pistons for the fitting of a single cast iron piston ring acting as a seal between the piston and the cylinder bore.

27. Connecting Rods. Hardened steel gudgeon pins secure the pistons to the two one-piece connecting rods, while Teflon plugs retain the gudgeon pins within the piston. A sintered bronze bush is installed in the bore at the big-end of both connecting rods to provide a bearing surface between the connecting rods and the crank-pin. Both connecting rods are mounted on the one crank-pin.

28. Crankshaft. The crankshaft is a straight shaft with an offset flange (counterbalance) at one end (Figure 7). The shaft and counterbalance are machine finished. A recessed threaded hole is machined into the counterbalance, 10 mm from the centre line of the crankshaft, for the purpose of mounting the crank-pin. The crank-pin is made of case-hardened steel and secured to the crankshaft by a high tensile, socket-head cap-screw.

The offset crank-pin converts the rotary motion of the flange into the linear stroke to move the piston up and down the cylinder bore.

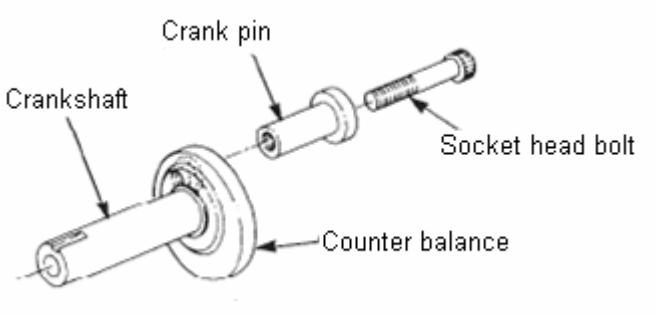


Figure 7 Air Compressor Crankshaft Assembly

29. Crankshaft Bearings. When the crankshaft is installed in the crankcase, it is supported by two ball type bearings. The bearings are a press fit, both onto the crankshaft and into the crankcase, with a steel spacer positioned between the two inner races of the bearings.

30. Valve System. Valve plates are installed above each cylinder with head gaskets positioned above and below the valve plates. Two identical one-way valves are installed in the valve plates, and arranged so that when the compressor is operating, air can only enter the cylinders through the inlet valves and exit through the outlet valves. A cylinder head is secured over each valve plate, providing the means of directing air flow to and from the cylinders, via ports which are machined into the heads and positioned directly over the valves.

31. Intake Stroke. As the pistons move down the bore of the cylinders, air is drawn into the compressor from the engine air inlet manifold via the remote breather pipe to the inlet ports.

32. Output Stroke. When the pistons pass bottom dead centre and start moving up the bore of the cylinders, spring pressure and a slight back-flow of the air causes the inlet valve to close. As the pistons move further up the bores, slight compression of the air in the cylinders acts against the outlet valves. This overcomes the spring pressure and opens the valves and directs the air to a bridge manifold. The bridge manifold provides a common outlet for the cylinders and is capable of being rotated through 360^{o}. An air outlet fitting and a pressure relief valve, which is preset at 517 kPa, are fitted to the bridge manifold.

33. Drive and Clutch Operation. The air compressor is mounted on a steel frame attached to the engine cylinder block. The steel frame also houses the driveshaft and provides a mounting for the drivebelt pulley. The drive pulley, which is secured to the end of the driveshaft by means of a roll-pin, incorporates a manually actuated dog type clutch and a spring-loaded release lever. The clutch is engaged (only when the engine is not operating) by depressing the button on the front of the drive pulley. The release lever locks the button in position, however, if the compressor speed exceeds the desired operating speed, centrifugal force causes the release lever to move outward, against spring pressure, and release the clutch actuating button. Spring pressure forces the actuating button outward, releasing the dog clutch and ceasing the drive to the compressor. The release lever is normally used as a manual release for the dog clutch, however, only when the engine is not operating.

Transfer Case

34. 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.

35. 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 8). 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.

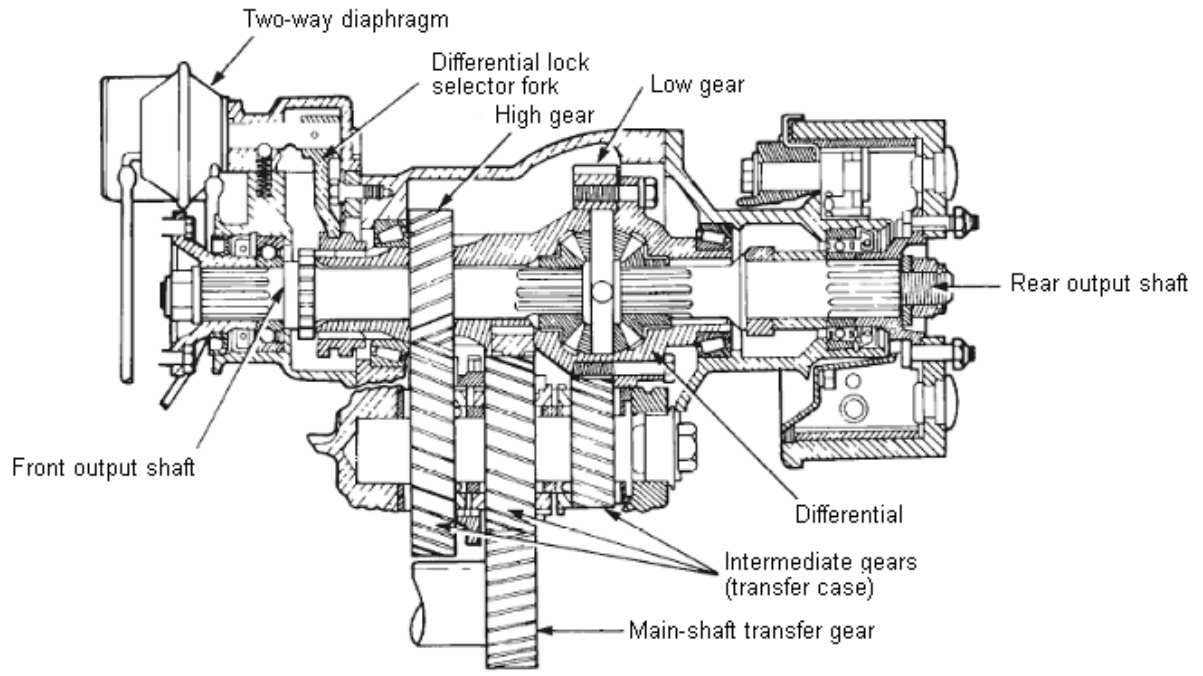


Figure 8 Transfer Case and Differential - Sectional View

36. 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 8). 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.

37. 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.

38. 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

39. The steerable front drive axle comprises a differential assembly, two axles (half shafts) and two steerable drive-ends (Figure 9). 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 are comprised of 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.

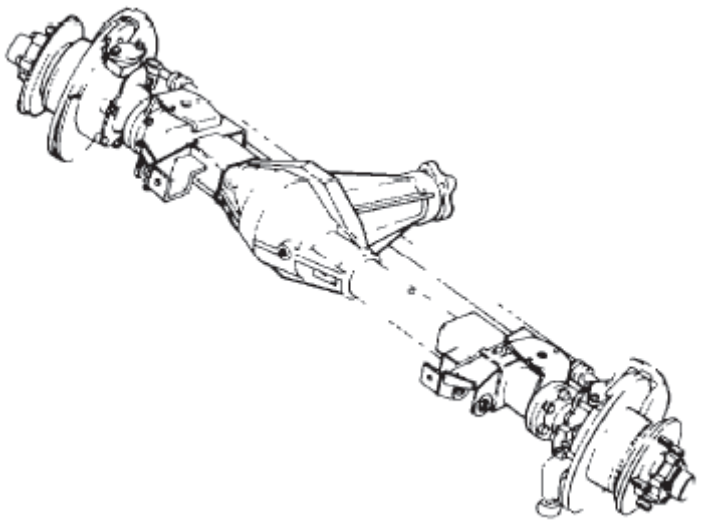


Figure 9 Front Axle Assembly

40. Steerable Dive End. Figure 10 illustrates a sectional view of the steerable drive-end.

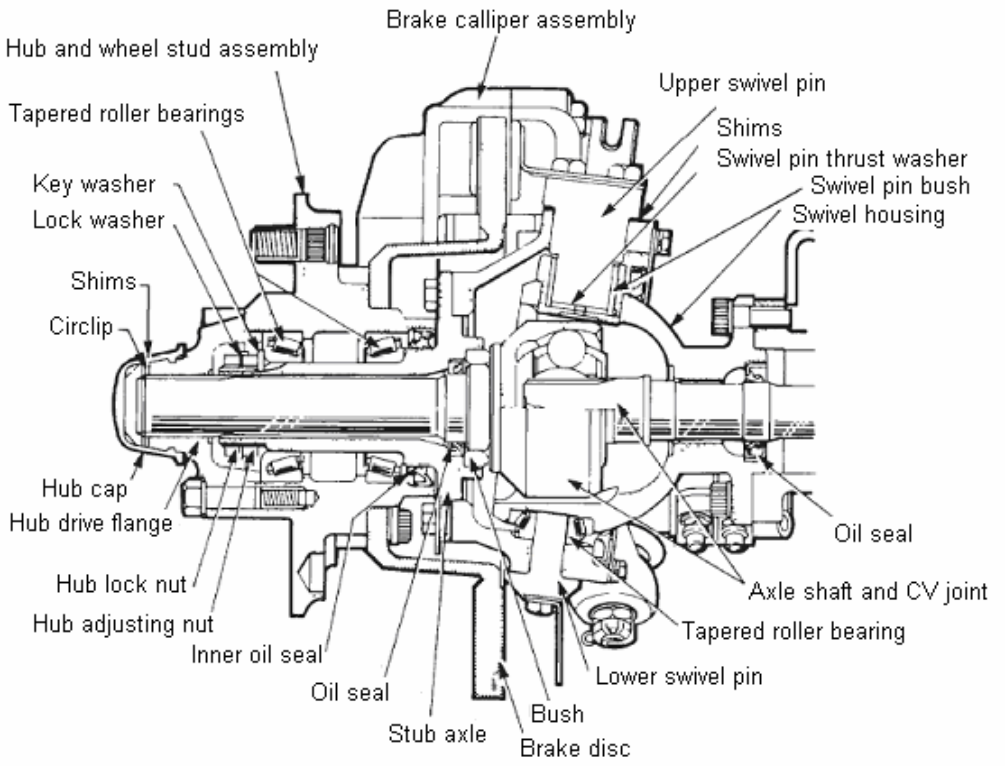


Figure 10 Steerable Drive-end - Sectional View

Rear Suspension

41. 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 11). 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.

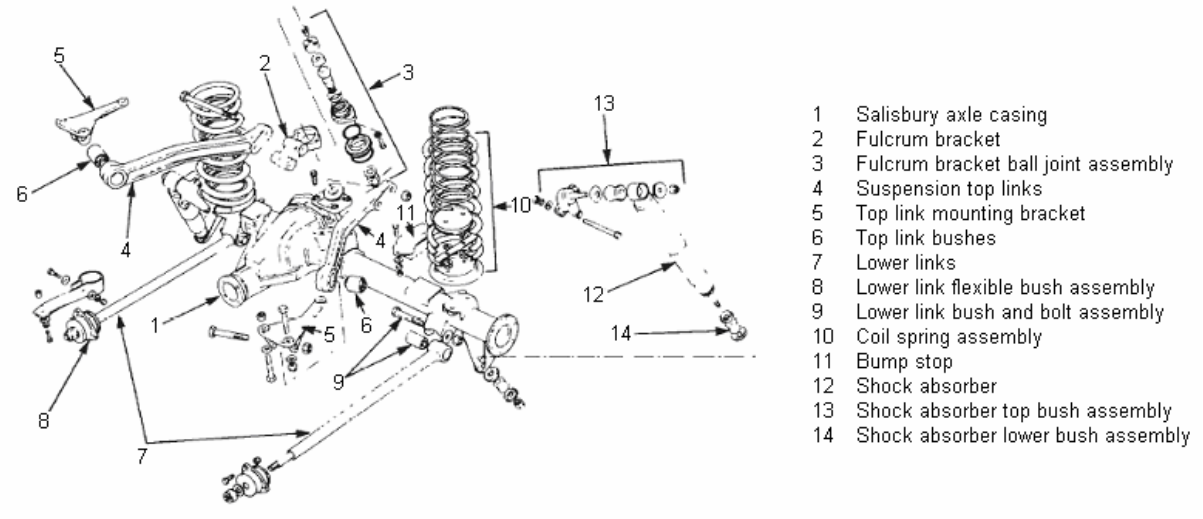


Figure 11 Rear Suspension

Rear Brakes

42. 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.

43. 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.

44. Figure 12 illustrates the various components of the rear wheel disc brake assembly.

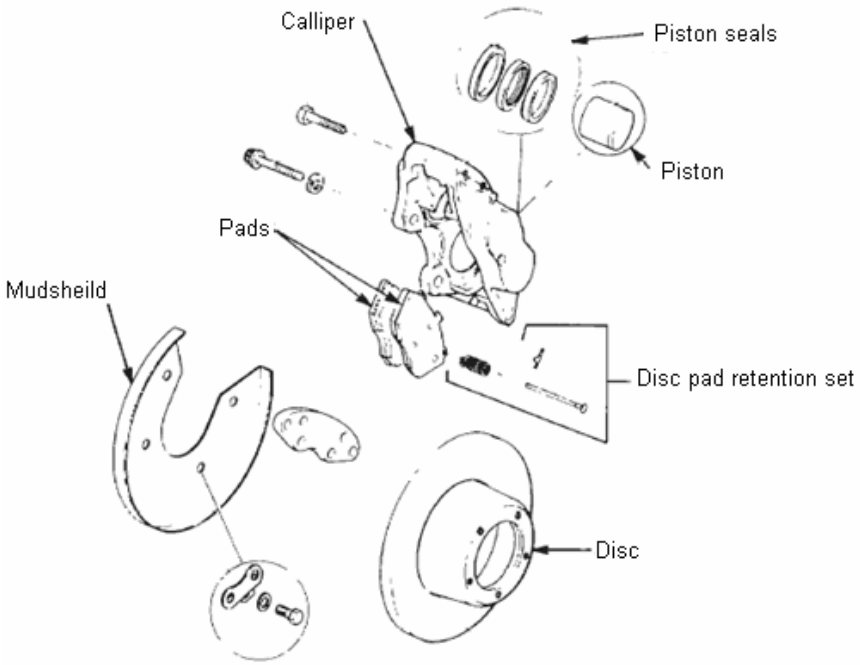


Figure 12 Rear Disc Brake Assembly - Exploded View

Steering

45. 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 13).

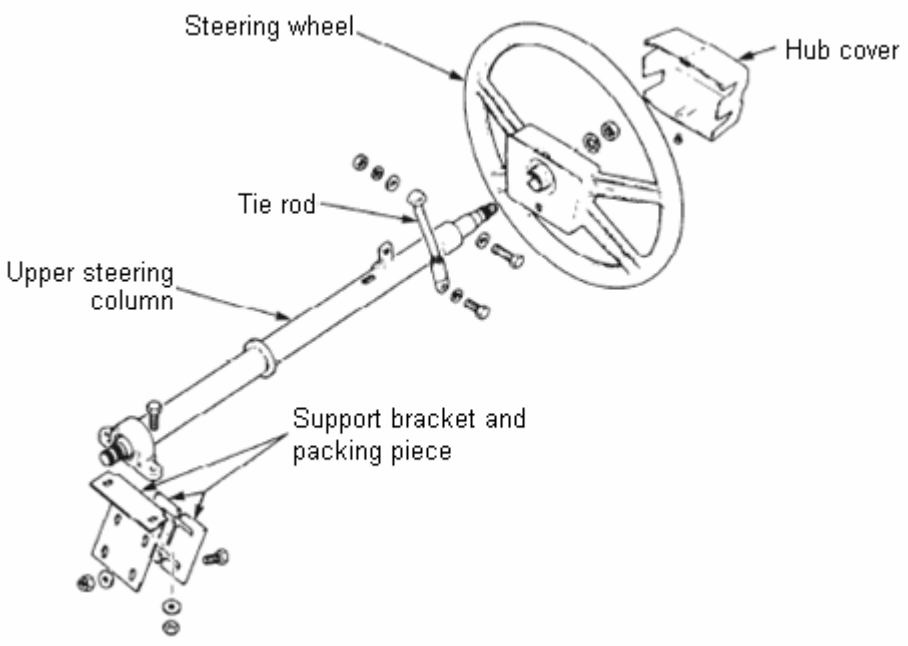


Figure 13 Steering Wheel, Column and Upper Shaft Assembly

46. The lower section of the steering shaft comprises two shafts (coupling shafts) which are held together by a reinforced coupling (Figure 14). 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.

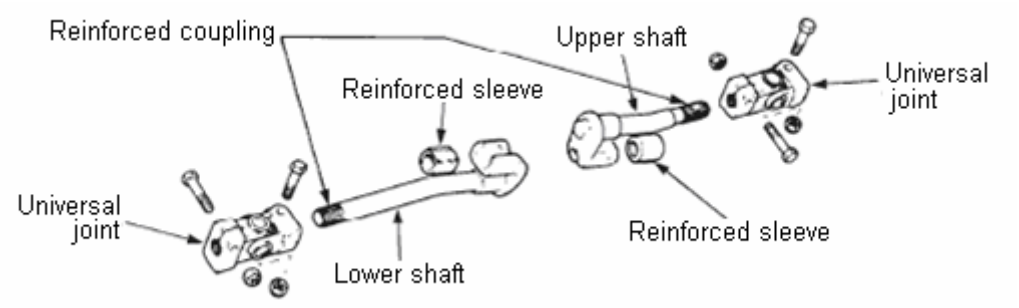
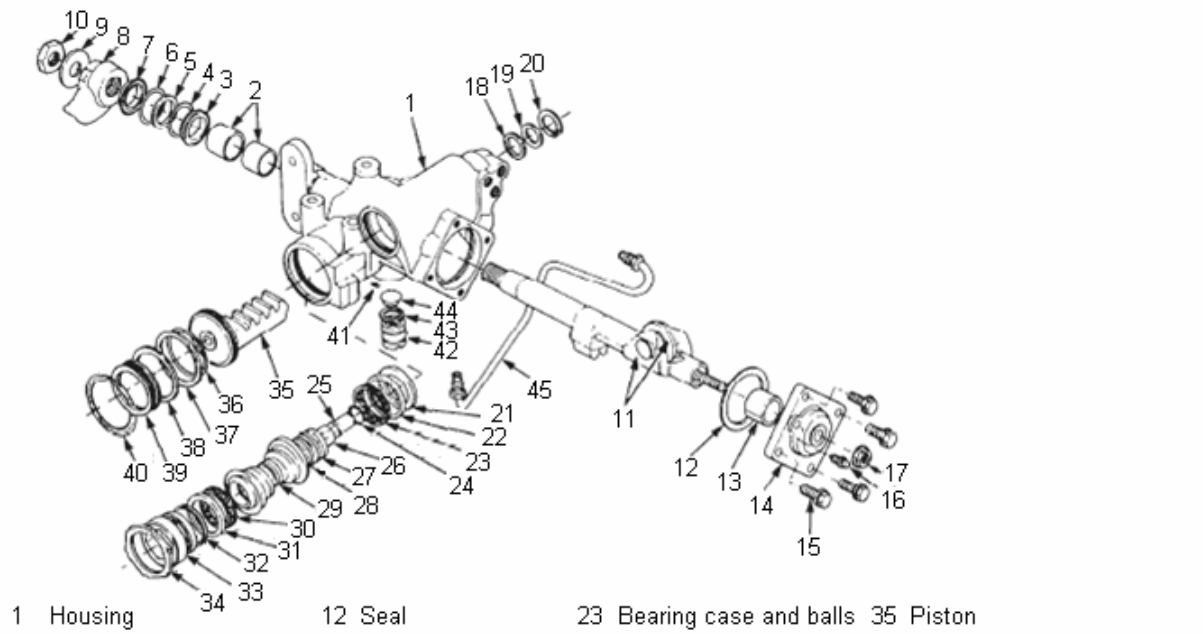


Figure 14 Steering Shaft (Lower Section) and Coupling - Exploded View

47. Steering Box. The steering box is a variable ratio, power assisted worm and roller type (Figure 15) 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 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	12	Seal	23	Bearing case and balls	35	Piston
2	Housing bushes	13	Bush	24	Circlip	36	Piston O-ring
3	Seal	14	Cover plate	25	Seal torsion bar	37	Piston Teflon seal
4	Backup washer	15	Self locking screws	26	Rotor	38	Cylinder cover seal
5	Backup seal		– 4 of	27	Teflon rings – 3 of	39	Cylinder cover
6	Circlip	16	Bleed screw	28	Stop-off rings	40	Cylinder cover retainer
7	Seal	17	Lock nut	29	Worm	41	Screw
8	Drop arm	18	Rotor seal	30	Bearing cage and balls	42	Rack adjusting screw
9	Tab washer	19	Seal washer	31	Bearing track	43	Rack adjusting screw seal
10	Sector shaft nut	20	Circlip	32	Seal	44	Rack pad
11	Sector shaft and follower assembly	21	Shims	33	Worm adjusting screw	45	Fluid line
		22	Bearing track	34	Lock nut		

Figure 15 Steering Box Assembly - Exploded View

48. Power Assistance. Power assistance is provided by means of a piston and toothed rack assembly located in the steering box housing. The teeth of the rack are meshed with a gear segment on the sector shaft 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.

49. 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.

50. 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.

51. Steering Linkages and Damper. As illustrated in Figure 16, 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.

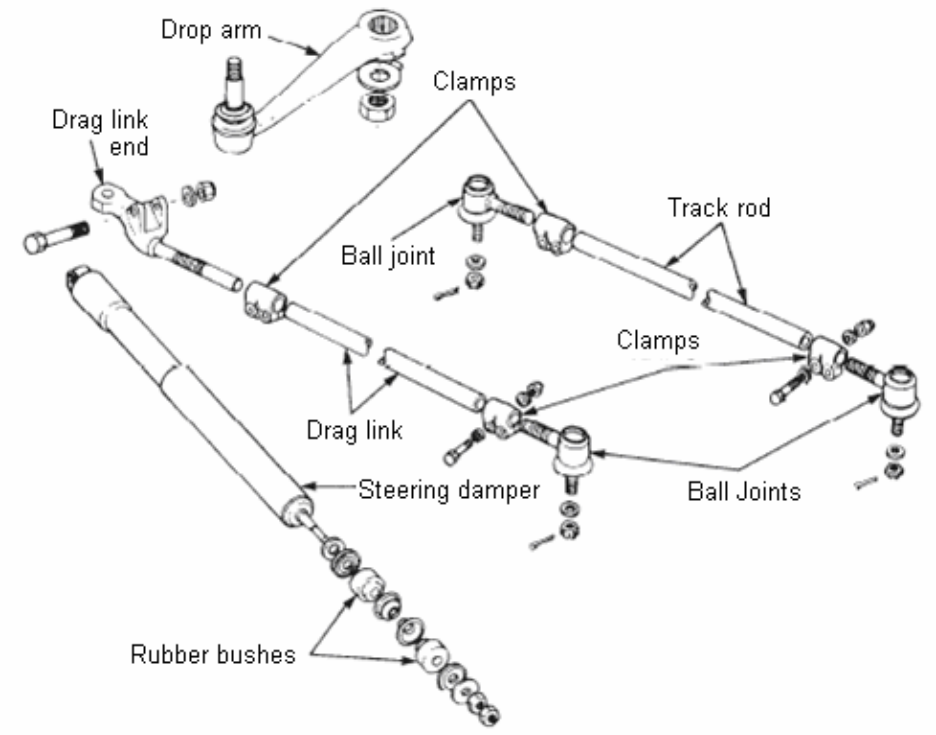


Figure 16 Drop Arm, Steering Linkages and Steering Damper

Driving Lights

52. The Lucas 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.

53. Relay. A six terminal relay (Figure 17) controls the current flow to the driving lights. The dash mounted rocker switch provides the earth path for the relay armature, while the voltage from the headlight high beam circuit provides the control voltage to the other side of the armature required to activate the relay. When the relay is activated by having both the control voltage (headlights on high beam) and earth path (dash board rocker switch ON) it switches battery voltage to the driving lights.

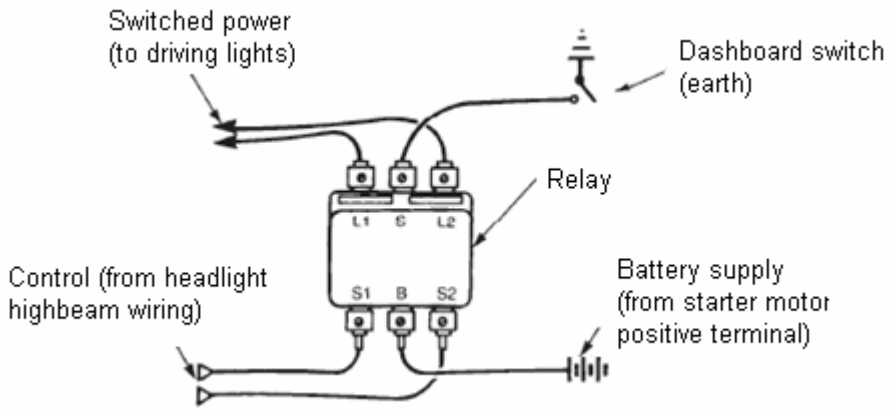


Figure 17 Driving Light Wiring Circuit

Rear Body

54. Lower Body. The rear body (Figure 18) 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.

55. Roll Bars. Two removable roll bars 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 utilized as bows for the canvas canopy which, when installed, protects both the occupants and cargo from the elements. The roll bars are also the fixtures to which the boat rack and the camouflage stowage frame are secured. Bolts retain the roll bars in their mountings and facilitate the removal of the roll bars when necessary.

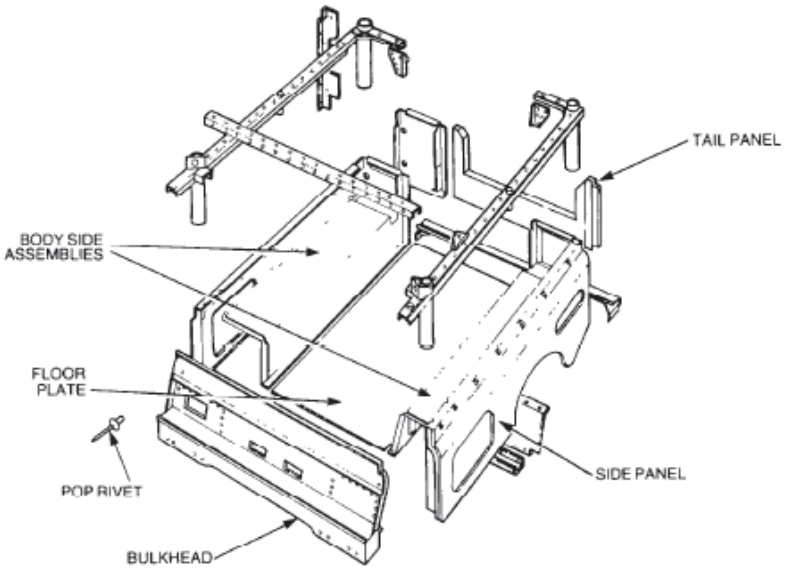


Figure 18 Rear Body - Exploded View

56. Toolbox and Arch Trim. A toolbox and wheel arch trim are incorporated on each side of the rear body (Figure 19). 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.

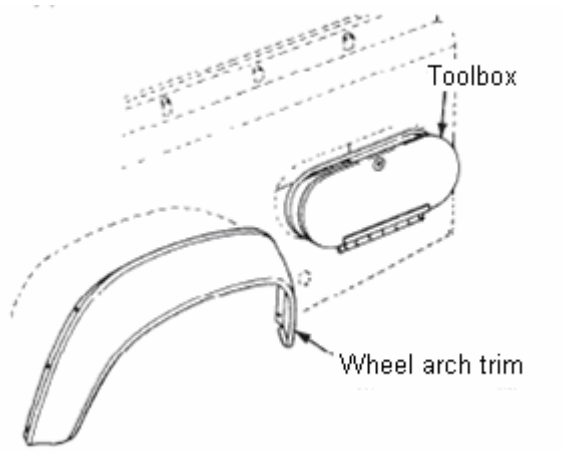


Figure 19 Toolbox and Wheel Arch Trim – Left Side

57. Cargo Area. A single rear facing seat is fitted to a frame located at the front of the cargo area (Figure 20). The seat is cushioned; vinyl covered and is fitted with a head restraint and seat belt. The seat frame can be removed to face forward or rearward. The angle (rake) of the back rest can be adjusted. Tool boxes are fitted to a frame and located above the wheel arches on either side of the cargo area of the rear body. The toolbox lids are able to be removed and hinge positions changed to allow access from inside or outside the vehicle. Provision has also been made for the stowage of two spare wheels which are located on either side of the cargo area and secured to brackets on either side of the cargo on the front roll bar support struts.

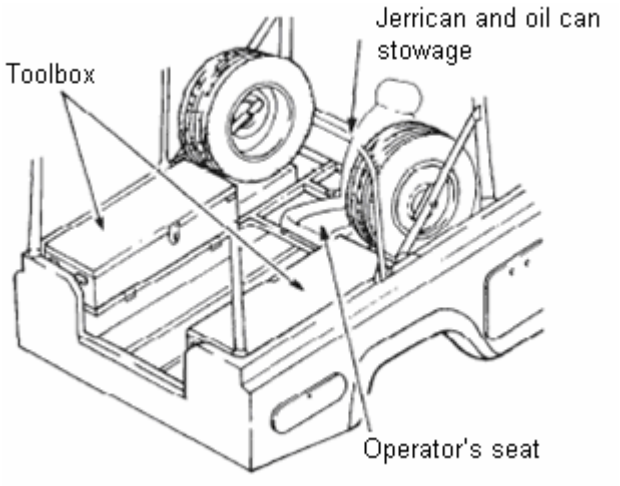


Figure 20 Cargo Area

Boat Rack

58. A two piece boat rack (Figure 21) is mounted externally on the front and rear canopy bows. Both sections of the rack are constructed from round and square section tubing, with plate steel cut to size and shaped to form the mounting brackets. The components of each section are welded together, then each of the two sections is secured by bolts, locknuts and washers to the front and rear canopy bows.

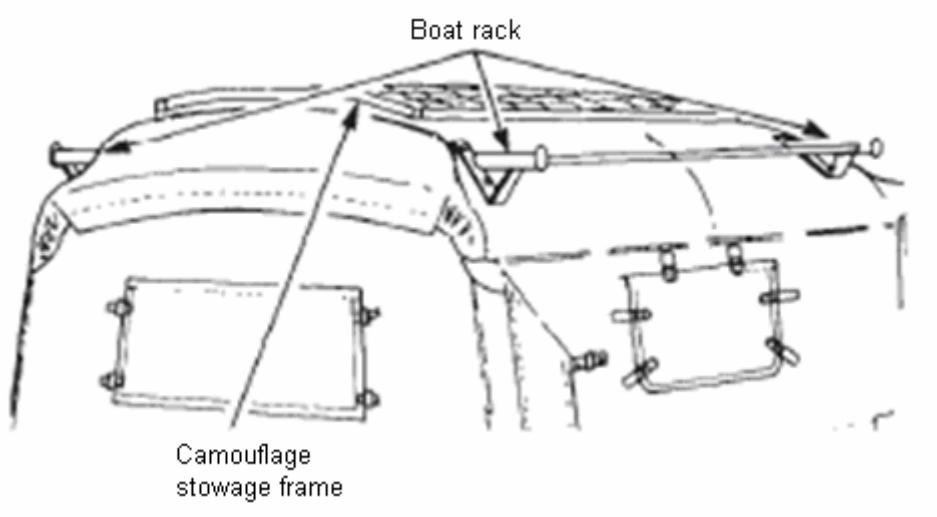


Figure 21 Boat Rack and Camouflage Stowage Frame

END

Distribution List: **VEH G 16.7 – Code 2** (Maint Level)
(Sponsor: LV SPO, Lt B Vehicles)
(Authority: TRAMM)