FIRE FIGHTING EQUIPMENT

Tank Capacities

Water Tank	10000 ltr (2200 Imp.gal)
Foam Liquid Tank	1200 ltr (265 Imp.gal)

Fire Pump

Type	Godiva GMA 5300, Two stage, centrifugal.
Output Ratings (not simultaneous)	
Low	5650 ltr/min (1243 GPM) at 15 bar and 3550 pump RPM
High	300 ltr/min (66 GPM) at 40 bar and 3550 pump RPM

Monitor

Output (100%)	4500 l/min (990 GPM)
(50%)	2250 l/min (495 GPM)
Operating Pressure	14 bar (202 lbf/in²)
Range (100%)	70m (230 ft) minimum
(50%)	50m (164 ft) minimum
Elevation	+45°
Depression	Within 9m (30 ft) of front of vehicle
Rotation	115° minimum about centre line of vehicle

Foam Sidelines

Flow Rate	450 ltr/min (123 gpm)
Pressure	7 bar (101 lbf/in²)
Range (stream)	20m -25m (65-82 ft) approx.
Expansion Ratio	8:1
25% Drain Time	6 minutes

Undertruck Nozzles

Flow Rate	400 ltr/min (88 GPM) at 14 bar

Bumper Turret

Output	1150 ltr/min (253 GPM)
Operating Pressure	14 bar (2021 lbf/in²)
Range (straight stream)	35m (115 ft) far point
Elevation	+45°
Depression	-20°
Rotation	90° minimum about centre line of vehicle

VEHICLE SPECIFICATIONS

Acceleration	0-80 KPH within 35 secs
Top Speed	120 KPH
Laden Weight	29860 kgs
Length incl Monitor	10400 mm
Width incl Mirrors	2850 mm
Height /roof Monitor	3620 mm
Underaxle Clearance:	
Front	350 mm
Rear	350 mm
Turning Circle (wall to wall)	29 m
Tilt Angle	30 degrees
Braking	32 - OKPH within - 10.7 m 64 - OKPH within - 40 m
Requirements	under C.A.P 168 1990 Chapter 8
Capacities	Water tank 10,000 ltr (2,200 I.G) Foam tank 1,200 ltr Monnex 100 kg
Vehicle Data	6 x 6 Chassis 585 BHP at 2,300 RPM Rockford Powertrain Power Devider and P.T.O Detroit Diesel 8V - 92 TA Turbocharged After Cooled

Braking System

Fully air operated with separate circuits controlling the front and rear brakes.

A engine driven compressor working at 2000 RPM delivers air from engine air filter via a drier to three groups of reservoirs.

1.	Primary services	- front/rear	- foot operated.
2.	Secondary services	- parking brake	- hand operated.
3.	Auxiliary services	- controls and equipment.	

A.B.S. anti-locking system is incorporated and a coupling located at the rear of the vehicle enables reservoirs to be charged from an external source of compressed air.

Tyres can be inflated from the vehicle air system.

Fuel System

2 x 125 ltrs (55 gals) tanks situated on brackets behind each rear wheel.

Hose Stowage

Located below cab floor, each locker houses 1 x flaked or dutch rolled hose 70 mm/30 m plus 1 x foam making branch-pipe (Chubb 10/10).

Equipment Stowage

On the tank top for 4 lengths of 140 mm (5.5") suction hose.

Gantries

1 x 2 section rope operated	10.66 m (35 ft) Ladder
1 x 2 section push up	5.5 m (18 ft) Extending Ladder
1 x 2 section push up	5.5 m (18 ft) Angus Sacol Wide Ladder

Towing Facilities

Four tow eyes)
2 x front) NOT SUITABLE FOR HEAVY RECOVERY
2 x rear)

Water Tank

10,000 ltr (2,200 I.G) filled through 2 x 2½" couplings fitted at the rear.

Foam Tank

1,200 ltrs (265 I.G) A fill through is fitted at the fill lid, capable of allowing 2 x 22.5 ltr (5 I.G) drums to be emptied simultaneously.

Water Pump

Godiva GMA 5,300 two stage centrifugal dual pressure unit complete with automatic water ring primer and separate header tank.

Pump output rating:

Low pressure	- 5650 LPM at 15 bar at 3550 RPM pump speed
High pressure	- 300 LPM at 40 bar at 3550 RPM pump speed

Foam Proportioning System

Round the pump system inductors adjust to between 3% and 8% for the monitor and a fixed rate of 6% for the bumper turret, sidelines and underbody protection.

Monitor

Output 100%	-	4,500 LPM) Operating pressure 14 bar
50%	-	2,250 LPM)
Range straight stream	-	100% - 70 m min
		50% - 50 m min

Based on flouro - protein expansion 8-1 25% drainage - 6 mins

Bumper Turret

Output	1150 LPM
Operating pressure	14 bar
Range straight stream	35 m min

Based on flouro -protein expansion 4-1 25% drainage - 3 mins

Foam Delivery

Each foam delivery outlet is complete with a pneumatically operated valve, pressure restrictor and 2.5" female connection ensuring that when the monitor is in use the output remains a constant 450 LPH. The restrictor can be removed for extended pump facilities.

Output	-	450 LPM
Pressure	-	7.0 bar
Range straight stream	-	20-25 m

Based on flouro - protein expansion 8-1 25% drainage - 6 mins

First Aid Hosereel - High Pressure

Pneumatical Operated Shut Off Valve
Electrical/Manual Rewind
36 m x 25 mm bore round hose and jet-fog-spray nozzle

Underbody Protection

5 Nozzles controlled by a pneumatically operated valve from the driver panel and operable independent or simultaneously with monitor or vehicle stationary or on the move.

Total Liquid Output - 400 LPM at 14 bar

Foam Tank Drain/Fill Connection

A quick release connection with manually operated valve and blanking cap, located at the right hand midbody locker.

An electrically driven (24 volt) foam tank fill pump is in the same locker and a 6 m long hose with 1 m pick up tube is provided.

Pump output rating - 40 LPM.

Outside Suction/Rapid Transfer Facility

A 5.5" male suction connection with a manually operated valve. Strainer and captive dustcap is located at the left hand side of the vehicle.

At the right hand side of the vehicle a 5.5" female connection is fitted, providing for the "Rapid Transfer" facility. A additional 5.5" female connection is fitted adjacent to the suction coupling for the rapid replenishment via a 150 mm (6") pipe direct to the water tank. Both connections are identified to prevent incorrect coupling of hoses.

Flushing

On completion of fire fighting operations the system can be cleansed of foam concentrate by inducing clean water down stream of the foam tank valve and discharging through the delivery outlets.

Pressure Relief Valve

The automatic pressure relief valve is a loaded pressure actuated unit which prevents high pressure surges which may burst hose on open line when branch pipes are closed without reducing pump speed.

Overheat Protection

To prevent overheating of the water pump when operating against "Closed Discharge". A automatic bypass system from the delivery side to the suction side of the water pump is incorporated.

Dry Powder System

Capacity - 1 x 100 kgs

The powder container, is designed for an operating pressure of 14 bar. An is equipped with a pressure gauge, charging hole, expelling gas supply line, powder riser pipe and drainage plug.

Nitrogen gas is used as the expellent.

One hosereel is provided, complete with manual rewind, reinforced rubber hose 30 m long x 19 - 25 mm diameter with trigger operated pistol type applicator.

Pistol Output 2.0 kg/sec
Range 10 m approx.
Height 8 m approx.

Winch

A 24 volt electrically operated winch complete with a wire rope, with two "D" type shackles and capable of a line pull of 3 tons its located centrally at the front of the vehicle.

A "plug-in" remote control is provided for safe operation and positioning.

Intercommunication System (Driver to Platform)

Includes 2 x headsets with microphone, speakers and quick release plug and sockets.

Elevating Mast and Floodlight Assembly

Elevation is controlled pneumatically from the monitor platform and manually operated for floodlight direction. 4 x 500 W floodlights are powered by a 110 volt 3 kW alternator mounted on the engine and controlled from the monitor platform panel and when fully elevated are approximately 7 m above the ground.

1 VEHICLE (Fig. 1)

The PROTECTOR P6/585/AP is a medium duty fire fighting vehicle designed specifically for use against fires involving aircraft. It carries a crew of five (including the driver) and quick-action fire fighting and rescue equipment.

The truck is built on a Simon Gloster Saro 6 X 6 chassis with forward control, centre driving position and a rear mounted V8 diesel engine. The high engine power offers excellent acceleration, high speed, high standards of cross country performance, reliability and ease of operation. Towing eyes are fitted, two at the front and two at the rear of the chassis.

The engine is located at the rear of the chassis and provides tractive power, ancillary drives for hydraulic, pneumatic and electrical services and, via a power divider and a power take off (PTO), drive for the fire pump. The torque converter and transmission gearbox are mounted centrally on the chassis, close coupled to a transfer gearbox.

The main transmission is fully automatic with five forward gears and one reverse. For maximum tractive effort off-road the differential gears of the transfer gearbox, individual axles and the rear inter-axle drive are locked.

The top hamper is of modular construction and the modules may be removed independently to give access for major repairs or servicing operations. To aid routine servicing access panels are provided within the modules. The modules are:

a) Cab/crew compartment.

b) Centre unit, comprising a foam making unit and monitor platform.

c) Two side locker units.

d) A High level locker.

e) Combined water and foam liquid tank.

f) Engine compartment.

To minimise torsional loads during off-road operations the cab, tank, pump and high level locker modules are fitted to the chassis using flexible mountings.

Non-slip tread-plate is fitted on all steps. Chequer-plate is fitted on all surfaces liable to damage from crew members boots and ancillary equipment. Grab handles and rails are fitted, where necessary, for the safety of the crew.

NOTE: Throughout this manual, where the terms 'left hand' (L.H.) and 'right hand' (R.H.) are used, it is with the operator facing towards the front of the vehicle.

2 FIRE FIGHTING SYSTEMS

FOAM AND WATER SYSTEM

The foam producing system comprises 'round-the-pump' foam inductors and a dual pressure, high capacity pump, driven by the engine via a power take off (PTO) unit. The system is supplied from a 10000 litre water tank and a 1200 litre foam liquid tank. Developed foam is delivered via a dual output, manually operated, self-aspirating monitor, two foreward- mounted sidelines, a power operated, non-aspirating bumper turret and five undertruck protection nozzles.

Water on its own can be delivered from all the foam deliveries and a high pressure first aid hosereel.

An external suction connection and rapid transfer facility are provided.

Replenishment

The water tank is normally replenished from hydrants. However, refilling can be carried out from a support tanker.

The foam tank is replenished from bulk storage or from drums, using an on-board, 24V d.c. pump, via a fill/drain valve controlled from a handle under the sill of the right hand forward side locker. Filling from drums can also be carried out through a filler cap on top of the tank.

Lockerage

Lockerage is provided for stowage of fire fighting and rescue equipment. All lockers are equipped with automatic lighting.

A 100kg dry powder extinguisher unit and hosereel is fitted in the ??? locker.

3 SUMMARY OF VEHICLE DATA

CHASSIS FRAME

Material	BS 4360-55C
Type	Ladder construction with bolted cross-members.

ENGINE

Manufacturer	Detroit Diesel
Model	8V-92TA Turbocharged, after cooled
Capacity	12.07litres (736in^3)
Gross power	436kW (585bhp) at 2300rpm
Gross torque	2088Nm (1540lbf ft) at 1500rpm

Power and torque values are valid at 30°C ambient temperature and 150m altitude.

The engine is set to 'clean burn' standard, ensuring a smoke emmission value of less than Hartridge 50 base reading.

TORQUE CONVERTER

Manufacturer	GM Allison
Model	TC 487
Size	16 inch
Stall torque ratio	1.50:1
Lock-up clutch	Automatic in all forward ratios

POWER DIVIDER

Manufacturer	Rockford Powertrain
Model	Multi plate clutch
Rating	462 kw (620 bhp) locked up

POWER TAKE OFF

Manufacturer	Rockford Powertrain
Ratio	1.615 X engine speed
Mounting	On front of engine, in drive train.
Rotation	As Engine
Rating	298kW (400bhp)

TRANSMISSION GEARBOX

Manufacturer	GM Allison
Model	HT 750DRD
Type	Co-axial planetary reduction gear assemblies
Ratios	1st 7.97:1 2nd 3.19:1 3rd 2.07:1 4th 1.40:1 5th 1.00:1 Reverse 4.47:1

TRANSFER GEARBOX

Manufacturer	Simon Gloster Saro Ltd
Model	GH6R10
Type	Permanent all-wheel drive single speed, constant mesh
Ratio	1.0:1

DRIVE LINE

Engine to transmission	Hardy Spicer Series 1810
Transmission to transfer gearbox	Hardy Spicer Series 1810
To front axle	Hardy Spicer Series 1710
To leading rear axle	Hardy Spicer Series 1810
Rear inter axle	Hardy Spicer Series 1710

FRONT AXLE

Manufacturer	GKN Heavy Axle Division
Model	SD66-11-1S
Type	Steer-drive, double reduction with differential lock
Rating	10,000kg
Overall ratio	4.53:1
Differential lock operation	Electro-pneumatic

REAR BOGIE

Manufacturer	GKN Heavy Axle Division
Axles	Leading - D66-11-1HF Trailing - D66-11-1 fitted with a drive head with interaxle and cross differential locks and hub reduction units
Rating	11,000kg per axle
Overall ratio	4.53:1
Differential locks operation	Electro-pneumatic

SUSPENSION

Front axle	Multi-leaf semi-elliptical springs.
Rear bogie	Multi-leaf semi-elliptical springs with centre pivots.
Dampers	Two hydraulic shock absorber struts on the front axle.

WHEELS AND TYRES

Wheels	Three-piece, split rim ten stud fixing.
Tyres	Michelin, 16.00 X 20, 28pr 'XL' high traction tread.

BRAKES

Type	Drum brake, 'S' cam operation
Actuation	Pneumatic, spring brake chamber, two per axle.
Swept area	2513cm² per wheel.
Drum size	394mm X 203mm

STEERING

Type	ZF 8098, Integral power steering with twin ram assistance.
Power supply	Engine driven hydraulic pump
Ratio	18.3:1

COOLING SYSTEM

Type	Rear mounted water cooled radiator and fan.
Temperature control	Thermostats.
Operating pressure	0.689kgf/cm²(10lbf/in²)
Circulation	Centrifugal water pump.
Coolant	Water and anti-freeze.
Fan	Mixed flow pusher type, driven by engine via a belt and a thermostat controlled clutch.
Engine coolant immersion heater	dual 110V, 750W elements. External supply from mains.

ENGINE AIR CLEANER

Type	Farr, removable element.
Location	Right hand side of engine at rear of chassis.

EXHAUST SYSTEM

Material	Mild steel
Location	High level, horizontal silencer, exhaust to rear at L.H. side of engine.

ELECTRICAL SYSTEM

Type	24V, negative earth.
Batteries	Four off low maintenance lead acid.
Battery rating	12V, 100Ah at 20hr rate, total; 200Ah at 24V CCA-IEC 510A, SAE 715A.
Battery master switch	Lucas SSB 100
Lighting voltage	24V
Starting voltage	24V
Alternator	Bosch O 120689 511
Alternator capacity	120A at 28V
Alternator protection	Protection relay and fast fuse CAV type 448 3/3M 100A continuous rating.
Circuits protection	5A, 10A, 15A, 20A, 25A, 50A and 70A circuit breakers.
Mains System	110V a.c.
Battery charger	Suitable for 110V a.c. 50Hz mains supply
Engine radiator immersion heater	1500W, suitable for 110V a.c. 50Hz mains supply.
Pneumatic compressor	Suitable for 110V a.c. 50Hz mains supply

CAPACITIES

Fuel tanks	2 X 125ltr, total 250 litres, (55 Imp. gal)
Engine sump	26 litres (5.7 Imp.gal)
Cooling System	100 litres (22 Imp. gal)
Transmission	30.3 litres (6.8 Imp. gal)
Transfer gearbox	25 litres (5.5 Imp.gal)
Leading rear axle drive head	12 litres (2.6 Imp. gal)
Trailing rear axle drive head	9.7 litres (2.1 Imp. gal)
Leading rear axle hubs	2 litres (3.5 pints) each
Trailing rear axle hubs	1.7 litres (3.0 pints) each
Front axle drive head	8 litres (1.75 Imp. gal)
Front axle hubs	2 litres (3.5 pints) each
Hydraulic pump drive gearbox	0.25 litre (0.43 pint)

ANTI-FREEZE

Use only anti-freeze that meets the GM 6038 formulation or equivalent with a maximum of 0.15% silicate content to GM performance specification 1899M.

Concentration %	Specific Gravity	Protection to
50	1.080	-37°C (-34°F)
40	1.065	-25°C (-13°F)
30	1.050	-16°C (+3°F)
25	1.042	-12°C (+10°F)