

M i l l s t r e a m

(Penthouse Systems) Ltd



Unhardened Collective Protection System
for Desert Use – UCPS(DU)



The physiological and psychological penalties of wearing respirators and NBC clothing to protect personnel against chemical warfare threats are well known. Even light-weight systems like the British Individual Protection Equipment (IPE) severely reduce the physical endurance of troops in quite moderate temperatures; they also have to be removed to permit troops to feed, shave and perform normal bodily functions.

A consortium of British companies specialising in NBC defence equipment has therefore developed a range of products capable of providing collective protection facilities adaptable to all normal requirements, both in mobile operations and in permanent static installations. This brochure describes the mobile systems. Systems for mobile operations come as standard autonomous equipments normally mounted in a 2.5 tonne trailer capable of being towed by any military load-carrying vehicle of 4 tonnes or greater capacity. They are designed to meet NATO standards for collective protection against the liquid and vapour hazards produced by chemical agents. They will also prevent the ingress of biological hazards and aerosol and radioactive dusts.

A standard mobile system is designed to sleep and feed a platoon of 30 men in circumstances where it is impossible to evacuate them to a toxic free locality for these purposes. A pair of systems is

therefore ideal for supporting a company-sized sub-unit of 120 men. For units in the front line it is envisaged that they might be found in the A1 echelon area where battalion support personnel are normally located.

Mobile systems are provided with two layers or skins, both made of CARM. The inner provides a vapour barrier, which is inflated to provide the toxic free area (TFA), and an outer skin supported by a metal framework, which keeps the two skins apart, covers it. The outer prevents falling aerosols and liquid agent droplets reaching the inner and this two layer arrangement ensures that the systems will withstand weeks of attack.

Under protracted attack the carbon filters in the air filtration units (AFUs) have to be regularly changed, but one of the two AFUs provided with each system is sufficient to keep the inner inflated if airlocks are closed. There is therefore no loss of protection while a filter is being changed. Even under the heaviest attack each filter has a 24 hours life, but it is recommended that each system be permanently monitored against failure with a chemical agent monitor, allowing maximum effective filter life to be obtained under all conditions of attack.

When operating in developed areas it will always be preferable to dispense with the use of outers and to erect inners inside buildings, ideally in cellars, thus providing

system users with a degree of ballistic and radiation protection.

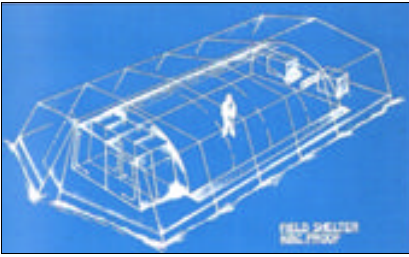
The outer skins can be provided in a variety of colours. For military use the normal choice will be between desert sand or NATO green (with foliage matched infra-red reflectance). Inner floors are made of a heavy duty black CARM and the tops of the inners are made of transparent CARM to allow in light during the day. With the lighting sets provided systems are nevertheless unobservable at night at distances above 200 metres provided the side flaps are down.

In addition to the standard 30 man units, larger systems can be provided for headquarters, workshops and hospitals. A 50-man standard has been designed and even larger sizes could be made to order. Special airlocks with larger ports are available to enable men on stretchers or large equipment to be introduced into these bigger toxic free areas.

More information is provided below on the individual elements that go to make up the complete UCPS system. A combined air conditioning unit (ACU) and heater is included as one of the essential items because there are few places in the world where at sometime in the year heating and/or cooling will not be required.

On the back page the various equipments are listed which go to make up a complete standard system.

SYSTEM DESIGN



The UCPS has been designed by a company with fifty years experience in producing inflatable military products ranging from Second World War barrage balloons to decoys such as dummy tanks. The company's expertise covers all aspects of military use and reliability, and the design and production teams have full UK Ministry of Defence AQAP approval.

CARM

Chemical Agent Resistant Material (CARM) is the basic material from which the barriers of collective protection systems are fabricated. CARM is produced in a range of colours and thicknesses; all consist of a reinforcement grid of multifilament polyester sandwiched between two continuous sheets of low density polyethylene which are welded together by a heat process. The continuous sheets of polyethylene have been subjected to stringent tests to prove their resistance to chemical vapour penetration. In all systems reliance is placed on an outer skin or building to prevent liquid or solid contaminants coming into contact with the inner skin protecting the toxic free area (TFA).

For mobile systems the outers are fabricated from NATO green or sand coloured CARM and the inners from a mixture of green or sand, transparent and heavy-duty black flooring CARM. NATO green CARM is pigment loaded to match its infra-red reflectance to that of natural foliage. The 0.75mm flooring CARM can be laid directly onto unprepared ground, but if it is stony or there are sharp protrusions, the use of an underlay is recommended; those issued for use with military pillow tanks are eminently suitable.

AIR FILTERS – TYPE AFU 300

The NBC Air Filtration Units (AFU) provide a supply of toxic free air to the shelter system. Two filter units are used; each coupled to the toxic free area of the shelter by flexible air supply hoses. During filter changing or in the unlikely event of the failure of one of the filter units, the shelter system can be maintained in operation with one filter only in use.

The AFUs can be provided to use any standard electrical supply and are tilted with 20m of electrical power cable and 2.5m of flexible ducting with quick connect couplings. Each AFU comprises an aluminium body supported by antivibration mountings on tubular steel support rails. The filter unit housing contains the fan and drive assembly, a composite high efficiency particulate and carbon filter and a washable pre-filter. Filters are replaced through a single filter access door.



Filter Operation.

Dirty air is drawn into the air inlet spigot of the filter access door and through the washable pre-filter which removes the larger dust particles. Air then passes through the composite filter, the first stage of which is a high efficiency particulate filter

that removes the remaining dust particles and biological agents. The second stage of the composite filter is an activated carbon filter, which removes chemical agents and gases. Having drawn air through the filters the fan delivers clean air to the shelter through the flexible air supply duct at a pressure sufficient to inflate the inner shelter and hold it at an overpressure of up to 130 Pa. The air supply from the AFUs is rated to provide the necessary purging of the airlocks.

TECHNICAL DATA

Maximum Air Flow	290m ³ /h (170cfm)
Supply Air Pressure	Up to 130 Pa
Pre-Filter Efficiency	80% min.
High Efficiency Filter	99.997% min.
Unit Size	0.66m x 0.7m x 1.19m long
Weight	91 kg

AIR CONDITIONING

The Air Conditioning Unit (ACU) provides heating or cooling to the air supplied from the AFUs before it is delivered to the shelter

The ACU is a self-contained portable unit driven by electrical power supplied by the second generator. It has built-in controls.



TECHNICAL DATA

Cooling Capacity	Up to 7kw
Operating Range	20°C to 55°C (cooling) - 10°C to +20°C (heating)
Running Current	20 amps
Power Required	7.5 KVA
Unit Size	0.65m x 0.875m x 0.875m
Weight	125 kg

GENERATING SETS

The two sets are continuously rated at 7.5 KVA and provide single phase 240V 50Hz outputs. They are powered by twin cylinder petrol driven engines which are easily hand started and draw their fuel from closely located jerricans by way of special syphoning adaptors. This permits continuous operation. Maintenance can be carried out in situ on the trailer

The alternators, which are directly coupled to the engines, are two pole rotating armature machines which have been tested under arduous military conditions. The electrical output is taken via an integral control box carried on the set; it provides basic instrumentation and circuit breaker equipment. The main power on/off switch and the engine ignition switch are readily accessible, and both generator sets are provided with approved earthing and connecting cables.

Both systems are carried on suitable anti-vibration mounts to minimise noise, and the engine exhausts are routed through the cargo bed, discharging beneath the trailer. One of the generating sets is used to run the two air filtration units and the lighting and power point system; the second unit powers the air conditioning unit when required. This dual set arrangement enables one generator to be serviced or repaired without loss of the basic TFA facility.

DISTRIBUTION BOX, LIGHTING AND POWER POINT SYSTEM

Each UCPS is provided with a distribution system that allows the trailer and the on-board generators to be located up to 25 metres from the shelter to prevent noise disturbing shelter occupants.

The ruggedly constructed distribution box has been well proved in the field. It provides 4 outlet

sockets to BS 4343. Three of these provide 240V supplies for running the two AFUs and the power point facility; the fourth outlet powers the 110V lighting system.

The lighting system comprises two twin tubed fluorescent rubber moulded units complete with blue filters and top shades to minimise light emission from the shelter at night. Each unit is connected to the festoon lead that runs along the length of the inner tent by way of hard rubber safety connectors.

All connectors comply fully with current military safety standards and are designed to avoid misconnection.

CHEMICAL TOILETS

Each UCPS is provided with two completely self-contained chemical toilets together with spare holding tanks and necessary chemical fluids.

These are carried in one of the stowage compartments on the trailer and are deployed in designated pressurised cubicles within the inner shelter

TRAILER

The trailer has been developed by one of the United Kingdom's leading trailer specialists. It is a dedicated single axle steel sprung trailer designed to carry one complete mobile UCPS together with all necessary power generation and support equipment.

It is rated at 2.5 tonnes GTW and is fitted with 5.50 x 16 Land Rover wheels and 750 x 16 Avon Ranger tyres. The towing hitch is fitted with a 76mm NATO eye and is of the mechanical overrun type complete with handbrake. An autoreversing type to meet EEC standards can be fitted if preferred. The hitch height is compatible with the normal hook height of most standard 4 tonne military vehicle.



The drawbar carries an adjustable solid tyred jockey wheel to facilitate easy manhandling, and three clamp type prop stands are provided to ensure complete stability of the trailer when detached from the towing vehicles.

Full road lighting is fitted as standard and connection to the towing vehicle electrical system is made by way of an approved multipin connector

Specially designed stowages are provided for each item of the UCPS including erecting gear and a full range of consumable spares. A full tilt cover made from CARM is carried on a sturdy framework and this is designed to give free access to both the sides and rear of the trailer. Capacity is provided within the framework to carry accessories such as camouflage nets and drinking water if required. The colour of the trailer and tilt match that of the UCPS.

Permanently mounted on the trailer are the two independent and self-contained electrical generators for running the complete system.



COMPLETE SYSTEM EQUIPMENT

CARM Outer complete with frame, tent pins and mallet in valises

CARM Inner complete in valise with connecting hoses

Air Filtration Units (AFUs) x 2

Air Conditioning/Heating Unit

Generators 7.5 KVA 240V 50HZ, petrol driven x 2

Rack mounted jerrican fuel supply system

Lighting and Power Kit

Chemical Toilets x 2

Trailer 2.5 tonne complete (spare wheel optional)

CARM Repair Kit

Spare AFU Filters x 2

Basic Tools and Generator Maintenance Pack

User and Maintenance Handbooks

Complete Equipment Schedule (CES)



NOTES

1. To monitor system performance it is desirable to have a chemical monitor and a manometer which can be supplied as optional extras if not available from national service inventories
2. The Lighting and Power Kit provides up to 3KW for cooking and heating water. Devices using naked flames should not be used inside agent systems because of the risk of damaging the CARM fabric.
3. The User Handbook only describes the erection and operation of the system, leaving services free to write entry and exit drills around their own clothing and equipment.