Universal Defense for Military Equipment
Mobile: +962 (79) 509 1000 Tel: +962 (77) 799 2000 Tel-Fax: +962 (6) 592 4909

Universal Defense is proud to represent FXC

Military Customer Support & Logistics

www.universal-defense.com

for all your military needs
udme

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Cargo Releases

The unique feature of the FXC Cargo Parachute Releases are that they are "load relief" actuated. Upon main parachute opening, tension forces are transmitted through the cargo release, to the payload. "Tension" activates the special delayed arming feature. The delay is necessary to prevent premature disconnect of the payload during the initial unstable parachute deployment sequence. Only after the main parachute is fully inflated, is the cargo release "armed" and ready for separation. Upon ground of water impact, the cargo release disconnects, separating the payload from the parachute.

The entire family of FXC Cargo Parachute Releases are temper proof, maintenance free, and are totally sealed against moisture, dirt, sand and dust.

Complete installation and operational instructions are published in:

- US ARMY FM-10-542
- US AIRFORCE TO-13C7-51-21
- NAVSEA TO300-AW-MM0-010

The Automatic Cargo Parachute Release is load relief actuated. It is by far the most reliable and versatile release available. The unit is completely sealed against moisture, dirt and tampering. It does not require any kind of adjustment, setting or arming by

the user.

OPERATION

Upon main parachute opening, tension forces are transmitted through FXC cargo release to the payload. "Tension" activates the special delayed arming feature. This delay is necessary to prevent premature disconnect of the payload during the initial, unstable parachute deployment sequence. After the system is stable under the main canopy, the release becomes a load-tension locking mechanism that will retain the cargo in the event of parachute oscillation, as long as forces along the parachute, cargo release, and the payload are in equilibrium. Upon ground impact, this equilibrium is broken, and the consequent load reduction allows the release to separate, allowing the parachute to free itself from the payload.

FEATURES

- Safe during descent in any weather
- Complete simplicity; needs no adjustments
- Sealed against moisture and dust
- Positively locked during opening shocks
- Disconnects immediately when load comes to rest
- Re-usable without dismantling or use of tools
- Operates in any orientation
- Arming delay starts when tension is applied between the load and the parachute

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ORDERING INFORMATION

Part No.	Load Range	Proof Load	Weight	Size	NSN Stock No.
811-00147	50-100	500	3.5 oz.	4.3" x 1.25"	Pending
811-00146	100-500	2,000	11.0 oz.	4.3" x 1.25"	1670-66-129-2922
811-00158	250-2,500	10,000	2.0 lbs.	6.5" x 1.68"	1670-01-310-2875
811-00220	2,000-5,000	20,000	8.0 lbs.	14" x 2.38"	1670-01-337-4366

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EXTRACTION PARACHUTE JETTISON SYSTEM (EPJS)

Overview:
A malfunction during an attempted airdrop delivery of heavy equipment to the battlefield risks the safety of the entire crew and the aircraft itself. The capacity of jettisoning extraction parachutes when they are outside the aircraft before the load has been extracted is essential. Currently, if a malfunction occurs the loadmaster must get behind the load and cut away the extraction parachutes by hand. This is very dangerous because the load could break away while the loadmaster is cutting the lines. The Extraction Parachute Jettison System (EPJS) concept has been developed to jettison malfunctioning parachutes quickly and safely.

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DM-500
DEREEFER, MECHANICAL - CARGO PARACHUTE

Overview:
The FXC Dereefer, model DM-500, Part No. 811-00289 is a 100 percent mechanical mechanism, designed to accommodate a wide range of cargo parachute types and sizes. It has specially designed to be be a "re-usable" substitute for the "use-once-and-throw-away" M-21 pyrotechnic cutter.

The DM-500 has been designed to fit perfectly into the existing M-21 mounting bracket, no modification required.

The timer offers a choice of preset delays of two to four second. Access to the timer external setting screw is quick and easy.

The timer mechanism is sealed against all outside elements. The internal subcomponents require no maintenance and are corrosion resistant throughout.

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Parachutes

24ft. Diameter Troop Chest Reserve Parachute

This 24ft. Diameter Troop Chest Reserve Parachute is used with all troop main parachutes: T-10 and the MC1-1B main parachutes. The pack is activated with a right hand pull cloverleaf-type ripcord. The pack flaps are withdrawn with nylon sheathed steel spring pack opening bands, thereby releasing the pilot chute. The pilot chute is a flat octagon with a cross type spring having an ejection force of 30lbs. The pilot chute extracts a 24ft. diameter, 24 gore canopy equipped with quick opening pocket bands. The 24 lines terminate on 2 snaps for attaching to the Dee-rings provided on the main lift webs on the troop harness. This is the standard chest reserve of the US army airborne forces.

T-10B Parachute Assembly Troop Main

With 3-point release and anti-inversion netting

Parachutist's High Altitude Oxygen Supply System

PHAOS (Parachutist's High Altitude Oxygen Supply) System is designed to meet the high altitude parachutist's mission requirements. The PHAOS system integrates an MBU-12P mask with an automatic diluter/demand regulator (as opposed to a constant flow system). This maximizes the effective use of oxygen which is consistent with mission objectives and individual user requirements. The PHAOS system provides automatic, 100% oxygen breathing when connected to a pre-breathing oxygen console and programmed dilution when breathing from the individual oxygen supply. This system was developed by integrating component concepts tested to military specifications. It meets all applicable oxygen system specifications. The PHAOS system is compatible with current oxygen systems and pre-breathing oxygen consoles.

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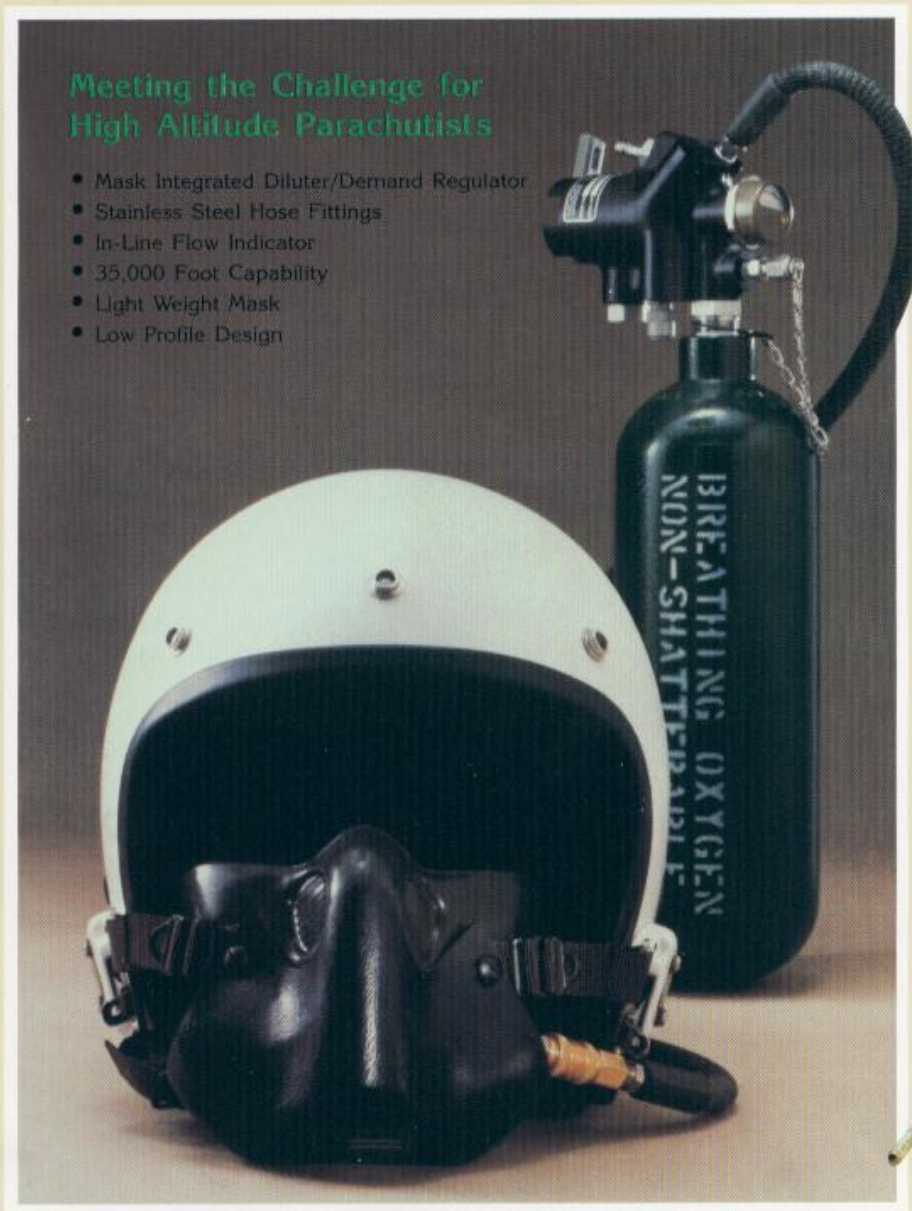

The PHAOS System

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PARACHUTIST'S HIGH ALTITUDE OXYGEN SUPPLY SYSTEM

The PHAOS Oxygen Supply

The individual oxygen supply manifolds a reducer, on/off valve, relief valve, gauge, fill valve, oxygen console connection, bottle(s) and hose assembly. The reducer provides strict control of the oxygen supply. The on/off valve is human engineered for parachutist's safety. It must be turned to the "on" position before connection to the prebreathing oxygen console. When disconnected from the console the individual oxygen supply automatically flows. The hose assembly includes an in-line flow indicator and quick disconnect.

The PHAOS Mask

The low profile, lightweight mask incorporates a diluter/demand regulator, auto dilution shut off, dilution aneroid, exhalation valve and male bayonet fittings. The mask eliminates hoses and connectors on the front torso providing the parachutist with a "clean front" thus improving vision and mobility. The mask mounted dilution port and exhalation valve allows the user to breathe comfortably throughout total descent, even after all oxygen is consumed. This also provides facial protection for inadvertent landings in brush and trees.

Ordering Information

FXC PART NO.	MODEL NO.	DESCRIPTION
811-00233	R259-006	Oxygen Supply System, 44 cu.in., Twin 22 cu.in.
811-00234	R259-007	Oxygen Supply System, 88 cu.in., Single
811-00235	R259-008	Oxygen Supply System, 120 cu.in., Single
811-00242	R267-004A	Mask Assembly., Short, w/o Communications
811-00243	R267-005A	Mask Assembly, Reg.
811-00244	R267-006A	Mask Assembly, Long
811-00245	R267-007A	Mask Assembly, Ex-Long
811-00246	R267-008A	Mask Assembly., Short, with Communications
811-00247	R267-009A	Mask Assembly, Reg.
811-00248	R267-0010A	Mask Assembly, Long
811-00249	R267-0011A	Mask Assembly, Ex-long
811-00252	B13426-1	Oxygen Charging System

PHAOS Optional Equipment

The basic PHAOS system can incorporate:

- various bottle capacities to increase duration
- light weight bottles
- mask integrated communications (microphone)
- helmet with fiberglass hard shell, rigid foam insert and bayonet receptacles
- helmet integrated communications (headphones)

All optional equipment is interchangeable with existing equipment and conforms with relevant military specifications.

Applicable Specifications

All components have been designed or selected to conform to the relevant requirements of applicable military specifications.

MIL-G-7601 Gage, Emergency Oxygen

MIL-C-7905 Cylinder
RRC-501
MS26545

MIL-R-17852 Reducer, Oxygen Pressure

MS 22066-3 Valve, Check, Oxygen Charging

MIL-H-81581 Hose Assembly, Breathing Oxygen

MIL-R-83178 Regulator, Oxygen, Diluter-Demand

Custom Helmet Assembly

This lightweight helmet system features maximum protection. The special edgeroll contour permits exceptional peripheral visibility through the goggles as well as sealing around the face. The helmet accepts standard oxygen breather masks, as well as inter-communication for aircraft or other parachutists. Made of fiberglass with a lusterless black finish.

Helmet HALO/HAHO
(With Intercom)
Part No. 811-00169-1 (*)

(No Intercom)
Part No. 811-00169-2 (*)

Helmet Size: (Hat Size)

(*) = (M) Medium 6⅞ to 7⅛
(L) Large 7¼ to 7½
(XL) Extra Large 7⅝ & Up

Portable test chamber

this tester is designed to perform functional testing of automatic parachute release.

- **Function**

Automatic parachute releases are sensitive to altitude pressure through an altitude blocking mechanism. The principle action to be tested is the consistency of the aneroid in releasing the mechanism at a predetermined altitude. Normal test procedures involve evacuating air from the test chamber to simulate an increase in altitude above the preset altitude of the release. At this point an arming pin, which is blocking the parachute release firing mechanism, is extracted and the release is armed. Pressurized air is bled back into the test chamber to simulate a rate of decreasing altitude. When the simulated altitude reaches the value for which the parachute release has been set the aneroid releases the firing mechanism and the release operates.

Parachute Flight Training Simulator

Flight Simulators: Safe and Cost-Effective Training

Flight simulators for conventional aircraft are very expensive, yet accepted as standard and essential tools. In simulated operations new pilots acquire skills, and experienced pilots maintain their proficiency. Instructors find it easy to identify piloting problems and safely repeat conditions that need improvement. Overall training costs are reduced and safety is improved, particularly in learning to cope with hazardous situations.

A Virtual Reality Parachute Training Simulator is now available from Universal Defense that offers similar benefits but for parachutists. A unique, low-cost parachute simulator provides a highly effective tool for teaching, planning and practicing parachute flight and missions.

This Virtual Reality Parachute Simulator supplements current field training techniques such as drop towers, towed launches and actual jumps.

The Problem:

Teaching trainees to correctly control and maneuver steerable parachutes has always been a difficult task. Maneuverable parachutes allow rapid deployment of mission specialists when fixed or rotary wing aircraft alone are inappropriate. However, parachutists who are injured on landing, or land in the wrong location, degrade or nullify operational effectiveness. Proficiency in controlling maneuverable parachutes is vital to mission success. Safe, accurate parachute maneuvering requires both training and practice of perceptual skills. Parachutists must learn to accurately sense visual motion cues, and to predict and manage their descent and drift toward the landing zone. The necessary maneuvering concepts are well documented. However, training techniques have previously been limited to texts, lectures, procedures practice, and actual (but solo) flights.

Aircrew emergency parachute canopy control training.

Military aircrews are equipped with steer able emergency four-line release or slotted parachutes. These parachutes cannot be steered and exhibit oscillations if the controls are not deployed, which contribute to visual disorientation and difficulty in achieving a non-injury Parachute Landing Fall (PLF) at touchdown. When deployed, these oscillations damp out and the parachute achieves a forward velocity which may be steered into the wind to minimize ground relative velocity or to avoid collisions.
These aircrew members find themselves flying a military aircraft in an emergency engine-out situation, having, at best, only received minimal training in its flight, and that under benign conditions at the beginning of their career. Subsequent training is limited to infrequent procedures training while suspended in a harness. Compared to operational paratroopers or smokejumpers, training to proficiency is

particularly critical because in emergencies there are no options on critical factors such as time of day or night, wind maximums or weather, and on landing terrain or hostile forces. Given the obvious necessity of good aircrew parachute canopy control skills, what arguments have been made against providing training? Typically presented are issues of the hazards of real parachuting training to a highly (and very expensively trained) individual who hopefully will never actually need it, and fears about adding additional training time to an already busy schedule.

The Importance of teaching flight skills:

Teaching flight skills is important since skillful flight means landing safely, in the correct location. Unskillful flight is dangerous.

Past problems with Teaching flight skills:

The Ground schools could teach concepts, but couldn't train perceptual or motor skills. Extensive critical memorization increases anxieties and impedes rapid and accurate instinctive responses. So the training couldn't provide the skill proficiency nor meet the need for self confidence.
Radioed directions can guide first flights, but are rarely available and when they are available radios can fail.
Common errors committed by conventionally trained parachutists included, Failure to assess and quickly react correctly to equipment malfunctions. Disorientation due to abrupt control motions, not tracking other jumpers and target location. Delayed, missing elements, or wrong size approach pattern. Over focus on accuracy, not safety.

The Solution:

A low-cost computer-graphics simulator is now available from Universal Defense that can dramatically increase the effectiveness of training. Flight simulation training, long accepted as an essential standard for military and commercial aircraft, is now being adopted by the professional parachuting communities. The same justifications that make aircraft simulation a success apply to parachute simulation: safety, availability, economy, and efficiency. The low-cost Parachute Flight Training Simulator has been developed and produced in quantity to provide flight training for smokejumper and military personnel, who fly round and ramair parachutes on a routine operational mission basis.

Professional parachute instructors provided input in the process of developing specifications for this low-cost simulation device. As a result, this simulator is optimized for teaching as well as practicing parachute flight concepts. The instructor evaluations of parachute simulator training note reduced training costs together with improved parachuting performance and safety. This has resulted in quantity production of these systems.

Teaching flight skills is now practical because the flight simulator allows lots of practice, encourages Student/Instructor dialog, teaches the safe handling of difficult situations, and provides unique teaching aids
Virtual Reality Flight Perceptions:

Wearing a VR head-mounted tracker and display, the trainee scans a richly detailed 3-D jump scene. This scene, which can be based on real mission terrain digital data maps, moves smoothly and accurately in response to parachute toggle inputs and head motions. This interactive scene motion provides the trainee with realistic perceptions of turning, drifting and maneuvering. The trainee can look overhead and react to simulated parachute malfunctions, and scan in any

direction to avoid collisions and conduct operations with other recorded or networked jumpers.

Advantages of virtual reality parachute training flight simulator:

Proficiency requires experience. With this simulator a trainee completes many jumps in a short time. The instructor uses these repeated simulator jumps to focus on specific points. One of the most important skills a student must learn is judging the effect of wind on touch down location. The instructor may select from a variety of wind profiles. These provide each student with numerous and varied experiences in maneuvering to a desired touchdown spot in the presence of wind. Through these many experiences a student develops proficiency in handling winds.

Instruction is tailored to the student's needs. The instructor tailors the simulator's parameters to meet student needs with a wide range of situations. For example, the jumper's deployment altitude, location, and heading can all be defined.

Teaching Aids are included. The instructor may freeze the simulation at any time to discuss the progress of a jump, and then may continue or end the jump. The instructor records all jumps for instructor and trainee review using a playback option. The playback shows the motion as viewed by the trainee and includes a display of the trainee's toggle inputs. The simulator evaluates completed landings. These evaluations are displayed on the instructor's screen and can be printed to provide a report of a trainee's progress. Recent experience has shown that canopy control simulator training can occur simultaneously with standard recurrent suspended harness training, with little or no schedule impact, while providing a incentive which helps overcomes previous objections due to discomfort from the harness during training. One of the most important results of simulator training is the increase in aircrew's self-confidence in using their emergency parachute equipment when necessary. This decreases the natural tendency of personnel in an emergency situation to want to

stay in an aircraft even beyond the point when procedures and good judgment would dictate otherwise. The low cost of this system is in sharp contrast to the enormous social, political, military, and financial consequences of aircrew losses.

How VR helps to teach plan and practice Parachute flight skills:

Equipment malfunction procedures. With a head mounted display and tracker, the jumper can observe the canopy overhead.

Canopy control skills. The VR headset produces an exciting immersive environment which, combined with special ground texture effects, creates a sensation of moving in a 3-D world and better landing cues due to ground rush from micro texture.

Collision avoidance. With a head mounted display and tracker, the jumper can keep track of other jumpers by scanning in all directions.

Mission preparation and rehearsal. Specific mission scenes can be created from digital map data and practiced with other recorded or networked jumpers.

Simulator Training Features that improve performance:

- Different Scenes and Winds (Shears, Up/Down Drafts) Set Difficulty
- Scenes Based on Mission Terrain Digital Maps for Planning and Rehearsal
- Wind Display Options: Wind Sock, Smoke, Line, None
- Alternative Landing Selections
- Misspotting, Heading amp; Altitude at Start
- Parachute Malfunctions Displayed Dynamically
- Networked Jumpers for Collision Avoidance amp; Group Operations
- Freeze, Continue, End, Repeat, Change Options
- Automatic Scoring and Printout

- Run Recording for Demonstrations
- Jumper, Overhead, Map Views for Playback Review

VR equipment features:

Field of view and high display frame rate selected to eliminate simulator sickness. VR display and tracker can separate for use with actual flight helmet. VR visor allows view of harness, and cutaway and main and reserve handles.

Who uses the Virtual Reality Flight Training Simulator?

When the World is watching, training experts rely on virtual reality. The Virtual Reality Parachute Flight Training Simulator was used by the United States Parachute Association and the US Army's elite Golden Knights team to train former President George Bush for his recent highly successful parachute jump in Yuma, Arizona. Systems are also currently being used by United States Bureau of Land Management Smokejumpers, the United States Marine Corps, Aviation Physiology and Emergency Aircrew training centers.

Results reported:

The situation is reversed from the traditional method. Basic canopy control skills are functional on the first jump. Students need not focus on memorized descriptions. Instead they work on refining skills. Safety is improved reducing student and experienced jumpers' injuries.

Options:

Universal Defense offers the Parachute Flight Training Simulator in a variety of configurations to meet specific training and budgetary requirements. All suggested system configurations provide capability to teach basic canopy control and can be readily enhanced to meet all customers' individual needs.

All systems can be used for mission planning and rehearsal by additional ground model options generated from Defense Mapping Agency digital terrain elevation data (DTED), digital feature analysis data (DFAD), and photographic imagery.

Universal Defense recognizes the fact that many organizations have a need for specific custom configurations, or may have budgetary circumstances necessitating phased acquisition of system components. Minimum single monitor (combined student and instructor monitor) configurations are possible. Detailed information for ordering component options is available on request.

Pricing for site specific items will be dependent on the details of the particular site. Typical site specific items include: translated manuals, specific parachute and drop zone models, scene model creation tools, harness's for suspension per customer specification, validation for customer supplied hardware, and international delivery, installation, training, and power capability.

Computer manufacturers frequently change their hardware and software designs, often without changing model numbers. All Universal Defense supplied equipment is tested for compatibility and operation. Universal Defense can only support customer supplied equipment on a time and material charge basis.

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ASTRA Automatic Activation Device (AAD)

Advantages

Universal Defense designed the Astra for external mounting. This high visibility allows for easy "Gear check" on the Astra's operational status and is therefore a significant improvement to safety.

The Astra is easily field-tested, using the Cutter Test Probe, for firing accuracy and function by any approved rigger using any test chamber that shows altitude and rate of descent. Because the Astra can be functionally tested in the field there is no requirement for mandatory expensive and inconvenient factory overhaul.

Field replaceable modular components allow any rigger to do all field changes on the Astra. Modular components facilitate installation allowing cables to be disconnected and the narrower ends easily fed through sleeves etc.

The Astra is very quick and easy to install.

Simple and quick to operate, accessible but well protected Astra On/off switch operation is an advantage e.g. under canopy compared to a time consuming "multiple response" system while at the same time preventing accidental operation.

The flashing indicator light that constantly shows correct program function is a positive indication that the Astra Central Processing Unit is actually checking altitude and rate of decent.

Sensors are in the Altitude Control Unit, so the Astra is not attitude sensitive. If the sensor unit were in the battery pack inside the container, an "adjustment factor" would need to be added which leads to erroneous readings if unusual attitudes occur.

The Astra has a capacitor in the battery box to ensure that as long as the indicator light is flashing that there will always be sufficient charge to fire the cutter. Without a capacitor it would be possible for a unit to indicate a satisfactory battery condition but there may not be sufficient charge to fire the cutter.

Robust machined aluminum Astra Control Unit case prevents breakage. A similarly machined aluminum battery case prevents the hazard of leaking acid into the reserve container. The smooth rounded corners on the space saving low volume battery pack prevent wear spots in the reserve container and permit mounting in the main container.

Robust heavy duty cable connections prevent accidental disconnect or breakage.

High level of EMF protection.

US manufactured but locally serviced.

Inexpensive battery packs that do not have to be replaced if the unit has fired. Battery voltages easily checked by any commercial Multitester.

Low initial purchase price and cost of maintenance.

The program design allows recovery of firing altitude data for later analysis.

1.0 Design Concepts

1.1 The ASTRA Automatic Activation Device is a computer controlled electronic altimeter that determines the rate of descent and the altitude above ground level (AGL) and fires a locking-loop cutter if an unsafe condition is detected.

1.2 The program stored in the microcontroller reads the digital value from the analog-to-digital converter and determines the rate of descent and the altitude above ground level (AGL).

2.0 Function

2.1 The ASTRA (P/N 811-00356-1) is designed to automatically cut the parachute container locking-loop if the unit's preset activation altitude is reached and, for whatever reason, the rate of descent exceeds 130 feet per second (ASTRA Expert settings). Under normal conditions, the ASTRA will not operate because the parachutist will have deployed his main chute, thus slowing his rate of descent to less than 115 feet per second before reaching the preset activation altitude.

2.2 The ASTRA is small in size, extremely rugged, and simple to operate. The 'ON/OFF' switch, when turned to 'ON', automatically calibrates the unit, checks continuity of the entire system, and continuously confirms the status of the batteries.

Designed to fire at Altitude Setting: 1000 +/- 200 feet AGL
Rate of Descent: 130 +/- 15 feet per second

3.0 Components

3.1 The ASTRA consists of three (3) major components:
The Altitude Control Assembly, the Power Pack, and the Cutter Assembly.

3.2 Altitude Control Assembly:

3.2.1 The Altitude Control Assembly contains a microcontroller circuit which has an EEPROM programmed with Universal Defense's custom software. The unit also contains a high resolution pressure transducer and circuits which convert ambient air pressure into an

electronic signal. This signal is amplified, and then converted to a digital value by an analog-to-digital converter.

3.2.2 The microcontroller reads the digital value from the analog-to-digital converter and determines the rate of descent and the altitude above ground level (AGL).

Note: The ASTRA is not moisture-proof

3.3 Power Pack:

3.3.1 The Power Pack contains a Battery Pack and a back-up circuit which provide enough energy to fire the cutter until the battery is too weak (minimum of 150 hours of normal use).

3.4 Cutter Assembly:

3.4.1 The Cutter Assembly contains a pyrotechnic cartridge which cuts a standard parachute locking-loop when unsafe conditions are detected by the Altitude Control Assembly. See container manufacturer for approved locking loops.