AVIATION PROTECTIVE EQUIPMENT ORIENTATION
01 OCT 2010

TERMINAL LEARNING OBJECTIVE

Action:	Employ aviation protective equipment
Conditions:	While serving as an Aircrew member
Standards:	In accordance with AR 95-1, AR 670-1 (ALARACT 177/2010), USAARL report number 93-15 and applicable Technical Manuals

ENABLING LEARNING OBJECTIVE A

Action:	Identify the safety features provided by aviation protection equipment
Conditions:	Given a list
Standards:	Select appropriate safety equipment and safety features associated with aviation equipment

Safety features provided by the aircraft

a. **Aircraft structural shell** (fuselage). The cockpit and cabin should possess sufficient strength to prevent intrusion of structure in occupied spaces during a survivable crash. The floor and nose of the aircraft should be of a design which reduces plowing or scooping of earth during crashes which could decrease stopping distances resulting in higher decelerative forces

b. **Landing gear and crashworthy seats**. Newer Army rotary wing aircraft (UH-60/AH-64) rely heavily on fixed landing gear and seats to attenuate crash forces. Fatalities are rare for vertical impacts up to approximately 15.2 meters per second (50 ft/sec). Maximum landing loads for the UH-60 is 540 ft/min (11.25g) under normal conditions

c. **Personnel restraint system**. To survive an impact, only to then be injured or killed due to ejection from the aircraft would be terrible. Studies indicate that contact injuries (secondary impacts) occur 5 times as often as acceleration injuries. Therefore personal restraints should be tight as to inhibit contact with objects in the cockpit, i.e. cyclic. Equipment should also be tied-down securely to prevent being thrown into crew members

d. **Post-crash factors**. Army aircraft offer protection from thermal injuries several ways. Crashworthy fuel systems; self sealing fuel cells, break free self sealing fuel lines, and fire extinguishing systems in the engine compartment and personal fire extinguishers in the cockpit (for personnel). Protection from drowning is primarily provided through training of the crewmember (water survival training); also, special equipment is required during over water missions: personal flotation devices (water wings), and rafts

ENABLING LEARNING OBJECTIVE B

Action:	Identify the characteristics and wear of flight clothing
Conditions:	Given a list
Standards:	Select garments authorized for aviation duties, the characteristics of those garments and the correct wear of those garments

1. **Army Aircrew Combat Uniform (A2CU)**

    a. Consists of a two-piece flight suit in Universal Camouflage Pattern. Provides flash-fire protection and enhances aircrew comfort during aviation operations. Similar in design to the Army Combat Uniform (ACU) and can be worn with the micro climate cooling system

    b. Composed of 92% Nomex™, 5% Kevlar ™, and 3% static dissipative fiber (P140)

        1)Superior flame resistance and durability
        2)Does **NOT** support combustion
        3)Does **NOT** melt or drip, designed to char
        4)Good chemical resistance
        5)Low shrinkage
        6)Comfortable to wear

    c. Uniform should be loose fitting to prevent thermal burns due to tightness. Size and fit should completely cover all skin not covered by gloves, helmet and boots. Best protection is provided by two layers of clothing (Nomex over Nomex, cotton, or wool). The coat is worn outside the trousers at all times; it will not extend below the top of the cargo pocket of the trousers, and will not extend higher than the bottom of the side pocket on the trousers. The green or sand T-shirt is worn underneath the coat and is tucked inside the trousers at all times

    d. Trousers will **NOT** be bloused into the boots while executing flight crew duties; when not performing crew duties, the trousers will be bloused with the hook and pile blousing straps or tucked into the boot

    e. The **Collar** is worn up and fastened while flying

    f. **Sleeves** will be worn **DOWN** at all times and **NOT** be rolled or cuffed. The Velcro™ tabs will be secured during flight

    g. Aviators will **NOT** press or starch the A2CU

2. **Under-garments**: Wear only cotton, wool, Nomex, or some combination of the three when performing crew duties

    a. **Boot socks** (tan, black or green)

    b. **T-shirt** (green or tan)- Cotton only

3. **Identification tags**

    a. Required to be worn around the neck by aircrew members while flying

    b. ID tag chain should be worn around outside of the collar and tucked between blouse and T-shirt

    c. Avoid covers or silencers which could cause burns if they melt (plastic or 550 cord)

4. **Boots**

    a. Characteristics: must provide stability to prevent ankle and/or foot injury which could compromise aircraft egress

    b. Retention: must remain on your feet during high G-Force events, to include crashes

        1) The boots must be laced up, fully to the top
        2) Avoid boots with zippers, straps, and jungle boots. Zippers will transfer heat, straps will give or even break and jungle boots will melt

    c. Non-Leather boots (issued) now authorized for wear must be approved and tested (more information available @ https://safety.army.mil/). Fire-retardant properties and function will be tested to determine if the boot will adequately protect the aviator

        1) Belleville 790 & 795
        2) Belleville 300 DES, 340 DES Hot Weather Boot
        3) Bates/Wolverive boots
        4) Welco
        5) Army Combat Boot, Temperate Weather (ACB-TW)
        6) Commercial Off The Shelf (COTS) boots **NOT** authorized for flight duties without current Air-Worthiness Release (AWR)

5. **Flight gloves** are constructed of a Nomex and leather

    a. Flight gloves are designed for comfort, insulation during a fire, and sensitivity to identify an object by touch

    b. Flight Gloves will be worn at all times during flight

    c. Gloves are to be worn under the sleeves of the Nomex flight suit. If a watch is worn, it should be worn outside of glove

6. **Flight helmets**

   a. **HGU 56/P** provides both crash protection and noise attenuation. It is superior to all preceding helmets. It is custom fit by local Aviation Life Support Equipment (ALSE) technician by heating or removing thermal plastic liners (TPL). Dual visor design provides eye and face protection day or night. Constructed of graphite and SPECTRA®, a thicker, less dense, energy absorbing liner. This helmet also has an upgraded retention system designed to provide better retention if the chin strap and nape strap are tight

   b. Use a visor at all times except while engaged in night vision goggle flights or when using target acquisition equipment

   c. Always ensure both chin and nape straps are tight prior to flight

   d. All service will be performed by qualified ALSE technician, except for routine cleaning

ENABLING LEARNING OBJECTIVE C

Action:	Identify the maintenance procedures for flight clothing
Conditions:	Given a list
Standards:	Select the appropriate maintenance procedures for flight clothing and equipment

1. **A2CU**

   a. Avoid wearing A2CU during routine ground duties due to possible contact with grease, oil, paint, glue, and other combustible materials, this reduces fire retardant properties and the breathing qualities of the garment

   b. Cleaning should be performed by washing and drying at temperatures less than 130° F

   c. Liquid fabric softeners should **NOT** be used. Fabric softeners will create a waxy build up on the A2CU uniform and will deteriorate the fire retardant properties

   d. Do **NOT** use any type of bleaching compound (Clorox, “Oxyclean”, etc…) in laundering

   e. Do **NOT** starch. In the event that the uniform is inadvertently starched, restore the fire resistance to its original state by rinsing the garment in warm water

   f. Ironing on the Permanent Press setting, medium temperature, can be done, but do not iron the Velcro tabs. Wrinkles, however, are hard to remove from Nomex due to its high temperature resistant quality

2. **Flight gloves** can be washed with mild soap and water while the gloves are on your hands, or in a washer

    a. **Washing temperature should not exceed 120° F**

    b. Do **NOT** bleach or starch

    c. Do **NOT** tumble dry, or expose wet gloves to heat or direct sunlight. Remove excess water by squeezing gloves or rolling them in towel. Do **NOT** wring or twist. Stretch gloves into shape and hang or lay flat to air dry with the palms out of the direct sun

3. **HGU-56P**

    a. Clean outer helmet and visors with warm soapy water and soft cloth. Remove the TPL to clean the liner

    b. Inspect helmet, each time it is used, for loose or worn parts, frayed straps, and cracking of the outer shell. Modifications may be made only by ALSE technicians

    c. Do **NOT** sit on helmet

    d. Do **NOT** place heavy or sharp objects in the helmet which can damage the protective qualities of the TPL, the lining or the shell

    e. Do **NOT** store in your POV due to the high temperatures experienced inside vehicles

ENABLING LEARNING OBJECTIVE D

Action:	Identify components and care of the Air Warrior system
Conditions:	Given a list
Standards:	Select the characteristics and care of Air Warrior equipment and correctly identify the purpose of using this system

NOTE: The AW system is the Army's first integrated life support ensemble for rotary wing crewmembers. It is designed to improve aircrew mission performance in such areas as comfort, endurance, aircraft and aircrew-station interface and safety of flight. The AW system is modular in design, to permit tailoring for mission requirements, minimize weight and bulk, and to facilitate maintenance and support

1. **Components**

    a. **Primary Survival Gear Carrier (PSGC)** is commonly known as the "ALSE vest". It was designed by aircrew members, it has multiple external and internal pockets, it weighs approximately 25 pounds with the basic survival gear equipped. It comes in one size and must be fitted to the individual to whom it is issued

CAUTION: The PSGC must be stocked, inspected and have the applicable forms/records updated by qualified Aviation Life Support Equipment (ALSE) technicians before it is ready for use in flight

1) **Contains** flashlight, survival radio (when issued), ammunition (when issued), safety restraint tether, extraction strap (with D-ring), tourniquet, first aid platform (containing survival medications, bandages, etc…), signaling platform (containing mirror, magnetic compass, flares, fire starting material, whistle, etc…) and accessory pouches for other survival equipment
2) **Some pouches may be placed on the vest at the users discretion, while others must be placed per the servicing units Standard Operating Procedure (SOP)**
3) **Personal Restraint Tether (PRT)** commonly known as a "monkey tail", attaches to the Safety Restraint Tether at the upper restraint loop to form the Crew Restraint Assembly (CRA). This allows crewmembers to be safely restrained in flight, while performing tasks which require them to be out of their crew seat

b. **Body armor** is issued to aviators operating in specific threat areas. It is manufactured in 5 sizes and must be fitted to the individual. It is composed of Kevlar material and has **Ballistic upgrade plates** which must be inserted into the carrier portion

WARNING: Do NOT soak soft ballistic inserts in water or use bleach or starch. The Air Warrior ballistic insert has a water-repellent treatment and a water-resistant casing to assist with preserving the ballistic capability. It is the user's responsibility to use good sense in further reducing the moisture risk by keeping the ballistic inserts dry

CAUTION: If the ballistic upgrade plates are known to have been dropped or damaged enough to cause cracking they should be inspected by qualified personnel, and/or replaced. If in doubt have them inspected

1) It is the users responsibility to keep all body armor components clean and dry, as well as inspect it prior to and after all uses
2) Proper fit is important, aviators must ensure that they have full range of motion of their arms, legs torso and head. It should not cause excessive discomfort. Follow these steps to ensure safety of flight in the cockpit:
   i. Perform a full cyclic sweep. If any interference is observed, continue to step ii.
   ii. Ensure the restraint buckle is positioned below the ballistic upgrade plate. If any interference is observed, continue to step iii.
   iii. If wearing large or X large soft body armor, select the next smaller sized ballistic upgrade plates and repeat the full cyclic sweep. If any interference is observed, continue to step iv.
   iv. Remove the rear soft body armor insert and repeat the full cyclic sweep. If any interference is observed, continue to step v.
   v. Remove the front ballistic upgrade plate and repeat the full cyclic sweep

c. **Holster** assembly has components that allow it to be configured in several ways; over the shoulder, on the hip, or in the drop-leg configuration. It also contains additional pouches for standard-issued, 9mm magazines
d. **Aircrew Survival and Egress Knife (ASEK)** consists of the knife, a hard sheath (attached to leg carrier assembly or vest), and seatbelt cutter tool (with screwdriver). The knife features a pointed handle which serves as a plexi-glass scoring device, and it also

has a heavy duty saw tooth design on the back edge of the knife blade. The handle is designed to serve as a hammer, and the rubber grip is designed to ensure positive control when wet or cold

e. **Miscellaneous**

1) **Army Combat Shirt (ACS)** designed to be worn under body armor in specific geographic areas as a replacement for the T-shirt, and blouse. It is limited to hot weather areas where the crewmember is required to wear some form of approved body armor. If the shirt does not have a flap for securing pens/pencils, the aircrew member will remove all pens/pencils while in, on, or around aircraft
2) **Fire Resistant Environmental Ensemble (FREE)** is an aviation approved, system of clothing designed to be a modular, tailorable/scalable (to the climate) that provides flame resistance, moisture wicking and anti-microbial capabilities. Consists of fleeces, undergarments and over-garments (including pants)
3) **Overwater Survival Gear** is issued to specific units with an overwater mission requirement. This equipment has specific training requirements that must be adhered to in order to prevent injuries and/or impair egress from the aircraft
4) **Microclimate Cooling System (MCS)** is equipped on aircraft operating in specific climates. It increases crew endurance in the hot climates by helping to maintain a lower body temperature. It consists of a crewmember vest, cooling liquid, and a compressor unit (mounted on the aircraft). It has a quick disconnect umbilical that allows rapid egress in the event of an aircraft emergency

ENABLING LEARNING OBJECTIVE E

Action:	Identify miscellaneous unsafe apparel
Conditions:	Given a list
Standards:	Correctly match apparel that is unsafe in the aviation environment with the threat that it creates

1. Metal jewelry (rings) and watches can be dangerous when working anywhere on the aircraft, near battery terminals, or any exposed wiring connections

2. Metal insignia (badges) can contribute to injuries during maintenance or crash sequences due to electrical short circuits. Foreign Object Damage (FOD) can also be caused by the insignia. Insignia and badges on the A2CU are authorized; however, they must be removed prior to entry onto the flight line, or working in or around aircraft

3. Shoulder Sleeve Insignia will be removed by all aircrew members prior to entry onto the flight line, or working in or around aircraft

4. Glasses and/or sunglasses are **NOT** a substitute for visors

NOTES