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PERFORMANCE SPECIFICATION FOR
DESIGN, DEVELOPMENT AND DELIVERY OF PROTOTYPES AND
OPTION FOR PRODUCTION QUANTITIES FOR
TACAIR NIGHT VISION HELMET MOUNT SYSTEM

1. SCOPE. This specification sets forth the requirements for design and development of an improved fixed-wing ejection Tactical Aircraft (TACAIR) Type Helmet Mount Assembly and delivery of 5 prototype units for Government testing and evaluation, with an option for production quantities, which may include minor modifications desired by the Government to the prototype unit. The improved TACAIR Type Helmet Mount Assembly shall form an interface between the ITT Night Vision Image Intensifier System (NVIIS) F4949G, Government Type designator AN/AVS-9, and the HGU-68 or HGU-85 Gentex Helmet employed by United States Marine Corps and Navy TACAIR aircrew.

2. APPLICABLE DOCUMENTS.

2.1. Drawings.

2.1.1. ITT Drawing for Helmet attachment bracket system / helmet modification kit (Part # 265030-3) dated 1/17/02 shall be used to interface with the helmet.

2.1.2. ITT Drawing for Helmet Mount (Part # 264317-3) (includes shield) dated 11/24/02 shall be used for information.

2.1.3. ITT Drawing for Helmet Mount Assembly (Part # 268495-2) (without shield) dated 7/29/02 shall be used for information.

2.1.4. ITT Drawing for AN/AVS-9 (Part # 264359) dated 3/21/02 shall be used to interface with the redesigned Helmet Mount Assembly.

2.2. Government Standards.

2.2.1. MIL-PRF-49425 (CR) EMI Requirements dated 3 June 1998.

3. REQUIREMENTS.

ITT F4949 Series NVIIS Binocular Helmet Mount Assembly. The contractor shall develop a Helmet Mount Assembly that meets all requirements specified herein.

3.1. Helmet Mount Assembly.

3.1.1. Weight. The Helmet Mount Assembly shall be lighter in weight than the present mount, which is approximately 240 grams. Binocular assembly shall not be greater than 550 grams.

The total combined weight of the binocular assembly, detachable Helmet Mount Assembly (including any integral power source with batteries) and helmet modification kit shall be less than 790 grams.

3.1.2. Size. The size of the redesigned Helmet Mount Assembly shall be no larger than the current mount.

3.1.3. Material. The Helmet Mount Assembly shall be made of a lightweight, non-breakable material. The improved design shall eliminate cracking of the Helmet Mount Assembly / binocular connection being experienced on the baseline.

3.1.4. Power Source

3.1.4.1. The Helmet Mount Assembly shall provide an improved power source from the baseline that currently utilizes short energy life, expensive batteries. Power requirement that drives the AN/AVS-9 Night Vision Image Intensifier System (NVIIS) is 3 volts Direct Current (DC). Improved power source solutions considered may be from AA alkaline or lithium batteries. The power source used shall be a standard commercial or military battery, which is compatible for use in aircraft operations when oxygen is in use. Recommended lithium batteries by part number that meet performance parameters at ambient temperature are: BR2/3A, TL-2155, TL-2100, CR123 and CR17450E. Any integral power pack battery housing shall have an end cap which can be removed and replaced by hand and which has a moisture resistant seal and retaining tether. Batteries shall be capable of being changed within one minute while in flight by an operator at the aircrew's station wearing flight gloves (Flyers Summer Gloves, NSN 8415-01-029-0113). Each power source shall provide sufficient power to operate the NVIIS system for 2 hours over a temperature range of -5°C to $+55^{\circ}\text{C}$. The discharge requirement is 53 milliamperes for 7 hours. At $+20^{\circ}\text{C}$, the endurance will be in excess of 5 hours supporting a total operational endurance of 10 hours.

3.1.4.2. Backup Power Source. A battery backup power source must be provided for in flight use and ground checks.

3.1.4.3. Power Select. Power select switch must be provided in the event of loss of primary power to switch to backup power in flight and ground use.

3.1.4.4. Wiring. The Helmet Mount Assembly shall have minimal exposed external wiring.

3.1.5. Low Battery Indication (LBI)

The Helmet Mount Assembly shall provide an LBI in a position so a crewmember wearing the device can see the indication. The power source shall contain circuitry that monitors the voltage of the power source and triggers a LBI located in the crewmember's view to blink when the power source / battery(ies) approach end of life. The LBI Light Emitting Diode (LED) shall begin to blink when the voltage supplied by the power source in use decreases to 2.1 ± 0.1 VDC. If the system is designed to operate from a single AA battery, the LBI Light Emitting

Diode (LED) shall begin to blink when the voltage supplied by the battery in use decreases to 0.9 +/-0.07 Vdc.

3.1.6. Adjustment of the Helmet Mount Assembly. The Helmet Mount Assembly shall allow the user to adjust the position of the Binoculars as follows:

3.1.6.1. Positioning. Using only one hand, the Helmet Mount Assembly shall provide the means for aircrew to quickly remove the binocular from the helmet, position the binocular into a stowed position out of the user's line of sight while remaining attached to the helmet, and return it to the operating position again when needed. Binocular components shall be attachable and detachable from Helmet Mount Assembly without visual acquisition.

3.1.6.2. Position Locking. The Helmet Mount Assembly shall provide a lock operating and locked stowed capability. The binocular shall move from both the operating position to the stowed position or the stowed position to the operating position with less than a 10 g force, and always remain in the mount when the lock release button is activated. The binocular shall lock in position for both the operating and stowed positions. The image intensifier tubes shall not be activated when the binocular is in the stowed position.

3.1.6.3. Height of Mount and Binocular. In either position, operating or stowed, the mount and the binocular shall not extend over 3 inches above the top most part of the helmet and not outside the parallel planes of the sides of the helmet when the pilot is facing forward and seated in a normal vertical position with helmet positioned normally.

3.1.6.4. Vertical Adjustment: The Helmet Mount Assembly shall provide the means for vertical adjustment. The vertical adjustment in the mount shall vary the vertical distance of the binocular relative to the mount a distance not less than 25 mm.

3.1.7. Inadvertent Binocular Separation. The Helmet Mount Assembly shall prevent inadvertent binocular separation from the Helmet Mount Assembly when the binocular may strike a portion of the aircraft canopy or other aircraft structures during head movement.

3.1.8. Breakaway: The Helmet Mount Assembly shall provide breakaway capability when system forces experienced are greater than 10 g. The minimum force required for the binocular to breakaway from the mount in a forward direction from the pilot's head shall be between 11 and 15 g. At 15 g force, the binocular shall breakaway from the mount within one second. The binocular shall not breakaway and the vertical adjustment shall not move when a downward force of 10 g is applied. The fore-aft adjustment shall not move when a forward force of 10 g is applied.

3.1.9. Interface. The Helmet Mount Assembly shall form the interface between the helmet and the binocular assembly and shall include the power source or improved power source solution.

3.1.9.1. The Helmet Mount Assembly shall interface with the NVIIS produced by ITT Industries, Government Type Designator AN/AVS-9, Models F4949G, F4949G-T and F4949R-T.

3.1.9.2. The Helmet Mount Assembly shall interface with the present helmet that is worn by TACAIR pilots, Gentex Helmet HGU-68/P or HGU-85/P.

3.1.9.3. The current Helmet Mount Bracket Kit, Part Number 265030-3 shall be used to interface with the helmet. The Helmet Mount Assembly shall interface with the current helmet attachment bracket system that is utilized / mounted on a TACAIR HGU-85/68/P helmet without changes.

3.1.10. Center of Gravity (CG)

The Improved Helmet Mount Assembly shall alleviate as much as possible forward CG. The Helmet Mount Assembly shall provide a safe integrated CG with the aircrew's helmet and headgear to prevent neck fatigue during extended use and neck injuries during ejection from aircraft. The solution to improve overall CG varies from one ejection seat to another and from one size occupant to another for ejection safety. The solution proposed shall improve CG for variables in size and ejection seats. The mass properties of a size Large HGU-68(V)6/P with AN/AVS-9 goggles (in the X-Z plane) are: Mass: 3.72 lbs, CGx: 2.54 inches from Occipital Condyle (OC), CGz: 2.59 inches from OC, Iy: 77.4 lb-in² about the CG. These numbers do not include mask, step-in visor or the headform mass properties. The Navy will evaluate CG for the various ejection seats used in USN / USMC tactical aircraft use the AN/AVS-9 Night Vision Image Intensifier Set.

3.1.11. Electro Magnetic Interference (EMI): Electro Magnetic Interference (EMI) shall not affect the redesigned Helmet Mount Assembly. Current problem results in an LBI light flashing when SPS-49 radar antenna sweeps near an operating AN/AVS-9 NVIIS. The SPS-49 Radar frequency band is 850-942 MHz with a transmitting power of 280-360 kW peak power with a scan rate of 6-12 rpm depending on version being used. A Prime Item Function Specification for the Long Range Air Surveillance Radar AN/SPS-49A(V)1 that is unclassified and contains performance parameters for all versions of the AN/SPS-49A(V)1 Radar currently in use on US Navy ships is available upon request. There is also a classified portion that has specific classified information that can be provided upon request. The Helmet Mount Assembly, when properly incorporated within the NVIIS system, shall comply with the EMI requirements of MIL-PRF-49425 (CR).

3.1.12. Maintenance: The Helmet Mount Assembly shall require minimal maintenance consisting of: remove/replace batteries, remove/replace mount from helmet shield and cleaning of entire mount.

3.1.13. Environmental Requirements.

3.1.13.1 Foreign Object Damage (FOD): The Helmet Mount Assembly dDesign shall prevent FOD hazards from occurring.

3.1.13.2. Salt Environment. The Helmet Mount Assembly shall be capable of operating in a salt spray environment without corrosion. The mount shall not be damaged and shall operate without degradation of performance after a minimum 48 hour exposure to a salt-fog atmosphere

of sodium chloride containing (on a dry basis) not more than 0.1% sodium iodide and not more than 0.5% total impurities, followed by a minimum drying period of 48 hours.

3.1.13.3. Explosive Environment: The mount and mount circuitry shall not cause ignition of a gaseous air mixture when operating in an explosive atmosphere environment.

3.1.13.4. Temperature Environment: The mount shall not be damaged nor suffer degradation of performance by continuous operation from +52° C to -32° C or after storage from +85° C to -32° C. The mount shall not be damaged nor suffer degradation of performance by sudden temperature changed from +23° C to +85° C and +23° C to -32° C occurring within five (5) minutes. Soak time at each temperature extreme shall be sufficient to attain stabilization.

3.1.13.5. Humidity: The mount shall not be damaged nor suffer degradation of performance when subjected to not less than 95% relative humidity at temperatures varying between +21° C and +65° C for a period of not less than 240 hours.

3.1.14. Workmanship: All mounts shall be free from burrs, dirt, grease, rust, corrosion, any embedded or surface foreign material, excessive adhesive, cracks, splits, cold flow, shrinkage, inclusions, porosity, or any similar characteristics. Threads shall be full and undamaged for their entire length or depth. Joints and seams shall be a tight fit, and electrical wiring shall be secure with unbroken insulation. All moving parts and adjustments shall move freely throughout their entire range without sticking, binding, or creeping.