

STATEMENT OF WORK

FOR

AVIATION COMBINED ARMS TACTICAL TRAINER (AVCATT) HELMET MOUNTED DISPLAY REPLACEMENT

**Prepared by
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**Statement of Work
For
AVCATT Helmet Mounted Display Replacement**

1.0 SCOPE.

This Statement of Work (SOW) defines the types of efforts required for design, development, production, installation, configuration management, testing, and delivery of the Replacement Helmet Mounted Display (HMD) units for the AVCATT trainer systems. This effort will also include obsolescence and transition to Life Cycle Contractor Support (LCCS) for the new units. It will address HMD Replacements for all AVCATT Airframe modules. HMD Replacements associated with this acquisition include, but are not limited to, the following platforms:

1. AH 64 Manned Module
2. CH 47 Manned Module
3. OH 58 Manned Module
4. UH 60 Manned Module
5. UH 72 Manned Module

1.1 Background.

The U.S. Army Program Executive Office Simulation, Training and Instrumentation (PEO STRI) has a requirement to provide life cycle upgrades to the AVCATT collective trainer. Technical advancements since the procurement of the current HMD solution have facilitated a technical refresh for the HMD units. Improvements in overall weight, performance and visual resolution will improve the immersive training environment. Greater reliability and faster repair time will reduce life cycle costs and trainer down time.

2.0 APPLICABLE DOCUMENTS.

The following documents form a part of this SOW to the extent specified herein. In the event of a conflict between documents referenced herein and the contents of this SOW, the contents of the SOW shall be the governing requirement.

2.1 Department of Defense Standards.

MIL-STD-130	Identification Marking of U.S. Military Property
MIL-STD-31000	Technical Data Packages
MIL-STD-40051-2A	Page-Based Technical Manuals
GEIA-HB-0007-A	Handbook, Logistics Product Data
GEIA-STD-0007-A	Specification, Logistics Data Products

Copies available on the WWW at URL: <https://assist.dla.mil/quicksearch/>

2.2 Department of Defense Directives.

DODD 8570.01 Information Assurance (IA) Training, Certification, and Workforce Management
Copies available on the WWW at URL: <http://www.dtic.mil/whs/directives/>

2.3 Department of Defense Instructions.

DODI 8500.2 Information Assurance Implementation
DODI 8510.01 DOD Information Assurance Certification and Accreditation Process (DIACAP)
Copies available on the WWW at URL: <http://www.dtic.mil/whs/directives/>

2.4 Other Government Documents, Drawings, and Publications.

AR 380.5 Marking and Labeling
Copies available on the WWW at URL http://www.apd.army.mil/pdffiles/r380_5.pdf
AR 25-2 Information Assurance
Copies available on the WWW at URL http://www.apd.army.mil/pdffiles/r25_2.pdf
DISR Department of Defense (DoD) Information Technology Standards Registry
Copies available on the WWW at URL <http://jtaonline.disa.mil/VJTA/index.jsp>
DA PAM 25-1-2 Information Technology Contingency Planning, 16 November 2006
Copies available on the WWW at URL http://www.apd.army.mil/pdffiles/p25_1_2.pdf

2.5 AVCATT Documentation

SSS	AVCATT System / Subsystem Specifications
SRS	AVCATT System Requirements Document
SSDD	AVCATT System/Subsystem Design Document
DRM	Data Rights Matrix
SEP Ver 1.0	AVCATT ACAT II Systems Engineering Plan
HMD SPEC	AVCATT Helmet Mounted Display Technical Specification
VISUAL SPEC	AVCATT Visual Technical Specification

3.0 REQUIREMENTS.

The Contractor shall design, build, integrate and deliver new HMD units that meet the requirements as defined in this SOW, the AVCATT HMD Technical Specification, the AVCATT Visual Technical Specification, the AVCATT System/Subsystem Specification (SSS) and the System/Subsystem Design Document (SSDD). The Contractor shall provide the resources, facilities, equipment, management and administrative effort necessary to fabricate, configure, integrate, verify, deliver, install and transition to LCCS the new HMD units. The Contractor shall perform all activities to integrate and assemble the hardware and software to achieve a fully functional system, with all support systems, that performs and operates in

accordance with the system specifications and contractor generated specifications. The Contractor shall verify the complete integration of the hardware and software of each subsystem and the overall system through the utilization of formalized test procedures.

In any instance where there is a conflict that would cause conflicting requirements or impacts to cost, schedule, or performance, the contractor shall immediately present that information to the Government and Integrated Product Team (IPT) for resolution and agreement on a path forward.

3.1 HMD (Base)

The Contractor shall replace the existing AVCATT HMD to support the requirements of the AVCATT HMD Technical Specifications. The Contractor shall evaluate the current AVCATT HMD/Tracking system and implement design changes needed to meet AVCATT's collective training tasks requirements. The Contractor shall ensure that the upgrades do not adversely impact any existing AVCATT functionality.

The Contractor shall replace the AVCATT HMD units to provide improved visual acuity, higher resolution and reduced weight. The Contractor shall upgrade both Pilot and Copilot views and maintain coordinated, realistic synthetic visual representations of Out The Window (OTW), Night Vision Goggles (NVG) and multiple sensor views with appropriate associated overlaid symbology.

The Contractor shall provide a ruggedized HMD solution that meets the training AVCATT environment needs. The Contractor shall provide a maintenance, repair and/or replacement plan that allows for shorter trainer down time and reduced Life Cycle costs.

The Contractor shall replace the Pilot and Copilot head tracking system. The Contractor shall provide a head tracking solution that maintains a dual 6 degree-of-freedom (6-DOF) tracking system for independently tracking both pilot and copilot head positions. The head tracking system shall interface with the current Image Generator for rendering the imagery on the HMD

3.2 Integrate AVCATT Overlaid Symbology (Option)

The Contractor shall integrate the associated overlaid symbology for each of the current aircraft platforms and any aircraft platforms that are under development at time of contract award.

3.3 System Design.

The Contractor shall perform the necessary engineering activities to finalize the AVCATT system design that meets the AVCATT HMD Technical Specifications. Selected designs and specifications shall be based on performance, cost, industry acceptance, long term availability and supportability, and shall be compatible with previous upgrades to the AVCATT system.

3.3.1 System Definition.

The Contractor shall establish the definition of the system with a focus on system products required to satisfy operational requirements. The Contractor shall complete the system, product, and subsystem interface requirements and verification definition, system and product requirements and verification definition, and preliminary subsystem requirement and verification definition, establish a system baseline, and complete technical reviews. The documentation generated during system definition shall be used to guide subsystem development.

3.3.2 Hardware Design.

The system hardware shall satisfy the requirements of the AVCATT HMD Technical Specifications. The Contractor shall maximize the use of commercial and Non-Developmental Items (NDI). The Contractor shall apply a system engineering process during each level of system development (system, subsystem, and component) to add value (additional detail) to the products defined in the prior application of the process. Through each of the following design stages, information generated shall be documented in the integrated database. The Contractor shall use the existing AVCATT hardware infrastructure as much as possible while meeting the requirements of the HMD Technical Specifications. Any changes that would result in new/added hardware but has potential life-cycle cost savings should be presented to the Government for consideration.

3.3.2.1 Preliminary Design.

The Contractor shall initiate subsystem design and create subsystem-level definition and design-to baselines to guide component development. The Contractor shall decompose identified subsystem functions into lower-level functions and allocate functional and performance requirements to component-level functional and physical architectures. Each preliminary subsystem requirements and verification definition and preliminary design-to baseline shall be evolved into a subsystem requirement and verification definition and design-to baseline. Preliminary component requirements and verification definition and build-to baselines shall be defined for the components and the subsystem being developed. Final subsystem definition shall include identification of recommended components and interfaces, resolution of subsystem-level risks, assessment of component risks, and design for quality factors to include producibility, verifiability, usability, supportability, trainability and disposability for each subsystem. Subsystem reviews shall be completed for each subsystem at the completion of its preliminary design stage. The results of the evaluation shall be documented in the Preliminary Design Review slides.

3.3.2.2 Detailed Design.

The Contractor shall complete subsystem design down to the lowest component level, and create a component requirements and verification definition and build-to component baseline for each component. Final component definition shall include identification of recommended parts and interfaces, resolution of component-level risks and for each component, down to the lowest sub-component, and the design for quality factors to include producibility, verifiability, usability, supportability, trainability and disposability. Component reviews shall be completed for each

component at the completion of the detailed design stage. The results of the evaluation shall be documented in the Critical Design Review slides.

3.3.2.3 Fabrication, Assembly, Integration and Test.

The Contractor shall integrate and assemble the system hardware that satisfies the requirements of the AVCATT HMD Technical Specifications. The Contractor shall resolve product deficiencies when specifications for the system, product, subsystem, assembly, or component are not met, as determined by inspection, analysis, demonstration, or test. The Contractor shall verify that the products designed satisfy the requirements.

3.3.3 Software Design and Implementation

The Contractor shall design software, develop executable code, perform unit testing, and integrate software components (with each other and with hardware components) to meet system requirements as stated in the technical specification, SSS, and SSDD. Software design includes not only design to requirements, but selection of existing software products including open source software to meet system requirements, and iterating the requirements to allow use of existing products when indicated by cost as an independent variable (CAIV) or schedule as an independent variable (SAIV) trades.

Products that perform information assurance functions are considered Information Assurance (IA) or IA-enabled Information Technology (IT) products and shall be selected from the DoD Unified Capabilities (UC) Approved Product List (APL) and configured in accordance with DoD-approved security configuration guidelines. These include databases which must comply with the Defense Information Systems Agency (DISA) database Security Technical Implementation Guide (STIG).

The Contractor shall document all new design and any changes to the software design and/or interface design in the AVCATT design documentation.

(DI-ADMN-80925) Revisions to Existing Government Documents Software Design Description (SDD)

(DI-ADMN-80925) Revisions to Existing Government Documents Interface Design Description (IDD)

(DI-CMAN-81248A) Interface Control Document (ICD)

(DI - IPSC-81442A) Software Version Description (SVD)

(DI - IPSC-81441A) Software Product Specification (SPS)

3.3.3.1 Software and Hardware Requirements and Architecture Development and Review.

The Contractor shall develop software and hardware requirements and architecture in accordance with your software development process plan. The Contractor shall work within the Integrated Product Team (IPT) and with the Post-Deployment Software Support (PDSS) contractor to iterate the system and System-of-System (SoS) software requirements and architecture as part of this activity. You are encouraged to recommend revisions to Government requirements and such

revisions shall be provided to the government IPT prior to approval, where such revisions would result in cost or schedule reduction or performance improvements. The Contractor shall define and record the software requirements to be met by each software item, the methods to be used to ensure that each requirement has been met, and the traceability between the software item requirements and system requirements.

(DI-ADMN-80925) Revisions to Existing Government Documents System/Subsystem Design Document (SSDD) – Manned Module

(DI-ADMN-80925) Revisions to Existing Government Documents System/Subsystem Design Document (SSDD) – System Level

(DI-ADMN-80925) Revisions to Existing Government Documents System/Subsystem Design Document (SSDD) - Training Environment

(DI-ADMN-80925) Revisions to Existing Government Documents Software Requirement Specifications (SRS) – Visual Systems

(DI-ADMN-80925) Revisions to Existing Government Documents Software Requirement Specifications (SRS) – Computer Software Configuration Item (CSCI)

3.3.3.2 Software or Product License.

Software, technical data, and products direct from the prime contractor shall be provided with a minimum of Government Purpose Rights (GPR) to allow the distribution, modification, and use by any 3rd party for any AVCATT or DoD purpose. This includes software, technical data, and products developed by a sub-contractor to support this effort. Any licensed COTS software and technical data shall be provided with a transferable license that allows distribution and use for any AVCATT purpose by any DoD contractor at no additional cost. With Government concurrence, existing AVCATT proprietary solutions for both hardware and software may be reused for a modification. However, if modification of existing AVCATT proprietary solutions is required in the design then the entire compiled and executable product must be provided with GPR. However, introduction of new proprietary solutions is not acceptable.

3.3.3.3 Software Development Test.

The Contractor shall follow an established software item testing process to test the software corresponding to each software item. The Contractor shall establish test cases (in terms of inputs, expected results, and evaluation criteria) and establish traceability between the test case and the system requirements. The Contractor shall provide detailed procedures for conducting the test and test data for testing the software corresponding to each software item. The testing shall be in accordance with the unit test cases and procedures. The Contractor shall analyze the results of item testing and shall record the test and analysis results.

3.3.3.4 Software and Hardware Commonality & Reuse.

The Contractor shall identify and integrate any software/hardware and data from other related programs that is available for reuse on the AVCATT program. The Contractor shall identify and integrate software/ hardware and data from one AVCATT aircraft platform that is available for reuse. The ability to use that software/hardware and/or data shall not impact the ongoing efforts

of the AVCATT program. Any software/hardware and data reuse shall meet the data rights requirements of this SOW.

3.3.4 Hardware and Software Integration.

The Contractor shall perform all activities to integrate the developed software and hardware with the existing AVCATT software and hardware to achieve a fully functional system that performs and operates in accordance with the AVCATT HMD Technical Specification. The Contractor shall verify the complete integration of the hardware and software of each hardware and software subsystem and the overall system through the utilization of Software Test Description (STD)s and formalized test procedures. The Contractor shall specify the functional interface between the computer program products and any equipment hardware with which it must operate.

3.3.5 Production Planning.

The Contractor shall perform production planning to ensure a smooth, timely, and cost effective production of the HMD replacements. Planning tasks shall be in place to support the required delivery schedule and include those actions required to ensure that the product design has stabilized, the manufacturing processes have been proven, and production facilities including, equipment, capability, and capacity are in place.

3.3.6 Product Definition Data (PDD).

During the systems engineering and design the Contractor shall develop, produce, and maintain PDD that accurately depicts the final product. The PDD is a technical description of items adequate for acquisition strategy, production, engineering and logistics support. The PDD shall disclose complete design, logistics, manufacturing requirements, and the means of measuring compliance with the requirements. Piece part information (e.g., drawings, computer aided design files and meta data) and associated lists shall provide the design, engineering, manufacturing, and quality assurance requirements information necessary to enable the procurement or manufacture of an interchangeable (form, fit, function) replacement for the original product.

(DI-ADMN-80925) Revisions to Existing Government Documents System/Subsystem Specifications (SSS)

(DI-ADMN-80925) Revisions to Existing Government Documents Commercial Drawings and Associated List

(DI-ADMN-80925) Revisions to Existing Government Documents Product Drawings and Associated List

3.4 Integrated Product and Process Management.

The Contractor shall established management techniques that integrate all essential acquisition activities through the use of multidisciplinary teams. The Contractor shall utilize systems engineering tools and overlay a management concept that encourages the use of IPTs. The

Contractor shall attend and support with the necessary team members the monthly AVCATT System Engineering IPT.

3.4.1 Systems Engineering and Design.

The Contractor shall implement a system engineering process that transforms all system requirements into a set of lower level performance requirements that define the system. The process shall accomplish planning, identify and allocate functional requirements, identify participation in trade studies, provide inputs to documentation, and include design reviews. The system engineering effort shall integrate all elements of a multifunctional engineering effort to meet system requirements. The Contractor shall insure the timely integration of engineering specialties such as reliability, maintainability, logistics engineering, human factors engineering, safety, value engineering, standardization, and transportability into design and development.

(DI-MISC-80711A) Scientific and Technical Reports

3.4.2 Software Engineering.

The Contractor shall develop the system software and firmware using your organizational software development practices that are compliant with at least Level 3 of the Software Engineering Institute's Capability Maturity Model for Software (CMM). The design process shall incorporate features that promote assessment of open source software products, ease of operation, IA, ease of software maintenance, ease of future updates and modifications, data void work around, and also any smart designs that can justify a reduction in the amount of documentation. Computer programs and computer data system shall be fully integrated in accordance with the system specification. The Contractor shall conduct market surveillance and market investigations, in order to maximize the use of open source software, commercial software and non-developmental software. The Contractor shall employ well-defined security policy models, structured, disciplined, and rigorous hardware and software development techniques, and sound system/security engineering principles.

3.4.2.1 Baseline Management

The Contractor shall coordinate all hardware and software baseline activities with the AVCATT PDSS contractor through the Governmental led IPTs. The PDSS contractor will be responsible for the AVCATT Software Baseline. The process shall account for multiple baseline drops to and from the PDSS managed AVCATT baseline. The Contractor shall continue this process until a final AVCATT Software Baseline is developed, tested, and accepted by the Government in a fielded software release. This dependency shall be clearly identified in the Contractor's Integrated Master Schedule (IMS).

3.4.2.2 Software Defect Management.

The Contractor shall document each problem detected in software products. Software item deliveries, including incremental deliveries, shall include defect history and open problems against the software item. The Contractor shall provide the defect history and open problems

against the delivered software products to the PDSS IPT. The Contractor shall participate as necessary in IPT meetings in order to allocate Discrepancy Reports (DRs) against the appropriate contract and or task order.

3.4.2.3 Supportability Engineering.

The Contractor shall conduct engineering analyses to establish quantitative and qualitative supportability design guidelines. The Contractor shall evaluate design and support alternatives, and establish system supportability preliminary design configurations consistent with system readiness and availability and life cycle cost goals. The Contractor shall coordinate with the AVCATT Life Cycle Contractor Support (LCCS) team, develop initial fielding plans for the upgrades and verify that the maintenance actions and support structure are aligned with the maintenance concept.

3.4.2.3.1 Logistics Support Analysis.

The Contractor shall ensure the supportability of the system through planning, implementation and verification of materials and services to meet the operational requirements. Readiness, availability and supportability shall be the primary design factors. The Contractor shall identify support resources and infrastructure necessary for test and evaluation activities. The Contractor shall analyze existing LCCS structures and develop and define an optimized support infrastructure for production and deployment. The recommended support resources shall be sufficient to allow another contractor with comparable skills to assume operation, maintenance, and support of the system and sustain the system availability requirement. The Contractor shall only use the form, fit, function, and interface requirements in the performance specifications for provisioning, training, and maintenance planning.

**(DI-SESS-81758A) Logistics Product Data with Tailored GEIA-STD-0007-1A
Annex to Exhibit A**

(DI-SESS-81759A) Logistics Product Data Summaries

3.4.3 Technical Publications.

The Contractor shall describe each operation and maintenance task in detail and in logical, systematic steps for the work to be accomplished. The operations and maintenance instructions shall accurately provide the technician with all the information needed to keep the equipment operational. It shall provide system and subsystem oriented instructions for installation, operation, maintenance, and testing. All tools, test equipment and consumable items required to accomplish any maintenance or installation shall be identified just prior to and as part of the task. Government furnished material, Government technical manuals or Government-approved commercial operation and maintenance manuals shall be used as references for system and subsystem maintenance. All Government technical and commercial off the shelf (COTS) manuals shall be reviewed to ensure changes, updates, revisions, or supplementation is not required to reflect the components actually being installed. All publications shall reflect the configuration of fielded hardware as documented in the product baseline (See Annex to Exhibit C).

- (DI-ADMN-80925) Revisions to Existing Government Documents (Operators Users Manual)**
- (DI-ADMN-80925) Revisions to Existing Government Documents (O/C, AAR, ULEP Guide)**
- (DI-ADMN-80925) Revisions to Existing Government Documents (SAF, BMC & AAR Op. Manual)**
- (DI-ADMN-80925) Revisions to Existing Government Documents (System Maintenance Manual (SMM))**
- (DI-ADMN-80925) Revisions to Existing Government Documents (Role Player Manual)**
- (DI-TMSS-80527C) Commercial Off-the-Shelf (COTS) Manuals and Associated Supplemental Data**

3.4.3.1 Technical Publication In Process Review's (IPRs).

The Contractor shall host and co-chair technical publications IPRs to ensure the technical publications are being updated according to contracts. Technical publication IPRs shall be scheduled to coincide with a system level program review defined in the integrated master plan. The Contractor shall act on reported decisions and discrepancies resulting from or associated with the IPRs. Each review shall include a review of incorporated corrections or comments from the previous IPR prior to proceeding with the current IPR. All technical data including the PDD shall be available for reference during these reviews. If any IPT member identifies previous IPR comments that are not included in the updated technical publications, the IPR shall be considered incomplete.

3.4.3.2 Validation.

Validation shall be accomplished on all technical publications, changes, supplemental data, and revisions thereto. Publications shall be validated prior to start of system testing. A technical publication shall not be ready for validation or verification until the following conditions have been fulfilled:

- a. Engineering technical review has been completed.
- b. Information, illustrations and parts lists reflect correct configurations of the system and equipment, to include all engineering changes.
- c. Procedural instructions are readily understandable by the intended user and adequate to perform all operations and maintenance functions.
- d. All procedures have been performed to assure accuracy and performance requirements.
- e. Adequacy of data is checked to ensure that it supports the approved maintenance and support plan.
- f. Hardware of the proper configuration is available for the validation and verification

effort.

- g. The use of any hazardous material has been identified.

3.4.3.3 Verification.

The updated technical publications verification shall be conducted after the validation is complete. Correction of discrepancies and changes resulting from training, testing and reviews shall be incorporated into the technical publications. The Contractor shall provide system equipment, technical and engineering support and facilities as required to aid in the performance of the verification effort. The Contractor shall incorporate all comments from compliance-reviews, technical accuracy reviews and verification reviews into final submission of the technical publications.

3.4.4 Quality Engineering.

The Contractor shall establish trackable measurement points to provide maximum visibility into near and prior processes to assure contractual requirements are being met. The Contractor shall select the proper methods to analyze these processes to continuously improve the system. Metrics shall be developed to assist management visibility into an adequate process control system. The Contractor shall establish a discrepancy tracking system with the ability to produce complete permanent records of all discrepancy or database listing. The Contractor shall establish a suspense system to ensure the timeliness of analysis and corrective action for discrepancies and risk reduction items.

3.4.4.1 Test Discrepancies.

Discrepancies shall be identified in a timely manner to allow time for correction to minimize impact on Contractor integration. As part of these activities, the Contractor shall work within the scheduled IPT to review the recorded test results and discrepancies. The Contractor shall follow the established process to receive test discrepancies from any IPT member and accomplish data entry. Upon closeout of a discrepancy, your process shall notify the Government designated test director that the discrepancy has been closed and the corrective action taken to correct the discrepancy. Government will have final approval on closure of any discrepancy written at Government Acceptance Testing.

3.4.4.2 Test Discrepancy Processing.

The Contractor shall document a detailed description defining the changes made to the equipment, hardware, and software to correct each discrepancy. Each discrepancy correction that modifies or changes any baseline shall be documented and entered in the configuration management system.

3.4.5 Specialty Engineering.

3.4.5.1 Reliability Engineering.

The Contractor shall develop, implement and manage a system reliability process satisfying all reliability objectives and be completely integrated within the systems engineering process.

3.4.5.2 Safety Engineering.

The Contractor shall develop and implement tasks and activities to identify, evaluate, and eliminate or control hazards throughout the systems life cycle. The Contractor shall ensure the safety of the system's design, operation, transportation, maintenance, support, and disposal. The Contractor shall conduct safety analyses, hazard identification and classification and hazards tracking integral to the system design effort. A hazard risk index including hazard severity and hazard probability levels shall be developed for all hazard.

3.4.6 Packaging, Handling, Transportation and Storage

The Contractor shall establish a packing, storage, and transportability process which identifies the most economical practices for preservation, packing, storage and transportation and which will result in the most effective means of satisfying these requirements. The Contractor shall consider areas such as trade studies, environmental conditions, physical limitations (dimensions, weight, major assemblies) which potentially may affect packing, storage, or transportability of the system.

3.4.7 Information Assurance (IA)

All IA and IA enabled products shall be securely configured IAW DoD-approved security configuration guidelines. The Contractor shall obtain Security Technical Implementation Guides (STIGs) <http://iase.disa.mil/stigs/index.html> and implement each STIG into the design. As part of the system design and component selection process, IA shall be considered as a requirement for all systems used to enter, process, store, display, or transmit information. IA shall be achieved through the acquisition and appropriate implementation of evaluated or validated GOTS or COTS IA and IA-enabled IT products. All Commercial-Off-The-Shelf (COTS) IA products and IA-enabled products shall be certified compliant with National Security Telecommunications and Information Systems Security Policy Number 11 (NSTISSP-11) by labs accredited under the National Information Assurance Partnership (NIAP) Common Criteria Evaluation and Validation Scheme (CCEVS) or National Institute of Standards and Technology (NIST) Federal Information Processing Standards (FIPS) Cryptographic Module Validation Program (CMVP). Similarly, Government Off-The-Shelf (GOTS) IA products or IA-enabled products employed by the system shall be evaluated by the National Security Agency (NSA) or in accordance with NSA approved processes.

3.4.8 Technical Reviews.

The Contractor shall conduct reviews, to include a System Requirements Review (SRR), a Preliminary Design Review (PDR), a Critical Design Review (CDR), and a Test Readiness Review (TRR) for the purpose of assessing technical progress. The Contractor shall coordinate and combine these reviews to the maximum extent possible. The Contractor shall document the results of the review, including any resulting action items. The Entrance/Exit Criteria for each review is defined in Appendix A. Normally, a design review shall be conducted at the

completion of each application of the system-engineering phase. Each review shall assess the system requirements and allocations to ensure that requirements are unambiguous, consistent, complete, feasible, verifiable, and traceable to top-level system requirements and present the design approach, risks associated with a continued development effort, and metrics.

3.4.9 Technical Interchange Meetings (TIMs).

The Contractor shall support TIMs. A TIM shall address specific topics or issues, address status of development or test activities between management reviews, address the functions of an established working group, or coordinate and provide guidance for engineering data or technical publications. At a minimum, The Contractor shall coordinate technical efforts through TIMs, IPTs.

3.4.10 Program Management.

The Contractor shall provide the overall management and administrative effort necessary to ensure that the requirements of this effort are accomplished and include provisions for technical and administrative planning, organization, coordination, resource allocation, and risk management. The Contractor shall track program progress utilizing metrics. The contractor risk management strategy should include the Government as part of its process.

3.4.10.1 Integrated Master Schedule (IMS).

The Contractor shall develop, implement, manage to, update, and maintain the contract IMS. All contract schedule information delivered or presented at program reviews shall originate from the IMS and shall contain all critical events and exit criteria, accomplishments, predecessors' and successors' events, and their dependencies. The IMS shall address total program activities including activities performed by major subcontractors. The Contractor shall conduct critical path analysis of the tasks and identify problem areas and corrective actions required to eliminate or reduce schedule impacts.

(DI-MISC-81861) Integrated Program Management Report (IPMR)

3.4.10.2 Financial Management.

The Contractor shall plan, budget, schedule, and control the resources allocated to meet the requirements of the contract. The Contractor shall document, track, and deliver the status of all appropriated funds associated with the contract to include payments, cancellations and invoices against each contract line item and sub-line item.

(DI-MGMT-81468) Contract Funds Status Report (CFSR)

3.4.10.3 Configuration Management (CM).

The Contractor shall follow established contractor processes and use tools to maintain consistency between system requirements, system configuration information, and all relevant information about the system. The consistency established through the CM process shall ensure that the system conforms to the requirements. The requirements shall be identified and documented in sufficient detail to support life cycle planning, to ensure component interchangeability, and to ensure accurate system information and safety of system operation and maintenance.

3.4.11 Integrated Digital Environment (IDE).

The Contractor shall establish an IDE to facilitate the electronic data interchange of all program data. All management, technical, cost, and schedule data (including all internal documents produced to design, develop, test and manage the program) shall be made available to all Government and contractor team members in an integrated, electronic, and query capable database, accessible via the Internet. The Contractor shall provide the capabilities for on-line review, comment, acceptance and approval of all deliverable data.

3.4.12 Associate Contractor Agreement (ACA).

The contractor may enter into an ACA with Government approved contractors in order to obtain the necessary documentation and software. The ACA should define the roles and responsibilities necessary by both parties in order for you to receive the information necessary to complete the tasks defined in this SOW and associated specification.

3.5 Integrated Testing.

The Contractor shall plan, coordinate, establish and implement a comprehensive test and evaluation (T&E) program to include all configurations of the system. System T&E refers to the test and evaluation activities which use the development and production hardware together with the software to validate that the system meets the operational, environmental and technical performance requirements as stated in the latest version of AVCATT HMD Technical Specification. System T&E includes all efforts associated with the design and production of models, specimens, fixtures and instrumentation in support of the T&E program. System test shall include a process to prepare the executable software, including any batch files, data files, or other software files needed to install and operate the software on a newly formatted (blank media) target computer. The Contractor shall create a Government accepted Requirements Traceability Verification Matrix, RTVM, which establishes traceability between testing and the system requirements, detailed procedures for conducting the test, and test data for each test. The Contractor shall develop step-by-step testing operations to be performed on items undergoing developmental testing. The Contractor shall identify items to be tested, the test equipment and support required, the test conditions to be imposed, the parameters to be measured, and the pass and fail criteria against which the test results will be measured. The test planning, test procedures and acceptance tests shall be structured to integrate all developmental, operational, and modeling and simulation activities to concentrate upon generation of data needed to insure that a decision on the systems capability to meet the objectives identified in the latest version of

AVCATT HMD Technical Specification is made with a minimum amount of uncertainty.

(DI-NDTI-80603A) Test Procedures (TPs)
(DI-IPSC-81439A) Software Test Descriptions (STDs)

3.5.1 Test Readiness Review (TRR).

The Contractor shall conduct a TRR that follows the established TRR format, prior to the start of formal Test Procedure execution. The IPT will agree to the time and location of the TRR. The entrance criteria for TRR will be in accordance with the criteria defined in Appendix A for a Formal System Test. All exit criteria for Hardware Software Integration (HSI) and Informal System Test shall be met prior to initiation of a TRR.

The Contractor shall address the following key issues at the system engineering TRR prior to the start of First Unit Test to ensure that the system and all test resources are ready to begin testing:

- a. Notification by the Contractor that they are ready for the Government to conduct the TRR.
- b. Test procedures comply with plans and descriptions, are adequate to accomplish test requirements and satisfy requirements for verification.
- c. Pre-test predictions and informal tests indicate testing will confirm performance.
- d. New or modified test equipment and facilities and procedure manuals required to accomplish planned test and evaluation, are available and satisfy the test requirements.
- e. Data acquisition and reduction provisions are in place.
- f. No Severity 1 or Severity 2 problem report issues are open.
- g. All open severity 3, 4 and 5 problem reports require prior approval by the Government to proceed to test.

The following shall be reviewed during the TRR:

- a. Evidence that the T&E program as required under the contract is ready to accept the qualification tests and their results.
- b. Evidence that the requirements in the development specification have been traced to qualification tests or tests on which the qualification tests rely.
- c. A list of outstanding problem reports, both external and internal cross-referenced to the contracted deliverable end items or development hardware and software products.
- d. Test requirements.
- e. Requirements changes pending.
- f. Test constraints based on previous testing or test hardware limitations.
- g. Test configuration (test article and instrumentation and support equipment).
- h. Detailed test procedures.
- i. Plans for collection, reduction and analysis of the test data.
- j. Calibration plan and status.
- k. Problem areas and their resolution.

The following shall be reviewed after the conclusion of testing:

- a. All open problem reports that will be transitioned to the AVCATT Post Deployment Software Support (PDSS) activity.

Severity shall be defined as follows:

- a. Severity 1 – Safety issue or prevents continuation of an operational or mission essential capability or testing.
- b. Severity 2 – Adversely affects the accomplishment of an operational or mission essential capability.
- c. Severity 3 - Adversely affects the accomplishment of an operational or mission essential capability but a work-around solution acceptable to the Government is known.
- d. Severity 4 – Results in user/operator inconvenience or annoyance but does not affect a required operational or missing essential capability. Any other effect.
- e. Severity 5 – Documentation errors.

3.5.2 Retrofit

The Contractor shall retrofit and install the HMD Upgrade to meet the requirements of this SOW and Technical Specification at each AVCATT location. Discrepancies shall be reported in a timely manner to allow concurrent work to the extent possible without impact to your integration effort. All retrofits shall be performed concurrent with other AVCATT upgrades when possible, in order to minimize system downtime and cost.

3.5.3 Site Acceptance Testing.

The Contractor shall plan, perform, and record acceptance testing of each retrofit in accordance with the specification and the approved procedures. Retrofit testing shall include testing of the kit in each module and workstation individually and testing of the integrated suite with the kits installed.

3.6 Training Products.

The Contractor shall develop and provide system operation and maintenance familiarization training through a combination of classroom, written instructions, and/or hands-on operation. The Contractor shall analyze, and prepare all training courseware including program of instruction, lesson plans, practical exercises, and a train-the-trainer package to accommodate new equipment training, sustainment training, and training of testers and evaluators. The Contractor shall have available draft training materials for each design increment prior to starting the system level test and evaluation (T&E). The Contractor shall conduct training for key test personnel prior to starting T&Es.

3.6.1 Instructor and Operator Training

The Contractor shall plan, develop, conduct, and document the completion of the initial instructor and operator course for the AVCATT BMC/SAF Operators. The course shall provide comprehensive training for instructors in the concepts, skills, and aptitude to efficiently operate the system. The course shall provide familiarization with the trainers operating techniques and shall emphasize the utilization of the instructor facility, its functions, and controls. The course shall address the physical and functional descriptions and operation of the equipment including features, advantages, and configurations.

(DI-ILSS-80872) Training Materials

3.6.2 Language.

The Contractor shall provide all instruction, training materials and trainer documentation in the English language.

3.7 Installation Program.

The Contractor shall perform all installation preparatory work prior to the arrival of the concurrency effort at each site including advising and assisting on-site personnel in any modifications they may be performing. The hardware shall be removed without damage and placed in a designated location within the simulator facility. Disposition of the hardware is the responsibility of the site.

3.7.1 Installation Tools and Test Equipment.

Your installation team shall be equipped with all standard tools required for the system installation. Any standard tools required and provided will be returned upon completion of the installation program. All special tools and test equipment shall remain at each site.

3.7.2 Installation Spares.

Your installation team shall be equipped with an installation spares package of common items. The Contractor shall replace all site spares used during the installation. The installation spares packages will be returned upon completion of the installation program.

3.7.3 Supportability.

The HMD shall be supportable within the agreed maintenance concept, implemented by the contractor as agreed by the government, for a period of at least 5 years from acceptance. This shall be achieved through an established consumer commercial support system, adequate stockage of spares and repair parts with necessary hardware and software tools, a guarantee of support by the HMD Units contractor, economical replacement with CIGs, and/or other viable means.

3.7.4 HMD Hardware Reliability.

HMD components, particularly display assemblies, shall be selected, employed and packaged for reliability, design stability, and long term supportability in accordance with the specified maintenance concept and in coordination with the contractor's life cycle support plan for the HMD. Use of low-cost, consumer-grade HMD components are not favored in lieu of more long-lived and supportable, high reliability components. The HMD shall demonstrate a 90% probability that no more than 10% of each type of manned module at a given site are simultaneously down for more than 30 minutes during a normal training day

3.7.5 Maintainability.

The mean time to repair (MTTR) or replace HMD Units shall be no greater than 30 days from the time the HMD unit is shipped to the agreed upon warranty facility.

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Appendix A

Entrance/Exit Criteria

1.1 SRR Entry Criteria:

- a. A preliminary agenda has been coordinated prior to the SRR.
- b. SRR technical products listed below for both hardware and software system elements have been made available to the SRR participants prior to the review:
 - (1) Draft System/subsystem specification has been delivered prior to the SRR In Accordance With (IAW) the Department of Defense (DD) FORM 1423-1, FEB 2001.
 - (2) All known Request for Actions (RFAs) are provided for Government approval.
 - (3) System software functionality description.
 - (4) Preferred system solution definition.
 - (5) Updated schedule data.

1.2 SRR Exit Criteria:

- a. The SRR is considered complete when all draft Request for Actions (RFAs) are signed off, and an acceptable level of program risk is ascertained.
- b. Considerations include:
 - (1) Can the system requirements satisfy the Technical Specification and Fidelity Analysis?
 - (2) Are the system requirements sufficiently detailed and understood to enable system functional definition and functional decomposition?
 - (3) Is there an approved system/subsystem specification submitted IAW the DD FORM 1423-1, FEB 2001?
 - (4) Are the risks known and manageable for design and development?
 - (5) Is the program schedule executable (technical/cost risks)?
 - (6) Is the program properly staffed?
 - (7) Is the program executable?
 - (8) Is the software functionality in the system specification consistent with the software sizing estimates?

1.3 PDR Entry Criteria:

- a. A preliminary SRR has been successfully completed, all known RFAs have been responded to and an agenda has been coordinated prior to the PDR.

- b. PDR technical products for each system hardware and software configuration item have been made available to the PDR participants prior to the review including:
 - (1) Updated system/subsystem specification submitted IAW the DD FORM 1423-1, FEB 2001, if any unforeseen changes have occurred since SRR close out.
 - (2) Draft Software Requirements Specification (SRS) has been submitted prior to PDR IAW the DD FORM 1423-1, FEB 2001.
 - (3) Updated risk assessment.
 - (4) A baseline management plan that depicts when you will pull from the AVCATT PDSS Baseline and will you drop your changes back into the Baseline.

1.4 PDR Exit Criteria:

- a. The PDR is considered complete when all known RFAs are documented and provided to the Government all PDR RFAs are closed, and an acceptable level of program risk is ascertained.
- b. Considerations include:
 - (1) Does the status of the technical effort and design indicate success?
 - (2) Can the preliminary design satisfy the Technical Specification and Fidelity Analysis provided by the Government and the System/Subsystem Specifications (SSS) developed by the contractor?
 - (3) SRS submitted as final IAW the DD FORM 1423-1, FEB 2001.
 - (4) Has the system allocated baseline been established and documented to enable detailed design to proceed with proper CM?
 - (5) Are adequate processes and metrics in place for the program to succeed?
 - (6) Are the risks known and manageable?
 - (7) Is the program schedule executable (technical/cost risks)?
 - (8) Is the program properly staffed?
 - (9) Is the program executable within the approved system allocated baseline?
 - (10) Is the software functionality in the approved allocated baseline consistent with the updated software metrics and resource-loaded schedule?
 - (11) Has the baseline branch merges and pulls been coordinated with other work on the AVCATT program?

1.5 CDR Entry Criteria:

- a. A PDR has been successfully completed, and all PDR RFAs have been responded to.
- b. All PDR exit criteria key issues have been satisfied.
- c. A preliminary agenda has been coordinated prior to the CDR.
- d. CDR technical products (hardware and software elements of the product baseline to

be reviewed and approved at the CDR) have been made available to the CDR participants prior to the review including:

- (1) Updates to the SSS submitted IAW the DD FORM 1423-1, FEB 2001, if required.
- (2) Current risk assessment.
- (3) A baseline management plan that depicts when you will pull from the AVCATT PDSS Baseline and will you drop your changes back into the Baseline.
- (4) Logistics Management Information (LMI) Data Product(s) with Tailored Worksheet of MIL-PRF-49506 Appendix B and delivered IAW the DD FORM 1423-1, FEB 2001) requirements.

e. Software Design Document (SDD) complete, submitted as draft IAW the DD FORM 1423-1, FEB 2001, and placed under CM?

f. Interface Design Document (IDD) complete, submitted as draft IAW the DD FORM 1423-1, FEB 2001, and placed under CM?

g. System/Subsystem Design Description (SSDD) complete, submitted as draft IAW the DD FORM 1423-1, FEB 2001, and placed under CM?

1.6 CDR Exit Criteria:

a. The CDR is considered complete when all CDR RFAs are approved, and an acceptable level of program risk is ascertained.

b. Considerations include:

- (1) Does the status of the technical effort and design indicate success?
- (2) Does the detailed design satisfy the Technical Specification and Fidelity Analysis provided by the Government and the SSS developed by the contractor?
- (3) Has the system product baseline been established and documented to enable hardware fabrication and software coding to proceed with proper CM?
- (4) Are adequate processes and metrics in place for the program to succeed?
- (5) SSDD submitted as final IAW the DD FORM 1423-1, FEB 2001.
- (6) SDD submitted as final IAW the DD FORM 1423-1, FEB 2001.
- (7) IDD submitted as draft IAW the DD FORM 1423-1, FEB 2001.
- (8) Are the risks known and manageable?
- (9) Is the program schedule executable (technical/cost risks)?
- (10) Is the program properly staffed?
- (11) Is the program executable within the approved product baseline?
- (12) Has the baseline branch merges and pulls been coordinated with other work on the AVCATT program?
- (13) Are Critical Safety Items identified?
- (14) Are IA considerations are addressed?
- (15) Is the software functionality in the approved product baseline consistent with the updated software metrics and resource-loaded schedule?

1.7 Hardware Software Integration (HSI)

To enter the formal HSI phase the software modules must meet the Ready for Integration criteria established by the Software Review Board (SRB). The criteria summarized below serves as the entrance criteria for the HSI phase.

1.8 HSI Entrance Criteria:

- a. Approval of STD by Integration Lead.
- b. Software under test is incorporated into CM Test Load.
- c. Exceptions documented in SDF and approved by sub-IPT lead and Integration lead.
- d. Identified discrepancies resolved, or closure plan approved by Integration Lead.
- e. SDD and IDD, to agree with any code changes, have been formally submitted to the Government as final IAW the DD FORM 1423-1, FEB 2001.

The HSI phase initiates the public evaluation of the developing software. HSI will occur at the System Engineering Environment in Orlando, FL. The primary activity of HSI is a formal contractor Quality Assurance (QA) run of the STD, supported by contractor Subject Matter Experts (SMEs), resulting in HSI Discrepancy Reports (HSI DR), as appropriate. Contractor QA STD runs provide final verification of correct operation of system components.

Formal QA STD tests are conducted by the contractor Test Director or his representative, usually one of the integration leads. These formal QA STD tests are witnessed by contractor QA and a Government witness, when desired. The contractor will provide lower level QA STD test schedules at least one week prior to test. The contractor will have the flexibility to modify the specific STD execution schedule, within the week time period identified, to account for hardware and personnel availability. The testing can be witnessed by any combination of PEO STRI Engineers, DCMA Representatives, or PEO STRI designated SME's. All Government SME comments made during the HSI phase will be captured as HSI DRs. DR priority assignment is made by the contractor Project Engineer, Test Director, and Integration Lead. DRs are tracked using the established CM tool. Status reports are made available to the Government. The contractor will have the authority to close all HSI DRs. In the event that a Government SME-generated discrepancy is closed, the contractor will notify the Government regarding the closure status and discrepancy resolution.

The HSI is concluded when the following exit criteria are satisfied.

1.9 HSI Exit Criteria:

- a. All STD sections have been run.
- b. STD sections updated and delivered as FINAL after all test execution is complete, in accordance with the DD FORM 1423-1, FEB 2001.
- c. All formal DRs documented and corrective action plan(s) developed.
- d. HSI DR Status Report from the CM tool available for TRR.

1.10 System Test Phase:

The contractor shall for first article testing purchase the hardware for the One SEE Manned Module and develop First Article Test Procedures. The PDSS contractor will install the developed software baseline load to support the new hardware. This hardware and software will be tested on the designated modules by PEO STRI according to the agreed test procedures. The Contractor shall supply engineering support for the test and participate in review meetings. The contractor shall then modify, if necessary, their design until First Article passes testing. The accepted test load will be provided to the PDSS contractor who will create a test load. The contractor shall provide one suite worth of hardware where the test load and hardware will be tested on a full AVCATT suite. The Contractor shall supply engineering support for the test and participate in review meetings. Upon acceptance of the software and hardware on the suite, this software baseline will become the release load and this will complete the non-recurring engineering (NRE) and test phase of the AVCATT HMD Replacement effort (CLIN 0001).

The contractor shall be responsible for creating the installation instructions and test acceptance procedures for the new HMD units. HMD Installation will be performed by the PDSS contractor. Acceptance testing will be performed by Government. The contractor shall be responsible for providing support for any installation issues encountered by the CLS crew and/or PDSS.

The System Test phase and its specific entrance and exit criteria are described below. The System Test phase is comprised of three sub-phases. The first sub-phase involves the Engineering Dry Run of the Test Procedures (TPs). The second sub-phase is the contractor QA run of the TPs. The third sub-phase is the Formal Government execution of Test Procedures.

1.11 System Test

This phase of System focuses on an Engineering dry run followed by a contractor QA run of the TPs. The intent of the Engineering dry run is to identify defects in the TPs and provide early identification of DRs. The intent of the contractor QA run of the TPs is to provide final verification of system operation prior to Government formal execution.

1.12 Formal System Test

A formal Government Acceptance Test will be conducted at the end of the Delivery Order on a full suite. This test focuses on the SSS requirements associated with the configurations and the Training Environment functionality implemented during that Delivery Order. The tests will be conducted by the Government, with support from contractor personnel, using the approved Test Procedures developed for the Delivery Order. A TRR will be held prior to the start of the Formal Government System Test Event to identify the status of the system under test, and to verify the entrance criteria has been met.

1.13 System Test Entrance Criteria:

- a. All HSI/STDs have been completed successfully.
- b. All TP sections have been run by contractor QA.
- c. The contractor shall have submitted their baseline back into the AVCATT PDSS and an official Test Load has been created to test against.
- d. All Internal DRs found during Engineering TP Dry Runs and contractor QA Runs are documented and reviewed with the Government as part of TRR.
- e. All Formal DRs documented, Corrective Action Plan(s) developed and reviewed with the Government as part of TRR.
- f. HSI Exit Criteria are satisfied.
- g. All formal priority one and two DRs closed or approved to proceed with corrective action plan.
- h. All formal priority three DRs closed or have approved workaround solutions.
- i. All formal priority four and five DRs documented and reviewed as part of the TRR.

The PEO STRI Test Director or appointed representative and Government SMEs, supported by the contractor Test Director or his representative and contractor SMEs as required, execute the TPs. During the conduct of the TPs, TP Discrepancy Reports (TP DR) are generated, as appropriate. DRs are assigned priorities by the Discrepancy Review Board (DRB) comprised of contractor and Government personnel using the established AVCATT DRB process. DRs are tracked using the established DR tracking tool. Status reports are posted weekly and made available to the Government.

The System Test is complete when the following exit criteria have been satisfied.

1.14 System Test Exit Criteria:

- a. All TP sections have been run successfully signifying the system meets the Delivery Order requirements.
- b. All DRs (HSI and TP) documented and Corrective Action Plan(s) developed.
- c. All priority one and two DRs closed or approved to proceed with corrective action plan.
- d. All priority three DRs closed or have approved workaround solution.
- e. All priority four and five DRs documented.
- f. Test Procedures submitted as FINAL in accordance with the **DD FORM 1423-1, FEB 2001**.

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