

STATEMENT OF WORK

FOR

AVIATION COMBINED ARMS TACTICAL TRAINER (AVCATT) UH-72A LAKOTA UPGRADE

**Prepared by
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**Statement of Works
For
AVCATT UH-72A Lakota Upgrade**

1.0 SCOPE.

This Statement of Work (SOW) defines the effort for designing, developing, integrating, and fielding an Aviation Combined Arms Tactical Trainer (AVCATT) UH-72A Lakota Upgrade.

1.1 Background.

The U.S. Army Program Executive Office for Simulation, Training and Instrumentation (PEO STRI) has a requirement to keep their simulators current with fielded aircraft systems. The Training and Doctrine Command (TRADOC) Capability Manager-Virtual (TCM-V) has required that the AVCATT includes the UH-72A Lakota aircraft configuration in order to comply with this requirement.

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 5000.2 Operation of the Defense Acquisition System
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
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

- Fidelity Analysis Sample: AVCATT Blackhawk UH-60M
- AVCATT UH-72A Security and Support (S&S) Battalion Training Task List
- Aircrew Training Manual for Light Utility Helicopter UH-72A Series
- U H-72A instrument and flight controls representation
- System/Subsystem Design Document (SSDD) - System Level for the AVCATT- Aviation Reconfigurable Manned Simulator
- System/Subsystem Design Document (SSDD) - Manned Module for the AVCATT- Aviation Reconfigurable Manned Simulator
- System/Subsystem Design Document (SSDD) - Training Environment for the AVCATT- Aviation Reconfigurable Manned Simulator
- System/Subsystem Specification (SSS)- System Level for the AVCATT
- System/Subsystem Specification (SSS)- Manned Module for the AVCATT
- System/Subsystem Specification (SSS)- Training Environment for the AVCATT
- Federated Input/Output (FIO) User Guide for the AVCATT
- AVCATT FIO Drawing

- AVCATT Overview

Copies available by CD upon request.

3.0 REQUIREMENTS.

The Contractor shall design, build, integrate and deliver an UH72A upgrade that meets the requirements as defined in this SOW, the Technical specifications, the AVCATT System / Subsystem Specification (SSS) and the System/Subsystem Design Document (SSDD). The Contractor shall provide all efforts, resources, facilities, equipment, and personnel necessary to complete the tasks in this SOW. 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. As needed the Contractor shall re-host or replace proprietary software, with the exception of commercial-off-the-shelf software, in order to execute this concurrency development and design. The Contractor shall verify the complete integration of the hardware and software subsystem and the overall system through the utilization of formalized test procedures.

3.1 System Design.

The Contractor shall use the specifications and requirements derived from the Training Task list provided as the basis of development to perform the necessary engineering activities to finalize the AVCATT system design that includes the upgrades to the UH-72A platform. 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. The design shall abstain from using the rear projectors currently used for displaying analog instrumentation inside the manned module. The Contractor shall also ensure the UH-72A Lakota kits are transferable and configurable among all AVCATT fielded suites and within the suite.

(DI-ADMN-80925) Revisions to Existing Government Documents (SSDD)

3.1.1 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.

3.1.2 Hardware Design.

The system hardware shall satisfy the requirements of the UH-72A platform, Technical Specifications and Fidelity Analysis requirements derived from the Training Task List provided. 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.

3.1.2.1 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.

3.1.2.2 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.

3.1.2.3 Fabrication, Assembly, Integration and Test.

The Contractor shall integrate and assemble the system hardware that satisfies the requirements of the UH-72A platform, Technical Specifications and Fidelity Analysis requirements derived from the Training Task List provided. 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 specifications.

3.1.3 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 SSS, SSDD and all Technical/Operator's manuals cited in this SOW. 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 IA or IA-enabled 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 DISA database Security Technical Implementation Guide (STIG).

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

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

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

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

3.1.3.1 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, 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 (SRS – Including Visual SRS)

3.1.3.2 Software or Product License.

Software, technical data, and products 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, introduction of new proprietary solutions is not acceptable.

3.1.3.3 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.

3.1.3.4 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 platform that is available for reuse on another AVCATT platform. The ability to use that software/hardware and/or data shall not impact the ongoing efforts of the AVCATT program. The AVCATT program and this UH-72A

upgrade shall be able to independently integrate, test, and field the products without dependence on any other effort. Any software/hardware and data reuse shall meet the data rights requirements of Section 3.1.3.2. You shall also consider common functionality and architecture across aircraft platforms to identify opportunities and potential cost savings.

3.1.3.5 SE Core Common Virtual Product Use and Development

The Contractor shall use, develop and integrate all SE Core virtual products in accordance with the SE Core standards and processes. The use and development SE Core products, standards, and processes applies to all terrain databases, moving models, AVCATT Virtual OneSAF, Gateway, and V-DIS. The Contractor shall use and integrate common terrain and moving models provided by the SE Core program. The Contractor shall define and describe the requirements and parameters of those products necessary to meet the requirements of this effort.

3.1.4 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 UH-72A Technical Specification, and Fidelity Analysis derived from the Training Talk list provided. 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 Descriptions 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.

3.1.5 Production Planning.

The Contractor shall perform production planning to ensure a smooth, timely, and cost effective production for the UH-72A upgrade. 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.

3.1.6 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 (SSS)

(DI-ADMN-80925) Revisions to Existing Government Documents (PDD)

(DI-SESS-81003C) Revisions to Existing Government Documents (Commercial Drawings and Associated List)

(DI-SESS-81000C) Revisions Required to Existing Government Documents (Product Drawings and Associated List)

3.2 Integrated Product and Process Management.

The Contractor shall establish and maintain a management technique that simultaneously integrates 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. Your Integrated Product and Process Development (IPPD) process shall interact with PEO STRI in its role as a customer and as the Integrated Product and Process Manager (IPPM). The IPPM role involves establishing performance requirements, monitoring and managing total program progress, risk management and evaluating product quality.

3.2.1 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.

3.2.2 Software Engineering.

The Contractor shall develop the system software and firmware using your organizational software development practices that are compliant with at least CMMI Level 3 (or an approved equivalent) of the Software Engineering Institute's Capability Maturity Model for Software (CMM). The Contractor shall provide evidence that the software development practices are compliant with CMM Level 3 or higher. 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 maintain a software Controlled Development Environment that

complies with the NIST SP 800-53 Revision 3. The Contractor shall employ well-defined security policy models, structured, disciplined, and rigorous hardware and software development techniques, and sound system/security engineering principles.

3.2.2.1 Baseline Management

The Government will provide a copy of the latest AVCATT software baseline at the time of award. The Contractor shall have a management process in place to coordinate all hardware and software baseline activities with the AVCATT PDSS contractor through the Governmental led Integrated Product Teams. It should account for multiple on-going developmental efforts being performed by other contractors. 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 process continues until a final AVCATT Software Baseline is developed, tested, and accepted by the Government in a fielded software release. This effort shall not be based on a frozen hardware and software baseline at the time of contract award. The hardware and software baseline shall iterate and update to account for other AVCATT program efforts. The Contractor shall collaborate with the Government IPT and the AVCATT PDSS contractor in order to plan a fielding baseline version that is synchronized with other AVCATT baseline affected efforts.

3.2.2.2 Software Defect Management.

The Contractor shall follow an established closed-loop defect management process. The Contractor shall document each problem detected in software products. The Contractor shall implement a corrective action system for handling each problem detected. 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 DRs against the appropriate contract and or task order.

3.2.2.3 Supportability Engineering.

The Contractor shall conduct engineering analyses to establish quantitative and qualitative supportability design guidelines. The Contractor shall conduct trade studies, 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.

3.2.2.3.1 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. The reliability process shall support economical achievement of overall program objectives and ensure sustained product integrity, personal safety, and logistics support information is derived from early reliability engineering analysis such that reliability engineering can be applied to influence the design effort. The process shall:

- Improve operational readiness and mission success of the system. Reduce system demand for maintenance manpower and logistic support.
- Provide essential management information.
- Hold down the reliability programs own impact on overall program cost and schedule.

Specific reliability design and verification criteria shall be established. Quantitative reliability requirements for the system, all major subsystems, and equipment shall be included in section 3 and section 4 of the system and item specifications. All reliability data and information used for logistics support analysis and engineering activities shall be based upon, and traceable to, the outputs of the reliability process. Reliability status shall be included as part of each program review. The Contractor shall conduct trade off studies to ensure quantitative issues such as stress levels, selection of parts, parts simplicity, and redundancy are properly considered in the design trade off. The Contractor shall verify that reliability requirements are attained through analyses and test.

3.2.2.3.2 Maintainability Engineering.

The Contractor shall develop, implement and maintain a system maintainability process satisfying all maintainability and related objectives and be completely integrated within the systems engineering process. The maintainability process shall form the basis of concurrent and subsequent life cycle planning. The maintainability effort shall measure complexity, accessibility, and testability to enhance servicing, preventive maintenance, corrective maintenance, and diagnostic capabilities. Specific design and verification criteria shall be established through performance specifications, of qualitative and quantitative factors to be expressed as measures of maintainability achievement, for system, segment, subsystem, and equipment levels.

3.2.2.3.3 Testability Engineering.

The Contractor shall develop, implement, and maintain a system testability process satisfying all testability requirements which is traceable throughout the design process, is integrated with other system engineering requirements, and is disseminated to design personnel and subcontractors. The Contractor shall establish controls for ensuring that each subcontractor's testability practices are consistent with overall system requirements. The Contractor shall define the means for demonstrating and validating that the diagnostic capability meets specified requirements, using maintainability demonstrations, test program verification, and other demonstration methods.

The Contractor shall ensure that as test and evaluation of the system progresses, problems presented by new failure modes, test voids, ambiguities, and test tolerance difficulties are recognized and defined, and solutions are traceable to diagnostic hardware and software, and technical publication procedures are updated. The Contractor shall define an approach for the analysis of acceptance test and evaluation results to determine how built in test hardware and software, automatic test equipment hardware and software, and maintenance documentation performed as a means for satisfying production testing, and meeting testability requirements.

The Contractor shall establish a testability program that accomplishes the following:

- Establishment of sufficient, achievable and affordable diagnostic concept and state-of-the-art testability built-in and off-line test performance requirements.
- Integration of testability into equipment and systems during the design process in coordination with the maintainability design process.
- Evaluation of the extent to which the design meets testability requirements.
- Inclusion of testability in the program review process.

3.2.2.3.4 Human Factors Engineering

The Contractor shall plan and implement a human factors engineering program to insure the satisfaction of system objectives and personnel safety of the operator and maintainer. Identify and eliminate program risk associated with critical human factors that have a significant impact on readiness, life cycle cost, schedule, performance, or safety. Ensure manpower, personnel, training, and logistics support information is derived from early human engineering analyses such that human factors engineering can be applied to influence the design effort. Verify through test and evaluation that trained personnel can safely and effectively operate, maintain, and control the system in its intended operational environment.

3.2.2.3.5 Contamination and Corrosion Control

The Contractor shall incorporate the latest state-of-the-art corrosion control technology as determined by logistic support analysis into the system design process, into the manufacturing process, in all levels of maintenance, in supply, and in the storage processes. The objective is to minimize corrosion by using design and manufacturing practices that address selection of materials; coatings and surface treatments; production processes; process specifications; system geometry; material limitations; environmental extremes; storage and ready conditions; preservation and packaging requirements; and repairs, overhaul, and spare parts requirements. Design concepts shall reflect realistic environments and resource availability as determined by logistic support analysis.

3.2.2.3.6 Standardization

The Contractor shall influence the system design to achieve maximum subsystem, component and repair parts commonality. You shall minimize equipment and parts proliferation through a standardization effort. The standardization effort shall include coordination with PEO STRI

LCCS contractors to maximize use of parts already in the inventory or to determine that the existing logistics support resources will benefit from the items chosen for the system.

3.2.2.3.7 Logistics Support Analysis.

The Contractor shall identify support resources and infrastructure necessary for test and evaluation activities. The Contractor shall analyze existing LCCS support 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 product and sustain the product availability requirement. The Contractor shall only use the form, fit, function, and interface requirements in the performance specifications for provisioning, training, and maintenance planning.

3.2.2.3.8 Supportability Analysis and Logistics Management Information.

The Contractor shall conduct repair level analyses, develop diagnostic, preventative maintenance and repair procedures, conduct facilities analyses, refine hardware and software maintenance and support concepts, and identify support resource requirements including required spares and support equipment. The Contractor shall develop a listing of which items should be repaired and which should be discarded and the level of maintenance at which the repair should be performed with the associated cost. The Contractor shall document the following in the integrated database:

- a. All input data and their corresponding value and source of the data.
- b. Operational scenario modeled, assumptions made, constraints assumed, and non-economic factors imposed.
- c. Maintenance alternatives considered.
- d. Analytical method and models used to perform the economic evaluations.
- e. Discussion of the sensitivity evaluation performed and results obtained.

**(DI-SESS-81758) Logistics Product Data with Tailored
GEIA-STD-0007-A Logistics Product Data Annex to Exhibit A
(DI-SESS-81759) Logistics Product Data Summaries**

3.2.3 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.

(DI-ADMN-80925) Revisions to Existing Government Documents (MM Op. Guide)

(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 (SMM)

(DI-ADMN-80925) Revisions to Existing Government Documents (Role Player Manual)

(DI-TMSS-80527B) Commercial Off-the-Shelf (COTS) Manuals and Associated Supplemental Data

3.2.3.1 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.

3.2.3.2 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.

(DI-CMAN-80792A) Validation Report

3.2.3.3 Verification.

The Contractor shall assist PEO STRI IPT members to verify that the technical publications are accurate. The IPT may choose to perform verification concurrently with the validation effort. Correction of discrepancies and changes resulting from training, testing, and reviews shall be incorporated into the technical publications. You shall provide system equipment, technical and engineering support and facilities as required to aid in the performance of verification effort. The Contractor shall incorporate all comments from compliance-reviews, technical accuracy reviews and verification reviews into final submission of technical publications. Verification shall be rescheduled if there are more than 15 percent corrections.

3.2.3.4 Item Unique Identification (IUID).

The Contractor shall coordinate among the IPT members to determine items associated with the upgrade requiring IUID including embedded subassemblies, components and parts, and identify the IUID to be used for each item. The Contractor shall provide IUID, or a DoD recognized IUID equivalent, for all identified items delivered. The IUID marking design for each item shall be both machine readable and human readable in accordance with MIL-STD-130N, paragraph 5.2.

(DI-MGMT-81858) Item Unique Identification (IUID) Marking and Verification Report

3.2.4 Quality Engineering.

The Contractor shall establish measurement points that will provide maximum visibility into new 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 utilize the established 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 timeliness of analysis and corrective action for discrepancies and risk reduction items.

3.2.4.1 Test Discrepancies.

The Contractor shall establish a Test Discrepancy corrective action process to ensure timeliness of analysis and corrective action of each test discrepancy. 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.

3.2.4.2 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.

3.2.5 Information Assurance (IA).

The Contractor shall ensure that the UH-72A upgrades occurring under this effort are in accordance with the existing program IA objectives, processes and requirements and also in accordance with the DoD Information Assurance Certification and Accreditation Process (DIACAP). The Contractor shall assist and provide information for the development and update of documentation required by DIACAP to certify and accredit the trainer. The Contractor shall address and implement the IA security requirements for a system that has a Mission Assurance Category (MAC) III. The Contractor shall follow standard DIACAP processes and procedures for the DIACAP for UNCLASSIFIED and SECRET accreditation MAC III to account for all security system changes. The Contractor shall ensure the design incorporates IA, taking into account physical storage, networking and operating system security. The Contractor shall maintain consistency with accepted networking policies and procedures. The Contractor shall support the Government in the Certification and Accreditation (C&A) effort. C&A efforts shall be planned and conducted concurrent with other planned program C&A efforts or concurrent with C&A required for other software releases.

3.2.6 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 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.

3.2.7 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.

3.2.8 Program Management.

The Contractor shall provide the overall management and administrative effort necessary to ensure that the requirements of this SOW are accomplished. The program management associated with this effort shall 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.

3.2.8.1 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-81650) Integrated Master Schedule (IMS)

3.2.8.2 Financial Management.

The Contractor shall plan, budget, schedule, and control the resources allocated to meet the requirements of the contract. The Contractor shall document and track 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-80227) Contractor's Progress Status and Management Report

3.2.8.3 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.

3.2.8.4 Configuration Verification and Audit.

The Contractor shall verify and audit the system configuration information to ensure that requirement attributes are met and accurately documented (equivalent to the old Physical Configuration Audit (PCA)). The Contractor shall:

- a. Verify system attributes through a systematic comparison with the associated results of system tests, analyses, inspections, demonstrations or simulation models.
- b. Maintain surveillance over the configuration management process to ensure it is being followed and remains in compliance with requirements.

(DI-SESS-81646) Configuration Audit Plan

3.2.9 Integrated Digital Environment (IDE).

The Contractor shall provide an Internet based 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.

3.2.10 Associate Contractor Agreement (ACA).

The contractor may enter into an ACA with the specific UH-72A platform Prime contractors in order to obtain the necessary documentation and software to complete the necessary tasks defined in this SOW. The ACA should define the roles and responsibilities necessary by both parties in order for the AVCATT prime contractor to receive the information necessary to complete the tasks defined in this SOW.

3.2.11 UH72A Data and Software

The Contractor is responsible for acquiring all UH72A platform specific technical data, software, documentation, and aircraft performance data necessary for execution of this effort. The Contractor is responsible for acquiring all data necessary to develop and accredit a complete aero/engine flight model.

3.3 Integrated Testing.

The Contractor shall follow the established AVCATT/contractor Test and Evaluation (T&E) processes to include the execution of Software Test Descriptions and Test Procedures. The Contractor shall develop step-by-step testing operations to be performed on items undergoing 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 entrance and exit criteria for testing under this are defined in Appendix A. Exit criteria for one phase of testing must be accomplished before entrance into the next phase of testing. In addition to satisfying all other requirements in this SOW the DD250 shall be signed when the software developed under this effort is integrated into a fielded software release.

(DI-ADMN-80925) Revisions to Existing Government Documents (Test Procedure (TPs)

(DI-ADMN-80925) Revisions to Existing Government Documents (Software Test Descriptions (STDs)

3.3.1 Test Readiness Review (TRR).

The Contractor shall conduct a TRR that follows the established AVCATT 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.

3.3.2 Retrofit.

The Contractor shall retrofit and install the UH-72A upgrades in accordance with the requirements specified under the SOW. 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 ECPs when possible in order to minimize system downtime and cost.

3.3.3 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.

3.4 Training Products.

The Contractor shall develop and provide system operation and maintenance familiarization training through a combination of classroom, written instructions, and 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 T&E. The Contractor shall conduct training for key test personnel prior to starting Tests and Evaluations.

3.4.1 Instructor and Operator Training

The Contractor shall plan, develop, conduct, and document the completion of the initial instructor and operator course for the AVCATT Battle Master (BMC) and 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.

3.4.2 Maintenance Training.

The Contractor shall plan, develop, conduct, and document the completion of the initial maintainer course for the AVCATT suite maintenance personnel prior to government acceptance testing. The course shall provide comprehensive training for maintainers in the concepts, skills, and aptitude to efficiently operate the system. This course shall consist of instruction in troubleshooting and maintenance, diagnostics to fault isolation, calibration, adjustments, remove and replace procedures, use of built in test, and repair that is beyond operator level maintenance. After completion of the course, all personnel shall be capable of operating, maintaining, and troubleshooting the trainer to the LRU.

3.4.3 New Equipment Training

After verification and acceptance of the trainer the Contractor shall provide NET training to the receiving organizations. This training shall be a self-contained course and provide detailed operational and maintenance knowledge of the Trainer. A Training Support Package shall be provided to assist in Train the Trainer activities. The Contractor shall develop and provide trainer operation and maintenance familiarization training through a combination of classroom, written instructions, and 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 trainer level T&E. The Contractor shall conduct training for key test personnel prior to starting Tests and Evaluations. The Contractor shall develop a complete and exportable training support package that integrates training products, materials, and other pertinent information necessary to train the trainer. The Contractor shall design and develop this training support package using instructional trainers design processes. For commercial and NDI courses, existing materials shall be utilized. The Contractor shall conduct training on an incremental basis and scheduled in accordance with the incremental delivery of each system capability.

(DI-ILSS-80872) Training Materials
(DI-ALSS-81523B) Training Conduct Support Document

3.4.4 Language.

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

3.4.5 Class Size.

For each student to receive the greatest benefit from the training, maximum class size shall be 12 trainees.

3.4.6 Location of Training.

The Contractor shall conduct the training courses on location at the Government site where the AVCATT is installed or at another mutually agreed to location.

3.4.7 Training Facility and Equipment.

The Contractor shall provide all required training aid material and equipment for courses conducted at the Government's facility. Training shall be conducted within 14 calendar days following Government acceptance. Training shall include classroom (indoor/outdoor) and practical exercise and shall total no more than eight hours per day.

3.4.8 Recommended Timing of Training Delivery.

The Contractor shall conduct training on an incremental basis and scheduled in accordance with the incremental delivery of each trainer capability.

3.4.9 Course Completion Criteria.

The Contractor shall develop criterion and performance feedback evaluation reports. The Contractor shall provide these reports and student capability assessments to those individuals who complete the subject course.

3.4.10 Certificate of Completion.

Upon successful completion of the training, the Contractor shall provide each participant with a personalized certificate recognizing their achievement and satisfactory completion of the program. The Contractor shall maintain a record of students attending the class, their test results, and the completed student course evaluation.

(DI-SESS-81524B) Training Evaluation Document

3.5 Installation Program.

The Contractor shall perform all installation preparatory work prior to the arrival of the UH-72A upgrade 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.

3.5.1 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.

3.5.2 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.

Appendix A

Entrance/Exit Criteria

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.

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?

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.

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?

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?

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) Is the software functionality in the approved product baseline consistent with the updated software metrics and resource-loaded schedule?

7. Hardware Software Integration (HSI) (if applicable)

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.

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 a CM tool established during this effort. 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.

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.

8. System Test Phase:

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.

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.

Formal System Test

A formal Government Acceptance Test will be conducted at the end of the effort. This test focuses on the SSS requirements associated with the configurations and the Training Environment functionality implemented during that effort. The tests will be conducted by the Government, with support from contractor personnel, using the approved Test Procedures developed for the effort. 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.

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 a CM tool established during the effort. Status reports are posted weekly and made available to the Government.

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

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.